



APPLICATION SPECIFICATION

TITLE

600-6000MHZ FLEXIBLE ANTENNA

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DOCUMENT NUMBER: AS-2079010100	CREATED / REVISED BY: Kang Cheng 2018/08/14	CHECKED BY: Cooper Zhou2018/08/14	APPROVED BY: Stary Song 2018/08/14

600-6000MHZ FLEXIBLE ANTENNA

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.

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: 600-6000MHz Flexible Antenna

Series Number: 207901

2.2 DESCRIPTION

Series 207901 is a monopole and low profile flexible antenna for 600~960/1500~3000/3000~6000MHz band application. It's made from Poly-flexible material, has a size from 147mm x25mm x 0.16mm and has double-sided TESA adhesive for "peel and stick" easy mounting.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2079010100 for full information.



Molex 2079010100 600-6000MHz FLEXIBLE ANTENNA 3D VIEW

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing(SD)	SD-2079010100	Mechanical Dimension of the product
Product Specification (PS)	PS-2079010100	Product Specification
Packing Drawing(PK)	PK-2079010100	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on a PC/ABS material block of 1.5mm thickness with VNA Agilent E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part No.2079010100 with a cable length of 100mm.

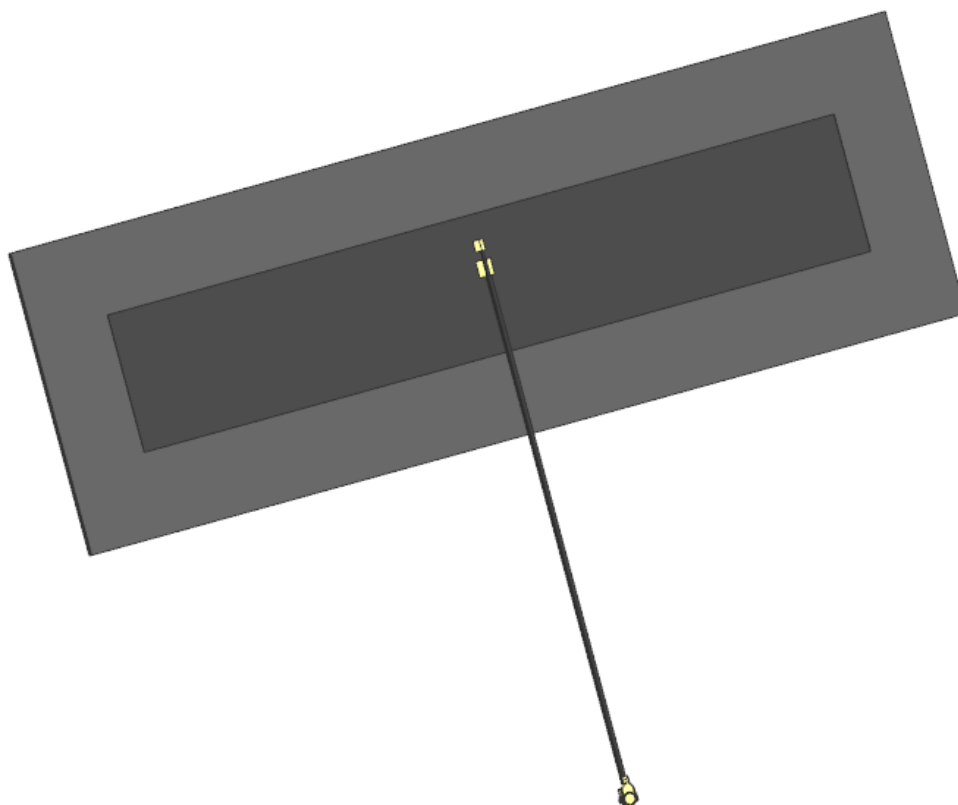


FIGURE 4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5MM THICKNESS

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FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5MM THICKNESS TESTED WITH VNA E5071C

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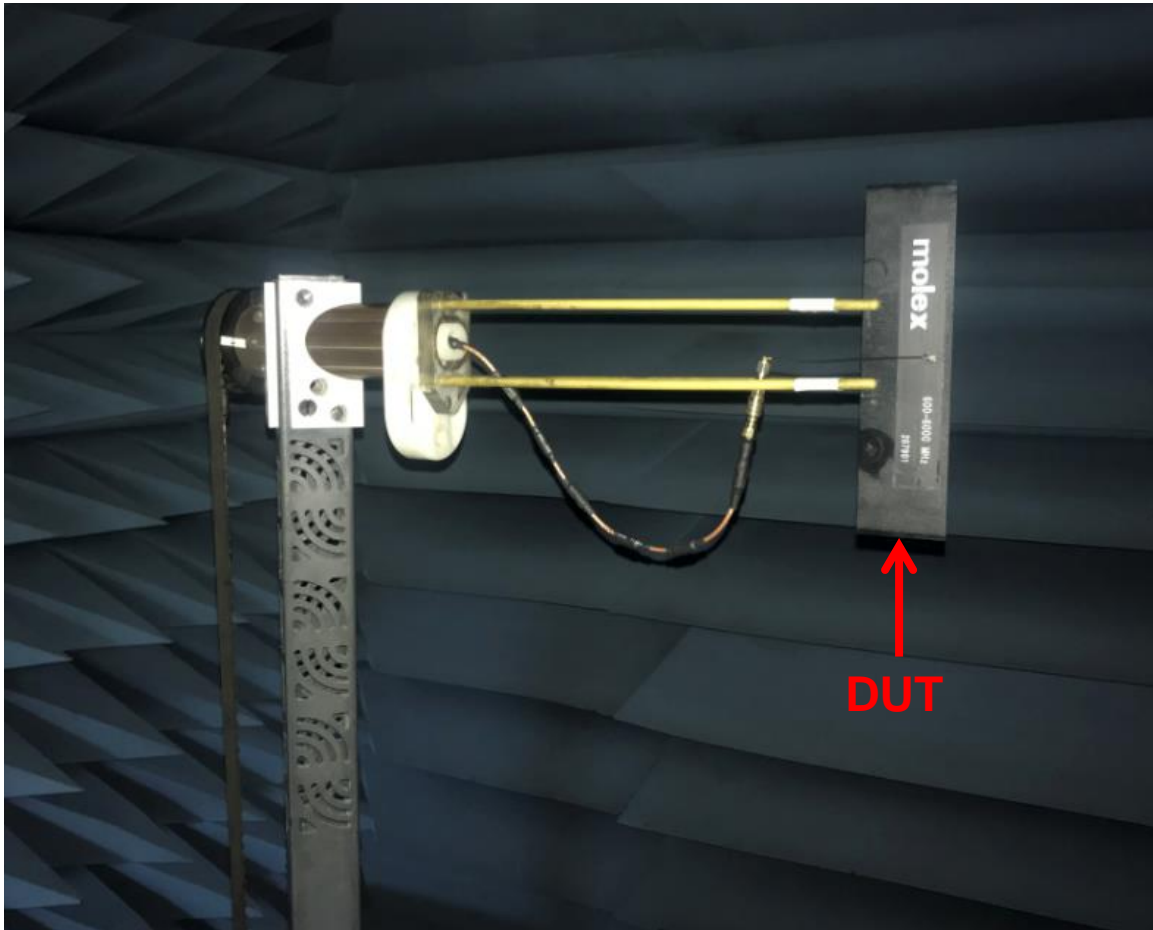


FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5MM THICKNESS TESTED IN OTA CHAMBER

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APPLICATION SPECIFICATION

4.2 ANTENNA PERFORMANCE

Description	Equipment	Requirement (100mm)		
		600-960MHz	1500-3000MHz	3000-6000MHz
Frequency Range	VNA E5071C	600-960MHz	1500-3000MHz	3000-6000MHz
Return Loss	VNA E5071C	<-3 dB	<-5 dB	<-5 dB
Peak Gain (Max)	OTA Chamber	2.6dBi	4.9dBi	5.4dBi
Average Total Efficiency	OTA Chamber	>70%	>65%	>70%
Polarization	OTA Chamber	Linear		
Input Impedance	VNA E5071C	50 ohms		

Note that the above antenna performance is measured with just the antenna mounted on a PC/ABS block to similar a free-space condition. When implement into the system, the frequency resonant might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dBi in the actual implementation as the radiation pattern will change due to the surround components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

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4.3 RETURN LOSS PLOT

All measurements in this document are done with cable length of 100mm.

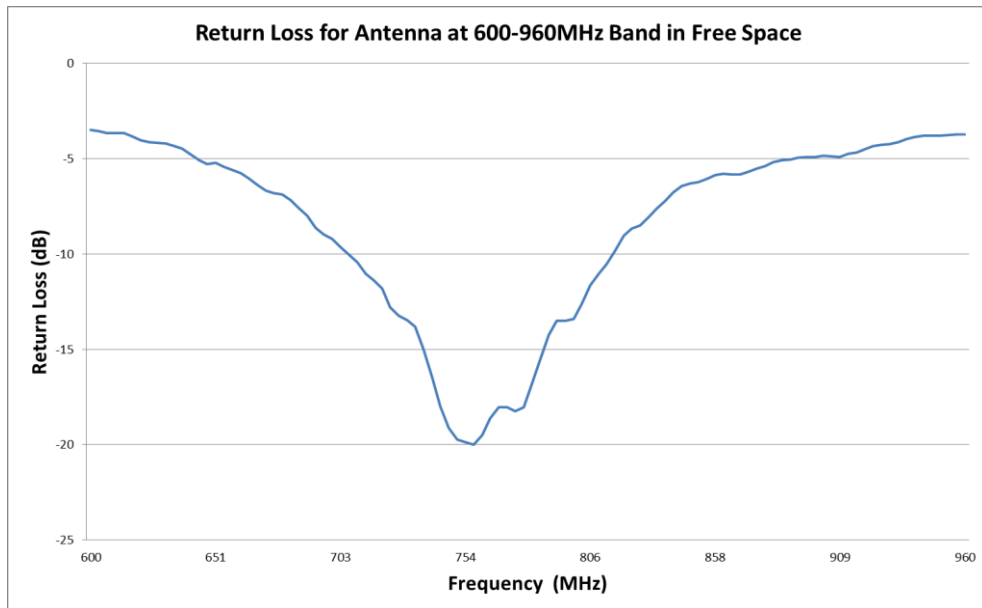


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 600-960MHZ IN FREE SPACE

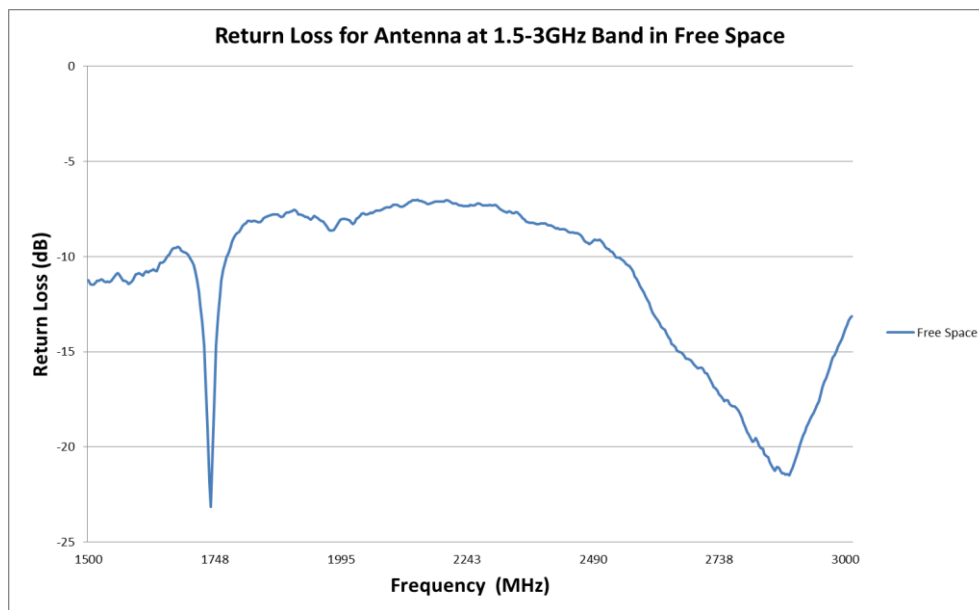


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 1.5-3GHZ IN FREE SPACE

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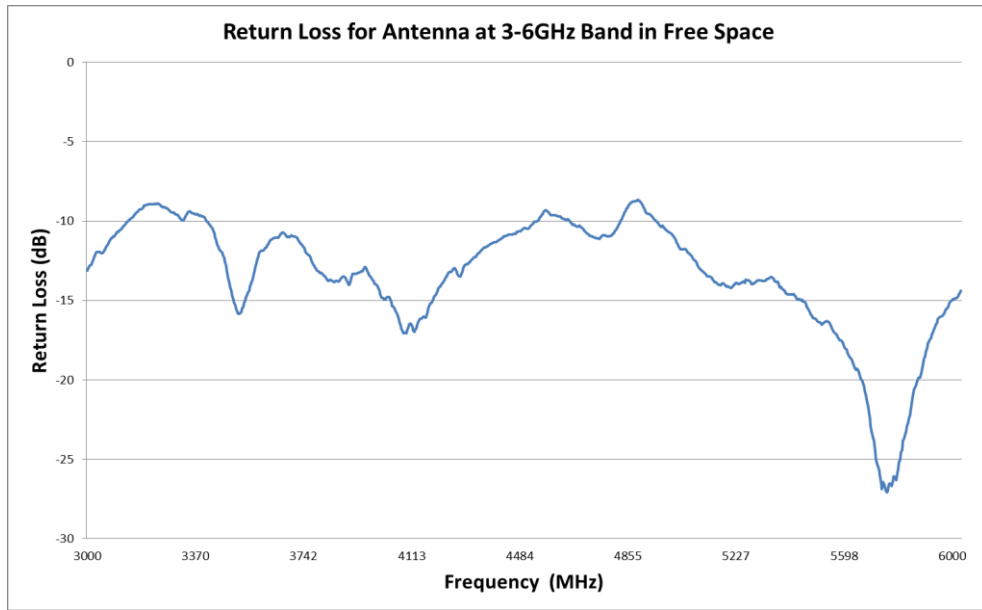


FIGURE 4.3.3 RETURN LOSS OF ANTENNA AT 3-6GHZ IN FREE SPACE

4.4 EFFICIENCY PLOT

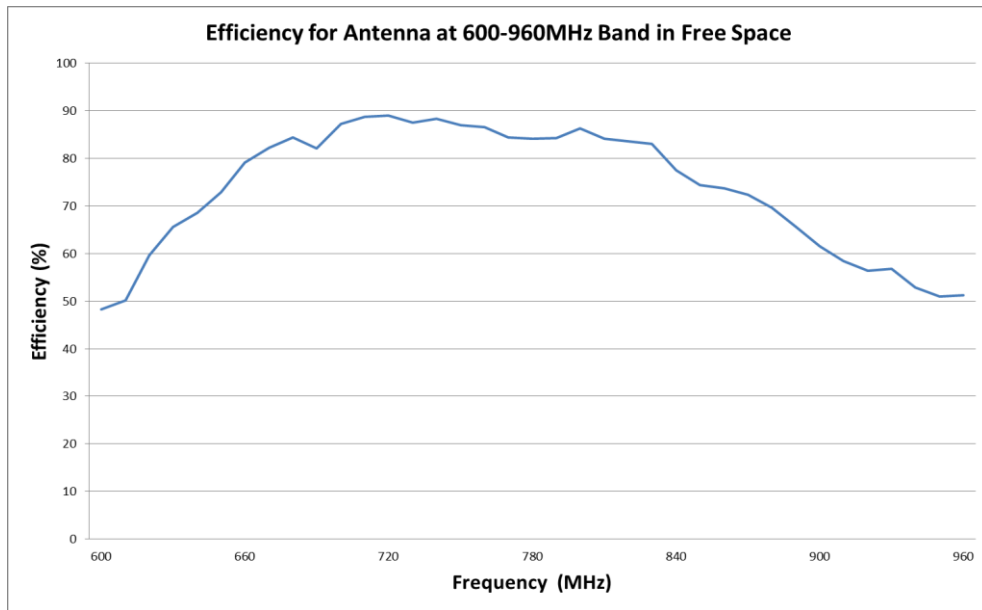


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 600-960MHZ IN FREE SPACE

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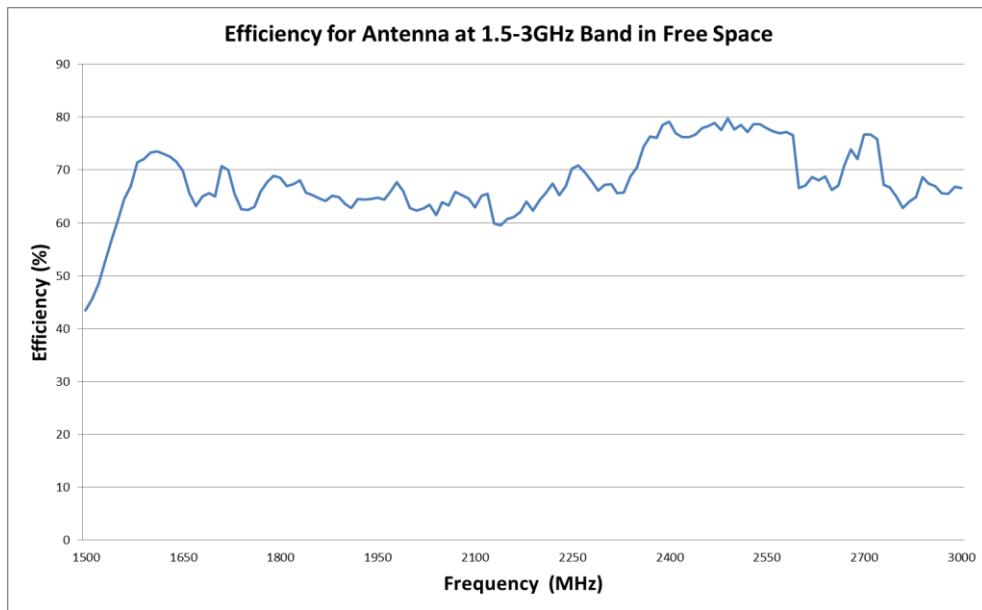


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 1.5-3GHZ IN FREE SPACE

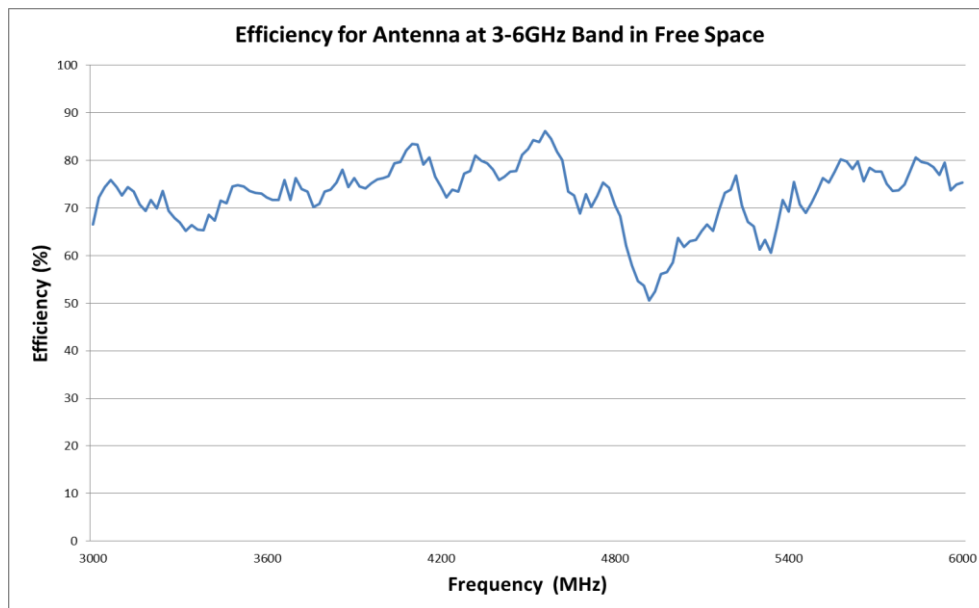


FIGURE 4.4.3 EFFICIENCY OF ANTENNA AT 3-6GHZ IN FREE SPACE

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4.5 2D RADIATION PATTERN

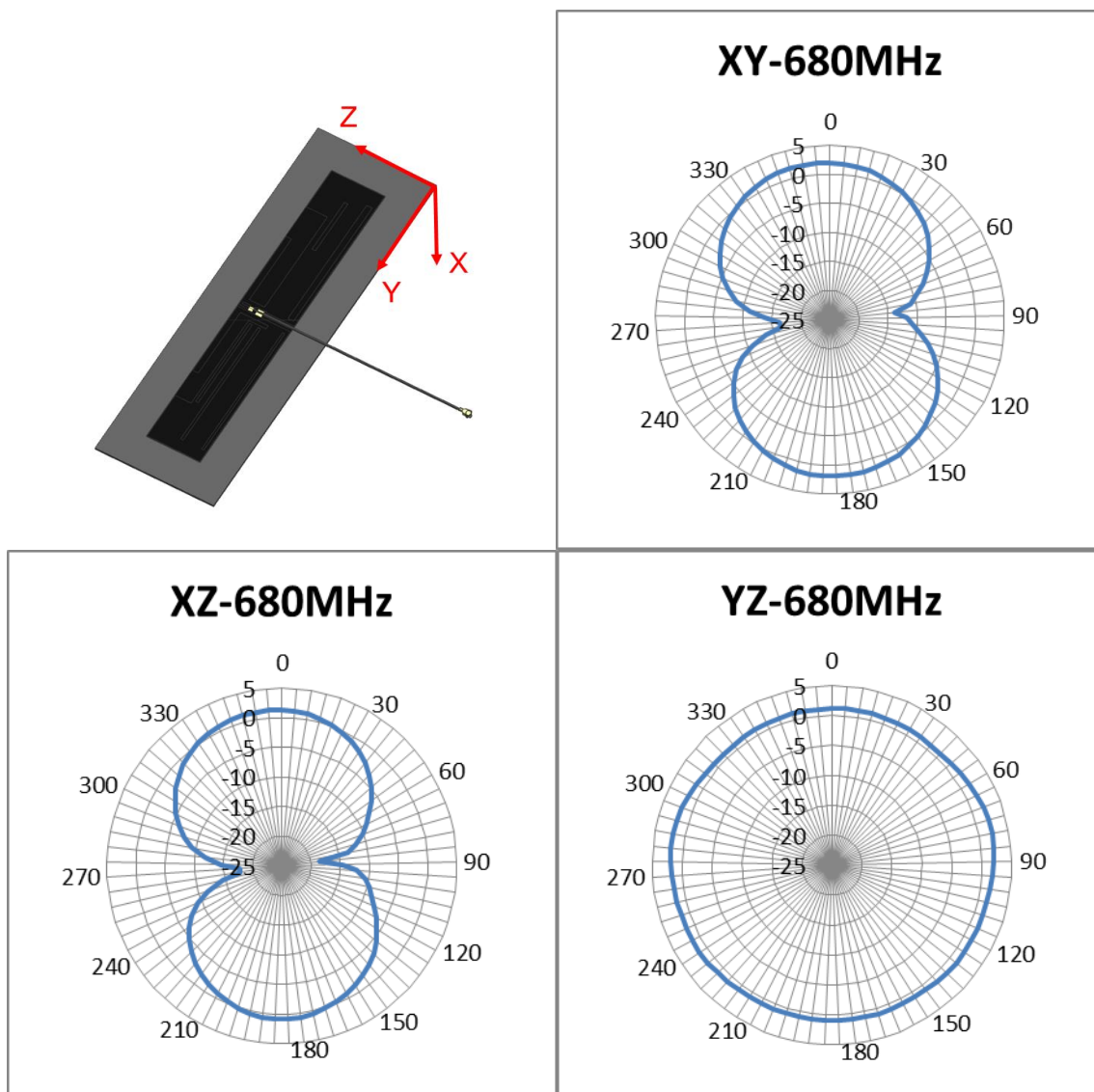


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 680MHZ IN FREE SPACE

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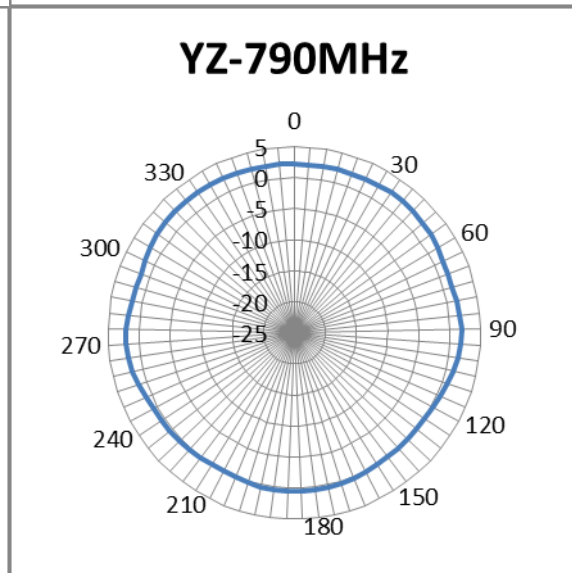
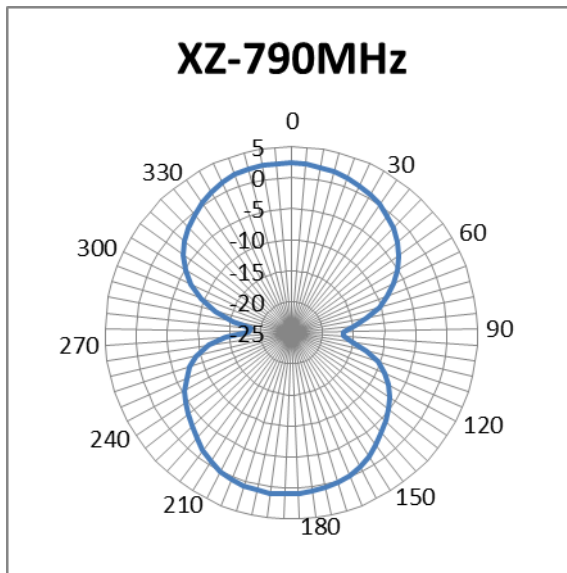
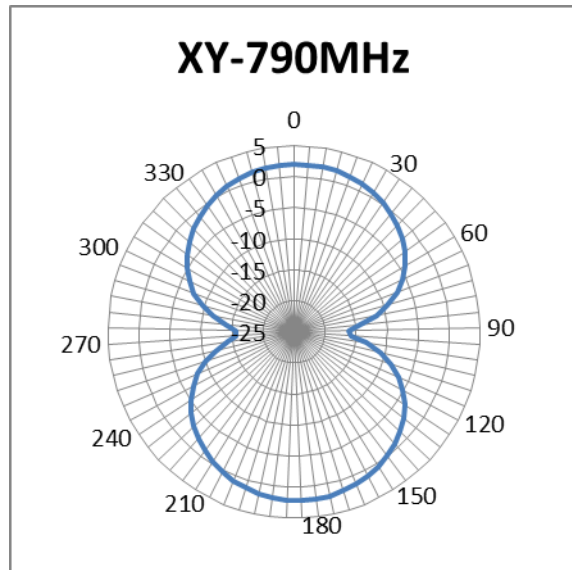
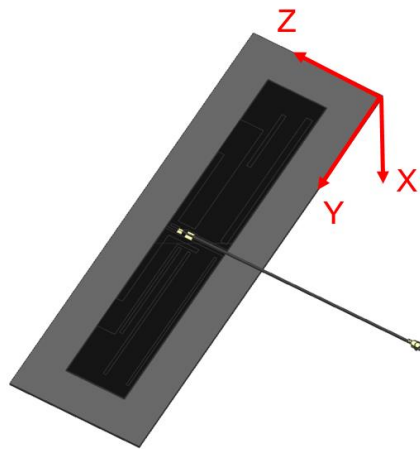


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 790MHZ IN FREE SPACE

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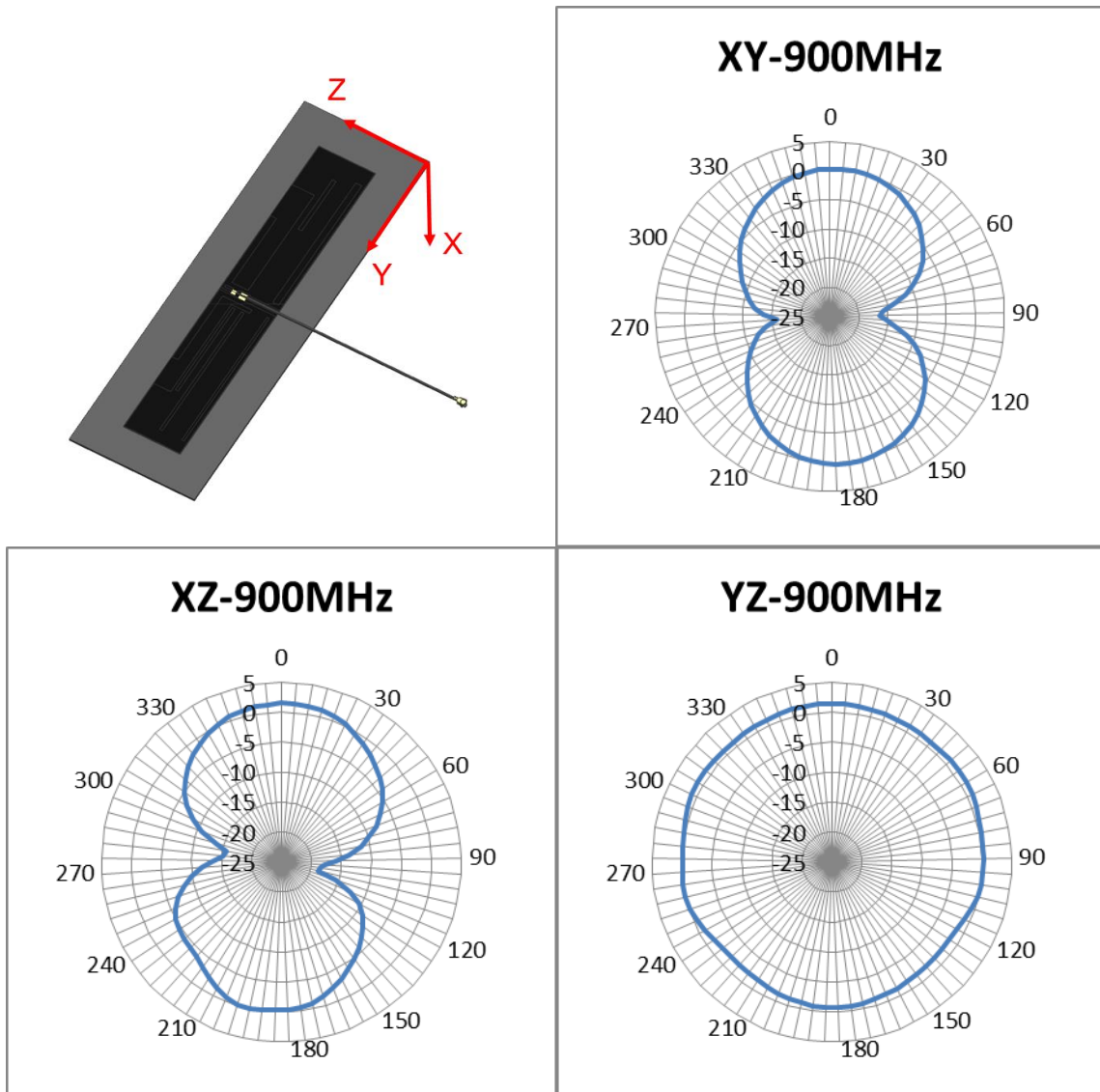


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 900MHZ IN FREE SPACE

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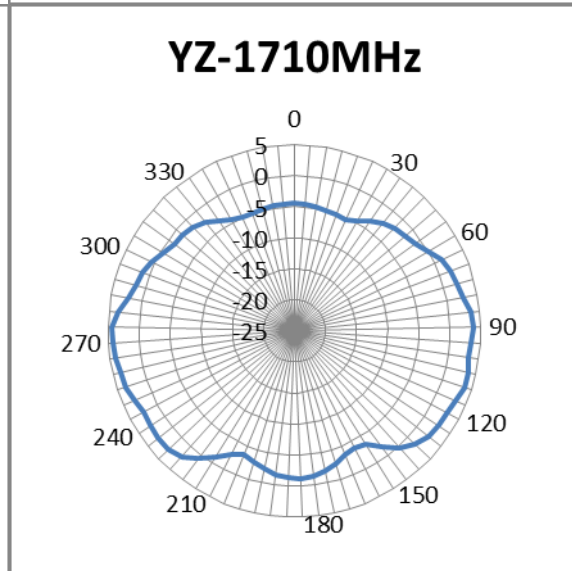
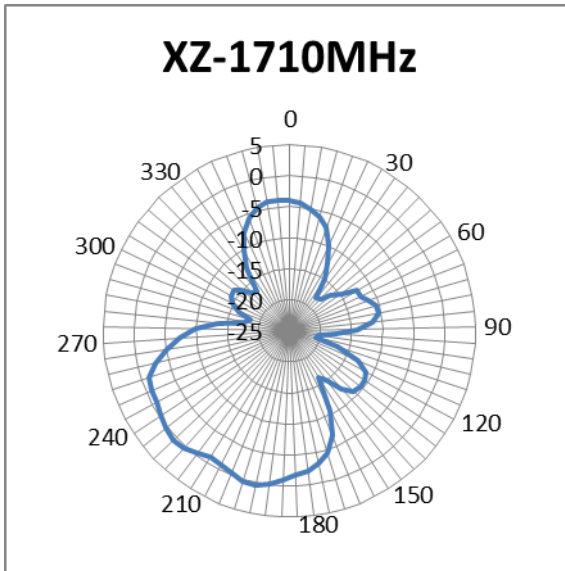
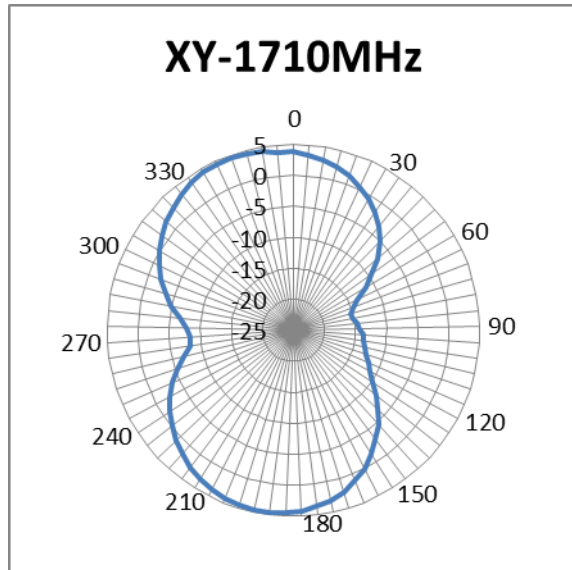
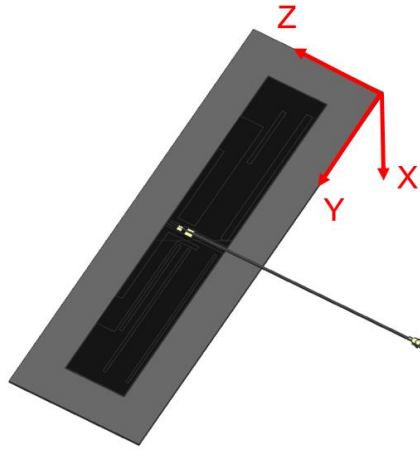


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

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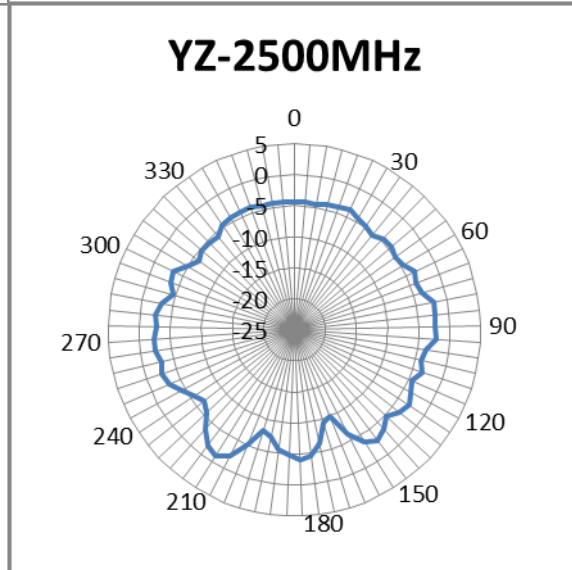
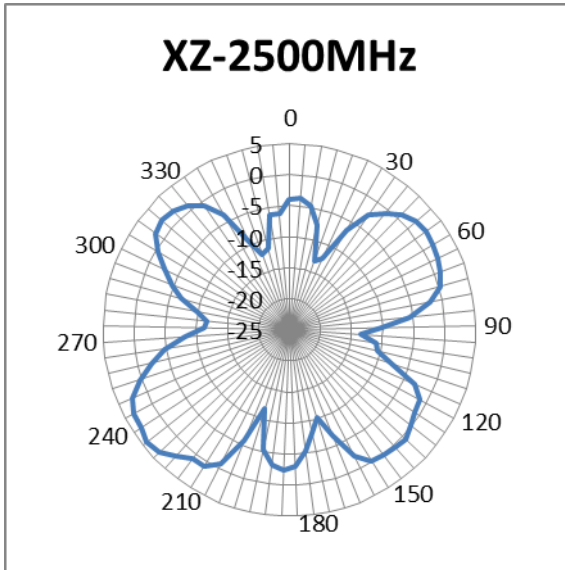
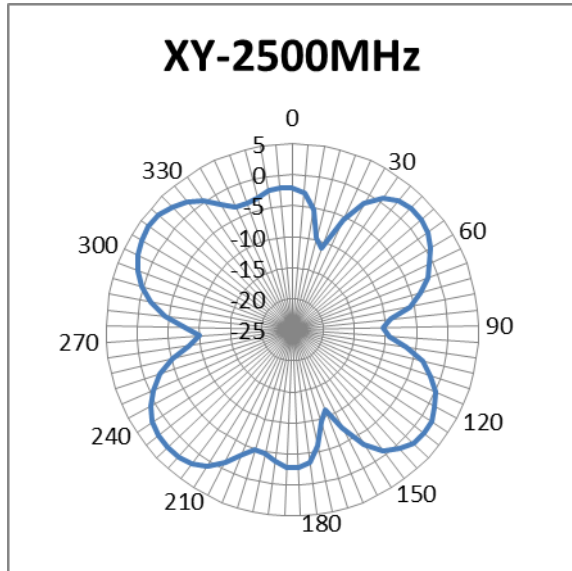
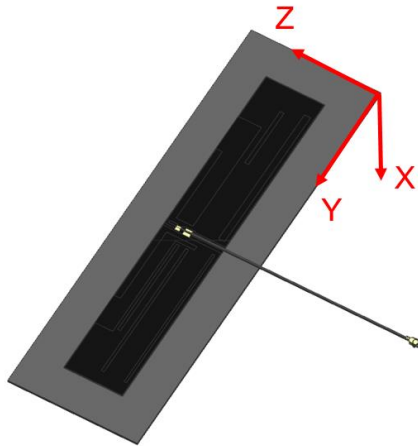


FIGURE 4.5.5 2D RADIATION PATTERN OF ANTENNA AT 2500MHZ IN FREE SPACE

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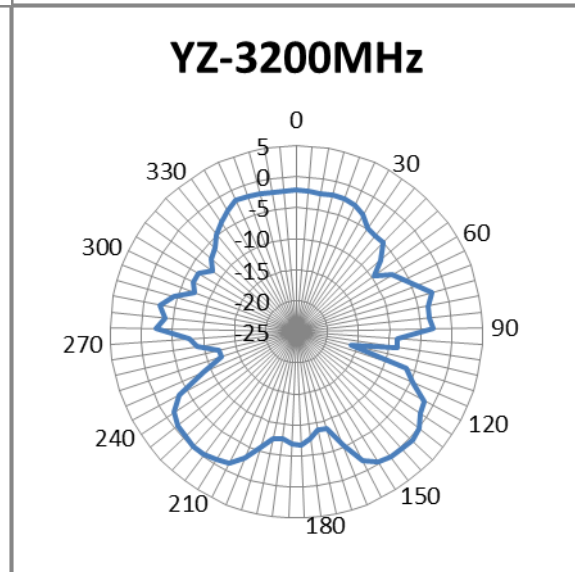
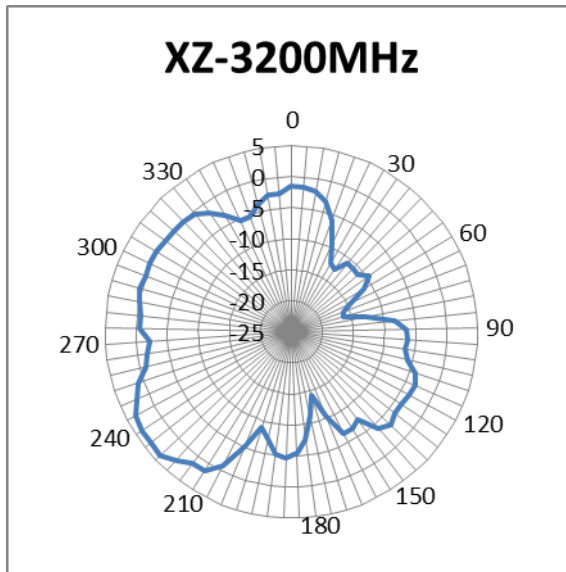
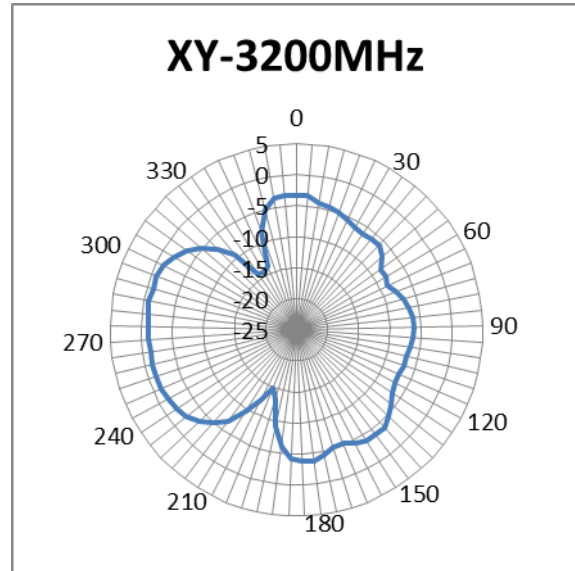
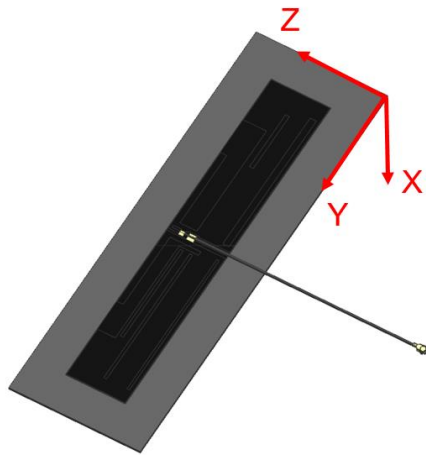


FIGURE 4.5.6 2D RADIATION PATTERN OF ANTENNA AT 3200MHZ IN FREE SPACE

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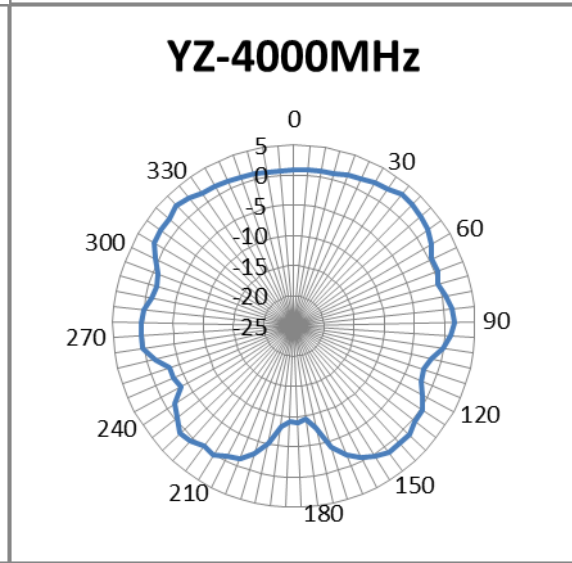
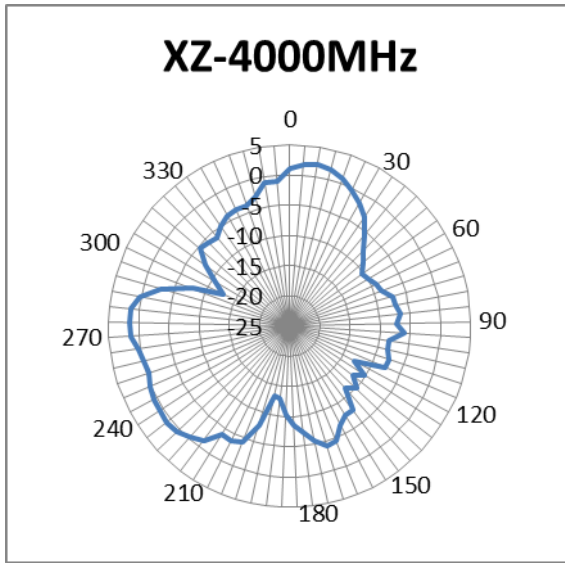
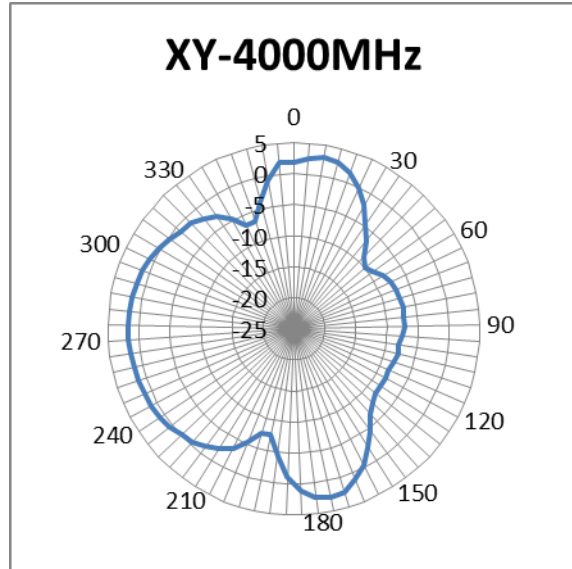
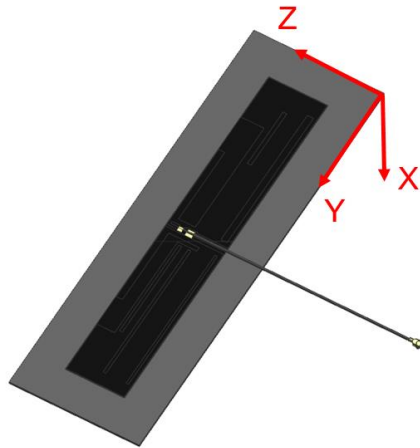


FIGURE 4.5.7 2D RADIATION PATTERN OF ANTENNA AT 4000MHZ IN FREE SPACE

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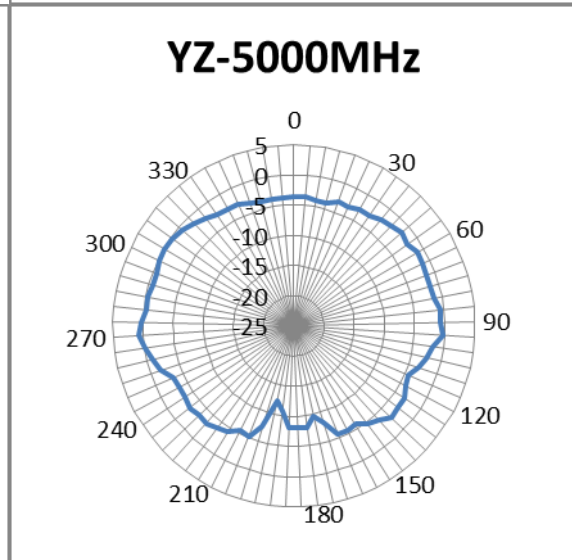
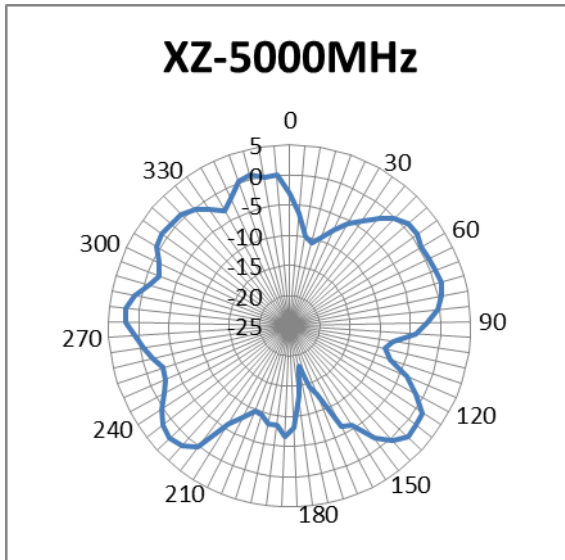
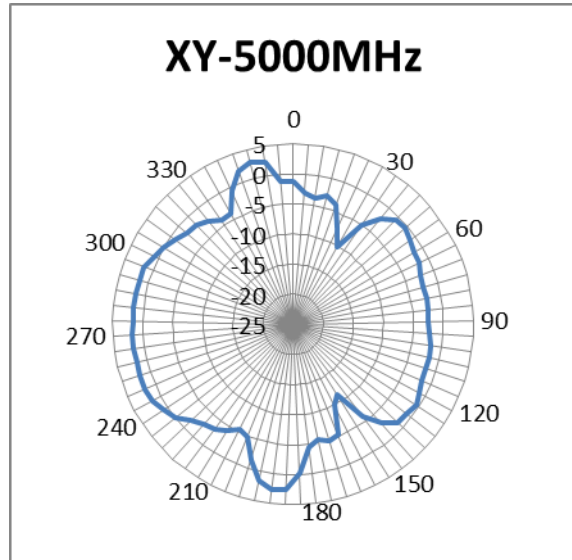
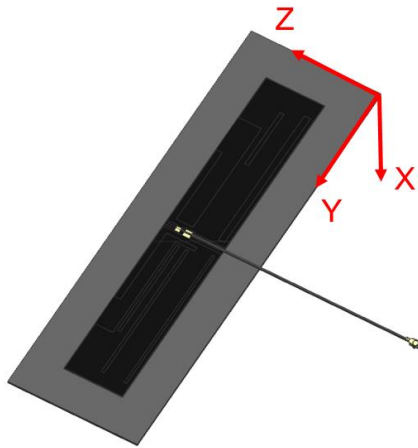


FIGURE 4.5.8 2D RADIATION PATTERN OF ANTENNA AT 5000MHZ IN FREE SPACE

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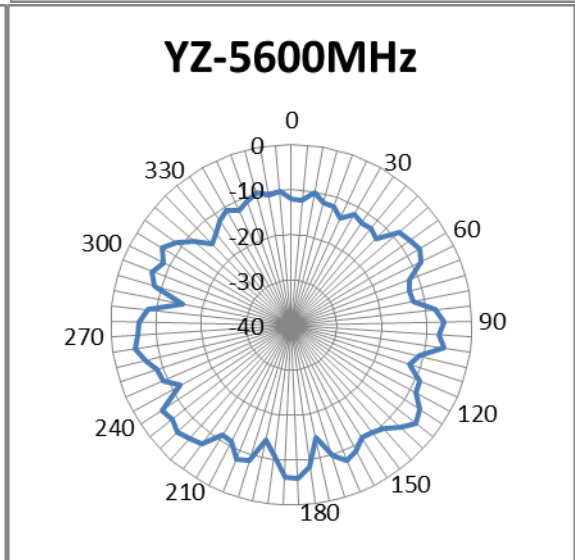
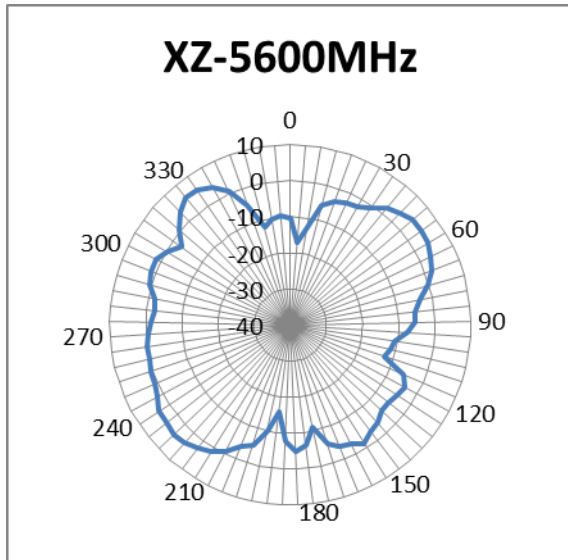
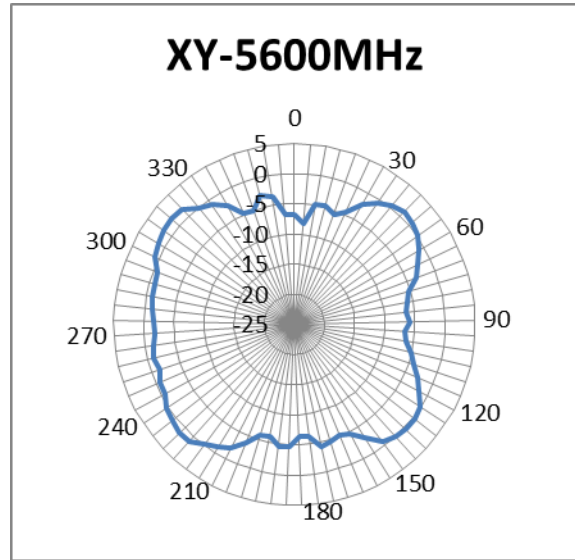
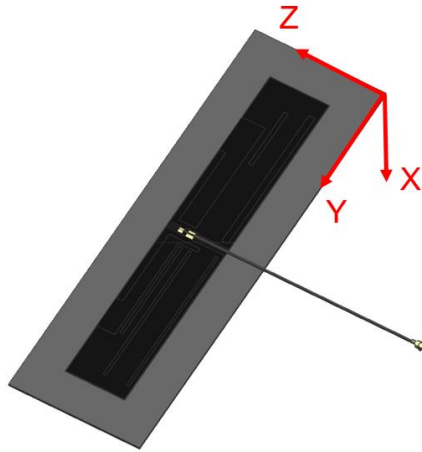


FIGURE 4.5.9 2D RADIATION PATTERN OF ANTENNA AT 5600MHZ IN FREE SPACE

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4.6 3D RADIATION PATTERN

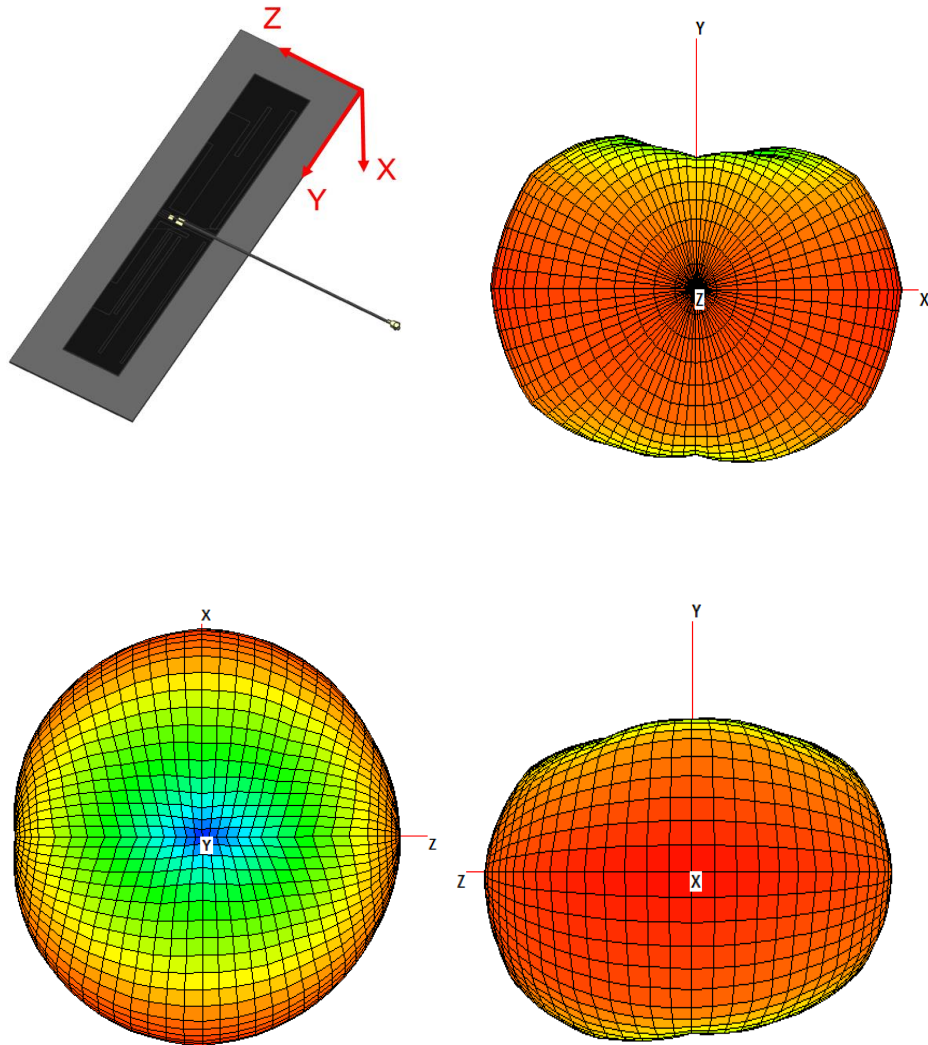


FIGURE 4.6.1 3D RADIATION PATTERN OF ANTENNA AT 680MHZ IN FREE SPACE

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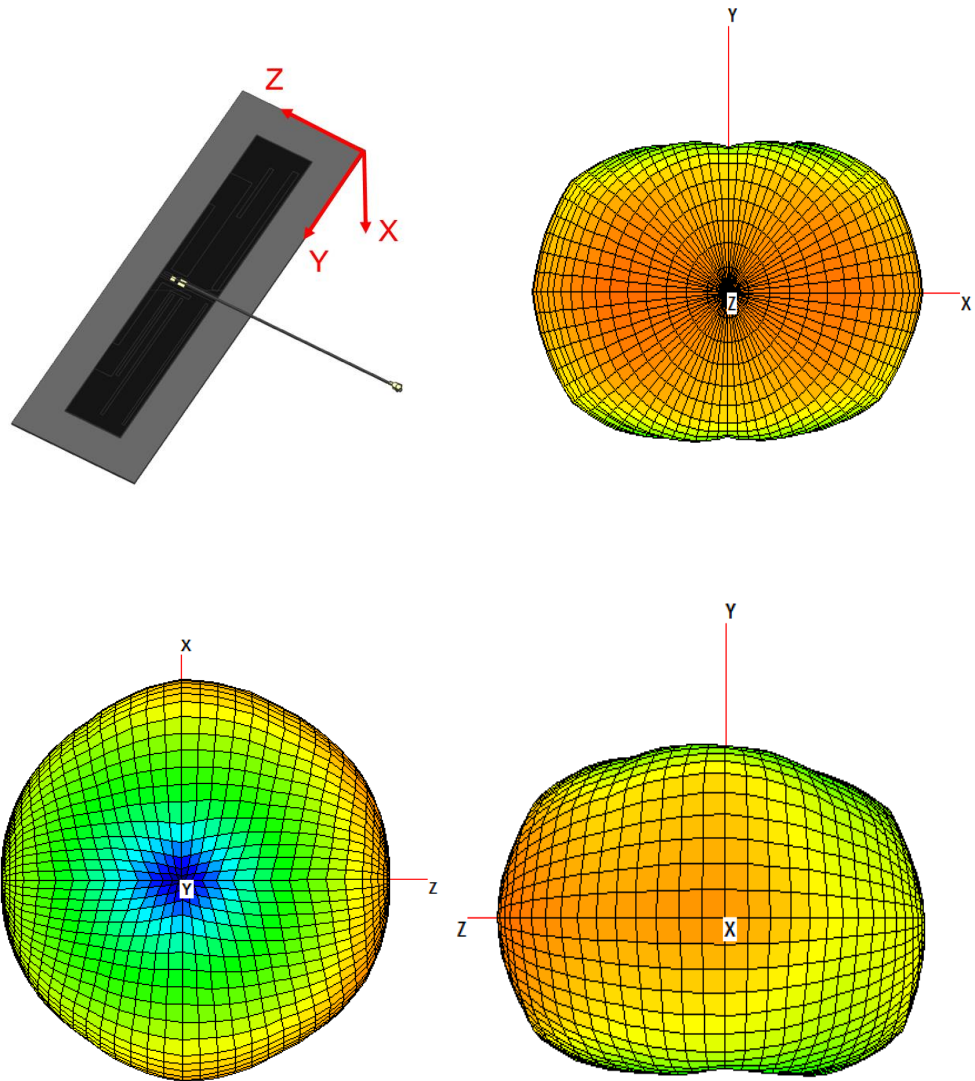


FIGURE 4.6.2 3D RADIATION PATTERN OF ANTENNA AT 790MHZ IN FREE SPACE

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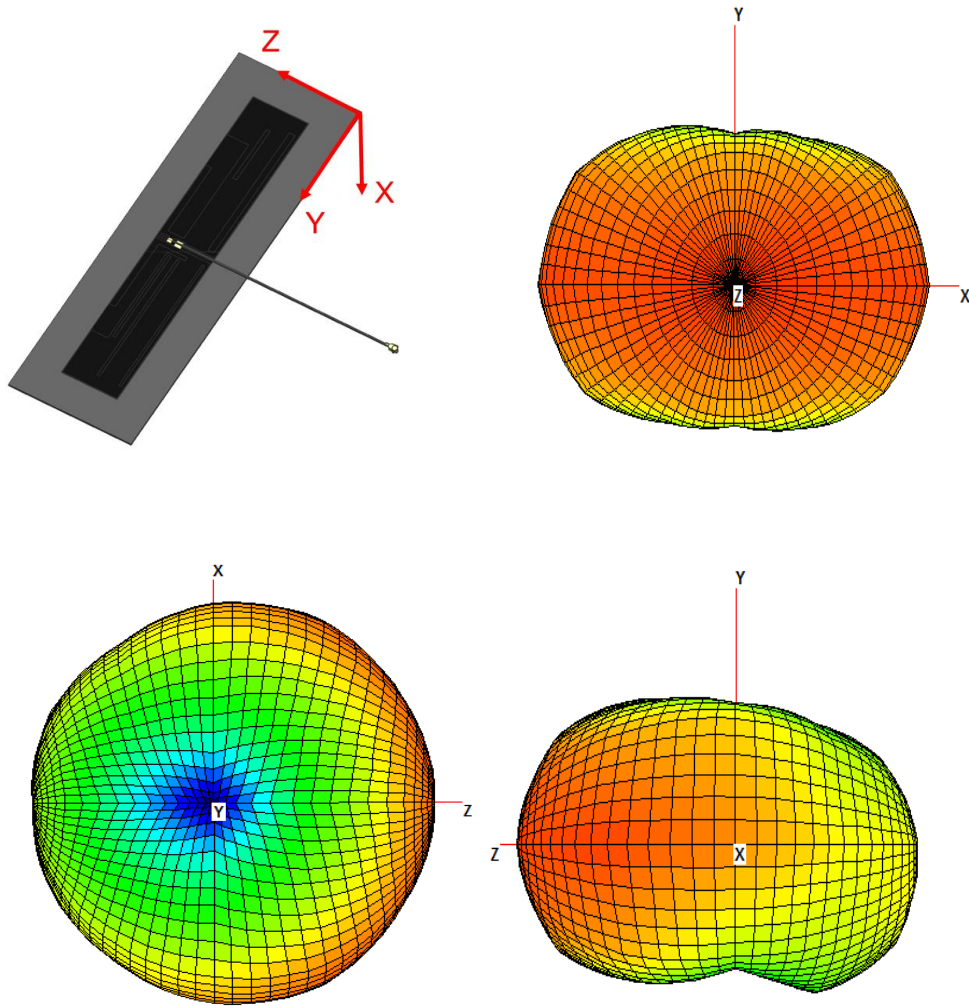


FIGURE 4.6.3 3D RADIATION PATTERN OF ANTENNA AT 900MHZ IN FREE SPACE

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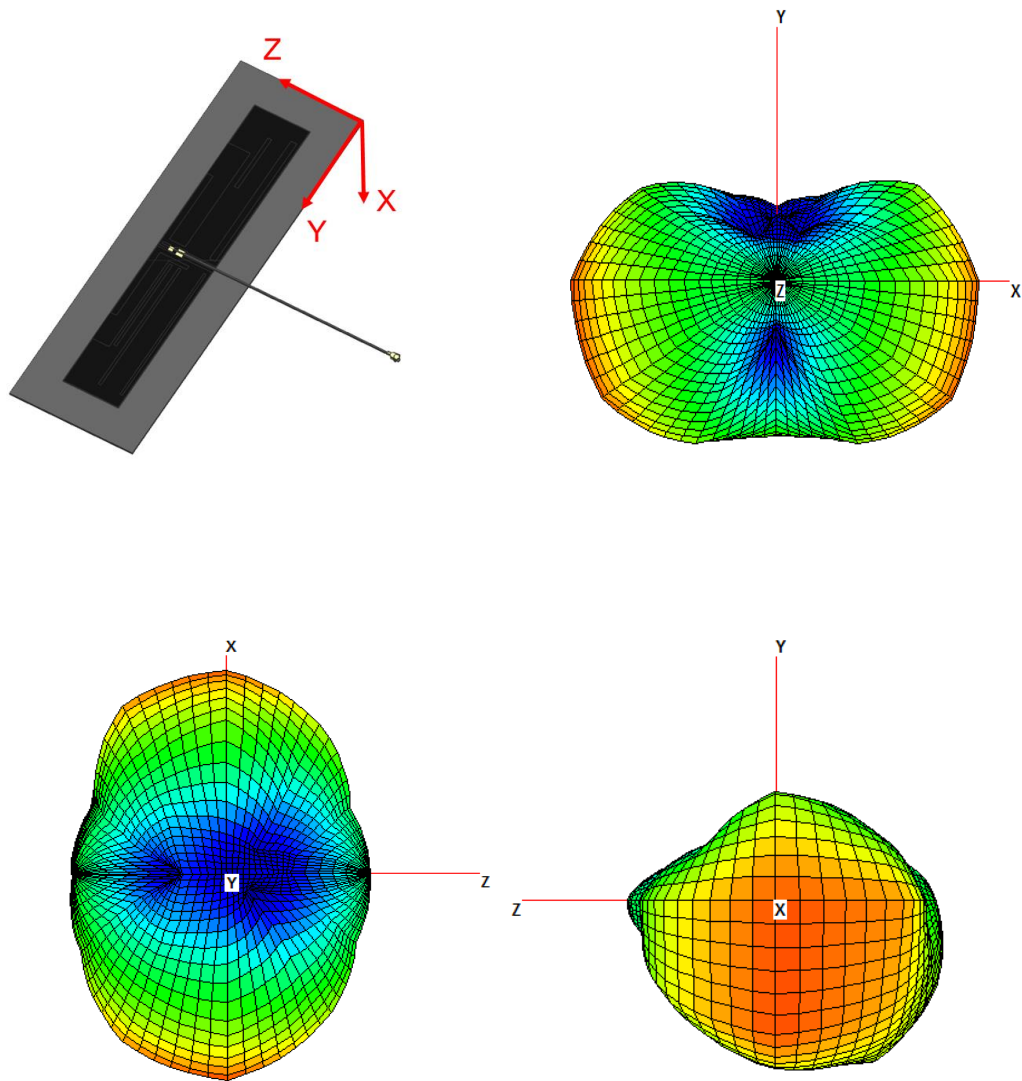


FIGURE 4.6.4 3D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

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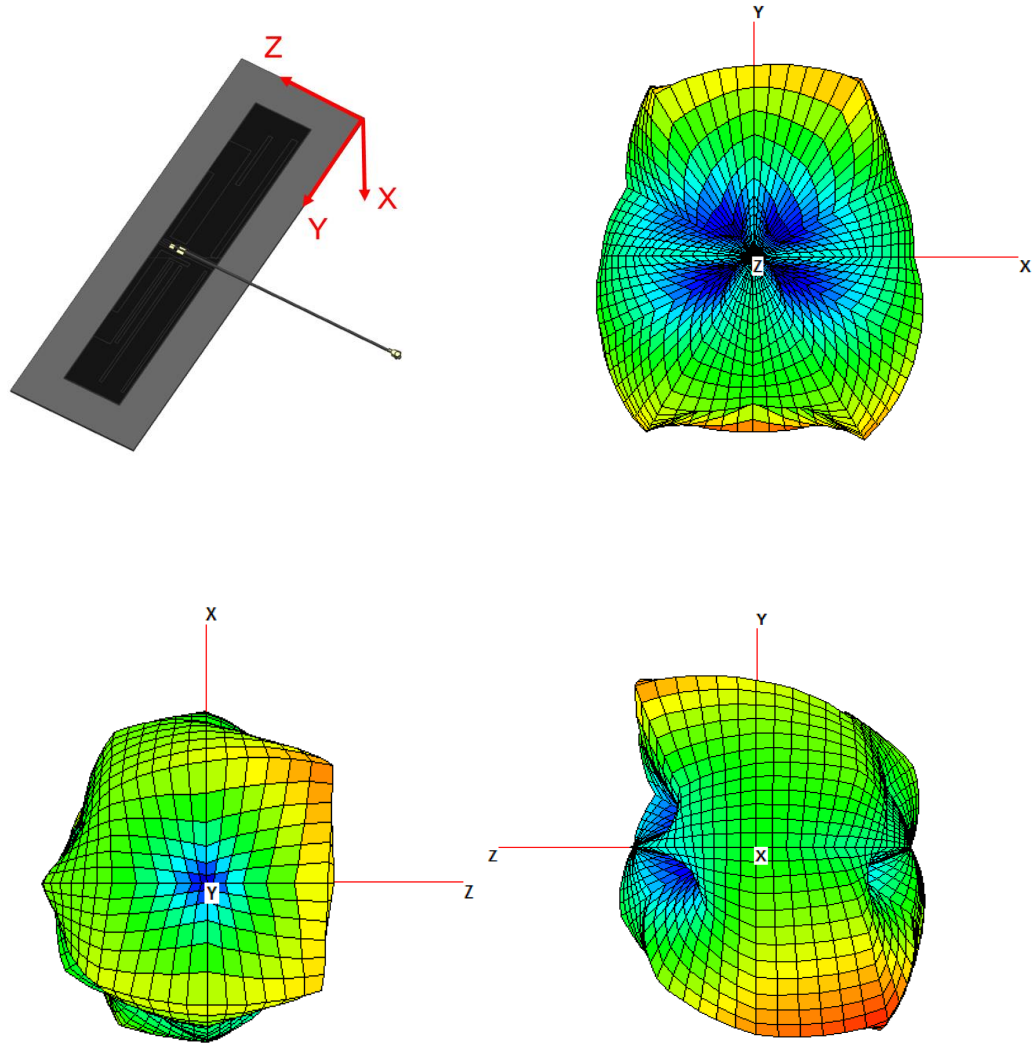


FIGURE 4.6.5 3D RADIATION PATTERN OF ANTENNA AT 2500MHZ IN FREE SPACE

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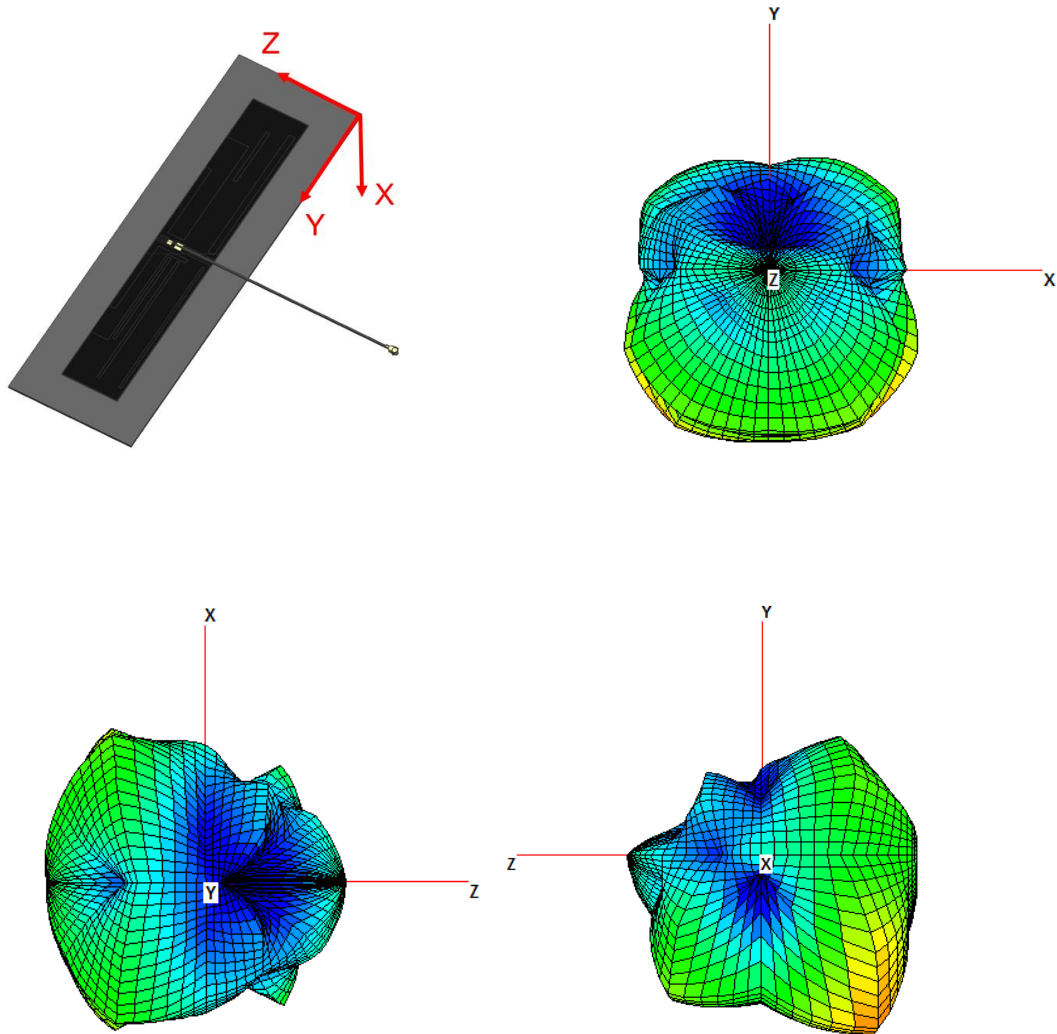


FIGURE 4.6.6 3D RADIATION PATTERN OF ANTENNA AT 3200MHZ IN FREE SPACE

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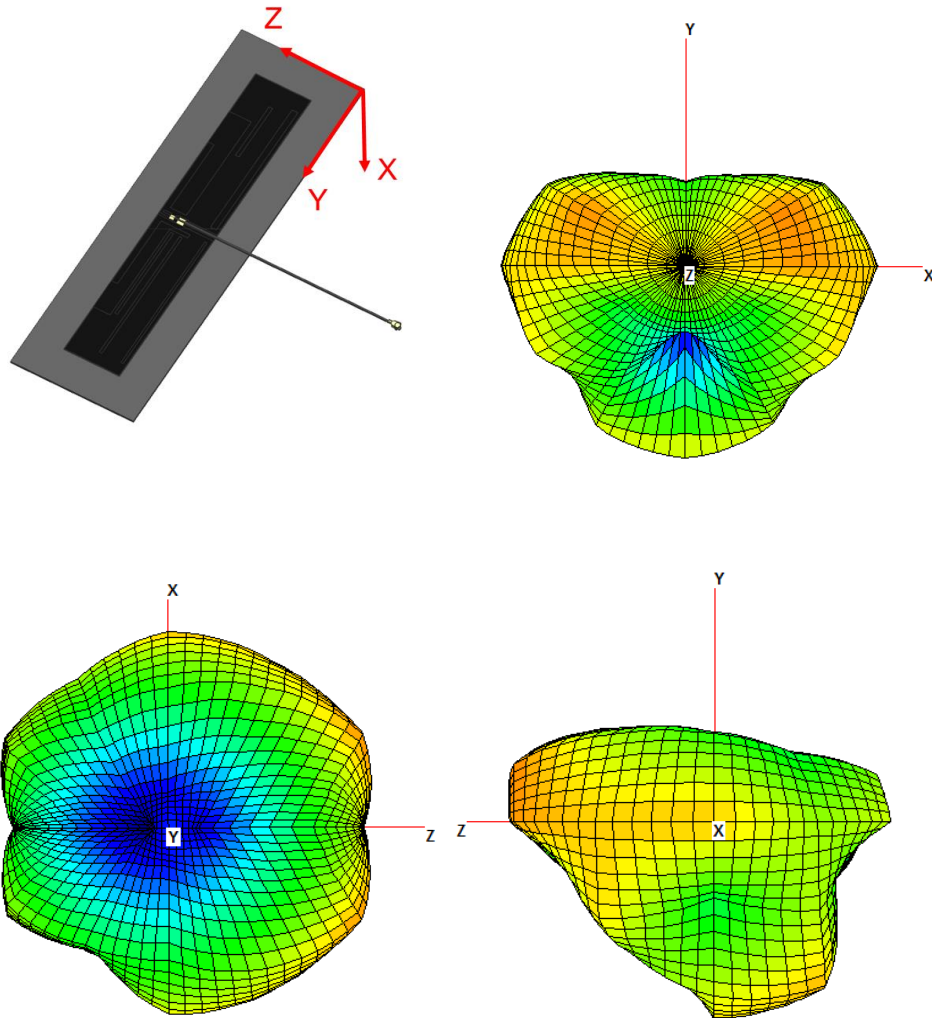


FIGURE 4.6.7 3D RADIATION PATTERN OF ANTENNA AT 4000MHZ IN FREE SPACE

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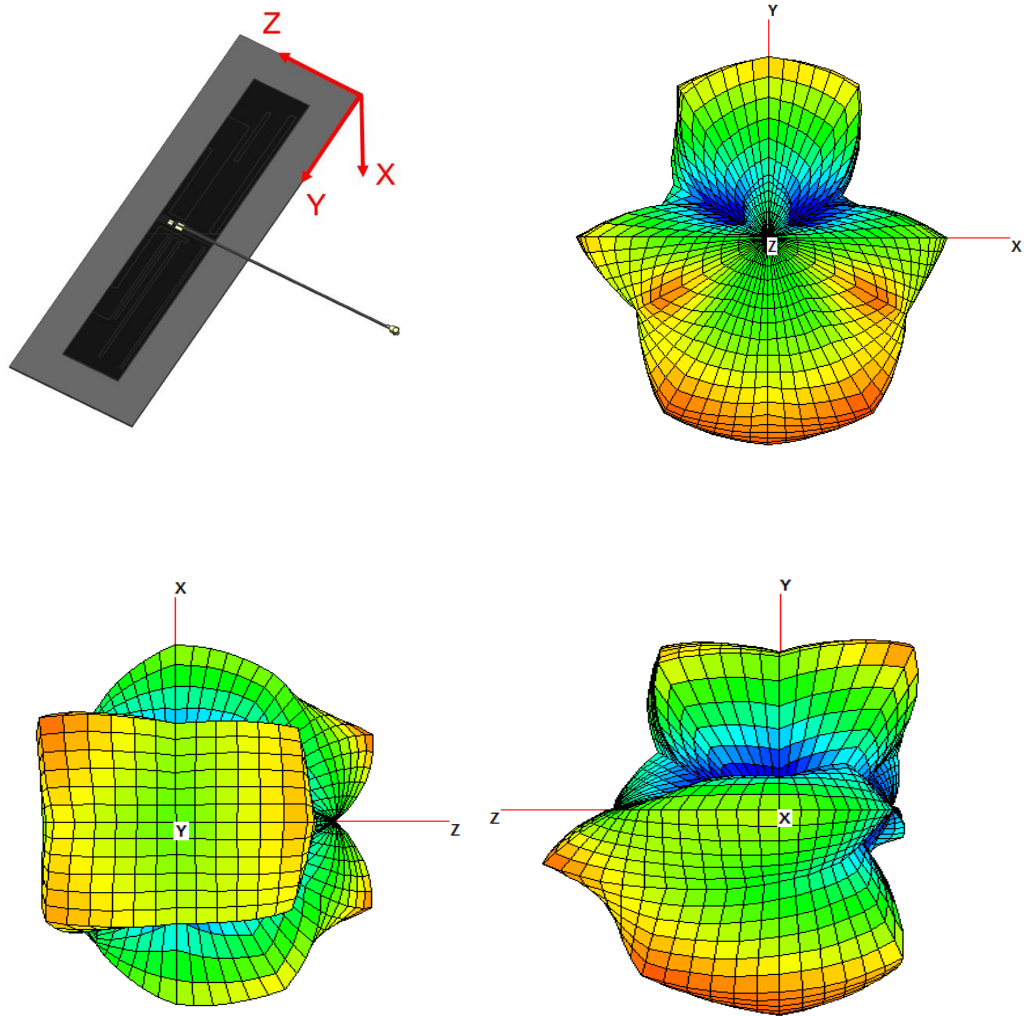


FIGURE 4.6.8 3D RADIATION PATTERN OF ANTENNA AT 5000MHZ IN FREE SPACE

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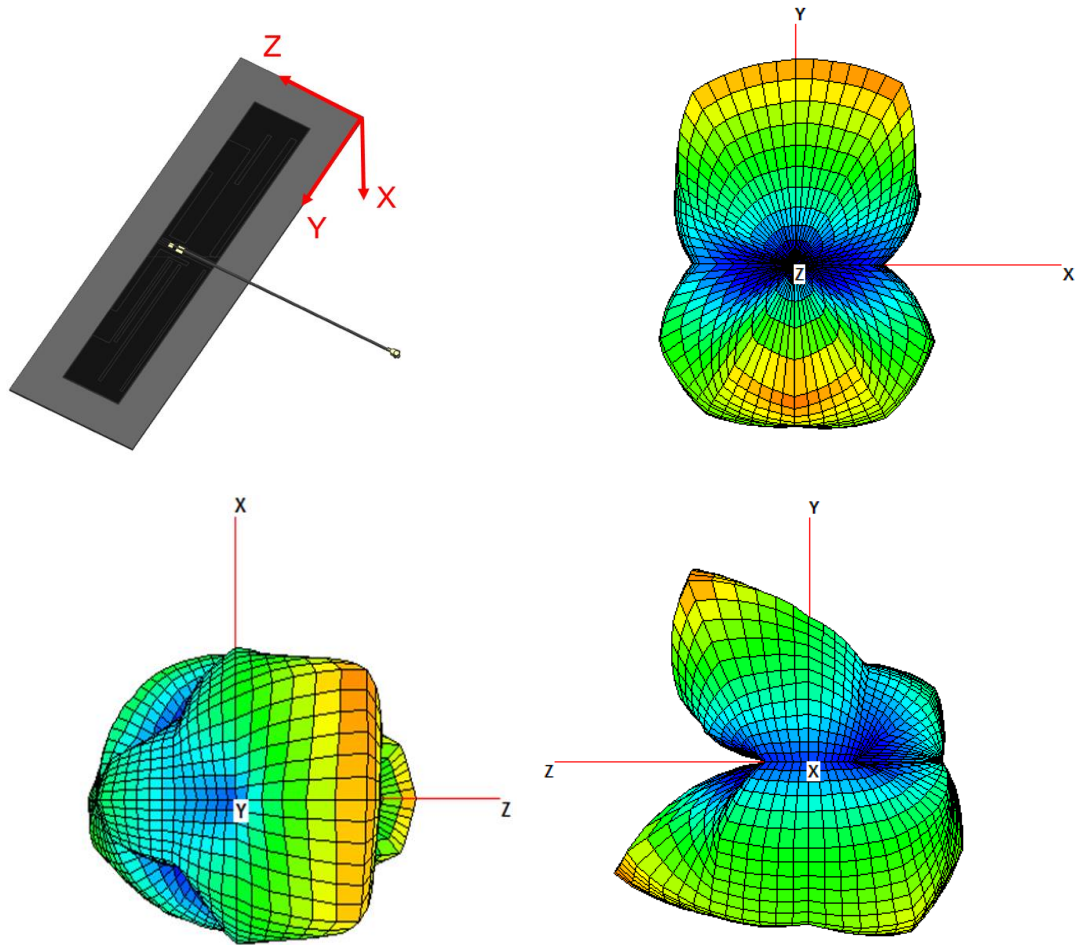


FIGURE 4.6.9 3D RADIATION PATTERN OF ANTENNA AT 6000MHZ IN FREE SPACE

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5.0 ASSEMBLY GUIDELINE

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

5.1 HOW TO TEAR FLEX RELEASE PAPER



1. Find cut line on flex back side



2. Bend flex slight along cut line



3. Tear release paper

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5.2 CABLE BENDING

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 5.2.1. If the cable crosses into the antenna flex, the antenna performance will be degraded.

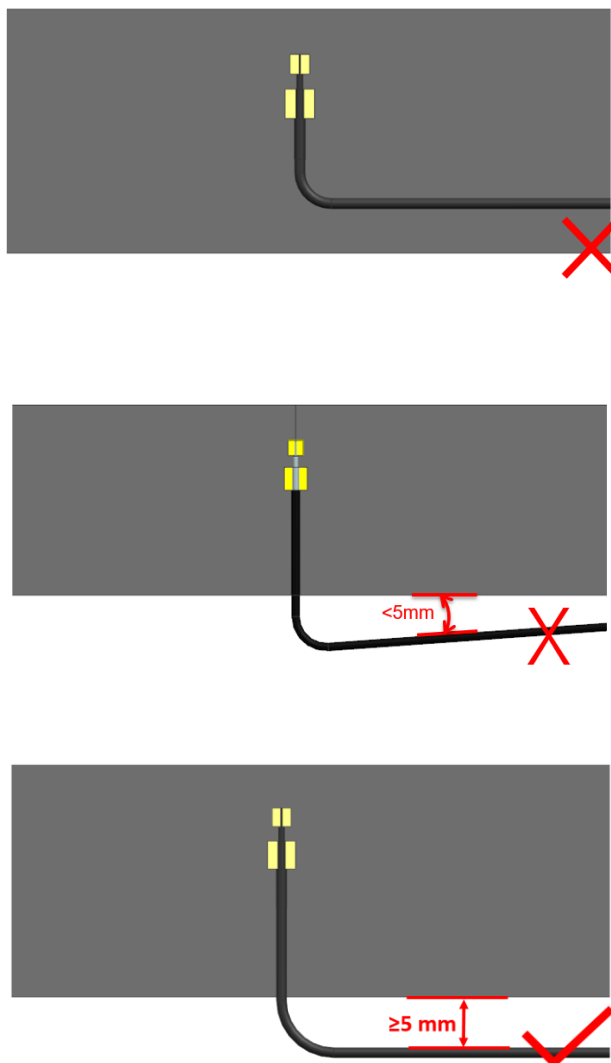


FIGURE 5.2.1 CABLE BENDING

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6.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

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

Four locations with parallel plane ground have been evaluated and these locations are shown in figure 6.1.0. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between antenna and parallel plane ground at high band. The minimum distance between antenna and plane ground is recommended to be 15mm to achieve acceptable RF performance.

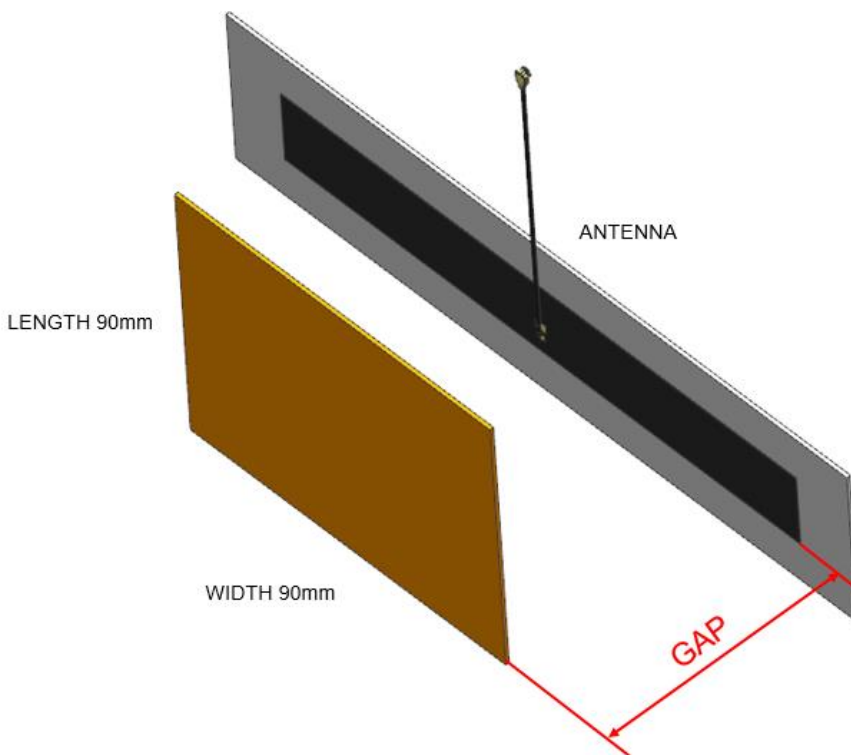


FIGURE 6.1.0 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane (GAP) ground is about 5mm;

Location 2: Distance between antenna and plane (GAP) ground is about 10mm;

Location 3: Distance between antenna and plane (GAP) ground is about 15mm;

Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

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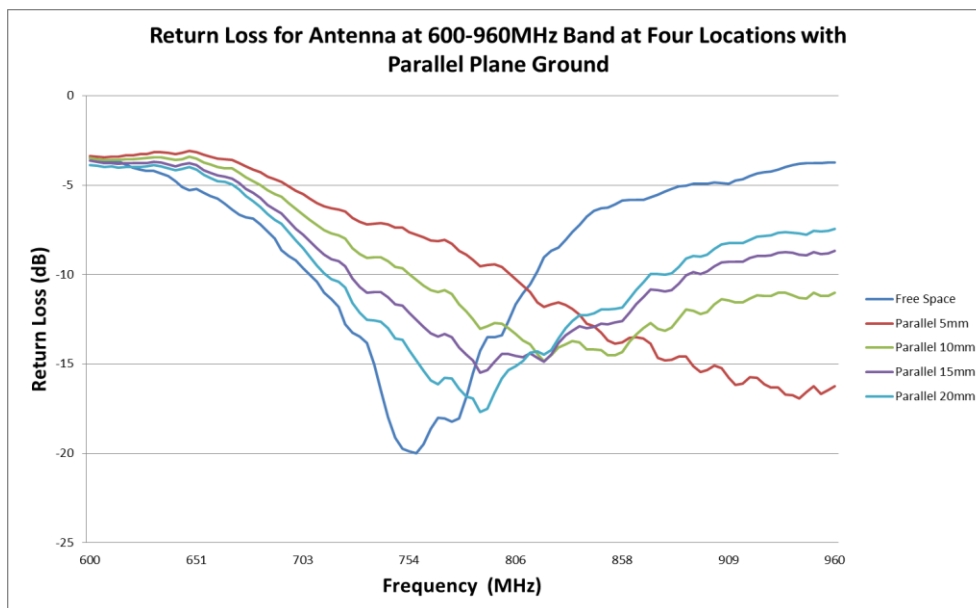


FIGURE 6.1.1 RETURN LOSS OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

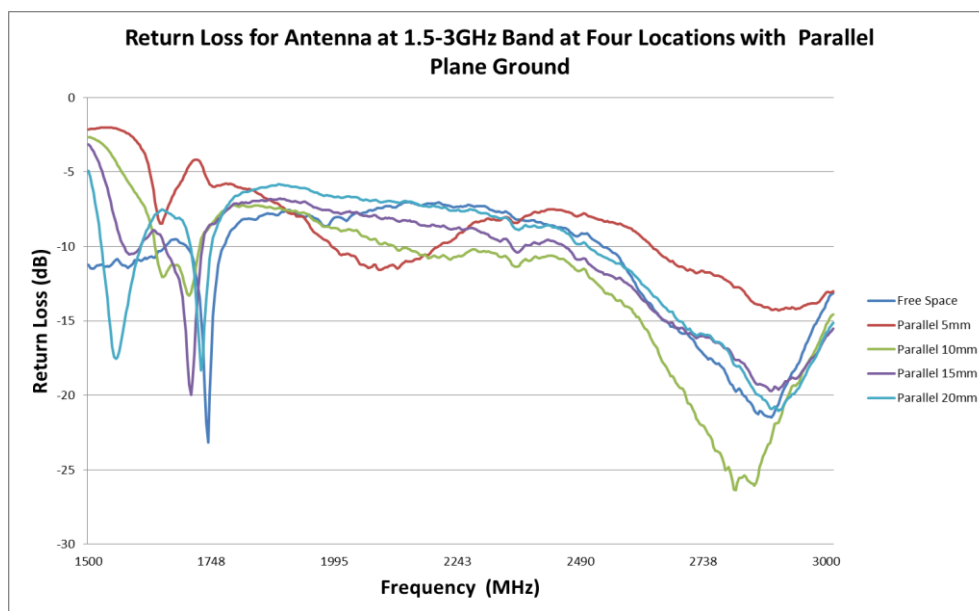


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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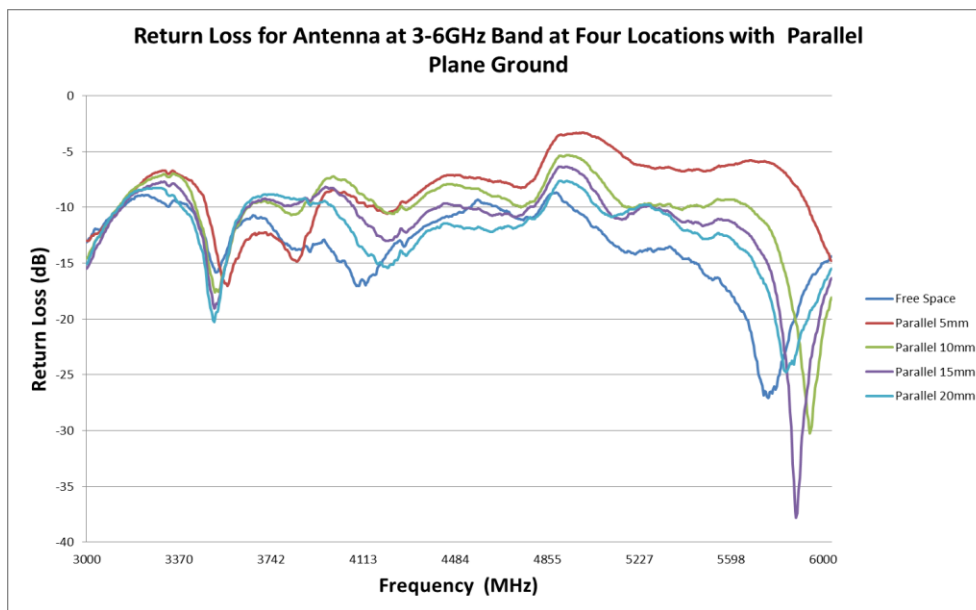


FIGURE 6.1.3 RETURN LOSS OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

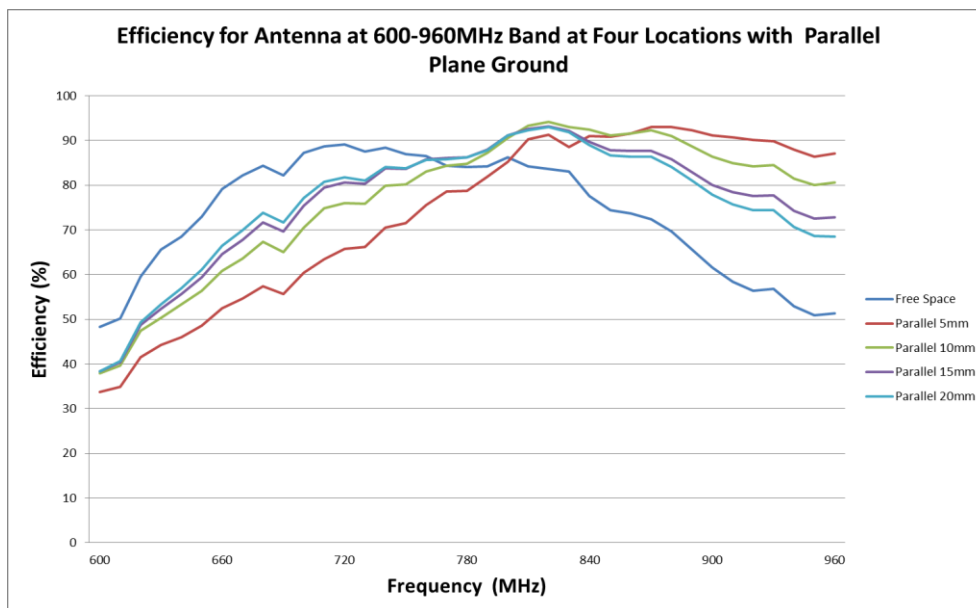


FIGURE 6.1.4 EFFICIENCY OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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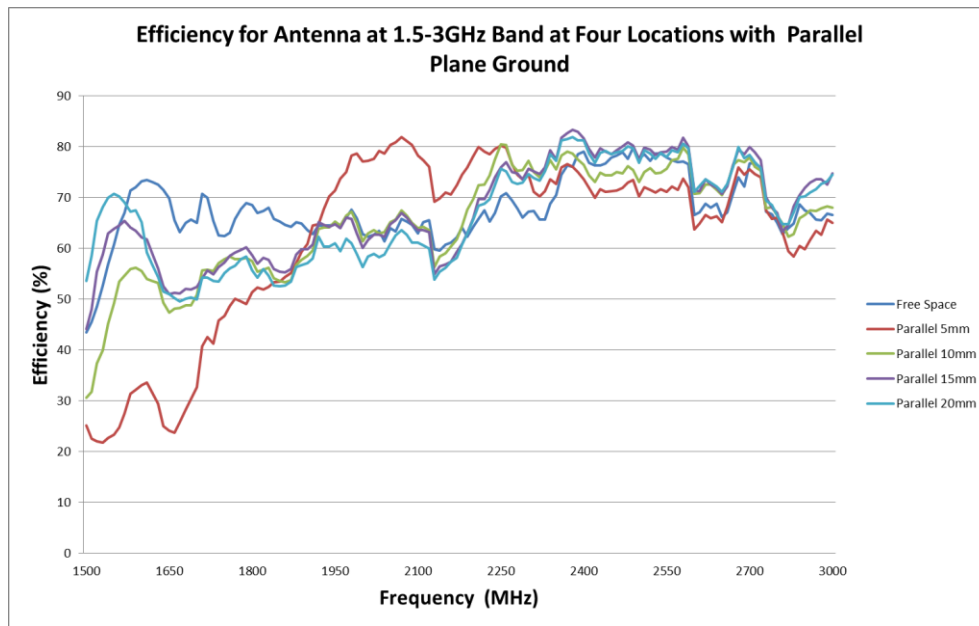


FIGURE 6.1.5 EFFICIENCY OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

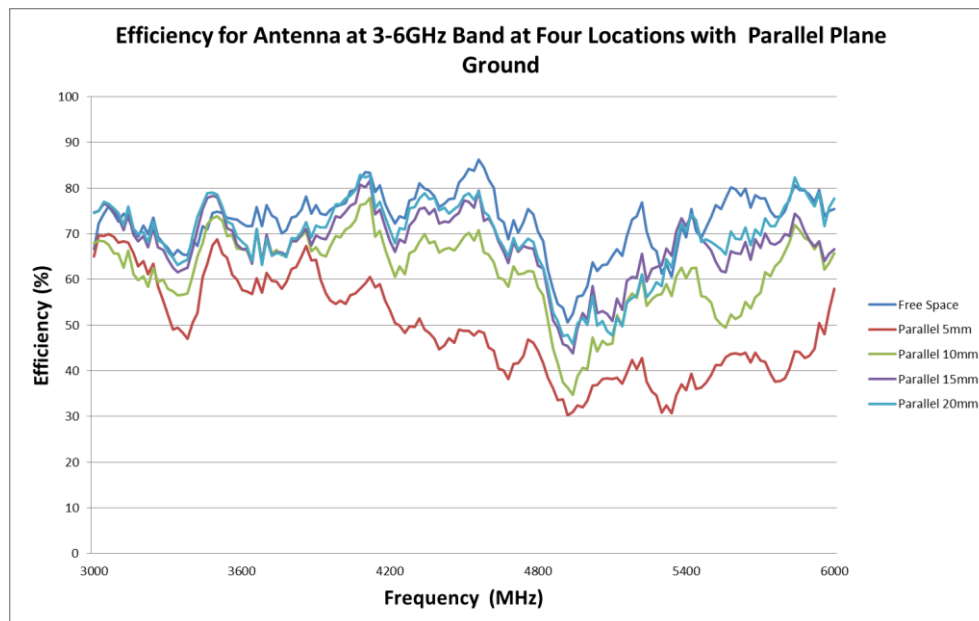


FIGURE 6.1.6 EFFICIENCY OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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

Four locations with vertical plane ground have been evaluated and these locations are shown in figure 6.2.0. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The distance between antenna and vertical plane ground affect the antenna performance slightly. We still suggest the minimum distance between antenna and plane ground is recommended to be 5mm.

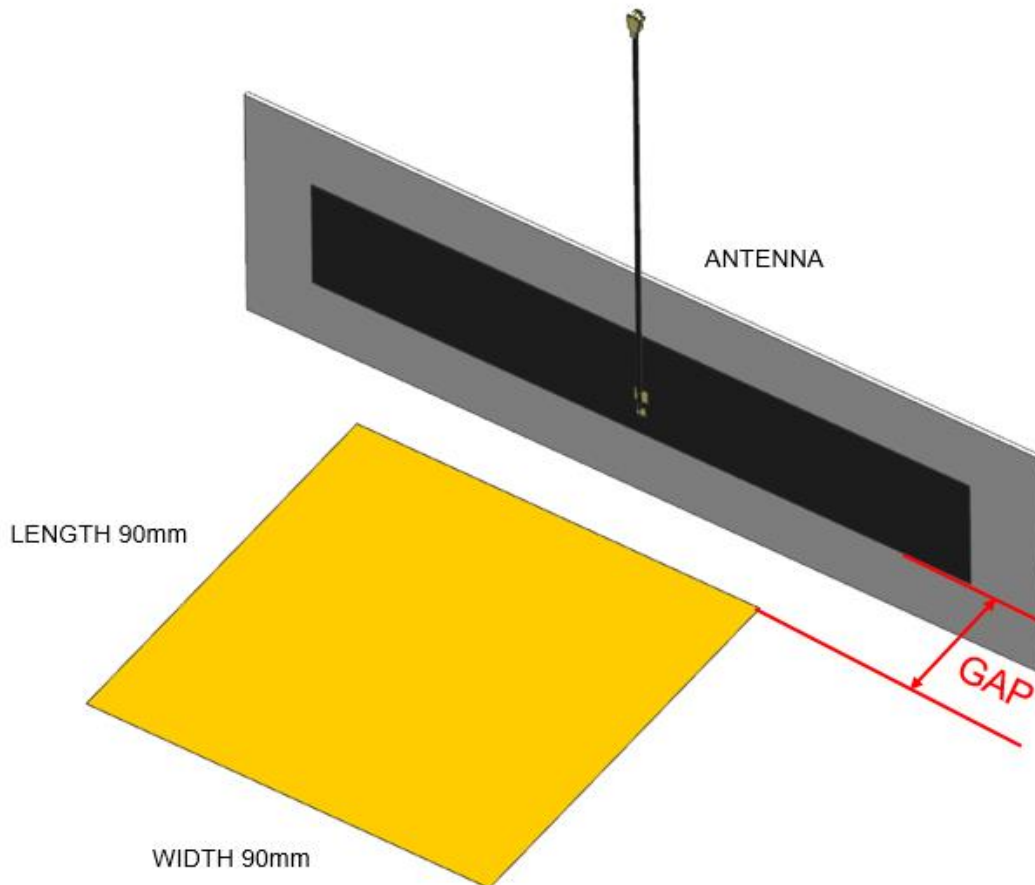


FIGURE 6.2.0 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane (GAP) ground is about 5mm;

Location 2: Distance between antenna and plane (GAP) ground is about 10mm;

Location 3: Distance between antenna and plane (GAP) ground is about 15mm;

Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

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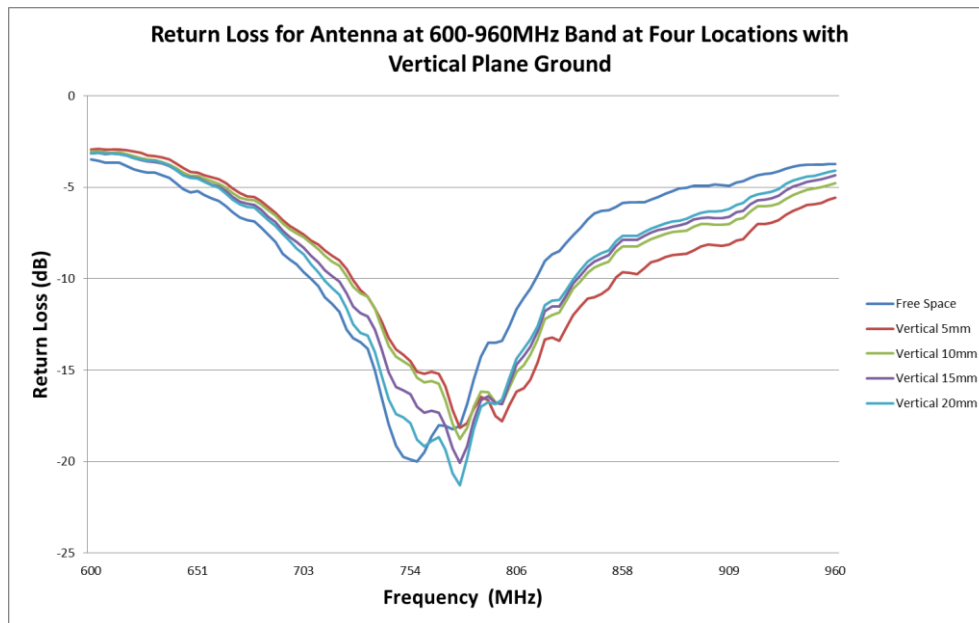


FIGURE 6.2.1 RETURN LOSS OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

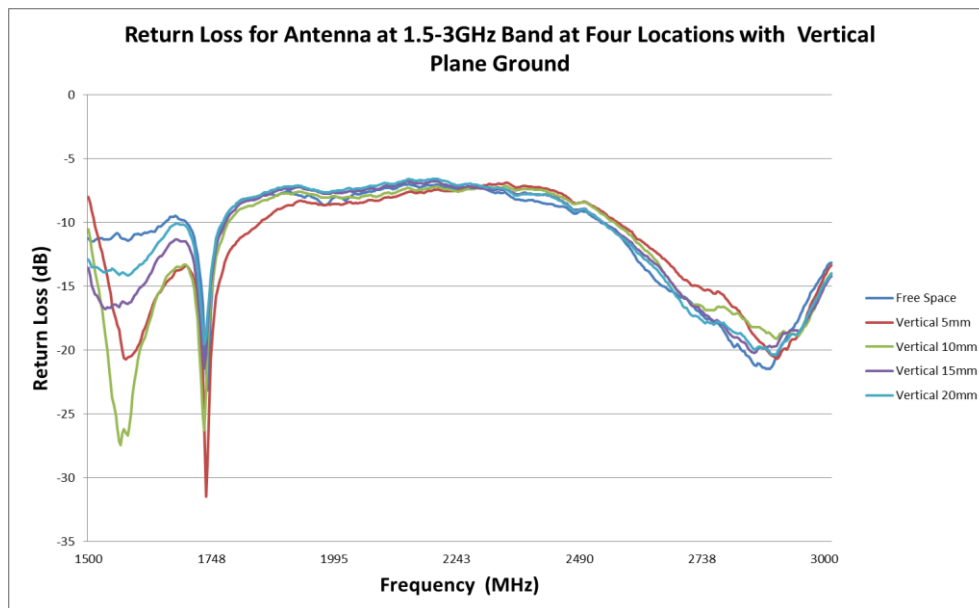


FIGURE 6.2.2 RETURN LOSS OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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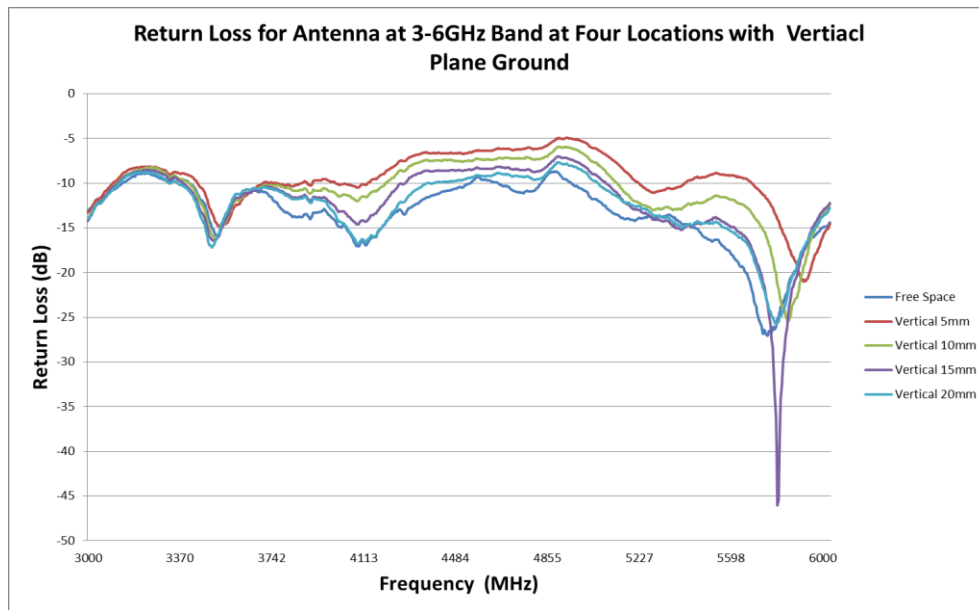


FIGURE 6.2.3 RETURN LOSS OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

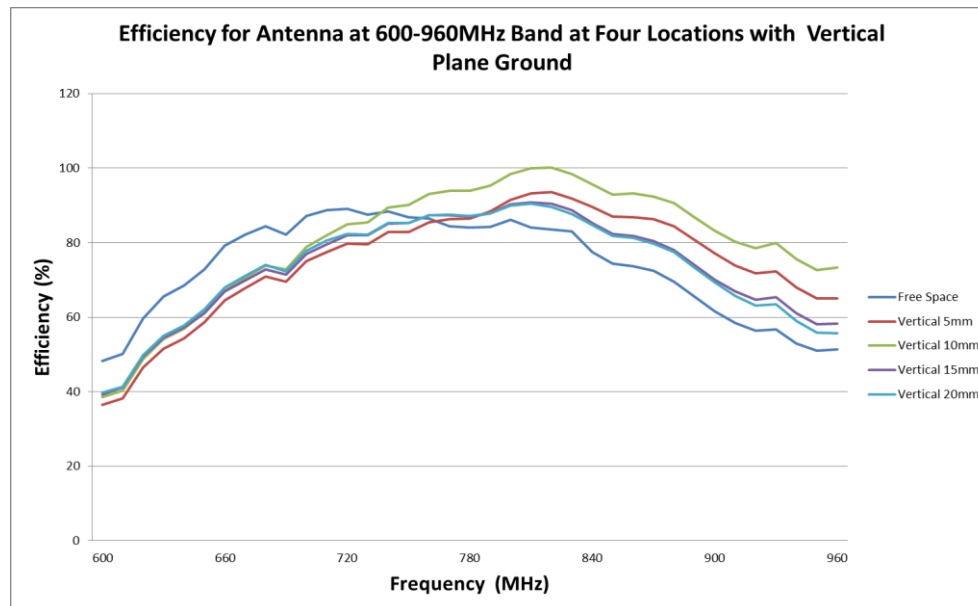


FIGURE 6.2.4 EFFICIENCY OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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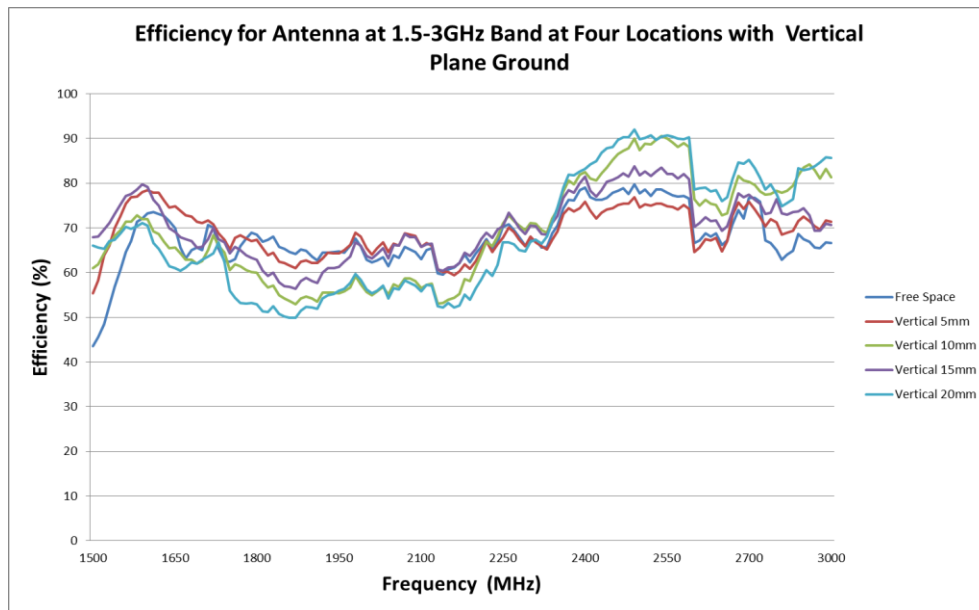


FIGURE 6.2.5 EFFICIENCY OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

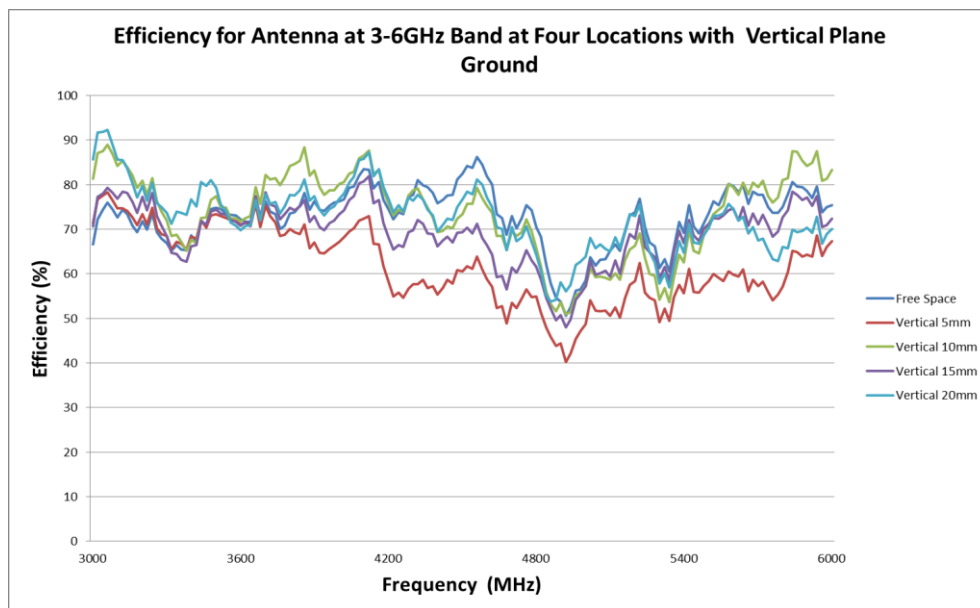


FIGURE 6.2.6 EFFICIENCY OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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

Four locations with the parallel plane ground have been evaluated and these locations are shown in figure 6.3.0. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The distance between the antenna and the parallel plane ground affect the antenna performance slightly. We still suggest the minimum distance between the antenna and the plane ground is recommended to be 5mm.

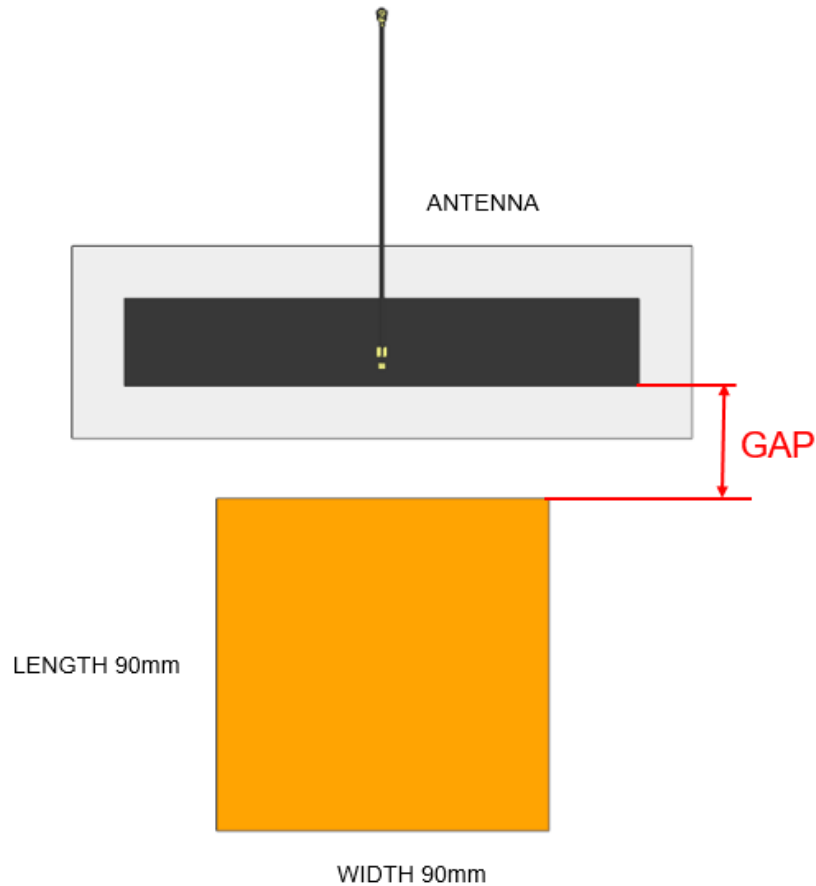


FIGURE 6.3.0 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane (GAP) ground is about 5mm;

Location 2: Distance between antenna and plane (GAP) ground is about 10mm;

Location 3: Distance between antenna and plane (GAP) ground is about 15mm;

Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

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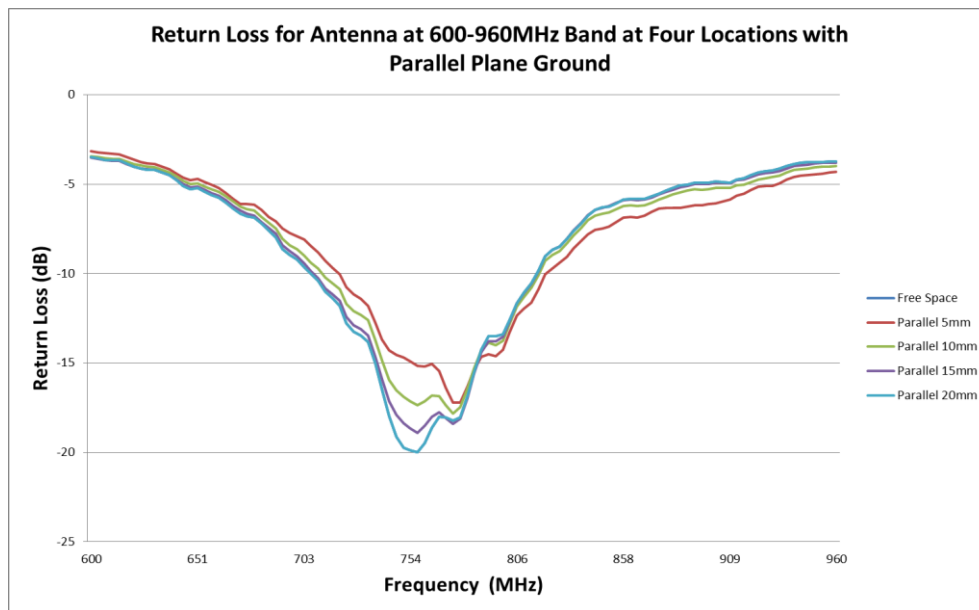


FIGURE 6.3.1 RETURN LOSS OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

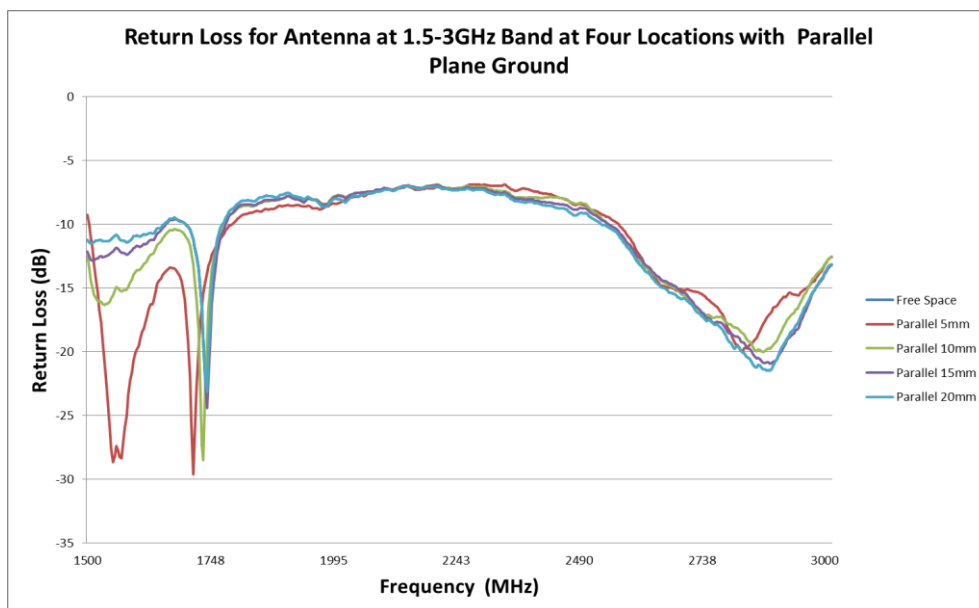


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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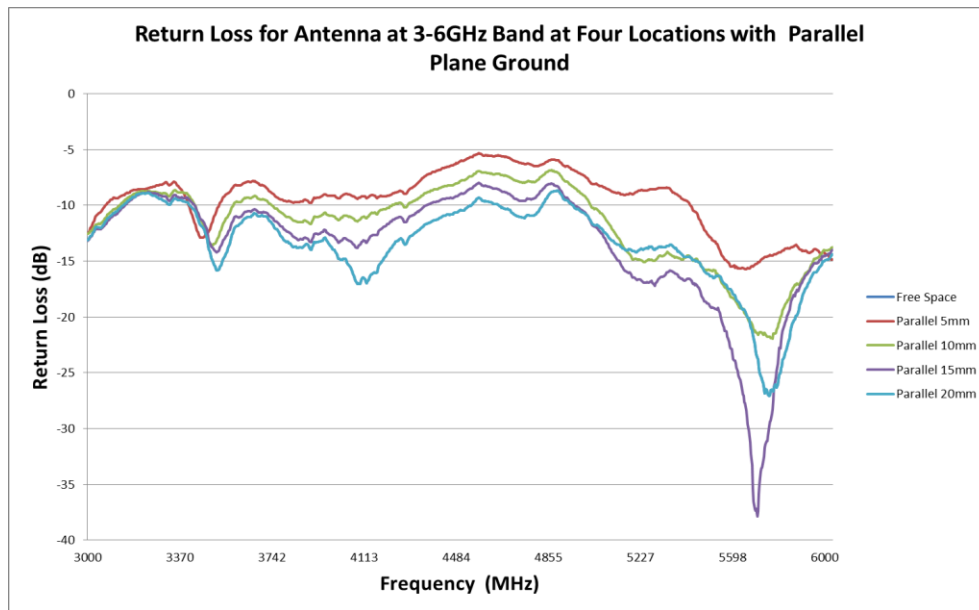


FIGURE 6.3.3 RETURN LOSS OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

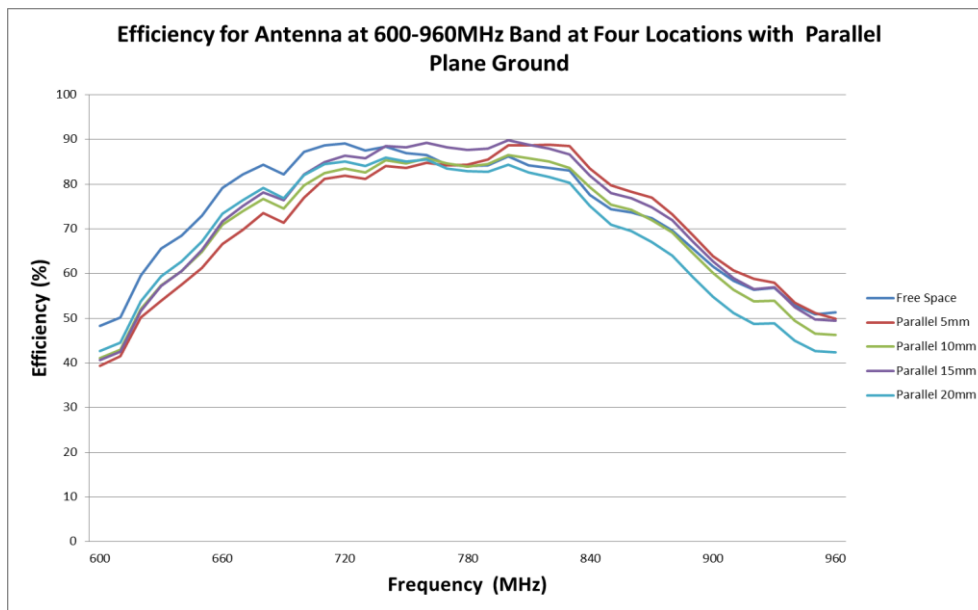


FIGURE 6.3.4 EFFICIENCY OF ANTENNA AT 600-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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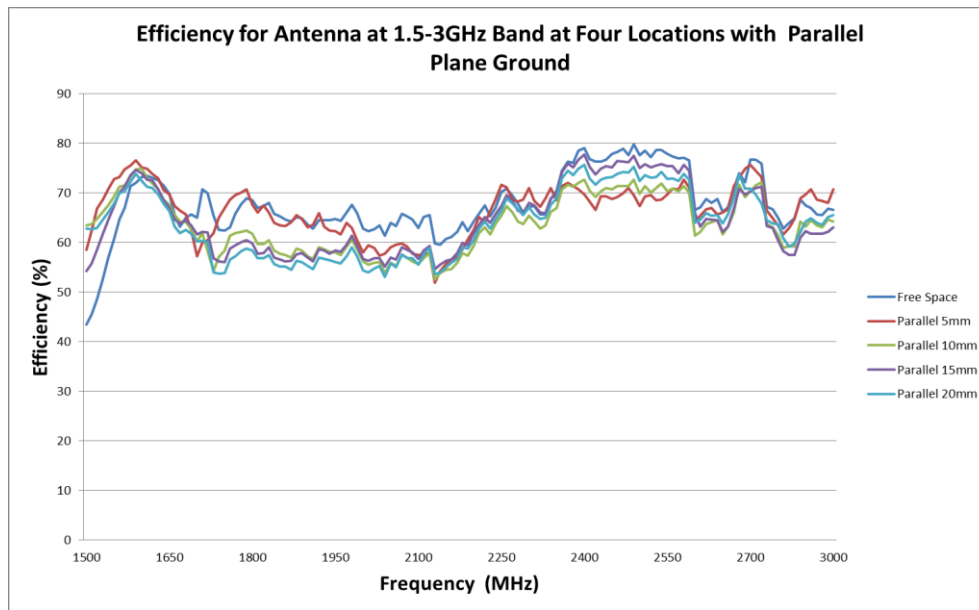


FIGURE 6.3.5 EFFICIENCY OF ANTENNA AT 1.5-3GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

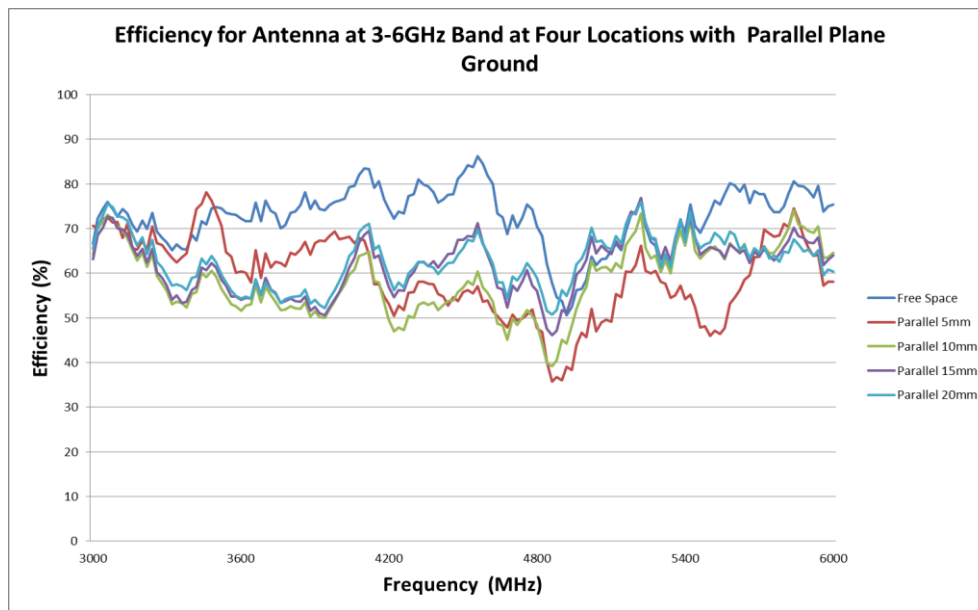


FIGURE 6.3.6 EFFICIENCY OF ANTENNA AT 3-6GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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