Approved by OMB
3060−0678

Date & Time Filed: Apr 17 2019 12:15:11:840PM
File Number: SES−MOD−INTR2019−01120

FCC APPLICATION FOR SPACE AND EARTH STATION:MOD OR AMD − MAIN FORM FCC 312 MAIN FORM FOR OFFICIAL USE ONLY	FCC Use Only

APPLICANT INFORMATION
Enter a description of this application to identify it on the main menu:
Modification of E150097 (Tampa Antenna)

1−8. Legal Name of Applicant

Name:	ISAT US Inc.	**Phone Number:**	202−572−0686
DBA Name:		**Fax Number:**	202−248−5177
Street:	1101 Connecticut Avenue NW Suite 1200	**E−Mail:**	Ethan.Lucarelli@inmarsat.com
City:	Washington	**State:**	DC
Country:	USA	**Zipcode:**	20036 −
Attention:	M. Ethan Lucarelli		

9−16. Name of Contact Representative

Name:	M. Ethan Lucarelli	**Phone Number:**	202−572−0686
Company:	ISAT US Inc.	**Fax Number:**	202−248−5177
Street:	1101 Connecticut Avenue NW Suite 1200	**E−Mail:**	Ethan.Lucarelli@inmarsat.com
City:	Washington	**State:**	DC
Country:	USA	**Zipcode:**	20036−
Attention:		**Relationship:**	

CLASSIFICATION OF FILING

17. Choose the button next to the classification that applies to this filing for both questions a. and b. Choose only one for 17a and only one for 17b. ◉ a1. Earth Station ○ a2. Space Station	(N/A) b1. Application for License of New Station (N/A) b2. Application for Registration of New Domestic Receive−Only Station ○ b3. Amendment to a Pending Application ◉ b4. Modification of License or Registration b5. Assignment of License or Registration b6. Transfer of Control of License or Registration ○ b7. Notification of Minor Modification (N/A) b8. Application for License of New Receive−Only Station Using Non−U.S. Licensed Satellite (N/A) b9. Letter of Intent to Use Non−U.S. Licensed Satellite to Provide Service in the United States (N/A) b10. Other (Please specify) (N/A) b11. Application for Earth Station to Access a Non−U.S.satellite Not Currently Authorized to Provide the Proposed Service in the Proposed Frequencies in the United States (N/A) b12. Application for Database Entry ○ b13. Amendment to a Pending Database Entry Application ○ b14. Modification of Database Entry

17c. Is a fee submitted with this application?

◉ If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).

○ Governmental Entity ○ Noncommercial educational licensee

○ Other(please explain):

17d.

Fee Classification CGX − Fixed Satellite Transmit/Receive Earth Station

18. If this filing is in reference to an existing station, enter:	19. If this filing is an amendment to a pending application enter both fields, if this filing is a modification please enter only the file number:	
(a) Call sign of station: E150097	(a) Date pending application was filed:	(b) File number: SESMOD2018032300263

TYPE OF SERVICE

20. NATURE OF SERVICE: This filing is for an authorization to provide or use the following type(s) of service(s): Select all that apply:

- [x] a. Fixed Satellite
- [ ] b. Mobile Satellite
- [ ] c. Radiodetermination Satellite
- [ ] d. Earth Exploration Satellite
- [ ] e. Direct to Home Fixed Satellite
- [ ] f. Digital Audio Radio Service
- [ ] g. Other (please specify)

21. STATUS: Choose the button next to the applicable status. Choose only one.

( ) Common Carrier (•) Non−Common Carrier

22. If earth station applicant, check all that apply.

- [ ] Using U.S. licensed satellites
- [x] Using Non−U.S. licensed satellites

23. If applicant is providng INTERNATIONAL COMMON CARRIER service, see instructions regarding Sec. 214 filings. Choose one. Are these facilities:

( ) Connected to a Public Switched Network ( ) Not connected to a Public Switched Network (•) N/A

24. FREQUENCY BAND(S): Place an 'X' in the box(es) next to all applicable frequency band(s).

- [ ] a. C−Band (4/6 GHz)
- [ ] b. Ku−Band (12/14 GHz)
- [x] c.Other (Please specify upper and lower frequencies in MHz.)

Frequency Lower: 19700 Frequency Upper: 30000 (Please specify additional frequencies in an attachment)

TYPE OF STATION

25. CLASS OF STATION: Choose the button next to the class of station that applies. Choose only one.

- ○ a. Fixed Earth Station
- ◉ b. Temporary−Fixed Earth Station
- ○ c. 12/14 GHz VSAT Network
- ○ d. Mobile Earth Station
- ○ e. Geostationary Space Station
- ○ f. Non−Geostationary Space Station
- ○ g. Other (please specify)

26. TYPE OF EARTH STATION FACILITY:

◉ Transmit/Receive ○ Transmit−Only ○ Receive−Only ○ N/A

"For Space Station applications, select N/A."

PURPOSE OF MODIFICATION

27. The purpose of this proposed modification is to: (Place an 'X' in the box(es) next to all that apply.)

- [ ] a −− authorization to add new emission designator and related service
- [ ] b −− authorization to change emission designator and related service
- [ ] c −− authorization to increase EIRP and EIRP density
- [ ] d −− authorization to replace antenna
- [x] e −− authorization to add antenna
- [ ] f −− authorization to relocate fixed station
- [ ] g −− authorization to change frequency(ies)
- [ ] h −− authorization to add frequency
- [ ] i −− authorization to add Points of Communication (satellites & countries)
- [ ] j −− authorization to change Points of Communication (satellites & countries)
- [ ] k −− authorization for facilities for which environmental assessment and radiation hazard reporting is required
- [ ] l −− authorization to change orbit location
- [ ] m −− authorization to perform fleet management
- [ ] n −− authorization to extend milestones
- [ ] o −− Other (Please specify)

ENVIRONMENTAL POLICY

28. Would a Commission grant of any proposal in this application or amendment have a significant environmental impact as defined by 47 CFR 1.1307? If YES, submit the statement as required by Sections 1.1308 and 1.1311 of the Commission's rules, 47 C.F.R. 1.1308 and 1.1311, as an exhibit to this application.A Radiation Hazard Study must accompany all applications for new transmitting facilities, major modifications, or major amendments.	○ Yes ◉ No

ALIEN OWNERSHIP Earth station applicants not proposing to provide broadcast, common carrier, aeronautical en route or aeronautical fixed radio station services are not required to respond to Items 30−34.

29. Is the applicant a foreign government or the representative of any foreign government?	○ Yes ◉ No
30. Is the applicant an alien or the representative of an alien?	○ Yes ○ No ◉ N/A
31. Is the applicant a corporation organized under the laws of any foreign government?	○ Yes ○ No ◉ N/A
32. Is the applicant a corporation of which more than one−fifth of the capital stock is owned of record or voted by aliens or their representatives or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ Yes ○ No ◉ N/A

33. Is the applicant a corporation directly or indirectly controlled by any other corporation of which more than one−fourth of the capital stock is owned of record or voted by aliens, their representatives, or by a foreign government or representative thereof or by any corporation organized under the laws of a foreign country?	○ Yes ○ No ◉ N/A
34. If any answer to questions 29, 30, 31, 32 and/or 33 is Yes, attach as an exhibit an identification of the aliens or foreign entities, their nationality, their relationship to the applicant, and the percentage of stock they own or vote.	

BASIC QUALIFICATIONS

35. Does the Applicant request any waivers or exemptions from any of the Commission's Rules? If Yes, attach as an exhibit, copies of the requests for waivers or exceptions with supporting documents.	◉ Yes ○ No Exhibit A
36. Has the applicant or any party to this application or amendment had any FCC station authorization or license revoked or had any application for an initial, modification or renewal of FCC station authorization, license, or construction permit denied by the Commission? If Yes, attach as an exhibit, an explination of circumstances.	◉ Yes ○ No

37. Has the applicant, or any party to this application or amendment, or any party directly or indirectly controlling the applicant ever been convicted of a felony by any state or federal court? If Yes, attach as an exhibit, an explination of circumstances.	○ Yes	◉ No
38. Has any court finally adjudged the applicant, or any person directly or indirectly controlling the applicant, guilty of unlawfully monopolizing or attemptiing unlawfully to monopolize radio communication, directly or indirectly, through control of manufacture or sale of radio apparatus, exclusive traffic arrangement or any other means or unfair methods of competition?If Yes, attach as an exhibit, an explanation of circumstances	○ Yes	◉ No
39. Is the applicant, or any person directly or indirectly controlling the applicant, currently a party in any pending matter referred to in the preceding two items? If yes, attach as an exhinit, an explanation of the circumstances.	○ Yes	◉ No
40. If the applicant is a corporation and is applying for a space station license, attach as an exhibit the names, address, and citizenship of those stockholders owning a record and/or voting 10 percent or more of the Filer's voting stock and the percentages so held. In the case of fiduciary control, indicate the beneficiary(ies) or class of beneficiaries. Also list the names and addresses of the officers and directors of the Filer.		

41. By checking Yes, the undersigned certifies, that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti−Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.

(●) Yes ( ) No

42a. Does the applicant intend to use a non−U.S. licensed satellite to provide service in the United States? If Yes, answer 42b and attach an exhibit providing the information specified in 47 C.F.R. 25.137, as appropriate. If No, proceed to question 43.

(●) Yes ( ) No

Exhibit B

42b. What administration has licensed or is in the process of licensing the space station? If no license will be issued, what administration has coordinated or is in the process of coordinating the space station?United Kingdom

43. Description. (Summarize the nature of the application and the services to be provided). (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Application to add GX Earth station terminal Tampa to communicate with Inmarsat−5 F2 and Inmarsat−5 F3 satellites.

Exhibit C

43a. Geographic Service Rule Certification

By selecting A, the undersigned certifies that the applicant is not subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25.

(●) A

By selecting B, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will comply with such requirements.

( ) B

By selecting C, the undersigned certifies that the applicant is subject to the geographic service or geographic coverage requirements specified in 47 C.F.R. Part 25 and will not comply with such requirements because it is not feasible as a technical matter to do so, or that, while technically feasible, such services would require so many compromises in satellite design and operation as to make it economically unreasonable. A narrative description and technical analysis demonstrating this claim are attached.

( ) C

CERTIFICATION

The Applicant waives any claim to the use of any particular frequency or of the electromagnetic spectrum as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. The applicant certifies that grant of this application would not cause the applicant to be in violation of the spectrum aggregation limit in 47 CFR Part 20. All statements made in exhibits are a material part hereof and are incorporated herein as if set out in full in this application. The undersigned, individually and for the applicant, hereby certifies that all statements made in this application and in all attached exhibits are true, complete and correct to the best of his or her knowledge and belief, and are made in good faith.

44. Applicant is a (an): (Choose the button next to applicable response.)

- ○ Individual
- ○ Unincorporated Association
- ○ Partnership
- ◉ Corporation
- ○ Governmental Entity
- ○ Other (please specify)

45. Name of Person Signing	46. Title of Person Signing
M. Ethan Lucarelli	Director, Regulatory and Public Policy

−−>

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT
(U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION
(U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 − Schedule B:(Technical and Operational Description)
FOR OFFICIAL USE ONLY

Location of Earth Station Site

E1: Site Identifier:	14	E5. Call Sign:	E150097
E2: Contact Name	Kevin Baker	E6. Phone Number:	808−469−7104
E3. Street:	6211 Glen Circle	E7. City:	Lino Lakes
		E8. County:	Anoka
E4. State	MN	E9. Zip Code	55014
E10. Area of Operation:		CONUS, Puerto Rico, USVI, Alaska, Hawaii, US Territories	
E11. Latitude:	0 °0 ’0.0 "		
E12. Longitude:	0 °0 ’0.0 "		
E13. Lat/Lon Coordinates are:		○ NAD−27	○ NAD−83 ◉ N/A
E14. Site Elevation (AMSL):		0.0 meters	

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer’s qualification measurement? If NO, provide as a technical analysis showing compliance with two−degree spacing policy.	○ Yes ○ No ◉ N/A

E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non−geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements?	○ Yes ○ No ◉ N/A
E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	◉ Yes ○ No

E18. Is frequency coordination required? If YES, attach a frequency coordination report as	○ Yes ◉ No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	○ Yes ◉ No
E20. FAA Notification − (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	○ Yes ◉ No

POINTS OF COMMUNICATION

Satellite Name:ISAT List | ISAT List | If you selected OTHER, please enter the following:	
E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier:	

E26. Common Name:	E27. Country:

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size<meters>	E41/42. Antenna Gain Transmint and/or Recieve (____dBi at _____GHz)	
14	Tampa 65	50	Tampa Microwave	Tampa 65	0.65	41.09 dBi at 19.7	
14	Tampa 65	50	Tampa Microwave	Tampa 65	0.65	41.11 dBi at 20.2	
14	Tampa 65	50	Tampa Microwave	Tampa 65	0.65	43.3 dBi at 29.5	
14	Tampa 65	50	Tampa Microwave	Tampa 65	0.65	45.11 dBi at 30.0	

E28. Antenna Id	E33/34. Diameter Minor/Major (meters)	E35. Above Ground Level (meters)	E36. Above Sea Level(meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers(dBW)
Tampa 65	0.65/0.65	0.0	0.0	0.0	4.0	0.0	49.3

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands (MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V, L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier (dBW)	E49. Maximum ERIP Density per Carrier (dBW/4kHz)
Tampa 65	19700 20200	R	Left Hand Circular	32M0G7W	0.0	0.0

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link

Tampa 65	29500 30000	T	Right Hand Circular	460KG7W	49.3	28.69

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

Tampa 65	29500 30000	T	Right Hand Circular	5M00G1W	49.3	18.33

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

FREQUENCY COORDINATION

E28. Antenna Id	**E51. Satellite Orbit Type**	**E52/53. Frequency Limits(MHz)**	**E54/55. Range of Satellite Arc Eastern/Western Limit**	**E56. Earth Station Azimuth Angle Eastern Limit**	**E57. Antenna Elevation Angle Eastern Limit**	**E58. Earth Station Azimuth Angle Western Limit**	**E59. Antenna Elevation Angle Western Limit**	**E60. Maximum EIRP Density toward the Horizon (dBW/4kHz)**
Tampa 65	Geostationary	19700 20200	0.0/0.0	0.0	5.0	0.0	5.0	0.0
	Geostationary	29500 30000	0.0/0.0	0.0	5.0	0.0	5.0	−9.0

REMOTE CONTROL POINT LOCATION

E61. Call Sign E120072 NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.		E66. Phone Number 808−469−7104	
E62. Street Address 6211 Glen Circle			
E63. City Lino Lakes	E68. County Anoka	E67/68. State/Country MN/ USA	E64. Zip Code 55014

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 − Schedule B:(Technical and Operational Description)
FOR OFFICIAL USE ONLY

Location of Earth Station Site

E1: Site Identifier:	15	E5. Call Sign:	E150097
E2: Contact Name	Kevin Baker	E6. Phone Number:	808−469−7104
E3. Street:	6211 Glen Circle	E7. City:	Lino Lakes
		E8. County:	Anoka
E4. State	MN	E9. Zip Code	55014

E10. Area of Operation: CONUS, Puerto Rico, USVI, Alaska, Hawaii, US Territories

E11. Latitude: 0 °0 ’0.0 "

E12. Longitude: 0 °0 ’0.0 "

E13. Lat/Lon Coordinates are: ○ NAD−27 ○ NAD−83 ◉ N/A

E14. Site Elevation (AMSL): 0.0 meters

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer’s qualification measurement? If NO, provide as a technical analysis showing compliance with two−degree spacing policy.	○ Yes ○ No ◉ N/A
E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non−geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer’s qualification measurements?	○ Yes ○ No ◉ N/A

E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	◉ Yes ○ No

E18. Is frequency coordination required? If YES, attach a frequency coordination report as	○ Yes ◉ No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	○ Yes ◉ No
E20. FAA Notification − (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	○ Yes ◉ No

POINTS OF COMMUNICATION

Satellite Name: ISAT List | ISAT List | If you selected OTHER, please enter the following:	
E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier:	
E26. Common Name:	E27. Country:

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size<meters>	E41/42. Antenna Gain Transmint and/or Recieve (____dBi at _____GHz)	
15	Tampa 95	50	Tampa Microwave	Tampa 95	0.95	44.53 dBi at 19.7	
15	Tampa 95	50	Tampa Microwave	Tampa 95	0.95	44.65 dBi at 20.2	
15	Tampa 95	50	Tampa Microwave	Tampa 95	0.95	46.61 dBi at 29.5	
15	Tampa 95	50	Tampa Microwave	Tampa 95	0.95	48.12 dBi at 30.0	

E28. Antenna Id	E33/34. Diameter Minor/Major (meters)	E35. Above Ground Level (meters)	E36. Above Sea Level(meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers(dBW)
Tampa 95	0.95/0.95	0.0	0.0	0.0	4.0	0.0	52.61

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands (MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V, L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier (dBW)	E49. Maximum ERIP Density per Carrier (dBW/4kHz)
Tampa 95	19700 20200	R	Left Hand Circular	32M0G7W	0.0	0.0

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link

Tampa 95	29500 30000	T	Right Hand Circular	460KG7W	52.61	32.0

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

Tampa 95	29500 30000	T	Right Hand Circular	5M00G1W	52.61	21.64

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

FREQUENCY COORDINATION

E28. Antenna Id	**E51. Satellite Orbit Type**	**E52/53. Frequency Limits(MHz)**	**E54/55. Range of Satellite Arc Eastern/Western Limit**	**E56. Earth Station Azimuth Angle Eastern Limit**	**E57. Antenna Elevation Angle Eastern Limit**	**E58. Earth Station Azimuth Angle Western Limit**	**E59. Antenna Elevation Angle Western Limit**	**E60. Maximum EIRP Density toward the Horizon (dBW/4kHz)**
Tampa 95	Geostationary	19700 30000	0.0/0.0	0.0	5.0	0.0	5.0	0.0
	Geostationary	29500 30000	0.0/0.0	0.0	5.0	0.0	5.0	−9.0

REMOTE CONTROL POINT LOCATION

E61. Call Sign E120072 NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.		E66. Phone Number 808−469−7104	
E62. Street Address 6211 Glen Circle			
E63. City Lino Lakes	E68. County Anoka	E67/68. State/Country MN/ USA	E64. Zip Code 55014

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 − Schedule B:(Technical and Operational Description)
FOR OFFICIAL USE ONLY

Location of Earth Station Site			
E1: Site Identifier:	16	E5. Call Sign:	E150097
E2: Contact Name	Kevin Baker	E6. Phone Number:	808−469−7104
E3. Street:	6211 Glen Circle	E7. City:	Lino Lakes
		E8. County:	Anoka
E4. State	MN	E9. Zip Code	55014
E10. Area of Operation:		CONUS, Puerto Rico, USVI, Alaska, Hawaii, US Territories	
E11. Latitude:	0 °0 ’0.0 "		
E12. Longitude:	0 °0 ’0.0 "		
E13. Lat/Lon Coordinates are:	○ NAD−27	○ NAD−83	◉ N/A
E14. Site Elevation (AMSL):	0.0 meters		

E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer’s qualification measurement? If NO, provide as a technical analysis showing compliance with two−degree spacing policy.	○ Yes ○ No ◉ N/A
E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non−geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer’s qualification measurements?	○ Yes ○ No ◉ N/A

E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point.	◉ Yes ○ No

E18. Is frequency coordination required? If YES, attach a frequency coordination report as	○ Yes ◉ No
E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as	○ Yes ◉ No
E20. FAA Notification − (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and/or the FAA's study regarding the potential hazard of the structure to aviation? FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION.	○ Yes ◉ No

POINTS OF COMMUNICATION

Satellite Name: ISAT List | ISAT List | If you selected OTHER, please enter the following:	
E21. Common Name:	E22. ITU Name:
E23. Orbit Location:	E24. Country:

POINTS OF COMMUNICATION (Destination Points)

E25. Site Identifier:	
E26. Common Name:	E27. Country:

ANTENNA

Site ID	E28. Antenna Id	E29. Quantity	E30. Manufacturer	E31. Model	E32. Antenna Size<meters>	E41/42. Antenna Gain Transmint and/or Recieve (____dBi at _____GHz)	
16	Tampa 130	50	Tampa Microwave	Tampa 130	1.3	46.24 dBi at 20.0	
16	Tampa 130	50	Tampa Microwave	Tampa 130	1.3	46.37 dBi at 19.7	
16	Tampa 130	50	Tampa Microwave	Tampa 130	1.3	51.29 dBi at 29.5	
16	Tampa 130	50	Tampa Microwave	Tampa 130	1.3	53.5 dBi at 30.0	

E28. Antenna Id	E33/34. Diameter Minor/Major (meters)	E35. Above Ground Level (meters)	E36. Above Sea Level(meters)	E37. Building Height Above Ground Level (meters)	E38. Total Input Power at antenna flange (Watts)	E39. Maximum Antenna Height Above Rooftop (meters)	E40. Total EIRP for al carriers(dBW)
Tampa 130	1.3/1.3	0.0	0.0	0.0	4.0	0.0	57.29

FREQUENCY

E28. Antenna Id	E43/44. Frequency Bands (MHz)	E45. T/R Mode	E46. Antenna Polarization(H,V, L,R)	E47. Emission Designator	E48. Maximum EIRP per Carrier (dBW)	E49. Maximum ERIP Density per Carrier (dBW/4kHz)
Tampa 130	19700 20200	R	Left Hand Circular	32M0G7W	0.0	0.0

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link

Tampa 130	29500 30000	T	Right Hand Circular	460KG7W	57.29	36.68

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

Tampa 130	29500 30000	T	Right Hand Circular	5M00G1W	57.29	26.32

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Various modulation up to 32 APSK Digital Data Link/Data Signaling

FREQUENCY COORDINATION

E28. Antenna Id	**E51. Satellite Orbit Type**	**E52/53. Frequency Limits(MHz)**	**E54/55. Range of Satellite Arc Eastern/Western Limit**	**E56. Earth Station Azimuth Angle Eastern Limit**	**E57. Antenna Elevation Angle Eastern Limit**	**E58. Earth Station Azimuth Angle Western Limit**	**E59. Antenna Elevation Angle Western Limit**	**E60. Maximum EIRP Density toward the Horizon (dBW/4kHz)**
Tampa 130	Geostationary	19700 20200	0.0/0.0	0.0	5.0	0.0	5.0	0.0
	Geostationary	29500 30000	0.0/0.0	0.0	5.0	0.0	5.0	−9.0

REMOTE CONTROL POINT LOCATION

E61. Call Sign E120072 NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed.			E66. Phone Number 808−469−7104
E62. Street Address 6211 Glen Circle			
E63. City Lino Lakes	E68. County Anoka	E67/68. State/Country MN/ USA	E64. Zip Code 55014

FCC NOTICE REQUIRED BY THE PAPERWORK REDUCTION ACT

The public reporting for this collection of information is estimated to average 2 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the required data, and completing and reviewing the collection of information. If you have any comments on this burden estimate, or how we can improve the collection and reduce the burden it causes you, please write to the Federal Communications Commission, AMD−PERM, Paperwork Reduction Project (3060−0678), Washington, DC 20554. We will also accept your comments regarding the Paperwork Reduction Act aspects of this collection via the Internet if you send them to PRA@fcc.gov. PLEASE DO NOT SEND COMPLETED FORMS TO THIS ADDRESS.

Remember − You are not required to respond to a collection of information sponsored by the Federal government, and the government may not conduct or sponsor this collection, unless it displays a currently valid OMB control number or if we fail to provide you with this notice. This collection has been assigned an OMB control number of 3060−0678.

THE FOREGOING NOTICE IS REQUIRED BY THE PAPERWORK REDUCTION ACT OF 1995, PUBLIC LAW 104−13, OCTOBER 1, 1995, 44 U.S.C. SECTION 3507.

ISAT US Inc.
FCC Form 312 Exhibit A

Application to Modify License E150097

I. DESCRIPTION OF MODIFICATION

ISAT US Inc. ("ISAT US") hereby seeks to modify its Global Xpress (GX) Ka-band blanket earth station license, Call Sign E150097 ("License"), File No. SES-LIC-20150625-00383 ("GX Land Application") (as modified), to add three new GX Earth station terminal types, Tampa 65, Tampa 95, Tampa 130, which will communicate with the Inmarsat-5 F2 ("I5F2") and Inmarsat-5 F3 ("I5F3") satellites. Section II addresses the proposed new earth station terminals. No other changes are requested by this modification application. ISAT US incorporates by reference Exhibits F (response to Question E17 regarding the remote control point) and G (24-hour point of contact)[1] of the GX Land Application, as well as certain other portions of the GX Land Application referenced below.

II. NEW EARTH STATION TERMINALS

This modification application seeks to add three terminal models that are manufactured by Tampa Microwave. These are the Tampa 65, Tampa 95, Tampa 130 terminals, which employ 65 centimeter, 95 centimeter, and 1.3 meter antennae, respectively. The terminals will operate on the same frequencies as the GX Terminals in the current license: 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space). The terminals will operate at fixed or temporary fixed locations and allow professional personnel from organizations from various sectors, initially U.S. government and potentially including in the future media and humanitarian, to quickly deploy a communication network to meet mission needs.

[1] Exhibit G was submitted as a supplement to the GX Land Application on August 14, 2015.

A. Land Terminal Description

This application seeks to license the Tampa 65, Tampa 95, Tampa 130 terminals. The terminals will operate on the same frequencies as the GX Terminals in the current license: 19.7-20.2 GHz (space-to-Earth) and 29.5-30.0 GHz (Earth-to-space). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the Tampa Microwave terminals meet the performance requirements in Section 25.138 (a) under clear sky conditions. Additionally, each of these terminal types will be operated within the -118 dBW/m^2/MHz power flux-density at the earth's surface of the I5F2 and I5F3 satellite. Thus, the proposed terminals are able to operate without causing unacceptable interference, consistent with the requirements of Section 25.209(f).[2]

The Commission has deleted the requirement to provide receive earth station patterns in the 19.7-20.2 GHz frequency band (see Sections 25.132 and 25.115). To the extent that the proposed terminal may have minor exceedance at certain off-axis angles, Inmarsat understands and agrees to accept interference from adjacent FSS satellite networks to the extent the relevant receiving antenna performance requirements of Section 25.209 are exceeded.

Radiation hazard analyses for the Tampa Microwave terminals and a discussion of the results are provided in Exhibit C.

The proposed terminals will be subject to the same national security requirements described in Section 4 of the GX Land Application. That discussion is incorporated by reference herein.

The following sections provide a description of each of the terminal types.

[2] *See* Section 25.209(f).

B. Tampa 65 Terminal

The required technical data for the proposed Tampa 65 earth station is provided in the Form 312. This terminal type employs a 65 centimeter antenna and the half-power beamwidth required in Section 25.130(f) is 0.92 degrees. In addition, for blanket licensing of transmitting earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.138(a) under clear sky conditions.

Below is an image of the Tampa 65 terminal:

C. Tampa 95 Terminal

The required technical data for the proposed Tampa 95 earth station is provided in the Form 312. This terminal employs a 95 centimeter antenna; and the half-power beamwidth required in Section 25.130(f) is 0.63 degrees. In addition, for blanket licensing of transmitting earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots

in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.138(a) under clear sky conditions.

Below is an image of the Tampa 95 terminal:

D. <u>Tampa 130 Terminal</u>

The required technical data for the proposed Tampa 130 earth station is provided in the Form 312. This terminal type utilizes a 1.3 meter antenna; and the half-power beamwidth required in Section 25.130(f) is 0.46 degrees. In addition, for blanket licensing of transmitting earth stations in the 29.5-30.0 GHz band, the Commission adopted off-axis EIRP spectral density levels contained in Section 25.138(a). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.138(a) under clear sky conditions.

Below is an image of the Tampa 130 terminal:

III. REQUEST FOR WAIVER

ISAT US hereby respectfully requests a partial waiver of Sections 25.115(g) and 25.132(b)(1) of the FCC's rules to the extent the antenna plots in Exhibit B of this application do not cover the entire range of off-axis angles called for in those rule sections. The relevant portions of Sections 25.115 and 25.132 call for plots of maximum co-polarized EIRP density in the plane tangent to the GSO arc at off-axis angles from minus 180° to plus 180°. Exhibit B of this application includes plots covering off-axis angles from minus 170° to plus 170°. These are the plots that were provided by the terminal manufacturer, and ISAT US was unable to receive plots covering the rest of the range called for in Sections 25.115 and 25.132 of the FCC's rules. The plots provided for each antenna show a sharp drop off in EIRP density at angles moving away from the GSO arc, and in each case show that by minus 10° or plus 10°, the EIRP densities are well below the envelope specified in Section 25.209 of the FCC's

rules, and that this performance well below the envelope continues through to minus 170° and plus 170°. As a result of the terminal design and demonstrated performance, there is no reason to expect that that the EIRP density levels would dramatically increase beyond minus 170° or plus 170°. Grant of this partial waiver will help accelerate the approval process of these terminals by not requiring unnecessary and duplicative measurements to be taken by the manufacturer, and thus would serve the public interest.

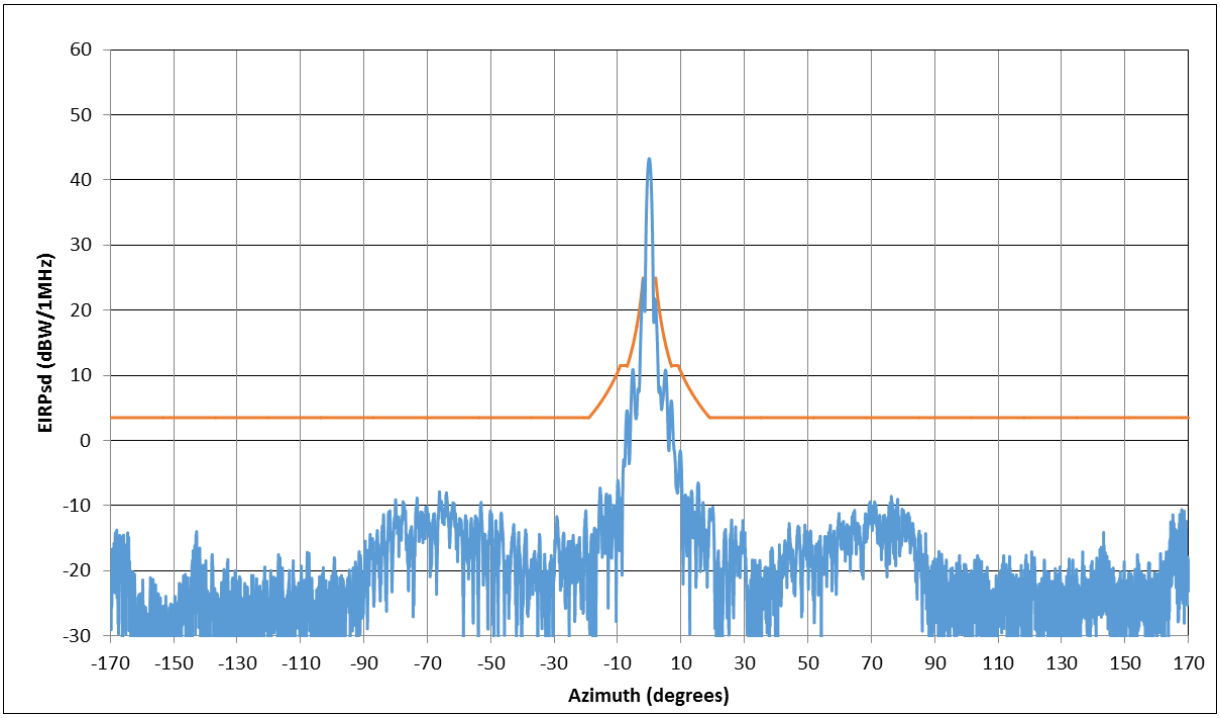
IV. RESPONSE TO QUESTION 36

ISAT US submits this response to Question 36 of the FCC Form 312 out of an abundance of caution. In 2005, the Commission dismissed a Petition for Declaratory Ruling (the "Petition") filed by Inmarsat Mobile Networks, Inc.'s affiliate, Inmarsat Global Limited ("Inmarsat Global"), seeking United States market access to provide MSS in the 2 GHz band. Subsequent to Inmarsat Global's filing, the Commission assigned all 2 GHz spectrum currently allocated for MSS in the United States to two other satellite operators, and thus dismissed Inmarsat Global's Petition.

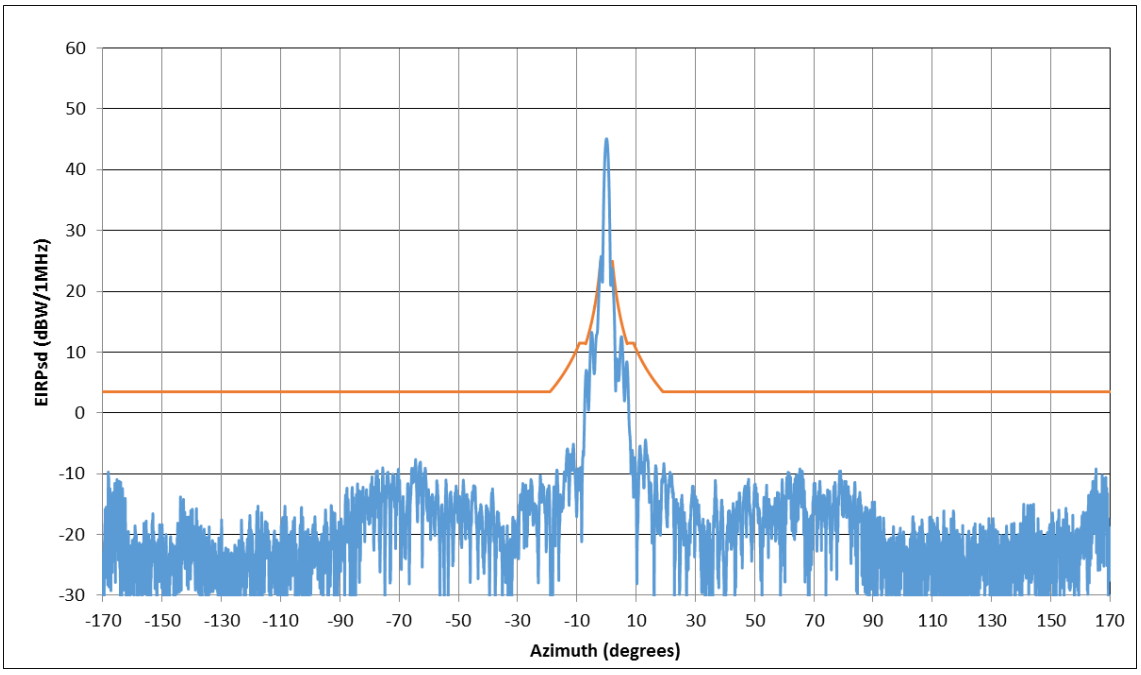
EXHIBIT B

1.0 Tampa 65 Off-Axis EIRP Masks

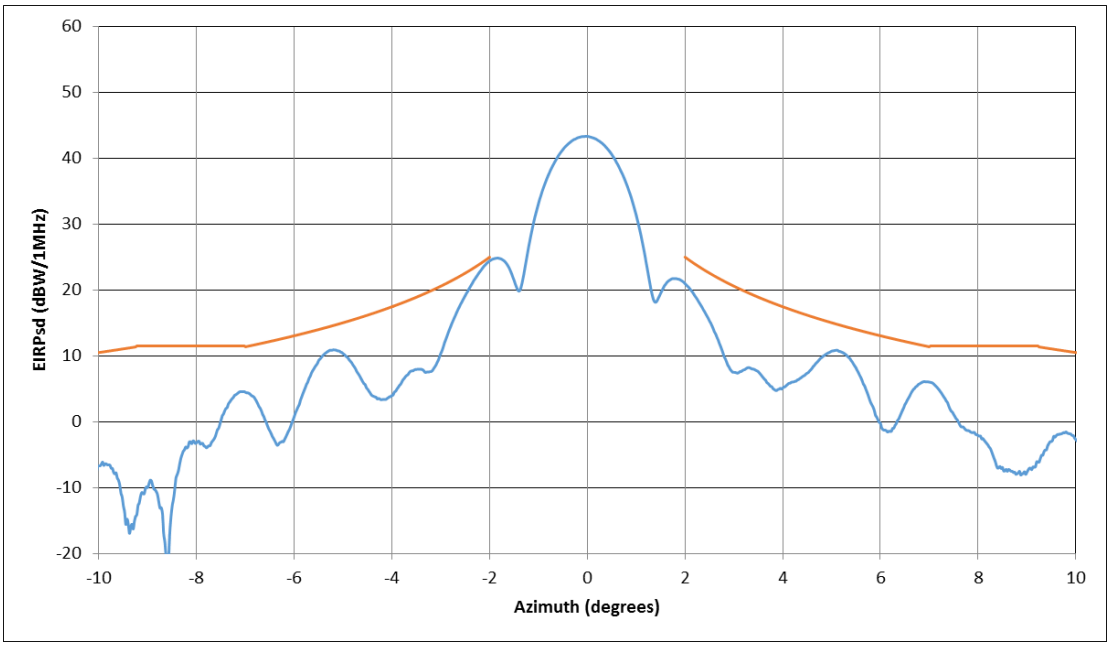
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



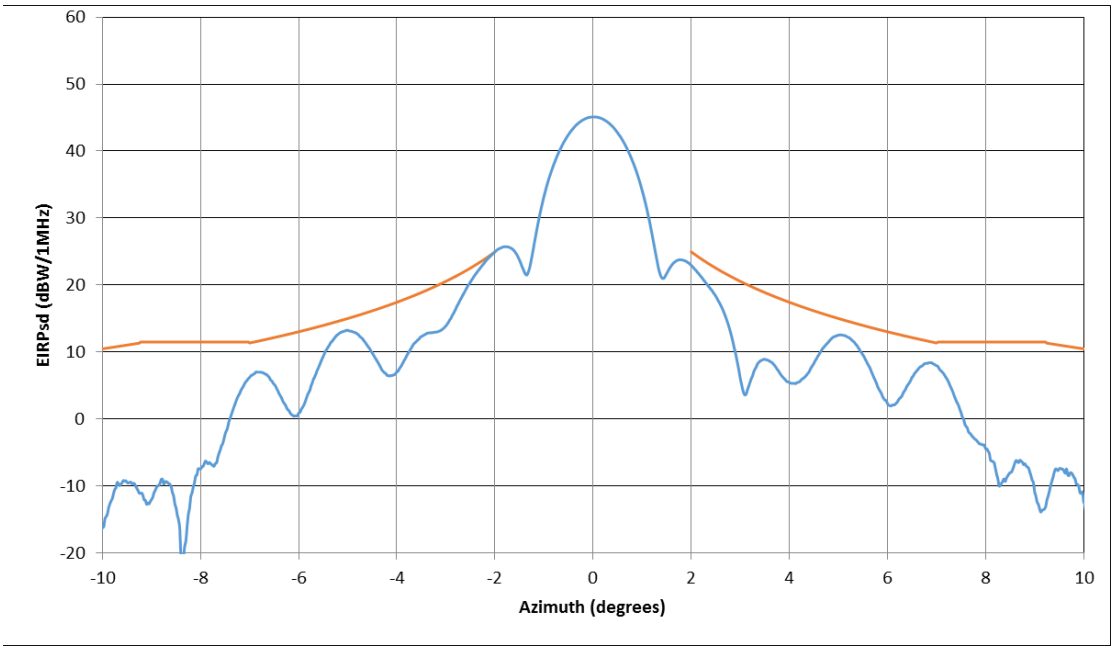
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz



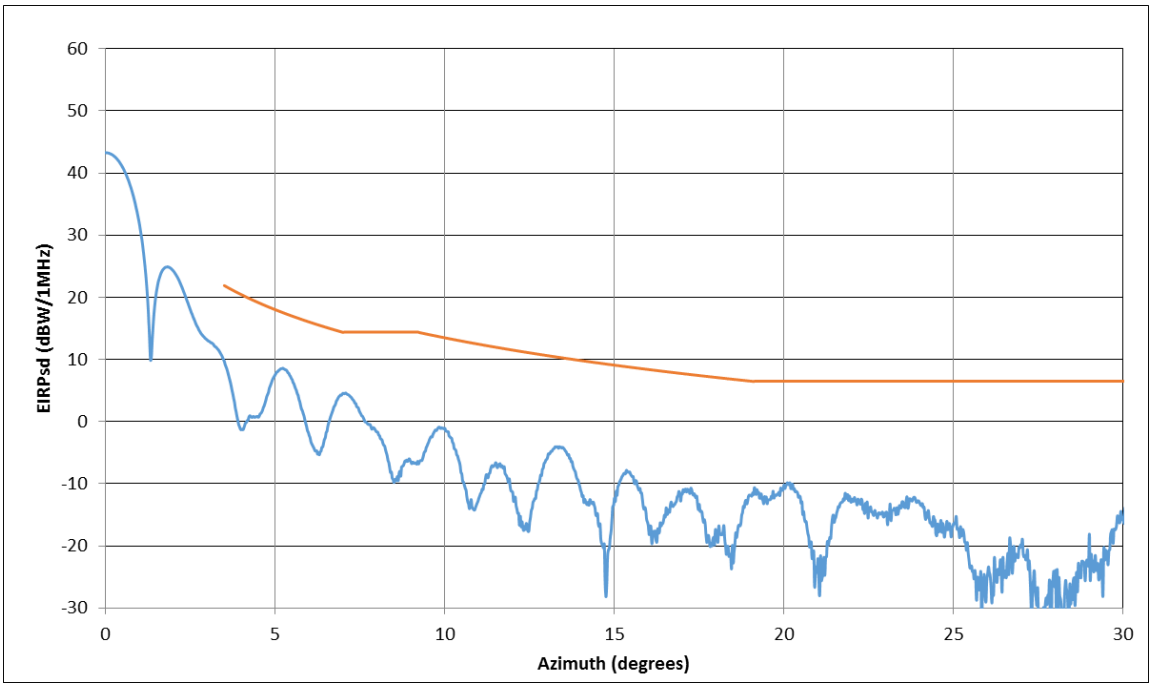
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



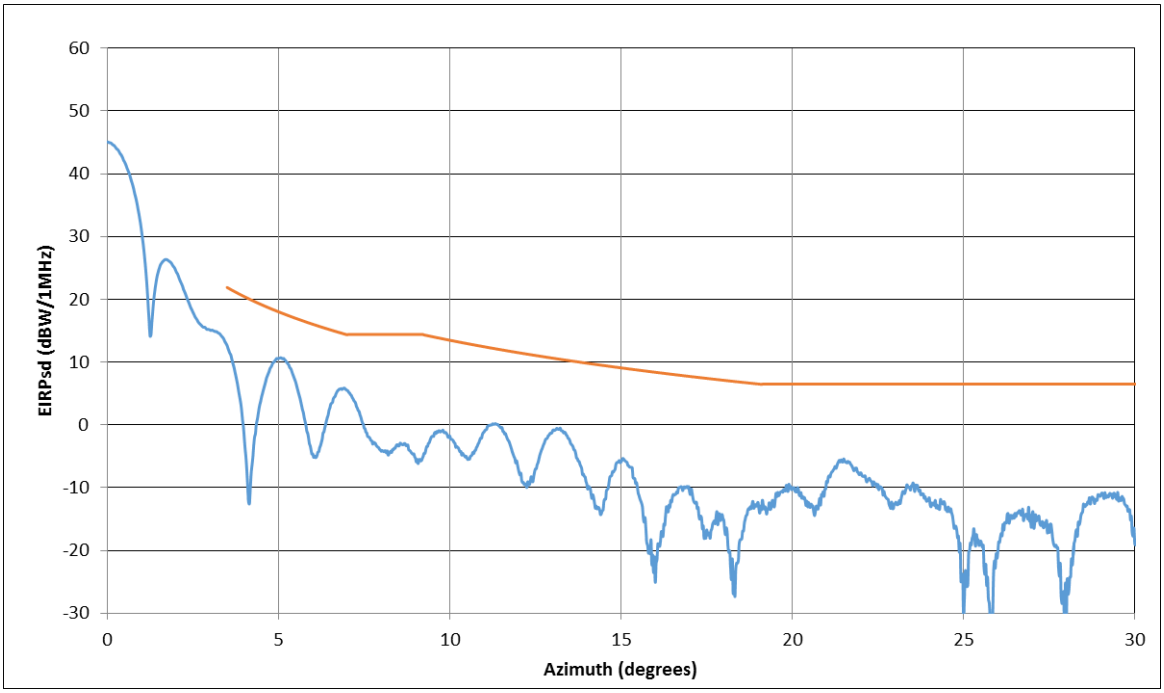
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHZ (-10 to +10 degrees)



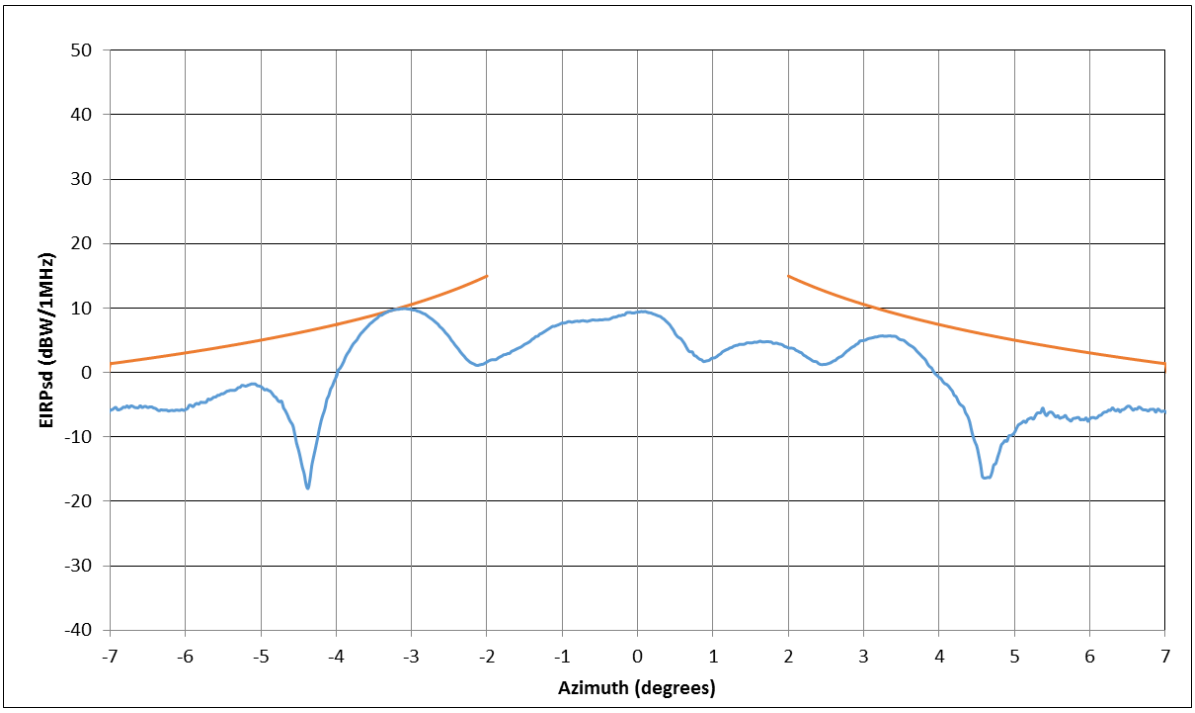
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



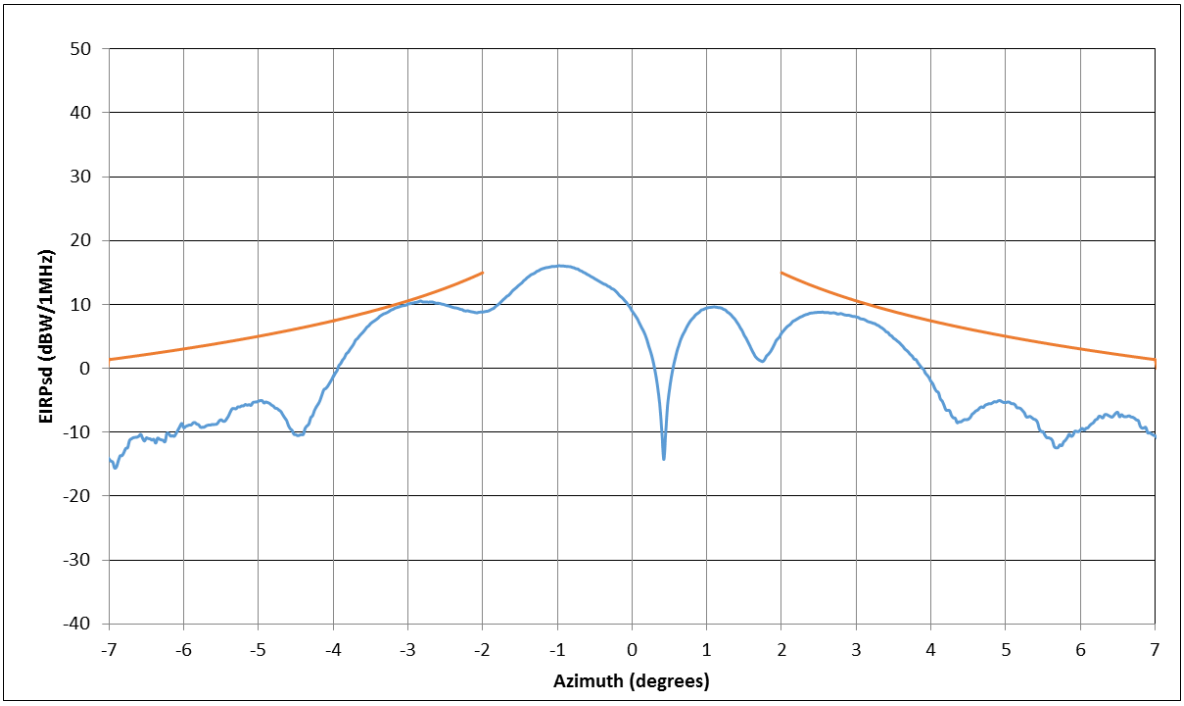
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



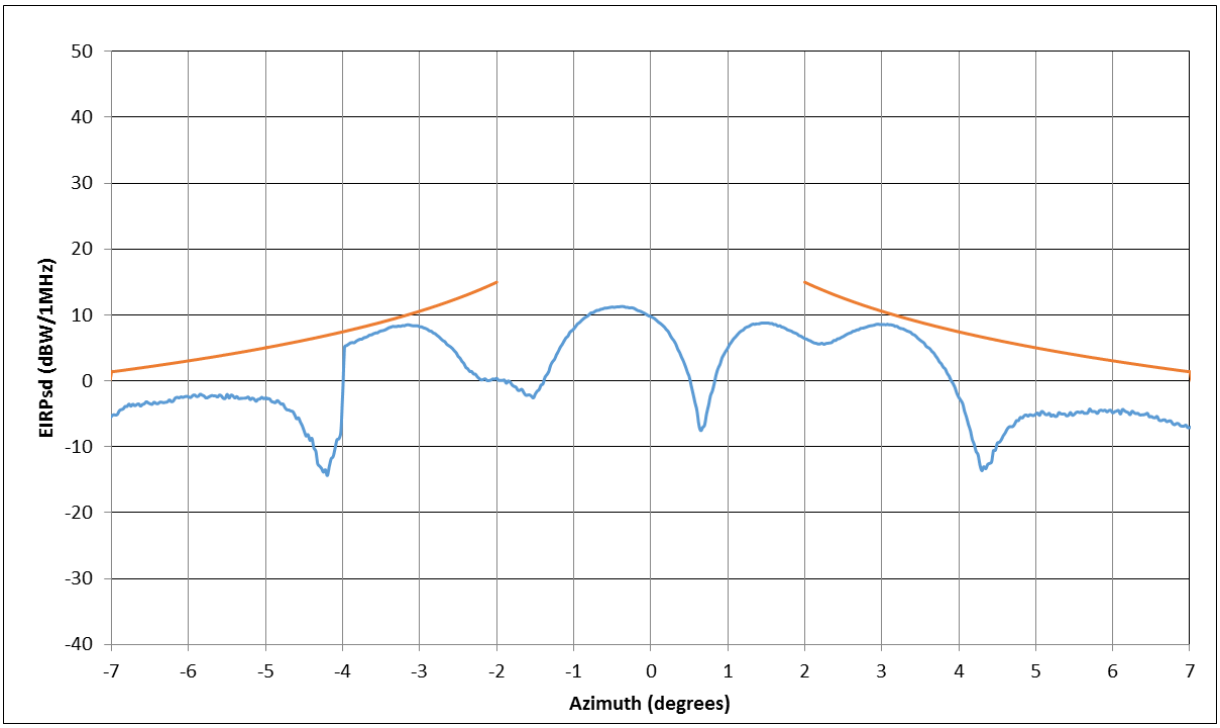
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



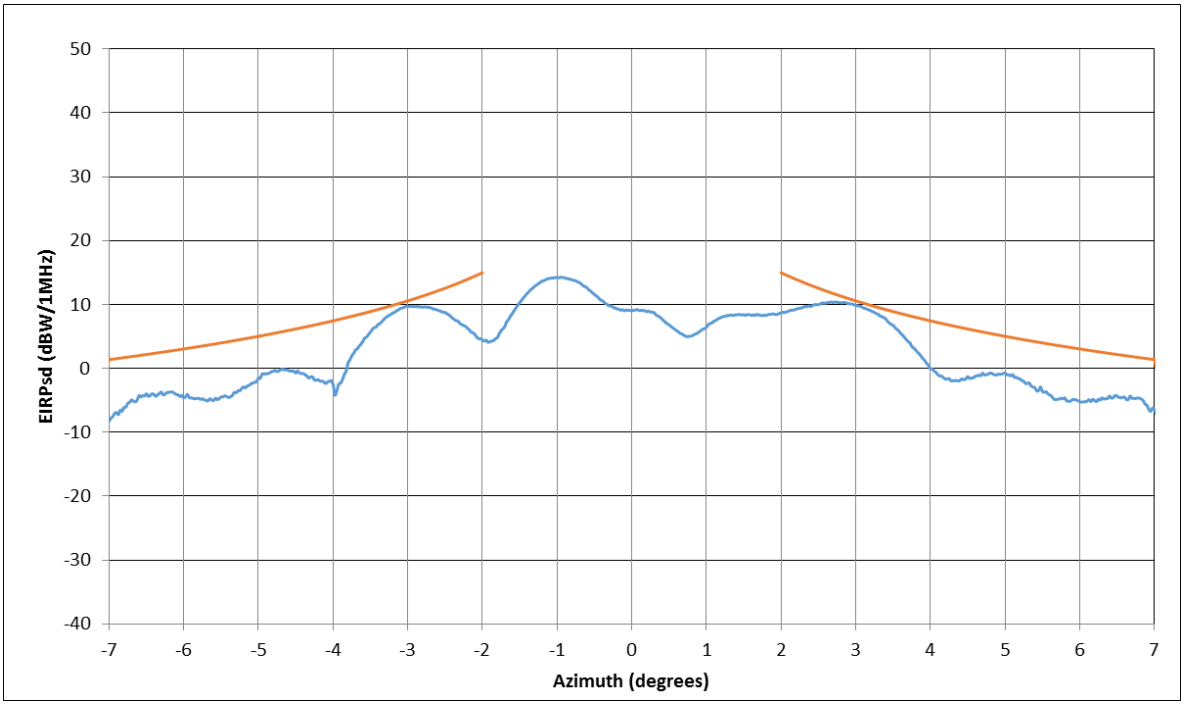
X-Pol EIRP density in the plane tangent to the GSO Arc 30 GHZ (-7 to +7 degrees)



X-Pol EIRP density in the plane perpendicular to the GSO Arc 29.5 GHZ (-7 to +7 degrees)

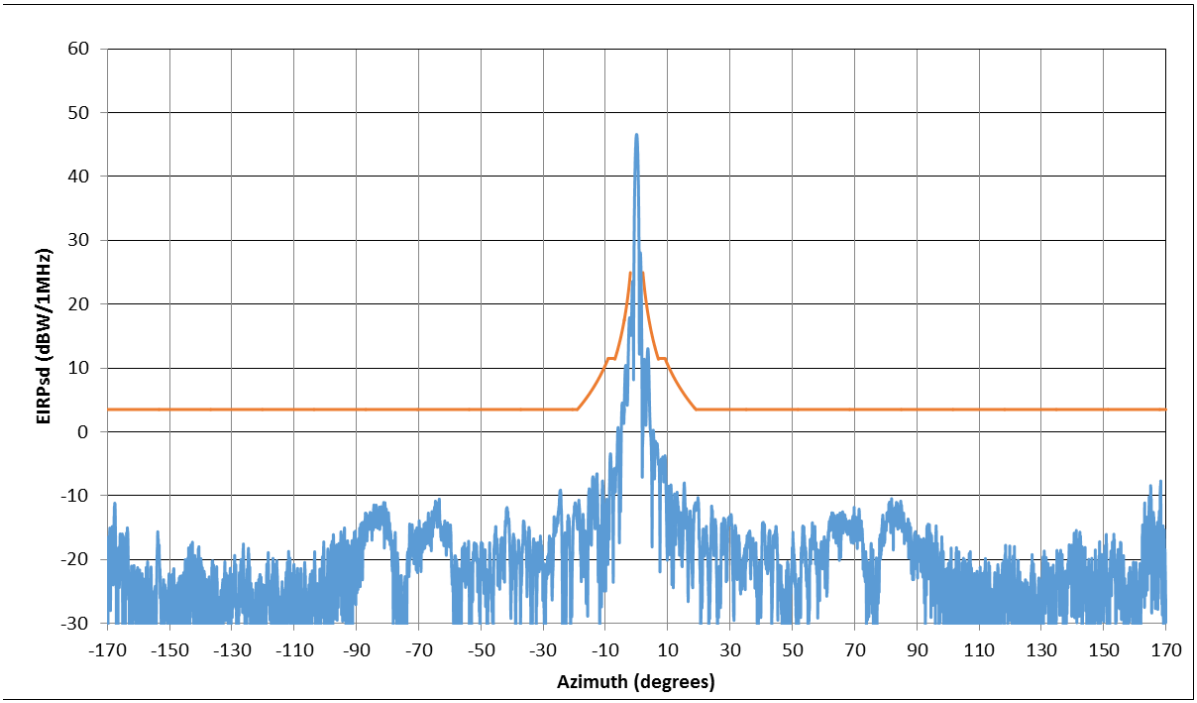


X-Pol EIRP density in the plane perpendicular to the GSO Arc 30 GHZ (-7 to +7 degrees)

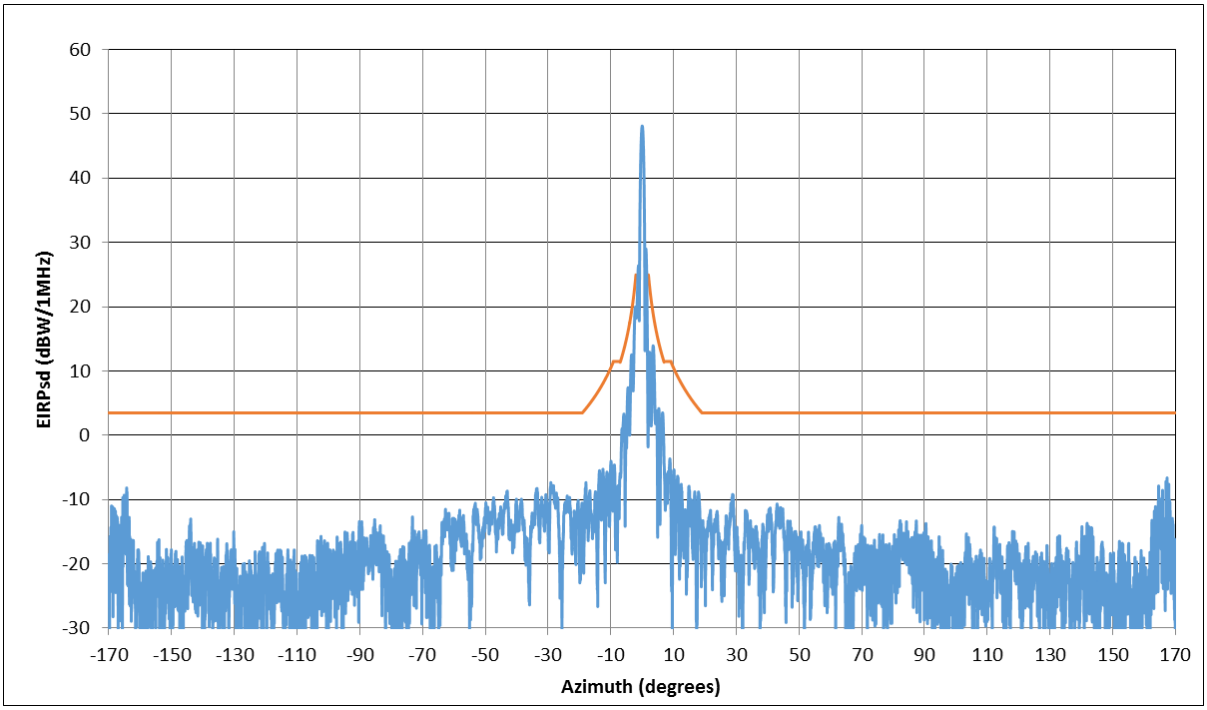


2.0 Tampa 95 Off-Axis EIRP Masks

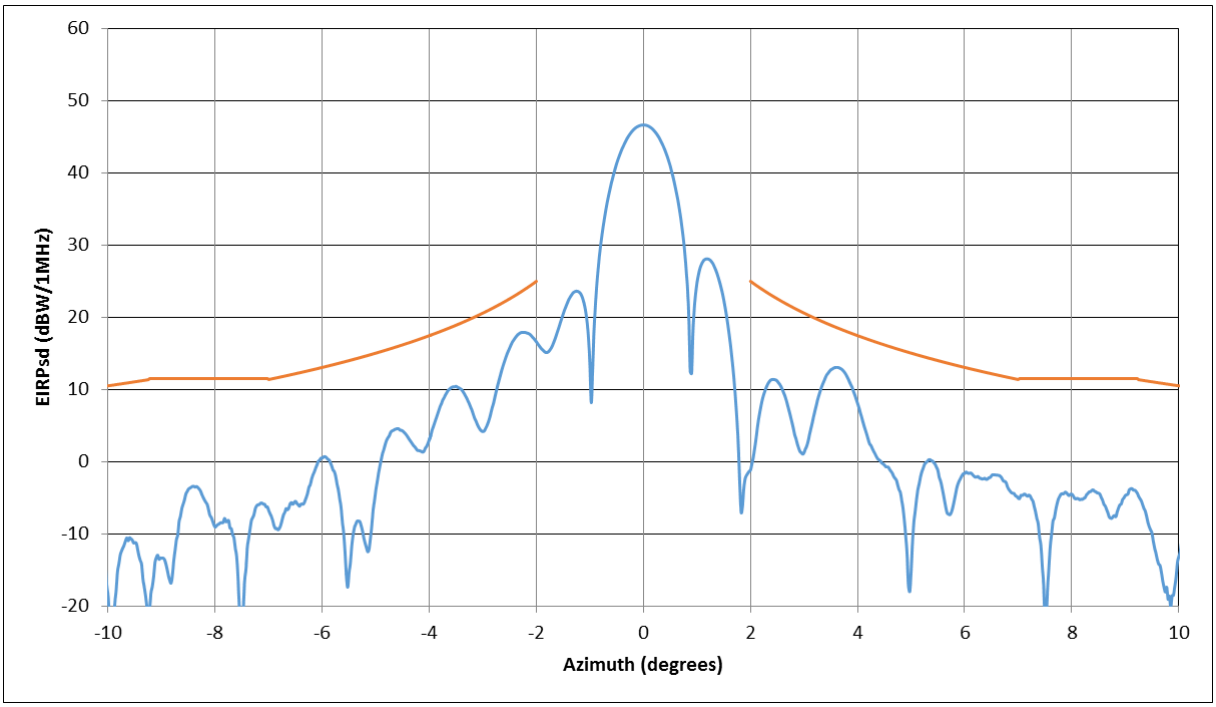
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



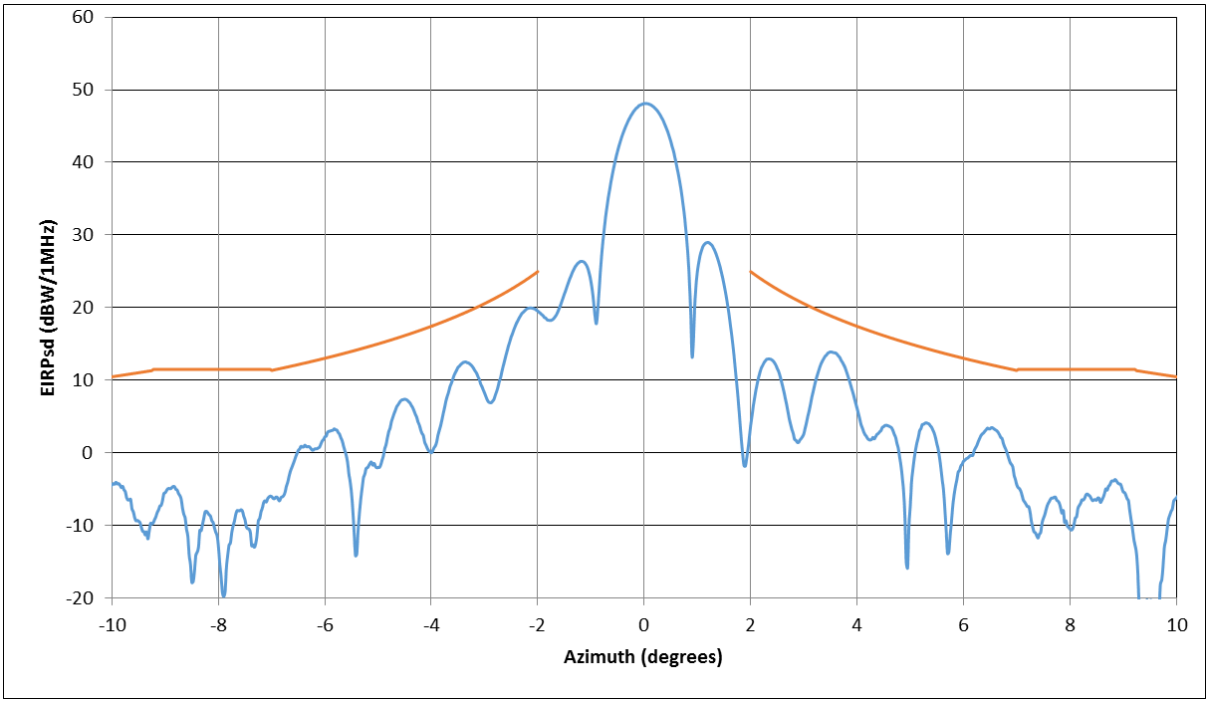
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30 GHZ



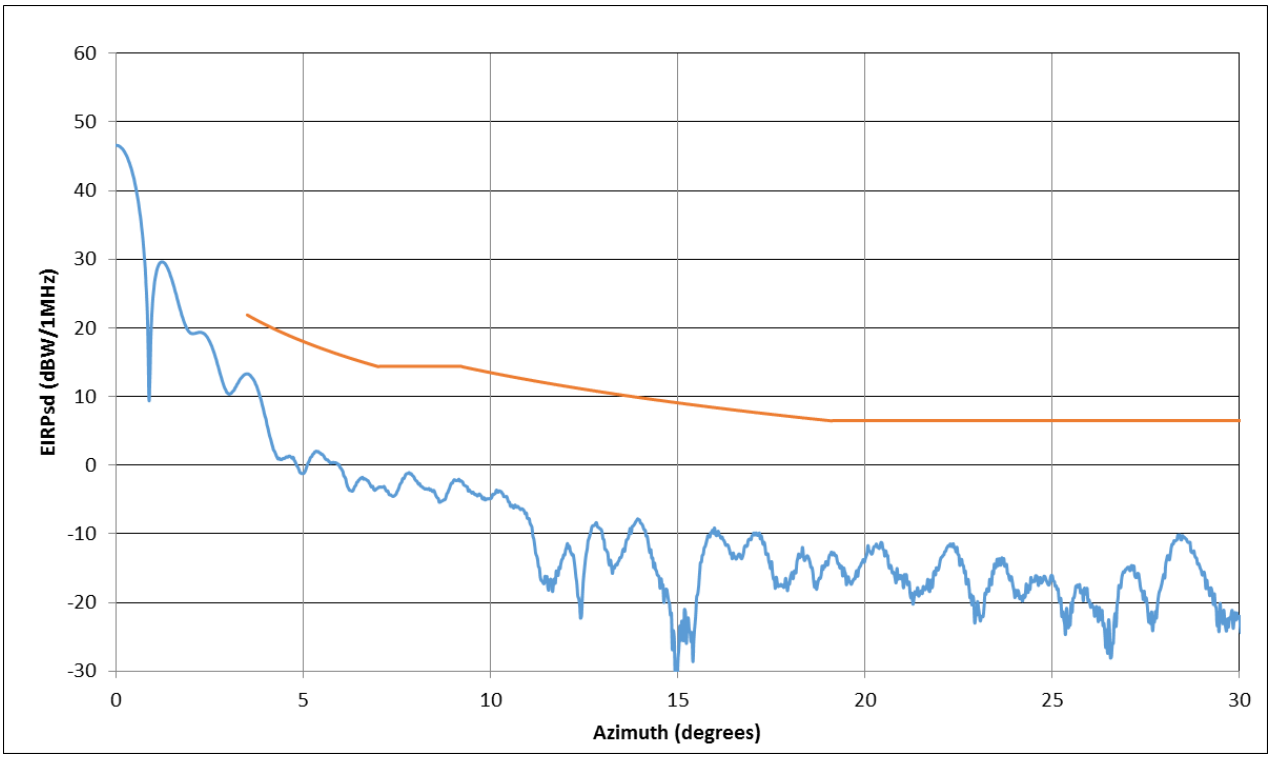
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



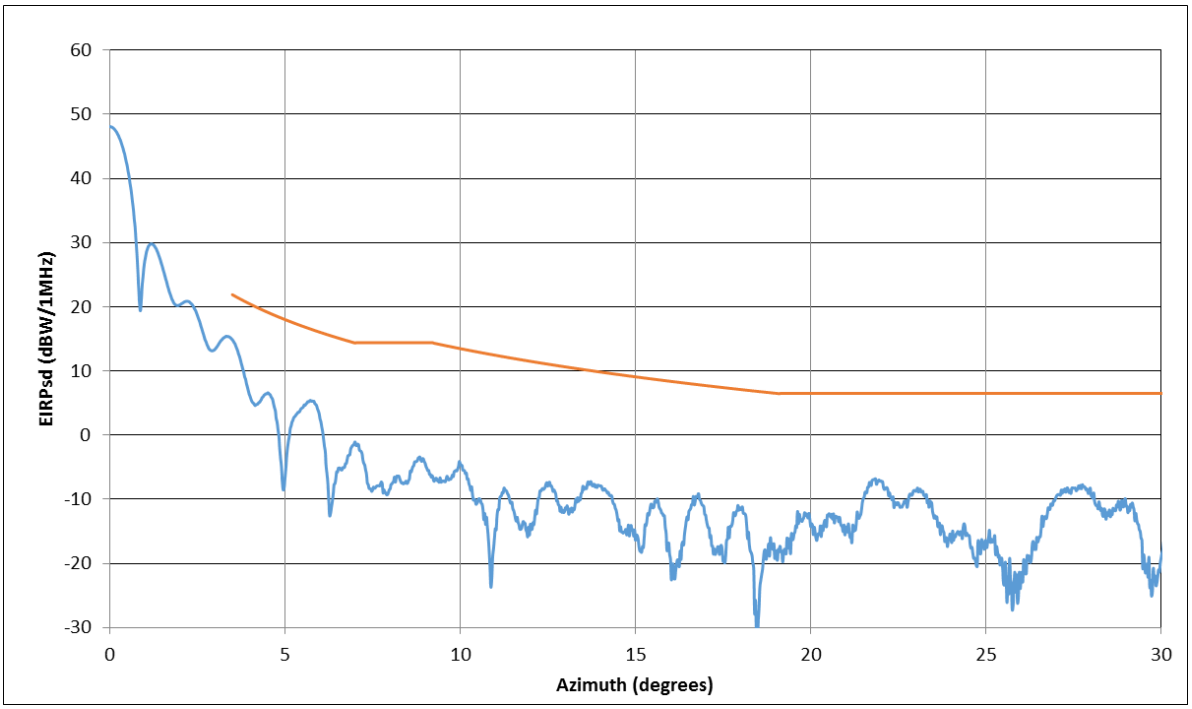
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30 GHz (-10 to +10 degrees)



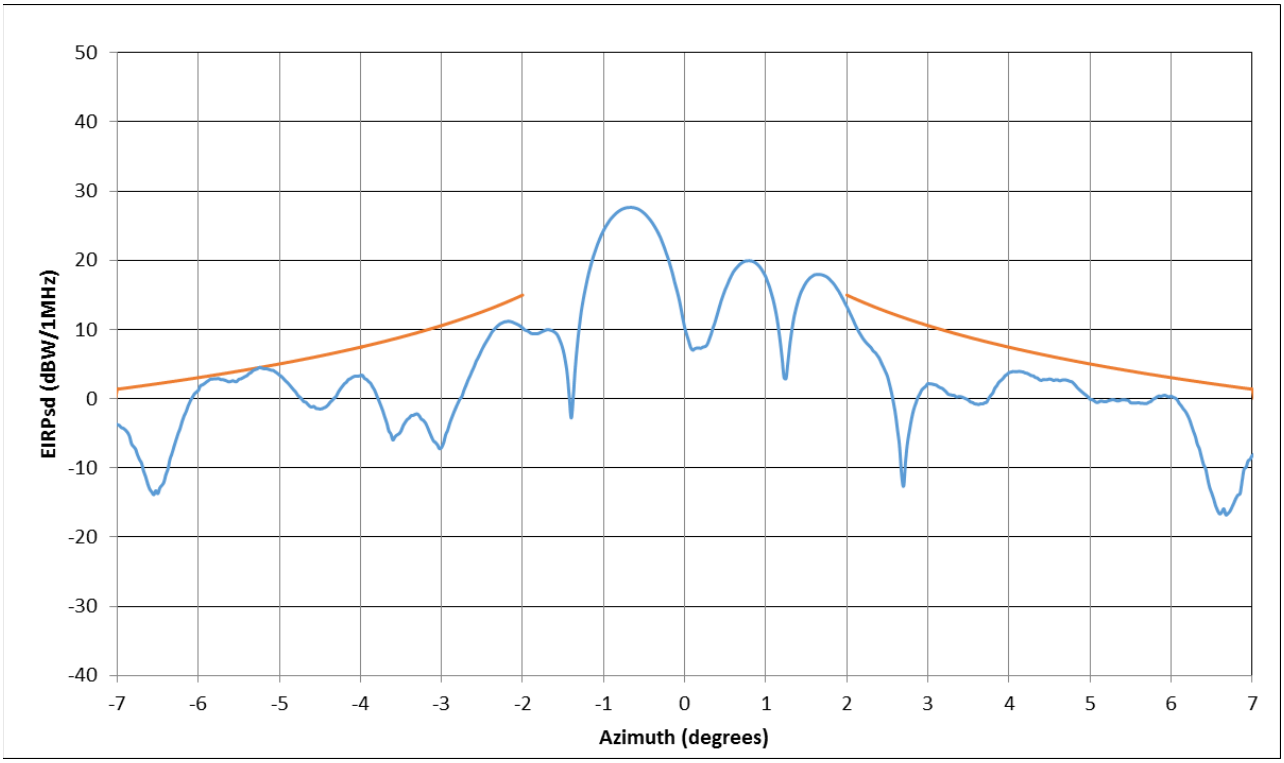
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



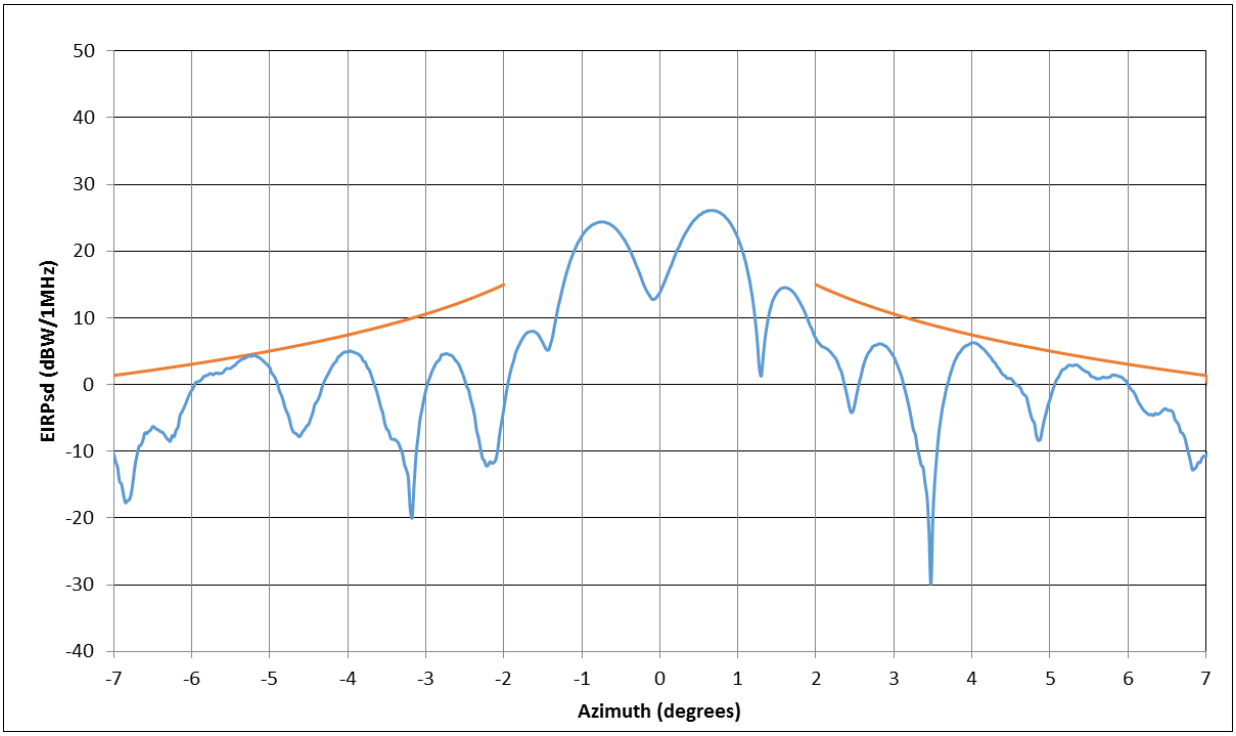
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



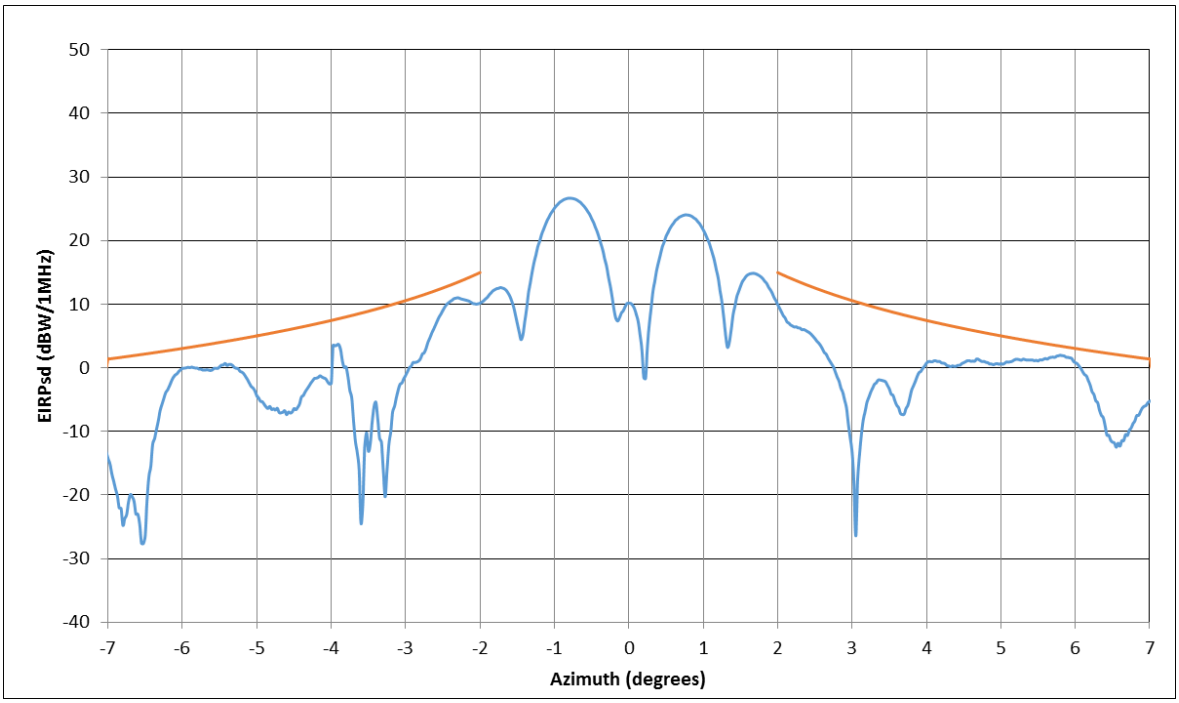
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



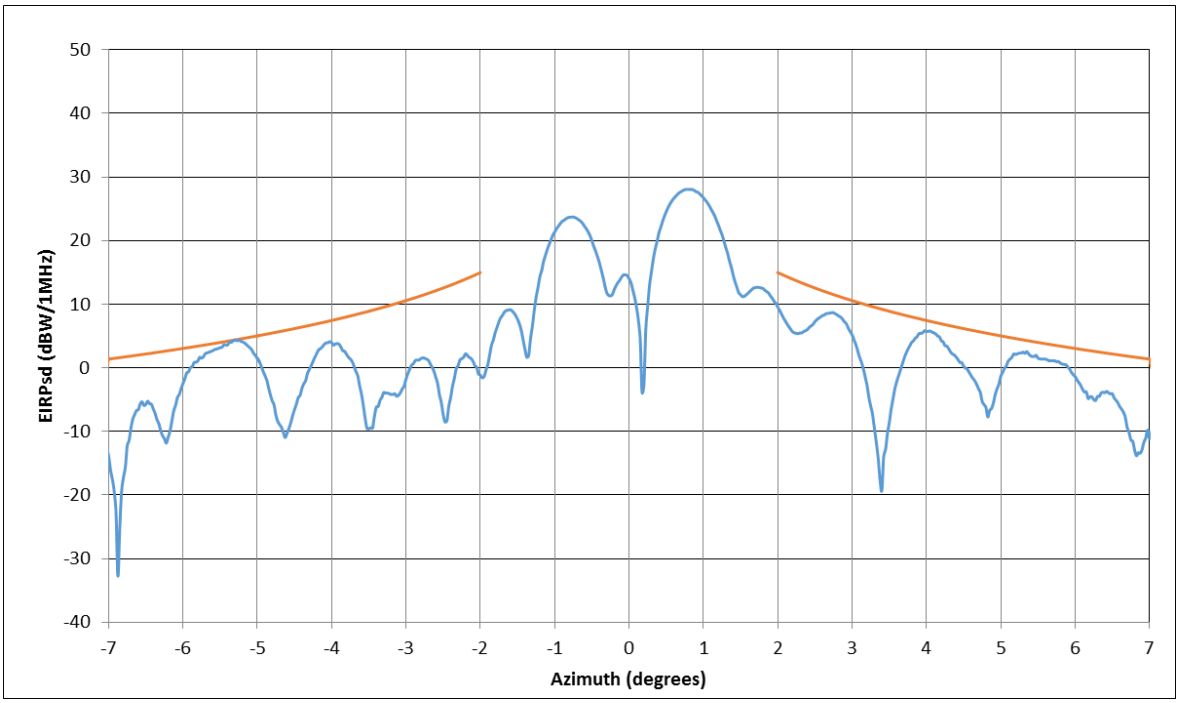
X-Pol EIRP density in the plane tangent to the GSO Arc 30.0 GHz (-7 to +7 degrees)



X-Pol EIRP density in the plane perpendicular to the GSO Arc 29.5 GHZ (-7 to +7 degrees)

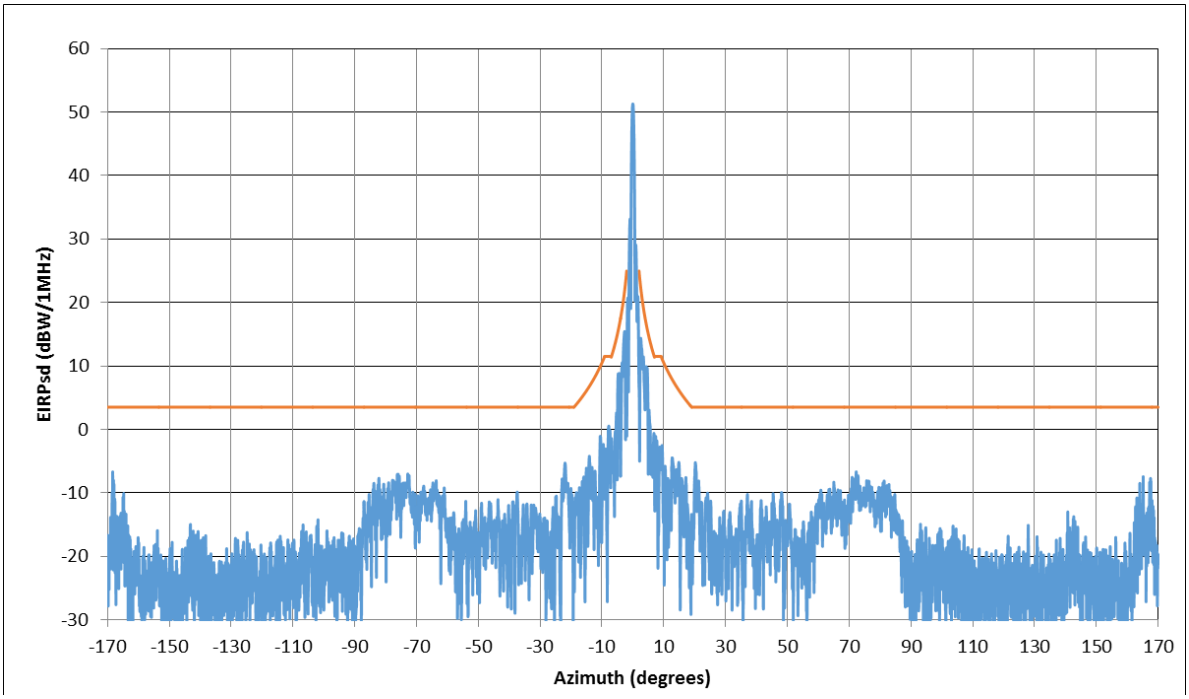


X-Pol EIRP density in the plane perpendicular to the GSO Arc 30.0 GHZ (-7 to +7 degrees)

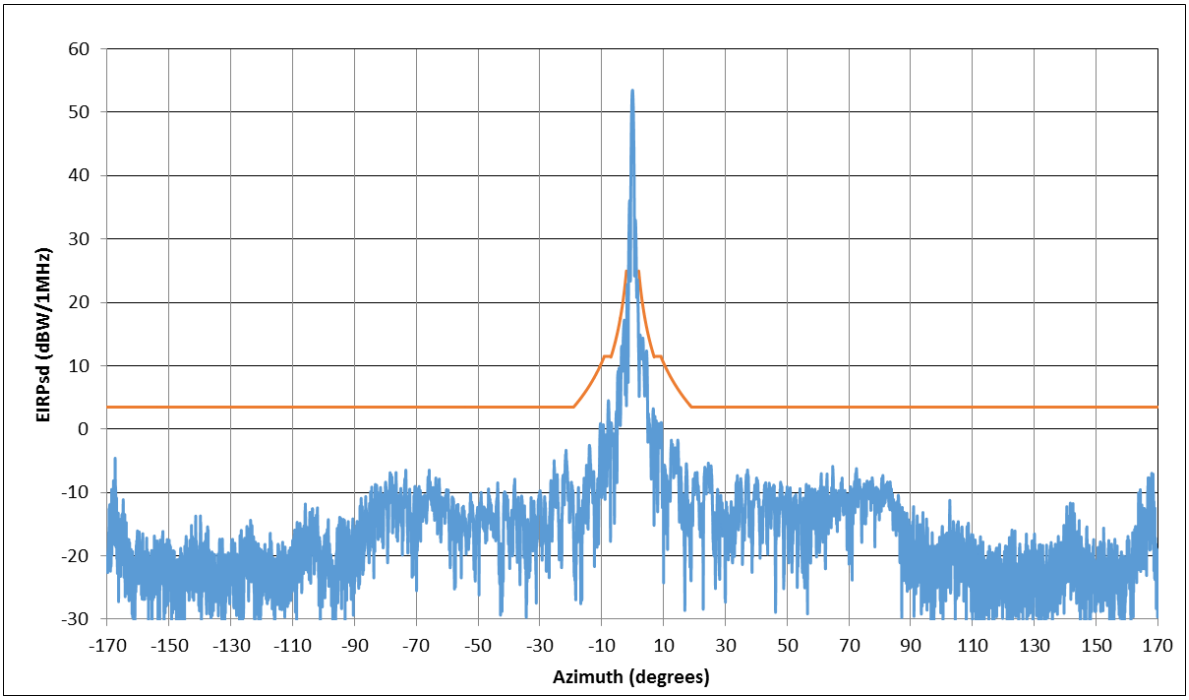


3.0 Tampa 130 Off-Axis EIRP Masks

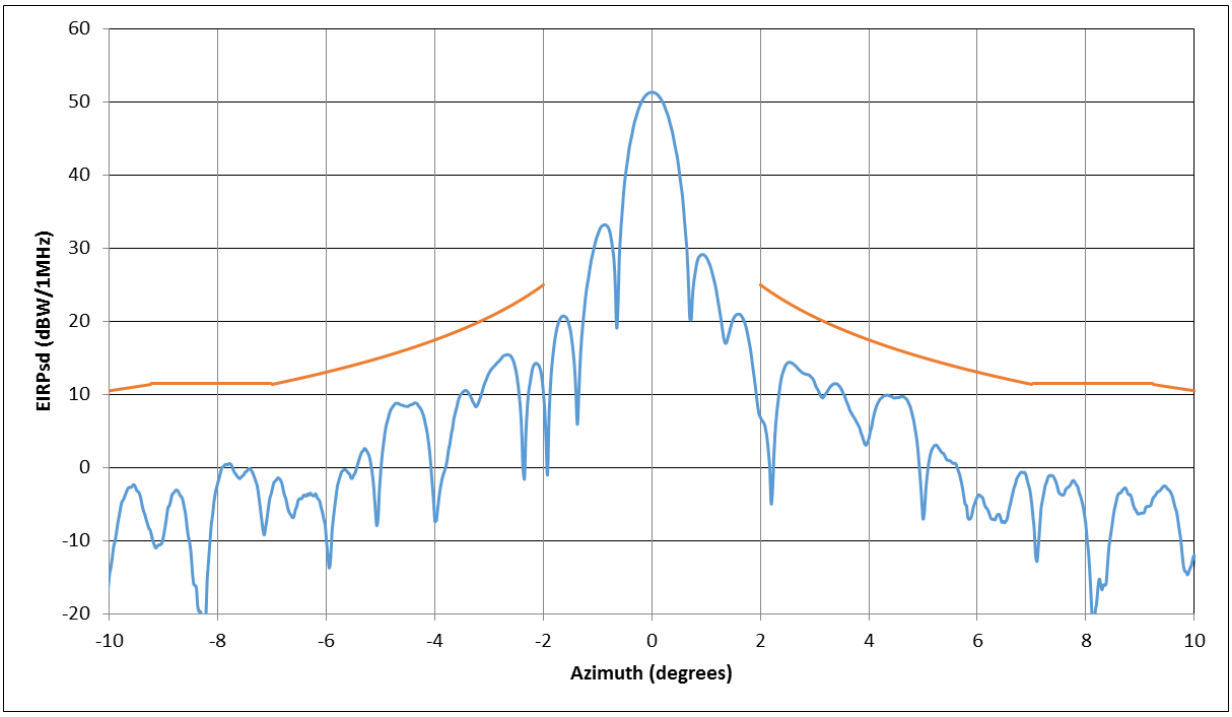
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



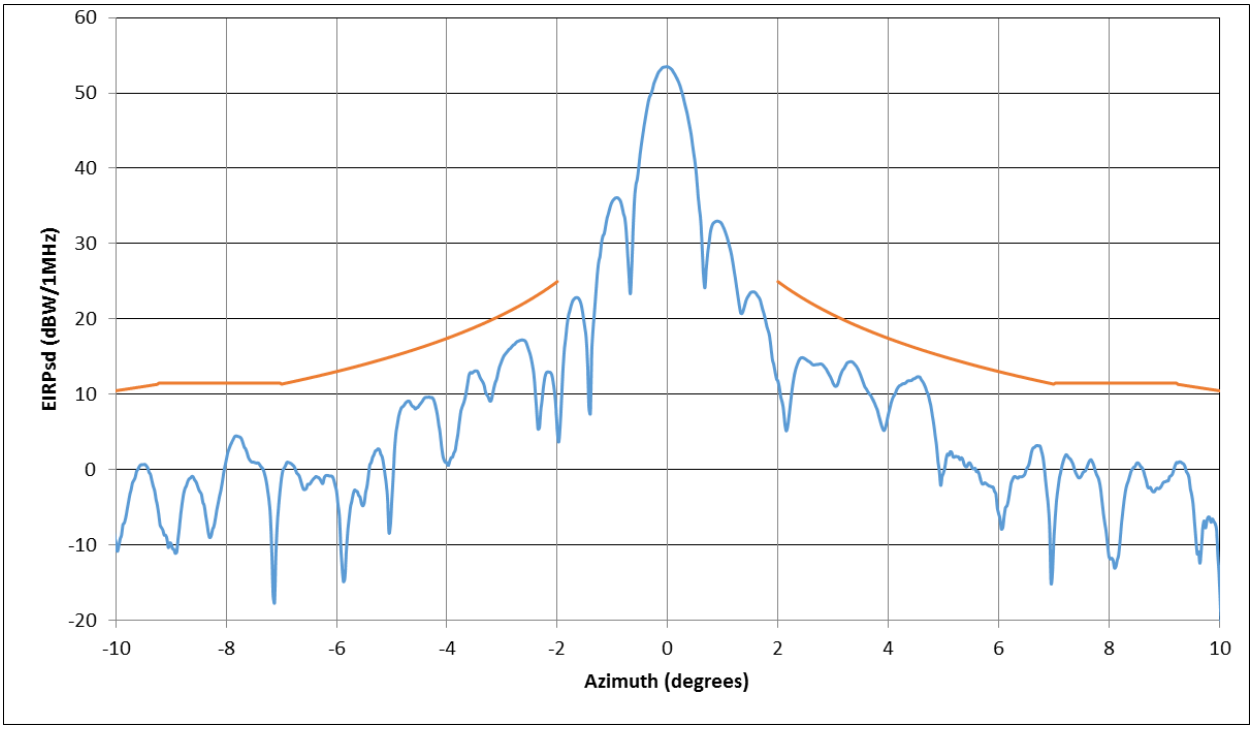
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz



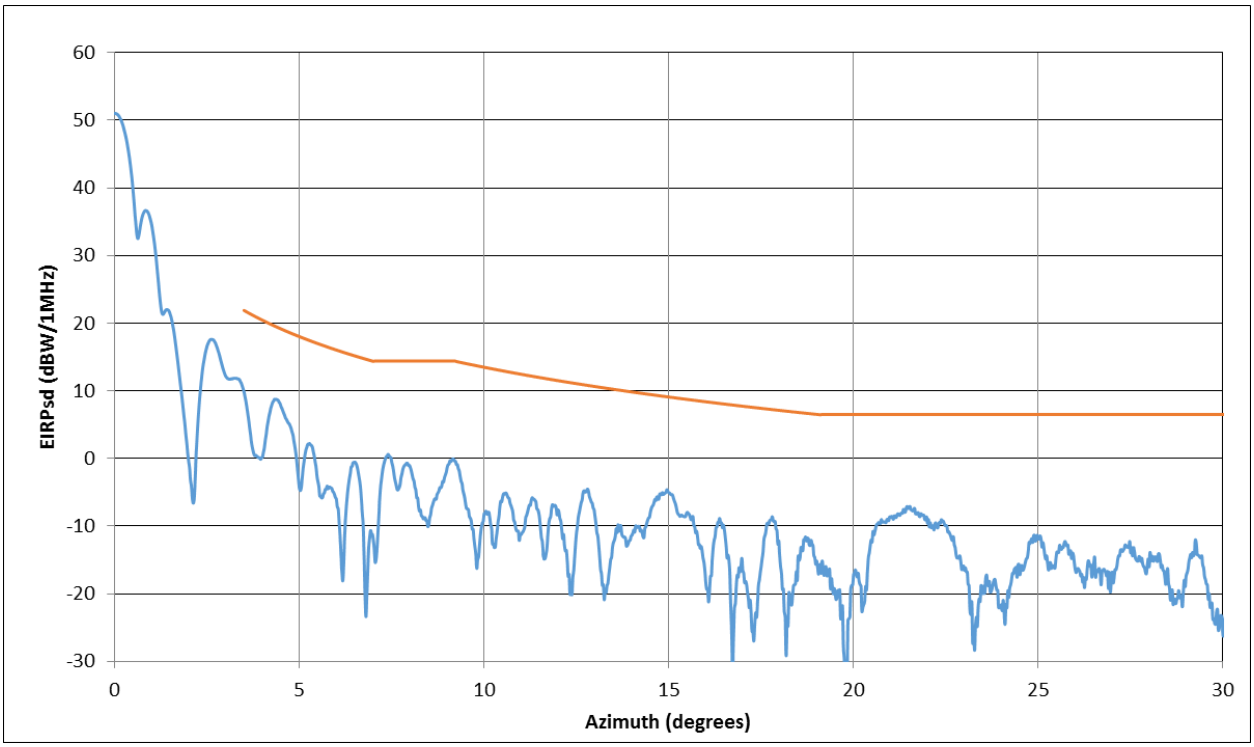
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



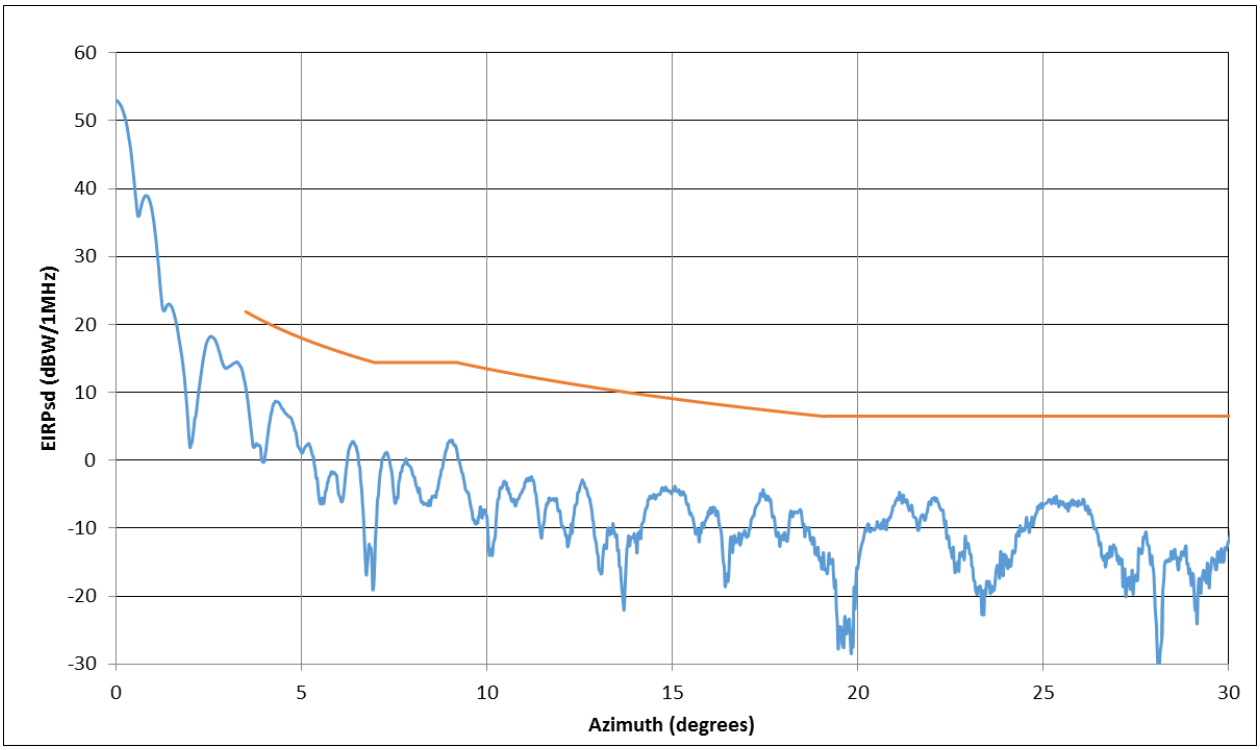
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz (-10 to +10 degrees)



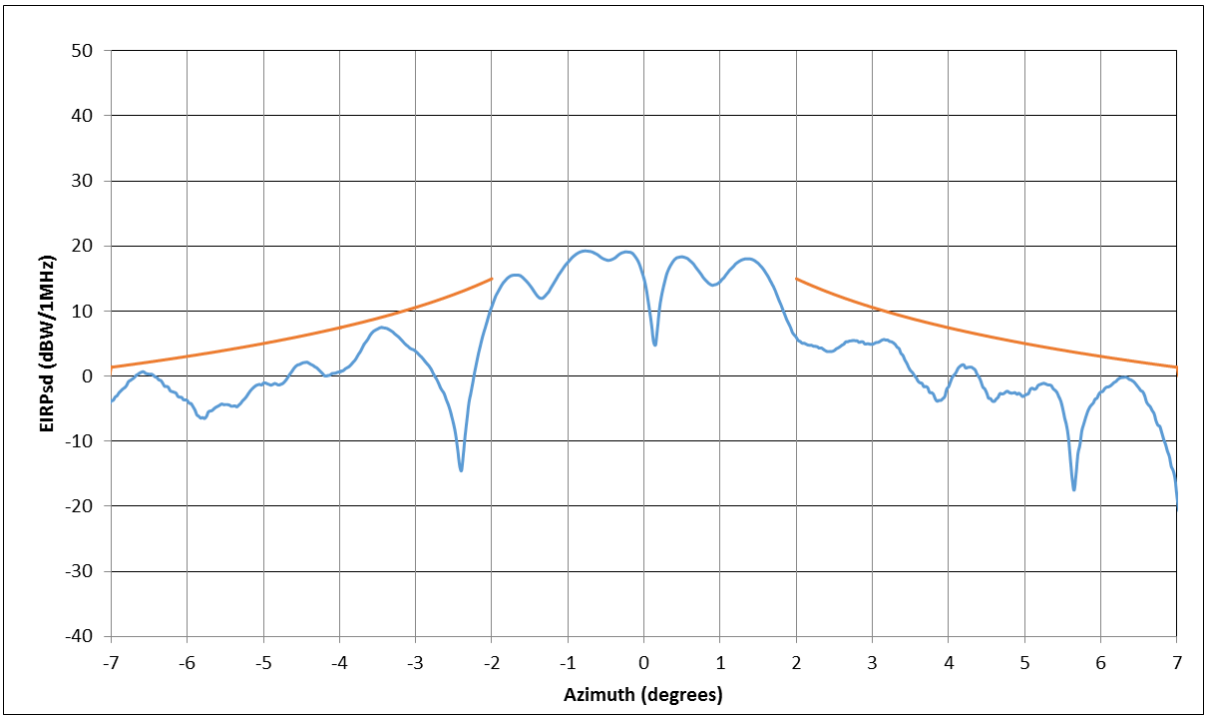
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



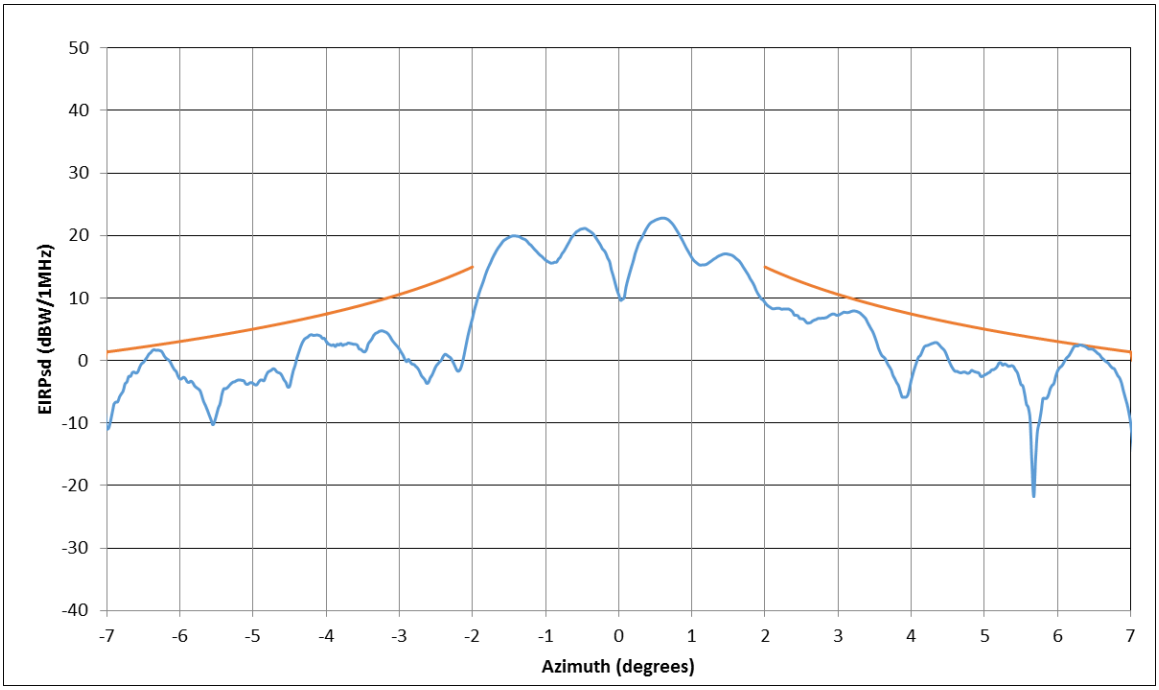
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



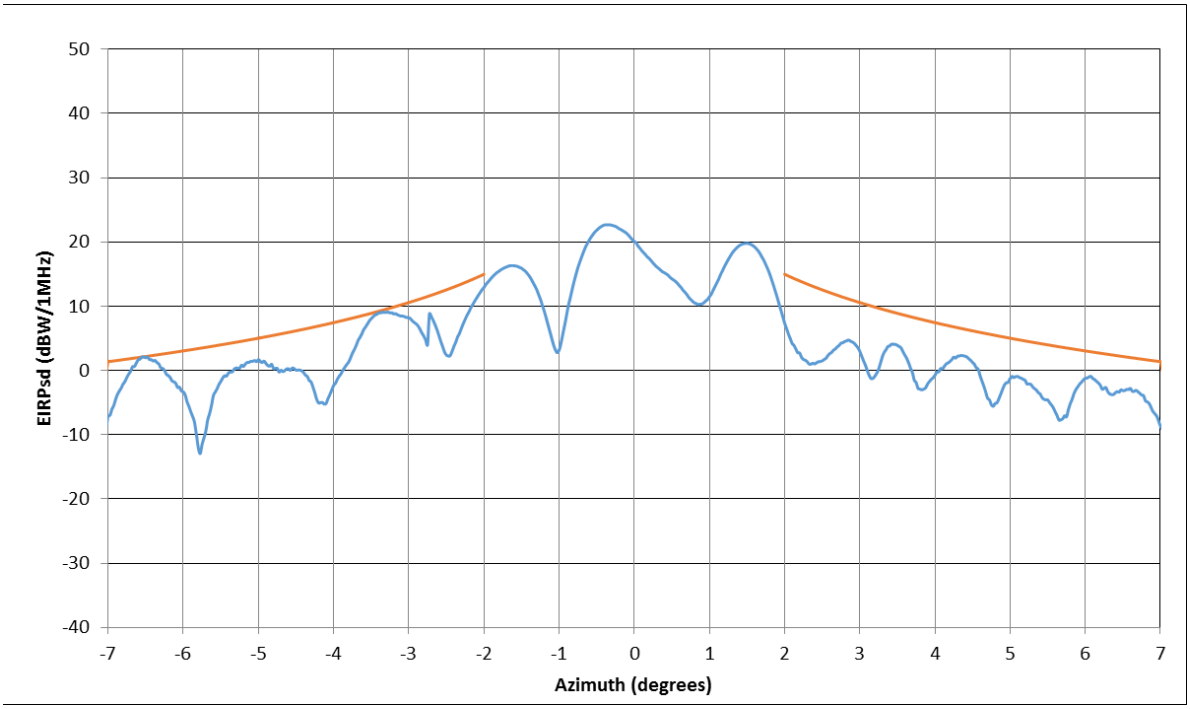
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



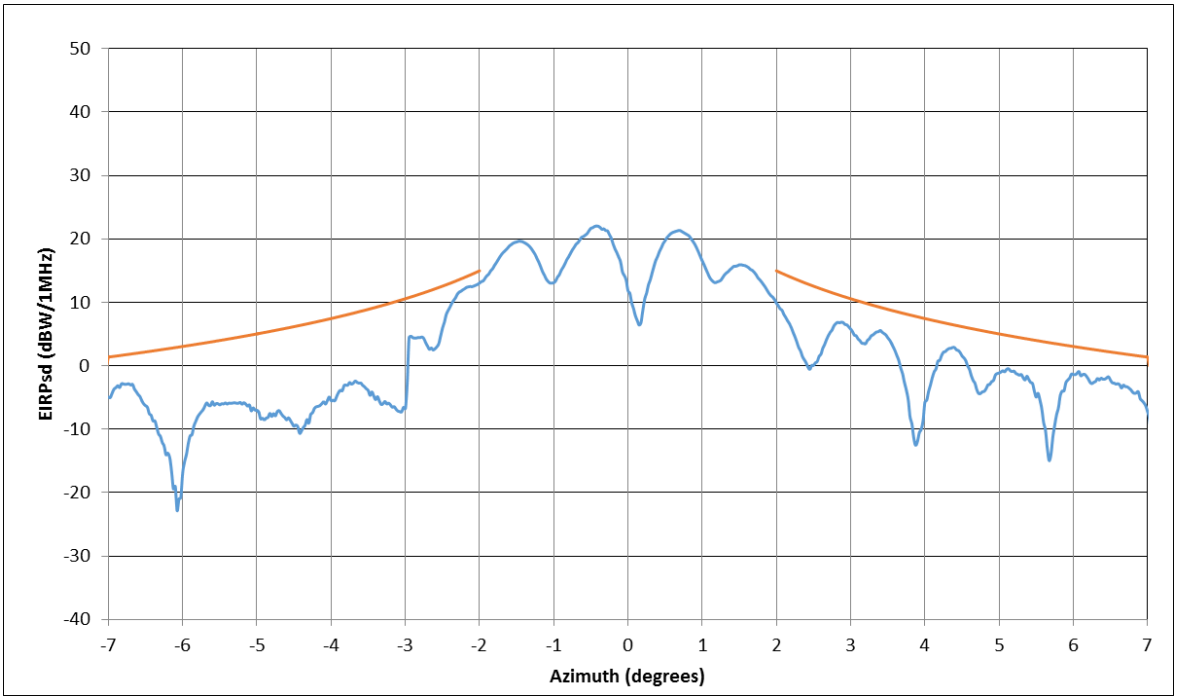
X-Pol EIRP density in the plane tangent to the GSO Arc 30.0 GHz (-7 to +7 degrees)



X-Pol EIRP density in the plane perpendicular to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



X-Pol EIRP density in the plane tangent to the GSO Arc 30.0 GHZ (-7 to +7 degrees)



ISAT US Inc.

FCC Form 312 Exhibit C

Radiation Hazard Analysis

I. Introduction

This Exhibit analyzes the non-ionizing radiation levels for the three Tampa Microwave terminal earth stations included in this application. The analysis and calculations performed in this Exhibit comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01.

Bulletin No. 65 and the FCC R&O 96-326 specify two Maximum Permissible Exposure (MPE) limits that are dependent on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. These are described below:

- General Population/Uncontrolled environment MPE limit is 1 mW/cm2. The General Population /Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less.
- Occupational/Controlled environment MPE limit is 5 mW/cm2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less.

The analysis determined the power flux density levels of the earth station in the 1) far-field, 2) near-field, and 3) transition region. The analysis also examined the safe distance required to meet both the controlled and uncontrolled exposure limits. The summary of results and discussion is provided in Section 2 and the detailed analyses are provided in Section 3.

II. Summary of Results

The Tables below summarize the results for the proposed Tampa terminals. The analysis of the non-ionizing radiation levels, provided in Section 3, assumed the maximum allowed input power to antenna of 4W and a 100% duty cycle resulting in worst case radiation levels. In a significant number of deployments, the terminal duty cycle would be below 100% and the actual power required would be lower than the 4W maximum resulting in lower radiation levels than those calculated. As with any directional antenna the maximum level of non-ionizing radiation is in the main beam of the antenna that is pointed to the satellite. As one moves around the antenna to the side lobes and back lobes the radiation levels decrease significantly. Thus, the maximum radiation level from an antenna occurs in a limited area in the direction the antenna is pointed to. This is especially true in the case of the Tampa terminals, as they utilize small, dish antennas that result in a very narrow main beam, resulting in higher calculated power density in the main beam but a sharp drop off in energy as one moves toward the side lobes.

The Tampa terminals are for commercial and government use and are not intended to be operated by the general public. The terminal is cost prohibitive for purchase by the general public, therefore it will only be operated by trained professional personnel. The antenna installers will be aware of the antenna's radiation environment and use measures best suited to maximize protection to anyone who may come into the proximity of the terminal.

As summarized in the tables below, the Tampa 65 antenna meets the FCC's MPE levels for uncontrolled or controlled environments beyond separation distances of about 32.14 m and 14.37 m, respectively. The Tampa 95 antenna meets the FCC's MPE levels for uncontrolled or controlled environments beyond separation distances of about 45.45 m and 20.32m, respectively. The Tampa 130 antenna meets the FCC's MPE levels for uncontrolled or controlled environments beyond separation distances of about 84.44 m and 37.76 m, respectively. Based on these calculations, the Tampa 65 antenna meets the FCC's MPE levels for controlled environments in the near field, far field and the transition region of the antenna and exceeds the MPE levels for uncontrolled environments in the near field, far field and the transition region of the antenna. The Tampa 95 antenna meets the FCC's MPE levels for controlled environments in the near field, far field, and transition region, and meets the MPE levels for uncontrolled environments in the far field region and exceeds the MPE levels for uncontrolled environments in the near field and transition regions. The Tampa 130 antenna meets the FCC's MPE levels for both controlled and uncontrolled environments in the near field, far field and the transition regions of the antenna. Training of personnel with access to the terminal would include consideration of the operational modes of the antenna and information on how to prevent radiation exposure, including disabling the communications system.

Additionally, there are various safety features associated with the operation and installation of the terminals that will prevent radiation exposure. For example, the terminals are designed to cease transmitting if the receive signal from the satellite is blocked, which could be caused by a person standing in front of the terminal or from other blockage. If the receive signal is blocked, the transmitter is shut down nearly instantaneously and will not resume operating until the signal from the satellite is reacquired. In fact there is a double shut down protection in the event that someone or something obstructs the RF path to the satellite. Not only does the terminal automatically turn off its Transmit capability if it loses the satellite Receive signal, i.e. the transmission path is compromised, but the radio frequency amplifier is additionally muted via its monitor and control so that no radio frequency can be transmitted. Especially given the small size of these antennas and their operational elevation angle, there is a high probability that any person passing close enough to the antenna to be exposed to its main beam would also block the RF path between the terminal and the satellite triggering the automatic shutdown mechanism. As a result of this automatic shutdown mechanism, the maximum continuous time that a person could be exposed to the main beam transmissions at any power level would be significantly less than one second before the antenna would cease transmitting.

The antenna will be operated only at locations not accessible by the general population. Given that the antenna will not operate below elevation angles of five degrees, and that the terminal will be pointed upward toward the satellite - persons are unlikely to be exposed to the main beam of the antenna. Any areas where the limits for uncontrolled environments could be exceeded will be restricted to trained personnel. Furthermore, the manuals for these terminals will provide warnings regarding potential for radiation hazard.

In conclusion, the results of the analysis combined with the design and operational characteristics of the terminals show that the Tampa terminals, when deployed, and used under the proper mitigation procedures, meet the guidelines specified in § 1.1310 of the Regulations.

Tampa 65 Terminal

Region	Distance (m)	Calculated Power Density (mW/cm2)	Limit Controlled Environment ≤ 5 mW/cm2	Limit Uncontrolled Environment ≤ 1 mW/cm2
Safe Range for Uncontrolled	≥32.14	1.0	Meets Limit	Meets Limit
Safe Range for Controlled	≥14.37	5.0	Meets Limit	Exceeds Limit
Near Field	10.56	2.80	Meets Limit	Exceeds Limit
Far Field	25.35	1.61	Meets Limit	Exceeds Limit
Transition Region	10.56	2.80	Meets Limit	Exceeds Limit

Tampa 95 Terminal

Region	Distance (m)	Calculated Power Density (mW/cm2)	Limit Controlled Environment ≤ 5 mW/cm2	Limit Uncontrolled Environment ≤ 1 mW/cm2
Safe Range for Uncontrolled	≥45.45	1.0	Meets Limit	Meets Limit
Safe Range for Controlled	≥20.32	5.0	Meets Limit	Exceeds Limit
Near Field	22.56	1.31	Meets Limit	Exceeds Limit
Far Field	54.15	0.70	Meets Limit	Meets Limit
Transition Region	22.56	1.31	Meets Limit	Exceeds Limit

Tampa 130 Terminal

Region	Distance (m)	Calculated Power Density (mW/cm2)	Limit Controlled Environment ≤ 5 mW/cm2	Limit Uncontrolled Environment ≤ 1 mW/cm2
Safe Range for Uncontrolled	≥84.44	1.0	Meets Limit	Meets Limit
Safe Range for Controlled	≥37.76	5.0	Meets Limit	Exceeds Limit
Near Field	42.25	0.70	Meets Limit	Meets Limit
Far Field	101.40	0.69	Meets Limit	Meets Limit
Transition Region	42.25	0.70	Meets Limit	Meets Limit

III. Detailed Calculations

Tampa 65 Terminal

Input Parameter	Value	Units	Symbol
Antenna Major Axis Dimension	0.65	m	D
Antenna Transmit Gain @30 GHz	45.11	dBi	G
Transmit Frequency	30000	MHz	F
Power Input to the Antenna	4	Watts	P
Antenna Efficiency	0.58	Real	η

Calculated Parameter	Value	Units	Symbol	Formula
Gain Factor	32433.96	Real	g	10^(G/10)
Wavelength	0.01	m	λ	300/f

Antenna Field Distances

Calculated Parameter	Value	Units	Symbol	Formula
Near-Field Distance	10.56	m	Rnf	$D^2/(4\lambda)$
Distance to Far-Field	25.35	m	Rff	$0.6D^2/\lambda$
Distance of Transition Range	10.56	m	Rt	Rt=Rnf

Power Density

Calculated Parameter	Value	Units	Symbol	Formula
Power Density in the Near Field	2.80	mW/cm^2	Snf	$16\eta P/(\pi D^2)$
Power Density in the Far Field	1.61	mW/cm^2	Sff	$gP/(4\pi Rff^2)$
Power Density in the Transition Region	2.80	mW/cm^2	St	Snf*Rnf/Rt

Distance to 1 mW/cm^2	32.14	m
Distance to 5 mW/cm^2	14.37	m

Tampa 95 Terminal

Input Parameter	Value	Units	Symbol
Antenna Major Axis Dimension	0.95	m	D
Antenna Transmit Gain @30 GHz	48.12	dBi	G
Transmit Frequency	30000	MHz	F
Power Input to the Antenna	4	Watts	P
Antenna Efficiency	0.58	Real	η

Calculated Parameter	Value	Units	Symbol	Formula
Gain Factor	64863.44	Real	g	10^(G/10)
Wavelength	0.01	m	λ	300/f

Antenna Field Distances

Calculated Parameter	Value	Units	Symbol	Formula
Near-Field Distance	22.56	m	Rnf	$D^2/(4\lambda)$
Distance to Far-Field	54.15	m	Rff	$0.6D^2/\lambda$
Distance of Transition Range	22.56	m	Rt	Rt=Rnf

Power Density

Calculated Parameter	Value	Units	Symbol	Formula
Power Density in the Near Field	1.31	mW/cm^2	Snf	$16\eta P/(\pi D^2)$
Power Density in the Far Field	0.70	mW/cm^2	Sff	$gP/(4\pi Rff^2)$
Power Density in the Transition Region	1.31	mW/cm^2	St	Snf*Rnf/Rt

Distance to 1 mW/cm2	45.45	m	
Distance to 5 mW/cm2	20.32	m	

Tampa 130 Terminal

Input Parameter	Value	Units	Symbol	
Antenna Major Axis Dimension	1.3	m	D	
Antenna Transmit Gain @30 GHz	53.5	dBi	G	
Transmit Frequency	30000	MHz	F	
Power Input to the Antenna	4	Watts	P	334.8
Antenna Efficiency	0.58	Real	η	

Calculated Parameter	Value	Units	Symbol	Formula
Gain Factor	223872.11	Real	g	10^(G/10)
Wavelength	0.01	m	λ	300/f

Antenna Field Distances

Calculated Parameter	Value	Units	Symbol	Formula
Near-Field Distance	42.25	m	Rnf	$D^2/(4\lambda)$
Distance to Far-Field	101.40	m	Rff	$0.6D^2/\lambda$
Distance of Transition Range	42.25	m	Rt	Rt=Rnf

Power Density

Calculated Parameter	Value	Units	Symbol	Formula
Power Density in the Near Field	0.70	mW/cm^2	Snf	$16\eta P/(\pi D^2)$
Power Density in the Far Field	0.69	mW/cm^2	Sff	$gP/(4\pi Rff^2)$
Power Density in the Transition Region	0.70	mW/cm^2	St	Snf*Rnf/Rt

Distance to 1 mW/cm^2	84.44	m
Distance to 5 mW/cm^2	37.76	m