

SPECIFICATION

Patent Pending

- Part No. : **MA910.W.A.CG.001**
- Product Name : **Guardian** 2 in 1 Wi-Fi MIMO
Adhesive Mount Antenna
- Features : Low-Profile Housing – Mounts Flush to Wall
2* Wi-Fi MIMO 2.4GHz/5.8 GHz
IP67 Waterproof Resistant Enclosure
Dims: 146*134*20mm
Cable: 3000mm Low Loss KSR200-P with RP-SMA(M)
connectors
Custom Cables and Connectors Available
RoHS Compliant



1. Introduction

The MA910 Guardian is a low-profile 2 in 1 Wi-Fi MIMO wall and adhesive mount external antenna. As part of the first series of panel antenna worldwide designed for IoT gateway and router devices, it belongs to a new generation of combination antenna.

The MA910 Guardian is ideal for Wi-Fi applications requiring the increased data throughput and range provided by MIMO technology, all in a convenient and compact form factor. It is designed with high efficiency and gain as well as high isolation between the antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths. With its heavy-duty, fully IP67 casing, the MA910 Guardian can withstand a range of environments.

All of these factors make the MA910 Guardian antenna an excellent choice for use by RF professionals in:

- IoT Gateway and Routers
- HD Video Streaming
- Transportation
- Remote monitoring applications

The standard MA910 Guardian antenna comes with 3 meter, low loss KSR-200-P coaxial cable. Customized cables and connector versions are also available. Also available in black.

2. Specification

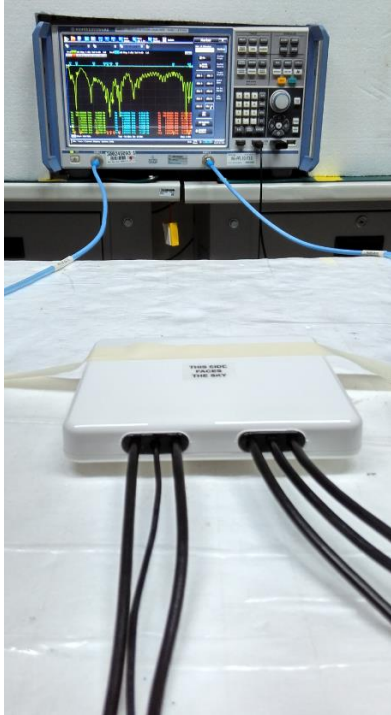
2.4GHz/5GHz Wi-Fi Antenna			
Frequency (MHz)		2400~2500	4900~5850
Efficiency (%)			
MIMO_1	Free space	43.80	31.63
	ABS	40.64	32.52
	Glass	40.95	31.05
	Metal	39.31	30.75
	Wall	46.28	30.47
MIMO_2	Free space	33.44	30.94
	ABS	35.14	30.79
	Glass	30.94	30.85
	Metal	34.58	30.00
	Wall	38.41	28.68
Average Gain (dBi)			
MIMO_1	Free space	-3.59	-5.08
	ABS	-3.91	-4.96
	Glass	-3.88	-5.18
	Metal	-4.06	-5.26
	Wall	-3.35	-5.25
MIMO_2	Free space	-4.77	-5.15
	ABS	-4.57	-5.18
	Glass	-5.11	-5.17
	Metal	-4.65	-5.34
	Wall	-4.16	-5.49
Peak Gain (dBi)			
MIMO_1	Free space	3.15	3.14
	ABS	4.14	3.38
	Glass	1.79	3.23
	Metal	4.02	4.18
	Wall	4.27	3.97
MIMO_2	Free space	1.74	3.90
	ABS	0.98	3.63
	Glass	2.55	5.27
	Metal	4.82	4.96
	Wall	2.03	4.17
Impedance		50Ω	
Polarization		Linear	
VSWR		< 3	
Cable		3 meter KSR200-P standard, fully customizable	
Connector		RP-SMA(M) standard, fully customizable	

MECHANICAL	
Antenna Dimensions	146*134*20mm
Casing	ASA
Weight (including cable)	672g
Ingress Protection Rating	IP67
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 Wi-Fi MIMO Antenna

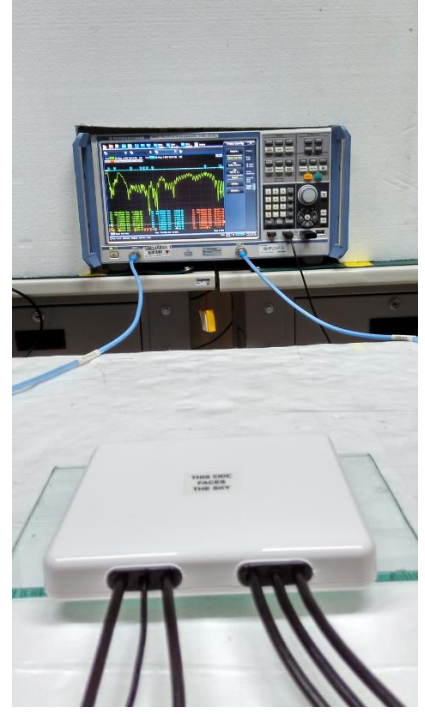
3.1.1 Test Setup



Free space



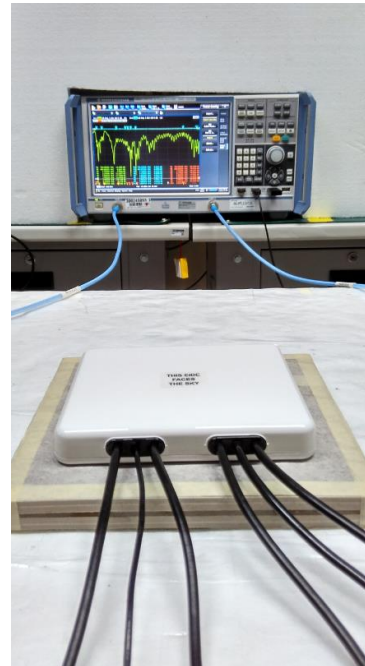
ABS



Glass



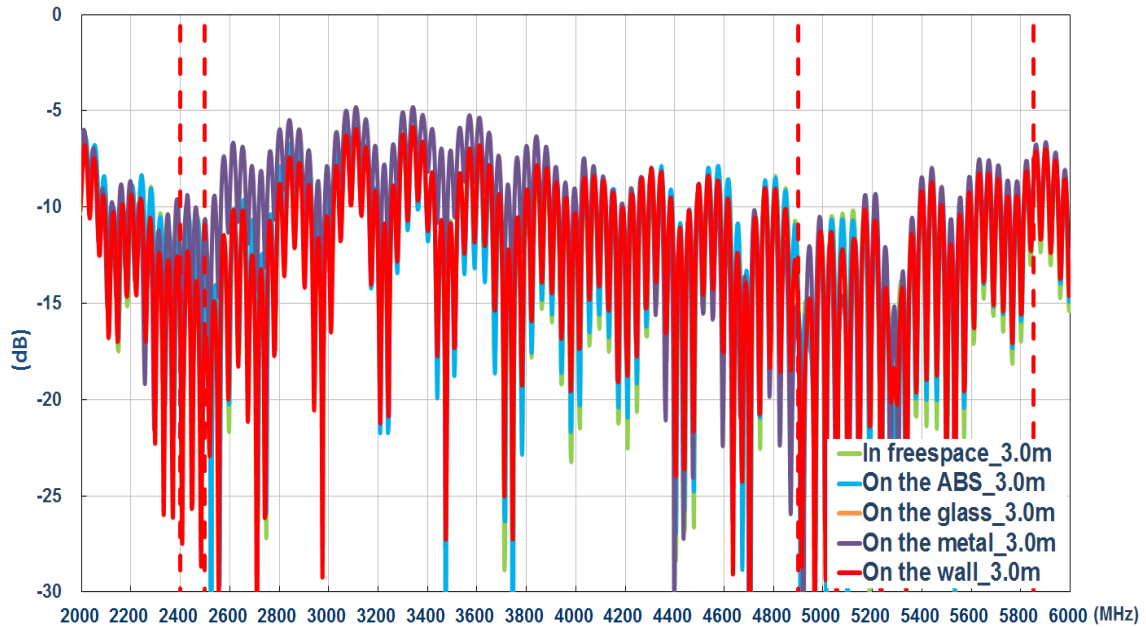
Metal



Wall

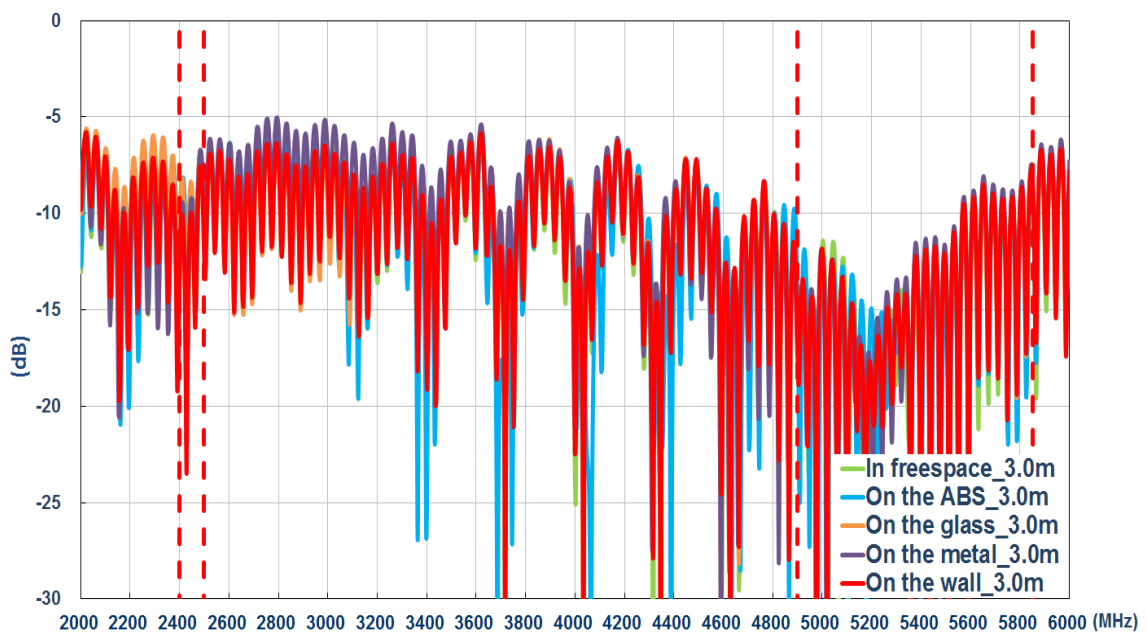
3.1.2 Wi-Fi 1 Antenna Return Loss

Performance in different environments with 3 meter cable length



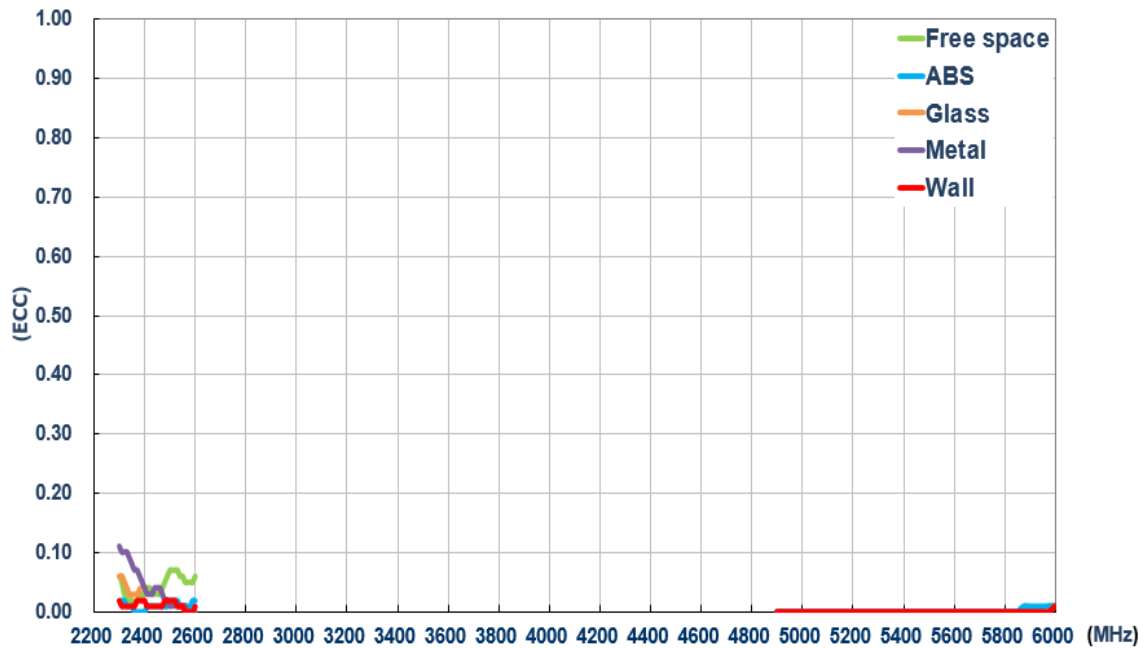
3.1.3 Wi-Fi 2 Antenna Return Loss

Performance in different environments with 3 meter cable length



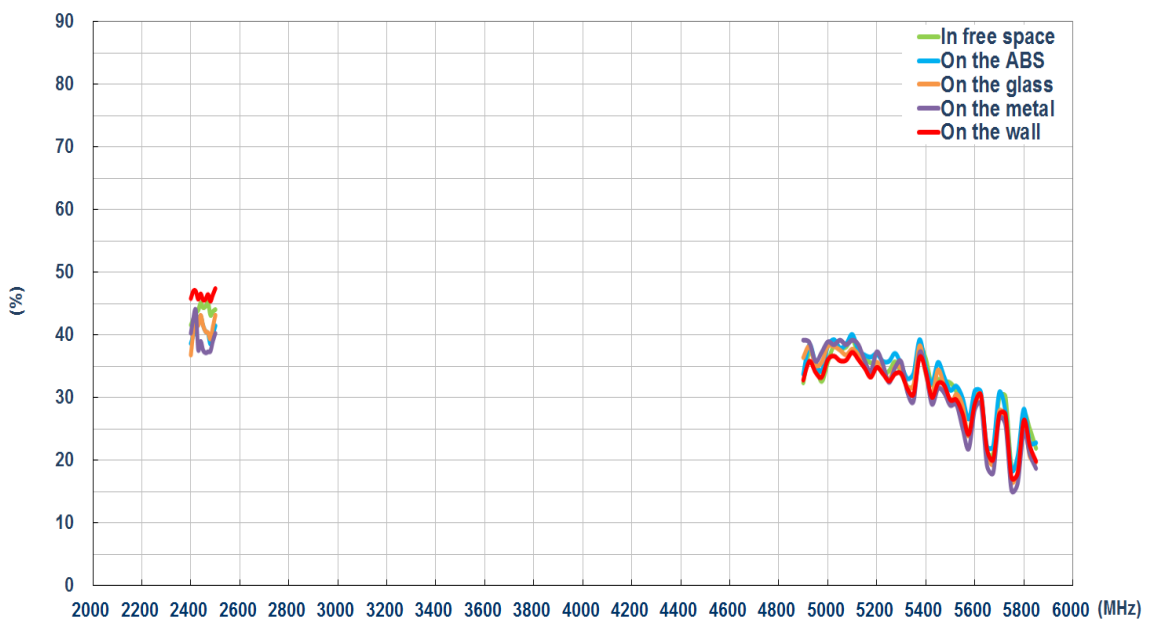
3.1.4 Wi-Fi Envelope Correlation Coefficient

Performance in different environments with 3 meter cable length



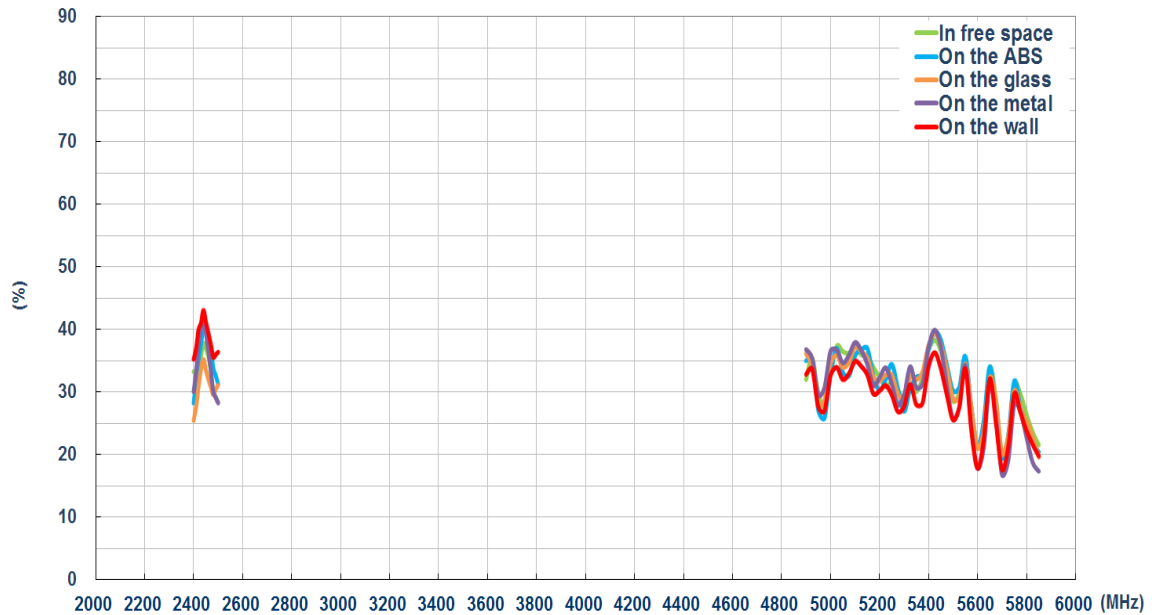
3.1.5 Wi-Fi 1 Antenna Efficiency

Performance in different environments with 3 meter cable length



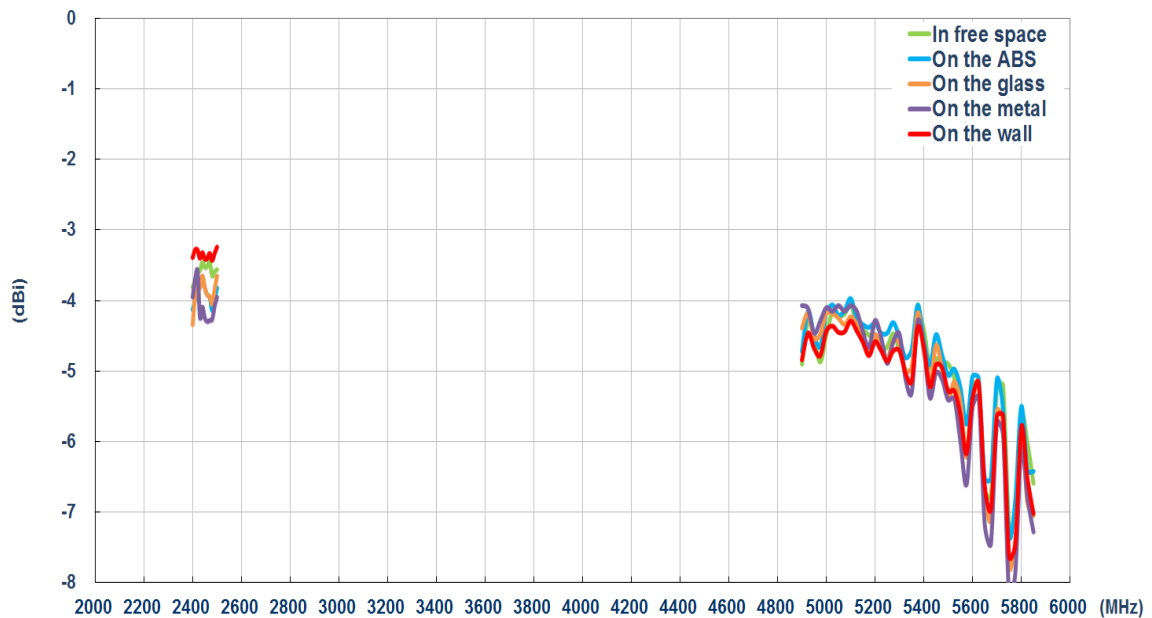
3.1.6 Wi-Fi 2 Antenna Efficiency

Performance in different environments with 3 meter cable length



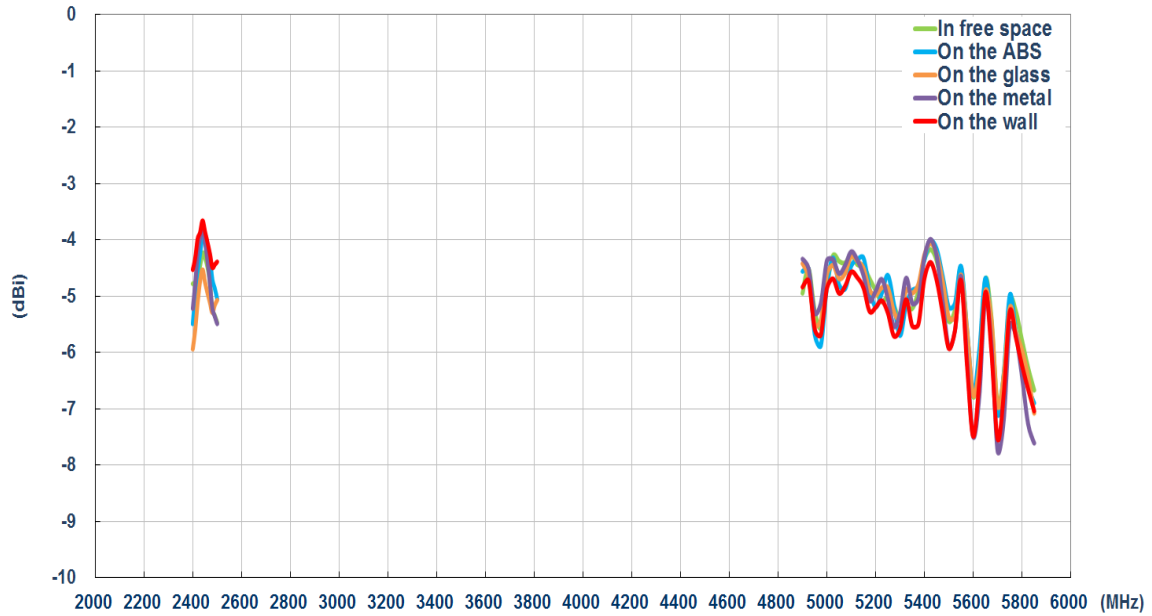
3.1.7 Wi-Fi 1 Antenna Average Gain

Performance in different environments with 3 meter cable length



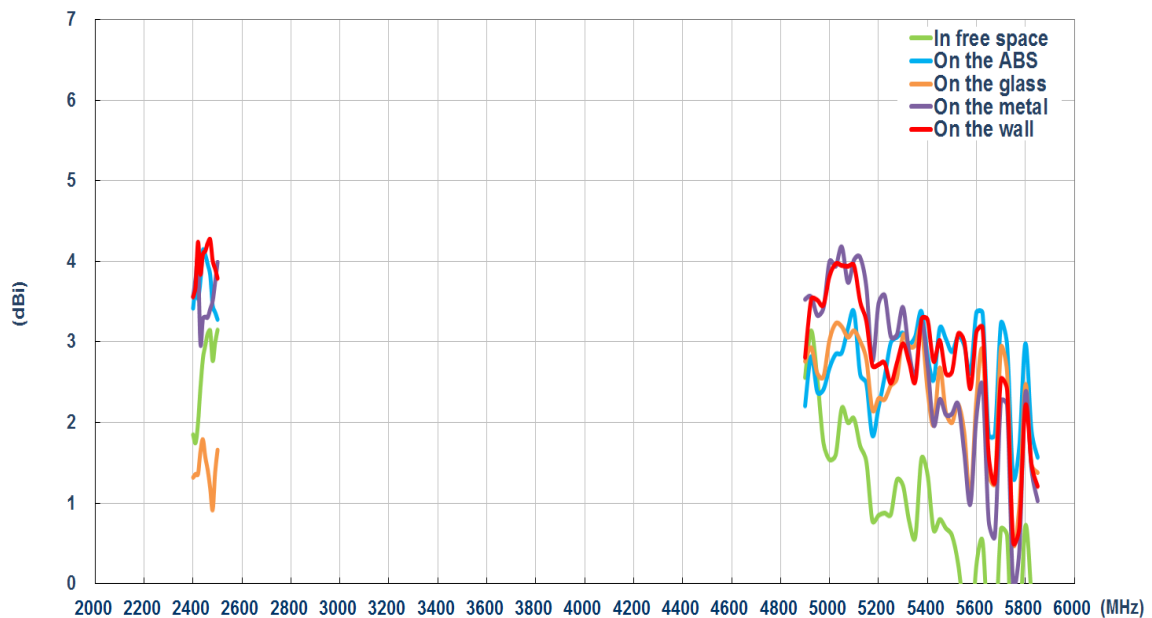
3.1.8 Wi-Fi 2 Antenna Average Gain

Performance in different environments with 3 meter cable length



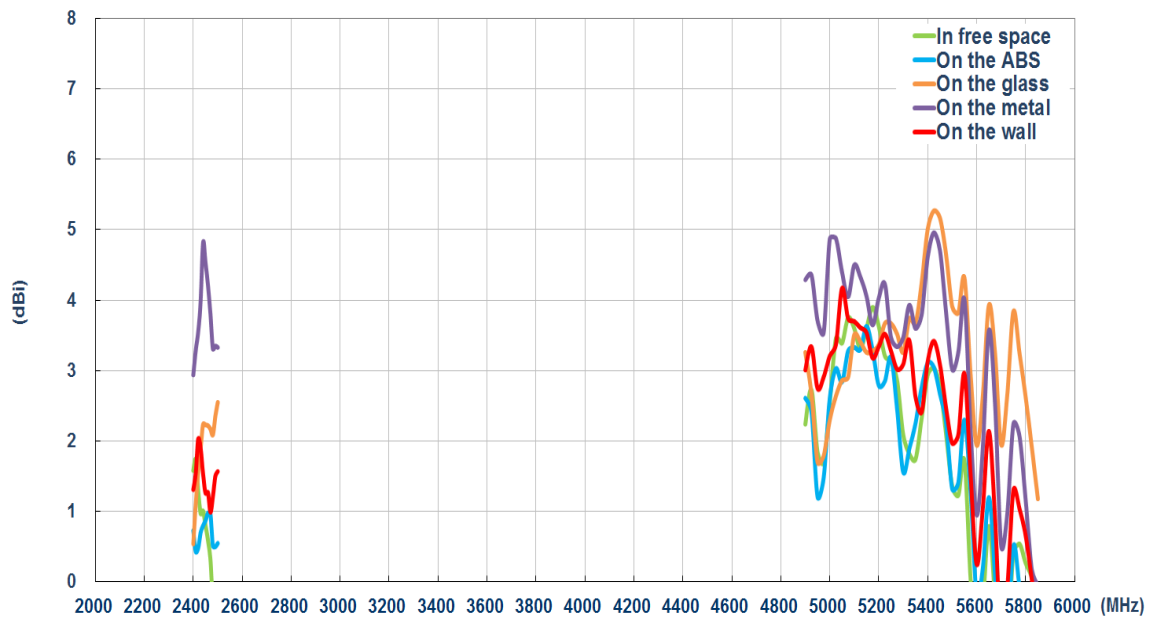
3.1.9 Wi-Fi 1 Antenna Peak Gain

Performance in different environments with 3 meter cable length

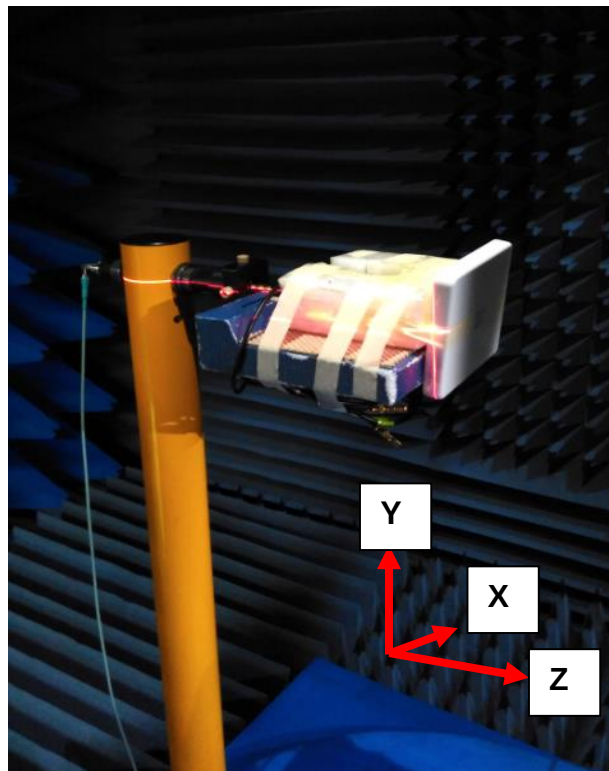


3.1.10 Wi-Fi 2 Antenna Peak Gain

Performance in different environments with 3 meter cable length



3.1.11 Test Setup For Antenna Radiation Pattern

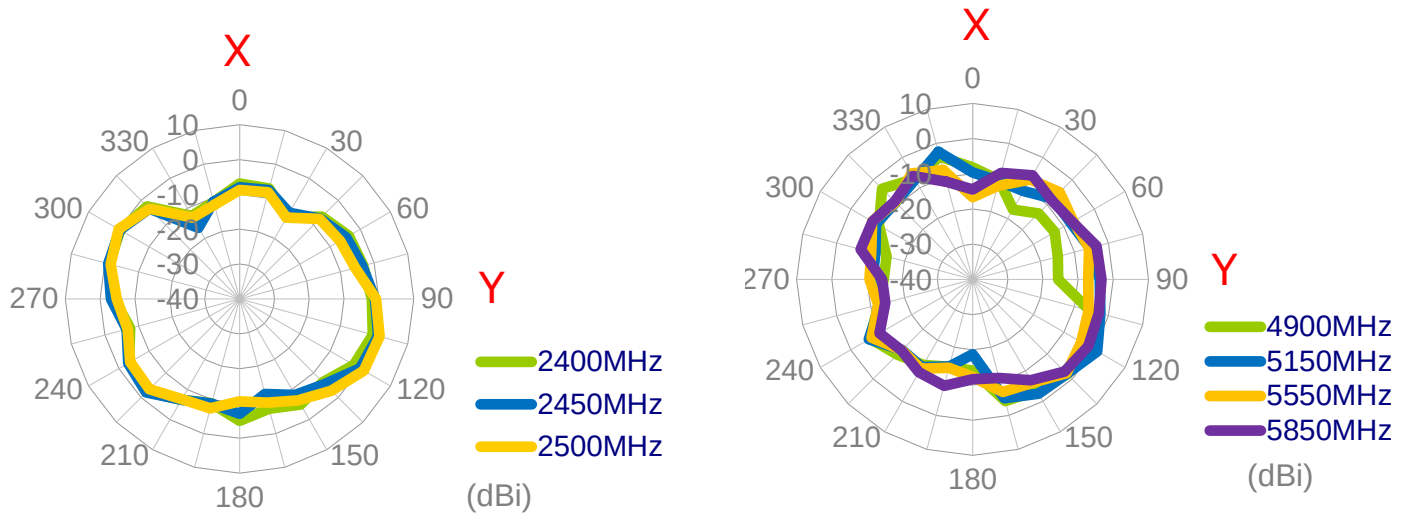


In free space

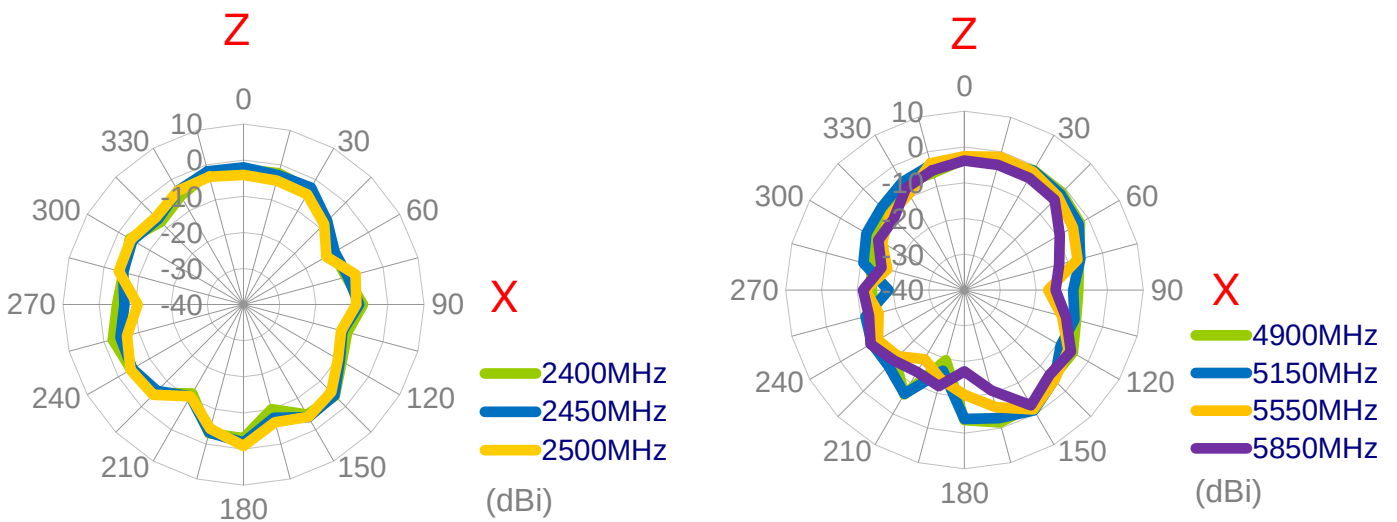
3.1.12 2D Radiation Pattern

Wi-Fi_MIMO1 with 3M cable length in free space

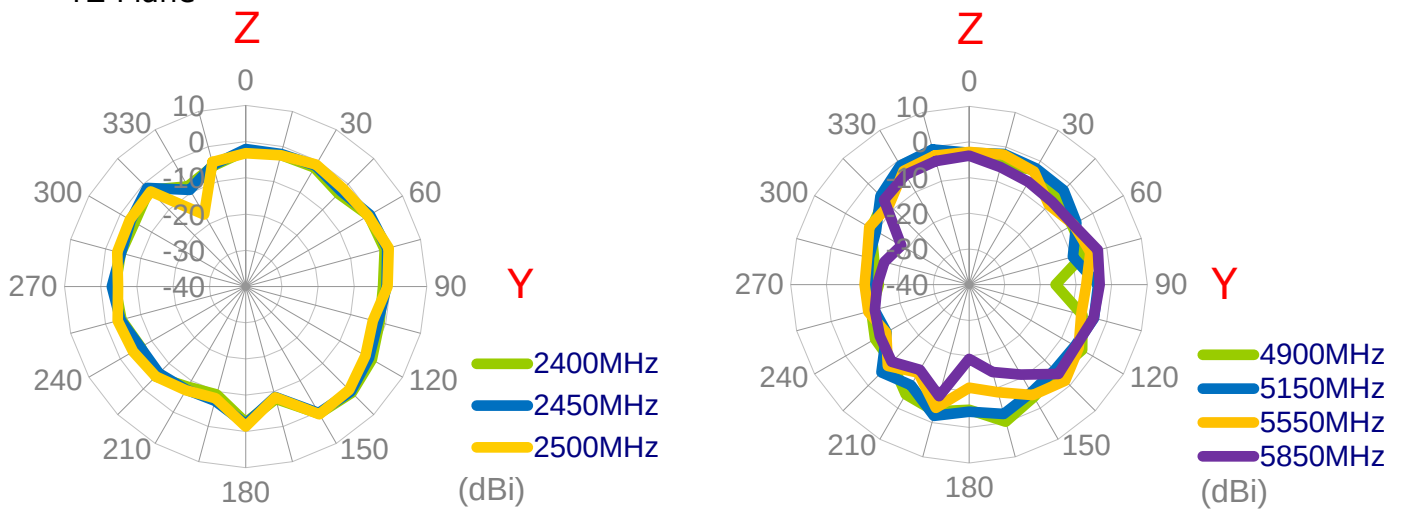
XY Plane



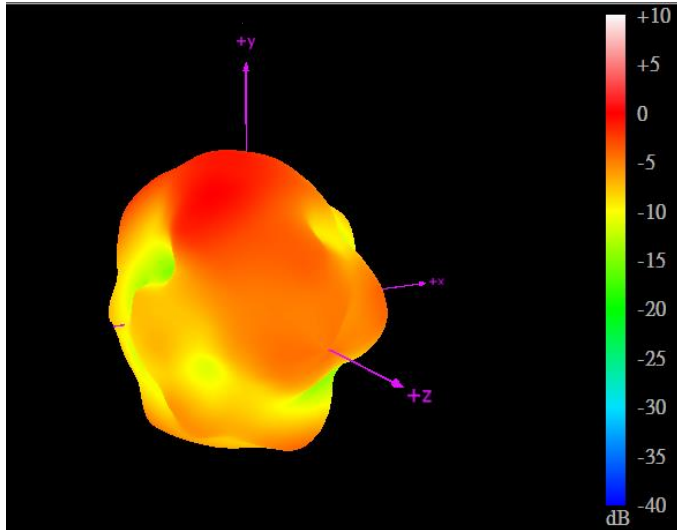
XZ Plane



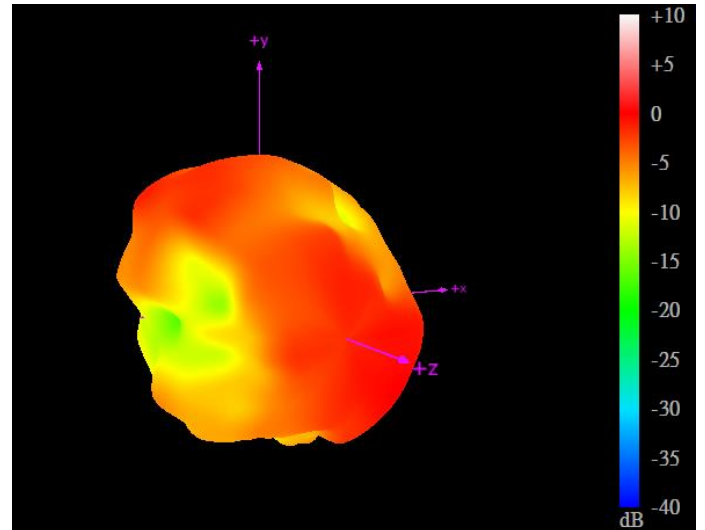
YZ Plane



3.1.13 3D Radiation Pattern (Wi-Fi_MIMO1 with 3M cable length in free space)



2450MH

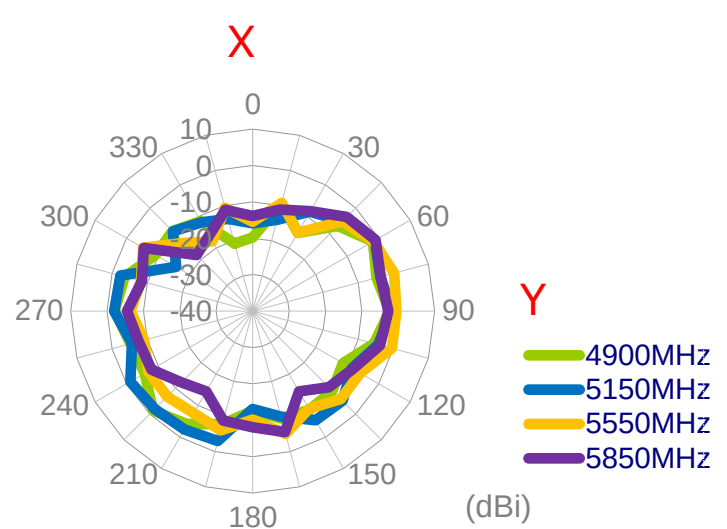
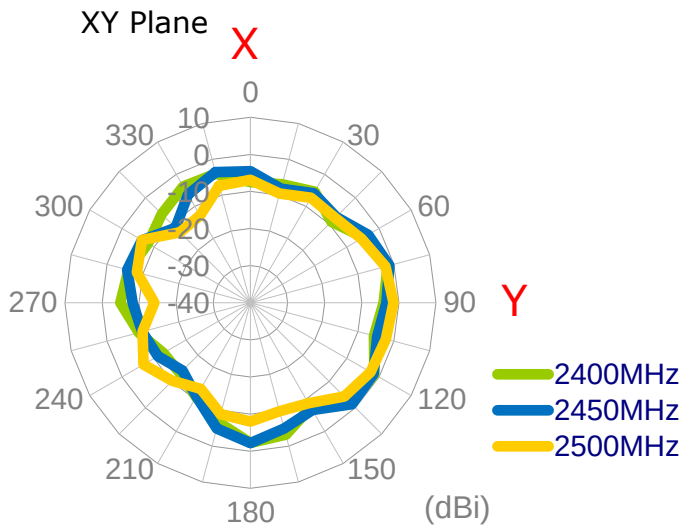


5550MHz

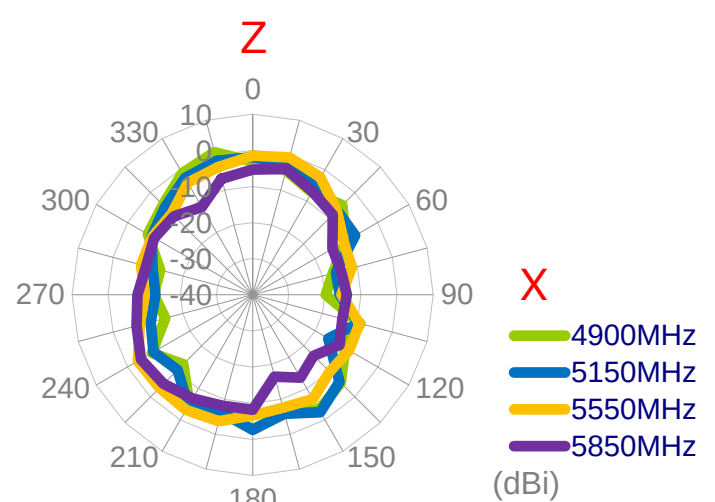
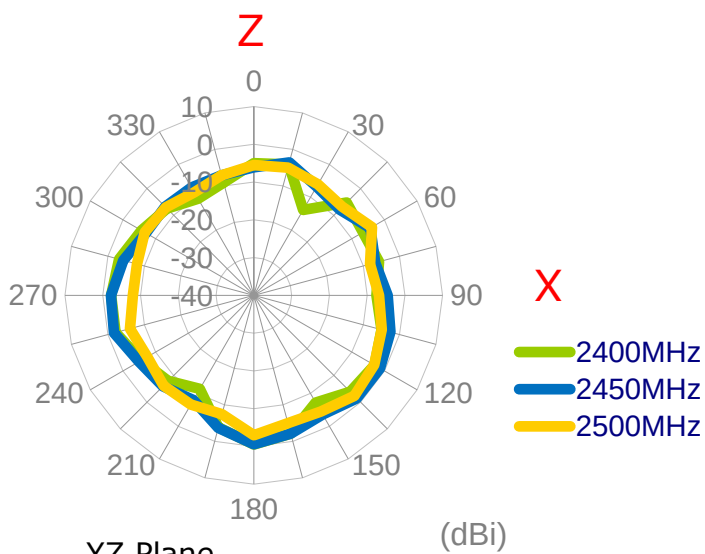
3.1.14 2D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length in free space

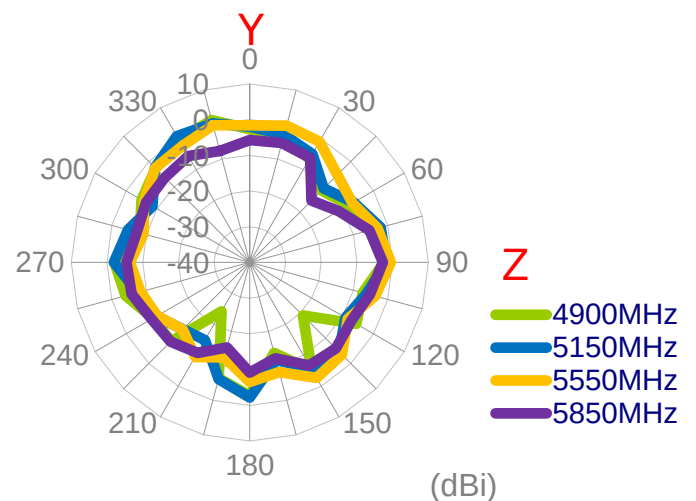
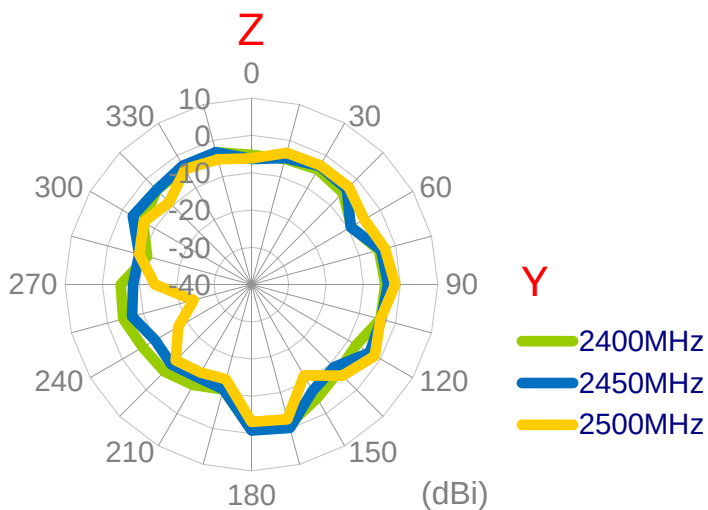
XY Plane



XZ Plane

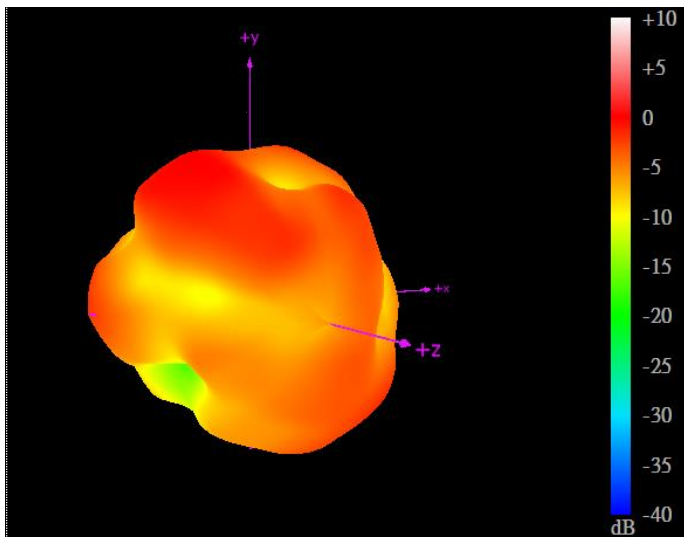


YZ Plane

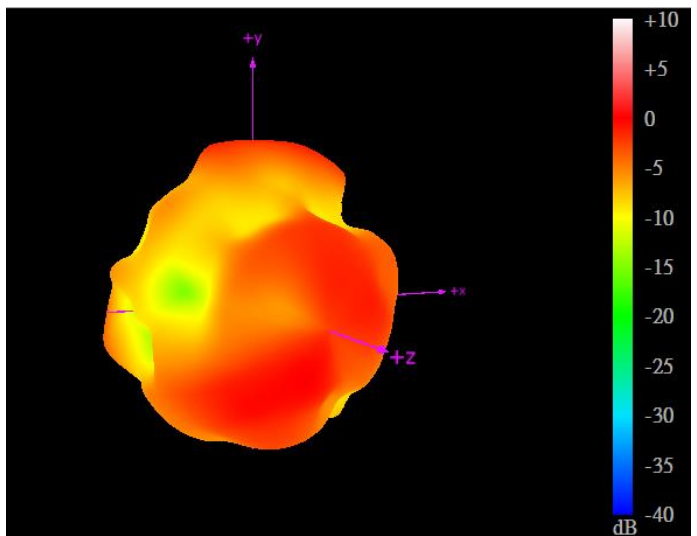


3.1.15 3D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length in free space

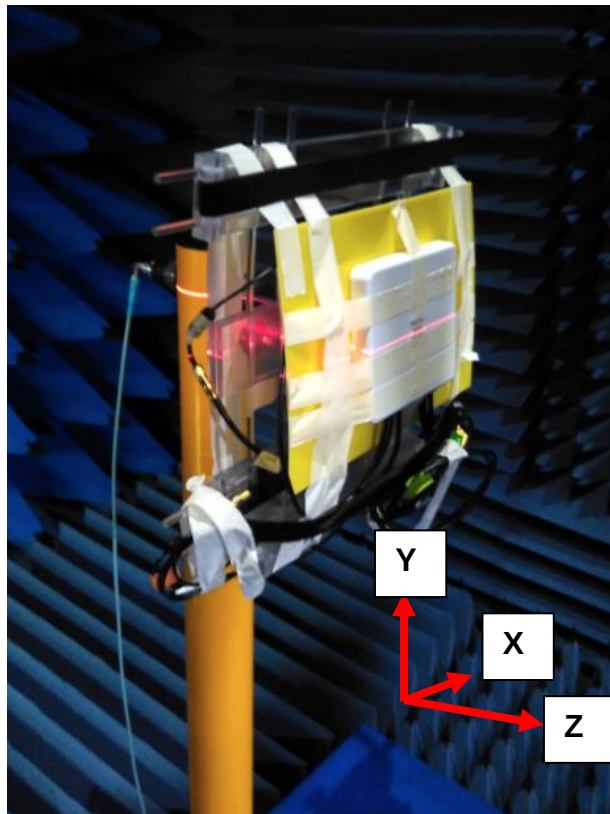


2450MHz



5550MHz

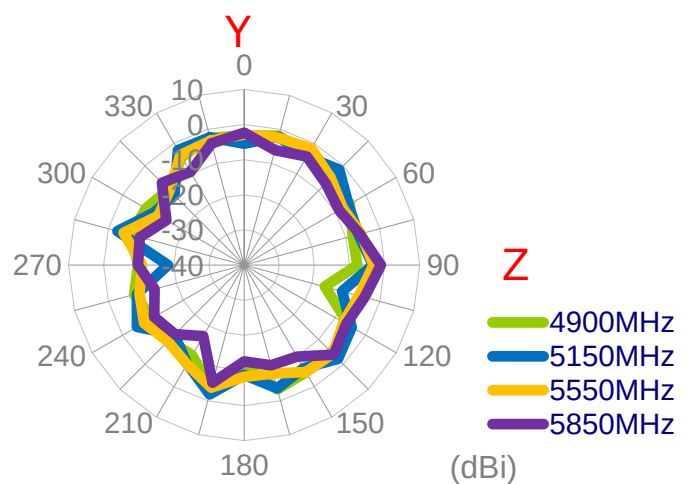
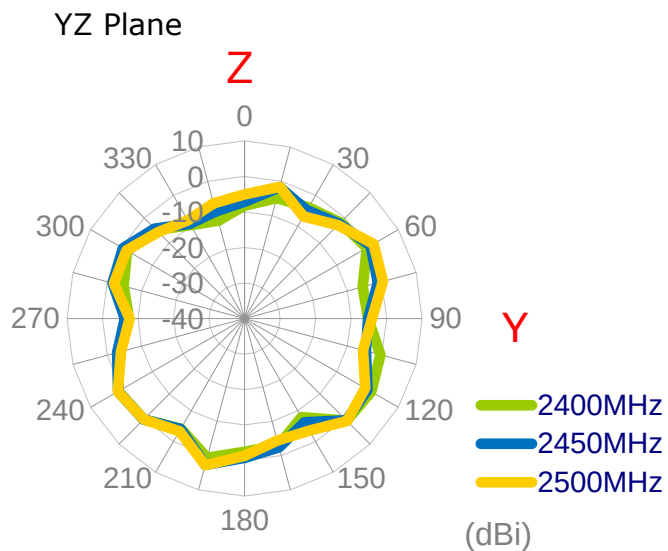
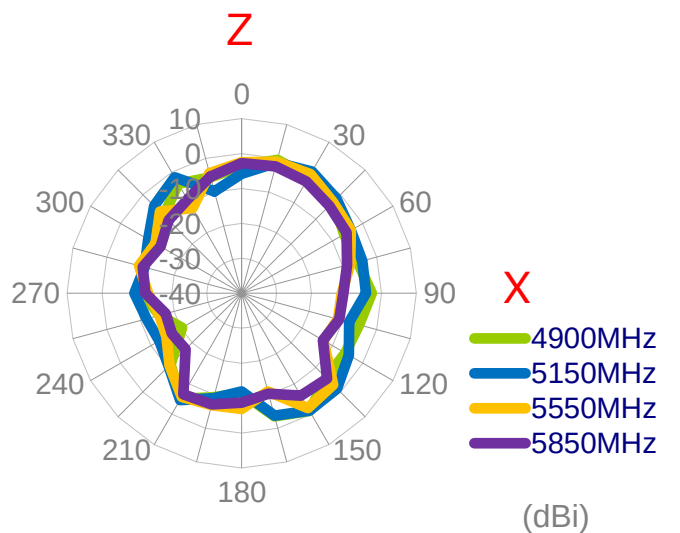
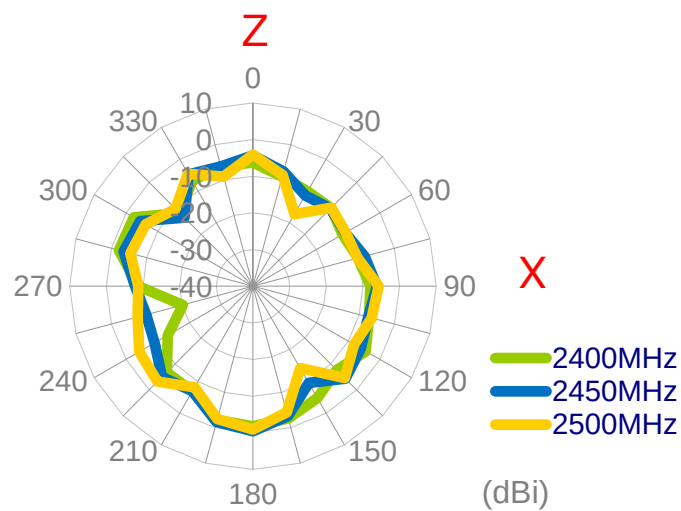
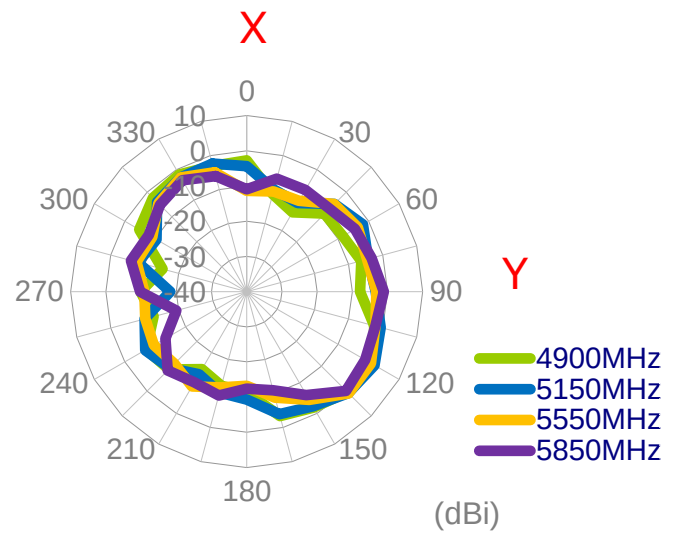
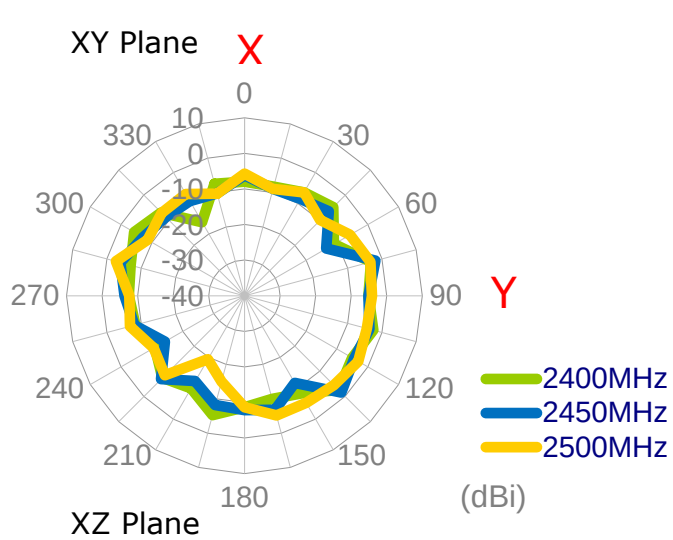
3.1.16 Test Setup for Antenna Radiation Pattern



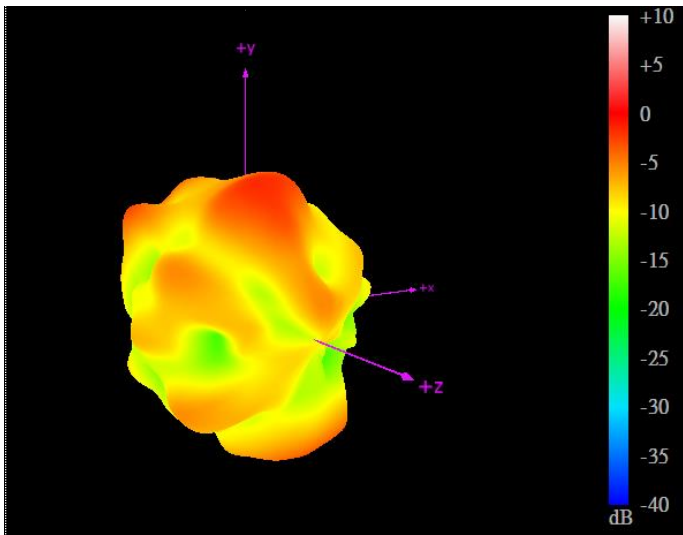
On the ABS

3.1.17 2D Radiation Pattern

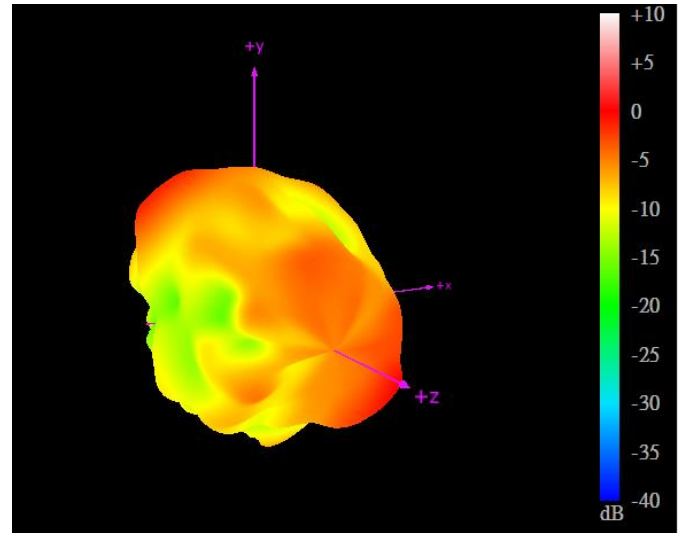
Wi-Fi MIMO1 with 3M cable length on the ABS



3.1.18 3D Radiation Pattern (Wi-Fi_MIMO1 with 3M cable length on the ABS)



2450MHz

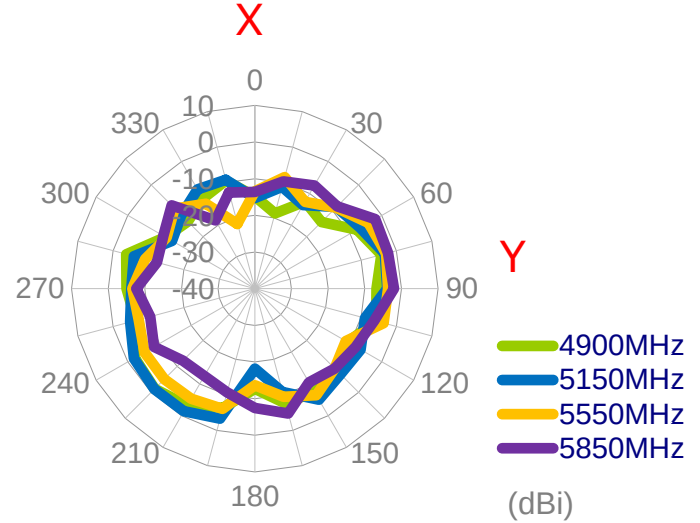
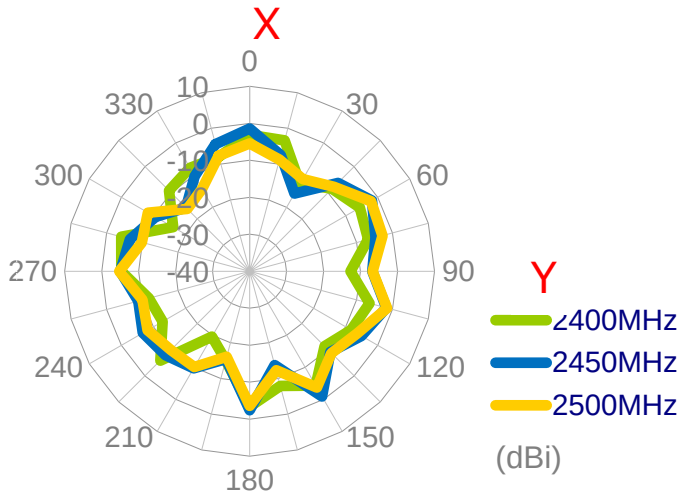


5550MHz

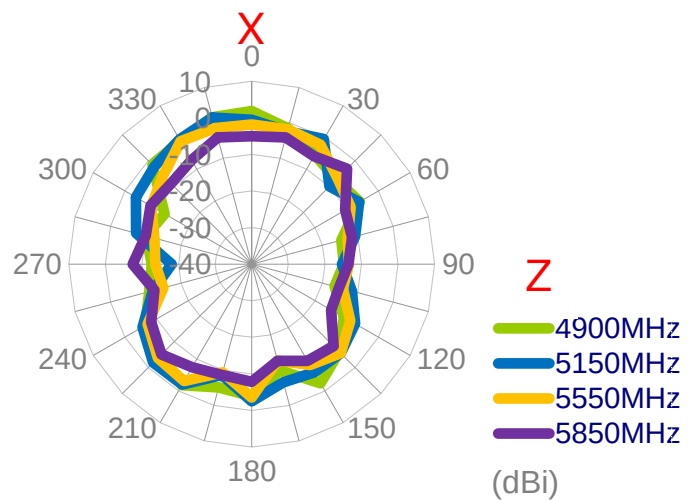
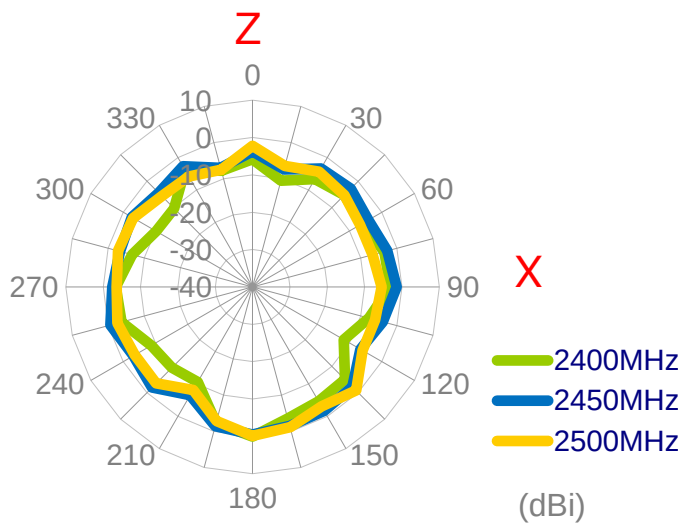
3.1.19 2D Radiation Pattern

Wi-Fi_MIMO2 with 3M cable length on the ABS

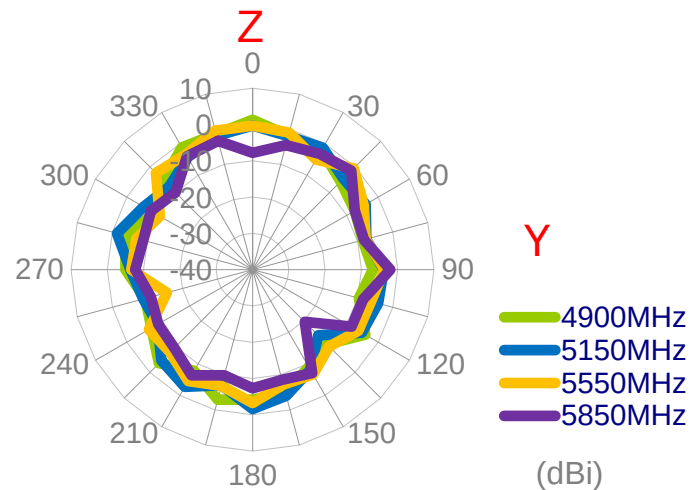
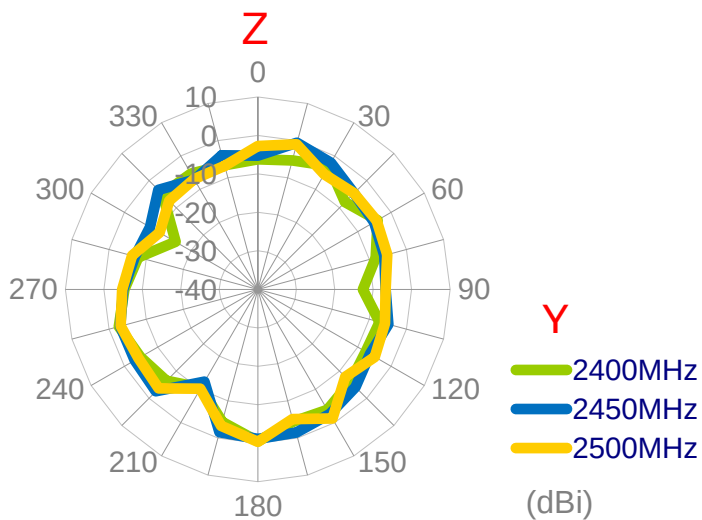
XY Plane



XZ Plane

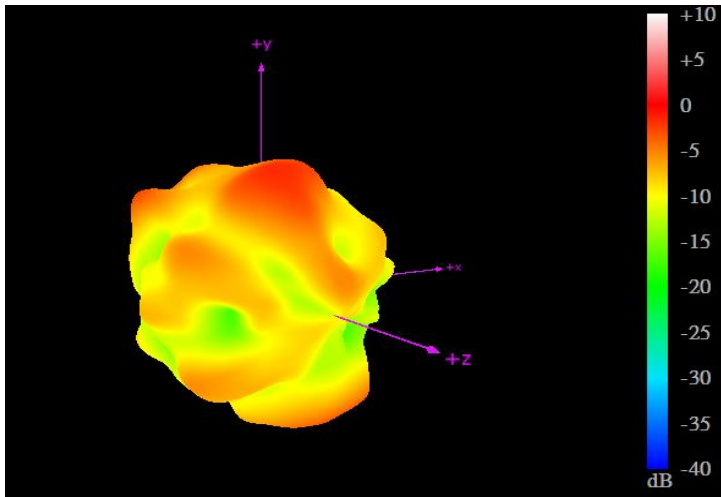


YZ Plane

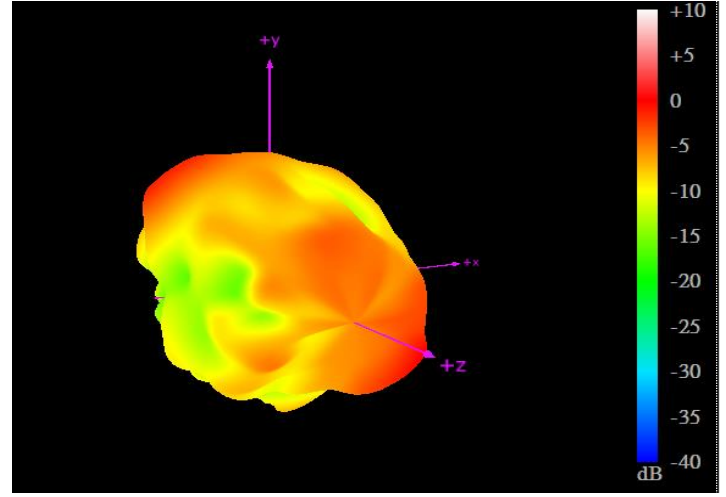


3.1.20 3D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length on the ABS

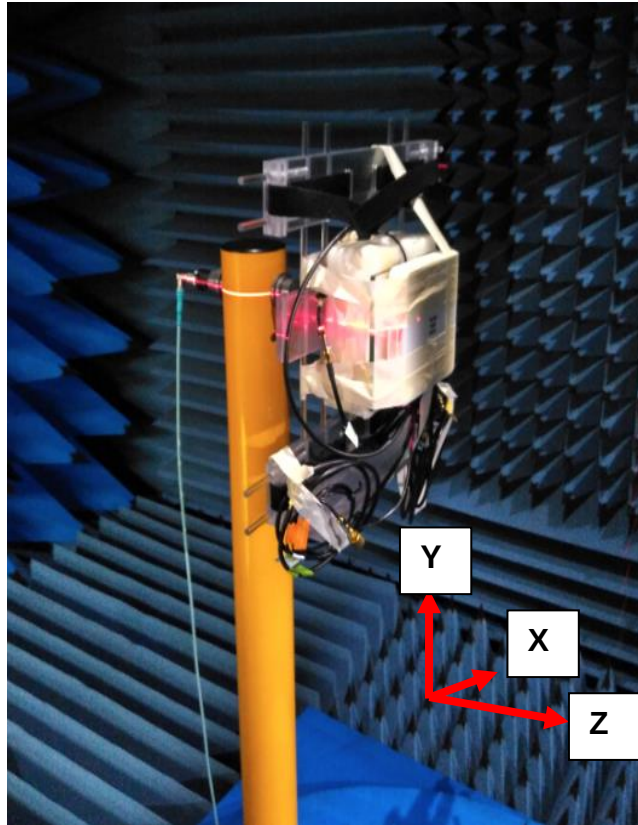


2450MH



5550MH

3.1.21 Test Setup For Antenna Radiation Pattern

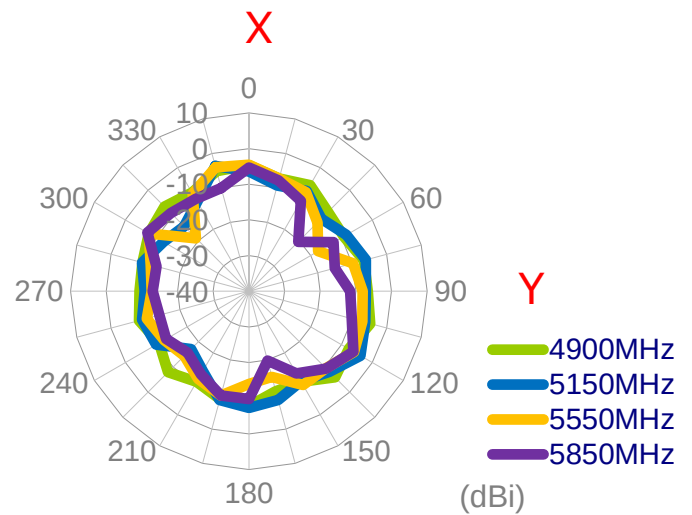
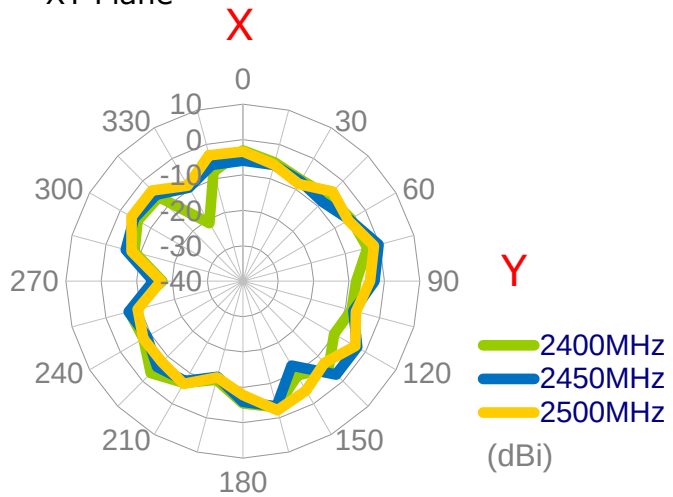


On the glass

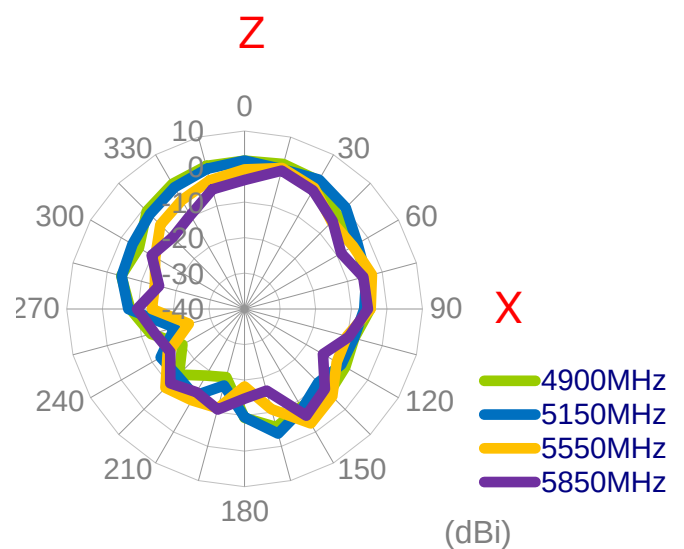
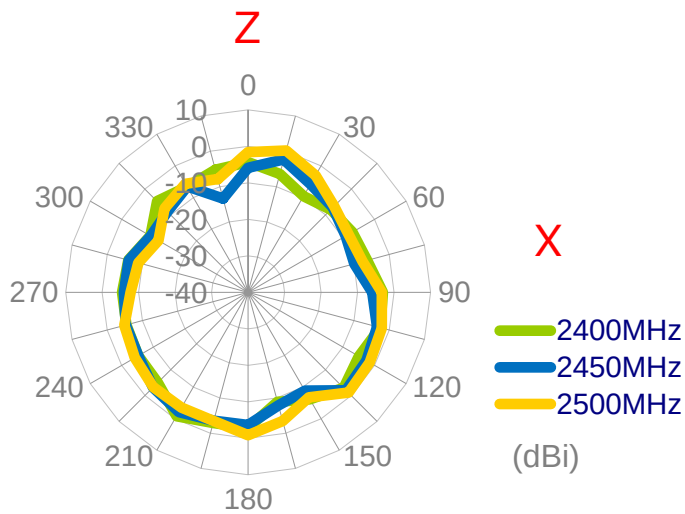
3.1.22 2D Radiation Pattern

Wi-Fi MIMO1 with 1M cable length on the glass

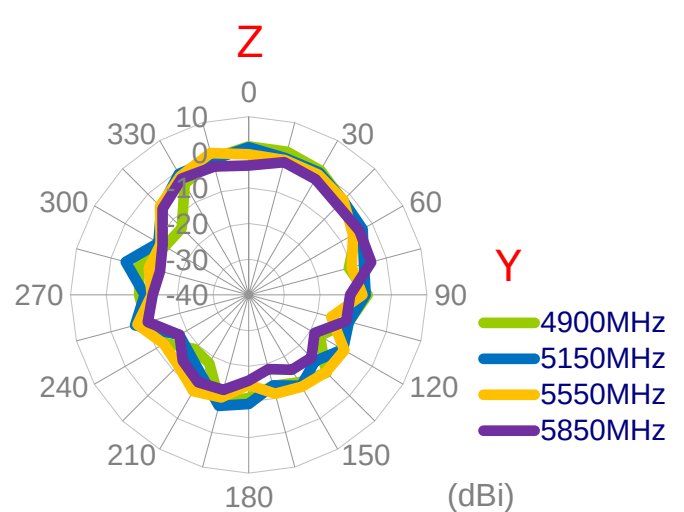
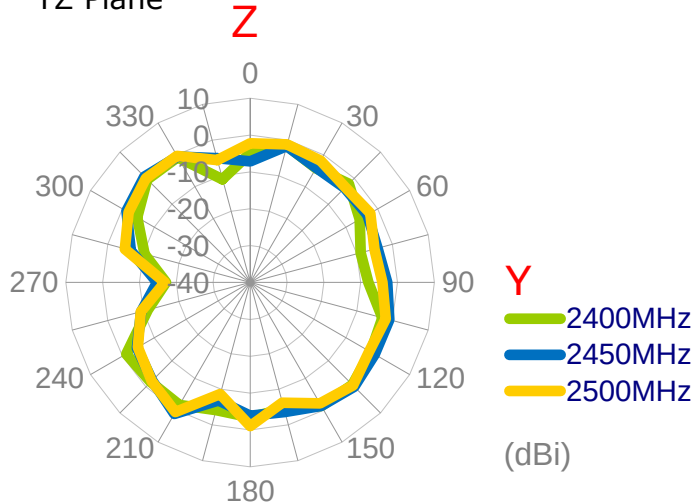
XY Plane



XZ Plane

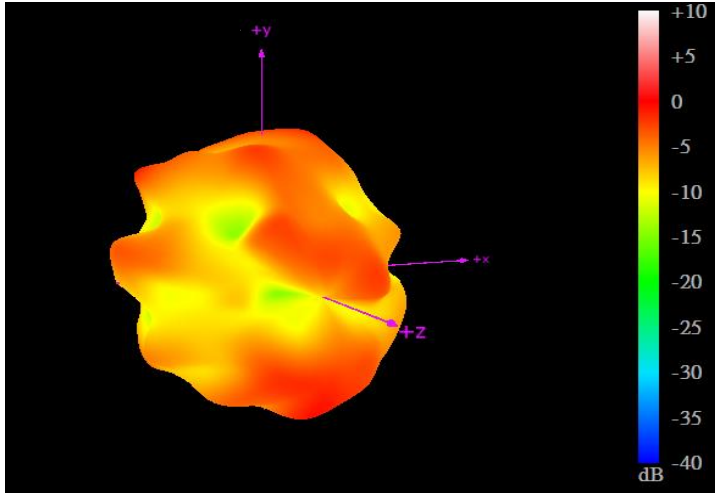


YZ Plane

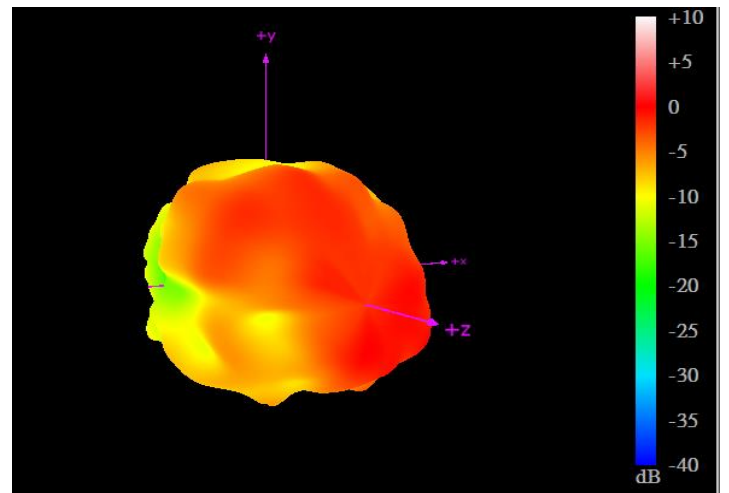


3.1.23 3D Radiation Pattern

Wi-Fi MIMO1 with 3M cable length on the glass



2450MHz

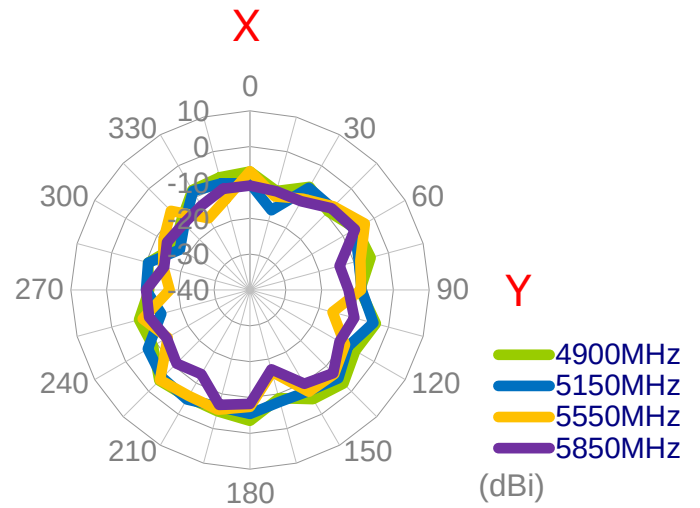
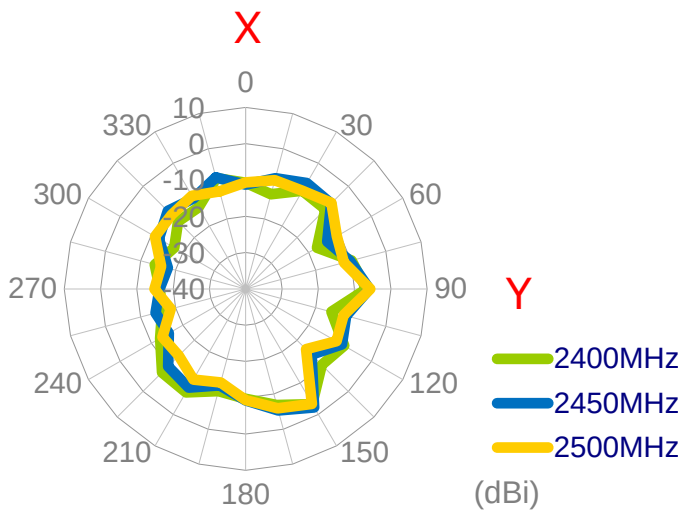


5550MHz

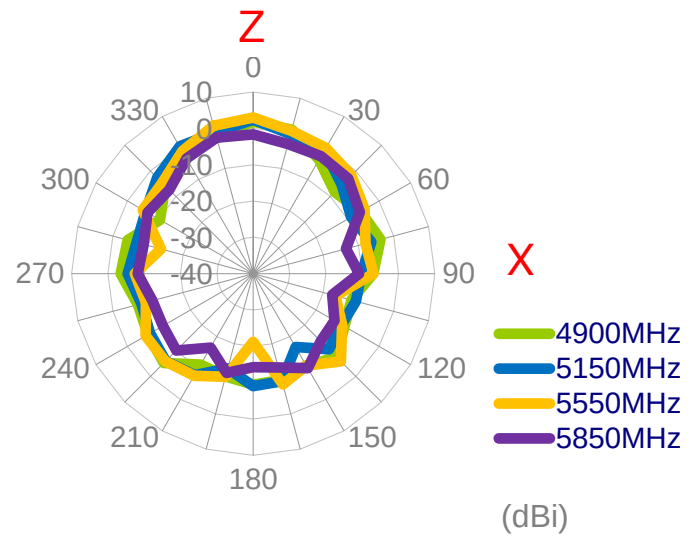
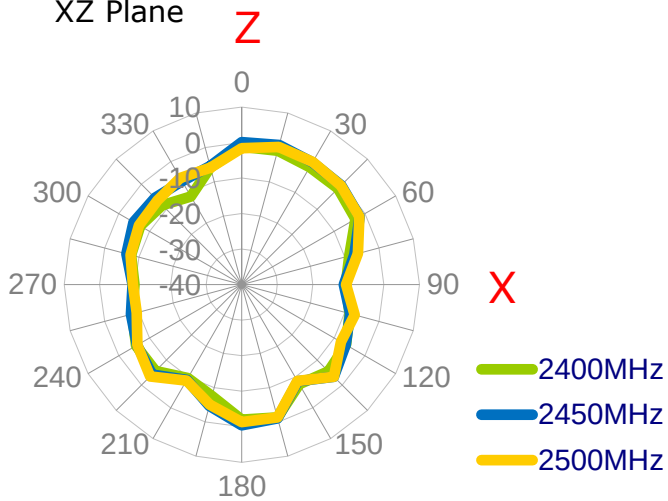
3.1.24 2D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length on the glass

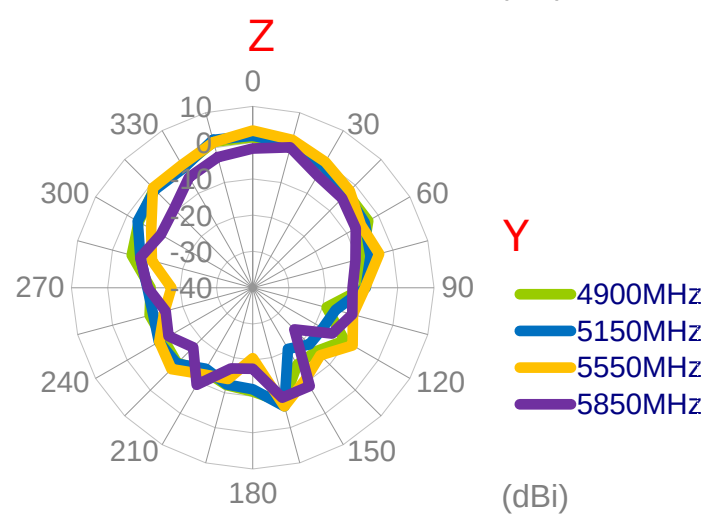
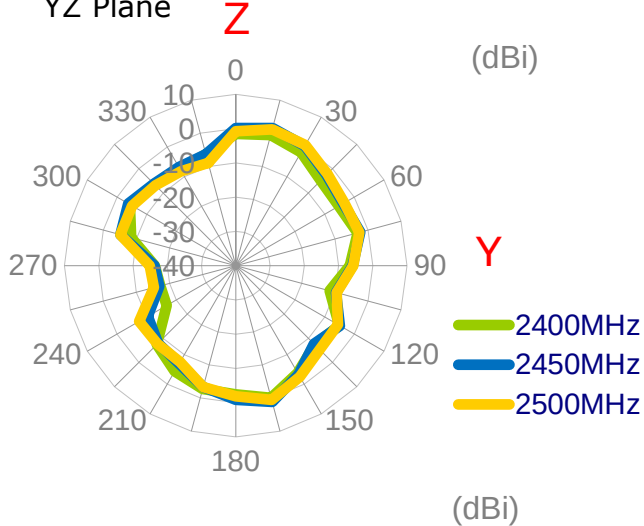
XY Plane



XZ Plane

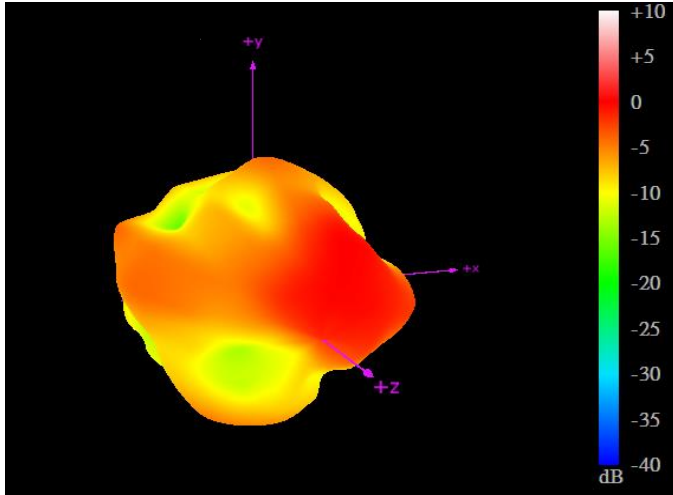


YZ Plane

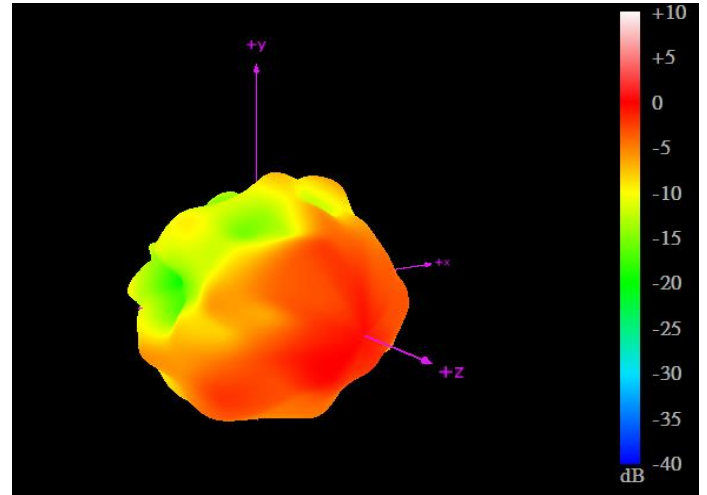


3.1.25 3D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length on the glass

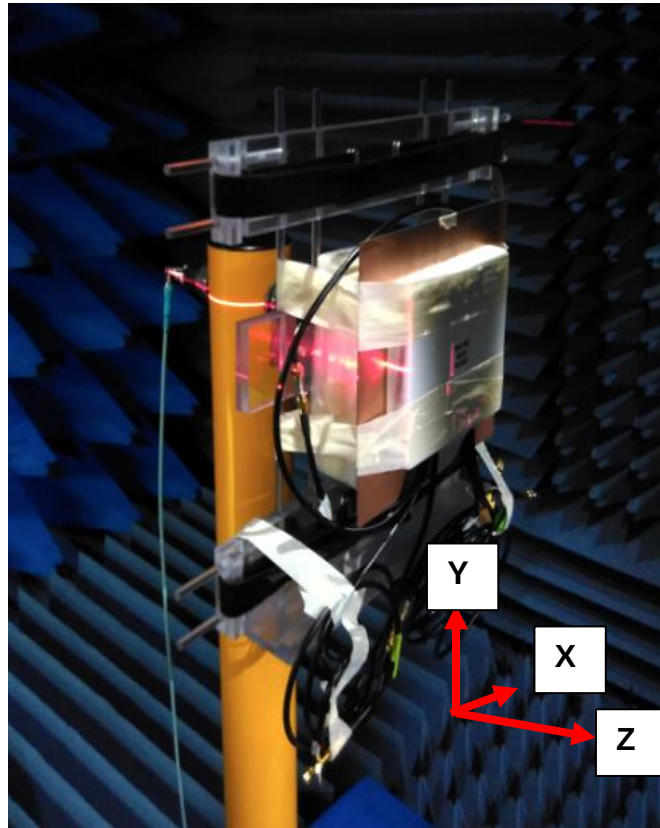


2450MHz



5550MHz

3.1.26 Test Setup For Antenna Radiation Pattern

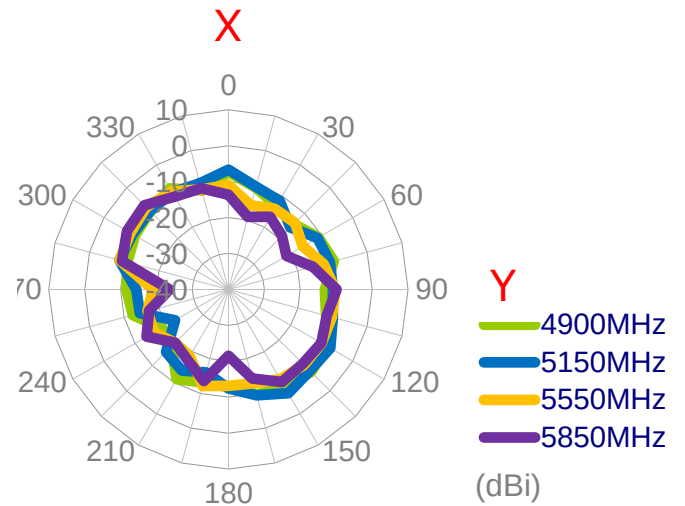
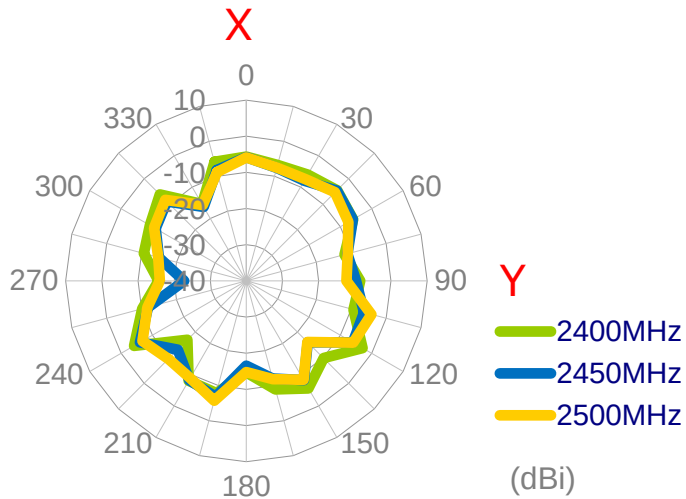


On the metal

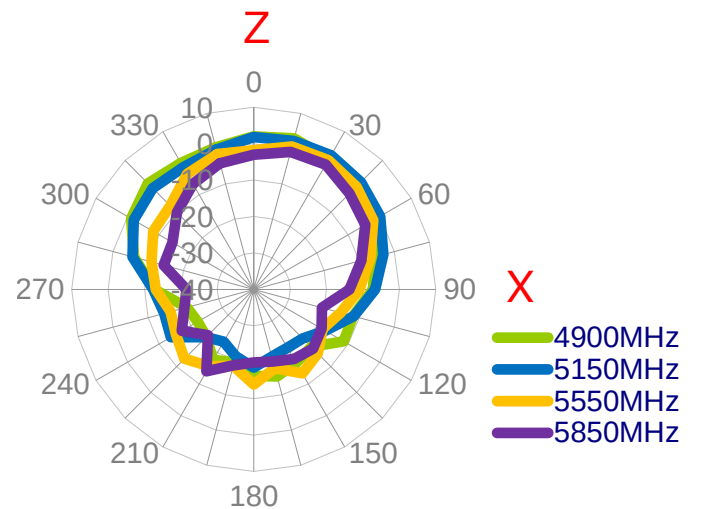
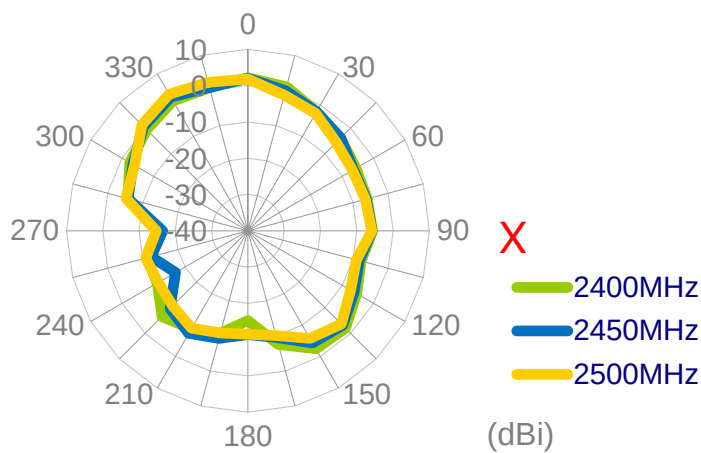
3.1.27 2D Radiation Pattern

Wi-Fi MIMO1 with 3M cable length on the metal

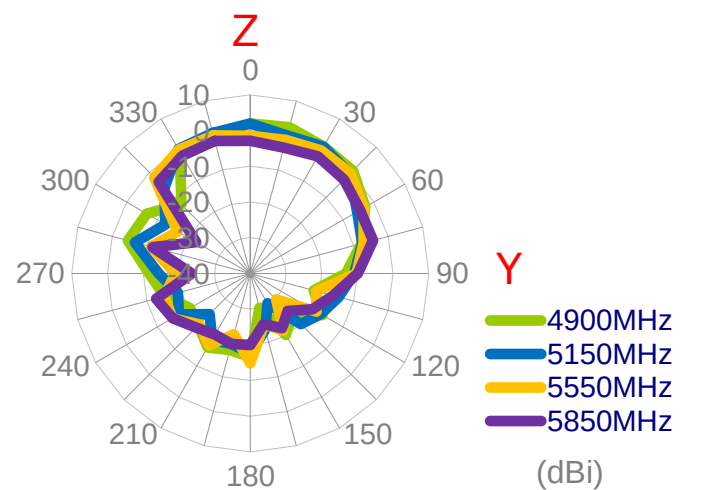
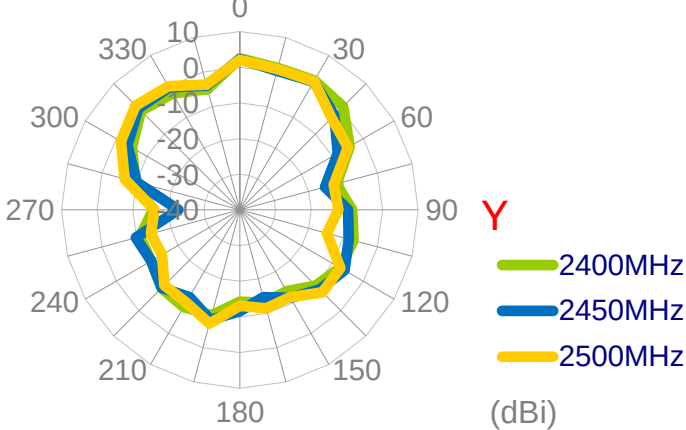
XY Plane



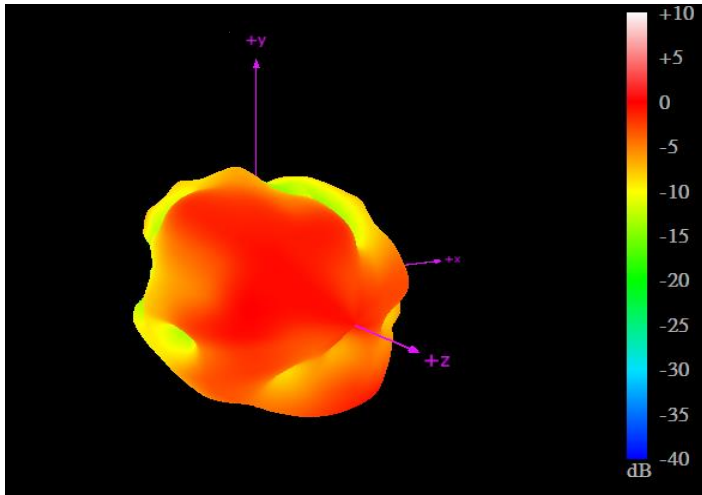
XZ Plane



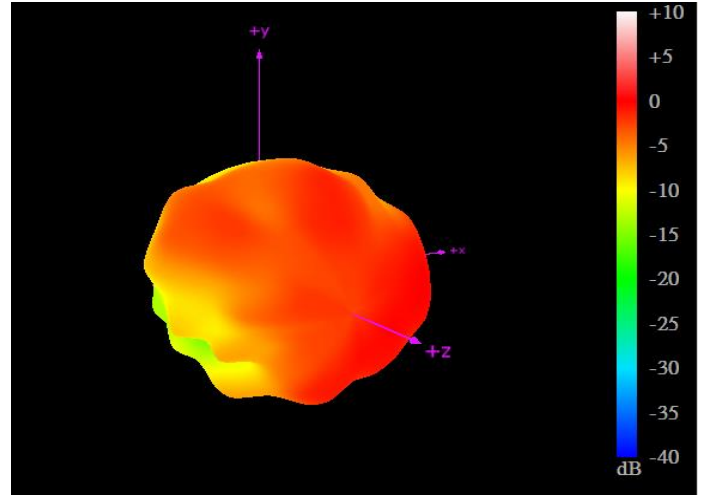
YZ Plane



3.1.28 3D Radiation Pattern (Wi-Fi MIMO1 with 3M cable length on the metal)



2450MHz

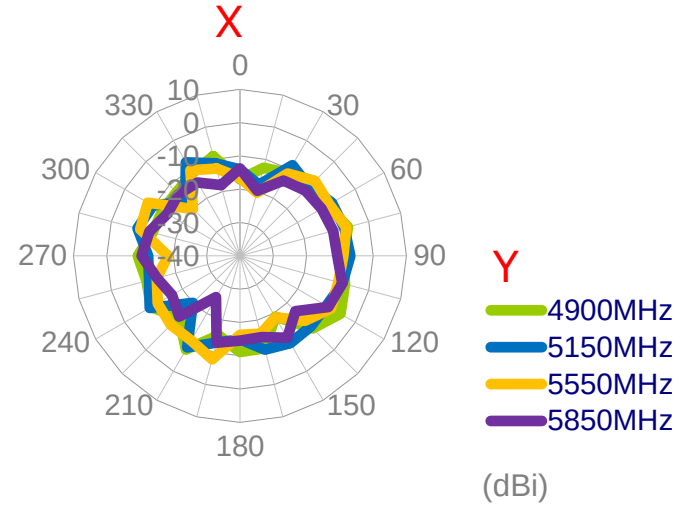
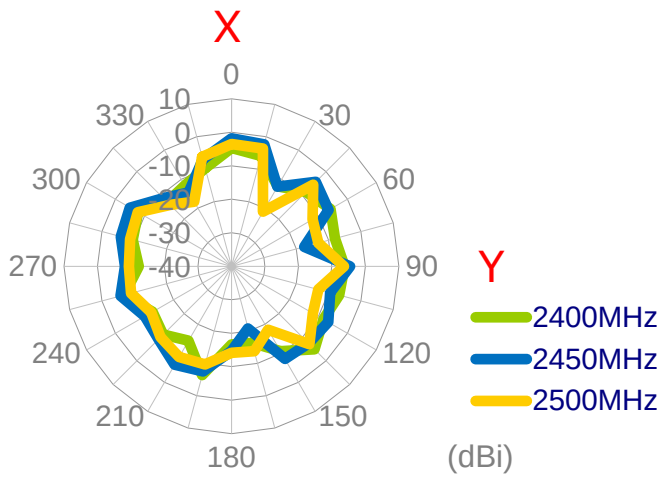


5550MHz

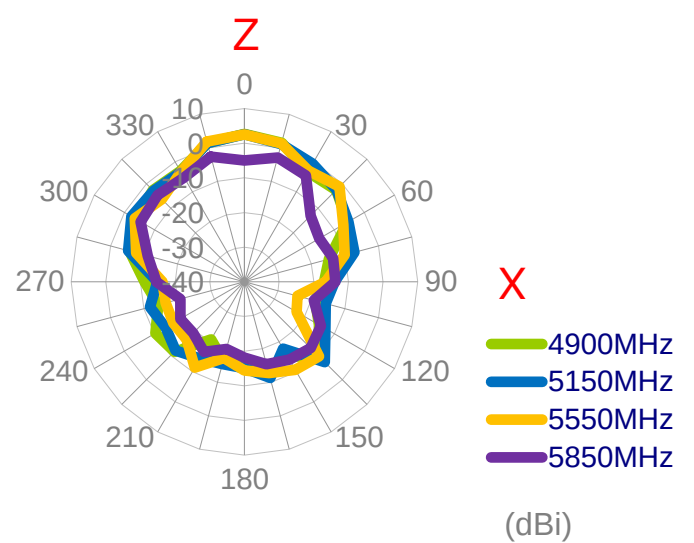
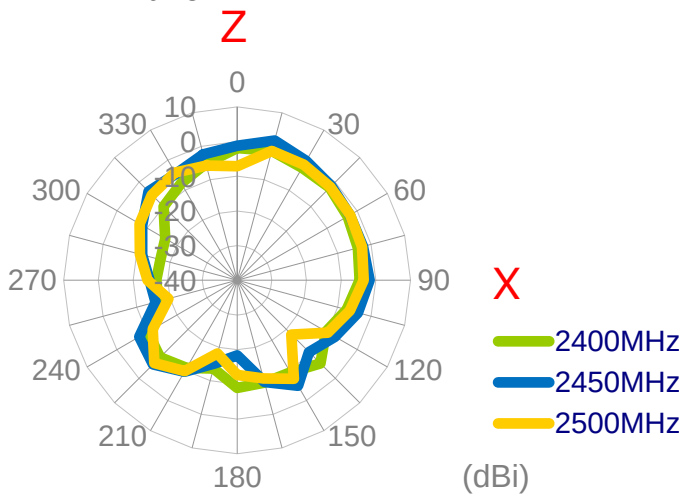
3.1.29 2D Radiation Pattern

Wi-Fi_MIMO2 with 3M cable length on the metal

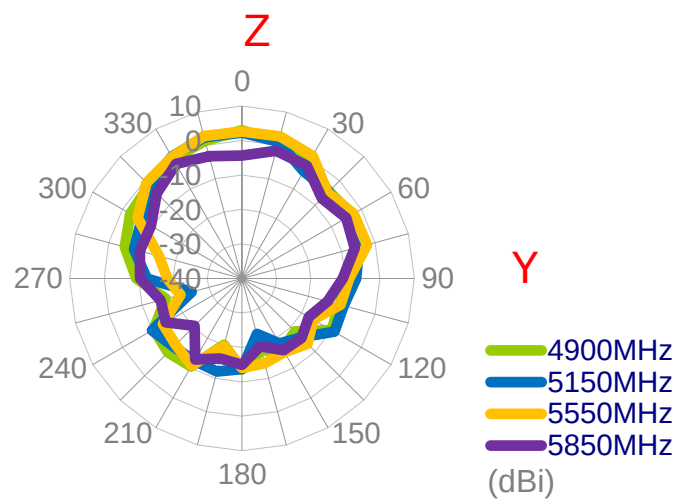
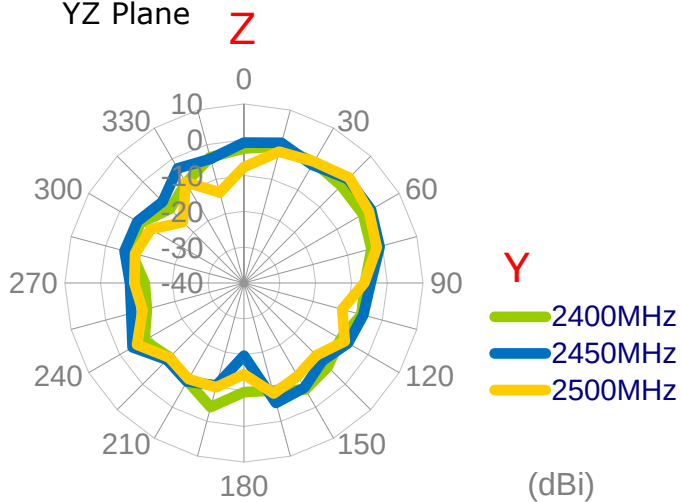
XY Plane



XZ Plane

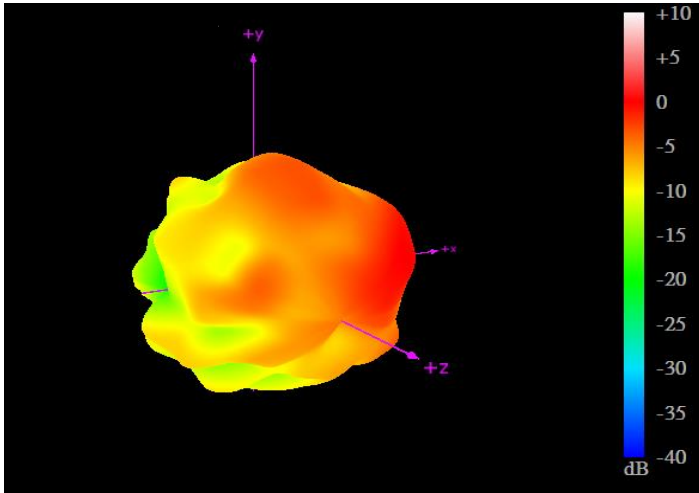


YZ Plane

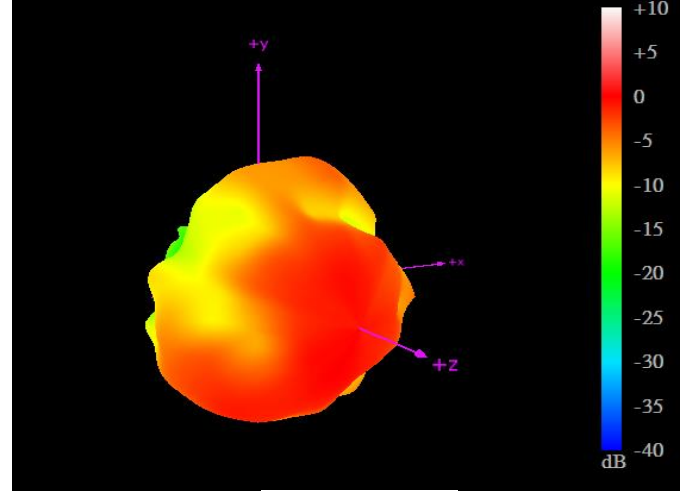


3.1.30 3D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length on the metal

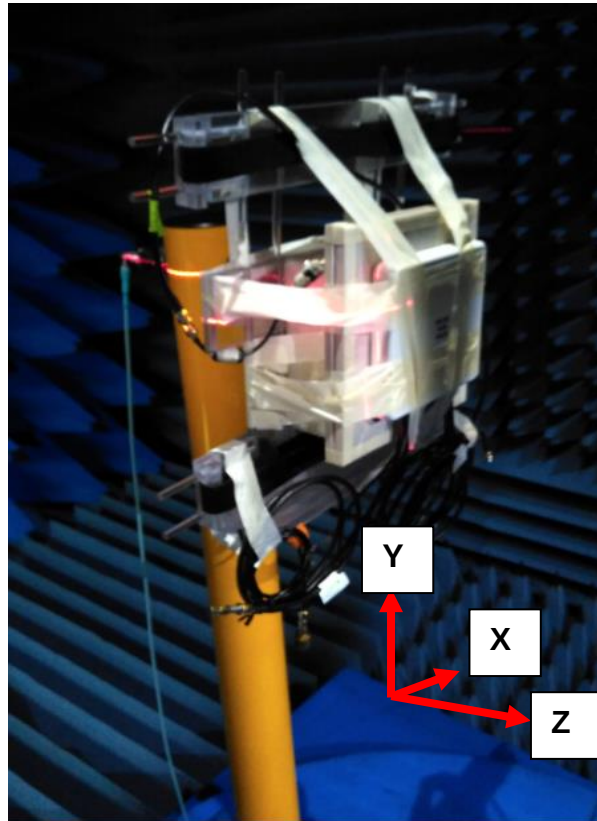


2450MHz



5550MHz

3.1.31 Test Setup For Antenna Radiation Pattern

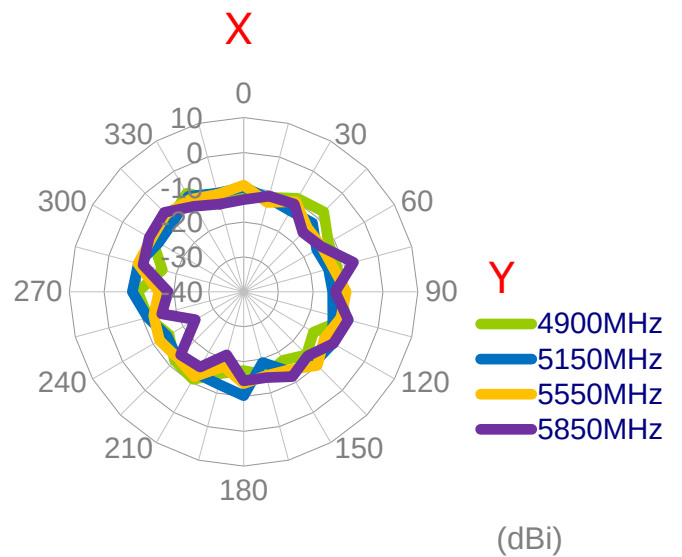
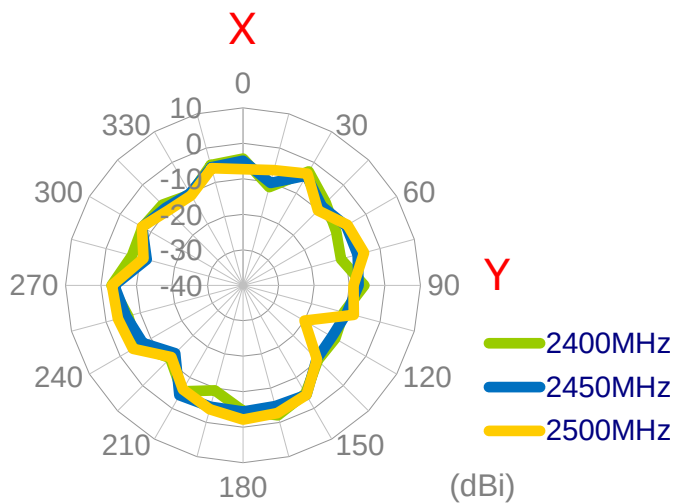


On the Wall

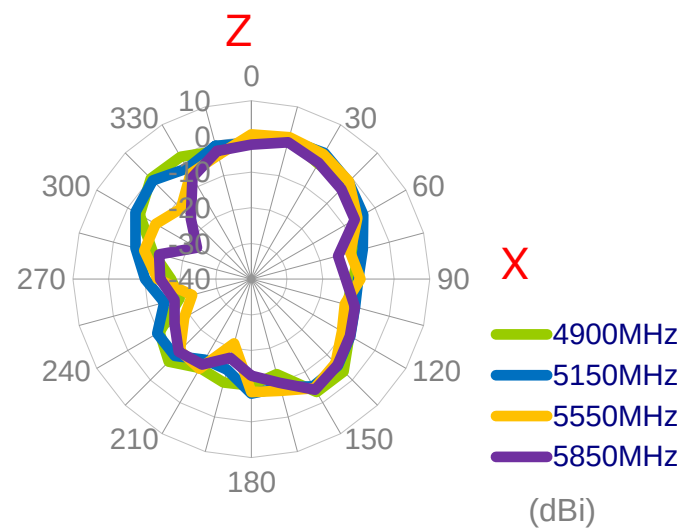
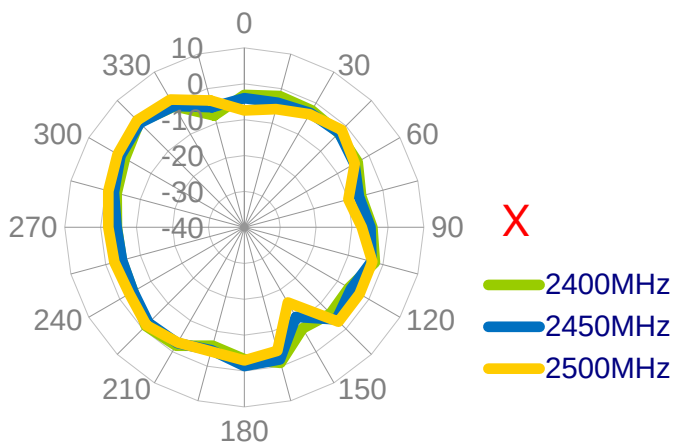
3.1.32 2D Radiation Pattern

Wi-Fi_MIMO1 with 3M cable length in free space

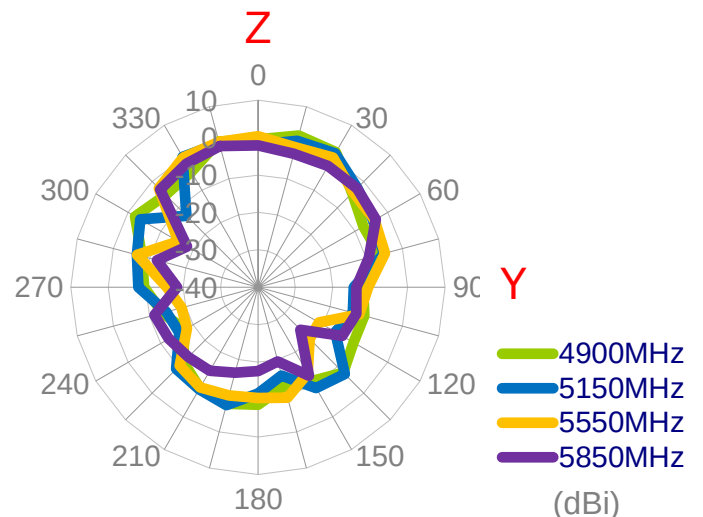
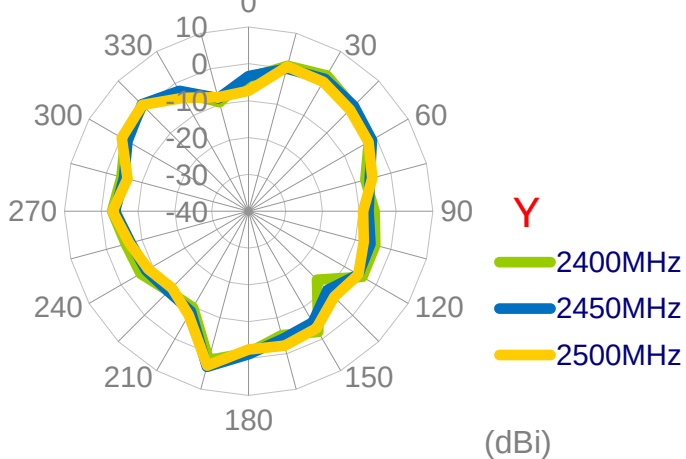
XY Plane



XZ Plane

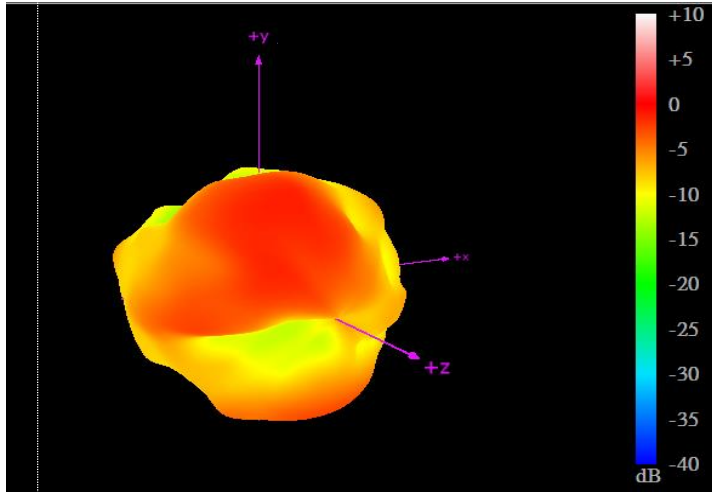


YZ Plane

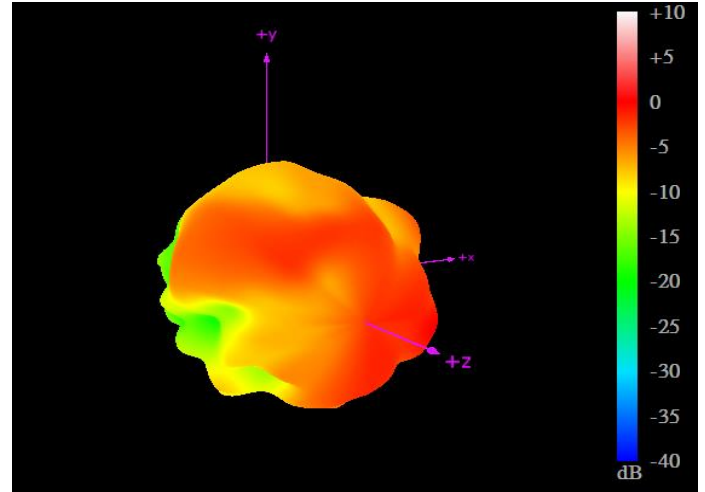


3.1.33 3D Radiation Pattern

Wi-Fi MIMO1 with 3M cable length in free space



2450MHz

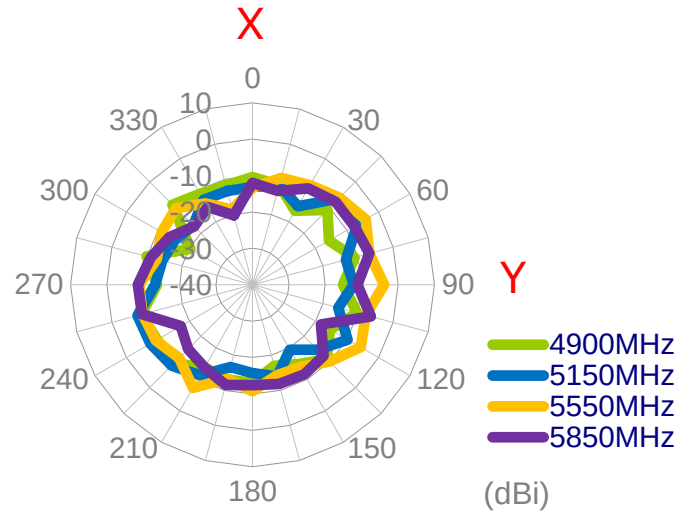
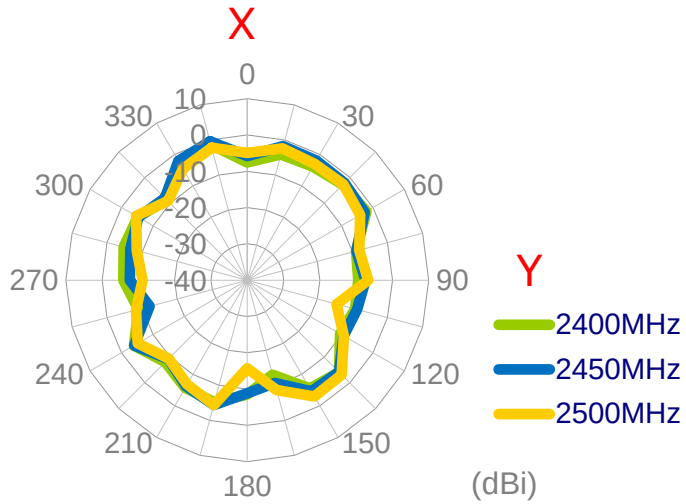


5550MHz

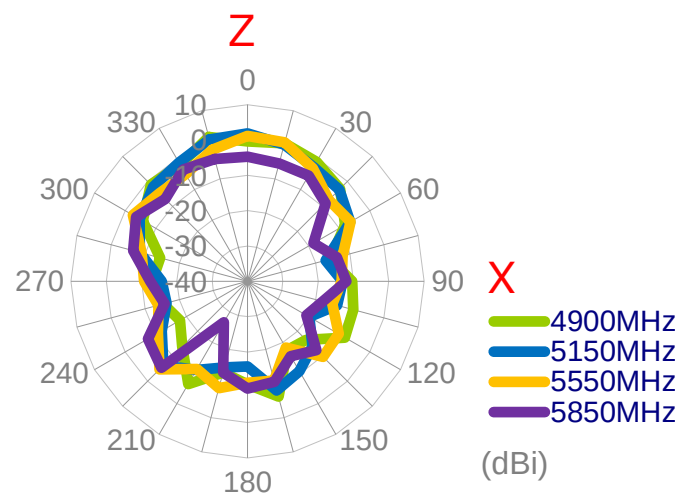
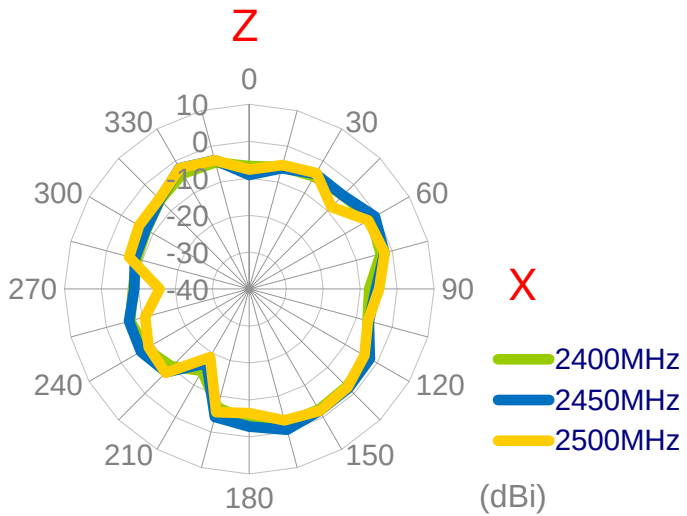
3.1.34 2D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length in free space

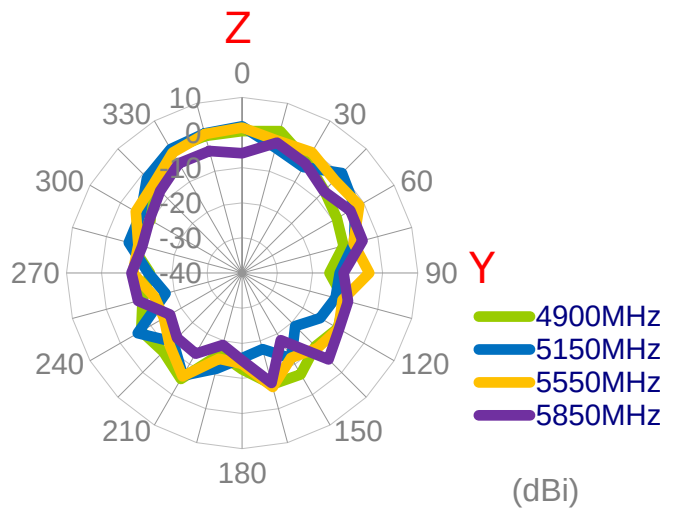
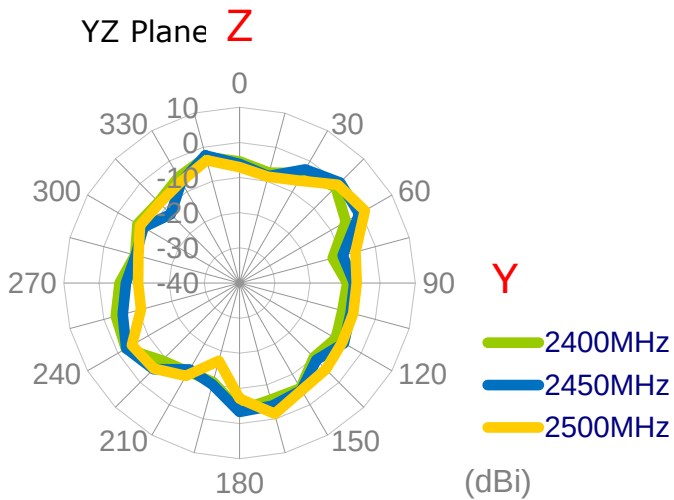
XY Plane



XZ Plane

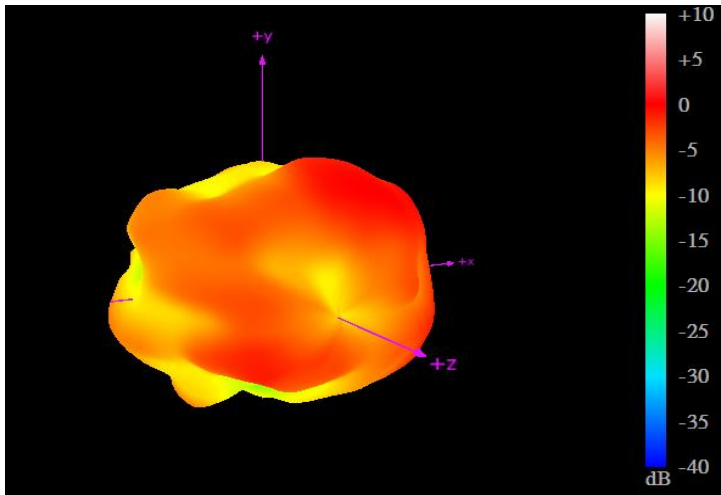


YZ Plane

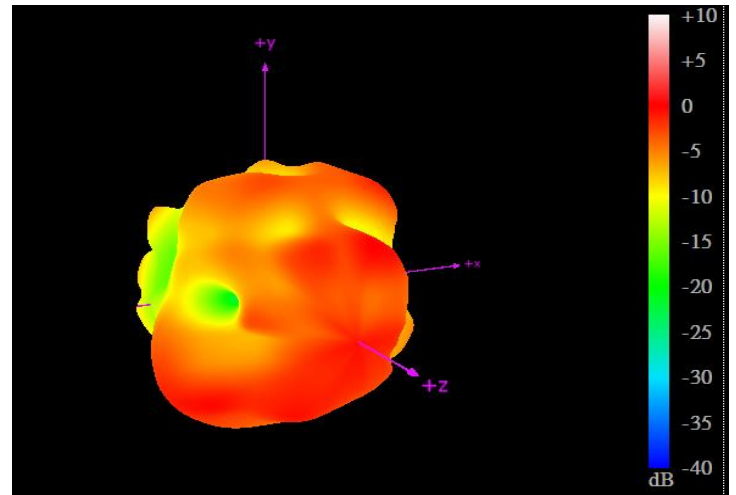


3.1.35 3D Radiation Pattern

Wi-Fi MIMO2 with 3M cable length in free space

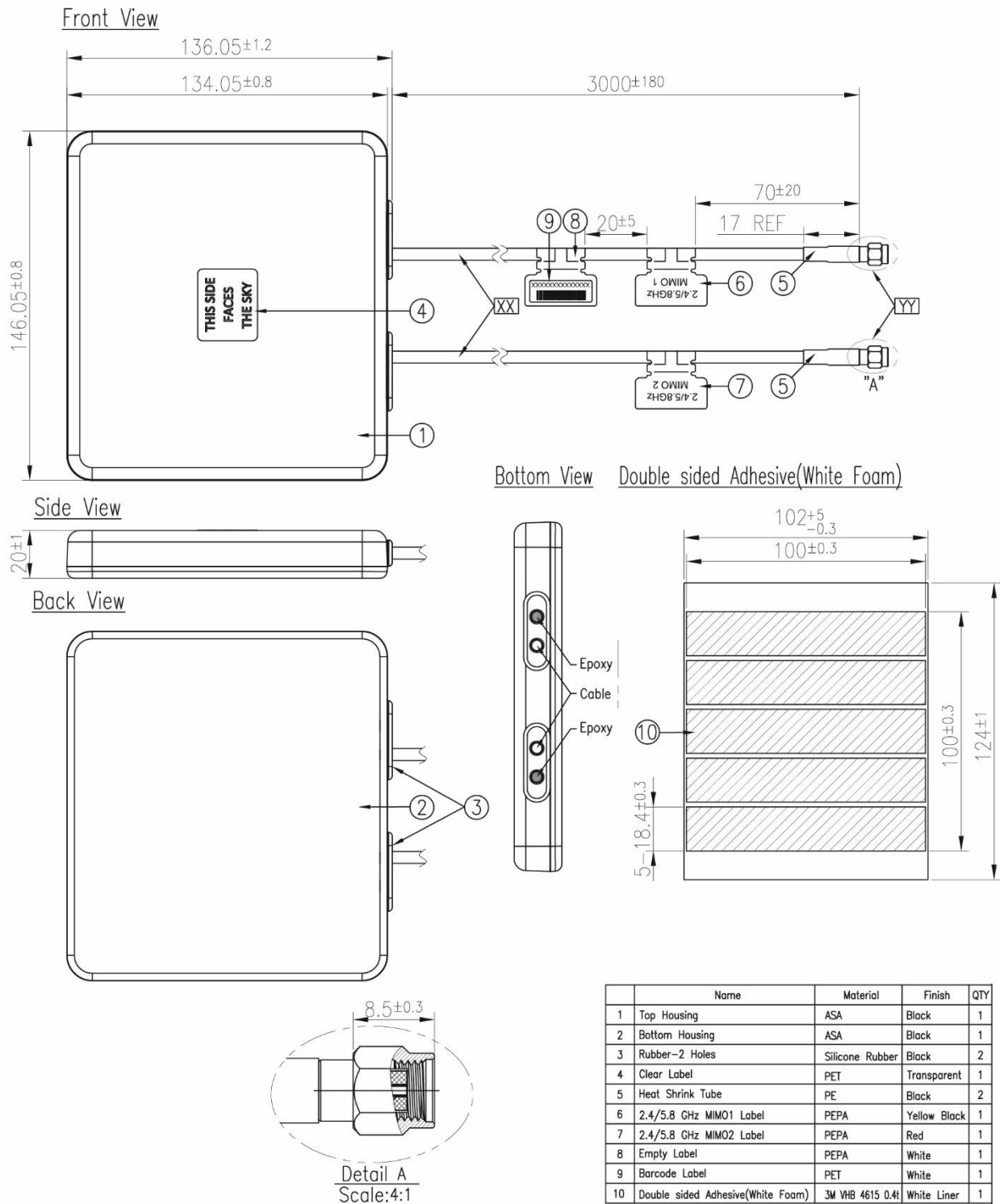


2450MHz

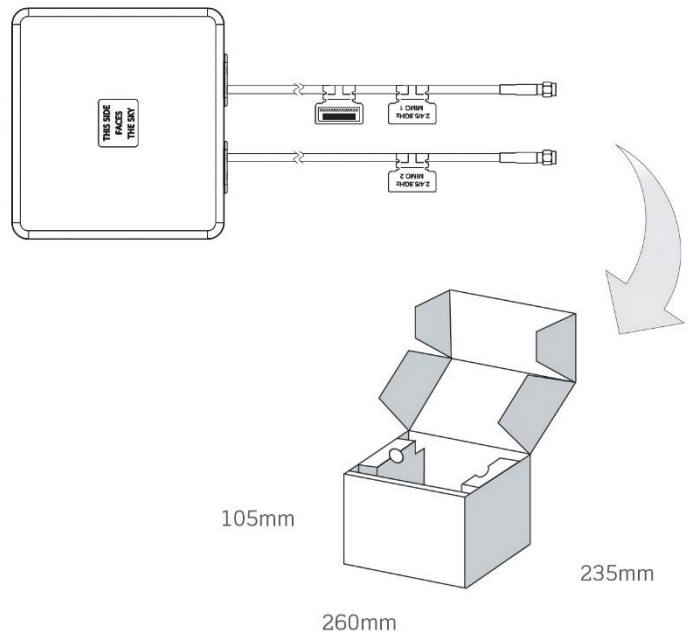


5550MHz

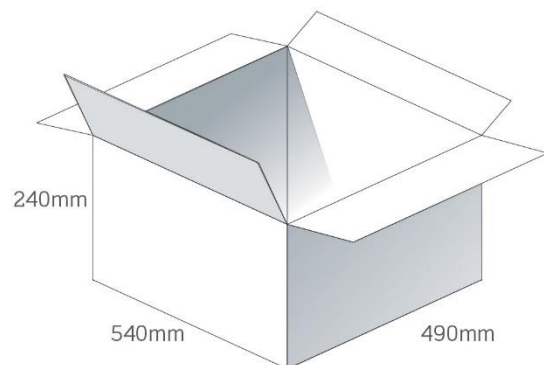
4. Mechanical Drawing (unit:mm)



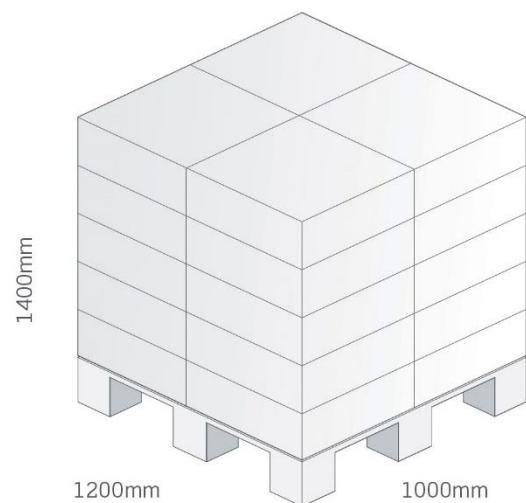
5. Packaging



1 No. MA910.A.CG.001 per small box
Box Dimensions - 260 x 235 x 105mm
Weight - 0.75Kg



8 pcs MA910.A.CG.001 per carton
Carton Dimensions - 540 x 490 x 240mm
Weight - 6.6Kg



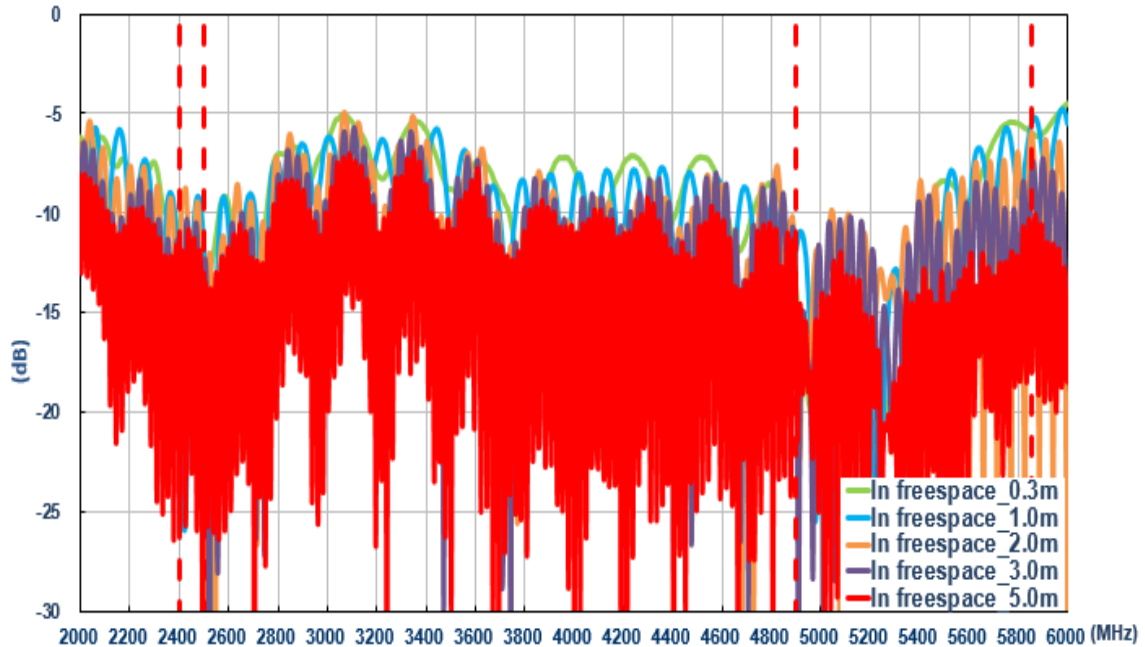
Pallet Dimensions 1200*1000*1400mm
20 Cartons per Pallet
4 Cartons per layer
5 Layers

6. Application Note

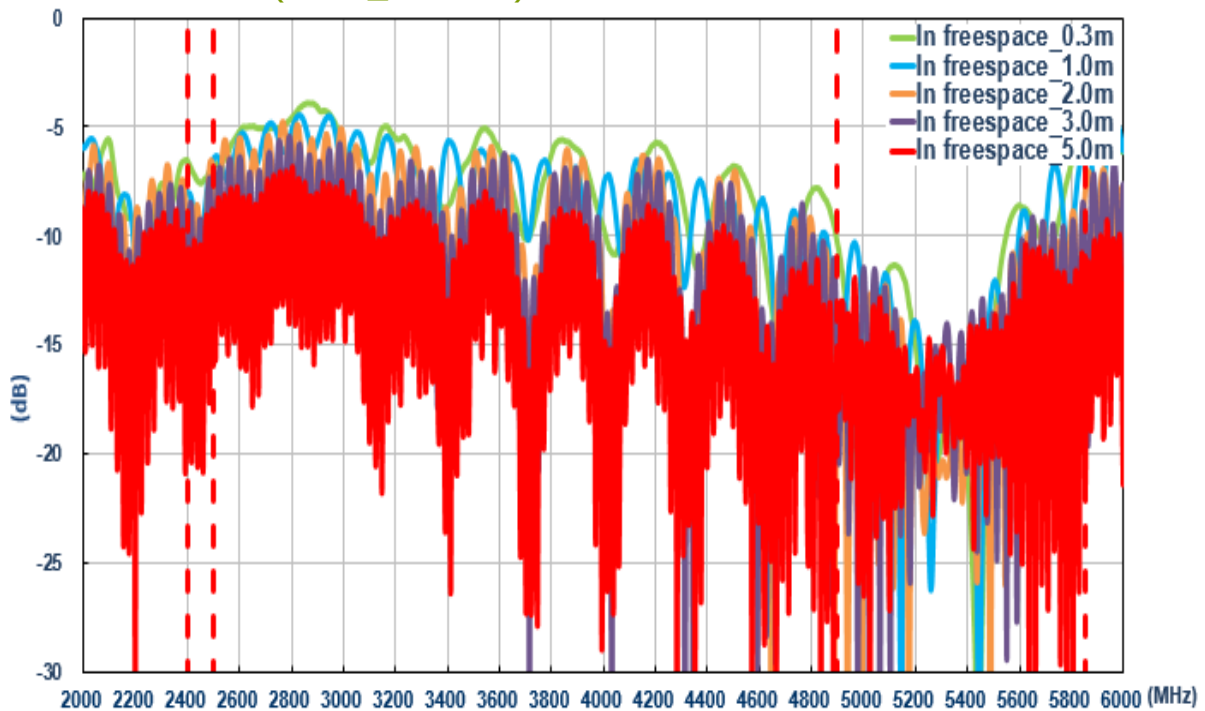
The MA961 antenna performance with different cable lengths is shown below.

6.1 In free space (Wi-Fi)

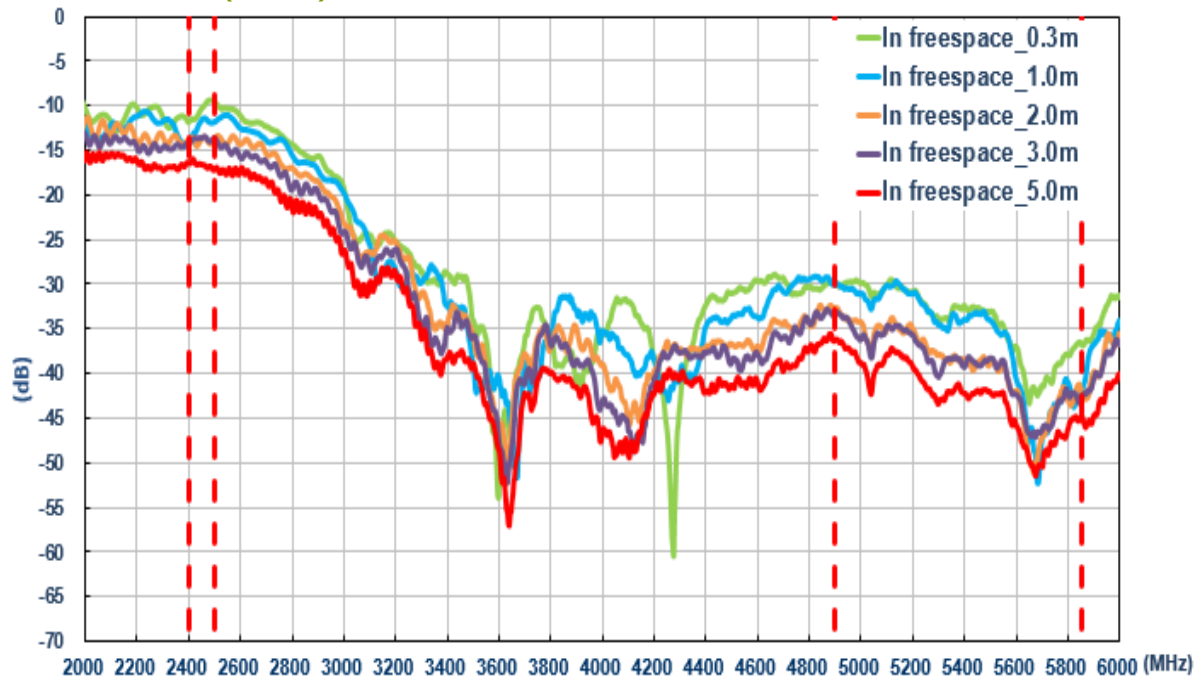
6.1.1 Return Loss (WI-FI_MIMO 1)



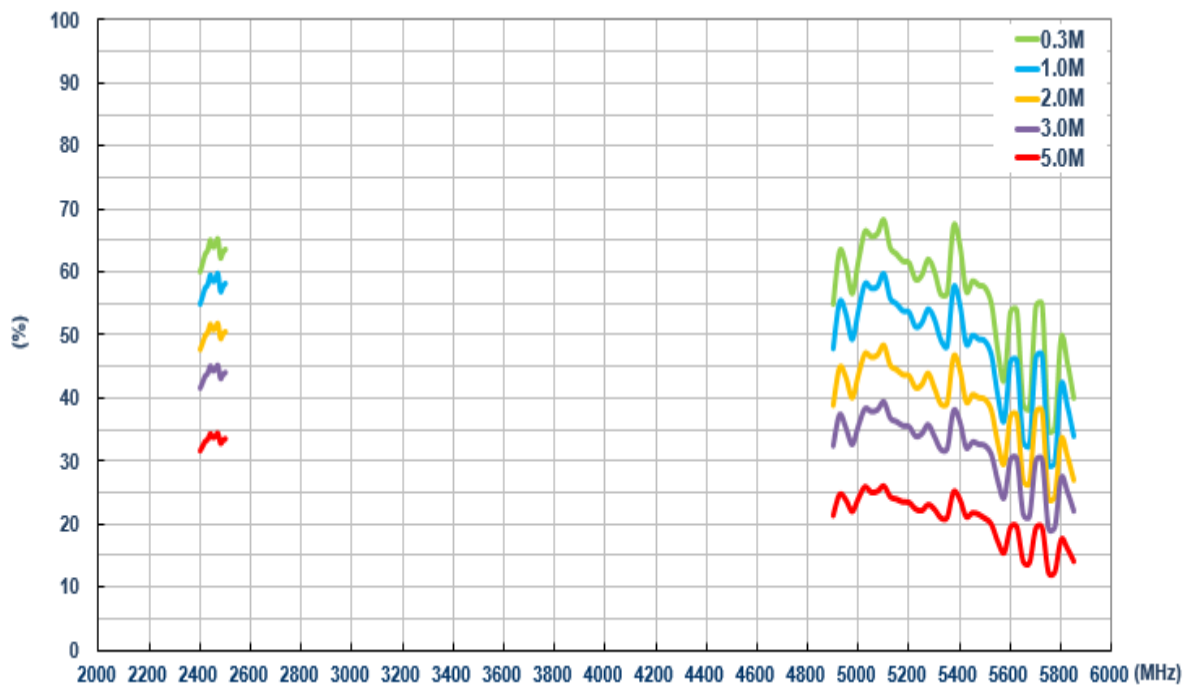
6.1.2 Return Loss (Wi-Fi_MIMO 2)



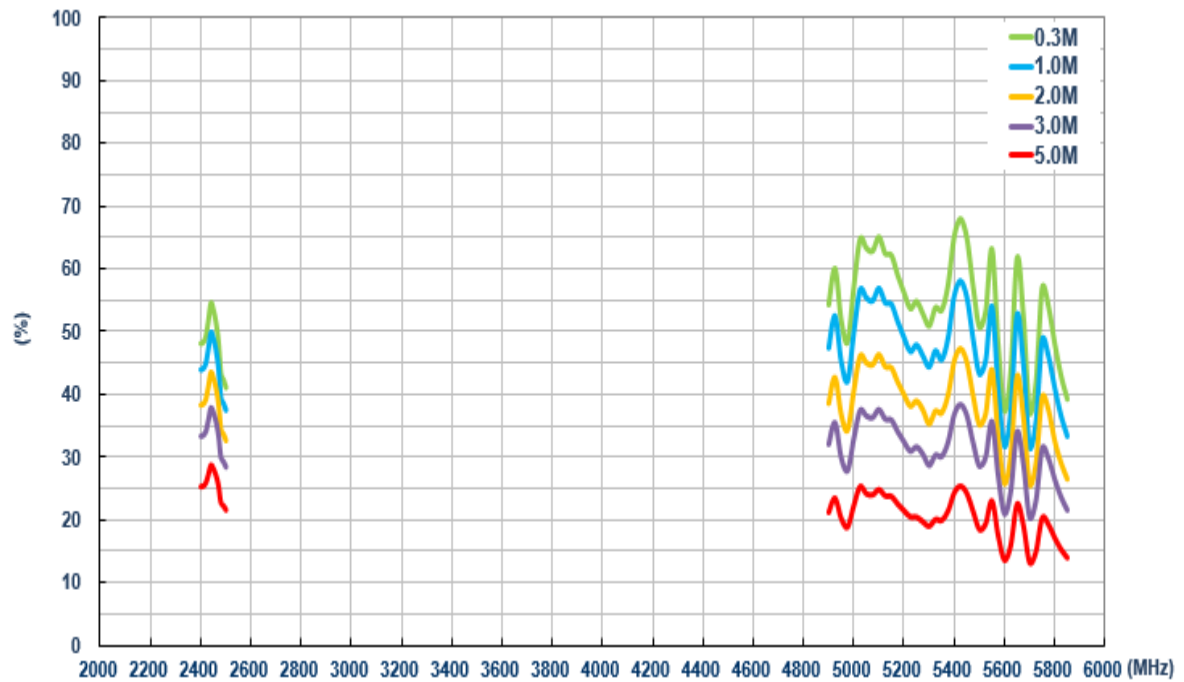
6.1.3 Isolation (Wi-Fi)



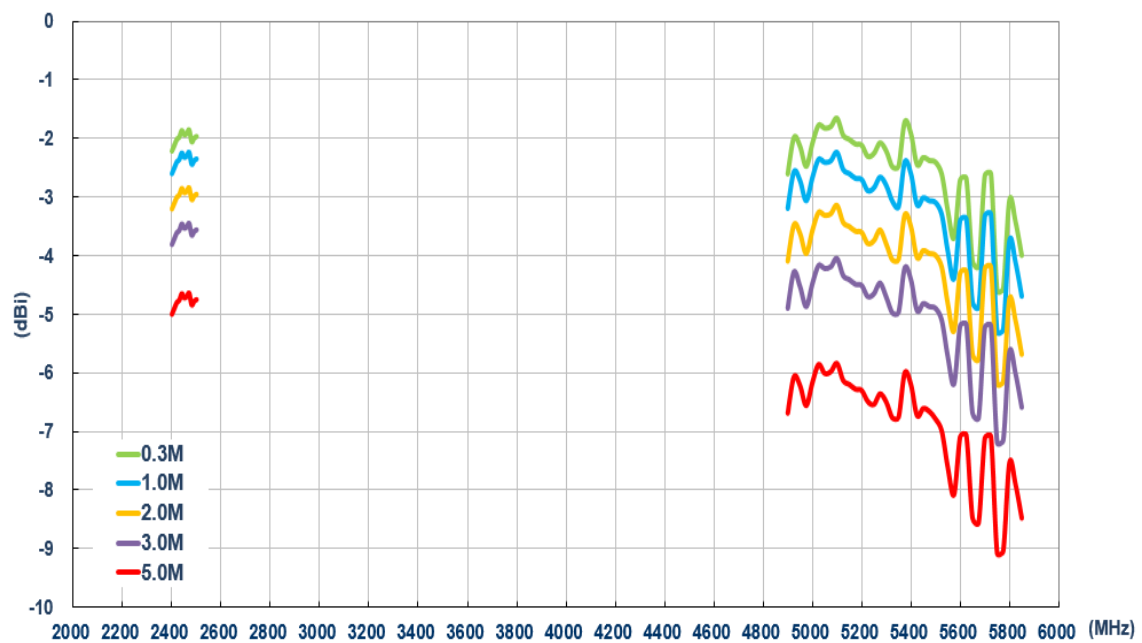
6.1.4 Efficiency (MIMO 1)



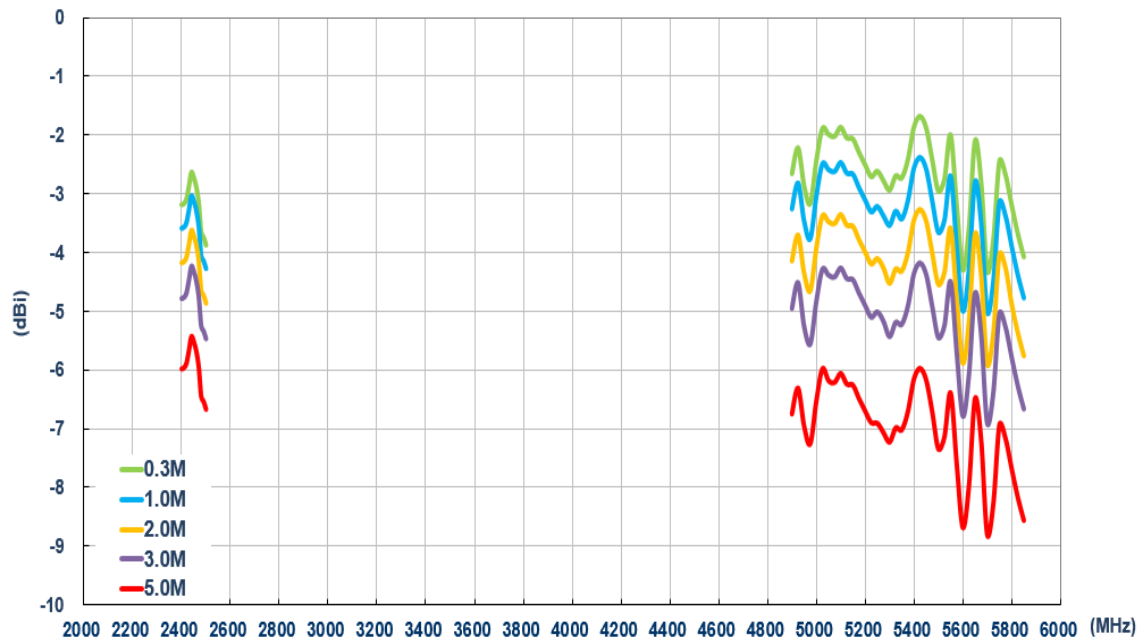
6.1.5 Efficiency (MIMO 2)



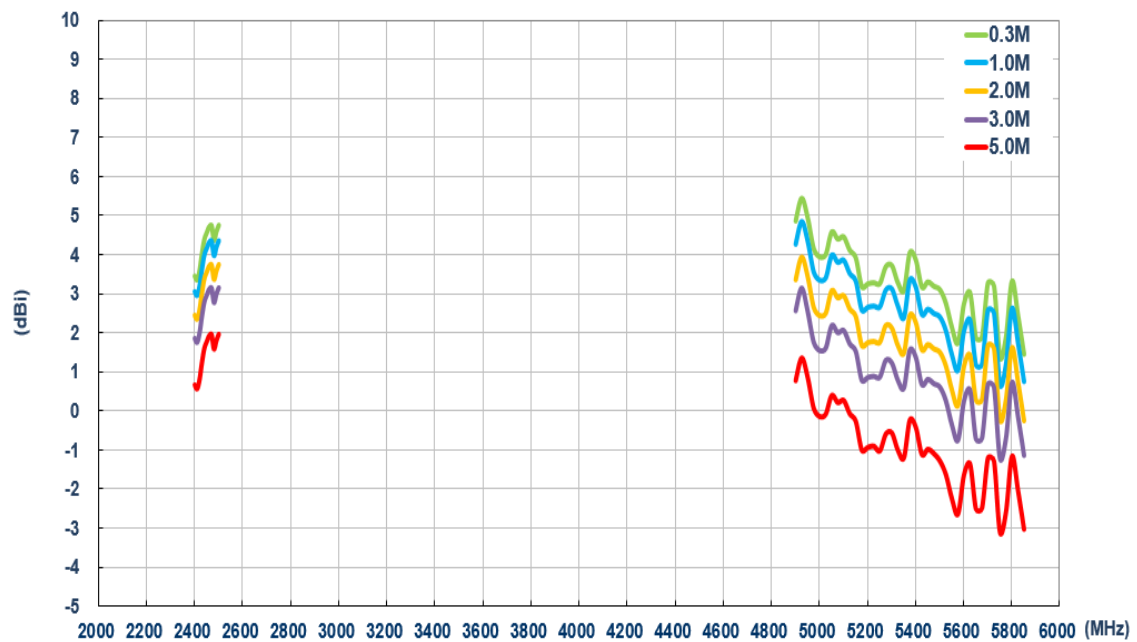
6.1.6 Average Gain (MIMO 1)



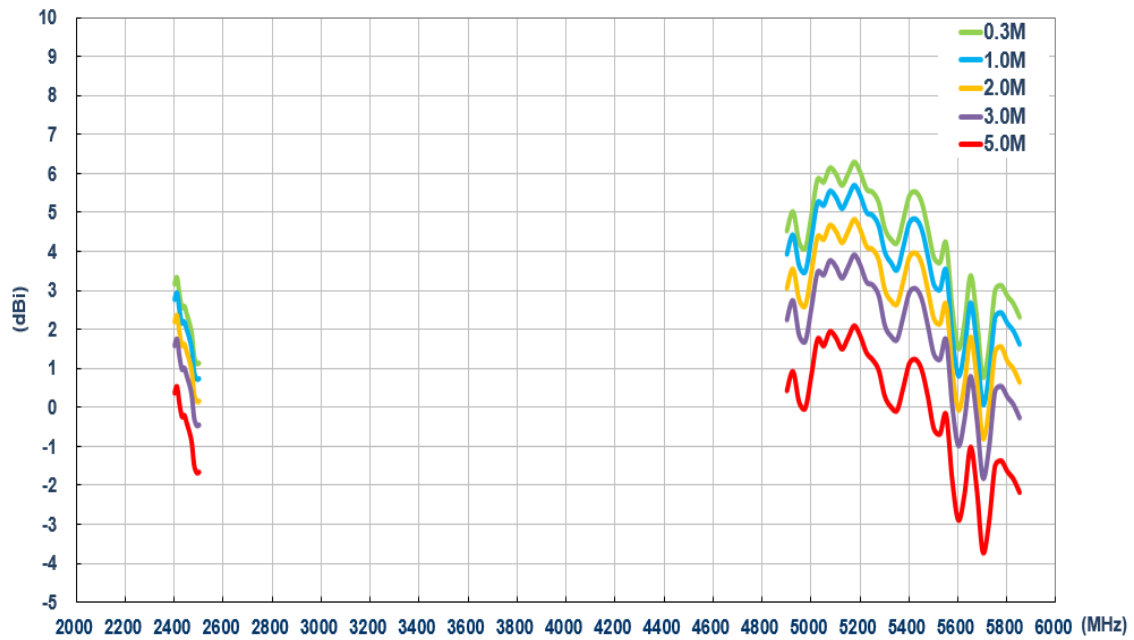
6.1.7 Average Gain (MIMO 2)



6.1.8 Peak Gain (MIMO 1)

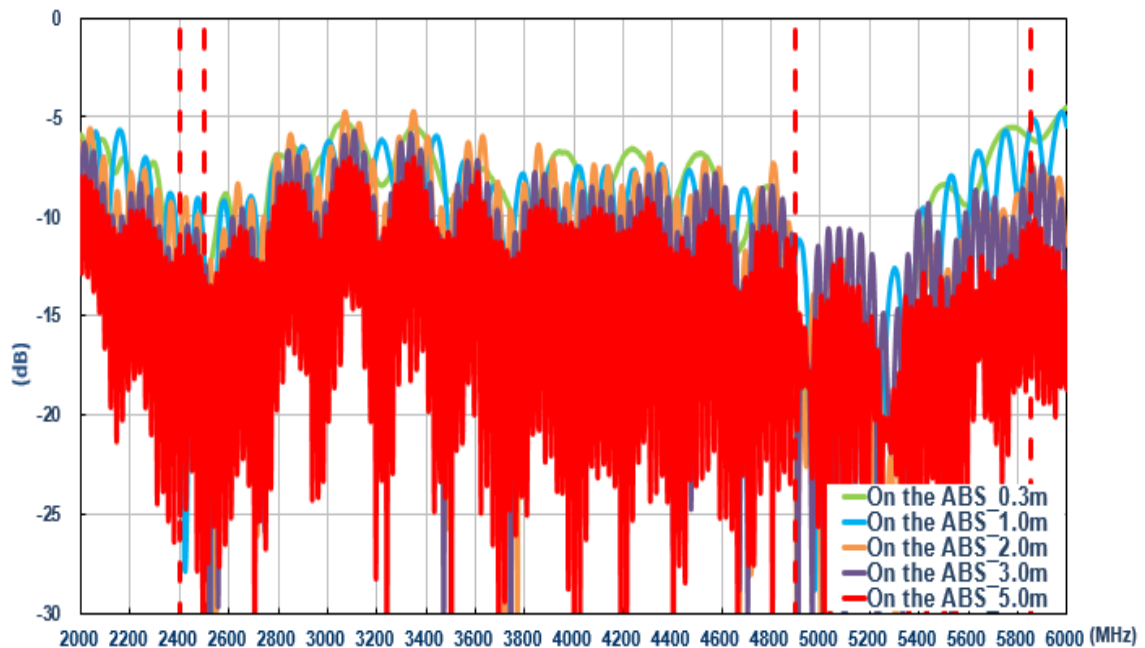


6.1.9 Peak Gain (MIMO 2)

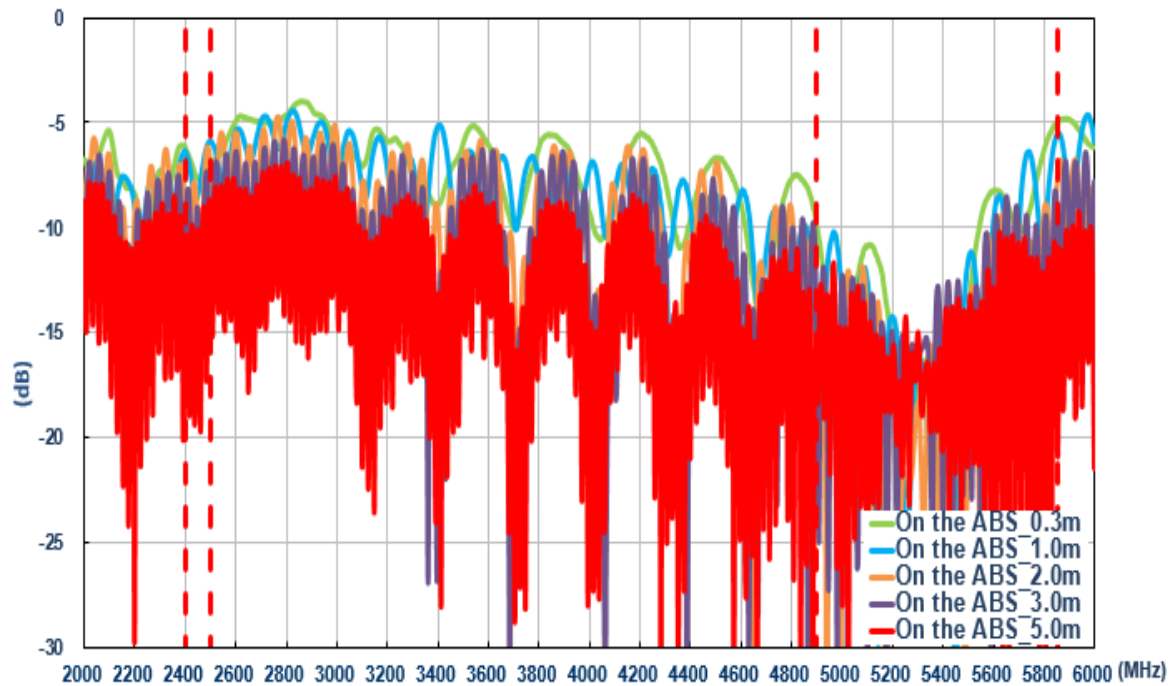


6.2 On the ABS (Wi-Fi)

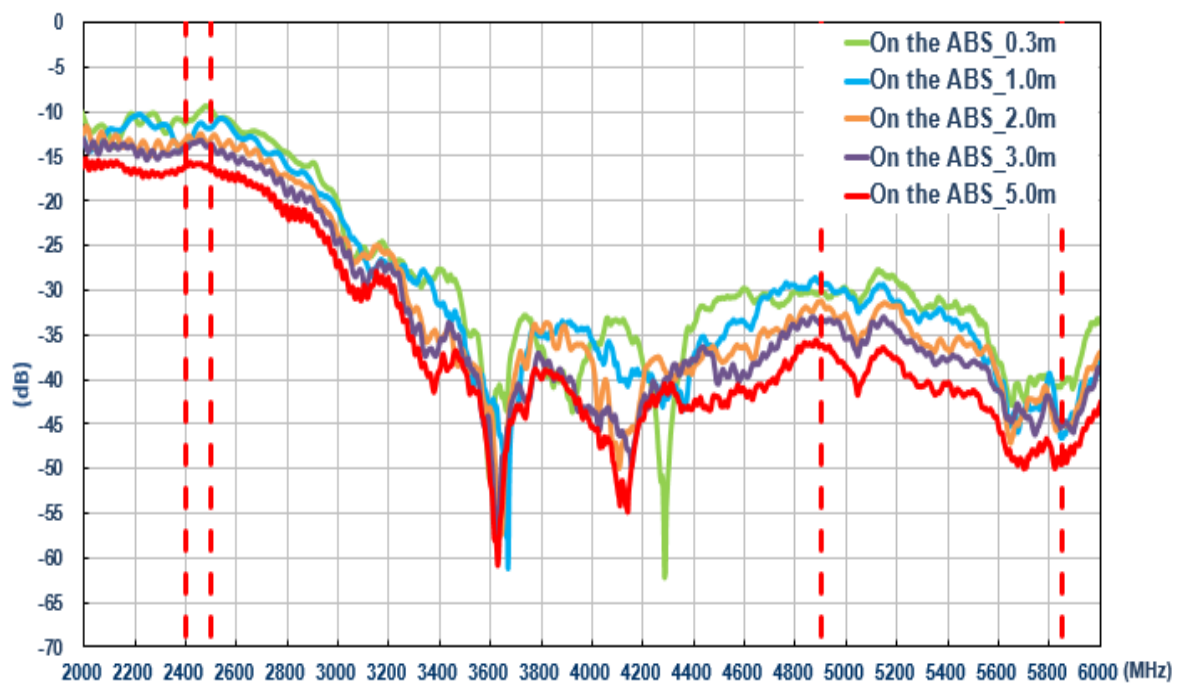
6.2.1 Return Loss (Wi-Fi MIMO 1)



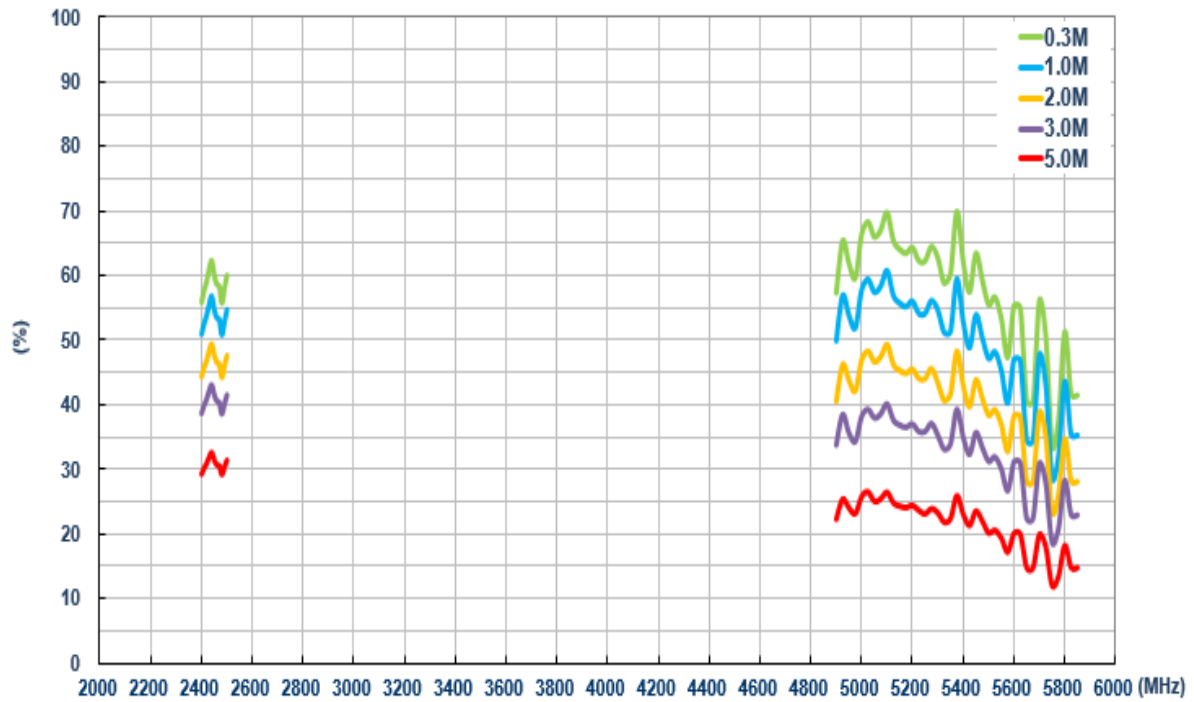
6.2.2 Return Loss (Wi-Fi MIMO 2)



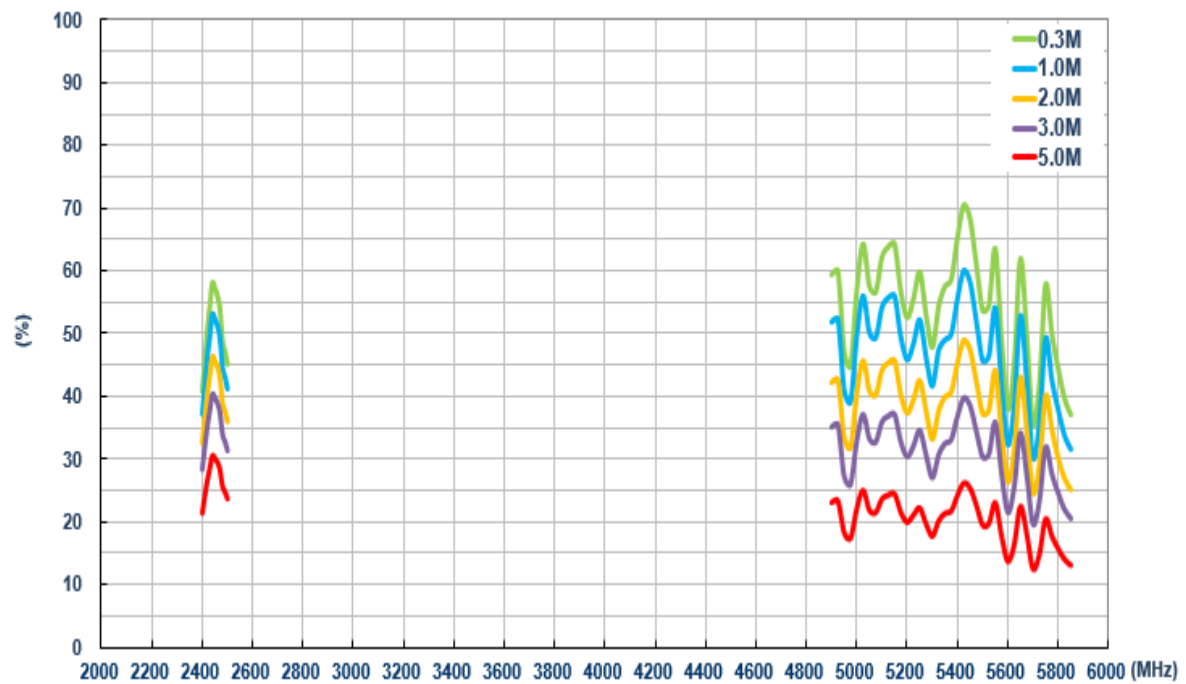
6.2.3 Isolation (Wi-Fi)



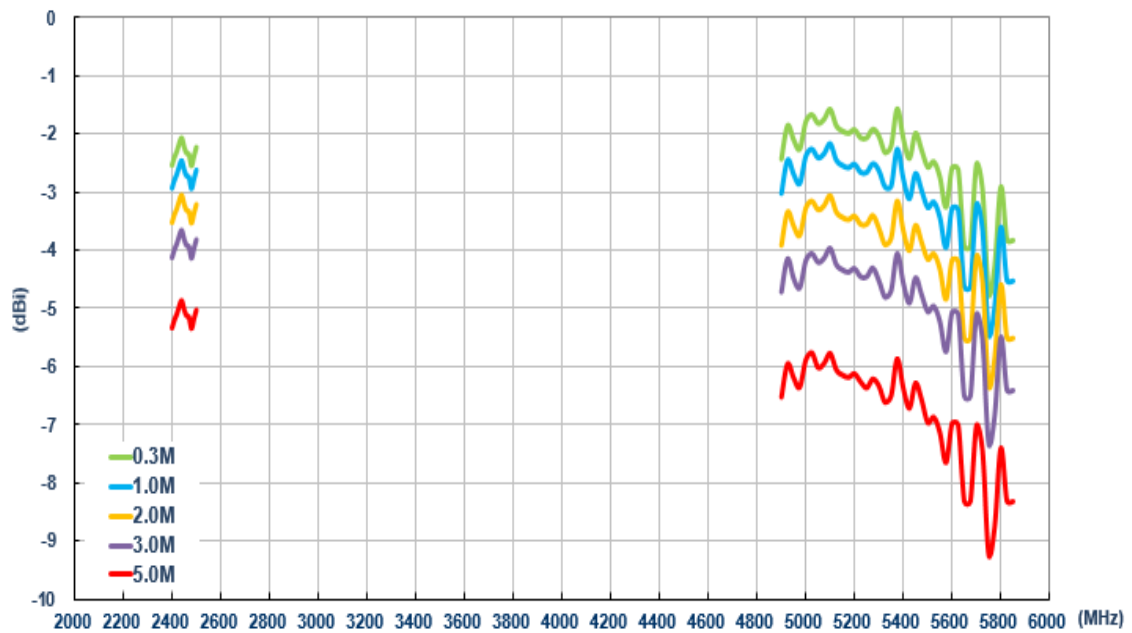
6.2.4 Efficiency (MIMO 1)



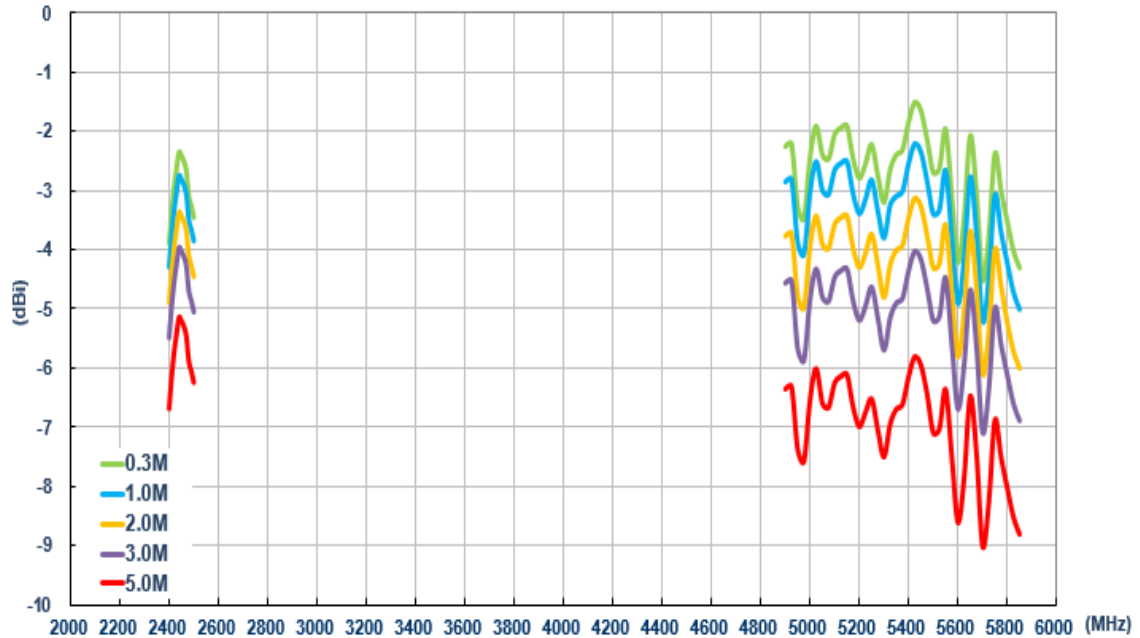
6.2.5 Efficiency (MIMO 2)



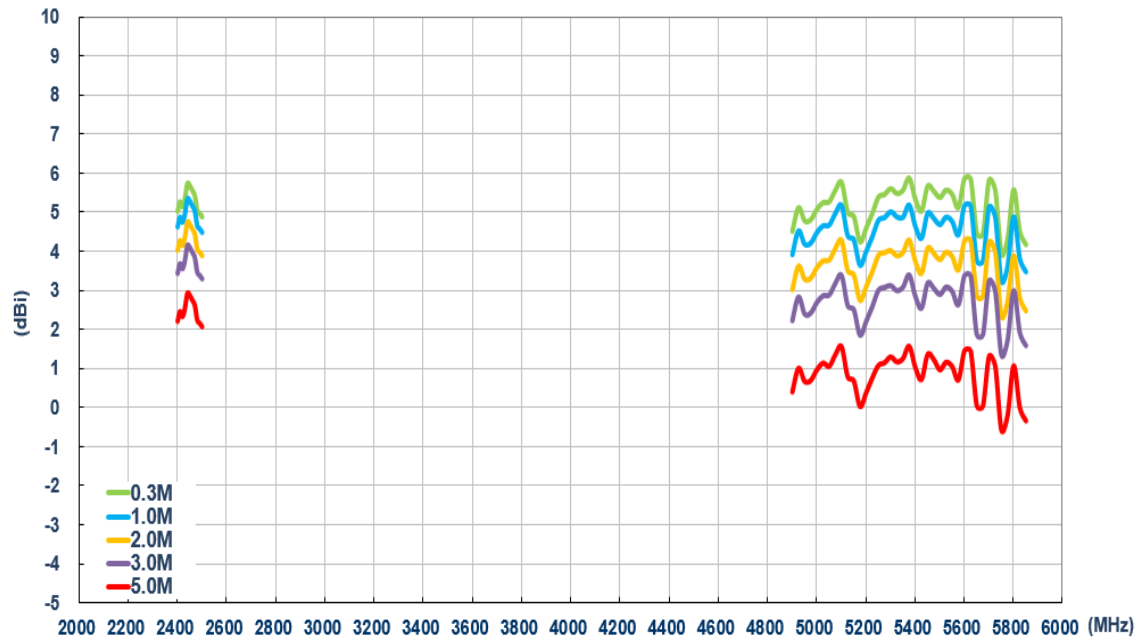
6.2.6 Average Gain (MIMO 1)



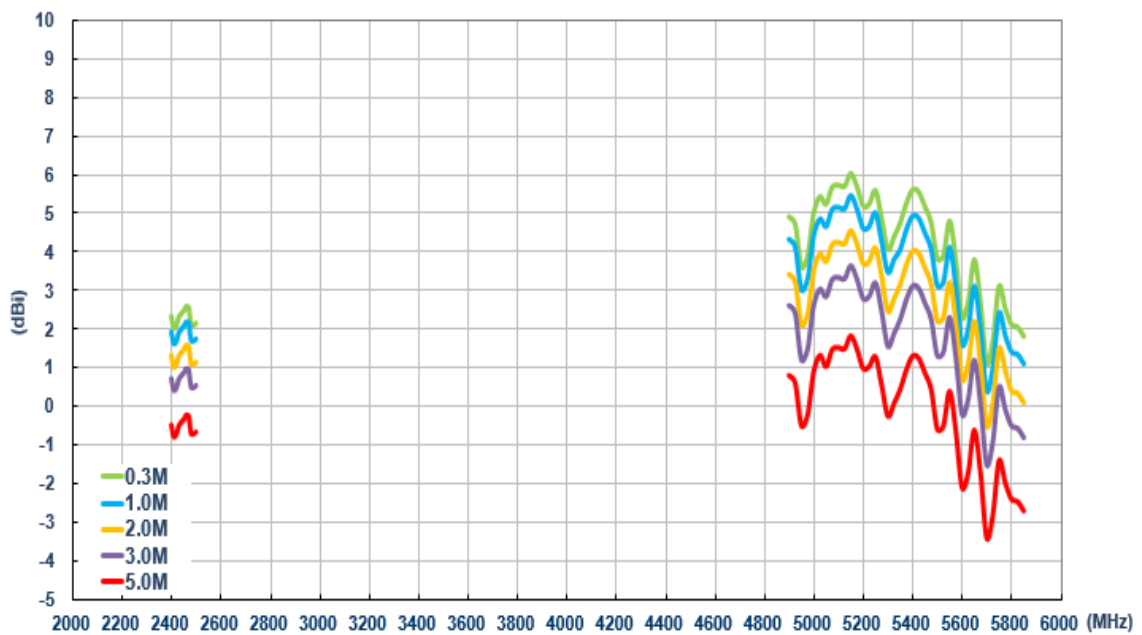
6.2.7 Average Gain (MIMO 2)



6.2.8 Peak Gain (MIMO 1)

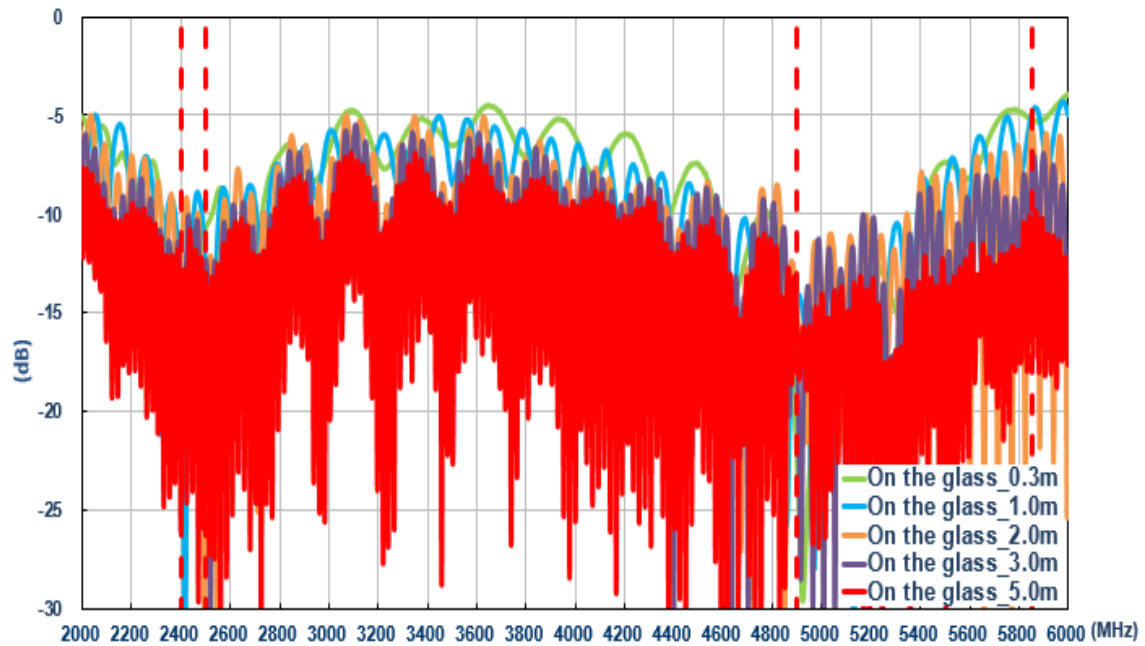


6.2.9 Peak Gain (MIMO 2)

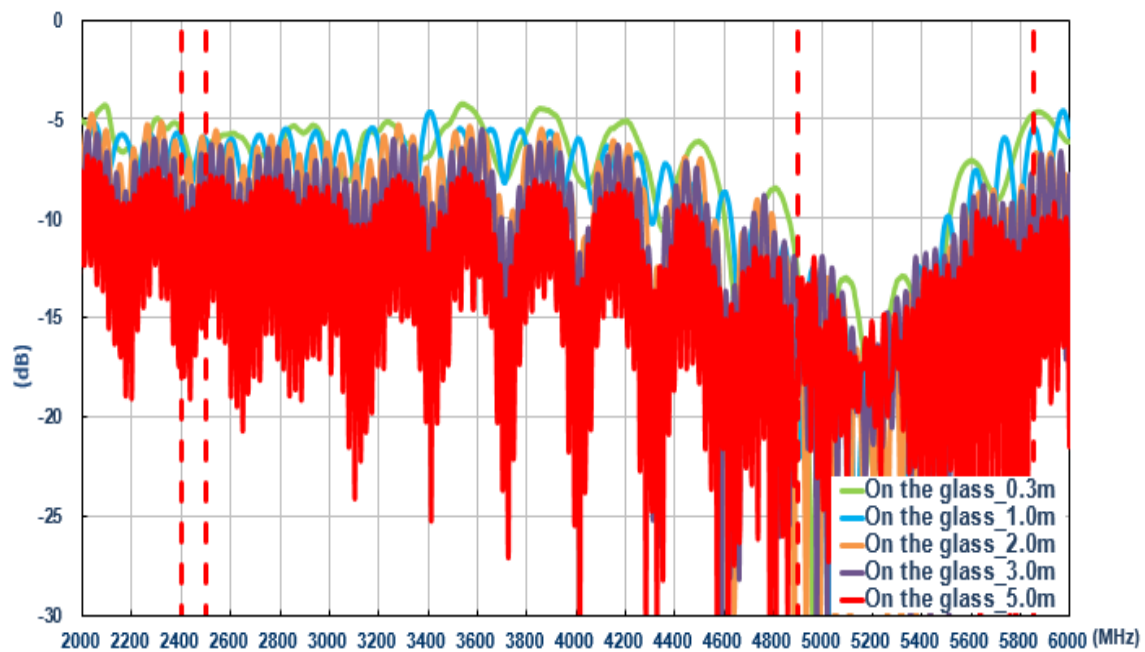


6.3 On the glass (Wi-Fi)

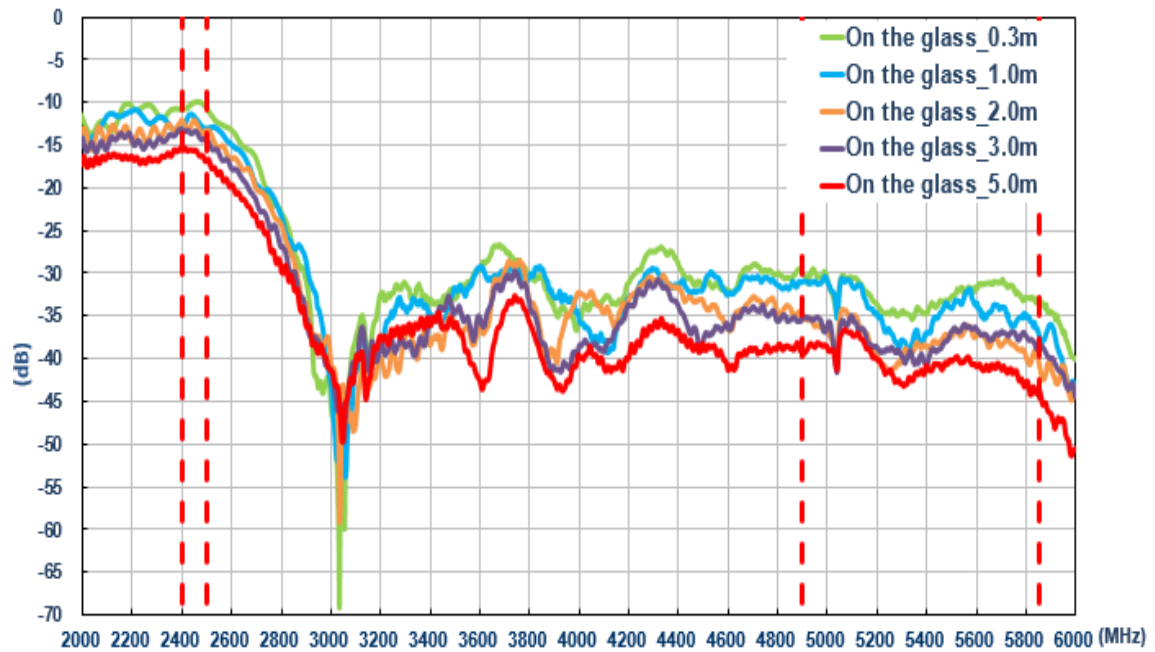
6.35.1 Return Loss (Wi-Fi MIMO 1)



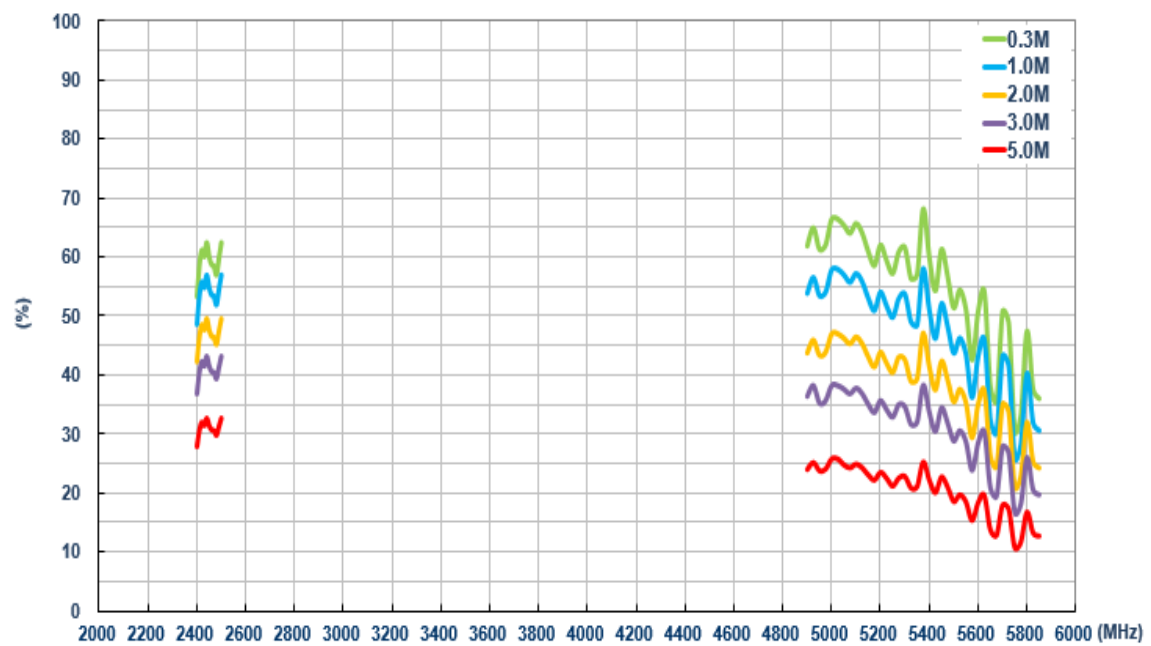
6.35.2 Return Loss (Wi-Fi MIMO 2)



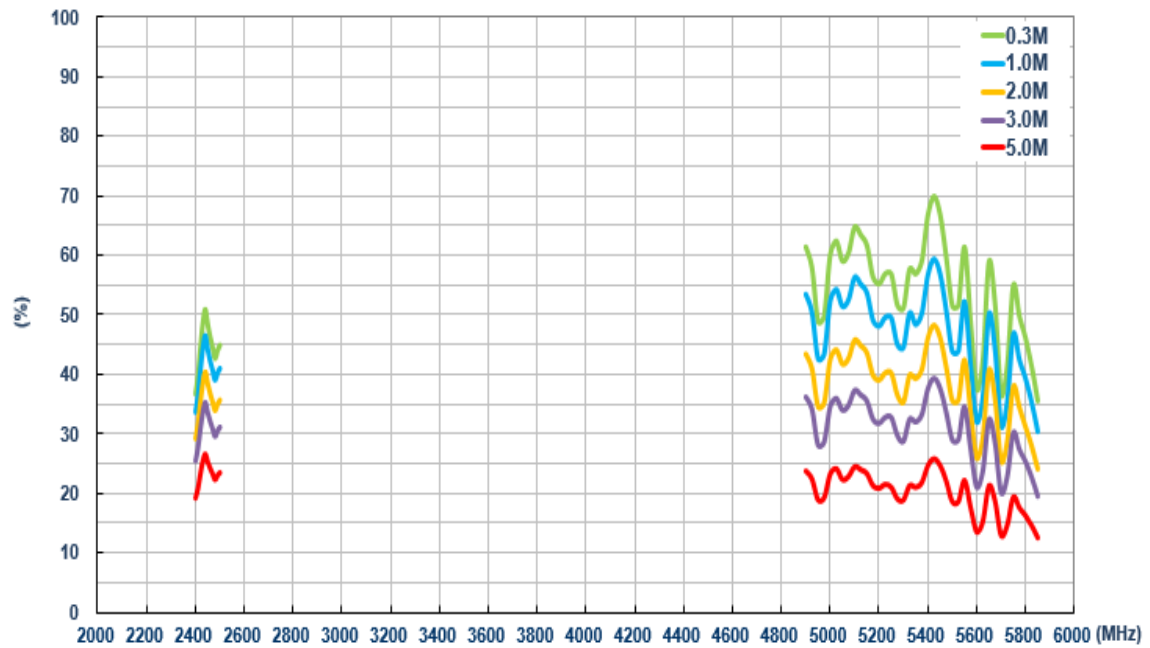
6.3.3 Isolation (Wi-Fi)



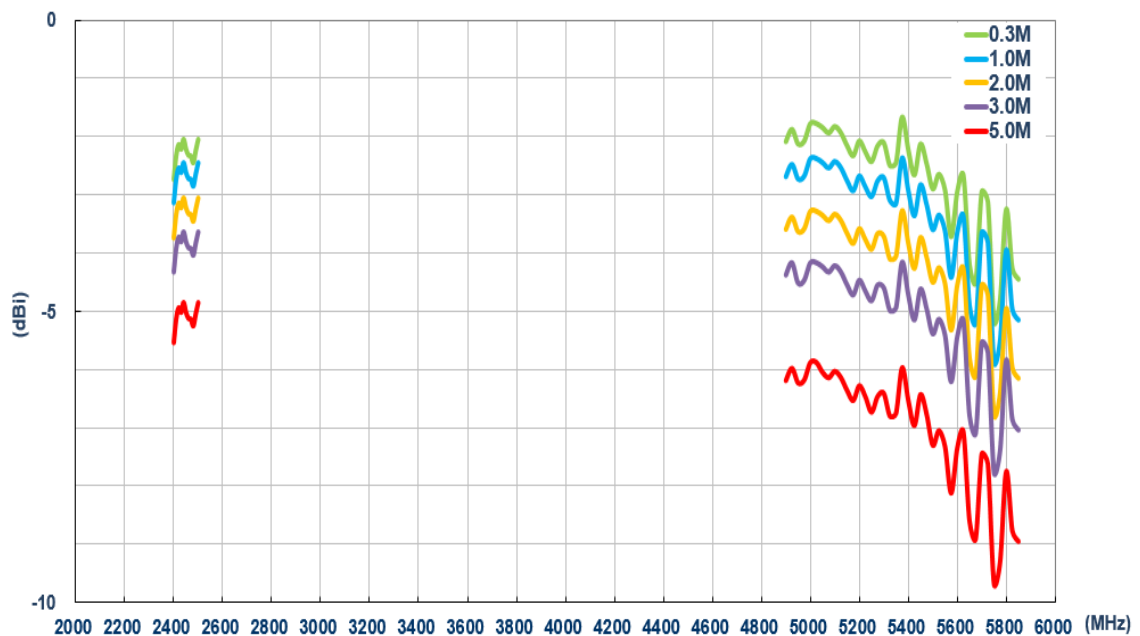
6.3.4 Efficiency (Wi-Fi MIMO 1)



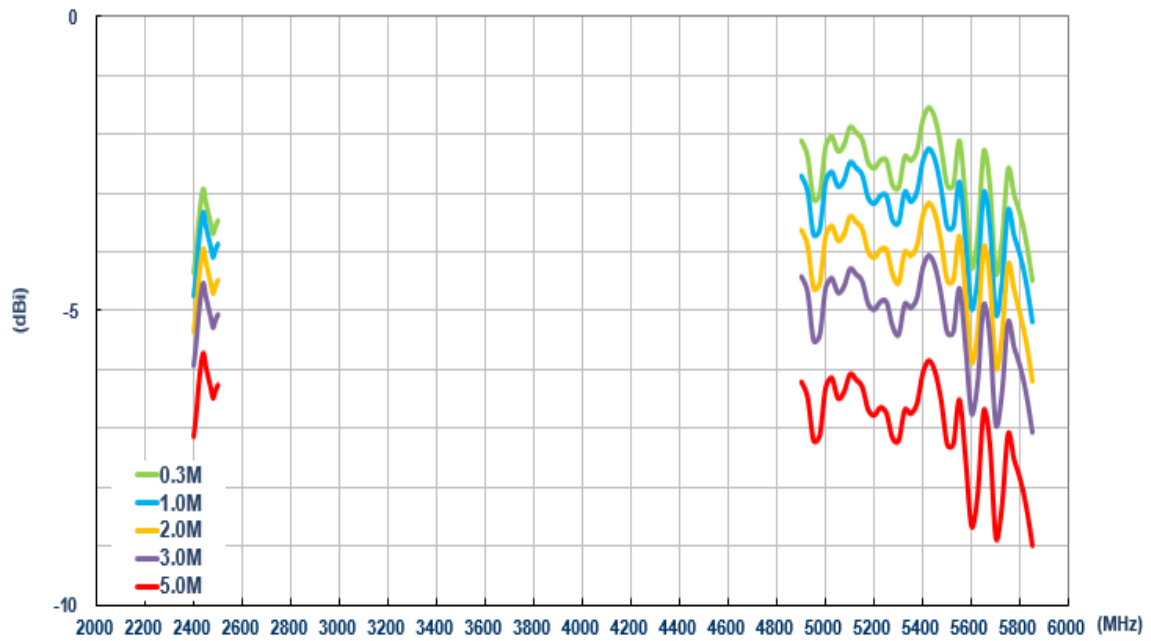
6.3.5 Efficiency (Wi-Fi MIMO 2)



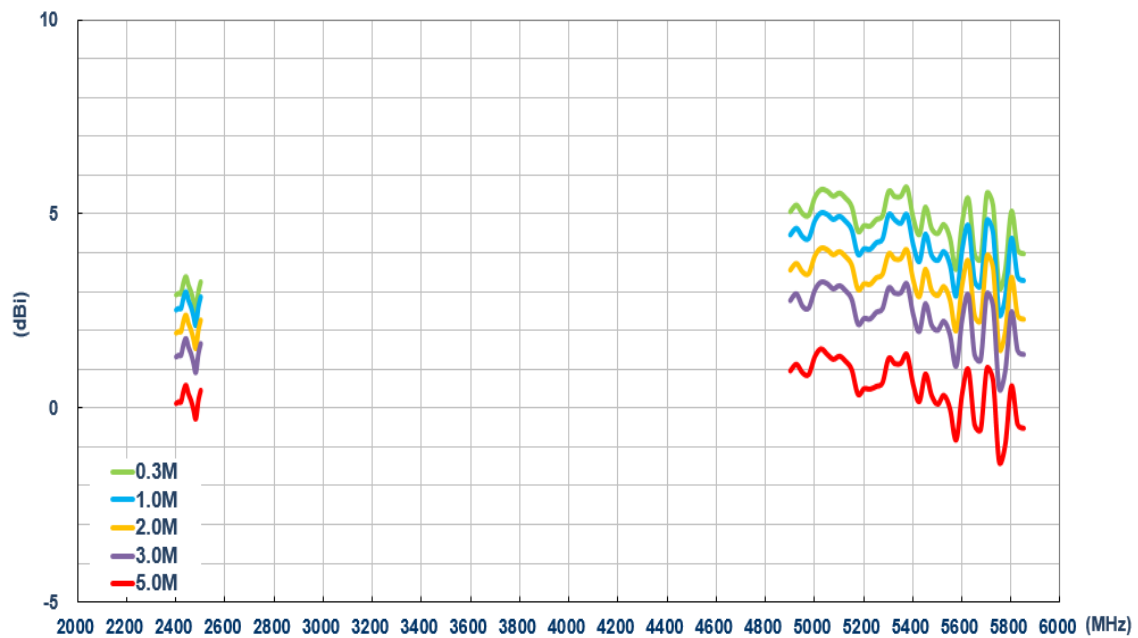
6.3.6 Average Gain (Wi-Fi MIMO 1)



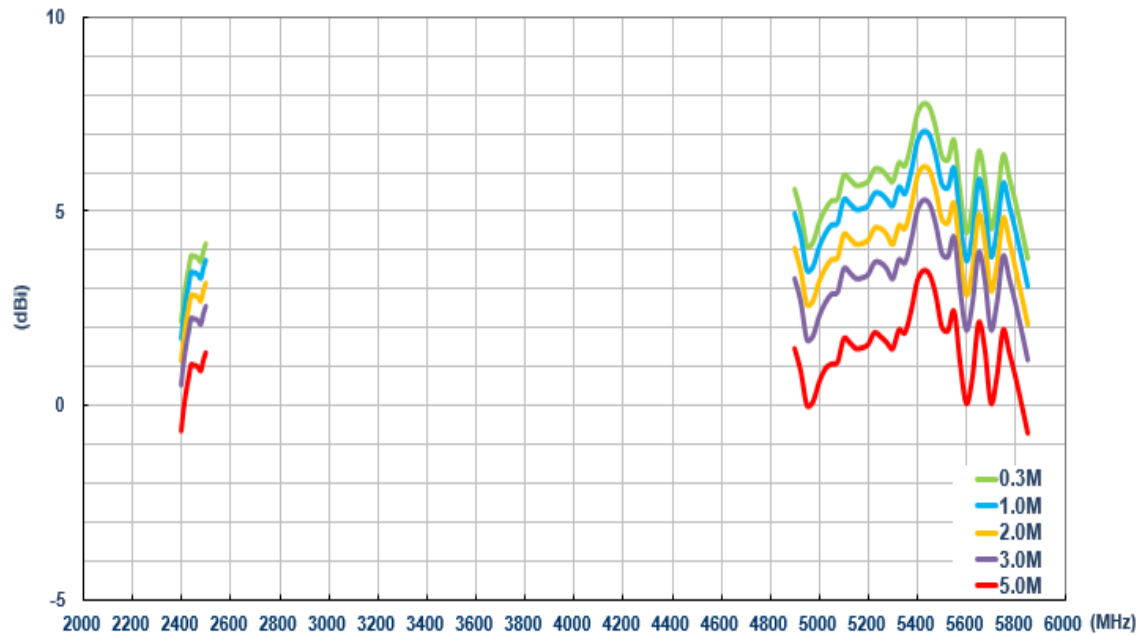
6.3.7 Average Gain (Wi-Fi MIMO 2)



6.3.8 Peak Gain (Wi-Fi MIMO 1)

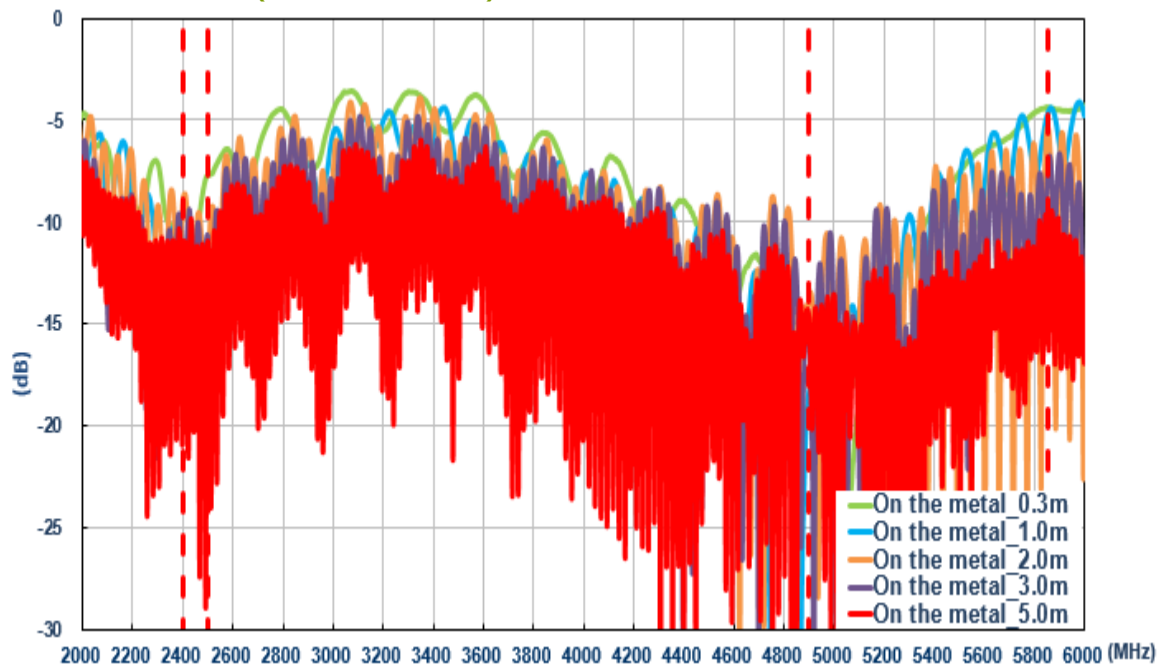


6.3.9 Peak Gain (Wi-Fi MIMO 2)

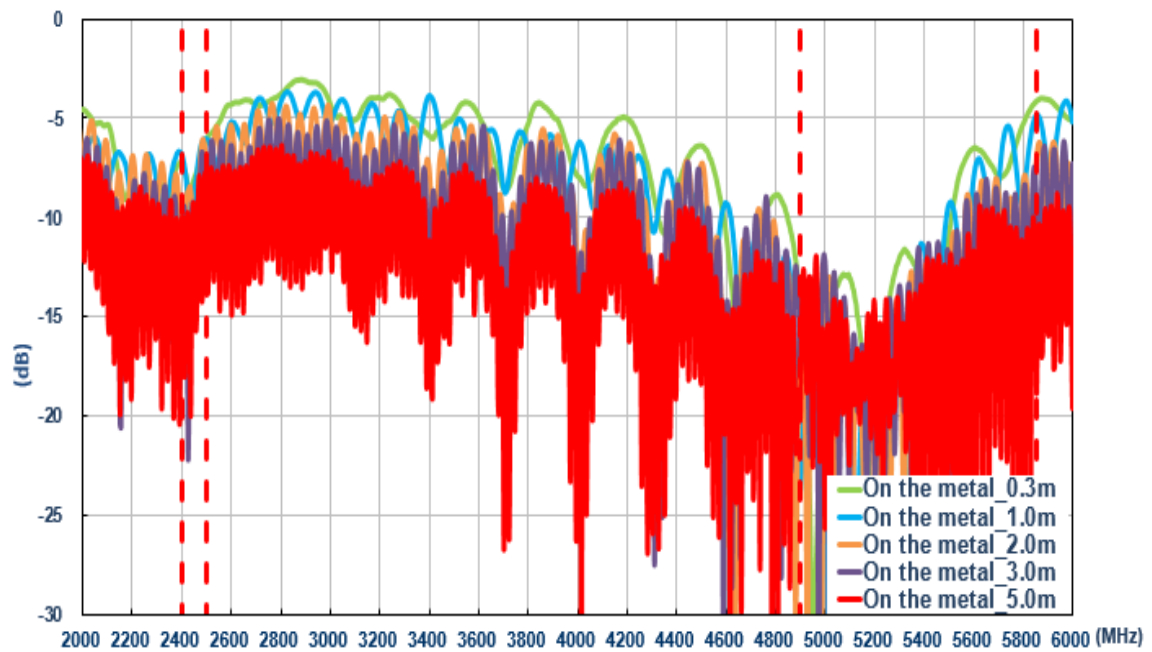


6.4 On the metal (Wi-Fi)

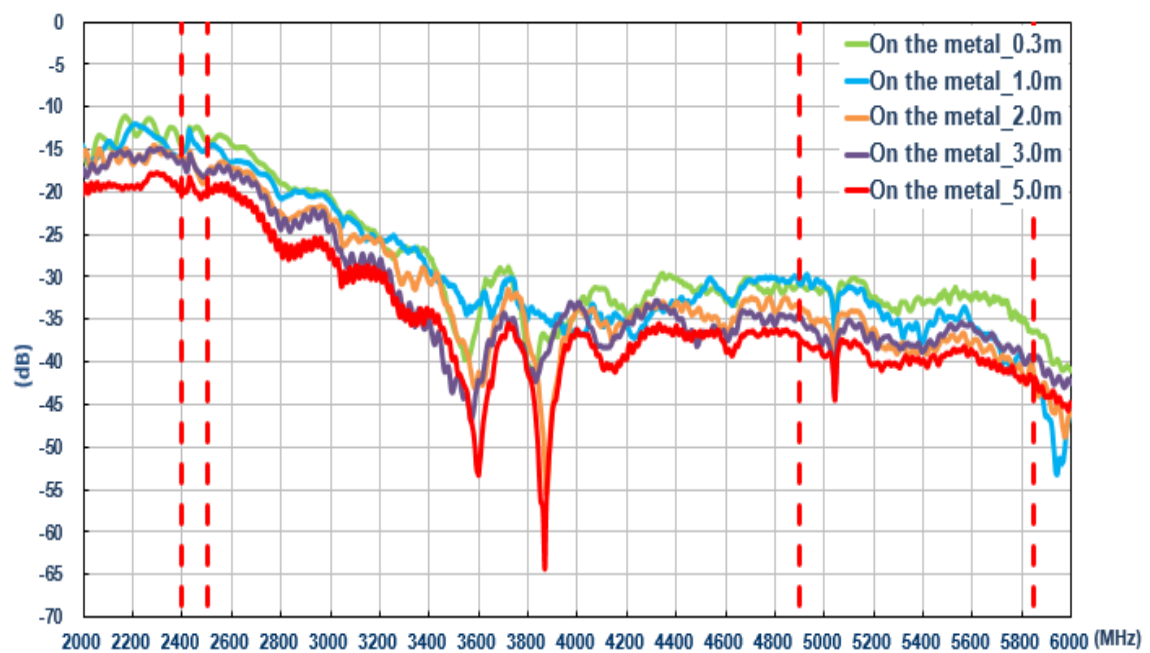
6.4.1 Return Loss (Wi-Fi MIMO 1)



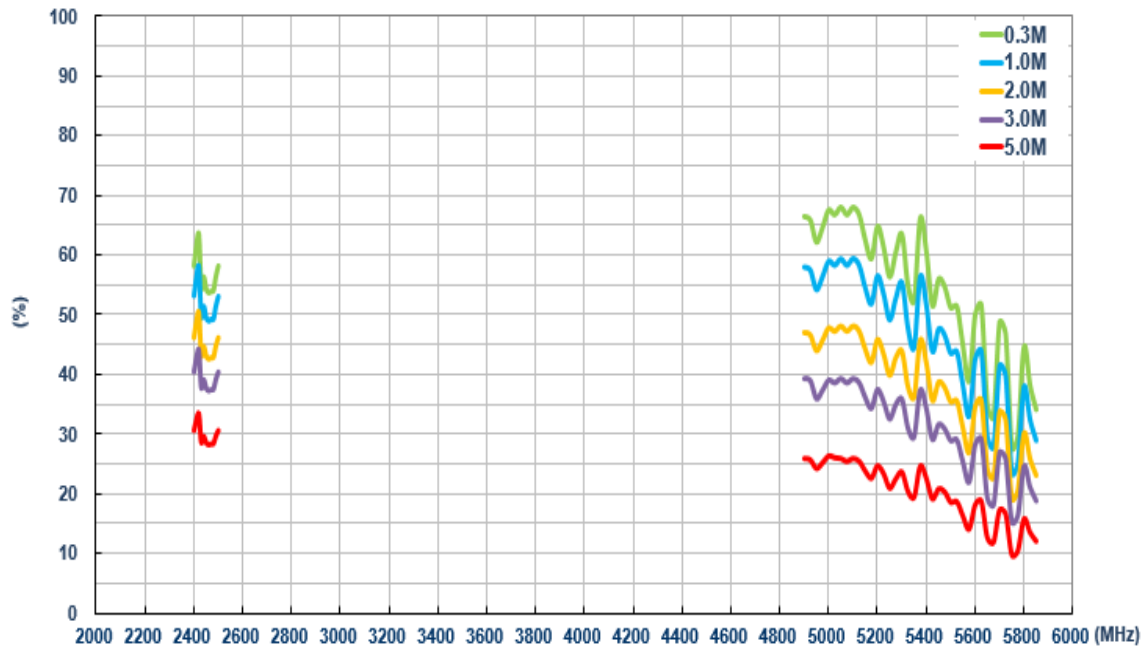
6.4.2 Return Loss (Wi-Fi MIMO 2)



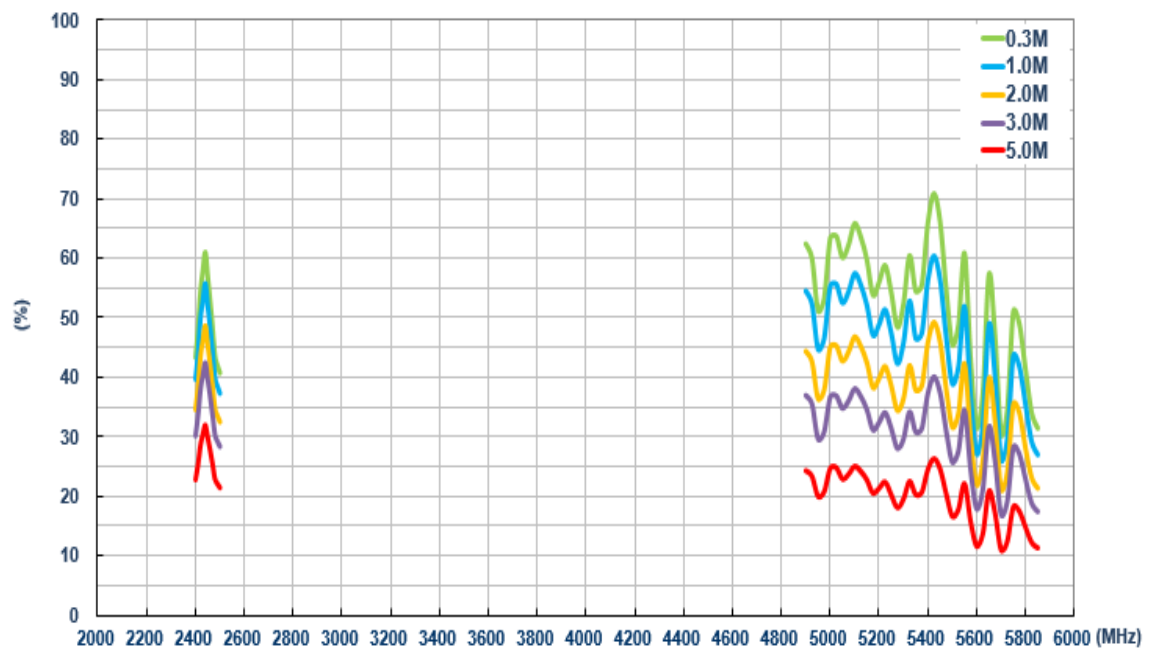
6.4.3 Isolation (Wi-Fi)



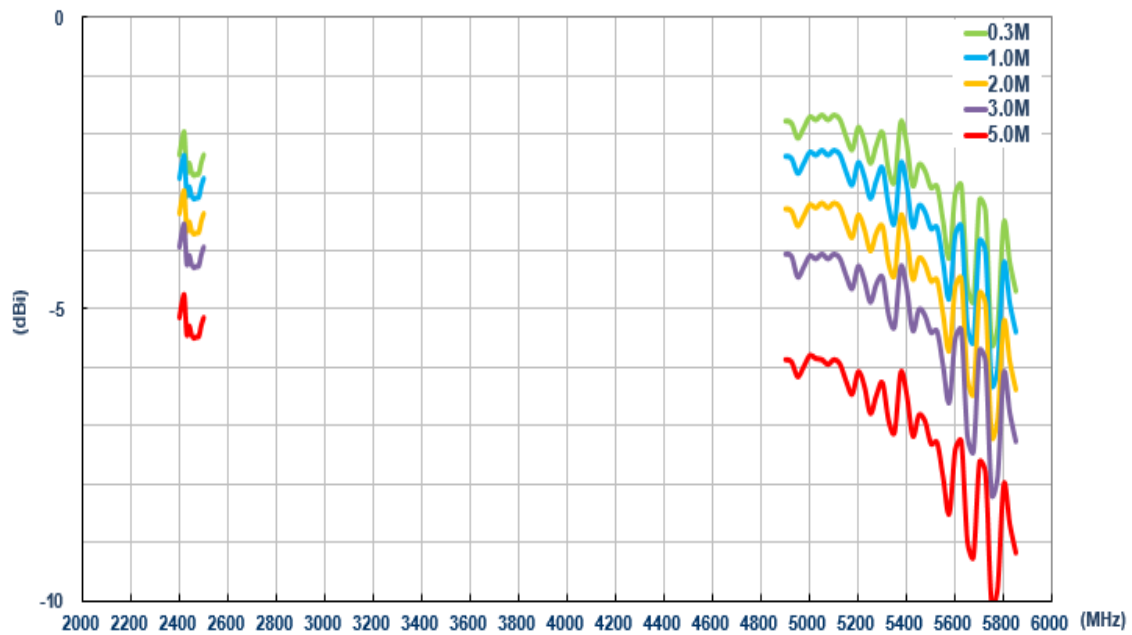
6.4.4 Efficiency (Wi-Fi MIMO 1)



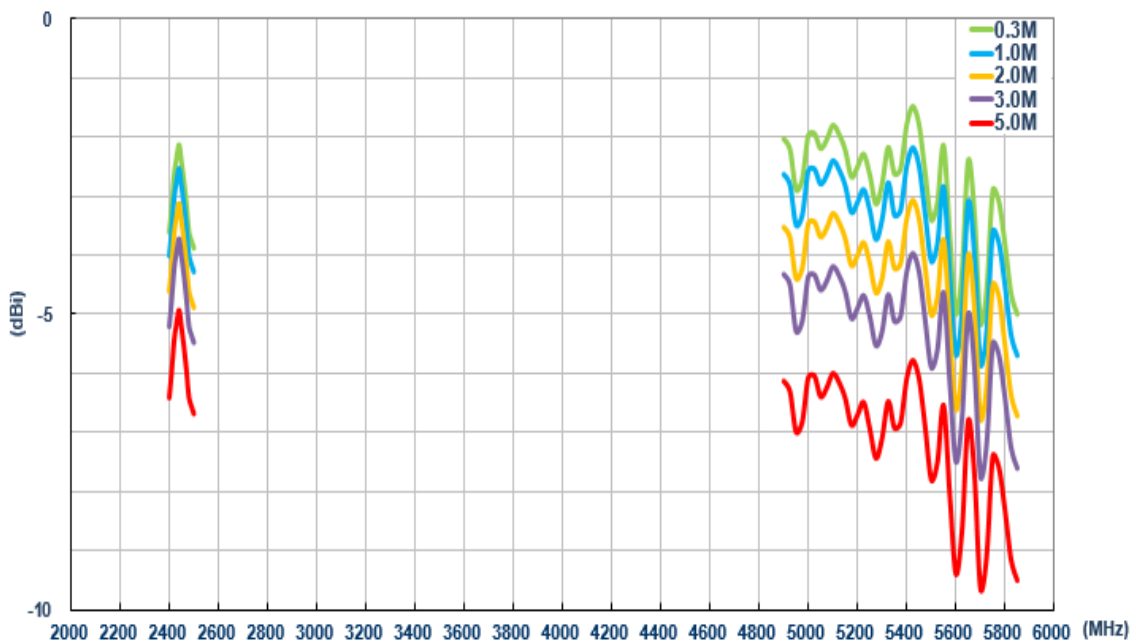
6.4.5 Efficiency (Wi-Fi MIMO 2)



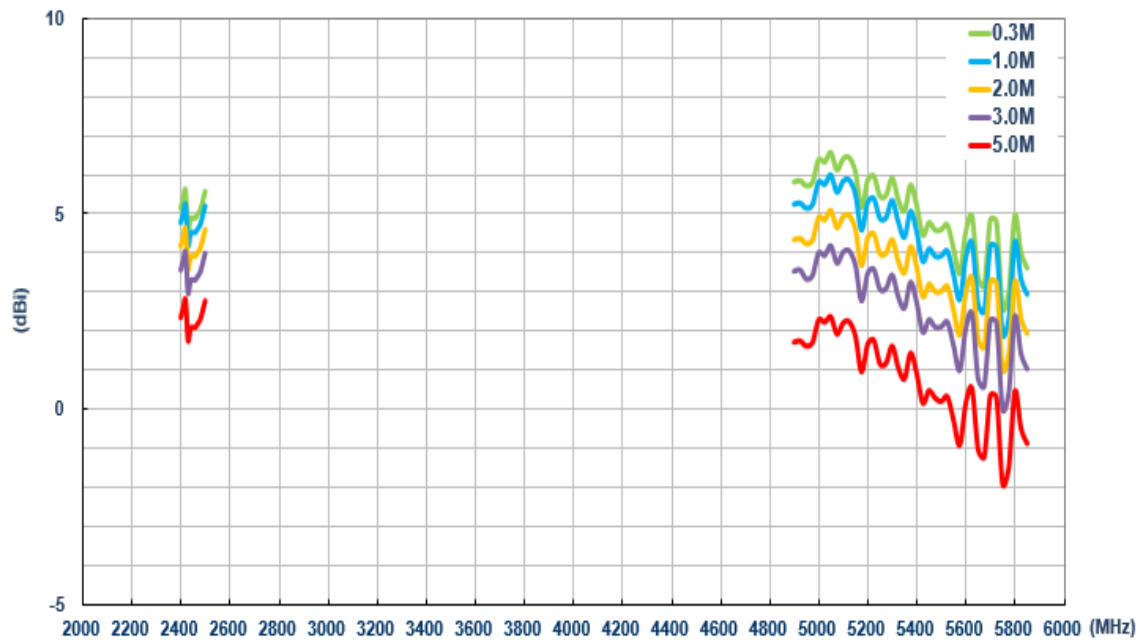
6.4.6 Average Gain (Wi-Fi MIMO 1)



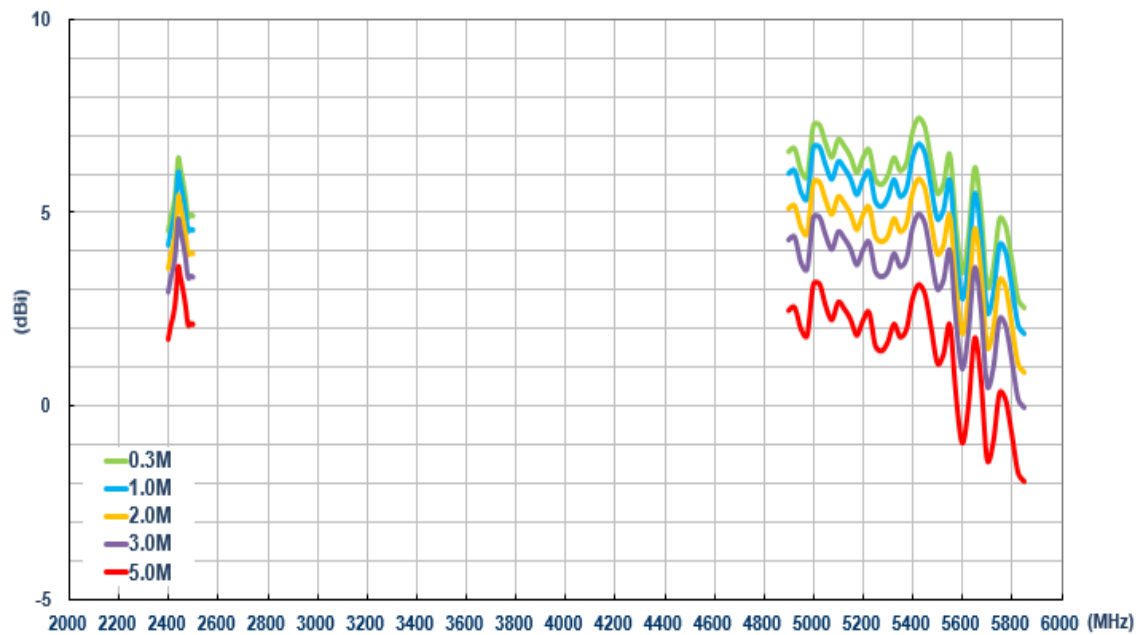
6.4.7 Average Gain (Wi-Fi MIMO 2)



6.4.8 Peak Gain (Wi-Fi MIMO 1)

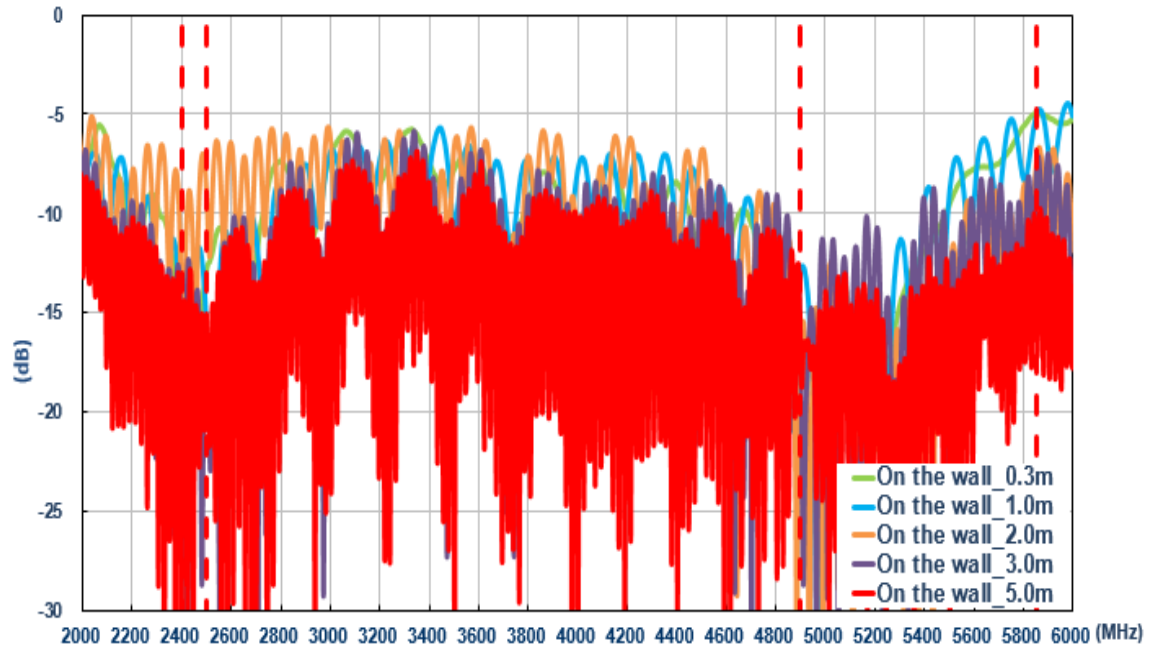


6.4.9 Peak Gain (Wi-Fi MIMO 2)

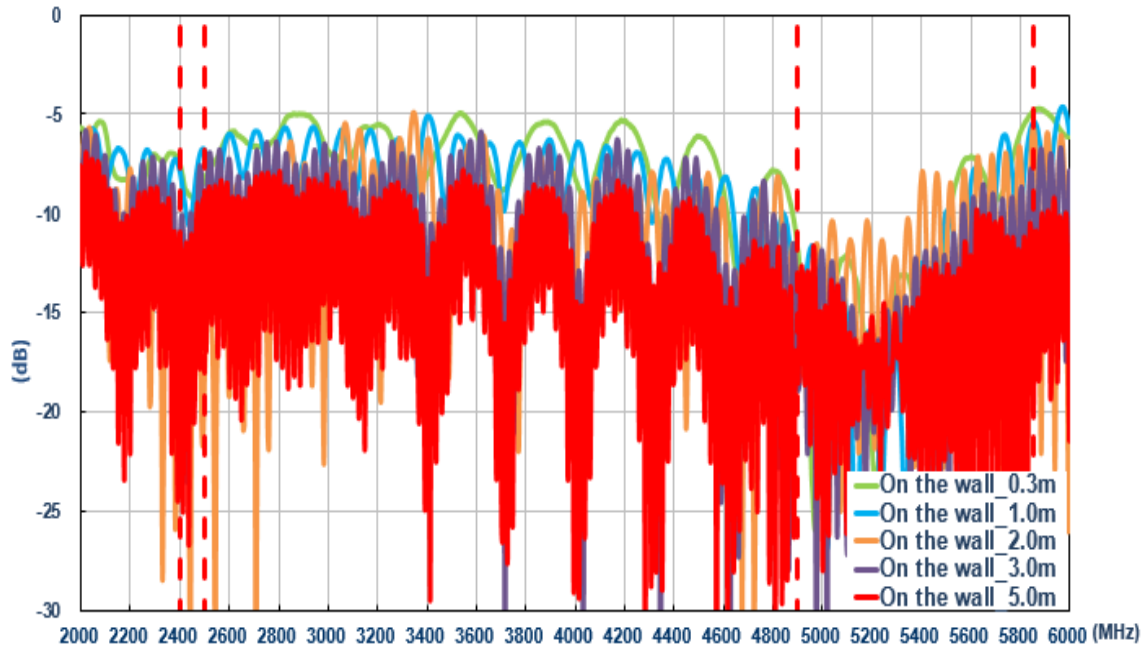


6.5 On the wall (Wi-Fi)

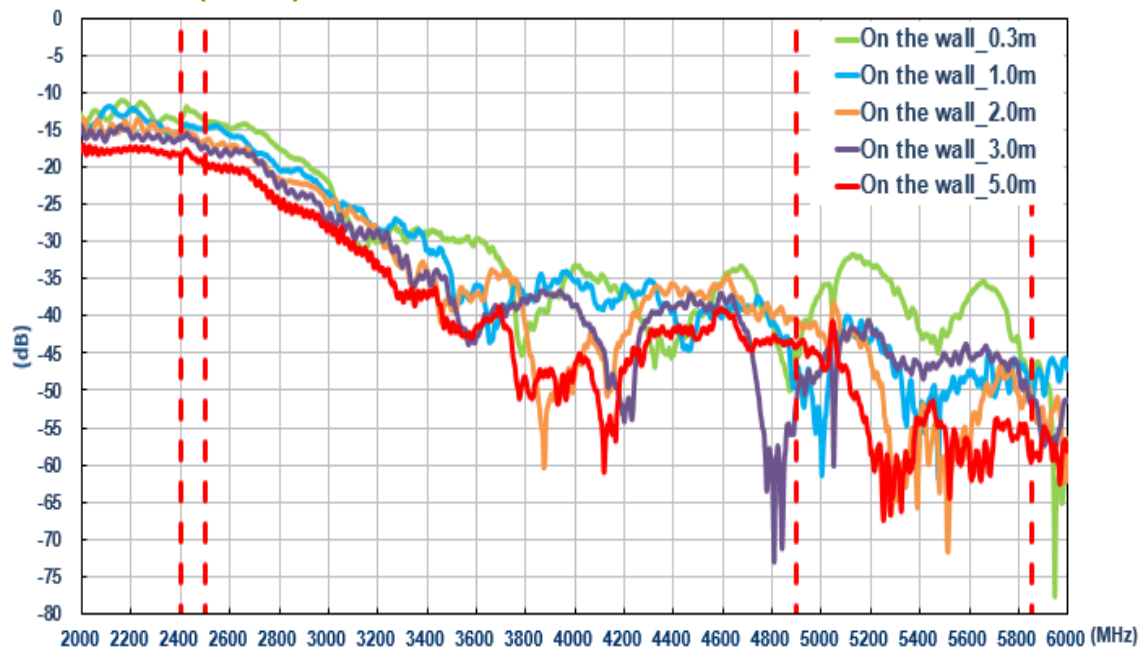
6.5.1 Return Loss (Wi-Fi MIMO 1)



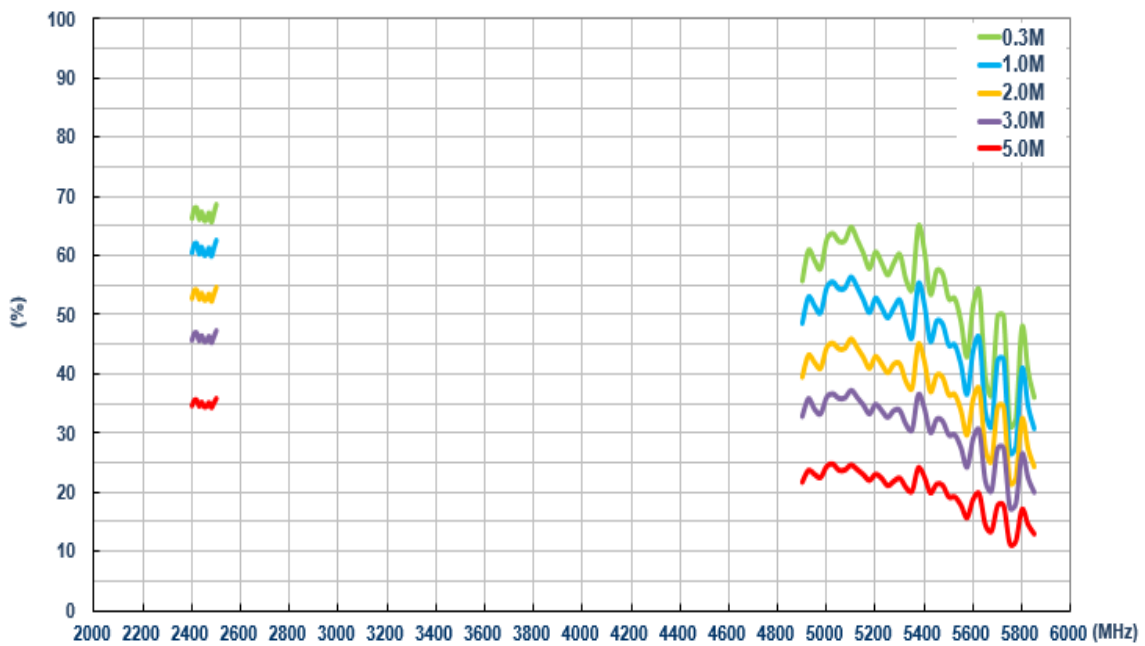
6.5.2 Return Loss (Wi-Fi MIMO 2)



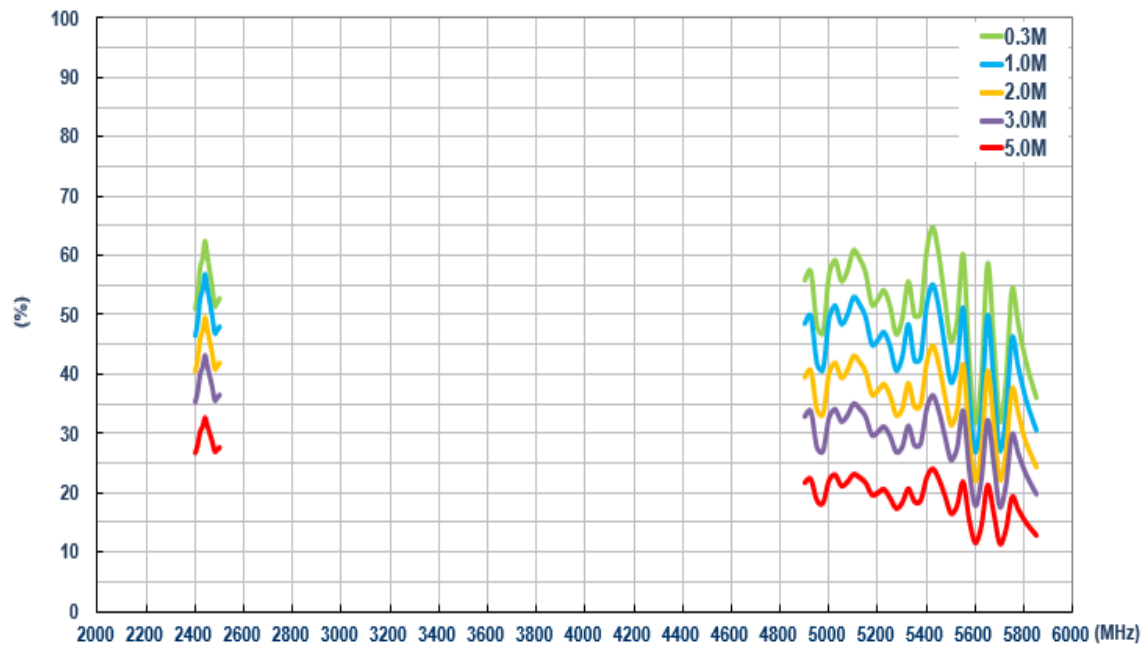
6.5.3 Isolation (Wi-Fi)



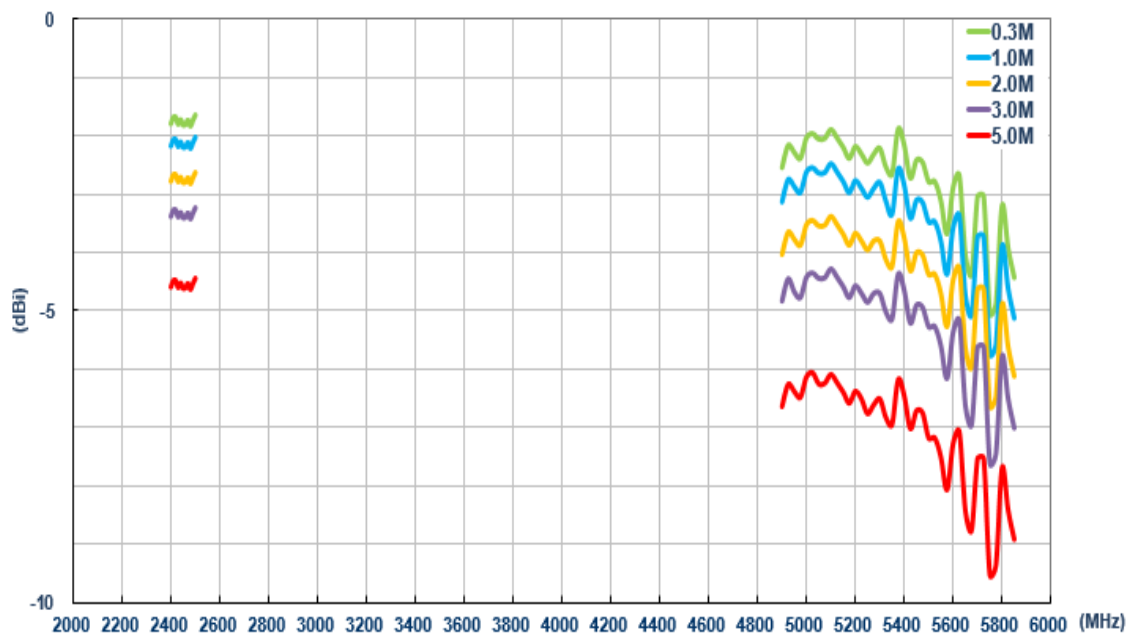
6.5.4 Efficiency (Wi-Fi MIMO 1)



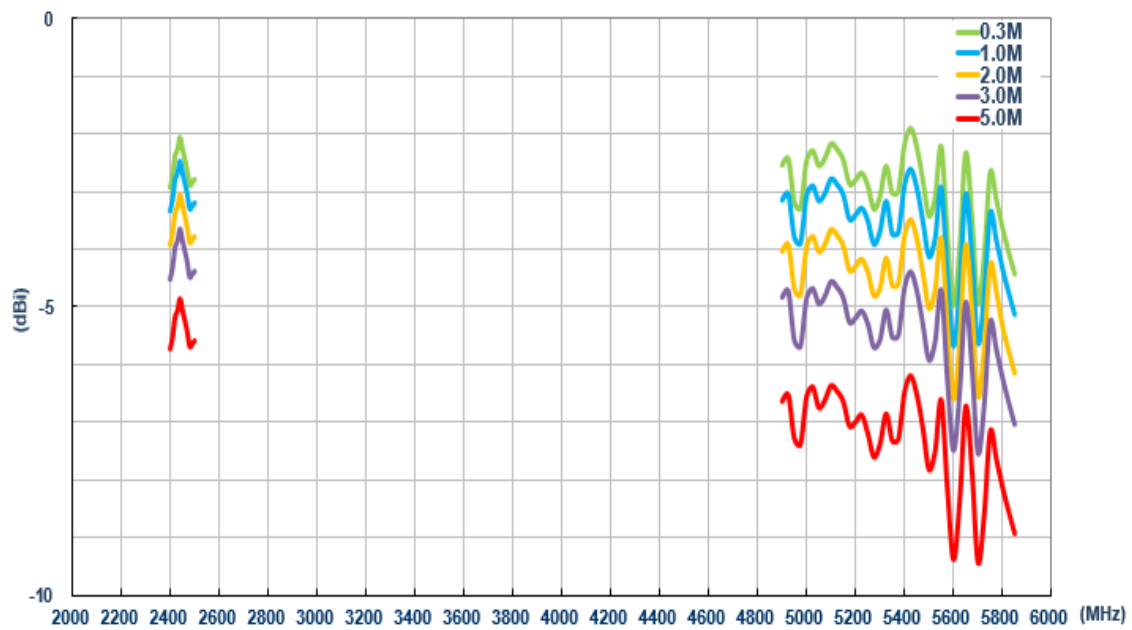
6.5.5 Efficiency (Wi-Fi MIMO 2)



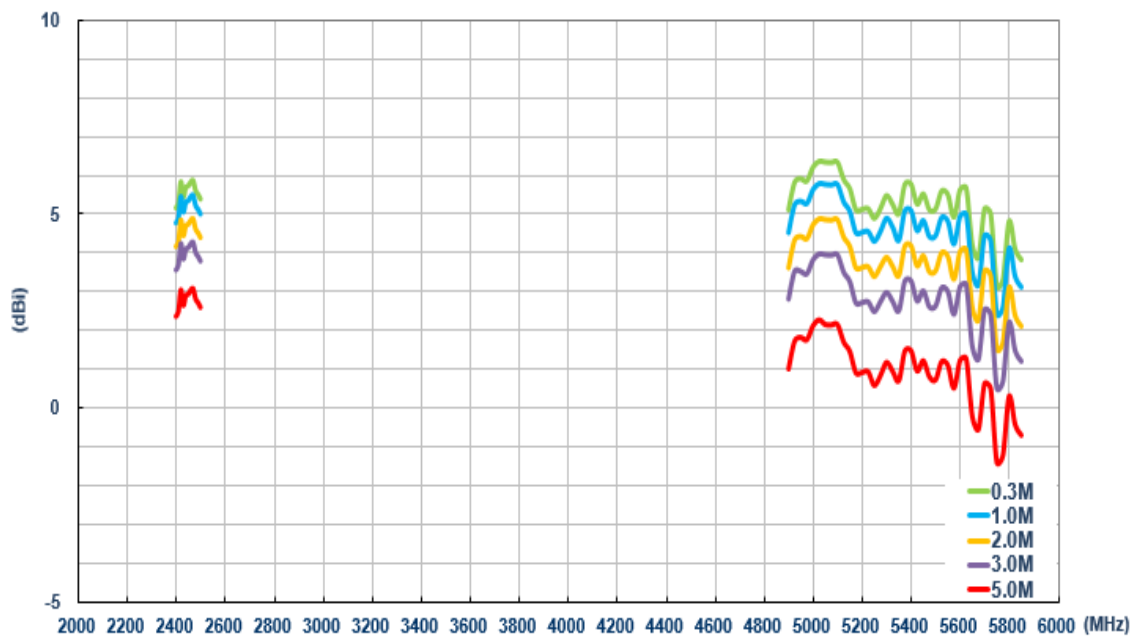
6.5.6 Average Gain (Wi-Fi MIMO 1)



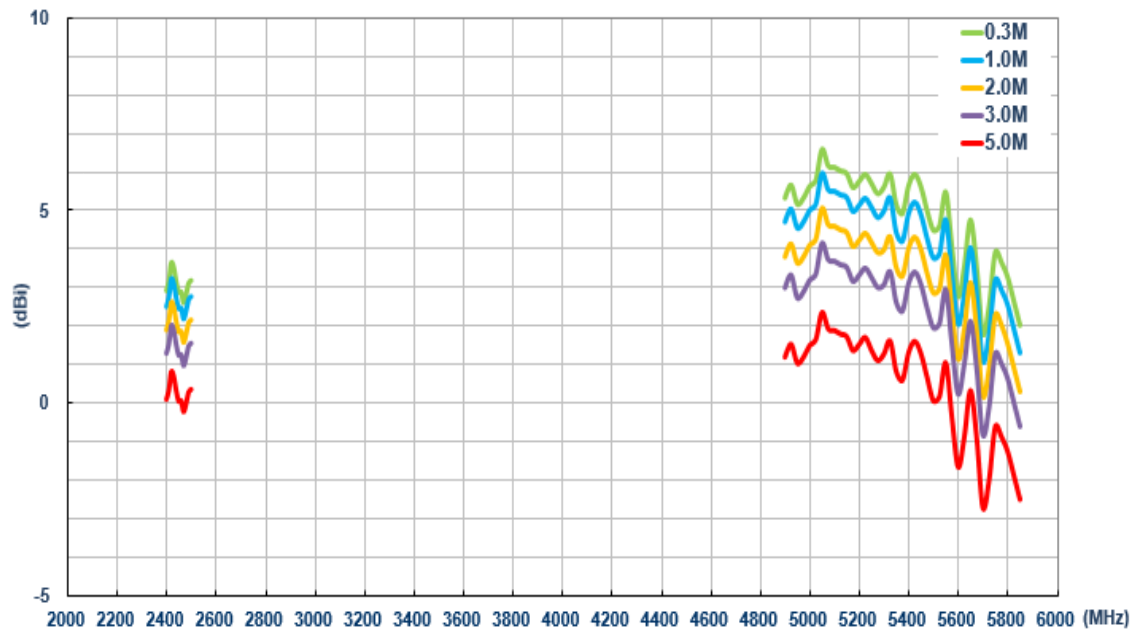
6.5.7 Average Gain (Wi-Fi MIMO 2)



6.5.8 Peak Gain (Wi-Fi MIMO 1)



6.5.9 Peak Gain (Wi-Fi MIMO 2)



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