



MICROWAVE PATH SURVEY REPORT

RADIO FREQUENCY INTERFERENCE (RFI) MEASUREMENT REPORT

Prepared For

ViaSat

Augusta, Georgia

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

MAY 12, 2015

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Addendum 1

Addendum 1 not applicable to this report

ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

On-site Radio Frequency Interference (RFI) measurements were performed on behalf of ViaSat, Inc. on May 12, 2015 at their proposed site in Augusta, Georgia. 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 an existing location of 33^{0} 28' 28.61" N and 81^{0} 58' 21.88" 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.

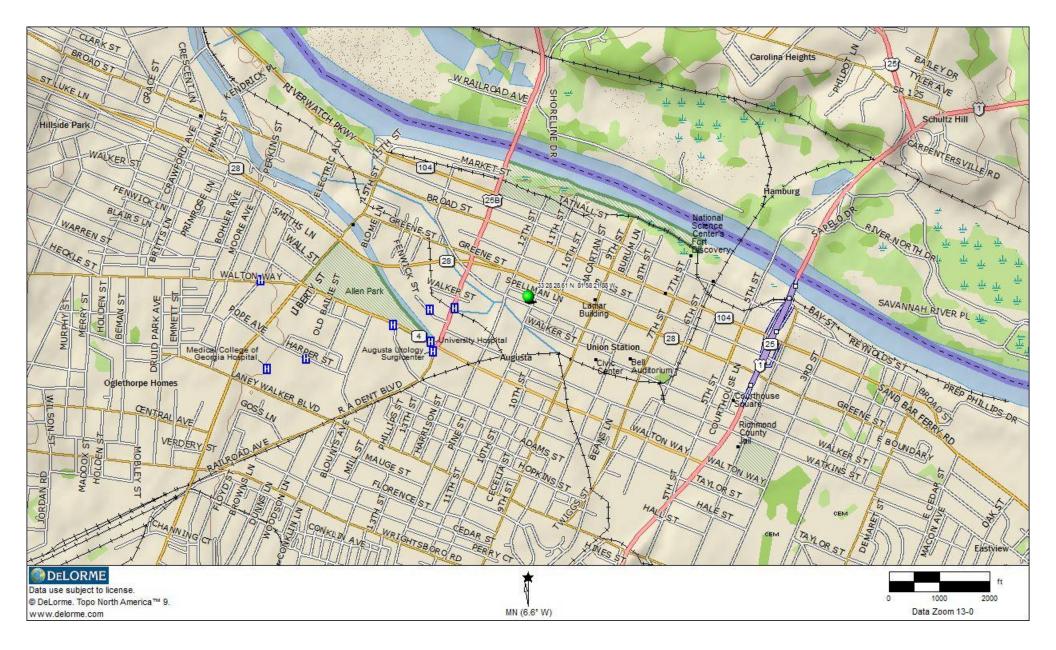


Figure 1.2-1 – Topographic Map



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 to 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

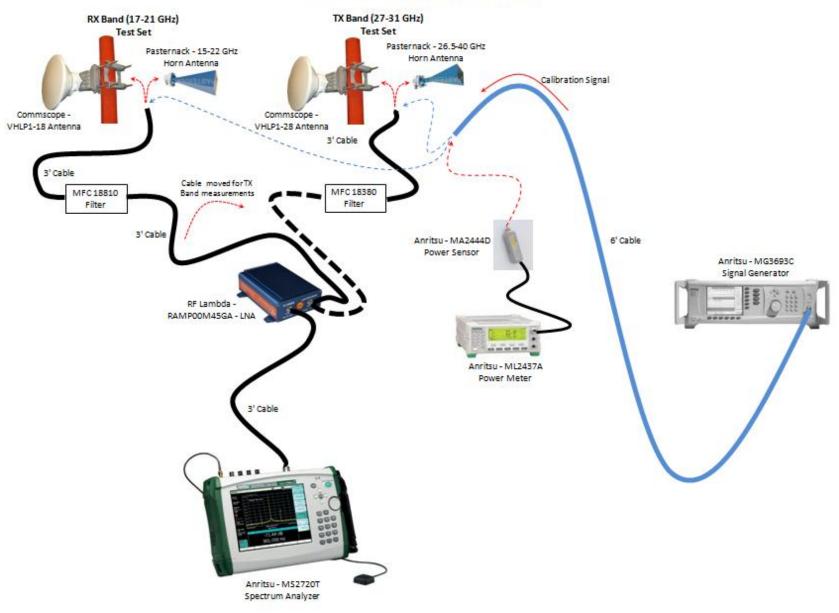
-30 =Conversion factor from dBm to dBW

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

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	M1 122.65 c	IBm @17.500 GHz			Spectrum A	nalyzer
Ref L∨l -120.0 dBm 90.0 dB Ext Gain	-120.0 dBm		4			
n put Atten 1.0 dB	-130.0					
)etection 'eak	-140.0					
RBW MHz	-150.0					
/BW 100 kHz	<u>***60.000000000000000000000000000000000</u>	www.	www.weighter	ndingulapia den norte na	when we have	Hangware
Sweep Time 10 ms	-170.0					
F races A: Max Hold						
	-180.0					Change
	-190.0					Quick Name
weep (Fast) continuous	-200.0					Change Save Location
req Ref nt Std Accy	-210.0 dBm					Change Type
n old Accy	17.000 GHz	1	Center 17.500 G Span 1.000 GH		18.0	00 GHz Setup/JPEG/
Freq		Amplitude	Span		BW	Marker

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

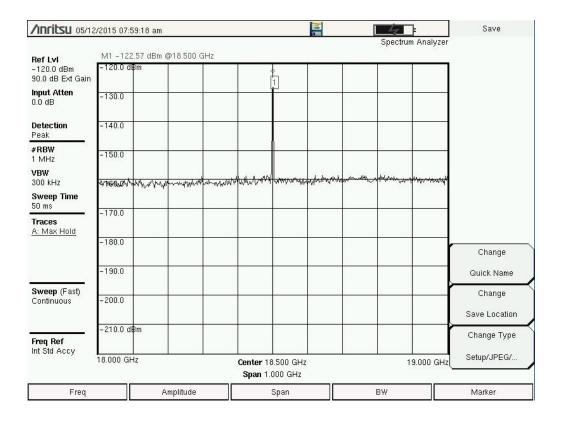


Figure 2.1-2 (B) Calibration Spectrum Photo 18.5 GHz

Freq		Amplitude	Sr	an	BW		Marker
	19.000 GHz		Center 19.5 Span 1.00			20.000 GHz	Setup/JPEG/
Freq Ref nt Std Accy							Change Type
	-210.0 dBm						Save Location
weep (Fast) Continuous	- 200.0					^	Change
	-190.0						Quick Name
	-180.0					r	Change
races : Max Hold	-170.0						
Sweep Time 50 ms	-170.0				E. 22		
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RBW MHz	-150.0						
Detection Peak	-140.0						
nput Atten).0 dB	-130.0						
-120.0 dBm 90.0 dB Ext Gain	-120.0 dBm		1				
Ref Lvi	M1 -121.85 d	Bm @19.500 GHz			oper	alulii Analyzer	
05/12	/2015 08:00:01	am			Spec	trum Analyzer	Save

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

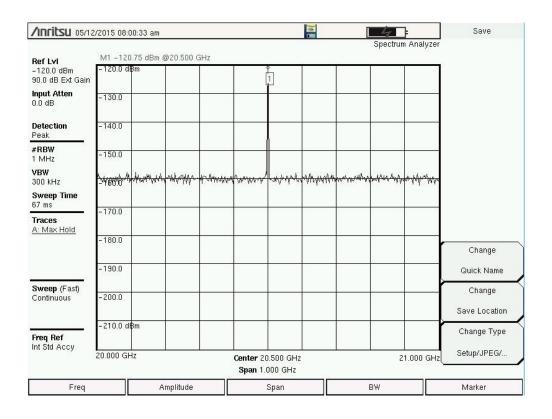


Figure 2.1-2 (D) Calibration Spectrum Photo 20.5 GHz

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				All	Spectrum .	Analyzer
Ref Lvl	M1 -121.72 dBr	n @27.500 GHz	33			
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			- L - L			
nput Atten).0 dB	-130.0					
Detection ^D eak	-140.0					
≭RBW IMHz	-150.0					
VBW 300 kHz	wateren war	and the way to be a second	monter	Mary Mary	water water water	papertural
Sweep Time 50 ms	-170.0					
Traces A: Max Hold						
	-180.0					Change
	-190.0					Quick Name
Sweep (Fast)						Change
Continuous	-200.0					Save Location
Freq Ref	-210.0 dBm					Change Type
nt Std Accy	27.000 GHz		Center 27.500 G Span 1.000 GH		28.	000 GHz Setup/JPEG/
Freq		Amplitude	Span		BW	Marker

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

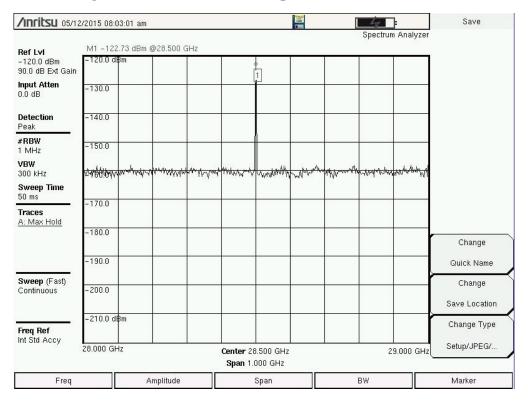


Figure 2.1-2 (F) Calibration Spectrum Photo 28.5 GHz

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							Spectrum	Analyzer	
Ref Lvl		5 dBm @29.5	00 GHz	N					
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Detection Peak	-140.0								
#RBW I MHz	-150.0								
VBW 300 kHz	- Haerolut	MAN MAN	whenter	WWWWWWWW MW	mandahunt	un an	mb-armhann	wayn wytafe	
Sweep Time 33 ms	-170.0				2	-			
Traces A: Max Hold	-170.0								
	-180.0							r	Change
	-190.0								Quick Name
Sweep (Fast)	- 200.0							^	Change
Continuous	-200.0								Save Location
Freq Ref	-210.0 dBn	1							Change Type
Int Std Accy	29.000 GHz	1	1	Center 29.50 Span 1.000			30	0.000 GHz	Setup/JPEG/
Freq		Amplitu	de	Sp	an		BW		Marker

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

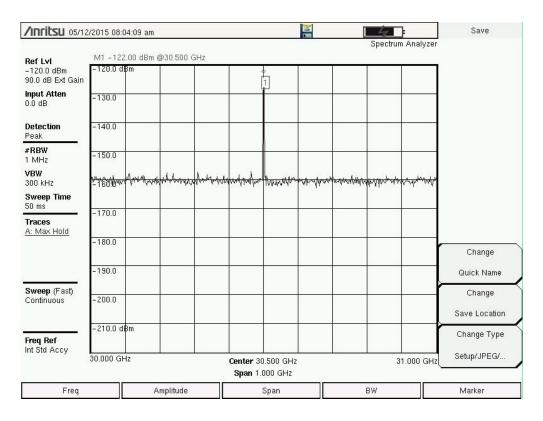


Figure 2.1-2 (H) Calibration Spectrum Photo 30.5 GHz

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 Augusta, Georgia

- 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:	Augusta, Georgia	ı
3.	SITE IDENTIFICATION:	Augusta	
4.	COORDINATES: (NAD 1983)	LATITUDE: LONGITUDE:	33 ⁰ 28' 28.61" N 81 ⁰ 58' 21.88" W
5.	GROUND ELEVATION:	134.86 feet AMS	L
6.	MEASUREMENT DATE AND TIMES:	MAY 12, 2015	
7.	GEOSTATIONARY ARC RANGE: SATELLITE POSITIONS: AZIMUTH: ELEVATION:	55W – 115W 137.3° – 229.7° 41.5° / 37.5°	
8.	GEOSTATIONARY ARC VISIBILITY:	Satellite arc has r	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



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					Spectr	um Analyzer	
Ref Lvi -120.0 dBm 90.0 dB Ext Gain	M1 -159.95 dBm -120.0 dBm	@17.500 GHz		Í			
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≭RBW MHz	- 150.0				-		
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	-190.0						Quick Name
Sweep (Fast) Continuous	-200.0					ſ	Change Save Location
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Freq		Amplitude	Span		BW		Marker

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

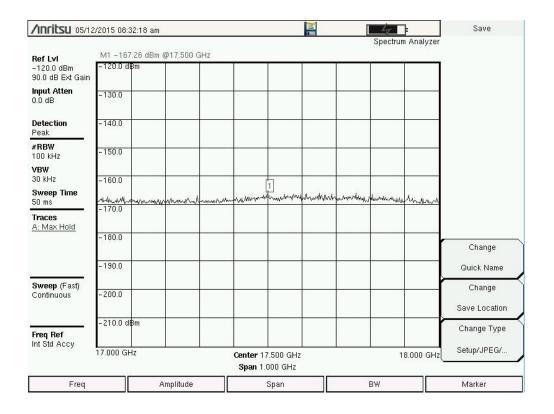


Figure 3.1-3 (B) Spectrum Photos 17-18 GHz 100 kHz Res BW Horizontal Pol 360°

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Input Atten 0.0 dB	-130.0				-		
Detection Peak	-140.0				· · · · ·		
#RBW 1 MHz	-150.0						
VBW 300 kHz	<u>1 </u>	water	- Martin Martin	uputrontoport	mmmullinkey	mmungada	
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Traces A: Max Hold	- 17 0.0						
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	-190.0						Quick Name
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Continuous	-200.0						Save Location
	-210.0 dBm				s	<u>+</u> - }	Change Type
F req Ref Int Std Accy							
	17.000 GHz		Center 17.50 Span 1.000			18.000 GHz	Setup/JPEG/
Freq		Amplitude	Sp	an	BW		Marker

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

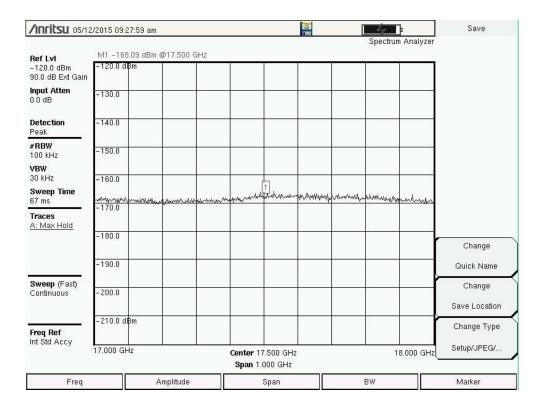


Figure 3.1-3 (D) Spectrum Photos 17-18 GHz 100 kHz Res BW Horizontal Pol Worst Case

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ef Lvi 120.0 dBm 0.0 dB Ext Gain	-120.0 dBm	6 dBm @17.50	0 GHz						
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				Span 1.000			10.0		
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Figure 3.1-3 (E) Spectrum Photos 17-18 GHz 1MHz Res BW Vertical Pol 360⁰

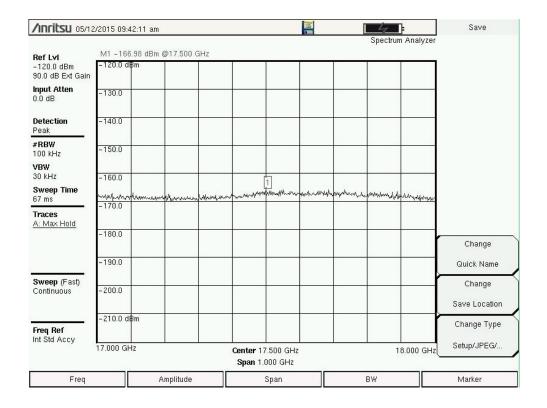


Figure 3.1-3 (F) Spectrum Photos 17-18 GHz 100 kHz Res BW Vertical Pol 360⁰

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Freq		Am	plitude		S	pan		I	BW		Marker

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

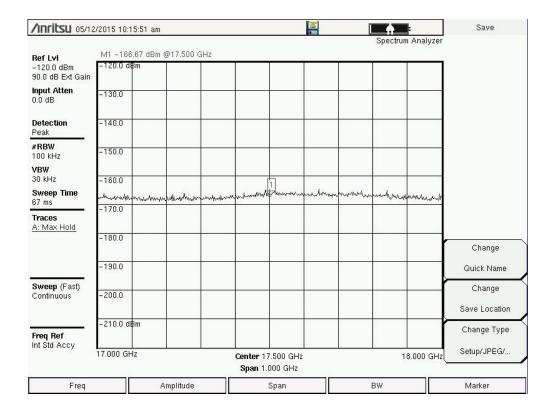


Figure 3.1-3 (H) Spectrum Photos 17-18 GHz 100 kHz Res BW Vertical Pol Worst Case

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Ref Lvl		dBm @18.500 G⊢	łz					
/INFILSU 05/12/						Spectrum	Analyzer	

Figure 3.1-4 (A) Spectrum Photos 18-19 GHz 1 MHz Res BW Horizontal Pol 360°

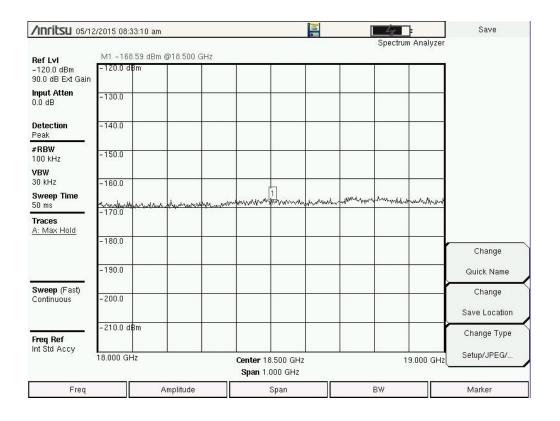


Figure 3.1-4 (B) Spectrum Photos 18-19 GHz 100 kHz Res BW Horizontal Pol 360⁰

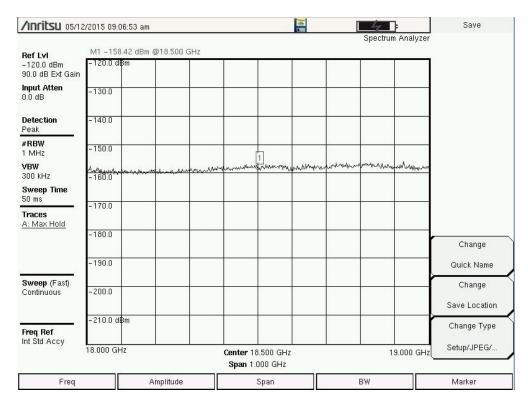


Figure 3.1-4 (C) Spectrum Photos 18-19 GHz 1 MHz Res BW Horizontal Pol Worst Case

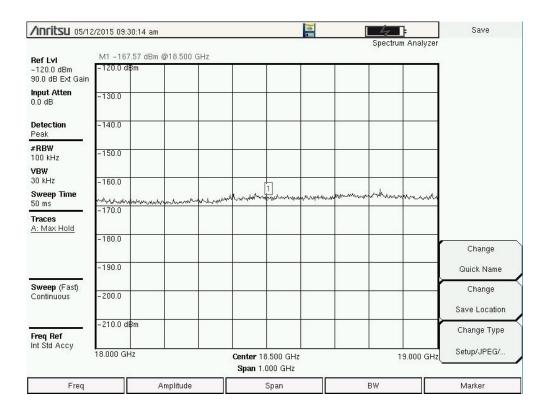


Figure 3.1-4 (D) Spectrum Photos 18-19 GHz 100 kHz Res BW Horizontal Pol Worst Case

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					Spectrum	Analyzer	
Ref Lvl	M1 -159.38 dBm	@18.500 GHz					
-120.0 dBm 30.0 dB Ext Gain	-120.0 dBm						
nput Atten D.0 dB	-130.0						
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/BW 300 kHz	The programme	and consider property and the	An attabundante	pprover and	urmith/when_lunty/p.a.	when you	
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	-190.0						Quick Name
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Continuous	-200.0						Save Location
	-210.0 dBm				9	- r	Change Type
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	18.000 GHz		Center 18.500 GH Span 1.000 GHz		19	.000 GHz	Compror Edr
Freq		Amplitude	Span		BW		Marker

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

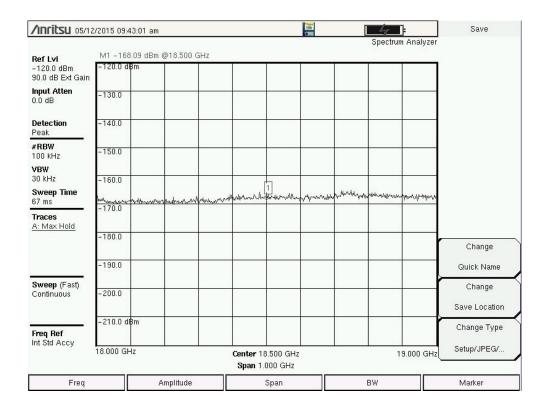
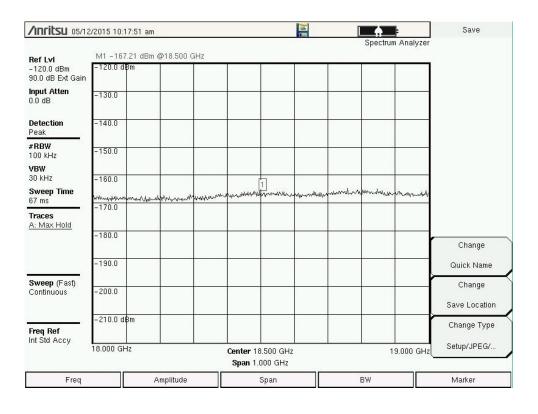


Figure 3.1-4 (F) Spectrum Photos 18-19 GHz 100 kHz Res BW Vertical Pol 360⁰

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n put Atten .0 dB	-130.0									
etection eak	-140.0				2			· · · · · ·		
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Figure 3.1-5 (G) Spectrum Photos 18-19 GHz 1 MHz Res BW Vertical Pol Worst Case





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Freq		Amplitude		Span		0	BW		Marker

Figure 3.1-5 (A) Spectrum Photos 19-20 GHz 1MHz Res BW Horizontal Pol 360°

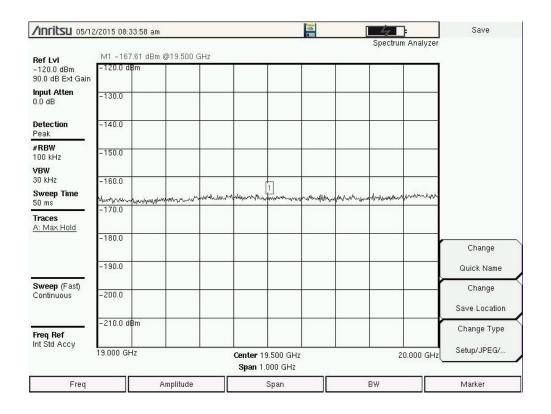


Figure 3.1-5 (B) Spectrum Photos 19-20 GHz 100 kHz Res BW Horizontal Pol 360°

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Ref Lvl	M1 -157.84	n 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					
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Sweep Time 50 ms Traces	-170.0									
A: Max Hold	-180.0								r	Change
	-190.0						-			Quick Name
Sweep (Fast) Continuous	-200.0						P -		ſ	Change Save Location
Freq Ref Int Std Accy	-210.0 dBm									Change Type
in ou necy	19.000 GHz			Center 19 Span 1.	9.500 GHz 000 GHz			î	0.000 GHz	Setup/JPEG/
Freq		Amplitude	•	Span			BW			Marker

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

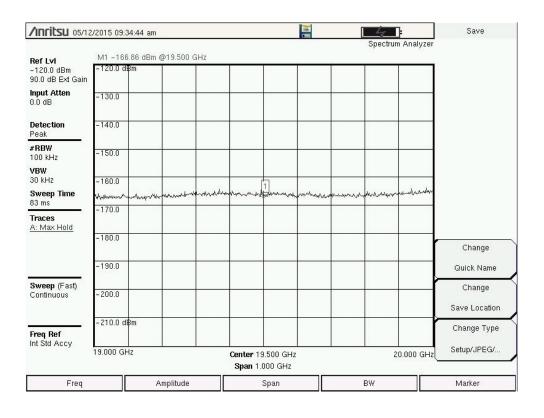
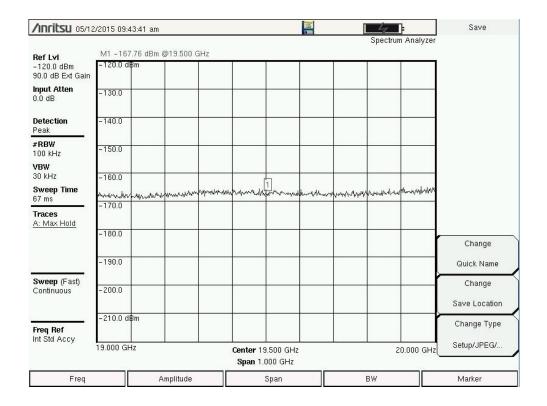


Figure 3.1-5 (D) Spectrum Photos 19-20 GHz 100 kHz Res BW Horizontal Pol Worst Case

/Inritsu 05/12	2/2015 09:39):56 am						[4	}	Save
Ref Lvi	M1 -158.										
-120.0 dBm 90.0 dB Ext Gain	-120.0 dB	m									
Input Atten 0.0 dB	-130.0										
Detection Peak	-140.0										
# RBW 1 MHz	-150.0					1		2			
VBW 300 kHz	<u>₩~∿∿∿~</u> ~~ -160.0	lide-yhet	hypothyte	Manhow	hinthight	-	WAMA	walkan	hodrown	hading to add a de to	
Sweep Time 50 ms	-170.0							5			
Traces <u>A: Max Hold</u>											
	-180.0									ľ	Change
	-190.0										Quick Name
Sweep (Fast) Continuous	-200.0										Change Save Location
Freq Ref Int Std Accy	-210.0 dB	m								ľ	Change Type
in our iccy	19.000 GH	:			Center 19 Span 1.	9.500 GH: 000 GHz			2	0.000 GHz	Setup/JPEG/
Freq Amplitude					Span			BW			Marker

Figure 3.1-5 (E) Spectrum Photos 19-20 GHz 1MHz Res BW Vertical Pol 360°





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Ref Lvl	M1 -157.	88 dBm @	019.500 G	Hz				13	Spectrur	n Analyzer	
-120.0 dBm 90.0 dB Ext Gain	-120.0 dE	m									
Input Atten 0.0 dB	-130.0										
Detection Peak	-140.0										
#RBW 1 MHz	-150.0				. [1]					
VBW 300 kHz	-160.0	en hanne	yuhun h	dimension the	www.hW	shughnw	mahan	an a	Maril Marine M Marine Marine M Marine Marine M	Inthe test of the	
Sweep Time 83 ms	-170.0					9		s			
Traces A: Max Hold	-180.0										
										ſ	Change
	-190.0										Quick Name
Sweep (Fast) Continuous	-200.0										Change Save Location
Freq Ref Int Std Accy	-210.0 dB	m								Ì	Change Type
	19.000 GH	z			Center 19 Span 1.0				2	0.000 GHz	Setup/JPEG/
Freq		Span			BW			Marker			

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

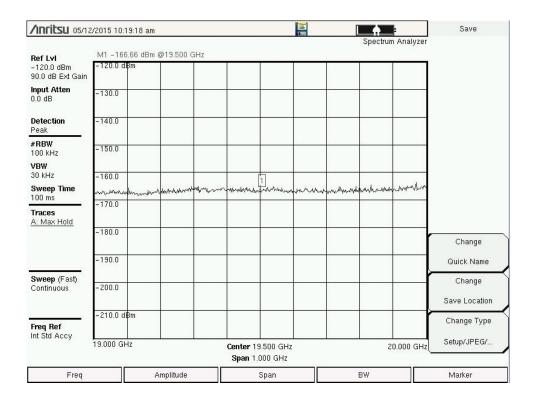


Figure 3.1-5 (H) Spectrum Photos 19-20 GHz 100 kHz Res BW Vertical Pol Worst Case

/Inritsu 05/12	1nritsu 05/12/2015 08:30:57 am 📔 🔟 🚛											
RefLvi -120.0 dBm	M1 -158	.09 dBm @	₽20.500 G	Hz					Spectru	n Analyzer		
90.0 dB Ext Gain	120.0 4	200										
Input Atten 0.0 dB	-130.0											
Detection Peak	-140.0							3				
#RBW 1 MHz	-150.0					1						
VBW 300 kHz	<u>144. Ann</u> - 160.0	pertraporter of	athyaDydwywara	n hay and a share where	national and the	in mark	hunganahang	promption	Madha	innagnad		
Sweep Time 83 ms	-170.0							5				
Traces A: Max Hold	-170.0					_						
	-180.0									r	Change	
	-190.0								-		Quick Name	
Sweep (Fast) Continuous	-200.0							1.		⊢–r	Change	
											Save Location	
Freq Ref	-210.0 dB	3m								r	Change Type	
Int Std Accy	20.000 GH	Iz			Center 20 Span 1.1			I	1	1.000 GHz	Setup/JPEG/	
Freq		AI	mplitude			Span			BW		Marker	

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

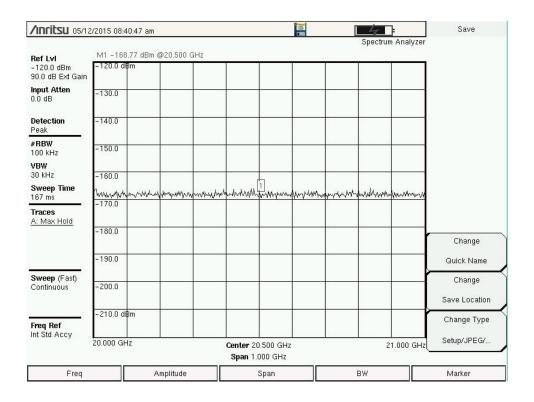
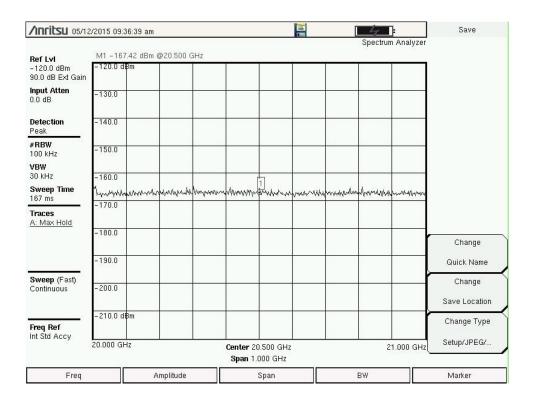


Figure 3.1-6 (B) Spectrum Photos 20-21 GHz 100 kHz Res BW Horizontal Pol 360⁰

/Inritsu 05/12	2/2015 09:2	4:01 am						[4	}	Save		
Ref Lvl	M1 -157	M1 -157.34 dBm @20.500 GHz											
-120.0 dBm 90.0 dB Ext Gain	-120.0 dE	lm											
Input Atten 0.0 dB	-130.0												
Detection Peak	-140.0								: 				
#RBW 1 MHz	-150.0					1							
VBW 300 kHz	Vmm -160.0	punknohm	where where	1 www.m	VWAYNWAN	ahdraw	and war	handrown	ehen ward	mahnut			
Sweep Time 67 ms	-170.0							-					
Traces A: Max Hold	100.0												
	-180.0									r	Change		
. <u> </u>	-190.0										Quick Name		
Sweep (Fast) Continuous	-200.0					-					Change Save Location		
Freq Ref Int Std Accy	-210.0 dE	Jm								ľ	Change Type		
in our rocy	20.000 GH	Z			Center 20 Span 1.1).500 GHz 300 GHz			2	1.000 GHz	Setup/JPEG/		
Freq		A	mplitude			Span	BW				Marker		

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



/Inritsu 05/12	nritsu 05/12/2015 09:40:56 am											
Ref Lvl	M1 -158.83 d	Bm @20.500 GHz			Spectrum A	nalyzer						
-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	1.00.0	<u>mandah manandaran</u>	1 Manna to	annonalisenter	www.weiner.	y Alman						
Sweep Time 50 ms	-170.0											
Traces <u>A: Max Hold</u>	100.0											
	-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						
in our locy	20.000 GHz		Center 20.50 Span 1.000		21.0	00 GHz Setup/JPEG/						
Freq		Amplitude	Spa	n	BW	Marker						

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

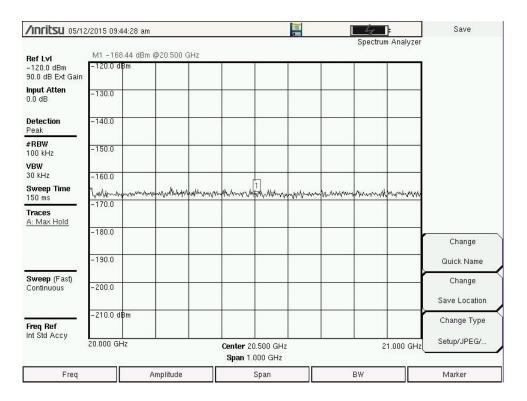


Figure 3.1-6 (F) Spectrum Photos 20-21 GHz 100 kHz Res BW Vertical Pol 360⁰

/Inritsu 05/12	2/2015 10:1	2:52 am						[A	ŧ.	Save	
Ref Lvl			@20.500 G	ίΗz					Spectrun	n Analyzer		
-120.0 dBm 90.0 dB Ext Gain	-120.0 di	3m										
Input Atten 0.0 dB	-130.0							-				
Detection Peak	-140.0											
#RBW 1 MHz	-150.0					1						
VBW 300 kHz	Цинтири -160.0	rananana	have have been a second	Vermanne	harayaayayaya	and way the second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	www.wha	dherformered	mudnenge		
Sweep Time 50 ms	-170.0		Dia d			-						
Traces A: Max Hold	100.0											
	-180.0									ľ	Change	
. <u> </u>	-190.0										Quick Name	
Sweep (Fast) Continuous	-200.0						7				Change Save Location	
Freq Ref Int Std Accy	-210.0 dl										Change Type	
	20.000 GH	Iz			Center 20 Span 1.0).500 GHz 000 GHz			2	1.000 GHz	Setup/JPEG/	
Freq Amplitude						Span		BW			Marker	

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

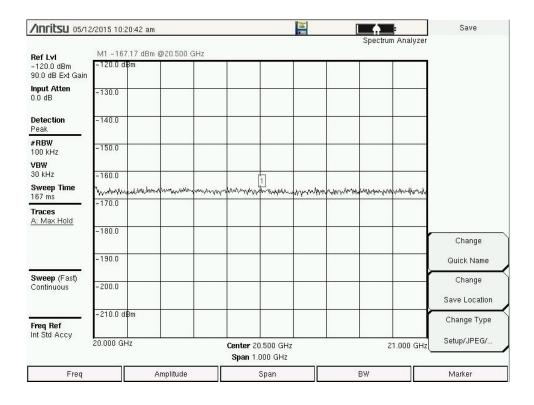


Figure 3.1-6 (H) Spectrum Photos 20-21 GHz 100 kHz Res BW Vertical Pol Worst Case

/INFILSU 05/12	/2015 10:29:19 a	ım				E	Save
	M1 _ 159 38 dF	m @27.500 GHz			Spectru	m Analyzer	
Ref Lvi -120.0 dBm 90.0 dB Ext Gain	-120.0 dBm						
nput Atten).0 dB	-130.0						
Detection Peak	-140.0				0		
#RBW 1 MHz	-150.0						
VBW 300 kHz	<u>*760.0</u> 44	m www.	m-hutrurtersongterer	person and the second second	www.	where the	
Sweep Time 50 ms	-170.0						
Traces A: Max Hold							
	-180.0					l r	Change
	-190.0						Quick Name
Sweep (Fast) Continuous	-200.0					ſ	Change Save Location
Freq Ref	-210.0 dBm				9		Change Type
Int Std Accy	27.000 GHz		Center 27.500 (Span 1.000 Gi			28.000 GHz	Setup/JPEG/
Freq		Amplitude	Span		BW		Marker

Figure 3.1-7 (A) Spectrum Photos 27-28 GHz 1MHz Res BW Horizontal Pol 360°

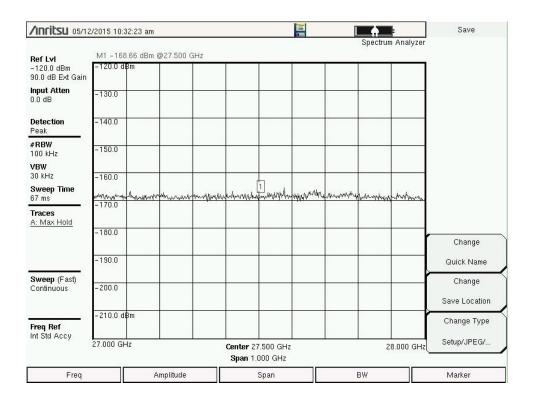


Figure 3.1-7 (B) Spectrum Photos 27-28 GHz 100 kHz Res BW Horizontal Pol 360⁰

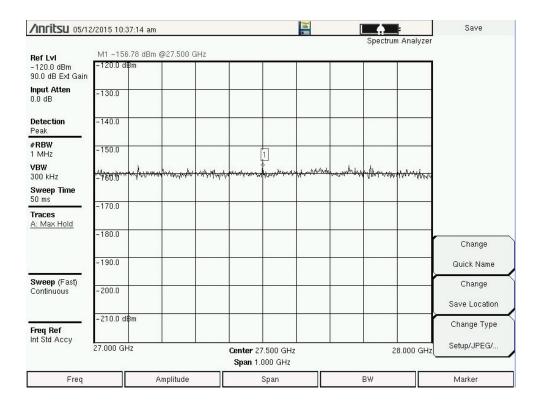


Figure 3.1-7 (C) Spectrum Photos 27-28 GHz 1MHz Res BW Vertical Pol 360°

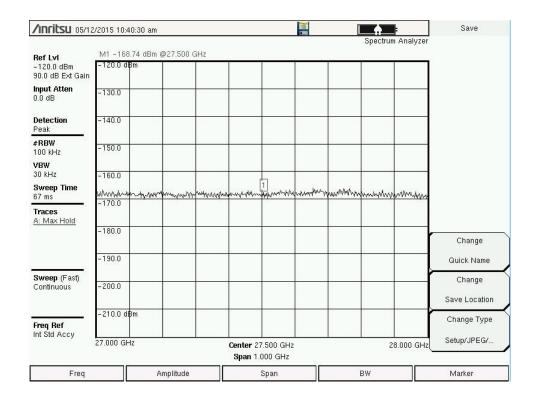


Figure 3.1-7 (D) Spectrum Photos 27-28 GHz 100 kHz Res BW Vertical Pol 360⁰

/Inritsu 05/12	2/2015 10:29:57	'am				Save						
Ref Lvl	M1 -158.48	M1 -158.48 dBm @28.500 GHz										
-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 ⁴⁴⁴⁴⁴	when the way and and	and the company	man	and when a provide the second s	n na						
Sweep Time 67 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						
in our looy	28.000 GHz		Center 28.500 Span 1.000		29.0	00 GHz Setup/JPEG/						
Freq		Amplitude	Spai	n	BW	Marker						

Figure 3.1-8 (A) Spectrum Photos 28-29 GHz 1MHz Res BW Horizontal Pol 360^{0}

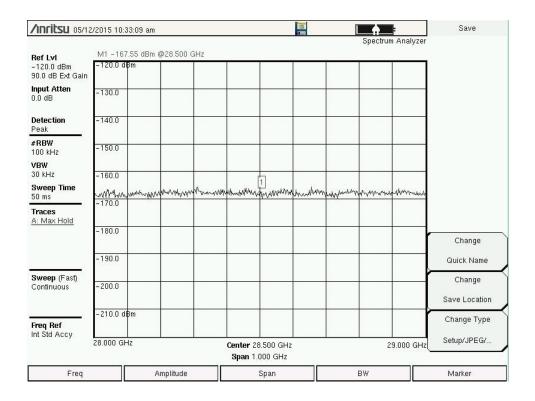


Figure 3.1-8 (B) Spectrum Photos 28-29 GHz 100 kHz Res BW Horizontal Pol 360°

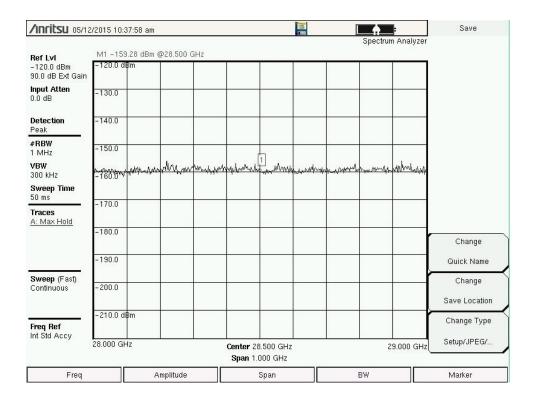


Figure 3.1-8 (C) Spectrum Photos 28-29 GHz 1MHz Res BW Vertical Pol 360⁰

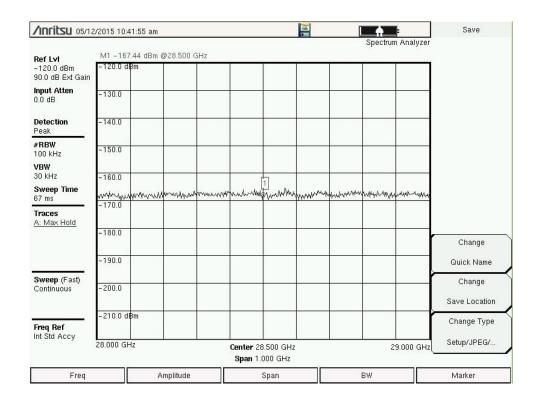


Figure 3.1-8 (D) Spectrum Photos 28-29 GHz 100 kHz Res BW Vertical Pol 360⁰

/Inritsu 05/12	1nritsu 05/12/2015 10:30:38 am 📕 🛄												
Ref Lvl	M1 -158.		29.500 G	iHz					Spectrun	n Analyzer			
-120.0 dBm 90.0 dB Ext Gain	-120.0 dB	m											
Input Atten 0.0 dB	-130.0												
Detection Peak	-140.0												
#RBW 1 MHz	-150.0				[1							
VBW 300 kHz	<u>አጫላኘት ታለቋ</u> -160.0	www.	androp	of appropriate of	wayyyyw	the MAN	angodina	which mand	millinger	Manapata			
Sweep Time 50 ms	-170.0	-						5					
Traces A: Max Hold							-						
	-180.0									r	Change		
	-190.0						-				Quick Name		
Sweep (Fast) Continuous	-200.0						7				Change Save Location		
Freq Ref Int Std Accy	-210.0 dB	m								ľ	Change Type		
in du Accy	29.000 GH:	2			Center 29 Span 1.0				3	0.000 GHz	Setup/JPEG/		
Freq Amplitude						Span	BW				Marker		

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

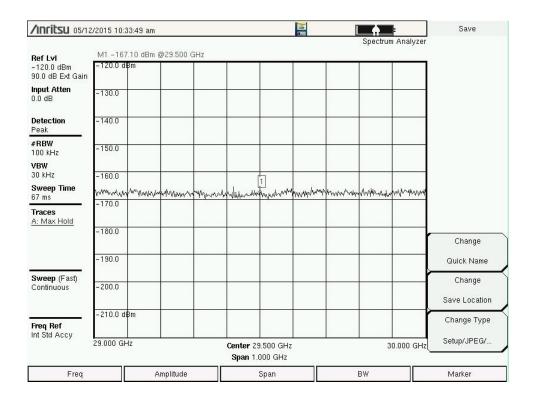


Figure 3.1-9 (B) Spectrum Photos 29-30 GHz 100 kHz Res BW Horizontal Pol 360⁰

/INFILSU 05/12	/2015 10:38:4	10 am				Save
					Spectrum An	alyzer
RefLvl -120.0 dBm	M1 -159.90) dBm @29.500 GHz				
90.0 dB Ext Gain						
nput Atten 1.0 dB	-130.0					
Detection Peak	-140.0					
≉RBW MHz	-150.0					
/BW 300 kHz	160.0	manuphantipart	which represent the group	when the man	-dimensional and	Manne
Sweep Time 50 ms	-170.0					
Traces A: Max Hold						
	-180.0					Change
	-190.0					Quick Name
Sweep (Fast) Continuous	-200.0					Change
Jonunuous	-200.0					Save Location
Freq Ref	-210.0 dBm					Change Type
Int Std Accy	29.000 GHz		Center 29.500 (Span 1.000 GF		30.00	0 GHz Setup/JPEG/
Freq		Amplitude	Span		BW	Marker

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

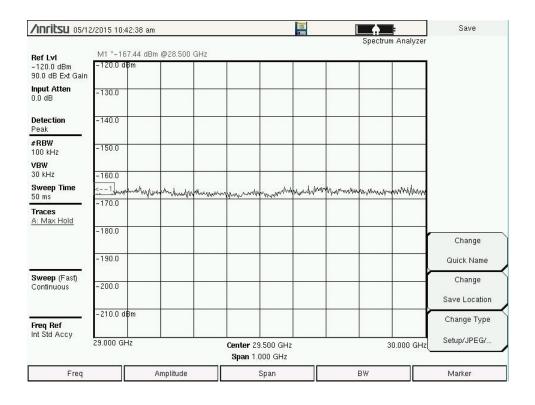


Figure 3.1-9 (D) Spectrum Photos 29-30 GHz 100 kHz Res BW Vertical Pol 360⁰

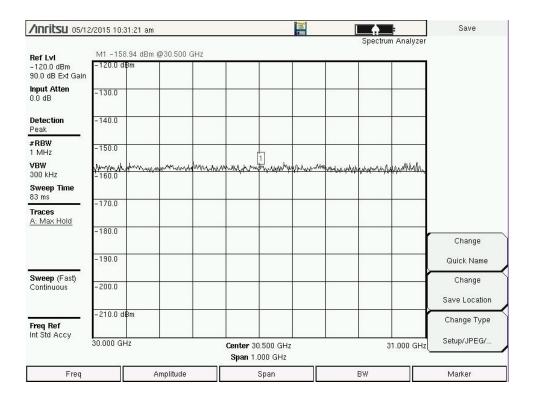


Figure 3.1-10 (A) Spectrum Photos 30-31 GHz 1MHz Res BW Horizontal Pol 360⁰

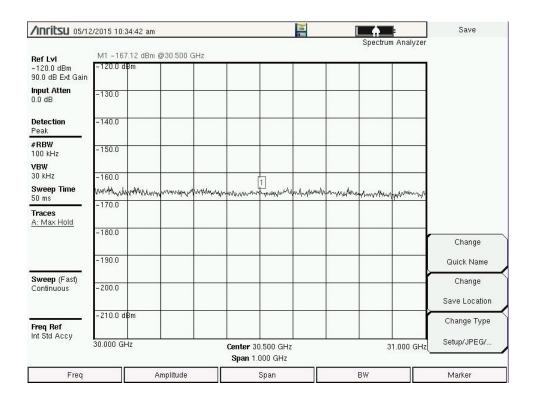


Figure 3.1-10 (B) Spectrum Photos 30-31 GHz 100 kHz Res BW Horizontal Pol 360⁰

/Inritsu 05/12	Tritsu 05/12/2015 10:39:20 am 📔 🛄											
Ref Lvl	M1 -159	.34 dBm (@30.500 G	ίΗz					Spectrur	n Analyzer		
-120.0 dBm 90.0 dB Ext Gain	-120.0 di	8m										
Input Atten 0.0 dB	-130.0											
Detection Peak	-140.0								:)			
#RBW 1 MHz	-150.0							ē.				
VBW 300 kHz	-160.0	whenthe	Monagen	rentender	N. MANANA	structure way	hordentry	Warne.	en handar	aptroph.		
Sweep Time 83 ms	-170.0					-		5				
Traces A: Max Hold												
	-180.0									l h	Change	
	-190.0										Quick Name	
Sweep (Fast) Continuous	-200.0					-					Change Save Location	
Freq Ref Int Std Accy	-210.0 dl										Change Type	
	30.000 GH	łz			Center 30 Span 1.0		101.0		3	1.000 GHz	Setup/JPEG/	
Freq	A	Amplitude			Span			BW		Marker		

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

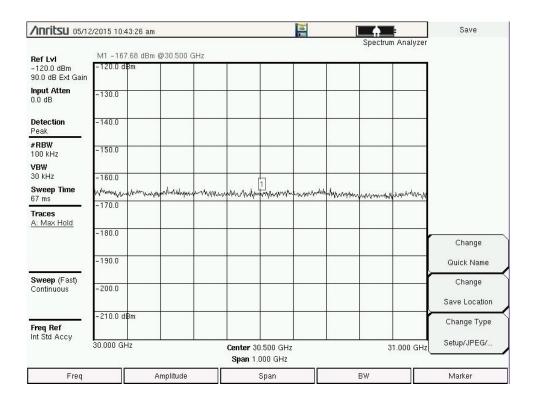


Figure 3.1-10 (D) Spectrum Photos 30-31 GHz 100 kHz Res BW Vertical Pol 360⁰

FOUR

SUMMARY OF RESULTS

The results of the measurements conducted at the proposed ViaSat, Inc site in Augusta, Georgia 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.

Ka-Band Measurements:

There was no radio frequency interference cases measured at this site above the noise floor of the test equipment.

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.