

Brilliant Technology Antennas

II. Four-Channel Unit

February 20, 2024

Allwave Corporation

3860 Del Amo Blvd., Suite 404

Torrance, CA 90503

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A. Test Summary

1. Antenna Under Test

Brilliant Technology: Four-channel unit

Three antennas, BLE, Wifi, and Embedded antennas

2. Frequencies

S-band: 2.40, 2.44, 2.48 GHz for BLE, WiFi, and Embedded

C-band: 5.15, 5.35, 5.50, 5.725 GHz for WiFi, and Embedded

3. Test Facility

Allwave's Antenna Chamber B, February 12-15, 2024

4. Measurement Method

Direct Far Field Measurement

5. Test Results

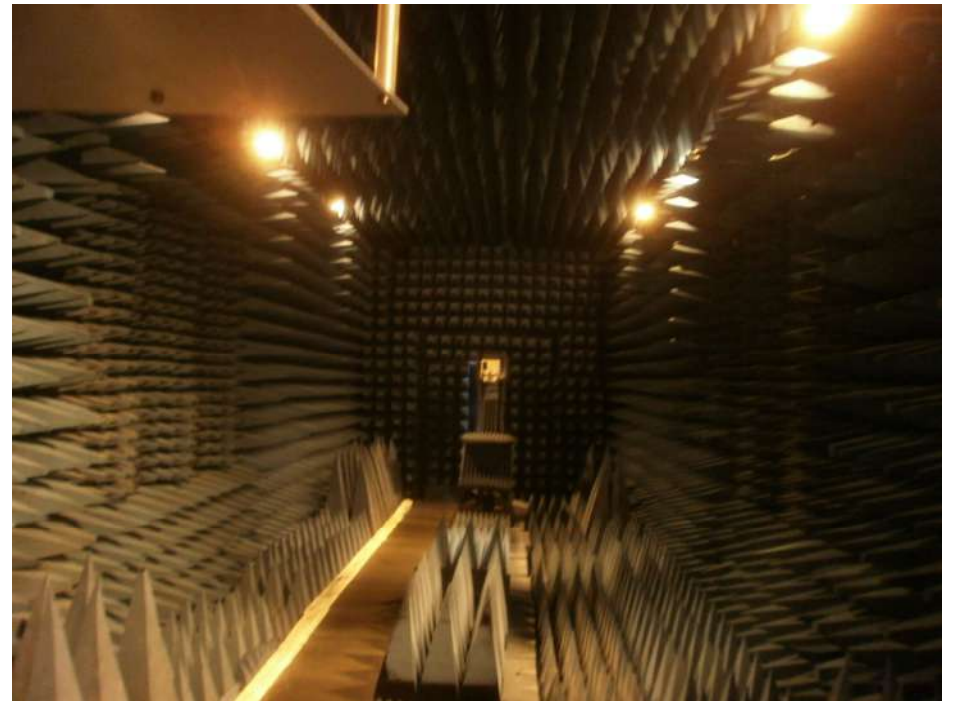
2D elevation and azimuth cuts, YZ, XZ, XY planes, gain calibration and 3D plots

Direct Far Field Measurement

Transmit



Receive

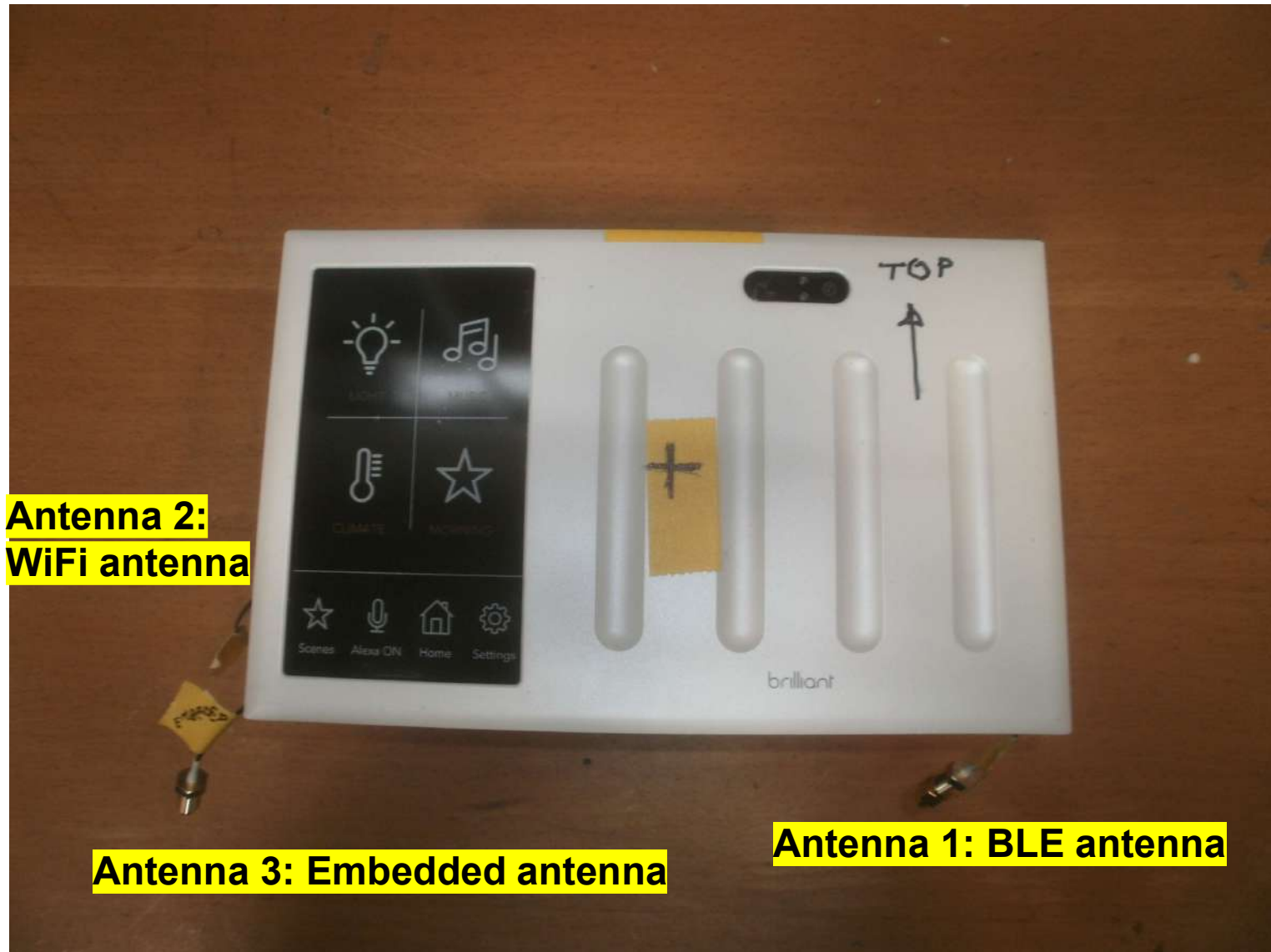


Direct Far Field Measurement

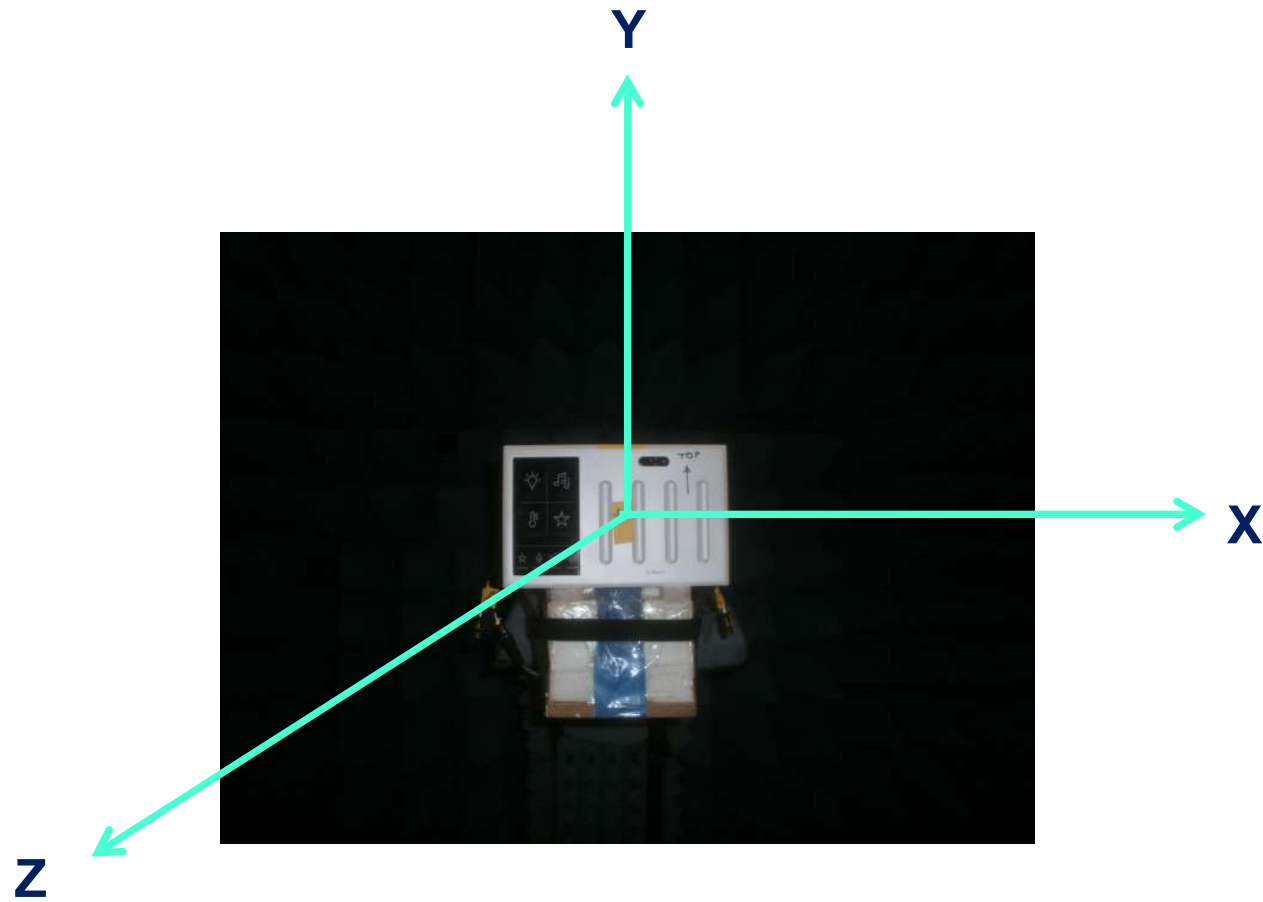
Antenna under test



Four-channel unit: Three antennas



Coordinates of antenna patterns



B. Test Results

B.1 Gain Measurements

B.2 Far Field Patterns

B.1 Gain Measurements

4-CH Antenna	1. BLE	2. WiFi	3. Embedded
Freq (GHz)	Gain (dB)	Gain (dB)	Gain (dB)
2.40	0.8	- 1.4	0.0
2.44	1.4	- 1.6	- 1.4
2.48	1.8	1.1	- 1.5
5.15	NA	- 3.9	2.0
5.35	NA	- 6.3	1.2
5.50	NA	- 3.5	- 0.5
5.725	NA	1.5	- 0.8

B.2 Far Field patterns

1. BLE antenna, S-band
 2. WiFi antenna, S-, C-band
 3. Embedded antenna, S-, C-band
-
- a) 2D Elevation cuts, ZX- and ZY-plane
 - b) 2D Azimuth cut: XY-Plane
 - c) 3D plots

S-band: 2.40, 2.44, 2.48 GHz

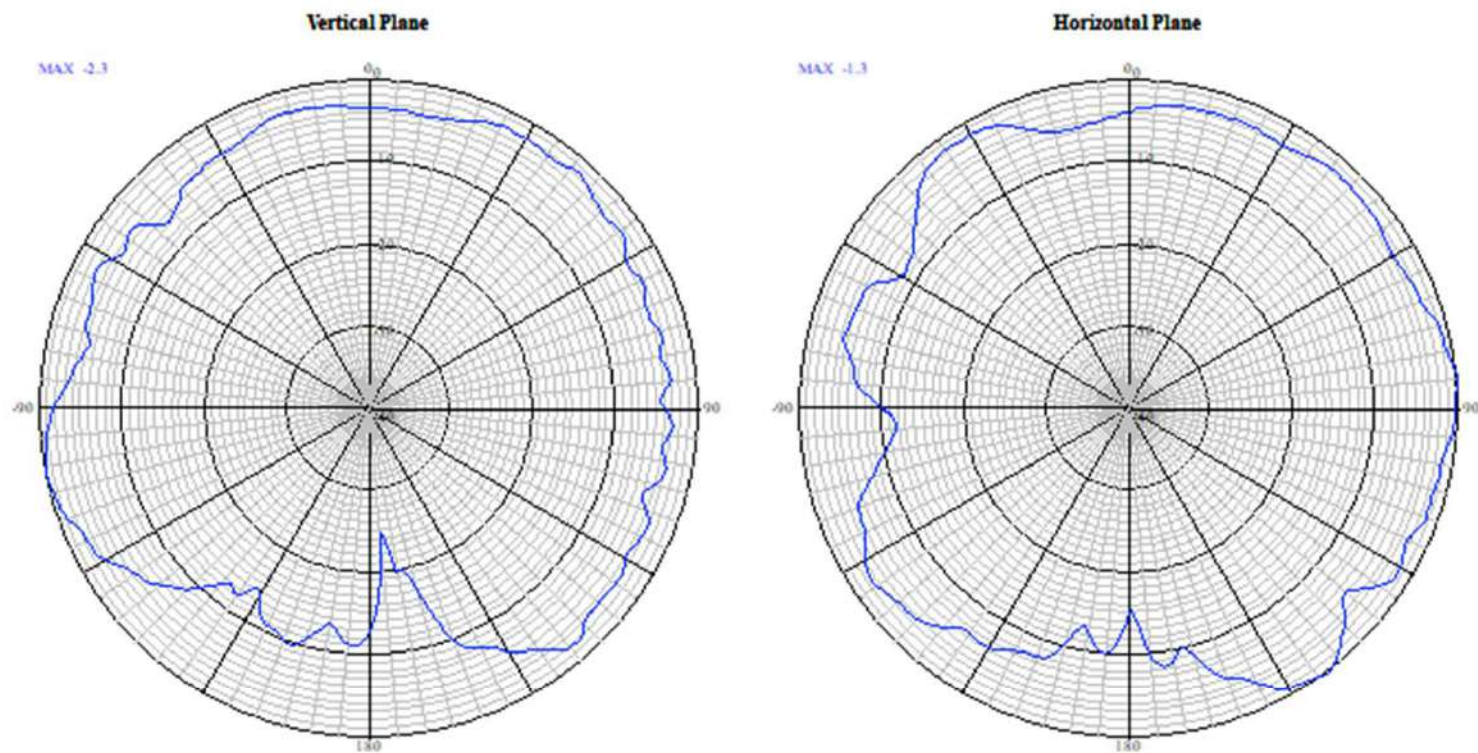
C-band: 5.15, 5.35, 5.50, 5.725 GHz

1. BLE antenna

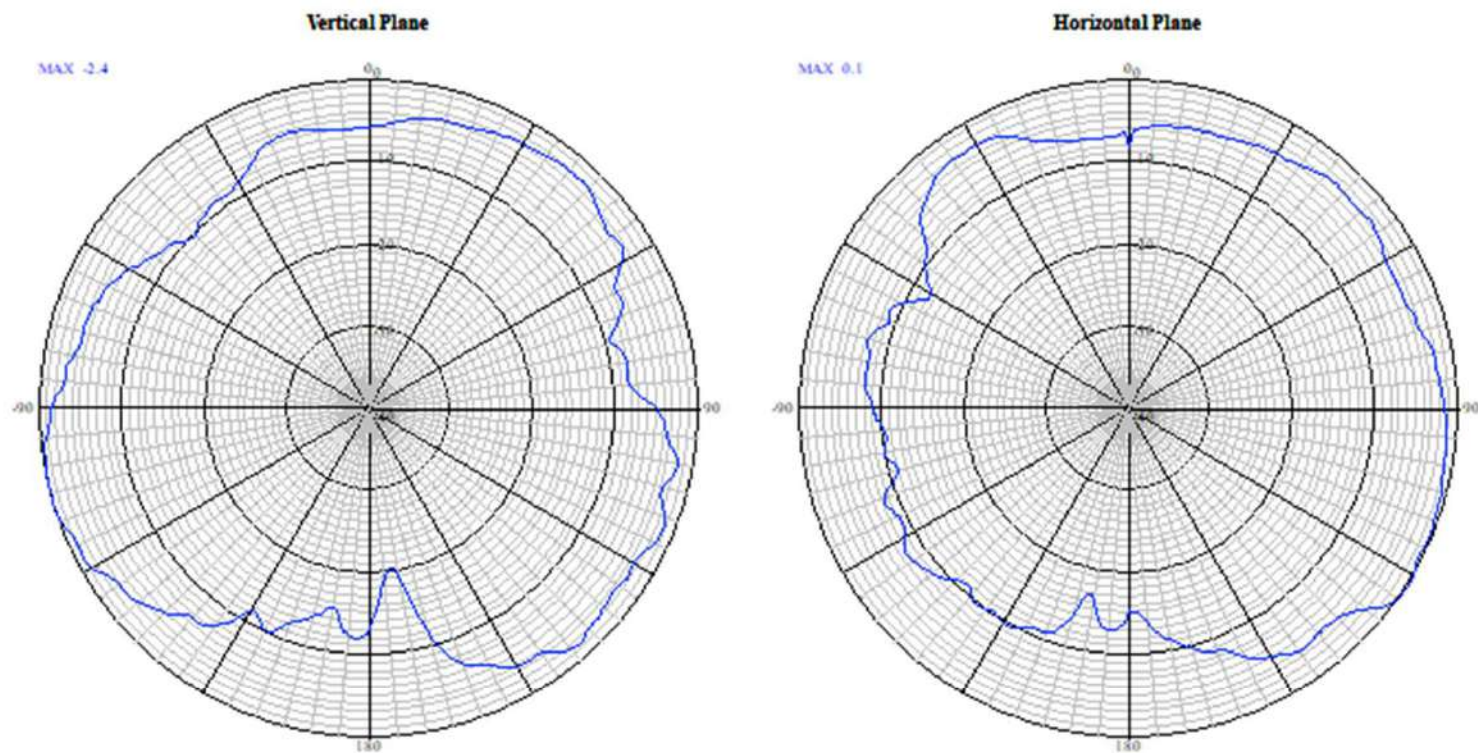
a) 2D Elevation cuts, ZX- and ZY-plane

Freq = 2.40, 2.44, 2.48 GHz

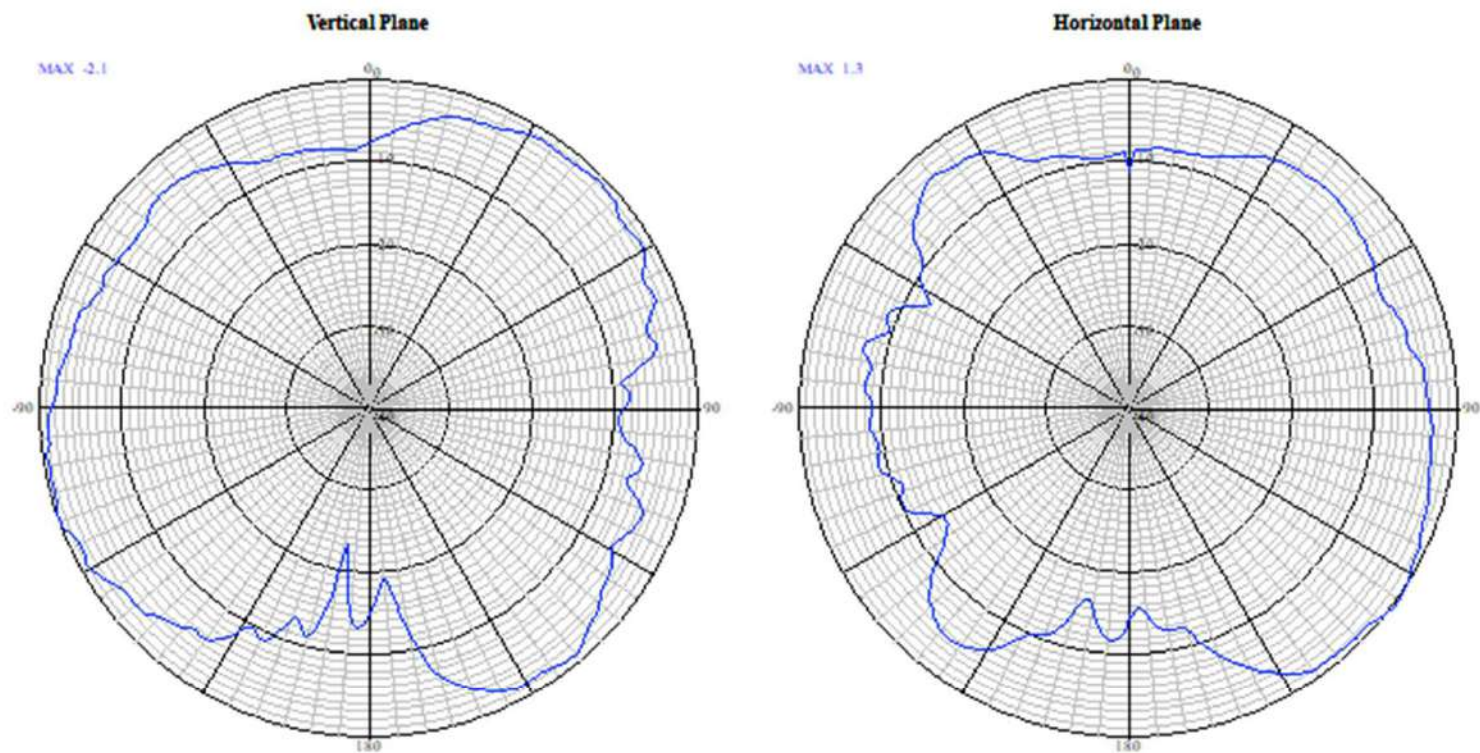
Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns
Frequency: 2.400000



Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns
Frequency: 2.440000



Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns
Frequency: 2.480000

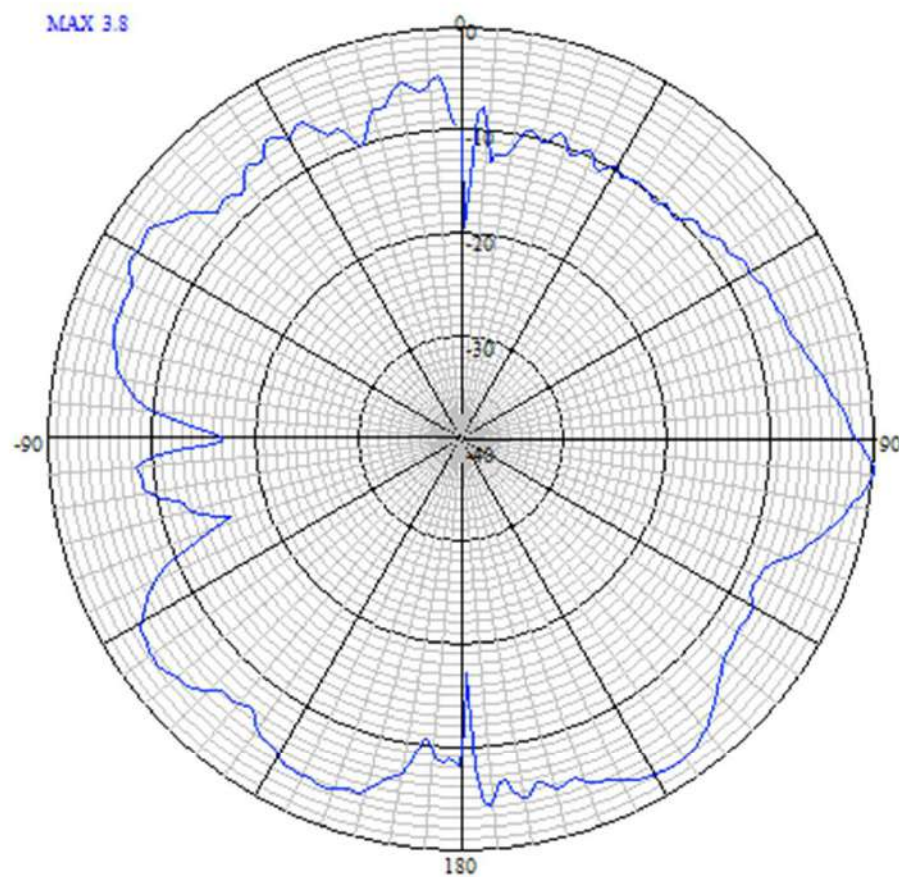


1. BLE antenna

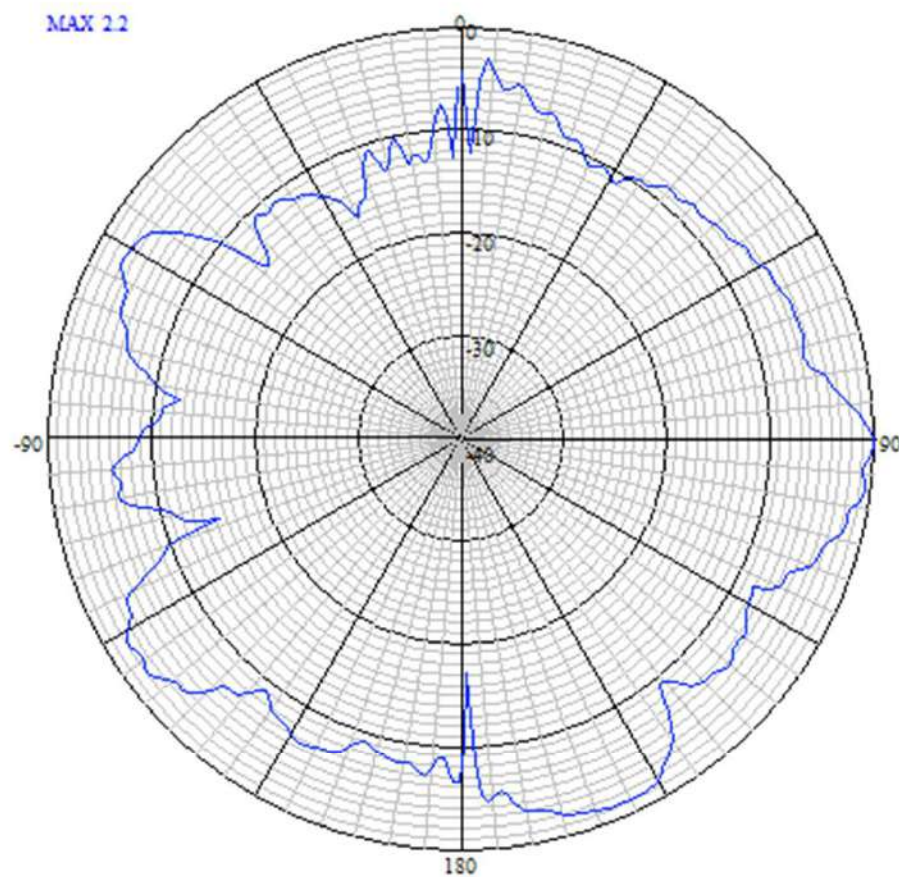
b) 2D Azimuth cut: XY-Plane

Freq = 2.40, 2.44, 2.48 GHz

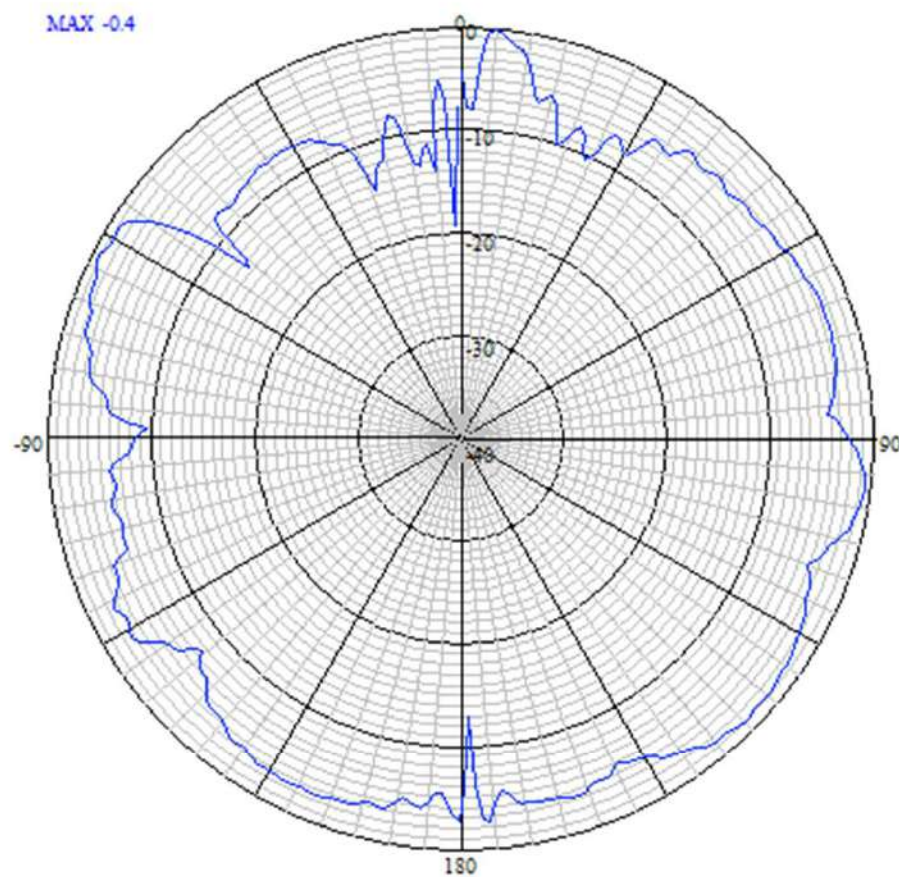
Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.400000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.440000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.480000
Azimuth Cut - XY Plane

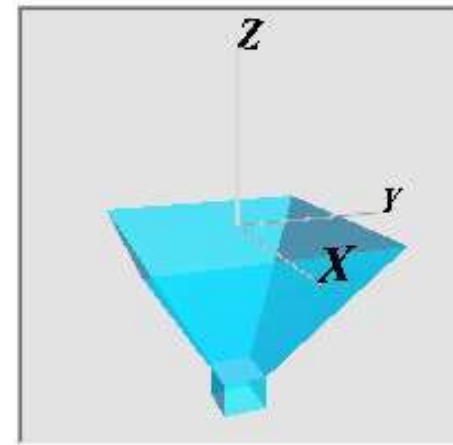
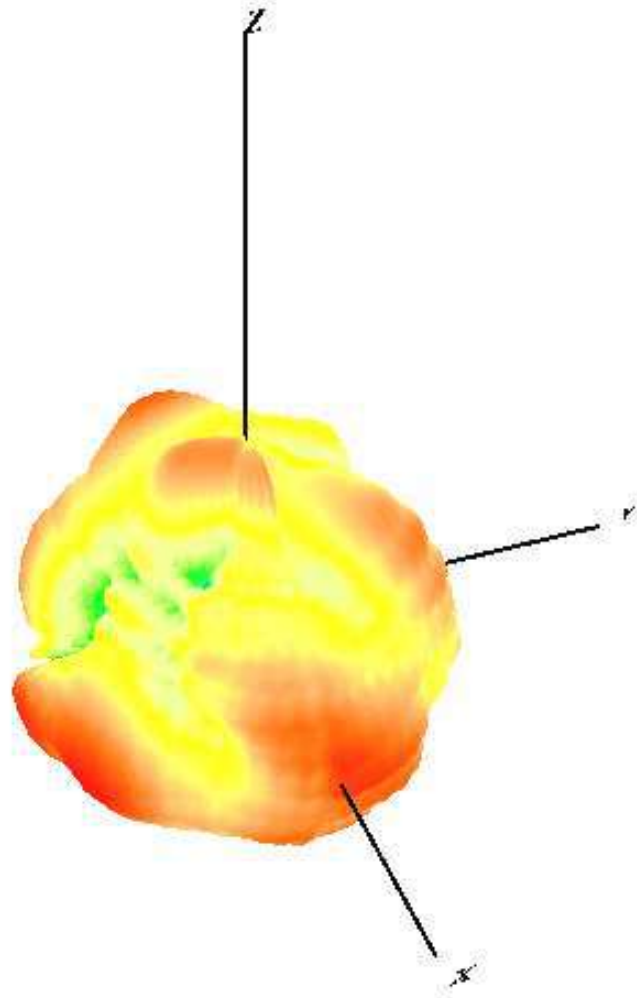


1. BLE antenna

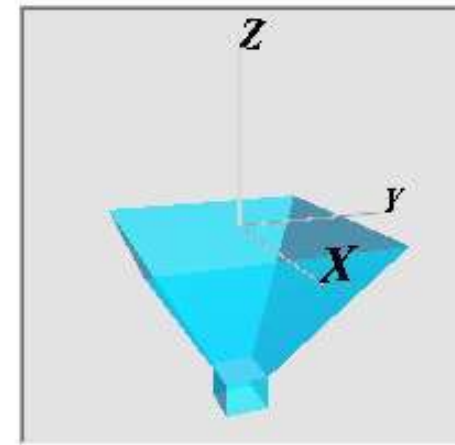
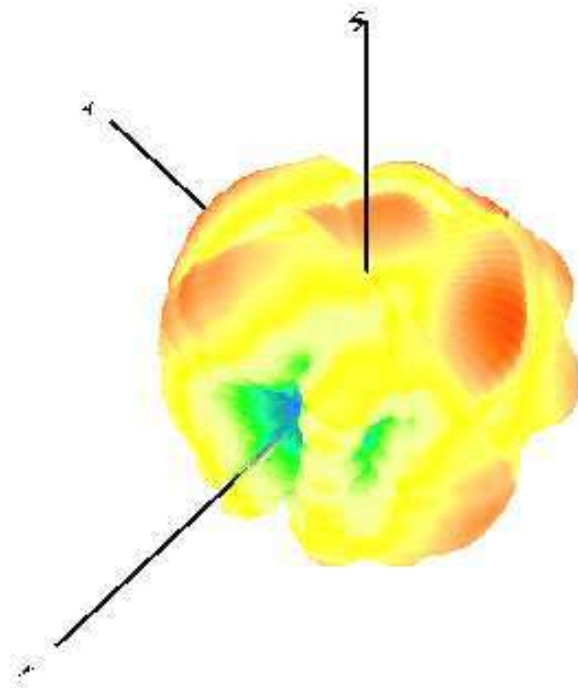
c) 3D plots

Freq = 2.40, 2.44, 2.48 GHz

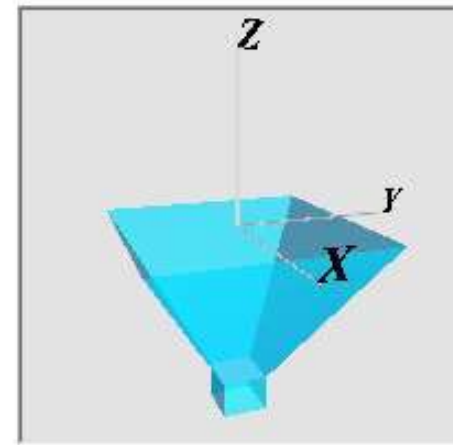
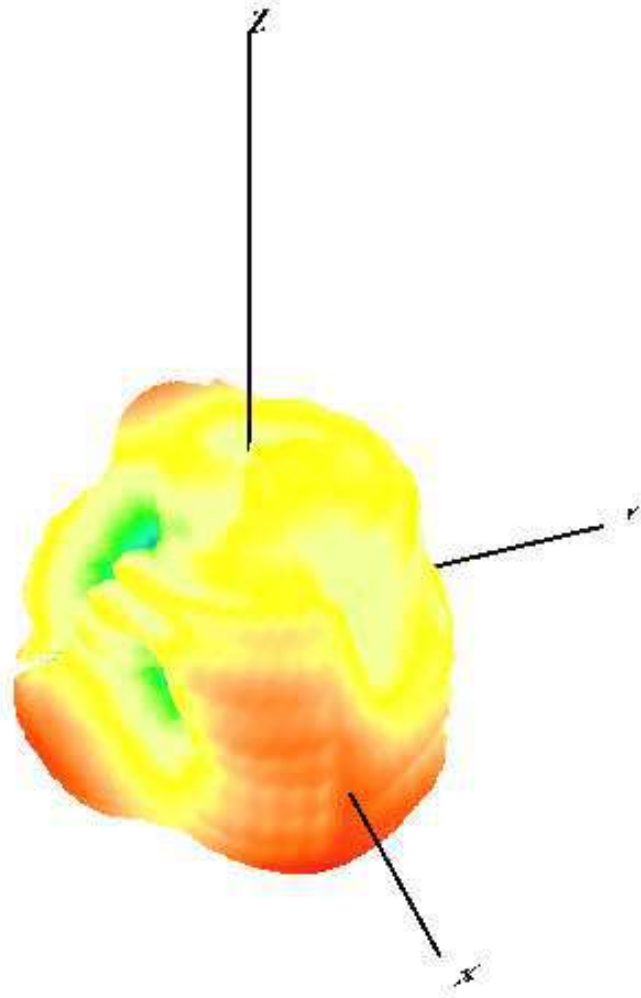
Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



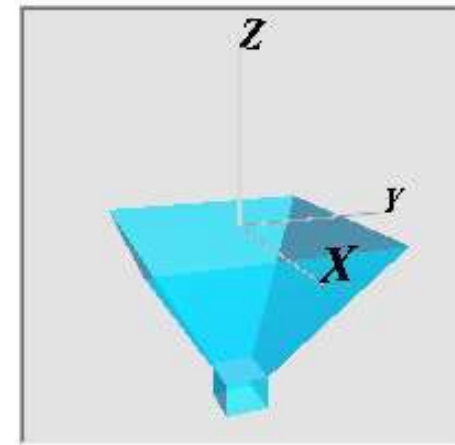
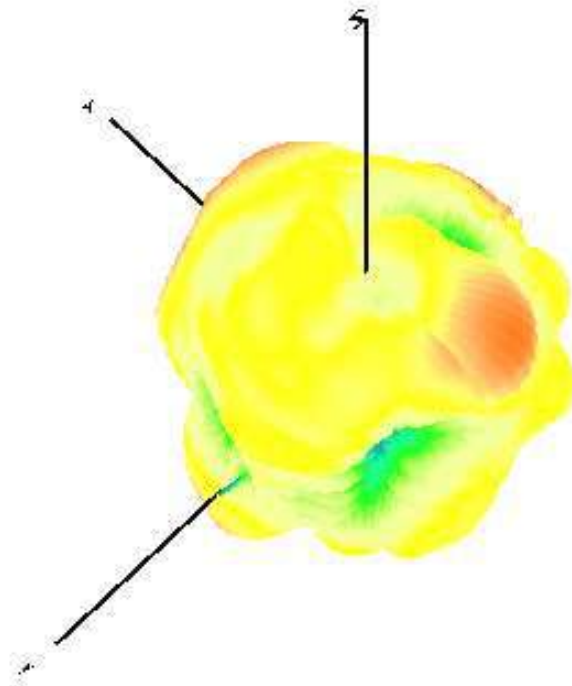
Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



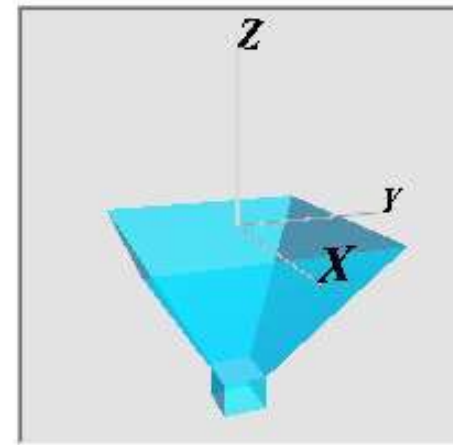
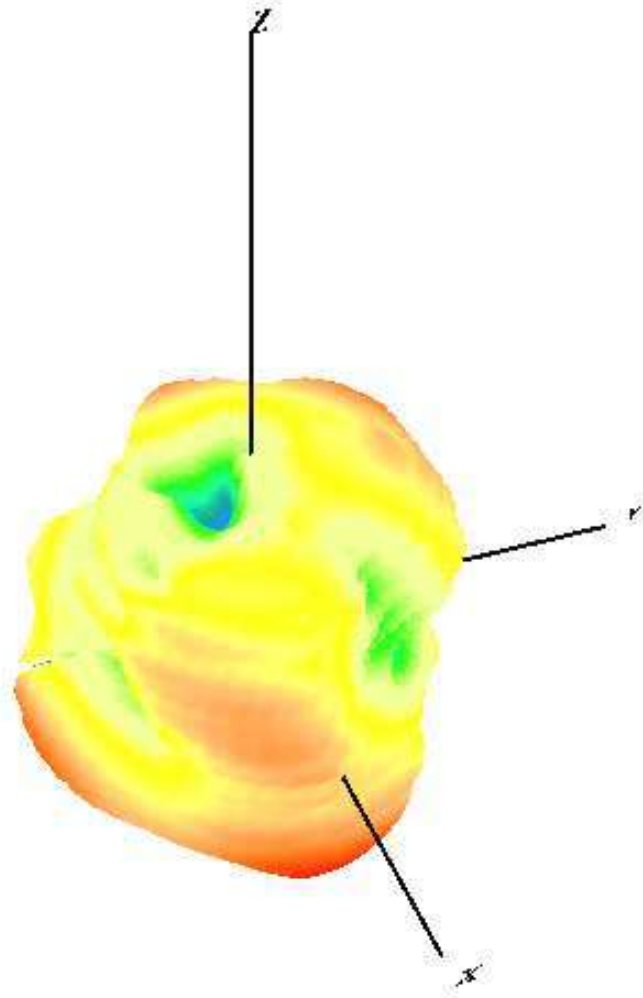
Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



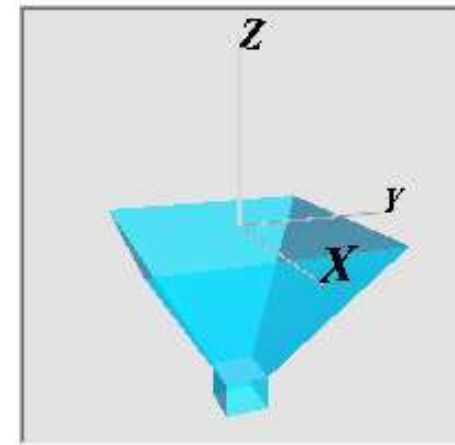
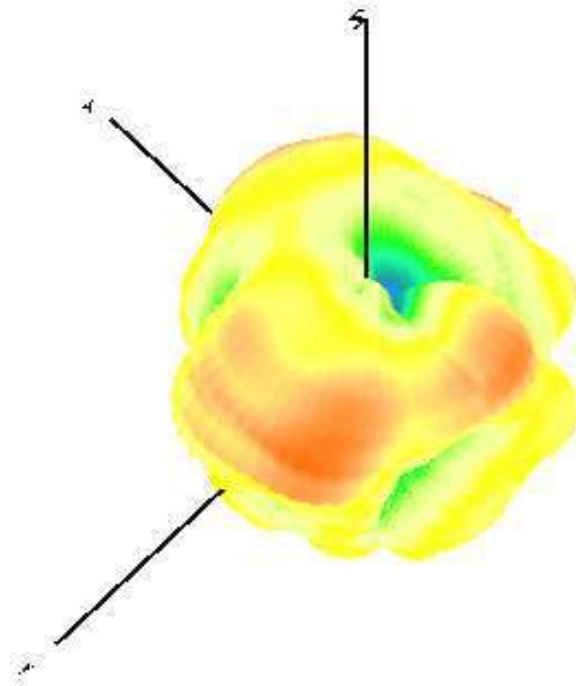
Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



Four-Channel Unit
Antenna 1: BLE antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



2. Wifi antenna

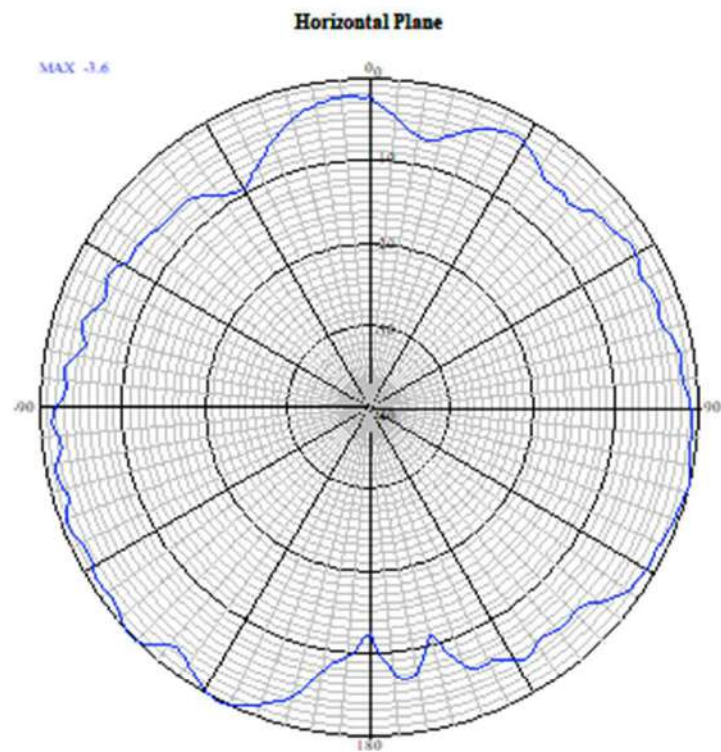
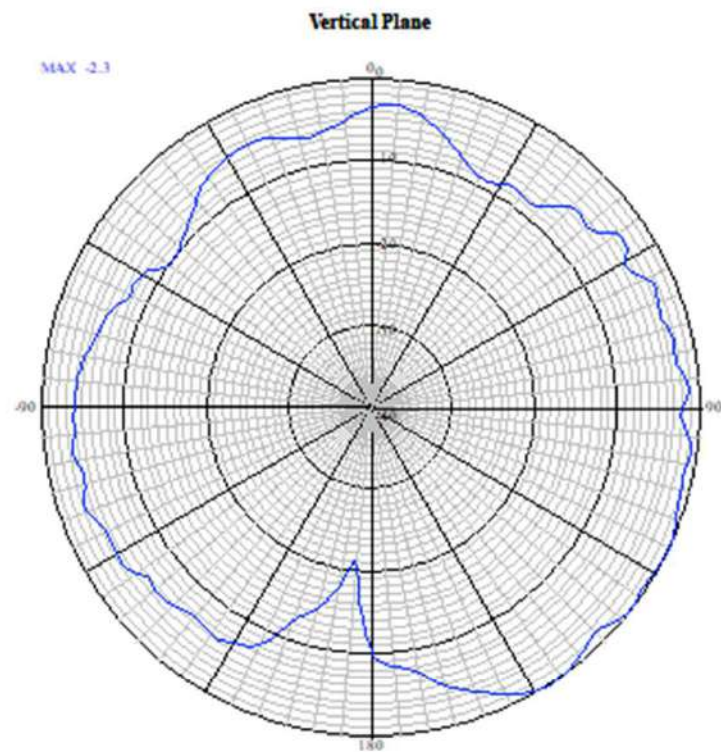
a) 2D Elevation cuts, ZX- and ZY-plane

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

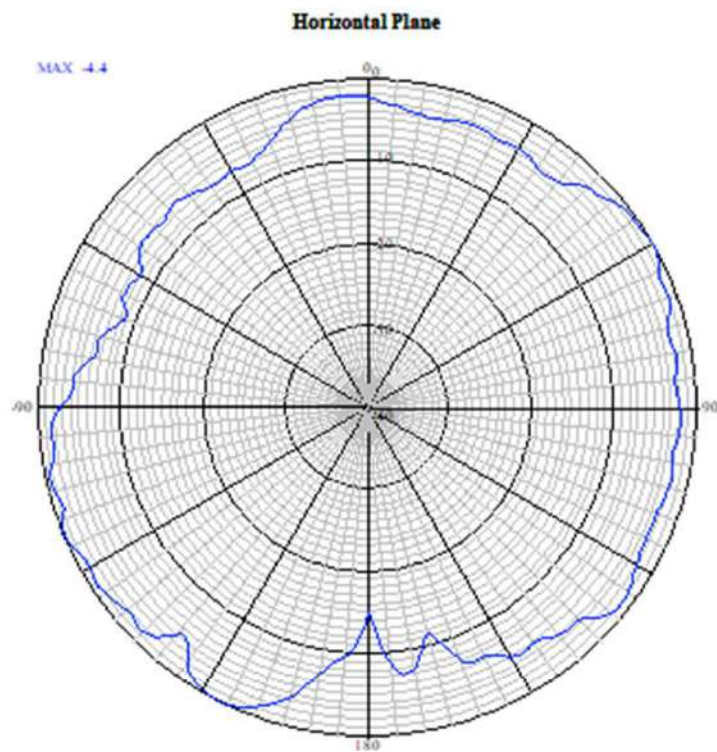
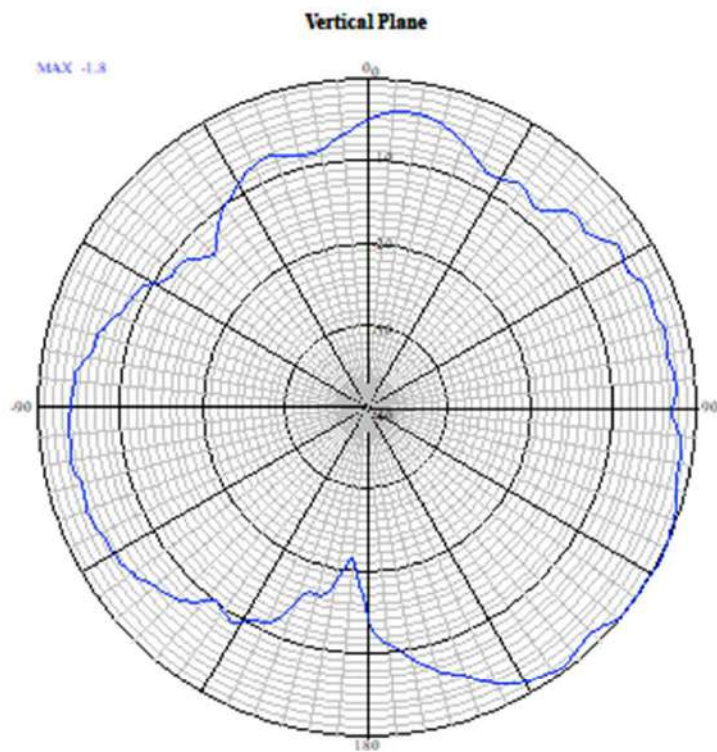
Frequency: 2.400000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

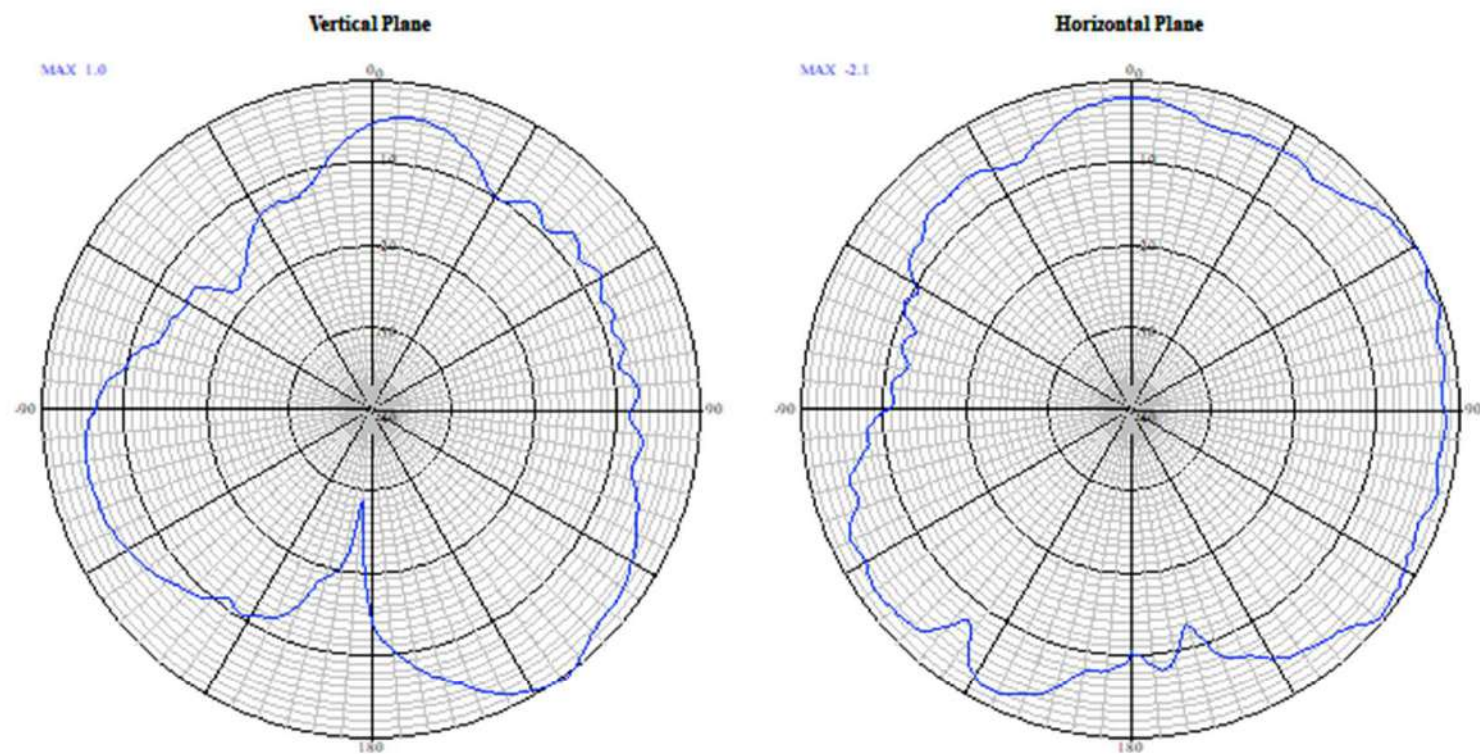
Frequency: 2.440000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

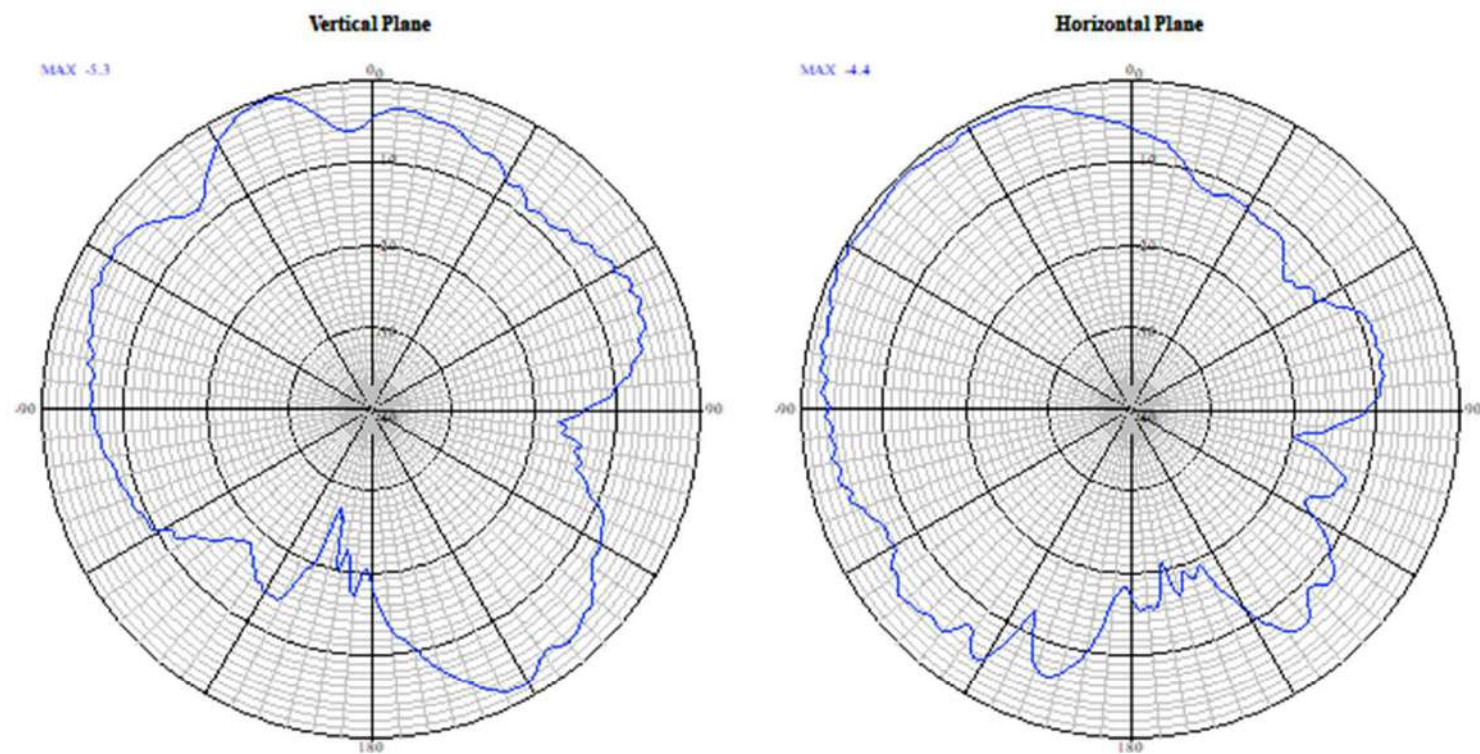
Frequency: 2.480000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

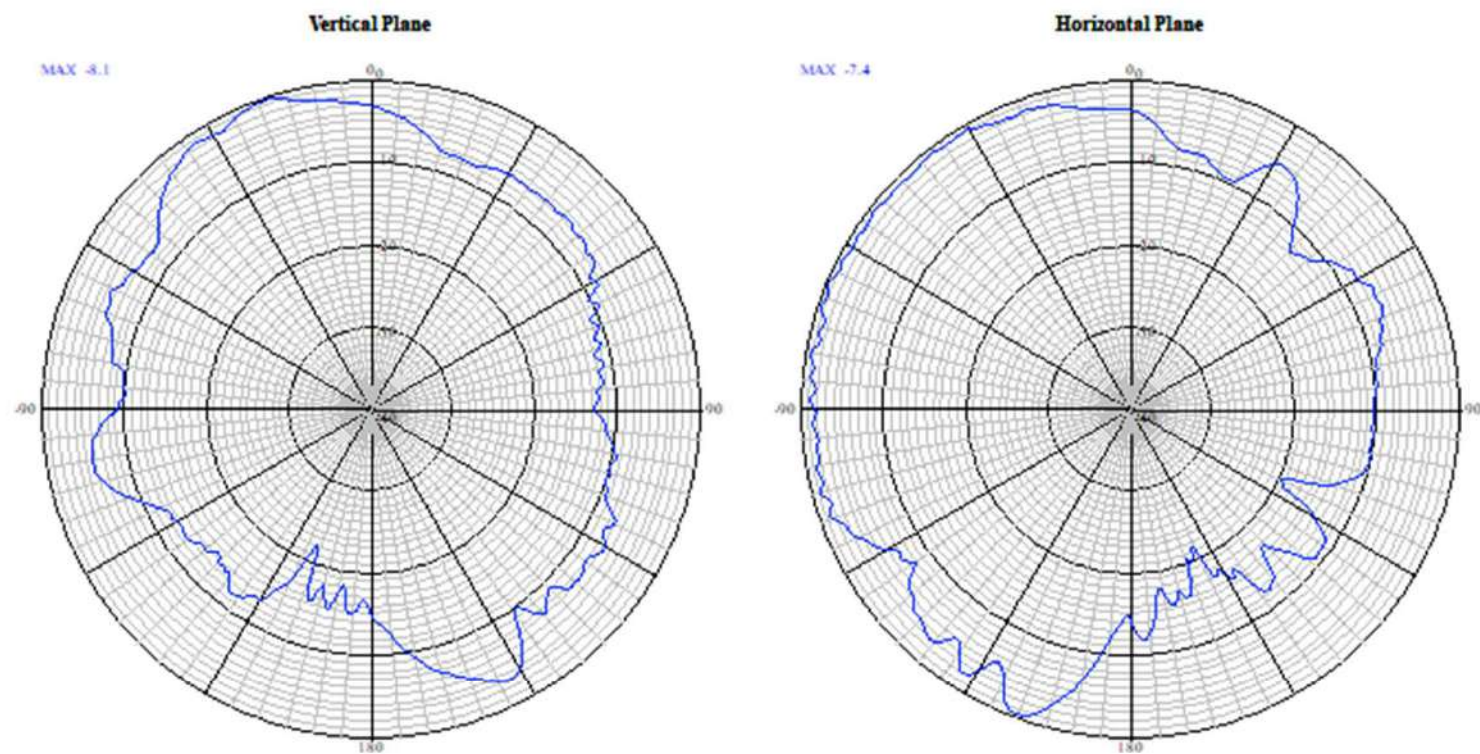
Frequency: 5.150000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

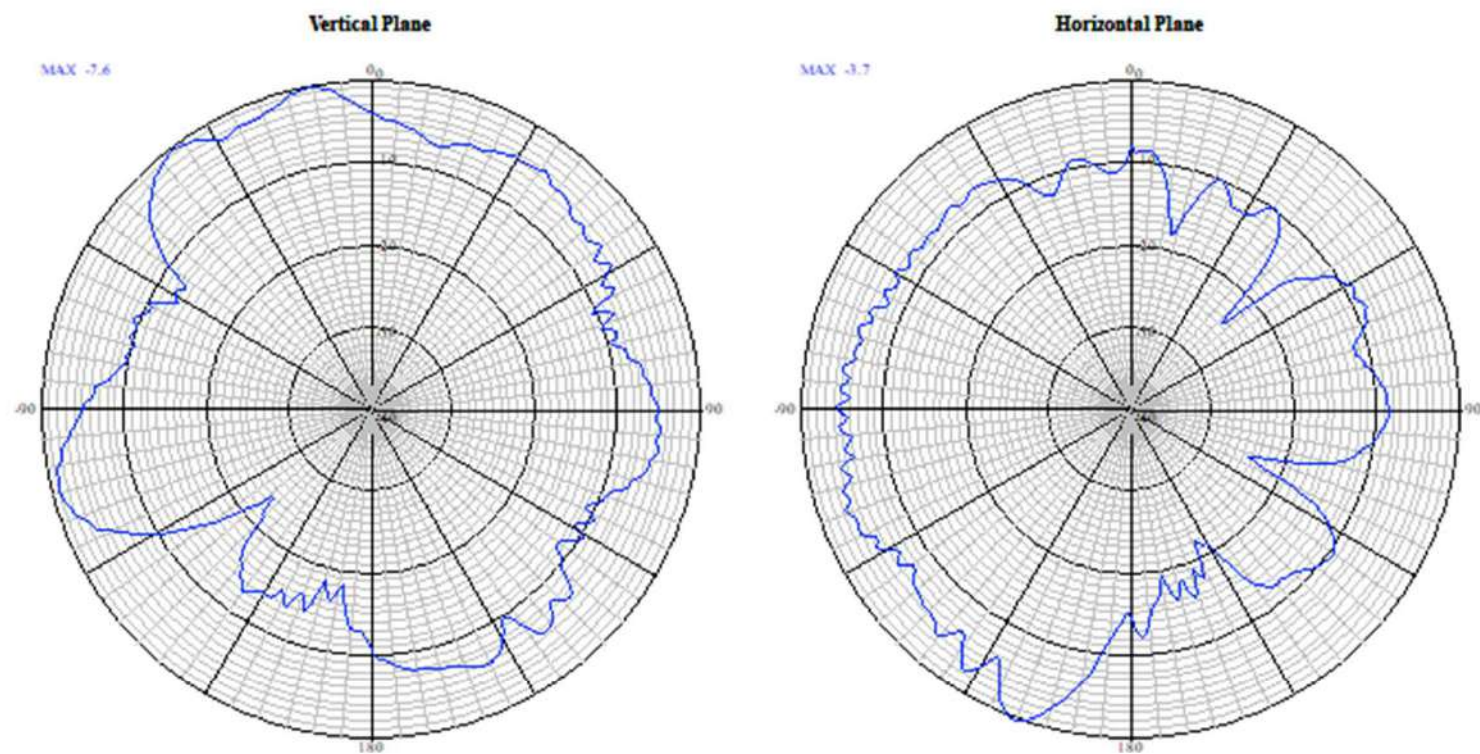
Frequency: 5.350000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

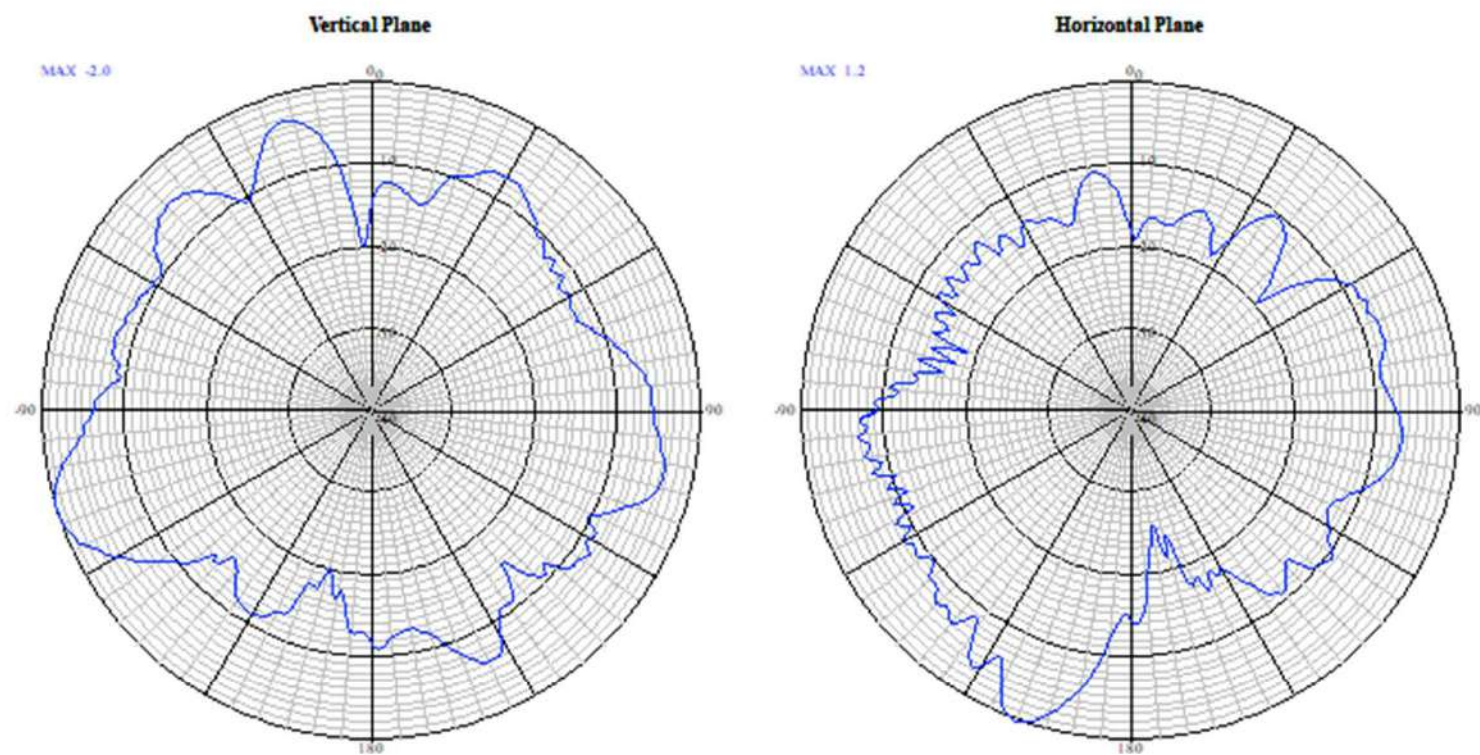
Frequency: 5.500000



Four- Channel Unit
Antenna 2: WiFi antenna

Far-Field Patterns

Frequency: 5.725000

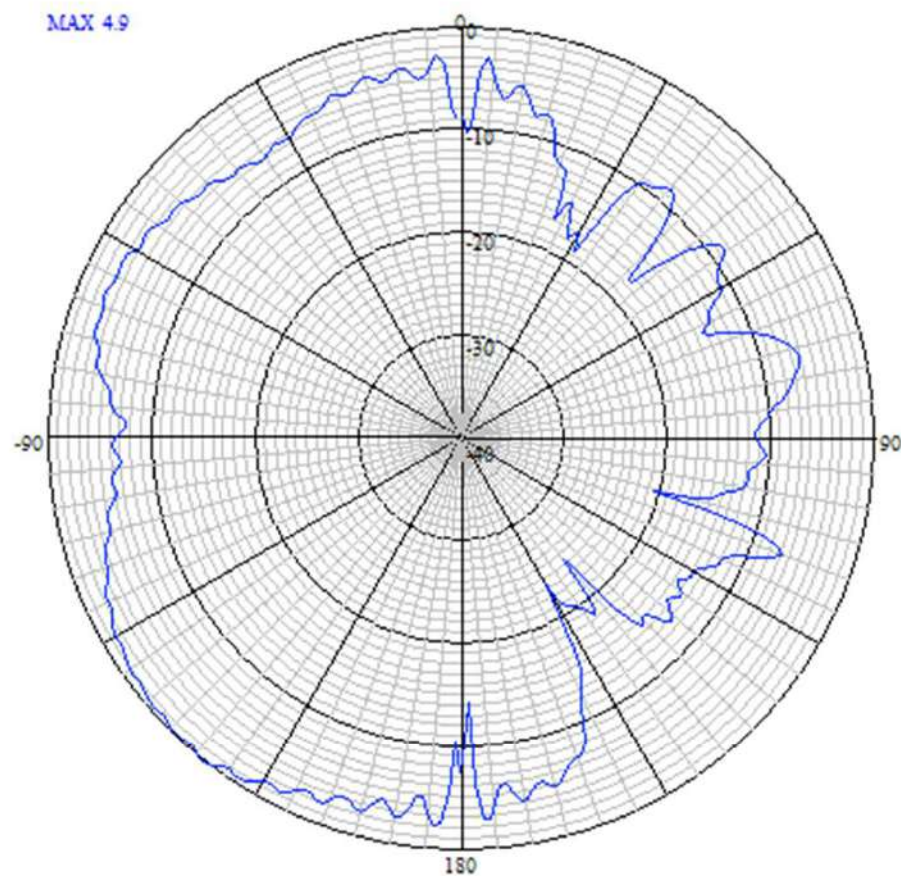


2. WiFi antenna

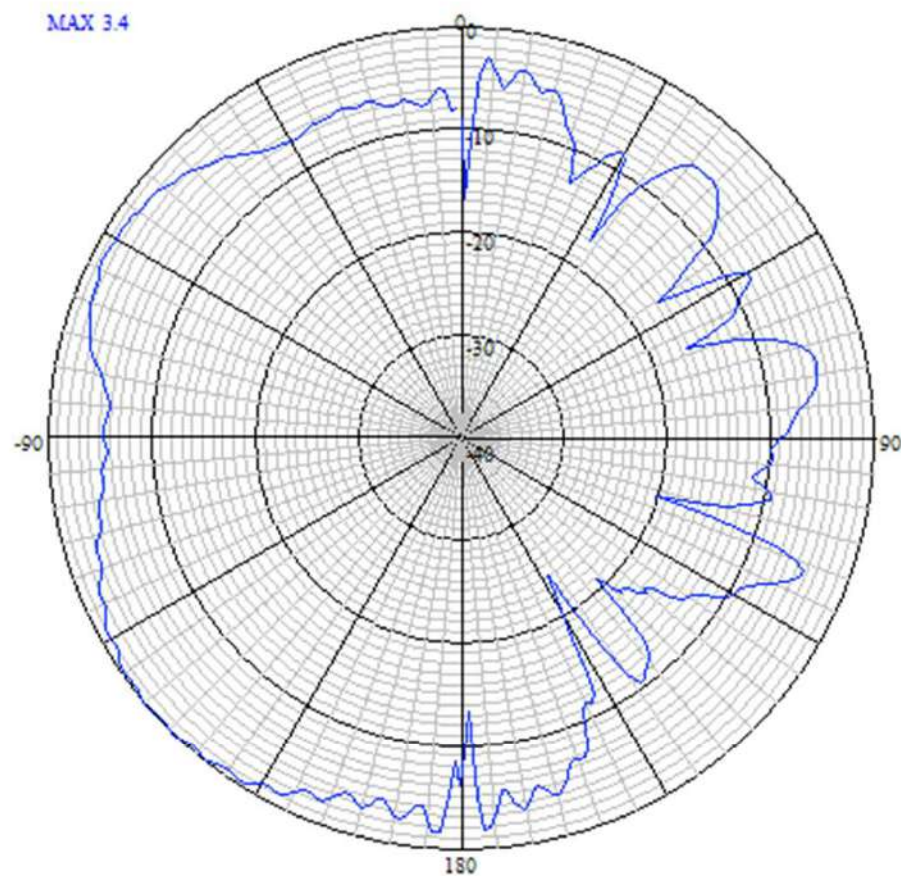
b) 2D Azimuth cut: XY-Plane

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

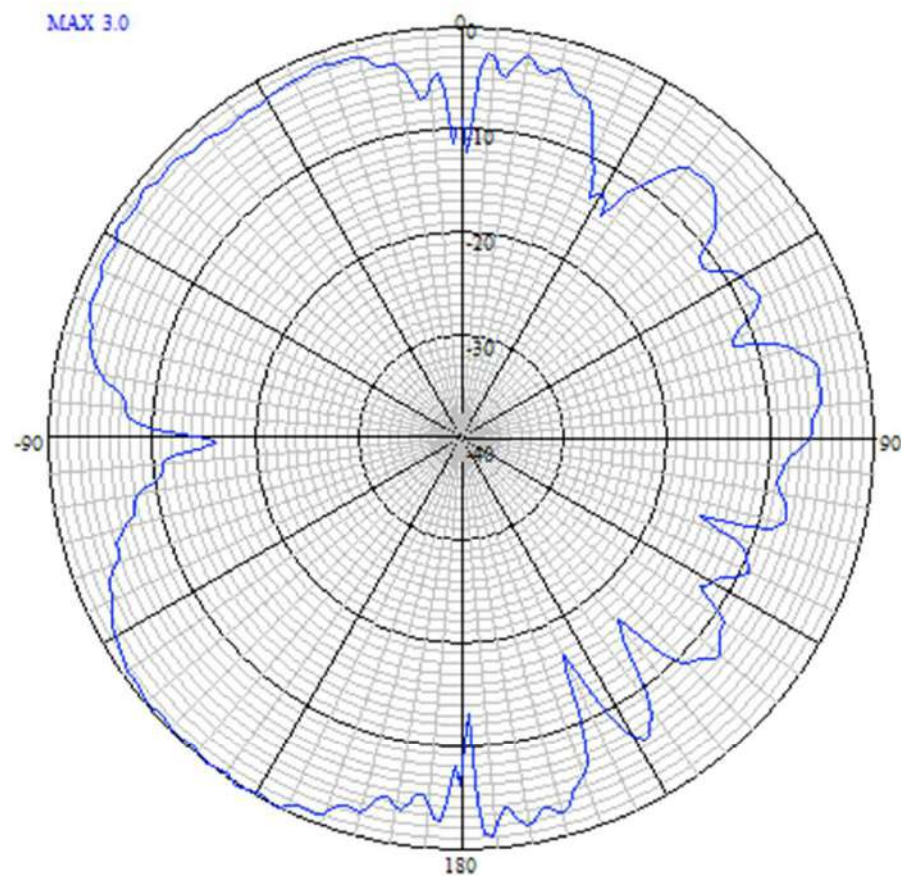
Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.400000
Azimuth Cut - XY Plane



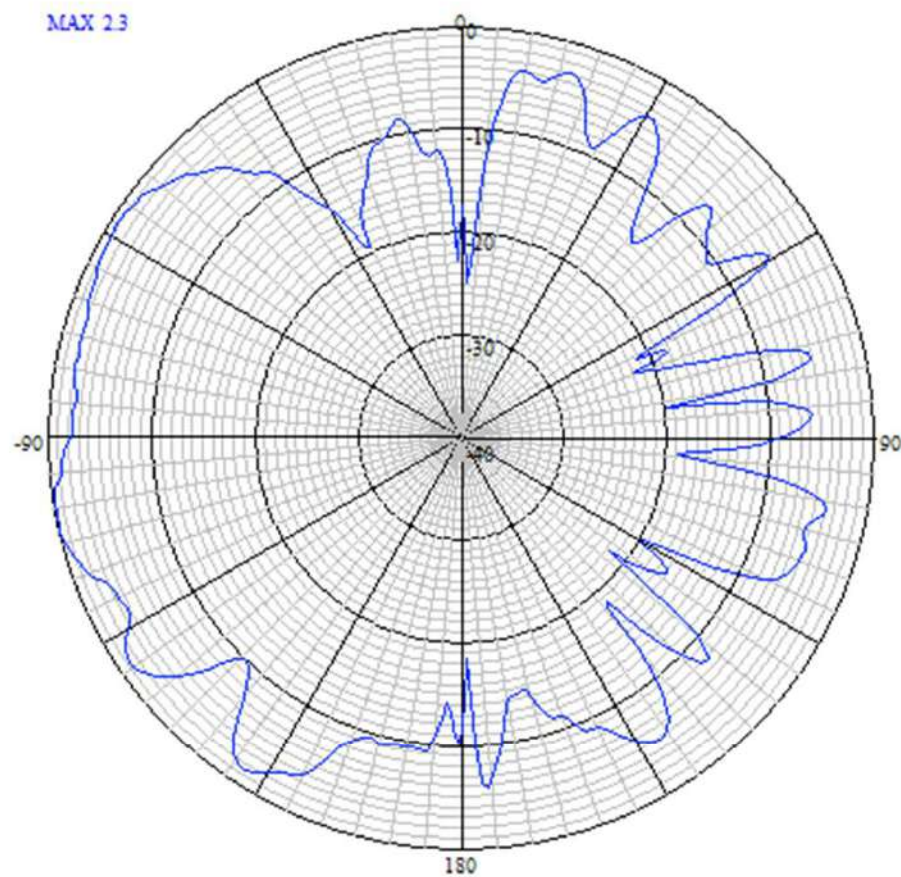
Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.440000
Azimuth Cut - XY Plane



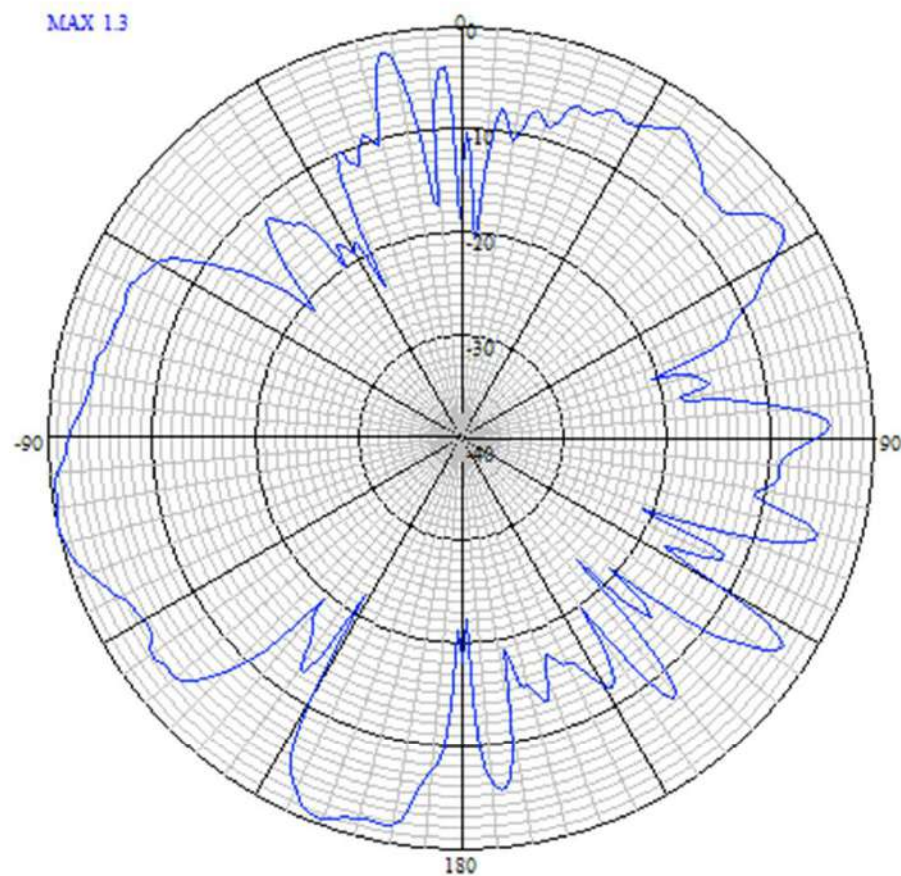
Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.480000
Azimuth Cut - XY Plane



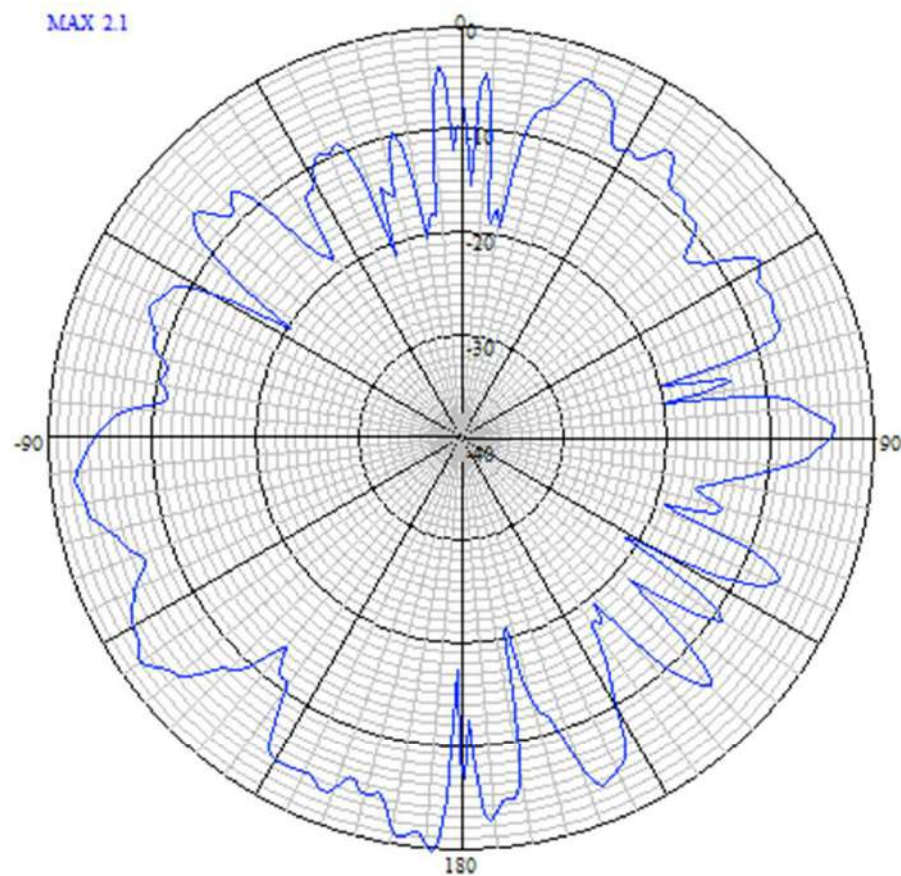
Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.150000
Azimuth Cut - XY Plane



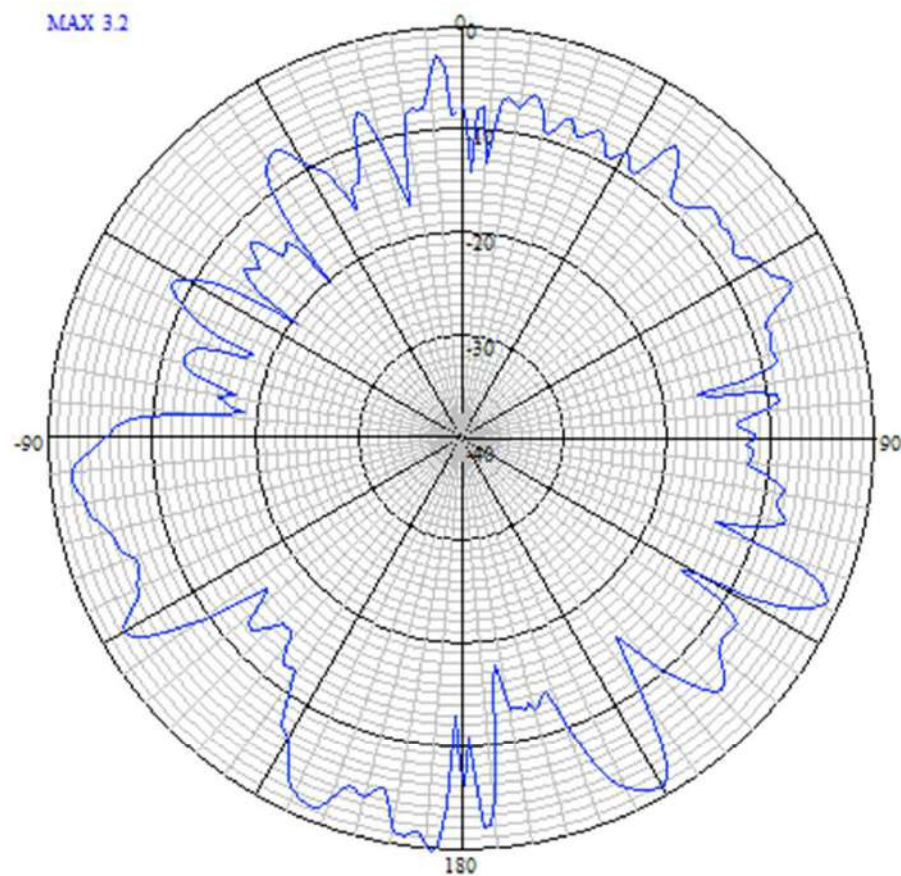
Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.350000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.500000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.725000
Azimuth Cut - XY Plane

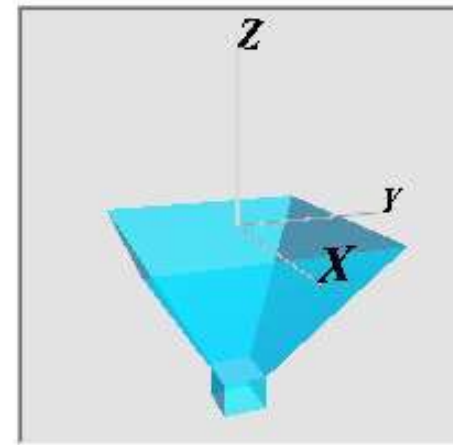
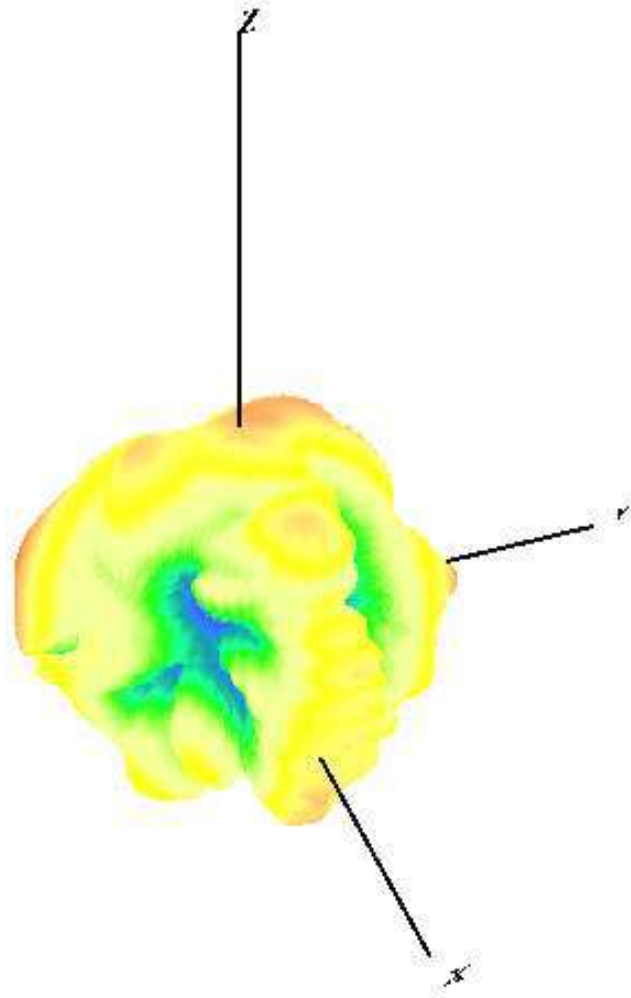


2. WiFi antenna

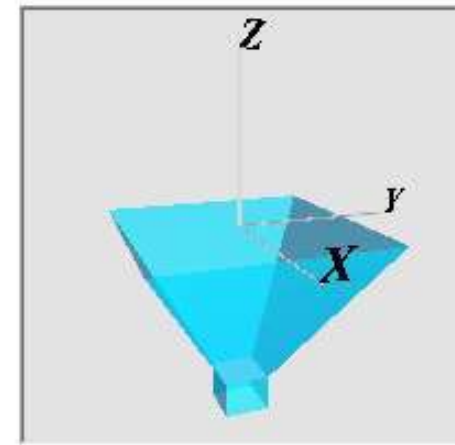
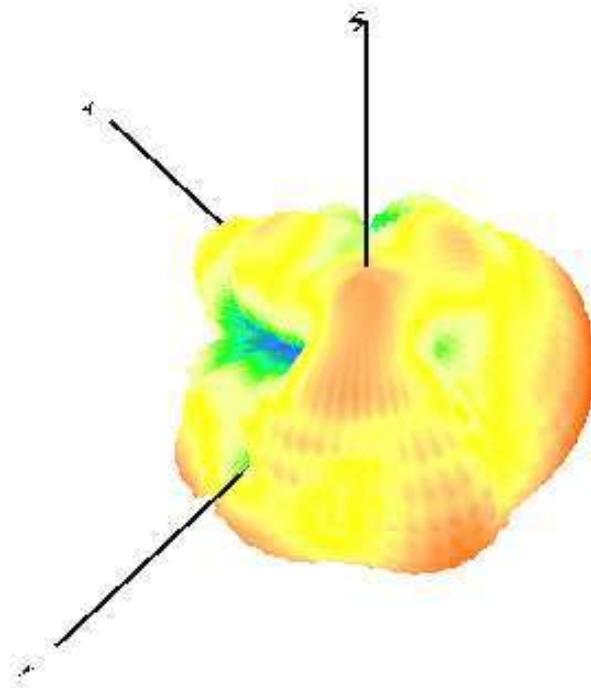
c) 3D plots

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

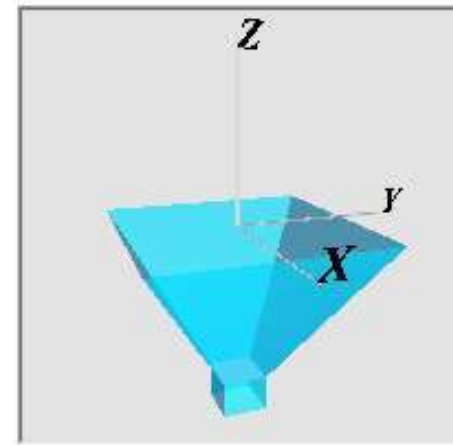
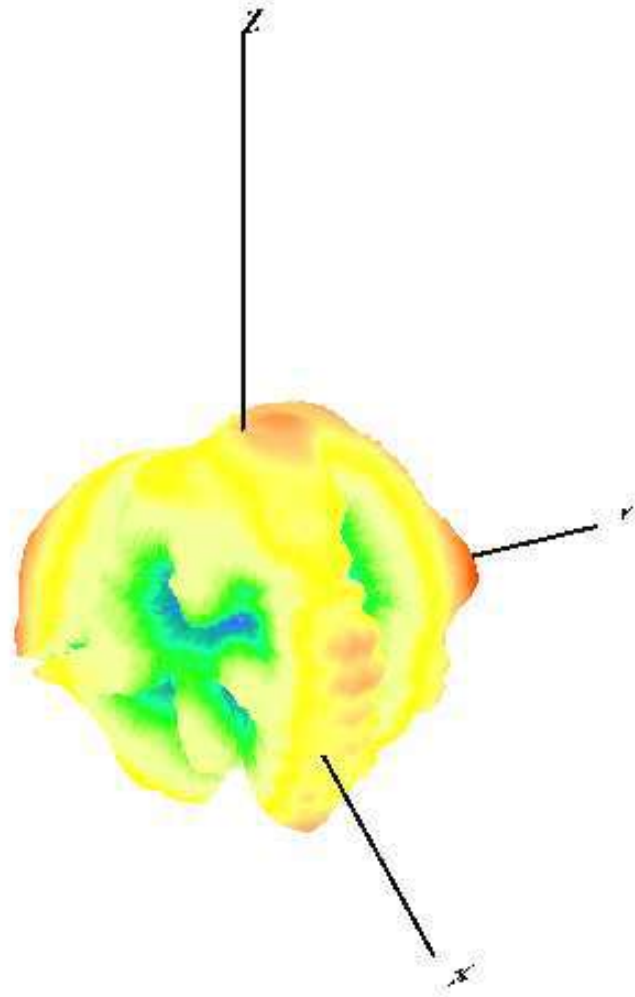
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



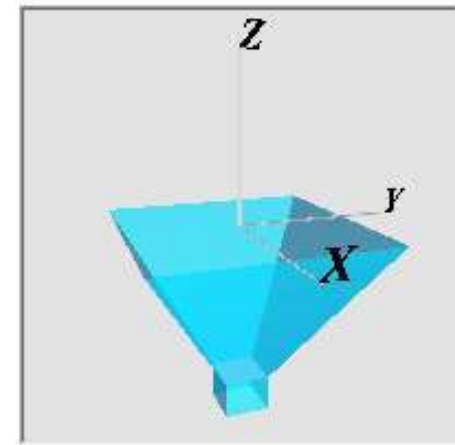
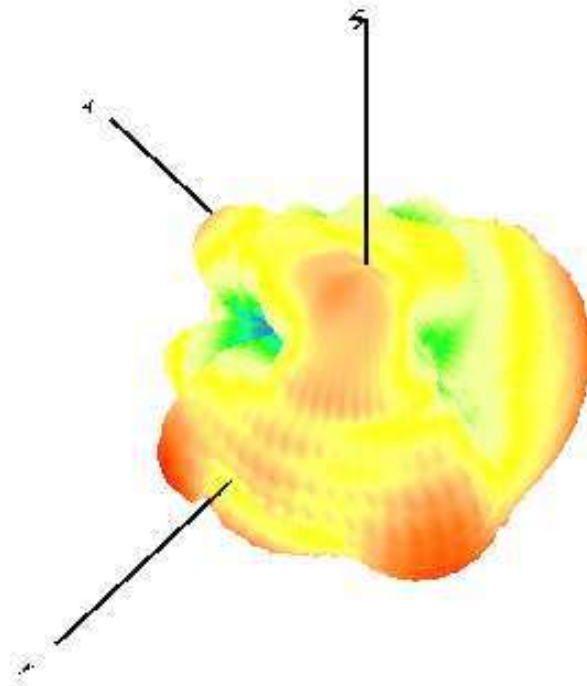
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



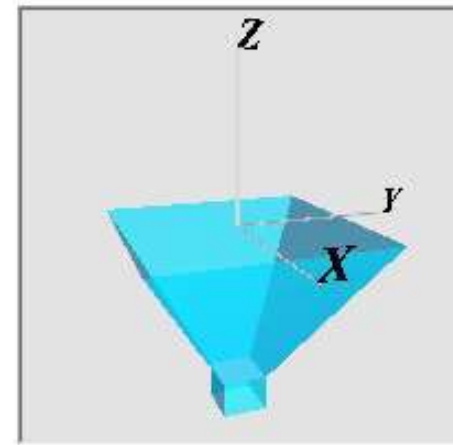
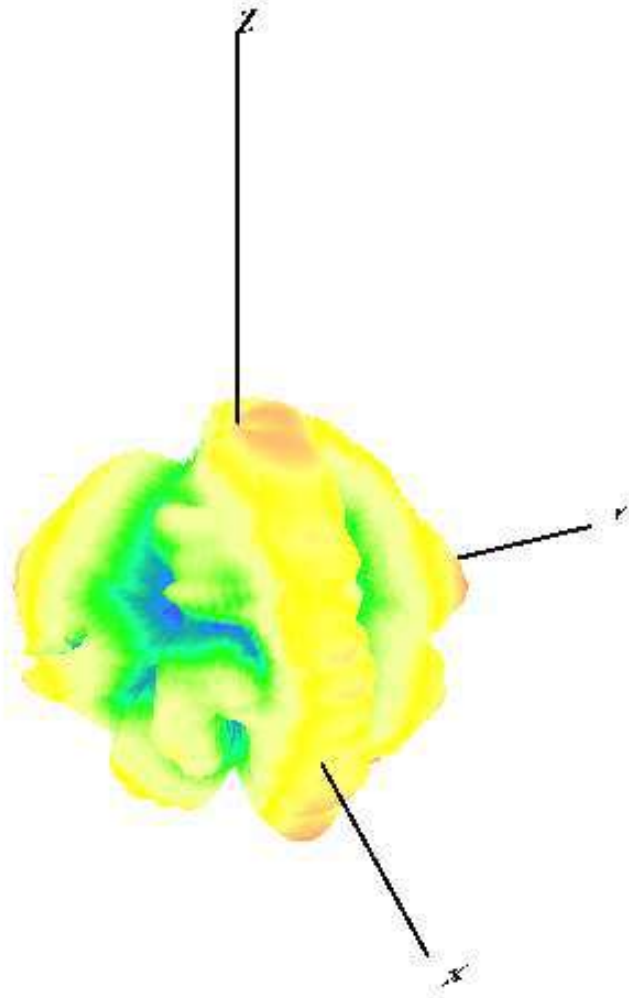
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



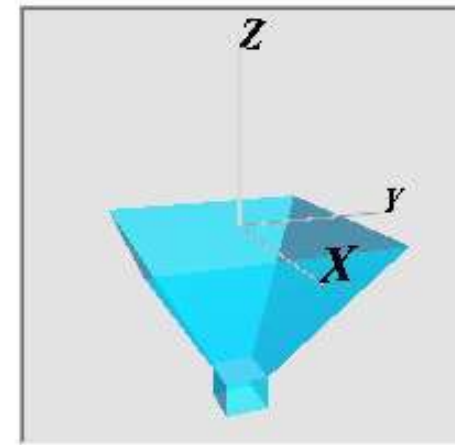
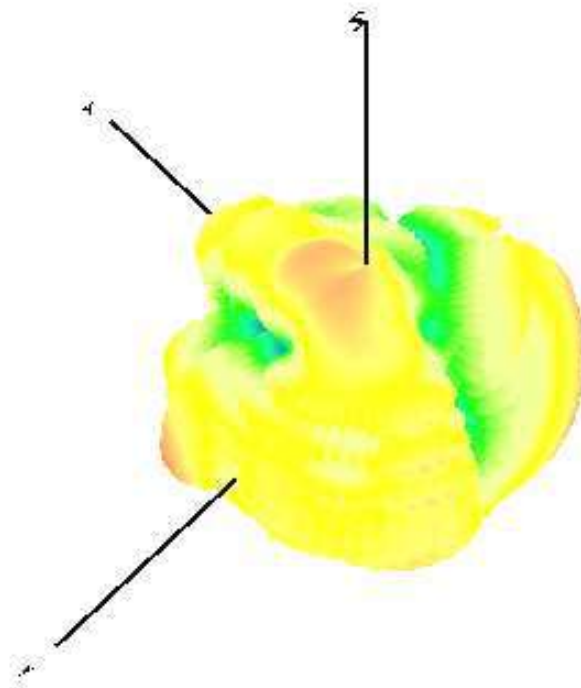
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



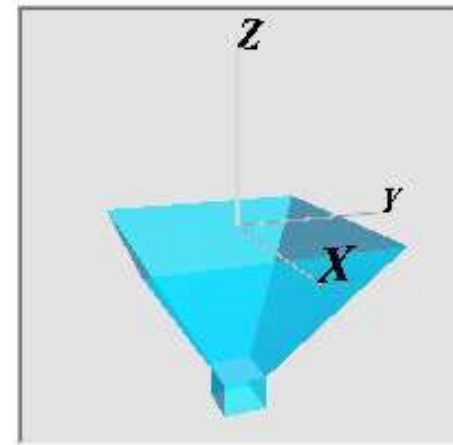
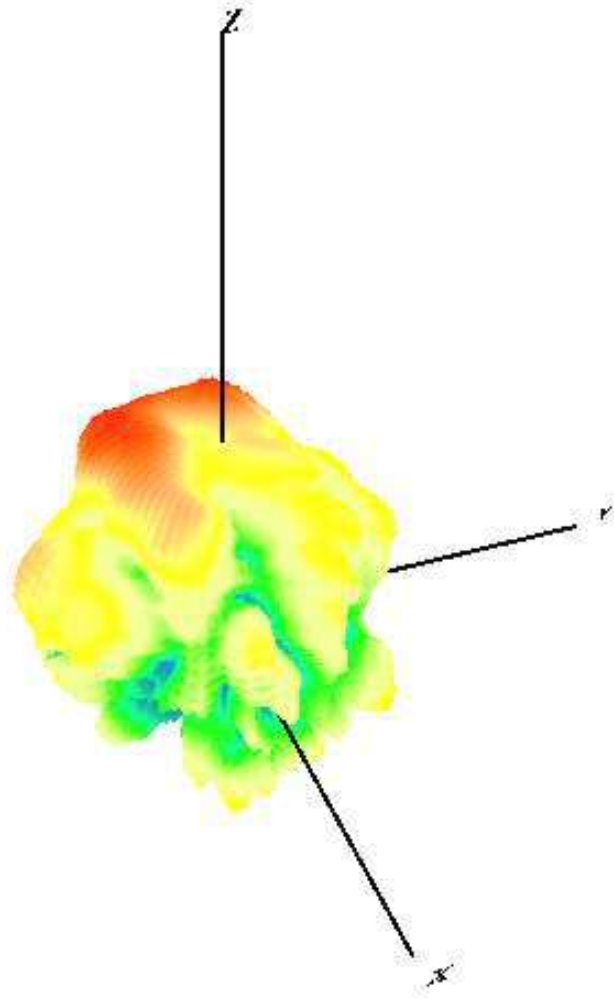
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



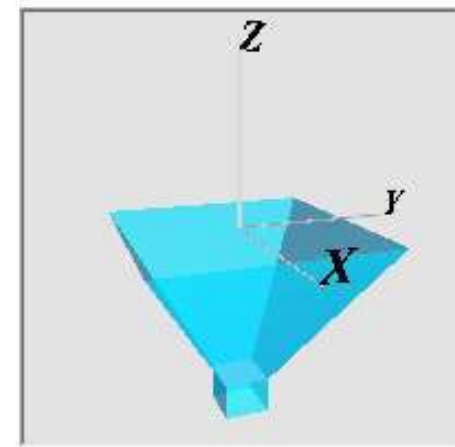
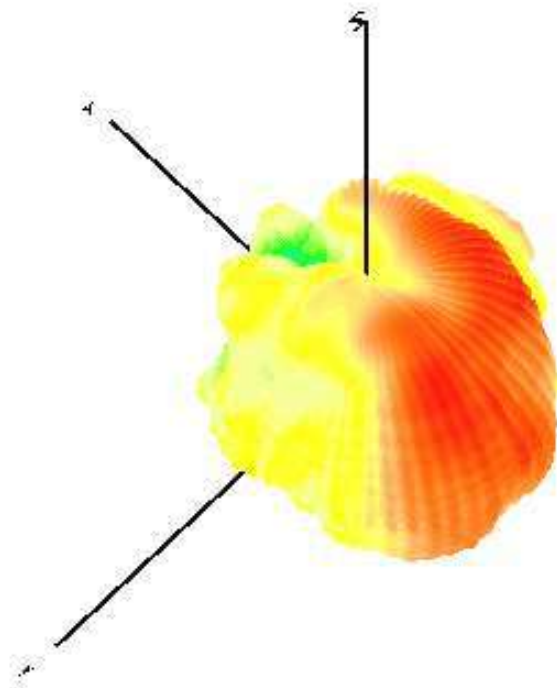
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



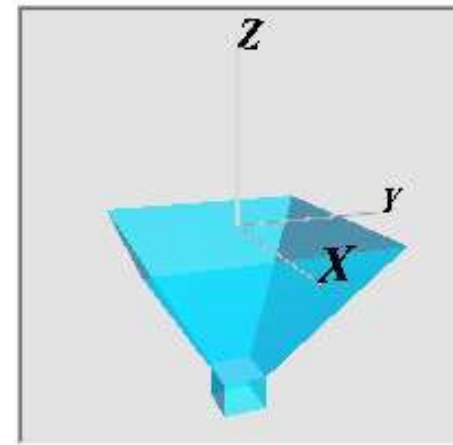
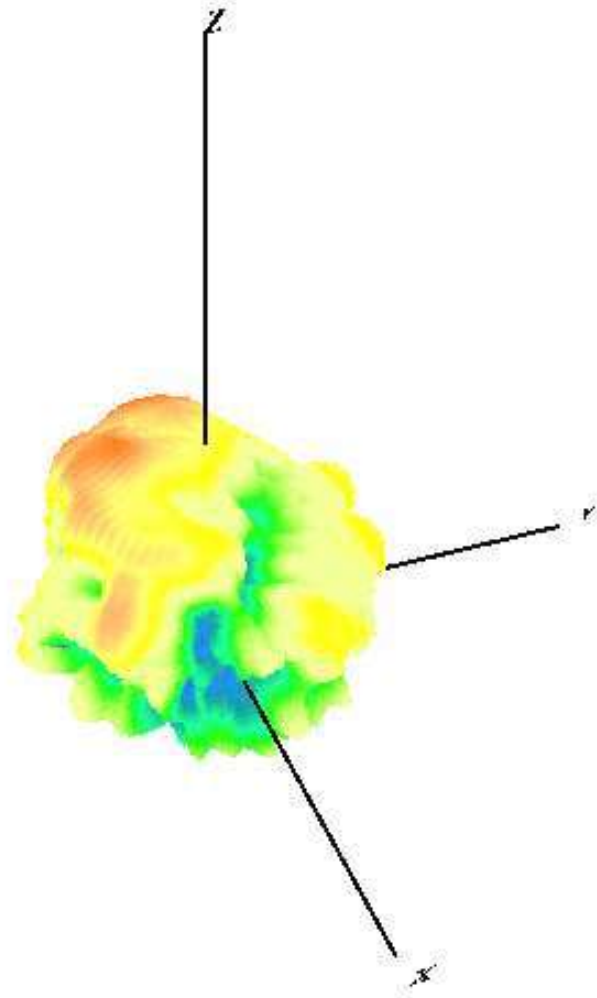
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.150000



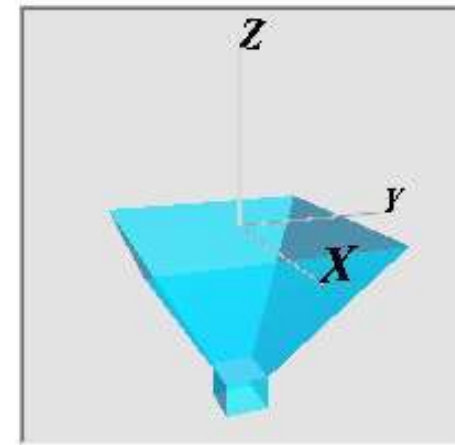
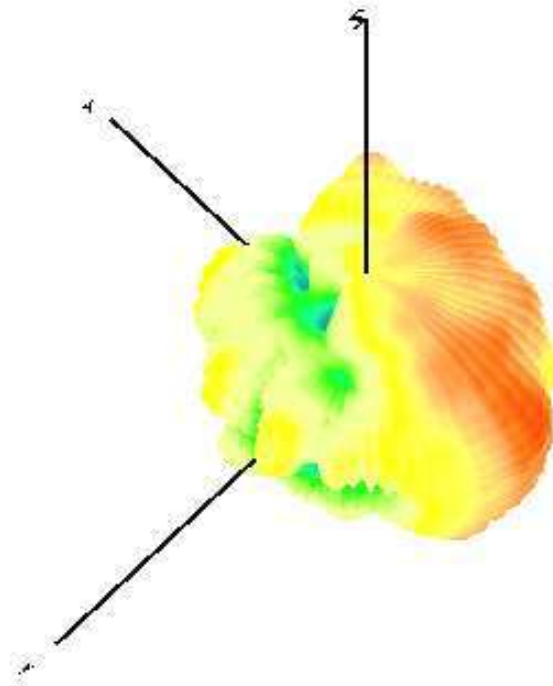
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.150000



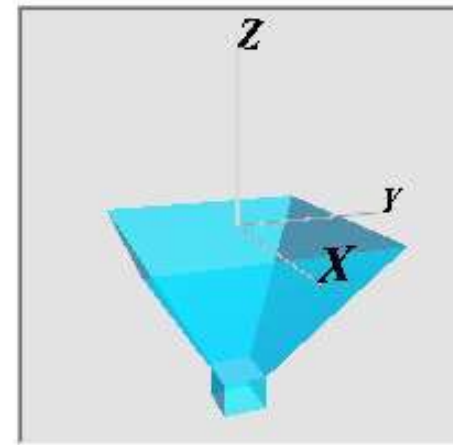
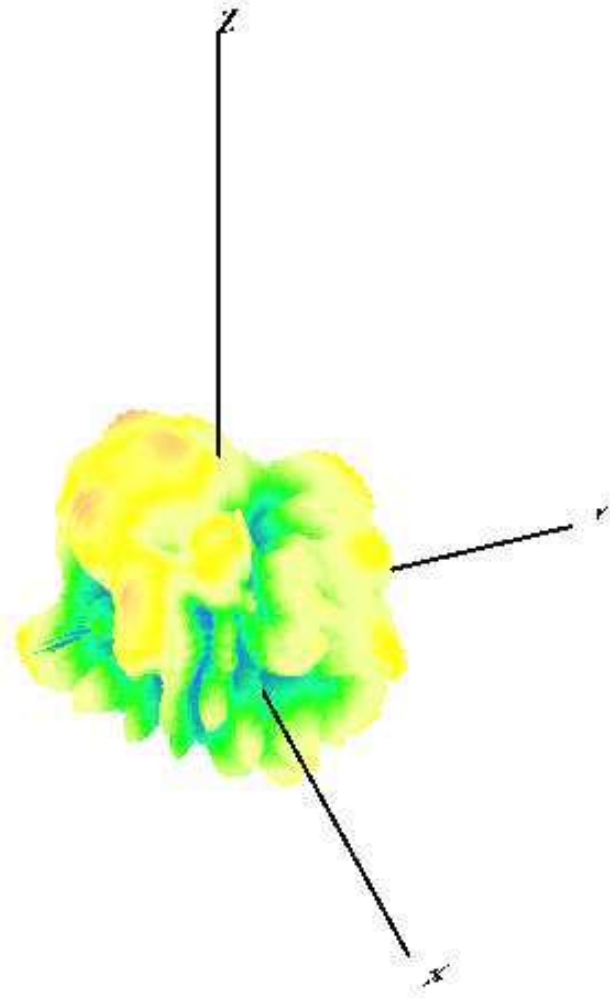
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.350000



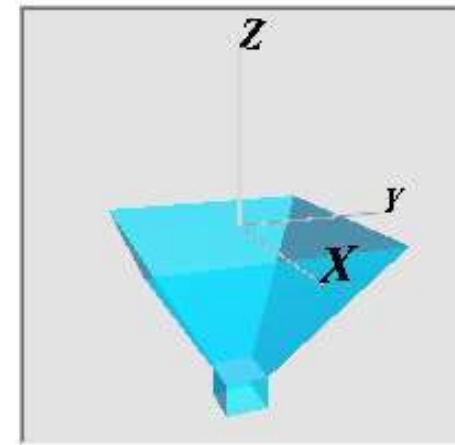
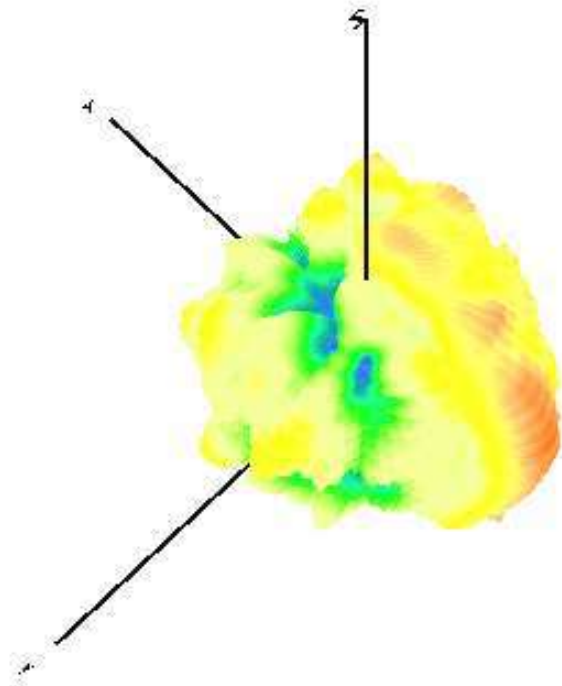
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.350000



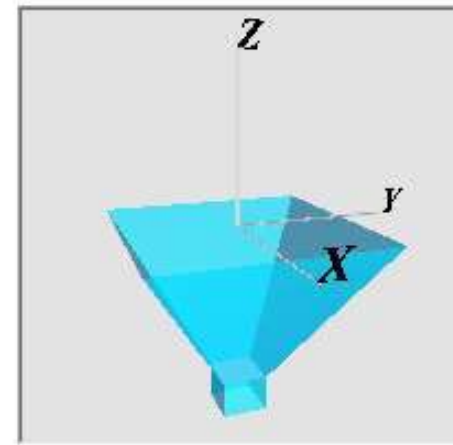
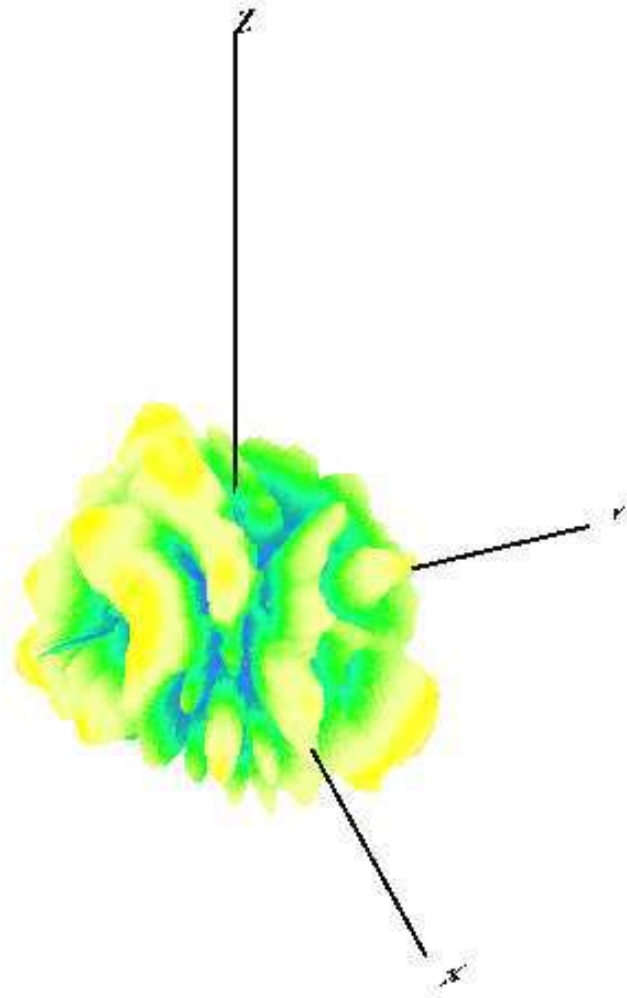
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.500000



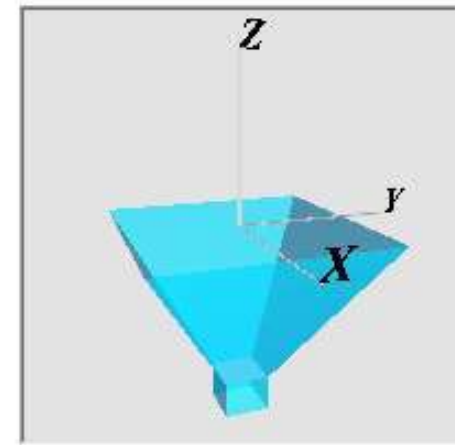
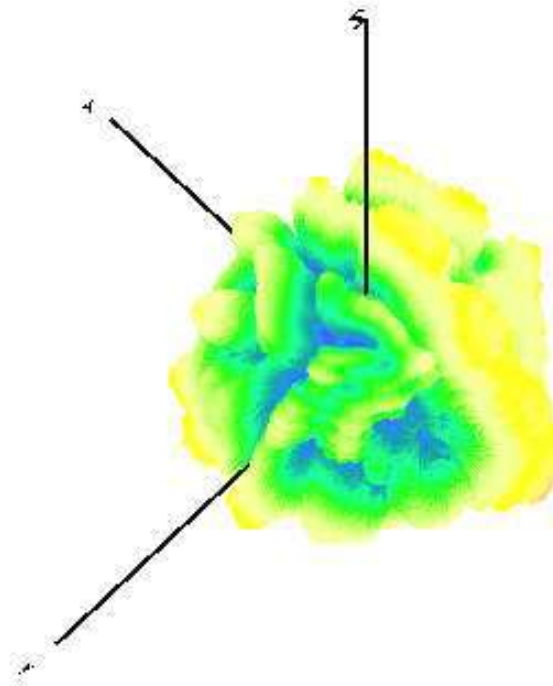
Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.500000



Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.725000



Four-Channel Unit
Antenna 2: WiFi antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.725000

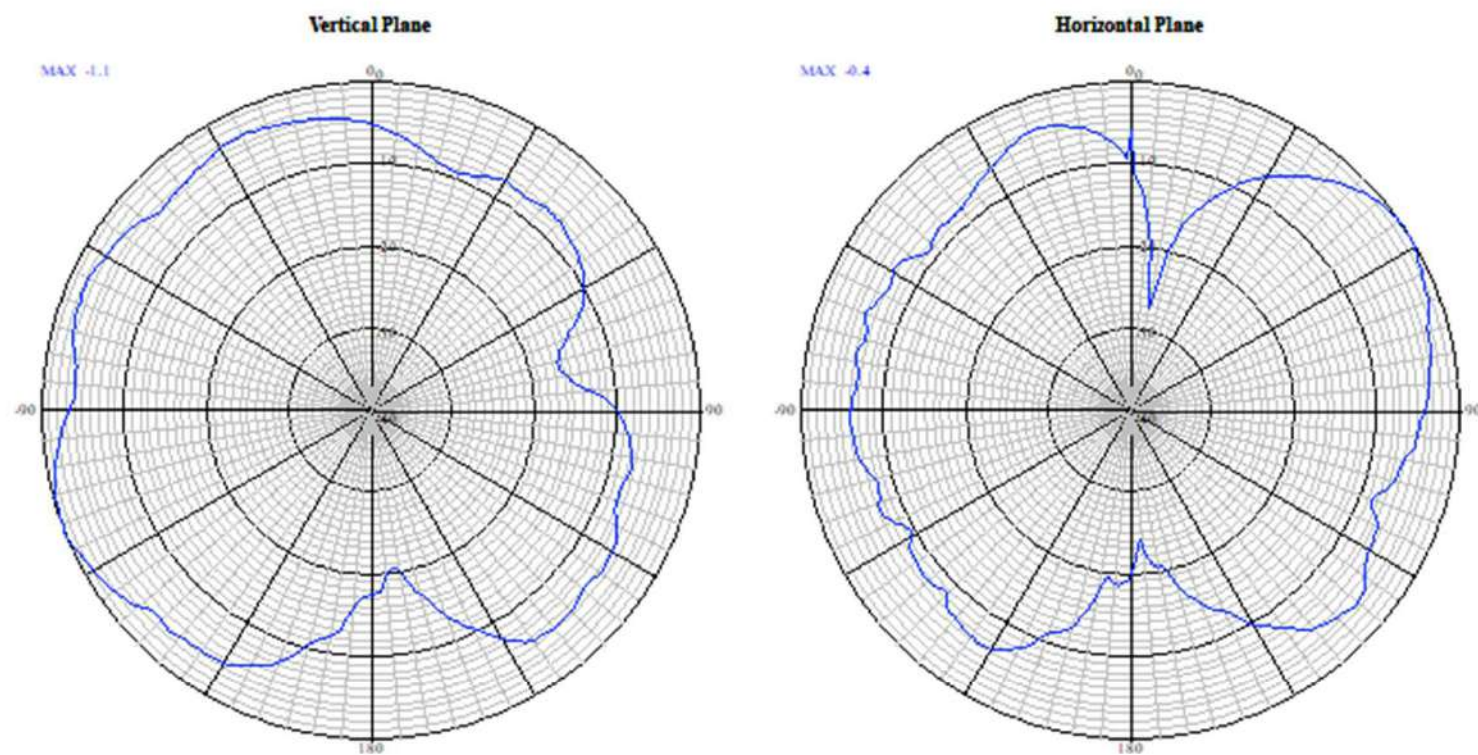


3. Embedded antenna

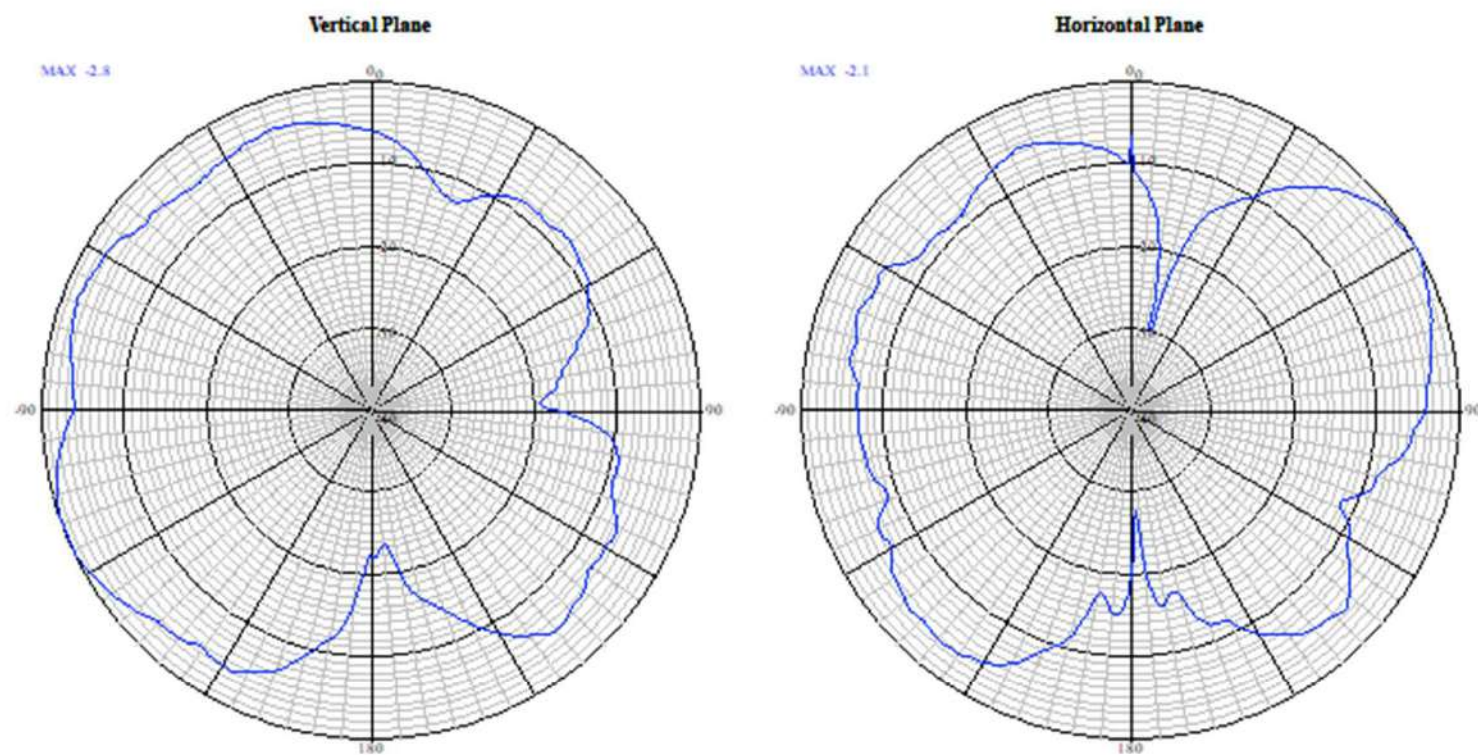
a) 2D Elevation cuts, ZX- and ZY-plane

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

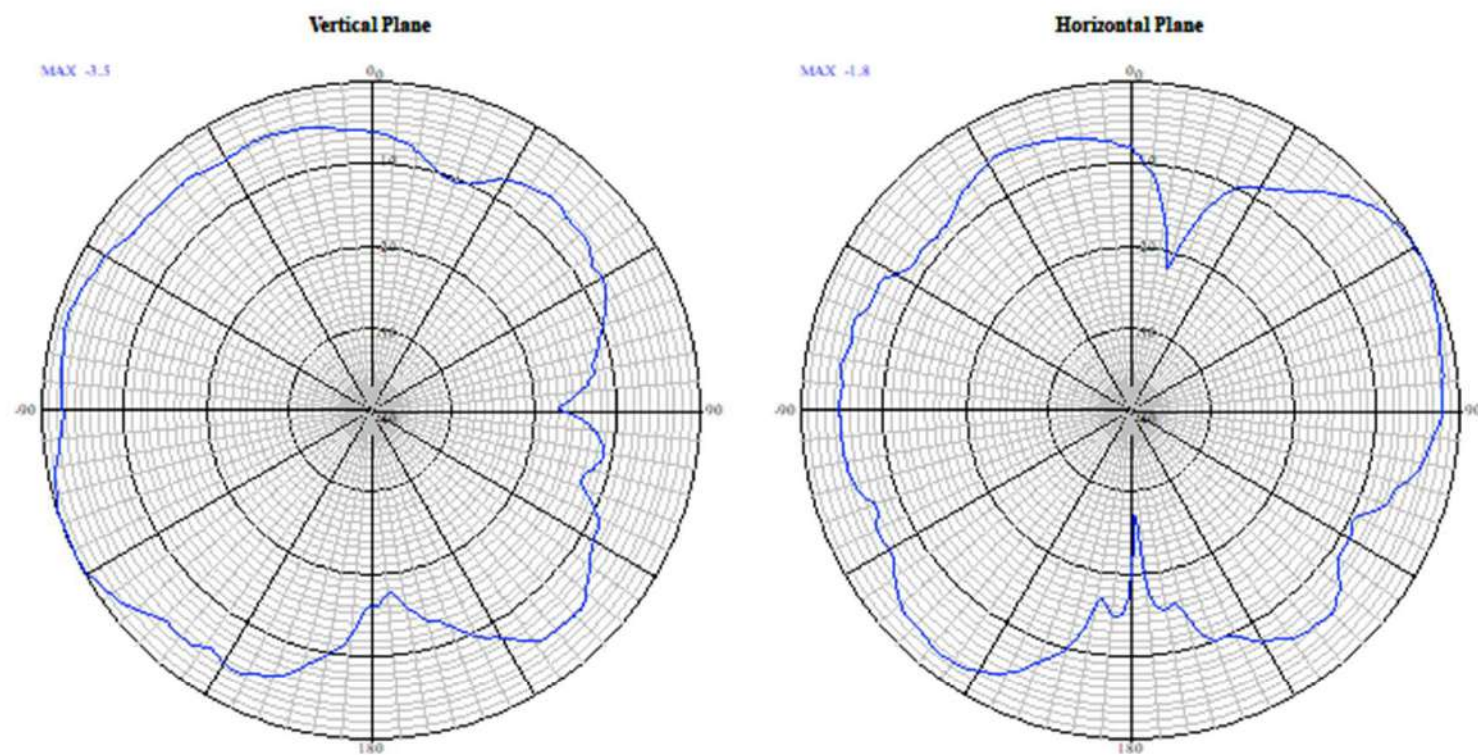
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 2.400000



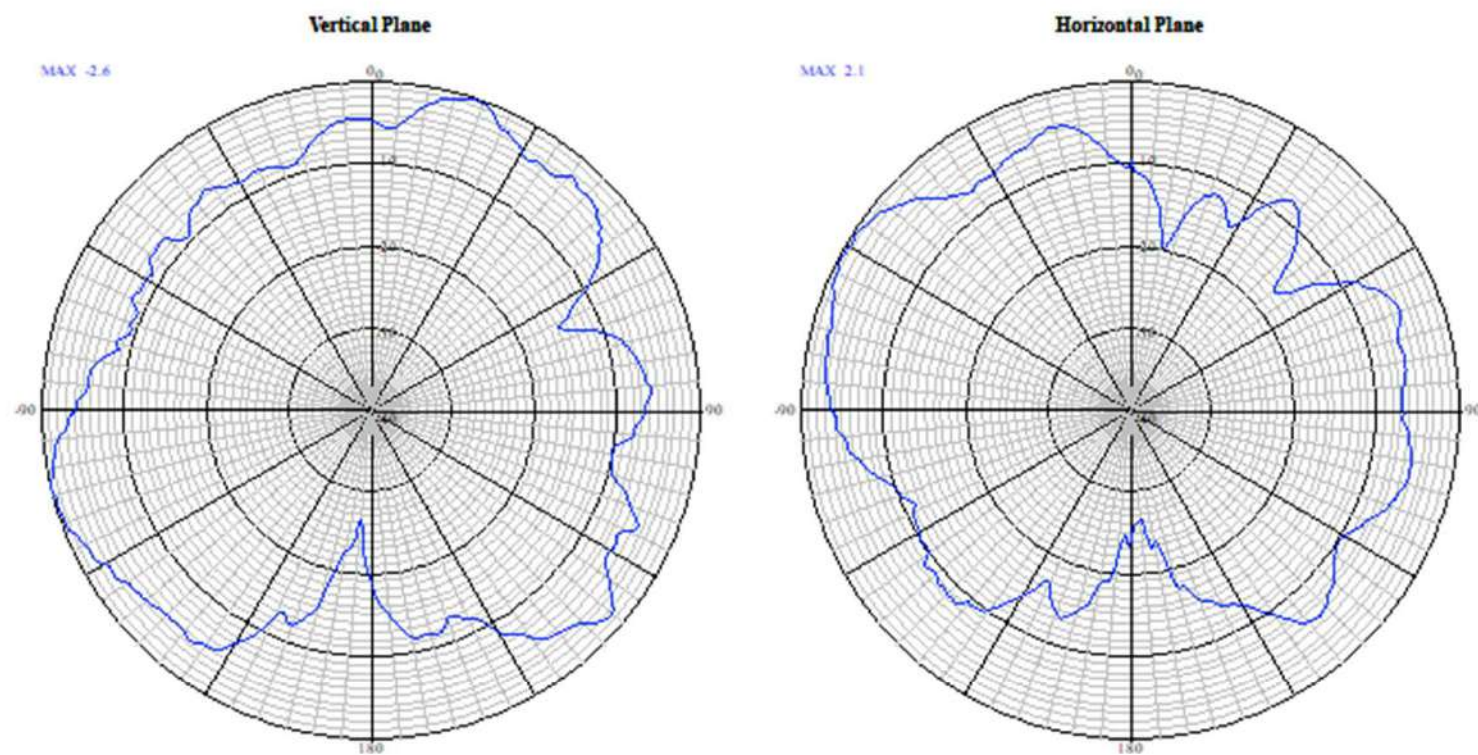
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 2.440000



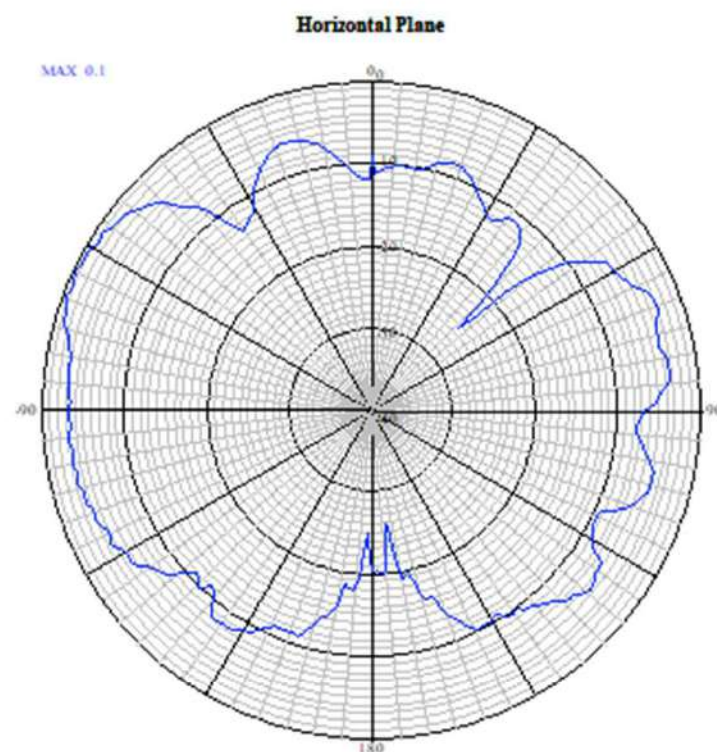
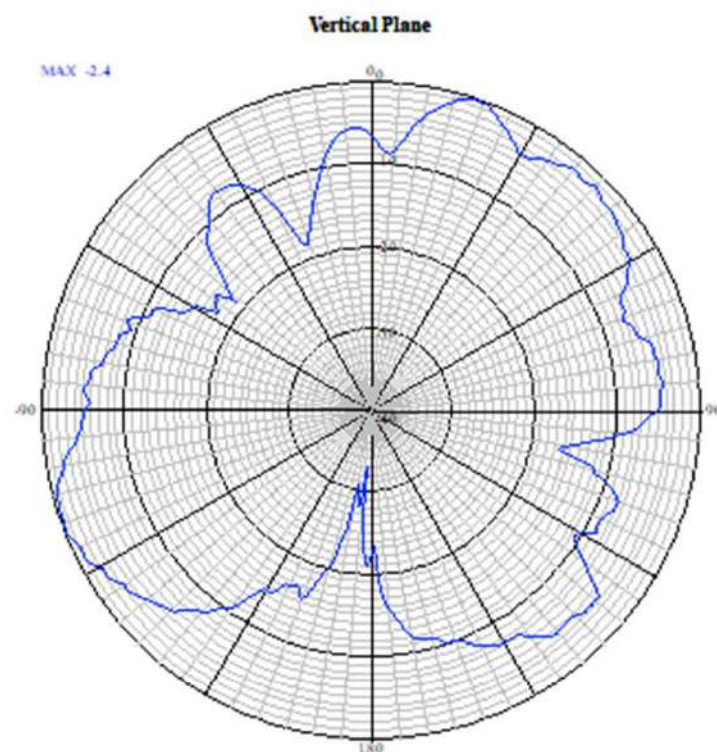
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 2.480000



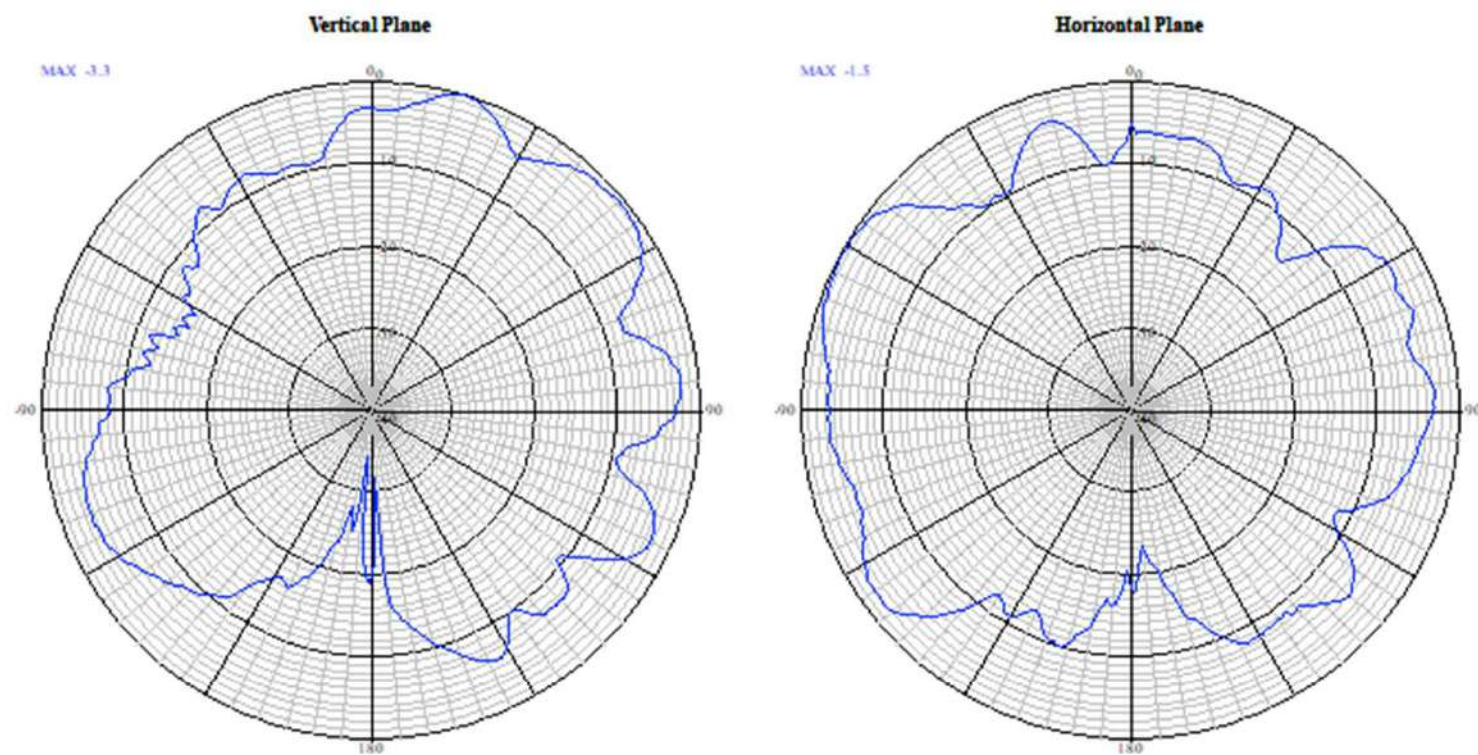
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 5.150000



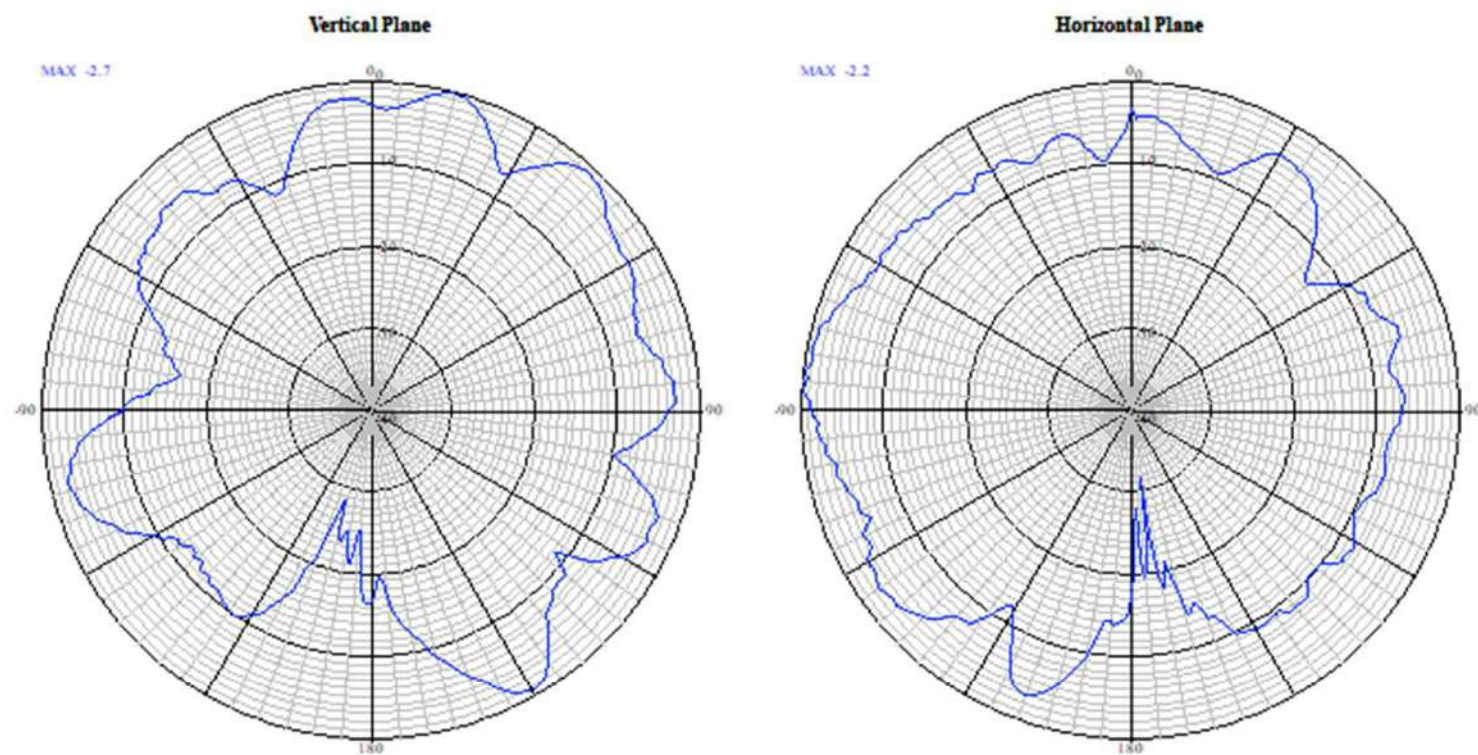
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 5.350000



Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 5.500000



Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns
Frequency: 5.725000

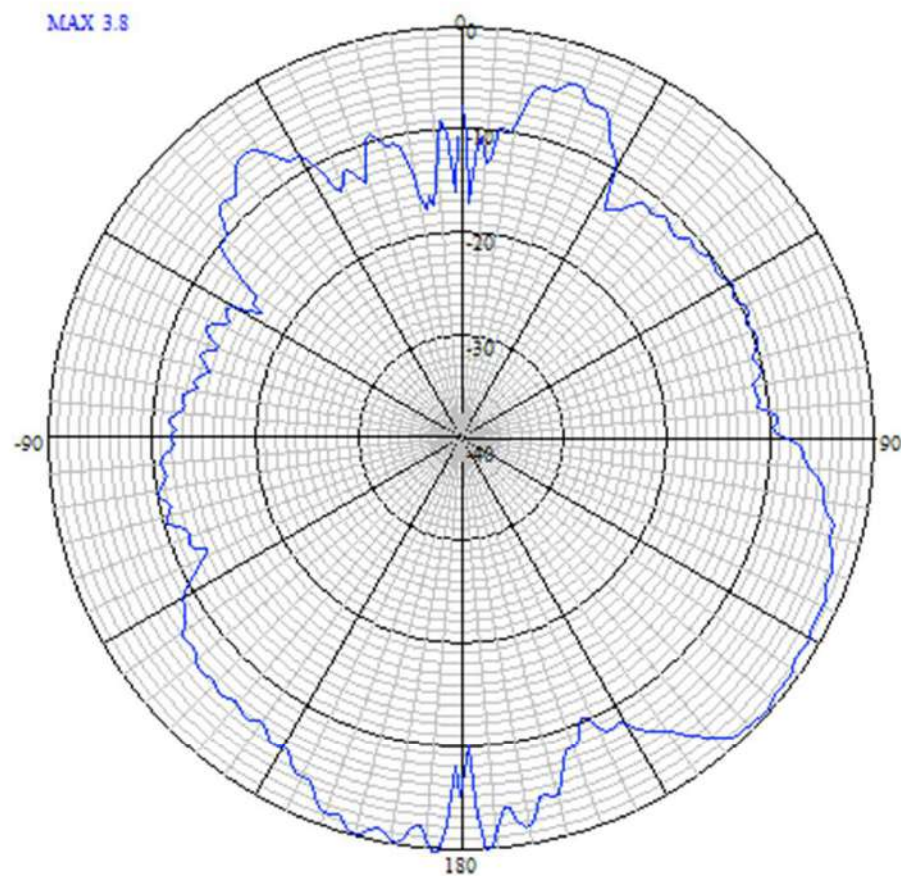


3. Embedded antenna

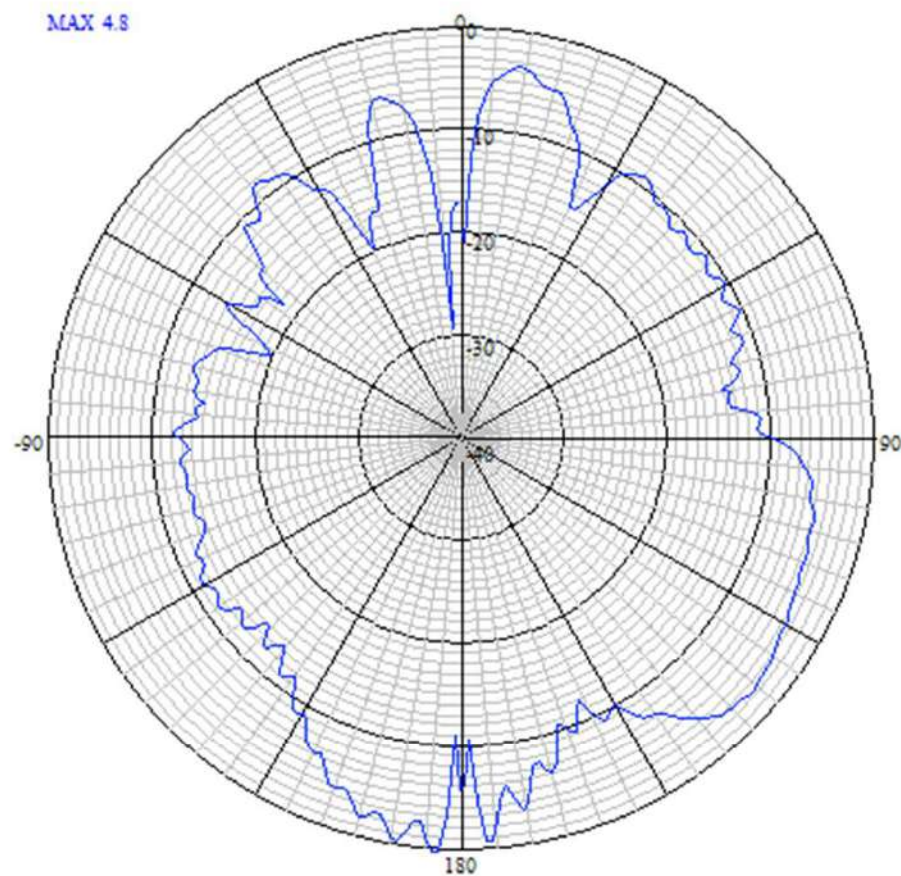
b) 2D Azimuth cut: XY-Plane

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

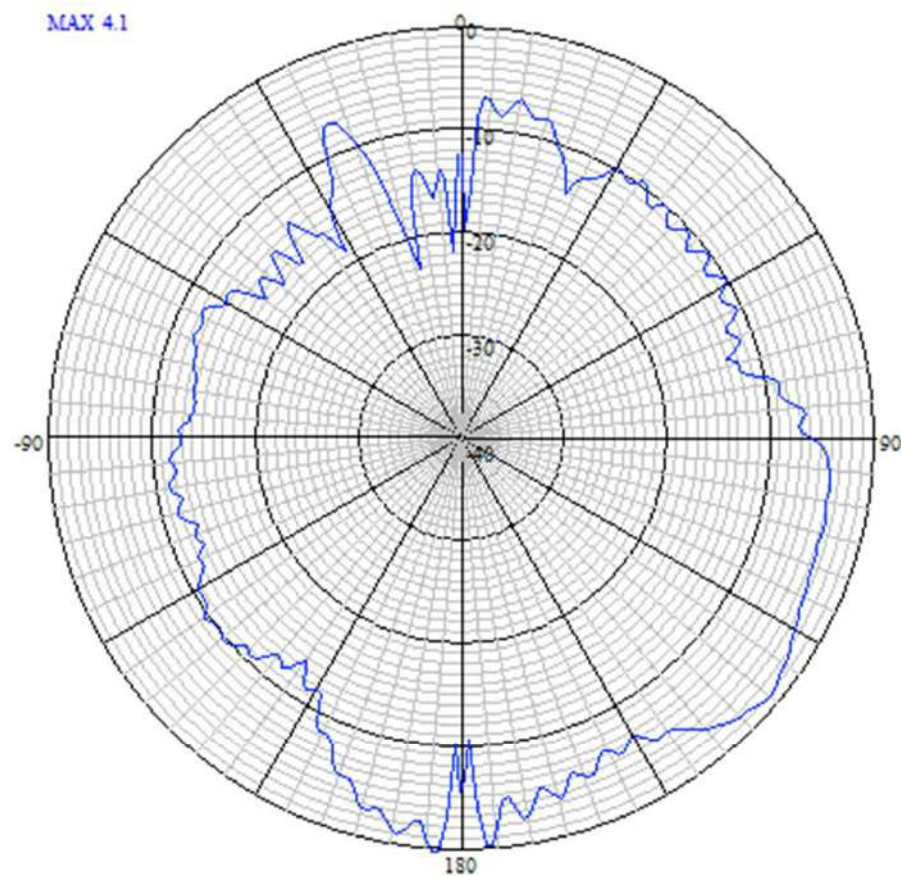
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.400000
Azimuth Cut - XY Plane



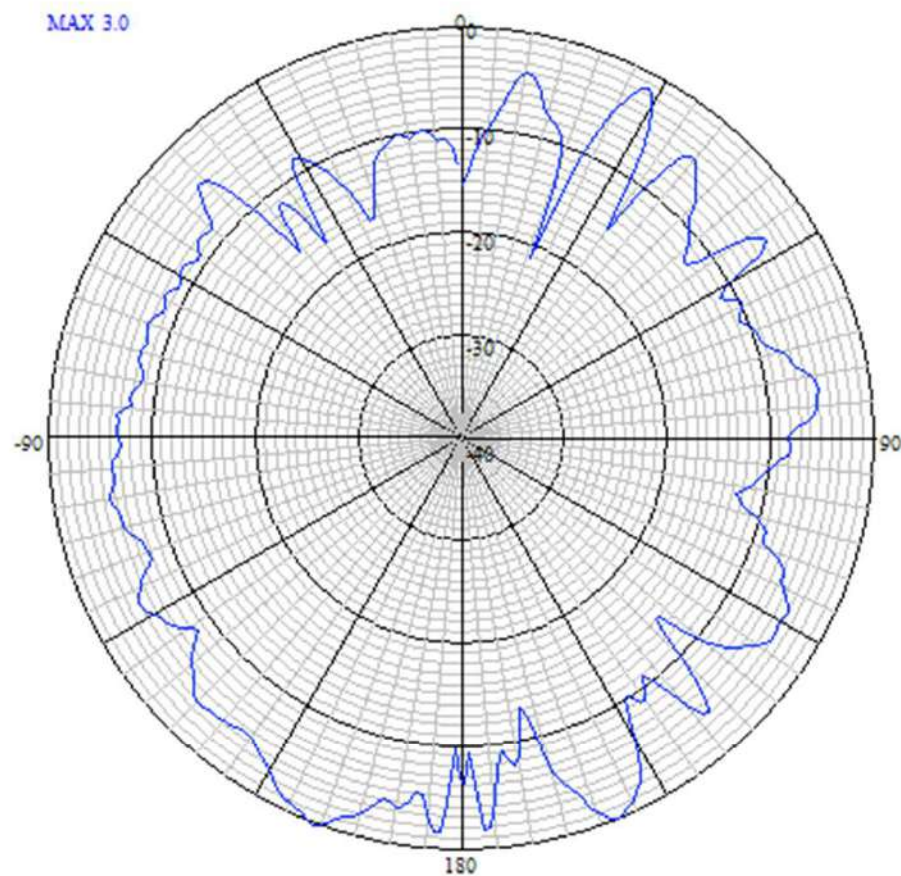
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.440000
Azimuth Cut - XY Plane



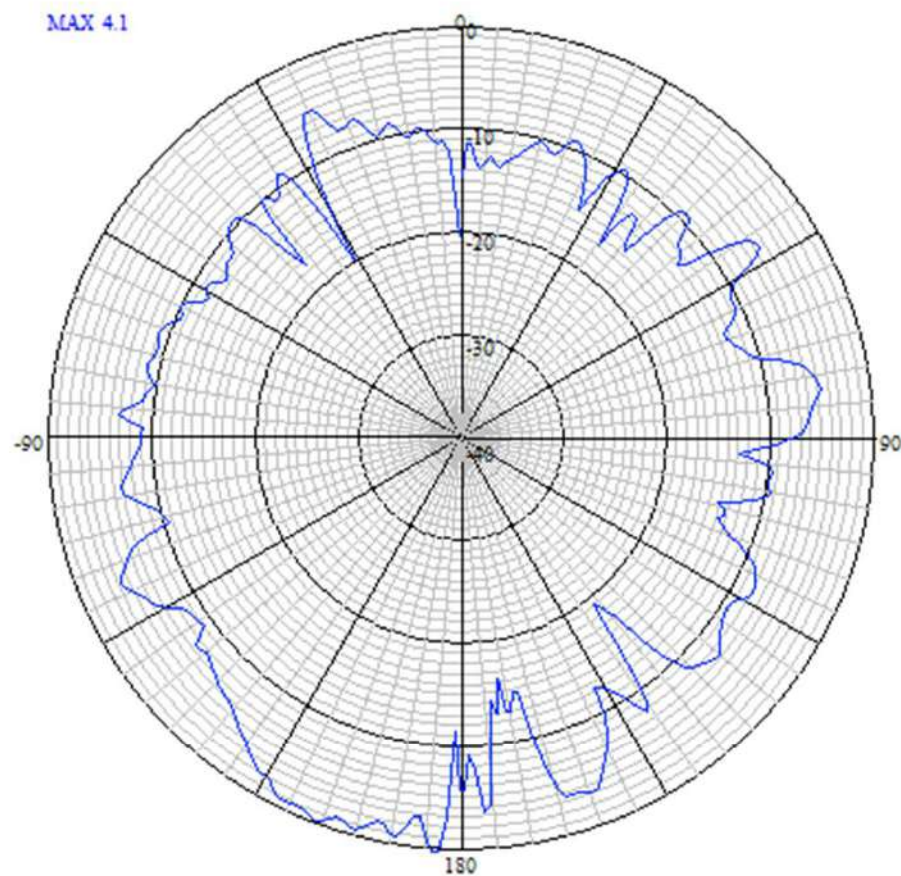
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 2.480000
Azimuth Cut - XY Plane



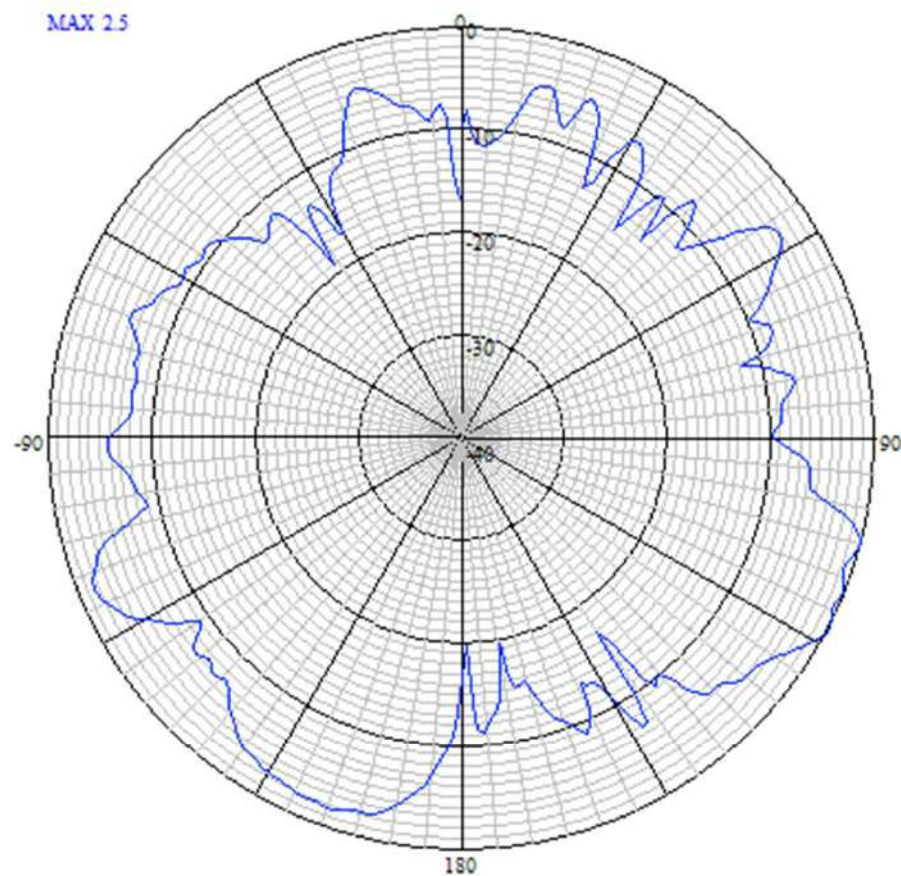
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.150000
Azimuth Cut - XY Plane



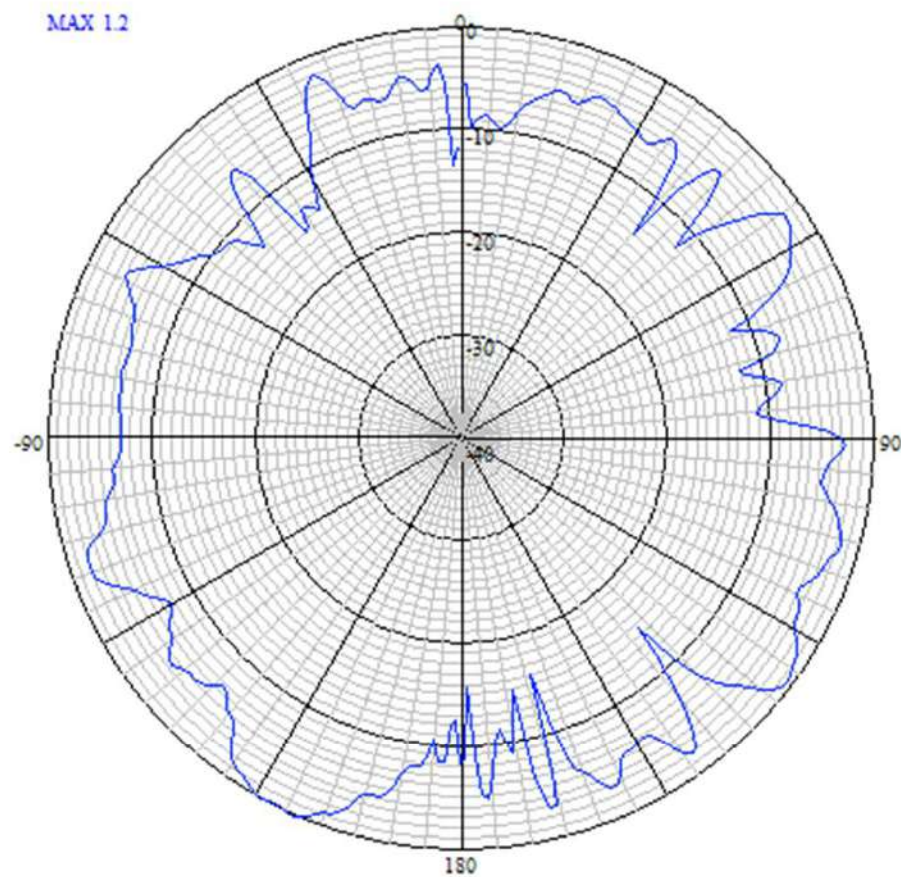
Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.350000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.500000
Azimuth Cut - XY Plane



Four- Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : 4 Cuts - 2 Radial, 2 Angular
Frequency: 5.725000
Azimuth Cut - XY Plane

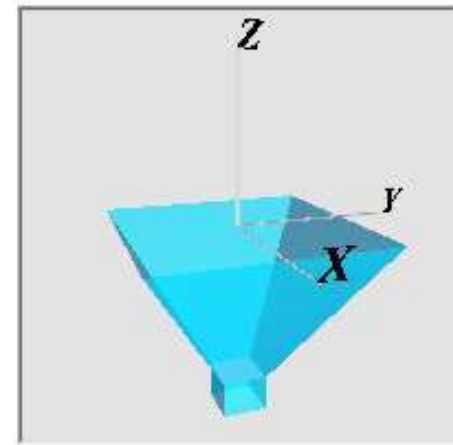
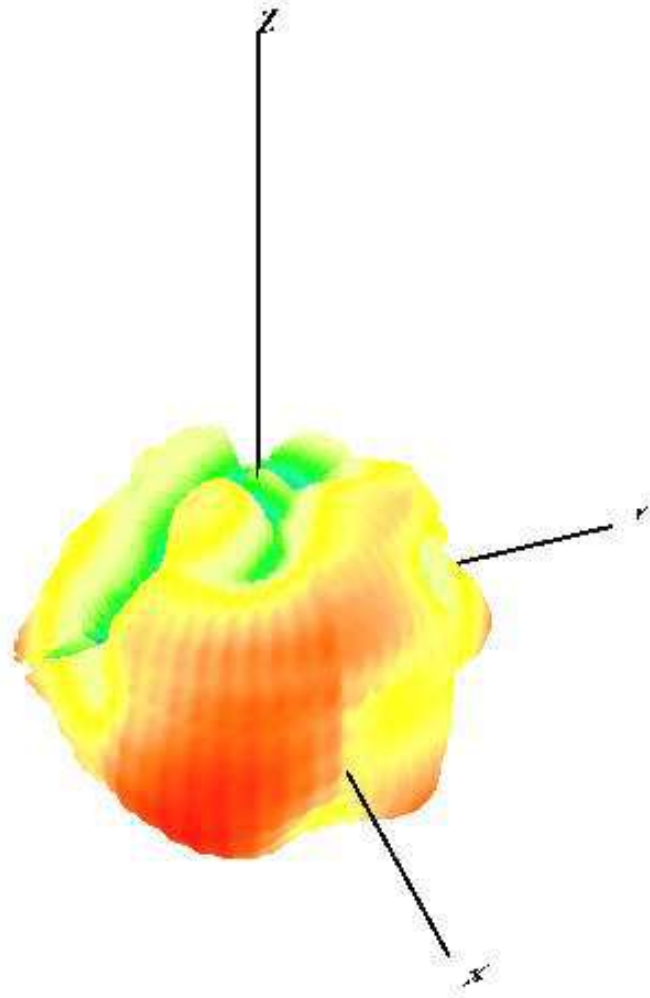


3. Embedded antenna

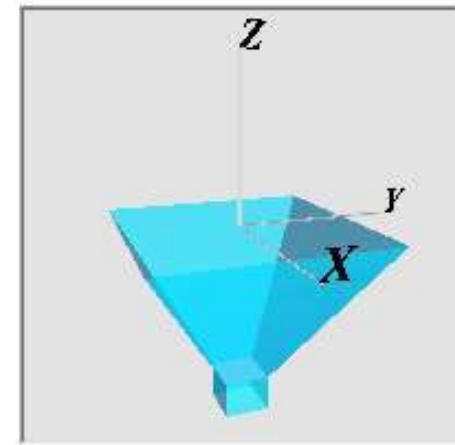
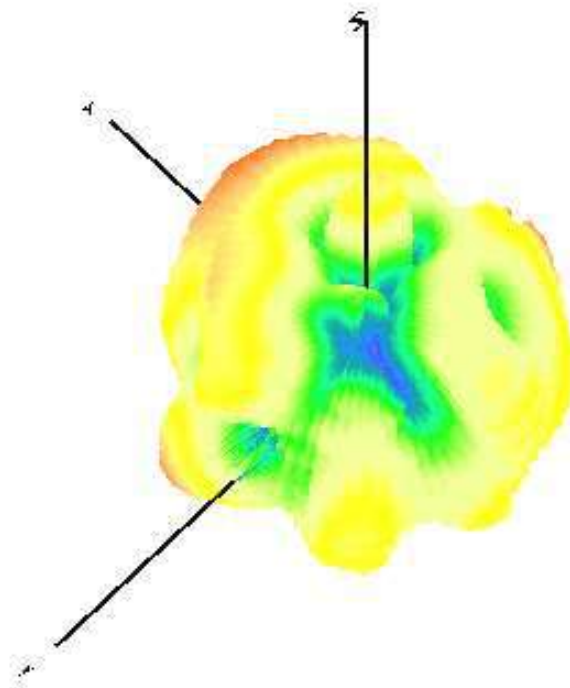
c) 3D plots

Freq = 2.40, 2.44, 2.48, 5.15, 5.35, 5.5, 5.725 GHz

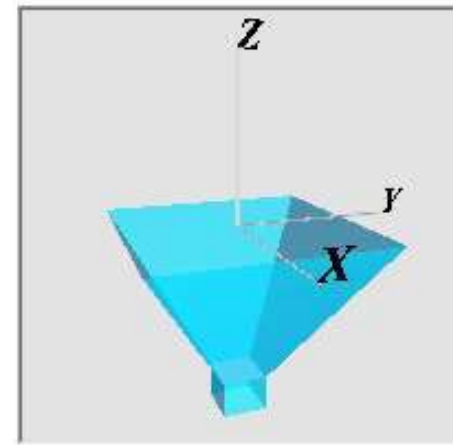
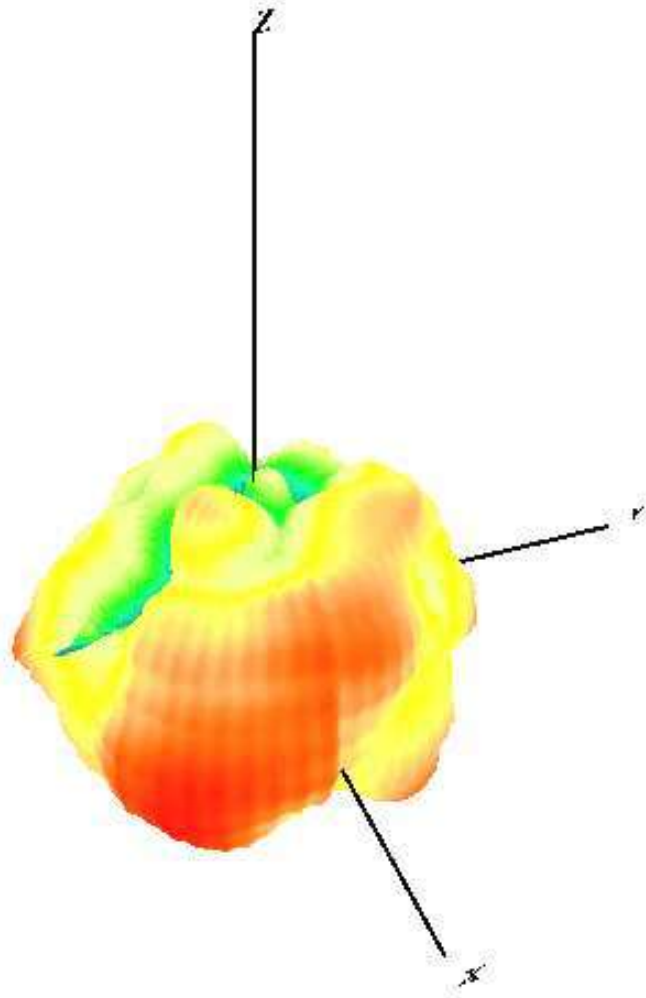
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



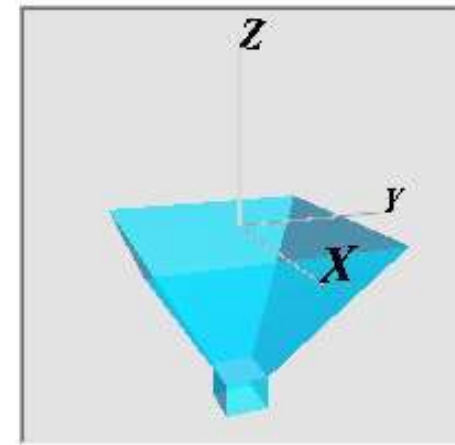
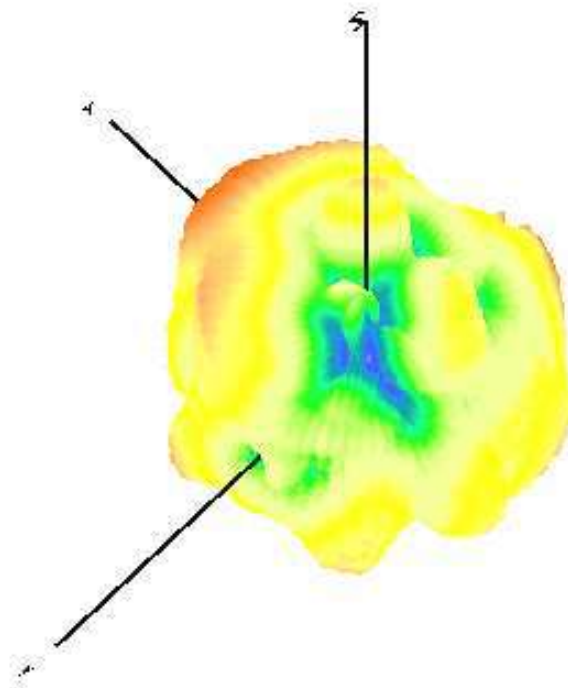
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.400000



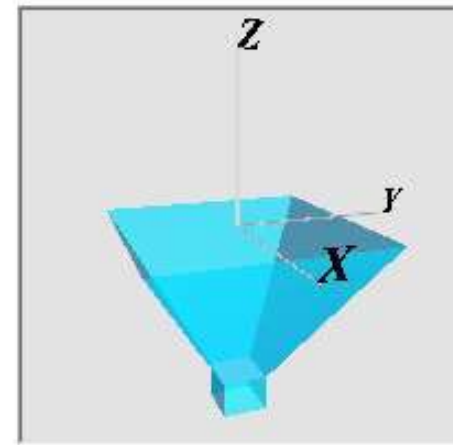
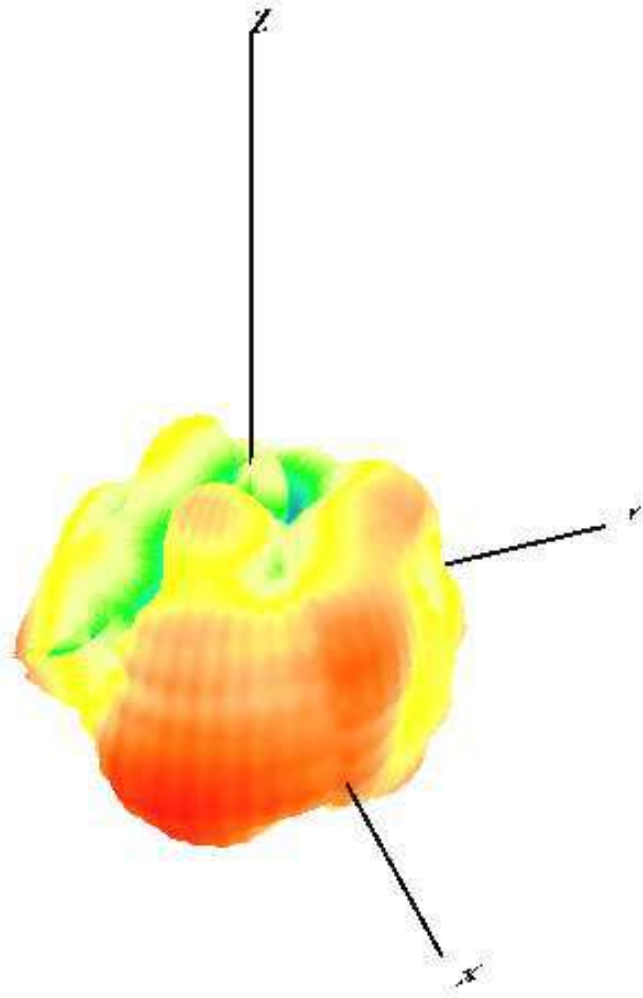
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



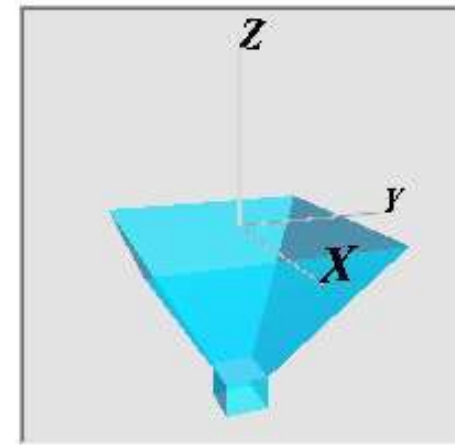
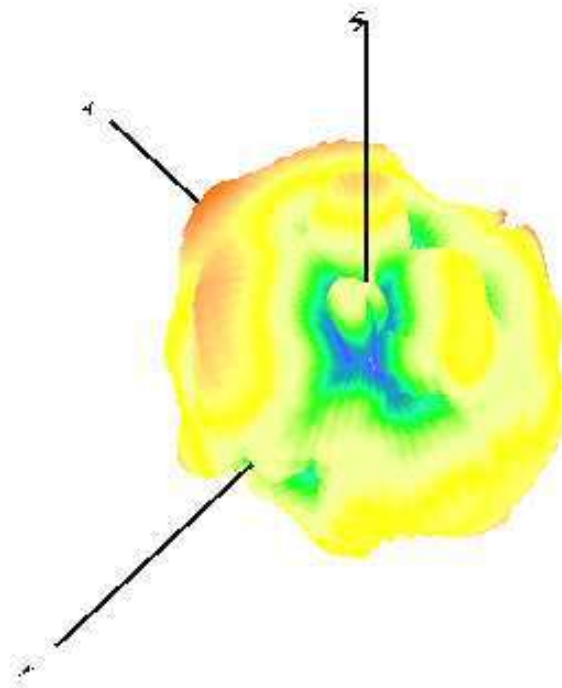
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.440000



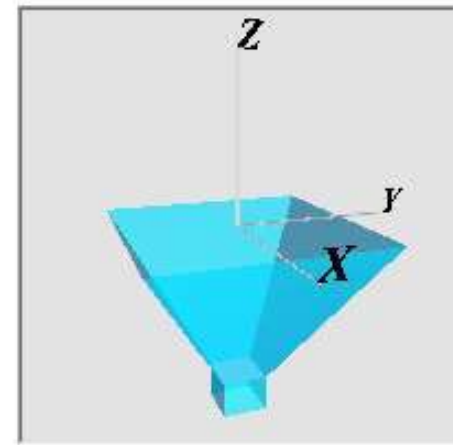
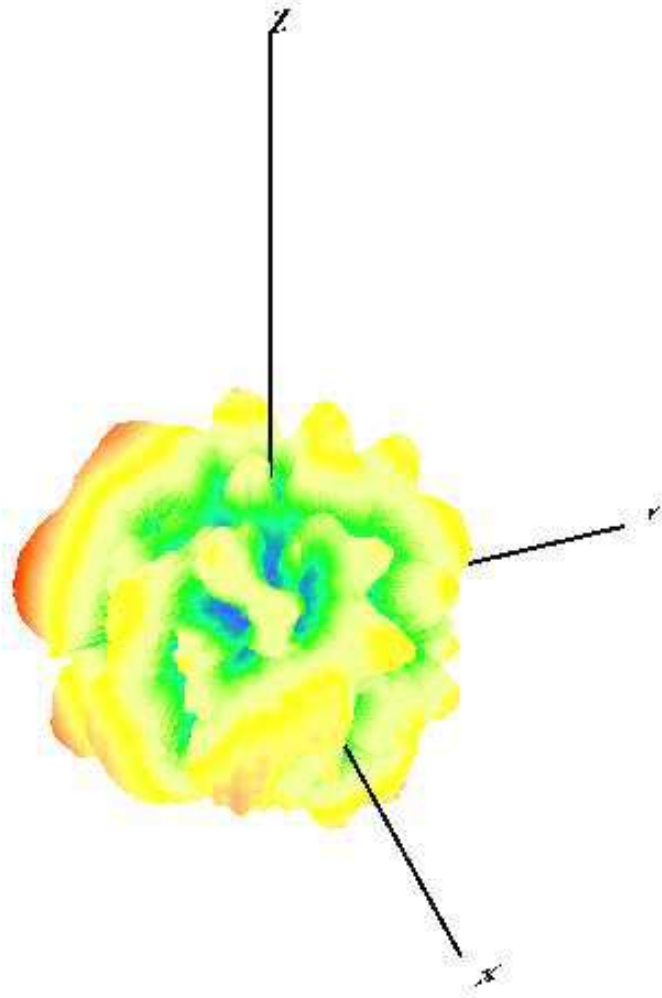
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



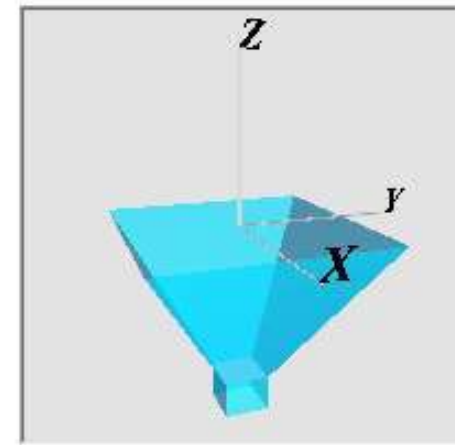
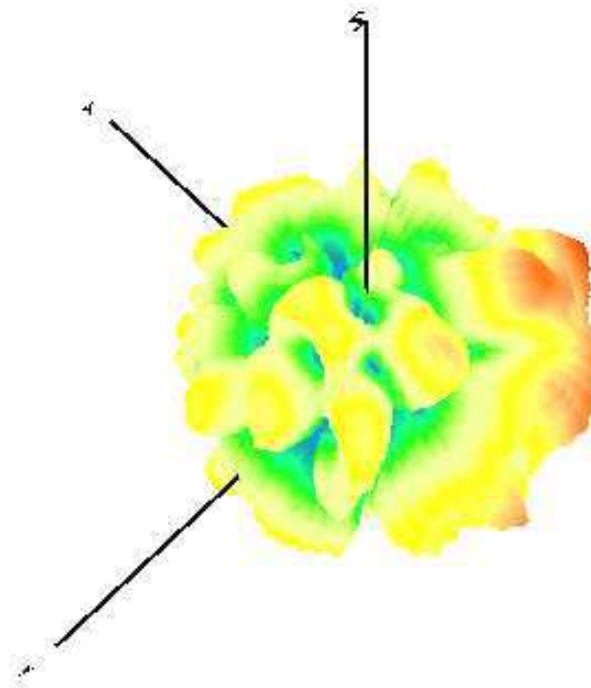
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 2.480000



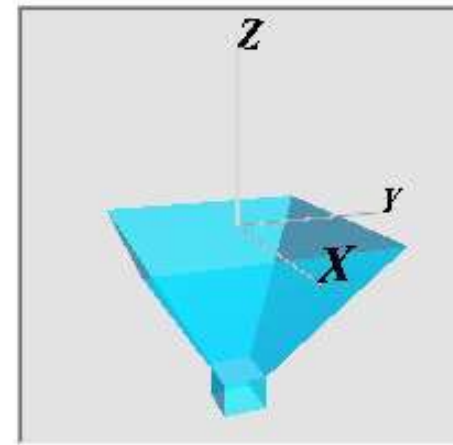
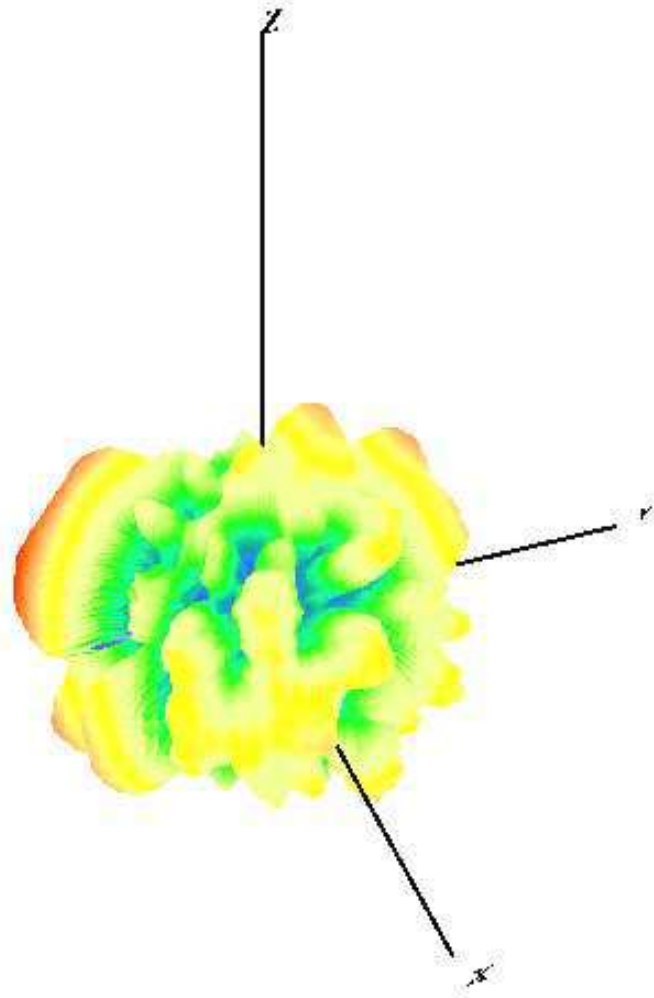
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.150000



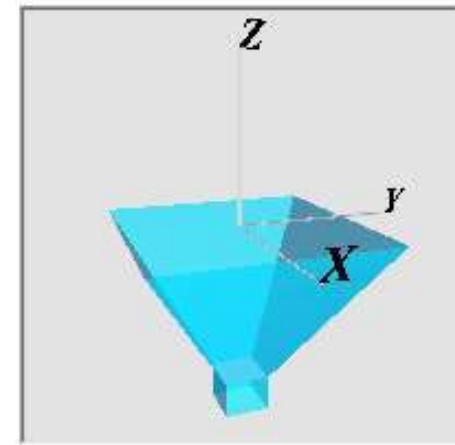
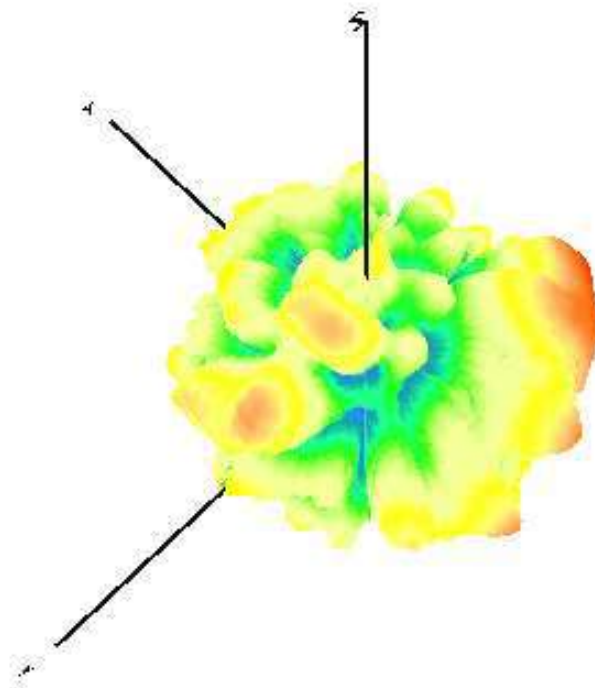
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.150000



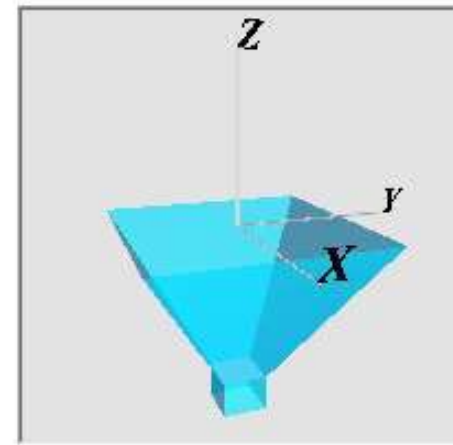
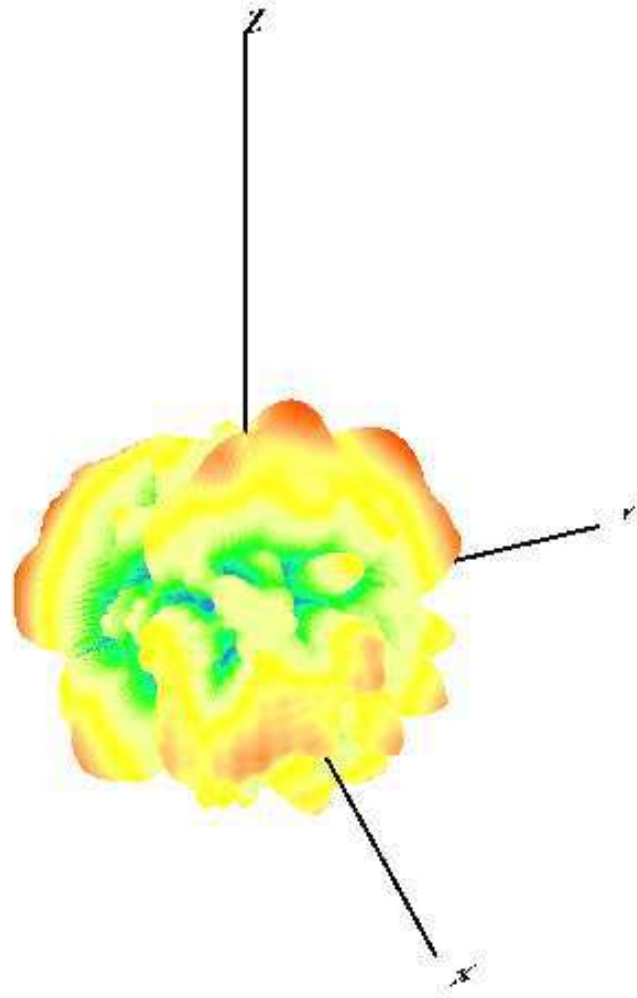
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.350000



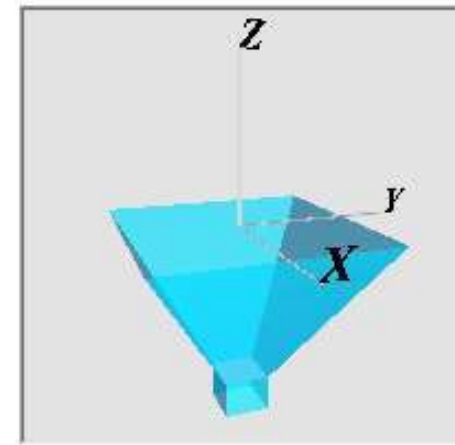
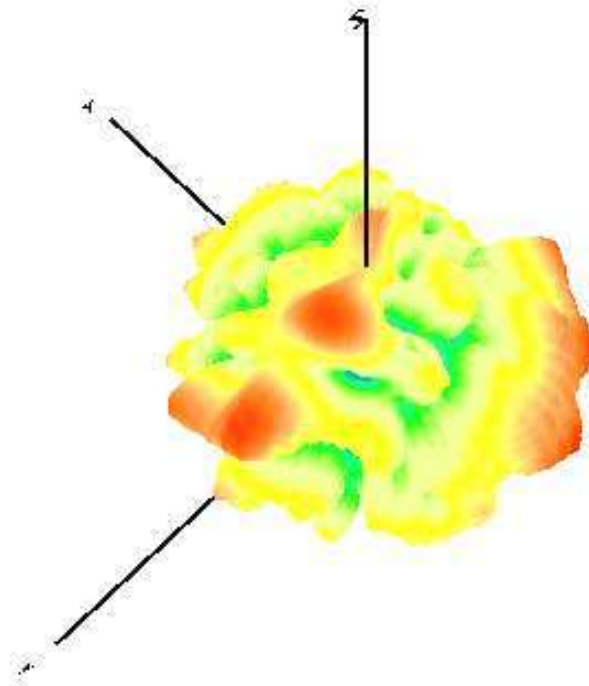
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.350000



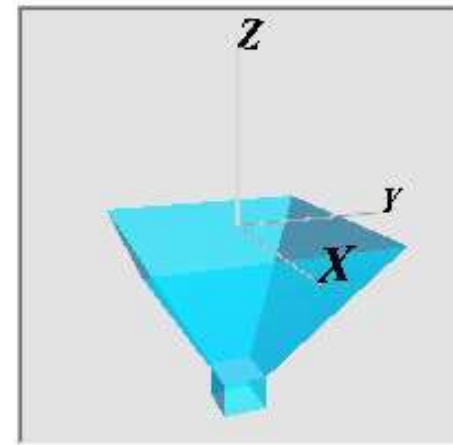
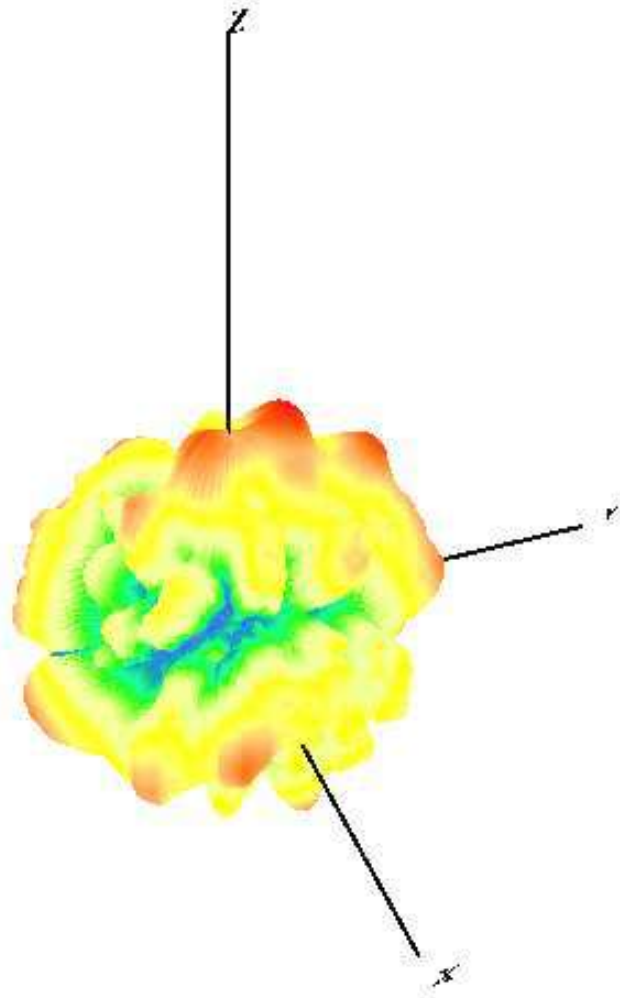
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.500000



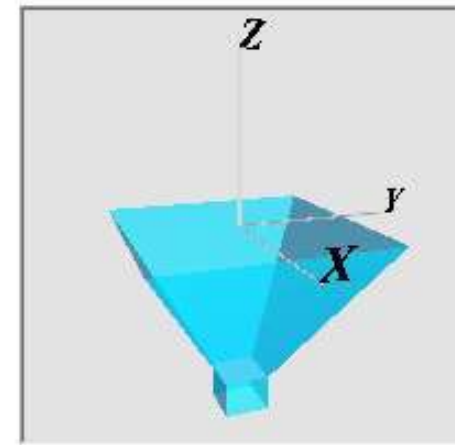
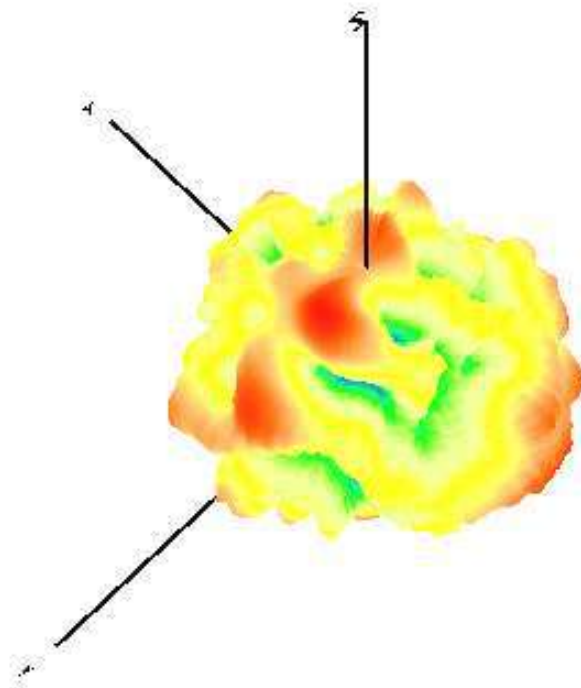
Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.500000



Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.725000



Four-Channel Unit
Antenna 3: Embedded antenna
Far-Field Patterns : Co - pol, Amp
Frequency: 5.725000



End of Files