Raysat SR-70 Antenna STA Application

1.0 Introduction

Raysat Antenna Systems, LLC ("RAS"), pursuant to Section 5.61 of the Commission's rules, 47 C.F.R. § 5.61, hereby requests an experimental special temporary authorization ("STA") to operate up to five (5) Land Mobile-Satellite Service ("LMSS") earth stations in the 14.0-14.5 GHz and 11.7-12.2 GHz frequency bands with the AMC-5 and AMC-6 satellites at 79° W.L. and 72° W.L., respectively. The satellites will communicate with the Spacenet hub earth station in McLean, Virginia (Call sign E860326).

RAS seeks to test and demonstrate the new SR70 earth terminal. RAS has developed the lighter SR70, a single-panel, Ku-band array antenna in connection with Department of Defense/Logistics Innovation Agency (DOD/LIA) operational requirements (prime contract # W31P4Q-05-A-0031/TO#0021) and seeks to operate the terminals pursuant to this government contract. The SR70 has a low profile and a small footprint, which allows it to be placed unobtrusively on vehicles. The full-motion tracking system provides broadband data access to users on-the-move. The antenna technology builds upon RAS's proven antenna technology for mobile applications.

Grant of the experimental STA would strongly serve the public interest by supplementing RAS's currently authorized LMSS operations with an additional lower-cost antenna, which will result in expanded service and equipment options for U.S. Government and ultimately other commercial customers.[1] RAS requires an STA to demonstrate the feasibility of the new lighter weight, lower cost antenna to potential U.S. government customers.

The operational requirements for the SR70 and the U.S. government objectives regarding the above referenced DOD/LIA contract have recently been finalized. Therefore, Raysat requests expeditious processing of this application by December 1, 2009.

2.0 Antenna

The SR-70 antenna technology builds upon RAS's proven antenna technology for mobile applications. The major enhancement is in the antenna panel which is capable of simultaneous Ku-band transmission and reception within the 14.0-14.5 GHz and 11.7-12.7 GHz bands, respectively. The antenna allows tracking in three axes, azimuth, elevation and polarization.

The antenna consists of a single 6 inch by 6 inch panel array which is mounted on a rotatable platform. The platform rotates in azimuth to orient the panel towards the satellite. The panel also tilts to set the elevation angle. Finally, the antenna has a

[1] *See* ELS File Nos. 0203-EX-PL-2008, 0204-EX-PL-2008 and 0033-EX-ST-2009.

polarization control mechanism which sets the correct polarization angle for both transmit and receive.

A drawing of the antenna panel and the antenna assembly is shown in Figures 1 and 2, respectively.

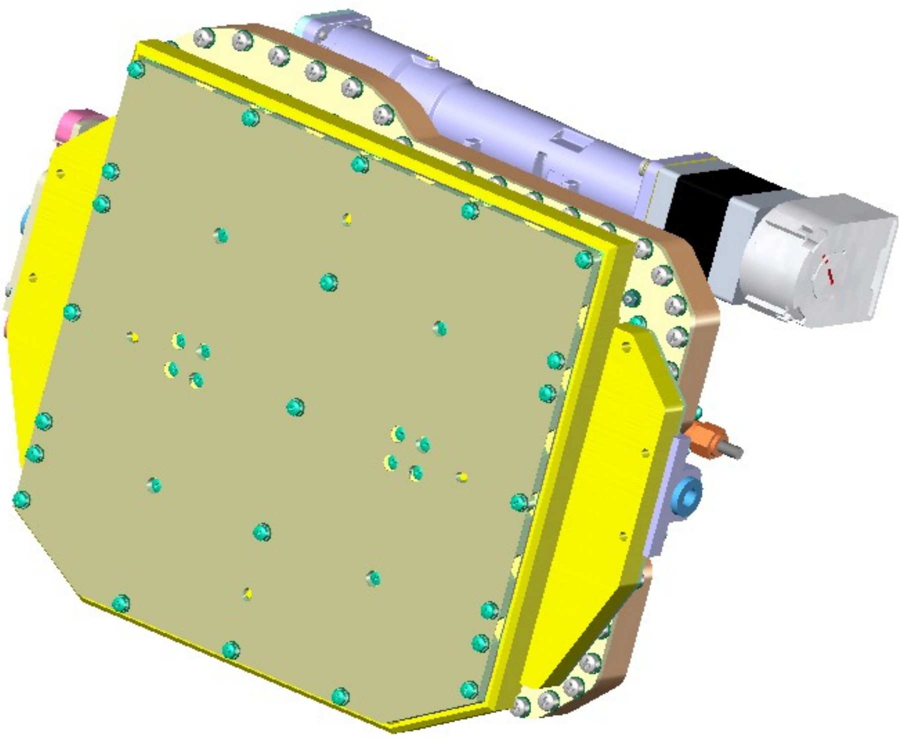

Figure 1
SR-70 Panel Array

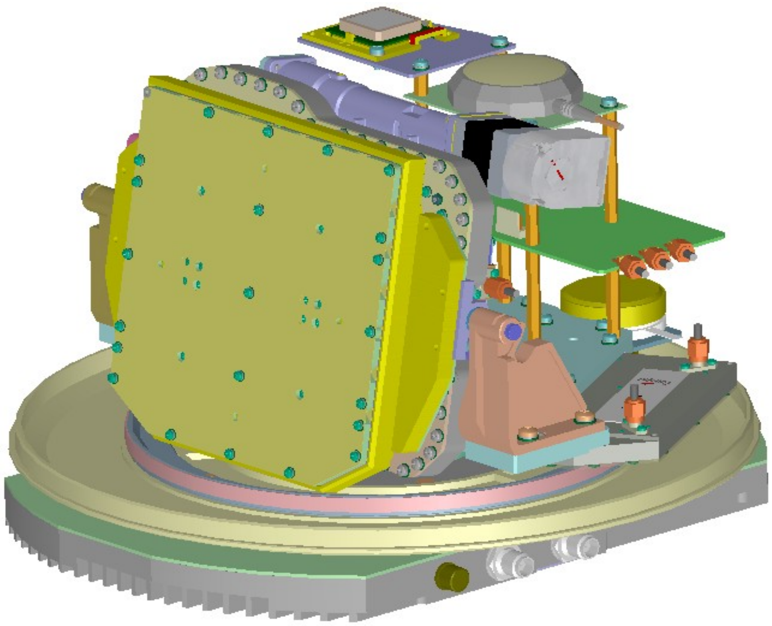

Figure 2
SR-70 Antenna

3.0 Antenna Operation

As with all RAS antennas, the SR70 has active control of the azimuth, elevation and polarization angles to maintain precise pointing towards the target satellite. The antenna scans mechanically in both azimuth and elevation.

For satellite acquisition and reacquisition, the proven principles implemented in existing RAS antennas will be applied. A simplified block diagram of the major components in the tracking and acquisition system is shown in Figure 3.

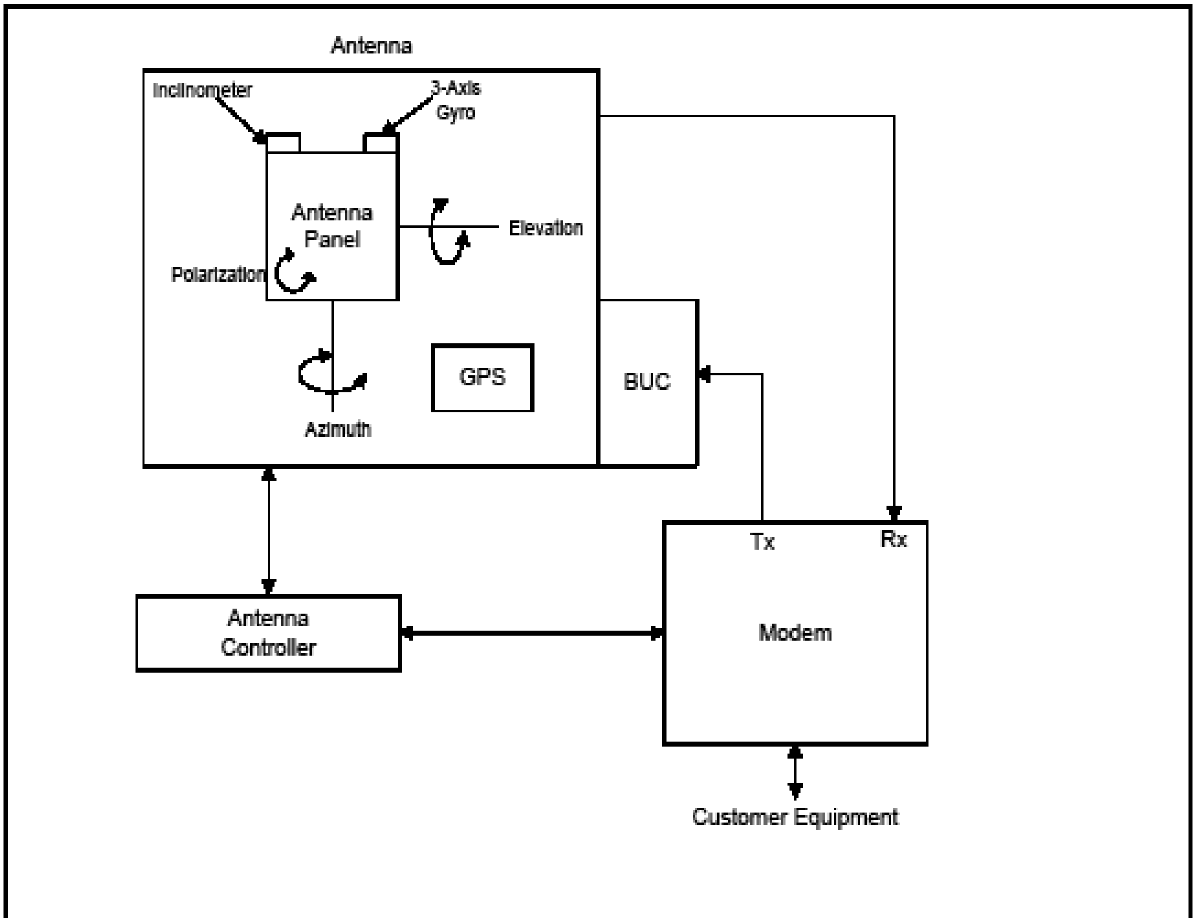

Figure 3
Typical Antenna Equipment Set-up

During operation, the antenna uses a built-in GPS receiver to determine its position on the earth. It then uses the geographical position and the longitudinal position of the satellite to determine the appropriate elevation angle. Once the elevation angle is set, the antenna rotates in azimuth. During the scanning process the antenna receives Eb/No information from the modem to verify that the target satellite has been acquired. Once the satellite is acquired, the antenna dithers in both azimuth and elevation by ±2.0° to maintain peaking on the satellite and the transmission is enabled. The antenna also has internal 3-axis gyroscopes and 2-axis inclinometers to help with the tracking while the antenna is in motion. The antenna will use the information from the gyros to determine when the pointing offset has reached 2.0° and will initiate transmit muting when this occurs within 100 milliseconds.

For purposes of protecting radio astronomy sites, in the absence of a coordination agreement with the National Science Foundation, Raysat terminals will not operate within line-of-sight vicinity of radio astronomy sites during observation periods.

Further, Raysat recognizes the utilization of the frequency band from 14.0-14.05 GHz and the possible use of the band from 14.05-14.2 GHz allocated to the National Aeronautics and Space Administration ("NASA") Tracking and Data Relay Satellite System ("TDRSS") for space research conducted at White Sands, New Mexico and Blossom Point, Maryland. Consistent with 47 C.F.R. §25.222(d), Raysat will cease transmit operations within 125 km of the operational facilities unless and until it reaches a coordination agreement with NASA permitting such operations. Raysat will operate the SR70 antennas within a 20 km radius of Vienna, VA and Petersburg, VA. Therefore, Raysat will not enter the 125 km TDRSS radius of White Sands or will reach a coordination agreement with NASA if it is operating within the 125 km radius of the Blossom Point, MD facility when that facility commences operations.

Raysat acknowledges that non-geostationary orbit ("NGSO") systems are also permitted to operate in the Ku-band. However, no such systems are currently authorized or planned to operate within the period contemplated for the proposed experimental operations. To the extent such systems are ultimately deployed, Raysat will coordinate with NGSO FSS licensees to protect their systems from harmful interference.

4.0 Antenna Patterns

The transmit gain pattern shown in Figures 4 and 5 exceeds the Commission's routine licensing guidelines, but by limiting the input power spectral density to -25.2dBW/4kHz the off axis EIRP density remains under the Section 25.222(a)(1) and 25.226(a)(1)(i) off-axis power spectral density ("PSD") mask even with a 2.0 degree scanning offset in the GSO plane as shown in Figure 6. *See* 47 C.F.R. § 25.226(b)(1)(iv)(A). Thus, at all times transmissions from the SR70 antenna are compliant with the Commission's two-degree spacing levels.

The maximum level of off-pointing is set to 2.0° in the plane of the GSO arc after which the transmissions are commanded to turn off within 100 milliseconds. *See* 47 C.F.R. § 25.226(b)(1)(iv)(B). In addition, reduced input power into the antenna ensures compliance with off-axis EIRP levels associated with two-degree spacing and the coordinated parameters of the serving satellite. RAS has performed detailed analysis and has confirmed that the adjacent satellite interference levels produced under the worst case operating conditions with a -25.2 dBW/4kHz at the input flange would be no worse than a Section 25.209 compliant antenna with -14dBW/4kHz at its input flange.

5.0 CONCLUSION

As demonstrated herein, grant of the requested experimental STA would strongly serve the public interest. Specifically, grant of the requested authority would permit RAS to add a new antenna to its already authorized LMSS operations and expand the range of mobile broadband options available to U.S. government users, without increasing the potential for interference to other users of Ku-band spectrum.

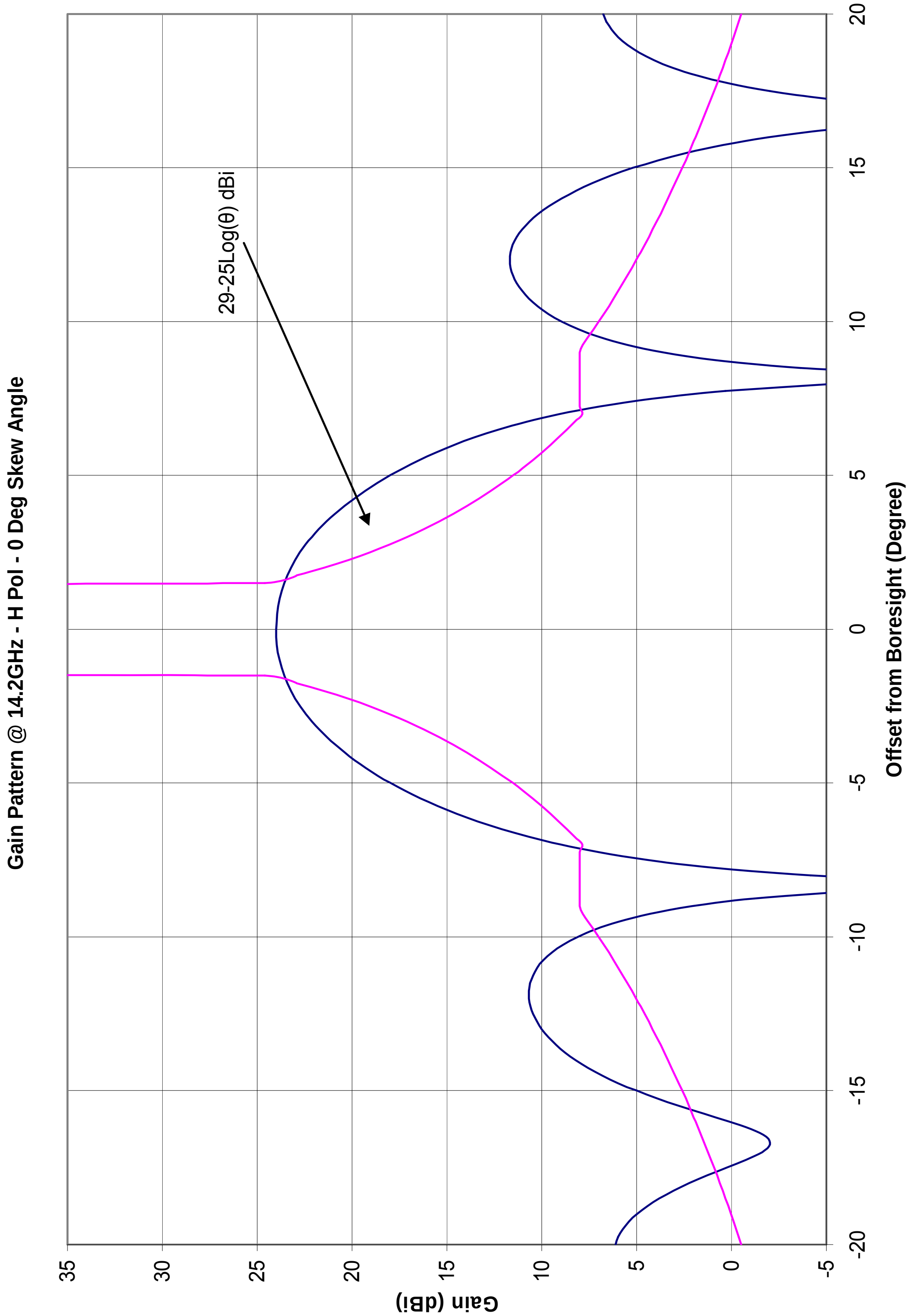

Figure 4
Close-In Gain Pattern

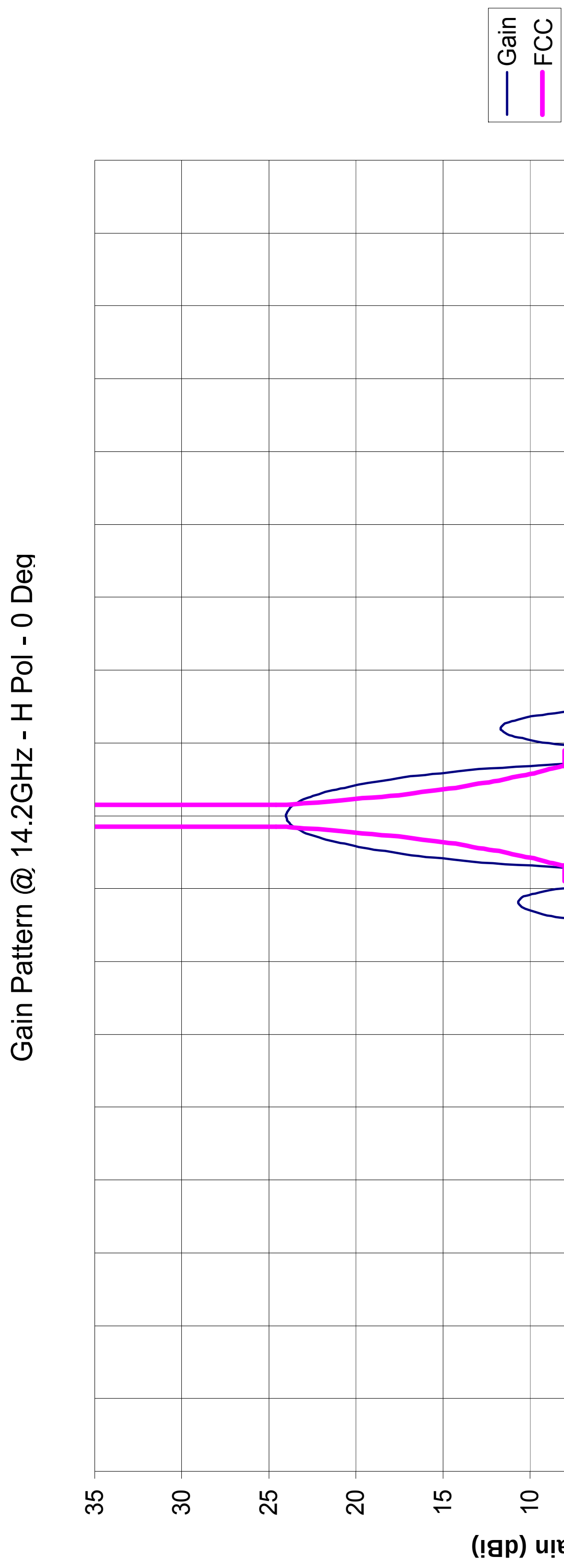

Figure 5
Wide Gain Pattern

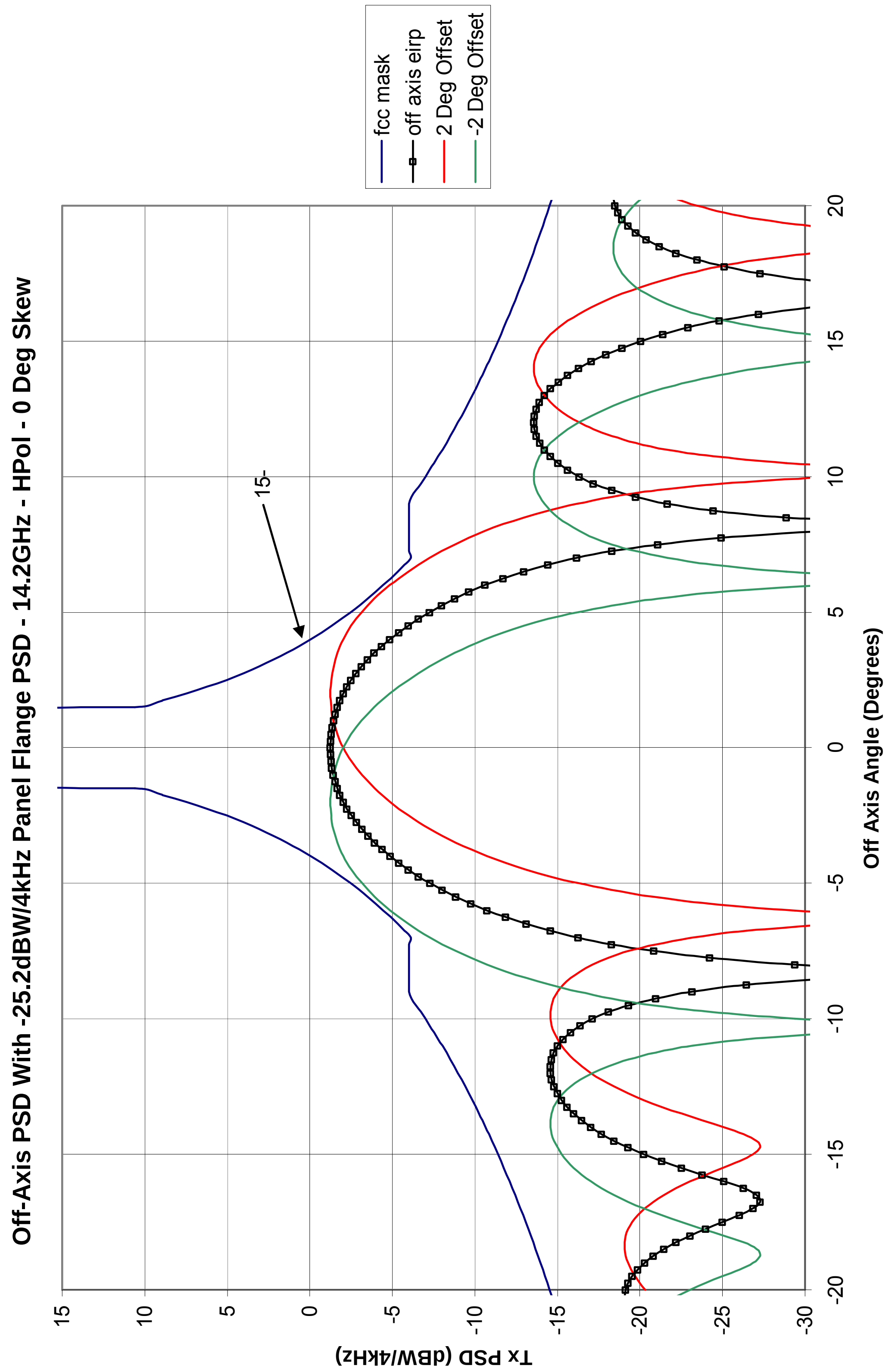

Figure 6
Off-Axis PSD Pattern