



APPLICATION SPECIFICATION

TITLE

3IN1 (4G/GPS/WIFI) EXTERNAL ANETNNA

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DOCUMENT NUMBER: AS-2068663000	CREATED / REVISED BY: Liu Hai 2019/11/19	CHECKED BY: Cheng Kang 2019/11/19	APPROVED BY: Andy Zhang 2019/11/19

3IN1 (4G/GPS/WIFI) EXTERNAL ANTENNA

1.0 SCOPE

This specification describes the antenna application. The information in this document is for reference and benchmark purposes only. The user is responsible for validating antenna RF performance based on 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: 3in1 (GPS/4G/WiFi) external antenna
Series Number: 2068663000

2.2 DESCRIPTION

206866 is 4G/GPS/WiFi 3in1 external antenna for use in Automotive Telematics, Transportation and remote monitoring applications.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2068663000 for full information.



FIGURE 2.3.1 DIMENSION OF THE 3IN1 (4G/GPS/WiFi)

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2068663000	Mechanical Dimension of the product
Product Specification (PS)	PS-2068663000	Product Specification
Packing Drawing (PK)	PK-2068663000	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS



FIGURE 4.1.1 ANTENNA TESTED WITH VNA E5071C

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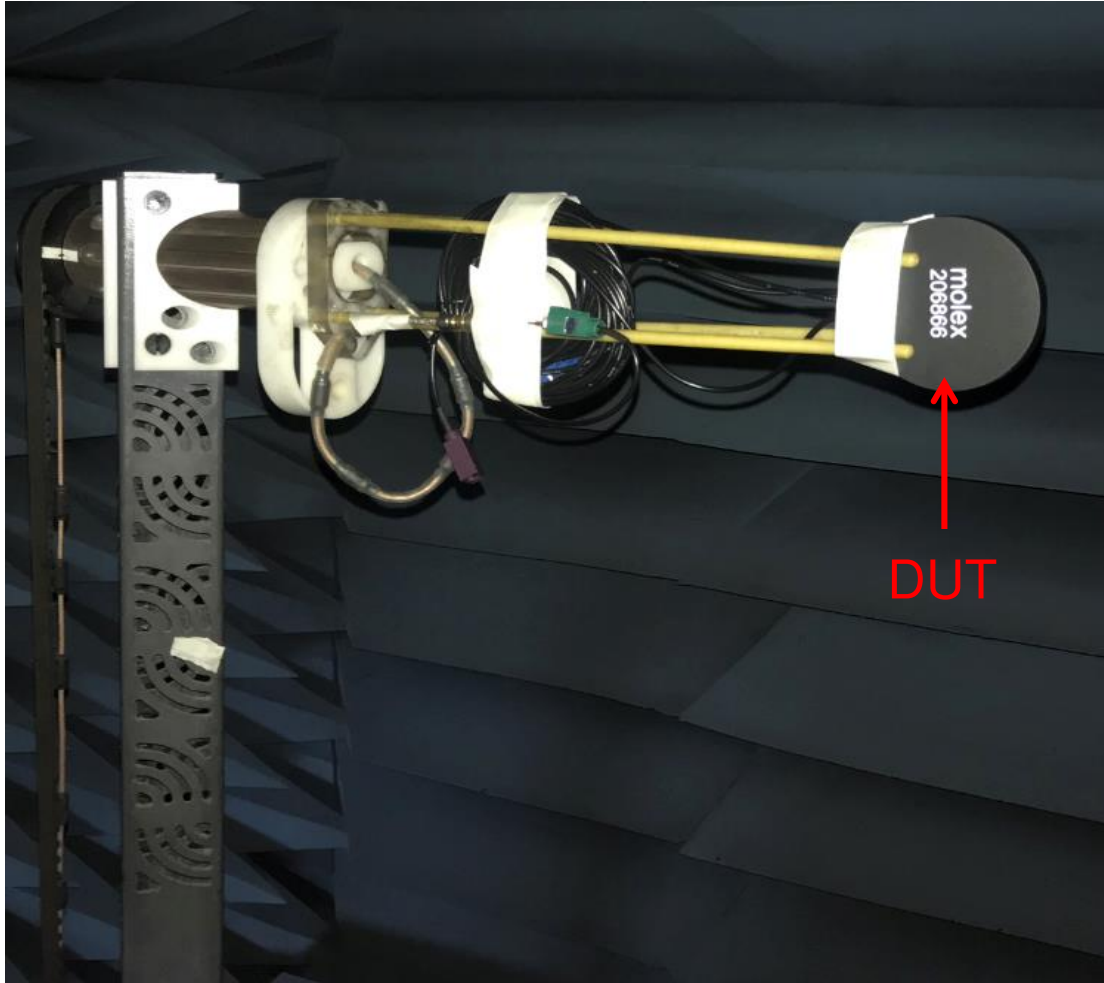


FIGURE4.1.2 ANTENNA TESTED WITH OTA CHAMBER

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4.2 ANTENNA PERFORMANCE

4.2.1 GPS ANTENNA

DESCRIPTION	EQUIPMENT	REQUIREMENT
Frequency Range	VNA E5071C	1575.42±1.023 MHz
VSWR	VNA E5071C	≤2.0
Average Total Efficiency	OTA Chamber	26.2%
Peak Gain (Max)	OTA Chamber	3dBic Based on 70*70mm ground plane
Polarization	OTA Chamber	RHCP
Input Impedance	VNA E5071C	50 ohms

4.2.2 GPS LNA

DESCRIPTION	EQUIPMENT	REQUIREMENT
Frequency Range	VNA E5071C	1575.42±1.023 MHz
DC Voltage	DC Supplier	3-5V
Gain	VNA E5071C	28±3dB
VSWR	VNA E5071C	≤2.0
Noise Figure	VNA E5071C	≤1.5dB
DC Current	DC Supplier	11±3m A (at 3.3V)

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4.2.3 4G ANTENNA

DESCRIPTION	EQUIPMENT	REQUIREMENT	
Frequency Range	VNA E5071C	824-960MHz	1710-2690MHz
Average Total Efficiency	OTA Chamber	21.6%	27.2%
Peak Gain (Max)	OTA Chamber	-0.5dBi type	0dBi type
Polarization	OTA Chamber	Linear	
VSWR	VNA E5071C	≤3.0	
Input Impedance	VNA E5071C	50 ohms	

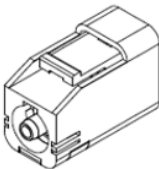
4.2.4 WIFI&BT ANTENNA

DESCRIPTION	EQUIPMENT	REQUIREMENT	
Frequency Range	VNA E5071C	2.4-2.5GHz	
VSWR	VNA E5071C	≤2.0	
Average Total Efficiency	OTA Chamber	23.3%	
Peak Gain (Max)	OTA Chamber	-2.7dBi	
Polarization	OTA Chamber	Linear	
Input Impedance	VNA E5071C	50 ohms	

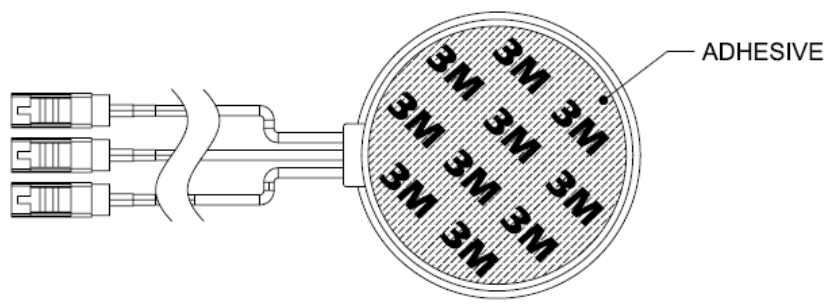
REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 6 of 25
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5.0 PRODUCT STRUCTURE INFORMATION

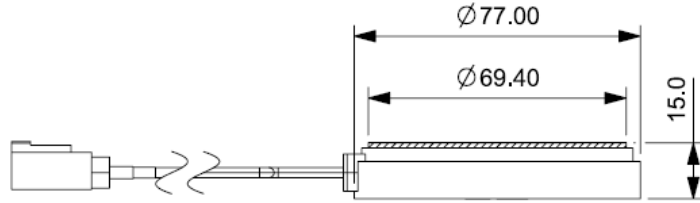
P/N	2068663000
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FAKRA



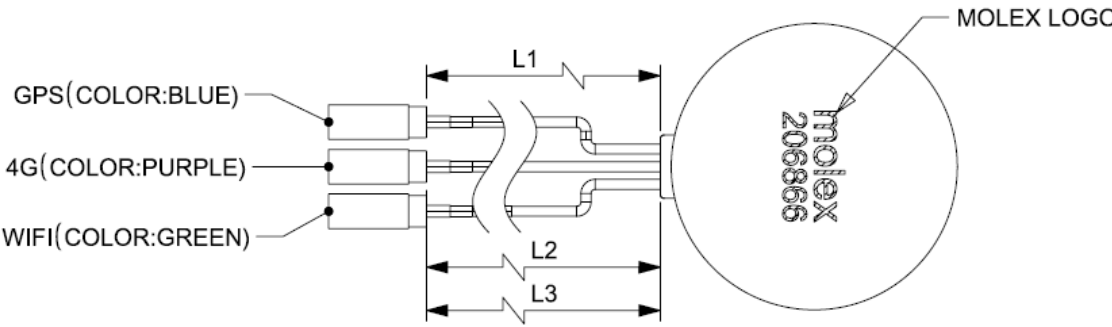
A SIDE



GPS(COLOR:BLUE)

4G(COLOR:PURPLE)

WIFI(COLOR:GREEN)



B SIDE

NOTE:

- CABLE LENGTH:L1=3000±100mm;L2=3000±100mm;
L3=3000±100mm
- FOAM GLUE FIXED ON THE A SIDE, A SIDE UP WHEN USED.
- MATERIAL PLEASE REFER TO TABLE A.

TABLE A		
ITE	MATERIAL	DESCRIPTION
1	ANTENNA	DIELECTRIC CERAMIC
2	PLASTIC CASE	ABS
3	PCB	FR4
4	SHIELDING CASE	TINPLATE
5	CABLE	RG174
6	GPS CONNECTOR	FAKRA-C
7	GSM CONNECTOR	FAKRA-D
8	WIFI CONNECTOR	FAKRA-E
9	ADHSIVE	3M CIP-66

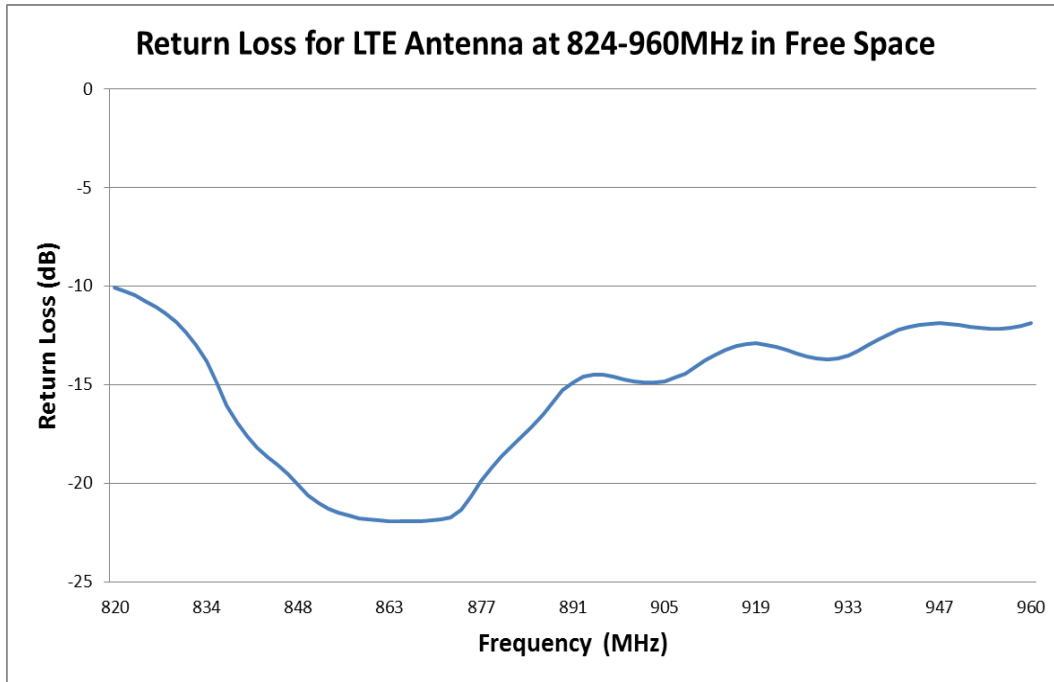
Mechanical Structure Information for 2068663000

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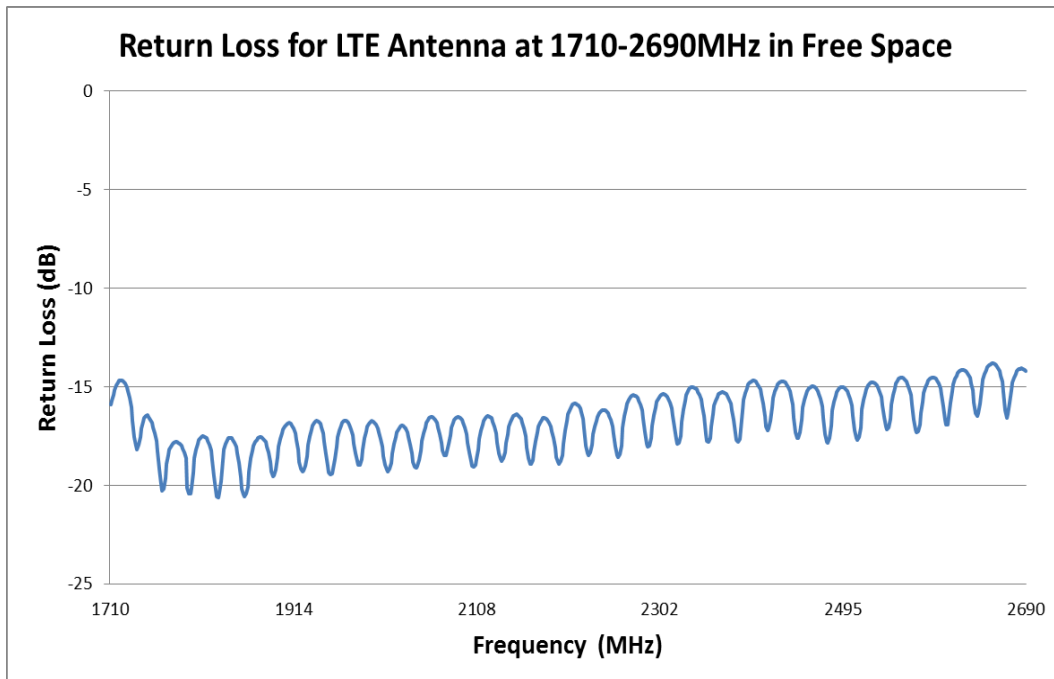
6.0 ANTENNA PERFORMANCE

6.1 RETURN LOSS PLOT

All measurements in this document are done with cable length of 3000mm

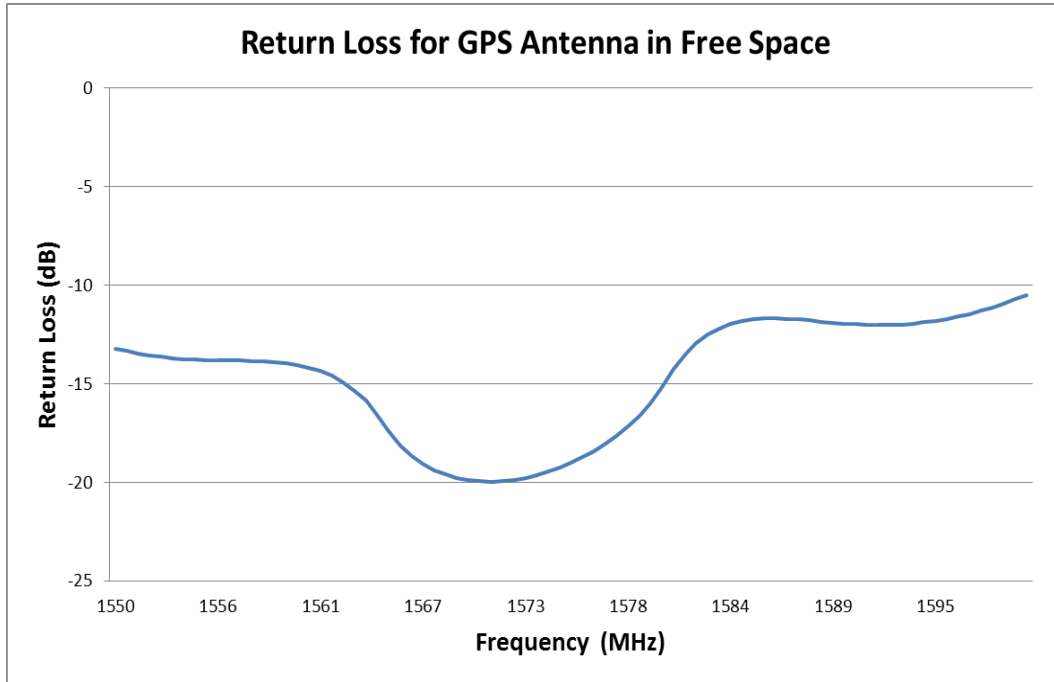


6.1.1 RETURN LOSS OF LTE ANTENNA AT 824-960MHZ IN FREE SPACE

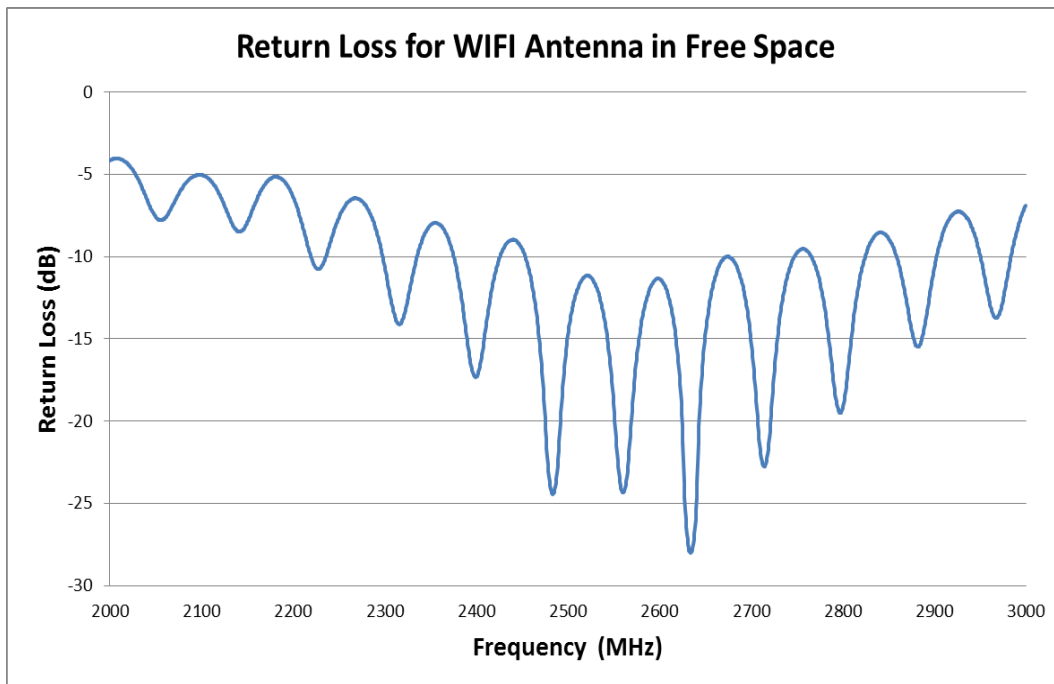


6.1.2 RETURN LOSS OF LTE ANTENNA AT 1710-2690MHZ IN FREE SPACE

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6.1.3 RETURN LOSS OF GPS ANTENNA IN FREE SPACE

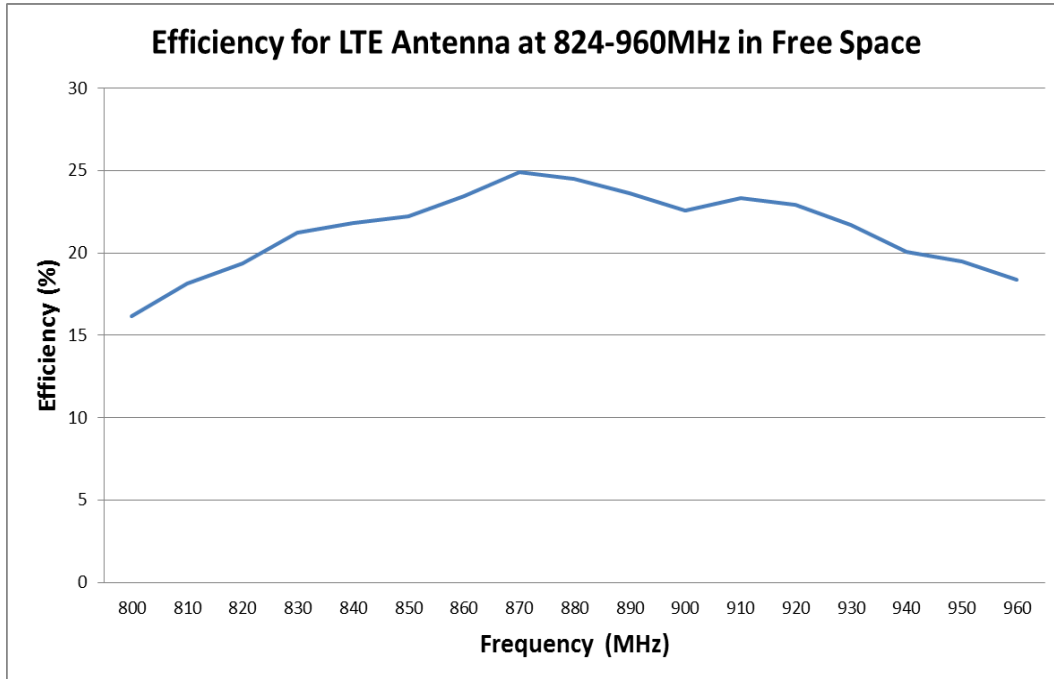


6.1.4 RETURN LOSS OF WIFI ANTENNA IN FREE SPACE

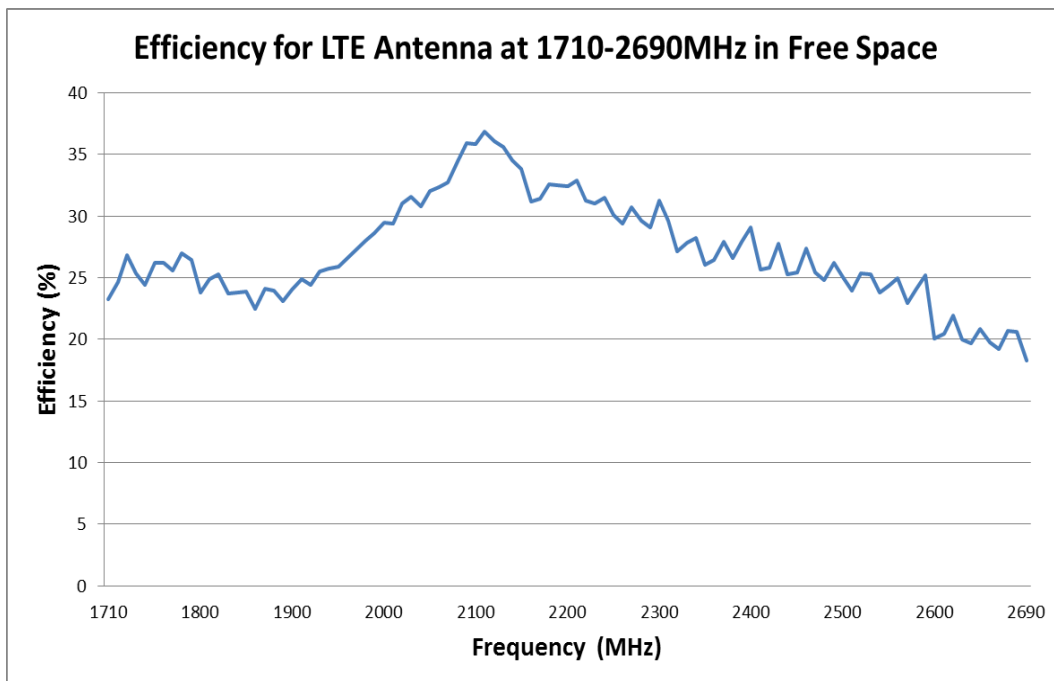
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6.2 EFFICIENCY PLOT

All measurements in this document are done with cable length of 3000mm



6.2.1 EFFICIENCY OF LTE ANTENNA AT 824-960MHZ IN FREE SPACE

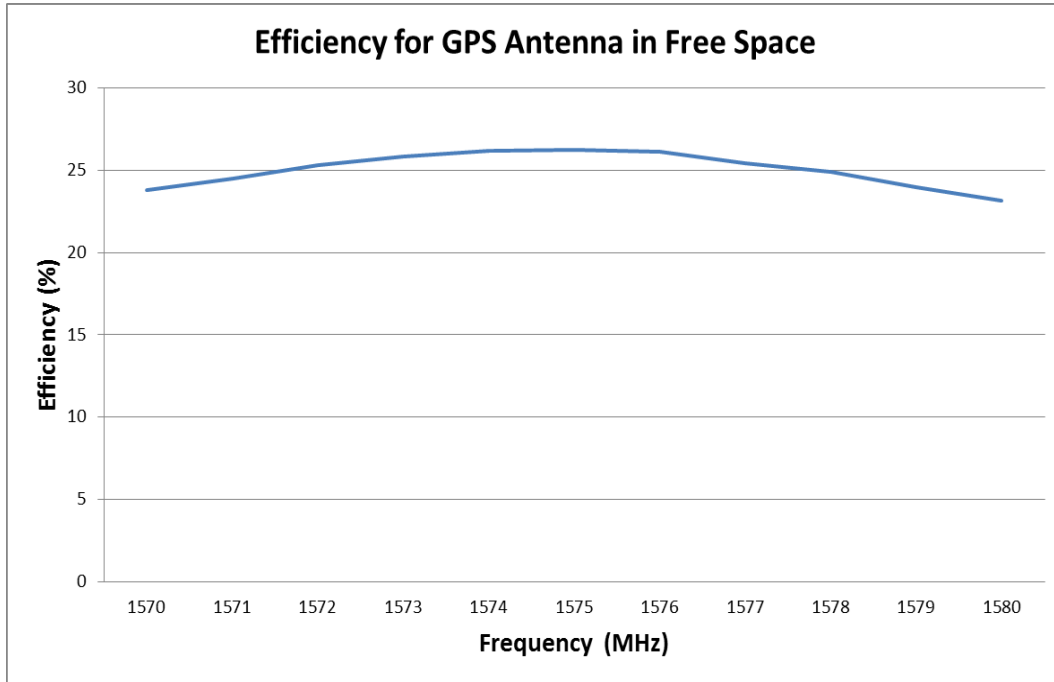


6.2.2 EFFICIENCY OF LTE ANTENNA AT 1710-2690MHZ IN FREE SPACE

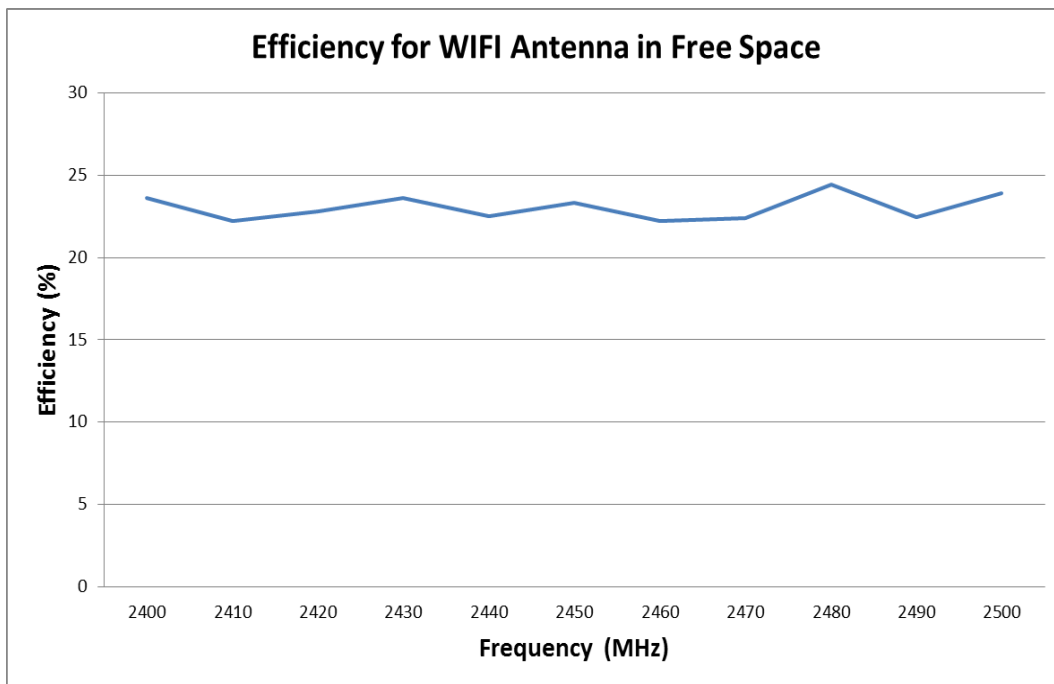
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6.2.3 EFFICIENCY OF GPS ANTENNA IN FREE SPACE



6.2.4 EFFICIENCY OF WIFI ANTENNA IN FREE SPACE

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7.0 RADIATION PATTERN

7.1 LTE ANTENNA 2D RADIATION PATTERN

All measurements in this document are done with cable length of 3000mm

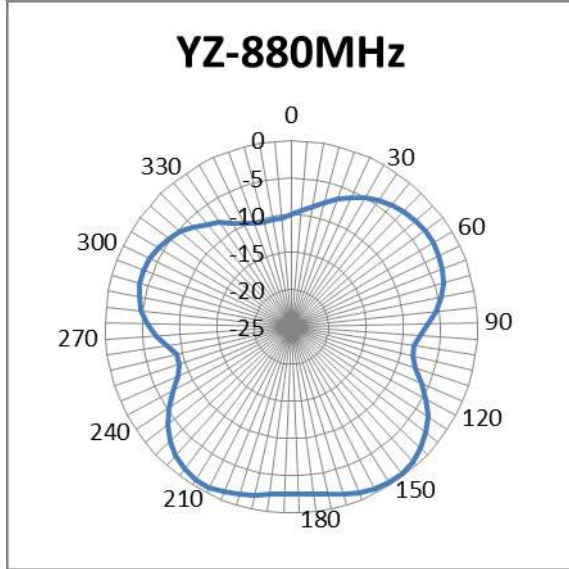
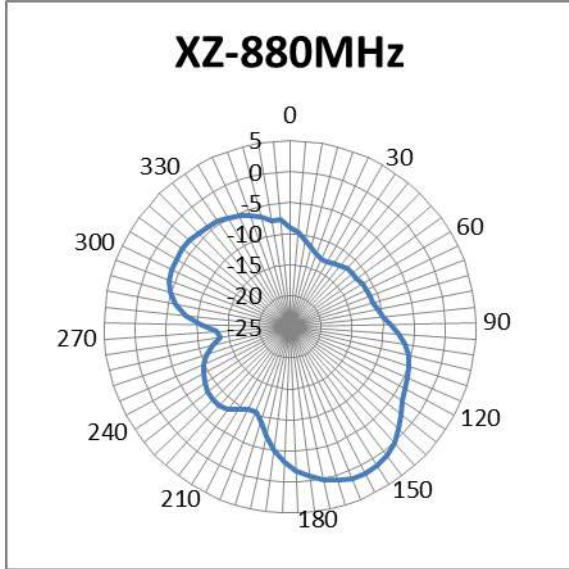
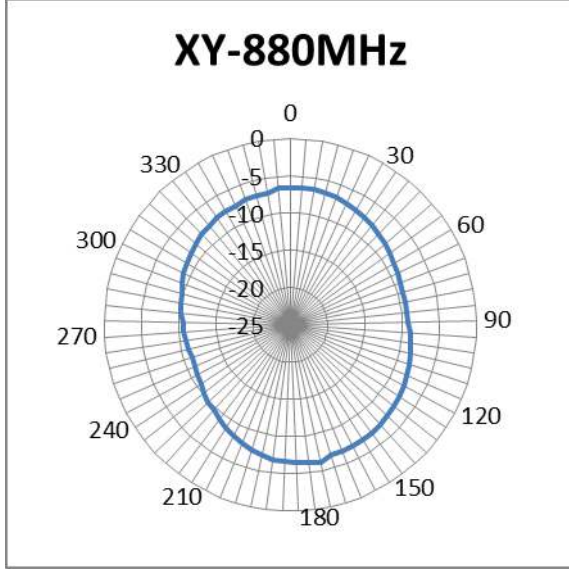
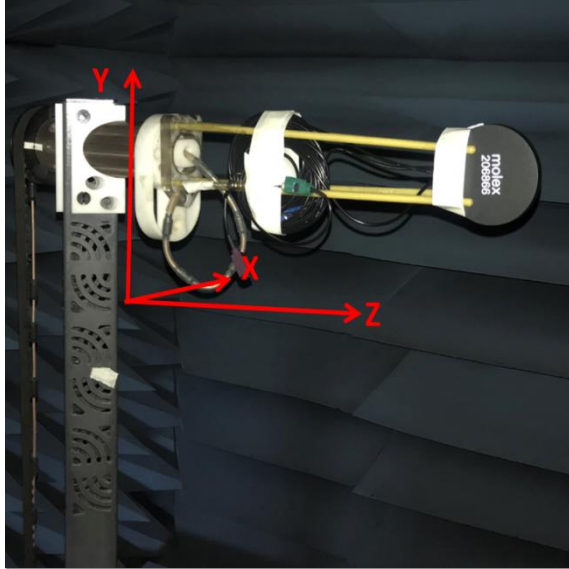
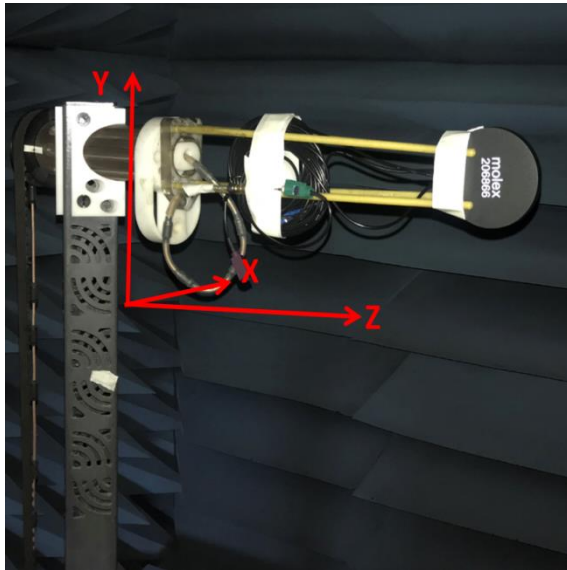
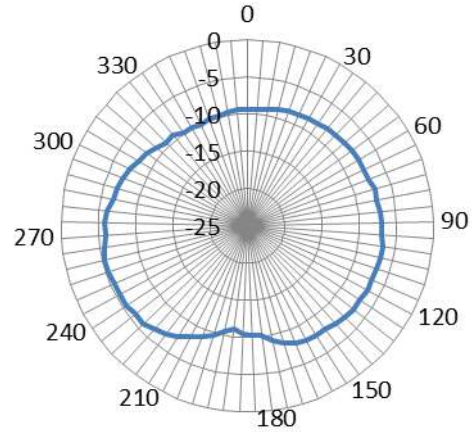


FIGURE 7.1.1 2D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

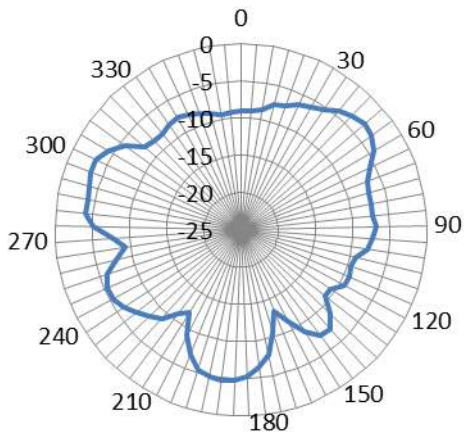
REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 12 of 25
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XY-1880MHz



XZ-1880MHz



YZ-1880MHz

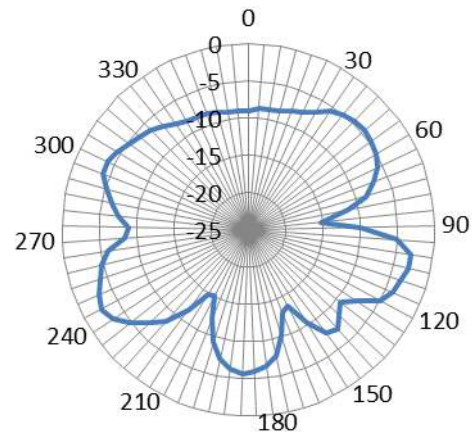
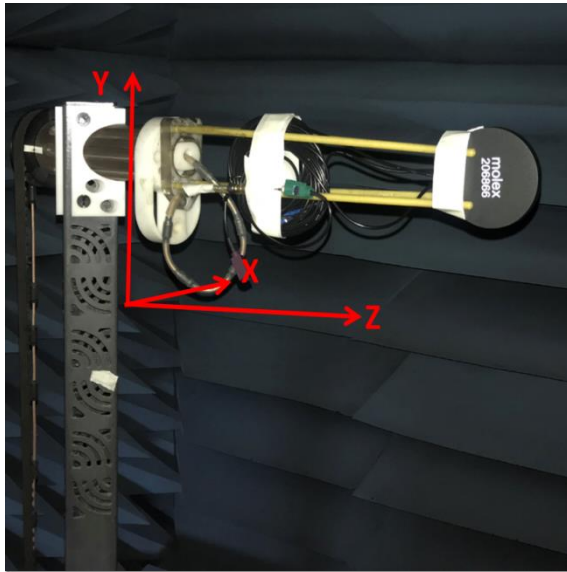
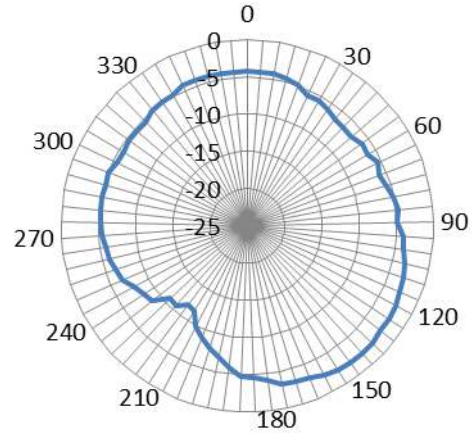


FIGURE 7.1.2 2D RADIATION PATTERN OF ANTENNA AT 1880MHZ IN FREE SPACE

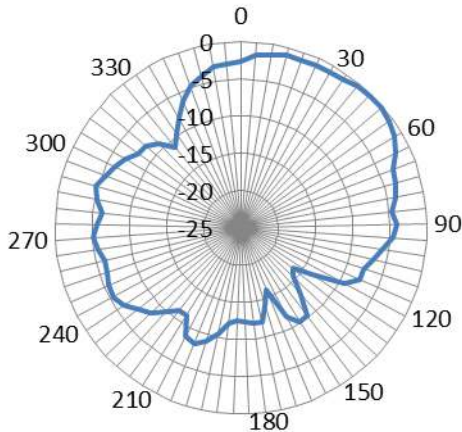
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XY-2170MHz



XZ-2170MHz



YZ-2170MHz

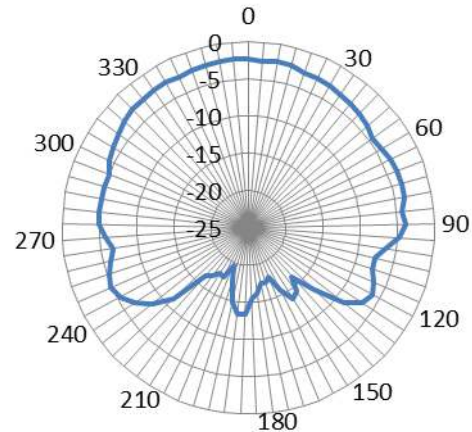
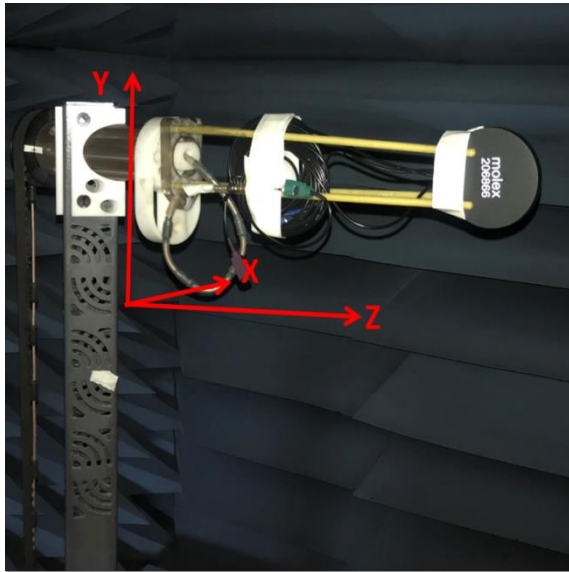
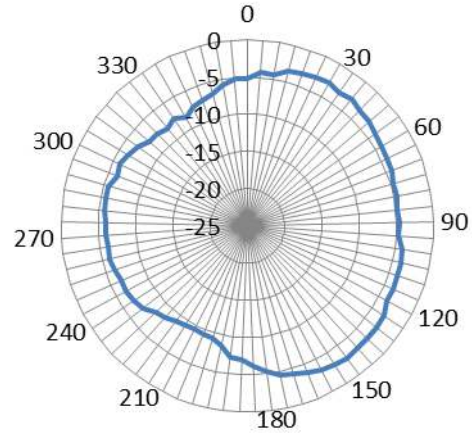


FIGURE 7.1.3 2D RADIATION PATTERN OF ANTENNA AT 2170MHz IN FREE SPACE

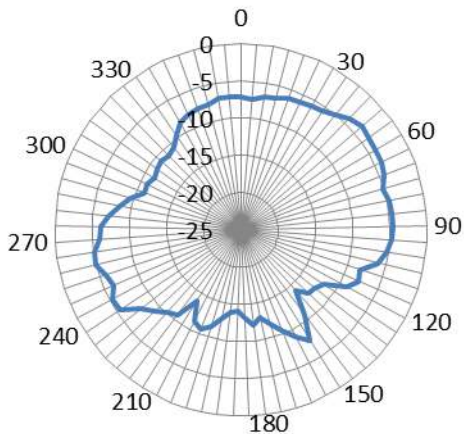
REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 14 of 25
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XY-2550MHz



XZ-2550MHz



YZ-2550MHz

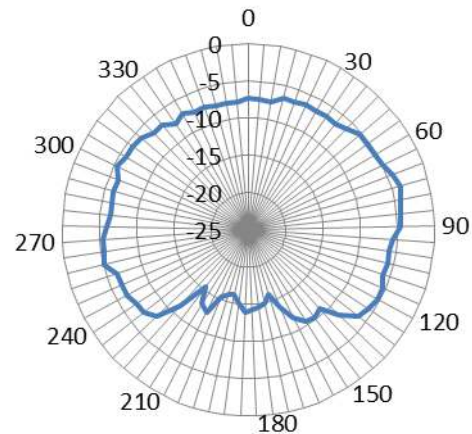


FIGURE 7.1.4 2D RADIATION PATTERN OF ANTENNA AT 2550MHz IN FREE SPACE

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7.2 3D RADIATION PATTERN

All measurements in this document are done with cable length of 3000mm

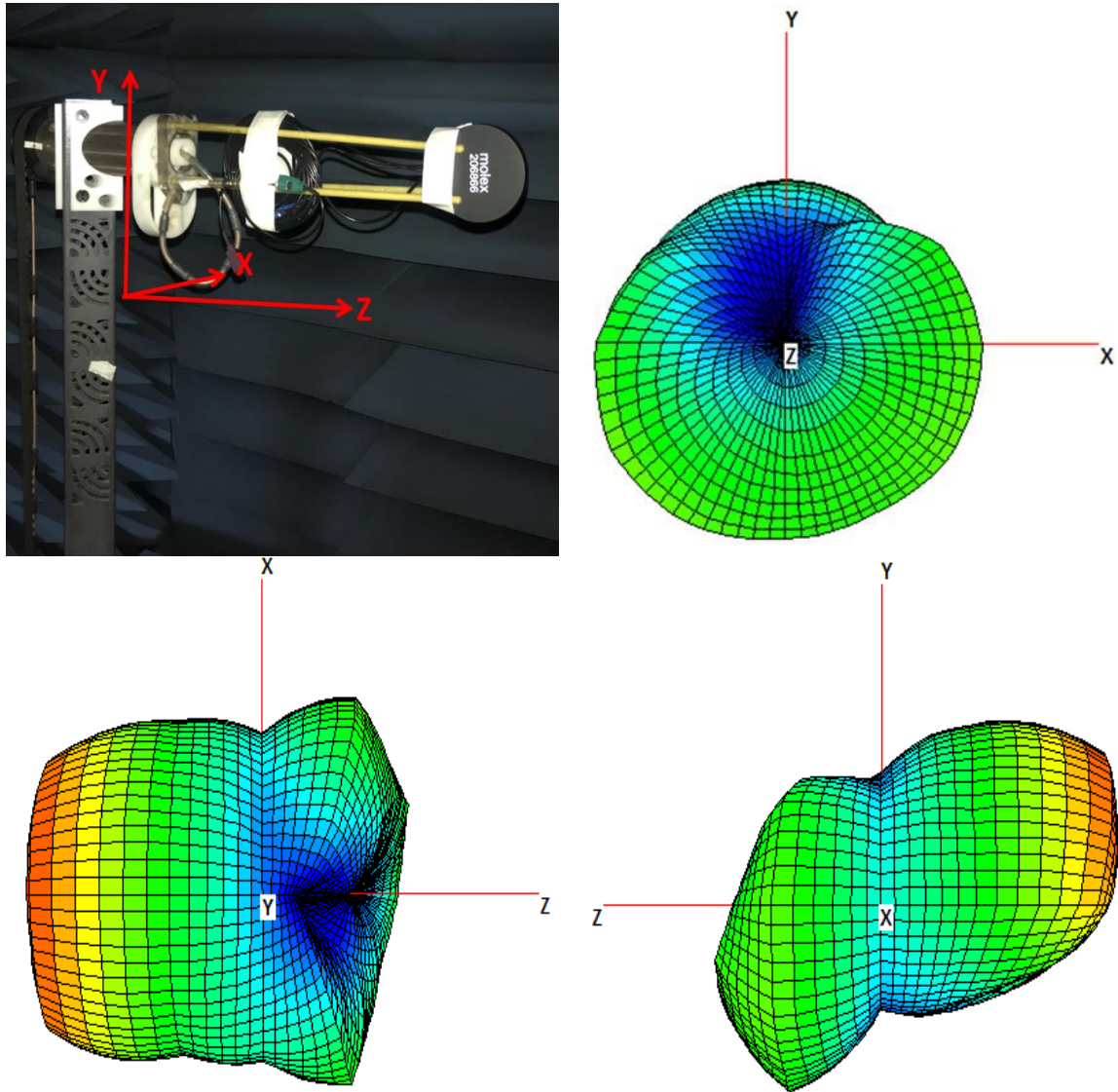


FIGURE 7.2.1 3D RADIATION PATTERN OF ANTENNA AT 880MHZ IN FREE SPACE

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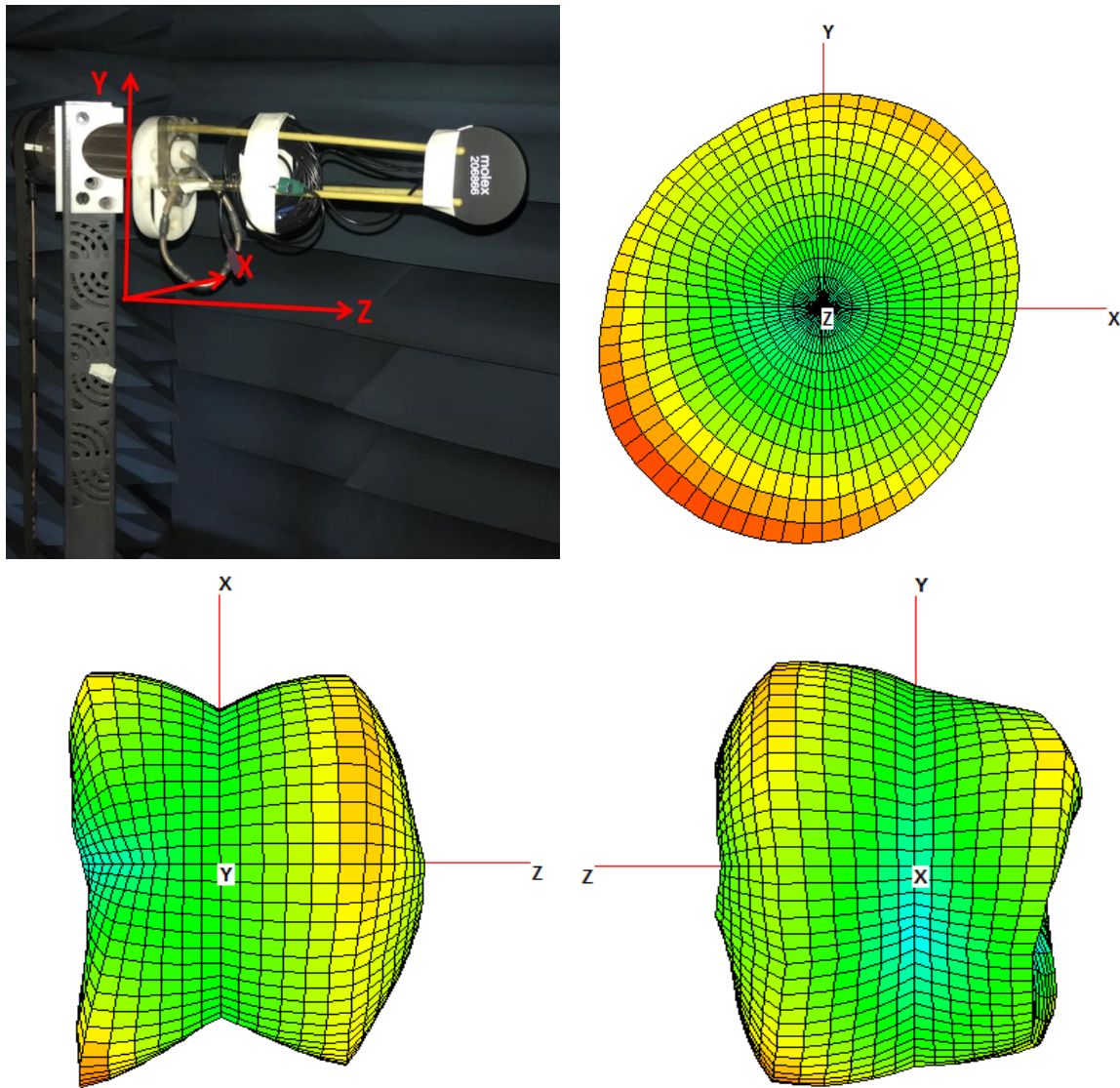


FIGURE 7.2.2 3D RADIATION PATTERN OF ANTENNA AT 1880MHZ IN FREE SPACE

REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 17 of 25
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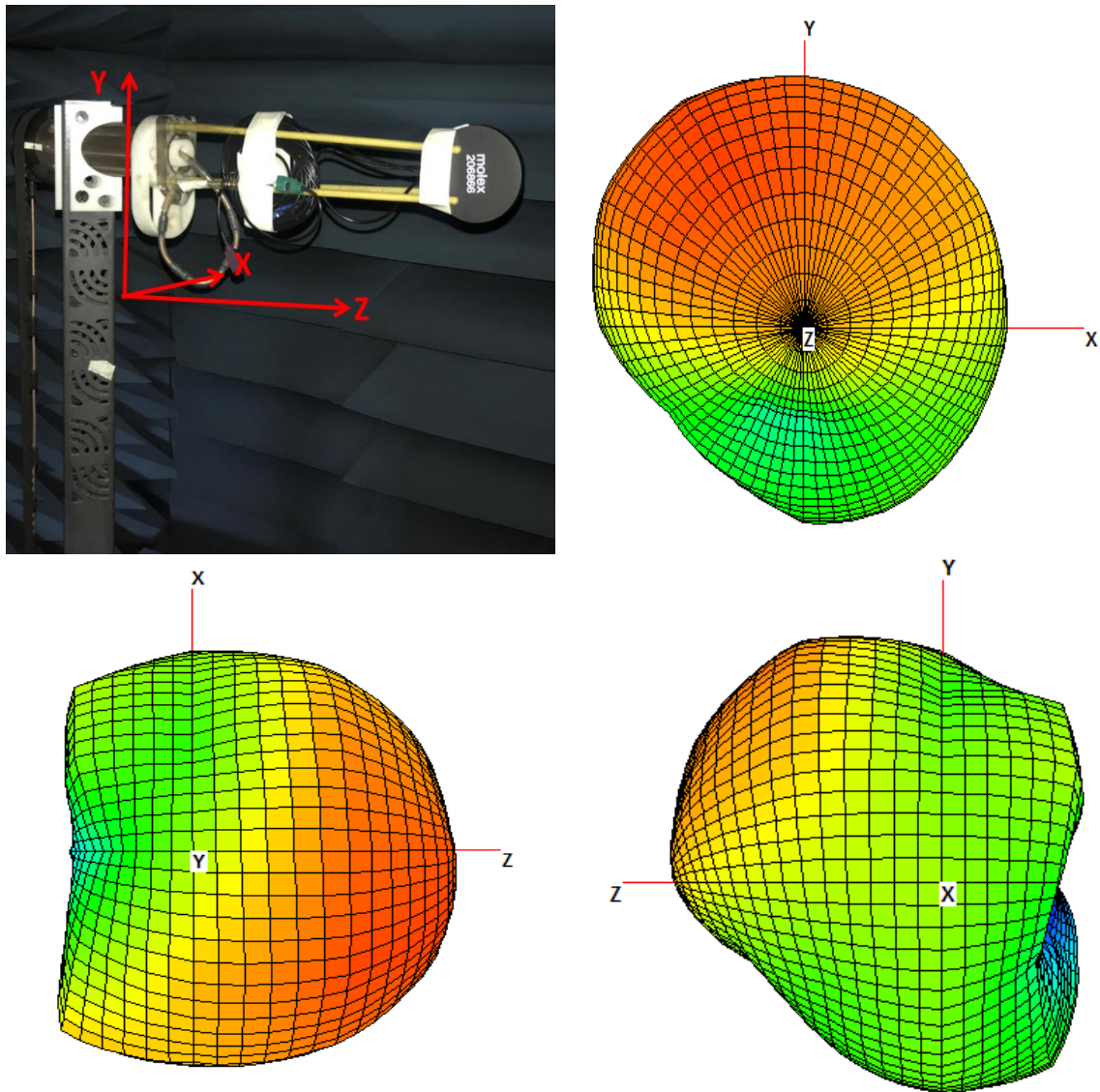


FIGURE 7.2.3 3D RADIATION PATTERN OF ANTENNA AT 2170MHZ IN FREE SPACE

REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 18 of 25
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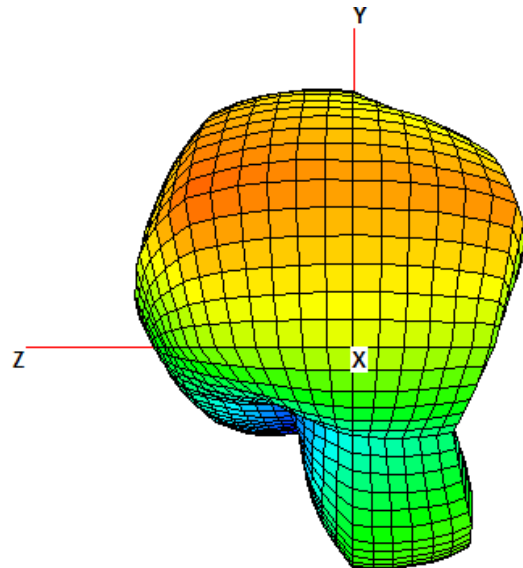
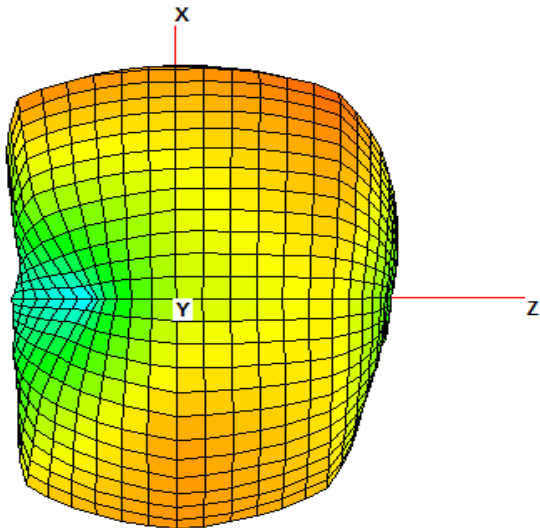
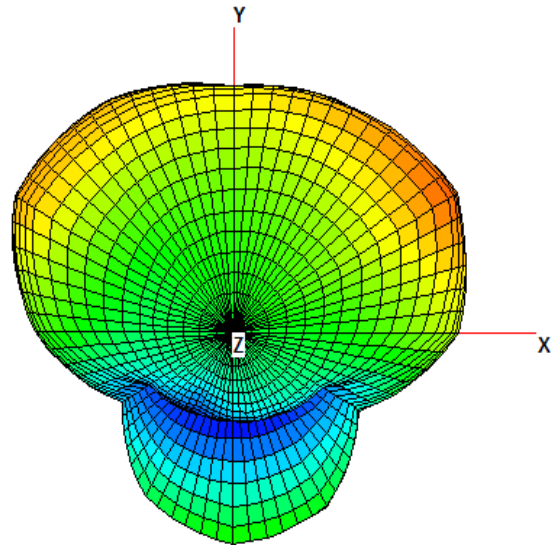
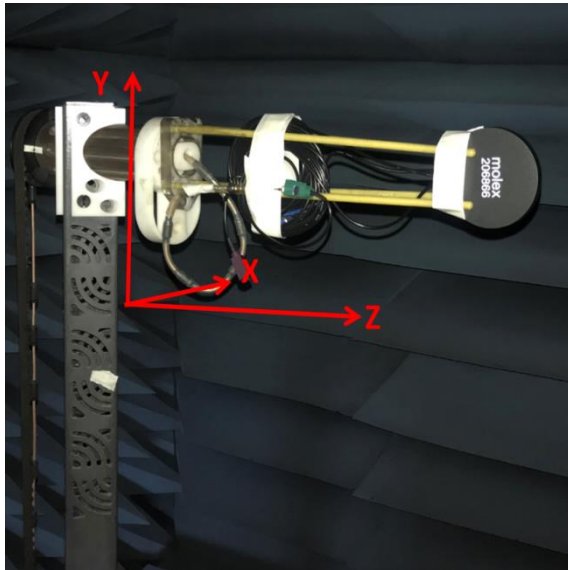
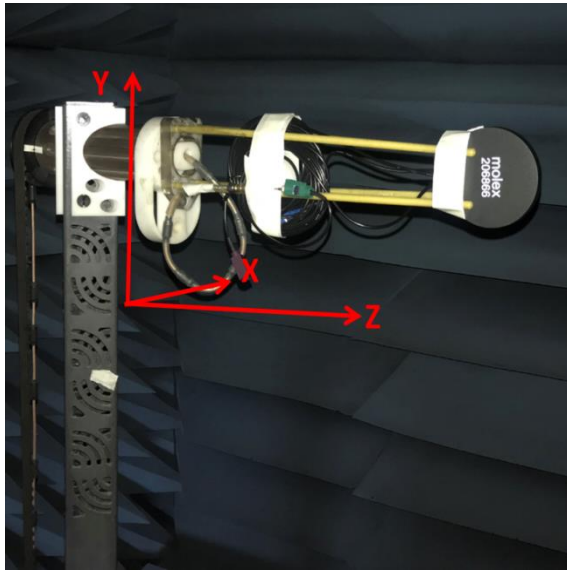


FIGURE 7.2.4 3D RADIATION PATTERN OF ANTENNA AT 2550MHZ IN FREE SPACE

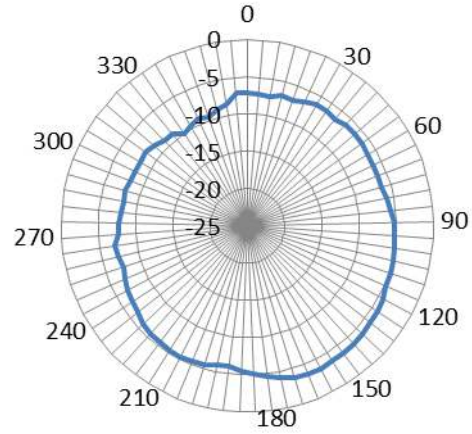
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7.3 WIFI ANTENNA 2D RADIATION PATTERN

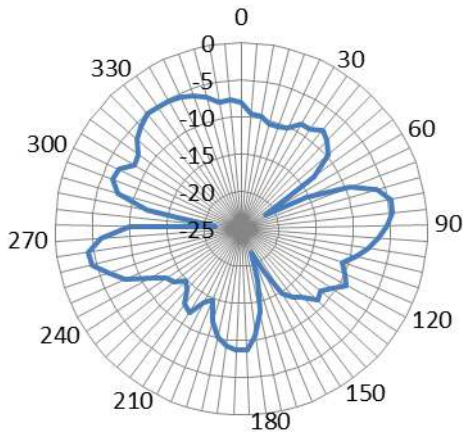
All measurements in this document are done with cable length of 3000mm



XY-2450MHz



XZ-2450MHz



YZ-2450MHz

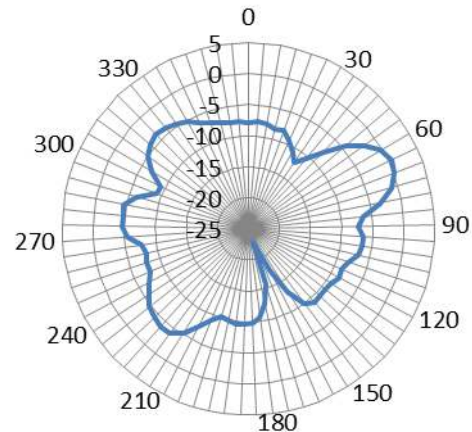


FIGURE 7.3 2D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

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7.4 WIFI ANTENNA 3D RADIATION PATTERN

All measurements in this document are done with cable length of 3000mm

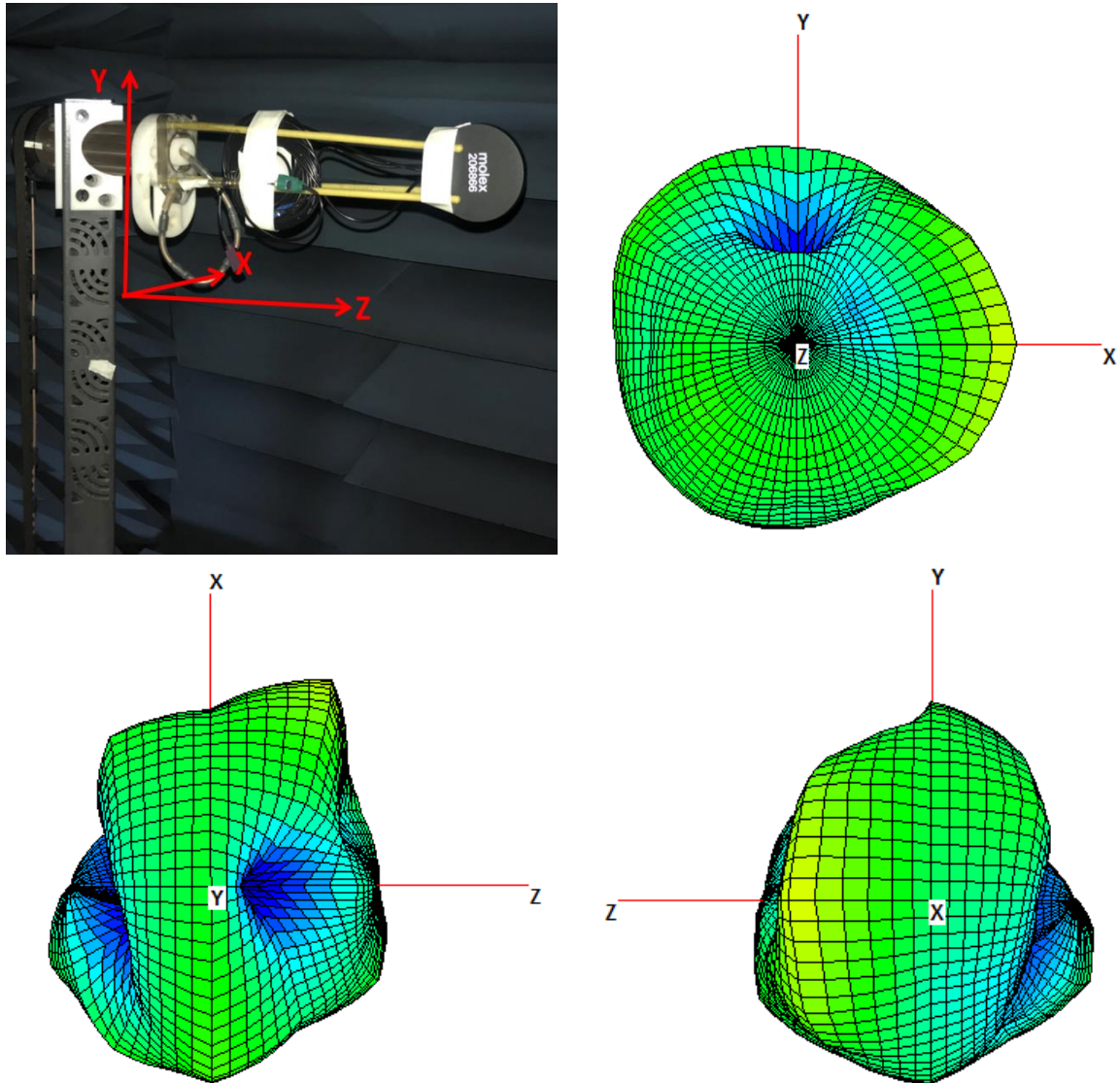
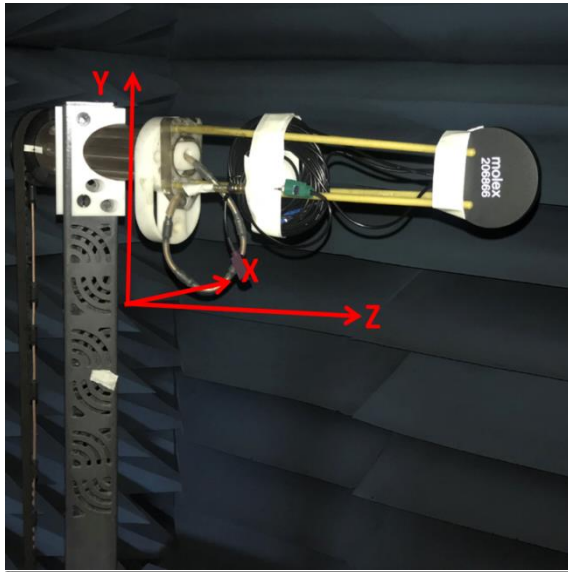


FIGURE 7.4 3D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

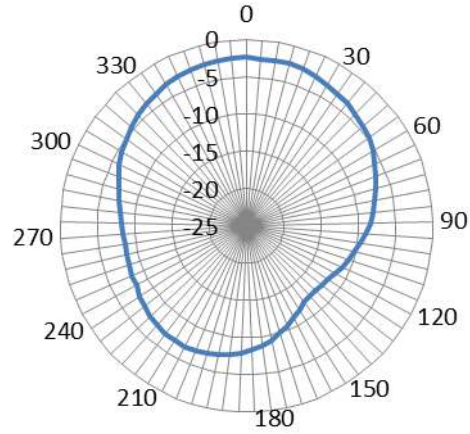
REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 21 of 25
DOCUMENT NUMBER: AS-2068663000	CREATED / REVISED BY: Liu Hai 2019/11/19	CHECKED BY: Cheng Kang 2019/11/19	APPROVED BY: Andy Zhang 2019/11/19

7.5 GPS ANTENNA 2D RADIATION PATTERN

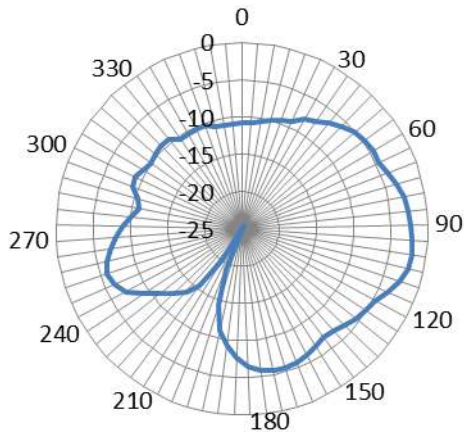
All measurements in this document are done with cable length of 3000mm



XY-1575MHz



XZ-1575MHz



YZ-1575MHz

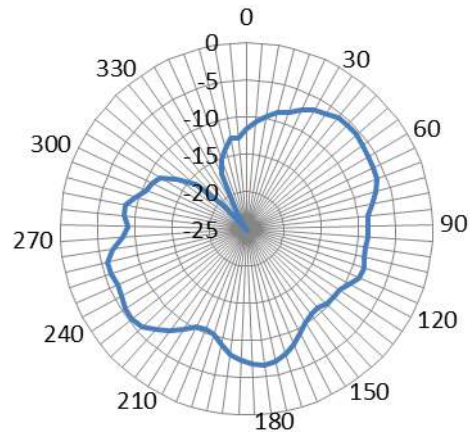


FIGURE 7.5 2D RADIATION PATTERN OF ANTENNA AT 1575MHZ IN FREE SPACE

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DOCUMENT NUMBER: AS-2068663000	CREATED / REVISED BY: Liu Hai 2019/11/19	CHECKED BY: Cheng Kang 2019/11/19	APPROVED BY: Andy Zhang 2019/11/19

7.6 GPS ANTENNA 3D RADIATION PATTERN

All measurements in this document are done with cable length of 3000mm

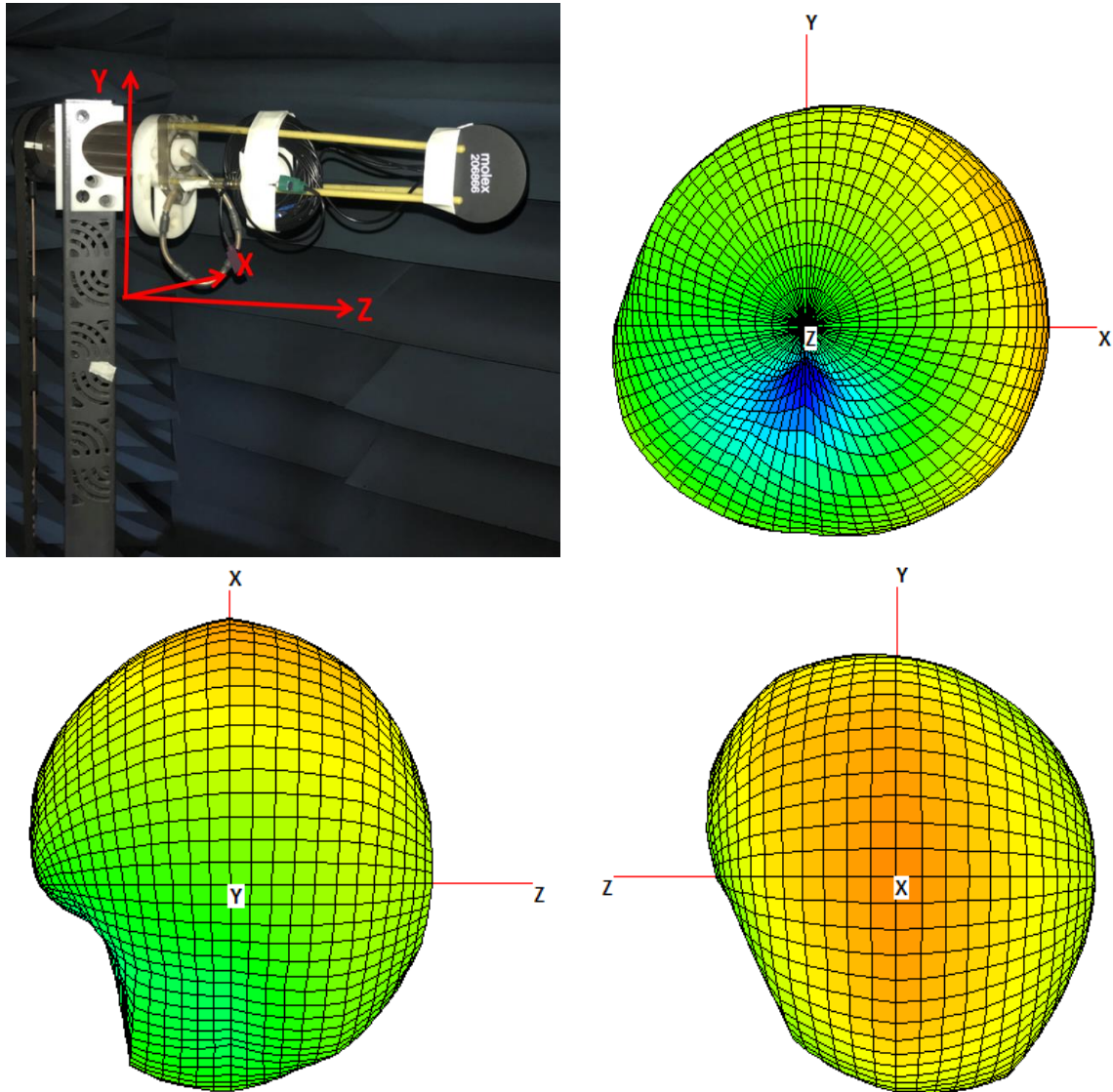
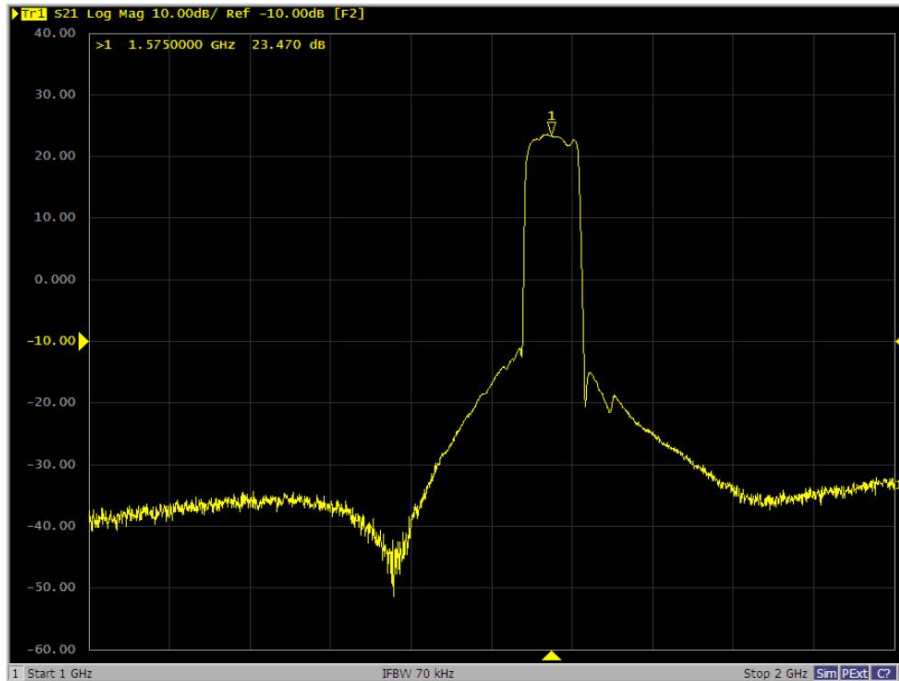


FIGURE 7.6 3D RADIATION PATTERN OF ANTENNA AT 1575MHZ IN FREE SPACE

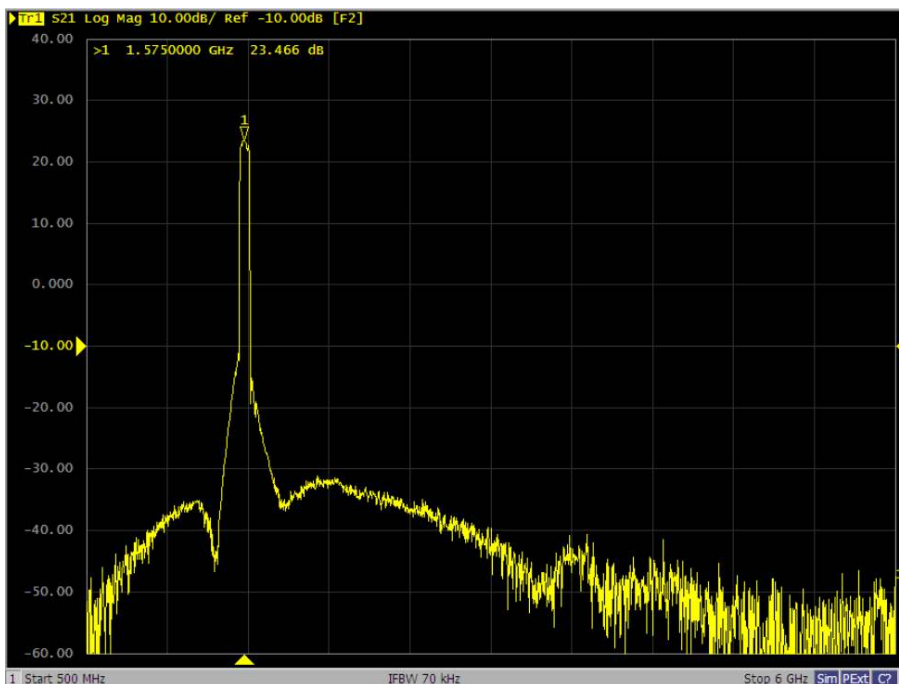
REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 23 of 25
DOCUMENT NUMBER: AS-2068663000	CREATED / REVISED BY: Liu Hai 2019/11/19	CHECKED BY: Cheng Kang 2019/11/19	APPROVED BY: Andy Zhang 2019/11/19

8.0 LNA GAIN

All measurements in this document are done with cable length of 3000mm



8.1 LNA GAIN OF GPS ANTENNA IN FREE SPACE



8.2 OUT-BAND REJECTION IN FREE SPACE

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APPLICATION SPECIFICATION

CHANGE HISTORY

REV	DATE	DESCRIPTION	PAGES CHANGED
A	2018/06/05	First Release	NA
B	2019/11/26	Update Release	Add to S11 data, the 2D and 3D radiation pattern of GPS antenna, the LNA gain and outband rejection.

REVISION: B	ECR/ECN INFORMATION: EC No: 627634 DATE: 2019/11/25	TITLE: 3IN1(4G/GPS/WIFI) External Antenna Application Specification	SHEET No. 25 of 25
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