Gilat North America
SR300Ka Antenna STA Application Introduction

1.0 Introduction

Gilat North America (GNA) hereby requests a special temporary authorization (“STA”) to operate up to 10 Land Mobile-Satellite Service (“LMSS”) earth stations in the 29.25 to 30 GHz and 19.7 to 20.2 GHz frequency bands.

GNA seeks to test and demonstrate the new SR300Ka antenna. GNA has developed the SR300Ka, a single panel Ka-band array antenna, in response to customer requests for higher transmit and receive performance. As with all GNA antennas the SR300Ka uses a full motion automated tracking system which allows the user to have broadband data access while on the move. The antenna technology builds upon GNA’ proven antenna technology for mobile applications. The antenna is designed for military or commercial vehicle’s access to information that is critical to their mission success.

Grant of the experimental STA would strongly serve the public interest by supplementing GNA’ currently authorized LMSS experimental operations with an additional lower-cost antenna, which will result in expanded service and equipment options for U.S. Government and commercial customers. GNA requires an STA to demonstrate the feasibility of the new antenna to potential customers in the commercial and government sectors.

2.0 Antenna

The SR300Ka antenna technology builds upon GNAs’ proven antenna technology for mobile applications. The major enhancement is in the antenna panel which is capable of simultaneous K/Ka-band transmit and reception. The element technology utilizes a high performance waveguide design. The panel is capable of both transmit (29.0GHz to 30.0GHz) and receive (19.2GHz to 20.2GHz) operation. The antenna allows tracking in both azimuth and elevation axis.

The antenna consists of a single 11.9 inch by 6.3 inch panel array which is mounted on a rotatable platform. The platform rotates in azimuth to orient the panel towards the satellite. As well the panel tilts to set the panel’s elevation angle. In addition the antenna has a polarization control mechanism which automatically sets the correct polarization for both transmit and receive. The antenna is capable of transmitting in either RHCP or LHCP via user control. The receive polarization is orthogonal to the transmit polarization.

3.0 Antenna Operation

As with all GNA antennas, the SR300Ka has active control of the azimuth, and elevation angles. To maintain peaking, the antenna scans mechanically in both azimuth and elevation axis.

For the satellite acquisition and reacquisition, the proven principles implemented in existing GNA antennas will be applied. A simplified block diagram of the major components in the tracking and acquisition system is shown in Figure 1.

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 calculate and set the appropriate elevation angle. Once the elevation angle is set the antenna begins scanning by rotating in azimuth. During the scanning process the antenna monitors the received power level within a specified frequency band with the Receive Signal Strength Indicator (RSSI). When a user-defined power threshold is reached the scanning is stopped and the antenna tracks on the signal. The ACU then queries the modem to see if there is a valid Eb/No. If there is a valid Eb/No verifying the target satellite has been acquired, the antenna will continue to track on the signal. If there is no valid Eb/No the antenna will resume scanning.

Once the satellite is acquired the antenna dithers mechanically in both azimuth and elevation to maintain peaking. The maximum scan angles are 0.37° in azimuth and 0.57° in elevation. The antenna will be able to maintain the pointing accuracy stated above while experiencing maximum angular velocities and accelerations of:

1) Velocity 60°/s and acceleration of 360°/s^2 in azimuth
2) Velocity 45°/s and acceleration of 180°/s^2 in elevation

The antenna also uses the internal 3-axis gyroscopes and 2-axis inclinometers to maintain precise pointing while the antenna is in motion. The antenna will also use the information from the gyros to determine when the maximum pointing offset has been reached and will initiate transmit muting when this occurs. The transmission will be muted within 100milliseconds of this occurring.

4.0 Antenna Patterns

By limiting the input power spectral density to **-17.1/40kHz** the off axis EIRP density remains under the off-axis PSD mask specified by the Commission in 25.138 as shown in Figure 3 and 4. Thus, at all times transmissions from the SR300Ka antenna are compliant with the Commission’s 2-degree spacing levels.

The maximum level of off-pointing is set to 0.5° in the plane of the GSO arc after which the transmissions are commanded to mute. 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.

GNA has performed detailed analysis and has confirmed that the adjacent satellite interference levels produced under the worst case operating conditions with a -17.1 dBW/40kHz at the input flange would meet the Commission's off axis PSD limits.

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 GNA to add a new antenna to its already authorized LMSS operations and expand the range of mobile broadband options available to U.S. government and commercial users, without increasing the potential for interference to other users of the Ka-band spectrum.

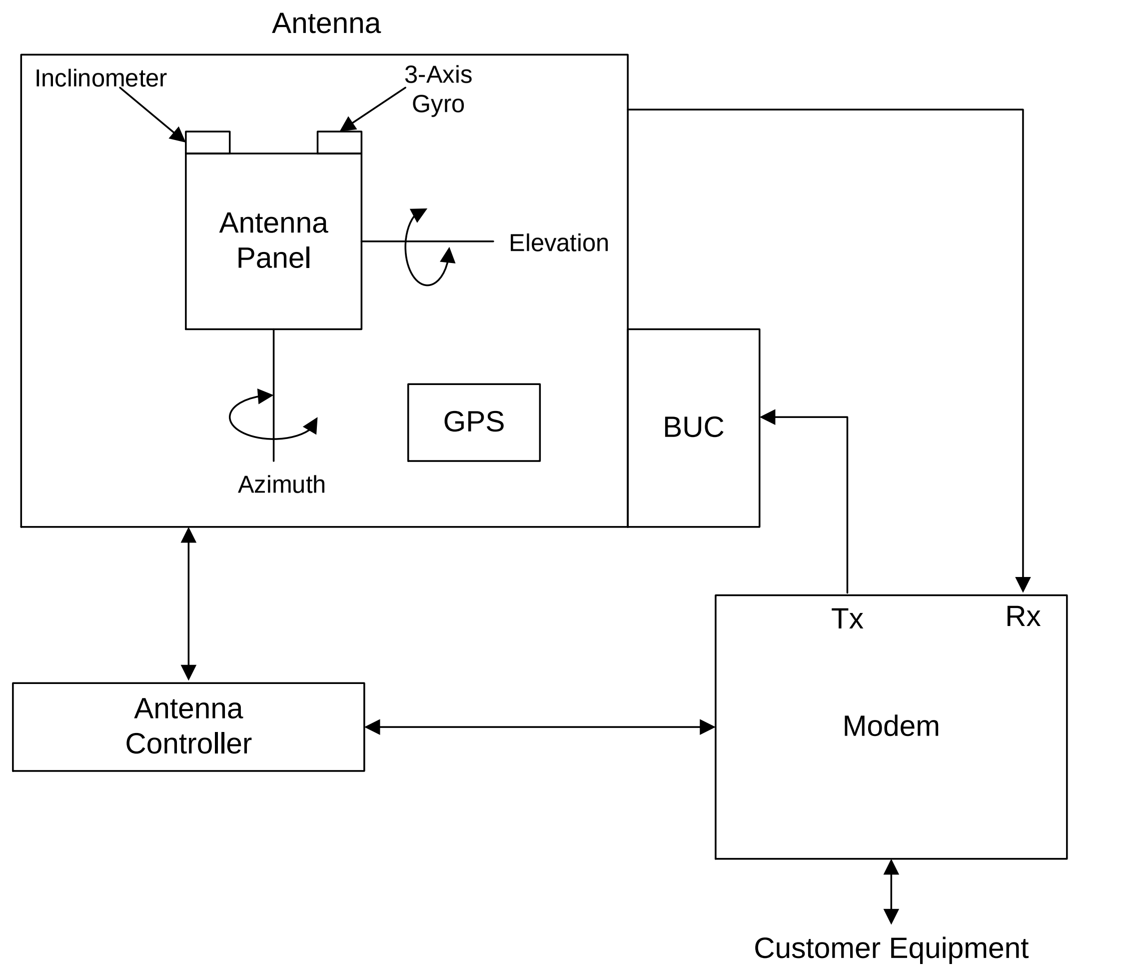

Figure 1
Typical Antenna Equipment Set-up

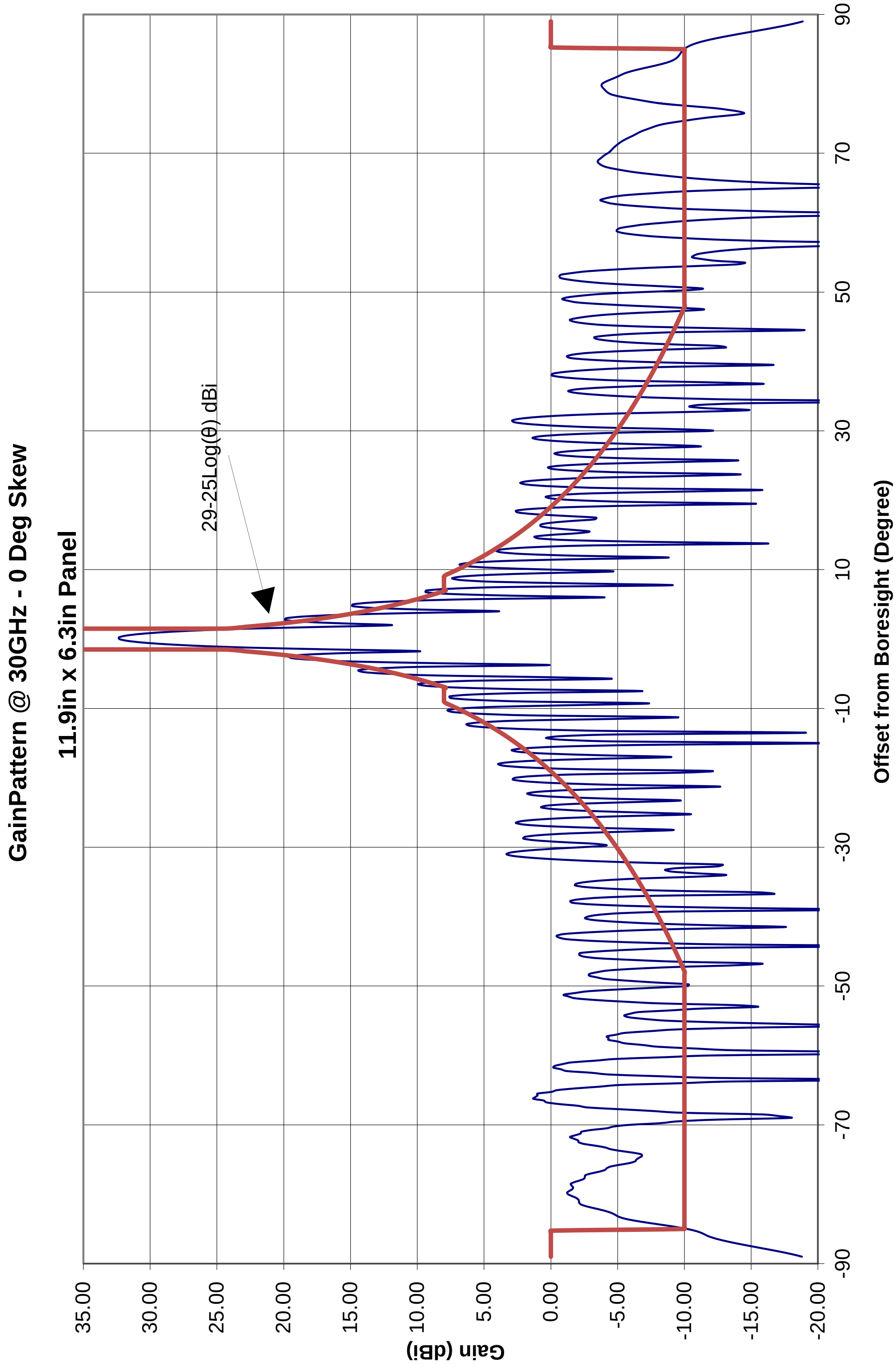

Figure 2
Wide Gain Pattern

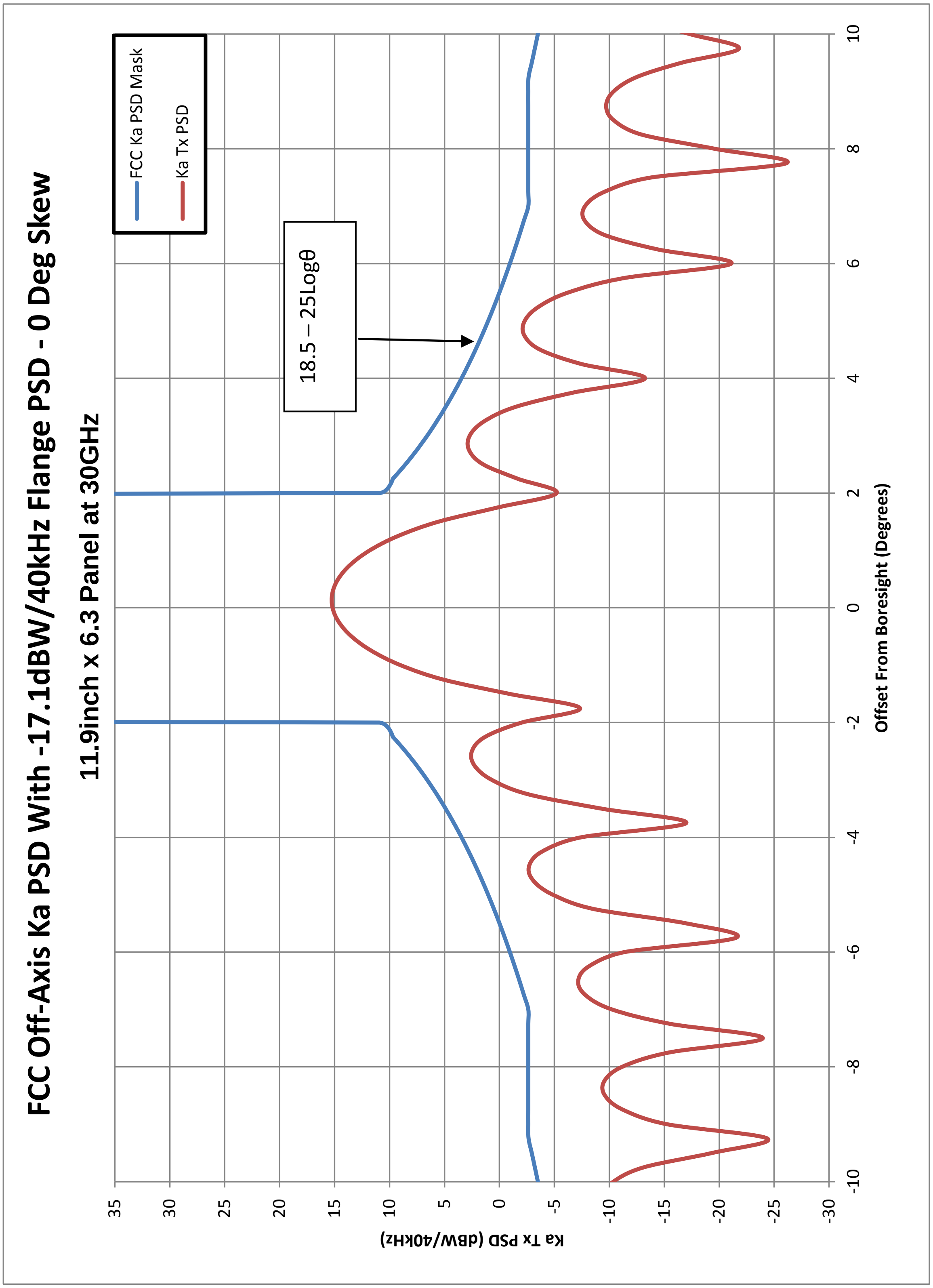

Figure 3
Narrow Off-Axis PSD Pattern

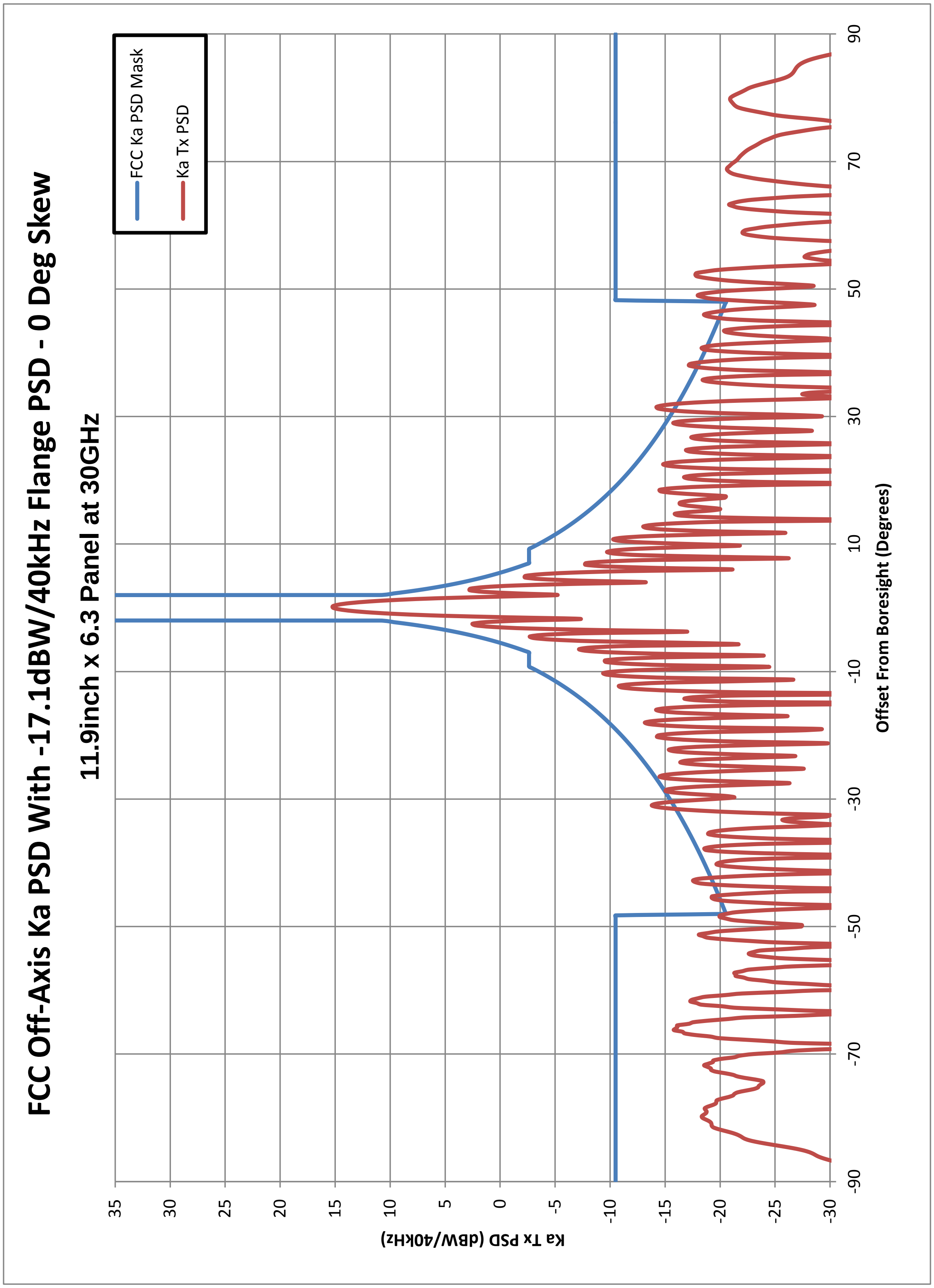

Figure 4
Wide Off-Axis PSD Pattern