

**Application for Amendment of
Boeing ESAA License Call Sign E140097**

1 Nature of Request

Pursuant to ESAA license call sign E140097, Boeing operates on a near global basis its Boeing Broadband Satellite Network (“BBSN”) to exclusively serve the needs of the United States Air Force Air Mobility Command (“AFAMC”). Boeing has been working with the Air Force to identify a new generation of transmit/receive antennas that are suitable for use on a new generation of aircraft that the Air Force is bringing into service.

Boeing has been conducting flight testing with one such candidate antenna – the Viasat KuKarray antenna – to ensure that it satisfies the mission requirements. Domestic testing was first conducted pursuant to experimental Call Sign WH2XJL, and later testing over international waters of the Atlantic and Pacific oceans was conducted under Special Temporary Authority (“STA”) File Number SES-STA-20150910-00574. Boeing’s testing of the KuKarray has concluded successfully, and with this application, Boeing seeks to add the Kukarray as a permanent antenna on the Boeing ESAA license. The technical details of the antenna are summarized below.

2 Antenna Designation

The KuKarray antenna, manufactured by ViaSat, transmits and receives using a single horn array aperture that is mechanically steered to acquire and track the desired satellite through aircraft flight maneuvers and over a large geographic range. The polarization angle is electronically rotated to match the polarization of the satellite. The horn array aperture is mounted on the top of the aircraft body and enclosed in a radome. Associated support electronics will be installed in the aircraft fuselage. Table 1 below provides the specifications for the KuKarray terminal, and Figure 1 provides a picture of the antenna

Specification	Antenna Data
Aperture Dimensions	76.20 x 15.24 cm rectangular
Transmit Band	14.0-14.5 GHz
Receive Band	10.95-12.75 GHz
Frequency Tolerance	< +/-10 kHz
G/T	11.0 dB/K @ 11.85 GHz (clear sky, in level flight @30k ft, -55°C air temp, EL >45°, w/ KuKarray radome)
Transmit Gain	~ 33.6 dBi @ 14.25 GHz
Receive Gain	~ 32.0 dBi @ 11.85 GHz
EIRP	46.0 dBW min, 47.0 dBW typical
Pointing Error	0.2° degrees rms

Table 1. KuKarray Specifications



Figure 1. KuKarray Antenna Picture

2.1 Antenna Control and Pointing

The KuKarray antenna employs mechanical steering of the azimuth and elevation apertures. The antenna is pointed based on aircraft Inertial Reference Unit (“IRU”) data which is calibrated to the antenna at installation.

2.2 Antenna Gain Patterns

Pursuant to §25.132(b)(1-2), Boeing provides the following antenna gain patterns for the KuKarray antenna. Both azimuth (Az) and elevation (El) patterns are provided for vertical (V) and horizontal (H) polarization at 14.2 GHz. Although the patterns below show points where the antenna levels exceed the Section 25.209 limits, in each such case Boeing operates the network to ensure that the limits that have been coordinated with adjacent satellite operators are not exceeded. This is done through the Network Control Center, which manages the total aggregate ESD emitted by all active platforms in any specific satellite service region to remain at or below the off-axis ESD limits that are coordinated for the target satellite or specified by Section 25.227(a)(3)(i) of the Commission’s rules. A detailed explanation of this capability is discussed on pages 17-18 of Boeing’s original ESAA application, dated September 22, 2014, File No. SES-STA-20140922-00748.

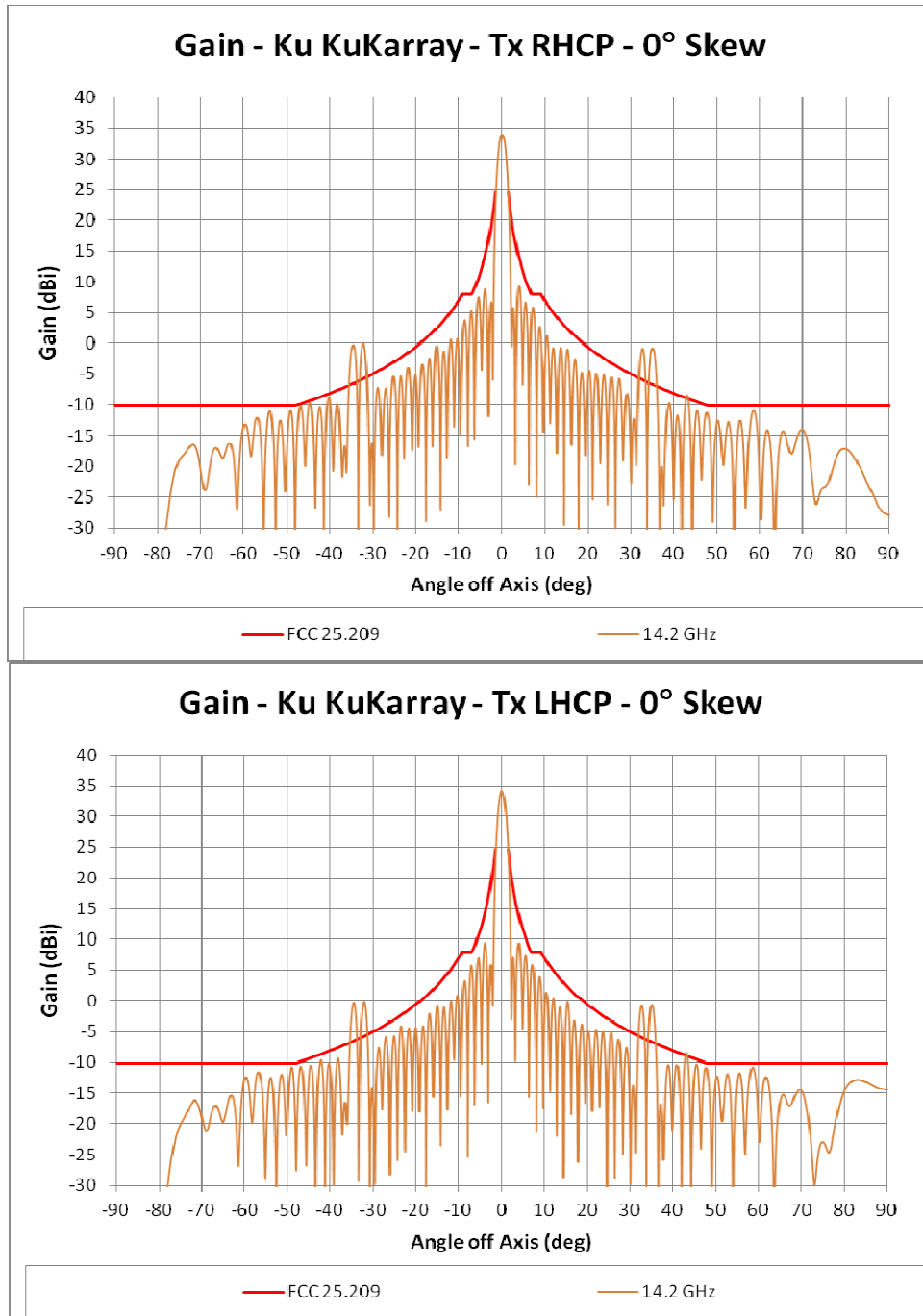


Figure 2: Antenna Measured RHCP & LHCP Azimuth Pattern at 14.2 GHz at Thetas between -75 and 75 degrees

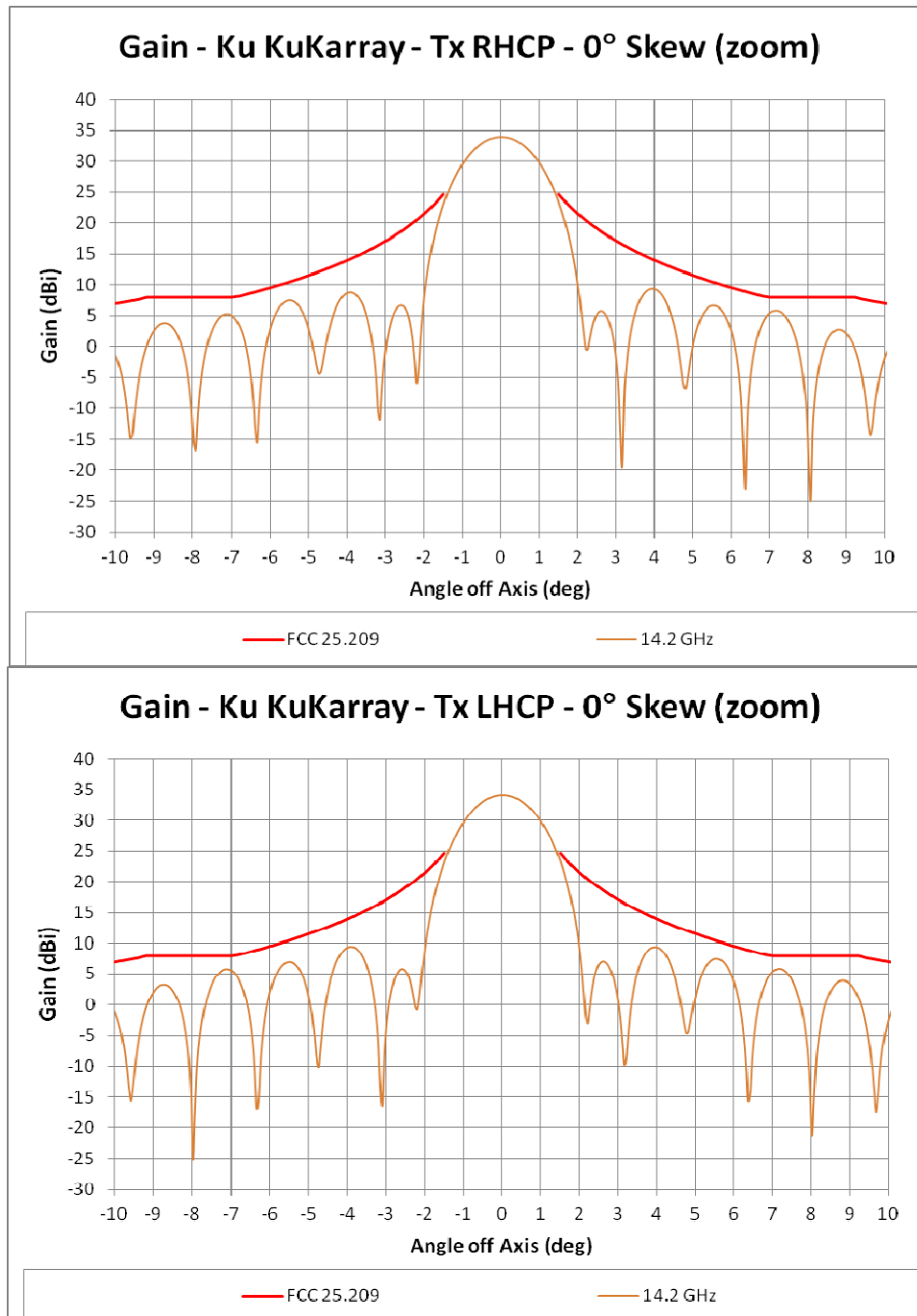


Figure 3: Measured RHCP & LHCP Azimuth Pattern at 14.2 GHz at Thetas between -7 and 7 degrees

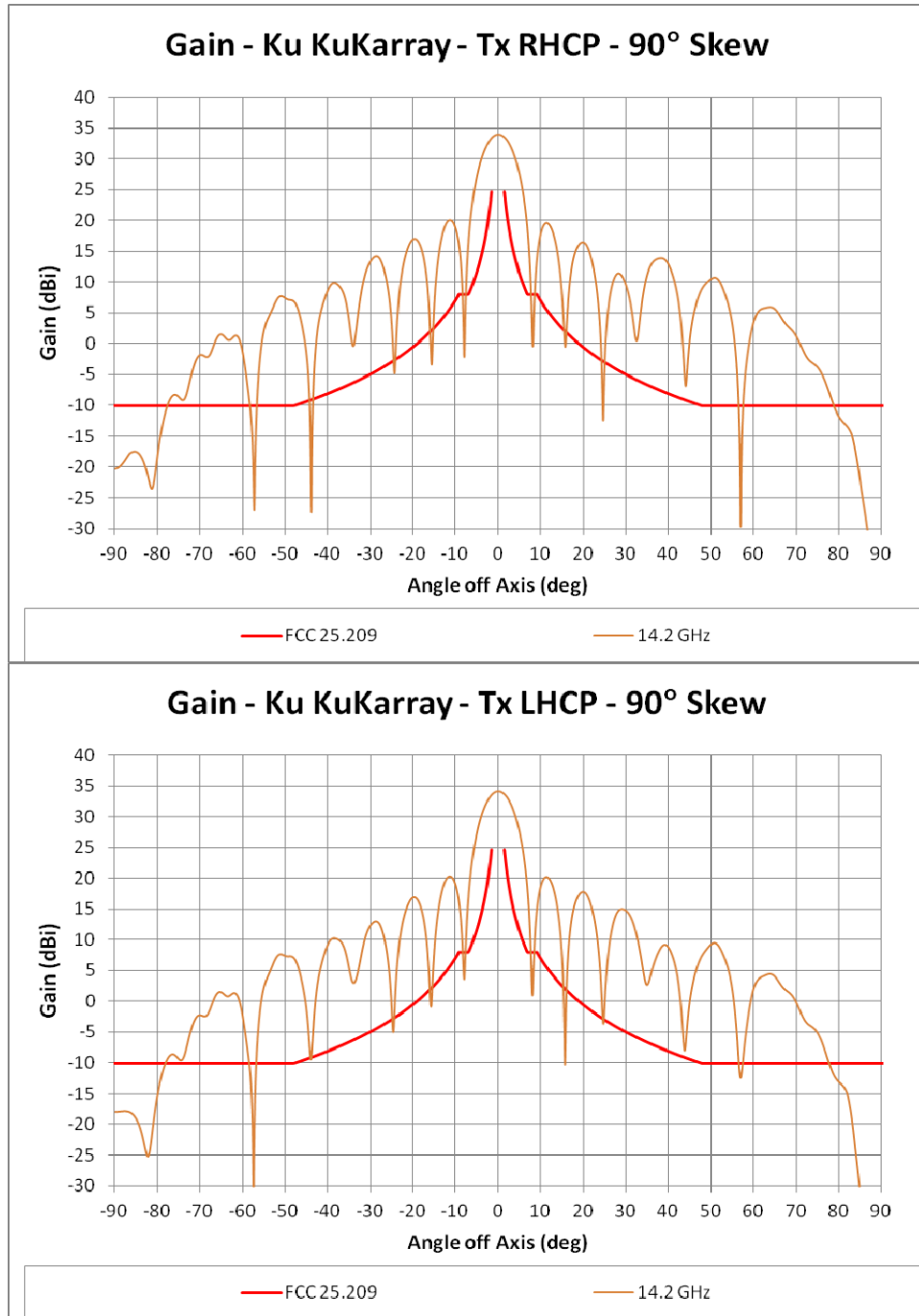


Figure 4: Antenna Measured RHCP & LHCP Elevation Pattern at 14.2 GHz at Thetas between -75 and 75 degrees

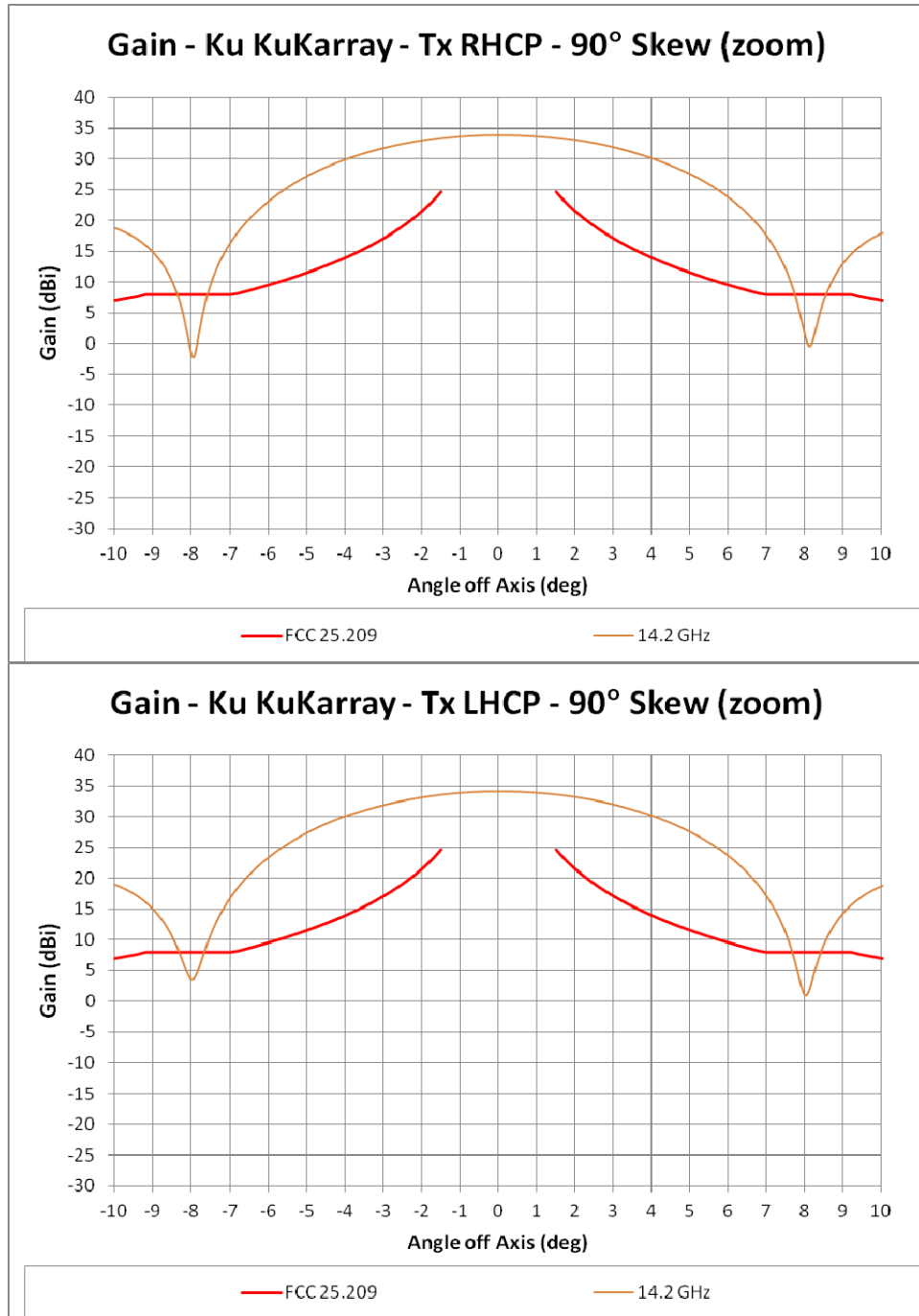


Figure 5: Antenna Measured RHCP & LHCP Elevation Pattern at 14.2 GHz at Thetas between -7 and 7 degrees