



Well Green Technology Co., Ltd

**No. 20, Alley51 ,Lane 118,ShuangLian Sec.2,Mintzu Rd.,
PingJen City, TaoYuan Hsien, Taiwan, R.O.C**

TEL: (03)420-6428 FAX: (03) 420-6418

TWINHEAD T8N
Antenna Test Report

Data 07/12/06

RD Manager	Supervisor	RD engineer	Sales engineer
David	Johnson	Tim	Jerry

1 Information Overview

1.1 Platform Information

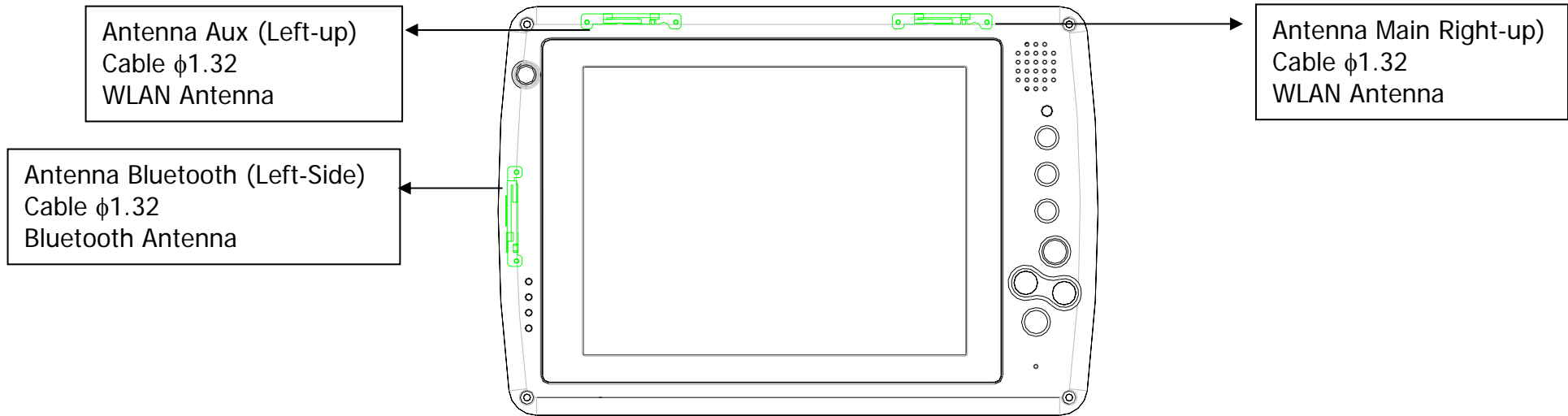
	Description	Comments
Project Code of System		
Project Stage	Prototype EPR PPR MP	
Platform Type	Notebook PC Tablet PC	

1.2 Antenna Information

Manufacturer	Well Green Technology Co., Ltd.	
Design Stage	Handmade Machine Tooling	
Antenna Aux		
Type	PIFA	
Model Name	T8N-L	
Part Number	TWT8NWIPI01B	
Antenna Location	Left-up of the panel	
Antenna Purpose	Wireless LAN 802.11abg Aux Antenna	
Connector Manufacturer	IPEX	
Connector Part No.	20278-101R-32 20278-111R-32	
Frequency GHz	2.4 – 2.5, 5.15 – 5.85	
Impedance	50	
Cable Manufacturer & PN	Wonderful Double	
Cable Diameter mm	1.32	
Cable Length		
Antenna Main		
Type	PIFA	
Model Name	T8N-R	
Part Number	TWT8NWIPI02B	
Antenna Location	Right-up of the panel	
Antenna Purpose	Wireless LAN 802.11abg Main Antenna	
Connector Manufacturer	IPEX	
Connector Part No.	20278-101R-32 20278-111R-32	
Frequency GHz	2.4 – 2.5, 5.15 – 5.85	
Impedance	50	
Cable Manufacturer & PN	Wonderful Double	
Cable Diameter mm	1.32	
Cable Length		
Antenna Bluetooth		
Type	PIFA	
Model Name	T8N- Left side	
Part Number	TWT8NBLPI01B	
Antenna Location	Left side	
Antenna Purpose	Bluetooth Antenna	
Connector Manufacturer	IPEX	
Connector Part No.	20278-101R-32 20278-111R-32	
Frequency GHz	2.4 – 2.5	
Impedance	50	
Cable Manufacturer & PN	Wonderful Double	
Cable Diameter mm	1.32	
Cable Length		

1. Antenna placement and Photo

1.1 Antennas placement

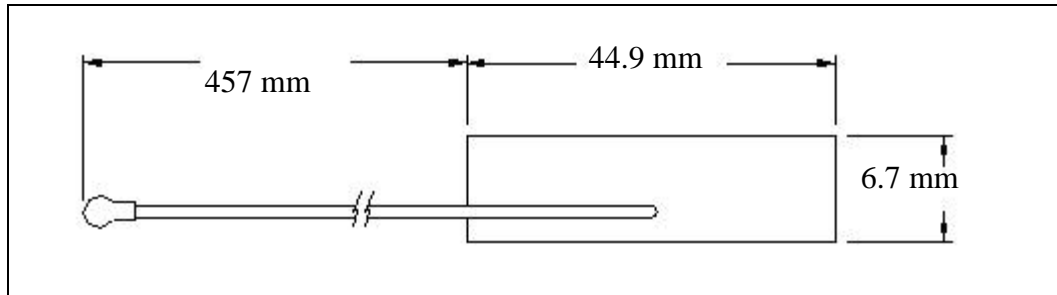


1.2 Antenna Assembly Photo

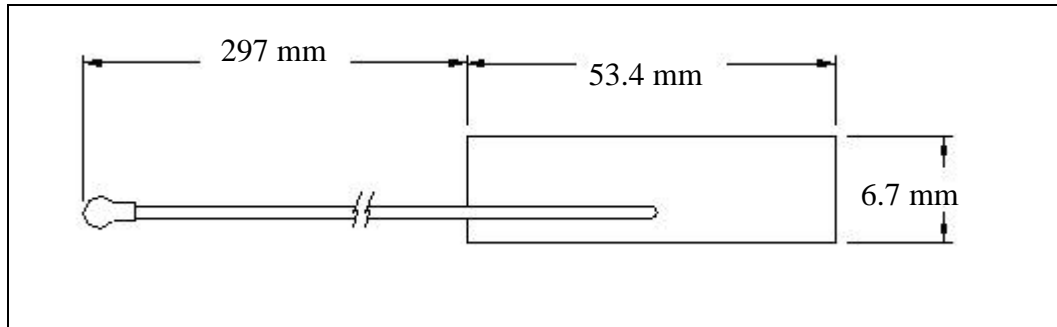


3. Antenna Dimension

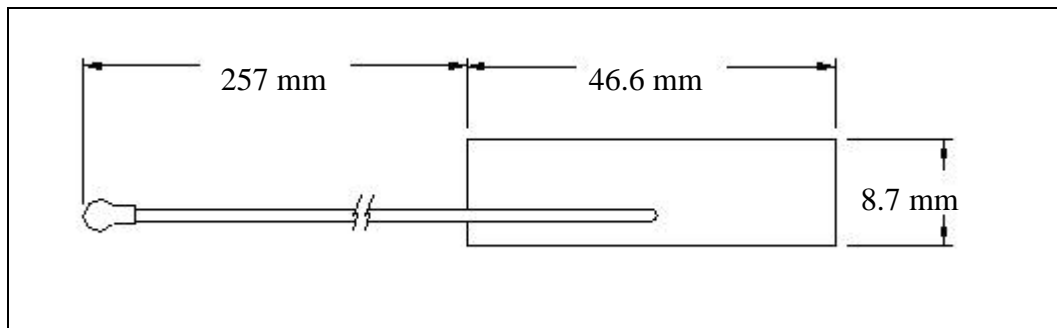
3.1 Antenna Aux



3.2 Antenna Main



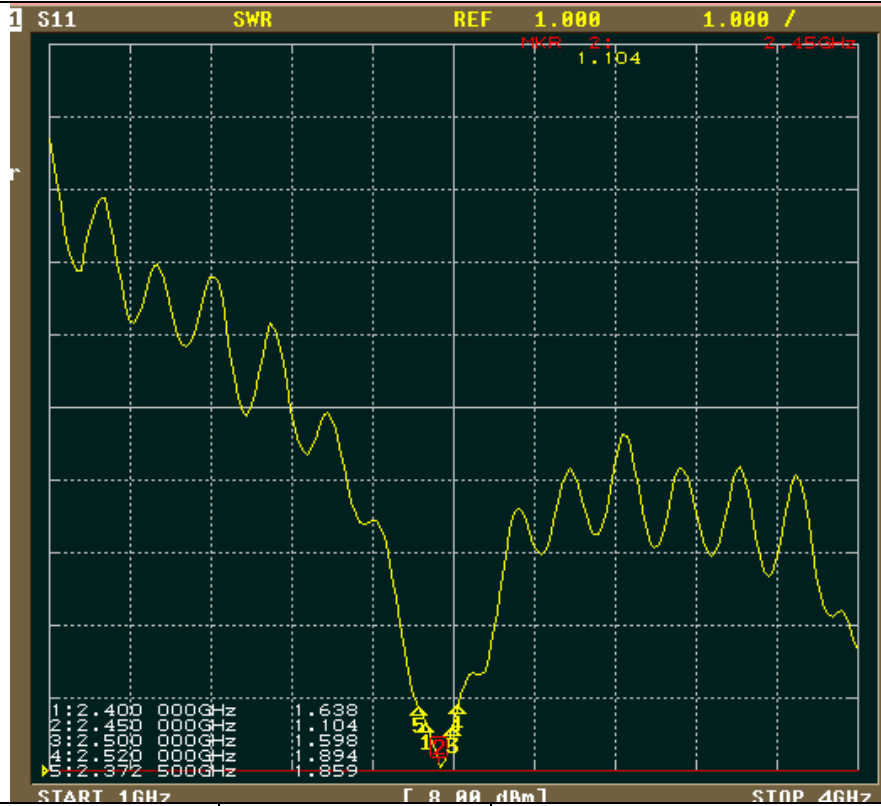
3.3 Antenna Bluetooth



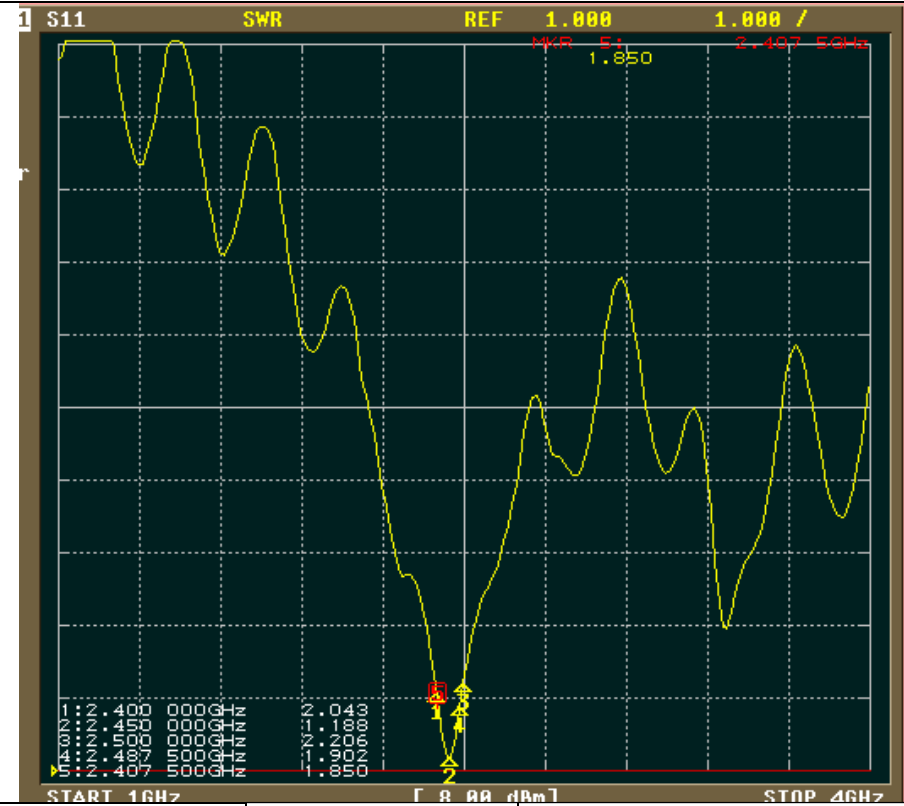
4. Voltage Standing Wave Ratio (VSWR)

4.1 VSWR 2.4 GHz ~ 2.5 GHz

Antenna Aux



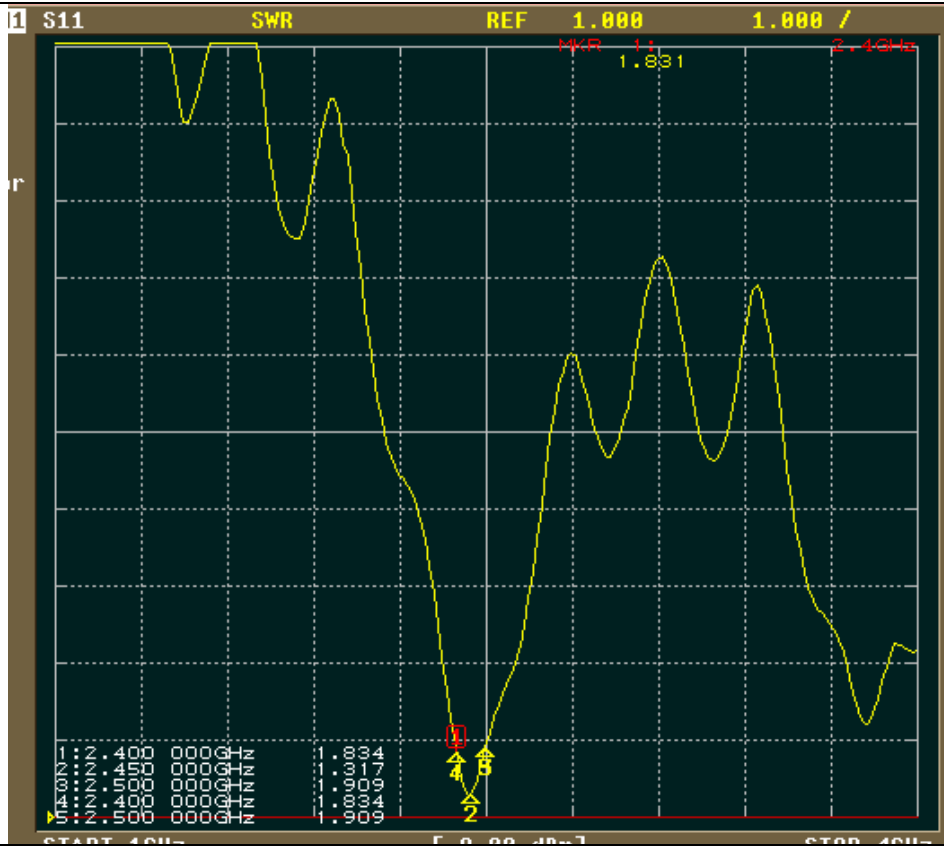
Antenna Main



Center freq. @MHz	Bandwidth @MHz	VSWR			Center freq. @MHz	Bandwidth @MHz	VSWR		
		2.4GHz	2.45GHz	2.5GHz			2.4GHz	2.45GHz	2.5GHz
2450	148	1.63	1.10	1.59	2450	80	2.04	1.18	2.20

VSWR 2.4 GHz ~ 2.5 GHz

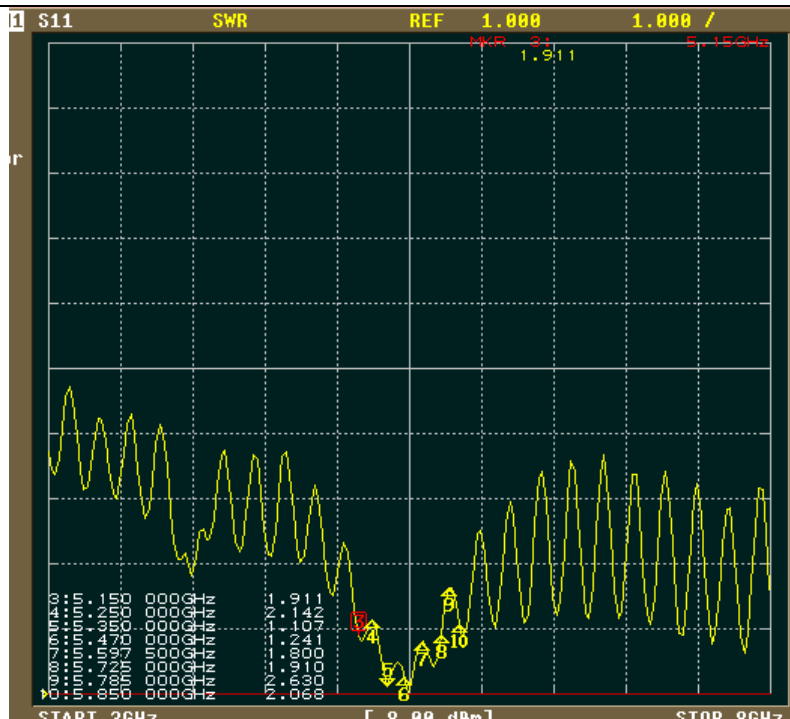
Antenna Bluetooth



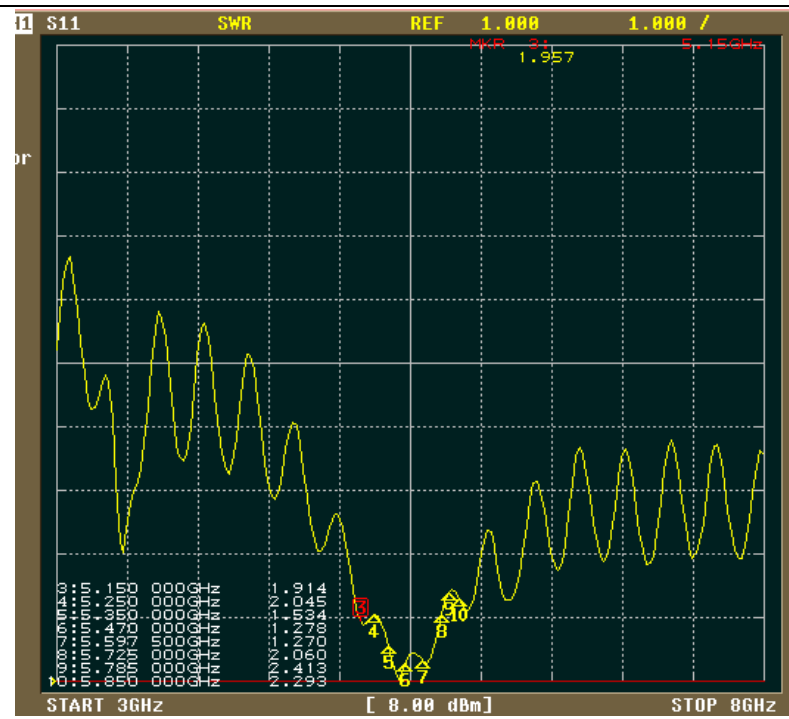
Center freq. @MHz	Bandwidth @MHz	VSWR		
		2.4GHz	2.45GHz	2.5GHz
2450		1.83	1.31	1.90

4.2 VSWR 5.15 GHz ~ 5.85 GHz

Antenna Aux



Antenna Main

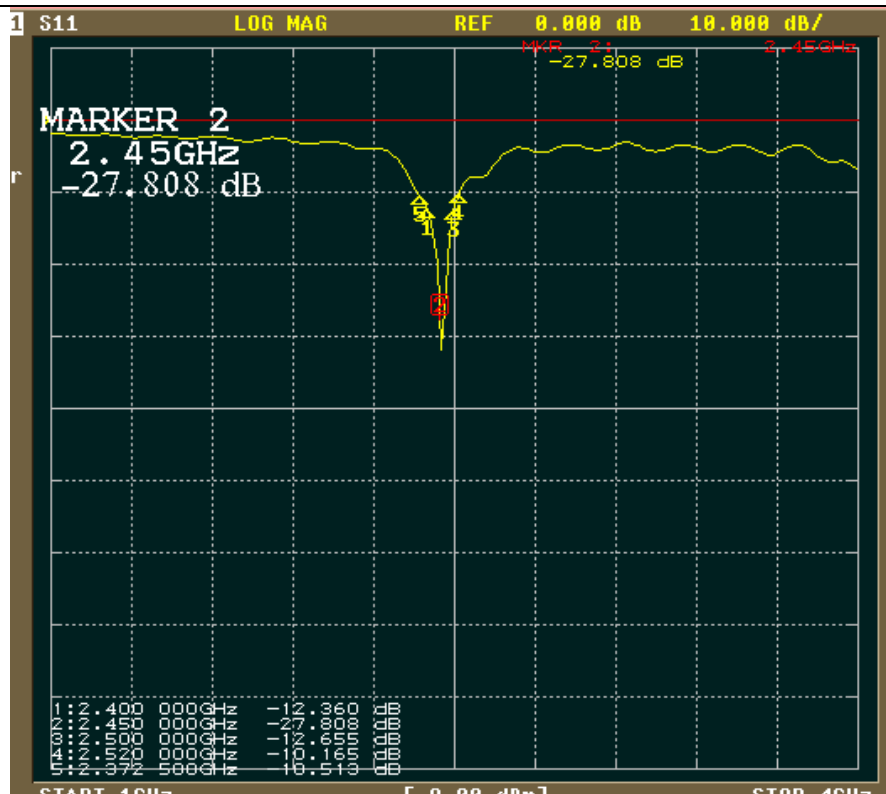


Center freq. @MHz	Bandwidth @MHz	VSWR			Center freq. @MHz	Bandwidth @MHz	VSWR		
		5.15GHz	5.25GHz	5.35GHz			5.15GHz	5.25GHz	5.35GHz
		1.91	2.14	1.10			1.91	2.04	1.53
		5.47GHz	5.5597GHz	5.75GHz			5.47GHz	5.5597GHz	5.75GHz
		1.24	1.80	1.91			1.27	1.27	2.06
		5.785GHz		5.85GHz			5.785GHz		5.85GHz
		2.63		2.06			2.41		2.29

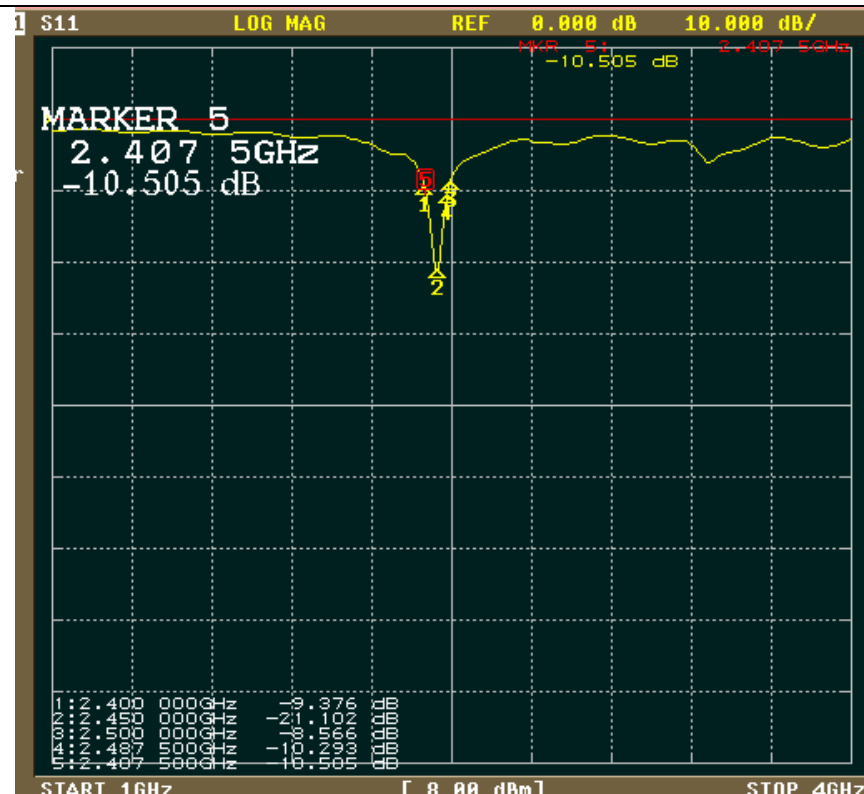
5. Return Loss

5.1 Return Loss 2.4GHz ~ 2.5GHz

Antenna Aux



Antenna Main



Center freq.
@MHz

Bandwidth
@MHz

Return Loss

2.4GHz

2.45GHz

2.5GHz

2450

148

-12.36

-27.80

-12.65

Center freq.
@MHz

Bandwidth
@MHz

Return Loss

2.4GHz

2.45GHz

2.5GHz

2450

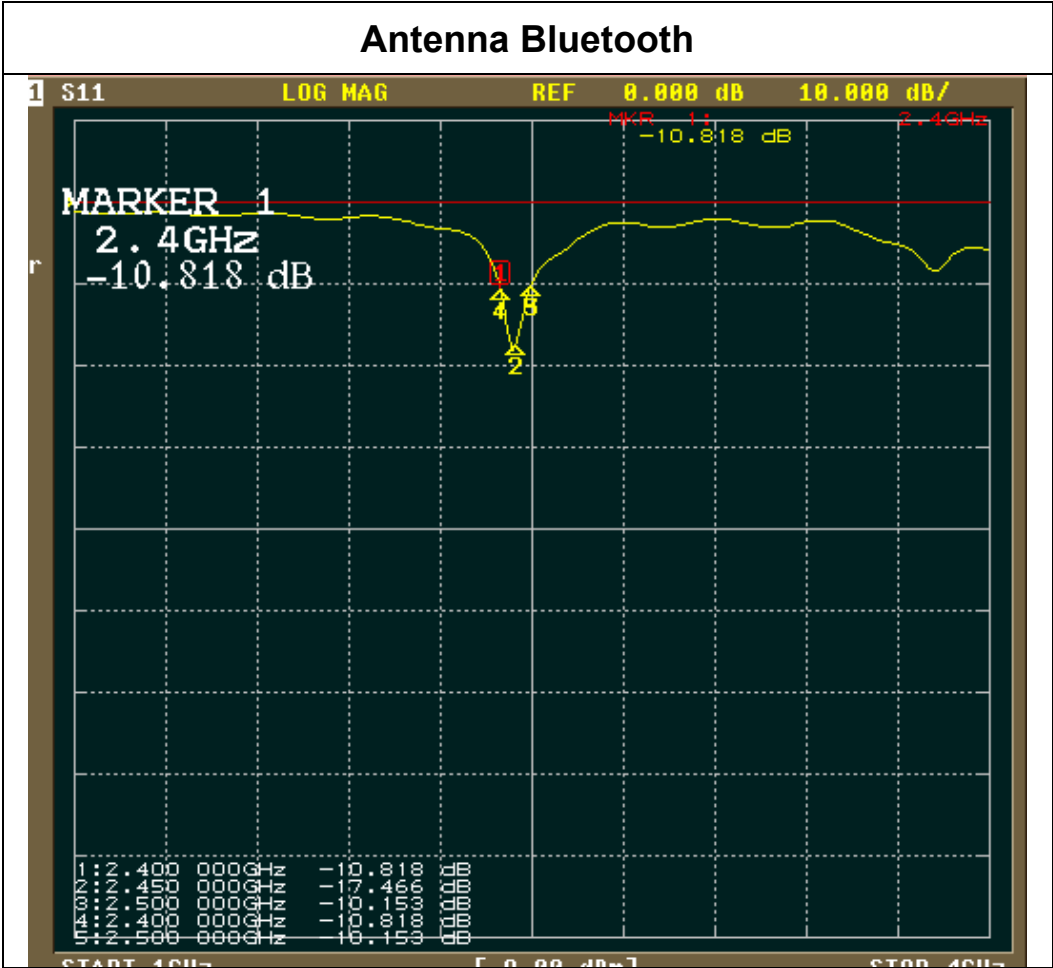
80

-9.37

-21.10

-8.56

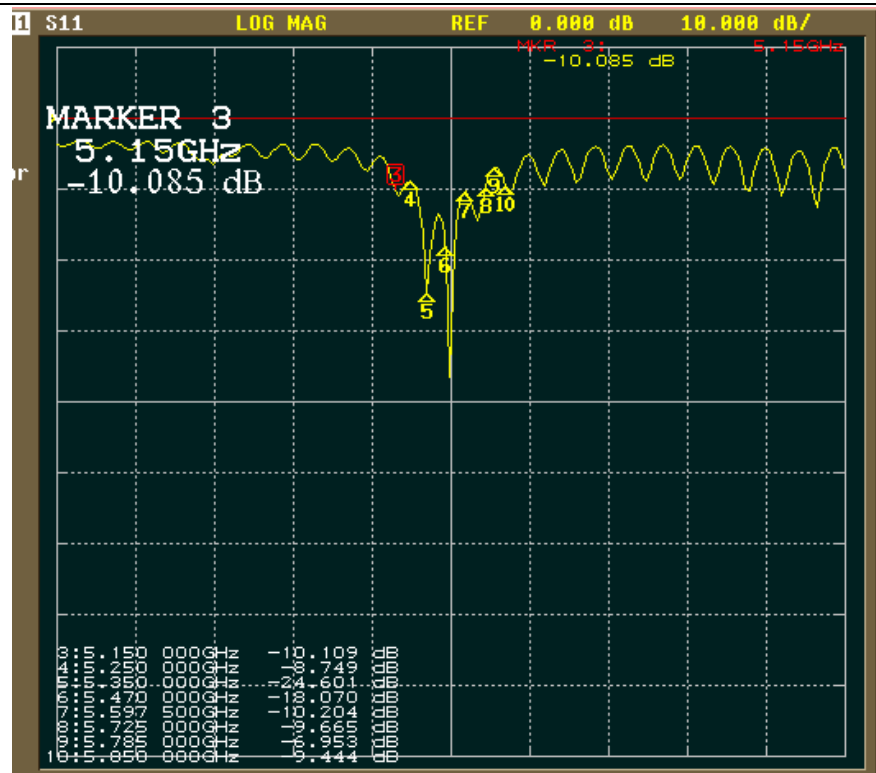
Return Loss 2.4GHz ~ 2.5GHz



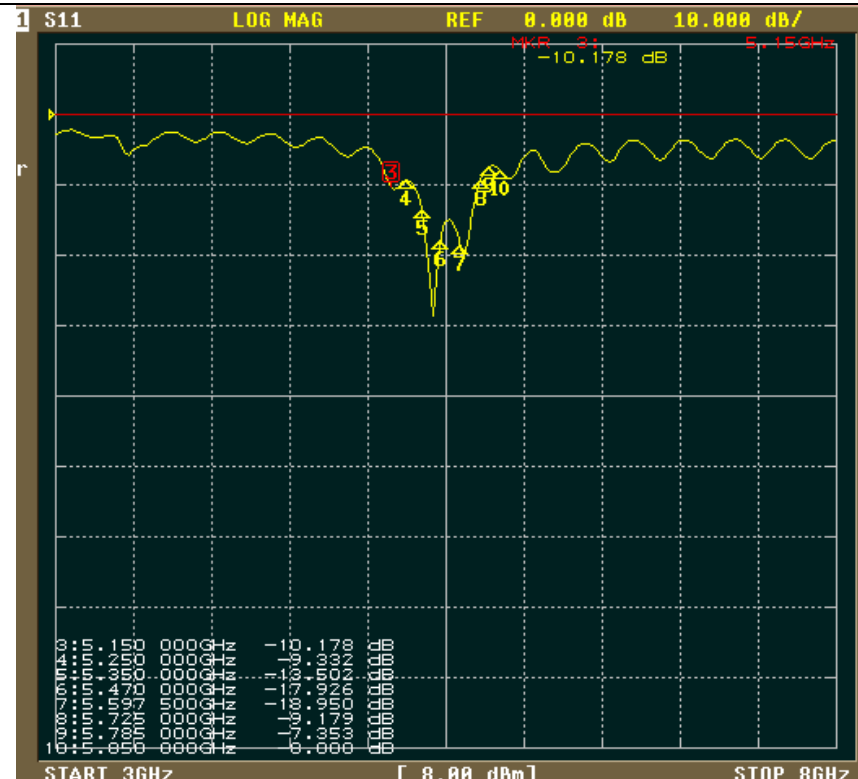
Center freq. @MHz	Bandwidth @MHz	Return Loss		
		2.4GHz	2.45GHz	2.5GHz
2450		-10.81	-17.46	-10.15

5.2 Return Loss 5.15GHz ~ 5.85GHz

Antenna Aux



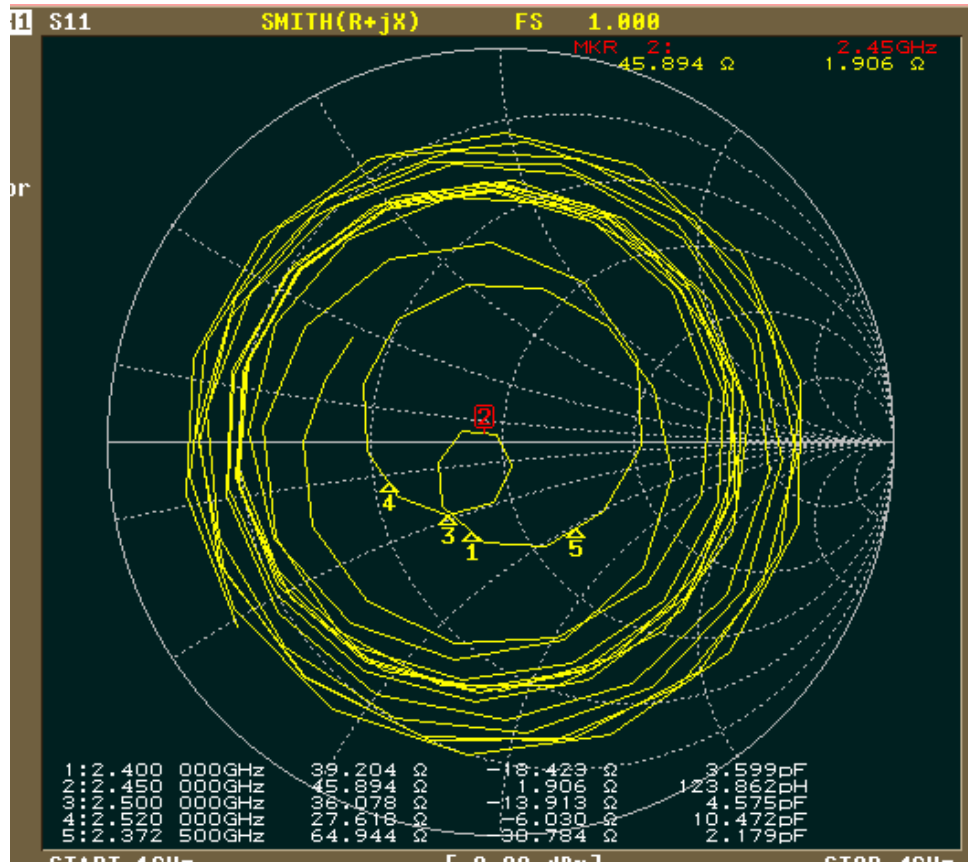
Antenna Main



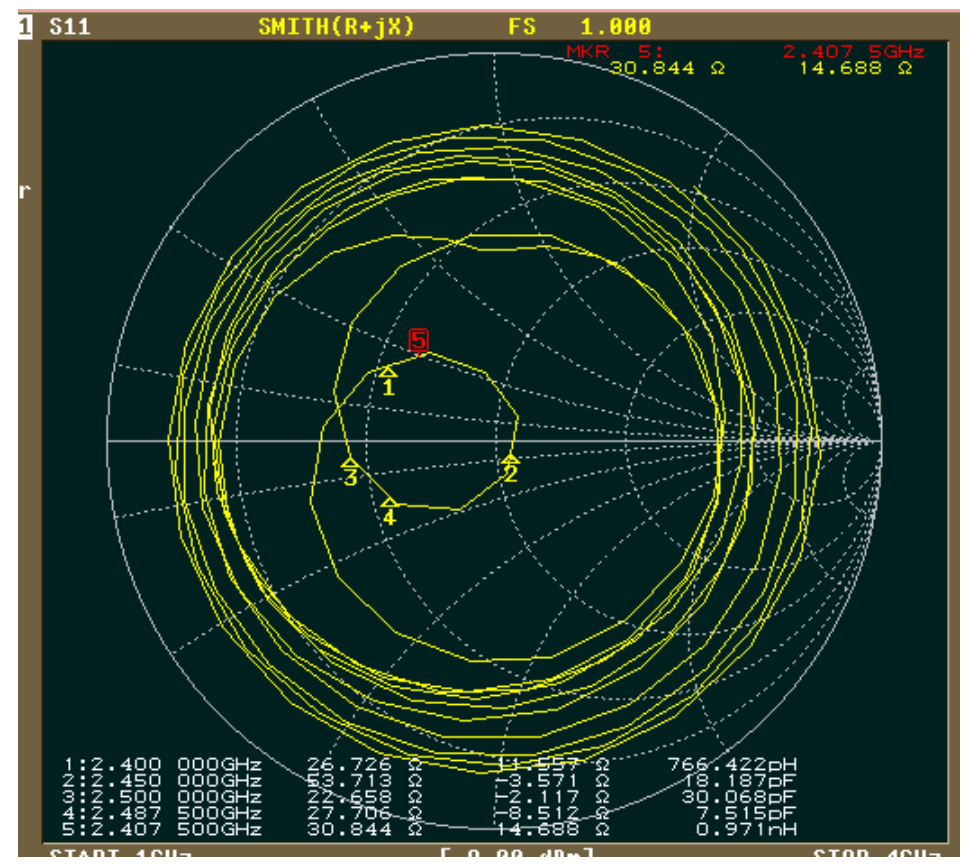
Center freq. @MHz	Bandwidth @MHz	Return Loss			Center freq. @MHz	Bandwidth @MHz	Return Loss		
		5.15GHz	5.25GHz	5.35GHz			5.15GHz	5.25GHz	5.35GHz
		-10.10	-8.74	-24.60			-10.17	-9.33	-13.50
		5.47GHz	5.5597GHz	5.75GHz			5.47GHz	5.5597GHz	5.75GHz
		-18.07	-10.20	-9.66			-17.92	-18.95	-9.17
		5.785GHz		5.85GHz			5.785GHz		5.85GHz
		-6.95		-9.44			-7.35		-8.00

6. Smith Chart

Antenna Aux

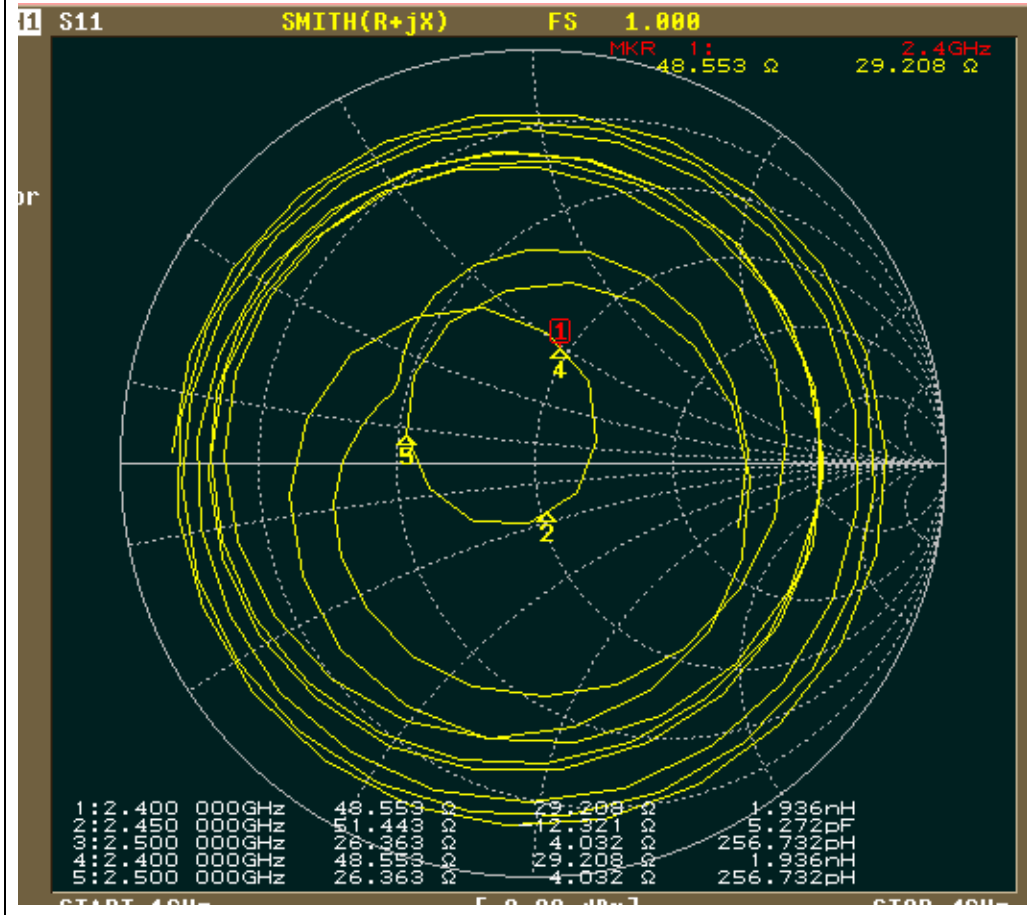


Antenna Main

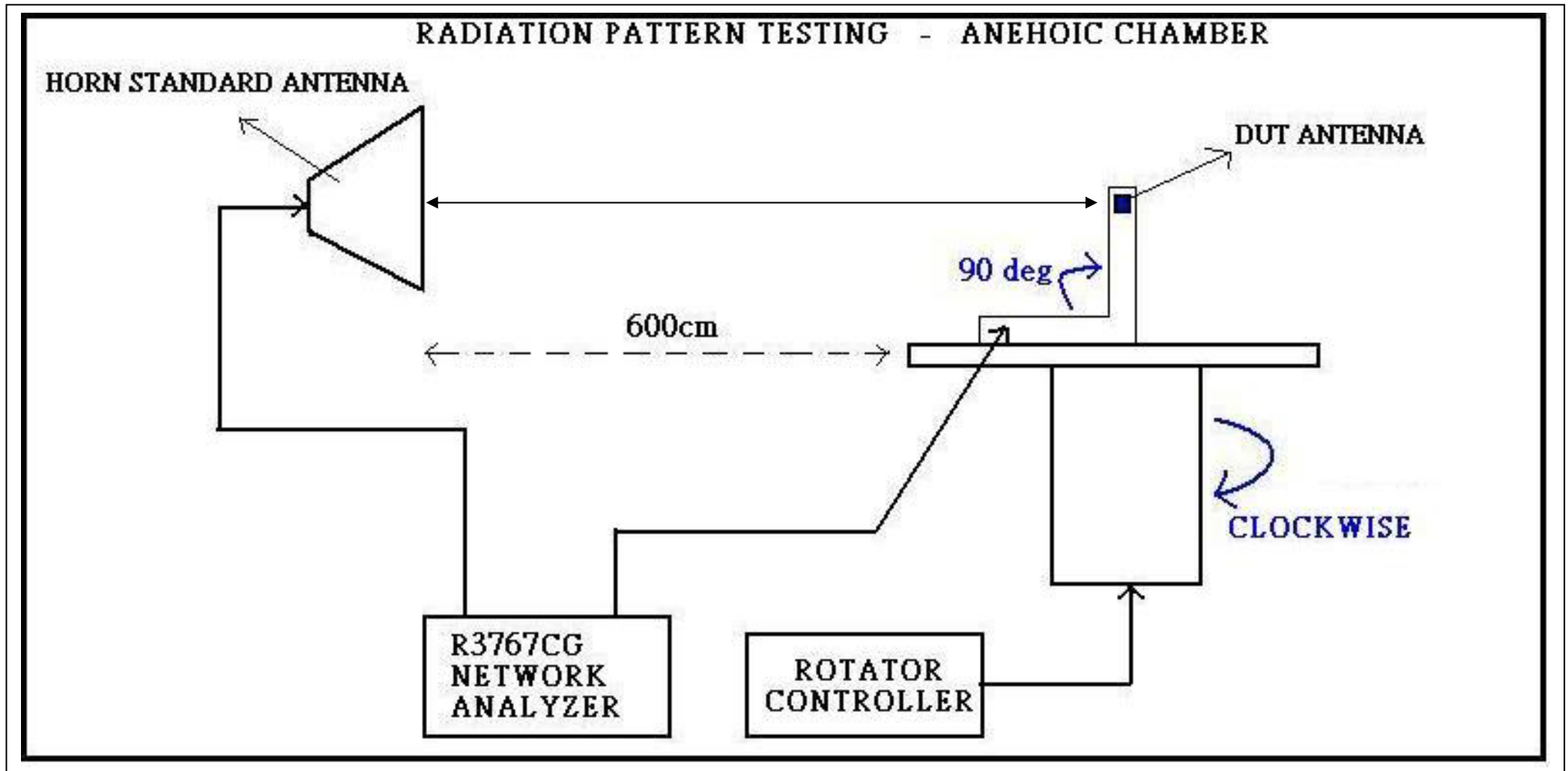


Smith Chart

Antenna Bluetooth



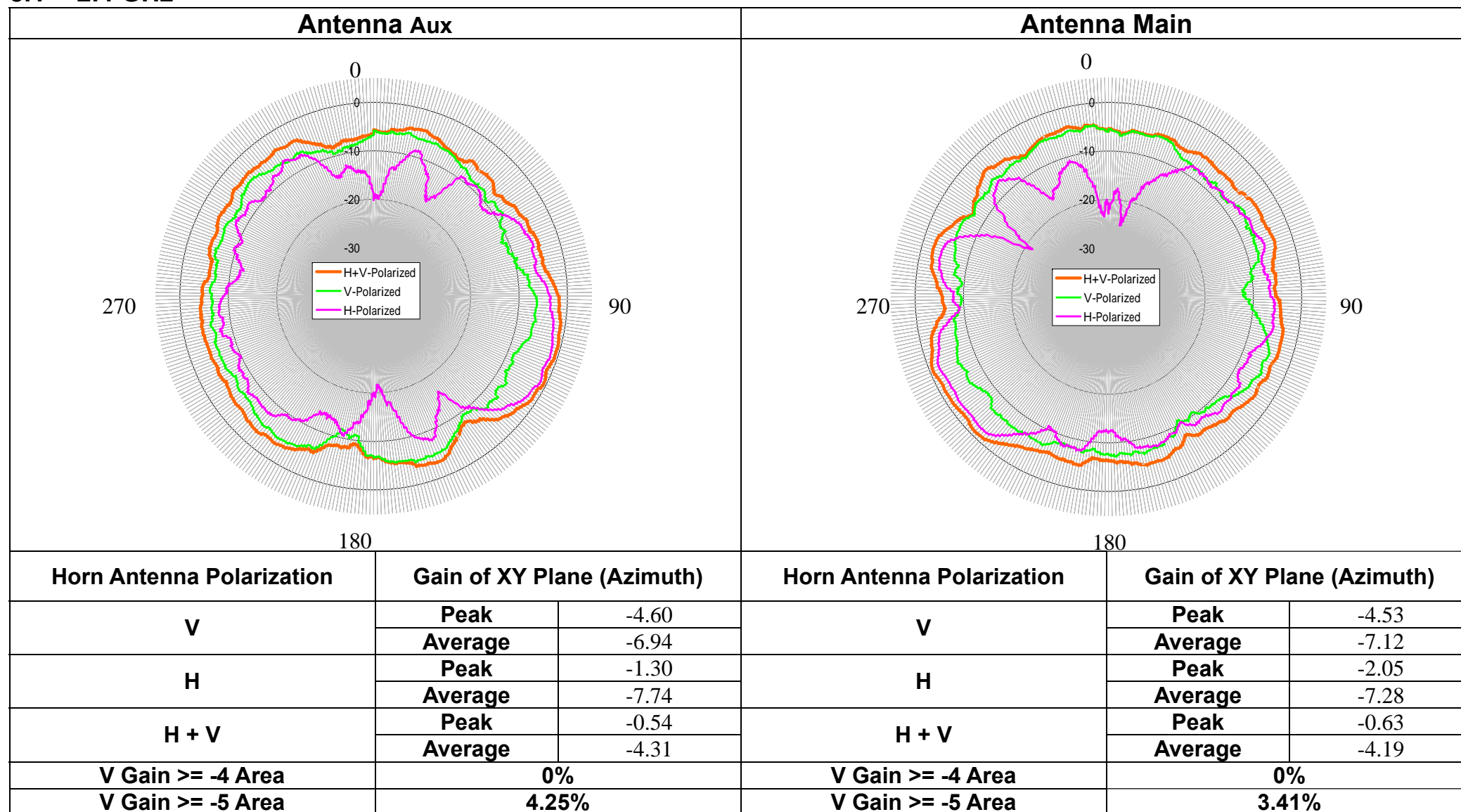
7. Antenna Radiation Pattern Testing Set Up



include a complete display and display plastics.

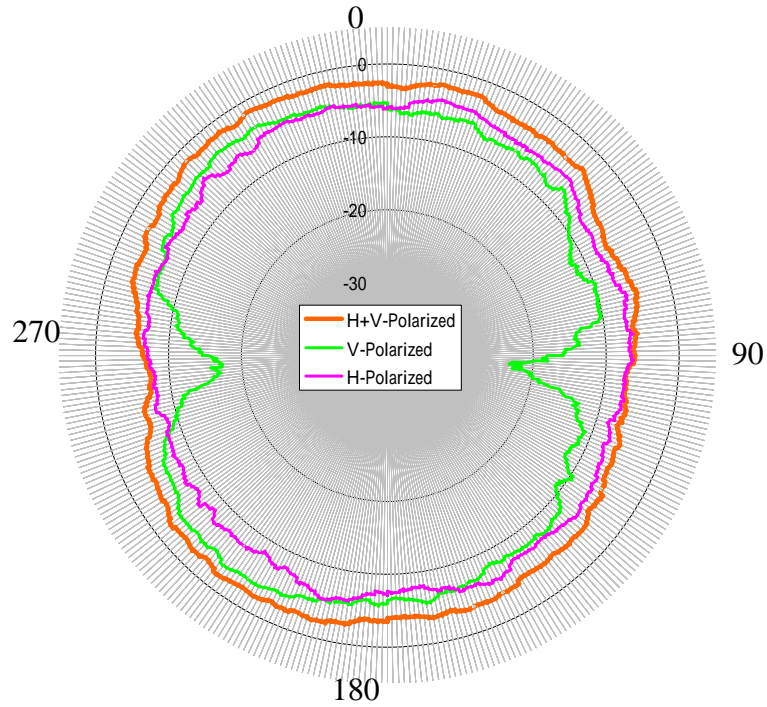
8. Radiation Pattern of XY Plane Testing Result

8.1 2.4 GHz



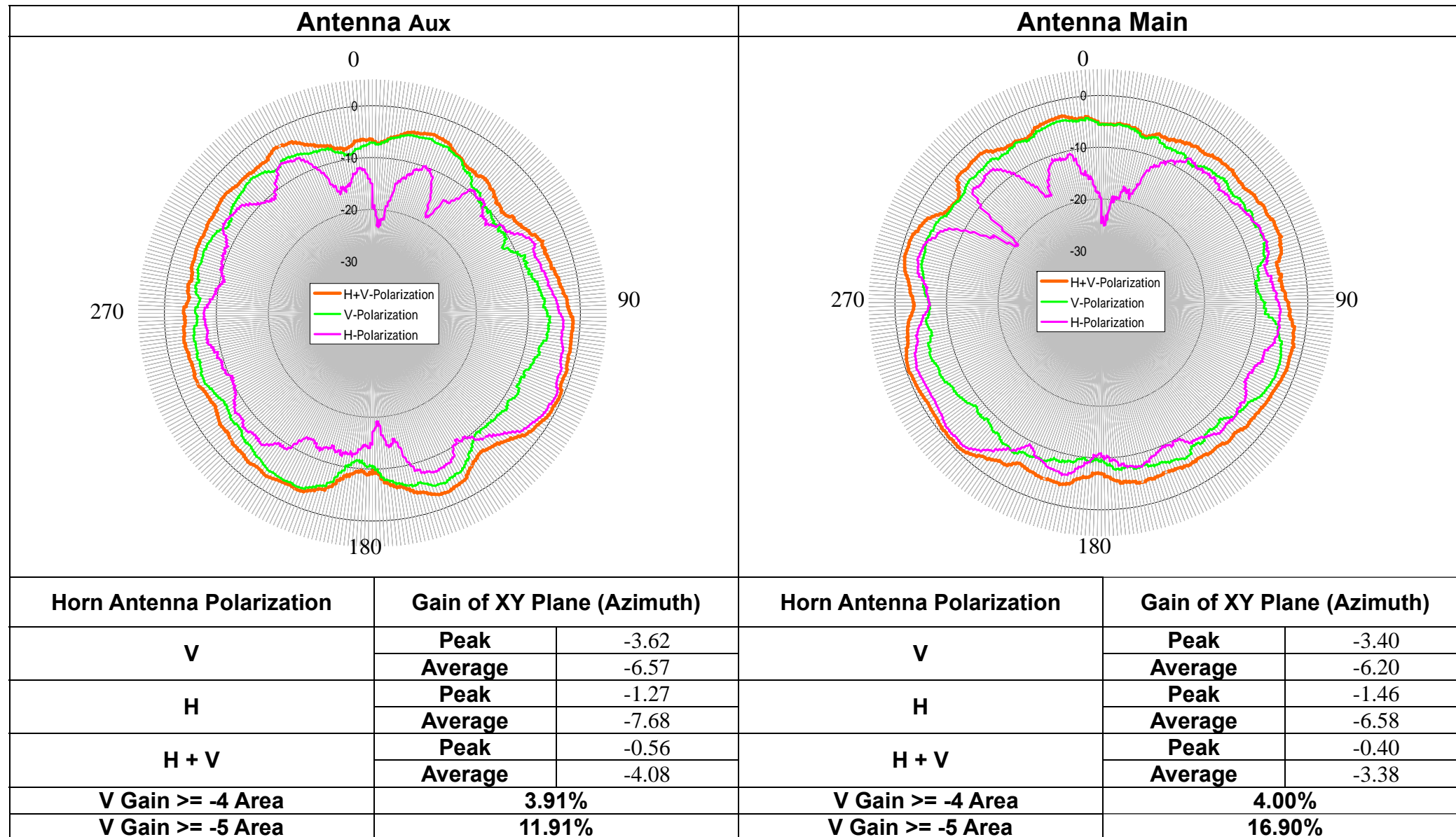
2.4 GHz

Antenna Bluetooth



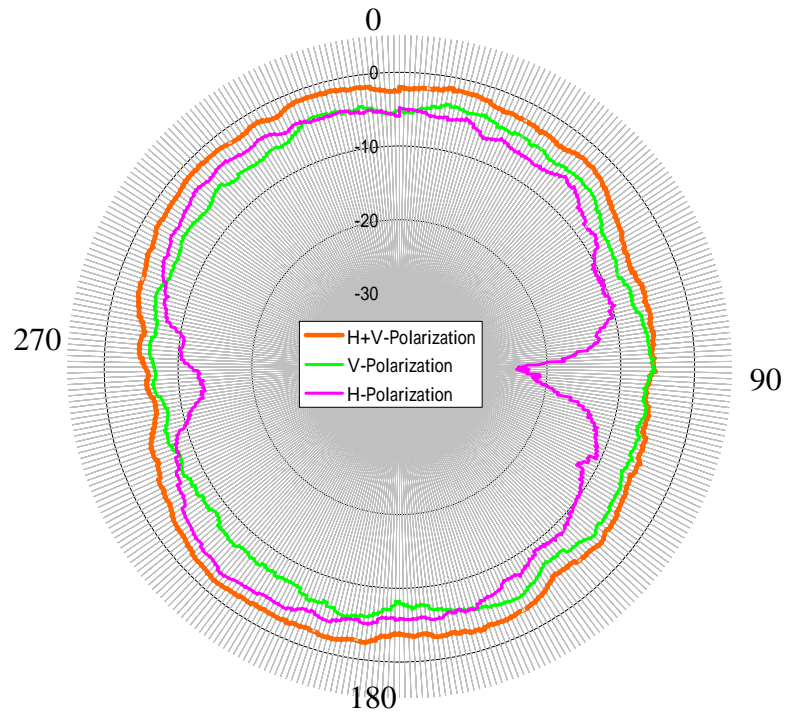
Horn Antenna Polarization	Gain of XY Plane (Azimuth)	
	V	Peak
	Average	-6.85
H	Peak	-4.18
	Average	-6.55
H + V	Peak	-1.47
	Average	-3.69
V Gain >= -4 Area	5.91%	
V Gain >= -5 Area	22.73%	

8.2 2.45 GHz



2.45 GHz

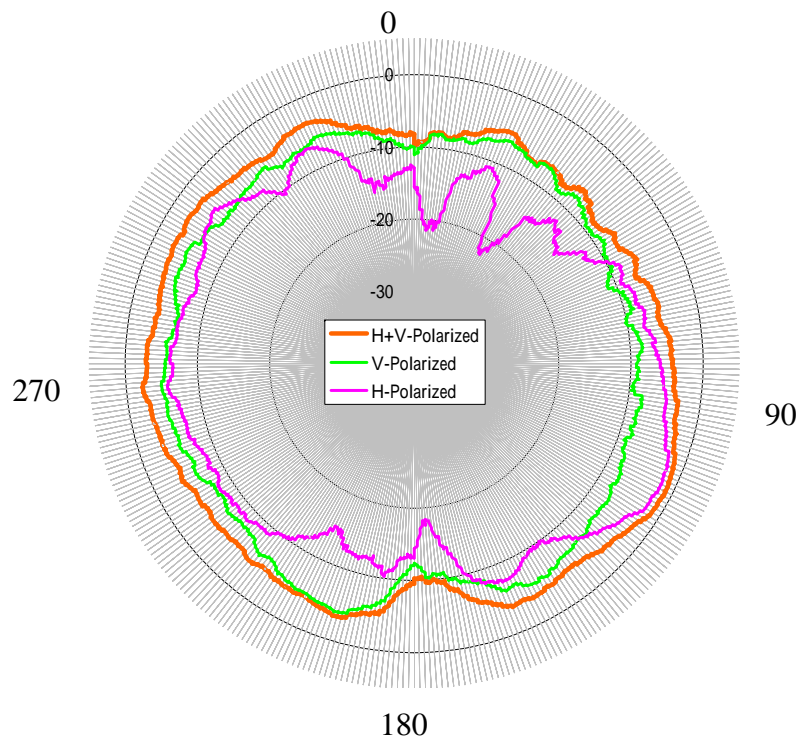
Antenna Bluetooth



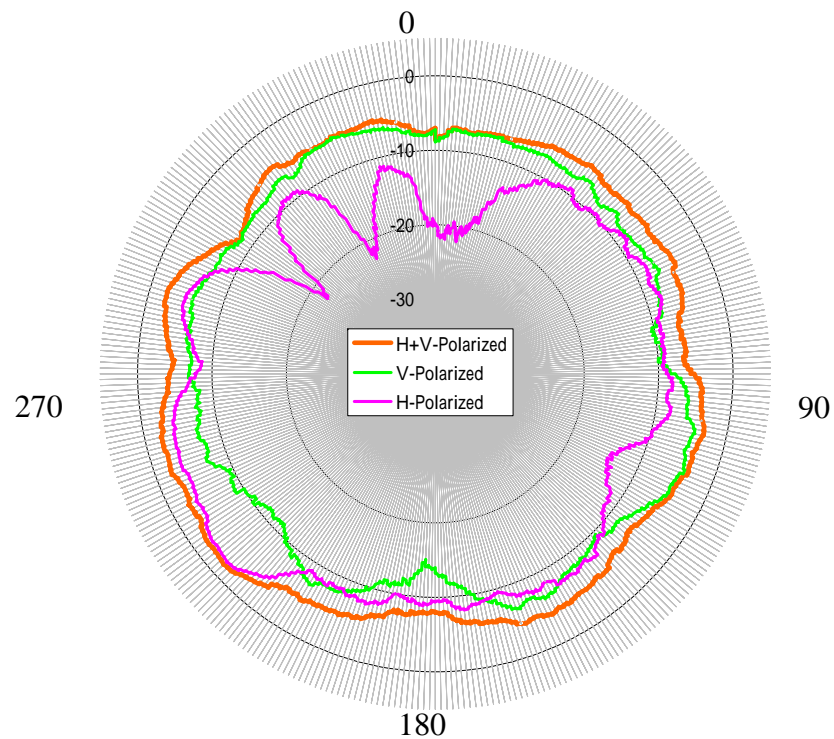
Horn Antenna Polarization	Gain of XY Plane (Azimuth)	
	V	Peak
	Average	-6.04
H	Peak	-2.92
	Average	-6.44
H + V	Peak	-1.34
	Average	-3.22
V Gain >= -4 Area	0.92%	
V Gain >= -5 Area	16.90%	

8.3 2.5 GHz

Antenna Aux



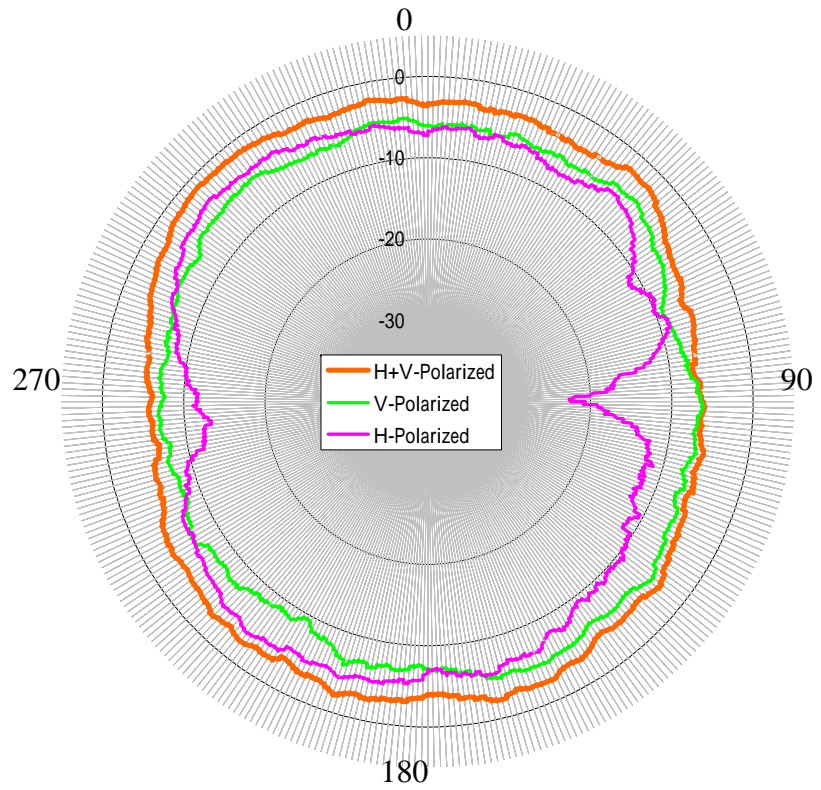
Antenna Main



Horn Antenna Polarization		Gain of XY Plane (Azimuth)		Horn Antenna Polarization		Gain of XY Plane (Azimuth)	
V	Peak	-3.89		V	Peak	-4.09	
	Average	-7.05			Average	-7.58	
H	Peak	-1.92		H	Peak	-2.26	
	Average	-8.02			Average	-8.15	
H + V	Peak	-0.90		H + V	Peak	-1.73	
	Average	-4.50			Average	-4.85	
Gain >= -4 Area		0.25%		Gain >= -4 Area		0%	
Gain >= -5 Area		5.5%		Gain >= -5 Area		4.33%	

2.5 GHz

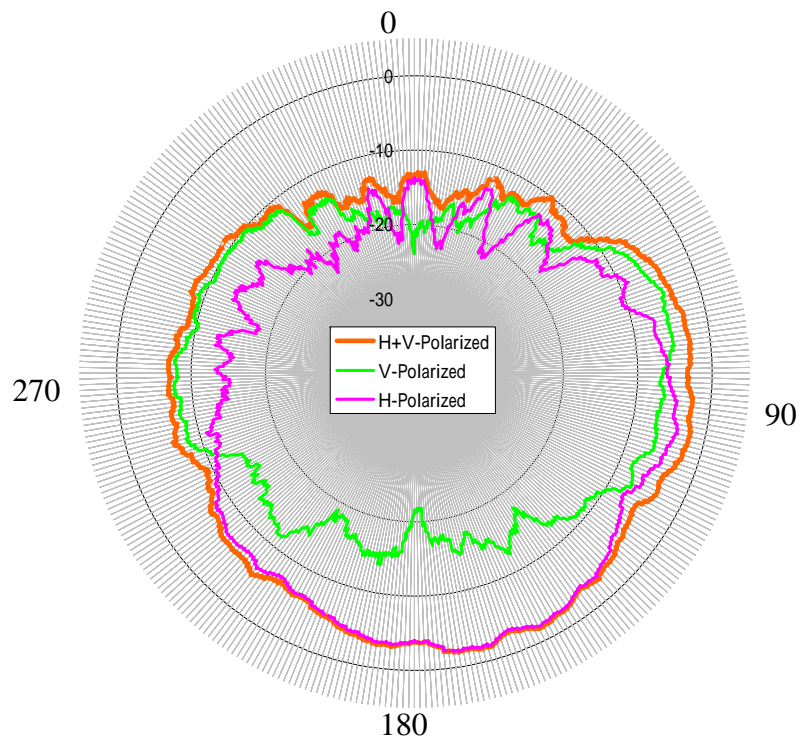
Antenna Bluetooth



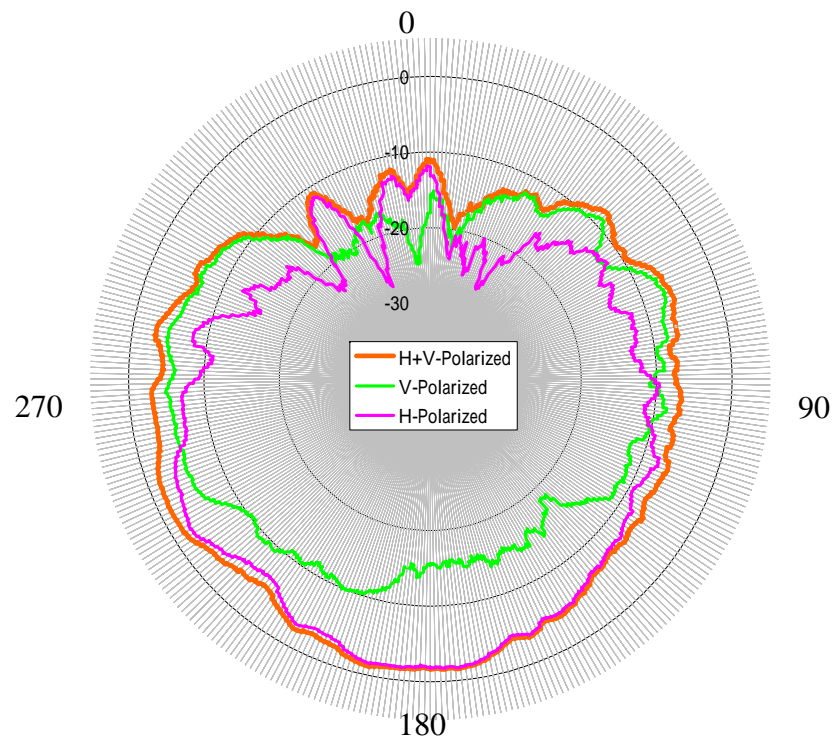
Horn Antenna Polarization	Gain of XY Plane (Azimuth)	
V	Peak	-4.45
	Average	-6.45
H	Peak	-3.39
	Average	-6.90
H + V	Peak	-1.33
	Average	-3.66
V Gain >= -4 Area	0%	
V Gain >= -5 Area	5.25%	

8.4 5.075 GHz

Antenna Aux



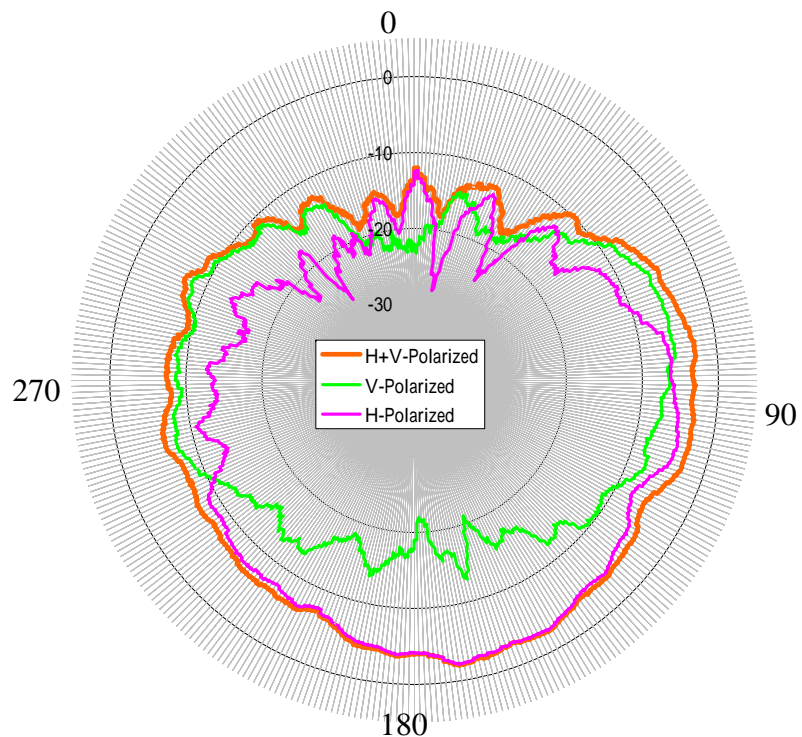
Antenna Main



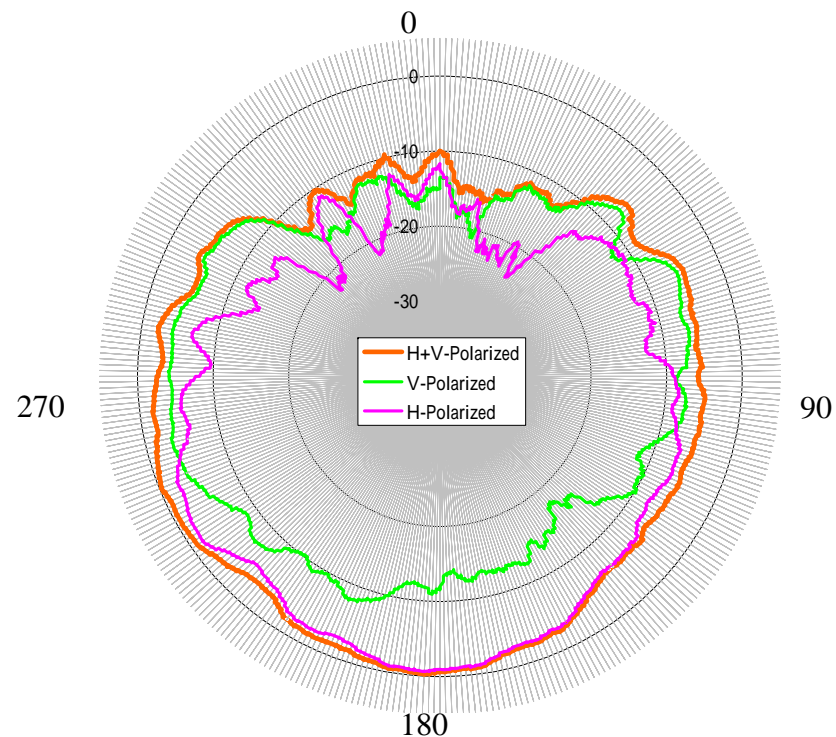
Horn Antenna Polarization		Gain of XY Plane (Azimuth)		Horn Antenna Polarization		Gain of XY Plane (Azimuth)	
V	Peak	-4.90		V	Peak	-4.61	
	Average	-10.74			Average	-10.11	
H	Peak	-1.95		H	Peak	-1.54	
	Average	-7.59			Average	-7.23	
H + V	Peak	-1.76		H + V	Peak	-1.12	
	Average	-5.87			Average	-5.42	
Gain >= -4 Area		0%		Gain >= -4 Area		0%	
Gain >= -5 Area		0.5%		Gain >= -5 Area		1.42%	

8.5 5.15 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-5.45

Average

-10.98

H

Peak

-2.22

Average

-8.04

H + V

Peak

-2.06

Average

-6.26

Gain >= -4 Area

0%

Gain >= -5 Area

0%

Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-3.51

Average

-8.64

H

Peak

-0.62

Average

-6.24

H + V

Peak

-0.25

Average

-4.27

Gain >= -4 Area

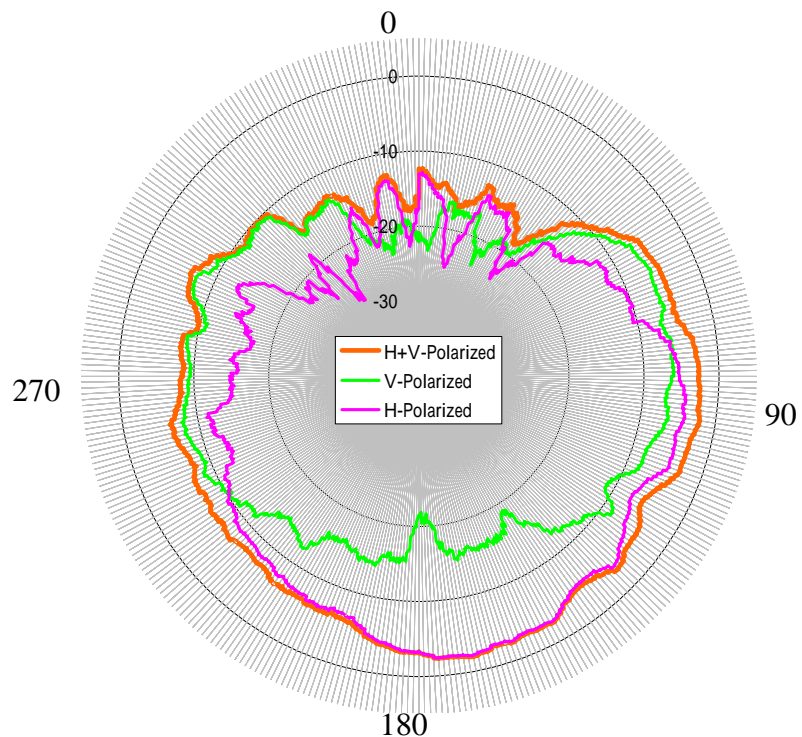
2.25%

Gain >= -5 Area

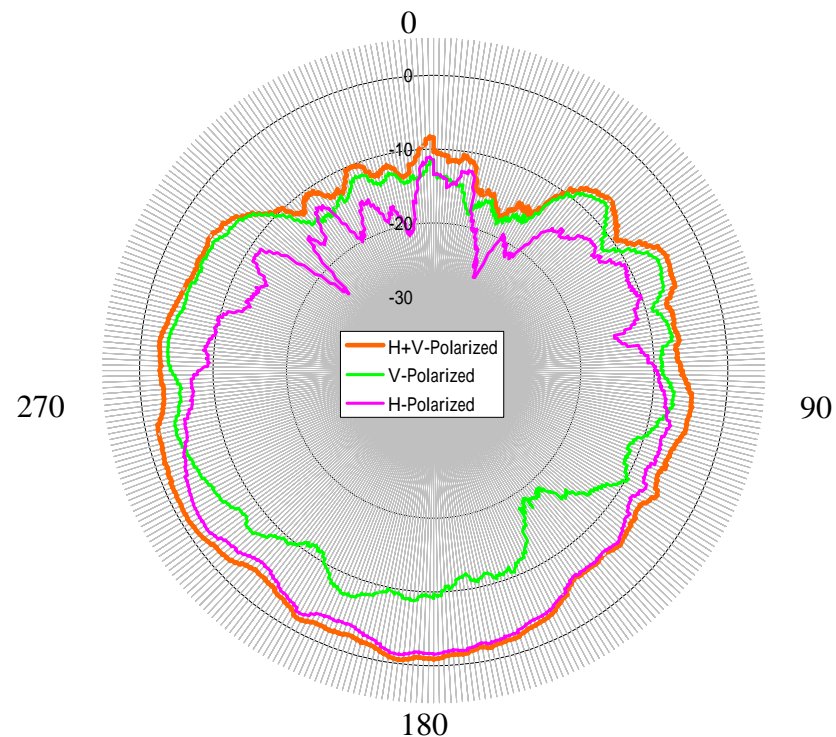
11.16%

8.6 5.25 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-5.90

Average

-10.83

H

Peak

-2.13

Average

-8.00

H + V

Peak

-1.97

Average

-6.18

Gain >= -4 Area

0%

Gain >= -5 Area

0%

Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-3.64

Average

-8.61

H

Peak

-1.25

Average

-6.78

H + V

Peak

-0.56

Average

-4.58

Gain >= -4 Area

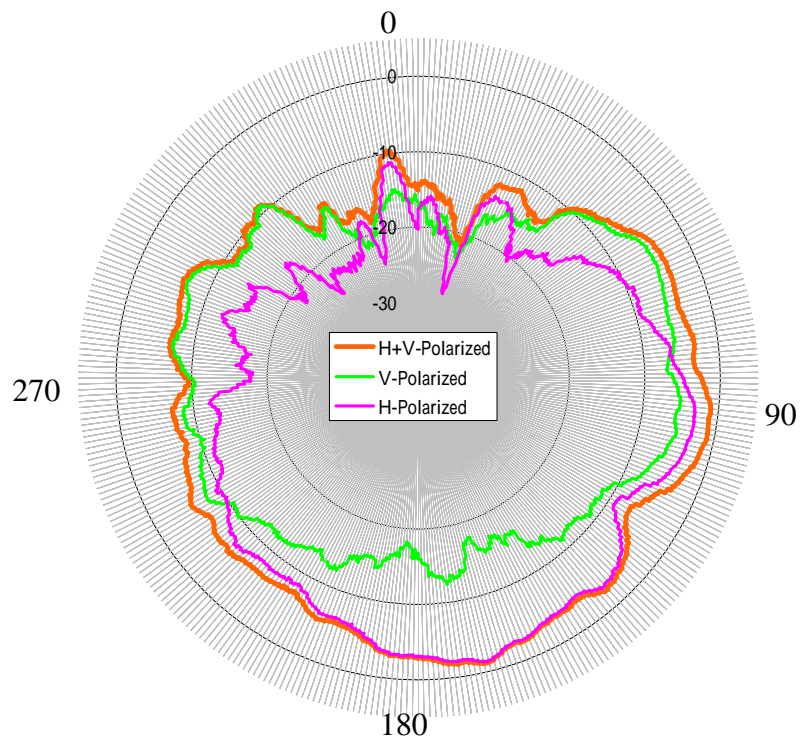
2.25%

Gain >= -5 Area

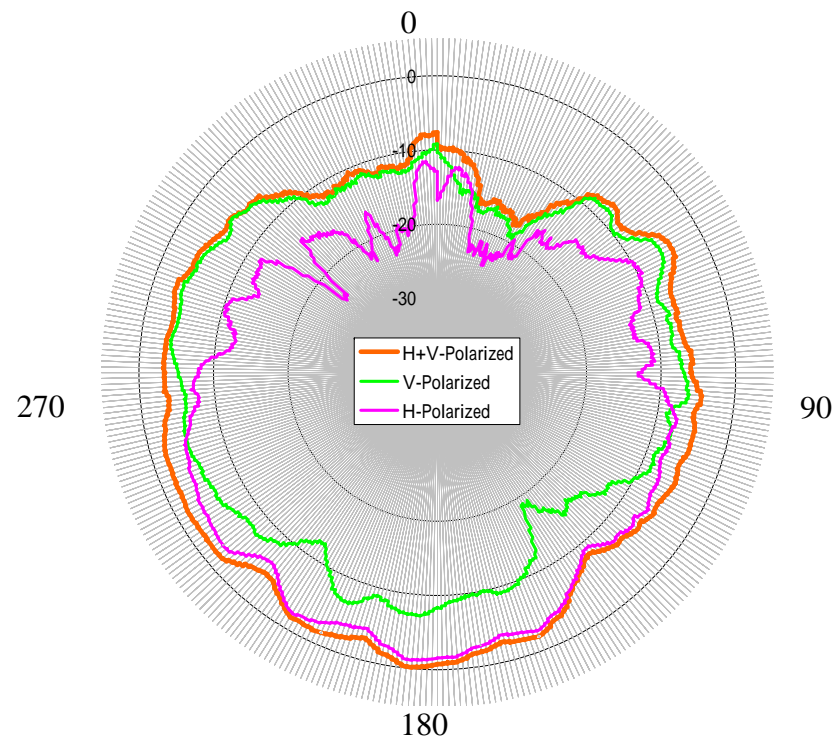
9.24%

8.7 5.35 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-4.96

Average

-10.01

H

Peak

-1.38

Average

-7.67

H + V

Peak

-0.93

Average

-5.67

Gain >= -4 Area

0%

Gain >= -5 Area

0.25%

Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-3.93

Average

-8.29

H

Peak

-1.11

Average

-7.09

H + V

Peak

-0.16

Average

-4.64

Gain >= -4 Area

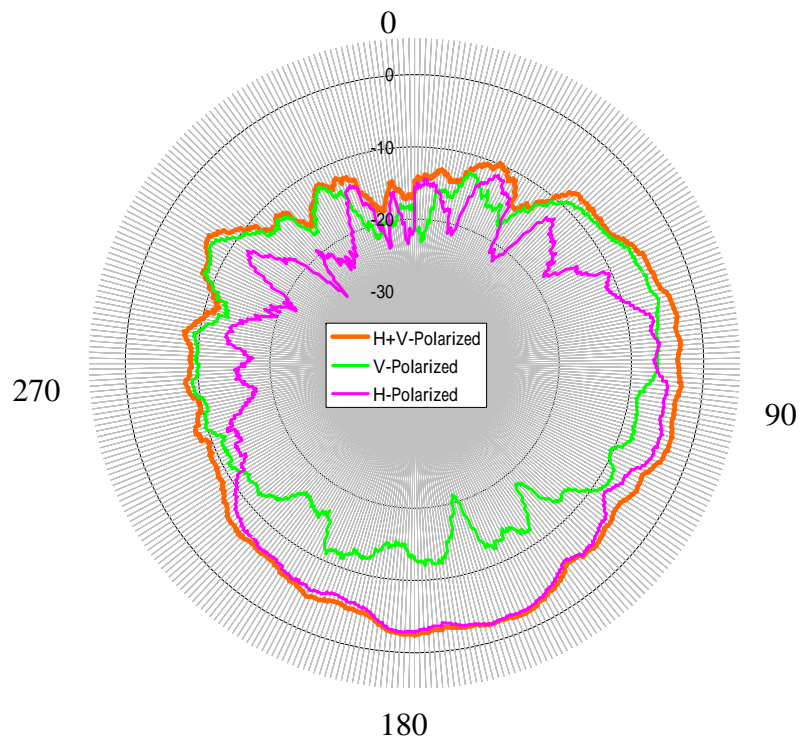
0.25%

Gain >= -5 Area

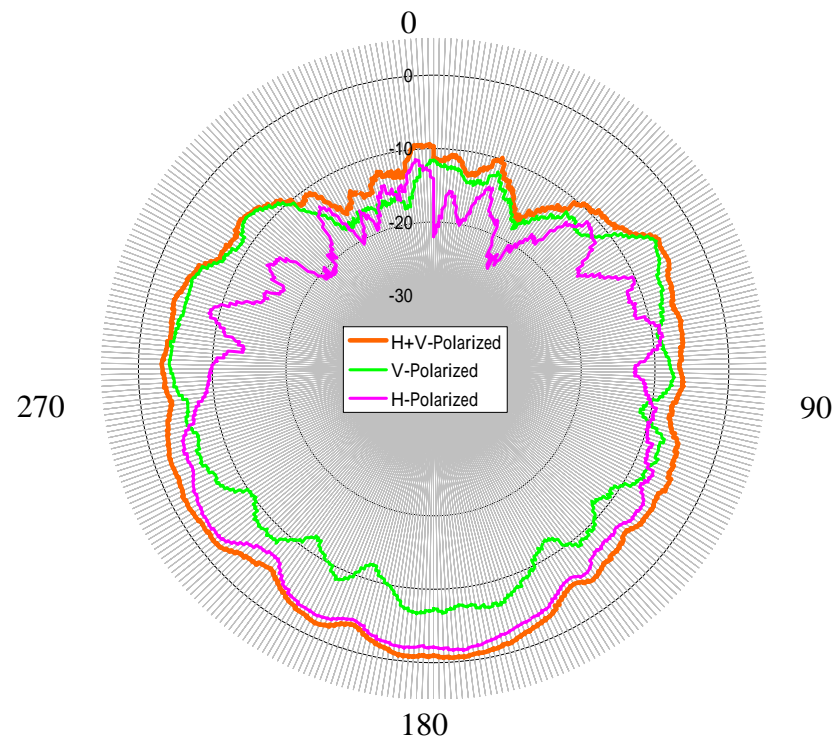
6.99%

8.8 5.47 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak -5.07
Average -10.77

H

Peak -2.44
Average -8.12

H + V

Peak -2.15
Average -6.23

Gain >= -4 Area

0%

Gain >= -5 Area

0%

Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak -4.16
Average -8.68

H

Peak -1.50
Average -7.19

H + V

Peak -0.58
Average -4.86

Gain >= -4 Area

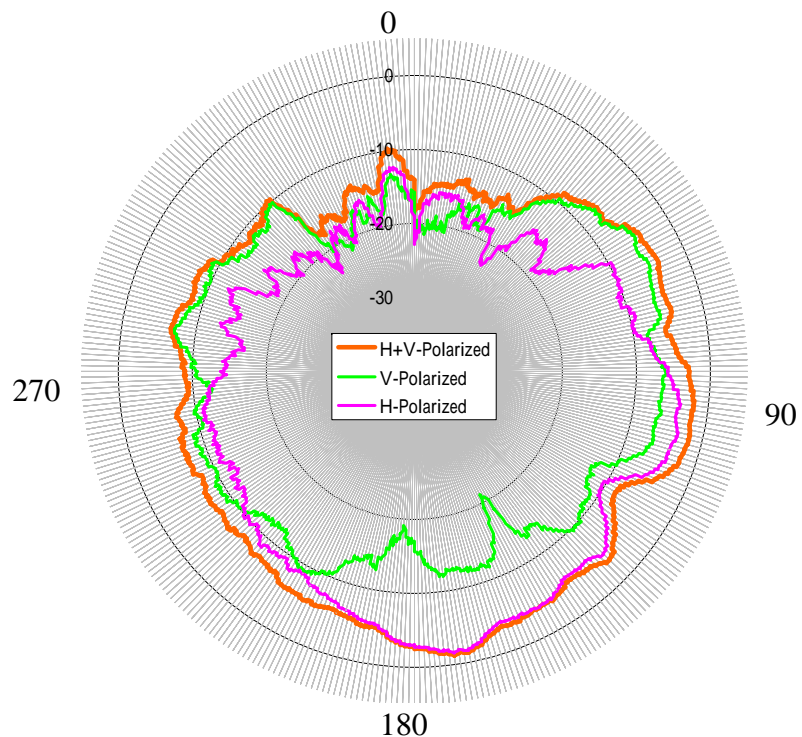
0%

Gain >= -5 Area

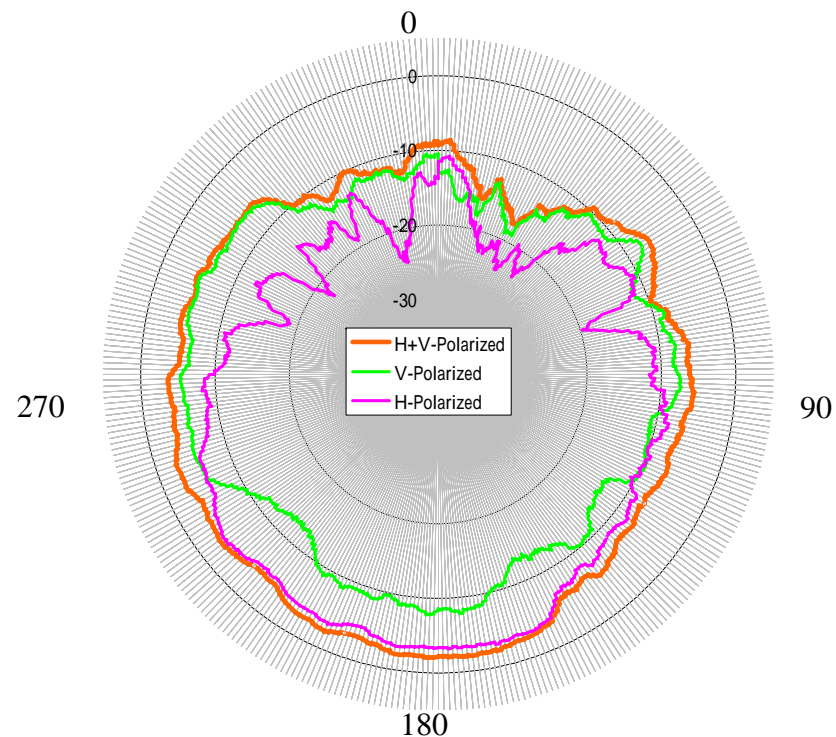
4.33%

8.9 5.5975 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-5.12

Average

-10.26

H

Peak

-1.59

Average

-8.34

H + V

Peak

-1.21

Average

-6.19

Gain >= -4 Area

0%

Gain >= -5 Area

0%

Horn Antenna Polarization

Gain of XY Plane (Azimuth)

V

Peak

-5.31

Average

-9.31

H

Peak

-2.99

Average

-8.07

H + V

Peak

-2.01

Average

-5.63

Gain >= -4 Area

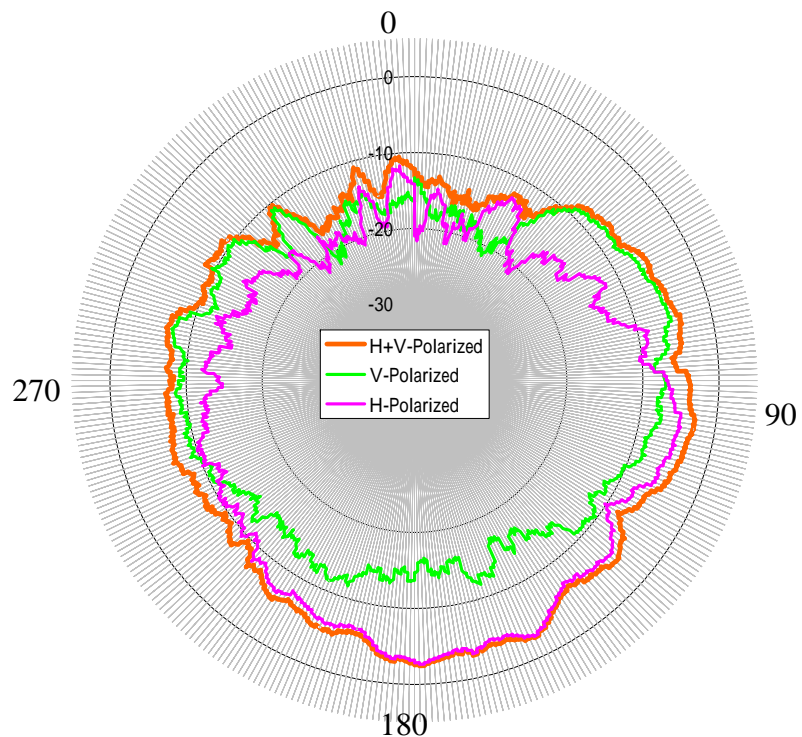
0%

Gain >= -5 Area

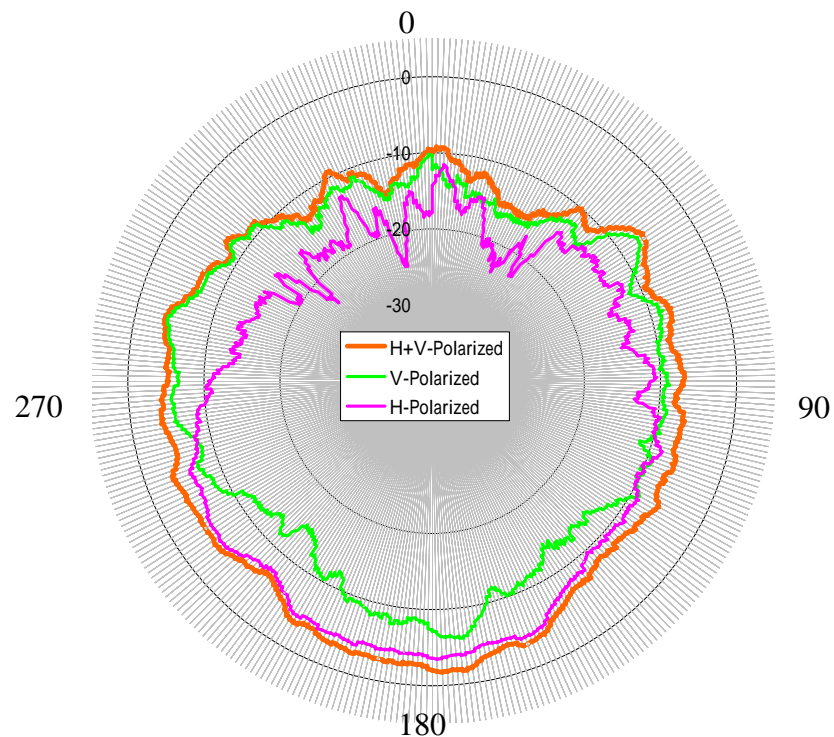
0%

8.10 5.725 GHz

Antenna Aux



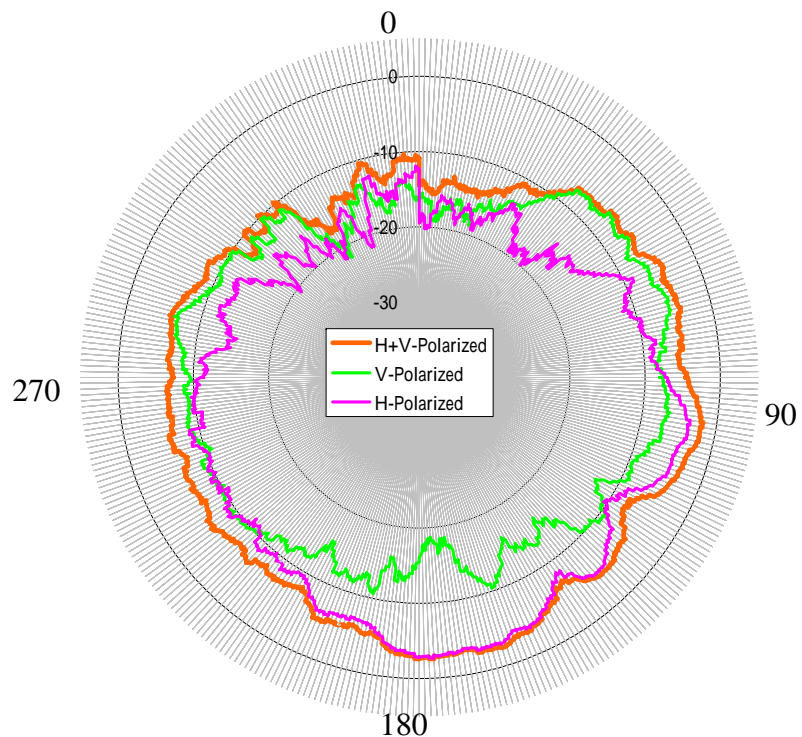
Antenna Main



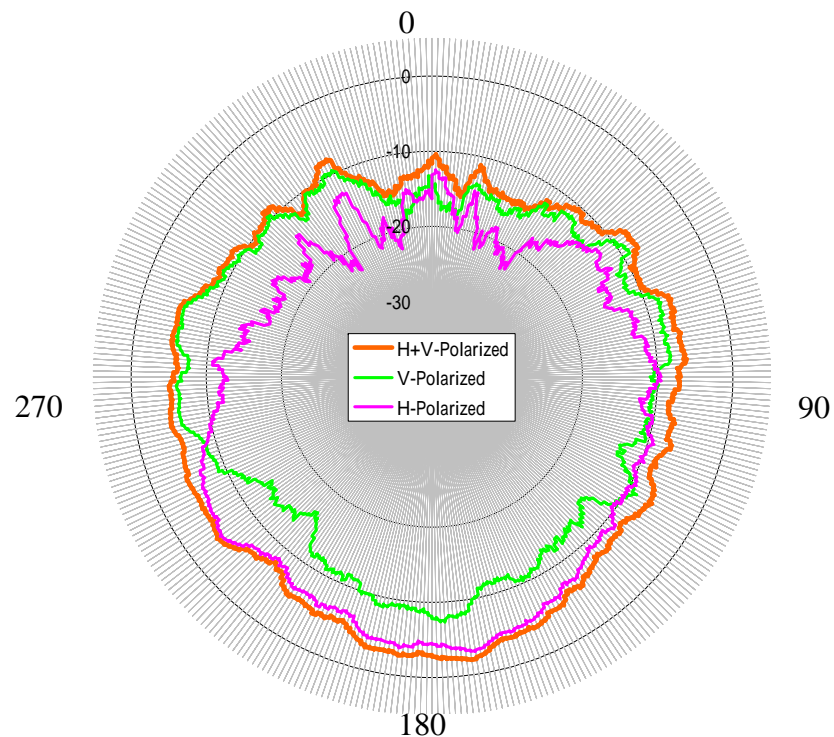
Horn Antenna Polarization		Gain of XY Plane (Azimuth)		Horn Antenna Polarization		Gain of XY Plane (Azimuth)	
V	Peak	-5.34		V	Peak	-4.31	
	Average	-10.96			Average	-9.73	
H	Peak	-2.64		H	Peak	-3.44	
	Average	-8.75			Average	-8.88	
H + V	Peak	-2.45		H + V	Peak	-1.71	
	Average	-6.70			Average	-6.27	
Gain >= -4 Area		0%		Gain >= -4 Area		0%	
Gain >= -5 Area		0%		Gain >= -5 Area		1.83%	

8.11 5.785 GHz

Antenna Aux



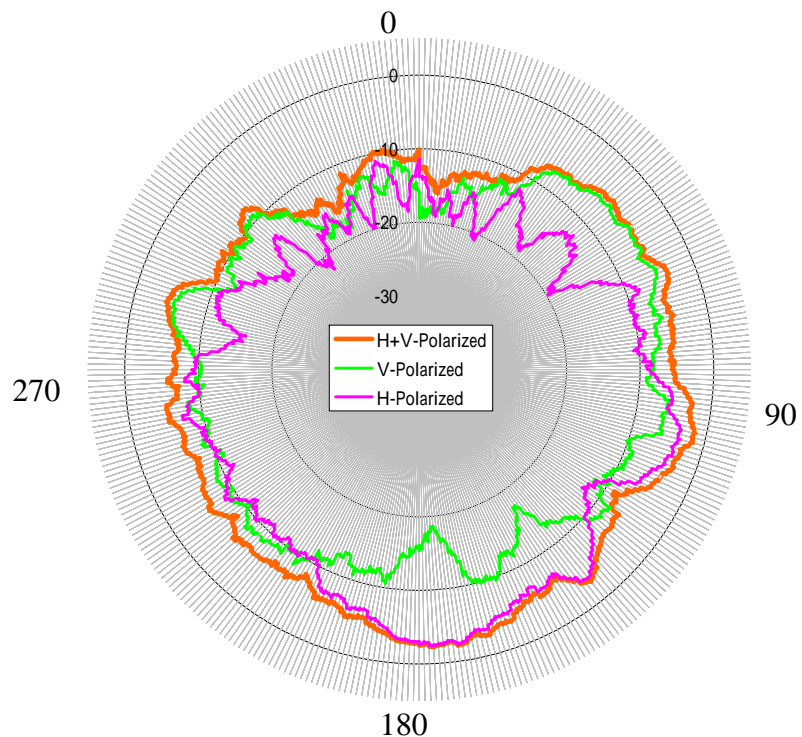
Antenna Main



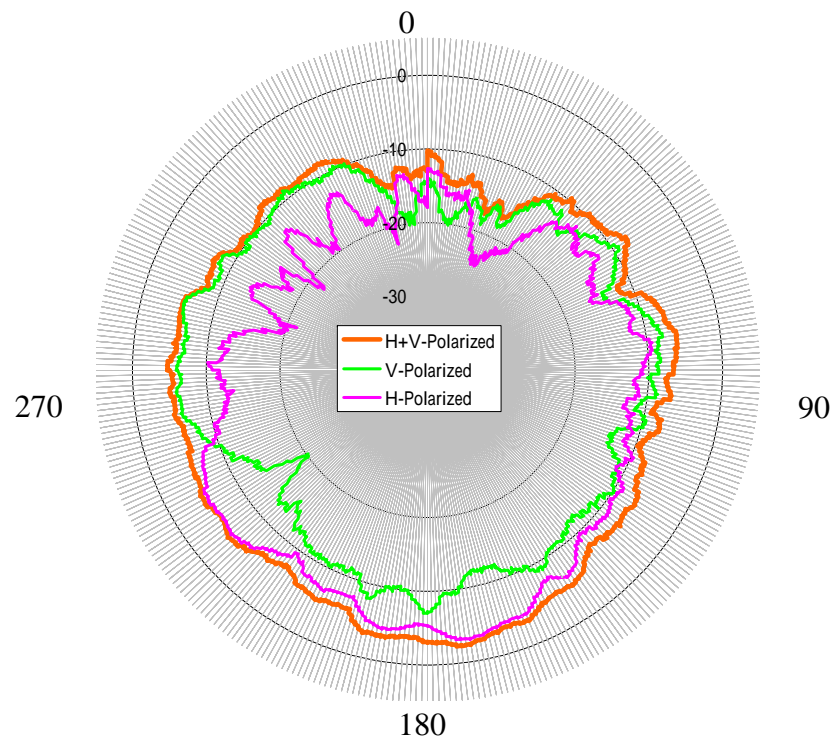
Horn Antenna Polarization		Gain of XY Plane (Azimuth)		Horn Antenna Polarization		Gain of XY Plane (Azimuth)	
V	Peak	-5.36		V	Peak	-5.66	
	Average	-10.29			Average	-10.38	
H	Peak	-2.67		H	Peak	-3.02	
	Average	-8.49			Average	-9.20	
H + V	Peak	-1.80		H + V	Peak	-2.00	
	Average	-6.29			Average	-6.74	
Gain >= -4 Area		0%		Gain >= -4 Area		0%	
Gain >= -5 Area		0%		Gain >= -5 Area		0%	

8.12 5.85 GHz

Antenna Aux



Antenna Main



Horn Antenna Polarization		Gain of XY Plane (Azimuth)		Horn Antenna Polarization		Gain of XY Plane (Azimuth)	
V	Peak	-5.05		V	Peak	-5.76	
	Average	-9.66			Average	-10.35	
H	Peak	-2.31		H	Peak	-3.02	
	Average	-8.67			Average	-9.36	
H + V	Peak	-1.54		H + V	Peak	-2.27	
	Average	-6.12			Average	-6.81	
Gain >= -4 Area		0%		Gain >= -4 Area		0%	
Gain >= -5 Area		0%		Gain >= -5 Area		0%	

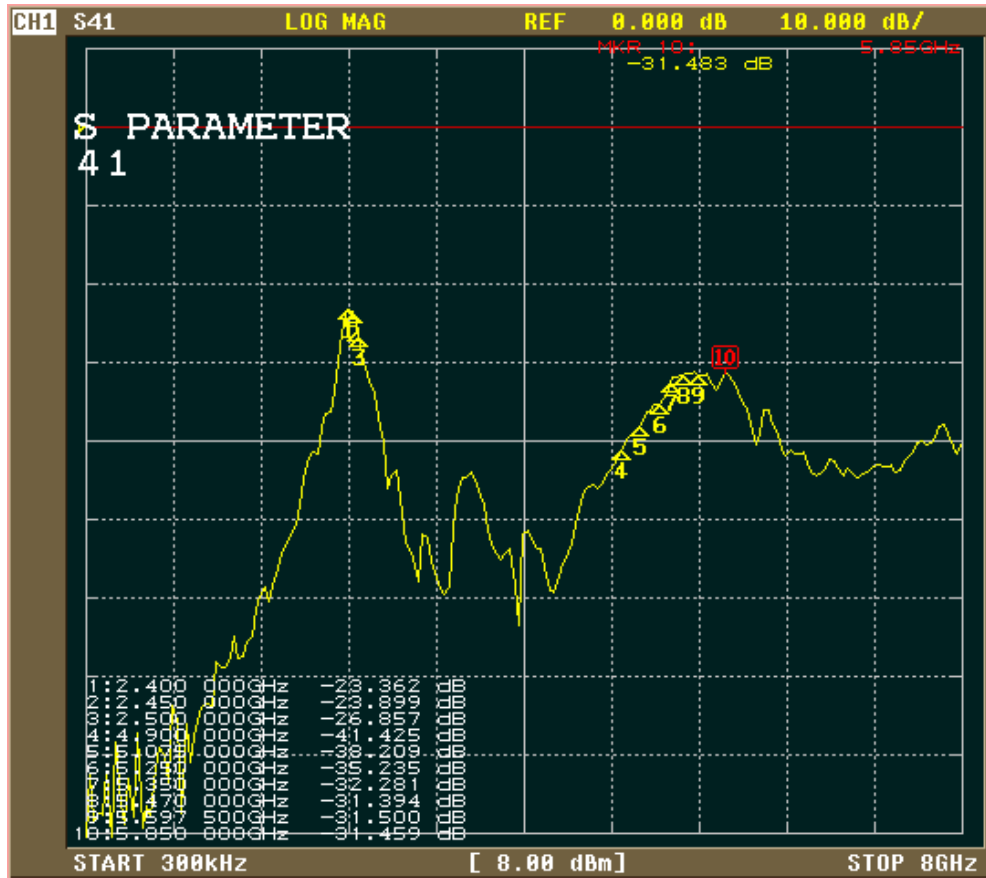
9. Isolation

Isolation is measured between the two antenna connectors with the platform opening 90 degrees. If there are only WLAN main and aux. antenna, we don't need to measure the isolation of two WLAN antennas. We just need to make sure that the distance between two WLAN antennas is over a half wave-length. The following is the minimum isolation requirements between the antennas of the two radios.

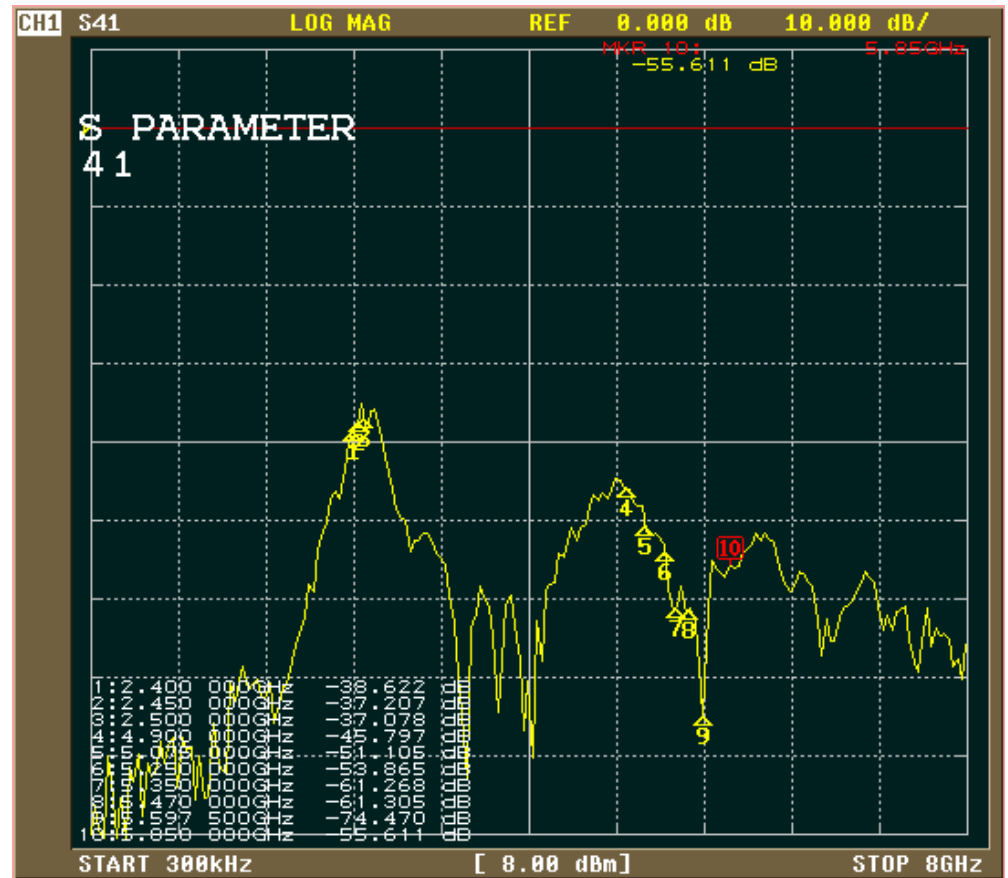
	Minimum Isolation Requirments			
	Receiver			
Transmitter	Bluetooth	802.11a WLAN	802.11b WLAN	WWAN GPRS or CDMA
Bluetooth	n/a	20 dB	40 dB	20 dB
802.11a WLAN	20 dB	n/a	n/a	20 dB
802.11b WLAN	40 dB	n/a	n/a	30 dB
WWAN GPRS or CDMA	20 dB	20 dB	20 dB	n/a

9.1 Isolation test result

Main→Aux



Main→B/T



Aux→B/T

