Gilat North America
ER5000Ku Antenna STA Application Introduction

1.0 Introduction

Gilat North America (GNA) hereby requests an experimental Special Temporary Authorization ("STA") to operate up to 10 Vehicle Mounted Earth Stations ("VMES") in the 14.0-14.5 GHz and 11.7-12.2 GHz frequency bands.

GNA seeks to test and demonstrate the new ER5000Ku. GNA has developed the ER5000Ku, a single panel Ku-band array antenna in response to customer requests for higher transmit and receive performance. As with all GNA antennas the ER5000Ku uses a full motion tracking system which allows the user to have broadband data access while on the move. The antenna technology builds upon GNA's proven antenna technology for mobile applications. The antenna is designed for military or commercial access to information rich applications that is critical to mission success.

Grant of the experimental STA would strongly serve the public interest by supplementing GNA's 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 ER5000Ku antenna technology builds upon GNA's proven antenna technology for mobile applications. The major enhancement is in the antenna panel which is capable of simultaneous Ku-band transmit and reception. The element technology utilizes a high performance waveguide design. The panel is capable of both transmit (14.0 GHz to 14.5 GHz) and receive (11.7 GHz to 12.7 GHz) operation. The antenna allows tracking in three axis: azimuth, elevation, and polarization.

The antenna consists of a single 22 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 its elevation angle. In addition the antenna has a polarization control mechanism which automatically sets the correct polarization angle for both transmit and receive. The automated control ensures the panel is precisely pointed to the satellite even while in motion.

3.0 Antenna Operation

As with all GNA antennas, the ER5000Ku has active control of the azimuth, elevation and polarization angles. The antenna scans mechanically in both azimuth and elevation.

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 determine the appropriate elevation angle. Once the elevation angle is set the antenna rotates in azimuth. During the scanning process the antenna monitors the received power level within a specified frequency band with the RSSI. When a 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 on the satellite. The maximum scan angles are 0.3° in azimuth. The antenna also uses the internal 3-axis gyroscopes and 2-axis inclinometers to help with the tracking 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 100 milliseconds of this occurring.

4.0 Antenna Patterns

The transmit gain pattern shown in Figure 2 exceeds the Commission's routine licensing guidelines, but by limiting the input power spectral density to **-19.0/4kHz** the off axis EIRP density remains under the off-axis PSD mask even with a 0.5° degree pointing error in the azimuth plane as shown in Figure 3. Thus, at all times transmissions from the ER5000Ku 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 turn off. 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 -19.0 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 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 Ku-band spectrum.

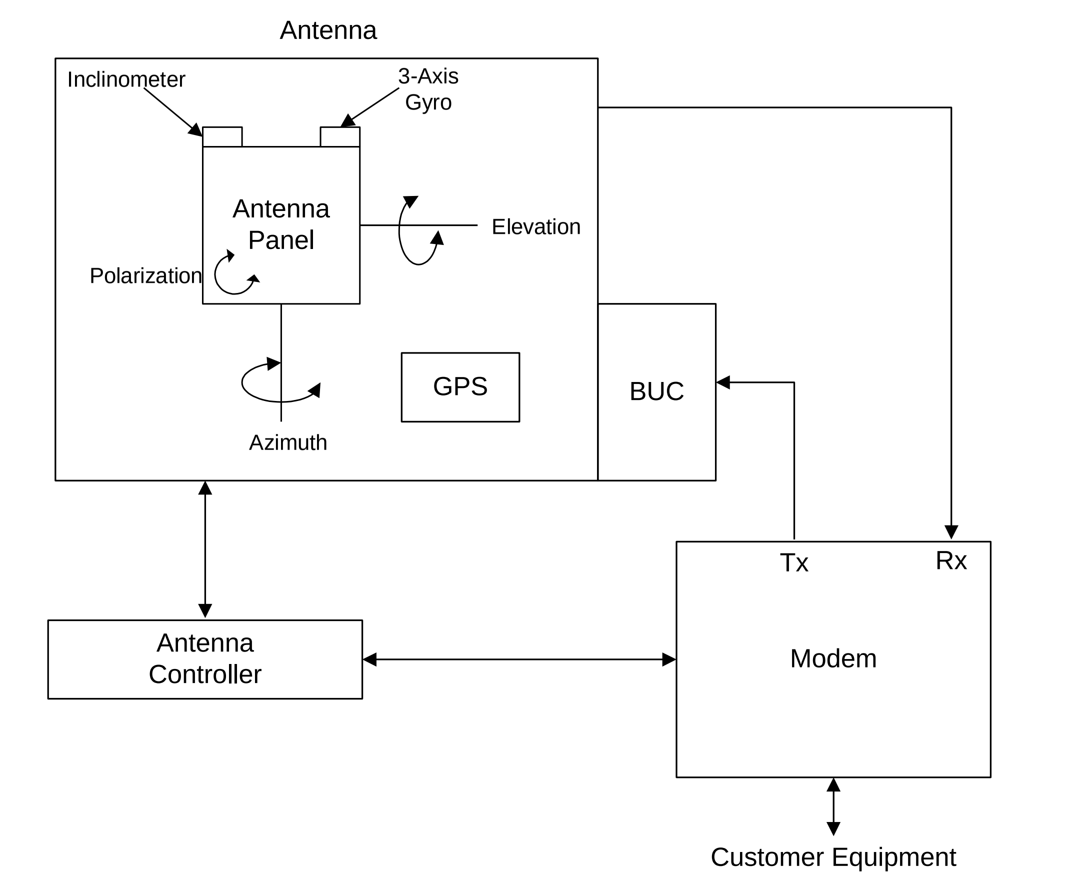

Figure 1
Typical Antenna Equipment Set-up

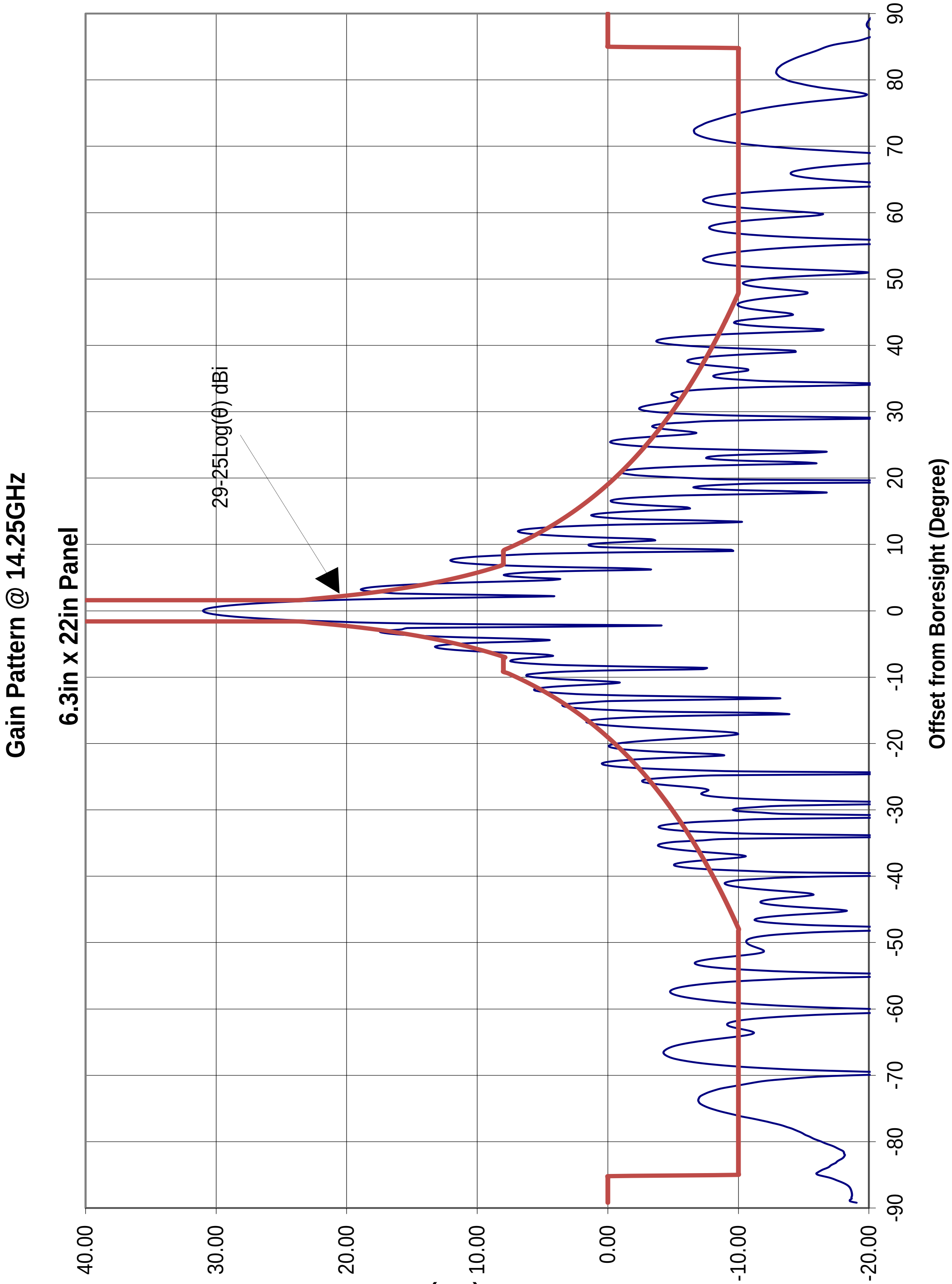

Figure 2
Gain Pattern

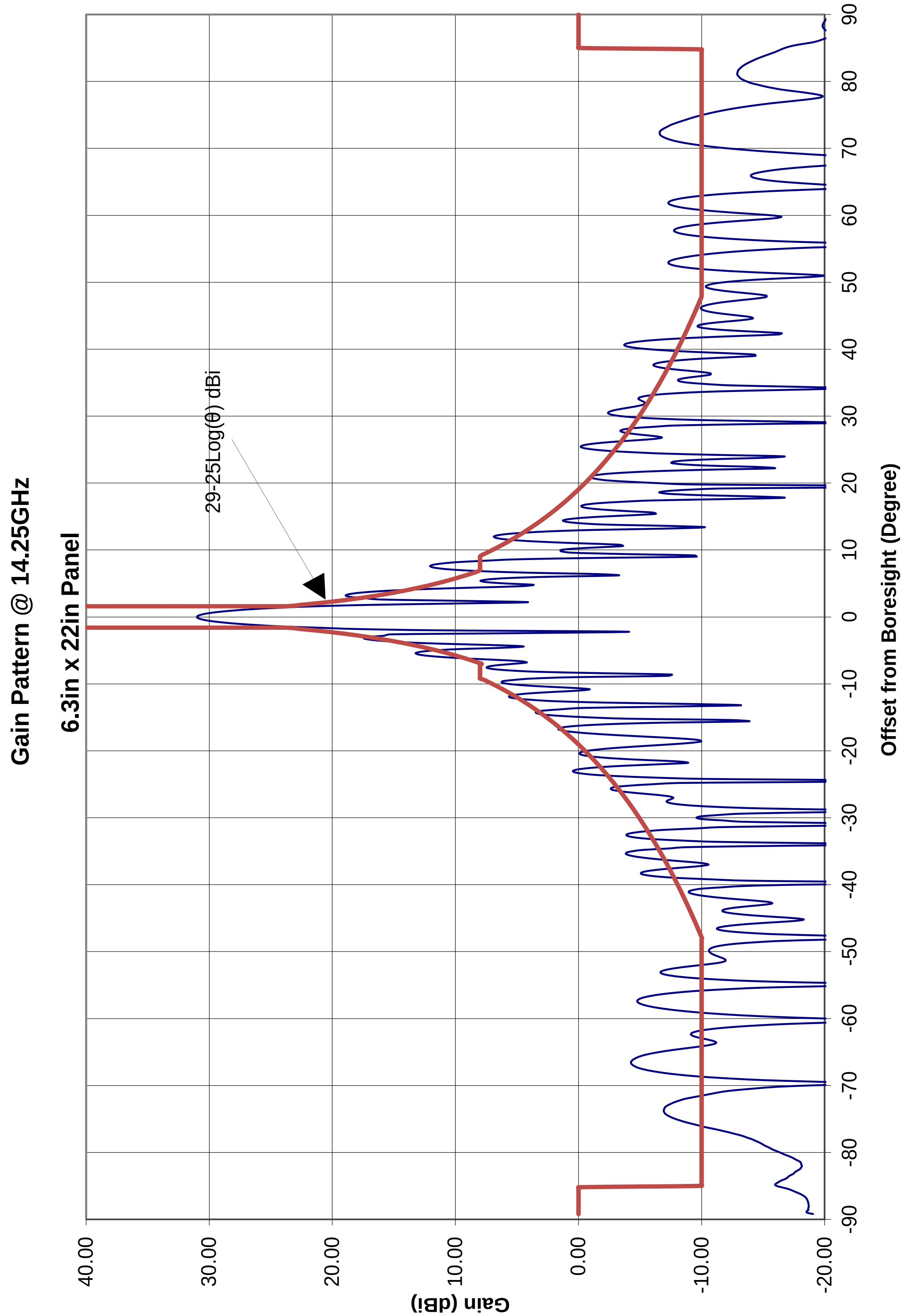

Figure 3A
Transmit PSD Pattern Wide

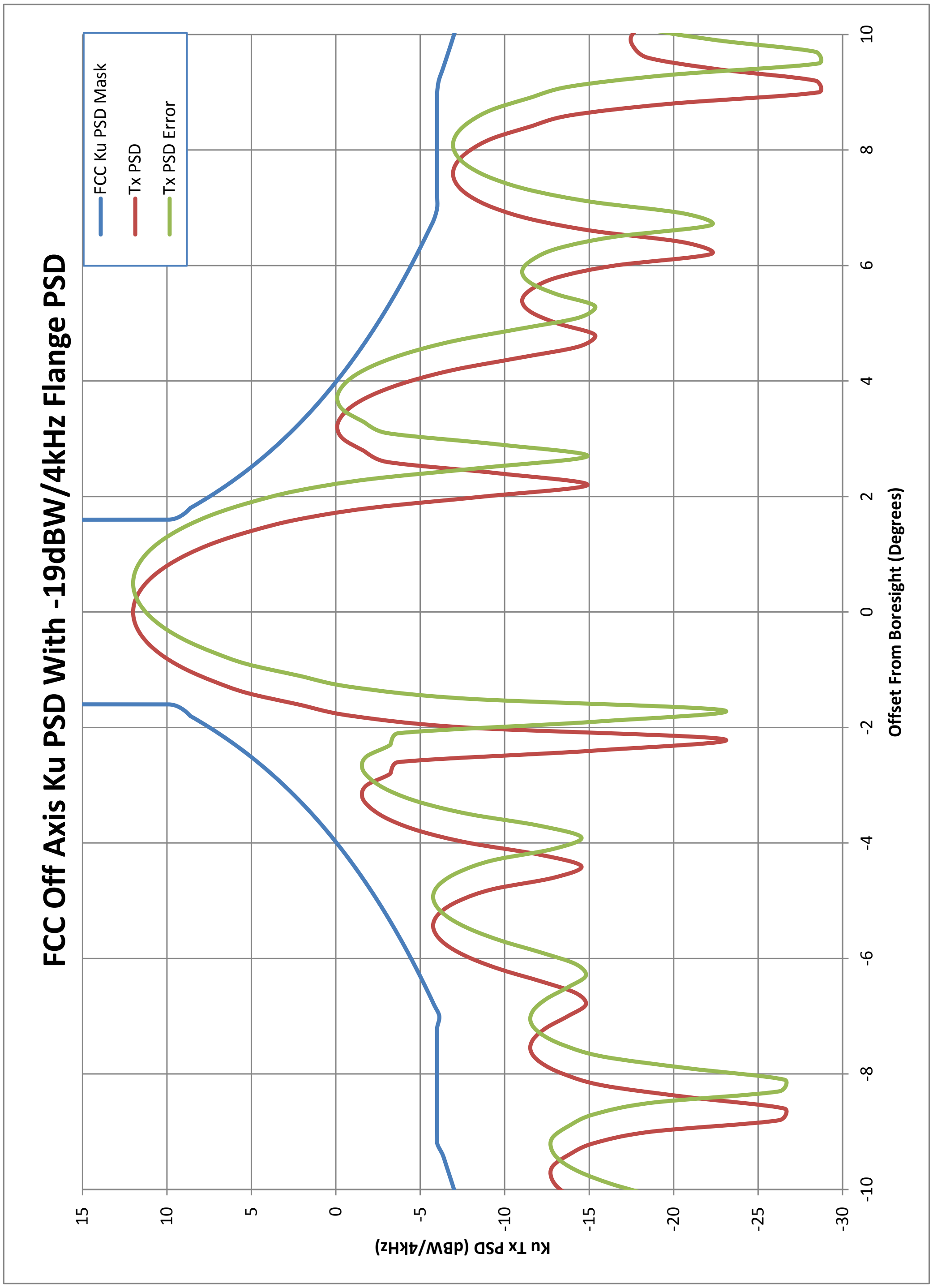

Figure 3B
Transmit PSD Pattern Narrow