

Intelsat License LLC

Request for Special Temporary Authority to Operate
a 2.4m Ka-band Antenna

Hagerstown, Maryland

EXHIBITS A – C

DECEMBER 18, 2015

Antenna Name: MTN-KA93 Call Sign: None

A) Site Location		Site Address	Latitude	Longitude	Elevation (m)	NAD	POC	Phone No.
1)	Hagerstown	17625 Technology Blvd, Hagerstown, MD 21740	39 35 53.35N	77 45 34.23W	175	83	Eric Lund	240-420-8990

B) Particulars of Operations

Frequency	Polarization	Emission	Tx/Rx Mode	Max EIRP		Associated Antenna	Modulation/ Services
				Max EIRP/ Carrier (dBW)	Density (dBW/4KHz)		
29500-30000	L,R	N0N	T	70	70.0	KA93	IOT
29500-30000	L,R	N0N	T	50	50.0	KA93	IOT
29500-30000	L,R	N0N	T	45	45.0	KA93	IOT
29500-30000	L,R	40M0G2D	T	70	30.0	KA93	IOT
18200-20200	L,R	N0N	R			KA93	IOT
18200-20200	L,R	40M0G2D	R			KA93	IOT

C) Frequency Coordination

Frequency Limits (MHz)	Satellite Arc		Elevation		Azimuth		Max EIRP Density to Horizon dBW/4 kHz	Associated Antenna
	East (°W)	West (°W)	East (°W)	West (°W)	East	West		
29500-30000	49.60	50.10	35.74	36.54	139.98	141.77	15.40	KA93

D) Points of Communications

Hagerstown to Intelsat-29e @ 49.7°W.L. S2913

E) Antenna Facilities

Site ID	Antenna ID	Units	Diameter (m)	Manufacturer	Model Number	Site Elevation (m)	Max Antenna Height (m)
Hagerstown	KA93	1	2.4	Vertex/RSI	2.4m	175	3.0AGL/178 AMSL

Max Gain(s):	54.6 dBi at 29.75GHz	51.7 dBi @ 19.95 GHz	
Maximum Total Input Power per pol at antenna flange	200		W
Maximum Aggregate output EIRP for all carriers	70.0		dBW

GENERAL DYNAMICS
C4 Systems

**Range Test Report
2.4m HWT
Antenna System**

Feed Model #: KA24MOFRLN
Feed Serial #: BB191-102
RF Specification: 975-3745A
Side lobe Specification: ITU-RS-580
Test Plan: 900-0199
Test Engineer: Zukowski, Werner

Test Report # 7037
Job #: 30654
15 August 2007

For
Intelsat

Prepared By: Zukowski, Werner



2600 N. Longview St., Kilgore, TX USA 75662-6842
Phone (903) 984-0555 • FAX (903) 984-1826

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29.575 GHz

Beamwidth	38
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30.000 GHz

Beamwidth	46
Gain	47
Co-Pol Patterns	48
Cross-Pol Patterns	52

VERT

18.800 GHz

Beamwidth	54
Gain	55
Co-Pol Patterns	56
Cross-Pol Patterns	60

20.275 GHz

Beamwidth	62
Gain	63
Co-Pol Patterns	64
Cross-Pol Patterns	68

21.750 GHz

Beamwidth	70
Gain	71
Co-Pol Patterns	72
Cross-Pol Patterns	76

29.150 GHz

Beamwidth	78
Gain	79
Co-Pol Patterns	80
Cross-Pol Patterns	84

29.575 GHz

Beamwidth	86
Gain	87
Co-Pol Patterns	88
Cross-Pol Patterns	92

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INTRODUCTION

The test data presented in this report represents an evaluation of a 2.4 meter Ka, HWT reflector system. The tests were conducted on the VertexRSI Test Range in accordance with a 900-0199 test plan.

This report shows the antenna's performance for Co-pol side lobe suppression, on axis cross polarization isolation, and antenna gain using the pattern integration method.

Job No.: 30654		FT No: 7037		Test Engineer: Zukowski, Werner	
Zukowski, Werner	08/15/07	Davisson, Richard	08/15/07	Pollard, Alan B.	08/15/07
<i>W. Zukowski</i>	15AUG07	<i>Richard Davisson</i>	8-16-07	<i>Alan B. Pollard</i>	9/10/07
Originator	Date	Approval	Date	Approval	Date

VertexRSI Antenna Products Division
2600 N. Longview St., Kilgore, TX 75662-6842

Kilgore, Texas Facility
Range Test Report

DATA REDUCTION FORMULAS

1. System Noise Temperature:

$$T_s = [T_h + (T_{LNA} + T_i)] / Y' \quad (^\circ\text{K})$$

where: T_s = system noise temperature in degrees K

T_h = hot load temperature in degrees K

T_{LNA} = LNA noise temperature in degrees K

T_i = sum of noise temperature contributions of device(s) installed between feed flange and LNA in degrees K

$$2. Y' = 10 \exp(Y_{dB}/10)$$

3. G/T_s :

$$T_s(\text{dB}) = 10 \text{ LOG}(T_s)$$

Where: T_s = System noise temp.($^\circ\text{K}$)

$$4. G/T_s(\text{dB}/^\circ\text{K}) = G - T_s(\text{dB})$$

5. Antenna Gain:

$$G_A = 10 \text{ LOG}[(G_3 + G_{10})/2] - L_{rms} - L_f$$

$$G_3 = 37,000 / (\text{az } 3\text{dB})(\text{el } 3\text{dB})$$

$$G_{10} = 107,000 / (\text{az } 10\text{dB})(\text{el } 10\text{dB})$$

where: $\text{az } 3\text{dB}$ = (cosine corrected) Azimuth Half Power Beamwidth, degrees

$\text{el } 3\text{dB}$ = Elevation Half Power Beamwidth, degrees

$\text{az } 10\text{dB}$ = (cosine corrected) Azimuth Beamwidth @ -10dB, degrees

$\text{el } 10\text{dB}$ = Elevation Beamwidth @ -10dB, degrees

L_{rms} = Reflector Surface Accuracy Loss, dB

$$L_{rms} = 4.92E^2F^2$$

E = RMS Surface Accuracy of Reflector, inches

F = Frequency, GHz

L_f = Feed Insertion Loss, dB

6. Azimuth Angle Corrected for Elevation Angle:

$$Az' = 2 \text{ SIN}^{-1} [\text{SIN}(Az/2)\text{COS } El]$$

Where: Az = Angle from 0° on axis

DATA REDUCTION FORMULAS CONTINUED

7. Sidelobe Envelope Specification: ITU-RS-580

For Angle A from 1 degree to 20 degrees _____ $29-25 \log(A)$
For Angle A from 20 to 26.3 degrees _____ -3.5 dBi
For Angle A from 26.3 to 48 degrees _____ $-32-25 \log(A)$
For Angle A from 48 to 180 degrees _____ -10 dBi

8. G/T : by Carrier to Noise Method

G/T dB/°K =

$C/N_{\text{O dB-Hz}} - 228.6 - \text{Satellite EIRP}_{\text{dBW}} + \text{Path Loss}_{\text{dB}} + \text{Aspect Correction}_{\text{dB}}$

9. C/N₀ =

$C+N/N - 2.5\text{dB} + 10 \log_{10} (\text{NBW})$

SUMMARY OF ANTENNA PERFORMANCE:

On-axis cross-pol isolation

Frequency (MHz):	18800	20275	21750	29150	29575	30000
Measured (dBi):						

HORZ

AZ	39.57	41.36	40.58	43.23	43.34	46.73
EL	33.15	32.66	30.71	38.54	35.98	48.79

VERT

AZ	43.94	54.97	44.58	49.48	48.75	47.64
EL	33.15	33.83	30.84	44.15	44.33	51.62

Spec. (dBi): Rx/Tx 30.0 dB on axis

Antenna Gain (Pattern Integration)

Frequency (MHz):	18800	20275	21750	29150	29575	30000
Measured (dBi):						

HORZ 50.08 50.73 51.29 53.87 53.84 54.21

VERT 50.05 50.74 51.26 53.99 54.02 54.17

Spec. (dBi): 50.50 51.20 51.70 53.90 54.10 54.20

Measurement accuracy estimated at +/- 0.47 dBi



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 105048
 Job Number..... 30654

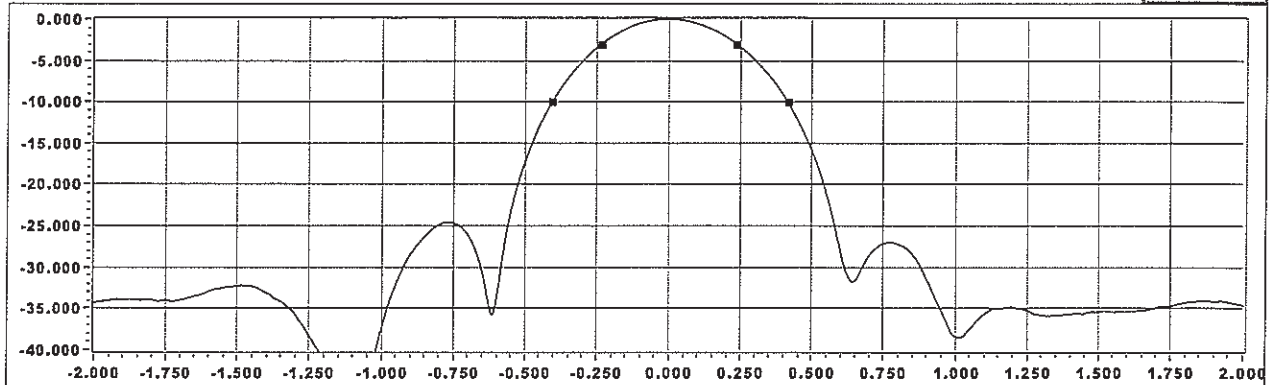
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...HORZ Polarization...Gain by Beamwidth...18.800 GHz

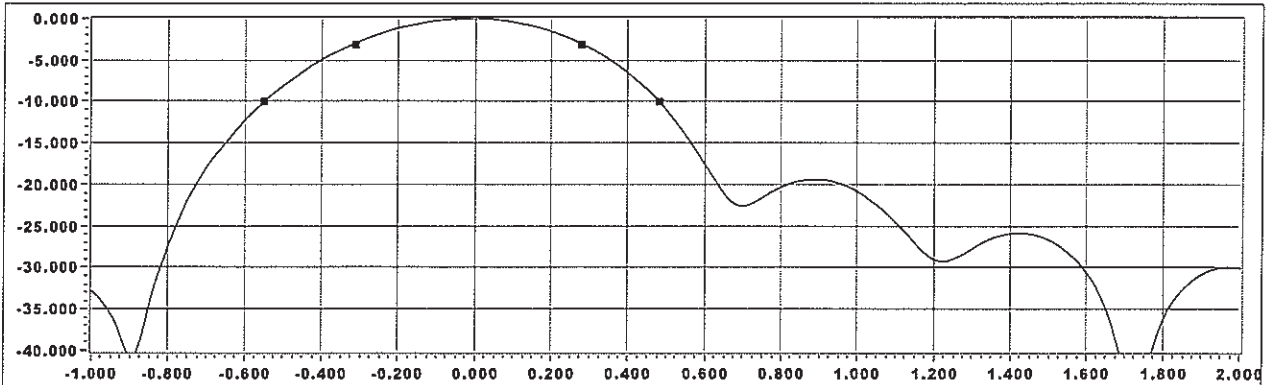
Spec. Gain (dBi):

Calculated Gain (dB):

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{((3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW})))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File
 EL Co-pol File

The calculated gain is less than the specified gain by 0.76 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	<input type="text" value="18.800000003"/>
AZ Ref. Level (dBm)	<input type="text" value="-40.20"/>
Feed Loss (dB)	<input type="text" value="1.00"/>
RMS (in.)	<input type="text" value="0.015"/>
Azimuth (deg)	<input type="text" value="179.920"/>
Elevation (deg)	<input type="text" value="6.030"/>

AZ 3dB BW (deg)	<input type="text" value="0.4694"/>
AZ 10dB BW (deg)	<input type="text" value="0.8190"/>
AZ 15dB BW (deg)	<input type="text" value="0.9636"/>
EL 3dB BW (deg)	<input type="text" value="0.5916"/>
EL 10dB BW (deg)	<input type="text" value="1.0321"/>
EL 15dB BW (deg)	<input type="text" value="1.2160"/>

Points Displayed

3dB Factor	<input type="text" value="37000"/>
10dB Factor	<input type="text" value="107000"/>

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 105525
 Job Number..... 30654

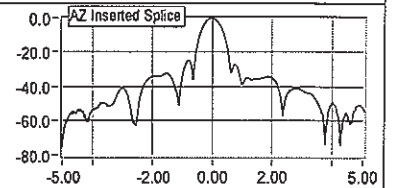
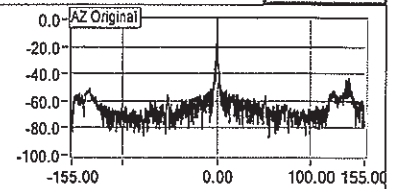
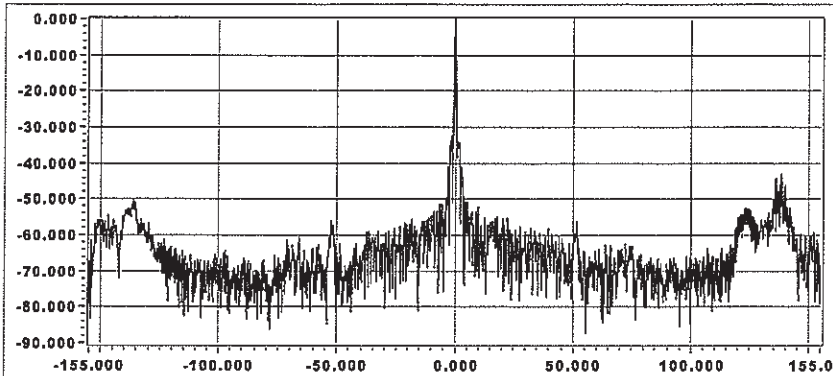
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...18.800 GHz

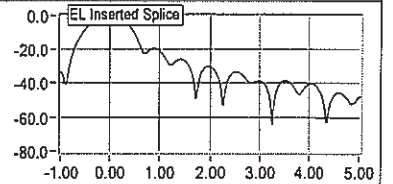
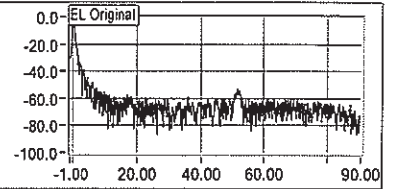
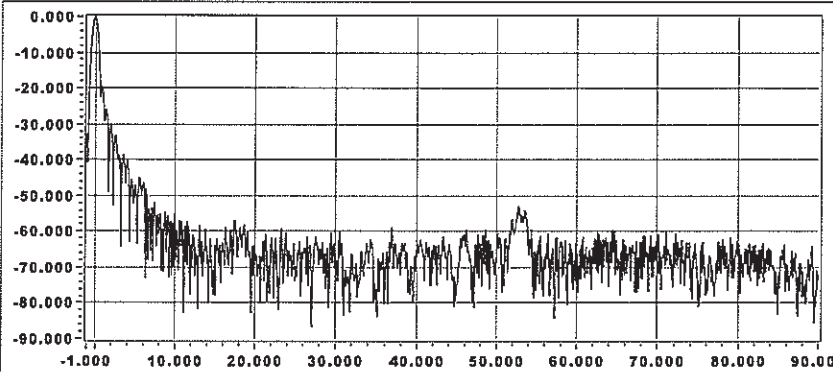
Spec. Gain (dBi): **50.500**

Calculated Gain (dB): **50.08**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=18800000187, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File: % 070814 105525 30654 TC-155-HA-18.800.txt
 EL Co-pol File: % 070814 104033 30654 TC-90-HE-18.800.txt
 AZ Insert File: % 070813 105151 30654 RC-5-HE-18.800.txt
 EL Insert File: % 070813 105048 30654 RC-5-HA-18.800.txt

The calculated gain is less than the specified gain by 0.42 dB.

Test Frequency (GHz): 18.800000187
 AZ Ref. Level (dBm): -40.20
 Azimuth (deg): 180.000
 Elevation (deg): 12.000

Versions
 61030 FAST
 60129 PACK

Points Displayed: 15861
 Feed Loss (dB): 0.85
 Angular Extent Loss(dB): 0.15
 Spar Blockage Loss (dB): 0.05
 Cross-pol Loss (dB): 0.05



Customer..... Intelsat
 Date/Local Time.... 8-14-2007 at 105525
 Job Number..... 30654

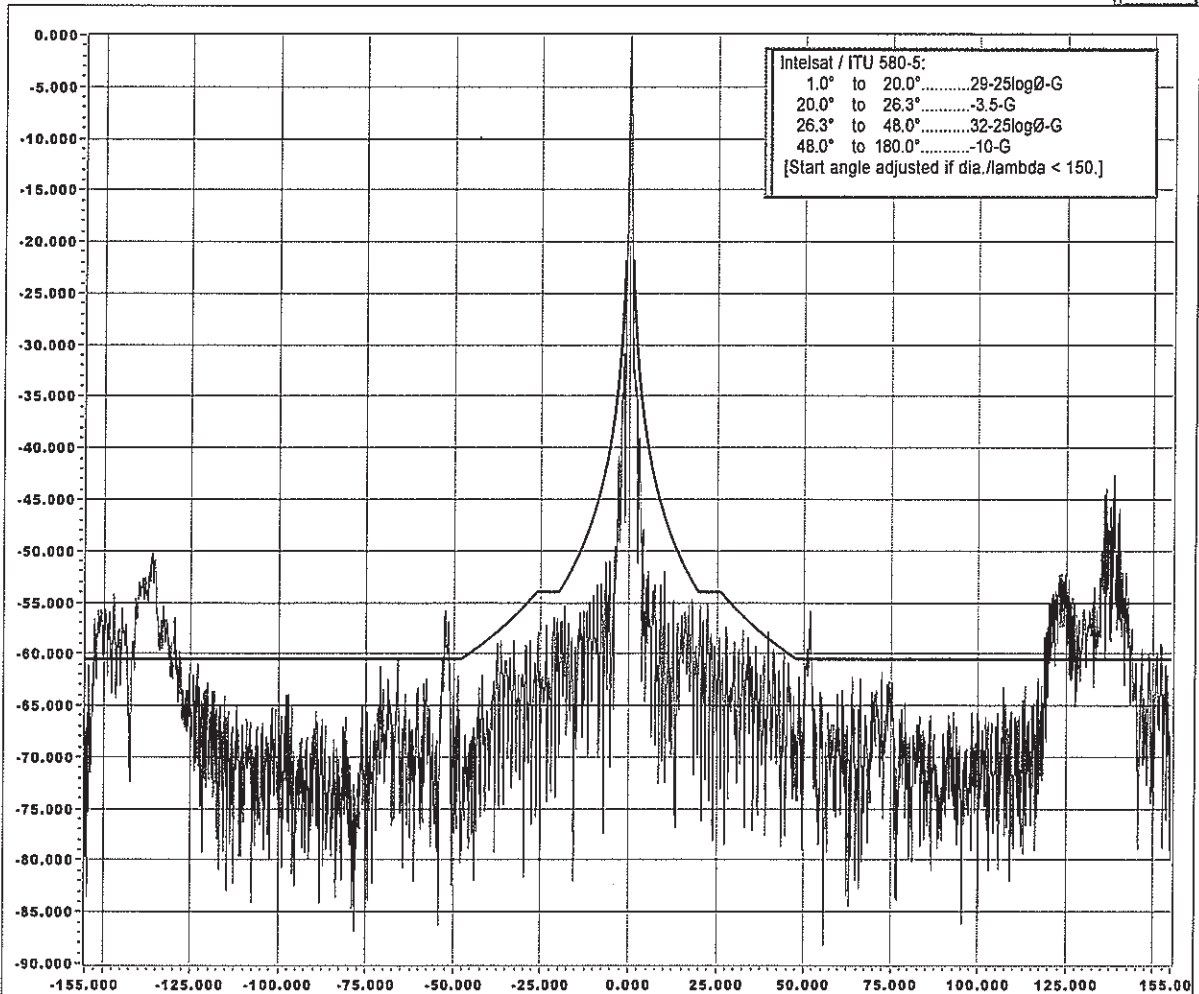
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...18.800 GHz

Azimuth

% Over Curve (not including main lobe)

15.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000187, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 105525 30654 TC-155-HA-18.800.txt

Test Frequency (GHz): 18.800000187

Ref. Level (dBm): -40.12

Points Displayed: 7954

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 50.500

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



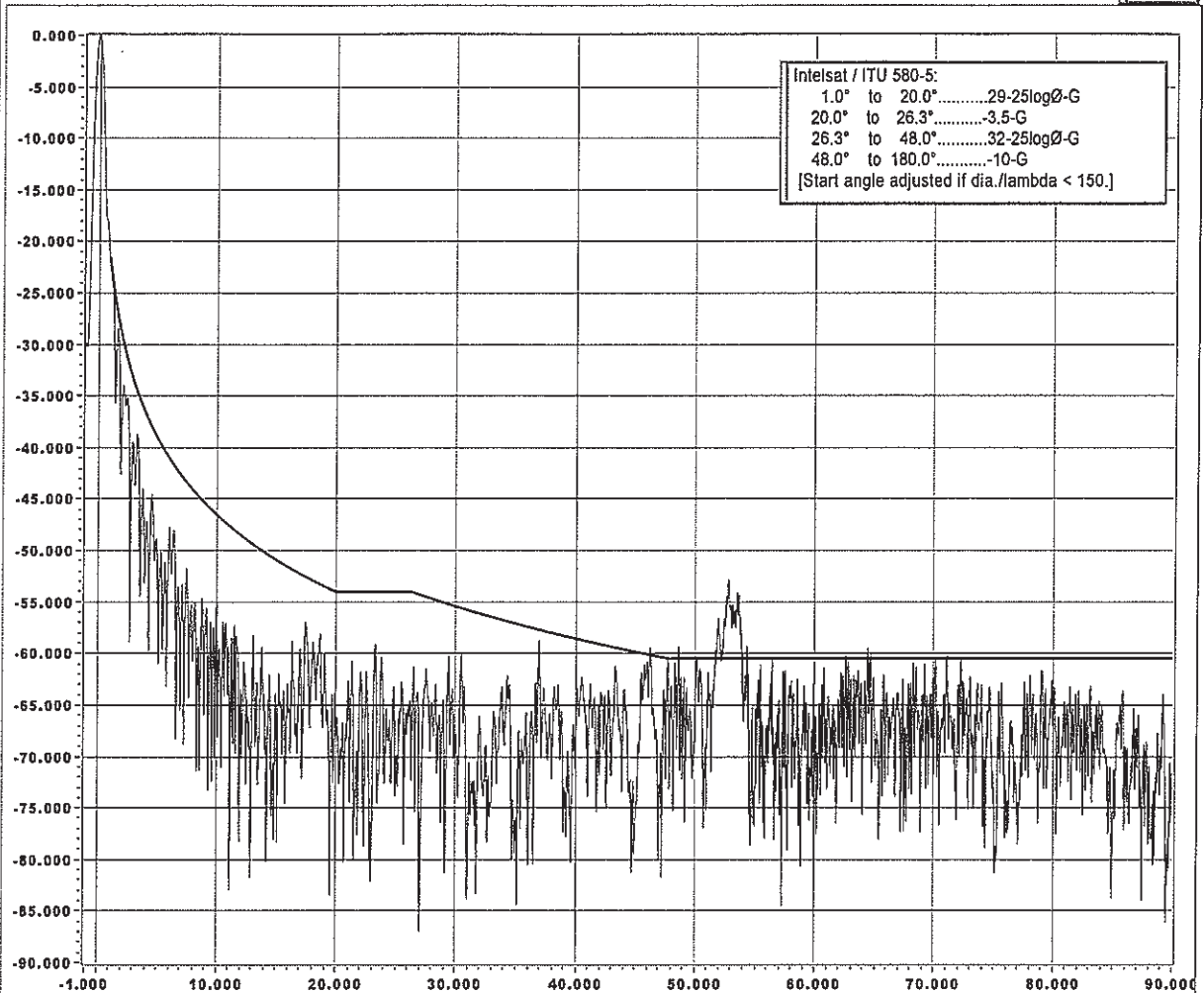
Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 104033
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...18.800 GHz

Elevation

% Over Curve (not including main lobe) 3.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000187, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 104033 30654 TC-90-HE-18.800.txt

Specified Gain: 50.500

Test Frequency (GHz): 18.800000187

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -40.43

Elevation Beam Center (deg): 12.000

Points Displayed: 7258

Versions
61030 FAST
60129 PACK

Margin Under Curve (dB): None



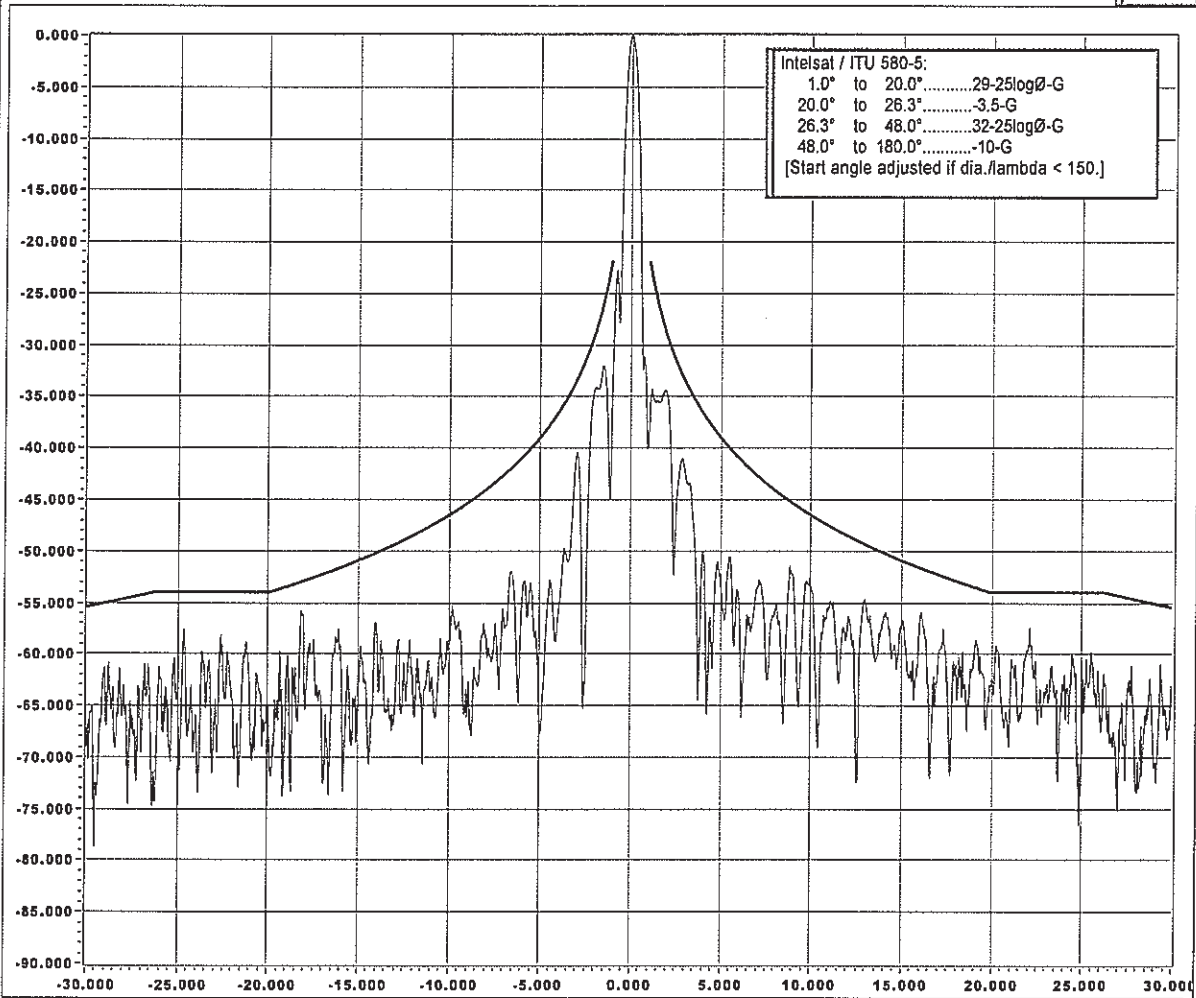
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 145100
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...18.800 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18799999999, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 145100 30654 RC-166-HA-18.800.txt

Test Frequency (GHz): 18.799999999

Ref. Level (dBm): -41.77

Points Displayed: 1339

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 50.500

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 2.72



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 145829
 Job Number..... 30654

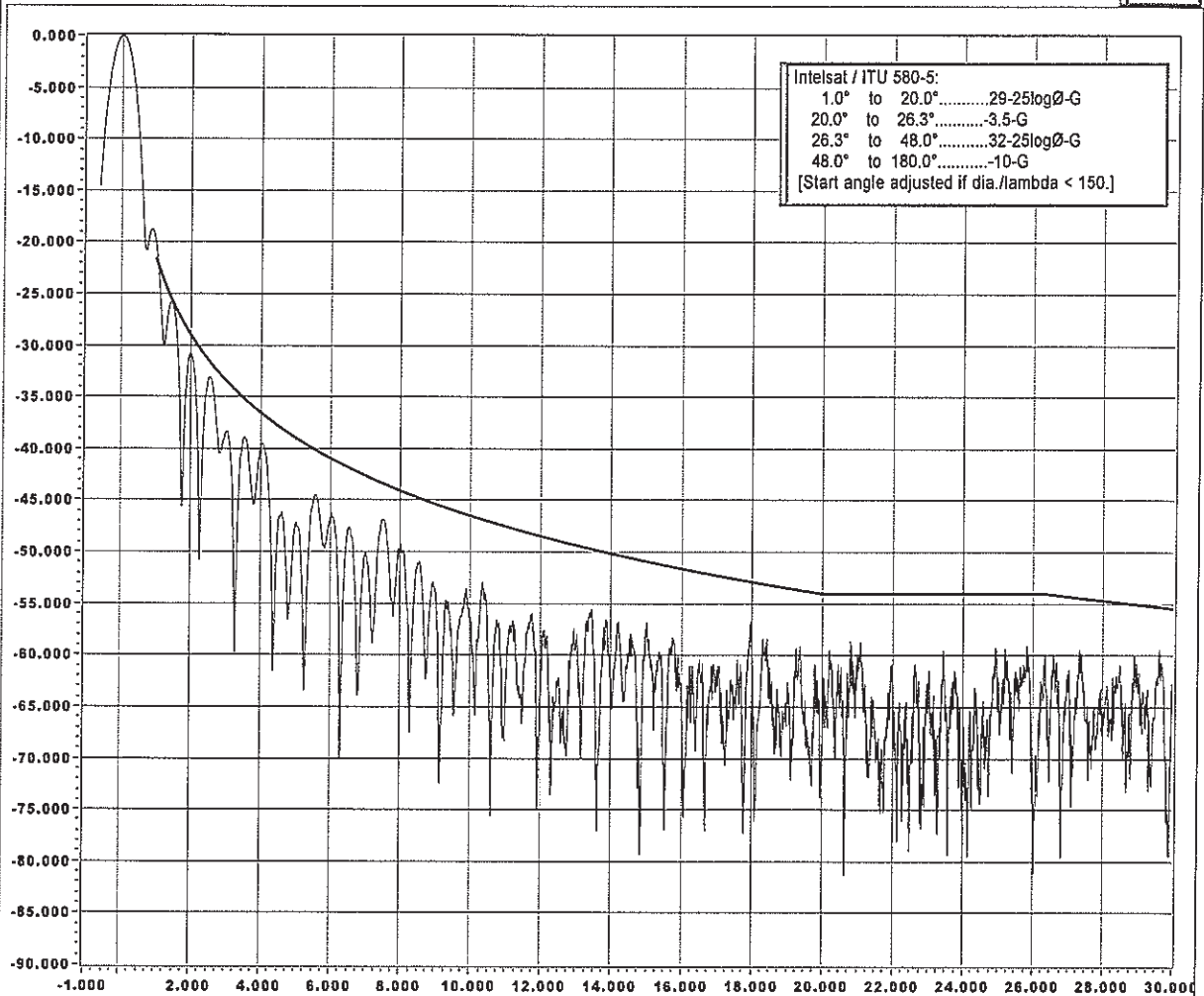
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...18.800 GHz

Elevation

% Over Curve (not including main lobe)

0.2



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18799999999, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 145829 30654 RC-90-HE-18.800.txt

Specified Gain: 50.500

Test Frequency (GHz): 18.799999999

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -42.31

Elevation Beam Center (deg): 6.030

Points Displayed: 3391

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



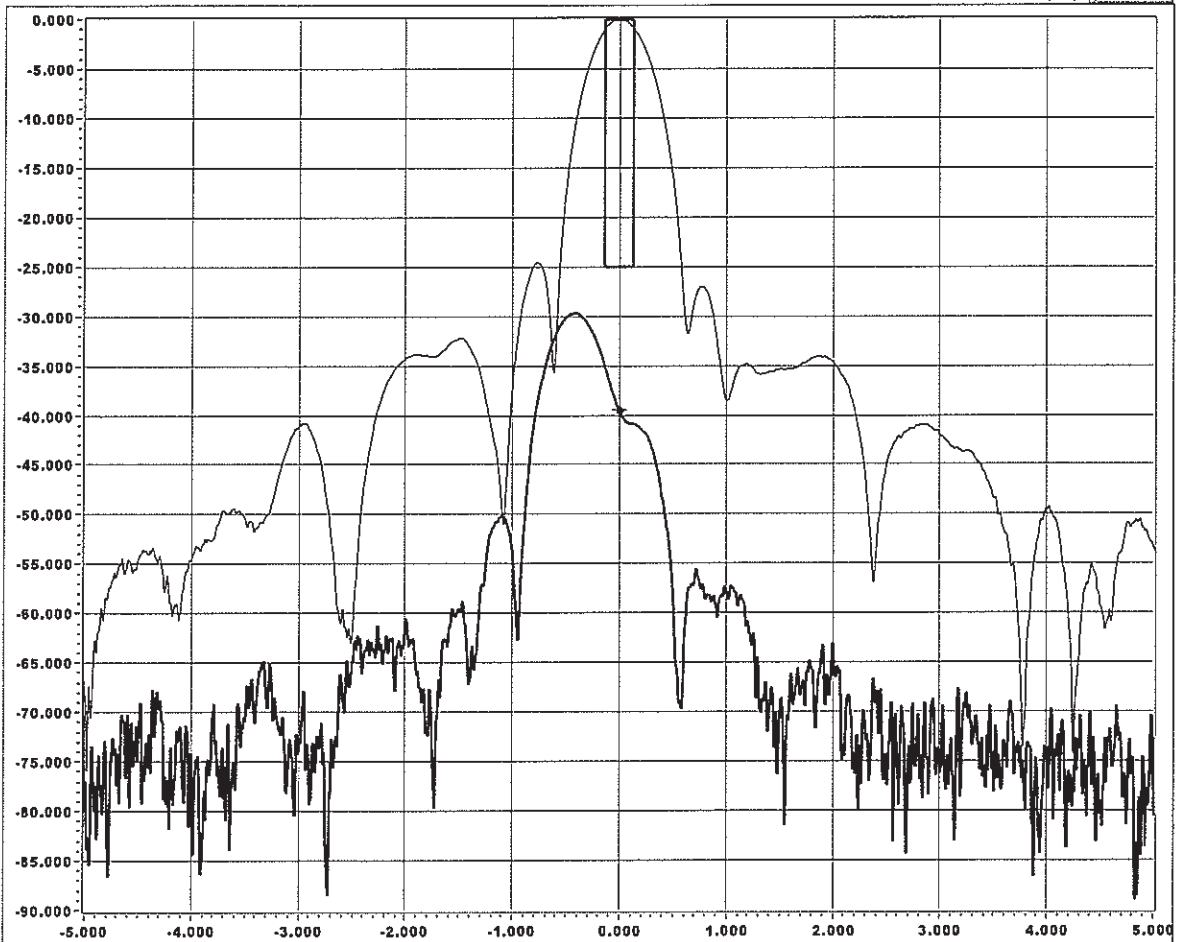
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 110954
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization... 18.800 GHz

Azimuth

On-axis Isolation (dB): 39.57



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 105048 30654 RC-5-HA-18.800.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 110954 30654 RX-5-HA-18.800.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	18.800000003	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-40.20	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192		

Versions
 61030 FAST
 60129 PACK



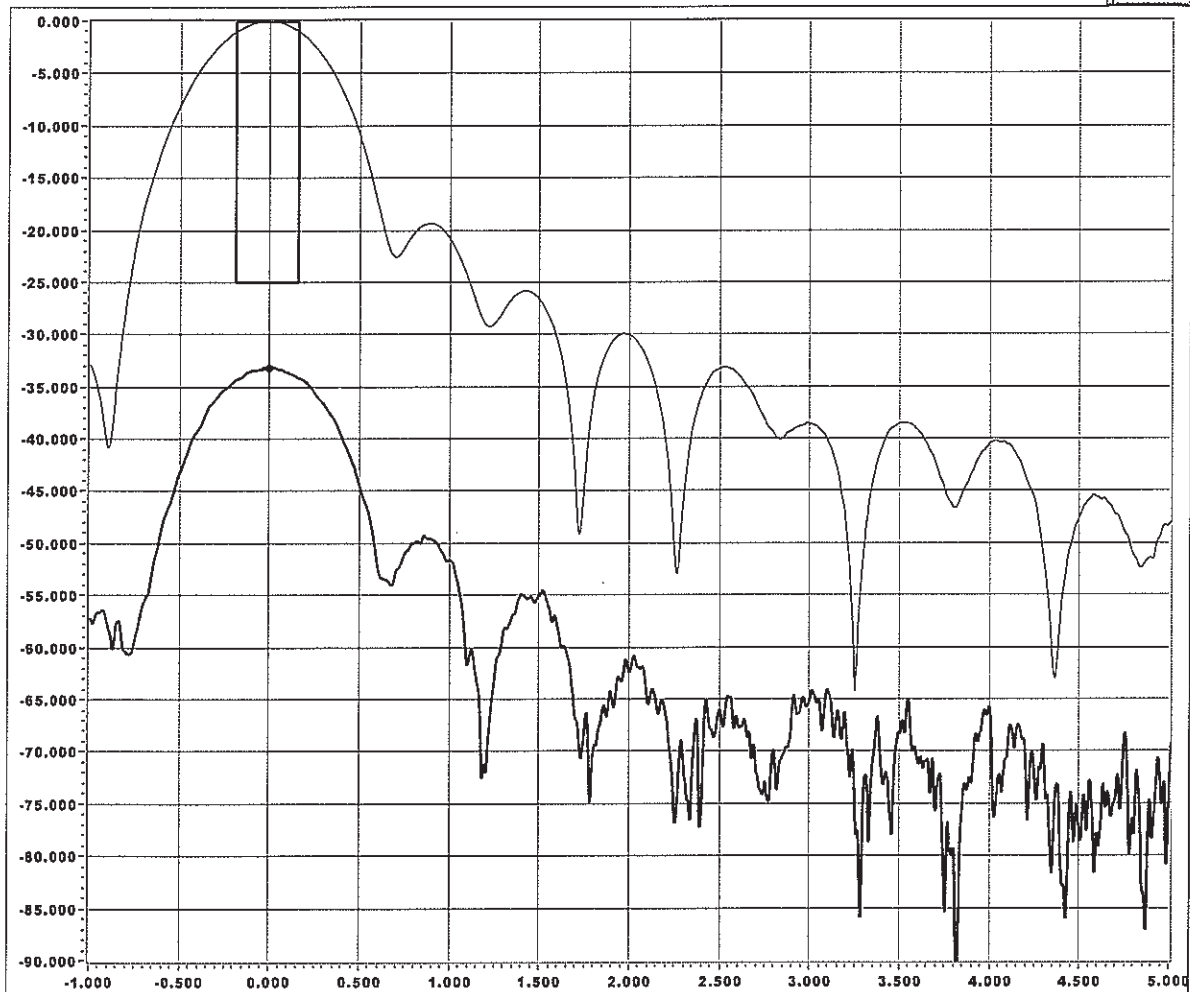
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 105151
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...18.800 GHz

Elevation

On Axis Isolation (dB): 33.15



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 105151 30654 RC-5-HE-18.800.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 111200 30654 RX-5-HE-18.800.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	18.800000003	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-40.20	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7532		

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 095759
 Job Number..... 30654

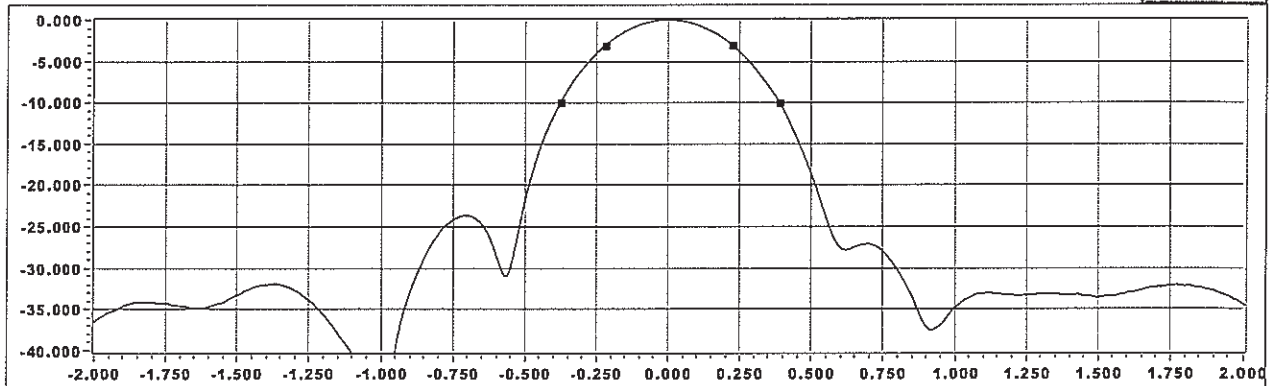
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...HORZ Polarization...Gain by Beamwidth...20.275 GHz

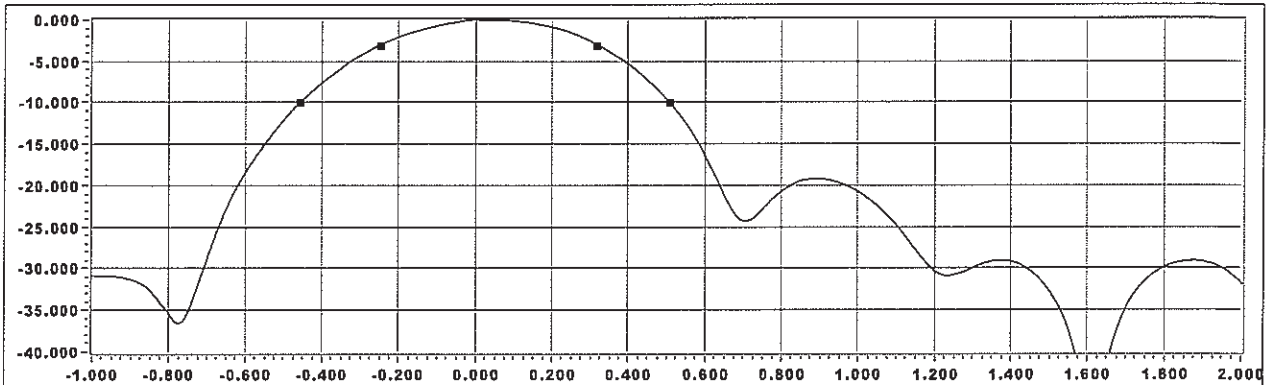
Spec. Gain (dBi): 51.200

Calculated Gain (dB): 50.20

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\left(\frac{3\text{dB factor}}{\text{AZ 3dB BW} * \text{EL 3dB BW}} \right) + \left(\frac{10\text{dB factor}}{\text{AZ 10dB BW} * \text{EL 10dB BW}} \right) \right] / 2] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=2027500001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 095759 30654 RC-5-HA-20.275.txt
 EL Co-pol File % 070813 095902 30654 RC-5-HE-20.275.txt

The calculated gain is less than the specified gain by 1.00 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	20.275000001
AZ Ref. Level (dBm)	-44.80
Feed Loss (dB)	1.00
RMS (in.)	0.015
Azimuth (deg)	179.920
Elevation (deg)	6.030

AZ 3dB BW (deg)	0.4409
AZ 10dB BW (deg)	0.7651
AZ 15dB BW (deg)	0.9003
EL 3dB BW (deg)	0.5665
EL 10dB BW (deg)	0.9671
EL 15dB BW (deg)	1.1351

Points Displayed 7983

3dB Factor	37000	Versions	61030 FAST
10dB Factor	107000		60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 111038
 Job Number..... 30654

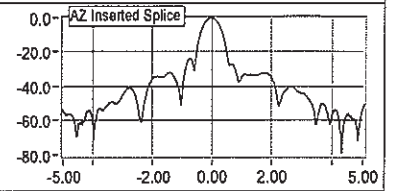
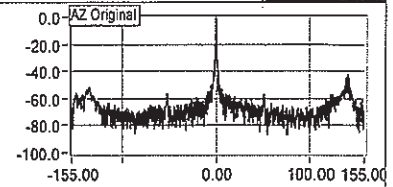
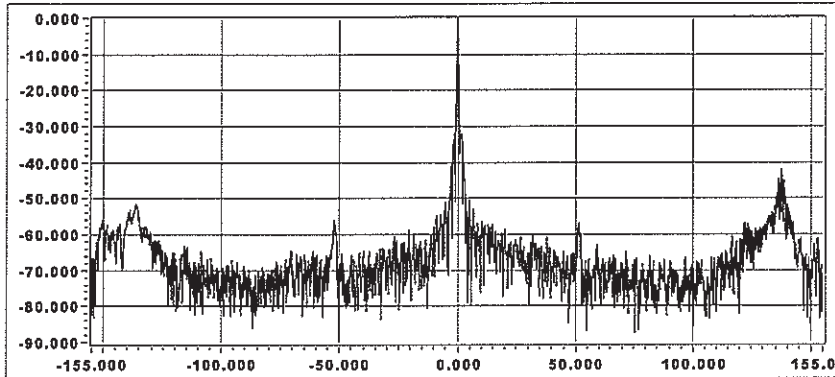
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...20.275 GHz

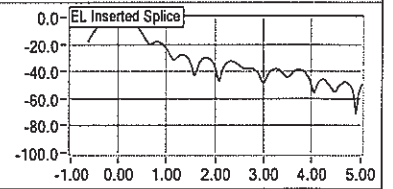
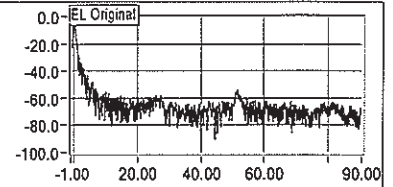
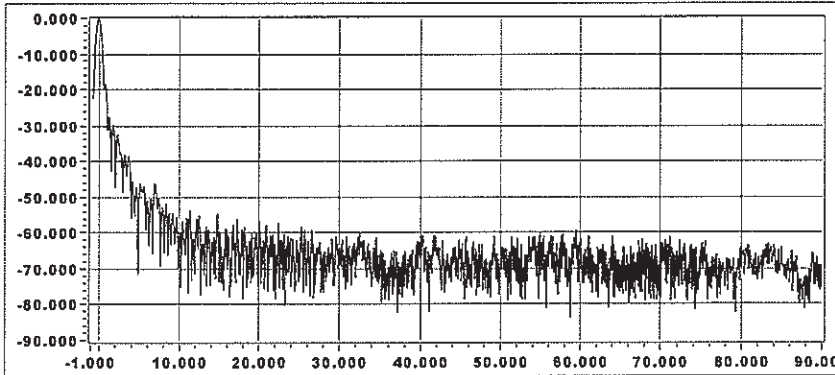
Spec. Gain (dBi): **51.200**

Calculated Gain (dB): **50.73**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{dellaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=20275000202, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070814 111038 30654 TC-155-HA-20.275.txt
 EL Co-pol File % 070814 111724 30654 TC-90-HE-20.275.txt
 AZ Insert File % 070812 152336 30654 RC-90-VE-20.275.txt
 EL Insert File % 070813 095759 30654 RC-5-HA-20.275.txt

The calculated gain is less than the specified gain by 0.47 dB.

Test Frequency (GHz) **20.275000202**
 AZ Ref. Level (dBm) **-44.80**
 Azimuth (deg) **180.000**
 Elevation (deg) **12.000**

Versions
 61030 FAST
 60129 PACK

Points Displayed **15830**
 Feed Loss (dB) **0.85**
 Angular Extent Loss(dB) **0.15**
 Spar Blockage Loss (dB) **0.05**
 Cross-pol Loss (dB) **0.05**



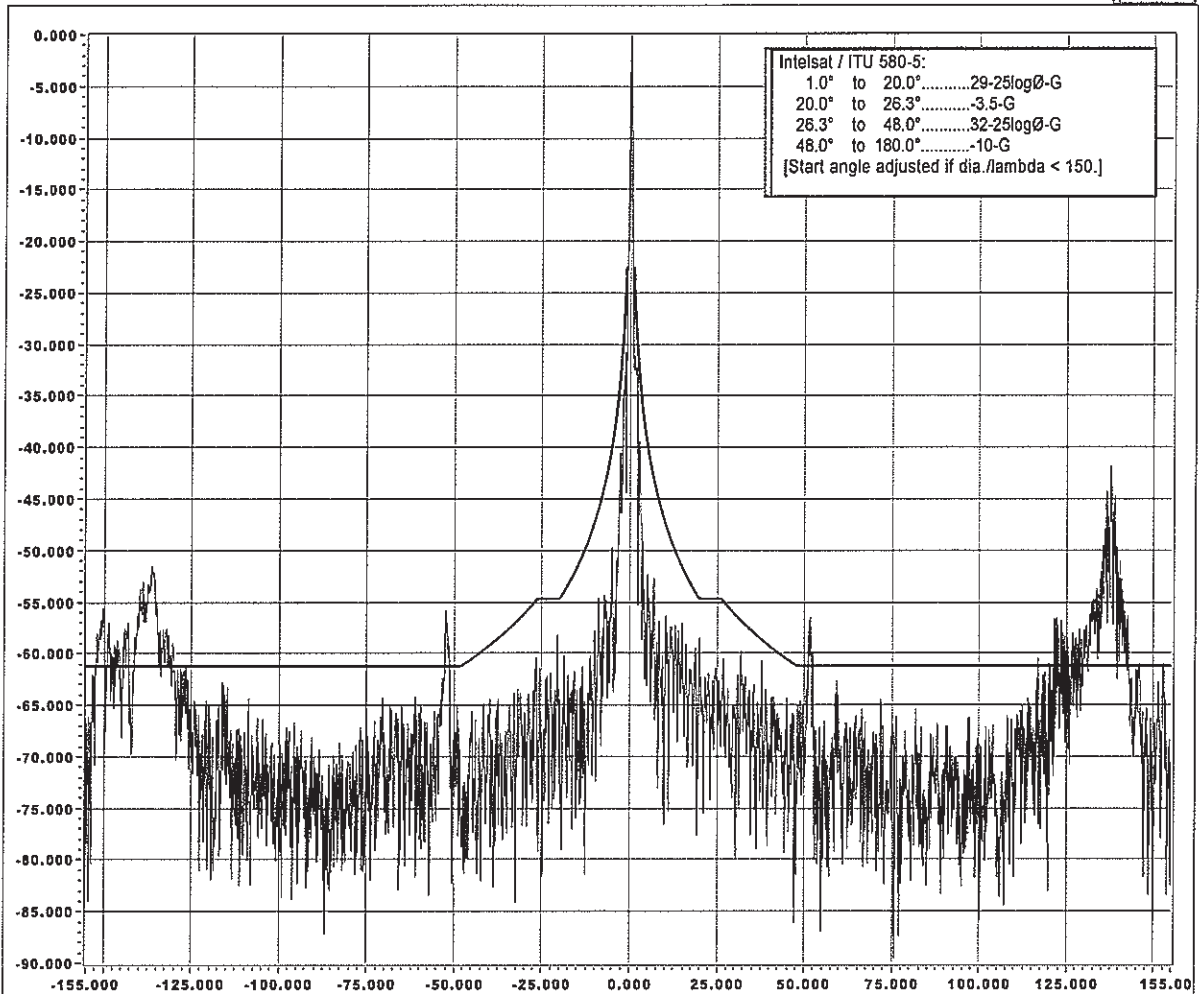
Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 111038
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...20.275 GHz

Azimuth

% Over Curve (not including main lobe) 11.7



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000202, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 111038 30654 TC-155-HA-20.275.txt

Test Frequency (GHz): 20.275000202

Ref. Level (dBm): -42.23

Points Displayed: 7920

Versions
61030 FAST
60129 PACK

Specified Gain (dB): 51.200

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 111724
 Job Number..... 30654

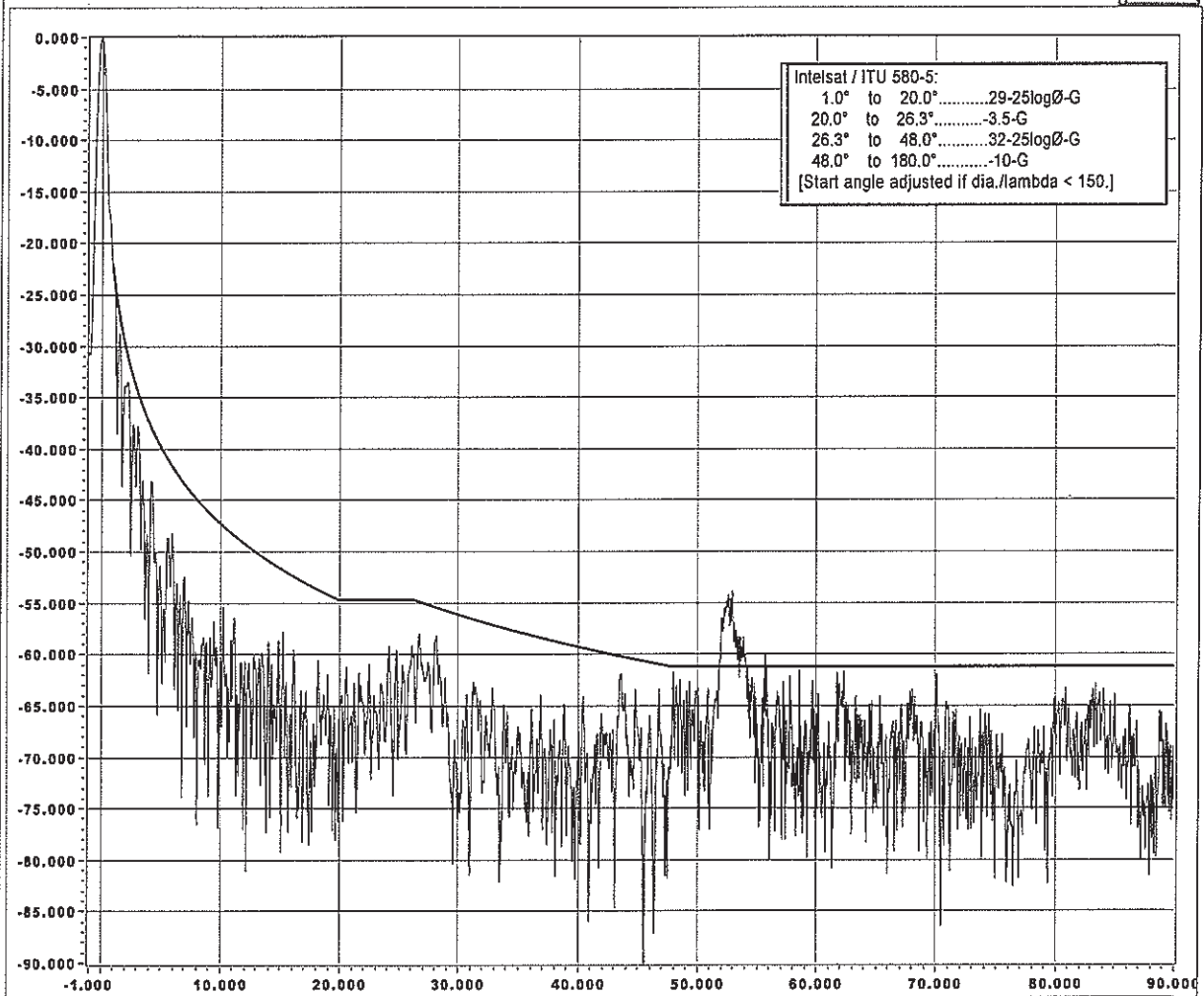
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...20.275 GHz

Elevation

% Over Curve (not including main lobe)

2.6



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000202, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 111724 30654 TC-90-HE-20.275.txt

Specified Gain: 51.200

Test Frequency (GHz): 20.275000202

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -42.37

Elevation Beam Center (deg): 12.000

Points Displayed: 7260

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



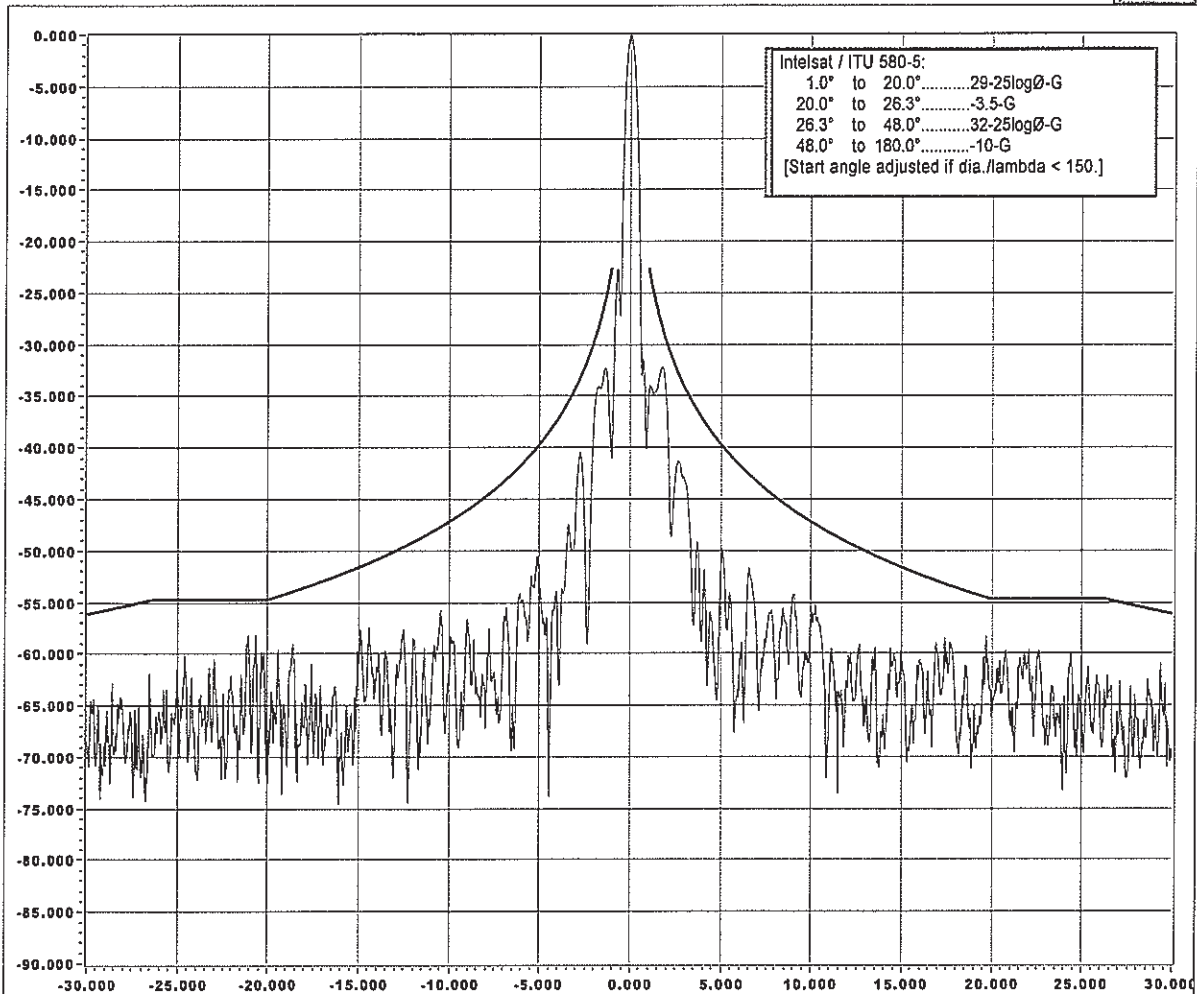
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 151611
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...20.275 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 151611 30654 RC-166-HA-20.275.txt

Test Frequency (GHz): 20.275000000

Ref. Level (dBm): -46.35

Points Displayed: 1338

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.200

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 3.40



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 152336
 Job Number..... 30654

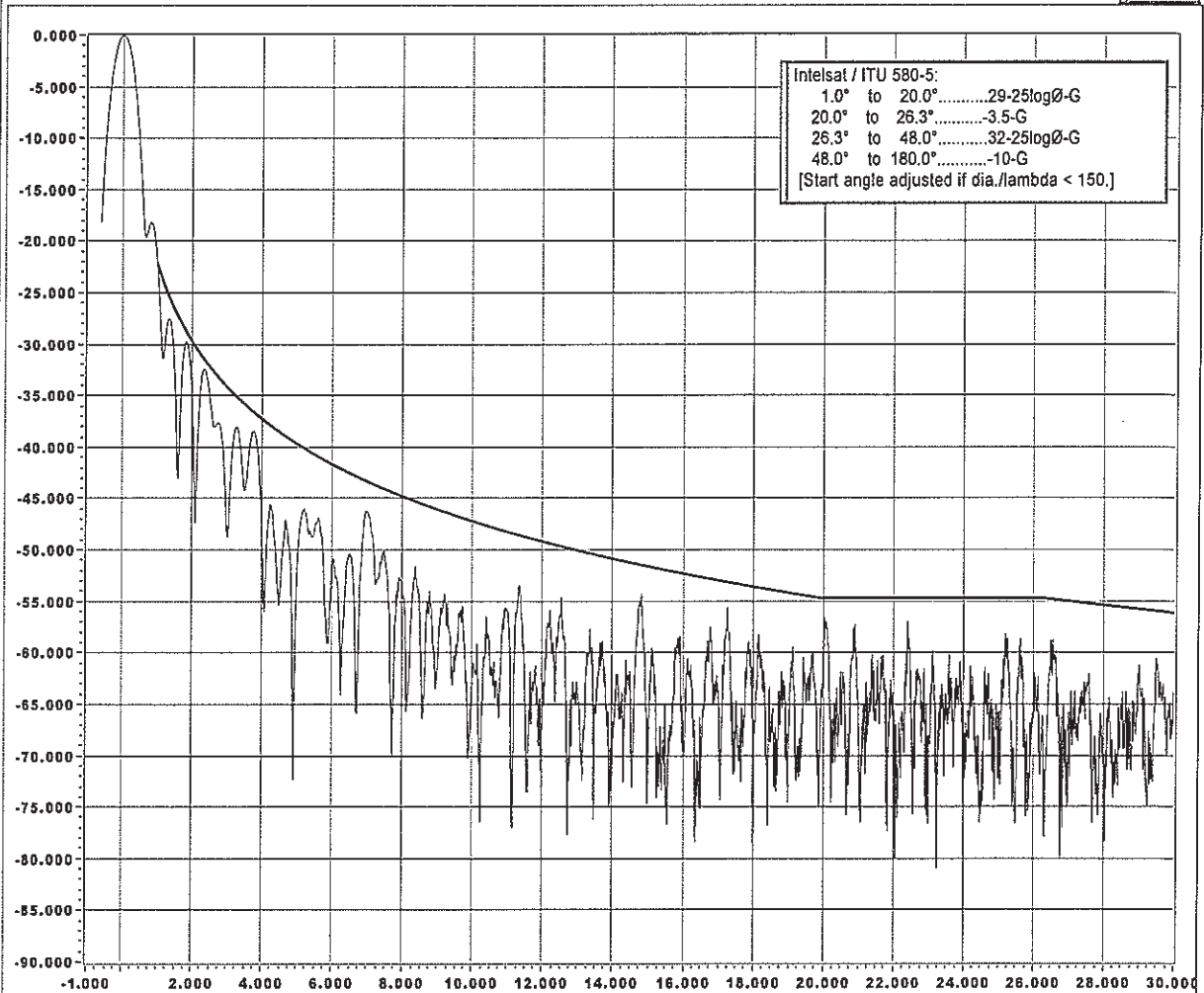
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...20.275 GHz

Elevation

% Over Curve (not including main lobe)

0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 152336 30654 RC-90-VE-20.275.txt

Specified Gain: 51.200

Test Frequency (GHz): 20.275000000

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -47.15

Elevation Beam Center (deg): 6.030

Points Displayed: 3390

Margin Under Curve (dB): None

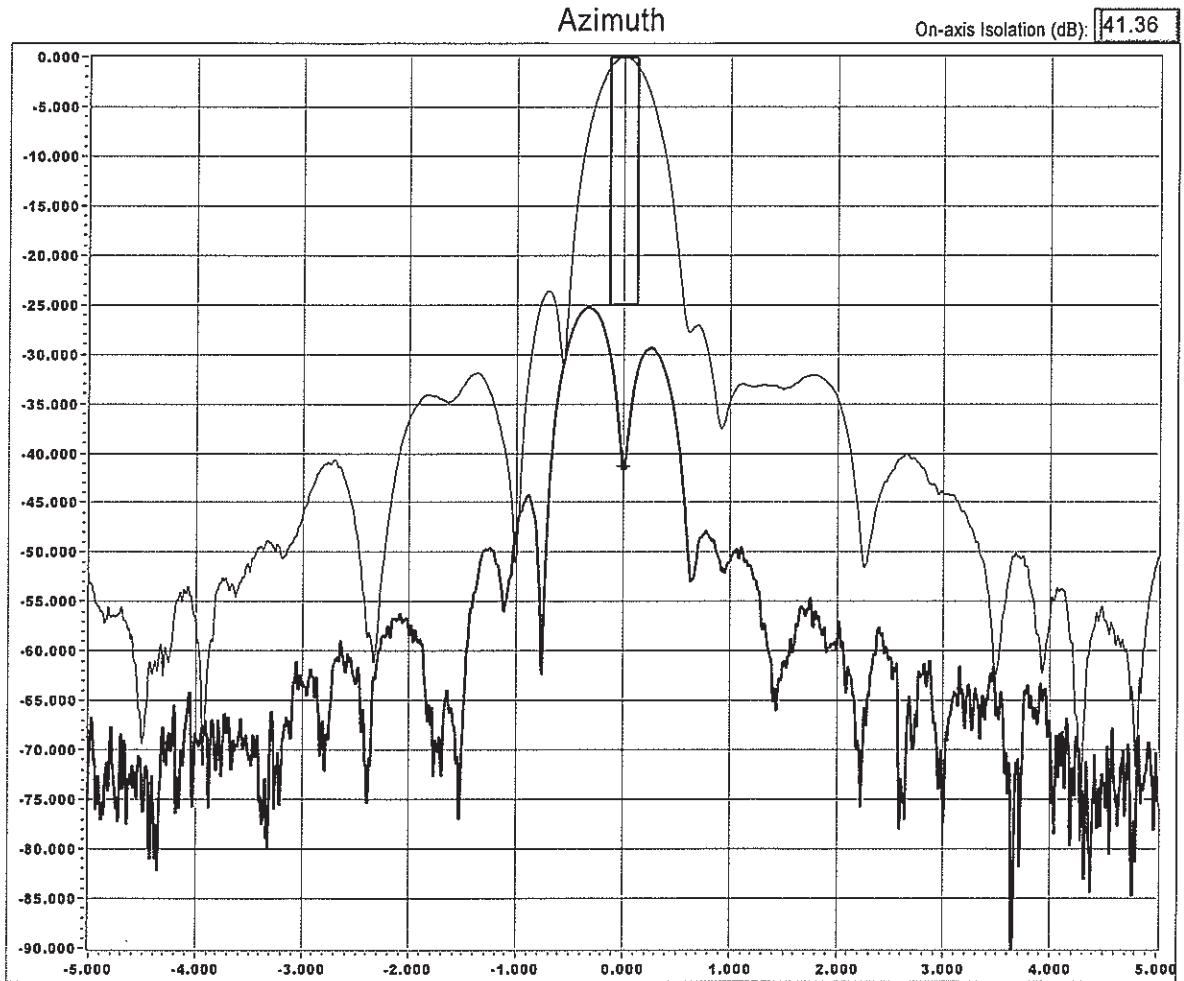
Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 100648
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...20.275 GHz



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 095759 30654 RC-5-HA-20.275.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 100648 30654 RX-5-HA-20.275.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	20.275000001	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-44.80	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7933	Versions 61030 FAST 60129 PACK	



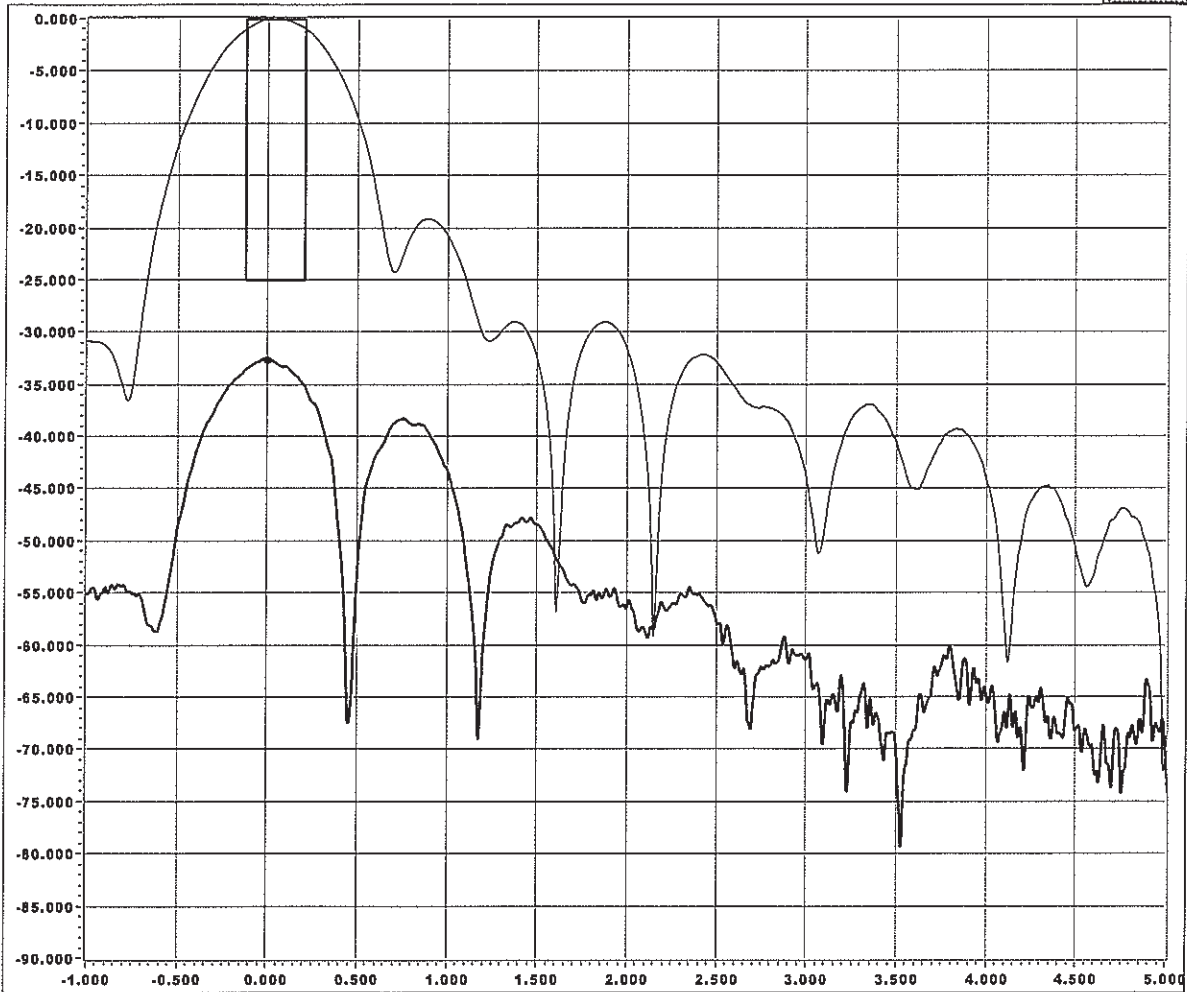
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 095902
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...20.275 GHz

Elevation

On Axis Isolation (dB): 32.66



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10	
Co-pol File: % 070813 095902 30654 RC-5-HE-20.275.txt	Azimuth Beam Center (deg): 179.920
Cross-pol File: % 070813 100855 30654 RX-5-HE-20.275.txt	Elevation Beam Center (deg): 6.030
Test Frequency (GHz): 20.275000001	On-axis Spec. Isolation (dB): 30.000
Ref. Level (dBm): -44.80	Off-axis Spec. Isolation (dB): 25.00
# Points Displayed: 7181	Versions 61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 095250
 Job Number..... 30654

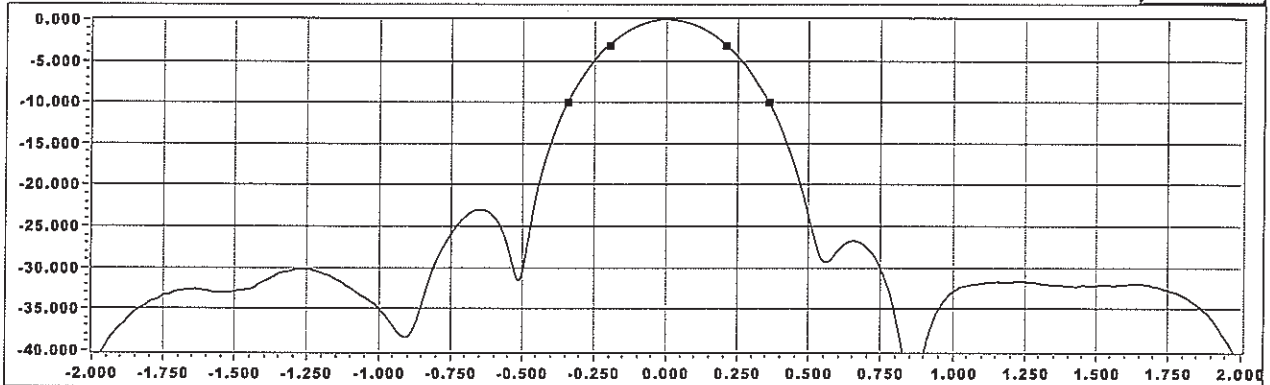
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...HORZ Polarization...Gain by Beamwidth...21.750 GHz

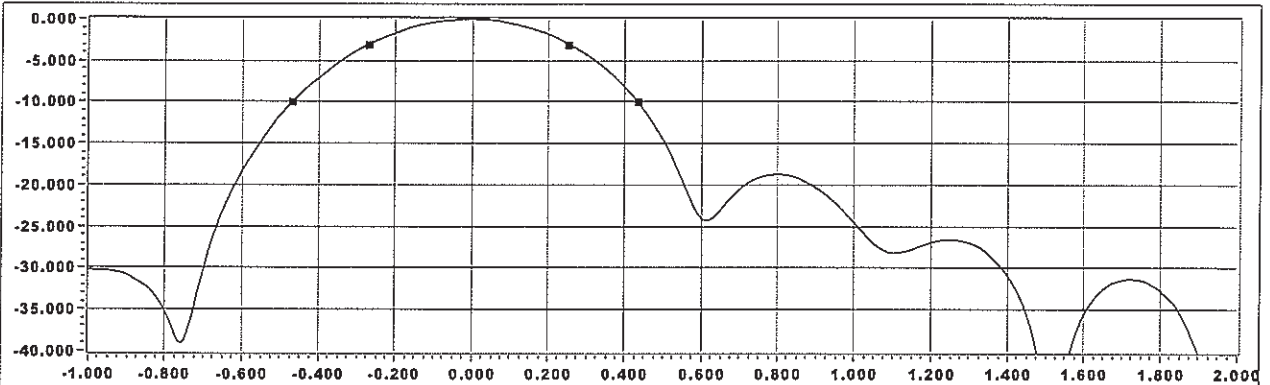
Spec. Gain (dBi): **51.700**

Calculated Gain (dB): **50.82**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{((3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW})))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=21750000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 095250 30654 RC-5-HA-21.750.txt
 EL Co-pol File % 070813 095352 30654 RC-5-HE-21.750.txt

The calculated gain is less than the specified gain by 0.88 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	21.75000001	AZ 3dB BW (deg)	0.4053	# Points Displayed	7960
AZ Ref. Level (dBm)	-42.53	AZ 10dB BW (deg)	0.7022		
Feed Loss (dB)	1.00	AZ 15dB BW (deg)	0.8250		
RMS (in.)	0.015	EL 3dB BW (deg)	0.5220		
Azimuth (deg)	179.920	EL 10dB BW (deg)	0.9040	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	1.0594	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 121603
 Job Number..... 30654

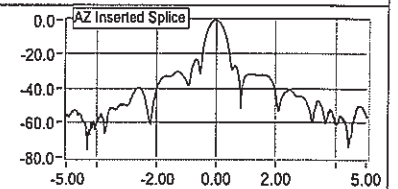
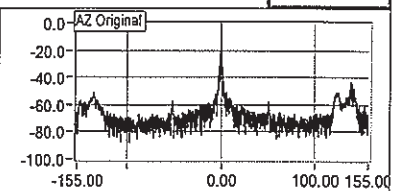
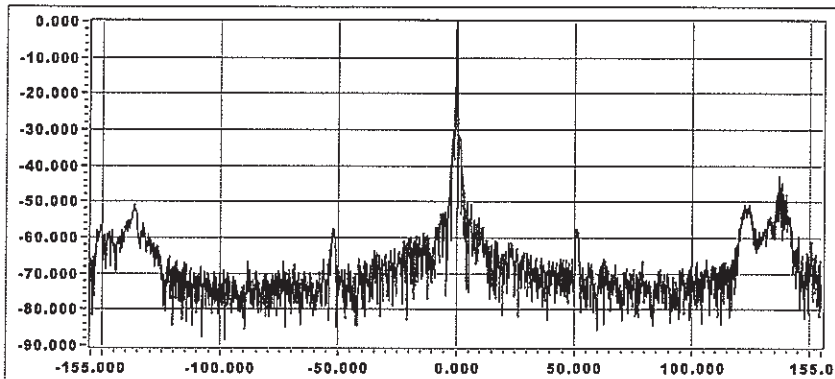
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...21.750 GHz

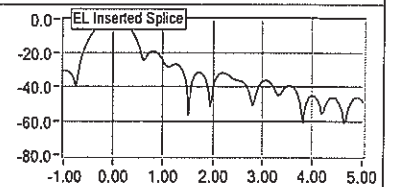
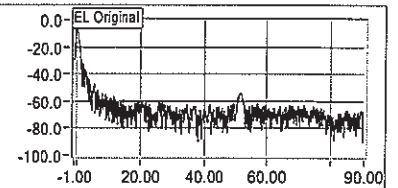
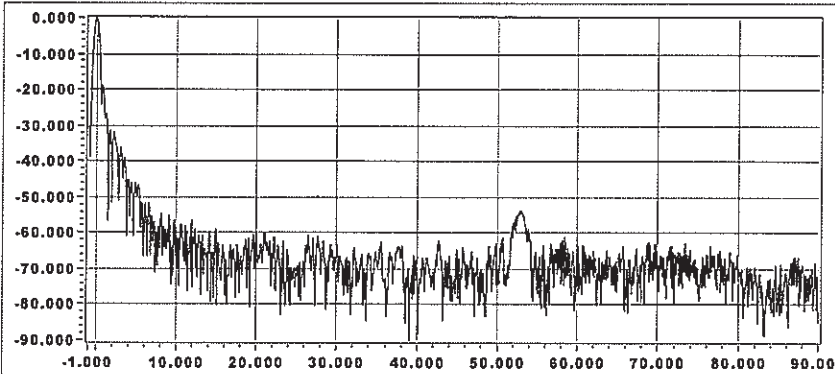
Spec. Gain (dBi): **51.700**

Calculated Gain (dB): **51.29**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{delta Theta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=21750000218, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File	% 070814 121603 30654 TC-155-HA-21.750.txt
EL Co-pol File	% 070814 122240 30654 TC-90-HE-21.750.txt
AZ Insert File	% 070813 095352 30654 RC-5-HE-21.750.txt
EL Insert File	% 070813 095250 30654 RC-5-HA-21.750.txt

The calculated gain is less than the specified gain by 0.41 dB.

Test Frequency (GHz)	21.750000218
AZ Ref. Level (dBm)	-42.53
Azimuth (deg)	180.000
Elevation (deg)	12.000

Versions
 61030 FAST
 60129 PACK

# Points Displayed	15793
Feed Loss (dB)	0.85
Angular Extent Loss(dB)	0.15
Spar Blockage Loss (dB)	0.05
Cross-pol Loss (dB)	0.05



Customer..... Intelsat
 Date/Local Time.... 8-14-2007 at 121603
 Job Number..... 30654

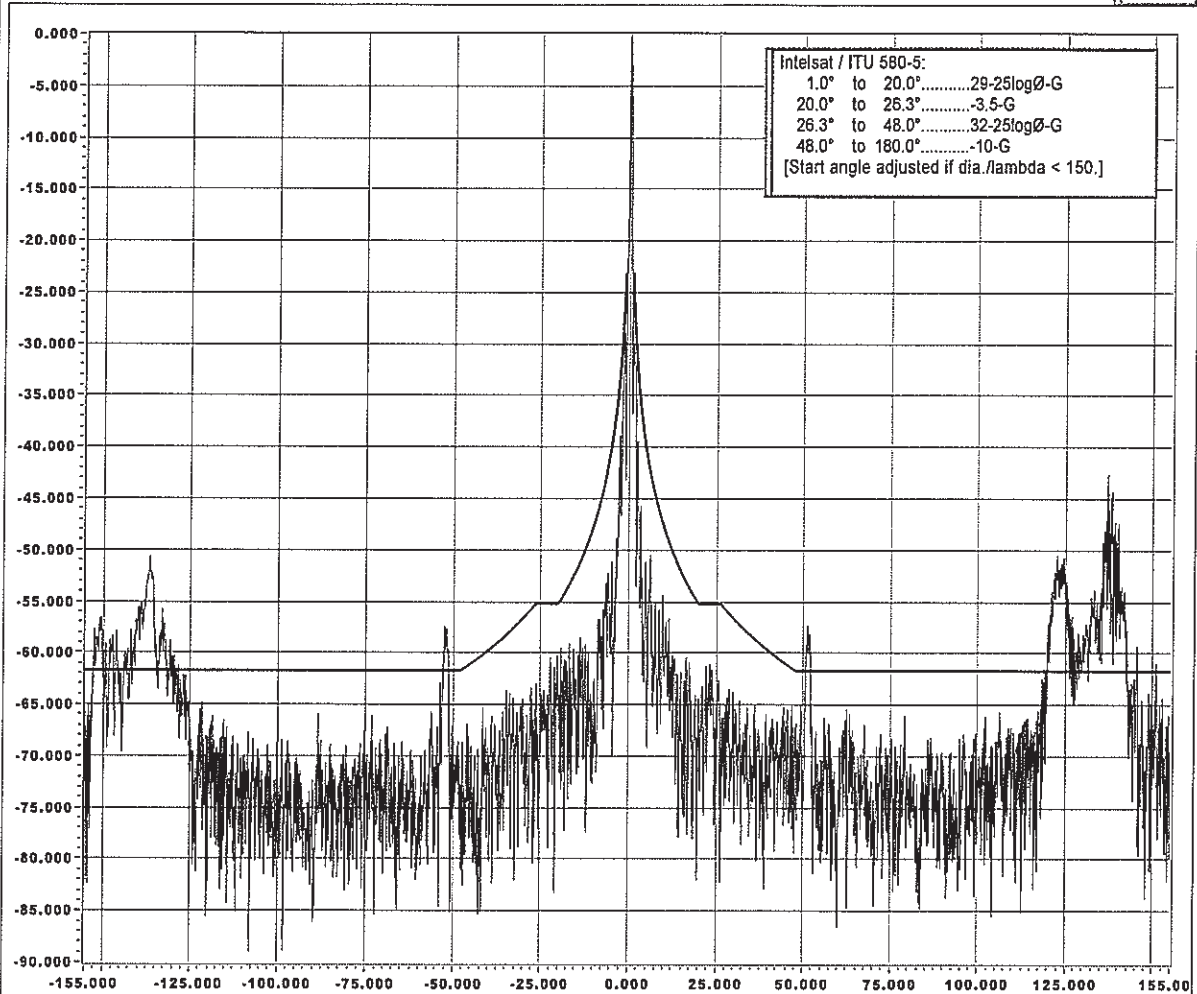
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...21.750 GHz

Azimuth

% Over Curve (not including main lobe)

13.8



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000218, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 121603 30654 TC-155-HA-21.750.txt

Test Frequency (GHz): 21.750000218

Ref. Level (dBm): -38.87

Points Displayed: 7881

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.700

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 122240
 Job Number..... 30654

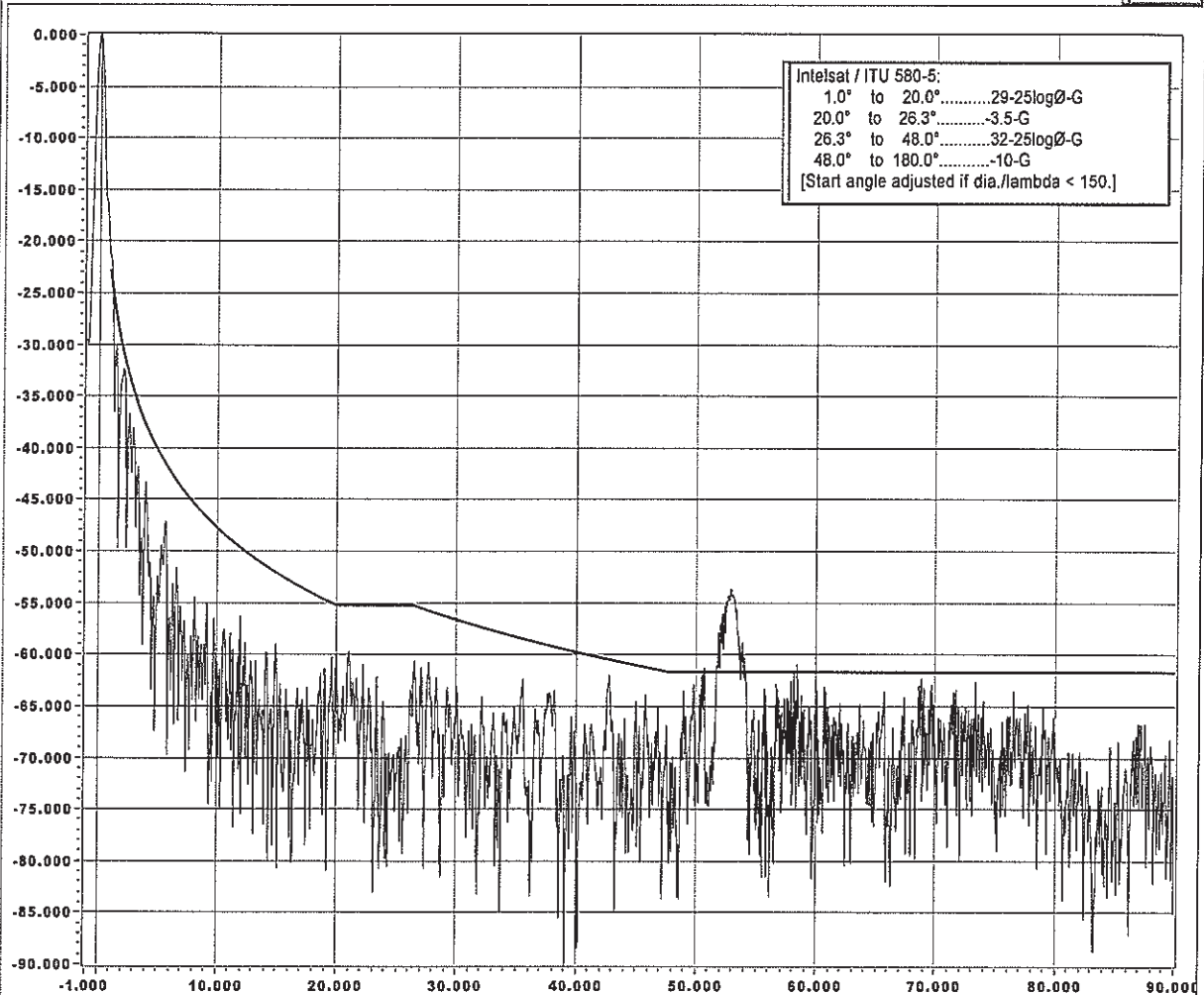
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...21.750 GHz

Elevation

% Over Curve (not including main lobe)

2.7



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000218, AZ rate (deg/s)=0.899, EL rate (deg/s)=0.565, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 122240 30654 TC-90-HE-21.750.txt

Specified Gain: 51.700

Test Frequency (GHz): 21.750000218

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -39.09

Elevation Beam Center (deg): 12.000

Points Displayed: 7204

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



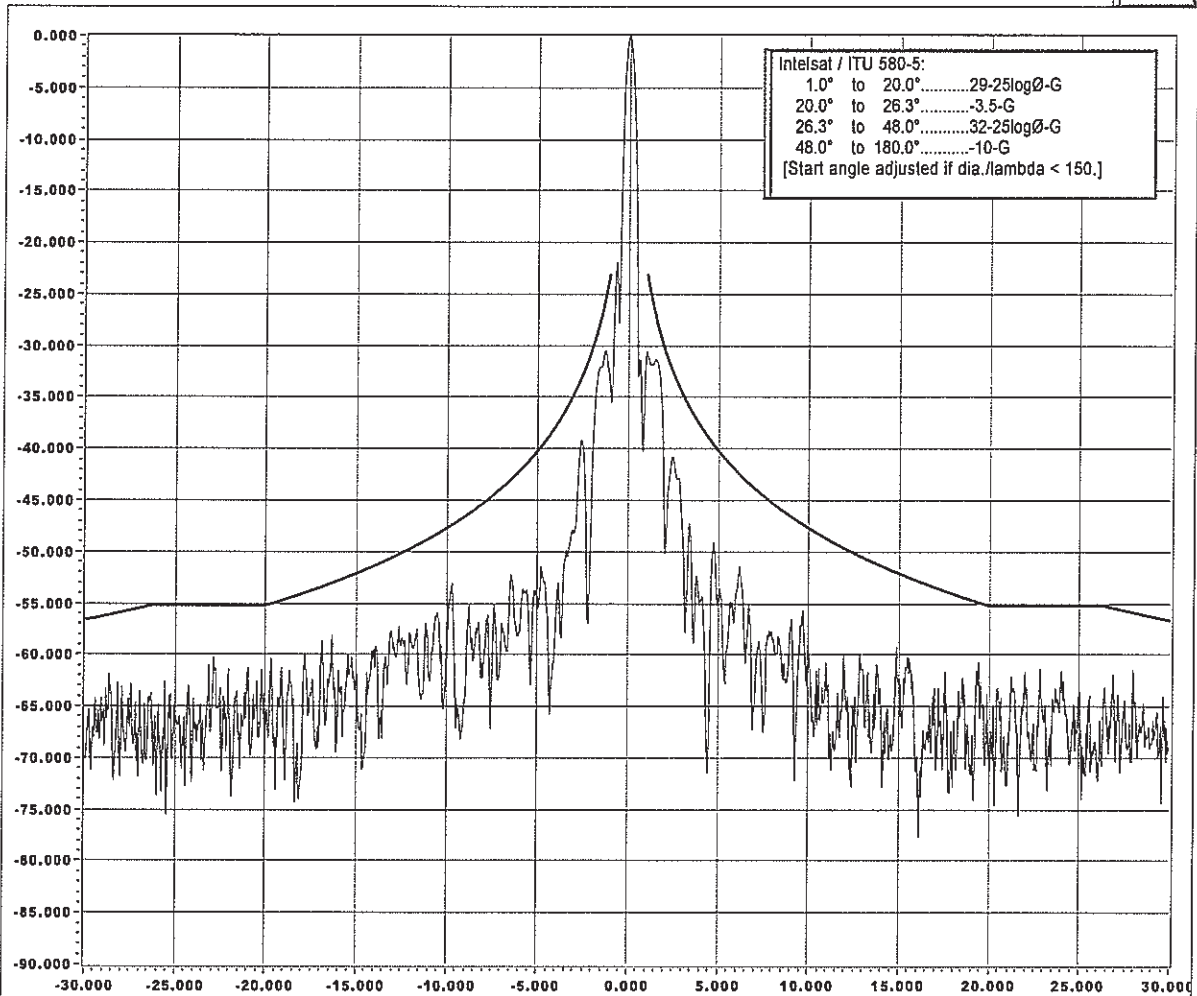
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 154433
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...21.750 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2175000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 154433 30654 RC-166-HA-21.750.txt

Test Frequency (GHz): 21.75000000

Ref. Level (dBm): -43.12

Points Displayed: 1336

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.700

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 3.70



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 155202
 Job Number..... 30654

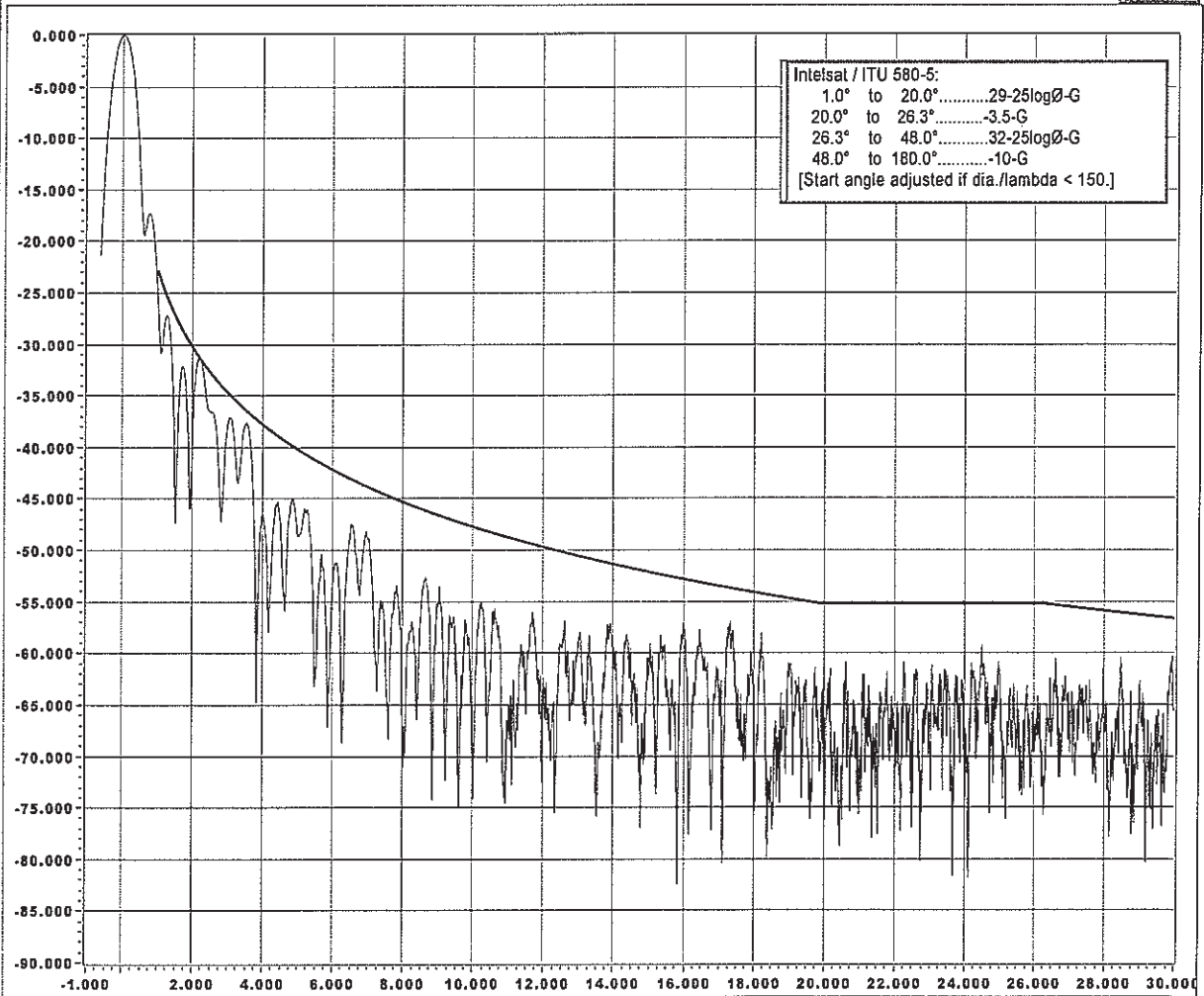
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...HORZ polarization...21.750 GHz

Elevation

% Over Curve (not including main lobe)

0.1



Intelsat / ITU 580-5:
 1.0° to 20.0°.....29-25logØ-G
 20.0° to 26.3°.....-3.5-G
 26.3° to 48.0°.....32-25logØ-G
 48.0° to 180.0°.....-10-G
 [Start angle adjusted if dia./lambda < 150.]

Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 155202 30654 RC-90-HE-21.750.txt

Specified Gain: 51.700

Test Frequency (GHz): 21.750000000

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -43.52

Elevation Beam Center (deg): 6.030

Points Displayed: 3385

Versions
 61030 FAST
 60129 PACK

Margin Under Curve (dB): None



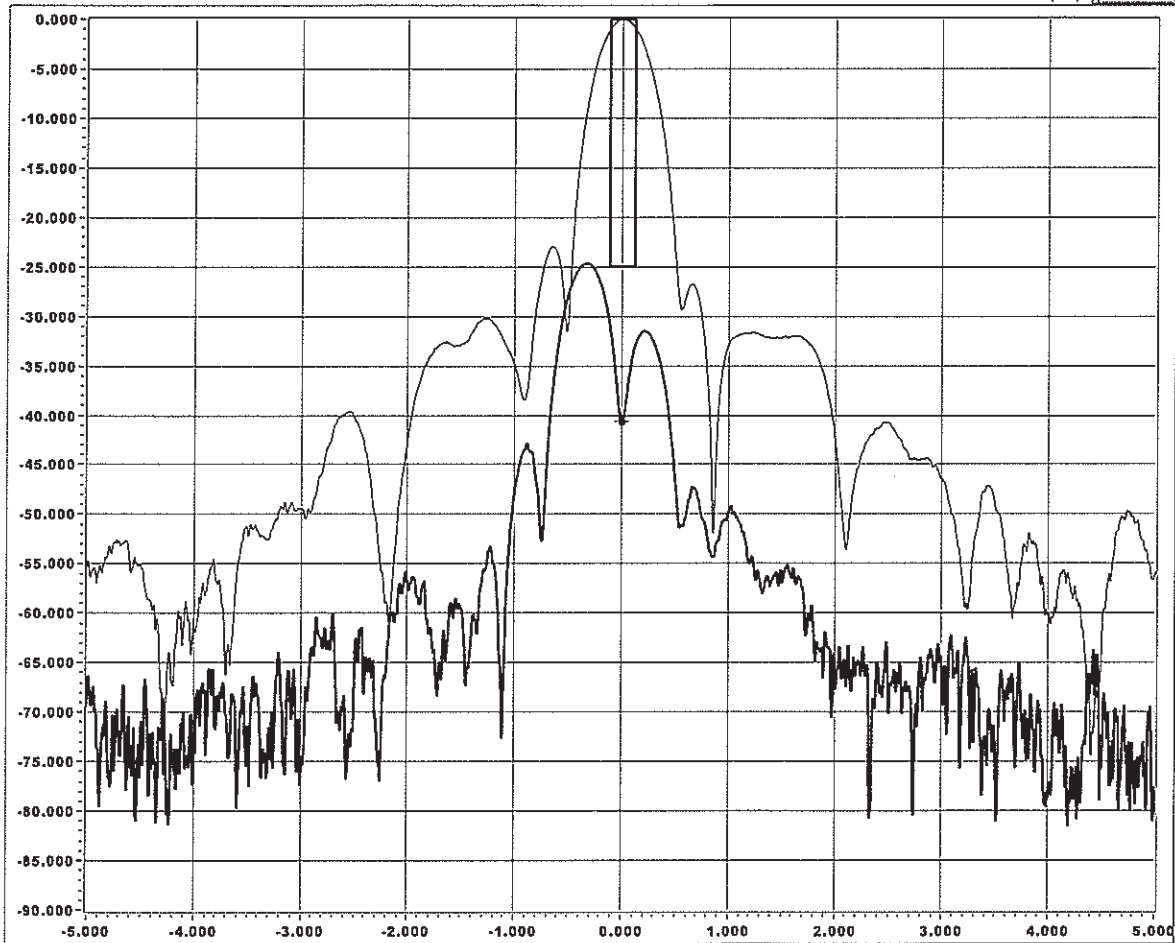
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 094528
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...21.750 GHz

Azimuth

On-axis Isolation (dB): 40.58



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2175000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 095250 30654 RC-5-HA-21.750.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 094528 30654 RX-5-HA-21.750.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	21.75000001	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-42.53	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7903	Versions 61030 FAST 60129 PACK	



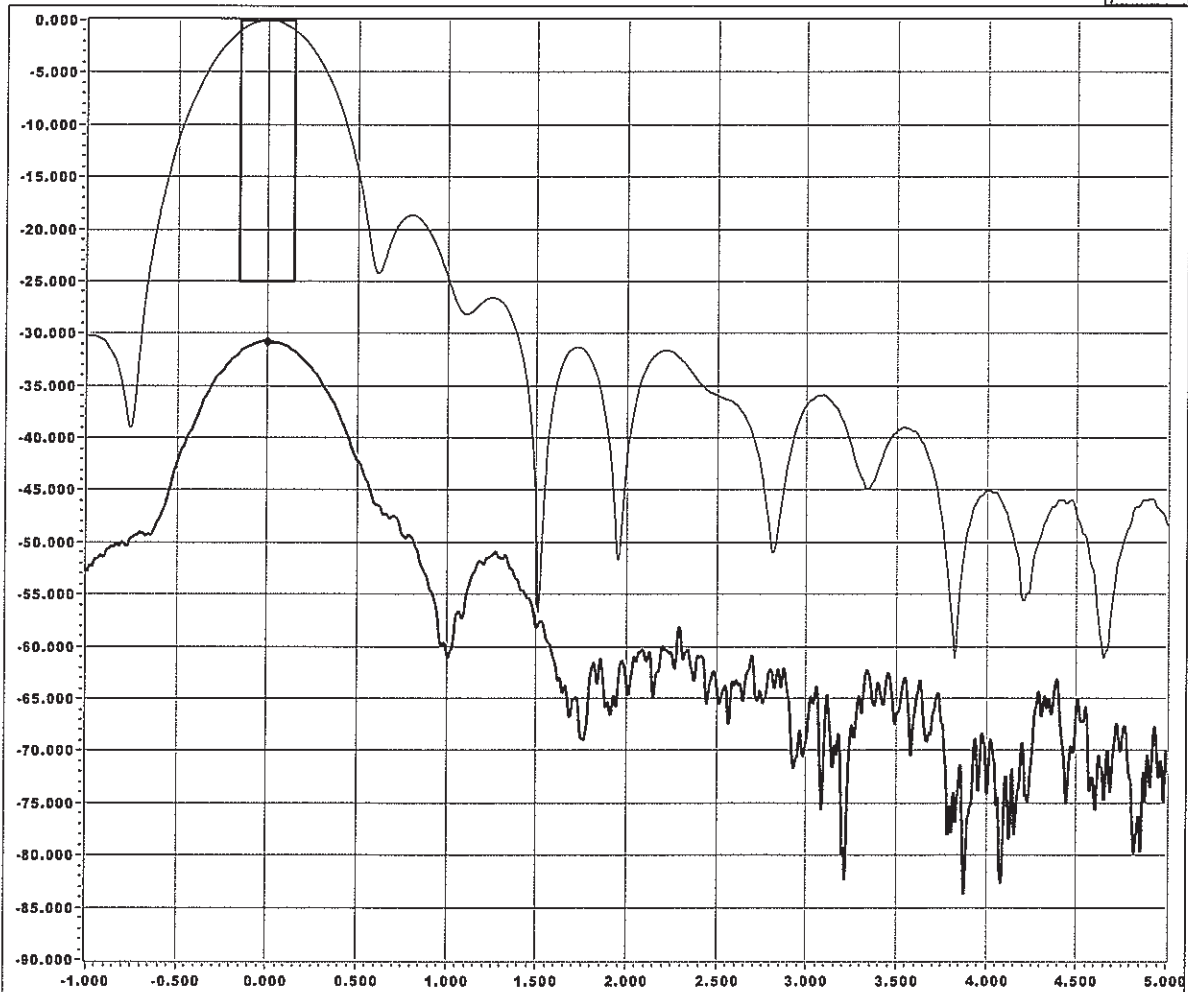
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 095352
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...21.750 GHz

Elevation

On Axis Isolation (dB): 30.71



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2175000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 095352 30654 RC-5-HE-21.750.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 094739 30654 RX-5-HE-21.750.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	21.75000001	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-42.53	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7180	Versions 61030 FAST 60129 PACK	



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 175522
 Job Number..... 30654

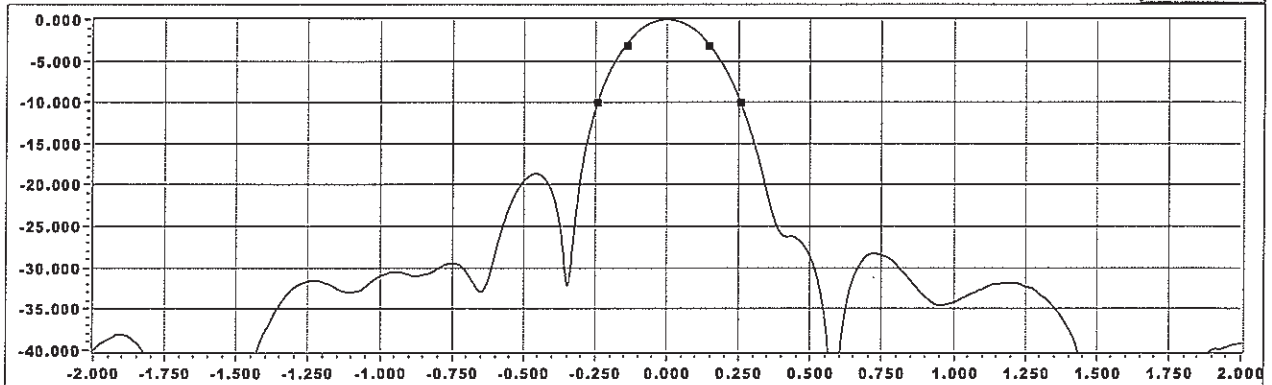
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Beamwidth...29.150 GHz

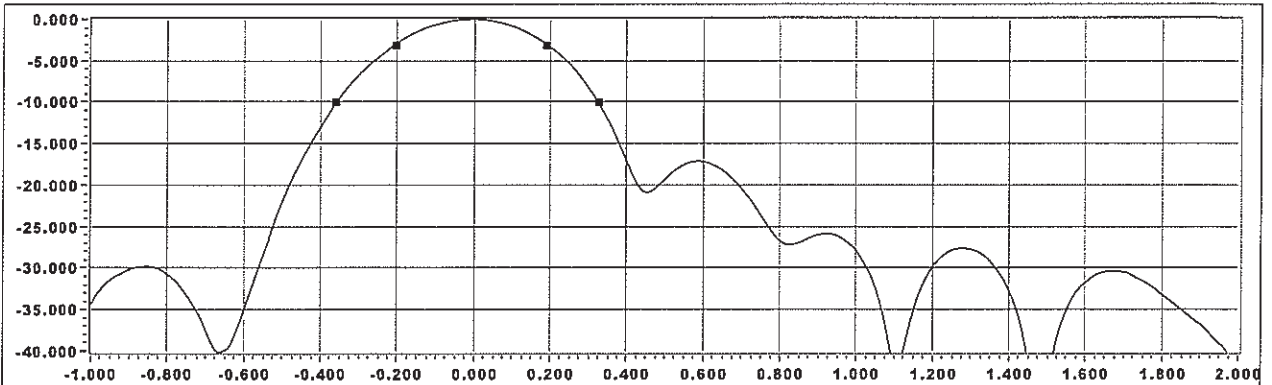
Spec. Gain (dBi): **53.900**

Calculated Gain (dB): **53.25**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{((3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW})))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=29149999997, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File: % 070813 175522 30654 TC-5-HA-29.150.txt
 EL Co-pol File: % 070813 175629 30654 TC-5-HE-29.150.txt

The calculated gain is less than the specified gain by 0.65 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.149999997	AZ 3dB BW (deg)	0.2885	# Points Displayed	8196
AZ Ref. Level (dBm)	-36.22	AZ 10dB BW (deg)	0.4976		
Feed Loss (dB)	0.85	AZ 15dB BW (deg)	0.5847		
RMS (in.)	0.015	EL 3dB BW (deg)	0.3955		
Azimuth (deg)	179.800	EL 10dB BW (deg)	0.6841	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	0.8070	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 224750
 Job Number..... 30654

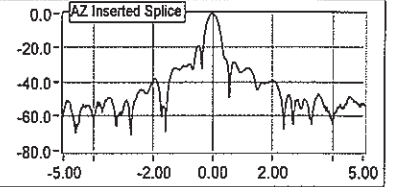
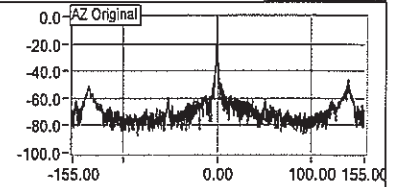
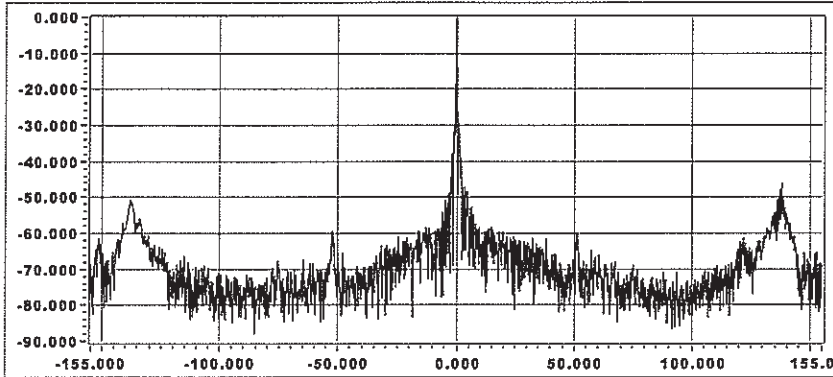
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...29.150 GHz

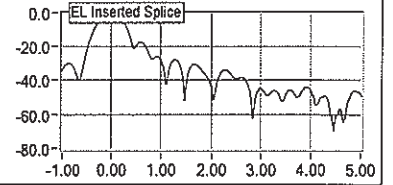
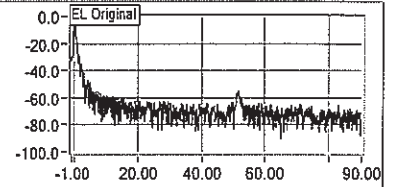
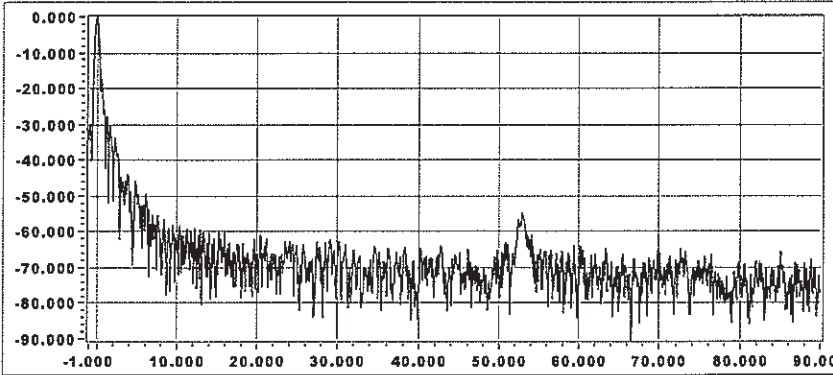
Spec. Gain (dBi): **53.900**

Calculated Gain (dB): **53.87**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=29150000295, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070813 224750 30654 TC-155-HA-29.150.txt
 EL Co-pol File % 070813 225342 30654 TC-90-HE-29.150.txt
 AZ Insert File % 070813 175629 30654 TC-5-HE-29.150.txt
 EL Insert File % 070813 175522 30654 TC-5-HA-29.150.txt

The calculated gain is less than the specified gain by 0.03 dB.

Test Frequency (GHz) **29.150000295**
 AZ Ref. Level (dBm) **-36.22**
 Azimuth (deg) **180.000**
 Elevation (deg) **12.000**

Versions
 61030 FAST
 60129 PACK

Points Displayed **15851**
 Feed Loss (dB) **0.85**
 Angular Extent Loss(dB) **0.15**
 Spar Blockage Loss (dB) **0.05**
 Cross-pol Loss (dB) **0.05**



Customer..... Intelsat
 Date/Local Time.... 8-13-2007 at 224750
 Job Number..... 30654

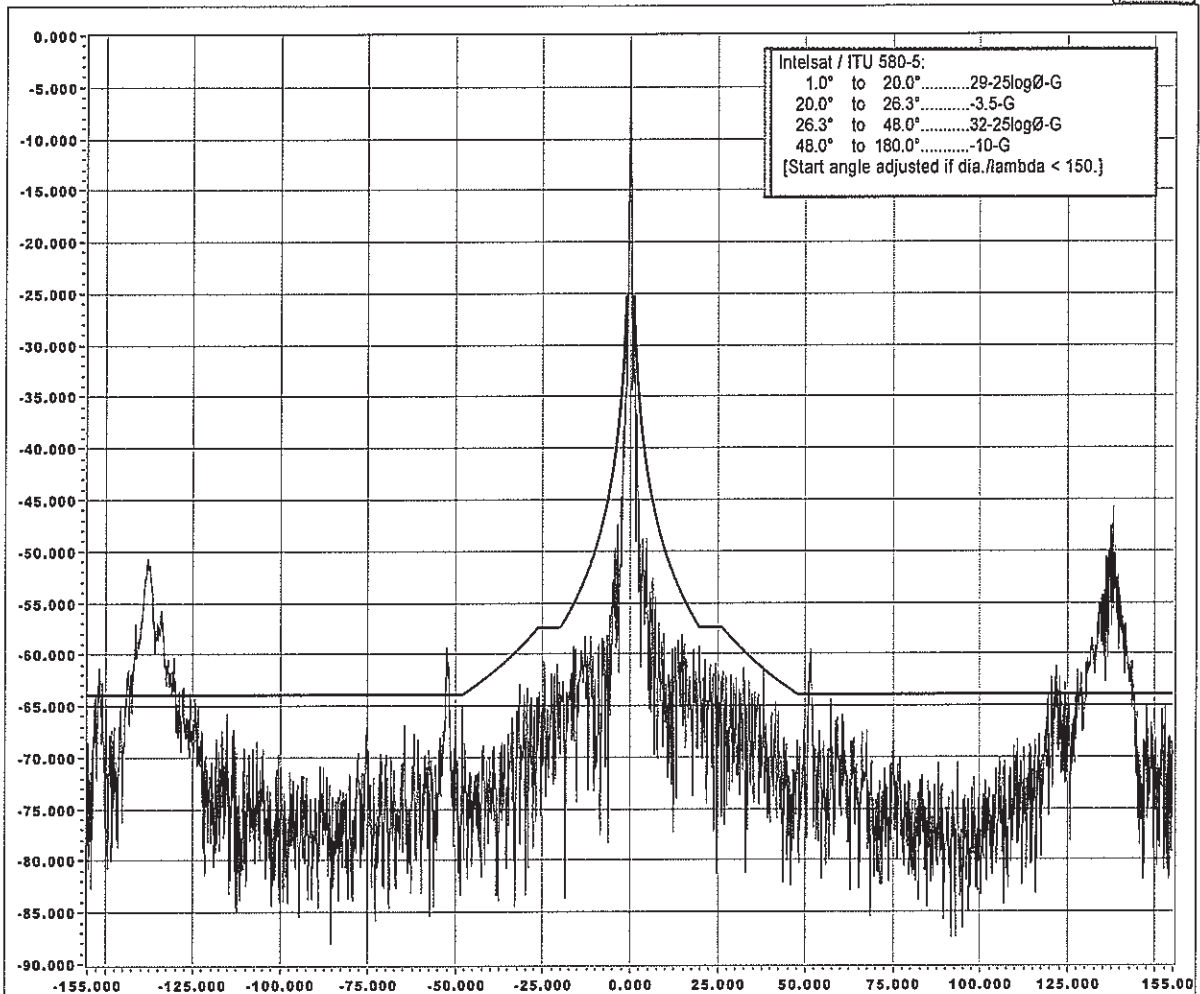
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.150 GHz

Azimuth

% Over Curve (not including main lobe)

10.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000295, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 224750 30654 TC-155-HA-29.150.txt

Test Frequency (GHz): 29.15000295

Ref. Level (dBm): -36.13

Points Displayed: 7948

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 53.900

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



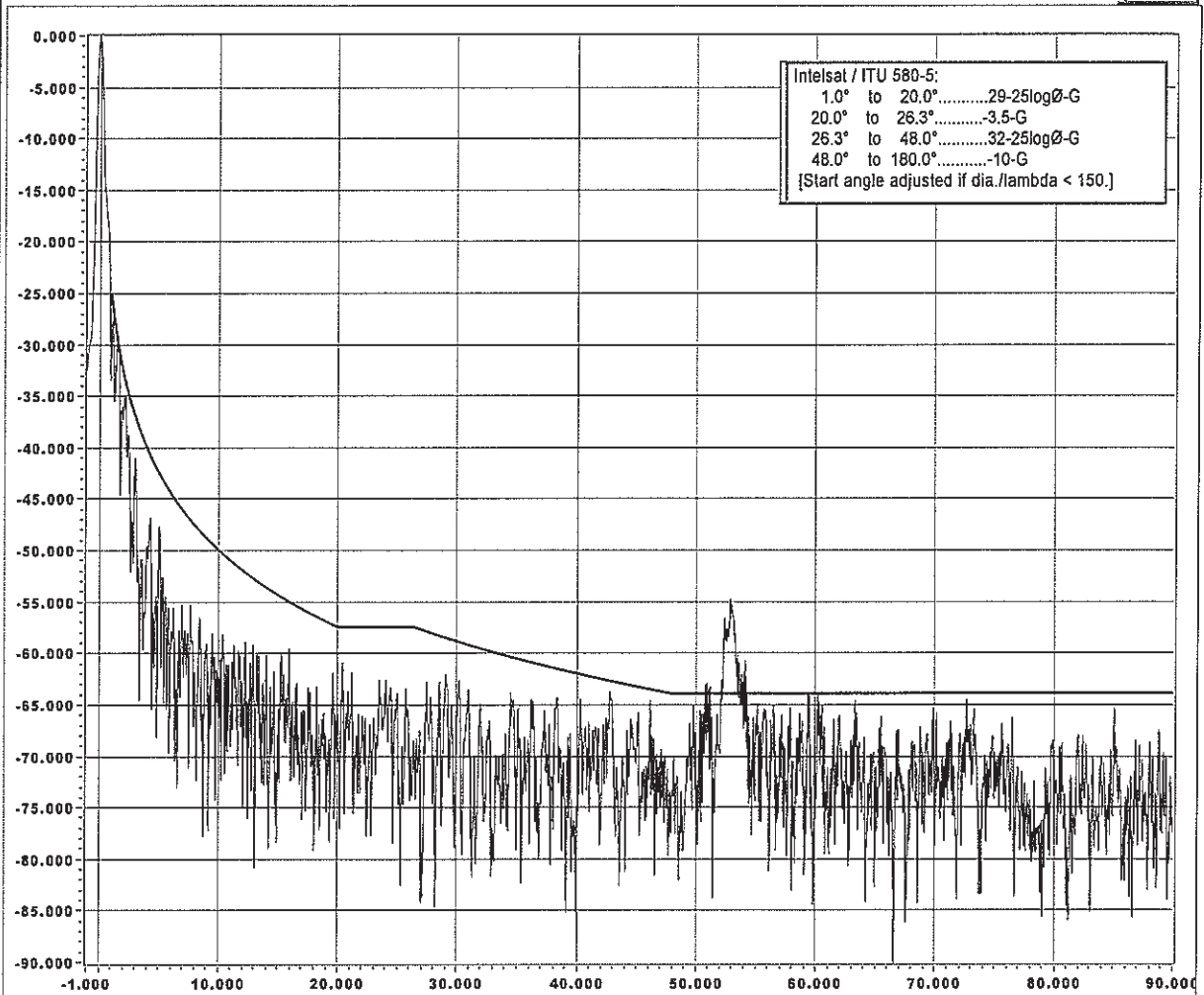
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 225342
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.150 GHz

Elevation

% Over Curve (not including main lobe) 2.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000295, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File:	% 070813 225342 30654 TC-90-HE-29.150.txt		Specified Gain:	53.900
Test Frequency (GHz):	29.150000295		Azimuth Beam Center (deg):	180.000
Ref. Level (dBm):	-36.68		Elevation Beam Center (deg):	12.000
# Points Displayed:	7272		Margin Under Curve (dB):	None

Versions
61030 FAST
60129 PACK



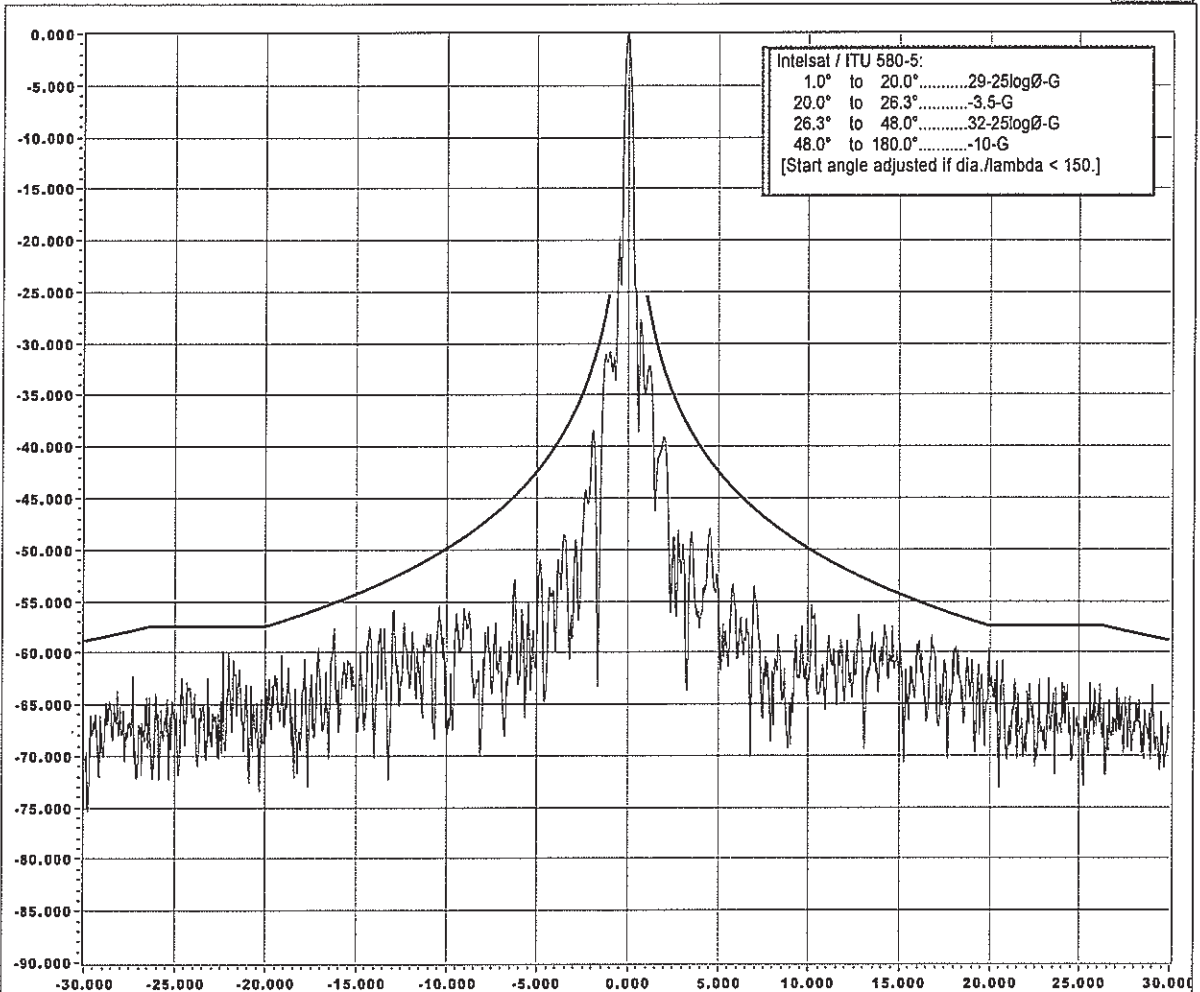
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 094129
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.150 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2915000002, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 094129 30654 TC-166-HA-29.150.txt

Test Frequency (GHz): 29.15000002

Ref. Level (dBm): -41.18

Points Displayed: 1380

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 53.900

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 2.20



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 094906
 Job Number..... 30654

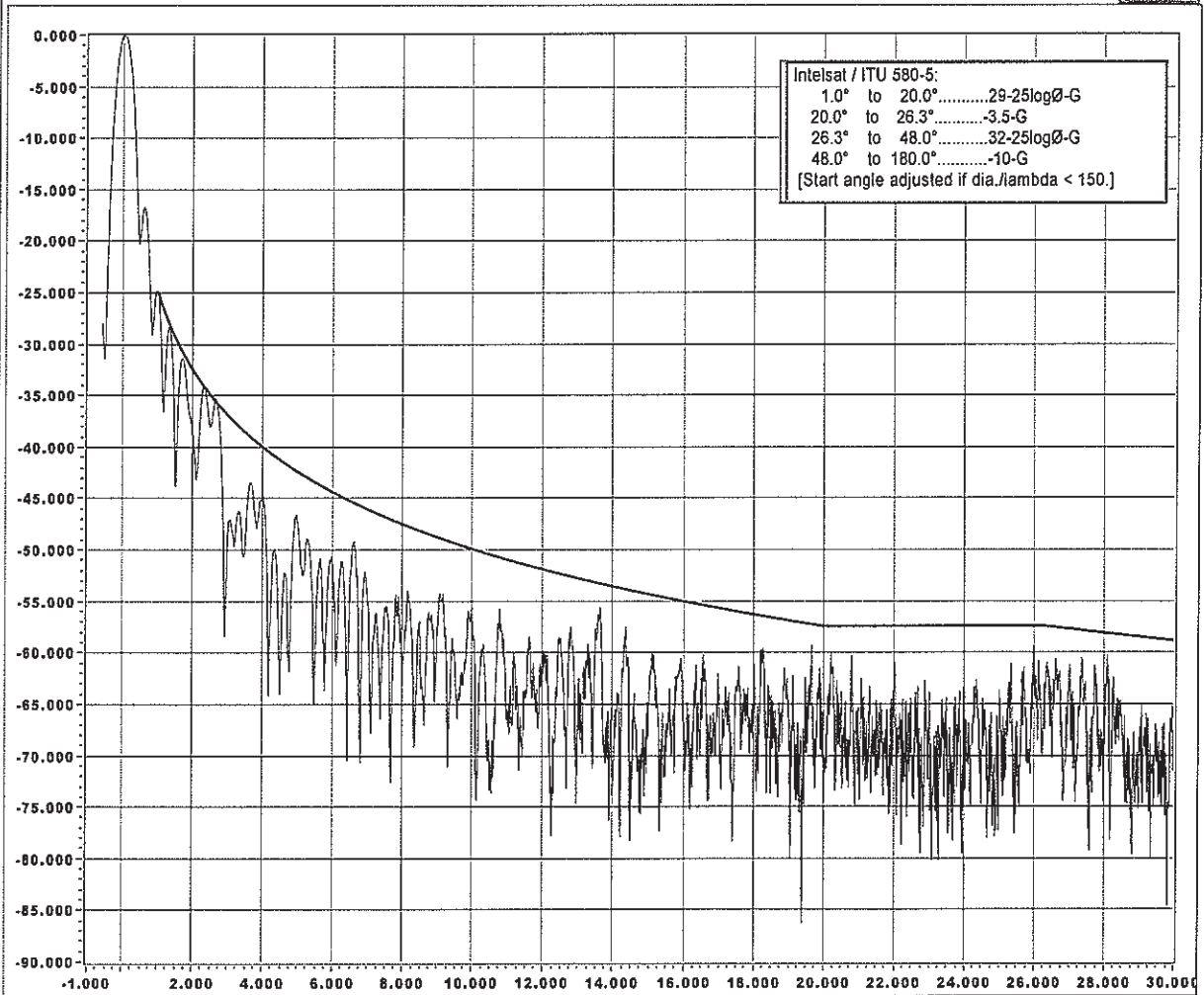
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.150 GHz

Elevation

% Over Curve (not including main lobe)

0.2



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2915000002, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 094906 30654 TC-90-HE-29.150.txt

Specified Gain: 53.900

Test Frequency (GHz): 29.15000002

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -41.72

Elevation Beam Center (deg): 6.030

Points Displayed: 3483

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



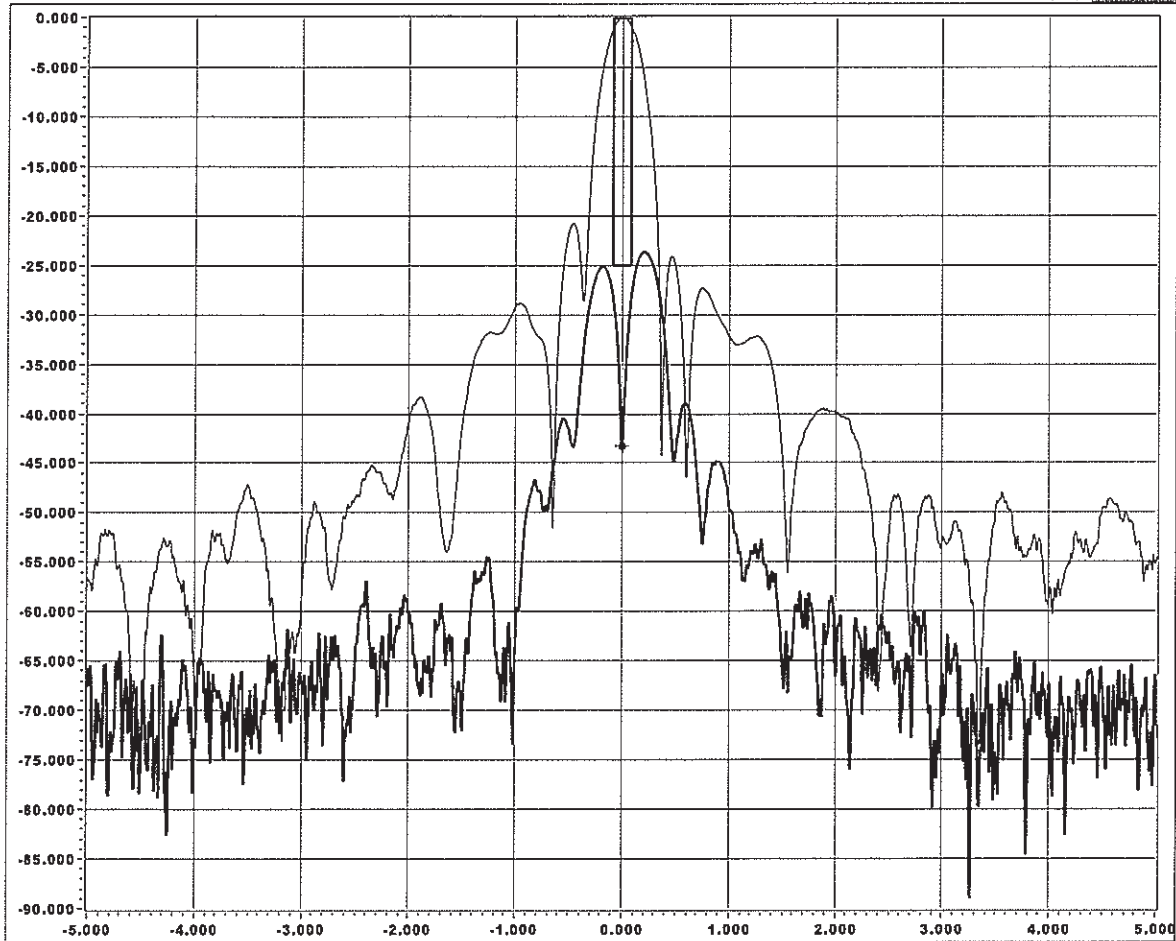
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 090045
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...29.150 GHz

Azimuth

On-axis Isolation (dB): 43.23



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2915000002, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070812 085332 30654 TC-5-HA-29.150.txt	Azimuth Beam Center (deg):	179.960
Cross-pol File:	% 070812 090045 30654 TX-5-HA-29.150.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.15000002	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-41.12	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192	Versions 61030 FAST 60128 PACK	



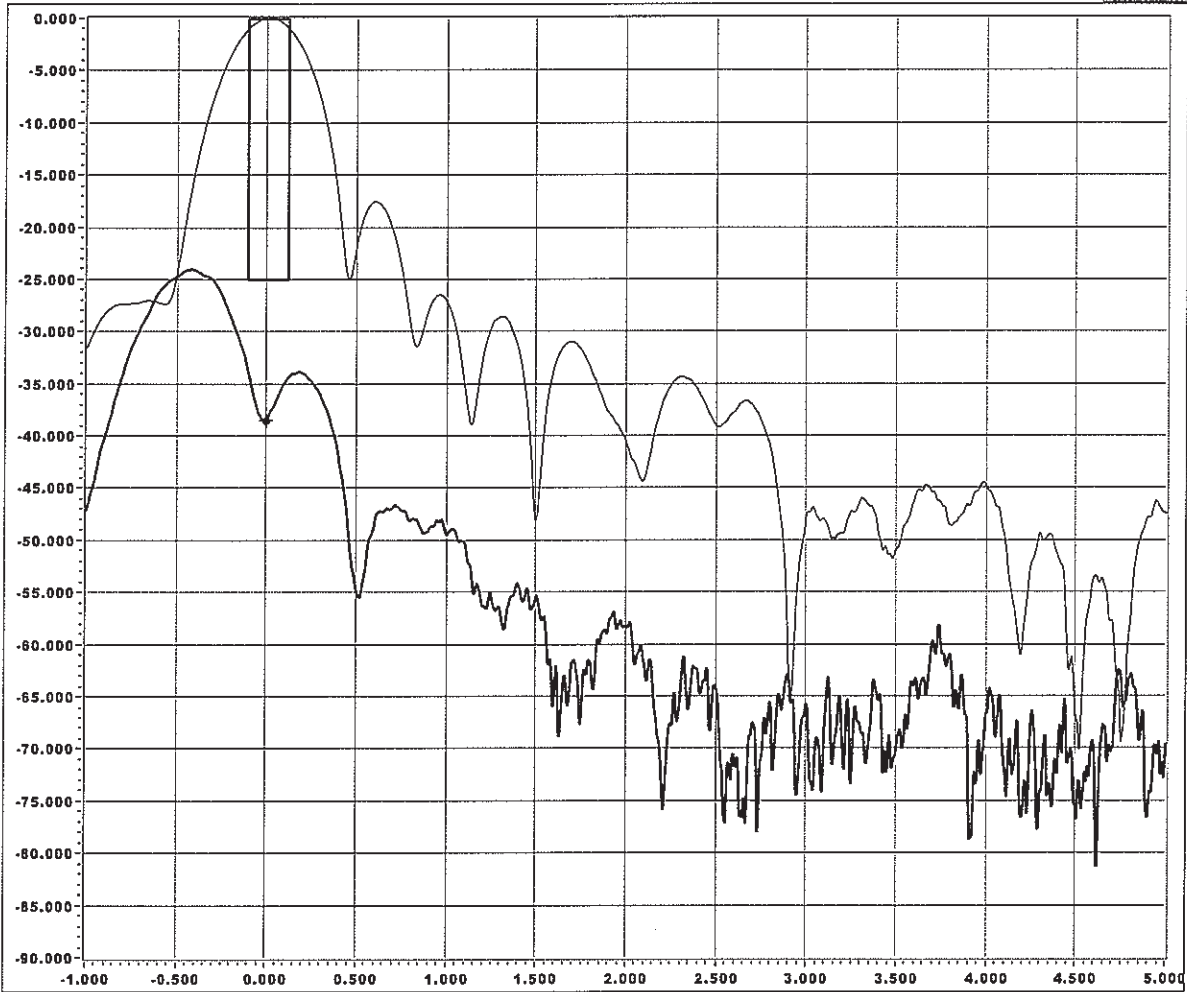
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 085446
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth,Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...29.150 GHz

Elevation

On Axis Isolation (dB): 38.54



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2915000002, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070812 085446 30654 TC-5-HE-29.150.txt	Azimuth Beam Center (deg):	179.960
Cross-pol File:	% 070812 090254 30654 TX-5-HE-29.150.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.15000002	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-41.12	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192	Versions	
		61030 FAST	
		60129 PACK	



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 175002
 Job Number..... 30654

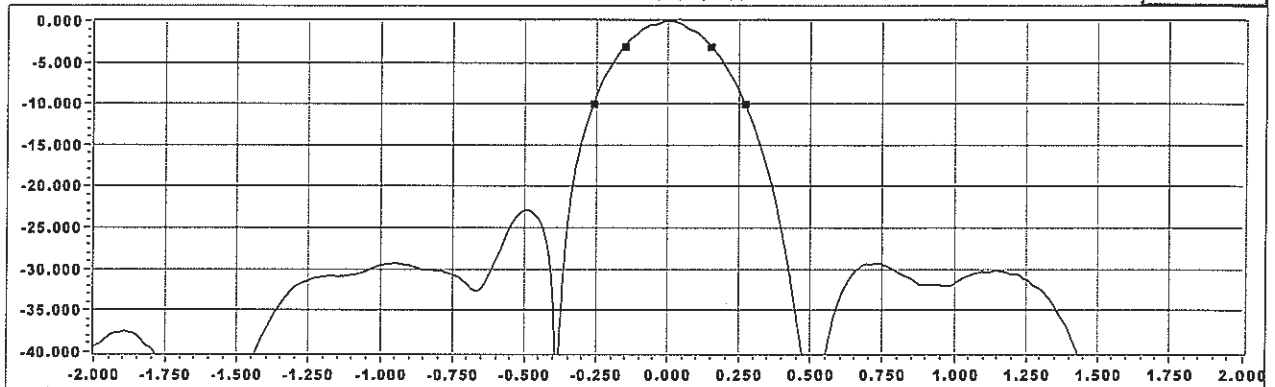
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Beamwidth...29.575 GHz

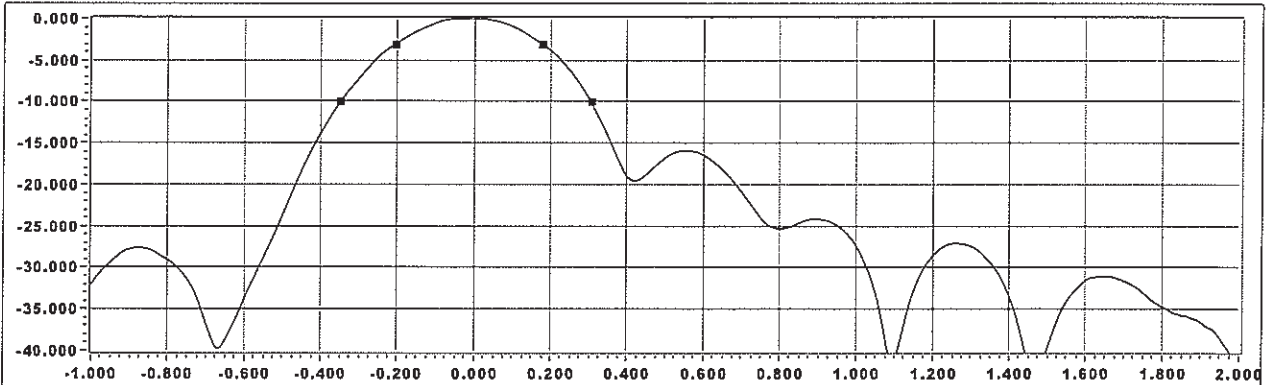
Spec. Gain (dBi): **54.100**

Calculated Gain (dB): **53.16**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{((3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW})))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=29574999996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 175002 30654 TC-5-HA-29.575.txt
 EL Co-pol File % 070813 175106 30654 TC-5-HE-29.575.txt

The calculated gain is less than the specified gain by 0.94 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.574999996	AZ 3dB BW (deg)	0.3031	# Points Displayed	8196
AZ Ref. Level (dBm)	-35.91	AZ 10dB BW (deg)	0.5321		
Feed Loss (dB)	0.85	AZ 15dB BW (deg)	0.6273		
RMS (in.)	0.015	EL 3dB BW (deg)	0.3797		
Azimuth (deg)	179.800	EL 10dB BW (deg)	0.6519	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	0.7718	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 222507
 Job Number..... 30654

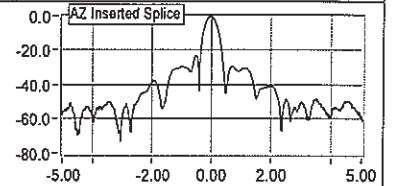
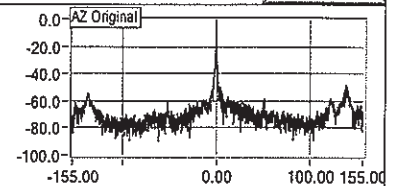
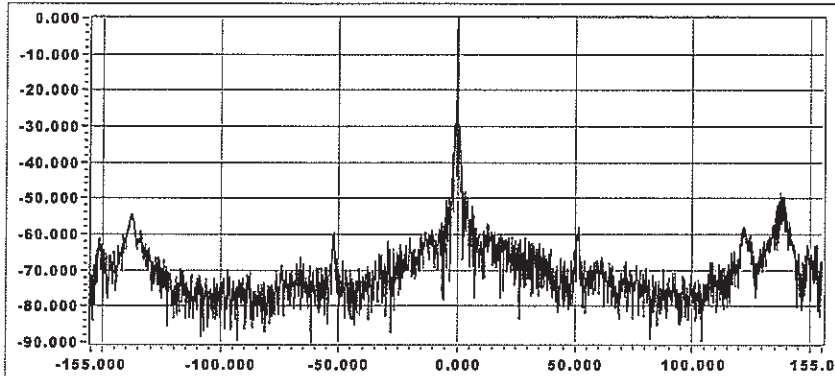
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...29.575 GHz

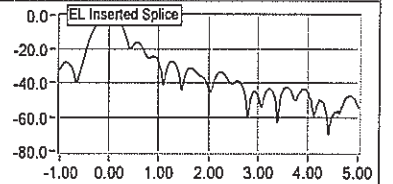
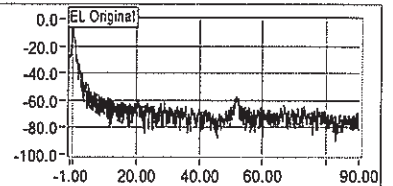
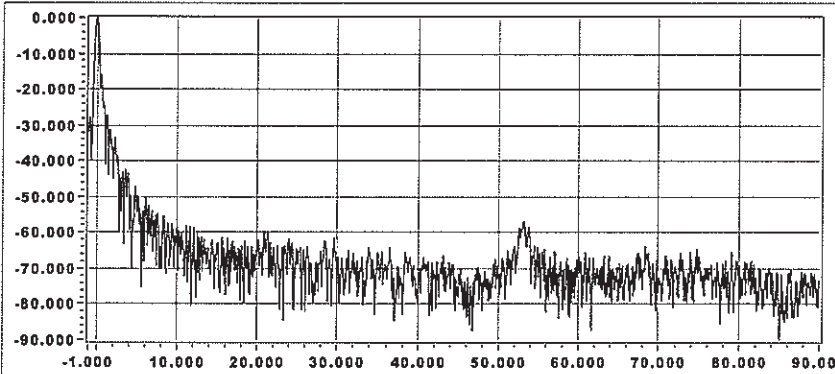
Spec. Gain (dBi): **54.100**

Calculated Gain (dB): **53.84**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [P_{\text{sub}\theta} \cdot \sin(\theta) \cdot \text{della}\theta] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=29575000299, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File	% 070813 222507 30654 TC-155-HA-29.575.txt
EL Co-pol File	% 070813 223106 30654 TC-90-HE-29.575.txt
AZ Insert File	% 070813 175106 30654 TC-5-HE-29.575.txt
EL Insert File	% 070813 175002 30654 TC-5-HA-29.575.txt

The calculated gain is less than the specified gain by 0.26 dB.

Test Frequency (GHz)	29.575000299
AZ Ref. Level (dBm)	-35.91
Azimuth (deg)	180.000
Elevation (deg)	12.000

Versions
 61030 FAST
 60129 PACK

# Points Displayed	15865
Feed Loss (dB)	0.85
Angular Extent Loss(dB)	0.15
Spar Blockage Loss (dB)	0.05
Cross-pol Loss (dB)	0.05



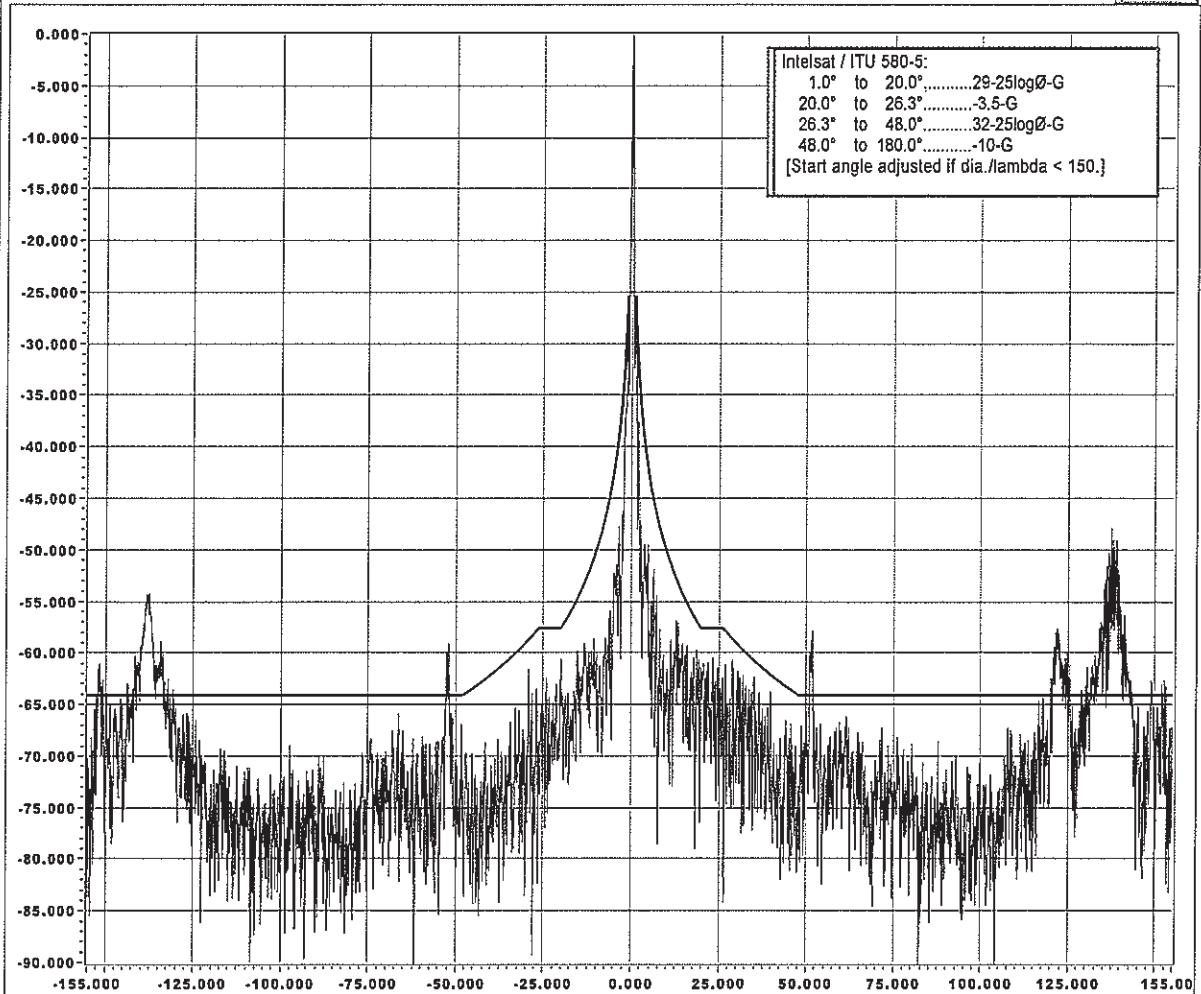
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 222507
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.575 GHz

Azimuth

% Over Curve (not including main lobe) 9.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000299, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 222507 30654 TC-155-HA-29.575.txt

Test Frequency (GHz): 29.575000299

Ref. Level (dBm): -36.39

Points Displayed: 7963

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.100

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 223106
 Job Number..... 30654

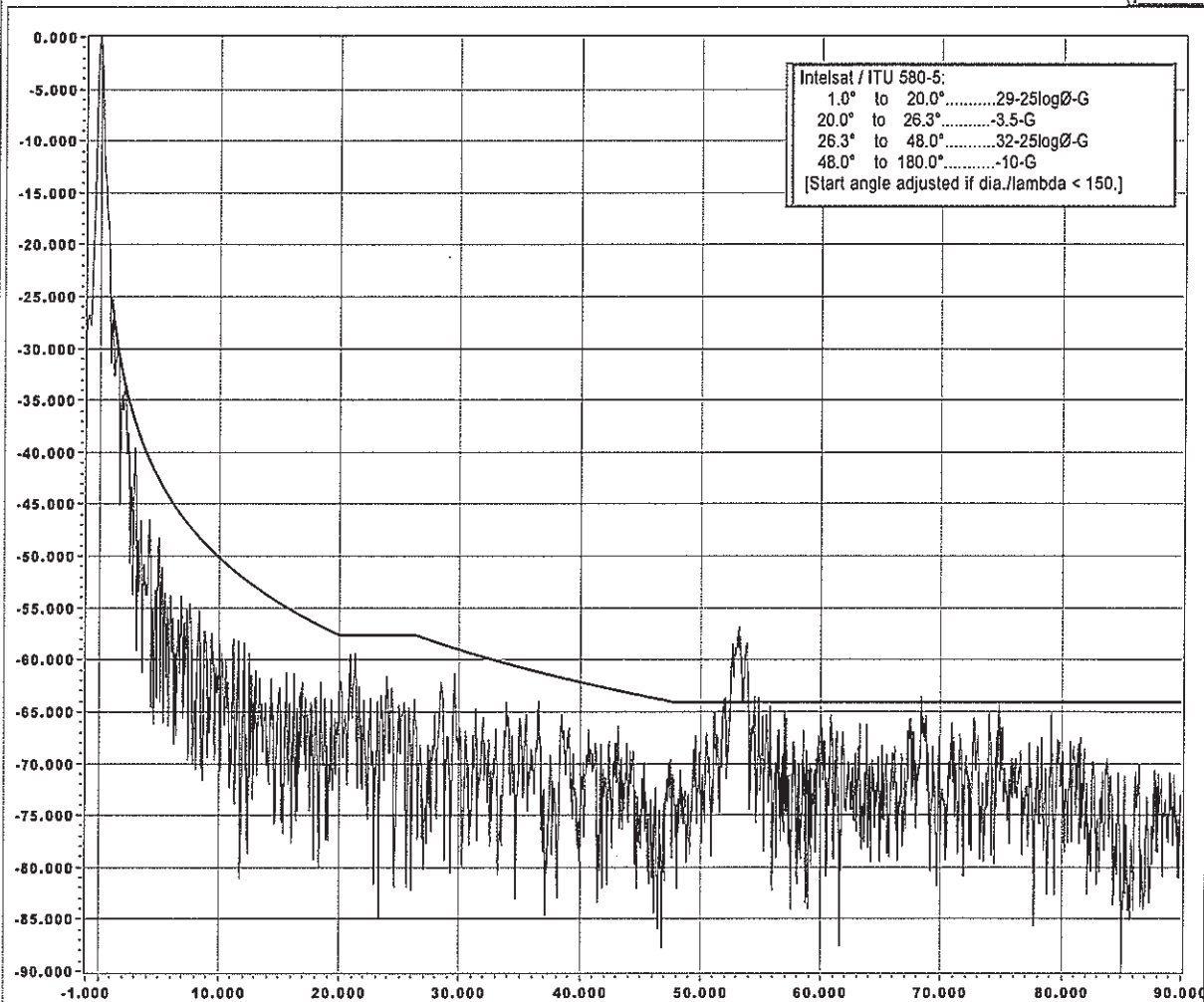
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.575 GHz

Elevation

% Over Curve (not including main lobe)

1.9



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000299, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 223106 30654 TC-90-HE-29.575.txt

Specified Gain: 54.100

Test Frequency (GHz): 29.575000299

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -35.88

Elevation Beam Center (deg): 12.000

Points Displayed: 7273

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



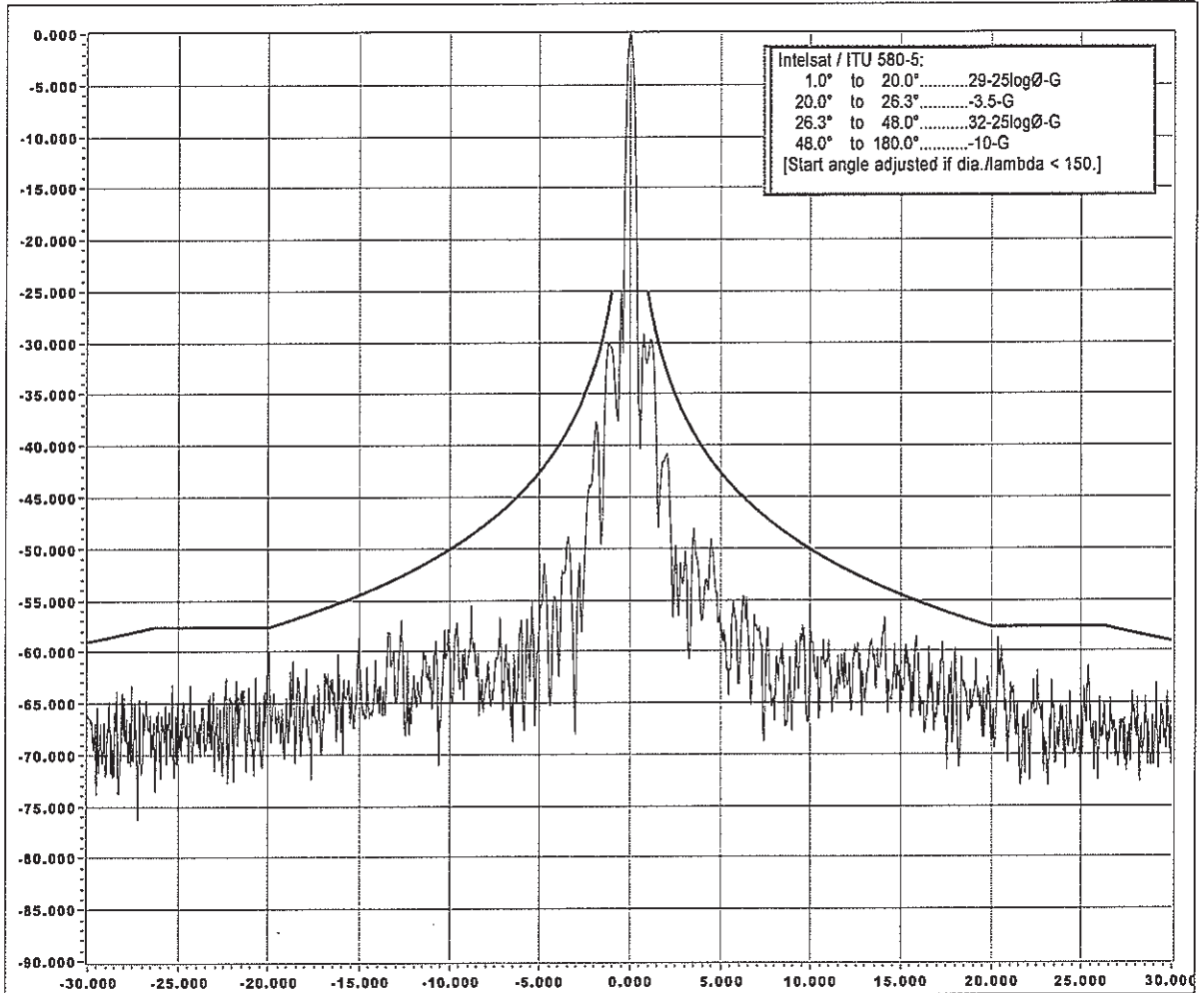
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 100859
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.575 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000005, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 100859 30654 TC-166-HA-29.575.txt
 Test Frequency (GHz): 29.575000005
 Ref. Level (dBm): -39.39
 # Points Displayed: 1374

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.100
 Azimuth Beam Center (deg): 179.960
 Elevation Beam Center (deg): 6.030
 Margin Under Curved (dB): 1.00



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 101634
 Job Number..... 30654

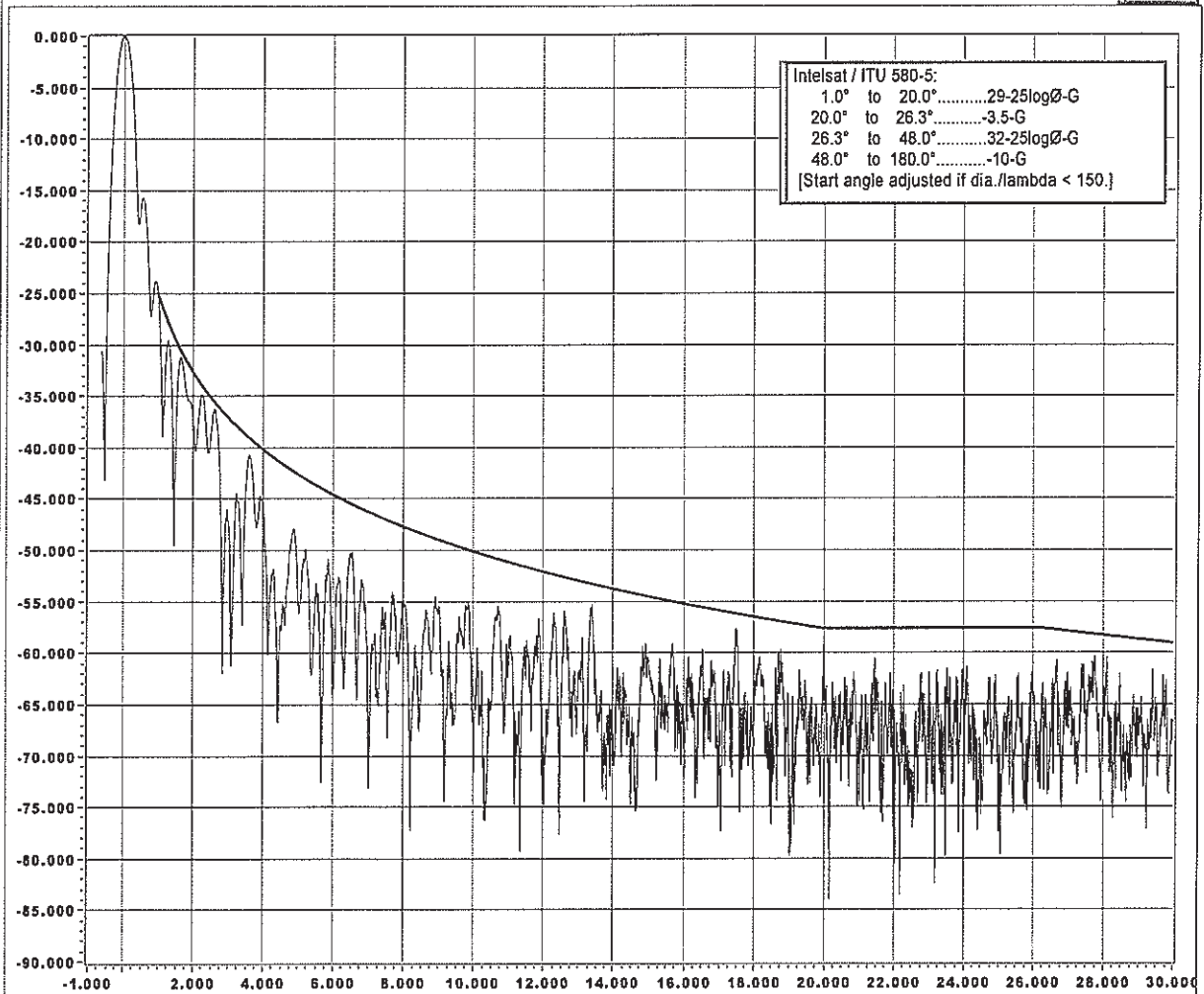
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...29.575 GHz

Elevation

% Over Curve (not including main lobe)

0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000005, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 101634 30654 TC-90-HE-29.575.txt

Specified Gain: 54.100

Test Frequency (GHz): 29.575000005

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -40.41

Elevation Beam Center (deg): 6.030

Points Displayed: 3467

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



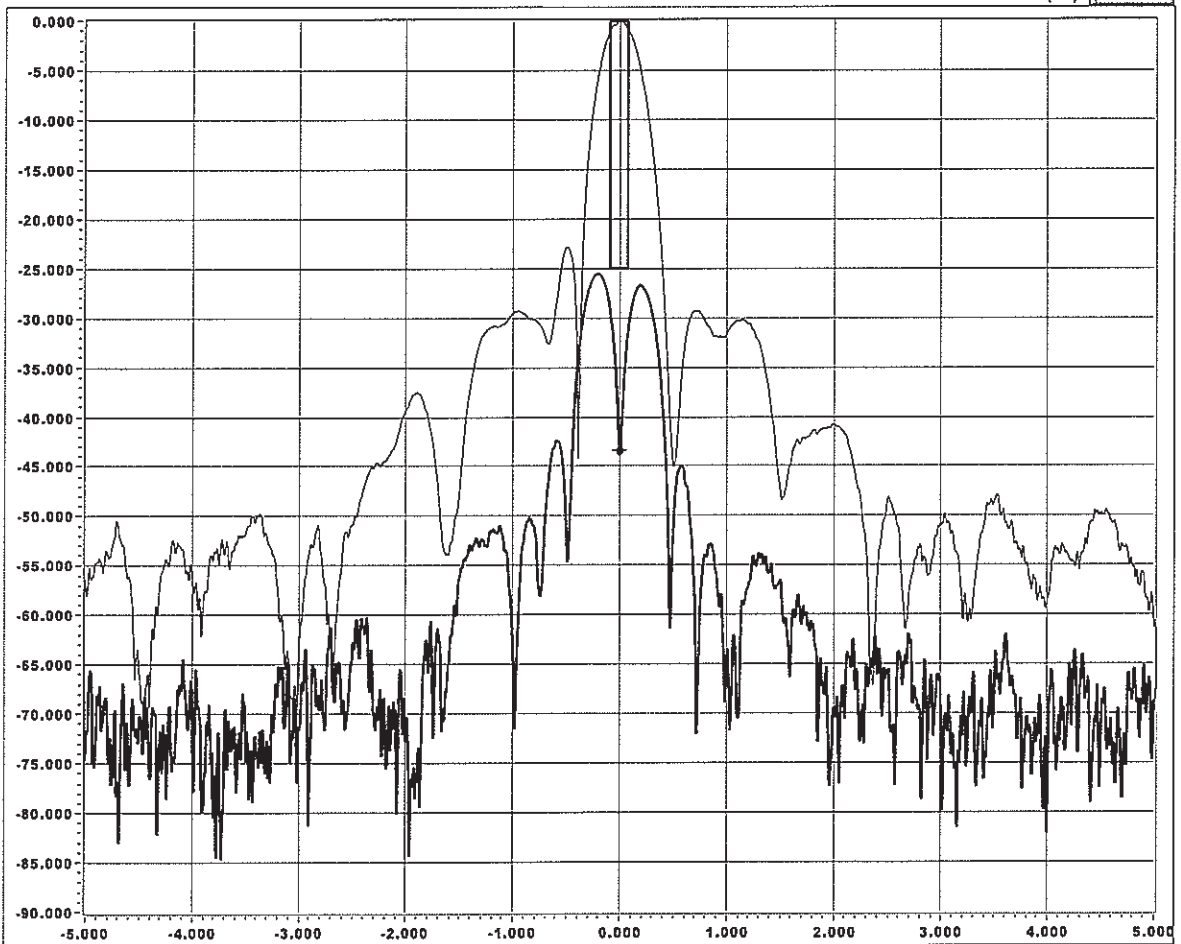
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 174452
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...29.575 GHz

Azimuth

On-axis Isolation (dB): 43.34



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29574999996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10	
Co-pol File:	% 070813 175002 30654 TC-5-HA-29.575.txt
Cross-pol File:	% 070813 174452 30654 TX-5-HA-29.575.txt
Test Frequency (GHz):	29.574999996
Ref. Level (dBm):	-35.91
# Points Displayed:	8192
Azimuth Beam Center (deg):	179.800
Elevation Beam Center (deg):	6.030
On-axis Spec. Isolation (dB):	30.000
Off-axis Spec. Isolation (dB):	25.00

Versions
 61030 FAST
 60129 PACK



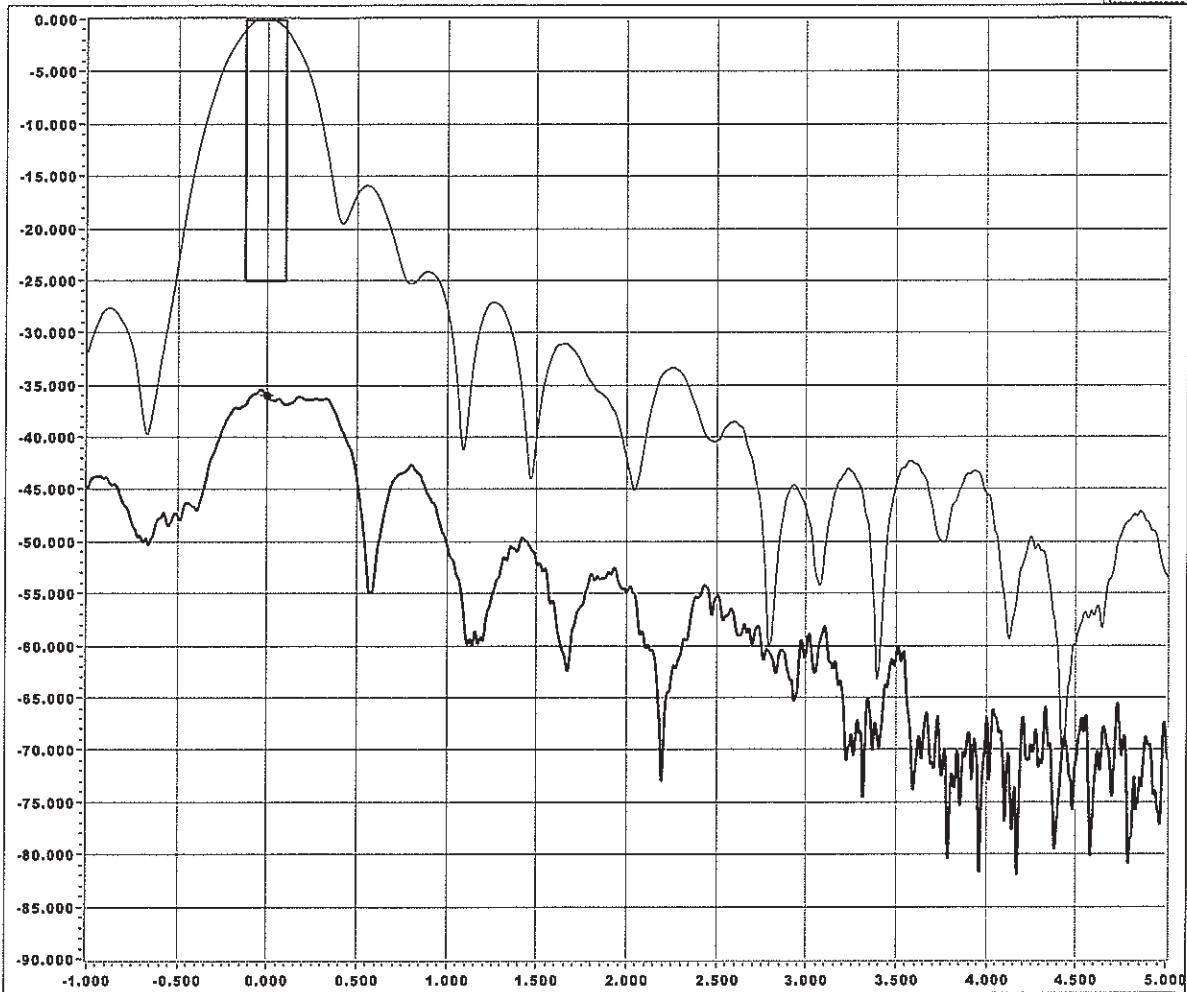
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 175106
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...29.575 GHz

Elevation

On Axis Isolation (dB): 35.98



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2957499996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 175106 30654 TC-5-HE-29.575.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 174655 30654 TX-5-HE-29.575.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.57499996	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-35.91	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7580		

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 173024
 Job Number..... 30654

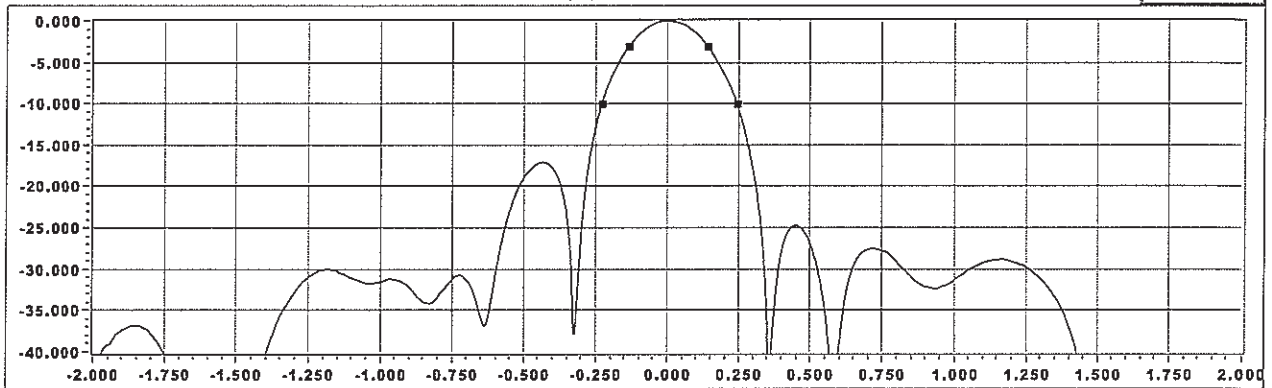
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Beamwidth...30.000 GHz

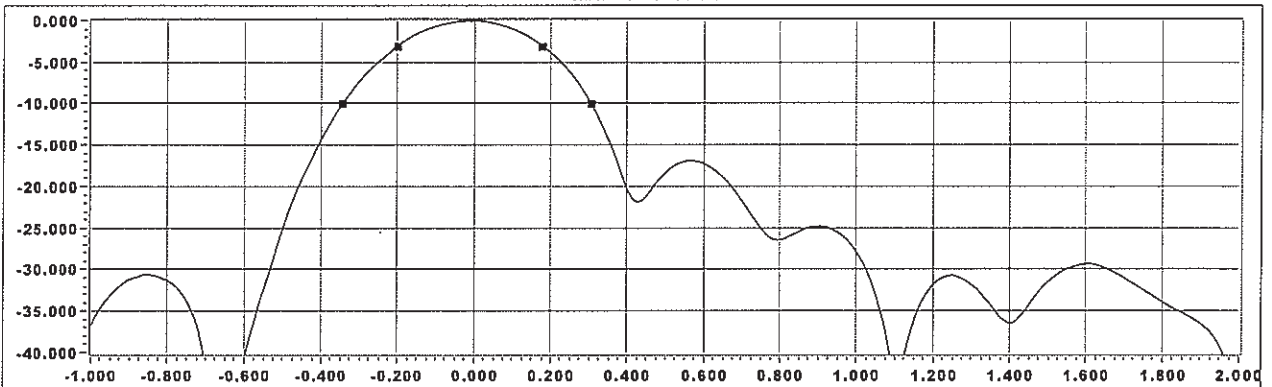
Spec. Gain (dBi): **54.200**

Calculated Gain (dB): **53.64**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{(3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW}))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=29999999995, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File: % 070813 173024 30654 TC-5-HA-30.000.txt
 EL Co-pol File: % 070813 173133 30654 TC-5-HE-30.000.txt

The calculated gain is less than the specified gain by 0.56 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.999999995	AZ 3dB BW (deg)	0.2725	# Points Displayed	8196
AZ Ref. Level (dBm)	-42.26	AZ 10dB BW (deg)	0.4721		
Feed Loss (dB)	0.85	AZ 15dB BW (deg)	0.5465		
RMS (in.)	0.015	EL 3dB BW (deg)	0.3777		
Azimuth (deg)	179.800	EL 10dB BW (deg)	0.6499	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	0.7646	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 230449
 Job Number..... 30654

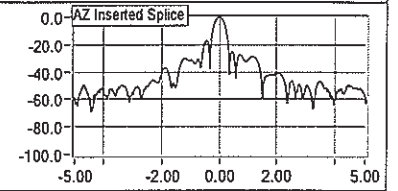
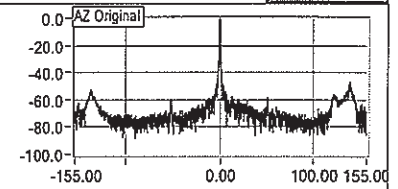
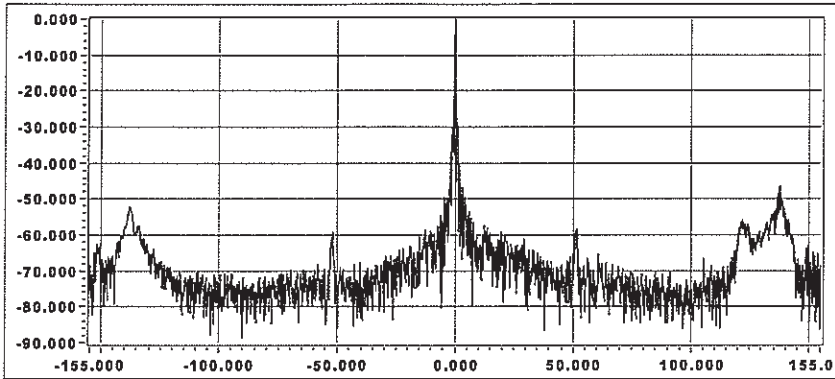
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...HORZ Polarization...Gain by Integration...30.000 GHz

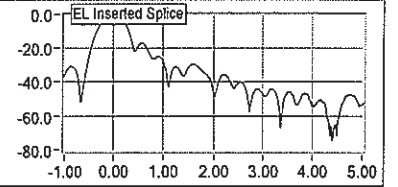
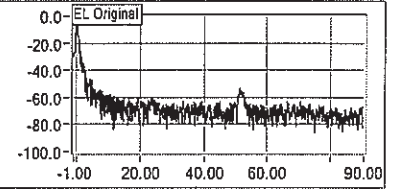
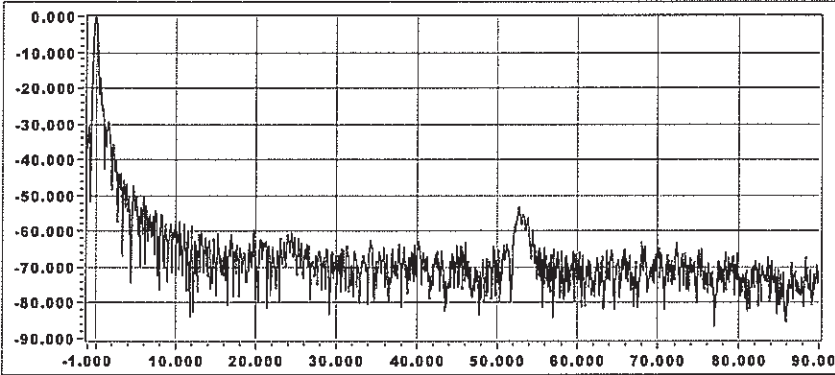
Spec. Gain (dBi): 54.200

Calculated Gain (dB): 54.21

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [P_{\text{sub}} \sin(\Theta) \cdot \Delta\Theta] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Θ) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where P_{sub} is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=30000000302, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070813 230449 30654 TC-155-HA-30.000.txt
 EL Co-pol File % 070813 231052 30654 TC-90-HE-30.000.txt
 AZ Insert File % 070813 173133 30654 TC-5-HE-30.000.txt
 EL Insert File % 070813 173024 30654 TC-5-HA-30.000.txt

The calculated gain is greater than the specified gain by 0.01 dB.

Test Frequency (GHz) 30.000000302
 AZ Ref. Level (dBm) -42.26
 Azimuth (deg) 180.000
 Elevation (deg) 12.000

Versions
 61030 FAST
 60129 PACK

Points Displayed 15841
 Feed Loss (dB) 0.85
 Angular Extent Loss(dB) 0.15
 Spar Blockage Loss (dB) 0.05
 Cross-pol Loss (dB) 0.05



Customer..... Intelsat
 Date/Local Time.... 8-13-2007 at 230449
 Job Number..... 30654

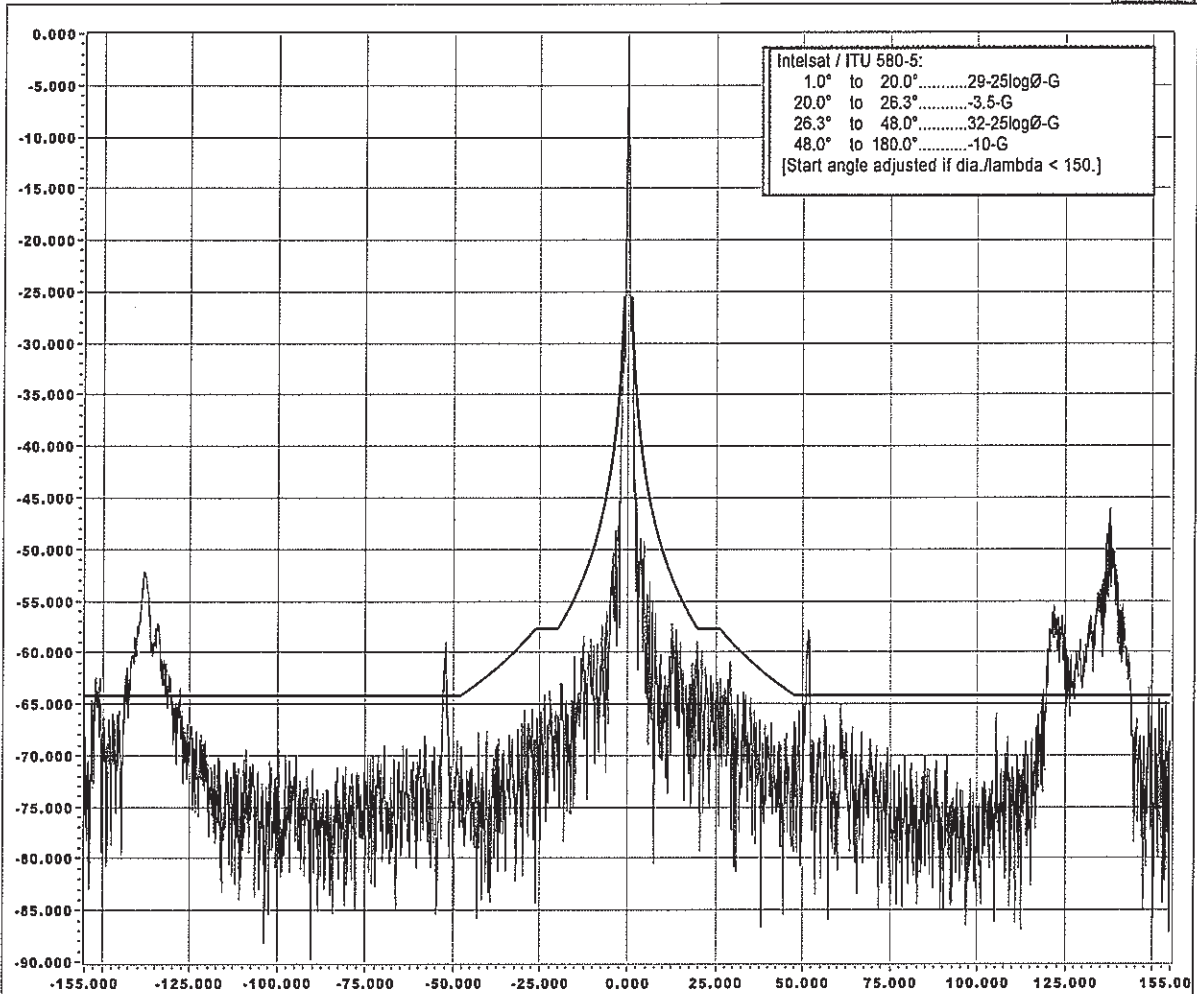
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...30.000 GHz

Azimuth

% Over Curve (not including main lobe)

12.8



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=30000000302, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 230449 30654 TC-155-HA-30.000.txt
 Test Frequency (GHz): 30.000000302
 Ref. Level (dBm): -40.72
 # Points Displayed: 7938

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.200
 Azimuth Beam Center (deg): 180.000
 Elevation Beam Center (deg): 12.000
 Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 231052
 Job Number..... 30654

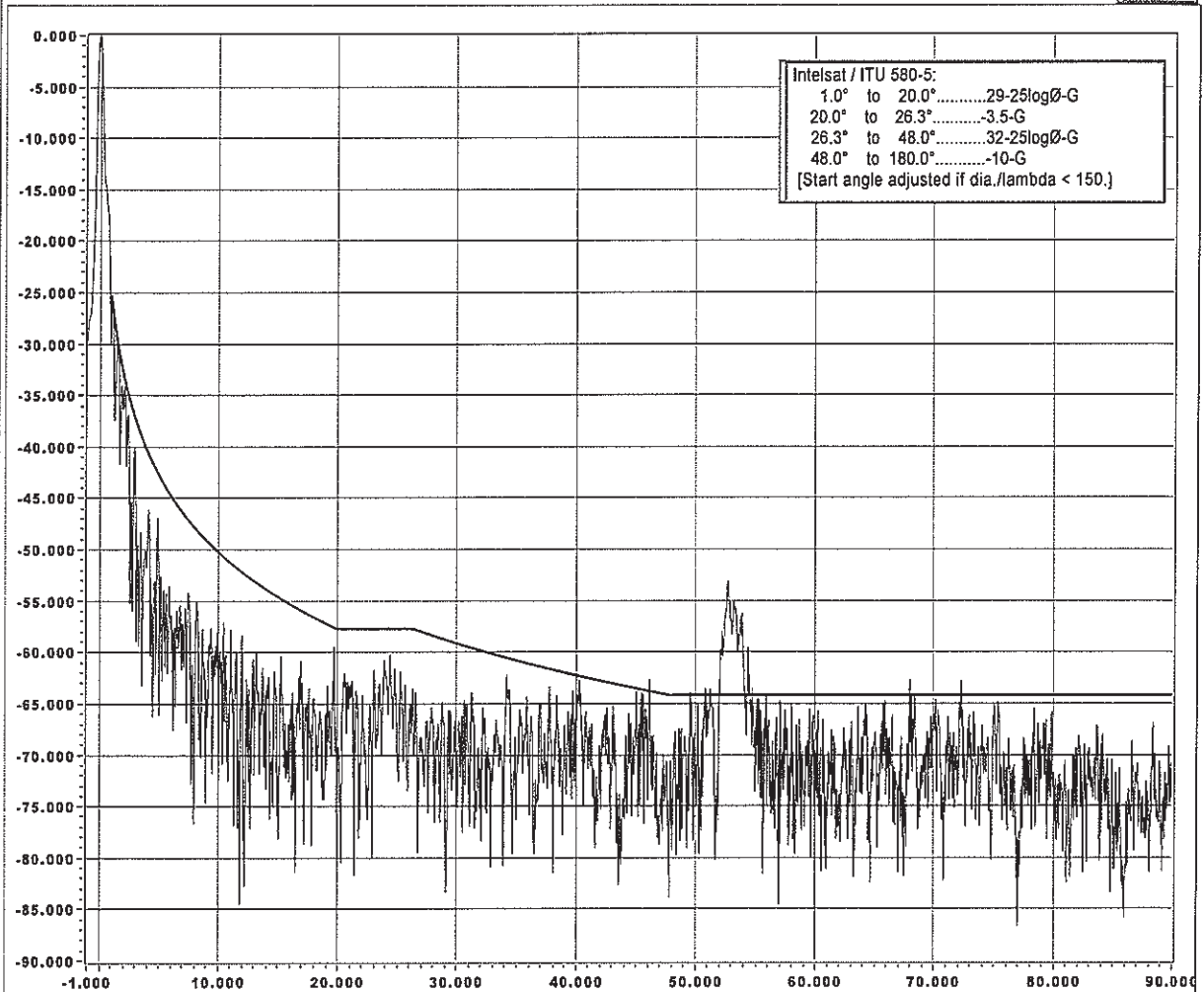
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...30.000 GHz

Elevation

% Over Curve (not including main lobe)

3.1



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=30000000302, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 231052 30654 TC-90-HE-30.000.txt

Specified Gain: 54.200

Test Frequency (GHz): 30.000000302

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -41.57

Elevation Beam Center (deg): 12.000

Points Displayed: 7272

Versions
61030 FAST
60129 PACK

Margin Under Curve (dB): None



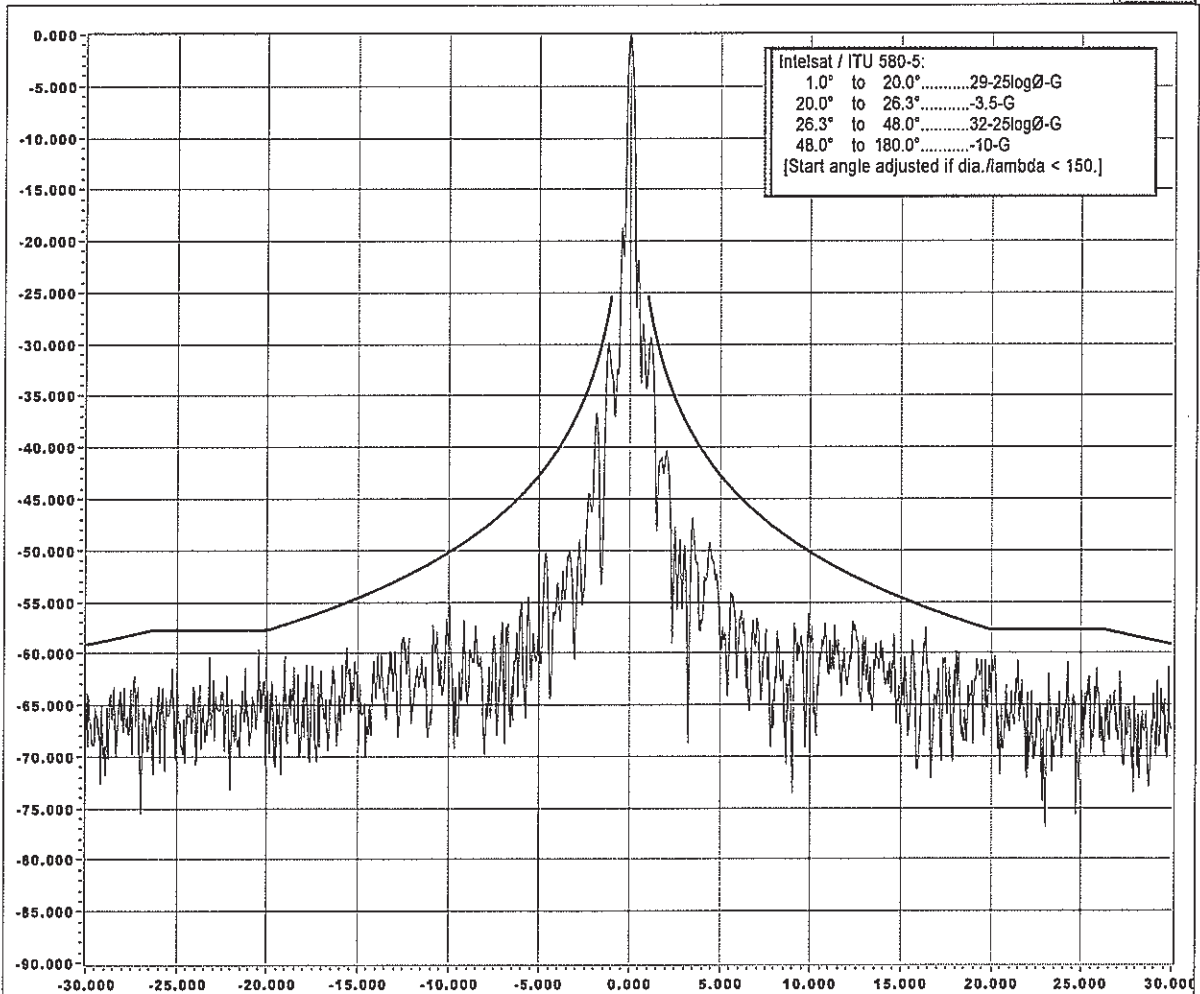
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 104702
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...30.000 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=30000000003, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 104702 30654 TC-166-HA-30.000.txt

Test Frequency (GHz): 30.000000003

Ref. Level (dBm): -44.60

Points Displayed: 1367

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.200

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 1.84



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 105433
 Job Number..... 30654

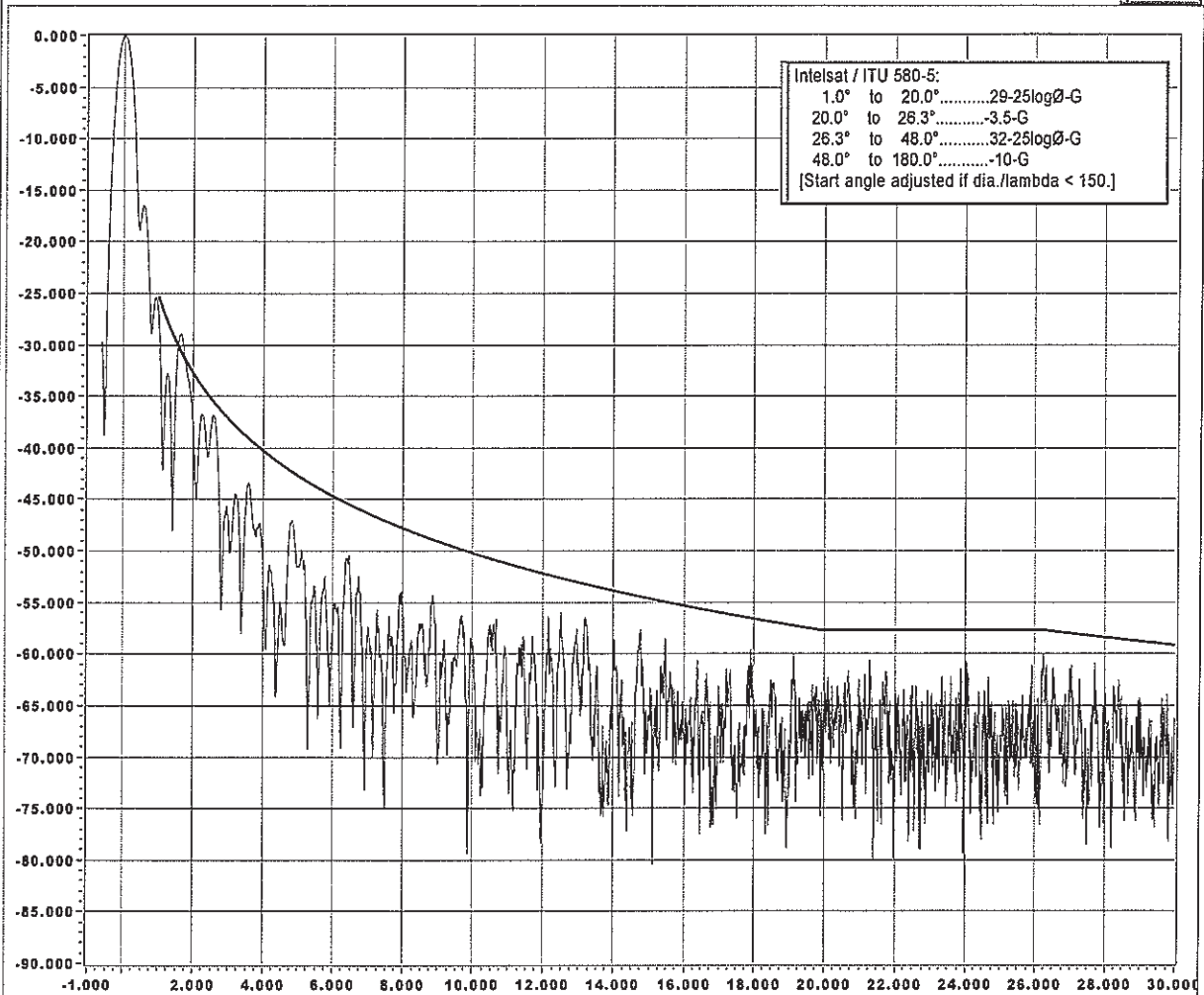
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...HORZ polarization...30.000 GHz

Elevation

% Over Curve (not including main lobe)

0.7



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=30000000003, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 105433 30654 TC-90-HE-30.000.txt

Specified Gain: 54.200

Test Frequency (GHz): 30.000000003

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -45.06

Elevation Beam Center (deg): 6.030

Points Displayed: 3451

Margin Under Curve (dB): None

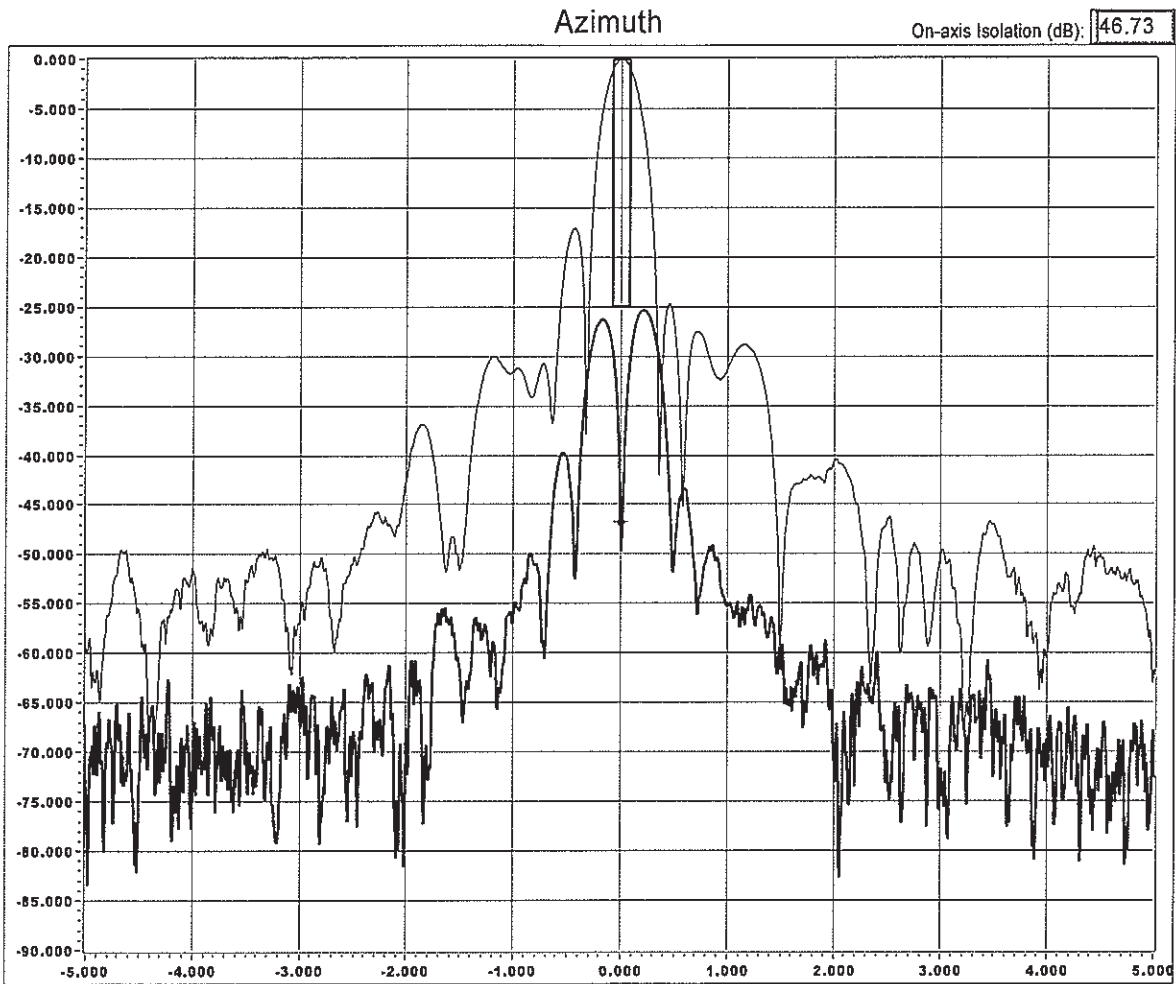
Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 173554
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...30.000 GHz



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2999999995, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 173024 30654 TC-5-HA-30.000.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 173554 30654 TX-5-HA-30.000.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.99999995	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-42.26	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192		

Versions
 61030 FAST
 60129 PACK



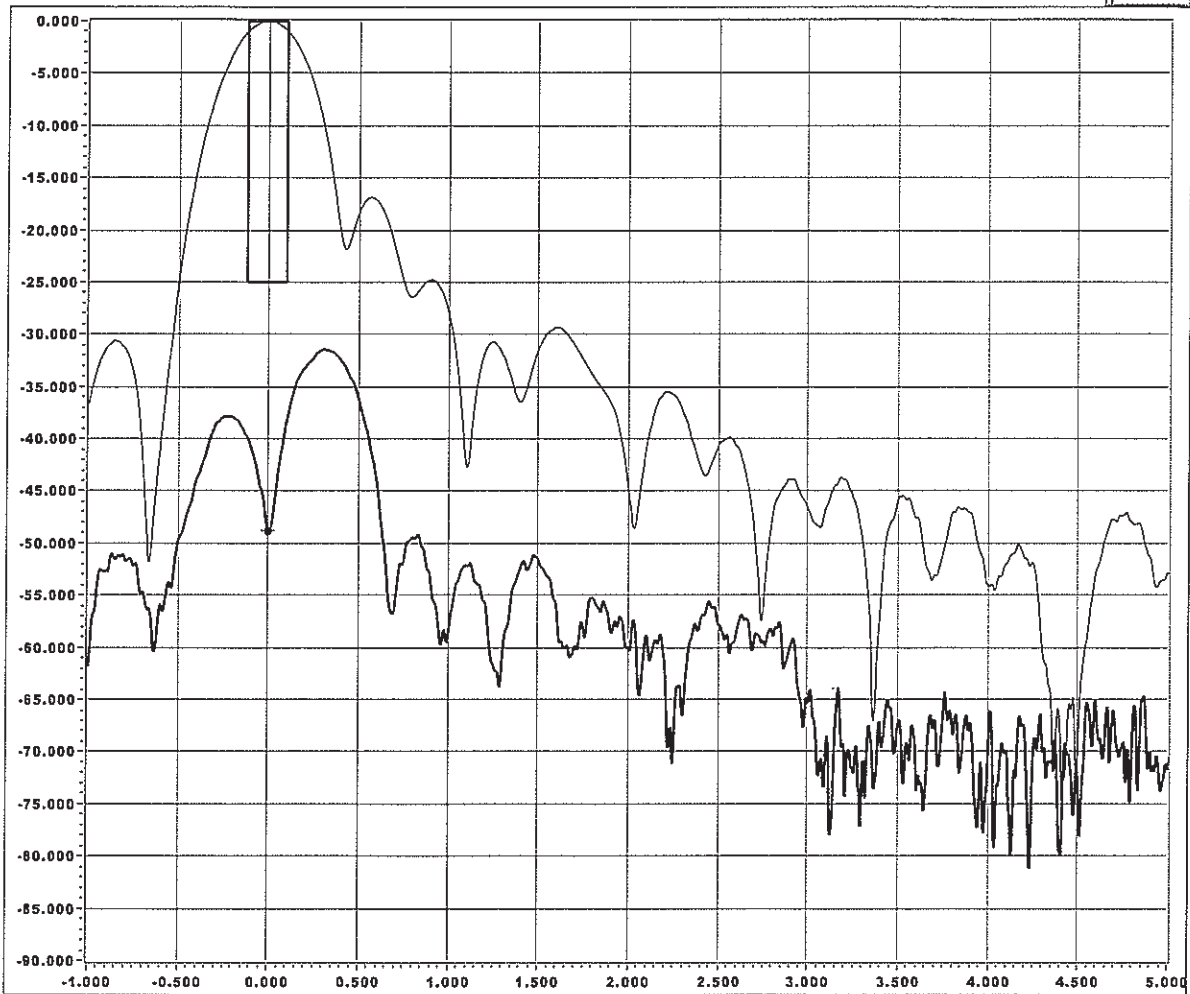
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 173133
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...HORZ polarization...30.000 GHz

Elevation

On Axis Isolation (dB): 48.79



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29999999995, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 173133 30654 TC-5-HE-30.000.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 173756 30654 TX-5-HE-30.000.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.999999995	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-42.26	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7576	Versions 61030 FAST 60129 PACK	



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 113001
 Job Number..... 30654

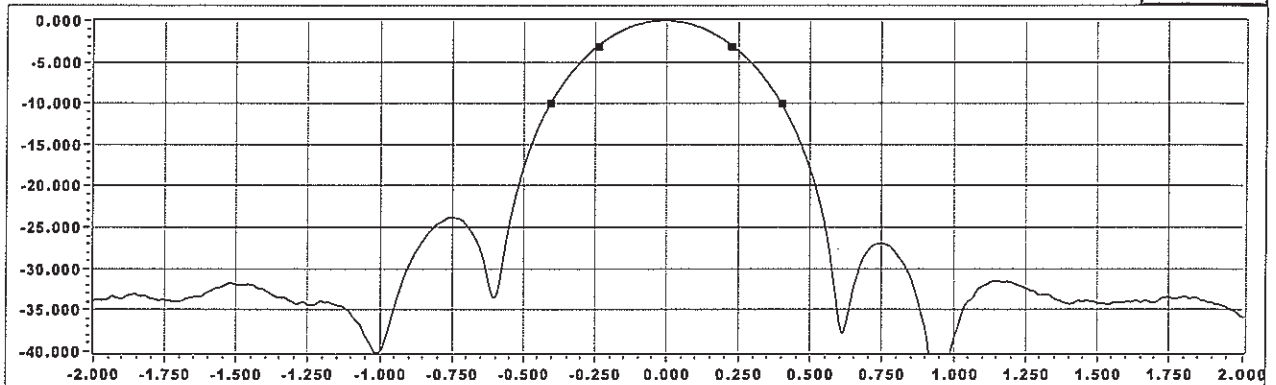
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...VERT Polarization...Gain by Beamwidth...18.800 GHz

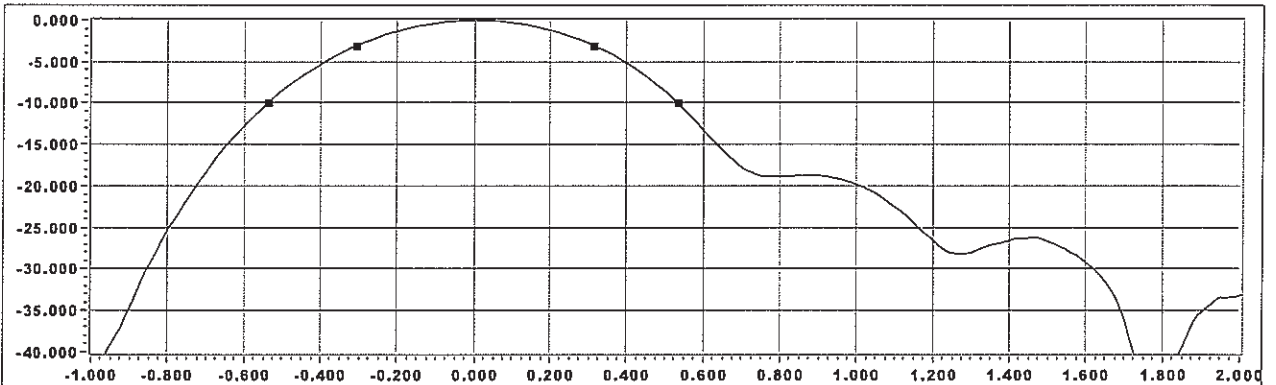
Spec. Gain (dBi):

Calculated Gain (dB):

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\left(\frac{3\text{dB factor}}{\text{AZ 3dB BW} * \text{EL 3dB BW}} + \frac{10\text{dB factor}}{\text{AZ 10dB BW} * \text{EL 10dB BW}} \right) / 2 \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File
 EL Co-pol File

The calculated gain is less than the specified gain by 0.87 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	<input type="text" value="18.800000003"/>
AZ Ref. Level (dBm)	<input type="text" value="-50.44"/>
Feed Loss (dB)	<input type="text" value="1.00"/>
RMS (in.)	<input type="text" value="0.015"/>
Azimuth (deg)	<input type="text" value="179.920"/>
Elevation (deg)	<input type="text" value="6.030"/>

AZ 3dB BW (deg)	<input type="text" value="0.4645"/>
AZ 10dB BW (deg)	<input type="text" value="0.8048"/>
AZ 15dB BW (deg)	<input type="text" value="0.9395"/>
EL 3dB BW (deg)	<input type="text" value="0.6170"/>
EL 10dB BW (deg)	<input type="text" value="1.0728"/>
EL 15dB BW (deg)	<input type="text" value="1.2833"/>

Points Displayed

3dB Factor	<input type="text" value="37000"/>
10dB Factor	<input type="text" value="107000"/>

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 100338
 Job Number..... 30654

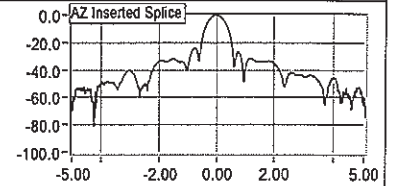
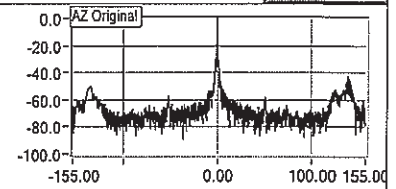
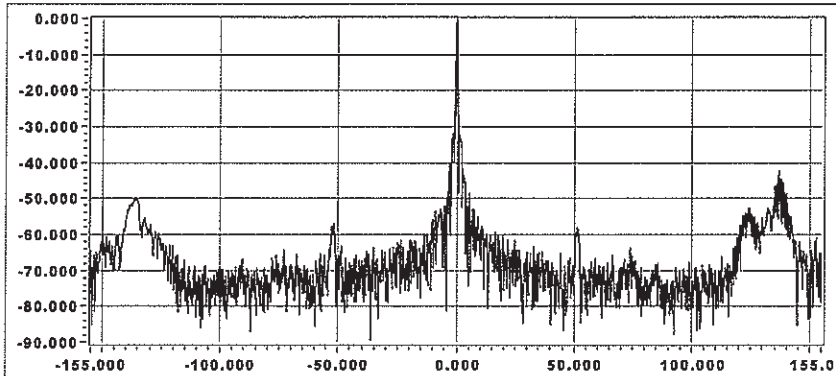
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...18.800 GHz

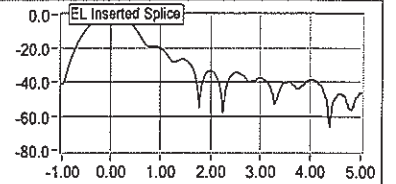
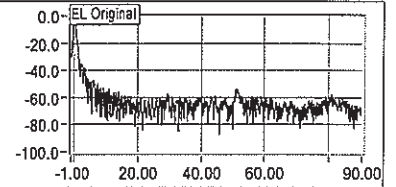
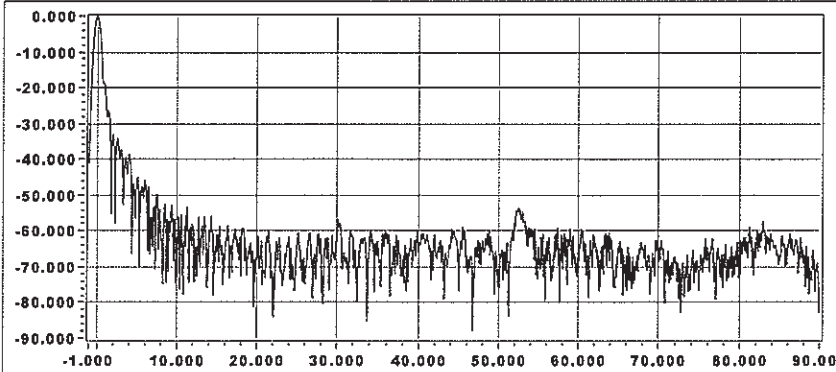
Spec. Gain (dBi): **50.500**

Calculated Gain (dB): **50.05**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

[SA Freq (Hz)=18800000186, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File: % 070814 100338 30654 TC-155-VA-18.800.txt
 EL Co-pol File: % 070814 100932 30654 TC-90-VE-18.800.txt
 AZ Insert File: % 070813 113106 30654 RC-5-VE-18.800.txt
 EL Insert File: % 070813 113001 30654 RC-5-VA-18.800.txt

Test Frequency (GHz): **18.800000186**
 AZ Ref. Level (dBm): **-50.44**
 Azimuth (deg): **180.000**
 Elevation (deg): **12.000**

Versions
 61030 FAST
 60129 PACK

The calculated gain is less than the specified gain by 0.45 dB.

Points Displayed: **15814**
 Feed Loss (dB): **0.85**
 Angular Extent Loss(dB): **0.15**
 Spar Blockage Loss (dB): **0.05**
 Cross-pol Loss (dB): **0.05**



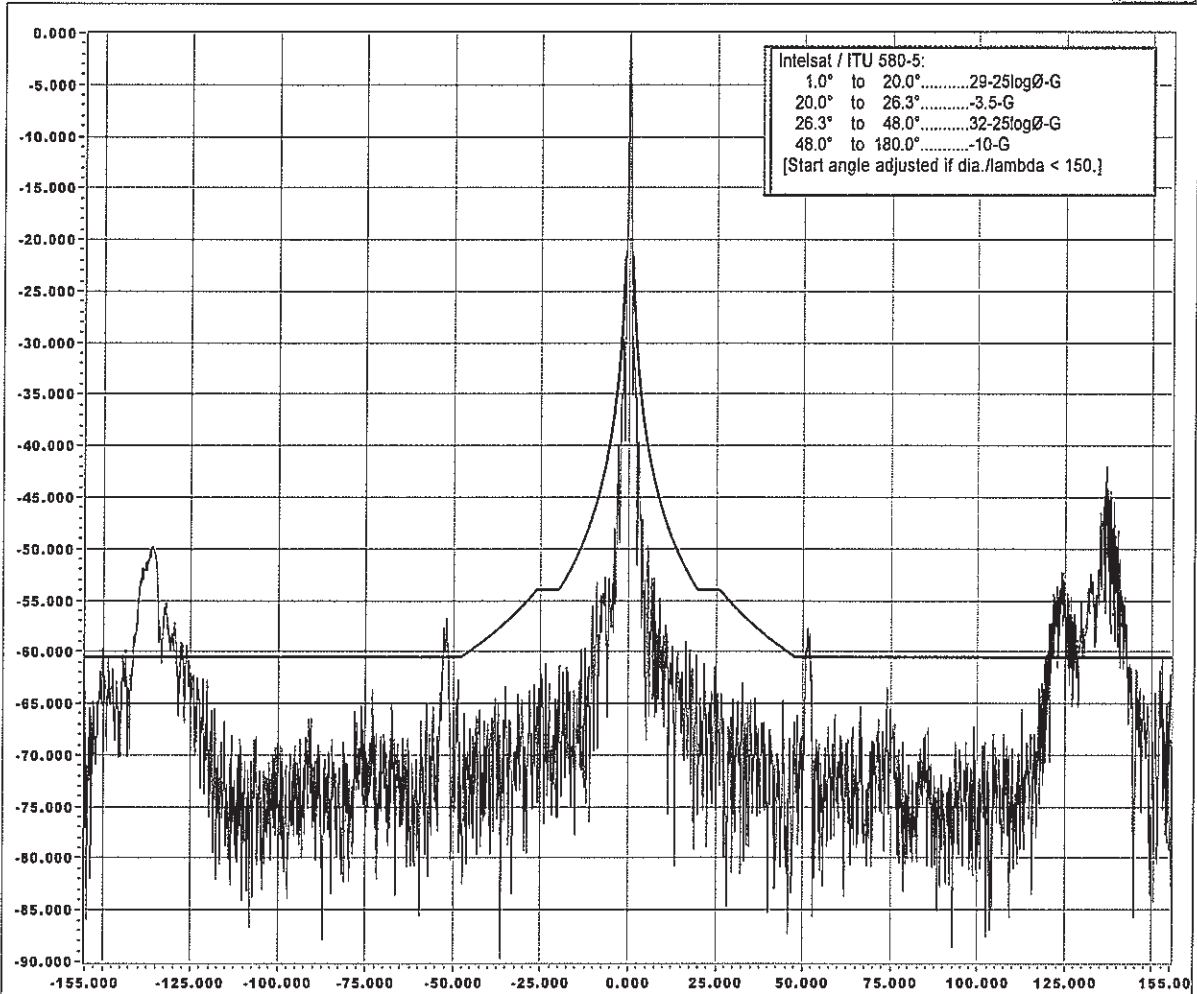
Customer..... Intelsat
 Date/Local Time.... 8-14-2007 at 100338
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...18.800 GHz

Azimuth

% Over Curve (not including main lobe) 12.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000186, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 100338 30654 TC-155-VA-18.800.txt

Test Frequency (GHz): 18.800000186

Ref. Level (dBm): -39.41

Points Displayed: 8192

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 50.500

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 100932
 Job Number..... 30654

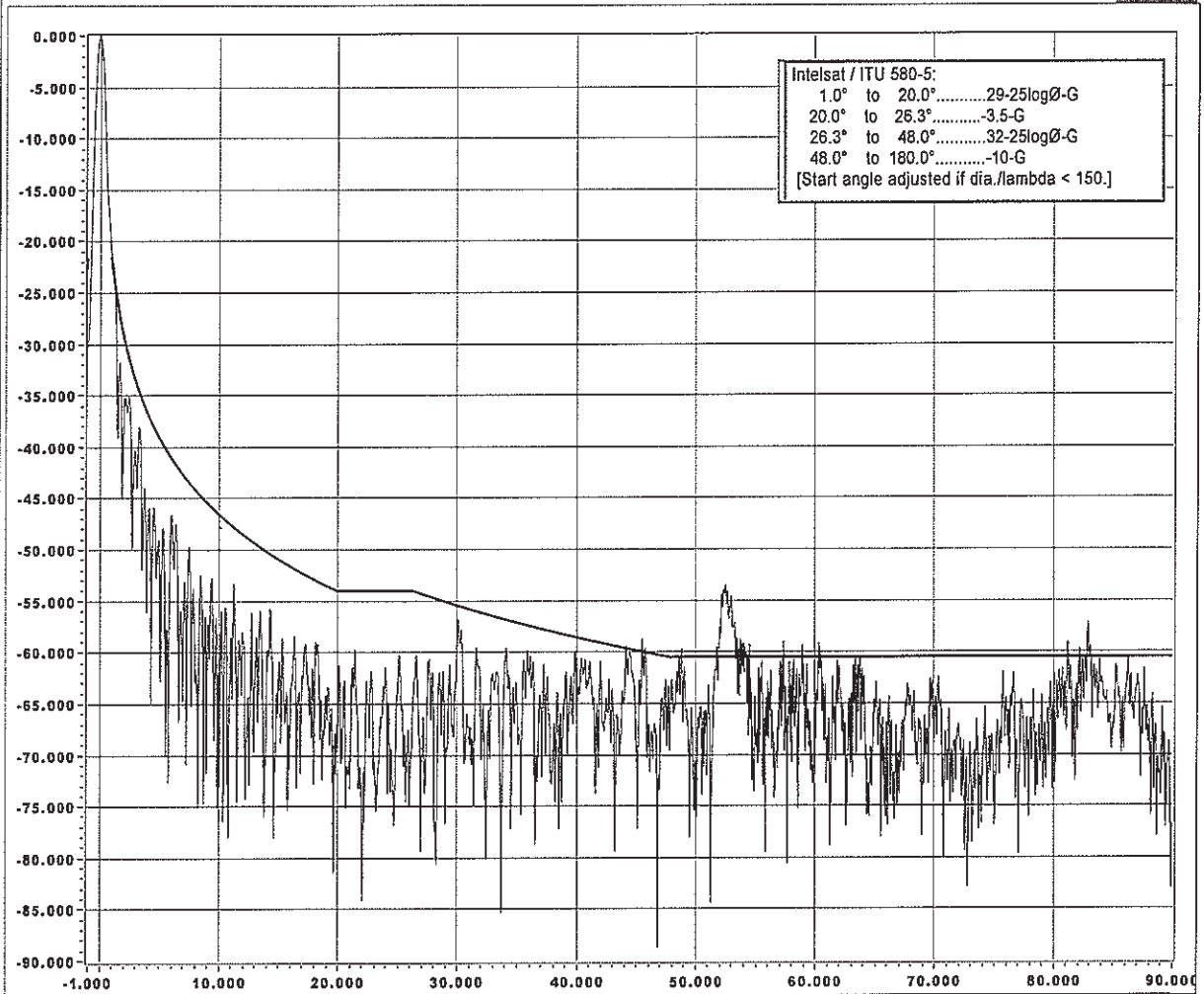
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...18.800 GHz

Elevation

% Over Curve (not including main lobe)

3.6



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000186, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 100932 30654 TC-90-VE-18.800.txt

Specified Gain: 50.500

Test Frequency (GHz): 18.800000186

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -39.29

Elevation Beam Center (deg): 12.000

Points Displayed: 7384

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



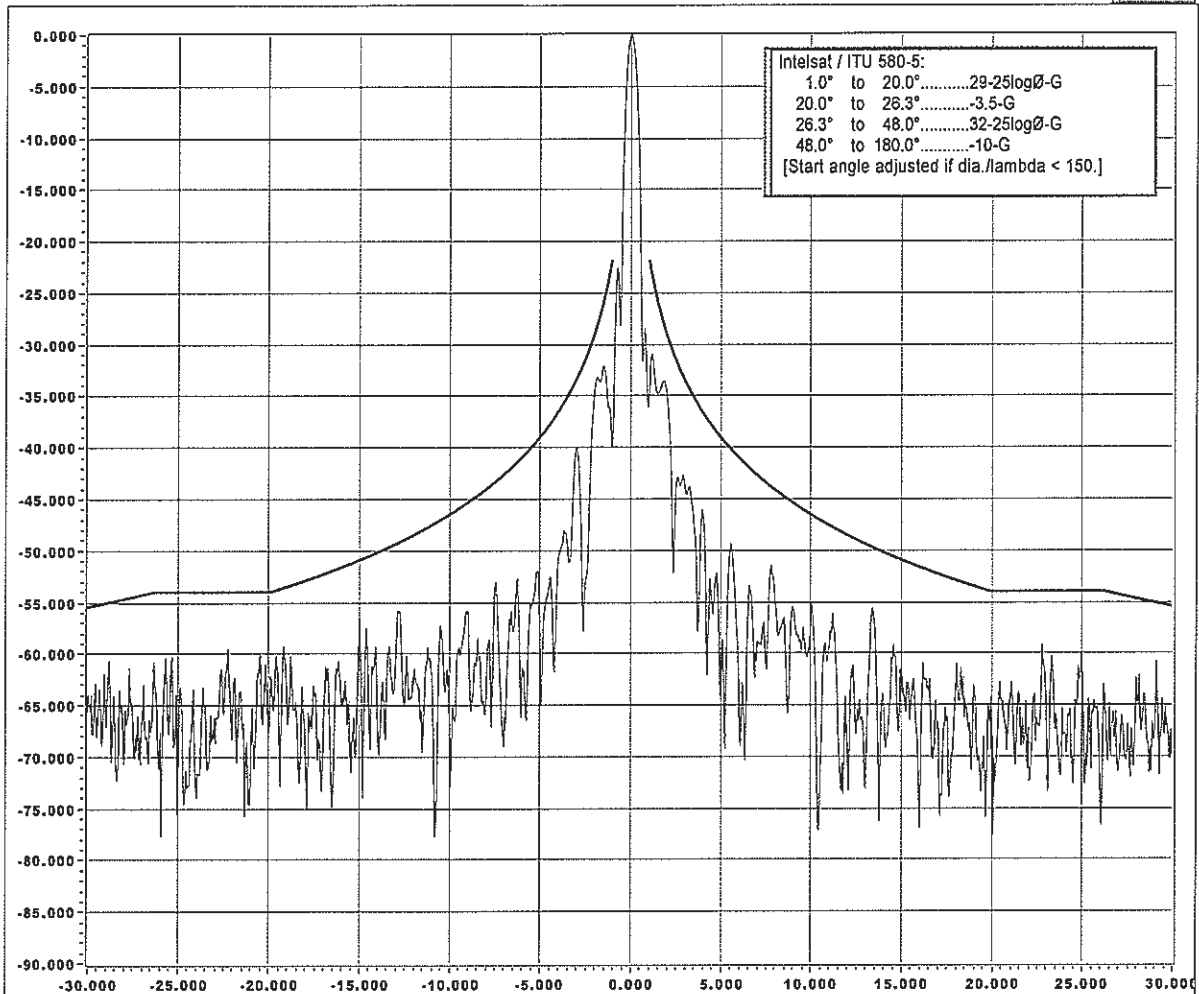
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 142223
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...18.800 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 142223 30654 RC-166-VA-18.800.txt
 Test Frequency (GHz): 18.80000000
 Ref. Level (dBm): -40.17
 # Points Displayed: 1341

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 50.500
 Azimuth Beam Center (deg): 179.960
 Elevation Beam Center (deg): 6.030
 Margin Under Curved (dB): 4.95



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 142949
 Job Number..... 30654

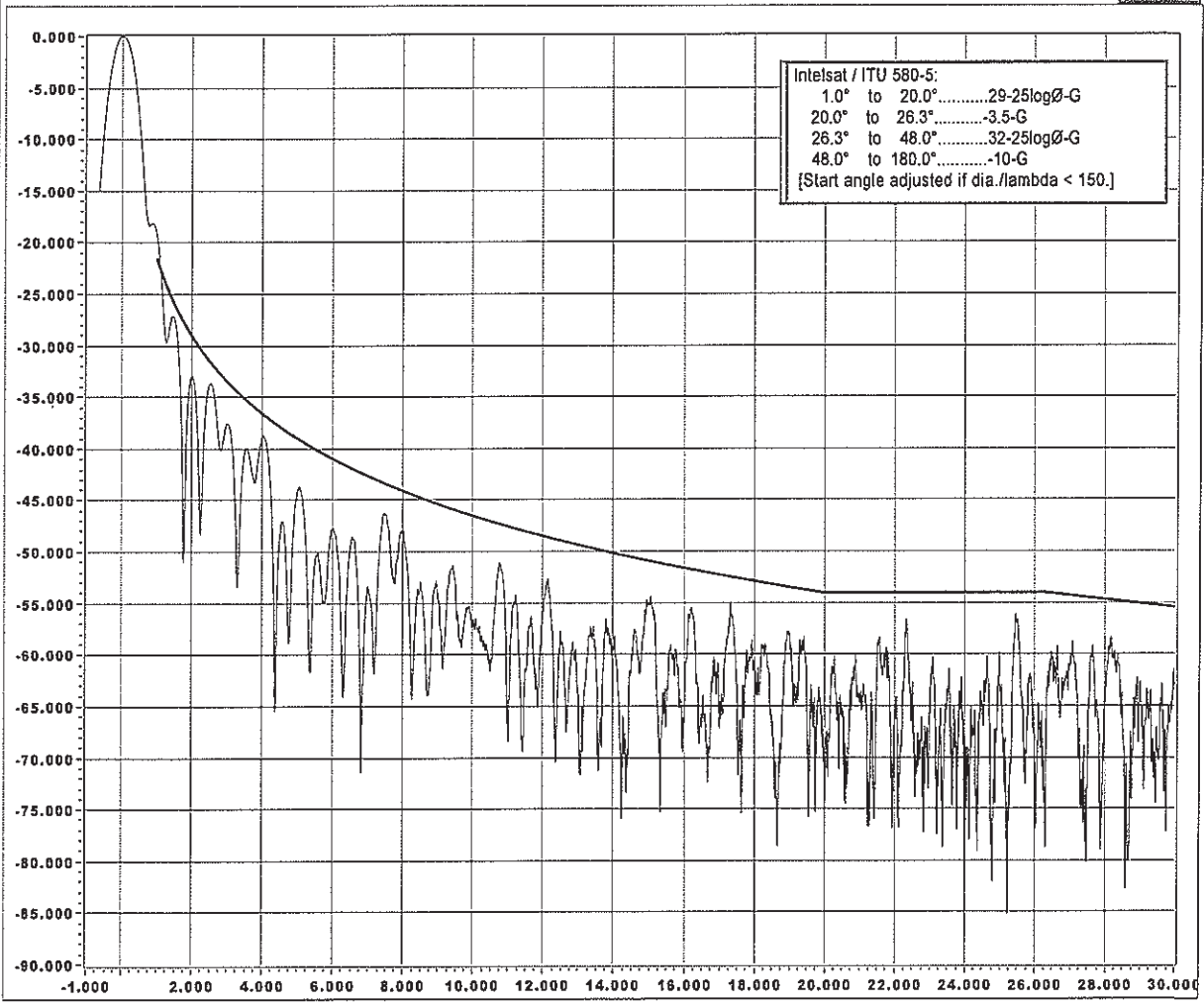
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...18.800 GHz

Elevation

% Over Curve (not including main lobe)

0.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 142949 30654 RC-90-VE-18.800.txt

Specified Gain: 50.500

Test Frequency (GHz): 18.800000000

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -40.60

Elevation Beam Center (deg): 6.030

Points Displayed: 3401

Margin Under Curve (dB): None



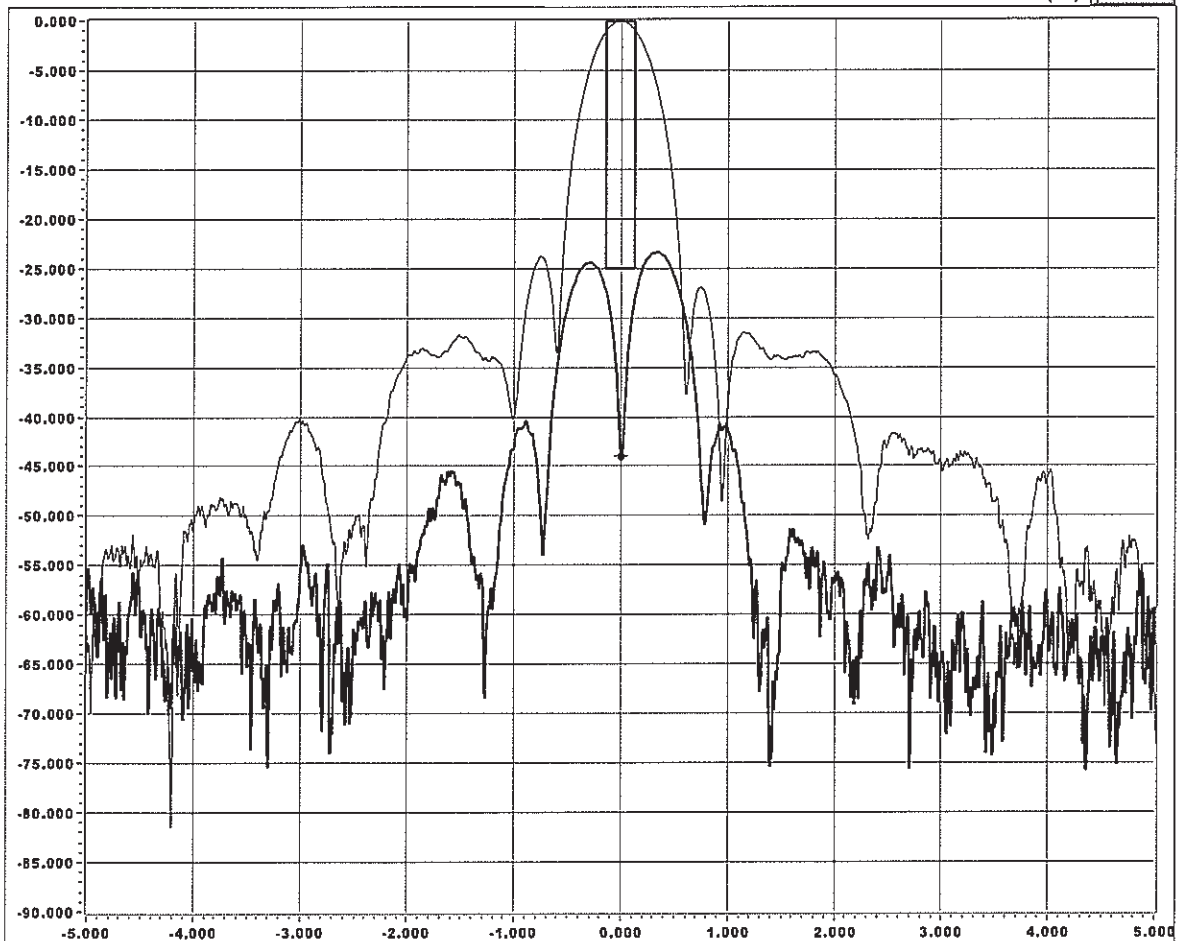
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 112604
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...VERT polarization...18.800 GHz

Azimuth

On-axis Isolation (dB): 43.94



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10	
Co-pol File: % 070813 113001 30654 RC-5-VA-18.800.txt	Azimuth Beam Center (deg): 179.920
Cross-pol File: % 070813 112604 30654 RX-5-VA-18.800.txt	Elevation Beam Center (deg): 6.030
Test Frequency (GHz): 18.800000003	On-axis Spec. Isolation (dB): 30.000
Ref. Level (dBm): -50.44	Off-axis Spec. Isolation (dB): 25.00
# Points Displayed: 8192	

Versions
 61030 FAST
 60129 PACK



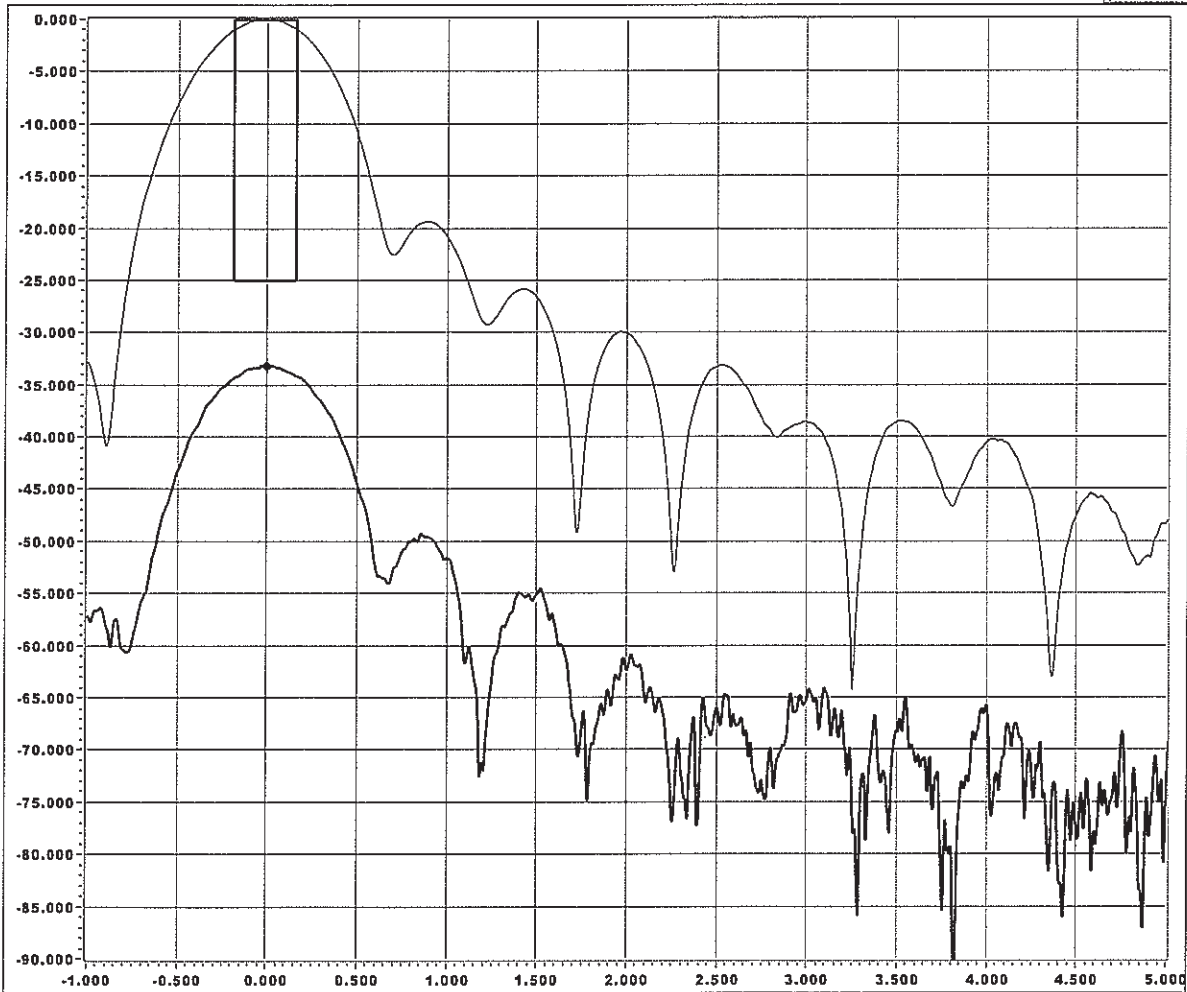
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 105151
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...HORZ polarization...18.800 GHz

Elevation

On Axis Isolation (dB): 33.15



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=18800000003, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 105151 30654 RC-5-HE-18.800.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 111200 30654 RX-5-HE-18.800.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	18.800000003	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-50.44	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7532		

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 144943
 Job Number..... 30654

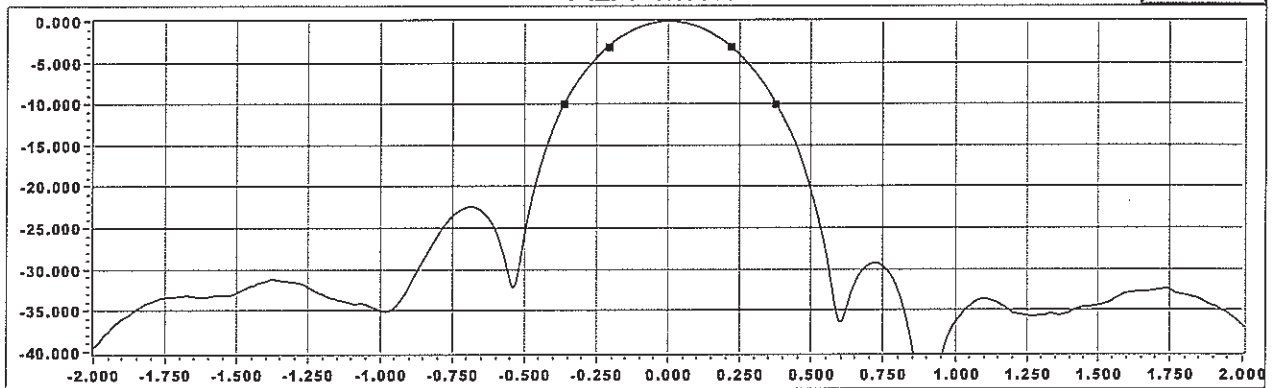
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...VERT Polarization...Gain by Beamwidth...20.275 GHz

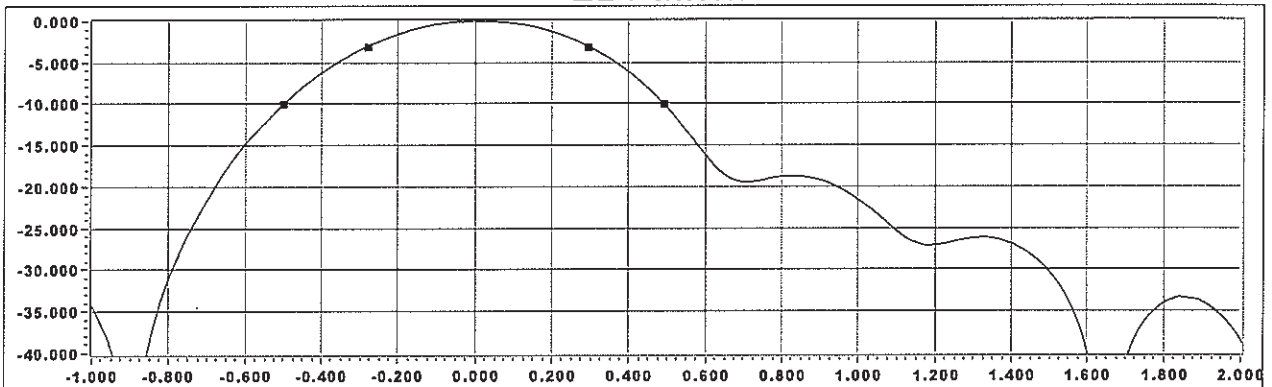
Spec. Gain (dBi): **51.200**

Calculated Gain (dB): **50.27**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{(\text{3dB factor} / (\text{AZ 3dB BW} * \text{EL 3dB BW})) + (\text{10dB factor} / (\text{AZ 10dB BW} * \text{EL 10dB BW}))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=2027500000, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File: % 070813 144943 30654 RC-5-VA-20.275.txt
 EL Co-pol File: % 070813 145044 30654 RC-5-VE-20.275.txt

The calculated gain is less than the specified gain by 0.93 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	20.27500000	AZ 3dB BW (deg)	0.4276	# Points Displayed	8196
AZ Ref. Level (dBm)	-46.72	AZ 10dB BW (deg)	0.7379		
Feed Loss (dB)	1.00	AZ 15dB BW (deg)	0.8687		
RMS (in.)	0.015	EL 3dB BW (deg)	0.5716		
Azimuth (deg)	179.870	EL 10dB BW (deg)	0.9915	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	1.1858	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 094615
 Job Number..... 30654

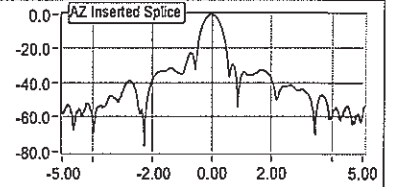
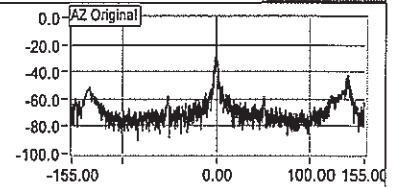
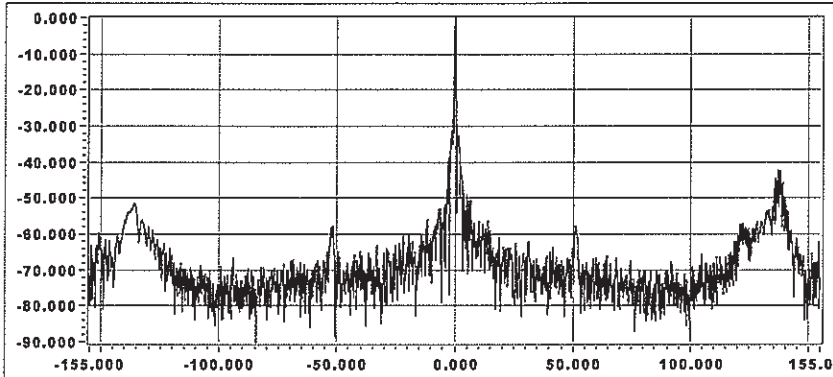
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...20.275 GHz

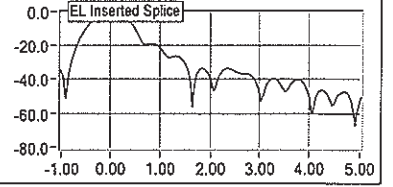
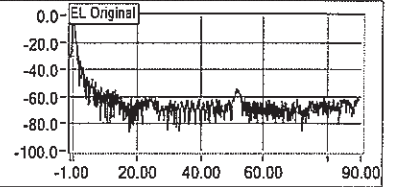
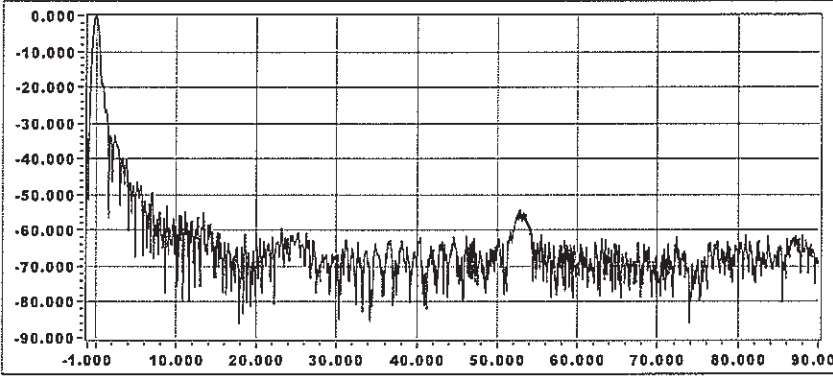
Spec. Gain (dBi): 51.200

Calculated Gain (dB): 50.74

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for look angles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at look angles offset from beam center.

SA Freq (Hz)=20275000200, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070814 094615 30654 TC-155-VA-20.275.txt
 EL Co-pol File % 070814 095214 30654 TC-90-VE-20.275.txt
 AZ Insert File % 070813 145044 30654 RC-5-VE-20.275.txt
 EL Insert File % 070813 144943 30654 RC-5-VA-20.275.txt

The calculated gain is less than the specified gain by 0.46 dB.

Test Frequency (GHz) 20.275000200
 AZ Ref. Level (dBm) -46.72
 Azimuth (deg) 180.000
 Elevation (deg) 12.000

Versions
 61030 FAST
 60129 PACK

Points Displayed 15855
 Feed Loss (dB) 0.85
 Angular Extent Loss(dB) 0.15
 Spar Blockage Loss (dB) 0.05
 Cross-pol Loss (dB) 0.05



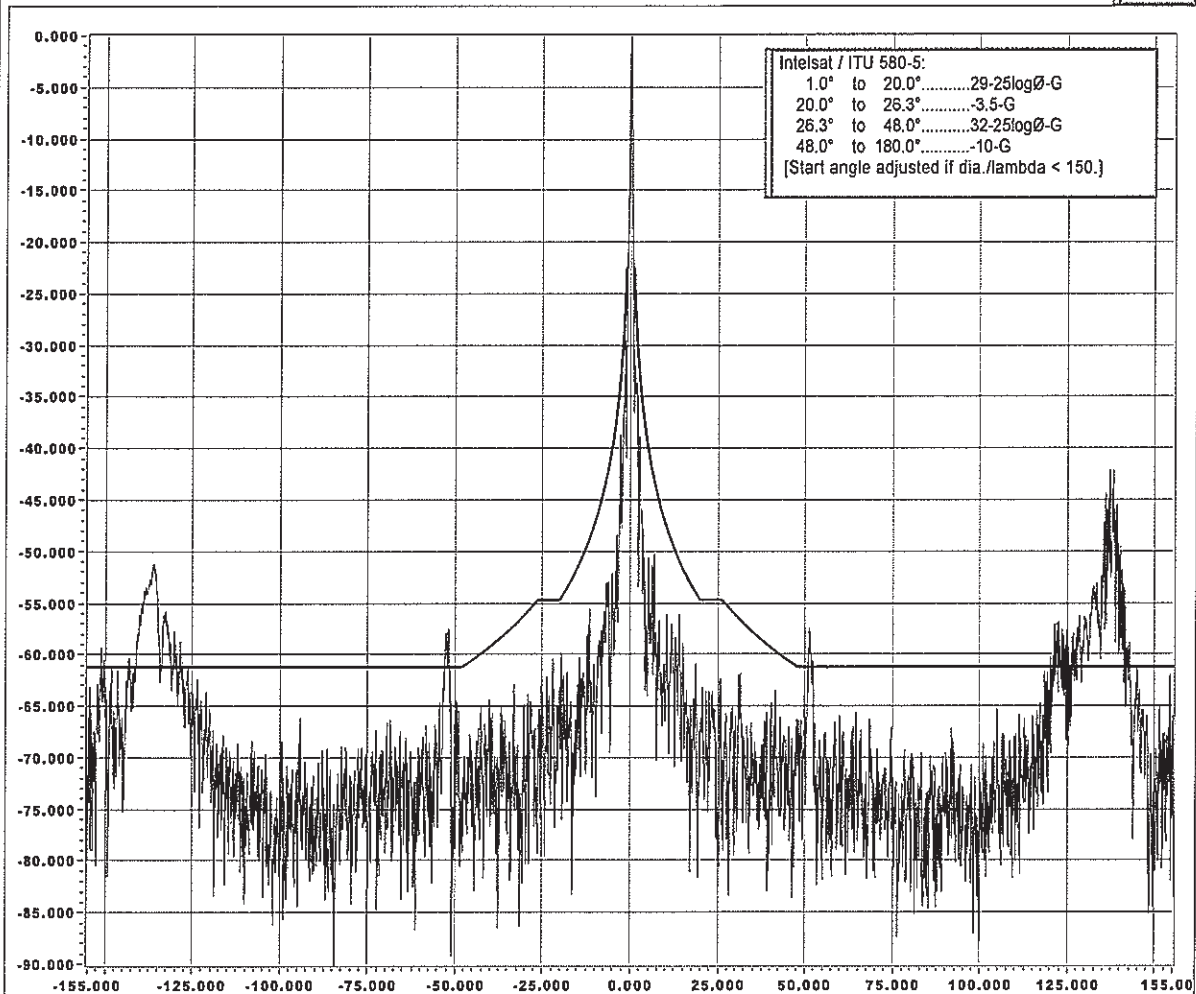
Customer..... Intelsat
 Date/Local Time.... 8-14-2007 at 094615
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...20.275 GHz

Azimuth

% Over Curve (not including main lobe) 10.6



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000200, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 094615 30654 TC-155-VA-20.275.txt

Test Frequency (GHz): 20.275000200

Ref. Level (dBm): -44.49

Points Displayed: 8192

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.200

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 095214
 Job Number..... 30654

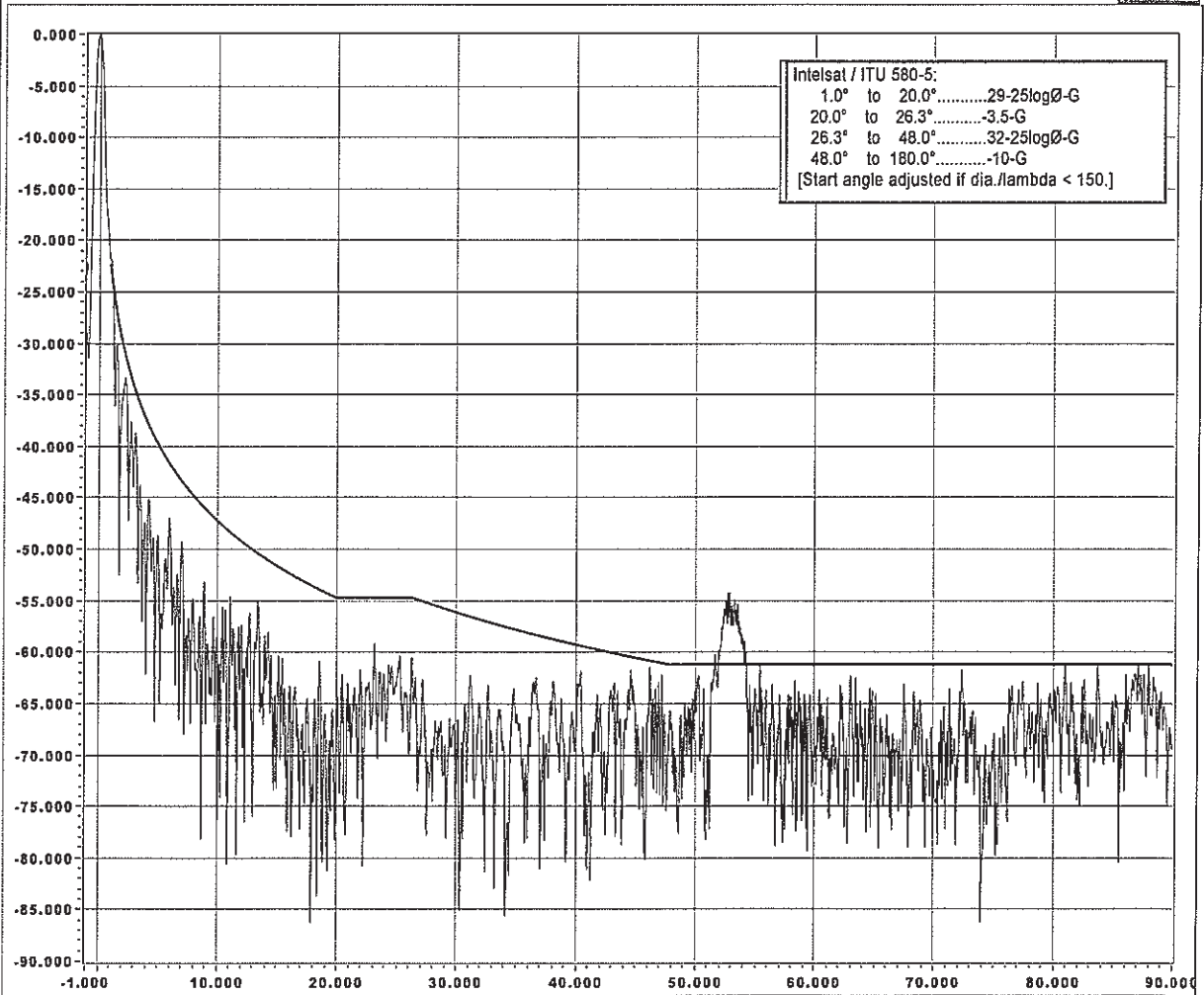
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...20.275 GHz

Elevation

% Over Curve (not including main lobe)

2.8



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000200, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 095214 30654 TC-90-VE-20.275.txt

Specified Gain: 51.200

Test Frequency (GHz): 20.275000200

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -44.37

Elevation Beam Center (deg): 12.000

Points Displayed: 7403

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



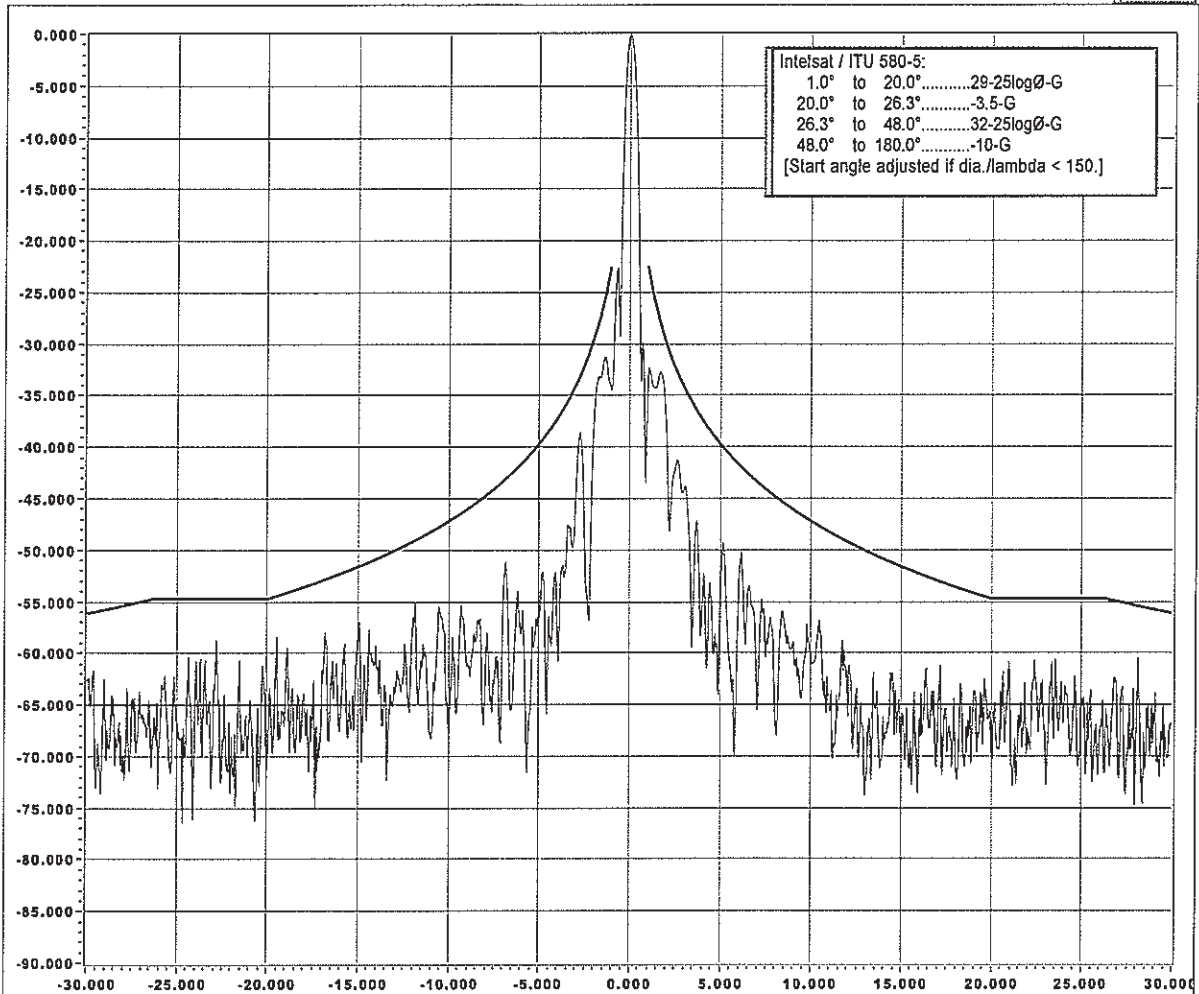
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 135304
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...20.275 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 135304 30654 RC-166-VA-20.275.txt

Test Frequency (GHz): 20.275000000

Ref. Level (dBm): -47.05

Points Displayed: 1344

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.200

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 3.93



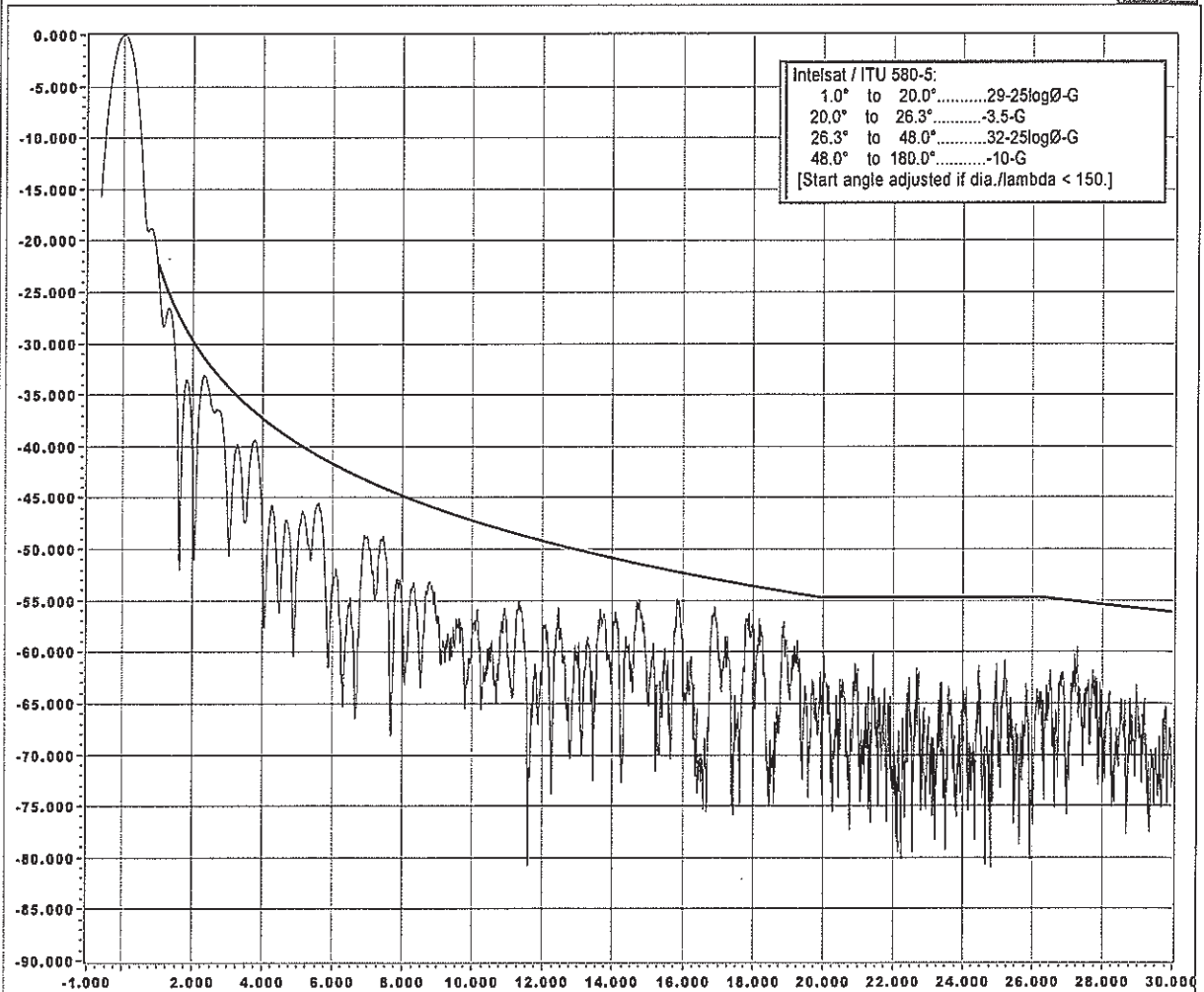
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 140036
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...20.275 GHz

Elevation

% Over Curve (not including main lobe)



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20275000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File:

Specified Gain:

Test Frequency (GHz):

Azimuth Beam Center (deg):

Ref. Level (dBm):

Elevation Beam Center (deg):

Points Displayed:

Margin Under Curve (dB):

Versions
 61030 FAST
 60129 PACK



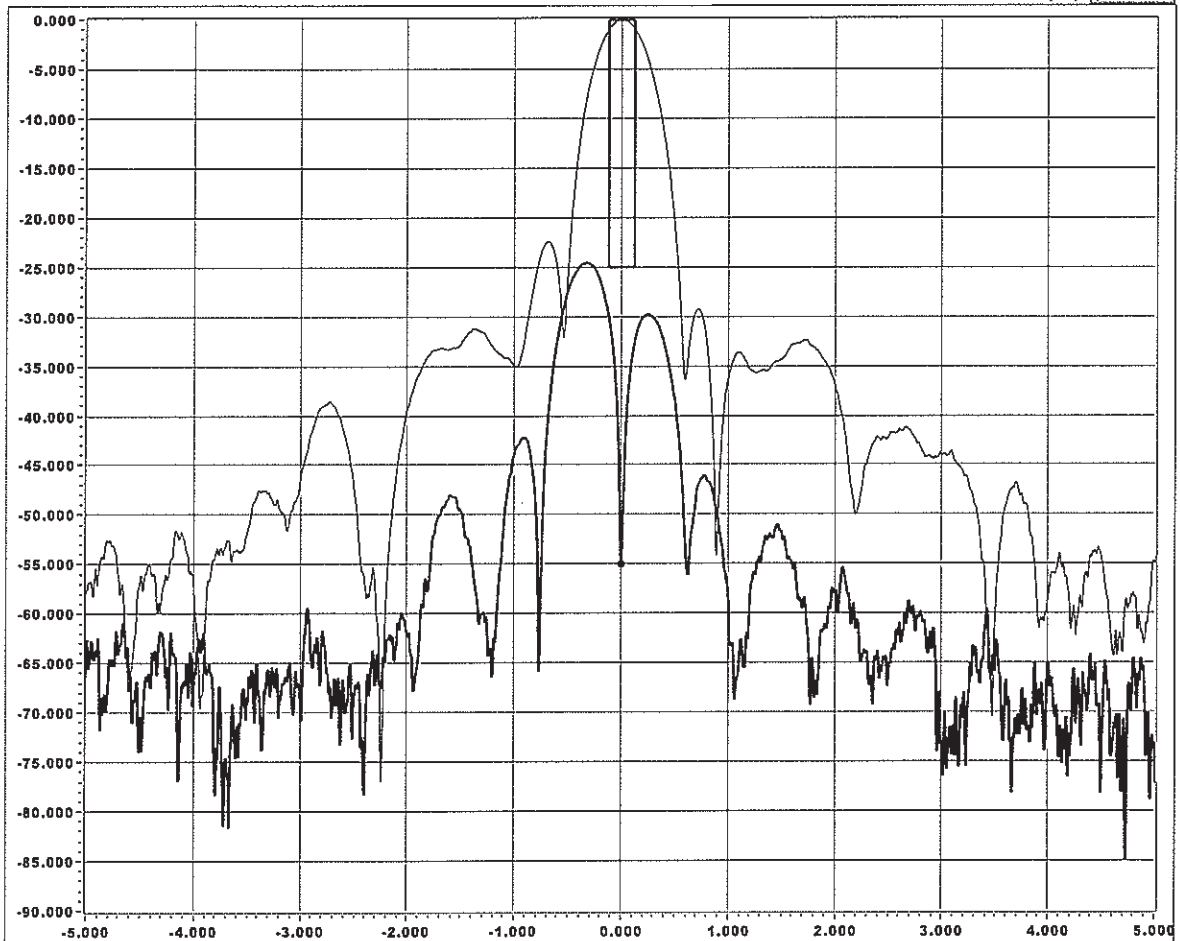
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 144431
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...VERT polarization...20.275 GHz

Azimuth

On-axis Isolation (dB): 54.97



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=20274999999, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 144943 30654 RC-5-VA-20.275.txt	Azimuth Beam Center (deg):	179.870
Cross-pol File:	% 070813 144431 30654 RX-5-VA-20.275.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	20.274999999	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-46.72	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192		

Versions
 61030 FAST
 60129 PACK



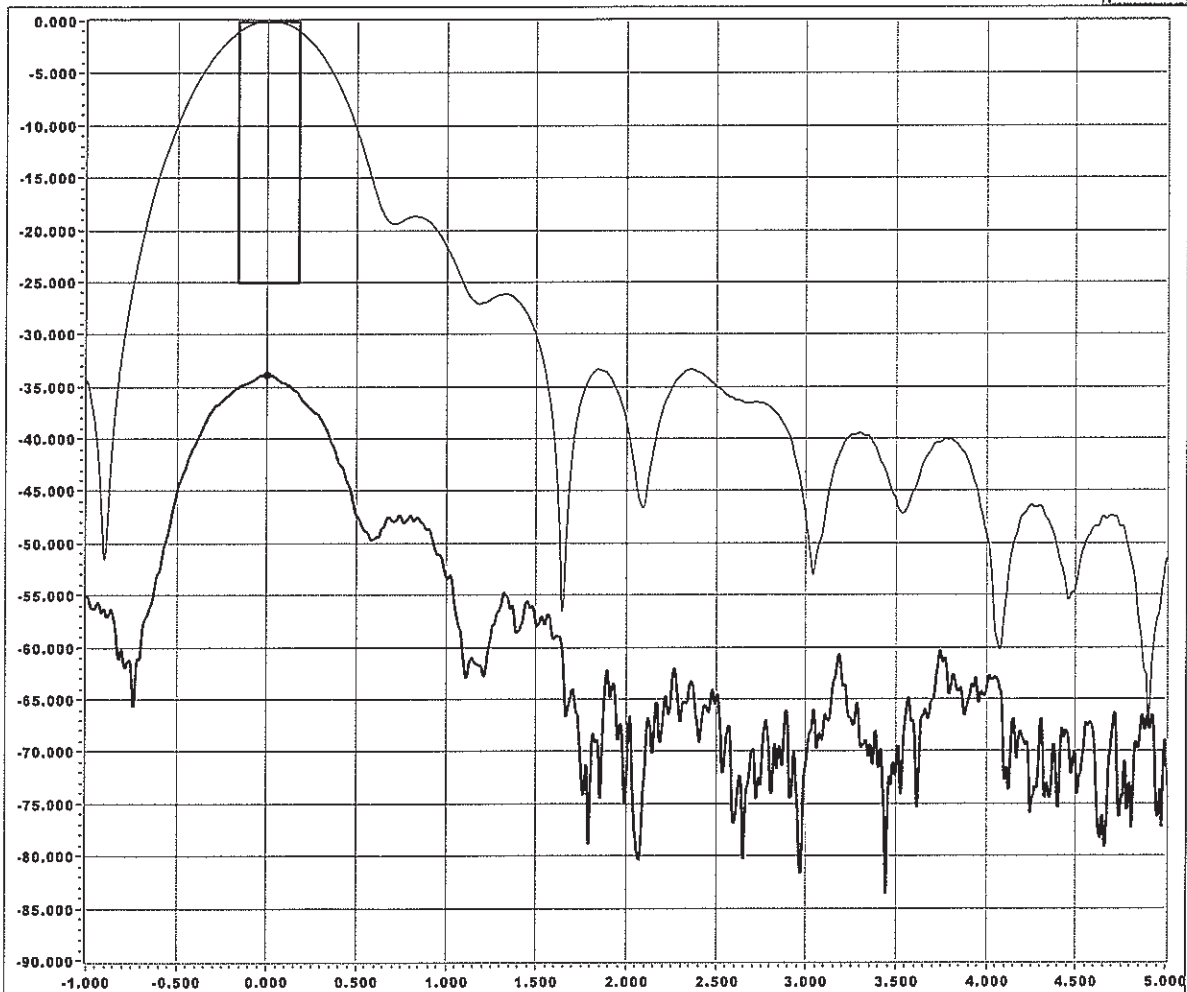
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 145044
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...VERT polarization...20.275 GHz

Elevation

On Axis Isolation (dB): 33.83



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2027500000, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10	
Co-pol File: % 070813 145044 30654 RC-5-VE-20.275.txt	Azimuth Beam Center (deg): 179.870
Cross-pol File: % 070813 144638 30654 RX-5-VE-20.275.txt	Elevation Beam Center (deg): 6.030
Test Frequency (GHz): 20.275000000	On-axis Spec. Isolation (dB): 30.000
Ref. Level (dBm): -46.72	Off-axis Spec. Isolation (dB): 25.00
# Points Displayed: 7613	



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 154019
 Job Number..... 30654

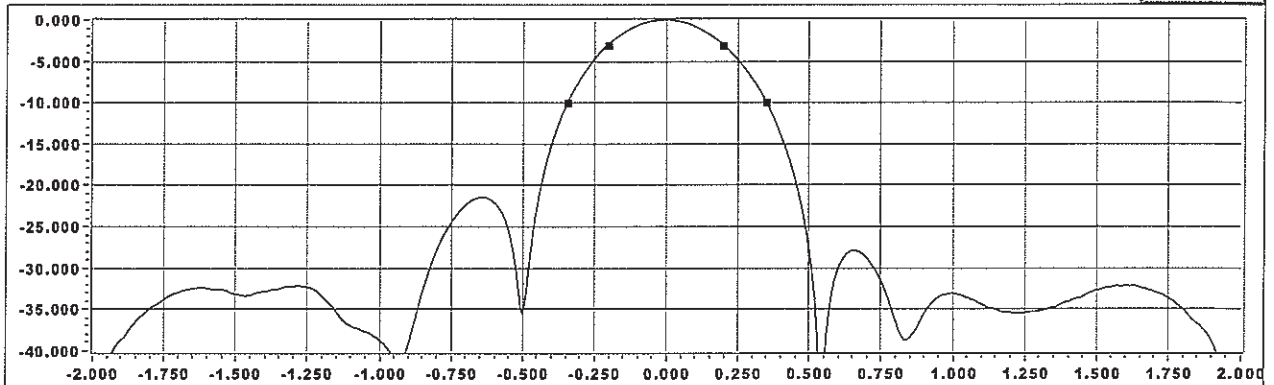
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...VERT Polarization...Gain by Beamwidth...21.750 GHz

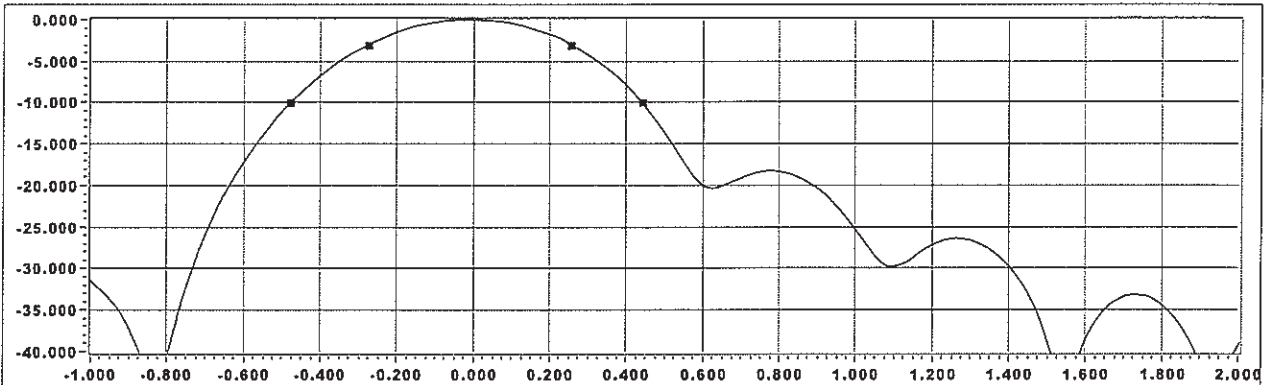
Spec. Gain (dBi): **51.700**

Calculated Gain (dB): **50.78**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\left(\frac{3\text{dB factor}}{\text{AZ 3dB BW} * \text{EL 3dB BW}} \right) + \left(\frac{10\text{dB factor}}{\text{AZ 10dB BW} * \text{EL 10dB BW}} \right) \right] / 2] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=2175000000, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 154019 30654 RC-5-VA-21.750.txt
 EL Co-pol File % 070813 154125 30654 RC-5-VE-21.750.txt

The calculated gain is less than the specified gain by 0.92 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	21.75000000
AZ Ref. Level (dBm)	-43.44
Feed Loss (dB)	1.00
RMS (in.)	0.015
Azimuth (deg)	179.870
Elevation (deg)	6.030

AZ 3dB BW (deg)	0.4047
AZ 10dB BW (deg)	0.6940
AZ 15dB BW (deg)	0.8105
EL 3dB BW (deg)	0.5298
EL 10dB BW (deg)	0.9190
EL 15dB BW (deg)	1.0863

Points Displayed **8196**

3dB Factor **37000**
 10dB Factor **107000**

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 092708
 Job Number..... 30654

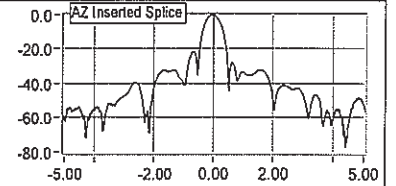
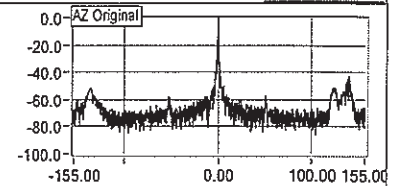
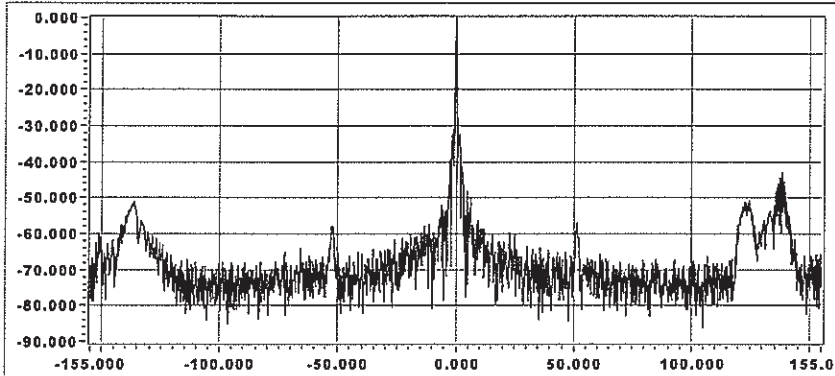
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...21.750 GHz

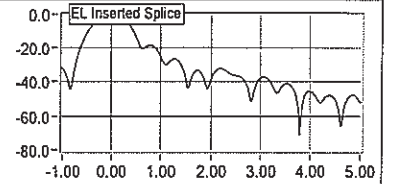
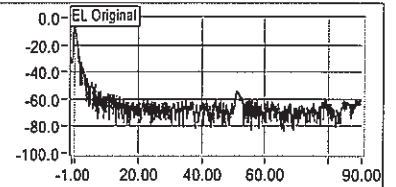
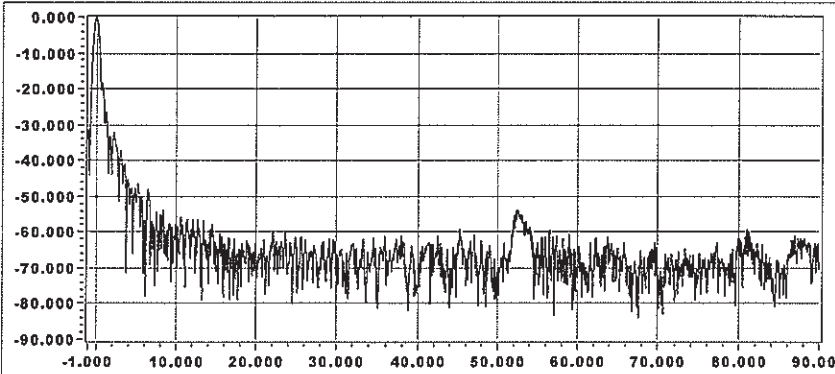
Spec. Gain (dBi): 51.700

Calculated Gain (dB): 51.26

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for lookangles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at lookangles offset from beam center.

SA Freq (Hz)=2175000214, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070814 092708 30654 TC-155-VA-21.750.txt
 EL Co-pol File % 070814 093305 30654 TC-90-VE-21.750.txt
 AZ Insert File % 070813 154125 30654 RC-5-VE-21.750.txt
 EL Insert File % 070813 154019 30654 RC-5-VA-21.750.txt

The calculated gain is less than the specified gain by 0.44 dB.

Test Frequency (GHz) 21.75000214
 AZ Ref. Level (dBm) -43.44
 Azimuth (deg) 180.000
 Elevation (deg) 12.000

Versions
 61030 FAST
 60129 PACK

Points Displayed 15904
 Feed Loss (dB) 0.85
 Angular Extent Loss(dB) 0.15
 Spar Blockage Loss (dB) 0.05
 Cross-pol Loss (dB) 0.05



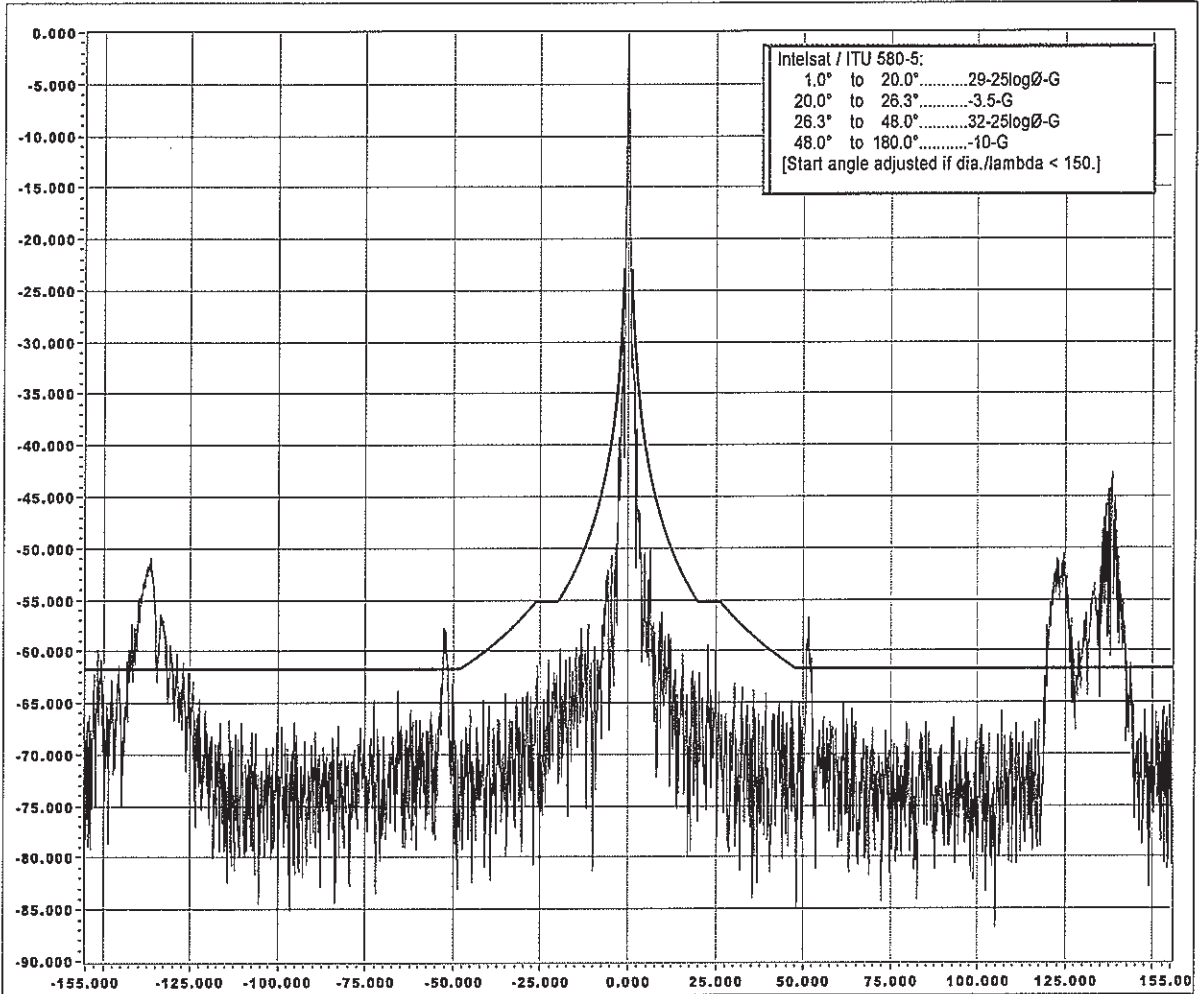
Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 092708
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...21.750 GHz

Azimuth

% Over Curve (not including main lobe) 11.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000214, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 092708 30654 TC-155-VA-21.750.txt
 Test Frequency (GHz): 21.750000214
 Ref. Level (dBm): -45.60
 # Points Displayed: 8192

Specified Gain (dB): 51.700
 Azimuth Beam Center (deg): 180.000
 Elevation Beam Center (deg): 12.000
 Margin Under Curved (dB): None

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 093305
 Job Number..... 30654

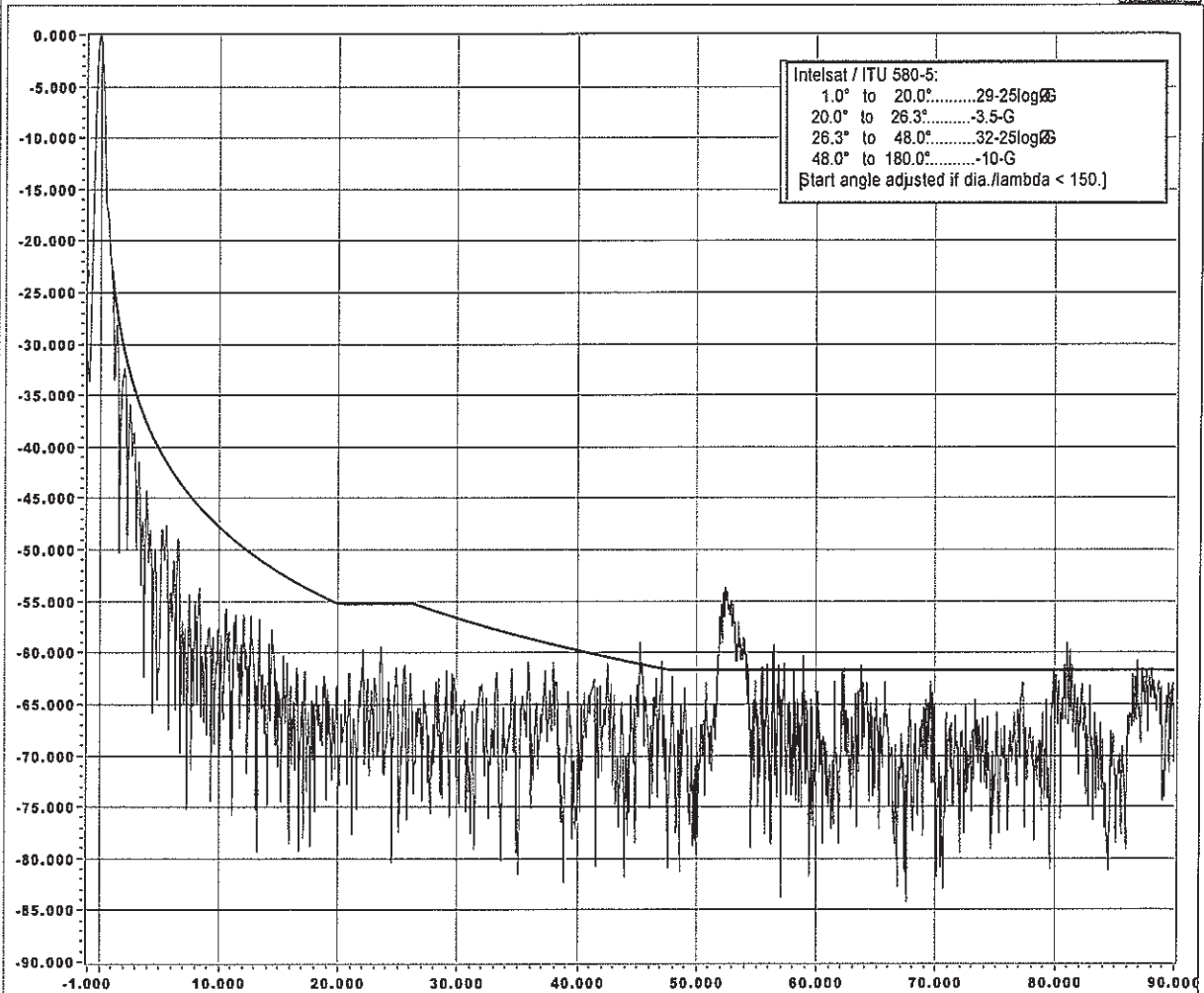
Altitude..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... JKO
 Spacecraft..... Short Range
 Transponder..... NA

TX.Co-pol...VERT polarization...21.750 GHz

Elevation

Power Curve (not including main lobe)

3.9



Intelsat / ITU 580-5:
 1.0° to 20.0°.....29-25logG
 20.0° to 26.3°.....-3.5-G
 26.3° to 48.0°.....32-25logG
 48.0° to 180.0°.....-10-G
 [Start angle adjusted if dia./lambda < 150.]

Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz) 21750000214, Az rate (deg/s) 1.142, EL rate (deg/s) 6.563, RBW (Hz) 0, VBW (Hz) 8

File: %70814 093305 30654 TC-90-VE-21.750.tk

Test Frequency (GHz): 21.750000214

Ref. Level (dBm): -45.72

#Points Displayed: 7434

61030 FAST
60129 PACK

Specified Gain: 51.700

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curve (dB): None



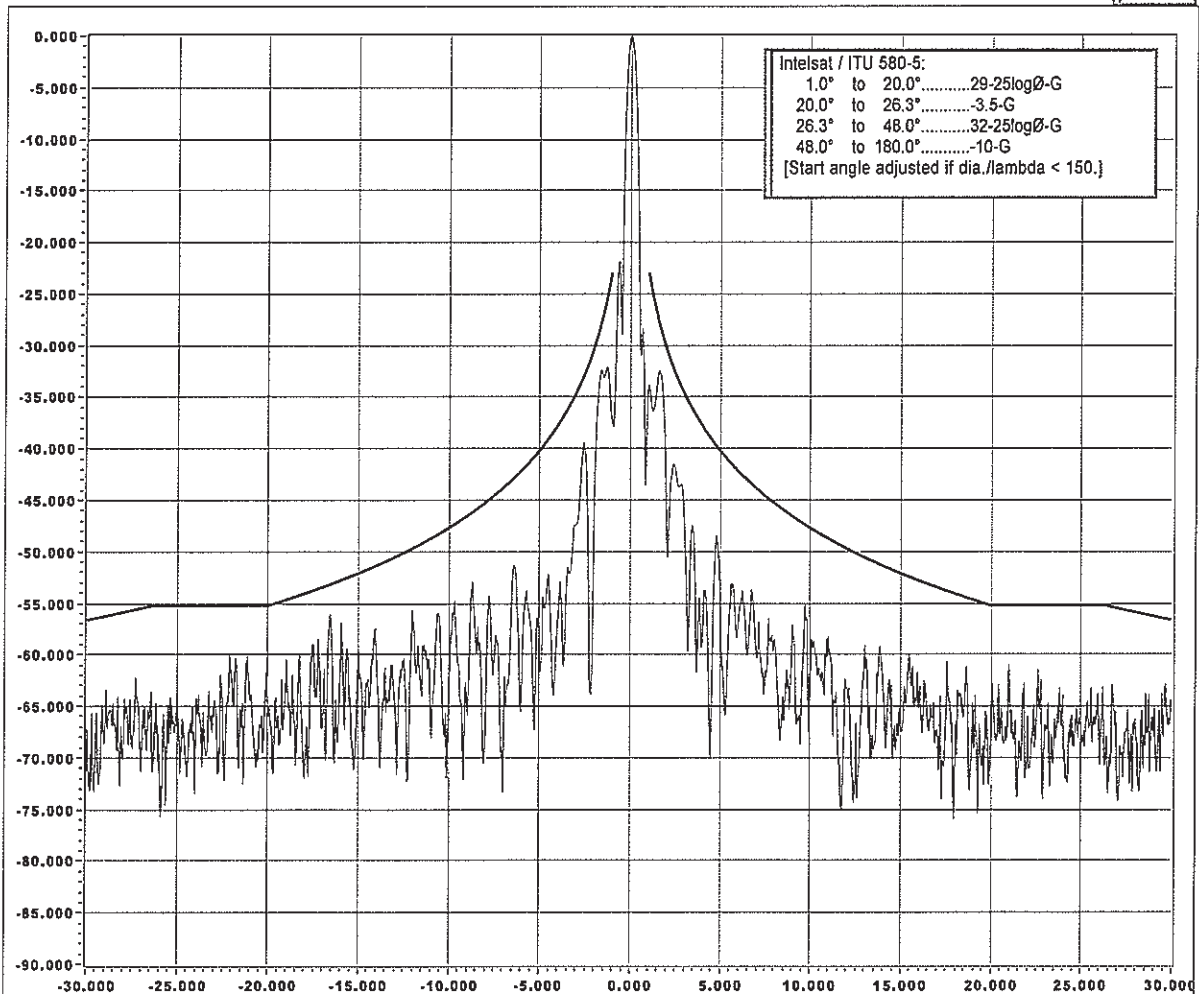
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 132601
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...21.750 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Intelsat / ITU 580-5:
 1.0° to 20.0°.....29-25logØ-G
 20.0° to 26.3°.....-3.5-G
 26.3° to 48.0°.....32-25logØ-G
 48.0° to 180.0°.....-10-G
 [Start angle adjusted if dia./lambda < 150.]

Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000001, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 132601 30654 RC-166-VA-21.750.txt

Test Frequency (GHz): 21.750000001

Ref. Level (dBm): -43.40

Points Displayed: 1348

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 51.700

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 2.88



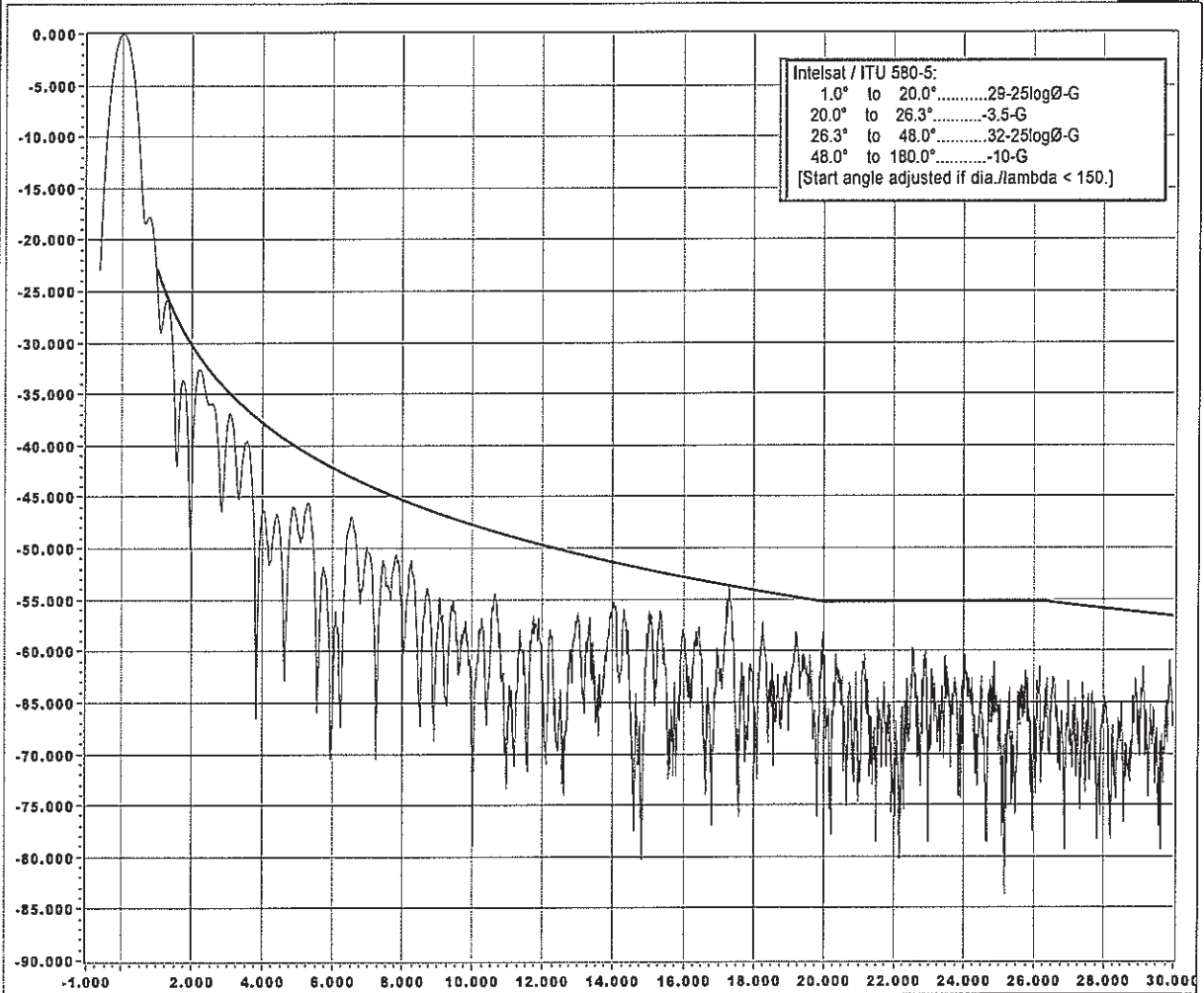
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 133333
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth,Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Co-pol...VERT polarization...21.750 GHz

Elevation

% Over Curve (not including main lobe)



Intelsat / ITU 580-5:
 1.0° to 20.0°.....29-25logθ-G
 20.0° to 26.3°.....-3.5-G
 26.3° to 48.0°.....32-25logθ-G
 48.0° to 180.0°.....-10-G
 [Start angle adjusted if dia./lambda < 150.]

Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=21750000001, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File:	<input type="text" value="% 070812 133333 30654 RC-90-VE-21.750.txt"/>	Specified Gain:	<input type="text" value="51.700"/>
Test Frequency (GHz):	<input type="text" value="21.750000001"/>	Azimuth Beam Center (deg):	<input type="text" value="179.960"/>
Ref. Level (dBm):	<input type="text" value="-44.13"/>	Elevation Beam Center (deg):	<input type="text" value="6.030"/>
# Points Displayed:	<input type="text" value="3413"/>	Margin Under Curve (dB):	<input type="text" value="None"/>

Versions
 61030 FAST
 60129 PACK



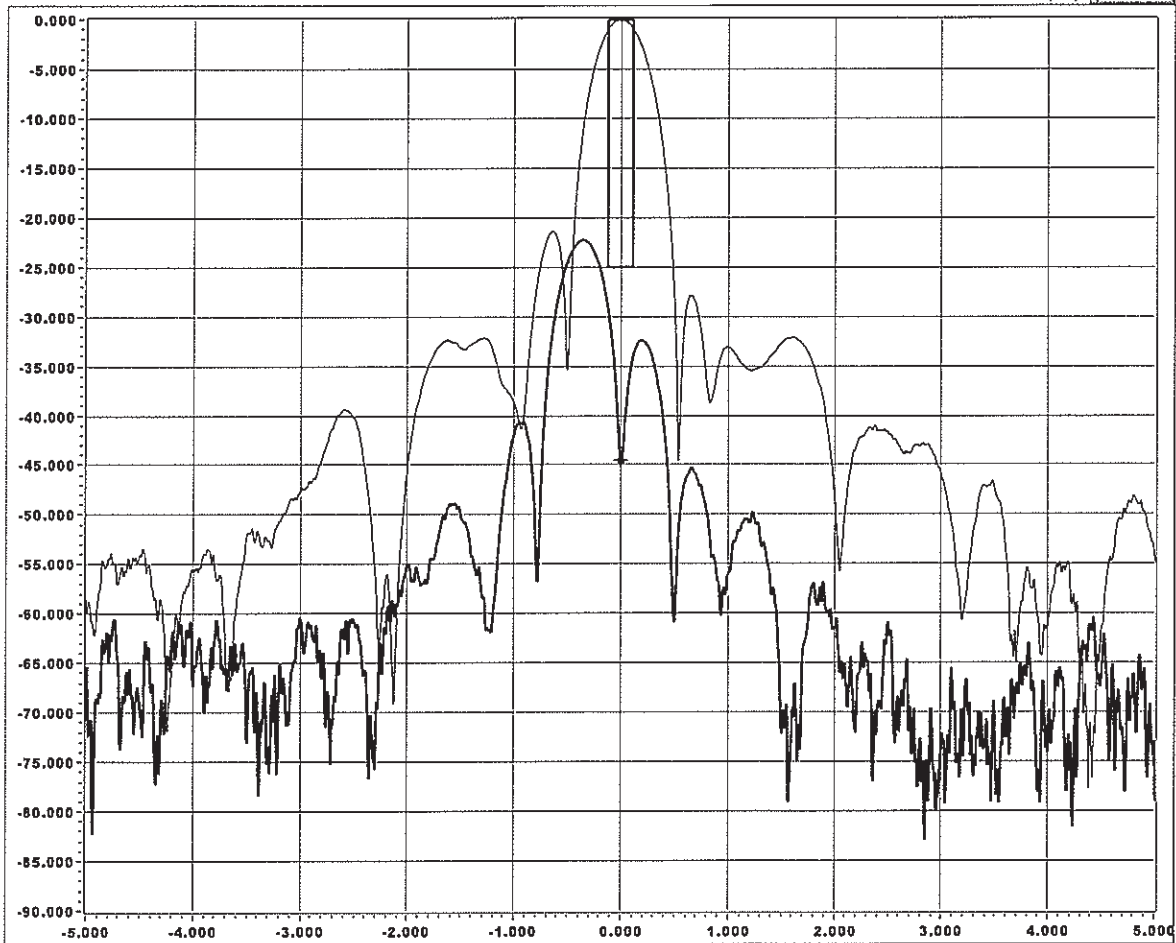
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 154733
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...VERT polarization...21.750 GHz

Azimuth

On-axis Isolation (dB): 44.58



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2175000000, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 154019 30654 RC-5-VA-21.750.txt	Azimuth Beam Center (deg):	179.870
Cross-pol File:	% 070813 154733 30654 RX-5-VA-21.750.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	21.750000000	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-43.44	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192	Versions 61030 FAST 60129 PACK	



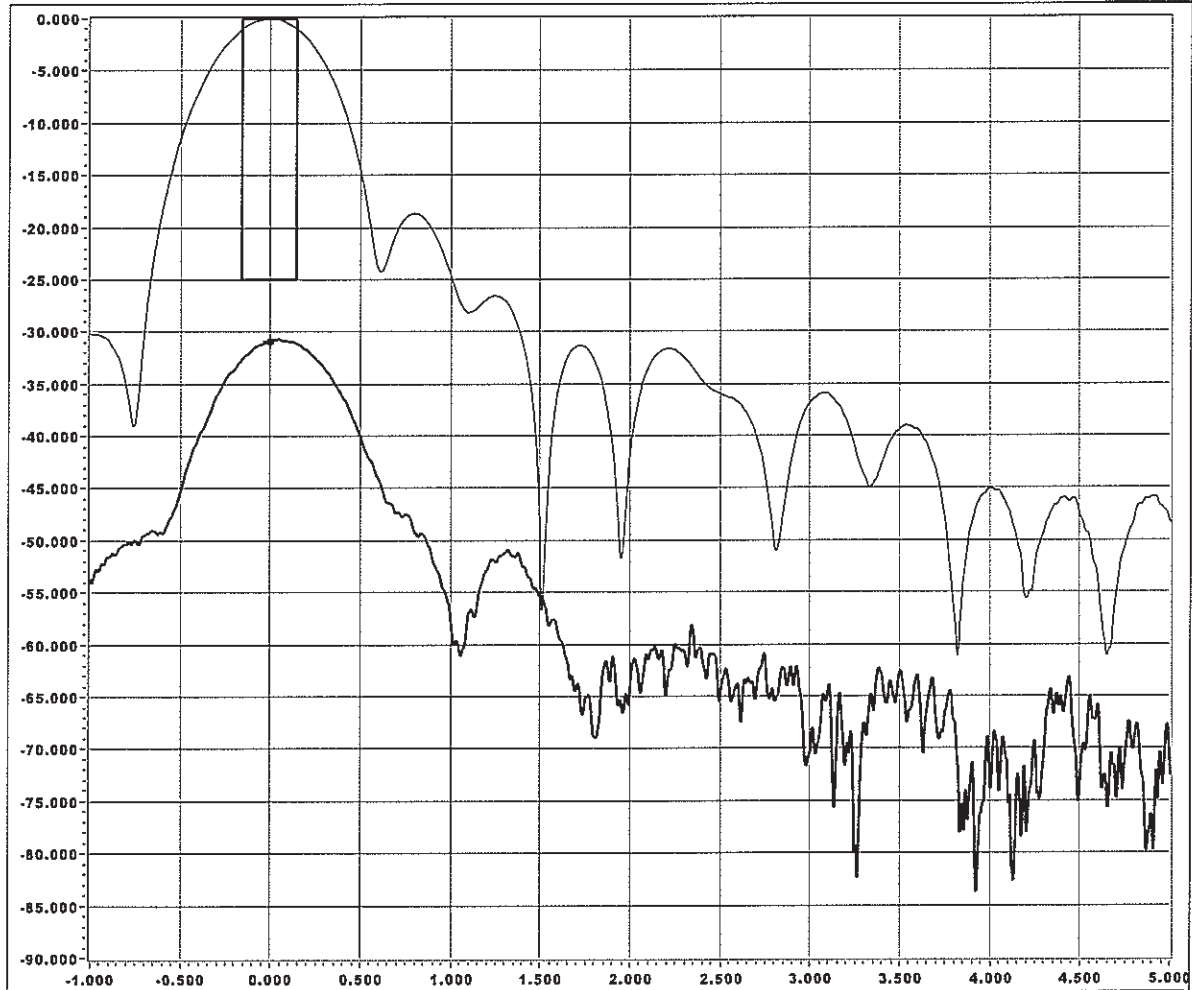
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 154125
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

RX...Cross-pol under Co-pol...VERT polarization...21.750 GHz

Elevation

On Axis Isolation (dB): 30.84



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2175000001, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 154125 30654 RC-5-VE-21.750.txt	Azimuth Beam Center (deg):	179.920
Cross-pol File:	% 070813 154937 30654 RX-5-VE-21.750.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	21.75000001	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	0.00	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192		

Versions
 61030 FAST
 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 160724
 Job Number..... 30654

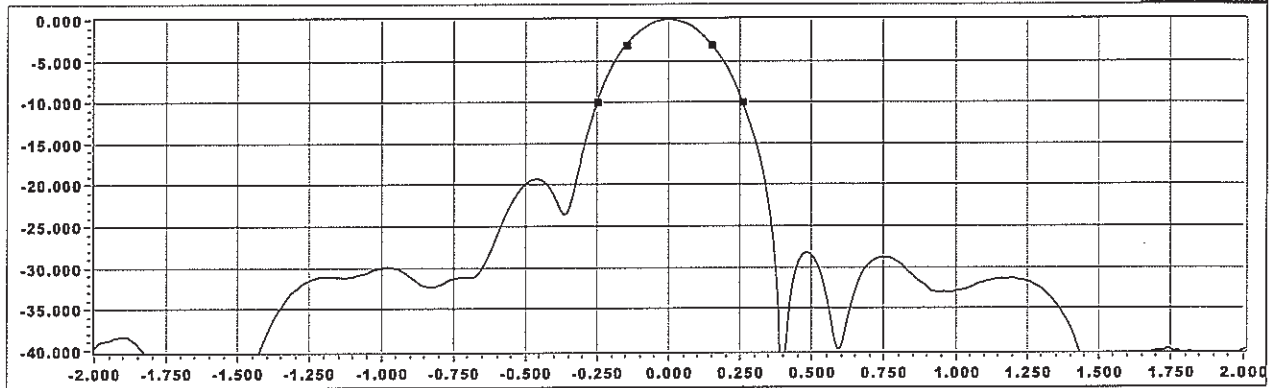
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...VERT Polarization...Gain by Beamwidth...29.150 GHz

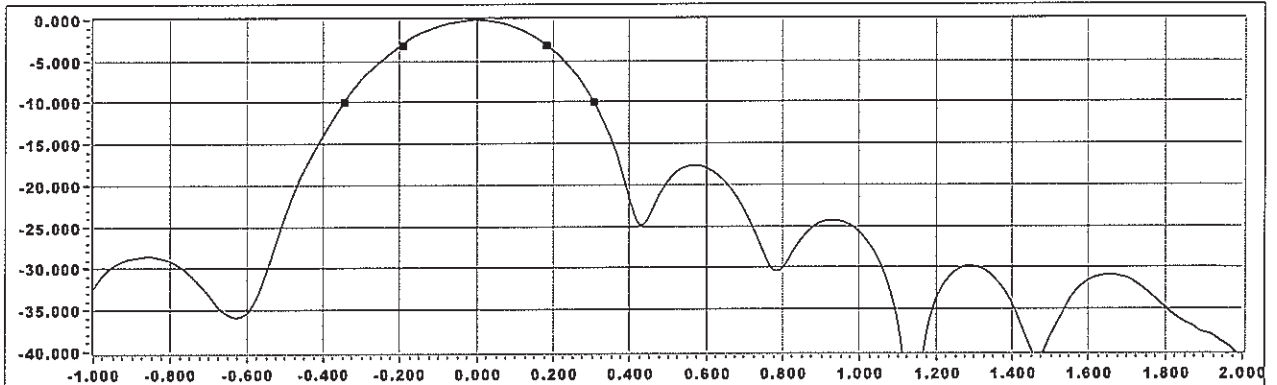
Spec. Gain (dBi): **53.900**

Calculated Gain (dB): **53.37**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{(\text{3dB factor} / (\text{AZ 3dB BW} * \text{EL 3dB BW})) + (\text{10dB factor} / (\text{AZ 10dB BW} * \text{EL 10dB BW}))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=29149999999, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 160724 30654 TC-5-VA-29.150.txt
 EL Co-pol File % 070813 160830 30654 TC-5-VE-29.150.txt

The calculated gain is less than the specified gain by 0.53 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.149999999	AZ 3dB BW (deg)	0.2956	# Points Displayed	8196
AZ Ref. Level (dBm)	-35.99	AZ 10dB BW (deg)	0.5087		
Feed Loss (dB)	0.85	AZ 15dB BW (deg)	0.5993		
RMS (in.)	0.015	EL 3dB BW (deg)	0.3738		
Azimuth (deg)	179.800	EL 10dB BW (deg)	0.6533	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	0.7689	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 080906
 Job Number..... 30654

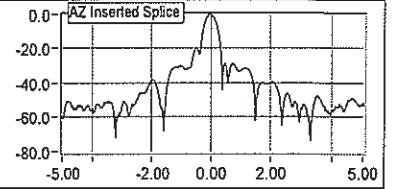
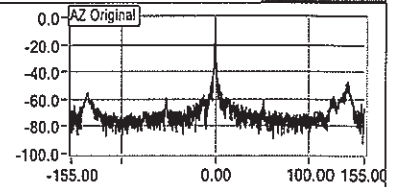
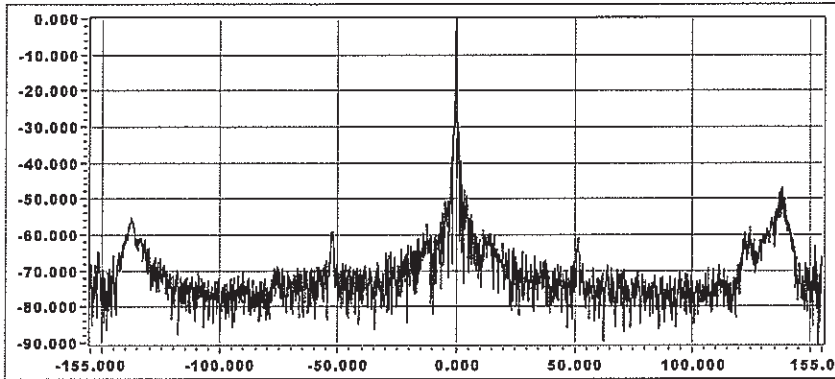
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...29.150 GHz

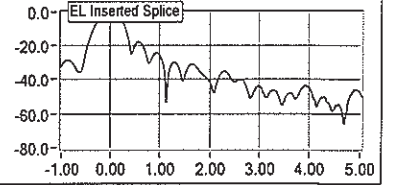
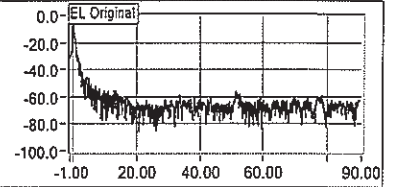
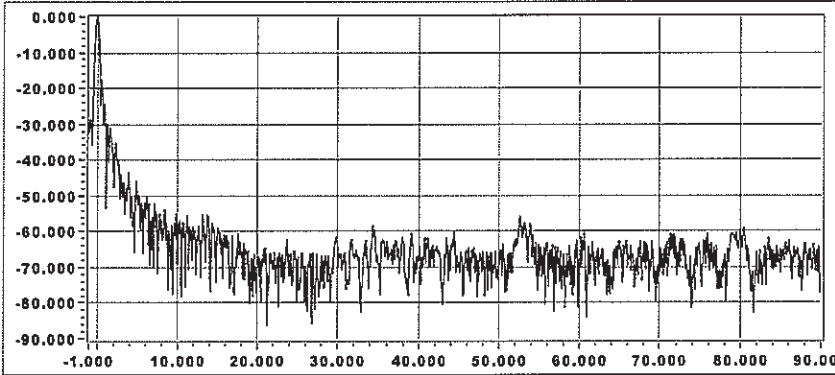
Spec. Gain (dBi): **53.900**

Calculated Gain (dB): **53.99**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta} a) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for lookangles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at lookangles offset from beam center.

SA Freq (Hz)=29150000289, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File % 070814 080906 30654 TC-155-VA-29.150.txt
 EL Co-pol File % 070814 081514 30654 TC-90-VE-29.150.txt
 AZ Insert File % 070813 160830 30654 TC-5-VE-29.150.txt
 EL Insert File % 070813 160724 30654 TC-5-VA-29.150.txt

The calculated gain is greater than the specified gain by 0.09 dB.

Test Frequency (GHz) **29.150000289**
 AZ Ref. Level (dBm) **-35.99**
 Azimuth (deg) **180.000**
 Elevation (deg) **12.000**

Versions
 61030 FAST
 60129 PACK

Points Displayed **16001**
 Feed Loss (dB) **0.85**
 Angular Extent Loss(dB) **0.15**
 Spar Blockage Loss (dB) **0.05**
 Cross-pol Loss (dB) **0.05**



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 080906
 Job Number..... 30654

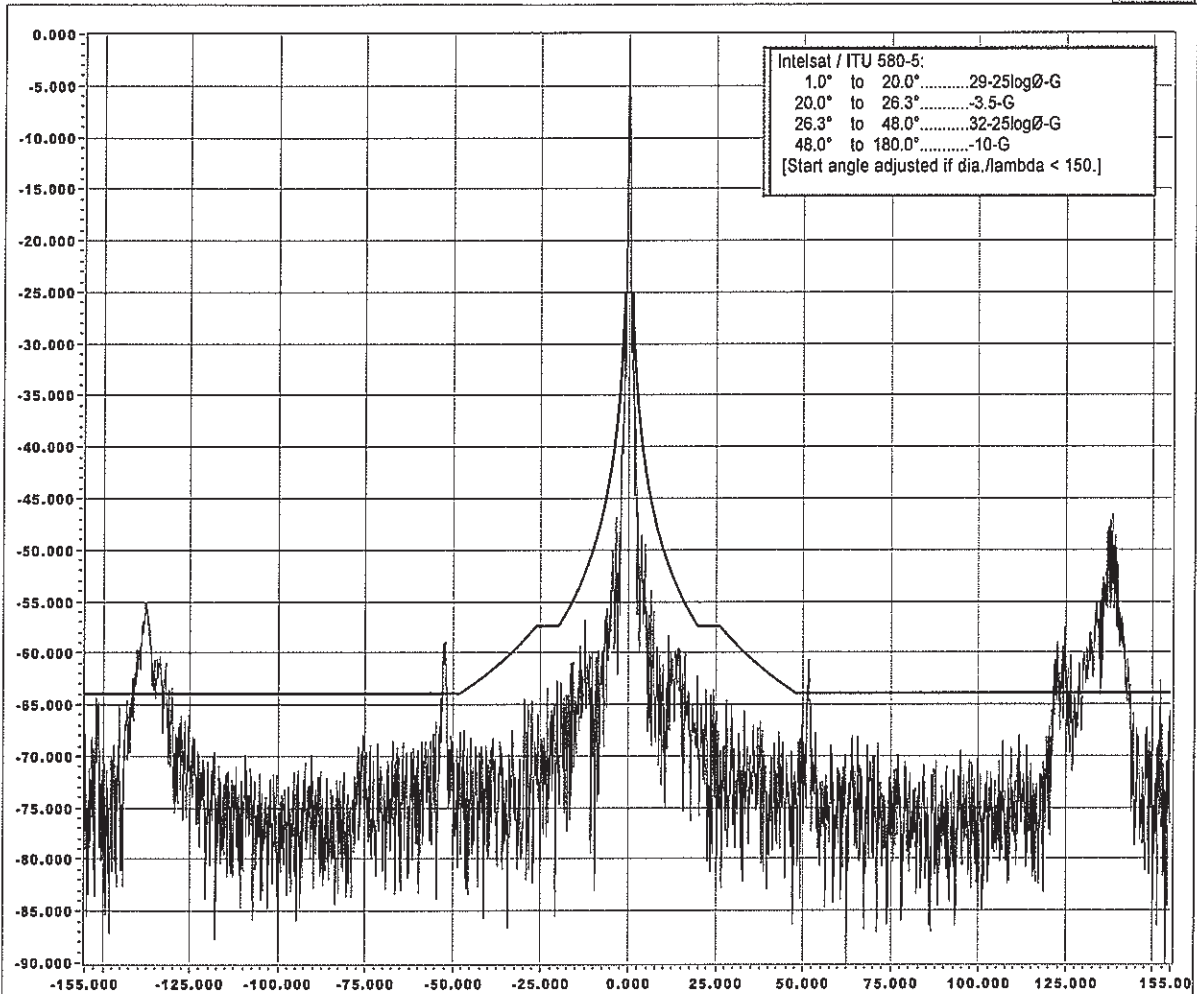
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.150 GHz

Azimuth

% Over Curve (not including main lobe)

9.1



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000289, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 080906 30654 TC-155-VA-29.150.txt

Test Frequency (GHz): 29.150000289

Ref. Level (dBm): -37.27

Points Displayed: 8192

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 53.900

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-14-2007 at 081514
 Job Number..... 30654

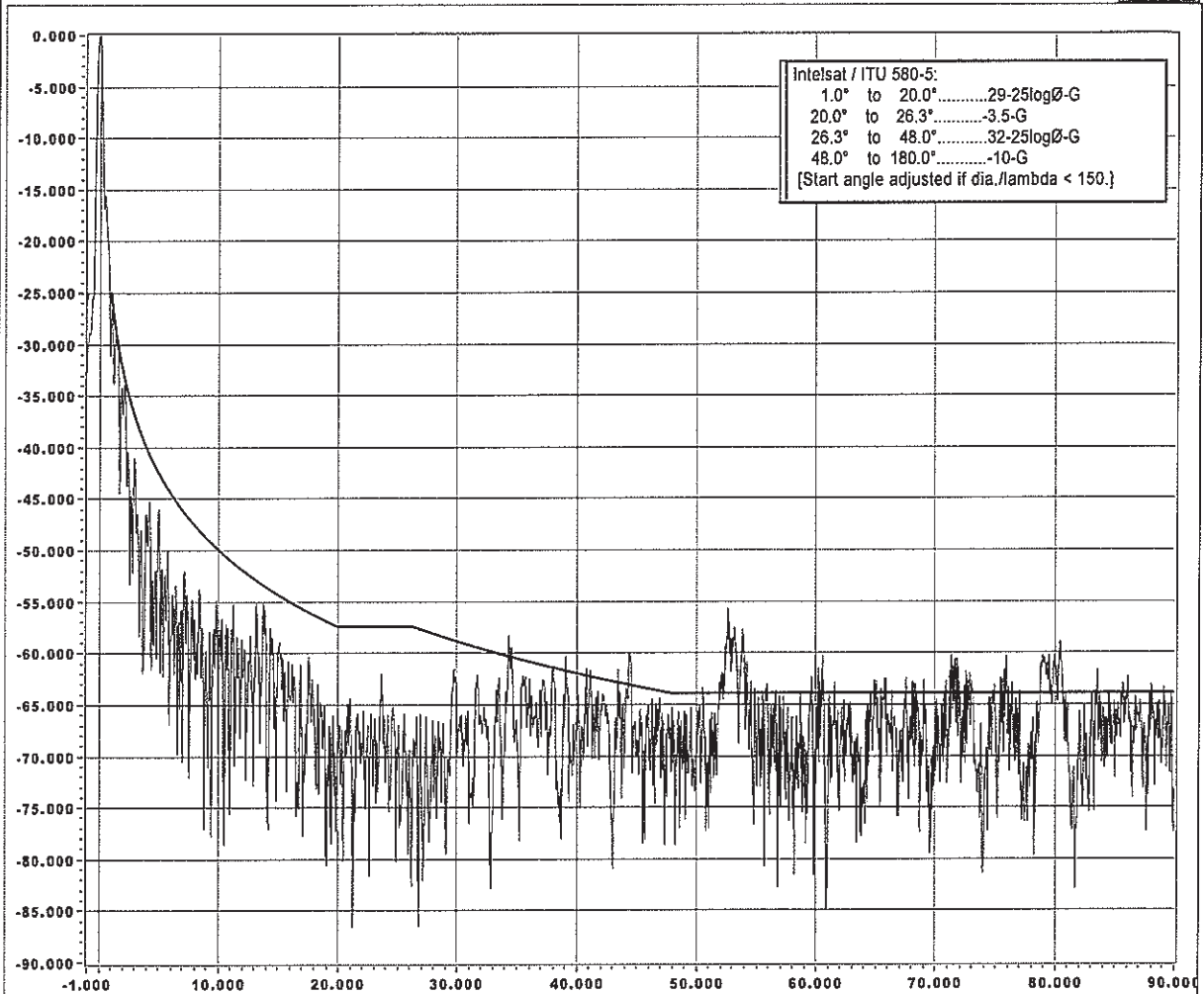
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.150 GHz

Elevation

% Over Curve (not including main lobe)

8.3



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000289, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070814 081514 30654 TC-90-VE-29.150.txt

Specified Gain: 53.900

Test Frequency (GHz): 29.150000289

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -37.28

Elevation Beam Center (deg): 12.000

Points Displayed: 7506

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



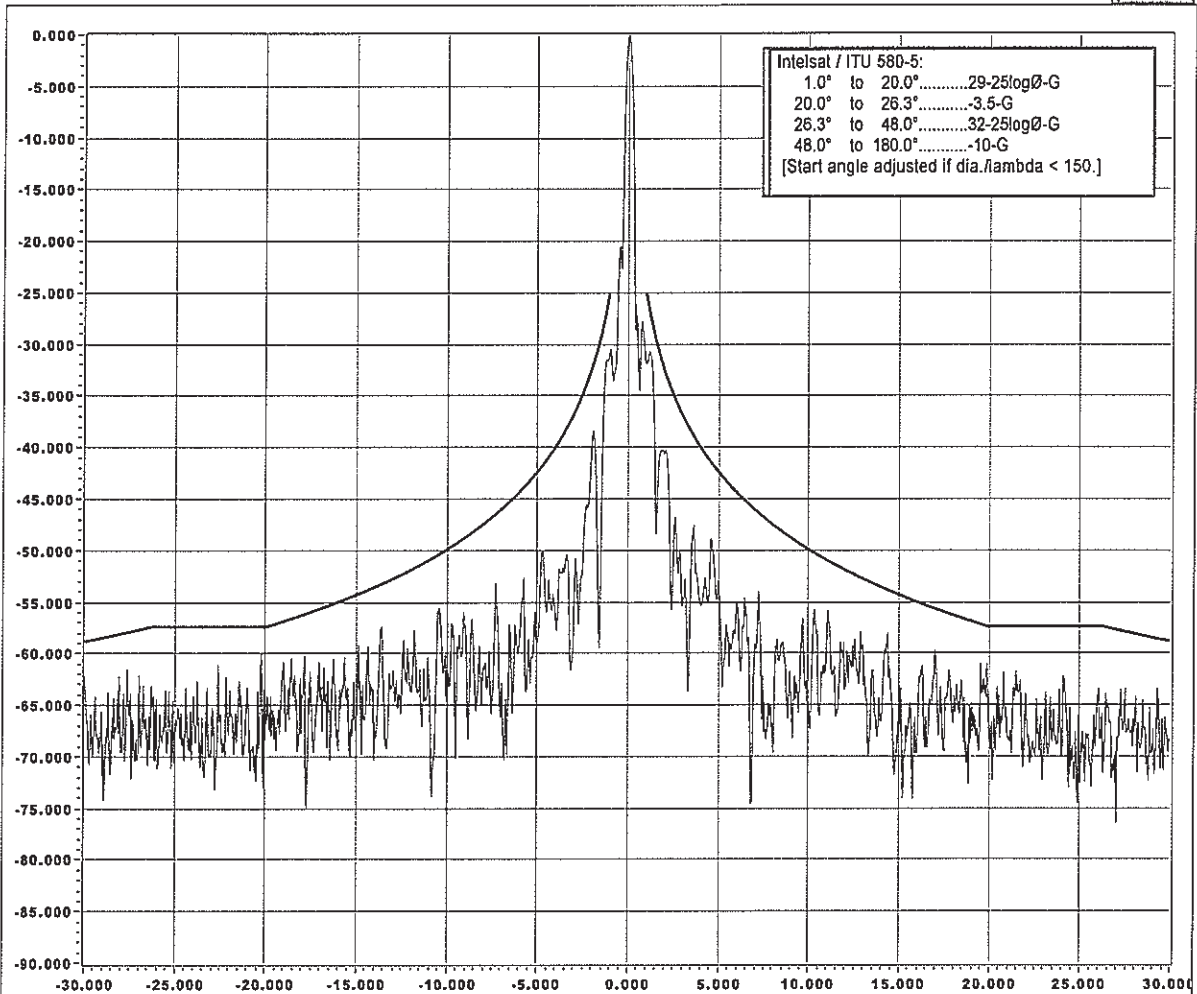
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 122746
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.150 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File:	% 070812 122746 30654 TC-166-VA-29.150.txt	Specified Gain (dB):	53.900
Test Frequency (GHz):	29.150000000	Azimuth Beam Center (deg):	179.960
Ref. Level (dBm):	-40.45	Elevation Beam Center (deg):	6.030
# Points Displayed:	1351	Margin Under Curved (dB):	2.52

Versions
61030 FAST
60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 123513
 Job Number..... 30654

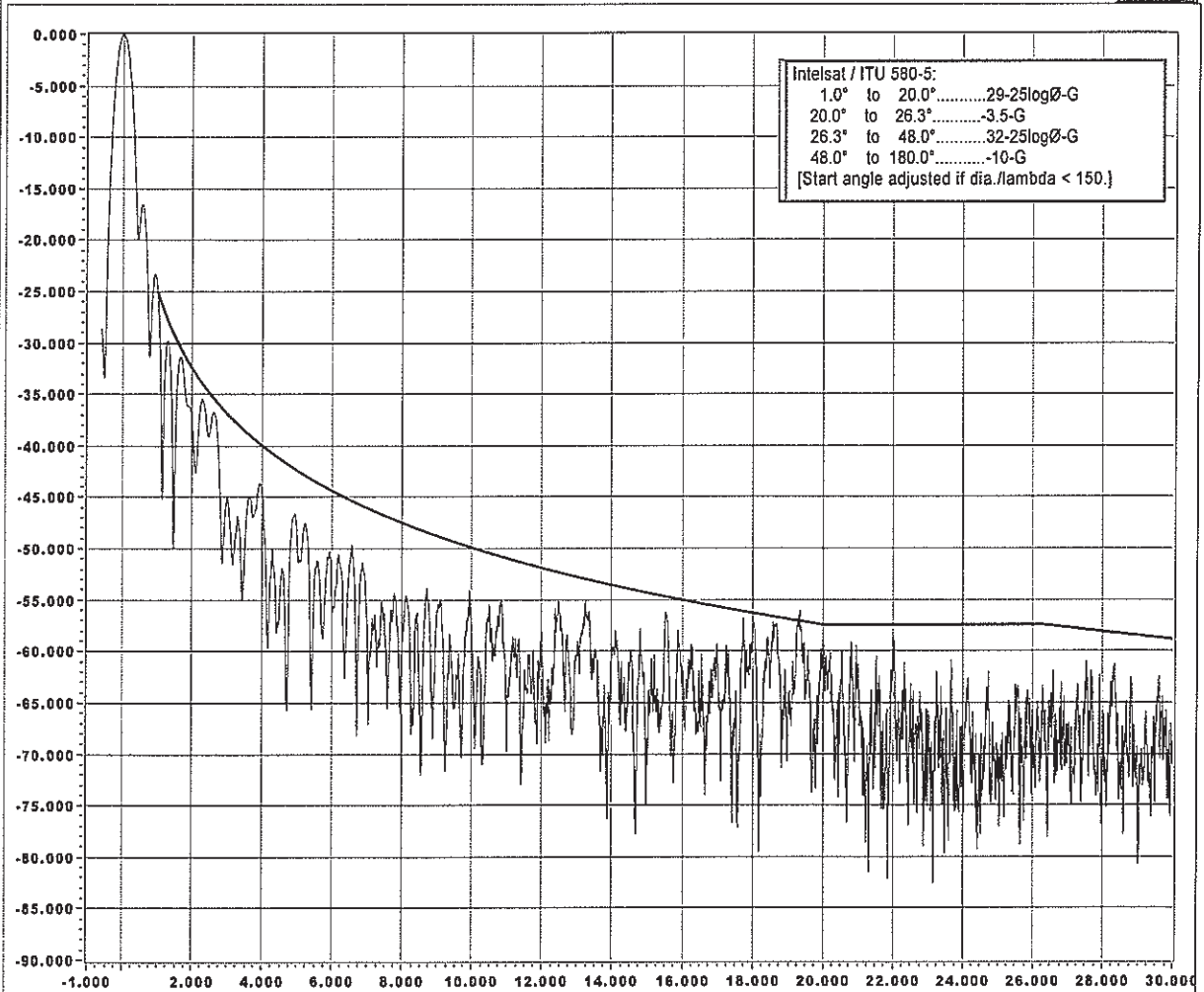
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth,Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.150 GHz

Elevation

% Over Curve (not including main lobe)

0.1



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29150000000, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 123513 30654 TC-90-VE-29.150.txt

Specified Gain: 53.900

Test Frequency (GHz): 29.150000000

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -40.66

Elevation Beam Center (deg): 6.030

Points Displayed: 3416

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



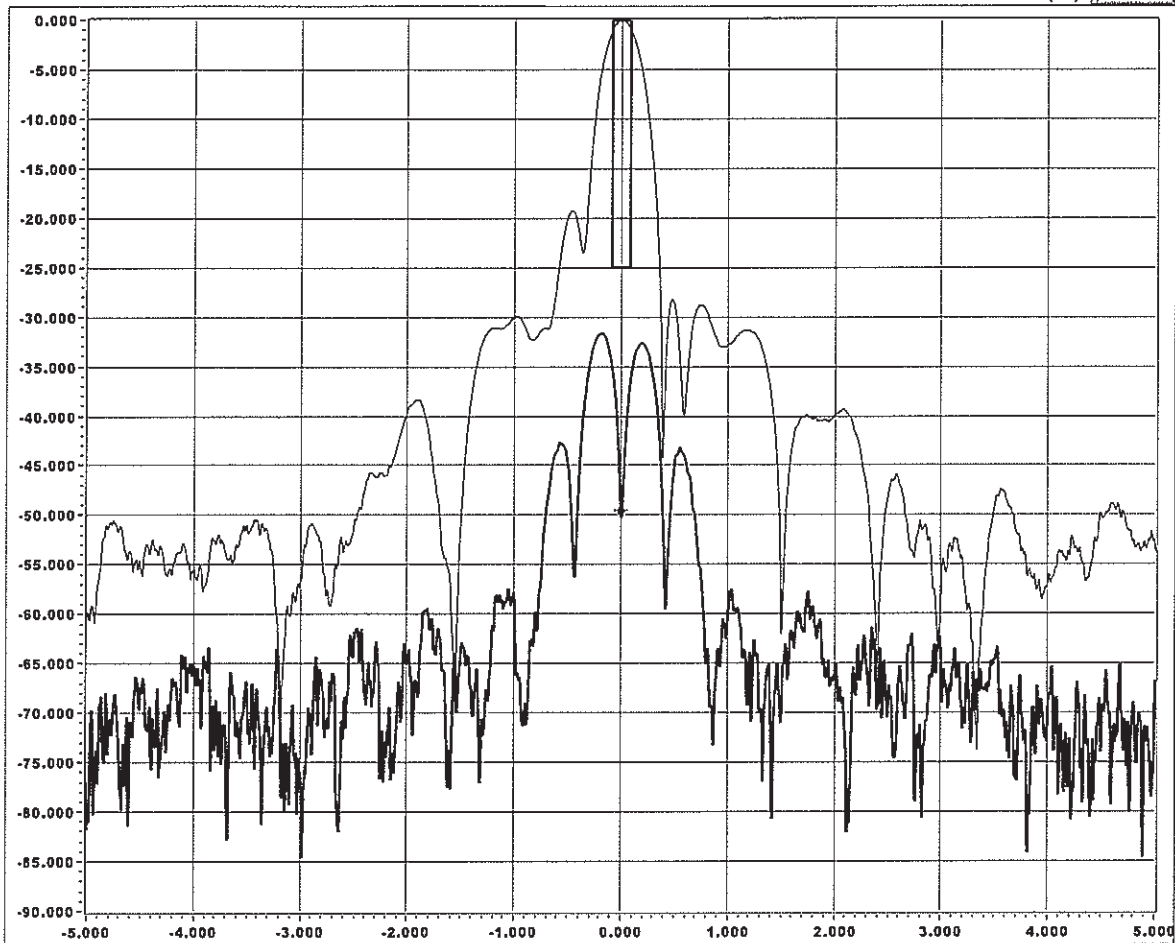
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 161533
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...VERT polarization...29.150 GHz

Azimuth

On-axis Isolation (dB): 49.48



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2914999999, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 160724 30654 TC-5-VA-29.150.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 161533 30654 TX-5-VA-29.150.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.149999999	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-35.99	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192	Versions 61030 FAST 60129 PACK	



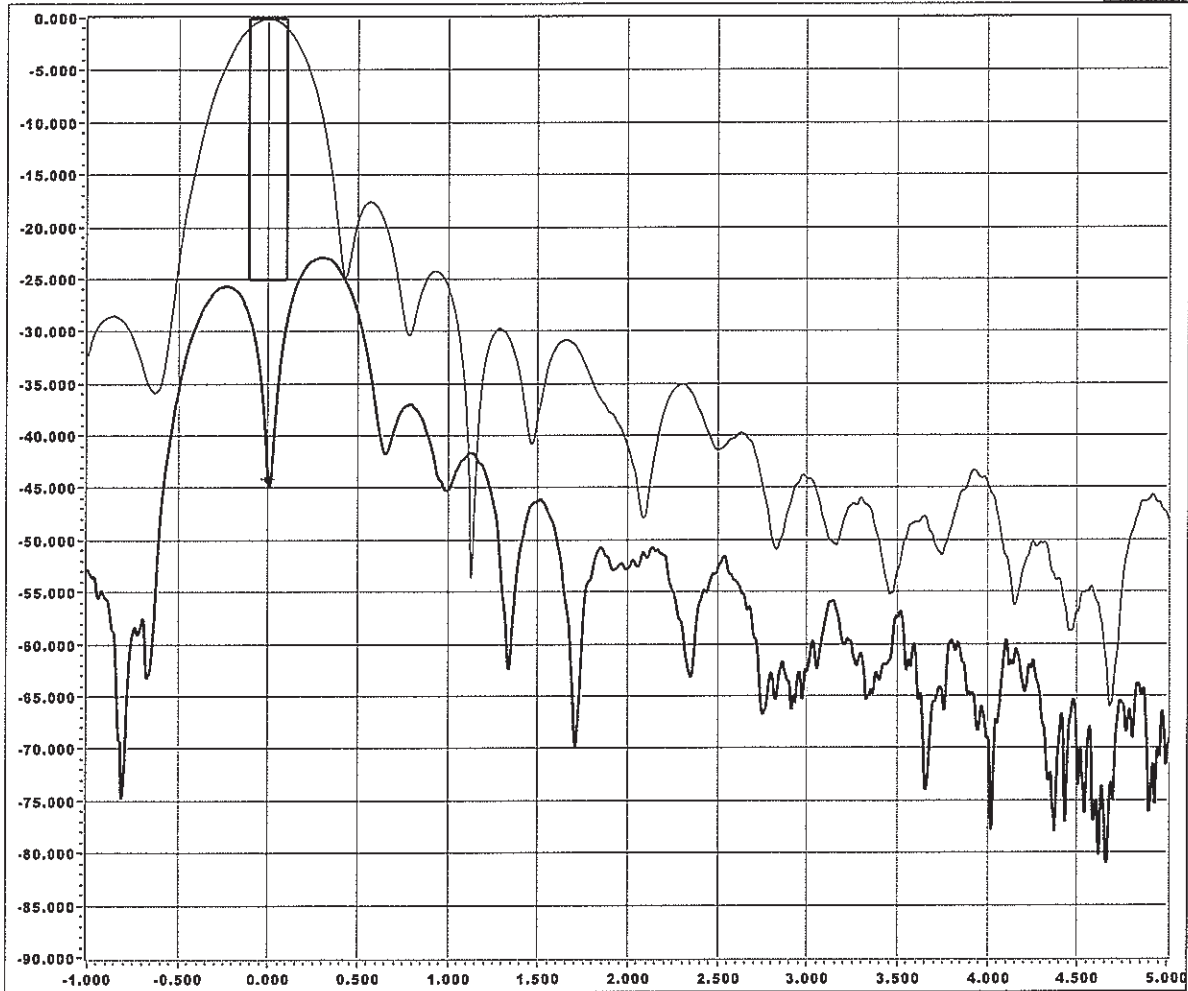
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 160830
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...VERT polarization...29.150 GHz

Elevation

On Axis Isolation (dB): 44.15



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29149999999, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

Co-pol File:	% 070813 160830 30654 TC-5-VE-29.150.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 161736 30654 TX-5-VE-29.150.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.149999999	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-35.99	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7593		



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 170427
 Job Number..... 30654

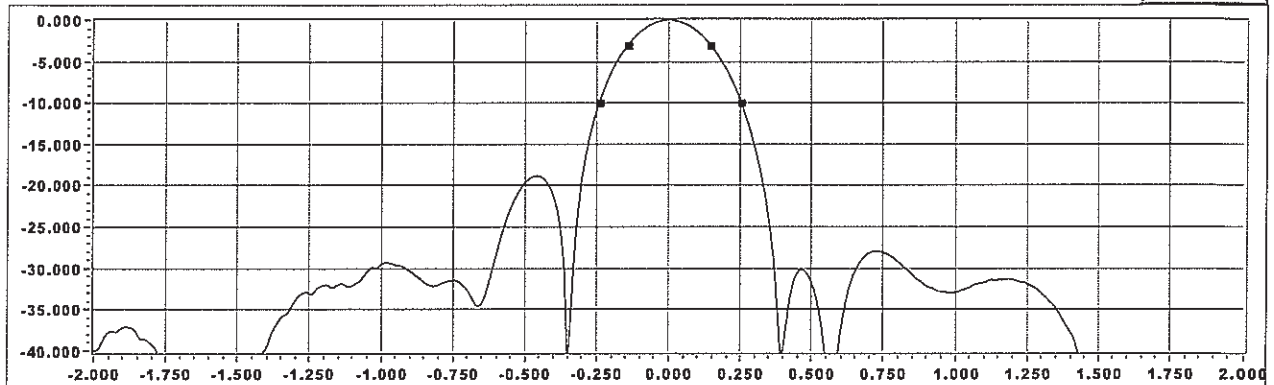
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...VERT Polarization...Gain by Beamwidth...29.575 GHz

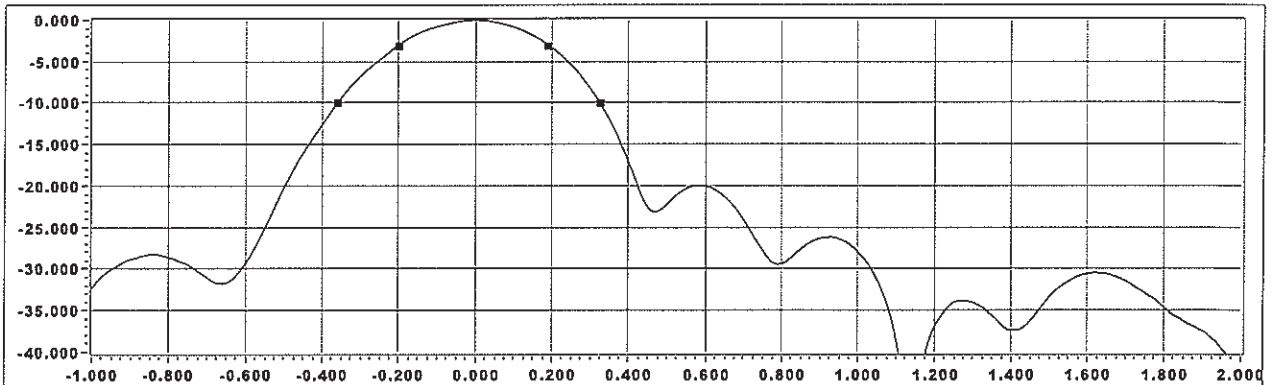
Spec. Gain (dBi): **54.100**

Calculated Gain (dB): **53.26**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{(3\text{dB factor} / (\text{AZ 3dB BW} * \text{EL 3dB BW})) + (10\text{dB factor} / (\text{AZ 10dB BW} * \text{EL 10dB BW}))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

SA Freq (Hz)=29574999996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 170427 30654 TC-5-VA-29.575.txt
 EL Co-pol File % 070813 170530 30654 TC-5-VE-29.575.txt

The calculated gain is less than the specified gain by 0.84 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.574999996	AZ 3dB BW (deg)	0.2876	# Points Displayed	8196
AZ Ref. Level (dBm)	-36.75	AZ 10dB BW (deg)	0.4946		
Feed Loss (dB)	0.85	AZ 15dB BW (deg)	0.5778		
RMS (in.)	0.015	EL 3dB BW (deg)	0.3904		
Azimuth (deg)	179.800	EL 10dB BW (deg)	0.6864	3dB Factor	37000
Elevation (deg)	6.030	EL 15dB BW (deg)	0.8169	10dB Factor	107000
				Versions	61030 FAST 60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 234912
 Job Number..... 30654

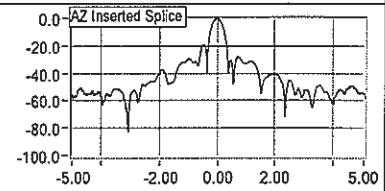
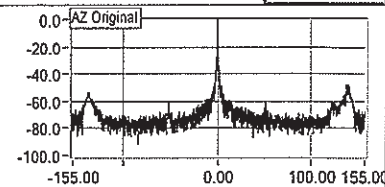
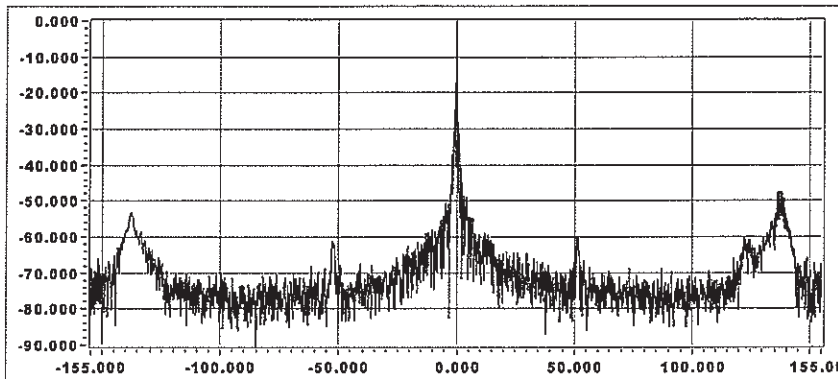
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...29.575 GHz

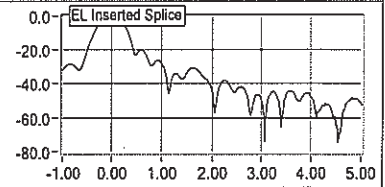
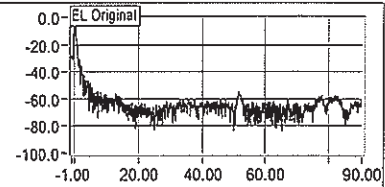
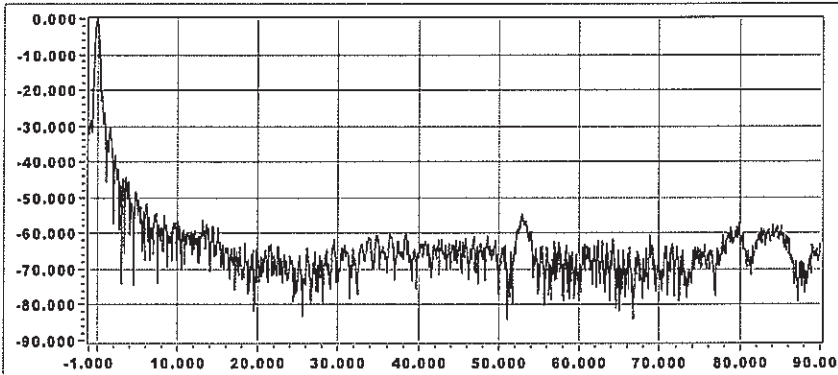
Spec. Gain (dBi): 54.100

Calculated Gain (dB): 54.02

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta} a) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for lookangles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at lookangles offset from beam center.

SA Freq (Hz)=29575000297, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File	% 070813 234912 30654 TC-155-VA-29.575.txt
EL Co-pol File	% 070813 235511 30654 TC-90-VE-29.575.txt
AZ Insert File	% 070813 170530 30654 TC-5-VE-29.575.txt
EL Insert File	% 070813 170427 30654 TC-5-VA-29.575.txt

The calculated gain is less than the specified gain by 0.08 dB.

Test Frequency (GHz)	29.575000297
AZ Ref. Level (dBm)	-36.75
Azimuth (deg)	180.000
Elevation (deg)	12.000

Versions
 61030 FAST
 60129 PACK

# Points Displayed	15840
Feed Loss (dB)	0.85
Angular Extent Loss(dB)	0.15
Spar Blockage Loss (dB)	0.05
Cross-pol Loss (dB)	0.05



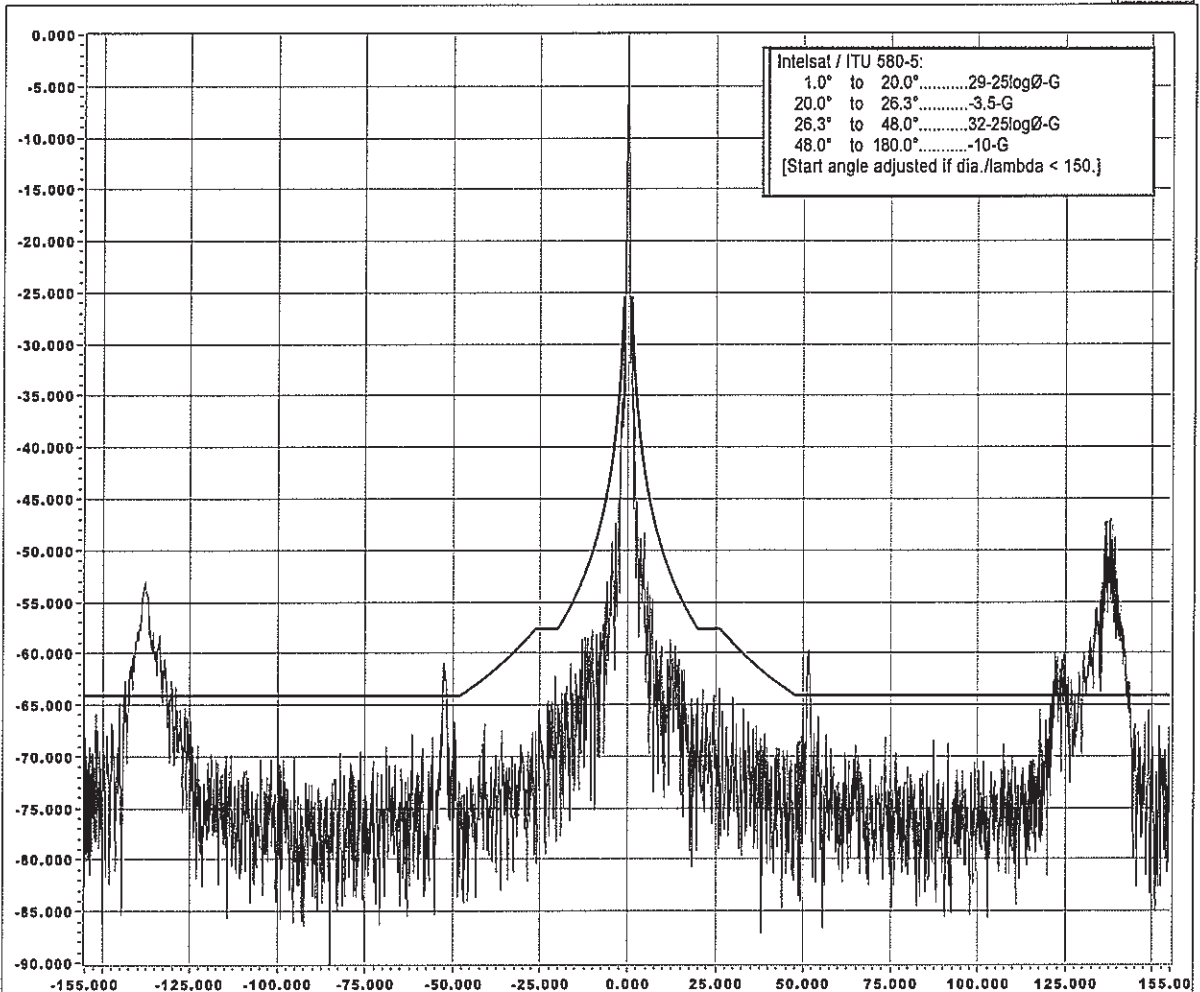
Customer..... Intelsat
 Date/Local Time.... 8-13-2007 at 234912
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.575 GHz

Azimuth

% Over Curve (not including main lobe) 9.8



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000297, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 234912 30654 TC-155-VA-29.575.txt		Specified Gain (dB): 54.100
Test Frequency (GHz): 29.575000297		Azimuth Beam Center (deg): 180.000
Ref. Level (dBm): -39.81	Versions	Elevation Beam Center (deg): 12.000
# Points Displayed: 7936	61030 FAST 60129 PACK	Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 235511
 Job Number..... 30654

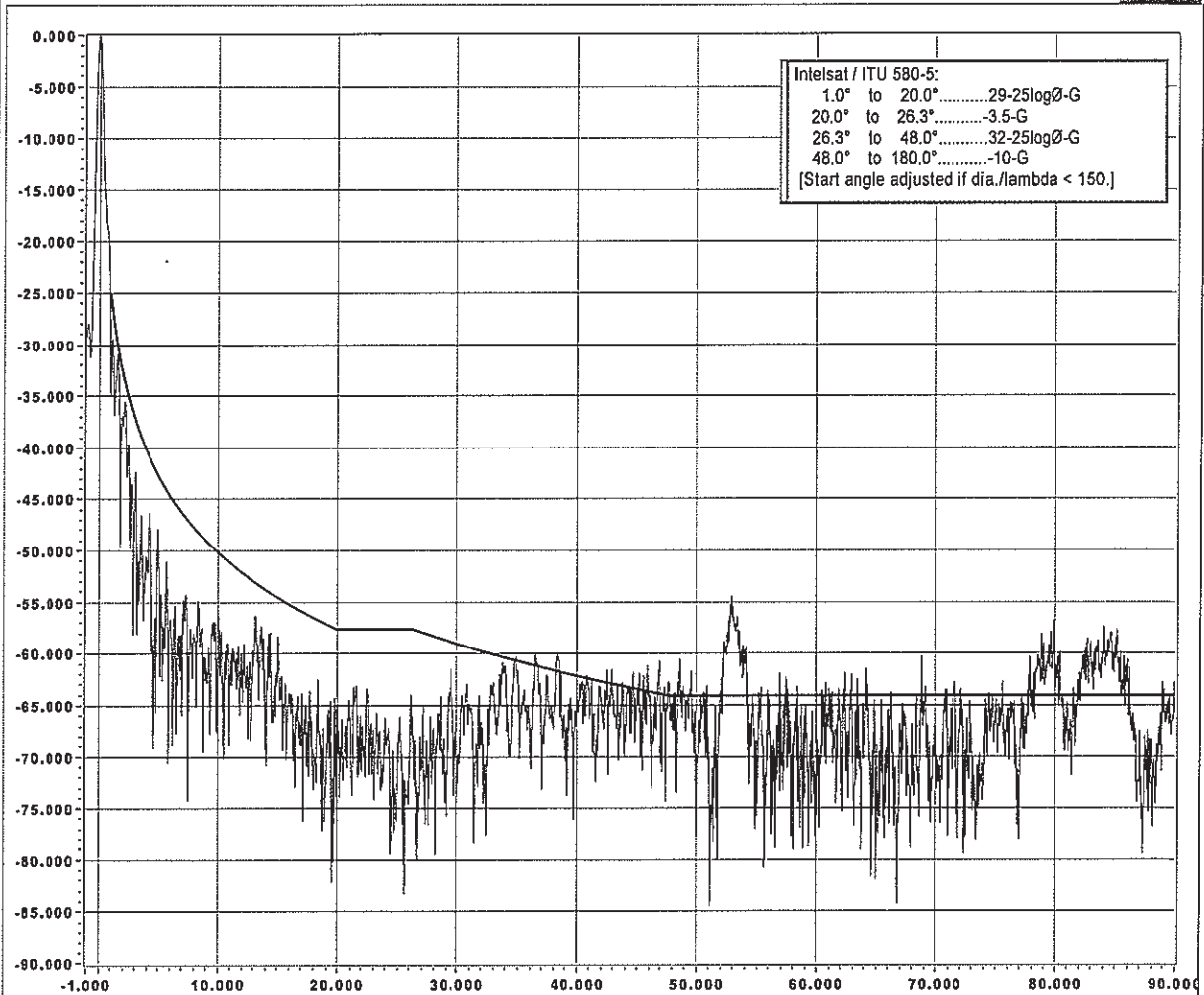
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.575 GHz

Elevation

% Over Curve (not including main lobe)

14.8



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29575000297, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 235511 30654 TC-90-VE-29.575.txt

Specified Gain: 54.100

Test Frequency (GHz): 29.575000297

Azimuth Beam Center (deg): 180.000

Ref. Level (dBm): -39.71

Elevation Beam Center (deg): 12.000

Points Displayed: 7283

Margin Under Curve (dB): None

Versions
 61030 FAST
 60129 PACK



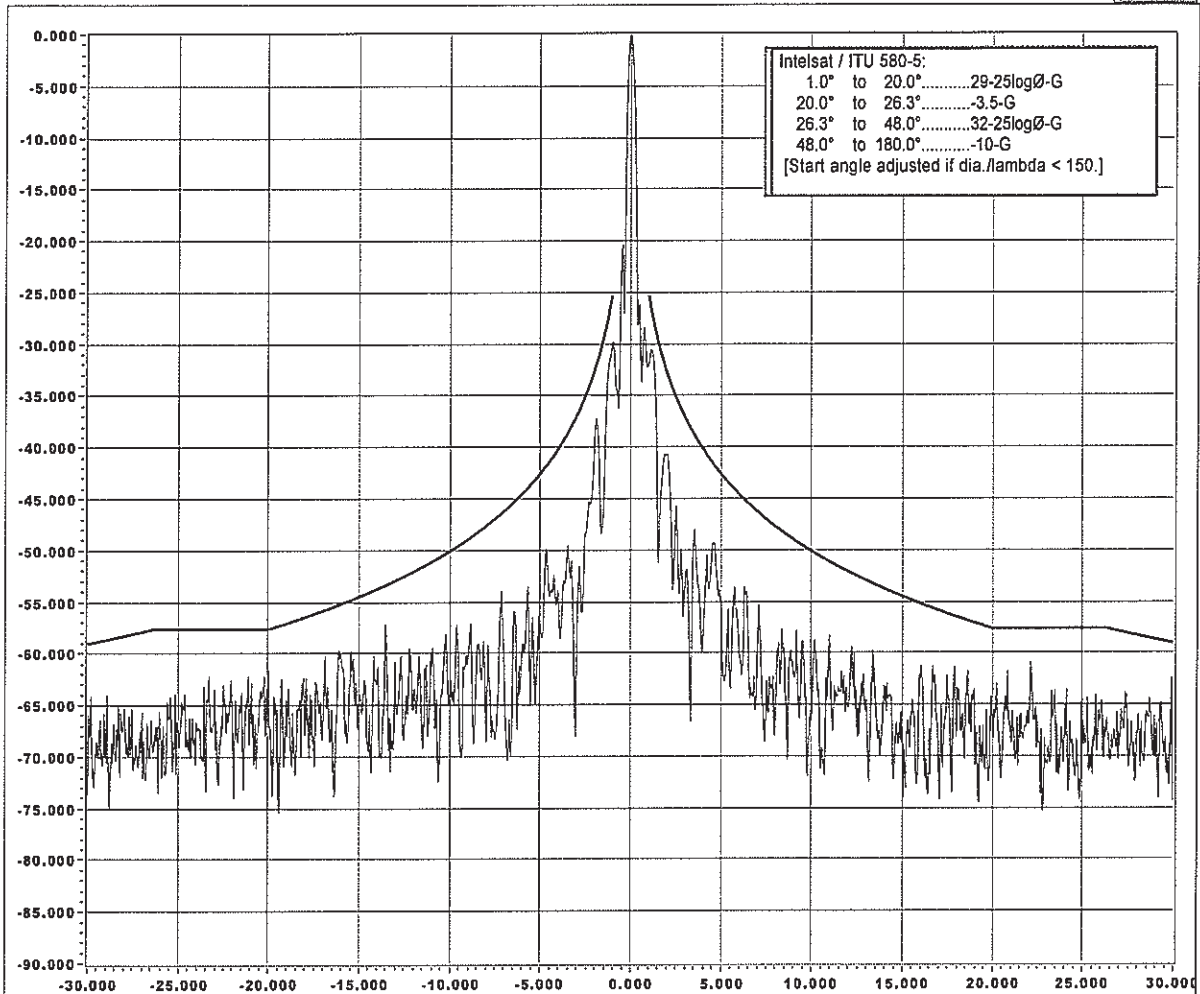
Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 120037
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.575 GHz

Azimuth

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29574999999, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 120037 30654 TC-166-VA-29.575.txt

Test Frequency (GHz): 29.574999999

Ref. Level (dBm): -39.18

Points Displayed: 1355

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.100

Azimuth Beam Center (deg): 179.960

Elevation Beam Center (deg): 6.030

Margin Under Curved (dB): 3.27



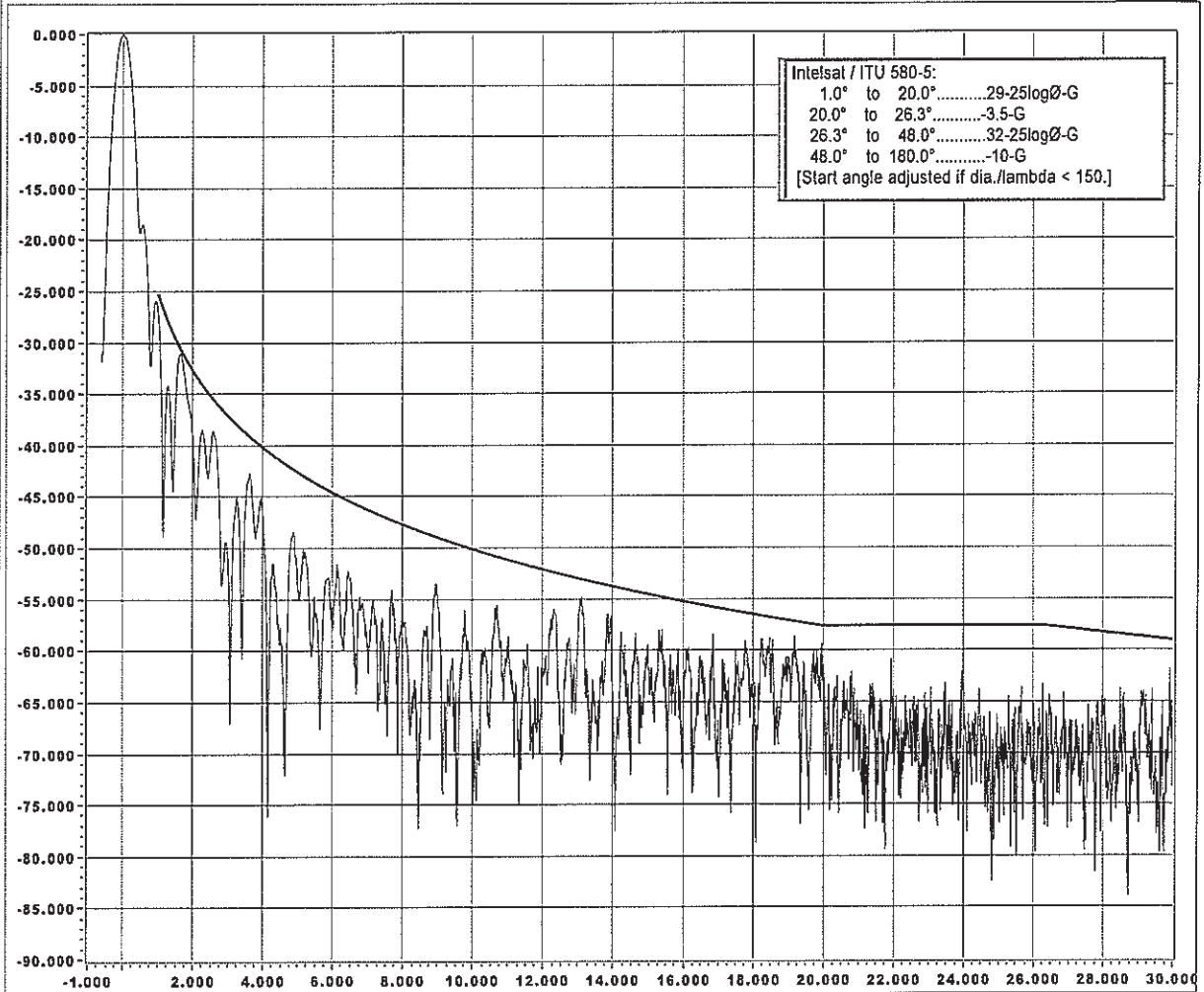
Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 120758
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth, Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Co-pol...VERT polarization...29.575 GHz

Elevation

% Over Curve (not including main lobe) 0.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29574999999, AZ rate (deg/s)=0.603, EL rate (deg/s)=0.713, RBW (Hz)=30, VBW (Hz)=10

File: % 070812 120758 30654 TC-90-VE-29.575.txt

Specified Gain: 54.100

Test Frequency (GHz): 29.574999999

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -39.72

Elevation Beam Center (deg): 6.030

Points Displayed: 3426

Margin Under Curve (dB): None



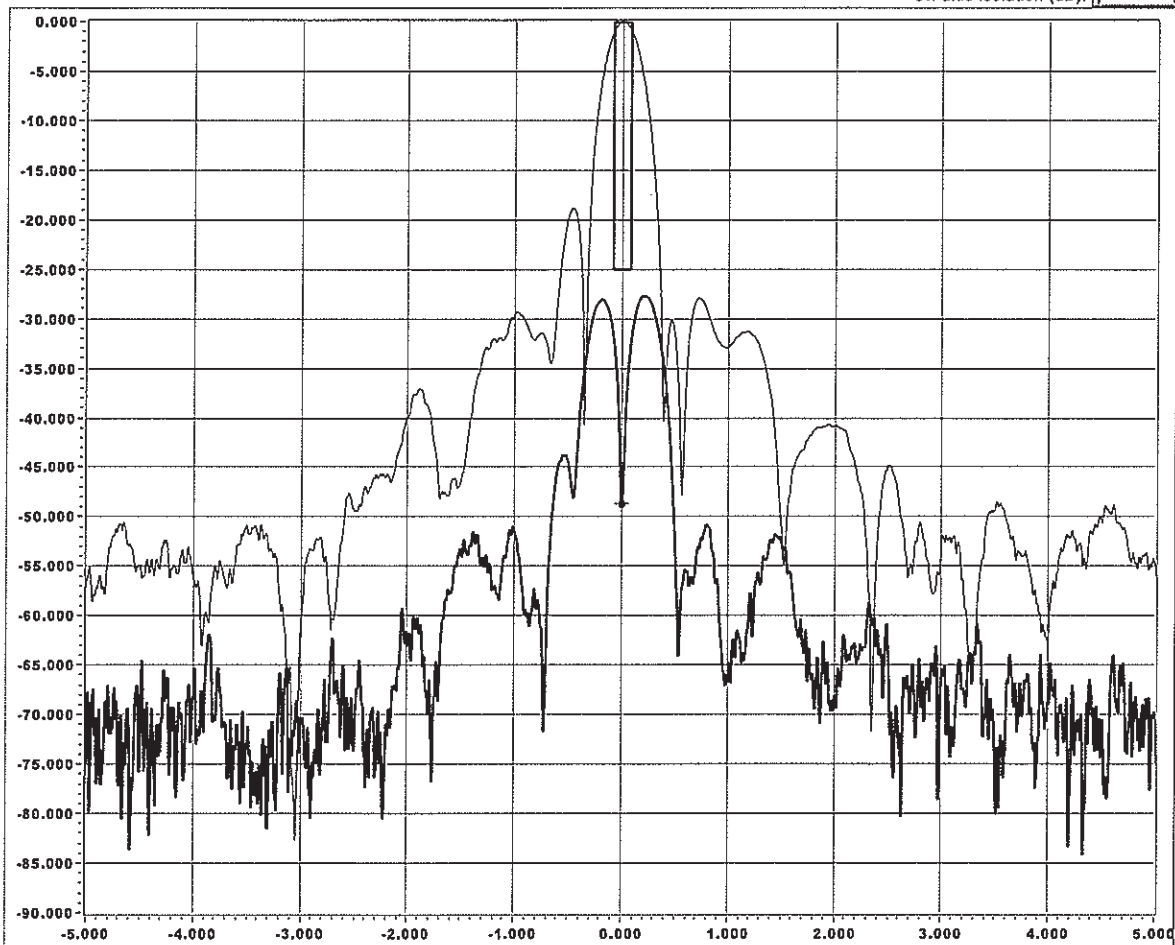
Customer..... Intelsat
 Date/Local Time.... 8-13-2007 at 171001
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer.... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...VERT polarization...29.575 GHz

Azimuth

On-axis Isolation (dB): 48.75



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=2957499996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 170427 30654 TC-5-VA-29.575.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 171001 30654 TX-5-VA-29.575.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.574999996	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-36.75	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	8192	Versions 61030 FAST 60129 PACK	



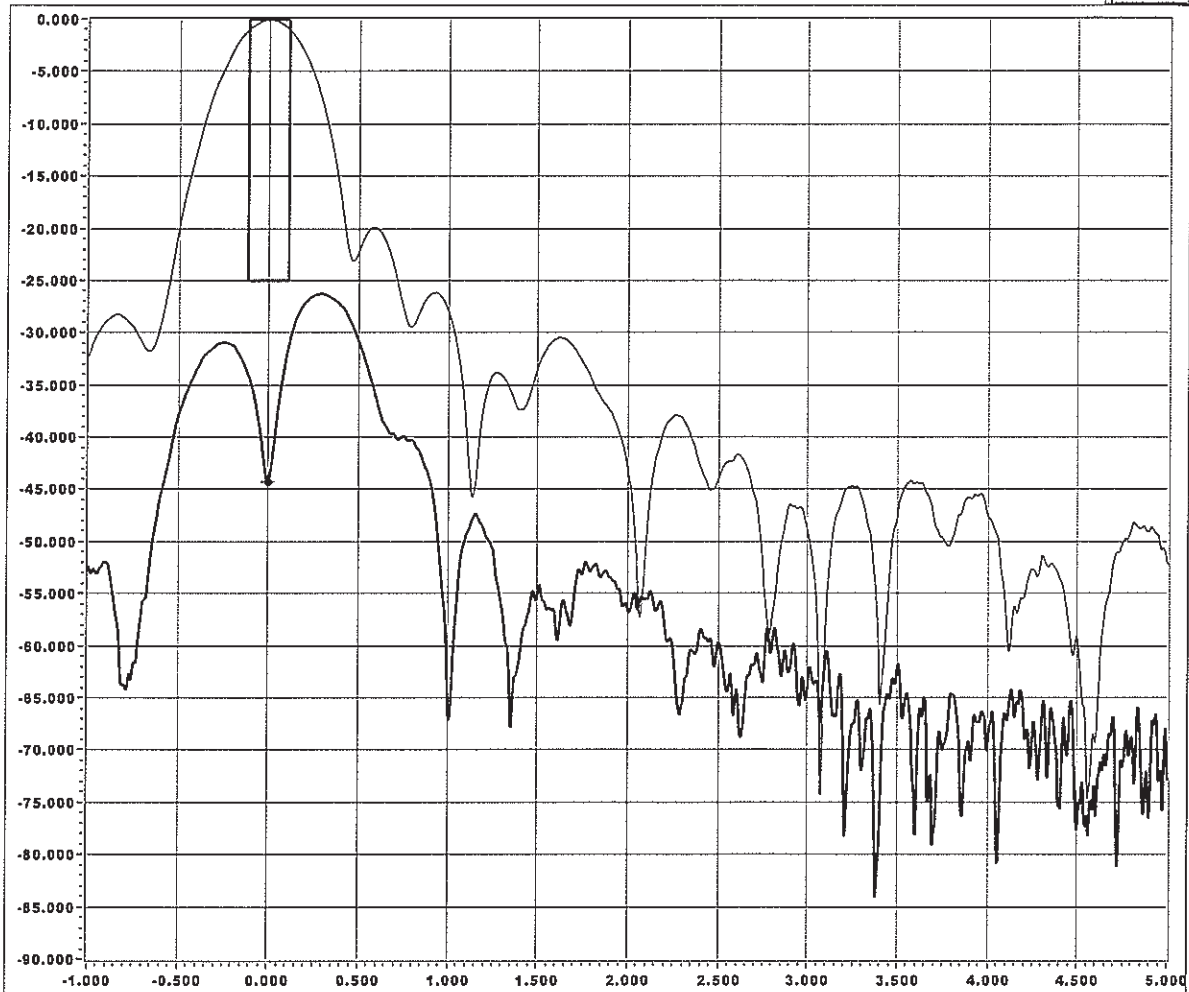
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 170530
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX...Cross-pol under Co-pol...VERT polarization...29.575 GHz

Elevation

On Axis Isolation (dB): 44.33



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=29574999996, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10			
Co-pol File:	% 070813 170530 30654 TC-5-VE-29.575.txt	Azimuth Beam Center (deg):	179.800
Cross-pol File:	% 070813 171204 30654 TX-5-VE-29.575.txt	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.574999996	On-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-36.75	Off-axis Spec. Isolation (dB):	25.00
# Points Displayed:	7595	Versions	61030 FAST 60129 PACK



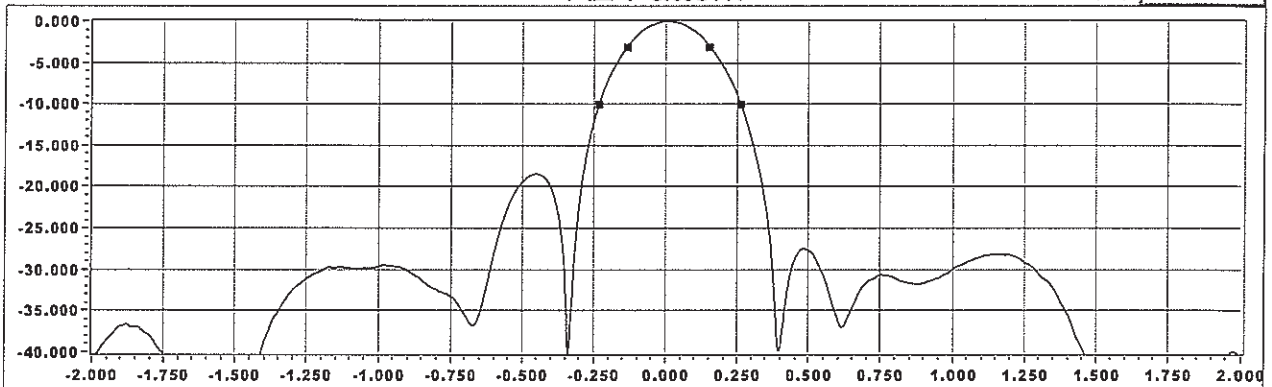
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 172101
 Job Number..... 30654

Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short/T Range
 Transponder..... NA

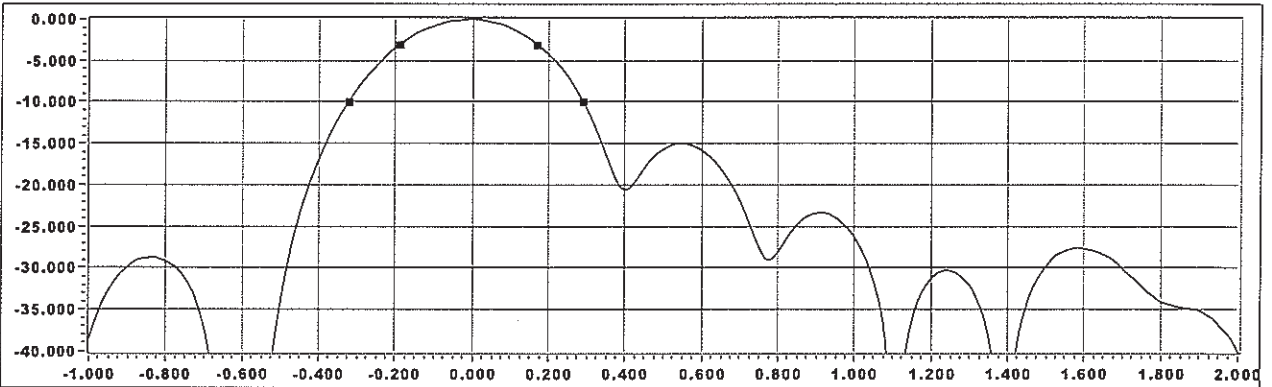
TX...VERT Polarization...Gain by Beamwidth...30.000 GHz

Spec. Gain (dBi): **54.200**
 Calculated Gain (dB): **53.69**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, AZ cosine corrected) relative to beam center.

$$\text{Gain by Beamwidth dBi} = 10 \log \left[\frac{((3\text{dB factor} / (\text{AZ } 3\text{dB BW} * \text{EL } 3\text{dB BW})) + (10\text{dB factor} / (\text{AZ } 10\text{dB BW} * \text{EL } 10\text{dB BW})))}{2} \right] - \text{Feed Loss dB} - 4.923(\text{RMS inches} * \text{Freq GHz})^2$$

[SA Freq (Hz)=29999999997, AZ rate (deg/s)=0.610, EL rate (deg/s)=0.706, RBW (Hz)=30, VBW (Hz)=10

AZ Co-pol File % 070813 172101 30654 TC-5-VA-30.000.txt
 EL Co-pol File % 070813 172209 30654 TC-5-VE-30.000.txt

The calculated gain is less than the specified gain by 0.51 dB.
 (The TIA-411-A tolerance for Gain by Beamwidth is +/- 0.55 dB.)

Test Frequency (GHz)	29.999999997
AZ Ref. Level (dBm)	-44.57
Feed Loss (dB)	0.85
RMS (in.)	0.015
Azimuth (deg)	179.800
Elevation (deg)	6.030

AZ 3dB BW (deg)	0.2860
AZ 10dB BW (deg)	0.4942
AZ 15dB BW (deg)	0.5753
EL 3dB BW (deg)	0.3565
EL 10dB BW (deg)	0.6141
EL 15dB BW (deg)	0.7211

Points Displayed **8196**

3dB Factor	37000	Versions	61030 FAST
10dB Factor	107000		60129 PACK



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 233144
 Job Number..... 30654

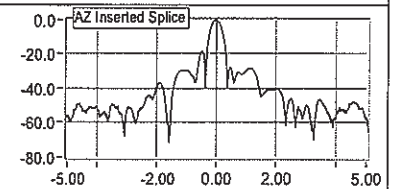
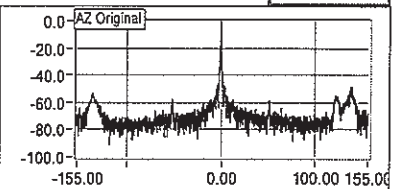
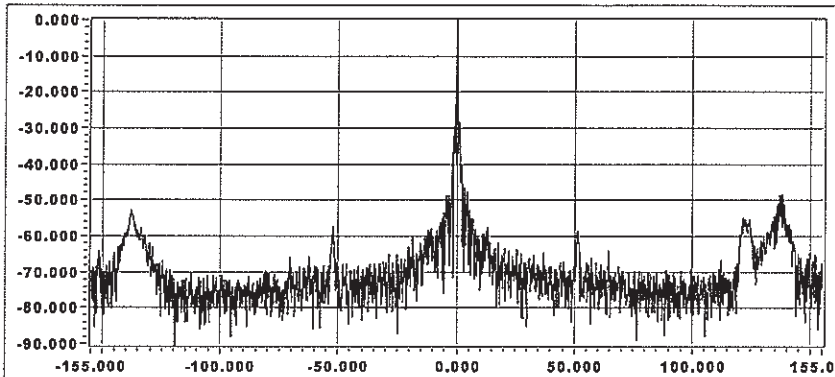
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...VERT Polarization...Gain by Integration...30.000 GHz

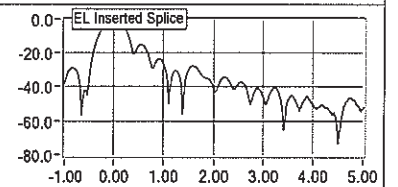
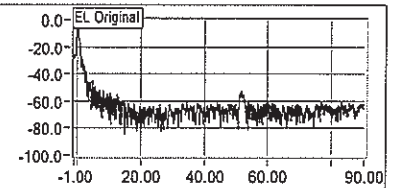
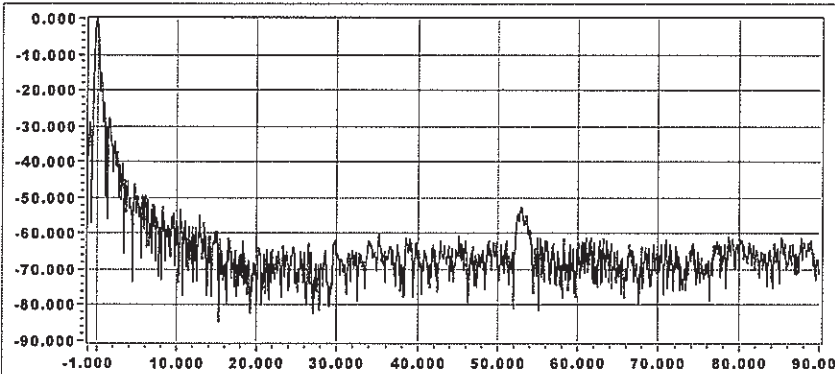
Spec. Gain (dBi): **54.200**

Calculated Gain (dB): **54.17**

AZ Pattern



EL Pattern



The Y-scale is power level (dB) relative to beam center; the X -scale is angle (degrees, AZ cosine corrected) relative to beam center.

Antenna Gain by Integration = $2 / (\text{Sum} [\text{PsubTheta} * \sin(\text{Theta}) * \text{deltaTheta}] - \text{FeedLoss} - \text{AngularExtentLoss} - \text{SparBlockageLoss} - \text{CrossPolLoss})$
 where the summation is performed for lookangles (Theta) offset from beam center from 0 to 180 degrees (in practice the summation occurs on both sides of beam center and the average is taken) and where PsubTheta is the power relative to beam center power and measured at lookangles offset from beam center.

SA Freq (Hz)=3000000302, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

AZ Co-pol File: % 070813 233144 30654 TC-155-VA-30.000.txt
 EL Co-pol File: % 070813 233745 30654 TC-90-VE-30.000.txt
 AZ Insert File: % 070813 172209 30654 TC-5-VE-30.000.txt
 EL Insert File: % 070813 172101 30654 TC-5-VA-30.000.txt

The calculated gain is less than the specified gain by 0.03 dB.

Test Frequency (GHz): **30.00000302**
 AZ Ref. Level (dBm): **-44.57**
 Azimuth (deg): **180.000**
 Elevation (deg): **12.000**

Versions
 61030 FAST
 60129 PACK

Points Displayed: **15845**
 Feed Loss (dB): **0.85**
 Angular Extent Loss(dB): **0.15**
 Spar Blockage Loss (dB): **0.05**
 Cross-pol Loss (dB): **0.05**



Customer..... Intelsat
 Date/Local Time.... 8-13-2007 at 233144
 Job Number..... 30654

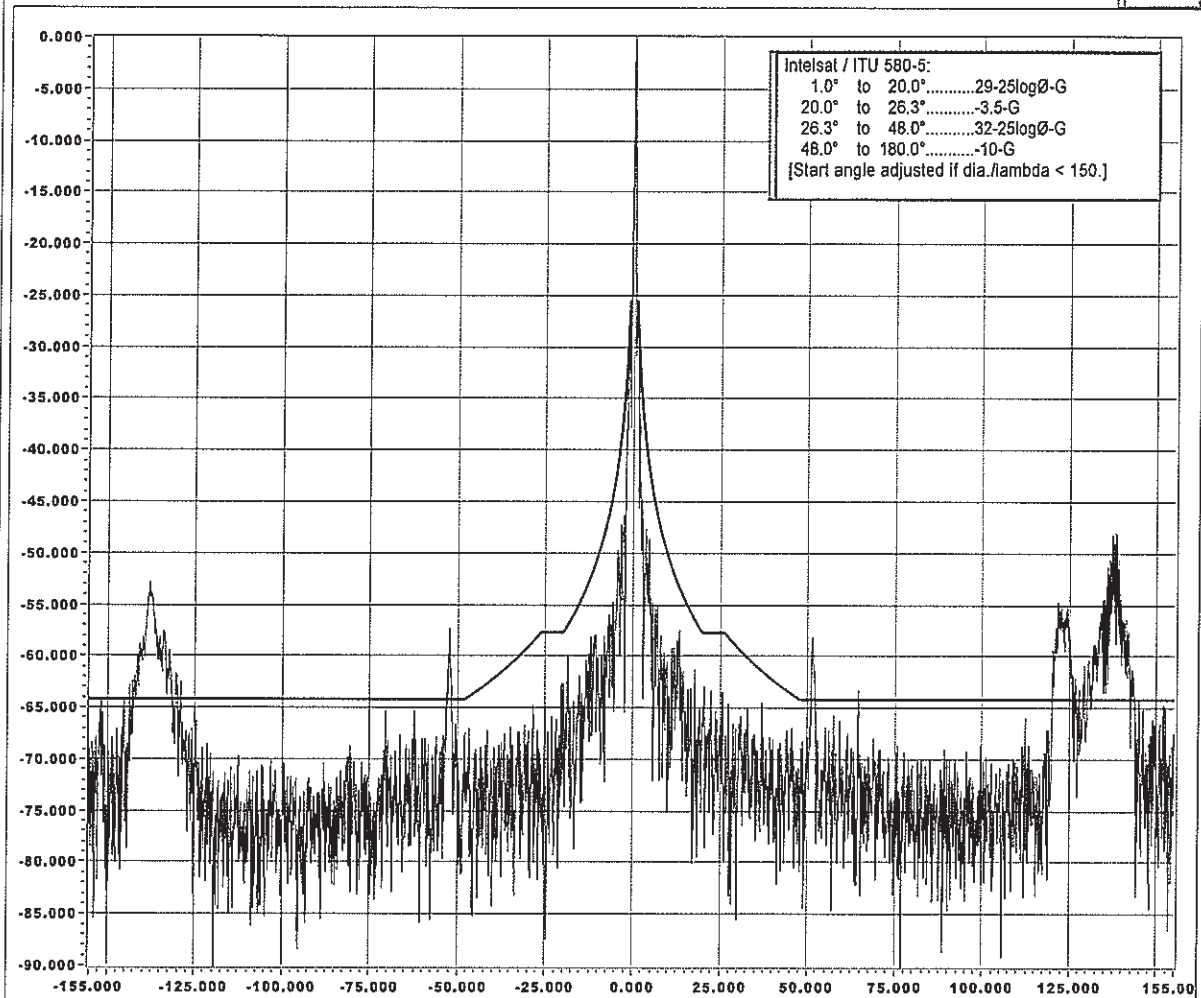
Model..... 2.4m HWT
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... ZUKO
 Spacecraft..... Short Range
 Transponder..... NA

TX...Co-pol...VERT polarization...30.000 GHz

Azimuth

% Over Curve (not including main lobe)

11.2



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)=30000000302, AZ rate (deg/s)=1.142, EL rate (deg/s)=0.563, RBW (Hz)=10, VBW (Hz)=3

File: % 070813 233144 30654 TC-155-VA-30.000.txt

Test Frequency (GHz): 30.000000302

Ref. Level (dBm): -43.27

Points Displayed: 7943

Versions
 61030 FAST
 60129 PACK

Specified Gain (dB): 54.200

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curved (dB): None



Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 233745
 Job Number..... 30654

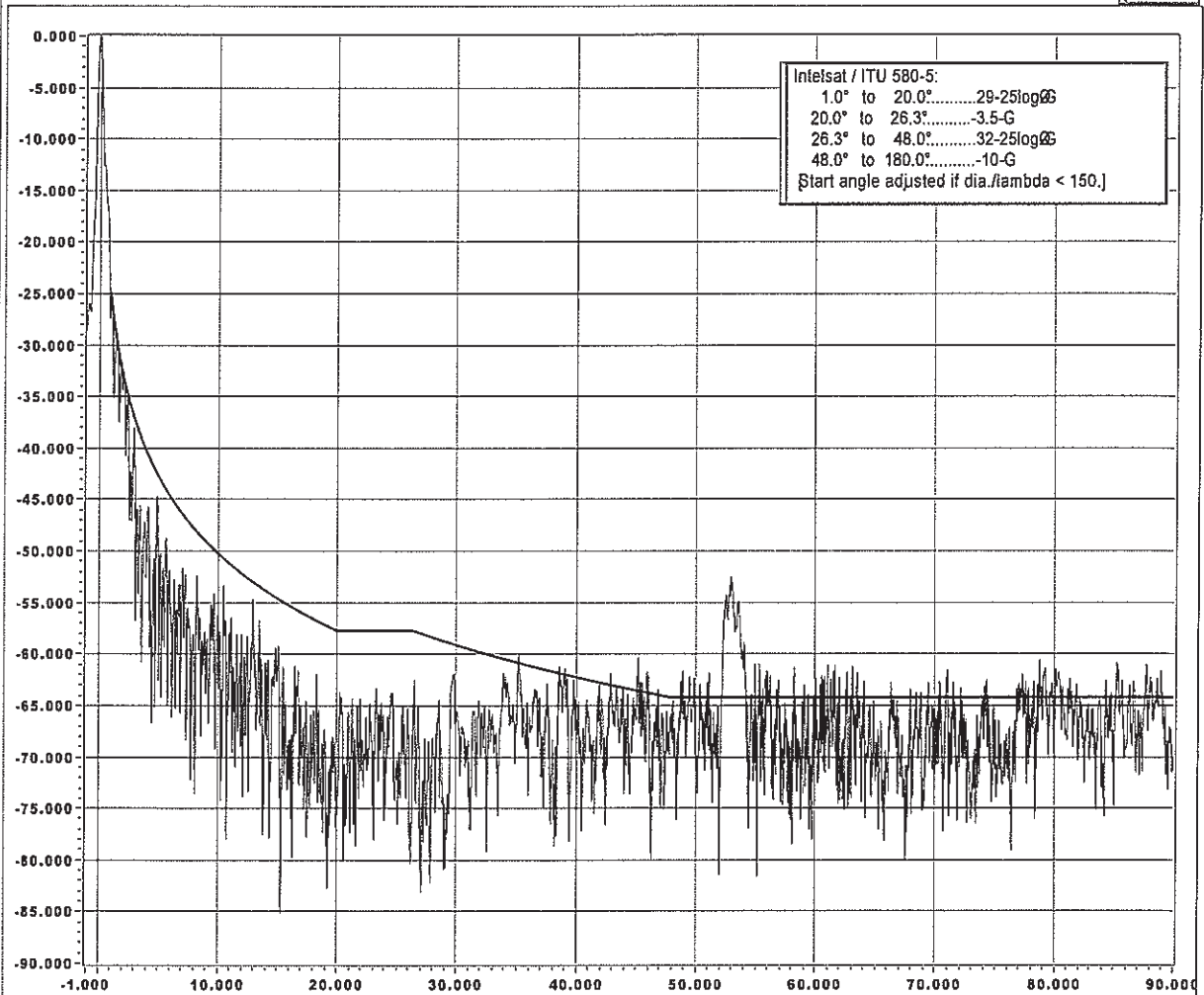
Altitude..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... JKO
 Spacecraft..... Short Range
 Transponder..... NA

TX.Co-pol...VERT polarization...30.000 GHz

Elevation

Power Curve (not including main lobe)

11.0



Y-scale is power level (dB) relative to beam center; x-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz) 30000000302, Az rate (deg/s) 1.142, EL rate (deg/s) 8.563, RBW (Hz) 0, VBW (Hz) 8

File: 070813 233745 30654 TC-90-VE-30.000.tx

Test Frequency (GHz): 30.00000302

Ref. Level (dBm): -44.15

#Points Displayed: 7284

Versions
 61030 FAST
 60129 PACK

Specified Gain: 54.200

Azimuth Beam Center (deg): 180.000

Elevation Beam Center (deg): 12.000

Margin Under Curve (dB): None



Customer..... Intelsat
 Date/Local Time.... 8-12-2007 at 113418
 Job Number..... 30654

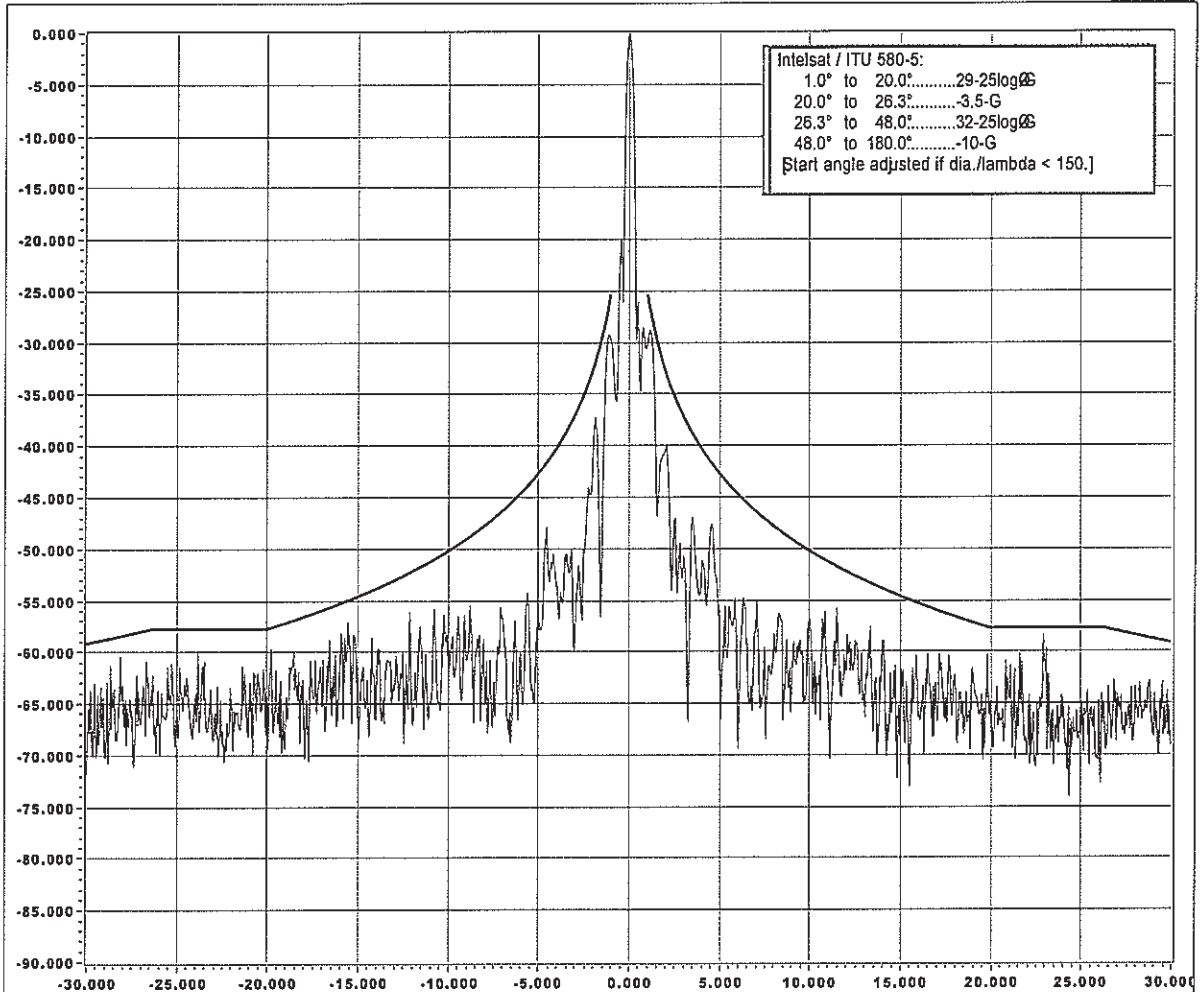
Antenna..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX.Co-pol...VERT polarization...30.000 GHz

Azimuth

Power Curve (not including main lobe)

0.0



Y-scale is power level (dB) relative to beam center; X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz) 80000000001, Az rate (deg/s) 6.603, EL rate (deg/s) 6.713, RBW (Hz) 80, VBW (Hz) 40

File: %070812 113418 30654 TC-166-VA-30.000.tx

Specified Gain (dB): 54.200

Test Frequency (GHz): 30.000000001

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -46.44

Elevation Beam Center (deg): 6.030

#Points Displayed: 1361

Versions
 61030 FAST
 60129 PACK

Margin Under Curved (dB): 0.58



Customer..... Intelsat
 Date/Local Time..... 8-12-2007 at 114147
 Job Number..... 30654

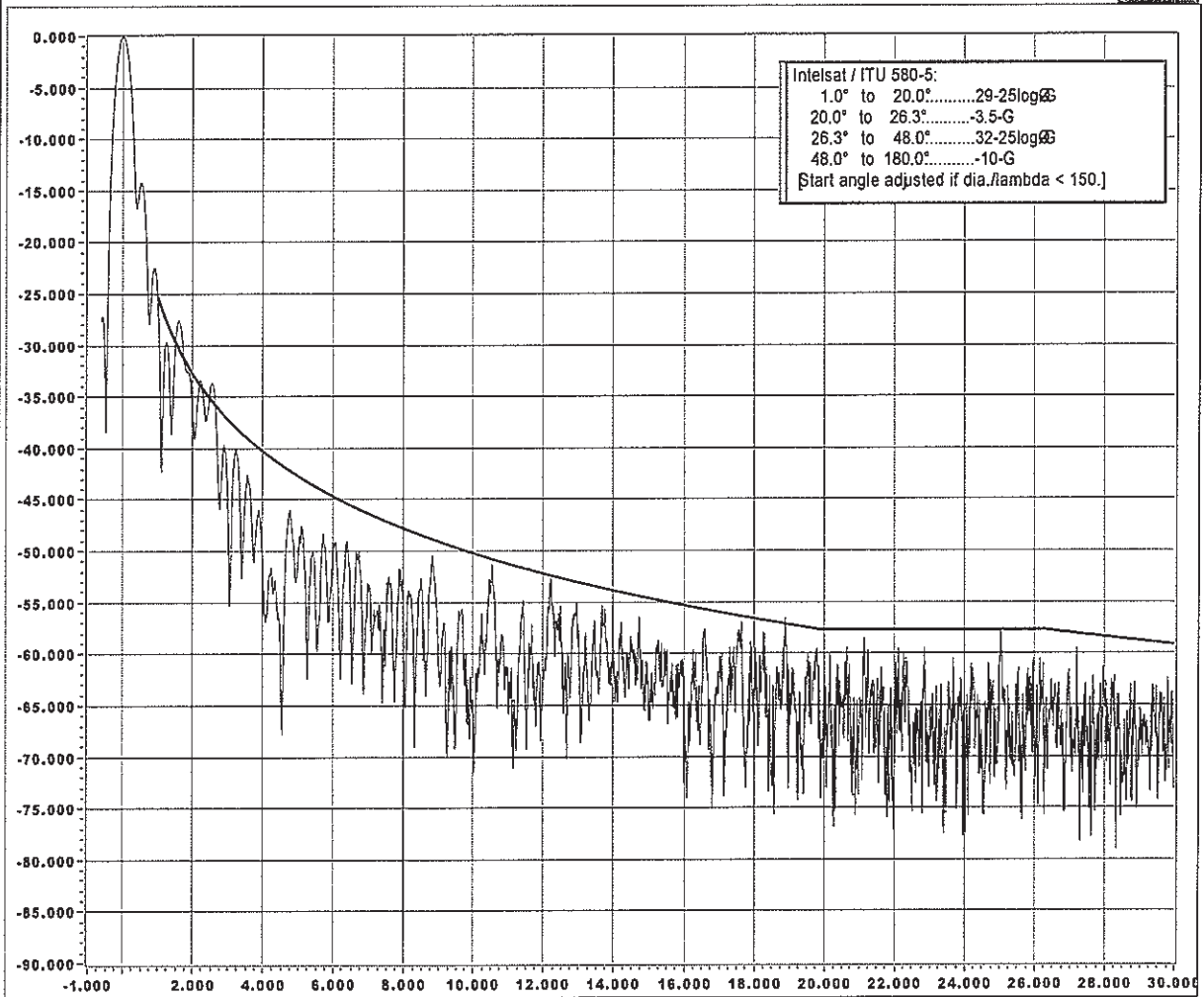
Model..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... Kenneth Taber
 Spacecraft..... Short/T Range
 Transponder..... NA

TX.Co-pol...VERT polarization...30.000 GHz

Elevation

Power Curve (not including main lobe)

1.8



Y-scale is power level (dB) relative to beam center; x-scale is an gle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz)0000000001, Az rate (deg/s)0.603, EL rate (deg/s)0.713, RBW (Hz)0, VBW (Hz)0

File: 070812 114147 30654 TC-90-VE-30.000.tk

Specified Gain: 54.200

Test Frequency (GHz): 30.00000001

Azimuth Beam Center (deg): 179.960

Ref. Level (dBm): -47.45

Elevation Beam Center (deg): 6.030

#Points Displayed: 3436

Versions
61030 FAST
60129 PACK

Margin Under Curve (dB): None



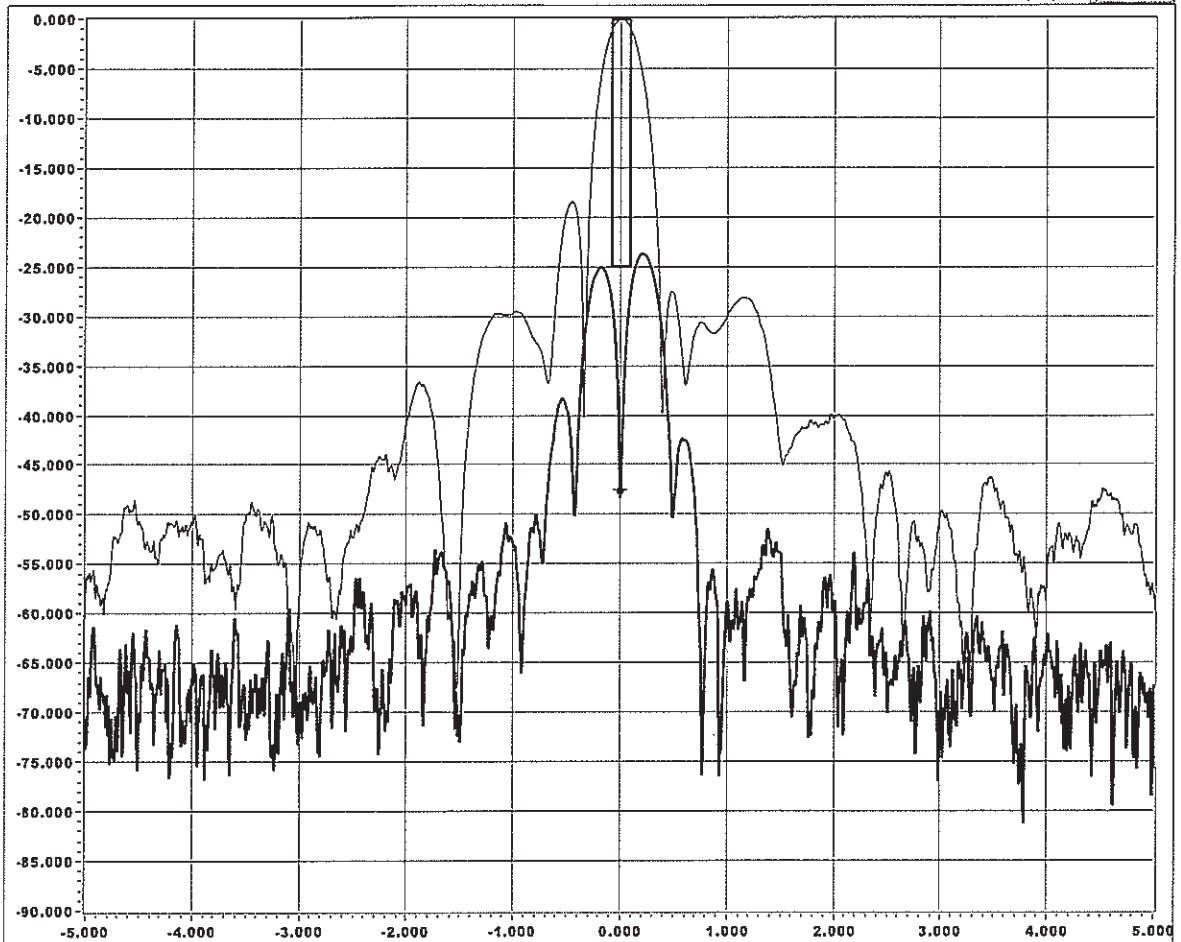
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 171630
 Job Number..... 30654

Antenna..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... JKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX.Cross-pol under Co-pol...VERT polarization...30.000 GHz

Azimuth

ϕ-ais Isolation (dB): 47.64



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz) 2999999997, AzRate (deg/s) 0.610, EL rate (deg/s) 0.706, RBW(Hz) 40, VBW(Hz) 40	
Co-pol File:	%070813 172101 30654 TC-5-VA-30.000.tx
Cross-pol File:	%070813 171630 30654 TX5-VA-30.000.tx
Test Frequency (GHz):	29.99999997
Ref. Level (dBm):	-44.57
#Points Displayed:	8192
Azimuth Beam Center (deg):	179.800
Elevation Beam Center (deg):	6.030
ϕ-ais Spec. Isolation (dB):	30.000
θ-ais Spec. Isolation (dB):	25.00



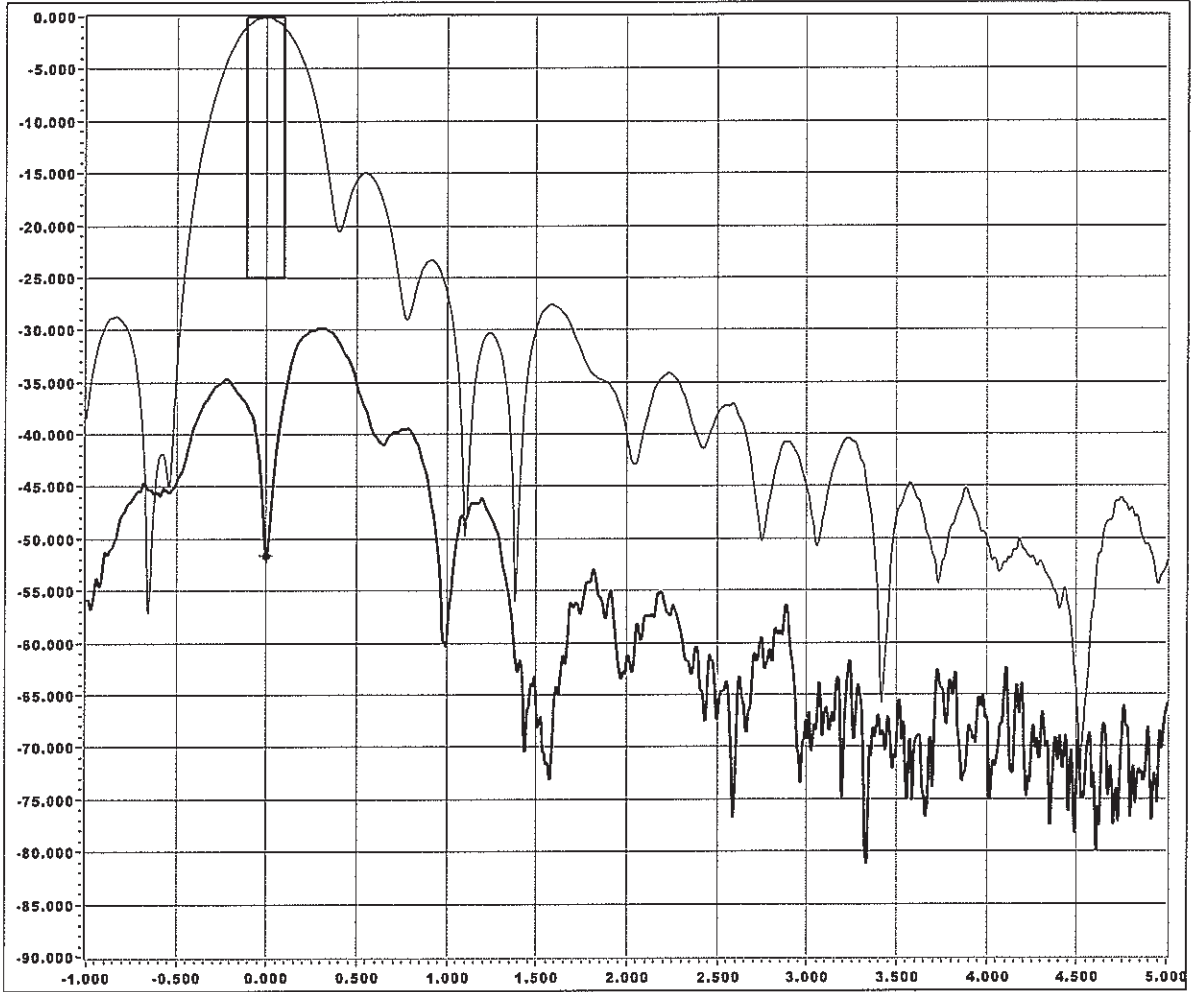
Customer..... Intelsat
 Date/Local Time..... 8-13-2007 at 172209
 Job Number..... 30654

Model..... 2.4m HW
 Location..... Test Range
 Weather..... Clear
 Test Engineer..... JKO
 Spacecraft..... Short/T Range
 Transponder..... NA

TX.Cross-pol under Co-pol...VERT polarization...30.000 GHz

Elevation

⊖ Axis Isolation (dB): 51.62



The Y-scale is power level (dB) relative to beam center; the X-scale is angle (degrees, cosine corrected) relative to beam center.

SA Freq (Hz) 2999999997, Az rate (deg/s) 0.610, EL rate (deg/s) 0.706, RBW (Hz) 80, VBW (Hz) 40

Co-pol File:	%70813 172209 30654 TC-5-VE-30.000.tk	Azimuth Beam Center (deg):	179.800
Cross-pol File:	%70813 171837 30654 TX-5-VE-30.000.tk	Elevation Beam Center (deg):	6.030
Test Frequency (GHz):	29.99999997	⊖-axis Spec. Isolation (dB):	30.000
Ref. Level (dBm):	-44.57	⊖-axis Spec. Isolation (dB):	25.00
#Points Displayed:	7761		

Antenna Noise Temperature and G/T

CUSTOMER: InetSat
 SITE: Kilgore, TX (Short Range)
 ANTENNA SIZE: 2.4m HWT
 JOB NUMBER: 30654
 LNA DATA: Miteq AMFW-8S-17212-130 S/N:

DATE: 8/14/07
 LOCAL TIME: 1433 hrs
 WEATHER: Clear
 TESTED BY: Zukowski, Werner

Polarization	Azimuth angle (deg)					Elevation angle (deg)				
	133.0	20.275	21.750	18.800	20.275	133.0	20.275	21.750	18.800	20.275
Frequency (GHz)	18.800	20.275	21.750	18.800	20.275	133.0	20.275	21.750	18.800	20.275
Hot load ambient temp (deg C)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
LNA ambient temp (deg C)	45.2	48.0	49.5	49.1	49.1	47.6	47.6	47.5	47.2	48.9
Cold sily noise power at SA (dBm)	-69.15	-66.42	-68.20	-69.98	-67.36	-69.55	-70.74	-68.17	-69.18	-70.19
Hot load noise power at SA (dBm)	-67.97	-65.88	-68.04	-68.04	-66.15	-67.97	-66.12	-67.80	-68.02	-68.03
LNA noise temp at spec (K)	130.00	189.00	127.00	130.00	189.00	127.00	130.00	189.00	127.00	189.00
Instrument floor noise power (dBm)	-88.88	-87.43	-87.52	-88.88	-87.43	-88.88	-87.43	-88.88	-87.43	-87.52
Spec temp (deg C)	23.0	33.0	23.0	23.0	33.0	23.0	33.0	23.0	23.0	33.0
Feed loss (dB)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Permanent losses after feed (dB)	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Temporary losses before LNA (dB)	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086
Antenna gain (dB)	50.08	50.73	51.29	50.08	50.73	51.29	50.08	50.73	51.29	50.73
LNA noise temp referenced in RF Spec	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00
Uncorrected y-factor (dB)	1.18	0.54	0.29	1.94	1.21	0.64	2.77	2.05	1.38	3.27
Corrected y-factor (dB)	1.19	0.54	0.29	1.96	1.22	0.65	2.80	2.07	1.40	3.31
Feed loss (ratio <1)	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794
Feed noise temp at ambient temp (K)	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61
Permanent losses after feed (ratio <1)	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996
Permanent noise temp after feed at amb. (K)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Temporary losses before LNA (ratio <1)	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980
Temporary noise temp before LNA at amb. (K)	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065
LNA noise temp at ambient (K)	148.07	206.00	148.19	151.36	207.27	146.63	150.26	205.43	146.54	149.75
y-factor corrected (ratio >1)	1.32	1.13	1.07	1.57	1.32	1.16	1.91	1.61	1.38	2.14
Tsys all at ambient (K)	347.67	454.63	427.62	293.32	390.02	392.76	241.08	319.61	330.42	214.20
Pattern noise temp (K)	169.17	232.37	272.06	94.90	147.48	229.16	28.98	59.09	148.91	-5.02
Feed noise temp at spec temp (K)	60.88	62.94	60.88	60.88	62.94	60.88	62.94	60.88	60.88	62.94
Permanent noise temp after feed at spec (K)	1.09	1.13	1.09	1.09	1.13	1.09	1.09	1.13	1.09	1.13
Tant, noise temp at spec (K)	198.26	247.51	276.58	136.26	180.06	242.81	83.90	109.88	179.16	56.39
Tsys referenced to spec (K)	315.63	367.73	397.05	256.85	300.55	363.10	204.68	230.60	299.59	177.77
Tsys (dBK)	24.99	25.66	28.99	24.10	24.78	25.60	23.11	24.77	22.50	22.53
G/Tsys (dB/K)	25.09	25.07	25.30	25.98	25.95	25.69	26.97	27.10	26.52	27.58
G/T	5	10	20	40	5	10	20	40	5	10
18.800	25.09	25.98	26.97	27.58	18.800	195.26	136.26	83.90	56.89	58.89
20.275	23.07	23.95	27.10	28.20	20.275	247.51	180.06	109.88	58.17	58.17
21.750	25.30	25.69	26.52	27.44	21.750	276.58	242.91	178.16	122.15	122.15

Antenna Noise Temperature and G/T

CUSTOMER: Incelast
 SITE: Kilgore, TX (Short Range)
 ANTENNA SIZE: 2.4m HW7
 JOB NUMBER: 30654
 LNA DATA: Mitq AMFV-85-17712-130 S/N:

DATE: 8/14/07
 LOCAL TIME: 1433 hrs
 WEATHER: Clear
 TESTED BY: Zukowski, Werner

Polarization	133.0		133.0		Vertical		133.0		133.0			
	Azimuth angle (deg)	Elevation angle (deg)	5	10	20	40	5	10	20	40		
Frequency (GHz)	18.800	20.275	21.750	18.800	20.275	21.750	18.800	20.275	21.750	18.800	20.275	21.750
Hot load ambient temp (deg C)	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3	36.3
LNA ambient temp (deg C)	45.2	48.0	49.5	48.1	48.1	47.6	47.8	47.5	47.5	47.2	47.2	48.9
Gold sky noise power at SA (dBm)	-69.42	-68.74	-68.38	-70.19	-67.57	-68.81	-70.88	-68.52	-69.66	-71.88	-69.48	-70.69
Hot load noise power at SA (dBm)	-68.27	-66.12	-68.18	-68.24	-66.25	-68.30	-68.19	-66.29	-68.39	-68.75	-66.54	-68.68
LNA noise temp at spec (K)	190.00	189.00	127.00	130.00	189.00	127.00	130.00	189.00	127.00	130.00	189.00	127.00
Instrument floor noise power (dBm)	-88.88	-87.43	-87.52	-88.88	-87.43	-87.52	-88.88	-87.43	-87.52	-88.88	-87.43	-87.52
Spec temp (deg C)	23.0	33.0	23.0	23.0	33.0	23.0	23.0	33.0	23.0	23.0	33.0	23.0
Feed loss (dB)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Permanent losses after feed (dB)	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Temporary losses before LNA (dB)	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086	0.086
Antenna gain (dB)	50.05	50.74	51.26	50.05	50.74	51.26	50.05	50.74	51.26	50.05	50.74	51.26
LNA noise temp referenced in RF Spec	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00
Uncorrected y-factor (dB)	1.15	0.62	0.20	1.95	1.32	0.51	2.69	2.23	1.29	3.13	2.94	2.01
Corrected y-factor (dB)	1.16	0.62	0.20	1.97	1.33	0.52	2.72	2.25	1.31	3.18	2.97	2.04
Feed loss (ratio <1)	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794	0.794
Feed noise temp at ambient temp (K)	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61	63.61
Permanent losses after feed (ratio <1)	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996	0.996
Permanent noise temp after feed at amb. (K)	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Temporary losses before LNA (ratio <1)	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980	0.980
Temporary noise temp before LNA at amb. (K)	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065	6.065
LNA noise temp at ambient (K)	148.07	206.00	148.19	151.36	207.27	146.63	150.26	205.43	146.54	149.75	205.08	147.70
y-factor corrected (ratio >1)	1.31	1.15	1.05	1.57	1.36	1.13	1.87	1.68	1.35	2.08	1.98	1.60
Tsys/all at ambient (K)	350.04	446.24	436.66	292.57	380.14	404.80	245.54	306.42	337.25	220.98	259.31	285.44
Pattern noise temp (K)	172.23	221.55	283.72	93.93	134.73	244.67	34.73	42.09	157.72	3.72	-18.18	89.46
Feed noise temp at spec temp (K)	60.88	62.94	60.88	62.94	62.94	60.88	62.94	60.88	62.94	60.88	62.94	60.88
Permanent noise temp after feed at spec (K)	1.09	1.13	1.09	1.09	1.13	1.09	1.09	1.13	1.09	1.09	1.13	1.09
Tant, noise temp at spec temp (K)	197.69	238.92	288.24	135.49	169.95	258.23	88.47	95.37	188.16	63.84	48.50	131.94
Tsys referenced to spec temp (K)	318.05	399.17	406.28	256.08	290.46	375.38	209.23	217.14	306.57	184.69	169.44	252.54
Tsys (dBK)	25.02	25.55	26.09	24.08	24.93	25.74	23.21	23.37	24.87	22.66	22.29	24.02
G/Tsys (dB/K)	25.03	25.19	25.17	25.97	26.11	25.52	26.84	27.37	26.39	27.39	28.45	27.24
G/T	5	10	20	40	5	10	20	40	5	10	20	40
18.800	25.03	25.97	26.84	27.39	18.800	197.69	135.49	88.47	95.37	188.16	63.84	48.50
20.275	25.19	26.11	27.37	28.45	20.275	238.92	169.95	96.37	106.37	184.69	169.44	252.54
21.750	25.17	25.52	26.39	27.24	21.750	286.24	255.23	186.16	131.94			



R.F. Specification

for

VertexRSI 2.40 Meter Fly Away Antenna

With Four Port Linearly Polarized Feed

Preliminary Spec. VSWR 1.5:1 for 21.2-21.75GHz, RTISO 50 db for 21.2-21.75 GHz

Receive Transmit

Frequency in GHz----- 18.800-21.750 29.150-30.000
 Port Type----- Rx1/Rx2 Tx1/Tx2
 Polarization----- Linear Linear
 Feed Port Polarizations----- VLP/HLP HLP/VLP
 Antenna Gain (+/- 0.2 dB)
 18.800 / 29.150 GHz----- 50.50 dBi 53.90 dBi
 20.275 / 29.575 GHz----- 51.20 dBi 54.10 dBi
 21.750 / 30.000 GHz----- 51.70 dBi 54.20 dBi

Antenna Noise Temperature
 5 degree Elevation----- 185 K
 10 degree Elevation----- 160 K
 20 degree Elevation----- 141 K
 40 degree Elevation----- 129 K

Typical G/T at 20 deg Elevation 20.275 GHz , clear horizon
 120 degree K LNA----- 27.0 dB/K
 200 degree K LNA----- 25.9 dB/K

Pattern Beamwidth in degrees at 20.275 / 29.575 GHz
 -3 dB Beamwidth----- 0.41 0.30
 -15 dB Beamwidth----- 0.86 0.63
 Sidelobes
 For Angle A from 1.0 to 30.0 Degrees----- 29 - 25 log A
 For Angle A from 30.0 to 130.0 Degrees----- -10 dBi -10 dBi
 For Angles from 130.0 to 180 Degrees----- 0 dBi 0 dBi

Cross Polarization Isolation
 On Axis----- 30.0 dB 30.0 dB
 Within 1.0 dB Beamwidth----- 25.0 dB 25.0 dB



R.F. Specification

for

VertexRSI 2.40 Meter Fly Away Antenna

With Four Port Linearly Polarized Feed

Preliminary Spec, VSWR 1.5:1 for 21.2-21.75GHz, RTISO 50 db for 21.2-21.75 GHz

Receive Transmit

VSWR (Return Loss)-----	1.30:1(17.7dB)	1.30:1(17.7dB)
Feed Insertion or Ohmic Loss-----	1.00 dB	0.85 dB
Port to Port Isolation (Rx to Rx, Tx to Tx, Same Band)-----	17.0 dB	17.0 dB
Port to Port Isolation-----	0.0 dB (Input)	-85.0 dB
Port to Port Isolation-----	-85.0 dB	0.0 dB (Input)
Output Waveguide Flange Interface-----	WR-42	WR-28
Total Power Handling Capability-----		100 Watts

Notes - Other operational frequencies available

- 10% of sidelobes may exceed the sidelobe specifications where applicable.
- Power handling capability is based on and limited by the physical characteristics in the feed components. Microwave power at these levels may contribute to the radiation hazard or exceed certain offaxis EIRP specifications.

-G/T is calculated by bolting single LNA directly to the feed. It does not allow for any post LNA effects.

All values are at the rear feed output flange.

TEST PLAN
for
RANGE TESTING
OF
LINEARLY POLARIZED ANTENNA

900-0199

Revision C
October 16, 1996



ANTENNA PRODUCTS DIVISION

2600 N. Longview St., Kilgore, TX USA 75662-6842
Phone (903) 984-0555 * FAX (903) 984-7597

C	RKD	10/16/96- RKD	T. Chambers	/	RChugh
B	ECR#95-0367	12/16/94- dds	RDavis	T	TC
A	Original Release	01/10/94- mis	R.Davis	%	RWS
REV.	DESCRIPTION	DATE	CHECK	MSTR.	APPR.

TEST PLAN FOR RANGE TESTING OF LINEARLY POLARIZED ANTENNAS

Test No.	Test Type	Test Proc. No.	Frequencies	Spec.	Pol.	Angle Travel for Patterns
1.	Receive Gain Meas. Using Expanded Patterns	TP1016	Low, Mid & High Freq in Rx Band	See Contract	V&H	$\pm 3.0^\circ$ Az -1° to $+3.0^\circ$ EI
2.	Receive Cross-pol Patterns	TP1053	Low, Mid & High Freq in Rx Band	See Contract	V&H	$\pm 5^\circ$ Az -1° to $+5^\circ$ EI
3.	Receive Patterns	TP1017	Low, Mid & High Freq. in Rx Band	See Contract	V&H	$\pm 30^\circ$ Az -1° to $+30^\circ$ EI -180° Az
4.	Transmit Gain Meas Using Expanded Patterns	TP1016	Low, Mid & High Freq. in Tx Band	See Contract	V&H	$\pm 3.0^\circ$ Az -1° to $+3.0^\circ$ EI
5.	Transmit Cross-pol Patterns	TP1053	Low, Mid & High Freq. in Tx Band	See Contract	V&H	$\pm 5^\circ$ Az -1° to $+5^\circ$ EI
6.	Transmit Patterns	TP1017	Low, Mid & High Freq. in Tx Band	See Contract	V&H	$\pm 30^\circ$ Az -1° to $+30^\circ$ EI -180° Az
7.	Antenna Noise Temp. Measurement	TP1157	Low, Mid & High in Rx Band	See Contract	V&H	---
8.	Sytem G/T Measurement	TP1007	Low, Mid, & High in Rx Band	See Contract	V&H	---

VertexRSI Antenna Products Division
2600 N. Longview St., Kilgore, TX 75662

1

Equipment List

LNA's:

Miteq Ka JSW44-20002600-50-SP S/N: 842807 (Testing)
Miteq Ka S/N 742125 (Testing)
Miteq Ka AMFW-8S-177212-130 S/N:579186 (Noise Temperature)

Analyzer's:

Agilent E4446A
S/N: MY46180164
CAL: 1-22-07 to 1-22-08

Signal Generator:

Agilent 83650B
S/N: 3420A01979
CAL: 26FEB07 to 26FEB08

Agilent 83650A
S/N: 3250A00394
CAL: 03MAY07 to 03MAY08

Source:

Feed Horn: Ka 1
Ka 2

Radiation Hazard Report

Analysis of Non-Ionizing Radiation for a 2.4 m Earth Station

This analysis provides the calculated non-ionizing radiation levels for a 2.4-meter earth station system.

The methods and calculations performed in this analysis are based on the FCC Office of Engineering and Technology Bulletin, No.65, October 1985 as 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 (Summarized in Annex 1). There are separate exposure limits applicable to the General Population/Uncontrolled Environment and the Occupational/Controlled Environment. The Maximum Permissible Exposure (MPE) limits for persons in a General Population/Uncontrolled environment for the frequency band of this antenna, is 1 mW/cm² for a 30 minute or lower time period as shown in Annex 1 (a). The MPE limit for persons in an Occupational/Controlled environment for the frequency band of this antenna is 5 mW/cm² for a 6 minute time or lower period as shown in Annex 1 (b). The purpose of this analysis described is to determine the power flux density levels of the earth station at the main reflector surface, the near-field, transition region, far-field, between the sub-reflector or feed and, at the main reflector surface, and between the antenna edge and the ground and to compare these levels to the specified MPEs.

The parameters of the antenna that is the subject of this analysis are shown in Table 1. Intermediate calculated values and constants are provided in Table 2.

Table 1. Input Parameters Used for Determining Power Flux Densities

Parameter	Symbol	Formula	Value	Units
Antenna Diameter	D	Input	2.4	m
Frequency	F	Input	29750	MHz
Transmit Power	P	Input	200	W
Antenna Gain (dBi)	G _{es}	Input	55	dBi

Table 2. Calculated Values and Constants

Parameter	Symbol	Formula	Value	Units
Antenna Surface Area	A _{surface}	$\pi D^2/4$	4.52	m ²
Wavelength	λ	300/F	0.010084	m
Antenna Gain (factor)	G	10 ^{Ges/10}	316227.77	n/a
Pi	π	Constant	3.1415927	n/a
Antenna Efficiency	η	$G\lambda^2/(\pi^2 D^2)$	0.57	n/a

1. Antenna Main Reflector Surface

The power density in the main reflector is determined from the Power level and the area of the main reflector aperture. This is determined from the following equation:

Power Density at the Main Reflector Surface:

$$\begin{aligned} S_{\text{surface}} &= 4P/A_{\text{surface}} && (1) \\ &= 176.839 \text{ W/m}^2 \\ &= 17.684 \text{ mW/cm}^2 \end{aligned}$$

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 is determined from the following equation:

Extent of the Near Field:

$$\begin{aligned} R_{\text{nf}} &= D^2 / (4\lambda) && (2) \\ &= 142.80 \text{ m} \end{aligned}$$

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

Near Field Density:

$$\begin{aligned} S_{\text{nf}} &= 16.0 \eta P / (\pi D^2) && (3) \\ &= 10.003 \text{ mW/cm}^2 \end{aligned}$$

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 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 is determined from the following equation:

Transition Region Power Density:

$$\begin{aligned} S_t &= S_{\text{nf}} R_{\text{nf}} / R_t && (4) \\ &= 10.003 \text{ mW/cm}^2 \end{aligned}$$

4. Far Field Distance Calculation

The distance to the Far Field Region is calculated using the following equation:

Distance to Far Field Region:

$$\begin{aligned} R_{ff} &= 0.6 D^2 / \lambda \\ &= 342.720 \text{ m} \end{aligned} \quad (5)$$

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

On-axis Power Density in the Far Field:

$$\begin{aligned} S_{ff} &= G P / (4 \pi R_{ff}^2) \\ &= 4.285 \text{ mW/cm}^2 \end{aligned} \quad (6)$$

5. Region between the Main Reflector and the Ground

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

Power Density between Reflector and Ground:

$$\begin{aligned} S_g &= P / A_{\text{surface}} \\ &= 4.421 \text{ mW/cm}^2 \end{aligned} \quad (7)$$

7. Summary of Calculations

Table 3. Summary of Expected Radiation levels for Uncontrolled Environment

Region	Symbol	Calculated Maximum Radiation Power Density Level (mW/cm ²)	Hazard Assessment
1. Main Reflector	S_{surface}	17.684	Potential Hazard
2. Near Field (R _{nf} = 142.8 m)	S_{nf}	10.003	Potential Hazard
3. Transition Region (R _{nf} < R _t < R _{ff})	S_t	10.003	Potential Hazard
4. Far Field (R _{ff} = 342.72 m)	S_{ff}	4.285	Potential Hazard
5. Between Main Reflector and Ground	S_g	4.421	Potential Hazard

Table 4. Summary of Expected Radiation levels for Controlled Environment

Region	Symbol	Calculated Maximum Radiation Power Density Level (mW/cm ²)	Hazard Assessment
1. Main Reflector	S_{surface}	17.684	Potential Hazard
2. Near Field (R _{nf} = 142.8 m)	S_{nf}	10.003	Potential Hazard
3. Transition Region (R _{nf} < R _t < R _{ff})	S_t	10.003	Potential Hazard
4. Far Field (R _{ff} = 342.72 m)	S_{ff}	4.285	Satisfies FCC MPE
5. Between Main Reflector and Ground	S_g	4.421	Satisfies FCC MPE

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

8. Conclusion

Based upon the above analysis, it is concluded that harmful levels of radiation may exist in those regions noted for the Uncontrolled (Table 3) Environment and the Controlled Environment (Table 4).

The antenna is located at a facility in Hagerstown, MD.

The antenna is in a facility with secured access in and around the proposed antenna. The earth station will be 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 might be working or otherwise present in or near the direct path of the main beam.

The applicant will ensure that the main beam of the antenna will be pointed at least one diameter away from any building, or other obstacles in those area that exceed the MPE levels. Since one diameter removed from the center of the main beam the levels are down by 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.

Finally, the earth station's operating personnel will not have access to areas that exceed the MPE levels, while the earth station is in operation. The transmitter will be turned off during those periods of maintenance, so that the MPE standard of 5.0 mW/cm² will be complied with for those regions in close proximity to the main reflector, which could be occupied by operating personnel.

"The licensee shall take all necessary measures to ensure that the antenna does not create potential exposure of humans to radiofrequency radiation in excess of the FCC exposure limits defined in 47 CFR 1.1307(b) and 1.1310 wherever such exposures might occur. Measures must be taken to ensure compliance with limits for both occupational/controlled exposure and for general population/uncontrolled exposure, as defined in these rule sections. Compliance can be accomplished in most cases by appropriate restrictions such as fencing. Requirements for restrictions can be determined by predictions based on calculations, modeling or by field measurements. The FCC's OET Bulletin 65 (available on-line at www.fcc.gov/oet/rfsafety) provides information on predicting exposure levels and on methods for ensuring compliance, including the use of warning and alerting signs and protective equipment for workers."

ANNEX 1
(MPE Levels)

a) Limits for General Population/Uncontrolled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm²)
30-300	0.2
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	1

b) Limits for Occupational/Controlled Exposure (MPE)

Frequency Range (MHz)	Power Density (mW/cm²)
30-300	1
300-1500	Frequency(MHz)*(4.0/1200)
1500-100,000	5