WHA YU INDUSTRIAL CO., LTD.
No. 326 Sec 2. Kung Tao 5 Road,
Hsin Chu City, Taiwan

Antenna Design for Wireless AP

(BELKIN case)

V1.00

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Revised History

Date	Version	Revised Record
12/13/10	1.00	1st released

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Specification

Rough description	2G/5G antenna for a Wireless AP. Isolation between antennas must be under 20dB minus.	
Item	Initial Specification	Final Specification
Dimensions	PCB : Ant1 45(L)*12(W)*0.6(H)mm Ant2 49(L)*9(W)*0.8(H)mm	
Impedance	50Ω	
Test environment	With Housing	
Spectrum	802.11n	
Freq. Range	2.4~2.5GHz/4.9~5.825GHz	
Antenna type	PCB	
Gain	dBi	
VSWR	1.92：1	
Radiation	Omni	
Polarization	Linear	
HPBW / H	None	
HPBW / E	None	
Rad. efficiency	>70%	
Connector type	I-PEX	
Cable type	1.13	
Cable length	None	
Isolation	20dB	

1. Antennas' setup and environment

1.1 Ant 1

1.2 Ant 2

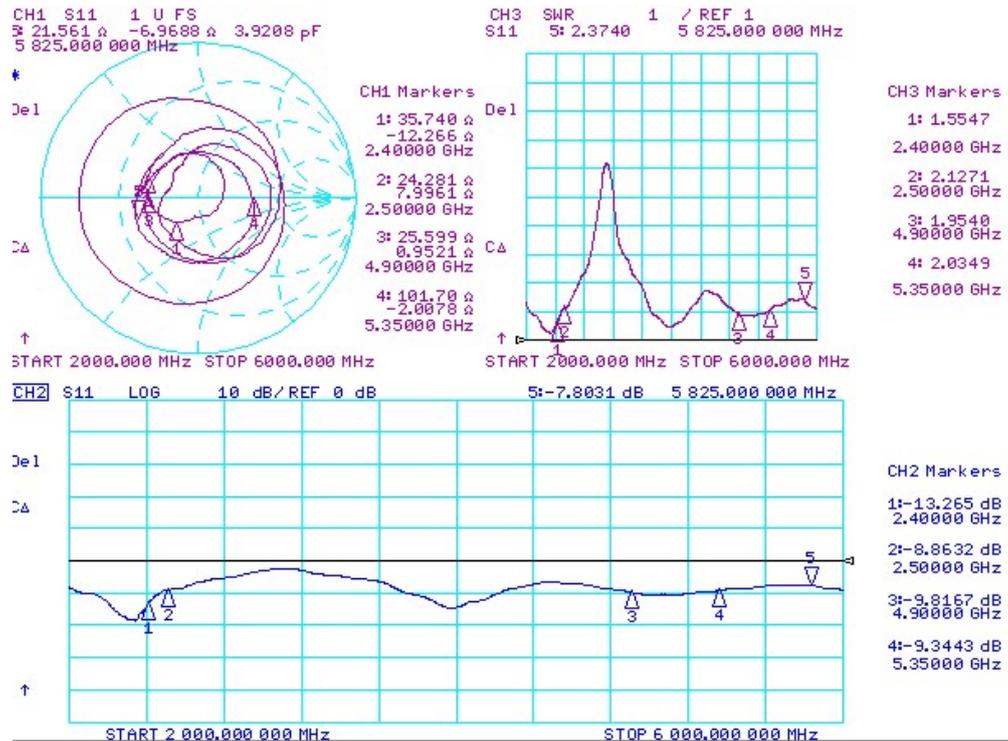# 2 S-parameter test results

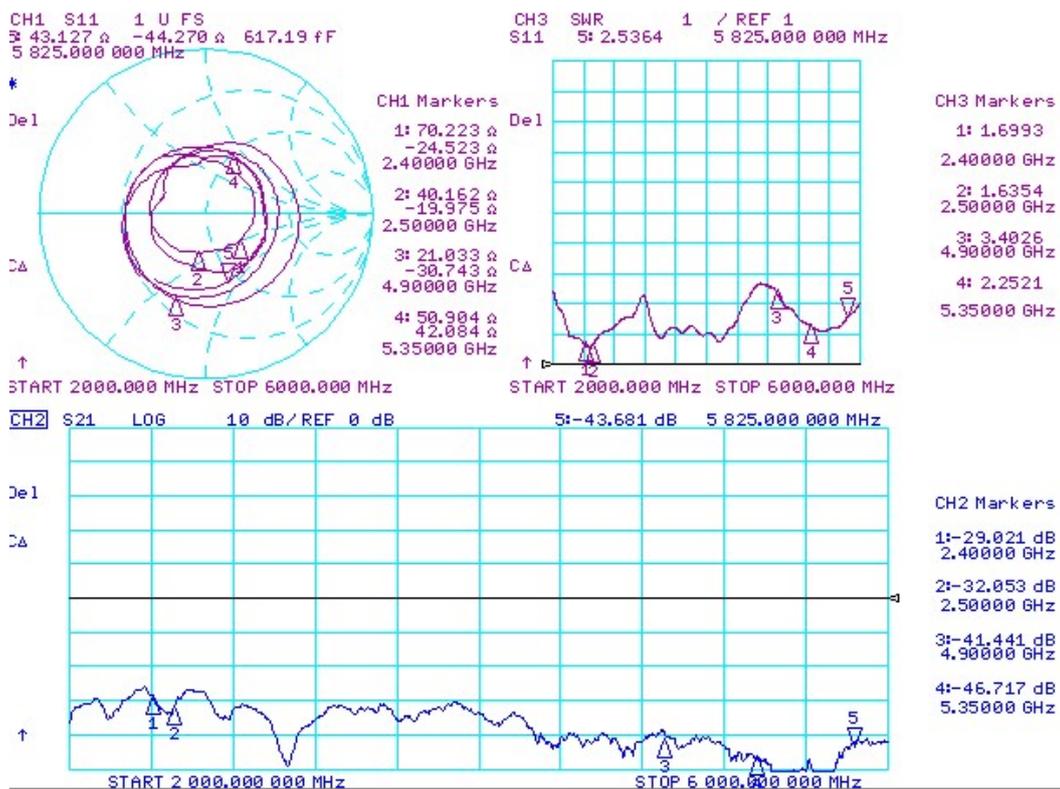## 2.1 Ant1 S11 and S12 Test Results

2.1.1 S11
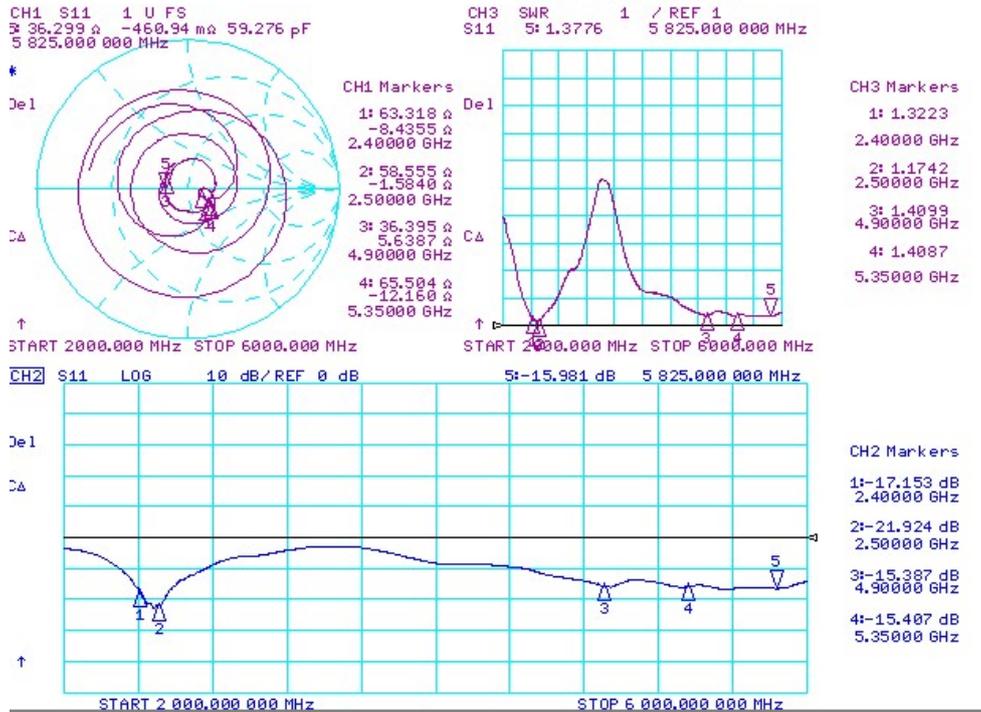
2.1.2 S12
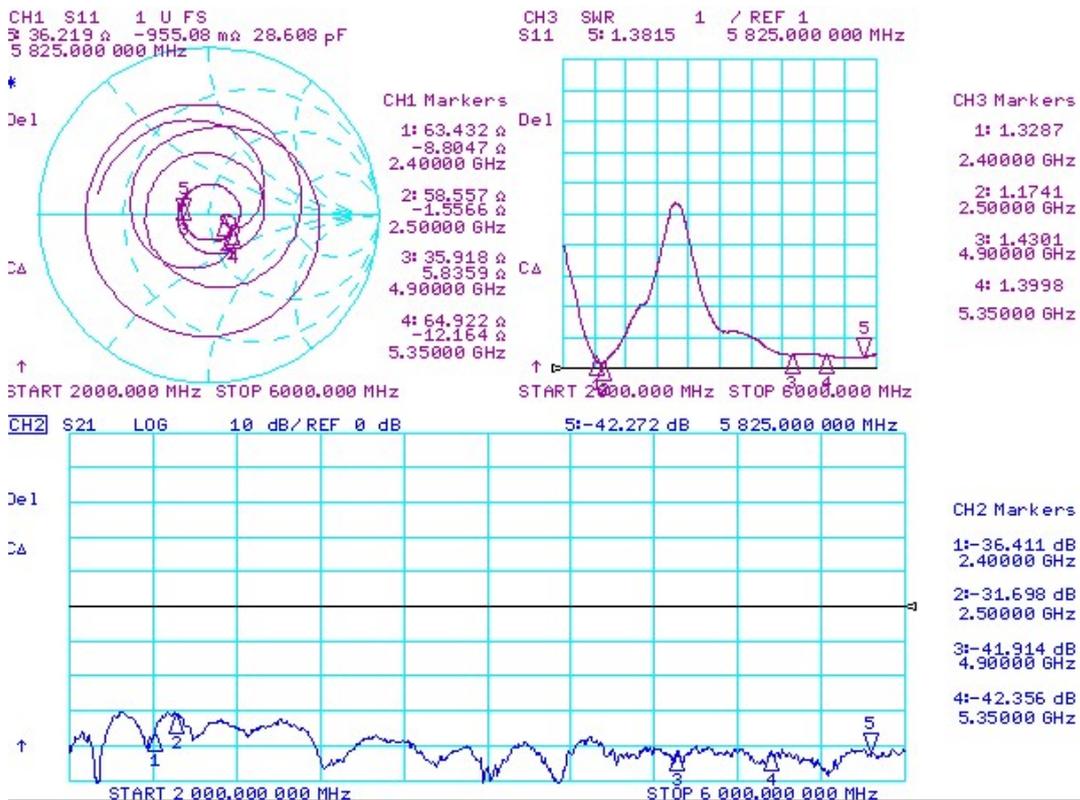
2.2 Ant2 S11 and S12 Test Results

2.2.1 S11

2.2.2 S12

3.1 Measurement setting for Ant1
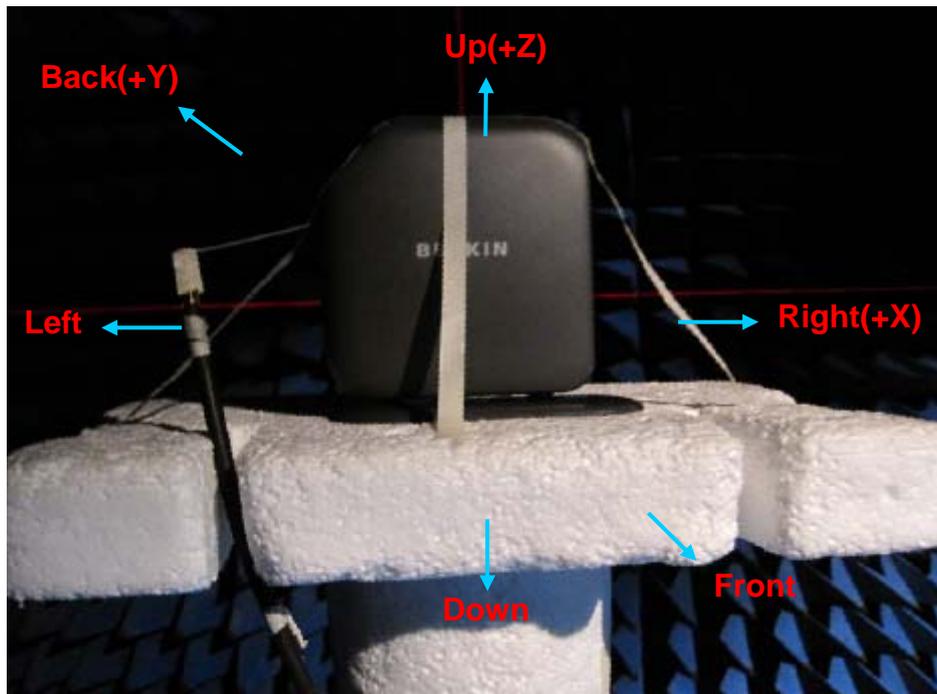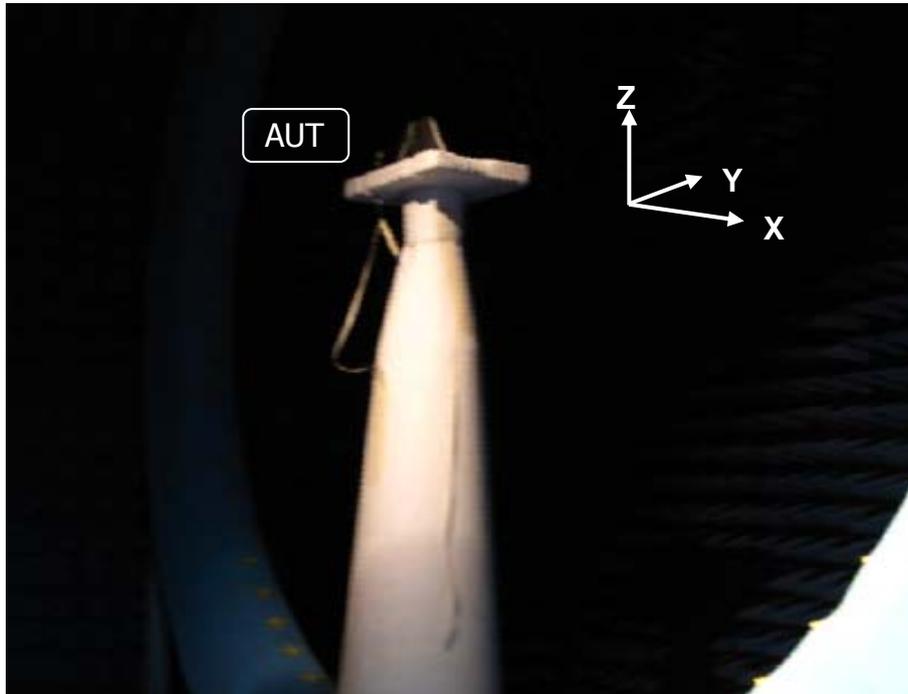
	XY	YZ	XZ
0°	Right	Up	Up
90°	Back	Back	Right
180°	Left	Down	Down
270°	Front	Front	Left
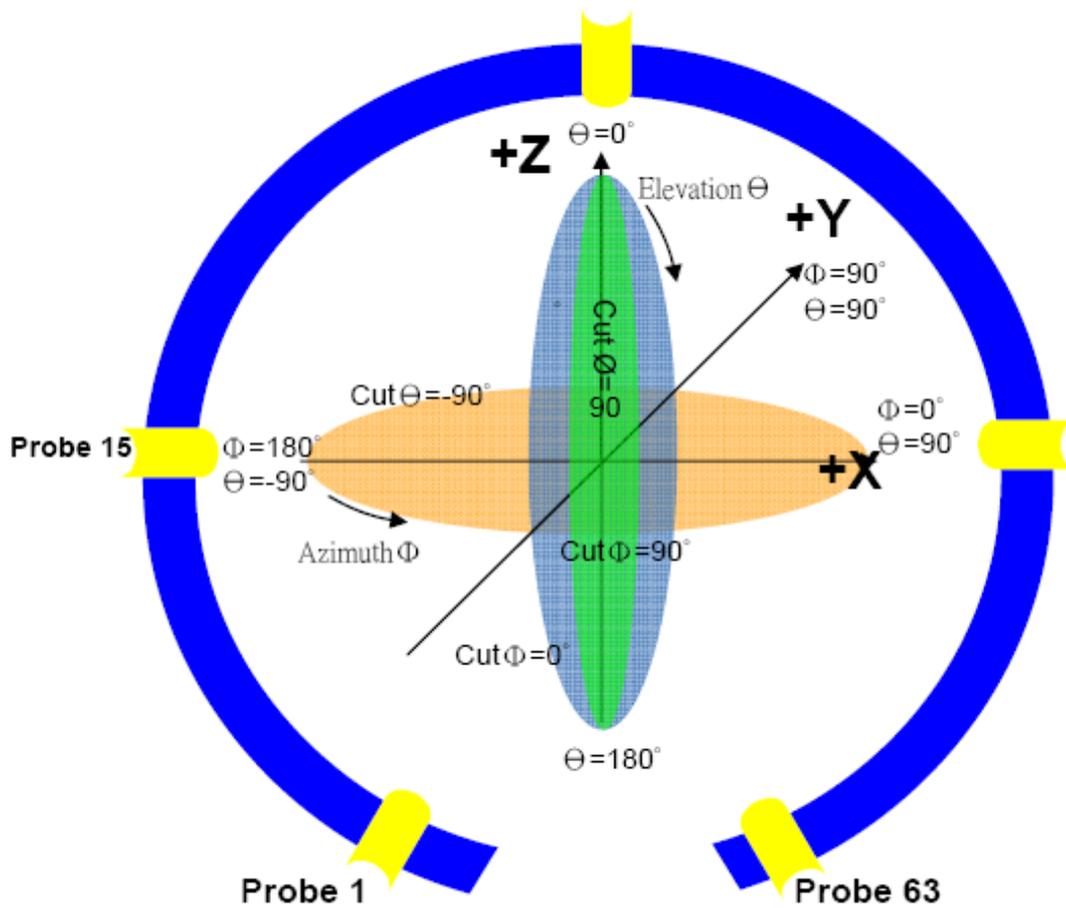
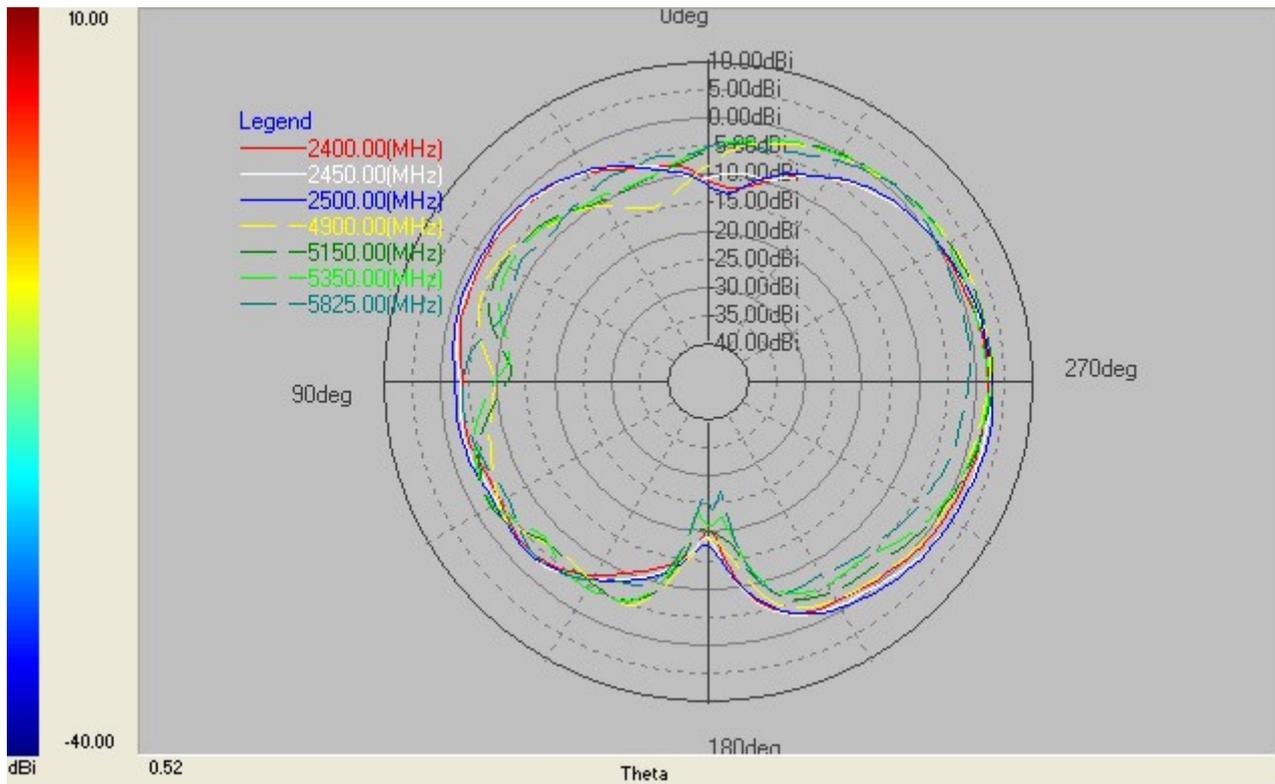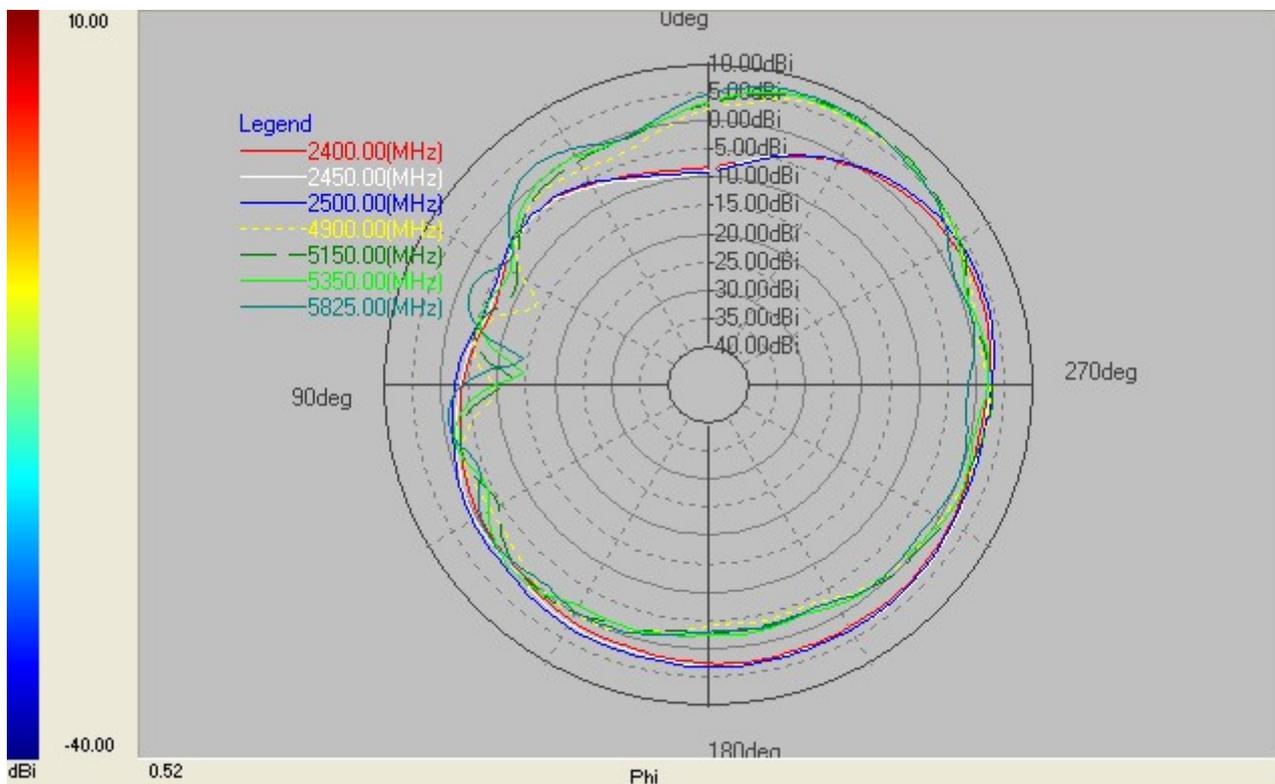|	θ	φ
Total angle	175°	360°
How many angle scan one point	5°	5°
Total scan point	36	73

3 2D patterns
3.1 ANT 1

2.4~2.5GHz/4.9~5.825GHz
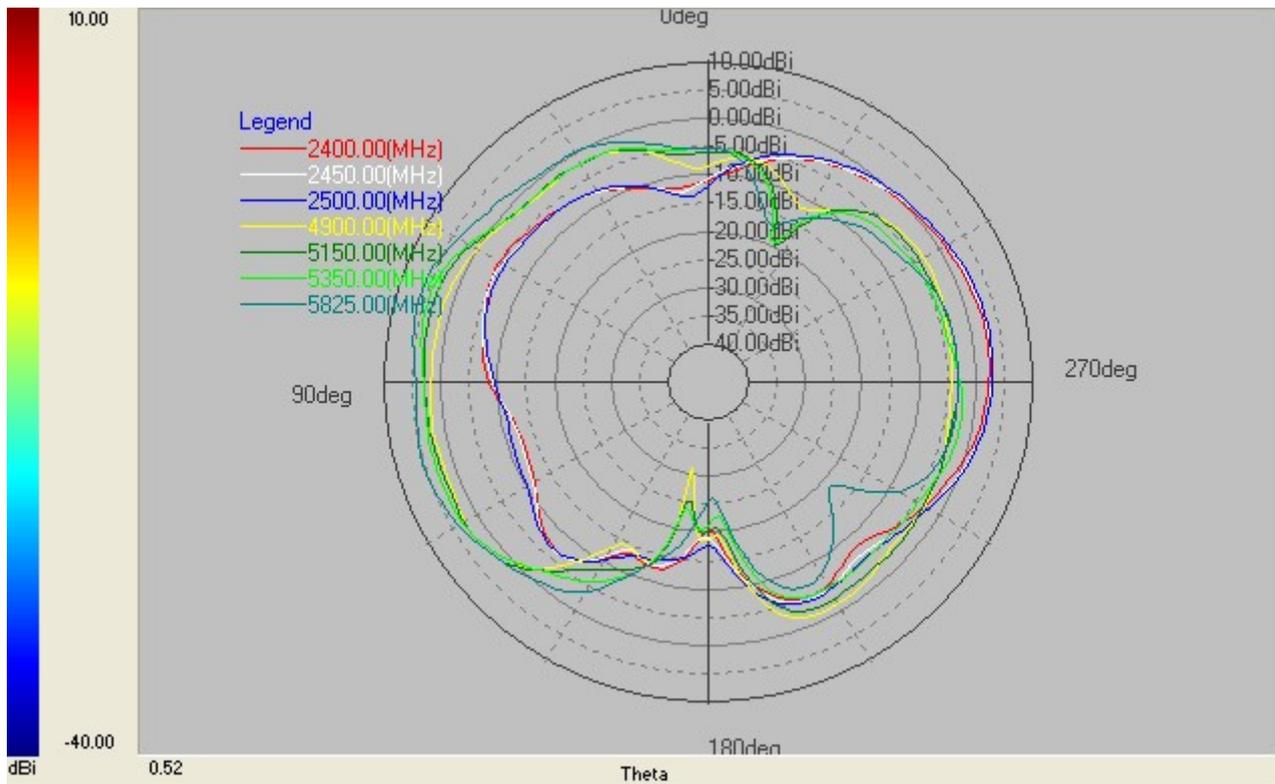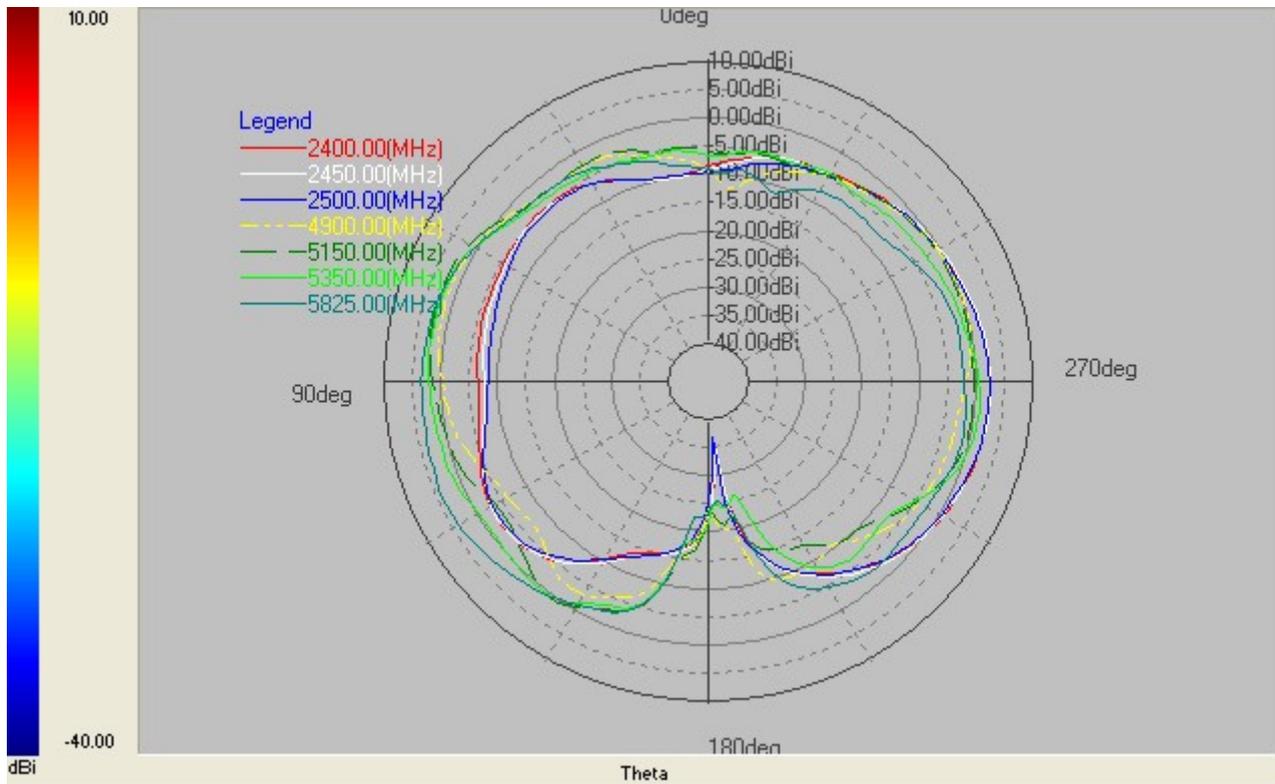

X-Z Plane (E-total)

Y-Z Plane (E-total)
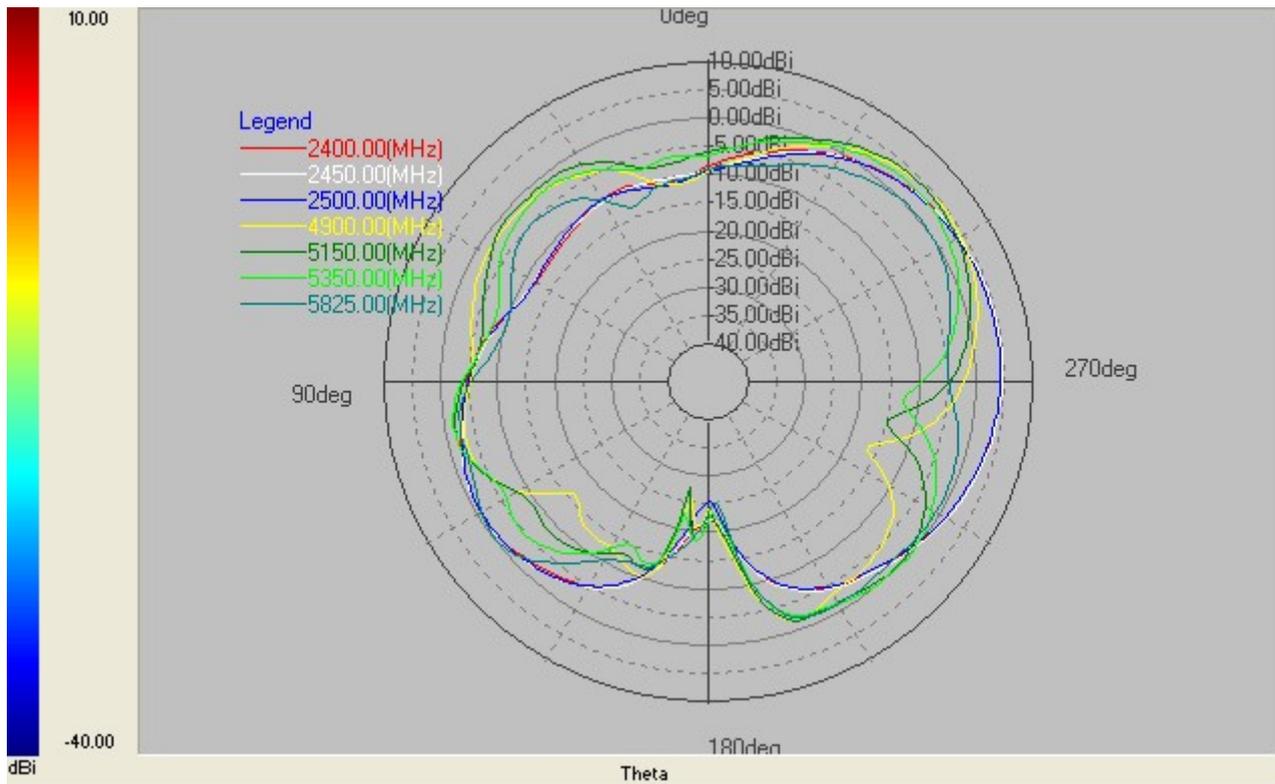

X-Y Plane (E-total)
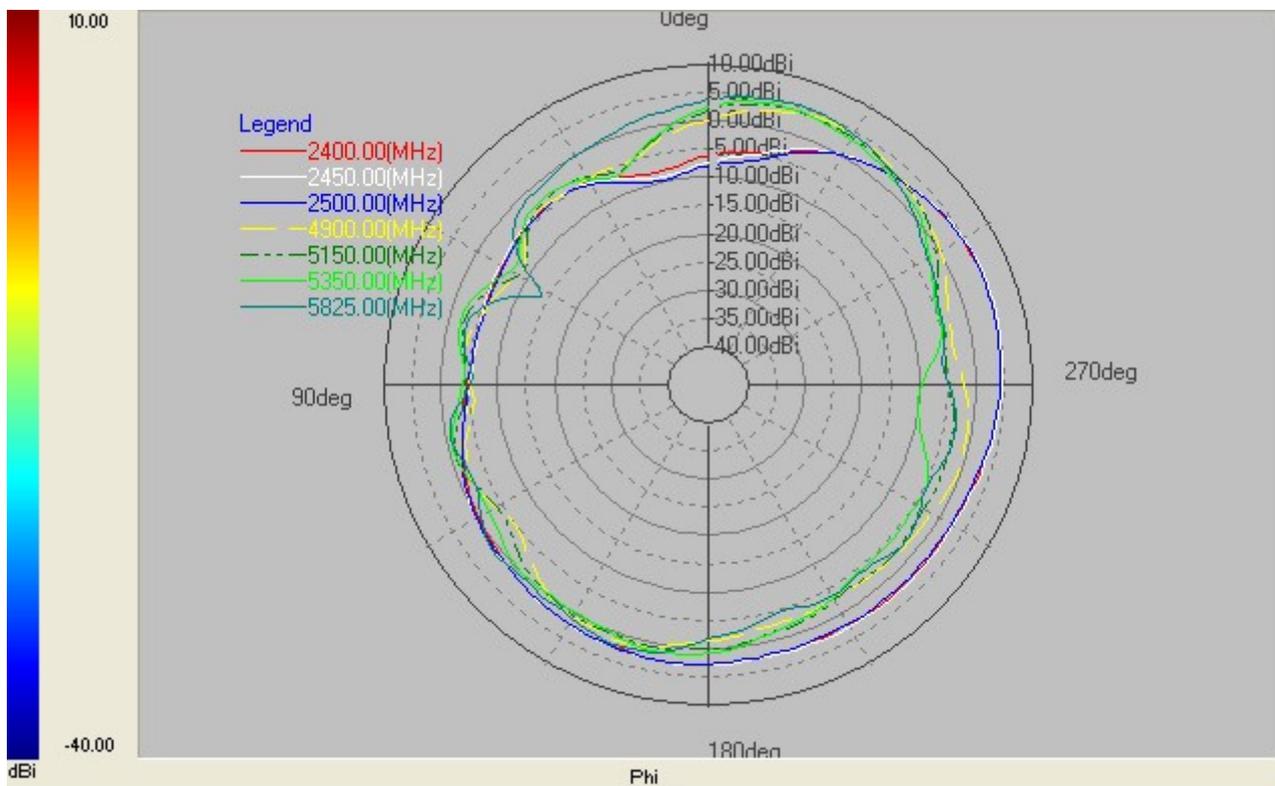
3.2   Ant 2

2.4~2.5GHz/4.9~5.825GHz

X-Z Plane (E-total)

Y-Z Plane (E-total)

X-Y Plane (E-total)

4. Summary

4.1 Return Loss

Frequency	Ant1(dB)	Ant2 (dB)
2400MHz	-17	-13
2450MHz	-20	-10
2500MHz	-21	-8
4900MHz	-15	-9
5150MHZ	-16	-9
5350MHZ	-15	-9
5825MHZ	-15	-7

4.2 Isolation

Frequency	ANT1 (dB)	ANT2 (dB)
2400MHz	-36	-29
2450MHz	-33	-30
2500MHz	-31	-32
4900MHz	-41	-41
5150MHZ	-42	-41
5350MHZ	-42	-46
5825MHZ	-42	-41

4.3 3D total Peak Gain & Efficiency

Frequency	Ant1		Ant2	
	Peak Gain (dBi)	Efficiency (%)	Peak Gain (dBi)	Efficiency (%)
2400MHz	4.1	74	4.3	75
2450MHz	5.0	84	4.9	83
2500MHz	4.6	85	4.8	80
4900MHz	6.1	82	5.2	64
5150MHZ	6.9	88	5.2	72
5350MHZ	6.9	86	4.2	69
5825MHZ	7.4	90	5.9	74