SPECIFICATION

Part No.	:	**MA240.LBI.001**
Product Name	:	MA240 Genesis LTE MIMO/GNSS 3in1 Adhesive Mount Combination Antenna 1* GNSS – GPS-GLONASS 2* 4G MIMO LTE 698 to 896/1710 to 2700MHz Supports 3G Fall-back
Features	:	IP67 Antenna 1* GPS-GLONASS: 2 meter RG-174 SMA(M) 2 * LTE: 2 meter Low loss NFC-200 SMA(M)ST Dimensions: 205.8mm x 58mm x 12.4mm **RoHS Compliant**

1. Introduction

The MA.240 4G Genesis antenna is an omni-directional, fully IP67 waterproof external M2M antenna for use in telematics, transportation and remote monitoring applications worldwide. It is designed to be mounted directly on glass or plastic in the interior of vehicles.

Typical applications
- HD Video over LTE
- First Responder and Emergency Services
- Automotive Vehicle Tracking and Telematics

This unique antenna delivers powerful MIMO antenna technology for worldwide 4G LTE bands at 700MHz/800MHz/1700MHz/1800MHz/2600MHz, plus GPS-GLONASS for next generation location accuracy.

4G wireless applications demand high speed data uplink and downlink. High efficiency and high gain MIMO antennas are necessary to achieve the required signal to noise ratio and throughput required to solve these challenges. Taoglas also takes care to have high isolation between the two MIMO antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths. In contrast, smaller MIMO antennas with poorer quality thinner cables will have much reduced efficiency and isolation, which would lead to a large drop in system throughput or drops, and may indeed not make a system connection at all.

The GPS-Glonass antenna has been carefully designed to work equally well on both GPS and Glonass bands, leading to higher location accuracy and stability of tracking in urban environments.

Finally, if your device requires USA LTE certification with an external antenna then the MA240 is the ideal solution to pass approvals.

Cable length and connector types are customizable. Contact your regional Taoglas sales office for support.

2. Specification

GPS-GLONASS	
Center Frequency	GPS:1575.42±3 MHz GLONASS:1602±0.5 MHz
Passive Antenna Gain	GPS: 1.67dBi GLONASS: 0.37dBi
VSWR	1.5:1 Max
Impedance	50Ω
Cable	2 meters RG174 standard, fully customizable
Connector	SMA(M), standard, fully customizable
LNA Electrical Properties	
Center Frequency	GPS:1575.42±3 MHz GLONASS:1602±0.5 MHz
Impedance	50 Ohm
VSWR	< 1.5:1
Return Loss	10 dB Min.
Gain	3.3V 30dB
DC Power Input	3.3V
Noise Figure @3.3V	1.7dB

4G/3G MIMO1 Antenna									
Frequency (MHz)		698~803	824~894	880~960	1710~1880	1850~1990	1920~2170	2490~2690	3410~3490
Efficiency (%)									
In free space	30cm	72.01	45.99	34.09	73.58	68.59	33.44	63.58	38.76
	1M	70.55	56.19	39.21	66.54	52.25	45.40	59.01	33.16
	2M	64.18	42.21	29.69	60.55	33.71	27.32	50.17	29.20
	3M	59.38	37.78	27.57	53.47	29.71	23.89	42.78	24.46
	5M	51.25	31.84	23.14	41.89	22.94	18.50	32.70	17.59
On the 2mm ABS base	30cm	65.93	36.48	26.86	60.26	38.12	30.54	56.90	32.33
	1M	71.92	52.85	31.51	62.46	48.02	42.26	59.79	34.38
	2M	58.76	34.28	23.40	49.55	31.05	24.95	44.87	24.37
	3M	56.15	31.80	21.72	44.39	29.14	22.18	38.32	20.40
	5M	46.95	25.27	18.25	34.28	21.13	16.89	29.24	14.68
On the glass base	30cm	43.02	18.05	11.86	37.76	27.71	27.15	58.38	30.74
	1M	49.79	15.28	8.64	38.20	35.24	37.66	63.96	32.37
	2M	38.34	17.81	10.33	31.05	22.58	22.19	46.02	23.13
	3M	36.20	16.54	9.59	27.82	20.43	18.90	39.31	18.78
	5M	30.66	12.52	8.06	21.48	15.35	15.02	29.99	13.94
Average Gain(dBi)									
In free space	30cm	-1.46	-3.39	-4.75	-1.44	-1.67	-4.84	-1.98	-4.45
	1M	-1.52	-2.53	-4.23	-1.82	-2.84	-3.49	-2.31	-4.98
	2M	-1.96	-3.76	-5.35	-2.29	-4.79	-5.72	-3.01	-5.70
	3M	-2.30	-4.25	-5.68	-2.83	-5.34	-6.30	-3.70	-6.45
	5M	-2.94	-4.99	-6.43	-3.89	-6.47	-7.41	-4.87	-7.90
On the 2mm ABS base	30cm	-1.86	-4.41	-5.79	-2.24	-4.27	-5.21	-2.46	-5.34
	1M	-1.44	-2.83	-5.26	-2.10	-3.21	-3.79	-2.25	-4.80
	2M	-2.36	-4.67	-6.39	-3.10	-5.16	-6.09	-3.49	-6.59
	3M	-2.54	-5.00	-6.72	-3.57	-5.45	-6.61	-4.18	-7.34
	5M	-3.34	-6.01	-7.47	-4.70	-6.84	-7.78	-5.35	-8.79
On the glass base	30cm	-3.76	-7.54	-9.36	-4.28	-5.59	-5.70	-2.35	-5.32
	1M	-3.12	-8.39	-10.74	-4.24	-4.55	-4.27	-1.95	-4.90
	2M	-4.26	-7.59	-9.96	-5.13	-6.48	-6.58	-3.38	-6.57
	3M	-4.51	-7.92	-10.29	-5.61	-6.92	-7.25	-4.07	-7.53
	5M	-5.24	-9.14	-11.05	-6.73	-8.16	-8.27	-5.24	-8.77

Frequency (MHz)		698~803	824~894	880~960	1710~1880	1850~1990	1920~2170	2490~2690	3410~3490
Peak Gain(dBi)									
In free space									
	30cm	3.61	1.20	-0.05	3.31	3.41	-0.63	3.01	0.43
	1M	2.84	2.15	0.02	2.61	1.74	1.08	3.26	-0.68
	2M	3.11	0.98	-0.65	2.46	-0.33	-1.50	1.98	-0.82
	3M	2.78	0.35	-0.98	1.92	-0.89	-2.09	1.28	-1.57
	5M	2.14	-0.40	-1.74	0.86	-2.01	-3.19	0.12	-3.02
On the 2mm ABS base	30cm	3.09	-0.25	-0.95	2.34	0.42	-0.30	2.97	-0.92
	1M	2.30	2.38	-0.13	2.12	1.09	0.81	3.11	-0.32
	2M	2.59	-0.57	-1.55	1.49	-0.47	-1.17	1.94	-2.17
	3M	2.49	-0.90	-1.88	1.08	-0.77	-1.79	1.26	-2.92
	5M	1.62	-1.85	-2.64	-0.11	-2.15	-2.87	0.08	-4.37
On the glass base	30cm	1.04	-3.36	-5.33	0.57	-0.37	0.31	3.15	0.82
	1M	0.78	-3.92	-6.55	1.42	0.67	1.21	4.22	1.80
	2M	0.54	-3.22	-5.93	0.99	-1.26	-0.57	2.12	-0.43
	3M	0.27	-3.55	-6.25	-0.72	-1.76	-1.37	1.43	-0.97
	5M	-0.43	-4.96	-7.01	-1.89	-2.94	-2.26	0.26	-2.63

4G/3G MIMO2 Antenna									
Frequency (MHz)		698~803	824~894	880~960	1710~1880	1850~1990	1920~2170	2490~2690	3410~3490
Efficiency (%)									
In free space	30cm	58.24	56.13	53.67	76.47	68.59	62.96	74.88	56.10
	1M	64.65	57.39	48.73	62.52	53.06	48.63	50.84	30.29
	2M	51.90	46.53	46.74	62.79	55.87	51.48	59.06	42.12
	3M	47.88	45.93	43.42	55.53	49.19	45.01	50.66	35.40
	5M	41.47	38.78	36.45	43.44	38.00	34.87	38.49	25.38
On the 2mm ABS base	30cm	63.50	33.06	39.97	69.58	59.05	54.39	61.78	39.33
	1M	73.97	51.78	44.03	63.30	48.55	46.18	52.15	27.82
	2M	56.60	29.34	34.82	57.11	48.11	44.46	48.71	29.50
	3M	53.49	27.18	32.32	50.22	44.24	38.88	41.62	30.25
	5M	45.23	22.87	27.09	39.51	32.73	30.11	31.75	17.78
On the glass base	30cm	66.98	26.43	29.96	63.52	59.22	60.07	71.14	38.27
	1M	52.66	47.32	35.07	53.47	52.02	50.64	64.75	29.52
	2M	59.70	23.27	26.09	52.25	48.25	49.10	56.09	28.70
	3M	57.47	21.58	23.80	46.05	42.08	42.68	47.91	26.90
	5M	47.72	18.28	20.30	36.15	32.78	33.26	36.55	17.29
Average Gain(dBi)									
In free space	30cm	-2.37	-2.71	-2.88	-1.17	-1.67	-2.04	-1.27	-2.53
	1M	-1.92	-2.46	-3.24	-2.05	-2.83	-3.19	-2.96	-5.19
	2M	-2.87	-3.52	-3.48	-2.03	-2.55	-2.91	-2.30	-3.78
	3M	-3.22	-3.56	-3.81	-2.56	-3.11	-3.50	-2.97	-4.53
	5M	-3.85	-4.31	-4.56	-3.63	-4.23	-4.61	-4.16	-5.98
On the 2mm ABS base	30cm	-2.01	-4.90	-4.04	-1.59	-2.32	-2.65	-2.10	-4.05
	1M	-1.32	-2.92	-3.62	-2.03	-3.21	-3.41	-2.85	-5.56
	2M	-2.51	-5.42	-4.64	-2.44	-3.21	-3.53	-3.13	-5.30
	3M	-2.75	-5.74	-4.97	-3.00	-3.58	-4.11	-3.82	-5.26
	5M	-3.49	-6.50	-5.73	-4.04	-4.89	-5.22	-4.99	-7.50
On the glass base	30cm	-1.88	-5.81	-5.27	-2.02	-2.29	-2.22	-1.48	-4.17
	1M	-2.95	-3.28	-4.57	-2.81	-2.87	-2.98	-1.90	-5.30
	2M	-2.38	-6.36	-5.87	-2.88	-3.18	-3.09	-2.52	-5.42
	3M	-2.51	-6.69	-6.29	-3.43	-3.78	-3.70	-3.20	-5.73
	5M	-3.36	-7.41	-6.96	-4.48	-4.86	-4.79	-4.38	-7.62

Peak Gain(dBi)									
In free space	30cm	1.57	1.71	1.59	3.04	3.41	3.21	4.82	4.81
	1M	2.41	2.17	1.33	2.00	2.14	1.94	2.16	1.29
	2M	1.07	0.83	0.99	2.19	2.52	2.33	3.78	3.56
	3M	0.74	0.85	0.66	1.65	1.96	1.75	3.14	2.81
	5M	0.10	0.11	-0.09	0.59	0.84	0.64	1.92	1.36
On the 2mm ABS base	30cm	3.44	-0.13	0.28	2.23	2.06	2.09	2.56	2.44
	1M	2.26	0.96	0.89	1.98	2.03	2.04	2.58	0.93
	2M	2.94	-0.50	-0.32	1.38	1.17	1.22	1.53	1.19
	3M	2.75	-0.83	-0.58	0.75	0.69	0.59	0.84	1.11
	5M	1.96	-1.73	-1.41	-0.22	-0.50	-0.47	-0.33	-1.01
On the glass base	30cm	2.66	-1.47	-0.30	3.37	2.59	2.92	5.87	3.50
	1M	0.85	1.65	-0.30	1.95	2.45	2.45	4.25	-0.01
	2M	2.16	-2.19	-0.90	2.51	1.70	2.05	4.84	2.25
	3M	2.10	-2.51	-1.43	2.09	1.11	1.31	4.16	0.65
	5M	1.18	-3.07	-1.99	0.91	0.02	0.35	2.98	0.05

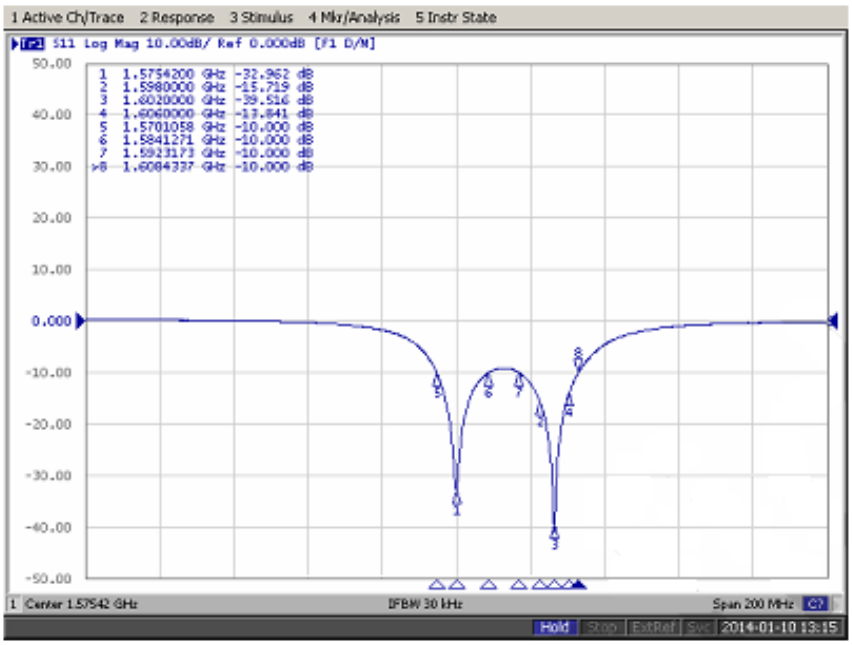
MECHANICAL	
Antenna Dimensions	205.8 x 58 x 12.4mm
Housing	PC+ABS Alloy
Ingress Protection Rating	IP67
Weight	250g
ENVIRONMENTAL	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 90°C
Humidity	Non-condensing 65°C 95% RH

3. Antenna Characteristics

3.1 GPS-GLONASS Antenna

3.1.1 Test Setup

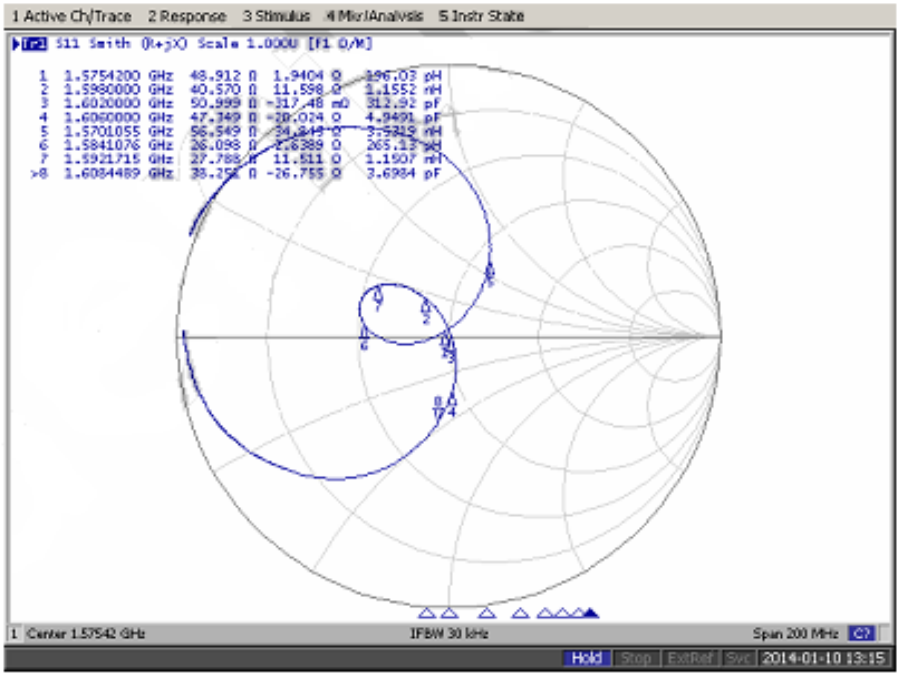
3.1.2 GPS-GLONASS Return Loss



Return Loss : -32.9 dB @ 1575.42MHz

Return Loss : -39.5 dB @ 1602MHz

3.1.3 GPS-GLONASS Smith Chart

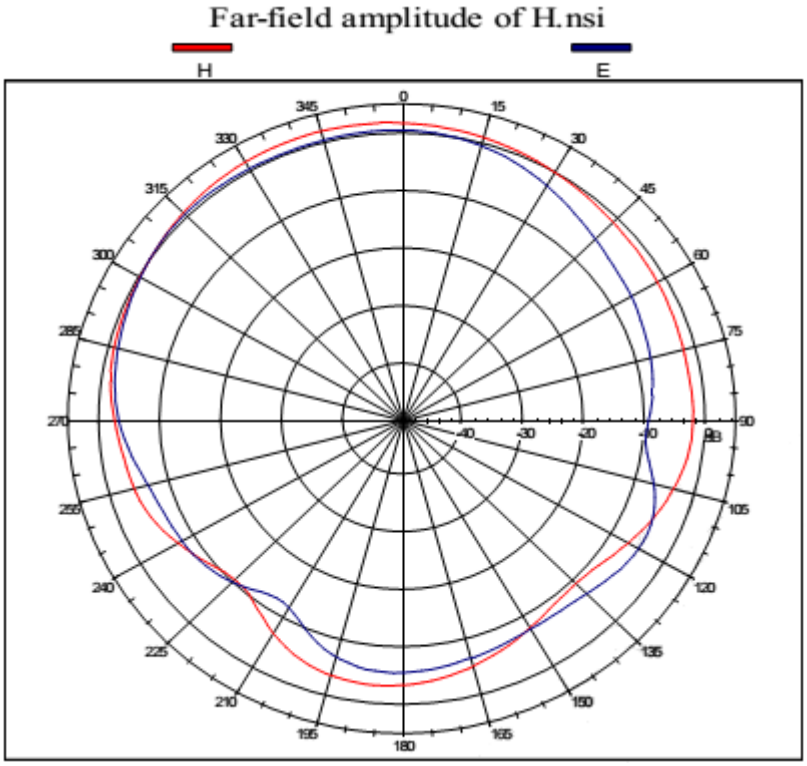


Impedance : 48.9+j1.9 Ohm@ 1575.42MHz

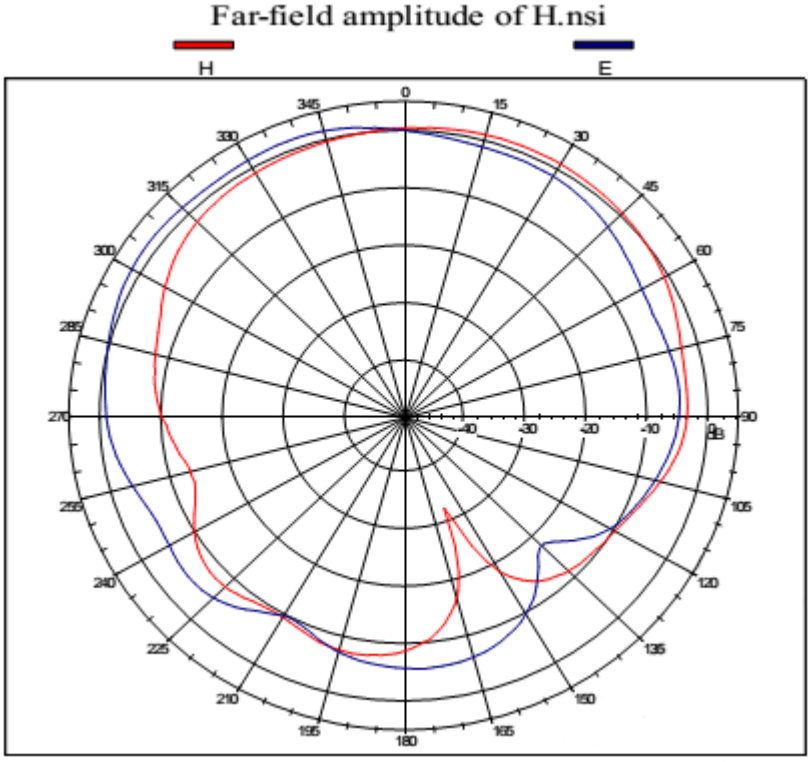
Impedance : 50.9-j0.3 Ohm@ 1602MHz

3.1.4 GPS-GLONASS Gain Pattern

Gain pattern @ 1575.42MHz

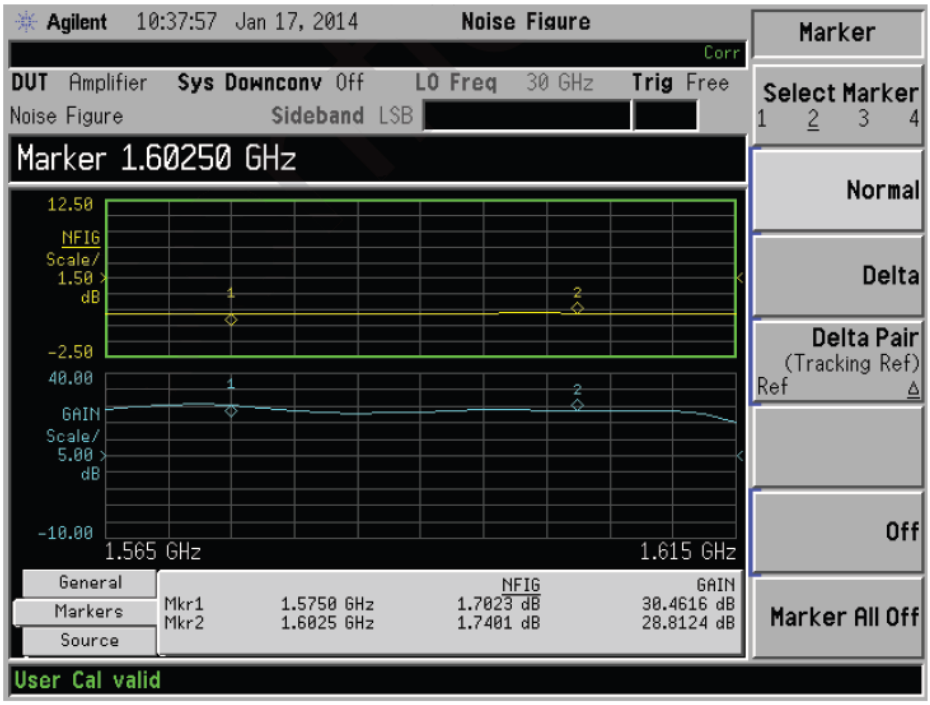


Gain pattern @ 1602MHz



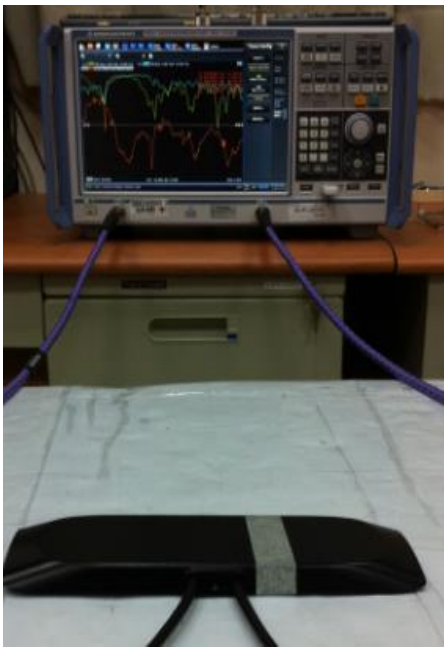
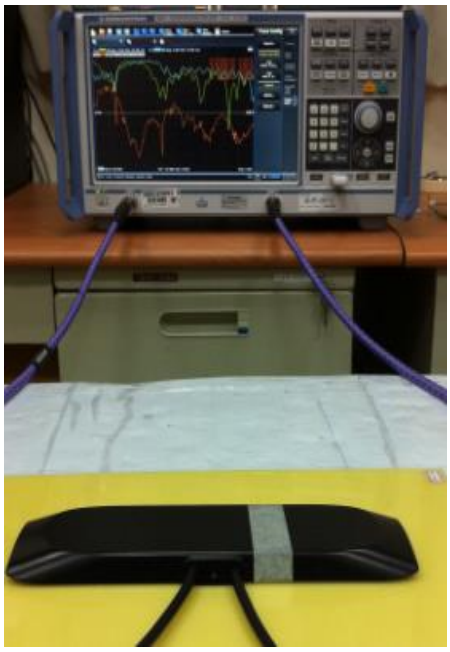
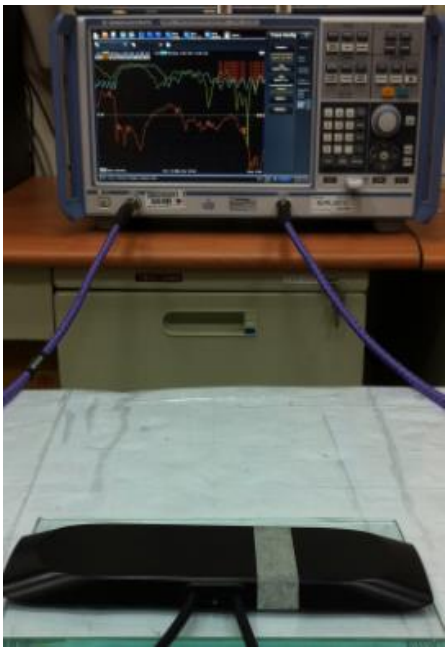
Gain Pattern Data				
Angle(°)	1575.42 MHz		1602 MHz	
	H	E	H	E
-90	-2.65	-3.35	-10.17	-1.12
-76	-0.98	-1.65	-7.82	0.16
-60	-0.15	-0.23	-4.64	1.65
-46	0.94	0.64	-2.01	1.62
-30	1.85	0.49	-0.90	1.59
-16	2.03	0.39	-0.39	1.63
0	1.67	0.44	0.37	-0.10
16	0.82	-0.69	0.90	-1.31
30	-0.23	-2.91	0.89	-1.56
46	-1.38	-5.56	0.16	-3.28
60	-1.90	-6.83	-1.12	-5.34
76	-2.49	-9.09	-3.33	-5.26
90	-2.50	-9.82	-3.93	-5.24

3.1.5 GPS-GLONASS LNA Noise Figure



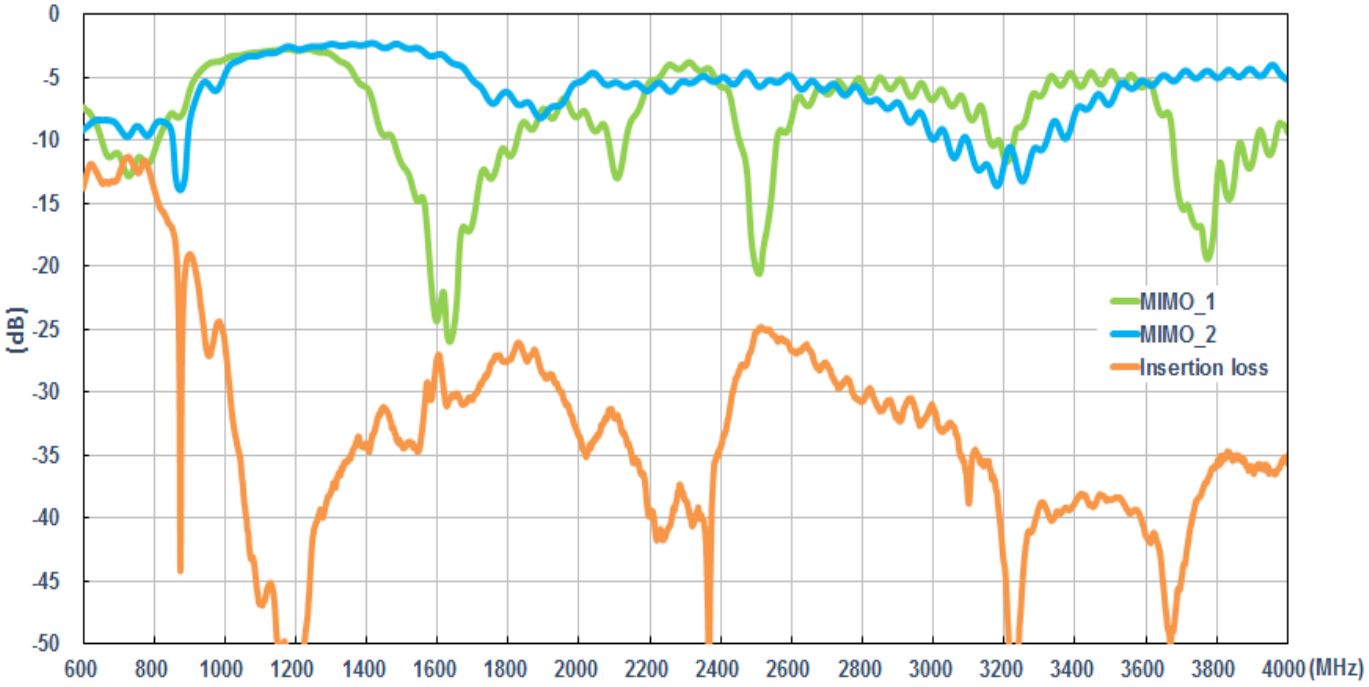
3.2 LTE MIMO Antenna

3.2.1 Test Setup

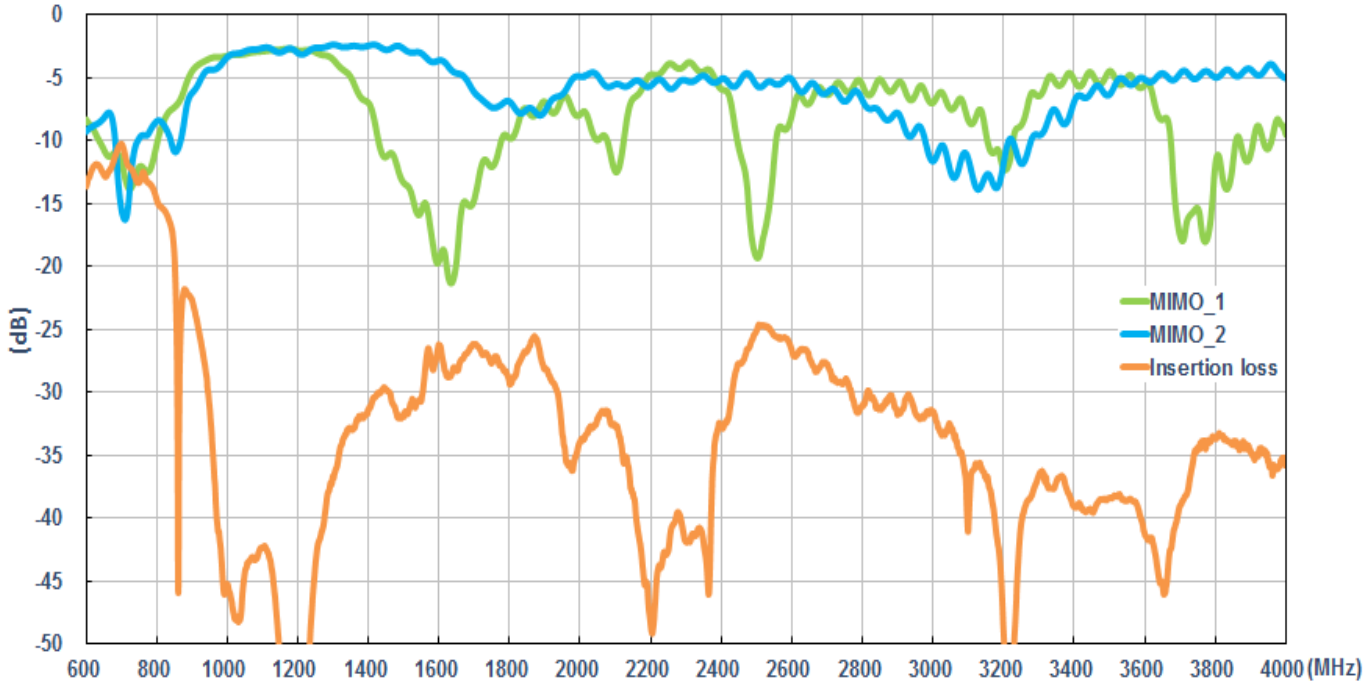
In free space	On 2mm ABS base	On the glass base
		

3.2.2 LTE Antenna Return Loss

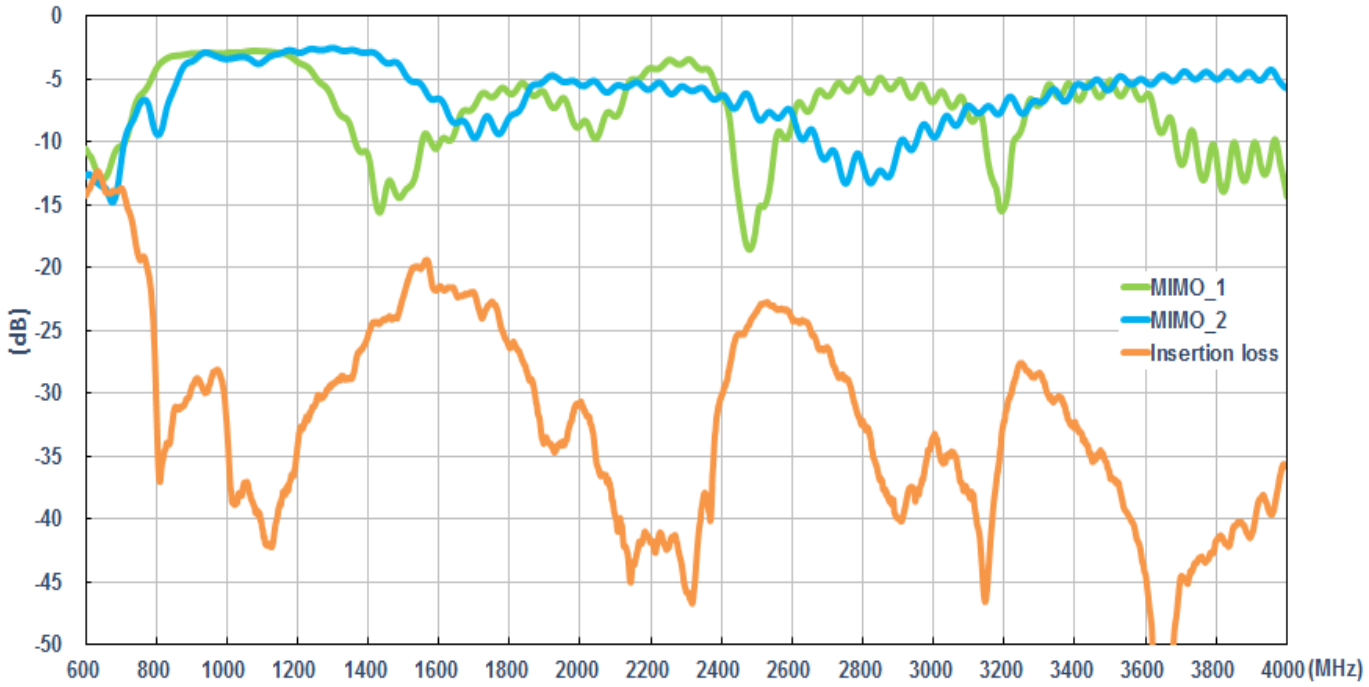
Setup in the free space with 2 meters cable length



Setup on the 2mm ABS base with 2 meters cable length

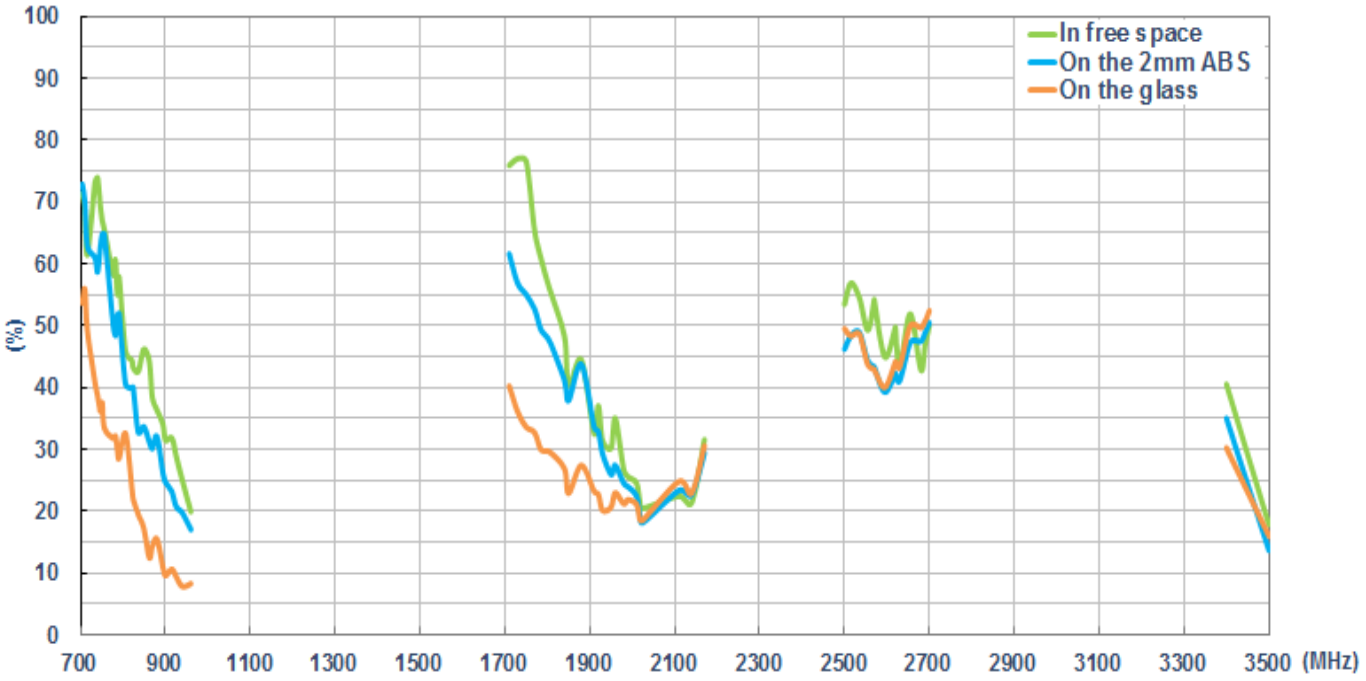


Setup on the glass base with 2 meters cable length

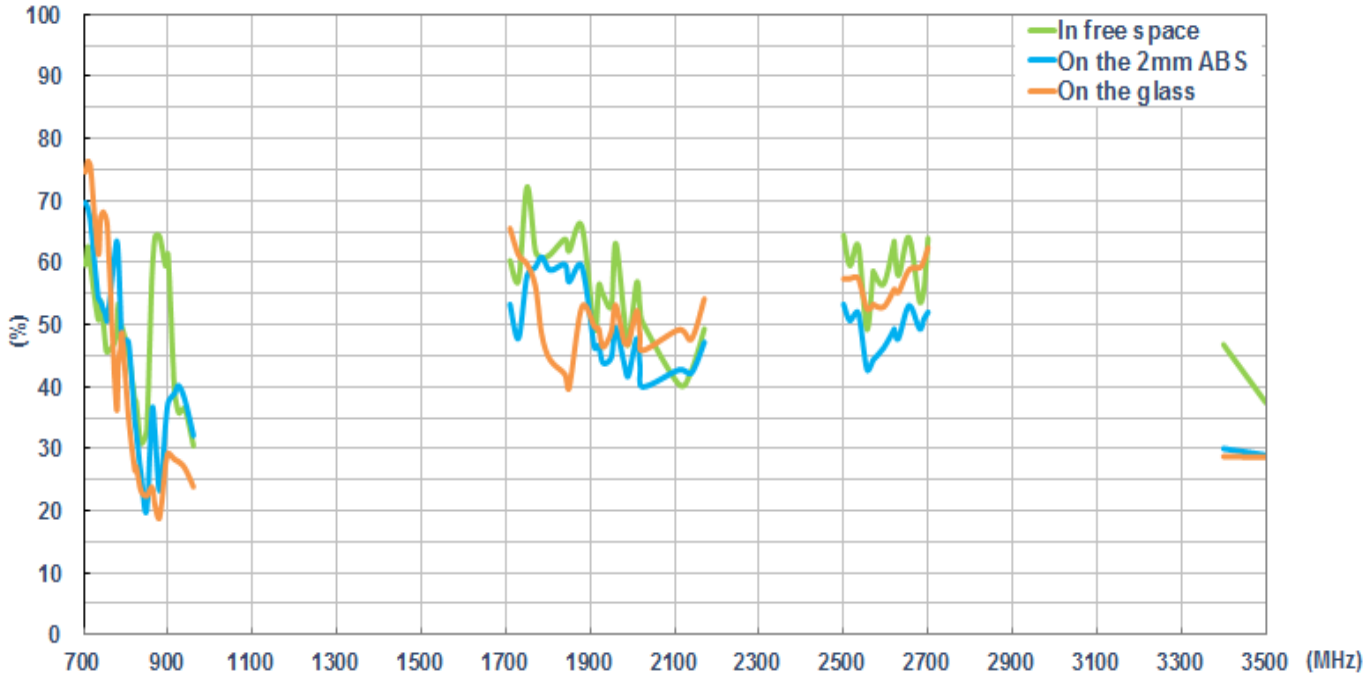


3.2.3 LTE Antenna Efficiency

MIMO_1

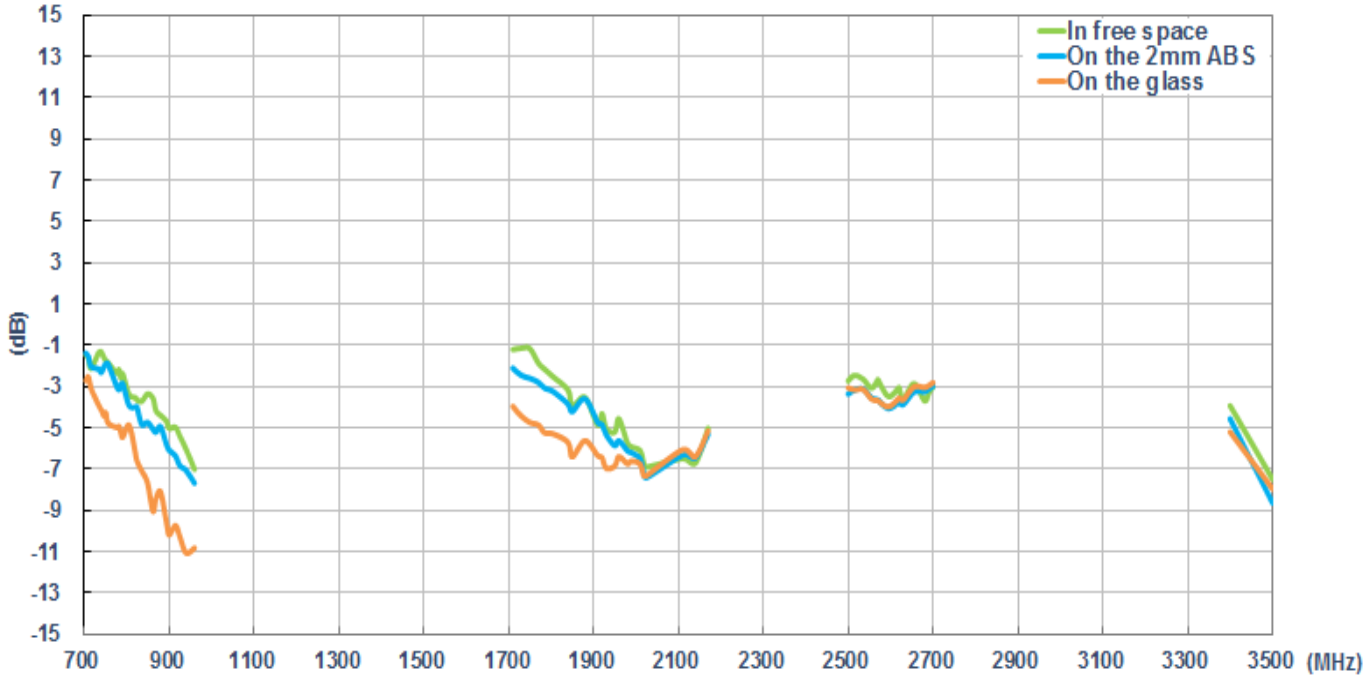


MIMO_2

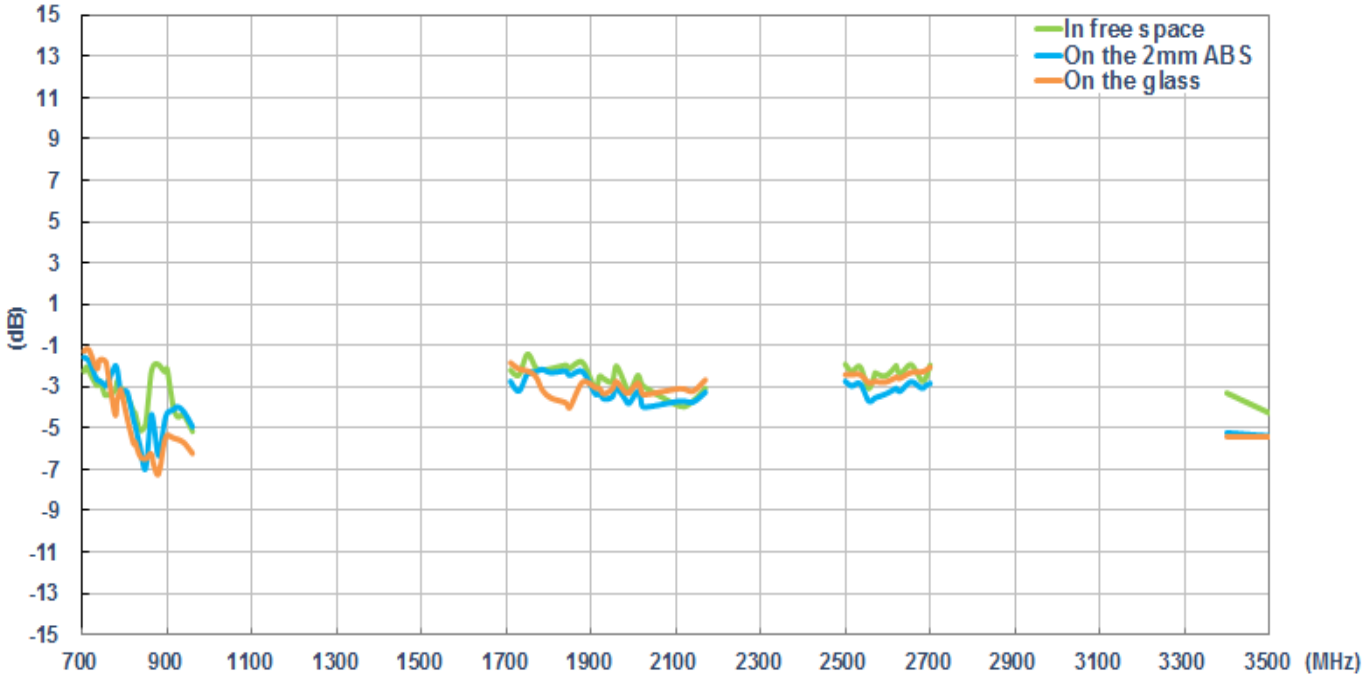


3.2.4 LTE Antenna Average Gain

MIMO_1

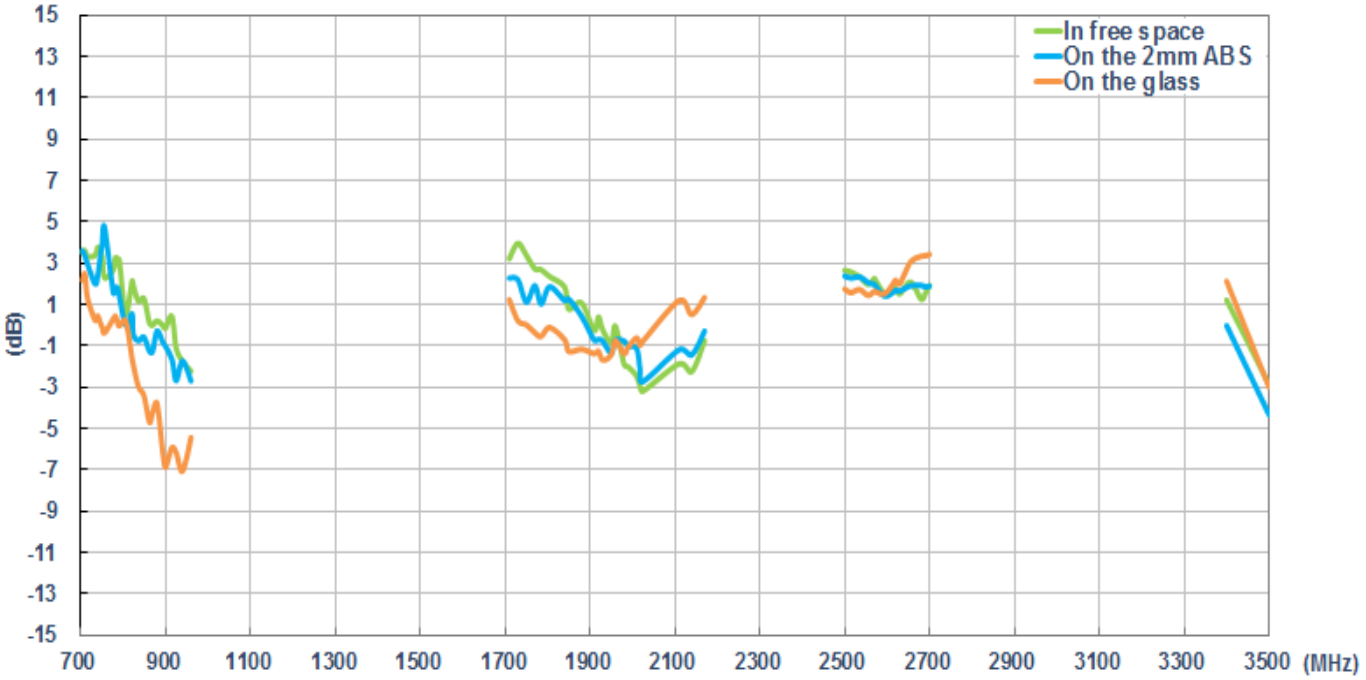


MIMO_2

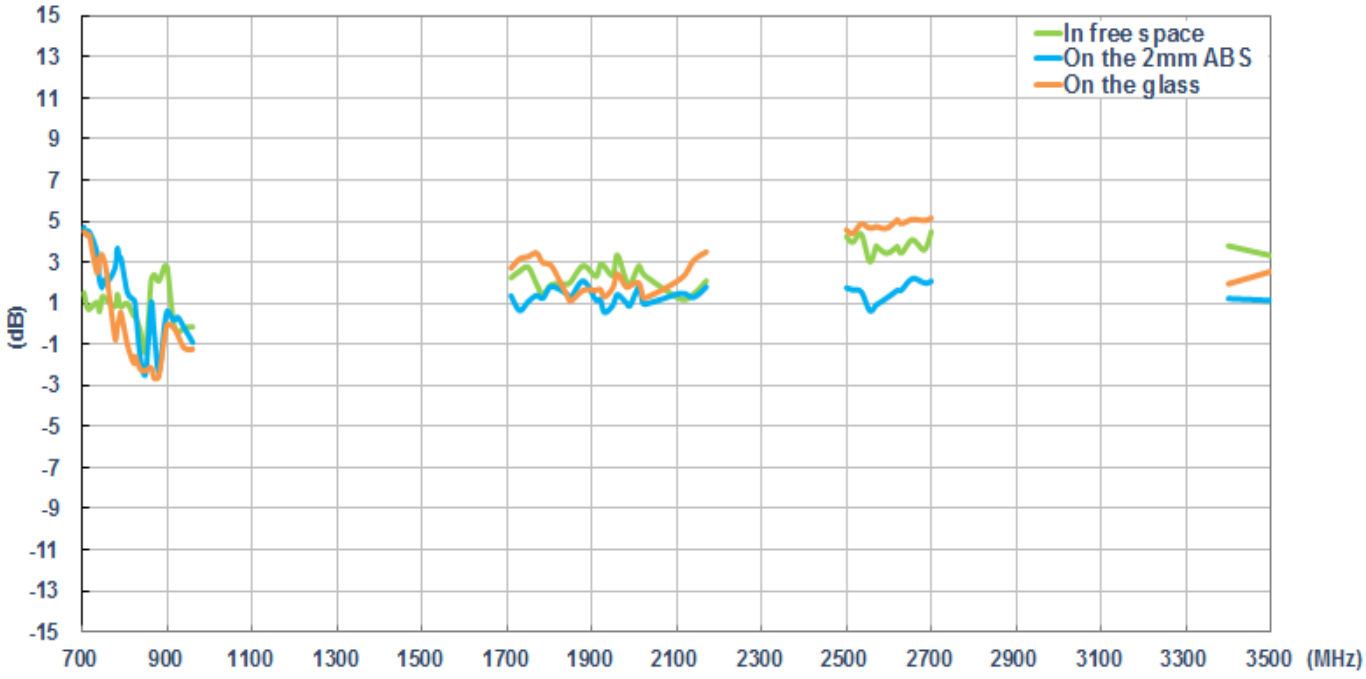


3.2.5 LTE Antenna Peak Gain

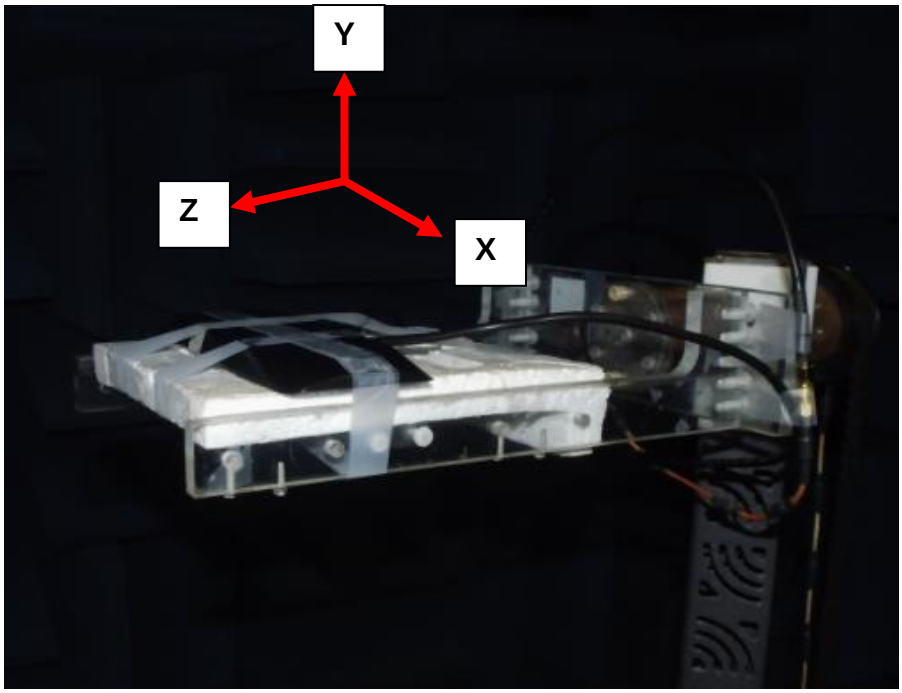
MIMO_1



MIMO_2



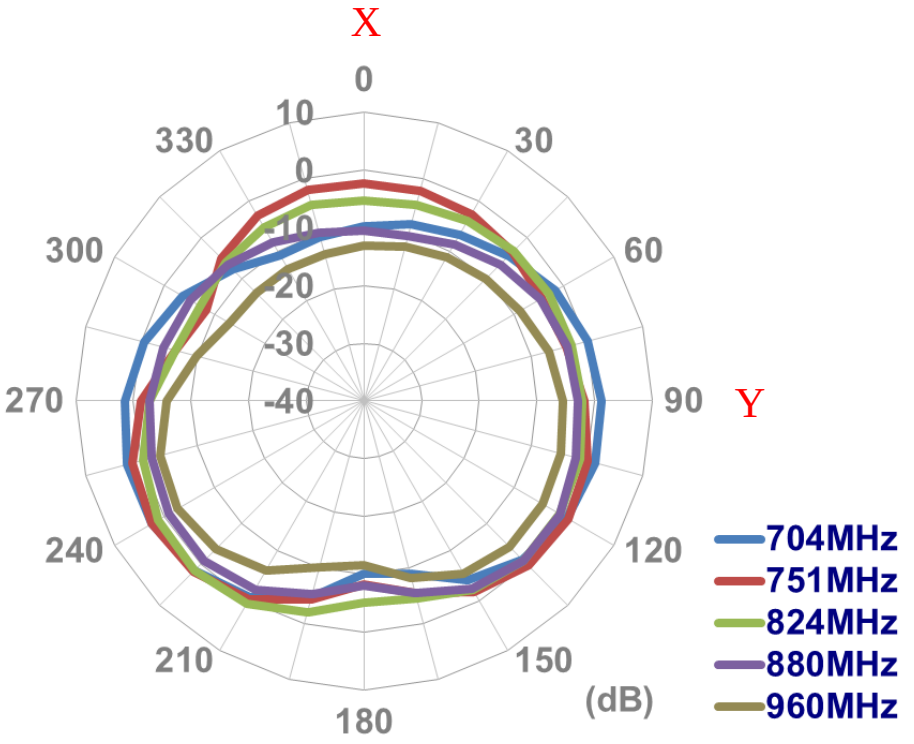
3.2.6 Test Setup For Antenna Radiation Pattern (ETS Anechoic chamber)

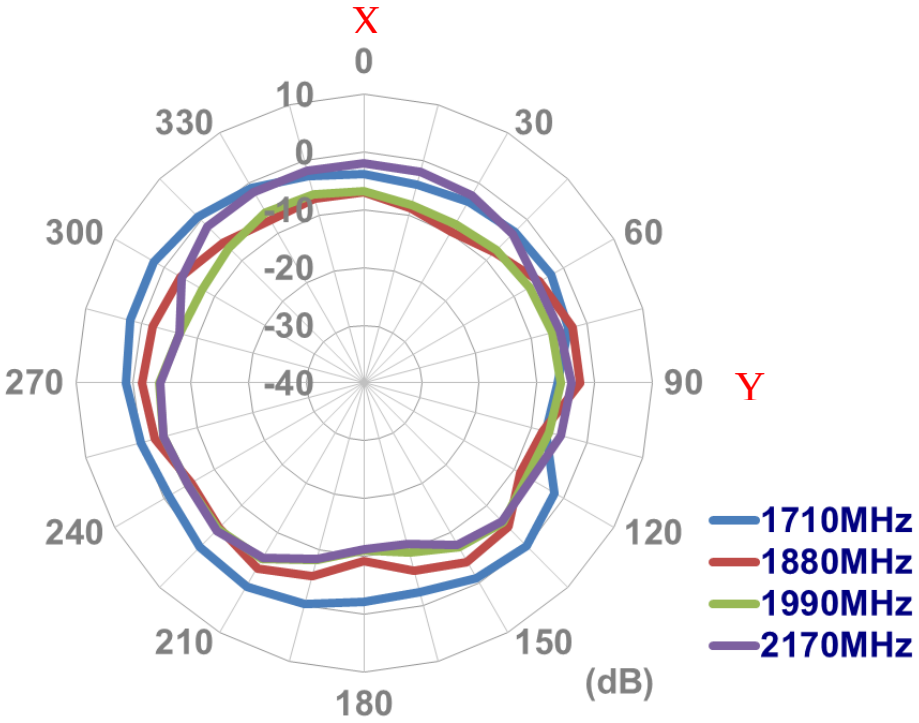


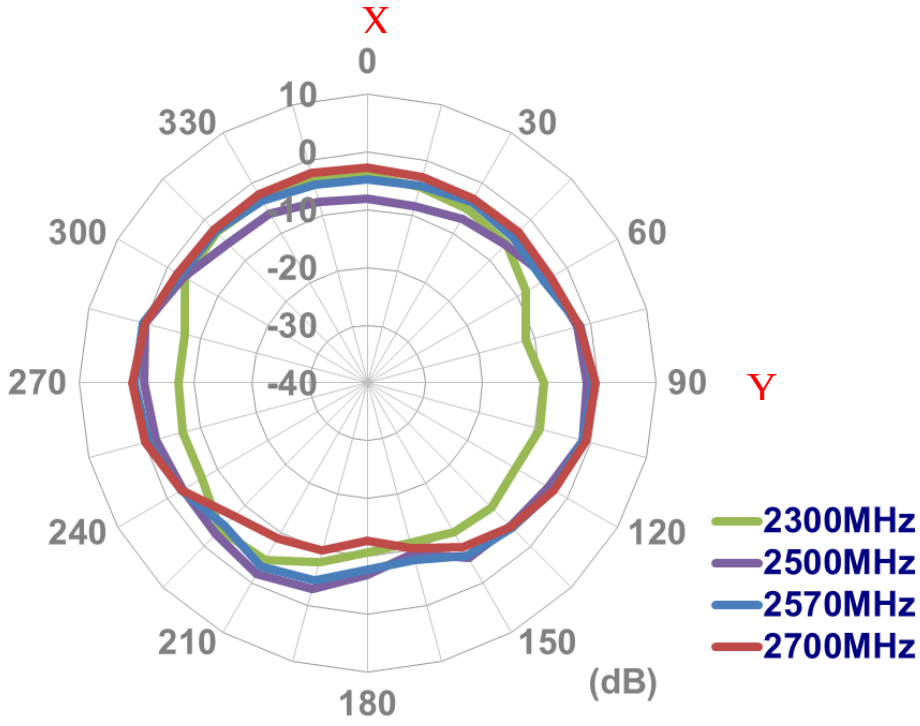
In free space

3.2.7 2D Radiation pattern (MIMO1 with 2M cable length in free space)

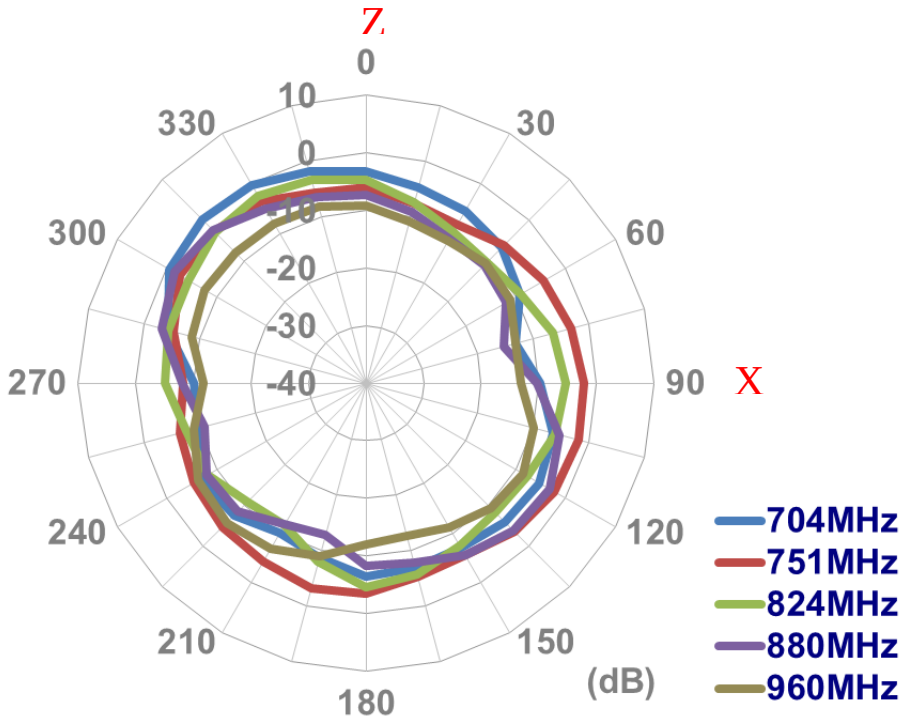
XY Plane

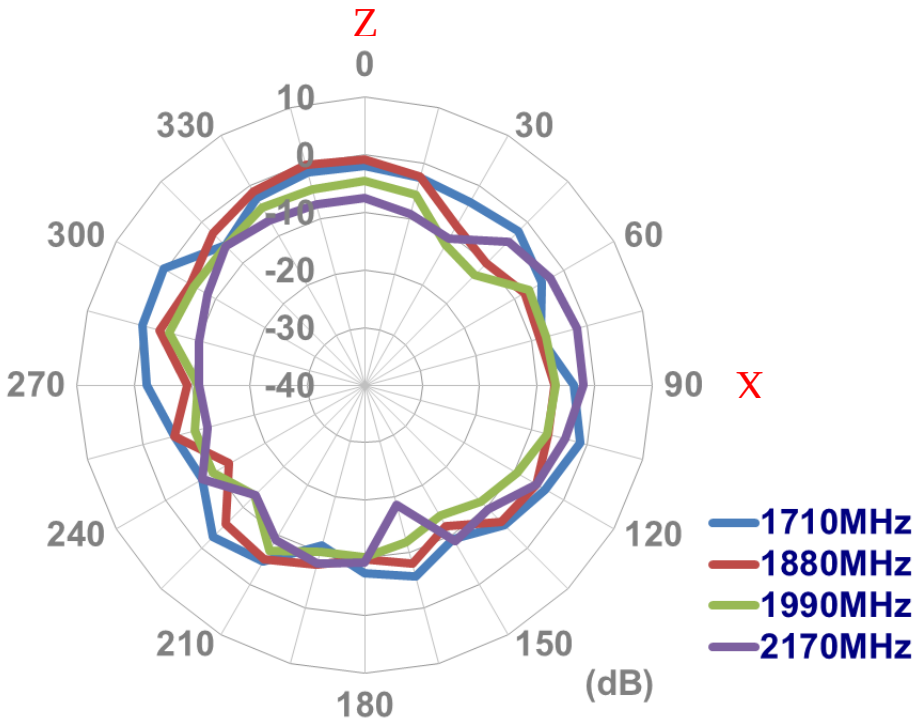


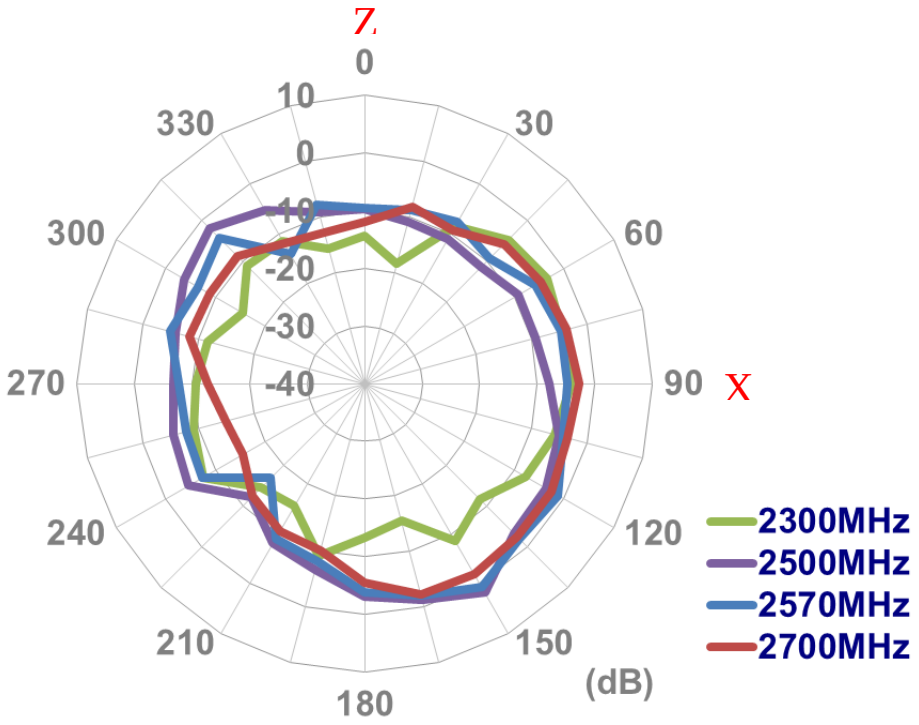



X
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

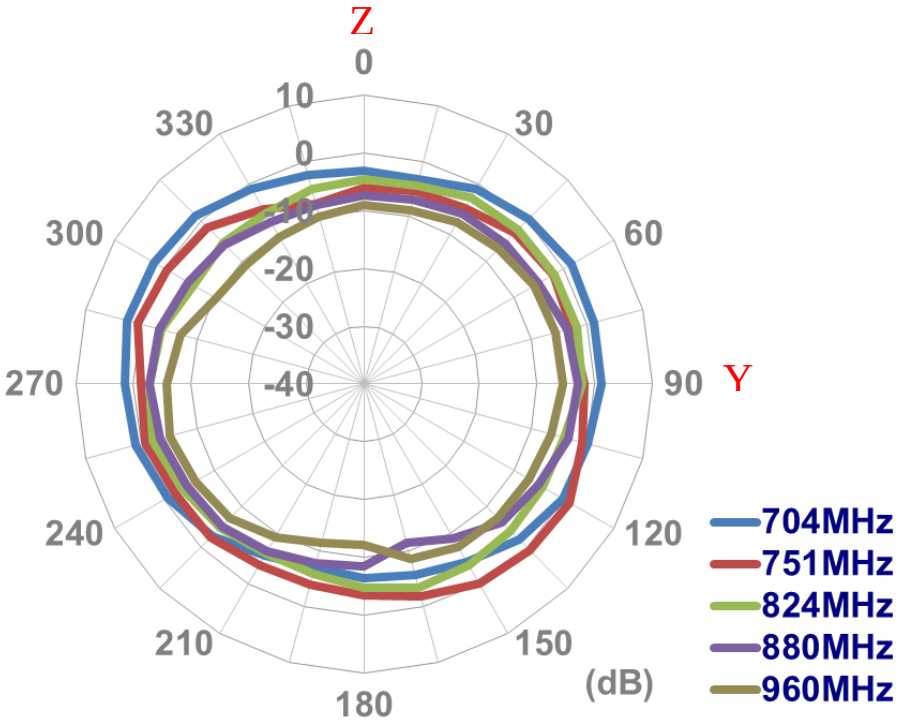
XZ Plane

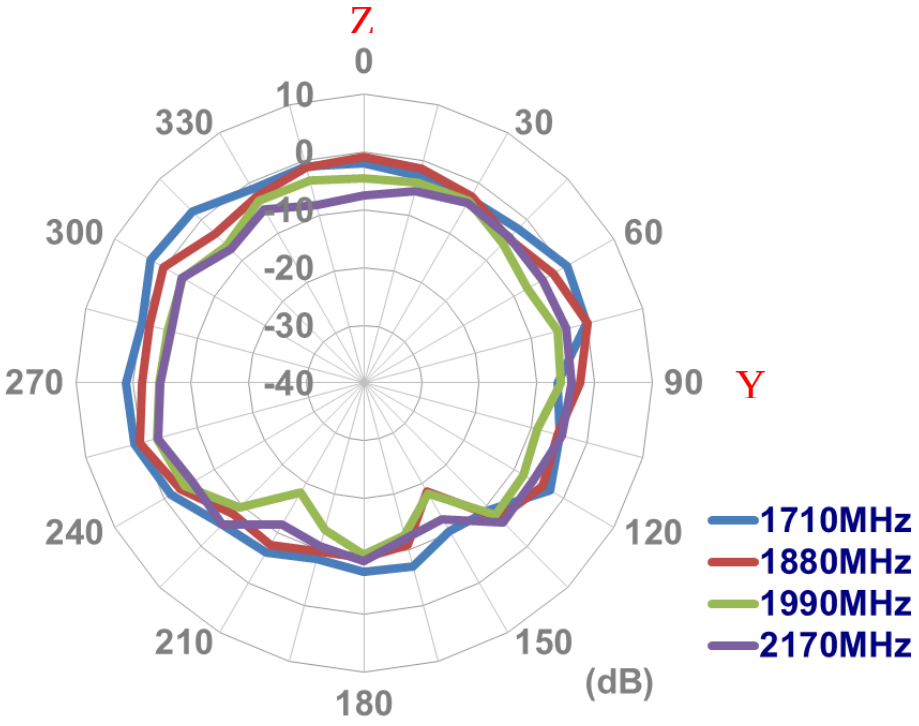

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

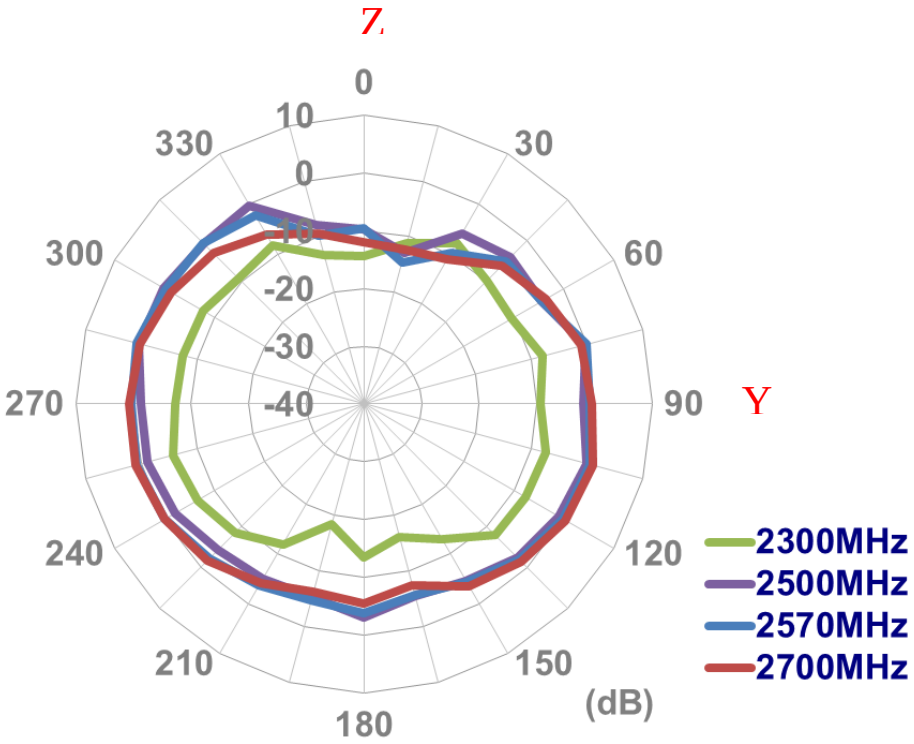

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

YZ Plane

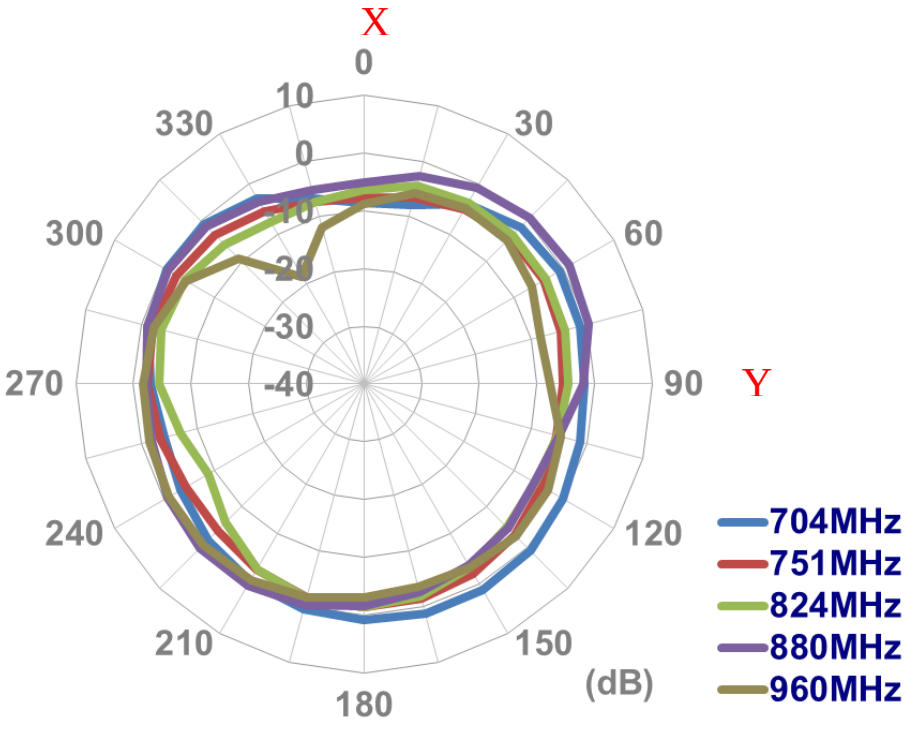

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
(dB)
180
704MHz
751MHz
824MHz
880MHz
960MHz

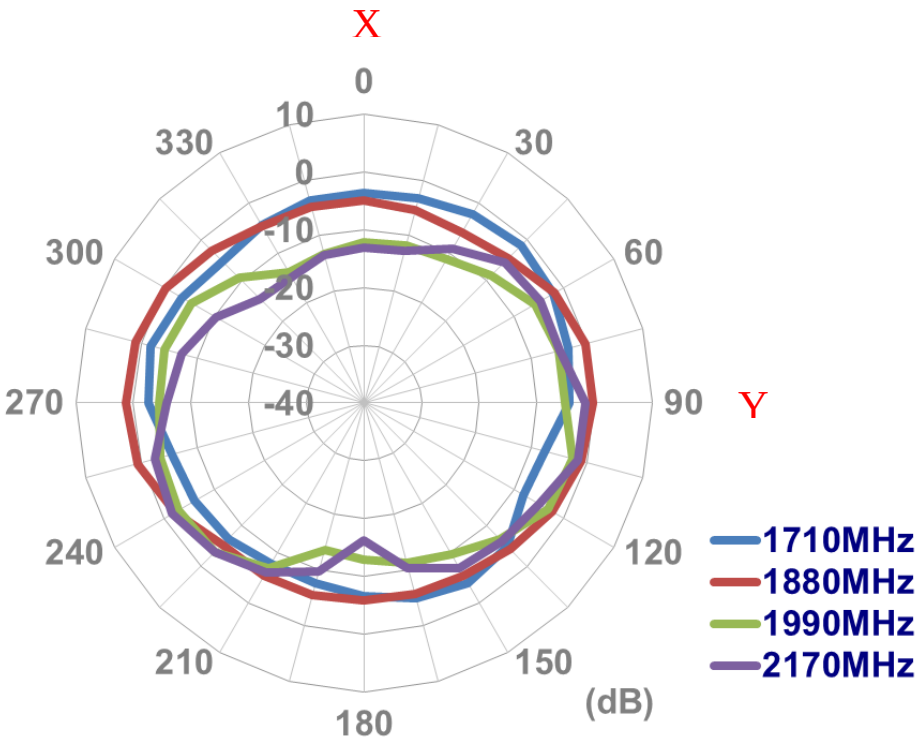

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
(dB)
180
1710MHz
1880MHz
1990MHz
2170MHz

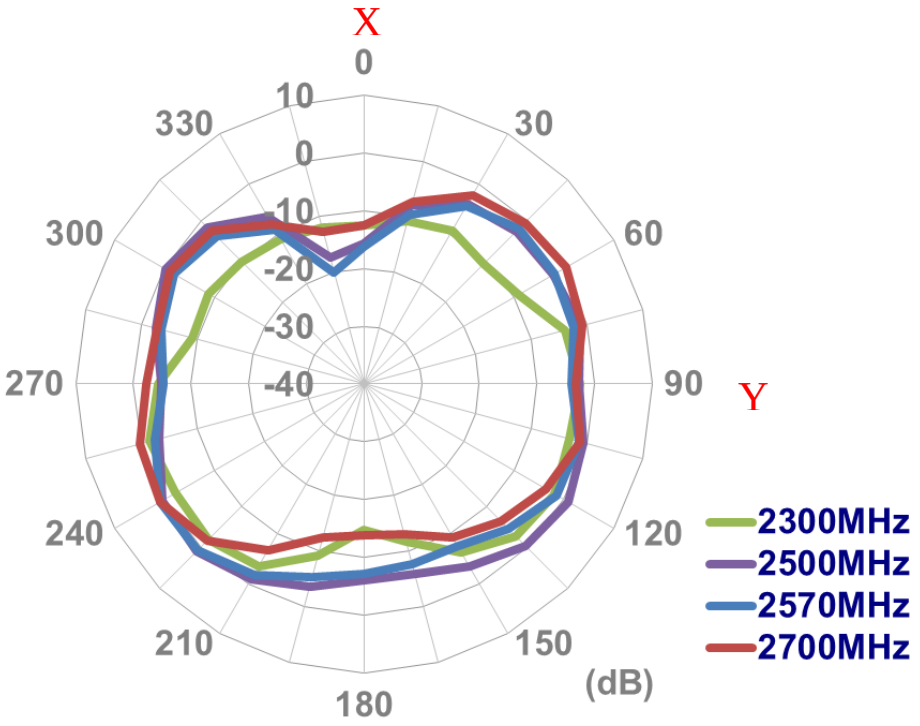


3.2.8 2D Radiation pattern (MIMO2 with 2M cable length in free space)

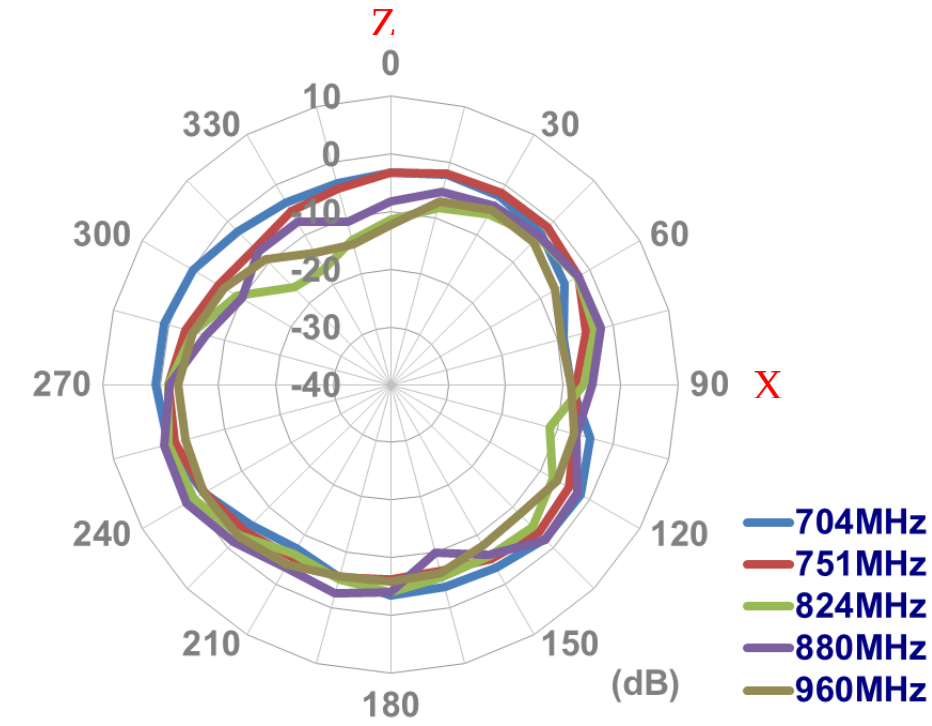
XY Plane

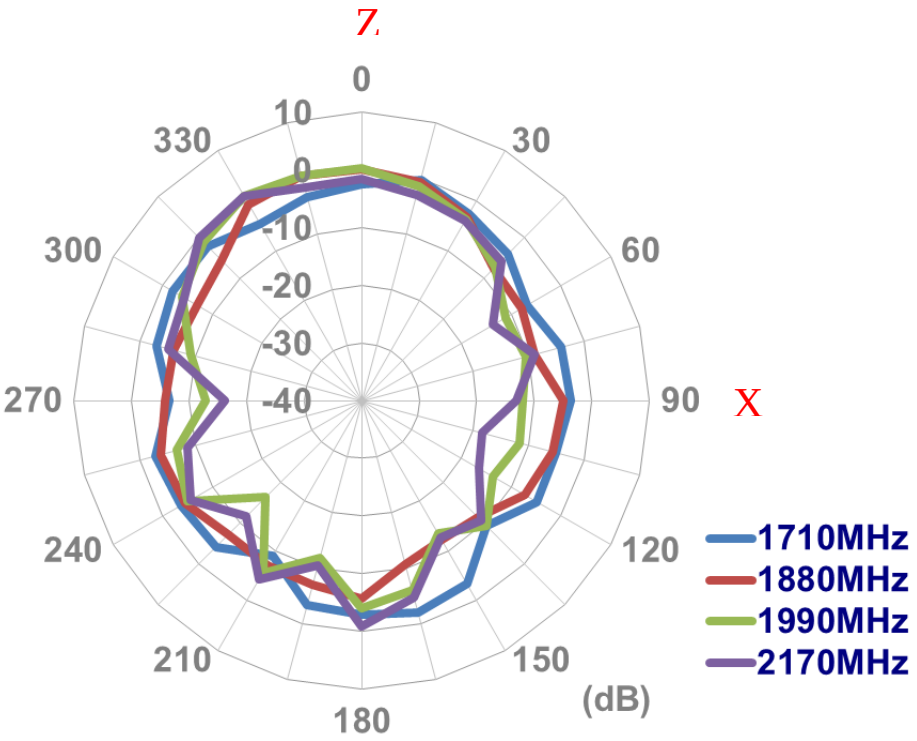


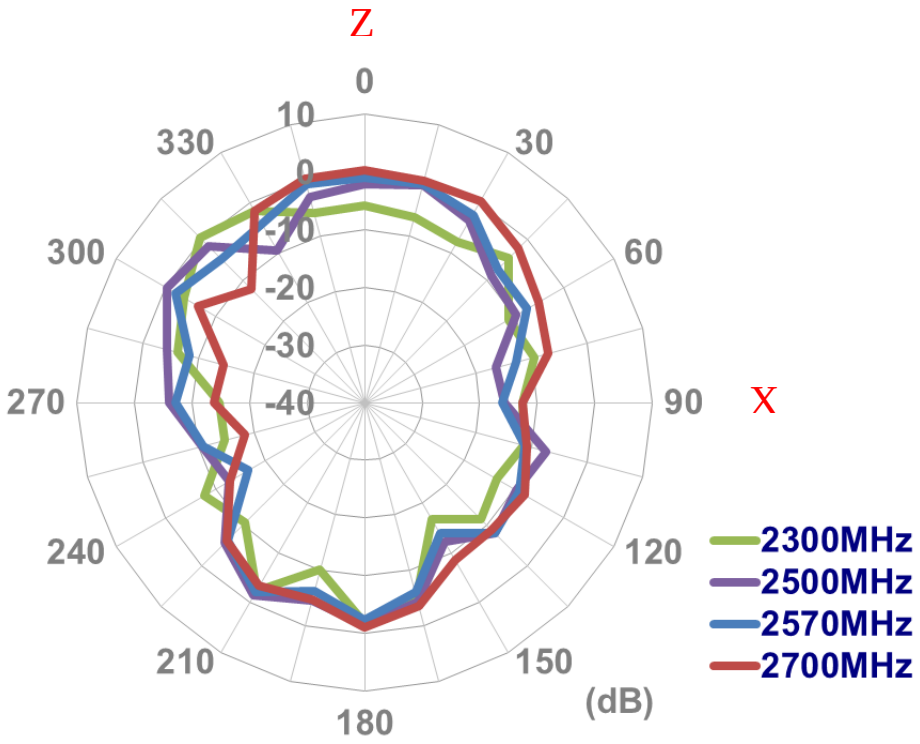

X
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


X
0
10
30
330
0
60
10
300
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

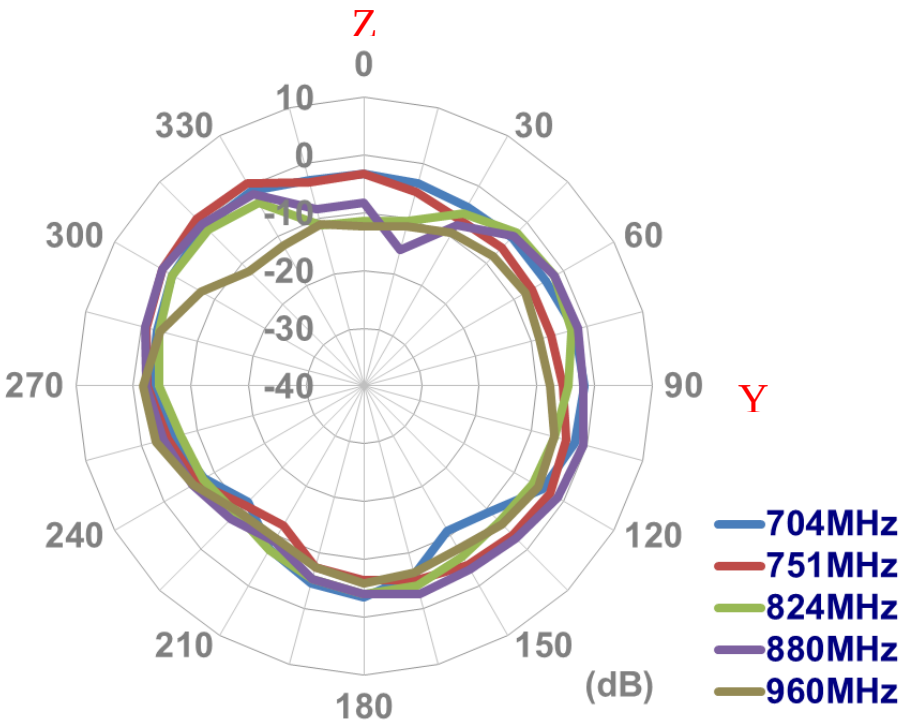
XZ Plane

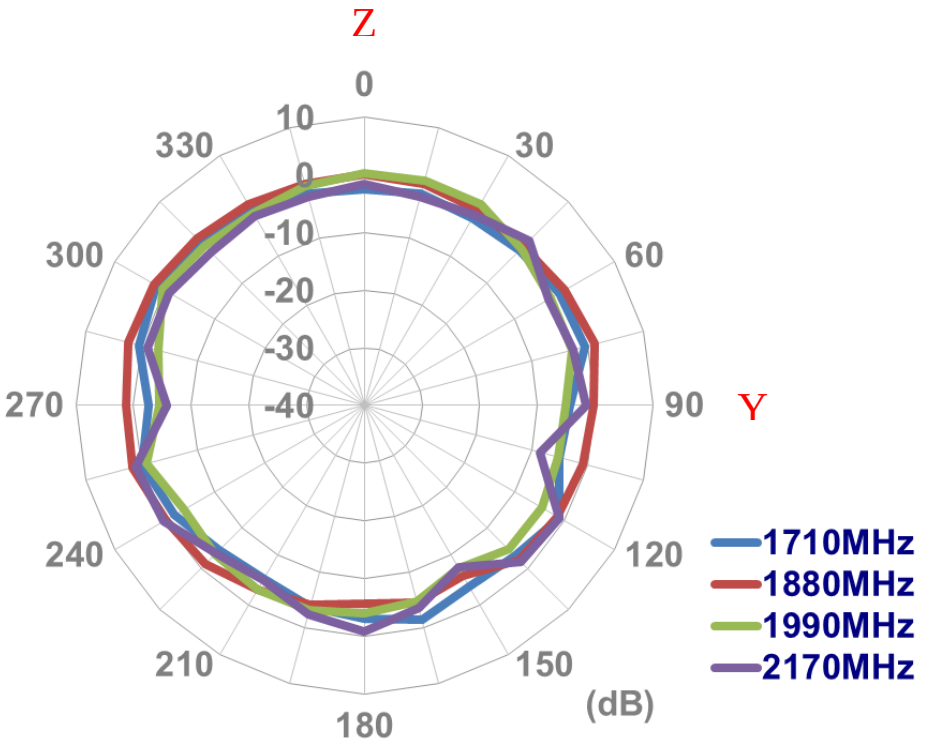

Z
0
10
30
60
90
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
X
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

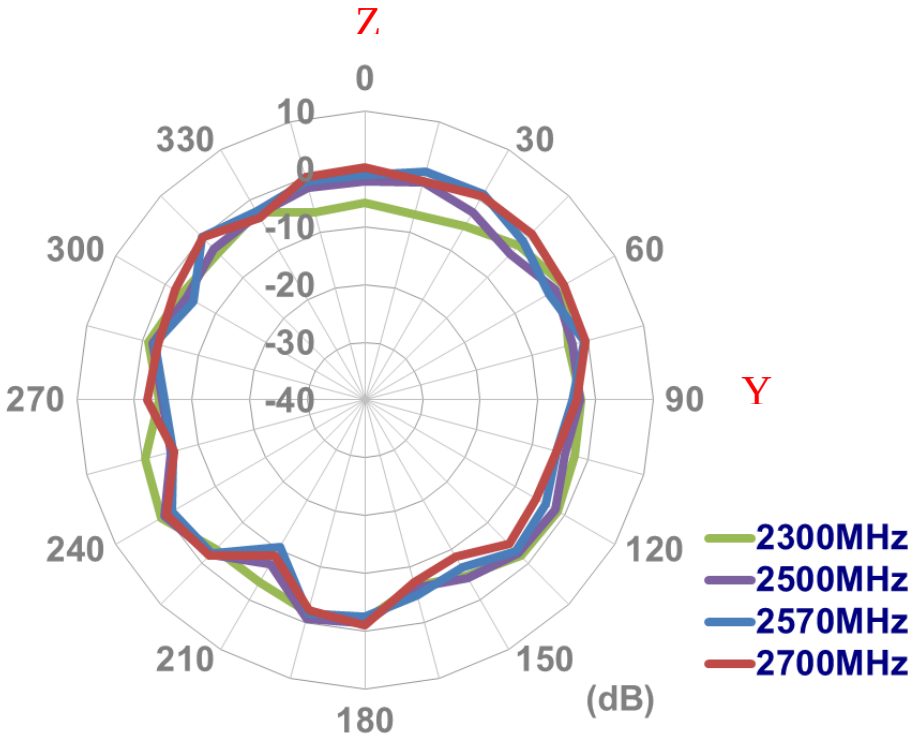

Z
0
10
30
60
90
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
X
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
-10
300
60
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

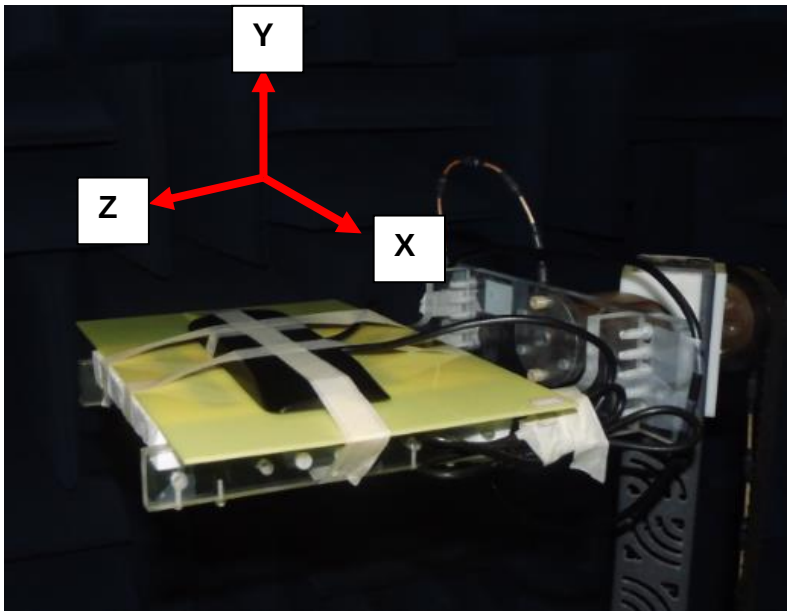
YZ Plane


Z
0
10
30
330
0
-10
300
60
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
120
240
150
210
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
120
240
150
210
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

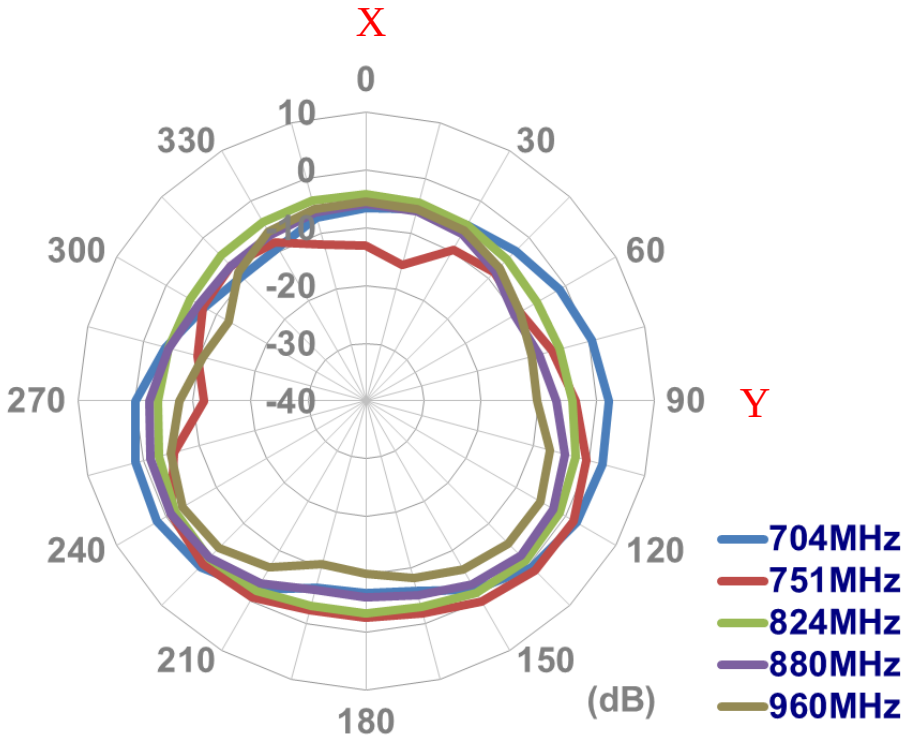
3.2.9 Test Setup For Antenna Radiation Pattern (ETS Anechoic chamber)

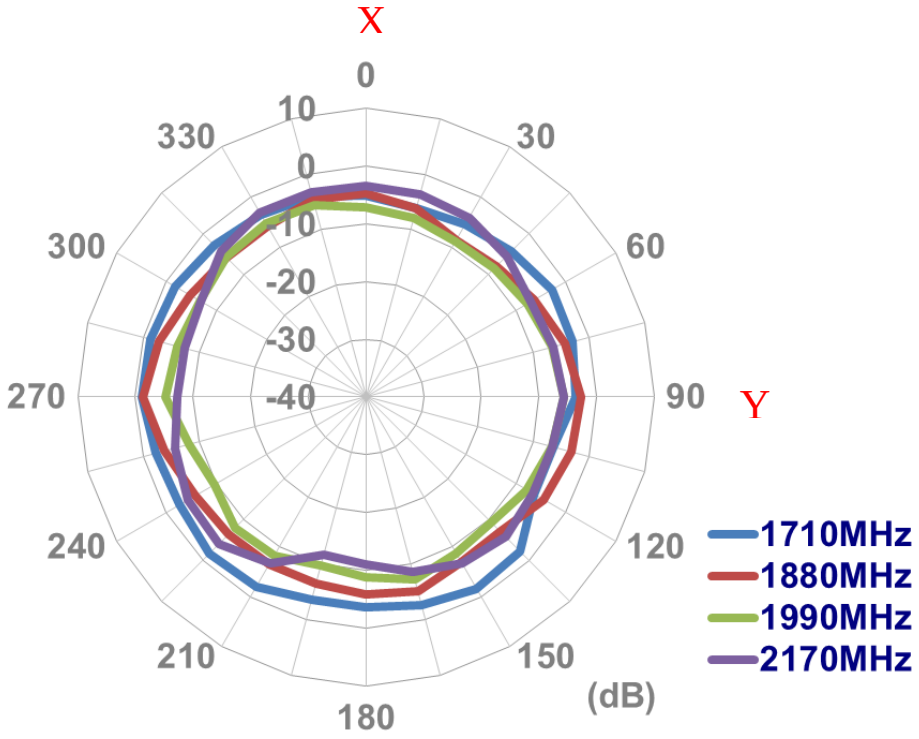


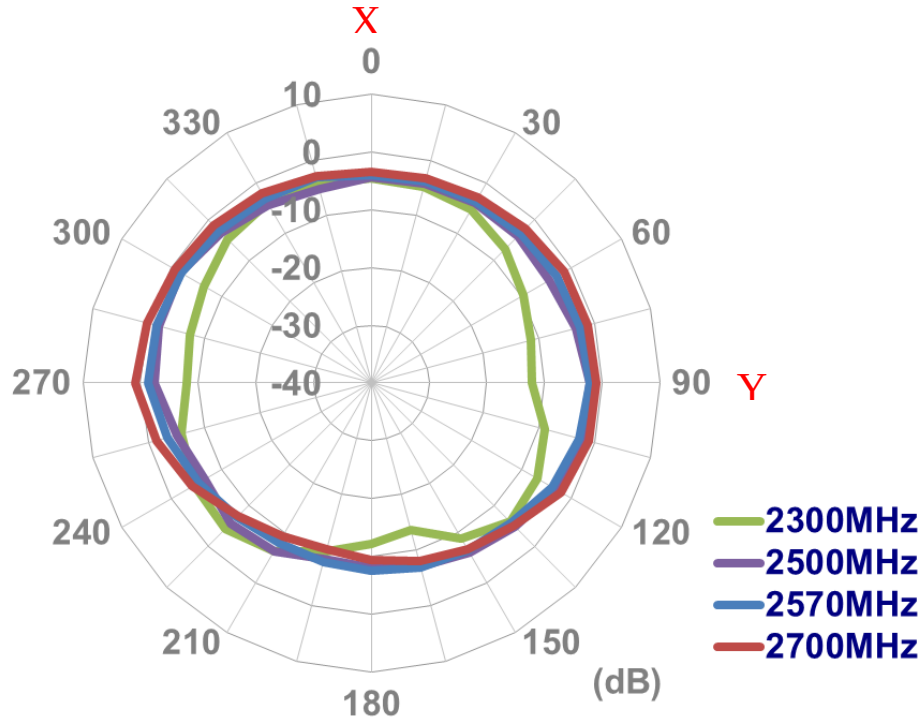
On the 2mm ABS base

3.2.10 2D Radiation pattern (MIMO1 with 2M cable length on the 2mm ABS)

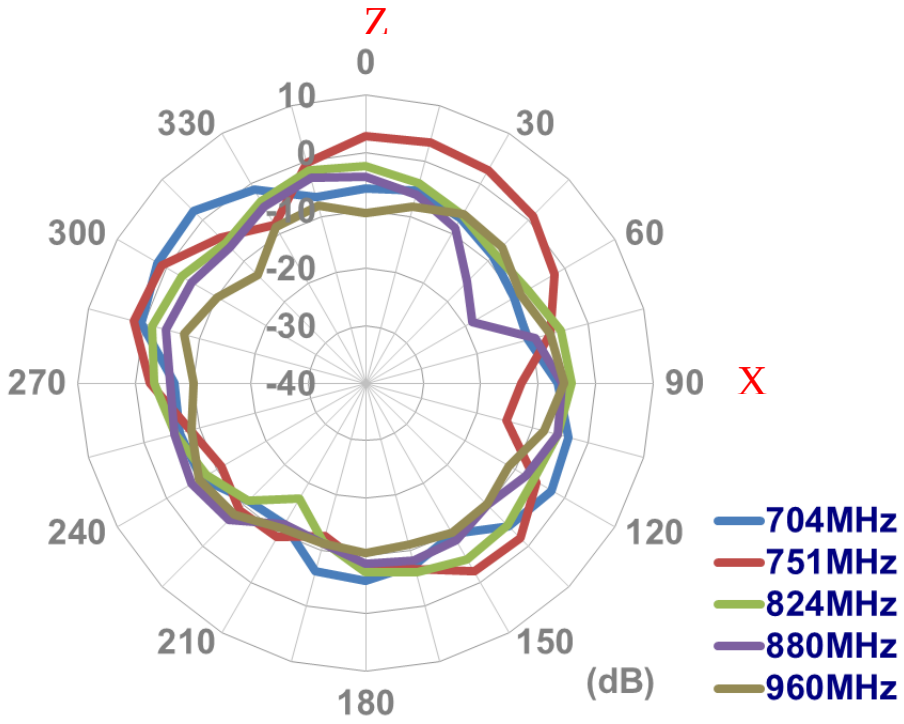
XY Plane

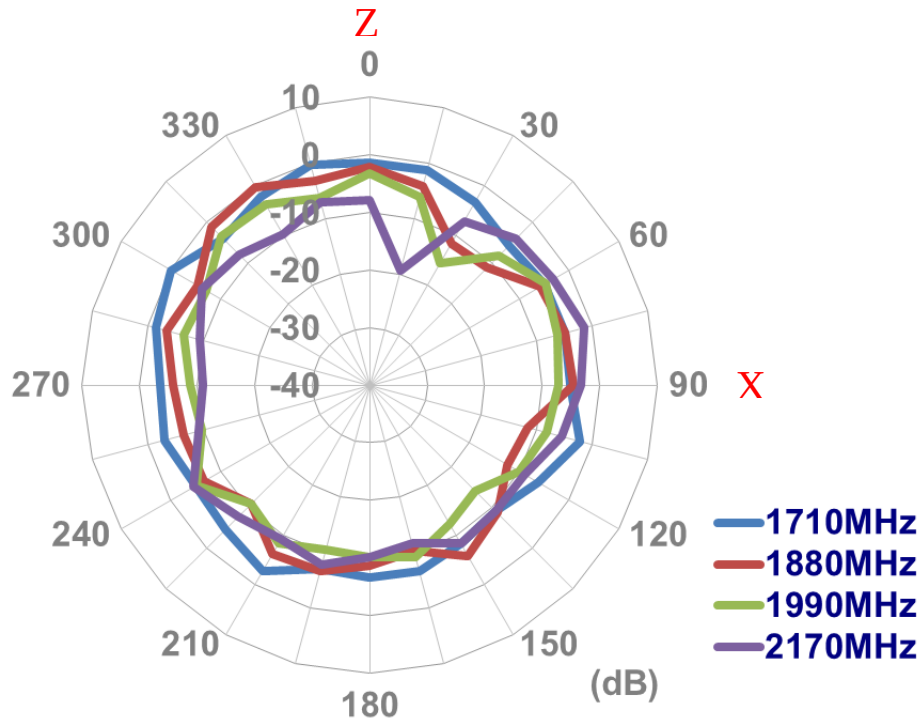


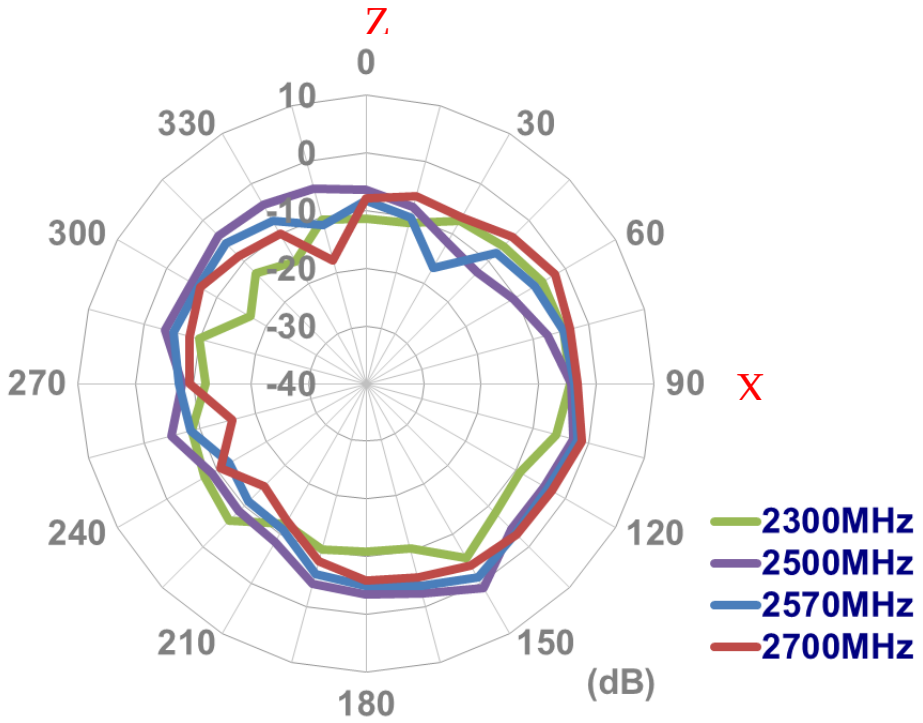



X
0
10
30
60
90
Y
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

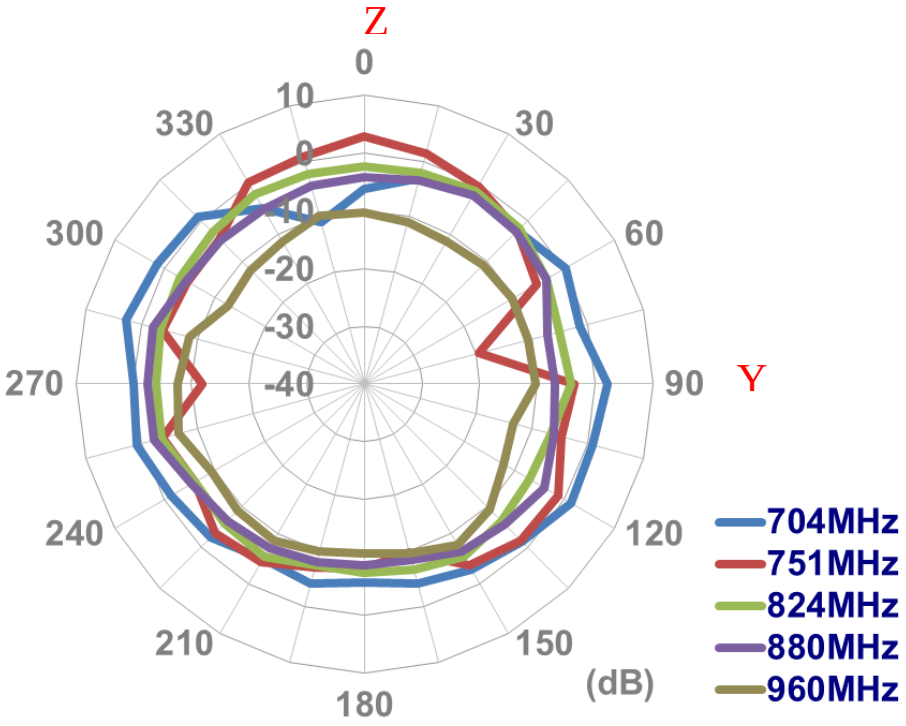
XZ Plane

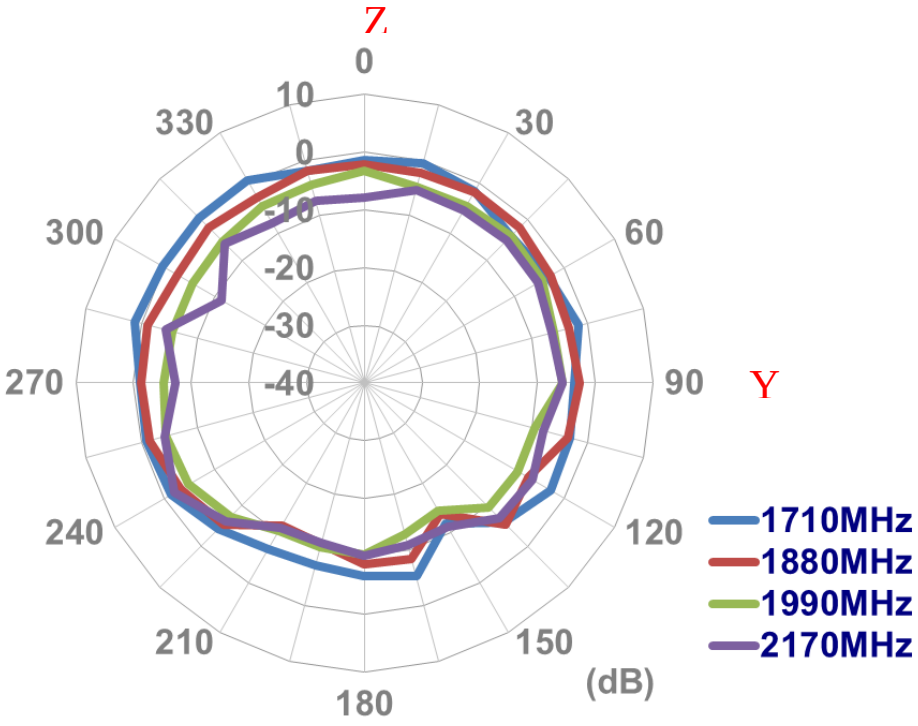

Z
0
10
30
60
90
X
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

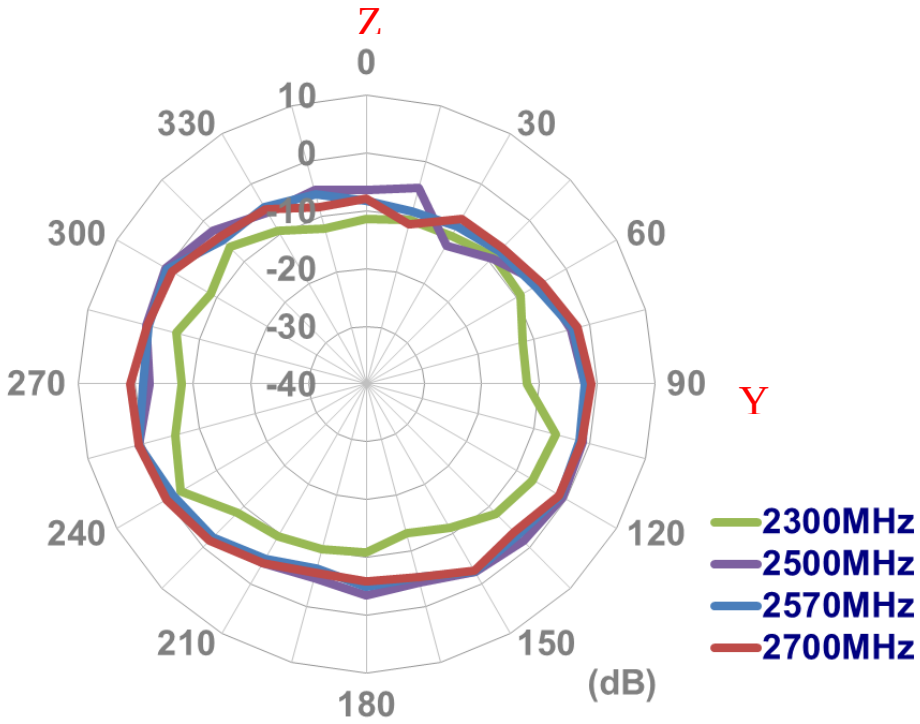

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
330
30
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

YZ Plane

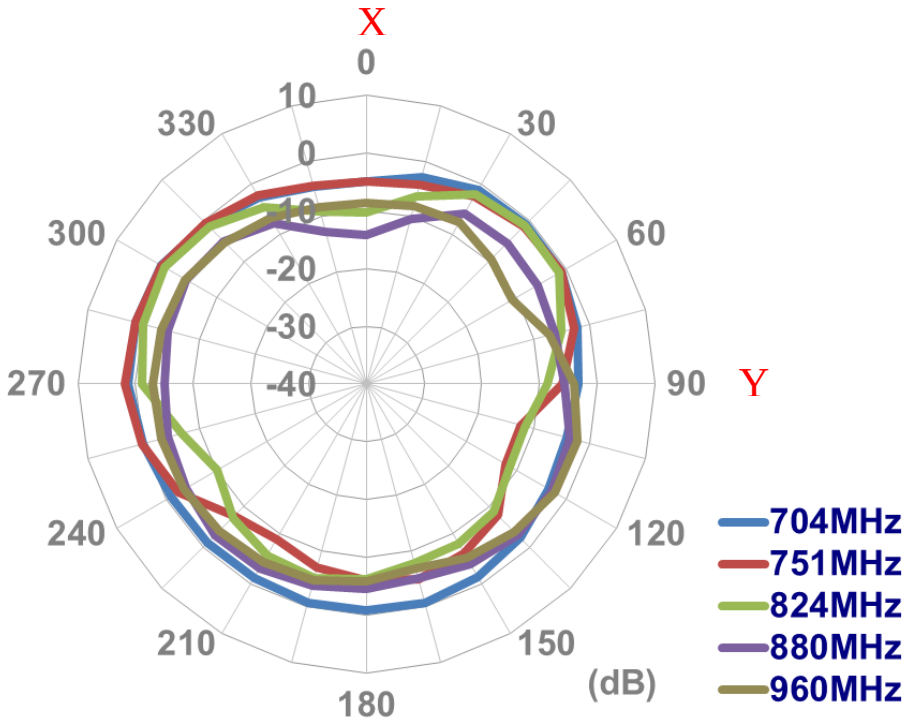

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
(dB)
180
704MHz
751MHz
824MHz
880MHz
960MHz

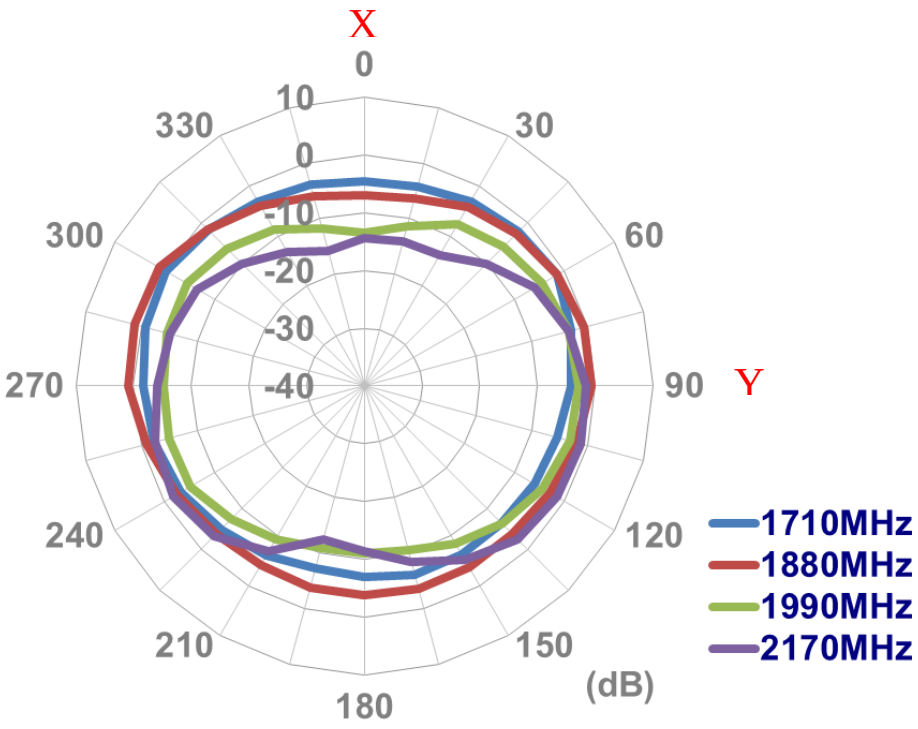

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
(dB)
180
1710MHz
1880MHz
1990MHz
2170MHz

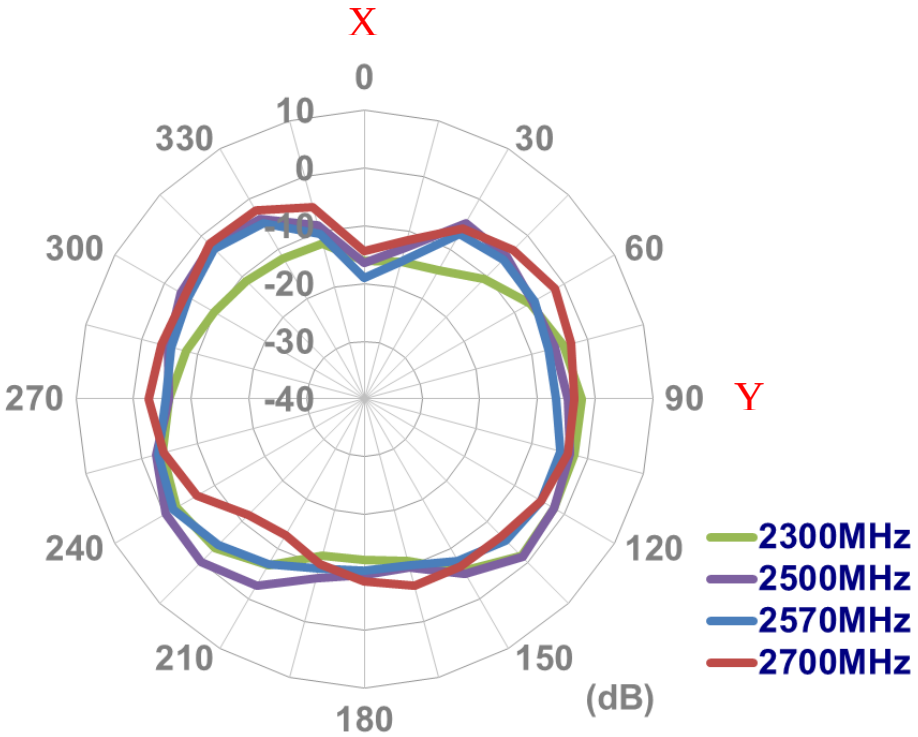


3.2.11 2D Radiation pattern (MIMO2 with 2M cable length on the 2mm ABS)

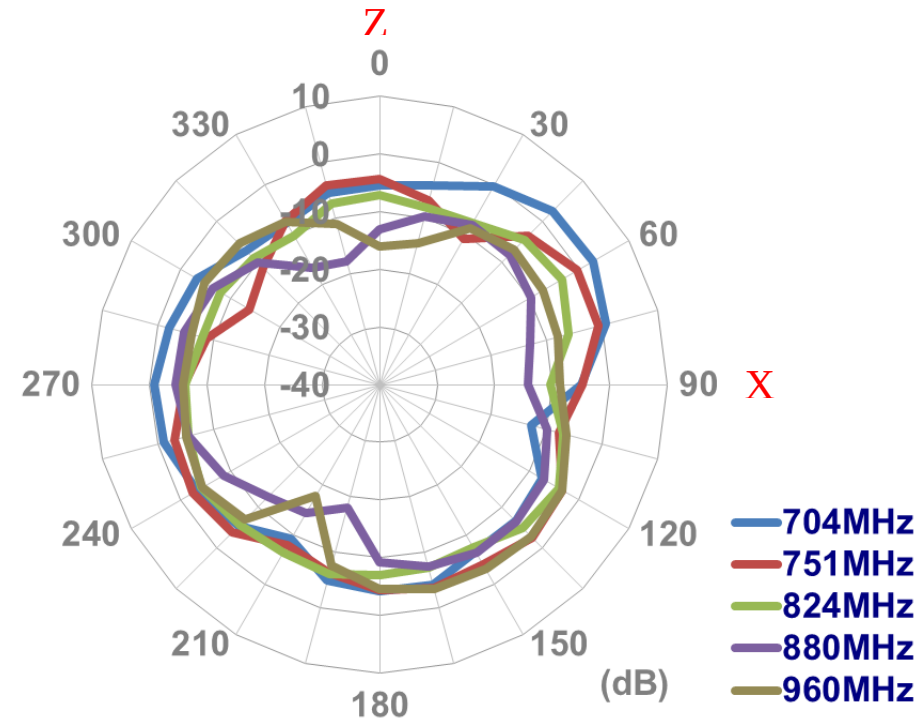
XY Plane

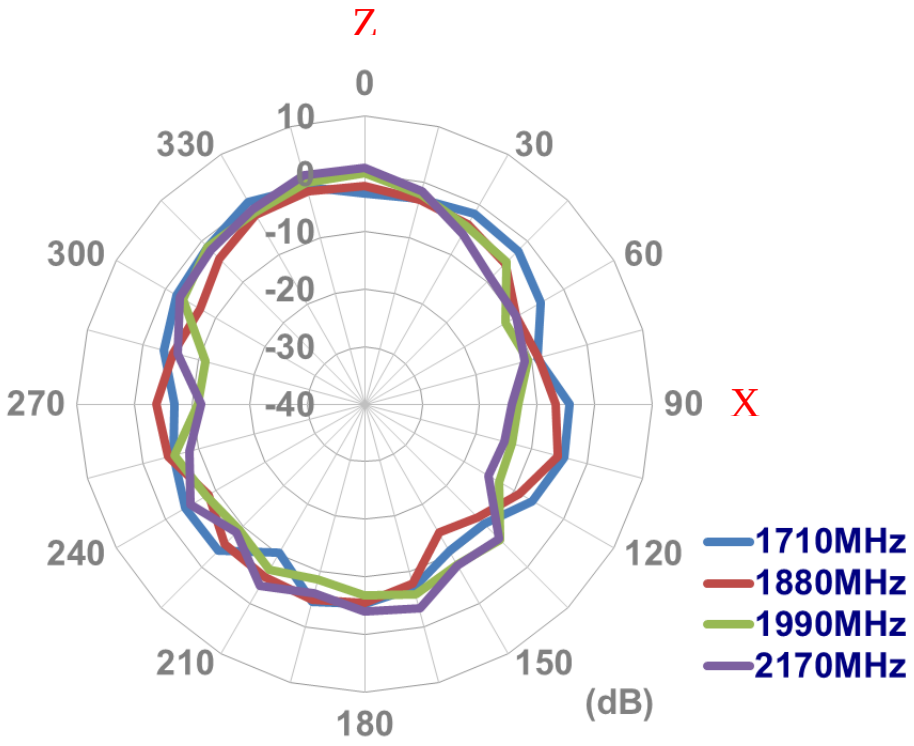


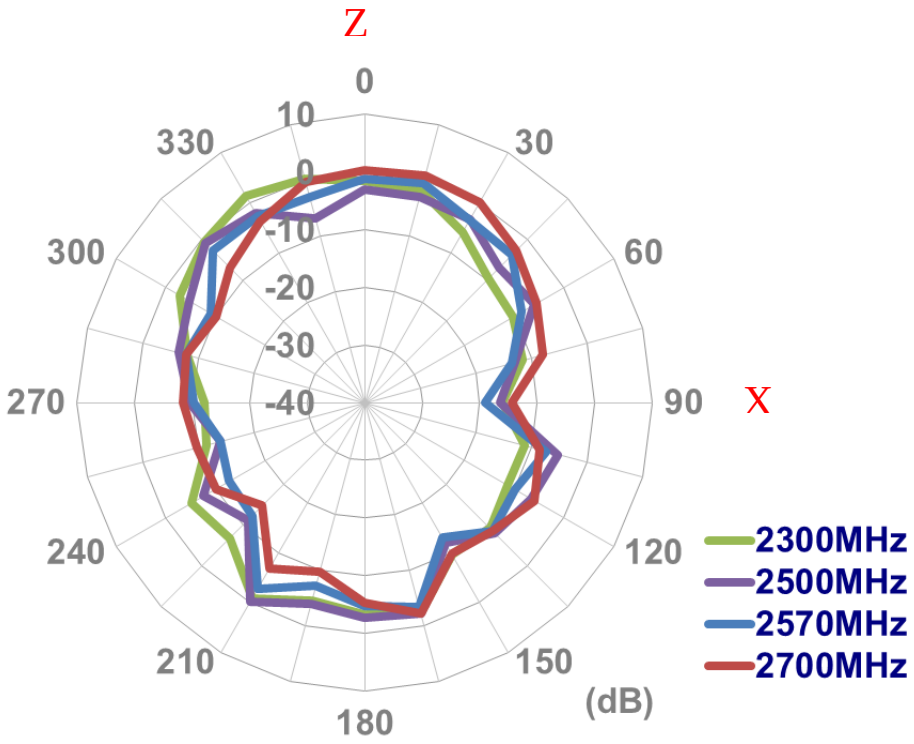

X
0
10
30
330
0
60
300
-10
-20
270
-30
90
Y
-40
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


X
0
10
30
330
0
60
300
-10
-20
270
-30
90
Y
-40
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

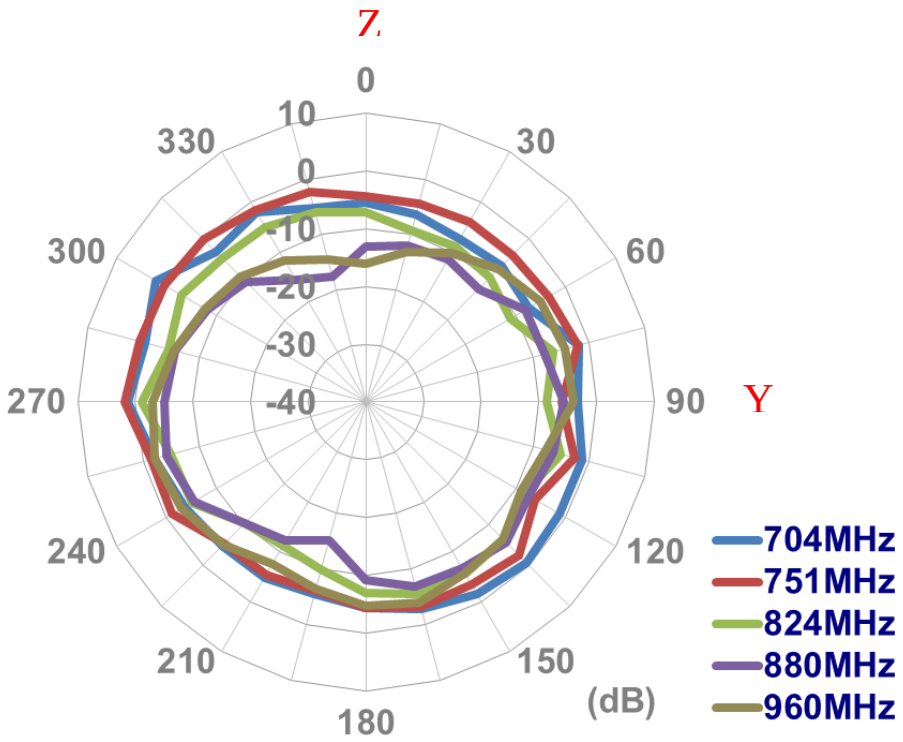
XZ Plane

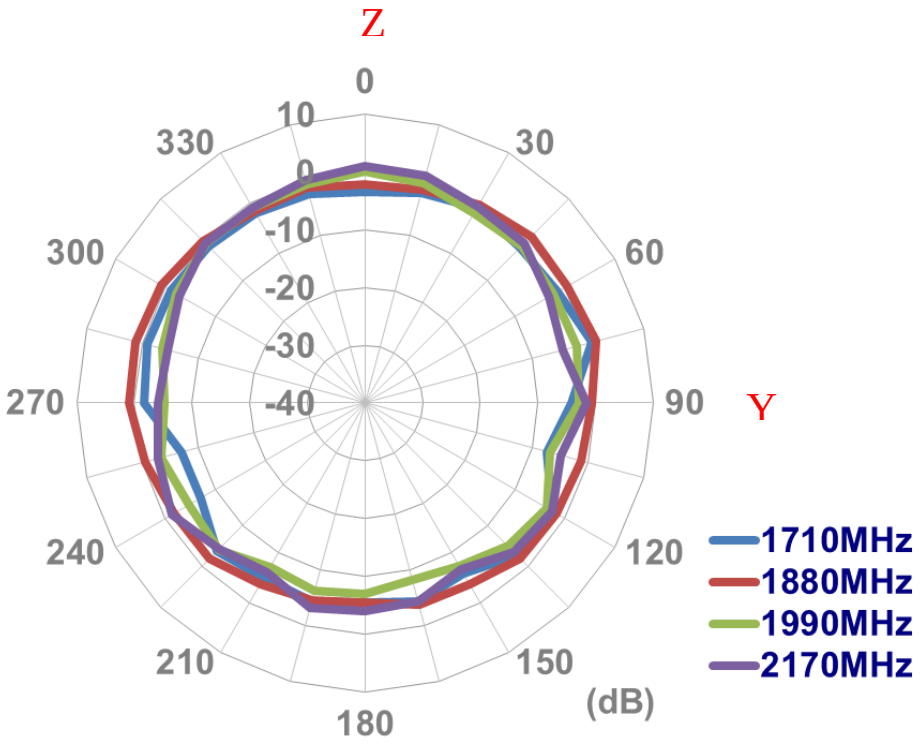

Z
0
30
60
90
X
120
150
180
210
240
270
300
330
10
0
-10
-20
-30
-40
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

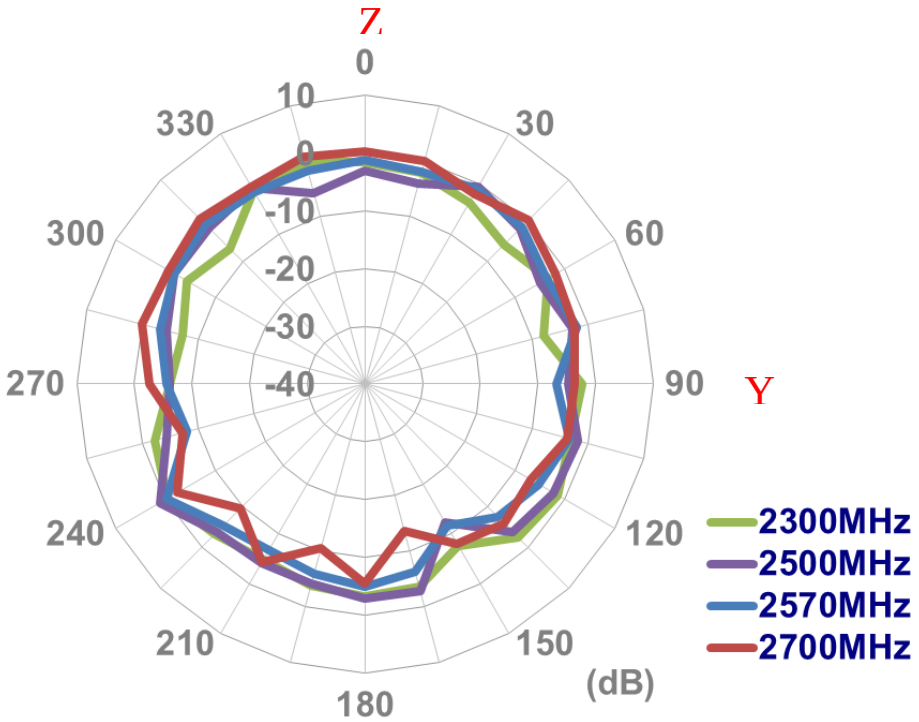

Z
0
30
60
90
X
120
150
180
210
240
270
300
330
10
0
-10
-20
-30
-40
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

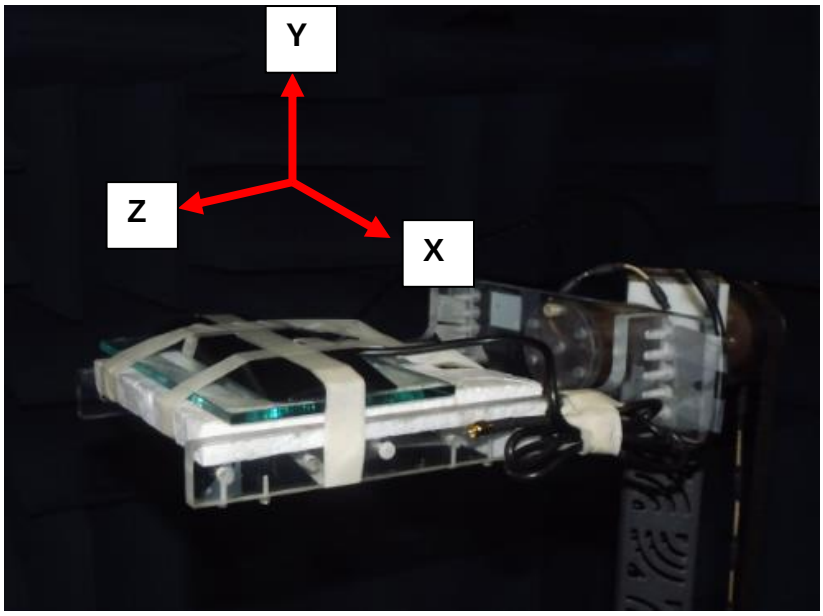
YZ Plane


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
120
240
150
210
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
-10
300
-20
-30
270
-40
90
Y
120
240
150
210
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

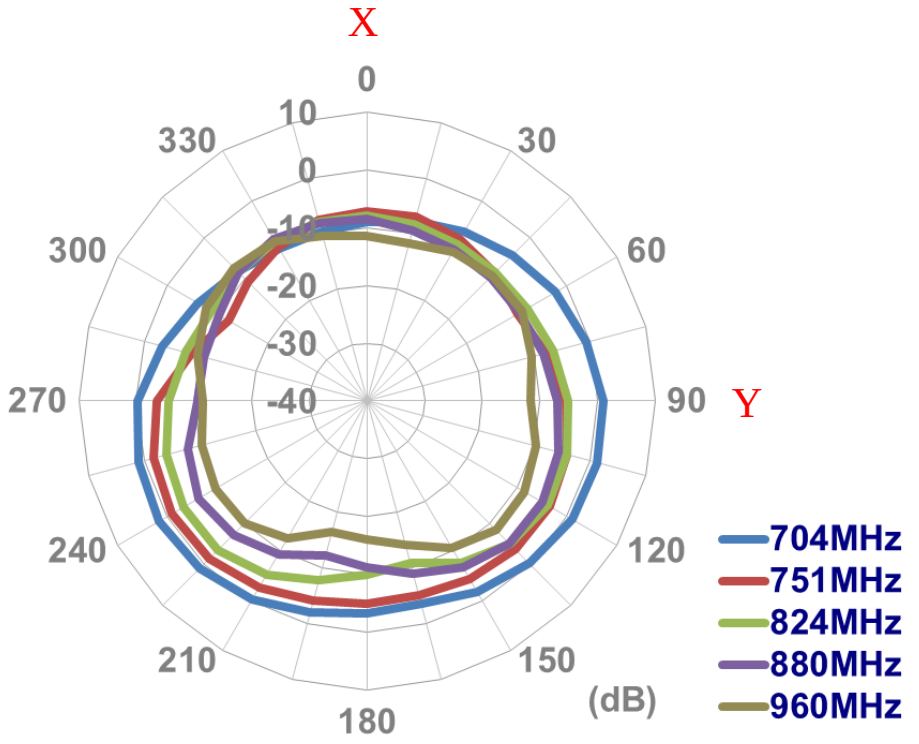
3.2.12 Test Setup For Antenna Radiation Pattern (ETS Anechoic chamber)

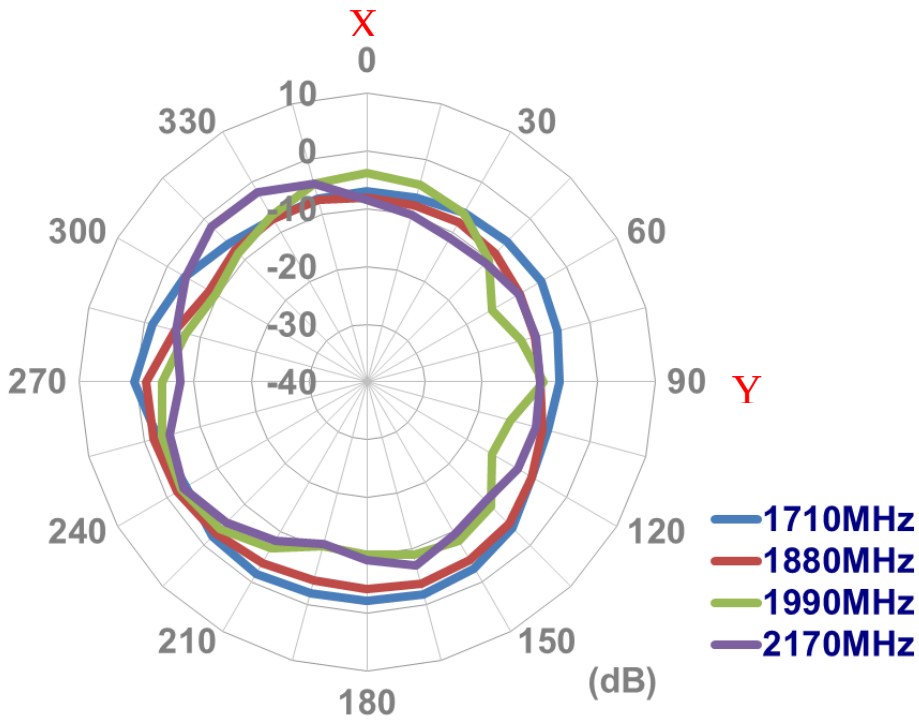


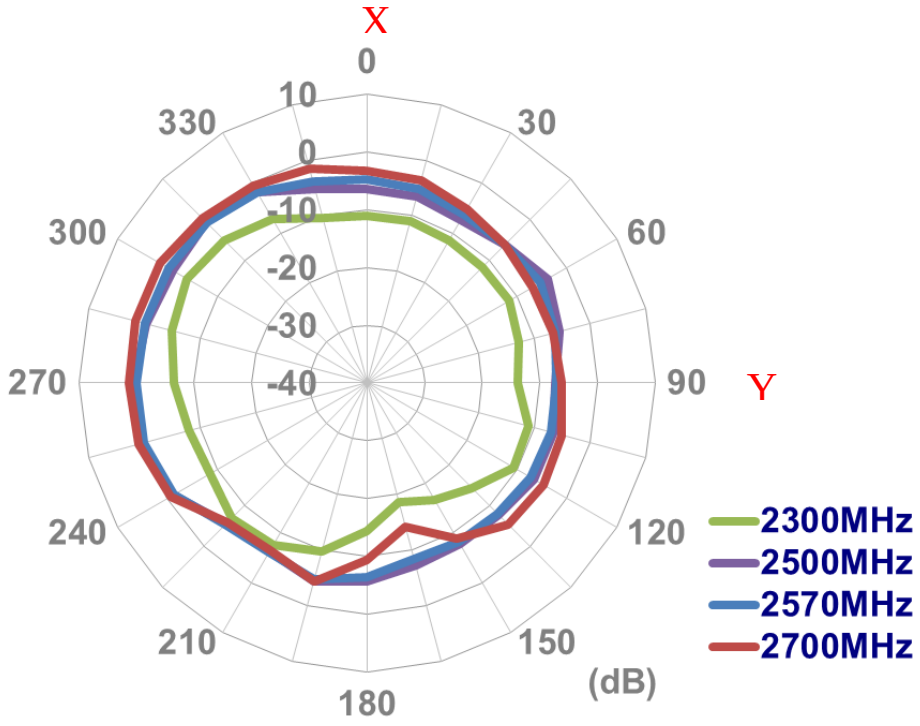
On the glass base

3.2.13 2D Radiation pattern (MIMO1 with 2M cable length on the glass)

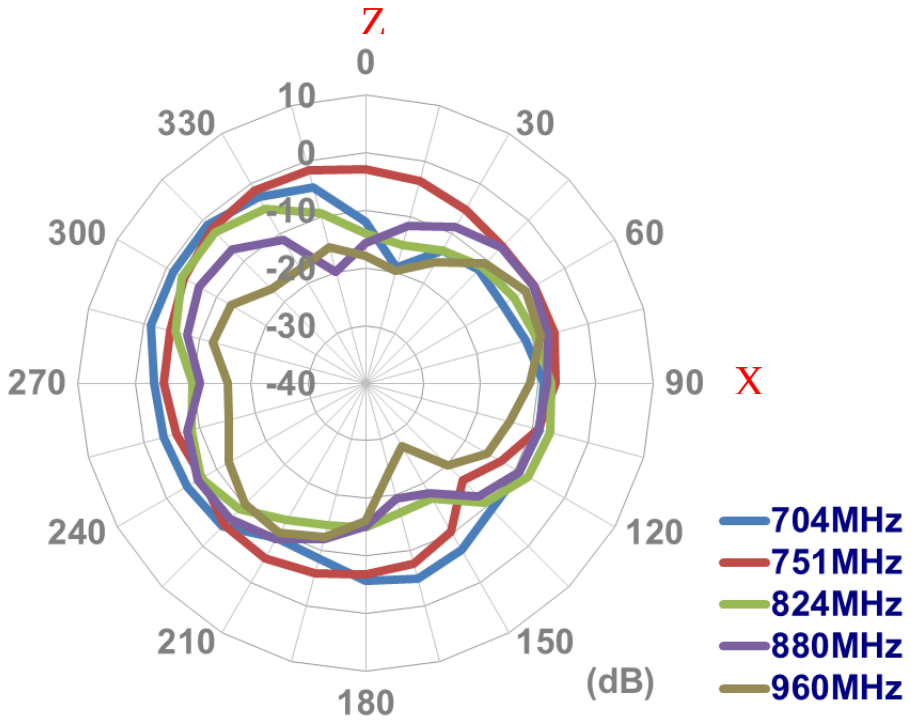
XY Plane

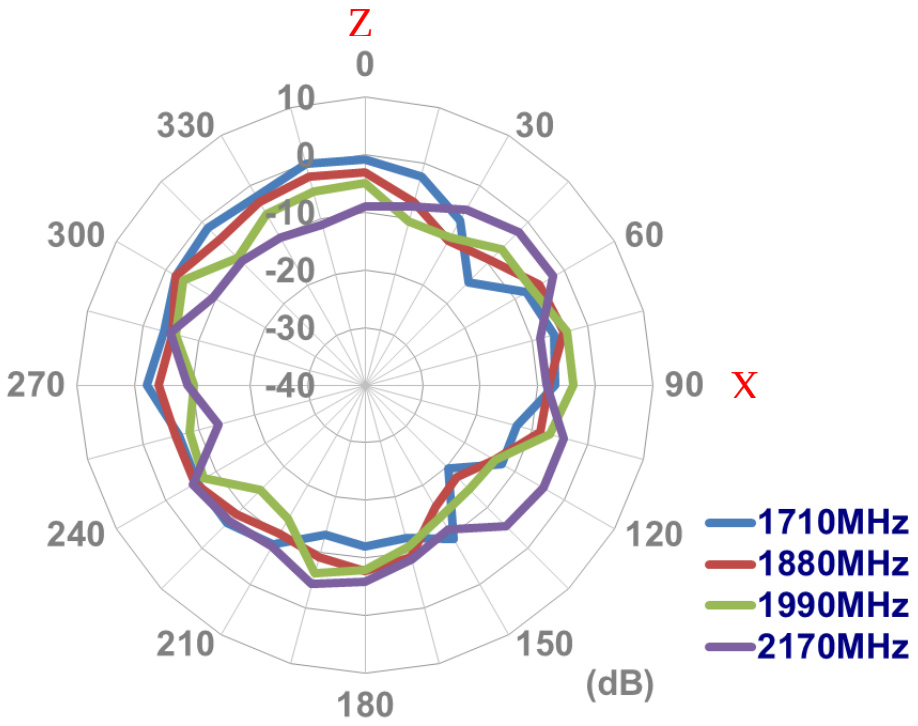


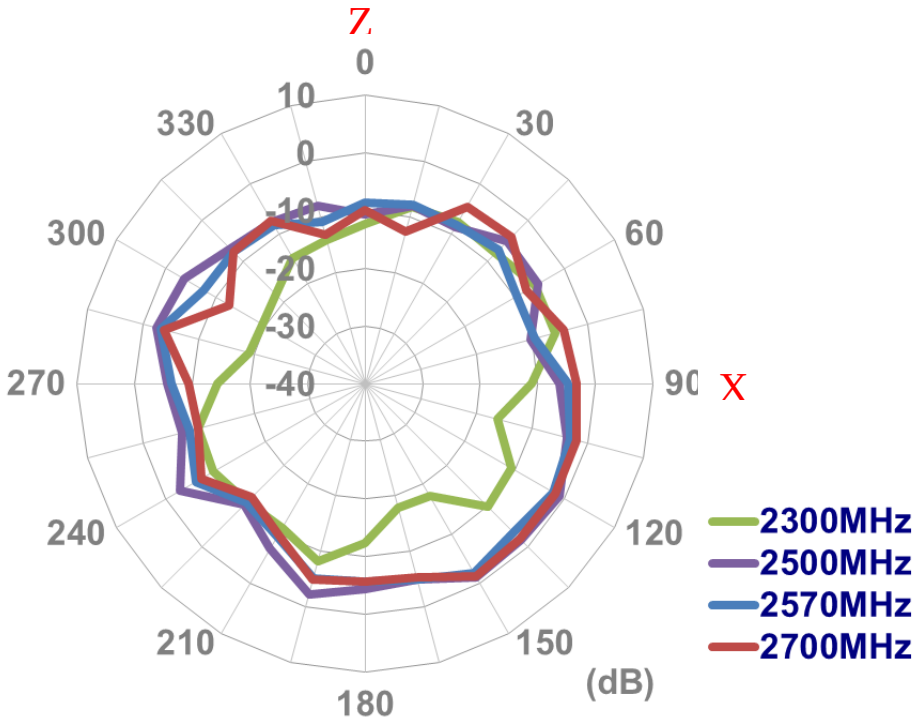



X
0
10
30
60
90
Y
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

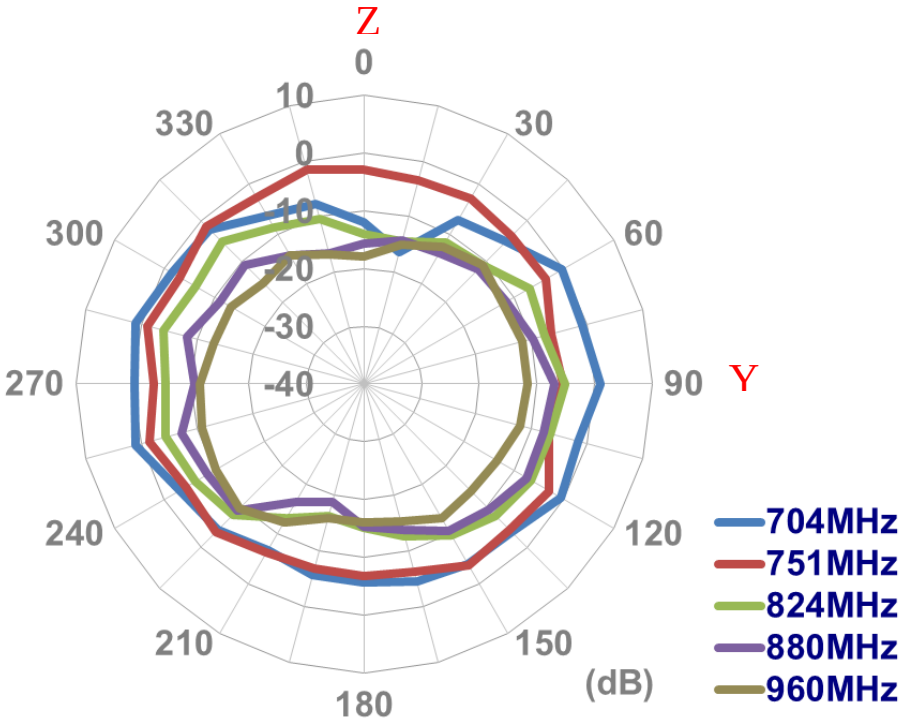
XZ Plane

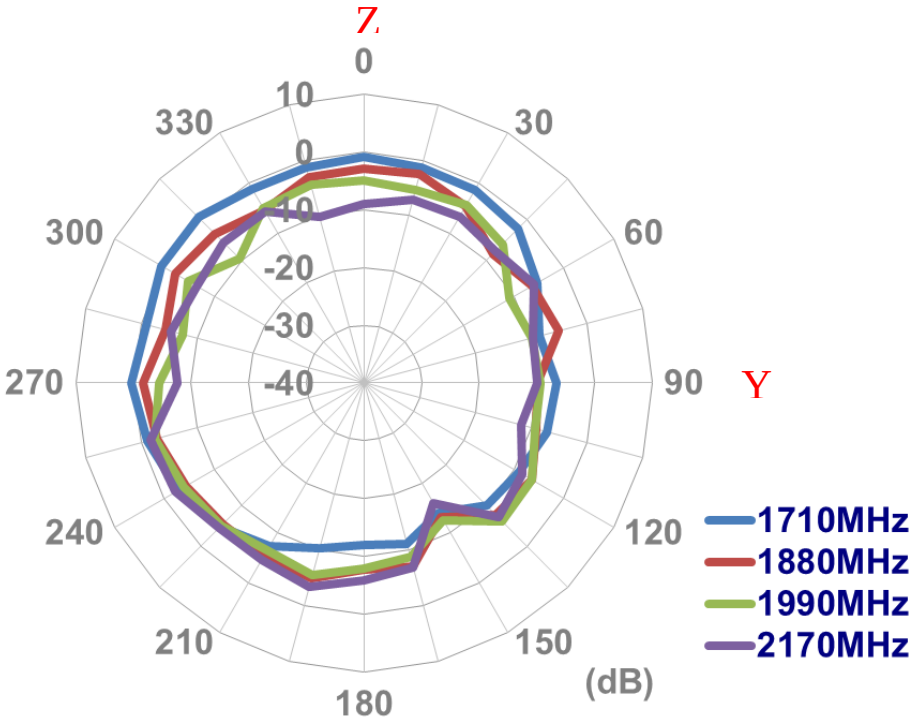

Z
0
10
30
60
90
X
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

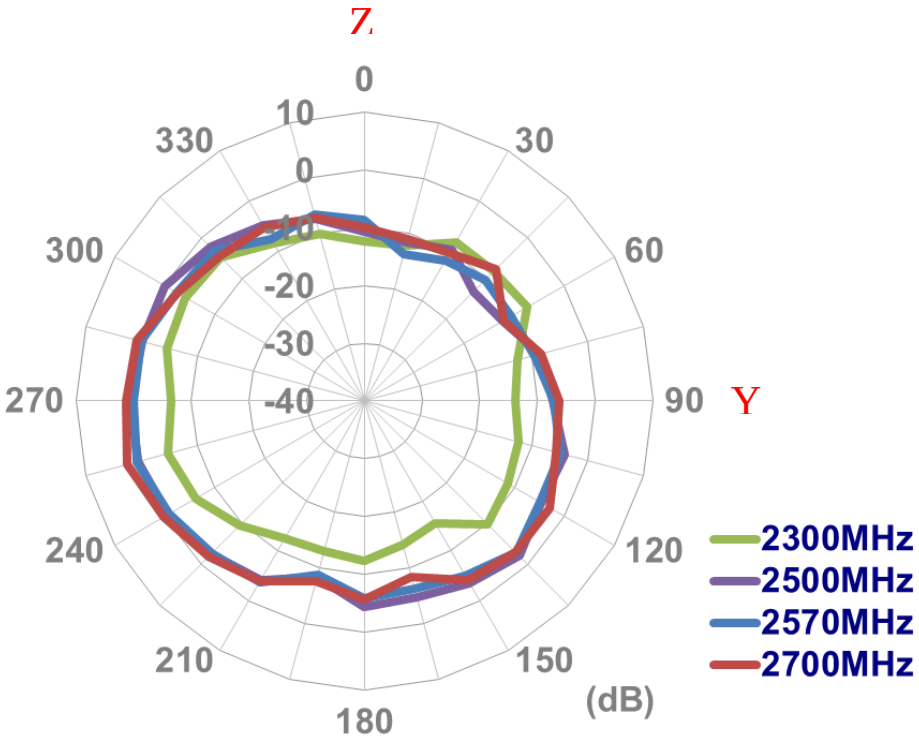

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
(dB)
180
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
(dB)
180
2300MHz
2500MHz
2570MHz
2700MHz

YZ Plane

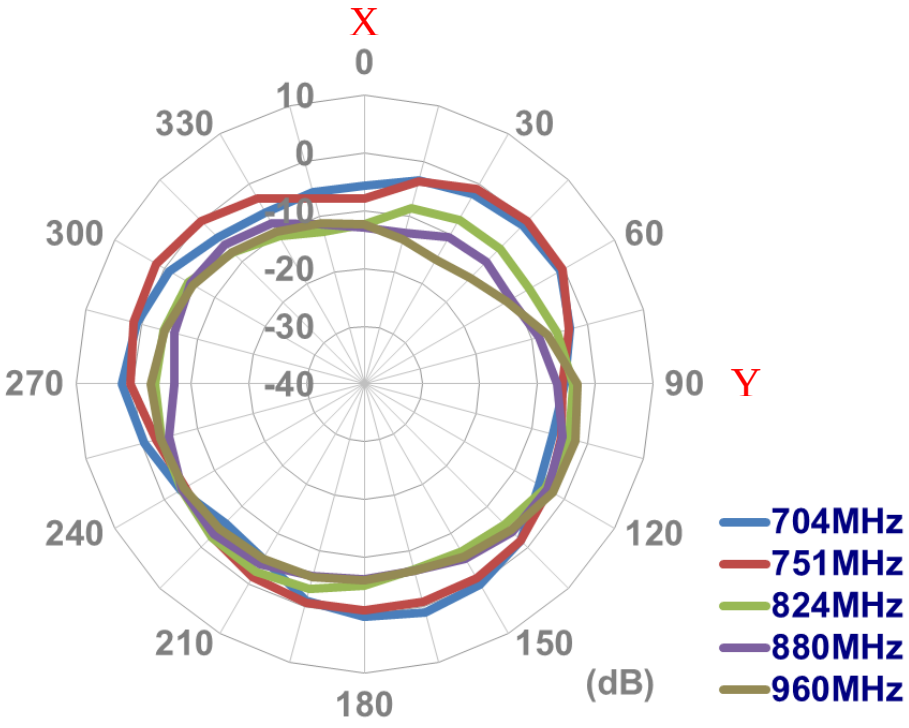

Z
0
10
30
60
90
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
Y
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

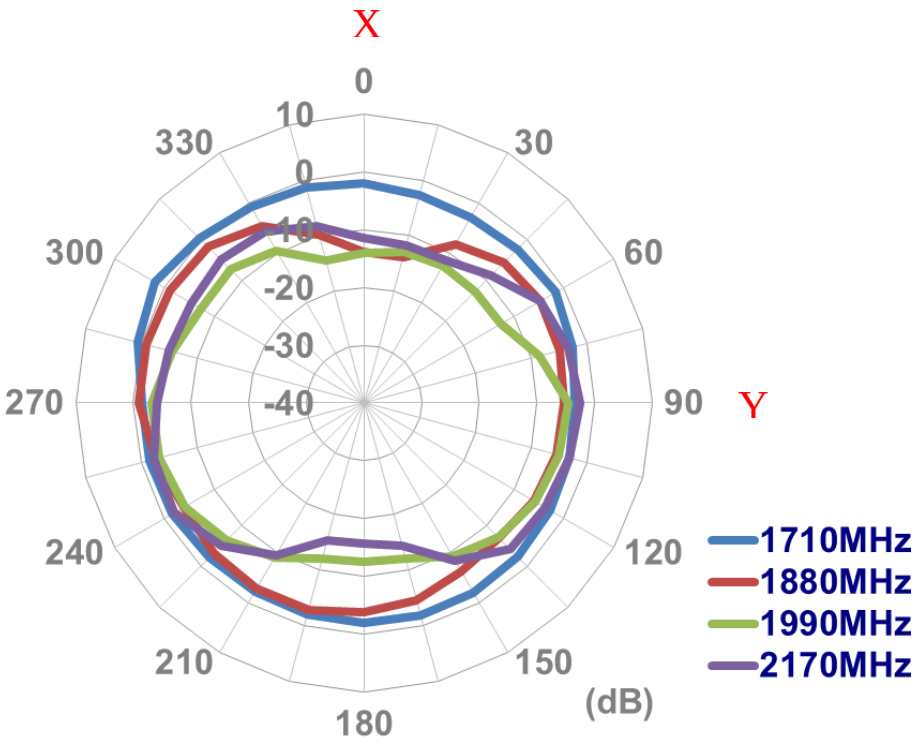

Z
0
10
30
60
90
120
150
180
210
240
270
300
330
0
-10
-20
-30
-40
Y
(dB)
1710MHz
1880MHz
1990MHz
2170MHz

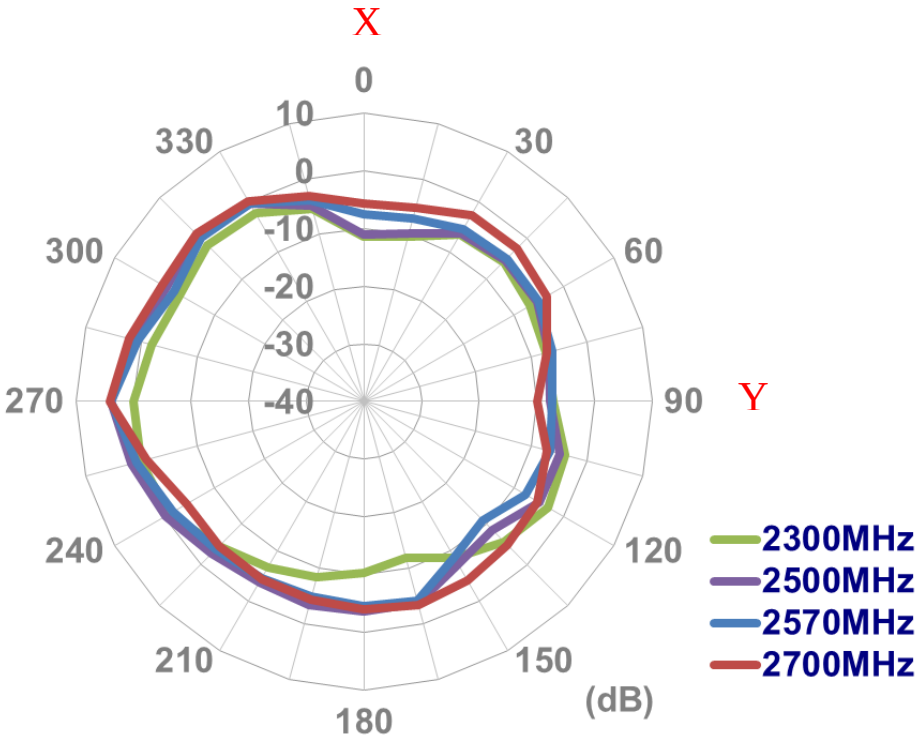


3.2.14 2D Radiation pattern (MIMO2 with 2M cable length on the glass)

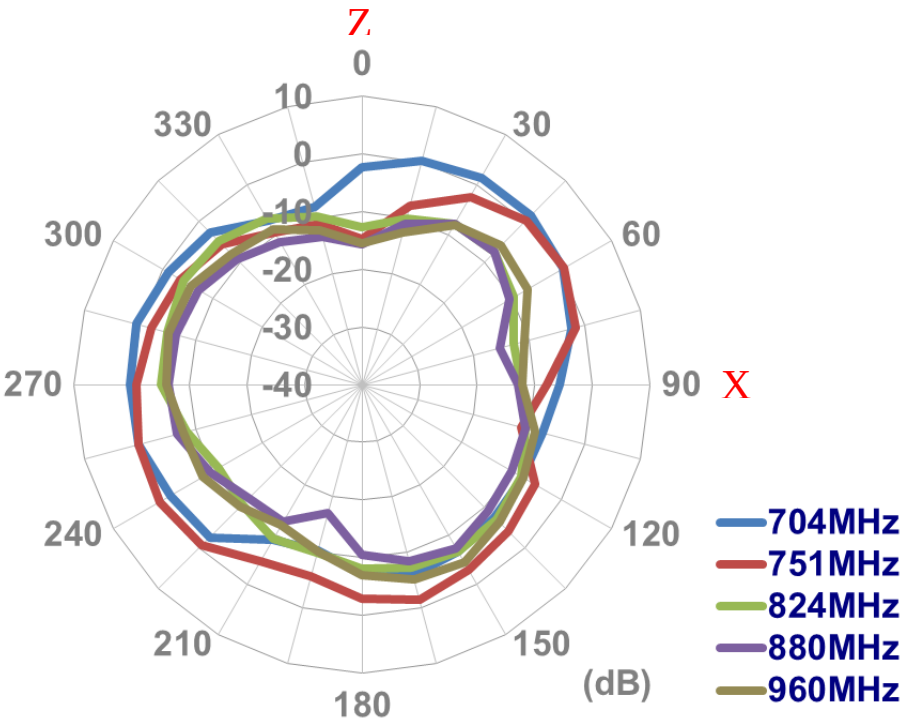
XY Plane

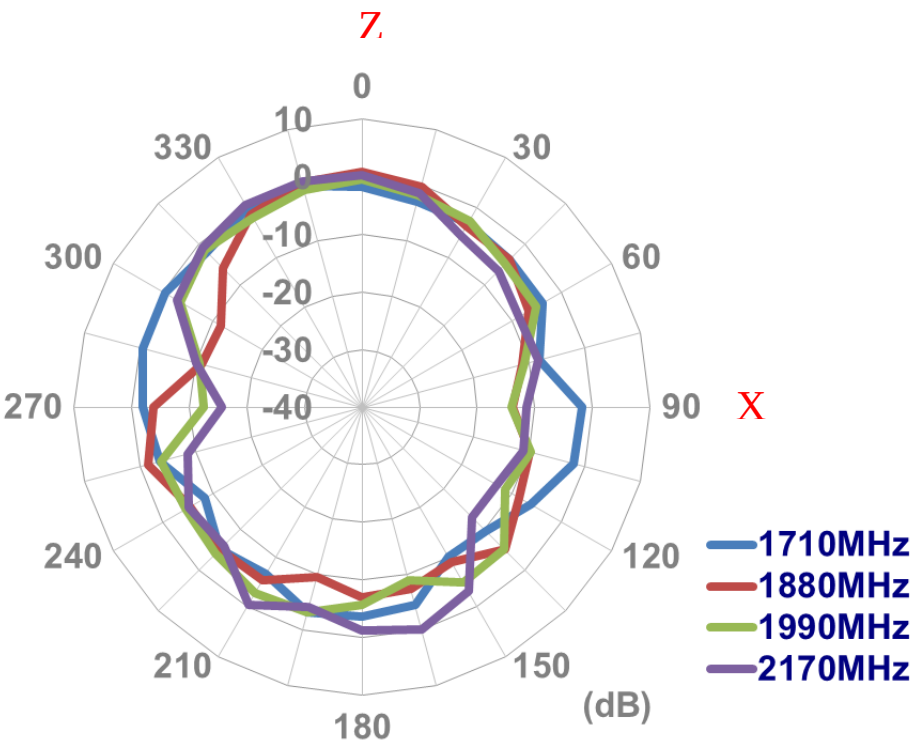


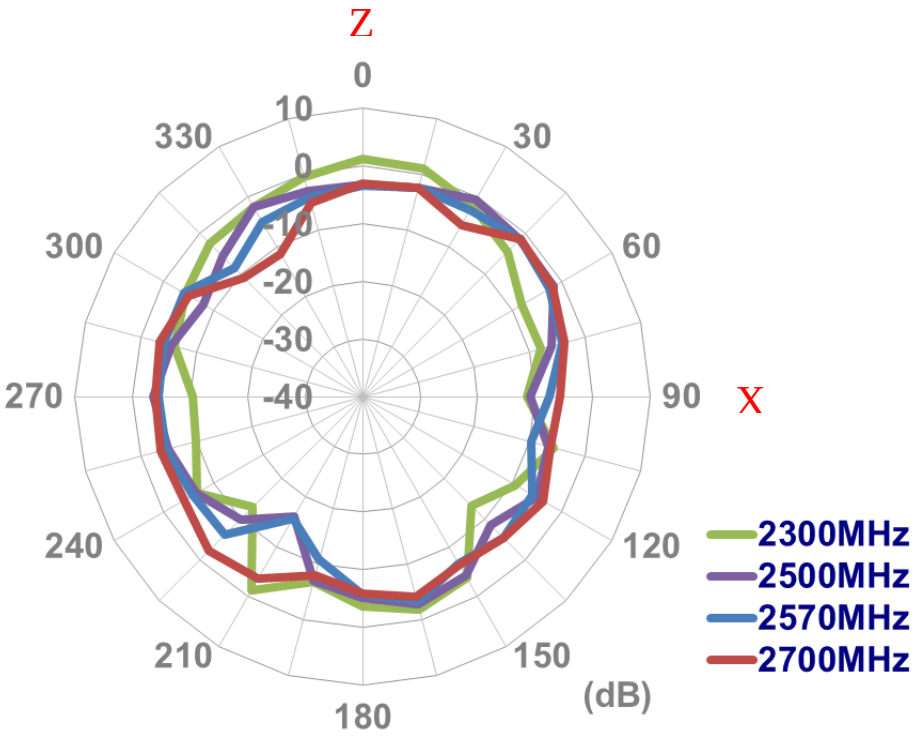

X
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


X
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

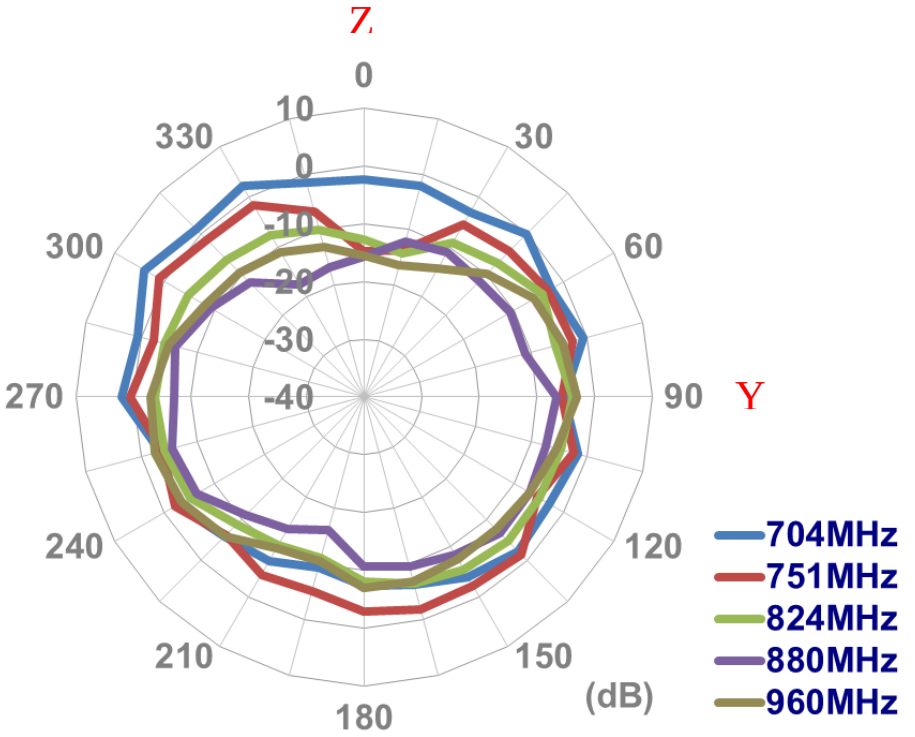
XZ Plane

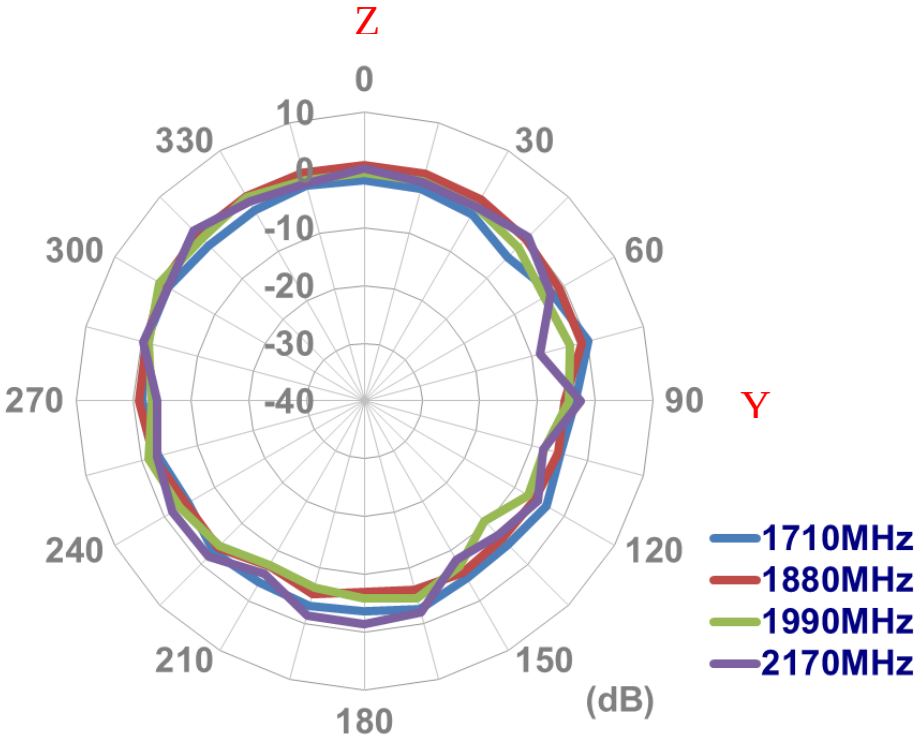

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz

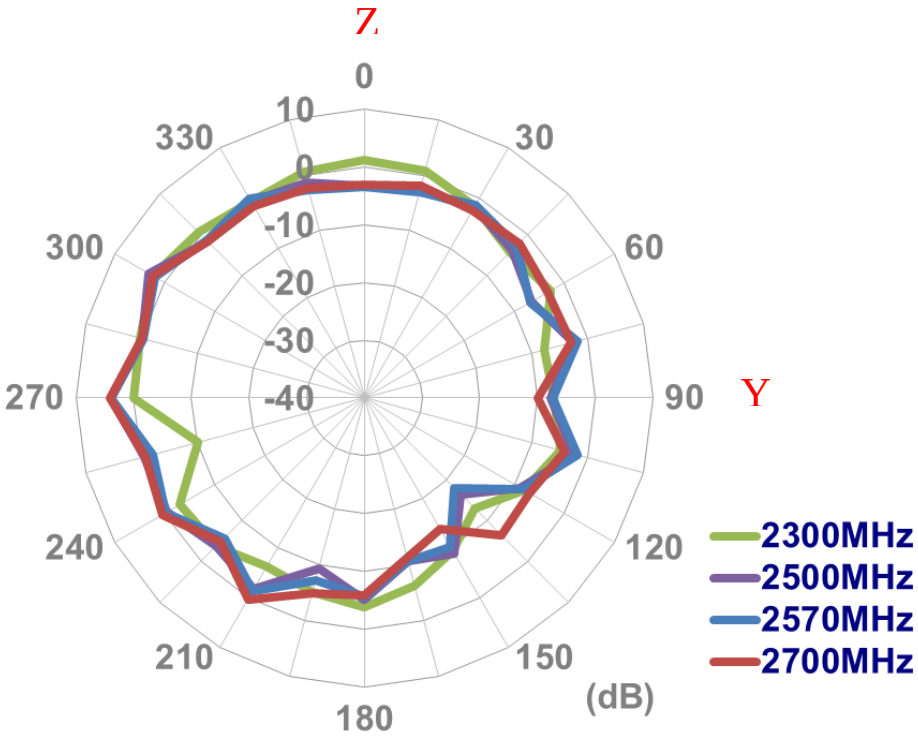

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
1710MHz
1880MHz
1990MHz
2170MHz


Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
X
240
120
210
150
180
(dB)
2300MHz
2500MHz
2570MHz
2700MHz

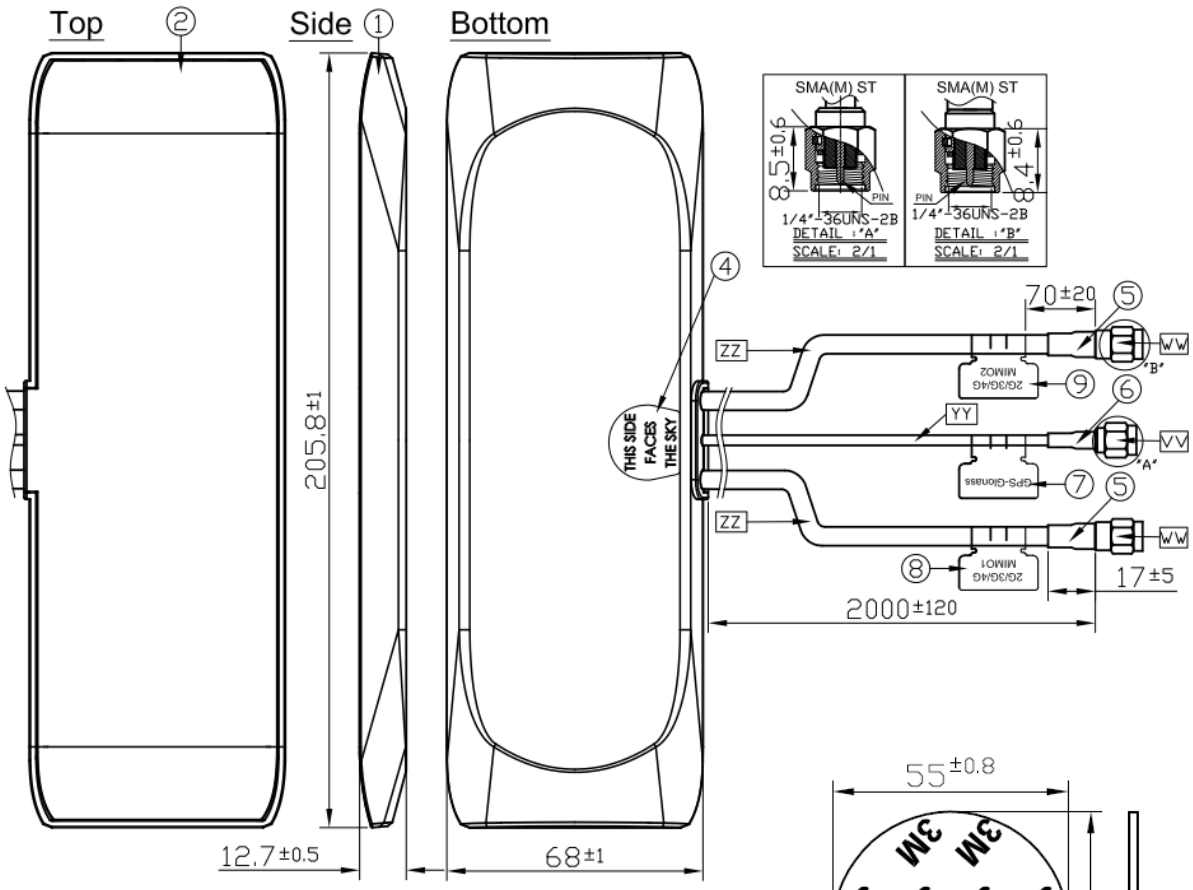
YZ Plane

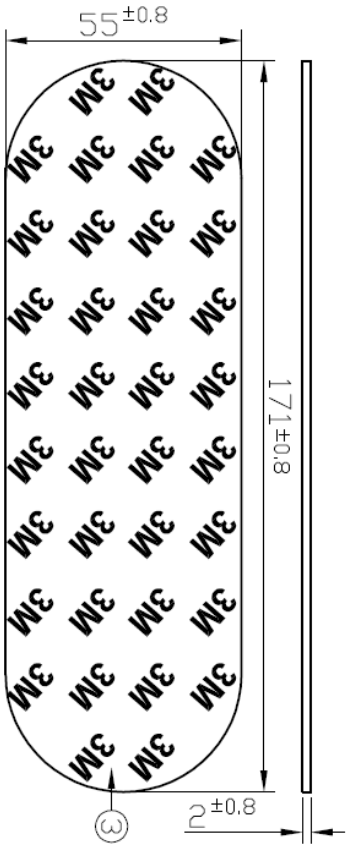

Z
0
10
30
330
0
60
300
-10
-20
-30
270
-40
90
Y
240
120
210
150
180
(dB)
704MHz
751MHz
824MHz
880MHz
960MHz


Z
0
10
30
330
0
-10
60
300
-20
-30
270
-40
90
Y
120
240
1710MHz
1880MHz
1990MHz
2170MHz
210
150
(dB)
180


Z
0
10
30
330
0
-10
60
300
-20
-30
270
-40
90
Y
120
240
2300MHz
2500MHz
2570MHz
2700MHz
210
150
(dB)
180

4.Drawing

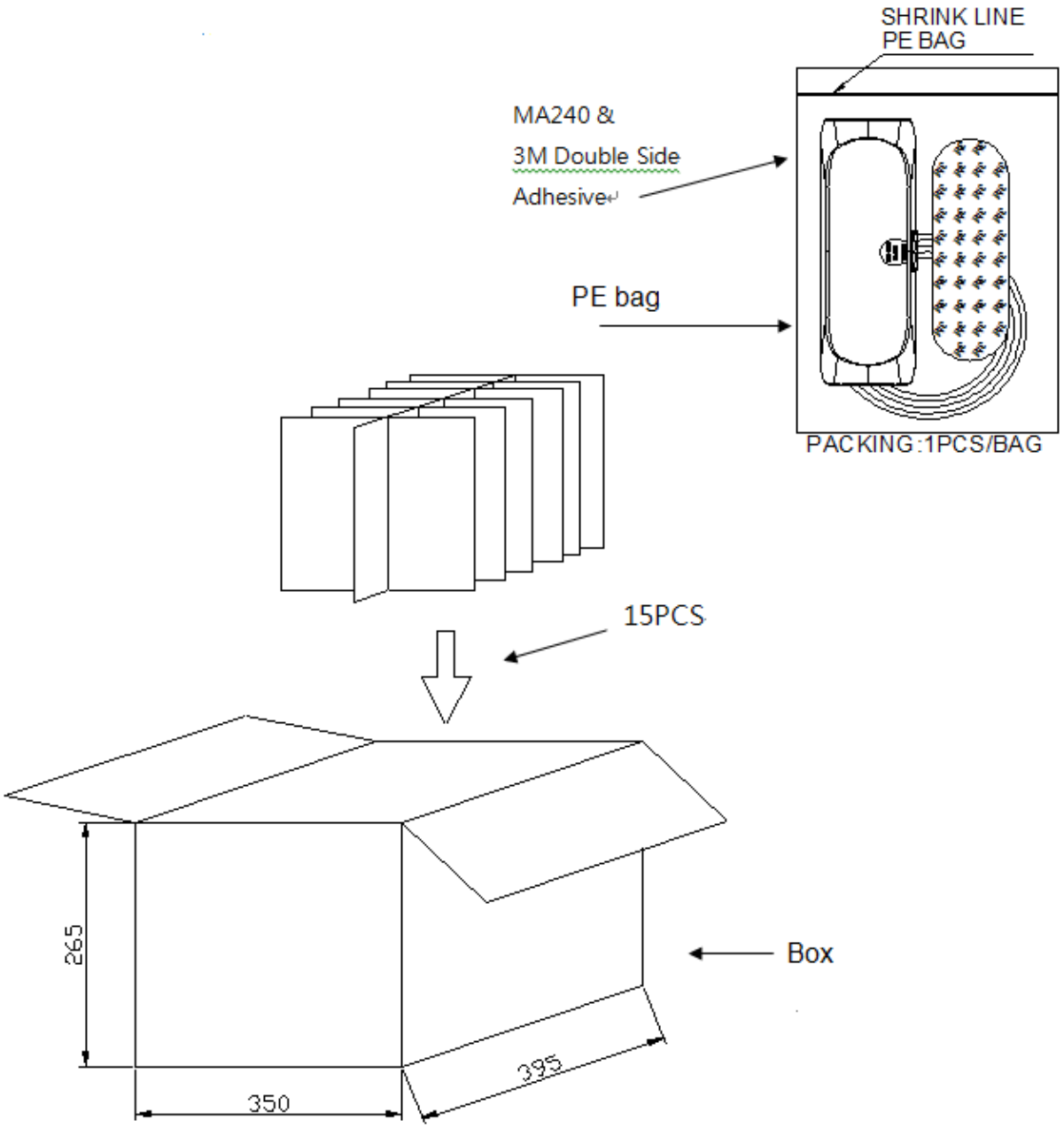




	Name	Material	Finish	QTY
1	Housing Top MA240	ABS	Black	1
2	Housing Bottom MA240	ABS	Black	1
3	3M Double Sided Adhesive With Foam	3M9448+CR4305	Black	1
4	Clear Label	PET	White	1
5	Heat Shrink Tube (CFD 200)	PE	Black	2
6	Heat Shrink Tube (RG 174)	PE	Black	1
7	GPS-Glonass Label (48*30)	Coated Paper	Orange	1
8	2G/3G/4G MIMO1 Label (48*30)	Coated Paper	Gray	1
9	2G/3G/4G MIMO2 Label (48*30)	Coated Paper	White	1

	Name	Spec	Finish	QTY
VV	Connector Type	SMA(M) ST	Gold	1
WW	Connector Type	SMA(M) ST	Gold	2
YY	Cable Type	RG 174	Black	1
ZZ	Cable Type	NFC 200	Black	2

5.Packaging

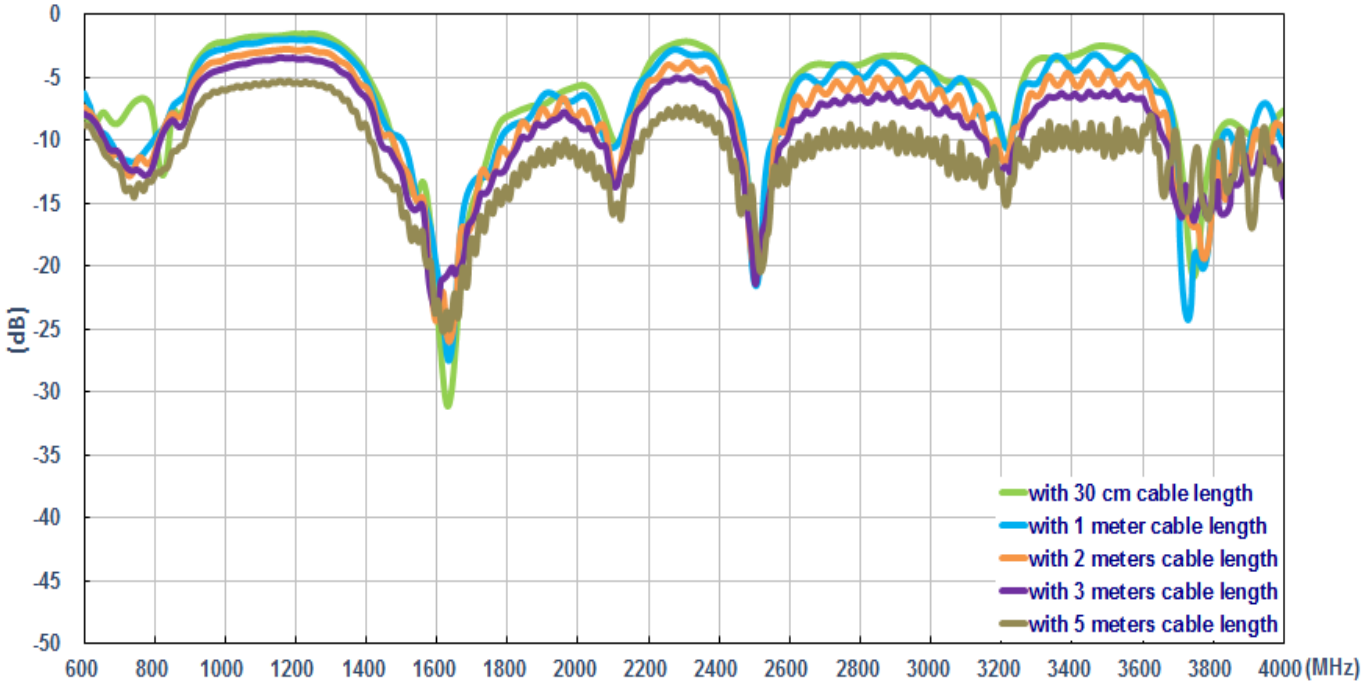

SHRINK LINE
PE BAG
MA240 &
3M Double Side
Adhesive
PE bag
PACKING:1PCS/BAG
15PCS
265
350
395
Box

6. Application Note (LTE MIMO Antenna)

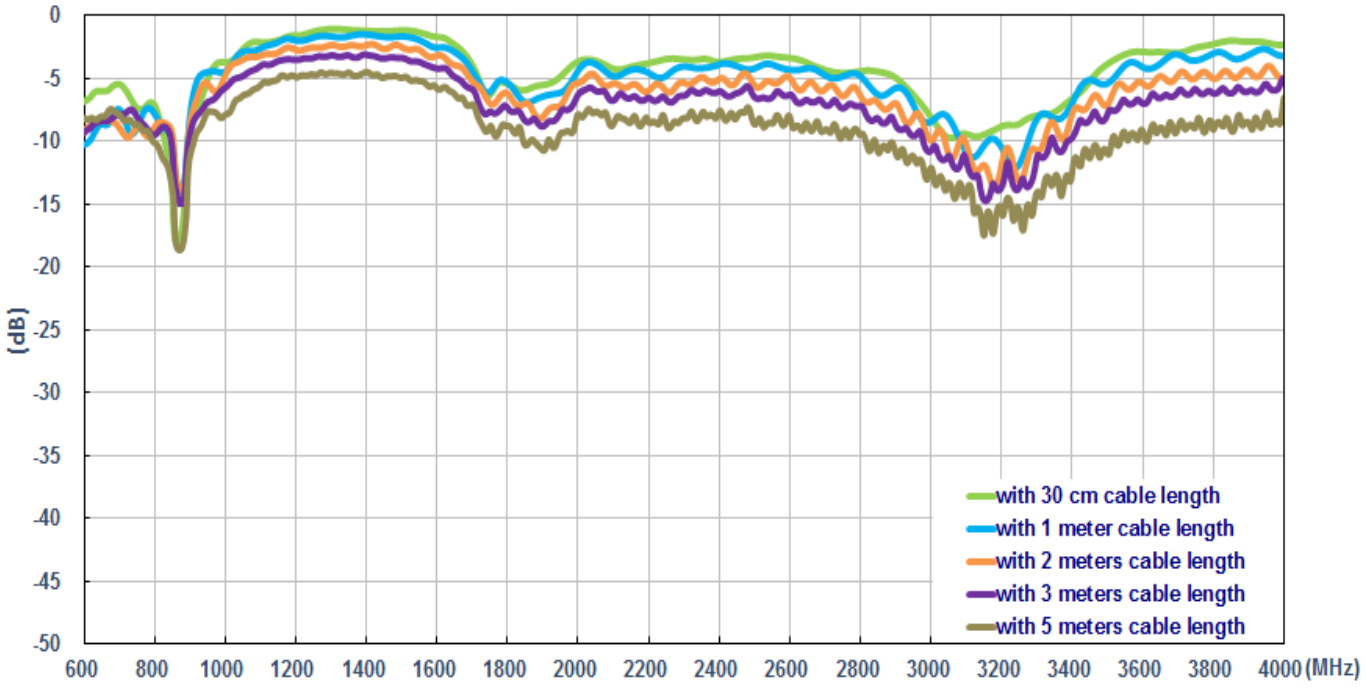
The MA240 antenna measurement with difference cable length and difference environments, the performance is shown as below,

6.1 In free Space

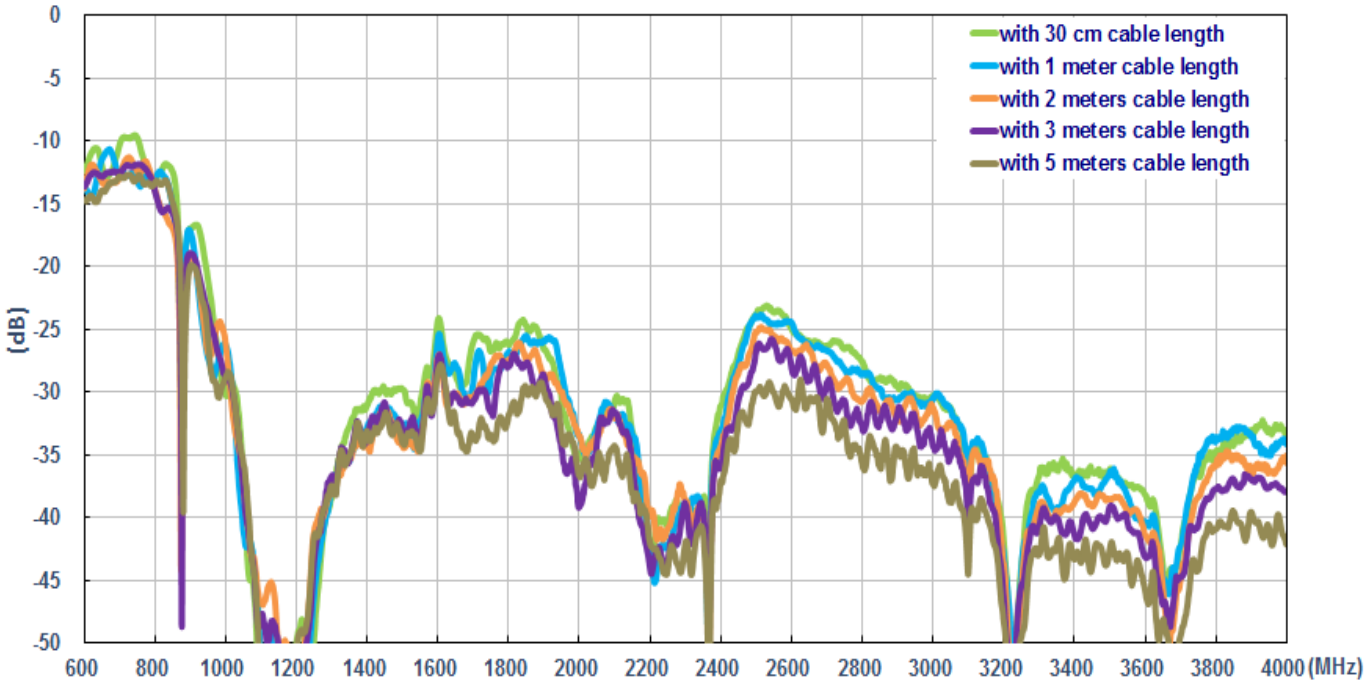
6.1.1 Return loss(MIMO_1 in free space)



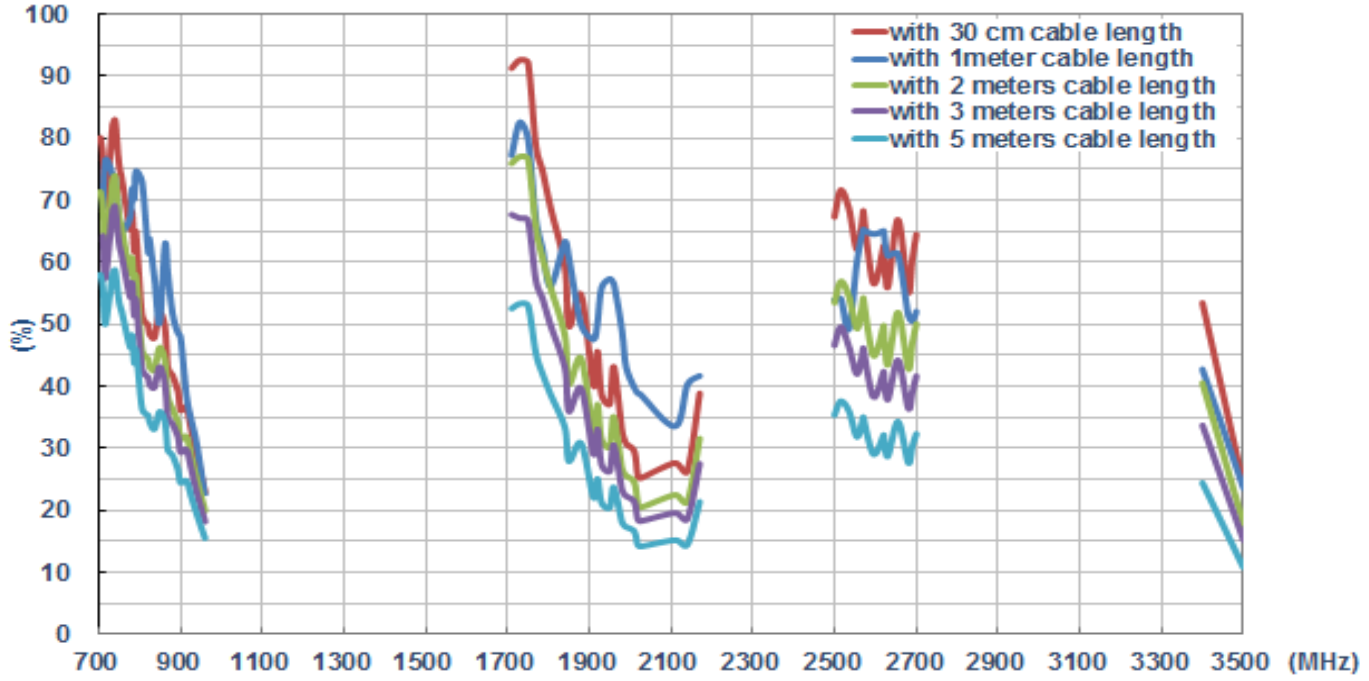
6.1.2 Return loss (MIMO_2 in free space)



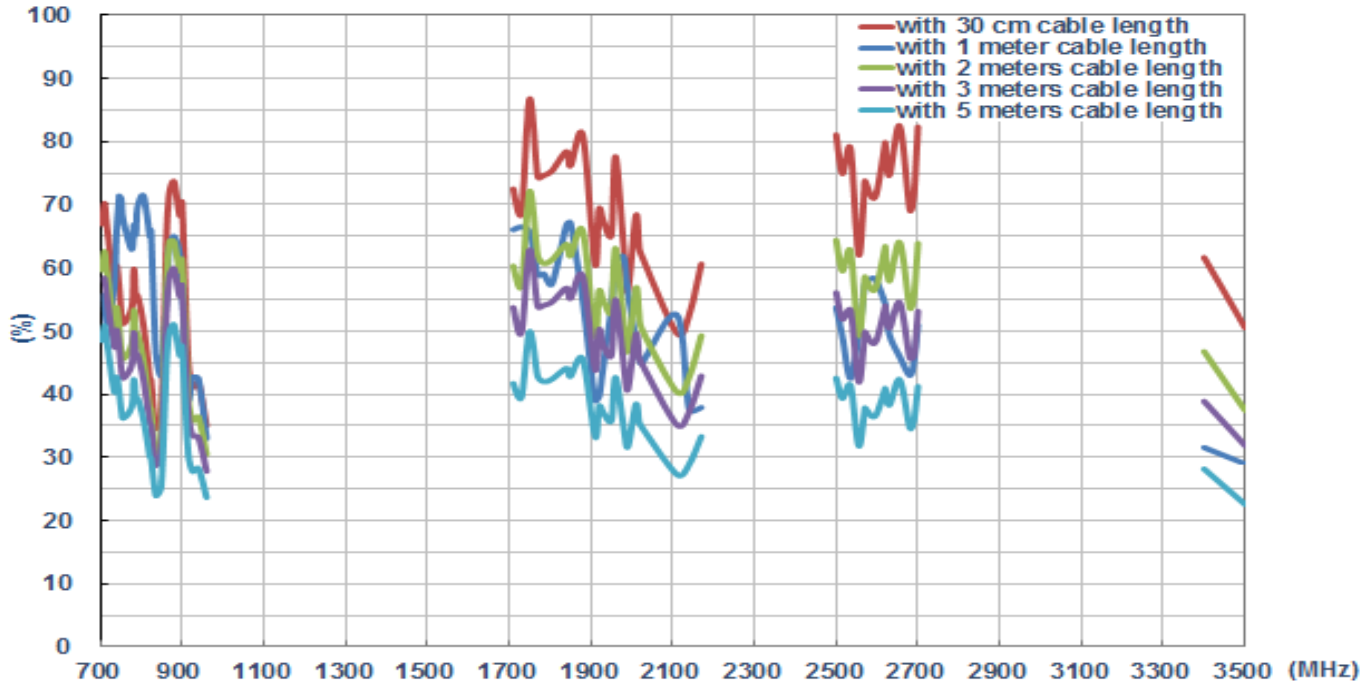
6.1.3 Insertion loss (in free space)



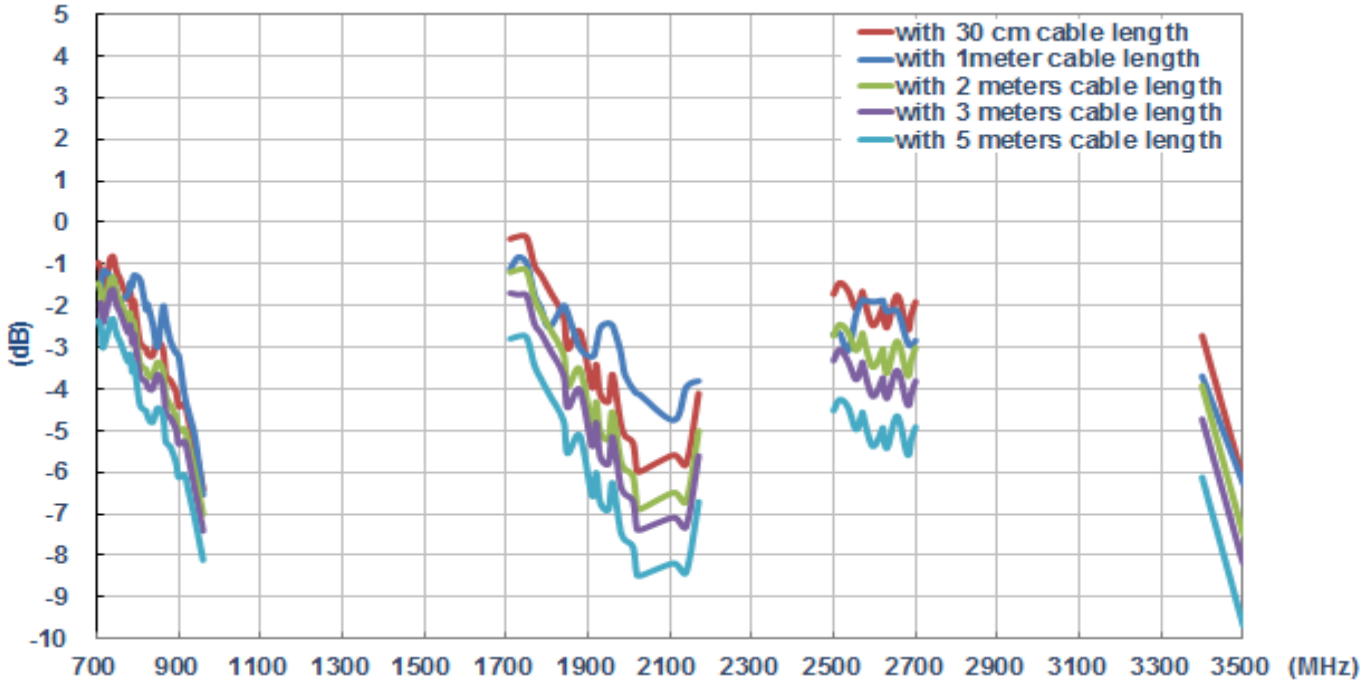
6.1.4 Efficiency (MIMO_1 in free space)



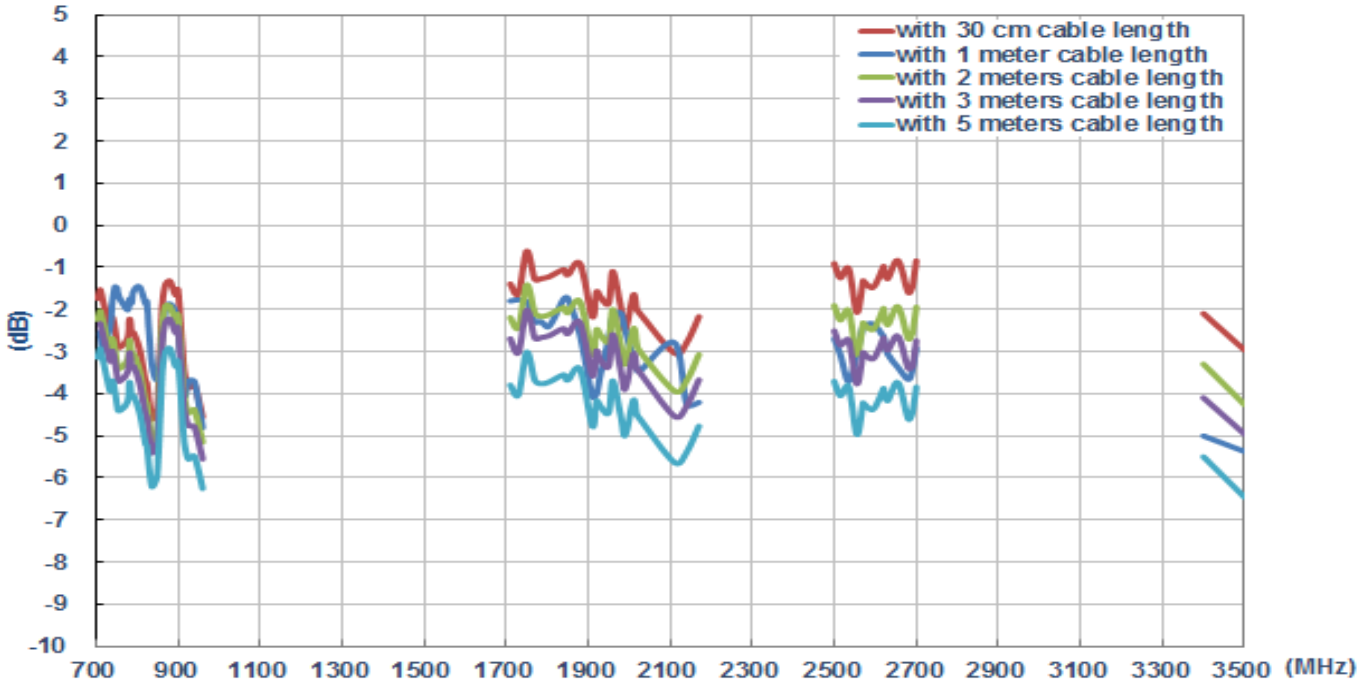
6.1.5 Efficiency (MIMO_2 in free space)



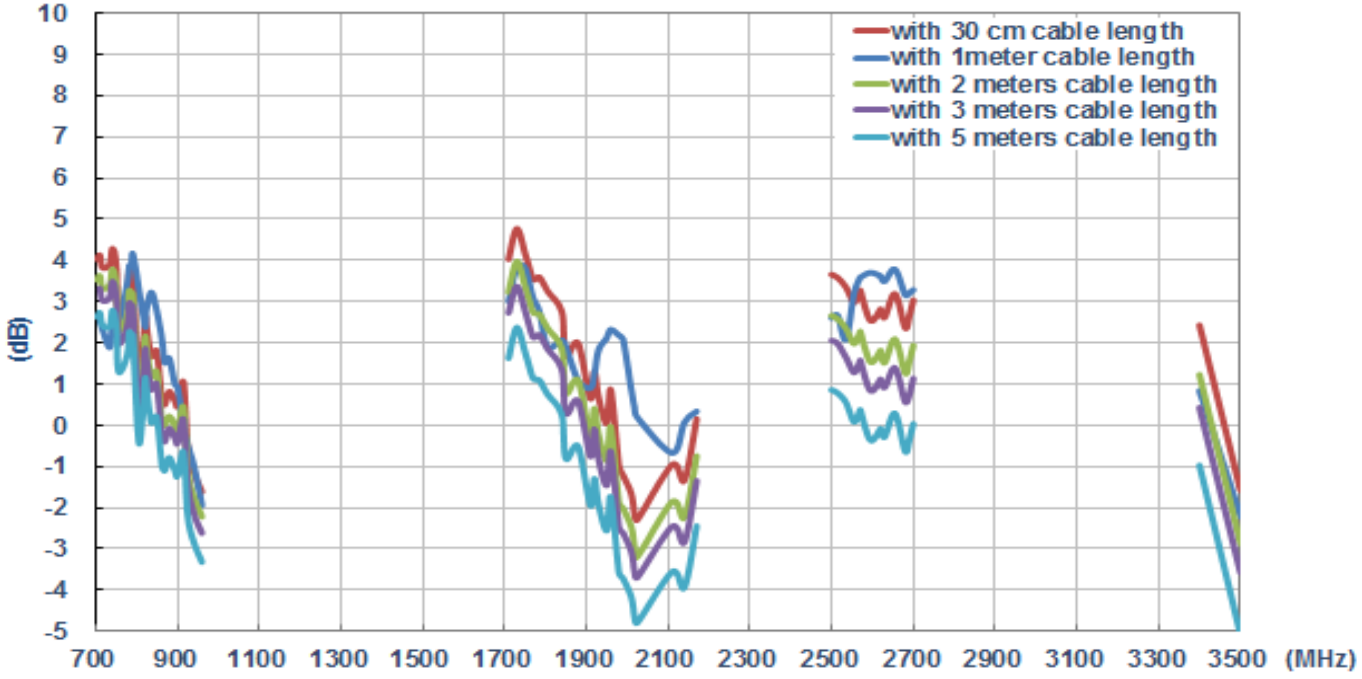
6.1.6 Average Gain (MIMO_1 in free space)



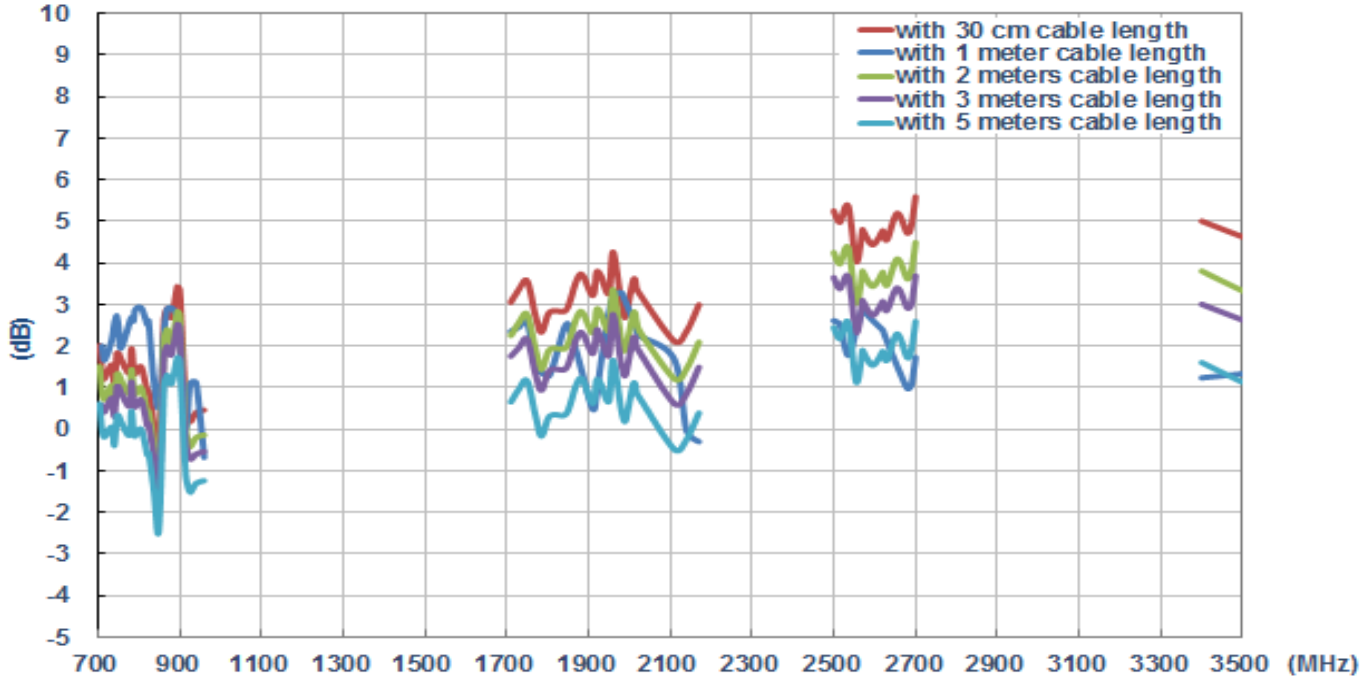
6.1.7 Average Gain (MIMO_2 in free space)



6.1.8 Peak Gain (MIMO_1 in free space)

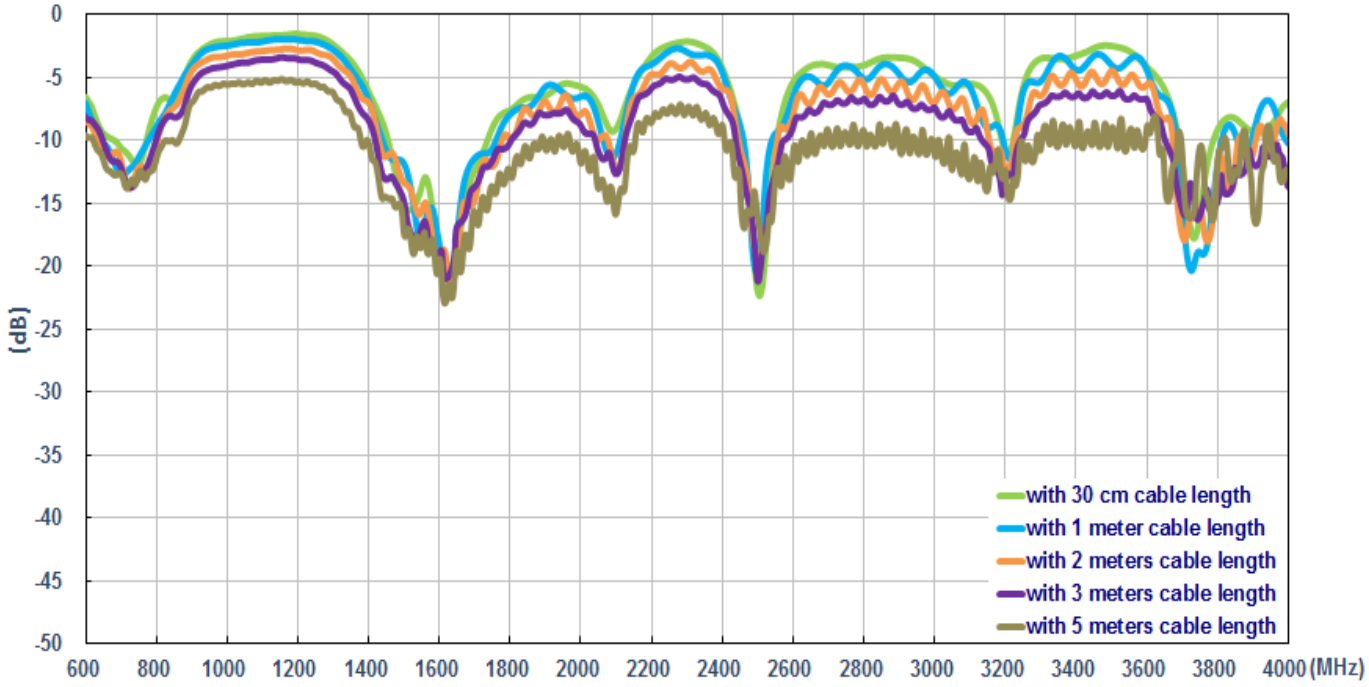


6.1.9 Peak Gain (MIMO_2 in free space)

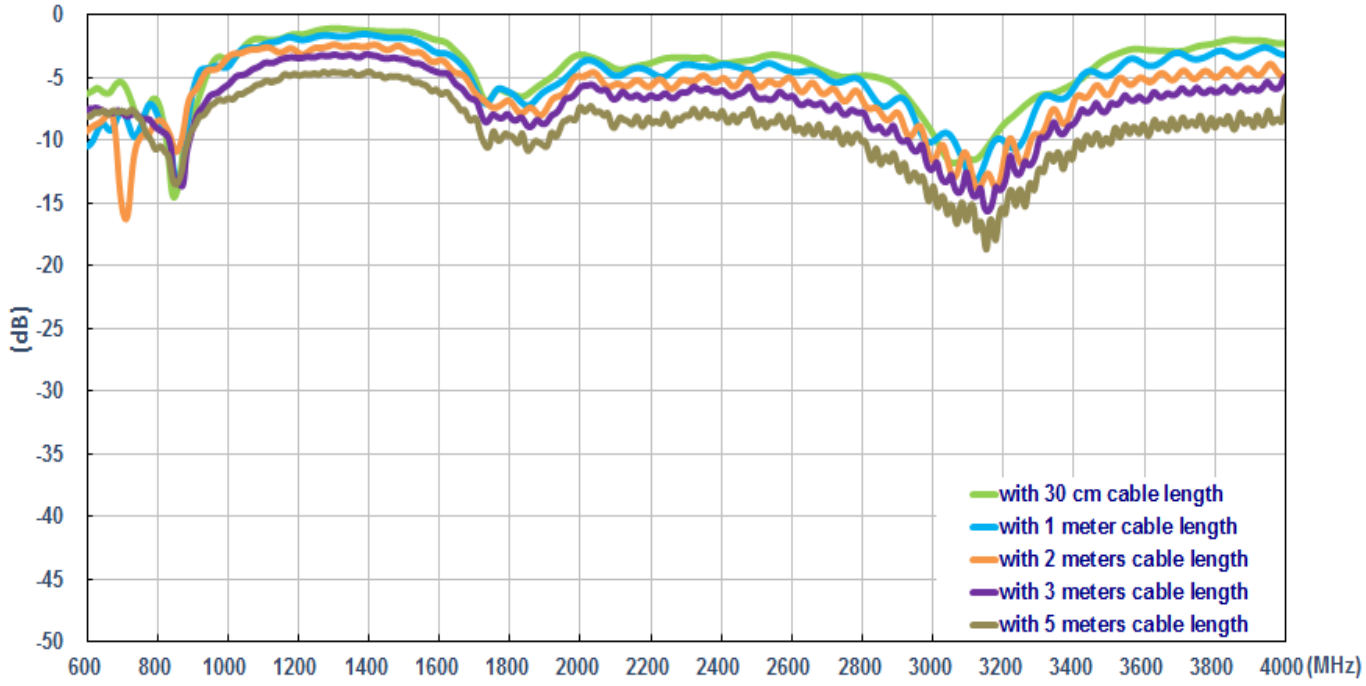


6.2 On 2mm ABS Base

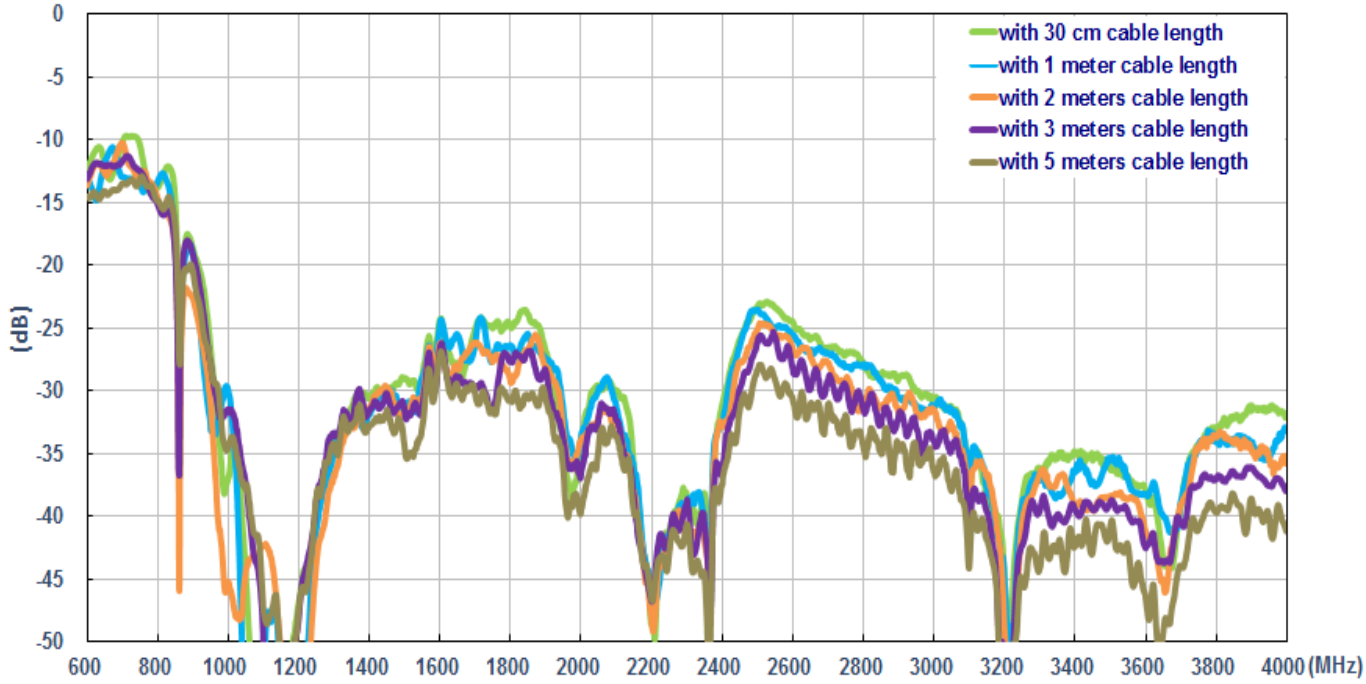
6.2.1 Return loss(MIMO_1 on the 2mm ABS)



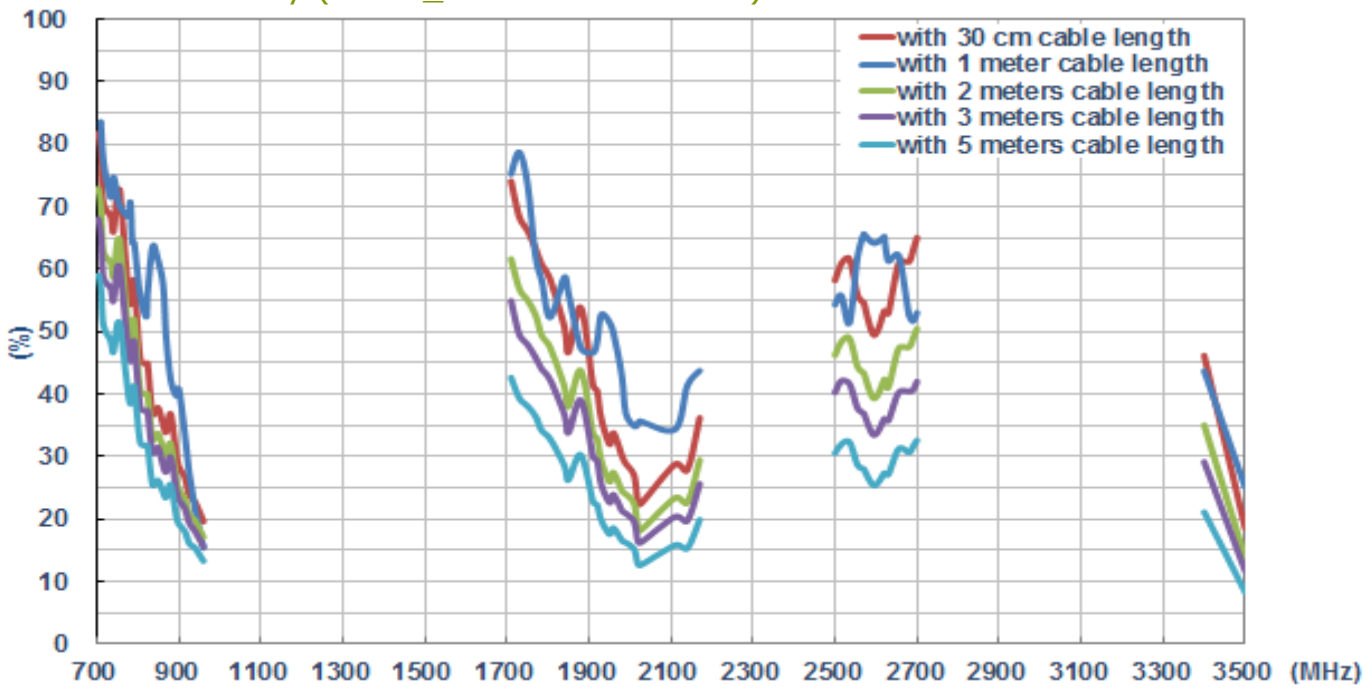
6.2.2 Return loss (MIMO_2 on the 2mm ABS)



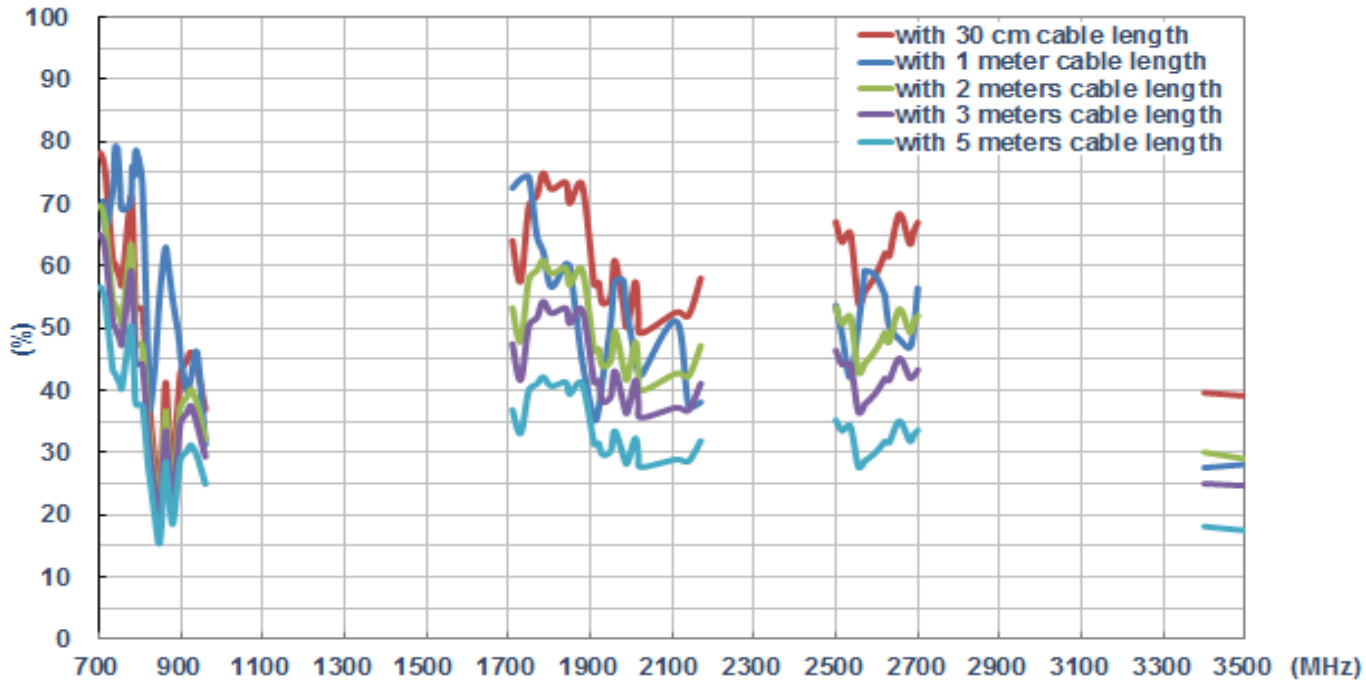
6.2.3 Insertion loss (on the 2mm ABS)



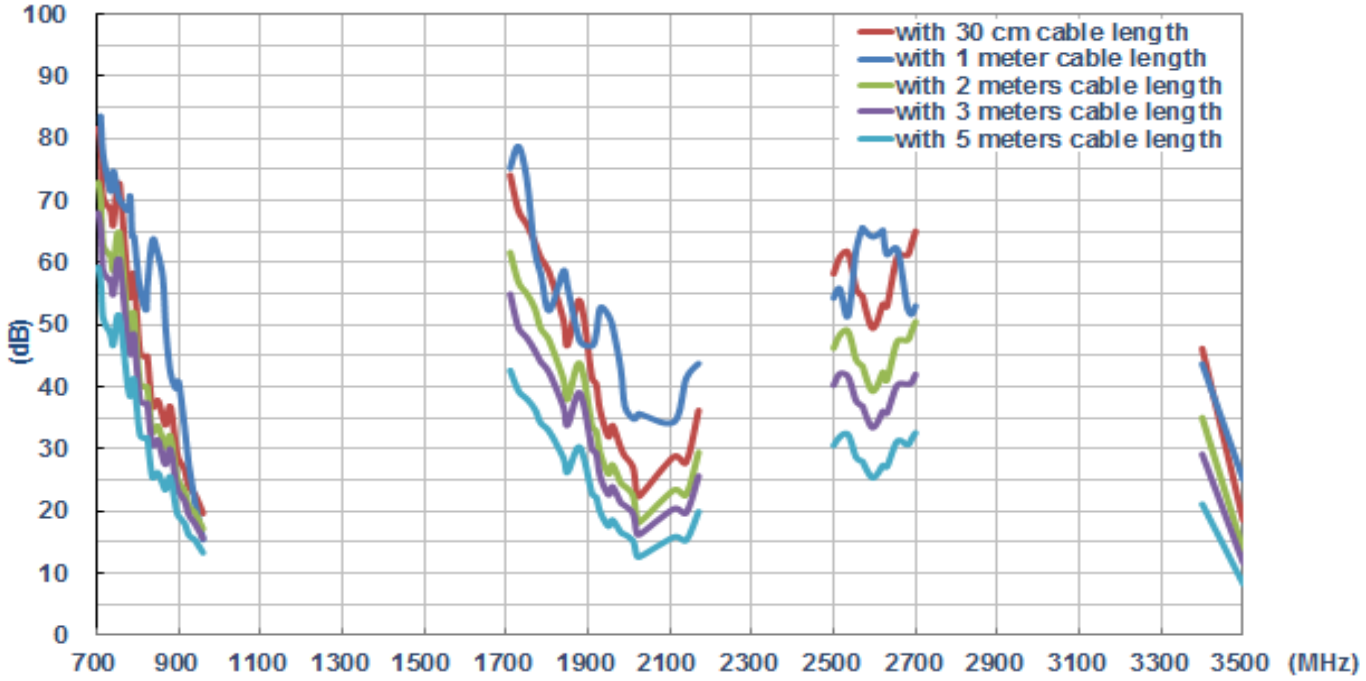
6.2.4 Efficiency (MIMO_1 on the 2mm ABS)



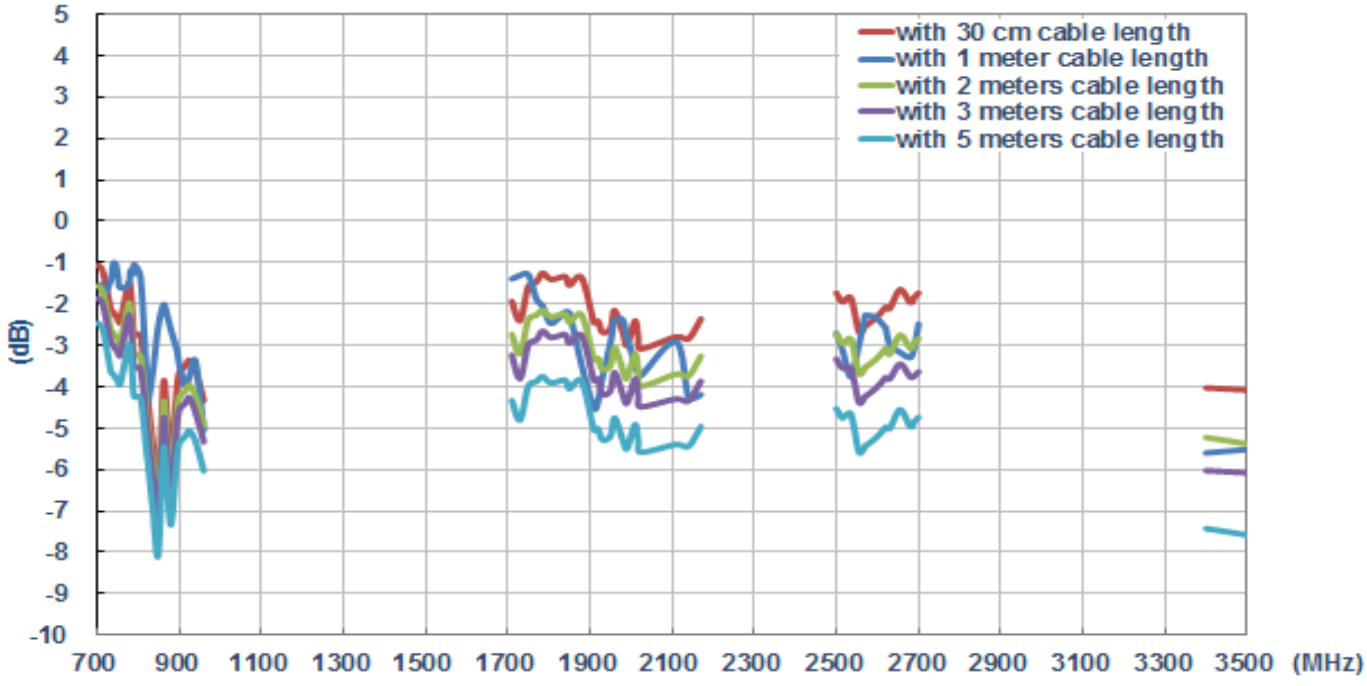
6.2.5 Efficiency (MIMO_2 on the 2mm ABS)



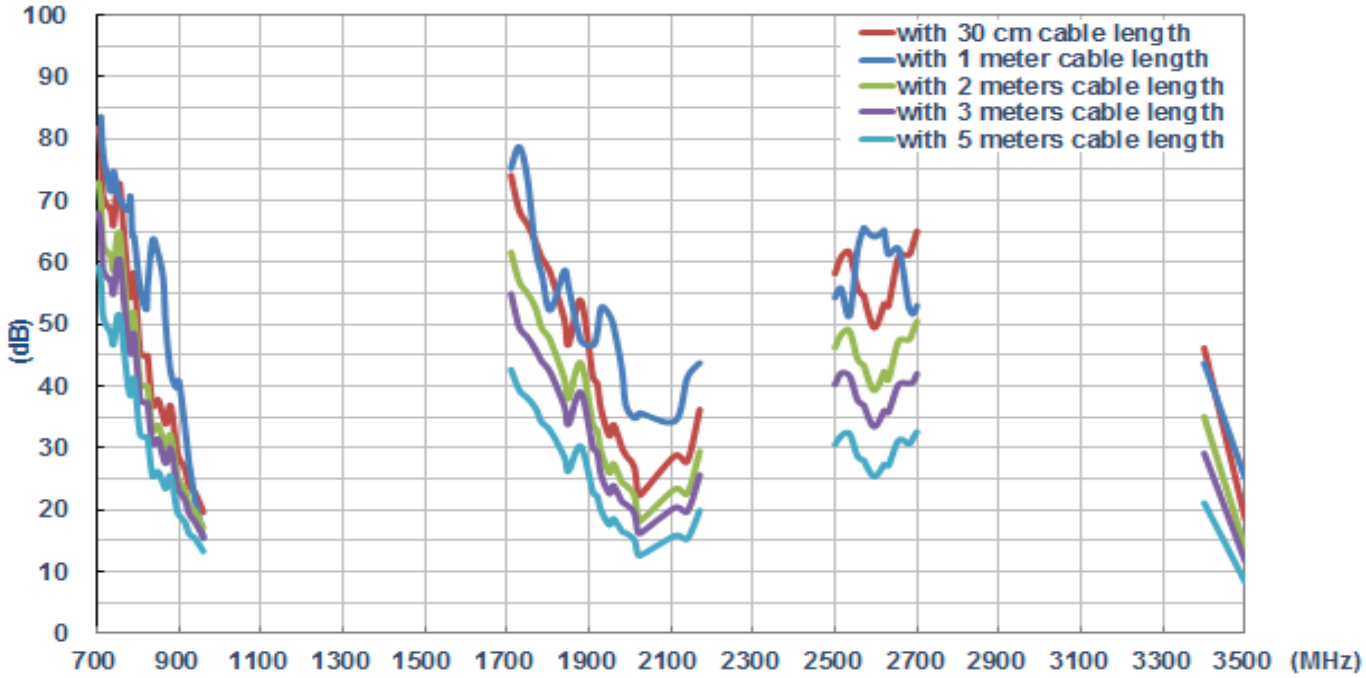
6.2.6 Average Gain (MIMO_ on the 2mm ABS)



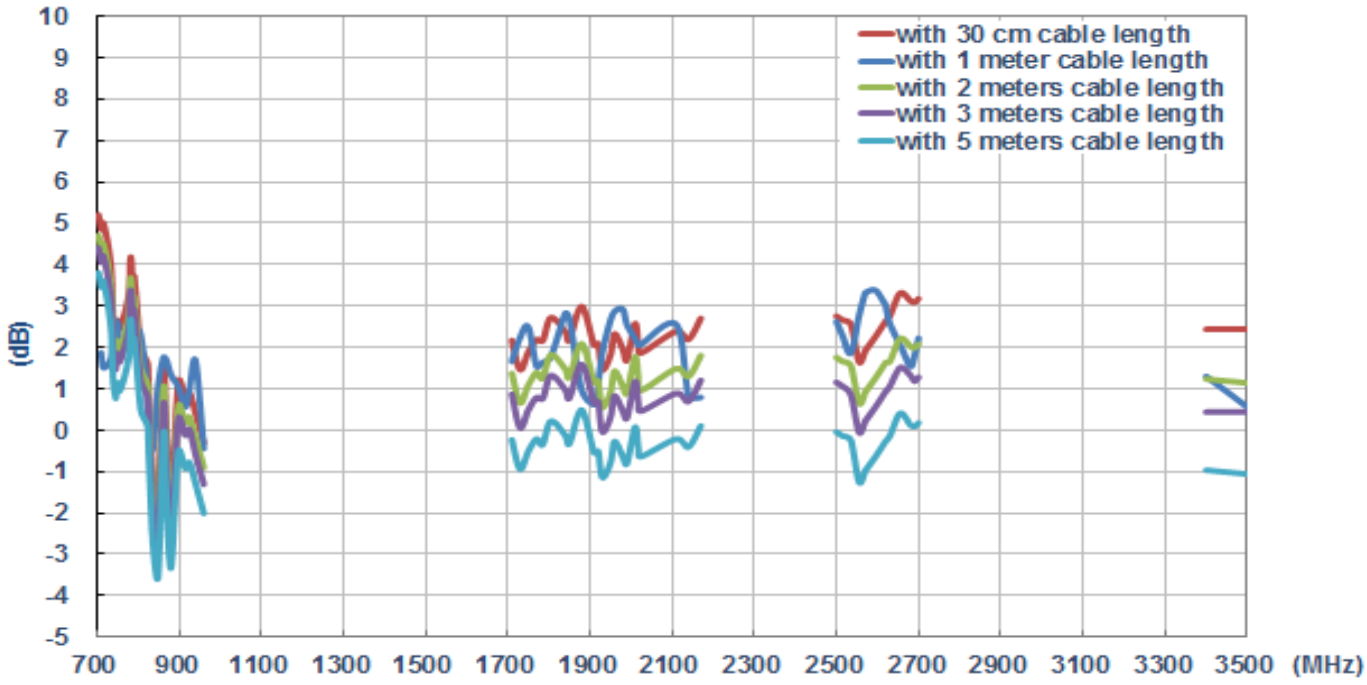
6.2.7 Average Gain (MIMO_2 on the 2mm ABS)



6.2.8 Peak Gain (MIMO_1 on the 2mm ABS)

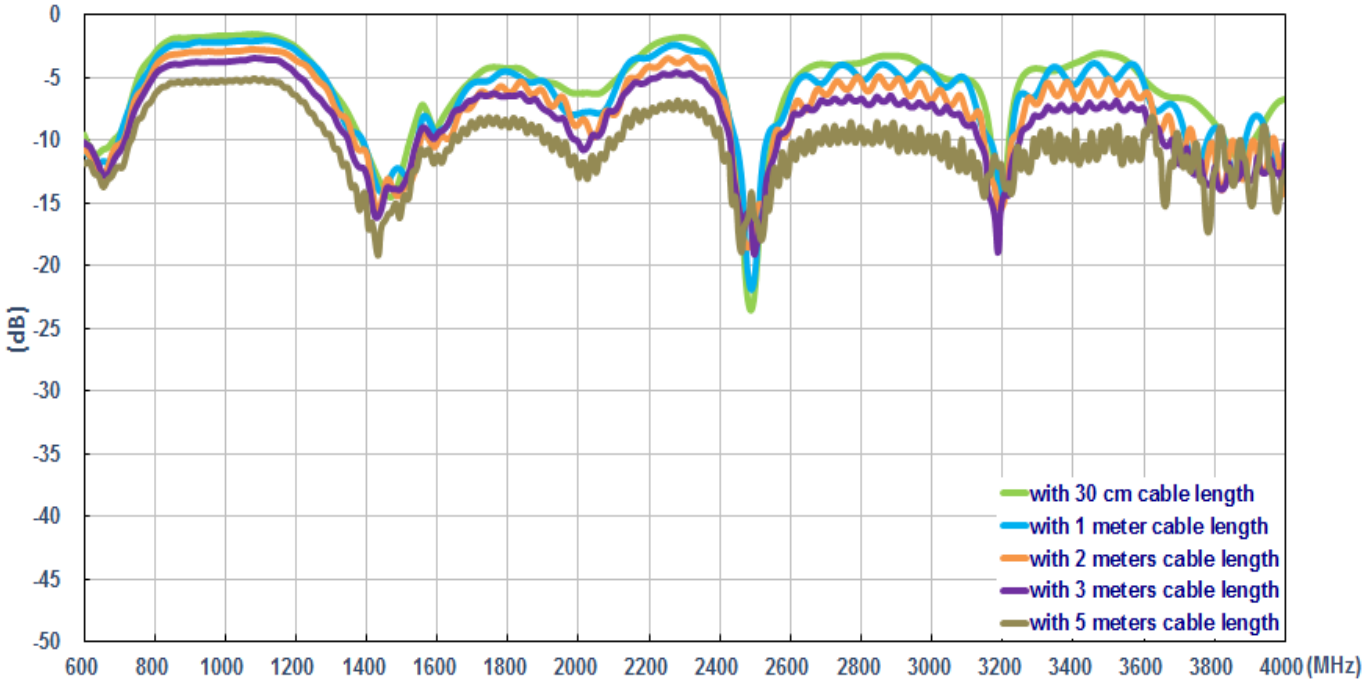


6.2.9 Peak Gain (MIMO_2 on the 2mm ABS)

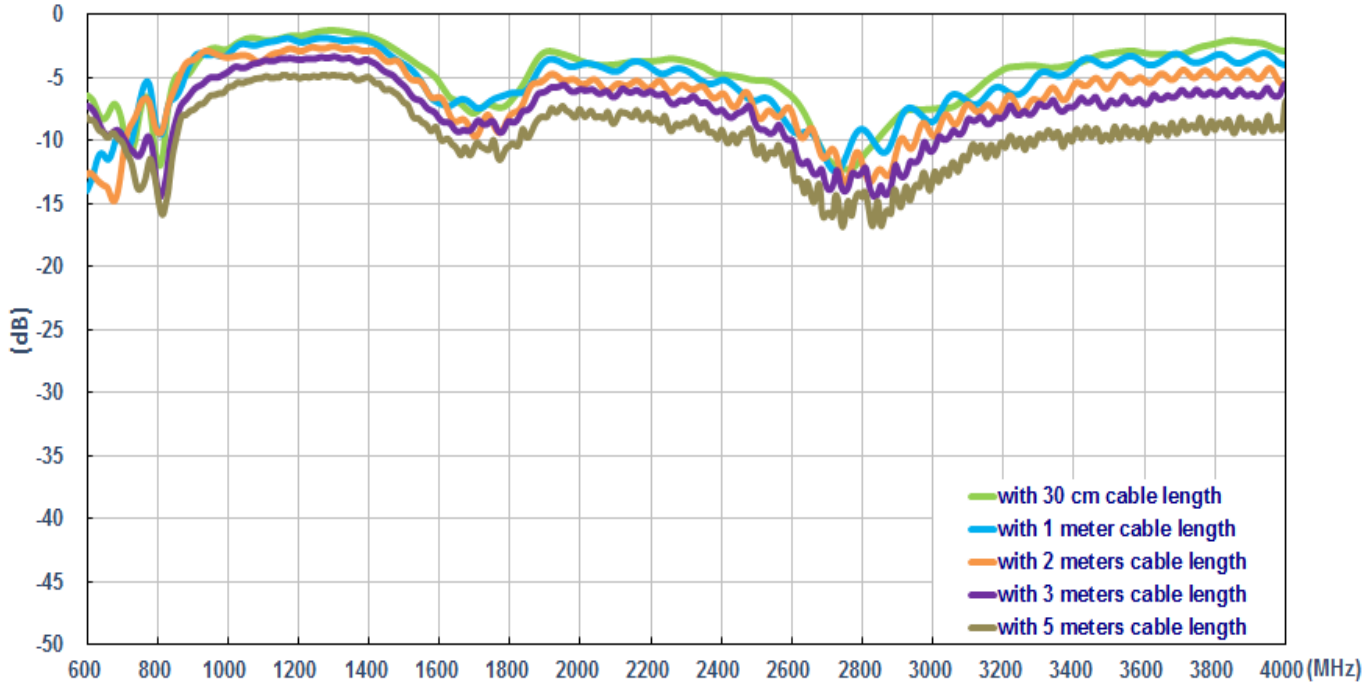


6.3 On the glass base

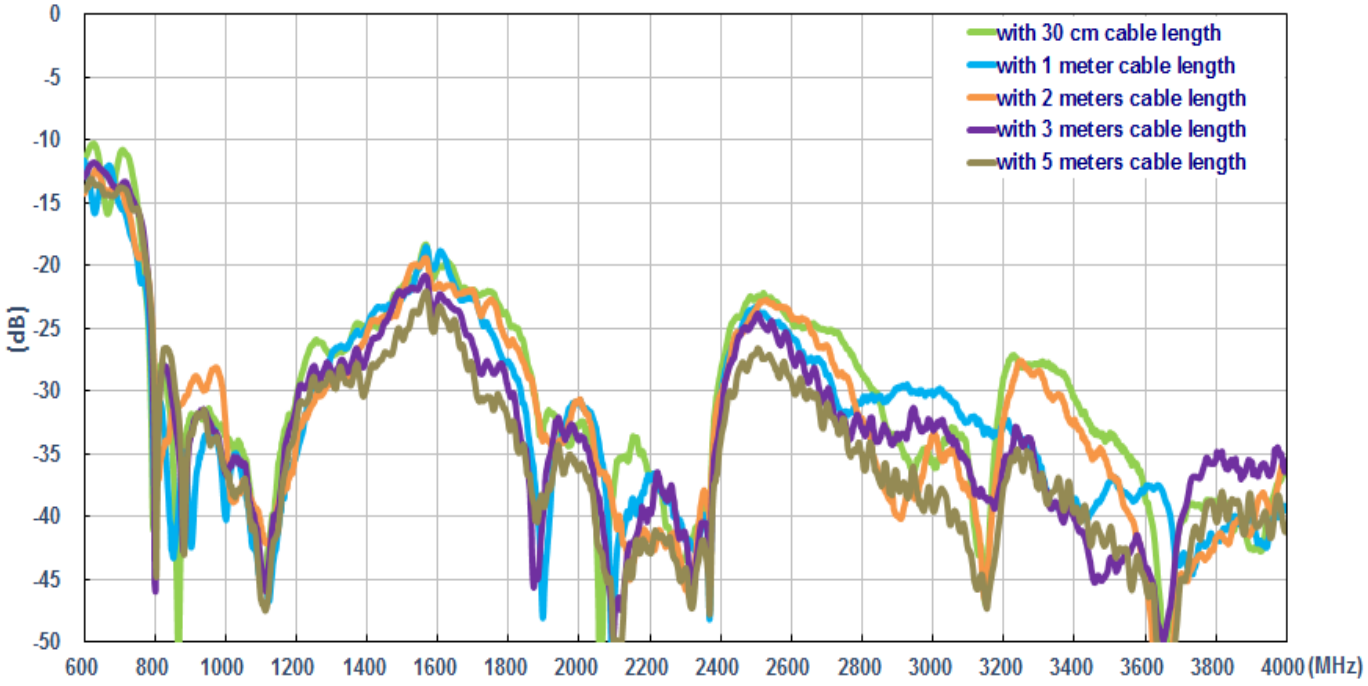
6.3.1 Return loss(MIMO_1 on the glass)



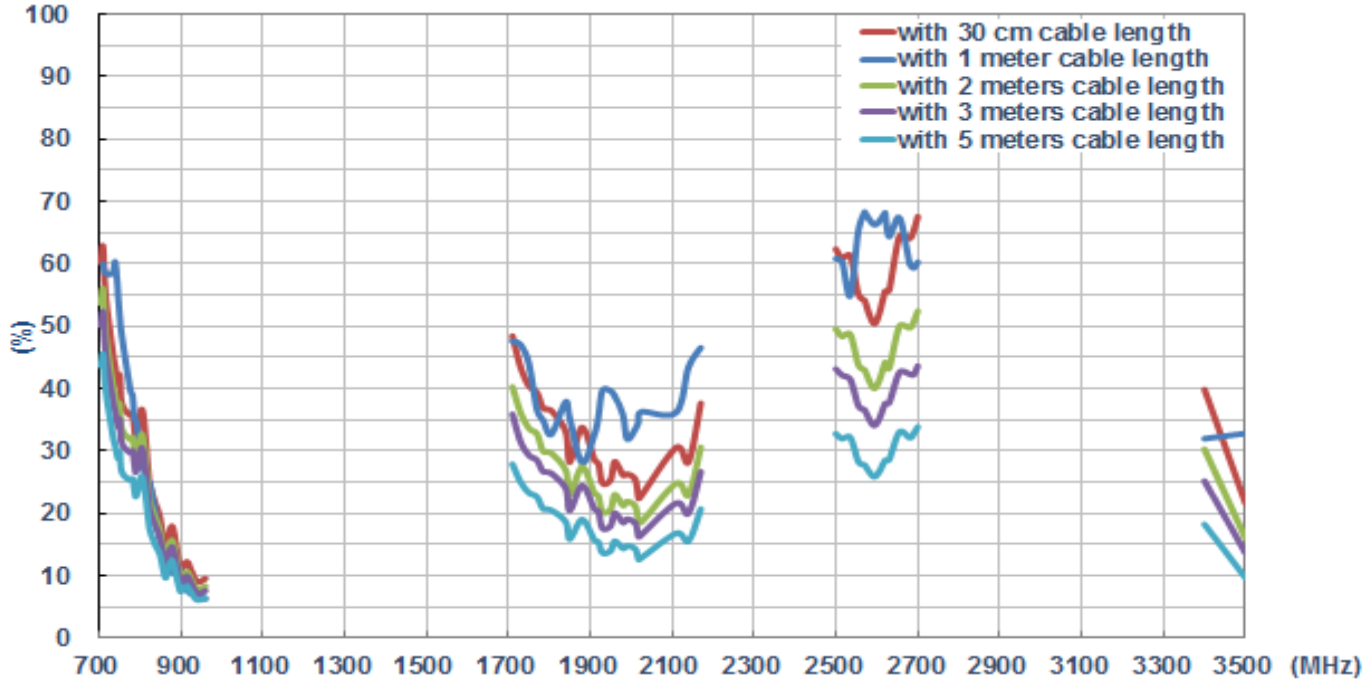
6.3.2 Return loss (MIMO_2 on the glass)



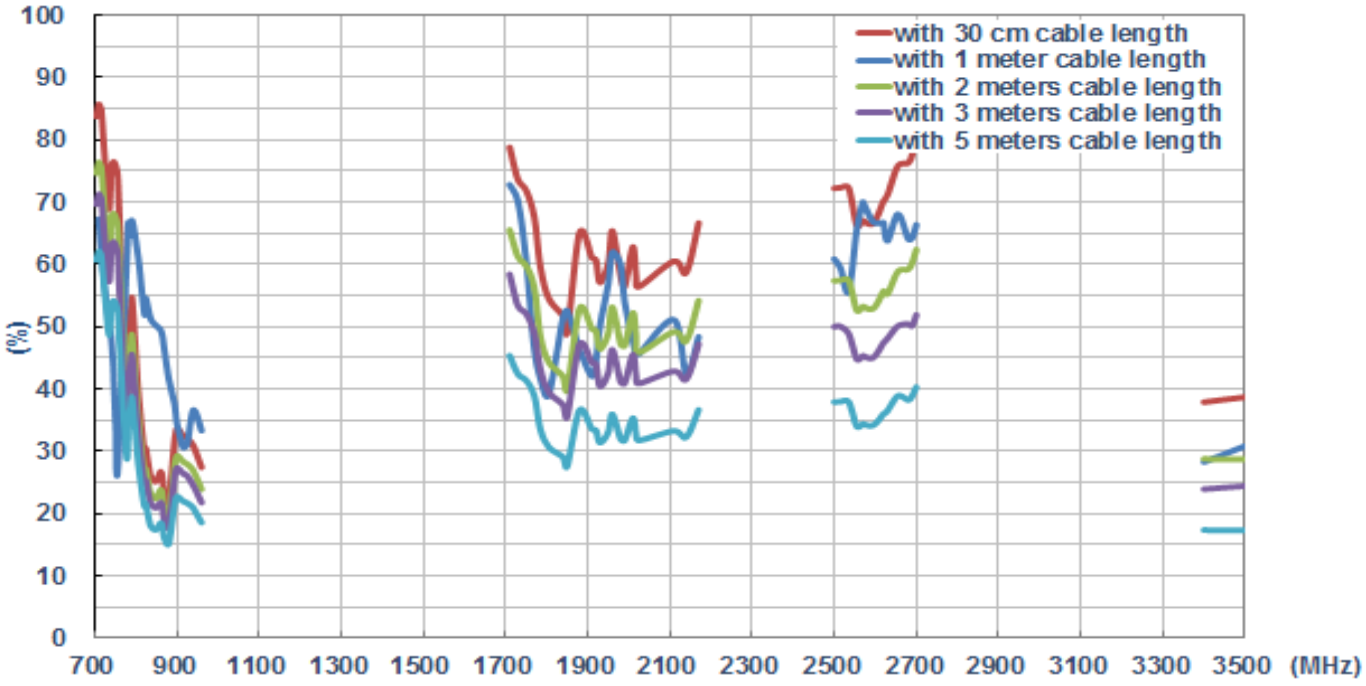
6.3.3 Insertion loss (on the glass)



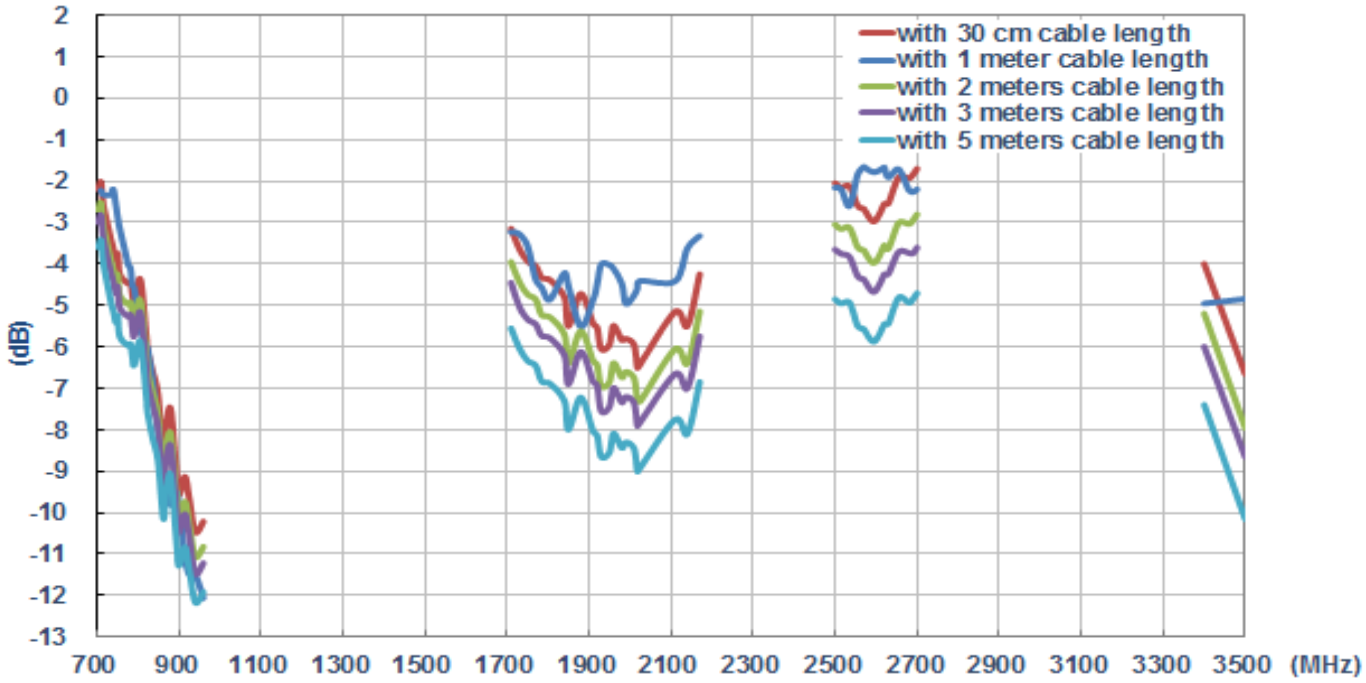
6.3.4 Efficiency (MIMO_1 on the glass)



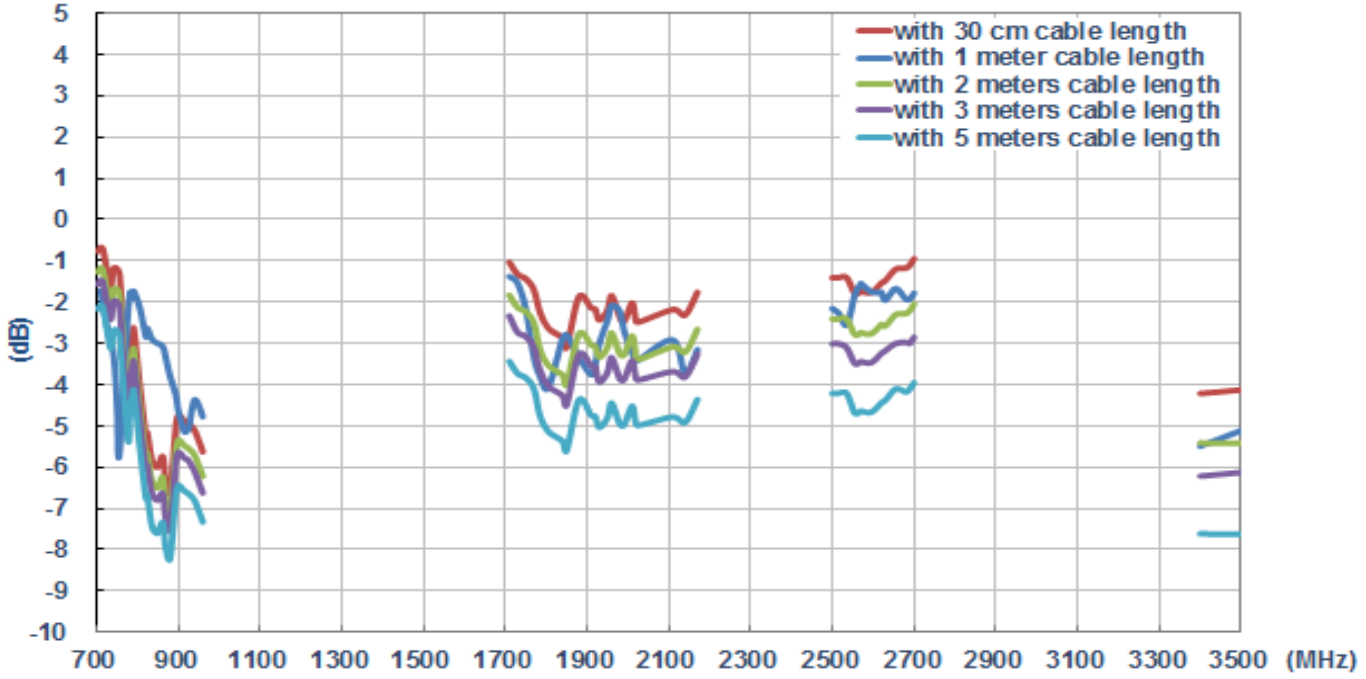
6.3.5 Efficiency (MIMO_2 in on the glass)



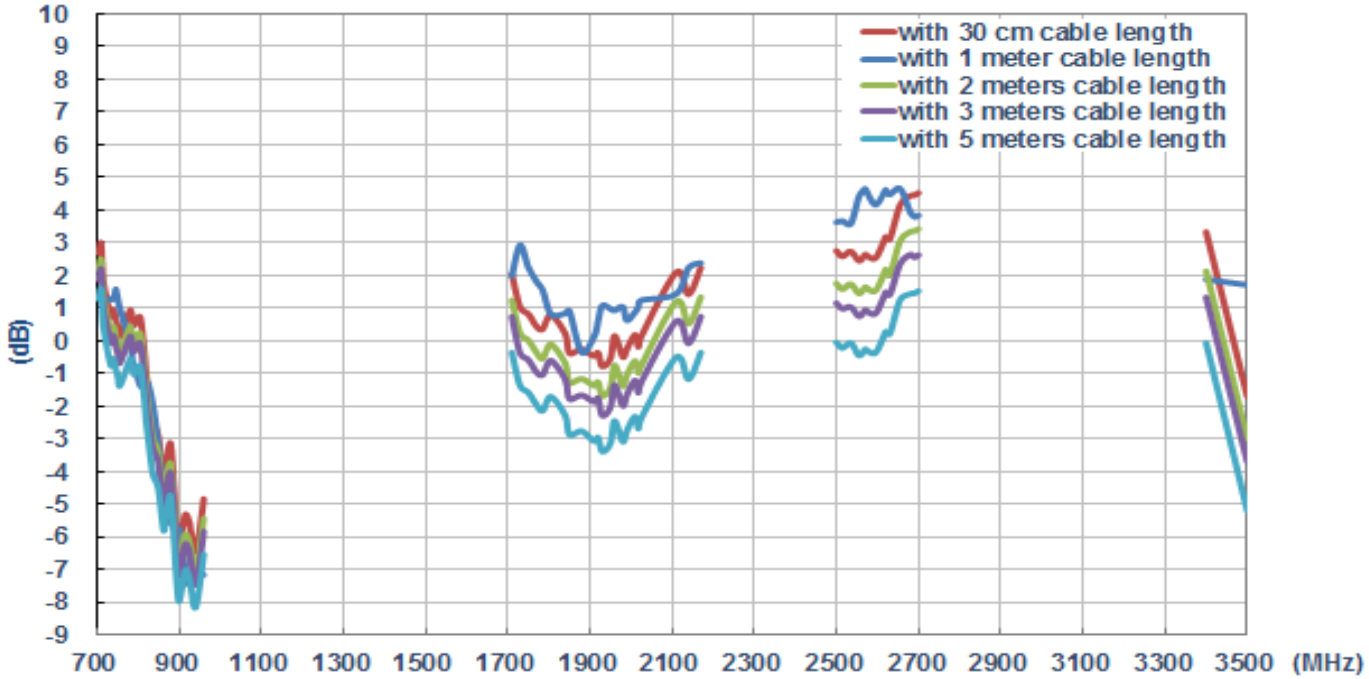
6.3.6 Average Gain (MIMO_1 on the glass)



6.3.7 Average Gain (MIMO_2 on the glass)



6.3.8 Peak Gain (MIMO_1 on the glass)



6.3.9 Peak Gain (MIMO_2 on the glass)