



APPLICATION SPECIFICATION

TITLE

824~2170MHZ FELEXIBLE ANTENNA SIDE-FED

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AS-2125700100	Liu Hai 2019/06/13	Cheng Kang 2019/06/13	Andy Zhang 2019/06/13

824~2170MHZ FLEXIBLE ANTENNA SIDE-FED

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: 824~2170MHz Flexible Antenna Side-Fed

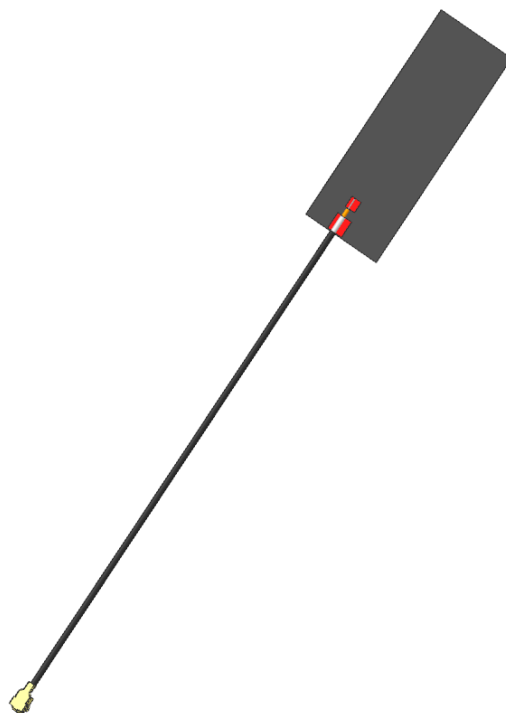
Series Number: 212570XXXX

2.2 DESCRIPTION

Series 212570 is super small size monopole and low profile flexible antenna with side-fed for 824~960/1710~2170MHz band application. It's made from Poly-flexible material, has a tiny form factor and has double-sided 3M adhesive for "peel and stick" easy mounting.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2125700100 for full information.



Molex 212570XXXX 824~2170MHz Flexible Antenna Side-Fed 3D View

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing(SD)	SD-2125700100	Mechanical Dimension of the product
Product Specification (PS)	PS-2125700100	Product Specification
Packing Drawing(PK)	PK-2125700100	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 2 mm thickness with VNA Agilent E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.2125700150 with a cable length of 150mm.

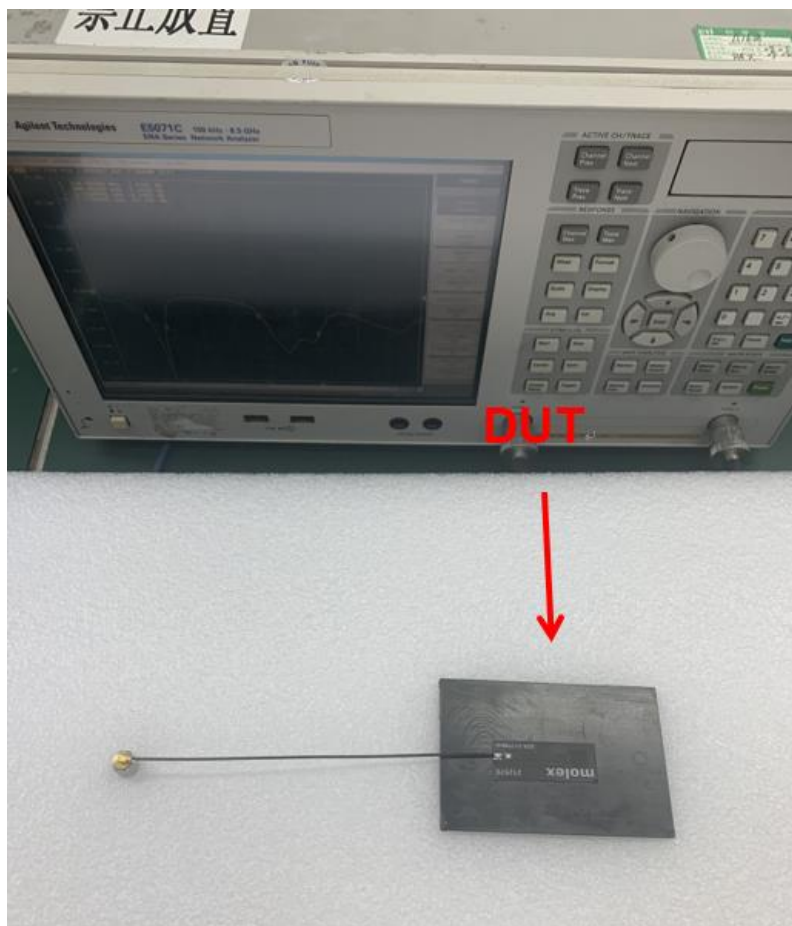


FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 2MM THICKNESS TESTED WITH VNA E5071C

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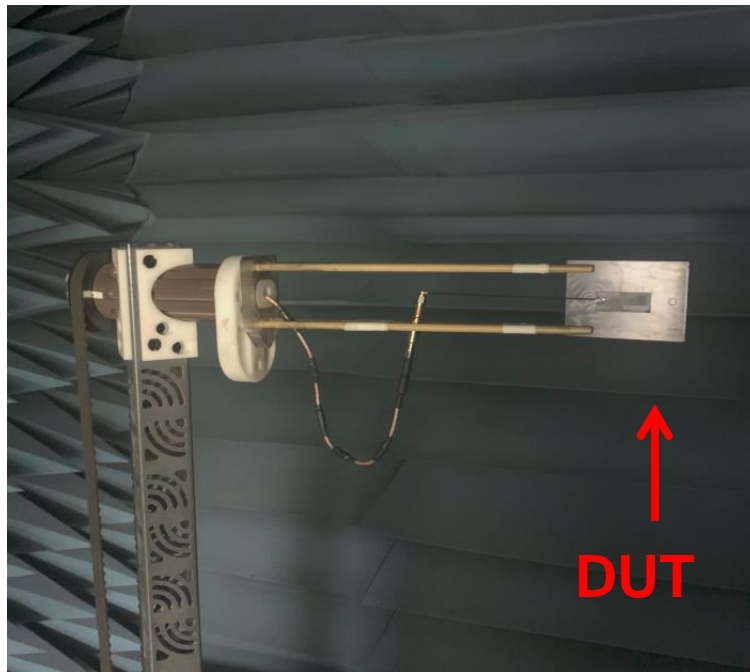


FIGURE 4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 2MM THICKNESS TESTED IN OTA CHAMBER

4.2 ANTENNA PERFORMANCE

DESCRIPTION	EQUIPMENT	REQUIREMENT	
Frequency Range	VNA E5071C	824-960MHz	1710-2170MHz
Return Loss	VNA E5071C	< -5 dB	< -5 dB
Peak Gain (Max)	OTA Chamber	-0.45dBi	1.76dBi
Average Total Efficiency	OTA Chamber	>30%	>60%
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 150mm.

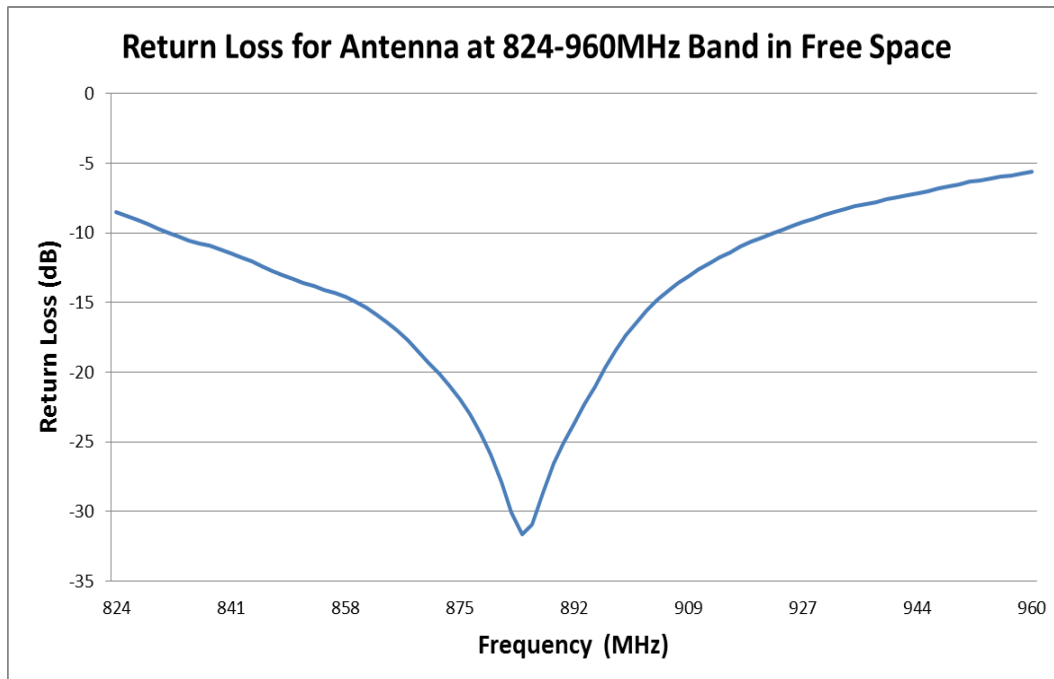


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 824-960MHZ BAND IN FREE SPACE

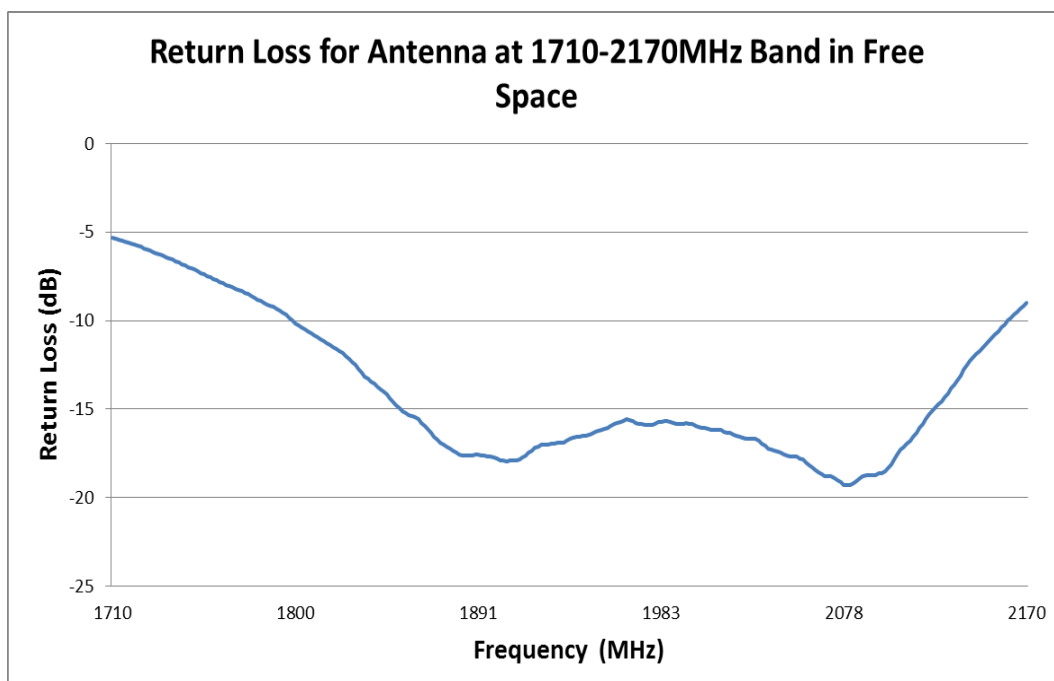


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 1710-2170MHZ BAND IN FREE SPACE

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4.4 EFFICIENCY PLOT

All measurements in this document are done with cable length of 150mm.

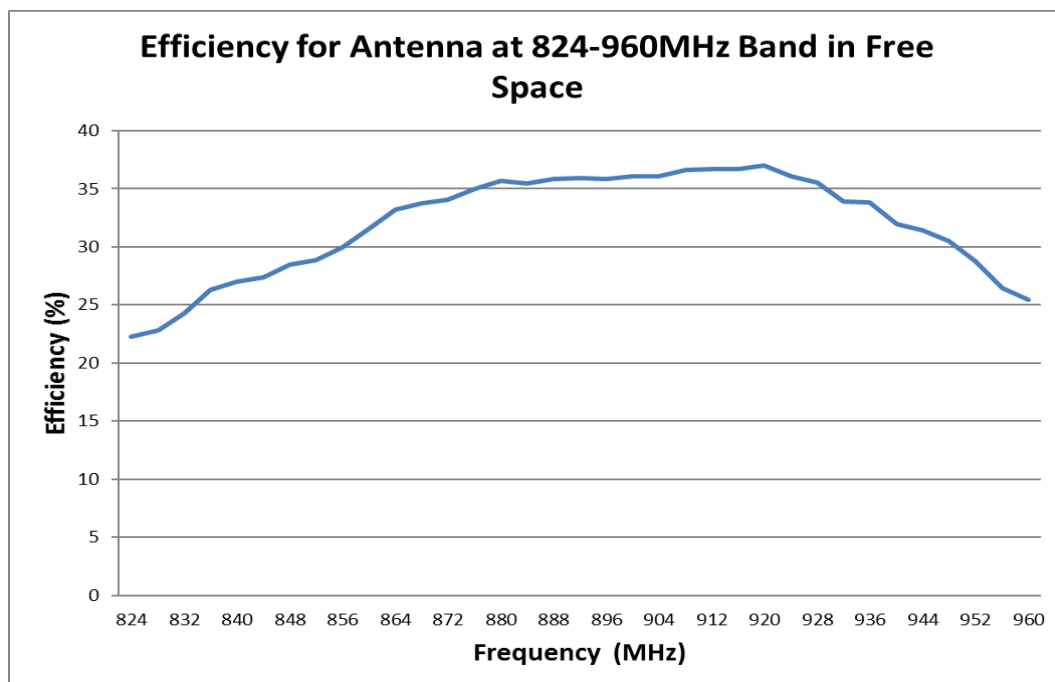


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 824-960MHZ BAND IN FREE SPACE

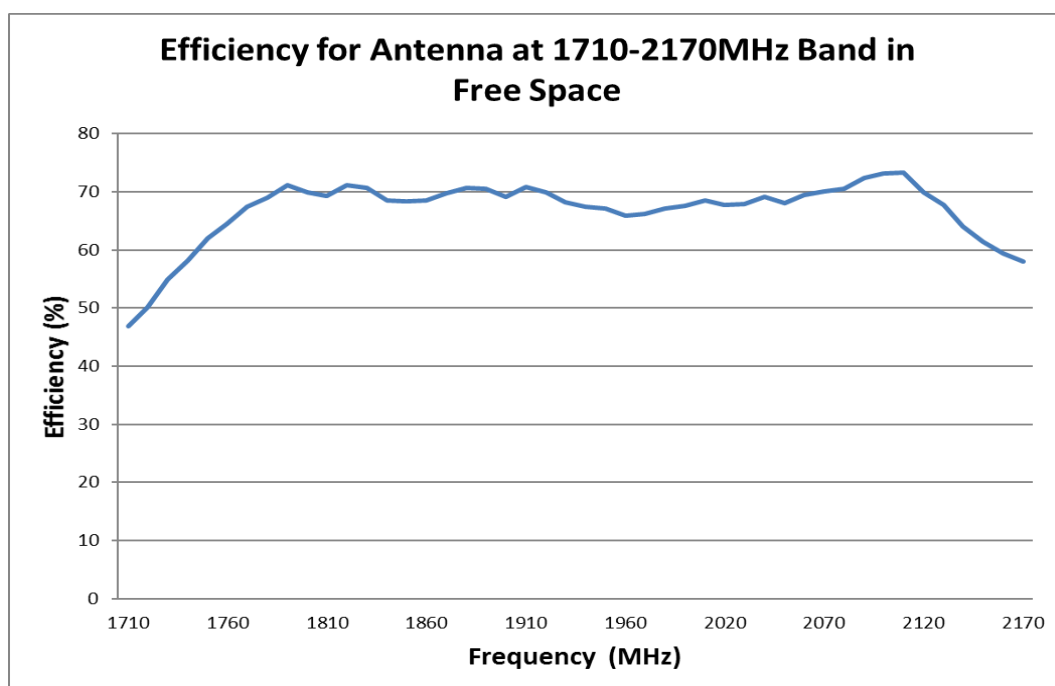


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 1710-2170MHZ BAND IN FREE SPACE

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4.5 2D RADIATION PATTERN

All measurements in this document are done with cable length of 150mm.

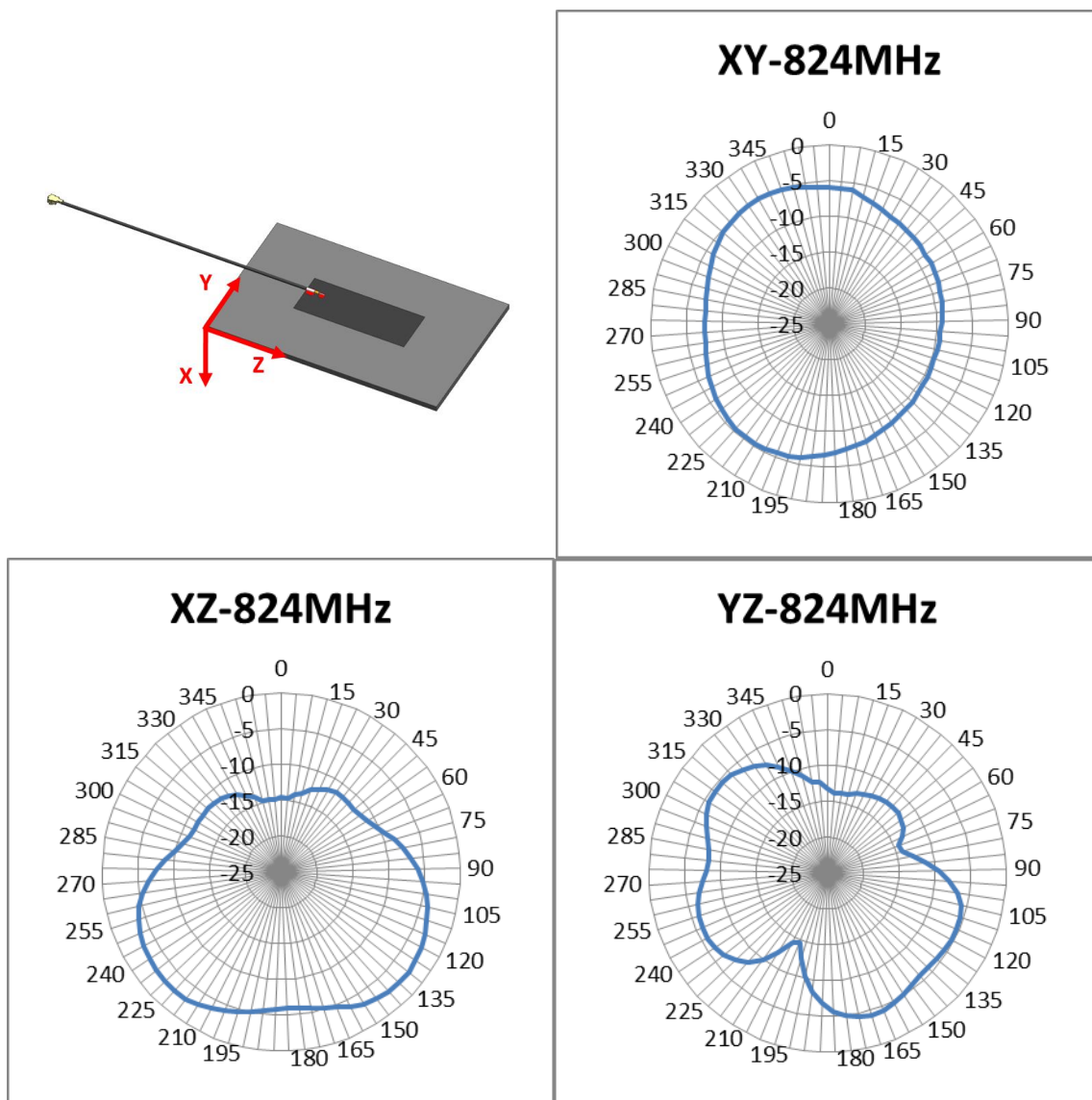


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 824MHZ IN FREE SPACE

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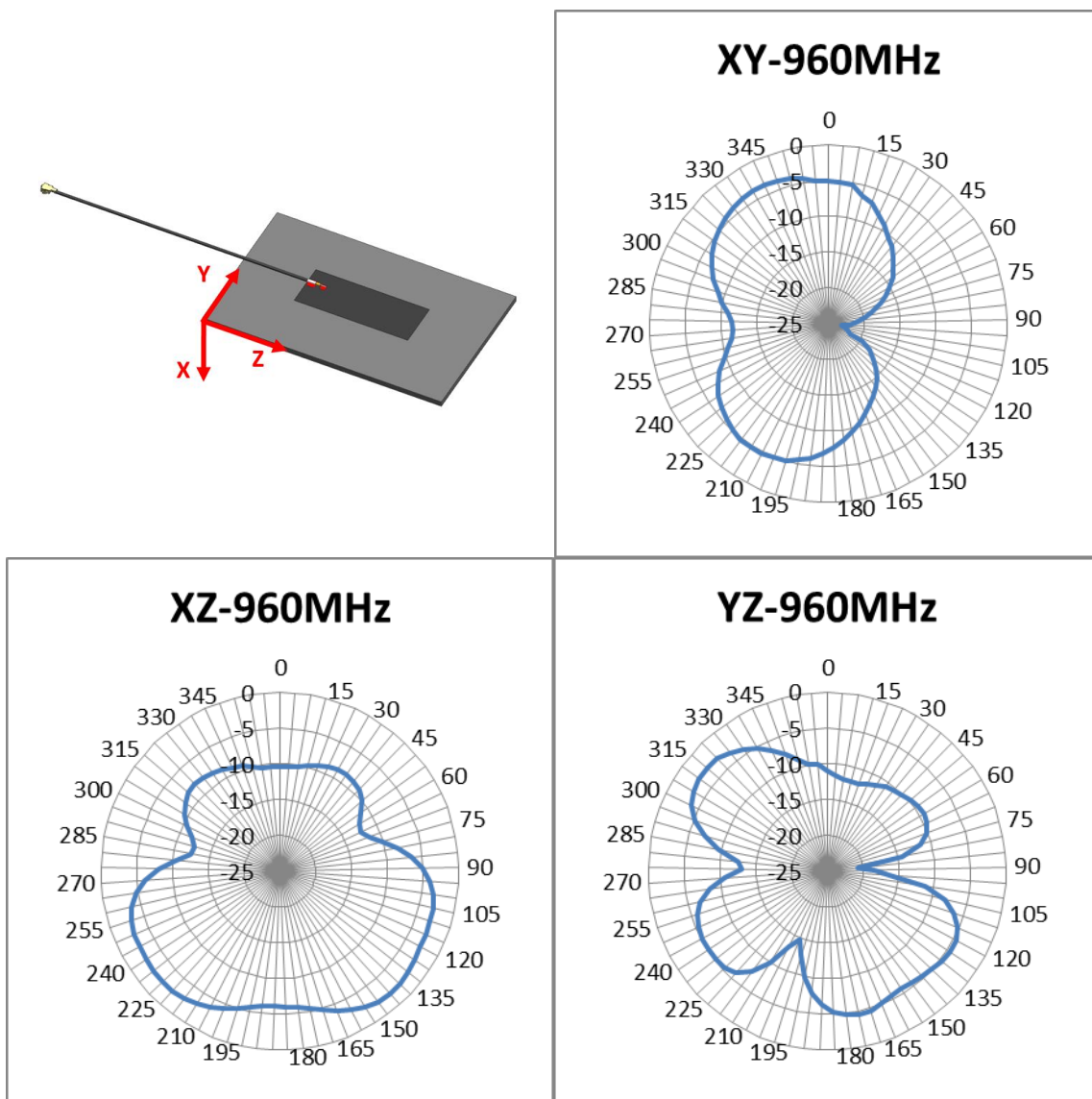
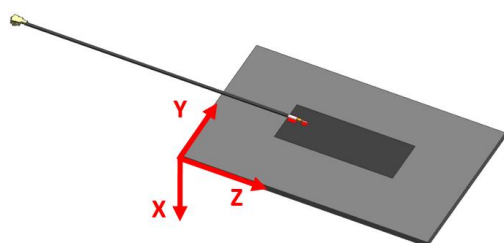
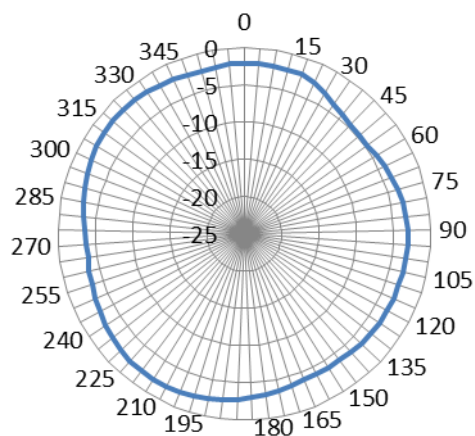


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 960MHZ IN FREE SPACE

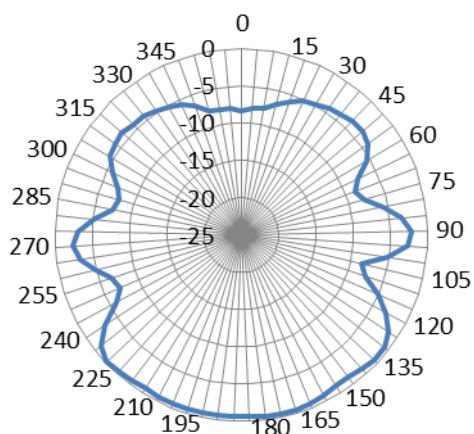
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XY-1710MHz



XZ-1710MHz



YZ-1710MHz

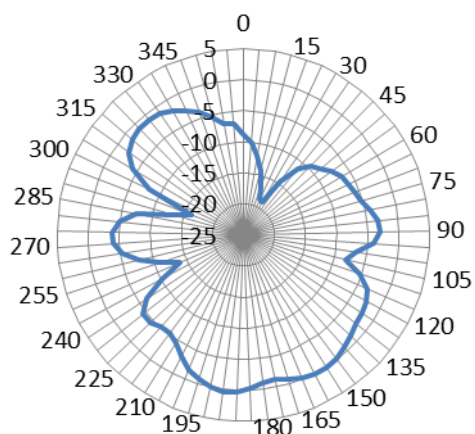
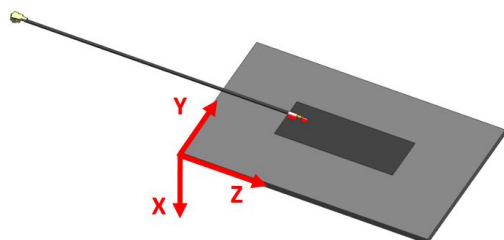
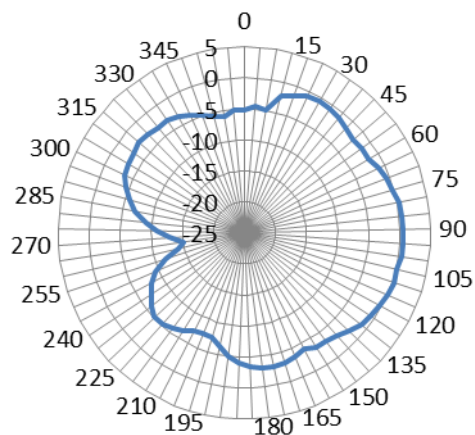


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

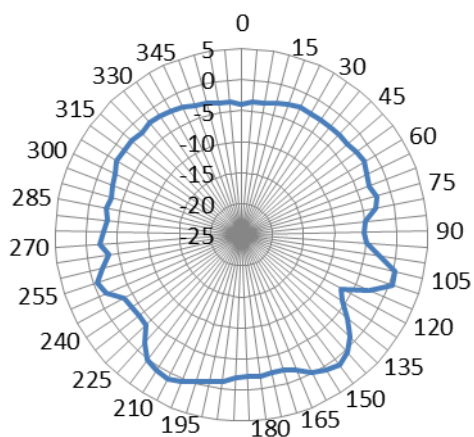
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XY-2170MHz



XZ-2170MHz



YZ-2170MHz

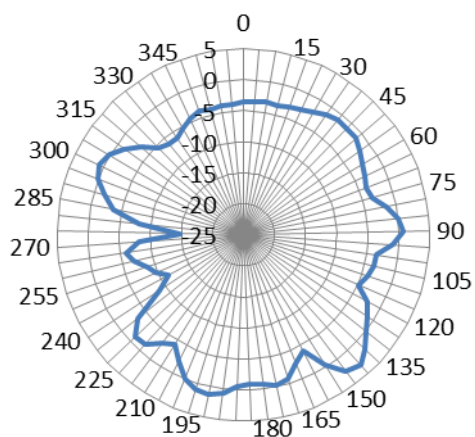


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

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4.6 3D RADIATION PATTERN

All measurements in this document are done with cable length of 150mm.

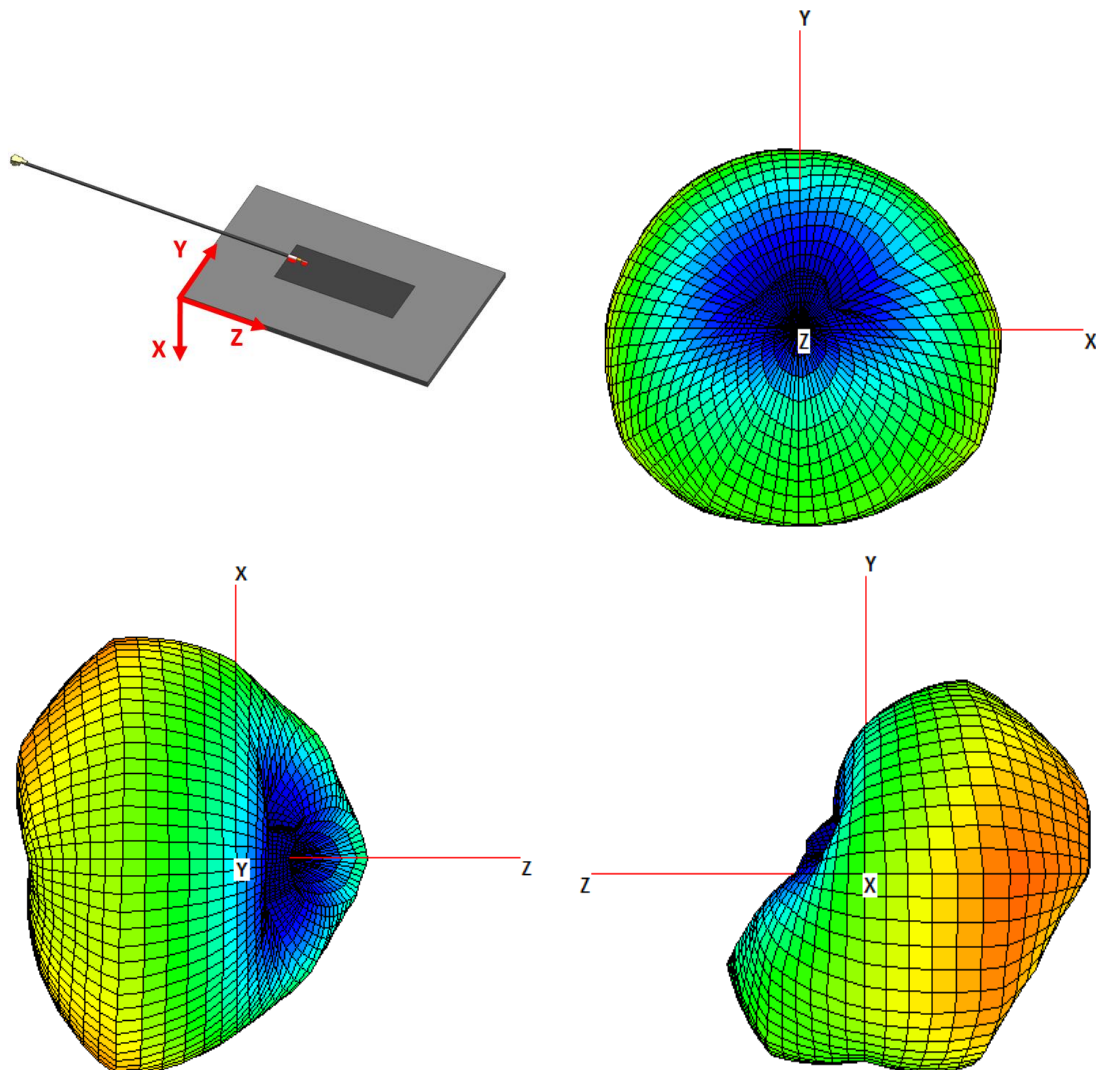


FIGURE 4.6.1 3D RADIATION PATTERN OF ANTENNA AT 824MHZ IN FREE SPACE

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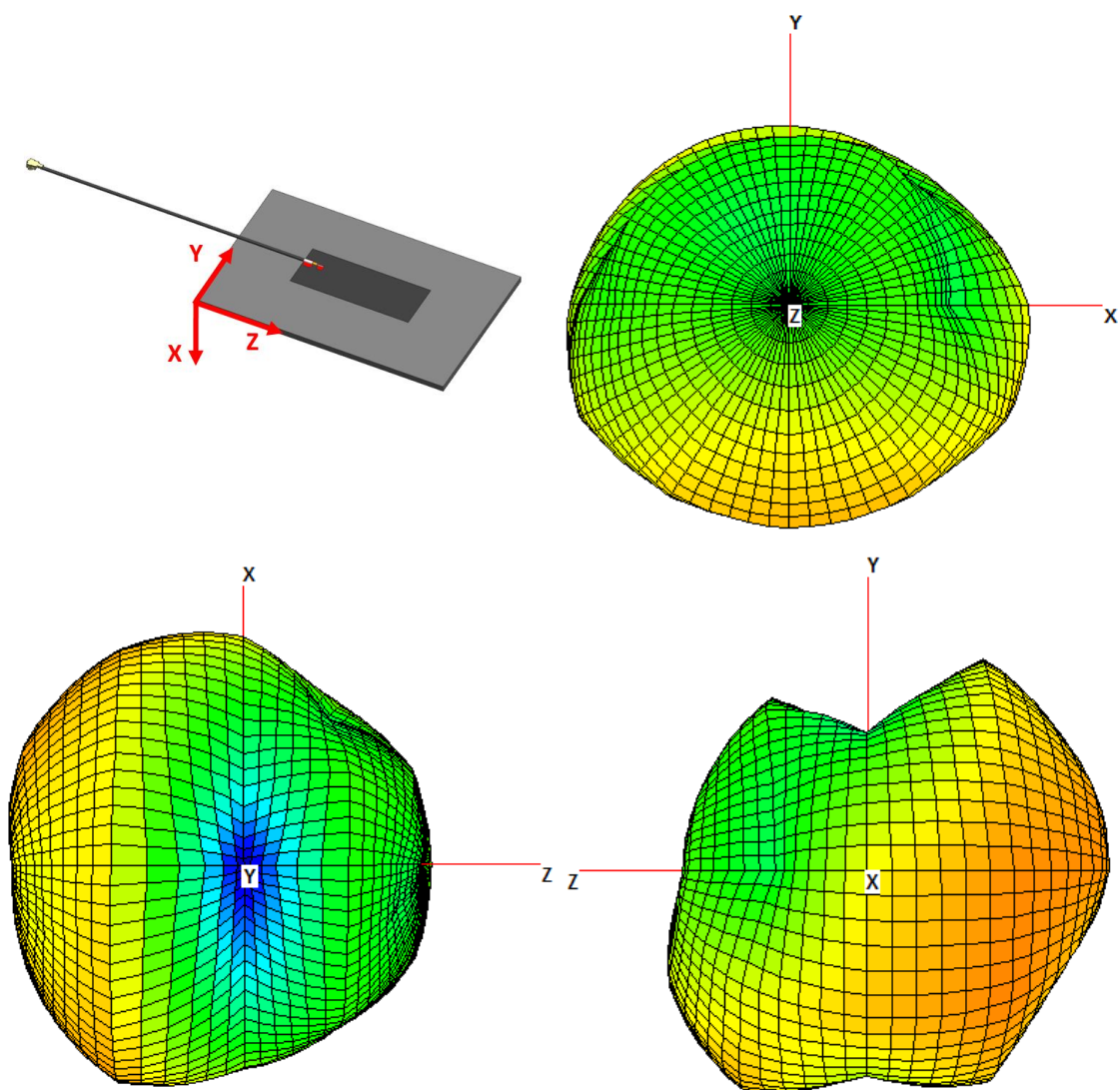


FIGURE 4.6.2 3D RADIATION PATTERN OF ANTENNA AT 960MHZ IN FREE SPACE

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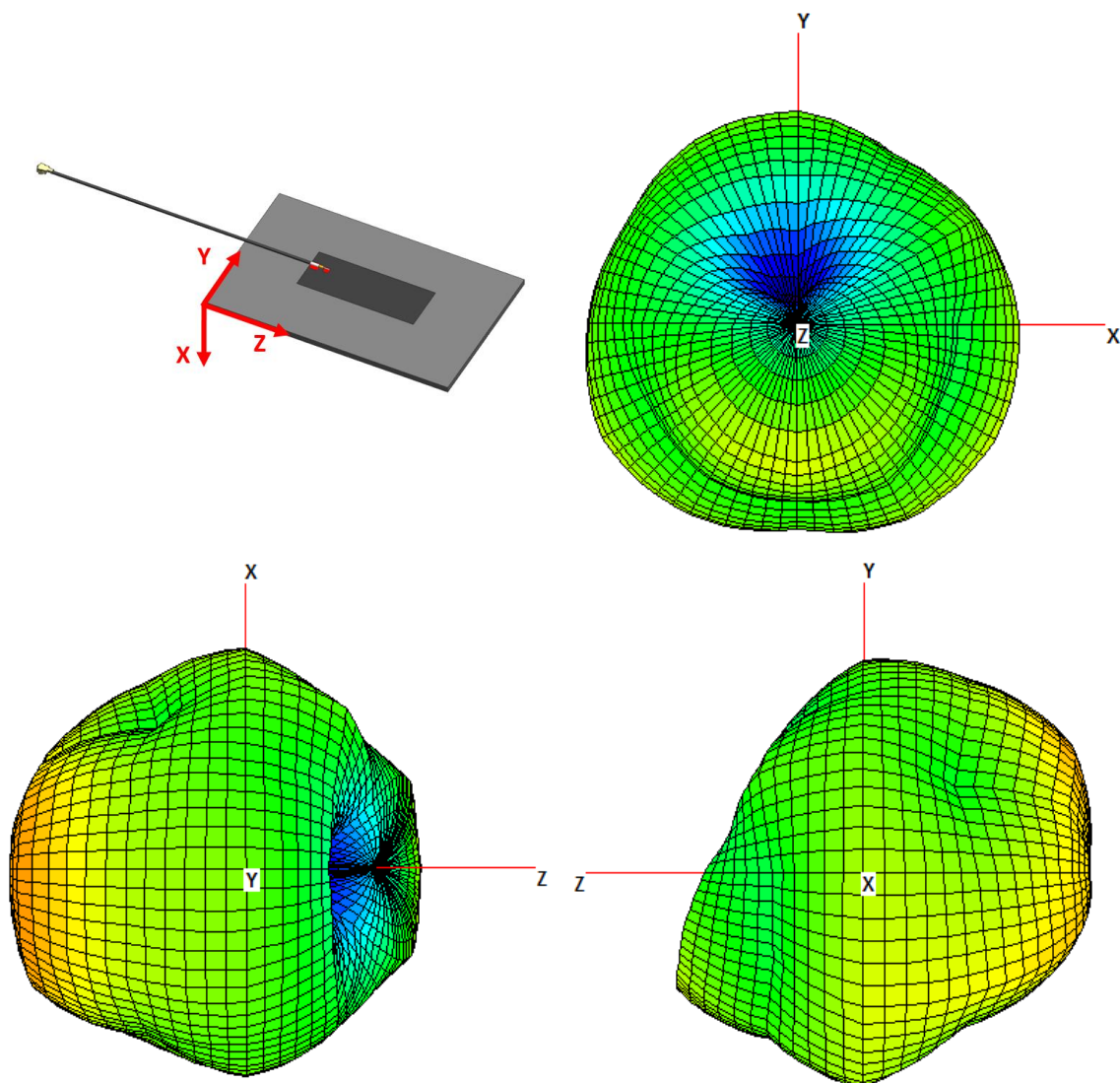


FIGURE 4.6.3 3D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

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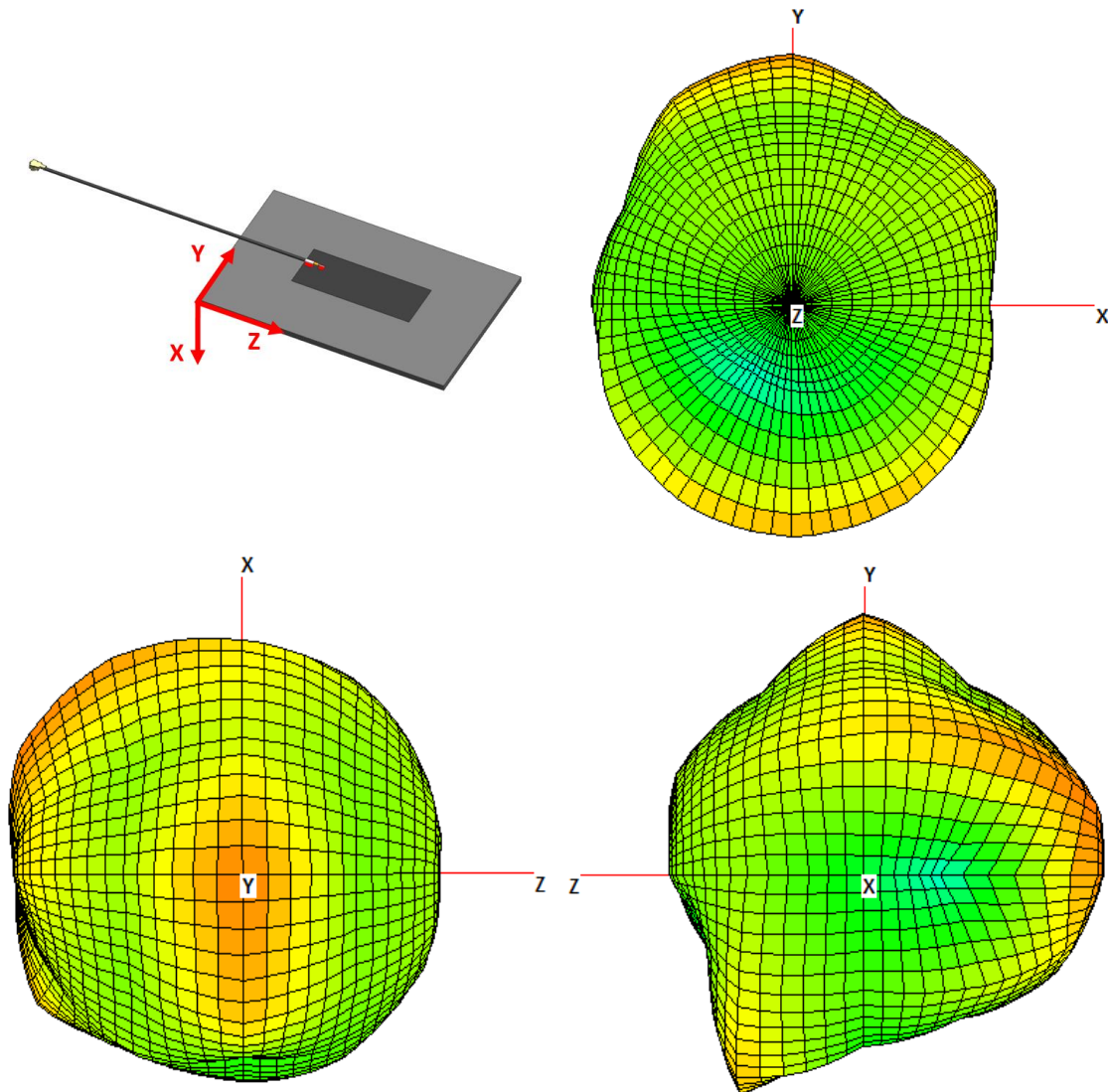


FIGURE 4.6.4 3D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

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5.0 ASSEMBLY GUIDELINE

The flex antenna comes with an adhesive TESA 68537 for assemble onto the plastic wall of the system. The surface should be smooth with $R_a < 1.6\mu m$, and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

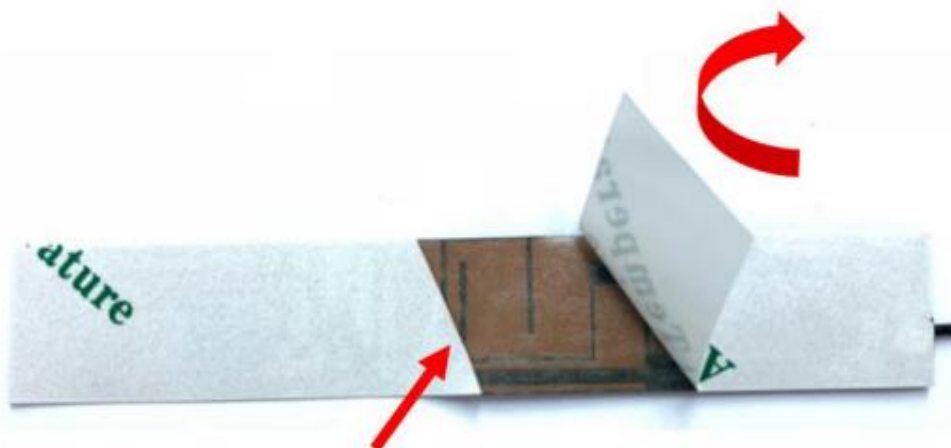
5.1 HOW TO TEAR FLEX RELEASE PAPER



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 Flex edge at least 5mm as shown in figure 5.2.1. If the cable bends into the antenna flex, the antenna performance will be degraded.



FIGURE 5.2.1 CABLE BENDING

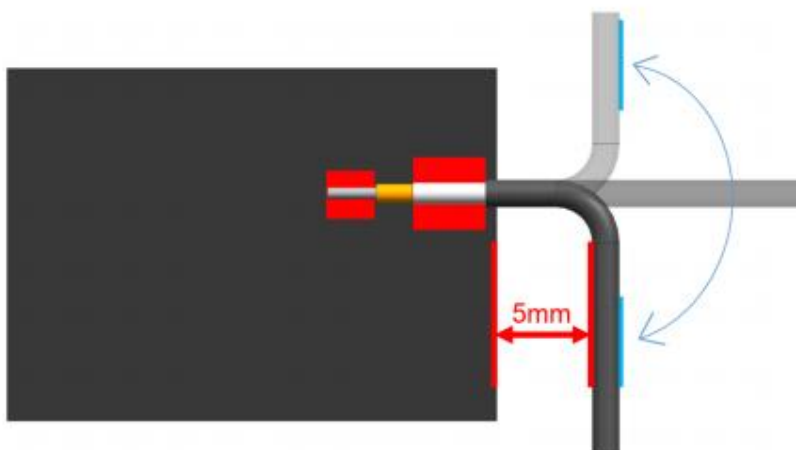


FIGURE 5.2.2 CABLE ACTIVITY RANGE

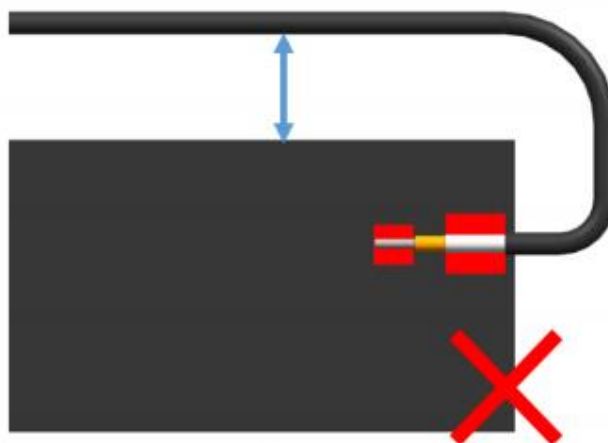


FIGURE 5.2.3 CABLE BENDING

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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. 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 grounding has some influence on the low frequency performance of the antenna. We suggest the minimum distance between the antenna and the plane ground is recommended to be 15mm.

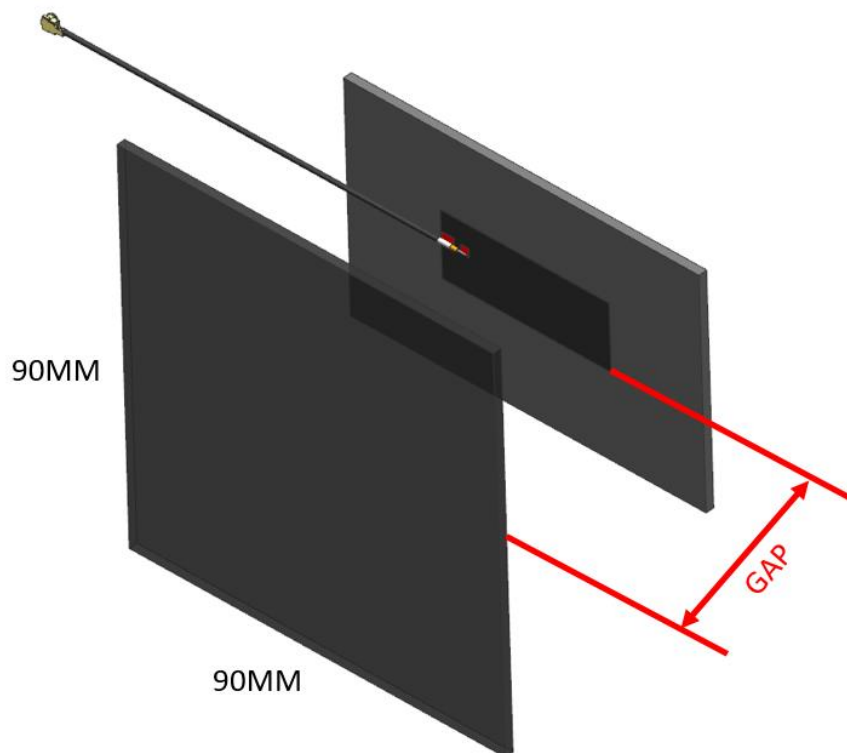


FIGURE 6.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

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

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

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

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

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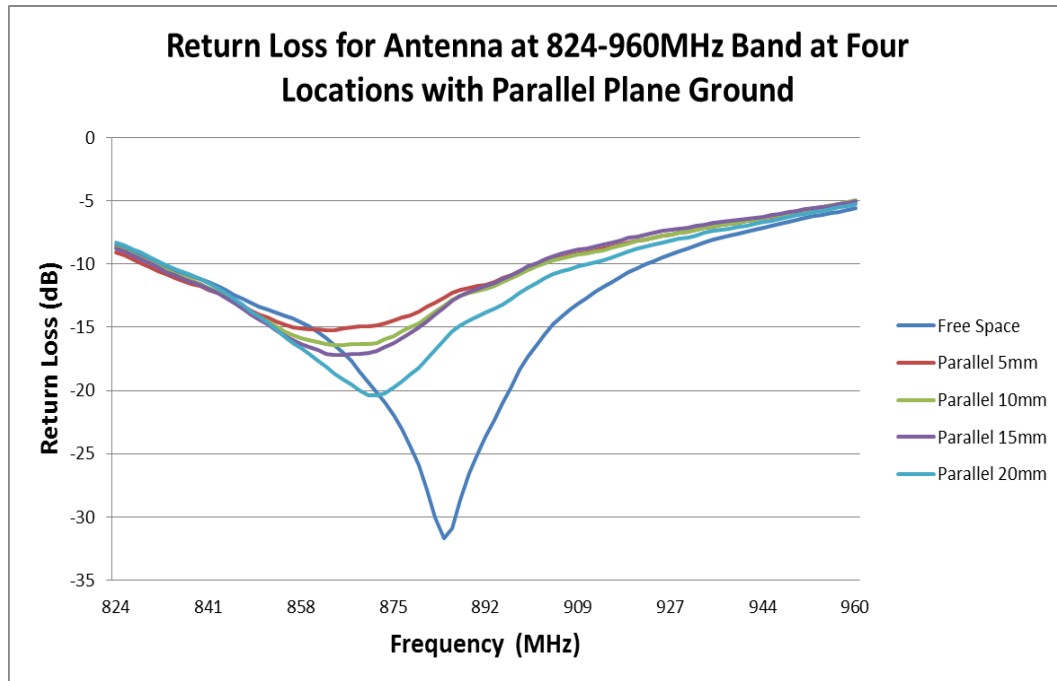


FIGURE 6.1.1 RETURN LOSS OF ANTENNA AT 824-960MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

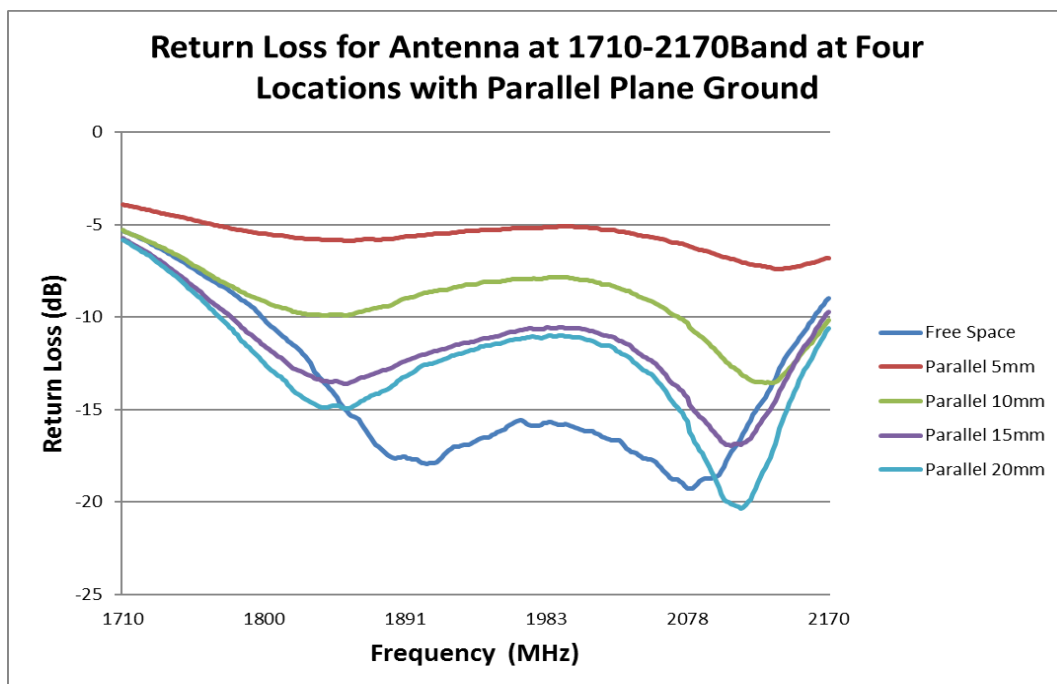


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 1710-2170MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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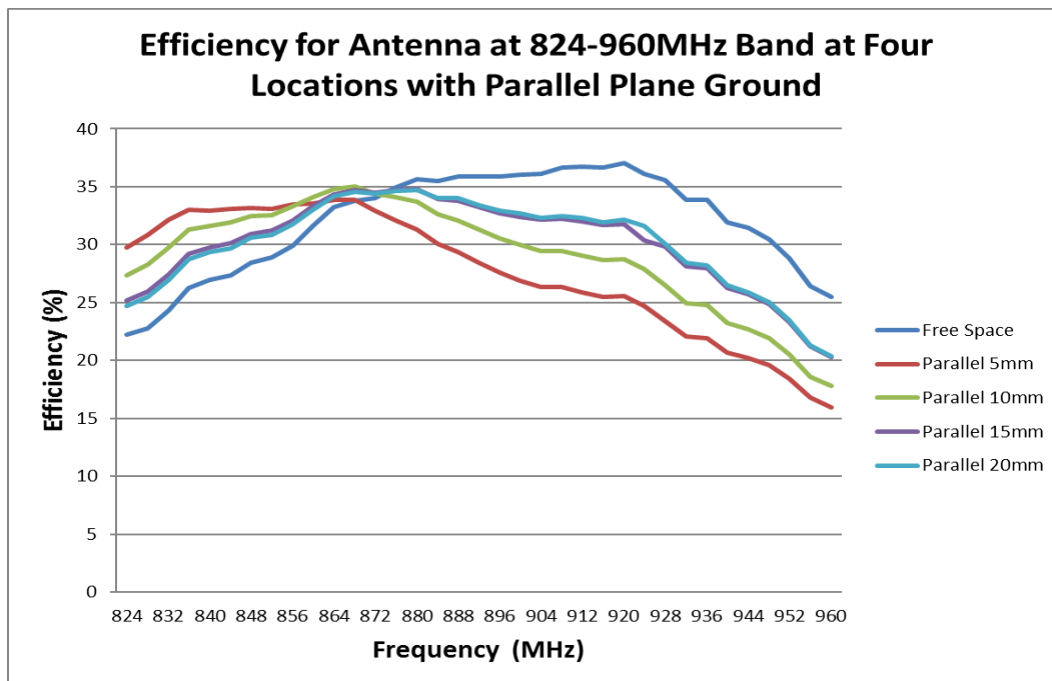


FIGURE 6.1.3 EFFICIENCY OF ANTENNA AT 824-960MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

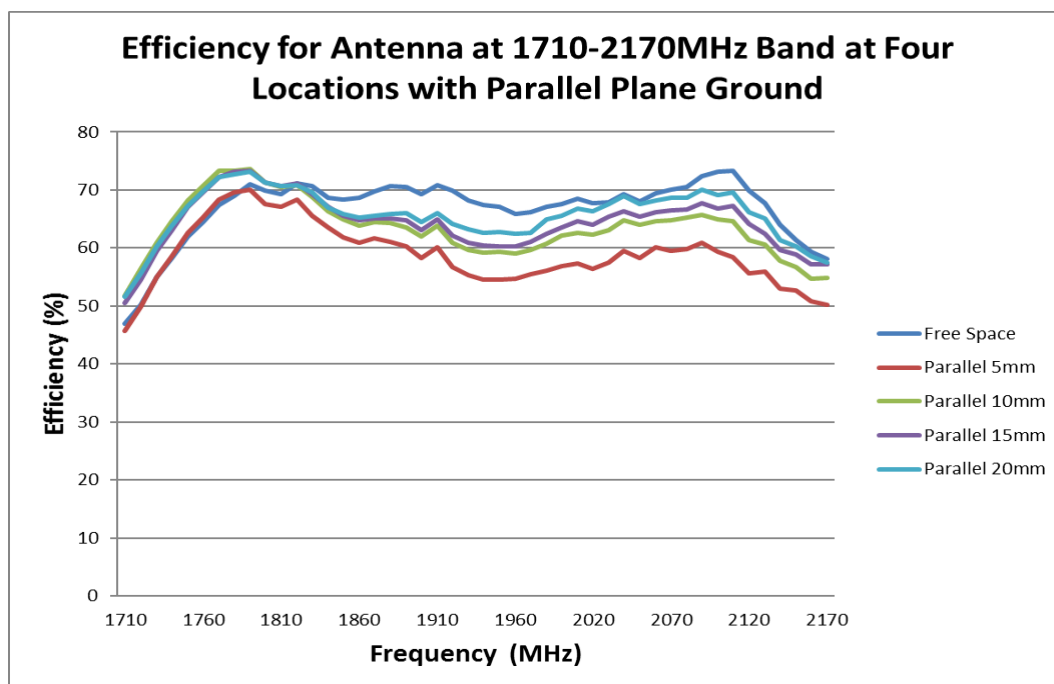


FIGURE 6.1.4 EFFICIENCY OF ANTENNA AT 1710-2170MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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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. 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 grounding has some influence on the low frequency performance of the antenna. We suggest the minimum distance between the antenna and the plane ground is recommended to be 10mm.

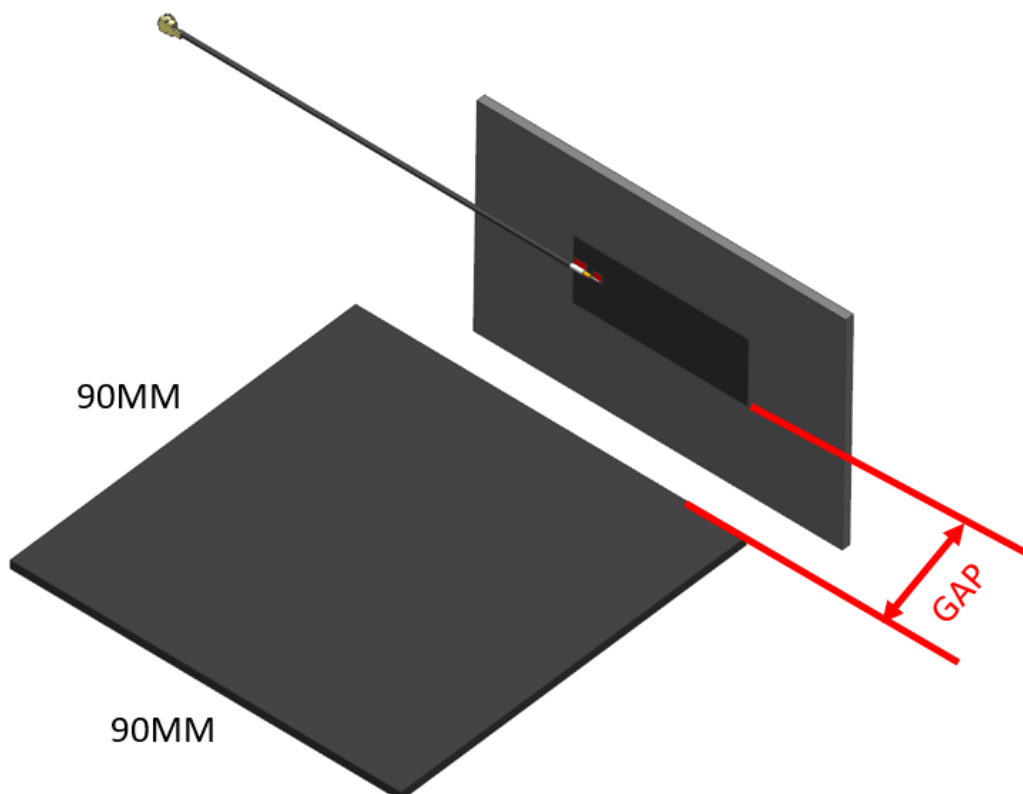


FIGURE 6.2 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

Ground Size: 90mm*90mm;

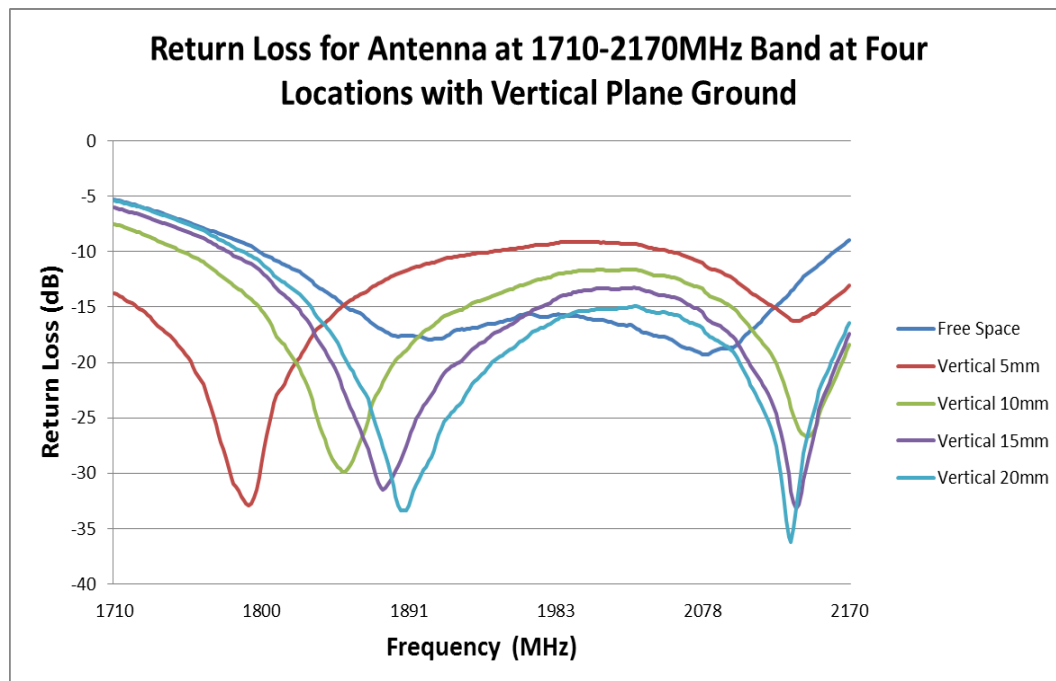
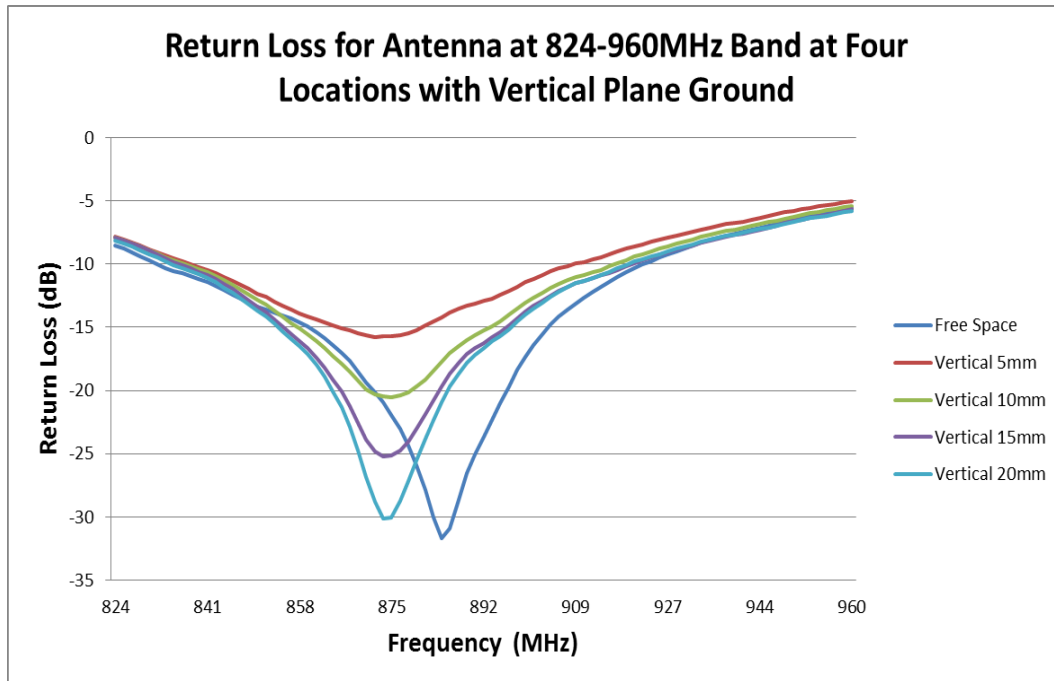
Location 1: Distance between antenna and plane ground (GAP) is about 5mm;

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

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

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

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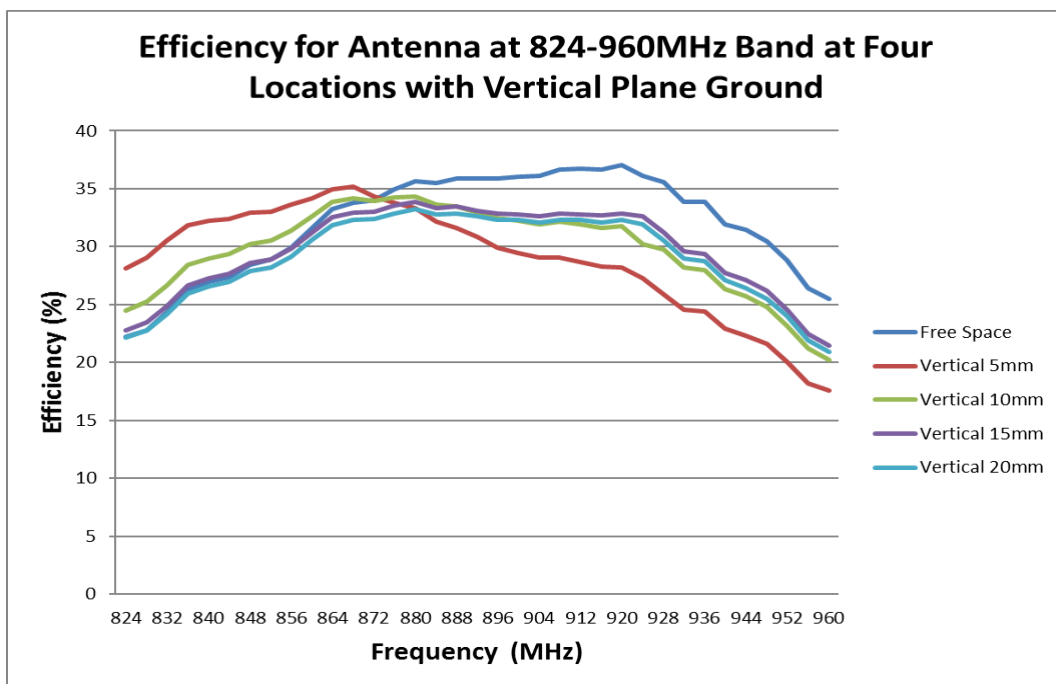


FIGURE 6.2.3 EFFICIENCY OF ANTENNA AT 824-960MHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

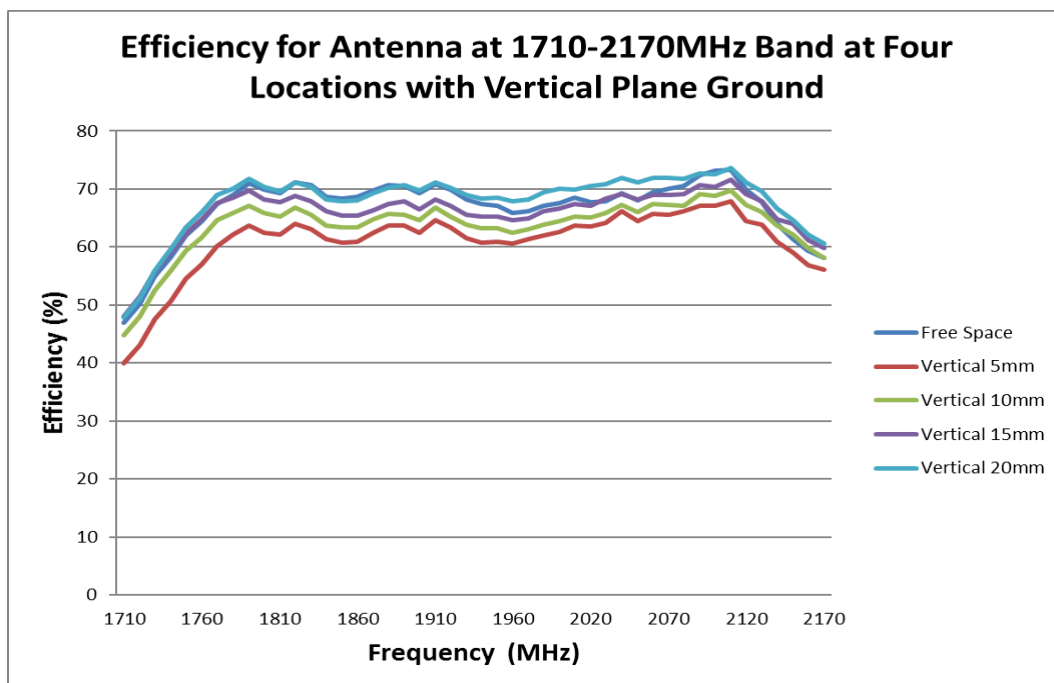


FIGURE 6.2.4 EFFICIENCY OF ANTENNA AT 1710-2170MHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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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. 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 grounding has some influence on the low frequency performance of the antenna. We suggest the minimum distance between the antenna and the plane ground is recommended to be 15mm.

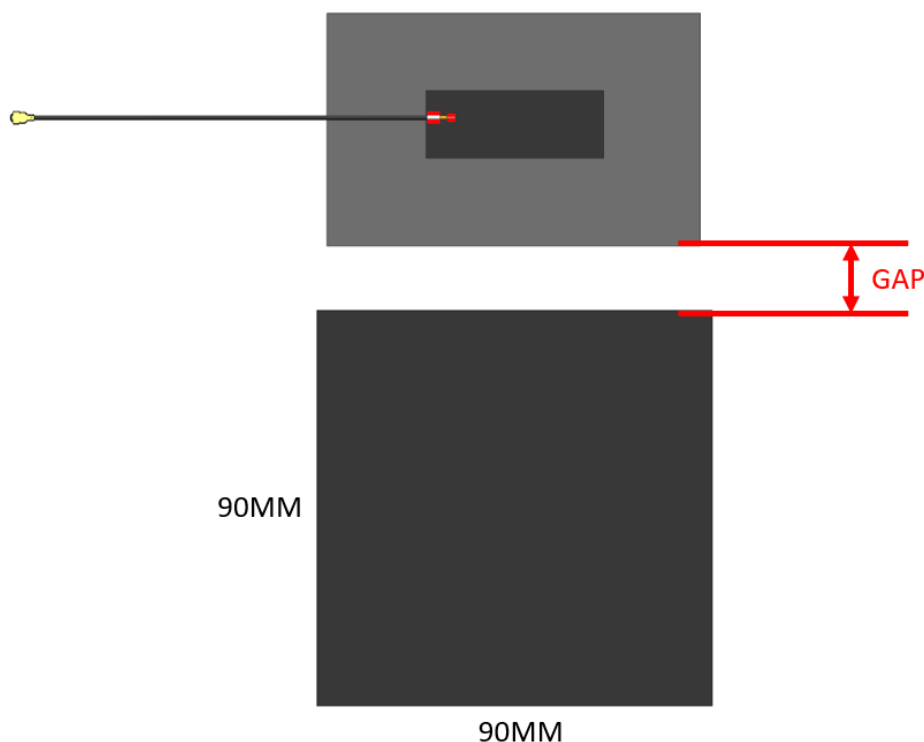


FIGURE 6.3 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

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

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

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

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

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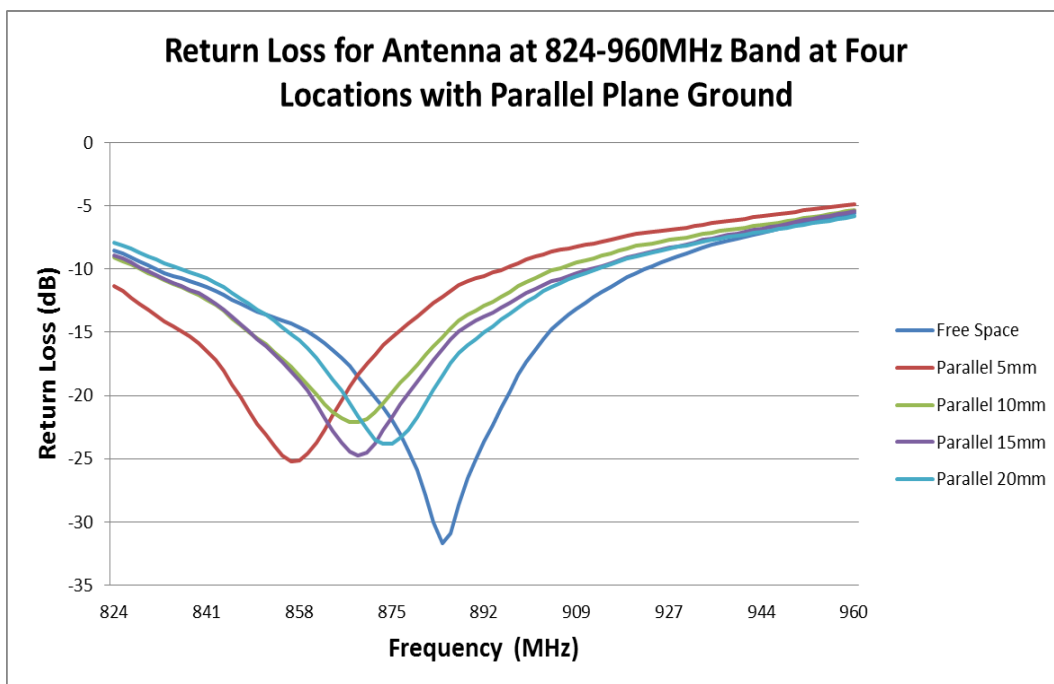


FIGURE 6.3.1 RETURN LOSS OF ANTENNA AT 824-960MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

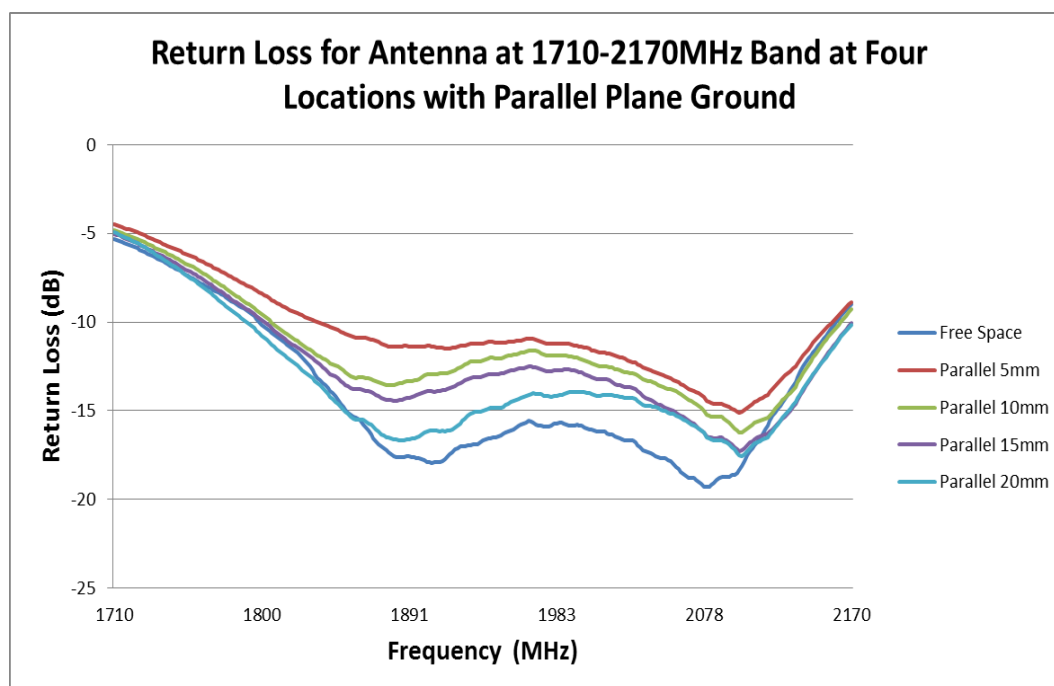


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 1710-2170MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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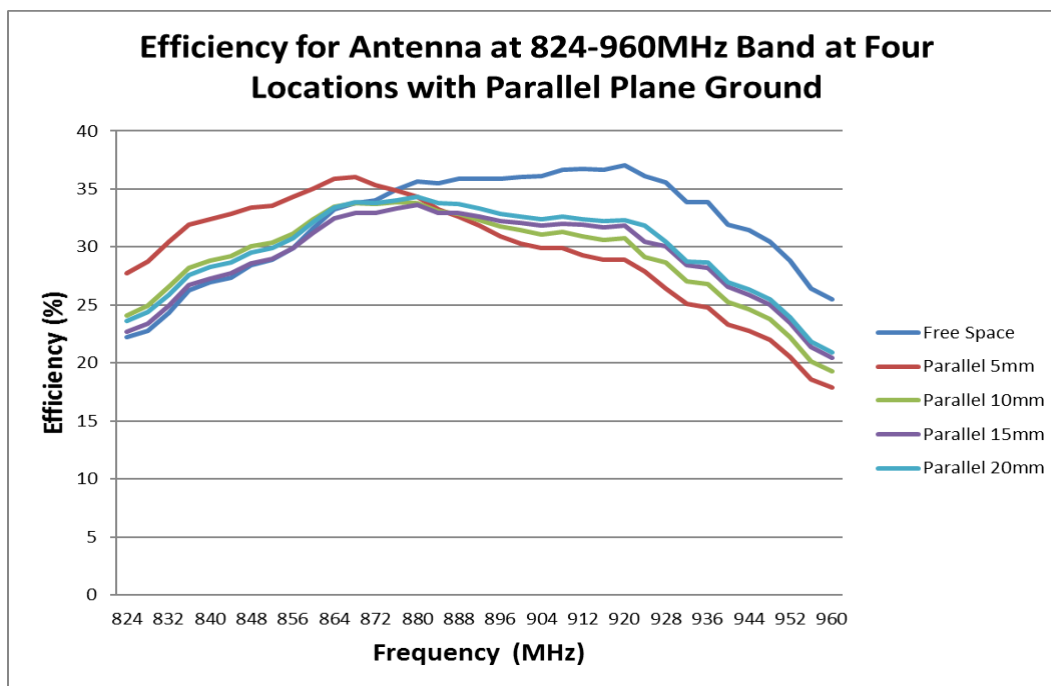


FIGURE 6.3.3 EFFICIENCY OF ANTENNA AT 824-960MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

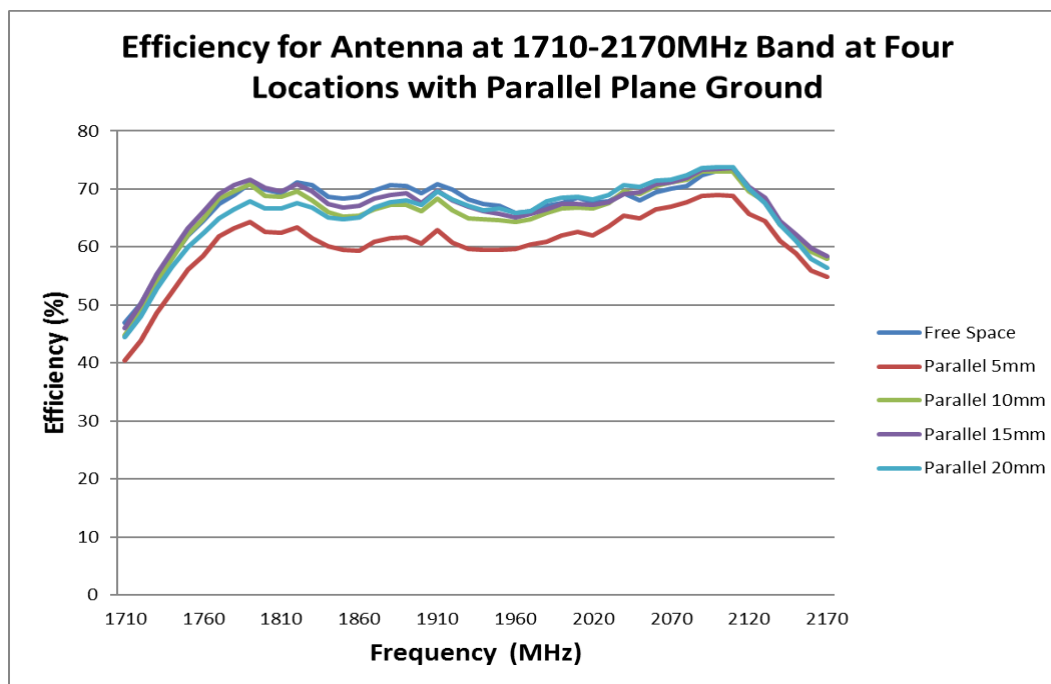


FIGURE 6.3.4 EFFICIENCY OF ANTENNA AT 1710-2170MHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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6.4 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT CABLE LENGTH

Six cable length have been evaluated. The cable length is 50mm, 100mm, 150mm (reference metal), 200mm 250mm and 300mm. these states are shown in figure 6.4.

The cable length should be more than 100mm. The resonance frequency shift to lower and the antenna performance will decrease obviously at 824-960MHz band when the cable length is less than 100mm.

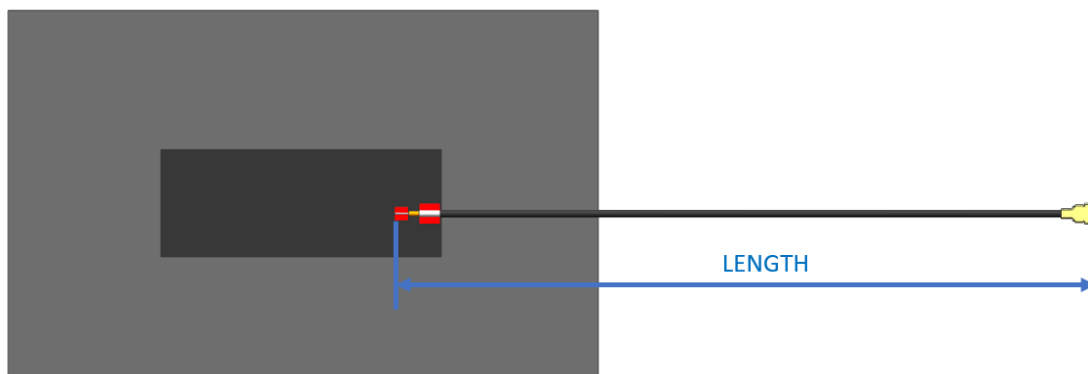


FIGURE 6.4 DIFFERENT CABLE LENGTH

CABLE LENGTH:50mm、 100mm、 150mm、 200mm、 250mm、 300mm

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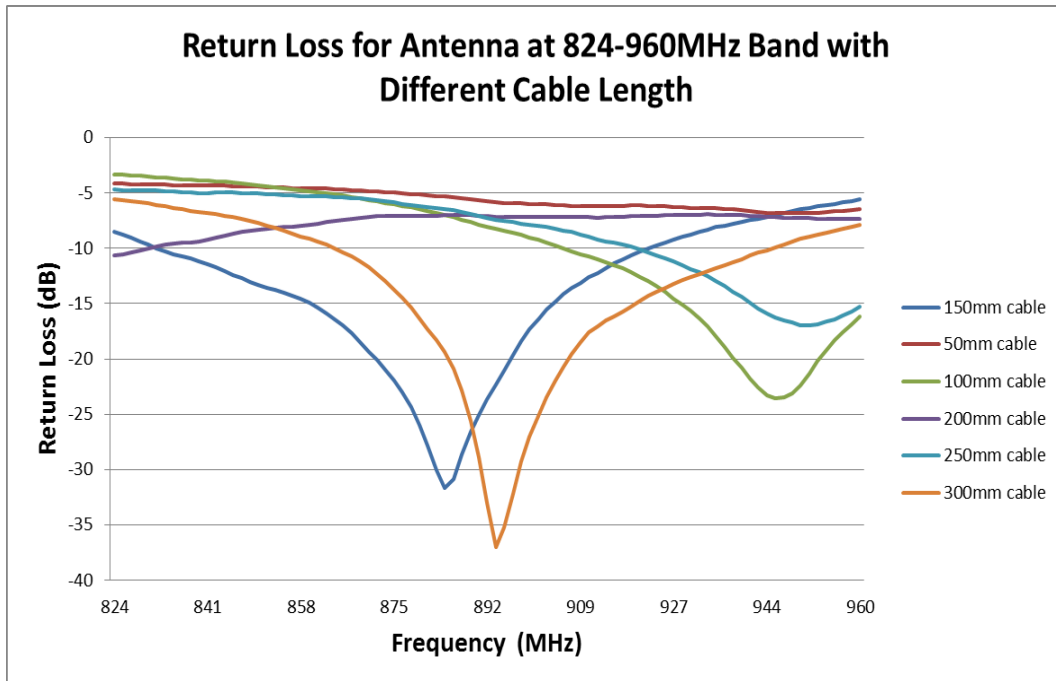


FIGURE 6.4.1 RETURN LOSS OF ANTENNA AT 824-960MHZ BAND WITH DIFFERENT CABLE LENGTH

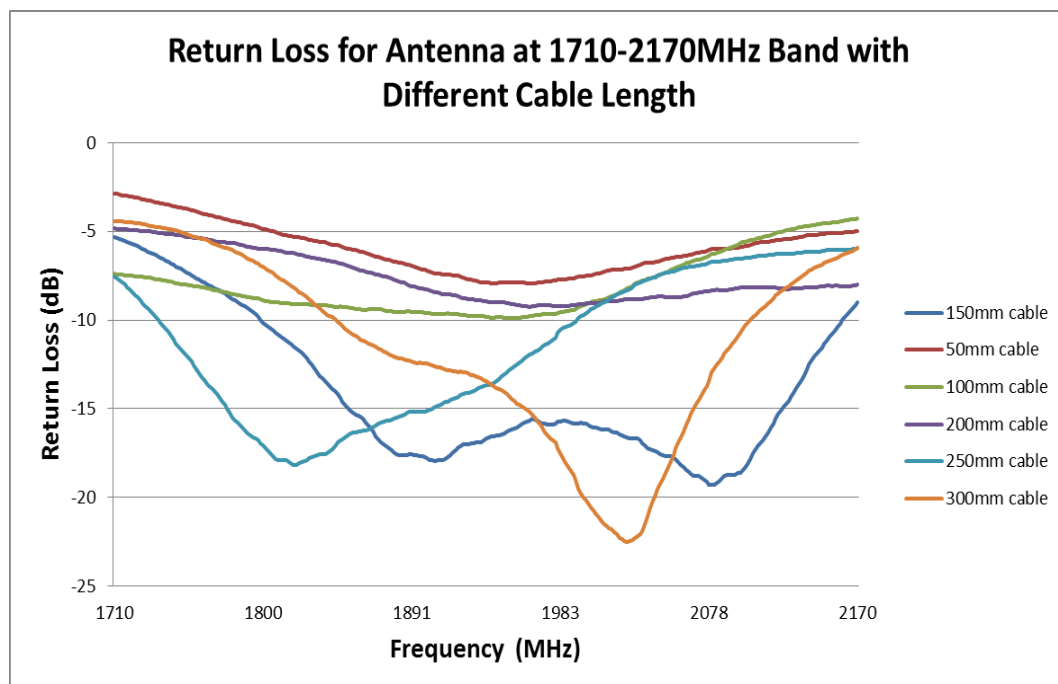


FIGURE 6.4.2 RETURN LOSS OF ANTENNA AT 1710-2170MHZ BAND WITH DIFFERENT CABLE LENGTH

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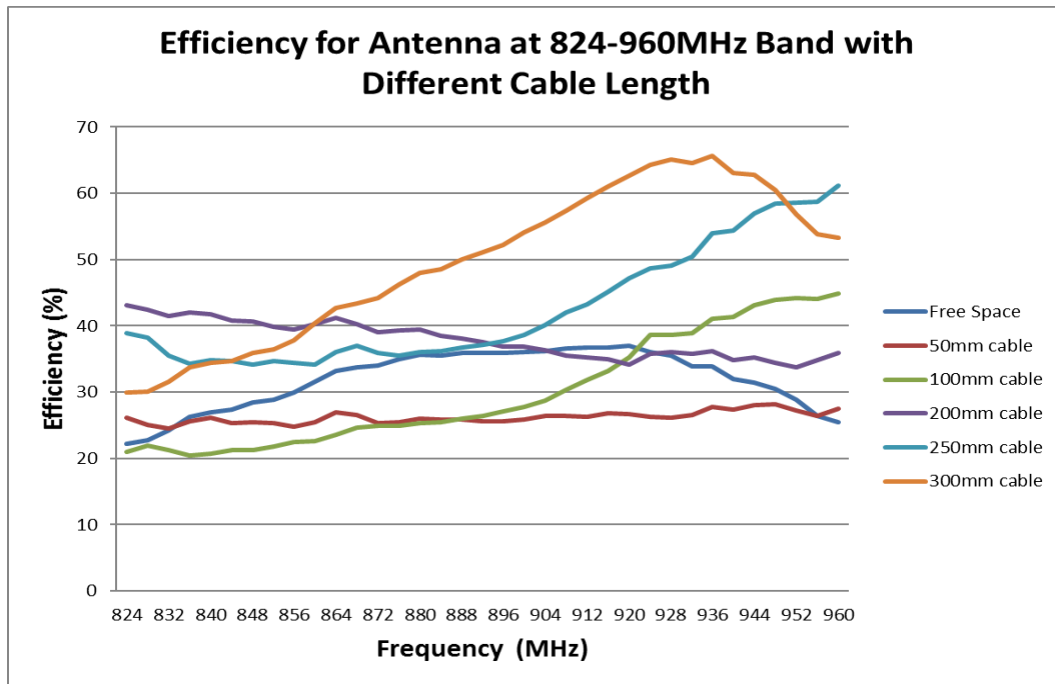


FIGURE 6.4.3 EFFICIENCY OF ANTENNA AT 824-960MHZ BAND WITH DIFFERENT CABLE LENGTH

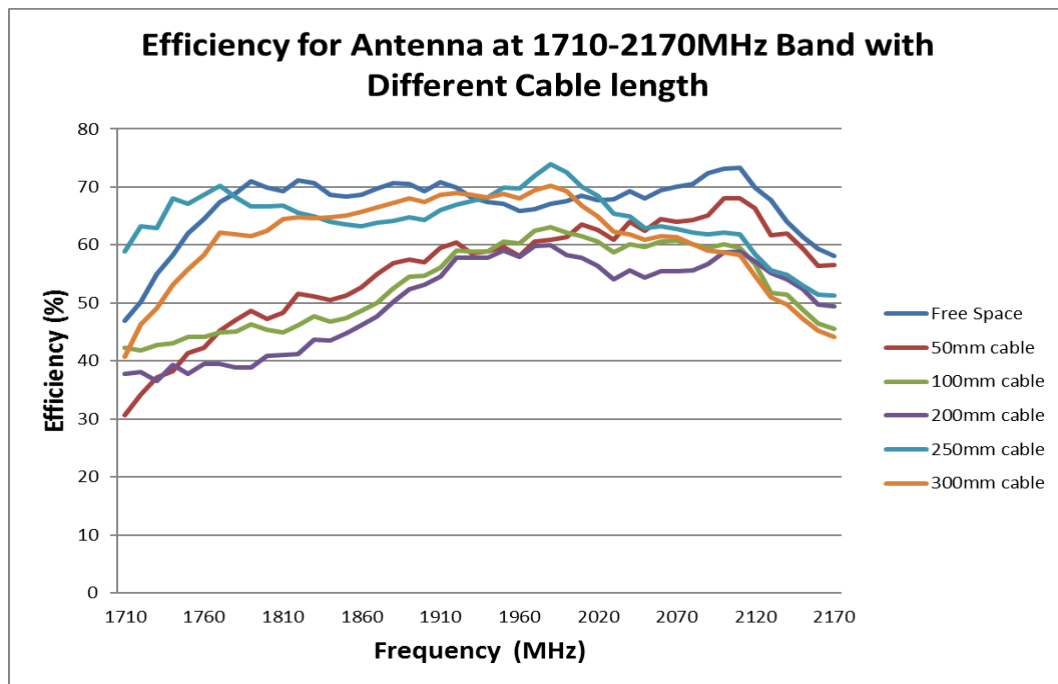


FIGURE 6.4.4 EFFICIENCY OF ANTENNA AT 1710-2170MHZ BAND WITH DIFFERENT CABLE LENGTH

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