Approved by OMB
3060−0678

APPLICATION FOR EARTH STATION SPECIAL TEMPORARY AUTHORITY

APPLICANT INFORMATIONEnter a description of this application to identify it on the main menu:
Request for Special Temporary Authority for Transportable Ku−Band Earth Station

**1. Applicant**

| | | | |
|---|---|---|---|
| **Name:** | The Titan Corporation | **Phone Number:** | 858−552−9935 |
| **DBA Name:** | | **Fax Number:** | 858−552−9996 |
| **Street:** | 3033 Science Park Road | **E−Mail:** | tmr@titan.com |
| City: | San Diego | **State:** | CA |
| **Country:** | USA | **Zipcode:** | 92121 − |
| **Attention:** | Mr Tom M Remillard | | |

**2. Contact**

| | | | |
|---|---|---|---|
| **Name:** | Jesse G. Hindemith | **Phone Number:** | 858−486−1115 |
| **Company:** | Intellicom Technologies, Inc. | **Fax Number:** | |
| **Street:** | P.O. Box 27056 | E−Mail: | hindemith@itccom.com |
| **City:** | San Diego | **State:** | CA |
| **Country:** | USA | **Zipcode:** | 92198 − |
| **Attention:** | | **Relationship:** | |

3. Reference File Number

4a. Is a fee submitted with this application?

(●) If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R.Section 1.1114).

( ) Governmental Entity ( ) Noncommercial educational licensee

( ) Other(please explain):

4b. Fee Classification CGX − Fixed Satellite Transmit/Receive Earth Station

5. Type Request

( ) Use Prior to Grant ( ) Change Station Location (●) Other

| | |
|---|---|
| 6. Requested Use Prior Date<br>06/03/2005 | |
| 7. City | 8. Latitude<br>(dd mm ss.s h) 0 0 0.0 |

| 9. State | 10. Longitude<br>(dd mm ss.s h) 0 0 0.0 |
|---|---|

11. Please supply any need attachments.

Attachment 1: Exhibit A  Attachment 2: Exhibit B  Attachment 3:

12. Description. (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

To meet critical governmental service dates, The Titan Corporation requests the grant of a Special Temporary Authority to permit them to perform antenna verification testing of a transportable earth station. The antenna is to be used by U.S. military forces to provide digital data services in support their operations. The granting of this STA will aid The

13. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti−Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application" for these purposes.

◉ Yes ○ No

| 14. Name of Person Signing | 15. Title of Person Signing |
|---|---|
| Mark Monte | Director of Engineering |

WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT
(U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION
(U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).

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**12. Description**

To meet critical governmental service dates, The Titan Corporation requests the grant of a Special Temporary Authority to permit them to perform antenna verification testing of a transportable earth station. The antenna is to be used by U.S. military forces to provide digital data services in support their operations. The granting of this STA will aid The Titan Corporation in meeting urgent governmental demands necessary in the furtherance of the public interest.

SATELLITE EARTH STATION AUTHORIZATIONS
FCC Form 312 – Schedule B:(Technical and Operational Description)
FOR OFFICIAL USE ONLY

Location of Earth Station Site

| | | | |
|---|---|---|---|
| E1: Site Identifier: | Transportable | E5. Call Sign: | |
| E2: Contact Name | Mark Monte | E6. Phone Number: | 858–552–9500 |
| E3. Street: | Various Locations Throughout | E7. City: | |
| | the United States | E8. County: | |
| E4. State | | E9. Zip Code | |

E10. Area of Operation: Vatious Locations Throughout the United States

E11. Latitude: 0 °0 '0.0 "

E12. Longitude: 0 °0 '0.0 "

E13. Lat/Lon Coordinates are: ○ NAD–27 ◉ NAD–83 ○ N/A

E14. Site Elevation (AMSL): 0.0 meters

| | |
|---|---|
| E15. If the proposed antenna(s) operate in the Fixed Satellite Service (FSS) with geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a) and (b) as demonstrated by the manufacturer's qualification measurement? If NO, provide as a technical analysis showing compliance with two–degree spacing policy. | ○ Yes ◉ No ○ N/A |
| E16. If the proposed antenna(s) do not operate in the Fixed Satellite Service (FSS), or if they operate in the Fixed Satellite Service (FSS) with non–geostationary satellites, do(es) the proposed antenna(s) comply with the antenna gain patterns specified in Section 25.209(a2) and (b) as demonstrated by the manufacturer's qualification measurements? | ○ Yes ○ No ◉ N/A |
| E17. Is the facility operated by remote control? If YES, provide the location and telephone number of the control point. | ○ Yes ◉ No |

| | |
|---|---|
| E18. Is frequency coordination required? If YES, attach a frequency coordination report as | ○ Yes ◉ No |
| E19. Is coordination with another country required? If YES, attach the name of the country(ies) and plot of coordination contours as | ○ Yes ◉ No |
| E20. FAA Notification – (See 47 CFR Part 17 and 47 CFR part 25.113(c)) Where FAA notification is required, have you attached a copy of a completed FCC Form 854 and or the FAA's study regarding the potential hazard of the structure to aviation?<br>FAILURE TO COMPLY WITH 47 CFR PARTS 17 AND 25 WILL RESULT IN THE RETURN OF THIS APPLICATION. | ○ Yes ◉ No |

POINTS OF COMMUNICATION

| | |
|---|---|
| Satellite Name:OTHER \| OTHER \| | If you selected OTHER, please enter the following: |

| | |
|---|---|
| E21. Common Name: AMC–9 | E22. ITU Name: AMC–9 |
| E23. Orbit Location: 83 W.L. | E24. Country: |

POINTS OF COMMUNICATION (Destination Points)

| | |
|---|---|
| E25. Site Identifier: | |
| E26. Common Name: | E27. Country: |

ANTENNA

| Site ID | E28. Antenna Id | E29. Quantity | E30. Manufacturer | E31. Model | E32. Antenna Size<meters> | E41/42. Antenna GainTransmint and/or Recieve (____dBi at _____GHz) |
|---|---|---|---|---|---|---|
| Transportable | T1 | 1 | The Titan Corporation | FSS–4180 | 0.46 | 31.0 dBi at 11.950 |
| | | | | | | 32.0 dBi at 14.250 |

| E28. Antenna Id | E33/34. Diameter Minor/Major (meters) | E35. Above Ground Level<BR> (meters) | E36. Above Sea Level<BR> (meters) | E37. Building Height Above Ground Level<BR> (meters) | E38. Total Input Power at antenna flange<BR> (Watts) | E39. Maximum Antenna Height Above Rooftop<BR> (meters) | E40. Total EIRP for al carriers<BR> (dBW) |
|---|---|---|---|---|---|---|---|
| T1 | 0.0/0.0 | 1.2 | 0.0 | 0.0 | 13.0 | 0.0 | 43.1 |

FREQUENCY

| E28. Antenna Id | E43/44. Frequency Bands (MHz) | E45. T/R Mode | E46. Antenna Polarization(H,V, L,R) | E47. Emission Designator | E48. Maximum EIRP per Carrier (dBW) | E49. Maximum ERIP Density per Carrier (dBW/4kHz) |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| T1 | 11700.0<br>12200.0 | R | Horizontal and Vertical | 1M23G7D | 0.0 | 0.0 |

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Digital Data

| | | | | | | |
|---|---|---|---|---|---|---|
| T1 | 14000.0<br>14500.0 | T | Horizontal and Vertical | 1M23G7D | 40.9 | 16.0 |

E50. Modulation and Services (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.)

Digital Data

FREQUENCY COORDINATION

| **E28. Antenna Id** | **E51. Satellite Orbit Type** | **E52/53. Frequency Limits(MHz)** | **E54/55. Range of Satellite Arc E/W Limit** | **E56. Earth Station Azimuth Angle Eastern Limit** | **E57. Antenna Elevation Angle Eastern Limit** | **E58. Earth Station Azimuth Angle Western Limit** | **E59. Antenna Elevation Angle Western Limit** | **E60. Maximum EIRP Density toward the Horizon (dBW/4kHz)** |
|---|---|---|---|---|---|---|---|---|
| T1 | Geostationary | 11700.0<br>12200.0 | 83.0/ 84.0 | 0.0 | 0.5 | 0.0 | 0.5 | 0.0 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Geostationary | 14000.0<br>14500.0 | 83.0/ 84.0 | 0.0 | 0.5 | 0.0 | 0.5 | -26.0 |

REMOTE CONTROL POINT LOCATION

| E61. Call Sign<br><br>NOTE: Please enter the callsign of the controlling station, not the callsign for which this application is being filed. | | | E65. Phone Number |
|---|---|---|---|
| E62. Street Address | | | |
| E63. City | E67. County | E64/68. State/Country<br>/ | E66. Zip Code |

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# Analysis of Non-Ionizing Radiation for a 0.5-Meter Earth Station System

This report analyzes the non-ionizing radiation levels for a 0.5-meter earth station system. The analysis and calculations performed in this report comply with the methods described in the FCC Office of Engineering and Technology Bulletin, No. 65 first published in 1985 and revised in 1997 in Edition 97-01. The radiation safety limits used in the analysis are in conformance with the FCC R&O 96-326. Bulletin No. 65 and the FCC R&O specifies that there are two separate tiers of exposure limits that are dependant on the situation in which the exposure takes place and/or the status of the individuals who are subject to the exposure. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment are shown in Table 1. The General Population/Uncontrolled MPE is a function of transmit frequency and is for an exposure period of thirty minutes or less. The MPE limits for persons in an Occupational/Controlled environment are shown in Table 2. The Occupational MPE is a function of transmit frequency and is for an exposure period of six minutes or less. The purpose of the analysis described in this report is to determine the power flux density levels of the earth station in the far-field, near-field, transition region, between the subreflector or feed and main reflector surface, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

Table 1. Limits for General Population/Uncontrolled Exposure (MPE)

| Frequency Range (MHz) | Power Density ($mW/cm^2$) |
|---|---|
| 30-300 | 0.2 |
| 300-1500 | Frequency (MHz)*(0.8/1200) |
| 1500-100,000 | 1.0 |

Table 2. Limits for Occupational/Controlled Exposure (MPE)

| Frequency Range (MHz) | Power Density ($mW/cm^2$) |
|---|---|
| 30-300 | 1.0 |
| 300-1500 | Frequency (MHz)*(4.0/1200) |
| 1500-100,000 | 5.0 |

Table 3. Formulas and Parameters Used for Determining Power Flux Densities

| Parameter | Symbol | Formula | Value | Units |
|---|---|---|---|---|
| Antenna Diameter | D | Input | 0.5 | m |
| Antenna Surface Area | $A_{surface}$ | $\pi D^2 / 4$ | 0.17 | $m^2$ |
| Subreflector Diameter | $D_{sr}$ | Input | 6.9 | cm |
| Area of Subreflector | $A_{sr}$ | $\pi D_{sr}{}^2/4$ | 37.39 | $cm^2$ |
| Frequency | F | Input | 14250 | MHz |
| Wavelength | $\lambda$ | 300 / F | 0.021053 | m |
| Transmit Power | P | Input | 13.00 | W |
| Antenna Gain (dBi) | $G_{es}$ | Input | 32.0 | dBi |
| Antenna Gain (factor) | G | $10^{Ges/10}$ | 1584.9 | n/a |
| Pi | $\pi$ | Constant | 3.1415927 | n/a |
| Antenna Efficiency | $\eta$ | $G\lambda^2/(\pi^2D^2)$ | 0.34 | n/a |

## 1. Far Field Distance Calculation

The distance to the beginning of the far field can be determined from the following equation:

Distance to the Far Field Region

$$R_{ff} = 0.60\ D^2 / \lambda \quad (1)$$
$$= 6.0\ m$$

The maximum main beam power density in the far field can be determined from the following equation:

On-Axis Power Density in the Far Field

$$S_{ff} = G\ P / (4\ \pi\ R_{ff}^{\ 2}) \quad (2)$$
$$= 45.083\ W/m^2$$
$$= 4.508\ mW/cm^2$$

## 2. Near Field Calculation

Power flux density is considered to be at a maximum value throughout the entire length of the defined Near Field region. The region is contained within a cylindrical volume having the same diameter as the antenna. Past the boundary of the Near Field region, the power density from the antenna decreases linearly with respect to increasing distance.

The distance to the end of the Near Field can be determined from the following equation:

Extent of the Near Field

$$R_{nf} = D^2 / (4\ \lambda) \quad (3)$$
$$= 2.5\ m$$

The maximum power density in the Near Field can be determined from the following equation:

Near Field Power Density

$$S_{nf} = 16.0\ \eta\ P / (\pi\ D^2) \quad (4)$$
$$= 105.243\ W/m^2$$
$$= 10.524\ mW/cm^2$$

## 3. Transition Region Calculation

The Transition region is located between the Near and Far Field regions. The power density begins to decrease linearly with increasing distance in the Transition region. While the power density decreases inversely with distance in the Transition region, the power density decreases inversely with the square of the distance in the Far Field region. The maximum power density in the Transition region will not exceed that calculated for the Near Field region. The power density calculated in Section 1 is the highest power density the antenna can produce in any of the regions away from the antenna. The power density at a distance $R_t$ can be determined from the following equation:

Transition Region Power Density

$$S_t = S_{nf}\ R_{nf} / R_t \quad (5)$$
$$= 10.524\ mW/cm^2$$

## 4. Region between the Main Reflector and the Subreflector

Transmissions from the feed assembly are directed toward the subreflector surface, and are reflected back toward the main reflector. The most common feed assemblies are waveguide flanges, horns or subreflectors. The energy between the subreflector and the reflector surfaces can be calculated by determining the power density at the subreflector surface. This can be determined from the following equation:

Power Density at the Subreflector

$$S_{sr} = 4000\ P / A_{sr} = 1390.642\ mW/cm^2 \quad (6)$$

## 5. Main Reflector Region

The power density in the main reflector is determined in the same manner as the power density at the subreflector. The area is now the area of the main reflector aperture and can be determined from the following equation:

Power Density at the Main Reflector Surface

$$S_{surface} = 4\ P / A_{surface} = 312.894\ W/m^2 = 31.289\ mW/cm^2 \quad (7)$$

## 6. Region between the Main Reflector and the Ground

Assuming uniform illumination of the reflector surface, the power density between the antenna and the ground can be determined from the following equation:

Power Density between Reflector and Ground

$$S_g = P / A_{surface} = 78.224\ W/m^2 = 7.822\ mW/cm^2 \quad (8)$$

## 7. Summary of Calculations

Table 4. Summary of Expected Radiation levels for Uncontrolled Environment

| Region | Calculated Maximum Radiation Power Density Level ($mW/cm^2$) | | Hazard Assessment |
|---|---|---|---|
| 1. Far Field ($R_{ff}$ = 6.0 m) | $S_{ff}$ | 4.508 | Potential Hazard |
| 2. Near Field ($R_{nf}$ = 2.5 m) | $S_{nf}$ | 10.524 | Potential Hazard |
| 3. Transition Region ($R_{nf} < R_t < R_{ff}$) | $S_t$ | 10.524 | Potential Hazard |
| 4. Between Main Reflector and Subreflector | $S_{sr}$ | 1390.642 | Potential Hazard |
| 5. Main Reflector | $S_{surface}$ | 31.289 | Potential Hazard |
| 6. Between Main Reflector and Ground | $S_g$ | 7.822 | Potential Hazard |

Table 5. Summary of Expected Radiation levels for Controlled Environment

| Region | Calculated Maximum Radiation Power Density Level ($mW/cm^2$) | | Hazard Assessment |
|---|---|---|---|
| 1. Far Field ($R_{ff}$ = 6.0 m) | $S_{ff}$ | 4.508 | Satisfies FCC MPE |
| 2. Near Field ($R_{nf}$ = 2.5 m) | $S_{nf}$ | 10.524 | Potential Hazard |
| 3. Transition Region ($R_{nf} < R_t < R_{ff}$) | $S_t$ | 10.524 | Potential Hazard |
| 4. Between Main Reflector and Subreflector | $S_{sr}$ | 1390.642 | Potential Hazard |
| 5. Main Reflector | $S_{surface}$ | 31.289 | Potential Hazard |
| 6. Between Main Reflector and Ground | $S_g$ | 7.822 | Potential Hazard |

It is the applicant's responsibility to ensure that the public and operational personnel are not exposed to harmful levels of radiation.

## 8. Conclusions

Based upon the above analysis, it is concluded that harmful levels of radiation may exist in those regions noted for the Uncontrolled (Table 4) and Controlled (Table 5) environments

At one or more of the testing operation locales, the earth station will be placed on the roof of a building, and public access to that roof is restricted. At those locales where the antenna will be placed on the ground for testing, an area around the antenna, equal to one diameter removed from the main beam will be roped off, and public access will be denied. This restricted area will be at least 10 feet around the antenna, and radiation hazard signs will be posted during the operation of this earth station. Since one diameter removed from the center of the main beam the levels are down at least 20 dB, or by a factor of 100, these potential hazards do not exist for either the public, or for earth station personnel.

The applicant will ensure that the main beam of the antenna will be pointed at least one diameter away from any buildings, or other obstacles in those areas that exceed the MPE levels.

The earth station will marked with the standard radiation hazard warnings, as well as the area in the vicinity of the earth station, to inform those in the general population, who may be working, or otherwise present on the roof, and in or near, the main beam of the antenna.

Finally, occupational exposure will be limited, and the transmitter will be turned off during periods of maintenance, so that the MPE standard of 5.0 mw/cm**2 will be complied with for those regions in close proximity to the main reflector, and subreflector, which could be occupied by operating personnel.

SES AMERICOM

An SES GLOBAL Company

May 18, 2005

Federal Communications Commission – International Bureau
445 12th Street, S.W.
Washington, D.C. 20554

Subject: Engineering Certification of SES Americom

To whom it may concern:

This letter certifies that SES Americom Inc. ("SES") is aware of the application to be filed by Intellicom Technologies, Inc ("Intellicom"), for The Titan Corporation ("Titan") to access SES satellites AMC-9 at 83 degrees W.L. licensed by the Federal Communications Commission ("FCC"), using Ku-band transmit/receive antennas that are not compliant with the FCC 2-degree spacing requirements for off-axis sidelobe gain. The SES AMC-9 satellites provide coverage of the Continental United States (CONUS) from its orbital location at 83 degrees W.L. Within the +/- 6 degrees orbital arc from AMC-9[1], SES Americom owns and operates the following satellites:

- AMC-5 at 79 degrees W.L.
- AMC-16 at 85 degrees W.L. (operations to begin in the near-term)
- AMC-3 at 87 degrees W.L.

SES Americom understands that Titan will be deploying Titan DATD, Model FSS-4180 transmit/receive transportable remote antenna with a 46cm circular aperture and a Titan MPM-1000 modem. The proposed antennas are not compliant with the FCC part 25 rules. These antennas exhibit their non-compliance in the region from 1.0 to 7.0 degrees off axis from maximum gain in the transmit band, due to the width of their main gain lobe. The amount of non-compliance is 6.9 dB in this range of off-axis angle. The terminals are compliant with the side lobe pattern requirements specified in Section 25.209 of the Commission's Rules for off-axis angles starting at 7.0 degrees in the transmit band.

The carrier to be transmitted is a narrowband phase-modulated digital carrier with a bandwidth of 1.23 MHz. The uplink transmit antenna input power density is set to –16 dBW/4KHz. At the off-axis angle where the antenna gain non-compliance is 6.9 dB, the effective input power density with a compliant antenna would be –9.1 dBW/4KHz[2]. Even though this effective antenna input power density value of –9.1 dBW/4KHz is 4.9 dB poorer than the routine-licensing value

[1] There are no operational satellites at this time at 77 degrees W.L., and 81 degrees W.L. There is no operational satellite at 89 degrees W.L. also, but IA-8 is expected to be operational at this orbital location in the next 3-4 months.

[2] The value –9.1 dBW/4KHz is obtained by adding the 6.9 dB non-compliance factor to –16 dBW/4KHz.



SES AMERICOM, Inc. | Four Research Way | Princeton | NJ 08540 | USA | tel (1) 609-987-4000 | www.ses-americom.com

of –14 dBW/4KHz[3], coordination with neighboring satellites is feasible[4] since the Intellicom carrier has a bandwidth of only 1.23 MHz.

These antennas are equipped with tracking systems which results in a pointing accuracy of less than or equal to +/- 0.20 degrees. Additionally the terminal has a built-in feature of stopping uplink transmission if the pointing error accidentally exceeds +/- 0.2 degrees.

Furthermore, in order to prevent unacceptable interference into adjacent satellites, SES and Intellicom acknowledge that these antennas will be operated in compliance with the technical, operational, and performance requirements of Part 25 of the FCC rules and any requirements set forth in the licenses granted by the FCC for the above Intellicom-18" antenna. SES and Intellicom acknowledge that the use of the Intellicom non-conforming antennas will not cause unacceptable interference into adjacent satellites in accordance with the FCC's 2-degree spacing policy and will accept interference from adjacent satellites at the same levels as that of an earth station employing an antenna conforming to the reference patterns defined in § 25.209 of the FCC rules.

SES Americom will do any inter-system coordination required within the satellites operated by SES Americom. In the event that new satellites become operational at orbital locations 77 degrees W.L. and 81 degrees W.L., SES Americom will do the necessary inter-system coordination with the new satellites.

Sincerely,

K. Jonnalagadda

Krish Jonnalagadda
Satellite Market Development, Manager
SES Americom

Acceptance by Intellicom:

Intellicom testifies that the information provided to SES Americom and reflected in this Affidavit is true and accurate to the best of Intellicom's knowledge.

Paul Moller

Paul Moller
VP
Intellicom Technologies, Inc

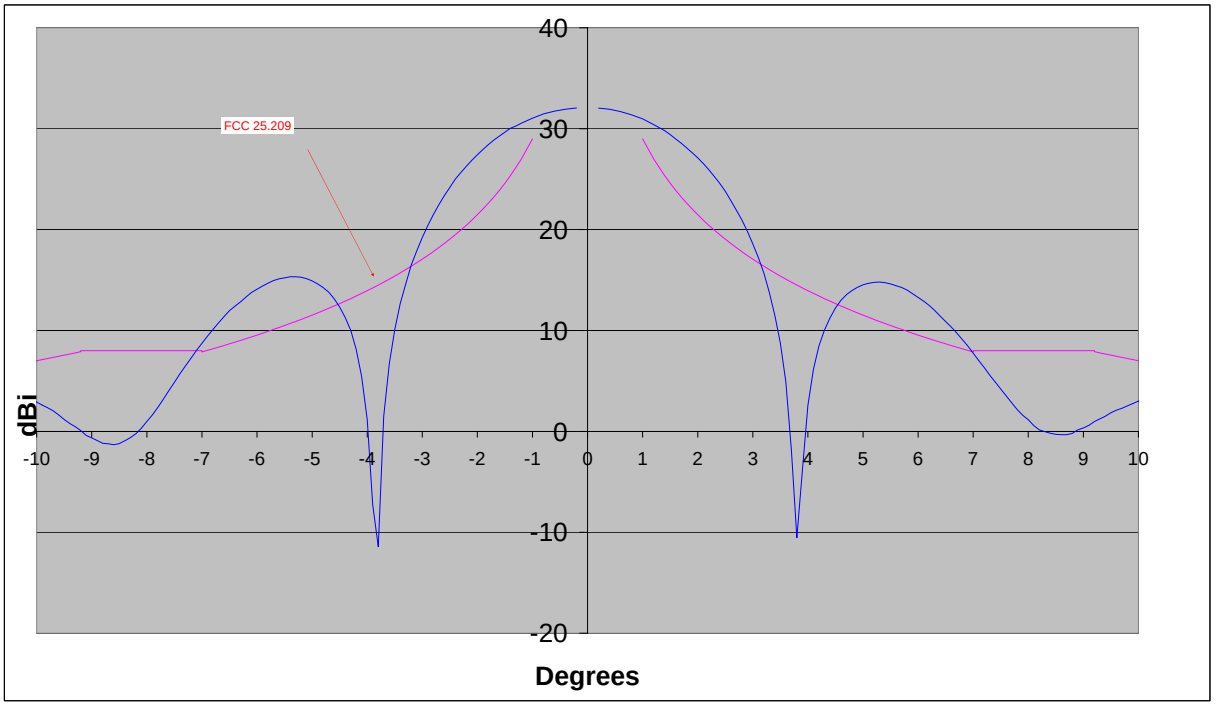
[3] 47 CFR § 25.134

[4] Coordination of high-density carriers is routinely done among the US operators. In TV/FM carrier with a spreading bandwidth of 2 MH, for instance, the carrier density is very high in the center 4 MHz band. Coordination is often done by selecting the center frequencies of such narrow-band high-density carriers to be those that fall in the guard bands of the co-pol transponders of the adjacent satellites.

**Titan/Datron Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **13.84 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.038** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.1 dB** | |
| **Axis** | **EL** | **XPOL** | **-40.7 dB** | |
| **Plane** | **E-PLANE** | **Max Difference between antenna and FCC209** | | **5.9 dB** |





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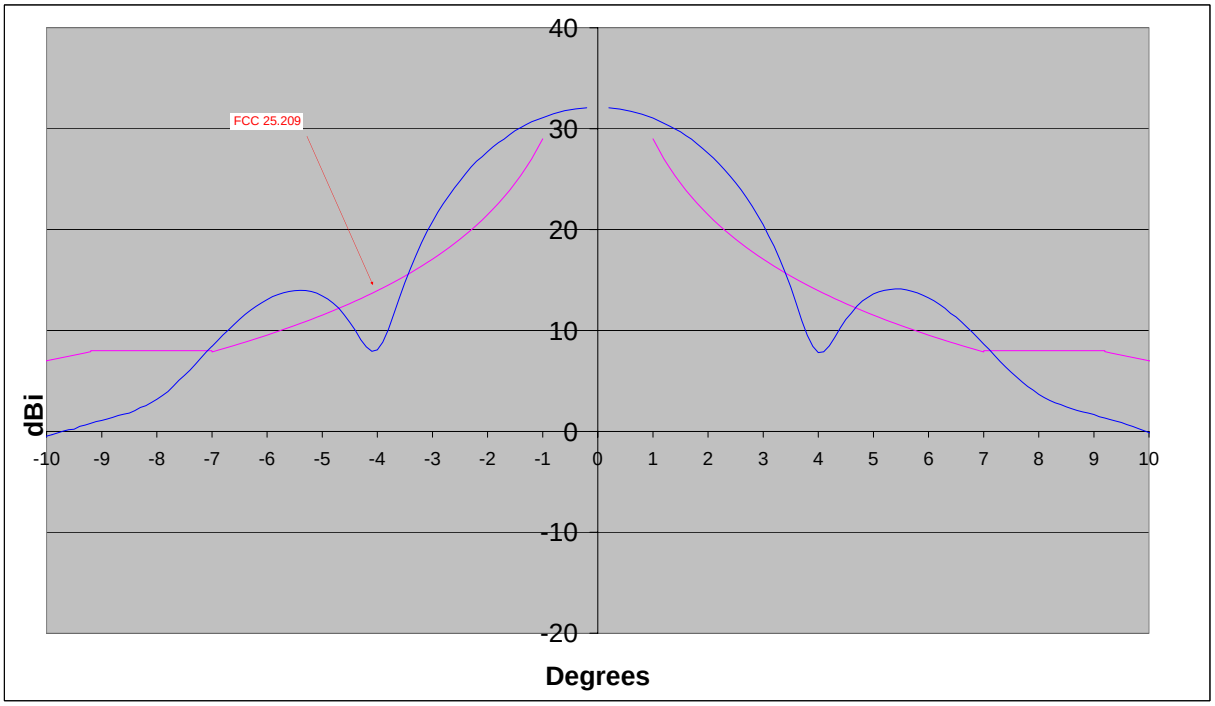
**Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **13.84 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.028** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.1 dB** | |
| **Axis** | **AZ** | **XPOL** | **-35.9 dB** | |
| **Plane** | **H-Plane** | **Max Difference between antenna and FCC209** | | **6.3 dB** |

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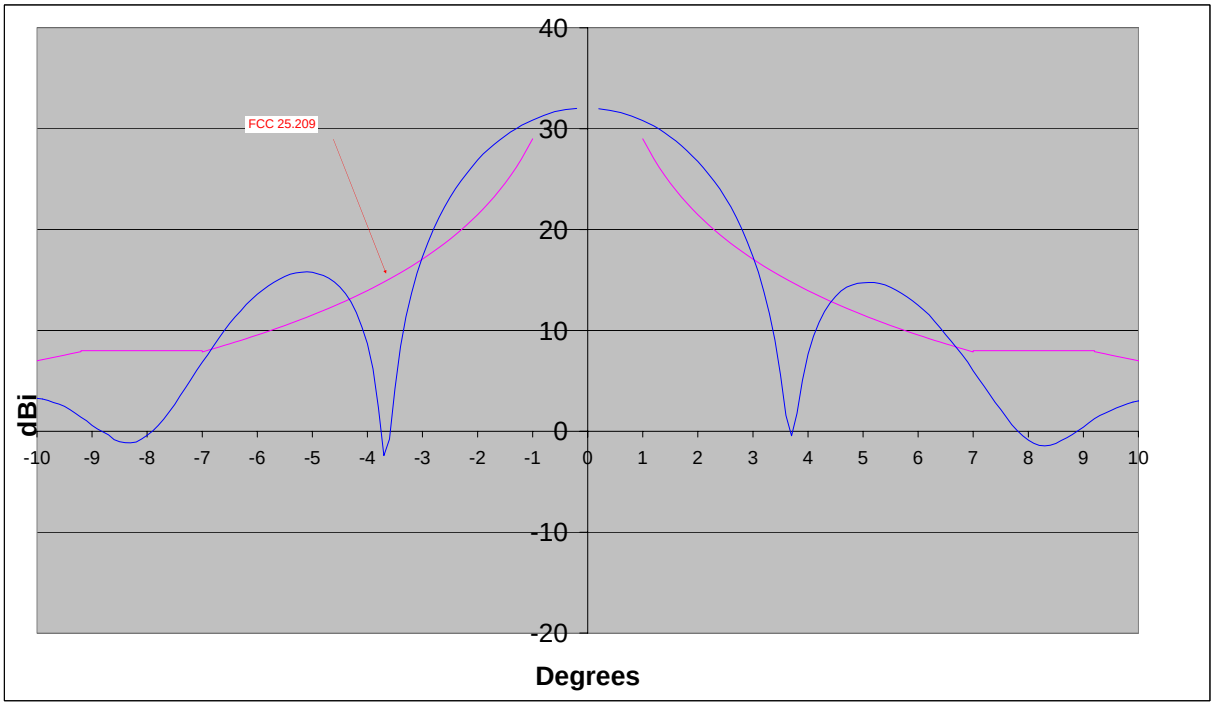
**Titan/Datron Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.16 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.039** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.0 dB** | |
| **Axis** | **EL** | **XPOL** | **-39.7 dB** | |
| **Plane** | **E-PLANE** | **Max Difference between antenna and FCC209** | | **5.4 dB** |

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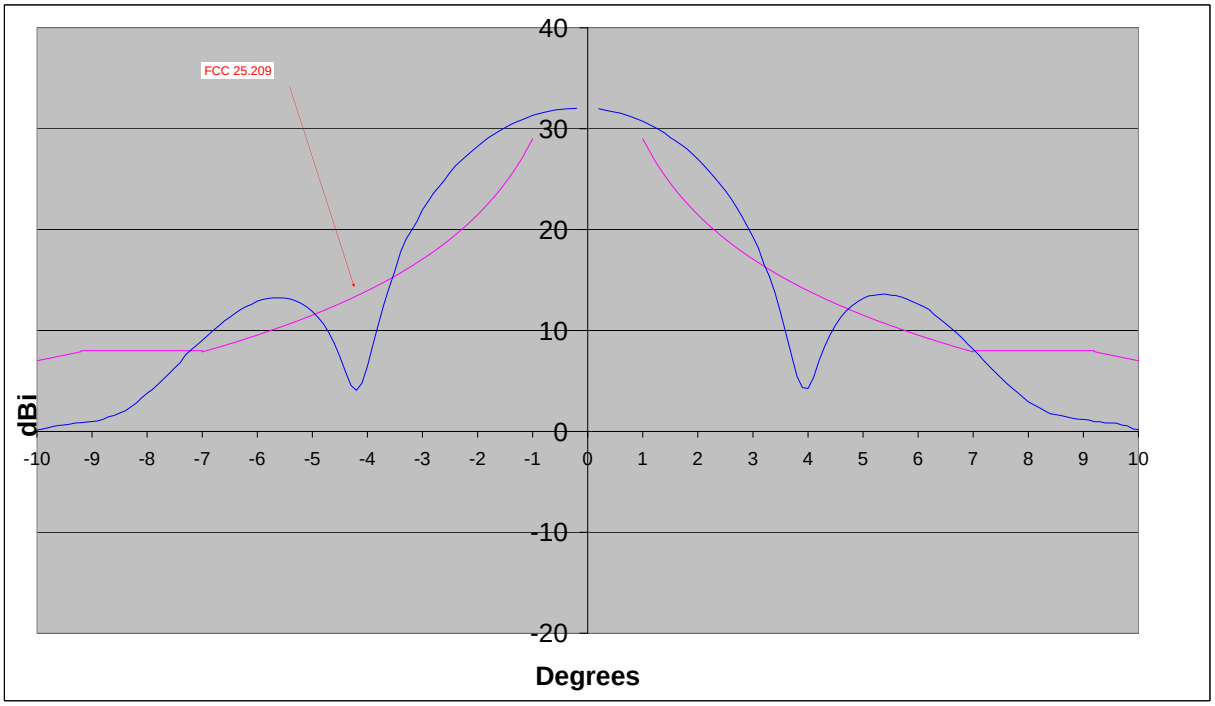
**Titan/Datron Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.16 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.029** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.0 dB** | |
| **Axis** | **AZ** | **XPOL** | **-37.3 dB** | |
| **Plane** | **H-Plane** | **Max Difference between antenna and FCC209** | | **6.9 dB** |

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**Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

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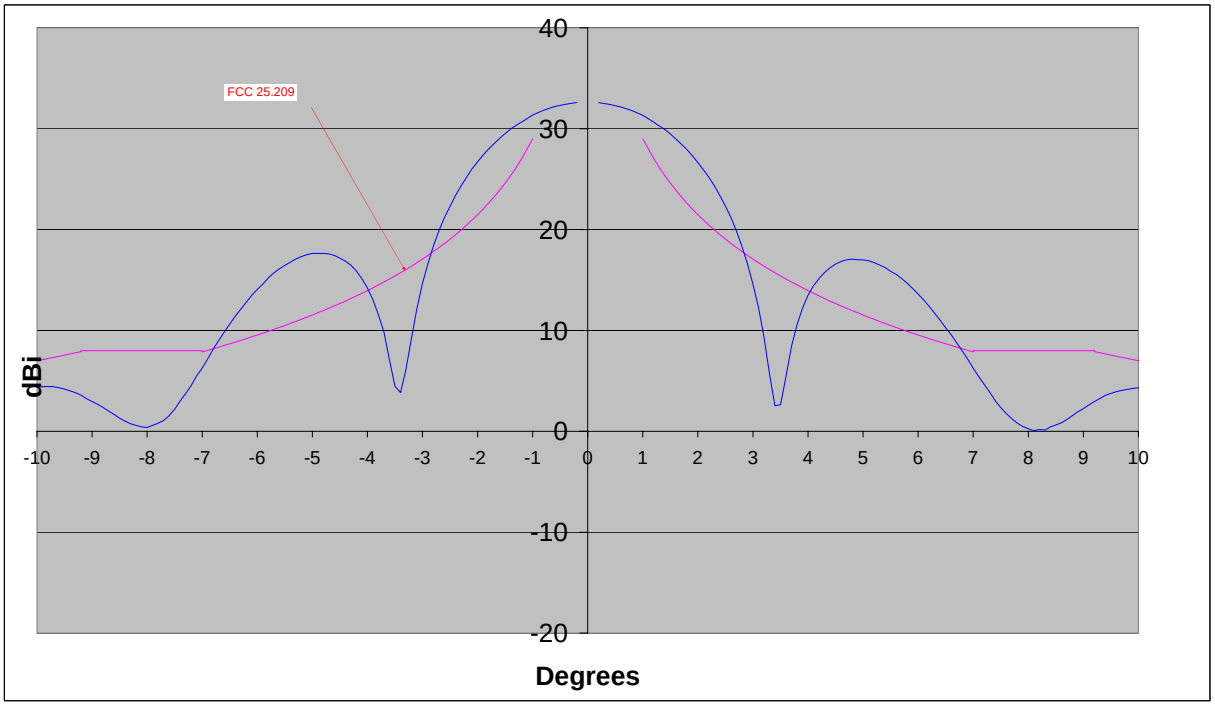
| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.5 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# 40** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.6 dB** | |
| **Axis** | **Elevation** | **XPOL** | **-34.5 dB** | |
| **Plane** | **E Plane** | **Max Difference between antenna and FCC209** | | **6.2 dB** |





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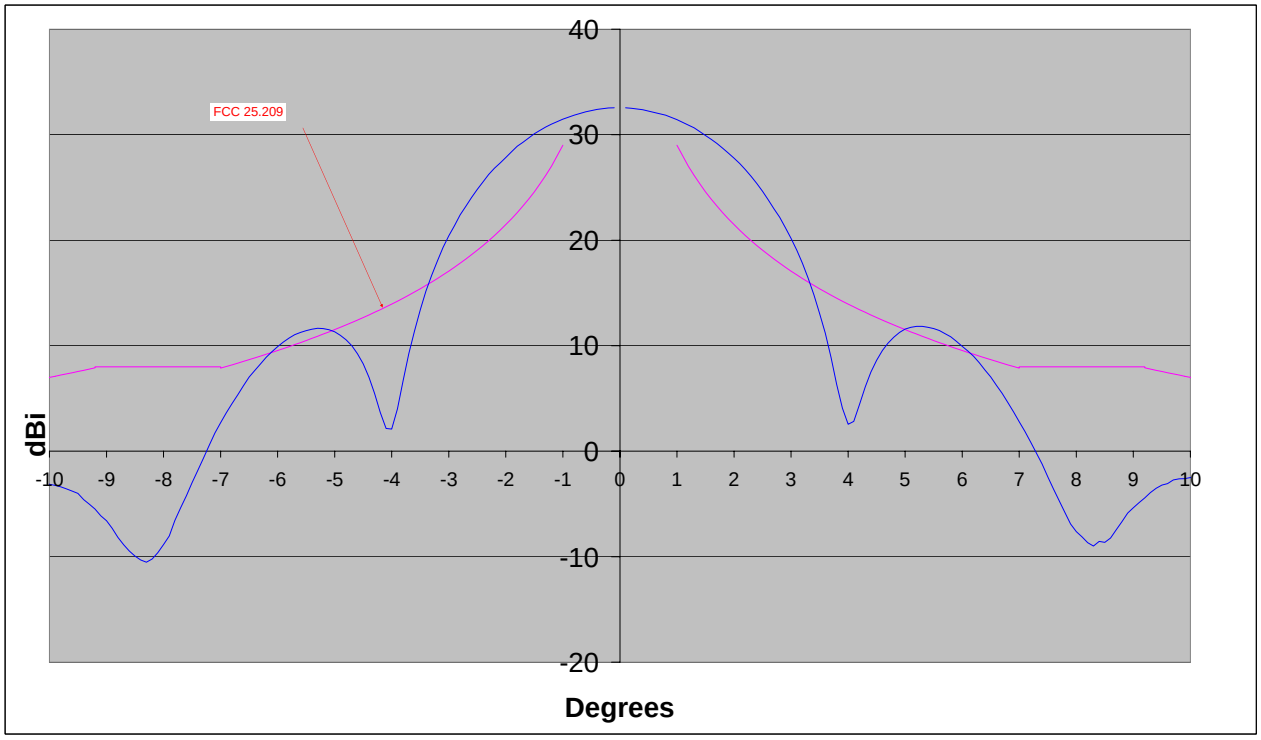
| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.5 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# 20** |
| **Polarization** | **HORIZONTAL** | **Peak Gain** | **32.6 dB** | |
| **Axis** | **Azimuth** | **XPOL** | **-36.6 dB** | |
| **Plane** | **H Plane** | **Max Difference between antenna and FCC209** | | **6.4 dB** |

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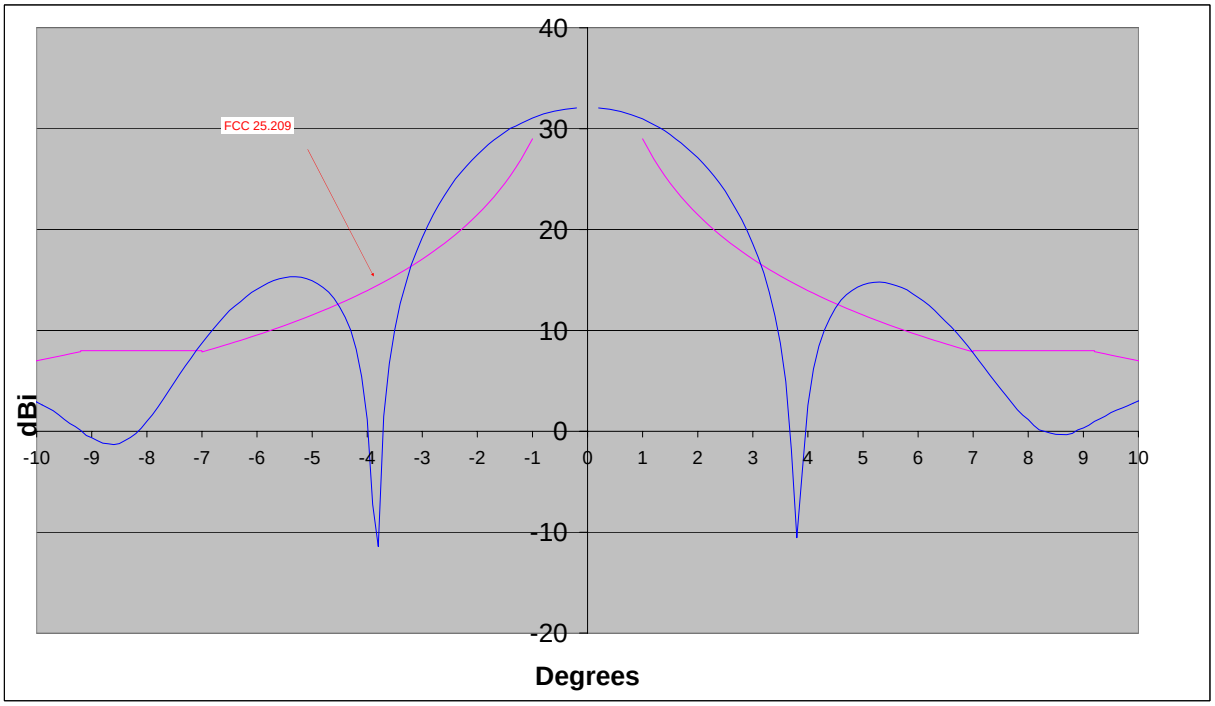
5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **13.84 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.038** |
| **Polarization** | **VERT** | **Peak Gain** | **32.1 dB** | |
| **Axis** | **EL** | **XPOL** | **-40.7 dB** | |
| **Plane** | **E-PLANE** | **Max Difference between antenna and FCC209** | | **5.9 dB** |

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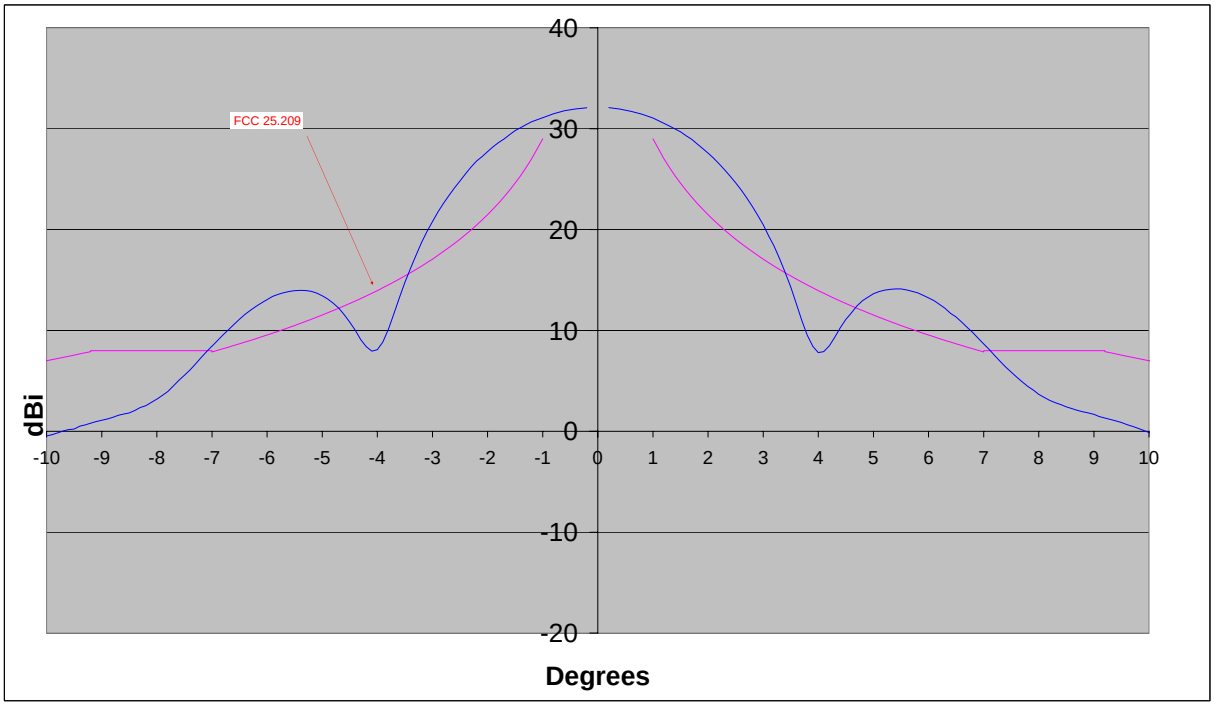
**Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **13.84 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.028** |
| **Polarization** | **VERT** | **Peak Gain** | **32.1 dB** | |
| **Axis** | **AZ** | **XPOL** | **-35.9 dB** | |
| **Plane** | **H-Plane** | **Max Difference between antenna and FCC209** | **6.3 dB** | |





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**Titan/Datron Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

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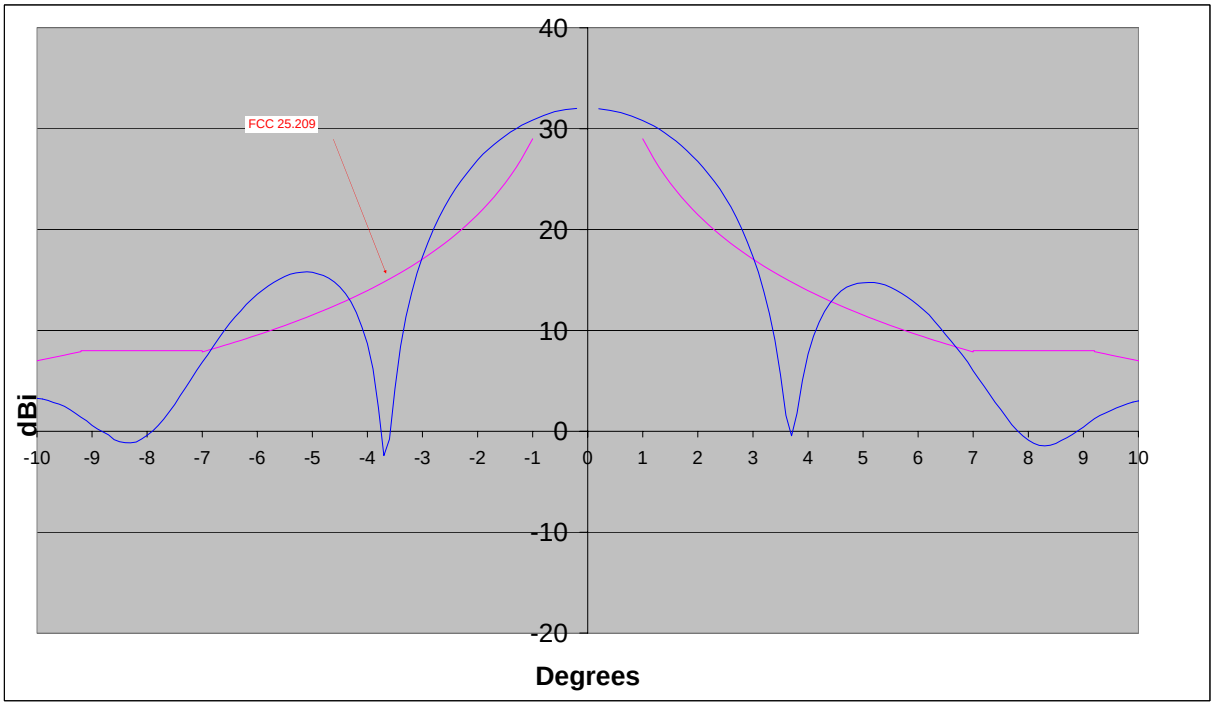
| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.16 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.039** |
| **Polarization** | **VERT** | **Peak Gain** | **32.0 dB** | |
| **Axis** | **EL** | **XPOL** | **-39.7 dB** | |
| **Plane** | **E-PLANE** | **Max Difference between antenna and FCC209** | | **5.4 dB** |

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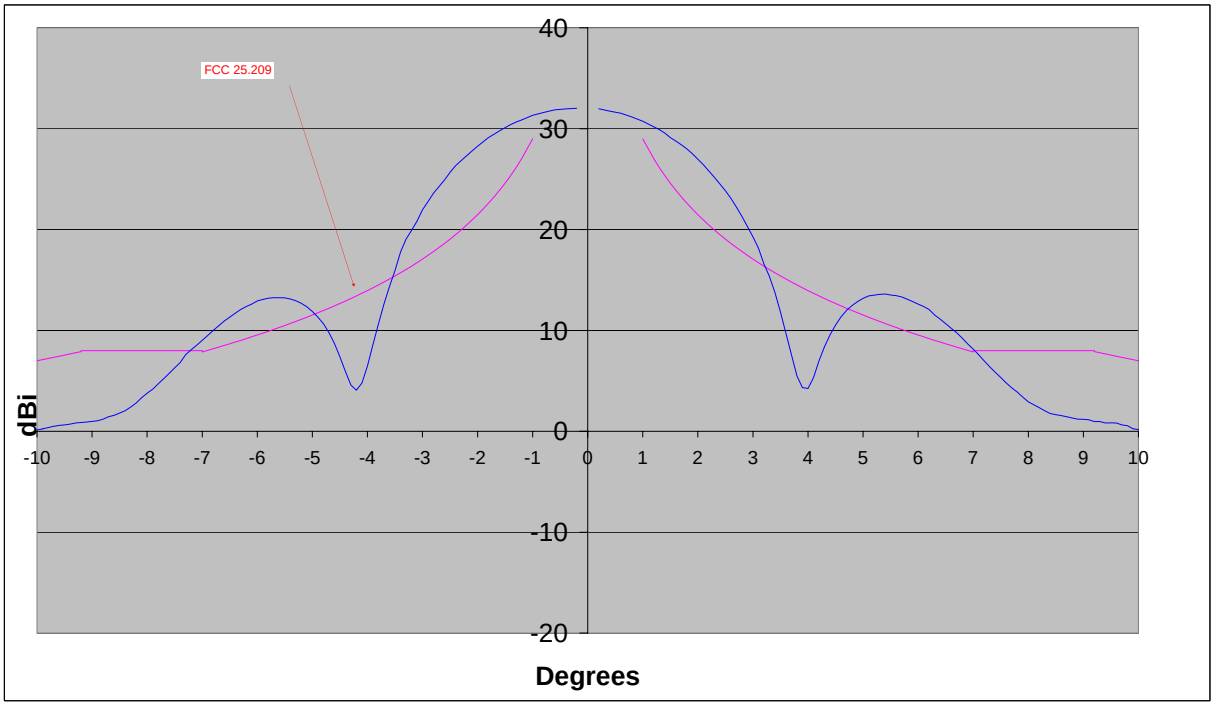
**Titan/Datron Antenna Gain Plotted Against FCC Antenna Performance Standards 25.209**

5/27/2005

| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.16 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# OPTIM2.029** |
| **Polarization** | **VERT** | **Peak Gain** | **32.0 dB** | |
| **Axis** | **AZ** | **XPOL** | **-37.3 dB** | |
| **Plane** | **H-Plane** | **Max Difference between antenna and FCC209** | | **6.9 dB** |

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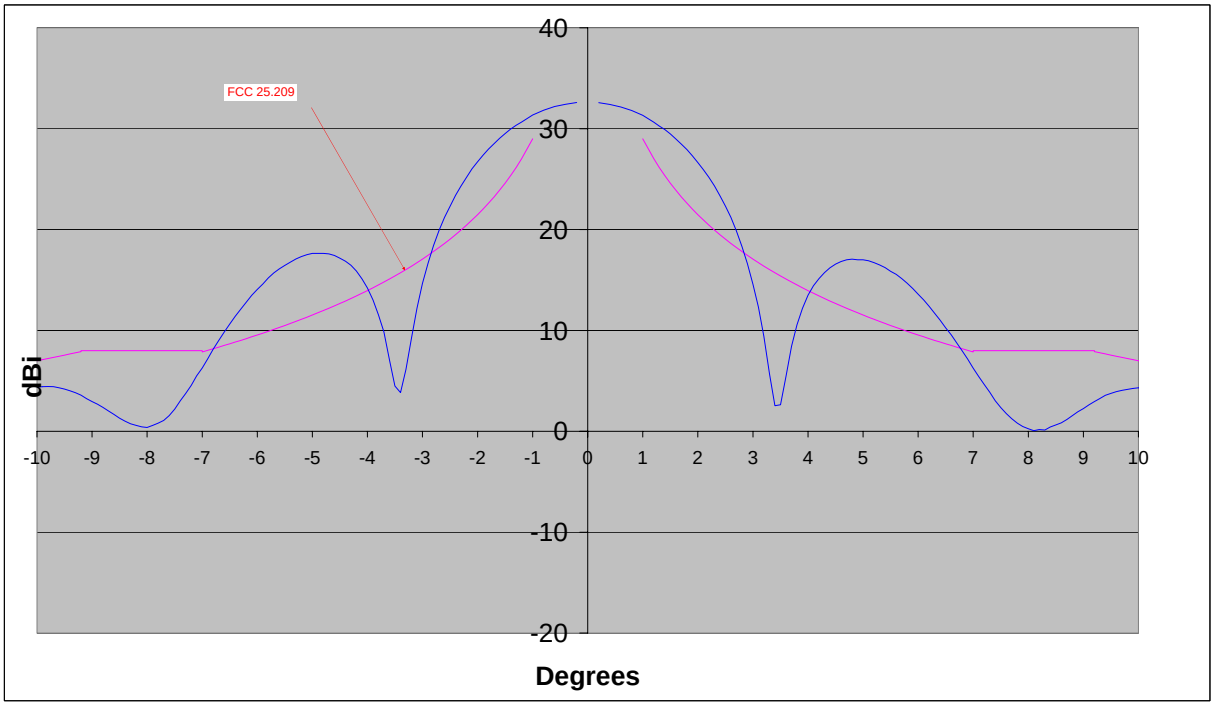
| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.5 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# 40** |
| **Polarization** | **VERT** | **Peak Gain** | **32.6 dB** | |
| **Axis** | **Elevation** | **XPOL** | **-34.5 dB** | |
| **Plane** | **E Plane** | **Max Difference between antenna and FCC209** | | **6.2 dB** |

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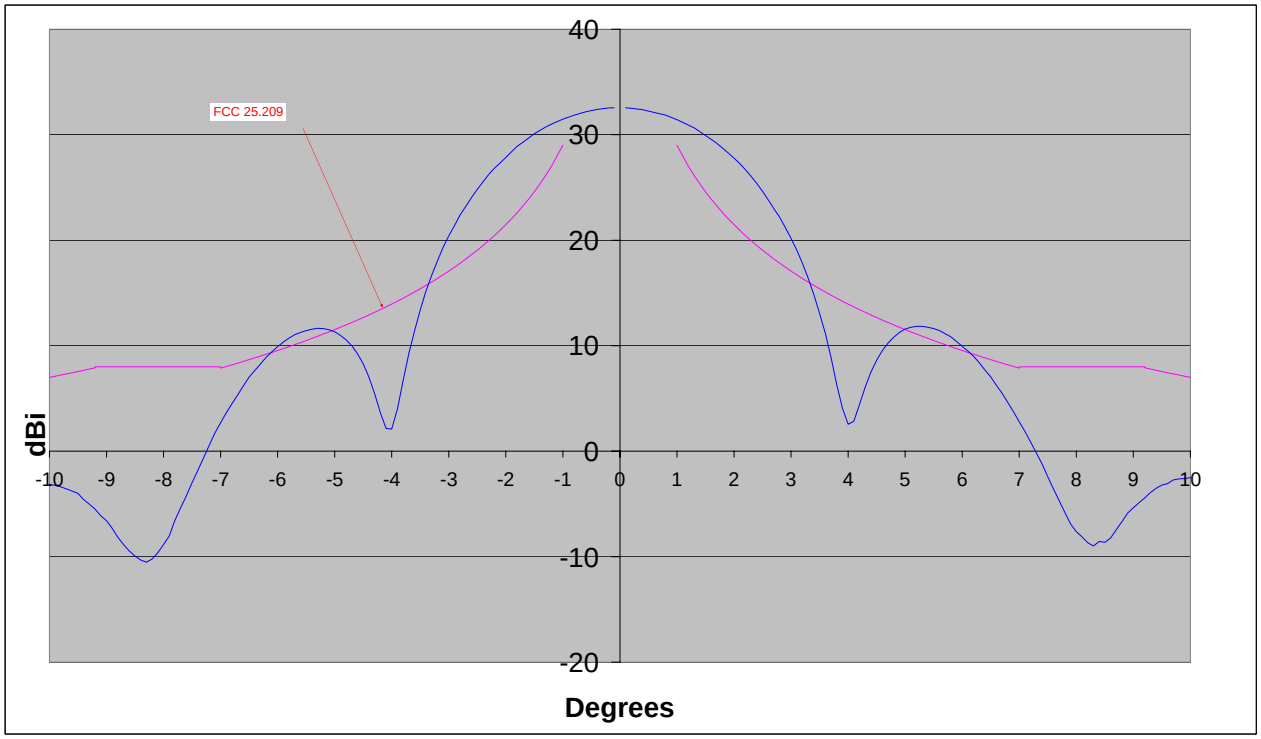
| | | | | |
|---|---|---|---|---|
| **Frequency** | **14.5 GHz** | **Antenna** | **18" (0.46 m)** | **Plot Ref# 20** |
| **Polarization** | **VERT** | **Peak Gain** | **32.6 dB** | |
| **Axis** | **Azimuth** | **XPOL** | **-36.6 dB** | |
| **Plane** | **H Plane** | **Max Difference between antenna and FCC209** | | **6.4 dB** |





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