2.4/5GHZ WIFI DUAL BAND ANTENNA WITH SIDE SOLDER CABLE

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APPLICATION SPECIFICATION

2.4/5GHZ WIFI DUAL BAND ANTENNA WITH SIDE SOLDER CABLE

1.0 SCOPE

This specification describes the antenna application and surrounding. The information in this document is for reference and benchmark purposes only. The user is responsible for validating antenna RF performance based on the user's actual implementation.

Although this document AS-2042810300 is for U.FL compatible connector and 300mm cable, it is applicable to all products under 204281 series. All measurements in this document are done with the part no.2042810300 with a cable length of 300mm, it is used to illustrate the product application. There is no different between the performances for 204810100 and 204811100. The document is applicable to all cable length as well.

Antenna illustrations in this document are generic representations. They are not intended to be an image of any antenna listed in the scope.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

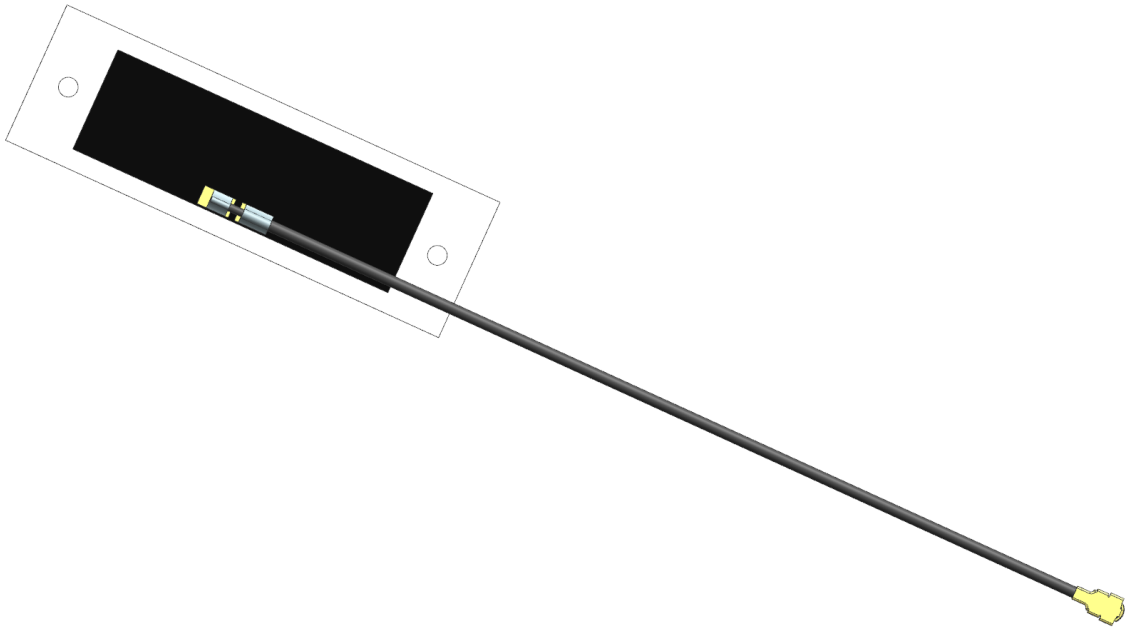
Product name: 2.4/5GHz WIFI Dual Band Antenna with Side Solder Cable
Series Number: 204281

2.2 DESCRIPTION

Series 204281 is a balanced, side-fed, dipole-type, high efficiency antenna for 2.4/5 GHz applications, including WiFi, Bluetooth, Zigbee and others. This antenna is made from poly-flexible material with small size 35*11*0.1mm, and has double-sided adhesive tape for easy "peel and stick" mounting. This balanced antenna with ground plane independent design offers various cable length options for ease of integration into various devices.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2042810300 for full information.



Molex 204281XXXX 2.4/5GHz Wide dual band Antenna 3D View

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DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810300	**Benson Liu 2018/01/24**	**Kang Cheng 2018/01/24**	**Chris Zhong 2018/01/24**

3.0 APPLICABLE DOCUMENTS

Document	Number	Description
Sales Drawing(SD)	SD-2042810300	Mechanical Dimension of the product
	SD-2042811300	
Product Specification (PS)	PS-2042810300	Product Specification
Packing Drawing(PK)	PK-2042810300	Product packaging specifications

4.0 ANTENNA PERFORMANCE

Product name	2.4/5GHz Wide Dual Band Antenna with side solder cable
Part number	204281****
Frequency	2.4GHz-2.5GHz
	5.15GHz-5.85GHz
Polarization	Linear
Operating with matching	-30℃ to 85℃
Storage with matching	-40℃ to 95℃
RF Power	2 Watts
Impedance with matching	50 Ohms
Antenna type	Flex
Connector type	U.FL for 2042810***
	IPEX MHF4 for 2042811***
User Implementation type	Adhesive 3M9077
Cable diameter	Ø1.13mm
Cable length	250mm for 2042810250 and 2042811250

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on a PC/ABS material block of 1mm thickness with VNA Agilent 5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.2042810300 and 2042811300 with a cable length of 300mm.

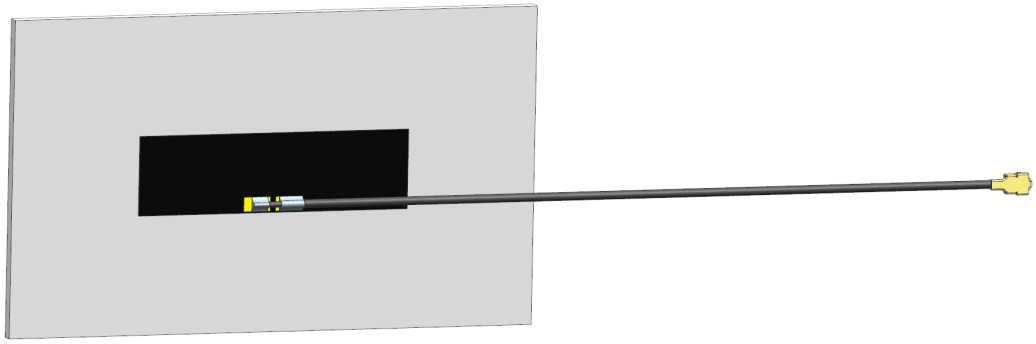

FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 1MM THICKNESS

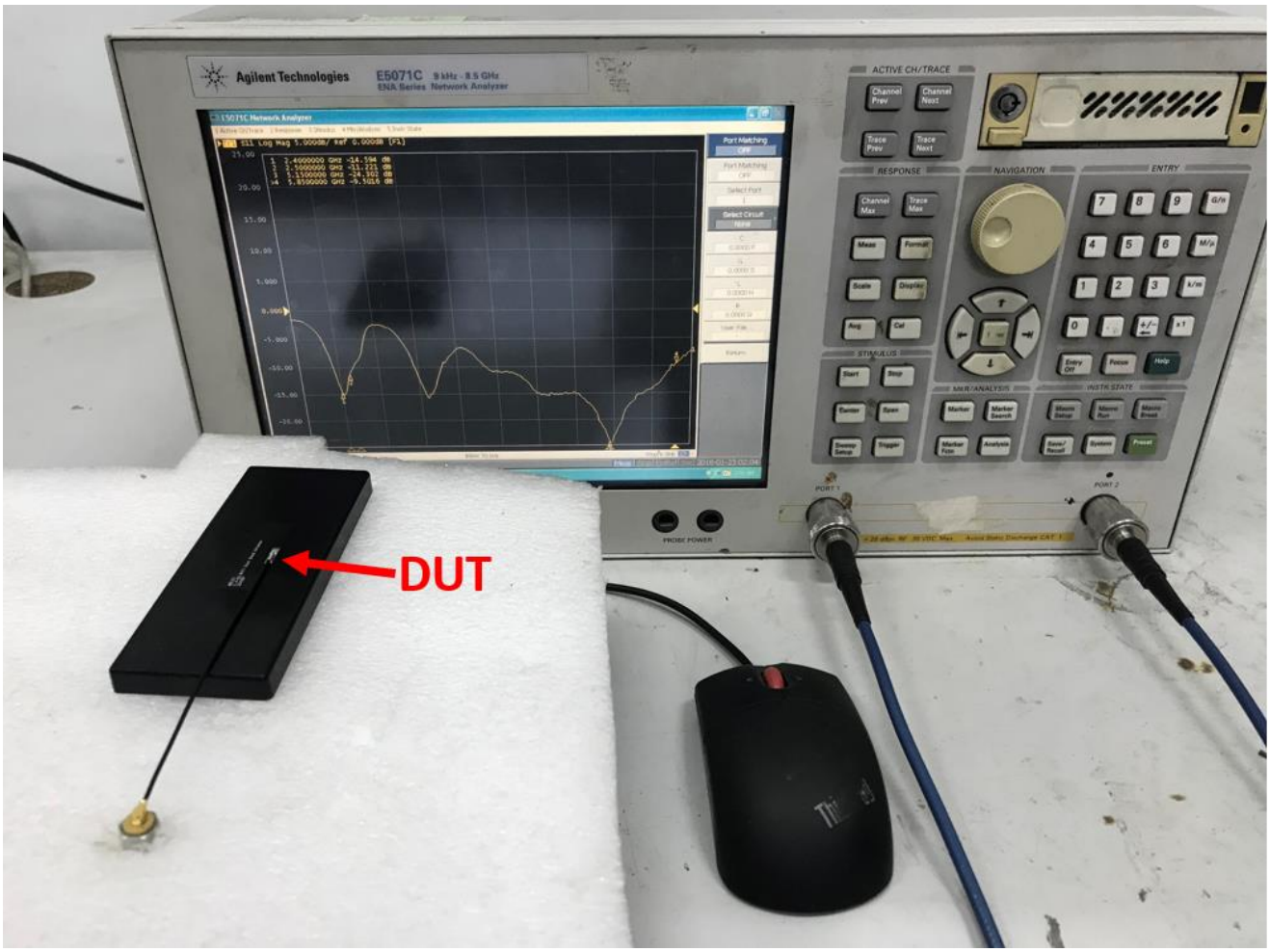

FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1MM THICKNESS TESTED WITH VNA E5071C

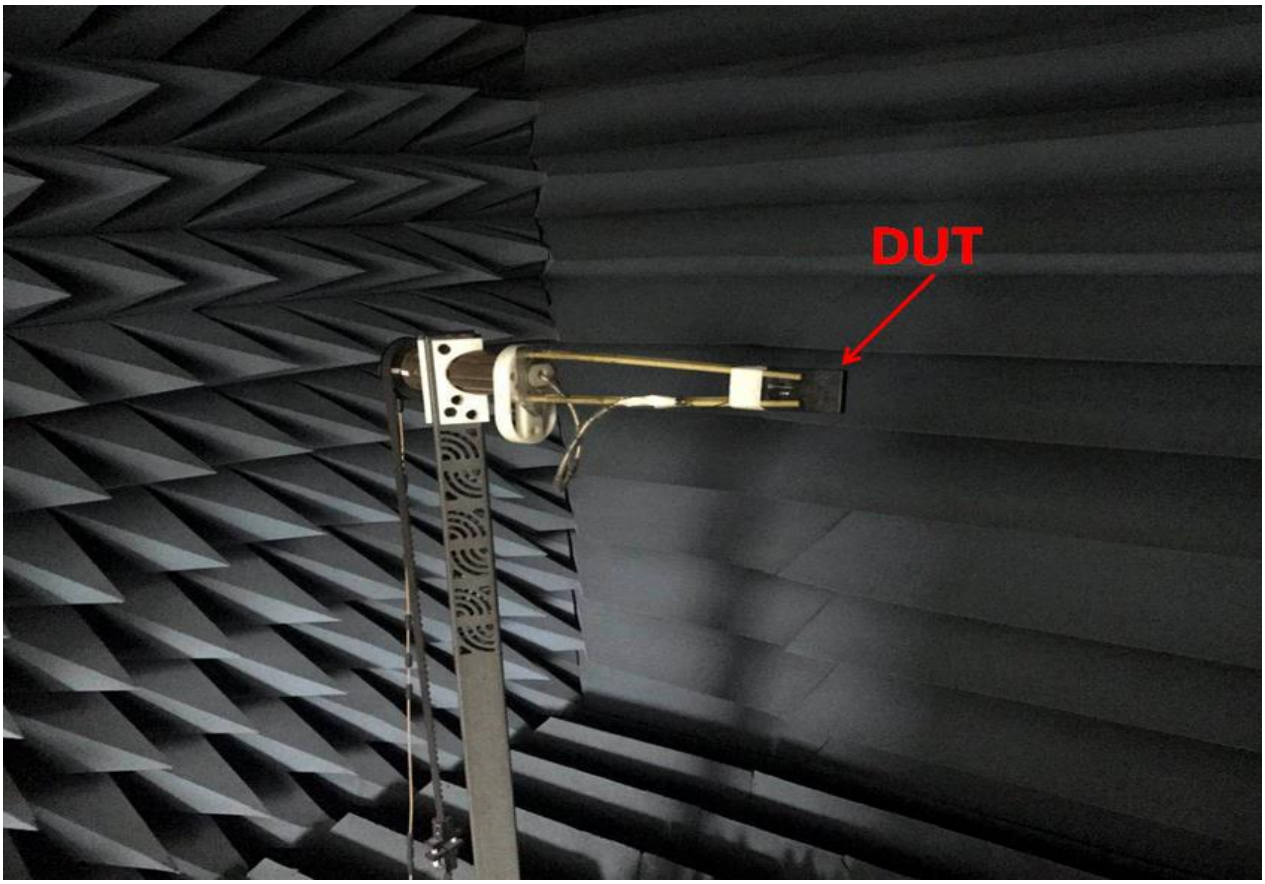

FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 1MM THICKNESS TESTED IN OTA CHAMBER

4.2 ANTENNA PERFORMANCE

5.1.2 ANTENNA PERFORMANCE FOR CABLE LENGTH 250mm		
P/N	2042810250 and 2042811250	
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz
Peak Gain(Max)	2.0dBi	3.3dBi
Total efficiency	>65%	>68%
Return Loss	<-10dB	

4.3 RETURN LOSS PLOT

All measurements in this document are done with a cable length of 250mm

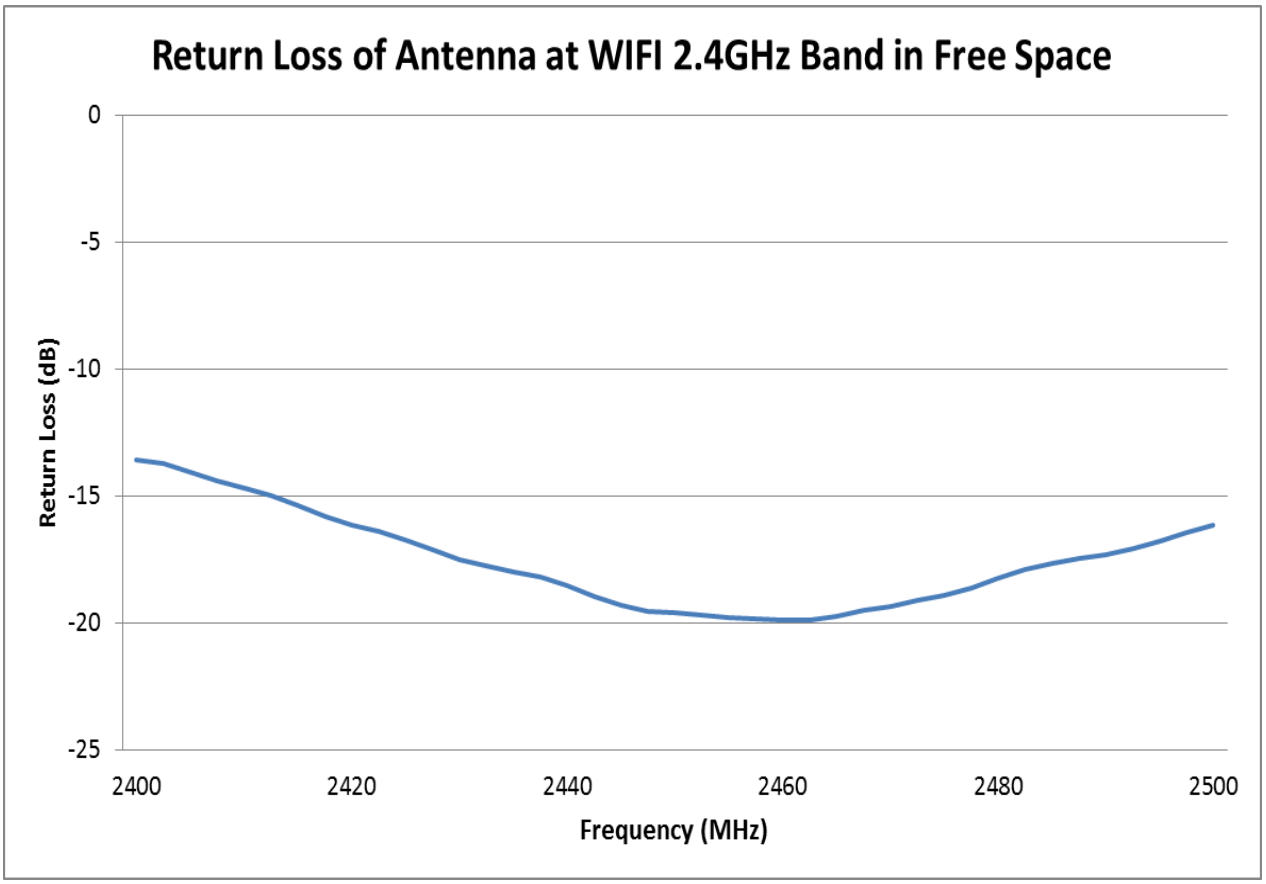

FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT WIFI 2.4GHZ BAND IN FREE SPACE

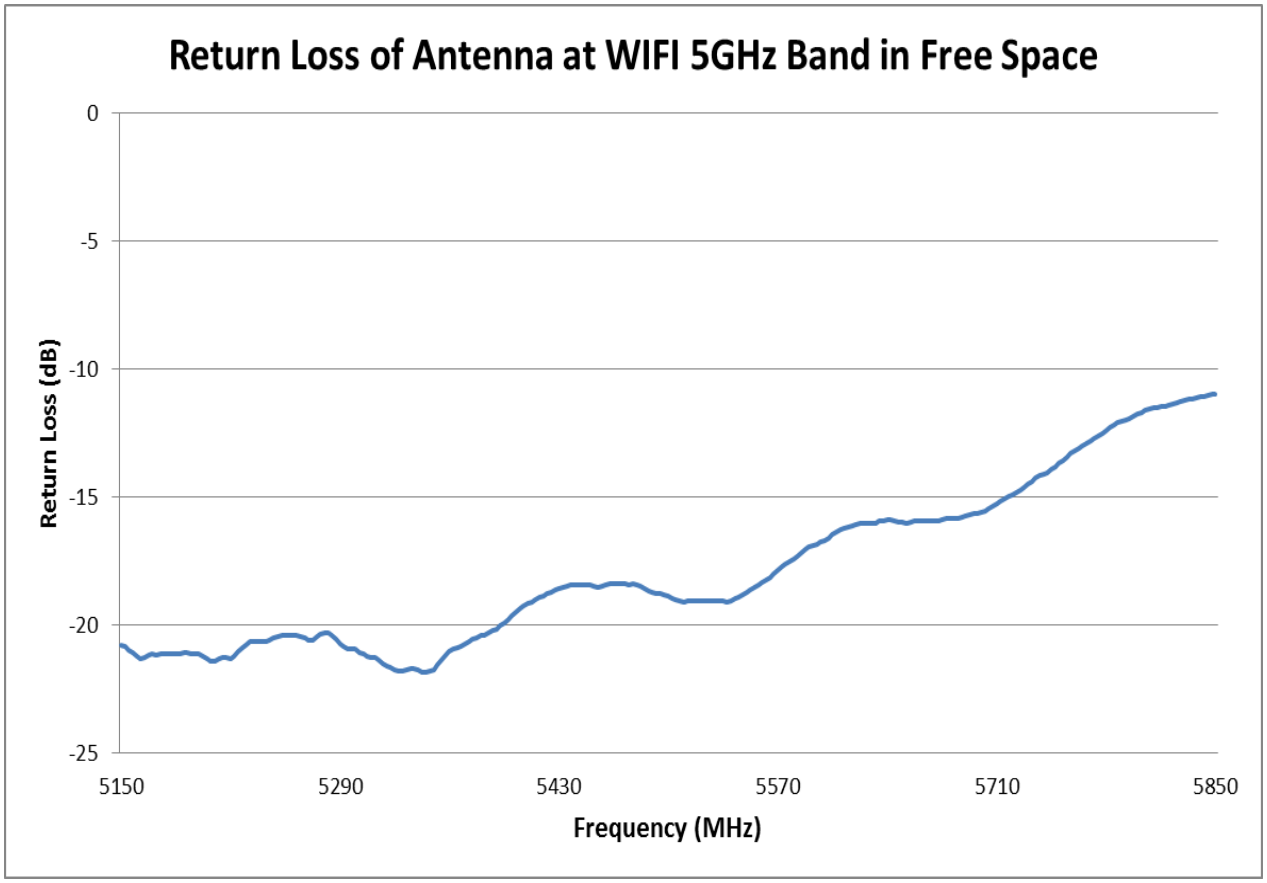

FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT WIFI 5GHZ BAND IN FREE SPACE

4.4 EFFICIENCY PLOT

All measurements in this document are done with a cable length of 250mm

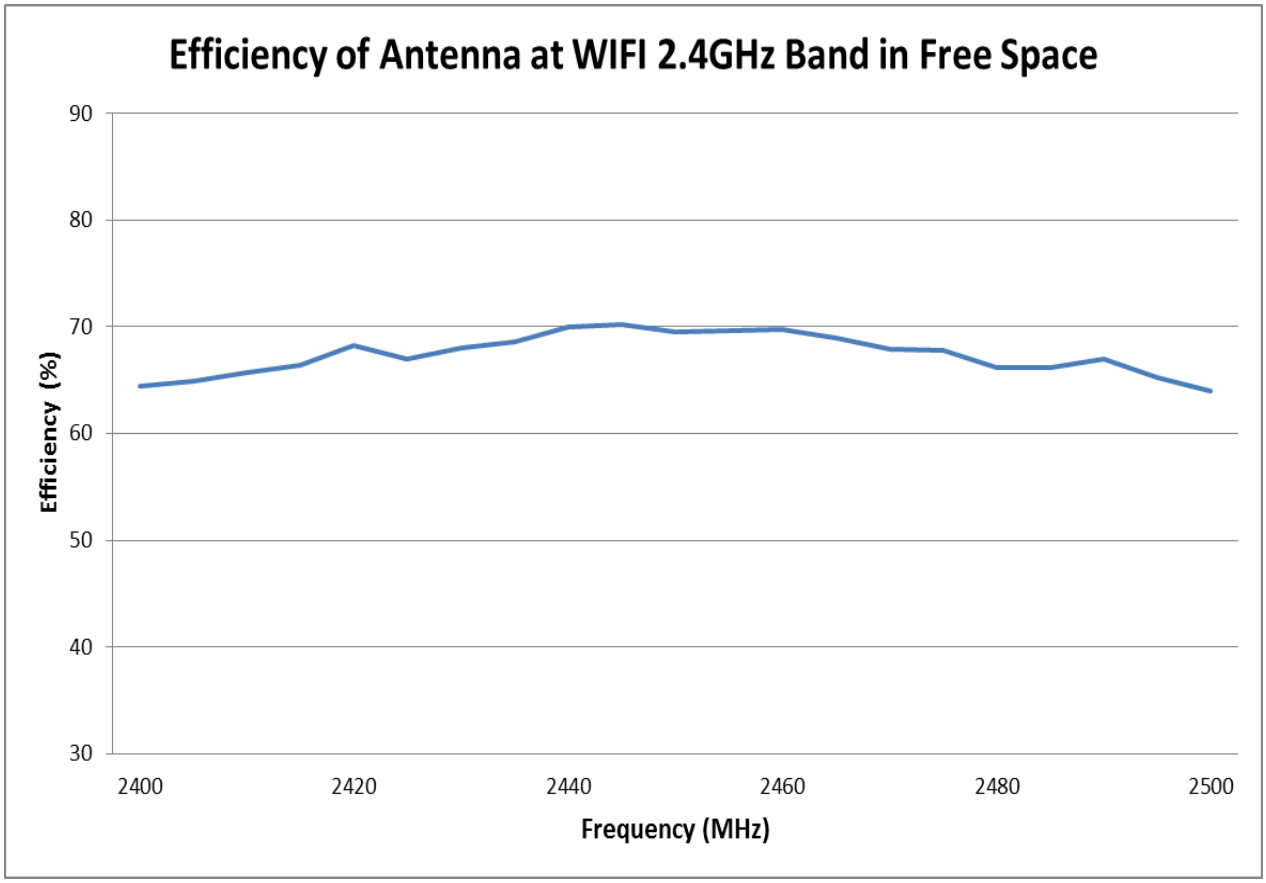

FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT WIFI 2.4GHZ BAND IN FREE SPACE

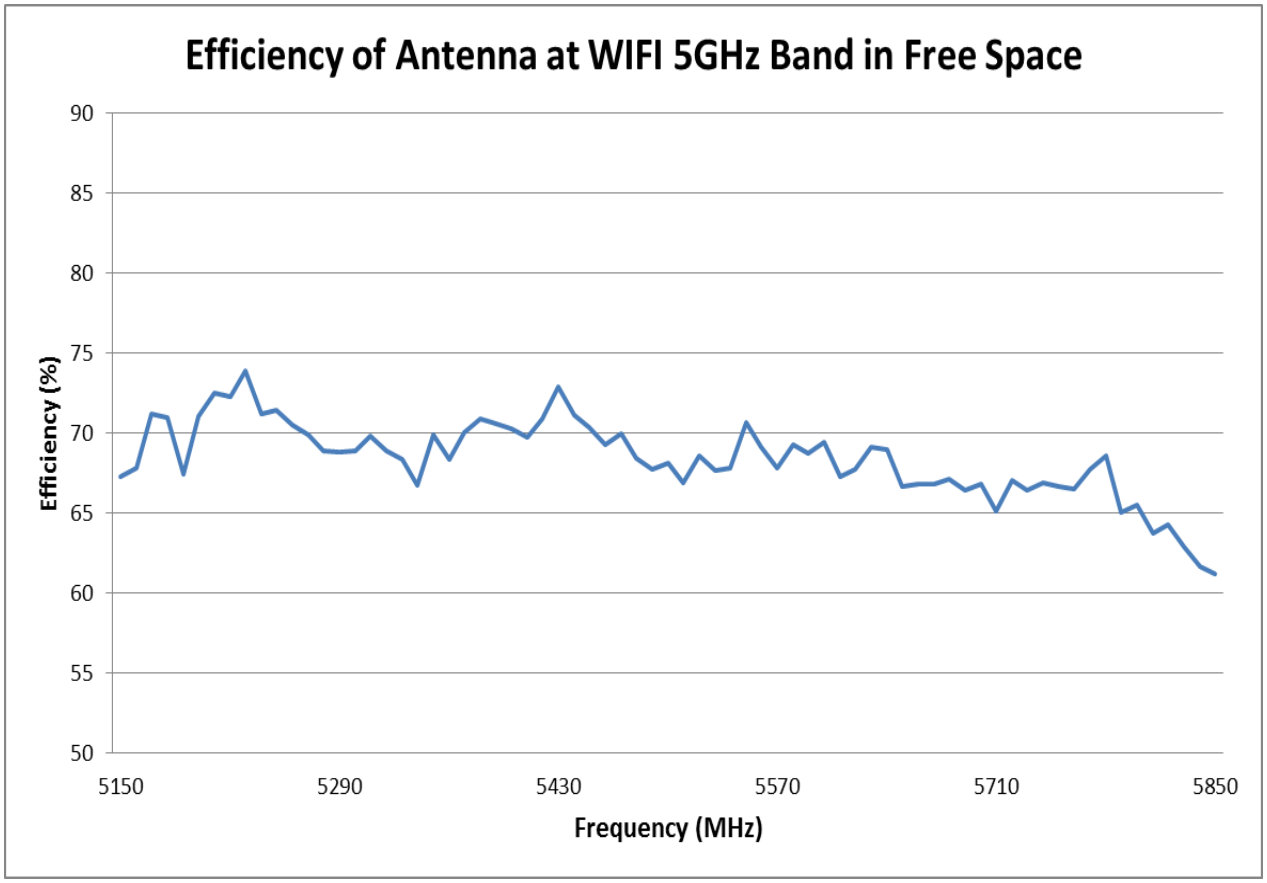

FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT WIFI 5GHZ BAND IN FREE SPACE

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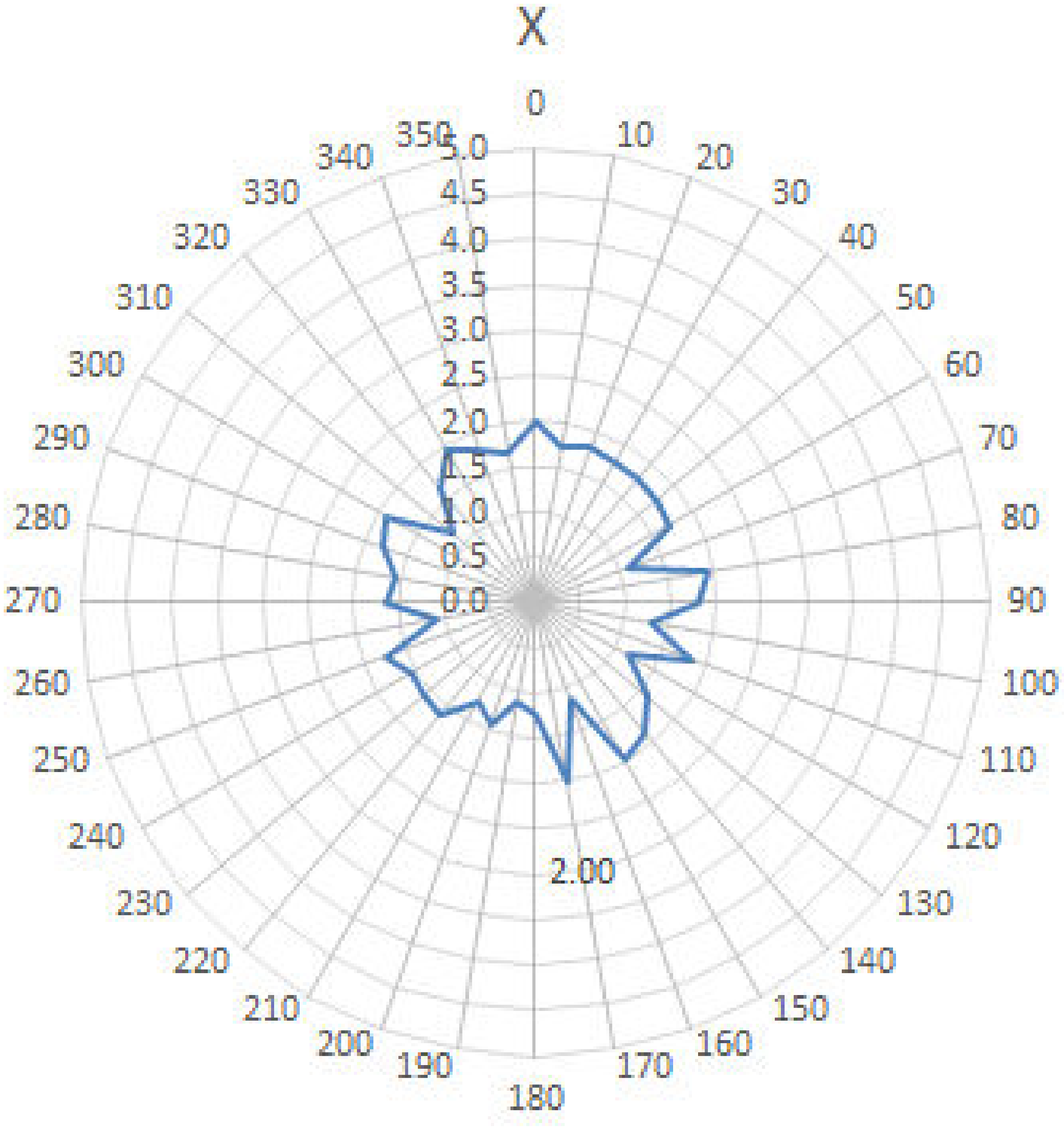
4.5 RADIATION PATTERN

All measurements in this document are done with a cable length of 250mm.

FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 2.44GHZ IN FREE SPACE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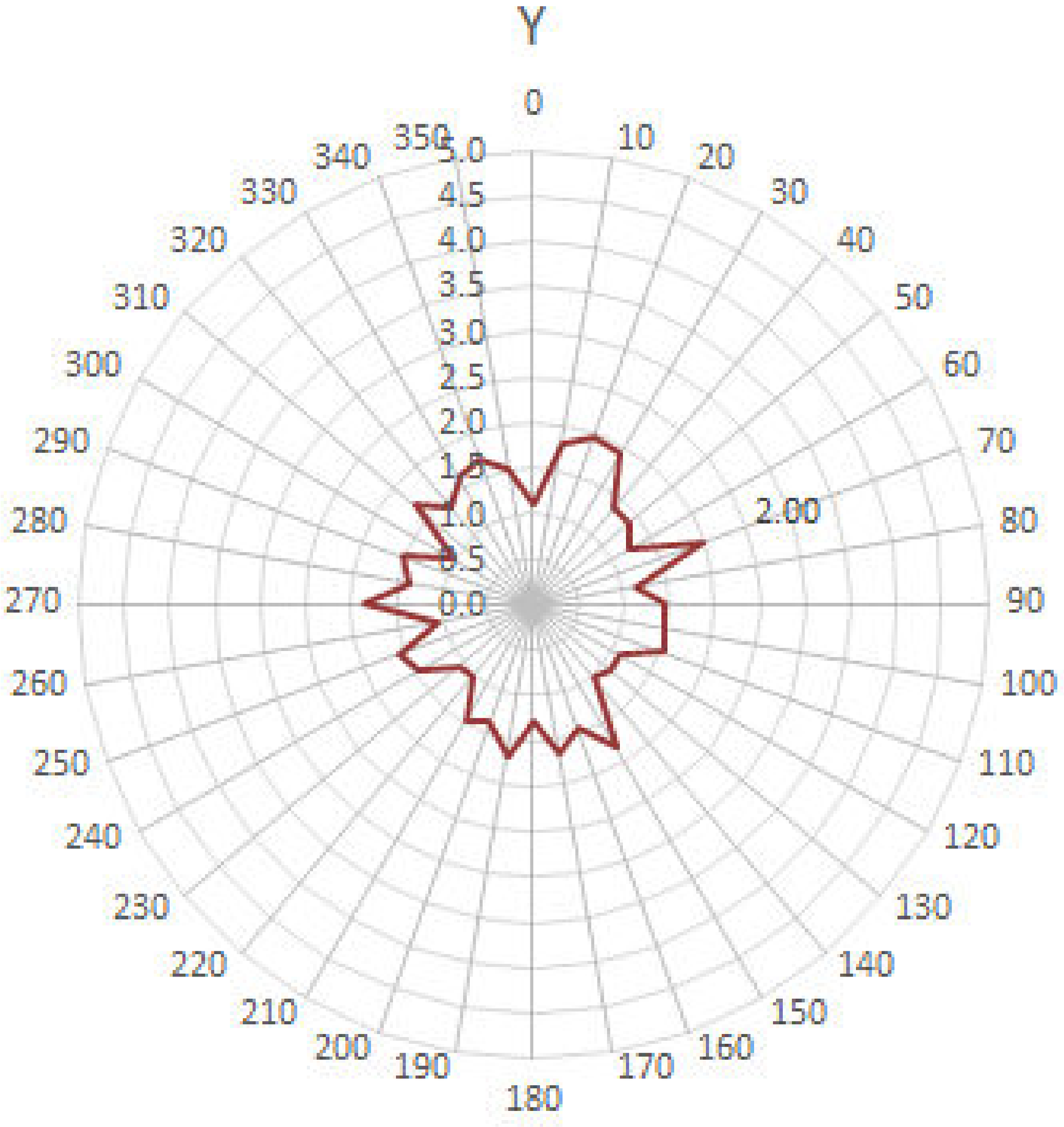
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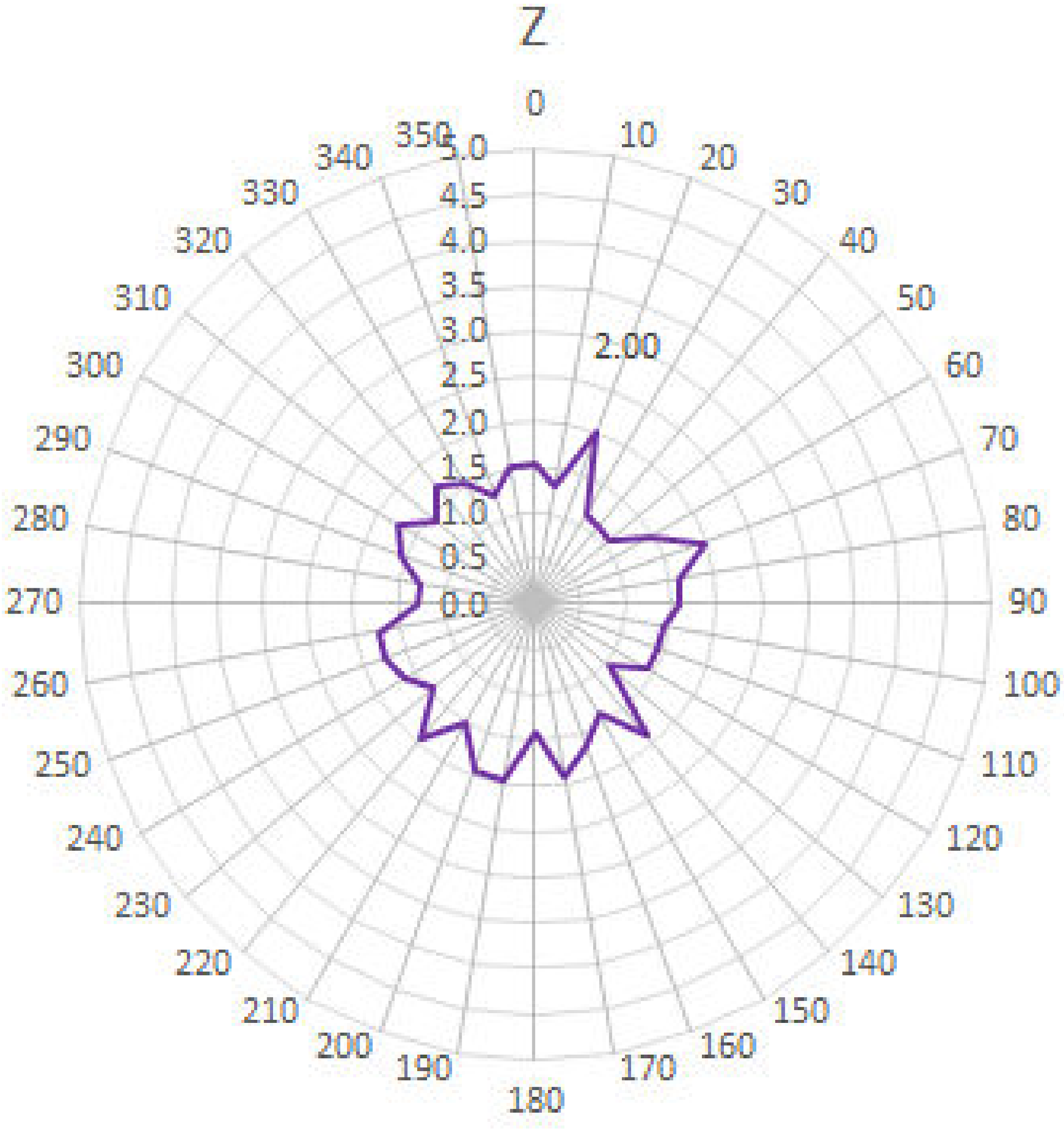
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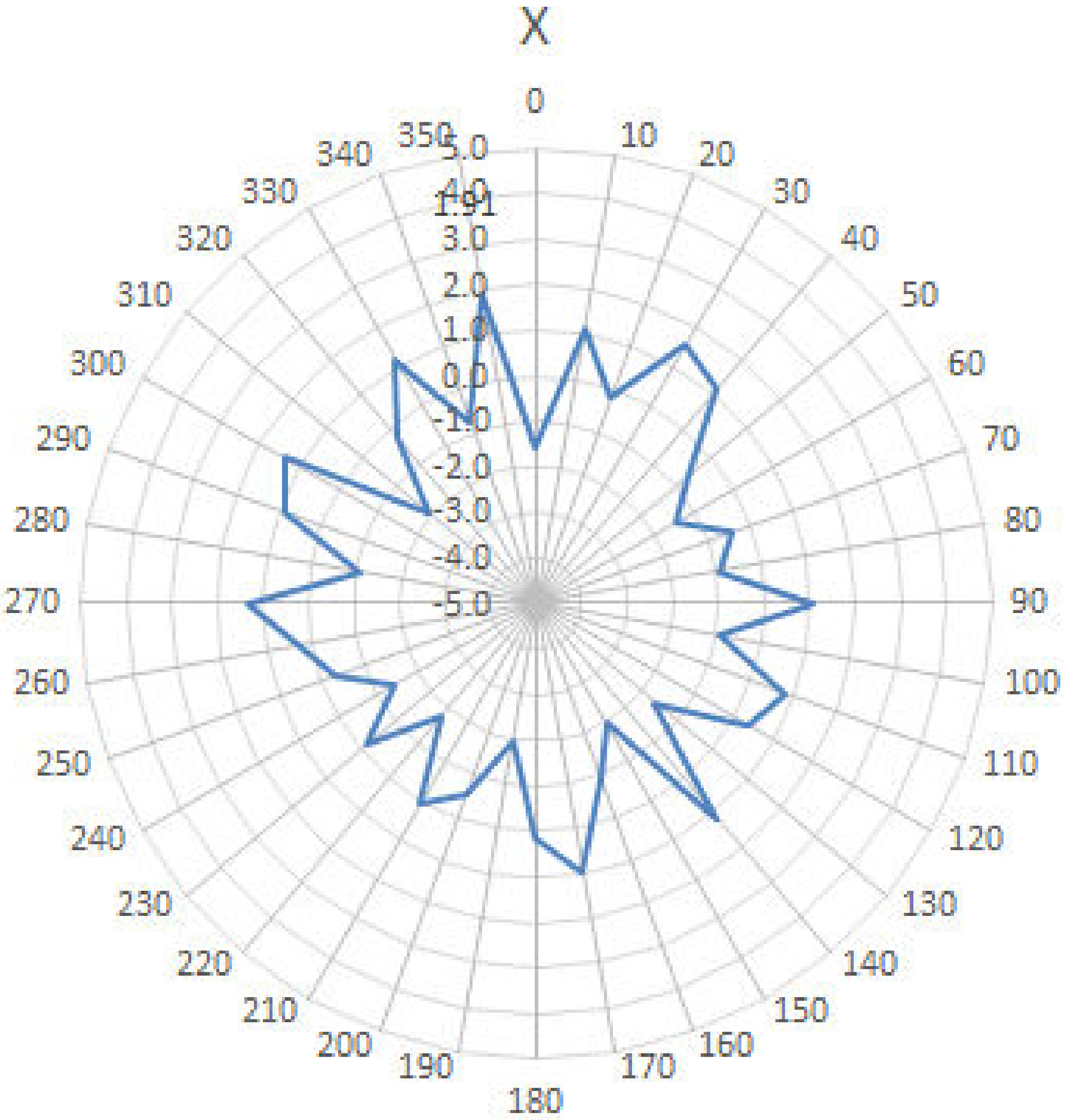
FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 5.80GHZ IN FREE SPACE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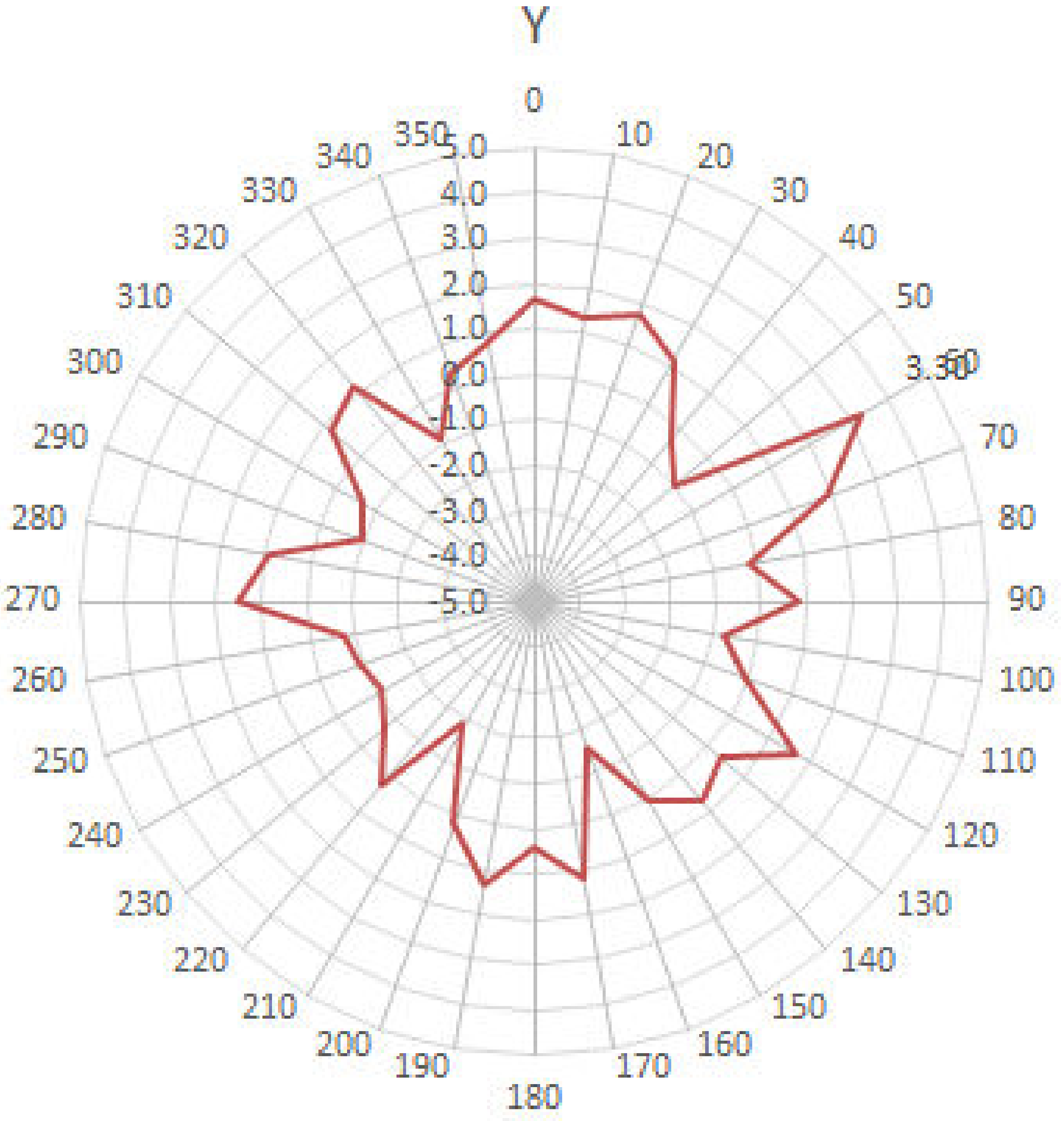
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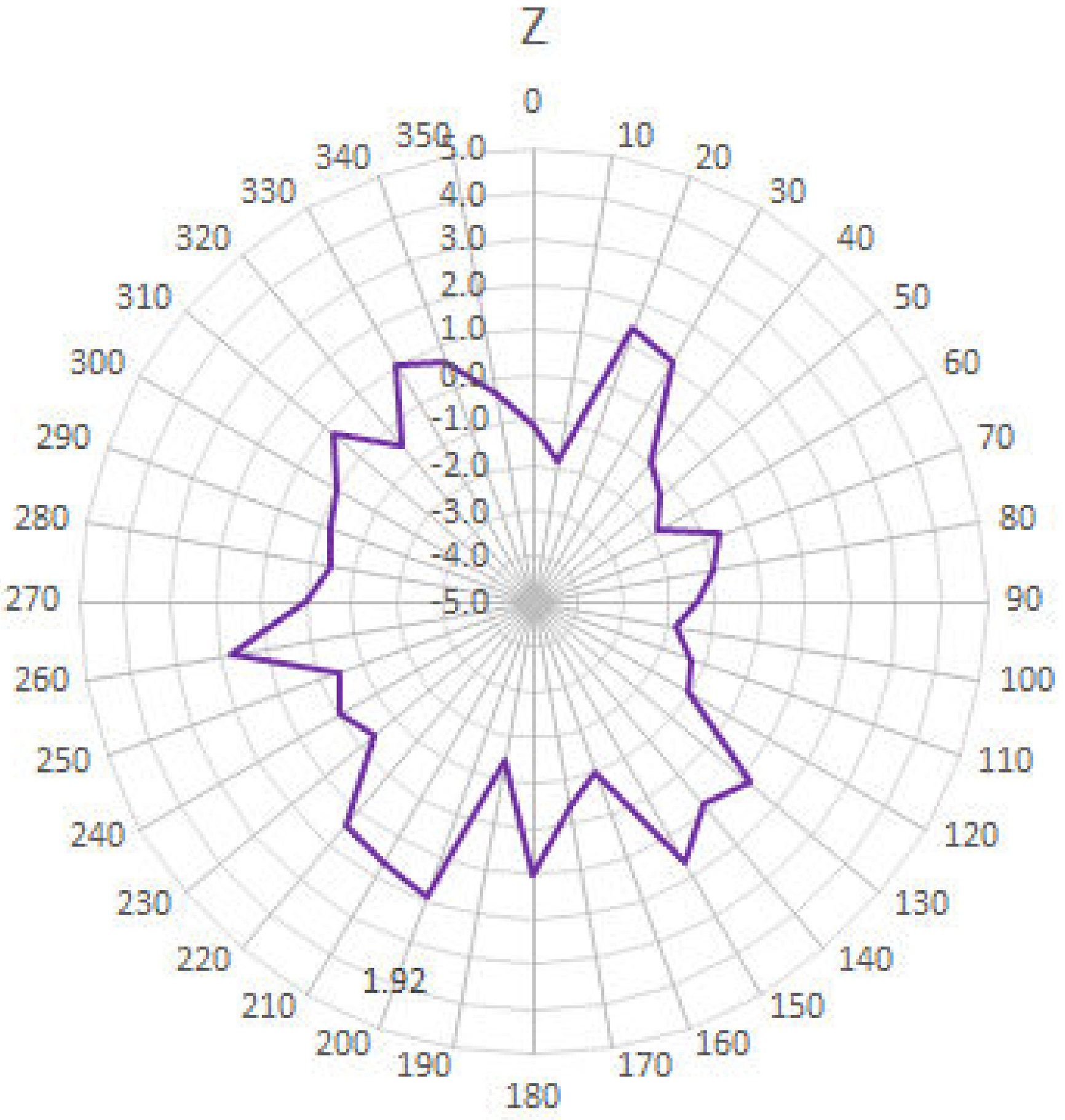
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5.0 ASSEMBLY GUIDELINE

The flex antenna comes with an adhesive 3M9077 for assemble onto the plastic wall of the system. The surface should be smooth with Ra<1.6um, and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

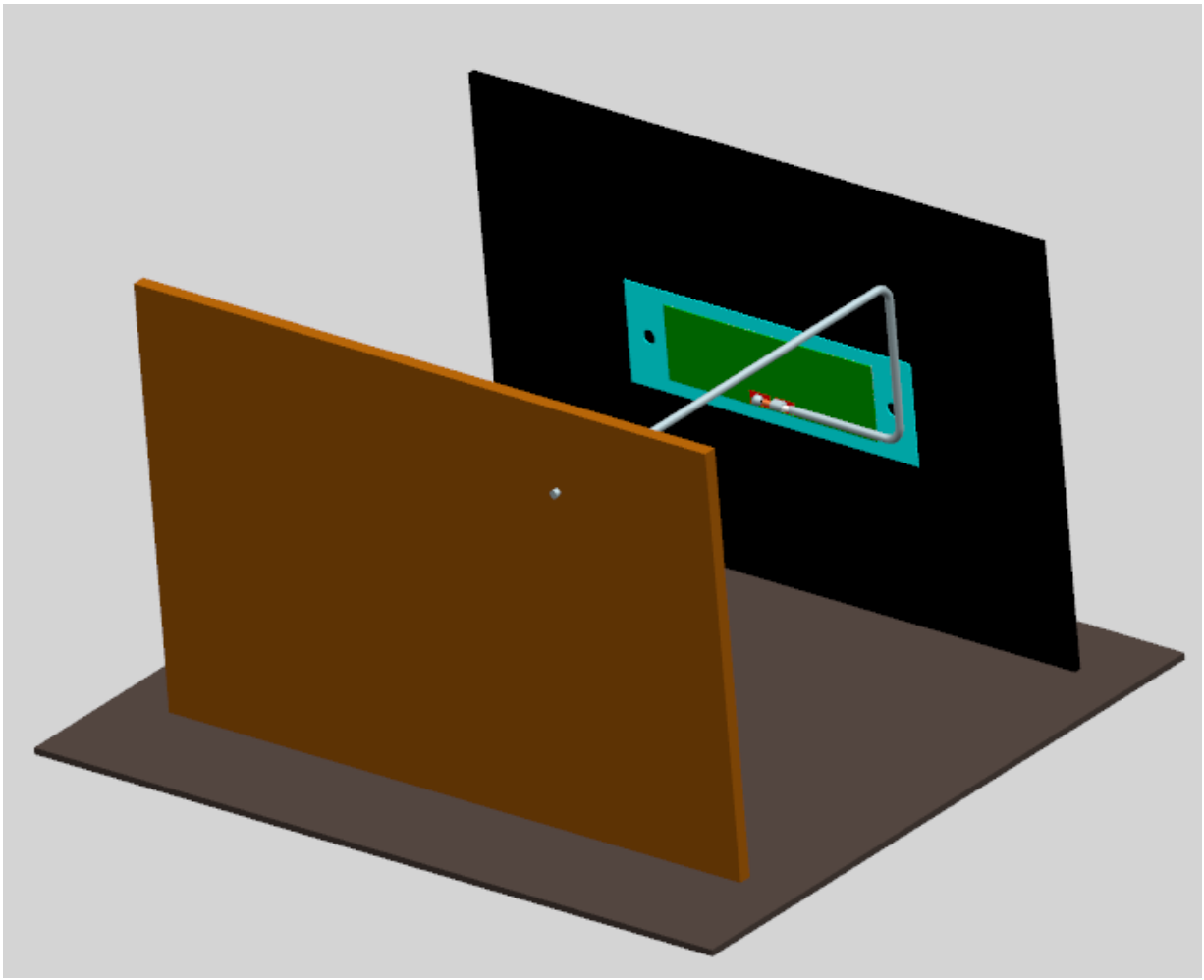

FIGURE 5.1 ASSEMBLY GUIDELINE

During the assembly of the antenna in a device, the cable needs to be positioned away from the antenna flex to achieve best performance. The cable must be away from the pattern at least 5mm as shown in figure 5.2. If the cable crosses into the antenna flex, the antenna performance will be degraded.

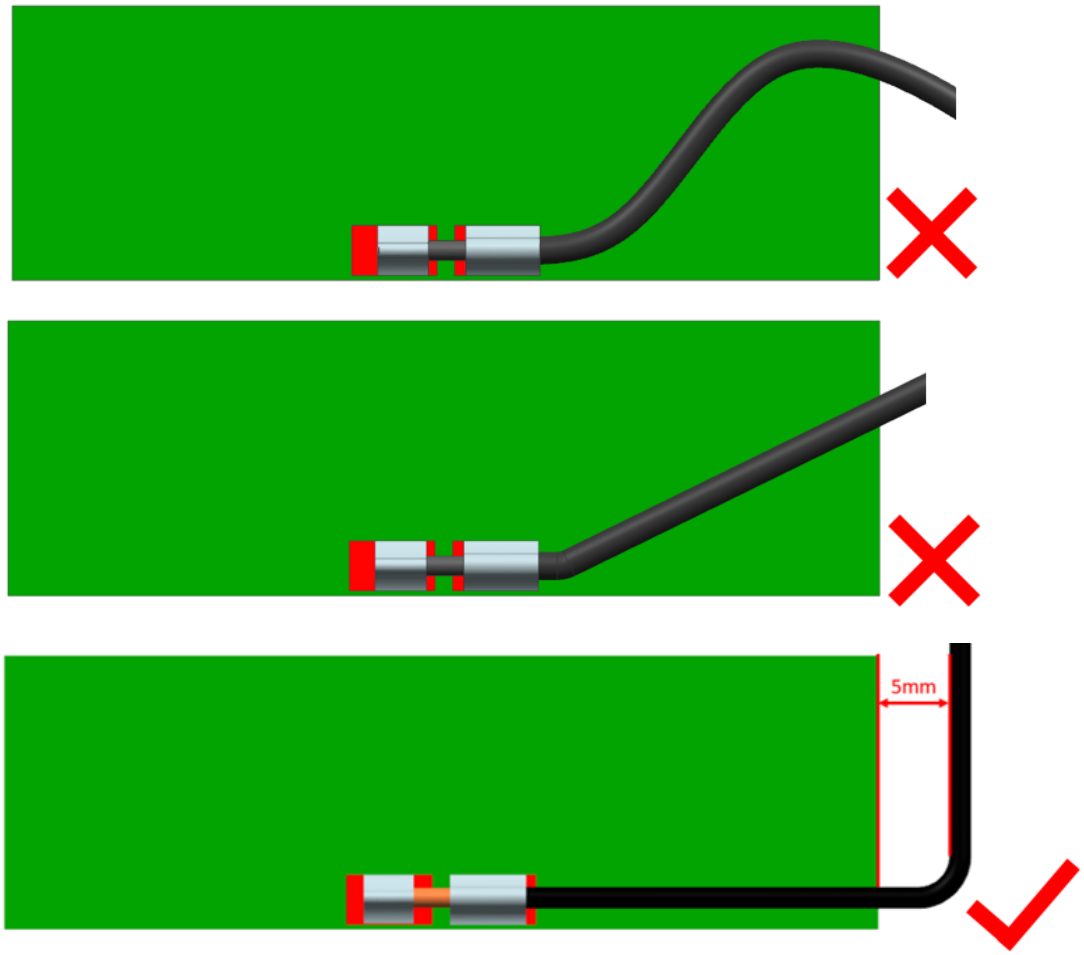

FIGURE 5.2 CABLE BENDING

6.0 THE ANTENNA PERFORMANCE VARIATION WITH CABLE LENGTH

6.1 CABLE LOSS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENTS	
	Frequency Range	2.4GHz/5GHz	2GHz~3GHz	5GHz~6.0GHz
6.1.1	Attenuation	1m cable measured by VNA5071C	⩽3.5dB/m	⩽5dB/m

6.2 CABLE LENGTH AFFECT THE ANTENNA PERFORMANCE

Balance antenna resonance is insensitive by cable's length, but the cable's loss will affect the total efficiency. Refer to 6.1.1.

6.3 FOR EXAMPLE

	250mm cable		
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Cable Loss
	X		X-LOSS=Y
2400	1.91	64.44	0.2m*3.5dB/m
2420	1.96	68.21	
2440	2.00	69.92	
2460	1.85	69.74	
2480	1.79	66.18	
2500	1.94	64.02	
5150	2.99	67.25	0.2m*5dB/m
5200	3.08	71.00	
5250	3.12	71.40	
5300	2.98	68.86	
5350	3.08	69.89	
5400	3.01	70.30	
5450	2.82	70.32	
5500	2.67	68.08	
5550	2.51	70.63	
5600	2.95	69.40	
5650	2.76	66.66	
5700	2.75	66.78	
5750	2.76	66.67	
5800	3.30	65.48	
5850	2.63	61.21	

- The data is just for your reference, all accurate performance should be according to the test results in the OTA chamber.

7.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

7.1 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIONS WITH PARALLEL PLANE GROUND

Antenna performance will be degraded if the antenna is placed too close to a ground plane. Four locations from 5mm, 10mm, 15mm and 20mm with a parallel plane ground have been evaluated. The locations are shown in figure 7.1.1. The plane ground size is 90mm*90mm. The antenna performance is better with larger distance between antenna and parallel plane ground. The minimum distance between antenna and plane ground is recommended to be at least 15mm to achieve acceptable RF performance.

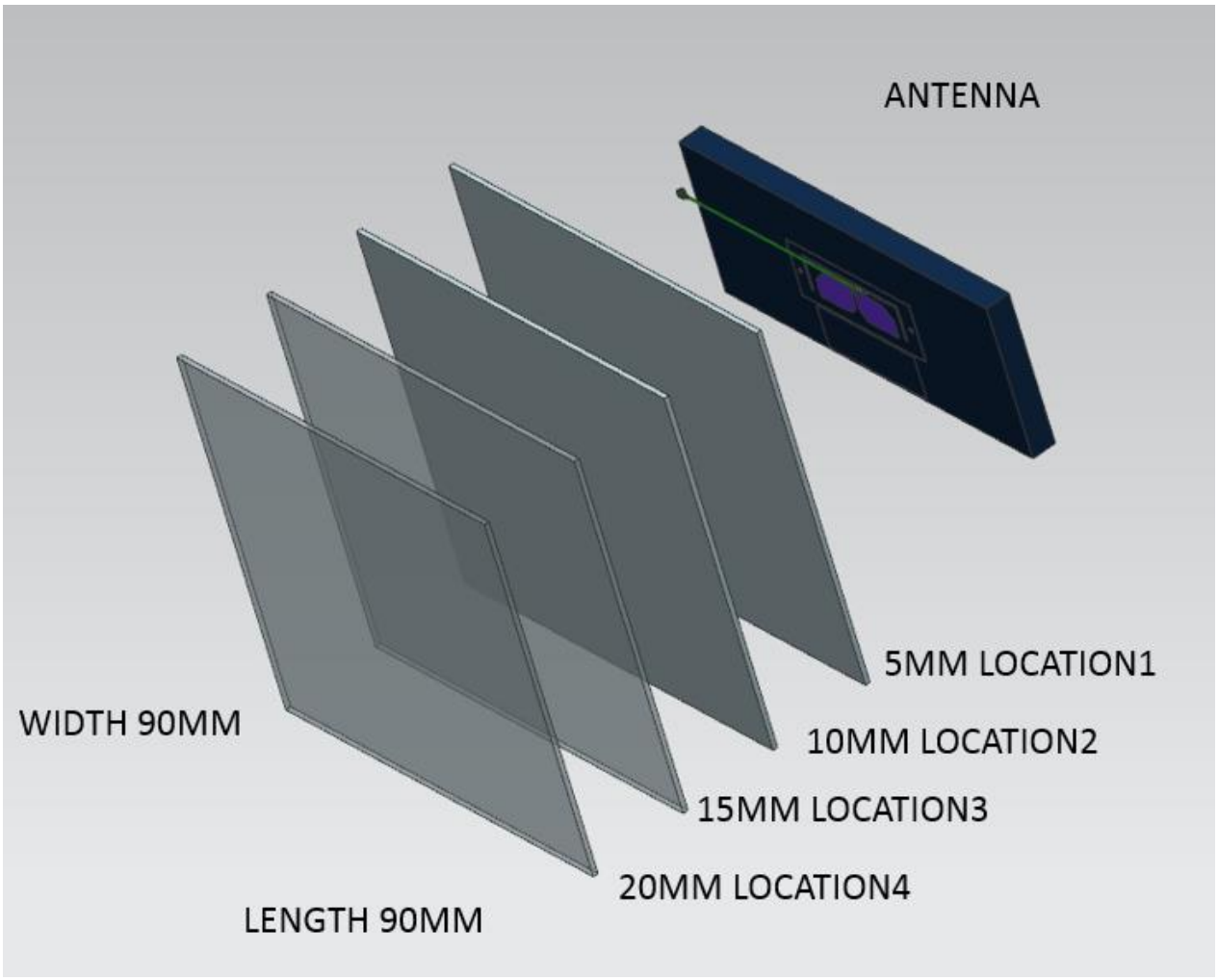

FIGURE 7.1.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

.

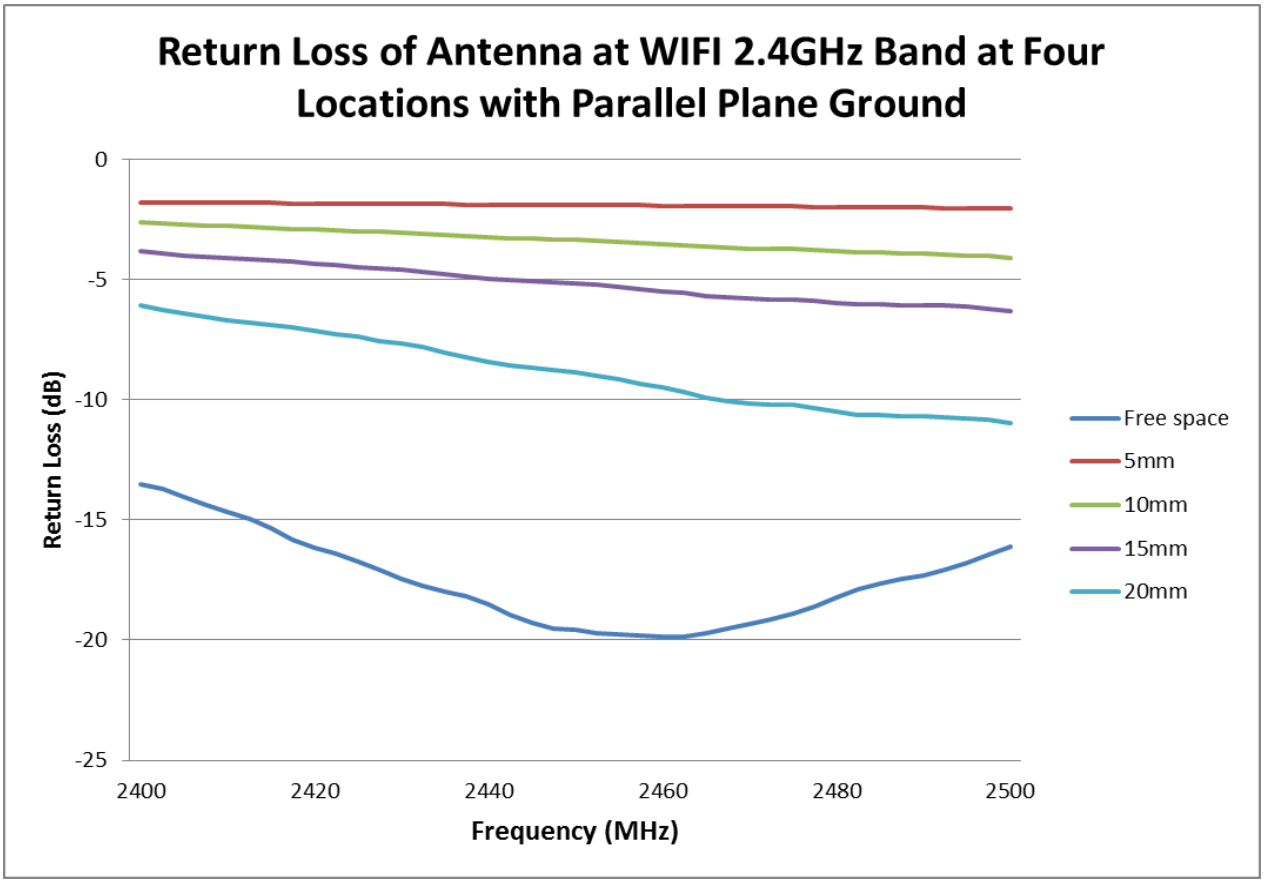

FIGURE 7.1.2 RETURN LOSS OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

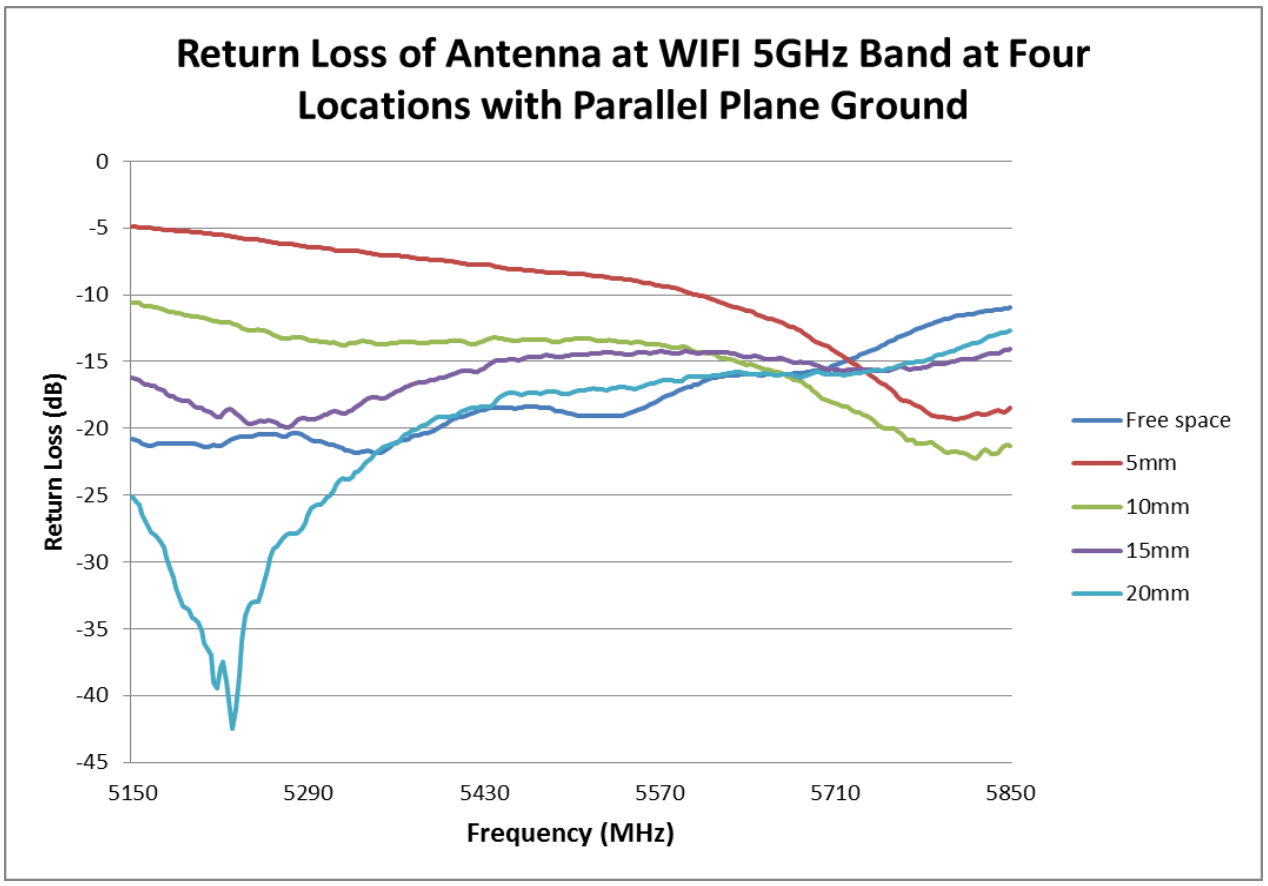

FIGURE 7.1.3 RETURN LOSS OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

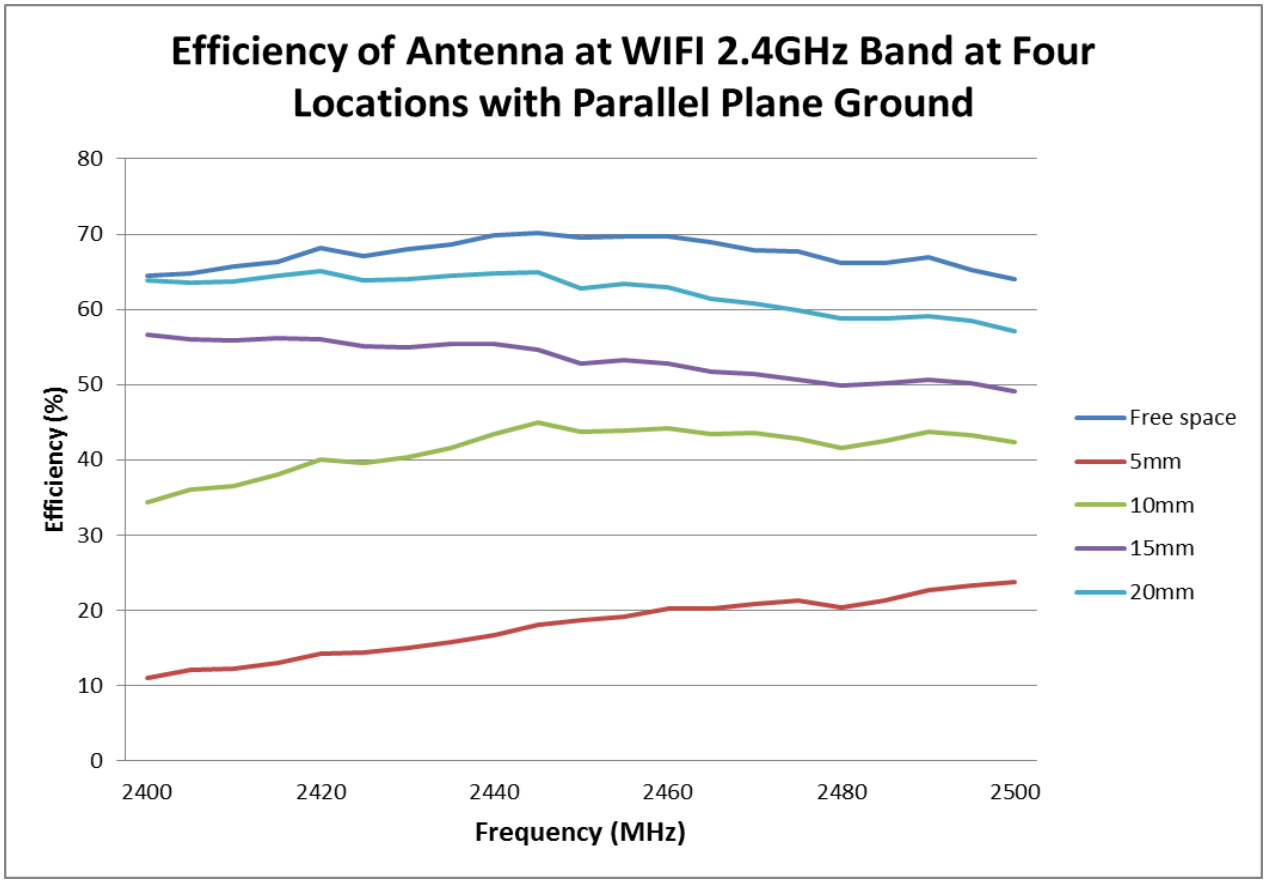

FIGURE 7.1.4 EFFICIENCY OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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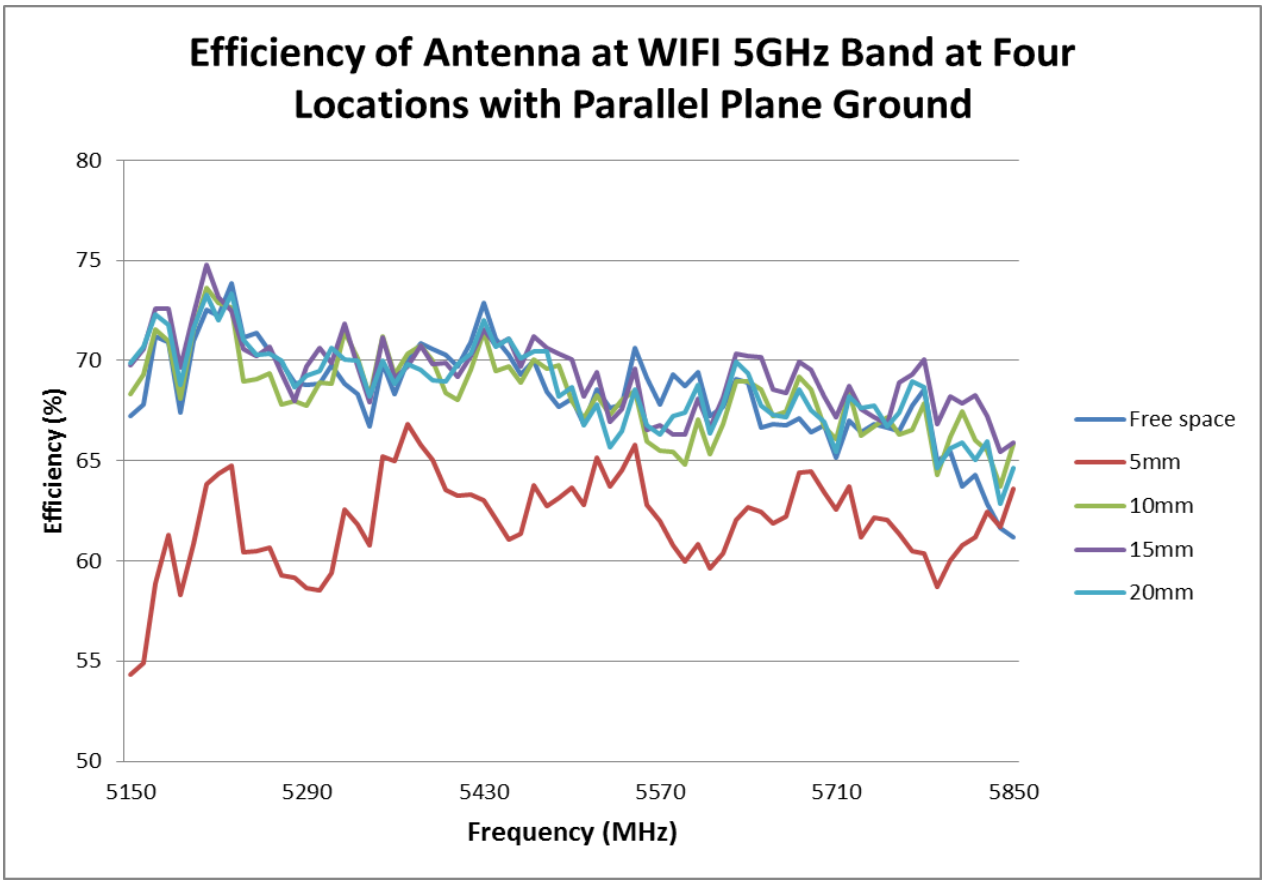

FIGURE 7.1.5 EFFICIENCY OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

7.2 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIONS WITH VERTICAL PLANE GROUND

Antenna performance will be degraded if the antenna is placed too close to a ground plane. Four locations of 5mm, 10mm, 15mm and 20mm away from the vertical plane ground have been evaluated. These locations are shown in figure 7.2.1. The plane ground size is 90mm*90mm. The antenna performance is better with larger distance between antenna and vertical plane ground. The minimum distance between antenna and plane ground is recommended to be at least 10mm to achieve acceptable RF performance.

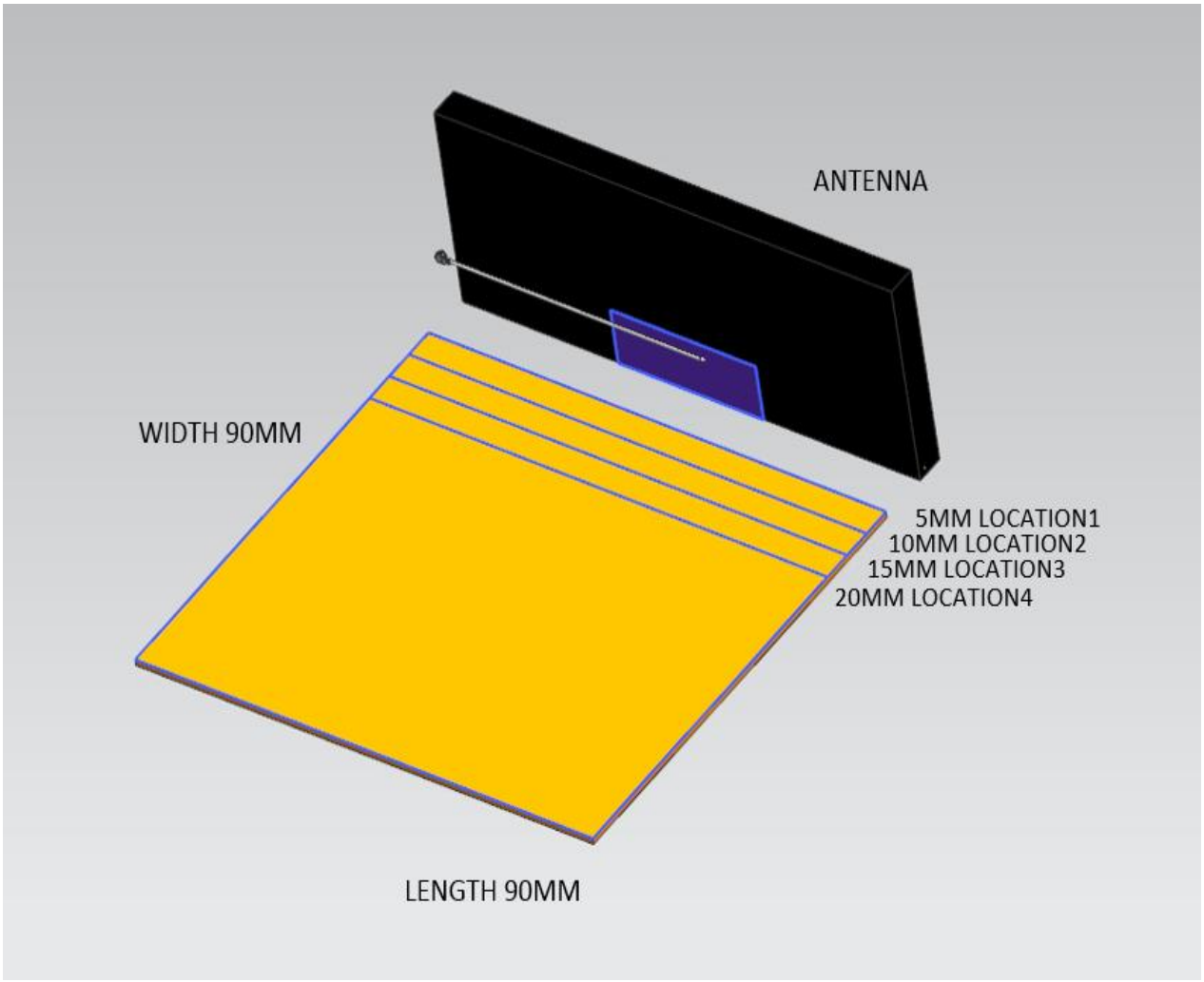

FIGURE 7.2.1 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

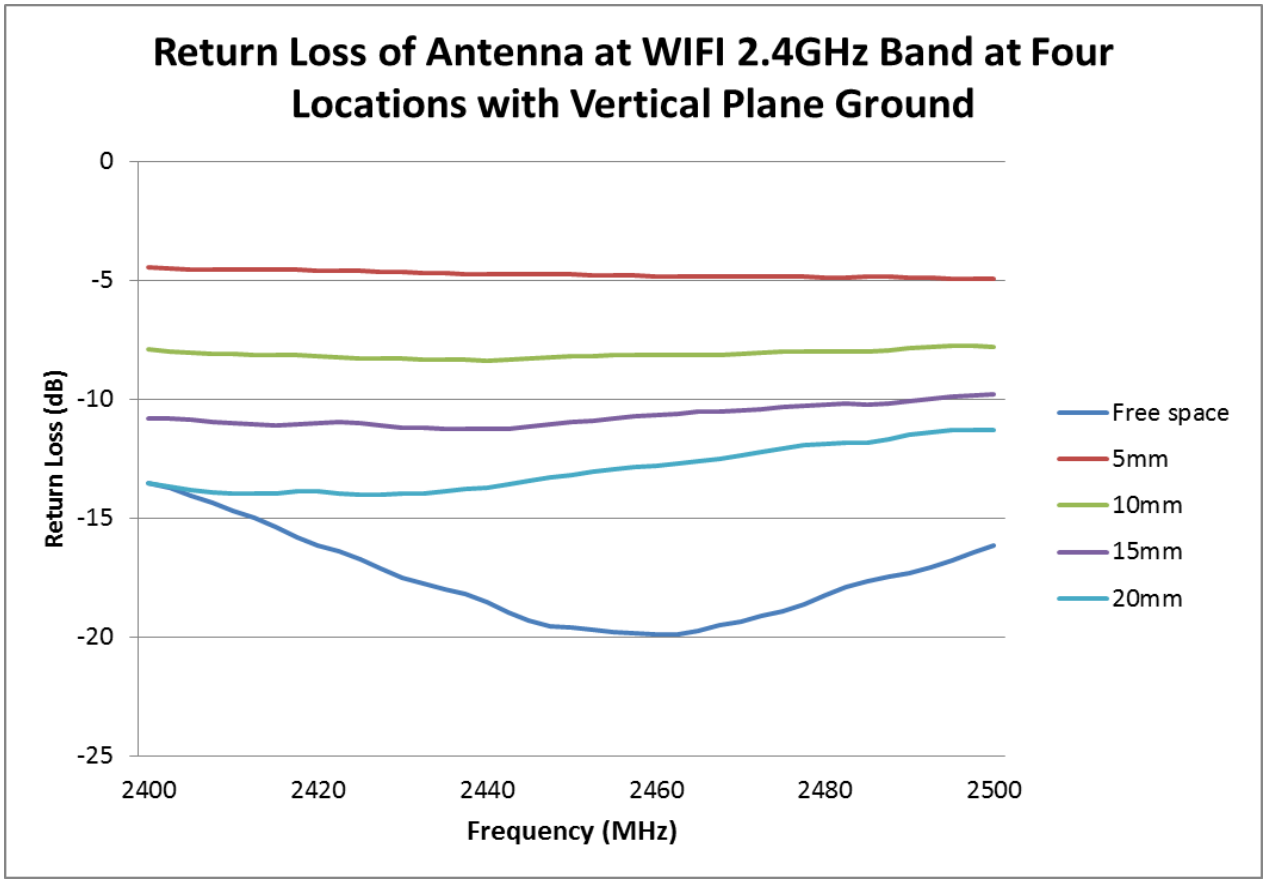

FIGURE 7.2.2 RETURN LOSS OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

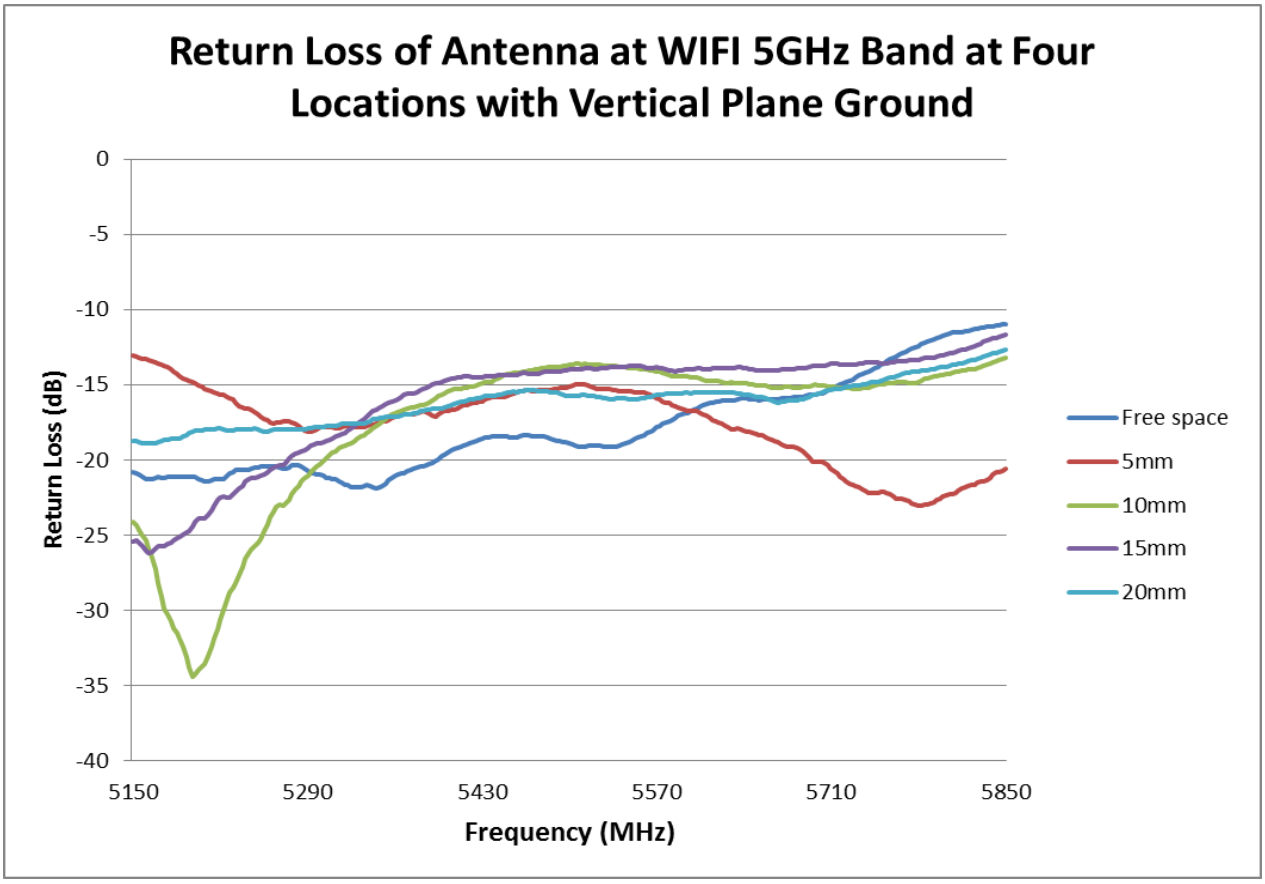

FIGURE 7.2.3 RETURN LOSS OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

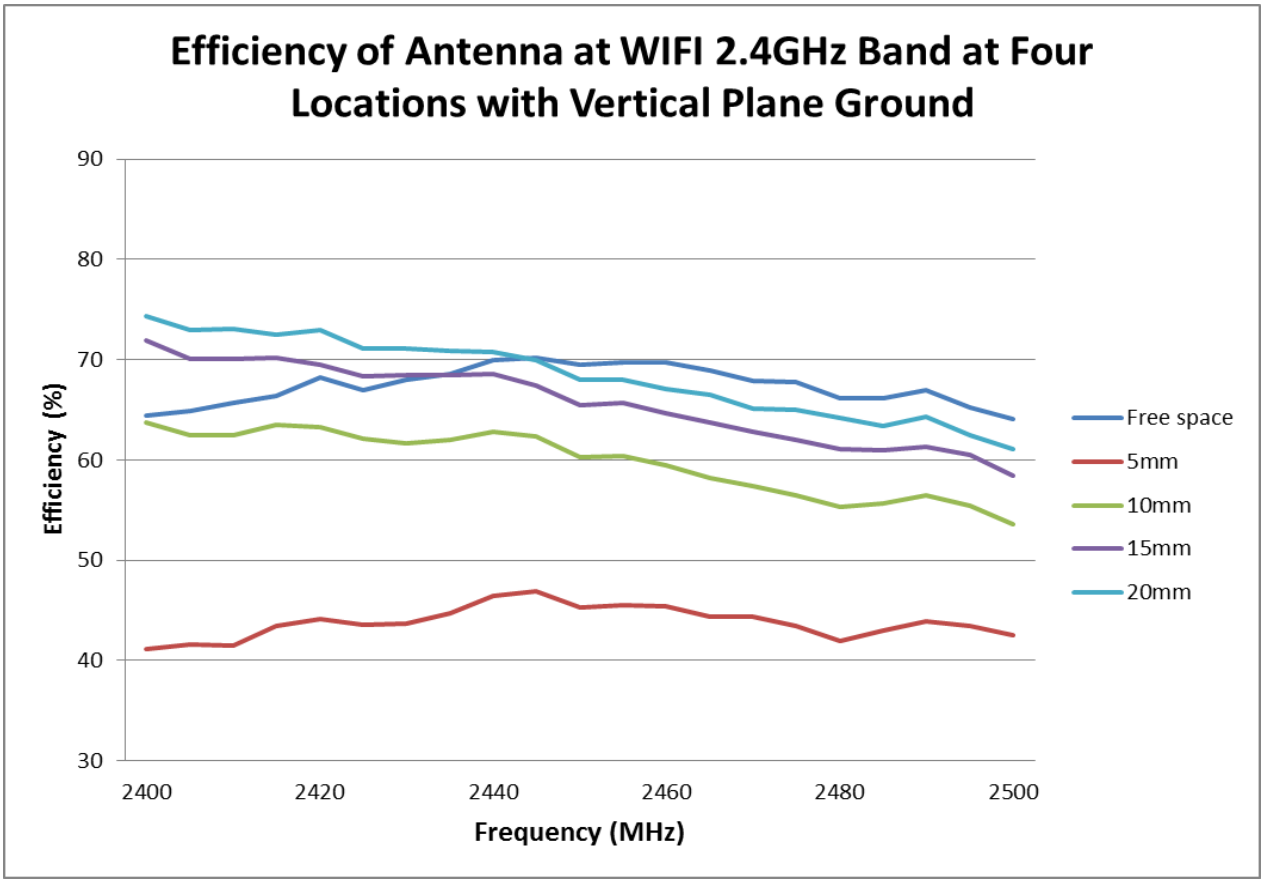

FIGURE 7.2.4 EFFICIENCY OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

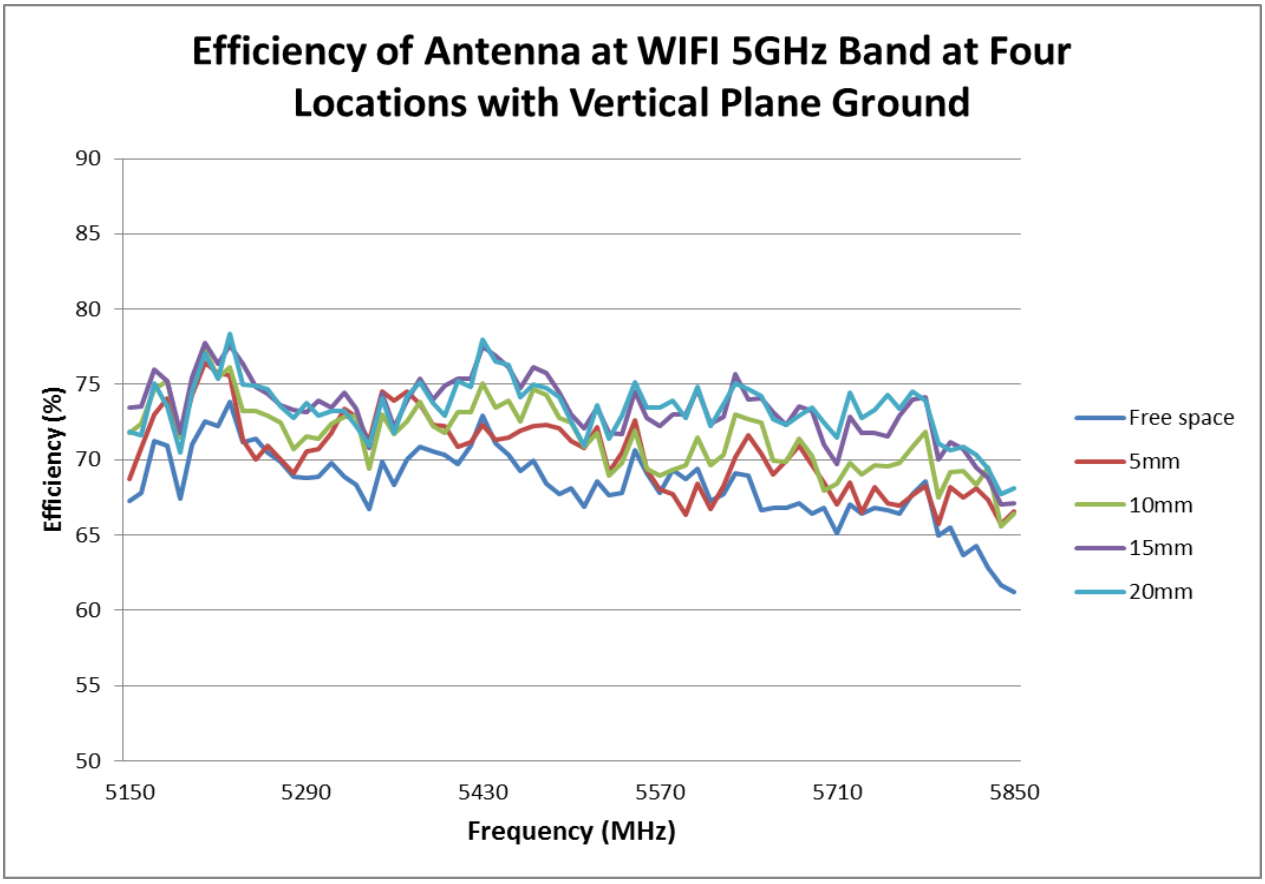

FIGURE 7.2.5 EFFICIENCY OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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7.3 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCES WITH PARALLEL PLANE GROUND

Antenna performance will be degraded if the antenna is placed too close to a ground plane. Four locations 5mm,10mm,15mm and 20mm from a parallel plane ground have been evaluated. These locations are shown in figure 7.3.1. The plane ground size is 90mm*90mm. The antenna performance is better with larger distance between the antenna and the parallel plane ground. The minimum distance between the antenna and the plane ground is recommended to be at least 10mm to achieve acceptable RF performance.

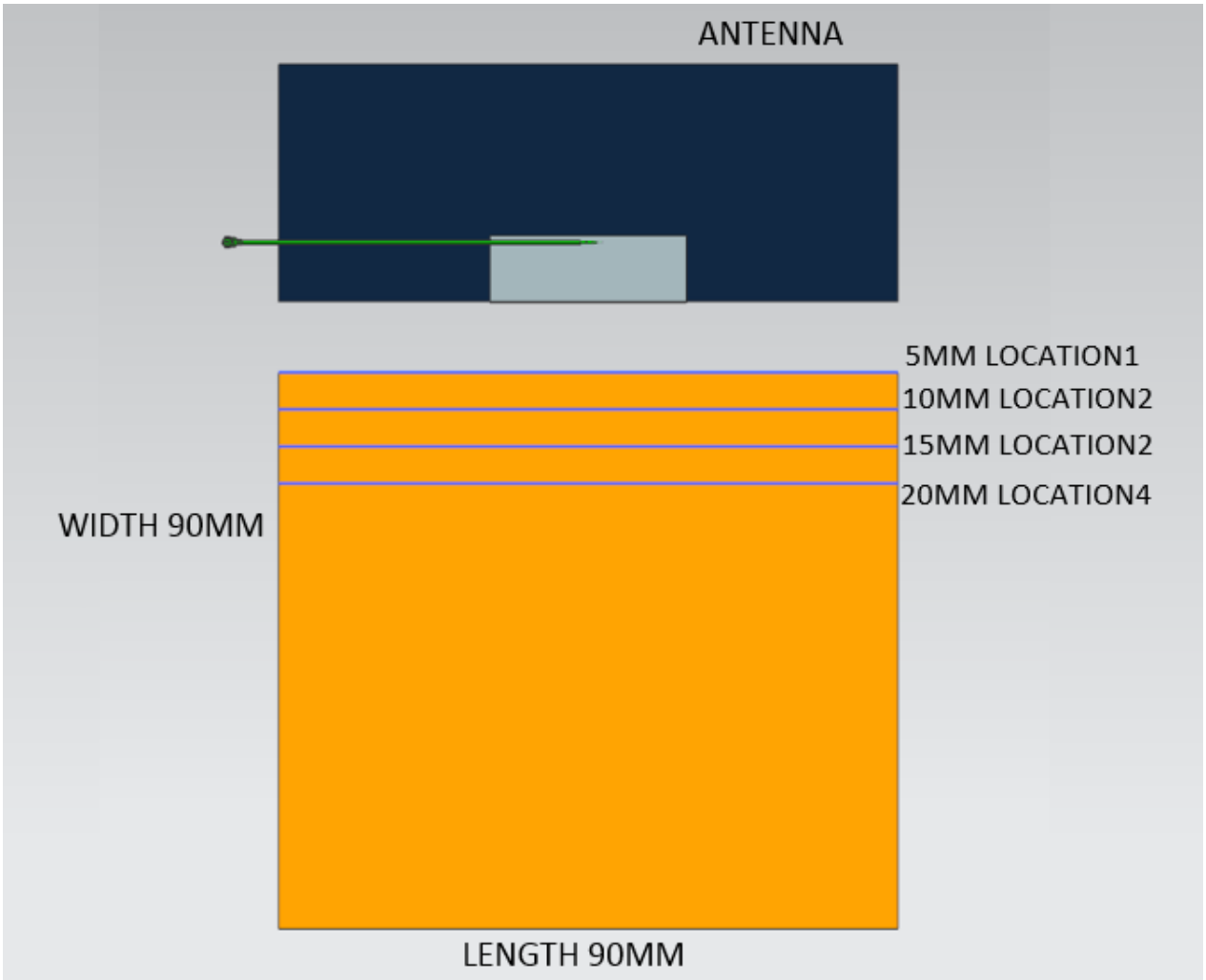

FIGURE 7.3.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

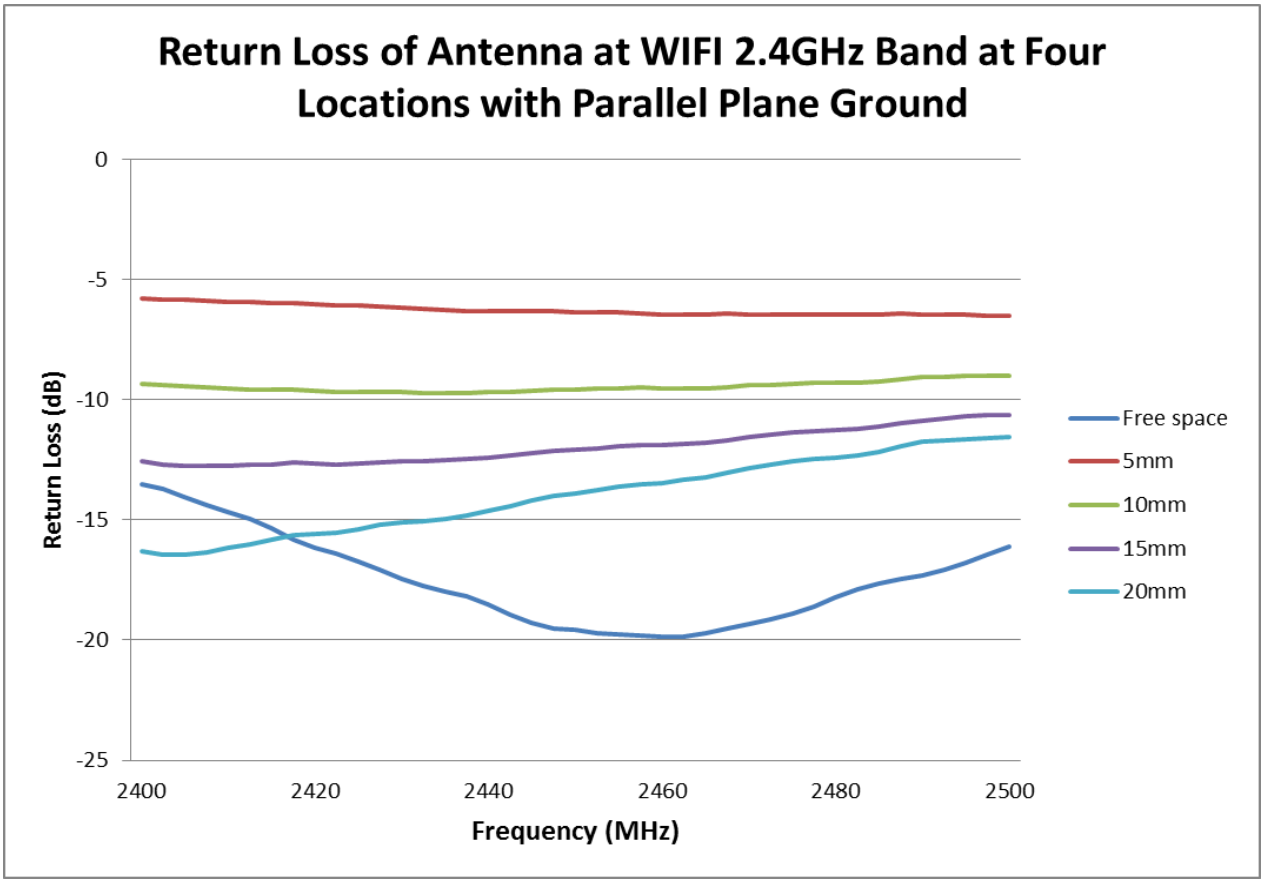

FIGURE 7.3.2 RETURN LOSS OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

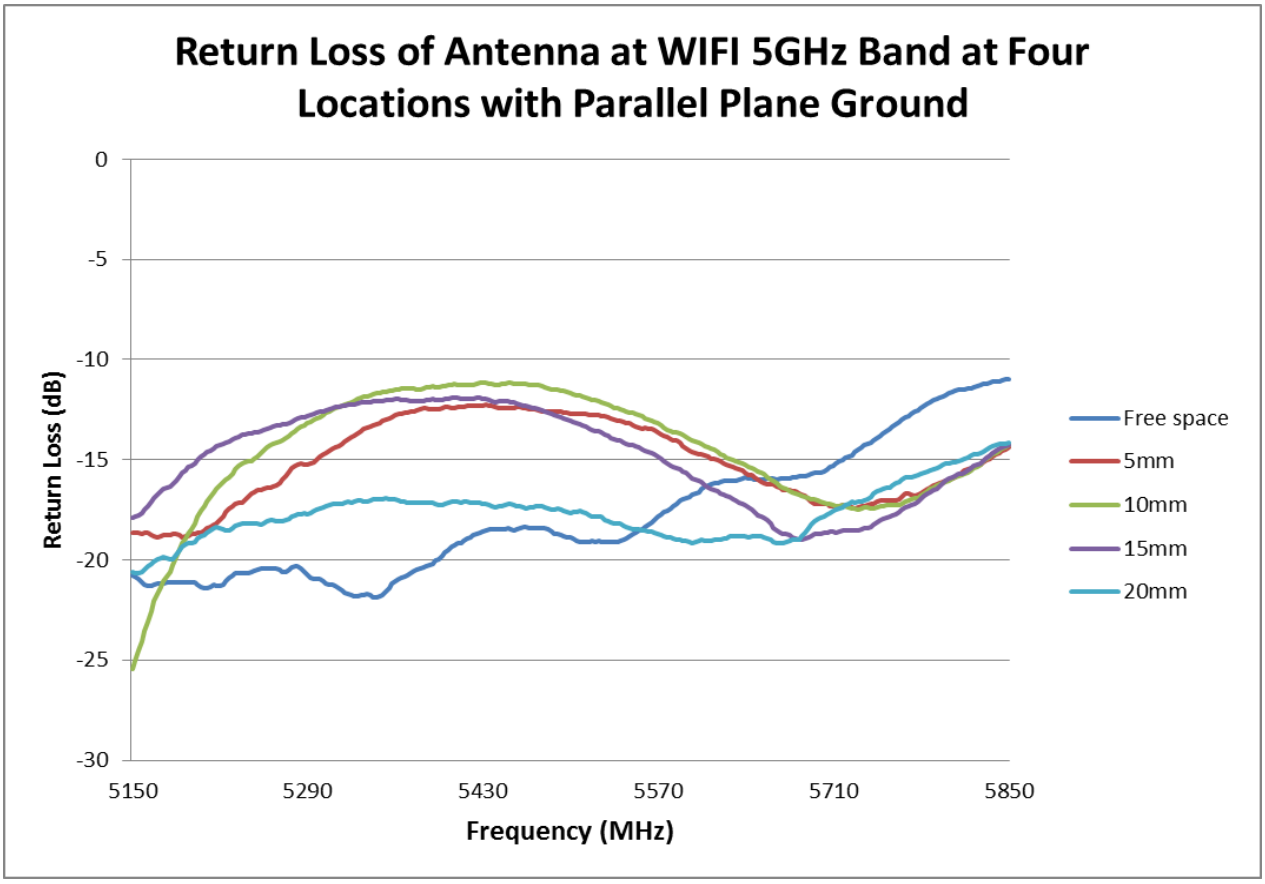

FIGURE 7.3.3 RETURN LOSS OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
C	EC No: 171309 DATE: 2018/01/24	2.4/5G WIFI ANTENNA WITH SIDE SOLDER CABLE	

DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810300	Benson Liu 2018/01/24	Kang Cheng 2018/01/24	Chris Zhong 2018/01/24

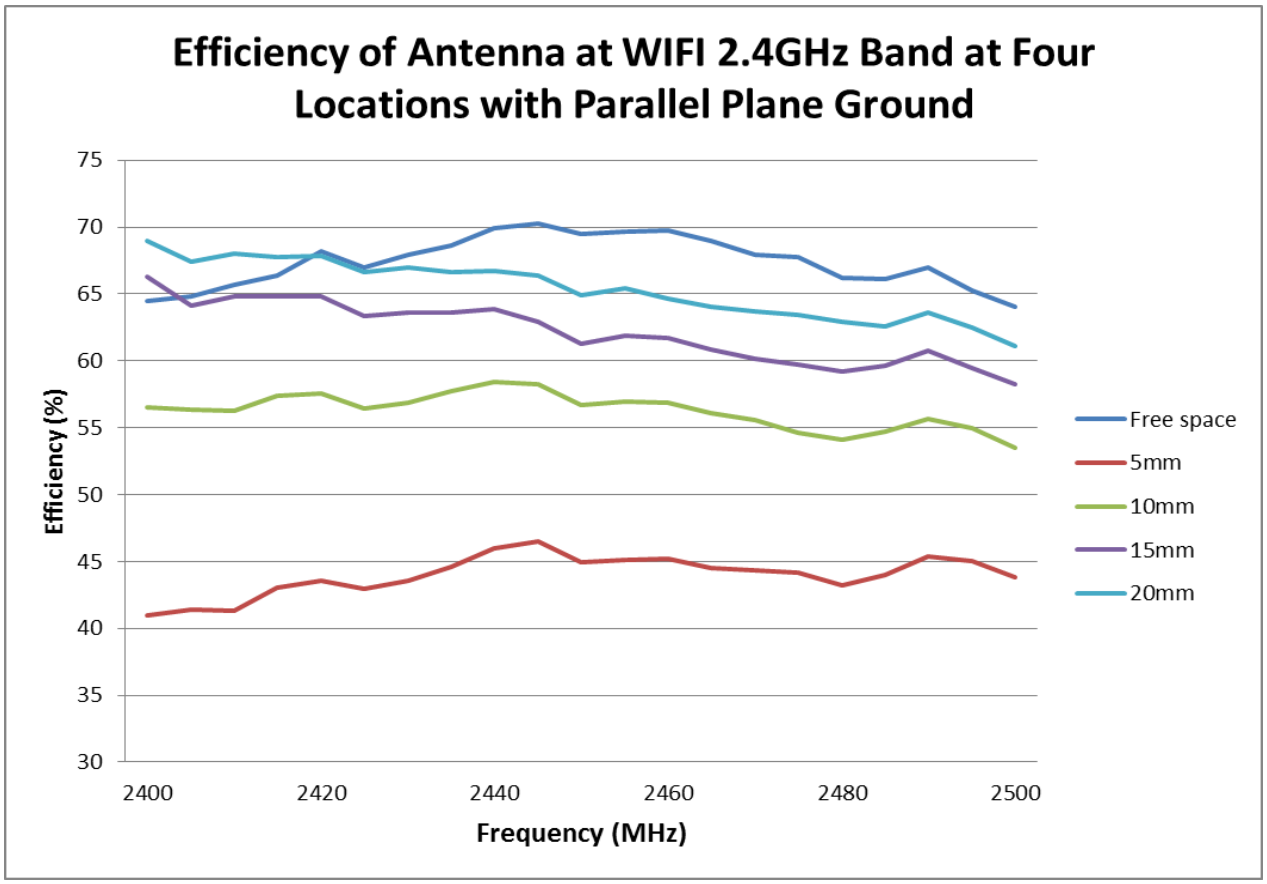

FIGURE 7.3.4 EFFICIENCY OF ANTENNA AT WIFI 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
C	EC No: **171309** DATE: **2018/01/24**	**2.4/5G WIFI ANTENNA WITH SIDE SOLDER CABLE**	

DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810300	**Benson Liu 2018/01/24**	**Kang Cheng 2018/01/24**	**Chris Zhong 2018/01/24**

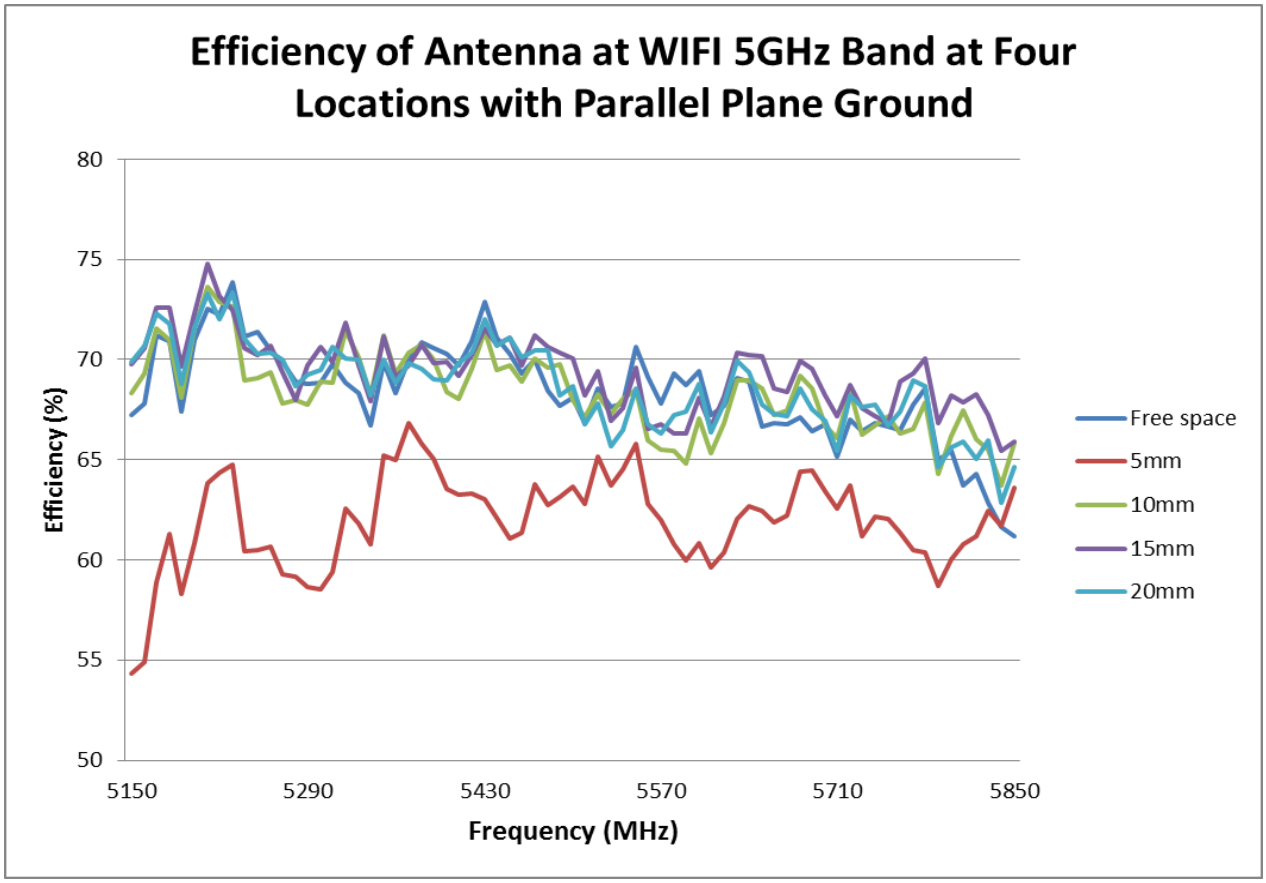

FIGURE 7.3.5 EFFICIENCY OF ANTENNA AT WIFI 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND