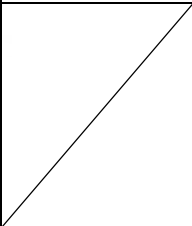


Date :2023.05.10

SPECIFICATION

Product Name	ANTENNA
Model Name	External Antenna (BLE 1)
Provider	RadiAnt
Part Code.	9200000-00204

	Submitted	Checked		Approved
Buyer				
RadiAnt	Submitted	Checked	Checked	Approved
				

– Table of Contents –

1. Product History	3
2. Electrical Feature	4
2.1 Product Feature	
2.2 Frequency Band	
2.3 Impedance	
2.4 Detailed Passive Electrical SPEC	
2.5 Maximum Power	
3. Environment Test	6
4. Overall Performance	8
4.1 Test Environment	
4.2 VSWR	
4.3 Passive Ant Gain & Efficiency	
4.4 Radiation Pattern	
4.4.1 2400MHz	
4.4.2 2425MHz	
4.4.3 2450MHz	
4.4.4 2485MHz	
5. Drawing	16

1. Product History

LIST					
NO	Data	Front	After	Change	REV
1	2023.03.27			Approval	0
2	2023.05.10			Data 추가(Avg.Gain & Peak Gain)	1
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Product Features

- 2.4GHz BLE
- High efficiency
- Excellent performance



2.2. Frequency Band.

Frequency Range	2400 ~ 2485MHz
-----------------	----------------

2.3 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.4 Detailed Passive Electrical Spec

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

Frequency Range	2400 ~ 2485MHz			
FREQUENCY	2400	2425	2450	2485
VSWR	2.19	2.72	3.06	2.88
Avg.Gain[dBi]	-1.30	-1.80	-2.64	-2.82
Peak Gain[dBi]	2.88	2.28	1.45	0.90

2.5 Maximum Power

- $P=2W$ Under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C , $+80^{\circ}\text{C}$

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and $+80^{\circ}\text{C}$ for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = $+80^{\circ}\text{C}$
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

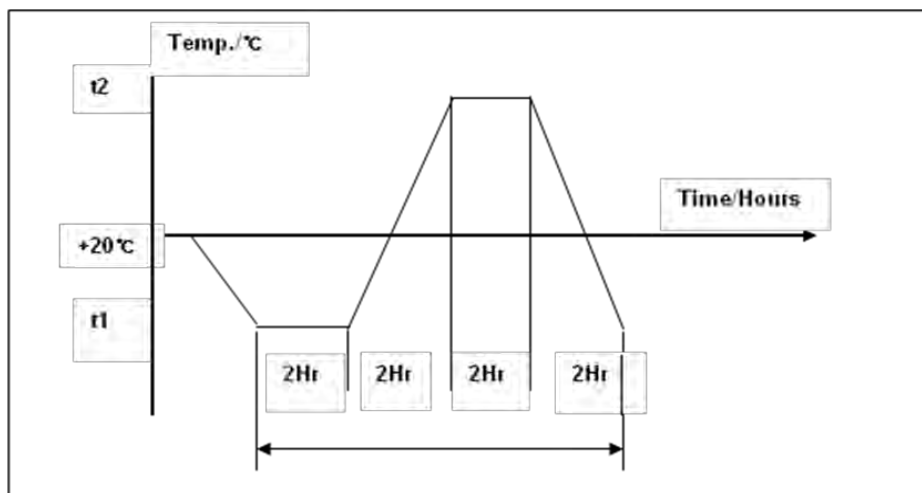


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

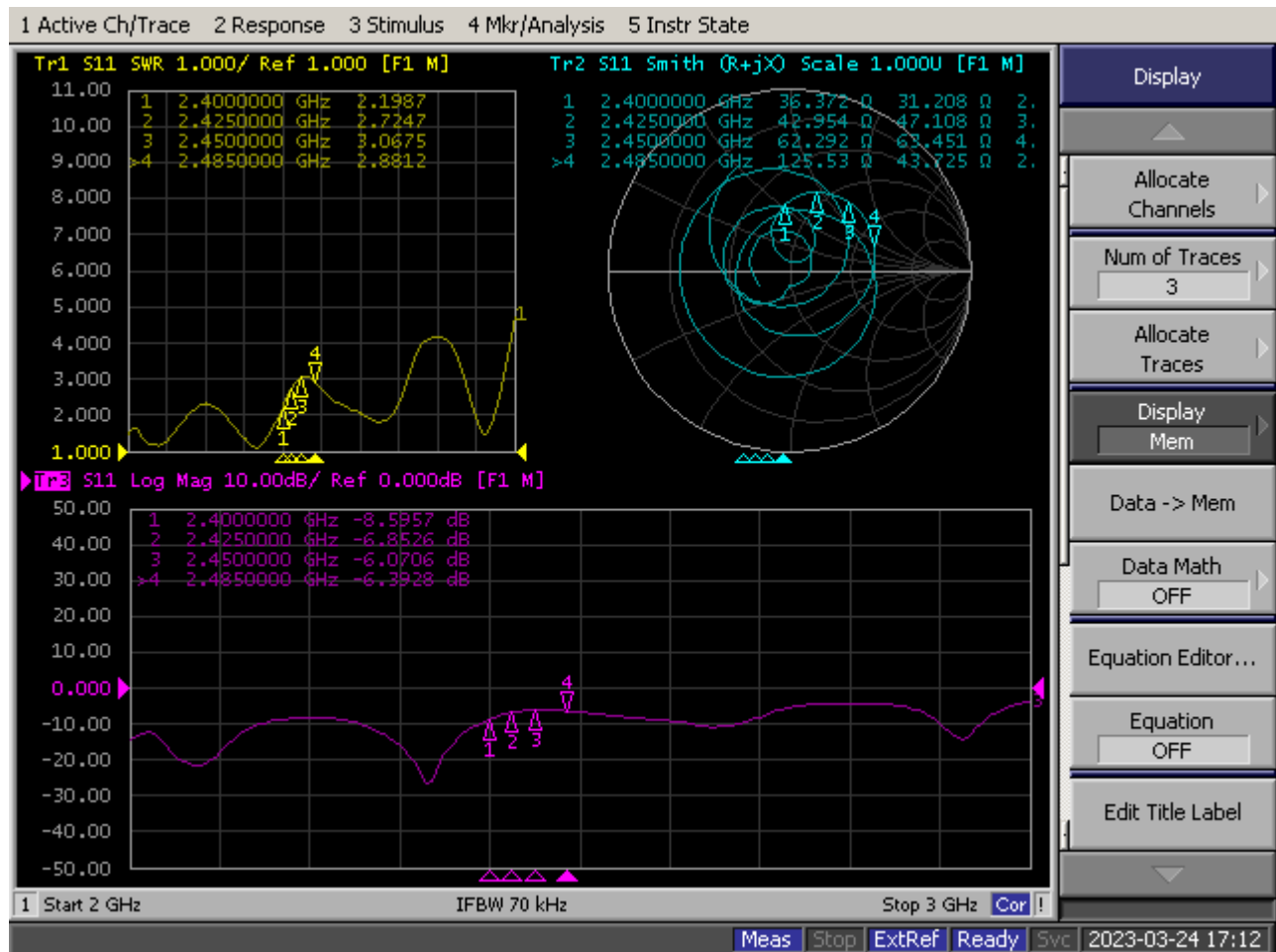
4. Overall Performance

4.1 Test Environment

- ENA Series Network Analyzer E5071C , 100KHz ~ 8.5GHz
- 3D Anechoic chamber 400MHz ~ 6GHz



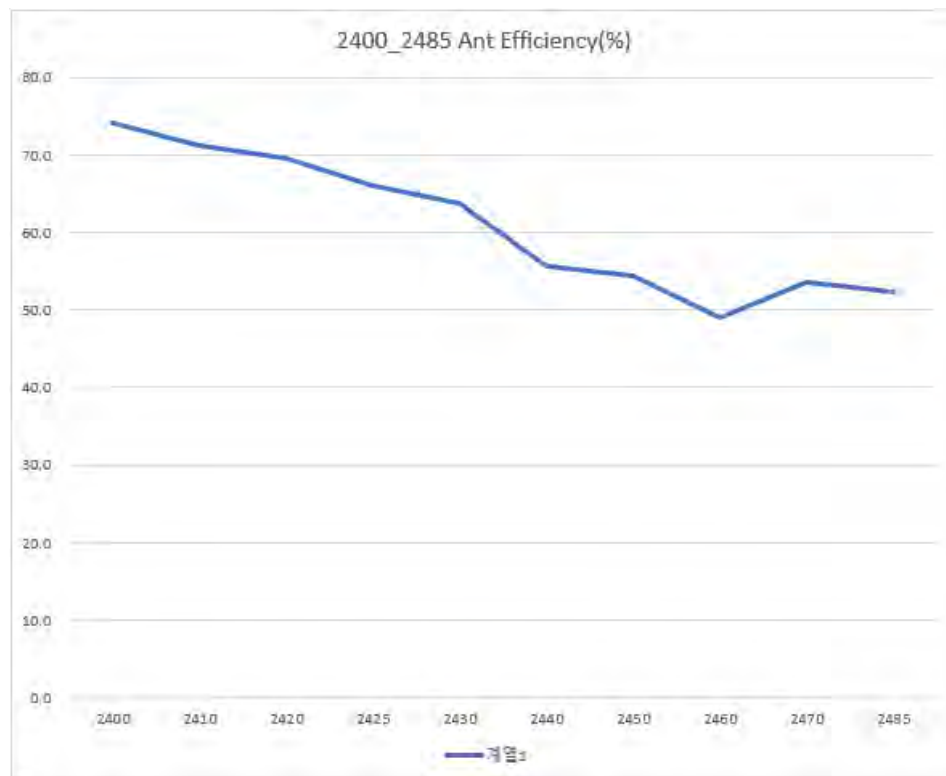
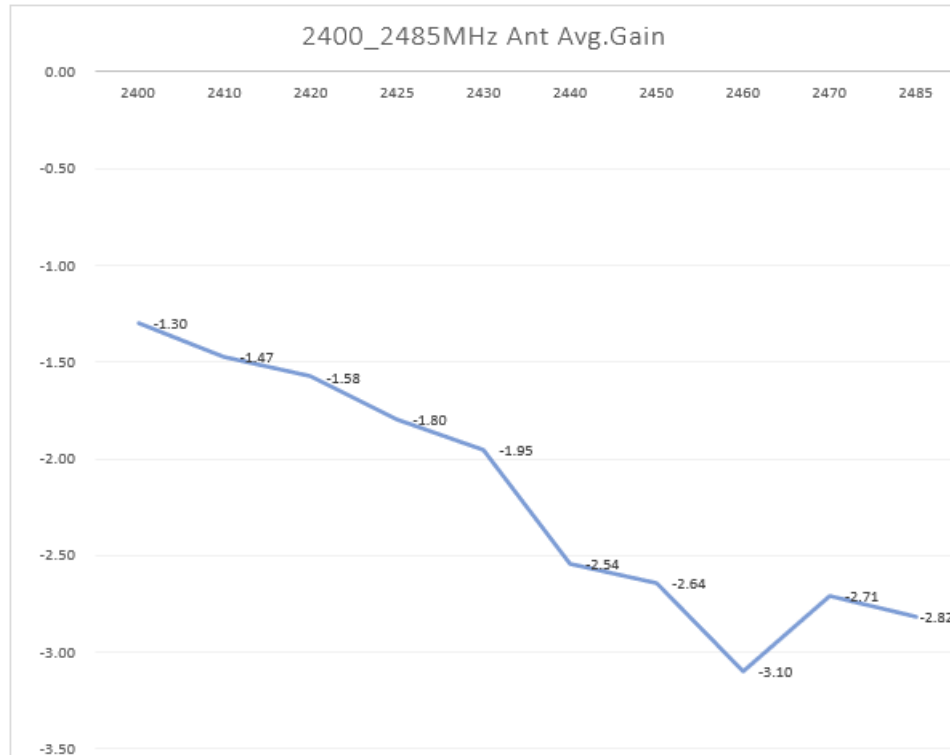
4.2 VSWR



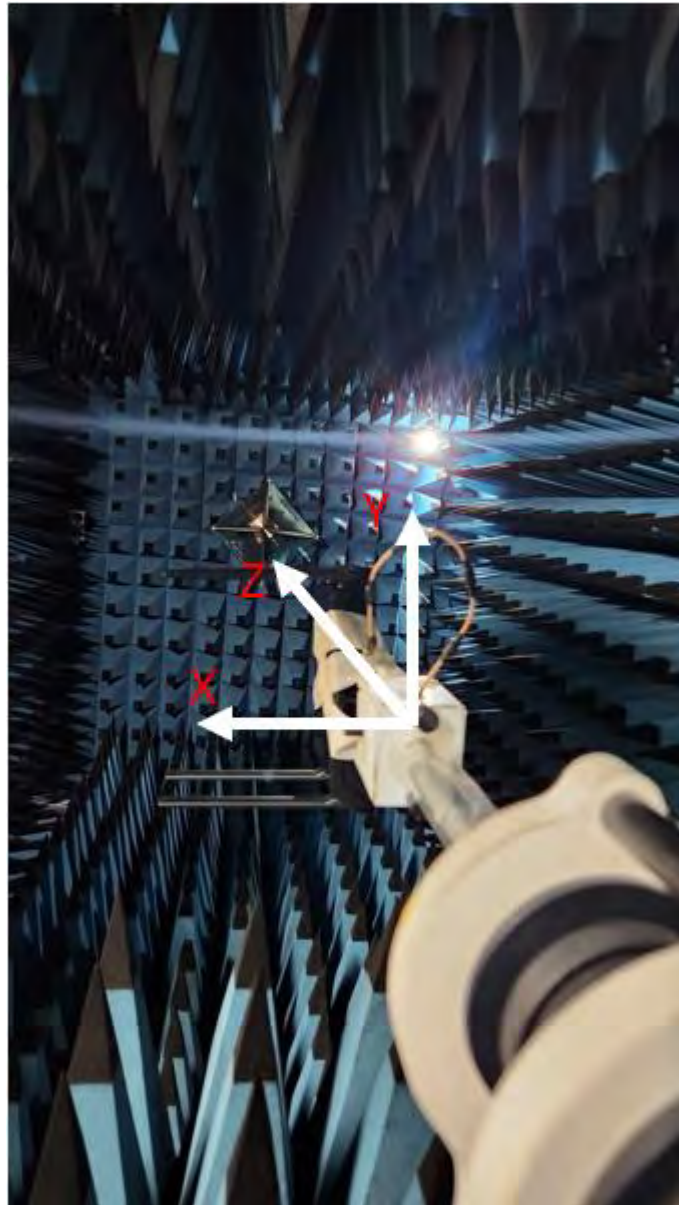
FREQUENCY	2400	2425	2450	2485
VSWR	2.19	2.72	3.06	2.88

4.3 Passive Ant Gain

4.3.1 2400 ~ 2485MHz



4.4 Radiation Pattern

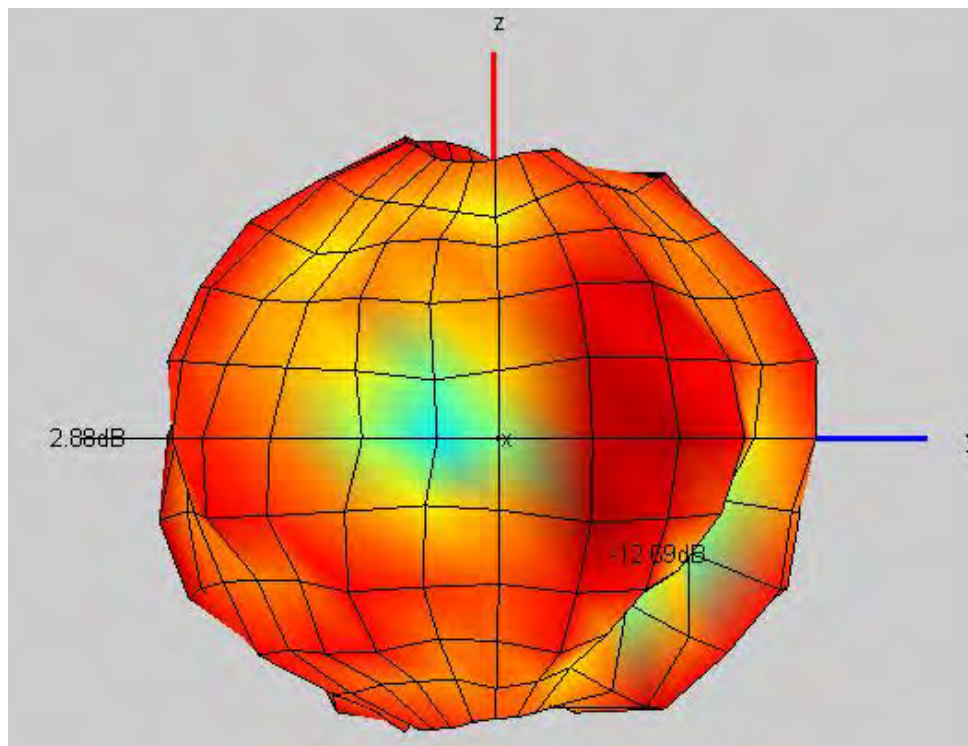


H plane : the tangent of XY

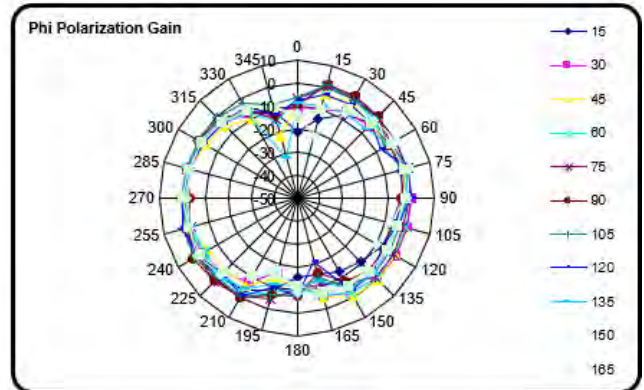
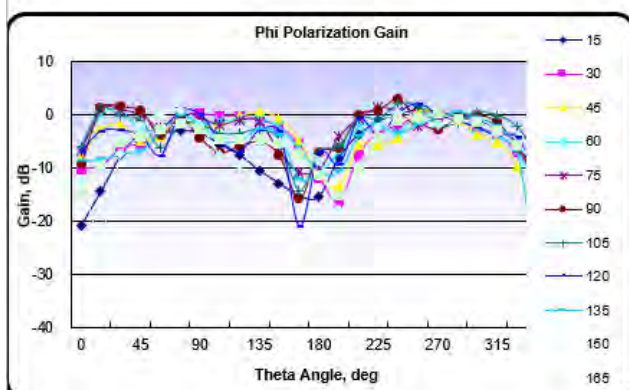
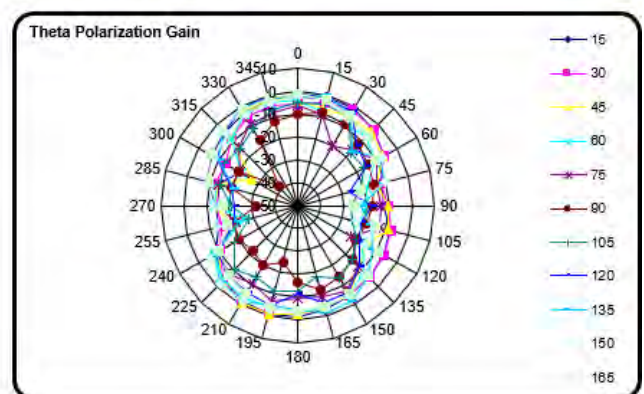
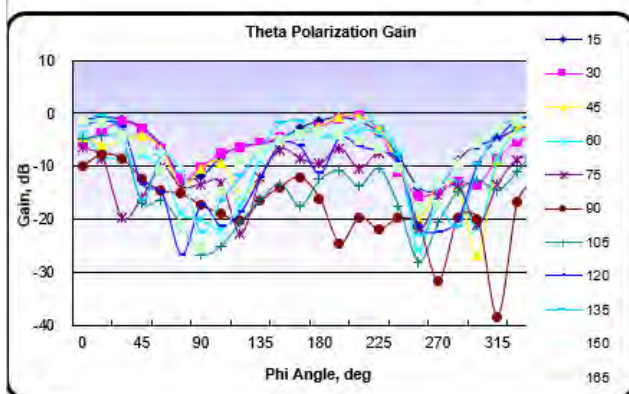
E1 plane : the tangent of XZ

E2 plane : the tangent of YZ

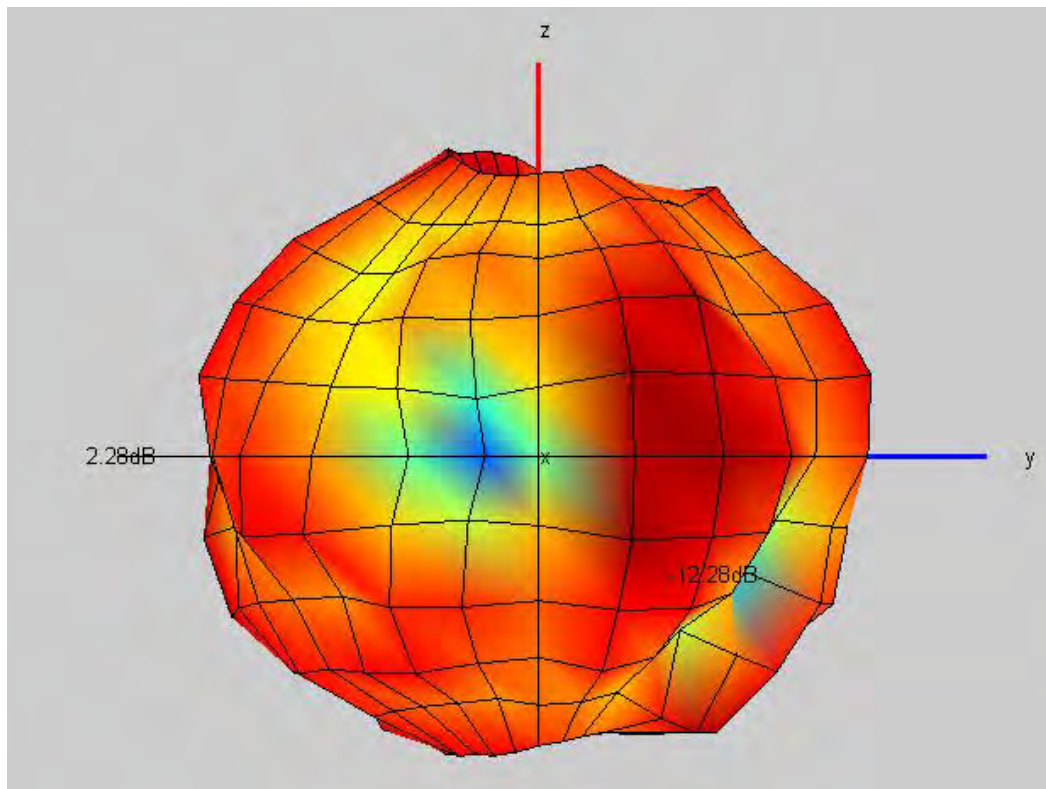
4.4.1 2400MHz



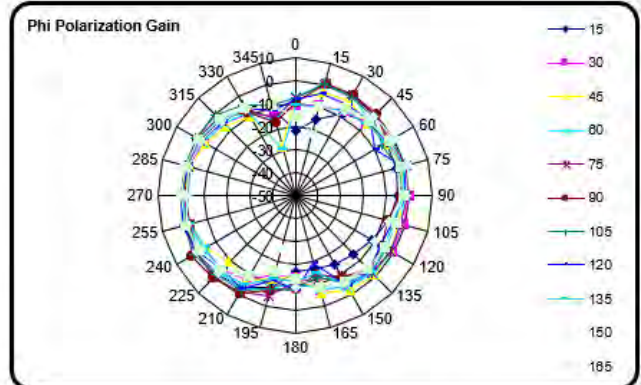
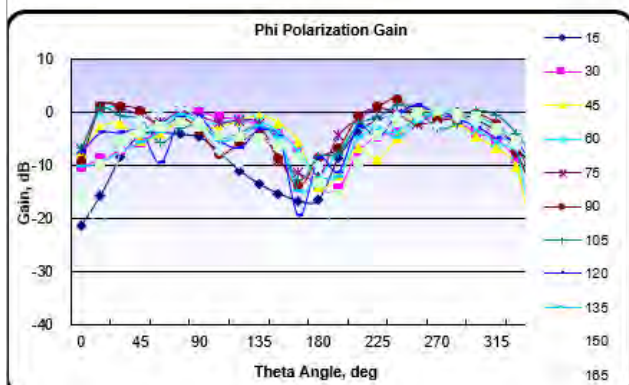
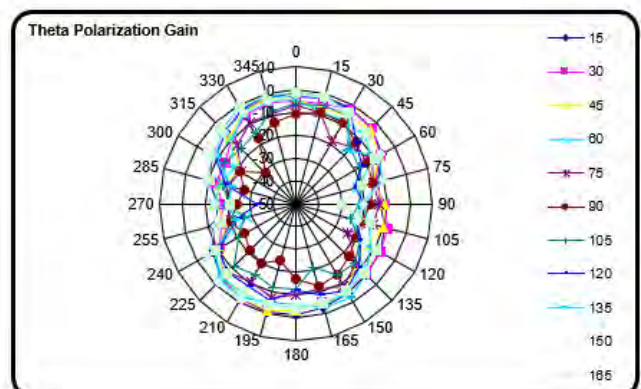
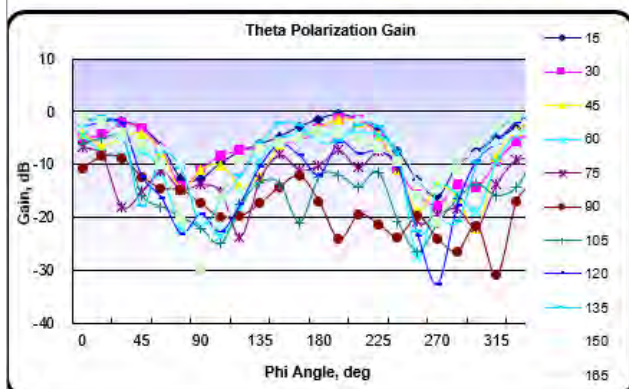
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



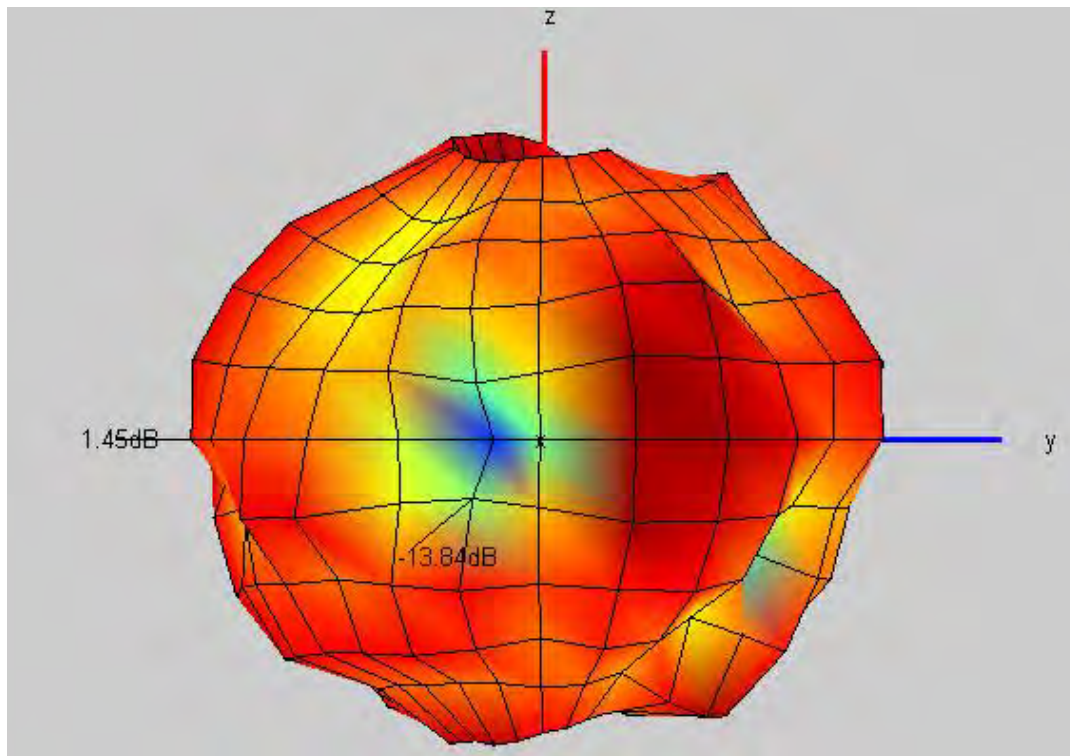
4.4.2 2425MHz



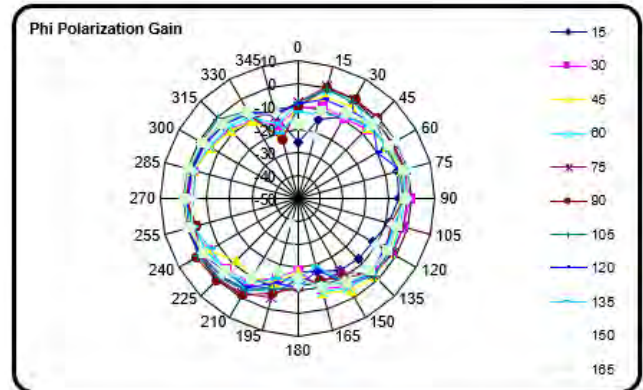
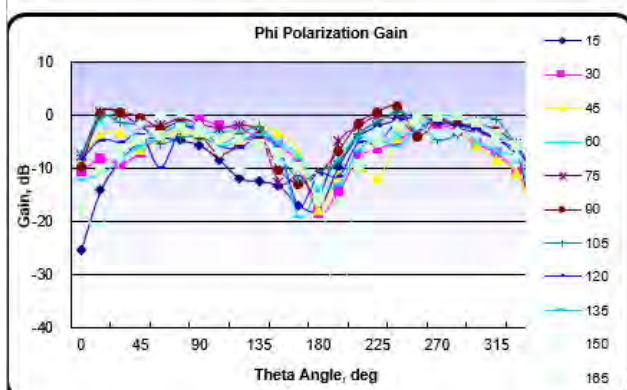
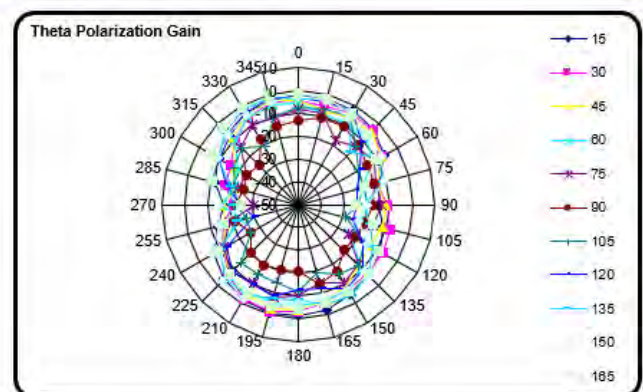
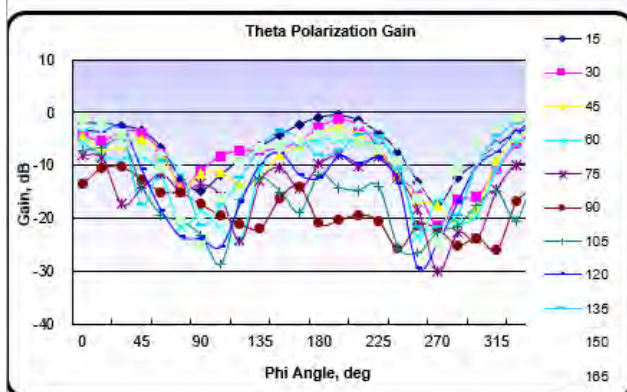
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



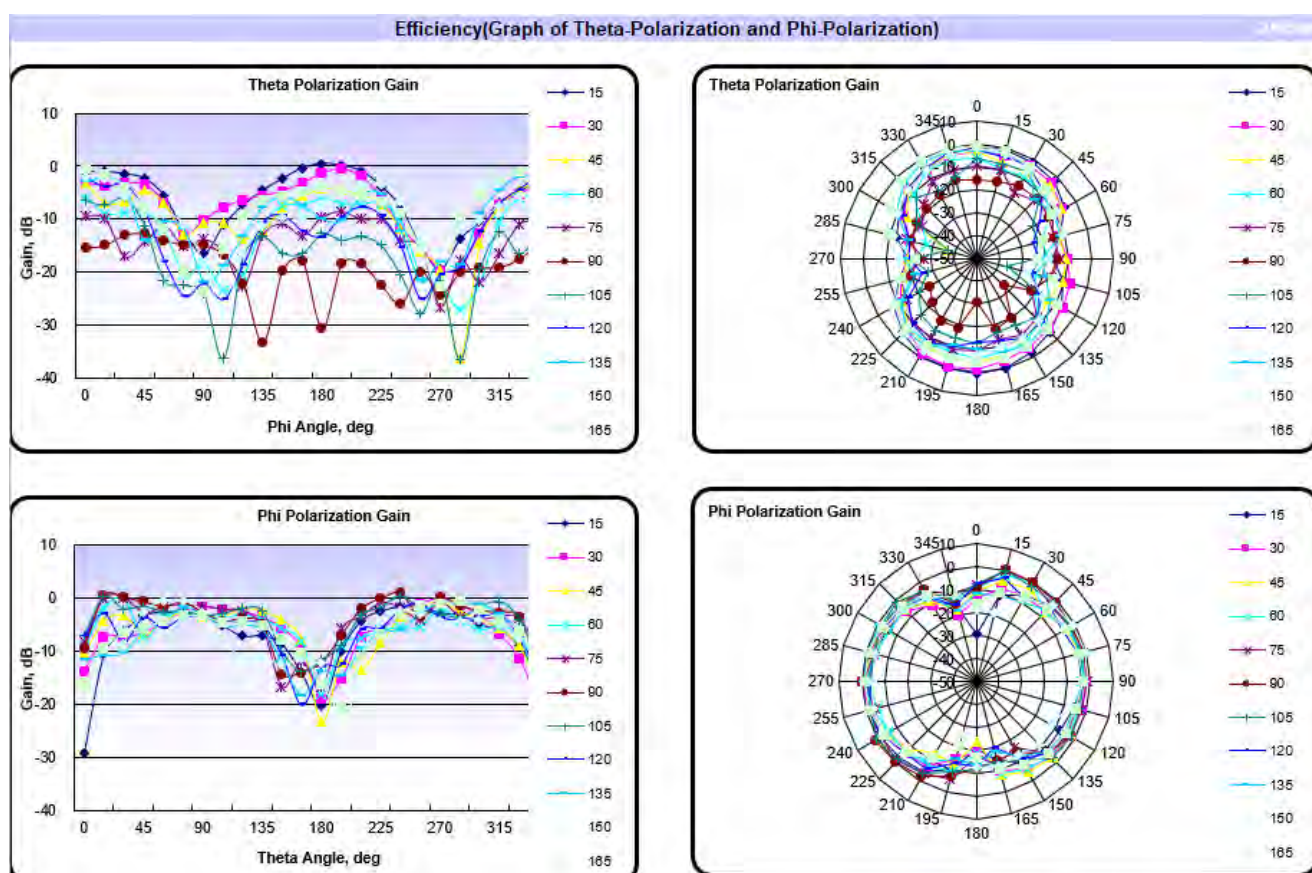
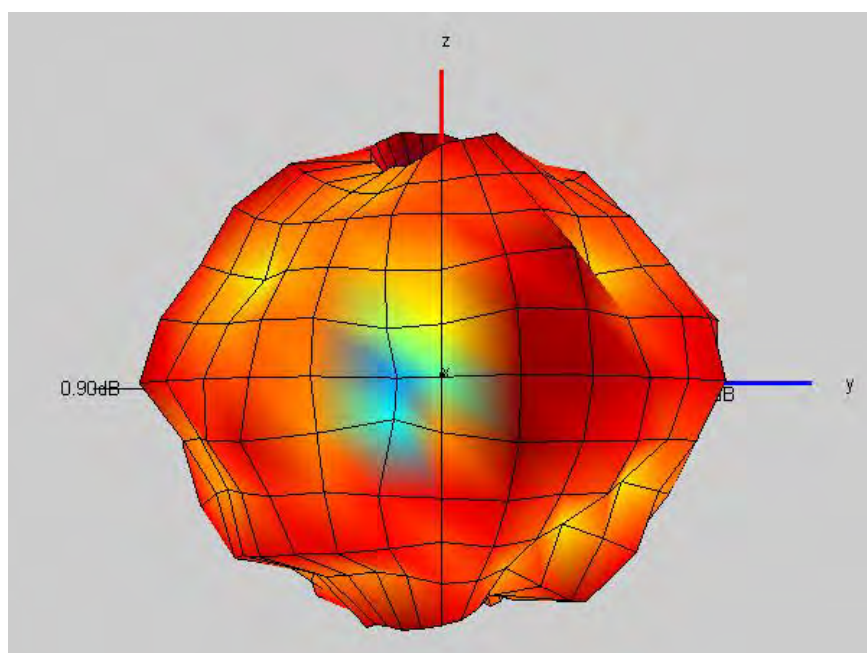
4.4.3 2450MHz



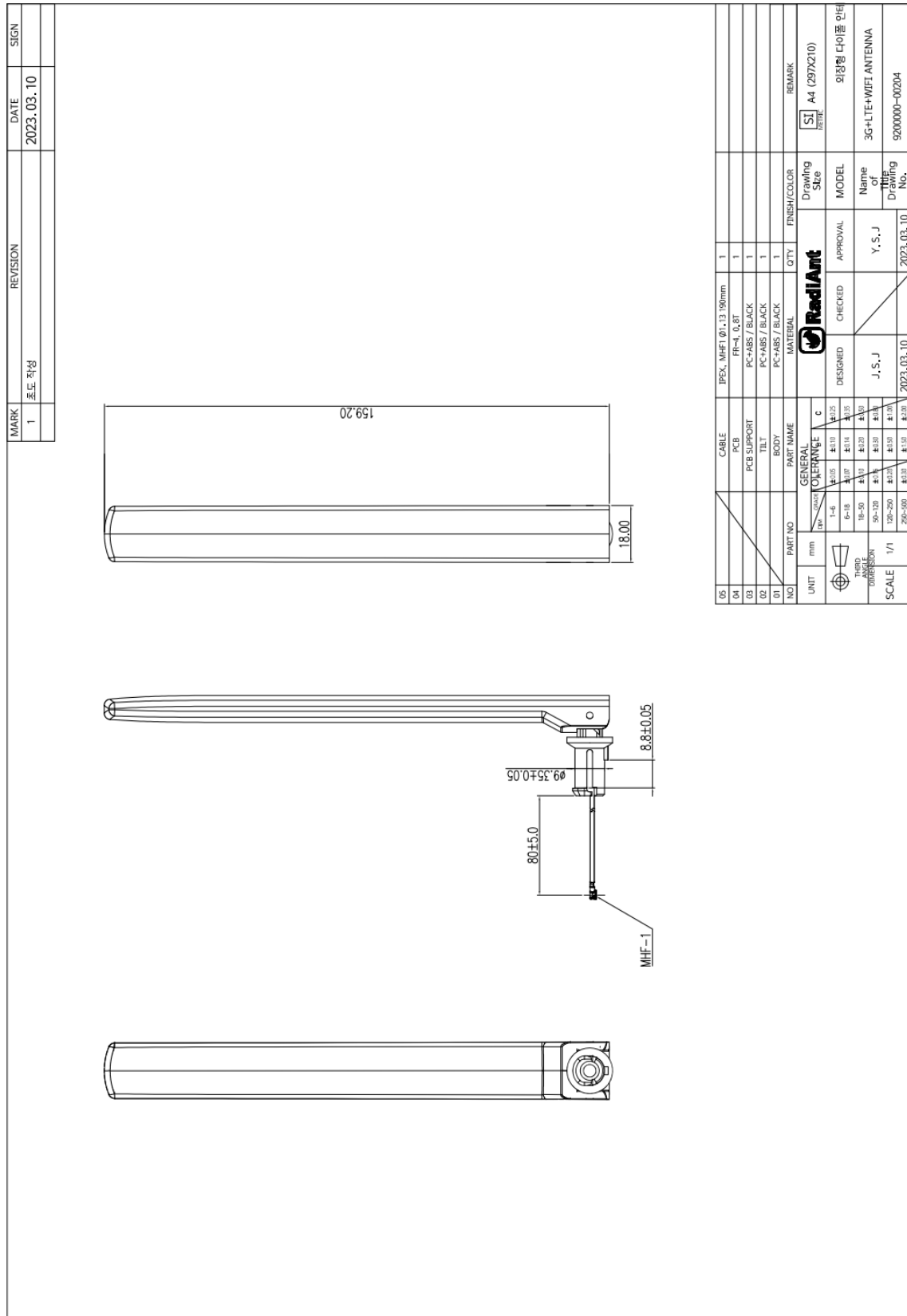
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



4.4.4 2485MHz



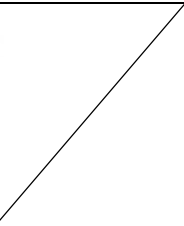
5. Drawing



Date :2023.05.10

SPECIFICATION

Product Name	ANTENNA
Model Name	External Antenna (BLE 2)
Provider	RadiAnt
Part Code.	9200000-00204

	Submitted	Checked		Approved
Buyer				
RadiAnt	Submitted	Checked	Checked	Approved
				

– Table of Contents –

1. Product History	3
2. Electrical Feature	4
2.1 Product Feature	
2.2 Frequency Band	
2.3 Impedance	
2.4 Detailed Passive Electrical SPEC	
2.5 Maximum Power	
3. Environment Test	6
4. Overall Performance	8
4.1 Test Environment	
4.2 VSWR	
4.3 Passive Ant Gain & Efficiency	
4.4 Radiation Pattern	
4.4.1 2400MHz	
4.4.2 2425MHz	
4.4.3 2450MHz	
4.4.4 2485MHz	
5. Drawing	16

1. Product History

LIST					
NO	Data	Front	After	Change	REV
1	2023.03.27			Approval	0
2	2023.05.10			Data 추가(Avg.Gain & Peak Gain)	1
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Product Features

- 2.4GHz BLE
- High efficiency
- Excellent performance



2.2. Frequency Band.

Frequency Range	2400 ~ 2485MHz
-----------------	----------------

2.3 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.4 Detailed Passive Electrical Spec

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

Frequency Range	2400 ~ 2485MHz			
FREQUENCY	2400	2425	2450	2485
VSWR	1.77	2.04	2.24	2.23
Avg.Gain[dBi]	-1.09	-1.50	-2.28	-2.51
Peak Gain[dBi]	3.99	4.32	3.62	2.48

2.5 Maximum Power

- $P=2W$ Under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C, +80°C

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and +80°C for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = +80°C
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

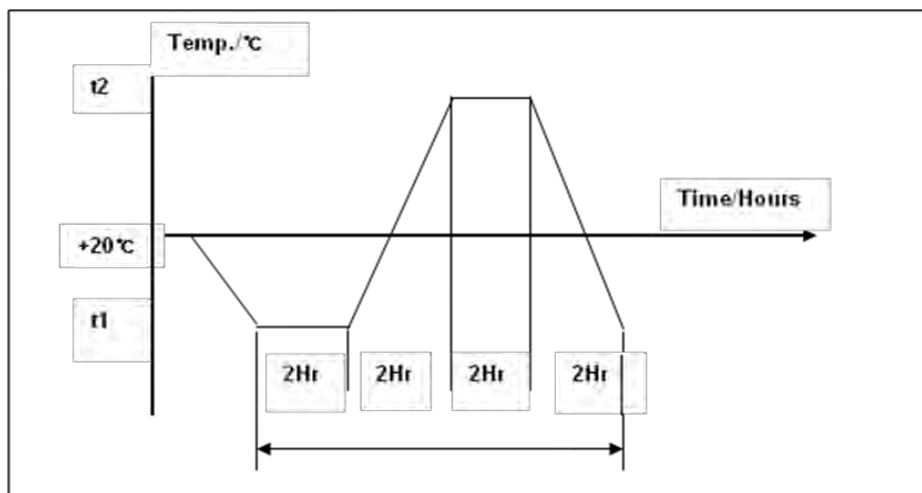


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

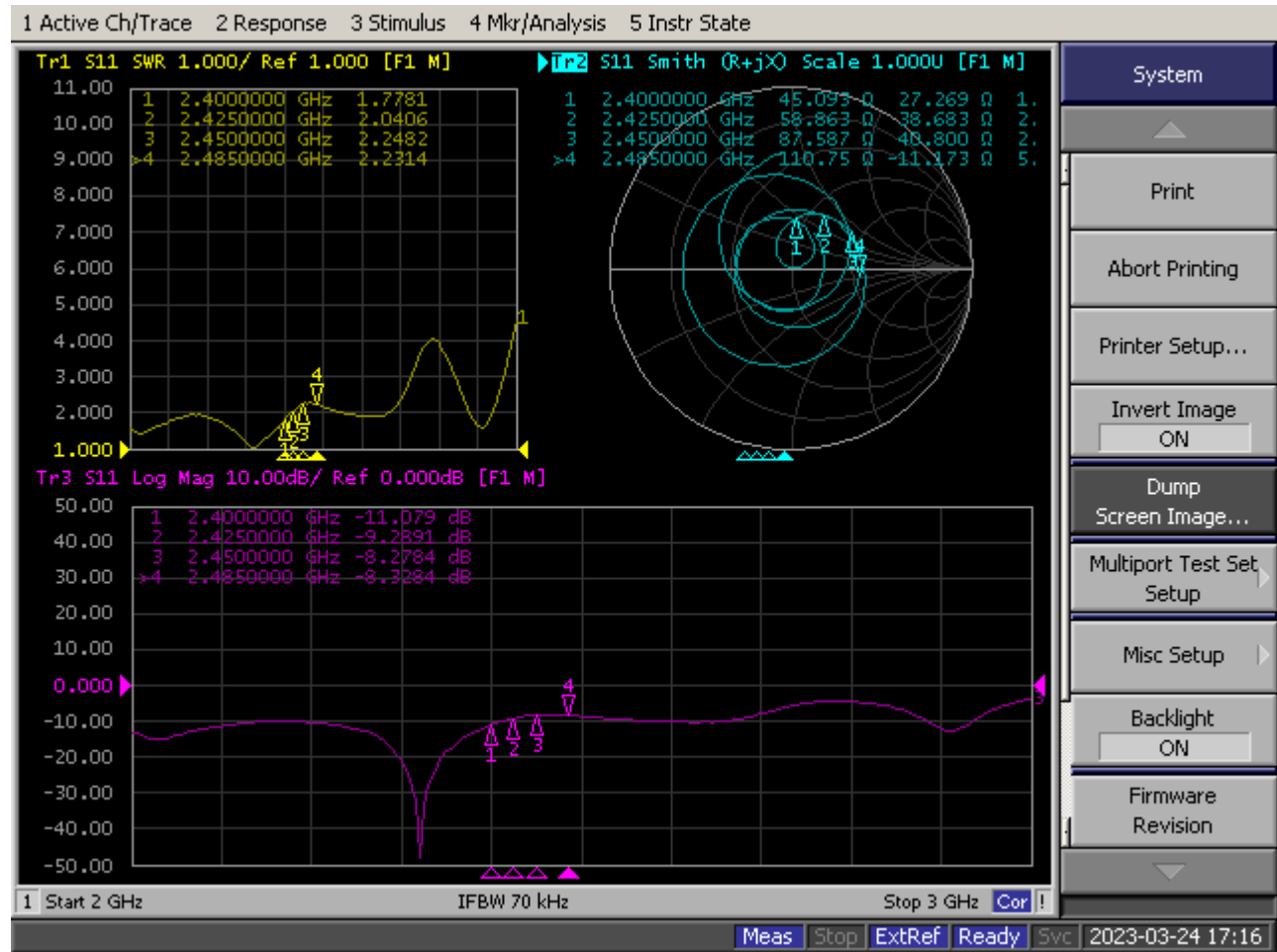
4. Overall Performance

4.1 Test Environment

- ENA Series Network Analyzer E5071C , 100KHz ~ 8.5GHz
- 3D Anechoic chamber 400MHz ~ 6GHz



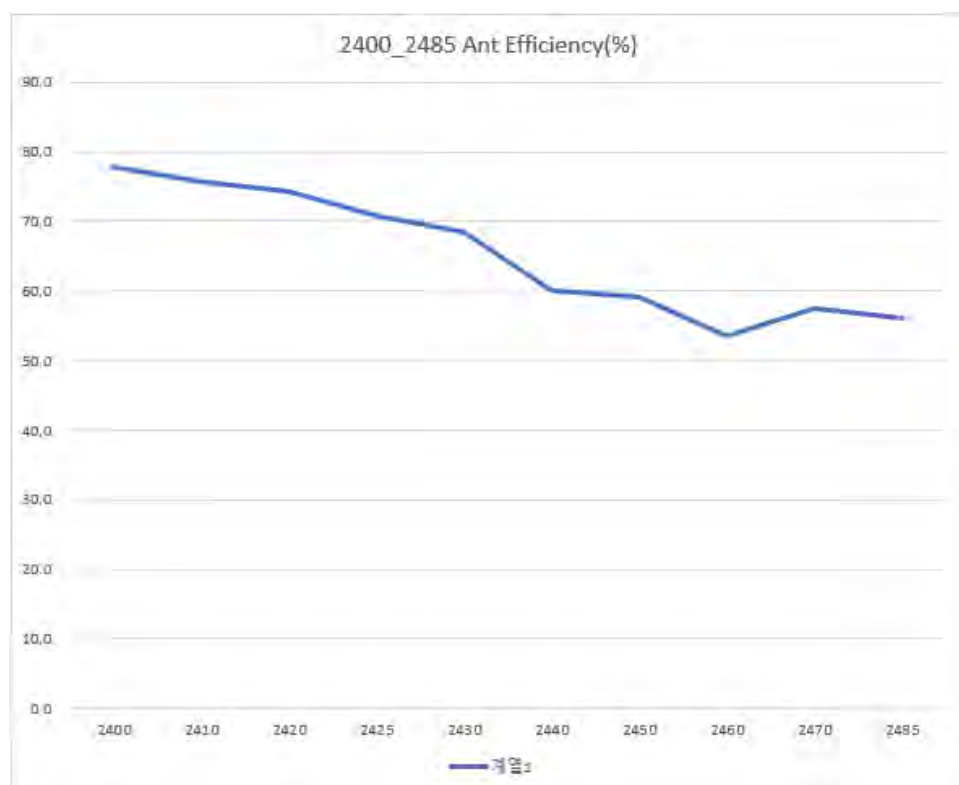
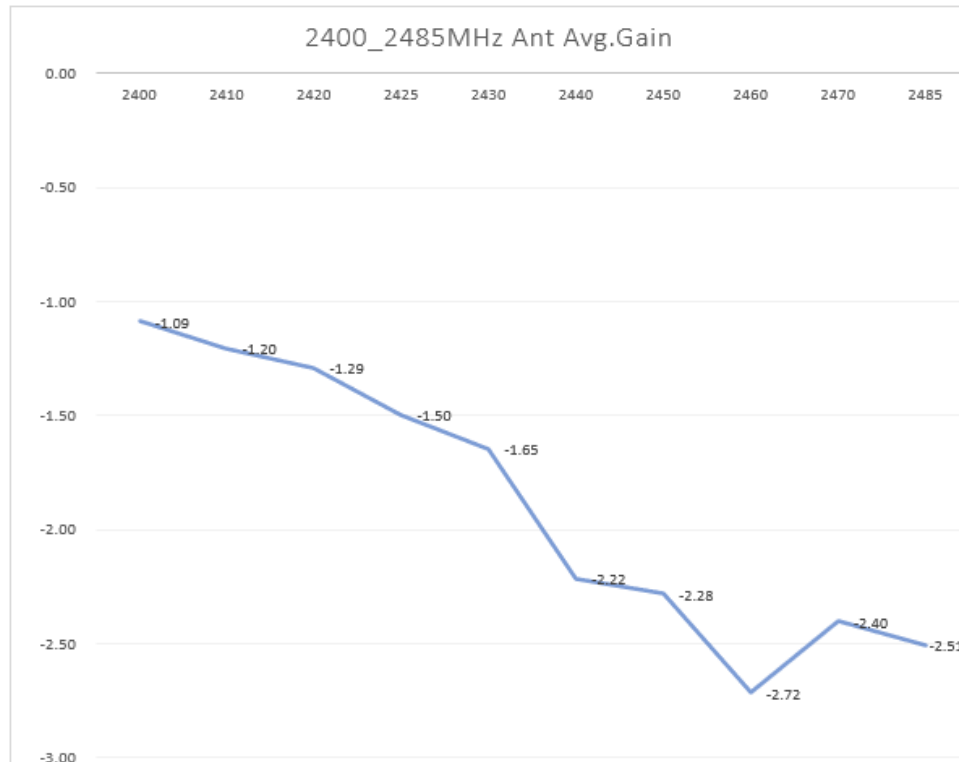
4.2 VSWR



FREQUENCY	2400	2425	2450	2485
VSWR	1.77	2.04	2.24	2.23

4.3 Passive Ant Gain

4.3.1 2400 ~ 2485MHz



4.4 Radiation Pattern

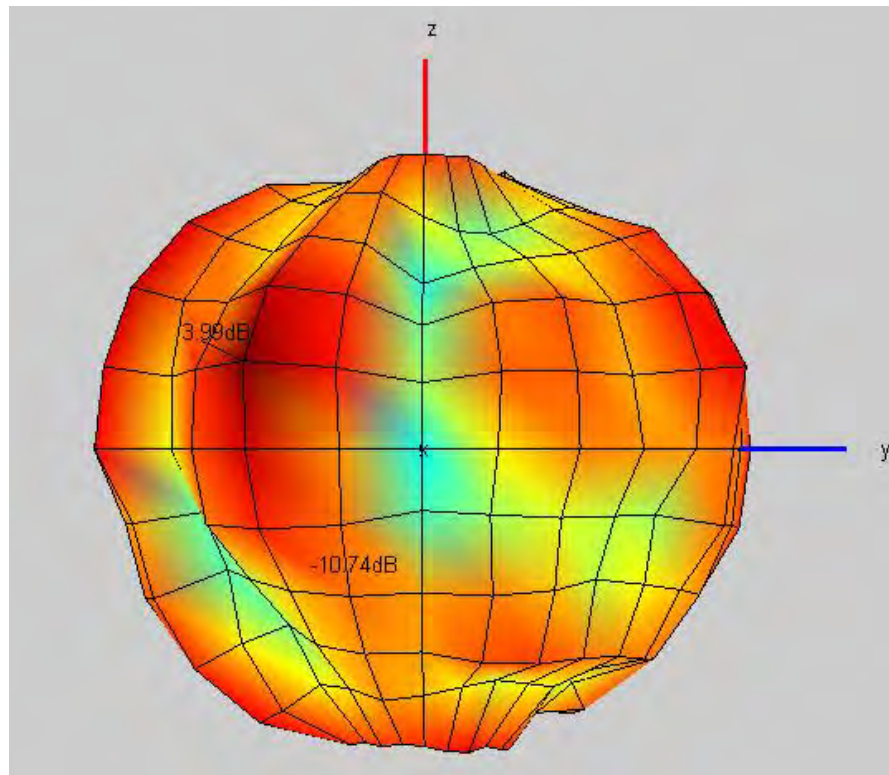


H plane : the tangent of XY

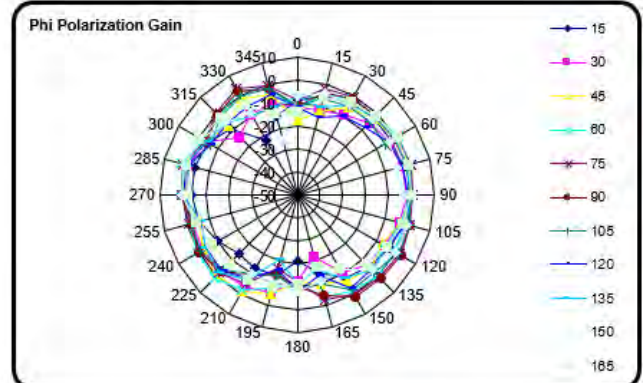
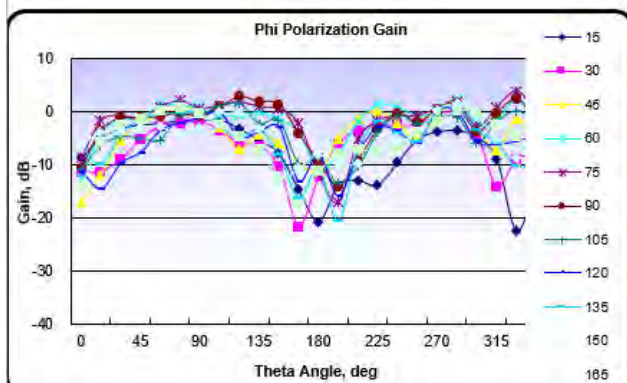
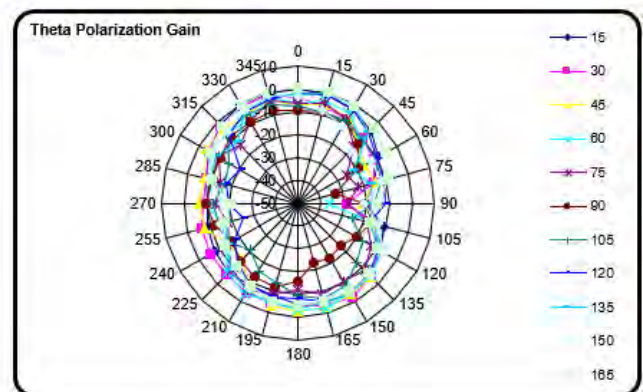
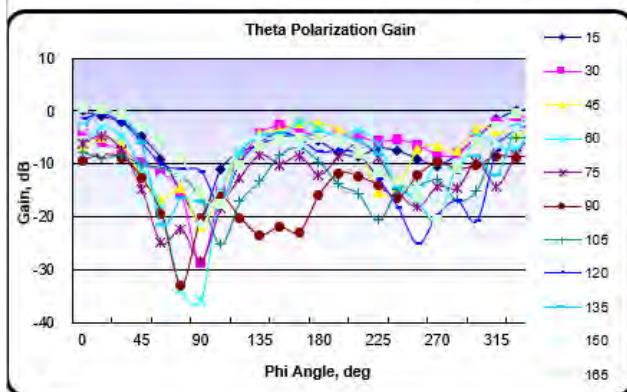
E1 plane : the tangent of XZ

E2 plane : the tangent of YZ

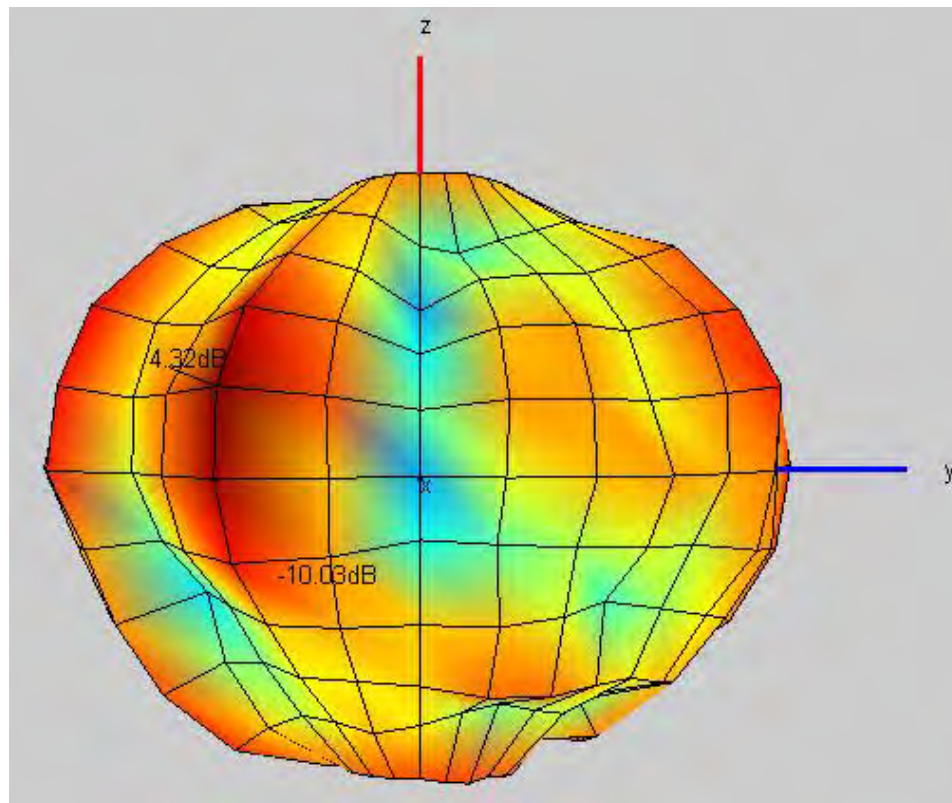
4.4.1 2400MHz



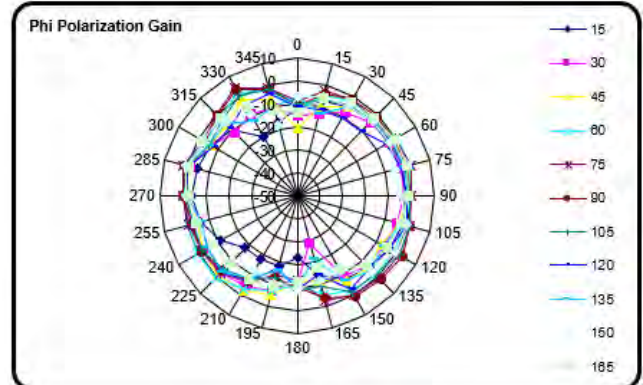
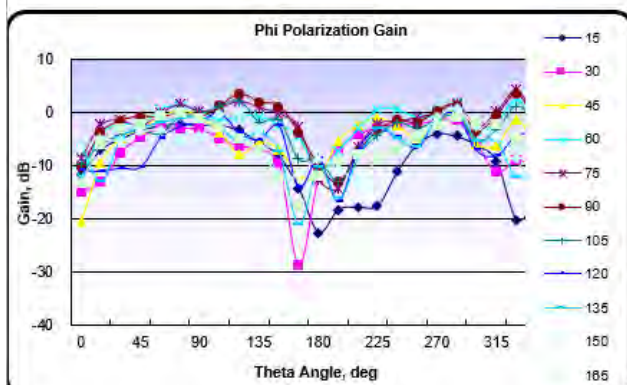
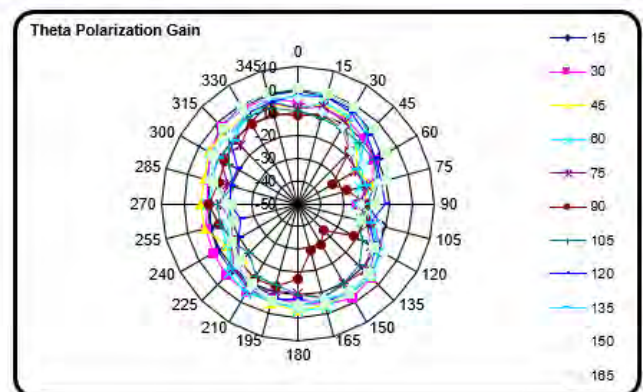
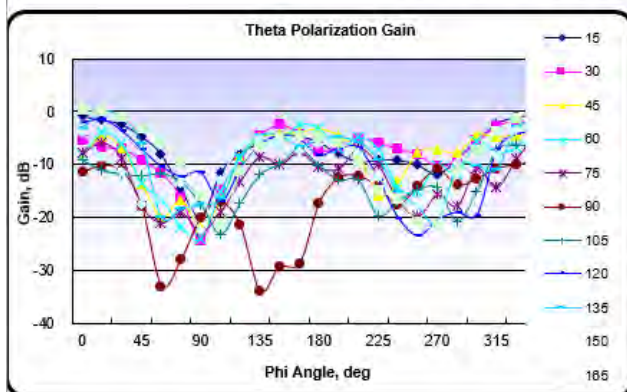
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



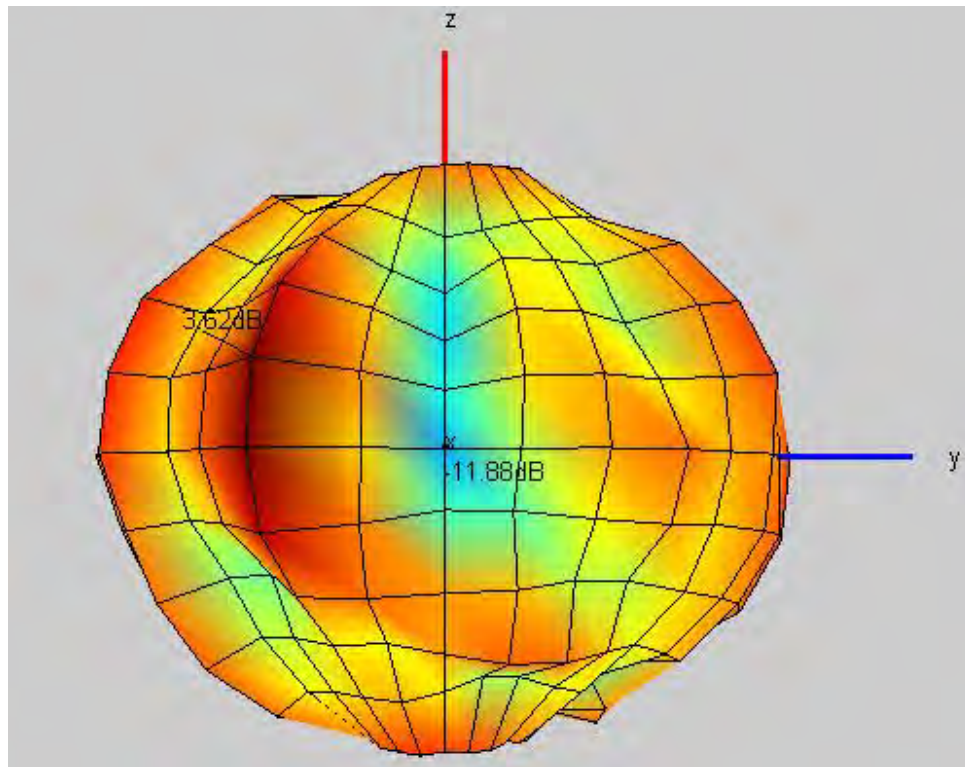
4.4.2 2425MHz



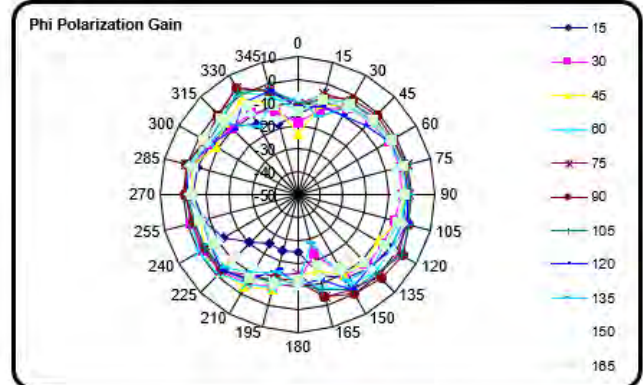
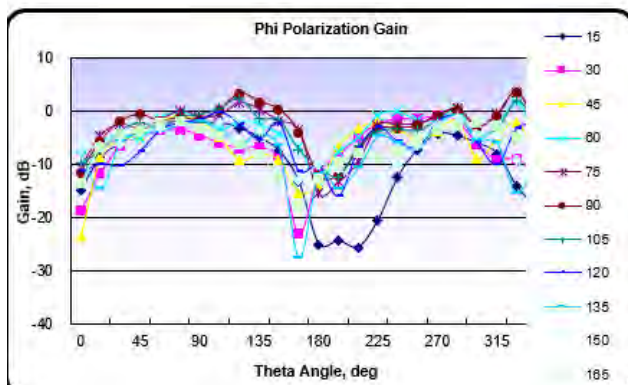
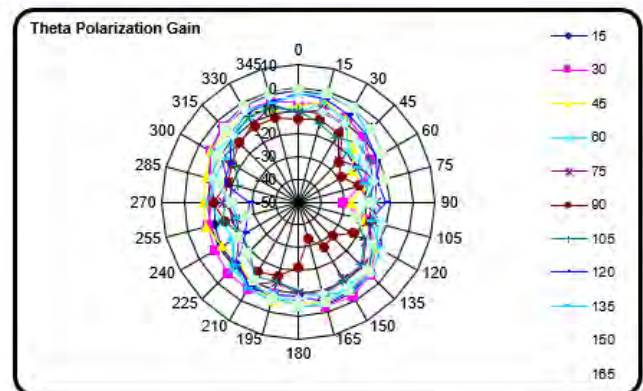
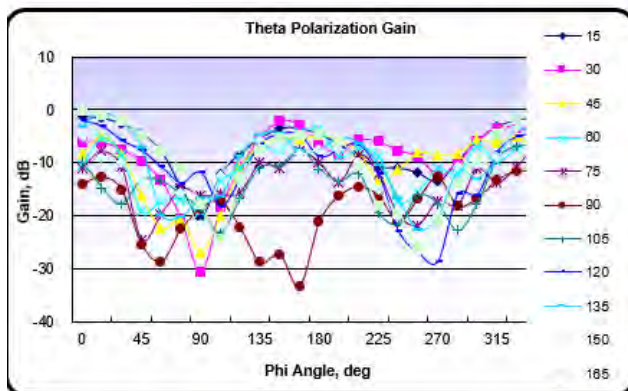
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



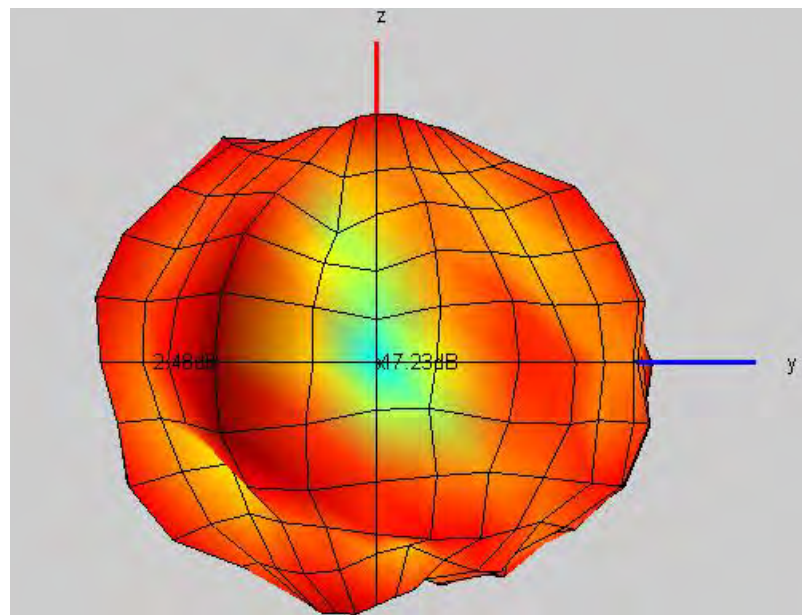
4.4.3 2450MHz



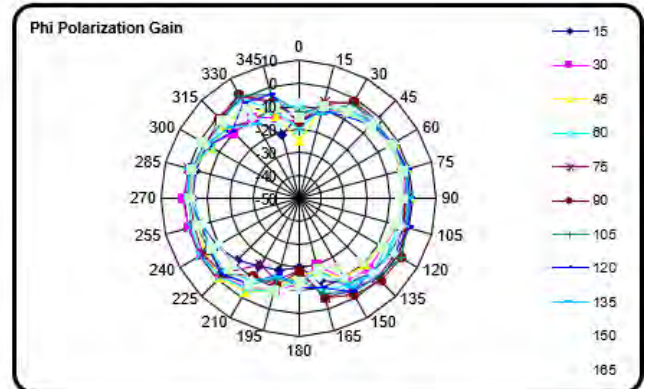
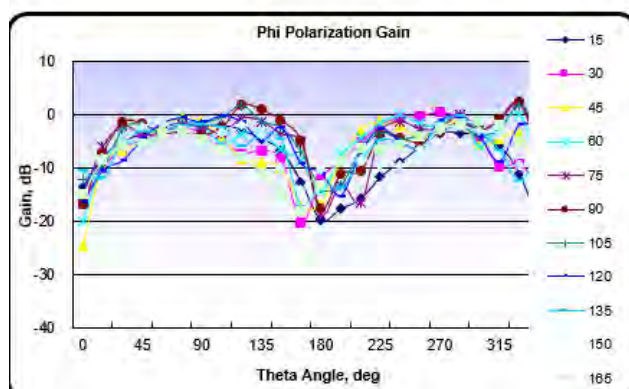
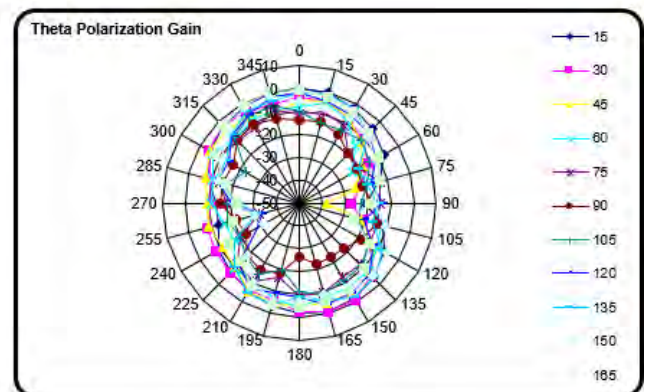
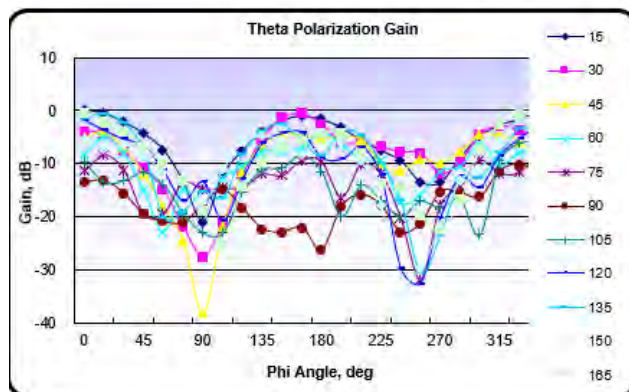
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



4.4.4 2485MHz



Efficiency(Graph of Theta-Polarization and Phi-Polarization)



5. Drawing

NO	PART NO	PART NAME	MATERIAL	QTY	FINISH/COLOR	REMARK
05		CABLE	IPEX, MHF1 Ø1.13 190mm	1		
04		PCB	FR-4, 0.8T	1		
03		PCB SUPPORT	PC-ABS / BLACK	1		
02		TILT	PC-ABS / BLACK	1		
01		BODY	PC-ABS / BLACK	1		

GENERAL TOLERANCE C	
1-4	±0.05
5-10	±0.10
11-15	±0.15
16-20	±0.20
21-25	±0.25
26-30	±0.30
31-35	±0.35
36-40	±0.40
41-45	±0.45
46-50	±0.50

UNIT	mm
1-4	±0.05
5-10	±0.10
11-15	±0.15
16-20	±0.20
21-25	±0.25
26-30	±0.30
31-35	±0.35
36-40	±0.40
41-45	±0.45
46-50	±0.50

SCALE	1/1
1/1	1/1

Date :2023.05.09

SPECIFICATION

Product Name	ANTENNA
Model Name	Chip Antenna (BLE)
Provider	RadiAnt
Part Code.	RFANT3216120A5T

	Submitted	Checked		Approved
Buyer				
RadiAnt	Submitted	Checked	Checked	Approved
				

– Table of Contents –

1. Product History	3
2. Electrical Feature	4
2.1 Product Feature	
2.2 Frequency Band	
2.3 Impedance	
2.4 Detailed Passive Electrical SPEC	
2.5 Maximum Power	
3. Environment Test	6
4. Overall Performance	8
4.1 Test Environment	
4.2 VSWR	
4.3 Passive Ant Gain & Efficiency	
4.4 Radiation Pattern	
4.4.1 2400MHz	
4.4.2 2425MHz	
4.4.3 2450MHz	
4.4.4 2485MHz	
5. Drawing	16

1. Product History

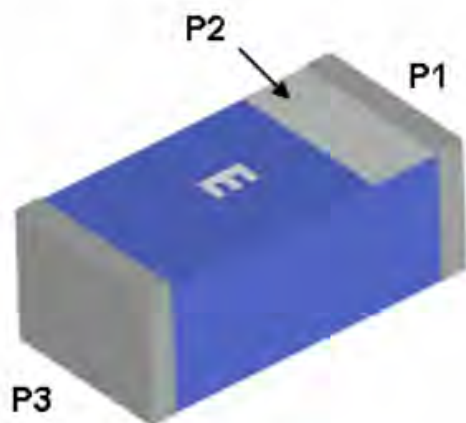
LIST					
NO	Data	Front	After	Change	REV
1	2023.03.27			Approval	0
2	2023.05.09			Data 추가(Avg.Gain & Peak Gain)	1
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Product Features

- 2.4GHz CHIP ANT
- 2.4GHz ISM Band RF Application
- Provider Walsin Technology corporation

CONSTRUCTION



PIN	Connection
1	Feeding
2	Identification Mark
3	Soldering terminal

2.2. Frequency Band.

Frequency Range	2400 ~ 2485MHz
-----------------	----------------

2.3 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.4 Detailed Passive Electrical Spec

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

Frequency Range	2400 ~ 2485MHz			
FREQUENCY	2400	2425	2450	2485
VSWR	3.51	2.24	1.42	2.06
AVG.Gain[dBi]	-7.68	-6.47	-5.86	-6.28
Peak Gain[dBi]	-2.10	-0.53	0.07	-0.94

2.5 Maximum Power

- $P=2W$ Under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C , $+80^{\circ}\text{C}$

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and $+80^{\circ}\text{C}$ for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = $+80^{\circ}\text{C}$
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

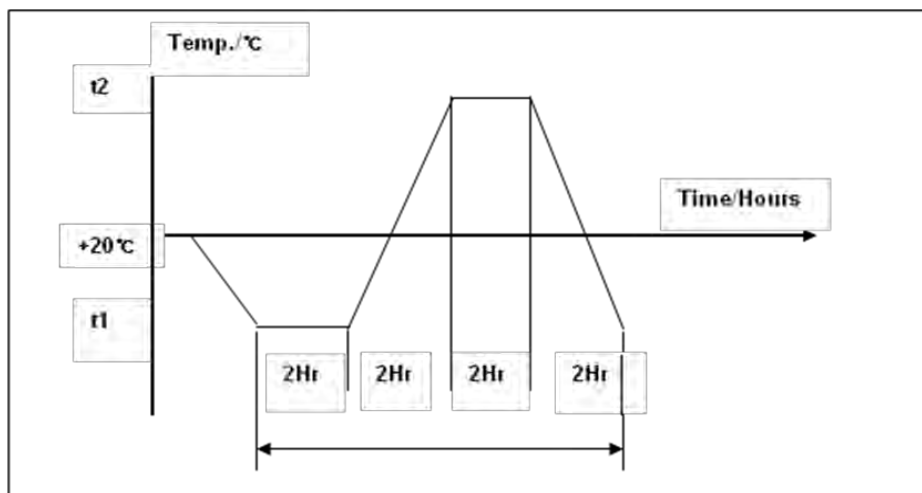


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

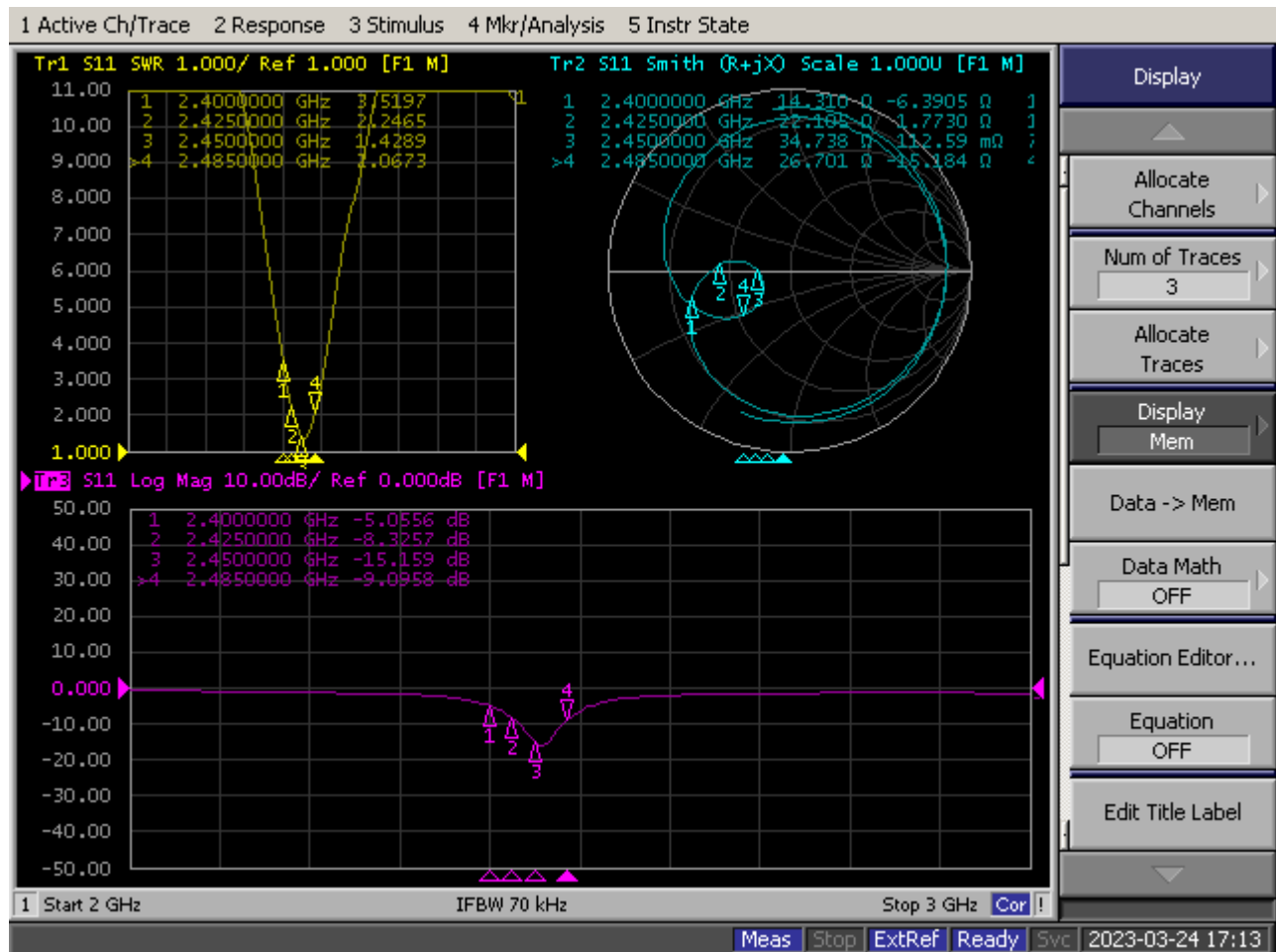
4. Overall Performance

4.1 Test Environment

- ENA Series Network Analyzer E5071C , 100KHz ~ 8.5GHz
- 3D Anechoic chamber 400MHz ~ 6GHz



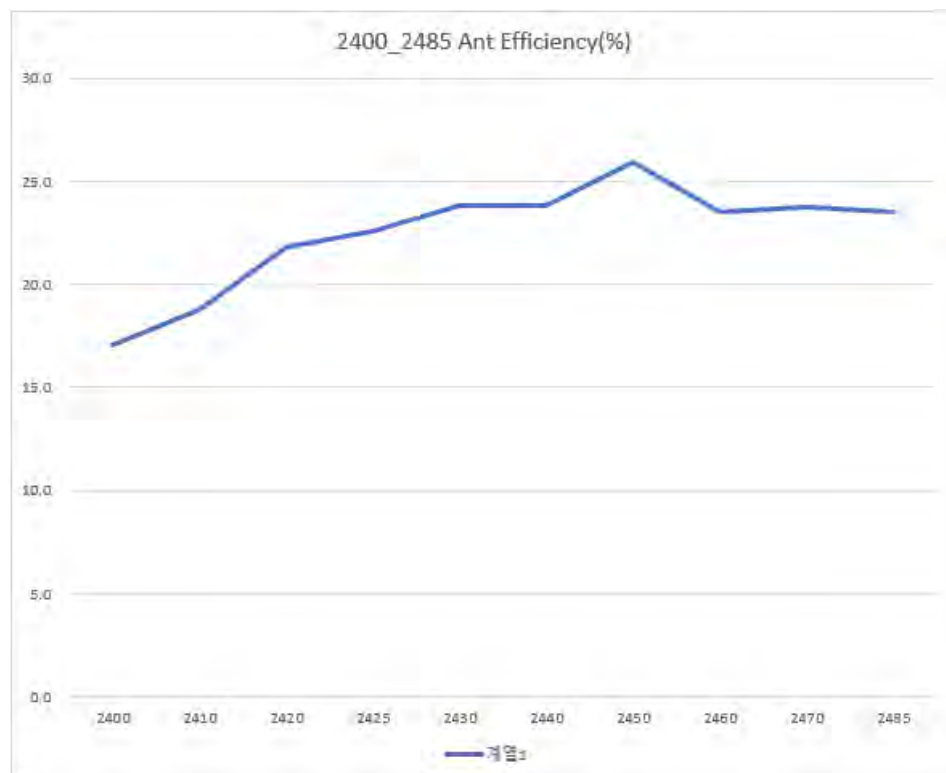
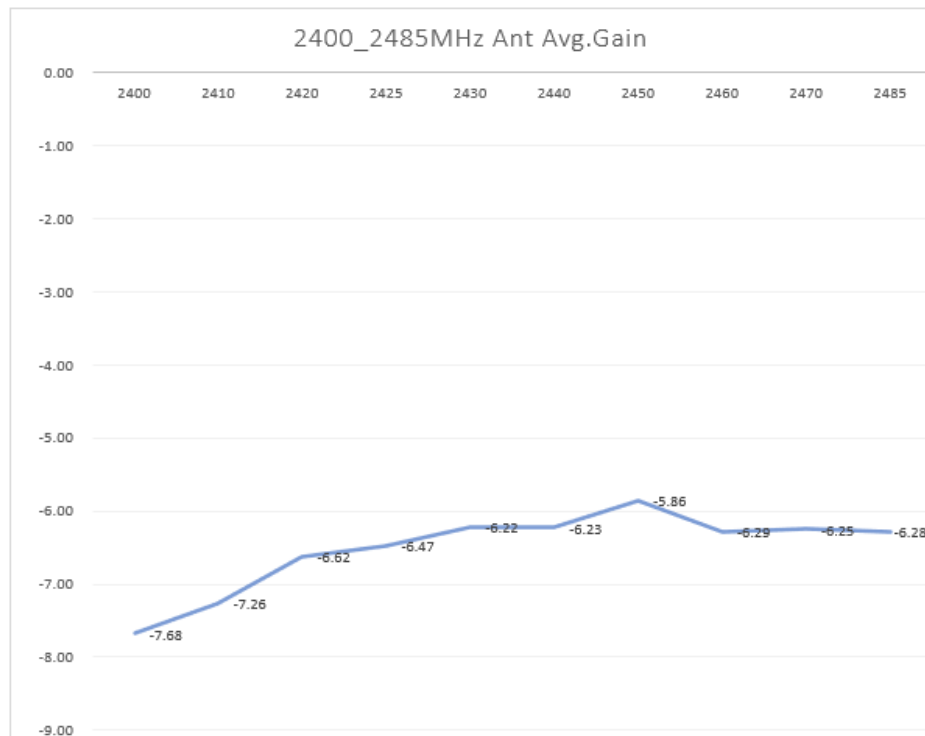
4.2 VSWR



FREQUENCY	2400	2425	2450	2485
VSWR	3.51	2.24	1.42	2.06

4.3 Passive Ant Gain

4.3.1 2400 ~ 2485MHz

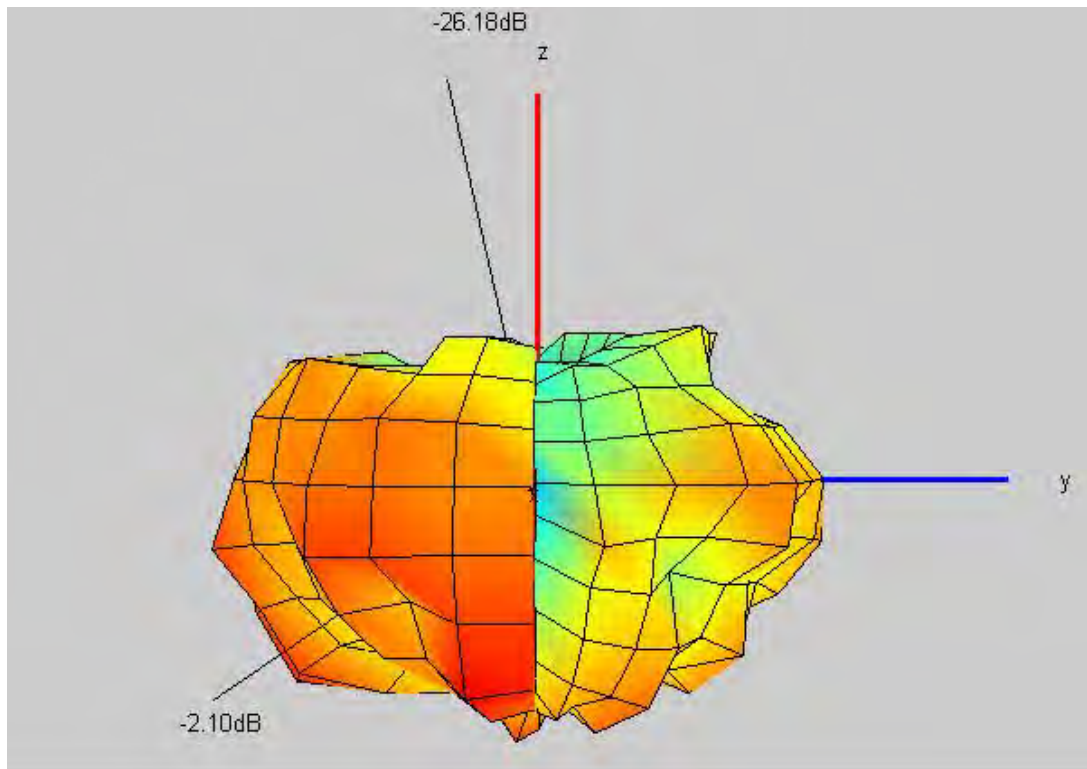


4.4 Radiation Pattern

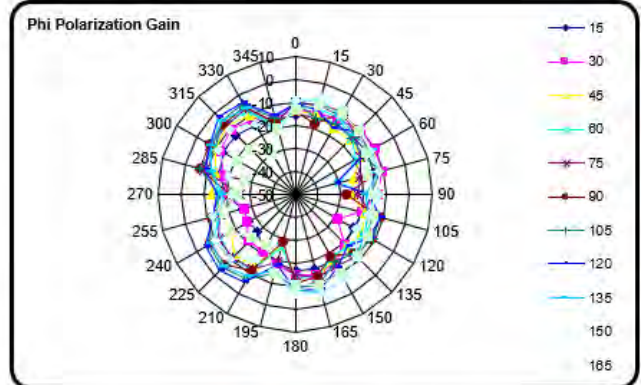
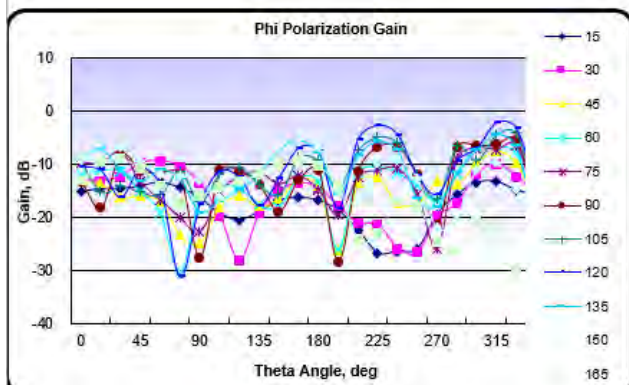
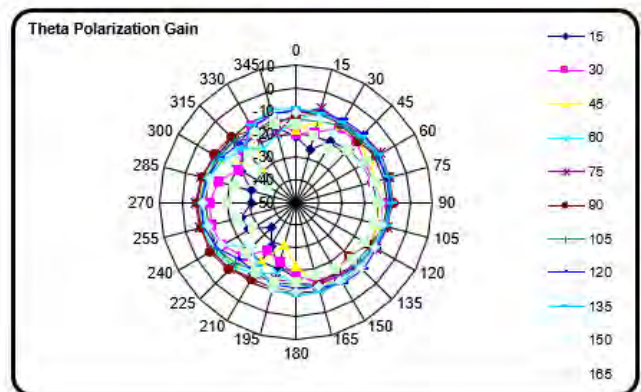
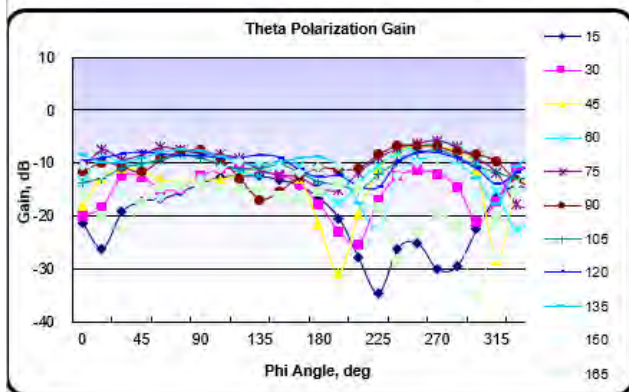


H plane : the tangent of XY
E1 plane : the tangent of XZ
E2 plane : the tangent of YZ

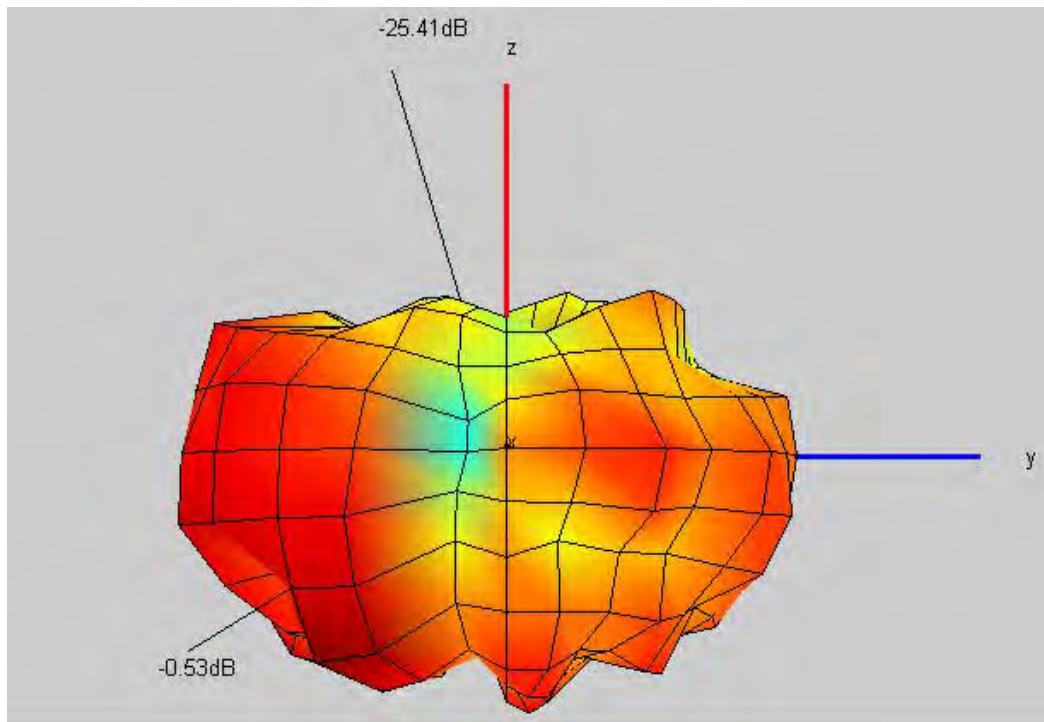
4.4.1 2400MHz



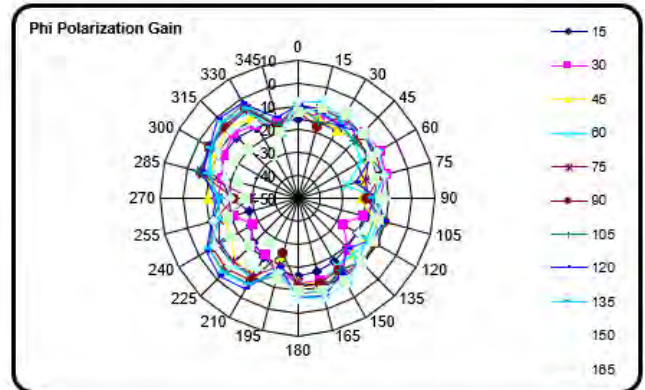
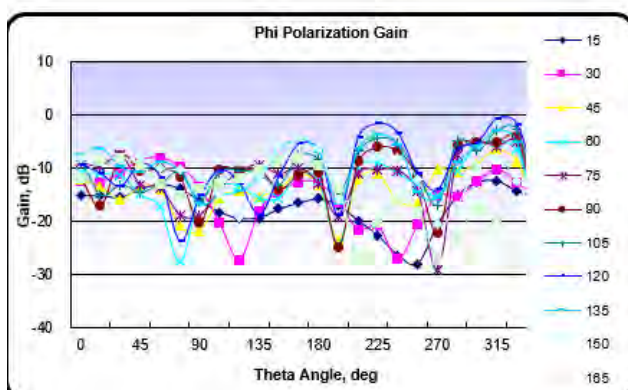
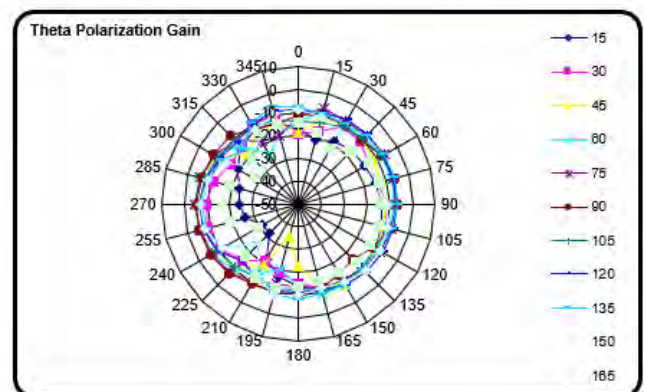
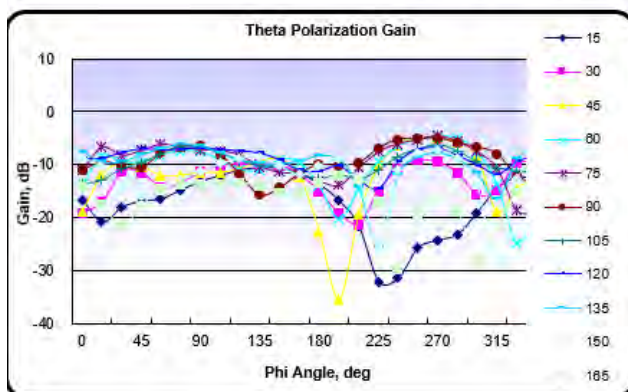
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



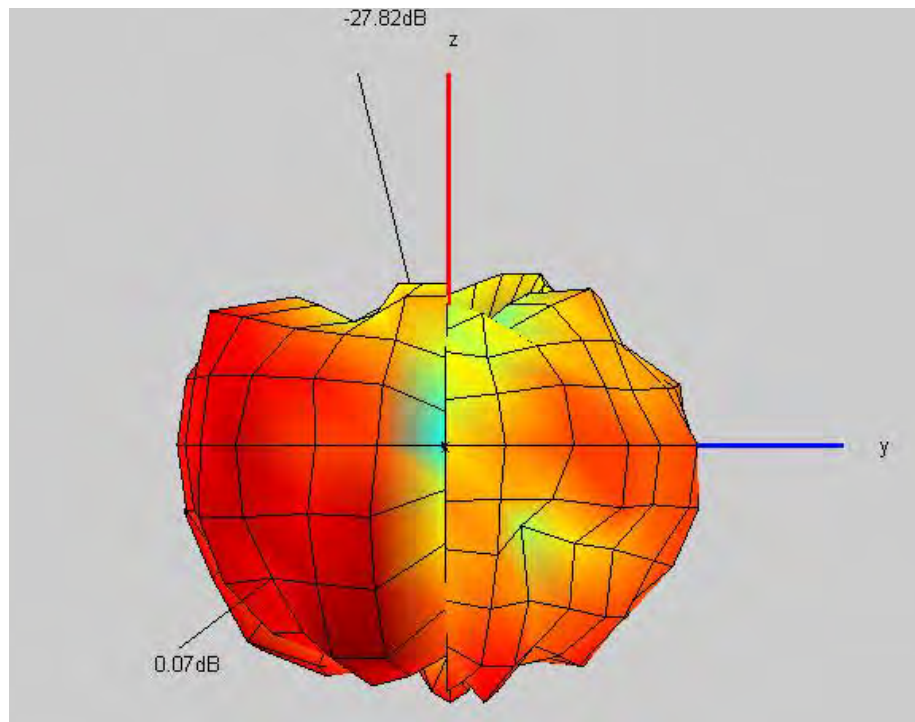
4.4.2 2425MHz



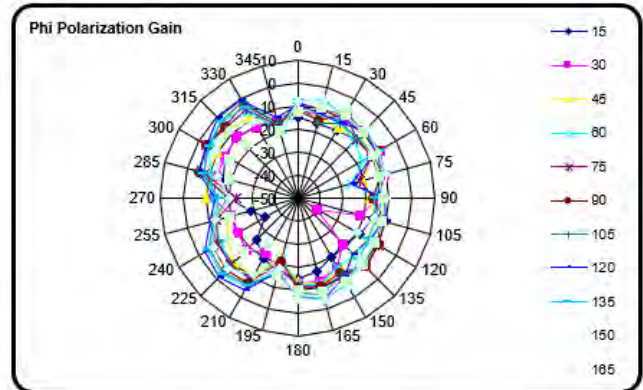
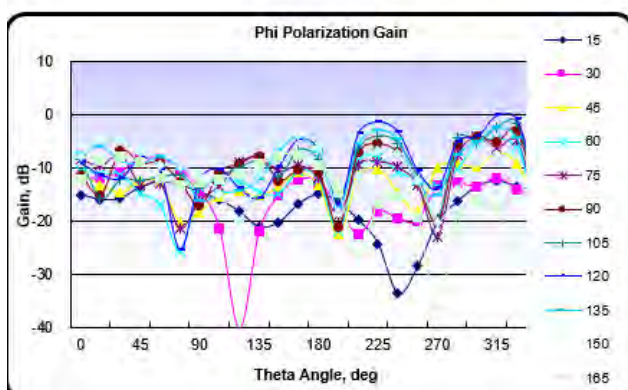
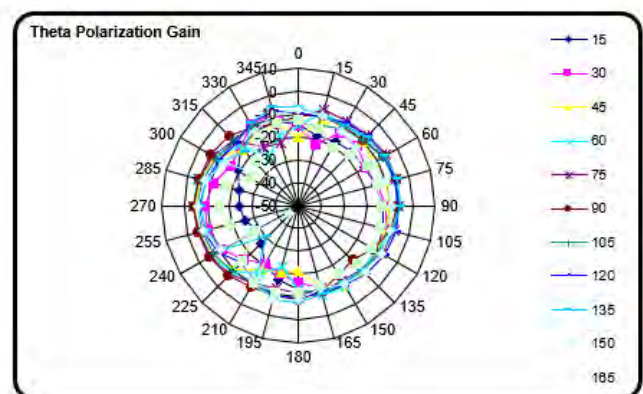
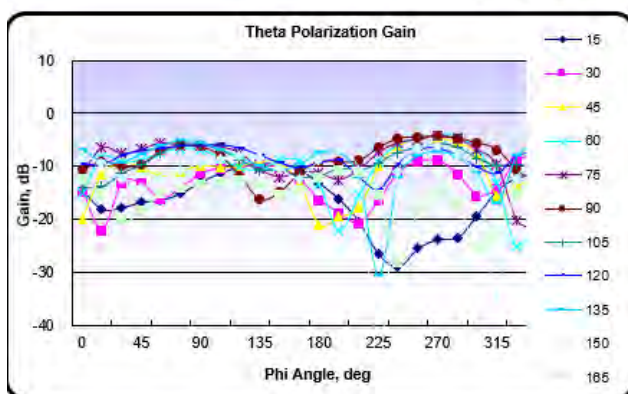
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



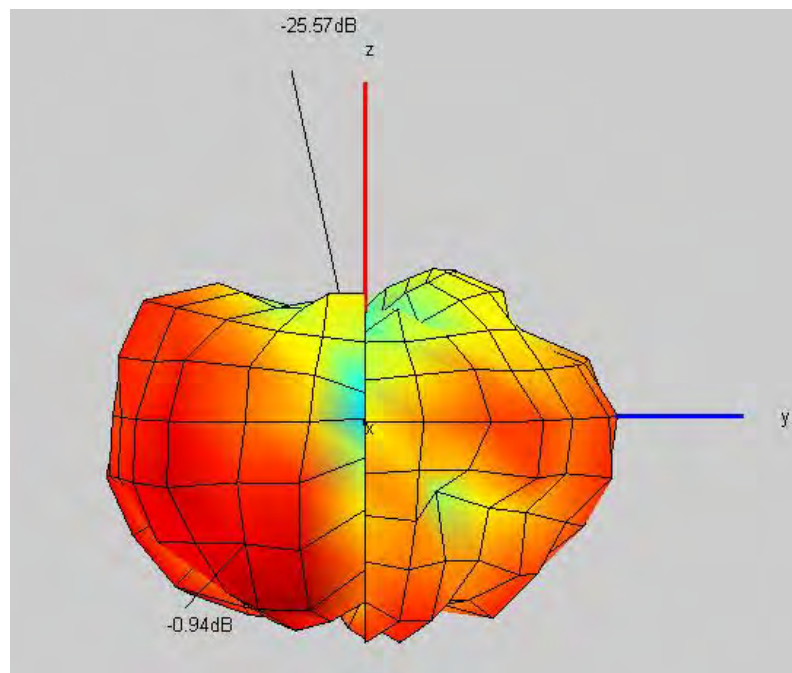
4.4.3 2450MHz



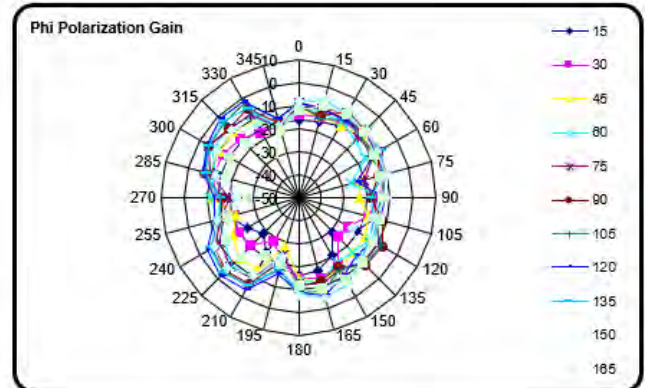
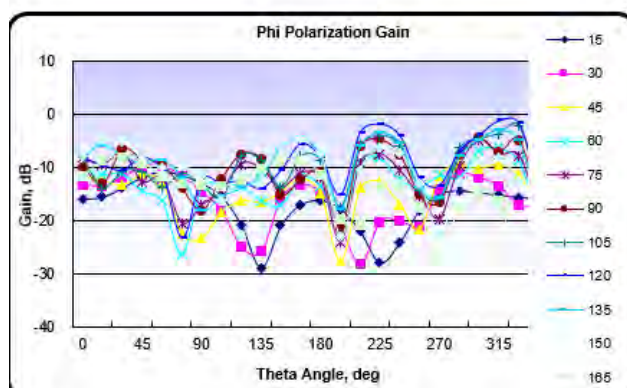
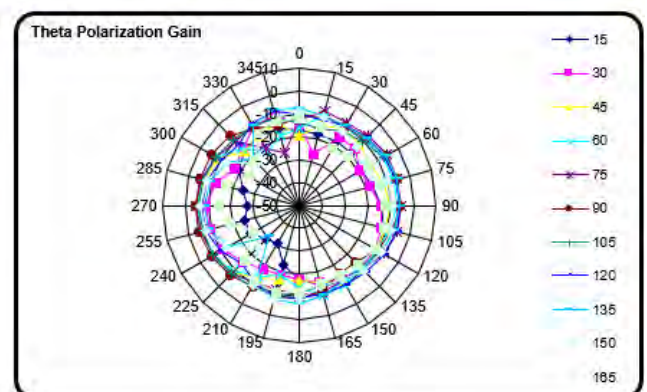
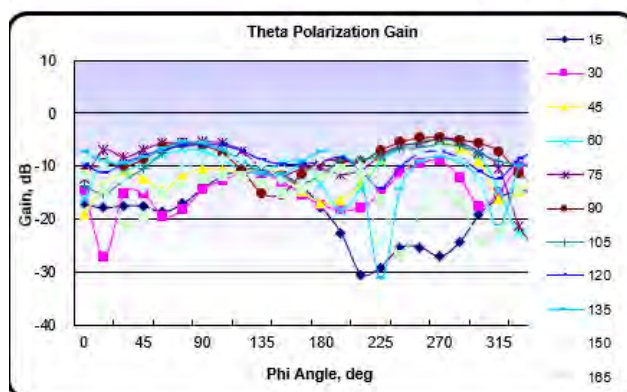
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



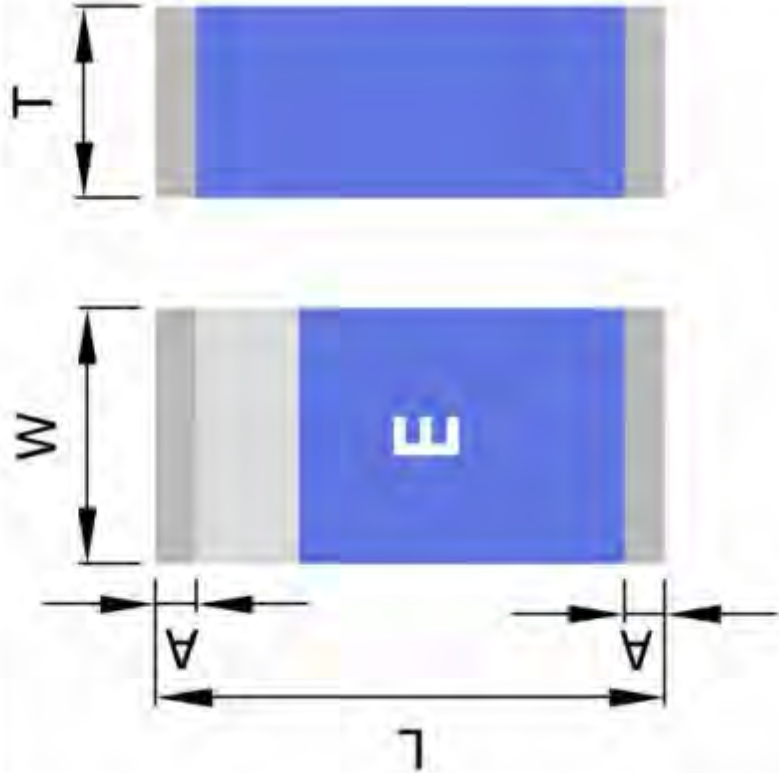
4.4.4 2485MHz



Efficiency(Graph of Theta-Polarization and Phi-Polarization)



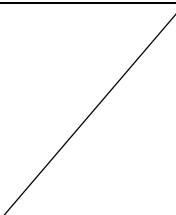
5. Drawing

Figure	Symbol	Dimension (mm)
	L	3.20 ± 0.20
	W	1.60 ± 0.10
	T	1.20 ± 0.10
	A	0.25 ± 0.15

Date :2023.05.09

SPECIFICATION

Product Name	ANTENNA
Model Name	External Antenna
Provider	RadiAnt
Part Code.	9200000-00204

	Submitted	Checked		Approved
Buyer				
RadiAnt	Submitted	Checked	Checked	Approved
				

– Table of Contents –

1. Product History	3
2. Electrical Feature	4
2.1 Product Feature	
2.2 Frequency Band	
2.3 Impedance	
2.4 Detailed Passive Electrical SPEC	
2.5 Maximum Power	
3. Environment Test	6
4. Overall Performance	8
4.1 Test Environment	
4.2 VSWR	
4.3 Passive Ant Gain & Efficiency	
4.4 Radiation Pattern	
4.4.1 700MHz	
4.4.2 850MHz	
4.4.3 960MHz	
4.4.4 1710MHz	
4.4.5 1920MHz	
4.4.6 2170MHz	
4.4.7 2350MHz	
4.4.8 2580MHz	
4.4.9 2655MHz	
5. Drawing	23

1. Product History

LIST					
NO	Data	Front	After	Change	REV
1	2023.03.24			Approval	0
2	2023.05.09			Data 추가(Avg.Gain & Peak Gain)	1
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Product Features

- Multi Band LTE
- High efficiency
- Excellent performance



2.2. Frequency Band.

Frequency Range	700 ~ 960MHz, 1710 ~ 2655MHz
-----------------	------------------------------

2.3 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.4 Detailed Passive Electrical Spec

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

Frequency Range	700 ~ 960MHz, 1710 ~ 2655MHz								
FREQUENCY	700	850	960	1710	1920	2170	2350	2580	2655
VSWR	6.09	1.93	2.72	1.23	1.61	1.99	1.15	1.80	2.33
AVG.Gain[dBi]	-5.01	-0.86	-2.83	-1.00	-0.30	-2.21	-1.90	-2.88	-4.28
Peak Gain[dBi]	-1.53	4.14	2.83	6.32	6.13	4.78	3.05	2.29	1.48

2.5 Maximum Power

- $P=2W$ Under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C, +80°C

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and +80°C for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = +80°C
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

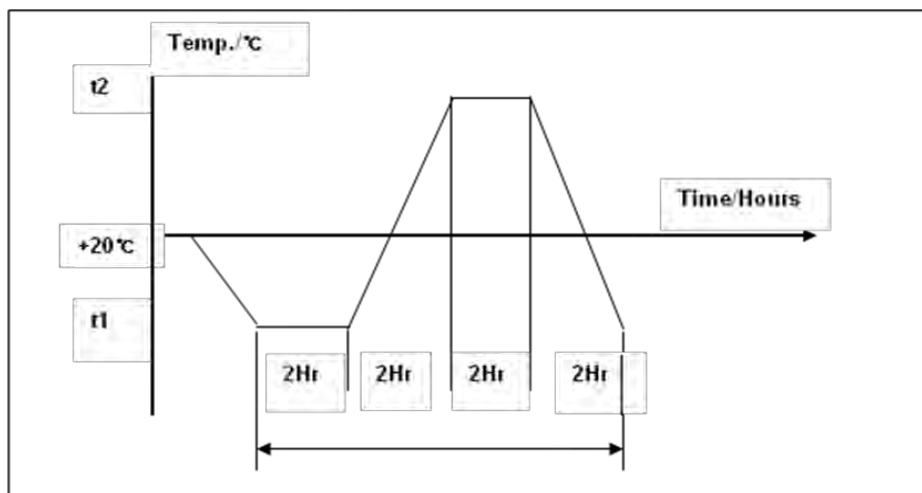


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

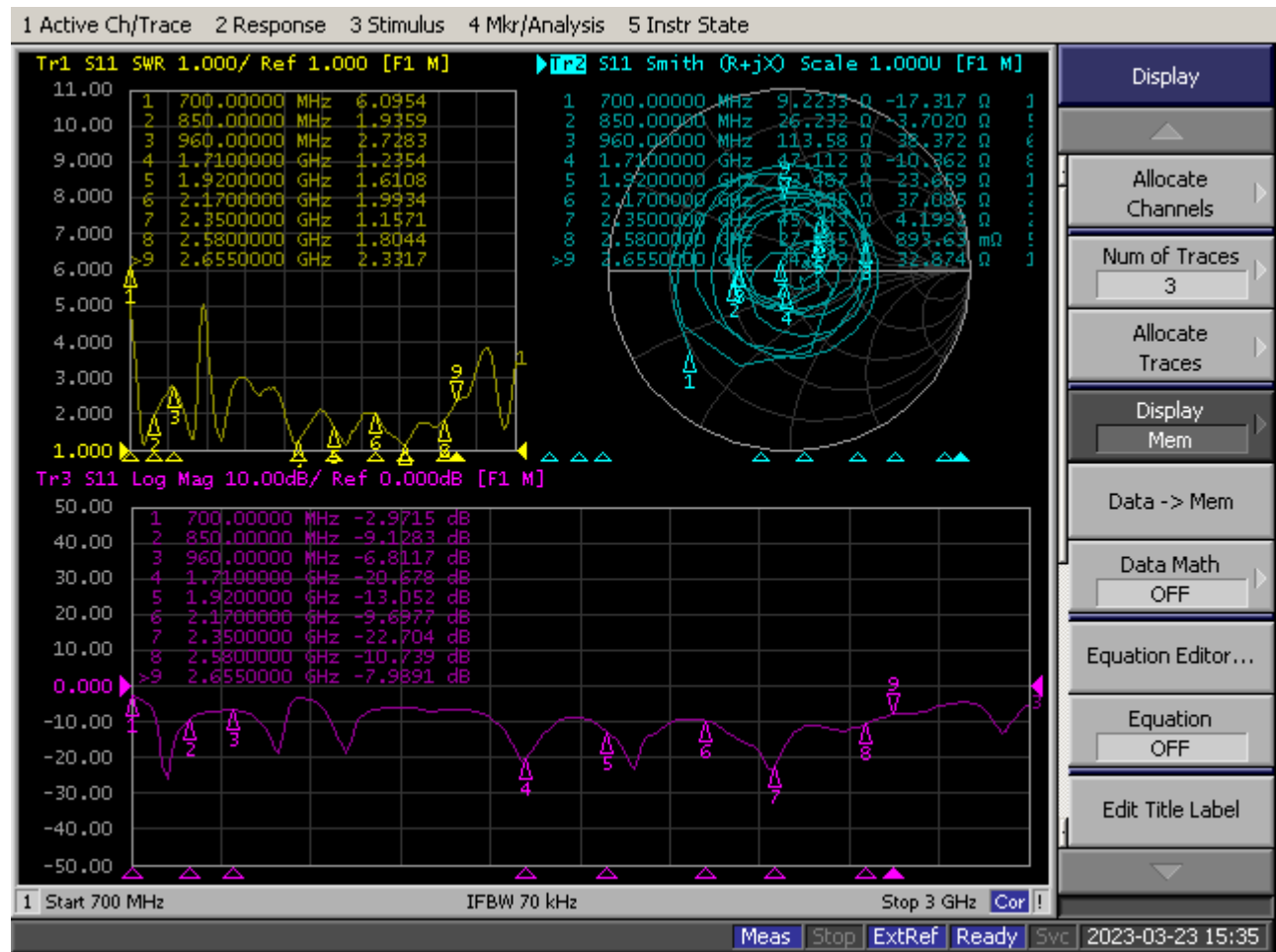
4. Overall Performance

4.1 Test Environment

- ENA Series Network Analyzer E5071C , 100KHz ~ 8.5GHz
- 3D Anechoic chamber 400MHz ~ 6GHz



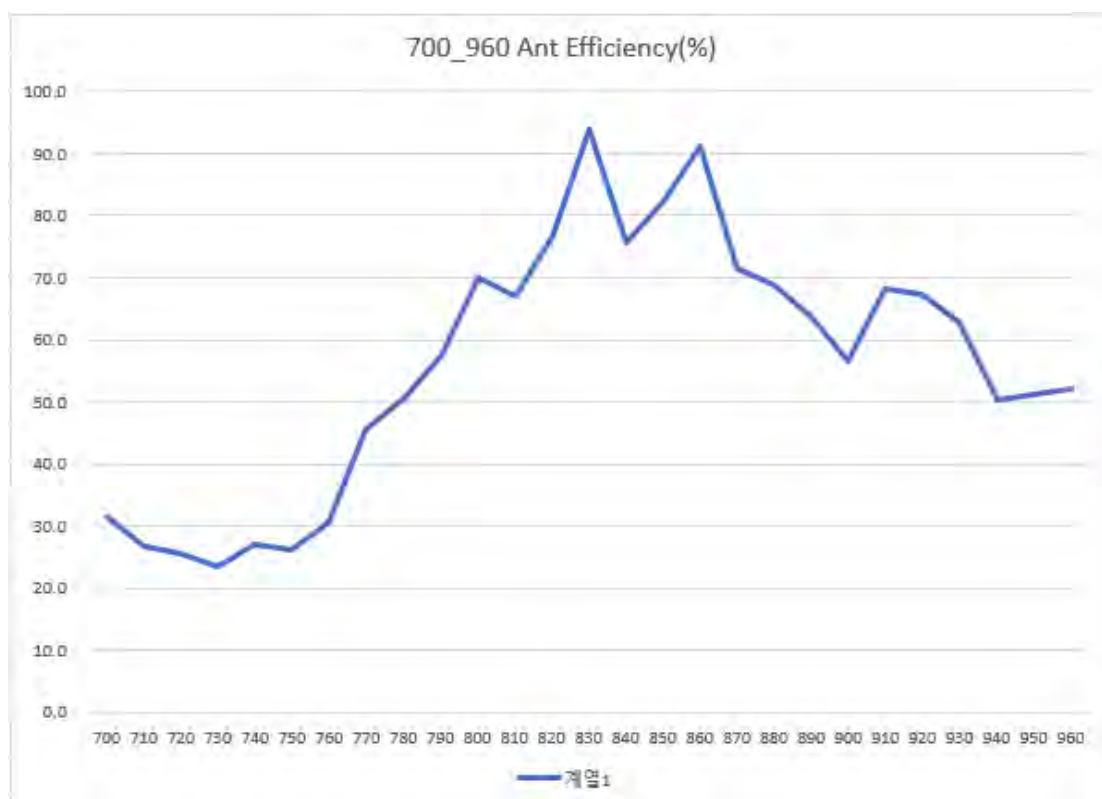
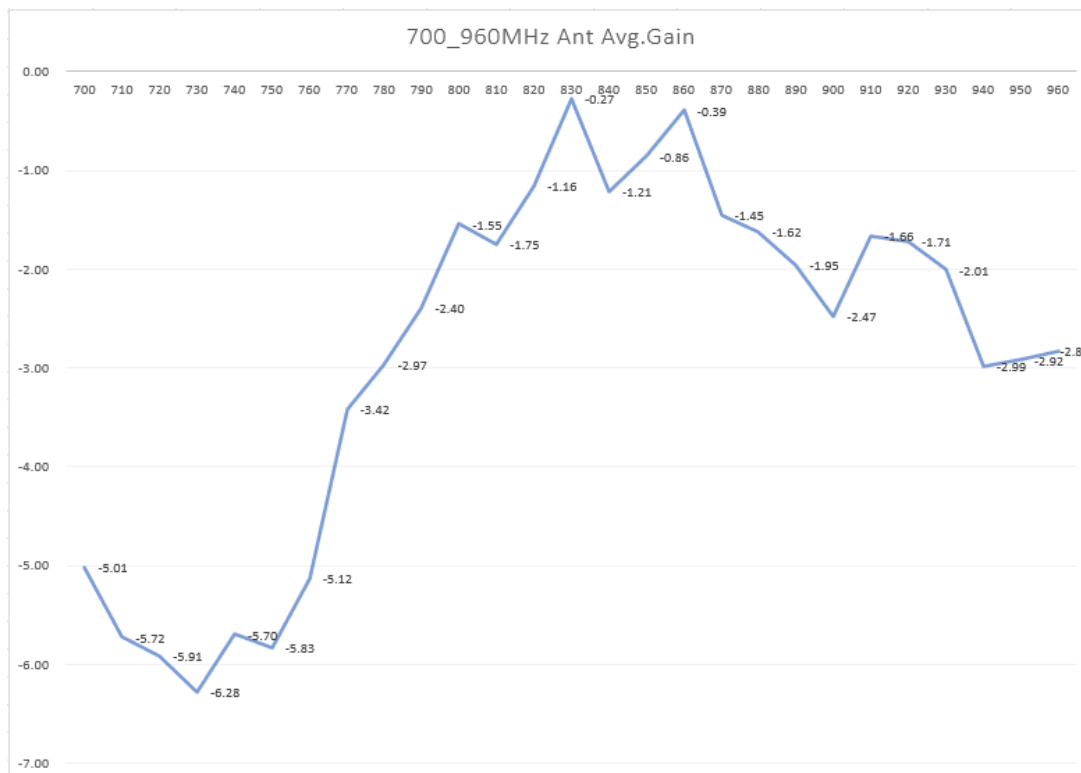
4.2 VSWR



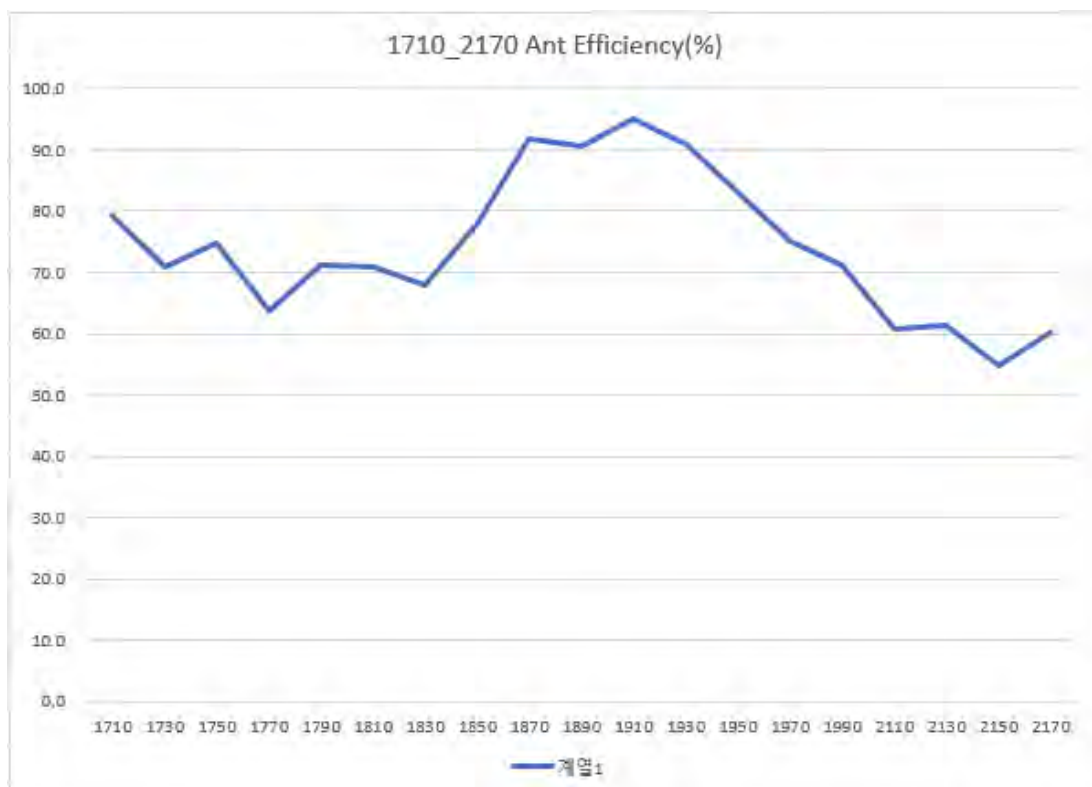
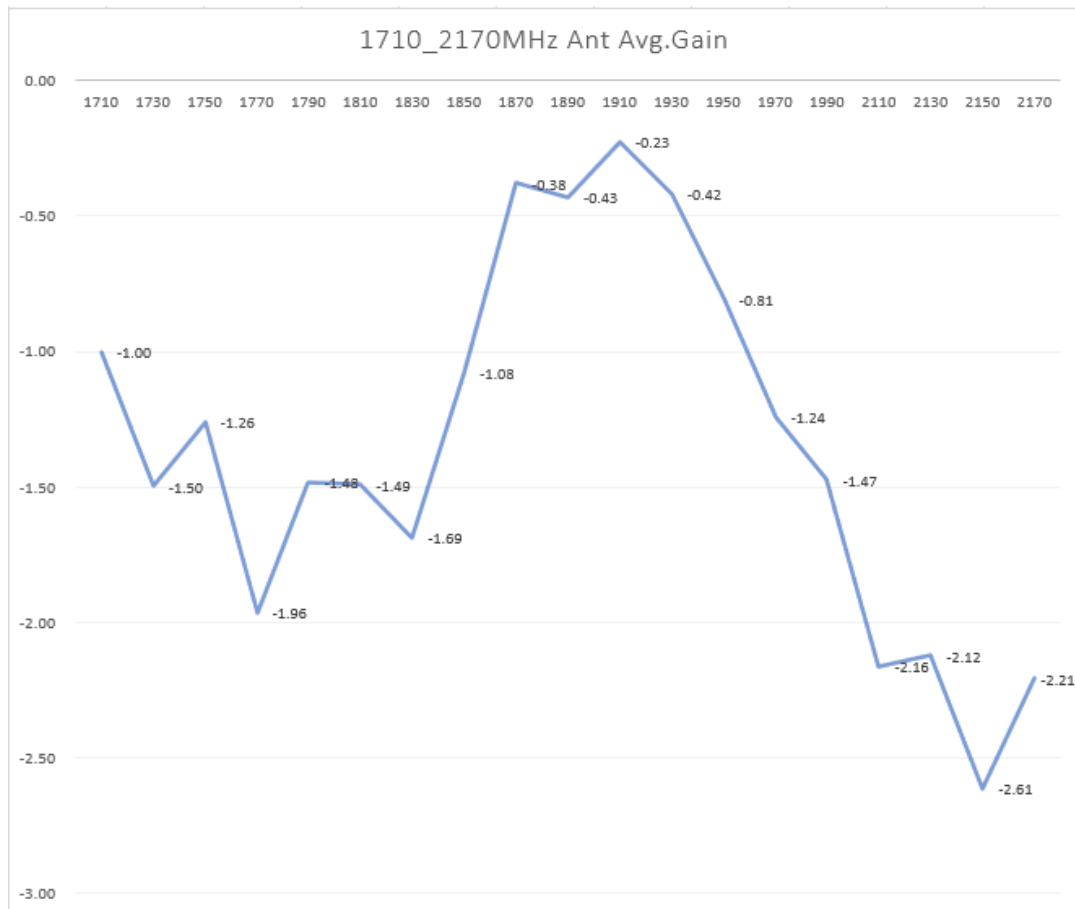
FREQUENCY	700	850	960	1710	1920	2170	2350	2580	2655
VSWR	6.09	1.93	2.72	1.23	1.61	1.99	1.15	1.80	2.33

4.3 Passive Ant Gain

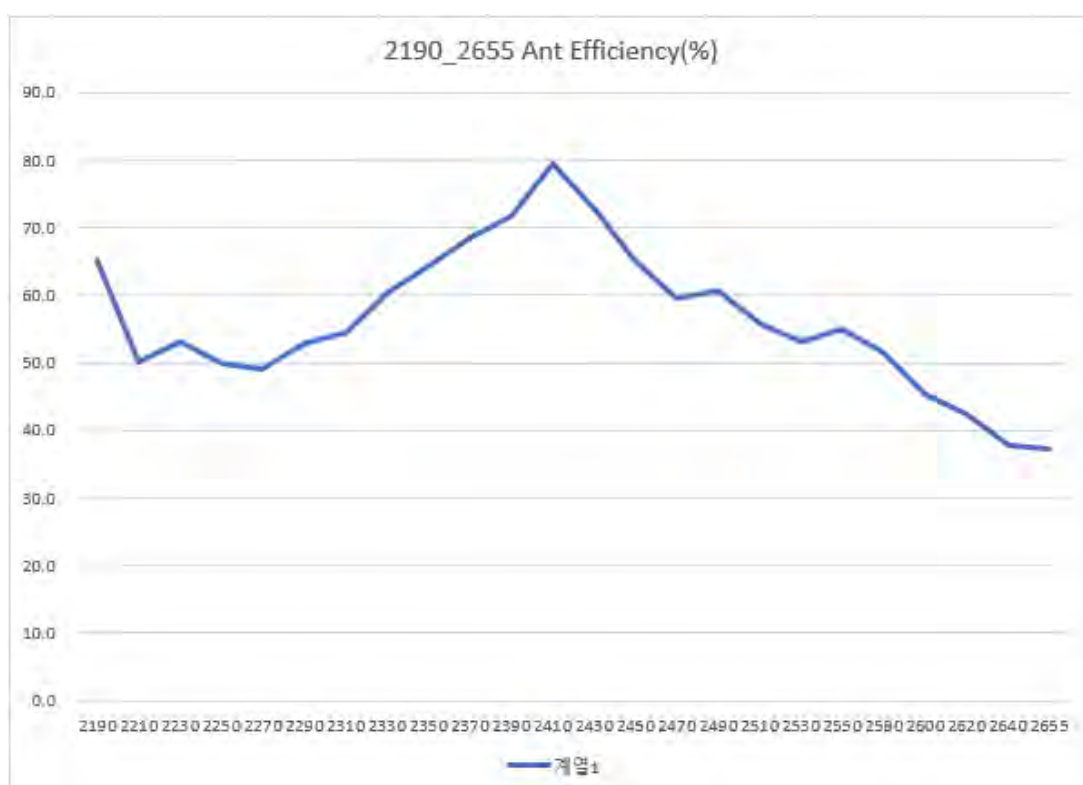
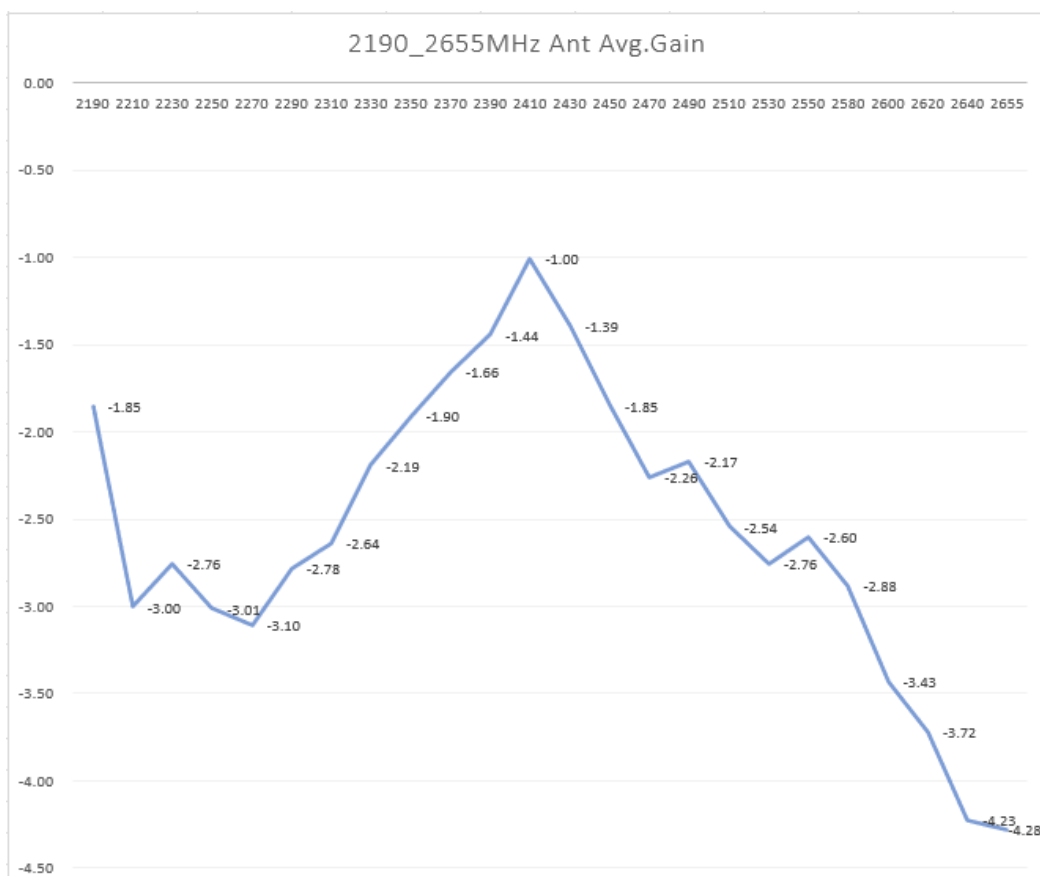
4.3.1 700 ~ 960MHz



4.3.2 1710 ~ 2170MHz



4.3.3 2190 ~ ~ 2655MHz



4.4 Radiation Pattern

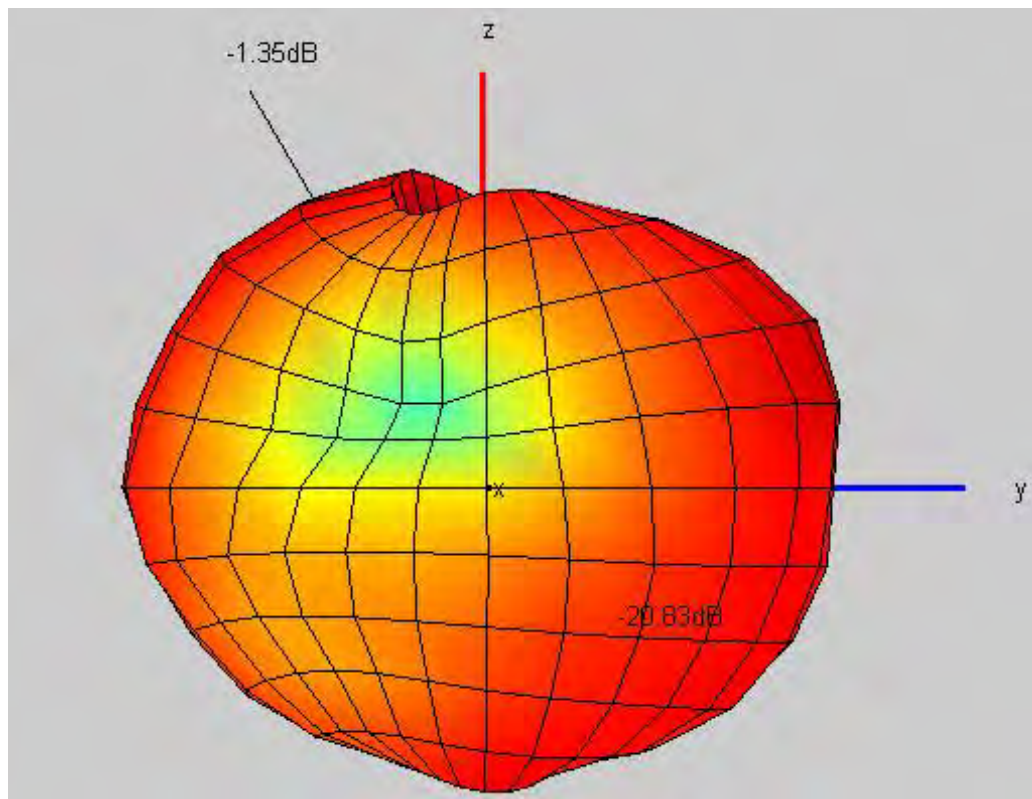


H plane : the tangent of XY

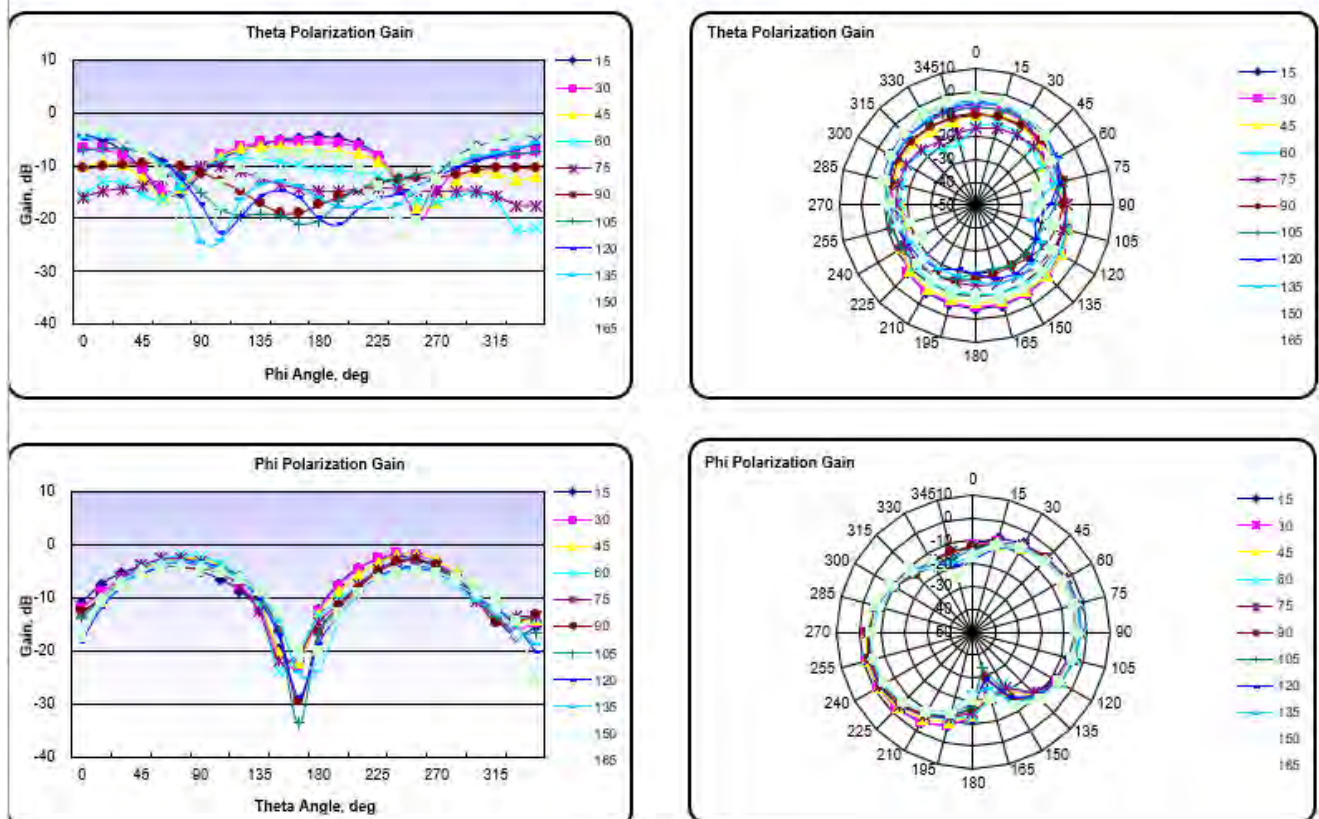
E1 plane : the tangent of XZ

E2 plane : the tangent of YZ

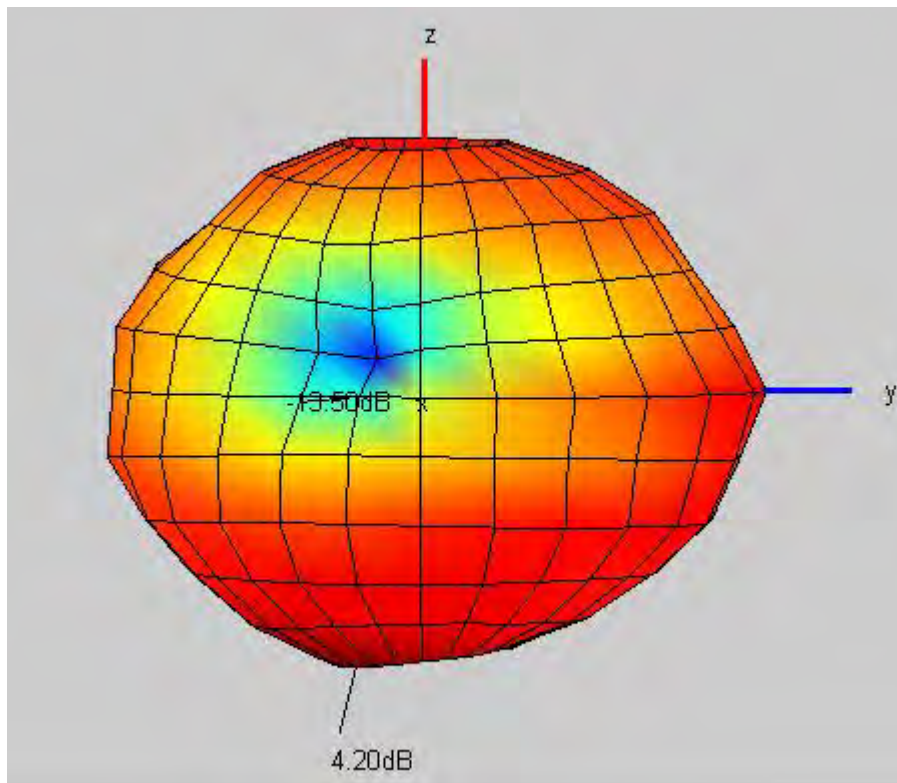
4.4.1 700MHz



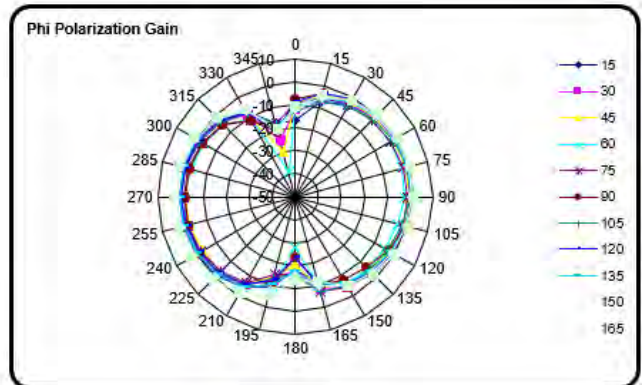
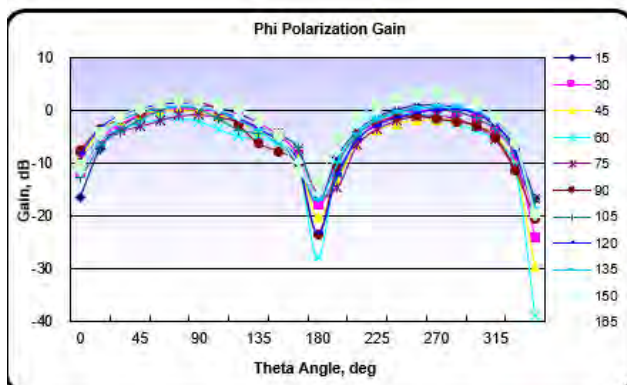
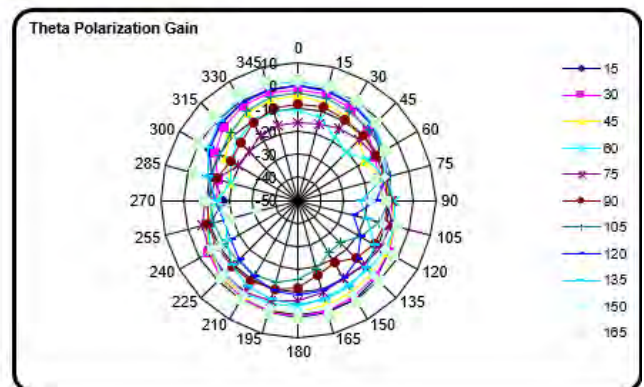
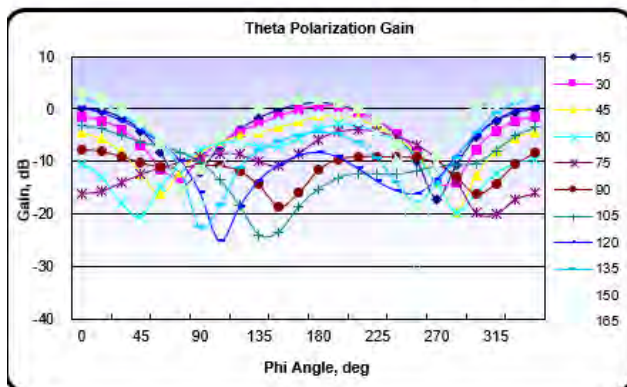
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



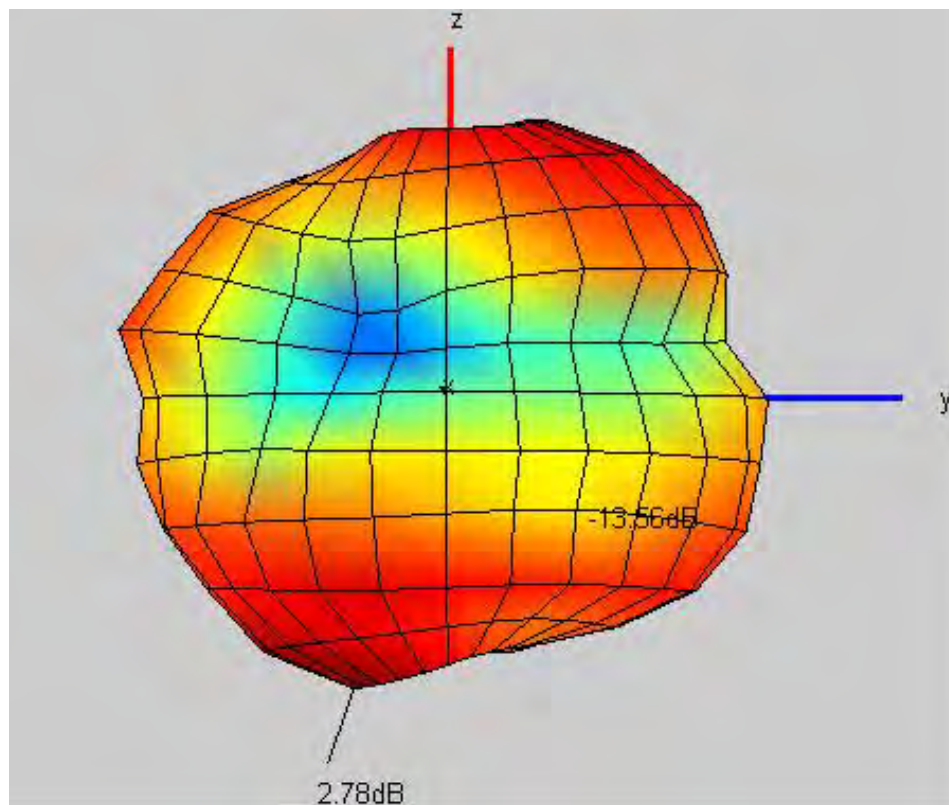
4.4.2 850MHz



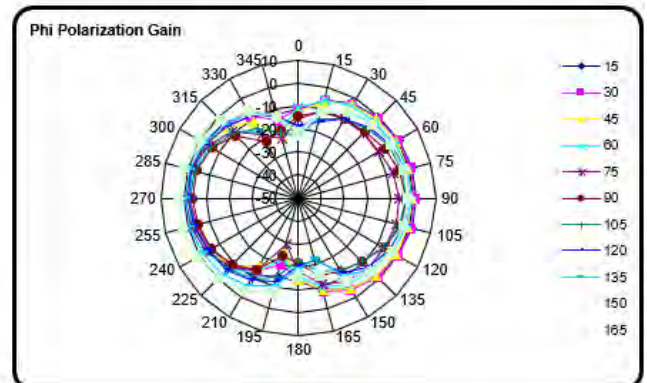
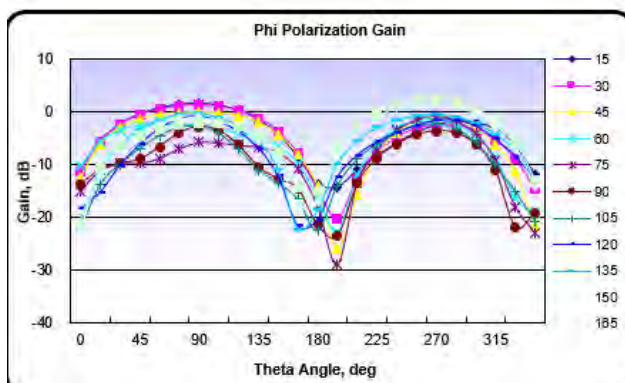
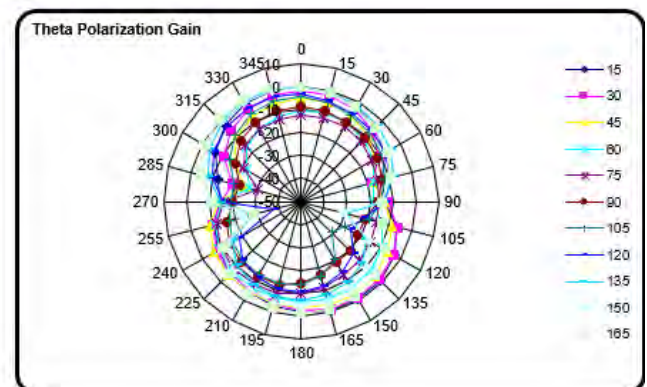
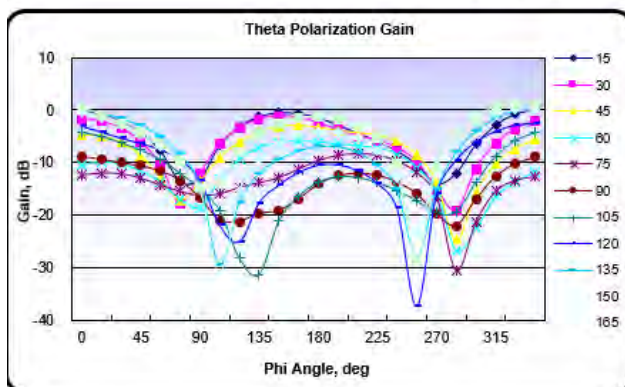
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



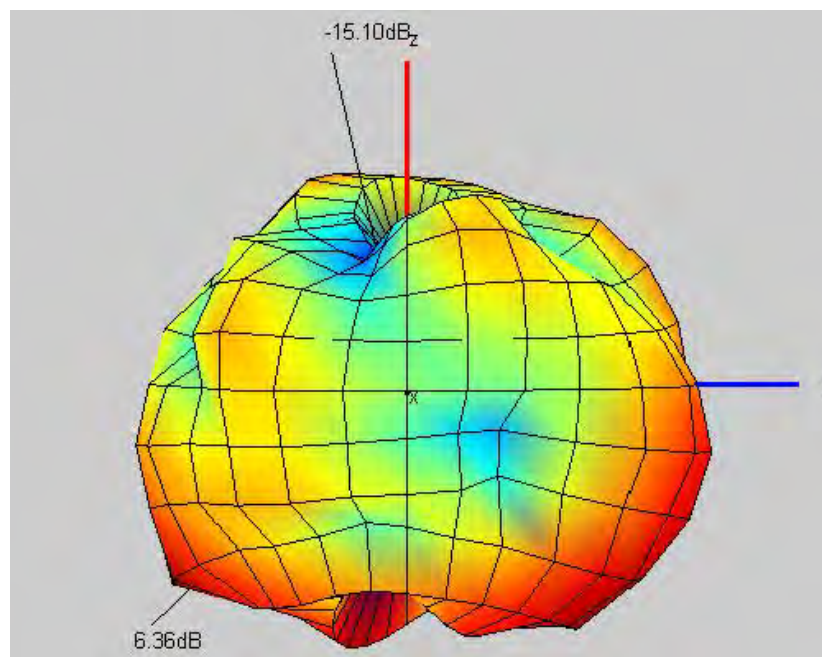
4.4.3 960MHz



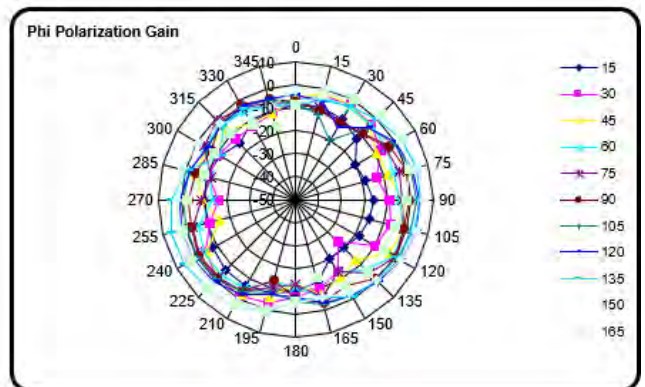
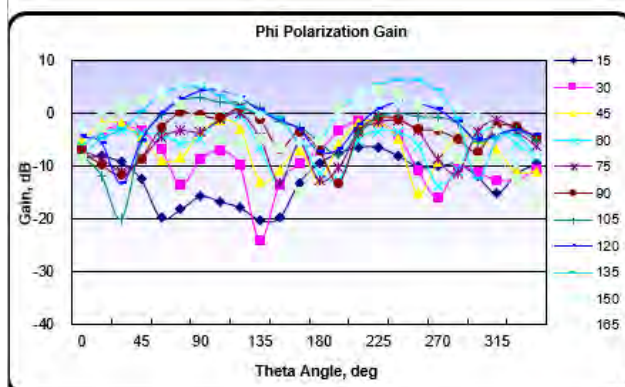
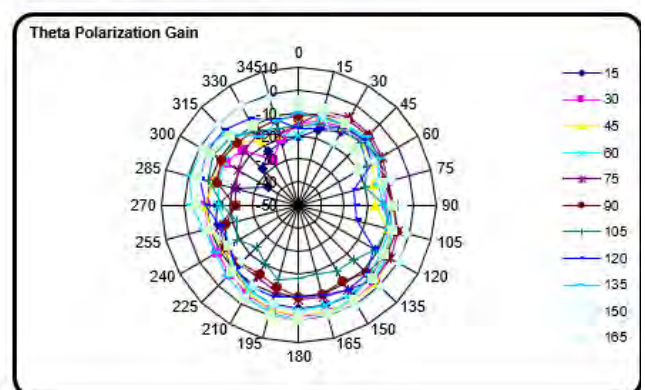
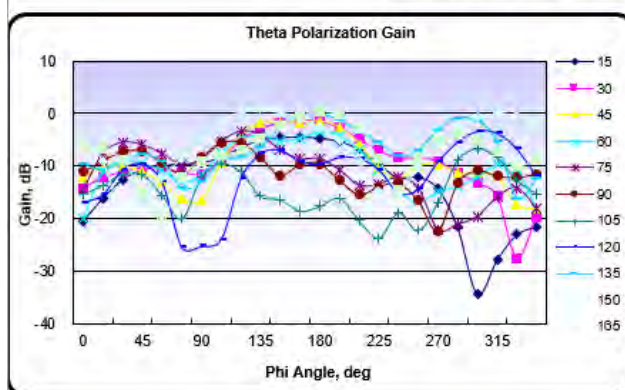
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



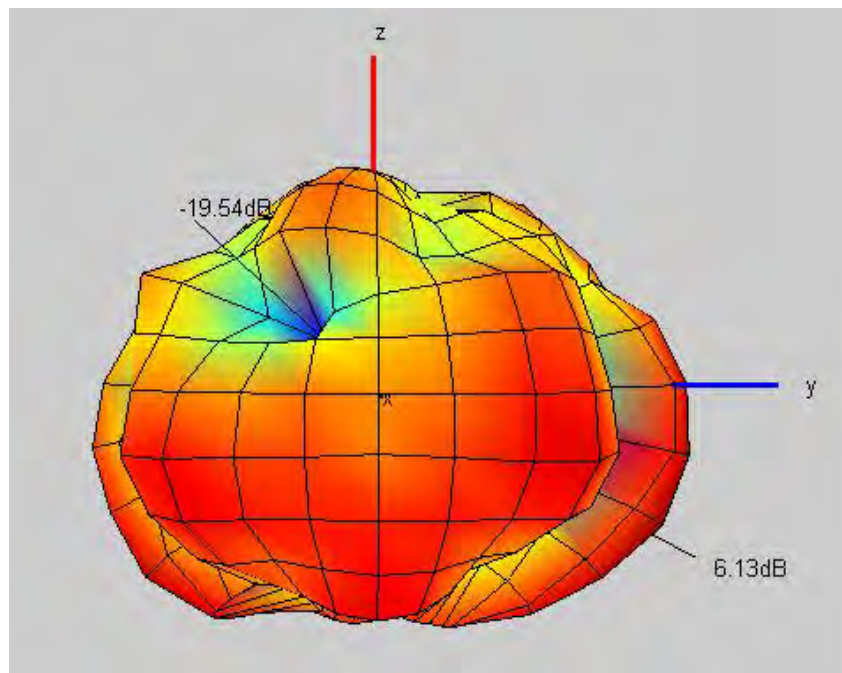
4.4.4 1710MHz



Efficiency(Graph of Theta-Polarization and Phi-Polarization)

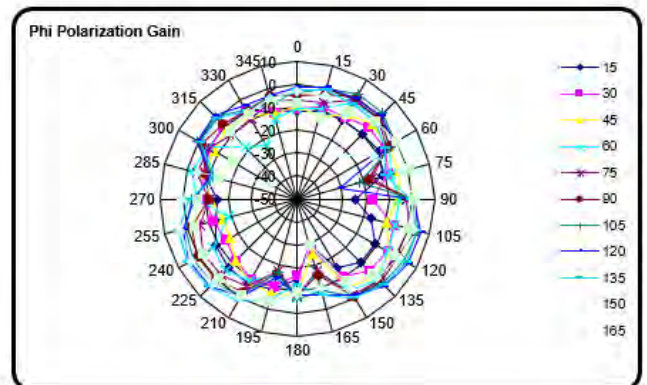
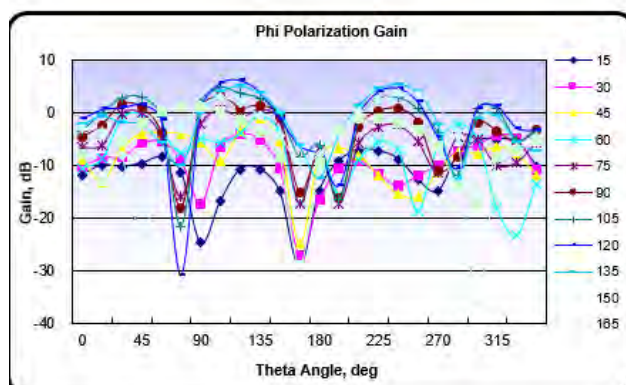
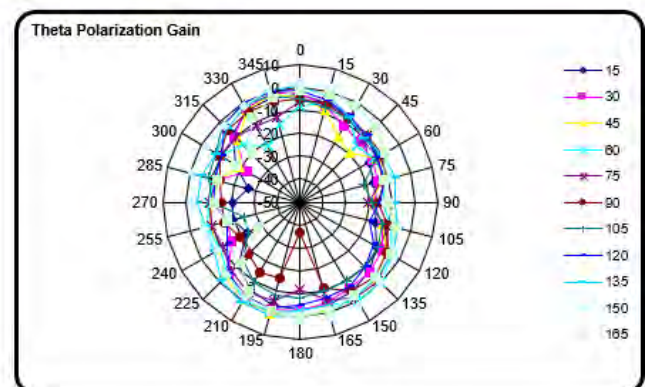
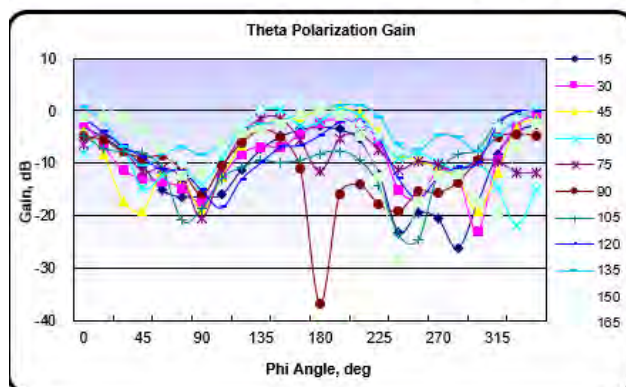


4.4.5 1920MHz

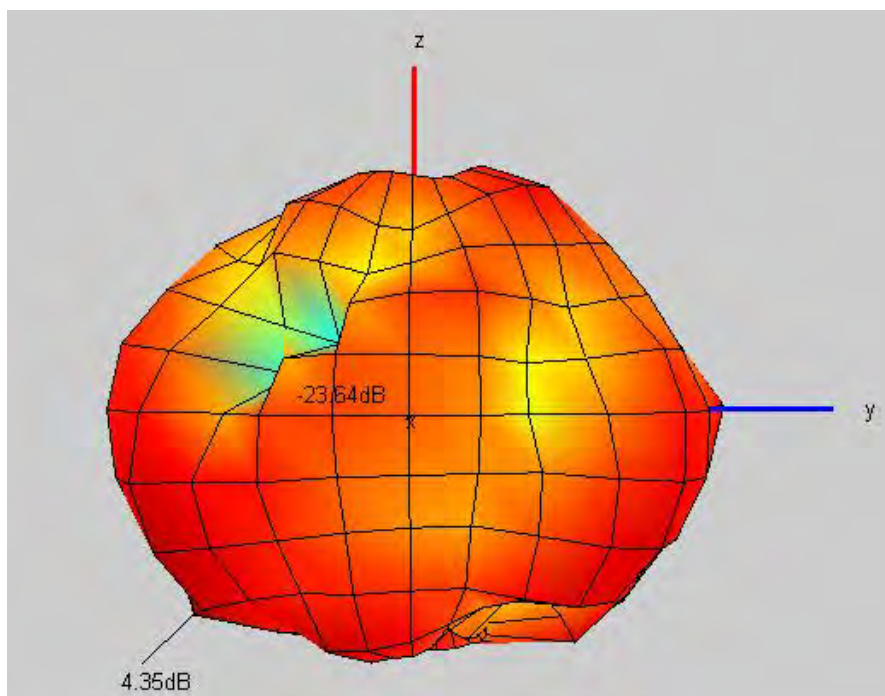


Efficiency(Graph of Theta-Polarization and Phi-Polarization)

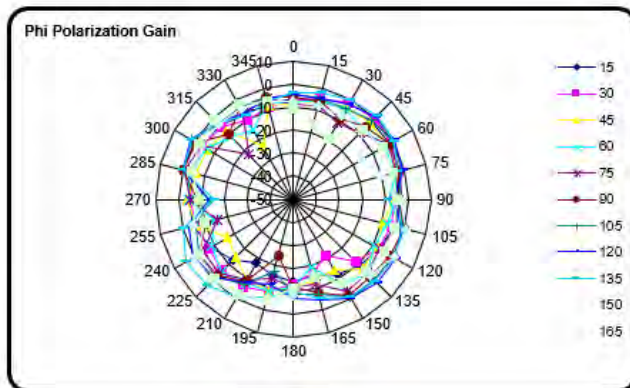
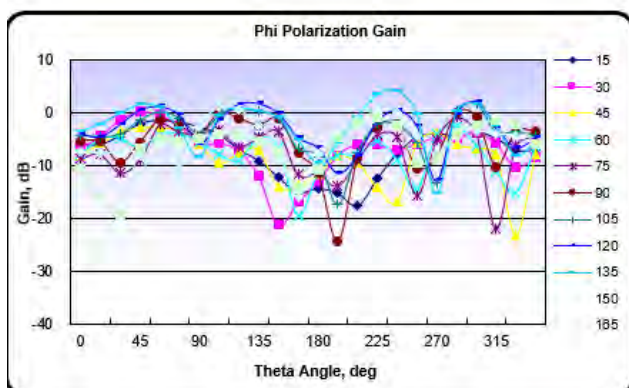
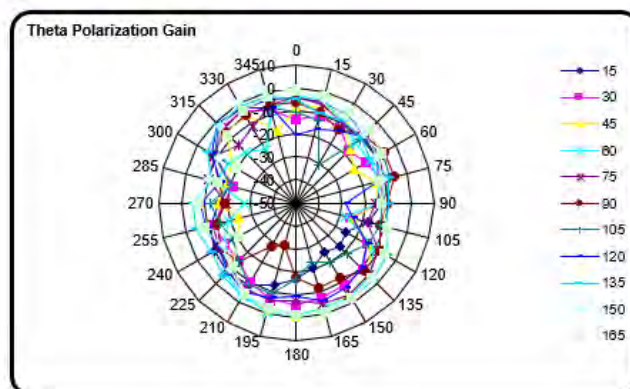
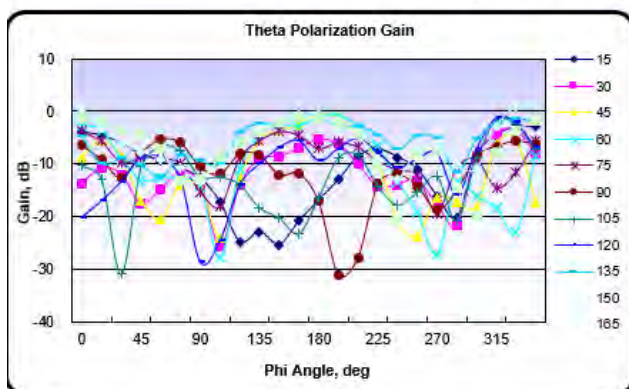
© RadiAnt



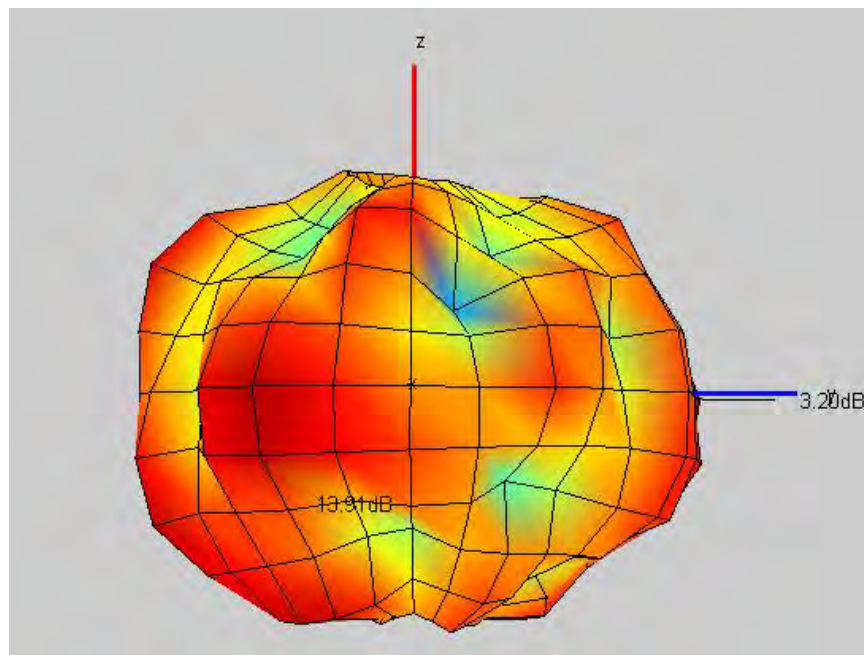
4.4.6 2170MHz



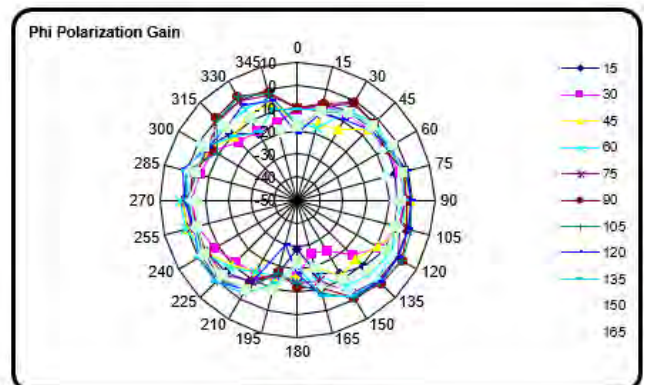
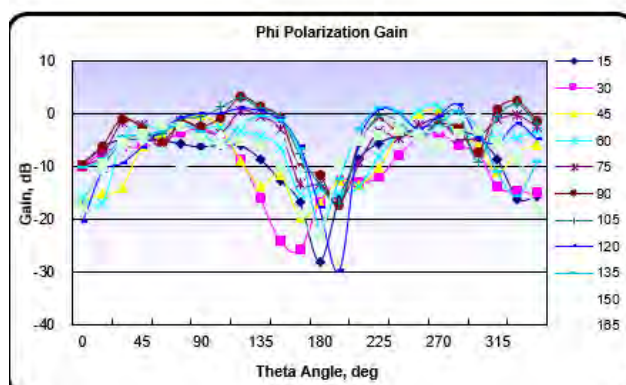
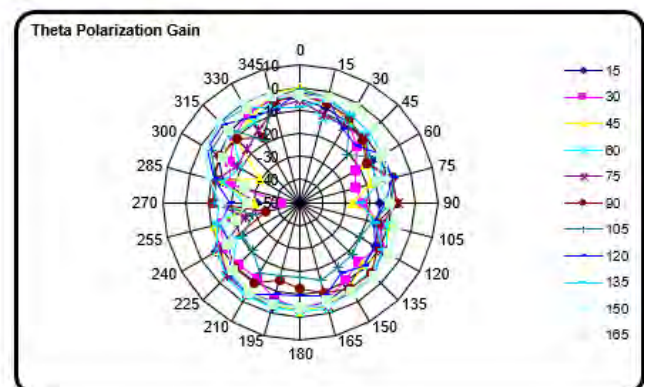
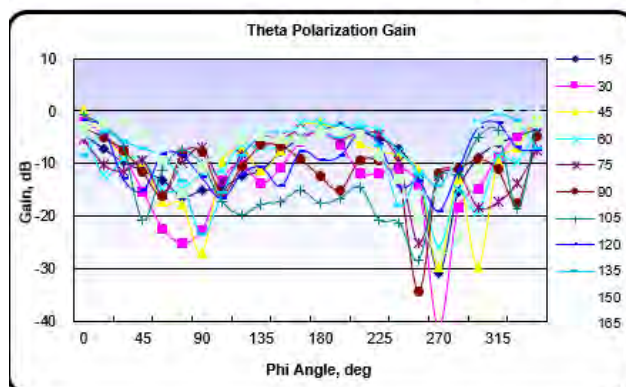
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



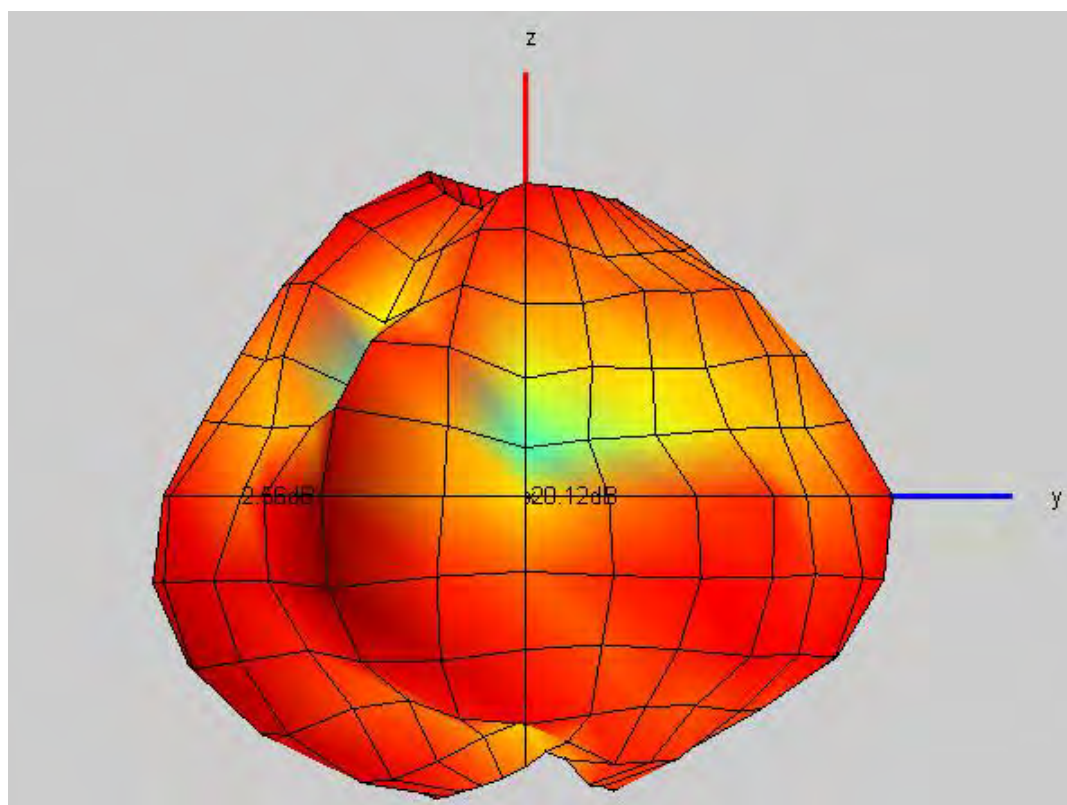
4.4.7 2350MHz



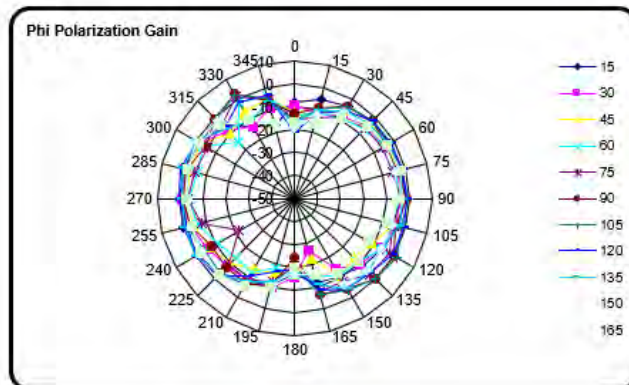
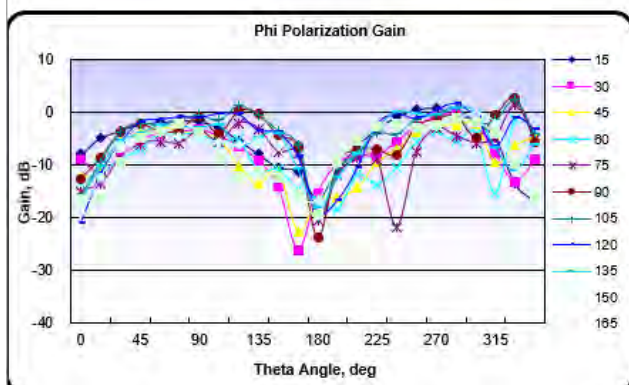
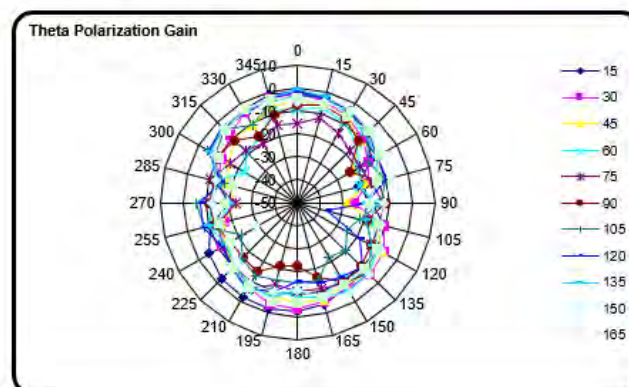
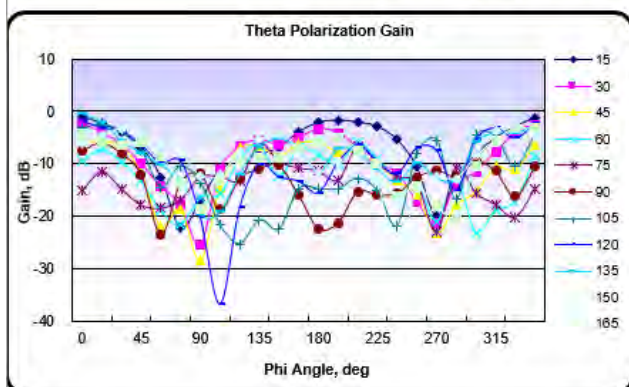
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



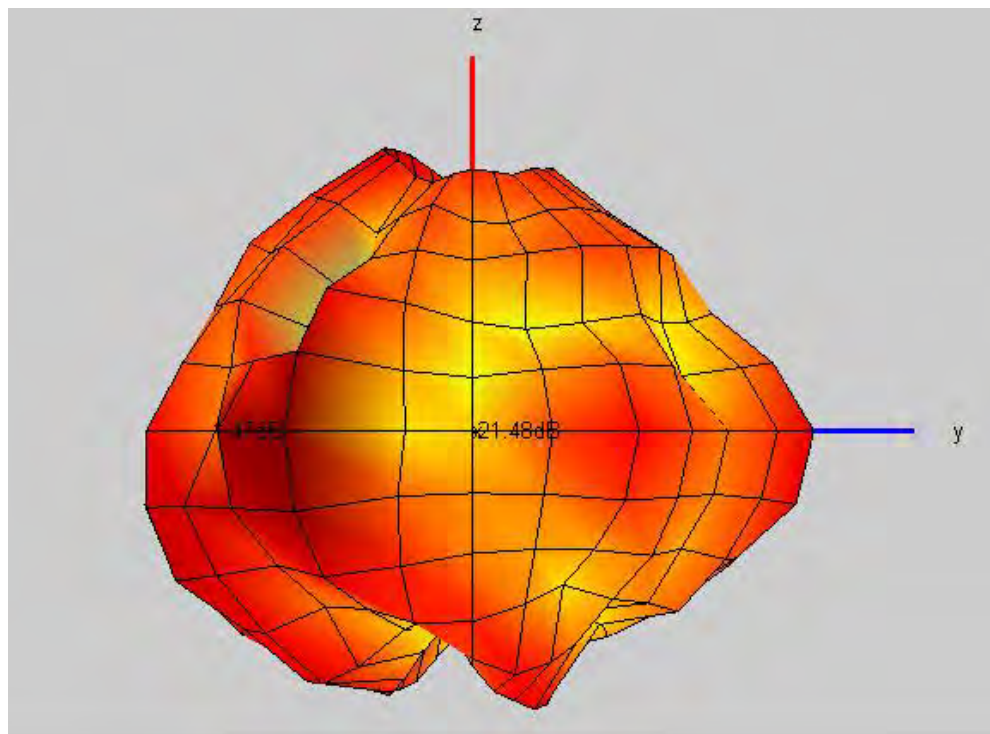
4.4.8 2580MHz



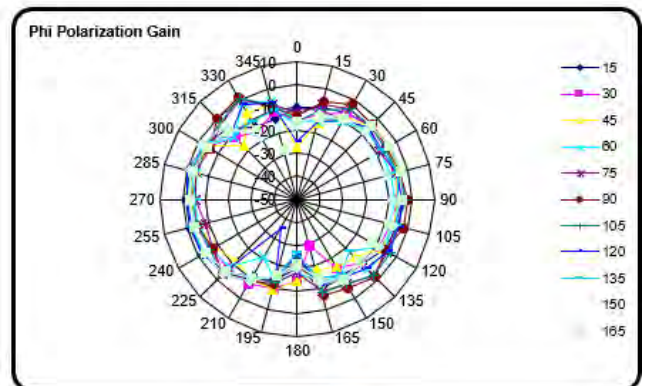
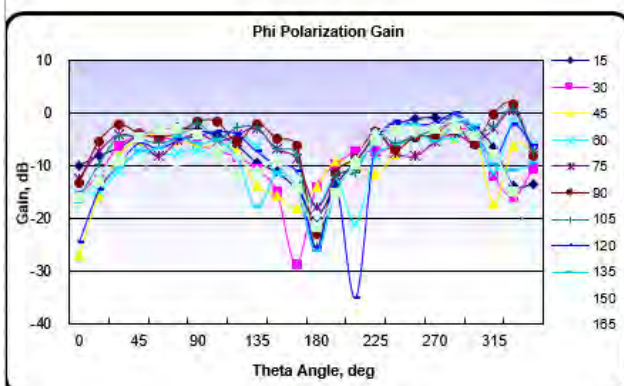
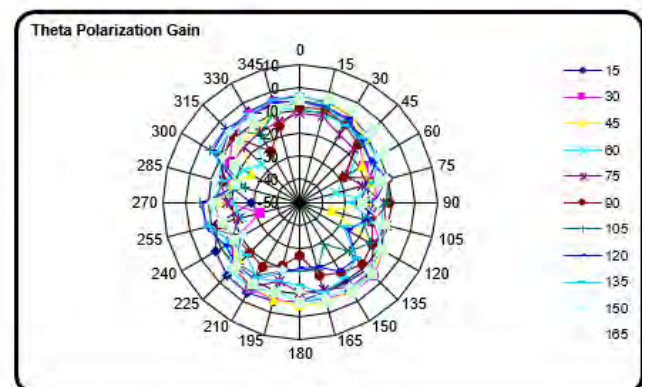
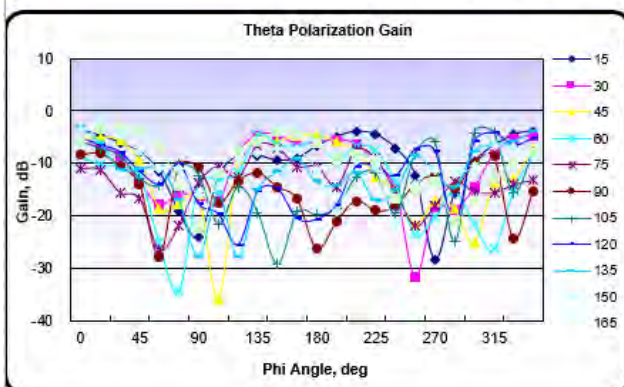
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



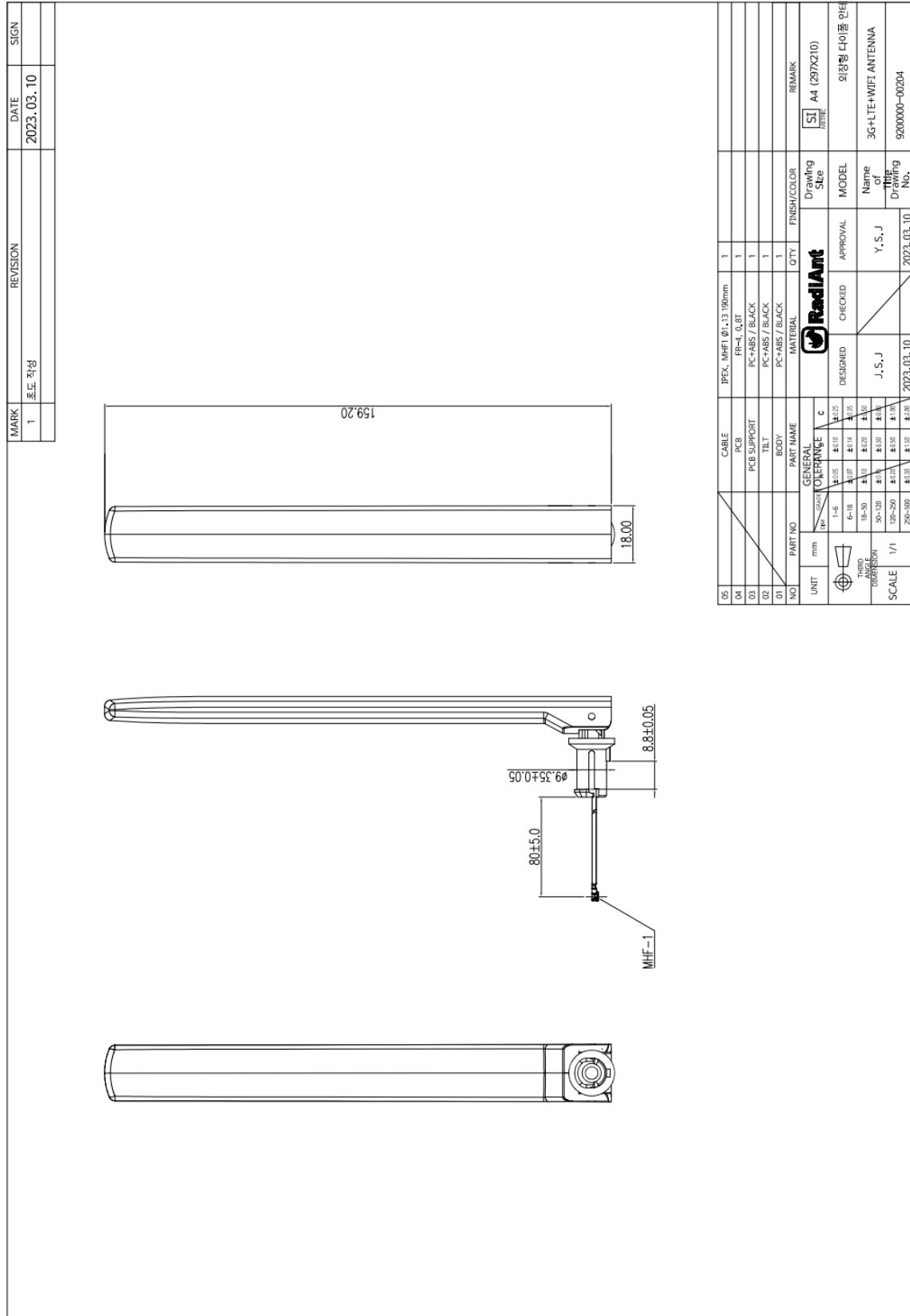
4.4.9 2655MHz



Efficiency(Graph of Theta-Polarization and Phi-Polarization)



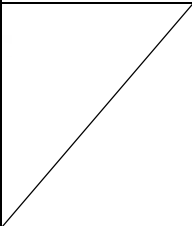
5. Drawing



Date :2023.05.10

SPECIFICATION

Product Name	ANTENNA
Model Name	External Antenna (ZigBee)
Provider	RadiAnt
Part Code.	9200000-00204

	Submitted	Checked		Approved
Buyer				
RadiAnt	Submitted	Checked	Checked	Approved
				

– Table of Contents –

1. Product History	3
2. Electrical Feature	4
2.1 Product Feature	
2.2 Frequency Band	
2.3 Impedance	
2.4 Detailed Passive Electrical SPEC	
2.5 Maximum Power	
3. Environment Test	6
4. Overall Performance	8
4.1 Test Environment	
4.2 VSWR	
4.3 Passive Ant Gain & Efficiency	
4.4 Radiation Pattern	
4.4.1 2400MHz	
4.4.2 2425MHz	
4.4.3 2450MHz	
4.4.4 2485MHz	
5. Drawing	16

1. Product History

LIST					
NO	Data	Front	After	Change	REV
1	2023.03.27			Approval	0
2	2023.05.10			Data 추가(Avg.Gain & Peak Gain)	1
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

2. Electrical Feature

2.1. Product Features

- 2.4GHz ZigBee
- High efficiency
- Excellent performance



2.2. Frequency Band.

Frequency Range	2400 ~ 2485MHz
-----------------	----------------

2.3 Impedance

2.2.1 Input Impedance

- $R = 50\Omega$

2.4 Detailed Passive Electrical Spec

Impedance Matching optimization is performed under the below mentioned environment.

2.4.1 Free Space Environment

Frequency Range	2400 ~ 2485MHz			
FREQUENCY	2400	2425	2450	2485
VSWR	2.32	2.72	3.09	3.27
Avg.Gain[dBi]	-1.60	-2.03	-2.99	-3.03
Peak Gain[dBi]	3.50	3.39	2.30	2.34

2.5 Maximum Power

- $P=2W$ Under

3. Environment Test

3.1 Operating Temperature Test

3.1.1 Test Condition

Temperature = -30°C, +80°C

Duration time = 1 hour

3.1.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.1.3 Measuring Method

Antenna is kept at -30°C for 1 hour and +80°C for 1 hour and then passed test of 2.4

3.2 Temperature Cycling Test

3.2.1 Test Condition

- Low cycling Temperature TLC = -40°C
- High cycling Temperature THC = +80°C
- 1Cycle = 4 hours
- Test number = 10Cycle

3.2.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.2.3 Measuring Method

Antenna is kept at low temperature -40°C for 2 hours and increase the temperature up to $+80^{\circ}\text{C}$ within 2 hour and kept for another 2 hours at the same temperature will be 1 cycle. As shown in Figure 3.2.1 repeat 10 cycle and kept for 2 hour in normal temperature.

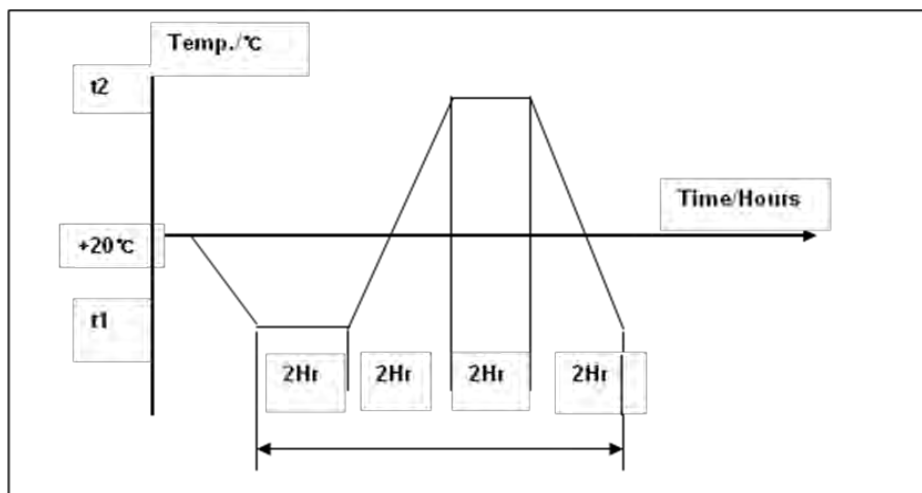


Figure 3.2.1 Temperature Cycling

3.3 Corrosion Resistance Test

3.3.1 Test Condition

- NaCl = 90%
- Water Temperature = 60°C
- Duration Time = 96 hours

3.3.2 Requirements

After the test, the antenna must not have an outer damage, and also it must pass requirement shown in 2.4.

3.3.3 Measuring Method

Antenna is soaked in sodium chloride solution at temperature $+60^{\circ}\text{C}$ and 90%(NaCl) for 96 hours and dry out.

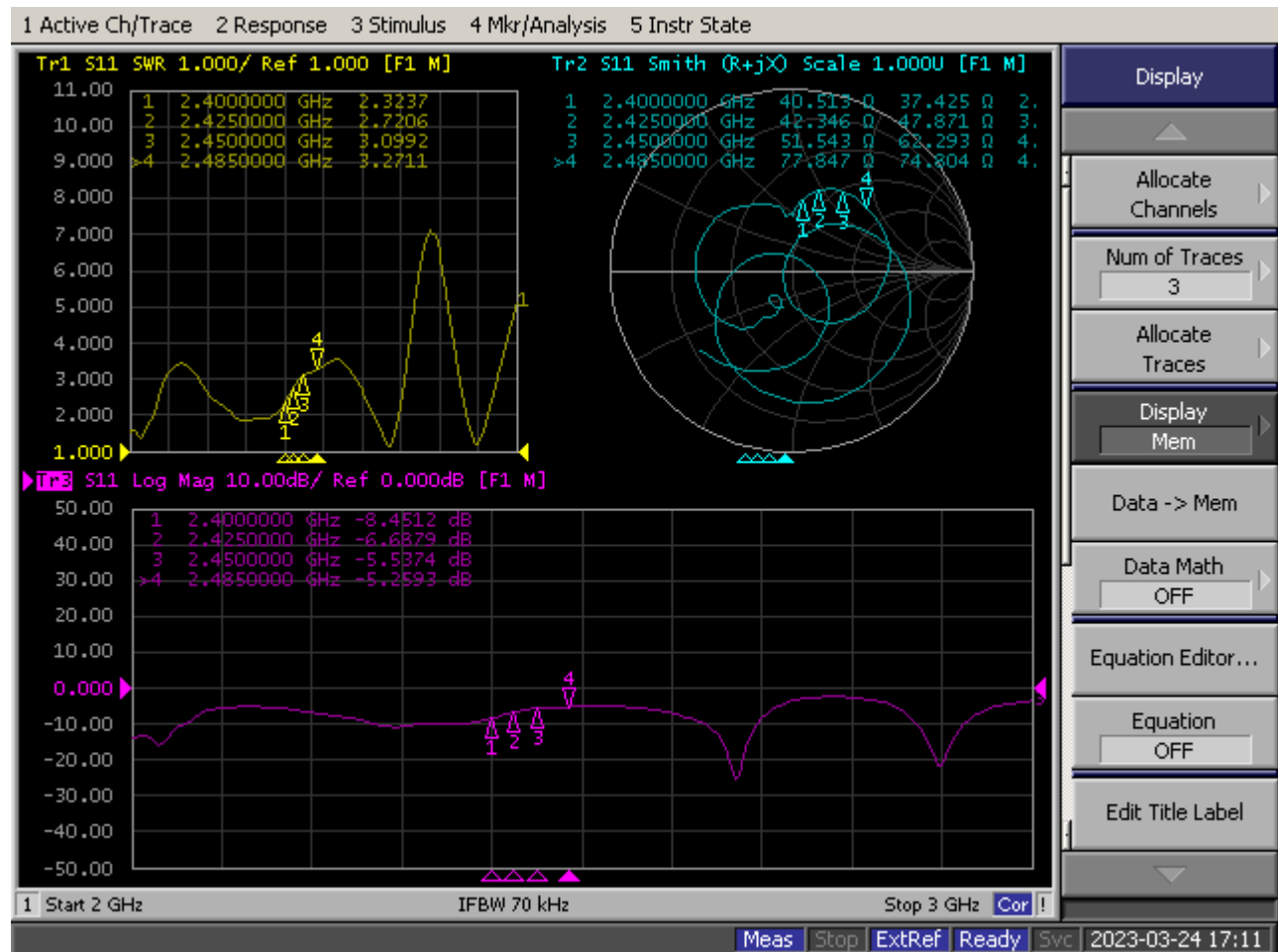
4. Overall Performance

4.1 Test Environment

- ENA Series Network Analyzer E5071C , 100KHz ~ 8.5GHz
- 3D Anechoic chamber 400MHz ~ 6GHz



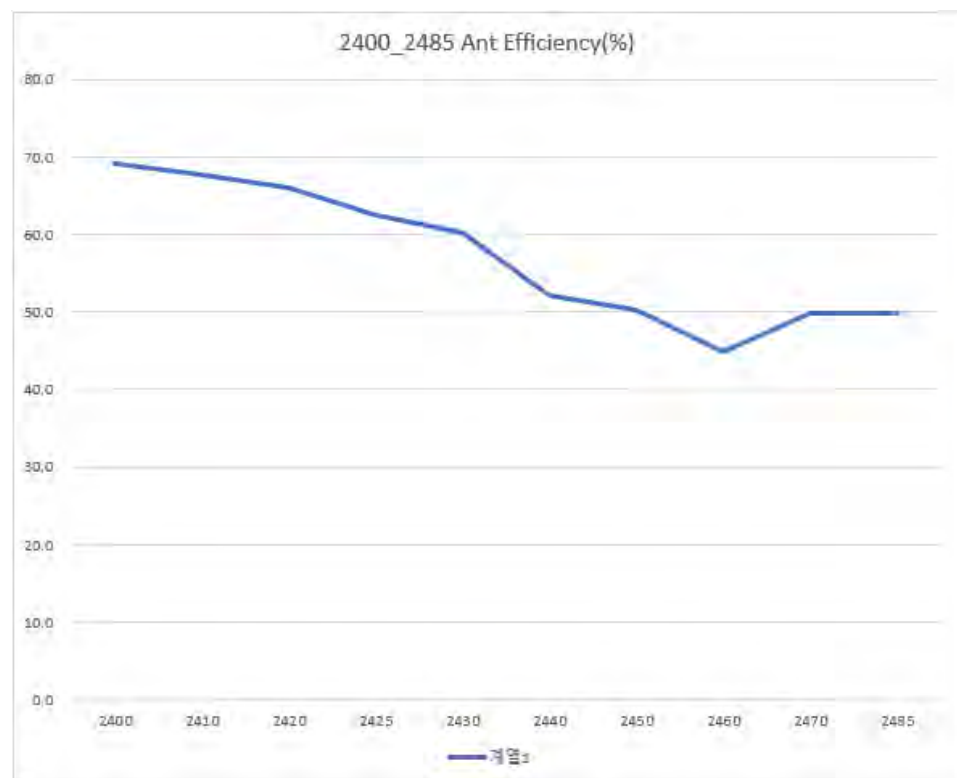
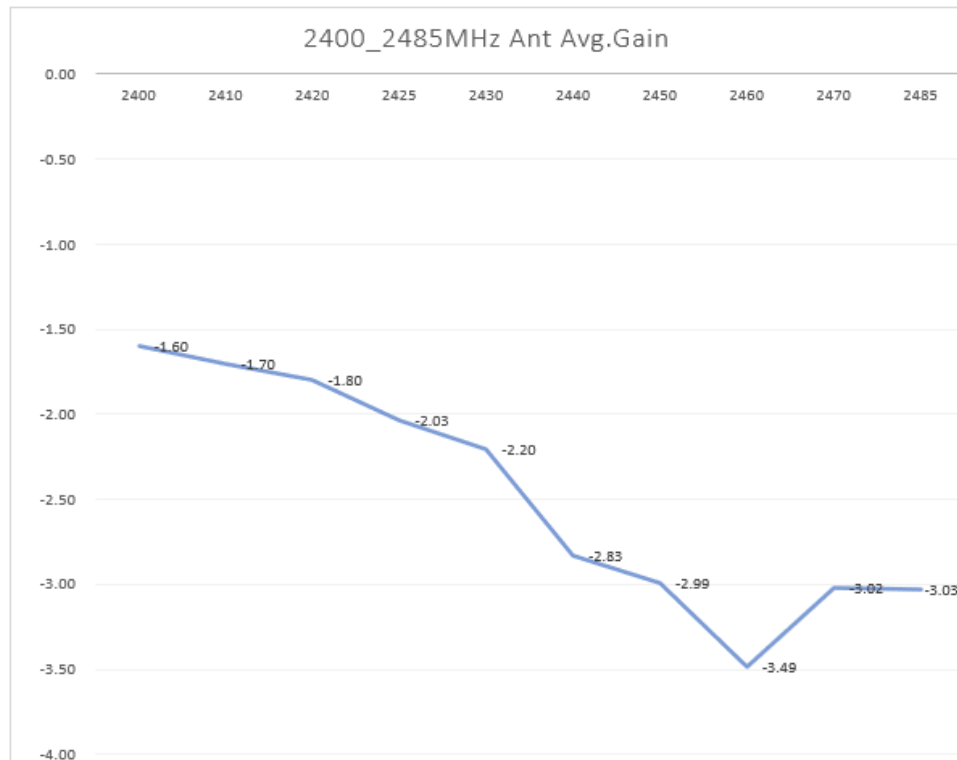
4.2 VSWR



FREQUENCY	2400	2425	2450	2485
VSWR	2.32	2.72	3.09	3.27

4.3 Passive Ant Gain

4.3.1 2400 ~ 2485MHz



4.4 Radiation Pattern

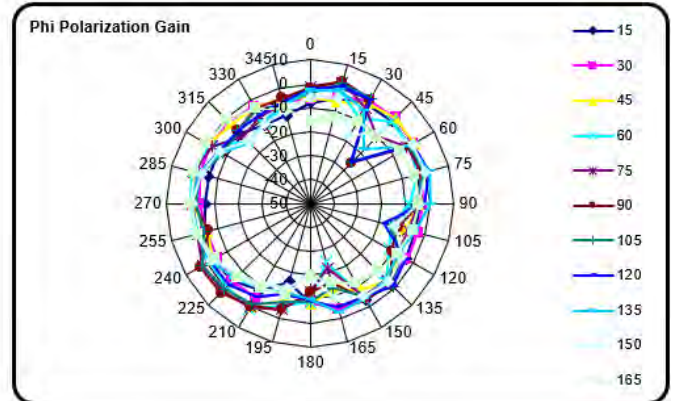
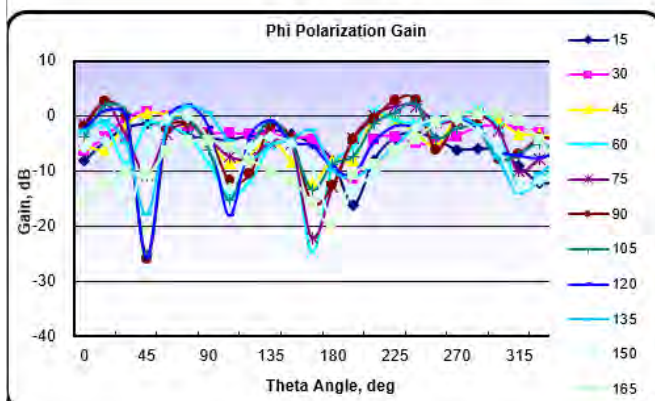
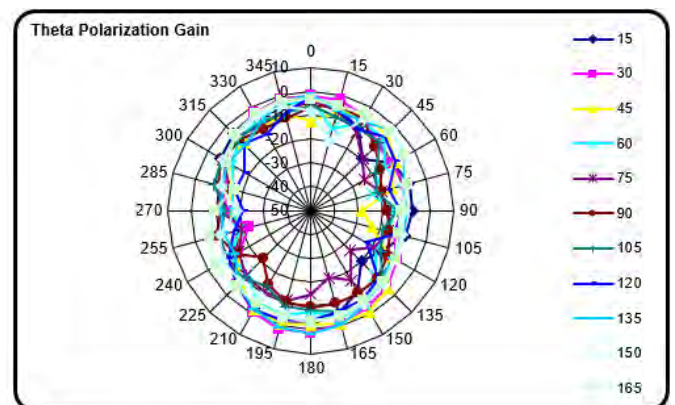
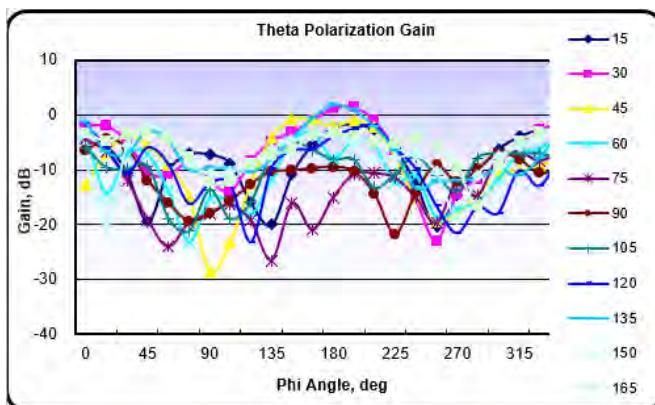
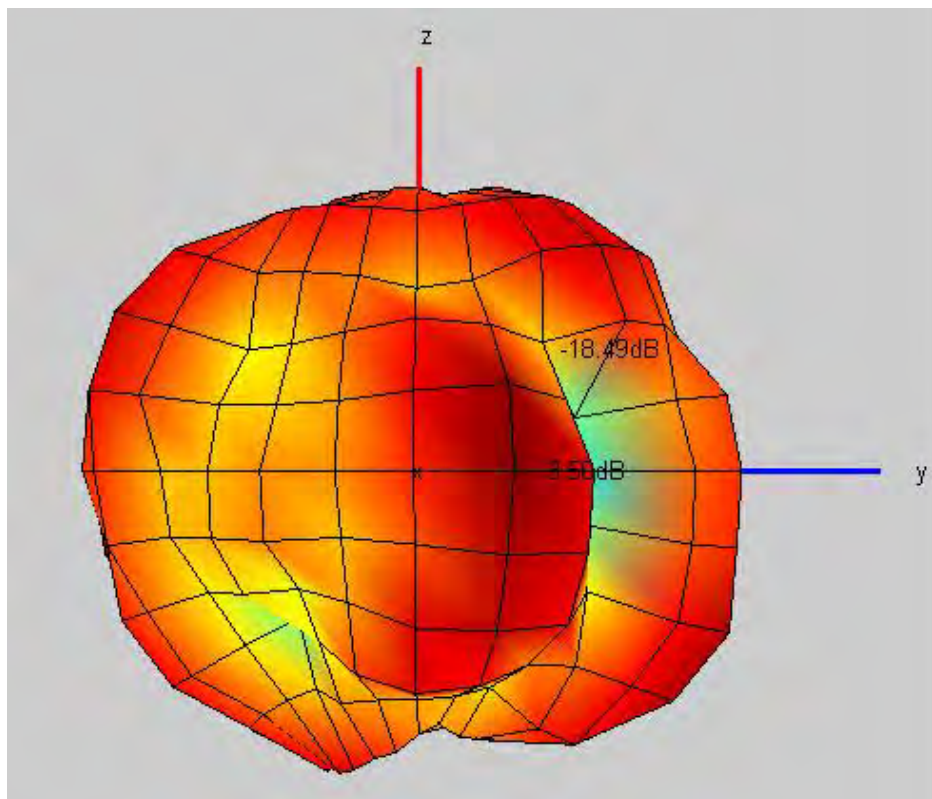


H plane : the tangent of XY

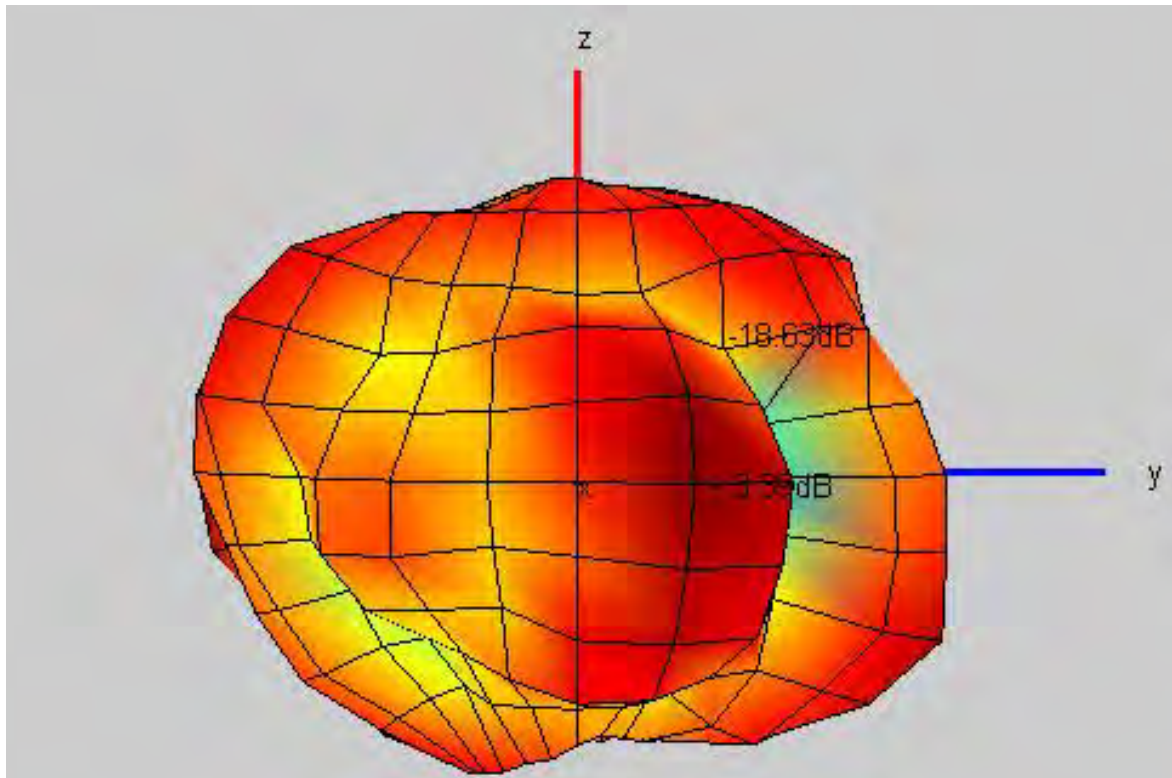
E1 plane : the tangent of XZ

E2 plane : the tangent of YZ

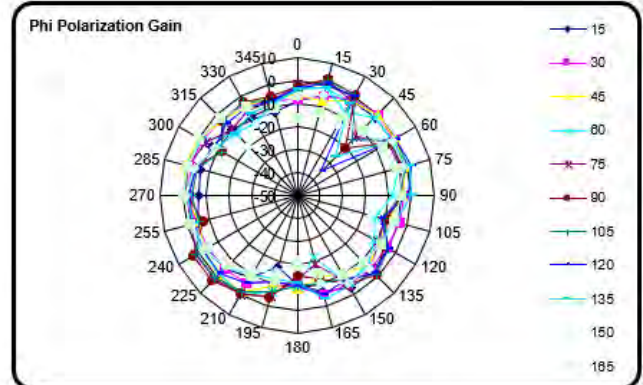
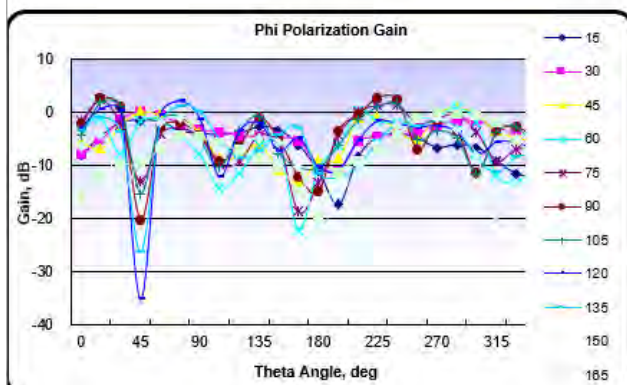
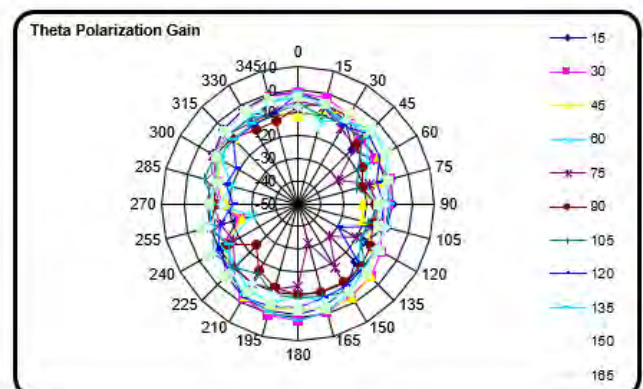
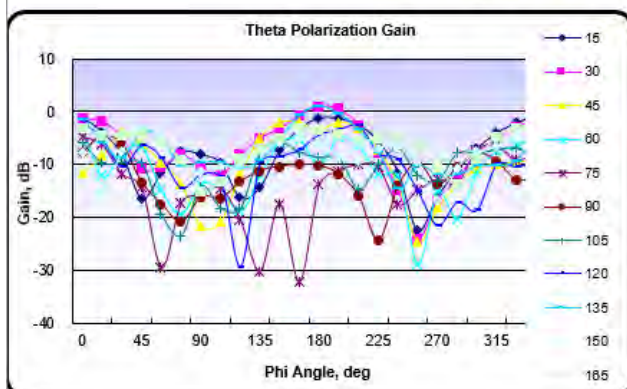
4.4.1 2400MHz



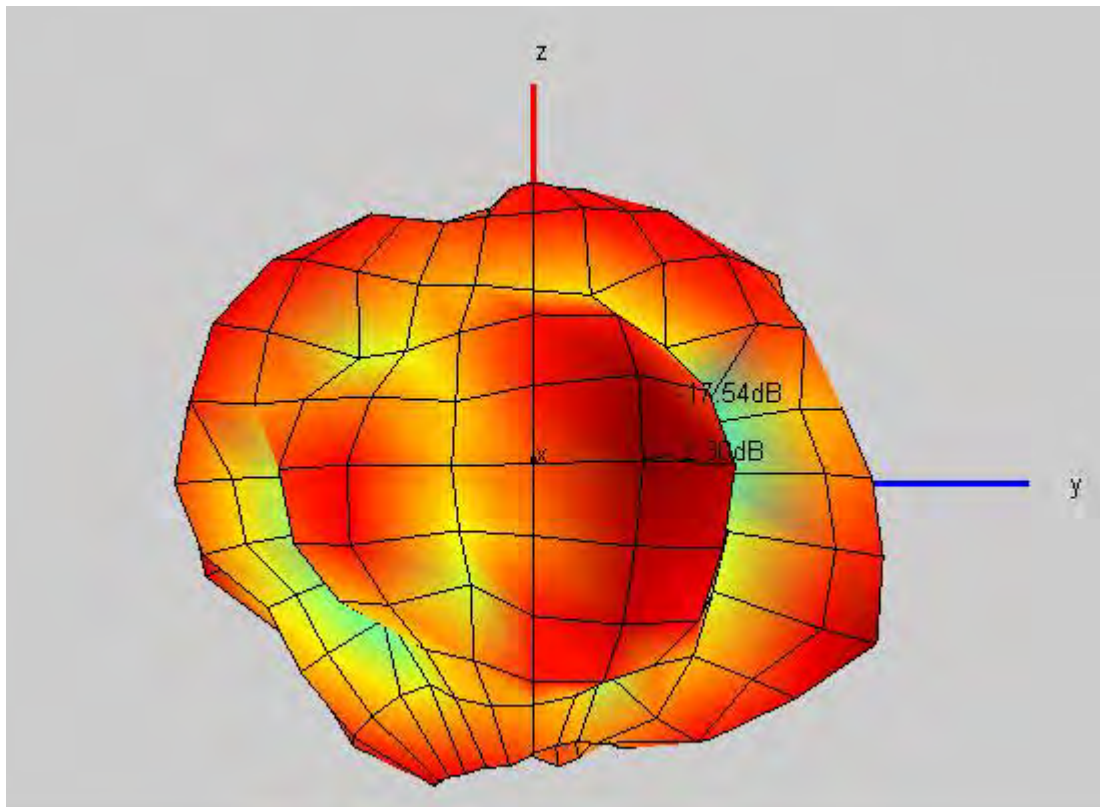
4.4.2 2425MHz



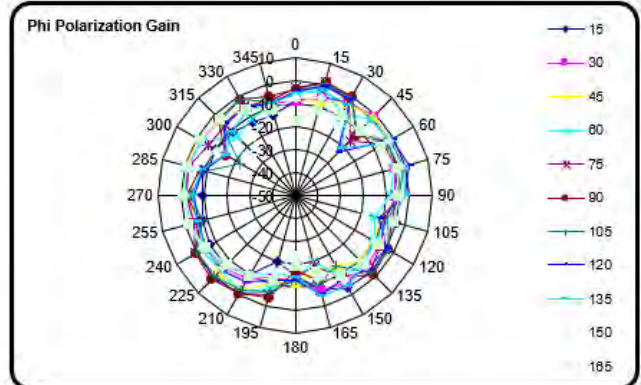
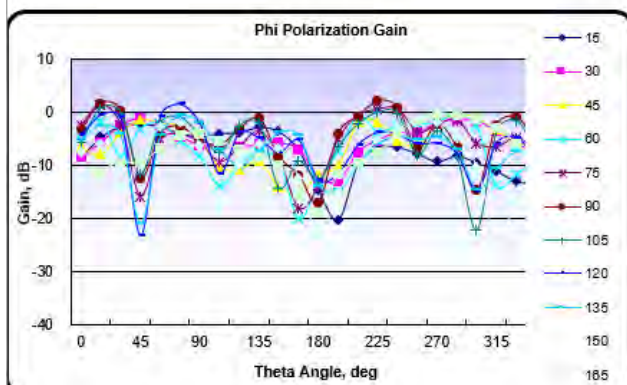
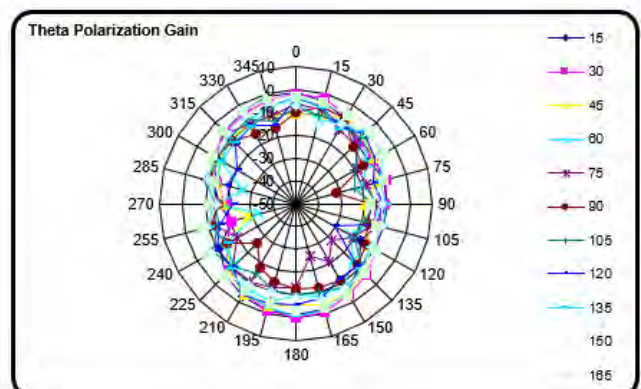
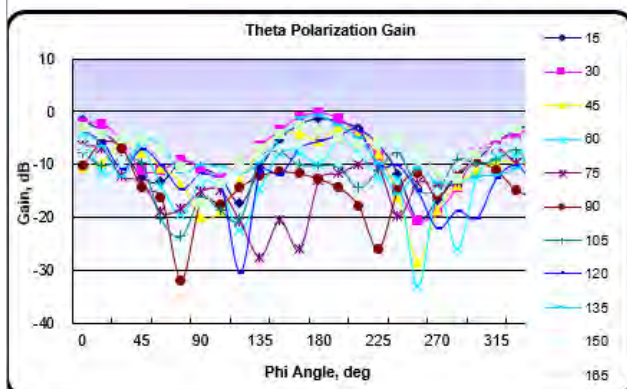
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



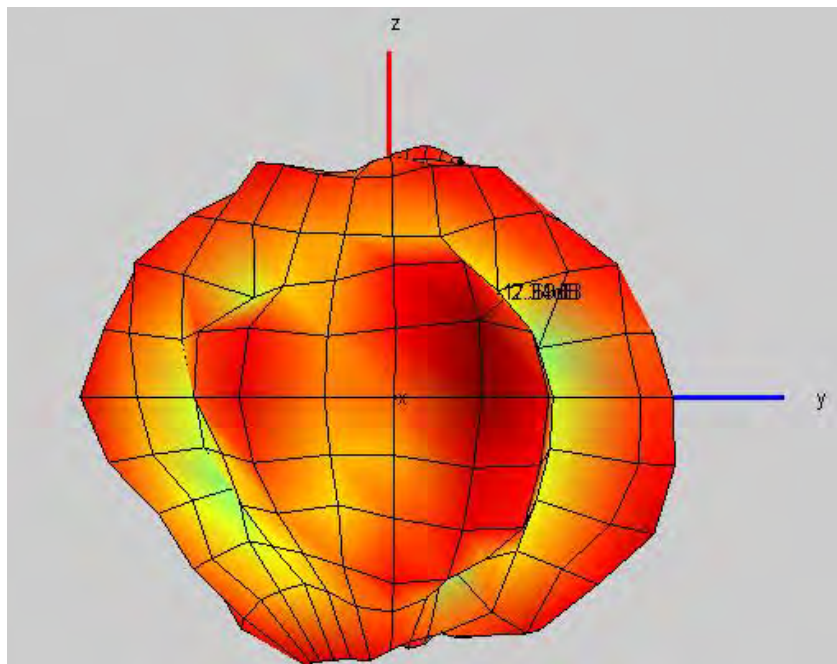
4.4.3 2450MHz



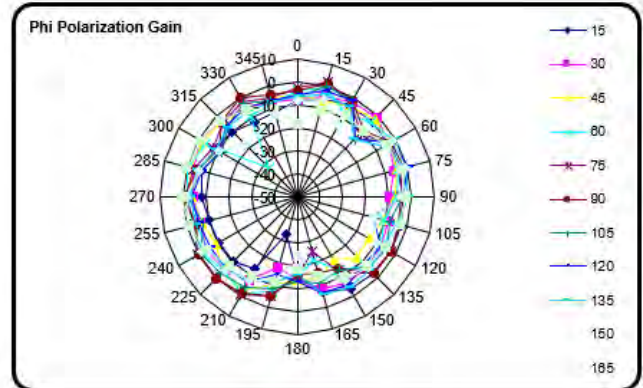
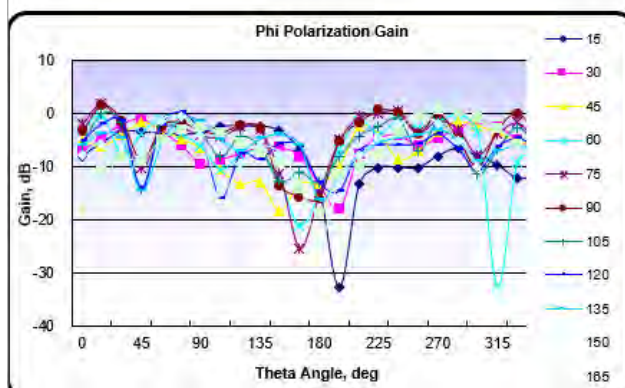
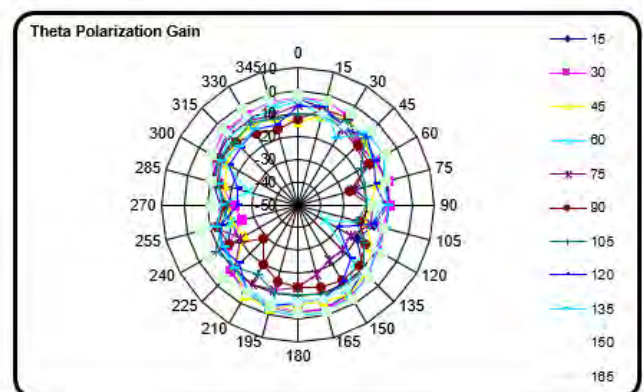
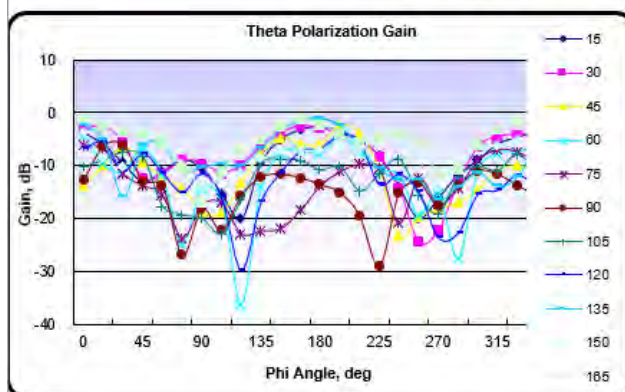
Efficiency(Graph of Theta-Polarization and Phi-Polarization)



4.4.4 2485MHz



Efficiency(Graph of Theta-Polarization and Phi-Polarization)



5. Drawing

