AUT Report

Product Model： EAP650 D120-Outdoor 1.0

Manufacturer： TP-Link Systems Inc.

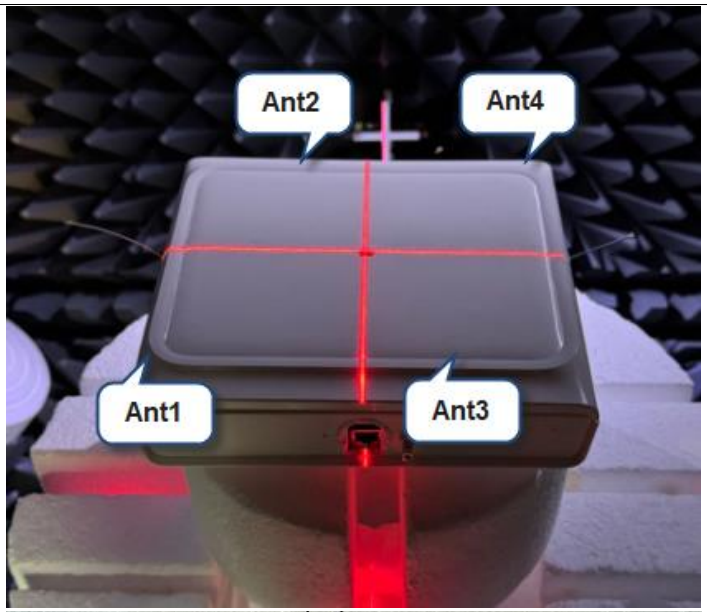
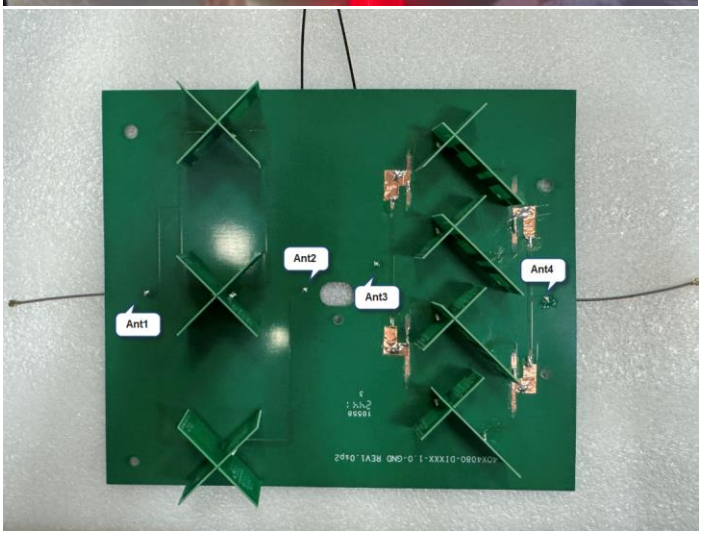
Date： 2024.10.29

Checked By： Feng Ziqi

TP-Link Systems Inc.
10 Mauchly, Irvine, CA 92618

Index

1. Antenna Distribution

EAP650 D120-Outdoor 1.0



2. Electrical Characteristics

Ant1	
Frequency	2400~2500MHz
Impedance	50Ohm
Antenna Type	Dipole
Antenna Gain	6.0dBi@2400~2500MHz
Radiation pattern	Directional
P/N	EAP650 D120-Outdoor 1.0

Ant2	
Frequency	2400~2500MHz
Impedance	50Ohm
Antenna Type	Dipole
Antenna Gain	6.0dBi@2400~2500MHz
Radiation pattern	Directional
P/N	EAP650 D120-Outdoor 1.0

Ant3	
Frequency	5150~5850MHz
Impedance	50Ohm
Antenna Type	Dipole
Antenna Gain	8.0dBi@5150~5850MHz
Radiation pattern	Directional
P/N	EAP650 D120-Outdoor 1.0

Ant4	
Frequency	5150~5850MHz
Impedance	50Ohm
Antenna Type	Dipole
Antenna Gain	8.0dBi@5150~5850MHz
Radiation pattern	Directional
P/N	EAP650 D120-Outdoor 1.0

3. Gain and Radiation Pattern

3.1 Measurement Procedure

This measurement experiment adopted an antenna near-field measurement system, and the diagram of the measurement system was shown in Figure 3-1. The excitation signal was generated by the Keysight E5071C (300kHz-20GHz). Under the control of the central computer, the probe rotated in the θ direction, and the EUT rotated in the φ direction with the turntable. The probe sampling frame received and collected signals in the near-field range of the EUT. The software system which was controlled by the central computer completed the processing, output and display of the test data.

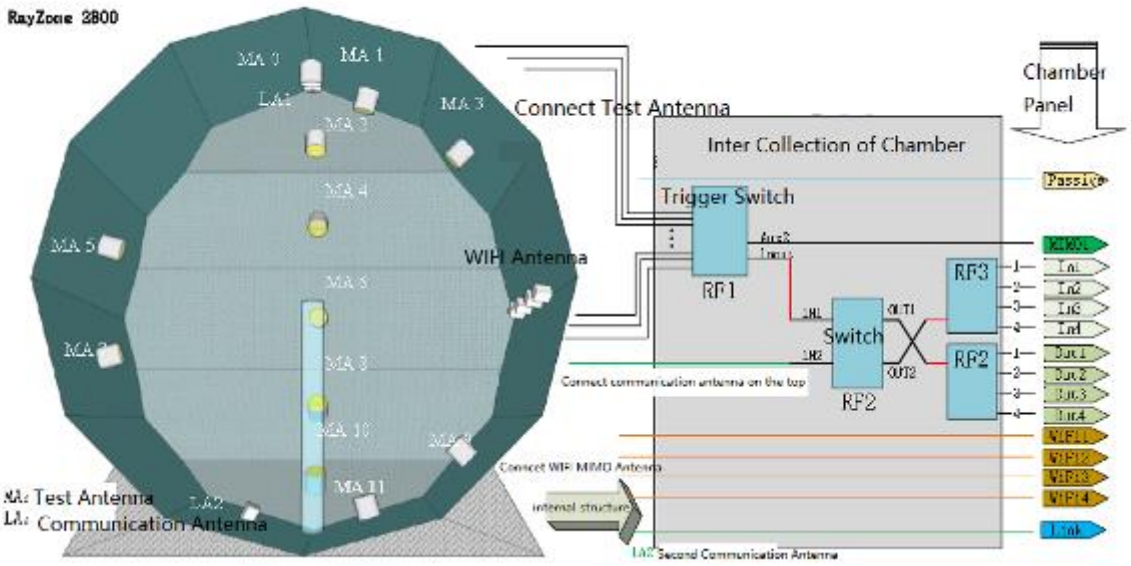


Figure 3-1

The test site was a full anechoic chamber with a size of 3.0m×3.1m×2.97m, which was built by GTS Rayzone2800. All six surfaces of the anechoic chamber were pasted with absorbing materials. And the chamber was calibrated by the authoritative third-party lab every year. The antenna anechoic chamber measurement system adopted a 13-probe multi-probe system. The probe antennas were evenly distributed on the spherical surface surrounding the EUT, and theirs operating frequency was 600MHz~8.5GHz.

During the measurement, the probe antennas were rotated in the θ direction under the control of the probe holder to sample the near-field data at the θ angle. At the same time, the EUT rotated with the turntable in the φ direction to sample the near field data at the φ angle. The sampling accuracy was 15°. The system diagram was shown in Figure 3-2. From the sampling results, the EUT's near-field test data of θ component, φ component and total component could be obtained.

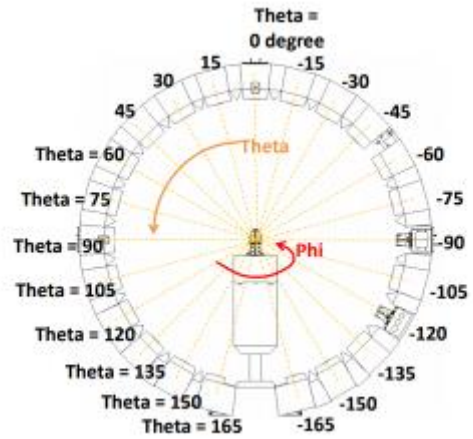


Figure 3-2

Before the measurement, calibrated the vector network analyzer, and then connected the input end of each antenna to the output end of the vector network analyzer, and evenly the antennas to be measured.

Test Equipment listed below:

Equipments	Model	Manufacturer	S/N	Cali. Interval	Cali. Due Date
Chamber	Rayzone2800	GTS(General Test System)	MY534704345	12months	2024/01/15
Vector Network Analyzer	E5071C	Keysight	MY46315238	24months	2024/03/13
GTS MaxSign100 Software	V2.1	GTS(General Test System)	/	/	/

3.2 Test Setup

The test setup was shown in Figure 3-3, 3-4:

Figure 3-3

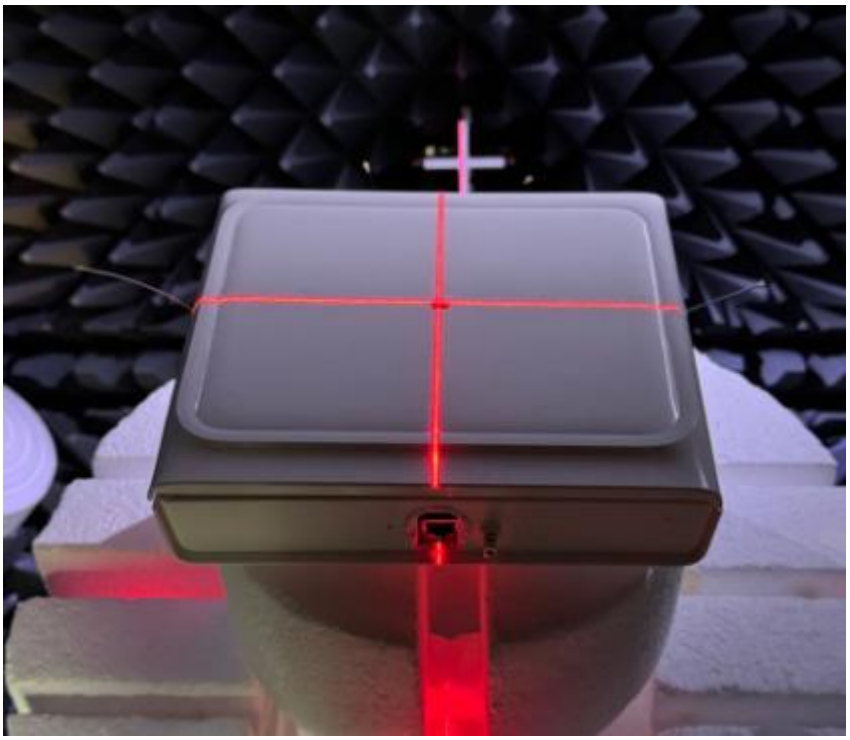
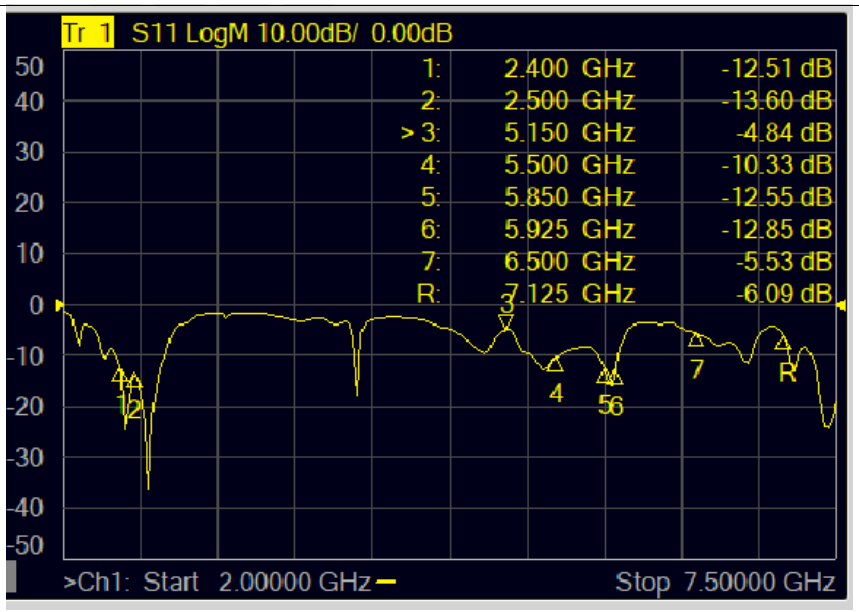
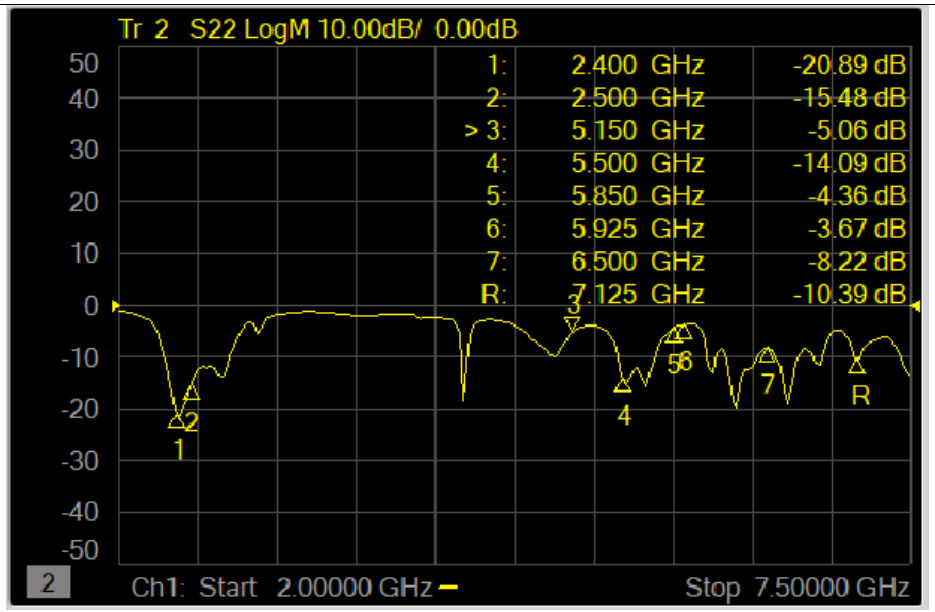


Figure 3-4

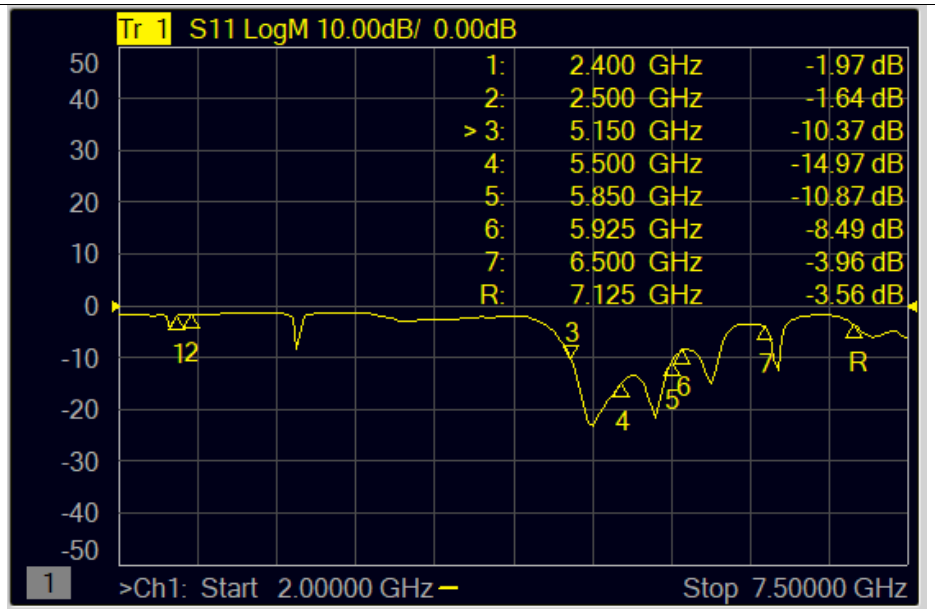
3.3 S Parameter Test Data

Ant1


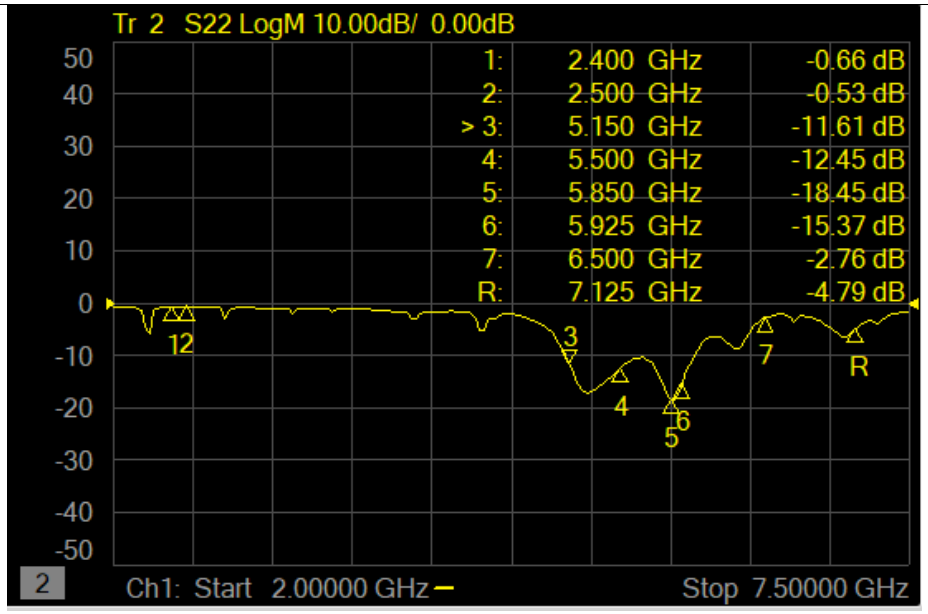
Ant2


Tr 2 S22 LogM 10.00dB/ 0.00dB
1: 2.400 GHz -20.89 dB
2: 2.500 GHz -15.48 dB
> 3: 5.150 GHz -5.06 dB
4: 5.500 GHz -14.09 dB
5: 5.850 GHz -4.36 dB
6: 5.925 GHz -3.67 dB
7: 6.500 GHz -8.22 dB
R: 7.125 GHz -10.39 dB
50
40
30
20
10
0
-10
-20
-30
-40
-50
Ch1: Start 2.00000 GHz
Stop 7.50000 GHz

Ant3


Tr 1 S11 LogM 10.00dB/ 0.00dB
1: 2.400 GHz -1.97 dB
2: 2.500 GHz -1.64 dB
> 3: 5.150 GHz -10.37 dB
4: 5.500 GHz -14.97 dB
5: 5.850 GHz -10.87 dB
6: 5.925 GHz -8.49 dB
7: 6.500 GHz -3.96 dB
R: 7.125 GHz -3.56 dB
50
40
30
20
10
0
-10
-20
-30
-40
-50
>Ch1: Start 2.00000 GHz
Stop 7.50000 GHz

Ant4



3.4 Antenna Peak Gain

Frequency	2.45GHz 2400~2500MHz	5.2GHz 5150~5250MHz	5.3GHz 5250~5350MHz	5.6GHz 5470~5725MHz
Ant1 MaxGain(dBi)	6.00	NA	NA	NA
Ant2 MaxGain(dBi)	4.76	NA	NA	NA
Ant3 MaxGain(dBi)	NA	7.61	7.90	8.00
Ant4 MaxGain(dBi)	NA	8.00	8.00	7.95
Ant1 Polarization/ Φ (°) / θ (°)	Theta/75/0	NA	NA	NA
Ant2 Polarization/ Φ (°) / θ (°)	Theta/105/0	NA	NA	NA
Ant3 Polarization/ Φ (°) / θ (°)	NA	Theta/90/0	Theta/75/0	Theta/90/0
Ant4 Polarization/ Φ (°) / θ (°)	NA	Theta/90/0	Theta/105/0	Theta/105/0
Max Gain(dBi)	6.00	8.00	8.00	8.00

Frequency	5.8GHz 5725~5895MHz
Ant1 MaxGain(dBi)	NA
Ant2 MaxGain(dBi)	NA
Ant3 MaxGain(dBi)	7.56
Ant4 MaxGain(dBi)	8.00
Ant1 Polarization/ Φ (°) / θ (°)	NA
Ant2 Polarization/ Φ (°) / θ (°)	NA
Ant3 Polarization/ Φ (°) / θ (°)	Theta/90/0
Ant4 Polarization/ Φ (°) / θ (°)	Theta/90/0

Max Gain(dBi)	8.00

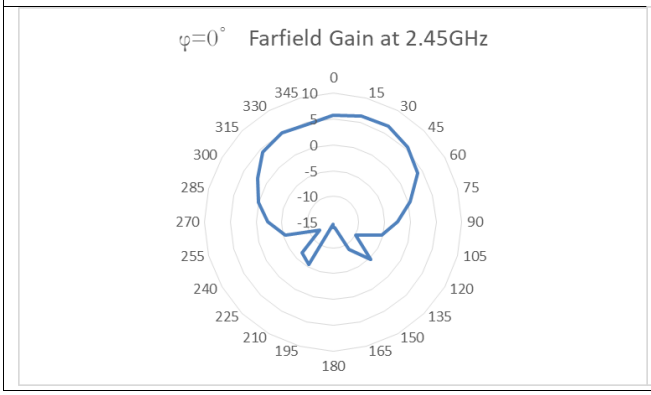
3.5 Antenna Horizontal plane Gain

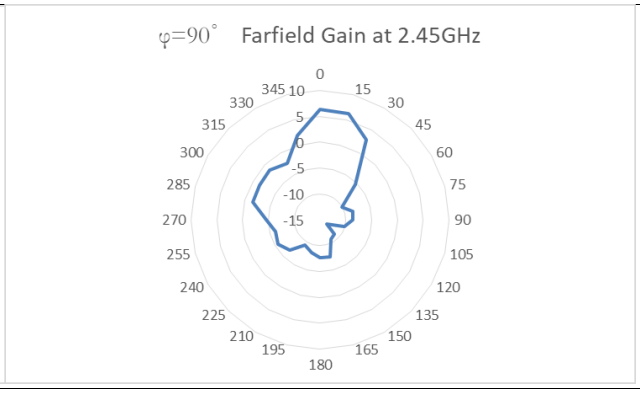
3.5.1 5150~5250MHz

θ	>30°
Ant3 MaxGain(dBi)	-4.41
Ant4 MaxGain(dBi)	-4.00
Max Gain(dBi)	-4.00

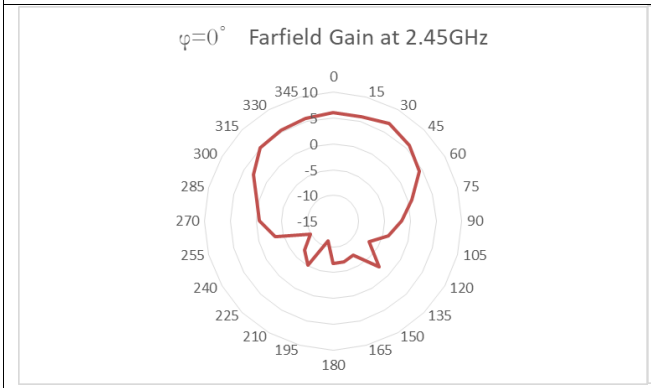
3.6 Antenna Radiation Pattern

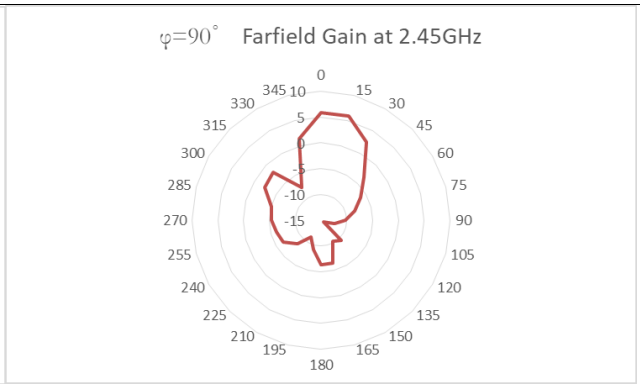
Ant1



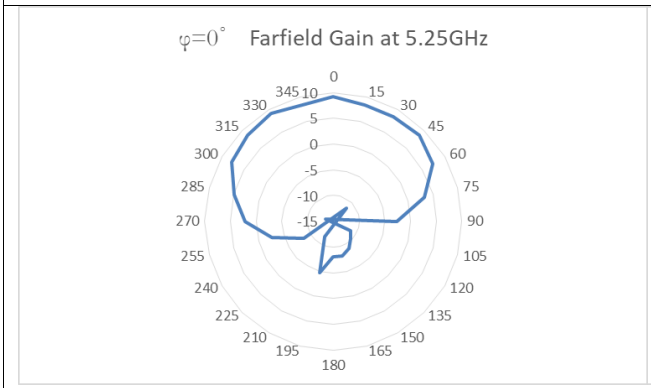


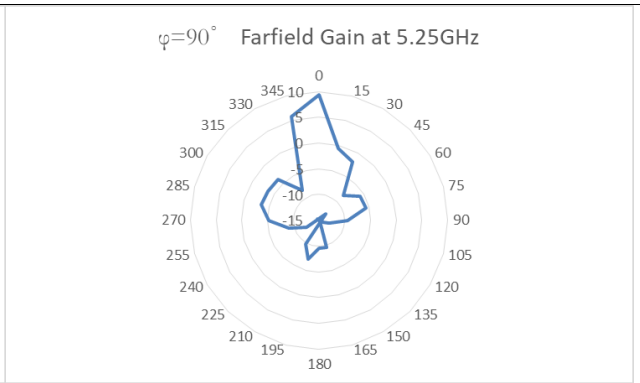
Ant2

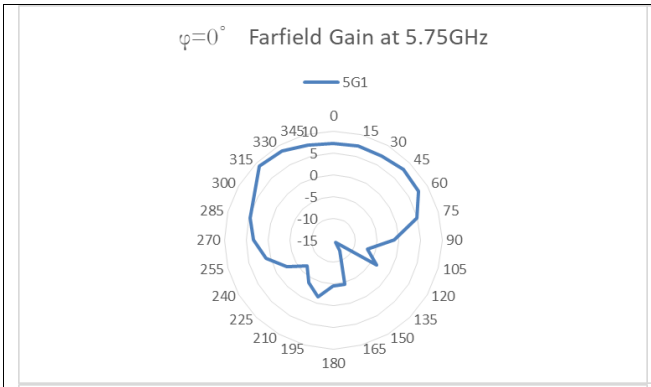


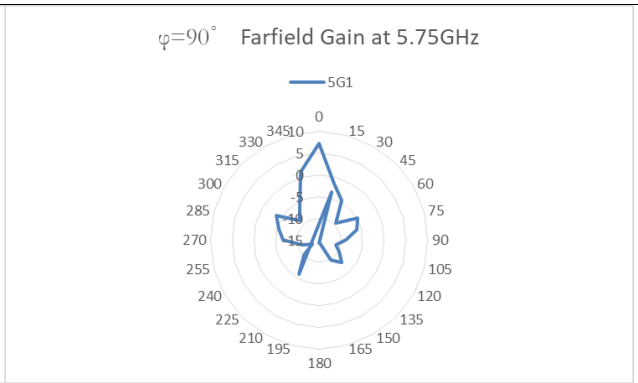


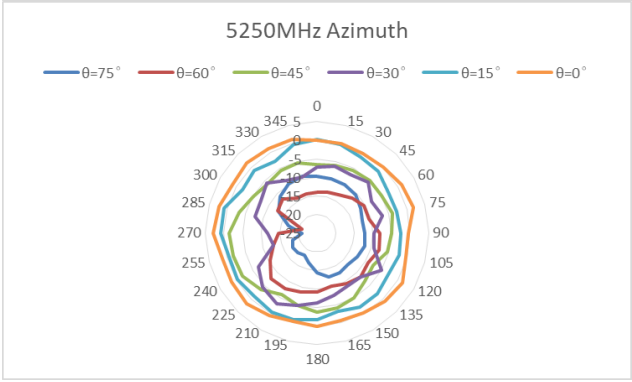
Ant3



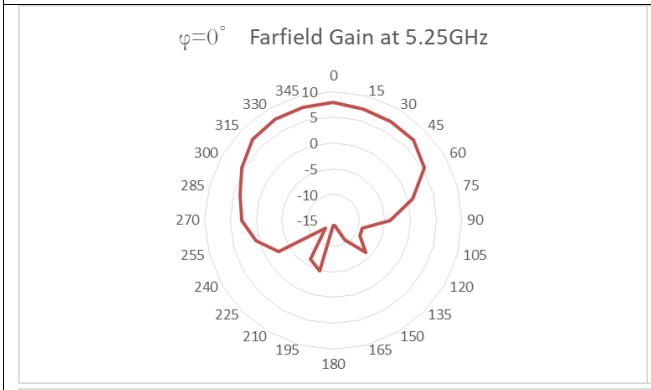


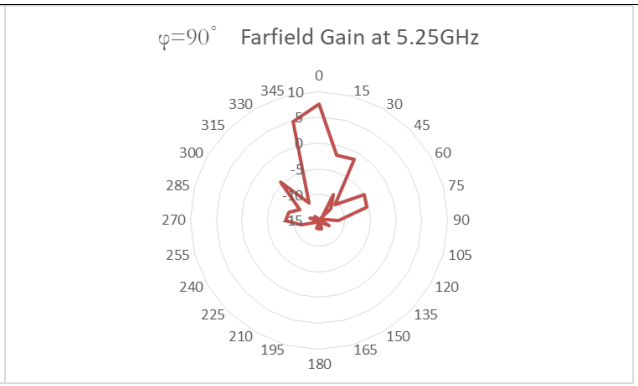

φ=0° Farfield Gain at 5.75GHz
5G1

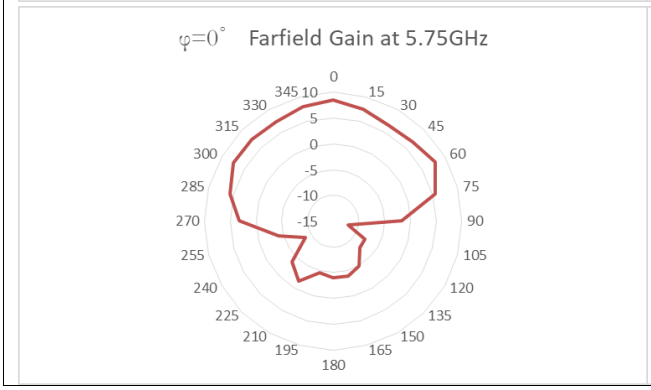

φ=90° Farfield Gain at 5.75GHz
5G1

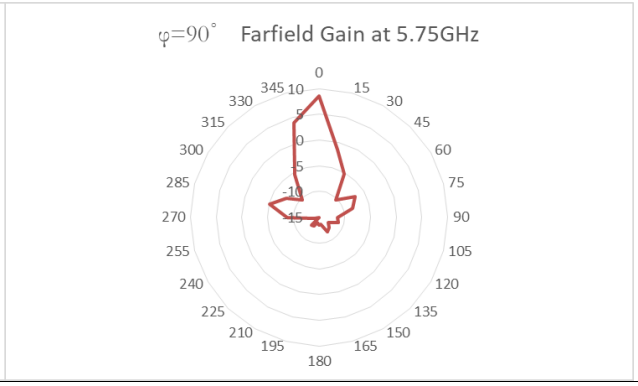

5250MHz Azimuth
θ=75°
θ=60°
θ=45°
θ=30°
θ=15°
θ=0°

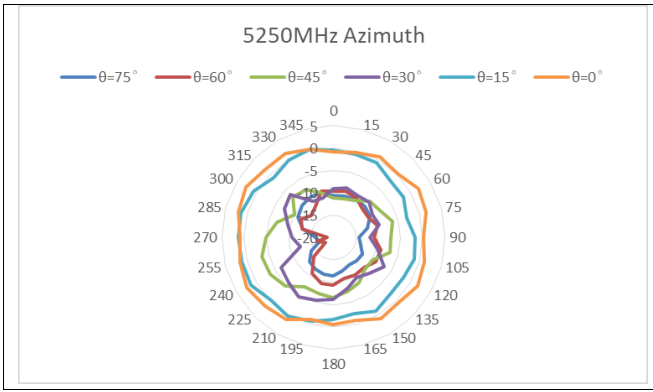
Ant4


φ=0° Farfield Gain at 5.25GHz


φ=90° Farfield Gain at 5.25GHz


φ=0° Farfield Gain at 5.75GHz


φ=90° Farfield Gain at 5.75GHz


5250MHz Azimuth
θ=75°
θ=60°
θ=45°
θ=30°
θ=15°
θ=0°
0
15
30
45
60
75
90
105
120
135
150
165
180
195
210
225
240
255
270
285
300
315
330
345
5
0
-5
-10
-15
-20