TITLE

MOLEX LTE ANTENNA HINGED

TABLE OF CONTENTS

1.0 SCOPE

2.0 PRODUCT DESCRIPTION

3.0 APPLICABLE DOCUMENTS

4.0 ANTENNA PERFORMANCE

5.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

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MOLEX LTE ANTENNA HINGED

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: Molex LTE antenna hinged

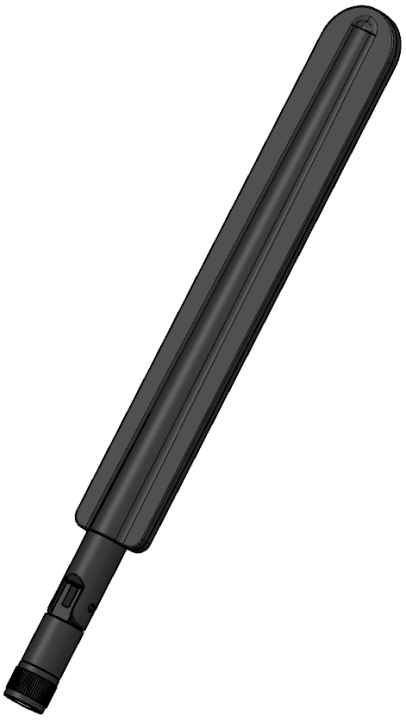
Series Number: 213523

2.2 DESCRIPTION

213523 is external antenna being designed to cover all Cellular working frequencies in the 698-2690MHz spectrum. The joint hinge of the antenna allows 90°rotating on vertical plane, and the SMA-J connector allows 180°rotating on horizontal plane.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2135230001 for full information.



Molex 2135230001 698~2690MHz EXTERNAL ANTENNA 3D VIEW

3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2135230001	Mechanical Dimension of the product
Product Specification (PS)	PS-2135230001	Product Specification
Packing Drawing (PK)	PK-2135230001	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on a 100*100mm ground with VNA Agilent E5071C and Over-The-Air (OTA) chamber for the part No.213523 series.

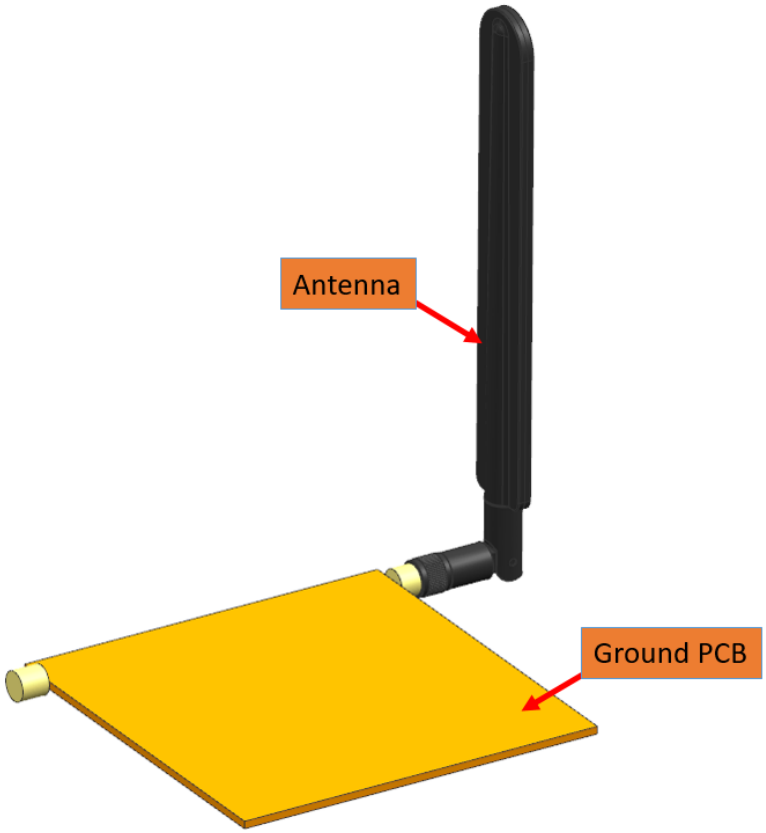


FIGURE4.1.1 ANTENNA MOUNTED ON A 100*100MM GROUND

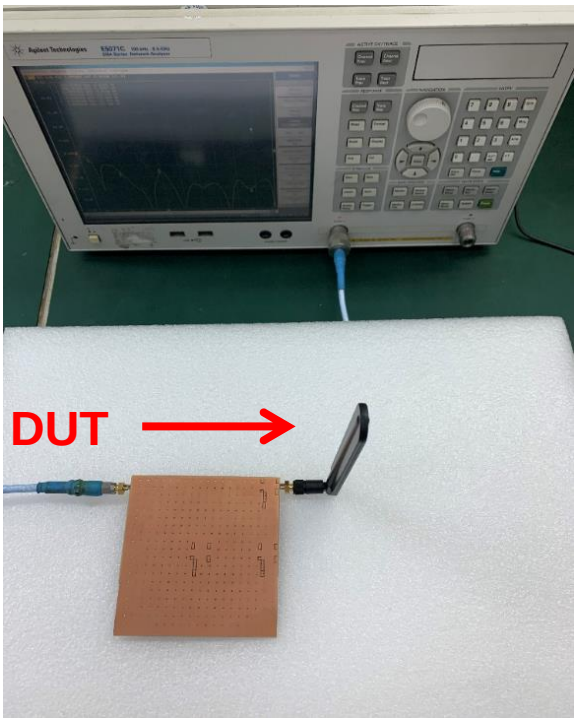


FIGURE4.1.2 ANTENNA MOUNTED ON 100*100MM GROUND TESTED WITH VNA E5071C

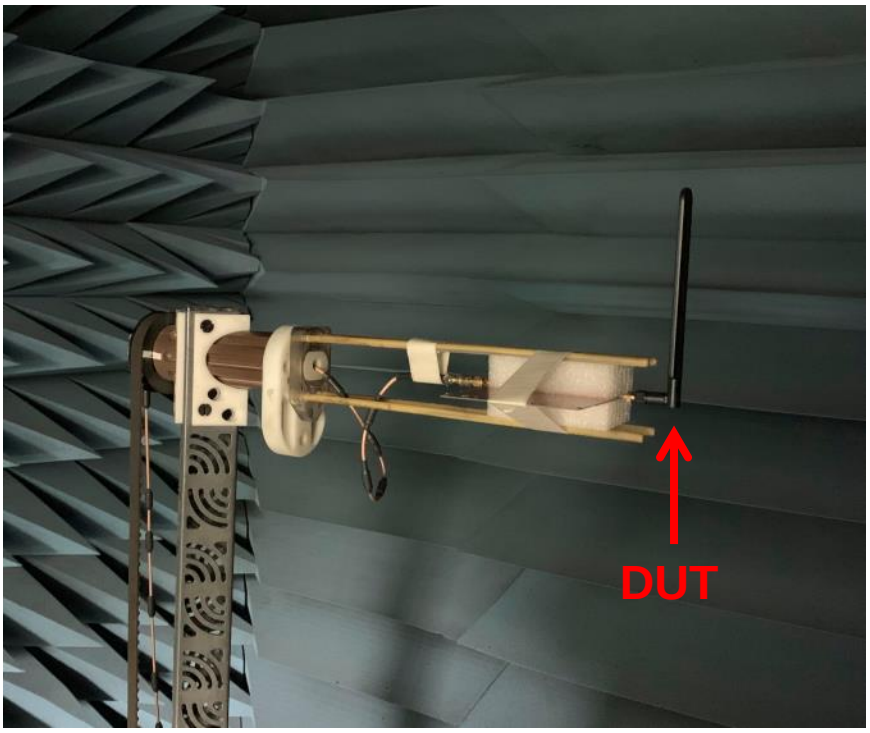


FIGURE4.1.3 ANTENNA MOUNTED ON 100*100MM GROUND TESTED IN OTA CHAMBER

4.2 ANTENNA PERFORMANCE

Description	Equipment	Requirement	
Frequency Range	VNA E5071C	698-960MHz	1.71-2.69GHz
Return Loss	VNA E5071C	<-5 dB	<-10 dB
Peak Gain (Max)	OTA Chamber	2.3dBi	4.8dBi
Average Total Efficiency	OTA Chamber	>55%	>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 PCB to simulate 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.

4.3 RETURN LOSS PLOT

All measurements in this document are done by installing the antenna on 100*100mm PCB.

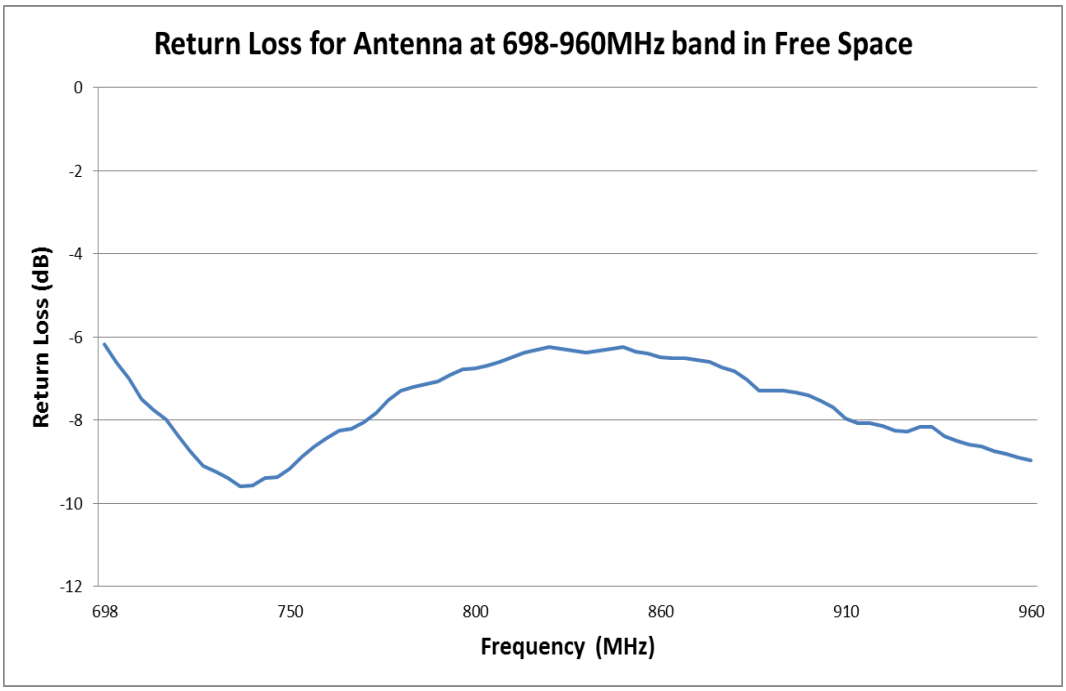


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 698-960MHZ IN FREE SPACE

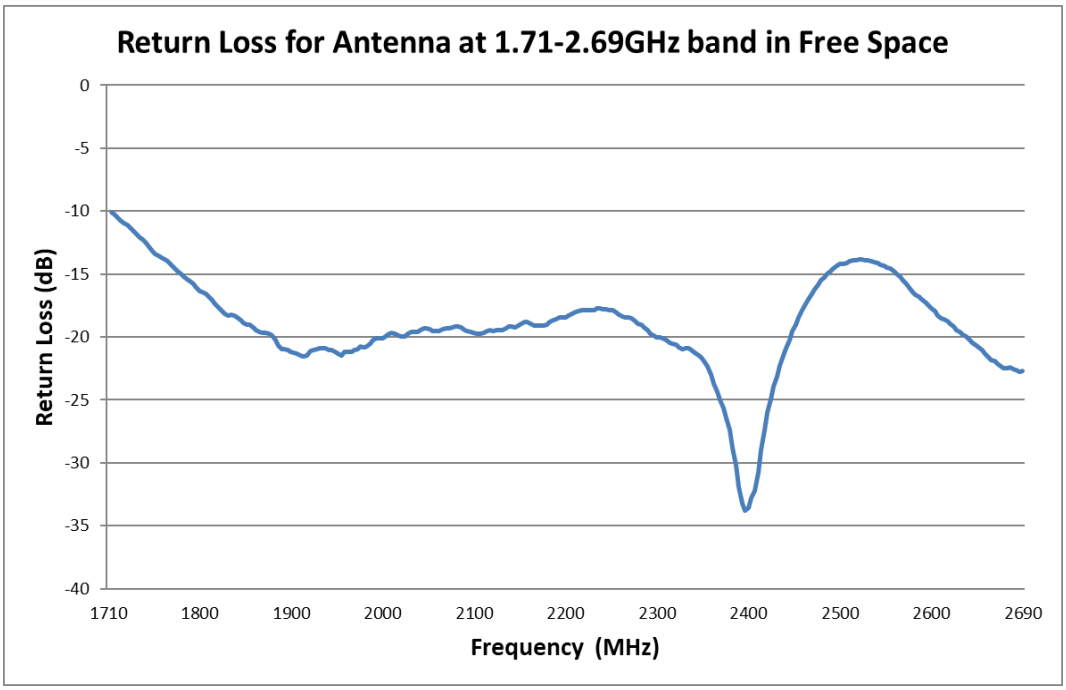


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 1.71-2.69GHZ IN FREE SPACE

4.4 EFFICIENCY PLOT

All measurements in this document are done by installing the antenna on 100*100mm PCB.

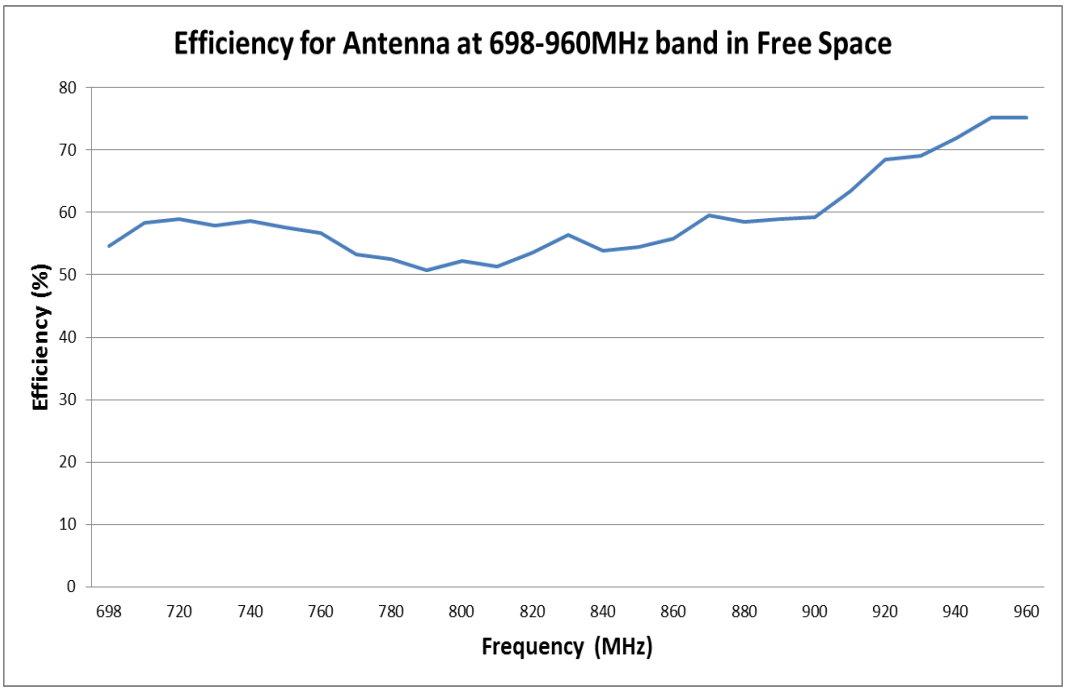


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 698-960MHZ IN FREE SPACE

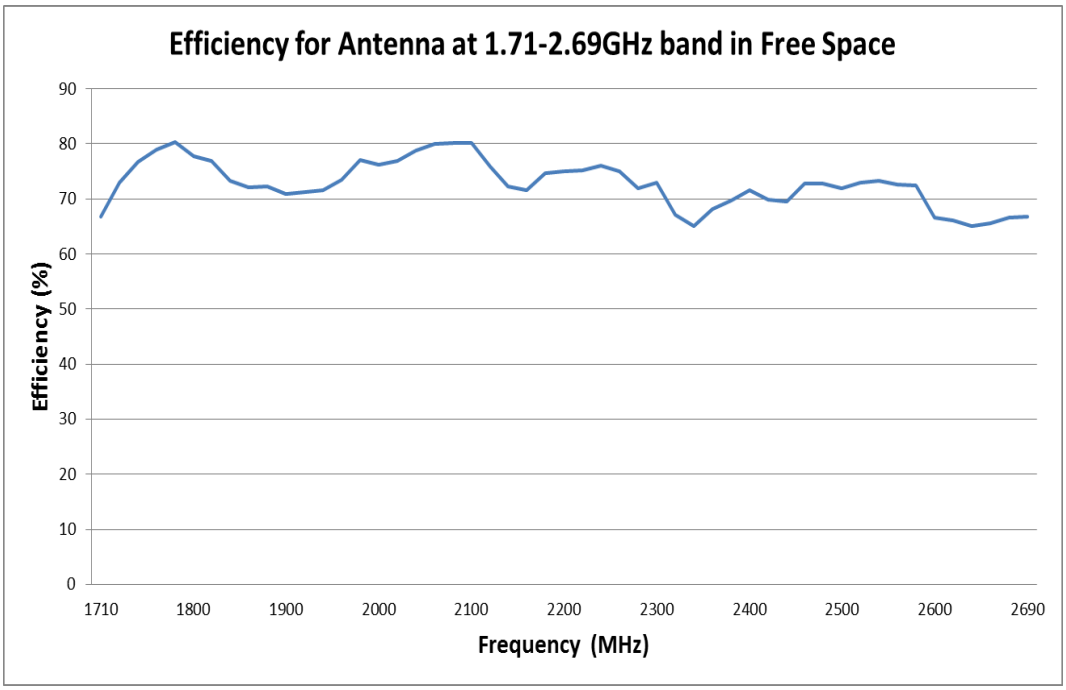


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 1.71-2.69GHZ IN FREE SPACE

4.5 2D RADIATION PATTERN

All measurements in this document are done by installing the antenna on 100*100mm PCB.

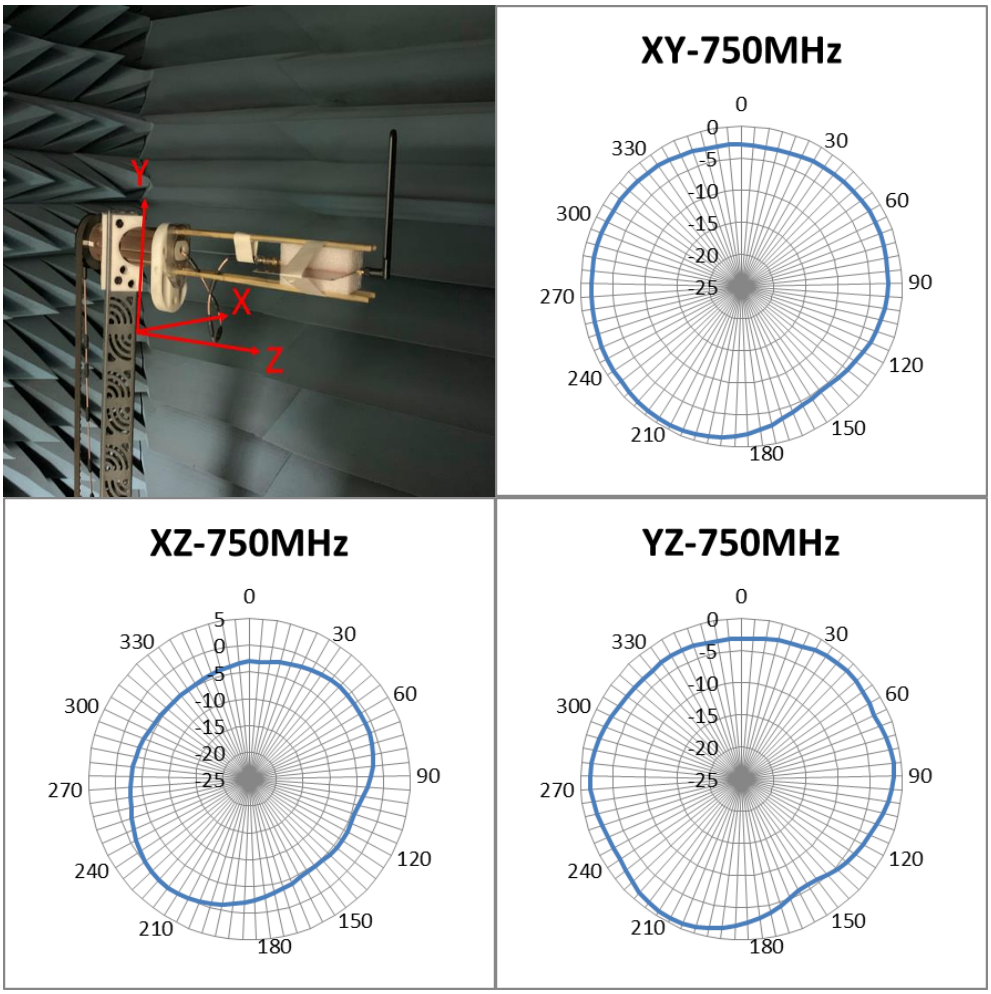


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 750MHZ IN FREE SPACE

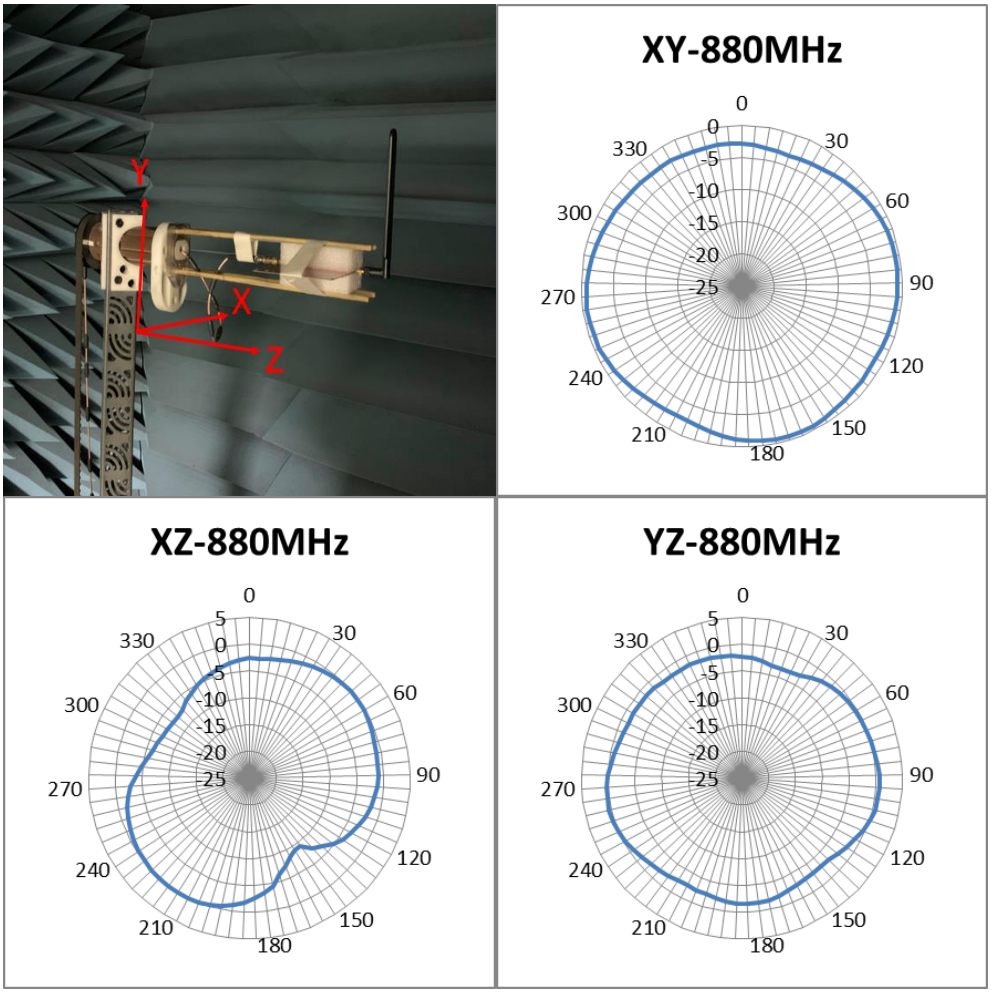


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

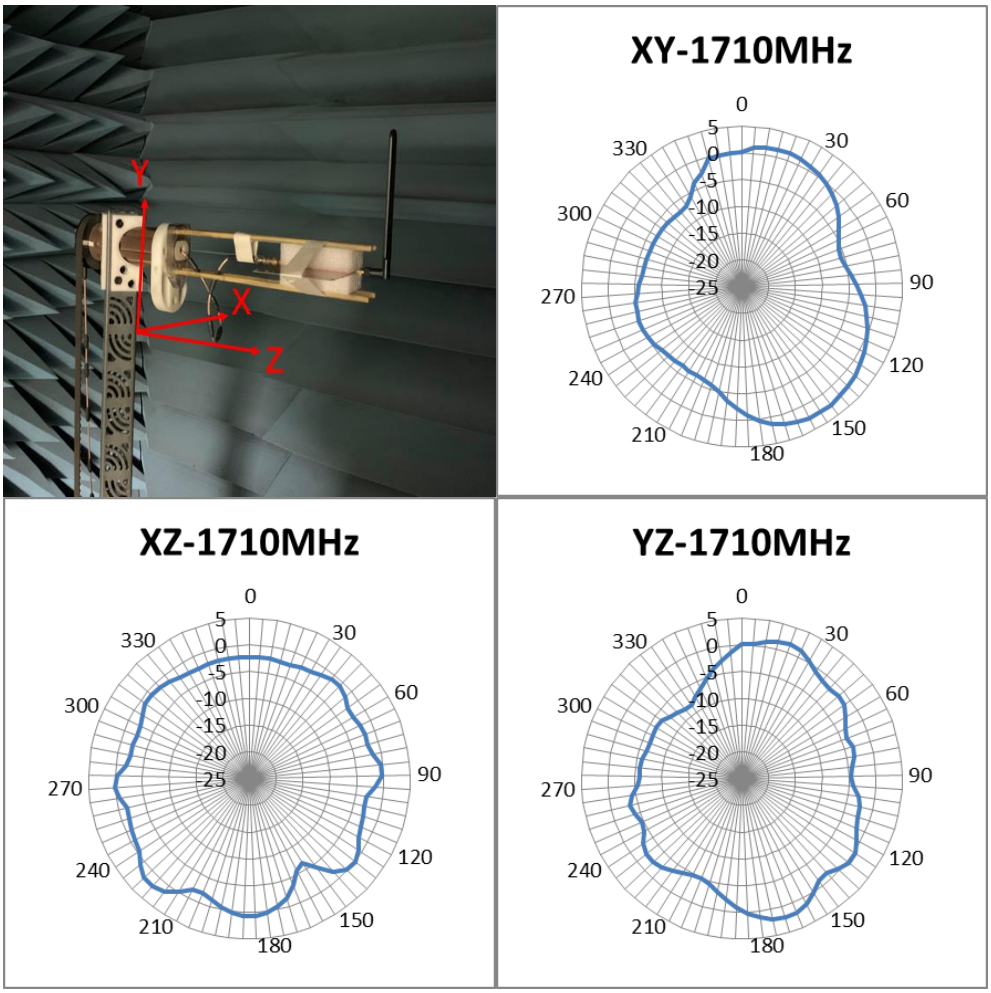


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

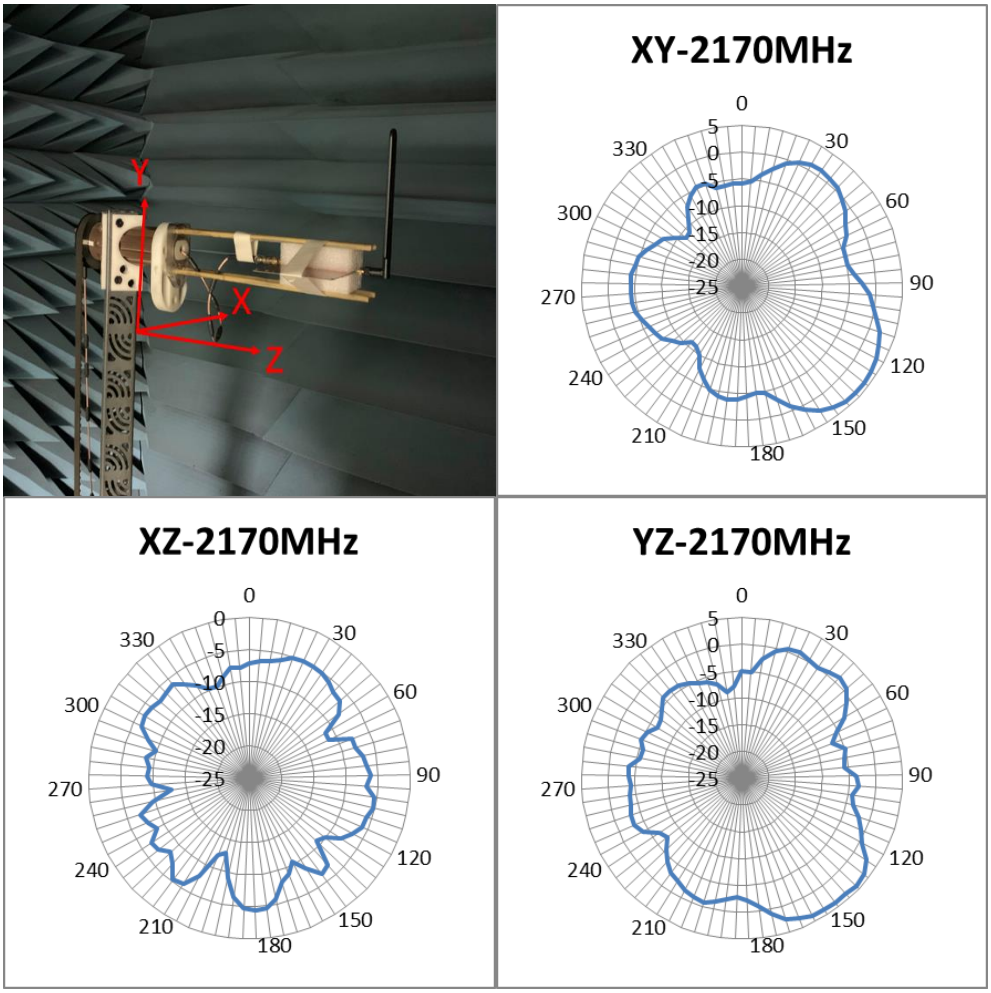


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

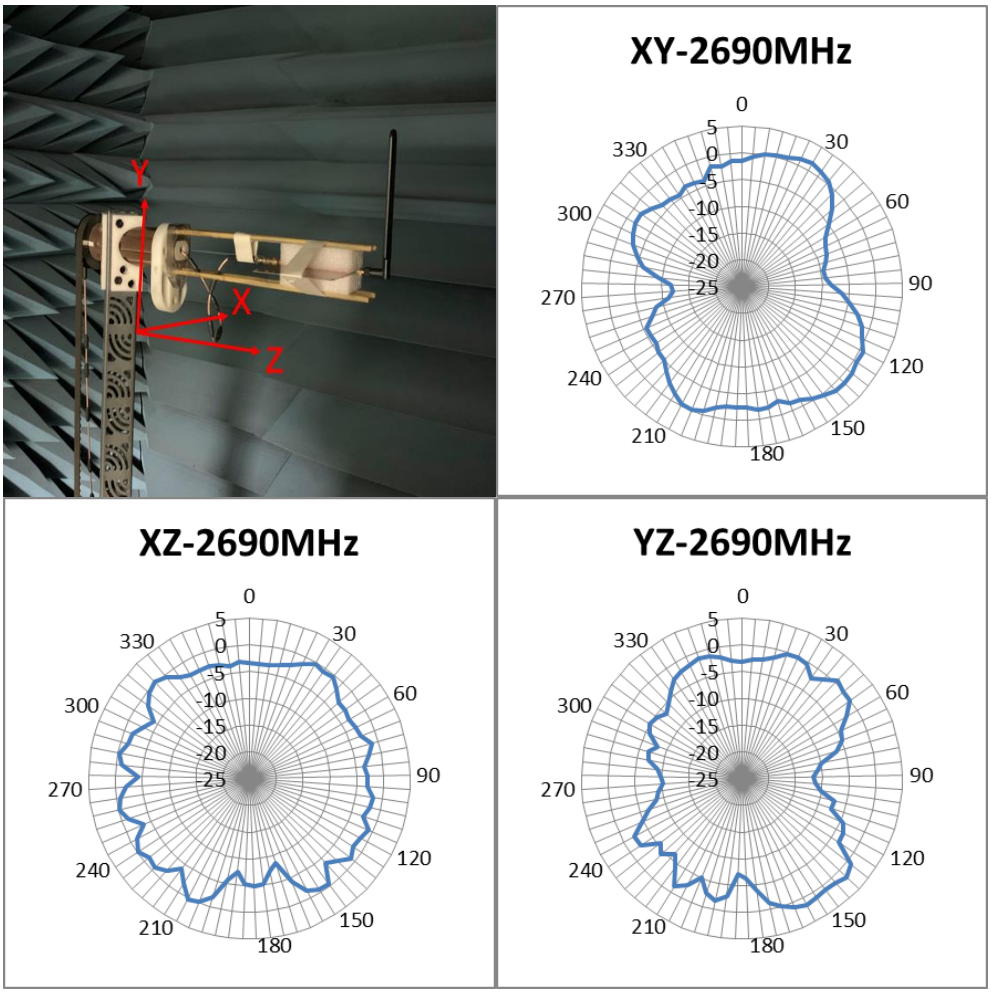


FIGURE 4.5.5 2D RADIATION PATTERN OF ANTENNA AT 2690MHZ IN FREE SPACE

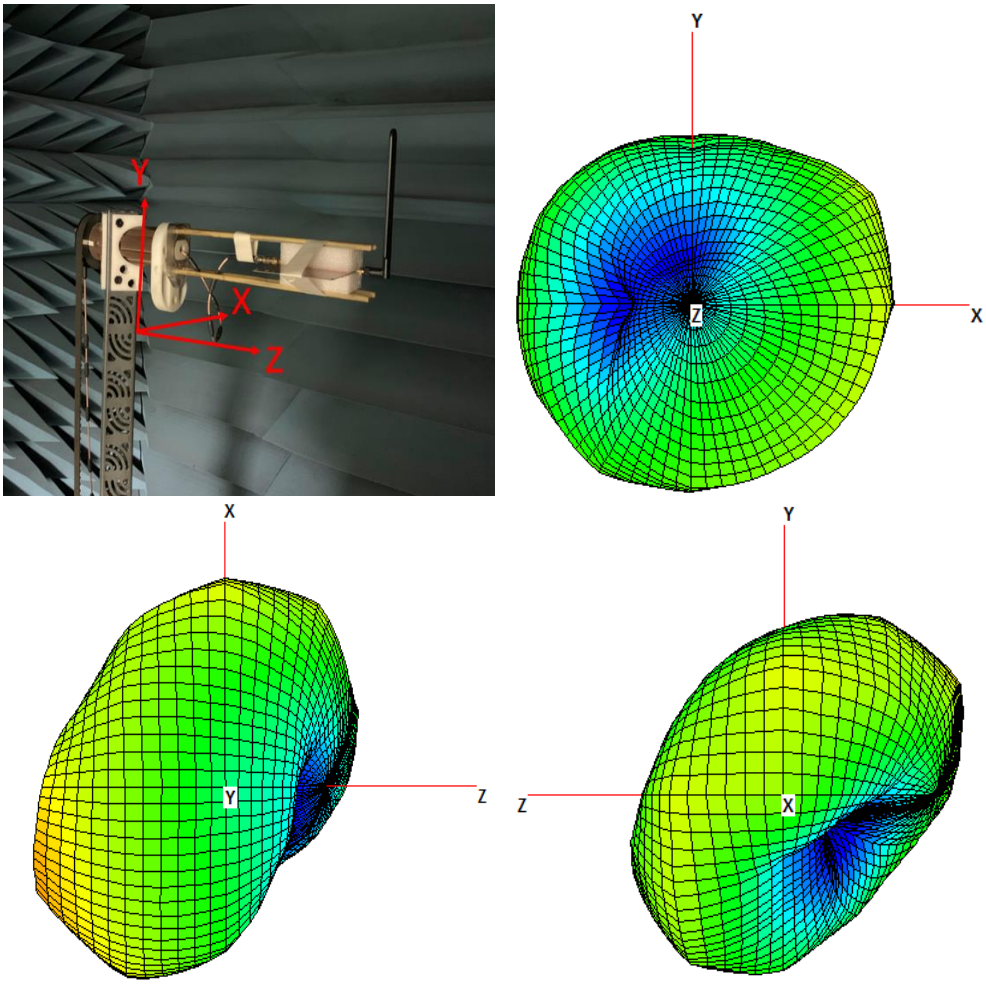


FIGURE 4.5.10 3D RADIATION PATTERN OF ANTENNA AT 750MHZ IN FREE SPACE

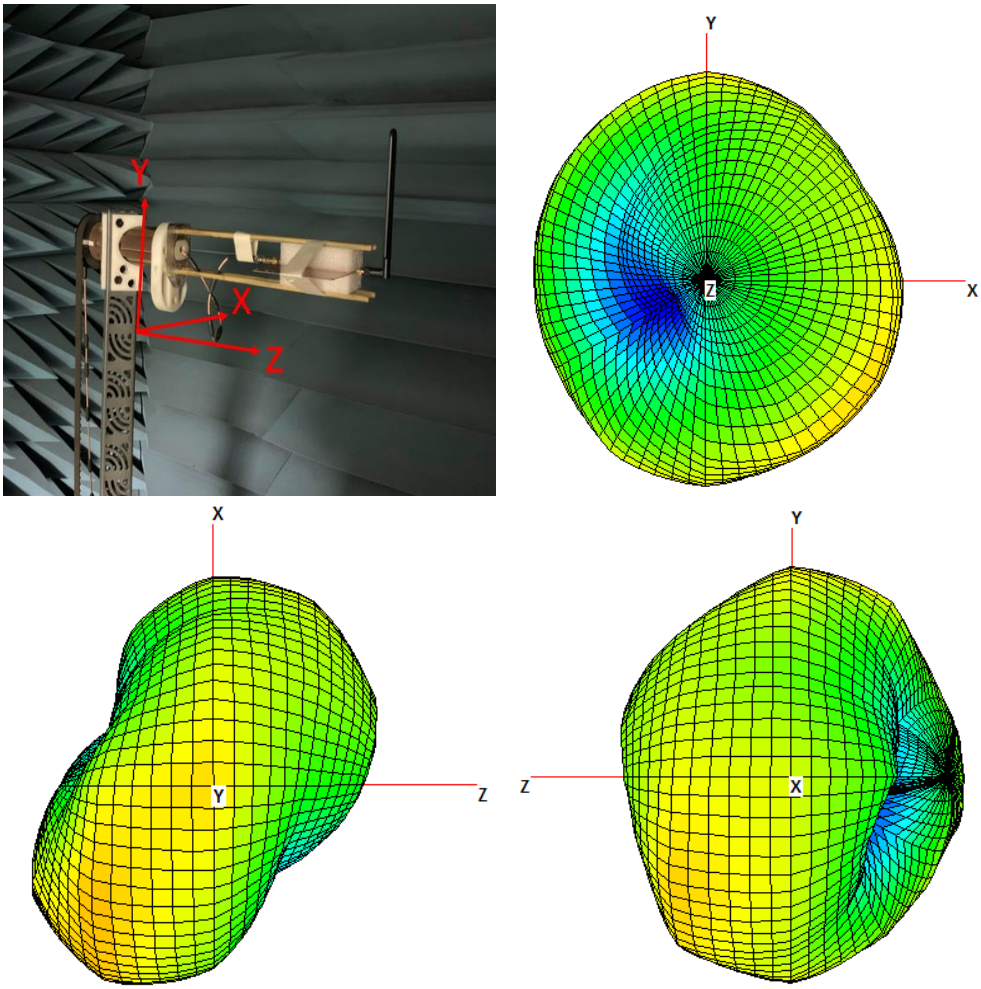


FIGURE 4.5.11 3D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

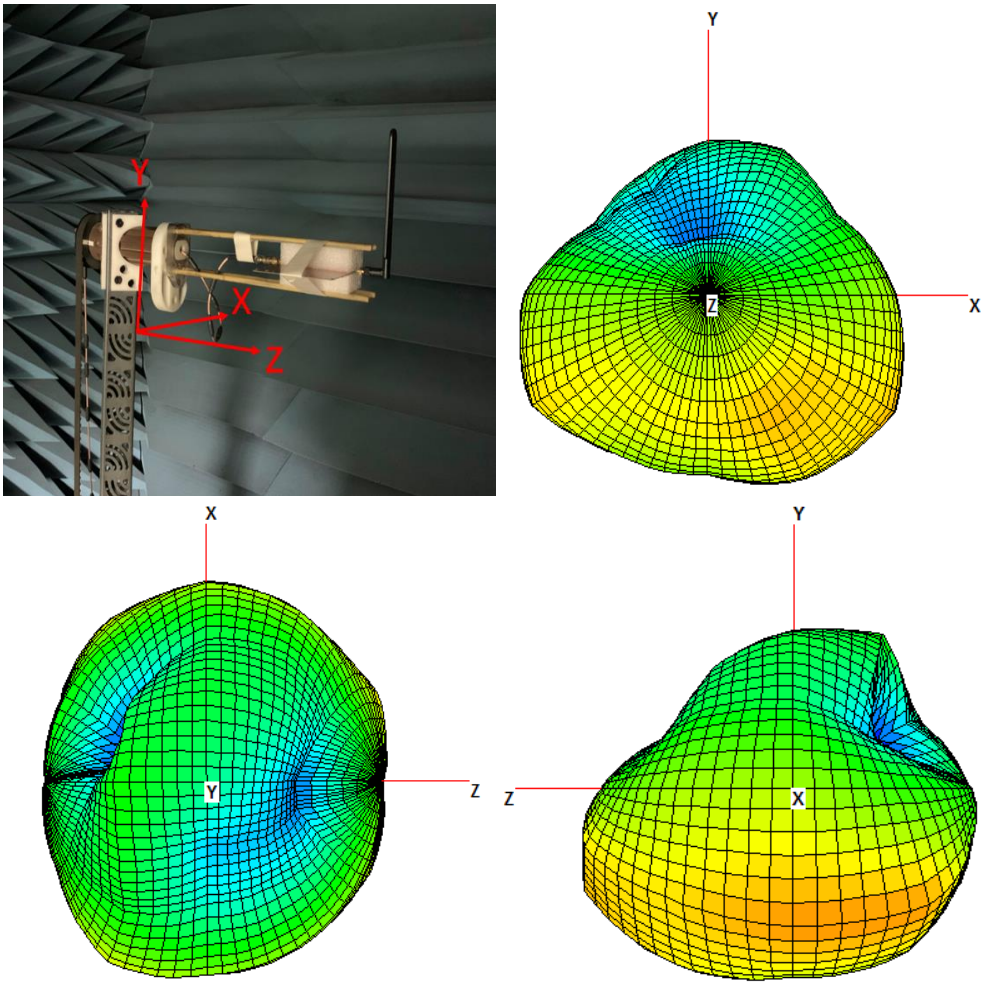


FIGURE 4.5.12 3D RADIATION PATTERN OF ANTENNA AT 1710MHZ IN FREE SPACE

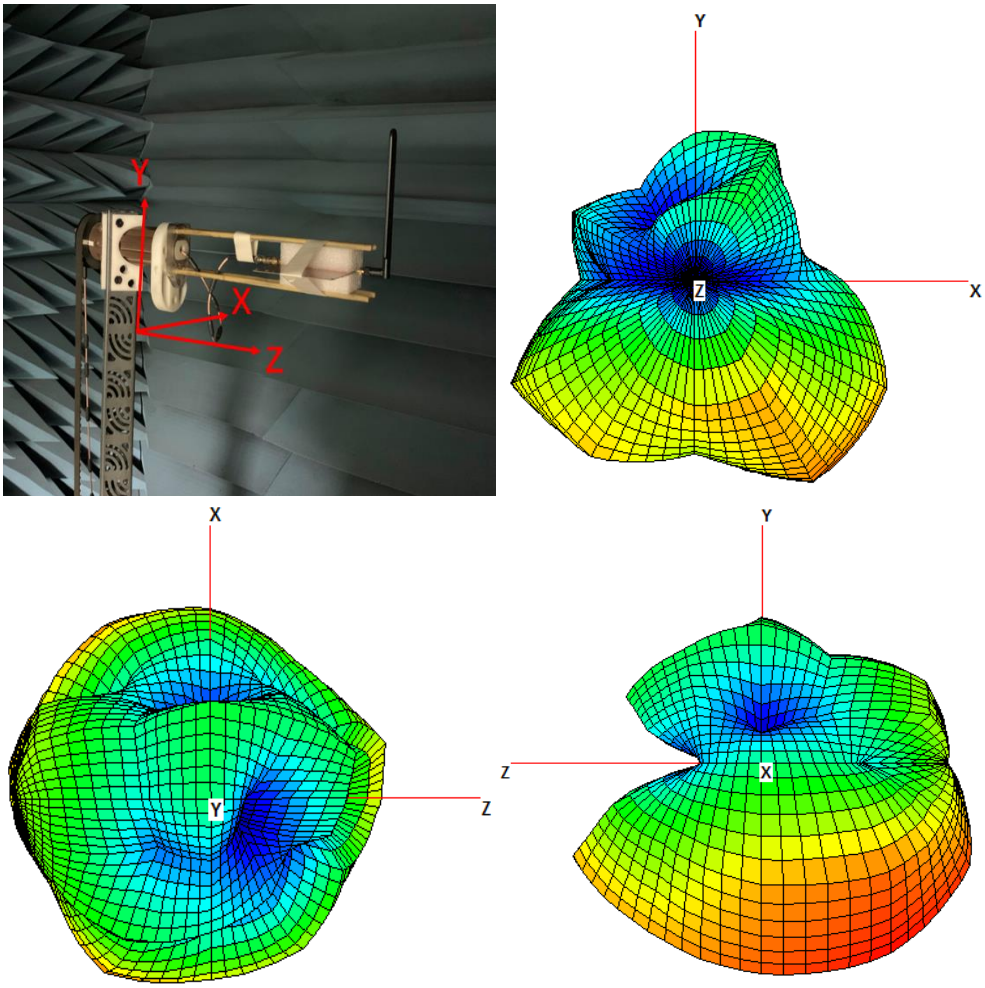


FIGURE 4.5.13 3D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

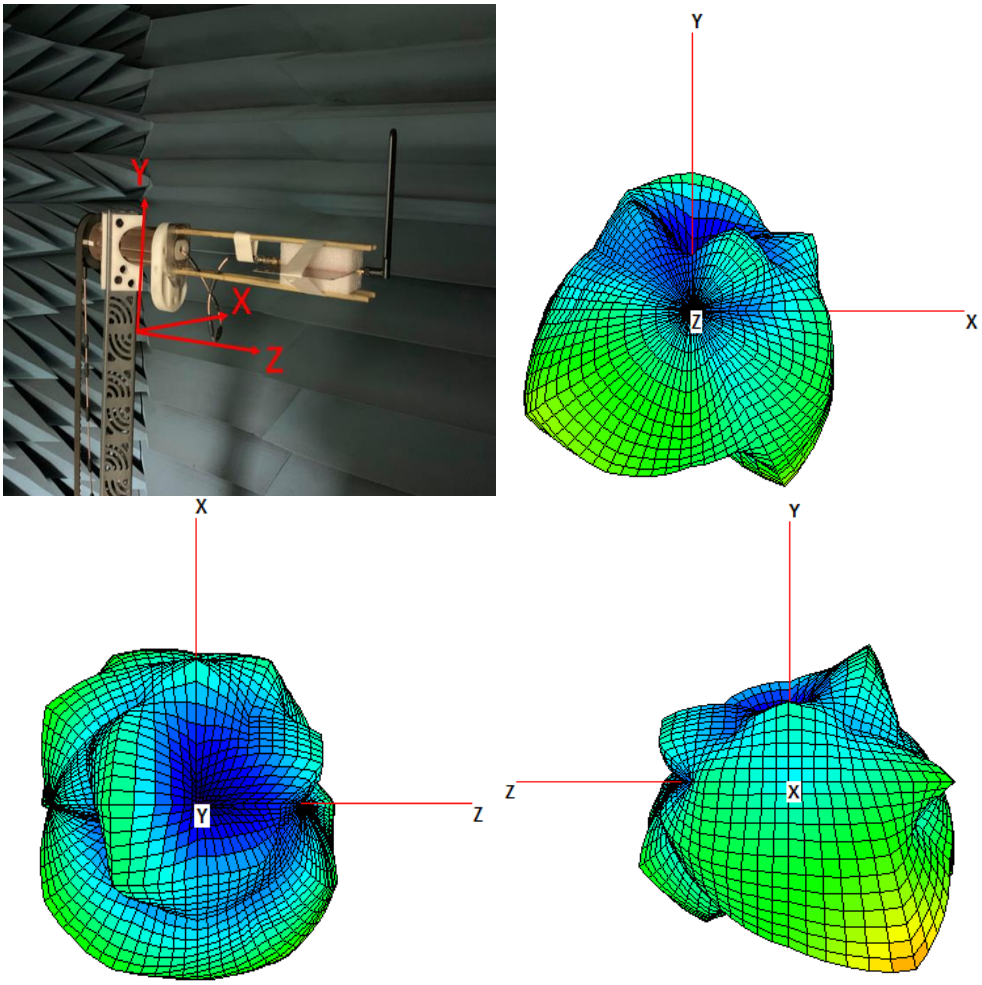


FIGURE 4.5.14 3D RADIATION PATTERN OF ANTENNA AT 2690MHZ IN FREE SPACE

5.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

5.1 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT STATES

Four states for antenna have been evaluated and these states are shown in figure 5.1.0. The ground size is 100mm*100mm. After testing, the performance of antenna installed on PCB is better than that not installed on PCB, so we recommend using Reference state. The 4.4-5GHz performance in reference state is better than state2, so we still recommend using standard state.

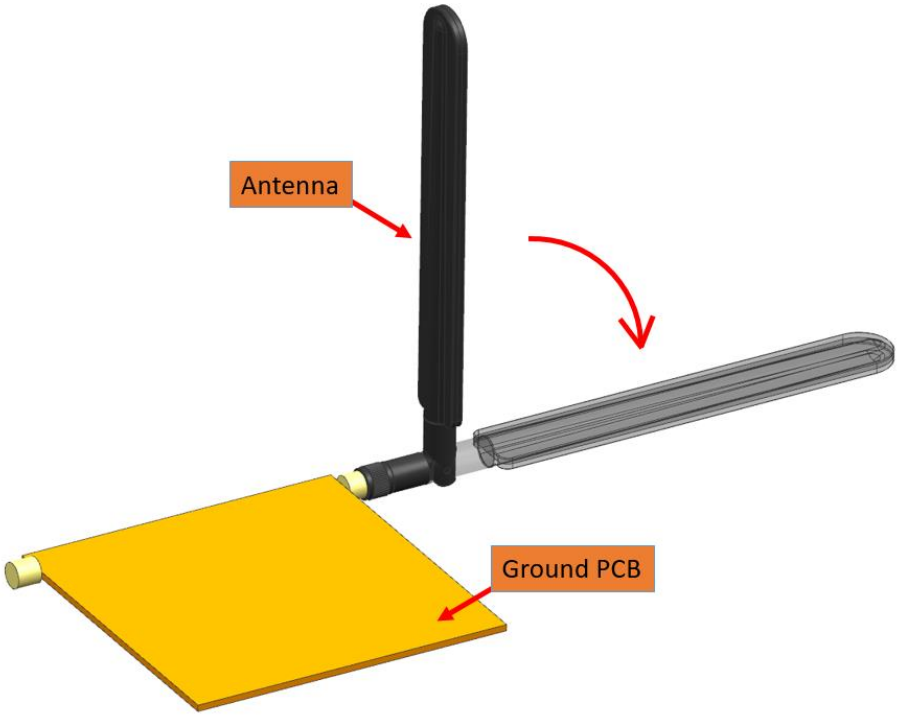


FIGURE 5.1.0 FOUR STATES FOR ANTENNA

Ground Size: 100mm*100mm;
Reference state: Antenna mounted on Ground and bend 90 degree;
State 2: Antenna mounted on Ground and no bending;
State 3: Signal antenna no bending (no mount on ground);
State 4: Signal antenna and bend 90 degree (no mount on ground).

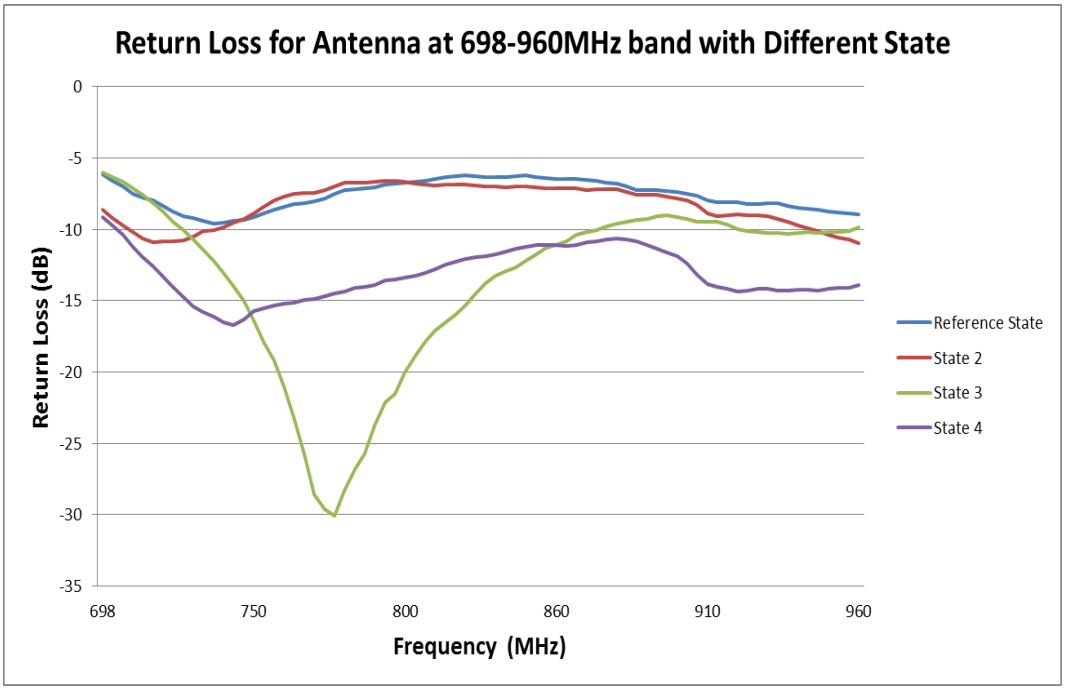


FIGURE 5.1.1 RETURN LOSS OF ANTENNA AT 698-960MHZ WITH DIFFERENT STATES

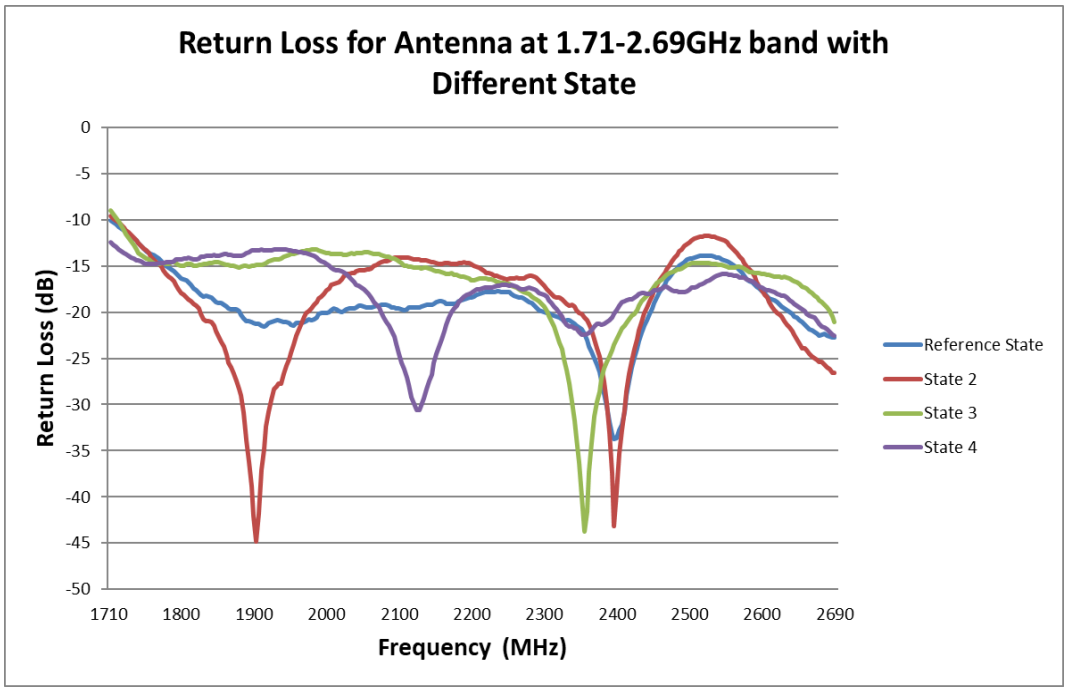


FIGURE 5.1.2 RETURN LOSS OF ANTENNA AT 1.71-2.69GHZ WITH DIFFERENT STATES

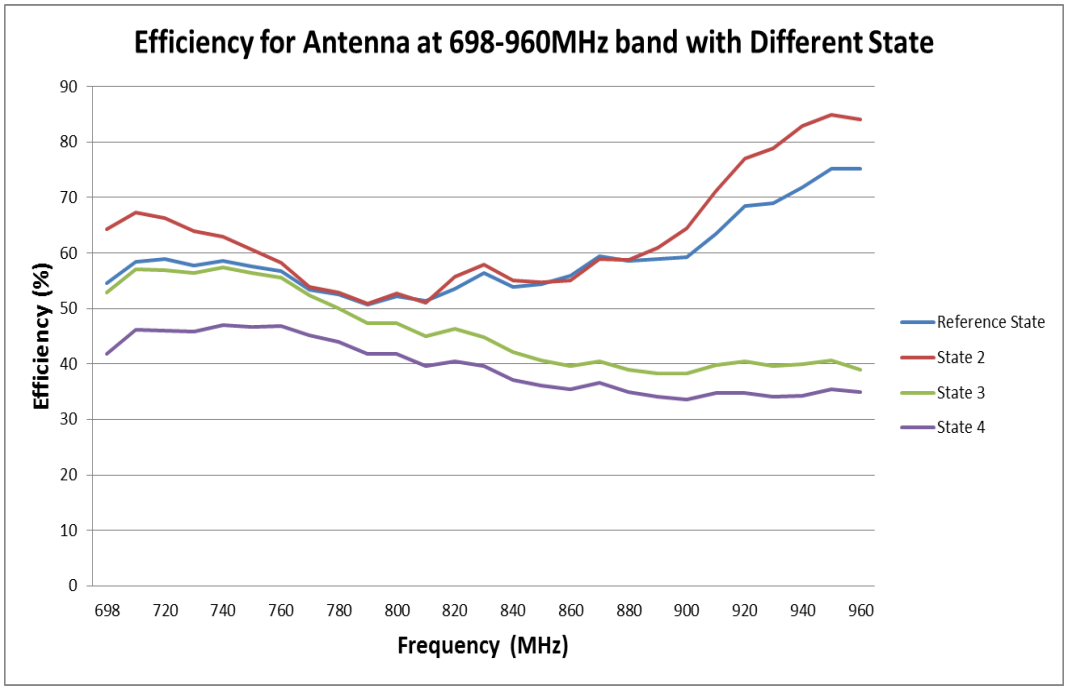


FIGURE 5.1.5 EFFICIENCY OF ANTENNA AT 698-960MHZ WITH DIFFERENT STATES

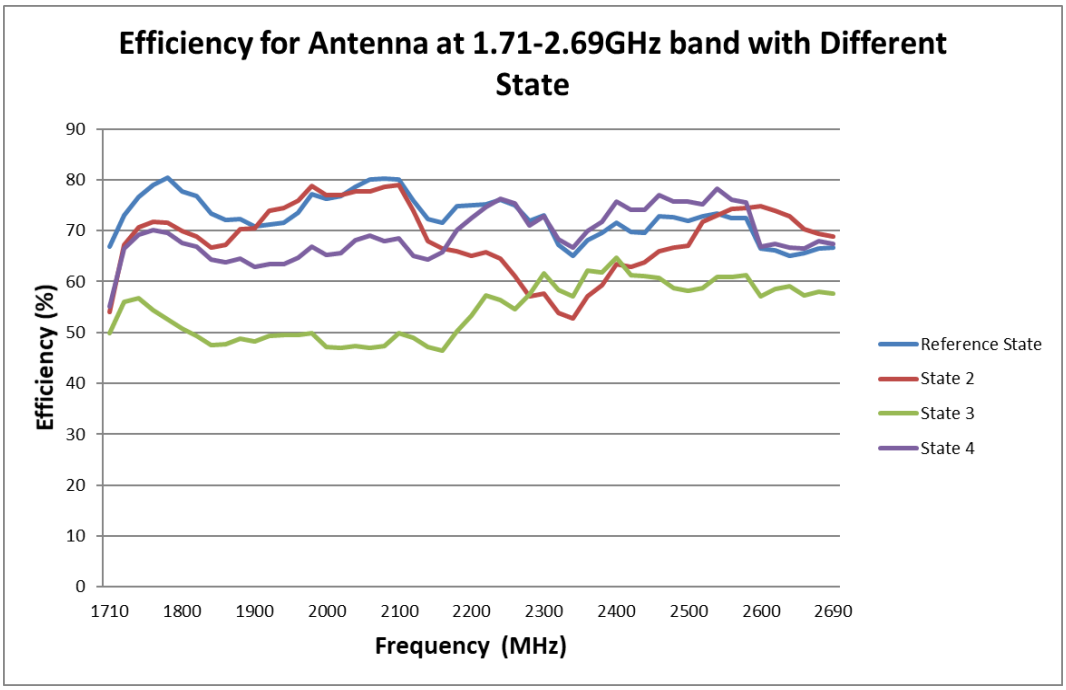
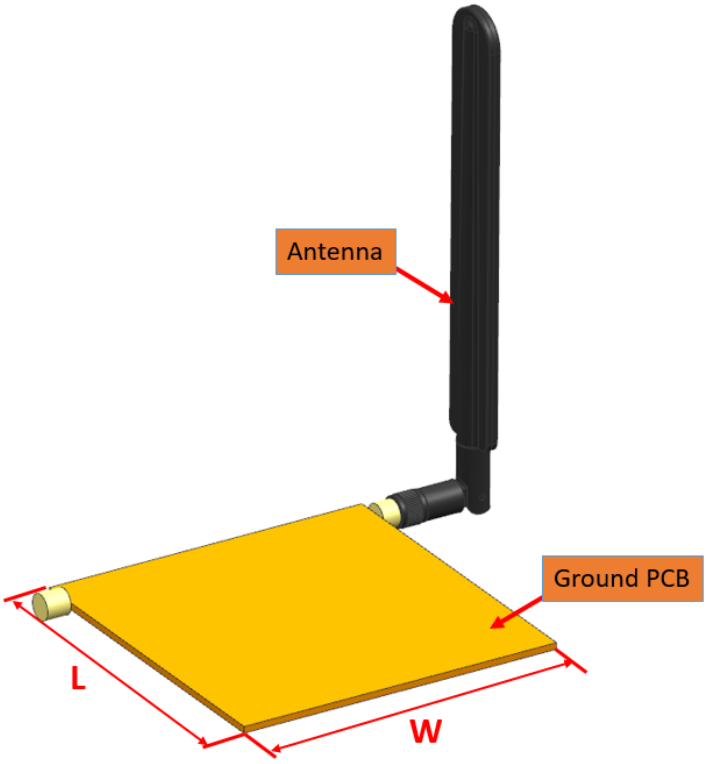


FIGURE 5.1.6 EFFICIENCY OF ANTENNA 1.71-2.69GHZ WITH DIFFERENT STATES

5.2 ANTENNA RF PERFORMANCE AS A FUNCTION WITH DIFFERENT GROUND SIZE

Four different ground size have been evaluated and the size are shown in figure 5.2.0. The increasing of ground size has little effect on the antenna performance, and the decreasing of ground size will lead to the deterioration of low frequency performance. The minimum ground size is suggested to be 100*100mm.



L*W (70*70、100*100、120*120、150*150)

FIGURE 5.2.0 FOUR DIFFERENT GROUND SIZE

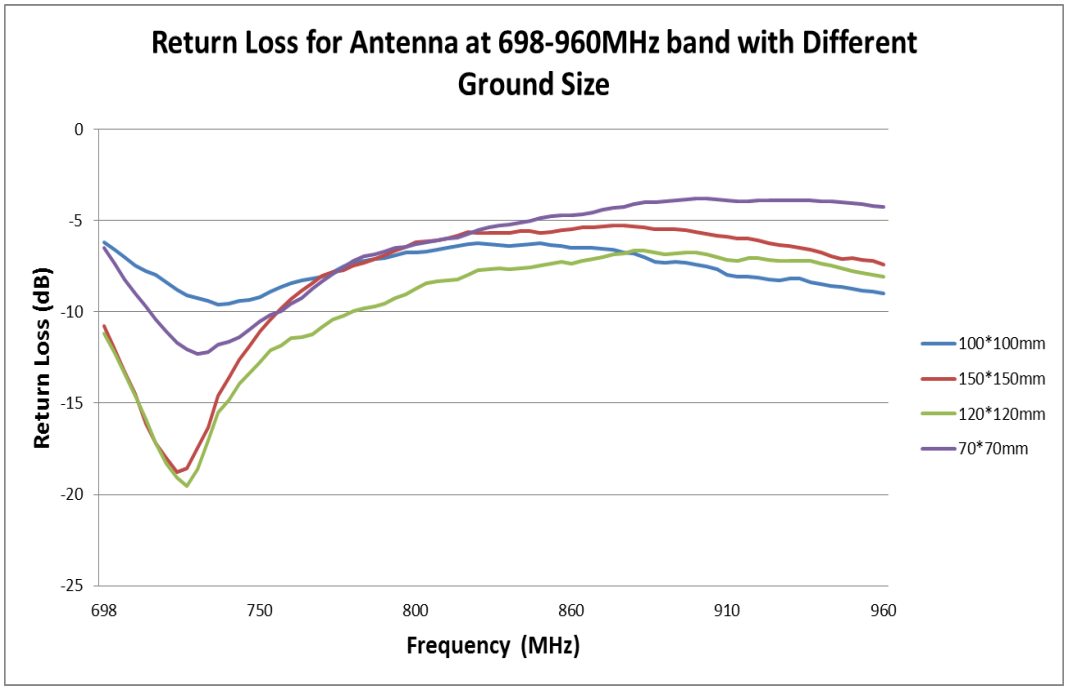


FIGURE 5.2.1 RETURN LOSS OF ANTENNA AT 698-960MHZ WITH DIFFERENT GROUND SIZE

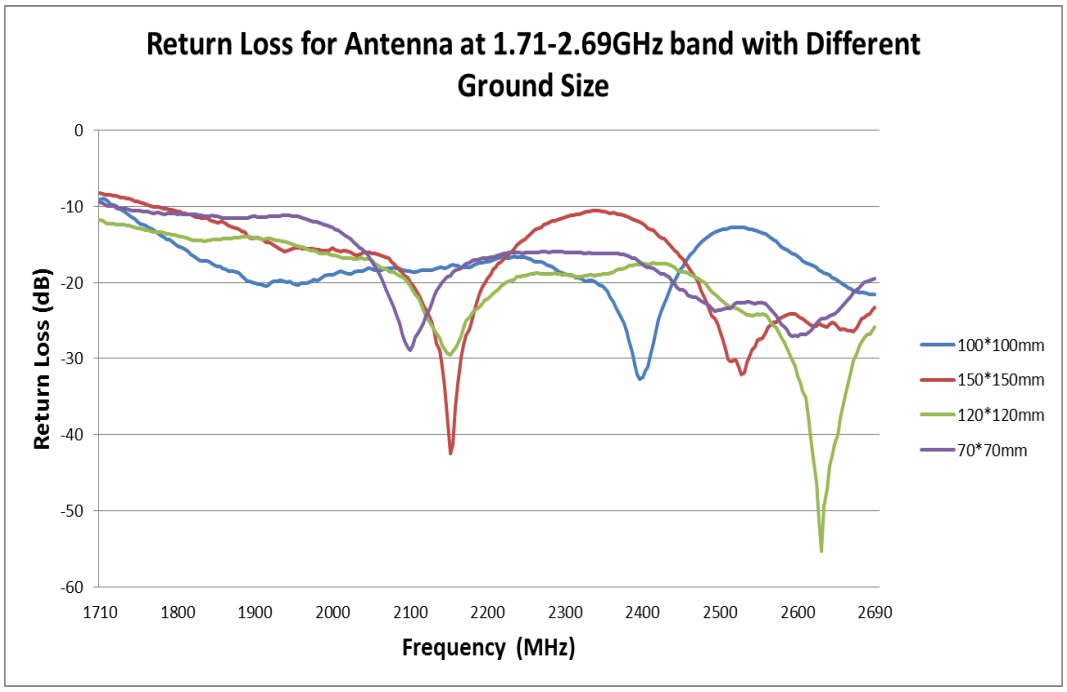


FIGURE 5.2.2 RETURN LOSS OF ANTENNA AT 1.71-2.69HZ WITH DIFFERENT GROUND SIZE

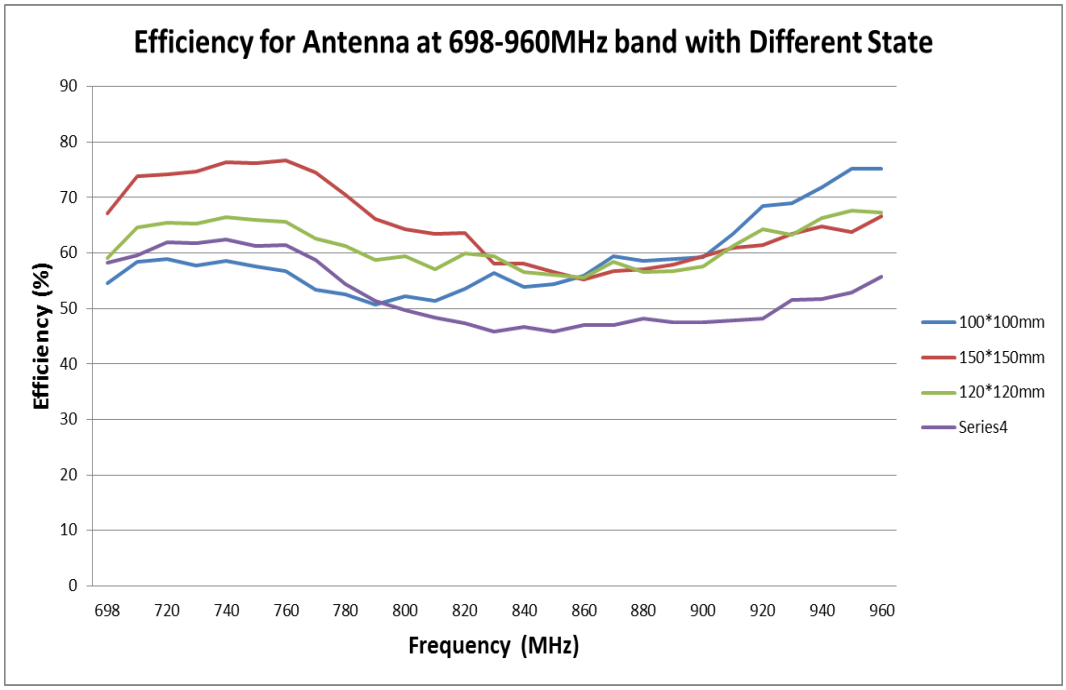


FIGURE 5.2.5 EFFICIENCY OF ANTENNA AT 698-960MHZ WITH DIFFERENT GROUND SIZE

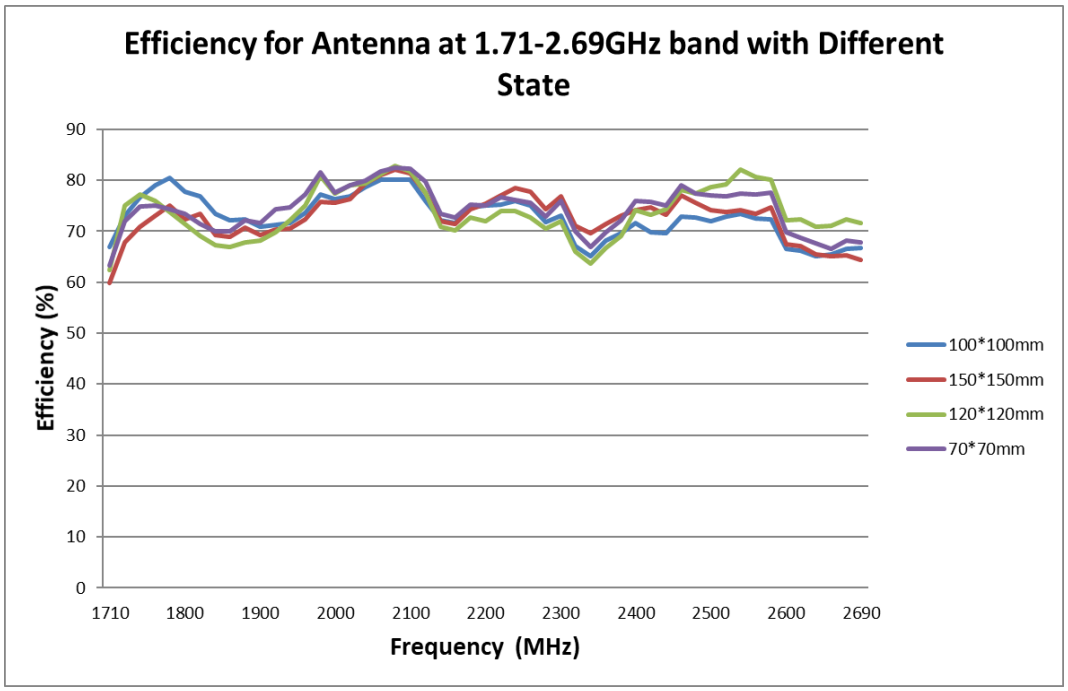


FIGURE 5.2.6 EFFICIENCY OF ANTENNA AT 1.7-2.7GHZ WITH DIFFERENT GROUND SIZE

TH DIFFERENT GROUND SIZE