Testing Tomorrow's Technology

Application
For

Title 47 USC, Part 2, Subpart J, Paragraph 2.902, Equipment Authorization of Verification for an Unintentional Radiator per Part 15, Subpart B, Paragraphs 15.107 and 15.109

And

Part 2, Subpart J, Paragraph 2.907 Equipment Authorization of Certification for an Intentional Radiator per Part 15, Subpart C, paragraph 15.247

For the

nVideon, Inc.
Tel-Lynx Model: Connexion

FCC ID: 2AAGC-TLC001

UST Project: 13-0126
Issue Date: May 23, 2013

Total Pages: 55

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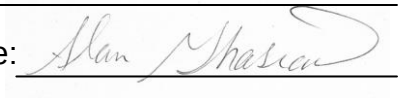
Testing Tomorrow's Technology

I certify that I am authorized to sign for the Test Agency and that all of the statements in this report and in the Exhibits attached hereto are true and correct to the best of my knowledge and belief:

US TECH (Agent Responsible For Test):

By: Alan Ghasiani

Name: 

Title: Compliance Engineer – President

Date May 23, 2013

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MEASUREMENT TECHNICAL REPORT

COMPANY NAME: nVideon, Inc.

MODEL: Connexion

FCC ID: 2AAGC-TLC001

DATE: May 23, 2013

This report concerns (check one): Original grant [X]
Class II change

Equipment type: 2.4 GHz Transmitter Module

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? yes_____ No X

If yes, defer until: _____N/A_____
date
agrees to notify the Commission by N/A
date
of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

US Tech
3505 Francis Circle
Alpharetta, GA 30004

Phone Number: (770) 740-0717
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1 General Information

1.1 Purpose of this Report

This report is prepared as a means of conveying test results information concerning the suitability of this exact product for public distribution according to the FCC Rules and Regulations Part 15, Section 247.

1.2 Characterization of Test Sample

The sample used for testing was received by US Tech on May 14, 2013 in good operating condition.

1.3 Product Description

The Equipment Under Test (EUT) is the nVideon, Inc. Tel-Lnyx, Model Connexion unit. This device allows for re-routing of cell phone calls to land-line phones, with added features, such as “Robo Call” block. A total of 2 cell phones can be linked to the EUT via Bluetooth. The product is considered a telephone assistant for landlines and Bluetooth mobile phones.

The EUT utilizes a radio module developed by CSR which uses Bluetooth technology therefore the EUT is considered a FHSS type device. The EUT has been evaluated as an FHSS radio product. Refer to the Theory of Operation for details regarding the EUT’s compliance as an FHSS radio.

1.4 Configuration of Tested System

The Test Sample was tested per *ANSI C63.4:2003, Methods of Measurement of Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (2003)* for FCC subpart B Digital equipment Verification requirements and per FCC KDB Publication number DA 00-705 for FHSS devices operating under section 15.247.

Digital RF conducted and radiated Verification emissions data (FCC 15.107 and 109) below 1 GHz were taken with the measuring receiver (or spectrum analyzer's) resolution bandwidth adjusted to 9 kHz and 120 kHz, respectively. All measurements performed above 1.0 GHz were made with a RBW of 1 MHz. All measurements are peak unless stated otherwise. The video filter associated with the spectrum analyzer was off throughout the evaluation process.

A list of EUT and Peripherals is found in Table 1 below. A block diagram of the tested system is shown in Figure 1. Test configuration photographs for spurious and fundamental emissions are provided in separate Appendices.

1.5 Test Facility

Testing was performed at US Tech's measurement facility at 3505 Francis Circle, Alpharetta, GA 30004. This site has been fully described and registered with the FCC. Its FCC site registration number is 186022. Additionally this site has also been fully described and submitted to Industry Canada (IC), and has been approved under file number 2982A-1.

1.6 Related Submittal(s)/Grant(s)

The EUT will be used to wirelessly send/receive data. The transceiver presented in this report will be used with other like transceivers:

The EUT is subject to the following FCC Equipment Authorizations:

a) Certification of the transmitter (with modular approval), see test data presented herein.
b) Verification as a class B digital device and computer peripheral (separate test report attached).

Table 1. EUT and Peripherals

PERIPHERAL MANUFACTURER.	MODEL NUMBER	SERIAL NUMBER	FCC ID:	CABLES P/D
2.4 GHz radio nVideon, Inc. (EUT)	Connexion	Engineering Sample	Pending: 2AAGC-TLC001	1.5 m U USB x 1 2.0 m U RJ11 x 2 4.0 m U RJ9 x 1 1.8 m U P x 1
Telephone	Various	Various	None	1.5 m U D (x2)
Temperature Sensor	BlueBox	Engineering Sample	None	4.0 m U D
Power Supply	Triad Magnetics	WSU120-0700	None	1.8 m U P
Laptop PC	Various	Various	Various	1.5 m U D 1.5 m U P

2 Tests and Measurements

2.1 Test Equipment

Table 2 below lists test equipment used to evaluate this product. Model numbers, serial numbers and their calibration status are included herein.

Table 2. Test Instruments

TEST INSTRUMENT	MODEL NUMBER	MANUFACTURER	SERIAL NUMBER	DATE OF LAST CALIBRATION
SPECTRUM ANALYZER	E4407B	Agilent	US41442935	10/29/2012
SPECTRUM ANALYZER	8566B	HEWLETT-PACKARD	2410A00109	11/21/2012
RF PREAMP 100 kHz to 1.3 GHz	8447D	HEWLETT-PACKARD	1937A02980	3/04/2013
BICONICAL ANTENNA 25 MHz to 200 MHz	BIA-25	Electro-Metrics	2451	6/04/2012 2 Year
LOG PERIODIC 100 MHz to 1000 MHz	3146	EMCO	3110-3236	6/05/2012 2 Year
HORN ANTENNA 1 GHz to 18 GHz	3115	EMCO	9107-3723	8/10/2011 2 Year
Loop Antenna 9KHz-30MHz	SAS-200/562	A. H. Systems	142	8/09/2011 2 Year
PREAMP 1 GHz to 26.5 GHz	8449B	HEWLETT-PACKARD	3008A00480	3/04/2013
LISN	8025-50-TS24-BNC	Solar Electronics	910495-910494	3/01/2013
CALCULATION PROGRAM	N/A	N/A	Ver. 6.0	N/A

Note: The calibration interval of the above test instruments are 12 months unless stated otherwise and all calibrations are traceable to NIST/USA.

2.2 Modifications to EUT Hardware

No modifications were made by US Tech in order to bring the EUT into compliance with FCC Part 15, Subpart C Intentional Radiator Limits for the transmitter portion of the EUT or the Subpart B Unintentional Radiator Limits (Receiver and Digital Device) Requirements.

2.3 Number of Measurements for Intentional Radiators (15.31(m))

Measurements of intentional radiators or receivers shall be performed and reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in Table 3 as follows:

Table 3. Number of Test Frequencies for Intentional Radiators

Frequency Range over which the device operates	Number of Frequencies	Location in the Range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near the top 1 near the bottom
Greater than 10 MHz	3	1 near top 1 near middle 1 near bottom

Because the EUT operates over 2.4 GHz to 2.4835 GHz, 3 test frequencies will be used.

2.4 Frequency Range of Radiated Measurements (Part 15.33)

2.4.1 Intentional Radiator

The spectrum shall be investigated for the intentional radiator from the lowest RF signal generated in the EUT, without going below 9 kHz to the 10th harmonic of the highest fundamental frequency generated or 40 GHz, whichever is the lowest.

2.4.2 Unintentional Radiator

For the digital device, an unintentional radiator, the frequency range shall be 30 MHz to 1000 MHz, or to the range specified in 2.4.1 above, whichever is the higher range of investigation.

2.5 Measurement Detector Function and Bandwidth (CFR 15.35)

The radiated and conducted emissions limits shown herein are based on the following:

2.5.1 Detector Function and Associated Bandwidth

On frequencies below 1000 MHz, the limits herein are based upon measurement equipment employing a CISPR Quasi-peak detector function and related measurement bandwidths (i.e. 9 kHz from 150 kHz to 30 MHz and 120 kHz from 30 MHz to 1000 MHz). Alternatively, measurements may be made with equipment employing a peak detector function as long as the same bandwidths specified for the Quasi-peak device are used.

2.5.2 Corresponding Peak and Average Requirements

Above 1000 MHz, radiated limits are based on measuring instrumentation employing an average detector function. When average radiated emissions are specified there is also a corresponding Peak requirement, as measured using a peak detector, of 20 dB greater than the average limit. For all measurements above 1000 MHz the Resolution Bandwidth shall be at least 1 MHz.

2.5.3 Pulsed Transmitter Averaging

When the radiated emissions limit is expressed as an average value, and the transmitter is pulsed, the measured field strength shall be determined by applying a Duty Cycle Correction Factor based upon dividing the total ON time during the first 100 ms period by 100 ms (or by the period if less than 100 ms). The duty cycle may also be expressed logarithmically in dB. Please section 2.8 herein for details.

2.6 EUT Antenna Requirements (CFR 15.203)

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. Only the antenna(s) listed in Table 4 will be used with this module.

Table 4. Allowed Antenna(s)

MANUFACTURER	TYPE OF ANTENNA	MODEL	REPORT REFERENCE	GAIN dB_i	TYPE OF CONNECTOR
nVideon, Inc.	Trace F Antenna	Engineering Sample	Antenna	3	PCB Trace

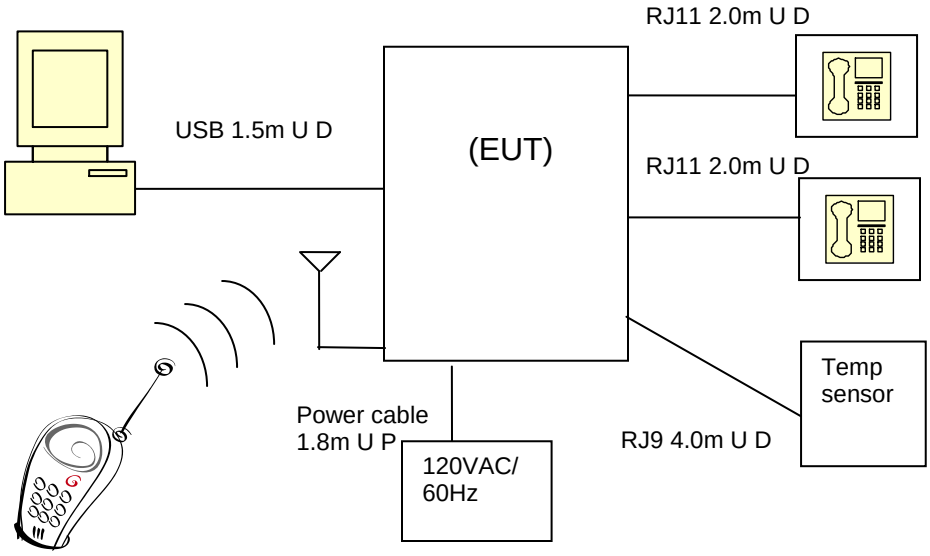


Figure 1. Test Configuration

2.7 Restricted Bands of Operation (Part 15.205)

Only spurious emissions can fall in the frequency bands of CFR 15.205. The field strength of these spurious cannot exceed the limits of 15.209. Radiated harmonics and other Spurious are examined for this requirement see paragraph 2.10.

2.8 Transmitter Duty Cycle (CFR 35 (c))

The duty cycle de-rating factor used in the calculation of average radiated limits (per CFR 15.209 and 15.35(c)) is described below. This factor was calculated by first determining the worst case scenario for system operation. DH% pocket type was found to be worse case scenario.

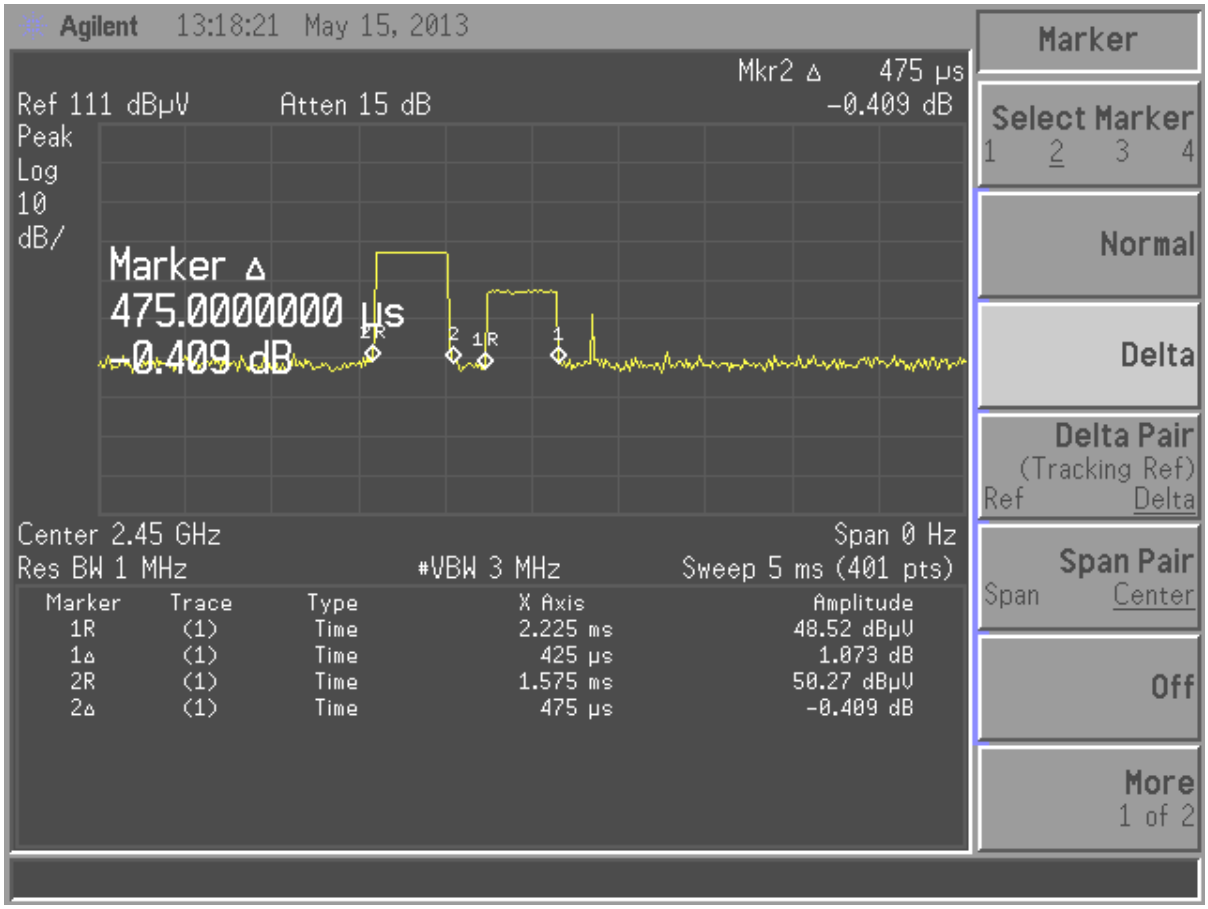


Figure 2. Pulse Width

Total Pulse time = 1Δ + 2Δ = 425 µS + 475 µS = 900µS

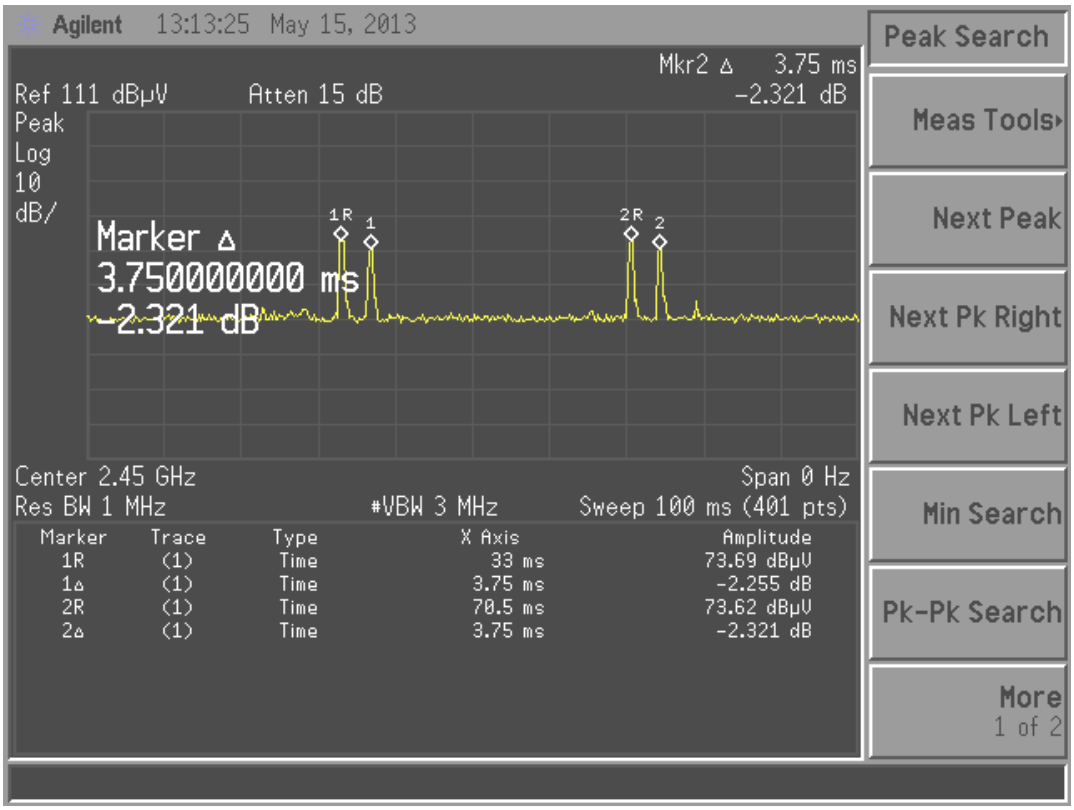


Figure 3. Pulse Count

The duty cycle is computed as follows (in any 100 ms period):

Time On = Pulse Width * Pulse Count
Time On = 900µS * 2
Time On = 1800 µS

Duty Cycle = Time On/ Total Time
Duty Cycle = (1800 µS /100mS) = 0.018
Correction Factor = $20\log_{10}(0.018)$ = **-34.9 dB**

2.9 Intentional Radiator, Power Lines Conducted Emissions (CFR 15.207)

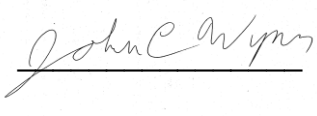
The power line conducted voltage emission measurements have been carried out in accordance with CFR 15.207, per ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into a continuous mode of transmission.

The worst-case results for conducted emissions were determined to be produced when the EUT was operating under continuous transmission on the low channel. There were no signals within 5.0 dB of the Average limits. Those results are given in Table 5 below.

Table 5. Transmitter Power Line Conducted Emissions Test Data, Part 15.207

CONDUCTED EMISSIONS 150 kHz to 30 MHz						
Tested By: JW	Specification Requirement: FCC Part 15.207 Class B		Project No.: 13-0126	Manufacturer: nVideon, Inc.		
				Model: Connexion		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL-PA (dB)**	**Corrected Results (dBuV)**	**Avg Limits (dBuV)**	**Margin (dB)**	**Detector**
120 VAC, 60 Hz, Phase Line						
0.1971	56.00	1.13	57.13	63.7	6.6*	**QP**
0.1971	38.60	1.13	39.73	53.7	14.0	**AVG**
0.5203	43.20	0.48	43.68	56.0	12.3*	**PK**
0.5203	29.60	0.48	30.08	46.0	15.9	**AVG**
2.2240	42.80	0.36	43.16	56.0	12.8*	**PK**
2.2240	30.40	0.36	30.76	46.0	15.2	**AVG**
9.9550	42.00	0.47	42.47	50.0	7.5	**PK**
10.5500	45.10	0.47	45.57	60.0	14.4*	**PK**
10.5500	18.60	0.47	19.07	50.0	30.9	**AVG**
20.0000	43.40	0.61	44.01	50.0	6.0	**PK**
120 VAC, 60 Hz, Neutral Line						
0.1950	54.50	1.13	55.63	63.8	8.2*	**QP**
0.1950	35.70	1.13	36.83	53.8	17.0	**AVG**
0.5353	40.40	0.46	40.86	46.0	5.1	**PK**
2.0760	37.80	0.36	38.16	46.0	7.8	**PK**
9.9800	41.60	0.46	42.06	50.0	7.9	**PK**
10.7600	44.80	0.47	45.27	60.0	14.7*	**PK**
10.7600	16.70	0.47	17.17	50.0	32.8	**AVG**
20.0200	42.30	0.61	42.91	50.0	7.1	**PK**

(*)= Quasi-Peak limit used
SAMPLE CALCULATIONS: At 0.195 MHz, = 54.5 + (1.13) = 55.63 dBuV

Test Date: May 15, 2013
Tested By
Signature:  Name: John Wynn

2.10 Intentional Radiator, Radiated Emissions (Antenna Conducted) (CFR 15.209, 15.247(d)) (IC RSS 210, A2.9 (a))

The EUT was put into a continuous-transmit mode of operation and tested per FCC KDB Publication DA 00-705 for conducted out of band emissions emanating from the antenna port over the frequency range of 30 MHz to 25 GHz. A conducted scan was performed on the EUT to identify and record spurious signals that were related to the transmitter. Antenna Conducted Emissions of a significant magnitude that fell within restricted bands were then measured as radiated emissions on the OATS. The conducted emissions graphs are found in figures below.

For radiated measurements, the EUT was set into a continuous transmission mode. Below 1 GHz, the RBW of the measuring instrument was set equal to 120 kHz. Peak measurements above 1 GHz were measured using a RBW = 1 MHz, with a VBW ≥ RBW. The results of peak radiated spurious emissions falling within restricted bands are given in Table 6 below.

For Average Voltage measurements above 1 GHz, the emissions were measured using RBW = 1 MHz and VBW = 10 Hz. For a pulse-modulated transmitter, the EUT's average emissions are further modified by adding to them the worst-case duty cycle, determined by adding the EUT's total pulse widths (on time) over a 100 ms period and dividing by 100 ms.

On the OATS, the EUT was mounted on top of a non-conductive table, 80 cm above the floor, by placing it in the X-Z plane along the Z axis with its bottom cover in parallel with the ground. The front of the EUT faced the measurement antenna located 3 meters away. Each signal measured was maximized by raising and lowering the receive antenna between 1 and 4 meters in height while monitoring the ever changing spectrum analyzer display (with channel A in the Clear-Write mode and channel B in the Max-Hold mode) for the largest signal visible. That exact antenna height where the signal was maximized was recorded for reproducibility purposes. Also, the EUT was rotated about its Y-axis while monitoring the Spectrum Analyzer display for maximum. The EUT azimuth was recorded for reproducibility purposes. The EUT was measured when both maxima were simultaneously satisfied.

The test data is detailed below in for this section. Several radiated emissions above 1 GHz were measured at a distance of 1 meter. The measured value at 1 meter was then extrapolated to the resultant at 3 meters using an inverse distance extrapolation factor of -20 dB/decade. There were no test failures.

2.10.1 Conducted Emissions

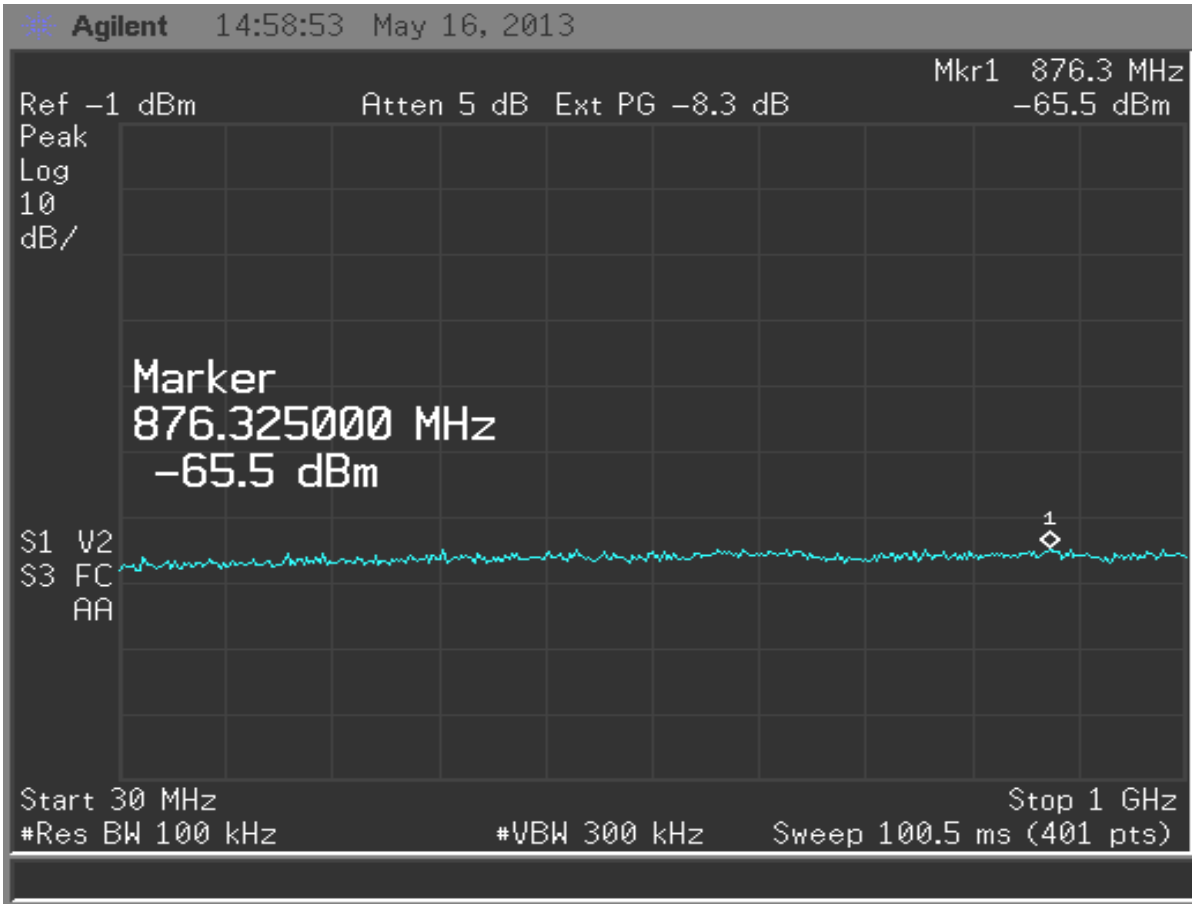


Figure 4. Antenna Conducted Spurious Emissions- Low Channel, Part 1

Note: Large Signal shown is Fundamental Frequency

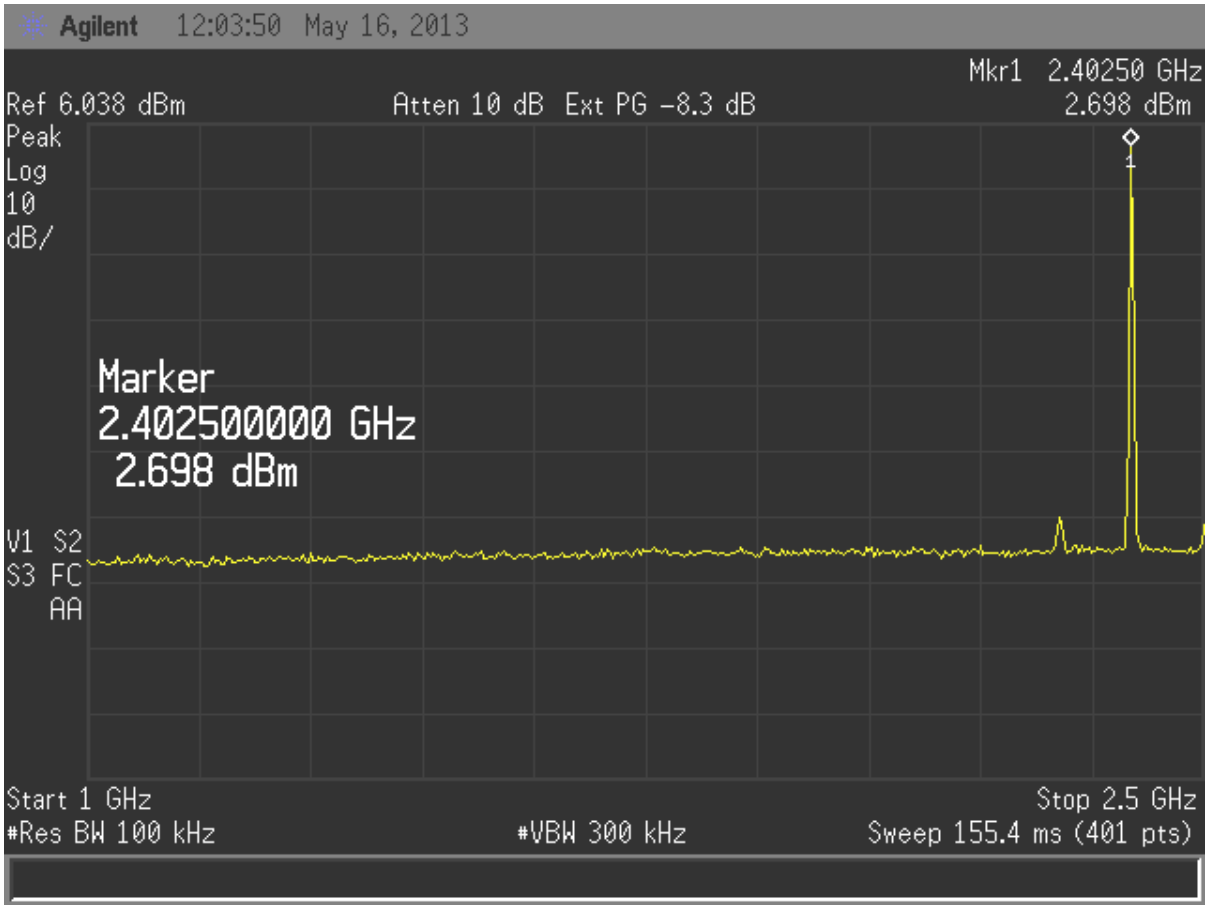


Figure 5. Antenna Conducted Spurious Emissions –Low Channel, Part 2

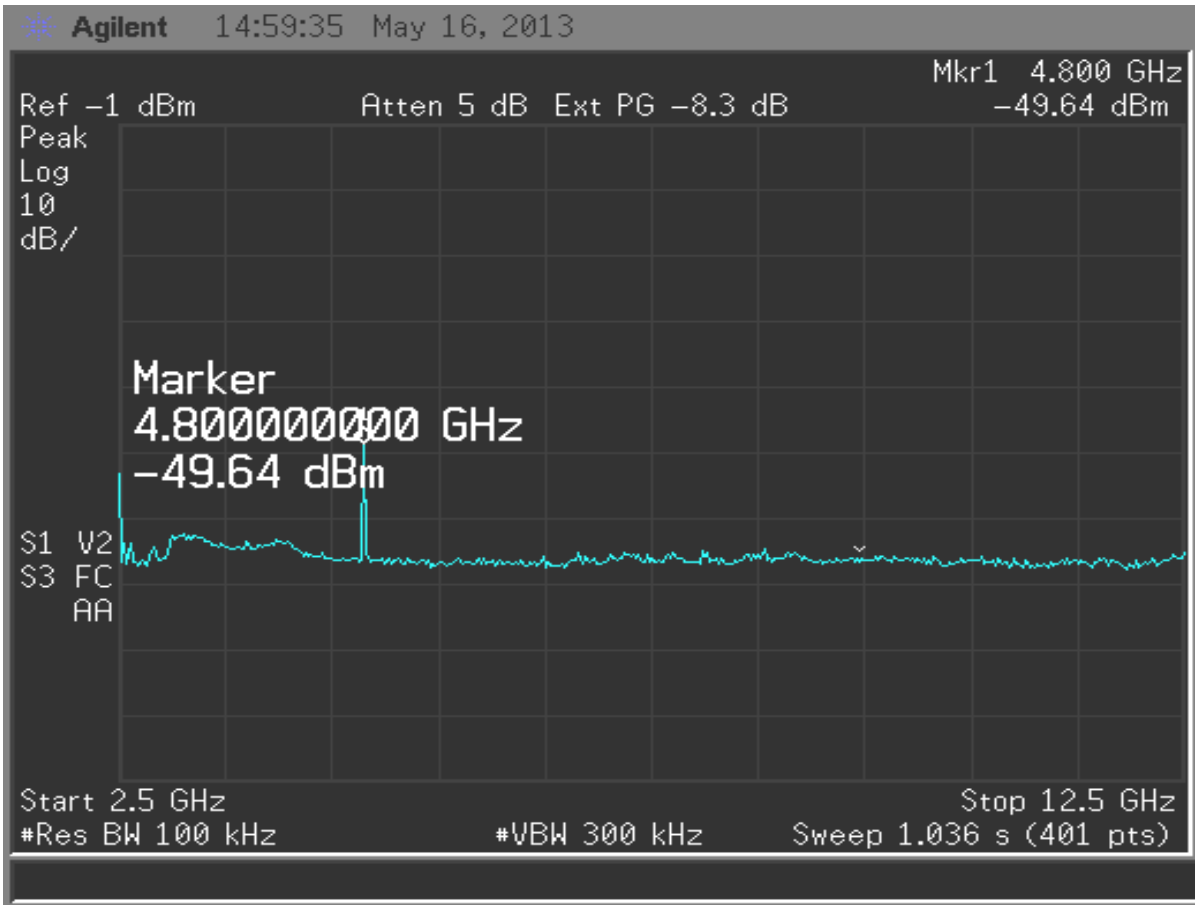


Figure 6. Antenna Conducted Spurious Emissions –Low Channel, Part 3

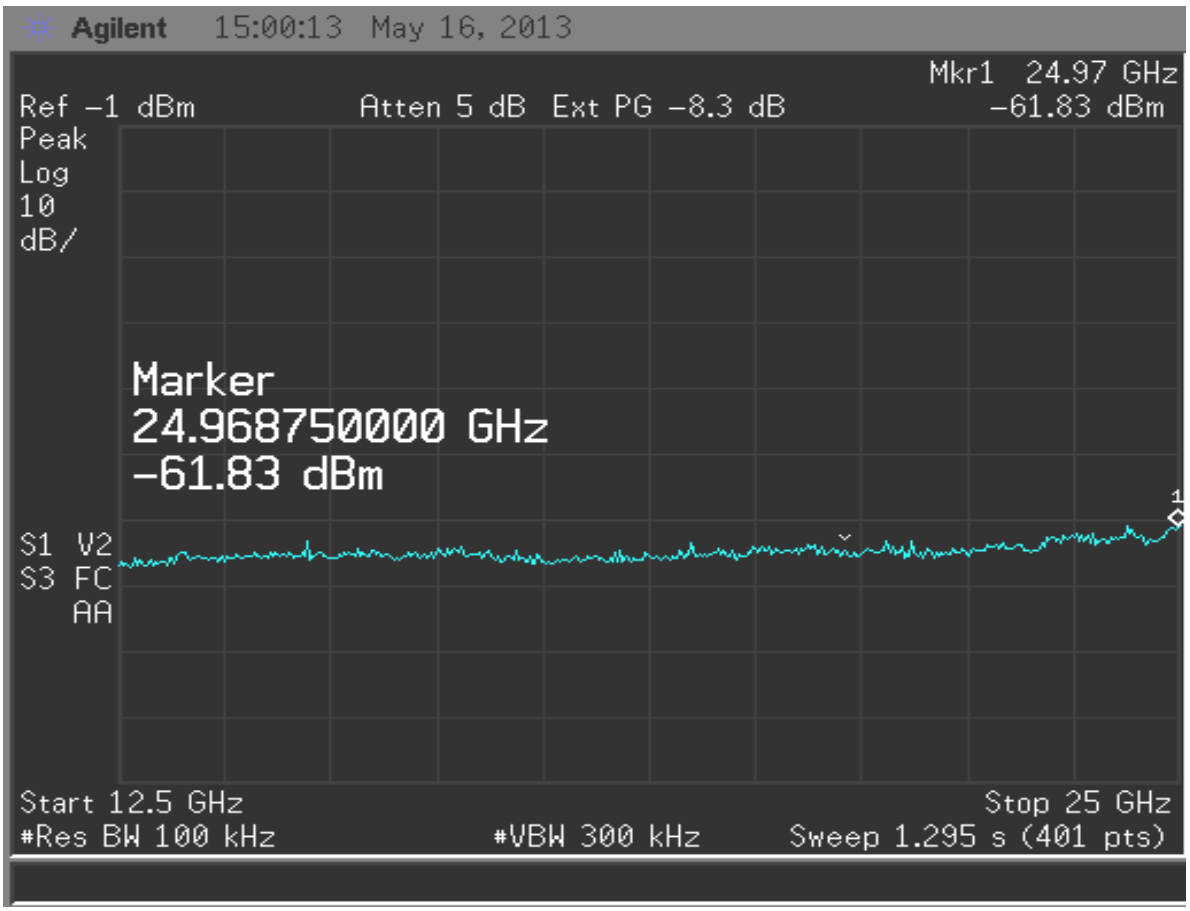


Figure 7. Antenna Conducted Spurious Emissions –Low Channel, Part 4

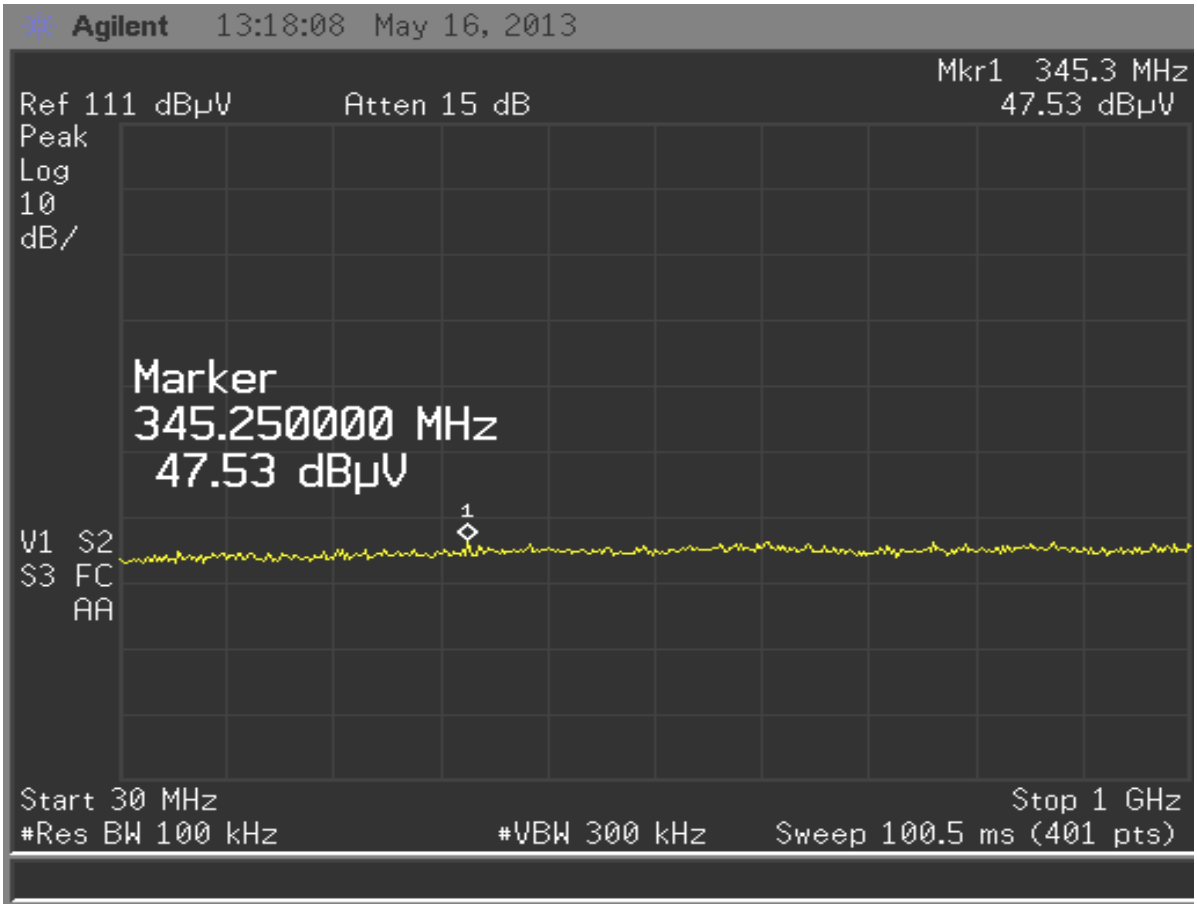


Figure 8. Antenna Conducted Spurious Emissions – Mid Channel, Part 1

Note: Signal shown represents Fundamental Frequency

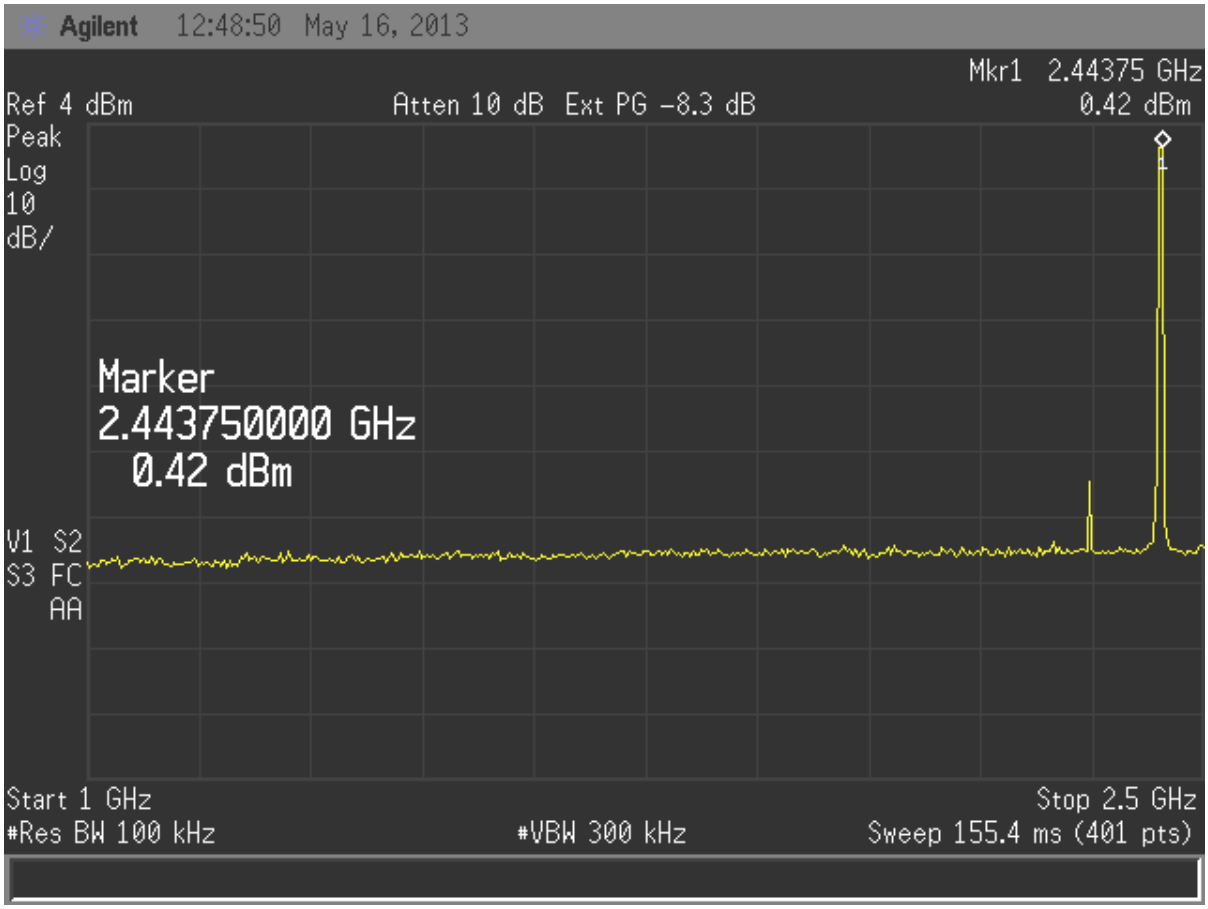


Figure 9. Antenna Conducted Spurious Emissions – Mid Channel, Part 2

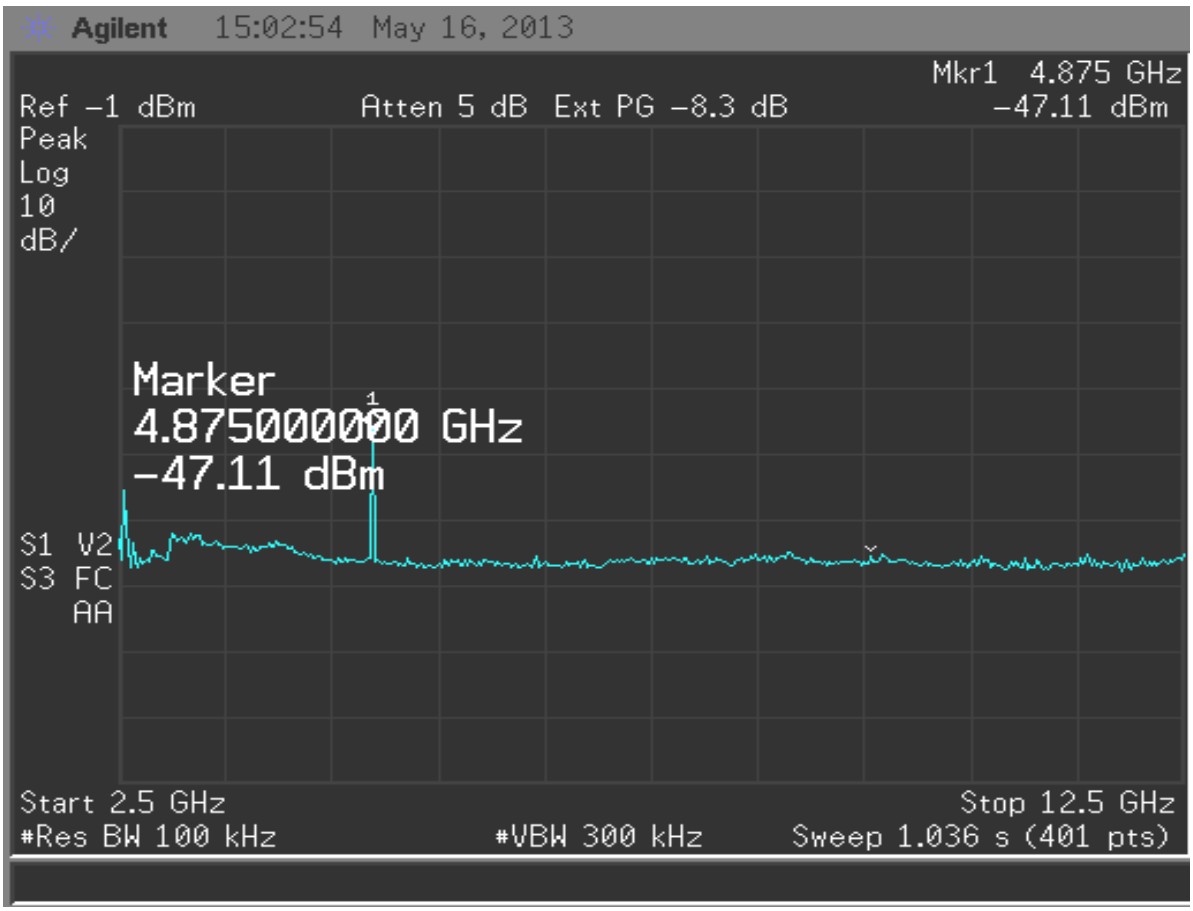


Figure 10. Antenna Conducted Spurious Emissions – Mid Channel, Part 3

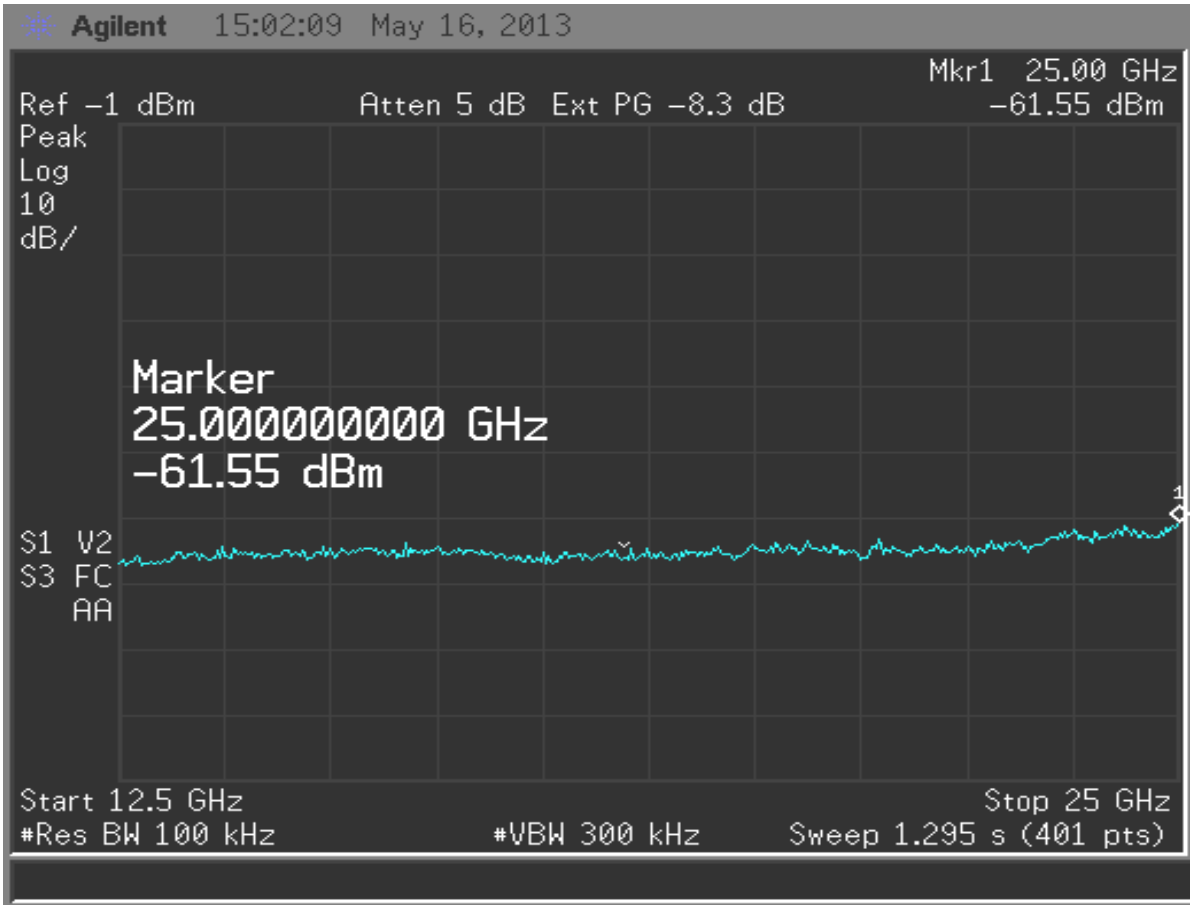


Figure 11. Antenna Conducted Spurious Emissions – Mid Channel, Part 4

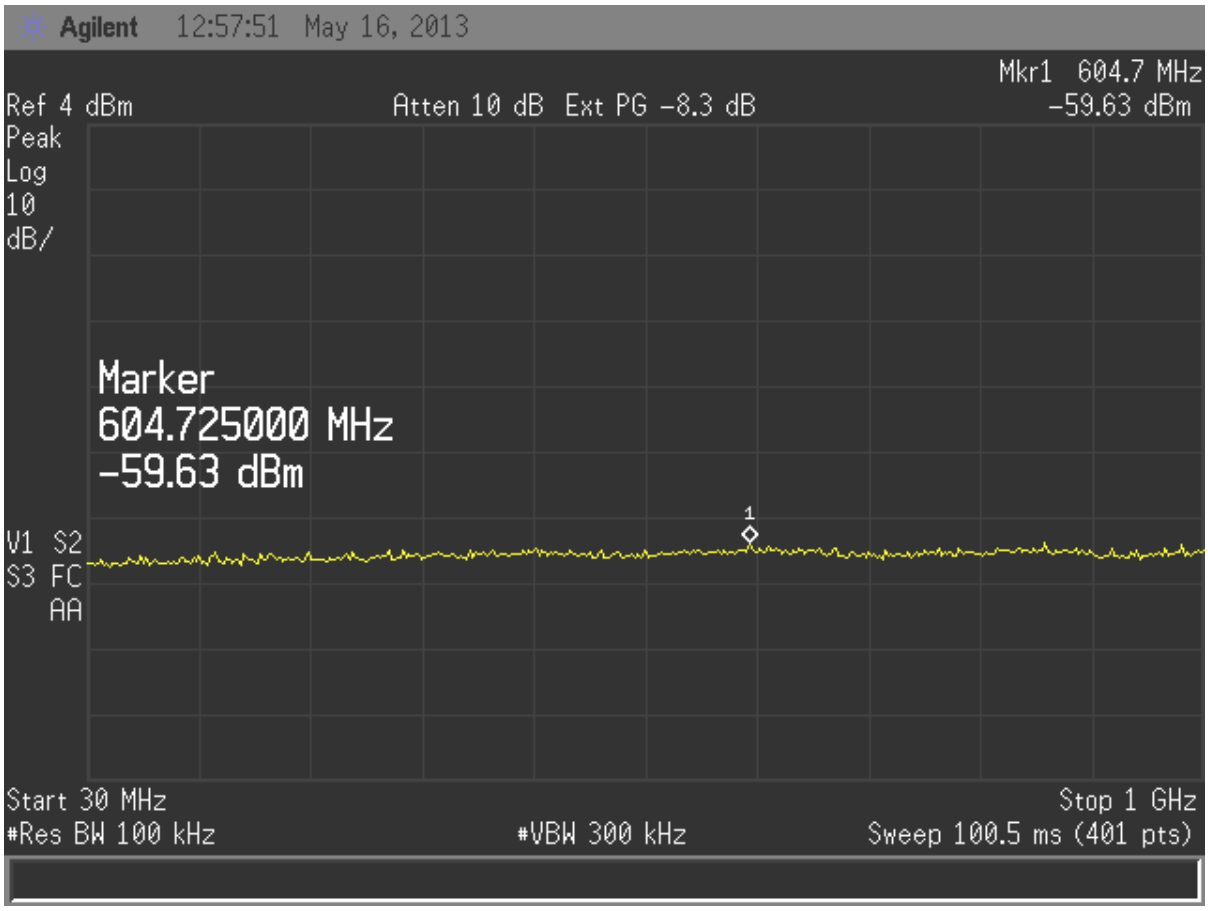


Figure 12. Antenna Conducted Spurious Emissions – High Channel, Part 1

Note: Large Signal shown is Fundamental Frequency

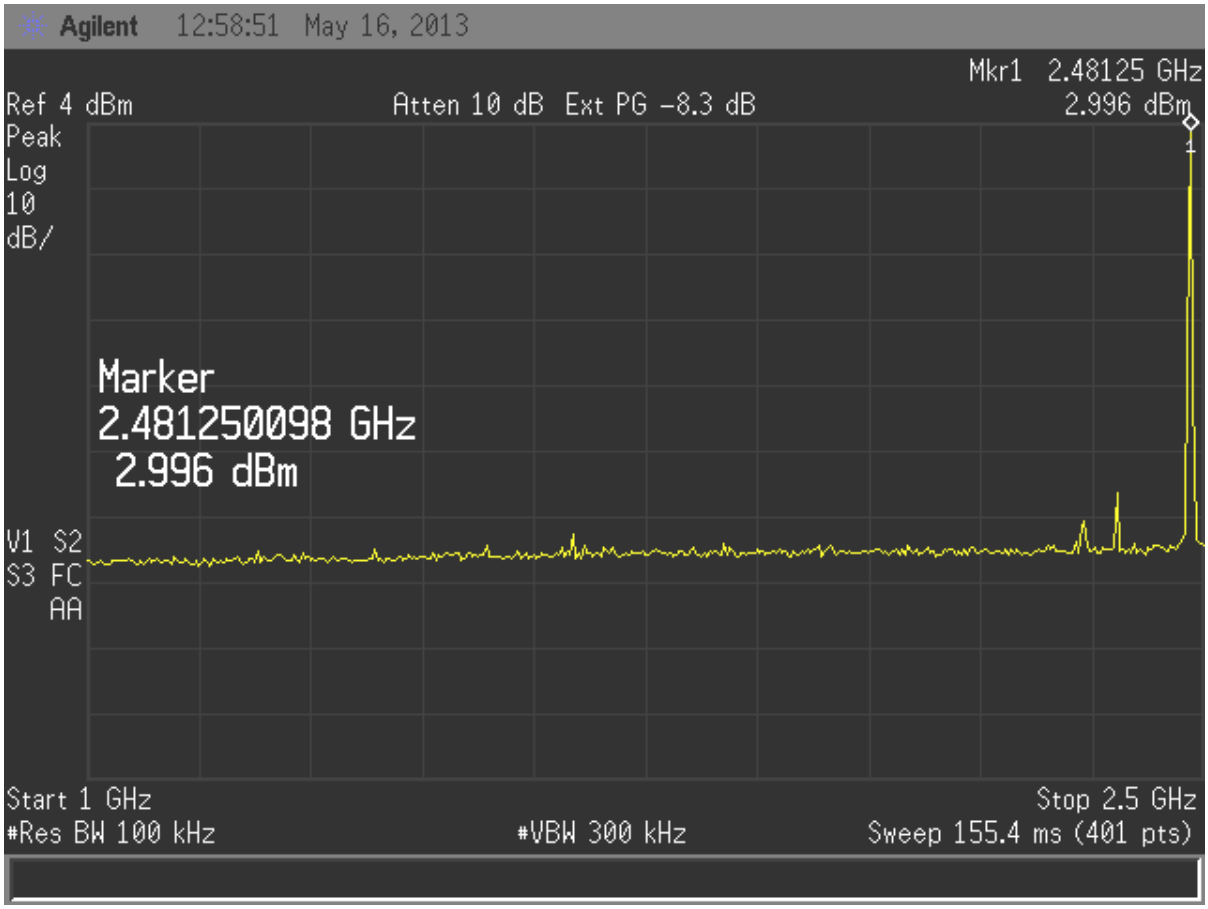


Figure 13. Antenna Conducted Spurious Emissions – High Channel, Part 2

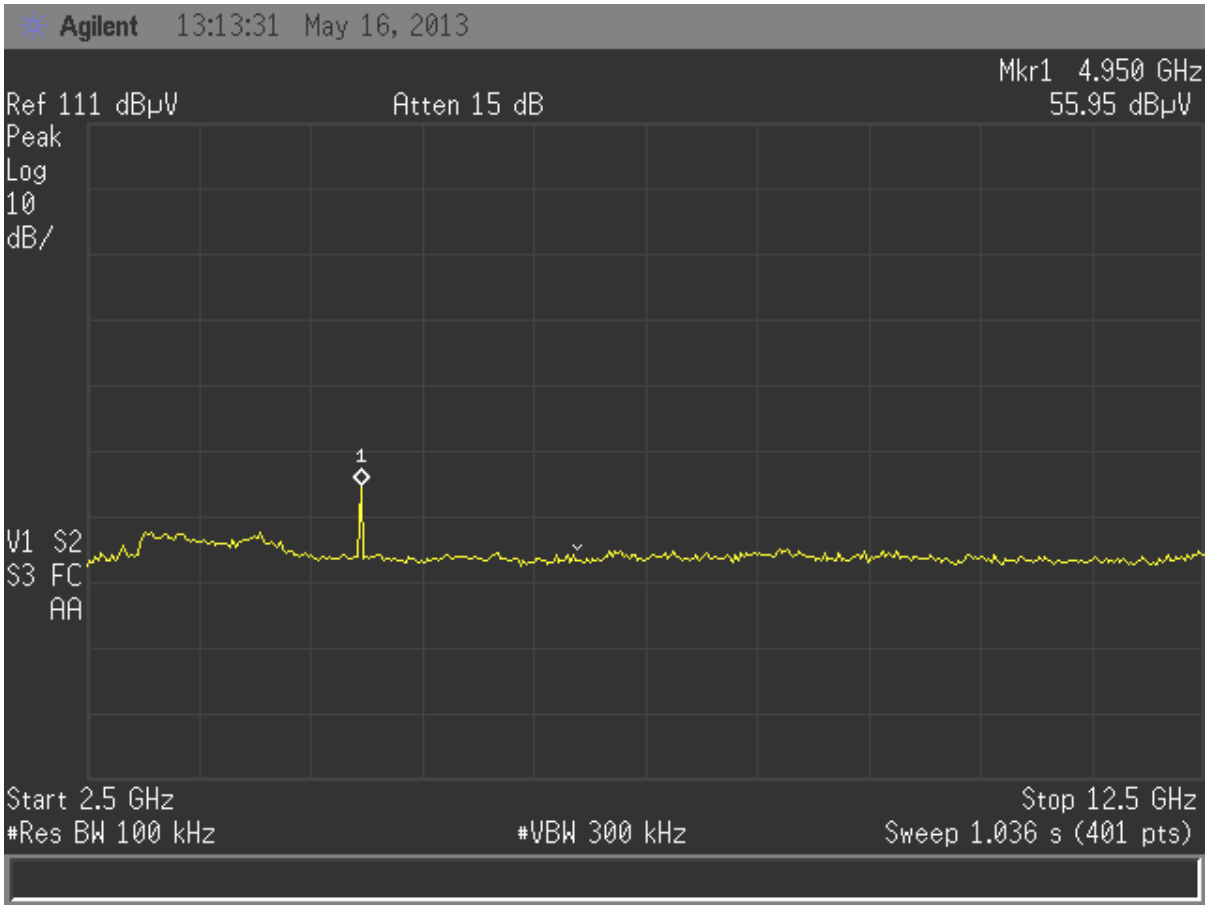


Figure 14. Antenna Conducted Spurious Emissions – High Channel, Part 3

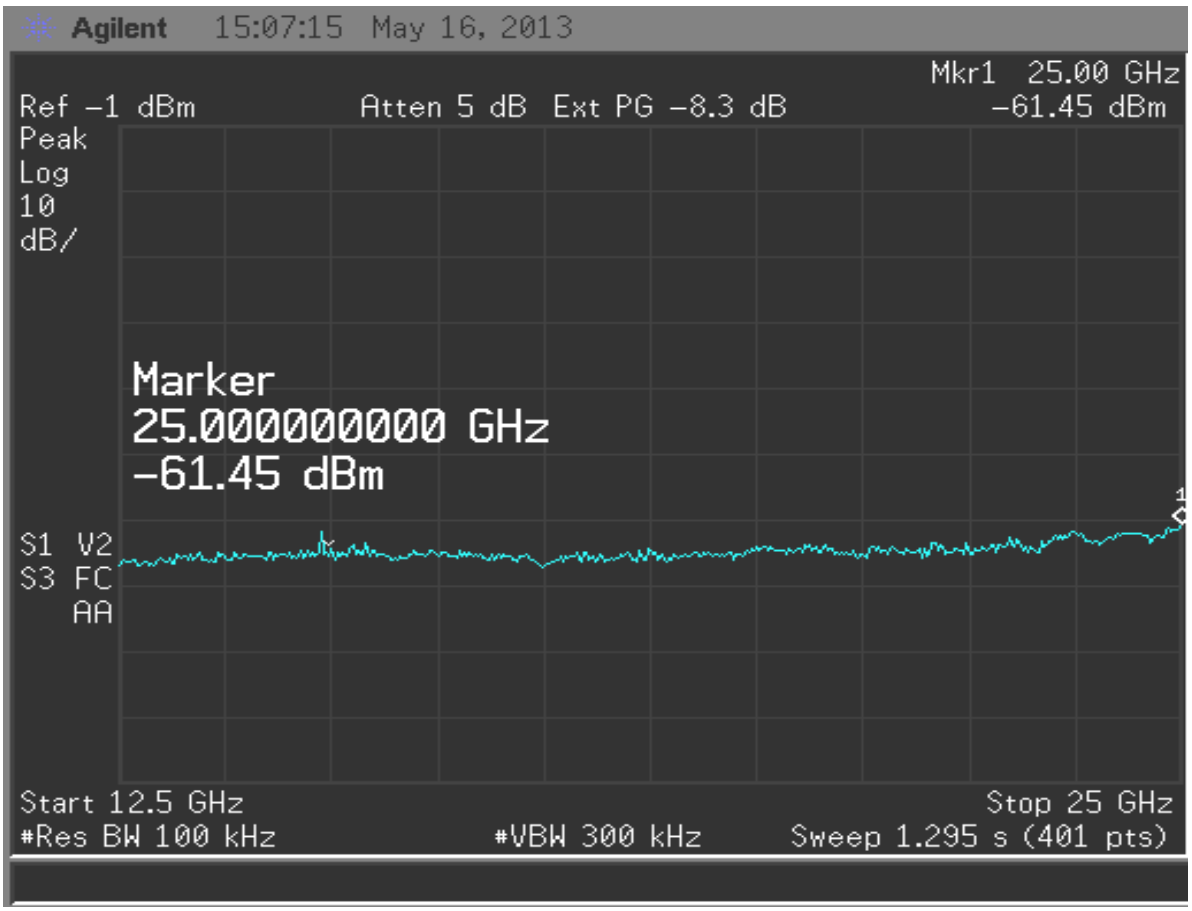


Figure 15. Antenna Conducted Spurious Emissions – High Channel, Part 4

2.10.2 Intentional Radiated Emissions

Table 6. Peak Fundamental and Harmonic Measurements

Radiated Fundamental and Harmonic Emissions, Tested from 30 MHz – 25 GHz						
Tested By:	**Test: FCC Part 15, Para 15.247(d)**			**Client: nVideon, Inc**		
JCW	**Project: 13-0126**			**Model: Connexion**		
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance**	**Pass Margin (dB)**
LOW BAND - PEAK						
2402.03	67.33	31.56	98.89		3.0m	
4804.76	57.4	3.04	60.44	74.0	3.0m	13.6
7205.775	57.4	1.86	55.54	74.0	1.0m	18.5
MID BAND- PEAK						
2441.02	72.56	31.42	103.98		3.0m	
4882.15	59.35	3.09	62.44	74.0	3.0m	11.6
7322.8	46.27	1.67	44.60	74.0	1.0m	29.4
9764.10	47.07	1.33	45.74	74.0	1.0m	28.3
HIGH BAND- PEAK						
2480.0	69.06	31.72	100.78		3.0m	
4959.95	56.97	.23	57.20	74.0	3.0m	16.8

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
3. Measurements taken at 1 meter distance were extrapolated to 3 meters using a factor of (-9.5 dB).
4. 1.5 dB loss factor is already added for all measurement using the high pass filter.
Sample Calculation: At 4882.15 MHz: = 59.35 dBuV+ 3.09 dB/m = 62.44 dBuV/m @ 3m
Margin = (74.0 – 62.44) = 11.6 dB

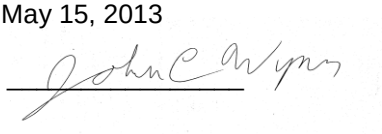
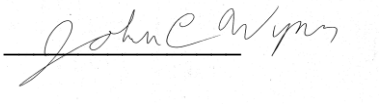
Test Date: May 15, 2013
Tested By
Signature:  Name: John C. Wynn

Table 7. Average Fundamental and Harmonic Measurements

Radiated Fundamental and Harmonic Emissions, Tested from 30 MHz – 25 GHz						
Tested By:	**Test: FCC Part 15, Para 15.247(d)**			**Client: nVideon, Inc**		
JCW	**Project: 13-0126**			**Model: Connexion**		
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Pass Margin (dB)**
LOW BAND - AVERAGE						
2402.03	66.94	31.56	98.50		3.0m./	
4804.76	66.94	31.86	35.08	54.0	3.0m./	18.9
7205.775	55.72	33.04	18.96	54.0	1.0m./	35.0
MID BAND - AVERAGE						
2441.02	67.12	31.56	98.92		3.0m./	
4882.15	58.34	31.81	26.53	54.0	3.0m./	27.5
7322.8	34.98	33.23	-1.59	54.0	1.0m./	55.6
9764.10	36.20	33.57	-0.03	54.0	1.0m./	54.0
HIGH BAND - AVERAGE						
2480.0	65.68	31.58	98.18		3.0m./	
4959.95	54.64	34.67	19.97	54.0	3.0m./	34.0

1. (*) Falls within the restricted bands of CFR 15.205. Limits based on CFR15.209 & 20 dB relaxation of CFR 15.35.
2. ND = No other signals detected within 20 dB of specification limit.
3. Measurements taken at 1 meter distance were extrapolated to 3 meters using a factor of (-9.5 dB).
4. 1.5 dB loss factor is already added for all measurement using the high pass filter.
RESULTS: At 4882.15 MHz: = 58.34 dBuV+ (-31.81(factor includes DC factor)) dB/m = 26.53 dBuV/m @ 3m
Margin = (54.0 – 26.53) = 27.47 dB

Test Date: May 15, 2013
Tested By
Signature:  Name: John C. Wynn

2.11 Maximum Peak Conducted Output Power (CFR 15.247 (b) (3))

Peak power within the band 2400 MHz to 2483.5 MHz was measured per FCC KDB Publication DA 00-705 as an Antenna Conducted test with a spectrum analyzer by connecting the spectrum analyzer directly, via a short RF cable, to the antenna output terminals on the EUT. The spectrum analyzer was set for an impedance of 50 Ω with the RBW set greater than the 20 dB bandwidth of the EUT, and the VBW ≥ RBW. The loss of the short cable is 0.3 dB. The loss of the pad is 8.0 dB. The raw data measured values are found in the following figures and peak antenna conducted output power is tabulated below.

Antenna Conducted Output Power was measured at Low Channel, Mid Channel and High Channel frequencies. See the following figures. The 8.3 dB loss for the short RF cable and attenuator is taken into consideration here (Corrected Measurement column).

Table 8. Peak Antenna Conducted Output Power per Part 15.247 (b) (3) (Same as EIRP)

Frequency of Fundamental (MHz)	Raw Test Data dBm	Corrected Measurement (dBm)	(mW)	FCC Limit (mW Maximum)
Low Band (ch00) 2401	4.105	4.105	2.57	125.0
Mid Band (ch40) 2441	3.805	3.805	2.40	125.0
High Band (ch79) 2480	3.756	3.756	2.37	125.0

Test Date: May 15, 2013
Tested By
Signature: _____ Name: John C. Wynn

2.12 Peak Power Output (CFR 15.247 (b)(3))

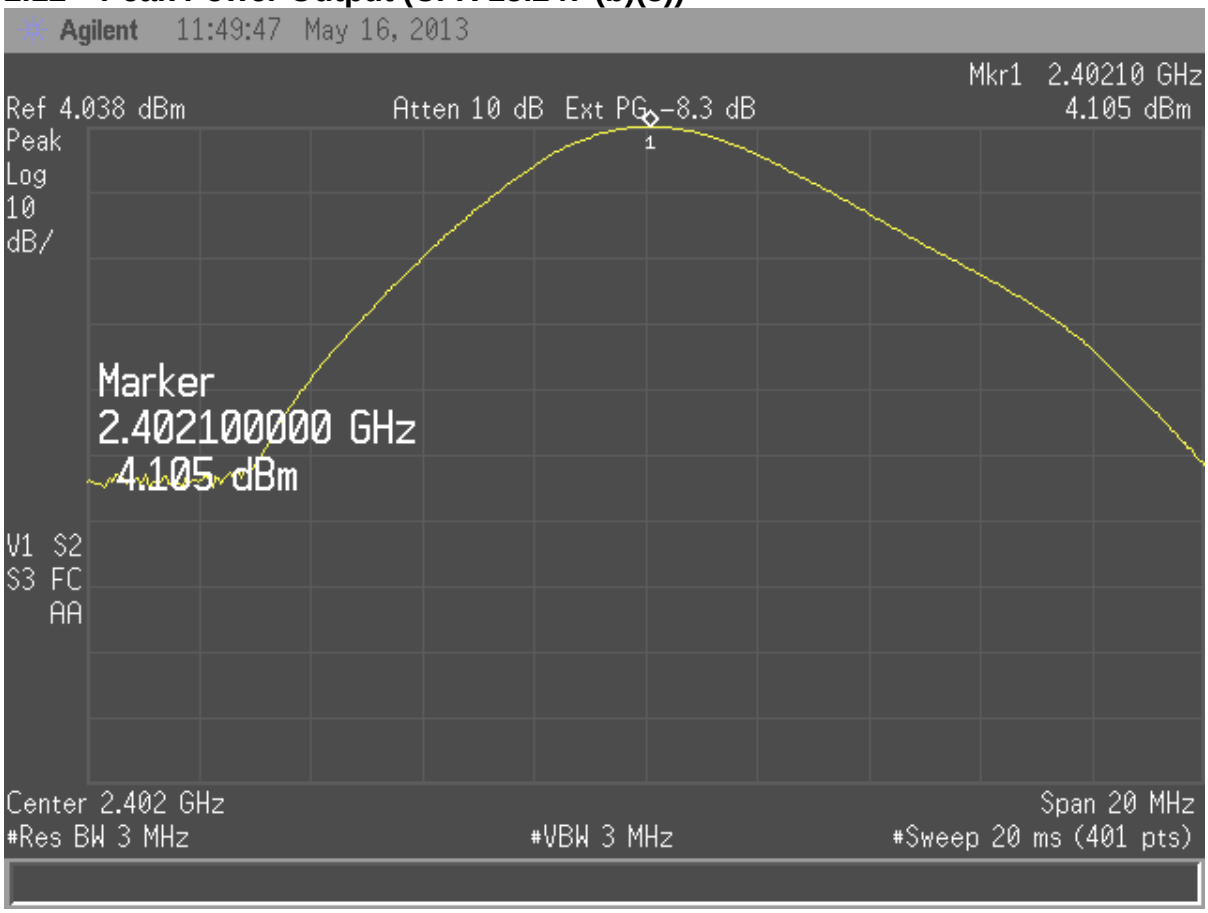


Figure 16. Peak Antenna Conducted Output Power, Low Channel

2.12 Peak Power Output (CFR 15.247 (b)(3))

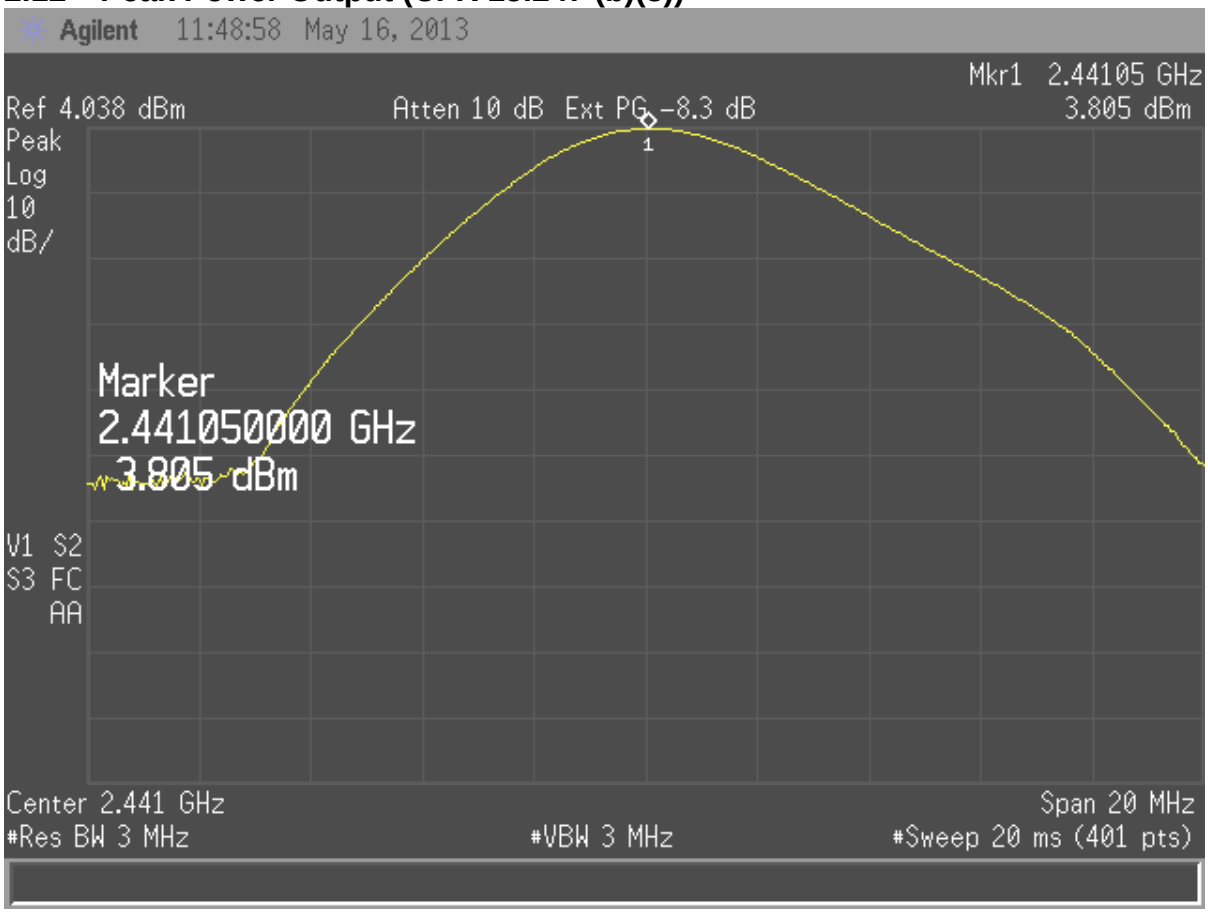


Figure 17. Peak Antenna Conducted Output Power, Mid Channel

2.12 Peak Power Output (CFR 15.247 (b)(3))

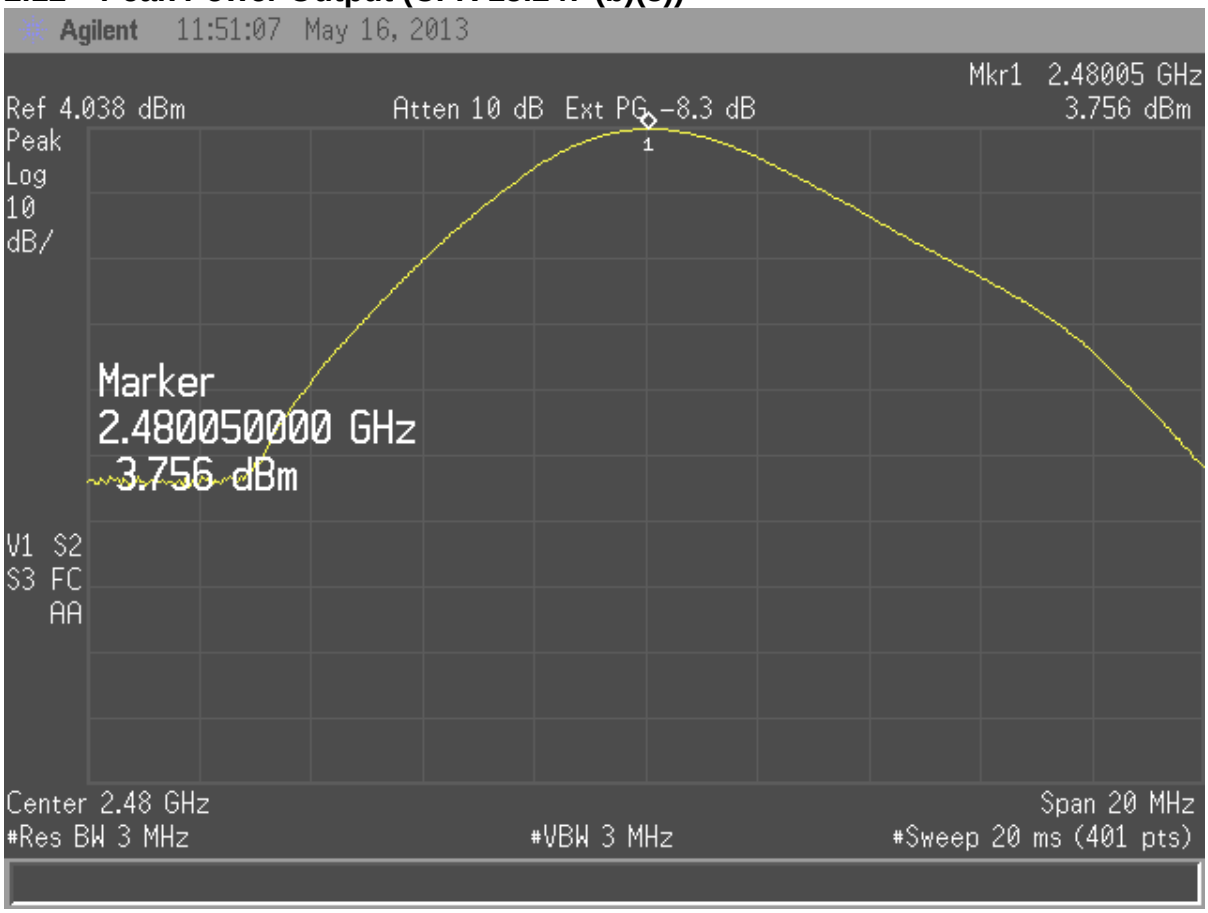


Figure 18. Peak Antenna Conducted Output Power, High Channel

2.12 Band Edge Measurements – (CFR 15.247 (d))

Band Edge measurements are made following the guidelines in FCC KDB Publication No. DA 00-705 with the EUT initially operating on the Lowest Channel and then operating on the Highest Channel within its band of operation. Antenna port conducted measurements are performed to demonstrate compliance with the requirement of 15.247(d) that all emissions outside of the band edges be attenuated by at least 20 dB when compared to its highest in-band value (contained in a 100 kHz band). Because these frequencies occur above 1000 MHz they have both a peak and average requirement.

To capture the band edge set the Spectrum Analyzer frequency span large enough (usually around 10 MHz) to capture the peak level of the emission operating on the channel closest to the band edge as well as any modulation products falling outside of the authorized band of operation. Conducted measurements are performed with RBW ≥1% of the frequency span. In all cases, the VBW is set ≥ RBW. See the following Figures.

Table 9. Upper Band Edge - Radiated Emissions

Peak Radiated Higher Band Edge Measurements						
Test By:	**Test: FCC Part 15.247**		**Client: nVideon, Inc.**			
JCW	**Class: B**		**Model: Connexion**			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CA-AMP+DC (dB/m)**	**Corrected Results (dBuV/m)**	**Limits (dBuV/m)**	**Margin (dB)**	**Detector PK / AVG**
Fund. 2480.0	69.06	31.72	100.78	--	--	**PK**
Band Edge 2483.5	(100.78-52.8)	--	47.98	54	$6.02_{\text{note 1}}$	**PK**

Note 1) Peak Measurements meet average limits.
CALCULATION OF WORST-CASE AVERAGE UPPER BAND EDGE MEASUREMENT:
Results = Peak Corrected Results + Duty Cycle Correction Factor- Delta
Results = 100.78 – 52.8 = 47.98 dBuV/m at 2483.5 MHz
Margin = Limit – Results = 54 – 47.98 = 6.02 dB

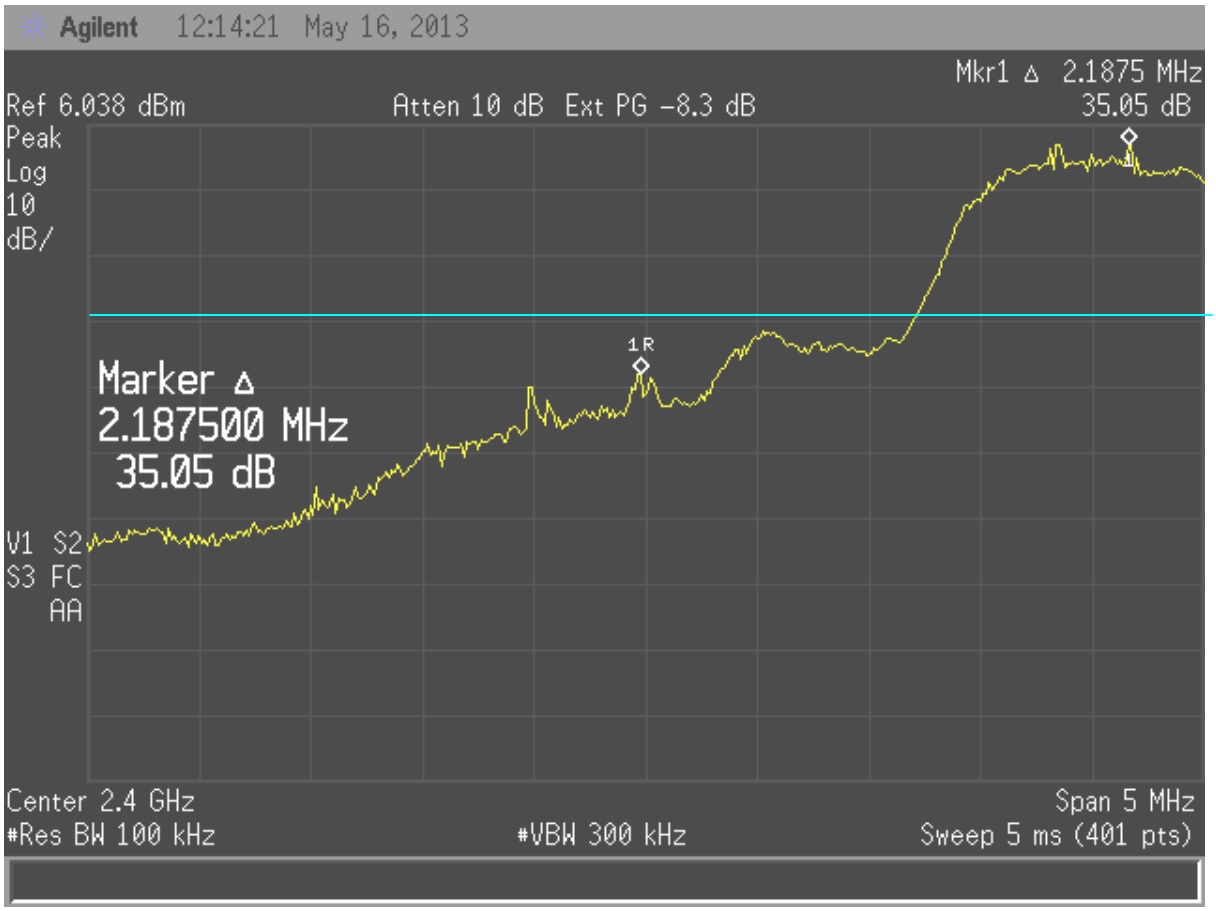


Figure 19. Band Edge Compliance – Low Channel Delta - Peak
Note: conducted emission shown here as this is the worst case

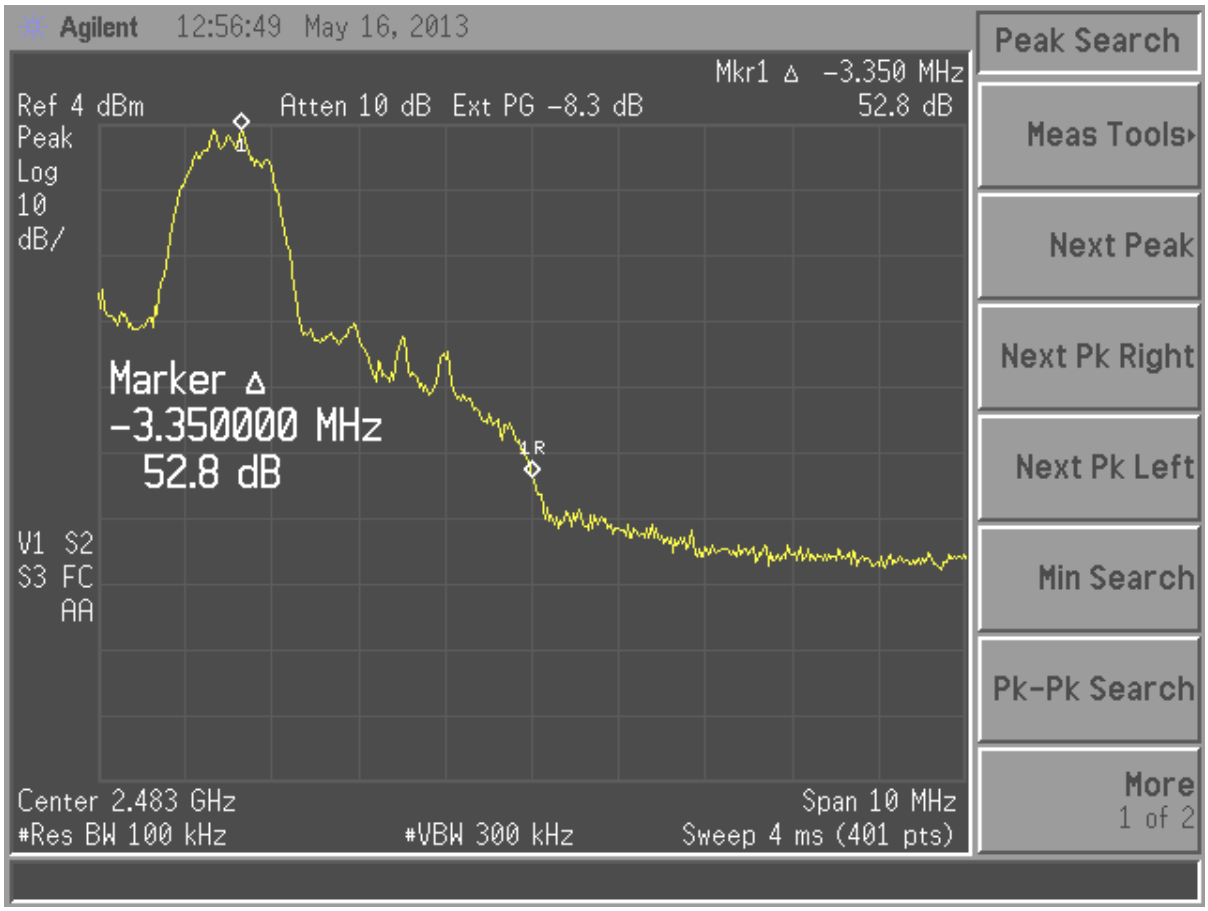


Figure 20. Band Edge Compliance – High Channel Delta - Peak
Note: conducted emission shown here as this is the worst case

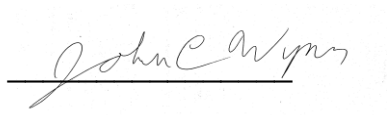
2.13 20 dB Bandwidth Measurement per CFR 15.247, 99% Occupied Bandwidth (IC RSS 210, A8.1)

The EUT antenna port was connected to a spectrum analyzer having a 50 Ω input impedance. Measurements were performed similar to the method of FCC, KDB Publication No. DA 00-705 for a bandwidth of 20 dB. The RBW was set to approximately 1/100 of the manufacturers claimed RBW and with the VBW ≥ RBW. The results of this test are given in the following Table and Figures.

Table 10. 20 dB Bandwidth and 99% Occupied Bandwidth

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
2401.99	1.425	1.425
2441.0	1.450	1.450
2480.0	1.438	1.438

Test Date: May 16, 2013

Tested By
Signature:  Name: John C. Wynn

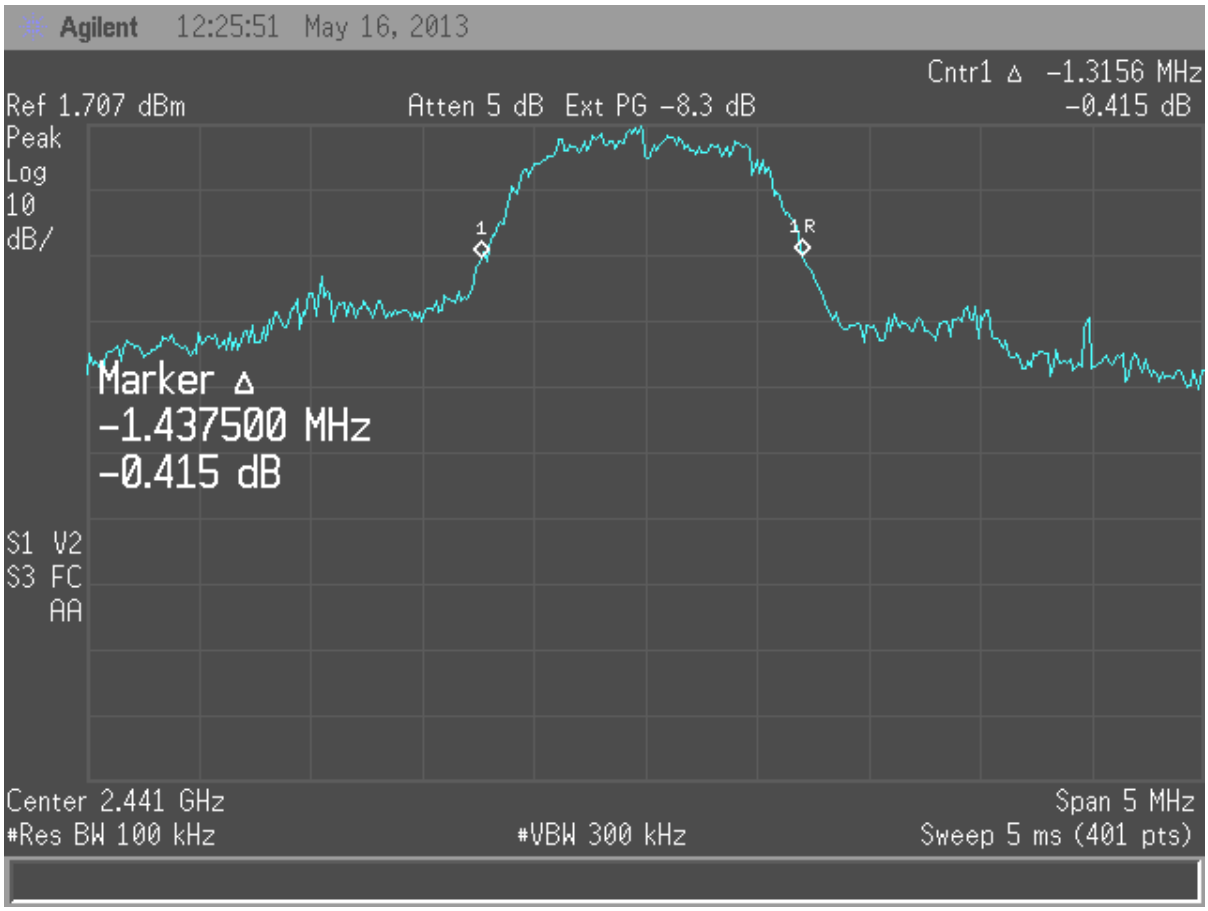


Figure 21. Low Channel 99% Bandwidth

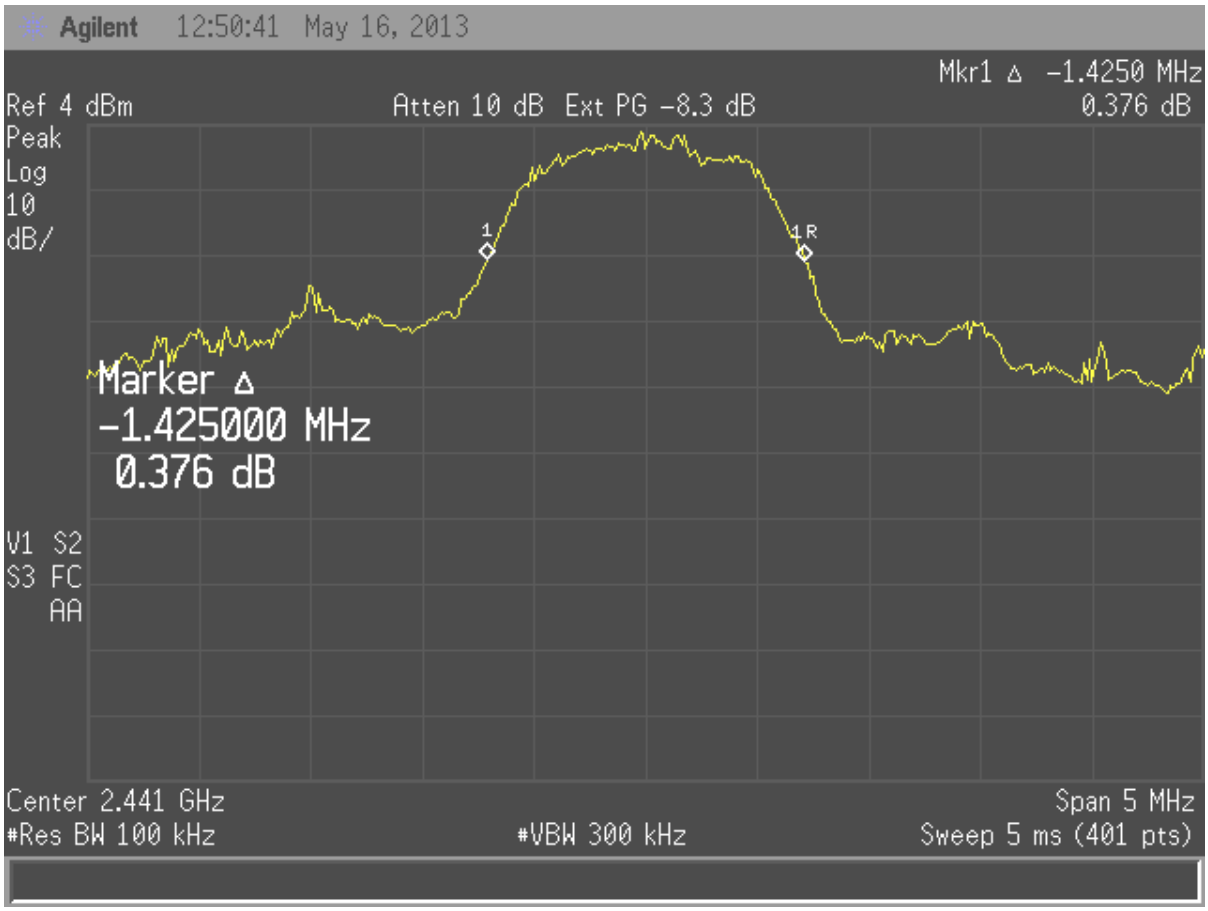


Figure 22. Mid Channel 99% Bandwidth

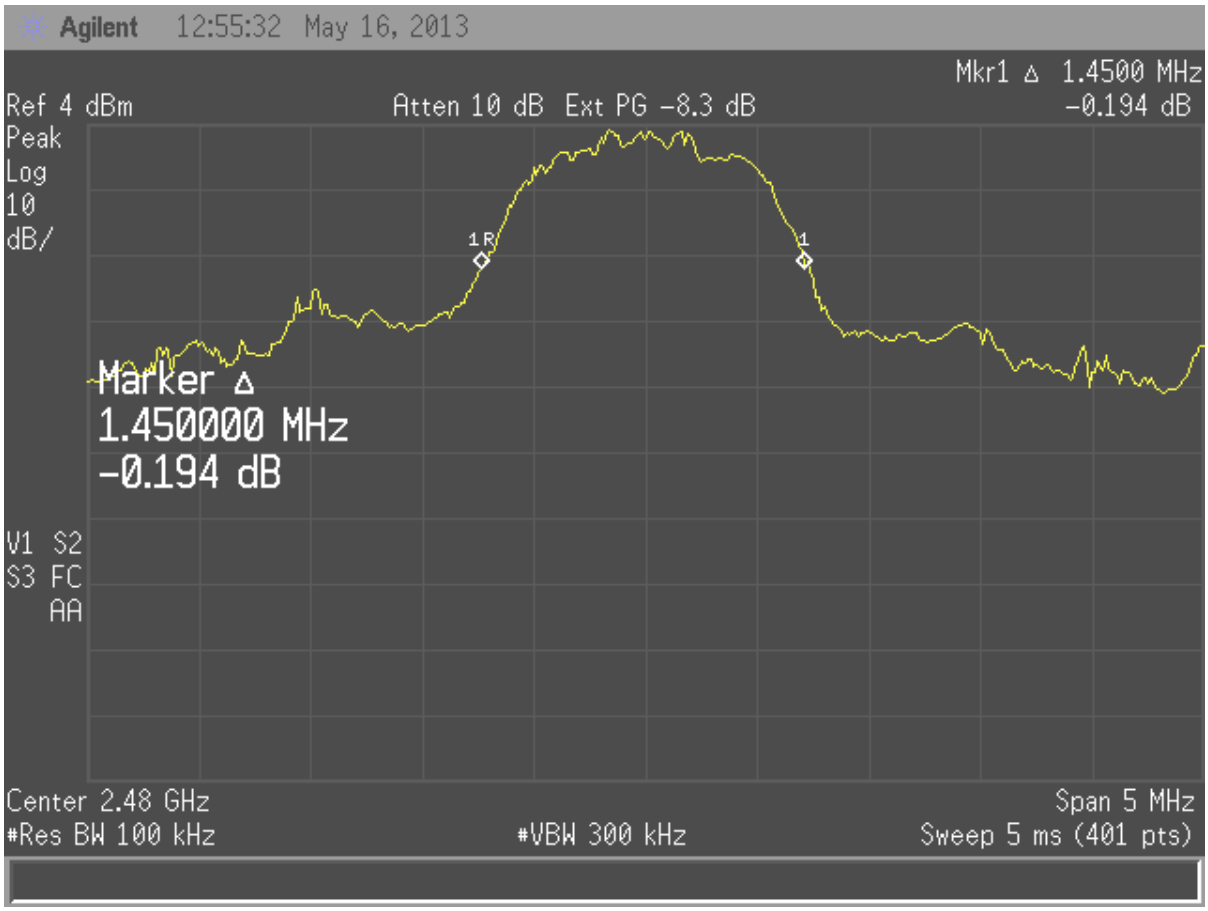


Figure 23. High Channel 99% Bandwidth

2.14 Frequency Separation (CRF 15.247(a)(1))

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or **two-thirds** of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

The test procedures outlined in FCC Public Notice DA 00-705 was used to conduct measurements.

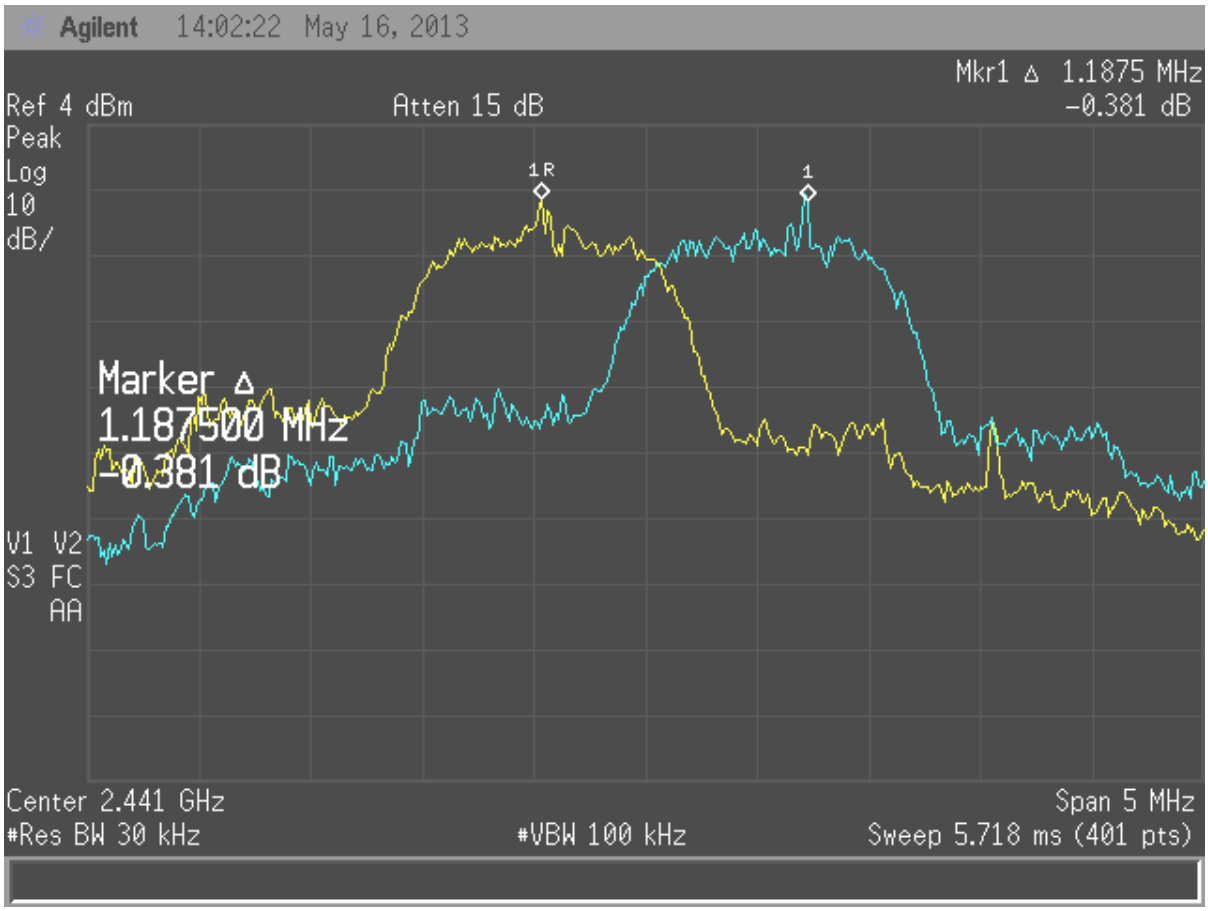


Figure 24. Channel Spacing

Frequency Separation > (two-thirds) 20dB bandwidth
1.1875MHz > (2/3) * 1.425MHz
1.1875MHz > 0.95MHz

2.15 Number of Hopping Frequencies (CFR 15.247(a)(1)(iii))(CRF 15.247(b)(1))

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.

The EUT employs at least 79 non-overlapping hopping channels therefore the maximum allowed output power is 1.0 watt.

The test procedures outlined in FCC Public Notice DA 00-705 was used to conduct measurements.

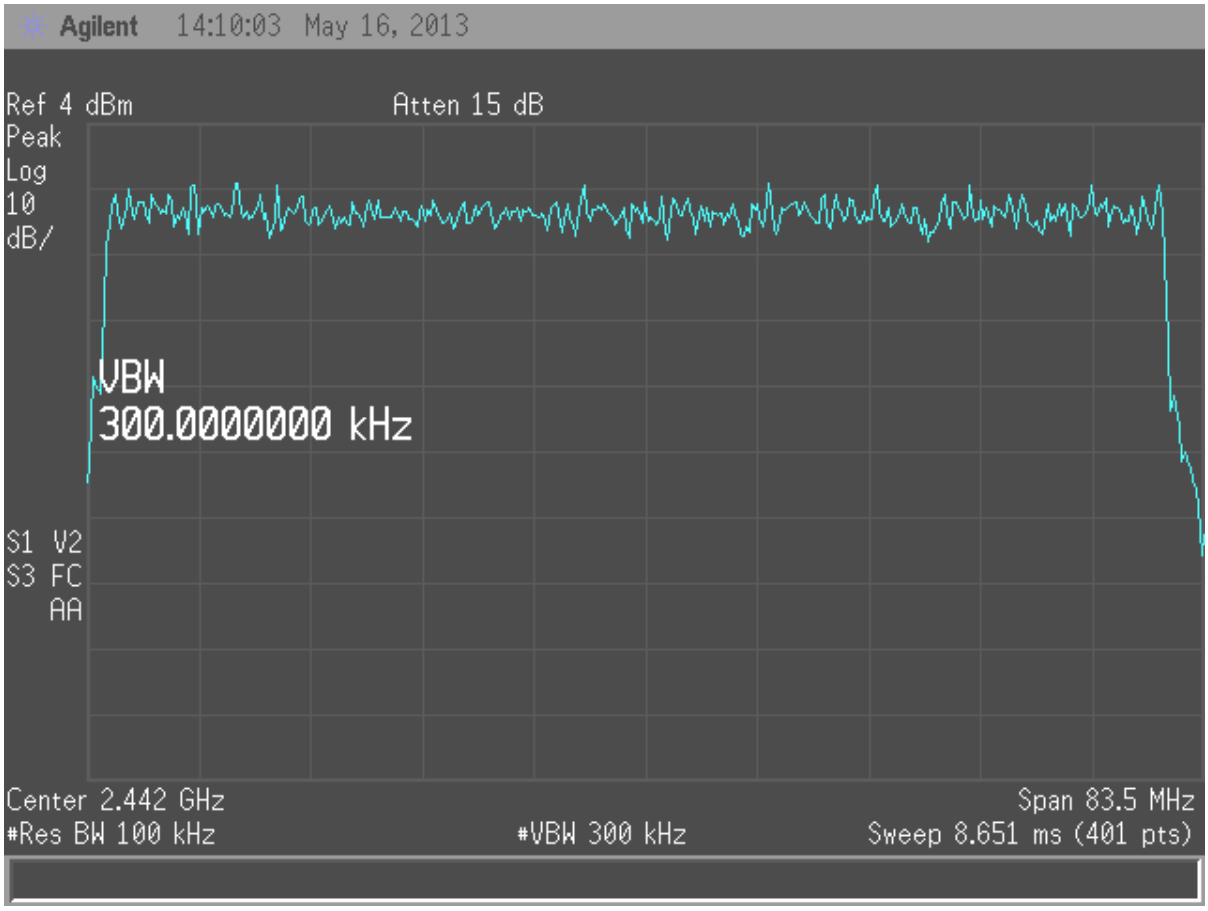


Figure 25. Number of Hopping, Entire Band

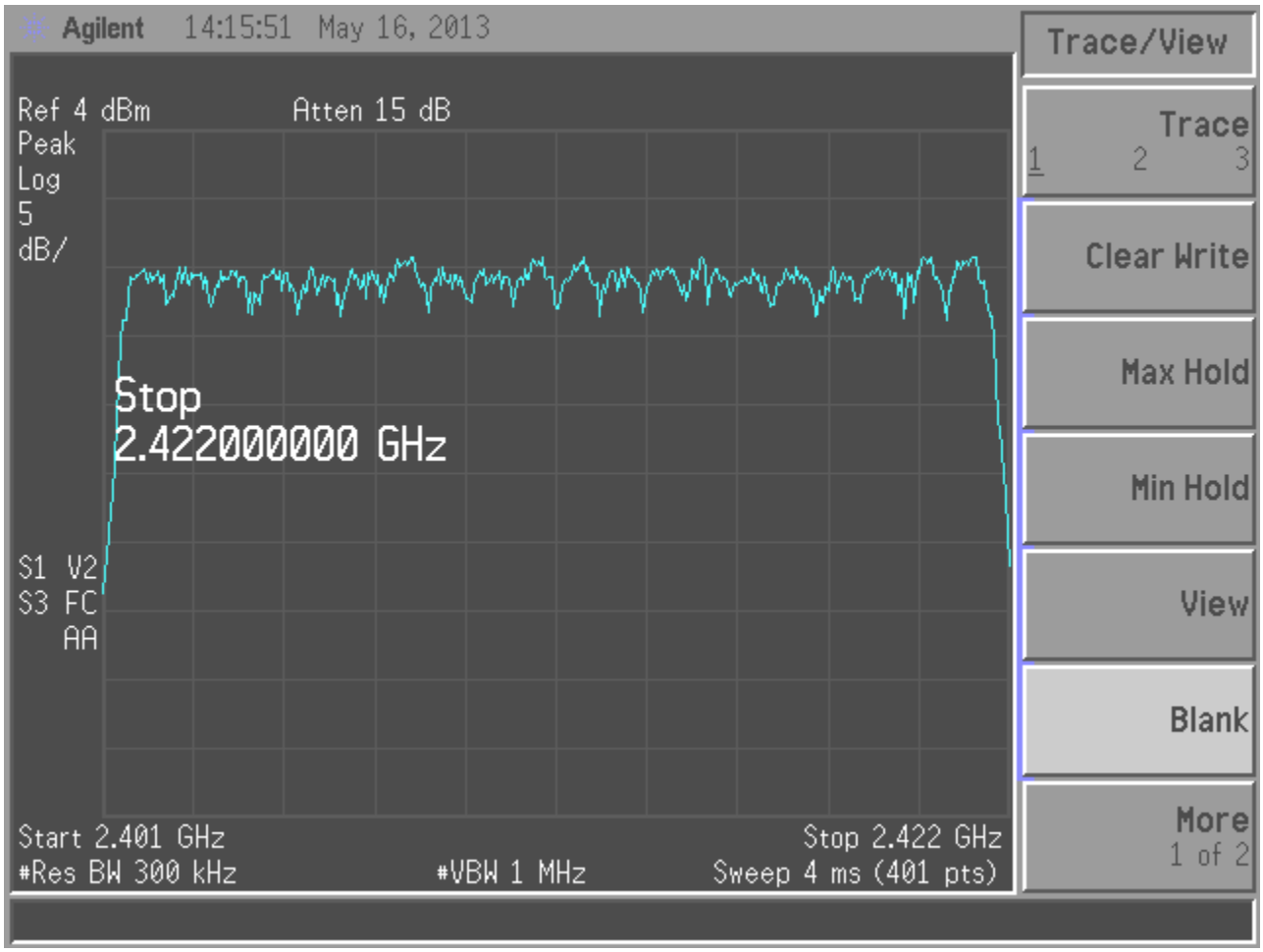


Figure 26. Channels 0 through 19

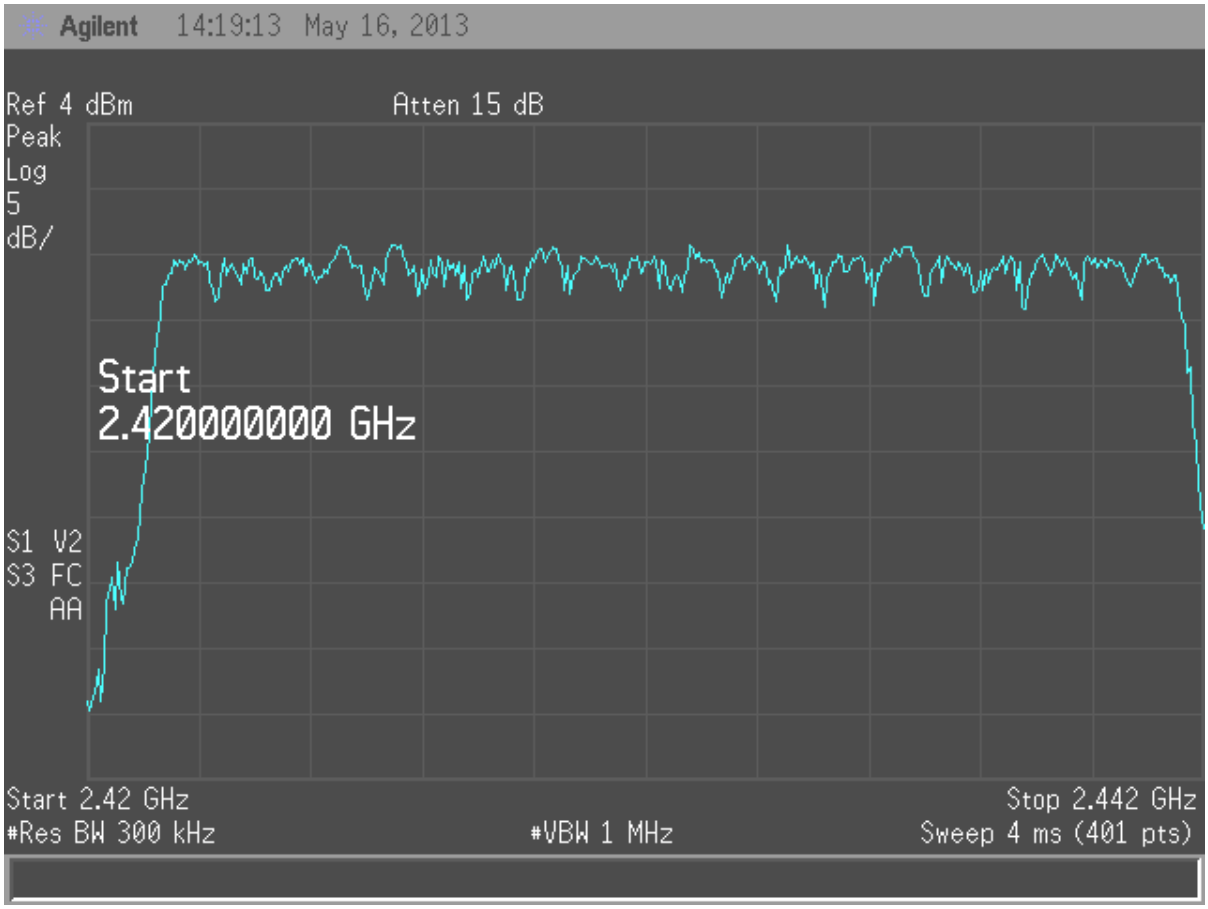


Figure 27. Channels 20 through 37

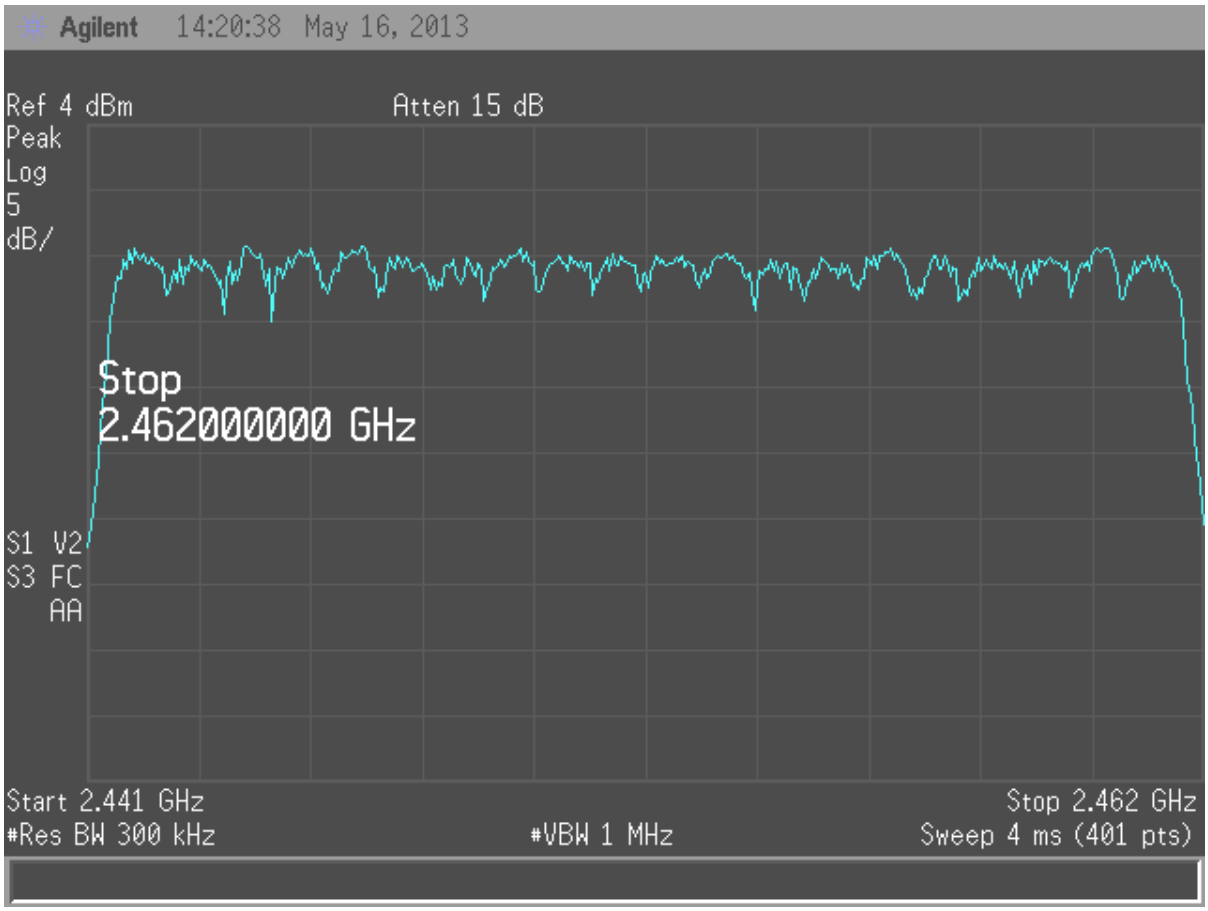


Figure 28. Channels 38 through 59

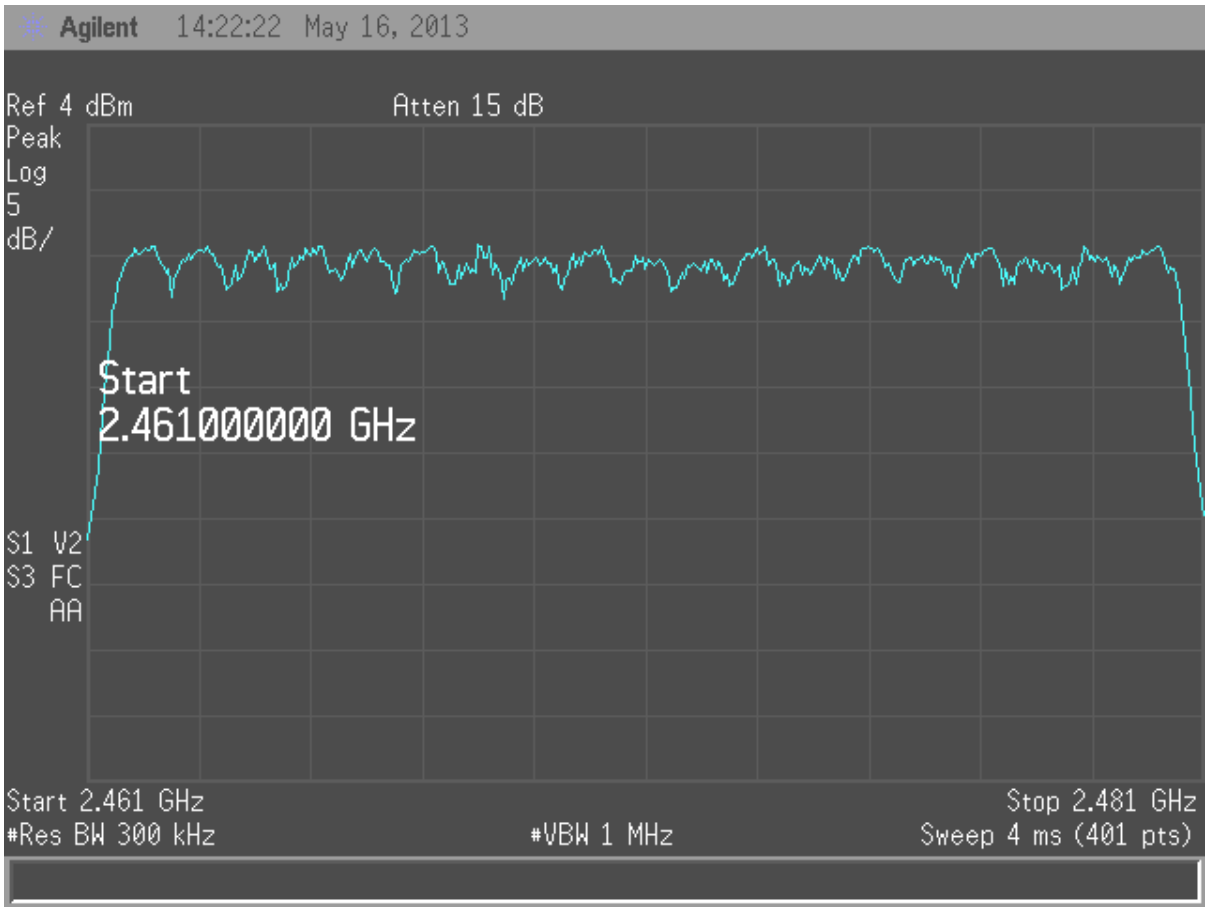


Figure 29. Channels 59 through 79

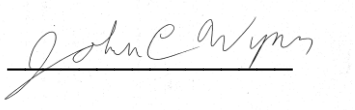
2.16 Unintentional Radiator Power Lines Conducted Emissions (CFR 15.107)

The test data provided herein is to support the Verification requirement for the digital apparatus. The power line conducted voltage measurements for Receiver and Digital Devices have been carried out in accordance with CFR 15.107 and ANSI C63.4, Paragraph 7, with a spectrum analyzer connected to an LISN and the EUT placed into an idle condition or a continuous mode of receive (non-transmitting). Please refer to the results as shown in the table below.

Table 11. Power Line Conducted Emissions Data, Class B Part 15.107

CONDUCTED EMISSIONS 150 kHz to 30 MHz						
Tested By: JW	Specification Requirement: FCC Part 15.107, 15.207 Class B		Project No.: 13-0126	**Client: nVideon, Inc.**		
				Model: Connexion		
Frequency (MHz)	**Test Data (dBuV)**	**LISN+CL-PA (dB)**	**Corrected**	**Avg Limits (dBuV)**	**Margin (dB)**	**Detector**
120 VAC, 60 Hz, Phase Line						
0.1971	56.00	1.13	57.13	63.7	6.6*	**QP**
0.1971	38.60	1.13	39.73	53.7	14.0	**AVG**
0.5203	43.20	0.48	43.68	56.0	12.3*	**PK**
0.5203	29.60	0.48	30.08	46.0	15.9	**AVG**
2.2240	42.80	0.36	43.16	56.0	12.8*	**PK**
2.2240	30.40	0.36	30.76	46.0	15.2	**AVG**
9.9550	42.00	0.47	42.47	50.0	7.5	**PK**
10.5500	45.10	0.47	45.57	60.0	14.4*	**PK**
10.5500	18.60	0.47	19.07	50.0	30.9	**AVG**
20.0000	43.40	0.61	44.01	50.0	6.0	**PK**
120 VAC, 60 Hz, Neutral Line						
0.1950	54.50	1.13	55.63	63.8	8.2*	**QP**
0.1950	35.70	1.13	36.83	53.8	17.0	**AVG**
0.5353	40.40	0.46	40.86	46.0	5.1	**PK**
2.0760	37.80	0.36	38.16	46.0	7.8	**PK**
9.9800	41.60	0.46	42.06	50.0	7.9	**PK**
10.7600	44.80	0.47	45.27	60.0	14.7*	**PK**
10.7600	16.70	0.47	17.17	50.0	32.8	**AVG**
20.0200	42.30	0.61	42.91	50.0	7.1	**PK**

* Denotes the Quasi-Peak limits being used instead of average.
SAMPLE CALCULATIONS: At 0.195 MHz, = 54.5 + (1.13) = 55.63 dBuV

Test Date: May 15, 2013
Tested By
Signature:  Name: John Wynn

2.17 Unintentional Radiator, Radiated Emissions (CFR 15.109, 15.209)

Radiated emissions within the band 9 KHz to 30 MHz and 30 MHz to 12.5 GHz were measured with a spectrum analyzer via a pre-amplifier by connecting the spectrum analyzer to a receiving antenna spaced three (3) meters from the EUT. The spectrum analyzer was set for a 50 Ω input impedance with the VBW set to ≥ the RBW bandwidth. The antenna was raised and lowered over a span of 4 meters in order to maximize the signal coming from the EUT. Similarly, the turntable was rotated through 360 degrees in the same maximizing effort. Also the EUT was scanned for a maximum radiated power when placed in each of the three mutually exclusive orthogonal planes.

Radiated emissions within the band of 9 kHz to 30 MHz were investigated using a calibrated Loop Antenna and per the requirements of ANSI C63.4:2003. The resolution bandwidth was set to 9 kHz, the video bandwidth was set to three times the resolution bandwidth.

For measurements above 30 MHz the measurements were made with the analyzer's resolution bandwidth set to 120 kHz for measurements made below 1 GHz and 1 MHz for measurements made above 1 GHz. The video bandwidth was set to three times the resolution bandwidth.

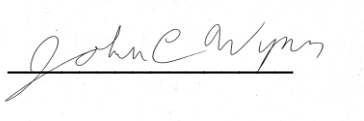
All measured signals were at least 6 db below the specification limit. The results of the measurements are reported in the tables below.

Table 12. Unintentional Radiator, Radiated Emissions

Unintentional Radiator, Radiated Emissions							
Test By: JCW	**Test: FCC Part 15.109, 15.209**			**Client: NVideon, Inc.**			
	Project: 13-0126 Class: B			**Model: Connexion**			
Frequency (MHz)	**Test Data (dBuV)**	**AF+CL-PA (dB)**	**Results (dBuV/m)**	**Limits (dBuV/m)**	**Distance / Polarization**	**Margin (dB)**	**DETECTOR PK / QP**
179.6500	47.13	-11.08	36.05	43.5	3m./Ver	7.5	**PK**
207.7400	50.27	-13.49	36.78	43.5	3m./Ver	6.7	**PK**
215.8000	48.96	-13.85	35.11	43.5	3m./Hor	8.4	**PK**
212.3300	44.46	-13.67	30.79	43.5	3m./Hor	12.7	**PK**
241.5700	51.84	-12.55	39.29	46.0	3m./Hor	6.7	**PK**
245.1300	47.44	-12.23	35.21	46.0	3m./Hor	10.8	**PK**
245.0666	48.39	-12.13	36.26	46.0	3m./Ver	9.7	**PK**
277.6900	46.38	-10.76	35.62	46.0	3m./Ver	10.4	**PK**
114.3400	45.90	-15.50	30.40	43.5	3m./Ver	13.1	**QP**
81.6270	45.90	-17.68	28.22	40.0	3m./Ver	11.8	**QP**
146.7700	47.60	-13.78	33.82	43.5	3m./Ver	9.7	**PK**
146.0000	45.60	-14.28	31.32	43.5	3m./Hor	12.2	**PK**
179.0000	45.60	-12.97	32.63	43.5	3m./Hor	10.9	**PK**
114.4900	47.80	-16.10	31.70	43.5	3m./Hor	11.8	**QP**

No other emissions detected within 20 dB of the FCC Part 15.209 limits
AF is antenna factor. CL is cable loss. PA is preamplifier gain
SAMPLE CALCULATION: At 241.57 MHz: = 51.84 + (-12.55) = 39.29 dBuV/m @ 3m
Margin = (46 – 39.29) = 6.7 dB

Test Date: May 14, 2013

Tested By Signature:  Name: John C. Wynn