X130D Antenna
Test Report
(In Near-field Facility)

Model Name: X130D

18 JUNE 2021

Version 1.2

Prepared by

RF Design team
Intellian Technologies, Inc.

Contents

1. History of document

Version	Date	Summary of Change	Editor	Comment
V1.0	03/26/2021	Antenna Measurement report	Hyunsoo Kim	
V1.1	21/04/2021	Correction of misspelled words	BoJoong Kim	
V1.2	18/06/2021	feed upgrade, Dual-pol pattern applied	Hyunsoo Kim	

2. Introduction

This document reports performance validation test result for X130D in conjunction with development project contracted with SES, with which antenna support ku, Ka band. Key Antenna performance requirements consist of antenna gain, cross pol isolation (CPI), antenna radiation pattern.

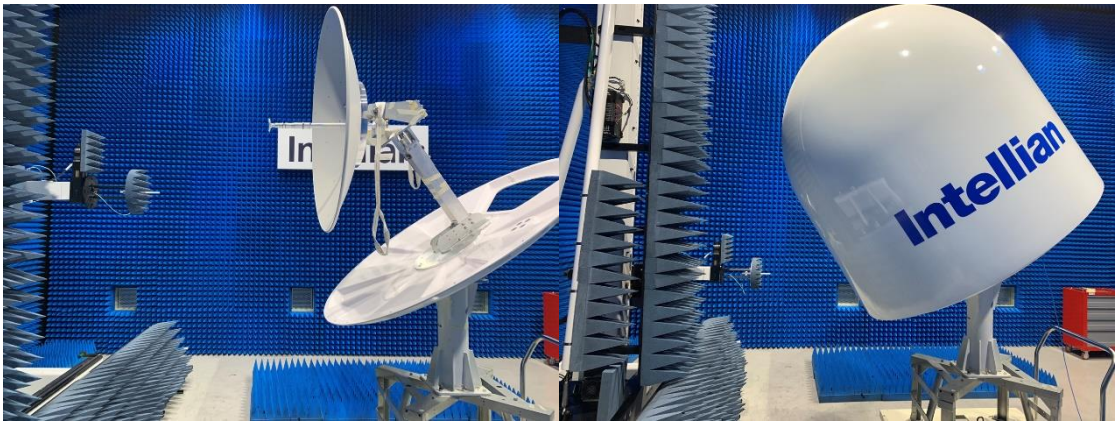

Fig 1. – Intellian Near-field Facility System

3. Requirements of antenna performance

<table>
<tr><td colspan="2">General Requirements</td></tr>
<tr><td>2.2.2.1 EIRP</td><td>Multiband MT systems should comply with the development Specification as per table 3
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2.2.4.2 Radome loss	The dry radome losses shall be no greater than 0.5dB for all three frequency bands for the respective transmit and receive frequency ranges.

4. Antenna Performance Data Summary

4.1. EIRP

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dBW]					≥55.0	
Development Specification [dBW]	-	-	-	-	≥55.8	-
Measured EIRP [dBW]	-	-	-	55.9	56.2	56.6

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dBW]					≥61.0	
Development Specification [dBW]	-	-	-	-	≥60.3	-
Measured EIRP [dBW]	-	-	-	61.3	61.5	61.8

4.2. G/T

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB/K]		≥21.0				
Development Specification [dB/K]		≥20.4		-	-	-
Measured G/T [dB/K]	20.4	21.0	21.4	-	-	-

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB/K]		≥21.0				
Development Specification [dB/K]	-	≥20	-	-	-	-
Measured G/T [dB/K]	21.0	21.4	21.0	-	-	-

4.3. Radiation pattern

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement				FCC 25.209 and ITU-R S.465-6		
Development Specification				FCC 25.209(TBD)		

Meet Co-pol Mask				C	C	C
Meet Cross-pol Mask				C	C	C

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement				FCC 25.209 and ITU-R S.465-6		
Development Specification				FCC 25.209(TBD)		
Meet Co-pol Mask				C	C	C
Meet Cross-pol Mask				C	C	C

※ **Gain**

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dBi]		-			-	
Development Specification(Excl.Radome)[dBi]		41.7			42.7	
Measured Gain (Excl.Radome)[dBi]	41.4	42.0	42.7	42.7	43.0	43.5
Measured Gain (Incd.Radome)[dBi]	41.1	41.7	42.4	42.4	42.7	43.2

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dBi]		-			-	
Development Specification(Excl.Radome)[dBi]		44.9	-	-	47.9	
Measured Gain (Excl.Radome)[dBi]	45.3	45.8	45.7	49.0	49.2	49.5
Measured Gain (Incd.Radome)[dBi]	44.8	45.3	45.2	48.3	48.5	48.8

4.4. CPI

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB]	≥30					
Development Specification [dB]	≥30			≥30		
Measured CPI [dB]	32.3	36.6	40.2	37.7	34.8	35.2

- **Apply the worst level in dual pol**

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB]	≥25					
Development Specification [dB]	≥21			≥25		
Measured CPI [dB]	23.2	29.4	27.4	28.6	27.5	25.8

- **Apply the worst level in dual pol.**

4.5. Radome loss (Excl. Radome Gain - Incl. Radome Gain)

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB]	≤0.5					
Development Specification [dB]	≤1.0					
Measured loss [dB]	0.3	0.3	0.3	0.3	0.3	0.3

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB]	≤0.5					
Development Specification [dB]	≤1.0					
Measured loss [dB]	0.5	0.5	0.5	0.7	0.7	0.7

5. EIRP

5.1. Requirement

2.2.2.1 EIRP

Multiband MT systems should comply with the development Specification as per table 3

Frequency Band (GHz)	Polarization (switchable)	Cross Polarization Discrimination (XPD)	EIRP (Mid Band)	G/T (Mid Band)	Amplifier (Typical)
RX 17.7-20.2 TX 27.5-30.0	RH or LH Co & Cross Pol	≥25 dB	≥ 61 dBW	≥ 21 dB/K	8 - 20 W
RX 10.7 – 12.75 TX 13.75 – 14.5	Linear X Pol (V/H) Co Pol Option	≥30 dB	≥ 55 dBW	≥ 21 dB/K	≥ 25W

Table 3 RF Specification

5.2. Development Specification

≥55.8 dBW @ 14.0 GHz 25W

≥60.3 dBW @ 28.8 GHz 20W

5.3. Measured EIRP

5.3.1. Test Method

5.3.1.1. Ku band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Transmit V-POL(H-POL) at 13.75 GHz, 14.0 GHz and 14.5 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Measure Gain by standard gain horn method or Direct gain method.
- Using the antenna gain values (dB) from the measurements above, add the MOP values of the BUC (dBW) to determine the antenna EIRP.

5.3.1.2. Ka band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Transmit RHCP(LHCP) at 27.5 GHz, 28.8 GHz and 30.0 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Measure Gain by standard gain horn method or Direct gain method.
- Using the antenna gain values (dB) from the measurements above, add the MOP values of the BUC (dBW) to determine the antenna EIRP.

5.3.2. Test result

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dBW]	-	-	-	-	≥55	-
Development Specification [dBW]	-	-	-	-	≥55.8	-
Measured Gain (Incd.Radome)[dBi]	-	-		42.4	42.7	43.2
Waveguide loss[dB]				0.5	0.5	0.5
25W Power [dBW]	-	-	-	14	14	14
Measured EIRP [dBW]	-	-	-	55.9	56.2	56.6

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dBW]	-	-	-	-	≥61.0	-
Development Specification [dBW]	-	-	-	-	≥60.3	-
Measured Gain (Incd.Radome)[dBi]	-	-		48.3	48.5	48.8

XCVR 20W Power [dBW]	-	-	-	13.0	13.0	13.0
Measured EIRP [dBW]	-	-	-	**61.3**	**61.5**	**61.8**

6. G/T

6.1. Requirement

2.2.2.1 G/T

Multiband MT systems should comply with the development Specification as per table 3

Frequency Band (GHz)	Polarization (switchable)	Cross Polarization Discrimination (XPD)	EIRP (Mid Band)	G/T (Mid Band)	Amplifier (Typical)
RX 17.7-20.2 TX 27.5-30.0	RH or LH Co & Cross Pol	≥25 dB	≥ 61 dBW	≥ 21 dB/K	8 - 20 W
RX 10.7 – 12.75 TX 13.75 – 14.5	Linear X Pol (V/H) Co Pol Option	≥30 dB	≥ 55 dBW	≥ 21 dB/K	≥ 25W

Table 3 RF Specification

6.2. Development Specification

≥20.4 dB/K @11.85GHz, EL 30

≥21.0 dB/K @19GHz, EL 20

6.3. Measured G/T (By Calculator)

6.3.1. Test Method

6.3.1.1. Ku Band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Receive V-POL(H-POL) at 10.95 GHz, 11.85 GHz and 12.75 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Measure Gain by standard gain horn method or Direct gain method.
- Using the antenna gain values (dB) from the measurements above, add the NF values of the LNB to determine the antenna G/T as shown below.
- Antenna noise temperature apply at 30deg of elevation.

6.3.1.2. Ka Band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Receive RHCP(LHCP) at 17.7 GHz, 19.0 GHz and 20.2 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.

- Measure Gain by standard gain horn method or Direct gain method.
- Using the antenna gain values (dB) from the measurements above, add the NF values of the XCVR to determine the antenna G/T as shown below.
- Antenna noise temperature apply at 20deg of elevation.

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB/K]		≥21.0				
Development Specification [dB/K]		≥20.4		-	-	-
Measured Gain (Incd.Radome)[dBi]	41.14	41.74	42.27			
Antenna noise temp.[K]	28.30	30.37	32.64			
Antenna contribution[K] : A	22.48	24.12	25.93			
Radome & Feed loss[dB]	1.0	1.0	1.0			
Ohmic contribution[K] : O	59.64	59.64	59.64			
LNB NF[dB]	0.5	0.5	0.5			
Receiver contribution[K] : R	35.39	35.39	35.39			
System Noise temp,[K] : T=A+O+R	117.51	119.15	120.96			
Measured G/T [dB/K]	**20.4**	**21.0**	**21.4**			

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB/K]		≥21.0				
Development Specification [dB/K]	-	≥20.0	-	-	-	-
Measured Gain (Incd.Radome)[dBi]	44.82	45.33	45.24			
Antenna noise temp.[K]	48.63	59.75	83.44			
Antenna contribution[K] : A	36.05	44.16	61.85			
Radome & Feed loss[dB]	1.3	1.3	1.3			
Ohmic contribution[K] : O	75.02	75.02	75.02			
XCVR NF[dB]	1.6	1.6	1.6			
Receiver contribution[K] : R	129.18	129.18	129.18			
System Noise temp,[K] : T=A+O+R	240.25	248.36	266.05			
Measured G/T [dB/K]	**21.0**	**21.3**	**21.0**			

7. Radiation Pattern

7.1. Requirement

Radiation Pattern Requirements	**FCC 25-209**

7.2. Development Specification

KU	47 CFR § 25.209			
Co-polarization (Tx)	In the plane tangent to the GSO arc	29-25log10θ	dBi	for 1.5° ≤ θ ≤ 7°.
		8	dBi	for 7° < θ ≤ 9.2°.
		32-25log10θ	dBi	for 9.2° < θ ≤ 19.1°.
		0	dBi	for 19.1° < θ ≤ 180°.
	This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7-180°, and by up to 6 dB in the region of main reflector spillover energy.			
	In the plane perpendicular to the GSO arc	32-25log10θ	dBi	for 3.0° < θ ≤ 19.1°.
		0	dBi	for 19.1° < θ ≤ 180°.
	This envelope may be exceeded by up to 6 dB in 10% of the range of θ angles from ±3-180°, and by up to 6 dB in the region of main reflector spillover energy.			
Cross-polarization (Tx)	In the plane tangent & perpendicular	19-25log10θ	dBi	for 1.8° < θ ≤ 7°.

KA	47 CFR § 25.209			
Co-polarization (Tx)	In the plane tangent to the GSO arc	29-25log10θ	dBi	for 2° ≤ θ ≤ 7°.
		8	dBi	for 7° < θ ≤ 9.2°.
		32-25log10θ	dBi	for 9.2° < θ ≤ 19.1°.
		0	dBi	for 19.1° < θ ≤ 180°.
	This envelope may be exceeded by up to 3 dB in 10% of the range of θ angles from ±7-180°, and by up to 6 dB in the region of main reflector spillover energy.			
	In the plane perpendicular to the GSO arc	32-25log10θ	dBi	for 3.5° < θ ≤ 7°.
		10.9	dBi	for 7° < θ ≤ 9.2°.
		35-25log10θ	dBi	for 9.2° < θ ≤ 19.1°.

		3	dBi	for 19.1° < θ ≤ 180°.
	This envelope may be exceeded by up to 6 dB in 10% of the range of θ angles from ±3-180°, and by up to 6 dB in the region of main reflector spillover energy.			
Cross-polarization (Tx)	In the plane tangent & perpendicular	19-25log10θ	dBi	for 2° < θ ≤ 7°.

7.3. Transmit Frequencies

7.3.1. Test Method

7.3.1.1. Ku Band

- Configure the antenna without radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Transmit V-POL at 13.75 GHz, 14.0 GHz and 14.5 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
  - Repeat this measurement at Transmit H-POL..
- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Transmit V-POL at 13.75 GHz, 14.0 GHz and 14.5 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
  - Repeat this measurement at Transmit H-POL..
- Measure Gain by standard gain horn method or Direct gain method.

7.3.1.2. Ka Band

- Configure the antenna without radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Transmit RHCP at 27.5 GHz, 28.8 GHz and 30.0 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Transmit RHCP at 27.5 GHz, 28.8 GHz and 30.0 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Repeat this measurement at Transmit LHCP.
- Measure Gain by standard gain horn method or Direct gain method.

7.3.2. Plots for 13.75 GHz(V-POL)

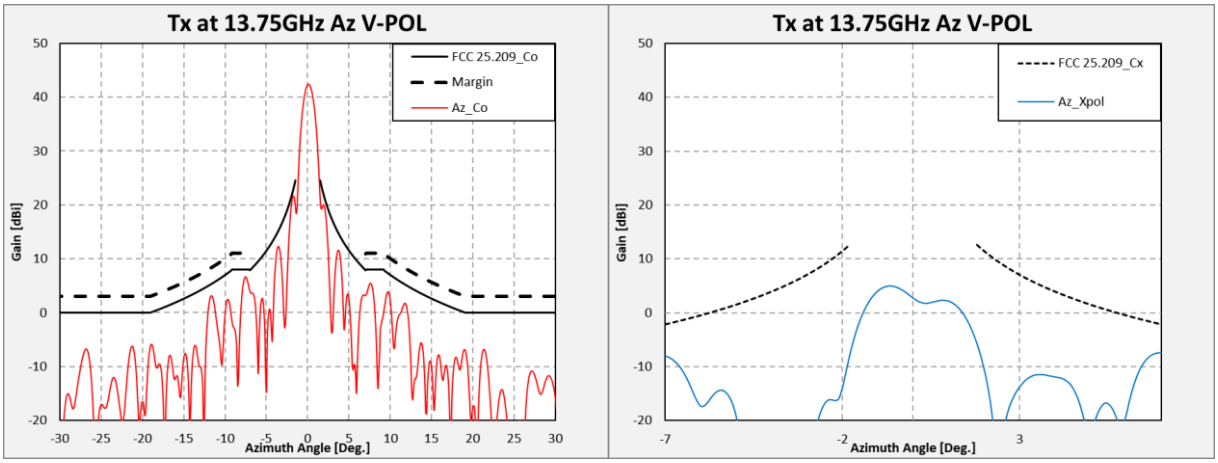

Figure 1 Plot for Azimuth Co & X-pol

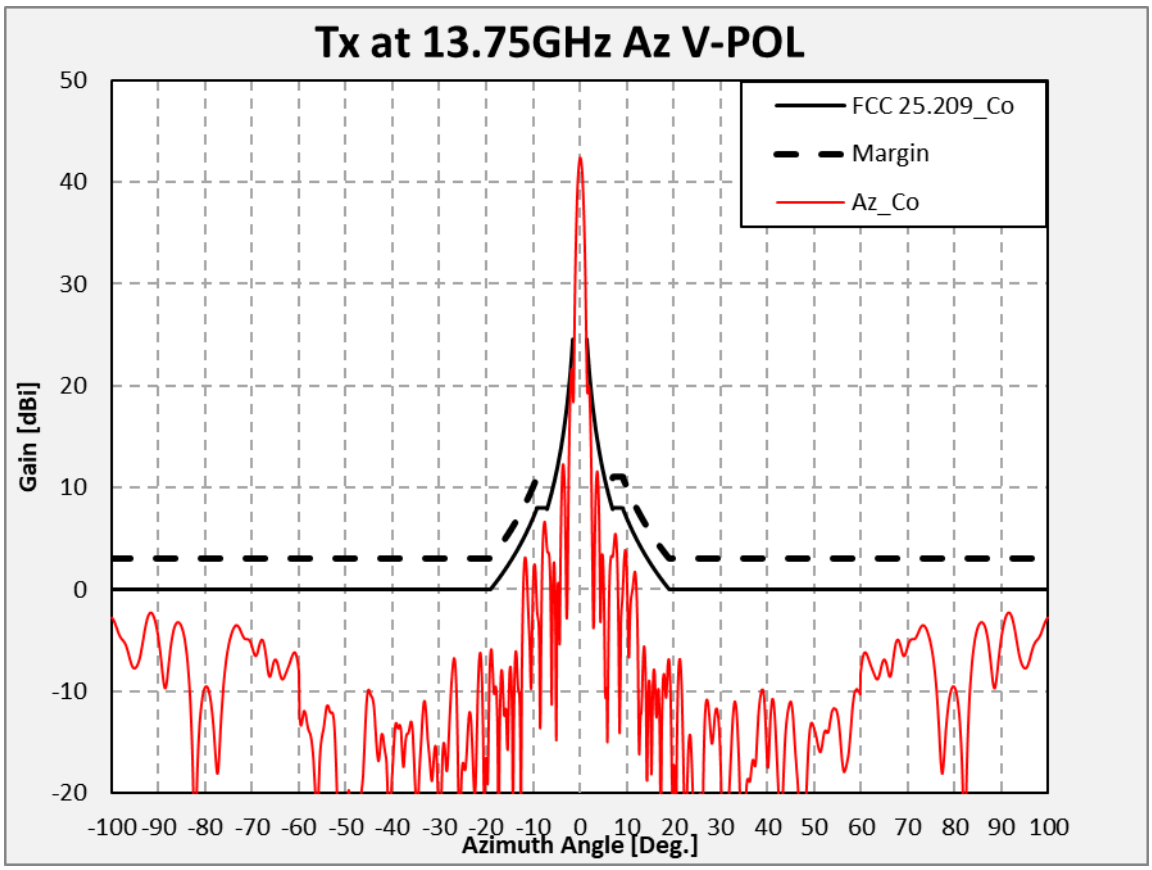

Figure 2 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

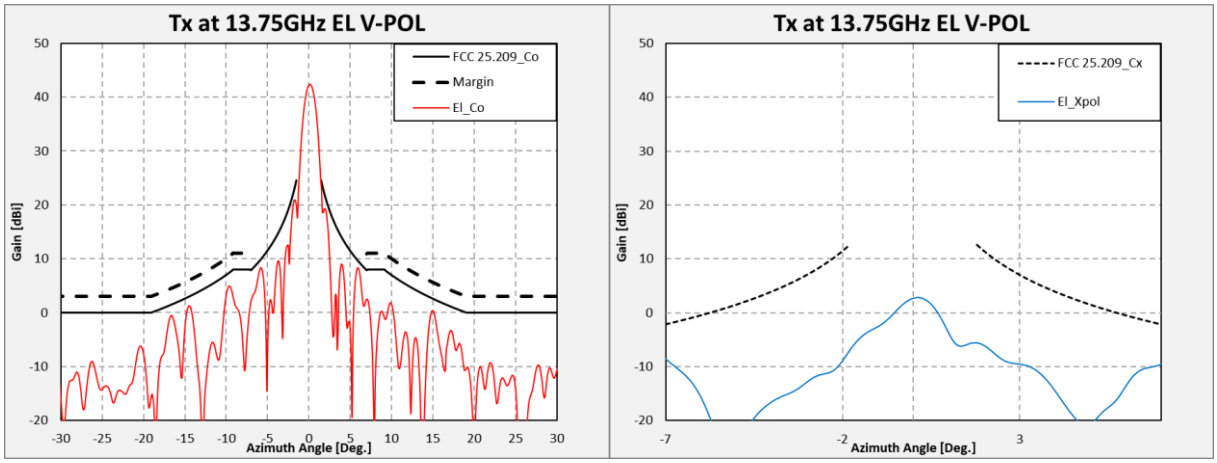

Figure 3 Plot for Elevation Co & X-pol

7.3.3. Plots for 13.75 GHz(H-POL)

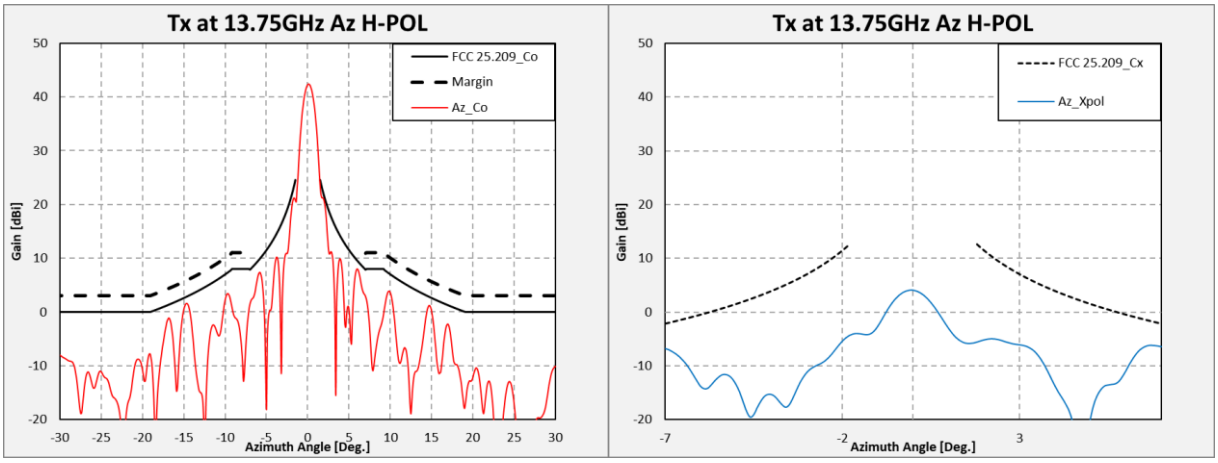

Figure 4 Plot for Azimuth Co & X-pol

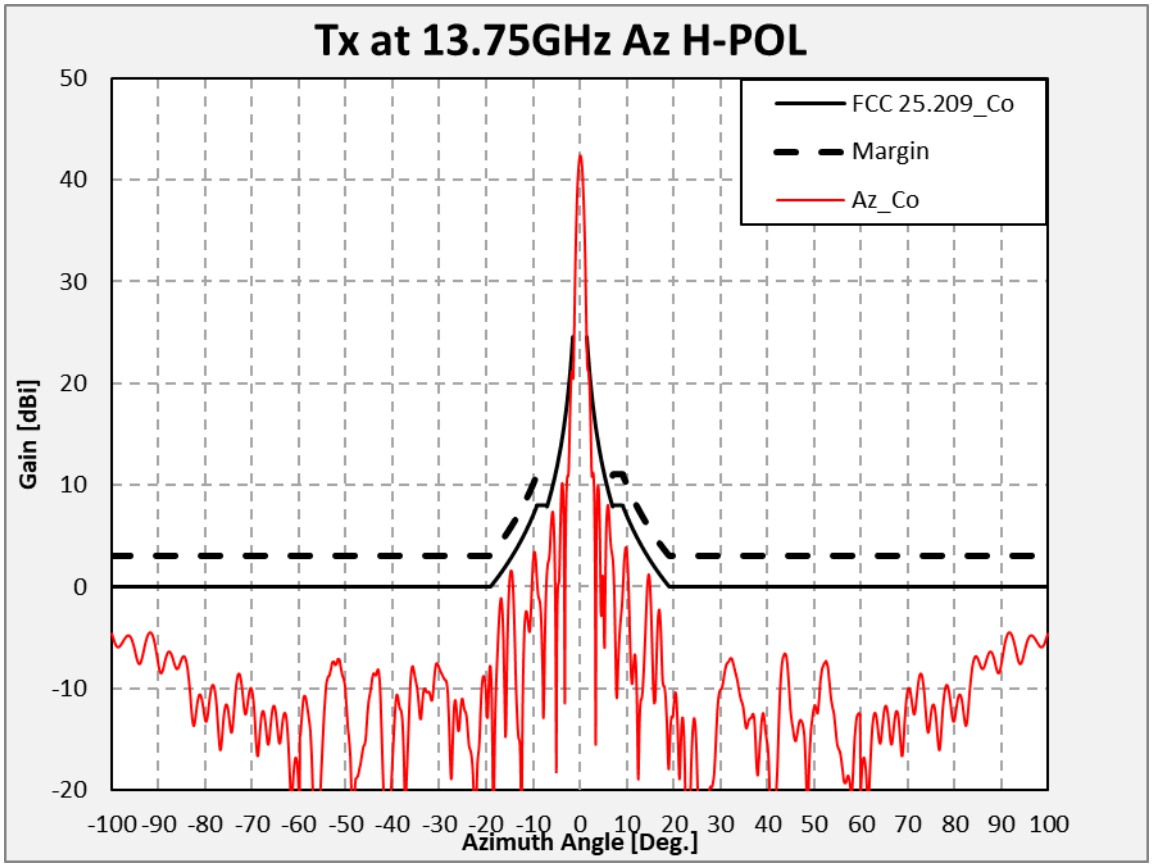

Figure 5 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

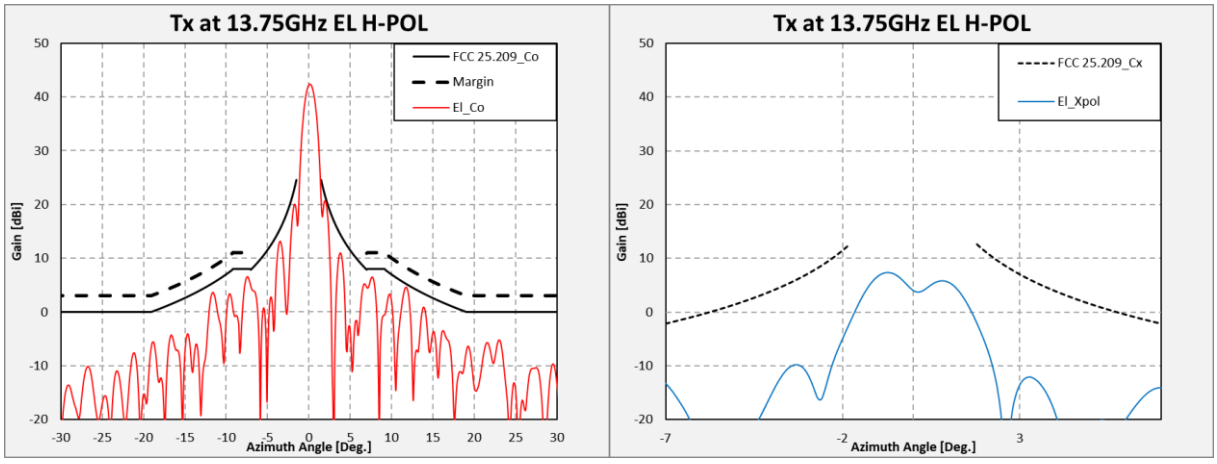

Figure 6 Plot for Elevation Co & X-pol

7.3.4. Plots for 14.0 GHz(V-POL)

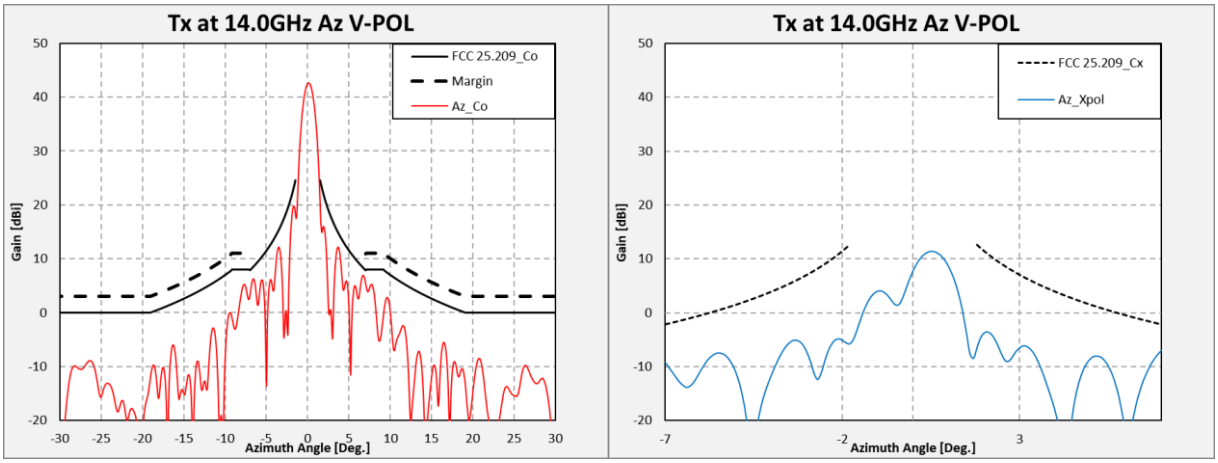

Figure 7 Plot for Azimuth Co & X-pol

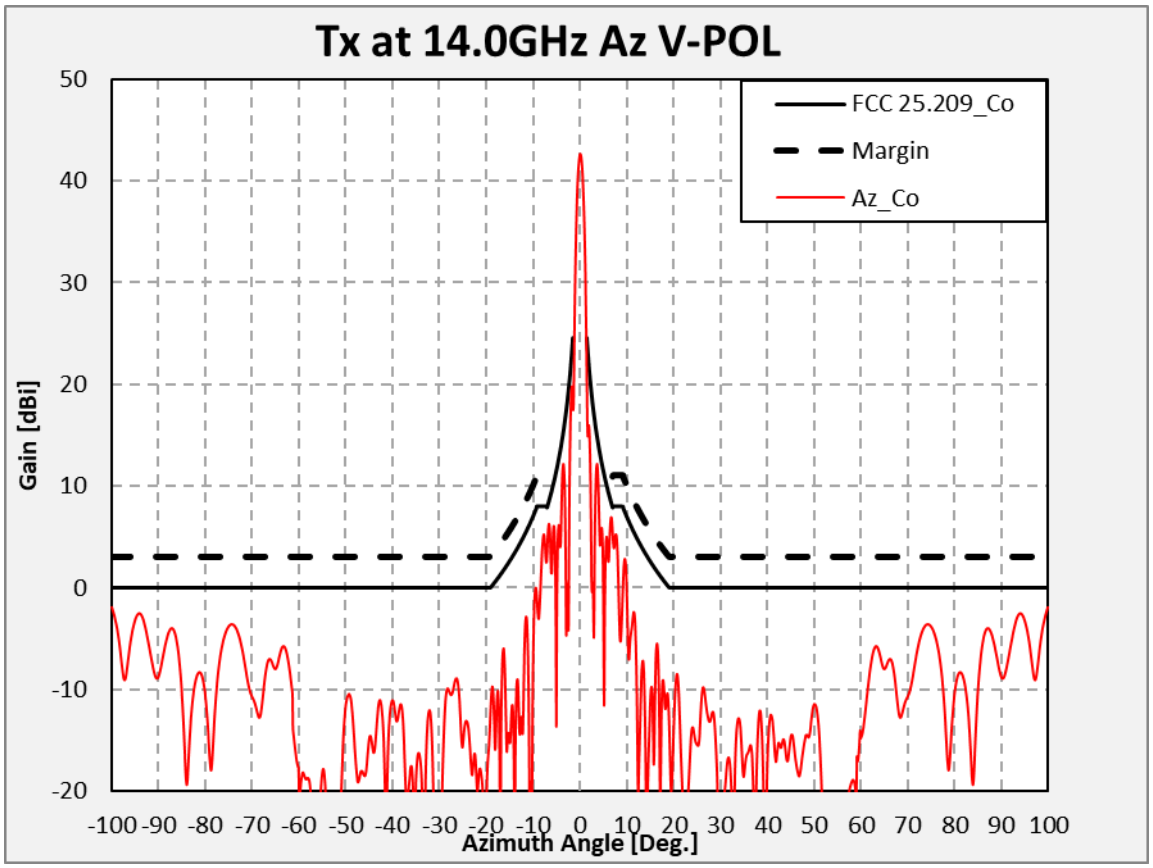

Figure 8 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

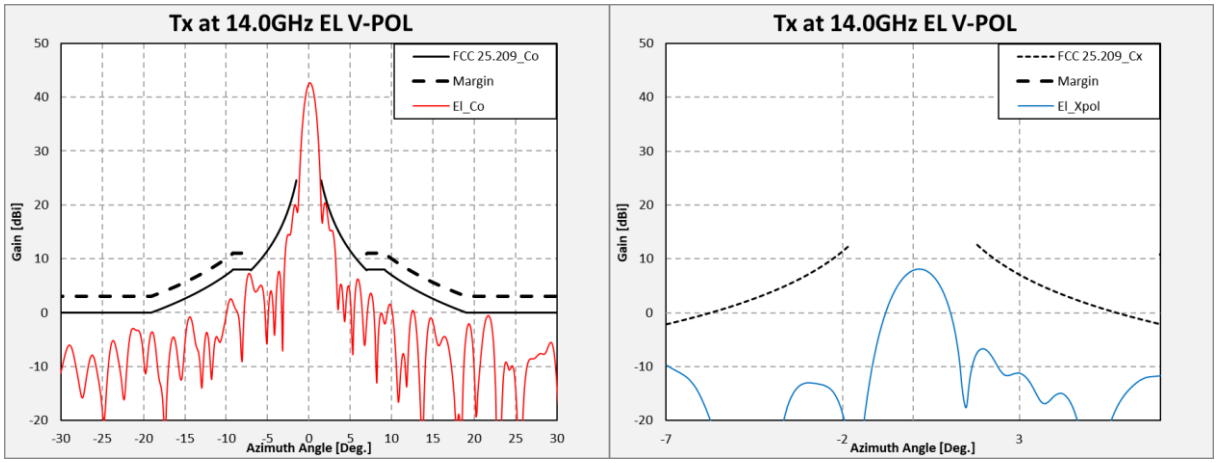

Figure 9 Plot for Elevation Co & X-pol

7.3.5. Plots for 14.0 GHz(H-POL)

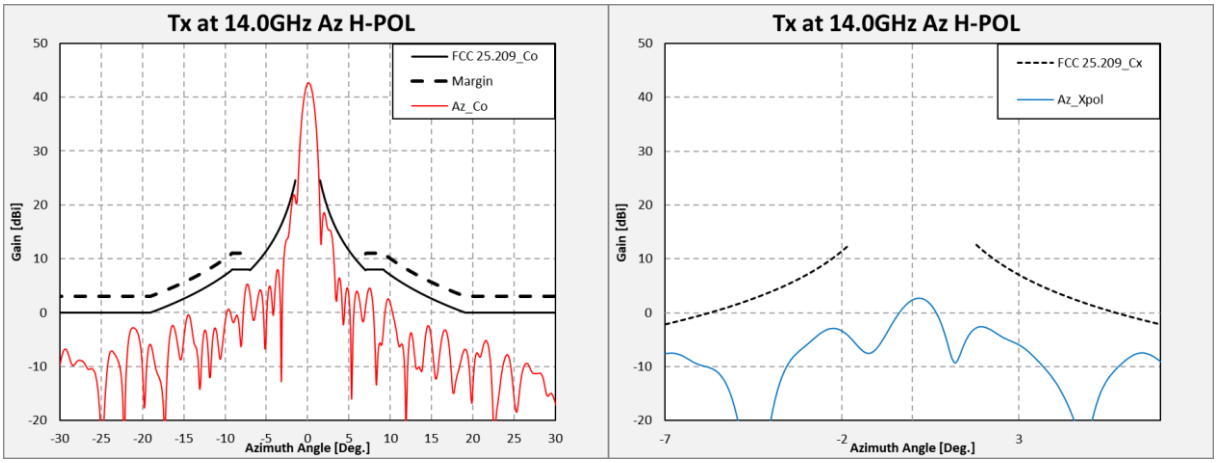

Figure 10 Plot for Azimuth Co & X-pol

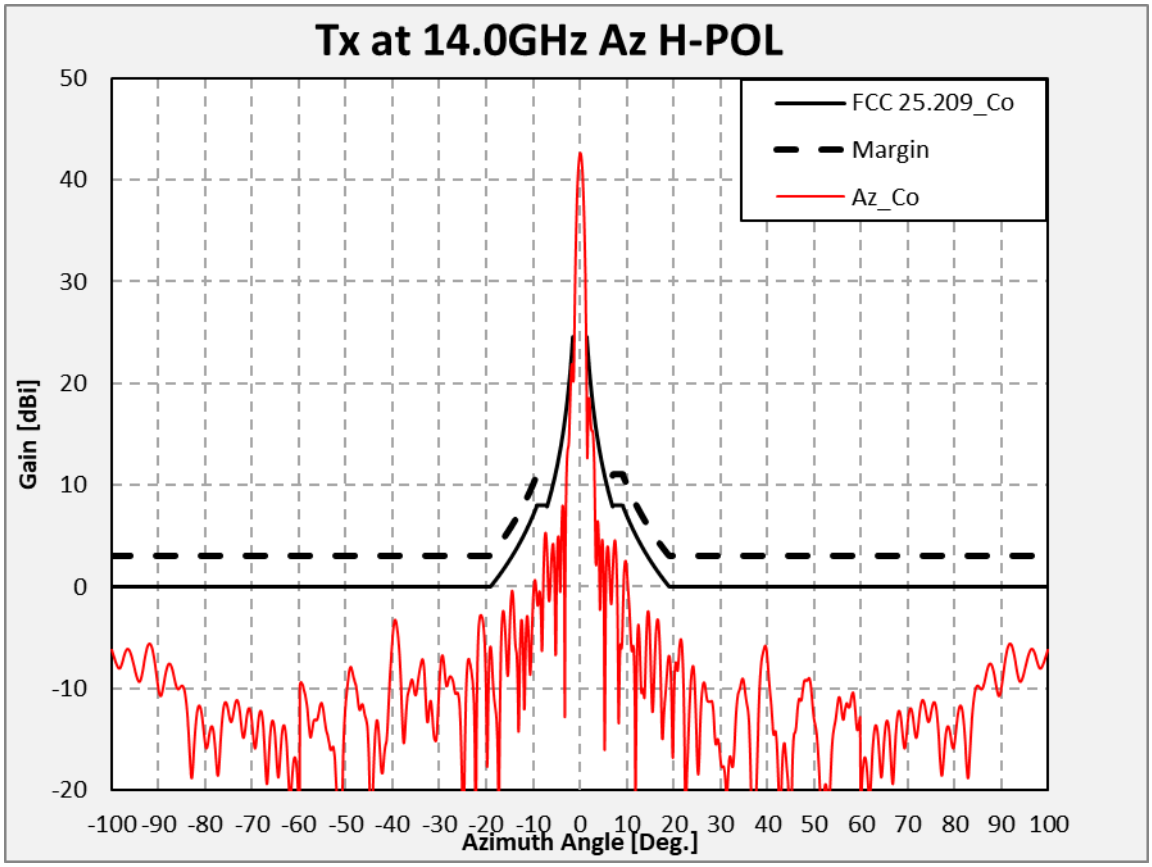

Figure 11 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

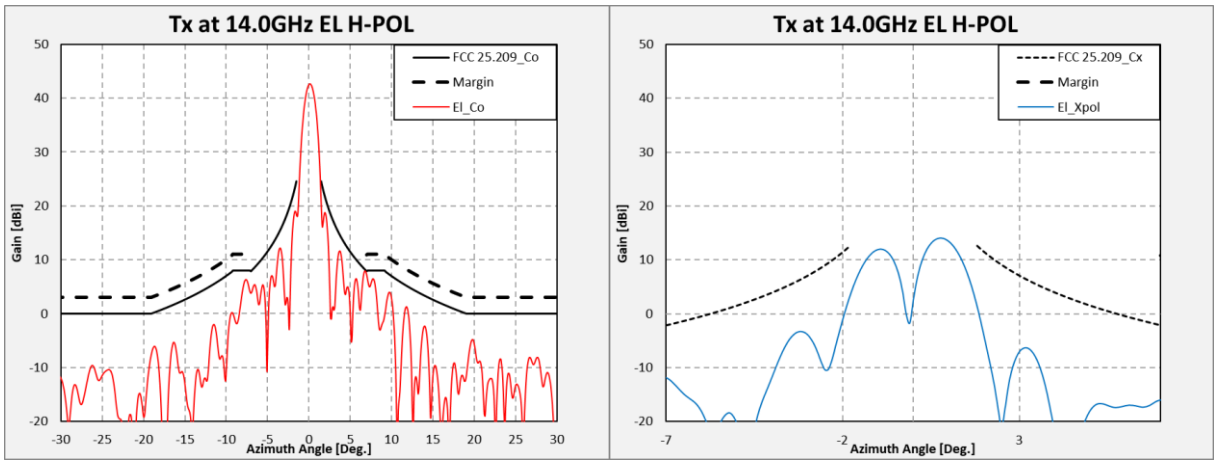

Figure 12 Plot for Elevation Co & X-pol

7.3.6. Plots for 14.5 GHz(V-POL)

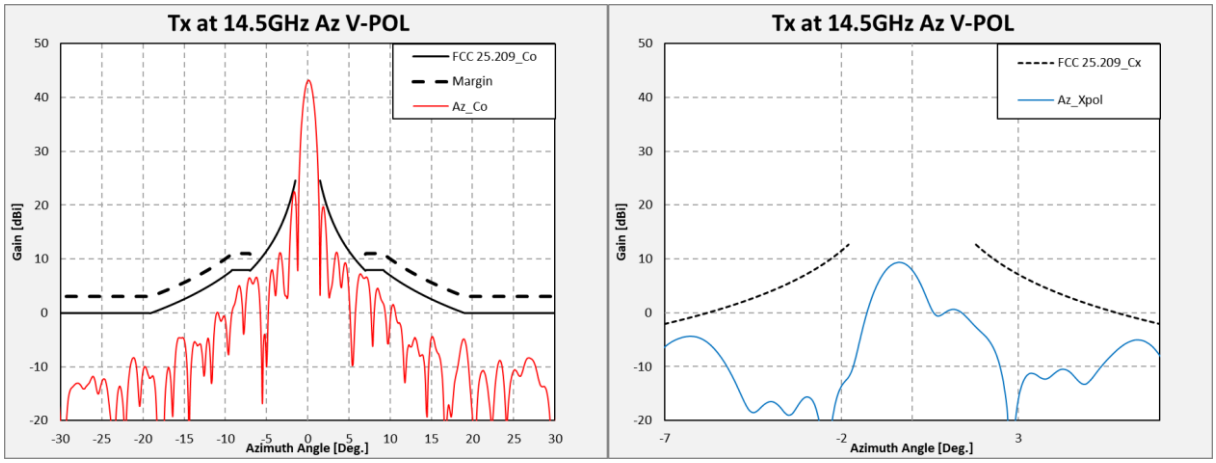

Figure 13 Plot for Azimuth Co & X-pol

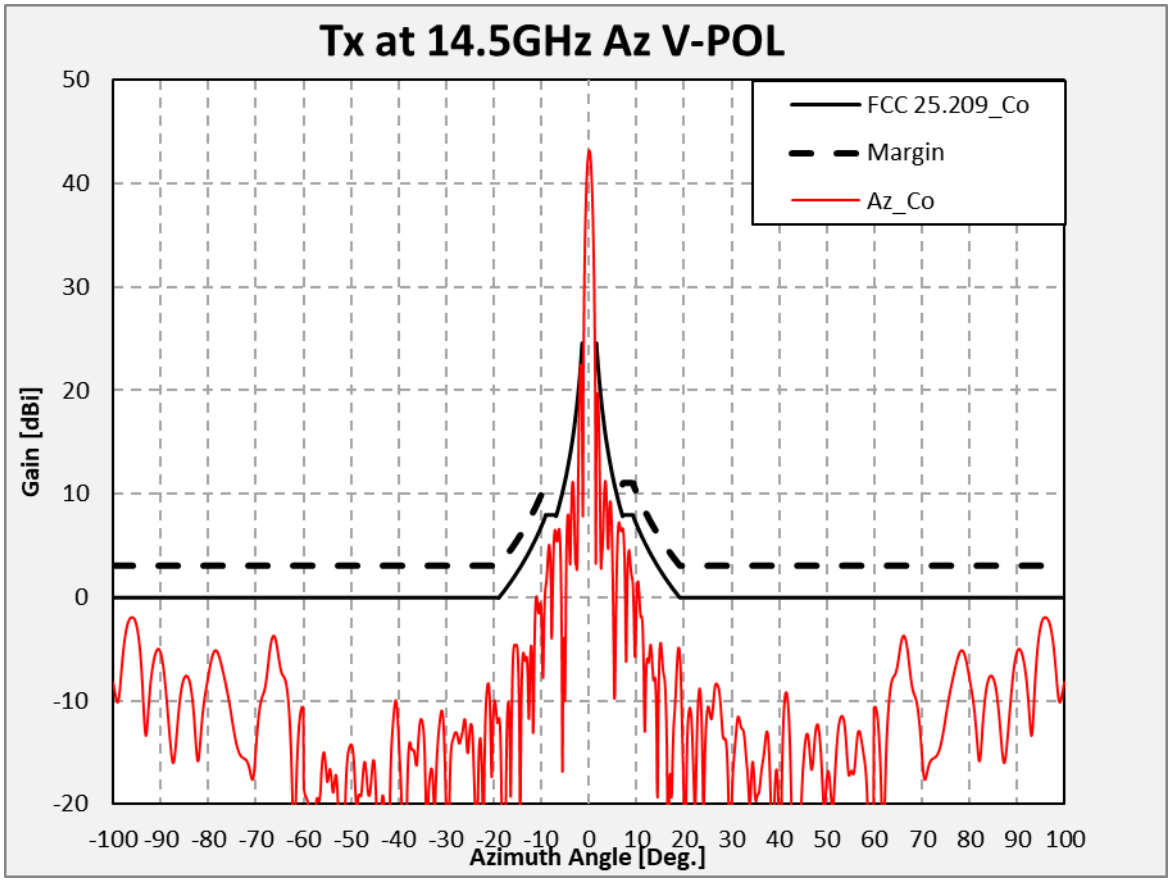

Figure 14 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

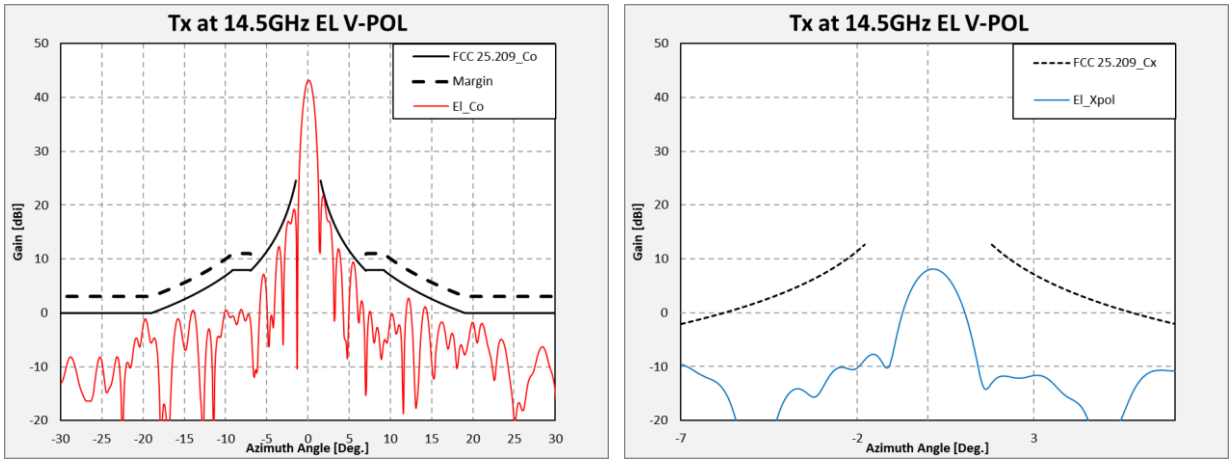

Figure 15 Plot for Elevation Co & X-pol

7.3.7. Plots for 14.5 GHz(H-POL)

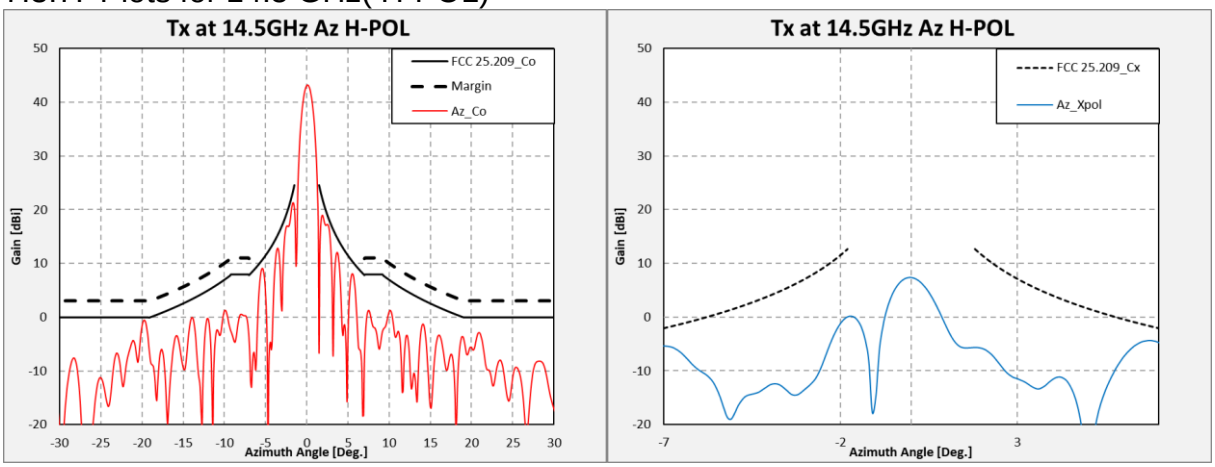

Figure 16 Plot for Azimuth Co & X-pol

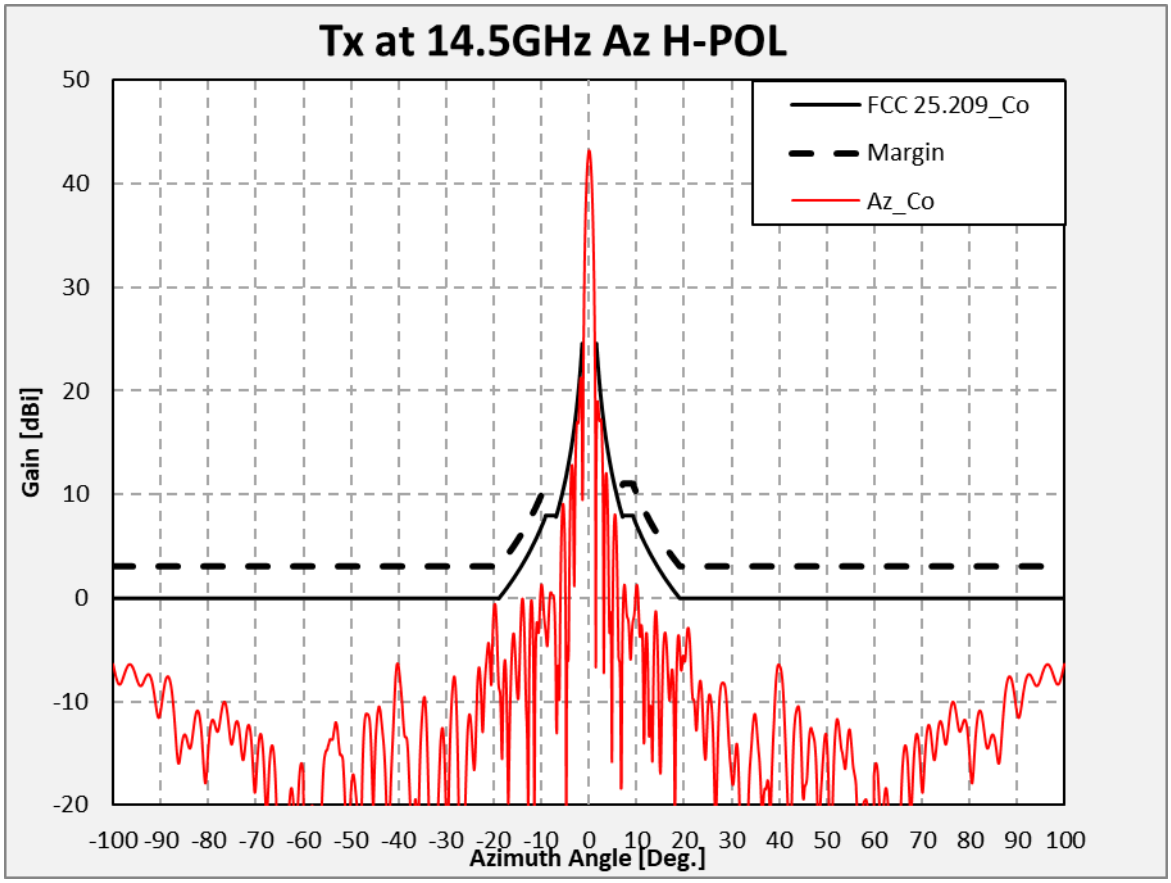

Figure 17Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

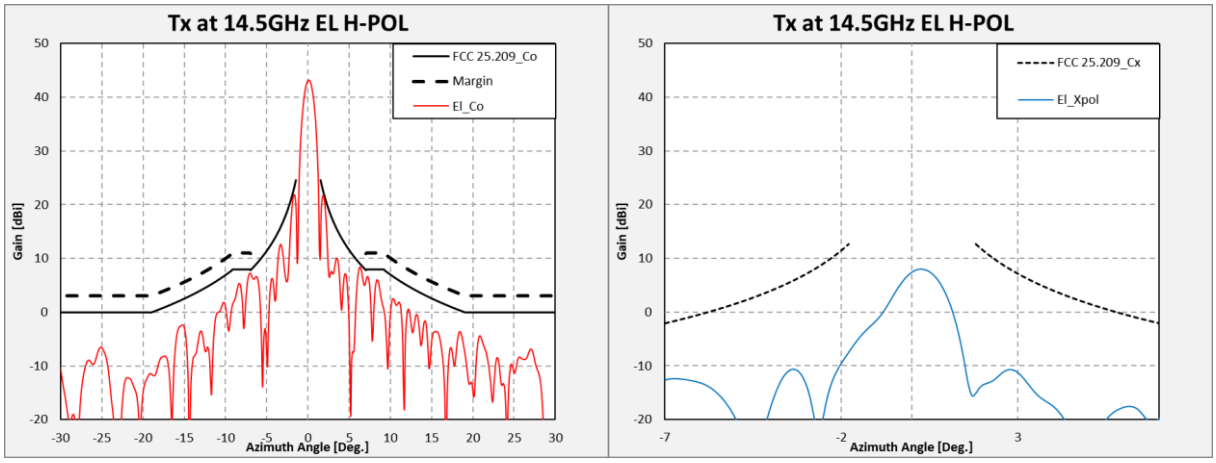

Figure 18 Plot for Elevation Co & X-pol

7.3.8. Plots for 27.5 GHz(LHCP)

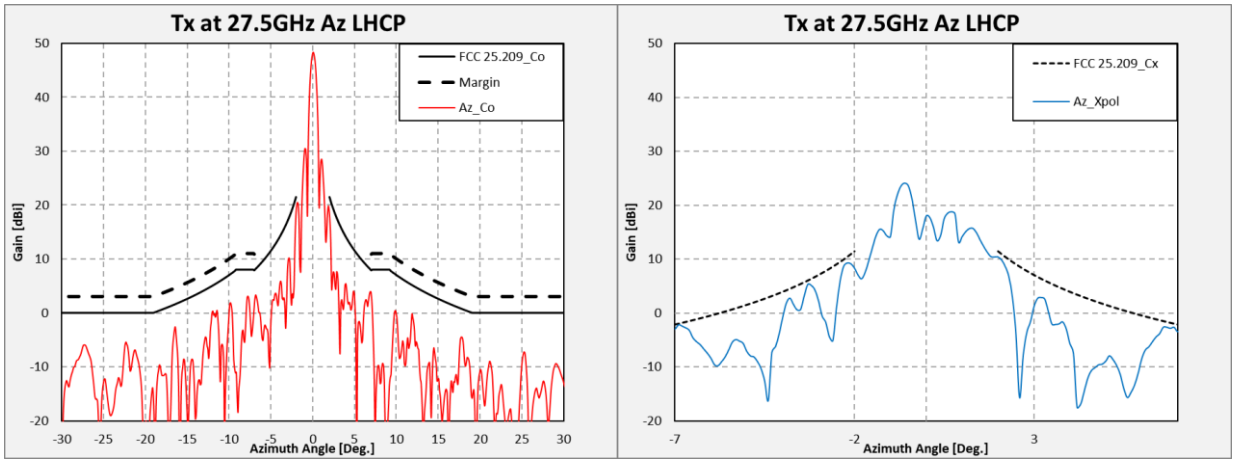

Figure 19 Plot for Azimuth Co & X-pol

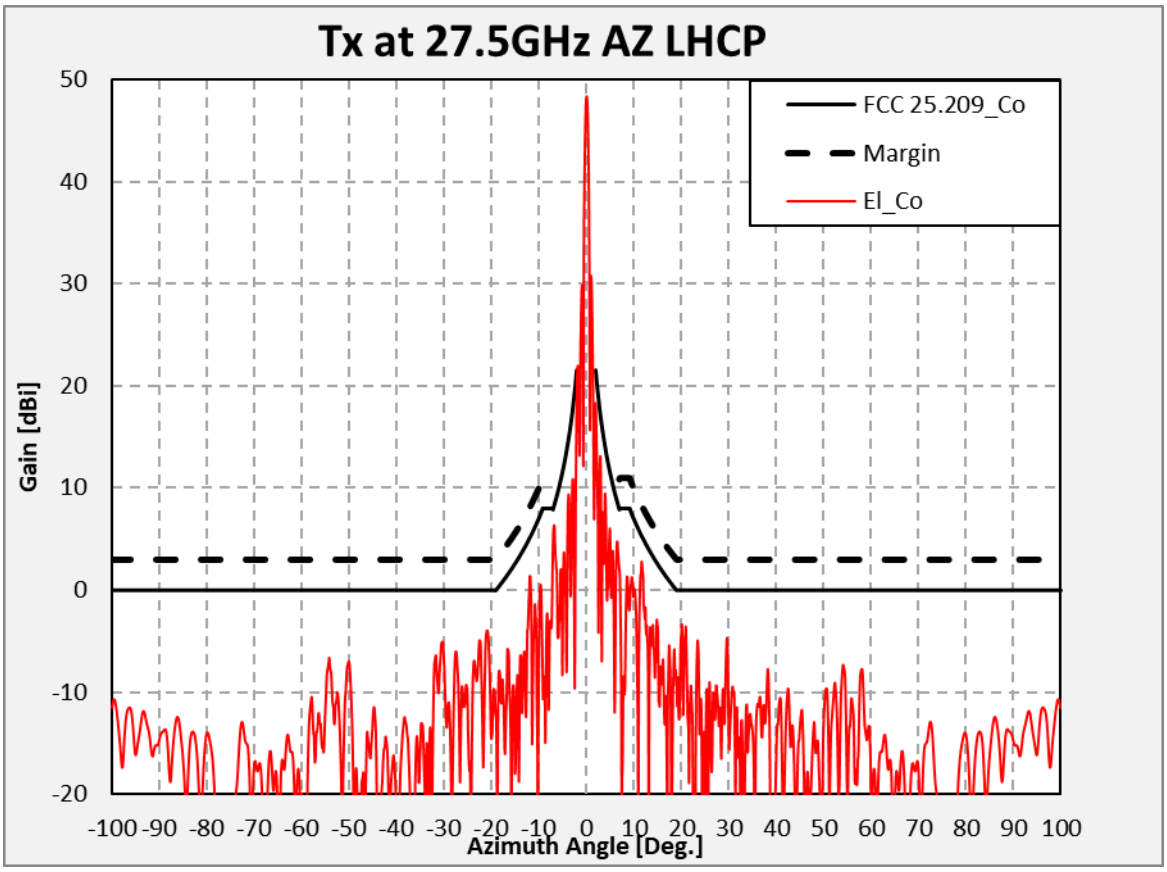

Figure 20 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

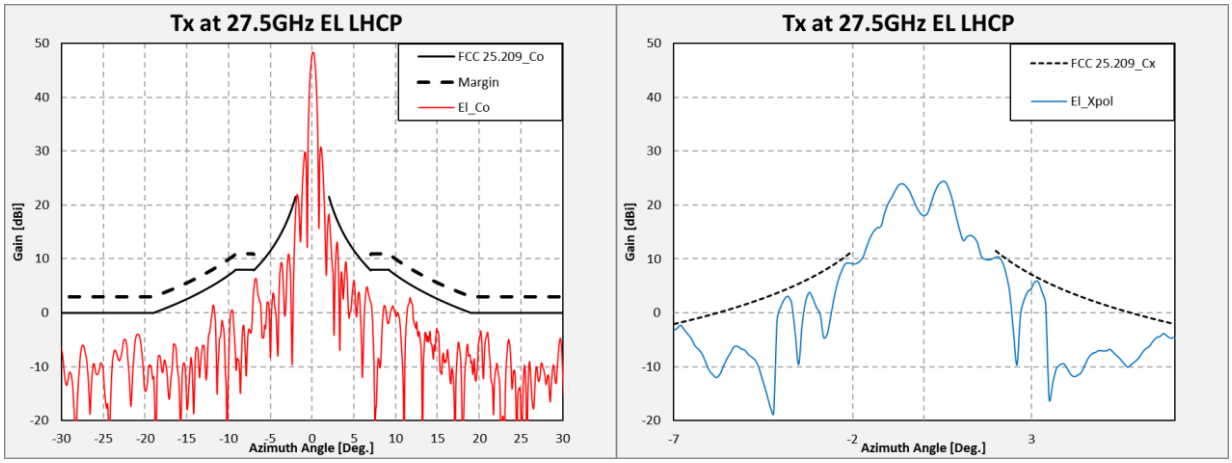

Figure 21 Plot for Elevation Co & X-pol

7.3.9. Plots for 27.5 GHz(RHCP)

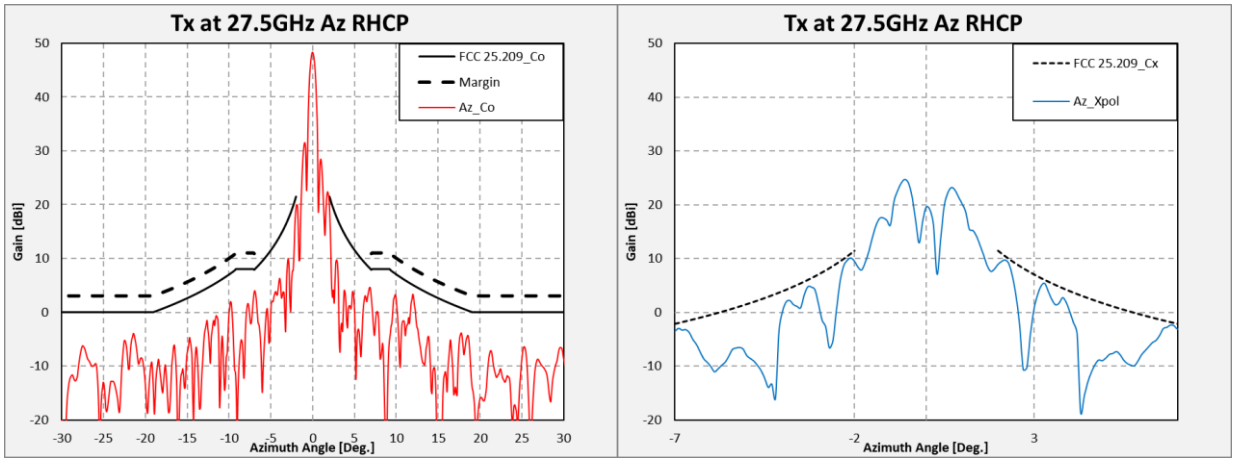

Figure 22 Plot for Azimuth Co & X-pol

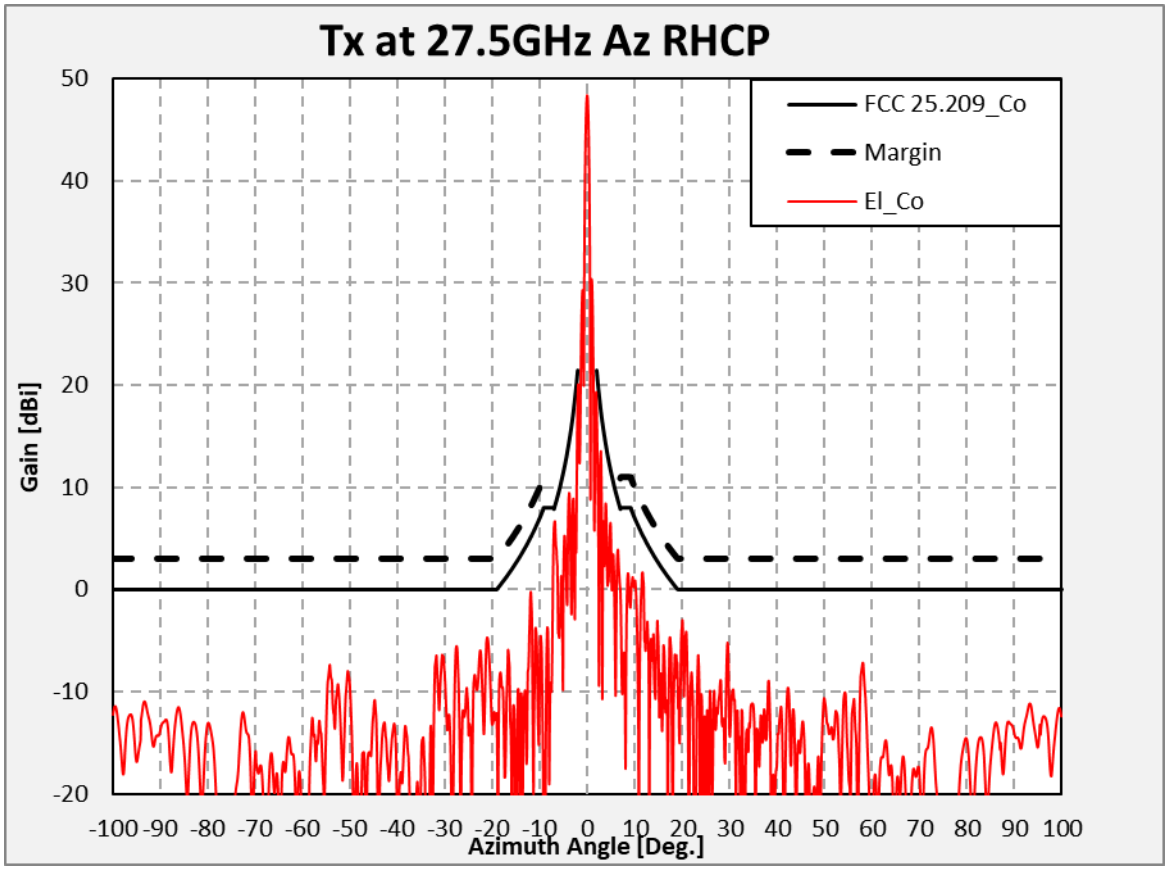

Figure 23 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

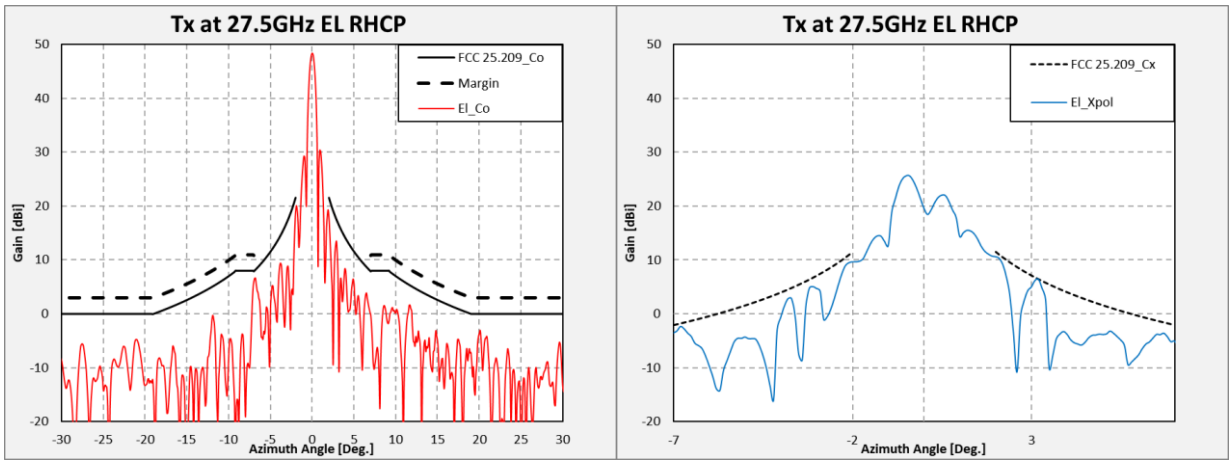

Figure 24 Elevation Co & X-pol

7.3.10. Plots for 28.8 GHz(LHCP)

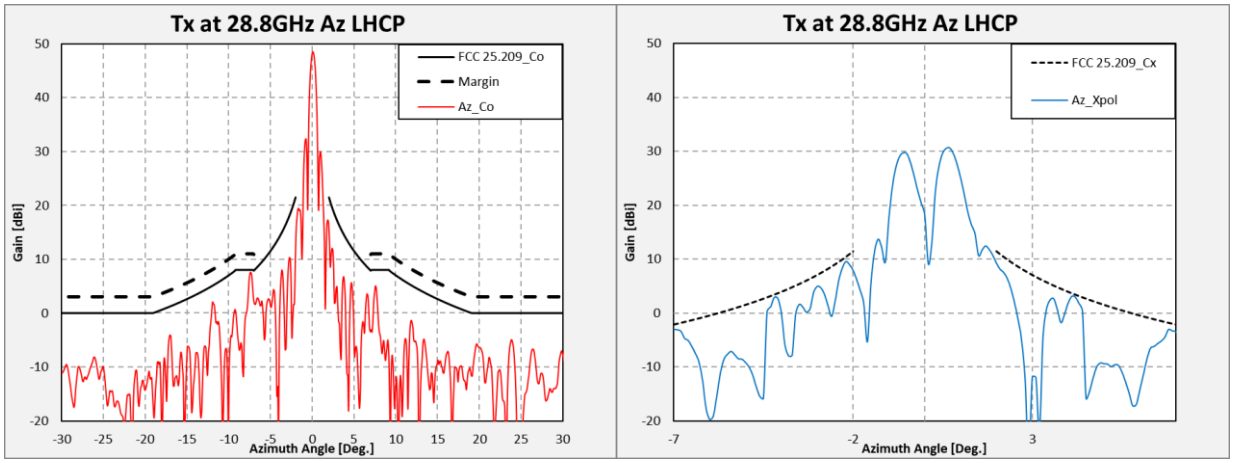

Figure 25 Plot for Azimuth Co & X-pol

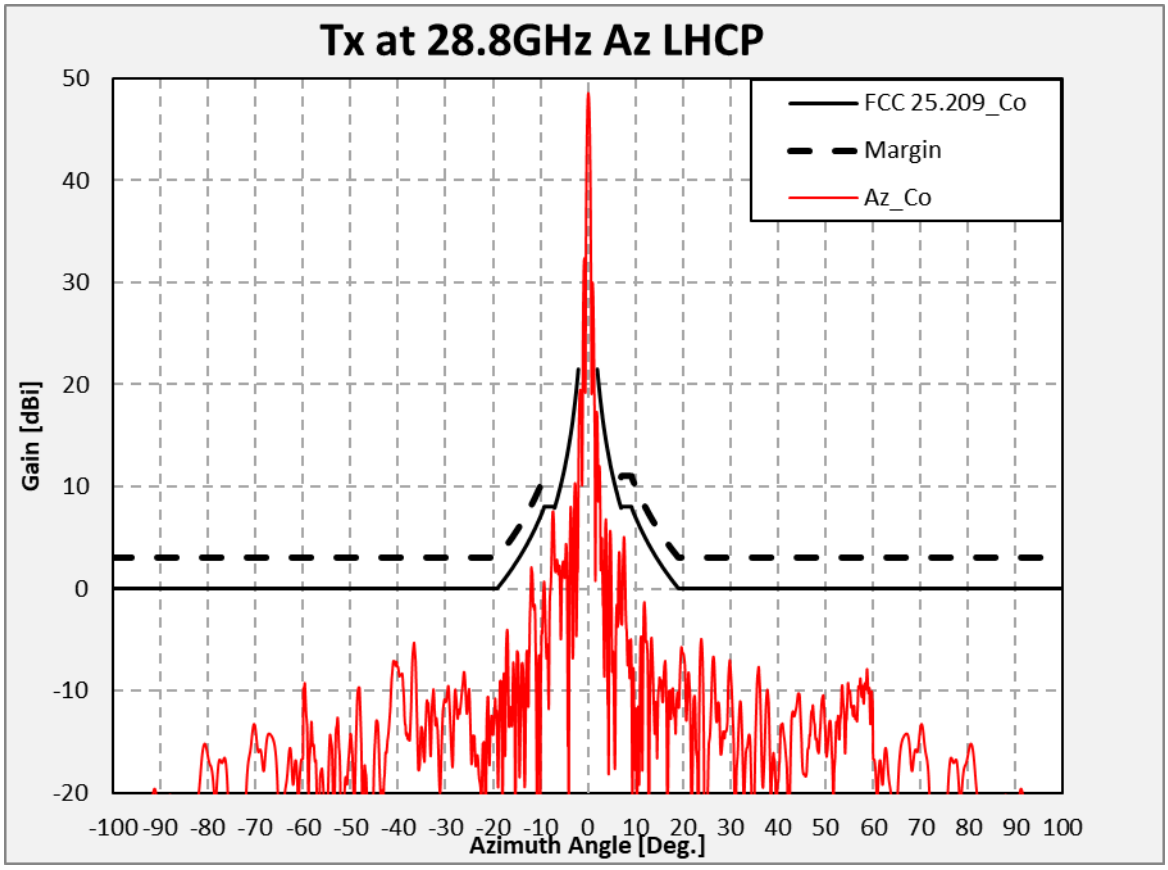

Figure 26 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

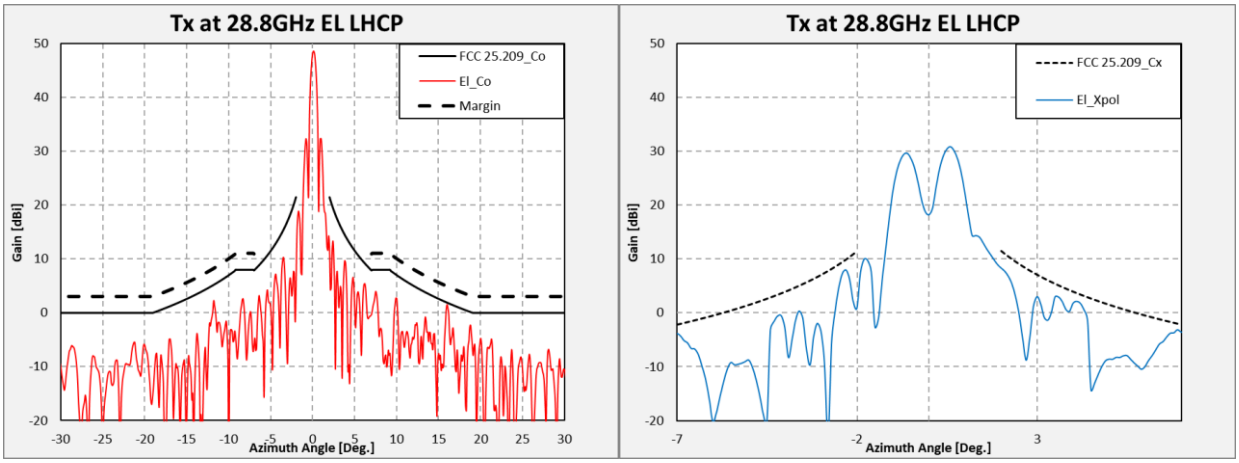

Figure 27 Elevation Co & X-pol

7.3.11. Plots for 28.8 GHz(RHCP)

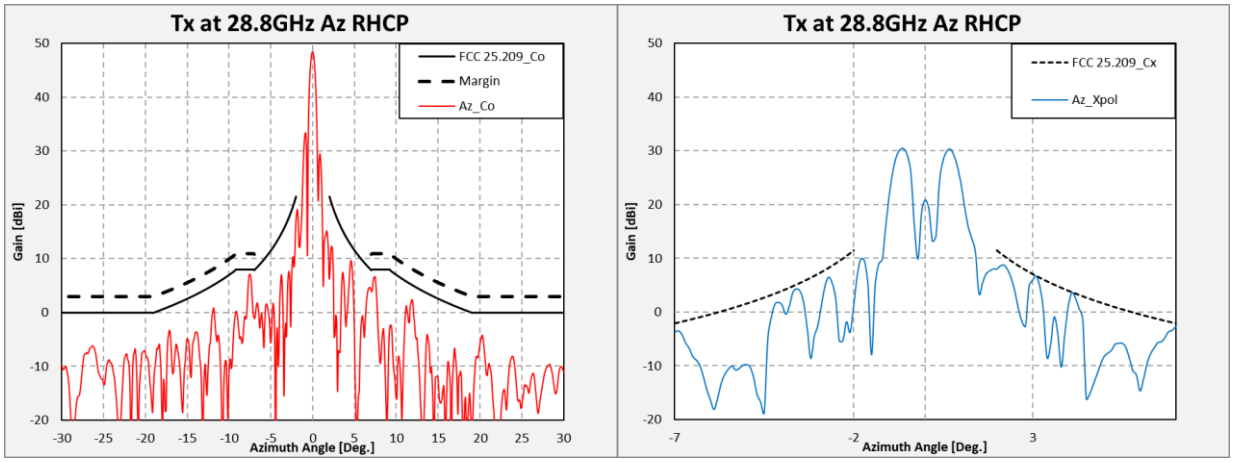

Figure 28 Plot for Azimuth Co & X-pol

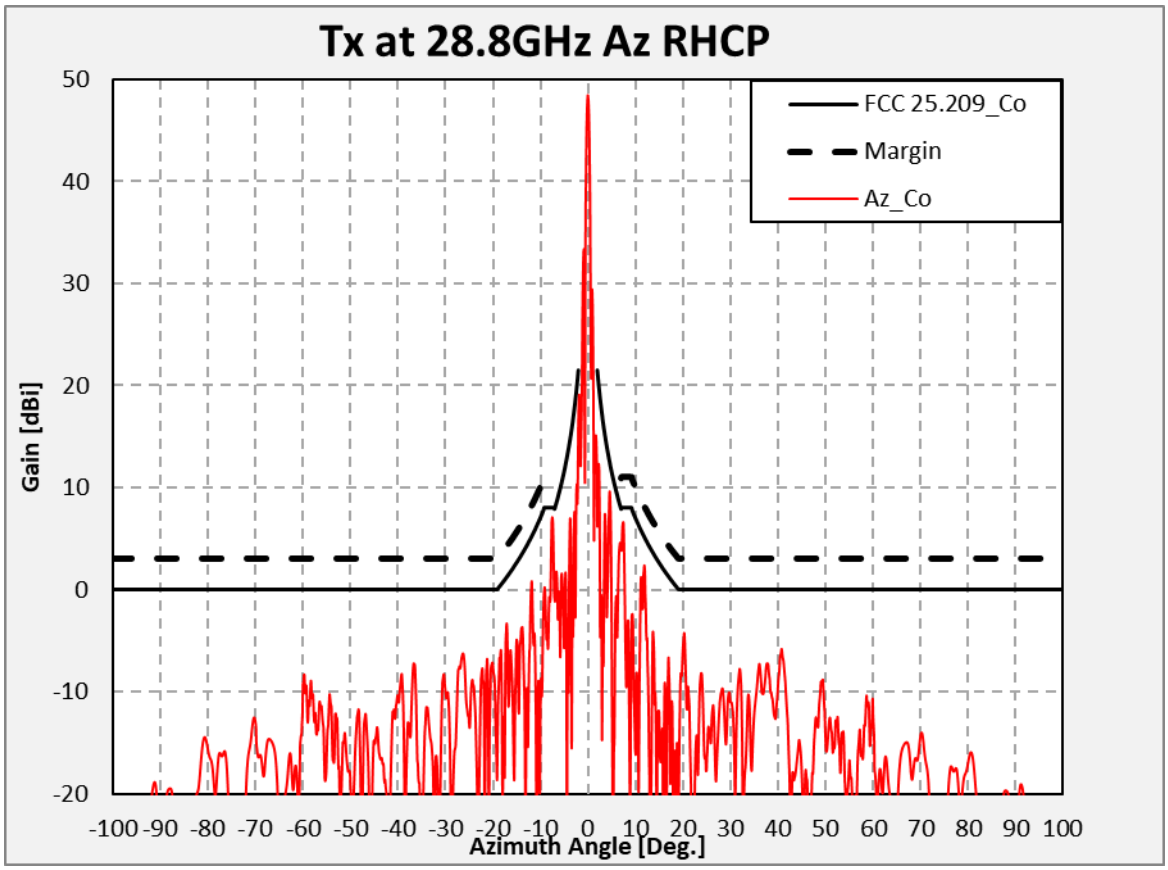

Figure 29 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

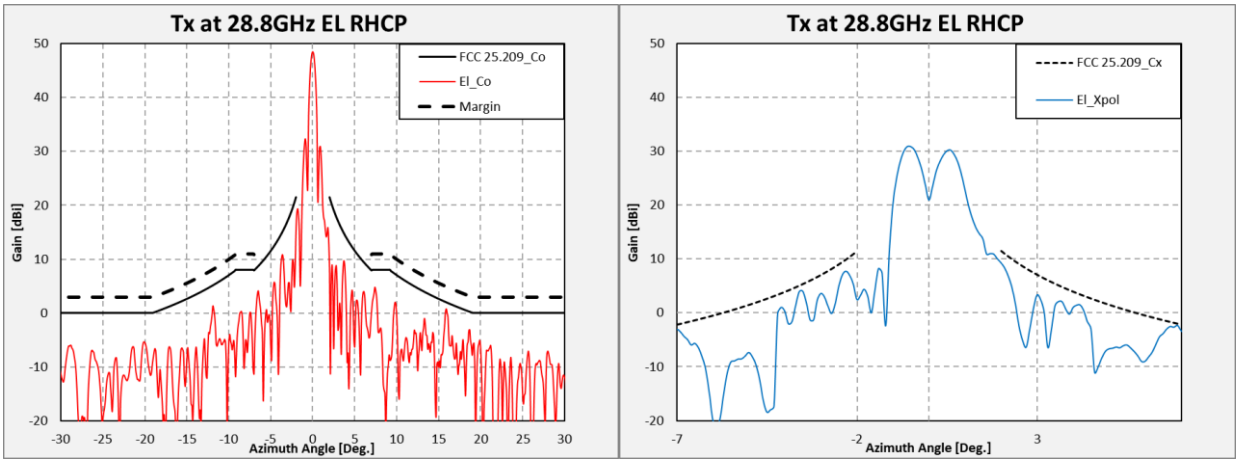

Figure 30 Elevation Co & X-pol

7.3.12. Plots for 30.0 GHz(LHCP)

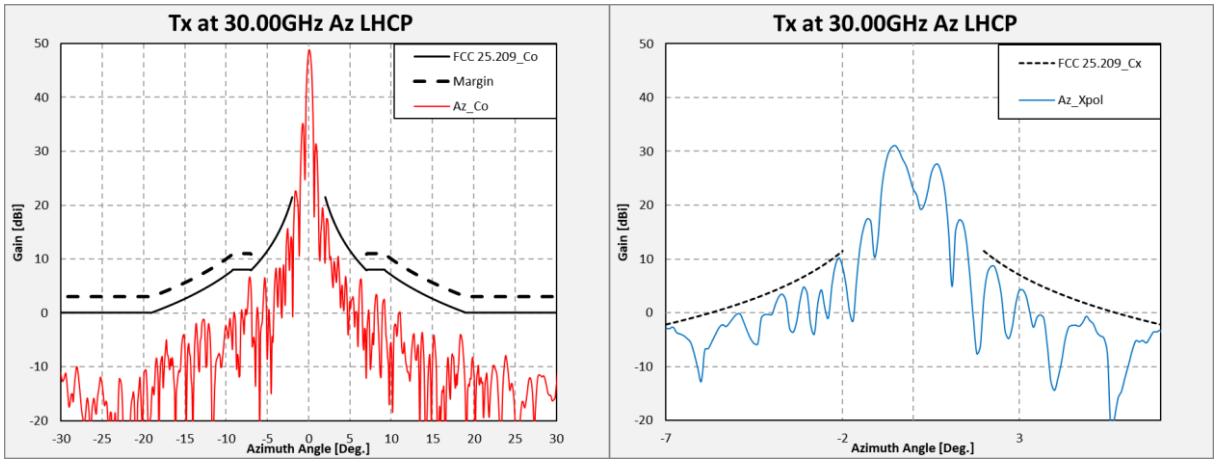

Figure 31 Plot for Azimuth Co & X-pol

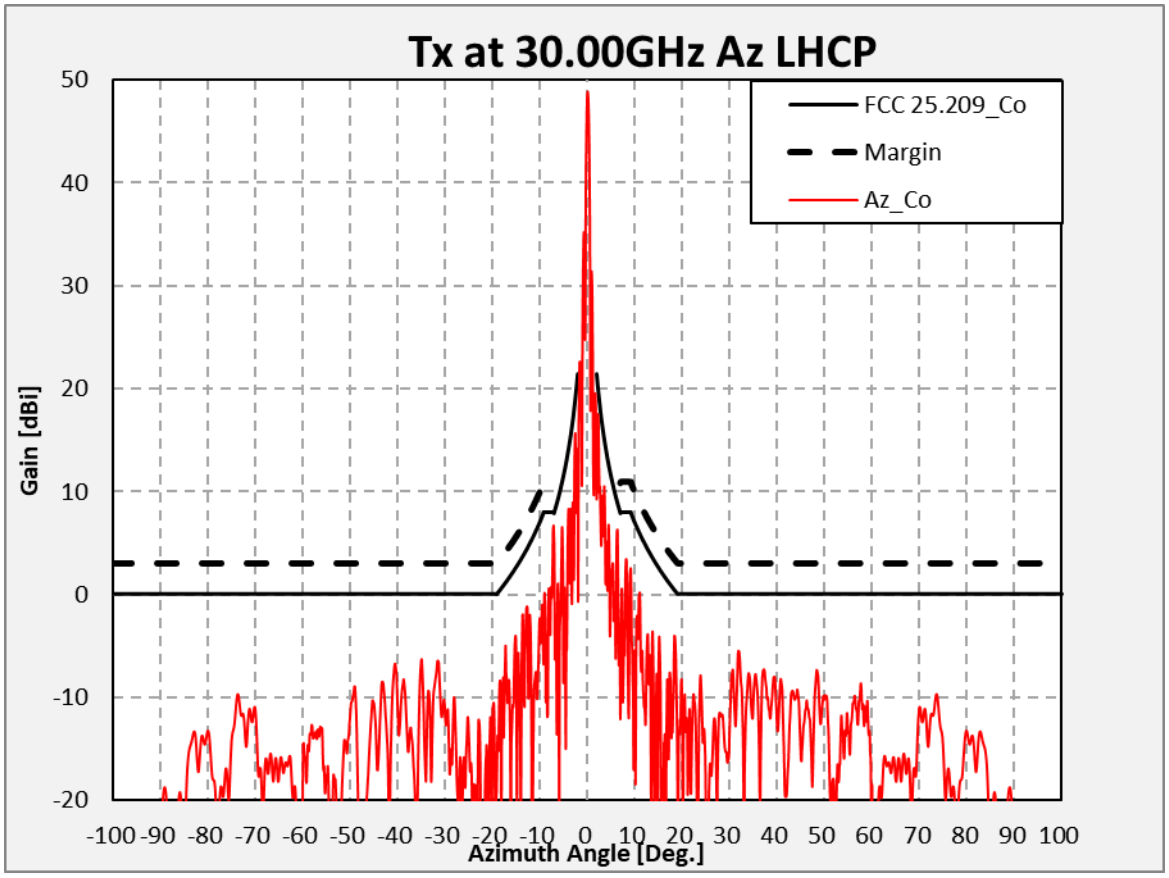

Figure 32 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

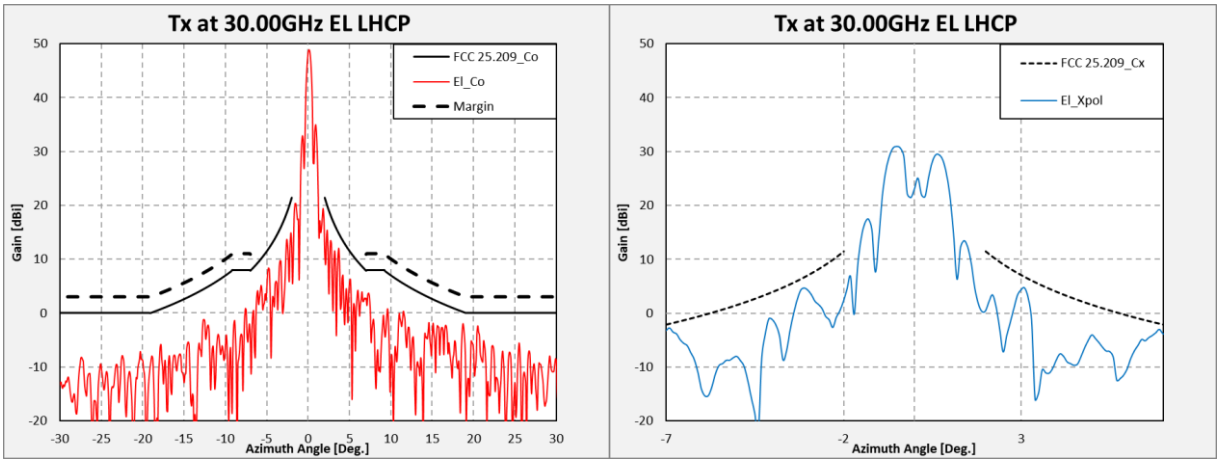

Figure 33 Plot for Elevation Co & X-pol

7.3.13. Plots for 30.0 GHz(RHCP)

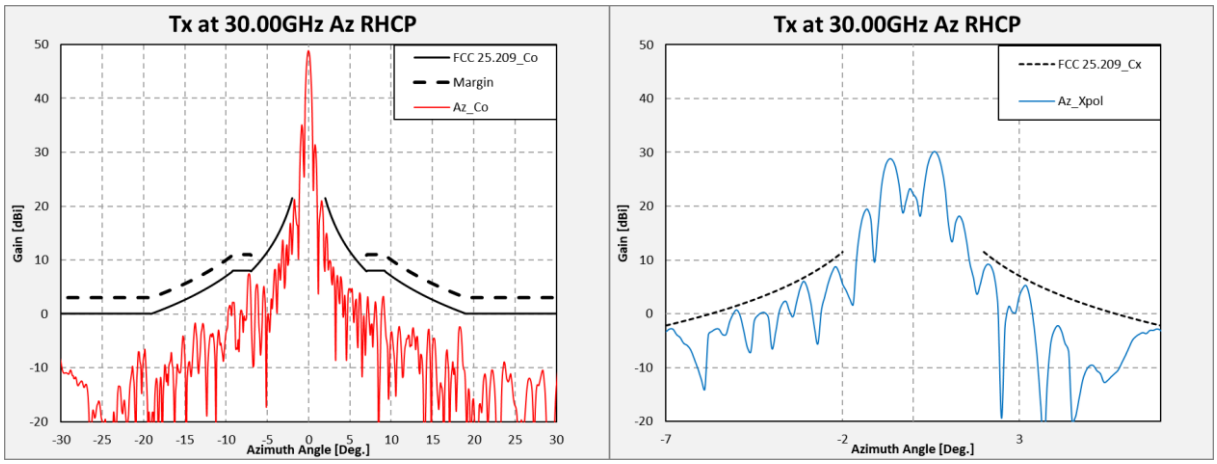

Figure 34 Plot for Azimuth Co & X-pol

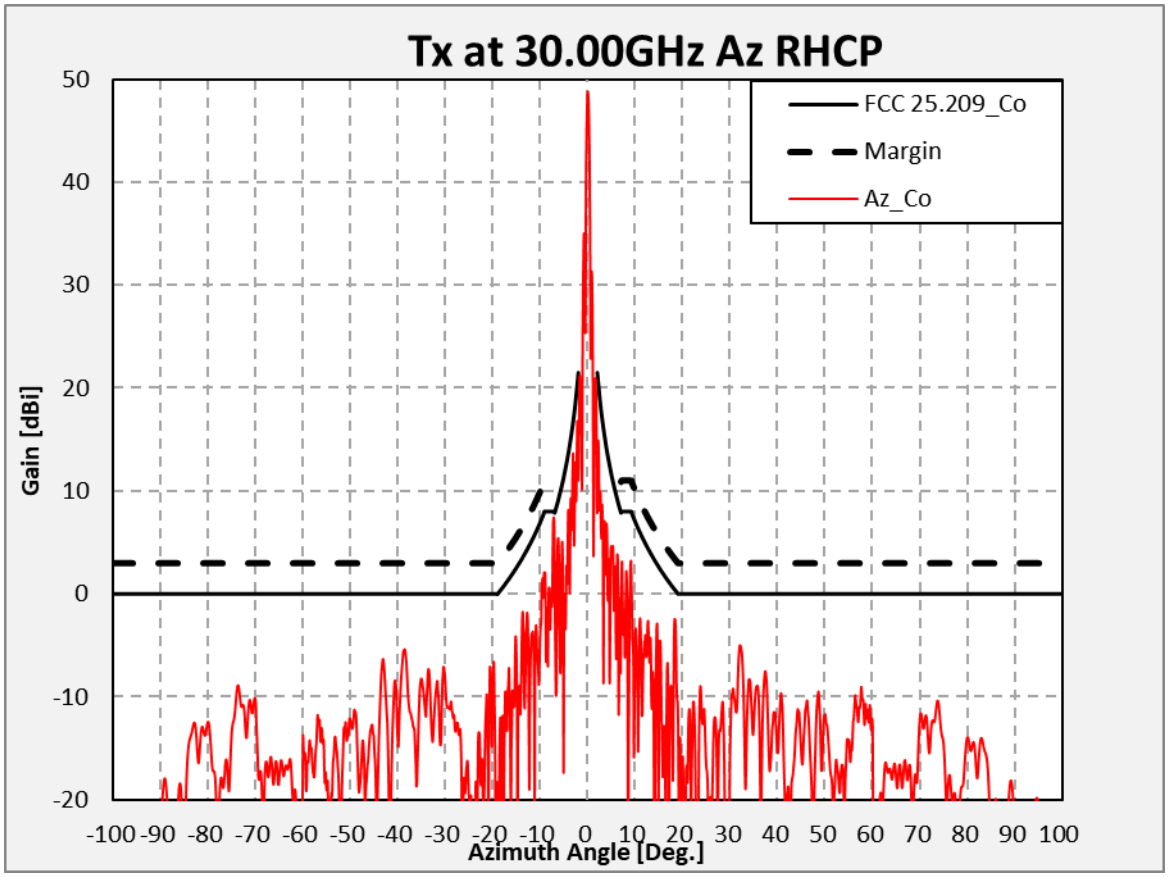

Figure 35 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

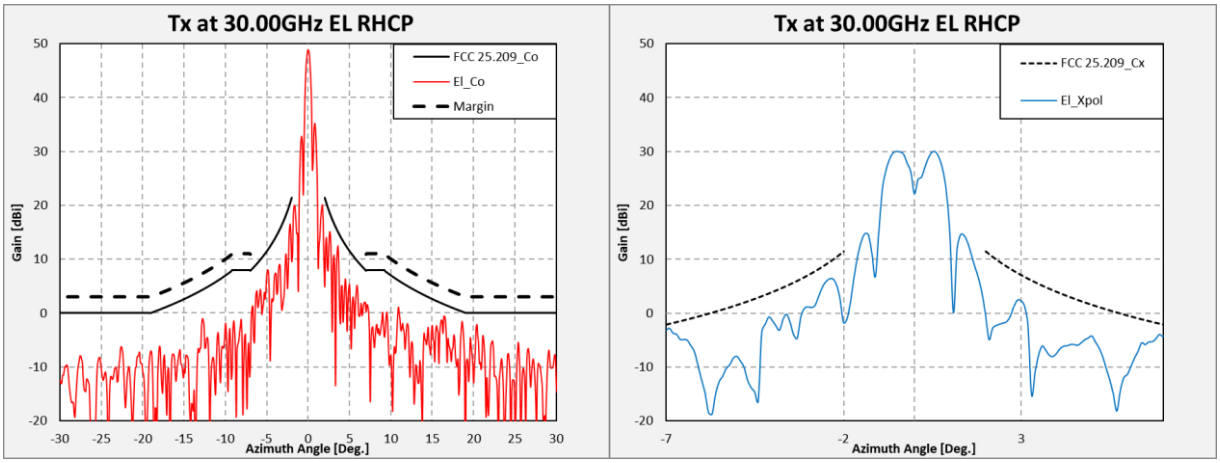

Figure 36 Plot for Elevation Co & X-pol

7.4. Receive Frequencies

7.4.1. Test Method

7.4.1.1. Ku Band

- Configure the antenna without radome in the Planar nearfield test range(PNF) to point with 30° elevation.

- Receive V-POL at 10.95 GHz, 11.85 GHz and 12.75 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
- Repeat this measurement at Receive H-POL.

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Receive V-POL at 10.95 GHz, 11.85 GHz and 12.75 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
  - Repeat this measurement at Receive H-POL.
- Measure Gain by standard gain horn method or Direct gain method.

7.4.1.2. Ka Band

- Configure the antenna without radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Receive RHCP at 17.7 GHz, 19.0 GHz and 20.2 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
  - Repeat this measurement at Receive LHCP.
- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
  - Receive RHCP at 17.7 GHz, 19.0 GHz and 20.2 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
  - Repeat this measurement at Receive LHCP.
- Measure Gain by standard gain horn method or Direct gain method.

7.4.2. Plots for 10.95 GHz(H-POL)

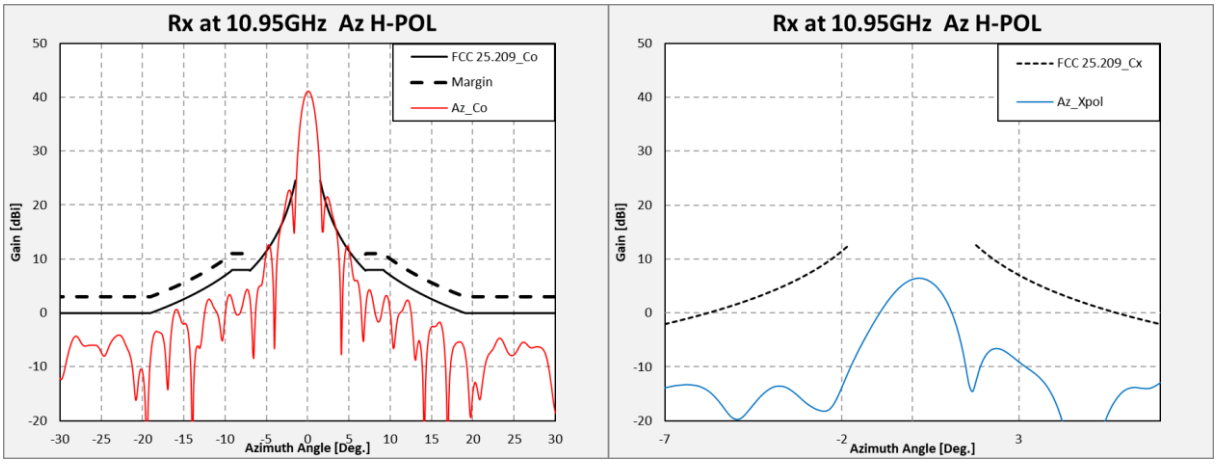

Figure 37 Plot for Azimuth Co & X-pol

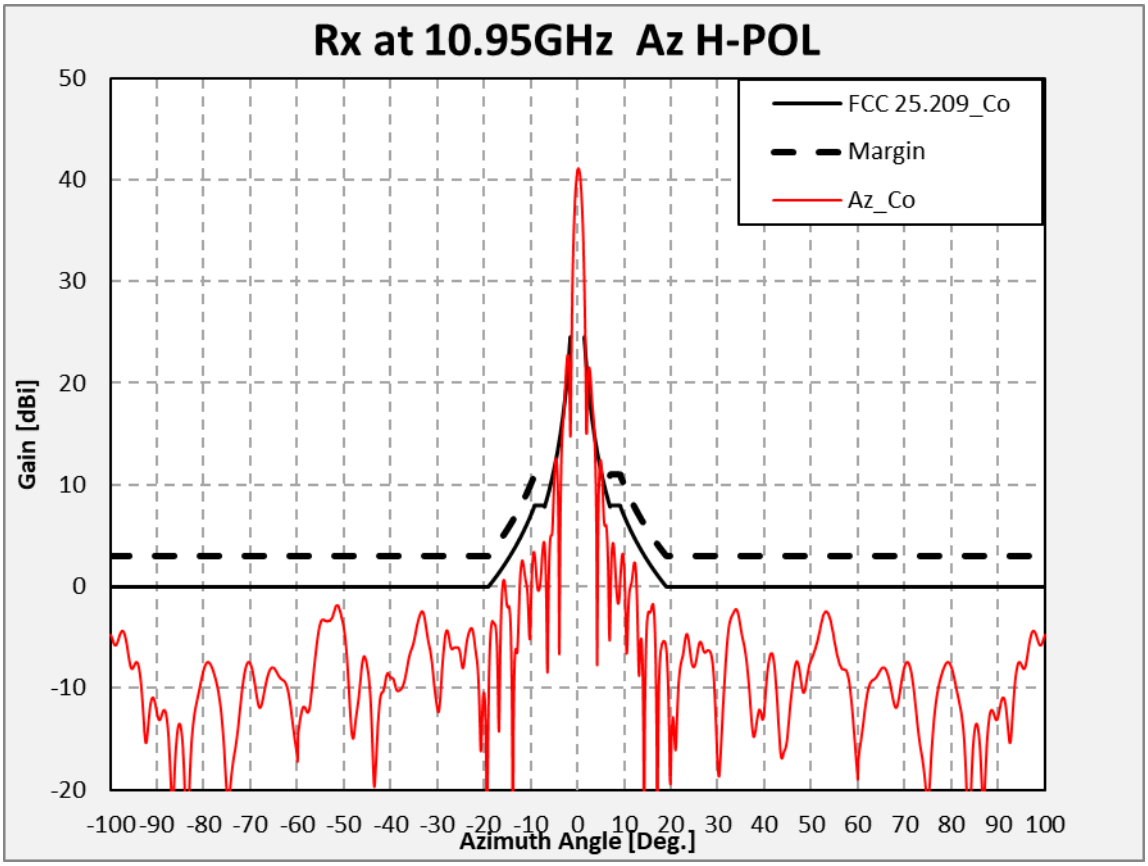

Figure 38 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

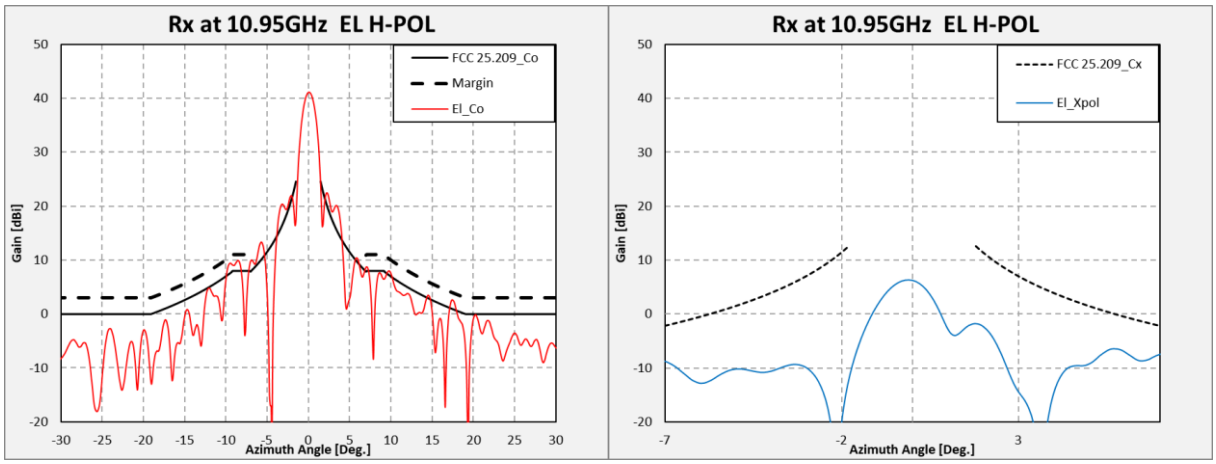

Figure 39 Plot for Elevation Co & X-pol

7.4.3. Plots for 10.95 GHz(V-POL)

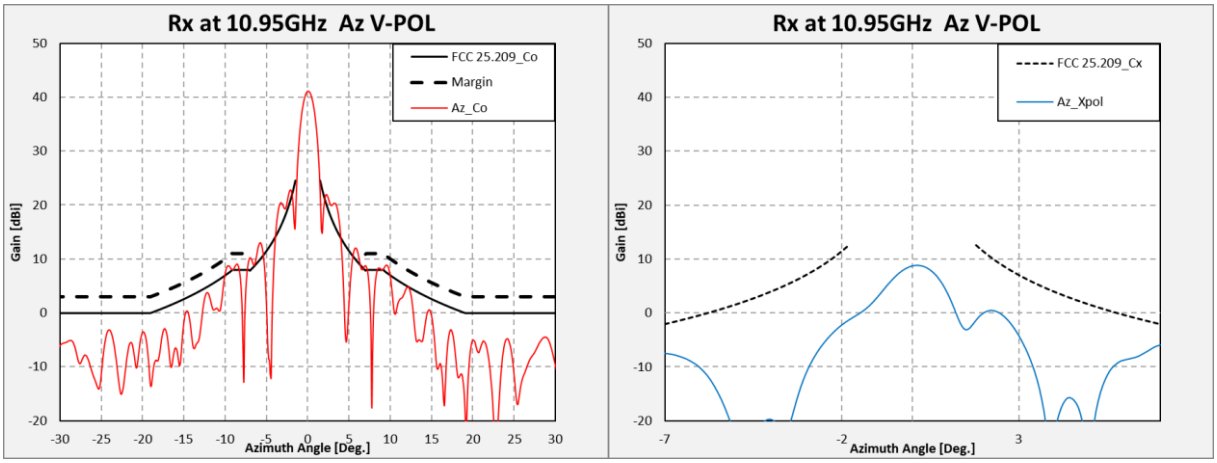

Figure 40 Plot for Azimuth Co & X-pol

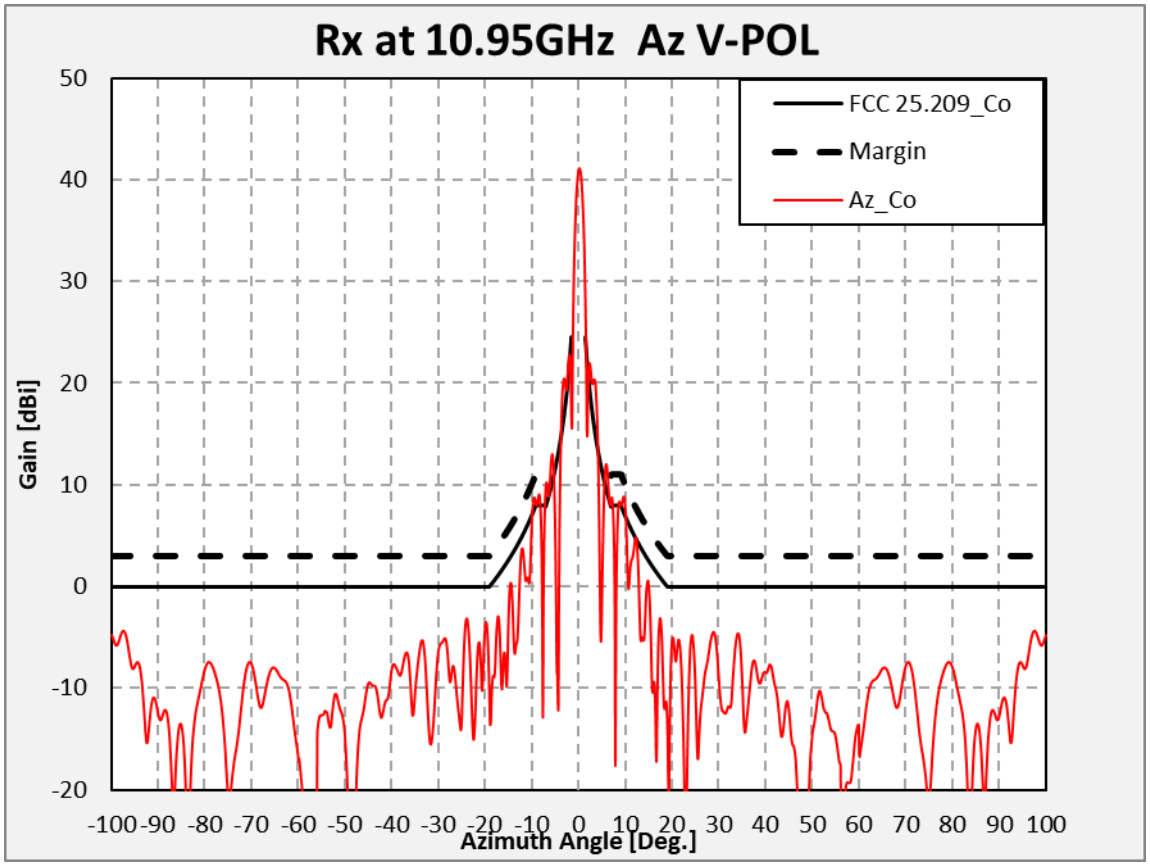

Figure 41 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

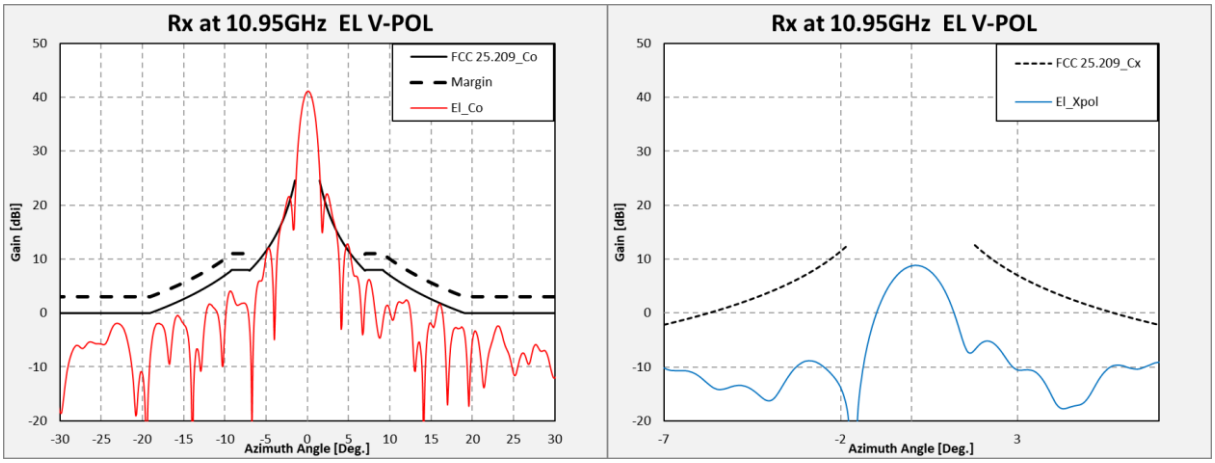

Figure 42 Plot for Elevation Co & X-pol

7.4.4. Plots for 11.85 GHz(H-POL)

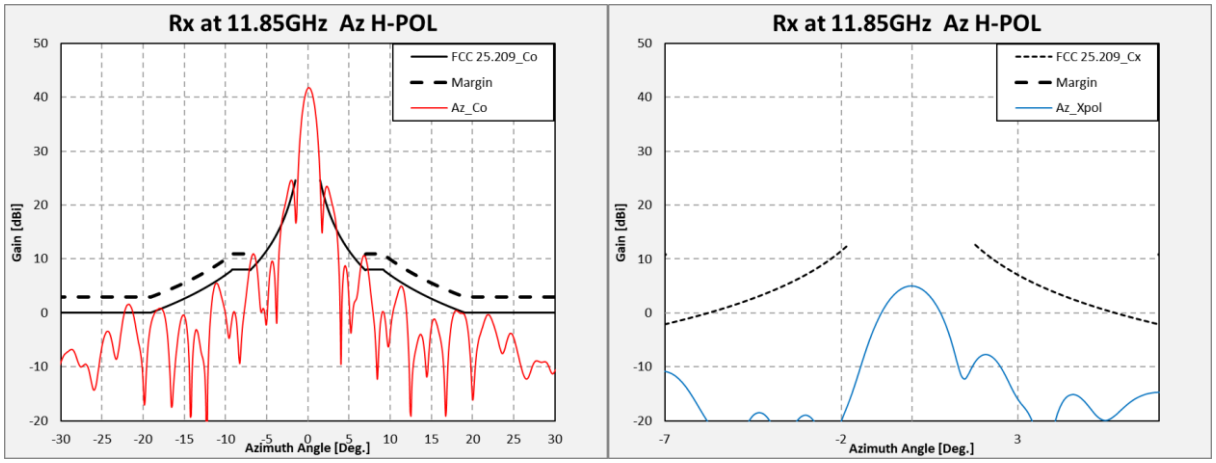

Figure 43 Plot for Azimuth Co & X-pol

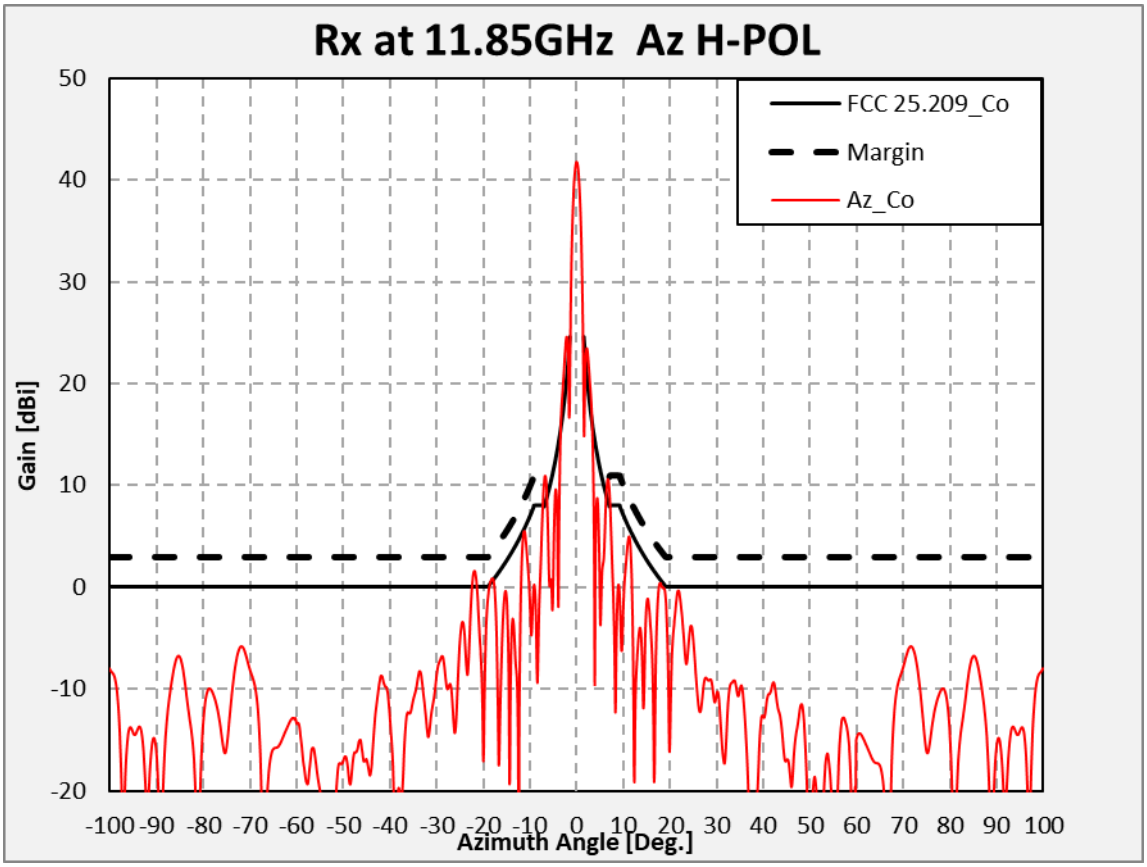

Figure 44 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

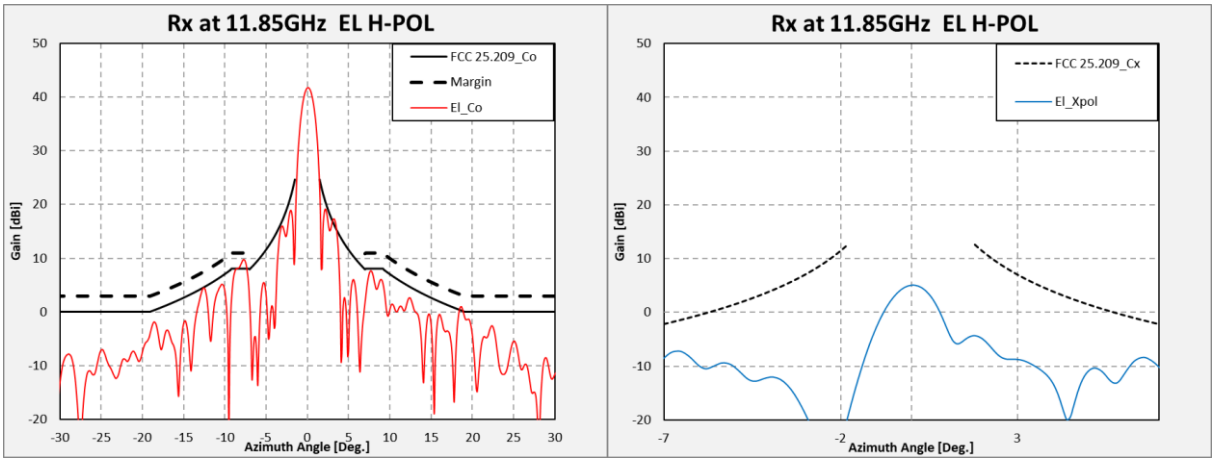

Figure 45 Plot for Elevation Co & X-pol

7.4.5. Plots for 11.85 GHz(V-POL)

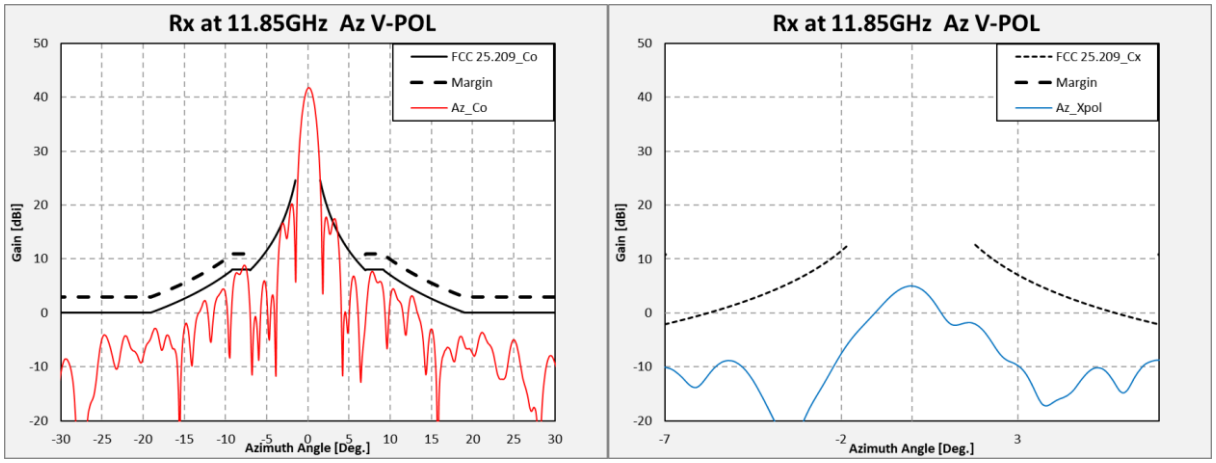

Figure 46 Plot for Azimuth Co & X-pol

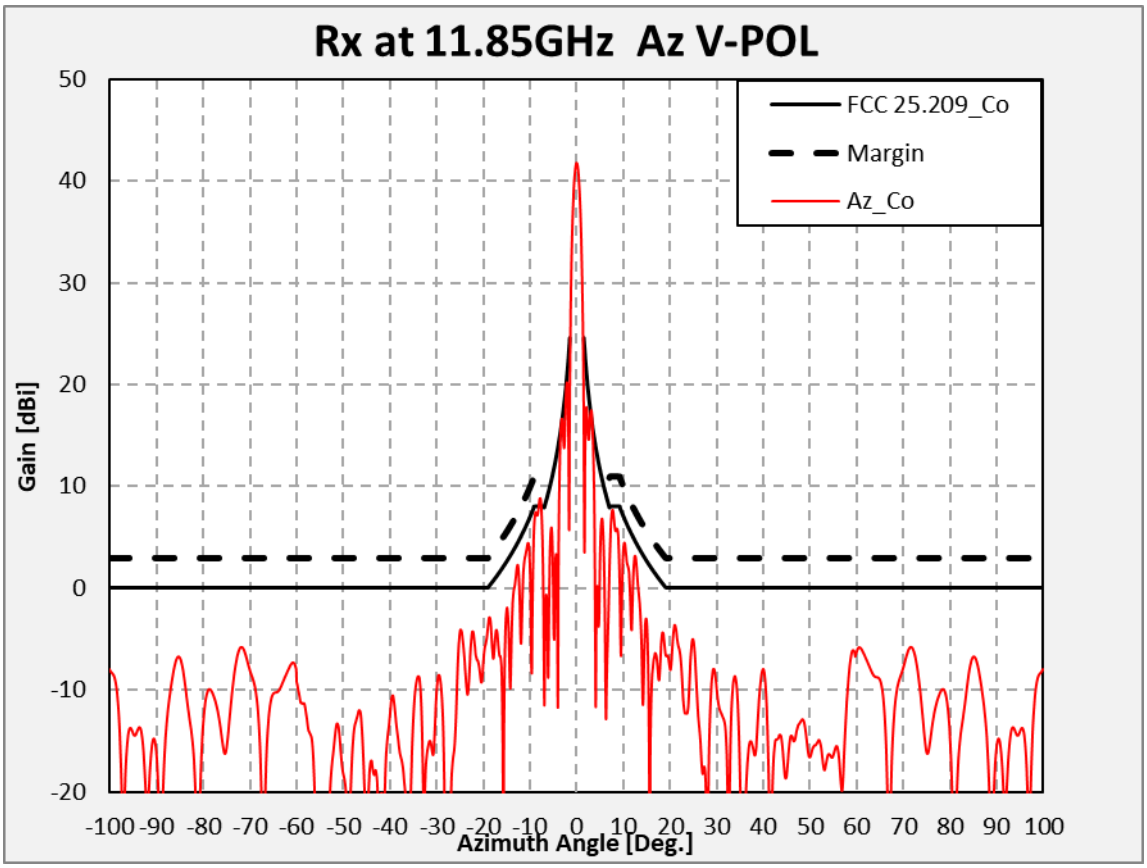

Figure 47 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

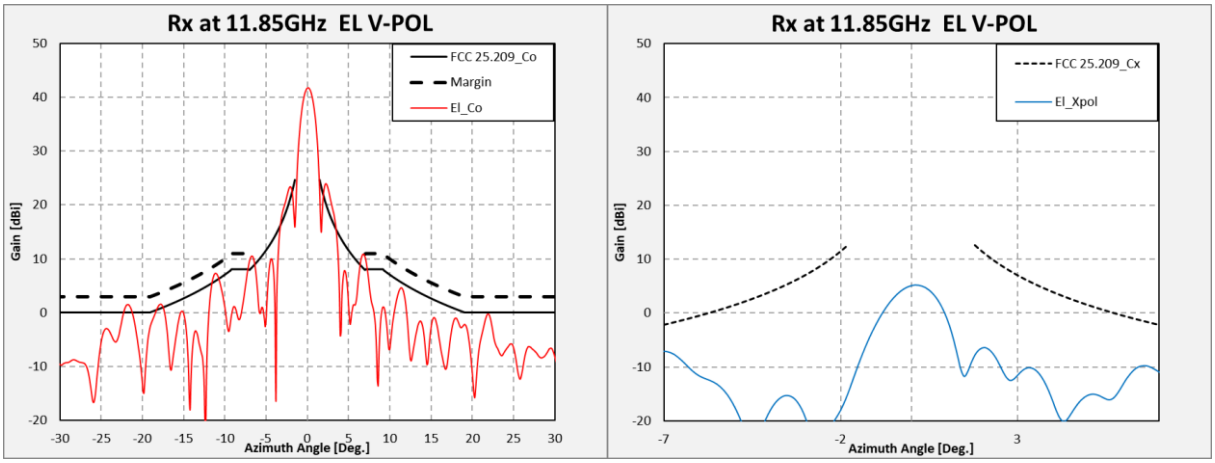

Figure 48 Plot for Elevation Co & X-pol

7.4.6. Plots for 12.75 GHz(H-POL)

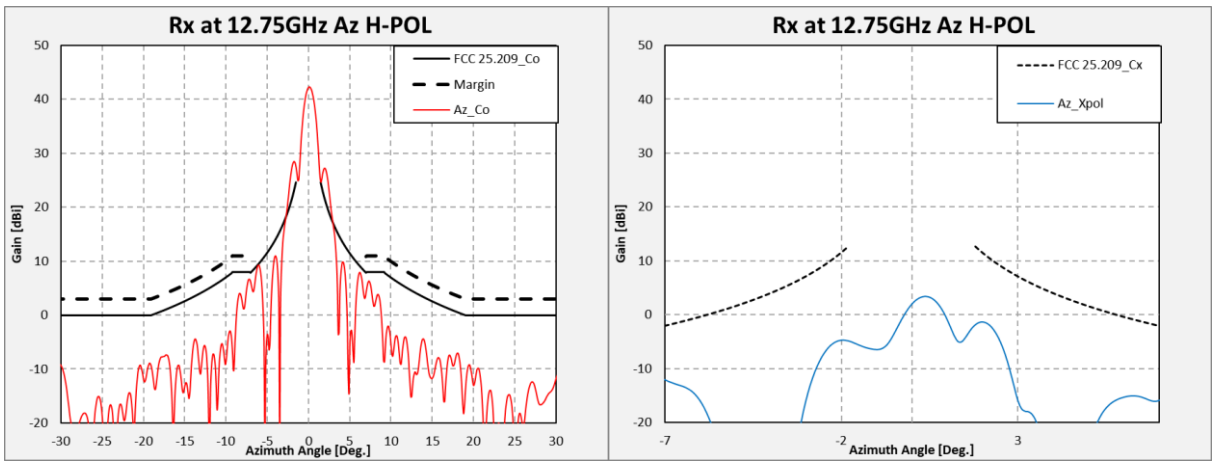

Figure 49 Plot for Azimuth Co & X-pol

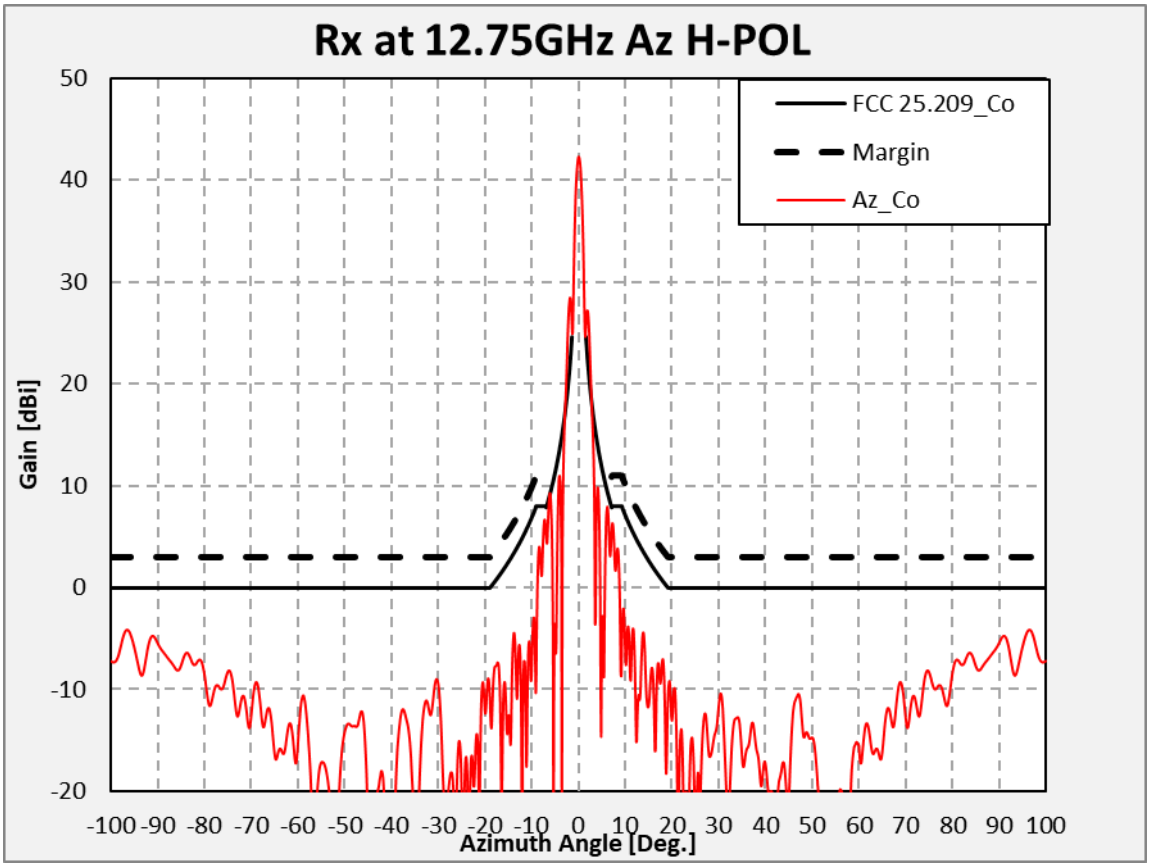

Figure 50 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

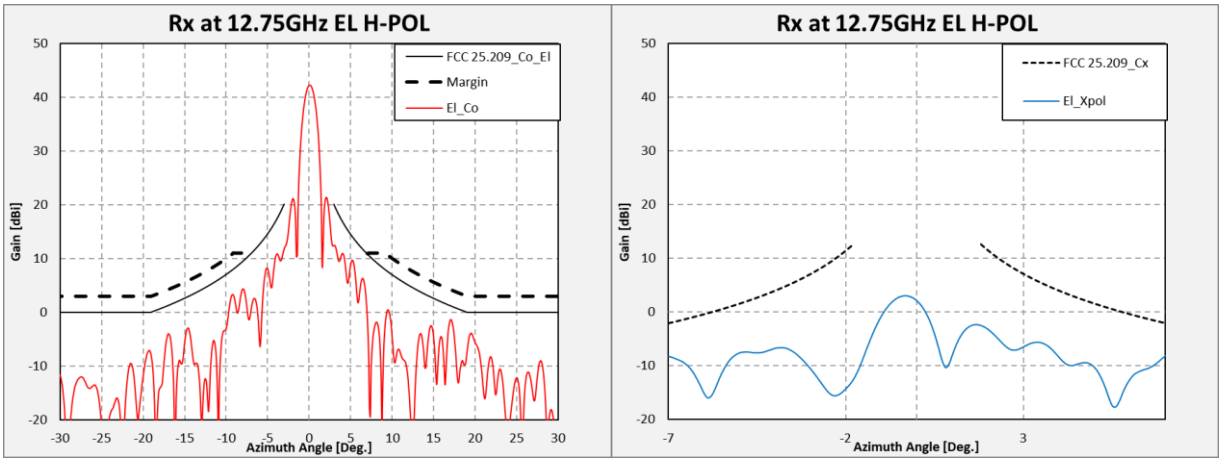

Figure 51 Plot for Elevation Co & X-pol

7.4.7. Plots for 12.75 GHz(V-POL)

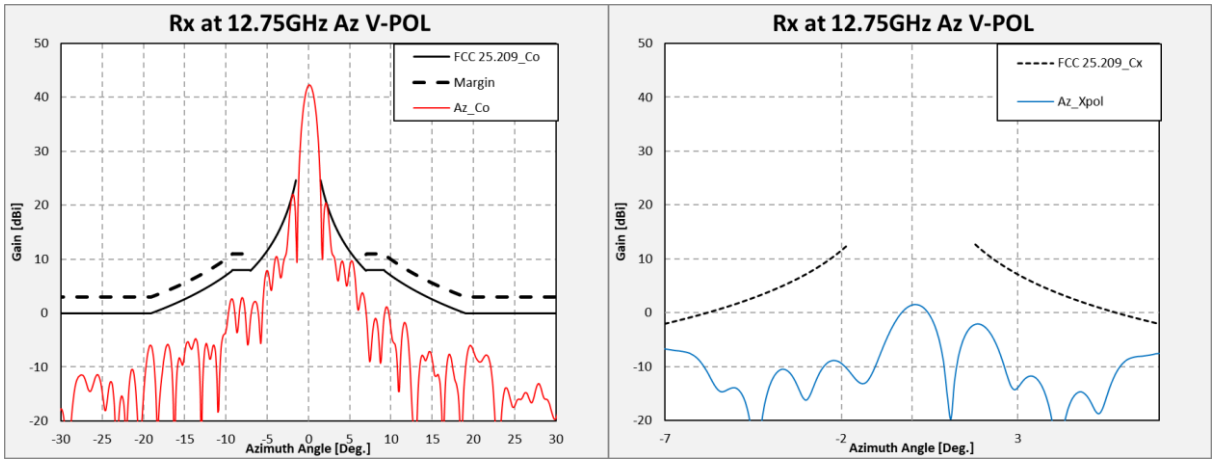

Figure 52 Plot for Azimuth Co & X-pol

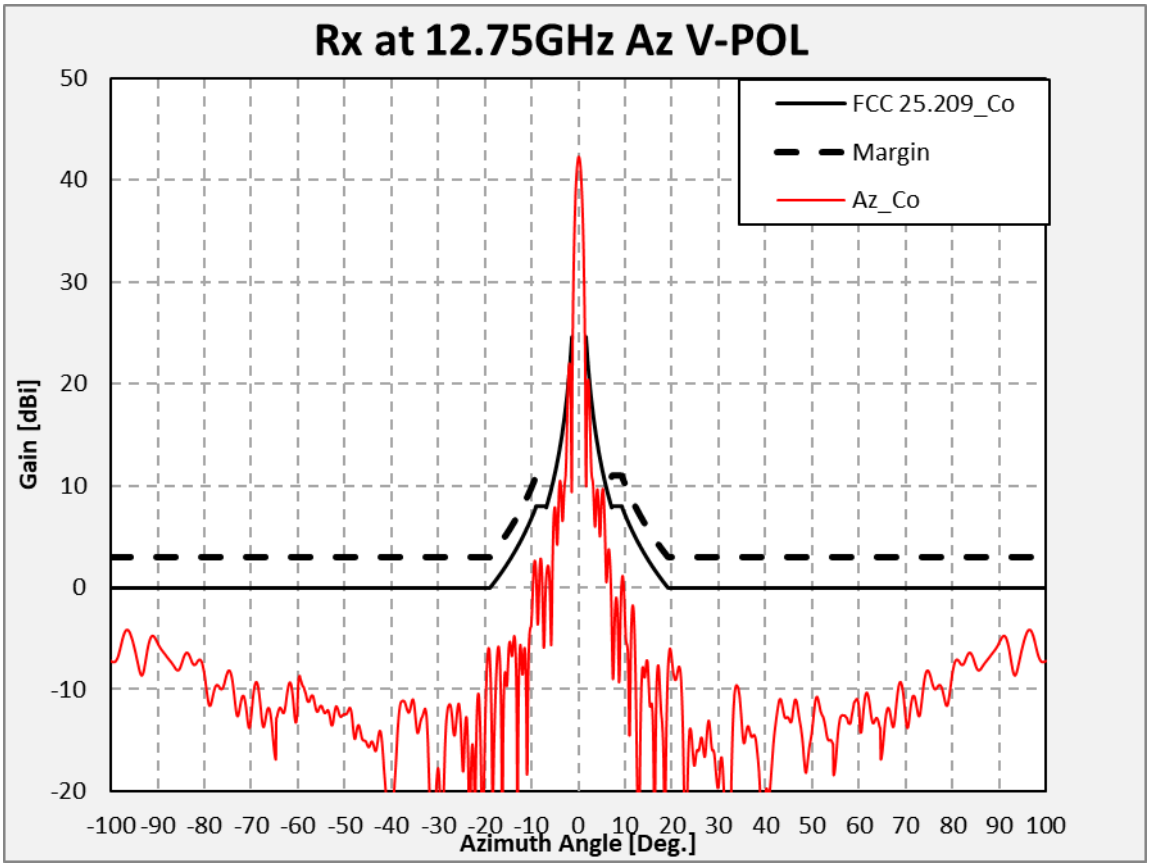

Figure 53 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

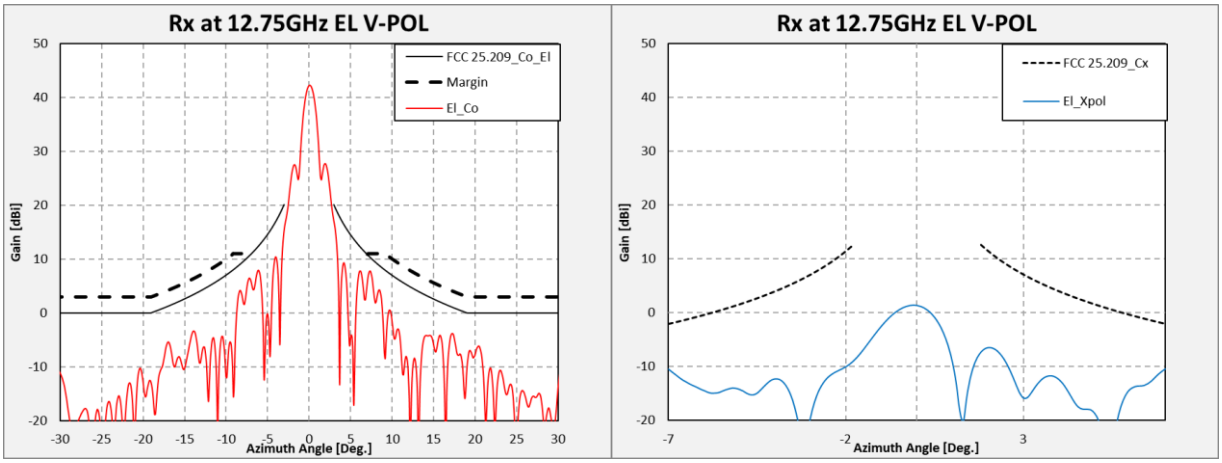

Figure 54 Plot for Elevation Co & X-pol

7.4.8. Plots for 17.7 GHz(LHCP)

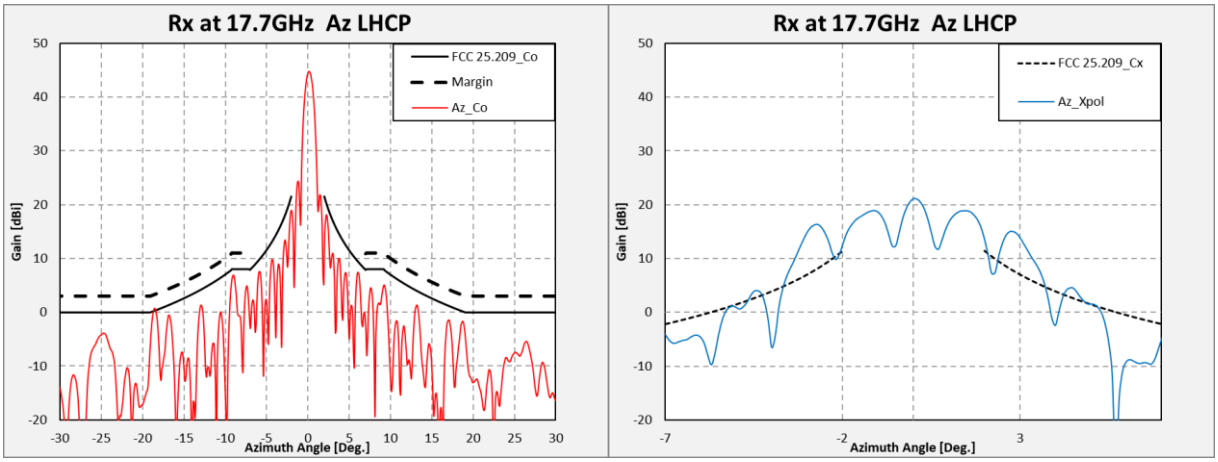

Figure 55 Plot for Azimuth Co & X-pol

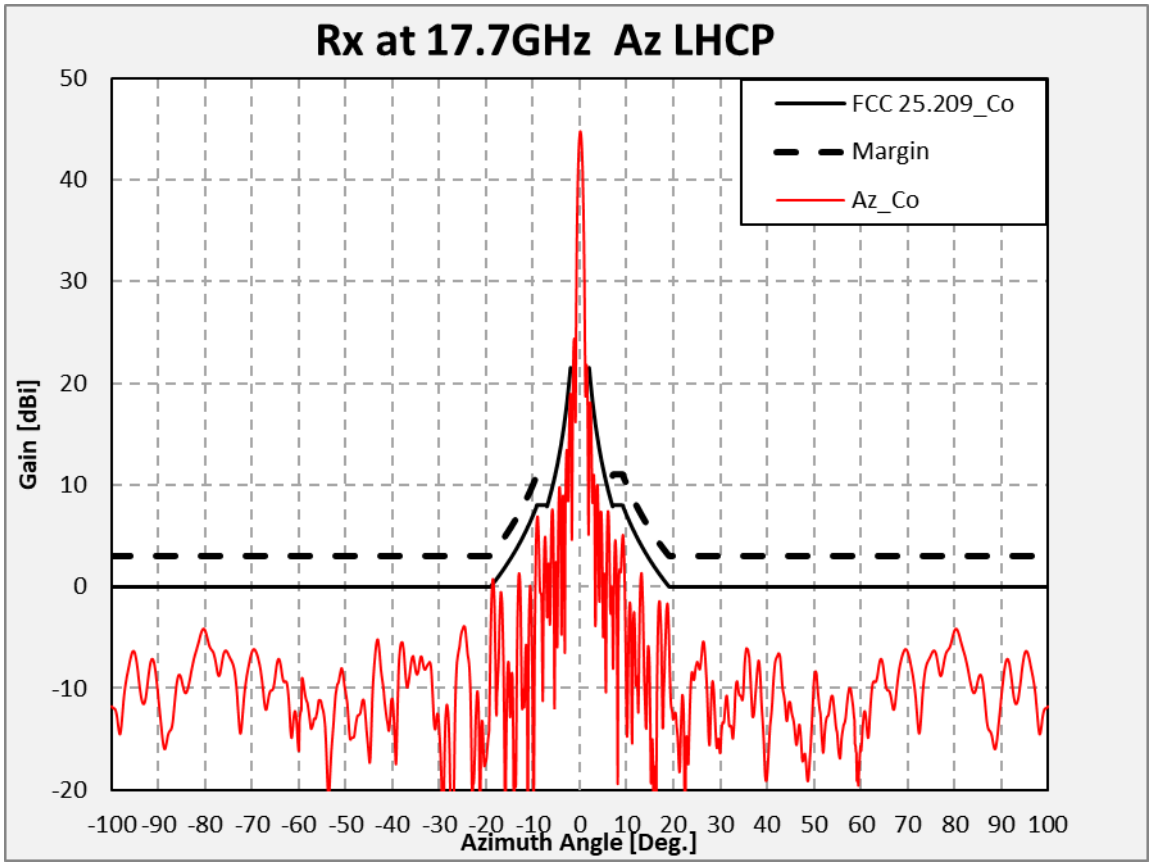

Figure 56 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

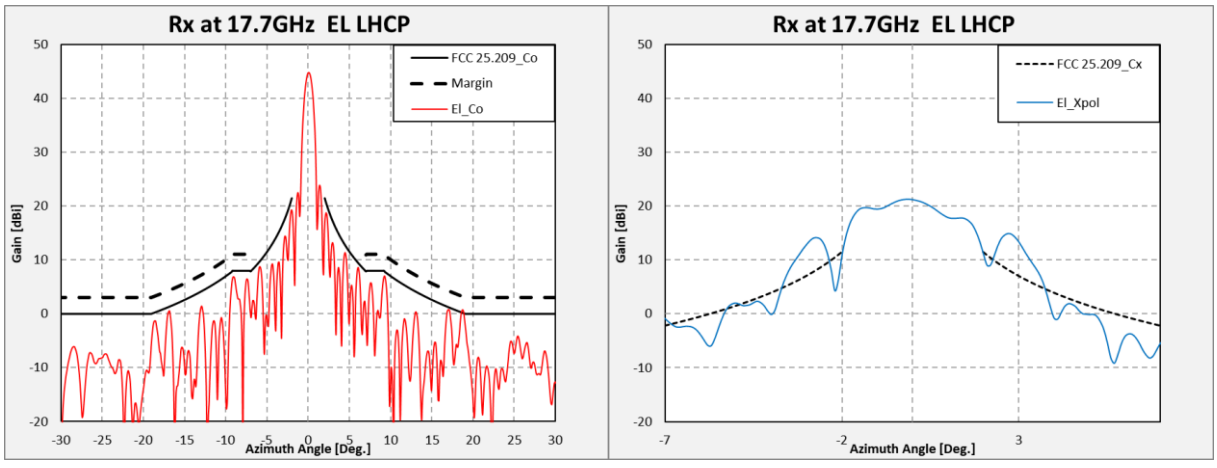

Figure 57 Plot for Elevation Co & X-pol

7.4.9. Plots for 17.7 GHz(RHCP)

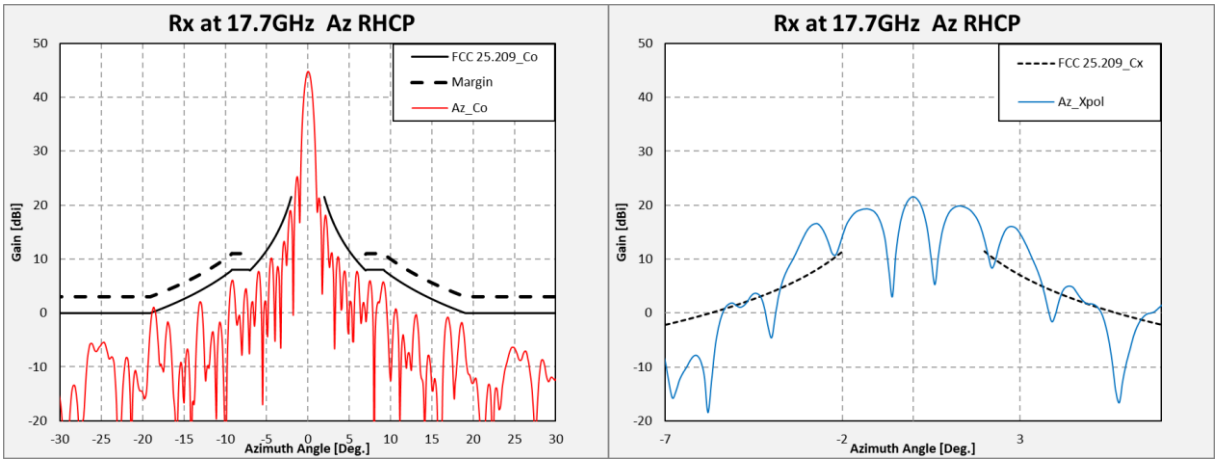

Figure 58 Plot for Azimuth Co & X-pol

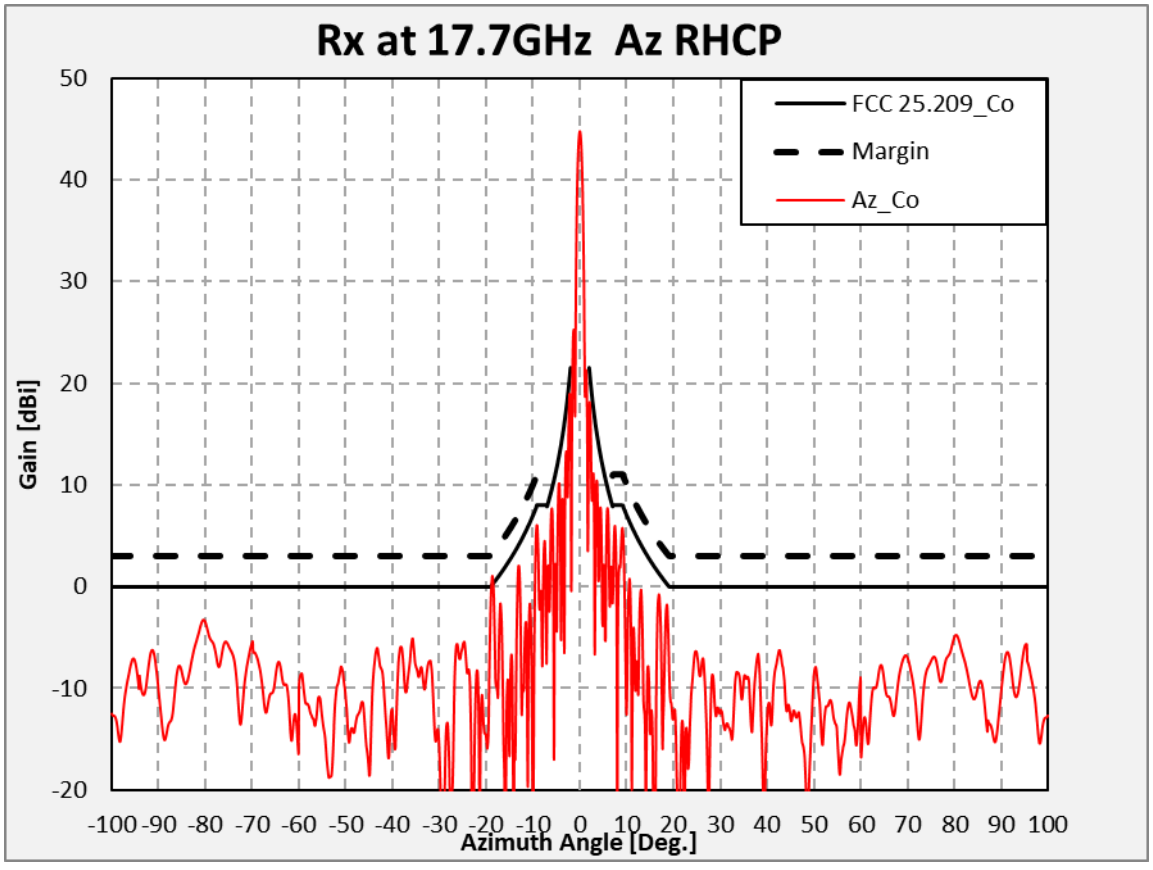

Figure 59 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

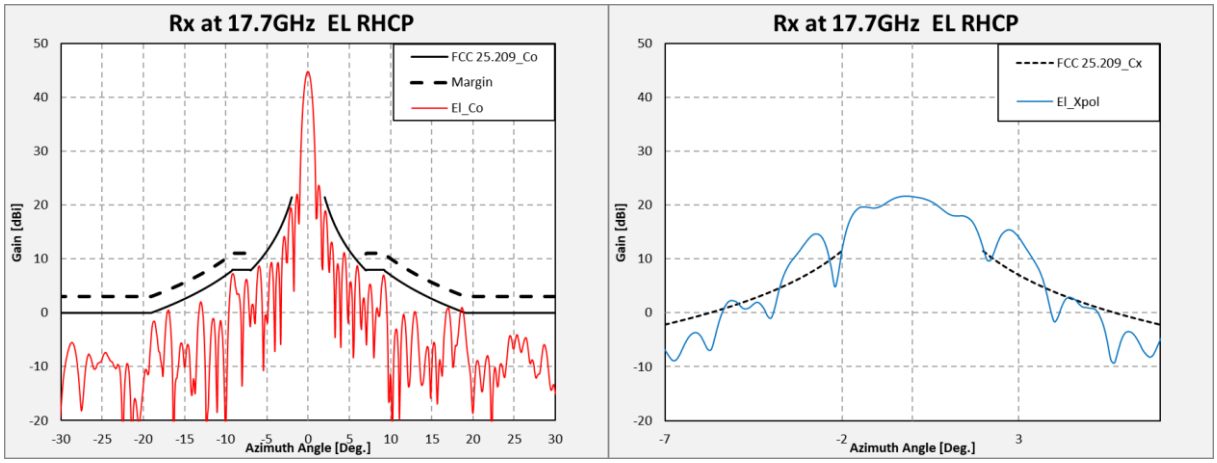

Figure 60 Plot for Elevation Co & X-pol

7.4.10. Plots for 19.0 GHz(LHCP)

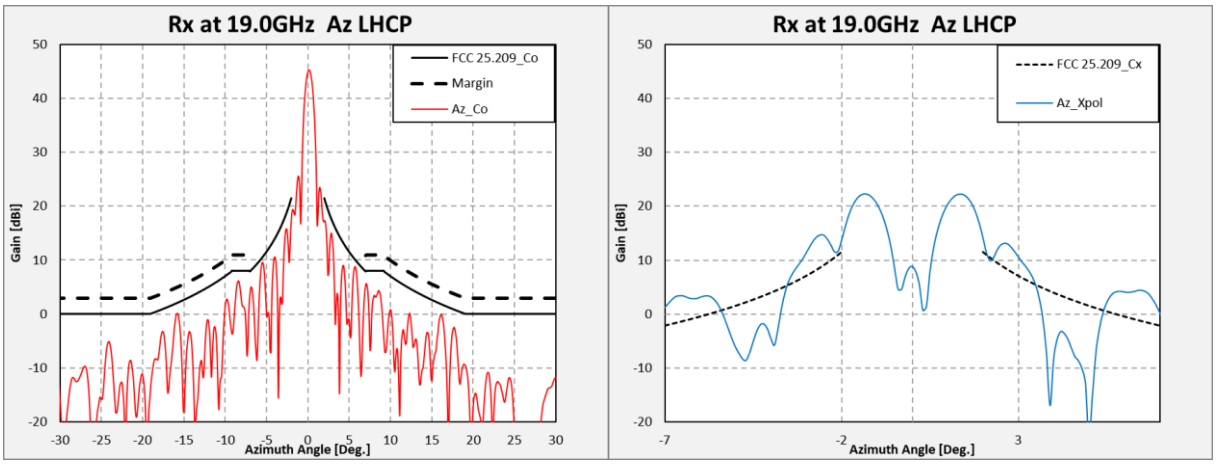

Figure 61 Plot for Azimuth Co & X-pol

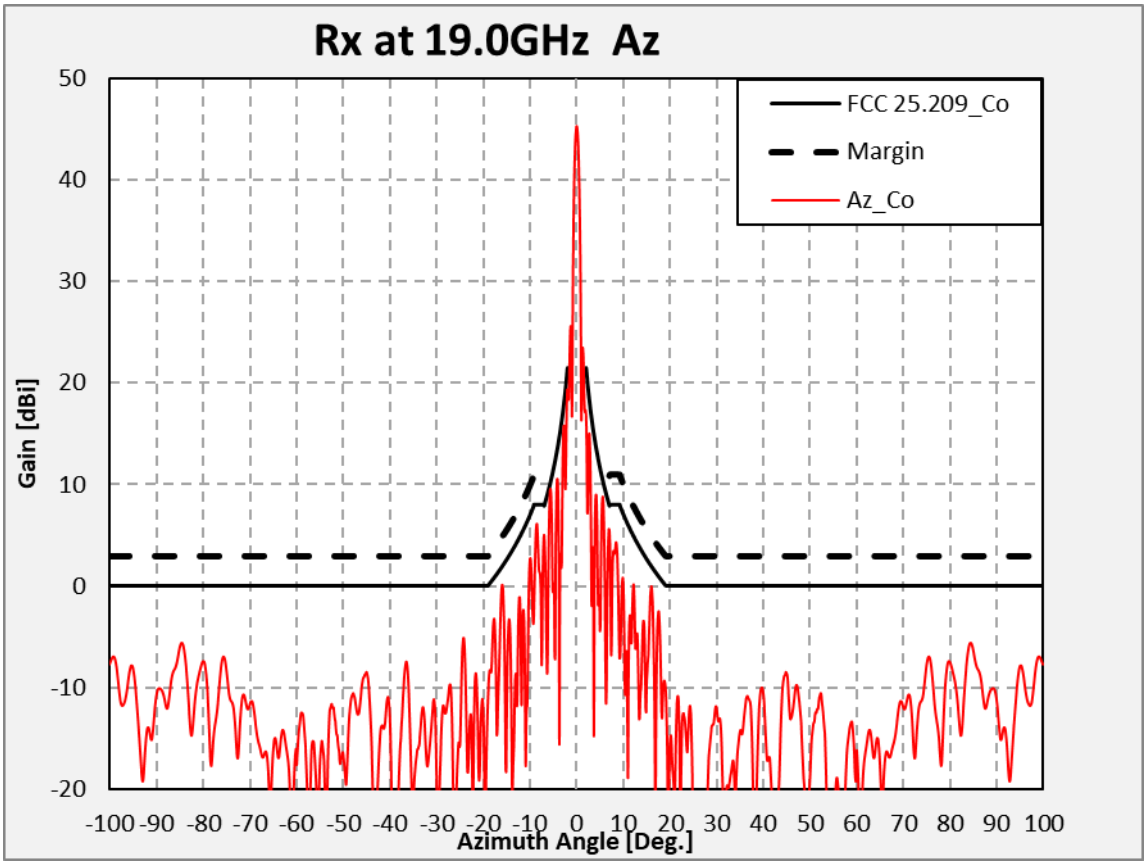

Figure 62 Plot for Azimuth Co-pol (Range: {-90 : 90} deg)

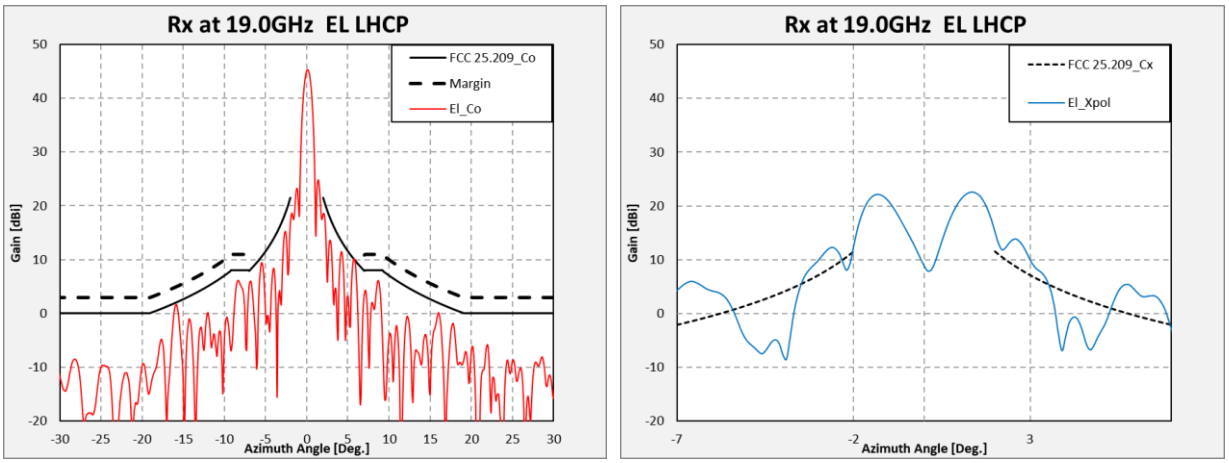

Figure 63 Plot for Elevation Co & X-pol

7.4.11. Plots for 19.0 GHz(RHCP)

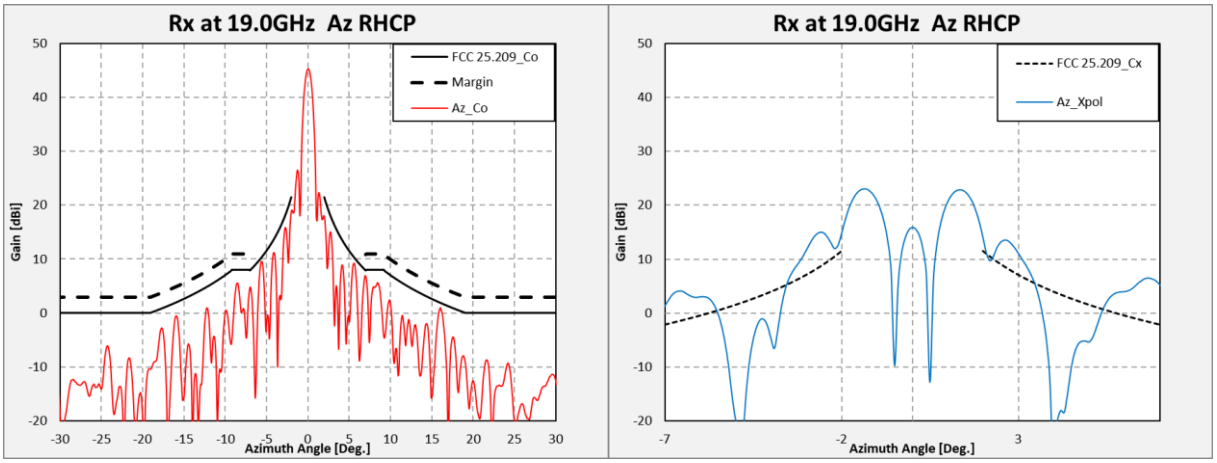

Figure 64 Plot for Azimuth Co & X-pol

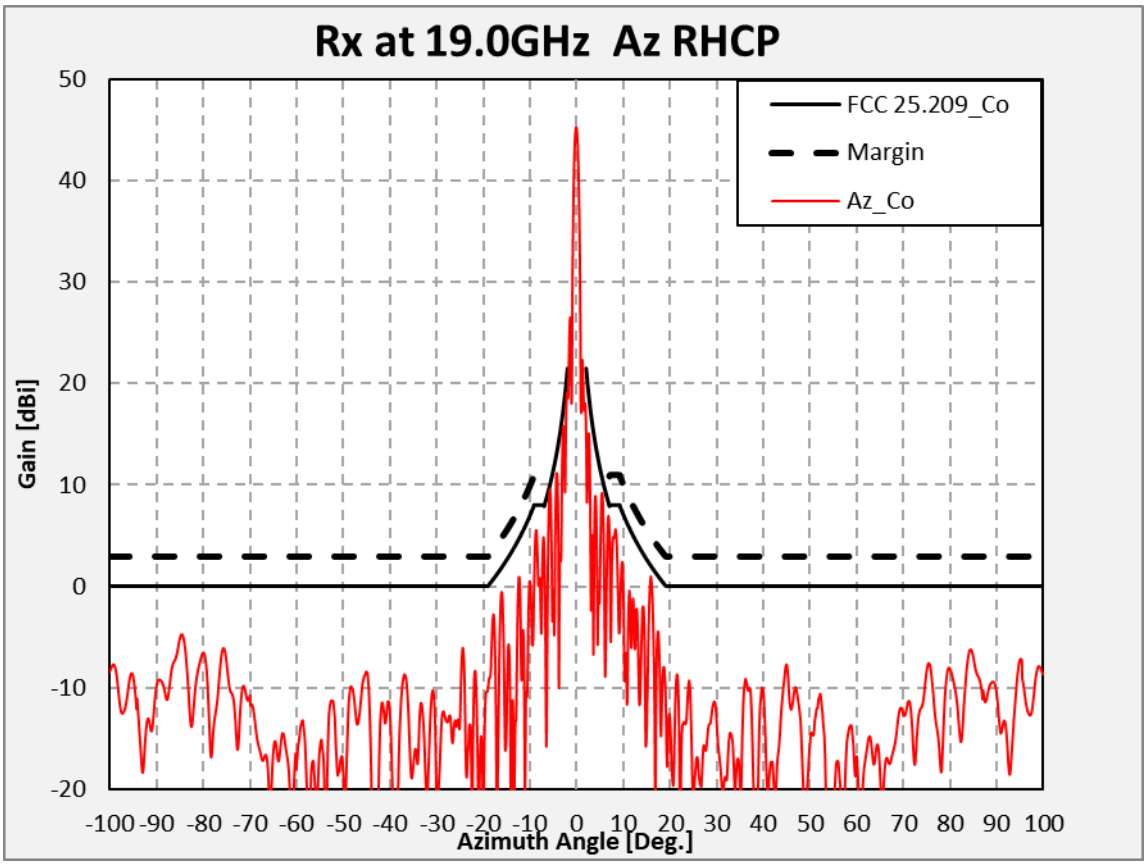

Figure 65 Plot for Azimuth Co-pol (Range: {-90 : 90} deg)

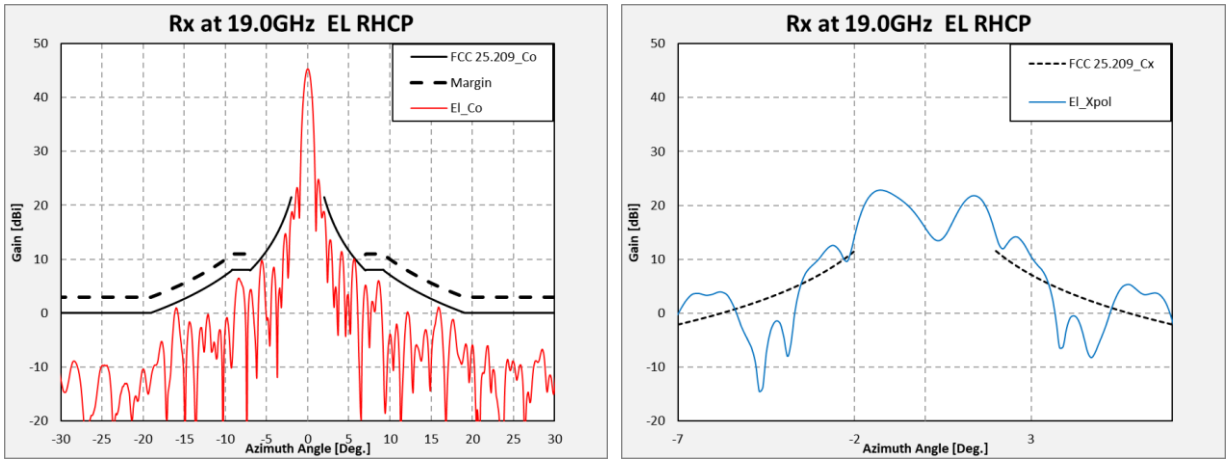

Figure 66 Plot for Elevation Co & X-pol

7.4.12. Plots for 20.2 GHz(LHCP)

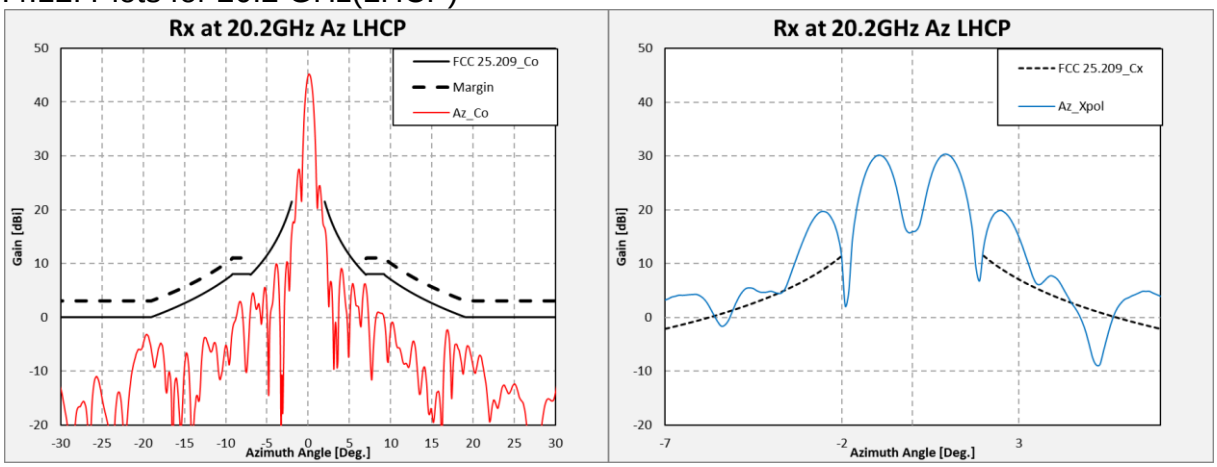

Figure 67 Plot for Azimuth Co & X-pol

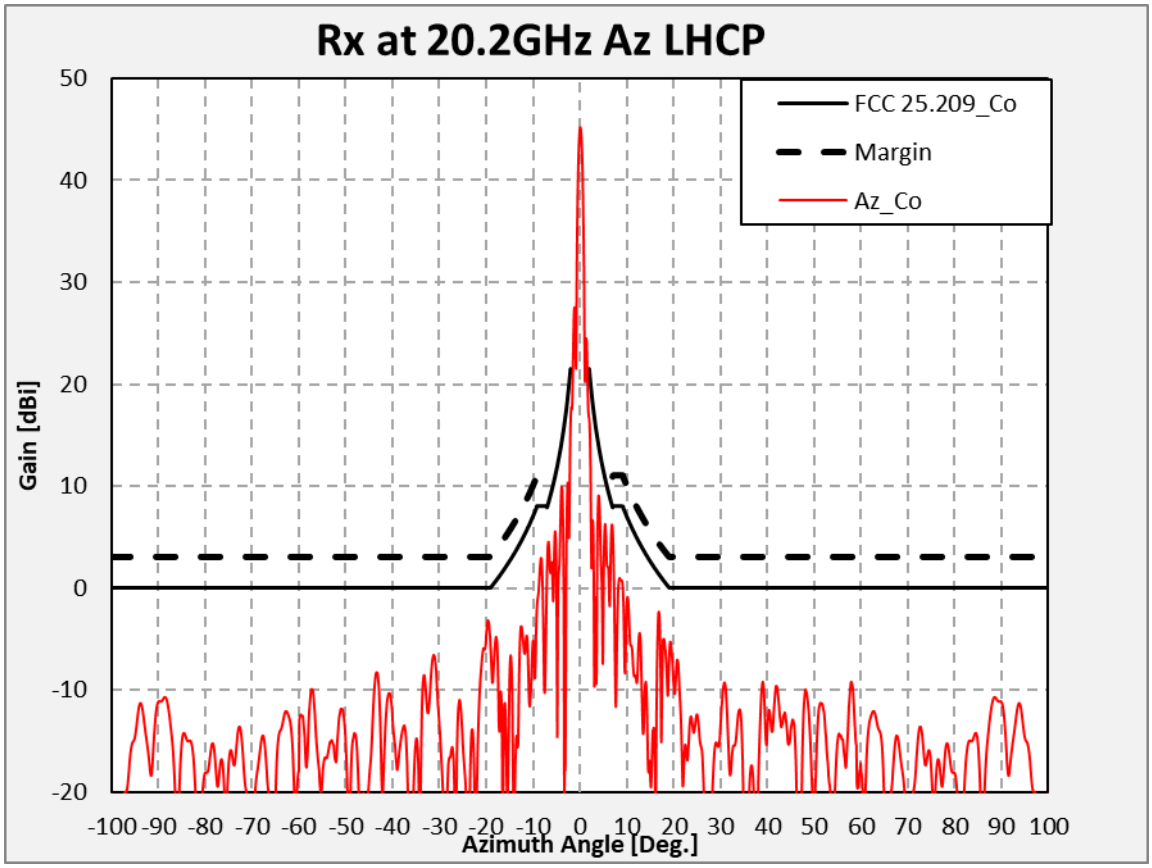

Figure 68 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

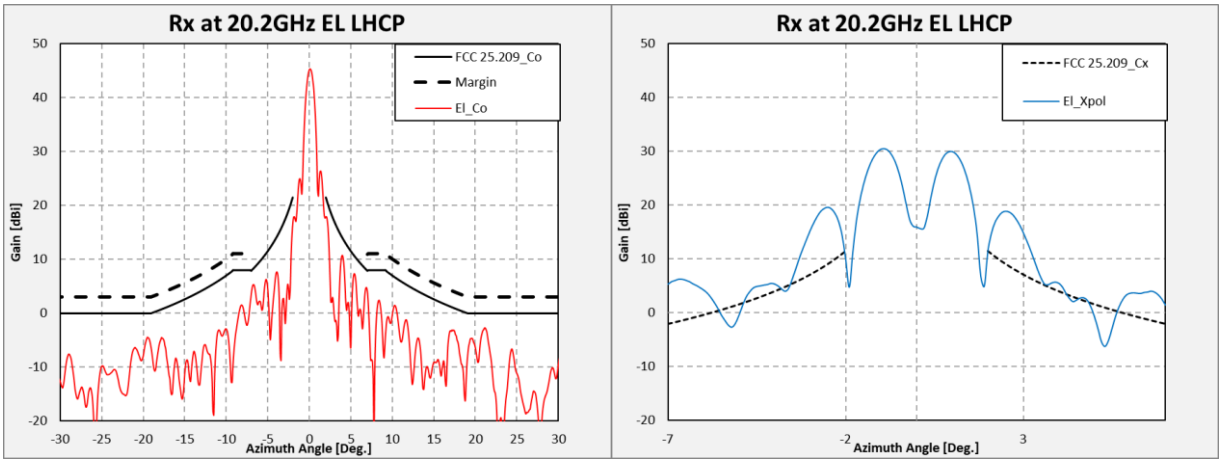

Figure 69 Plot for Elevation Co & X-pol

7.4.13. Plots for 20.2 GHz(RHCP)

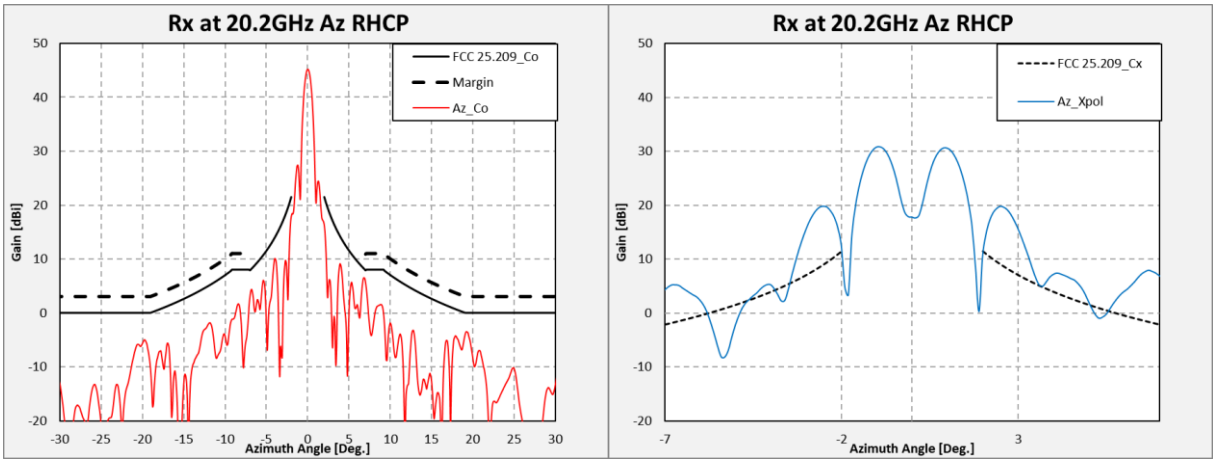

Figure 70 Plot for Azimuth Co & X-pol

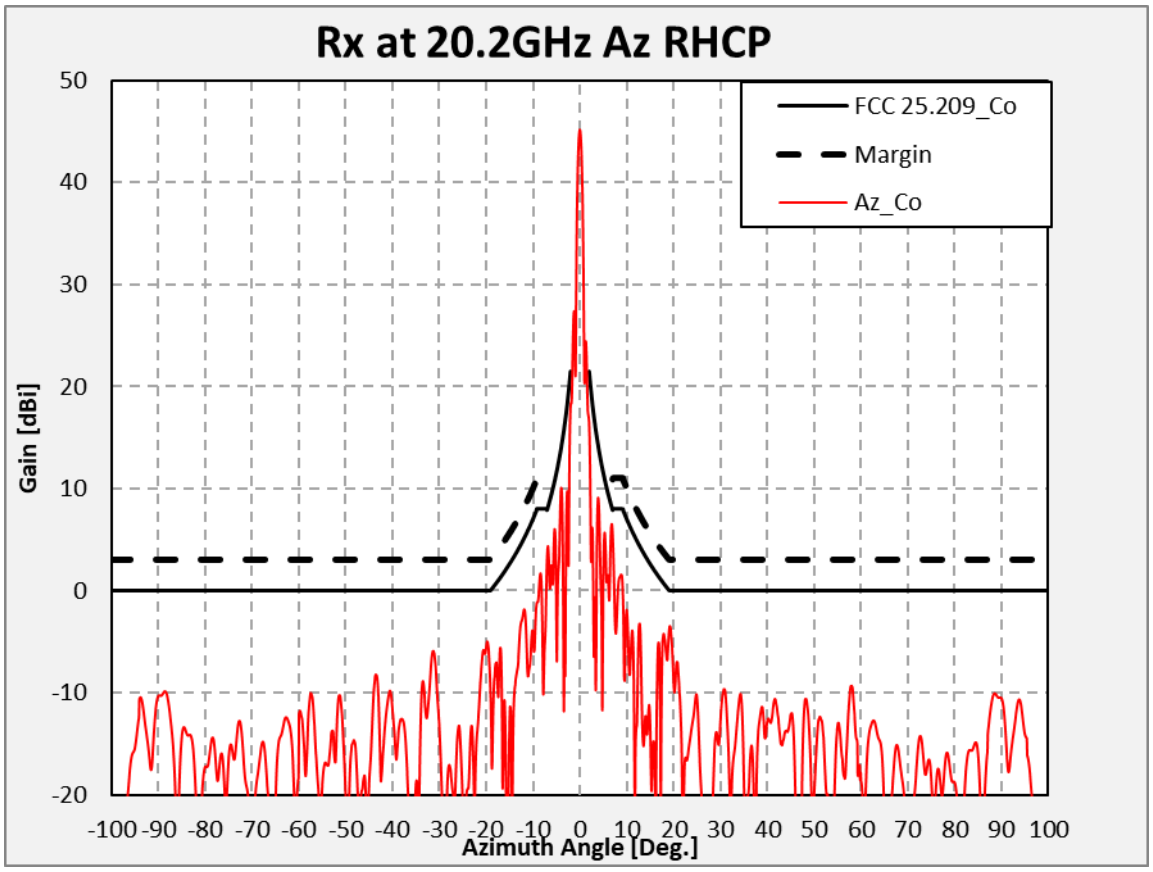

Figure 71 Plot for Azimuth Co-pol (Range: {-100 : 100} deg)

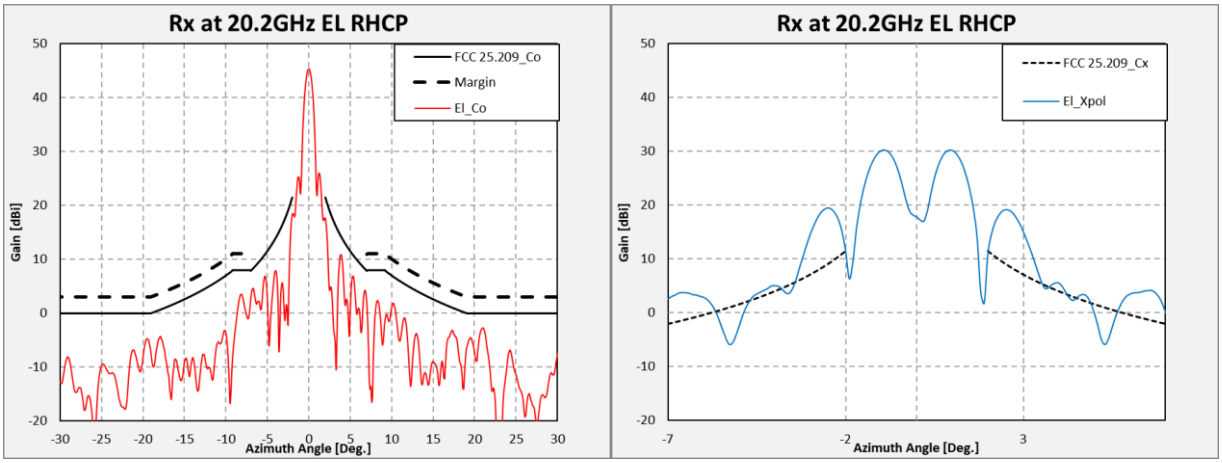

Figure 72 Plot for Elevation Co & X-pol

8. CPI

8.1. Requirement

2.2.2.1 Cross-polarization discrimination

Frequency Band (GHz)	Polarization (switchable)	Cross Polarization Discrimination (XPD)	EIRP (Mid Band)	G/T (Mid Band)	Amplifier (Typical)
RX 17.7-20.2 TX 27.5-30.0	RH or LH Co & Cross Pol	≥25 dB	≥ 61 dBW	≥ 21 dB/K	8 - 20 W
RX 10.7 – 12.75 TX 13.75 – 14.5	Linear X Pol (V/H) Co Pol Option	≥30 dB	≥ 55 dBW	≥ 21 dB/K	≥ 25W

Table 3 RF Specification

8.2. Development Specification

Intellian would meet Tx ≥ 30 dB and Rx ≥ 30 dB.(KU Band)

Intellian would meet Tx ≥ 25 dB and Rx ≥ 21 dB.(Ka Band)

8.3. Measured CPI (On Axis)

8.3.1. Test Method

8.3.1.1. Ku Band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Receive V-POLat 10.95 GHz, 11.85 GHz and 12.75 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
    - Repeat this measurement at Receive H-POL

- Plot the CPI that is the difference level between co-pol with cross-pol at on axis point.
- Plot the lower of V-POL-CPI or H-POL-CPI at the same frequency.

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB]	≥30					
Development Specification [dB]	≥30			≥30		
Measured CPI [dB]	32.3	36.6	40.2	37.7	34.8	35.2

8.3.1.2. Ka Band

- Configure the antenna with radome in the Planar nearfield test range(PNF) to point with 30° elevation.
    - Receive RHCP at 17.7 GHz, 19.0 GHz and 20.2 GHz measure the Co-pol & Cross-pol pattern over full scan (about ±100°) for this pointing angle.
    - Repeat this measurement at Receive LHCP.
- Plot the CPI that is the difference level between co-pol with cross-pol at on axis point.
- Plot the lower of RHCP-CPI or LHCP-CPI at the same frequency.

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB]	≥25					
Development Specification [dB]	≥21			≥25		
Measured CPI [dB]	23.2	29.4	27.4	28.6	27.5	25.8

9. Radome loss

9.1. Requirement

2.2.4.2 Radome loss	**The dry radome losses shall be no greater than 0.5dB for all three frequency bands for the respective transmit and receive frequency ranges.**

9.2. Development Specification

Intellian would meet under 1.0 dB

9.3. Measured Loss

9.3.1. Test Methodc

9.3.1.1. Ku Band

- Using Measured " Excl.radome gain" and " Incl.radome gain",calculate the radome loss.
- Plot the higher of V-POL-radome-loss or H-POL-radome-loss at the same frequency.

Frequency[GHz]	10.95	11.85	12.75	13.75	14	14.5
Requirement [dB]	≤0.5					
Development Specification [dB]	≤1.0					
Measured Gain (Excl.Radome)[dBi]	41.4	42.0	42.7	42.7	43.0	43.5
Measured Gain (Incd.Radome)[dBi]	41.1	41.7	42.4	42.4	42.7	43.2
Measured loss [dB]	0.3	0.3	0.3	0.3	0.3	0.3

9.3.1.2. Ka Band

- Using Measured " Excl.radome gain" and " Incl.radome gain",calculate the radome loss.
- Plot the higher of RHCP-radome-loss or LHCP-radome-loss at the same frequency.

Frequency[GHz]	17.7	19.0	20.2	27.5	28.8	30.0
Requirement [dB]	≤0.5					
Development Specification [dB]	≤1.0					
Measured Gain (Excl.Radome)[dBi]	45.3	45.8	45.7	49.0	49.2	49.5
Measured Gain (Incd.Radome)[dBi]	44.8	45.3	45.2	48.3	48.5	48.8
Measured loss [dB]	0.5	0.5	0.5	0.7	0.7	0.7