



APPLICATION SPECIFICATION

TITLE

698~4000MHZ FLEXIBLE ANTENNA

TABLE OF CONTENTS

1.0 SCOPE

2.0 PRODUCT DESCRIPTION

3.0 APPLICABLE DOCUMENTS

4.0 ANTENNA PERFORMANCE

5.0 ASSEMBLY GUIDELINE

6.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

7.0 OTHER MOLEX ANTENNA PRODUCTS

8.0 CHANGE HISTORY

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 1 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

698~4000MHZ 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: 698~4000MHz Flexible Antenna

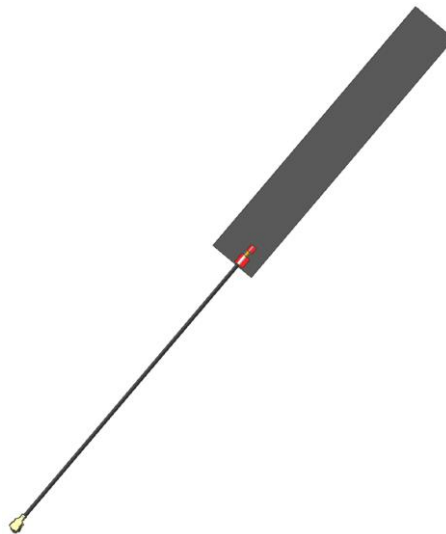
Series Number: 209142

2.2 DESCRIPTION

209142 is monopole flexible antenna for 4G full LTE bands in the spectrum of 698~ 4000 MHz, also optimally covers 2G and 3G. Antenna 85x14.5x0.1mm is made from flexible polymer material, cable standard length 180mm. It can be easily installed by simply "peel and stick" on non-metal surface.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2091420180 for full information.



ANTENNA 3D VIEW

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 2 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing(SD)	SD-2091420180	Mechanical Dimension of the product
Product Specification (PS)	PS-2091420180	Product Specification
Packing Drawing(PK)	PK-2091420180	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.2091420180 with a cable length of 180mm.

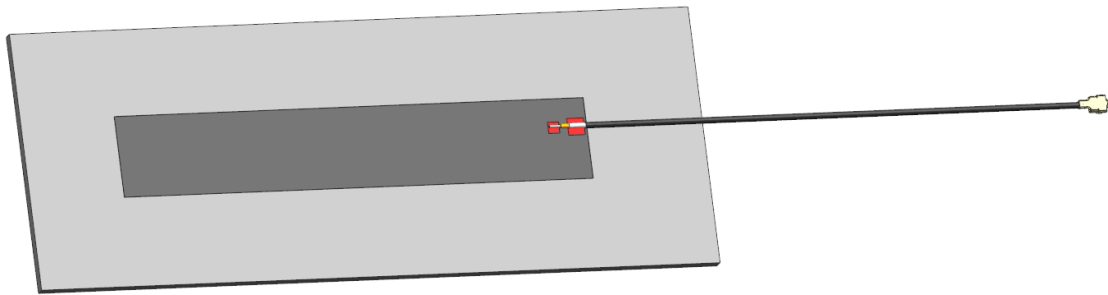


FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5MM THICKNESS

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 3 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

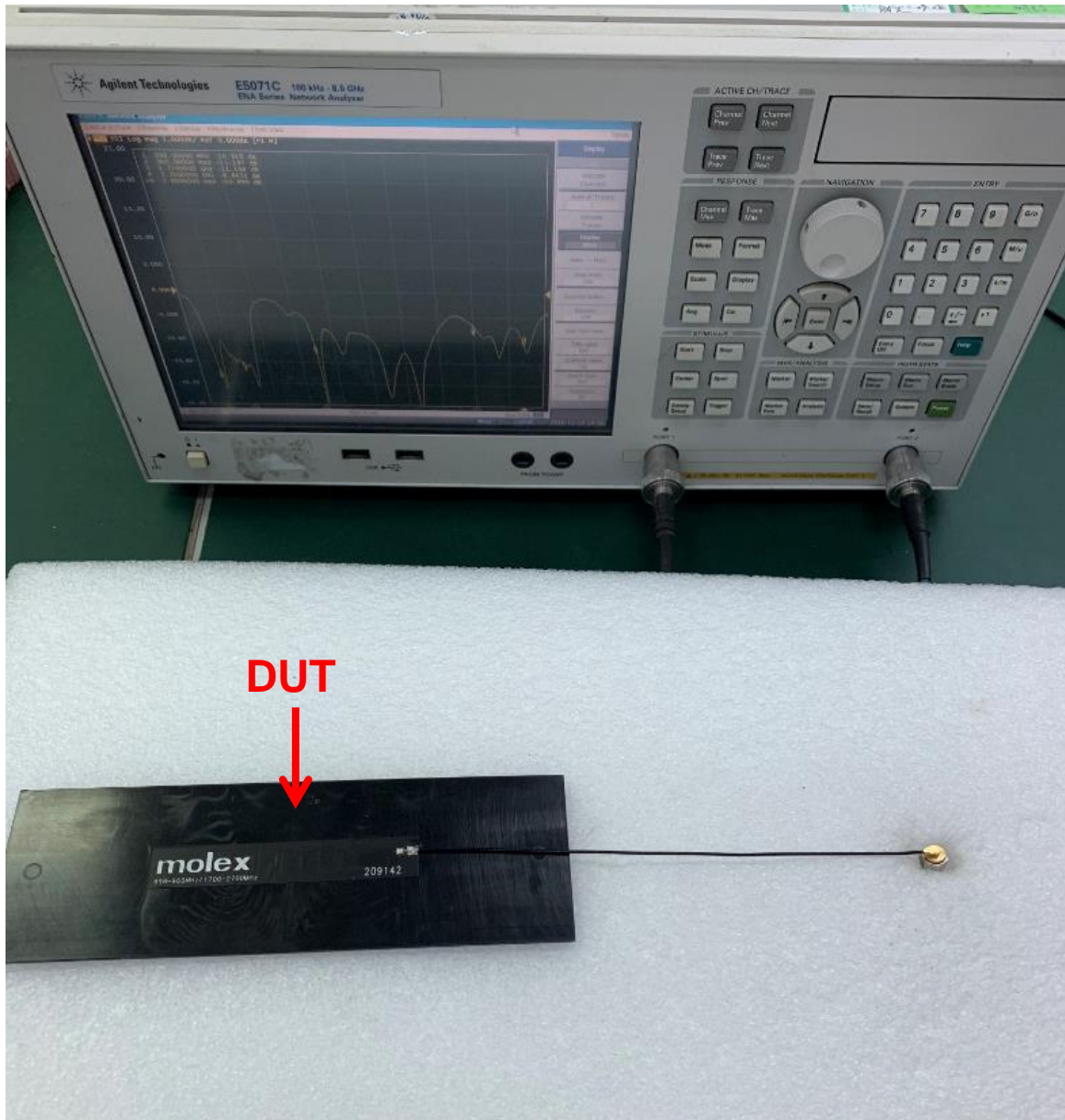


FIGURE 4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5MM THICKNESS TESTED WITH VNA E5071C

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 4 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



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

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification		SHEET No. 5 of 44
DOCUMENT NUMBER: AS-2091420180		CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



APPLICATION SPECIFICATION

4.2 ANTENNA PERFORMANCE

Description	Equipment	Requirement (180mm)		
		698-960MHz	1710-2690MHz	3.3-3.8GHz
Frequency Range	VNA E5071C	698-960MHz	1710-2690MHz	3.3-3.8GHz
Return Loss	VNA E5071C	<-10 dB	<-5 dB	<-5 dB
Peak Gain (Max)	OTA Chamber	1.2dBi	5.2dBi	2.7dBi
Average Total Efficiency	OTA Chamber	>45%	>55%	>55%
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.

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 6 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

4.3 RETURN LOSS PLOT

All measurements in this document are done with cable length of 180mm.

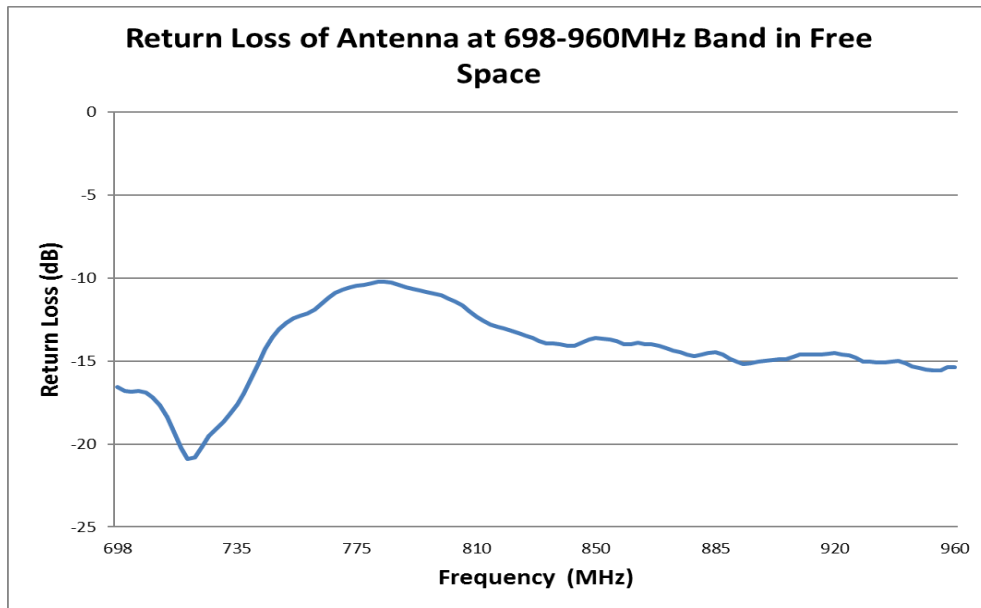


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 698-960MHZ IN FREE SPACE

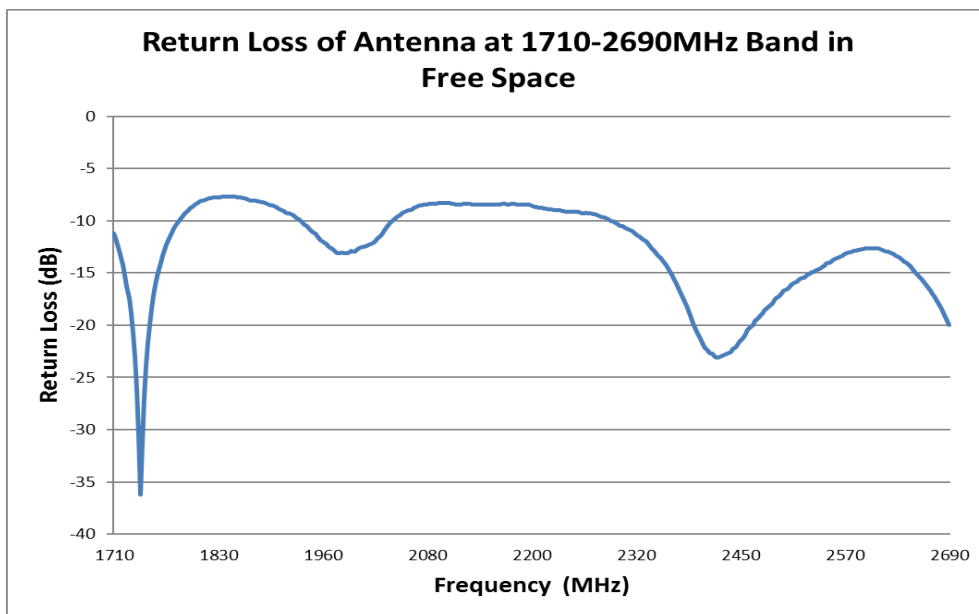


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 1710-2690MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 7 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

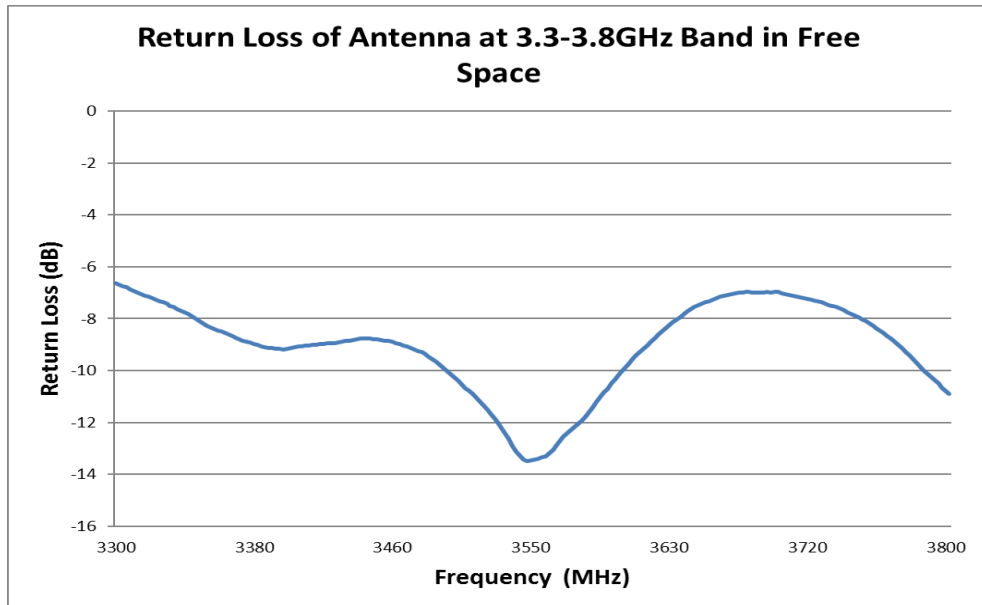


FIGURE 4.3.3 RETURN LOSS OF ANTENNA AT 3.3-3.8GHZ IN FREE SPACE

4.4 EFFICIENCY PLOT

All measurements in this document are done with cable length of 180mm.

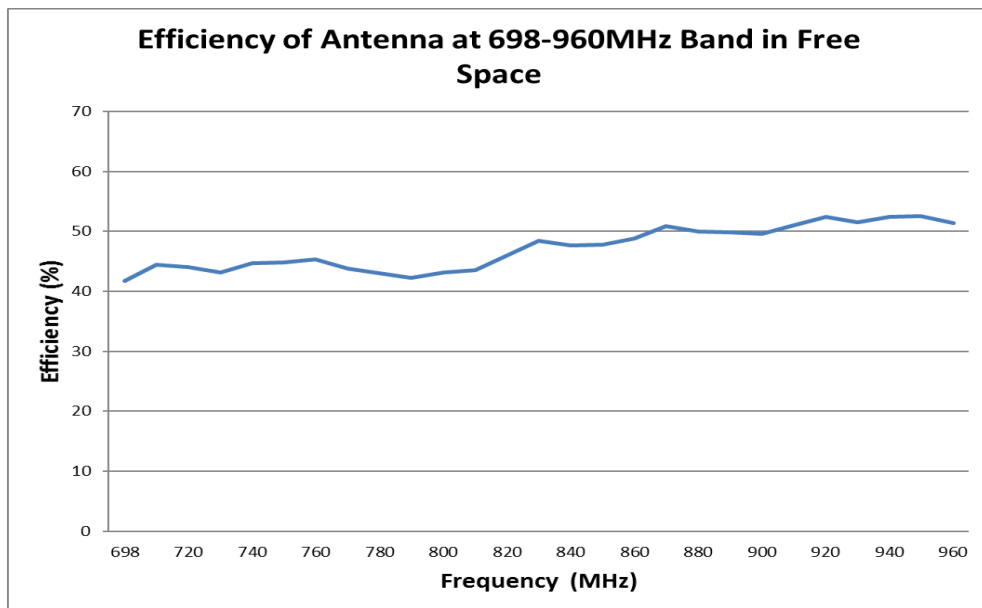


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 698-960MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 8 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

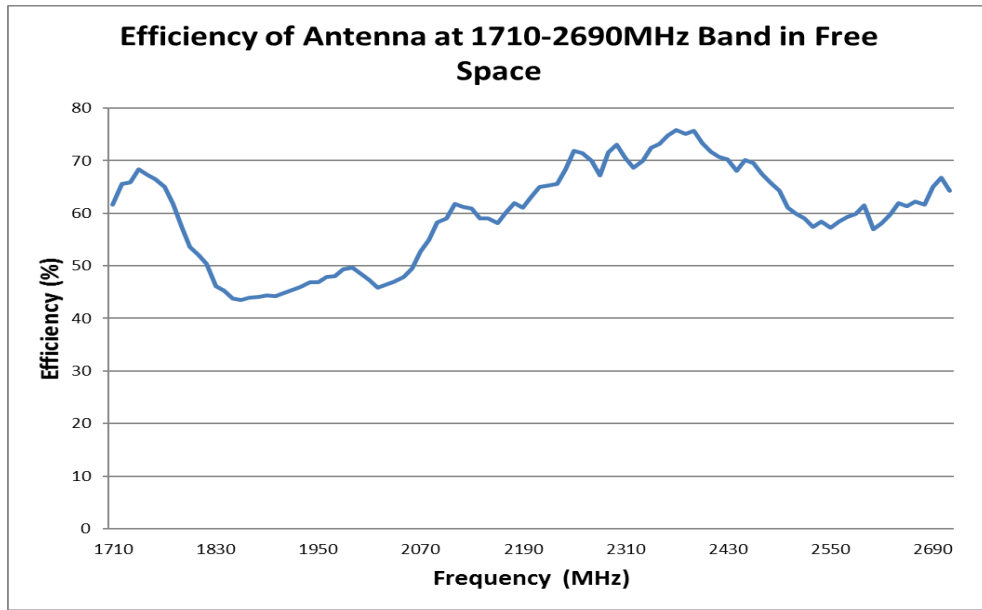


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 1710-2690MHZ IN FREE SPACE

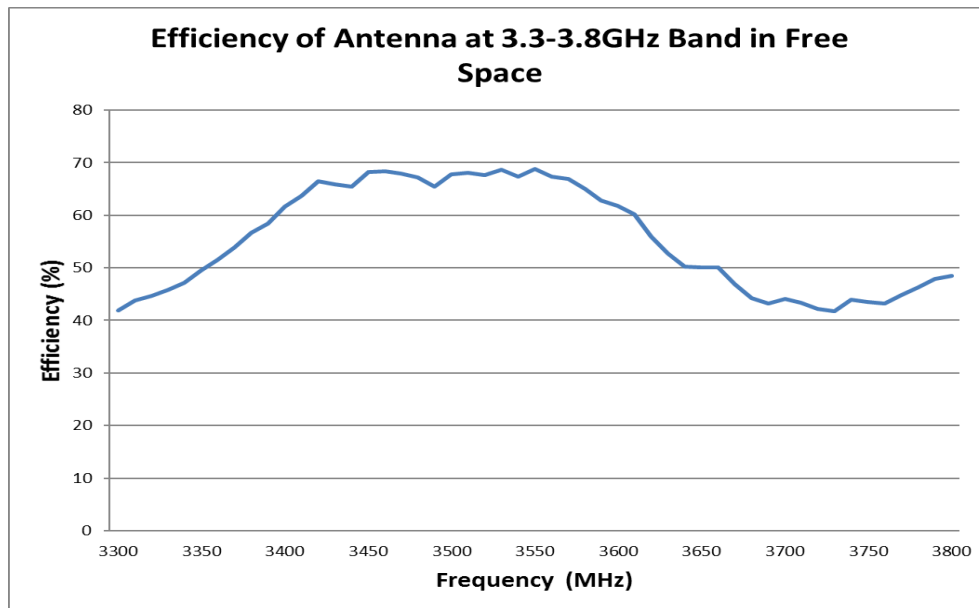


FIGURE 4.4.3 EFFICIENCY OF ANTENNA AT 3.3-3.8GHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 9 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

4.5 2D RADIATION PATTERN

All measurements in this document are done with cable length of 180mm.

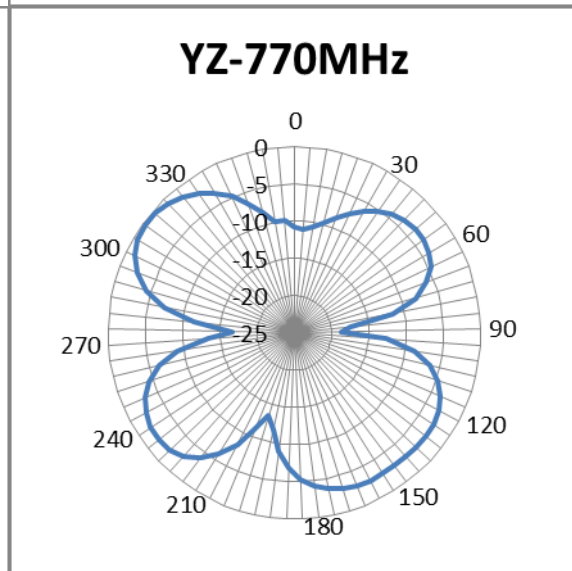
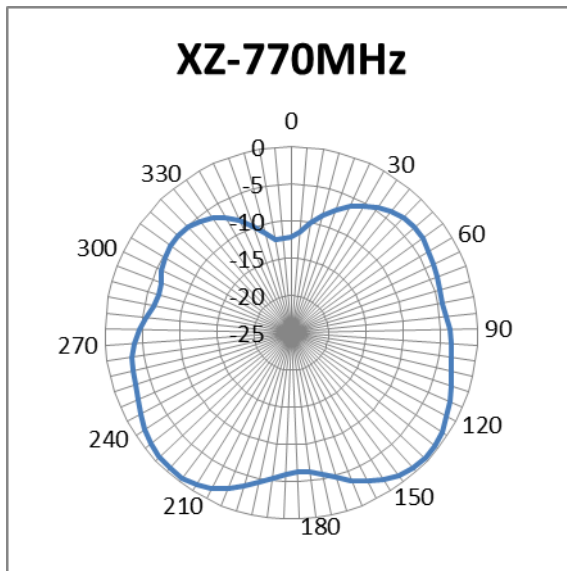
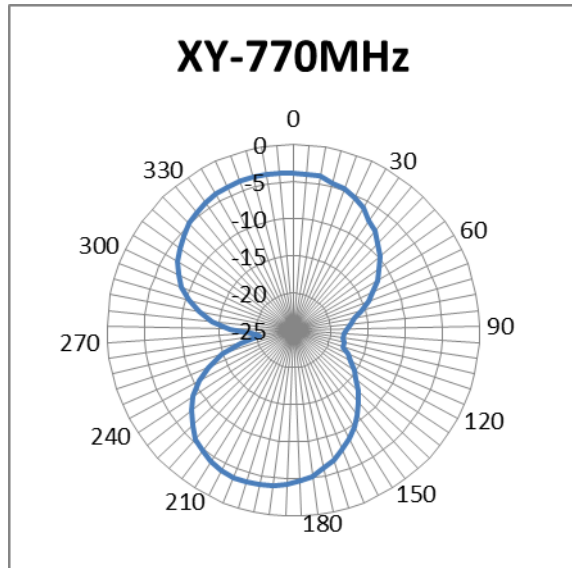
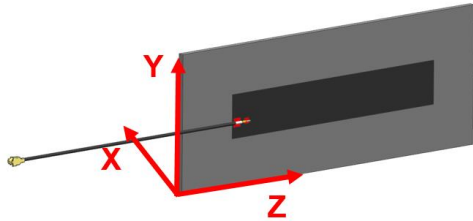


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 770MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 10 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

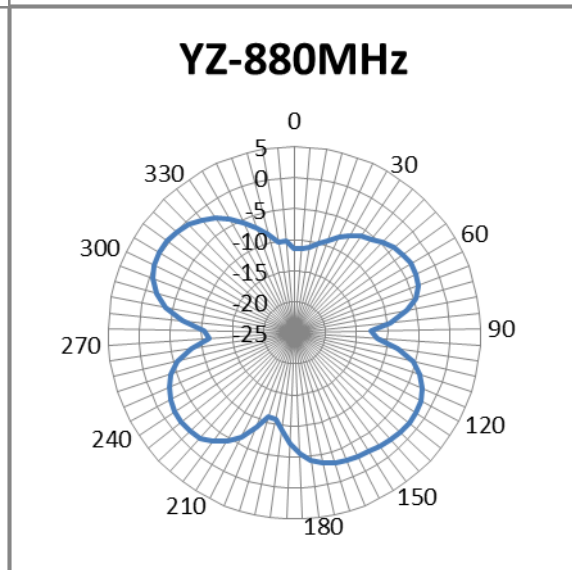
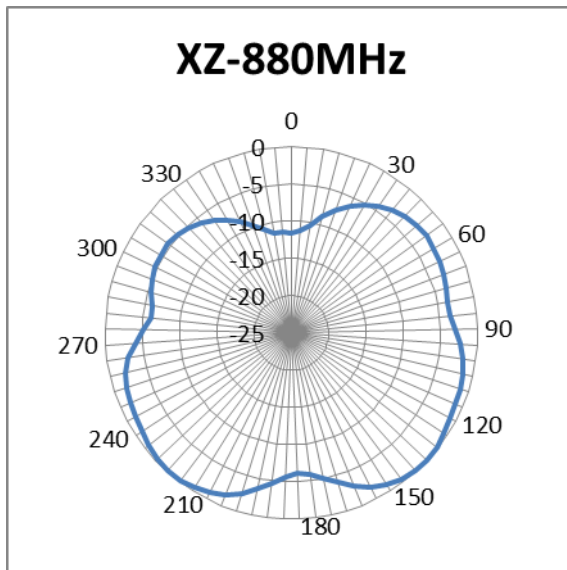
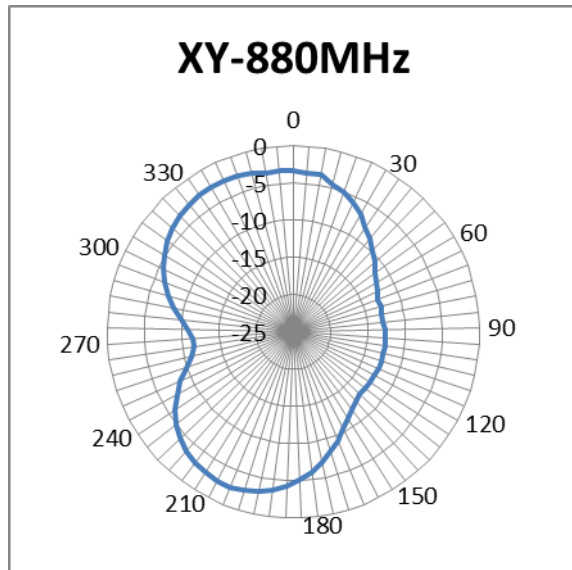
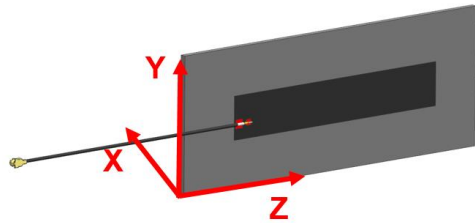
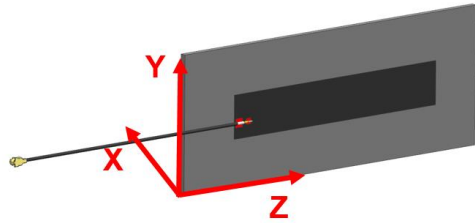
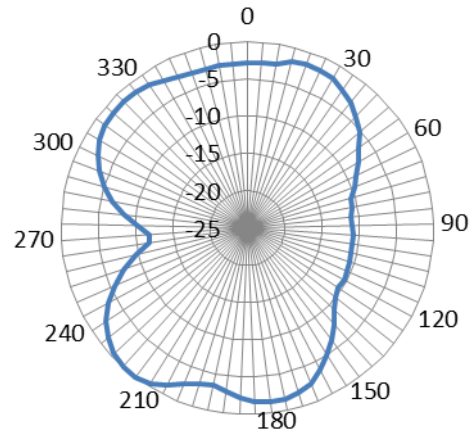


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

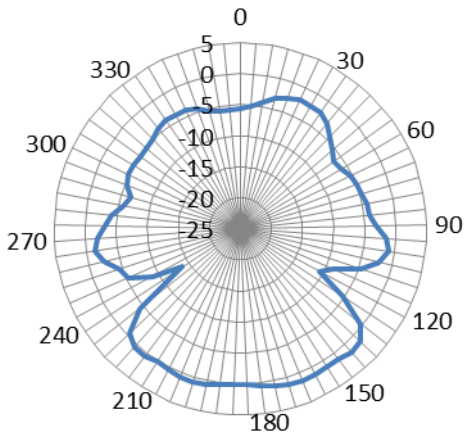
REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 11 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



XY-1880MHz



XZ-1880MHz



YZ-1880MHz

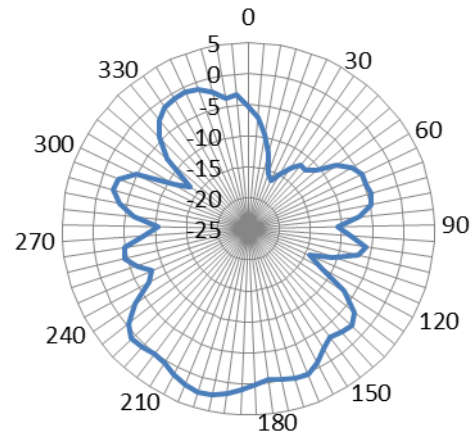


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 1880MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 12 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

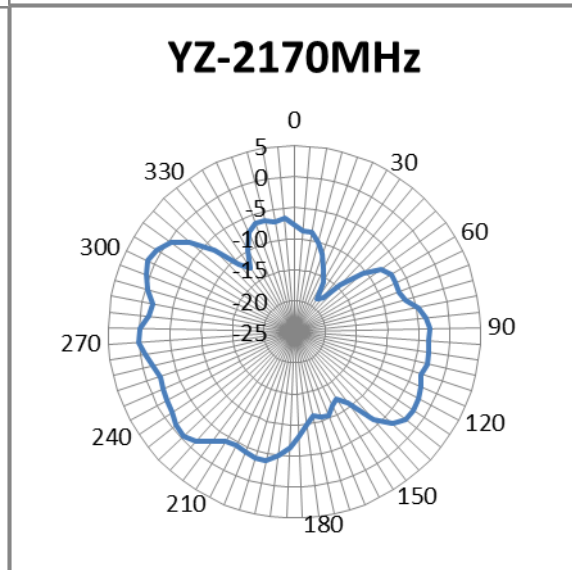
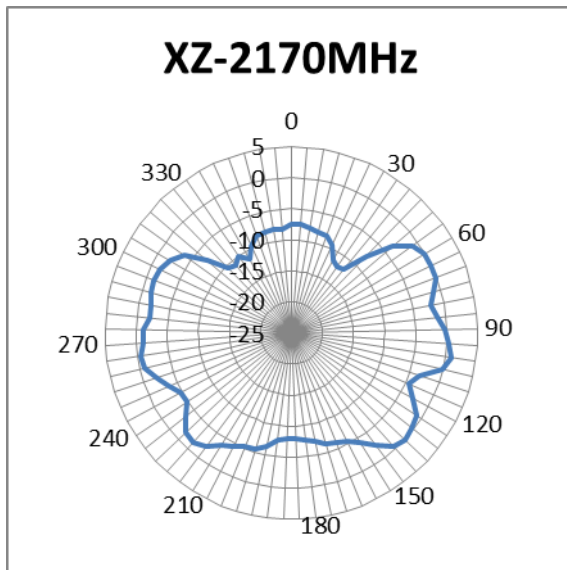
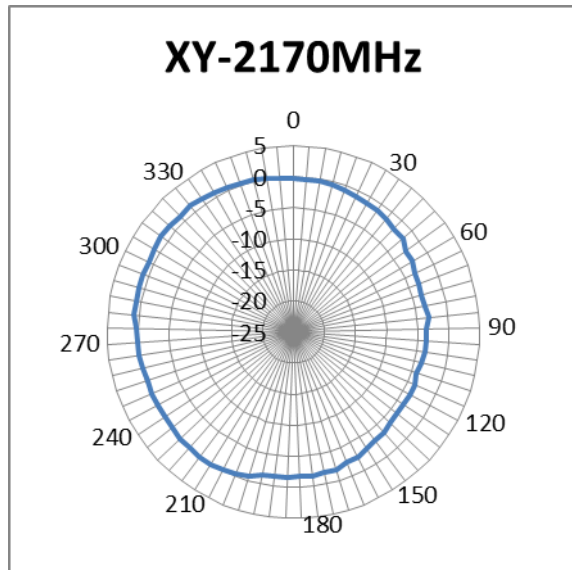
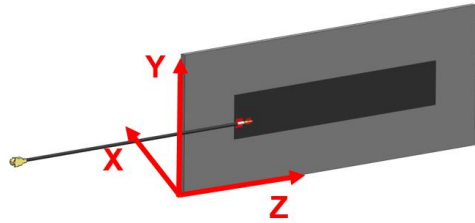


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 13 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

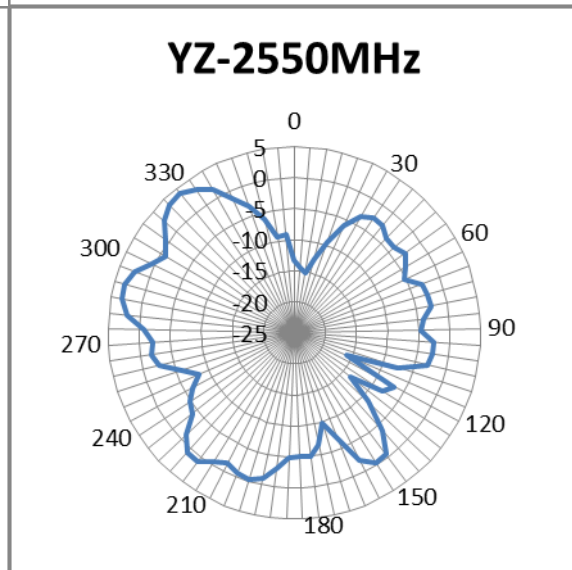
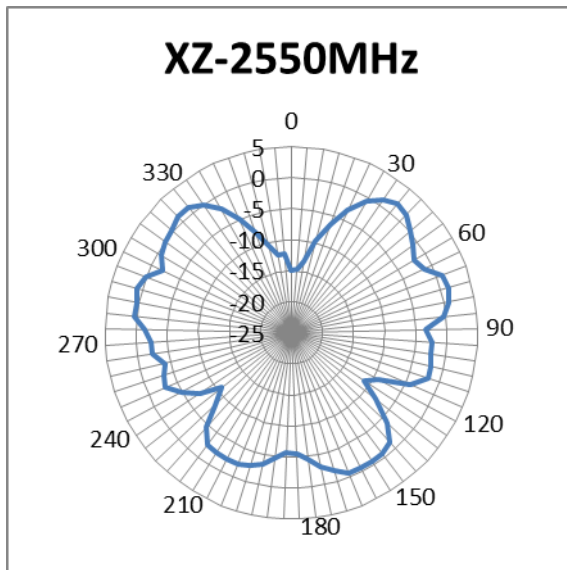
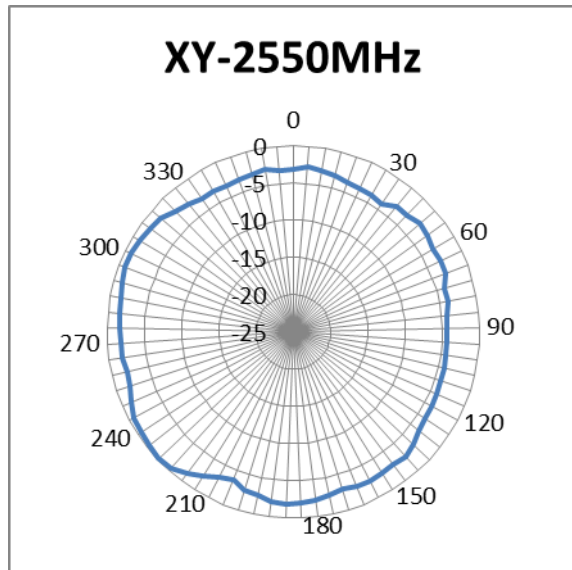
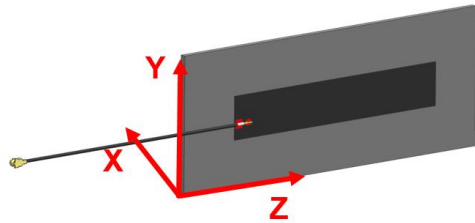


FIGURE 4.5.5 2D RADIATION PATTERN OF ANTENNA AT 2550MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 14 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

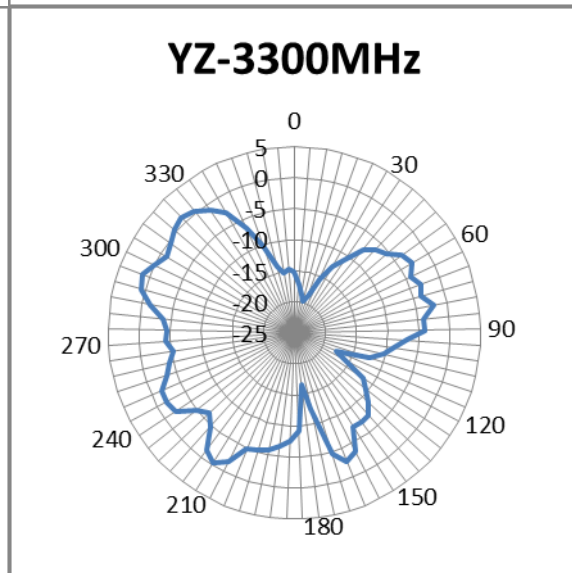
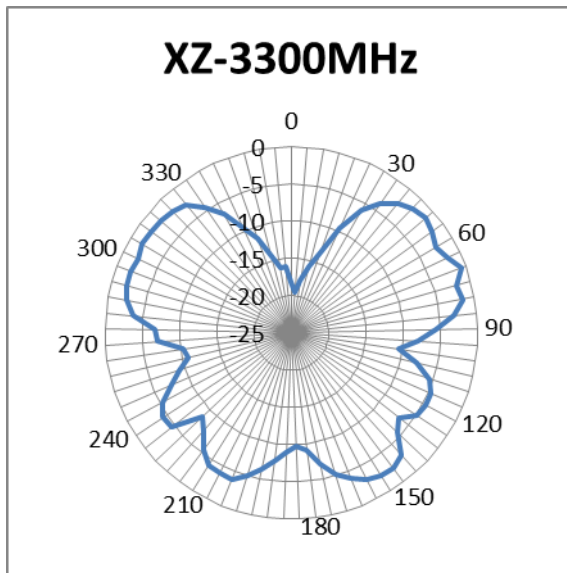
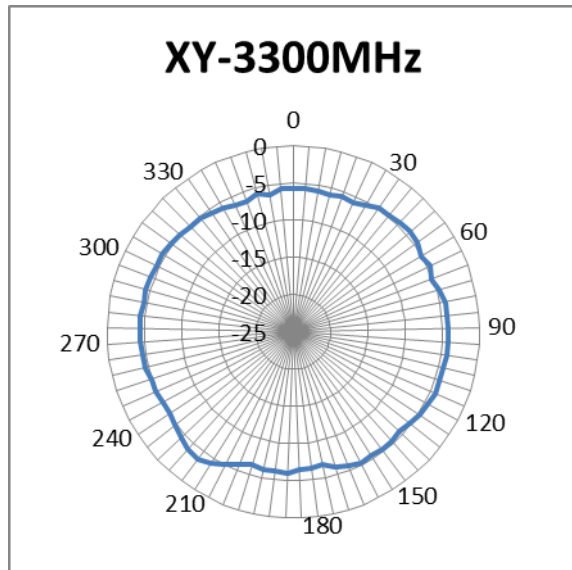
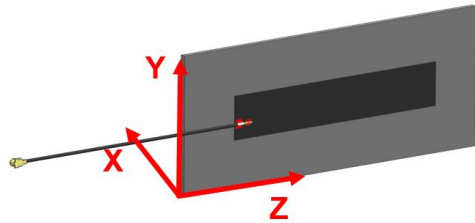
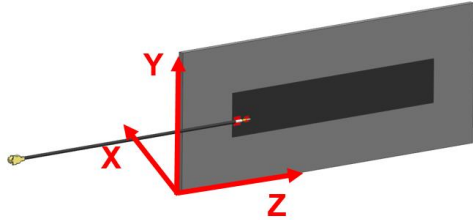
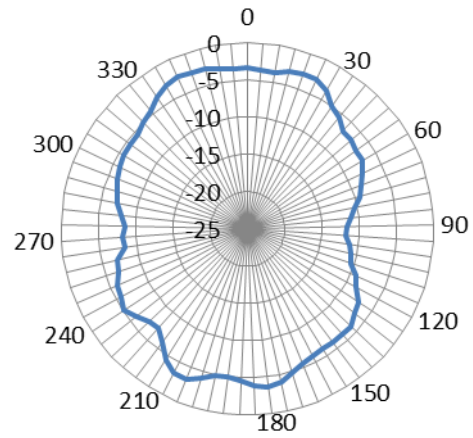


FIGURE 4.5.6 2D RADIATION PATTERN OF ANTENNA AT 3300MHZ IN FREE SPACE

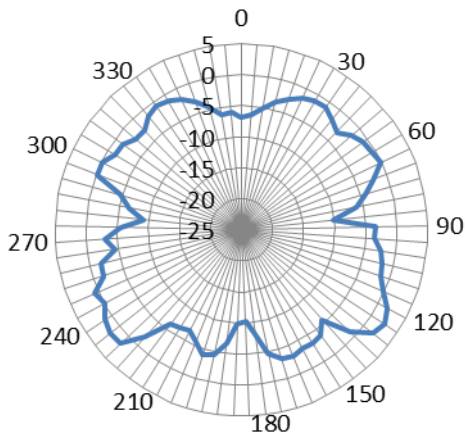
REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 15 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



XY-3550MHz



XZ-3550MHz



YZ-3550MHz

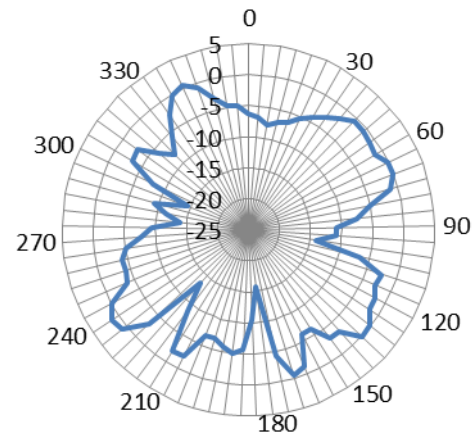
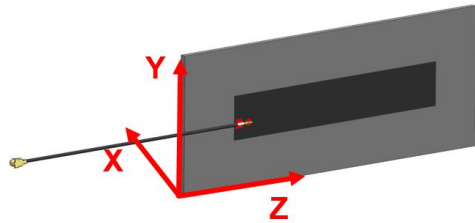
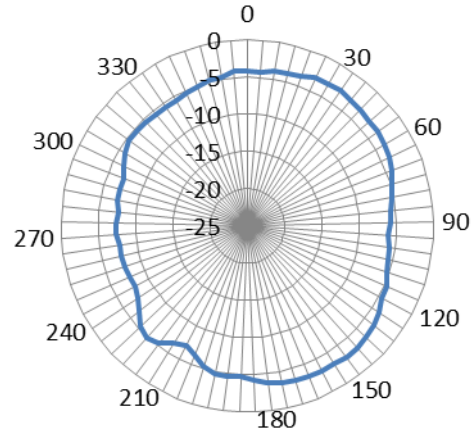


FIGURE 4.5.7 2D RADIATION PATTERN OF ANTENNA AT 3550MHZ IN FREE SPACE

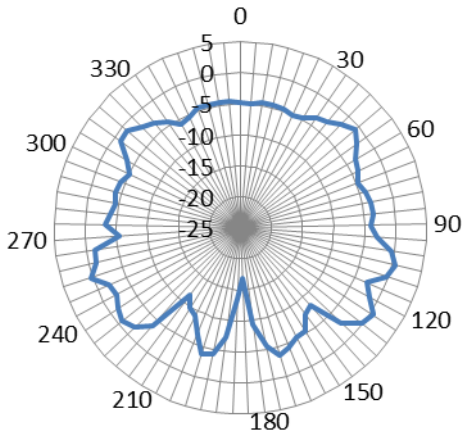
REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 16 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



XY-3800MHz



XZ-3800MHz



YZ-3800MHz

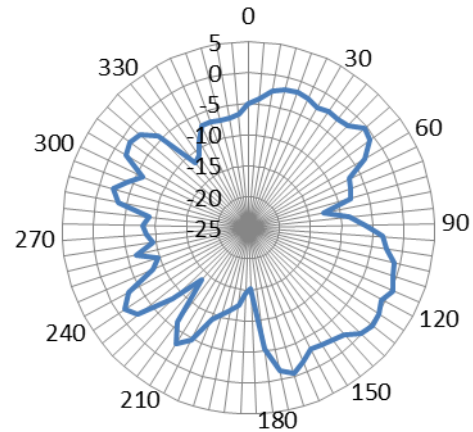


FIGURE 4.5.8 2D RADIATION PATTERN OF ANTENNA AT 3800MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 17 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

4.6 3D RADIATION PATTERN

All measurements in this document are done with cable length of 180mm.

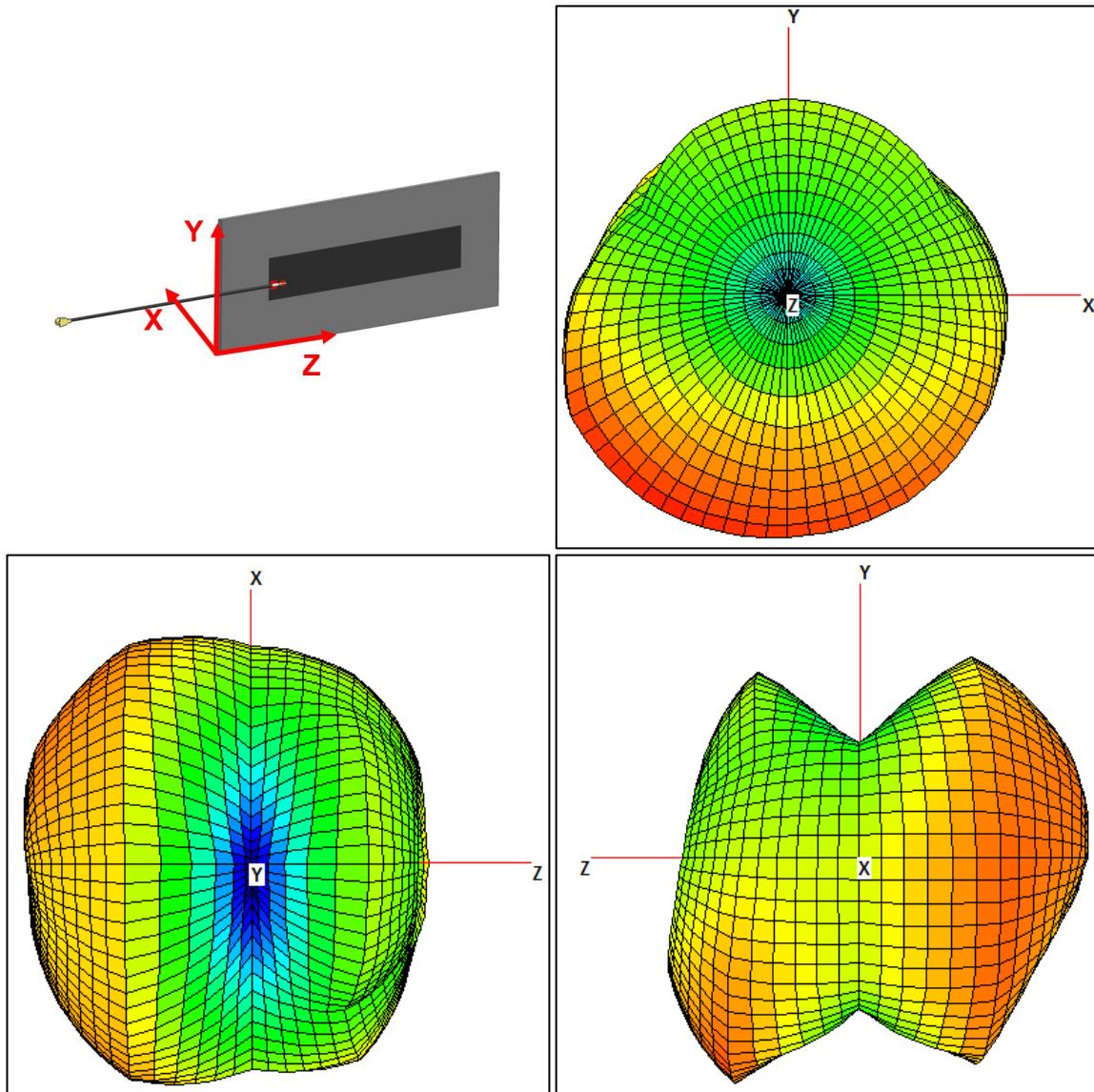


FIGURE 4.6.1 3D RADIATION PATTERN OF ANTENNA AT 770MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 18 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

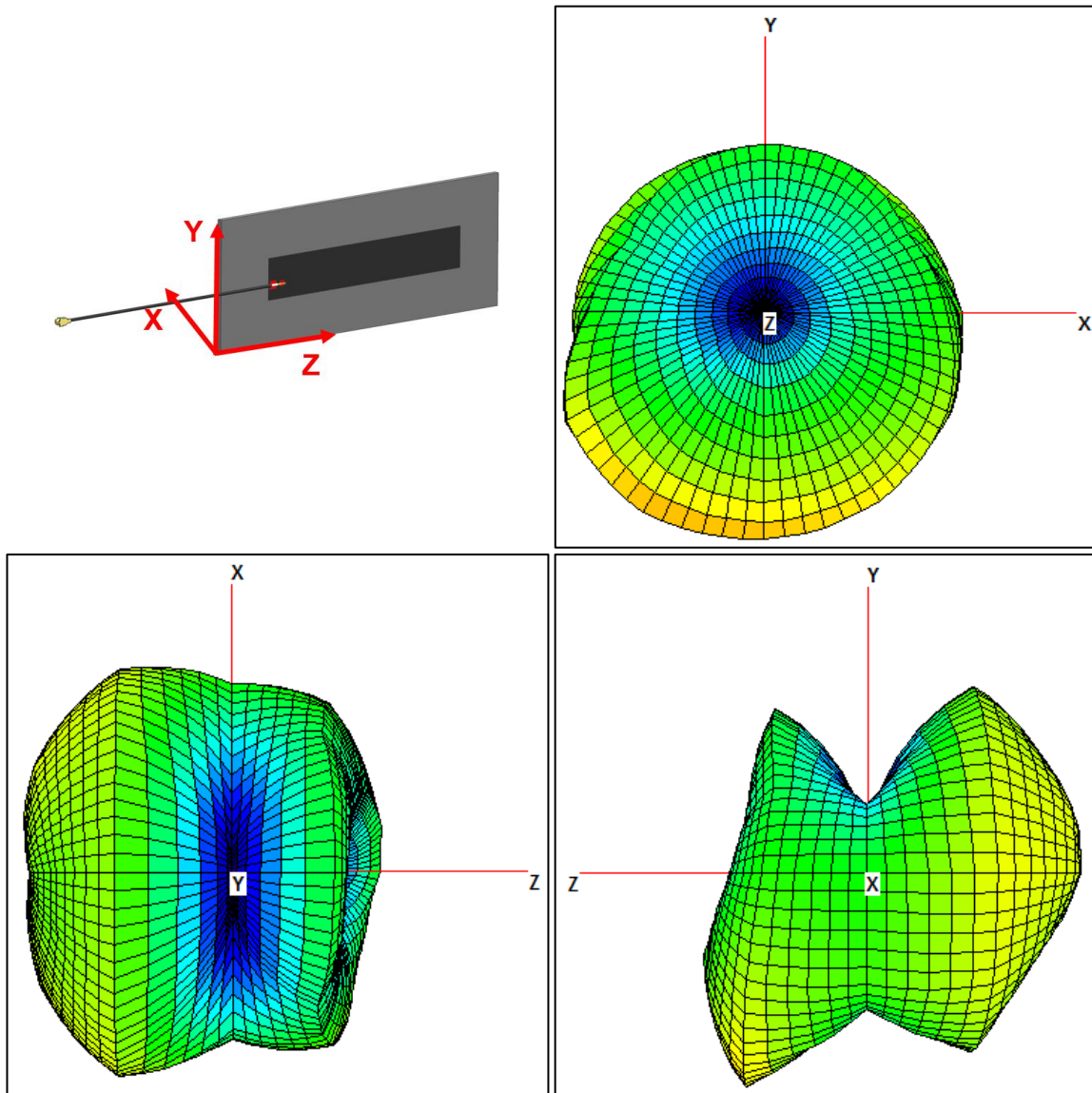


FIGURE 4.6.2 3D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 19 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

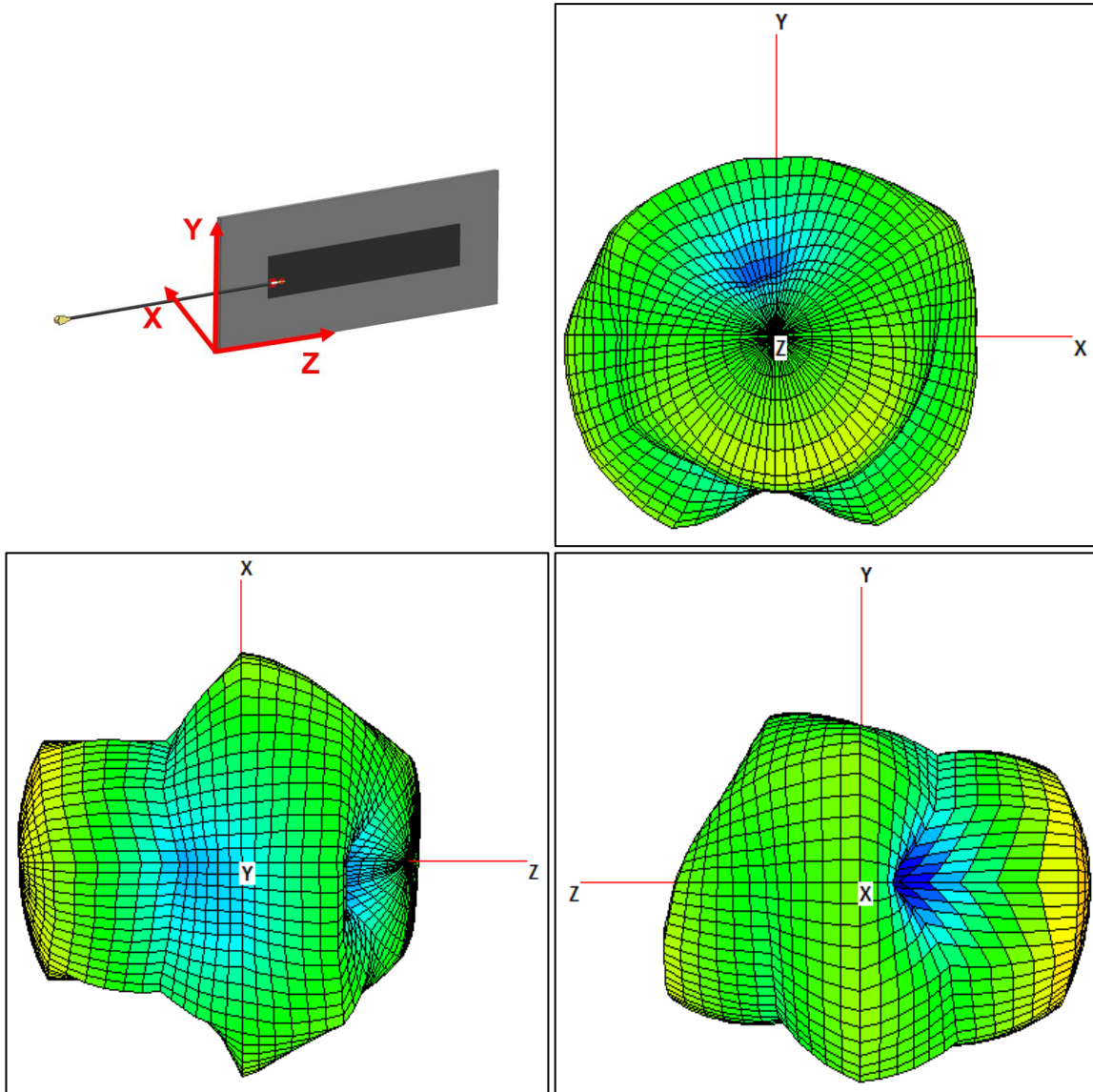


FIGURE 4.6.3 3D RADIATION PATTERN OF ANTENNA AT 1880MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 20 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

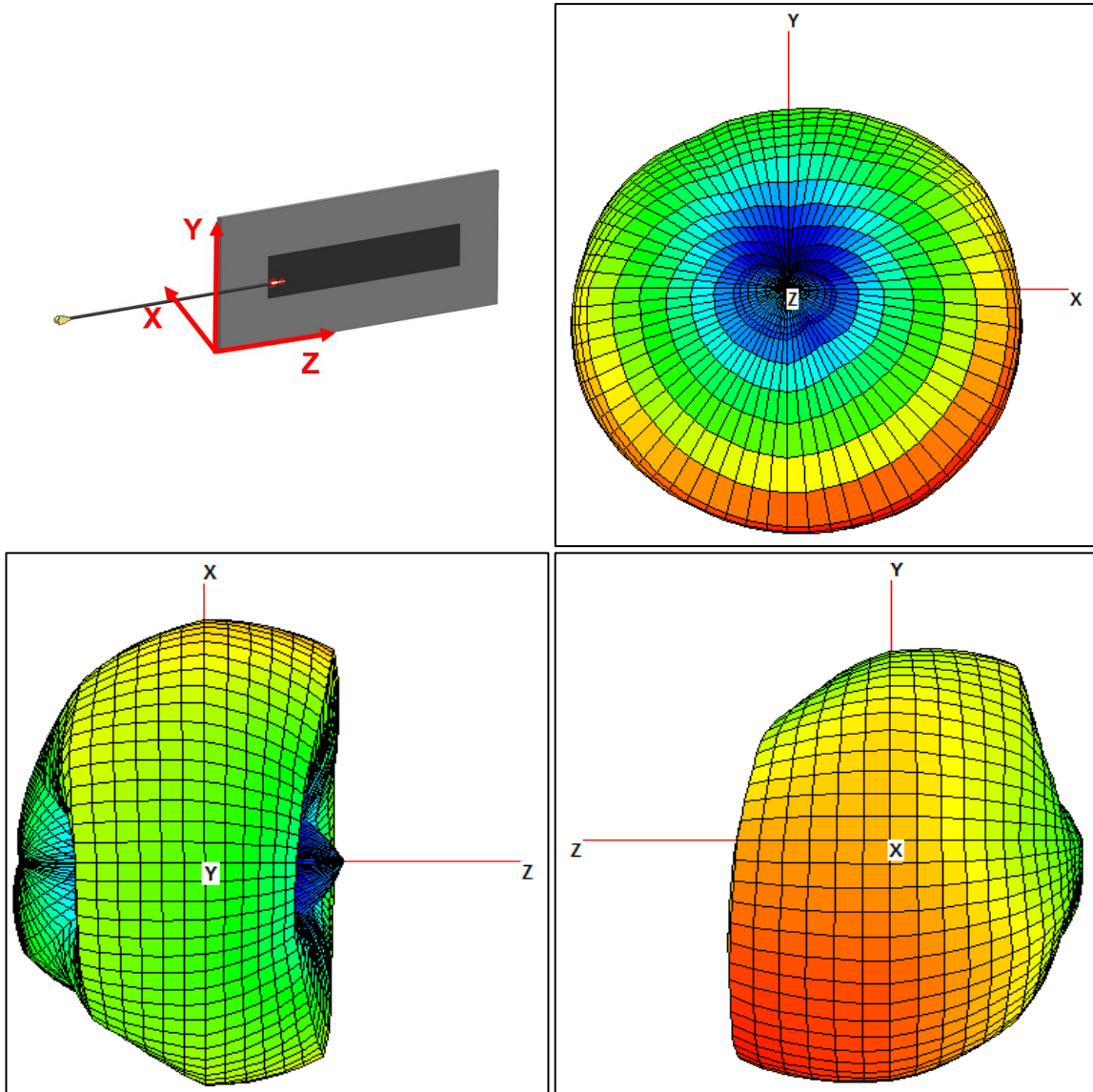


FIGURE 4.6.4 3D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 21 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

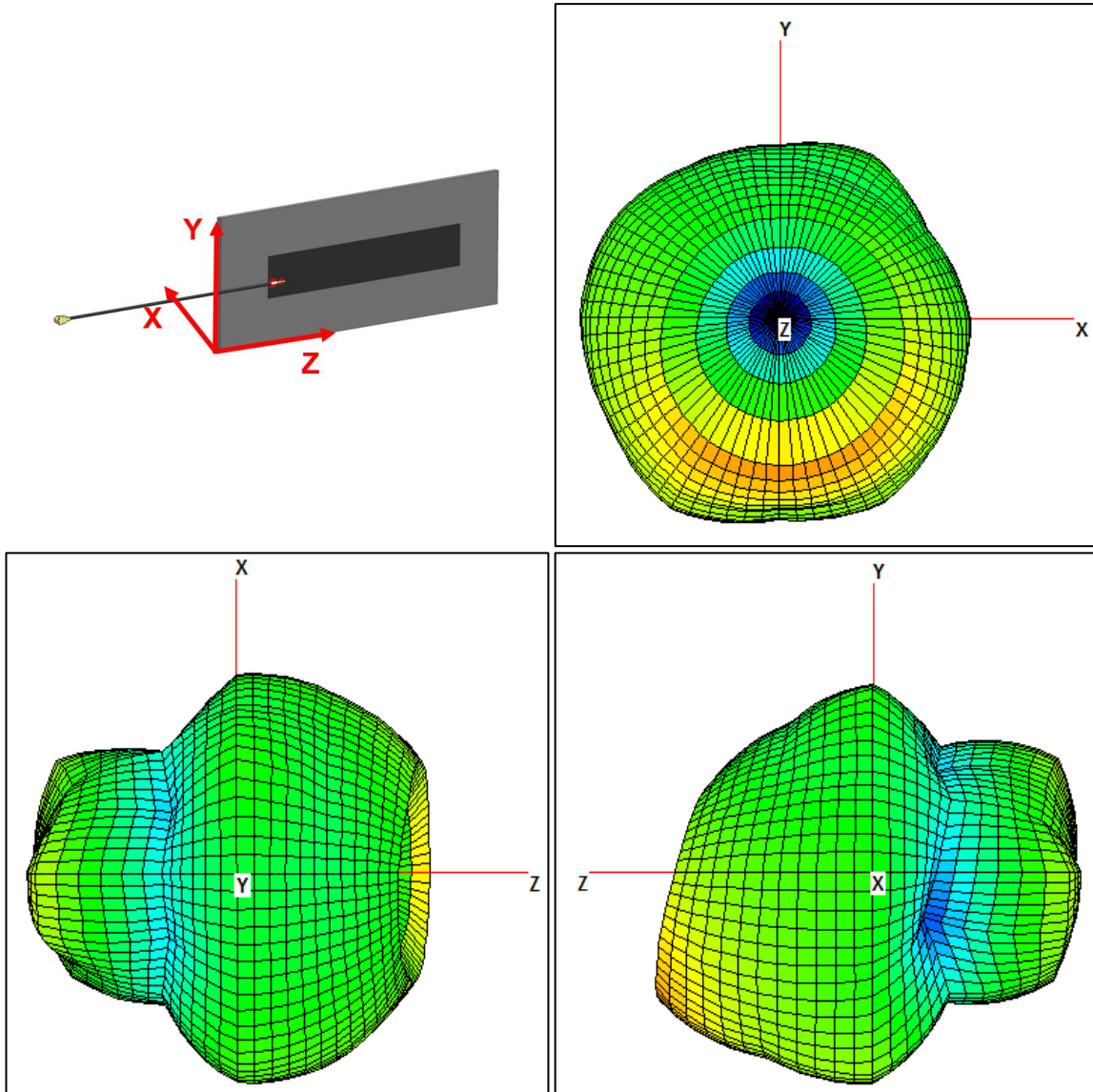


FIGURE 4.6.5 3D RADIATION PATTERN OF ANTENNA AT 2550MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 22 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

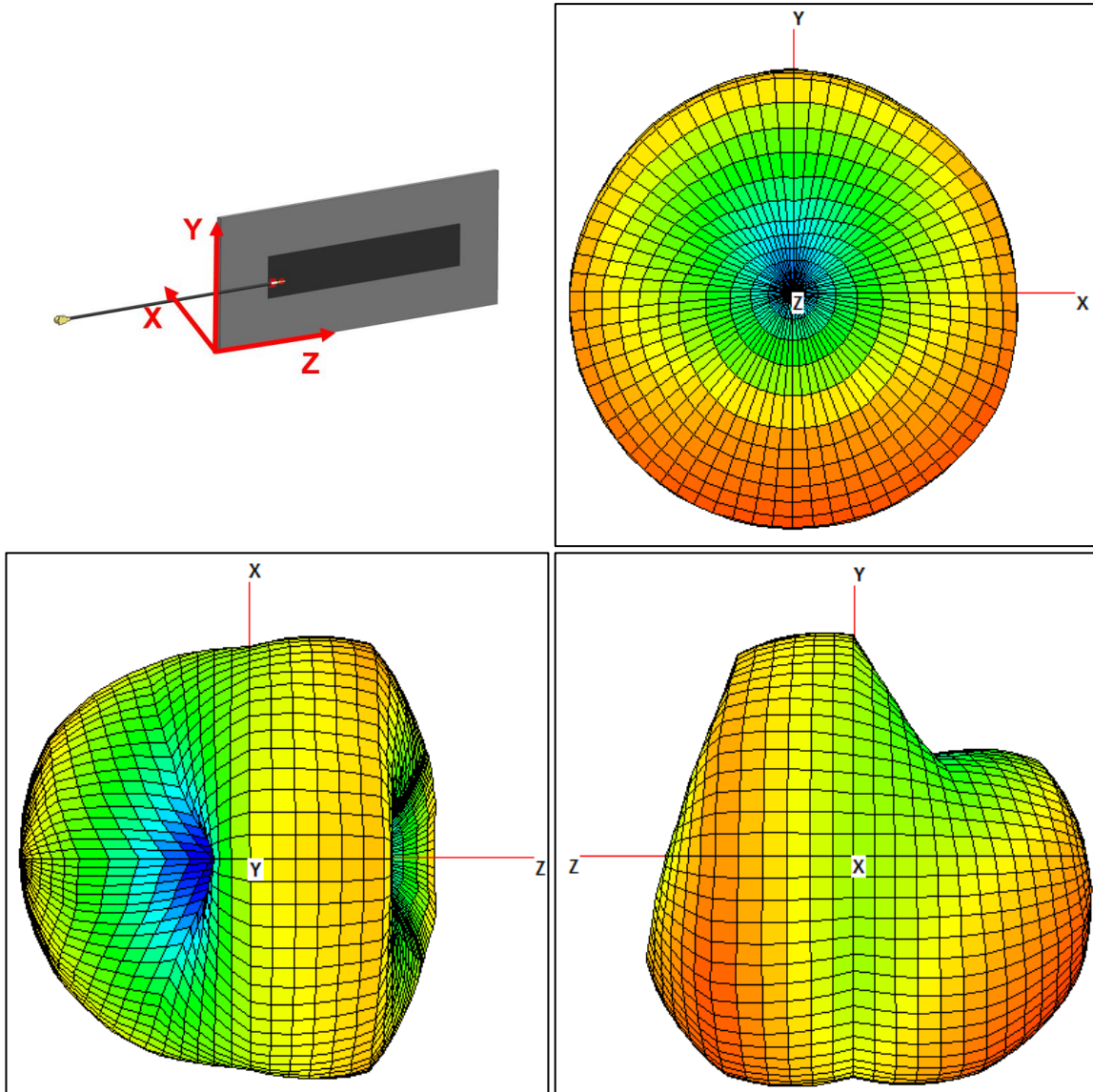


FIGURE 4.6.6 6D RADIATION PATTERN OF ANTENNA AT 3300MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 23 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

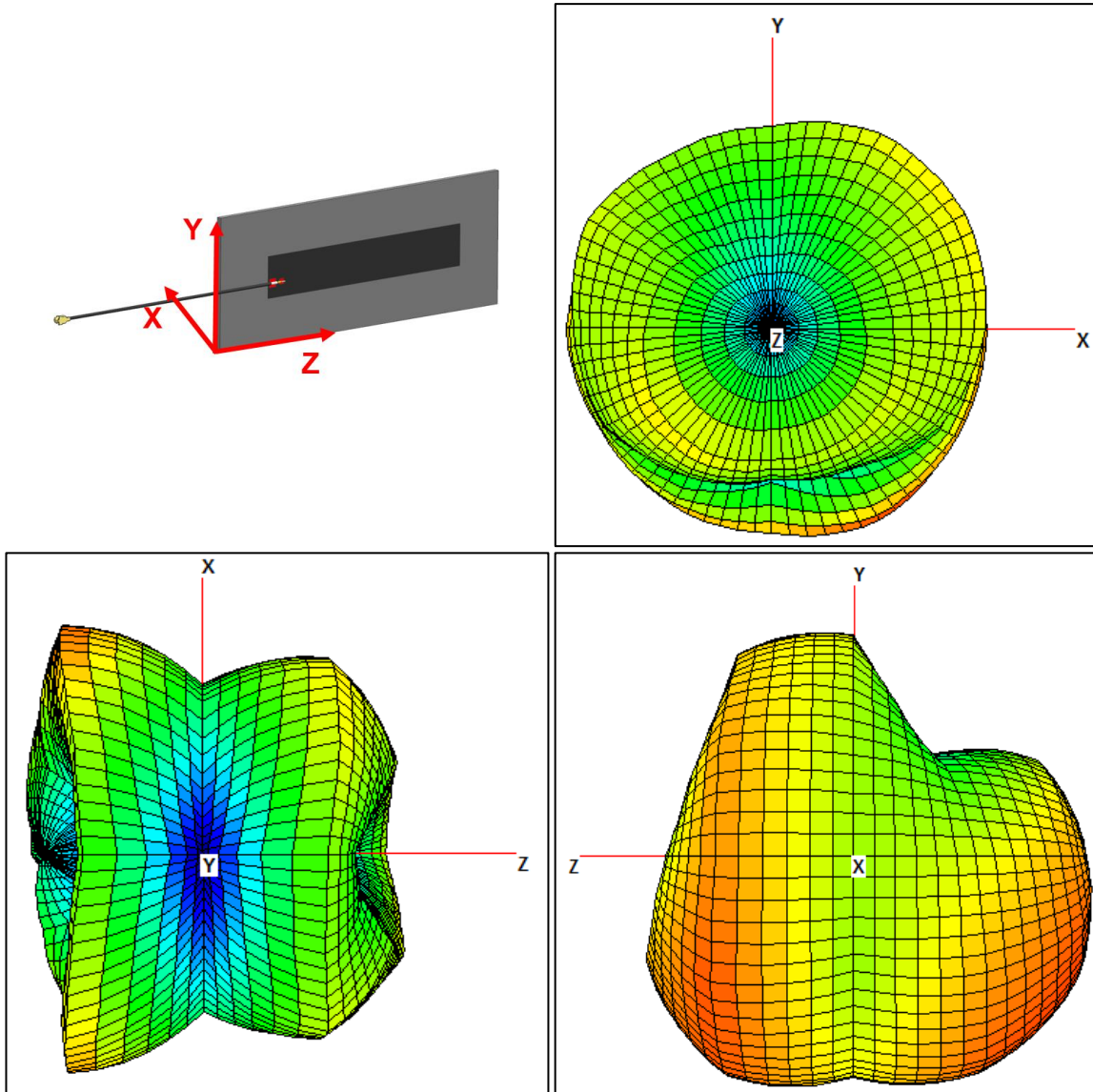


FIGURE 4.6.7 3D RADIATION PATTERN OF ANTENNA AT 3550MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 24 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

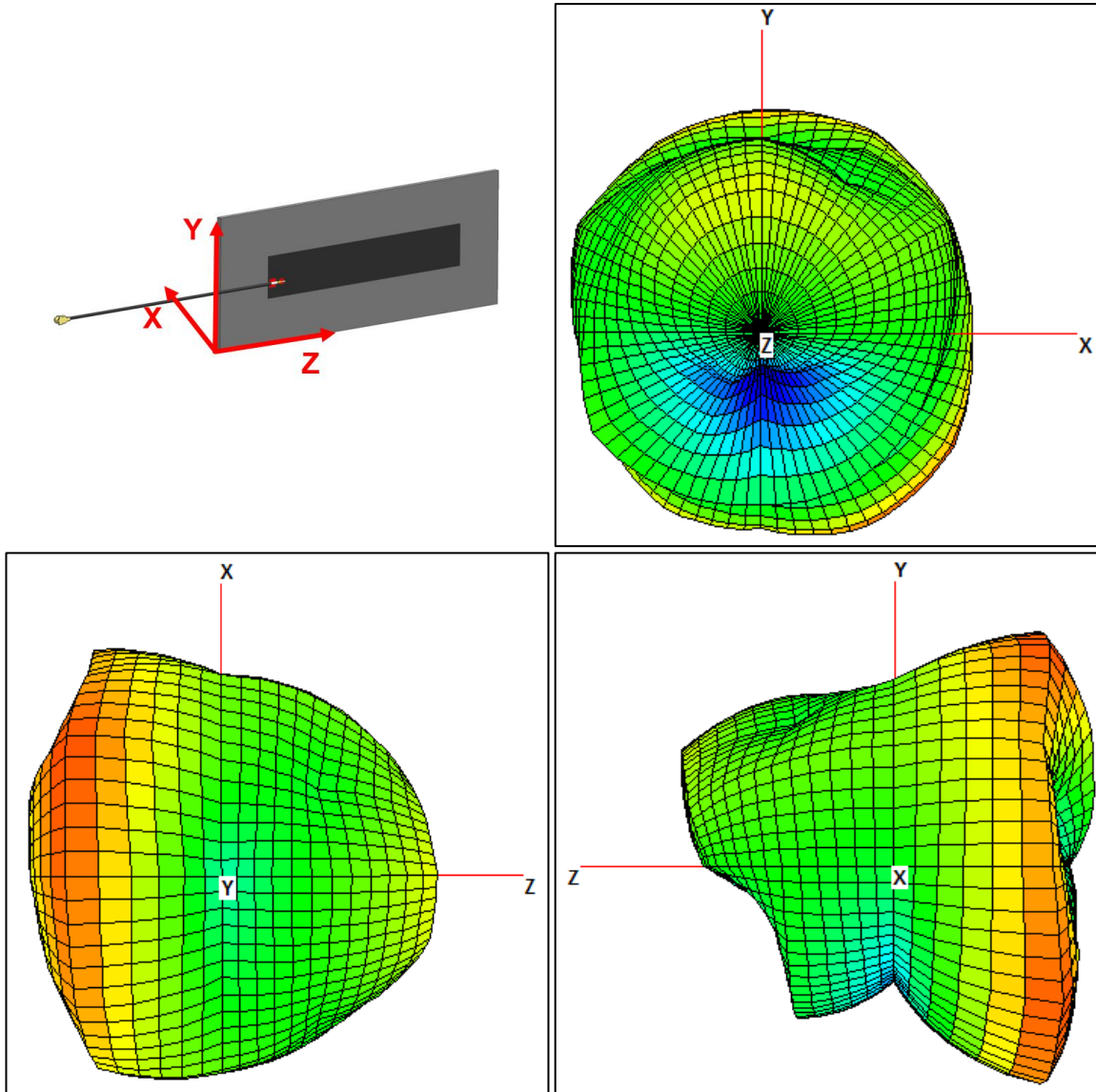


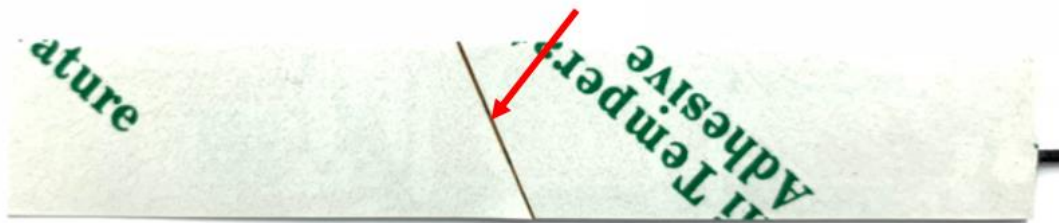
FIGURE 4.6.8 3D RADIATION PATTERN OF ANTENNA AT 3800MHZ IN FREE SPACE

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 25 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

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 $Ra < 1.6\mu m$, and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

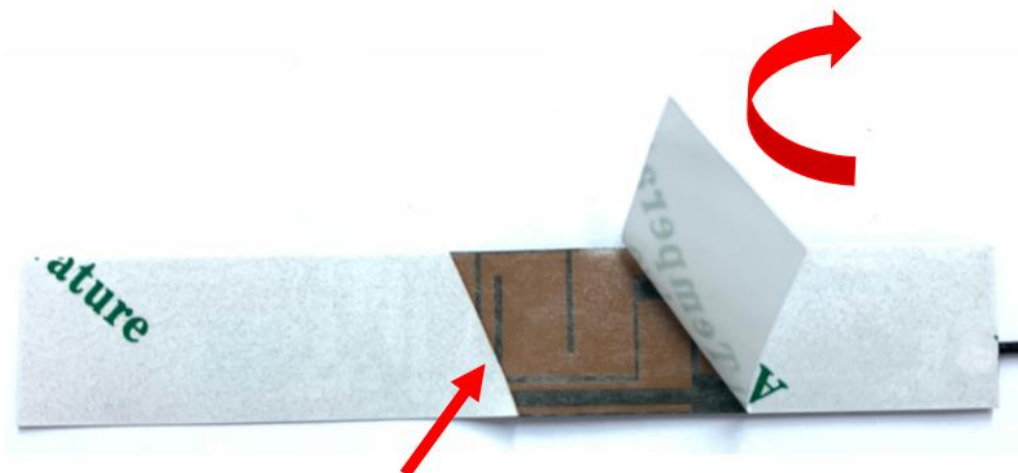
5.1 HOW TO TEAR FLEX RELEASE PAPER



1. Find cut line on flex back side



2. Bend flex slight along cut line



3. Tear release paper

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 26 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

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

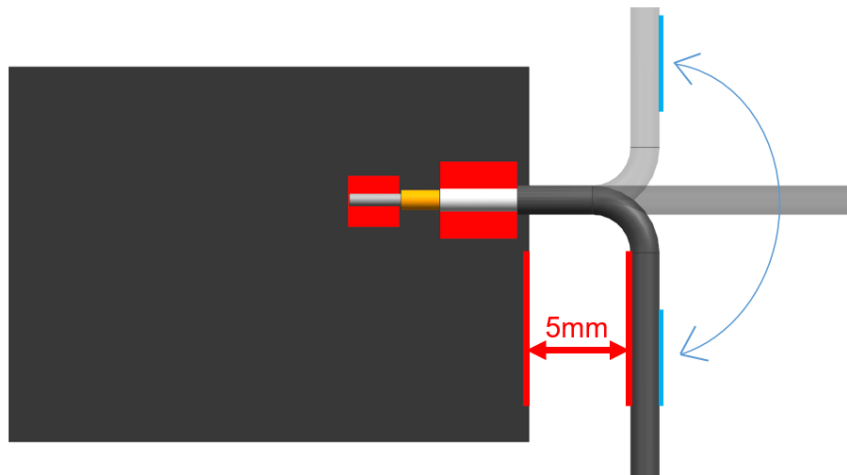


FIGURE 5.2.2 CABLE ACTIVITY RANGE

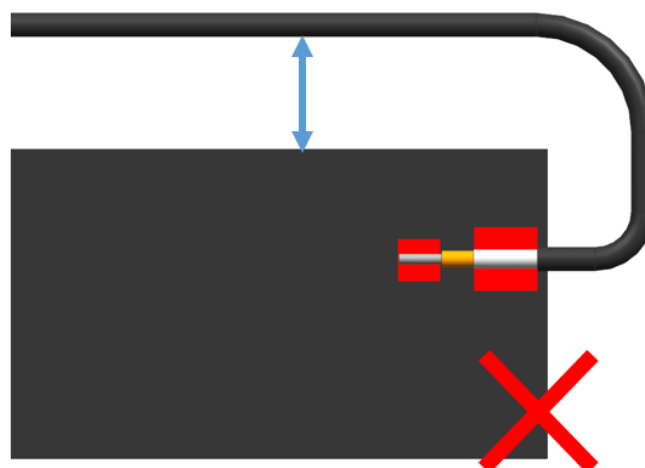


FIGURE 5.2.3 CABLE BENDING

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 27 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

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 20mm to achieve acceptable RF performance.

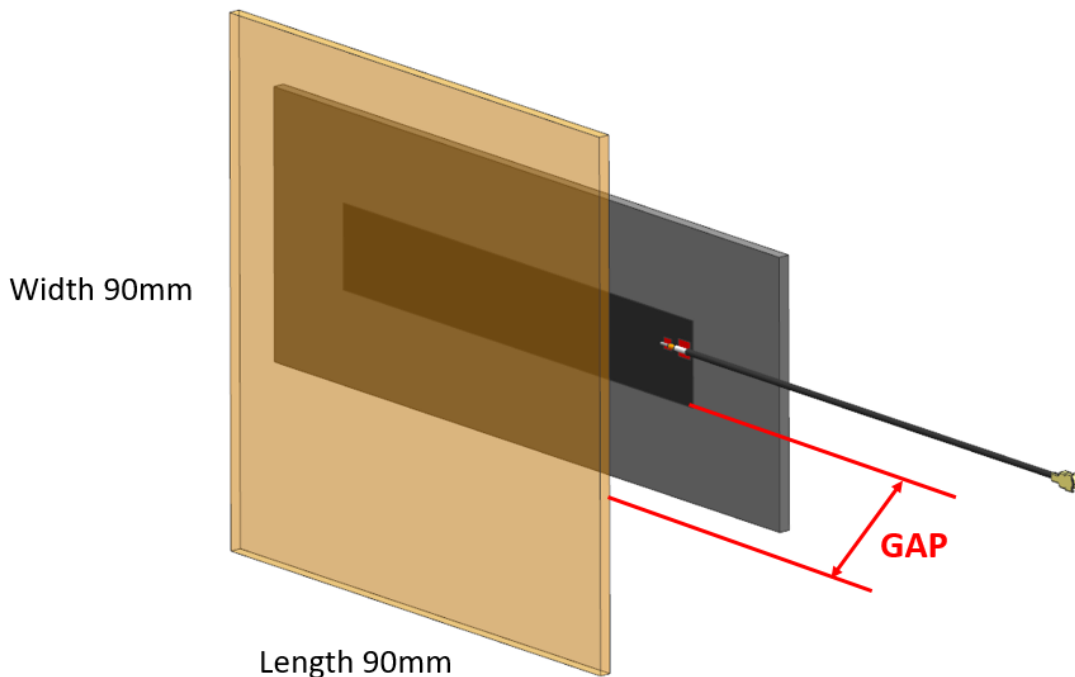


FIGURE 6.1.0 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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.

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 28 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

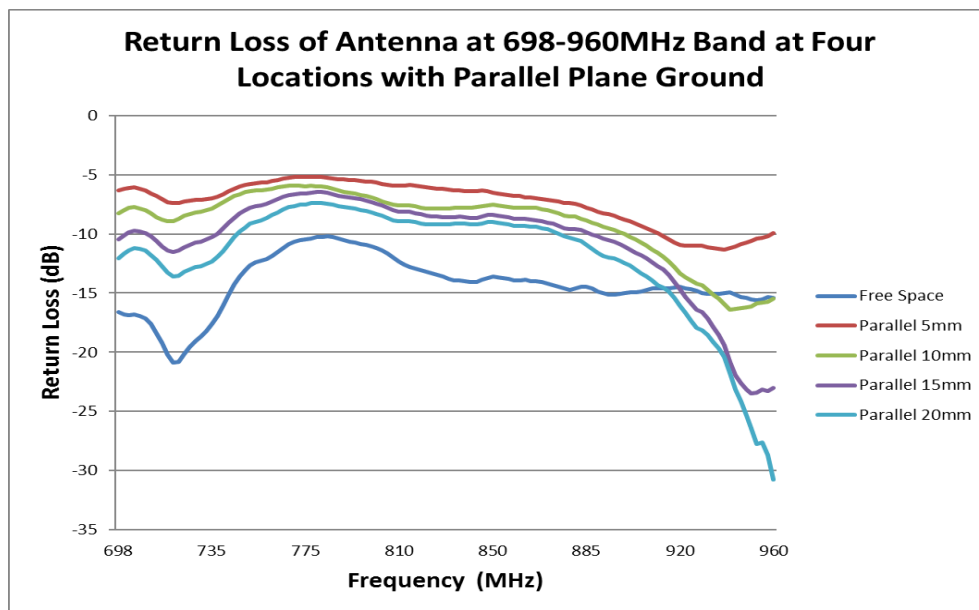


FIGURE 6.1.1 RETURN LOSS OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

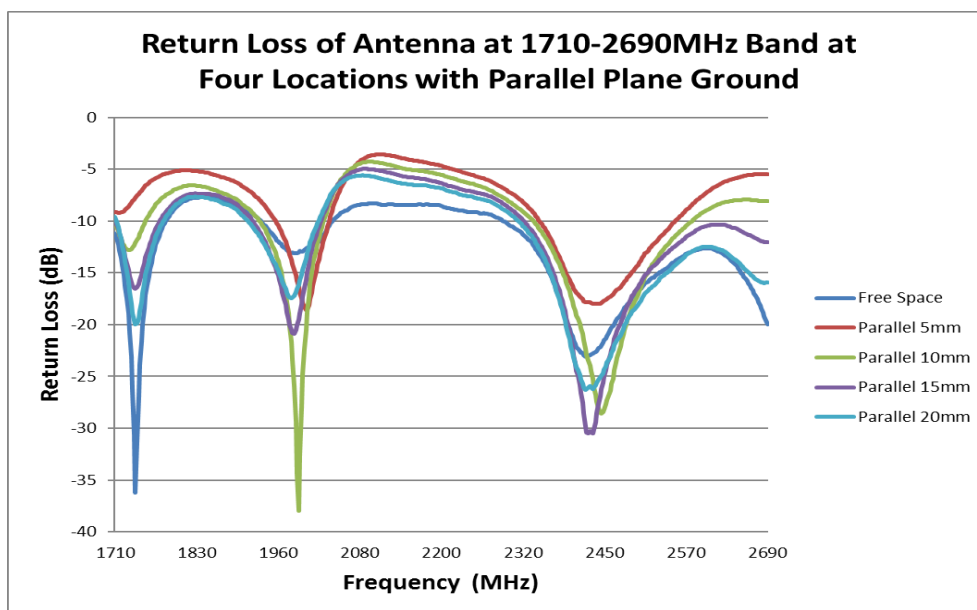


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 29 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

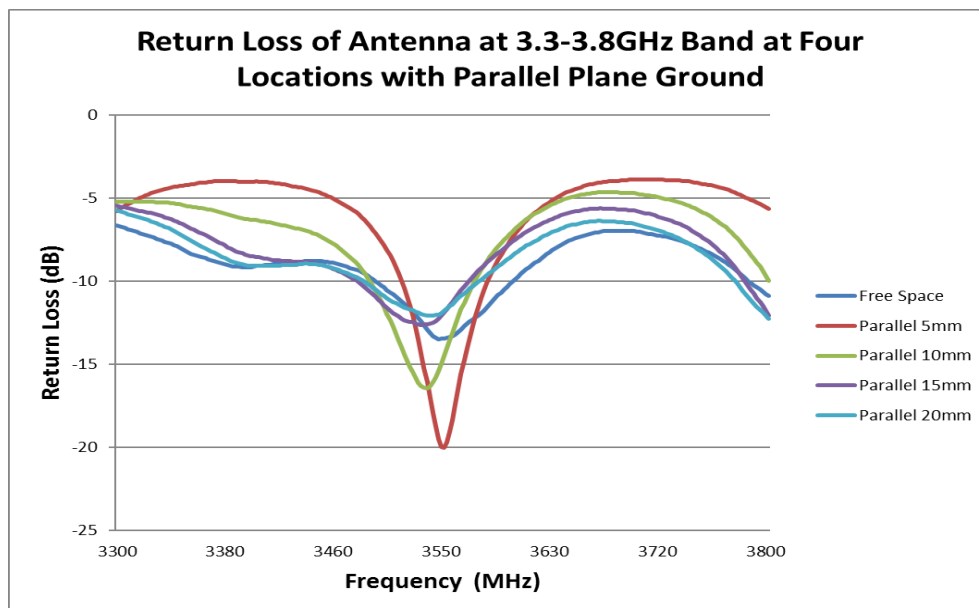


FIGURE 6.1.3 RETURN LOSS OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

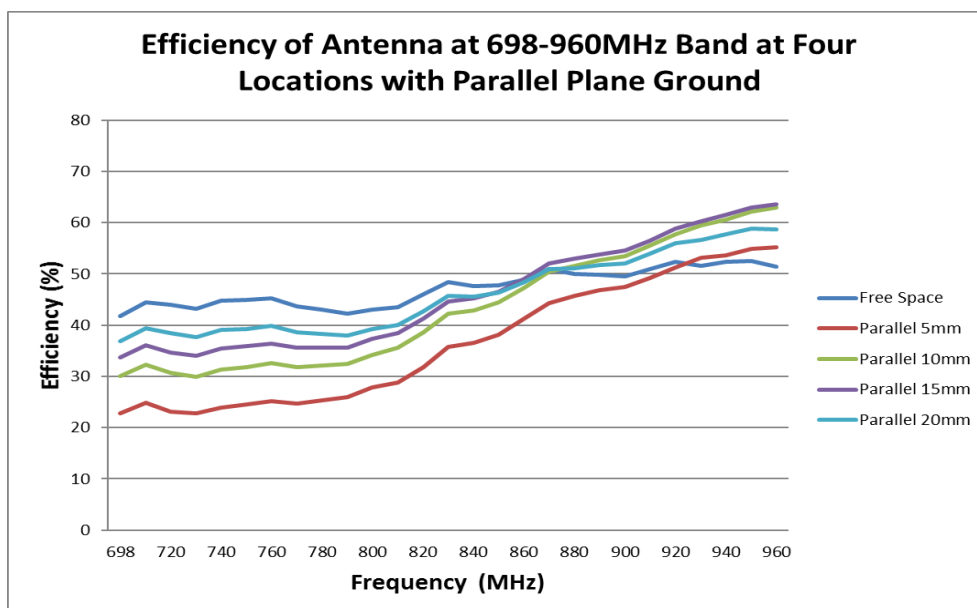


FIGURE 6.1.4 EFFICIENCY OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 30 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

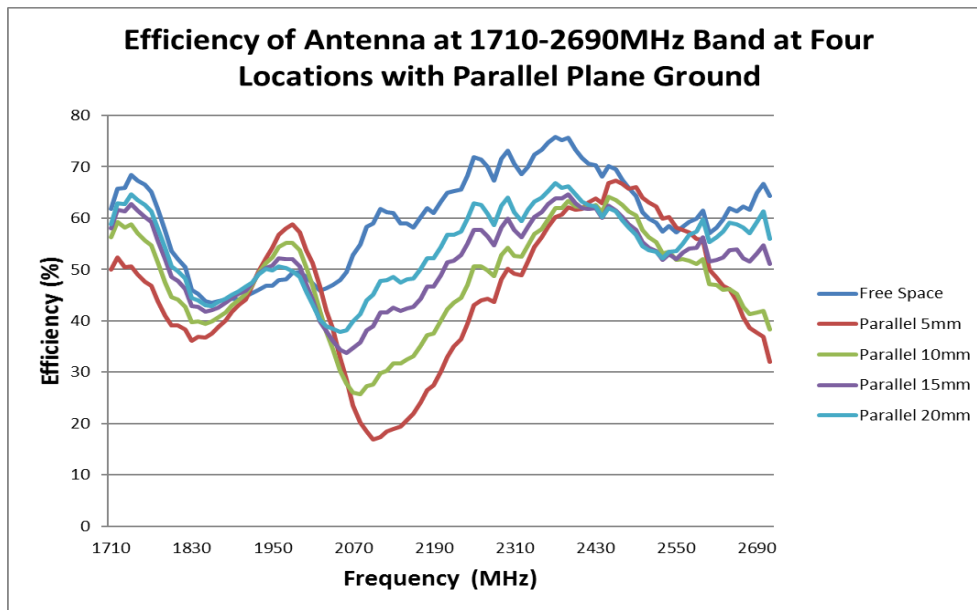


FIGURE 6.1.5 EFFICIENCY OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

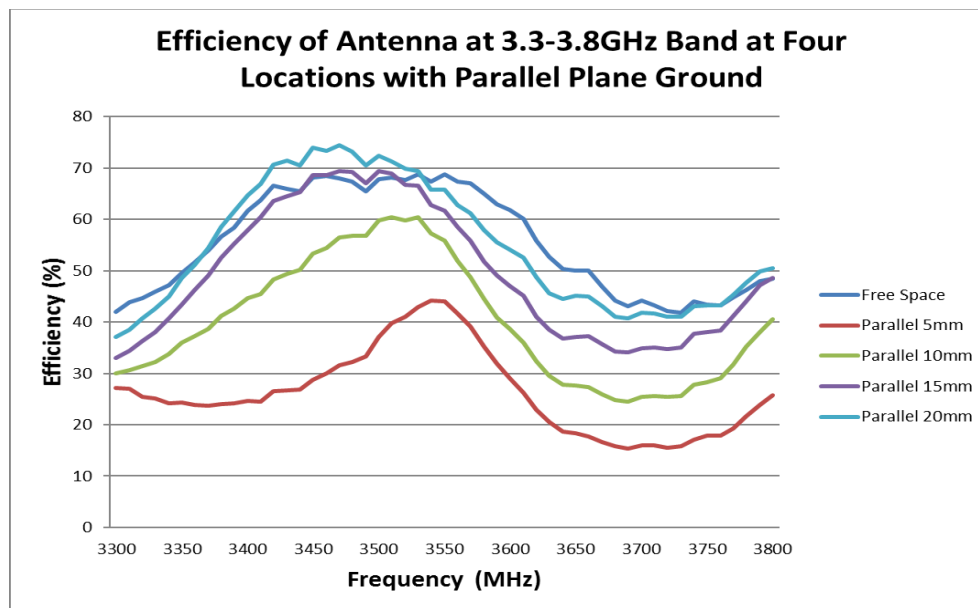


FIGURE 6.1.6 EFFICIENCY OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 31 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

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 20mm.

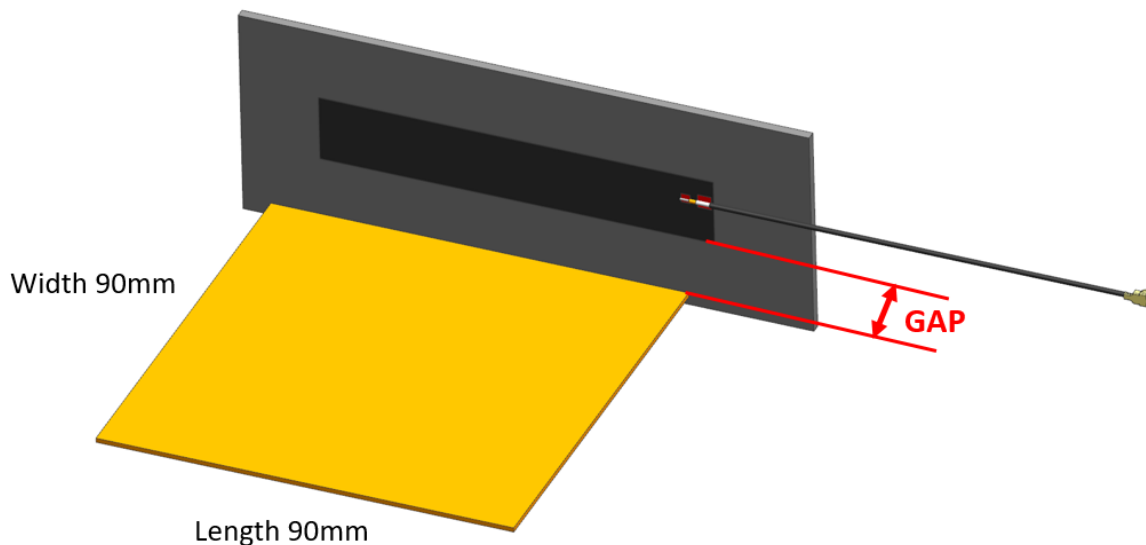


FIGURE 6.2.0 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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.

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 32 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

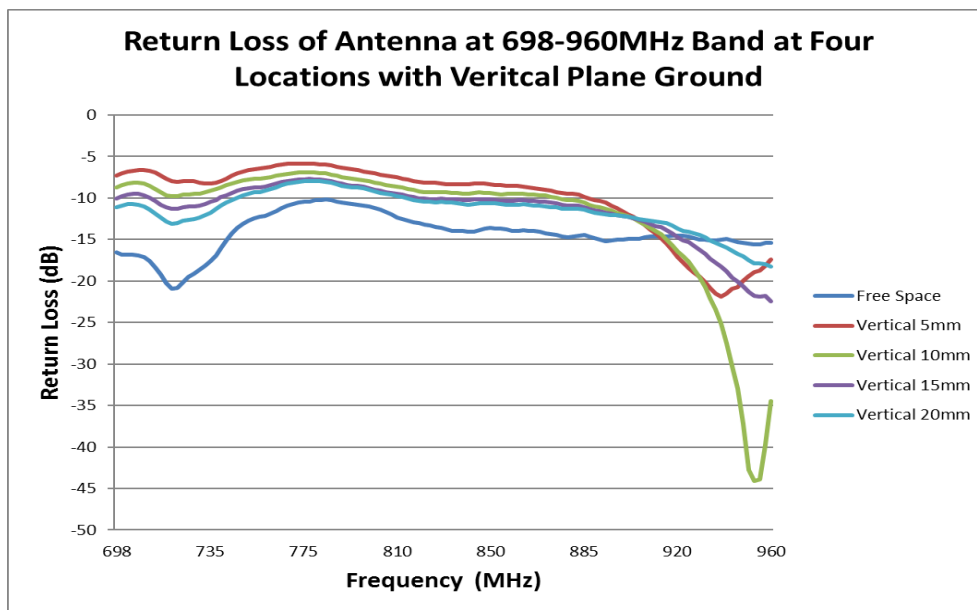


FIGURE 6.2.1 RETURN LOSS OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

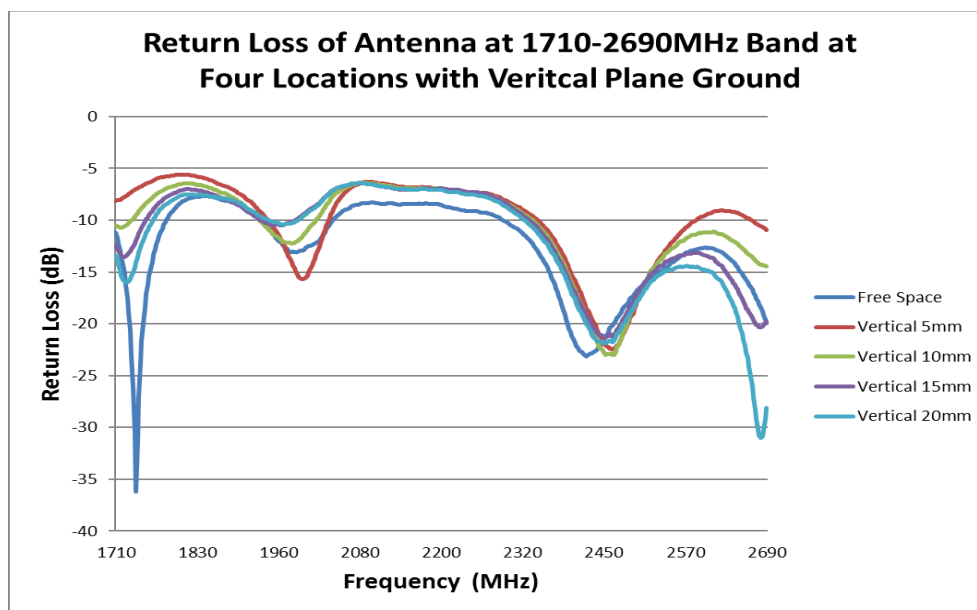


FIGURE 6.2.2 RETURN LOSS OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 33 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

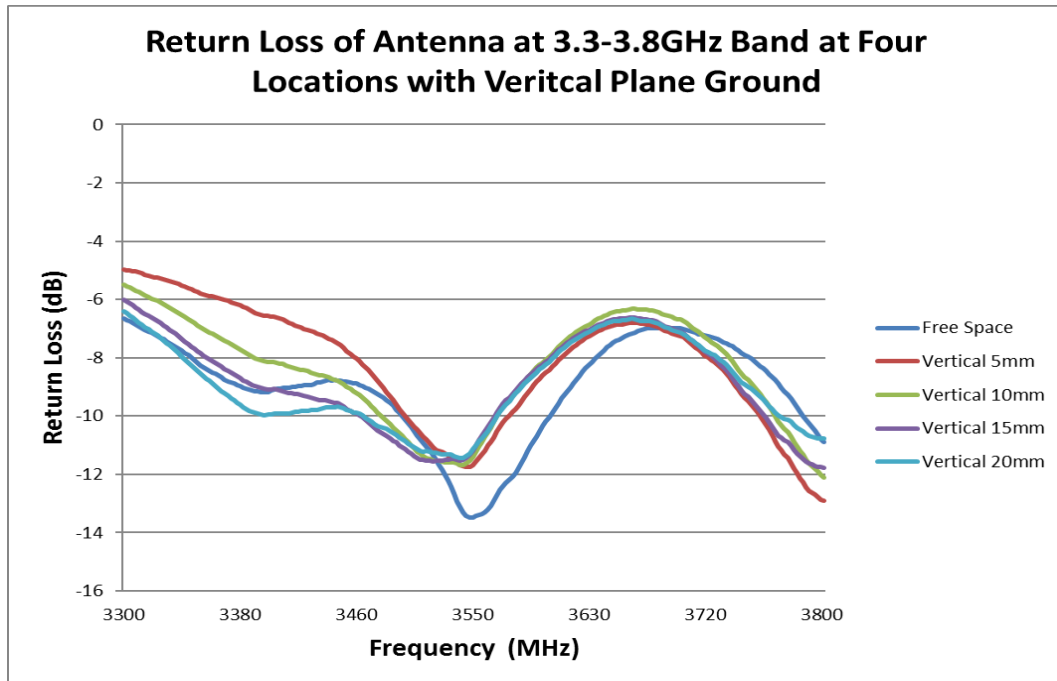


FIGURE 6.2.3 RETURN LOSS OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

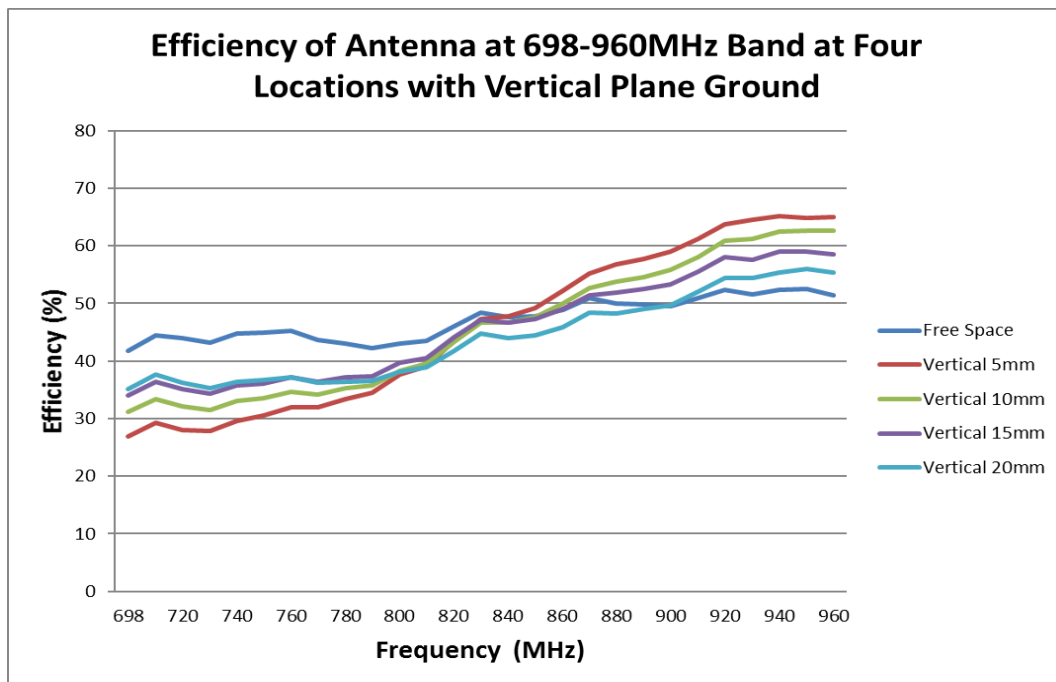


FIGURE 6.2.4 EFFICIENCY OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 34 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

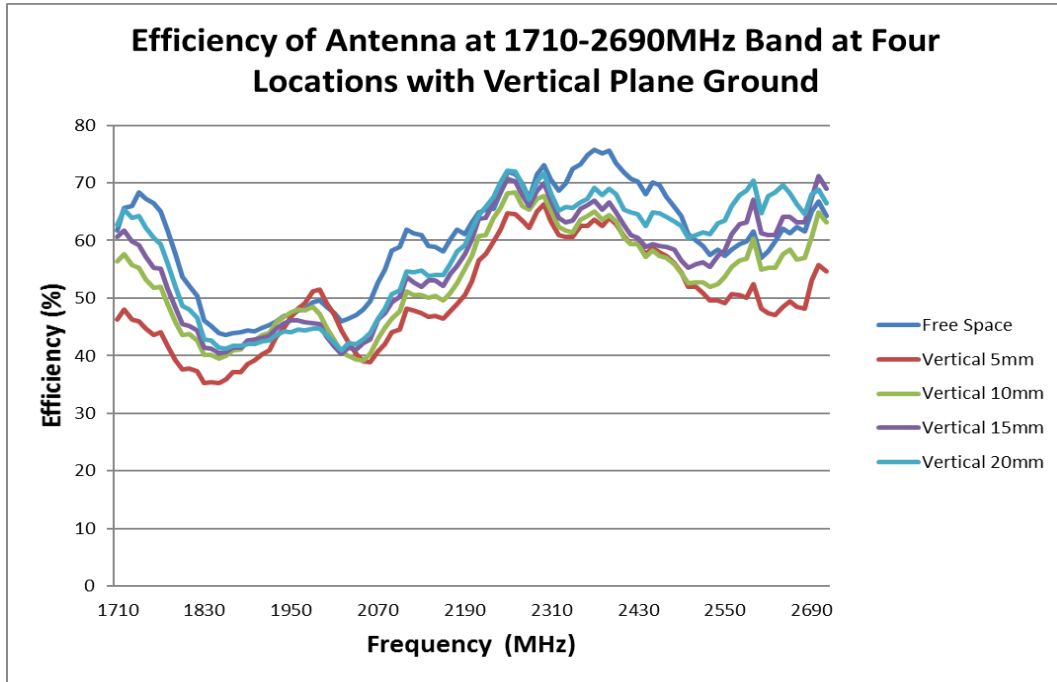


FIGURE 6.2.5 EFFICIENCY OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

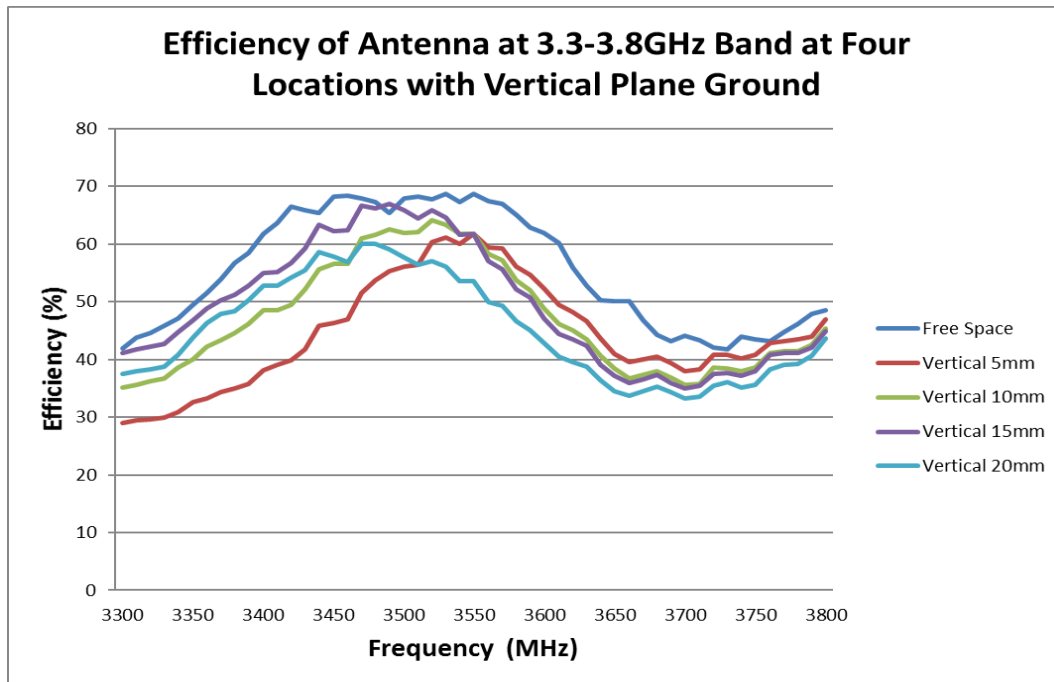


FIGURE 6.2.6 EFFICIENCY OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 35 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

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 20mm.

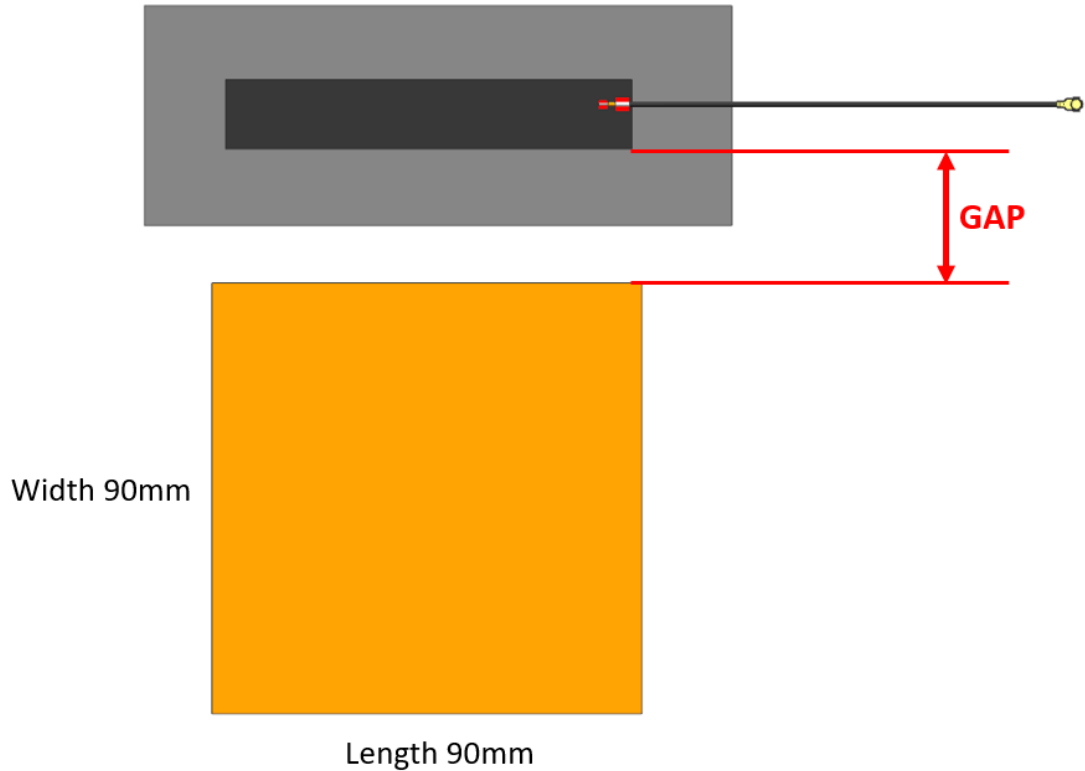


FIGURE 6.3.0 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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.

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 36 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

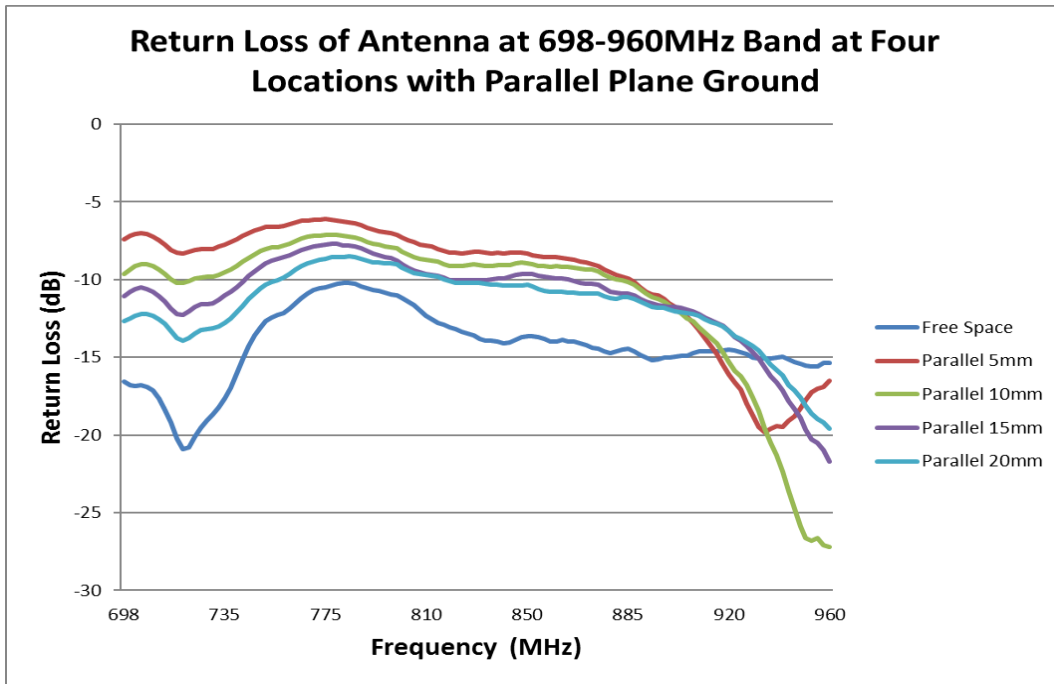


FIGURE 6.3.1 RETURN LOSS OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

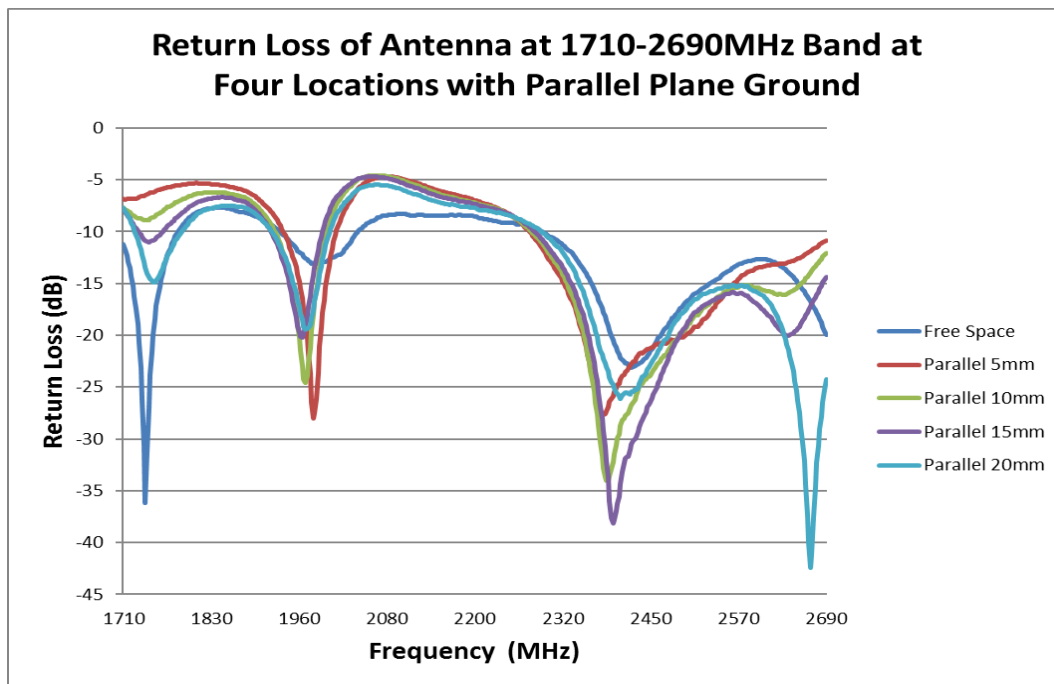


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 37 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

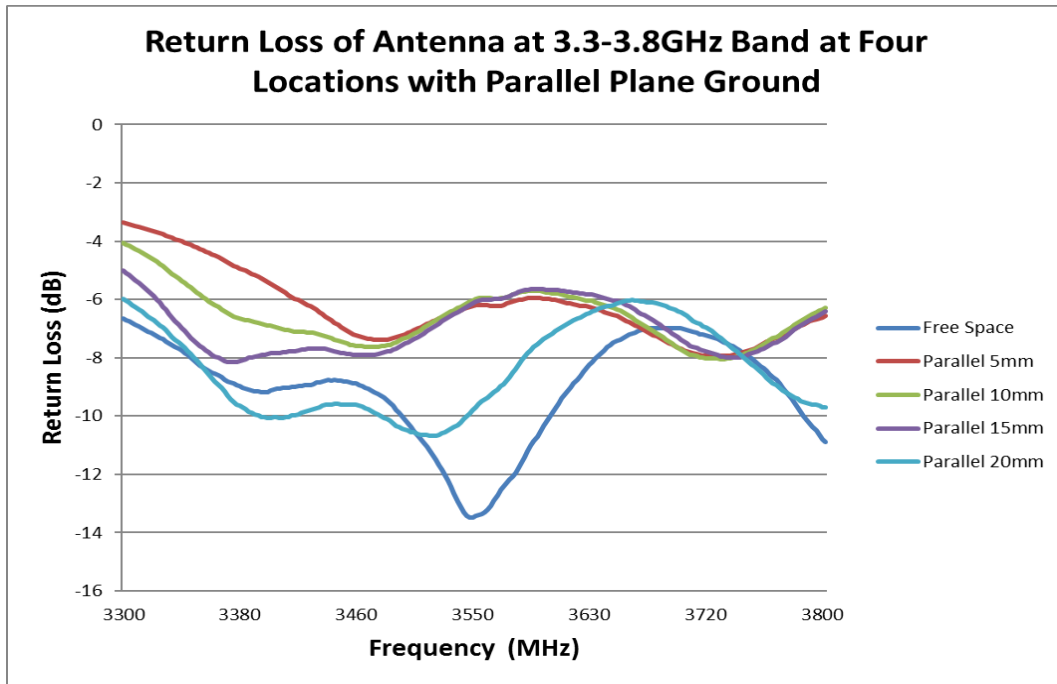


FIGURE 6.3.3 RETURN LOSS OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

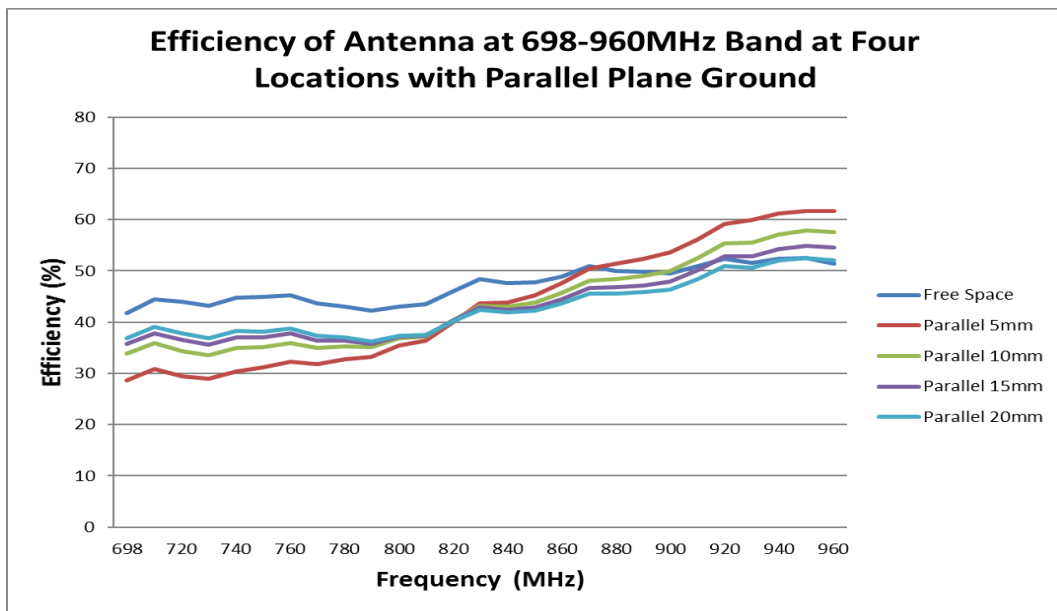


FIGURE 6.3.4 EFFICIENCY OF ANTENNA AT 698-960MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 38 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

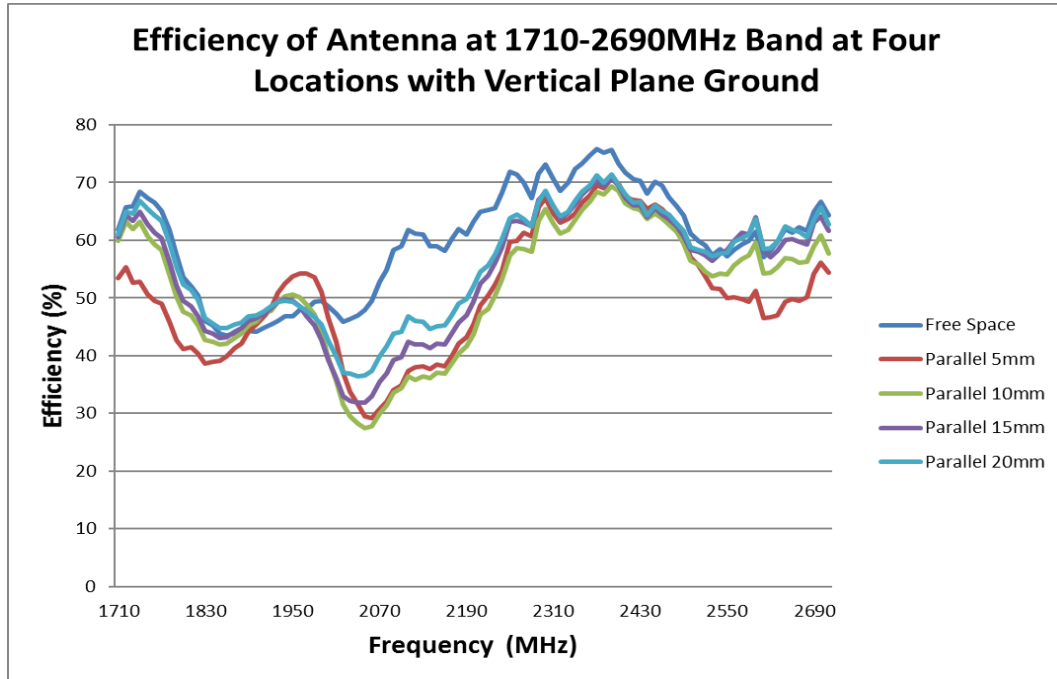


FIGURE 6.3.5 EFFICIENCY OF ANTENNA AT 1710-2690MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

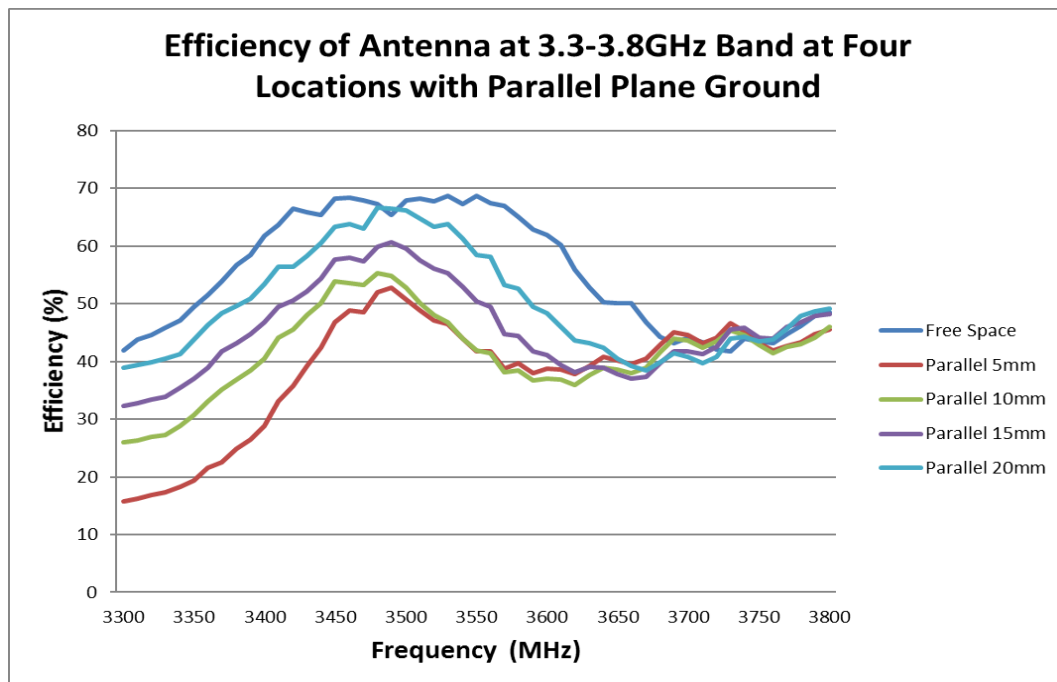


FIGURE 6.3.6 EFFICIENCY OF ANTENNA AT 3.3-3.8GHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 39 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

6.4 RF PERFORMANCE AS A FUNCTION ON DIFFERENT CABLE LENGTH

Five different cable length have been evaluated and these are shown in figure 6.5.0. These are 100mm,150mm, 200mm, 250mm and 300mm.

When using 100 mm cable, 698-960MHz performance has decreased significantly, and when using 150mm,250 mm,300 mm cable, the performance declines with varying degrees.

1710-2690MHz has a much lower performance when using 200mm cable.

3.3-3.8GHz has poor performance when using 200 mm cable and 250 mm cable.

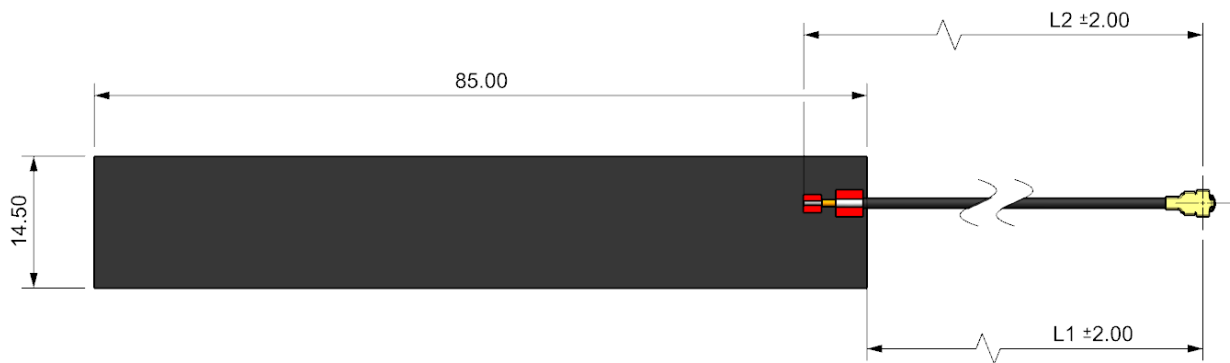


FIGURE 6.4.0 DIFFERENT CABLE LENGTH

CABLE LENGTH	"L1"-LENGTH	"L2"-LENGTH
180 mm	173 mm	180 mm
100 mm	93 mm	100 mm
150 mm	143 mm	150 mm
200 mm	193 mm	200 mm
250 mm	243 mm	250 mm
300 mm	293 mm	300 mm

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 40 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung

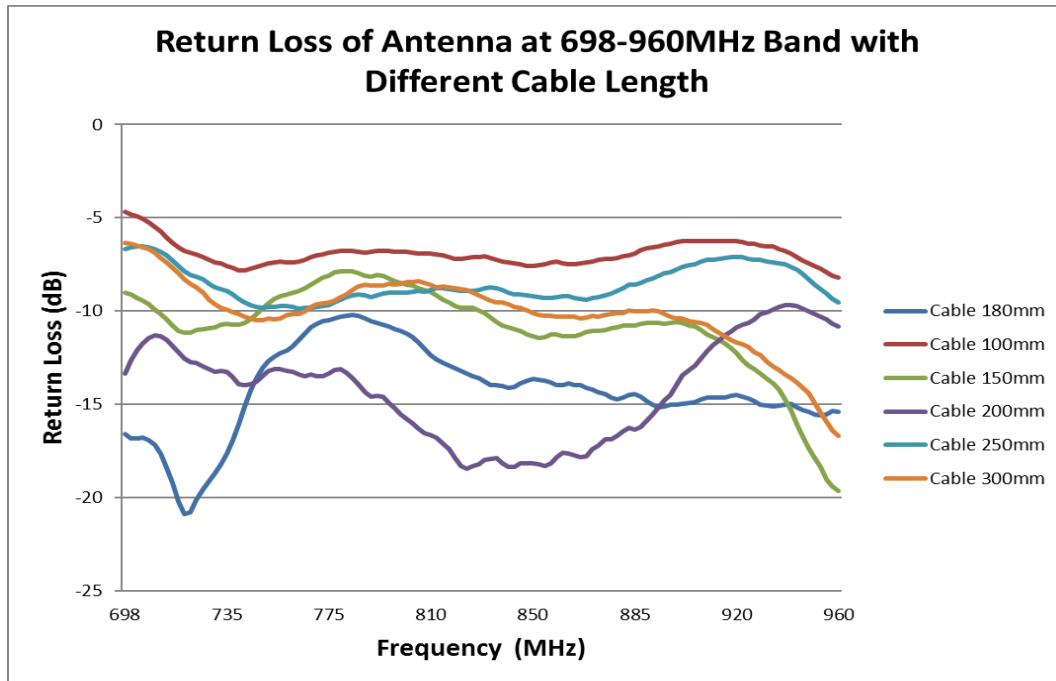


FIGURE 6.4.1 RETURN LOSS OF ANTENNA AT 698-960MHZ WITH SIX DIFFERENT CABLE LENGTH

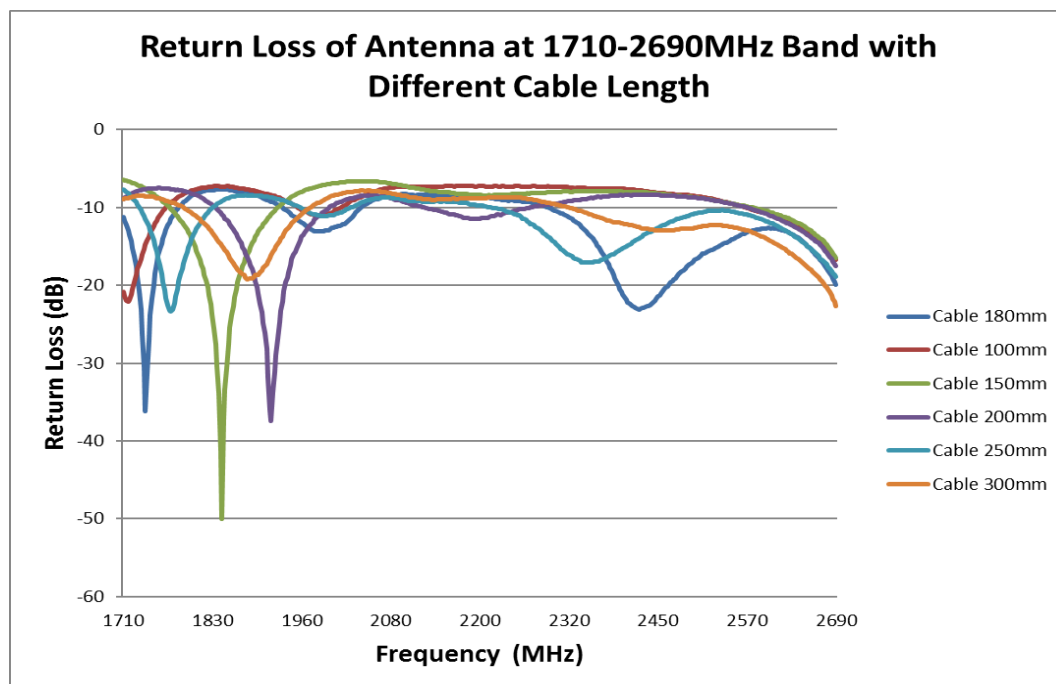


FIGURE 6.4.2 RETURN LOSS OF ANTENNA AT 1710-2690MHZ WITH SIX DIFFERENT CABLE LENGTH

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 41 of 44
DOCUMENT NUMBER: AS-2091420180		CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang
			APPROVED BY: Benson Hung

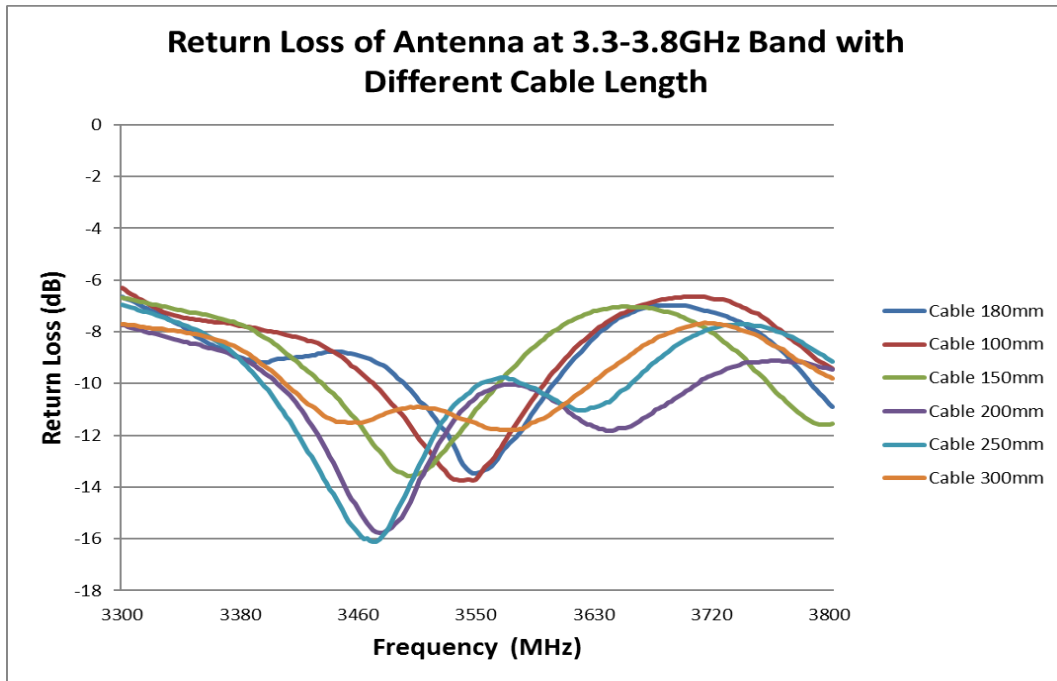


FIGURE 6.4.3 RETURN LOSS OF ANTENNA AT 3.3-3.8GHZ WITH SIX DIFFERENT CABLE LENGTH

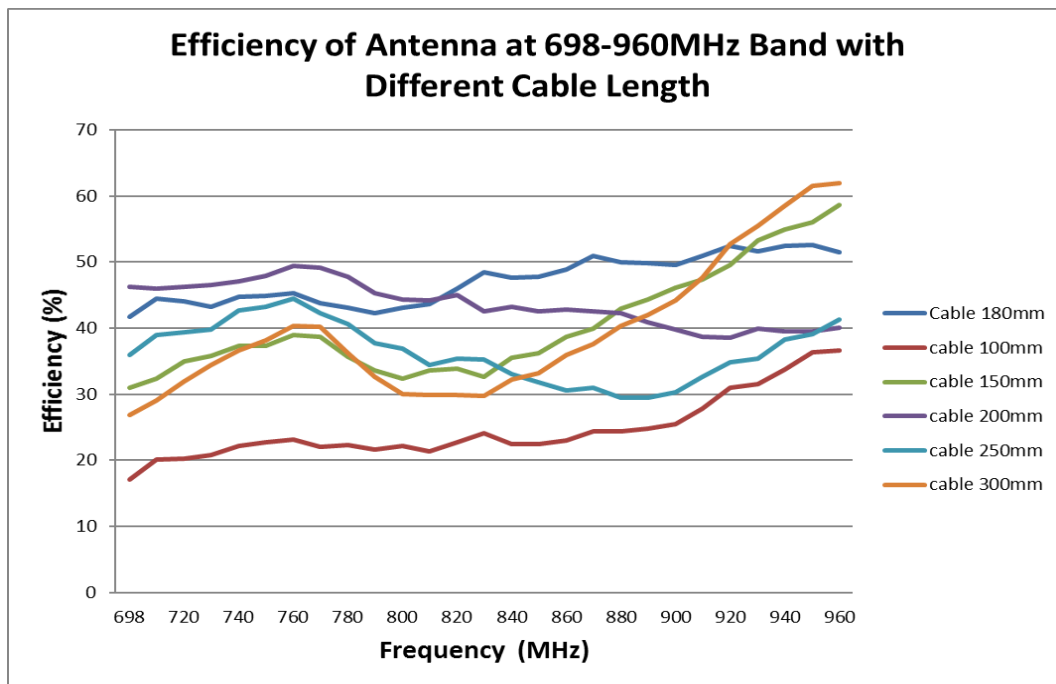


FIGURE 6.4.4 EFFICIENCY OF ANTENNA AT 698-960MHZ WITH SIX DIFFERENT CABLE LENGTH

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 42 of 44
DOCUMENT NUMBER: AS-2091420180		CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang
			APPROVED BY: Benson Hung

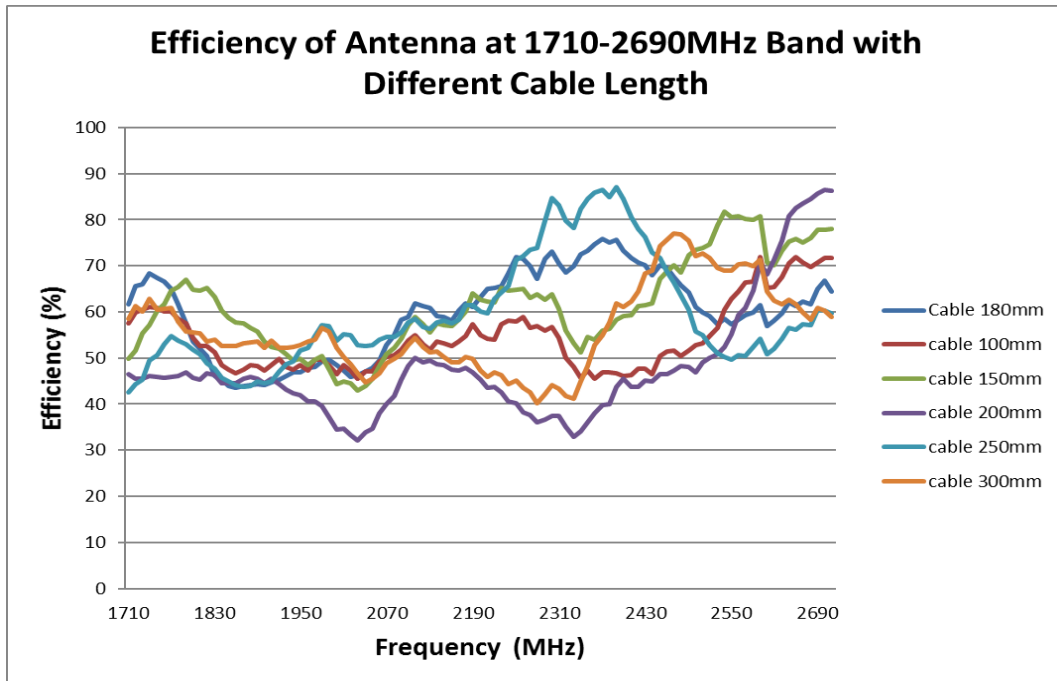


FIGURE 6.4.5 EFFICIENCY OF ANTENNA AT 1710-2690MHZ WITH SIX DIFFERENT CABLE LENGTH

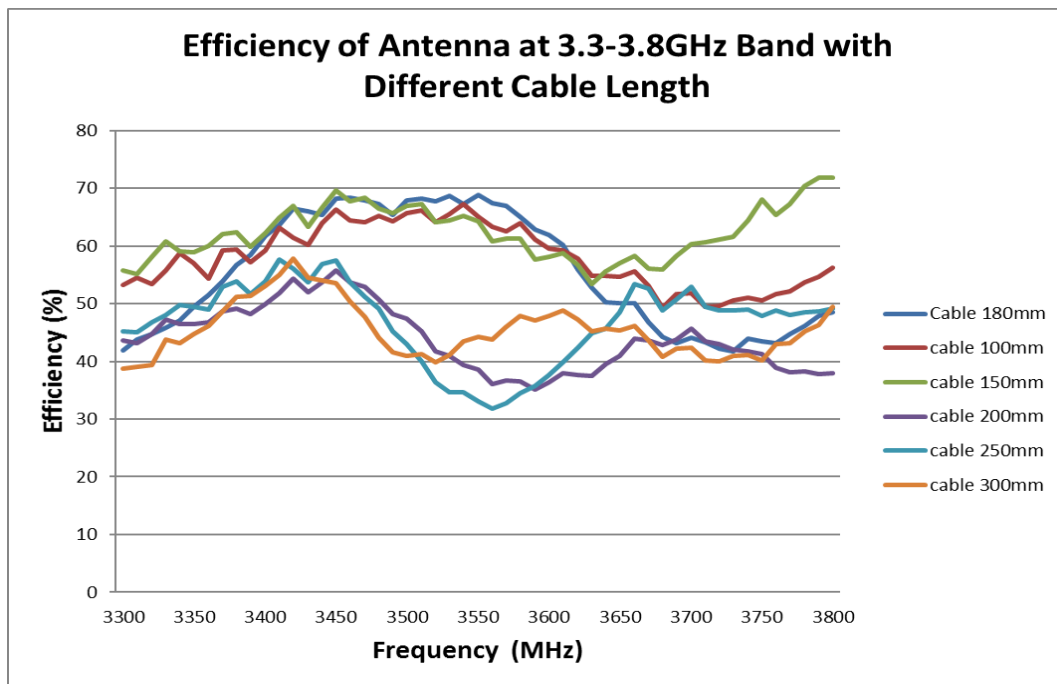


FIGURE 6.4.6 EFFICIENCY OF ANTENNA AT 3.3-3.8GHZ WITH SIX DIFFERENT CABLE LENGTH

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 43 of 44
DOCUMENT NUMBER: AS-2091420180	CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang	APPROVED BY: Benson Hung



APPLICATION SPECIFICATION

7.0 OTHER MOLEX ANTENNA PRODUCTS

Please refer to the Antenna products in Molex home page to view all the Molex Antenna products.

<https://www.molex.com>

Molex, LLC

2222 Wellington Court

Lisle, IL 60532

USA

8.0 CHANGE HISTORY

REV	DATA	DESCRIPTION
B	2019/03/18	Update general specification description
C	2022/12/12	Add 7.0 other molex antenna products

REVISION: C	ECR/ECN INFORMATION: EC No: 731790 DATE: 2022/12/12	TITLE: 698~4000MHz Flexible Antenna Application Specification	SHEET No. 44 of 44
DOCUMENT NUMBER: AS-2091420180		CREATED / REVISED BY: Liu Hai	CHECKED BY: Cheng Kang
		APPROVED BY: Benson Hung	