

# Specification

## Patent Pending

- Part No. : **MA910.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  
Dimensions: 146\*134\*20mm  
Cable: 3000mm Low Loss KSR200-P with RP-SMA(M)  
connectors  
Custom Cables and Connectors Available
- RoHS & Reach 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 white, contact your regional Taoglas customer support team for more information.

## 2. Specification

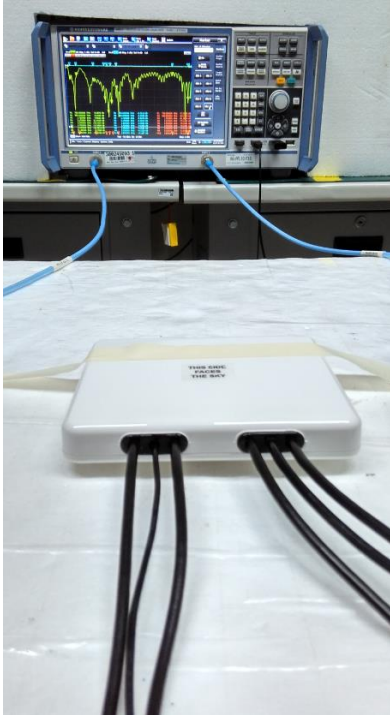
2.4GHz/5GHz Wi-Fi Antenna			
Frequency (MHz)		2400~2500	4900~5850
Efficiency (%)			
MIMO_1	Free space	43.80	31.63
	ABS	40.64	32.52
	Glass	40.95	31.05
	Metal	39.31	30.75
	Wall	46.28	30.47
MIMO_2	Free space	33.44	30.94
	ABS	35.14	30.79
	Glass	30.94	30.85
	Metal	34.58	30.00
	Wall	38.41	28.68
Average Gain (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)	445g
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

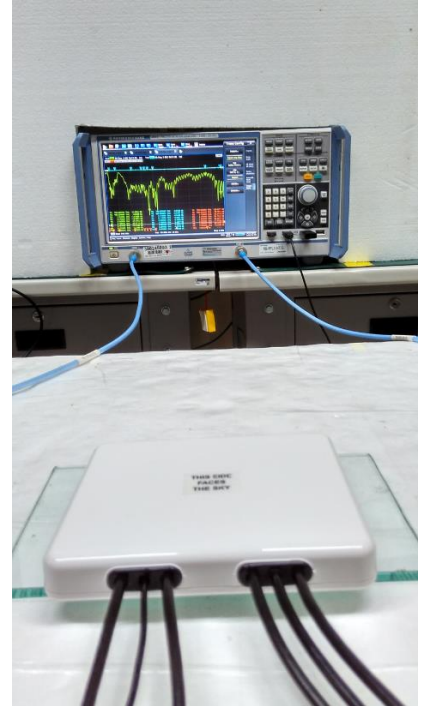
##### 3.1.1 Test Setup



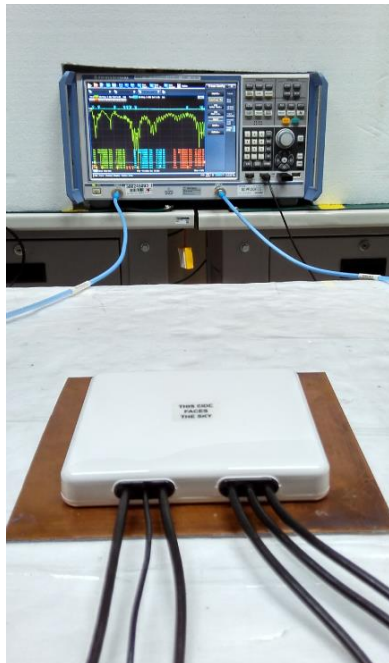
Free space



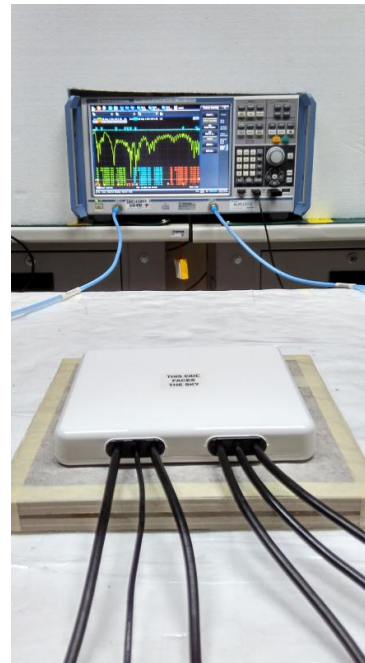
ABS



Glass



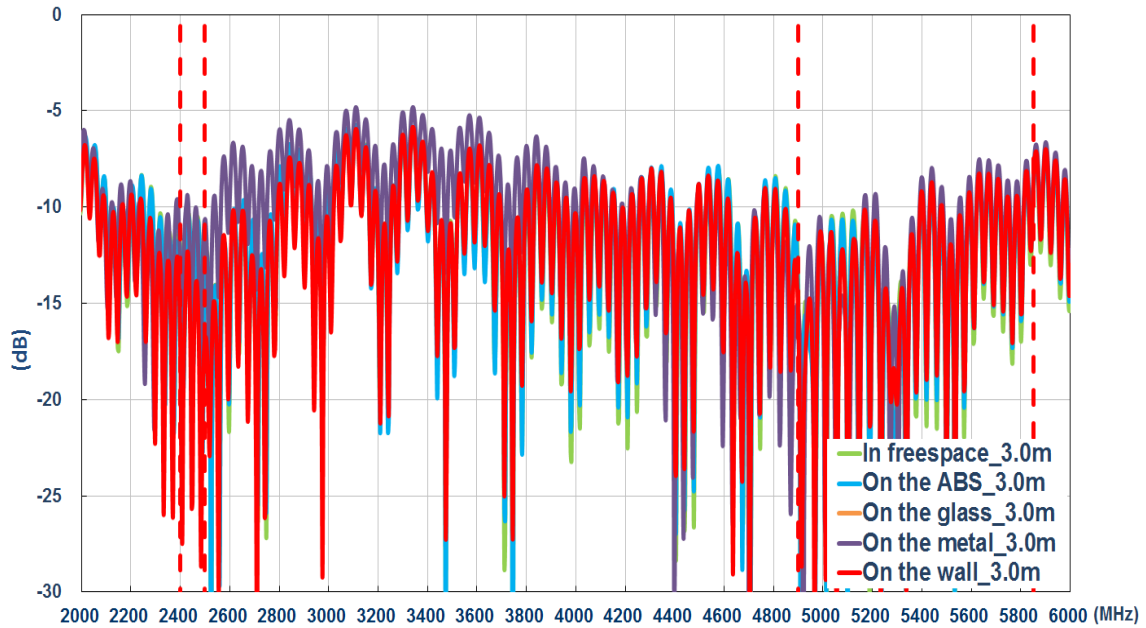
Metal



Wall

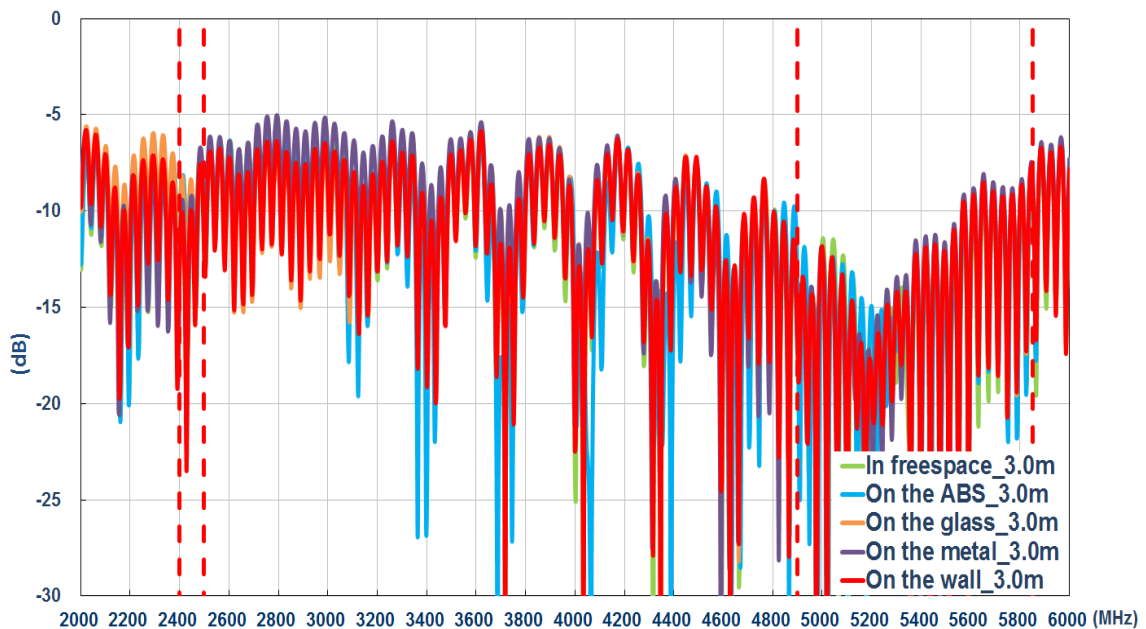
### 3.1.2 Wi-Fi 1 Antenna Return Loss

Performance in different environments with 3 meter cable length



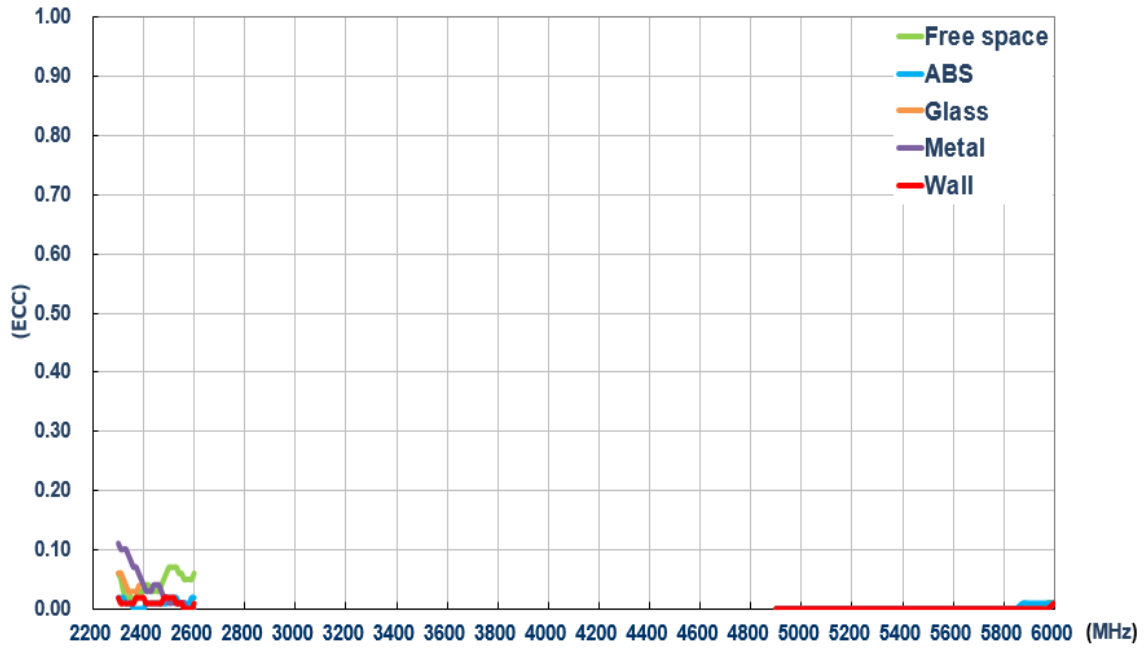
### 3.1.3 Wi-Fi 2 Antenna Return Loss

Performance in different environments with 3 meter cable length



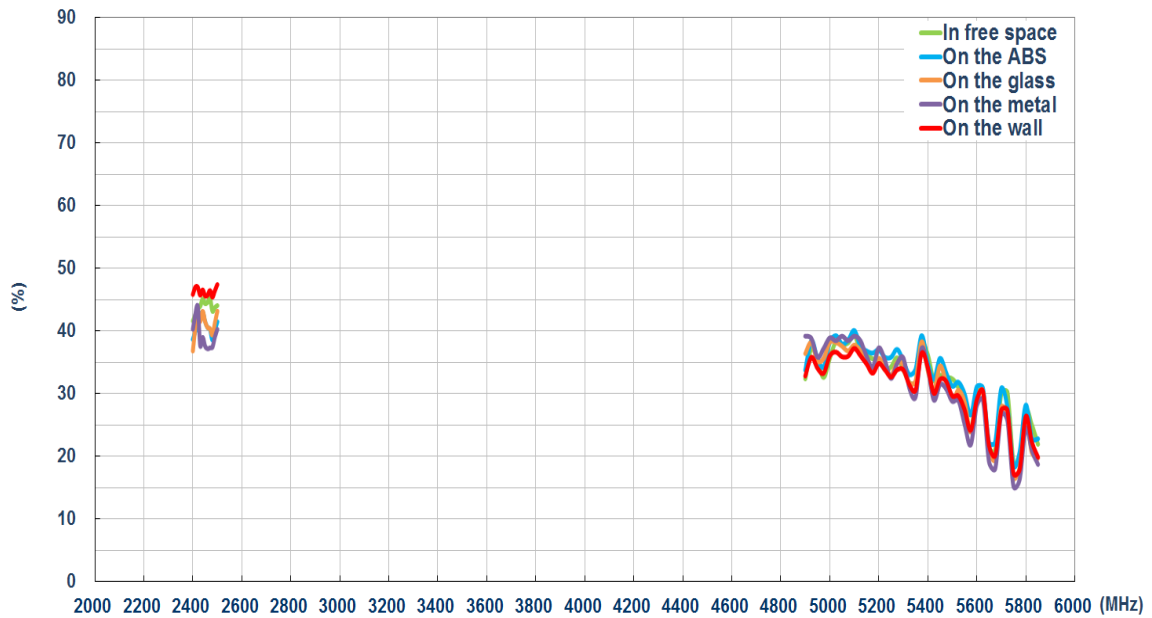
### 3.1.4 Wi-Fi Envelope Correlation Coefficient

Performance in different environments with 3 meter cable length



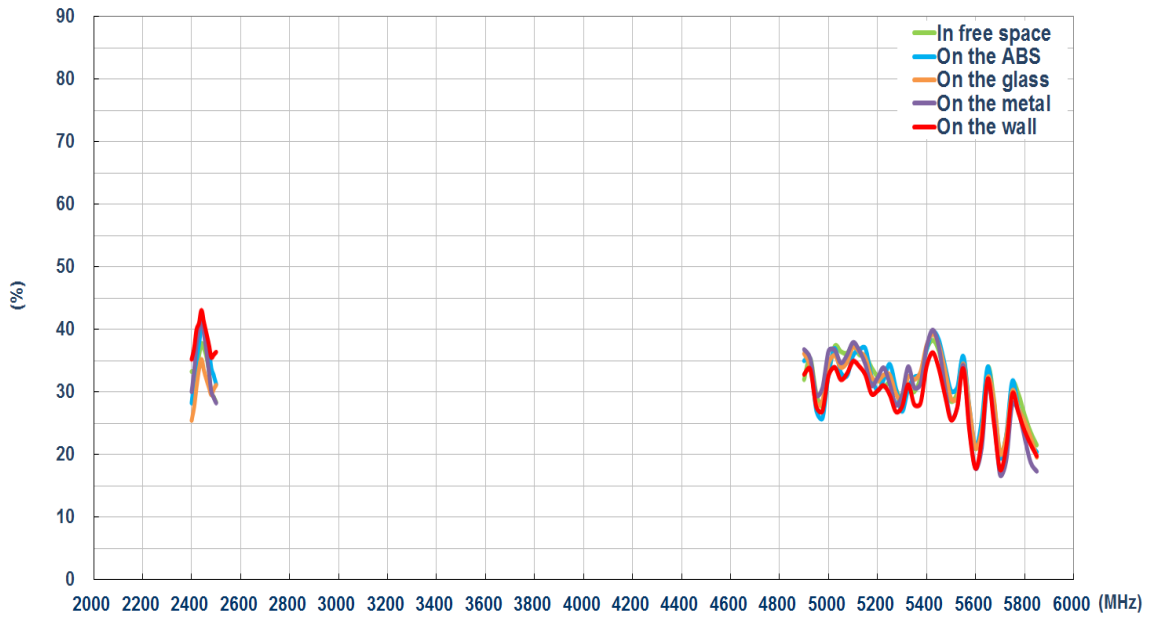
### 3.1.5 Wi-Fi 1 Antenna Efficiency

Performance in different environments with 3 meter cable length



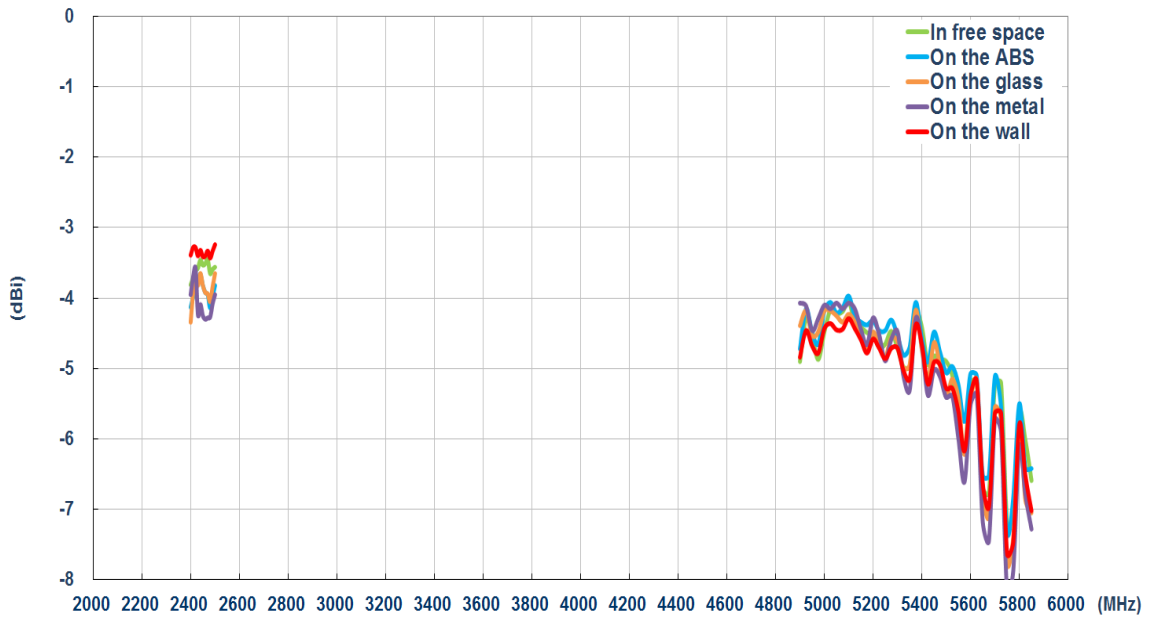
### 3.1.6 Wi-Fi 2 Antenna Efficiency

Performance in different environments with 3 meter cable length



### 3.1.7 Wi-Fi 1 Antenna Average Gain

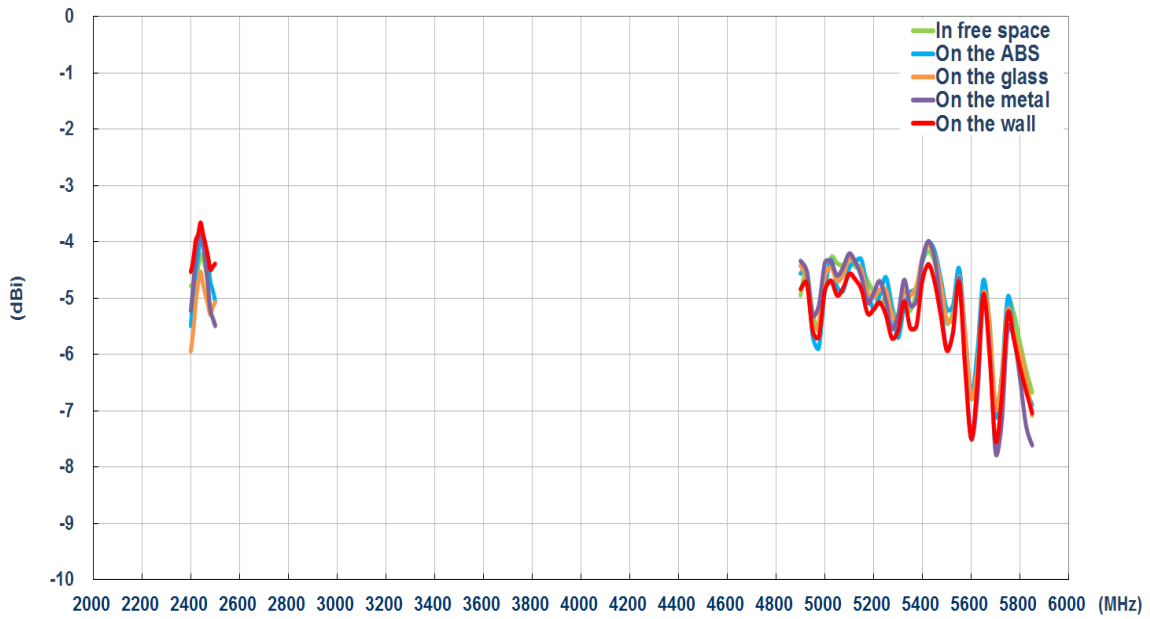
Performance in different environments with 3 meter cable length





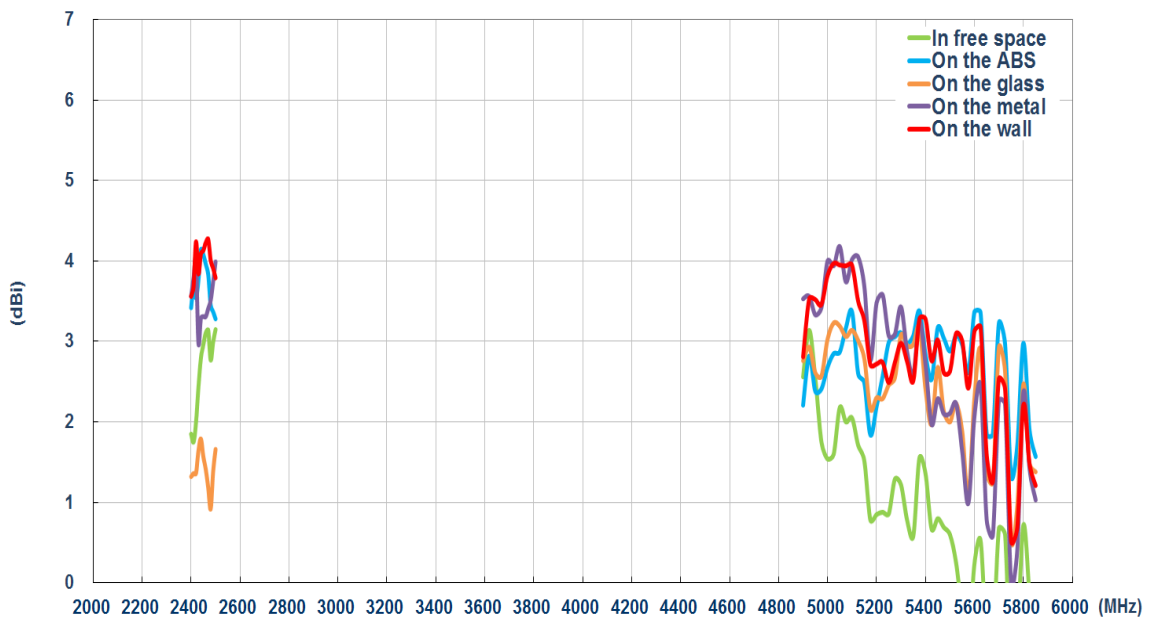
### 3.1.8 Wi-Fi 2 Antenna Average Gain

Performance in different environments with 3 meter cable length



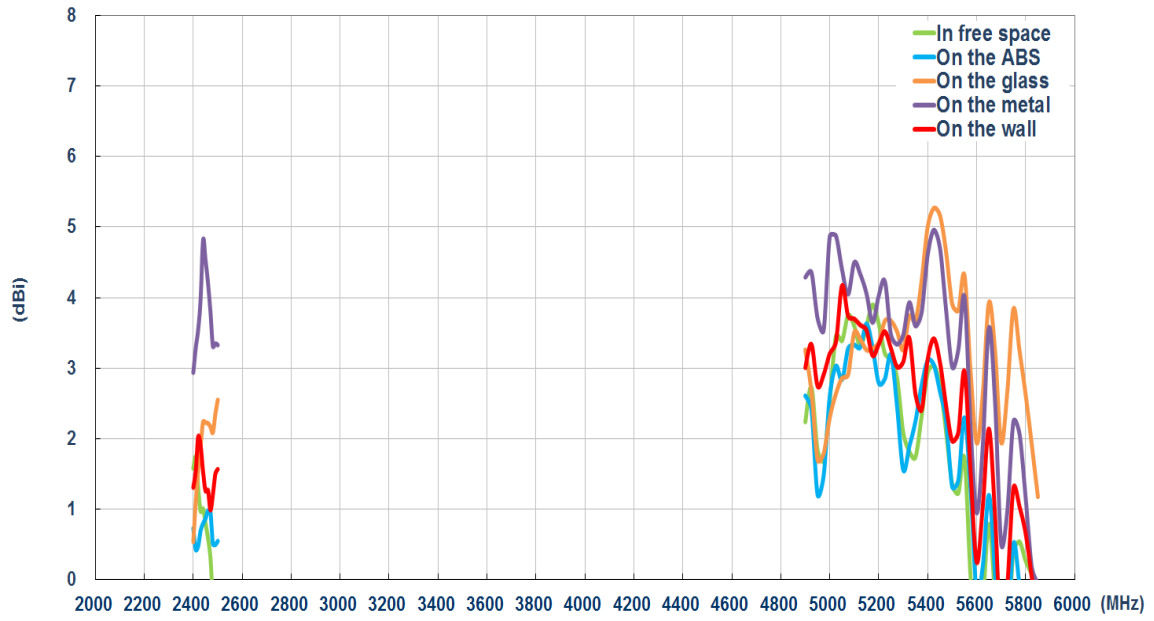
### 3.1.9 Wi-Fi 1 Antenna Peak Gain

Performance in different environments with 3 meter cable length

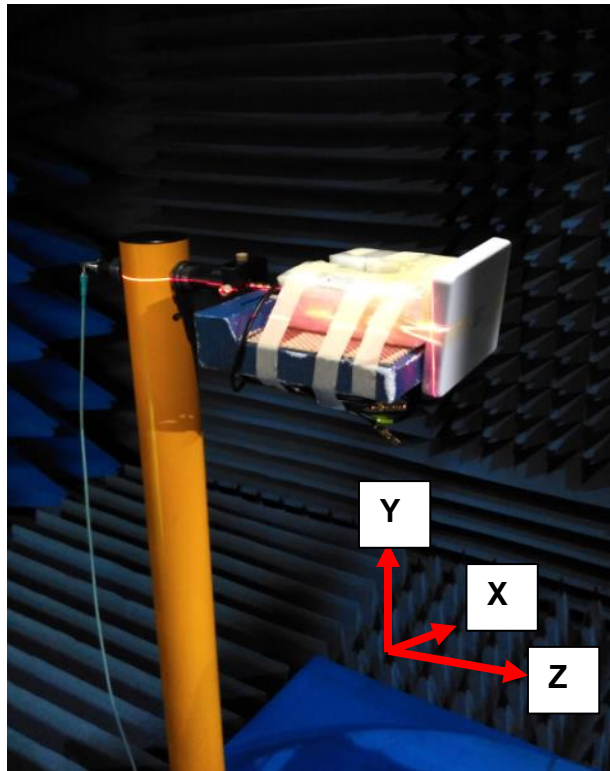


### 3.1.10 Wi-Fi 2 Antenna Peak Gain

Performance in different environments with 3 meter cable length



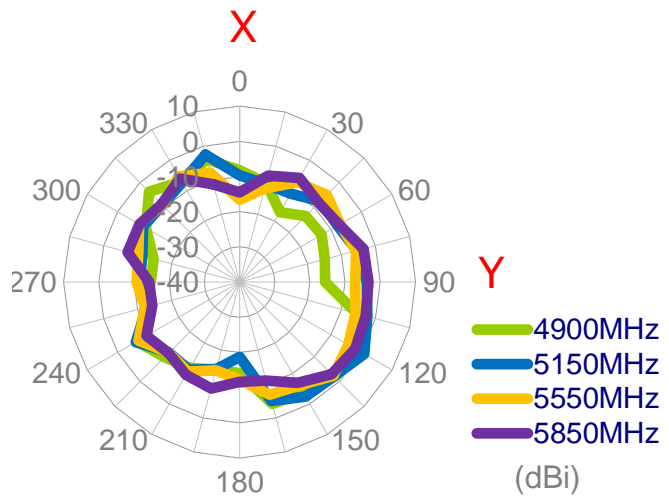
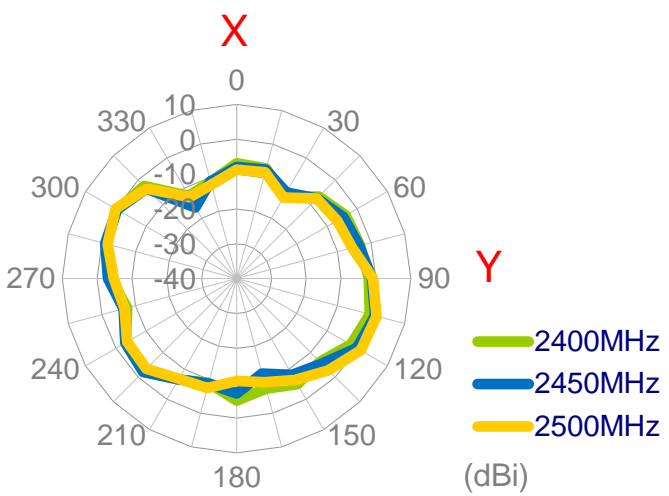
### 3.1.11 Test Setup For Antenna Radiation Pattern



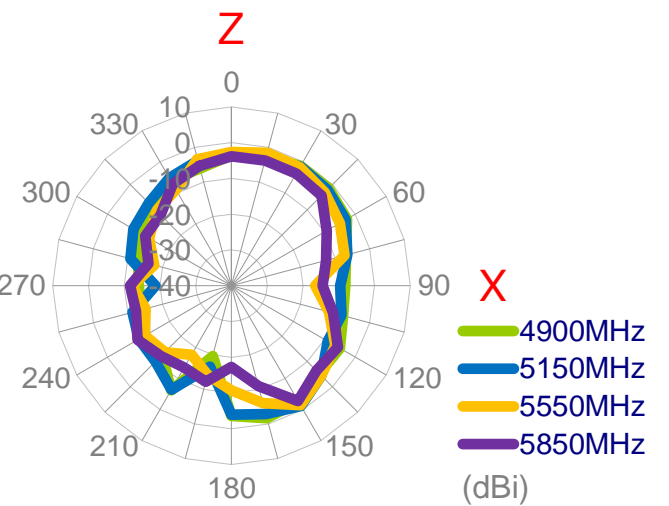
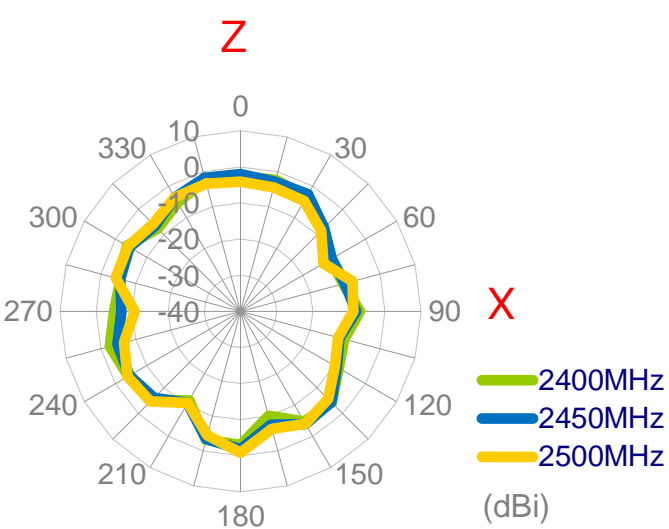
**In free space**

3.1.12 2D Radiation Pattern  
 Wi-Fi\_MIMO1 with 3M cable length in free space

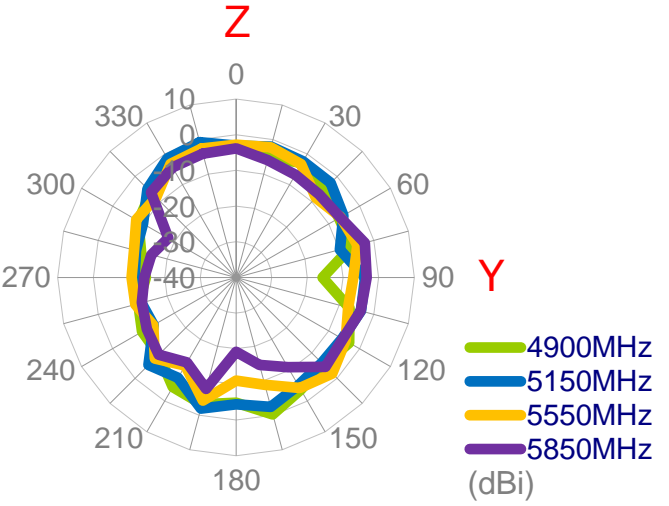
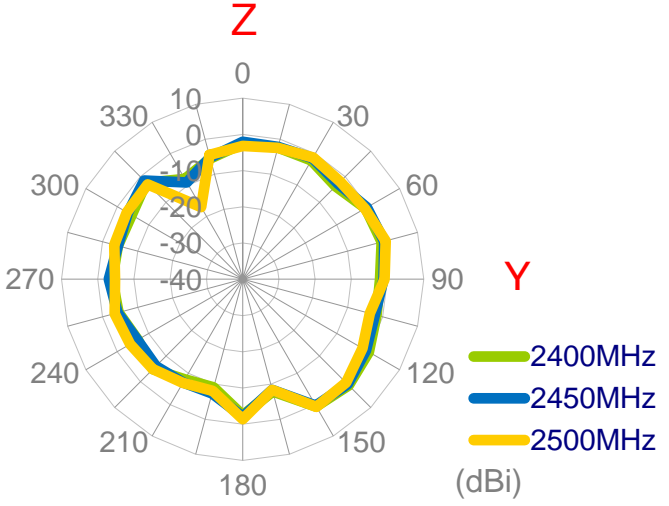
XY Plane



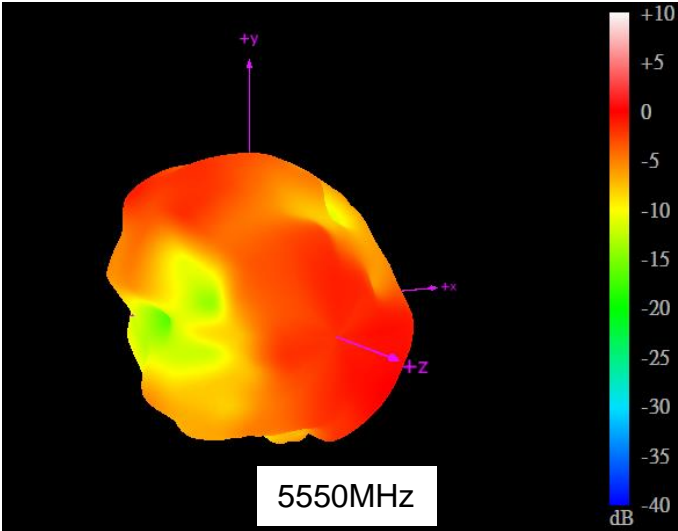
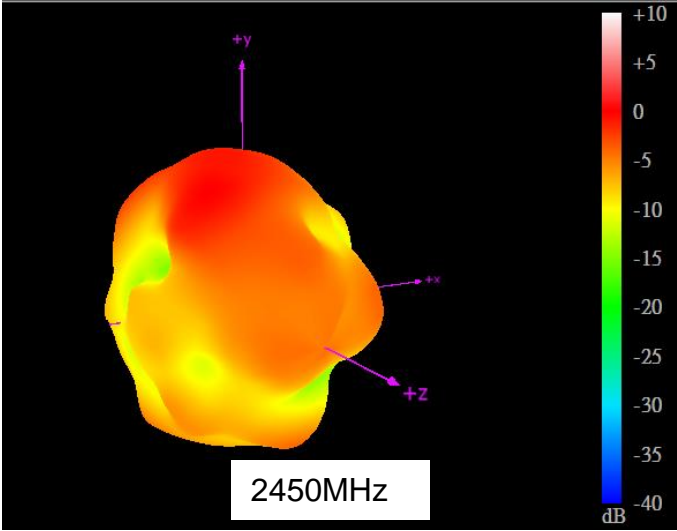
XZ Plane



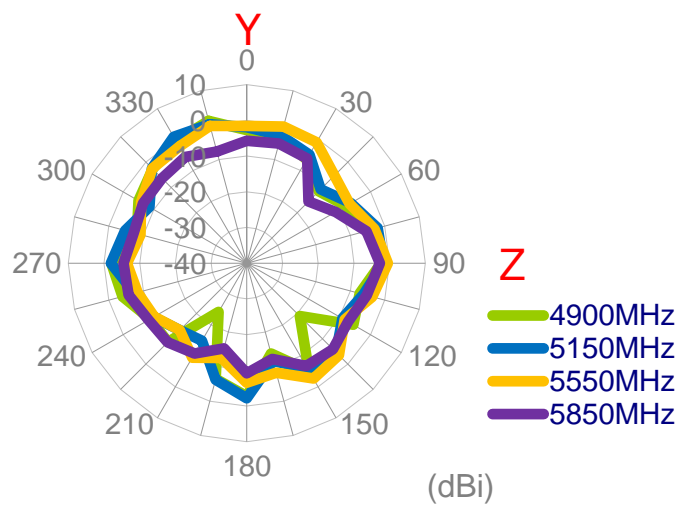
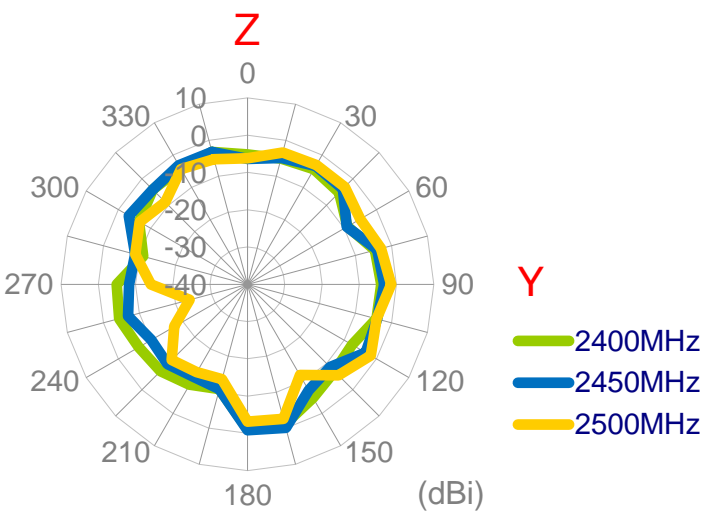
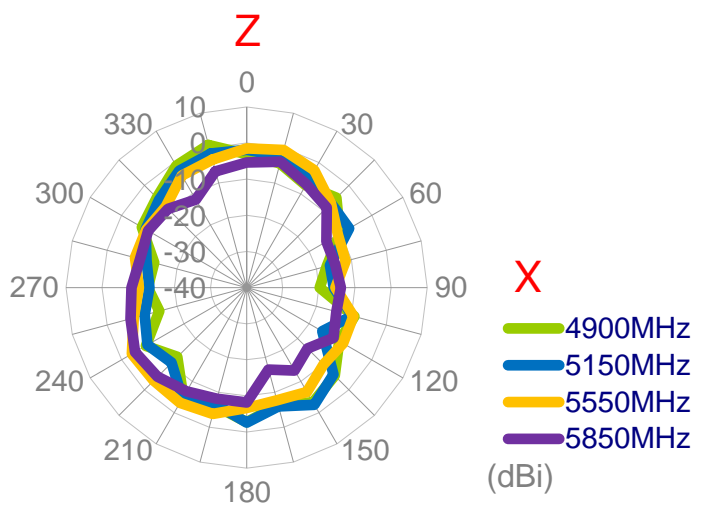
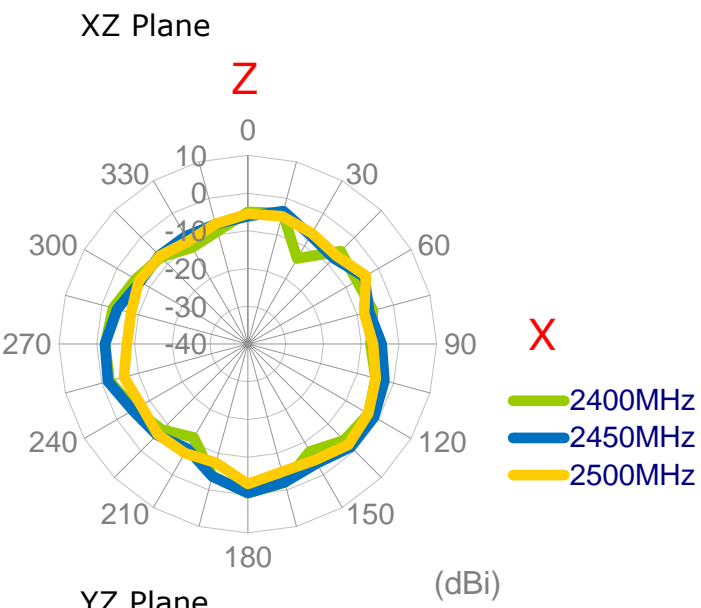
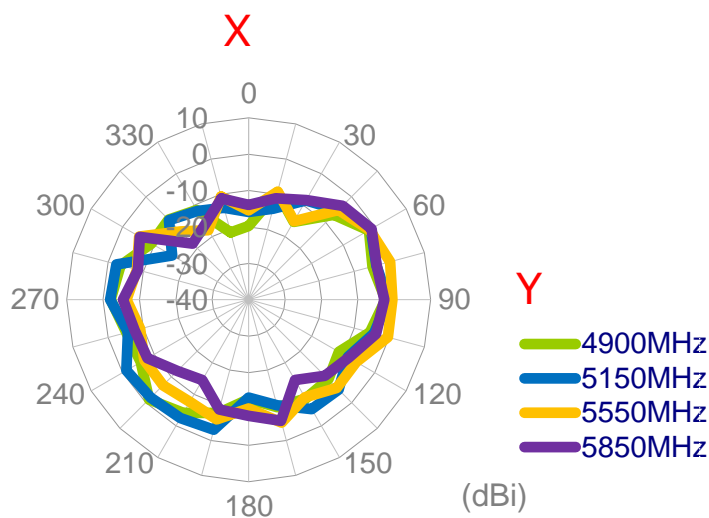
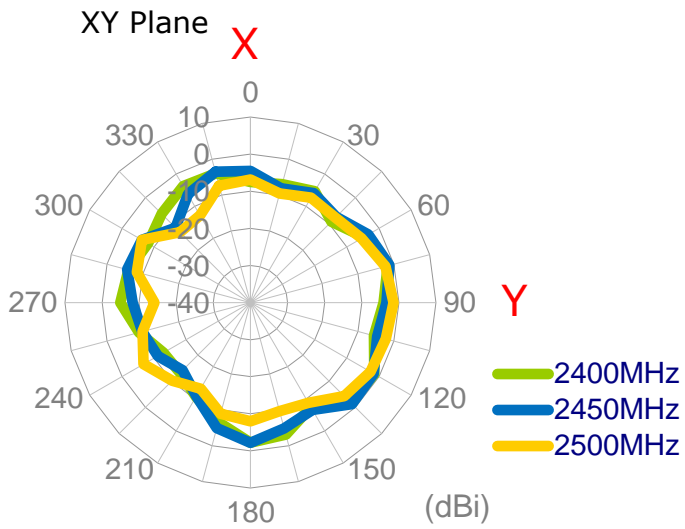
YZ Plane



3.1.13 3D Radiation Pattern (Wi-Fi\_MIMO1 with 3M cable length in free space)

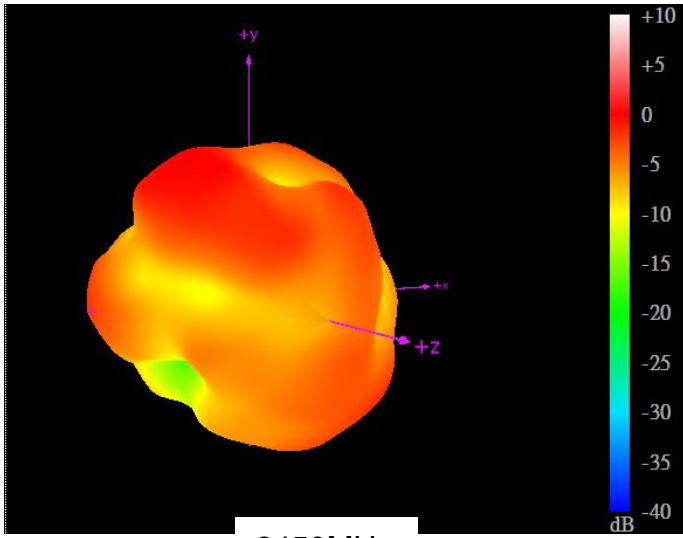


3.1.14 2D Radiation Pattern  
 Wi-Fi MIMO2 with 3M cable length in free space

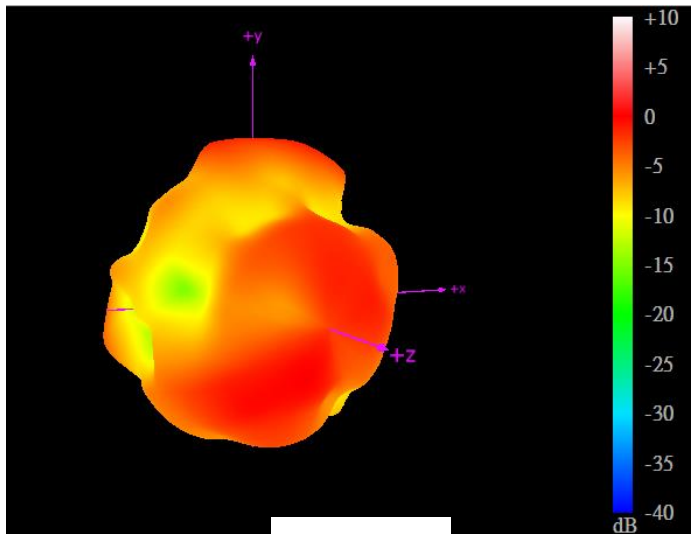


### 3.1.15 3D Radiation Pattern

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

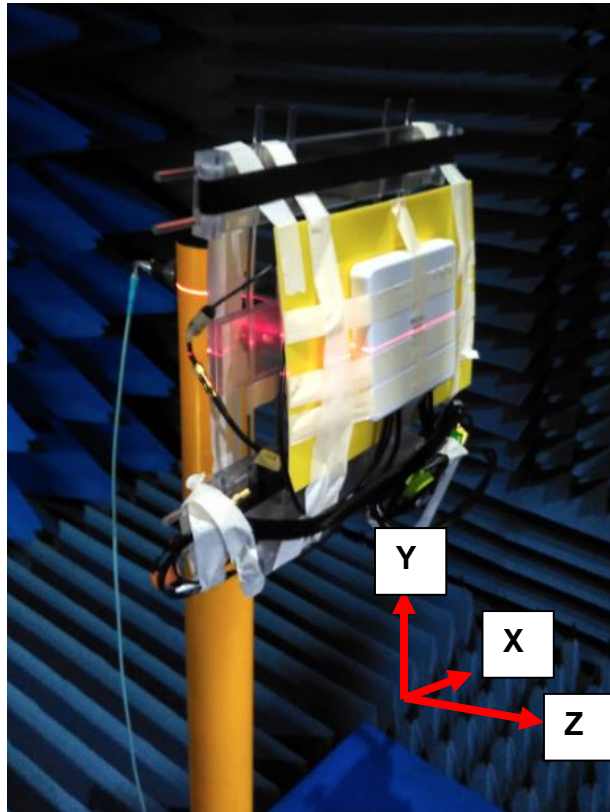


2450MHz



5550MHz

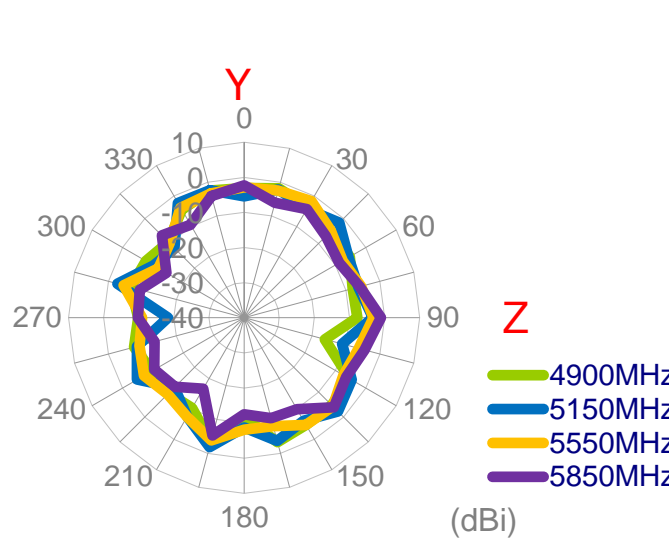
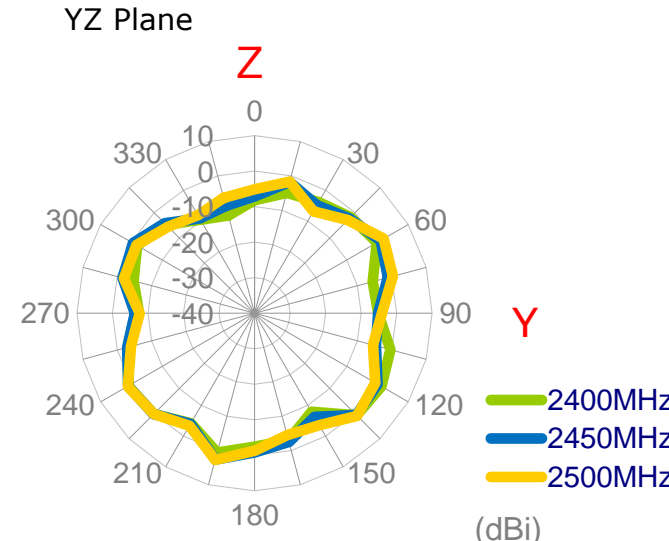
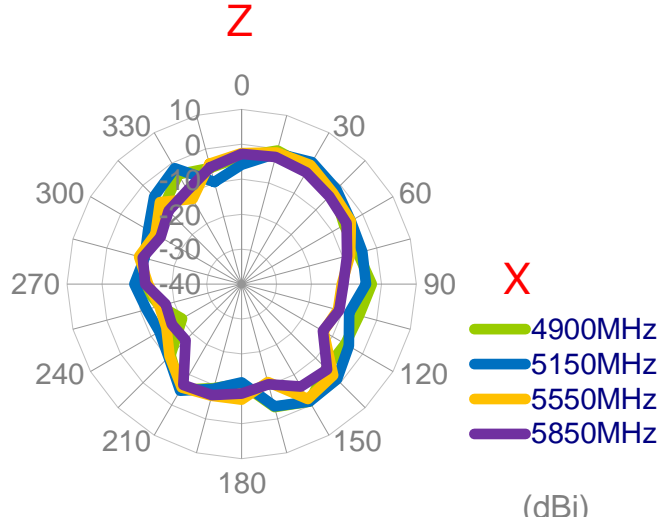
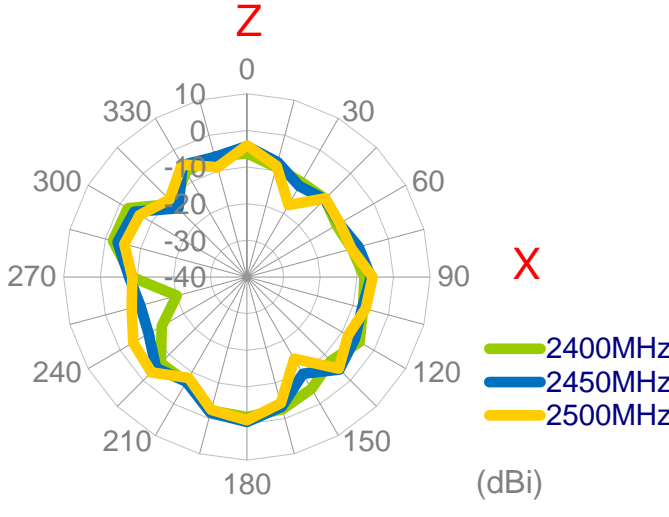
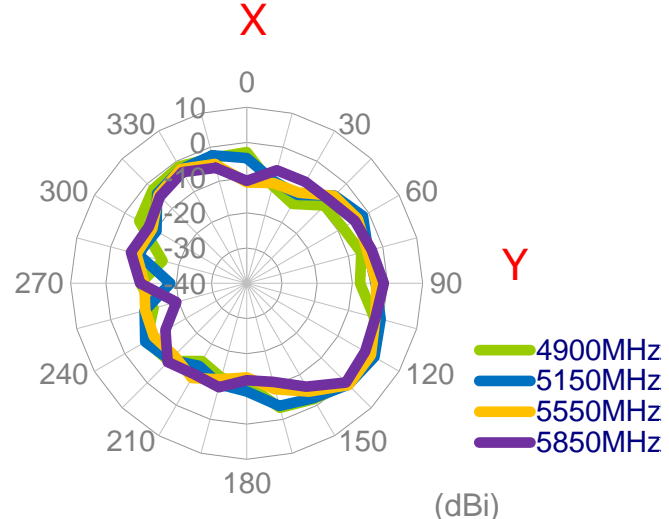
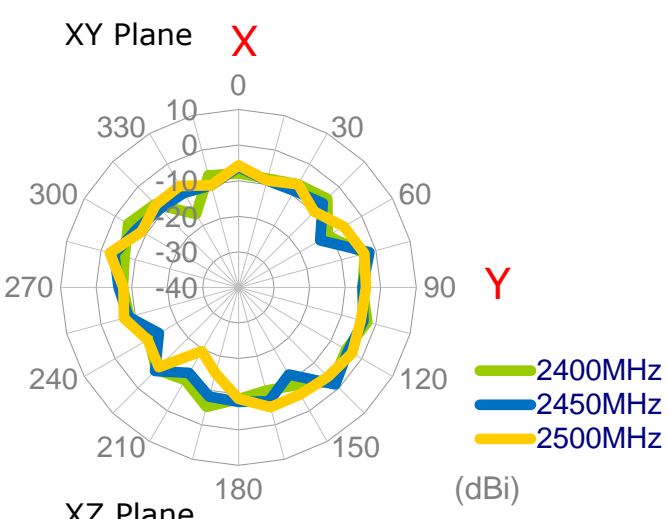
### 3.1.16 Test Setup for Antenna Radiation Pattern



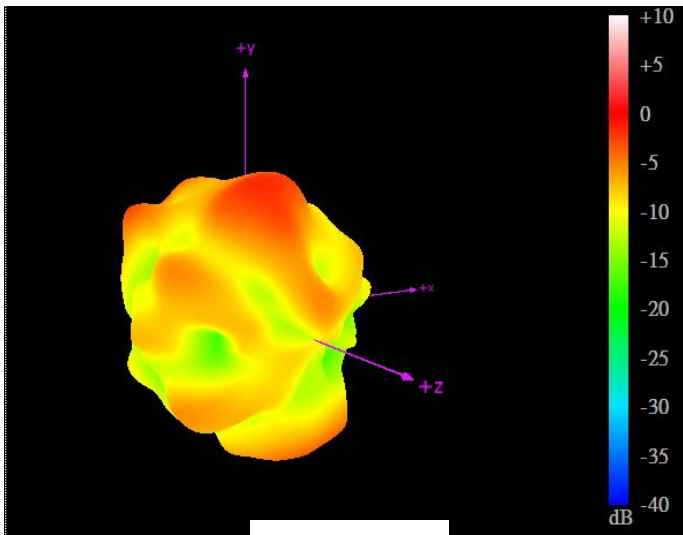
**On the ABS**



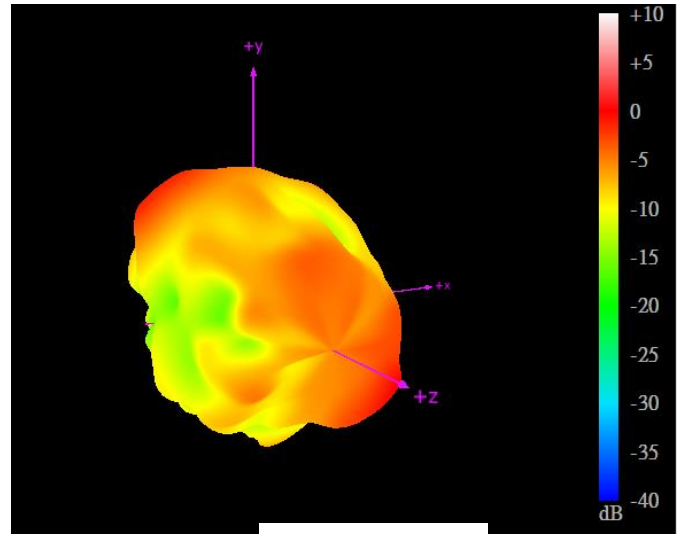
3.1.17 2D Radiation Pattern  
 Wi-Fi MIMO1 with 3M cable length on the ABS



### 3.1.18 3D Radiation Pattern (Wi-Fi\_MIMO1 with 3M cable length on the ABS)



2450MHz

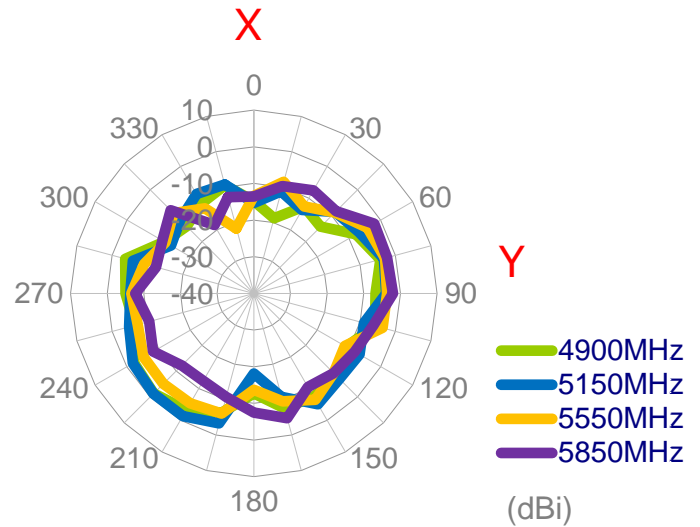
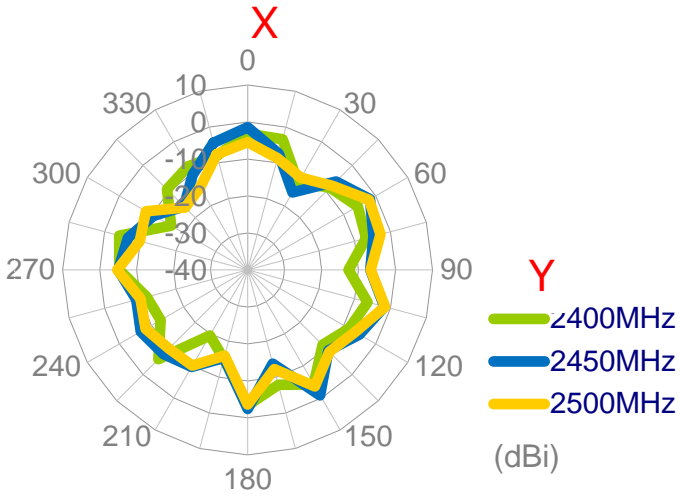


5550MHz

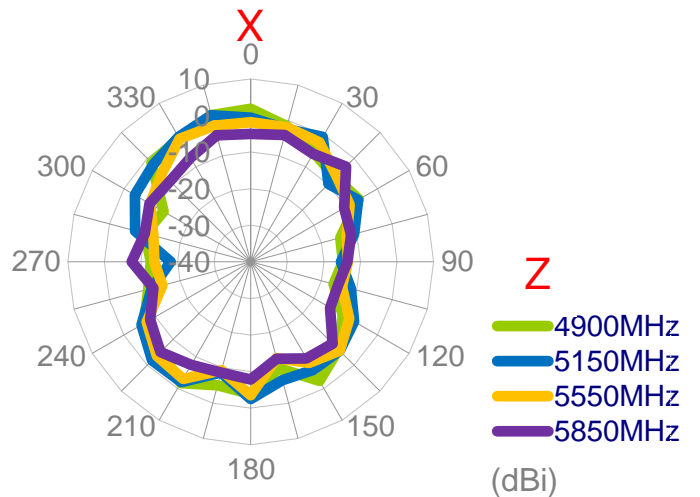
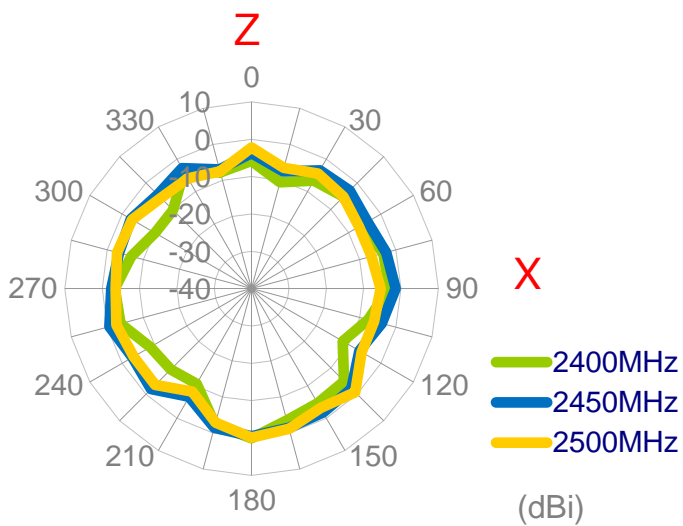
### 3.1.19 2D Radiation Pattern

Wi-Fi\_MIMO2 with 3M cable length on the ABS

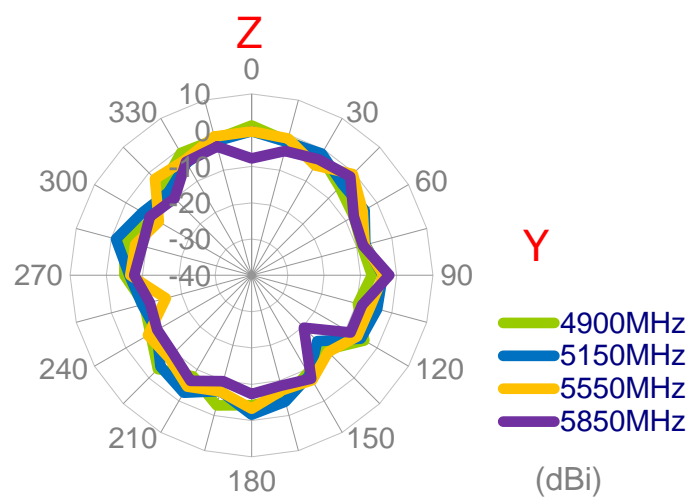
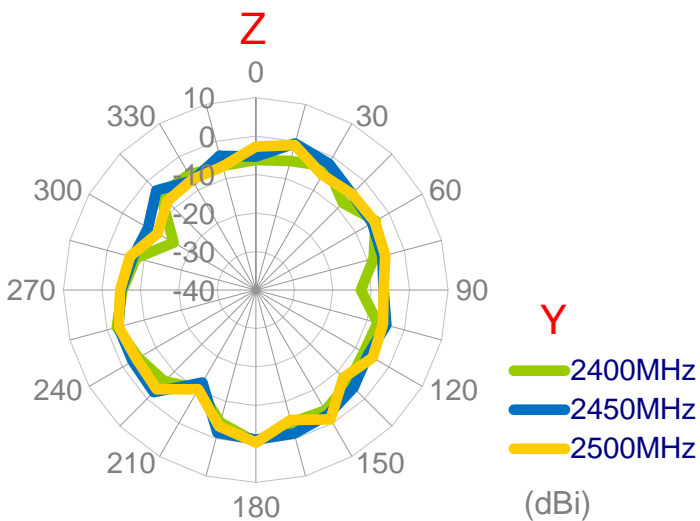
XY Plane



XZ Plane

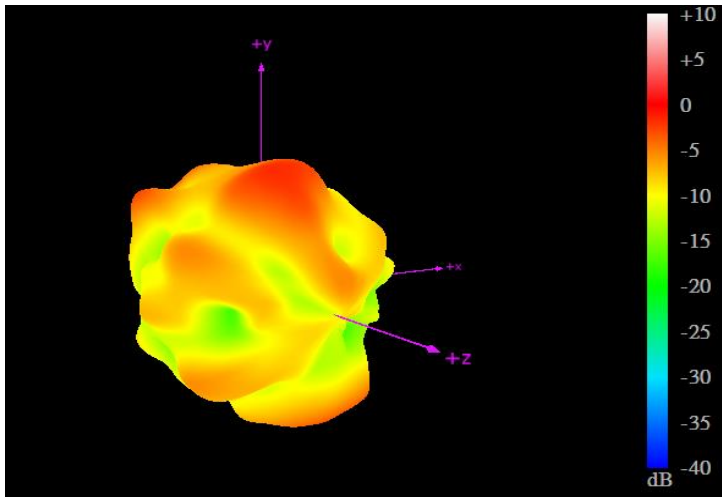


YZ Plane

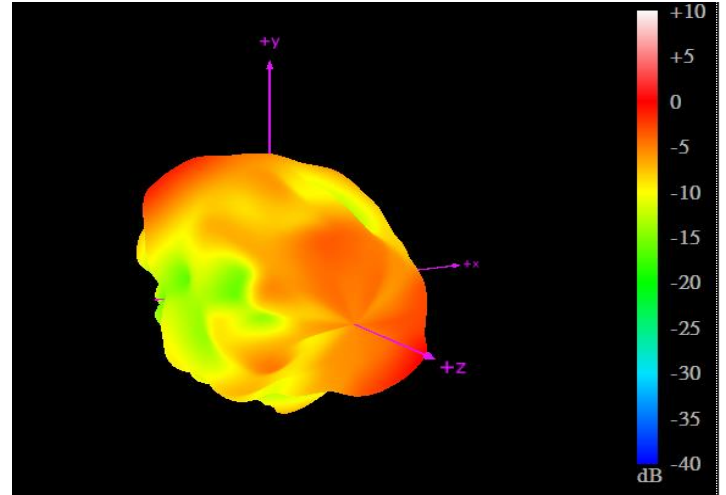


### 3.1.20 3D Radiation Pattern

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

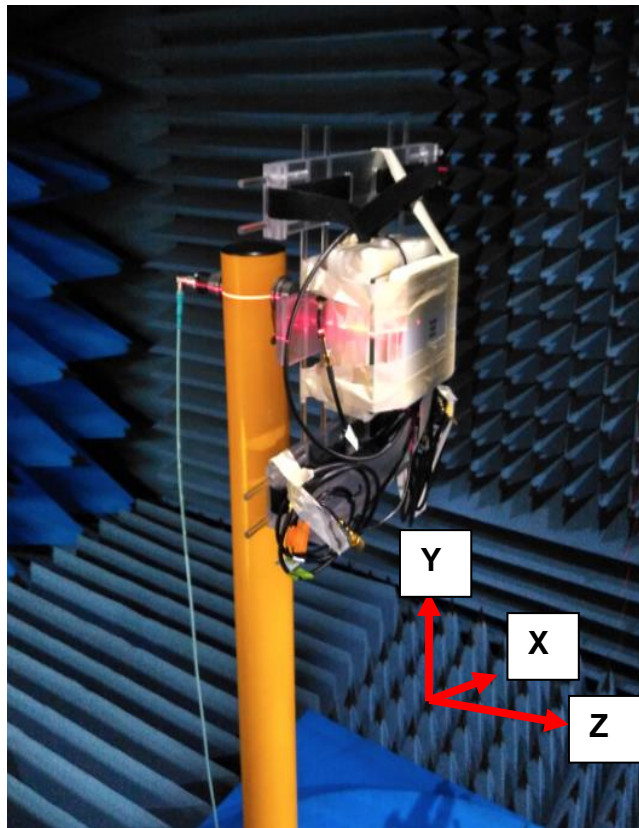


2450MH



5550MH

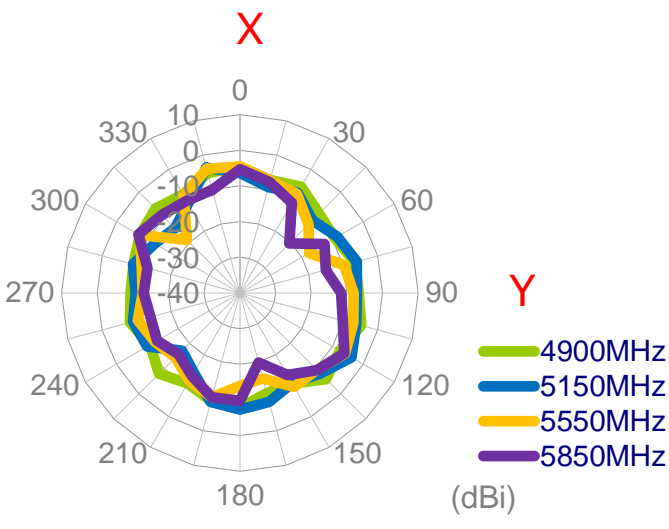
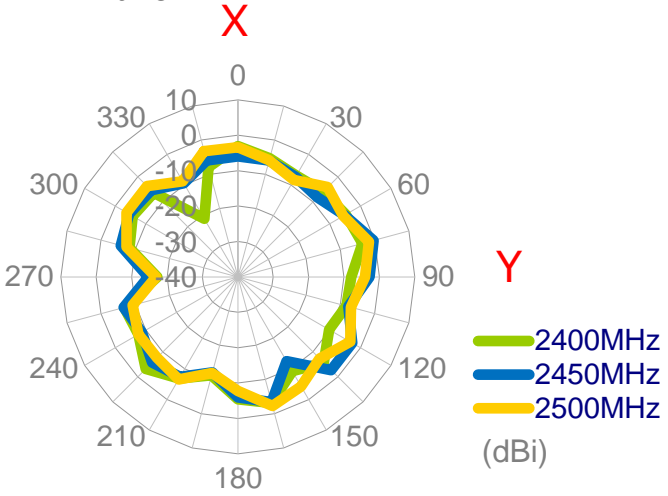
### 3.1.21 Test Setup For Antenna Radiation Pattern



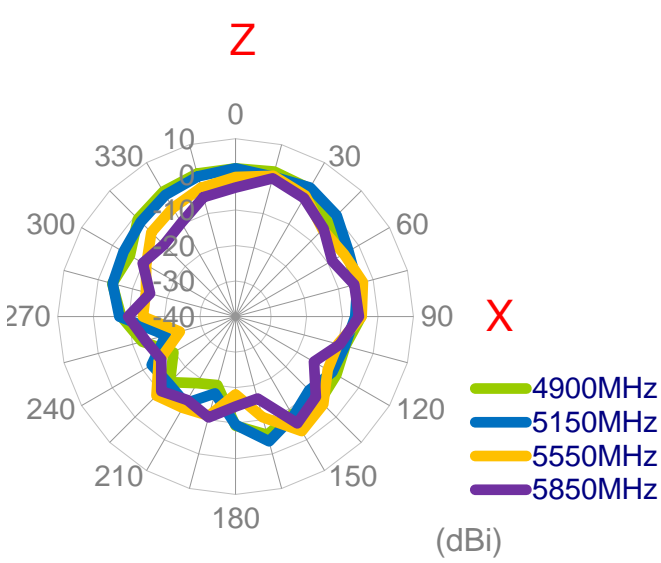
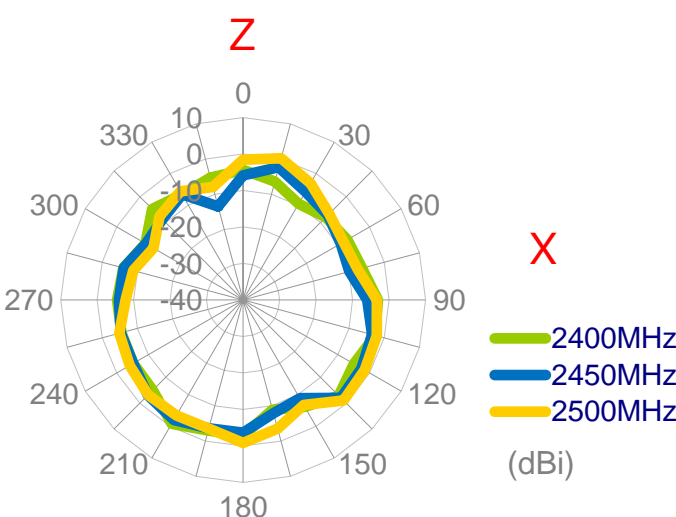
On the glass

3.1.22 2D Radiation Pattern  
 Wi-Fi MIMO1 with 1M cable length on the glass

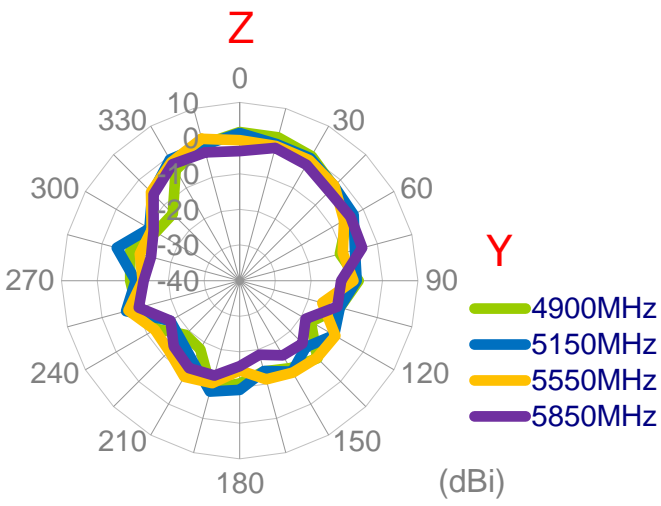
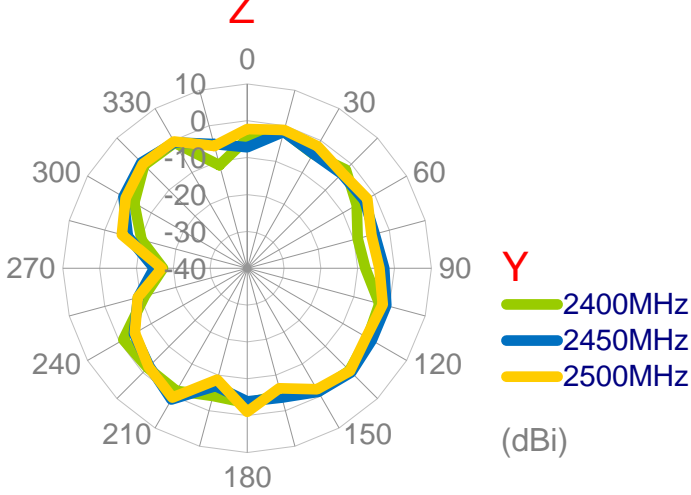
XY Plane



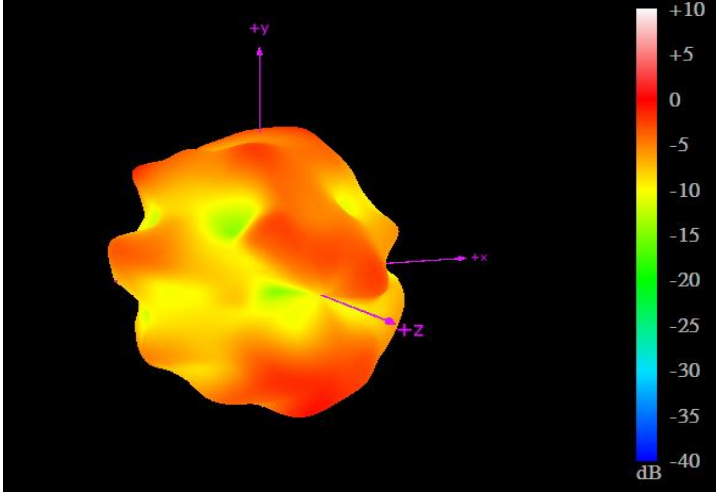
XZ Plane



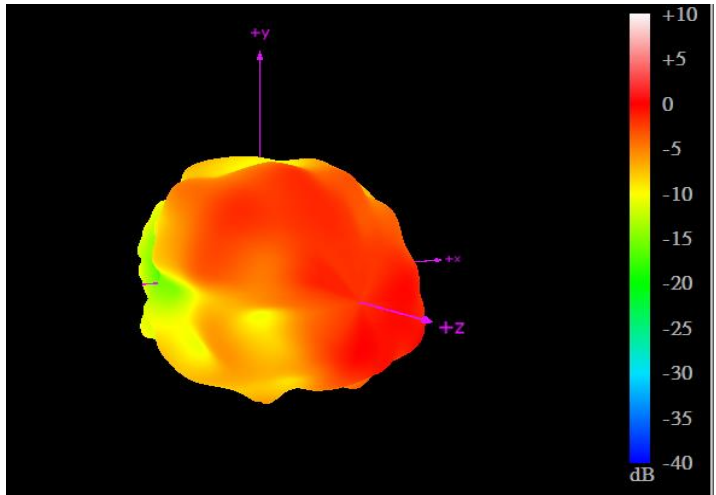
YZ Plane



3.1.23 3D Radiation Pattern  
Wi-Fi MIMO1 with 3M cable length on the glass



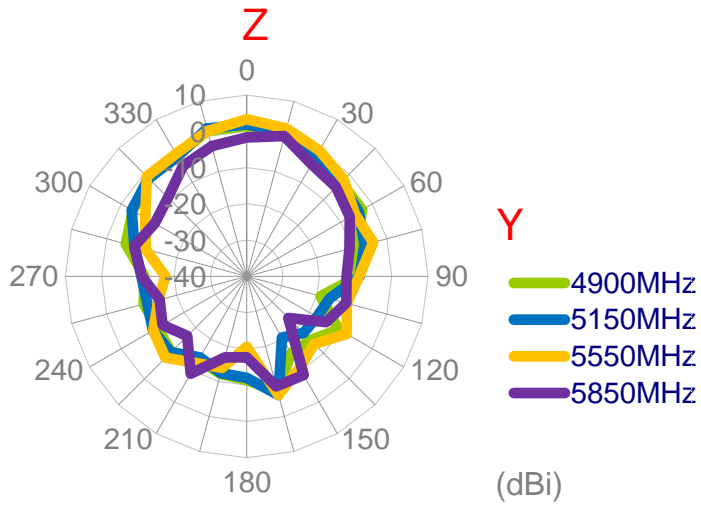
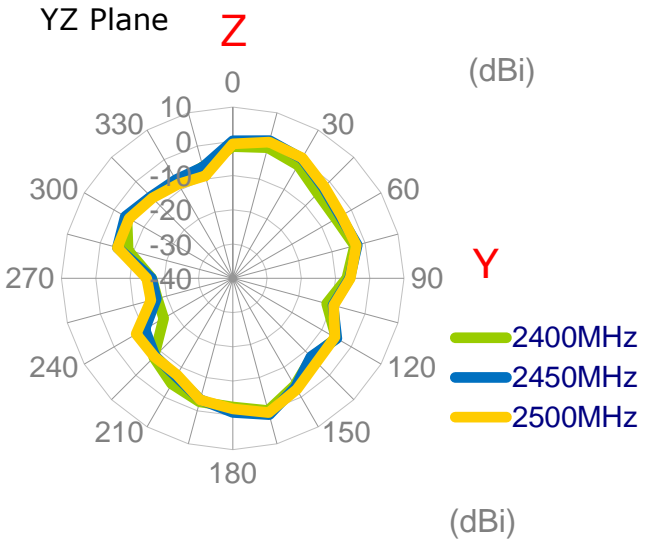
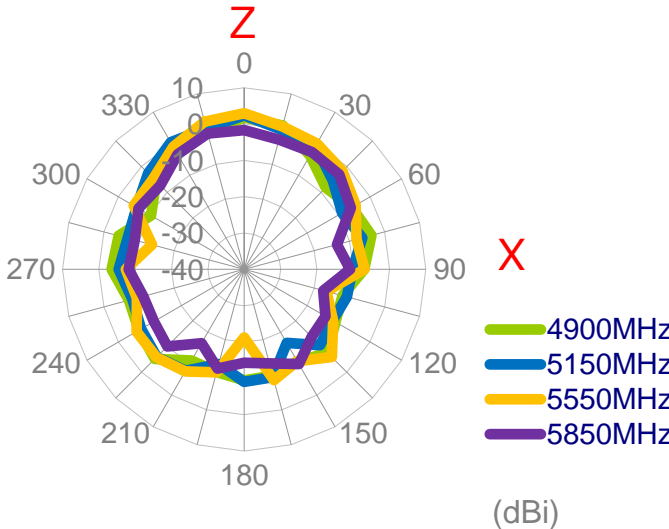
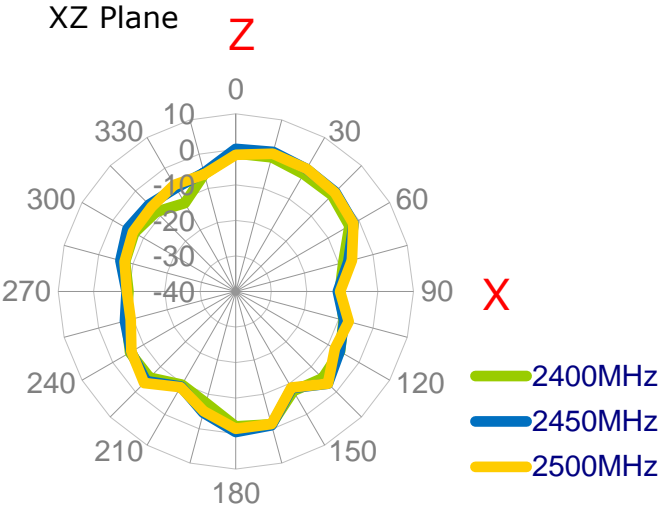
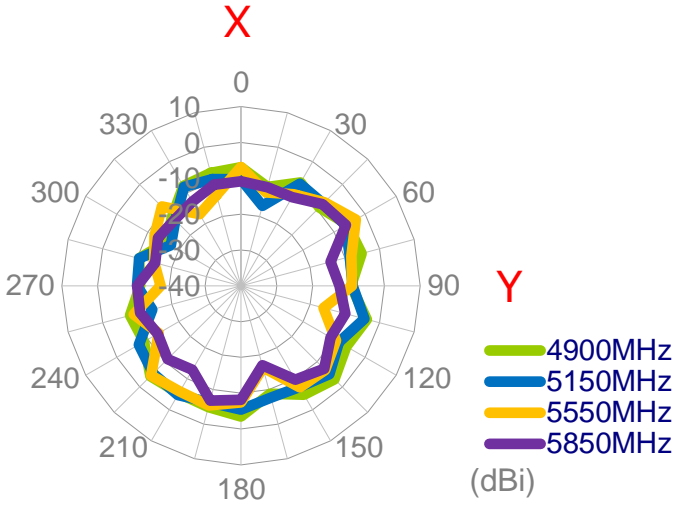
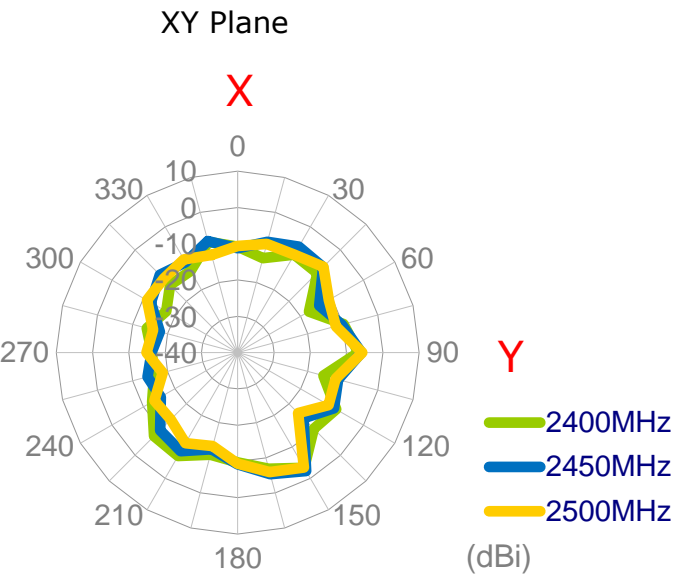
2450MHz



5550MHz



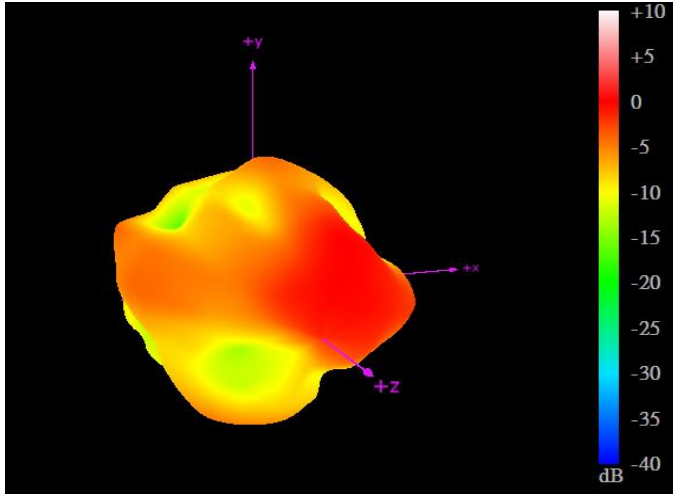
3.1.24 2D Radiation Pattern  
 Wi-Fi MIMO2 with 3M cable length on the glass



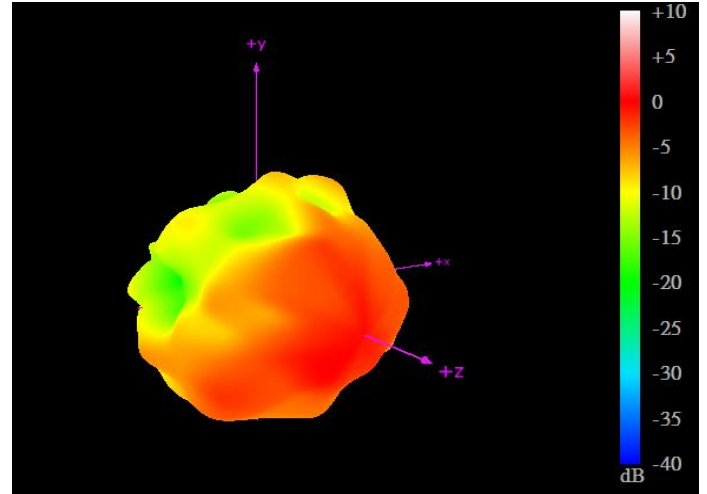


### 3.1.25 3D Radiation Pattern

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

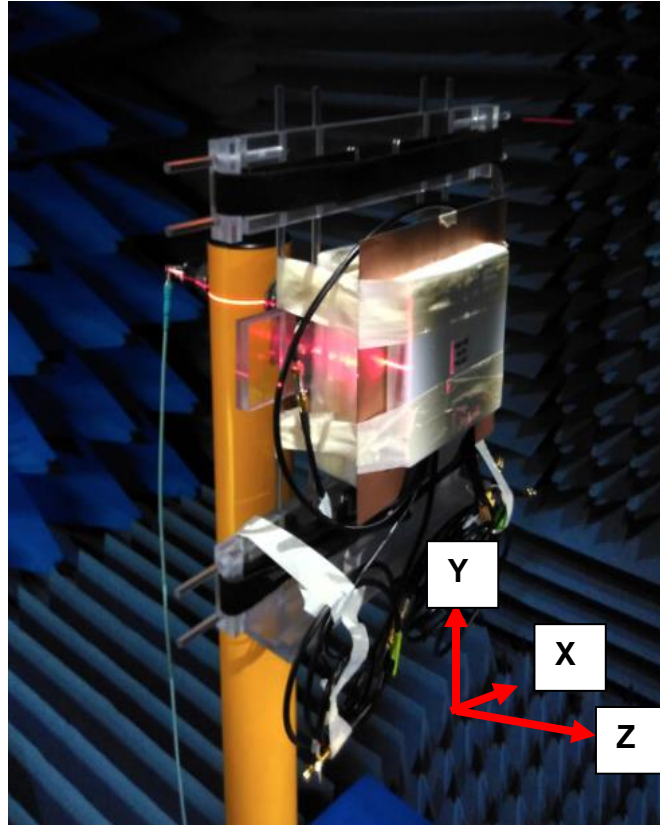


2450MHz



5550MHz

### 3.1.26 Test Setup For Antenna Radiation Pattern

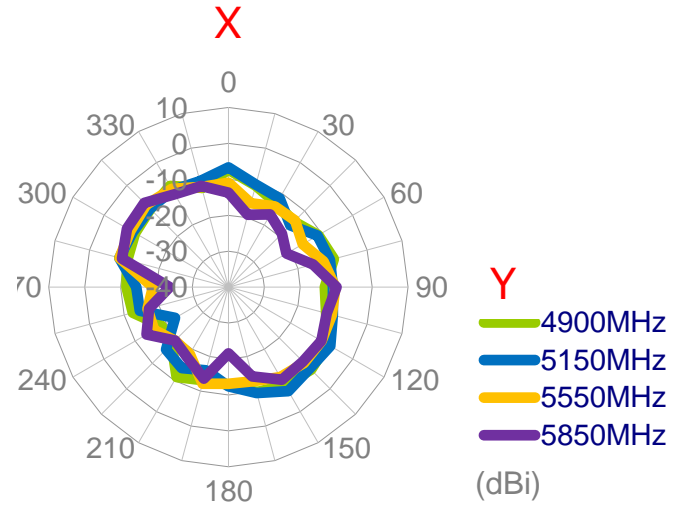
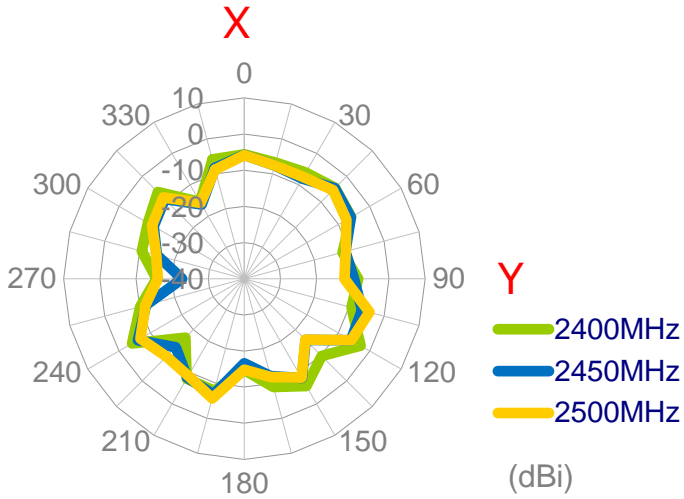


**On the metal**

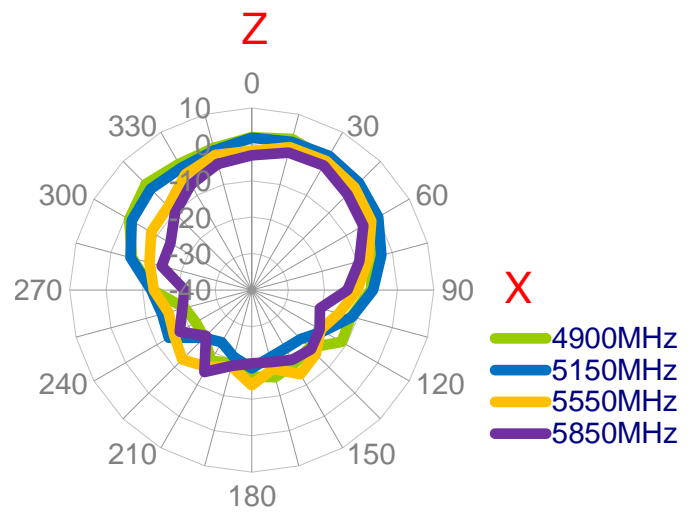
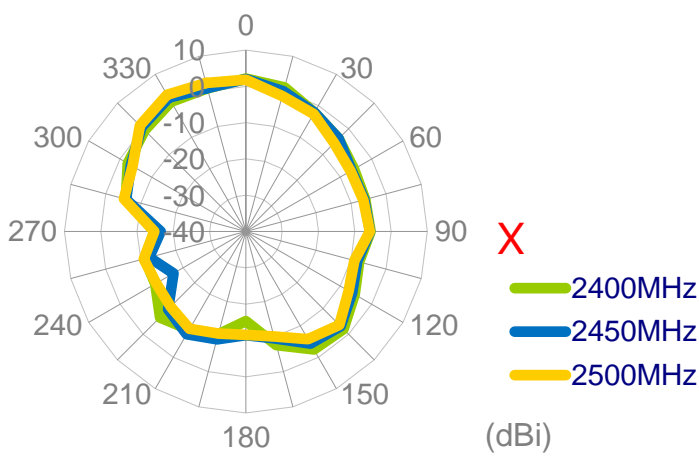
### 3.1.27 2D Radiation Pattern

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

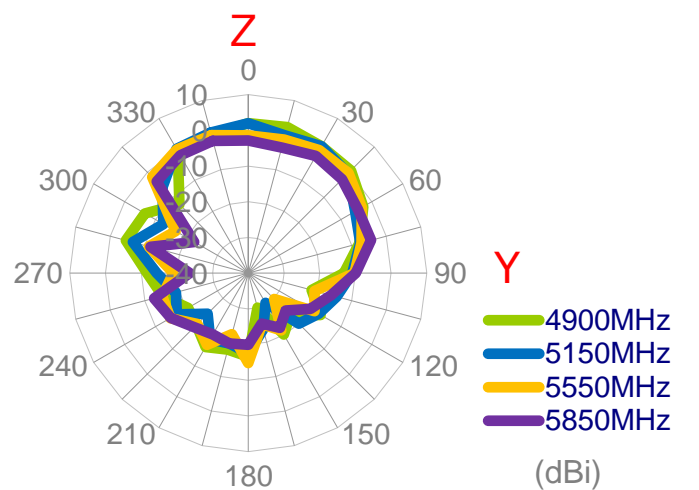
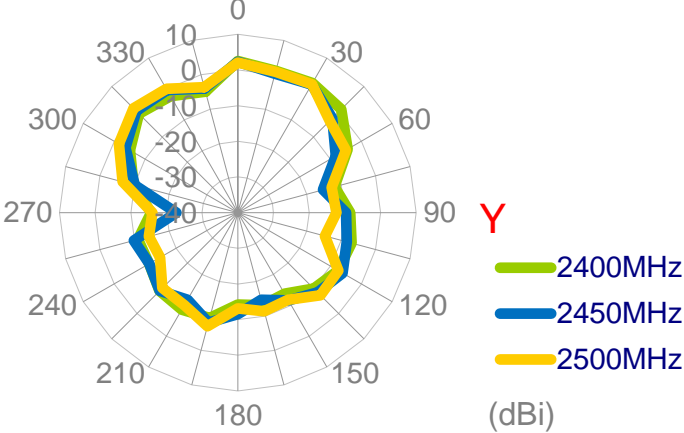
XY Plane



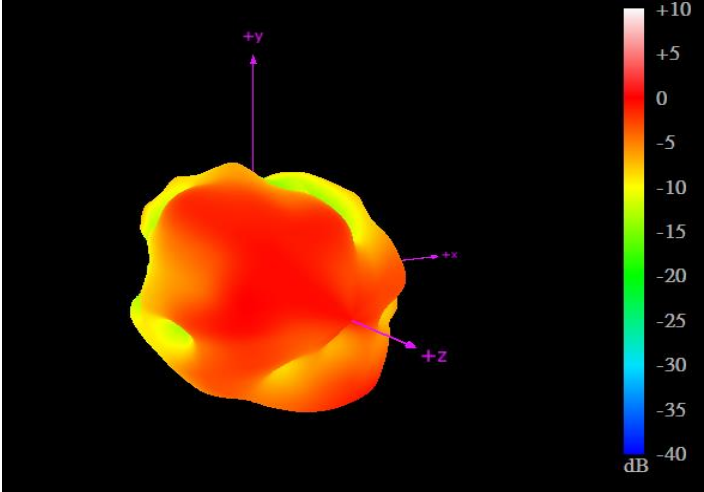
XZ Plane



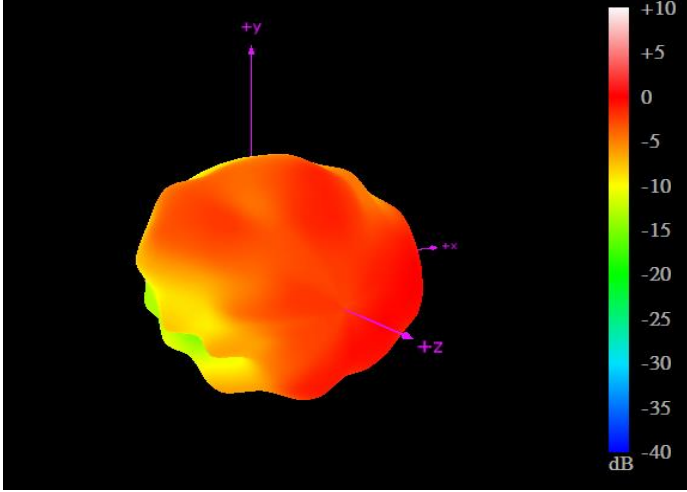
YZ Plane



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

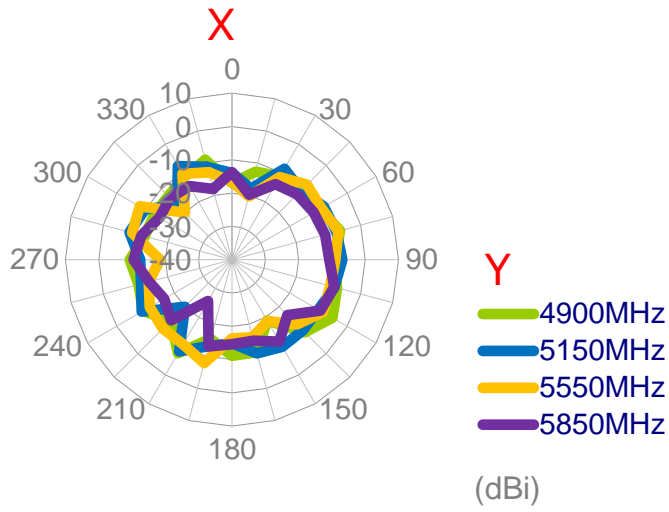
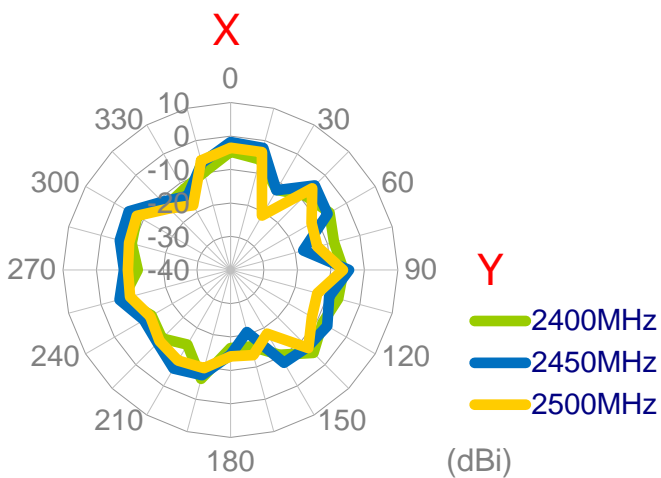


2450MHz

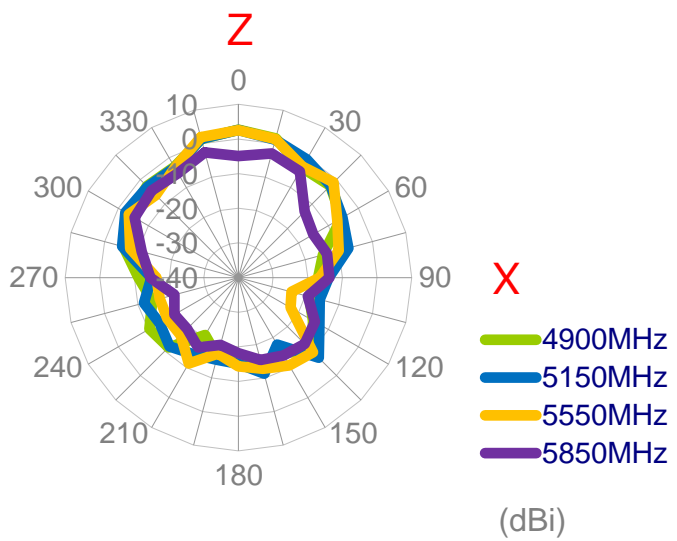
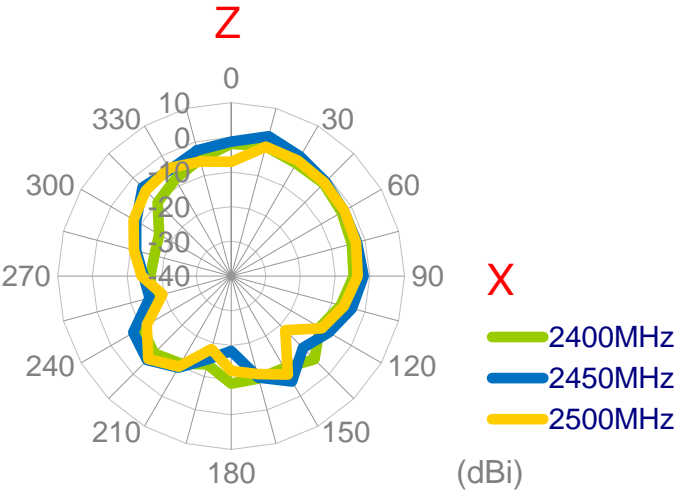


5550MHz

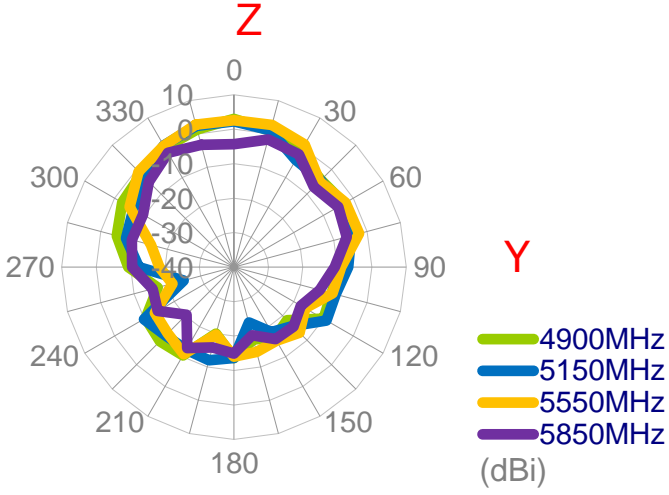
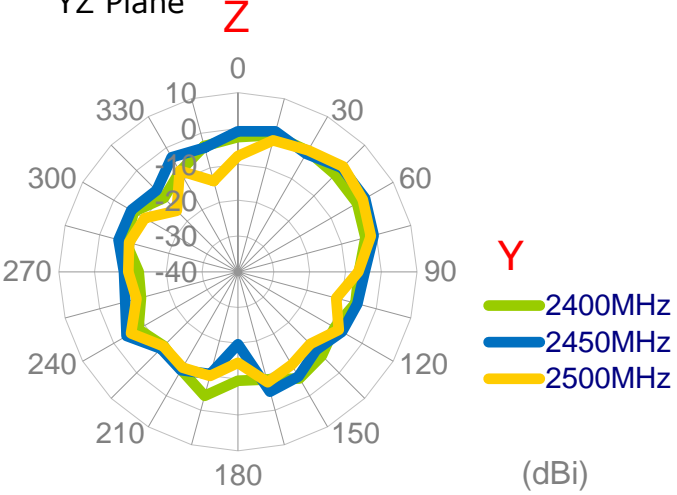
3.1.29 2D Radiation Pattern  
 Wi-Fi\_MIMO2 with 3M cable length on the metal  
 XY Plane



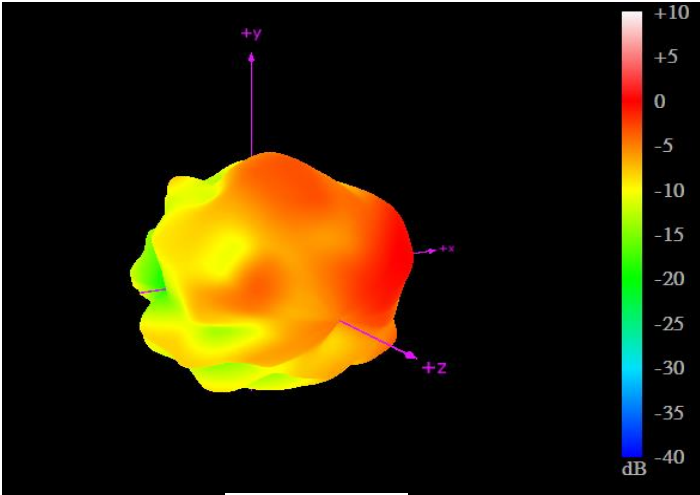
XZ Plane



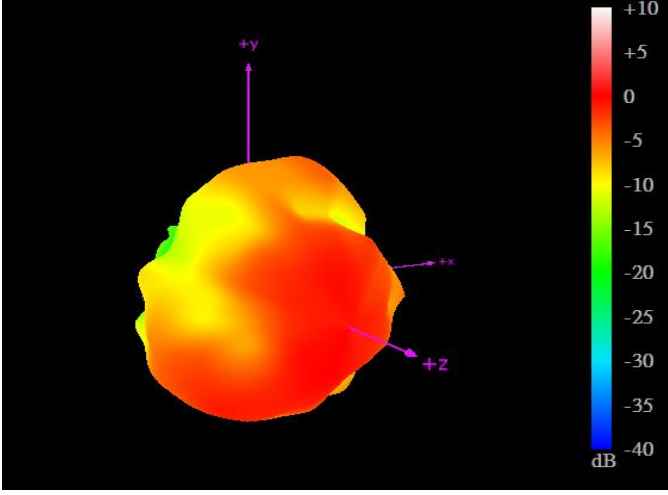
YZ Plane



3.1.30 3D Radiation Pattern  
Wi-Fi MIMO2 with 3M cable length on the metal

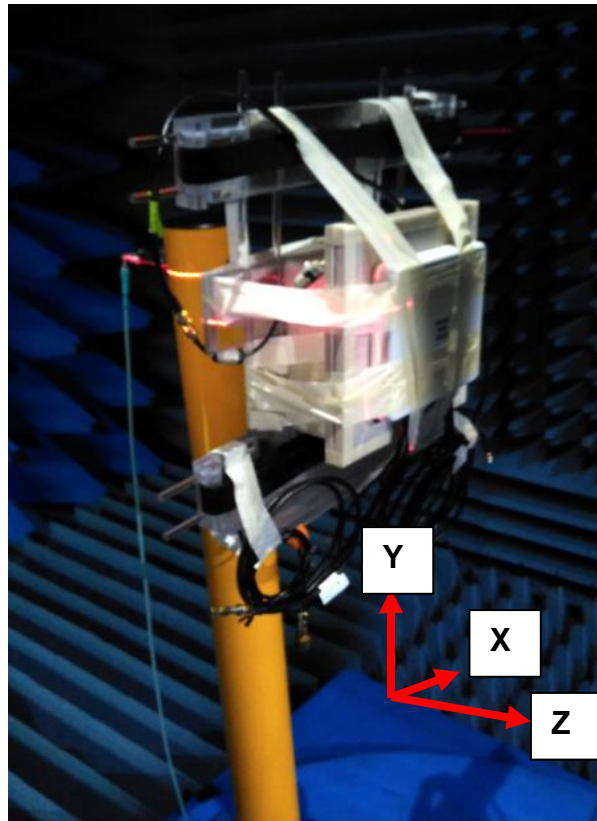


2450MHz



5550MHz

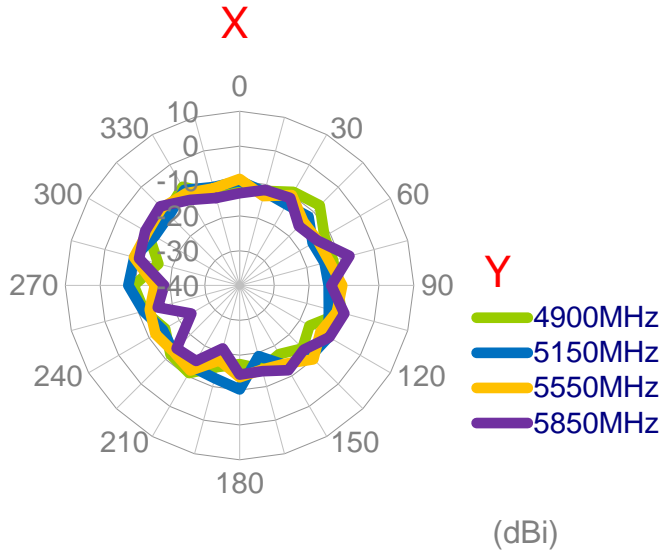
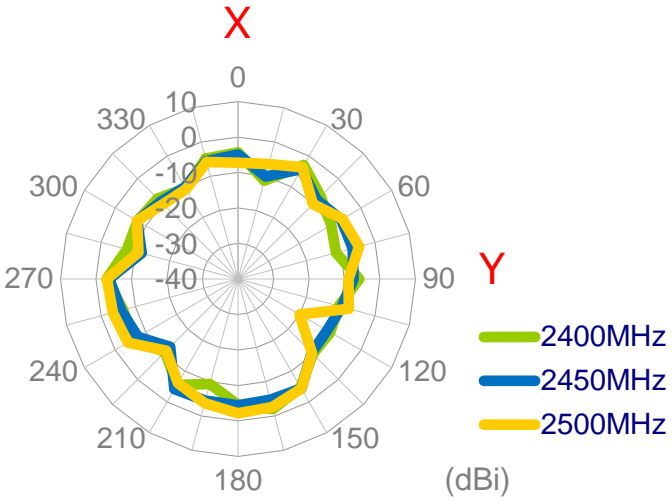
### 3.1.31 Test Setup For Antenna Radiation Pattern



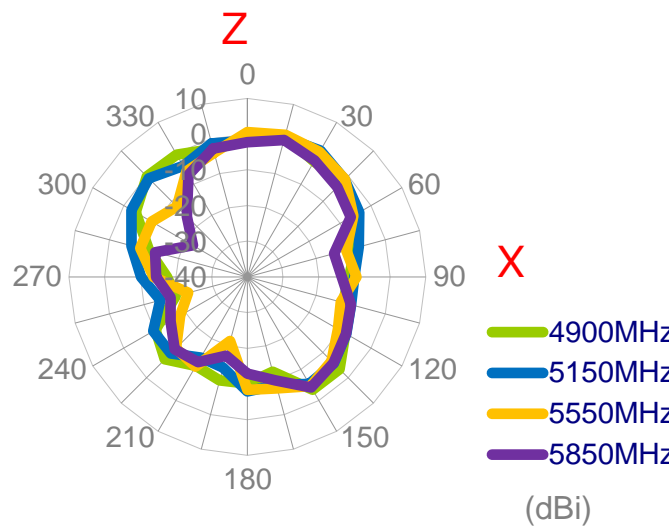
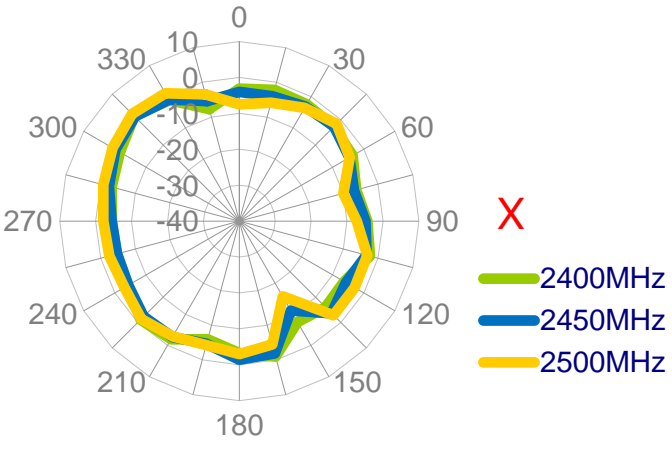
**On the Wall**

3.1.32 2D Radiation Pattern  
 Wi-Fi\_MIMO1 with 3M cable length in free space

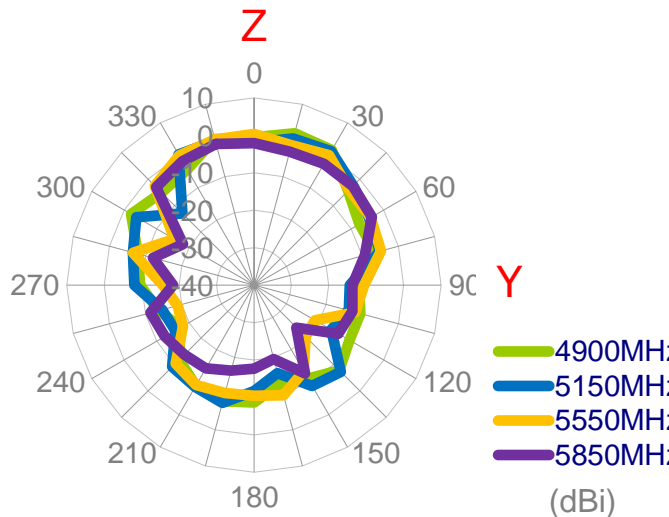
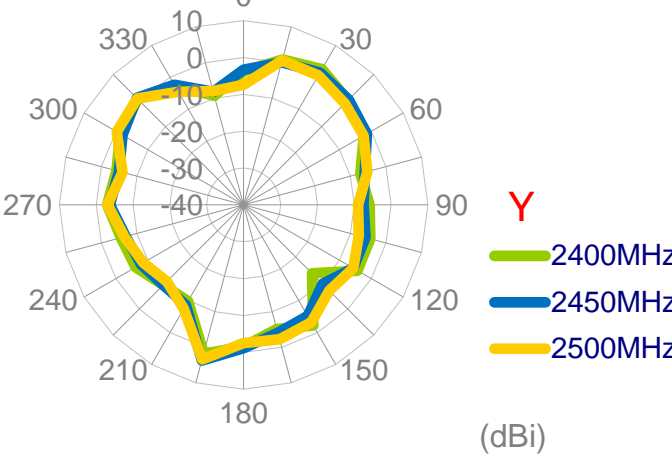
XY Plane



XZ Plane



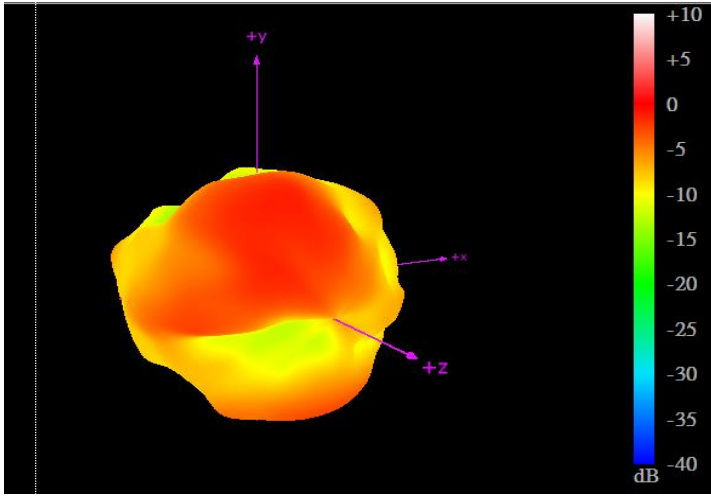
YZ Plane



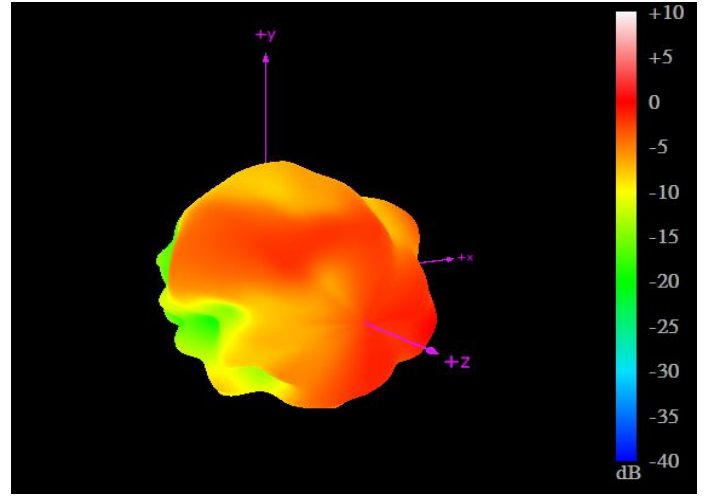


### 3.1.33 3D Radiation Pattern

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



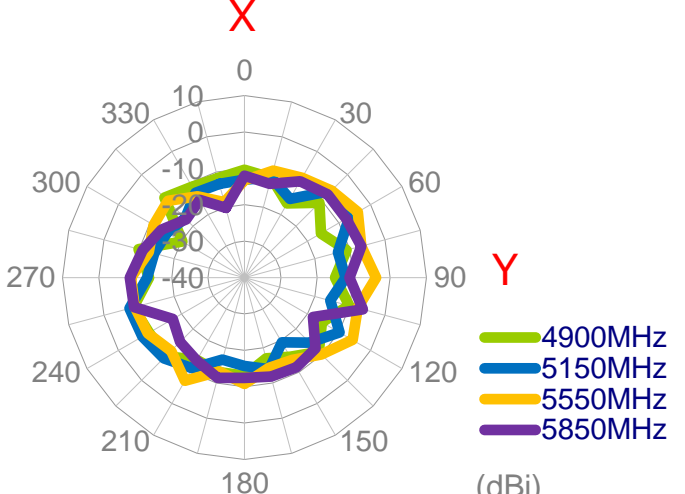
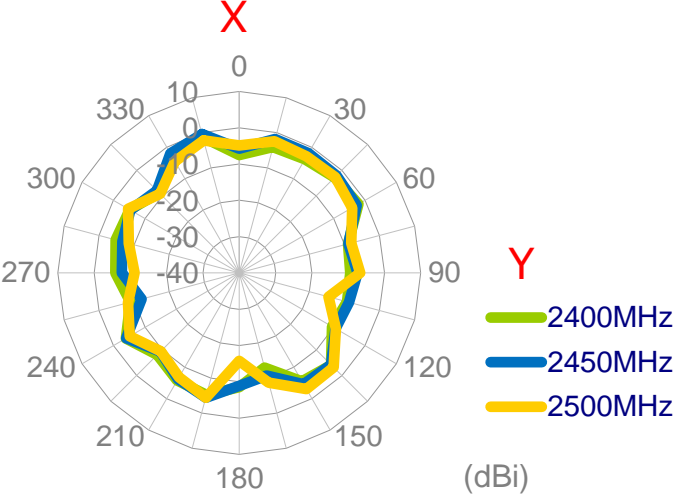
2450MHz



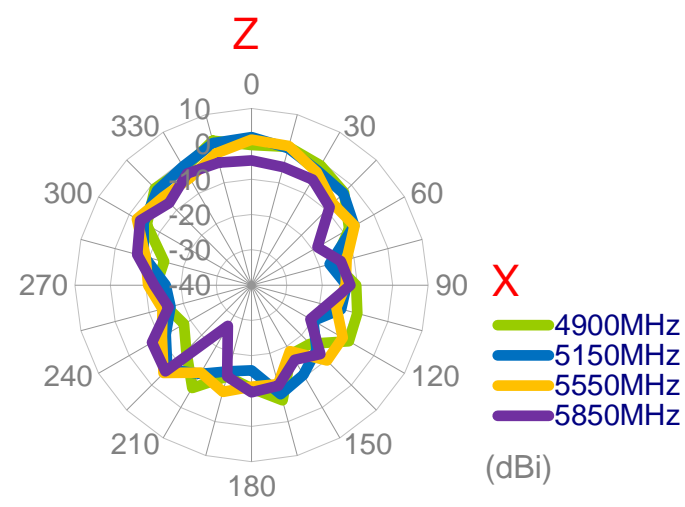
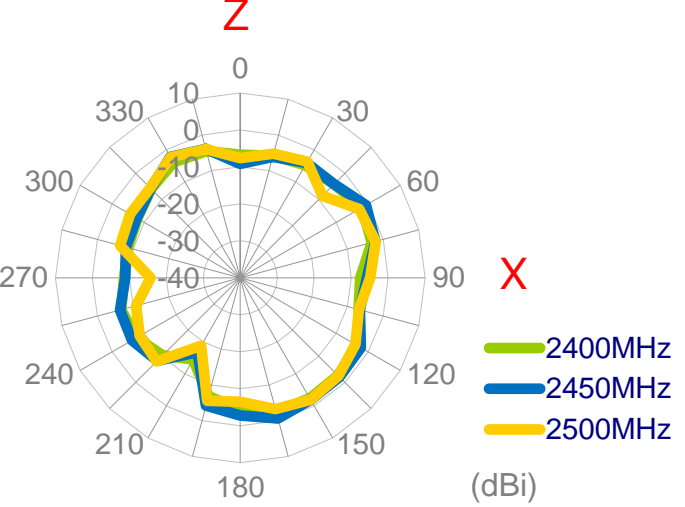
5550MHz

3.1.34 2D Radiation Pattern  
 Wi-Fi MIMO2 with 3M cable length in free space

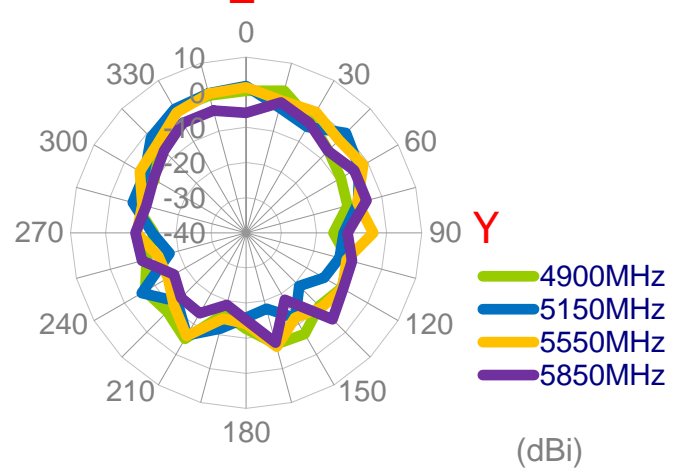
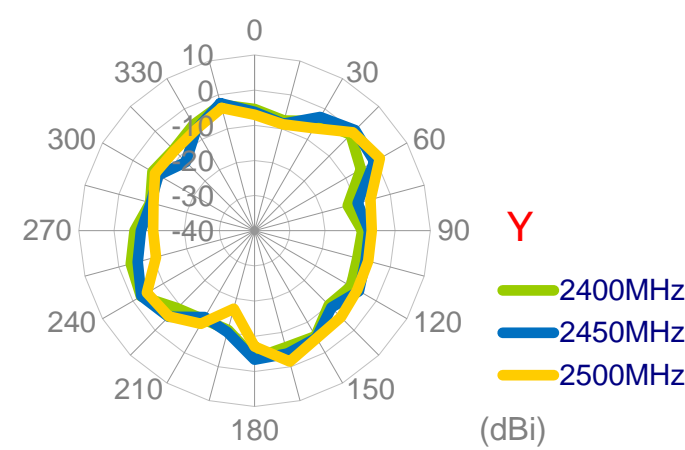
XY Plane



XZ Plane

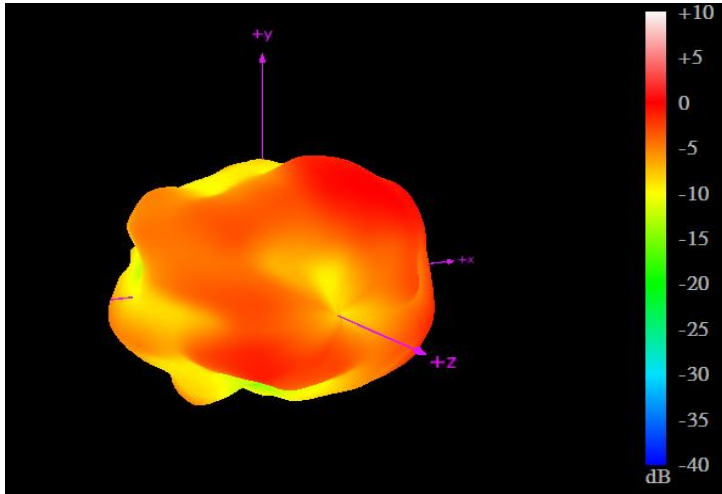


YZ Plane

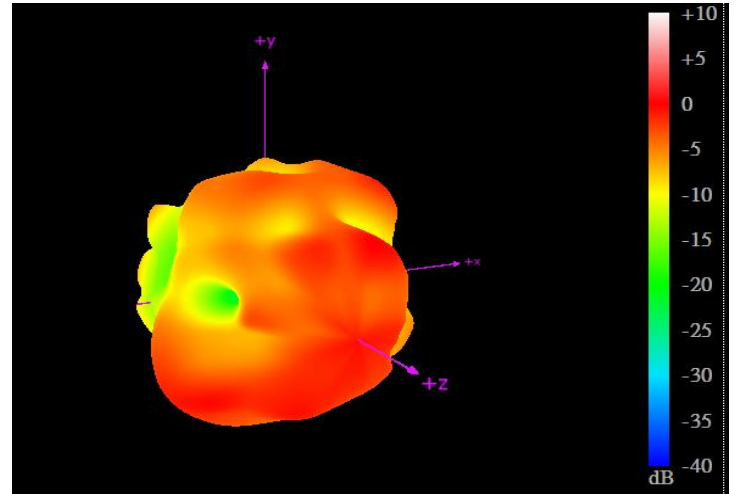


### 3.1.35 3D Radiation Pattern

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



2450MHz



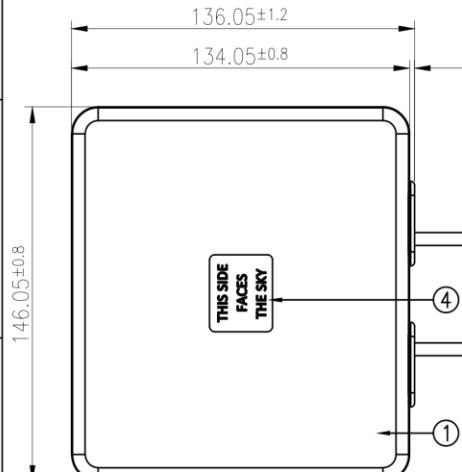
5550MHz

# 4. Mechanical Drawing (unit:mm)

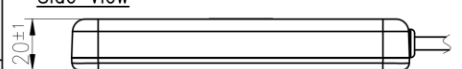
6	5	4	3	2	1	
ISO NO: EDW-16-8-6200		REV ZONE DESCRIPTION		ENG	APPROVED	ISSUED DATE
<Release>		ALL Initial Design		Haley	Paul	2016/12/12
		ALL Change Label to Print Heat Shrink Tube. Modify BOM. (ECR-18-8-009)		Alster	Haley	2109/01/16
		ALL Change Foam<ECR-19-8-005>		Ruby	Aaron	2019/11/20

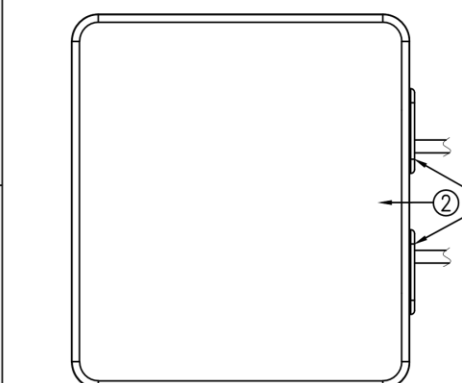
**Front View**



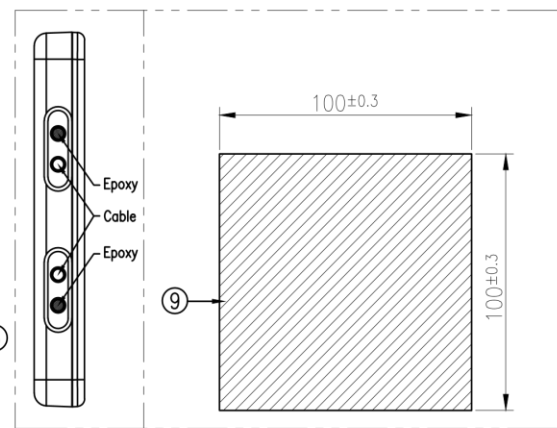
**Side View**



**Back View**



**Bottom View Double sided Adhesive(Black Foam)**



Name	P/N	Material	Finish	QTY
1 Top Housing	000116800000A	ASA	Black	1
2 Bottom Housing	0001168010000A	ASA	Black	1
3 Rubber-2 Holes	000715H010000A	Silicone Rubber	Black	2
4 Clear Label	001015H030000A	PET	Transparent	1
5 Heat Shrink Tube (Wi-Fi-1)	001316L060000A	PE	Yellow Tube/Black Text	1
6 Heat Shrink Tube (Wi-Fi-2)	001316L070000A	PE	Yellow Tube/Black Text	1
7 Empty Label	001015G000000A	PEPA	White	1
8 Barcode Label	001015G010000A	PET	White	1
9 Double Sided Adhesive(Black Foam)	001019C010000A	OK305-3M48K 35#	White Liner	1

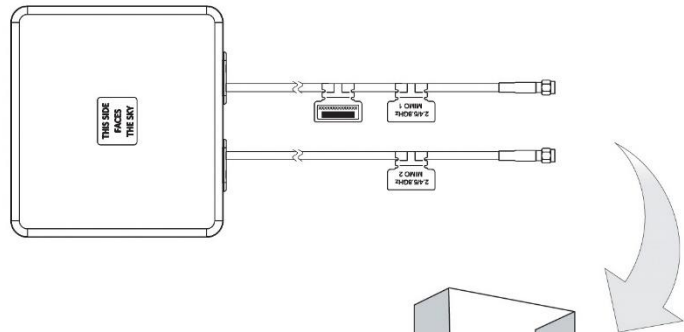
  

Name	P/N	Material	Finish	QTY
XX CFD200 Coaxial Cable	301415C010000A	PE	Black	2
YY RP-SMA(M)ST	200215K01004BA	Brass	Au Plated	2

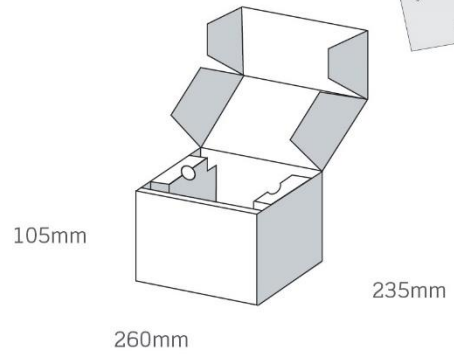
  

UNLESS OTHERWISE SPECIFIED TOLERANCES ON:	DATE: 2016/12/12	MAT'L:		SCALE: 1/2.5	TW Design Centre <small>This drawing and its inherent design concepts are property of Taoglas. Not to be copied or given to third parties without the written consent of Taoglas.</small>	REV D03
	XX± 0.5 .XX± 0.1 X± 0.3 .XXX± 0.05	UNIT: mm				
APPROVED BY: Paul	CHECKED BY: Jason	DRAWN BY: Haley	CUSTOMERS SIGNATURE / DATE		TITLE. : 2in1 Adhesive Wi-Fi(1&2) 3000mm CFD-200 RP-SMA(M) PART NO. : MA910.A.CG.001	

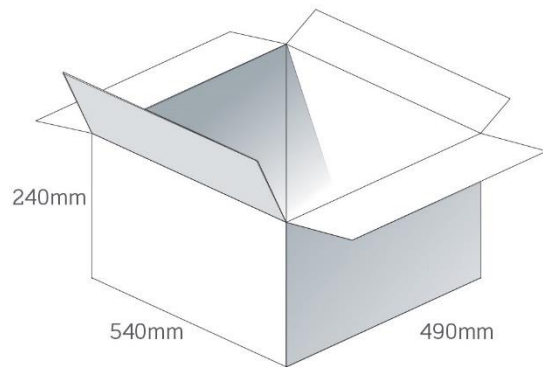
## 5. Packaging



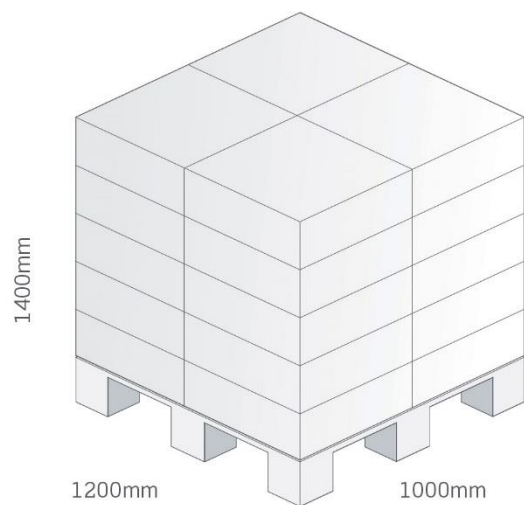
1 No. MA910.A.CG.001 per small box  
 Box Dimensions - 260 x 235 x 105mm  
 Weight - 0.75Kg



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

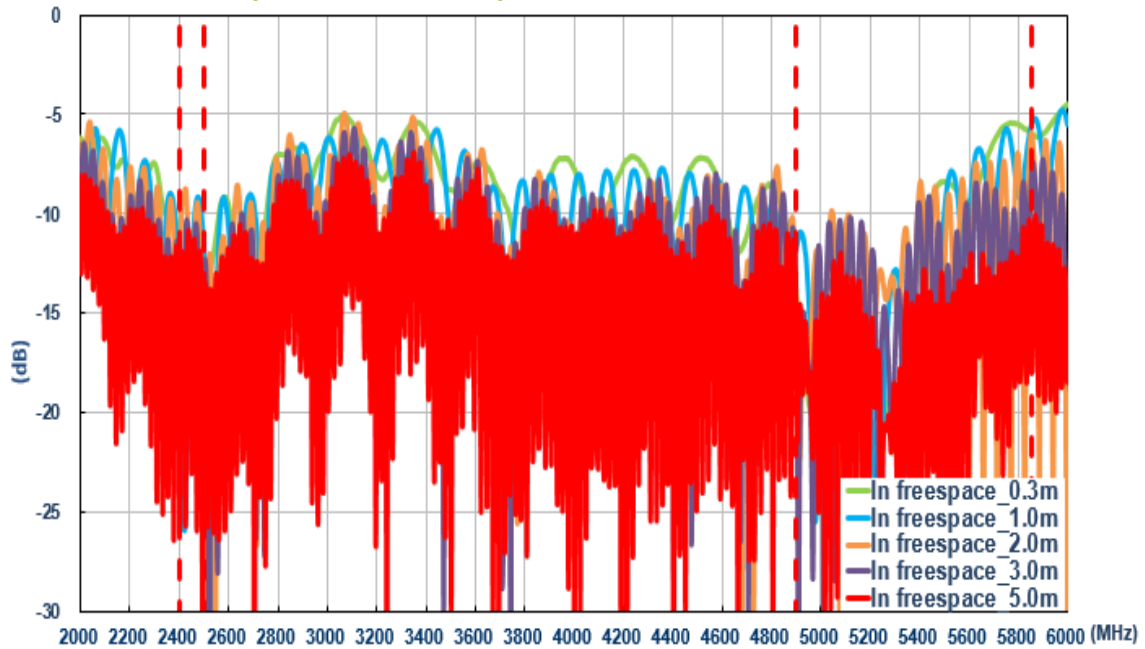


## 6. Application Note

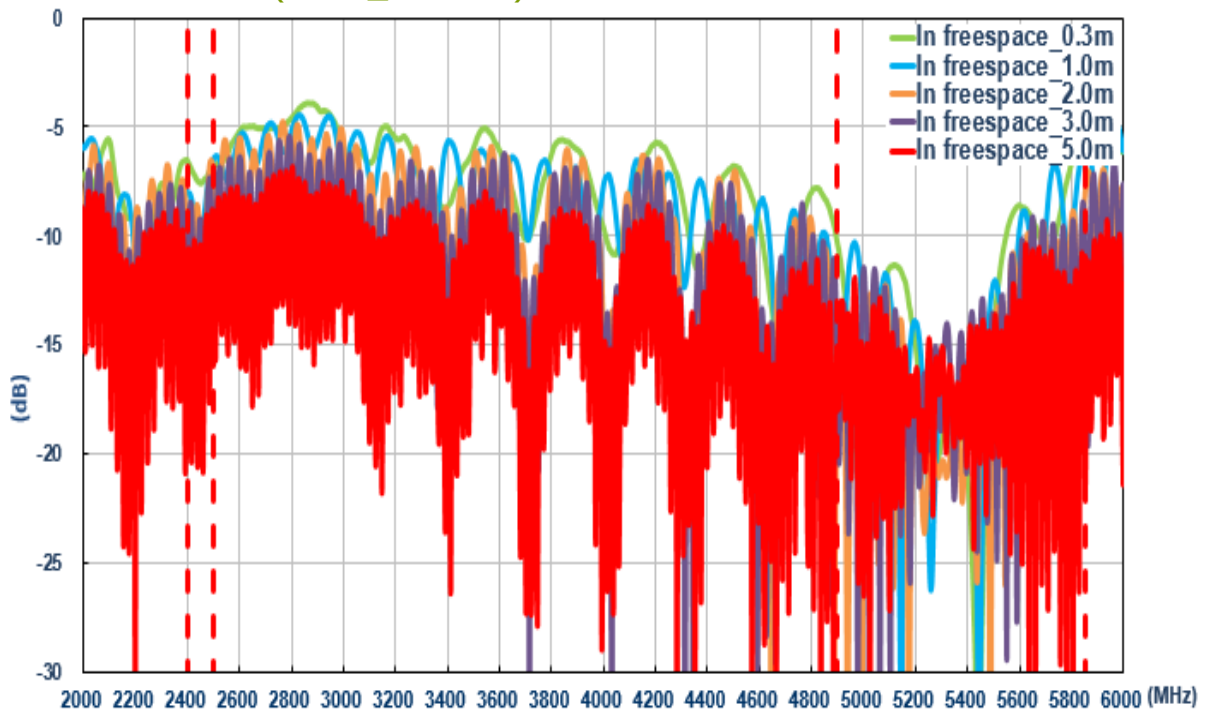
The MA910 antenna performance with different cable lengths is shown below.

### 6.1 In free space (Wi-Fi)

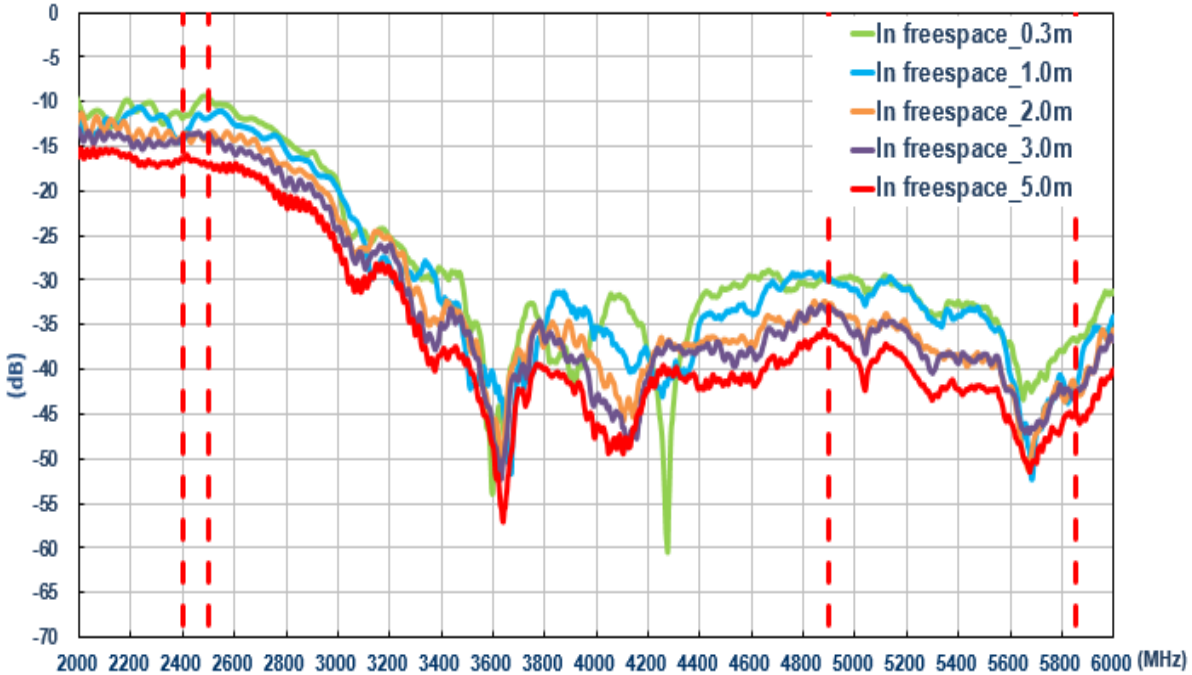
#### 6.1.1 Return Loss (WI-FI\_MIMO 1)



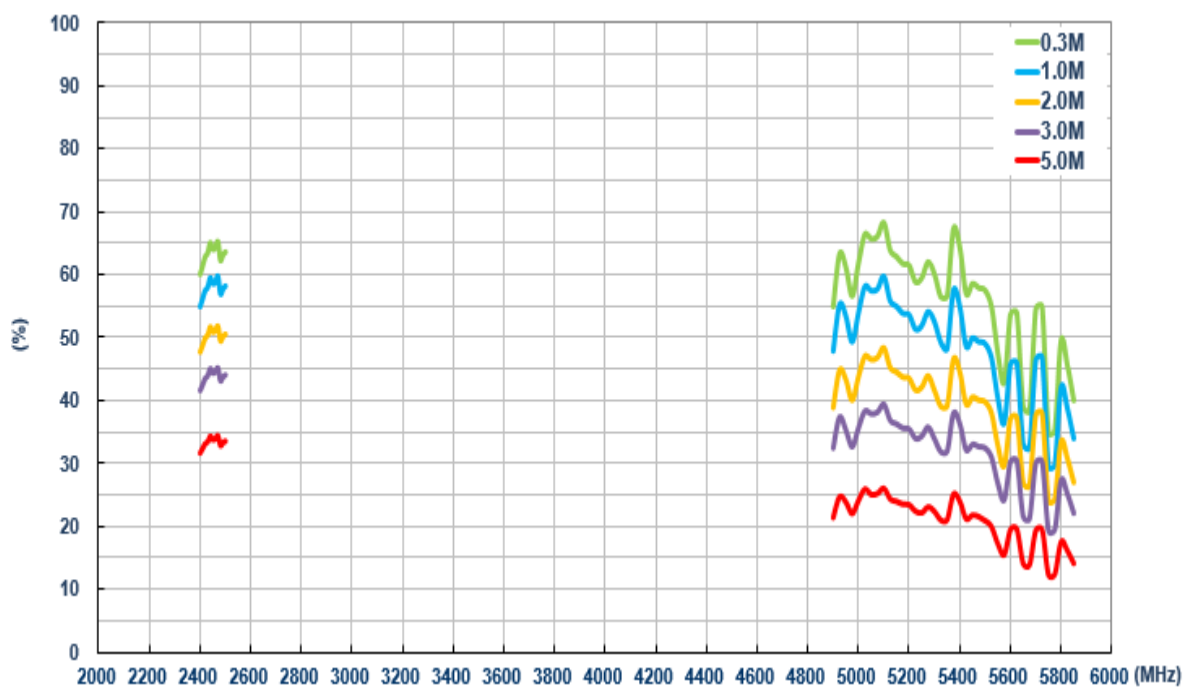
#### 6.1.2 Return Loss (Wi-Fi\_MIMO 2)



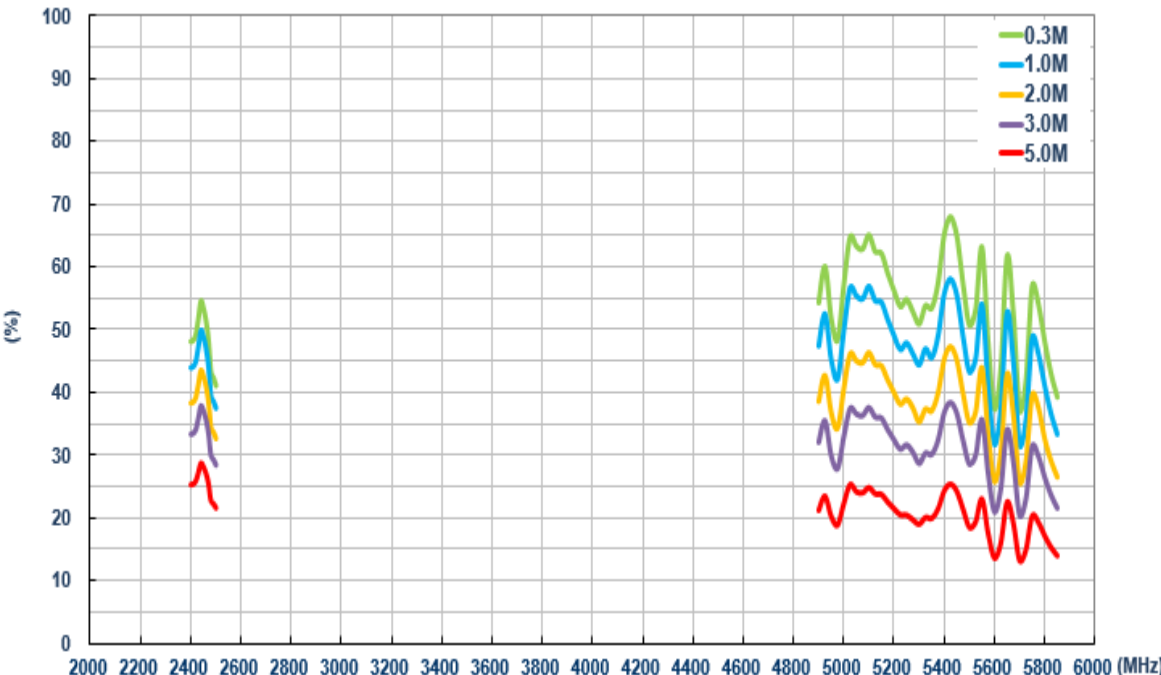
6.1.3 Isolation (Wi-Fi)



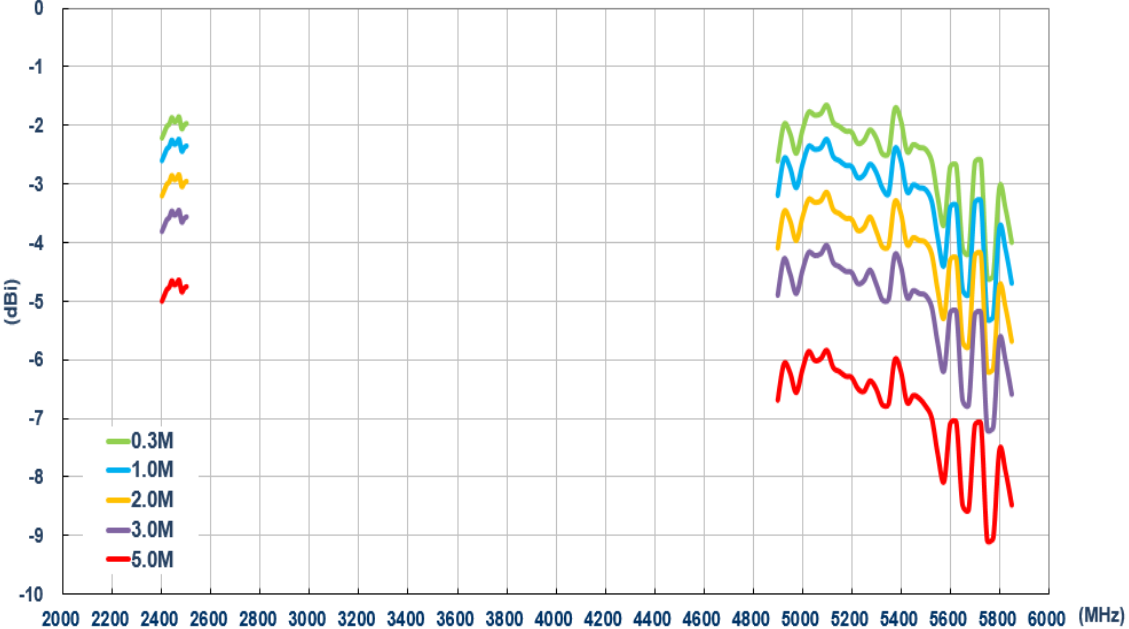
6.1.4 Efficiency (MIMO 1)



6.1.5 Efficiency (MIMO 2)

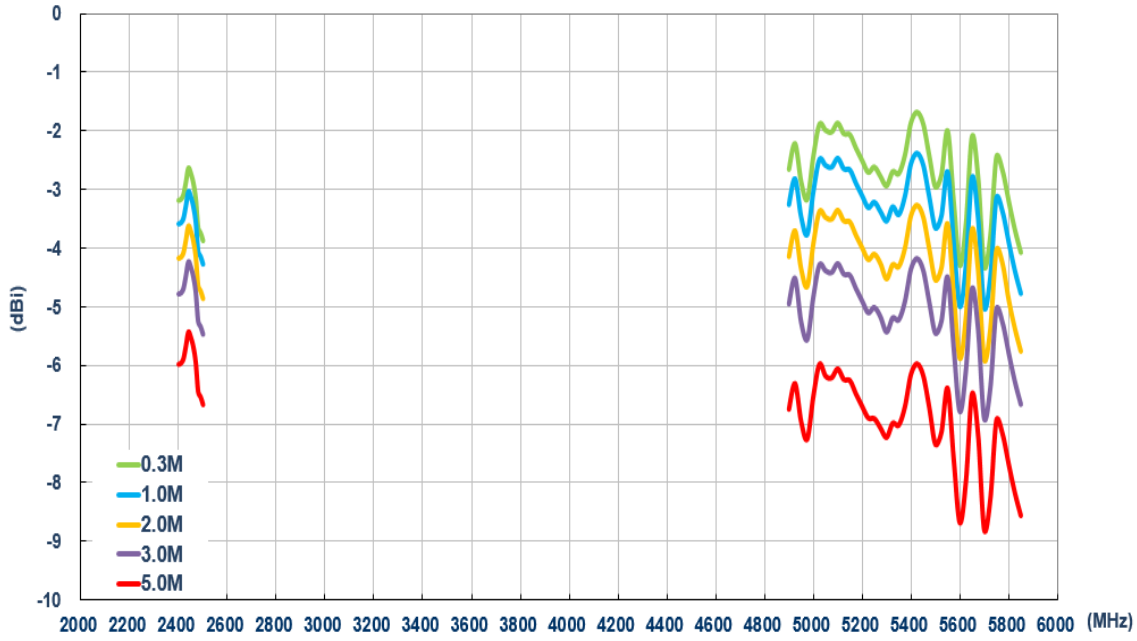


6.1.6 Average Gain (MIMO 1)

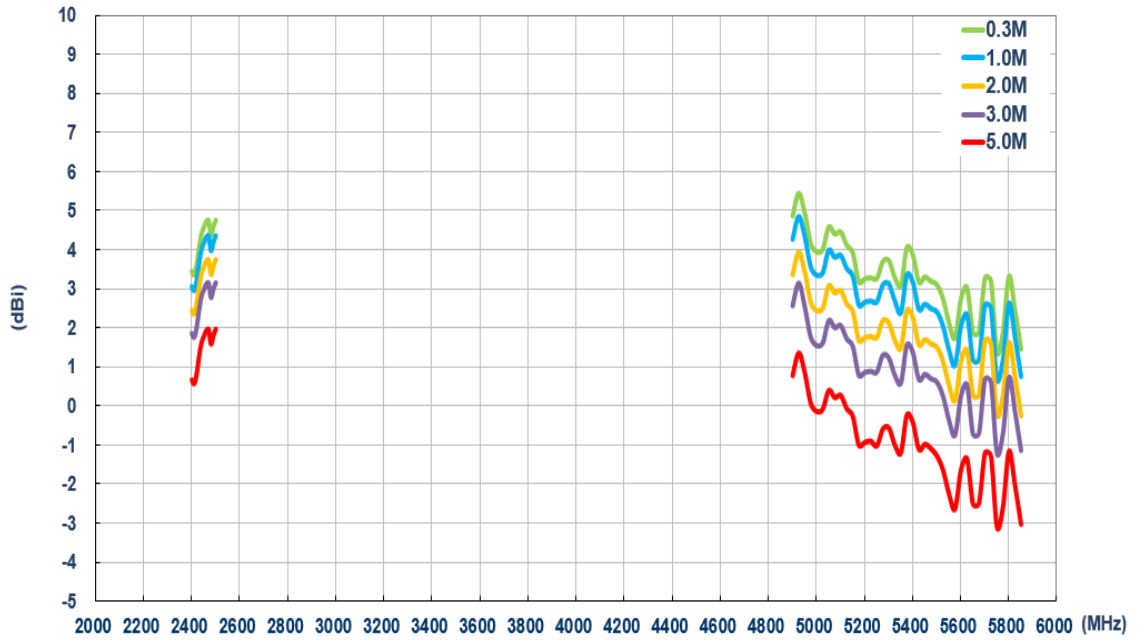




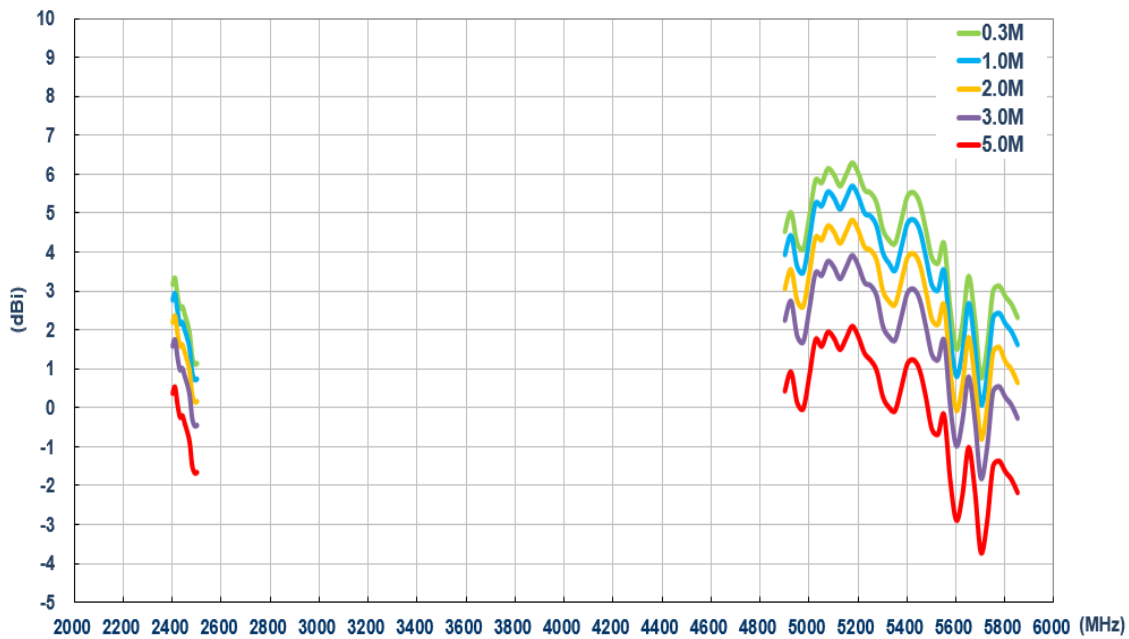
6.1.7 Average Gain (MIMO 2)



6.1.8 Peak Gain (MIMO 1)

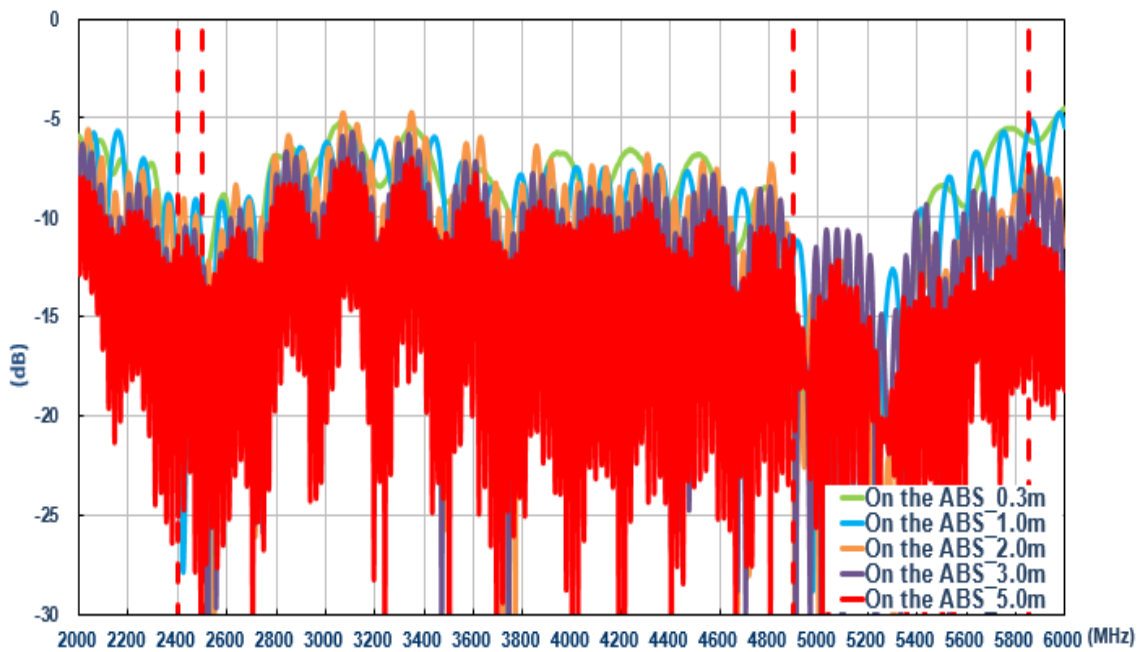


### 6.1.9 Peak Gain (MIMO 2)

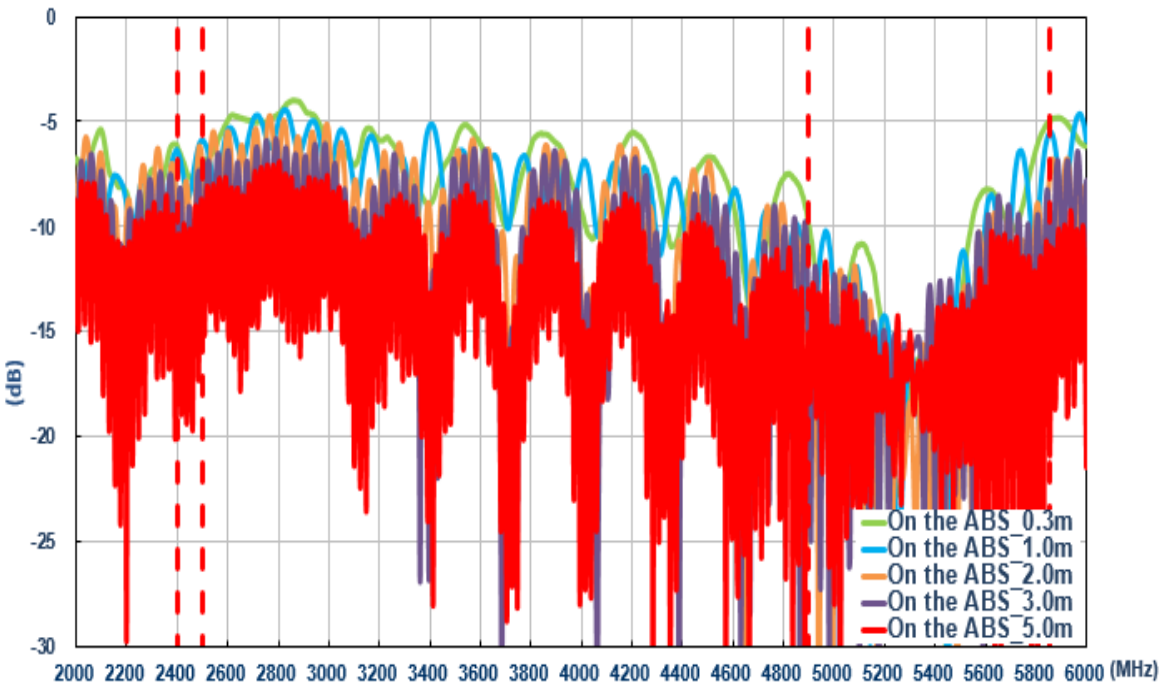


## 6.2 On the ABS (Wi-Fi)

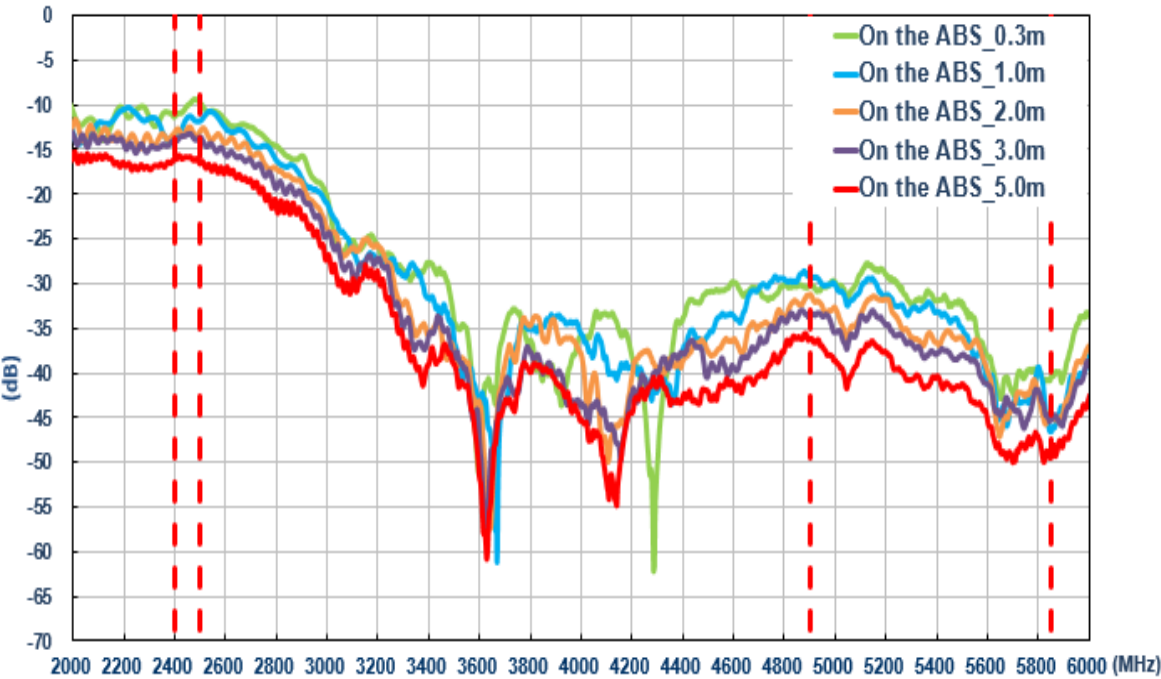
### 6.2.1 Return Loss (Wi-Fi MIMO 1)



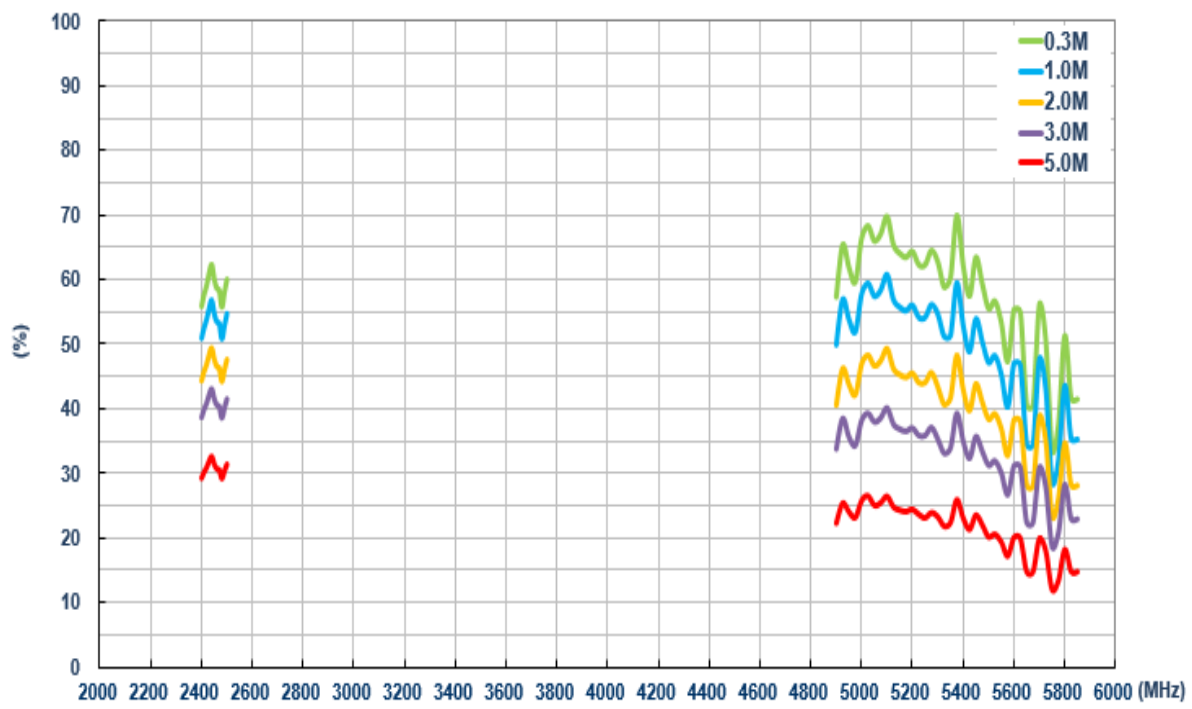
6.2.2 Return Loss (Wi-Fi MIMO 2)



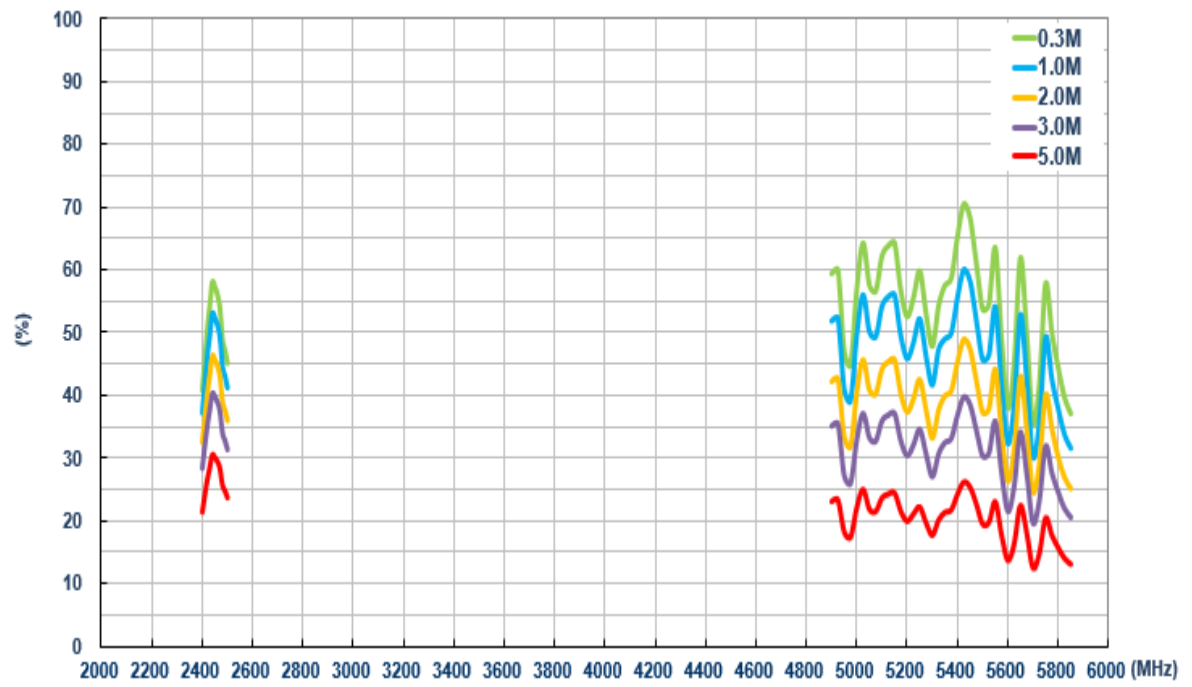
6.2.3 Isolation (Wi-Fi)



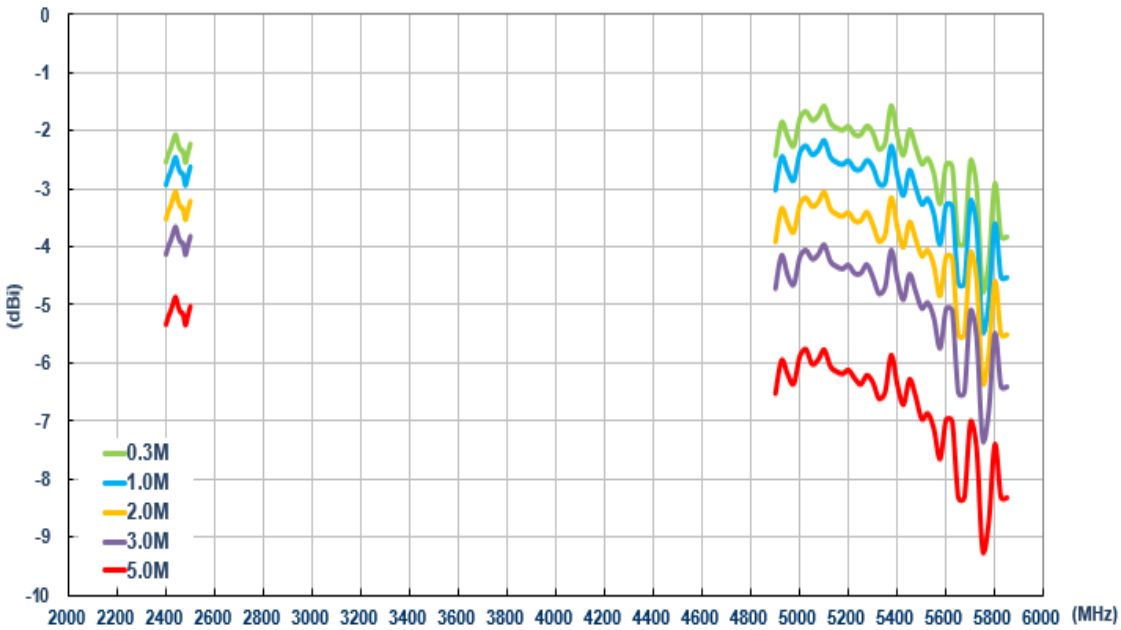
6.2.4 Efficiency (MIMO 1)



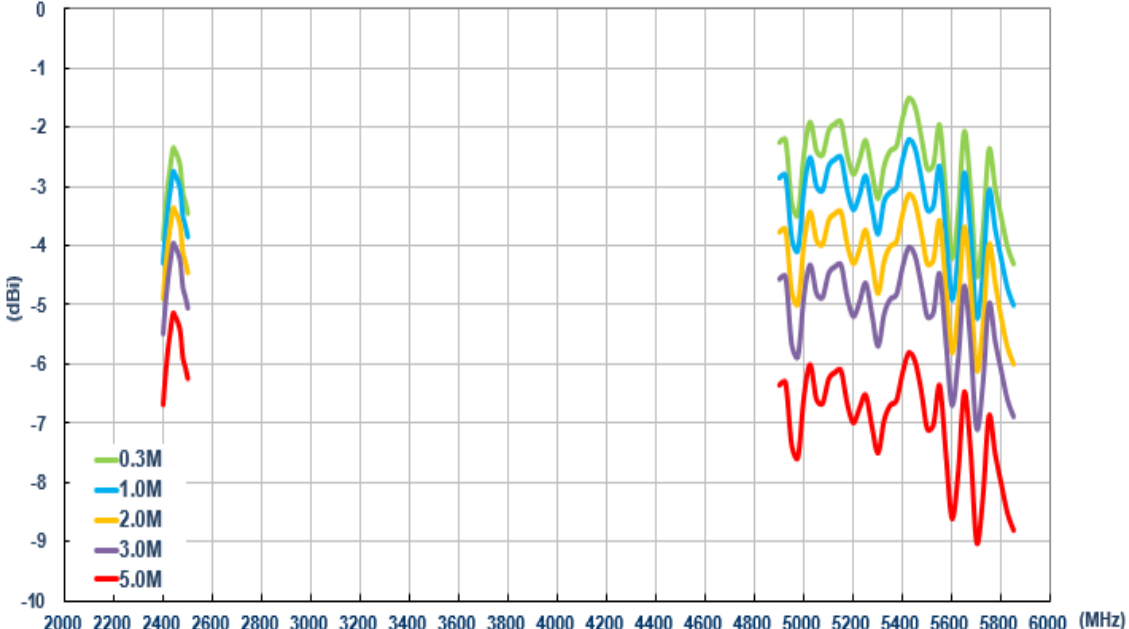
6.2.5 Efficiency (MIMO 2)



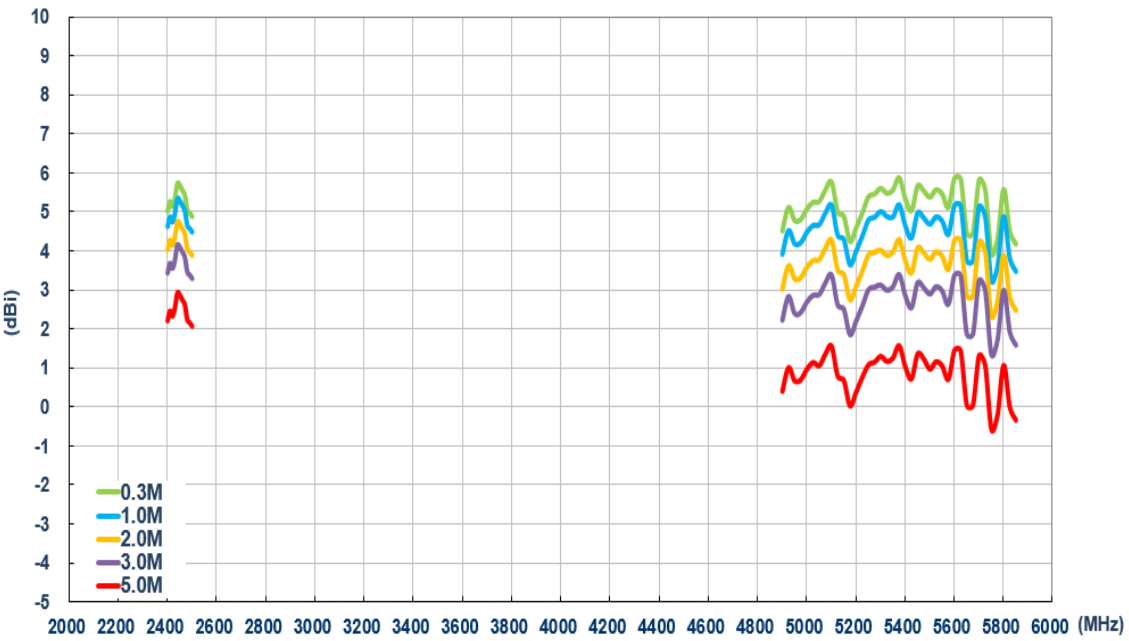
6.2.6 Average Gain (MIMO 1)



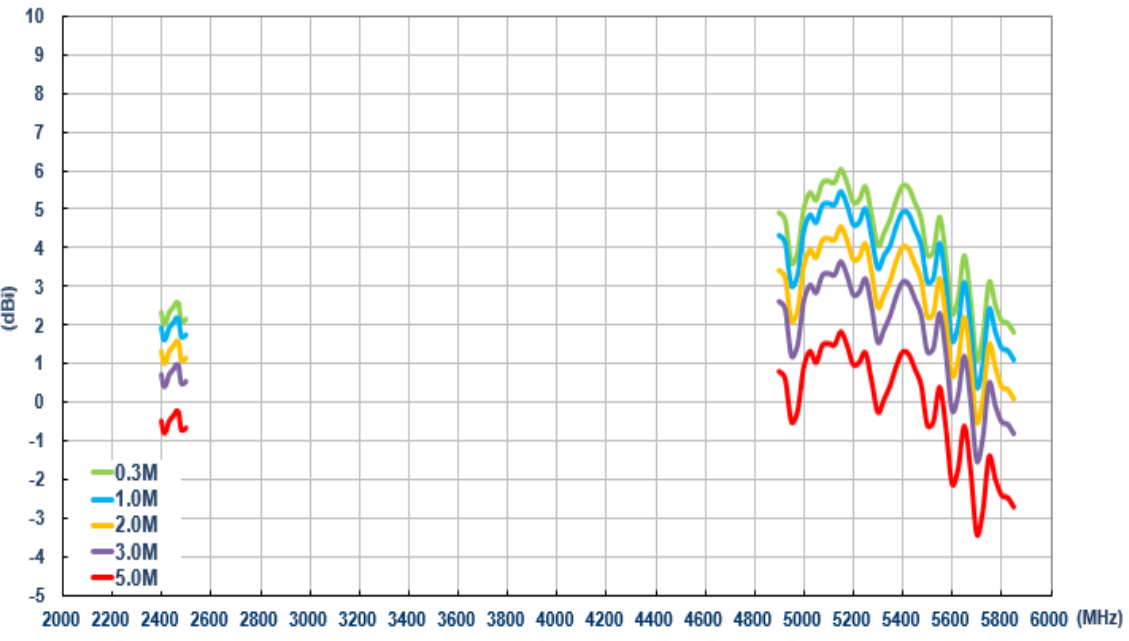
6.2.7 Average Gain (MIMO 2)



6.2.8 Peak Gain (MIMO 1)

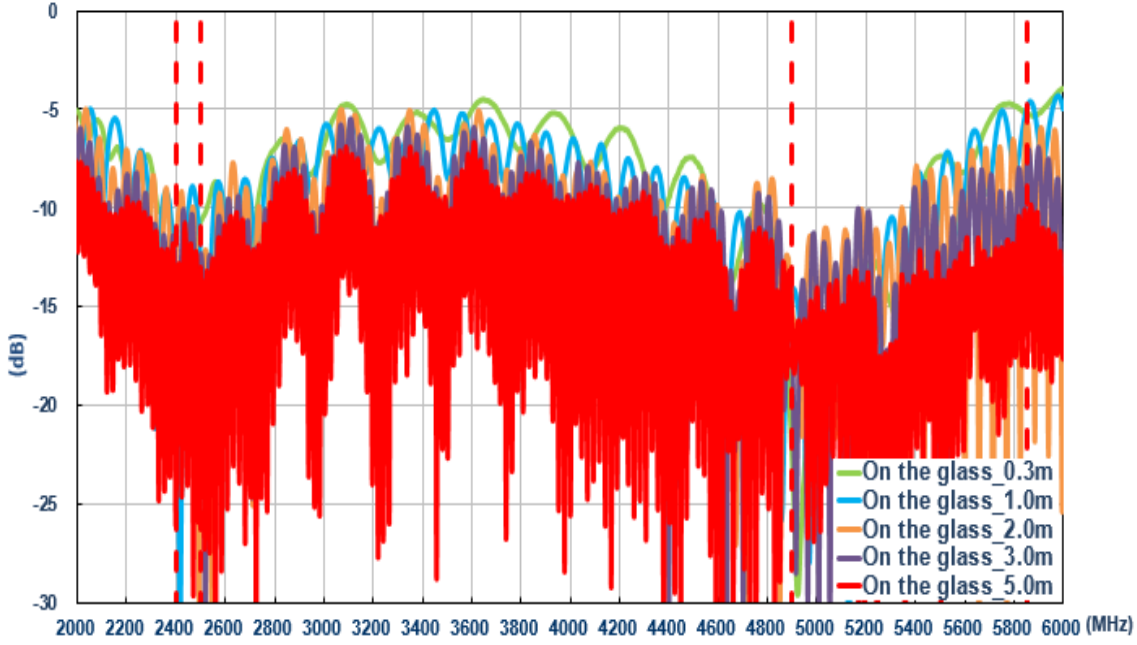


6.2.9 Peak Gain (MIMO 2)

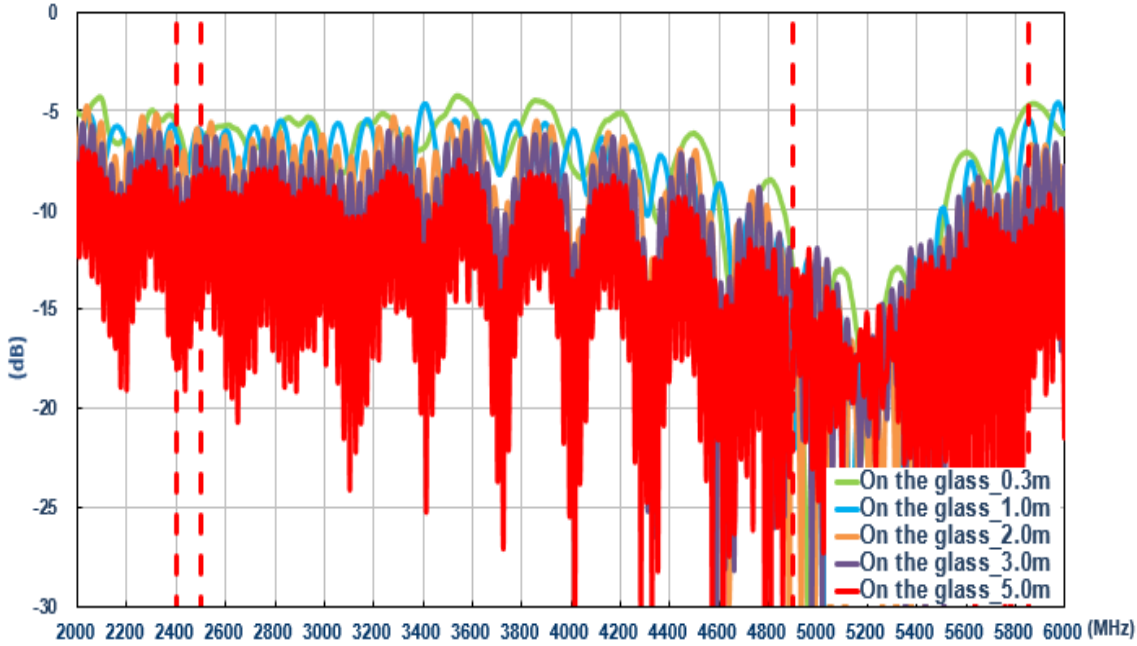


### 6.3 On the glass (Wi-Fi)

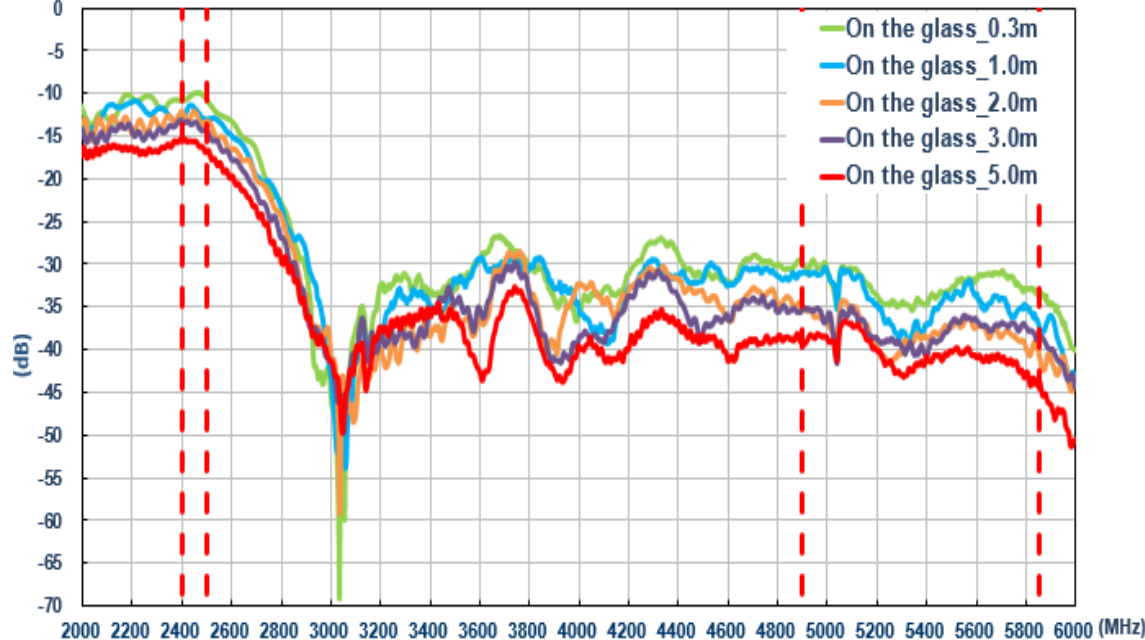
#### 6.35.1 Return Loss (Wi-Fi MIMO 1)



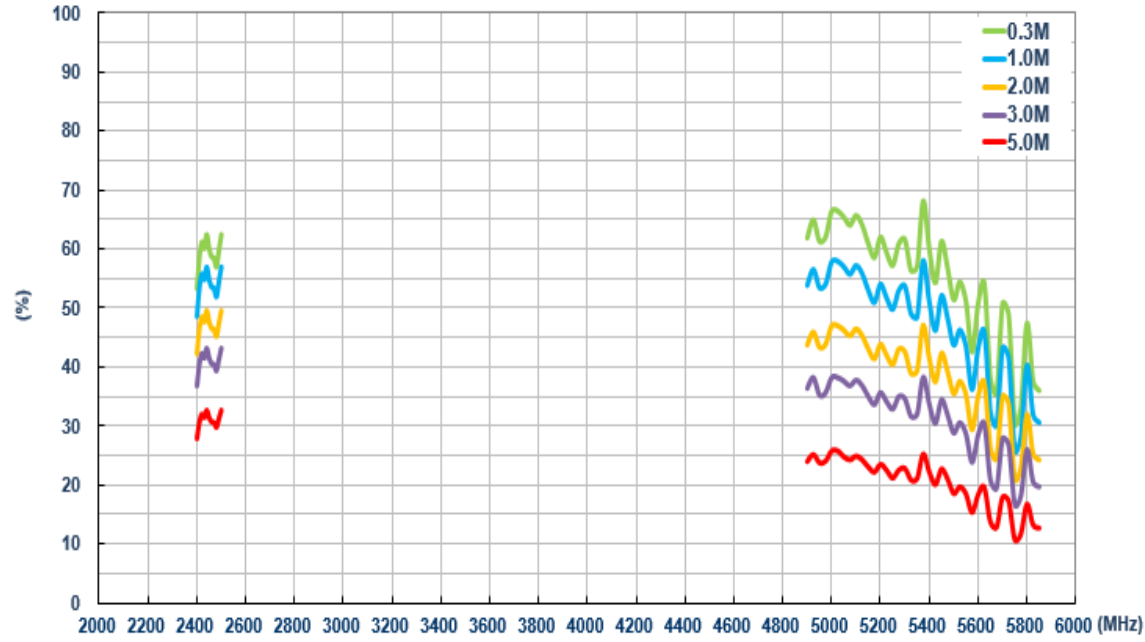
#### 6.35.2 Return Loss (Wi-Fi MIMO 2)



### 6.3.3 Isolation (Wi-Fi)

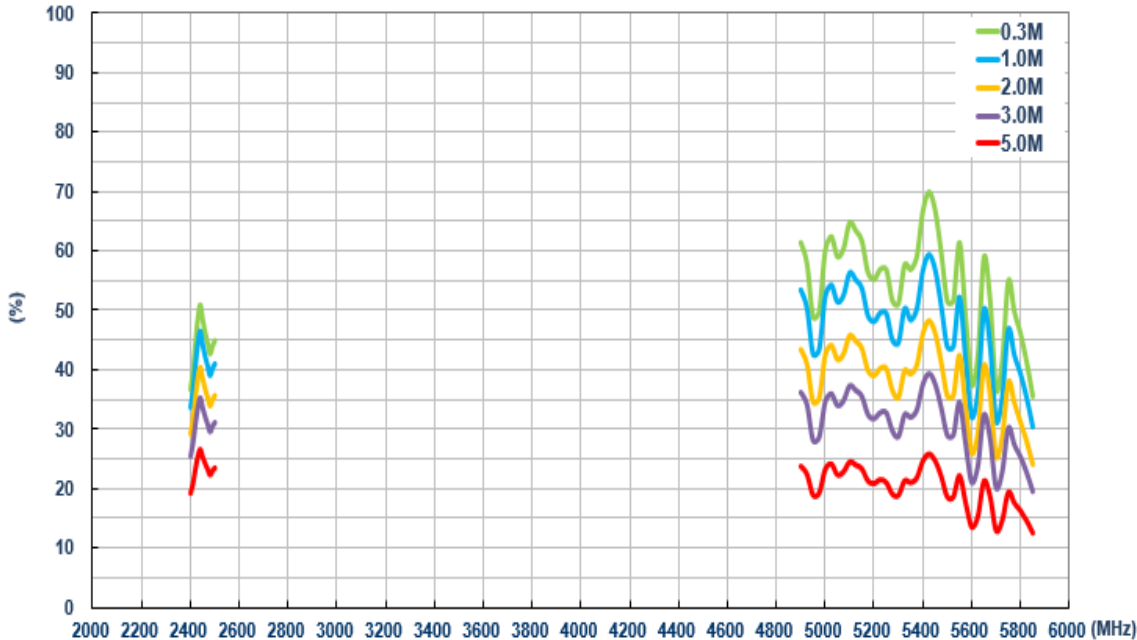


### 6.3.4 Efficiency (Wi-Fi MIMO 1)

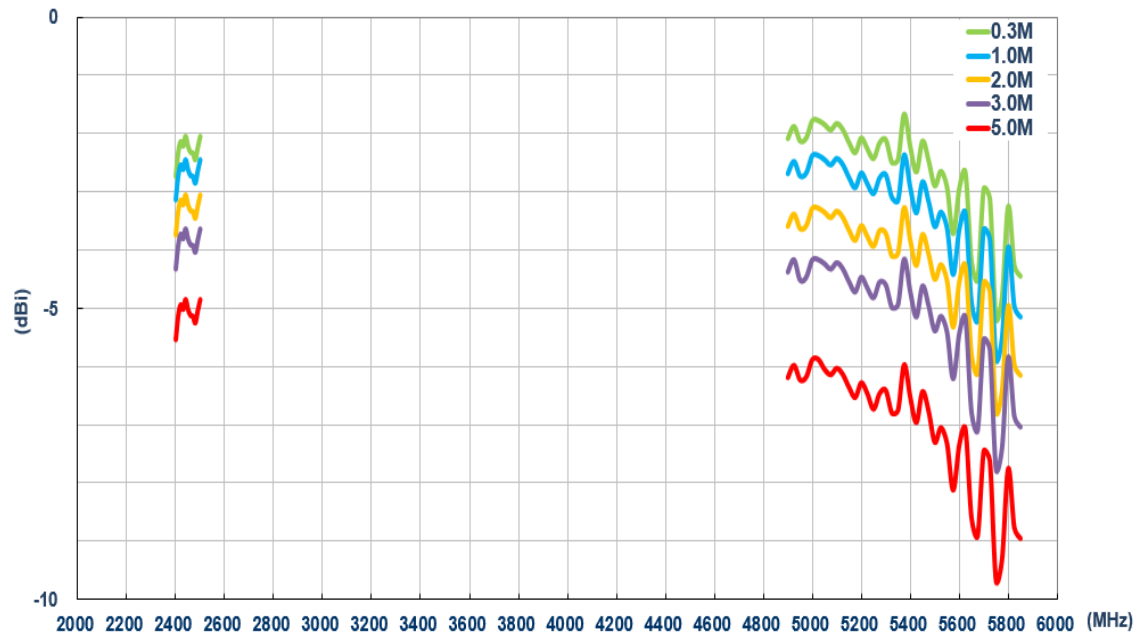




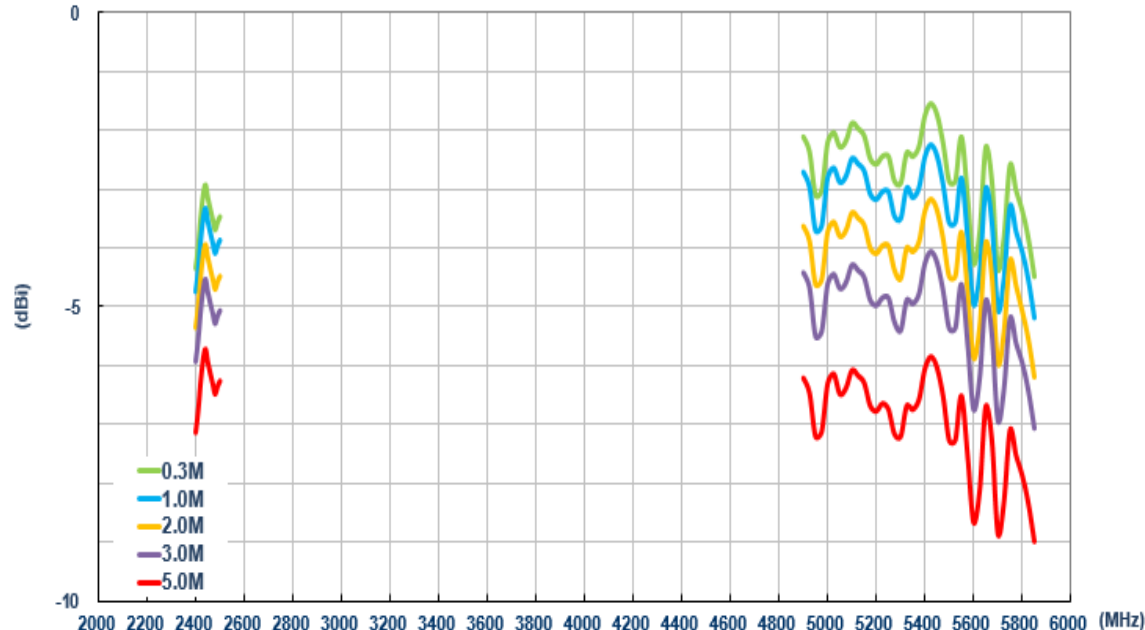
6.3.5 Efficiency (Wi-Fi MIMO 2)



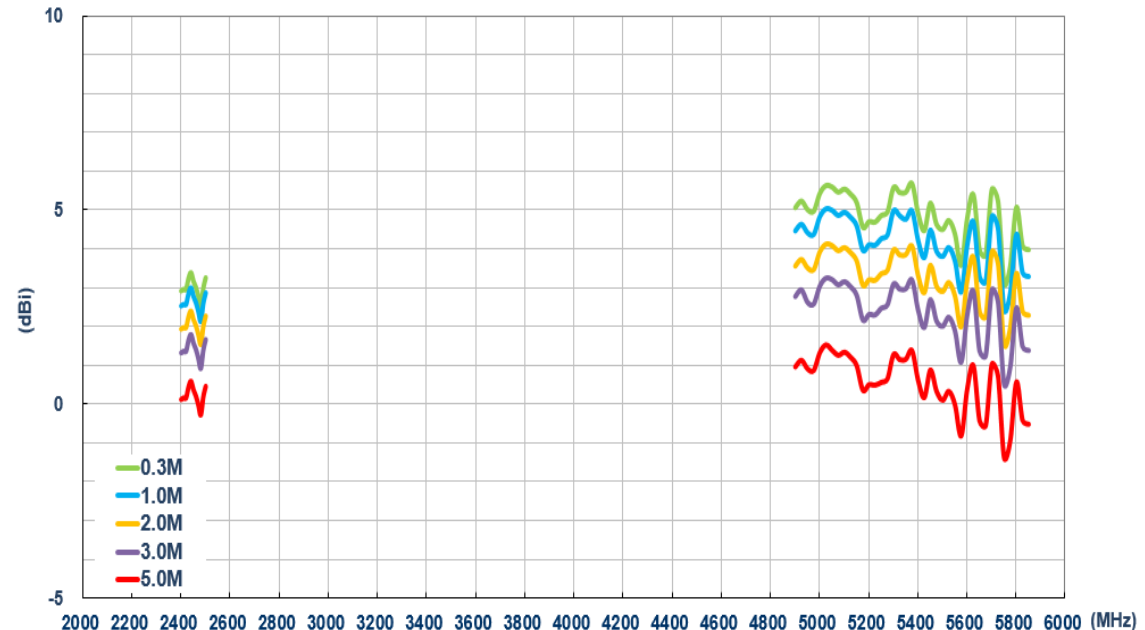
6.3.6 Average Gain (Wi-Fi MIMO 1)



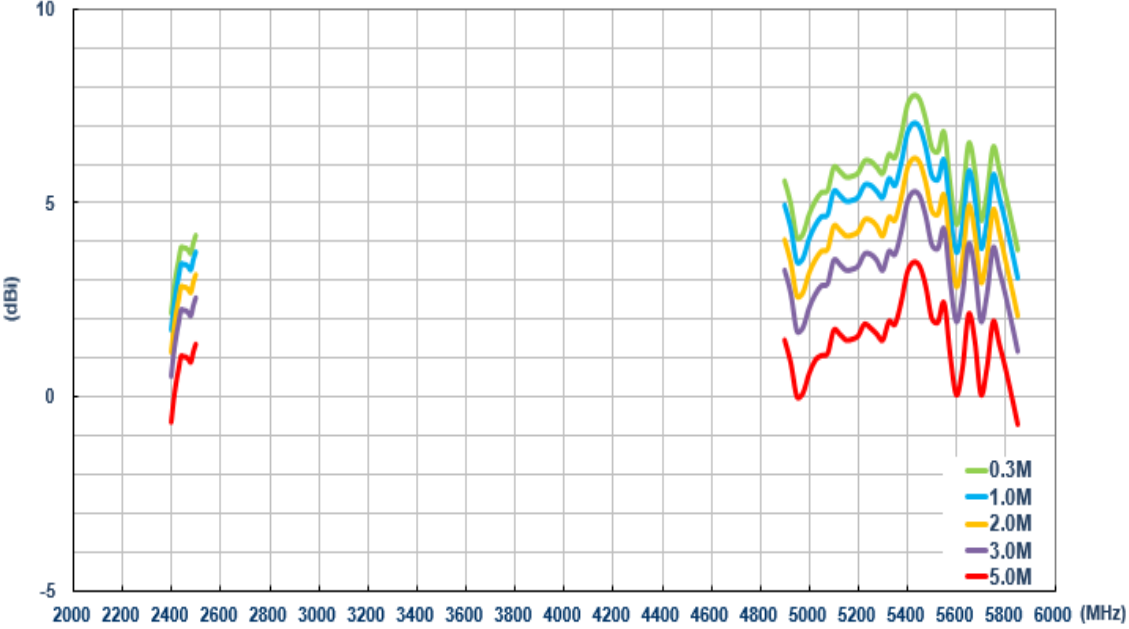
6.3.7 Average Gain (Wi-Fi MIMO 2)



6.3.8 Peak Gain (Wi-Fi MIMO 1)

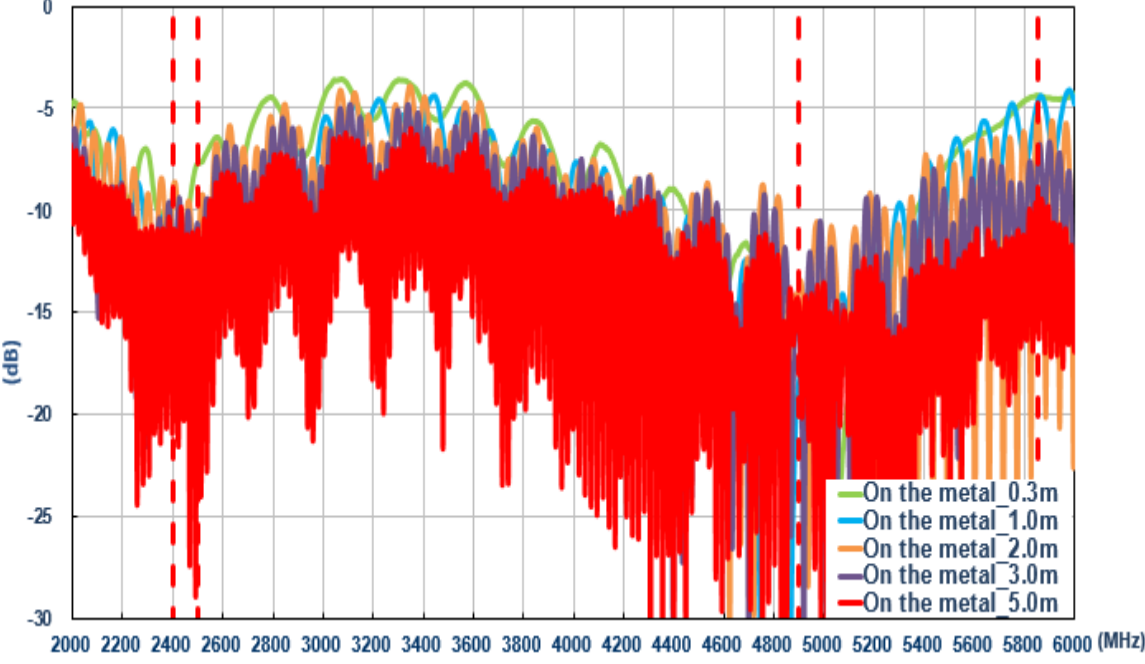


6.3.9 Peak Gain (Wi-Fi MIMO 2)

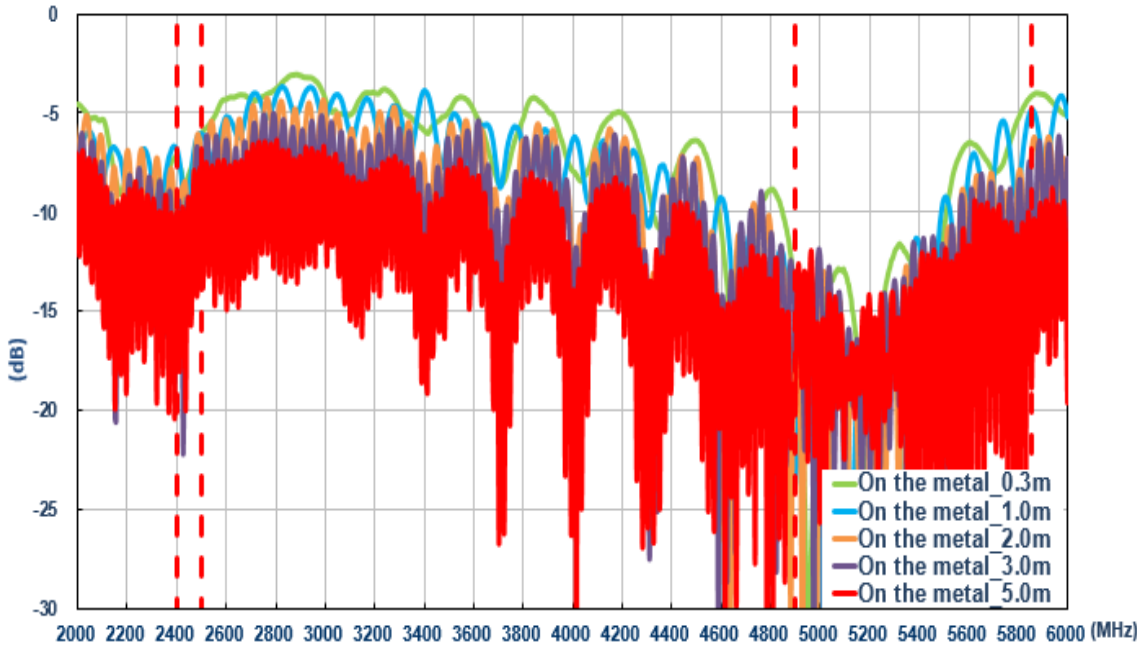


6.4 On the metal (Wi-Fi)

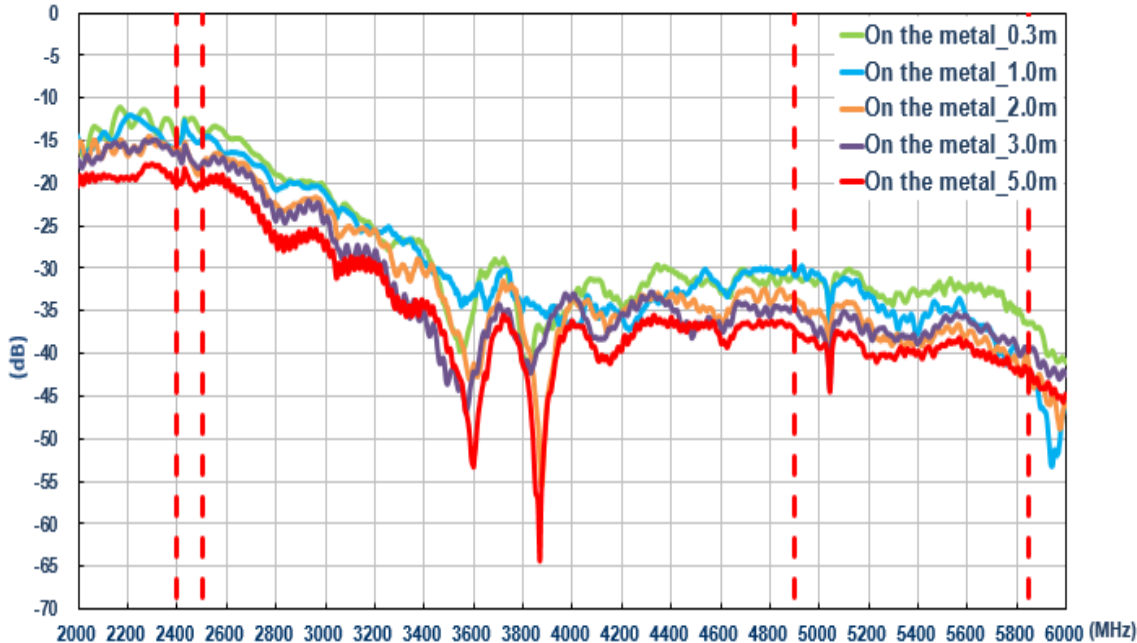
6.4.1 Return Loss (Wi-Fi MIMO 1)



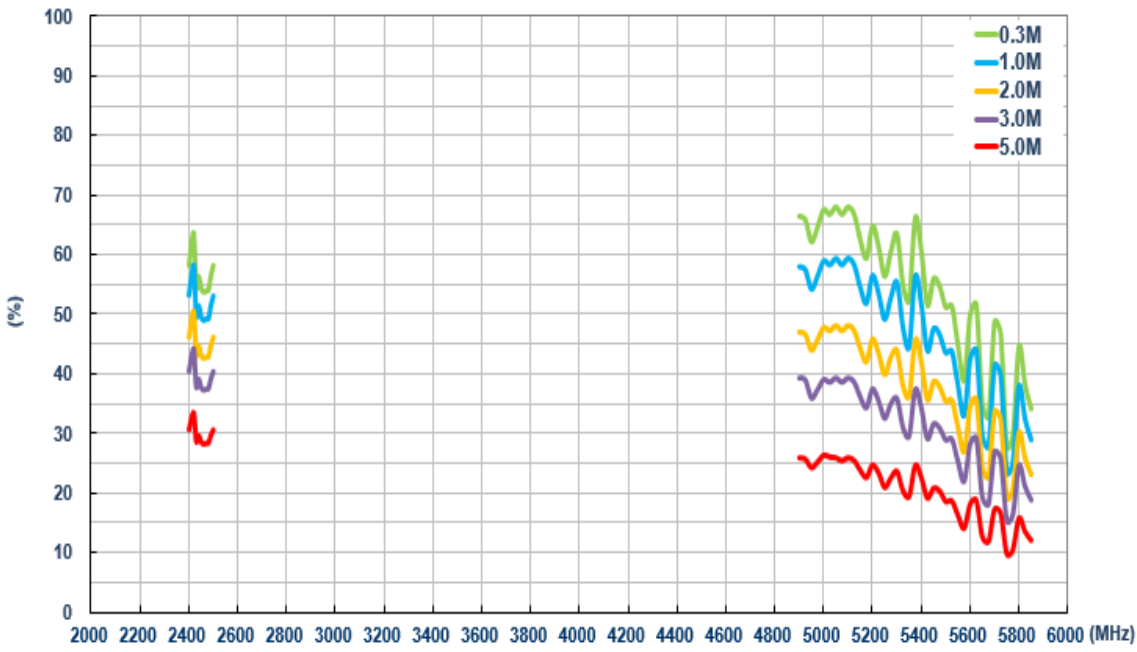
6.4.2 Return Loss (Wi-Fi MIMO 2)



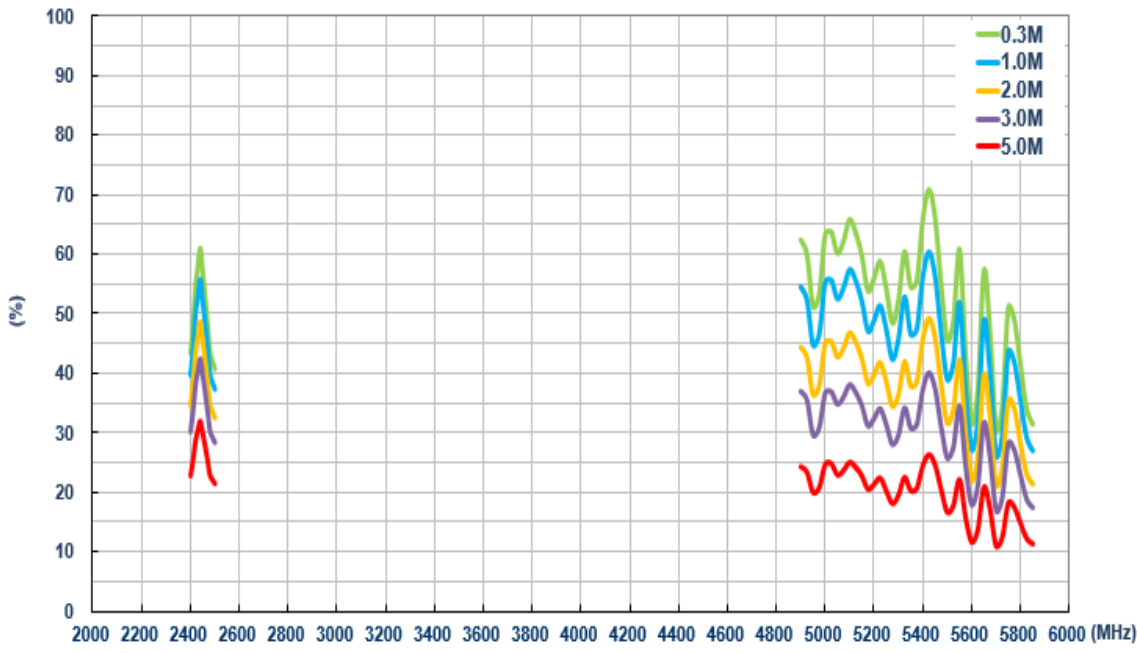
6.4.3 Isolation (Wi-Fi)



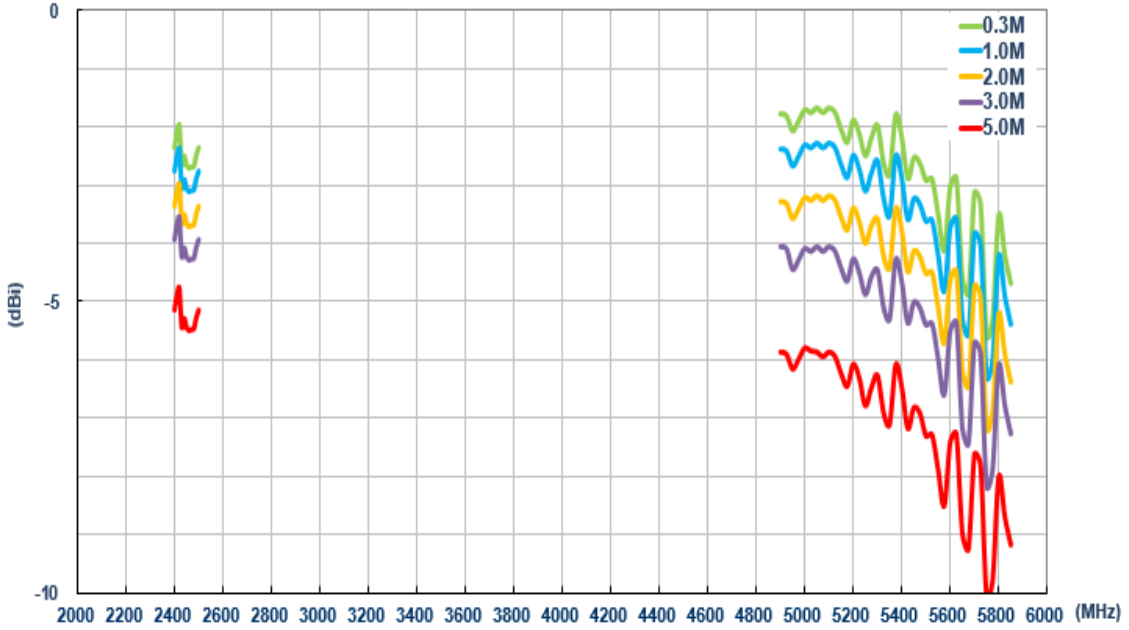
6.4.4 Efficiency (Wi-Fi MIMO 1)



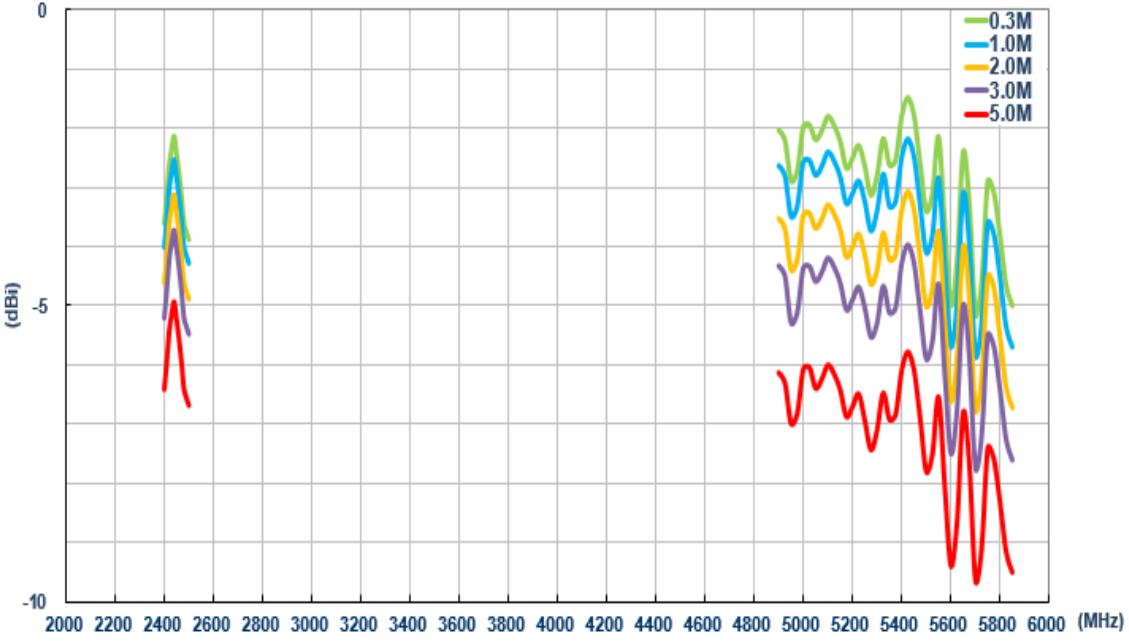
6.4.5 Efficiency (Wi-Fi MIMO 2)



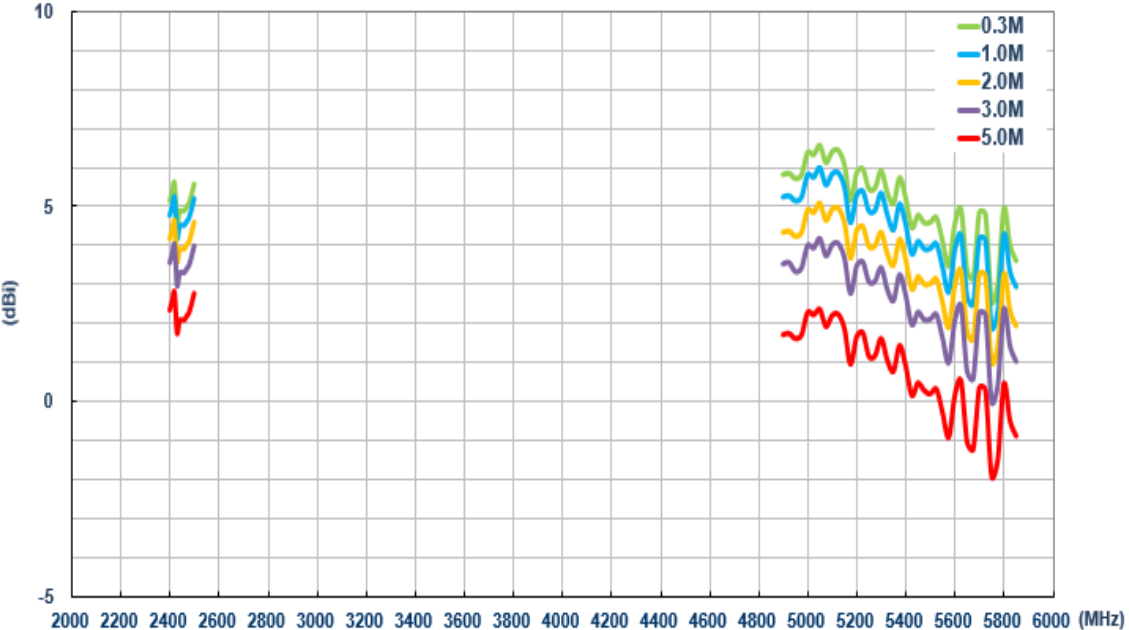
6.4.6 Average Gain (Wi-Fi MIMO 1)



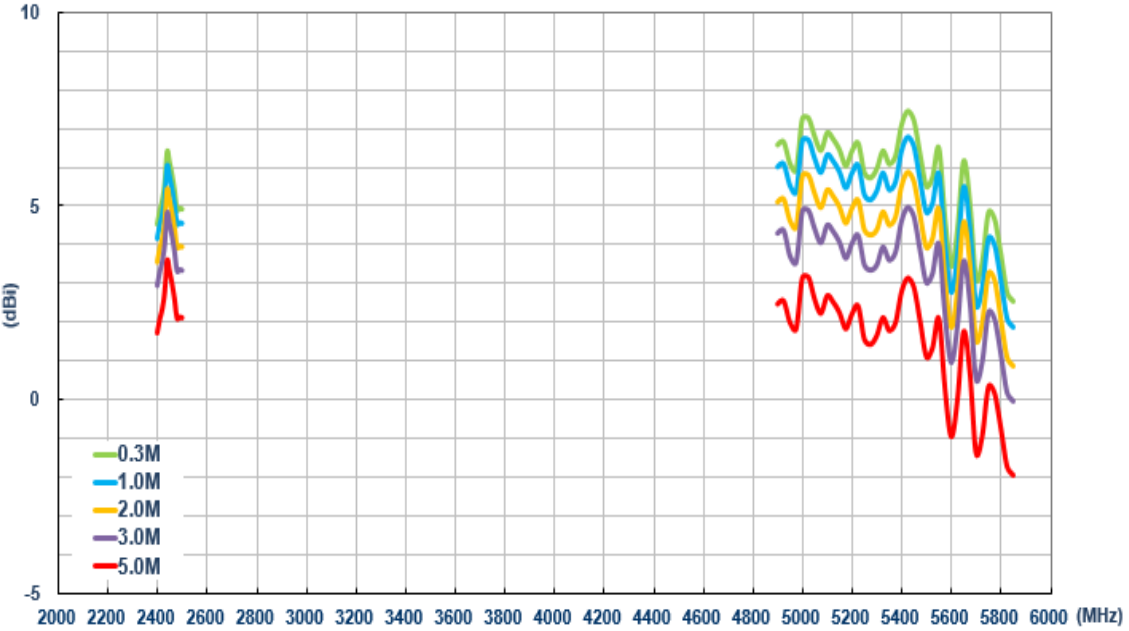
6.4.7 Average Gain (Wi-Fi MIMO 2)



6.4.8 Peak Gain (Wi-Fi MIMO 1)

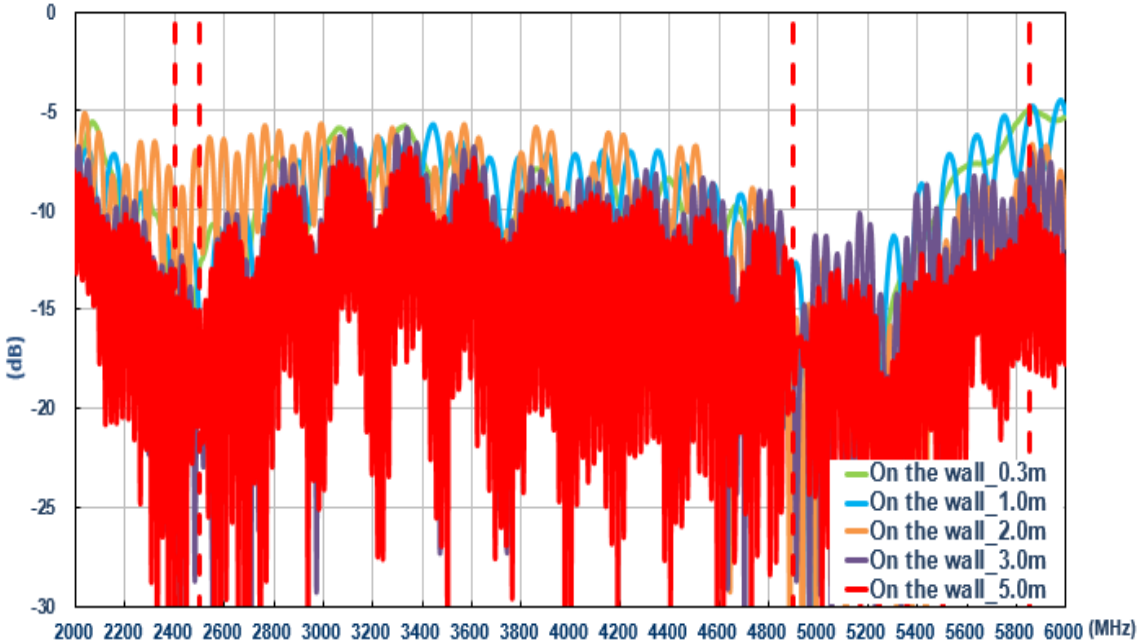


6.4.9 Peak Gain (Wi-Fi MIMO 2)

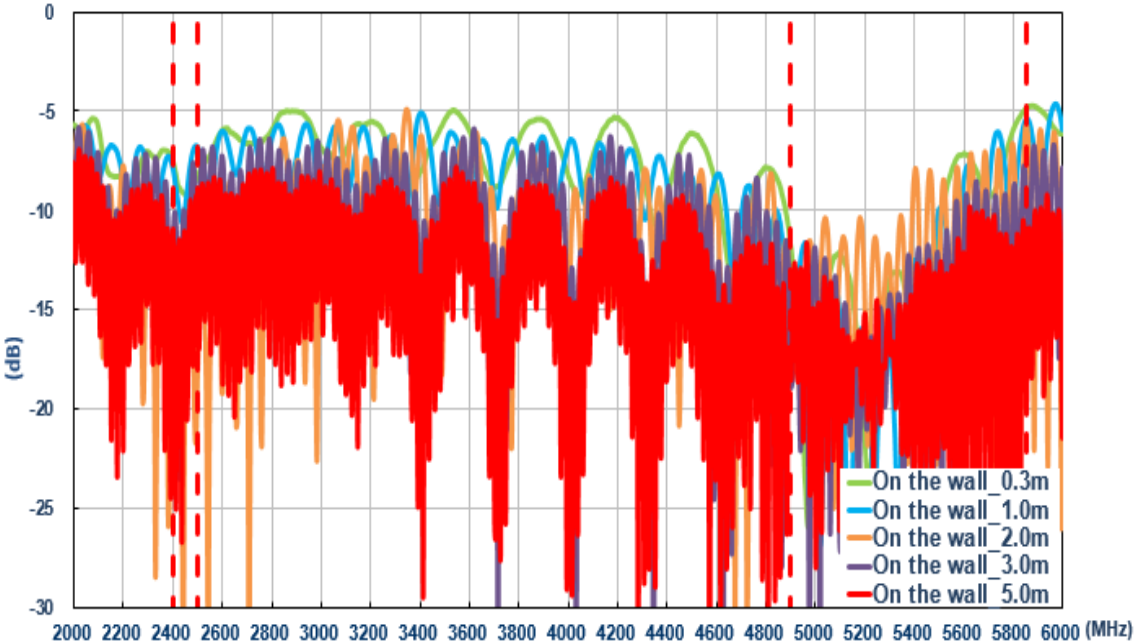


### 6.5 On the wall (Wi-Fi)

#### 6.5.1 Return Loss (Wi-Fi MIMO 1)

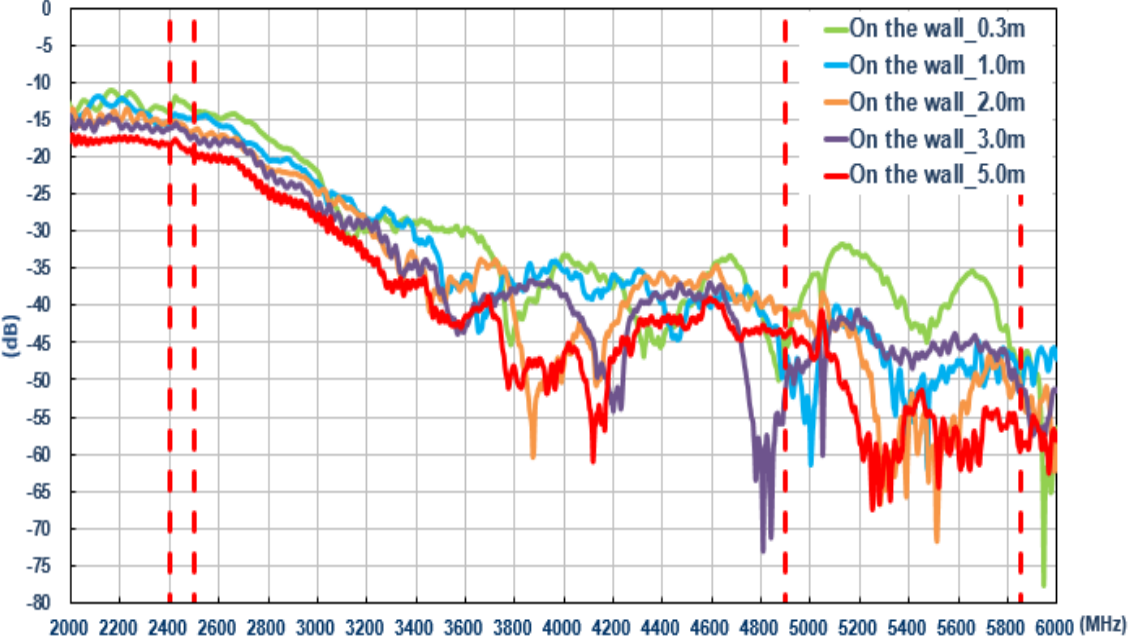


#### 6.5.2 Return Loss (Wi-Fi MIMO 2)

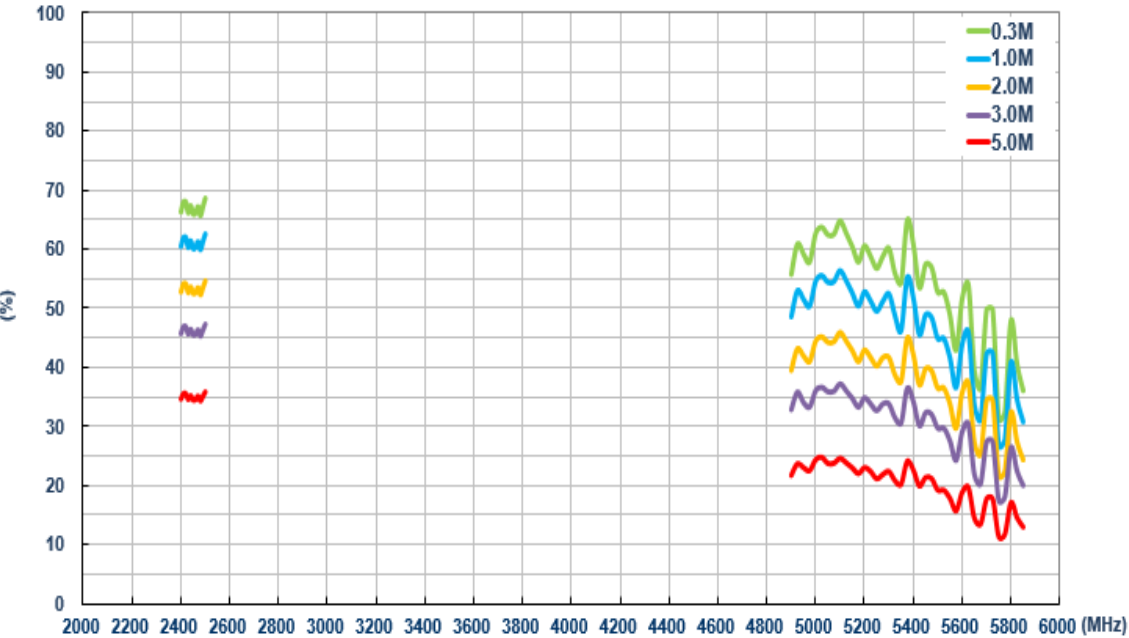




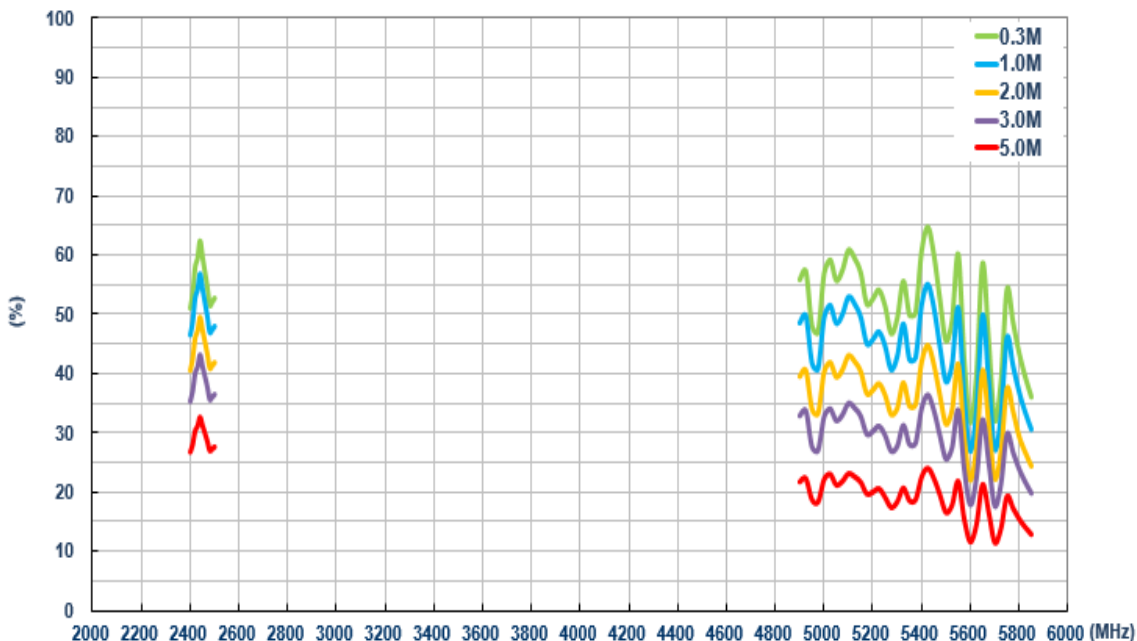
6.5.3 Isolation (Wi-Fi)



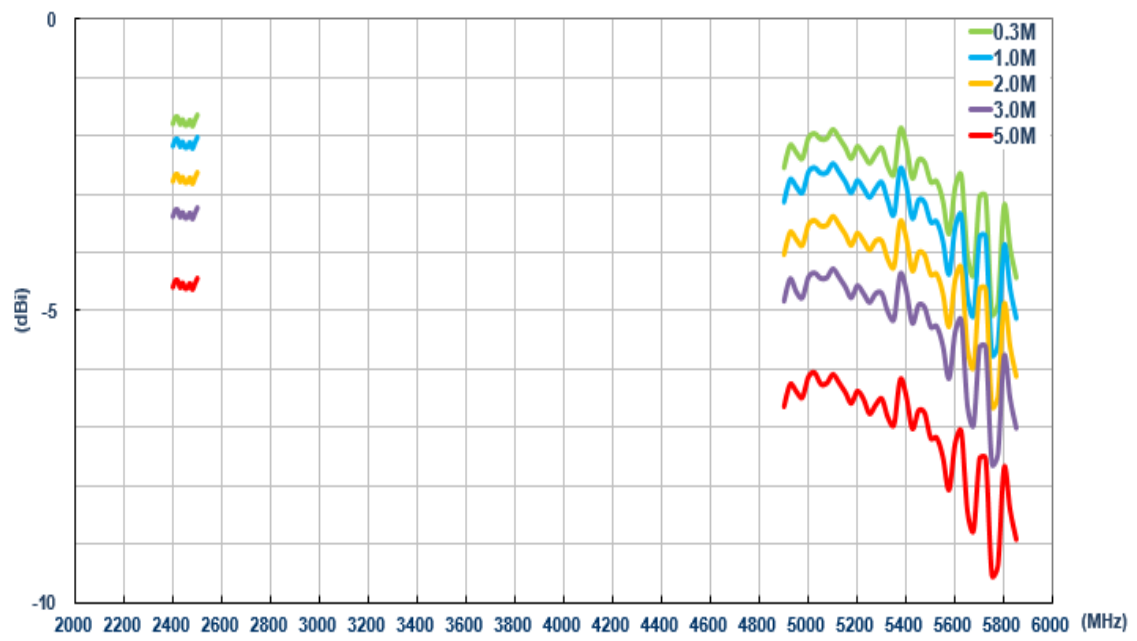
6.5.4 Efficiency (Wi-Fi MIMO 1)



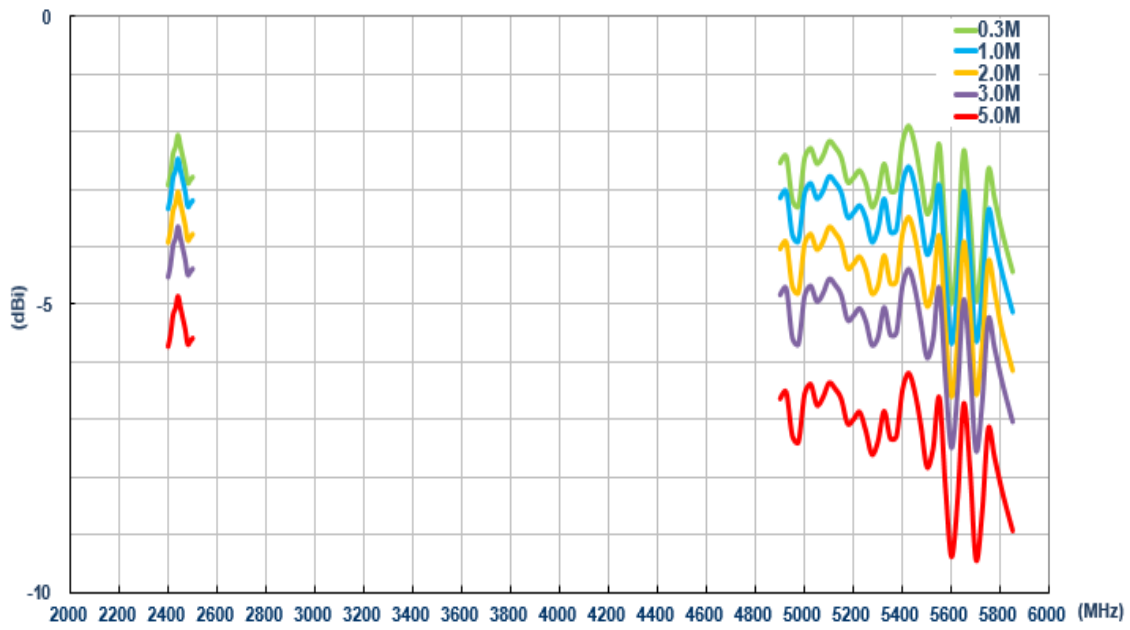
6.5.5 Efficiency (Wi-Fi MIMO 2)



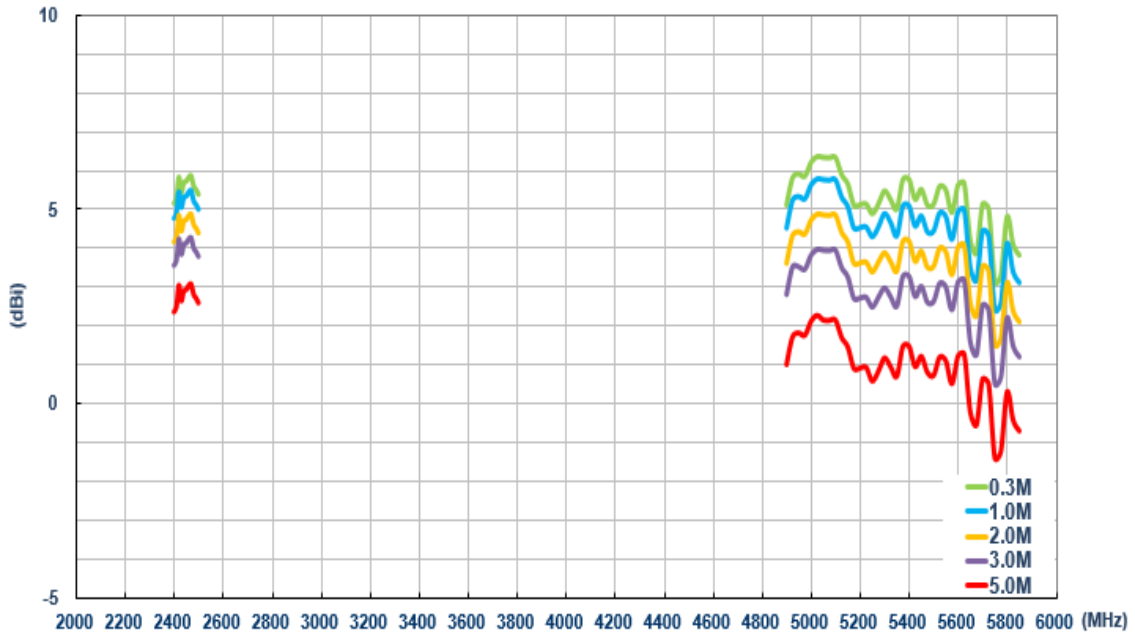
6.5.6 Average Gain (Wi-Fi MIMO 1)



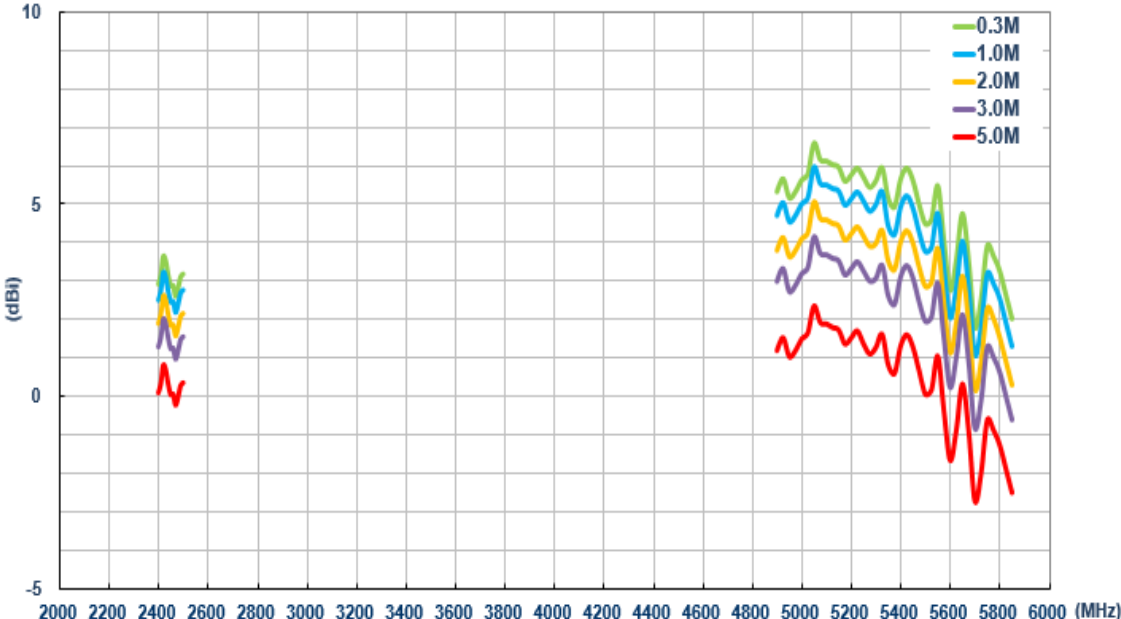
### 6.5.7 Average Gain (Wi-Fi MIMO 2)



### 6.5.8 Peak Gain (Wi-Fi MIMO 1)



6.5.9 Peak Gain (Wi-Fi MIMO 2)



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