



Technical Brief Intellicom Location

July 20, 2019



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Approved by:

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Revision History

Revision History:	Date	Document Revision Description
V01.0	2019 04 27	Initial Release
V01.1	2019 07 10	Updated with satellite parameters
V0.1.2	2019 07 20	Removed frequency band 28.5-30 GHz



2 INTRODUCTION

We are seeking an FCC experimental license for testing, evaluation, and certification of fixed earth stations.

As a commercial entity we are seeking a license to transmit within 30 to 31 GHz. Transmissions will be coordinated and approved in advance with the commercial and government satellite operators.

Since the 30-31 GHz band is assigned for federal use, we anticipate that FCC will need to coordinate with the NTIA via the IRAC Interdepartmental Radio Advisory Committee. The earth stations will be owned and tested and certified by a commercial entity. Future ARSTRAT certified earth stations will be manufactured and sold to the US Government for their use. We are including a statement of US government interest and a government point of contact supporting this activity.

The earth stations are compliant with **47CFR §25.209**.

Please contact the following for additional information, comments, or clarifications:

Paul Moller
Intellicom Technologies, Inc.
480-993-2220
PMoller@ITCcom.net
www.ITCcom.net



3 SYSTEM DESCRIPTION

This section provides a description of the SATCOM system.

3.1 Satellites (Points of Communication)

We are requesting a license for U.S. licensed space stations.

Satellites include:

- Only with authorization from ARSTRAT
 - WGS5 at 52.5W, 1000 MHz
 - WGS6 at 135W, 1000 MHz
- Only with authorization from Inmarsat
 - Inmarsat I-5 F2 at 55W, 1000 MHz

Link Budget Estimates

20190329m12v01.1_Terminal_Specs.xlsx

Satellite Parameters (Estimated)			
<i>Rx Antenna Beamwidth (Degrees)</i>			
<i>Narrow Coverage Beam</i>			
<i>(~400 mi diameter)</i>	1		
<i>Sat Grx (dBi) (30.5 GHz)</i>			
<i>(60% efficient)</i>	45		
<i>LNA Gain (dB)</i>	50		
<i>Receiver Transfer Gain (dB)</i>	15		
<i>HPA Gain (dB)</i>	52		
<i>Tx Antenna Beamwidth (Degrees)</i>			
<i>Narrow Coverage Beam</i>			
<i>(~400 mi diameter)</i>	1		
<i>Sat Gtx (dBi) (20.7 GHz)</i>			
<i>(60% efficient)</i>	45		
Satellite Transfer Gain (dB)		207	207



3.2 Earth Stations

Location	Intellicom Technologies 3215 N Arizona Ave, Suite B18 Chandler, Az 85225
Coordinates	33°21'06" N 111°50'24" W
Elevation Range	16 to 44 degrees
Azimuth Range	108 to 218 degrees
Transmit Frequency	30.0 to 31.0 GHz
Receive Frequency	20.2 to 21.2 GHz

Earth Station Attributes															
20190329m12v01.0_Terminal_Specs.xlsx															
ID	Band	Terminal	Model	Antenna	HPA psat (dBm)	HPA sat (watts)	WG Loss (dB)	Power Into Feed (dBm)	Power Into Feed (watts)	Gtx (dBi)	EIRP (dBW)	EIRP kW	Grx (dBi)	G/T (dB/K)	Description
															
1	ka	AVL/Viasat	BAT-600 MMT	60cm	42.9	19.4	0.67	42.2	16.6	44.4	56.6	457	40.2	17	First Article
2	ka	AVL	Model 1315	130cm	41.3	13.5	0	41.3	13.5	50.9	62.2	1660	46.2	22	First Article

Earth Station Pointing Angles			
20190329m12v01.1_Terminal_Specs.xlsx			
Intellicom, Chandler			
33.351715N	33°21'06.2"N		
111.840019W	111°50'24.1"N		
		Earth Station Pointing	
Satellites	Location (degrees)	Elevation (degrees)	True Azimuth (degrees)
WGS5 at 52.5W	52.5W	16.9	108.1
Inmarsat I-5 F2 (55W)	55W	19.0	109.8
WGS6 at 135W	135W	43.9	217.9
	Min	16	108
	Max	44	218



3.3 Link Budget Estimates

Downlink carrier PSD meets requirements.

Link Budget Estimates			
20190329m12v01.1_Terminal_Specs.xlsx			
	60 cm	134 cm	
HPA Power Output (dBW)	12.8	4.3	
Coupling + Mispointing Losses (dB)	0.87	0.87	
Earth Station Gain (dBi) (30.5 GHz)	44.4	50.9	
Uplink EIRPu (dBW)	56.4	54.3	
Path Loss Uplink (dB)	215	215	
Satellite Input (dBW)	-159	-161	
Satellite Parameters (Estimated)			
Rx Antenna Beamwidth (Degrees)			
Narrow Coverage Beam (~400 mi diameter)	1		
Sat Grx (dBi) (30.5 GHz)			
(60% efficient)	45		
LNA Gain (dB)	50		
Receiver Transfer Gain (dB)	15		
HPA Gain (dB)	52		
Tx Antenna Beamwidth (Degrees)			
Narrow Coverage Beam (~400 mi diameter)	1		
Sat Gtx (dBi) (20.7 GHz)			
(60% efficient)	45		
Satellite Transfer Gain (dB)		207	207
Downlink EIRPd (dBW)			
	48.8	46.7	
Path Loss downlink (dB)	211.8	211.8	
Earth Station Input (dBW)	-163.1	-165	
Grx (dBi)	40.2	41.3	
Carrier power into LNB	-122.9	-124	
LNB gain	50	50	
Es Receiver input (dBm)	-43	-44	
Es G/T (dB/K)	17	22	
Link C/No			
Uplink C/No (dB/Hz)	98.94	102.46	
Downlink C/No (dB/Hz)	97.34	103.84	
Total C/No (dB/Hz)	95.1	100.1	
Total Es/No (dB)	10	10	
Downlink Density			
EIRPd (dBW)	48.78	46.71	
Path Loss d (dB)	211.8	211.8	
G(1m, 20.7) dBi	47.78	47.78	
DL Density (dBW/m ²)	-115	-117	
Occupied Bandwidth (MHz)			
(10 Msymbols/s QPSK)	10	10	
DL Density (dBW/m ² /MHz)	-125	-127	
Mil-Std-188-164C, 4.3.2			
Max PFD (dBW/m ² /MHz)	-112	-112	
FCC 25.208c3, 17.7-19.7, 22.55-23.55 GHz, 25-90 degrees above horizontal plane	-105	-105	
FCC 25.208c3, 17.7-19.7, 22.55-23.55 GHz, 0-5 degrees above horizontal plane	-115	-115	
Minimum Es Elevation Angle (degrees)	16	16	
Worst case Satellite to earth beam grazing angle (above horizontal) (degrees)			
~ Es -satellite beamwidth	15	15	
downlink density meets requirements			



3.4 Points of Contact

Primary Contact:

Paul Moller
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Secondary Contact:

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Cell: 858.663.4520
Intellicom Technologies, Inc



4 Antenna Patterns - AVL Model 1315

4.1 Summary

The antenna is compliant with:

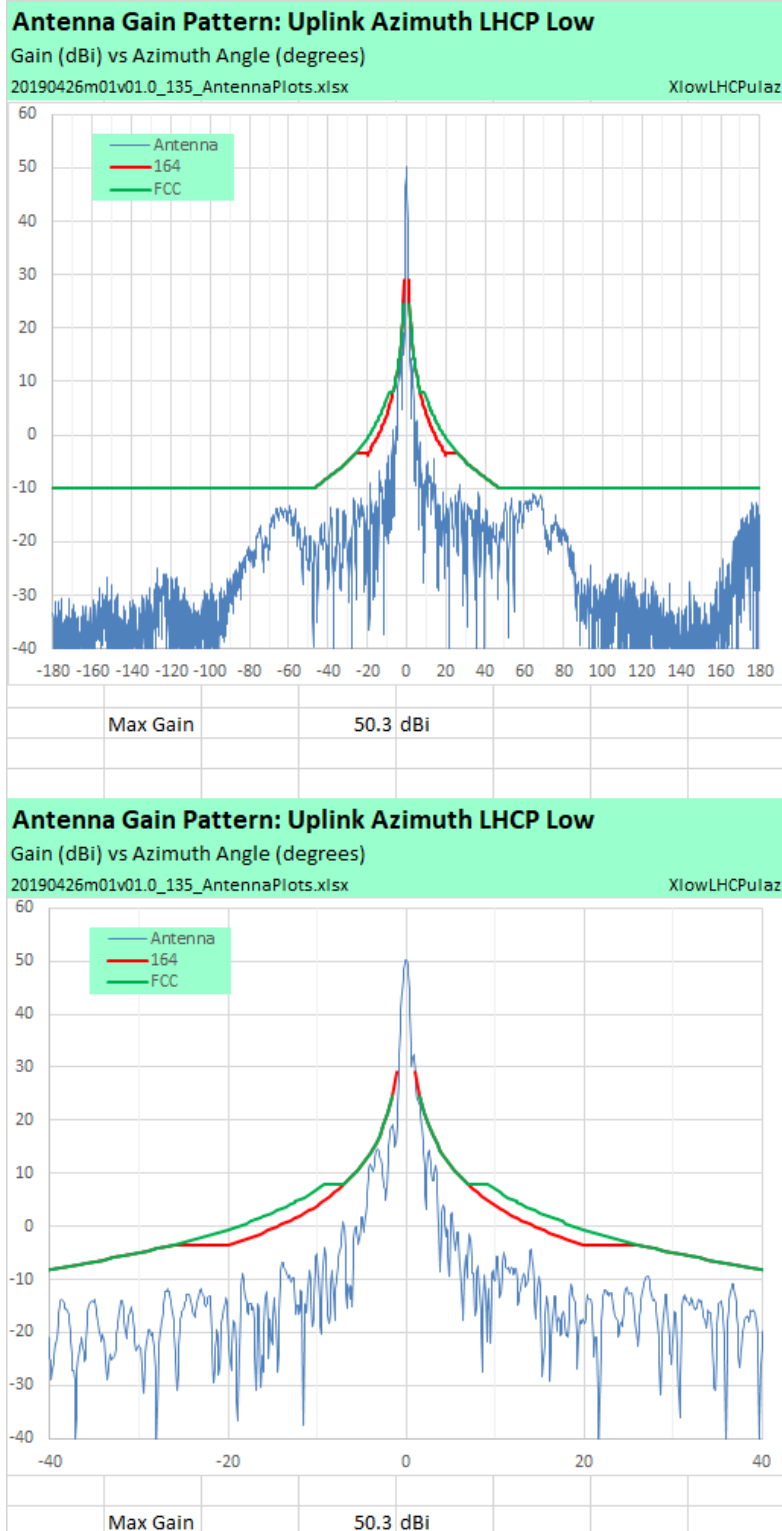
- CFR-2010-title47-vol2-sec25-209
- Mil-Std-188-164c

Transmit Gain and Axial Ratio			
	30.000 GHz	30.500 GHz	31.000 GHz
Gain, dBi LHCP	50.6	50.7	50.9
Gain, dBi RHCP	50.6	50.7	50.9
Axial Ratio, (dB) LHCP	0.8	0.9	0.7
Axial Ratio, (dB) RHCP	0.8	0.9	0.7

3 dB beamwidth in Azimuth is +/-0.3 or 0.6 degrees



4.2 Tx LHCP Azimuth

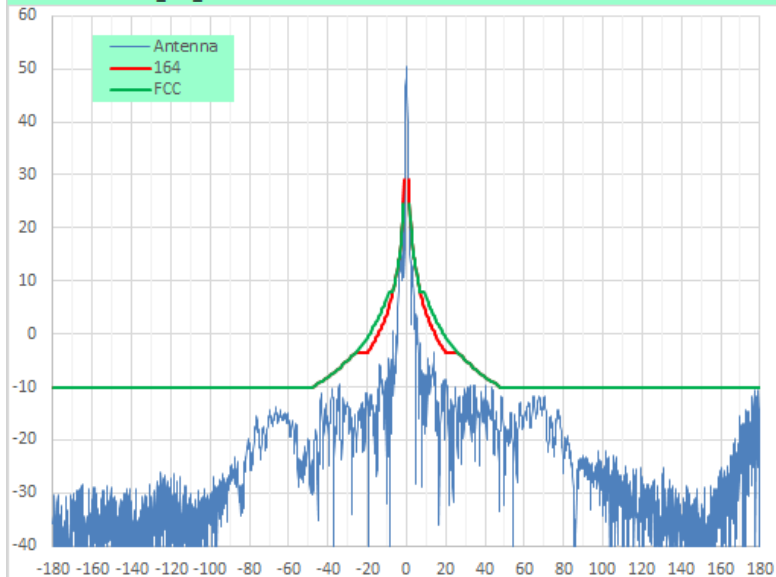


**Antenna Gain Pattern: Uplink Azimuth LHCP Mid**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidLHCPulaz



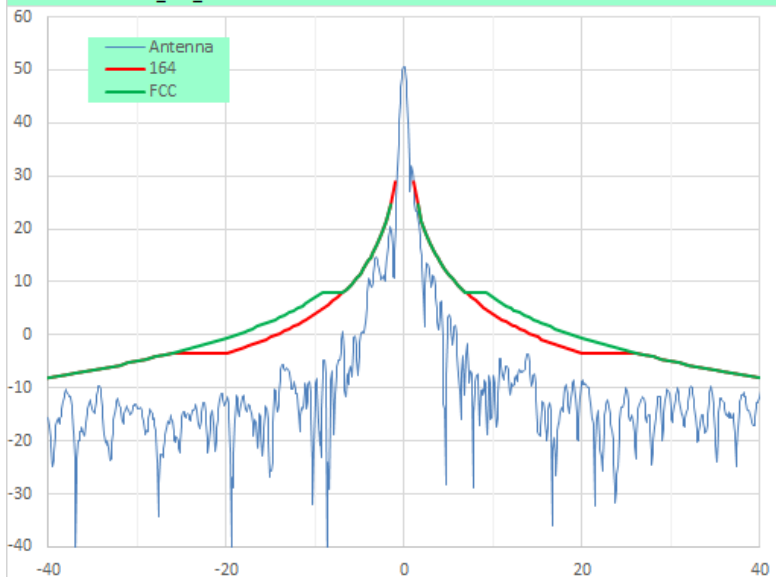
Max Gain 50.5 dBi

Antenna Gain Pattern: Uplink Azimuth LHCP Mid

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidLHCPulaz



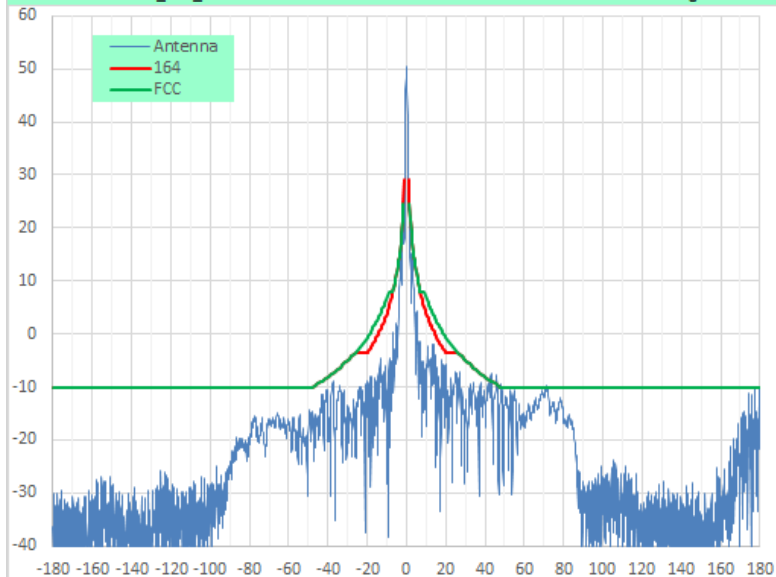
Max Gain 50.5 dBi

**Antenna Gain Pattern: Uplink Azimuth LHCP High**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XhighLHCPulaz



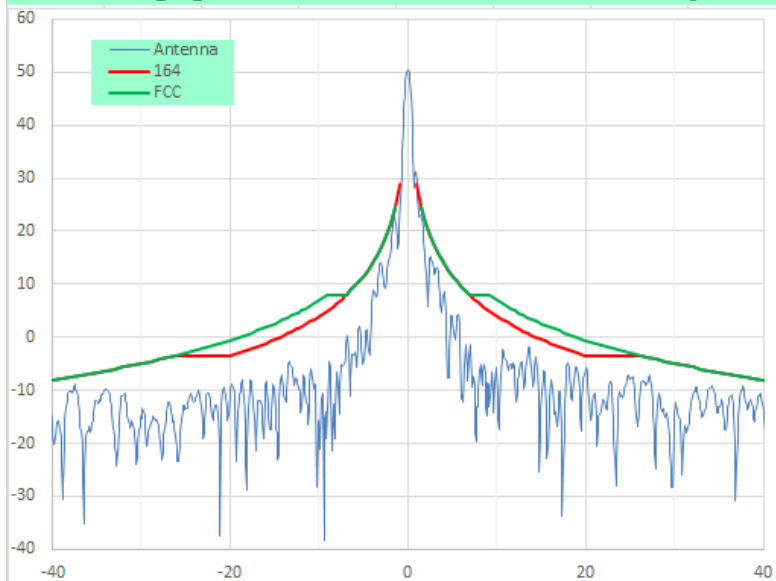
Max Gain	50.6 dBi
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Antenna Gain Pattern: Uplink Azimuth LHCP High

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

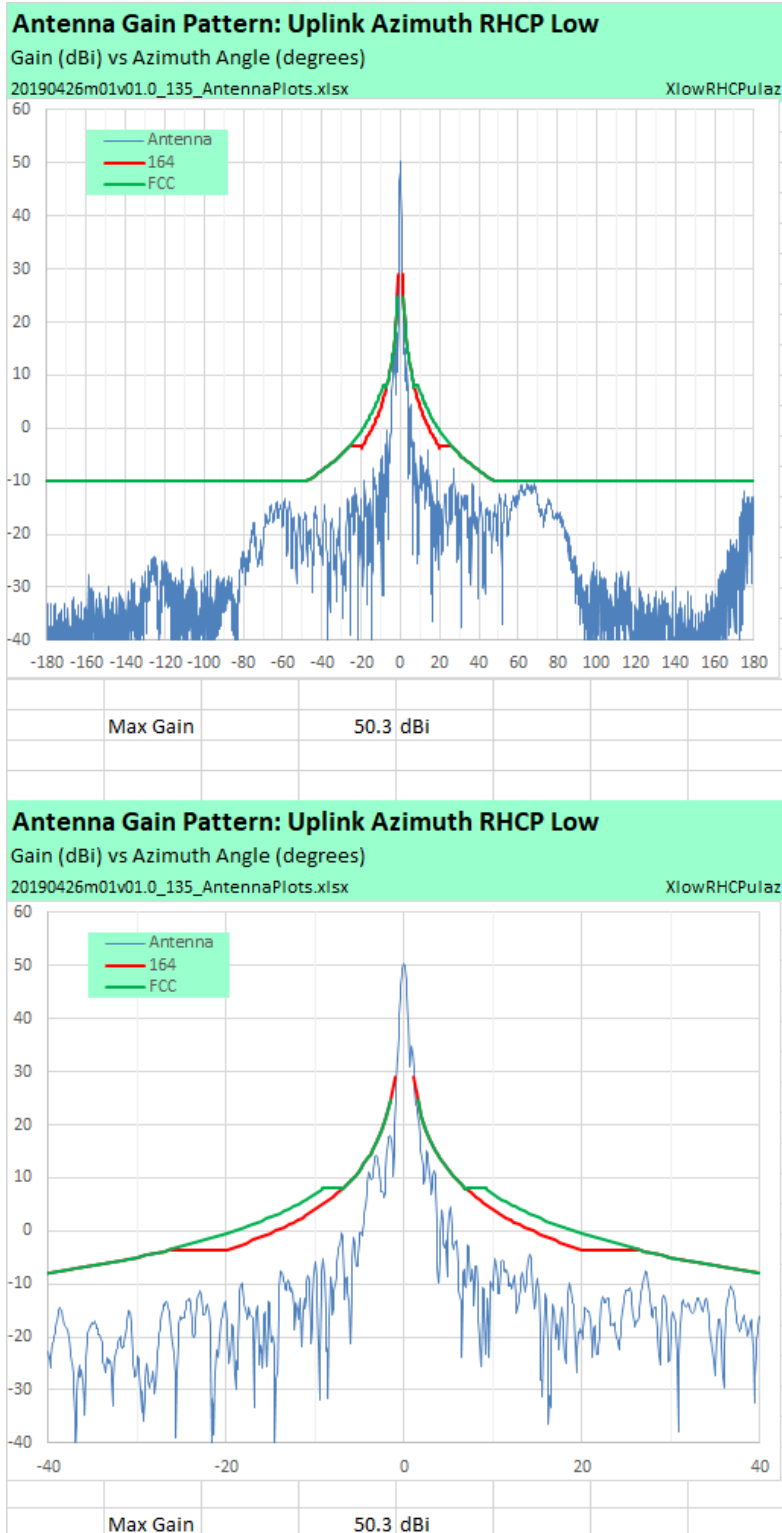
XhighLHCPulaz



Max Gain	50.6 dBi
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4.3 Tx RHCP Azimuth

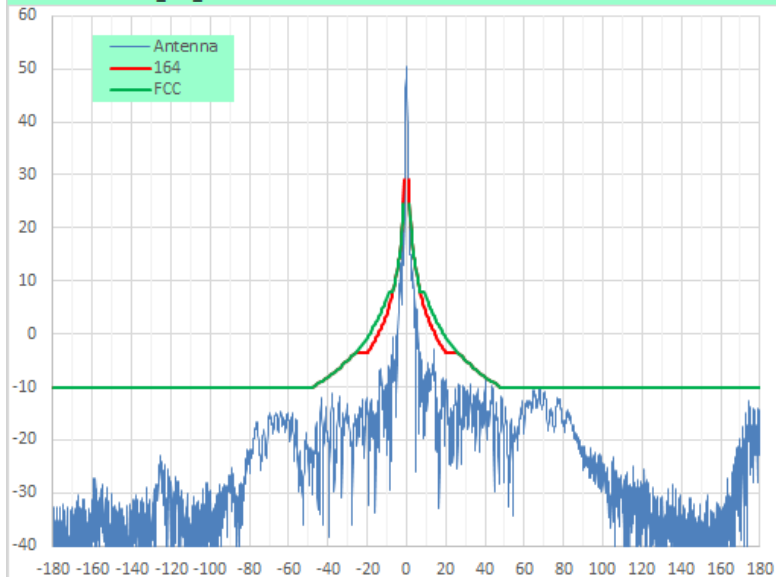


**Antenna Gain Pattern: Uplink Azimuth RHCP Mid**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidRHCPulaz



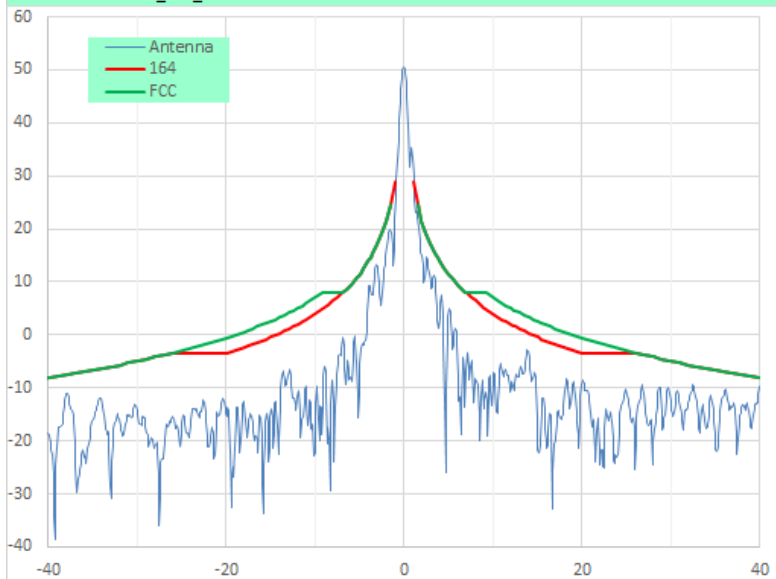
Max Gain	50.5 dBi
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Antenna Gain Pattern: Uplink Azimuth RHCP Mid

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidRHCPulaz



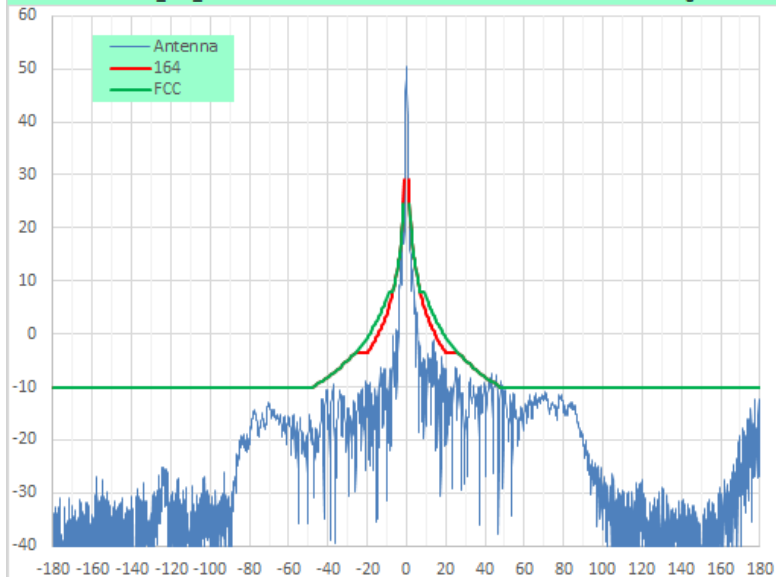
Max Gain	50.5 dBi
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**Antenna Gain Pattern: Uplink Azimuth RHCP High**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XhighRHCPulaz



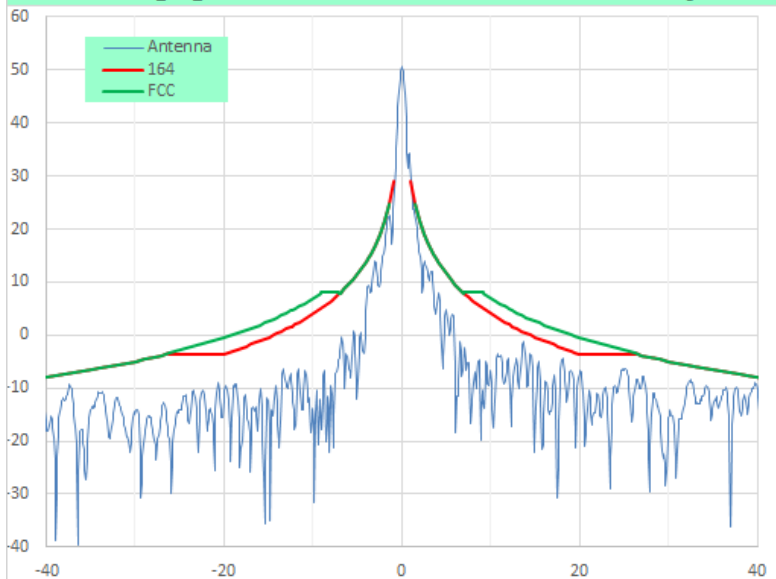
Max Gain	50.6 dBi
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Antenna Gain Pattern: Uplink Azimuth RHCP High

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

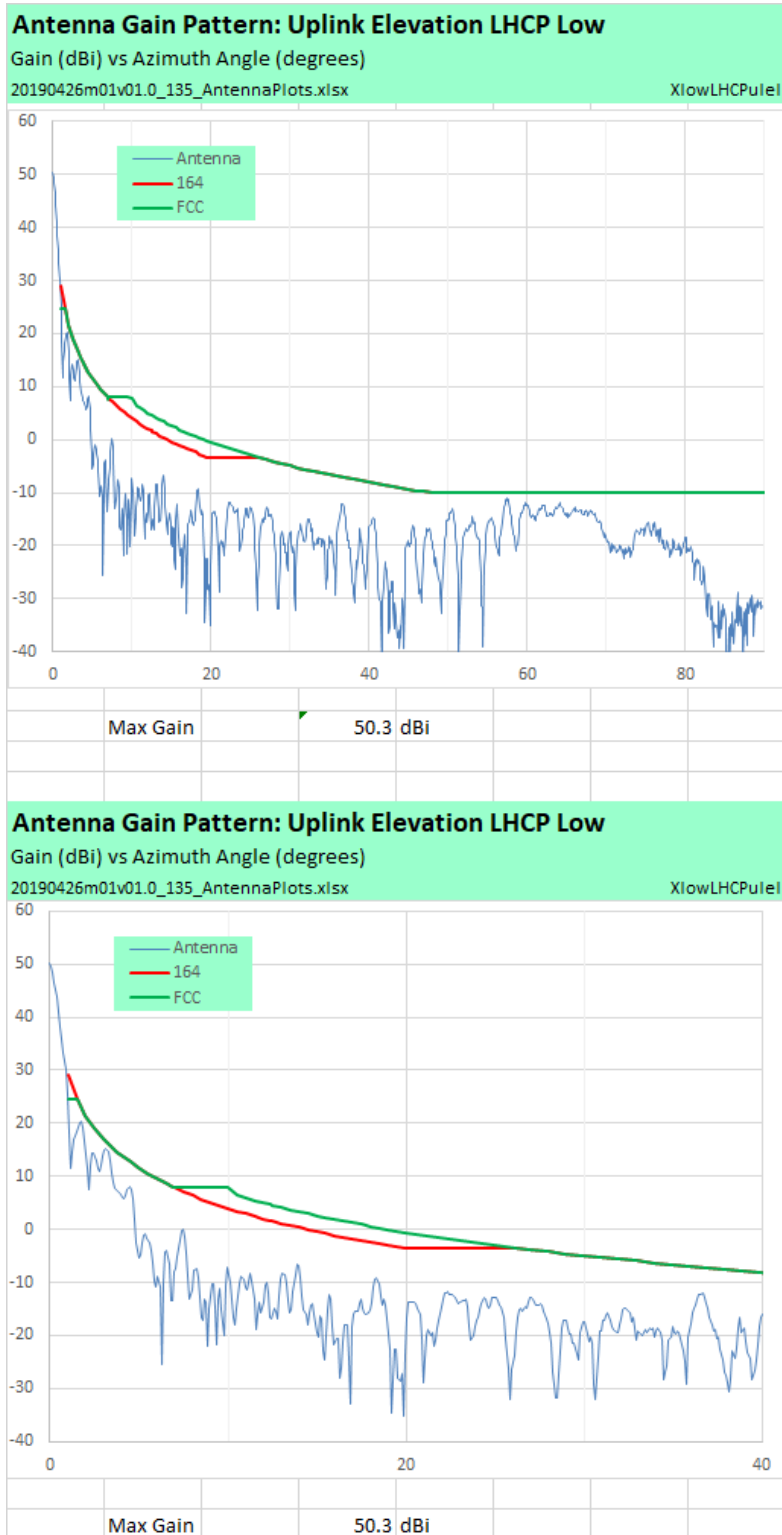
XhighRHCPulaz

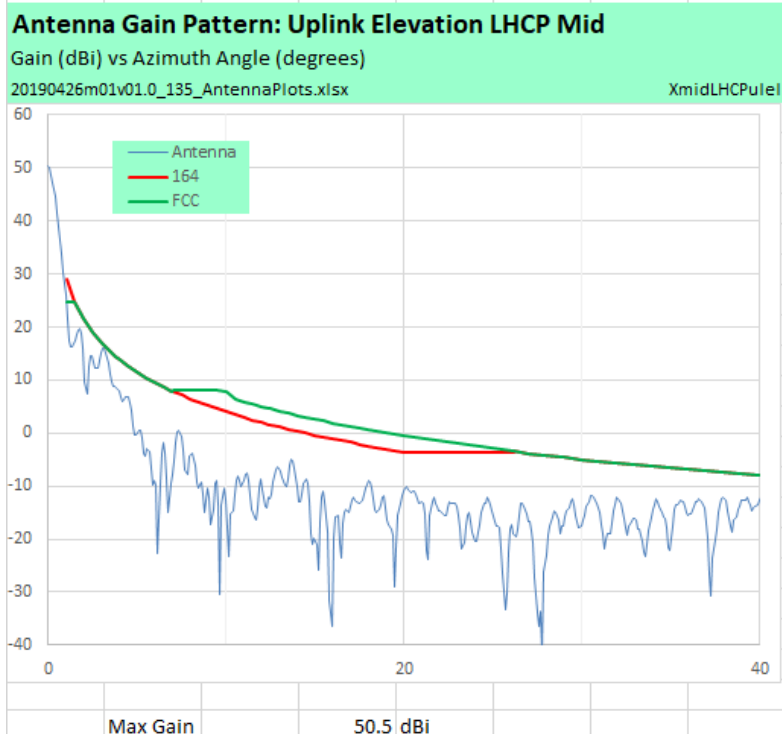
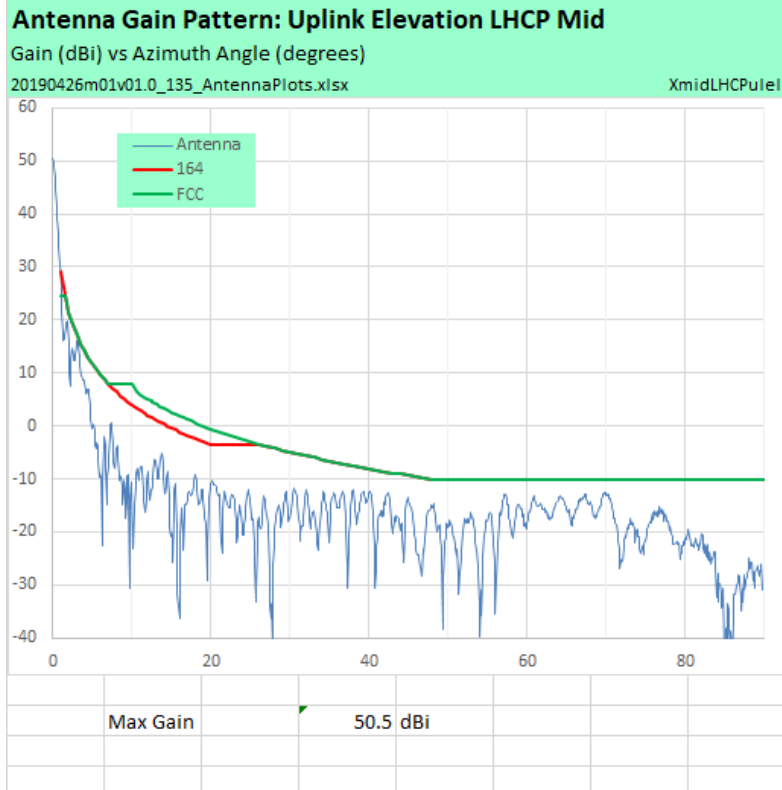


Max Gain	50.6 dBi
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4.4 Tx LHCP Elevation



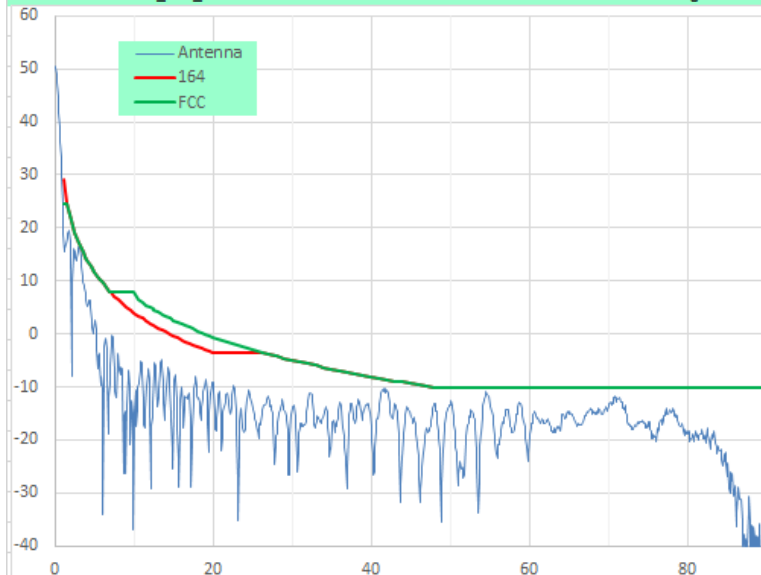


**Antenna Gain Pattern: Uplink Elevation LHCP High**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XhighLHCPuleI



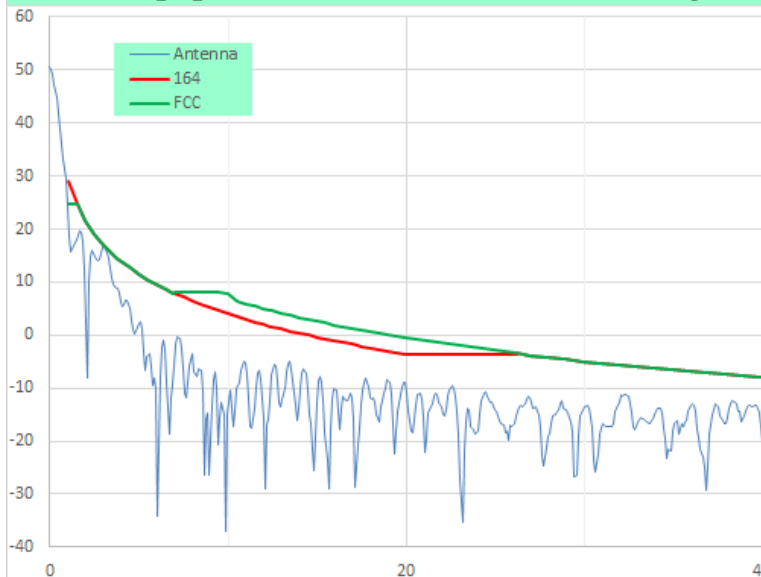
Max Gain 50.6 dBi

Antenna Gain Pattern: Uplink Elevation LHCP High

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

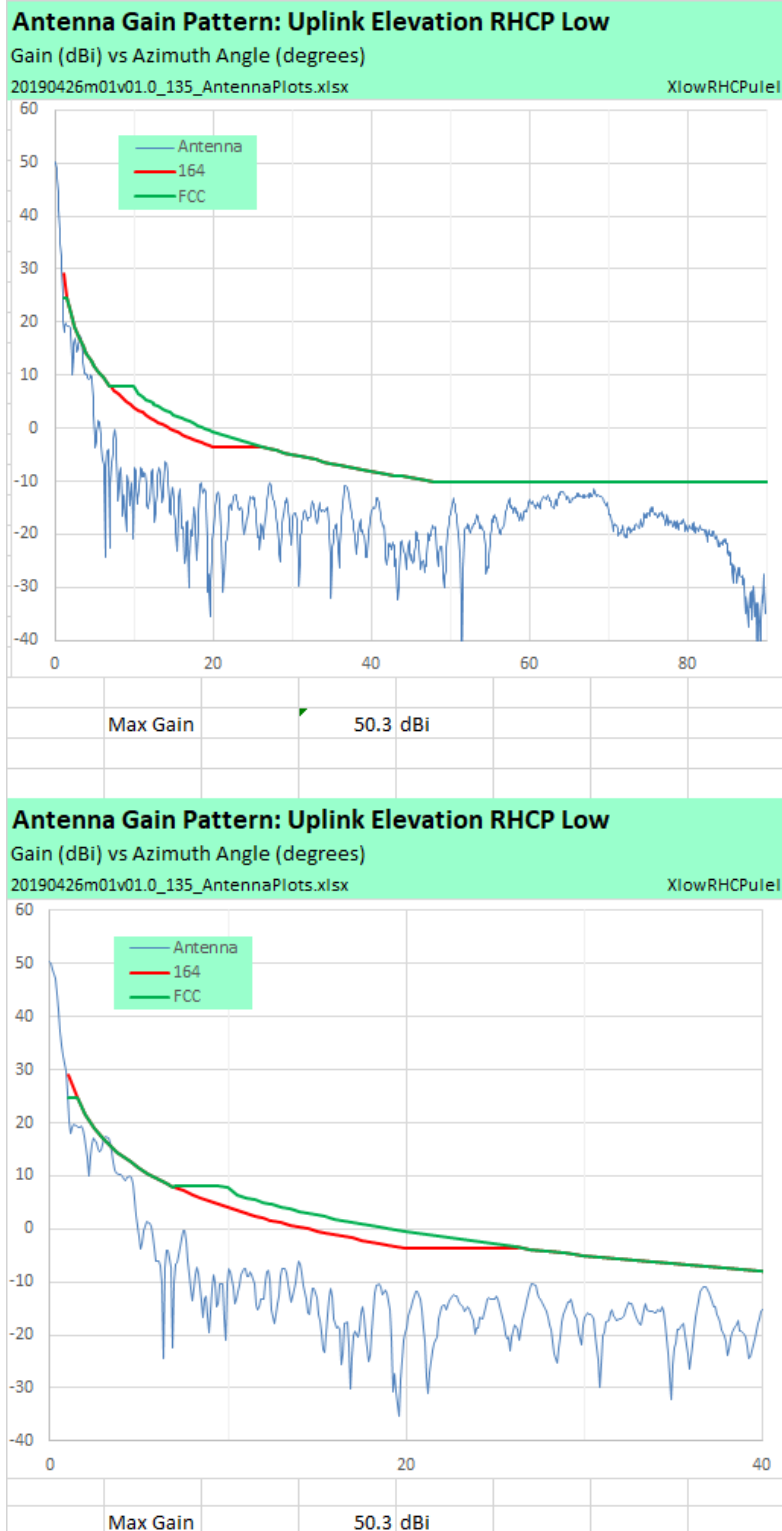
XhighLHCPuleI



Max Gain 50.6 dBi



4.5 Tx RHCP Elevation

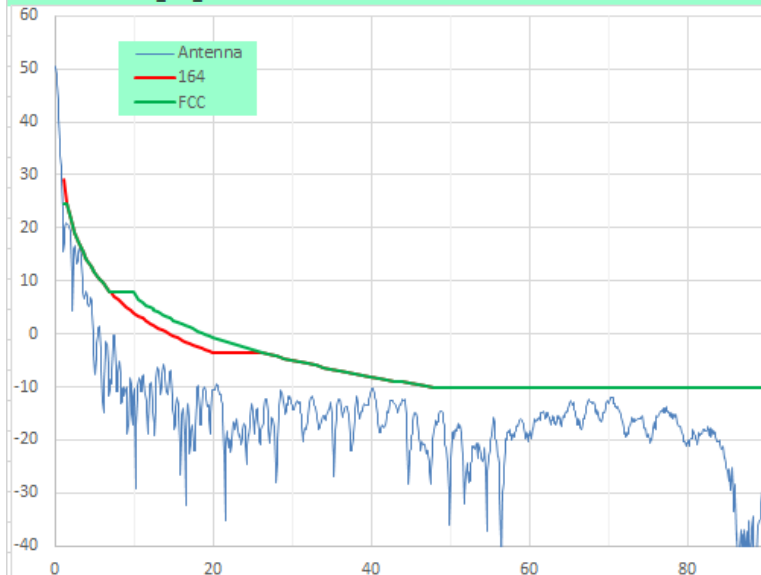


**Antenna Gain Pattern: Uplink Elevation RHCP Mid**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidRHCPuleI



Max Gain 50.5 dBi

Antenna Gain Pattern: Uplink Elevation RHCP Mid

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XmidRHCPuleI



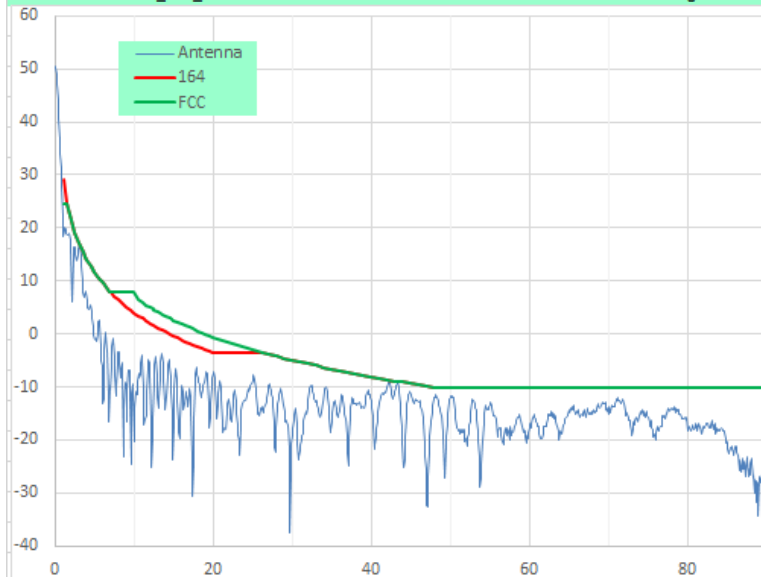
Max Gain 50.5 dBi

**Antenna Gain Pattern: Uplink Elevation RHCP High**

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XhighRHCPuleI



Max Gain 50.6 dBi

Antenna Gain Pattern: Uplink Elevation RHCP High

Gain (dBi) vs Azimuth Angle (degrees)

20190426m01v01.0_135_AntennaPlots.xlsx

XhighRHCPuleI



Max Gain 50.6 dBi



5 Antenna Patterns - AVL/Viasat BAT-600

5.1 Summary

The antenna is compliant with:

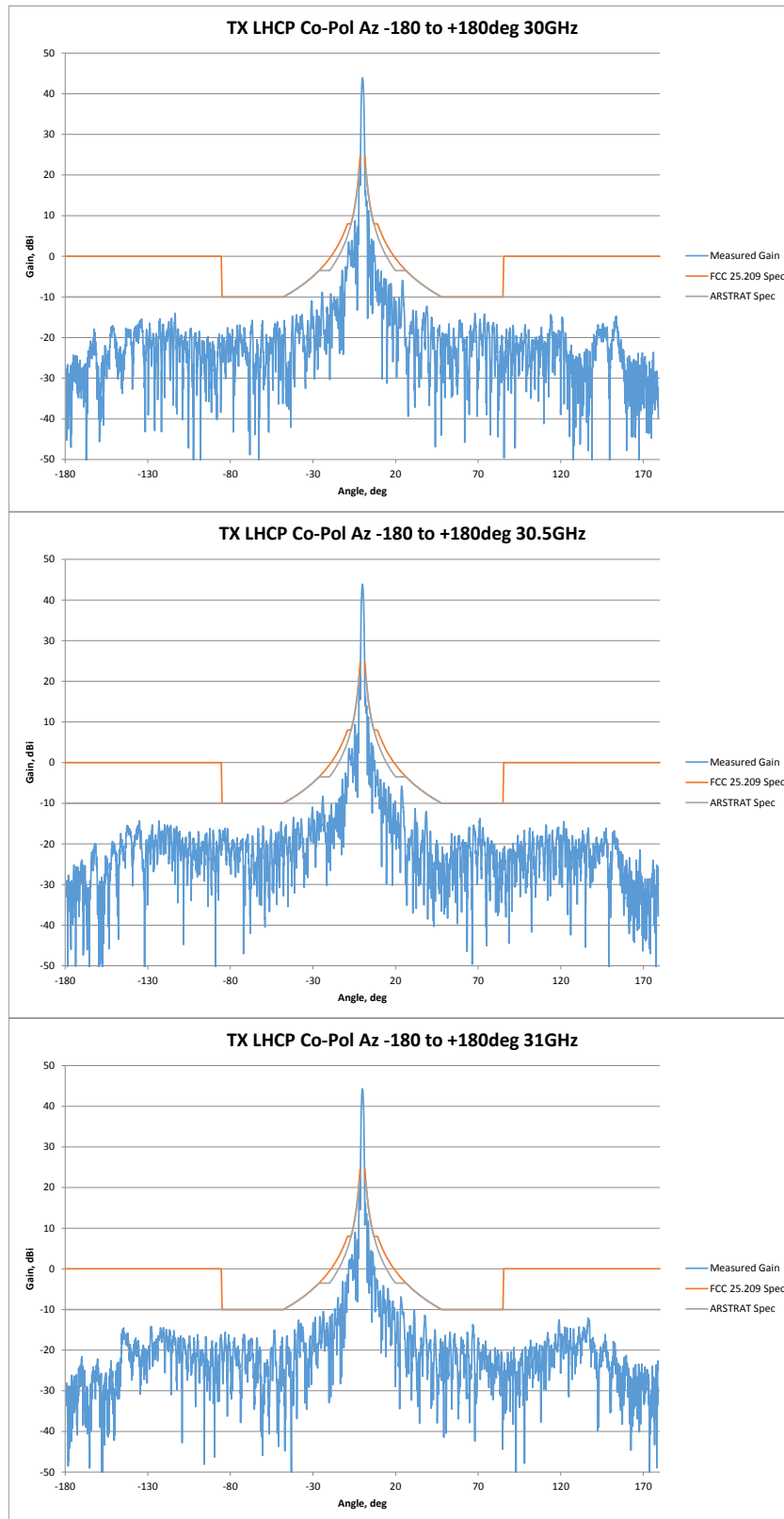
- CFR-2010-title47-vol2-sec25-209
- Mil-Std-188-164c

Transmit Gain and Axial Ratio			
	30.0GHz	30.5GHz	31.0GHz
Gain,dBi LHCP	43.9	43.9	44.4
Gain,dBi RHCP	44.1	43.9	44.2
Axial Ratio,dB LHCP	0.51	0.45	0.69
Axial Ratio, dB RHCP	0.42	0.49	0.77

3 dB beamwidth in Azimuth is 0.9 degrees

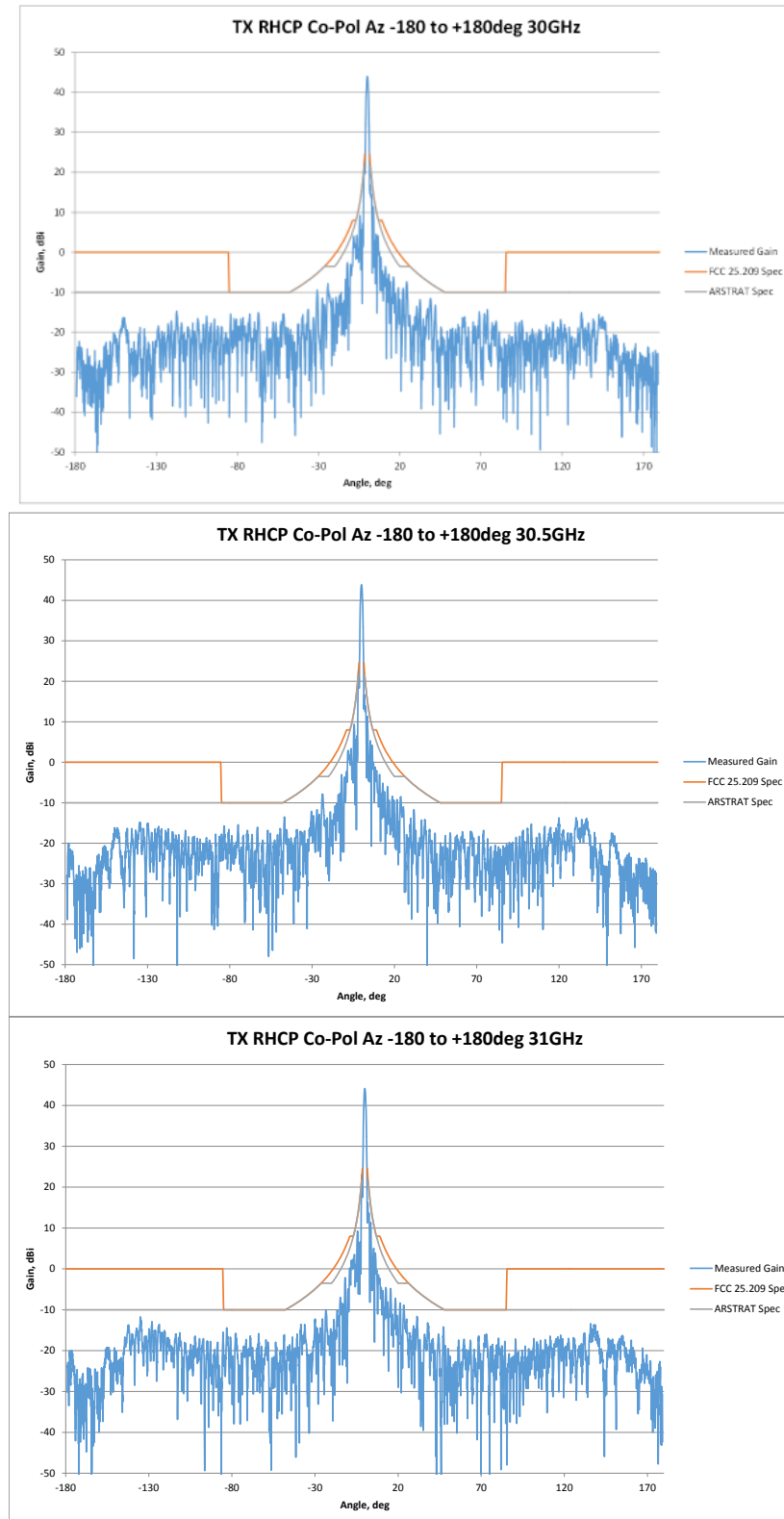


5.2 Tx LHCP Azimuth



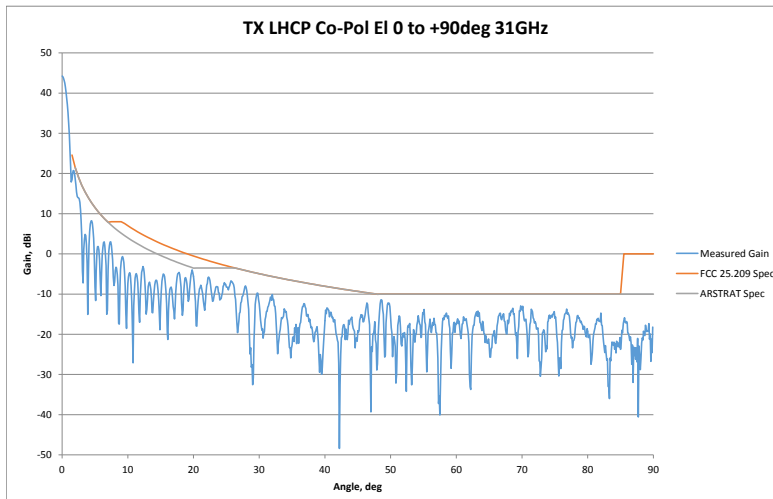
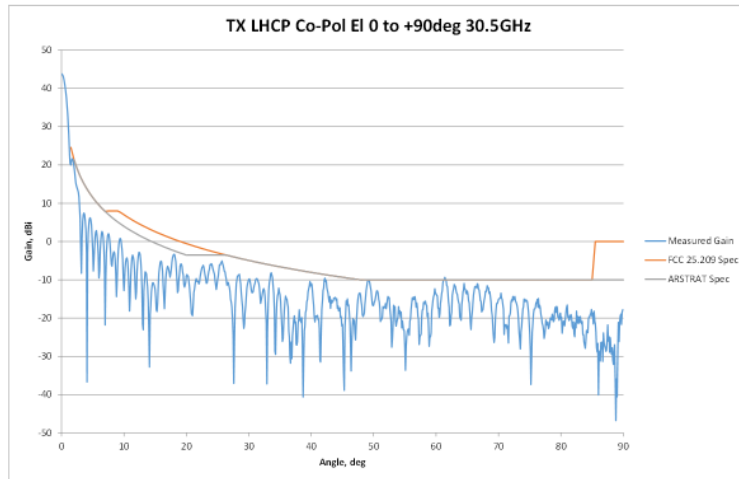
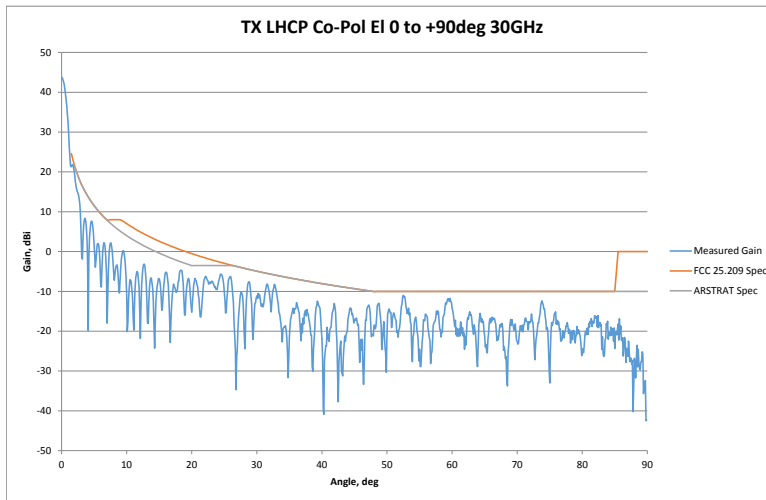


5.3 Tx RHCP Azimuth





5.4 Tx LHCP Elevation





5.5 Tx RHCP Elevation

