



MICROWAVE PATH SURVEY REPORT

RADIO FREQUENCY INTERFERENCE (RFI) MEASUREMENT REPORT

Prepared For

ViaSat

Birmingham, AL

Transmit and Receive Earth Station 17-21 GHz and 27-31 GHz

January 29, 2015

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5.1 Conclusions

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ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

On-site Radio Frequency Interference (RFI) measurements were performed on behalf of ViaSat, Inc. on January 29, 2015 at their proposed site in Birminham, AL. The purpose of these measurements was to determine the relative RFI levels in the 17-21 and 27-31 GHz common carrier frequency band and their impact on digital down-link satellite reception. Measurements were performed at one designated location. The purpose of this report is to document the results of these measurements and to present recommendations.

The analysis in this report is based upon the following:

- Andrew 4.1 Meter Antenna
- Satellite Arc: 55 to 115 Degrees West Longitude
- Frequency Range Considered: 17 to 21 GHz and 27-31 GHz
- Interference Objective: -156 dBW/1 MHz
- Type of Reception: Digital
- Measured Antenna Center Line: 6.5 Feet Above Ground Level

1.2 Background

ViaSat, Inc is proposing to locate a new transmit/receive antenna at a new location of $33^0 29'$ 58.6" N and $086^0 49' 13.4$ " W ViaSat, Inc had requested that Comsearch conduct RFI measurements at the facility to assess the interference potential. This facility is currently nonoperational and measurements were done at a point near the proposed antenna locations.

The measured site is identified on a portion of a topographic map shown in Figure 1.2-1. An aerial photo of the site location is shown in Figure 1.2-2. A photo of the measurement using a GPS is shown in Figure 1.2-3.

1.3 Constraints

The analysis in this report is based upon the following assumptions and constraints.

- The antenna selected will conform to the FCC reference pattern 32-25 Log θ as specified in 47CFR 25.209(a)(2).
- It is assumed that during the measurement period all of the terrestrial transmitters were active and operating at full transmit power for the licensed frequencies unless otherwise noted.
- The signal identification and frequencies analyzed are based upon information obtained from the various common carriers as to what frequencies were active at the time of the measurements and the traffic these frequencies were supposed to be carrying.
- The actual ground elevation of the site is based on the data from the topographic map.
- The interference objective of -156 dBW/1 MHz used throughout this report is based upon estimated link budget parameters and is subject to change. ViaSat, Inc should review the system parameters for this down-link in order to verify the viability of this objective.

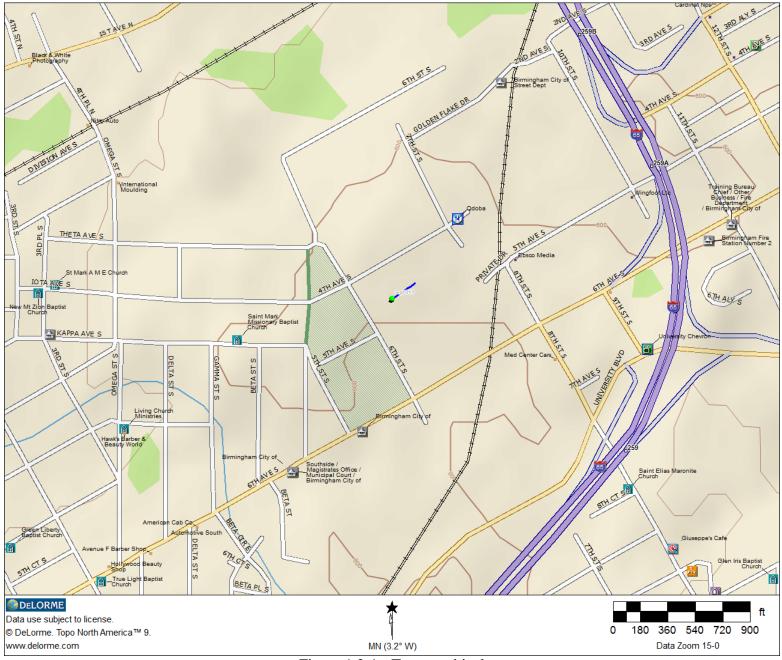


Figure 1.2-1 - Topographical

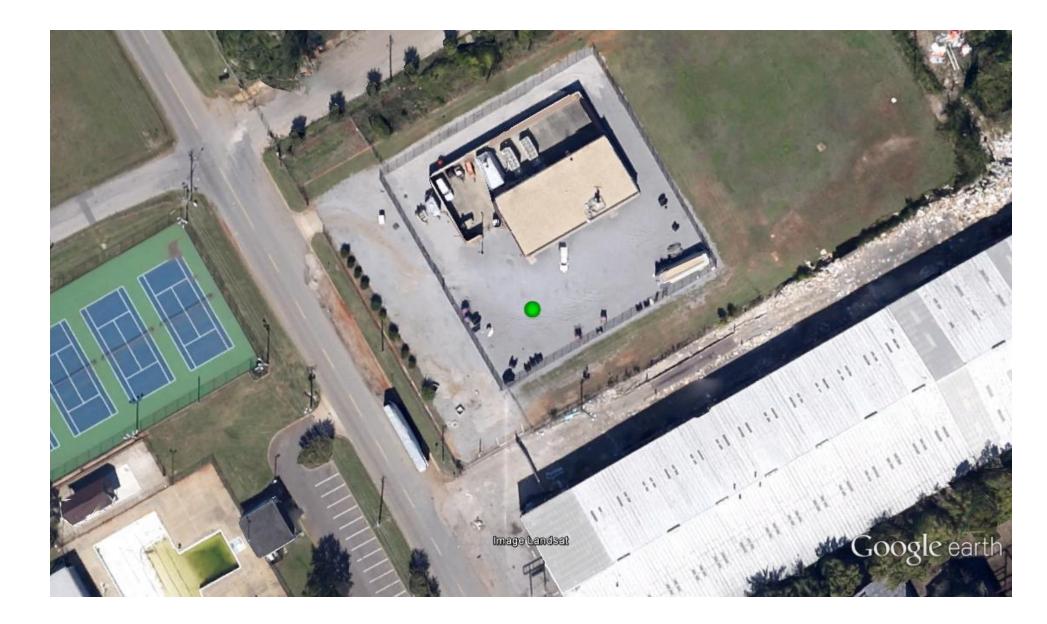


Figure 1.2-2 – Aerial Photograph



Figure 1.2-3 – GPS Photograph

TWO

TEST PROCEDURE

2.1 Calibration

Figures 2.1-1 is the block diagram of the test set for all bands to be tested. All test equipment used was allowed a proper warm-up period prior to calibration. The test set was calibrated by the signal substitution method, as recommended by NSMA, utilizing a synthesized signal generator. The reference signal from the signal generator was adjusted for the center frequency of each band to be tested and measured with a thermal power meter for calibrated reference test level (-60 dBm). This calibrated reference signal from the signal generator was then injected into the end of the coaxial cable of the test set at the point, which normally connects to the test antenna. A spectrum analyzer then measured the reference test signal level after passing through the test set. At this point, the spectrum analyzer was calibrated such that the top graticule of the spectrum analyzer display (-60 dBm) corresponded to the injected reference signal (-60 dBm) by utilizing the reference level offset function of the Anritsu –M52720T spectrum analyzer. Upon completion of the calibration process, a known reference level was obtained for the measured in a given set of spectrum analyzer display readings.

The following formula is used to transform the measured signal level as read on the spectrum analyzer display (dBm) to an isotropic reference signal level (dBW_I) as seen at the point of test:

 $dBW_I = LI - GA - 30$

Where: $dBW_I = Isotropic level in dBW$

LI = Level (dBm) of injected signal

GA = Test antenna gain

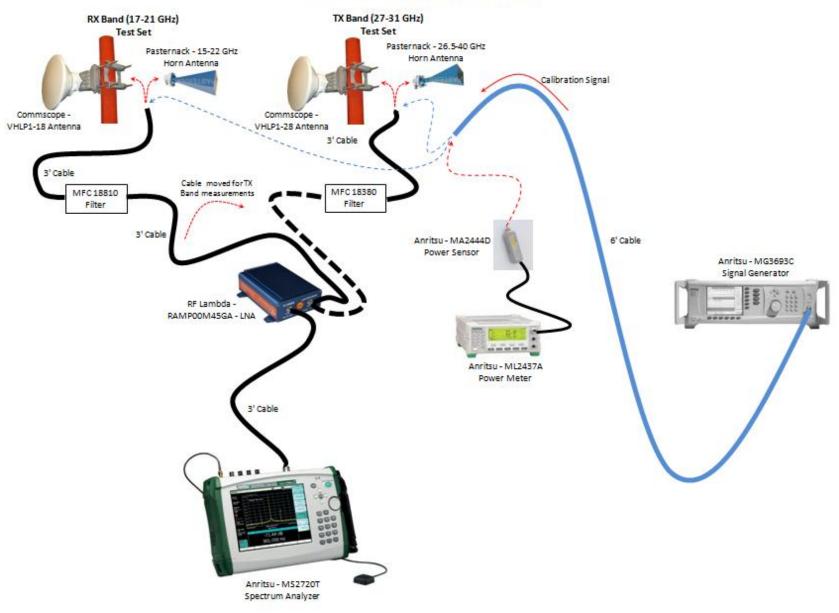
-30 =Conversion factor from dBm to dBW

at 19.5 GHz: $dBW_I = -60 dBm - 30 dB - 30 dB$

 $= -120 \text{ dBW}_{\text{I}}$

In this instance, the spectrum analyzer displayed measured signal level of -60 dBm equates to an isotropic signal level of -120 dBW_I.

Figures 2.1-2(A-H) displays the spectrum photographs of the described calibration procedure employed during these measurement.



Test Set Equipment Diagram



Figure 2.1-1 Receive Test Equipment Block

/Inritsu 01/29	/2015 08:09:00 am			Save
Ref Lvi	M1 -121.76 dBm @17.500 GHz		Spectrum Analyzer	
-120.0 dBm 90.0 dB Ext Gain	–120.0 dBm	¢ 1		
Input Atten 0.0 dB	-130.0			
Detection Peak	-140.0		0 0	
#RBW 1 MHz	-150.0			
VBW 300 kHz	cal Adrend and more frequencies and prove adaption of the second s	and the manual and the second	when you and the design and the	
Sweep Time 50 ms	-170.0			
Traces A: Max Hold				
	-180.0			Change
	-190.0			Quick Name
Sweep (Fast) Continuous	-200.0			Change Save Location
Freq Ref	–210.0 d₿m			Change Type
Int Std Accy	17.000 GHz	Center 17.500 GHz Span 1.000 GHz	18.000 GHz	Setup/JPEG/
Freq	Amplitude	Span	BW	Marker

Figure 2.1-2 (A) Calibration Spectrum Photo 17.5 GHz

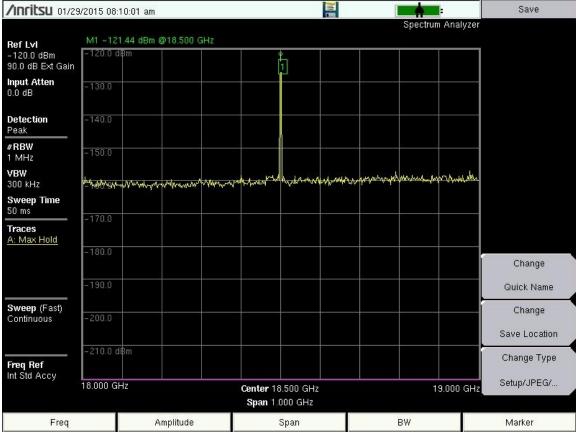


Figure 2.1-2 (B) Calibration Spectrum Photo 18.5 GHz

/Inritsu 01/29)/2015 08:10:53 am					:	Save
					Spectrum	Analyzer	
ef Lvl	M1 -120.74 dBm (@19.500 GHz					
120.0 dBm	-120.0 dBm		l ¢				
0.0 dB Ext Gain			1				
n put Atten .0 dB	-130.0						
etection eak	-140.0						
RBW MHz	-150.0			<u>.</u>	<u> </u>		
'BW 00 kHz	ntheligen and here and the second	mulman	mummer and and and	hupphryeansam	mannanahur	wanthman	
weep Time 7 ms	=170.0						
races A: Max Hold	3 1 7 0 0				e 6		
	-180.0						Change
-	-190.0						Quick Name
weep (Fast)						1	Change
ontinuous	-200.0						Save Location
req Ref	-210.0 dBm				9		Change Type
nt Std Accy	5						
	19.000 GHz		Center 19.500 GF	Iz	21	0.000 GHz	Setup/JPEG/
			Span 1.000 GHz				
Freq	A	mplitude	Span		BW		Marker

Figure 2.1-2 (C) Calibration Spectrum Photo 19.5 GHz

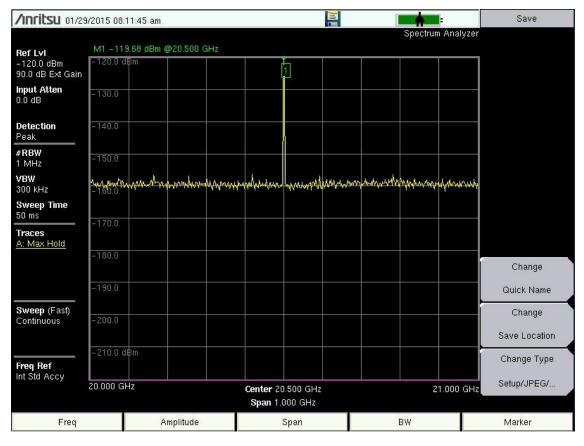


Figure 2.1-2 (D) Calibration Spectrum Photo 20.5 GHz

/INFILSU 01/29	/2015 08:12:50 am						Save
					Spect	rum Analyzer	
ef Lvl	M1 -122.13 dBm	@27.500 GHz					
120.0 dBm).0 dB Ext Gain	-120.0 dBm		1				
put Atten D dB	-130.0						
e tection eak	-140.0				а. — В		
RBW MHz	-150.0			<u></u>	<u>e</u> e	<u> </u>	
BW JO KHZ	ately ely for the desired of	44hrollynyn marinau	over photocological version	North Mary Mary	and a second and a s	walliampaptable	
weep Time) ms							
races : Max Hold	-170.0						
	-180.0						Change
	-190.0						Quick Name
weep (Fast) ontinuous	-200.0						Change Save Location
	-210.0 dBm						Change Type
req Ref tStd Accy	27.000 GHz						Setup/JPEG/
			Center 27.500 Span 1.000 (28.000 GHz	,
Freq		Amplitude	Spar	r i	BW		Marker

Figure 2.1-2 (E) Calibration Spectrum Photo 27.5 GHz

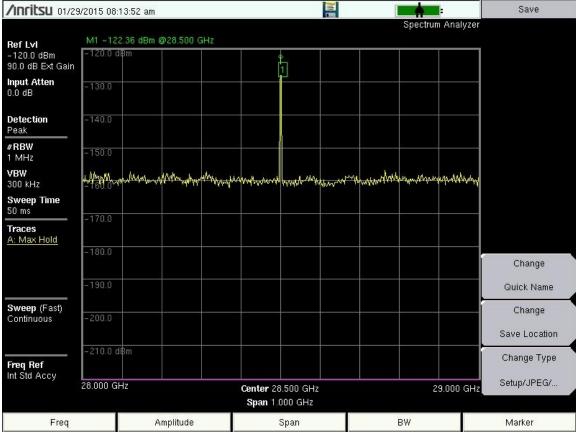


Figure 2.1-2 (F) Calibration Spectrum Photo 28.5 GHz

Inritsu 01/29)/2015 08:14:39 ar	n				1		:	Save
							Spectrur	n Analyzer	
ef Lvl	M1 -121.26 dBr	n @29.500 GHz							
120.0 dBm 0.0 dB Ext Gain	-120.0 dBm			1					
n put Atten .0 dB	-130.0								
etection eak	-140.0						dr n		
RBW MHz	-150.0						2 3		
/BW 100 kHz	Mater Barry	mannan	manna	A WWWWW	-	when when	www.han	many	
Sweep Time 7 ms	=170.0			-	6	32	÷		
races A: Max Hold	- 1,20.0								
	-180.0							1	Change
	-190.0								Quick Name
Weep (Fast) Continuous	-200.0								Change Save Location
req Ref	-210.0 dBm				2				Change Type
nt Std Accy	29.000 GHz			9.500 GH			3	0.000 GHz	Setup/JPEG/
Freq		Amplitude	Span	.000 GHz Span		1	BW		Marker

Figure 2.1-2 (G) Calibration Spectrum Photo 29.5 GHz

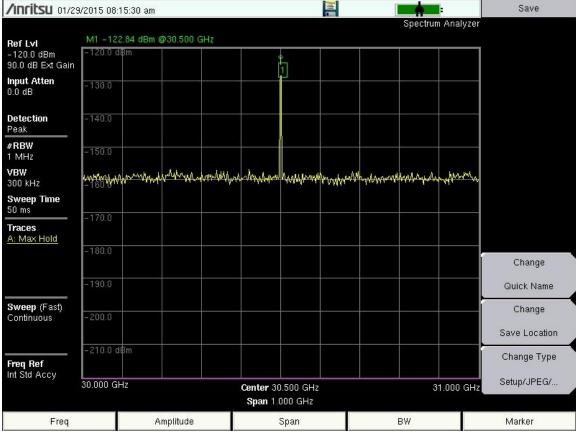


Figure 2.1-2 (H) Calibration Spectrum Photo 30.5 GHz

2.2 Methodology

Upon arriving at the existing earth station site, azimuth and horizon elevation measurements were performed to evaluate if any satellite arc obstructions exist. The coordinates of the existing earth station site were verified on the DeLorme topographic map. Photographs were taken to document the satellite arc (clearance) and are included in this report.

After site coordinates and horizon elevations were verified, the test equipment was set up and calibrated to measure the RF environment. Measurements were conducted at the proposed earth station location for the 17-21 and 27-31 GHz band. After the equipment calibration was completed, the test antenna was mounted on an extendable tower and elevated to a height of 6.5 feet. This height is greater than the centerline of the earth station antenna. The antenna was rotated 360 degrees (scanning), once in each polarization, while activating the peak hold function of the spectrum analyzer. This enabled the analyzer to maintain and display the maximum signal level received for all frequencies under consideration. After the initial documentation of interference, all interference conflicts if observed were peaked on to determine the azimuth and the level of the interference source.

Upon completion of the RF testing, the measured signal levels were transposed to earth station interference levels after accounting for the addition of the corresponding earth station antenna gain.

THREE

DATA PRESENTATION

The following section contains the tables and spectrum photos pertaining to the site location measured.

3.1 Houston, TX

- Table 3.1-1 presents a site data sheet including all pertinent site information.
- Figures 3.1-1 and 3.1-2 are the photographs depicting the existing earth station site and satellite arc.
- Figures 3.1-3 through 3.1-10 are the RF spectrum photographs depicting the interference environment at the test site.

TABLE 3.1-1

MEASUREMENT SITE DATA SHEET

1.	SYSTEM NAME:	ViaSat, Inc	
2.	CITY AND STATE:	Birmingham, AL	
3.	SITE IDENTIFICATION:	Birmingham	
4.	COORDINATES: (NAD 1983)		33° 29' 58.6" N 086° 49' 13.4" W
5.	GROUND ELEVATION:	603 feet AMSL	
6.	MEASUREMENT DATE AND TIMES:	January 29, 2015	
7.	GEOSTATIONARY ARC RANGE: SATELLITE POSITIONS: AZIMUTH: ELEVATION:	55W – 115W 131.7° – 224.1° 38.3° / 40.7°	
8.	GEOSTATIONARY ARC VISIBILITY:	Satellite arc has n	o blockage at this time



North



East

Figure 3.1-1 Earth Station Site Photographs



South



West

Figure 3.1-1 (cont.) Earth Station Site Photographs

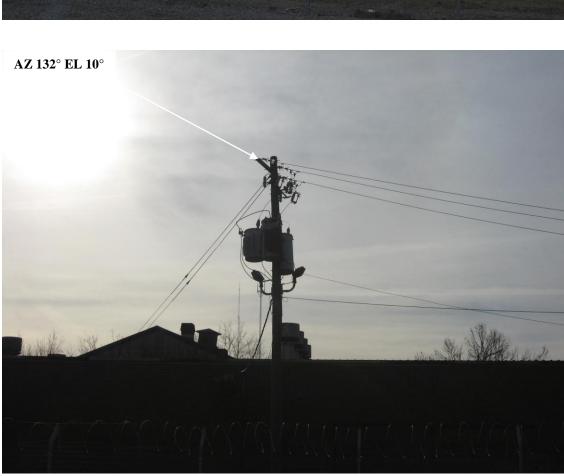




Figure 3.1-2 Horizon Photographs of Earth Station Site

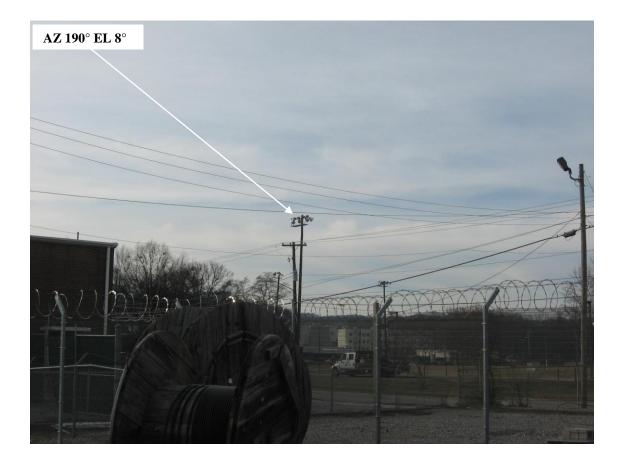




Figure 3.1-2 (cont.) Horizon Photographs of Earth Station Site

111115U 01/29	/2015 08:56:10 am					:	Save
ef Lvl	M1 -159,44 dBm @	017.500 GHz			Spectr	um Analyzer	
120.0 dBm 0.0 dB Ext Gain	–120.0 dBm						
put Atten 0 dB	-130.0					-	
e tection eak	-140.0				e de la companya de la	-	
RBW MHz	-150.0					<u> </u>	
SW O kHz	ngallangadasethyattadanaa	man	mar wall have a war	han an a	ngahar mapping segan p	where whith when	
weep Time ms	-170.0			-	8 		
aces Max Hold						a	
	-180.0					1	Change
	-190.0						Quick Name
veep (Fast) ntinuous	-200.0						Change Save Location
eq Ref Std Accy	-210.0 dBm						Change Type
	17.000 GHz		Center 17.500 G Span 1.000 GH			18.000 GHz	Setup/JPEG/
Freq	A	nplitude	Span		BW		Marker

Figure 3.1-3 (A) Spectrum Photos 17-18 GHz 1MHz Res BW Horizontal Pol 360°

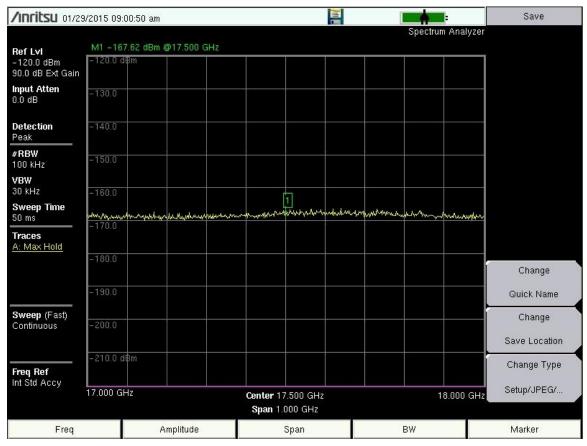


Figure 3.1-3 (B) Spectrum Photos 17-18 GHz 100 KHz Res BW Horizontal Pol 360°

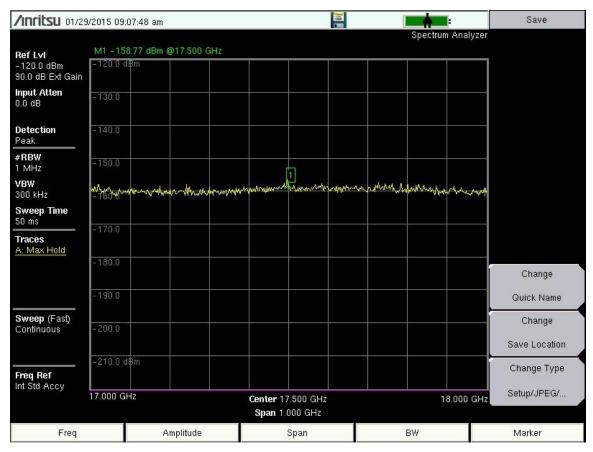


Figure 3.1-3 (C) Spectrum Photos 17-18 GHz 1MHz Res BW Horizontal Pol Worst Case

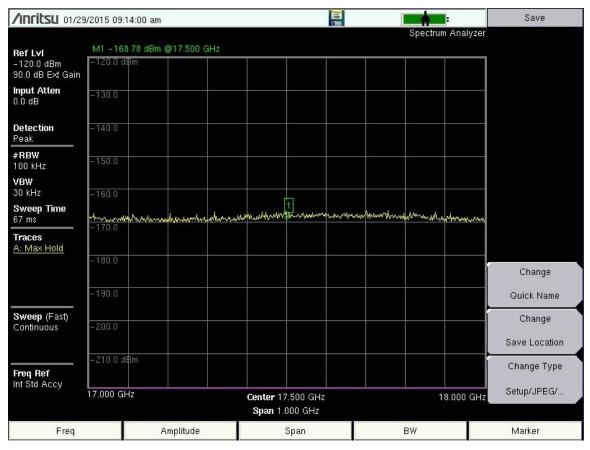


Figure 3.1-3 (D) Spectrum Photos 17-18 GHz 100 KHz Res BW Horizontal Pol Worst Case

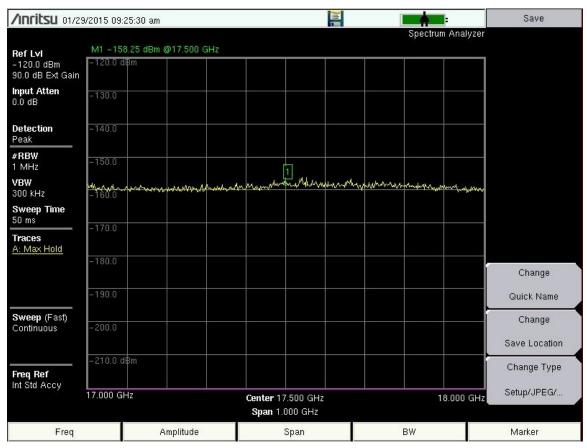


Figure 3.1-3 (E) Spectrum Photos 17-18 GHz 1MHz Res BW Vertical Pol 360⁰

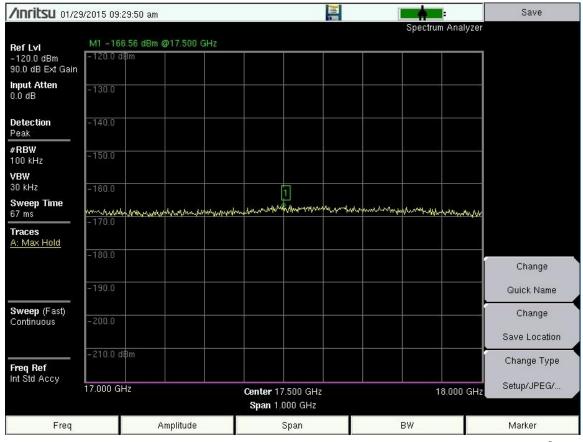


Figure 3.1-3 (F) Spectrum Photos 17-18 GHz 100 KHz Res BW Vertical Pol 360⁰

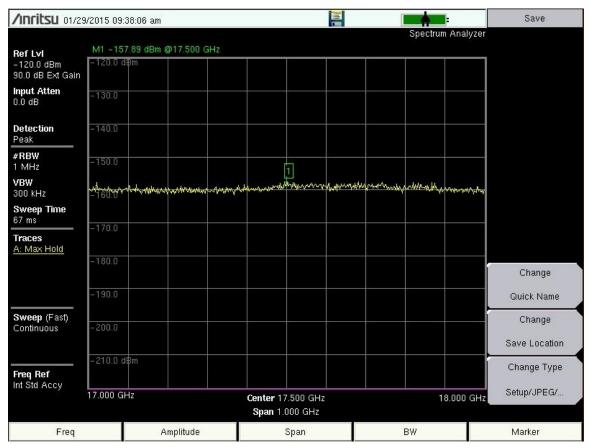


Figure 3.1-3 (G) Spectrum Photos 17-18 GHz 1 MHz Res BW Vertical Pol Worst Case

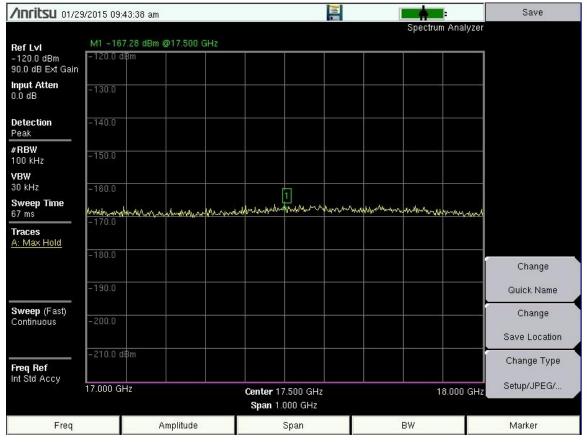


Figure 3.1-3 (H) Spectrum Photos 17-18 GHz 100 KHz Res BW Vertical Pol Worst Case

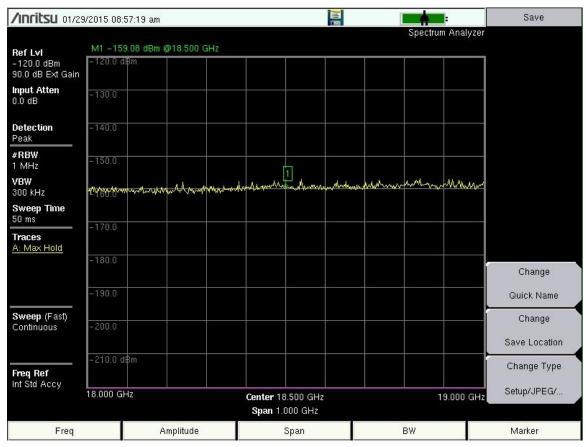


Figure 3.1-4 (A) Spectrum Photos 18-19 GHz 1MHz Res BW Horizontal Pol 360⁰

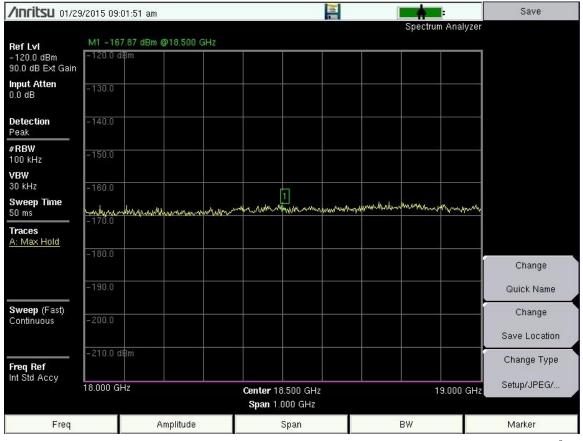


Figure 3.1-4 (B) Spectrum Photos 18-19 GHz 100 KHz Res BW Horizontal Pol 360⁰

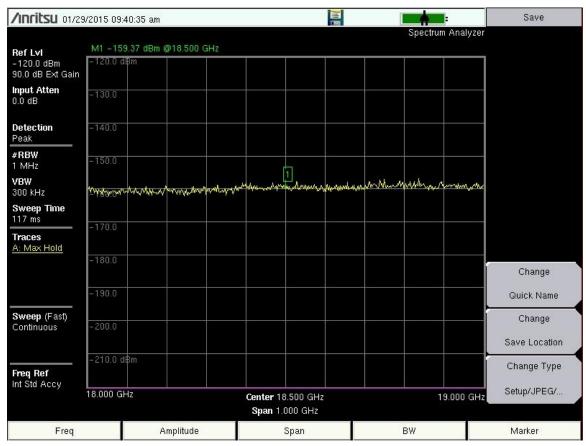


Figure 3.1-4 (C) Spectrum Photos 18-19 GHz 1MHz Res BW Horizontal Pol Worst Case

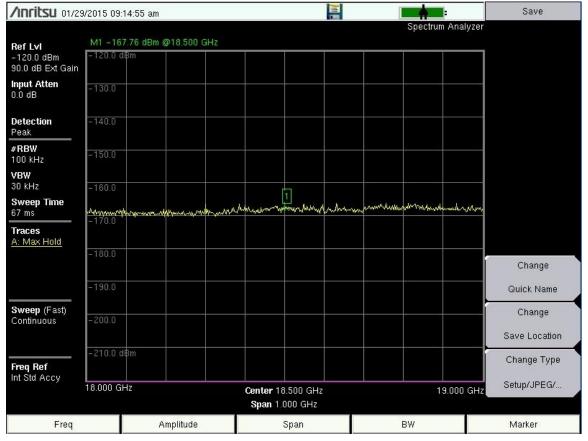


Figure 3.1-4 (D) Spectrum Photos 18-19 GHz 100 KHz Res BW Horizontal Pol Worst Case

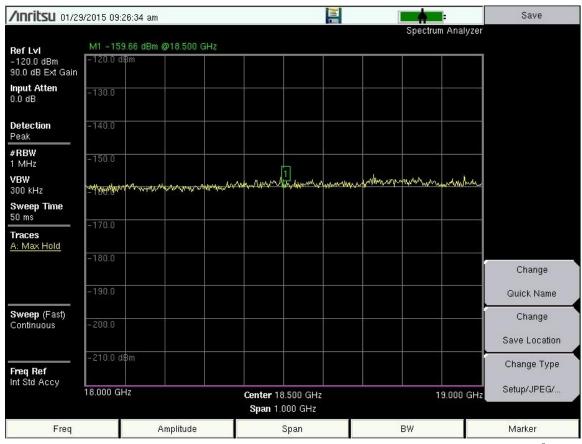


Figure 3.1-4 (E) Spectrum Photos 18-19 GHz 1MHz Res BW Vertical Pol 360⁰

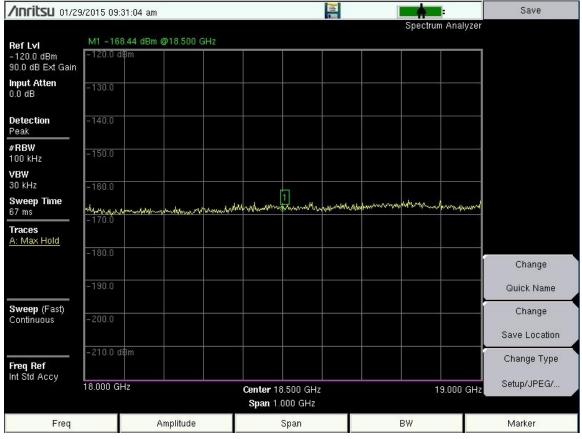


Figure 3.1-4 (F) Spectrum Photos 18-19 GHz 100 KHz Res BW Vertical Pol 360⁰

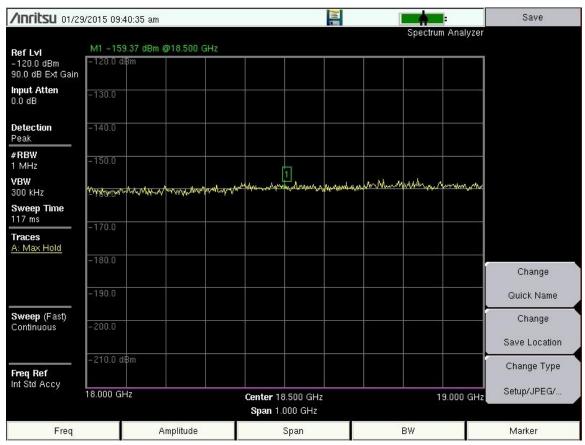


Figure 3.1-4 (G) Spectrum Photos 18-19 GHz 1 MHz Res BW Vertical Pol Worst Case

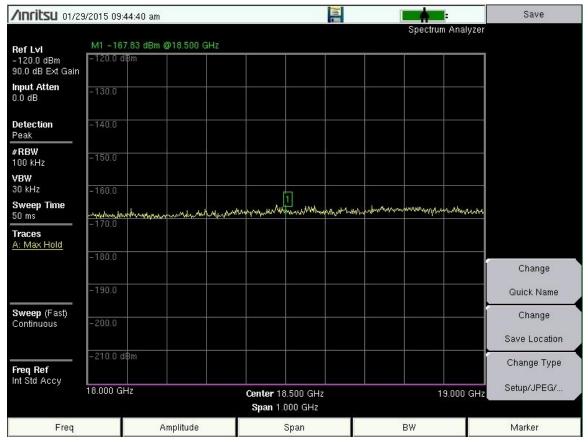


Figure 3.1-4 (H) Spectrum Photos 18-19 GHz 100 KHz Res BW Vertical Pol Worst Case

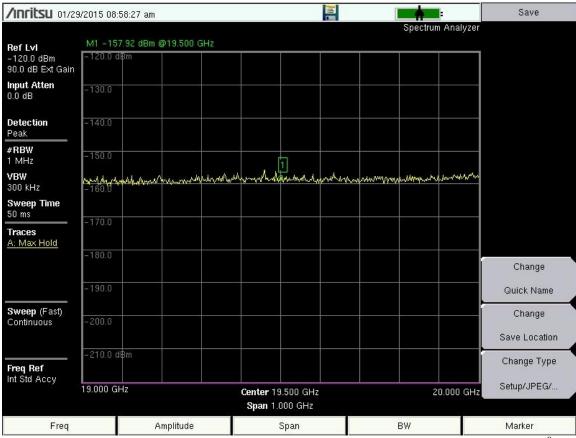


Figure 3.1-5 (A) Spectrum Photos 19-20 GHz 1MHz Res BW Horizontal Pol 360⁰

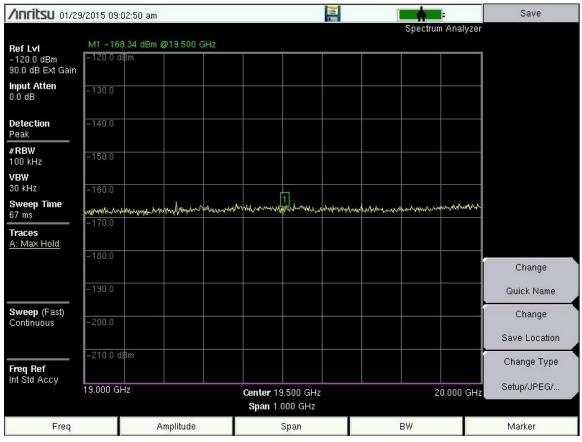


Figure 3.1-5 (B) Spectrum Photos 19-20 GHz 100 KHz Res BW Horizontal Pol 360⁰

/Inritsu 01/25)/2015 09:12:13 am			Save
Ref Lvl	M1 -158.40 dBm @19.500 GHz	2	Spectrum Analyzer	
-120.0 dBm 90.0 dB Ext Gain	-120.0 dBm			
Input Atten 0.0 dB	-130.0			
Detection Peak	-140.0			
#RBW 1 MHz	-150.0	 [1]		
VBW 300 kHz	-160.0	and the state of the	when when when the second seco	
Sweep Time 50 ms	-170.0			
Traces A: Max Hold				
	-180.0			Change
·)	-190.0			Quick Name
Sweep (Fast) Continuous	-200.0			Change Save Location
Freq Ref Int Std Accy	–210.0 dBm			Change Type
	19.000 GHz	Center 19.500 GHz Span 1.000 GHz	20.000 GHz	Setup/JPEG/
Freq	Amplitude	Span	BW	Marker

Figure 3.1-5 (C) Spectrum Photos 19-20 GHz 1MHz Res BW Horizontal Pol Worst Case

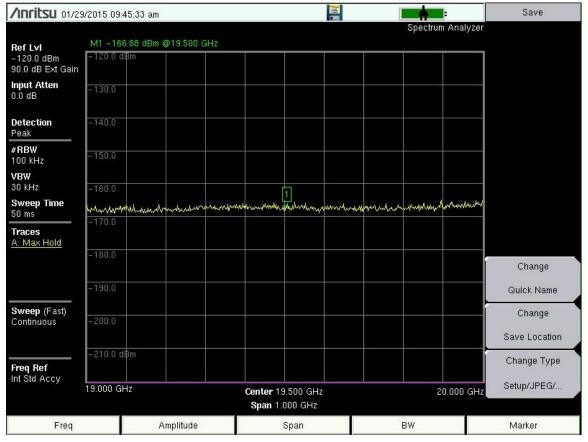


Figure 3.1-5 (D) Spectrum Photos 19-20 GHz 100 KHz Res BW Horizontal Pol Worst Case

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Ref Lvl	M1 -157.56 dB	m @19.500 GHz			Spectrum	n Analyzer	
–120.0 dBm 90.0 dB Ext Gain	-120.0 dBm						
Input Atten 0.0 dB	-130.0						
Detection Peak	-140.0				di se		
#RBW 1 MHz	-150.0		1				
VBW 300 kHz	12100000000000000000000000000000000000	as present and	mounteralities	mmmuna	manumun	whowever	
Sweep Time 50 ms	-170.0						
Traces A: Max Hold	-180.0						
		_					Change
Sweep (Fast)	-190.0						Quick Name
Continuous	-200.0						Change Save Location
Freq Ref Int Std Accy	-210.0 dBm						Change Type
	19.000 GHz Center 19.500 GHz 20.000 GHz Setup/JPEG/ Span 1.000 GHz						
Freq		Amplitude	Span		BW		Marker

Figure 3.1-5 (E) Spectrum Photos 19-20 GHz 1MHz Res BW Vertical Pol 360⁰

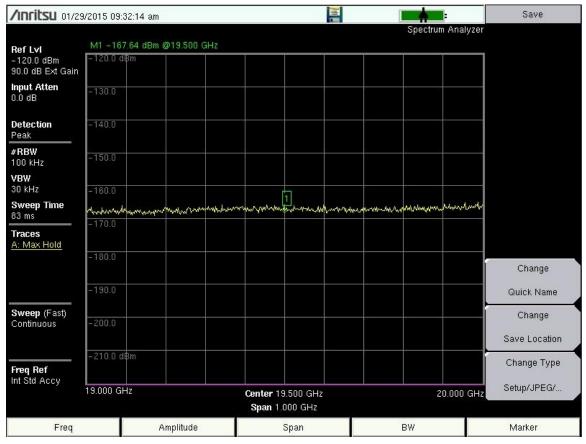


Figure 3.1-5 (F) Spectrum Photos 19-20 GHz 100 KHz Res BW Vertical Pol 360⁰

/Inritsu 01/29)/2015 09:41:47 am			Save		
Ref Lvl	M1 -157.90 dBm @19.500 GI	Hz	Spectrum Analyz	er		
-120.0 dBm 90.0 dB Ext Gain	–120.0 dBm					
Input Atten 0.0 dB	-130.0					
Detection Peak	-140.0					
#RBW 1 MHz	-150.0			<u></u>		
VBW 300 kHz	-160.0	mound	monorborhogelessen	w/		
Sweep Time 50 ms	-170.0			_		
Traces A: Max Hold						
	-180.0			Change		
	-190.0			Quick Name		
Sweep (Fast) Continuous	- 200.0			Change Save Location		
Freq Ref	–210.0 d₿m			Change Type		
Int Std Accy 19.000 GHz Center 19.500 GHz 20.000 GHz Setup/JPEG/ Span 1.000 GHz						
Freq	Amplitude	Span	BW	Marker		

Figure 3.1-5 (G) Spectrum Photos 19-20 GHz 1 MHz Res BW Vertical Pol Worst Case

/Inritsu 01/29	/2015 09:45:33 am			: Save
			Spectru	m Analyzer
Ref Lvl	M1 - 166.88 dBm @19.500	GHz		
–120.0 dBm 90.0 dB Ext Gain	-120.0 dBm			
Input Atten	100.0			
0.0 dB	-130.0			
Detection Peak	-140.0			
#RBW 100 kHz	-150.0			
VBW				
30 kHz	-160.0	1		. We shared
Sweep Time 50 ms		man man and and and and and and and and and a	mounderstates	hormontant
Traces	-170.0			
A: Max Hold				
	-180.0			Change
	100.0			
	-190.0			Quick Name
Sweep (Fast)	-200.0			Change
Continuous	-200.0			Save Location
	-210.0 dBm			Jave Location
Freq Ref				Change Type
Int Std Accy	19.000 GHz			Setup/JPEG/
	13.000/GHZ	Center 19.500 GHz Span 1.000 GHz		20.000 GHz
		16		
Freq	Amplitude	Span	BW	Marker

Figure 3.1-5 (H) Spectrum Photos 19-20 GHz 100 KHz Res BW Vertical Pol Worst Case

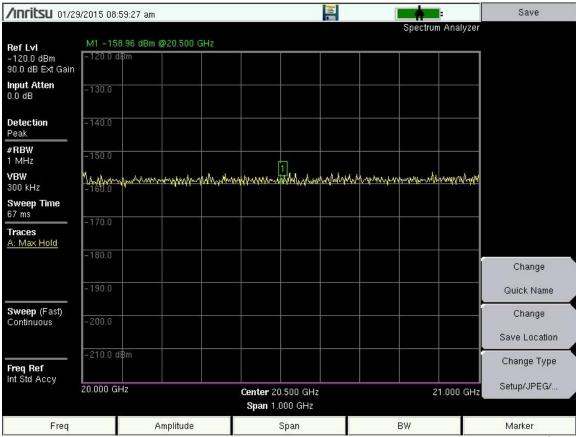


Figure 3.1-6 (A) Spectrum Photos 20-21 GHz 1MHz Res BW Horizontal Pol 360⁰

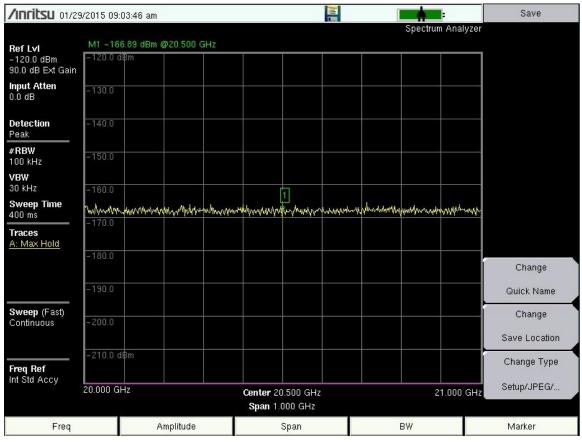


Figure 3.1-6 (B) Spectrum Photos 20-21 GHz 100 KHz Res BW Horizontal Pol 360⁰

/Inritsu 01/25	3/2015 09:13:04 am			Save	
Ref Lvl	M1 -158.36 dBm @20.500 GHz		Spectrum Analyze	er	
–120.0 dBm 90.0 dB Ext Gain	-120.0 d₿m				
Input Atten 0.0 dB	-130.0				
Detection Peak	-140.0				
#RBW 1 MHz	-150.0				
VBW 300 kHz	yrubananallantananana _150.0	prove the second provide a second	Manager and a second provident and the second se	w	
Sweep Time 50 ms	-170.0			7	
Traces A: Max Hold			· · · · ·		
	-180.0			Change	
	-190.0			Quick Name	
Sweep (Fast) Continuous	-200.0			Change Save Location	
Freq Ref	–210.0 d₿m			Change Type	
Int Std Accy 20.000 GHz Center 20.500 GHz 21.000 GHz Setup/JPEG/ Span 1.000 GHz					
Freq	Amplitude	Span	BW	Marker	

Figure 3.1-6 (C) Spectrum Photos 20-21 GHz 1MHz Res BW Horizontal Pol Worst Case

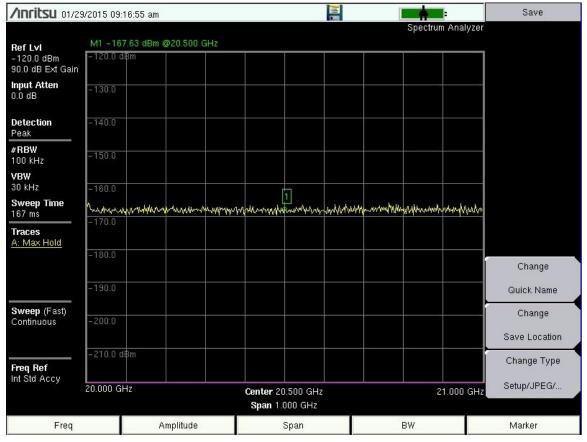


Figure 3.1-6 (D) Spectrum Photos 20-21 GHz 100 KHz Res BW Horizontal Pol Worst Case

/Inritsu 01/29/2015 09:28:45 am				Save	
Ref Lvi	M1 -158.49 dBm @20.500 GHz		Spectrum Analyzer		
-120.0 dBm 90.0 dB Ext Gain	–120.0 dBm				
Input Atten 0.0 dB	-130.0				
Detection Peak	-140.0				
#RBW 1 MHz	-150.0	1			
VBW 300 kHz	providen market white and which and which and which and a second se	a sumprementation and a superior	an month performance that an approximate		
Sweep Time 50 ms	-170.0				
Traces <u>A: Max Hold</u>	-180.0				
				Change	
	-190.0			Quick Name	
Sweep (Fast) Continuous	-200.0			Change Save Location	
Freq Ref Int Std Accy	–210.0 dBm			Change Type	
20.000 GHz Center 20.500 GHz 21.000 GHz Setup/JPEG/ Span 1.000 GHz					
Freq	Amplitude	Span	BW	Marker	

Figure 3.1-6 (E) Spectrum Photos 20-21 GHz 1MHz Res BW Vertical Pol 360°

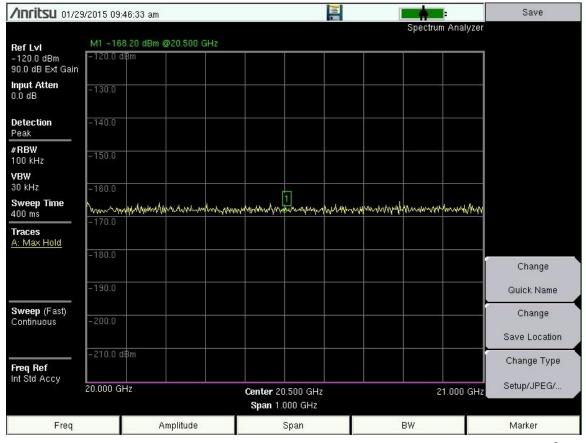


Figure 3.1-6 (F) Spectrum Photos 20-21 GHz 100 KHz Res BW Vertical Pol 360⁰

/Inritsu 01/29	9/2015 09:28:45 am			Save	
Ref Lvl	M1 -158.49 dBm @20.500 GHz		Spectrum Analyzer		
-120.0 dBm 90.0 dB Ext Gain	-120.0 dBm				
Input Atten 0.0 dB	-130.0				
Detection Peak	-140.0				
#RBW 1 MHz	-150.0	 			
VBW 300 kHz	Annon Manna Maria Maria Maria	har marken market was an a party and	man man and a second second second		
Sweep Time 50 ms	-170.0				
Traces A: Max Hold					
	-180.0			Change	
<u></u>	-190.0			Quick Name	
Sweep (Fast) Continuous	-200.0			Change Save Location	
Freq Ref Int Std Accy	-210.0 dBm			Change Type Setup/JPEG/	
	20.000 GHz Center 20.500 GHz 21.000 GHz Span 1.000 GHz				
Freq	Amplitude	Span	BW	Marker	

Figure 3.1-6 (G) Spectrum Photos 20-21 GHz 1 MHz Res BW Vertical Pol Worst Case

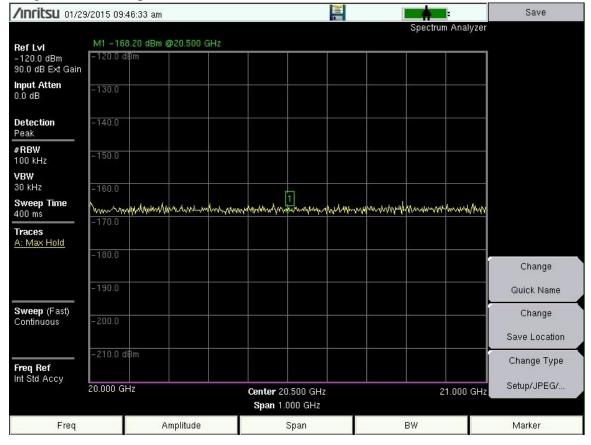


Figure 3.1-6 (H) Spectrum Photos 20-21 GHz 100 KHz Res BW Vertical Pol Worst Case

/Inritsu 01/29	1/2015 09:55:07 am			Save	
Ref Lvl	M1 -159.91 dBm @27.500 GHz		Spectrum Analyzer		
-120.0 dBm 90.0 dB Ext Gain	-120.0 dBm				
Input Atten 0.0 dB	-130.0				
Detection Peak	-140.0				
#RBW 1 MHz	-150.0				
VBW 300 kHz	mppmalarian many Midup adaptation	new reaction of the second of	Manufall Mapping and an approximation of the second s		
Sweep Time 50 ms	-170.0				
Traces A: Max Hold					
	-180.0			Change	
	-190.0			Quick Name	
Sweep (Fast) Continuous	-200.0			Change Save Location	
Freq Ref Int Std Accy	-210.0 dBm			Change Type	
27.000 GHz Center 27.500 GHz 28.000 GHz Setup/JPEG/ Span 1.000 GHz					
Freq	Amplitude	Span	BW	Marker	

Figure 3.1-7 (A) Spectrum Photos 27-28 GHz 1MHz Res BW Horizontal Pol 360^{0}

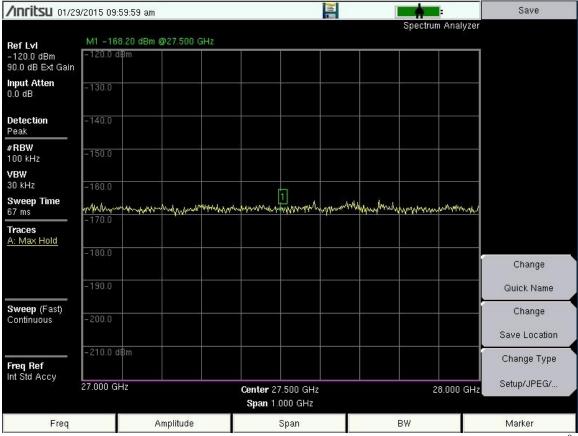


Figure 3.1-7 (B) Spectrum Photos 27-28 GHz 100 KHz Res BW Horizontal Pol 360⁰

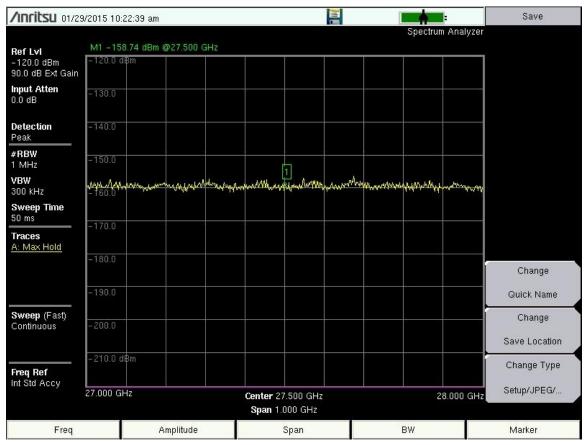


Figure 3.1-7 (C) Spectrum Photos 27-28 GHz 1MHz Res BW Vertical Pol 360⁰

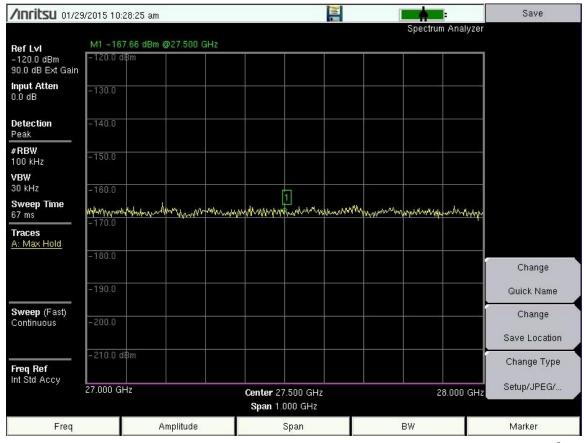


Figure 3.1-7 (D) Spectrum Photos 27-28 GHz 100 KHz Res BW Vertical Pol 360⁰

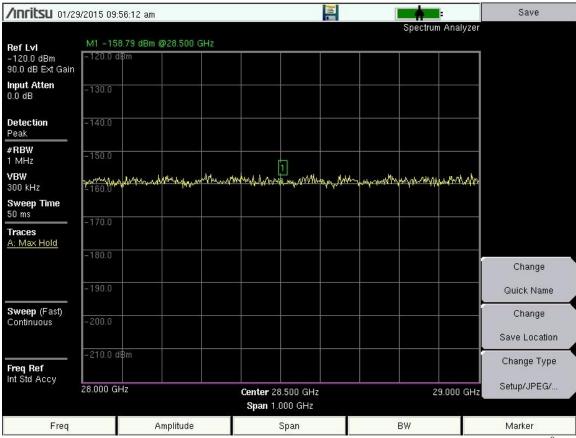


Figure 3.1-8 (A) Spectrum Photos 28-29 GHz 1MHz Res BW Horizontal Pol 360⁰

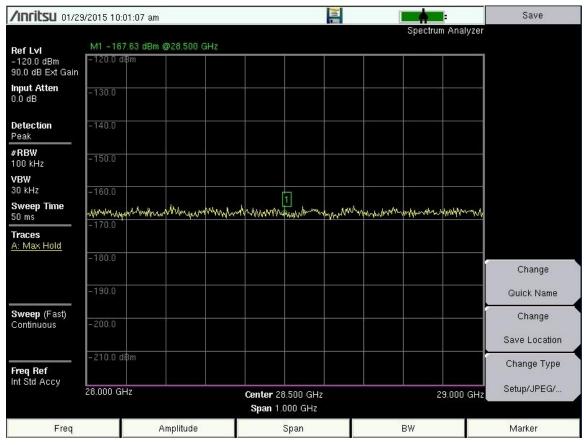


Figure 3.1-8 (B) Spectrum Photos 28-29 GHz 100 KHz Res BW Horizontal Pol 360⁰

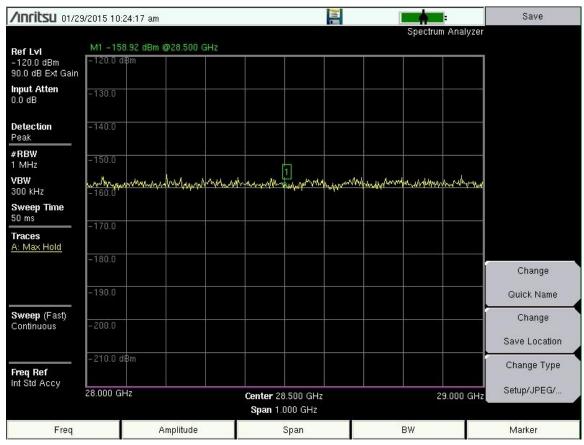


Figure 3.1-8 (C) Spectrum Photos 28-29 GHz 1MHz Res BW Vertical Pol 360⁰

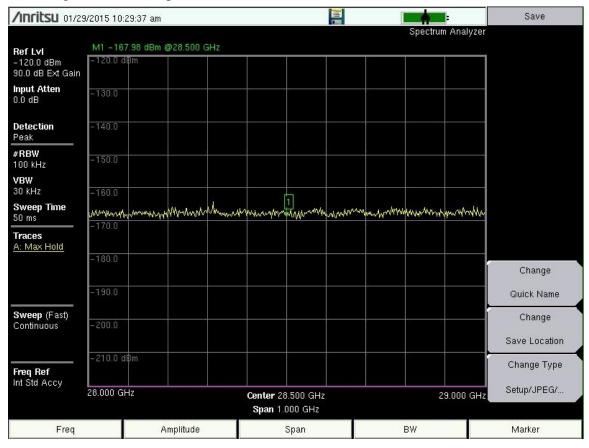


Figure 3.1-8 (D) Spectrum Photos 28-29 GHz 100 KHz Res BW Vertical Pol 360⁰

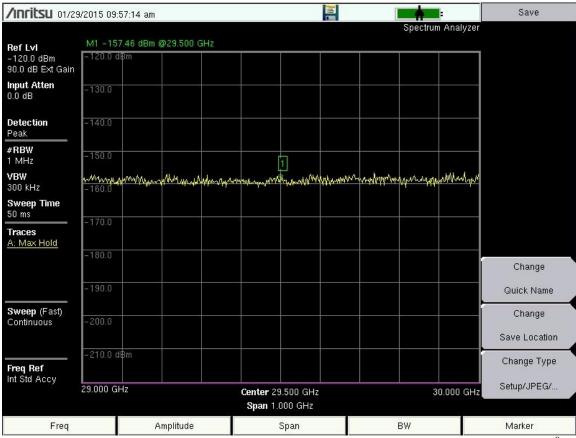


Figure 3.1-9 (A) Spectrum Photos 29-30 GHz 1MHz Res BW Horizontal Pol 360⁰

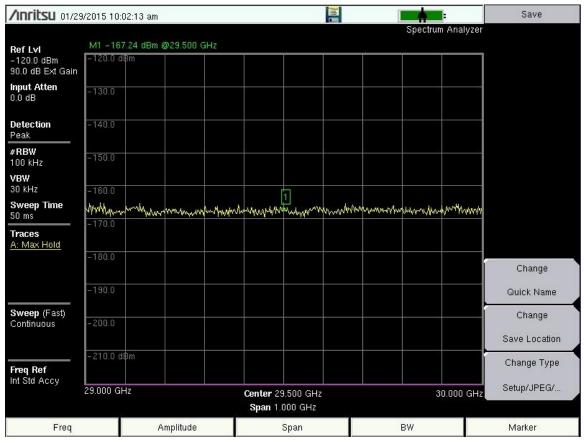


Figure 3.1-9 (B) Spectrum Photos 29-30 GHz 100 KHz Res BW Horizontal Pol 360⁰

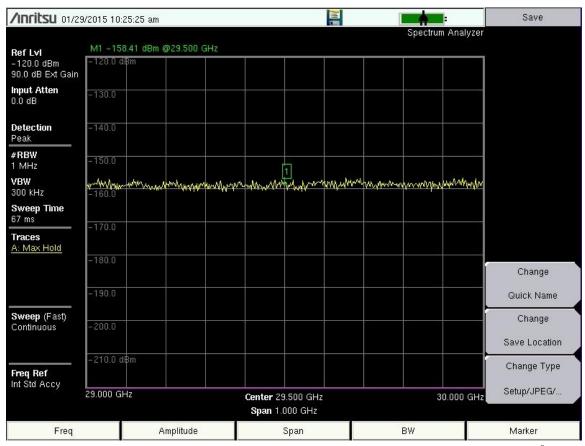


Figure 3.1-9 (C) Spectrum Photos 29-30 GHz 1MHz Res BW Vertical Pol 360⁰

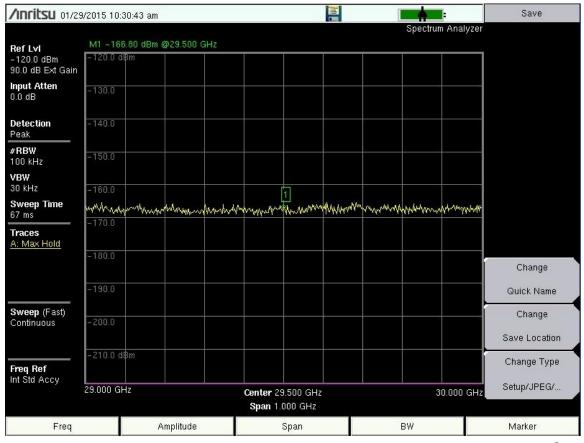


Figure 3.1-9 (D) Spectrum Photos 29-30 GHz 100 KHz Res BW Vertical Pol 360⁰

/Inritsu 01/29/2015 09:58:46 am				Save		
Ref Lvi -120.0 dBm	M1 -158.21 dBm @30.500 -120.0 dBm	GHz		Spectrum Analyzer		
90.0 dB Ext Gain Input Atten 0.0 dB	-130.0					
Detection Peak	-140.0					
#RBW 1 MHz	-150.0					
VBW 300 kHz	-160.0	when many and the second second	and the second second second	an a		
Sweep Time 50 ms Traces	-170.0					
<u>A: Max Hold</u>	-180.0				Change	
	-190.0				Quick Name	
Sweep (Fast) Continuous	-200.0				Change Save Location	
Freq Ref Int Std Accy	-210.0 dBm 30.000 GHz	Center 30.500	GHz	31.000 GHz	Change Type Setup/JPEG/	
Span 1.000 GHz						
Freq	Amplitude	Span		BW	Marker	

Figure 3.1-10 (A) Spectrum Photos 30-31 GHz 1MHz Res BW Horizontal Pol 360⁰

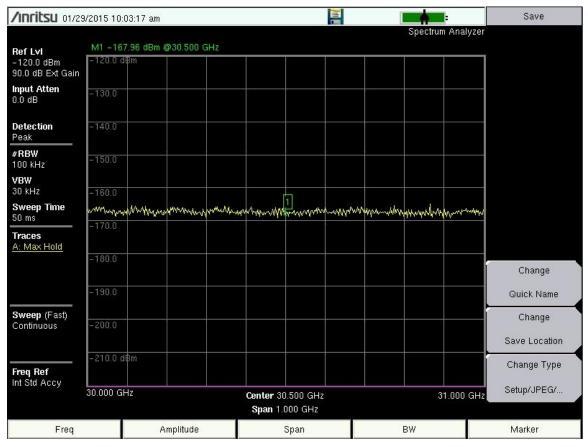


Figure 3.1-10 (B) Spectrum Photos 30-31 GHz 100 KHz Res BW Horizontal Pol 360°

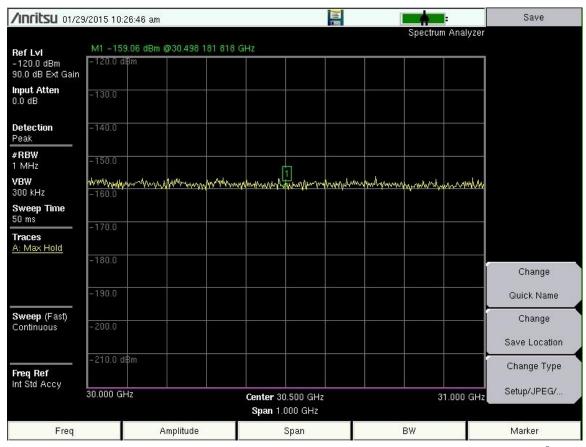


Figure 3.1-10 (C) Spectrum Photos 30-31 GHz 1MHz Res BW Vertical Pol 360⁰

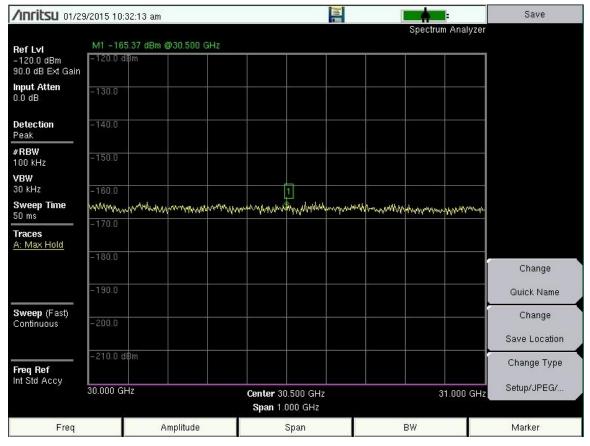


Figure 3.1-10 (D) Spectrum Photos 30-31 GHz 100 KHz Res BW Vertical Pol 360⁰

FOUR

SUMMARY OF RESULTS

The results of the measurements conducted at the proposed ViaSat, Inc site in Birmingham, AL are presented in this section.

Arc Clearance:

There is no potential satellite arc blockage at this site. Final arc clearance will depend on antenna placement.

Ku-Band Measurements:

There were no radio frequency interference cases measured at this site above the noise floor of the test equipment. Two (2) cases were predicted but none were found.

FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 <u>Conclusions</u>

There were no signals measured above the -156 dBW/ 1 MHz interference objective for digital reception at this site.

The satellite arc has no potential blockage from 55W through 115W.

5.2 <u>Recommendations</u>

It is recommended that frequency coordination of this site be initiated to protect this location at the more stringent digital receive interference objective.