ISAT US Inc.
FCC Form 312 Exhibit A

Application to Amend Pending Application to Modify License E150097

I. DESCRIPTION OF MODIFICATION

ISAT US Inc. (hereinafter "ISAT US") hereby seeks to amend its pending application to modify its Global Xpress blanket license for Ka-band land-based terminals, Call Sign E150097 ("License"). The License initially was issued under IBFS File No. SES-LIC-20150625-00383 ("GX Land Application") and was modified by File Nos. SES-MFS-20160527-00458, SES-MOD-20160720-00669, SES-MOD-20170425-00465, SES-MOD-20180323-00263, and SES-MOD-20190417-00528. The License is now the subject of a currently-pending modification application, SES-MOD-20190801-01017, to add two new Panther II terminals. This amendment will add three new GX Earth Station in Motion ("ESIM") terminal types ("MicroSat", "MilliSat-W", "MilliSat-H") that will communicate with the Inmarsat-5 F2 ("I5F2") and Inmarsat-5 F3 ("I5F3") satellites. These same three terminals were the subject of a previous application to modify Inmarsat's maritime ESIM license, Call Sign E140029, which was granted by the FCC on May 2, 2019.[1] The technical characteristics of the terminals are unchanged from the earlier application; the present application seeks authorization of these terminals for land-based ESIM use.

Section II addresses the proposed new Earth station terminals. ISAT US incorporates by reference Exhibit F (response to Question E17 regarding the remote control point at Inmarsat's Lino Lakes MN gateway, as the gateway complies with the recently adopted shut-off capabilities under Section 25.228(c)), updates Exhibit G (24-hour point of contact)[2] of the GX Land

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1 *See* IBFS File No. SES-MOD-20190321-00390.

2 The 24-hour point of contact with the ability to shut down any of the terminals immediately upon notification of harmful interference is at Inmarsat's Lino Lakes Gateway, call sign E120072.

Application, and it incorporates by reference certain other portions of the GX Land Application, as referenced below.

II. NEW EARTH STATION IN MOTION TERMINALS

This application seeks to add three terminal models that are manufactured by GetSat. The terminals will provide mobile communications services over Inmarsat's Ka-band Global Xpress satellite system in the 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth) frequency bands. The License currently covers operations in the 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth) frequency bands. This application seeks authority to operate in these same frequencies for land-based mobile applications. As pictured below, the GetSat terminals utilize small flat panel antennas to achieve a compact terminal size that is especially useful in mobile applications. These terminals will add to the option of terminals available to meet the needs of land-based users 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 mobile communications capability to meet mission needs.

A. Land-Based ESIM Terminal Description

This application seeks to license the MicroSat, Millisat-W, and Millisat-H terminals manufactured by GetSat ("GetSat Terminals"). The terminals will operate on the same frequencies as the GX Terminals in the current License: 29.5-30.0 GHz (Earth-to-space) and 19.7-20.2 GHz (space-to-Earth). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the MicroSat, Millisat-W, and Millisat-H terminals meet the EIRP density performance requirements in Section 25.218(i) under clear sky conditions. Additionally, each

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The new contact person is Ananda Mishra, available at 808 638-5820. This updated information is reflected in Form 312 Questions E61-E66.

of these ESIM terminal types will successfully receive signals from the I5F2 and I5F3 satellites below the maximum permitted power flux density at the Earth's surface of -118 dBW/m^2/MHz. Thus, the proposed terminals are able to operate without causing unacceptable interference, consistent with the requirements of Section 25.209(f).[3]

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, ISAT US 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 MicroSat, Millisat-W, and Millisat-H terminals and a discussion of the results are provided in Exhibit C.

The proposed GetSat Terminals will be subject to the same national security requirements described in Section 4 of Exhibit A of the GX Land Application. That discussion is incorporated by reference herein. Inmarsat has completed US334 coordination for the I5F2 and I5F3 satellites with the applicable Federal users. Each of the GetSat terminals complies with Sections 25.228(b) (self-monitoring) and 25.228(c) (network control and monitoring center). The terminals self-monitor and detect when there is a loss in the corresponding receive link. Upon detection of such loss of link, the terminal will immediately cease transmissions. This regulatory function is tested on each individual terminal during its first Over-the-Air Test. Additionally, each individual terminal can be monitored and controlled through a "Hub" at Inmarsat's Lino Lakes Gateway. The network will not allow the terminal

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

to transmit should the terminal violate any of the PSD or EIRP limits for the terminal; the Hub is aware of the terminal limitations as per terminal type, and the terminal will only transmit on those assigned slots/carriers the Hub instructs each terminal to use.

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

B. MICROSAT Terminal

The required technical data for the proposed MicroSat earth station is provided in the Form 312. This terminal type employs a 0.248 x 0.135 meter flat panel antenna and the half-power beamwidth required to be stated by Section 25.115(a)(9) is 2.4 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 25.218(i). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.218(i) under clear sky conditions.

Below are images of the MicroSat terminal both inside and outside of its radome:

C. MILLISAT-W Terminal

The required technical data for the proposed MILLISAT-W earth station is provided in the Form 312. This terminal type utilizes a variation on the MicroSat design, that employs a 0.5 x 0.135 meter flat panel antenna; and the half-power beamwidth required to be stated by Section 25.115(a)(9) is 1.2 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 25.218(i). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.218(i) under clear sky conditions.

Below are images of the MilliSat-W terminal, both inside and outside of its radome:

D. MILLISAT-H Terminal

The required technical data for the proposed MILLISAT-H earth station is provided in the Form 312. This terminal type utilizes a variation on the MicroSat design, that employs a 0.248 x 0.27 meter flat panel antenna; and the half-power beamwidth required to be stated by Section 25.115(a)(9) is 2.2 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 c Section 25.218(i). As illustrated in the off-axis EIRP spectral density plots in Exhibit B, the proposed terminal type meets the performance requirements in Section 25.218(i). under clear sky conditions.

Below is an image of the MilliSat-H terminal both inside and outside of its radome:

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 90° to plus 90°. 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.[4] 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 50° or plus 50°, the EIRP densities are well below the envelope specified in Section 25.209 of the FCC's rules. This strong performance against the Section 25.209 envelope is in part a result of the small rectangular panel and tight beam-forming of the GetSat terminal antennas. As a result of the terminal design, there is no reason to expect that that the EIRP density levels would dramatically increase beyond minus 90° or plus 90°. 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

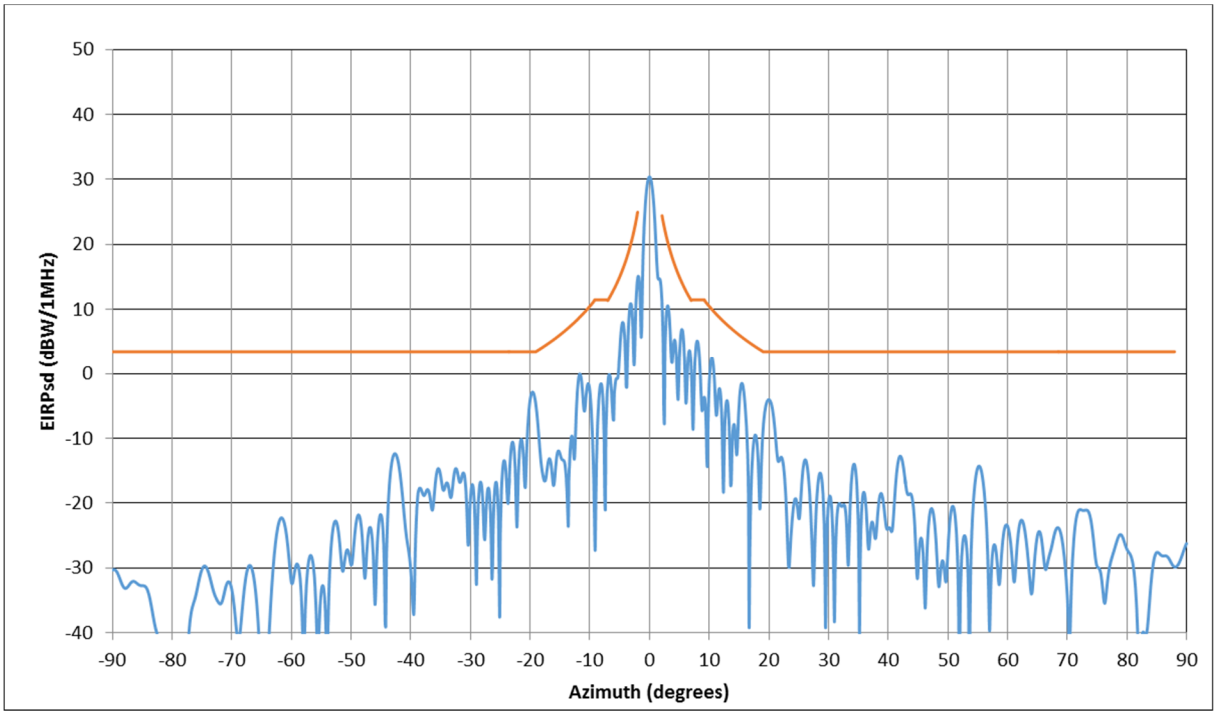
[4] In other instances, the plots provided by the manufacturer show greater ranges than those required under the FCC rules. Those greater ranges are included in this application for completeness and only reinforce the favorable performance of the GetSat terminals.

MSS in the United States to two other satellite operators, and thus dismissed Inmarsat Global's Petition.

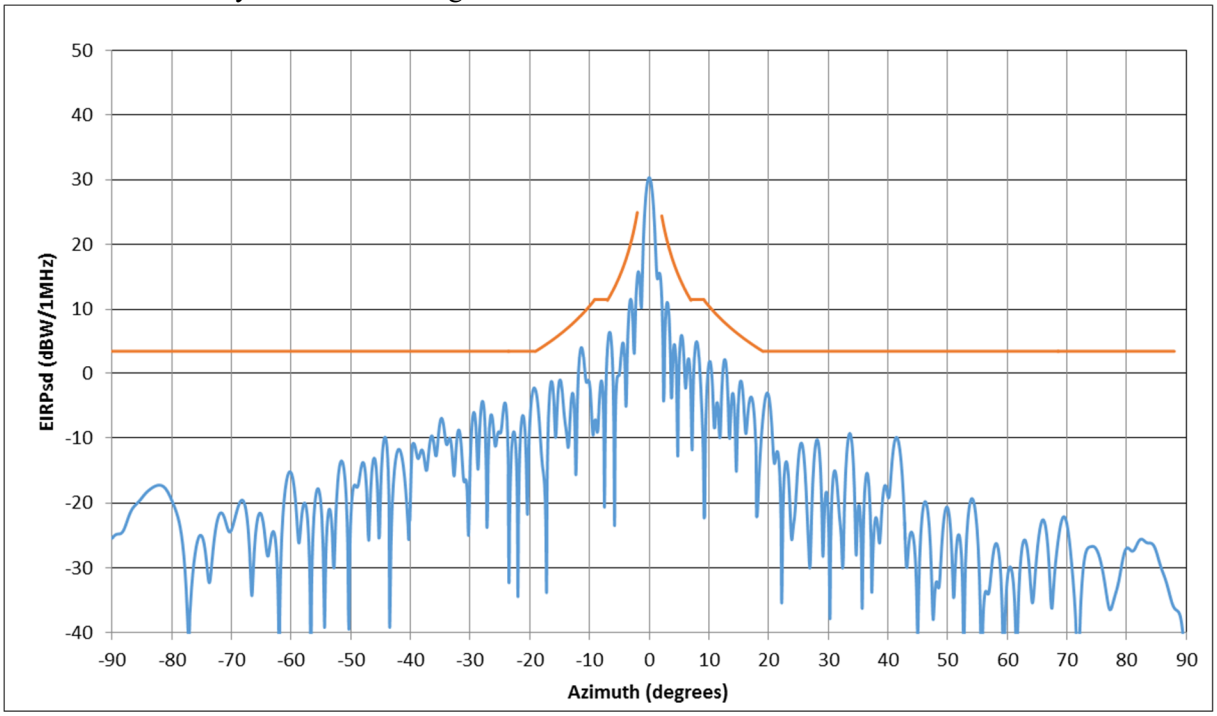
EXHIBIT B

1.0 MilliSat-W Off-Axis EIRP Masks

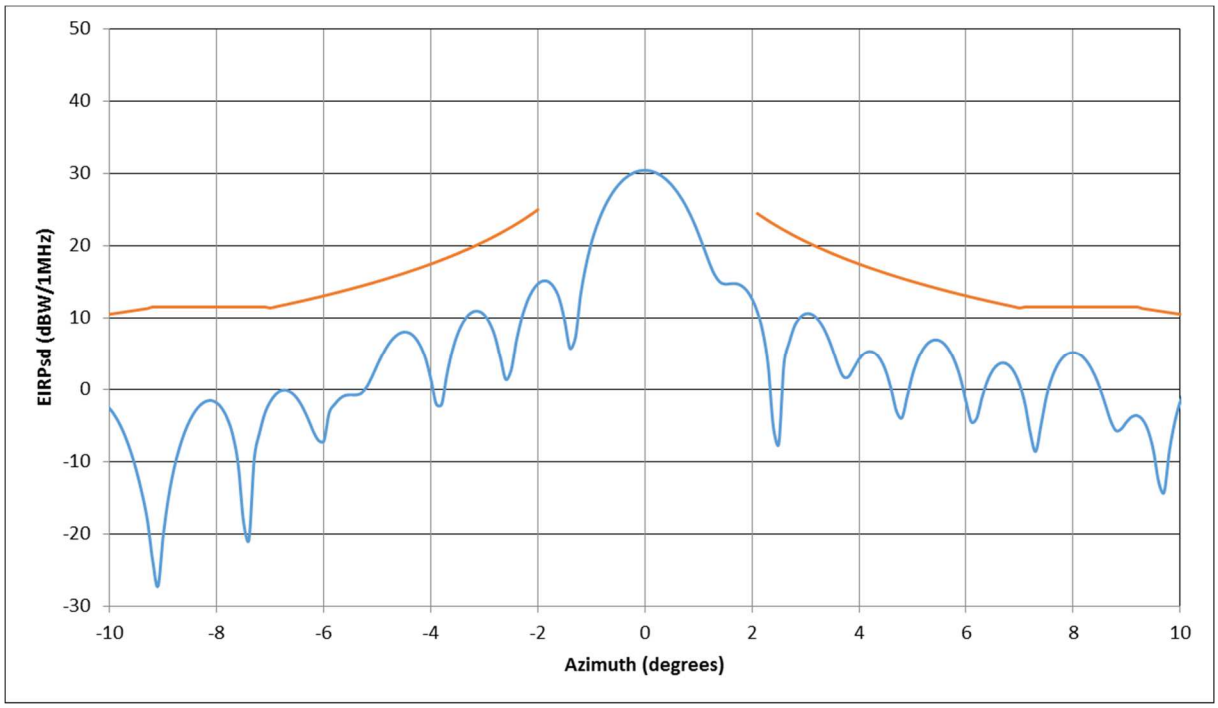
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



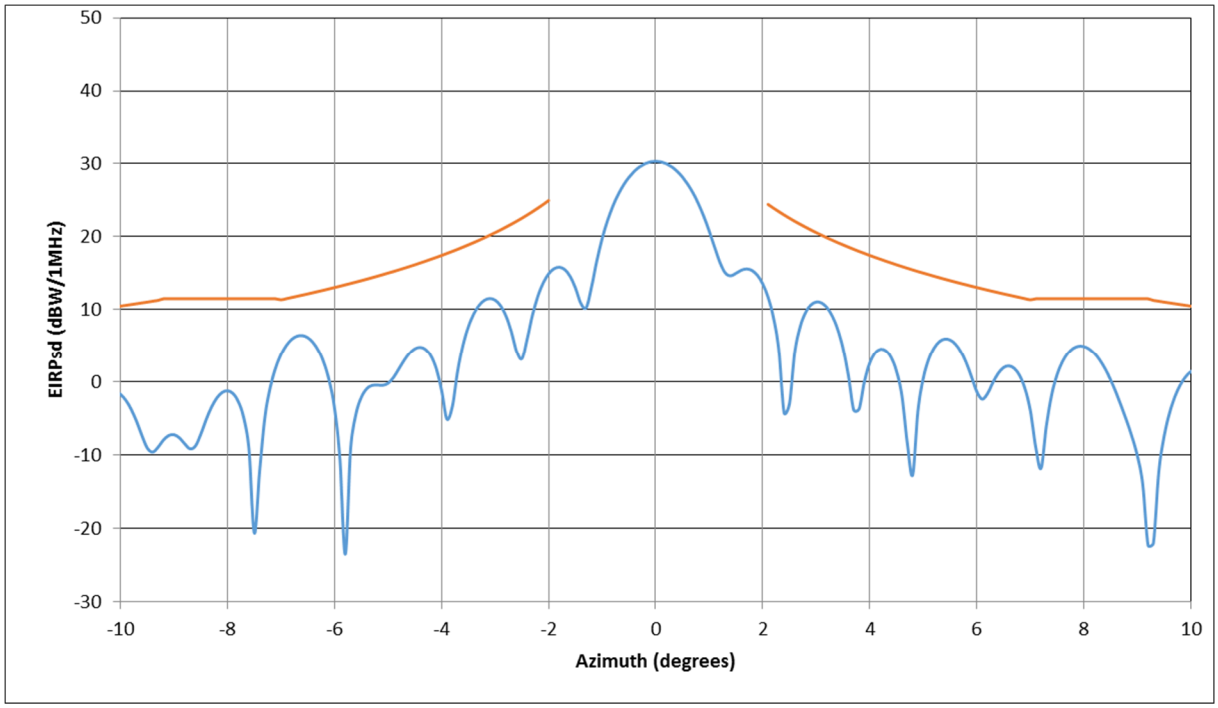
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz



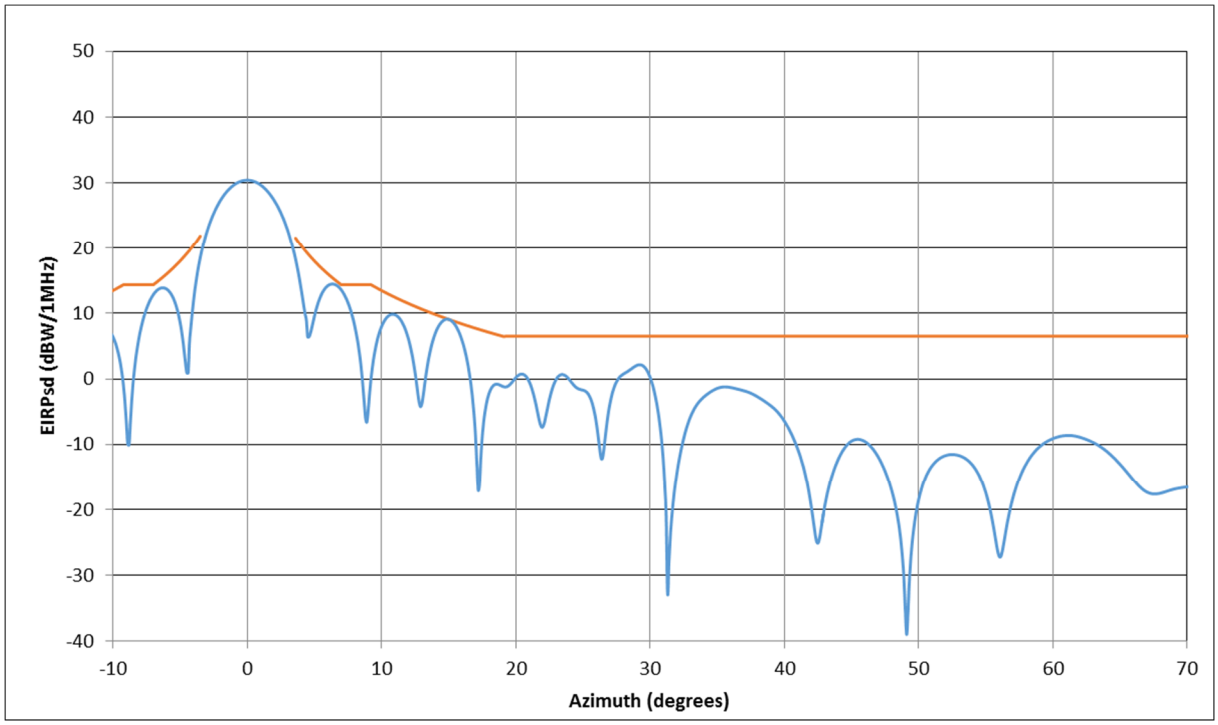
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



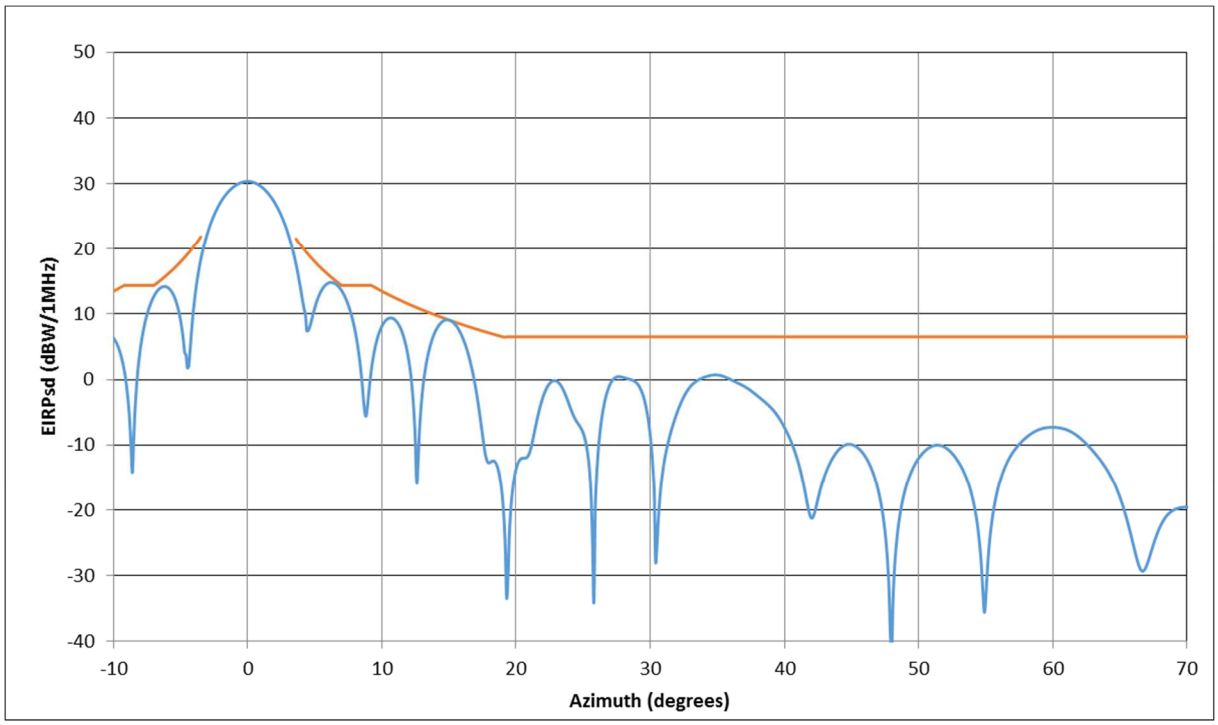
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHZ (-10 to +10 degrees)



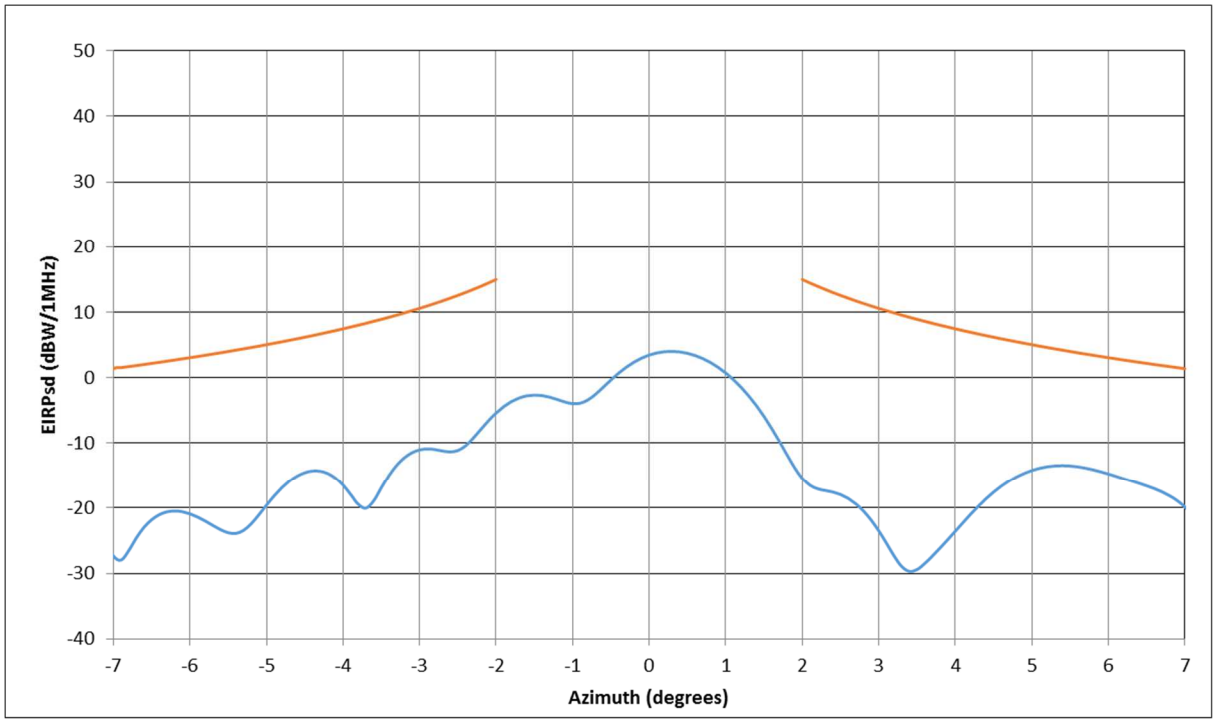
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



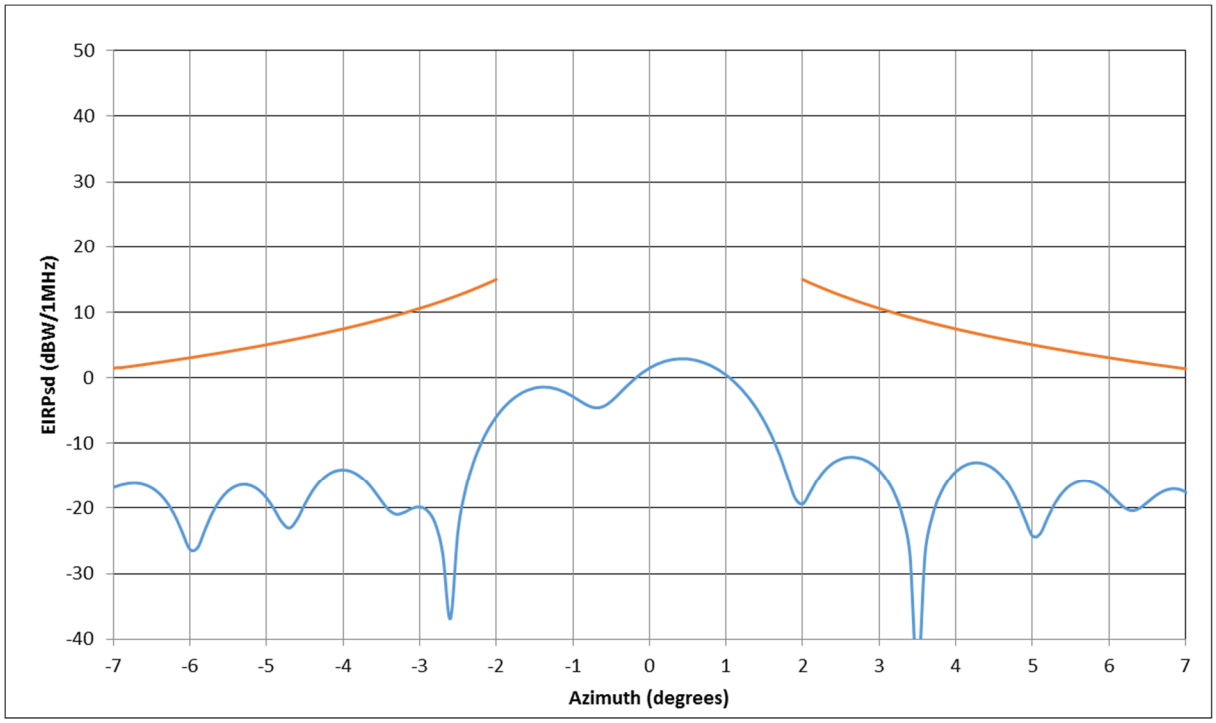
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



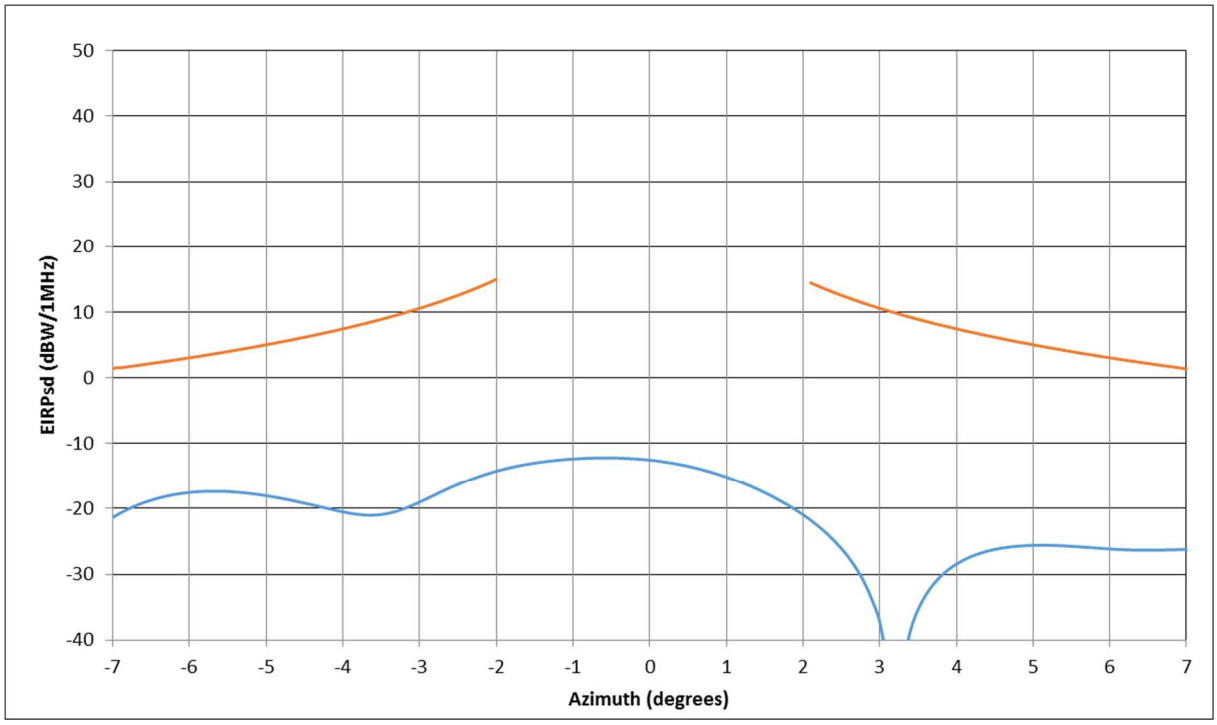
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



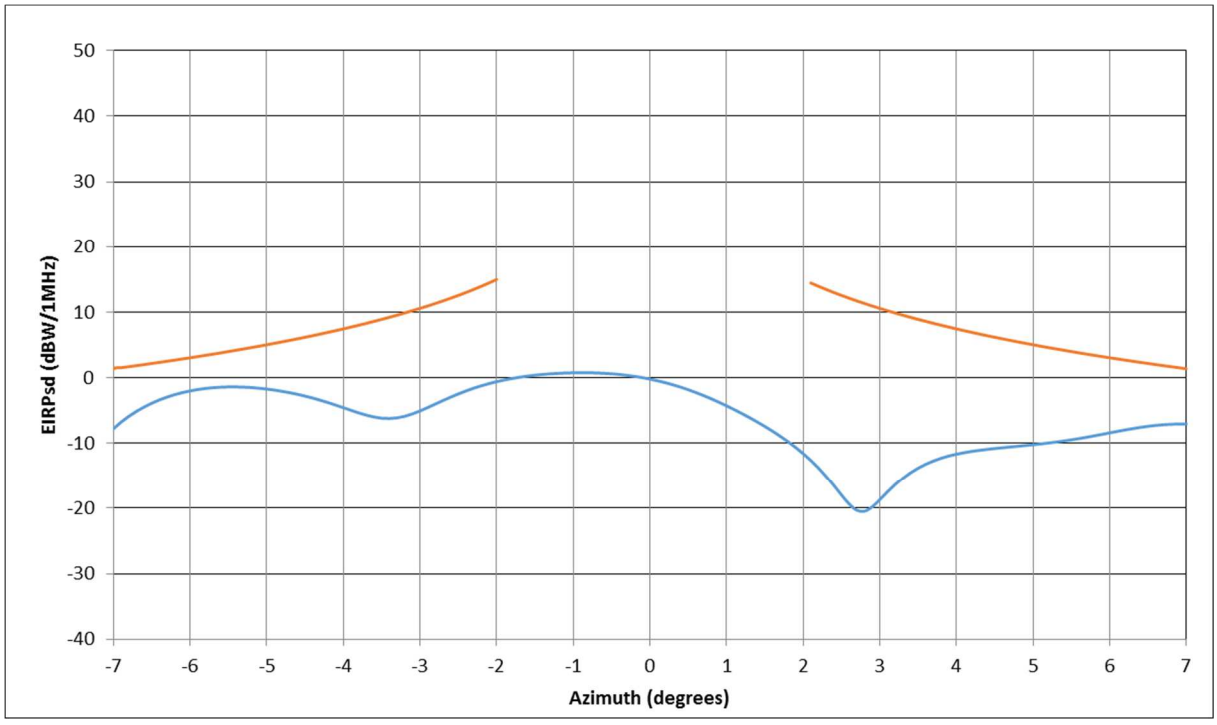
X-Pol EIRP density in the plane tangent to the GSO Arc 30 GHZ (-7 to +7 degrees)



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

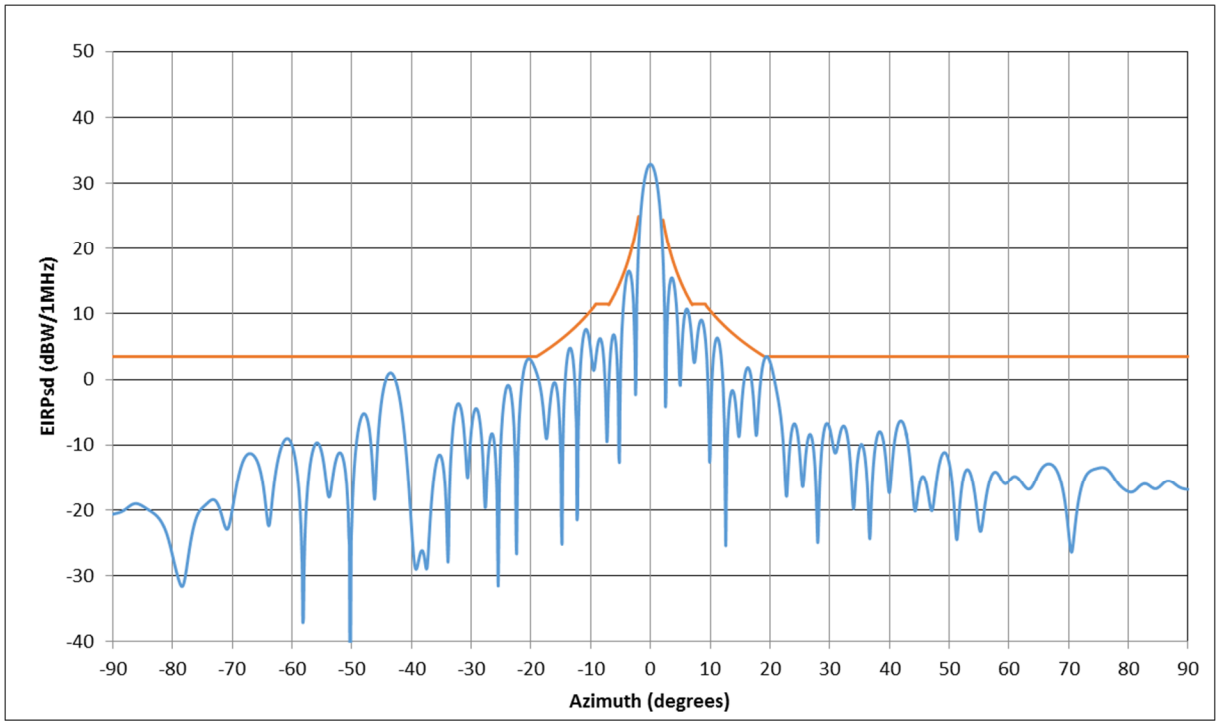


X-Pol EIRP density in the plane perpendicular to the GSO Arc 30 GHZ (-7 to +7 degrees)

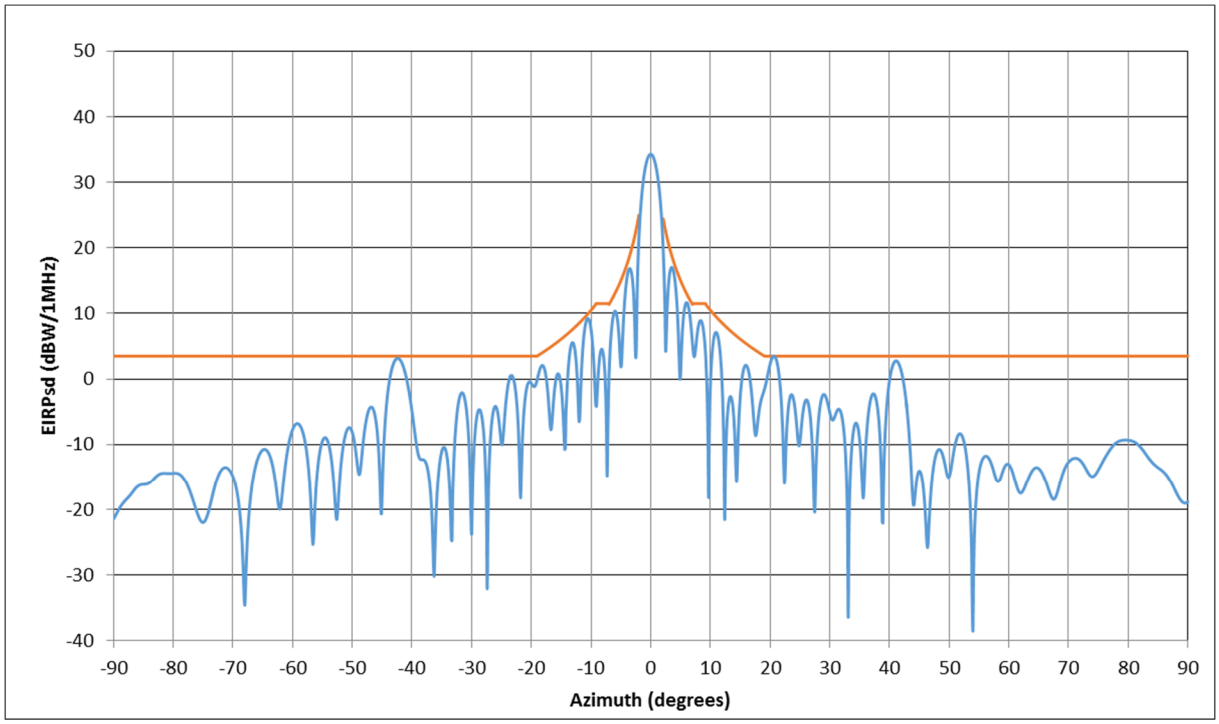


2.0 MilliSat-H Off-Axis EIRP Masks

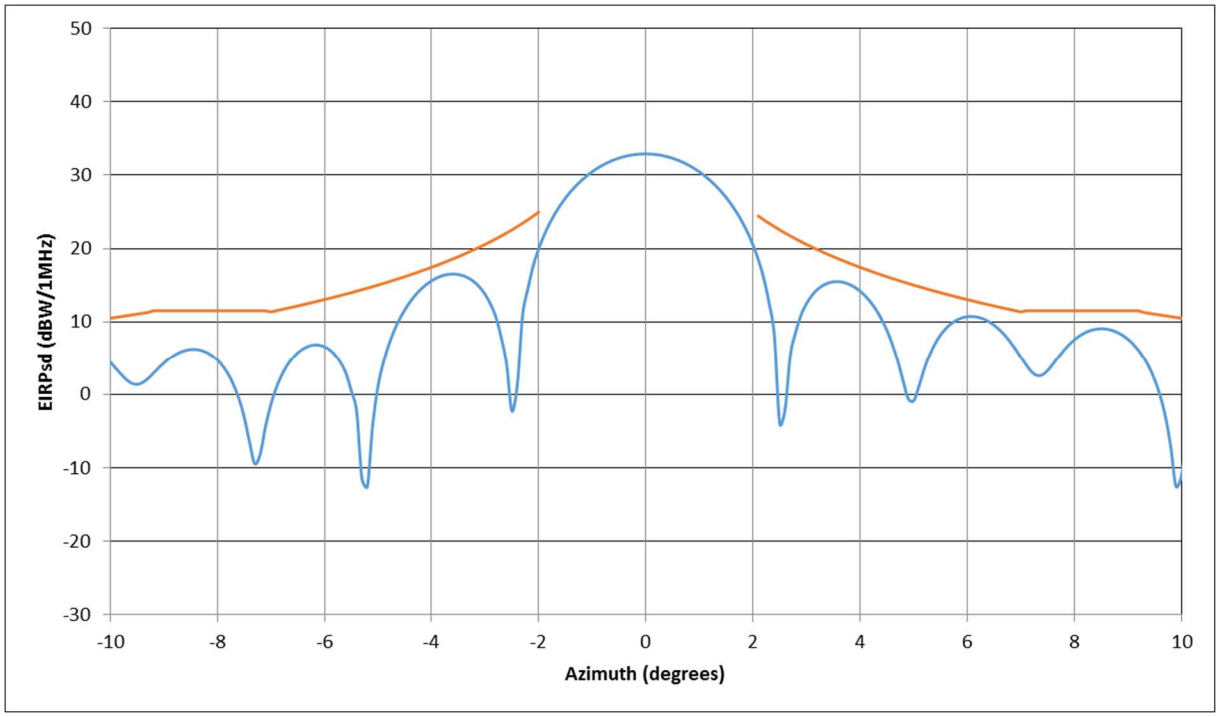
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



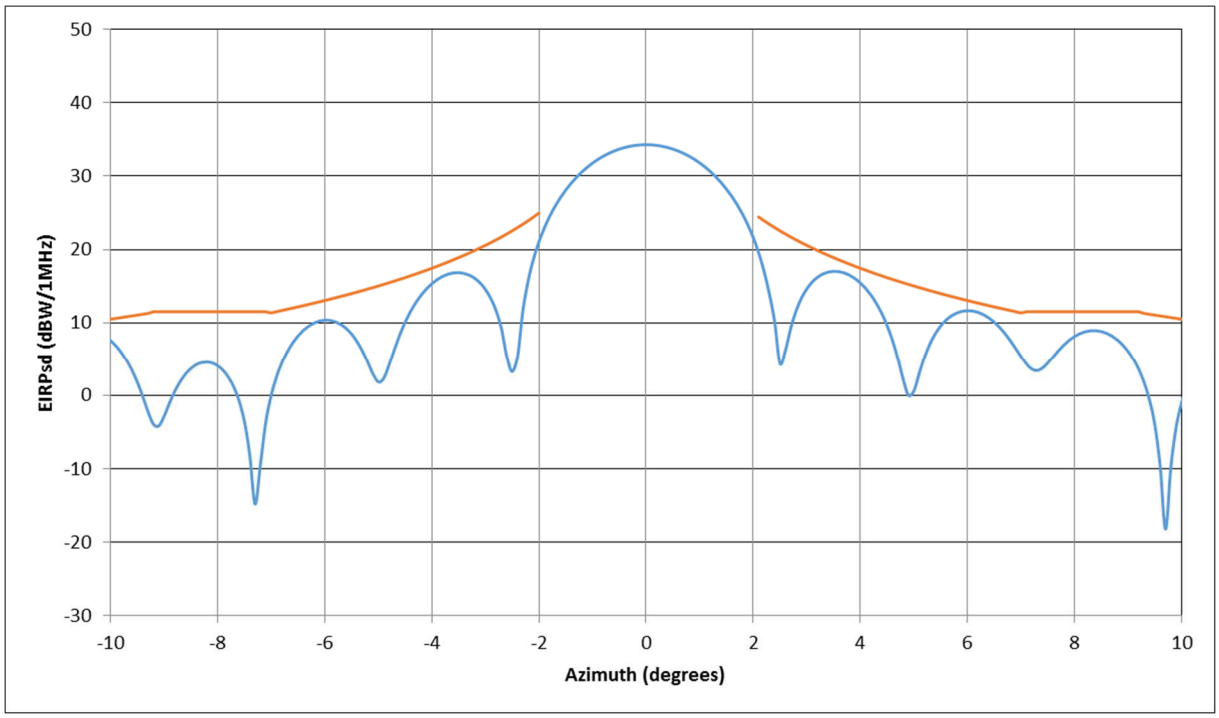
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30 GHZ



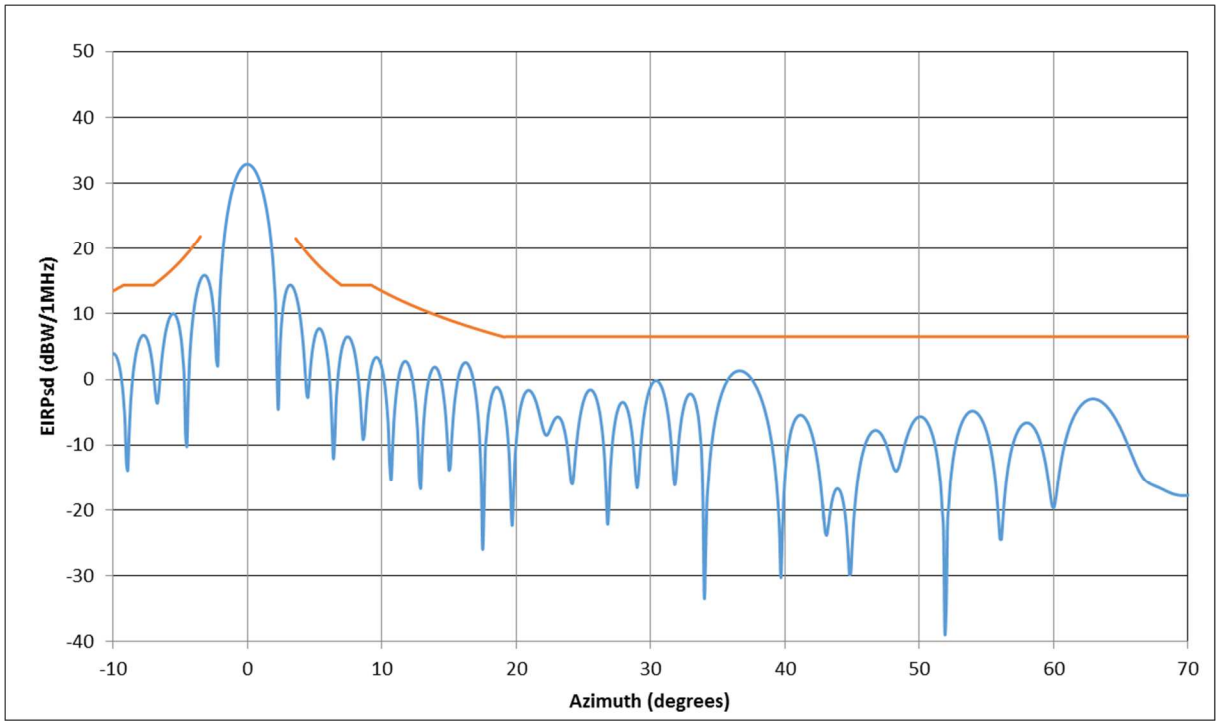
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



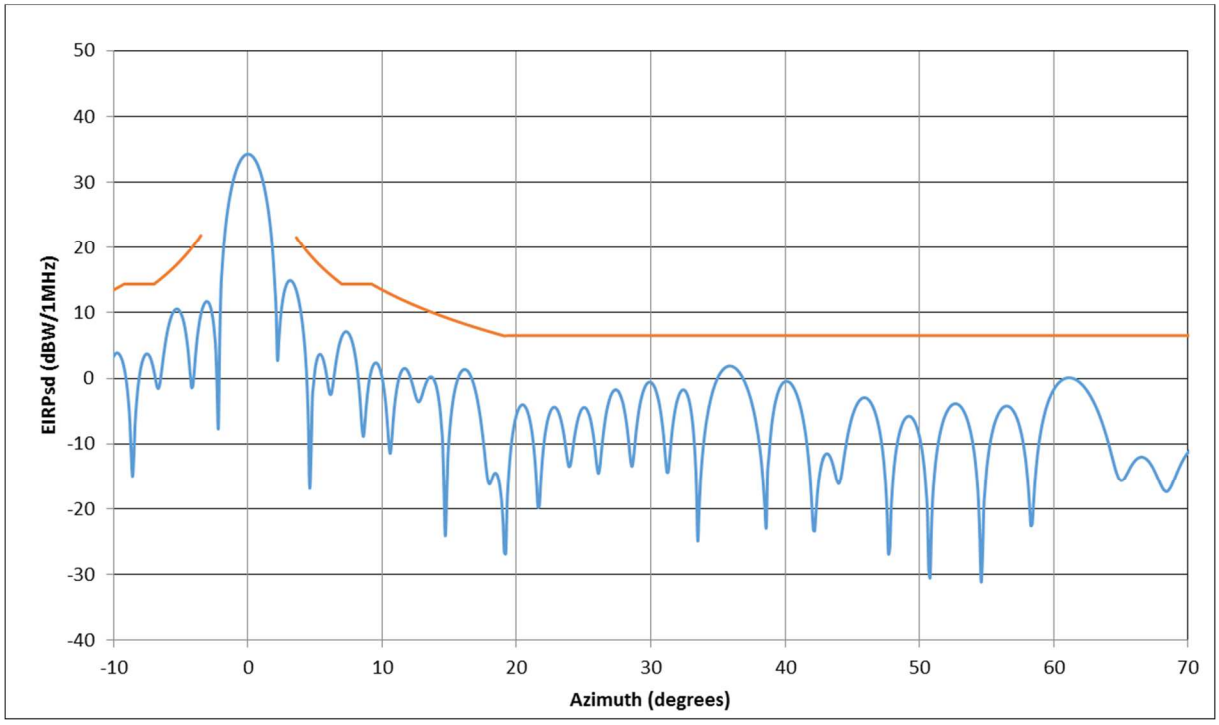
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30 GHz (-10 to +10 degrees)



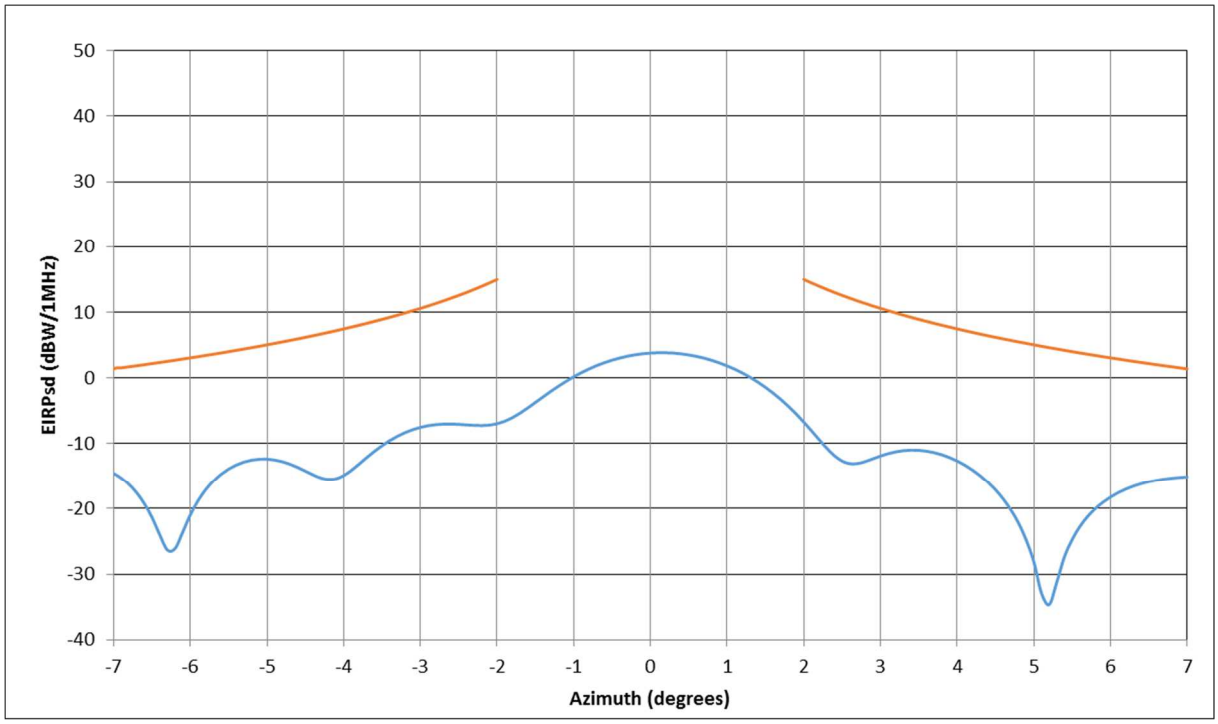
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



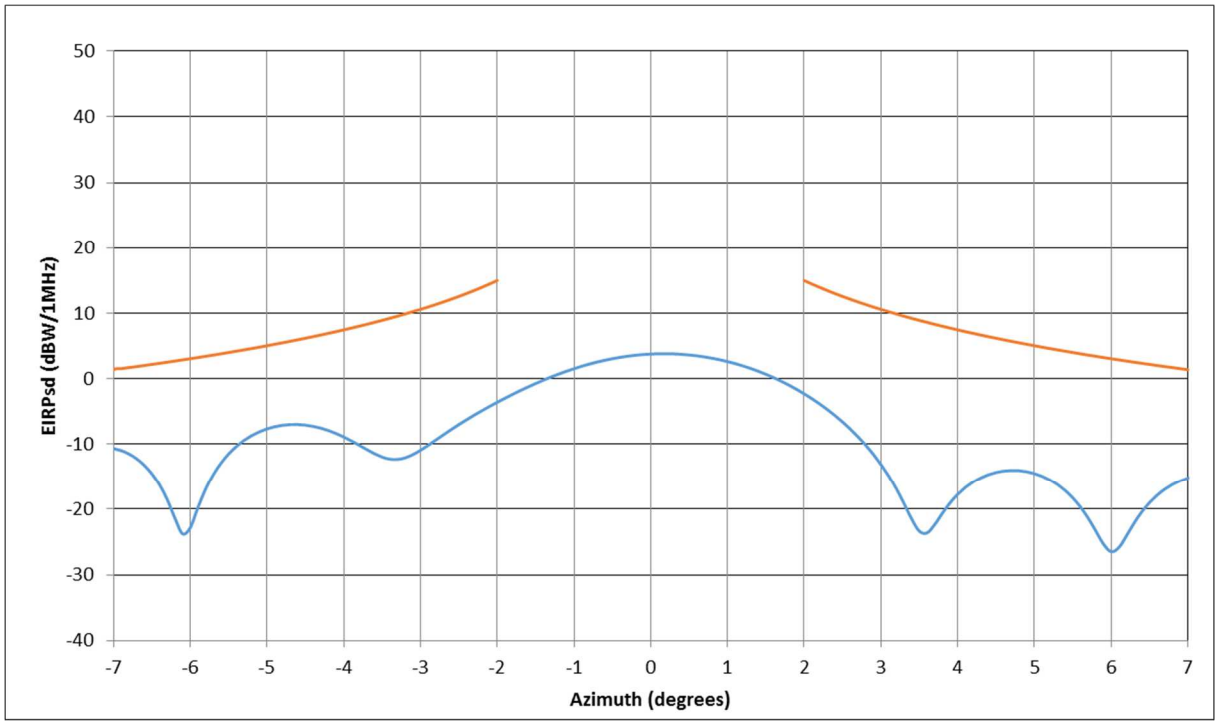
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



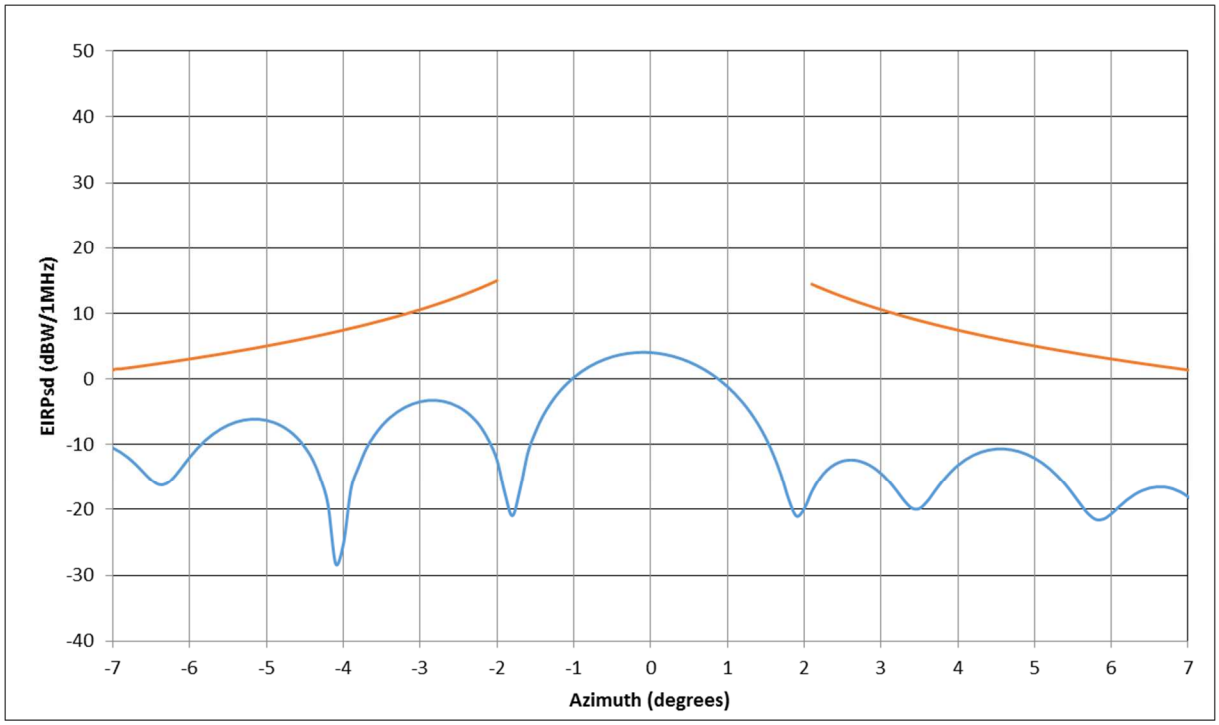
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



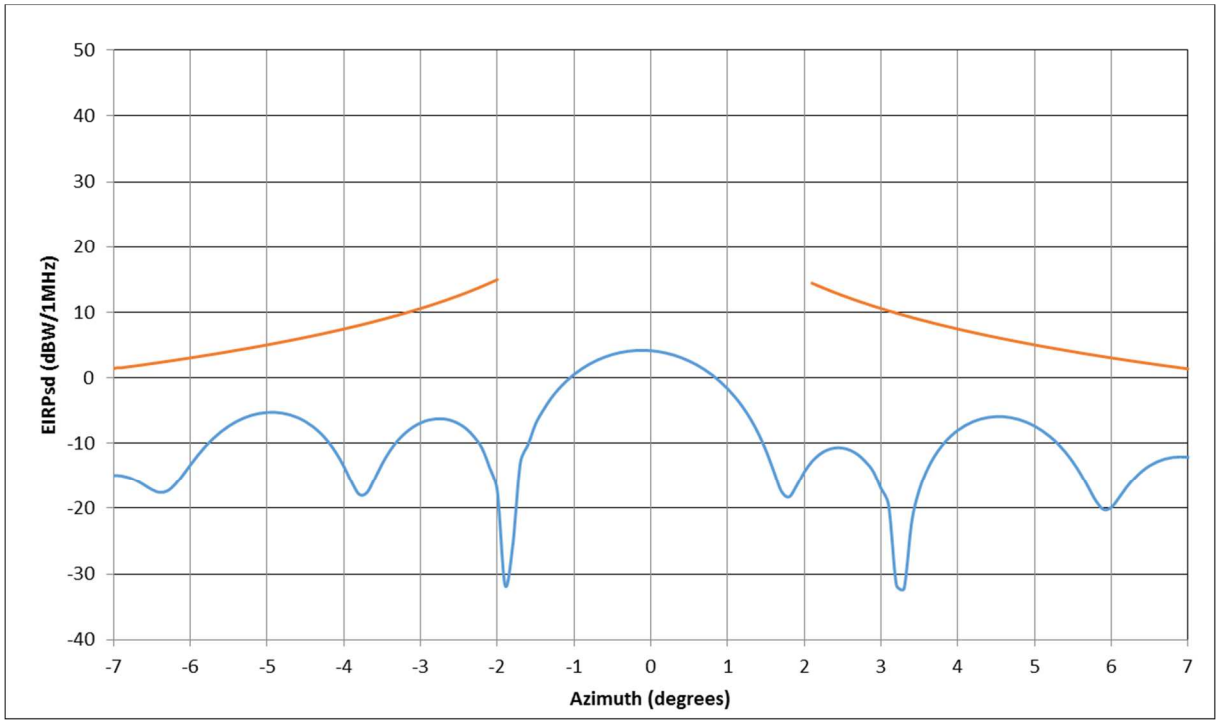
X-Pol EIRP density in the plane tangent to the GSO Arc 30.0 GHz (-7 to +7 degrees)



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

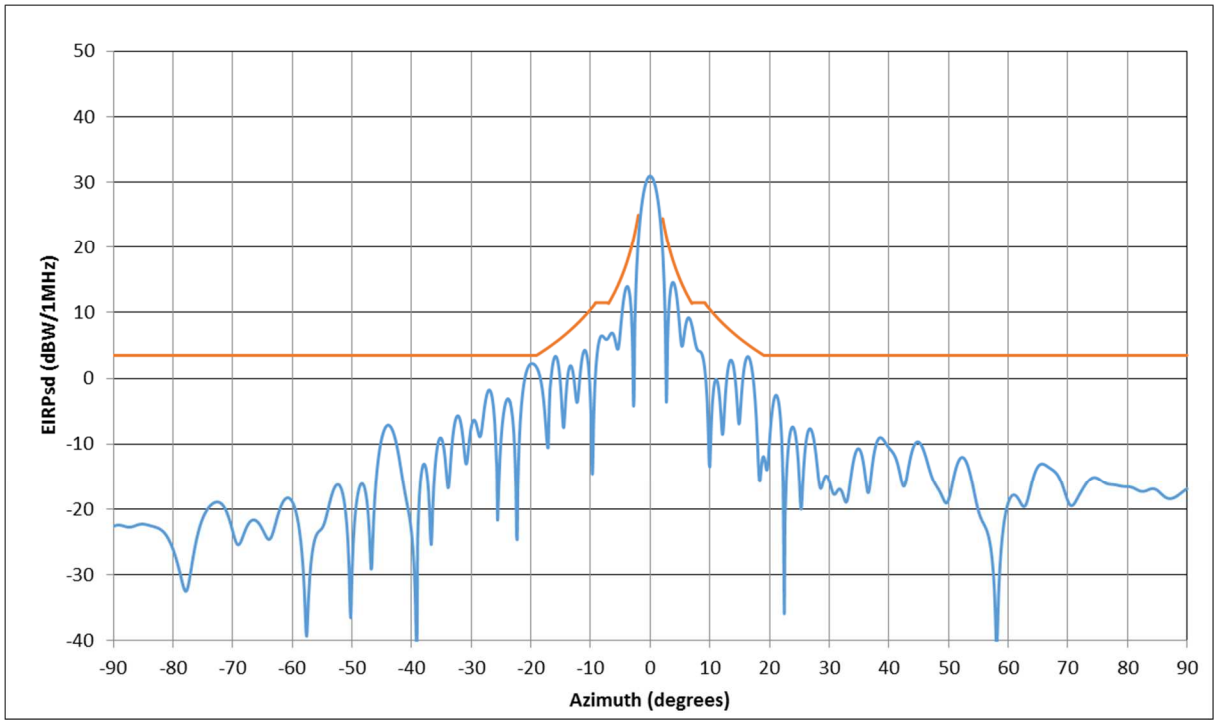


X-Pol EIRP density in the plane perpendicular to the GSO Arc 30.0 GHZ (-7 to +7 degrees)

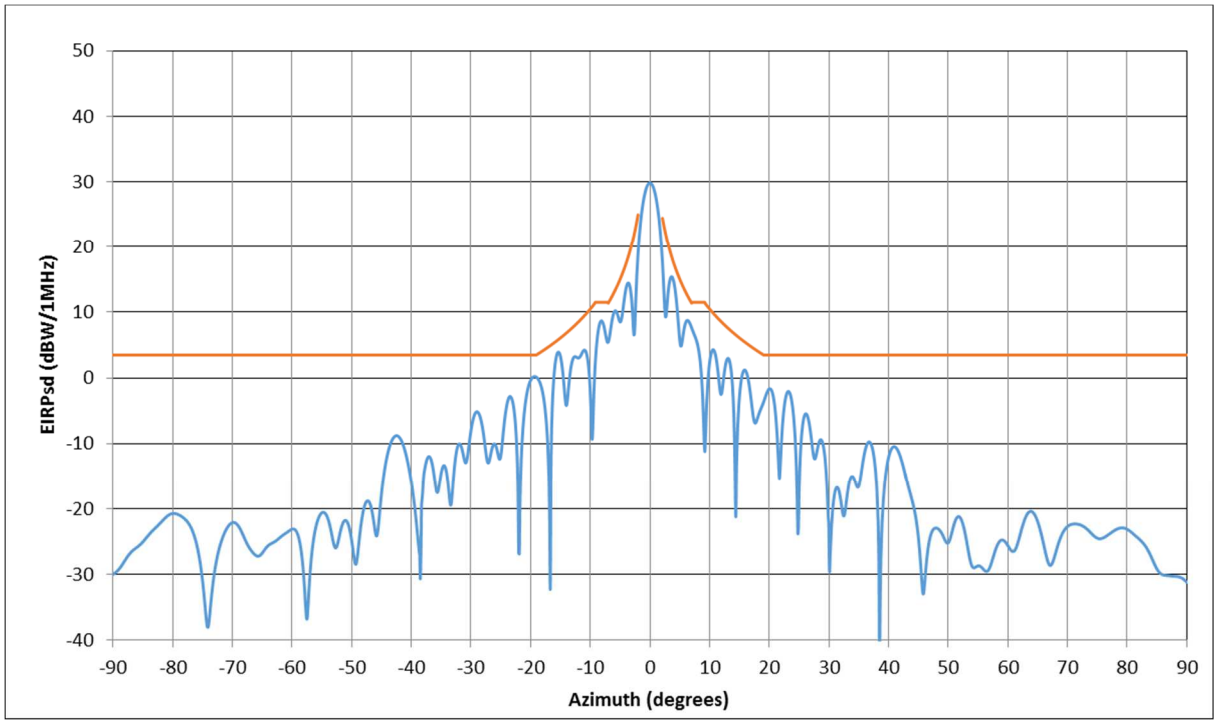


3.0 MicroSat Off-Axis EIRP Masks

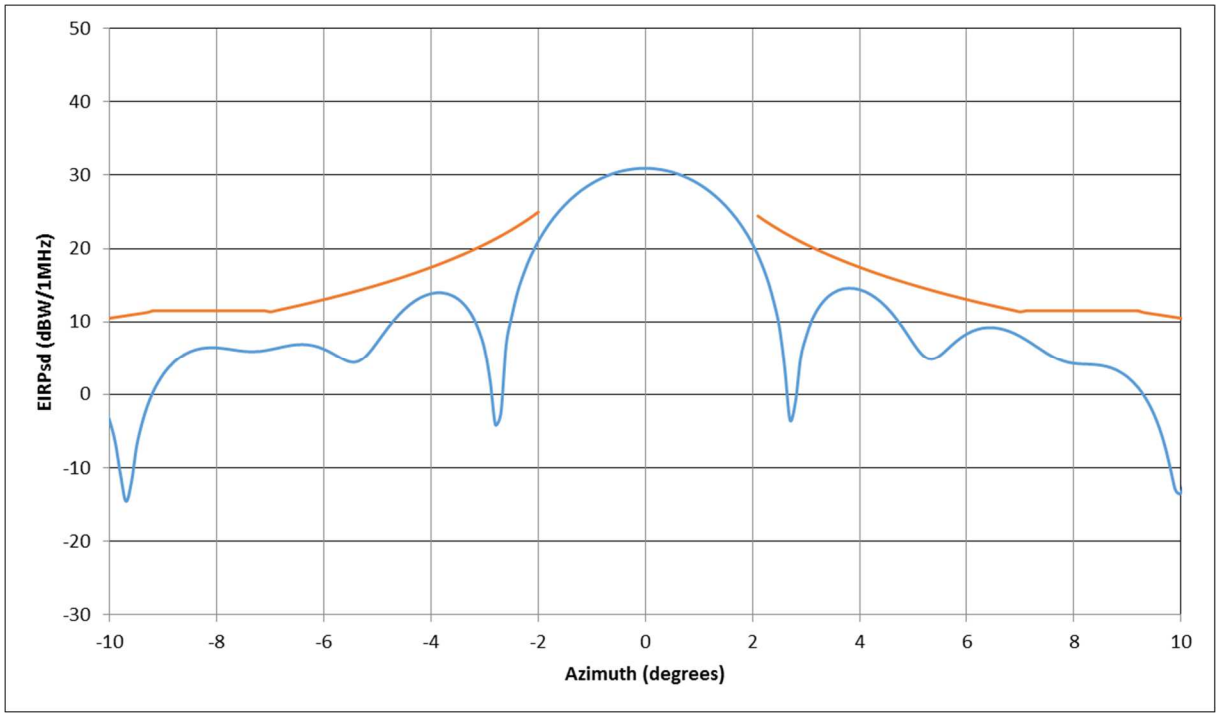
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz



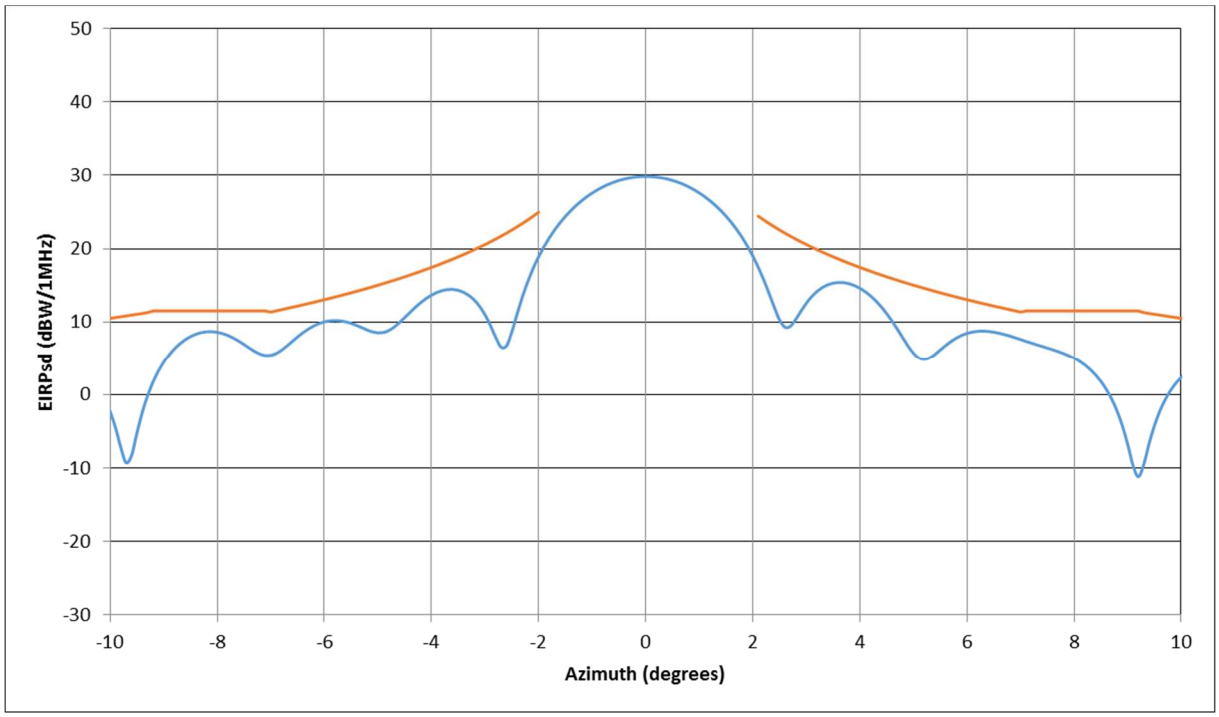
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz



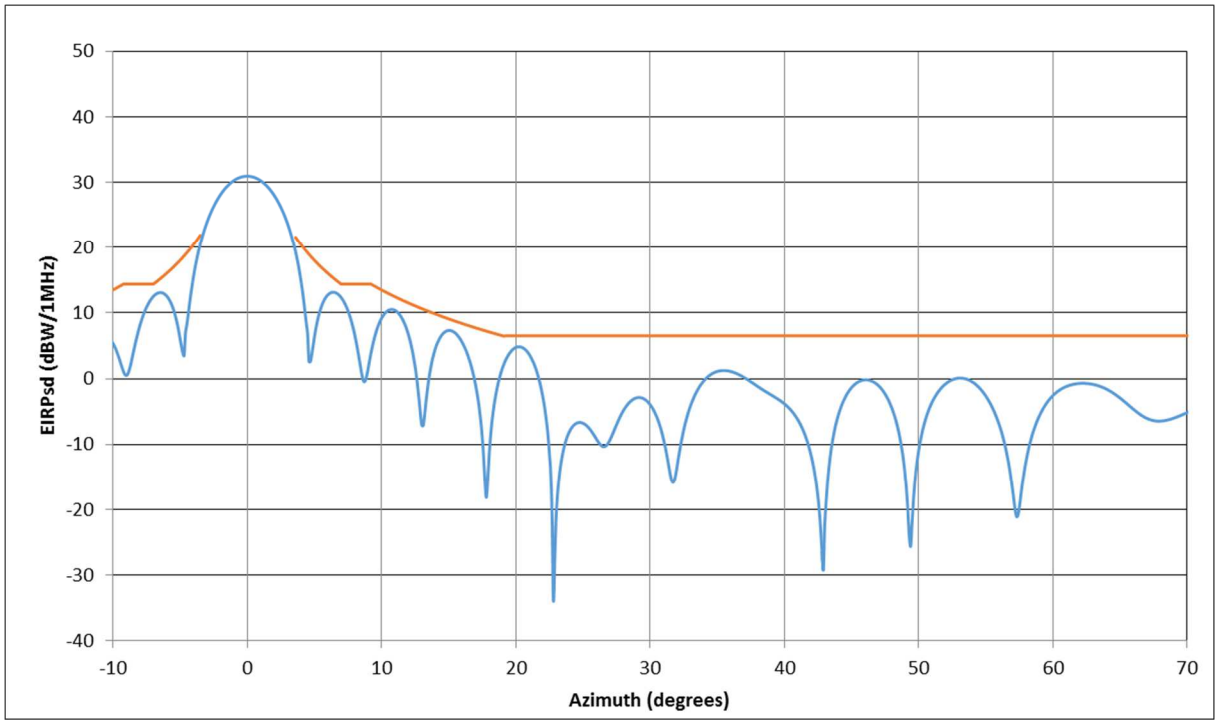
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 29.5 GHz (-10 to +10 degrees)



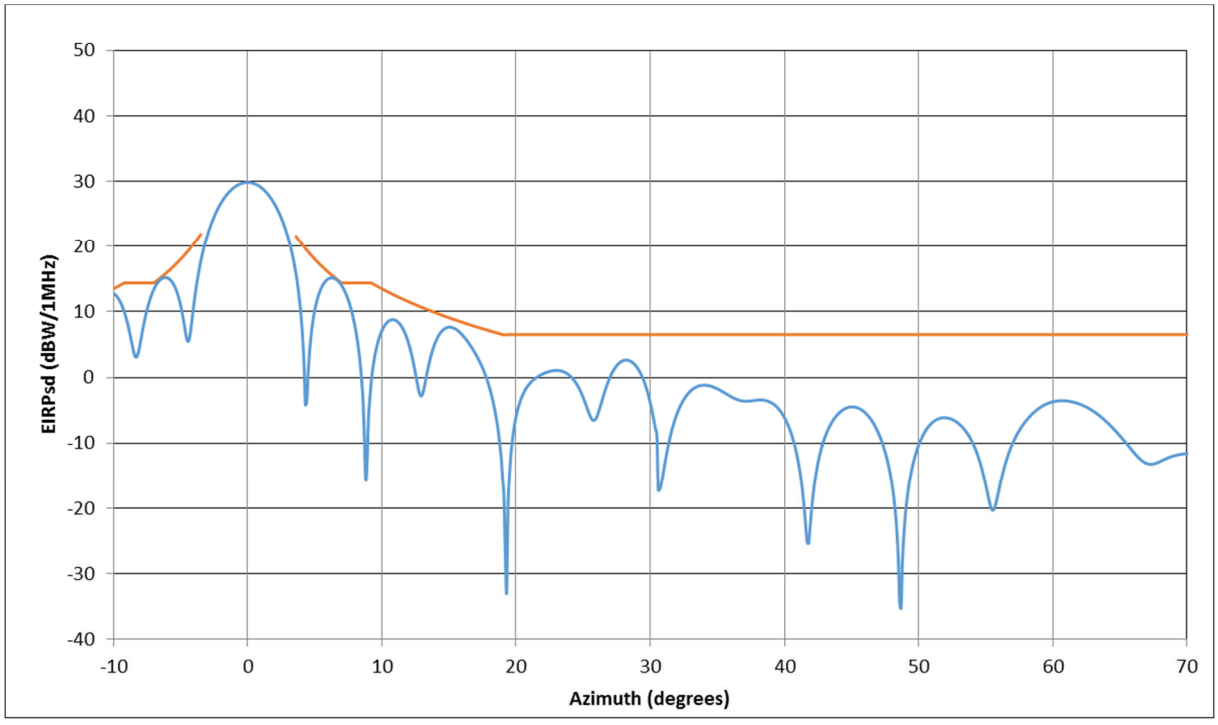
Co-Pol EIRP density in the Plane Tangent to the GSO Arc 30.0 GHz (-10 to +10 degrees)



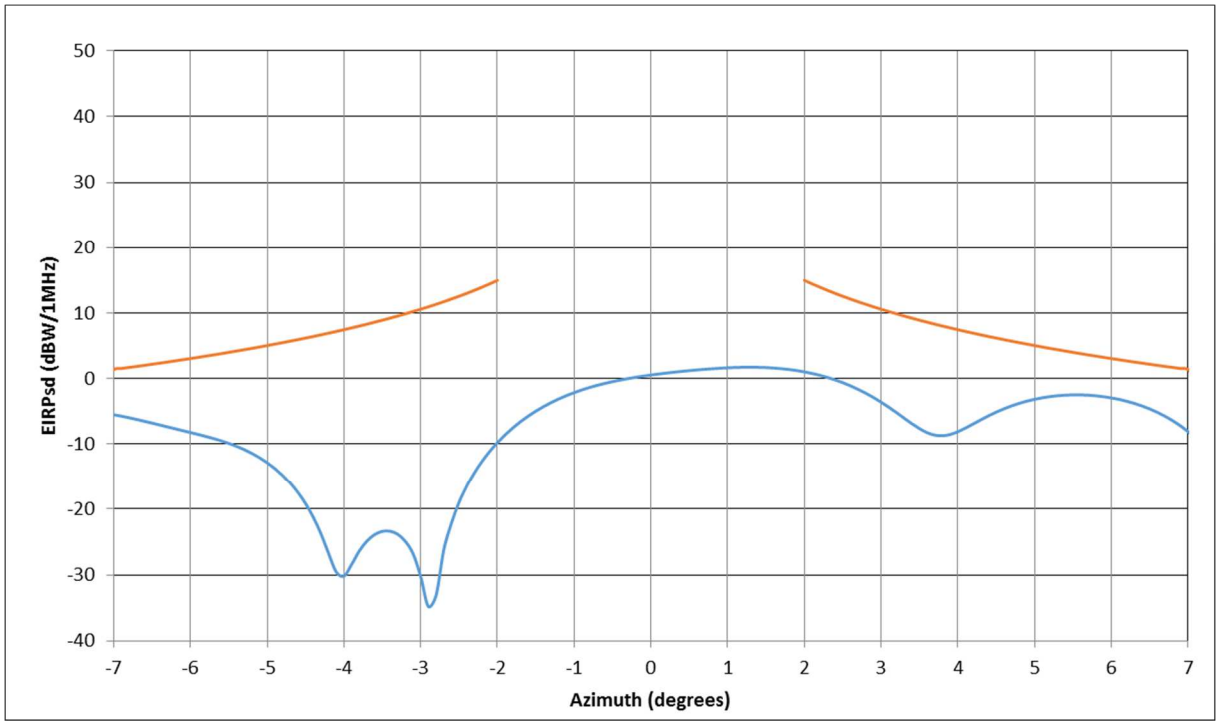
Co-Pol EIRP density in the Perpendicular to the GSO Arc 29.5 GHz (0 to +30 degrees)



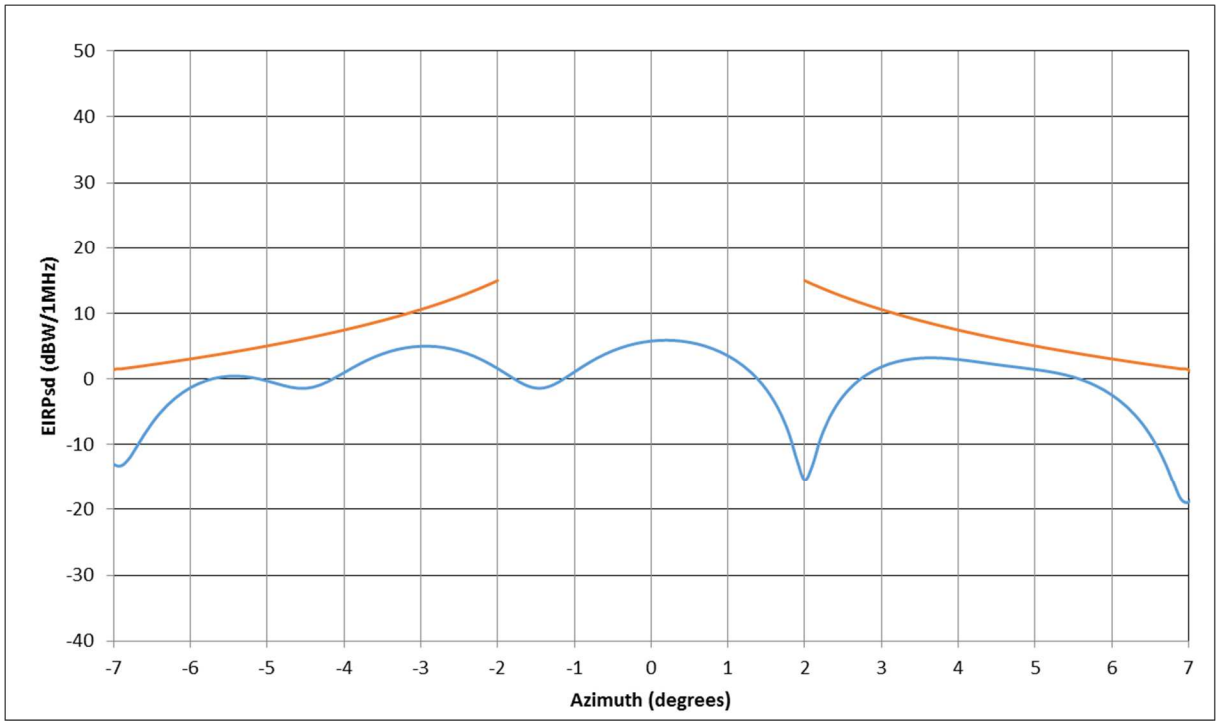
Co-Pol EIRP density in the Perpendicular to the GSO Arc 30.0 GHz (0 to +30 degrees)



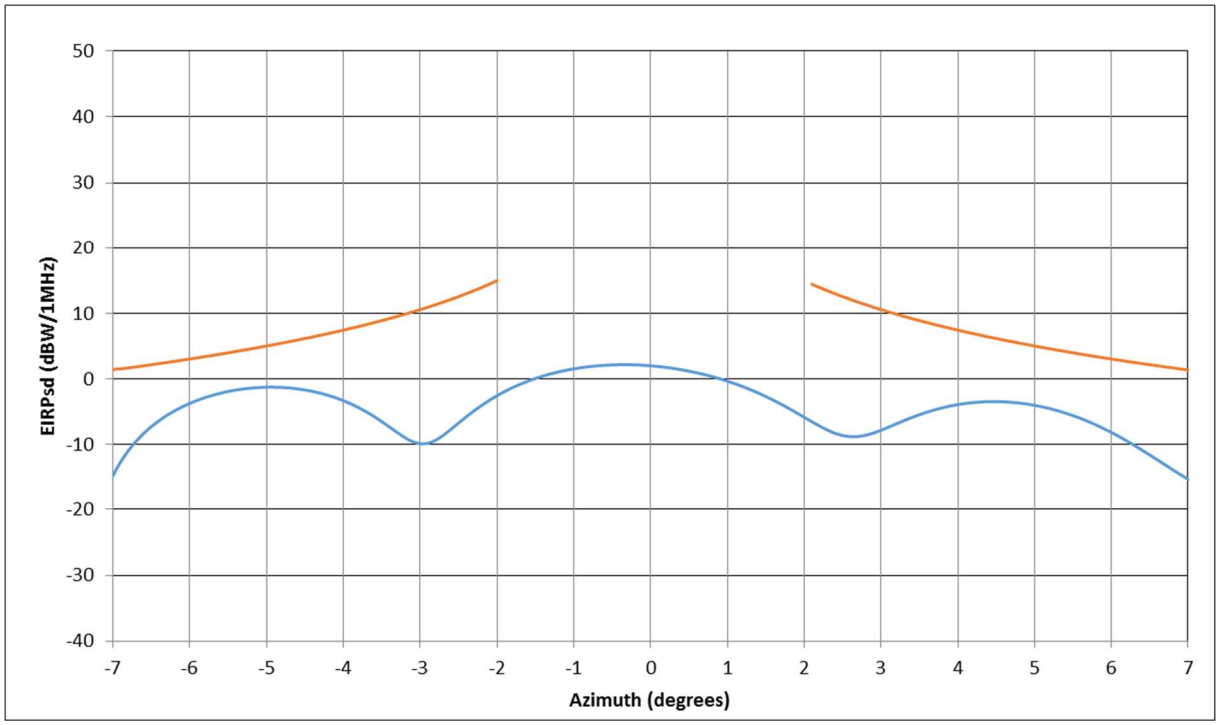
X-Pol EIRP density in the plane tangent to the GSO Arc 29.5 GHZ (-7 to +7 degrees)



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)