

Yorkie Contraband Cellular Detector

User Manual Version 1.2



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Introduction

Yorkie scans all active, nearby cellular (voice, text and data) devices and displays signal strength of the strongest one. Typical detection range is about 150 feet from the unit using the supplied omni-directional antenna. Because all cellular phones emit a beacon while powered on in standby mode (autonomous registration), Yorkie will detect those devices even if they are not actively being used. Autonomous registration detection varies among different base stations with phones typically registering between once every few minutes to up to 20 minutes. This time varies greatly based upon carriers, distance from base stations and individual handset manufacturers' standards.



Unboxing

Yorkie ships with a charging dock, AC adapter, omni-directional SMA antenna and the Yorkie receiver all in a hard carrying case.

Powering Up/Down Your Unit

Yorkie only has one physical button on the front of unit. Press this white button to power up and hold it down for 3 seconds to power down.

Charging Your Unit

Yorkie ships with an AC powered charging dock. Place unit in charging dock and be sure the red LED on top of unit is ON. If red LED is not ON, Yorkie is not being charged. Try adjusting Yorkie in dock until red LED is ON. Charging takes approximately 4-5 hours. Yorkie runs approximately 4 hours from a full charge. Yorkie may be operated while it is charging but this will heat up the unit and increase charging time substantially so it is not recommended for regular use. If you prefer to operate Yorkie while it is also being charged, be sure to turn on the dual cooling fans using the power switch on the rear of charging dock. Yorkie has smart trickle charging circuitry that is always calibrating the battery but if your battery runtime is noticeably short after a full charge, you may need to manually calibrate the battery. Go to BATTERY under MAIN MENU for more details and consult BVS support.

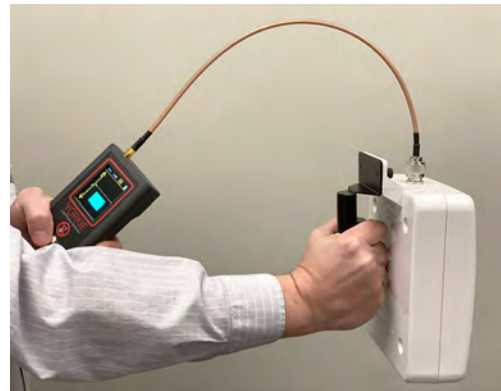


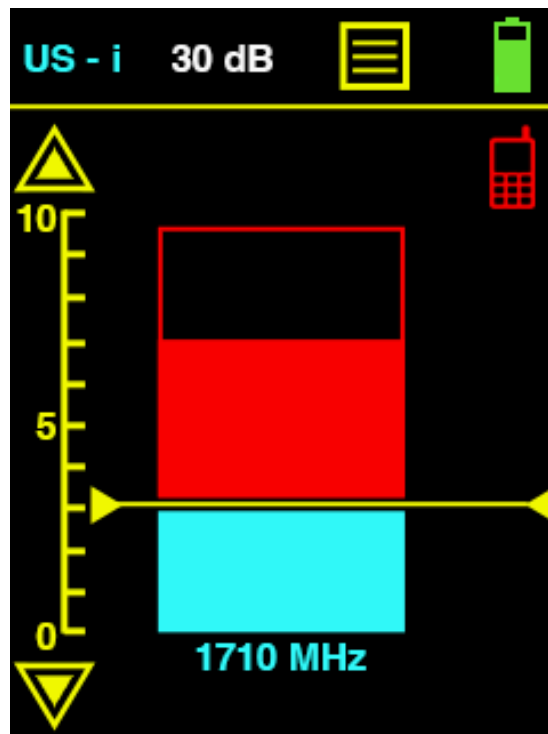
Operation

Yorkie chooses the strongest cell phone signal nearby and “locks” onto that phone as it continues to scan the remaining RF bands. As the signal strength increases (or you approach the signal source), Yorkie will vibrate more frequently. If you are using Yorkie in a “noisy” RF environment, try raising the threshold level to decrease the amount of detection triggers and vibrations. If you are not detecting anything, try lowering the ATTENUATION in the OPTIONS menu. You should see a blue bar on the left rise as you lower the attenuation further. Always start measurements with attenuation set at 0 dBm. For more information on typical detection ranges and environments, see included Yorkie data sheet or consult your BVS sales engineer.

Optional Accessories

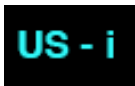
Yorkie supports optional direction finding (DF) antennas that easily screws into the standard SMA connector on top of the unit. Both DF antennas allow for increased detection range up to ½ mile away outdoors. The smaller dark model is a standard DF antenna while the larger, white model is a wideband antenna ideal for detecting a larger range of devices. While holding Yorkie in one hand, sweep the directional antenna back and forth slowly in order to increase Yorkie's range and pinpoint the direction and to locate the source of a cellular signal.





Main Measurement Screen

Yorkie scans all active nearby cellular devices but only displays the strongest signal. As the user moves closer or further from various active devices, the frequency will change to indicate the strongest (sometimes the closest one but not always) device detected.



Displays current country code of cellular bands being scanned. Navigate through main menu to select your country.



Current attenuation displayed on scale from 0 to 30 dB.



Main menu allows users to select country, check battery health, get more information about their Yorkie or navigate to further options including alert, attenuation and watermark settings.



Displays current charge to internal battery system. Internal battery lasts 2-5 hours depending upon amount of nearby wireless activity



Adjust current threshold higher on a scale from 0-10. This typically results in less cellular devices detected and subsequent alerts.



Adjust current threshold lower on a scale from 0-10. This typically results in more cellular devices detected and subsequent alerts.



Watermark shows highest signal strength since watermark was last reset. Watermark options can be changed by navigating to the main menu



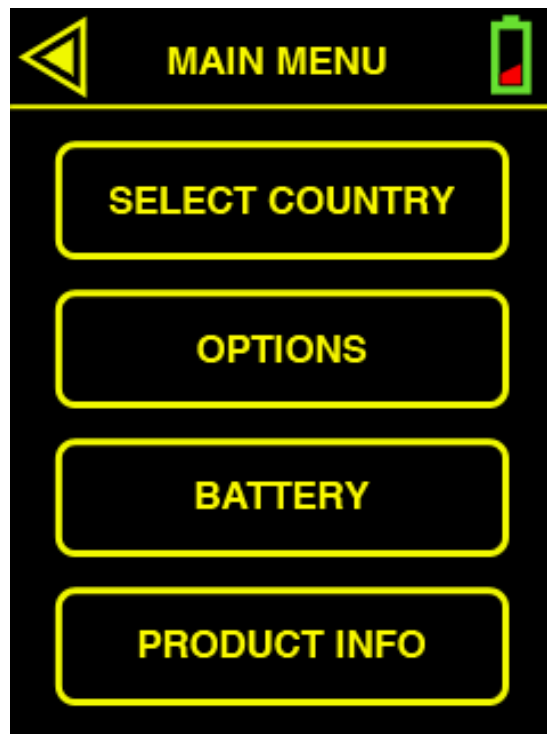
Threshold bar adjusts on a scale from 0-10 using the up and down arrows. The higher the bar is set, the less alerts will trigger. The lower the bar is set, the more alerts will trigger.



Indicates a cellular device is currently being detected and breaking the current threshold setting.

1710 MHz

Frequency of the current cellular device being detected



Main Menu Options

Yorkie Main Menu screen can be reached from nearly any other screen by touching the rectangular icon with three lines. This screen provides many adjustments as well as the unit's information and battery health.



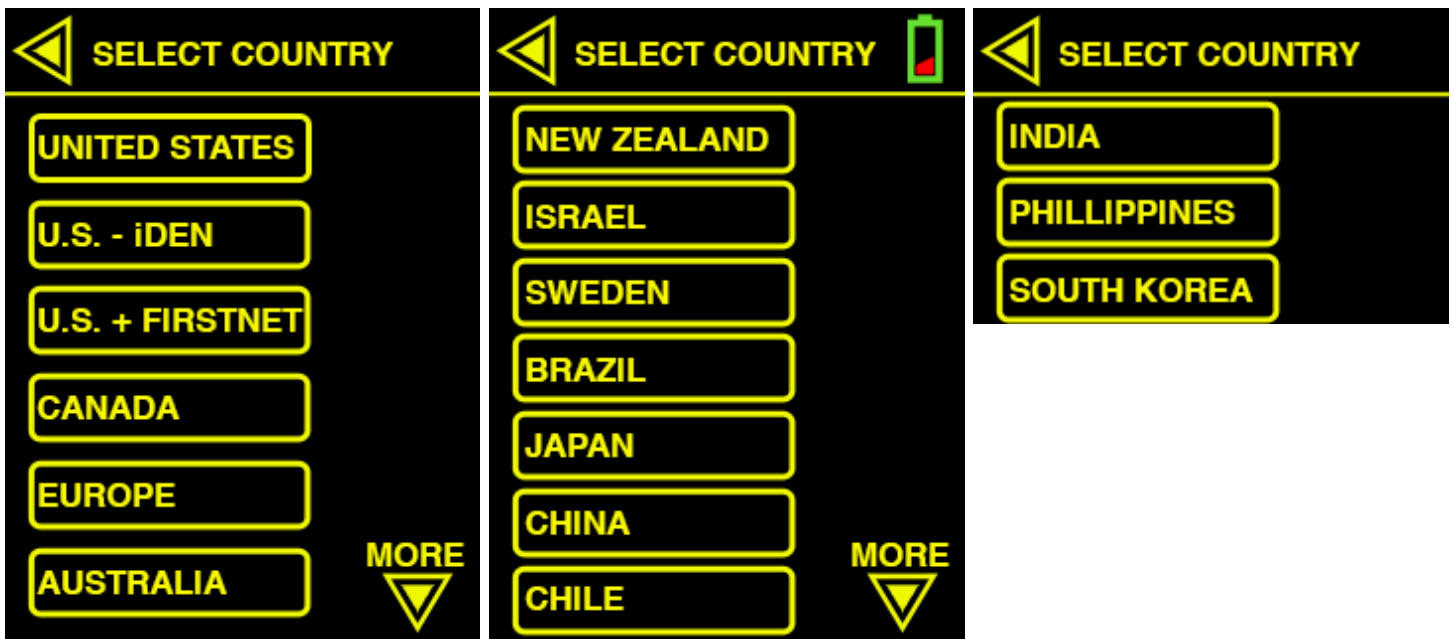
Use back button at anytime to navigate back to previous menu.

SELECT COUNTRY allows users to set the region in which they operate Yorkie

OPTIONS allows users access to a variety of settings in the unit

BATTERY allows users to see current battery capacity and health

PRODUCT INFO displays the unit's firmware so that users can stay up to date



Select Country

Touch the select country button to choose your country of operation. Before making any measurements with the Yorkie, be sure to verify the country setting. The main measurement screen displays the current country setting at the top left of the screen. If you do not see the country code of the country you are currently operating your Yorkie, you should select your country so that Yorkie is scanning for the correct frequencies. Check with your region's carriers to determine all of the frequency bands being broadcast in your region.

Yorkie country selection supports the following regions:

UNITED STATES

US – iDEN (includes all US bands except for iDEN public safety band)

US + FIRSTNET (includes all US bands including FIRSTNET public safety band)

EUROPE

CANADA

AUSTRALIA

NEW ZEALAND

ISRAEL

SWEDEN

BRAZIL

JAPAN

CHINA

CHILE

INDIA

PHILIPPINES

SOUTH KOREA

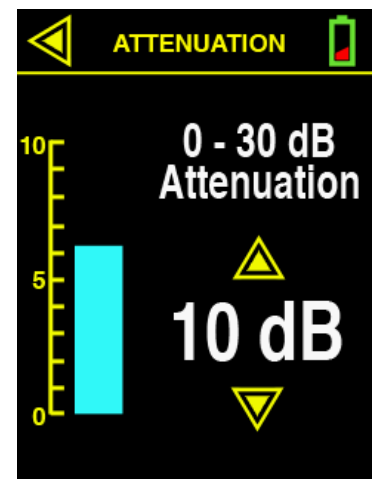


Options Menu

Yorkie Options menu allow users to customize the way they measure cellular signal strength to best match their environment and workflow.

ATTENUATION navigates to a screen allowing users to adjust attenuation on a scale from 0 to 30 dB. This screen also includes a signal strength bar on the left side offering real time signal strength so you can adjust accordingly. As you lower attenuation (down arrow) to increase Yorkie's range, you can see the signal strength bar on the left side move up. Conversely, if your Yorkie is triggering alerts too much due to a noisy RF floor, raise attenuation (up arrow) and you will see the signal strength bar on the left lower. Current attenuation setting is always displayed at the top of the main measurement screen.

STEALTH MODE toggles this mode on or off immediately. Many users who wish to measure cellular activity without bringing attention to themselves use STEALTH MODE. The screen displays nothing except for a simple animation at the top of the screen so that the user knows the unit is currently scanning without seeing any measurements.

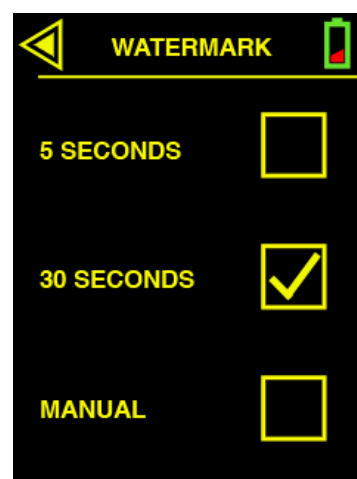


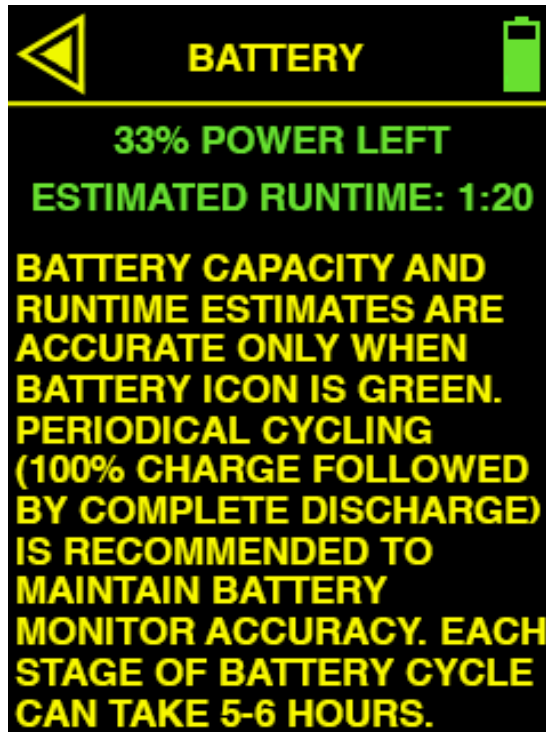
AUDIBLE ALERT toggles between an audio alert or no audio alert every time a cellular device breaks the signal strength threshold. This setting comes in handy when security personnel want to receive alerts within earshot of the Yorkie.

VIBRATING ALERT toggles between a vibrating alert or no vibrating alert every time a cellular device breaks the signal strength threshold. This setting comes in handy when security personnel want to covertly use Yorkie in their pockets.

WATERMARK navigates to a menu allowing users to customize their measurement time before the watermark automatically resets. Users can choose Yorkie to automatically reset the high watermark every 5 seconds, every 30 seconds or manually (never). In manual mode, users can easily reset the current watermark anytime by simply touching the watermark on the main measurement screen.

Watermark is especially useful in instances when the Yorkie operator cannot watch over the measurements for long periods of time but needs to verify that contraband devices are being used nearby. A typical setup involves Yorkie scanning unsupervised but powered in its charging cradle for a few hours or even overnight. If the watermark was set to manual mode, the user would see an indication of cellular activity while they were gone even if it was simply a cell phone in standby mode pinging a cellular base station for a second. In an environment where all cell phone activity is unauthorized or illegal, this would indicate that someone was in possession of a contraband phone.





Battery Screen

This screen indicates current battery capacity. If you are experiencing noticeably shorter run times for your Yorkie, navigate to this screen and follow the instructions. If battery issues persist, contact BVS support at 732-548-3737 or support@bvsystems.com.



Product Info Screen

This screen displays the current firmware and serial number of your Yorkie unit. Visit www.bvsystems.com to check for firmware updates and follow instructions from there. If you are contacting sales or support with any questions, navigate to this screen to verify your serial number.

SPECIFICATION

Part No.	:	TG.08.0113
Description	:	Monopole Passive Antenna Broadband frequency range for cellular and GNSS
Features	:	High efficiency at 698 to 960MHz, 1561MHz, 1575.42MHz, 1602MHz, 1710 to 2700MHz. 360°rotatable with durable brass hinge. Compatible with: <ul style="list-style-type: none">- 2G (GSM / DCS / PCS)- 3G (CDMA / WCDMA / UMTS / HSPA)- 4G (700LTE / 2700LTE)- GNSS (GPS / GLONASS / Galileo / BeiDou) Standard with SMA(M) connector Low profile with 72 ± 1.5mm Length RoHs Compliant



1. Introduction

The compact TG.08 with hinged rotatable SMA connector, is an impressively high efficiency monopole antenna, which provides wide coverage among cellular and GNSS frequencies.

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

This 72mm long monopole antenna works efficiently from 700MHz to 2700MHz, widely covering 4G/3G/2G bands, as well as GPS/GLONASS/Galileo /BeiDou. At its maximum efficiency when connected to ground plane, it can achieve 73% and 67% at GPS and LTE bands, respectively.

As all monopole antennas, TG.08 works best while connecting directly to the ground-plane of the device main-board, or with the device's metal enclosure.

The robust brass hinge enables TG.08 to be oriented in all directions, providing users to maximize performance with minimum effort.

TG.08, the small antenna with surprisingly large efficiency, is surely the best candidate in the market for Cellular/GNSS combination terminal antennas.

2. Specification

Parameter										
Straight Position										
Band		700LTE	GSM	BEIDOU	GPS/ GALILEO	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	-9.69	-8.70	-5.77	-5.44	-4.92	-3.84	-3.45	-3.62	-4.39
Efficiency (%)		10.75	13.50	26.48	28.56	32.24	41.40	45.18	43.46	36.73
Peak Gain (dBi)		-6.46	-4.93	-1.42	-1.07	-0.61	-0.02	0.66	0.33	0.36
Return Loss (dB)		< -2	< -3	< -6	< -6	< -10	< -10	< -10	< -8	< 4
Average Gain (dBi)	With 15x9cm Ground	-1.72	-4.35	-1.73	-1.67	-1.54	-1.38	-1.33	-1.70	-1.60
Efficiency (%)		67.86	37.27	67.08	68.13	70.22	72.83	73.67	67.77	69.40
Peak Gain (dBi)		1.24	-1.28	1.99	1.98	1.86	2.48	2.79	2.79	3.25
Return Loss (dB)		< -5		< -8						
Average Gain (dBi)	On 30x30cm Ground Metal Edge	-1.75	-2.55	-1.37	-1.34	-1.37	-1.31	-1.31	-1.70	-2.75
Efficiency (%)		66.98	56.27	73.02	73.38	72.97	74.02	74.05	67.83	53.12
Peak Gain (dBi)		1.53	0.13	3.95	3.86	3.82	2.82	3.22	3.20	2.22
Return Loss (dB)		< -5		< -9						
Average Gain (dBi)	On 30x30cm Ground Metal Center	-4.59	-3.46	-2.79	-2.82	-2.89	-2.71	-2.71	-2.94	-2.65
Efficiency (%)		35.71	45.52	52.63	52.25	51.38	53.68	53.56	50.89	54.39
Peak Gain (dBi)		-0.65	0.77	1.98	1.88	1.61	3.16	2.56	2.33	3.26
Return Loss (dB)		< -2		<-4						
Bent Position										
Average Gain (dBi)	In Free Space	-10.74	-10.14	-5.81	-5.48	-4.99	-4.03	-3.71	-4.00	-4.80
Efficiency (%)		8.44	9.70	26.27	28.29	31.68	39.58	42.60	39.93	33.53
Peak Gain (dBi)		-7.22	-5.54	-1.63	-1.29	-0.75	0.06	0.94	0.69	0.46
Return Loss (dB)		< -2	<-3	<-10	<-10	<-10	<-10	<-10	<-8	<-4
Average Gain (dBi)	With 15x9cm Ground	-1.72	-4.35	-1.73	-1.67	-1.54	-1.38	-1.33	-1.70	-1.60
Efficiency (%)		67.86	37.27	67.08	68.13	70.22	72.83	73.67	67.77	69.40
Peak Gain (dBi)		1.24	-1.28	1.99	1.98	1.86	2.48	2.79	2.79	3.25
Return Loss (dB)		< -5		<-8						

Average Gain (dBi)	On 30x30cm ground Metal Edge	-2.98	-2.87	-1.46	-1.43	-1.42	-1.26	-1.31	-1.81	-3.01
Efficiency (%)		50.73	52.04	71.38	71.90	72.16	74.96	74.01	66.35	50.02
Peak Gain (dBi)		0.74	0.65	3.47	3.51	3.56	3.03	3.56	3.62	2.69
Return Loss (dB)		< -5		<-8						
Average Gain (dBi)	On 30x30cm Ground Metal Center	-8.87	-6.76	-2.61	-2.63	-2.71	-2.80	-3.03	-3.47	-3.29
Efficiency (%)		13.53	21.31	54.89	54.63	53.54	52.53	49.87	45.22	46.93
Peak Gain (dBi)		-4.74	-1.92	1.96	1.89	2.00	3.01	2.26	1.79	2.58
Return Loss (dB)		<-2		<-3						
Radiation		Omni-directional								
Polarization		Linear								
Impedance		50 Ω								
Input Power		10W								
MECHANICAL										
Antenna length			72mm							
Antenna Diameter			10mm							
Casing			POM							
Connector			SMA(M)							
Weight			6g							
Recommended Torque for Mounting			0.9N·m							
Max. Torque for Mounting			1.176N·m							
ENVIRONMENTAL										
Operation Temperature			-40℃ ~ + 85℃							
Storage Temperature			-40℃ ~ + 85℃							
Humidity			Non-condensing 65℃ 95% RH							

2.1. LTE Bands – Straight in Free Space

LTE BANDS			
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 894	✗
7	UL: 2500 to 2570	DL: 2620 to 2690	✓
8	UL: 880 to 915	DL: 925 to 960	✗
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗
12	UL: 699 to 716	DL: 729 to 746	✗
13	UL: 777 to 787	DL: 746 to 756	✗
14	UL: 788 to 798	DL: 758 to 768	✗
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✗
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✗
19	UL: 830 to 845	DL: 875 to 890	✗
20	UL: 832 to 862	DL: 791 to 821	✗
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✗
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✗
25	UL: 1850 to 1915	DL: 1930 to 1995	✓
26	UL: 814 to 849	DL: 859 to 894	✗
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✗
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✗
29	UL: -	DL: 717 to 728 (LTE only)	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗
32	UL: -	DL: 1452 - 1496	✗
35	1850 to 1910		✓
38	2570 to 2620		✓
39	1880 to 1920		✓
40	2300 to 2400		✓
41	2496 to 2690		✓
42	3400 to 3600		✗
43	3600 to 3800		✗

*Covered bands represent an efficiency greater than 20%

2.2. LTE Bands – Straight on Edge of 300*300mm Ground Plane

LTE BANDS			
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 894	✓
7	UL: 2500 to 2570	DL: 2620 to 2690	✓
8	UL: 880 to 915	DL: 925 to 960	✓
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗
12	UL: 699 to 716	DL: 729 to 746	✓
13	UL: 777 to 787	DL: 746 to 756	✓
14	UL: 788 to 798	DL: 758 to 768	✓
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✓
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✓
19	UL: 830 to 845	DL: 875 to 890	✓
20	UL: 832 to 862	DL: 791 to 821	✓
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✗
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✓
25	UL: 1850 to 1915	DL: 1930 to 1995	✓
26	UL: 814 to 849	DL: 859 to 894	✓
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✓
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✓
29	UL: -	DL: 717 to 728 (LTE only)	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗
32	UL: -	DL: 1452 - 1496	✗
35	1850 to 1910		✓
38	2570 to 2620		✓
39	1880 to 1920		✓
40	2300 to 2400		✓
41	2496 to 2690		✓
42	3400 to 3600		✗
43	3600 to 3800		✗

*Covered bands represent an efficiency greater than 20%

2.3. LTE Bands – Bent in Free Space

LTE BANDS			
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 894	✗
7	UL: 2500 to 2570	DL: 2620 to 2690	✓
8	UL: 880 to 915	DL: 925 to 960	✗
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗
12	UL: 699 to 716	DL: 729 to 746	✗
13	UL: 777 to 787	DL: 746 to 756	✗
14	UL: 788 to 798	DL: 758 to 768	✗
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✗
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✗
19	UL: 830 to 845	DL: 875 to 890	✗
20	UL: 832 to 862	DL: 791 to 821	✗
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✗
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✗
25	UL: 1850 to 1915	DL: 1930 to 1995	✓
26	UL: 814 to 849	DL: 859 to 894	✗
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✗
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✗
29	UL: -	DL: 717 to 728 (LTE only)	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗
32	UL: -	DL: 1452 - 1496	✗
35	1850 to 1910		✓
38	2570 to 2620		✓
39	1880 to 1920		✓
40	2300 to 2400		✓
41	2496 to 2690		✓
42	3400 to 3600		✗
43	3600 to 3800		✗

*Covered bands represent an efficiency greater than 20%

2.4. LTE Bands – Bent on Edge of 300*300mm Ground plane

LTE BANDS			
Band Number	LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 894	✓
7	UL: 2500 to 2570	DL: 2620 to 2690	✓
8	UL: 880 to 915	DL: 925 to 960	✓
9	UL: 1749.9 to 1784.9	DL: 1844.9 to 1879.9	✓
11	UL: 1427.9 to 1447.9	DL: 1475.9 to 1495.9	✗
12	UL: 699 to 716	DL: 729 to 746	✓
13	UL: 777 to 787	DL: 746 to 756	✓
14	UL: 788 to 798	DL: 758 to 768	✓
17	UL: 704 to 716	DL: 734 to 746 (LTE only)	✓
18	UL: 815 to 830	DL: 860 to 875 (LTE only)	✓
19	UL: 830 to 845	DL: 875 to 890	✓
20	UL: 832 to 862	DL: 791 to 821	✓
21	UL: 1447.9 to 1462.9	DL: 1495.9 to 1510.9	✗
22	UL: 3410 to 3490	DL: 3510 to 3590	✗
23	UL: 2000 to 2020	DL: 2180 to 2200 (LTE only)	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559 (LTE only)	✓
25	UL: 1850 to 1915	DL: 1930 to 1995	✓
26	UL: 814 to 849	DL: 859 to 894	✓
27	UL: 807 to 824	DL: 852 to 869 (LTE only)	✓
28	UL: 703 to 748	DL: 758 to 803 (LTE only)	✓
29	UL: -	DL: 717 to 728 (LTE only)	✓
30	UL: 2305 to 2315	DL: 2350 to 2360 (LTE only)	✓
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5 (LTE only)	✗
32	UL: -	DL: 1452 - 1496	✗
35	1850 to 1910		✓
38	2570 to 2620		✓
39	1880 to 1920		✓
40	2300 to 2400		✓
41	2496 to 2690		✓
42	3400 to 3600		✗
43	3600 to 3800		✗

*Covered bands represent an efficiency greater than 20%

3. Antenna Characteristics

3.1. Testing setup

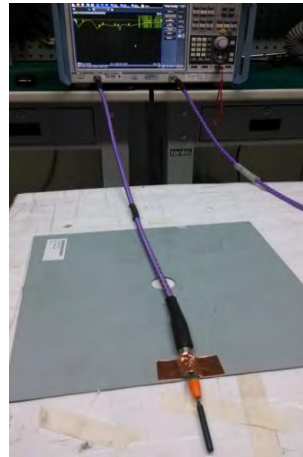
Antenna Straight Position



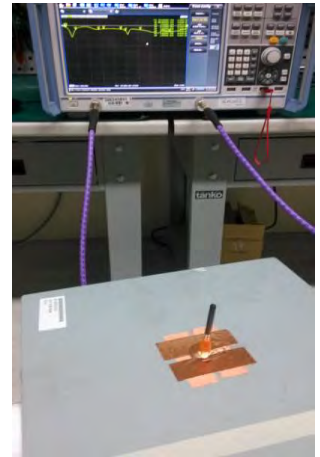
a) In free space



b) With 15*9cm Ground



c) With 30*30cm Ground
Metal Edge



d) With 30*30cm Ground
Metal Center

Antenna Bent Position



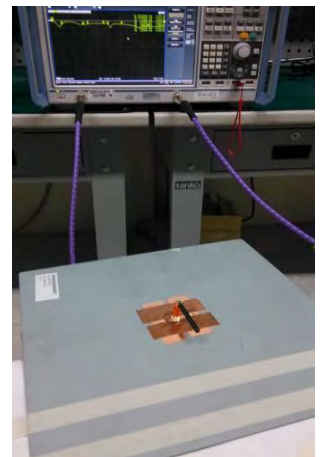
a) In free space



b) With 15*9cm Ground



c) With 30*30cm Ground
Metal Edge



d) With 30*30cm Ground
Metal Center

Figure.1 Measurement environments

3.2. Return loss

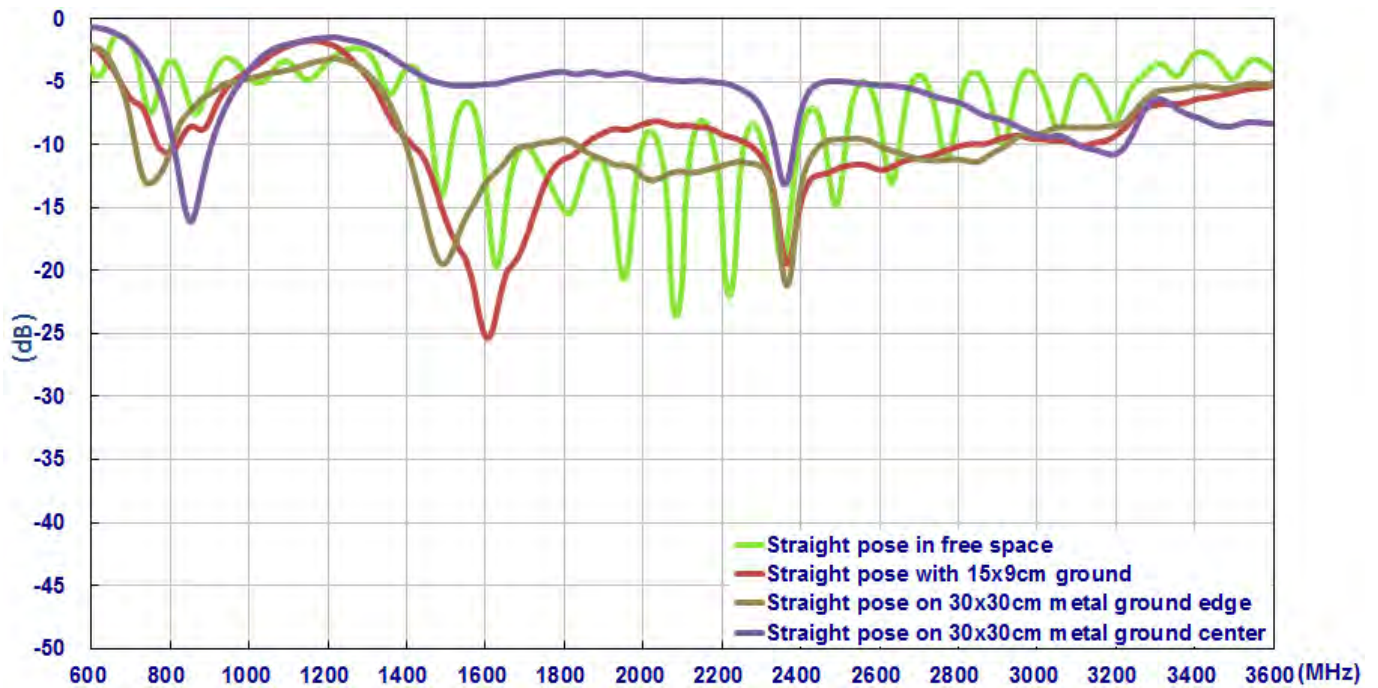


Figure2. Return loss of TG.08 antenna with straight Position

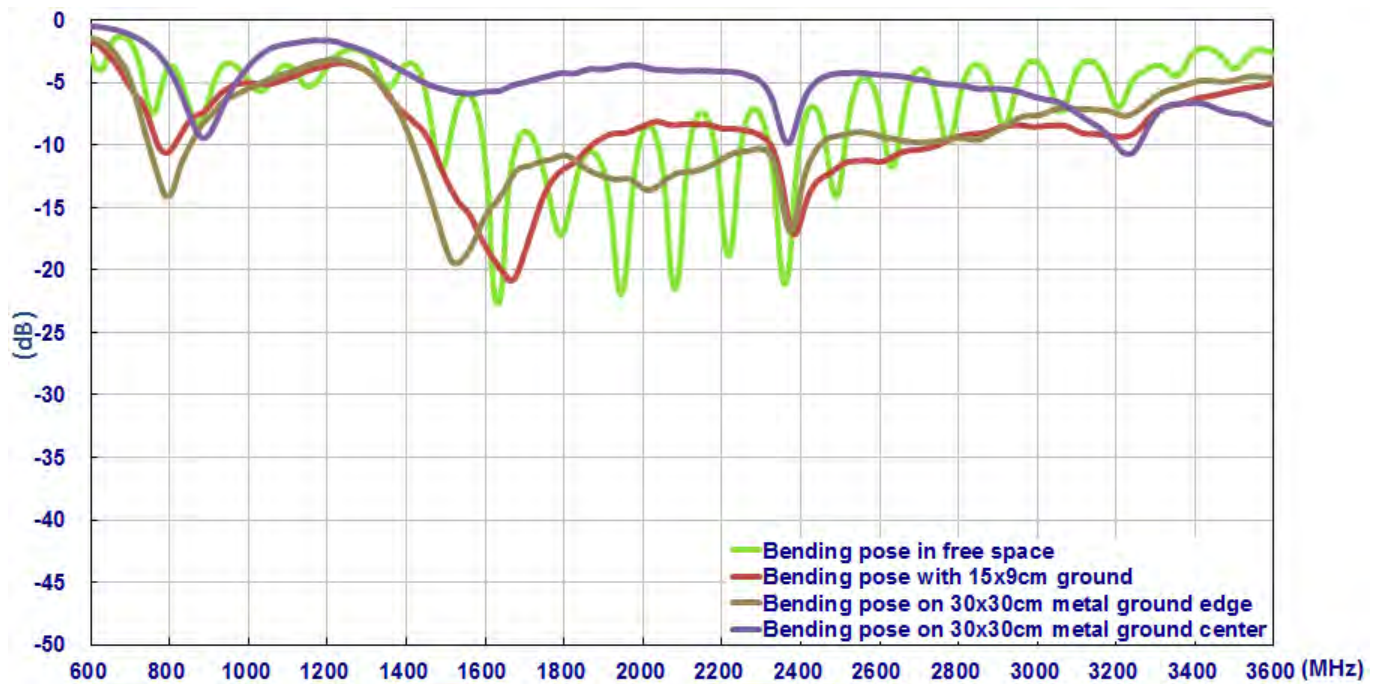


Figure3. Return loss of TG.08 antenna with bent Position

3.3. Efficiency

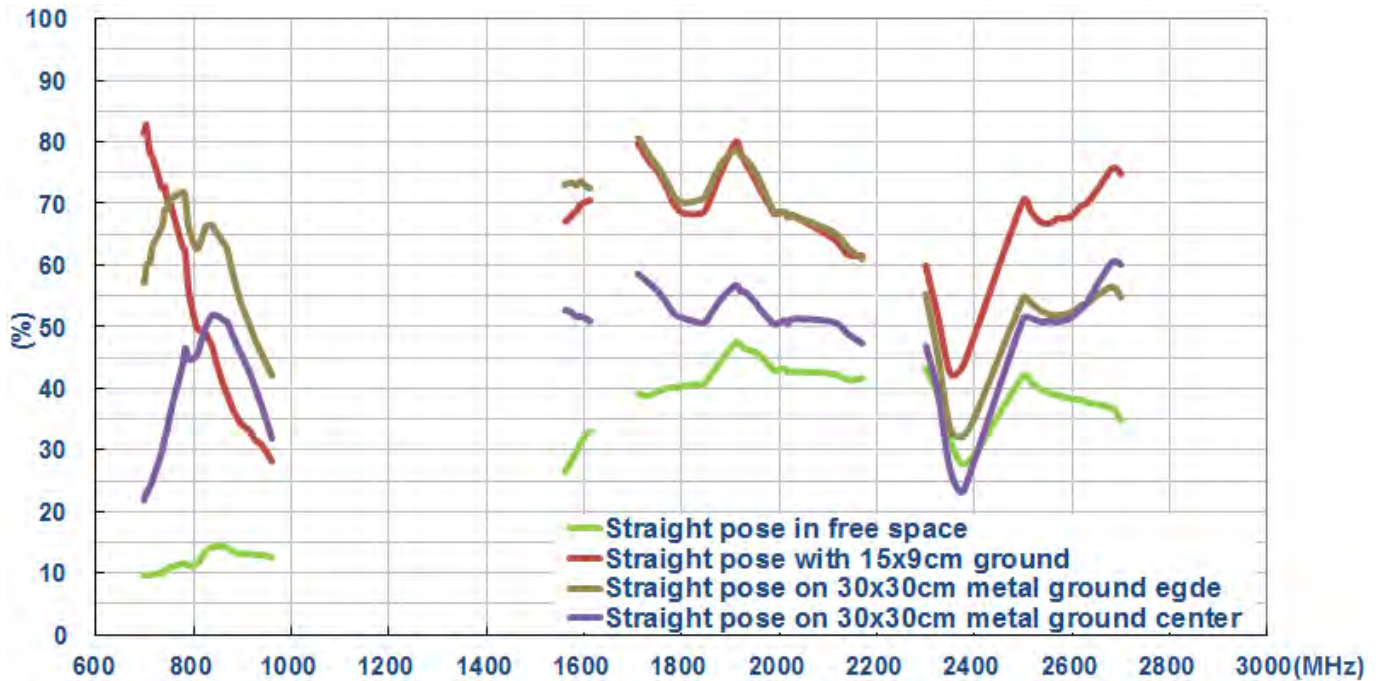


Figure4. Efficiency of TG.08 antenna with straight Position

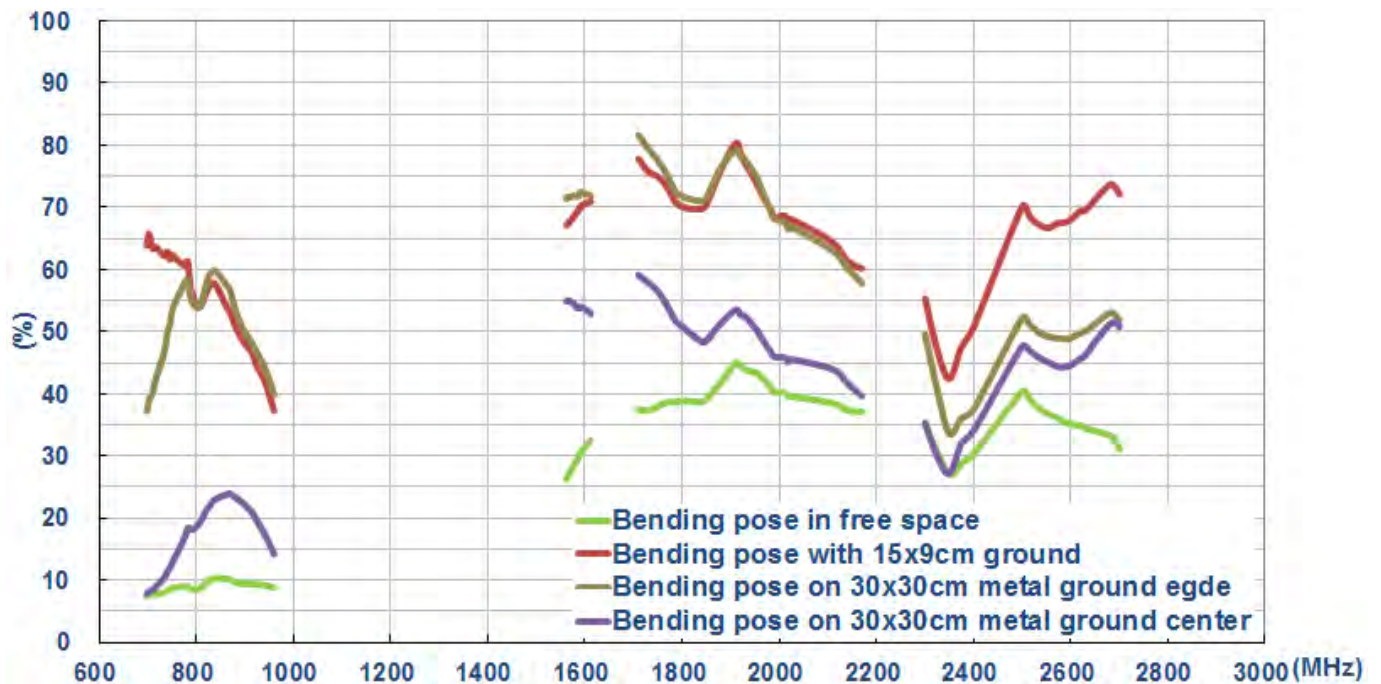


Figure5. Efficiency of TG.08 antenna with bent Position

3.4. Peak gain

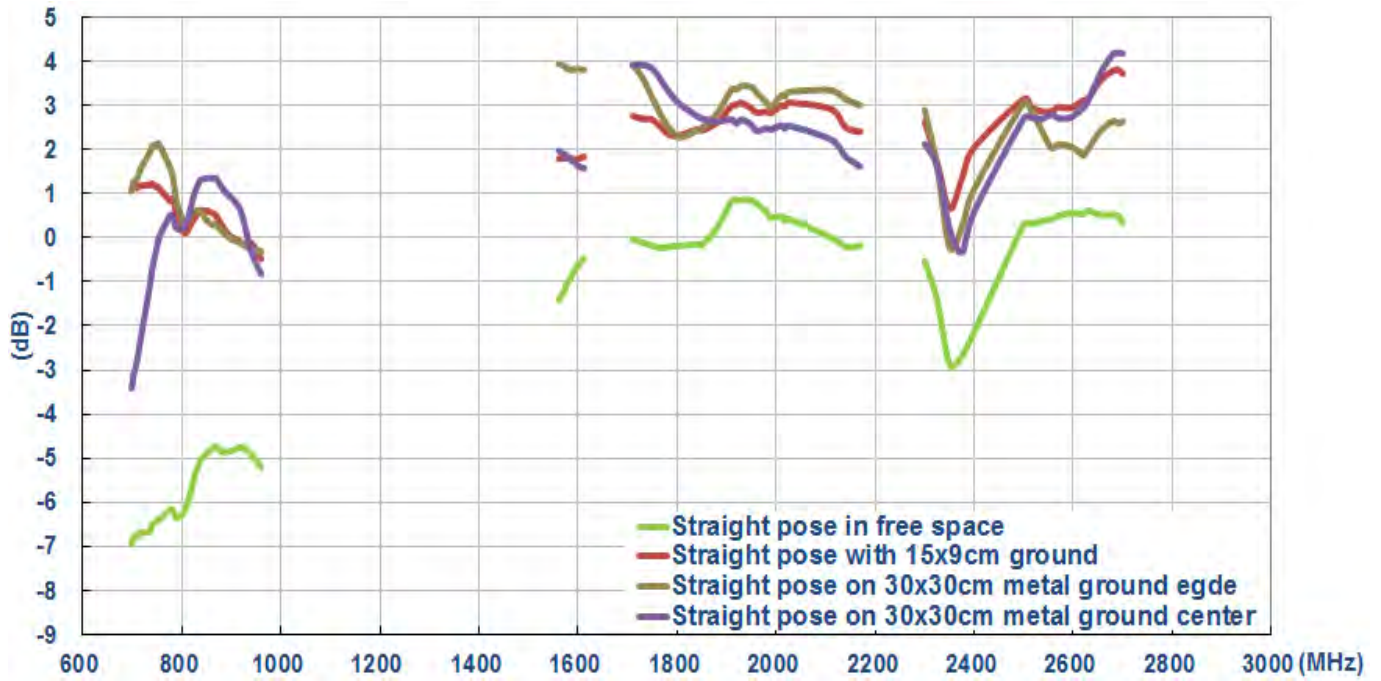


Figure6. Peak gain of TG.08 antenna with straight Position

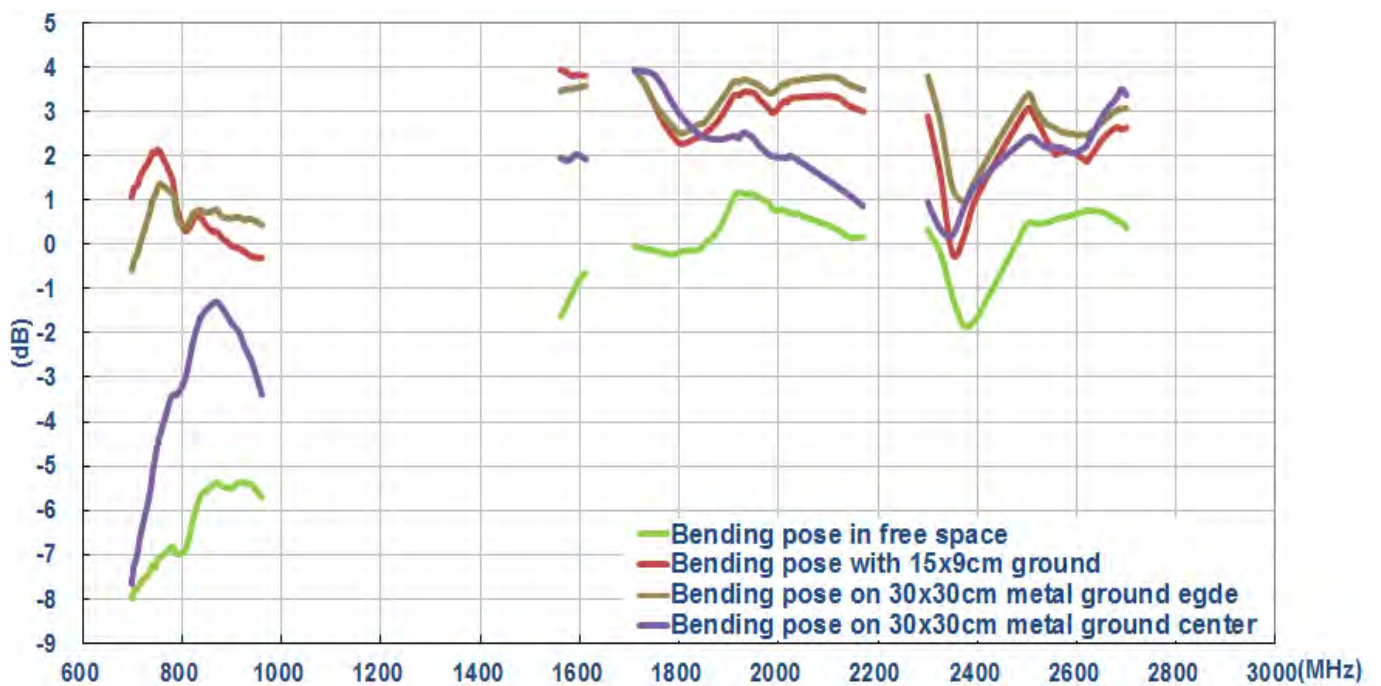


Figure7. Peak gain of TG.08 antenna with bent Position

3.5. Average gain

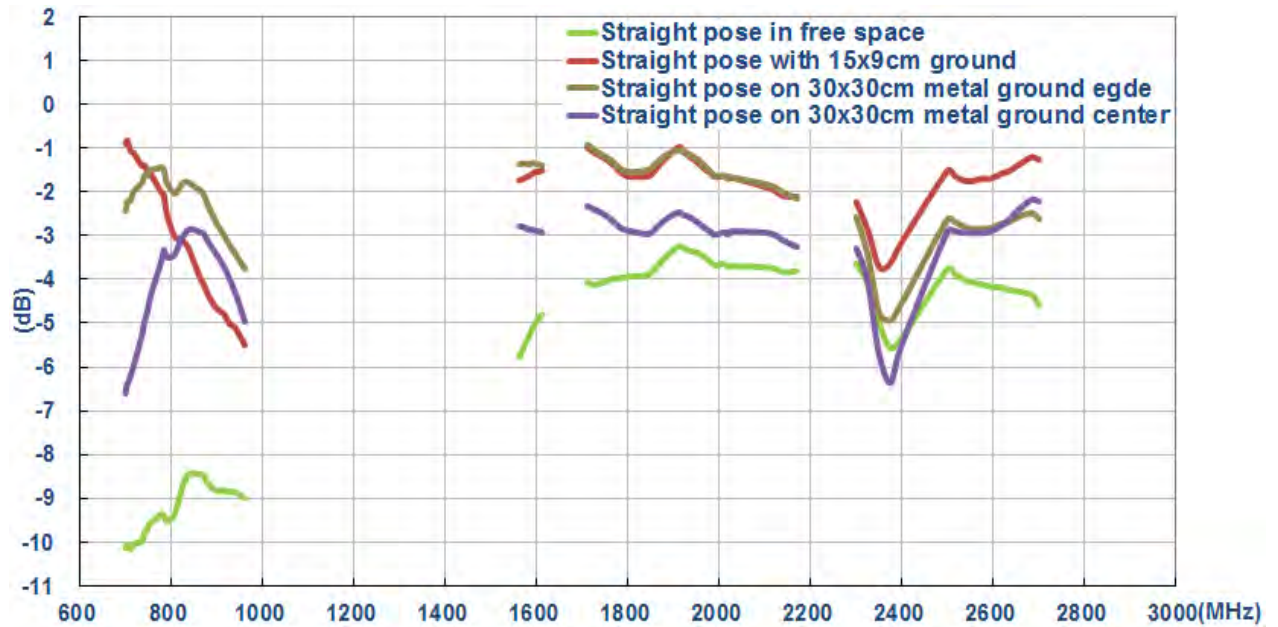


Figure8. Average gain of TG.08 with antenna straight Position

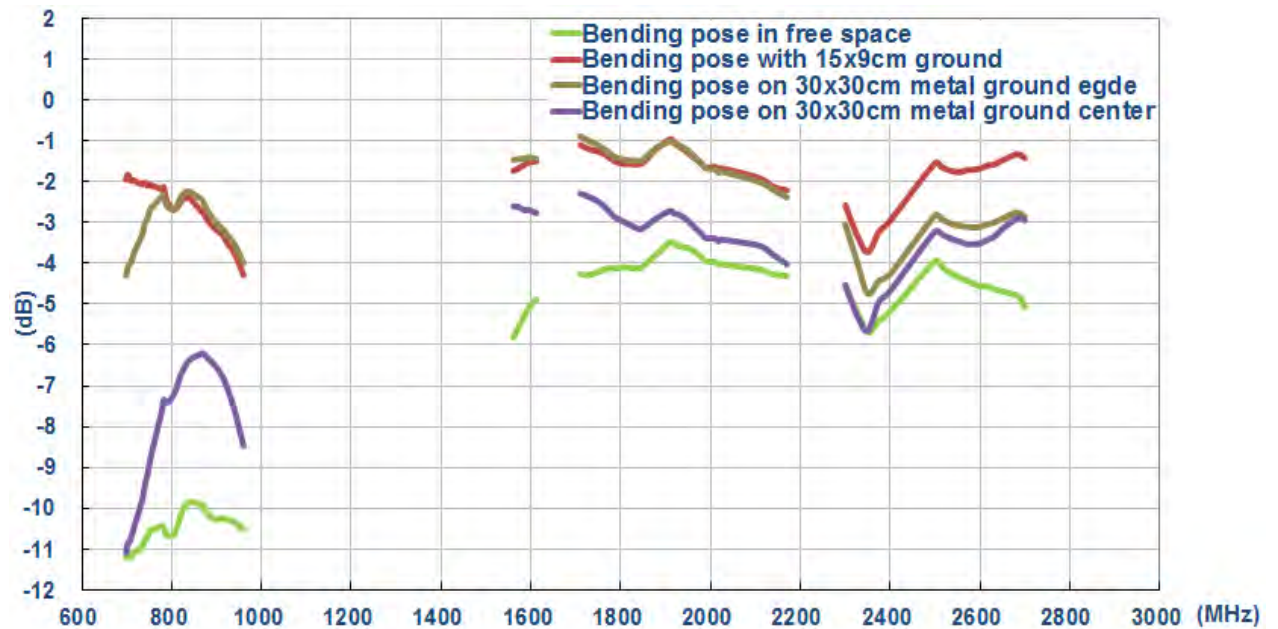
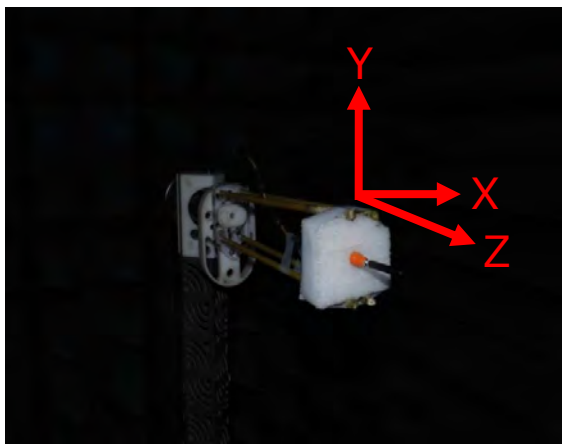


Figure9. Average gain of TG.08 antenna with bent Position

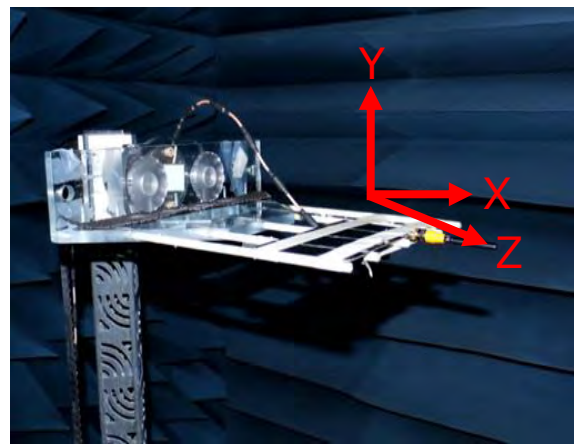
4. Antenna Radiation Patterns

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

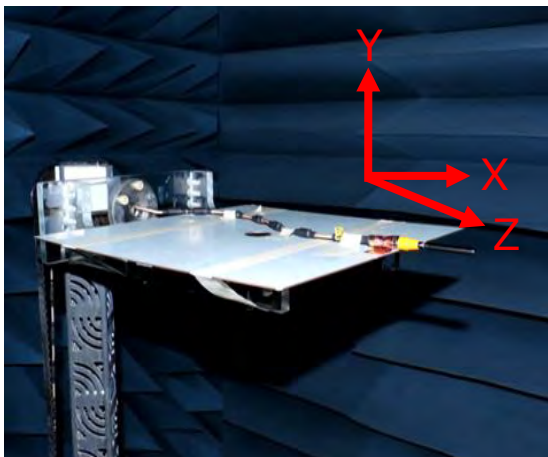
Antenna with Straight Position



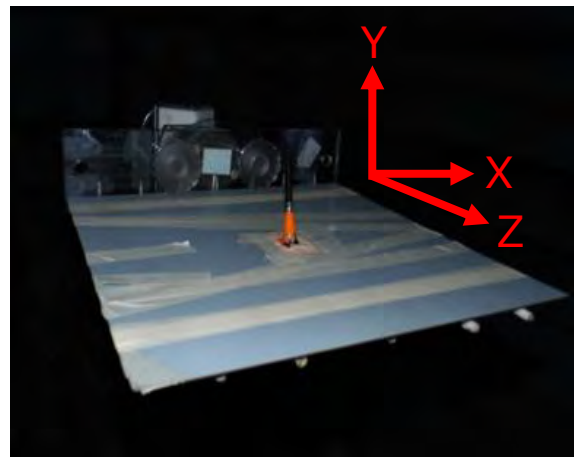
In free space



On 15x9cm ground plane

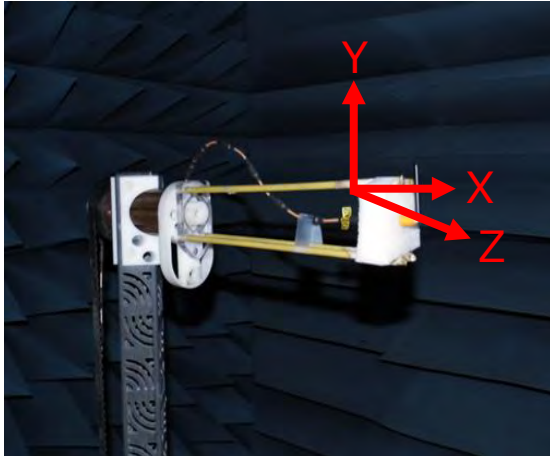


On 30x30cm metal ground center

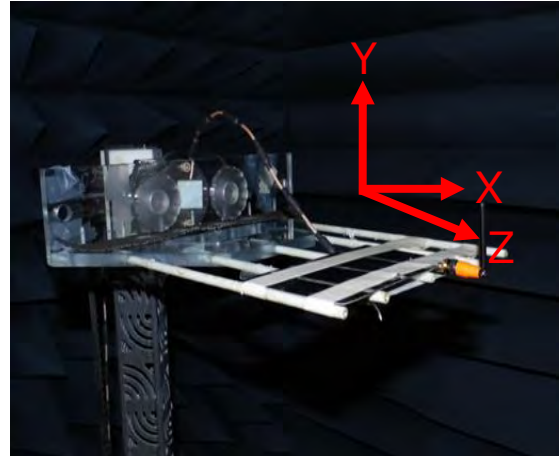


On 30x30cm metal ground edge

Antenna with Bent Position



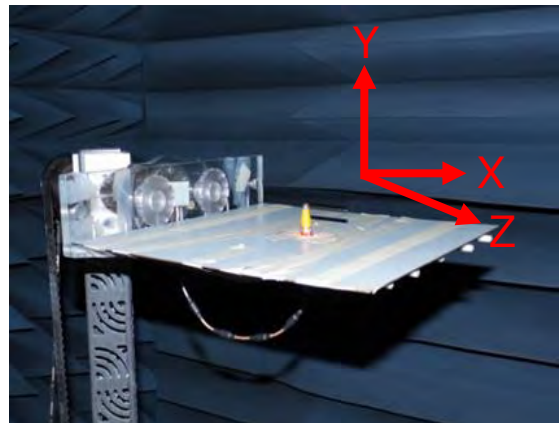
In free space



On 15x9cm ground plane



On 30x30cm metal ground center

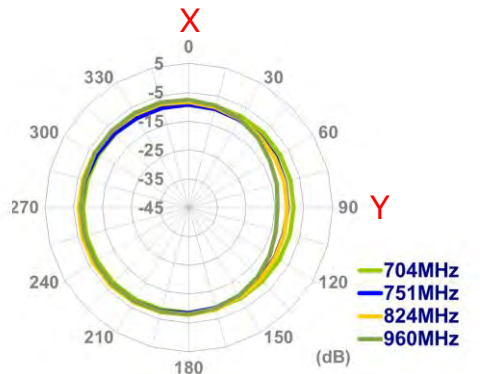


On 30x30cm metal ground edge

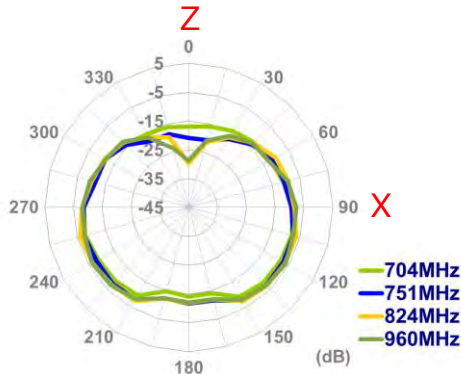
Figure.10. Testing Setup in ETS Anechoic Chamber

4.1. 2D Radiation pattern (Straight Position in free space)

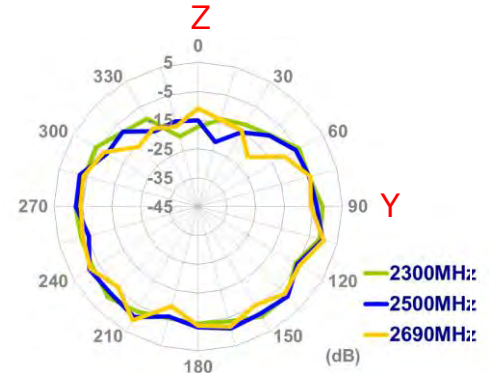
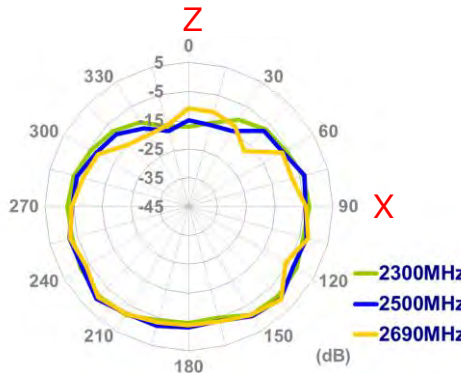
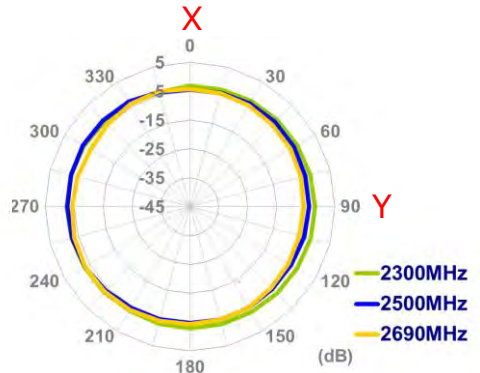
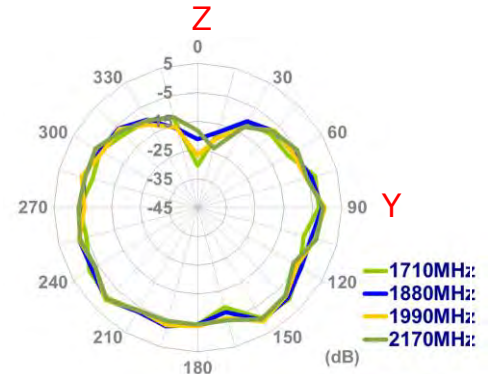
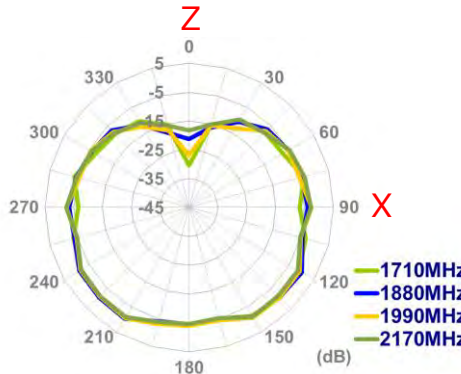
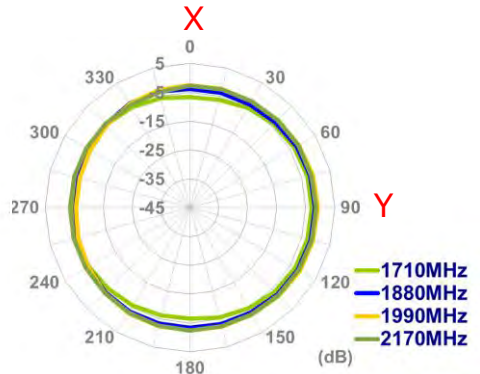
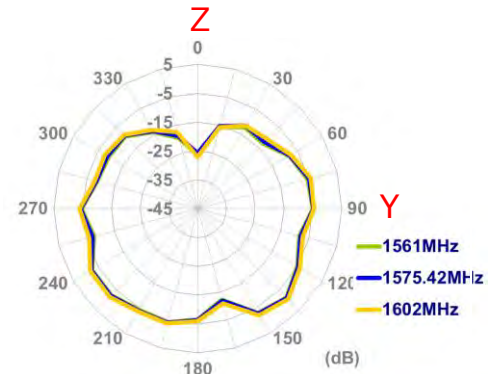
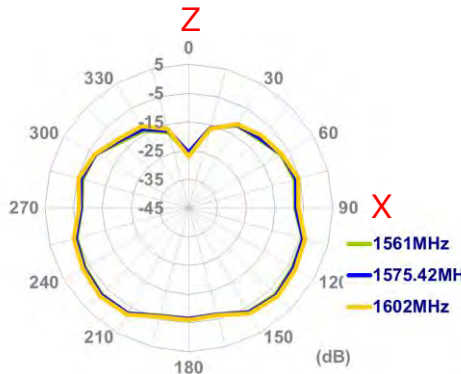
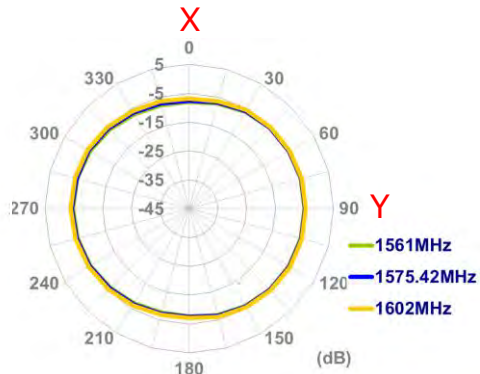
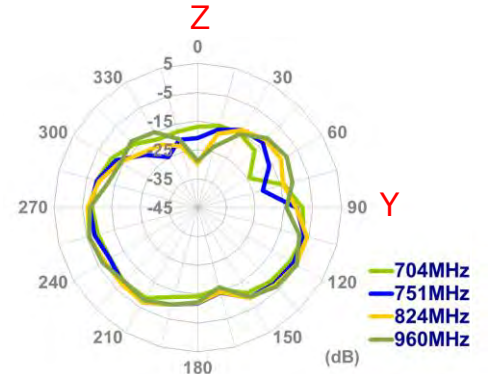
XY Plane



XZ Plane

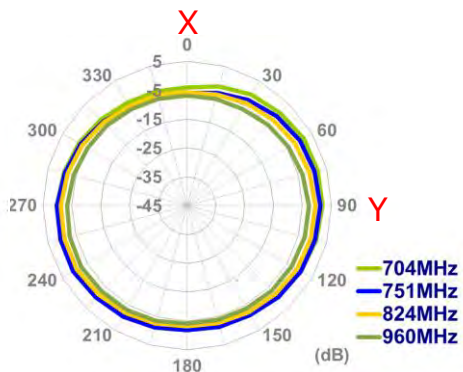


YZ Plane

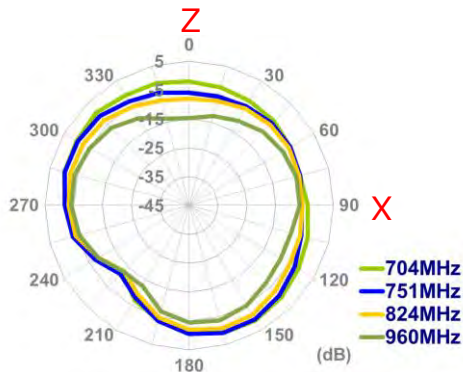


4.2. 2D Radiation pattern (Straight Position with 15x9cm ground)

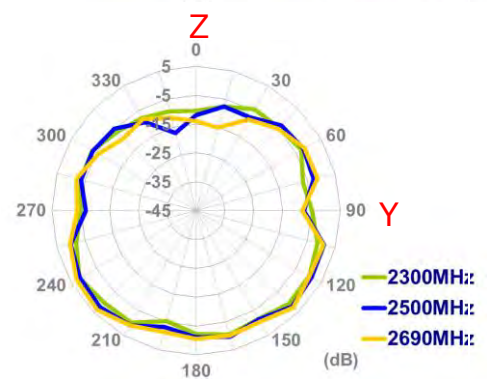
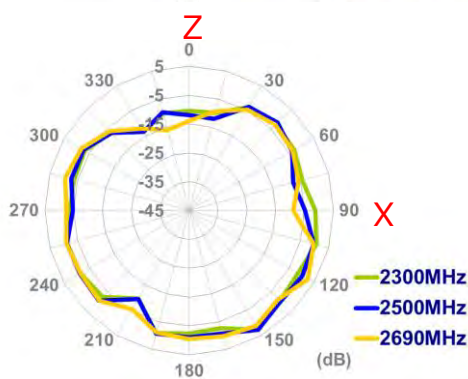
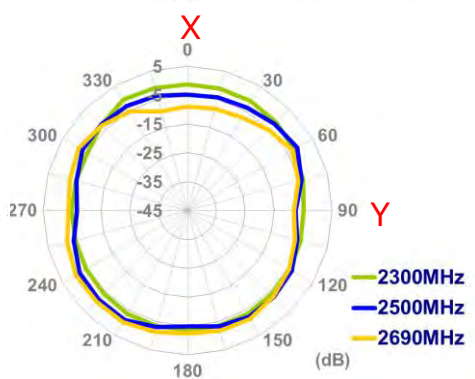
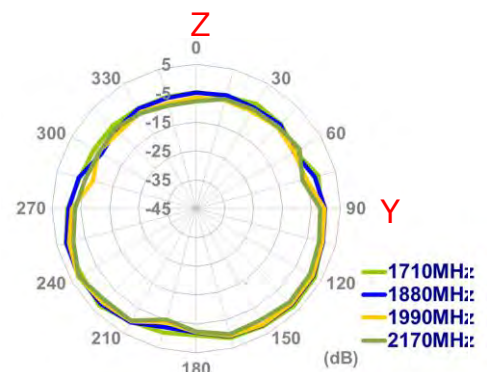
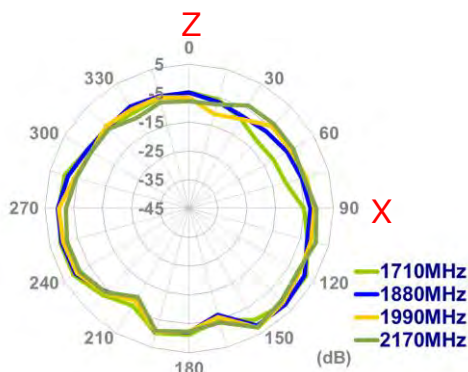
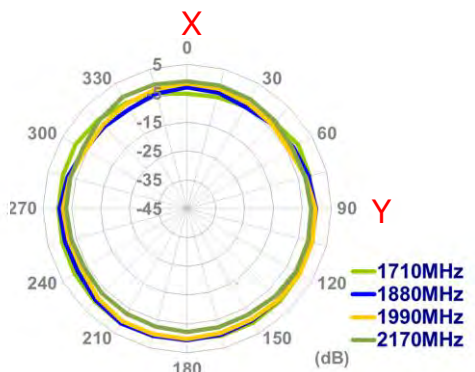
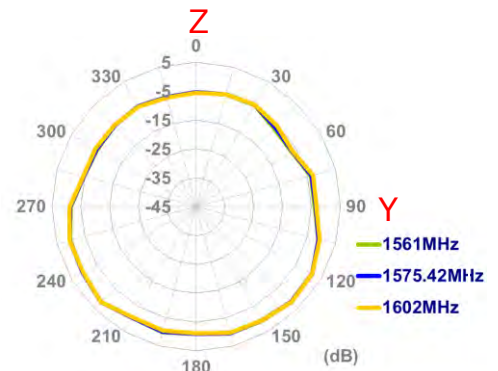
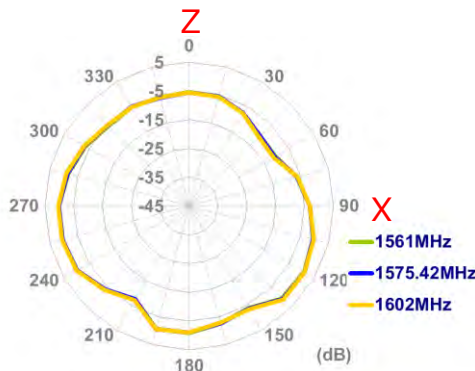
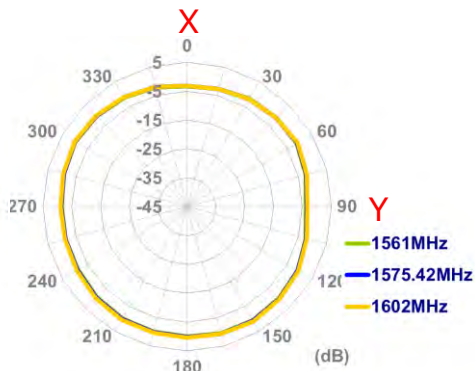
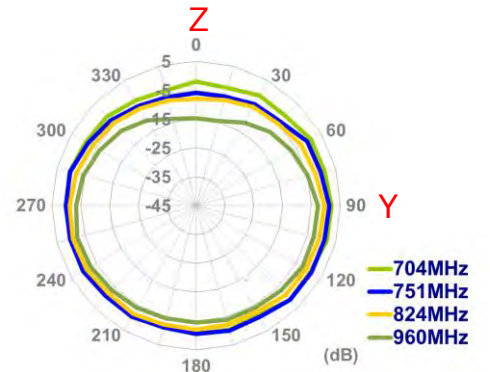
XY Plane



XZ Plane

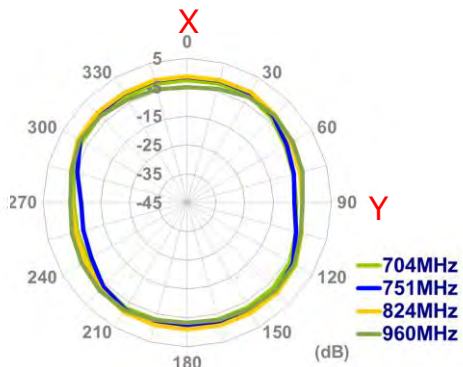


YZ Plane

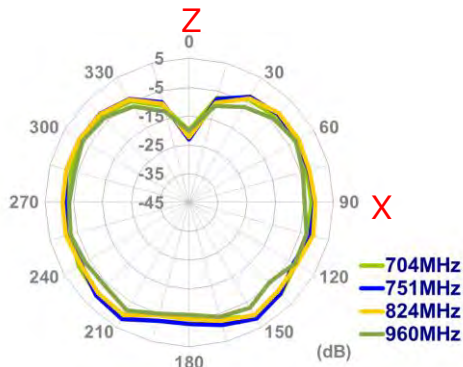


4.3. 2D Radiation pattern (Straight Position with 30x30cm Metal Ground Edge)

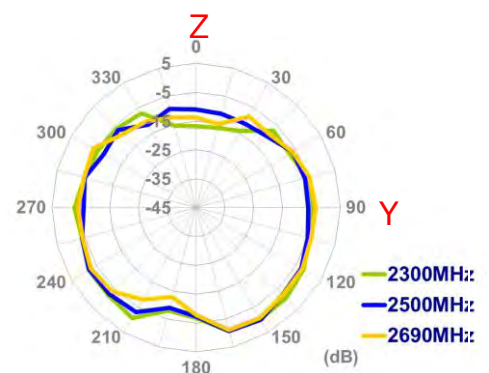
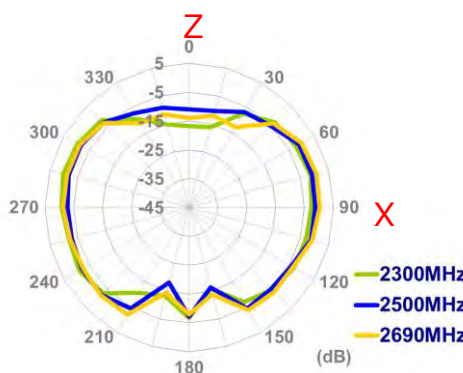
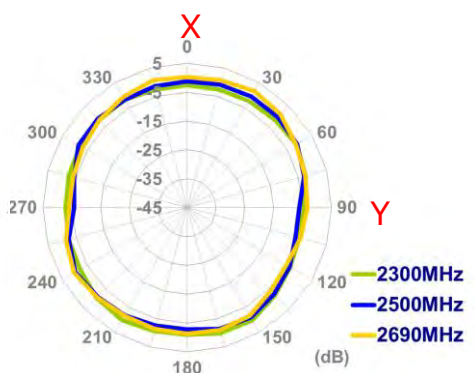
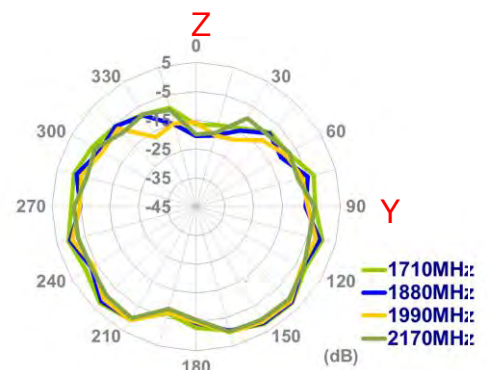
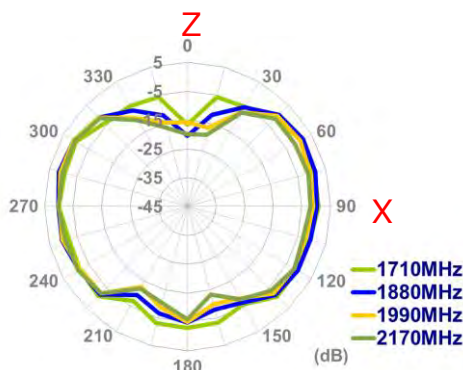
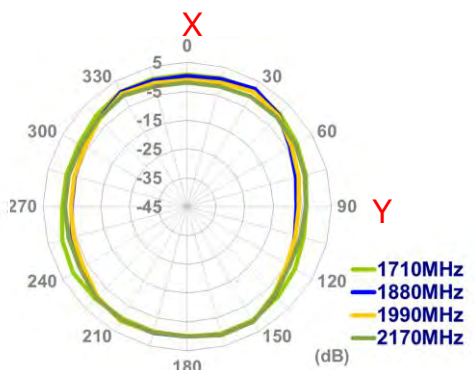
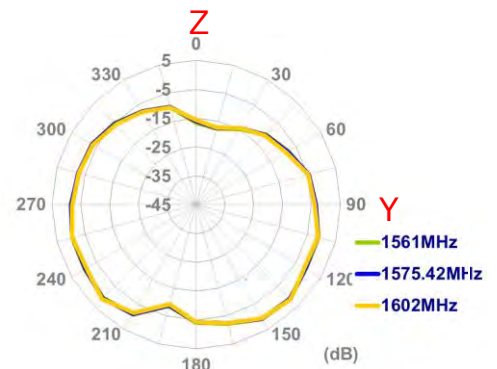
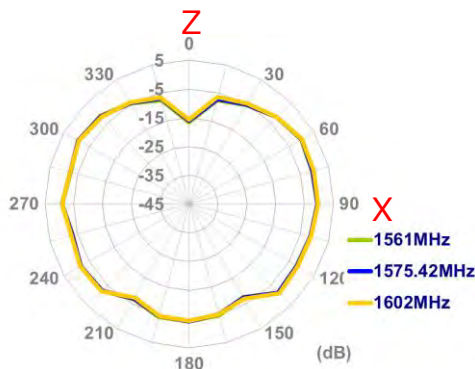
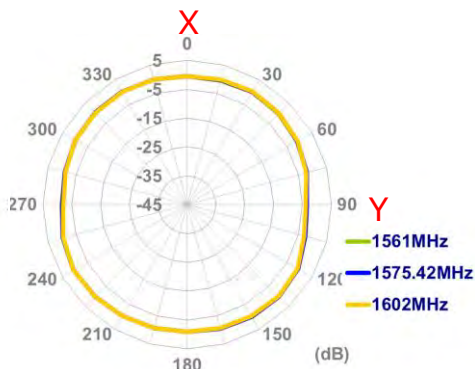
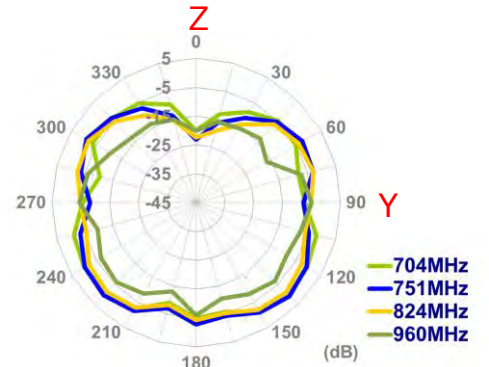
XY Plane



XZ Plane

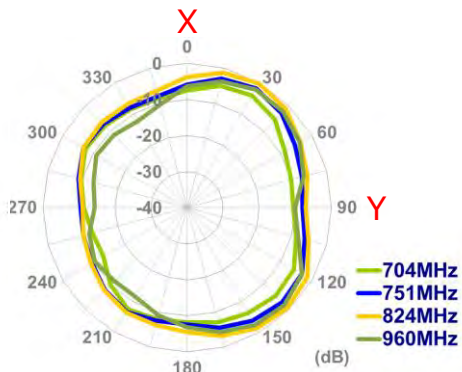


YZ Plane

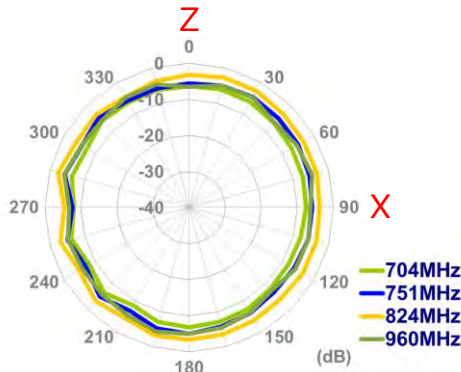


4.4. 2D Radiation pattern (Straight Position with 30x30cm metal ground center)

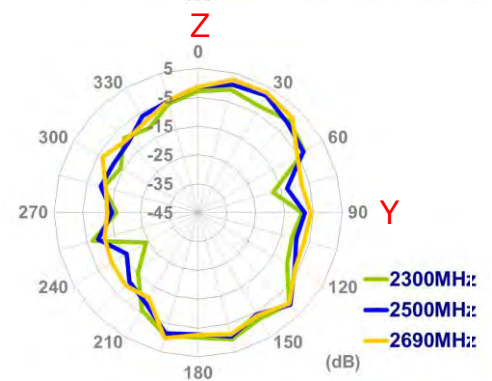
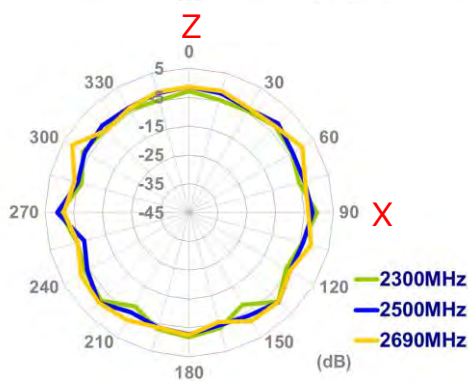
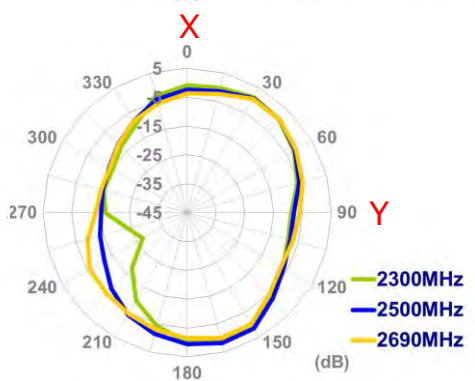
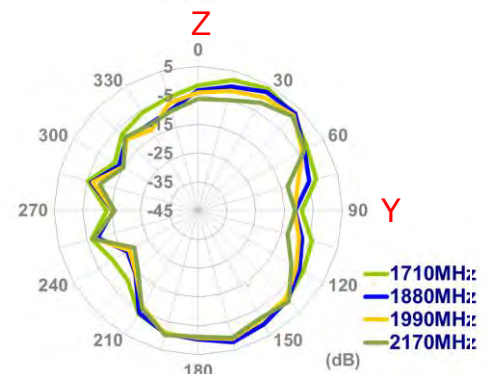
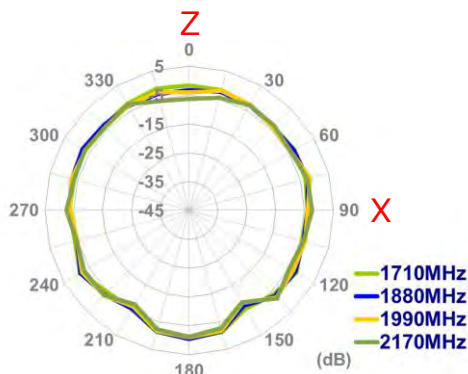
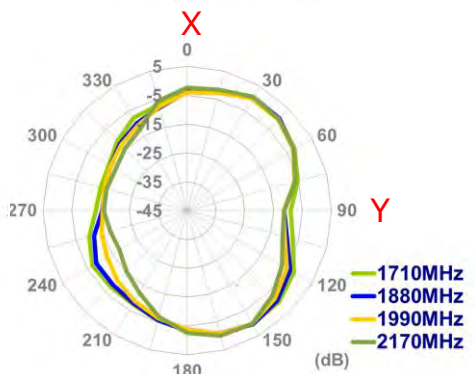
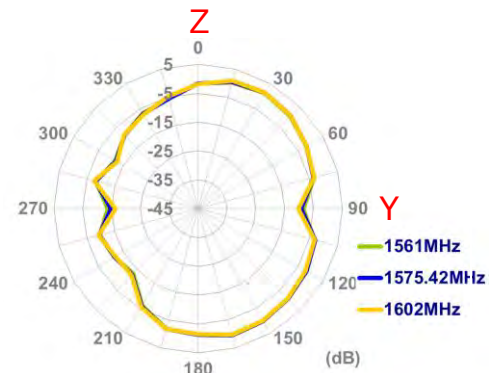
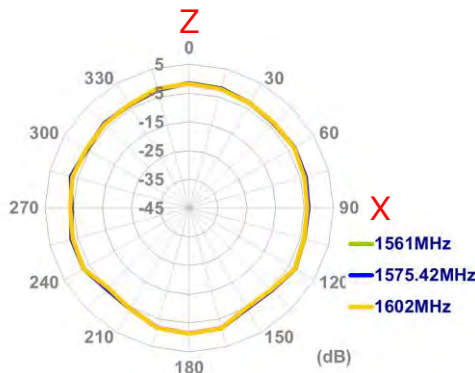
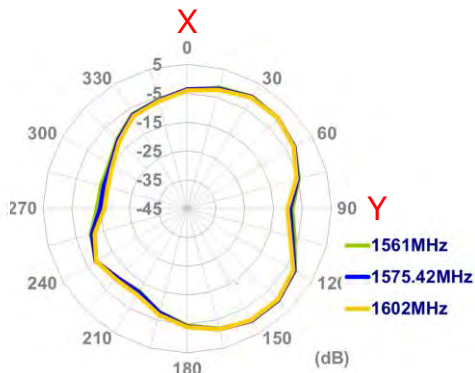
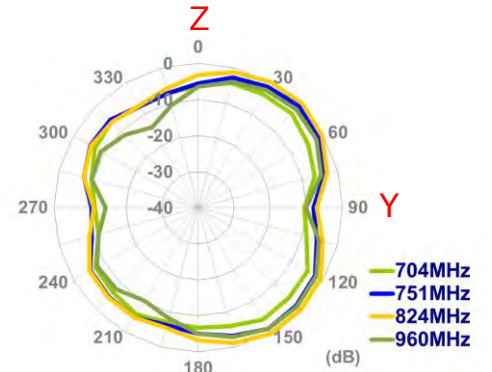
XY Plane



XZ Plane

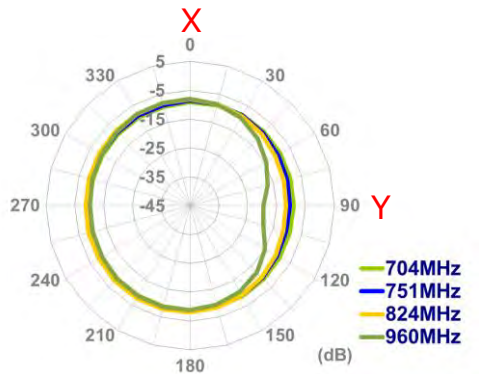


YZ Plane

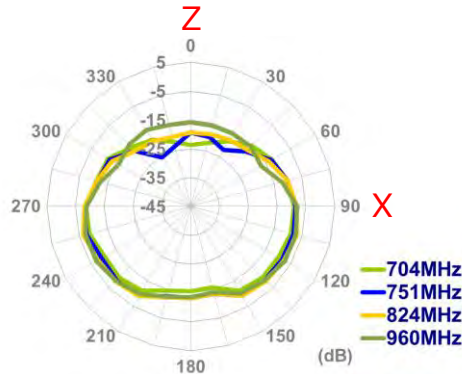


4.5. 2D Radiation pattern (Bent Position in free space)

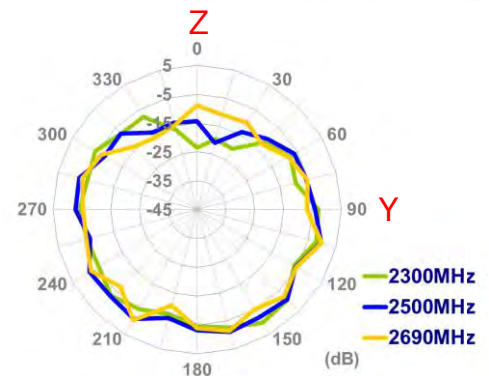
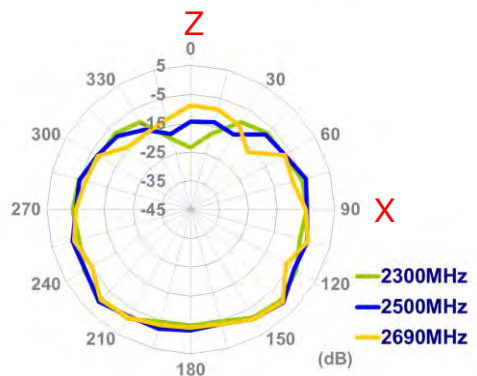
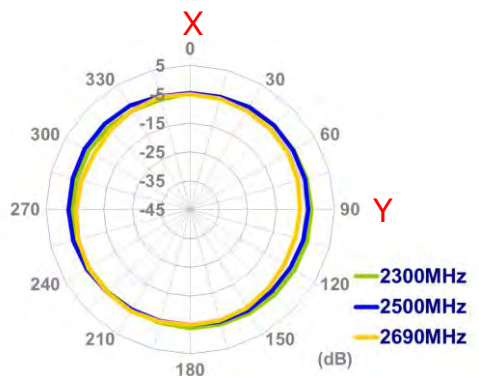
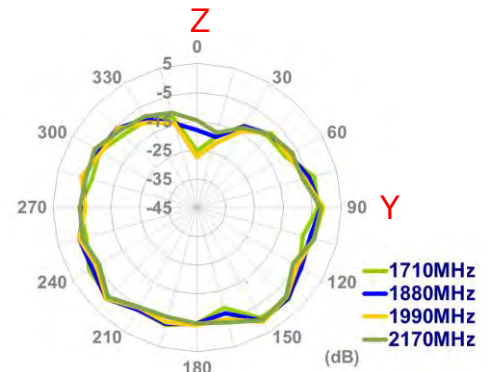
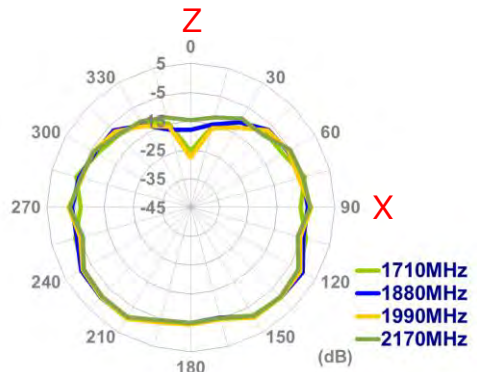
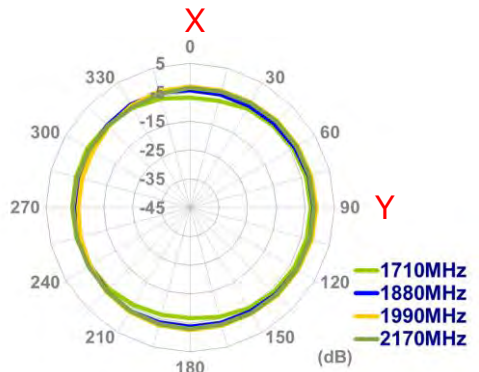
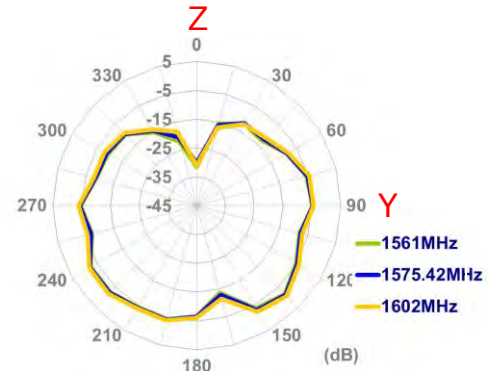
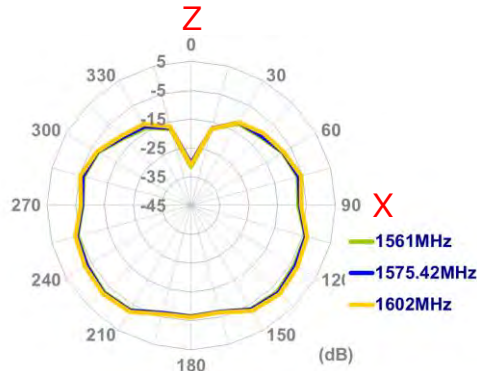
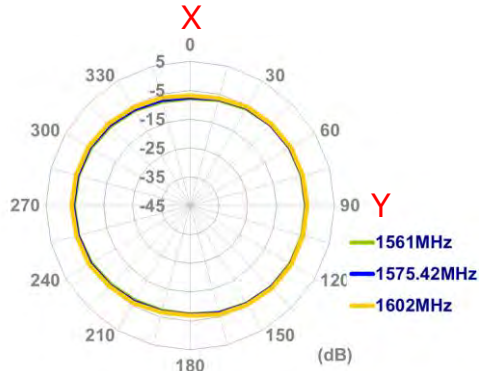
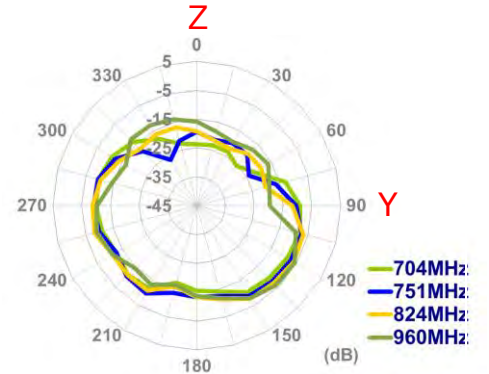
XY Plane



XZ Plane

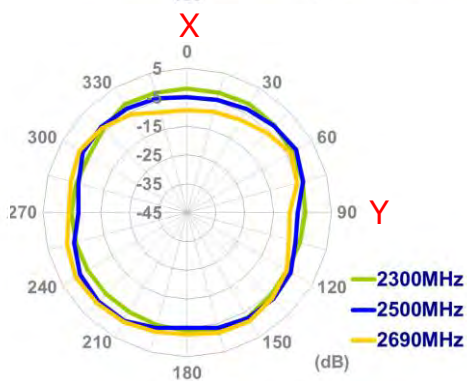
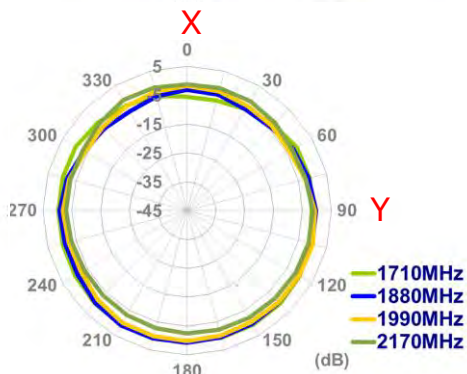
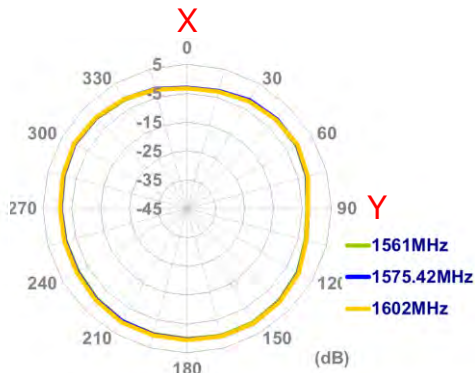
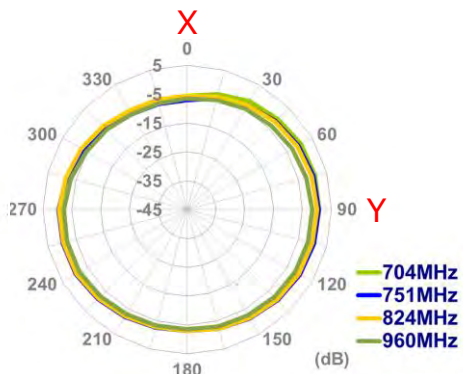


YZ Plane

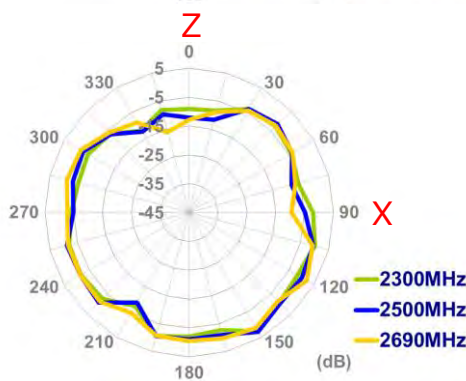
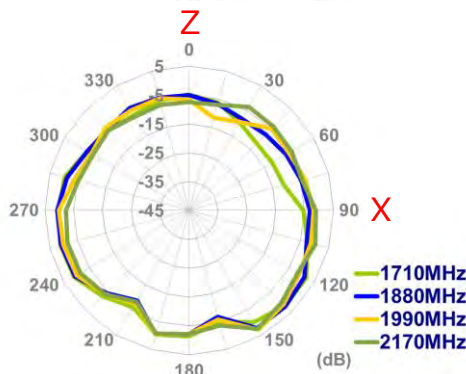
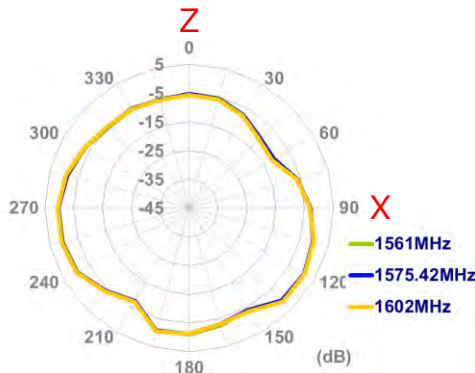
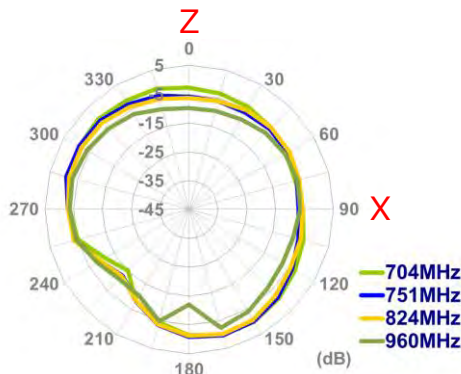


4.6. 2D Radiation pattern (Bent Position with 15x9cm ground)

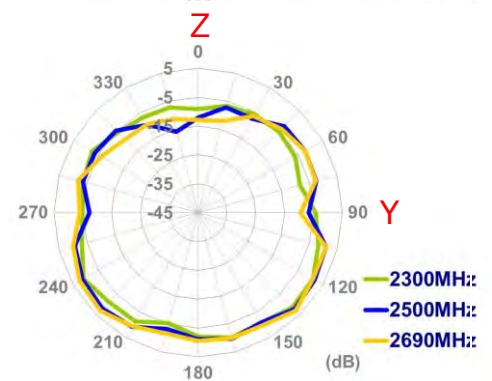
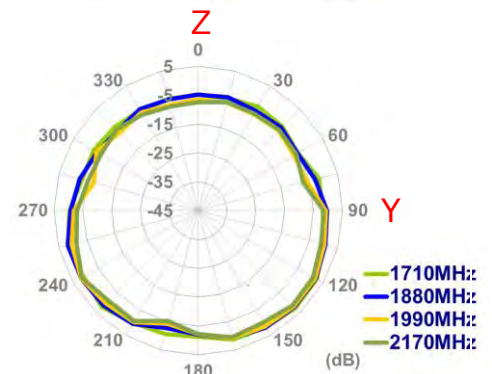
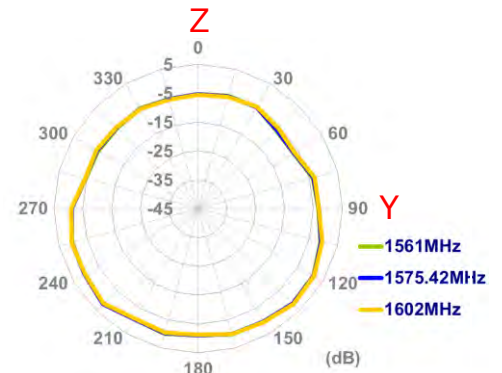
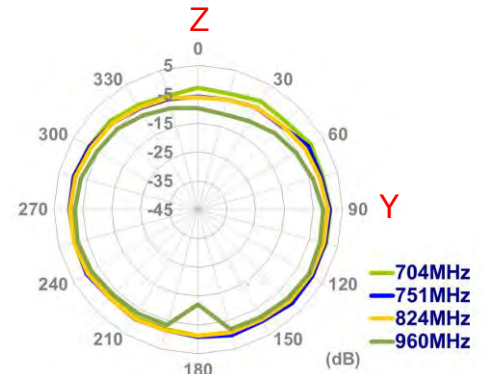
XY Plane



XZ Plane

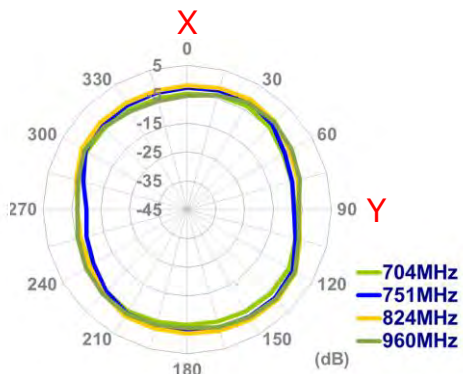


YZ Plane

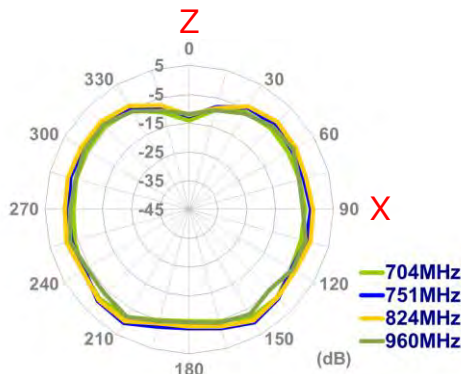


4.7. 2D Radiation pattern (Bent Position with 30x30cm metal ground edge)

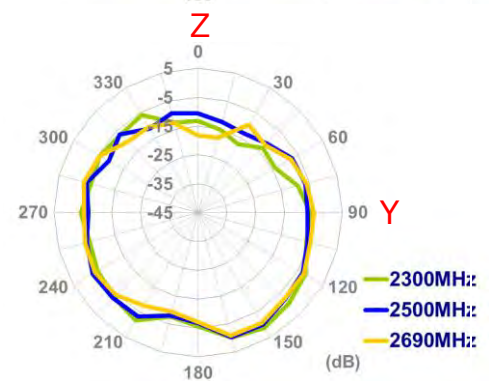
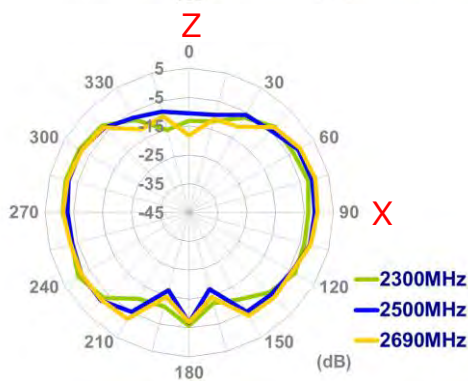
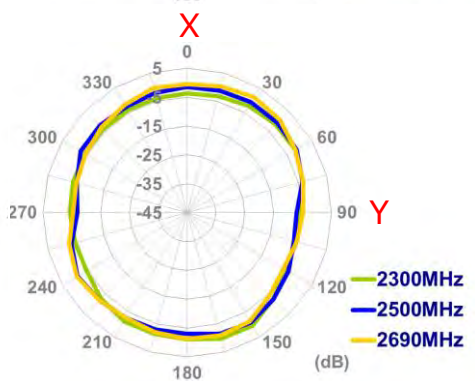
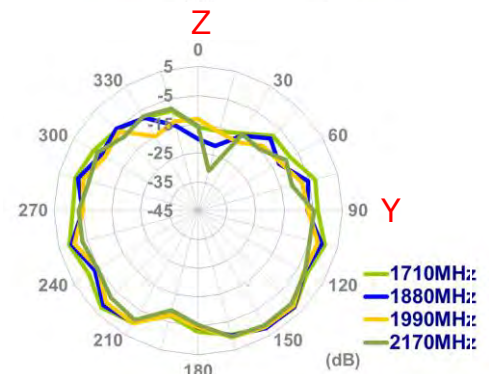
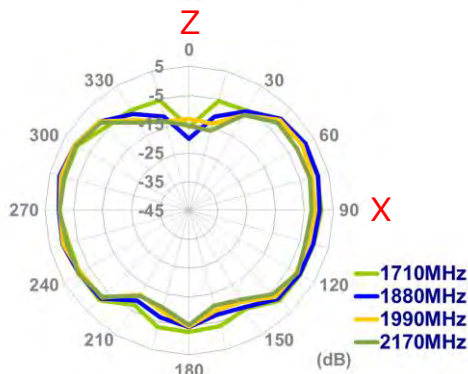
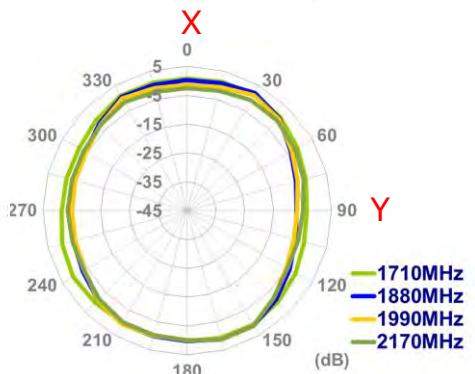
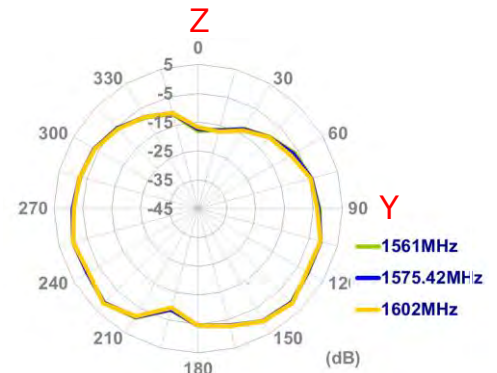
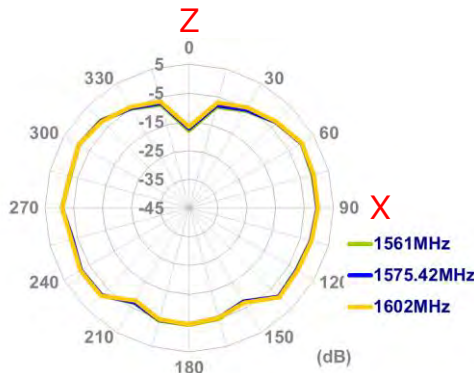
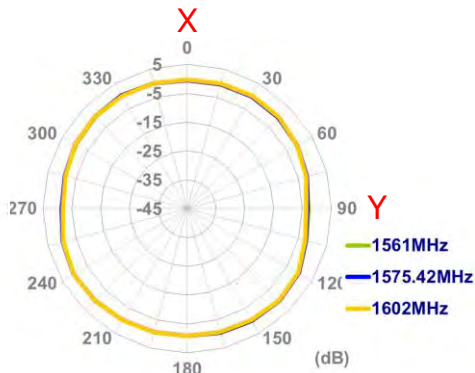
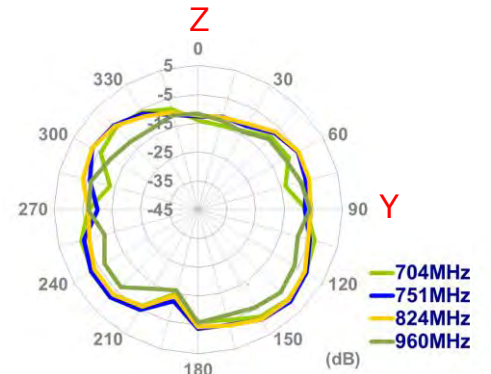
XY Plane



XZ Plane

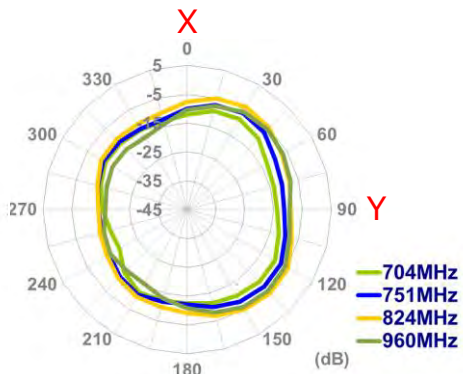


YZ Plane

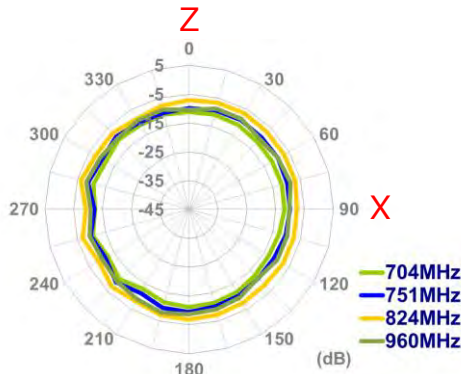


4.8. 4.8 2D Radiation pattern (Bent Position with 30*30cm metal ground center)

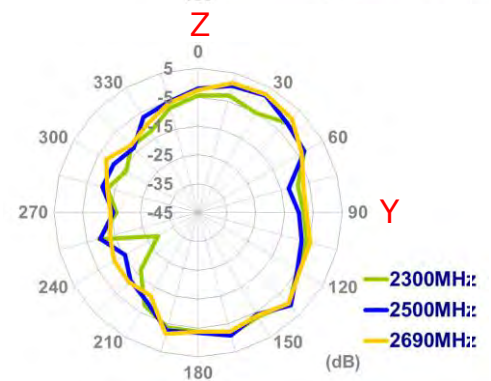
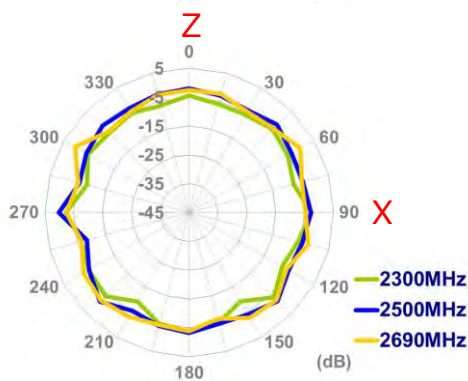
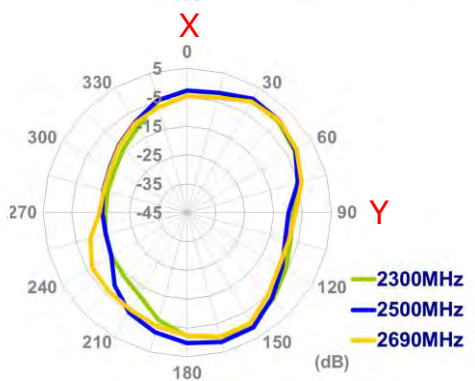
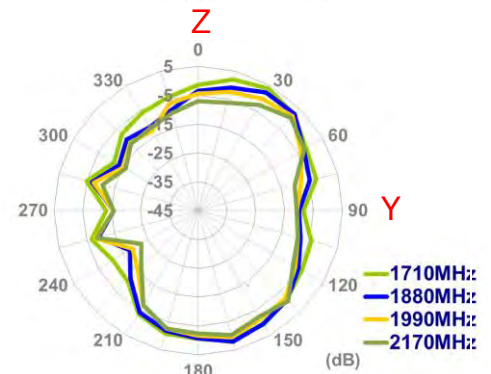
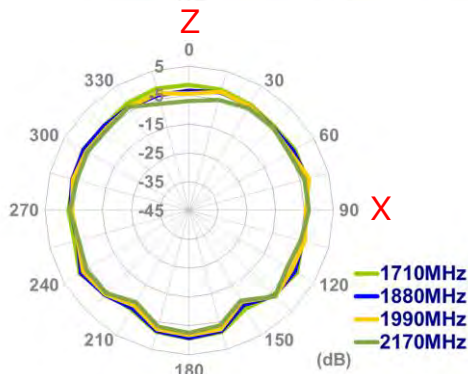
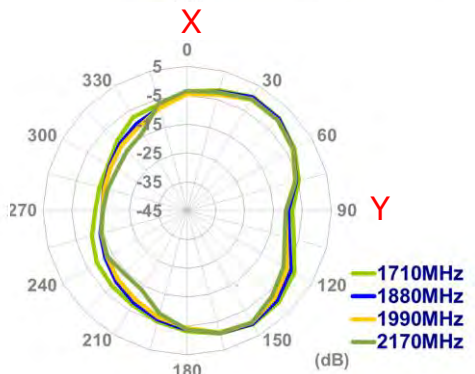
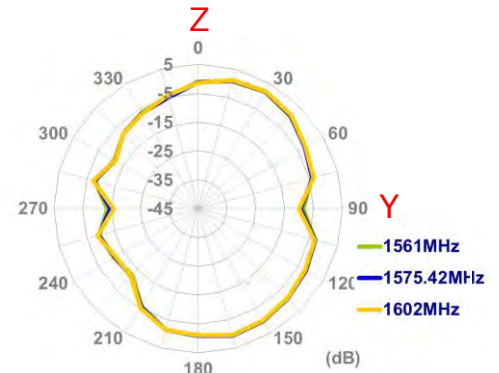
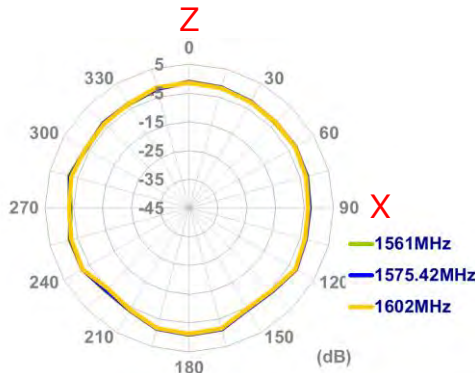
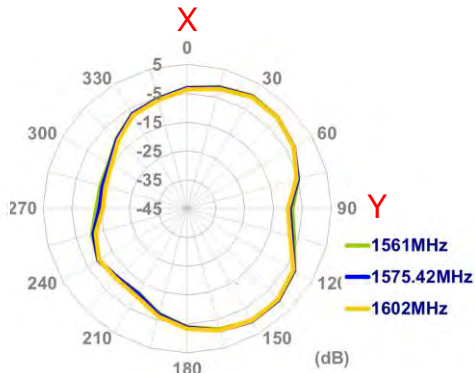
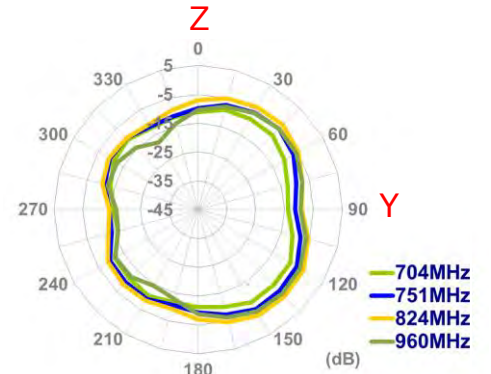
XY Plane



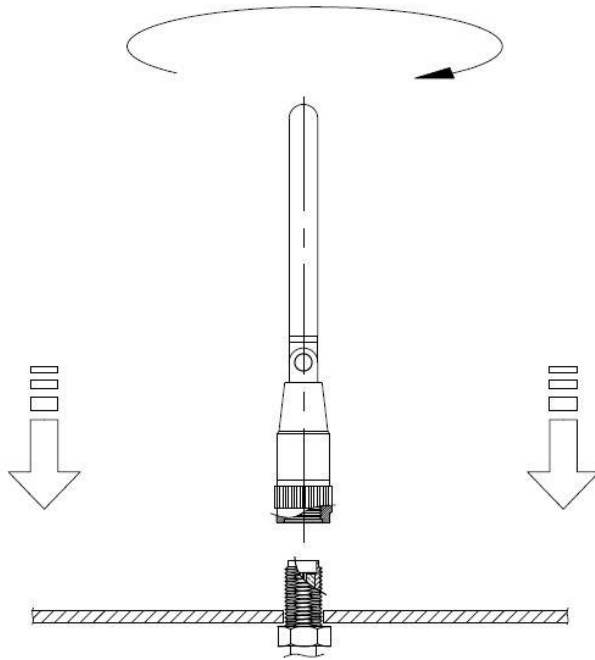
XZ Plane



YZ Plane



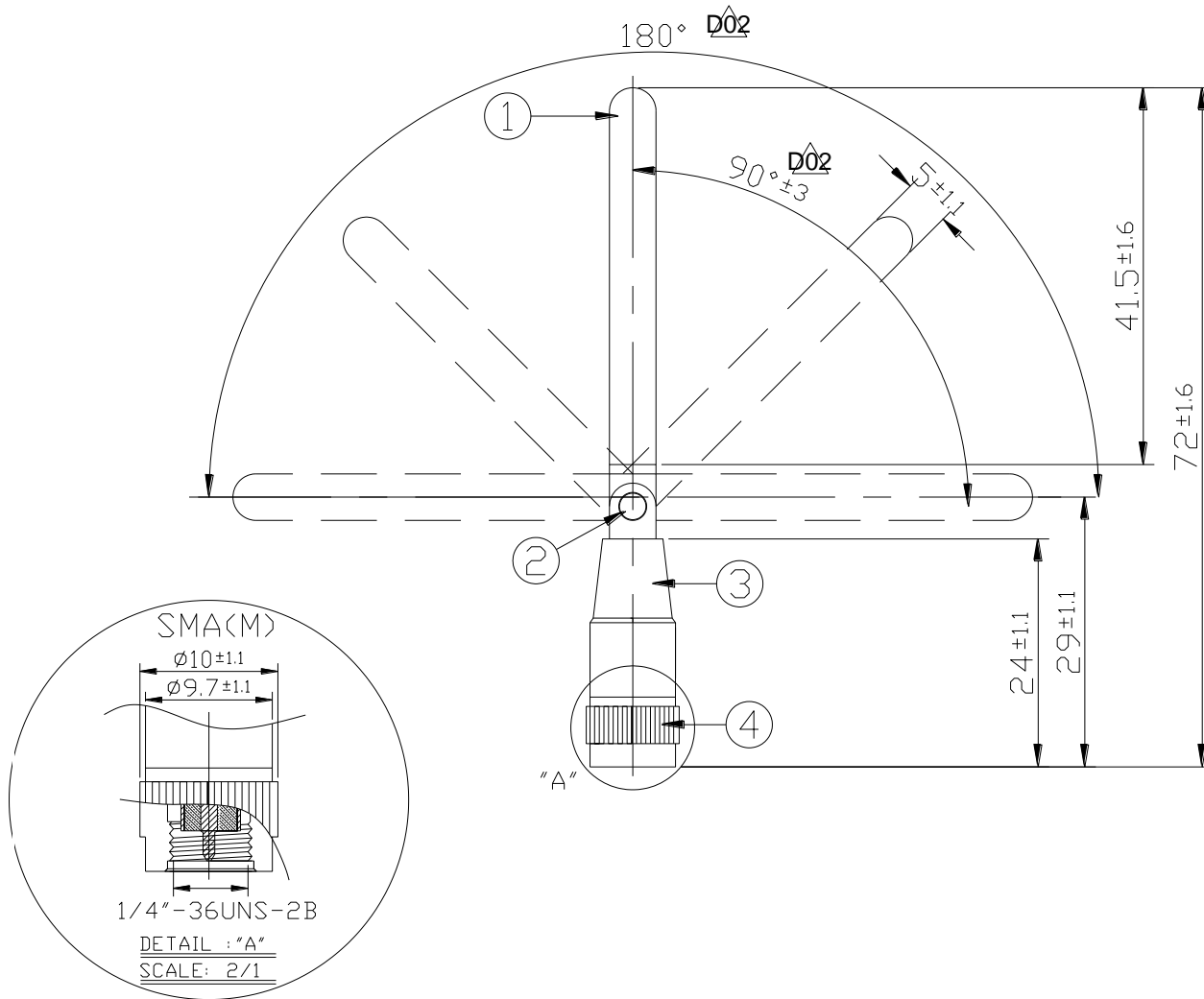
5. Installation



Recommended torque for mounting is 0.9 N.m

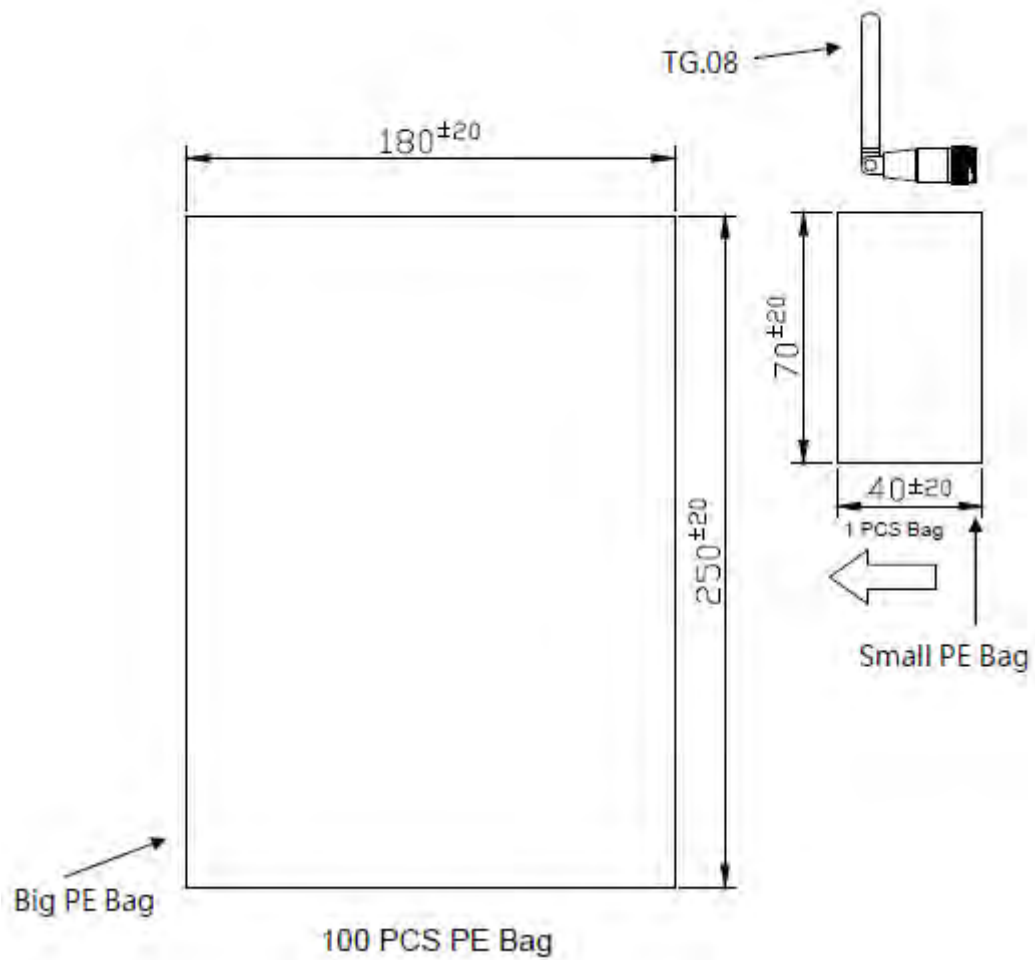
Maximum torque for mounting is 1.176 N.m

6. Drawing



	Name	P/N	Material	Finish	QTY
1	Housing	001013F000002A	POM	Black	1
2	Hinge	000613F000002A	Brass	Ni Plated	1
3	Cap	000713G000002A	POM	Orange $\Delta 0.3$	1
4	SMA(M) ST	200213F000002A	Brass	Ni Plated	1

7. Packaging



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