



**FCC 47 CFR PART 15 SUBPART C  
INDUSTRY CANADA RSS-210 ISSUE 8  
CLASS II PERMISSIVE CHANGE  
CERTIFICATION TEST REPORT**

**FOR**

**WIRELESS SPEAKER**

**MODEL NUMBER: PLAYBAR**

**FCC ID: SBVRM006**

**IC: 5373A-RM006**

**REPORT NUMBER: 13U16285-1**

**ISSUE DATE: MARCH 12, 2014**

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**NVLAP LAB CODE 200065-0**

Revision History

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** SONOS, INC.  
223 E. DE LA GUERRA ST.  
SANTA BARBARA, CA 93101, U.S.A.

**EUT DESCRIPTION:** WIRELESS SPEAKER

**MODEL:** PLAYBAR

**SERIAL NUMBER:** 1205000E58800046B (RAD)/ 1205000E58800016E (CON)

**DATE TESTED:** DECEMBER 05, 2013- FEBRUARY 11, 2014

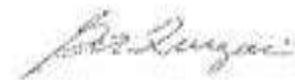
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Verification Services Inc. By:

Tested By:



George Quizon  
WISE PROJECT LEADER  
UL Verification Services Inc.



Tina Chu  
WISE LABORATORY TECHNICIAN  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A	<input checked="" type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input checked="" type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input type="checkbox"/> Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT possesses an 802.11 b/g/n wireless card. It is a 2.4/5GHz dual band concurrent module based on two Atheros' Osprey chipsets, AR9381 for 2GHz radio and AR9382 for 5GHz radio. The wireless card supports 802.11b/g/n functionality for 2.4GHz, and 802.11n for 5GHz. The 2.4GHz radio supports (3x3) MIMO, the 5GHz radio support (2x2) MIMO.

### 5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

This is a Class II permissive change project, change of scope is to add 802.11b 3x3.

### 5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	26.41	437.52

### 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes the following antenna arrangement. The maximum antenna gains as a function of frequency band operation are given in the following table.

Frequencies	Antenna A	Antenna B	Antenna D
2412-2462MHz	2.9dBi	4.4dBi	3.7dBi
Antenna A: Monopole, Antenna B: Monopole, Antenna D: Dipole			

### 5.5. SOFTWARE AND FIRMWARE

The Sonos software version is V4.6

Atheros Radio Test 2(ART2-GUI) V 2.3

### 5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in two orthogonal orientations X and Y, it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case data rates as provided by the manufacturer were:

802.11b mode: 24 Mbps

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	P05G	3535214077	DoC
Laptop AC Adapter	Dell	LA65NS2-01	72438-084	DoC

### I/O CABLES

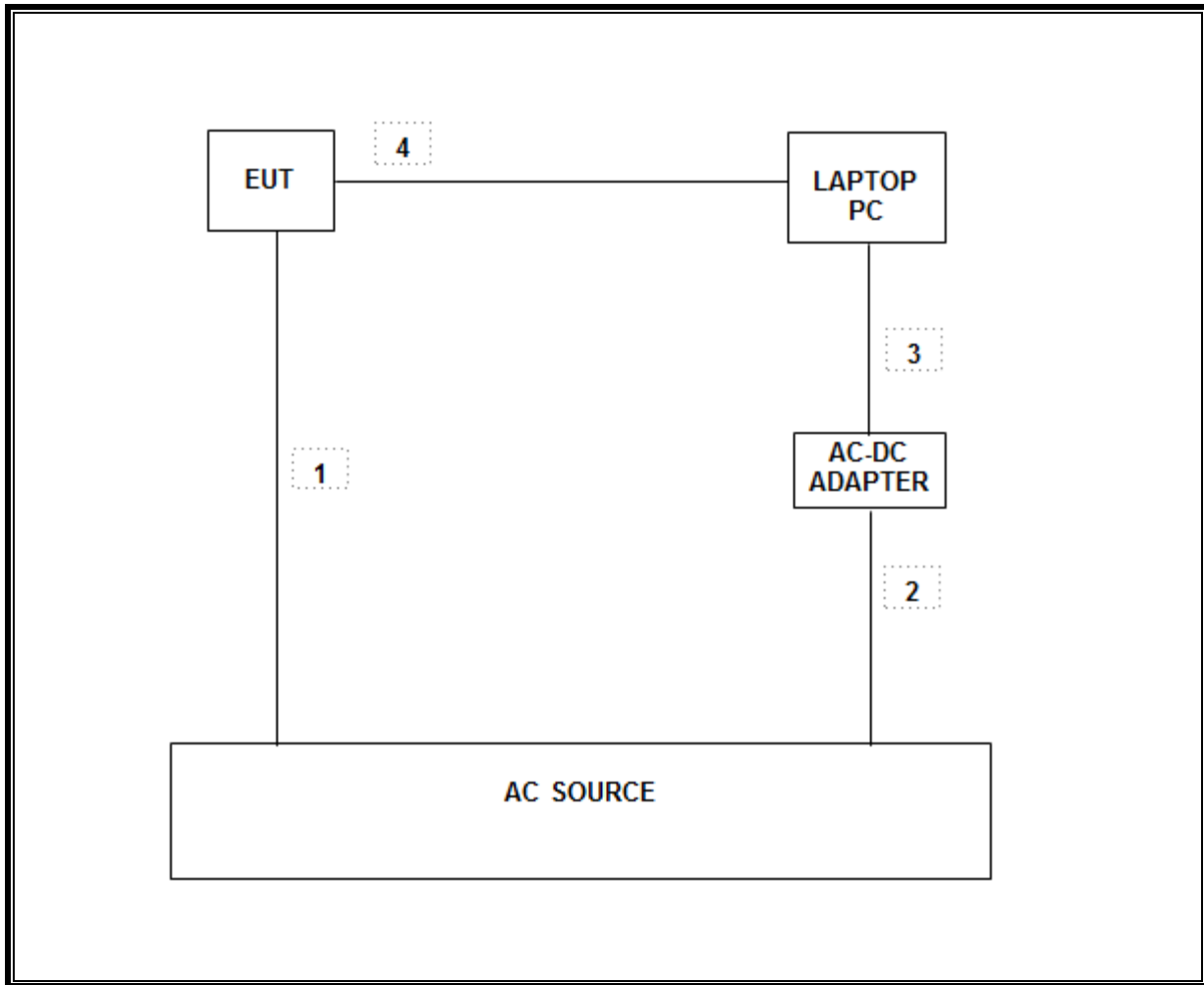
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	US 115V	Un-shielded	1.8m	N/A
2	AC	1	US 115V	Un-shielded	1m	N/A
3	DC	1	DC	Un-shielded	1.8m	N/A
4	Ethernet	2	RJ45	Un-shielded	2m	N/A

### TEST SETUP

Test software exercised the radio card.



**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	Asset	Cal Due
Horn Antenna 1-18GHz	ETS Lindgren	3117	F00131	02/18/15
Horn Antenna 1-18GHz	ETS Lindgren	3117	F00133	02/25/15
Preamplifier, 1300 MHz	Sonoma	310	F00008	05/27/14
Preamplifier, 1300 MHz	Sonoma	310	F00009	05/08/14
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	F00027	03/07/14
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	F00168	03/07/14
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	F00350	06/26/14
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	F00351	06/27/14
Spectrum Analyzer	Agilent	N9030A	F00128	02/12/15
Spectrum Analyzer, 3Hz-44GHz	Agilent	N9030A	F00127	02/21/14
Peak / Average Power Sensor	Agilent / HP	E9323A	F00163	04/03/14
P-Series single channel Power Meter	Agilent / HP	N1911A	F00164	04/03/14
Spectrum Analyzer, 44GHz	Agilent	E4446A	C01012	10/21/14
Spectrum Analyzer, 40GHz	HP	8564E	C00951	07/29/14
Antenna, Horn, 26GHz	ARA	MWH-1826/B	81140	05/17/14
Preamplifier, 26.5 GHz	Agilent	8449B	F100167	03/23/14

## 7. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### LIMITS

None; for reporting purposes only.

### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

### 7.1. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
<b>2.4GHz Band</b>						
802.11b 3TX	0.916	0.962	0.952	95.18%	0.21	1.092

## **7.2. MEASUREMENT METHODS**

6 dB BW: KDB 558074 D01

Output Power: KDB 558074 D0.

Power Spectral Density: KDB 558074 D01

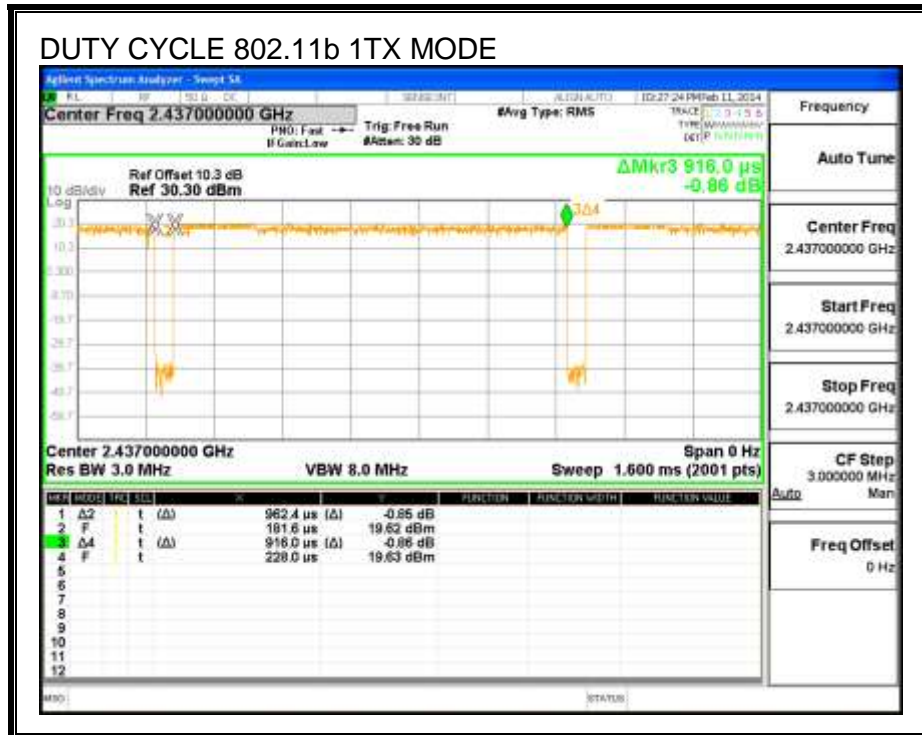
Out-of-band emissions in non-restricted bands: KDB 558074 D01

Out-of-band emissions in restricted bands: KDB 558074 D01

Band-edge: KDB 558074 D01 v03r01

### 7.3. DUTY CYCLE PLOTS

#### 2.4 GHz BAND



## 8. ANTENNA PORT TEST RESULTS

### 8.1. 802.11b MODE IN THE 2.4 GHz BAND

#### 8.1.1. 6 dB BANDWIDTH

##### LIMITS

FCC §15.247 (a) (2)

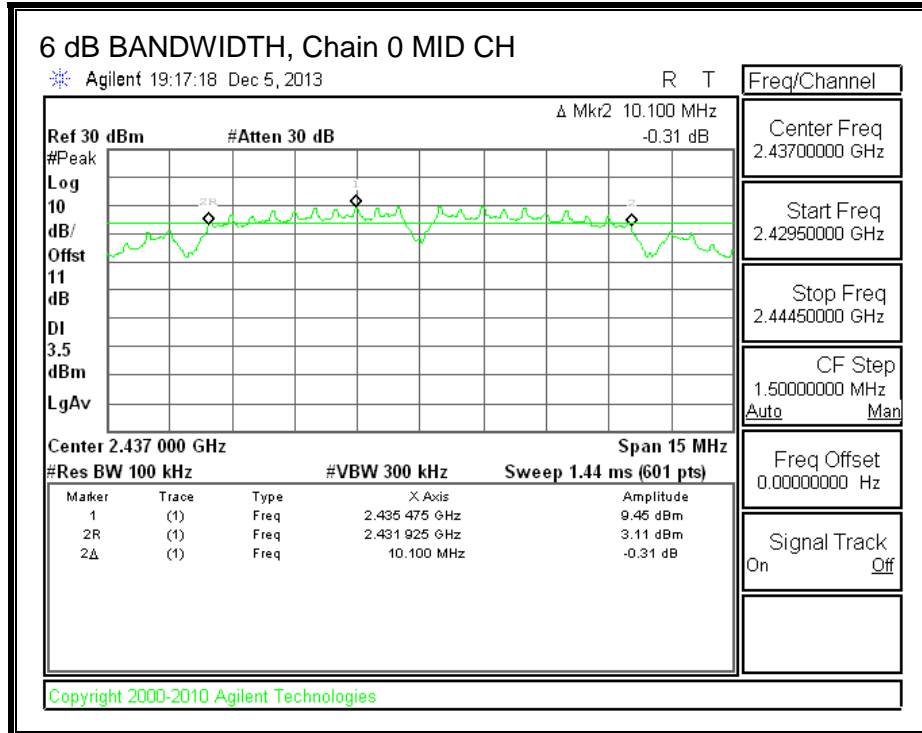
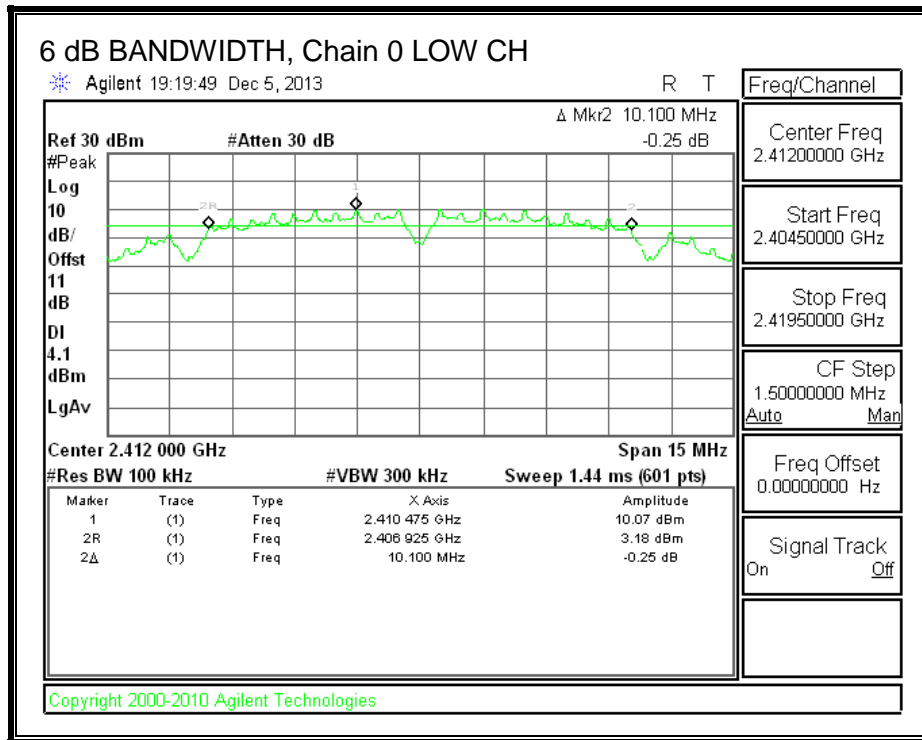
IC RSS-210 A8.2 (a)

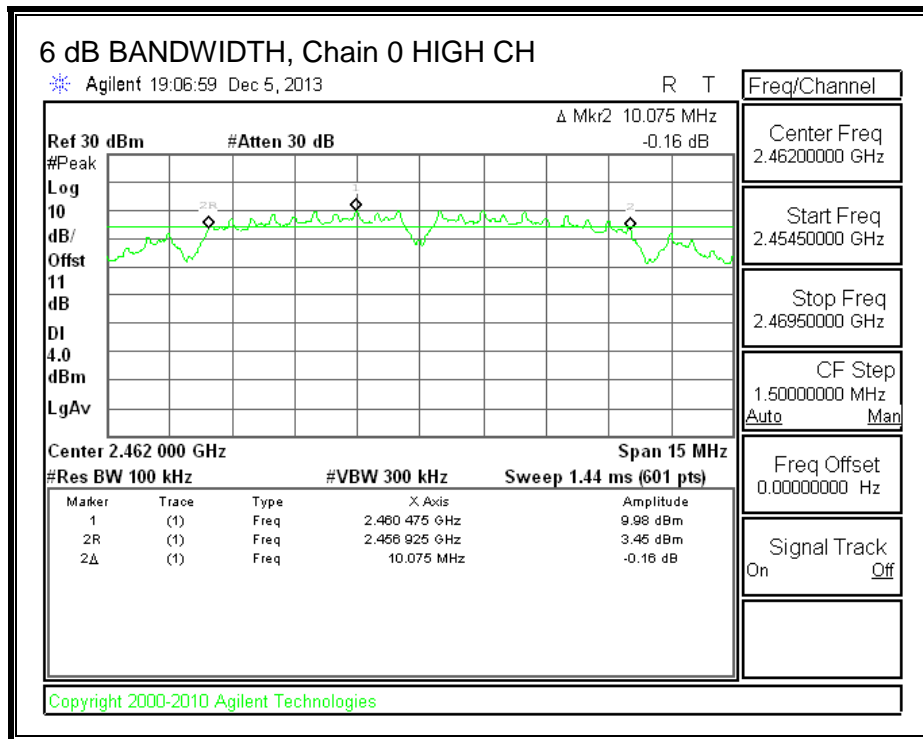
The minimum 6 dB bandwidth shall be at least 500 kHz.

##### RESULTS

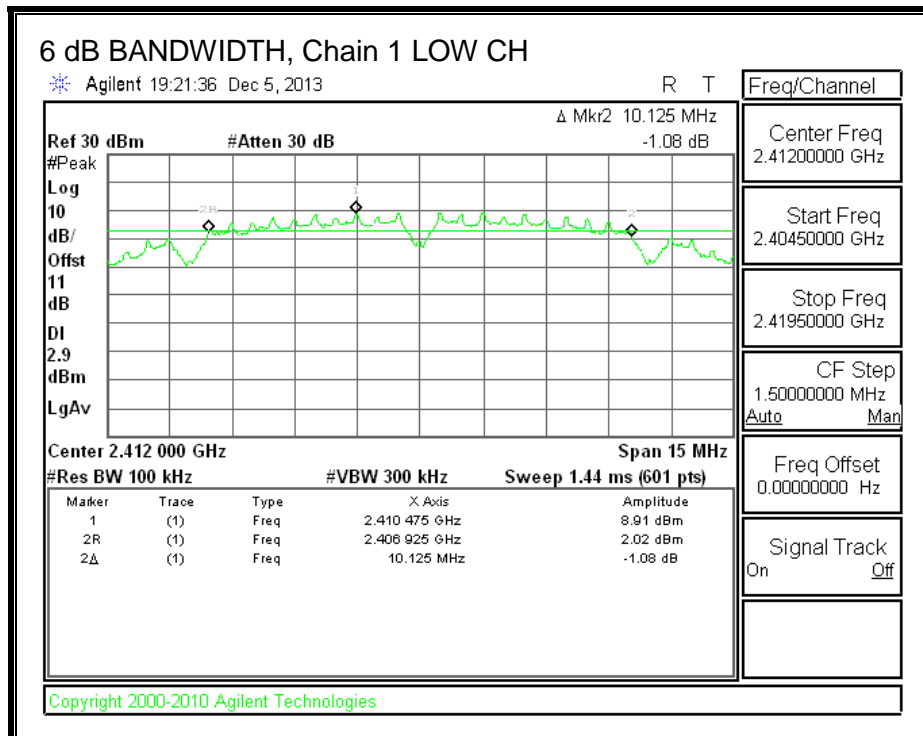
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	6 dB BW Chain 2 (MHz)	Minimum Limit (MHz)
Low	2412	10.100	10.125	10.125	0.5
Mid	2437	10.100	10.150	10.150	0.5
High	2462	10.075	10.125	10.150	0.5

**6 dB BANDWIDTH, Chain 0**

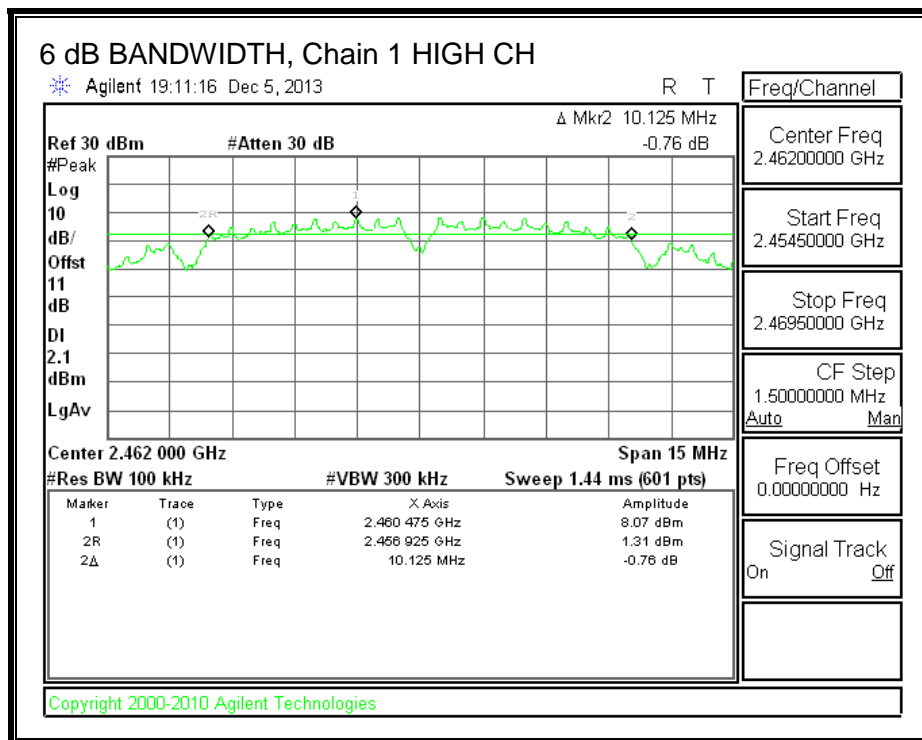
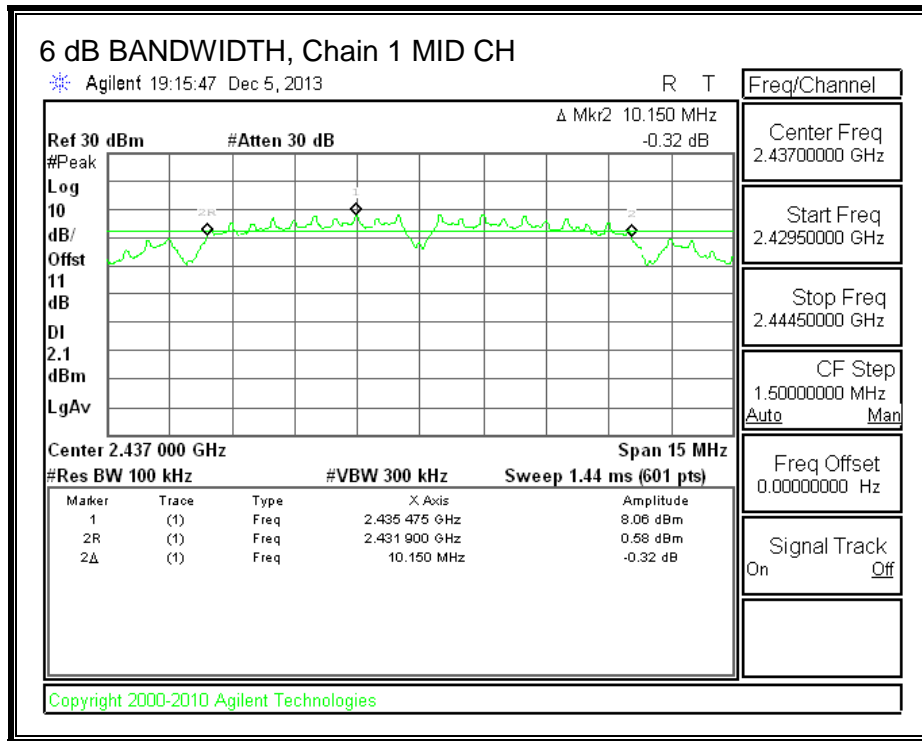




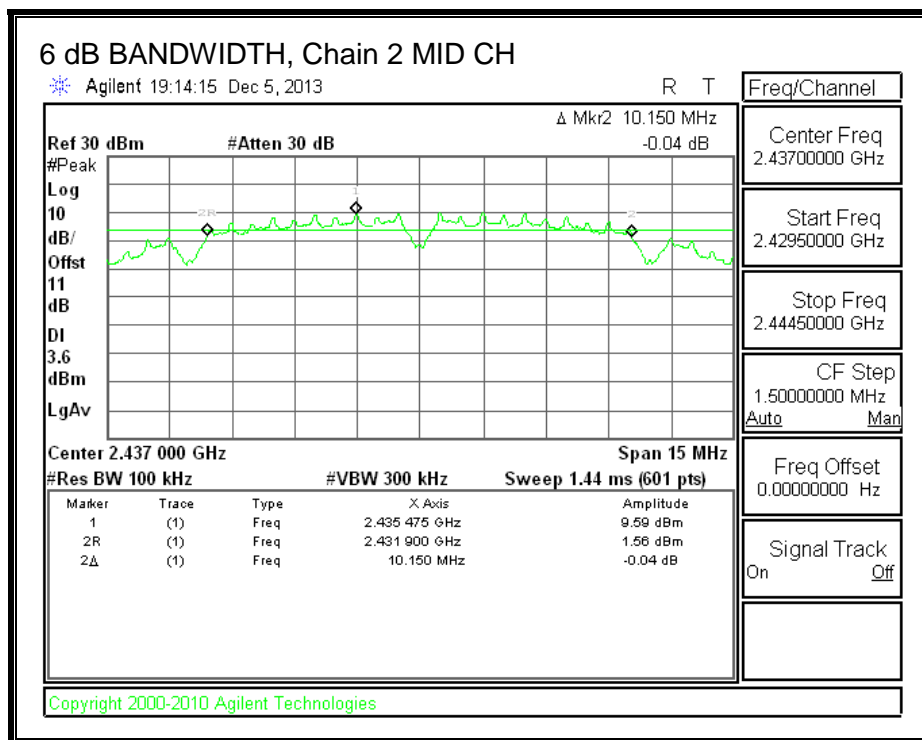
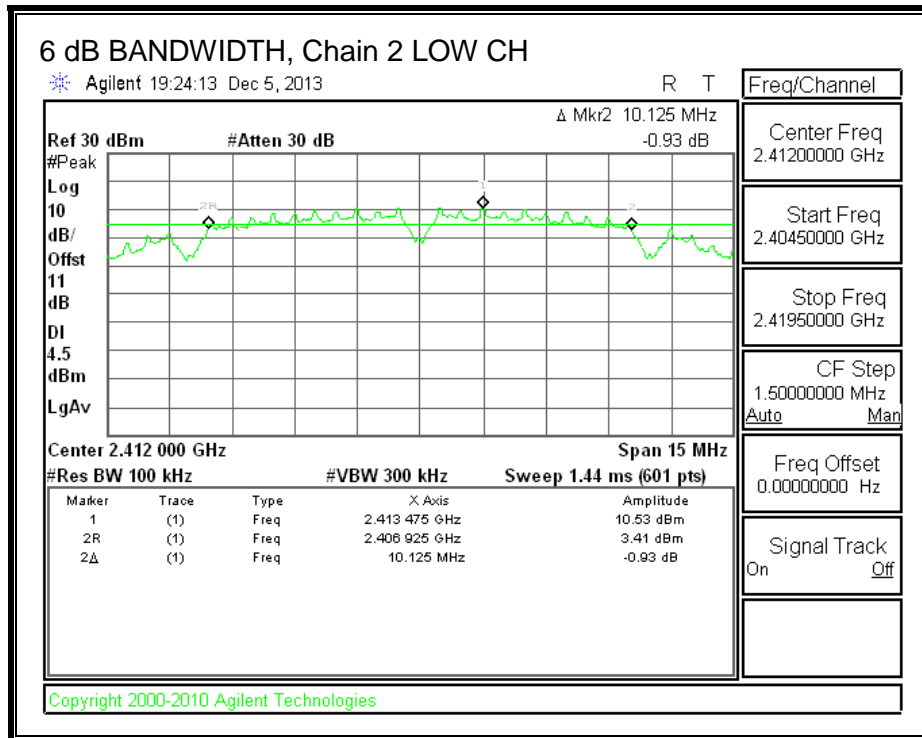
**6 dB BANDWIDTH, Chain 1**

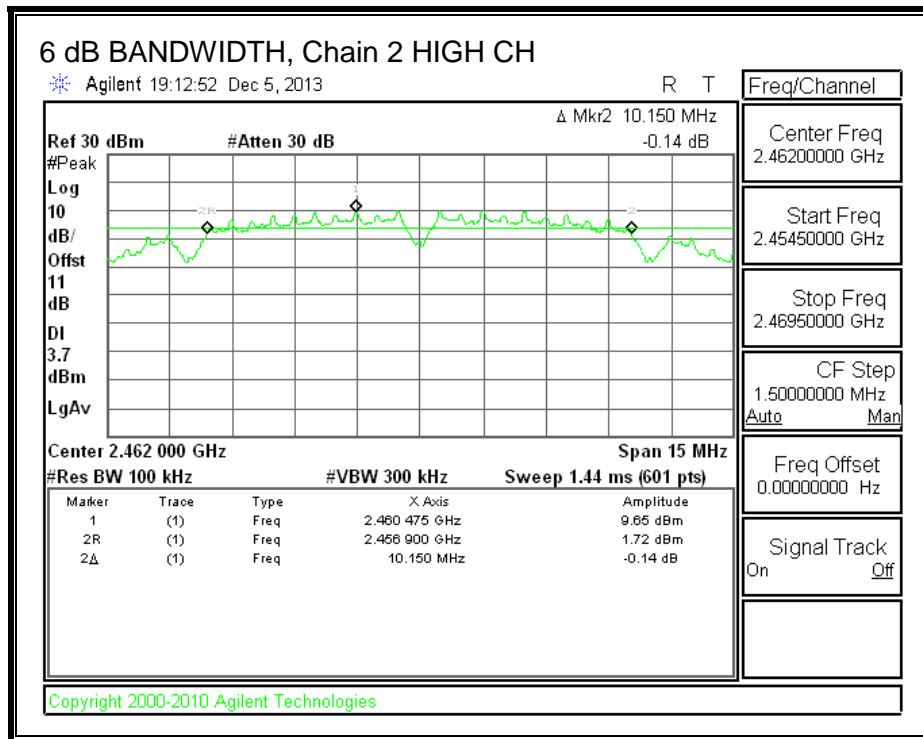






**6 dB BANDWIDTH, Chain 2**





### 8.1.2. 99% BANDWIDTH

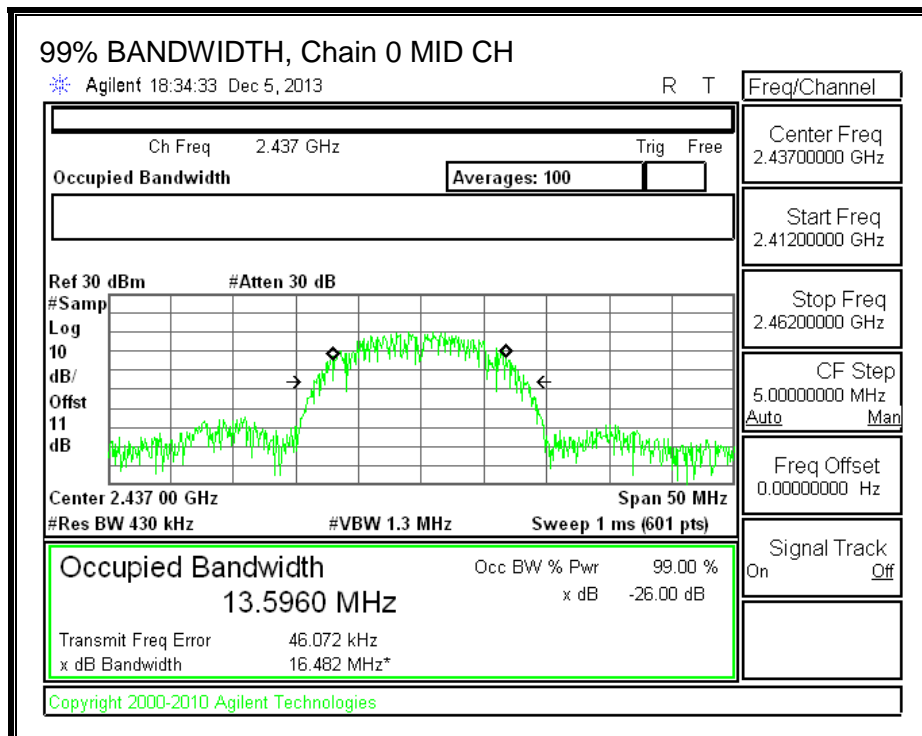
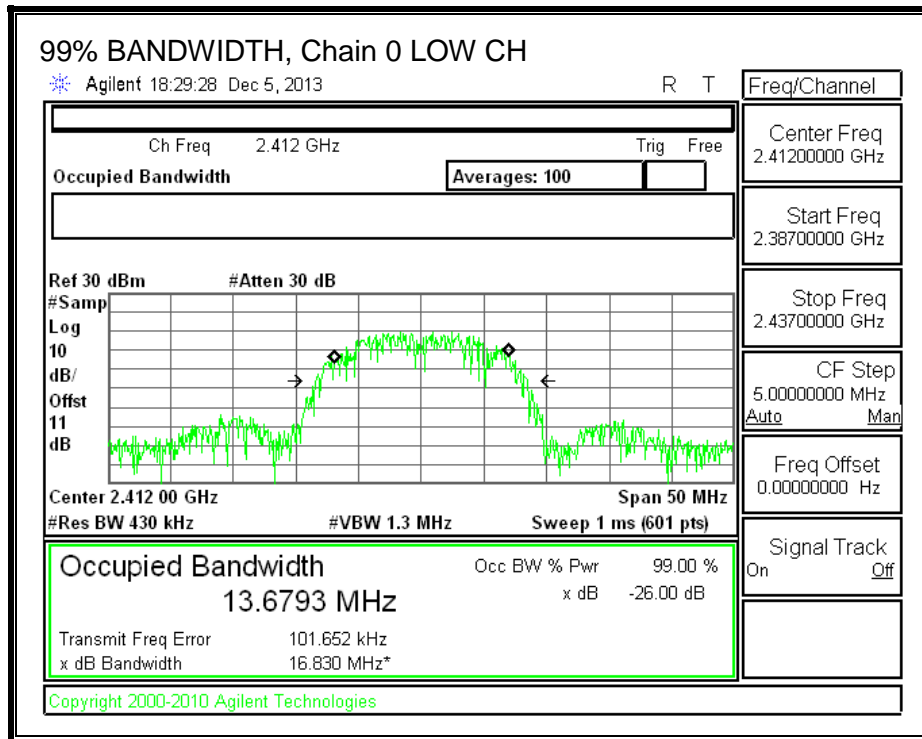
#### LIMITS

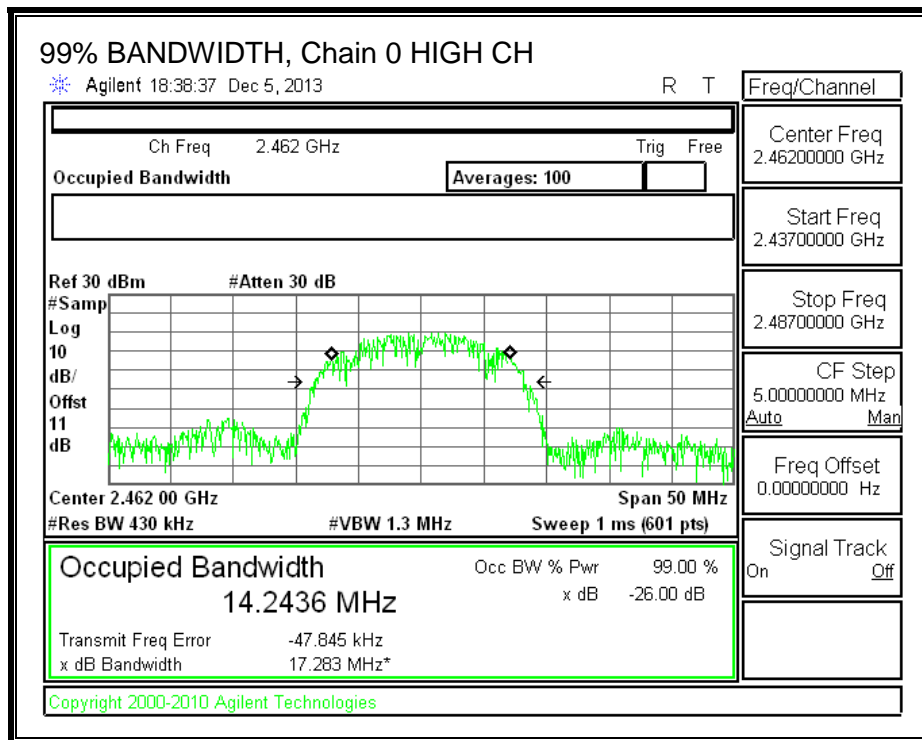
None; for reporting purposes only.

#### RESULTS

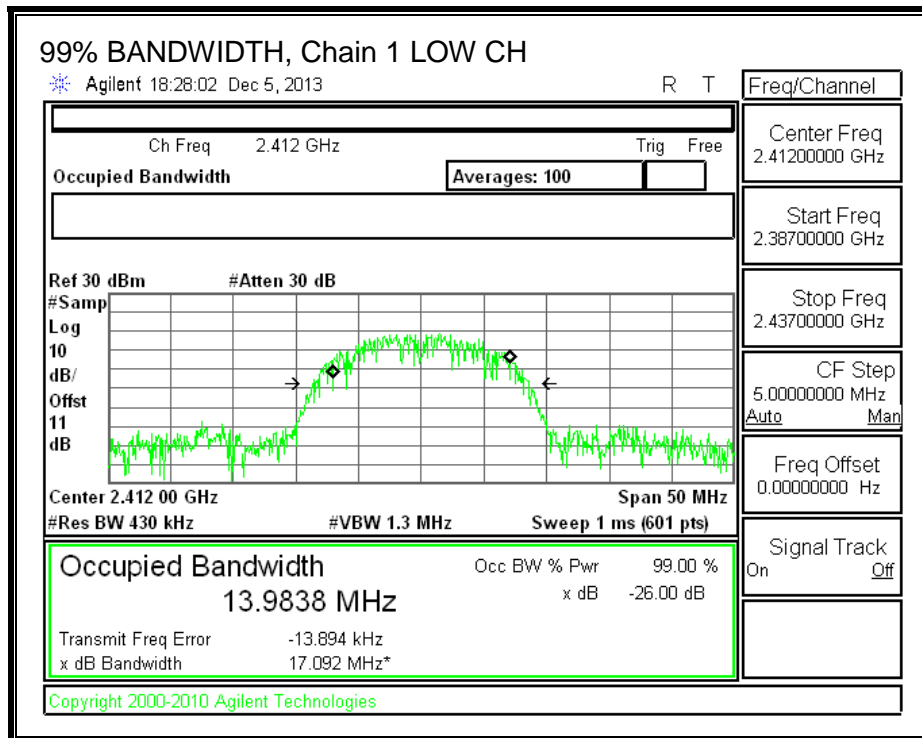
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	99% BW Chain 2 (MHz)
Low	2412	13.6793	13.9838	13.5198
Mid	2437	13.5960	13.6365	14.2646
High	2462	14.2436	14.0006	14.8235

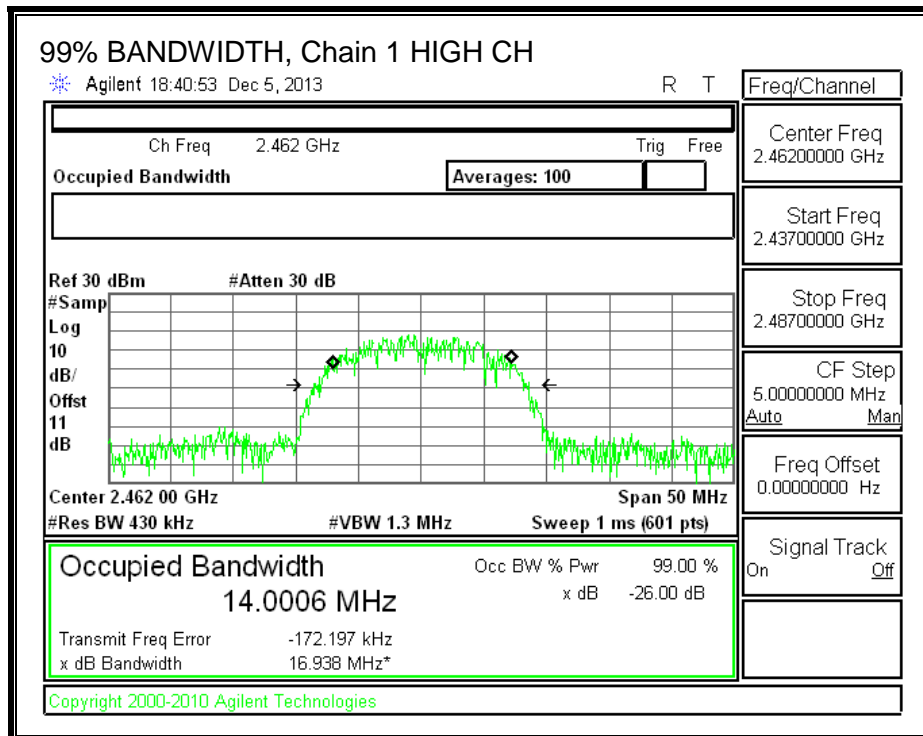
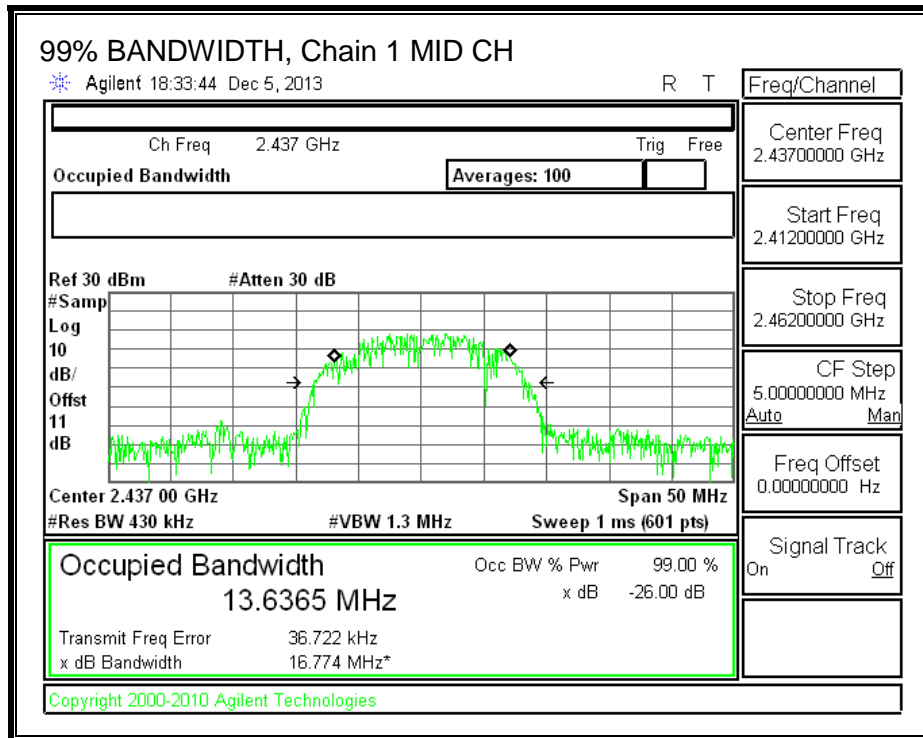
**99% BANDWIDTH, Chain 0**



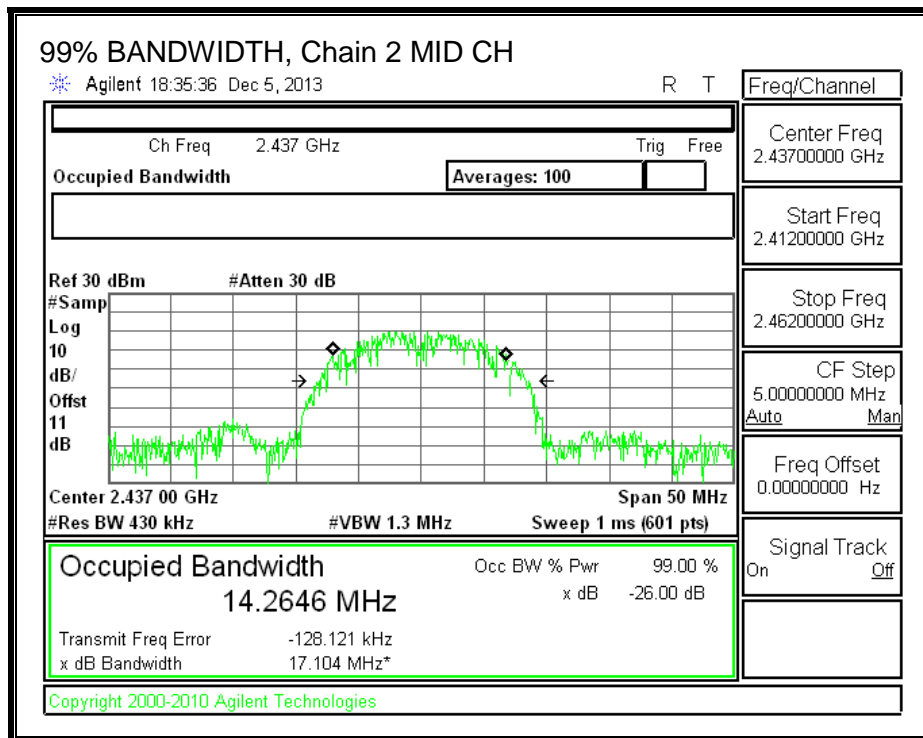
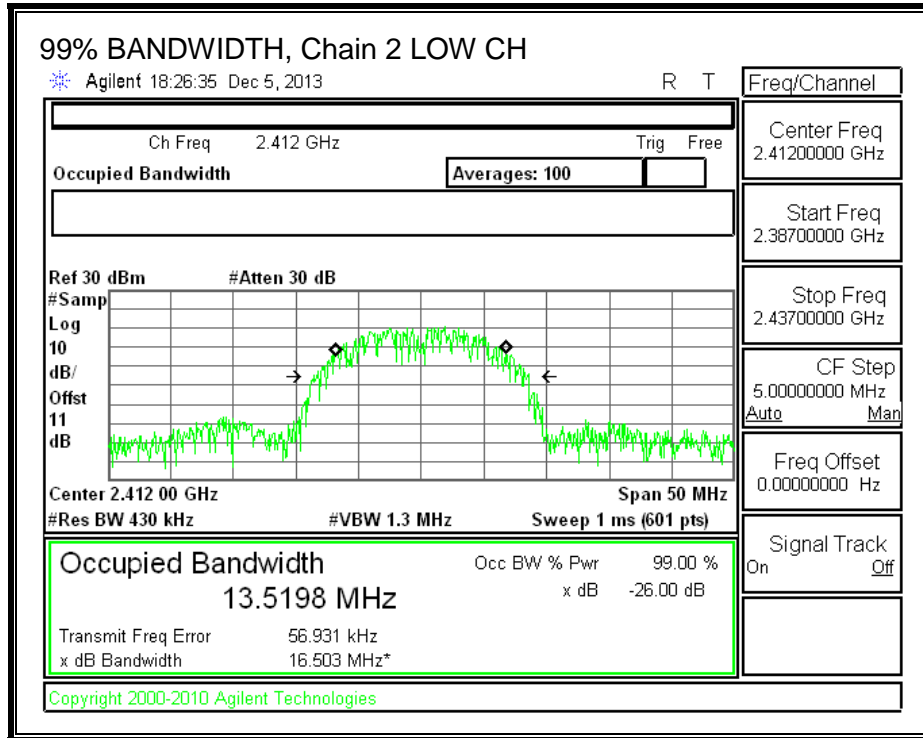


**99% BANDWIDTH, Chain 1**

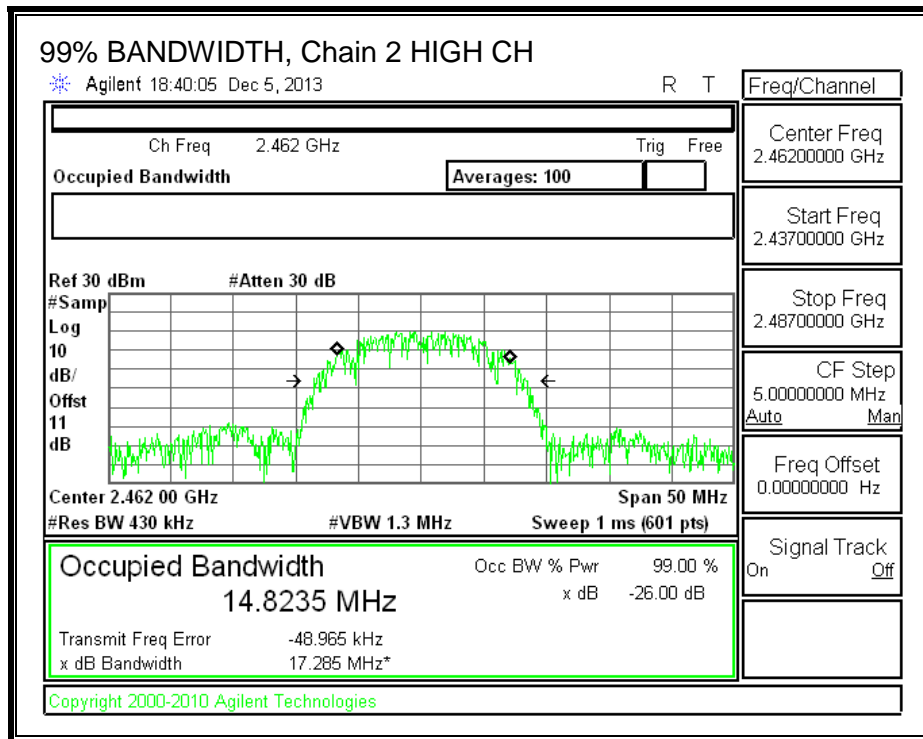




**99% BANDWIDTH, Chain 2**







### 8.1.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Chain 2 Power (dBm)	Total Power (dBm)
Low	2412	18.24	15.57	18.17	22.26
Mid	2437	18.54	15.79	18.24	22.46
High	2462	16.88	14.72	18.09	21.55

### 8.1.4. OUTPUT POWER

#### LIMITS

FCC §15.247

IC RSS-210 A8.4

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Chain 2 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
4.40	2.90	3.70	3.71

**RESULTS**

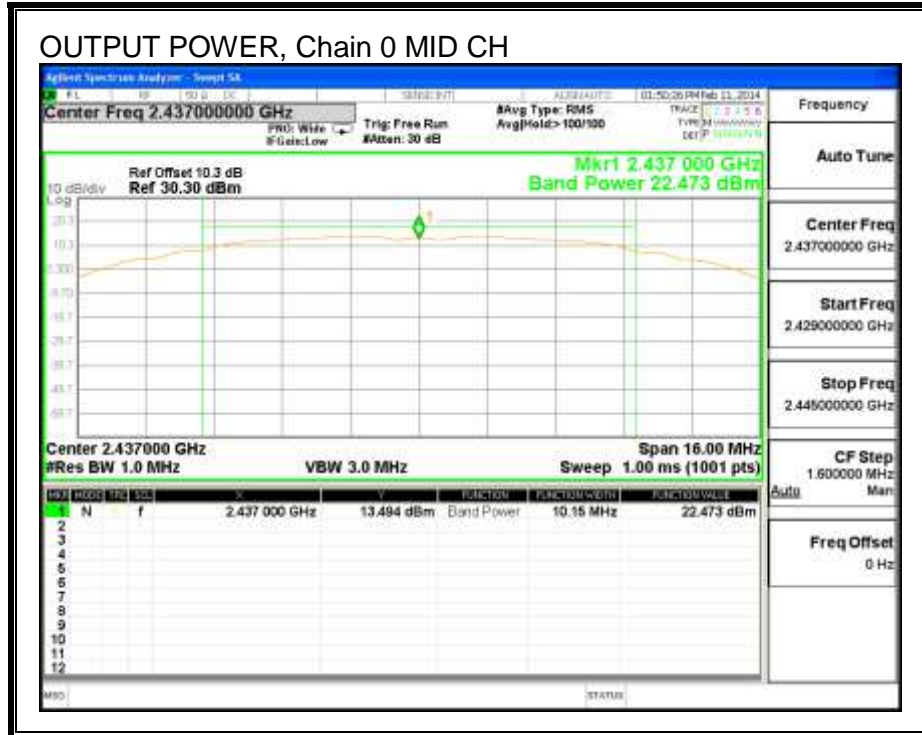
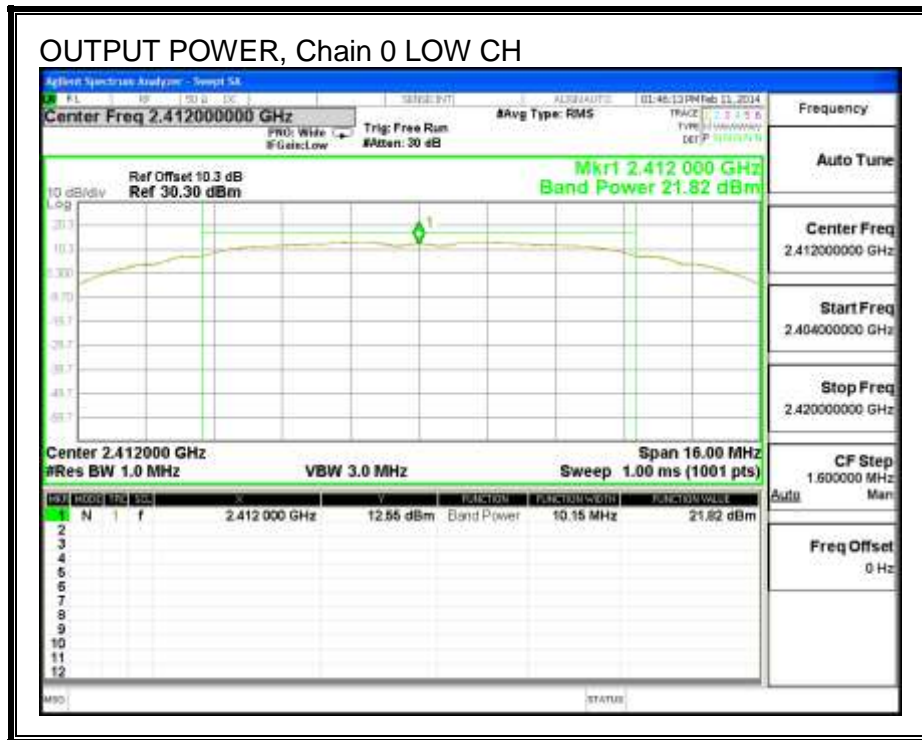
**Limits**

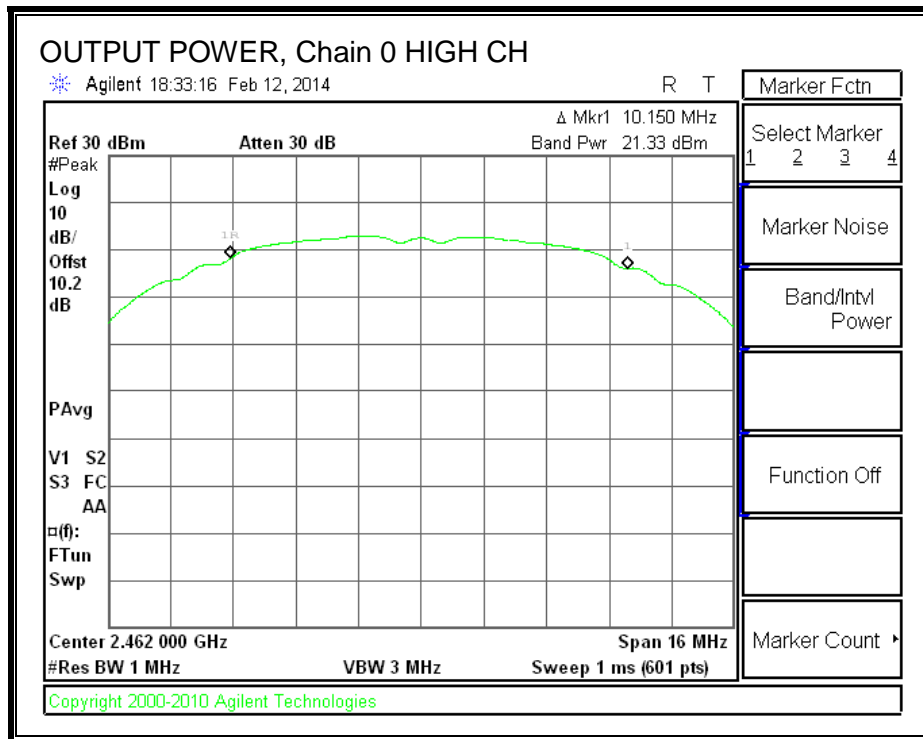
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	3.71	30.00	30	36	30.00
Mid	2437	3.71	30.00	30	36	30.00
High	2462	3.71	30.00	30	36	30.00

**Results**

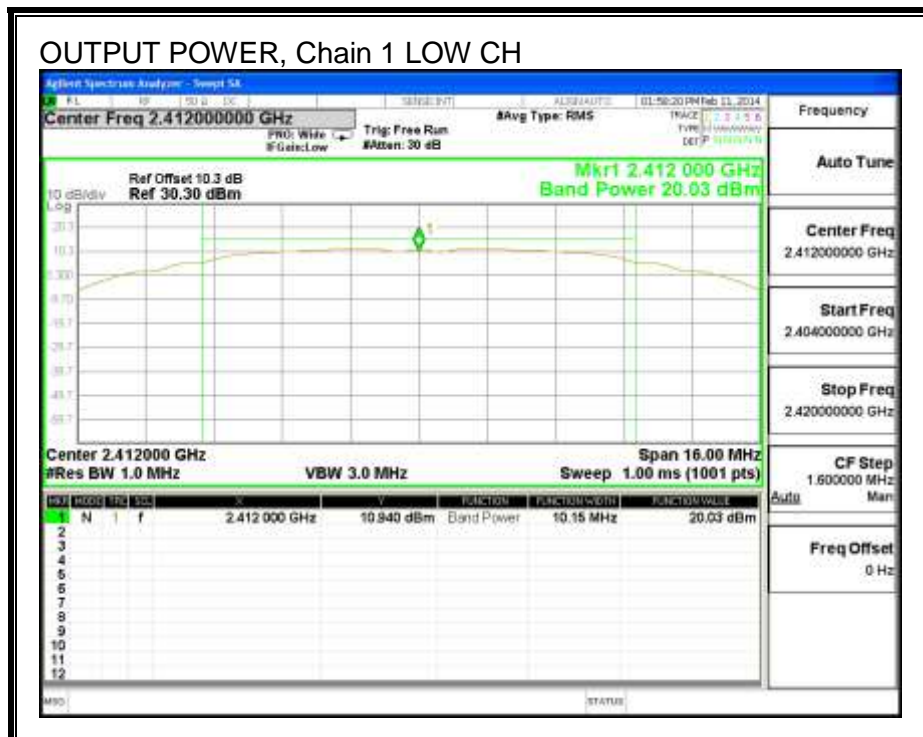
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Chain 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	21.82	20.03	22.12	26.19	30.00	-3.81
Mid	2437	22.47	19.98	22.07	26.41	30.00	-3.59
High	2462	21.33	18.64	21.87	25.60	30.00	-4.40

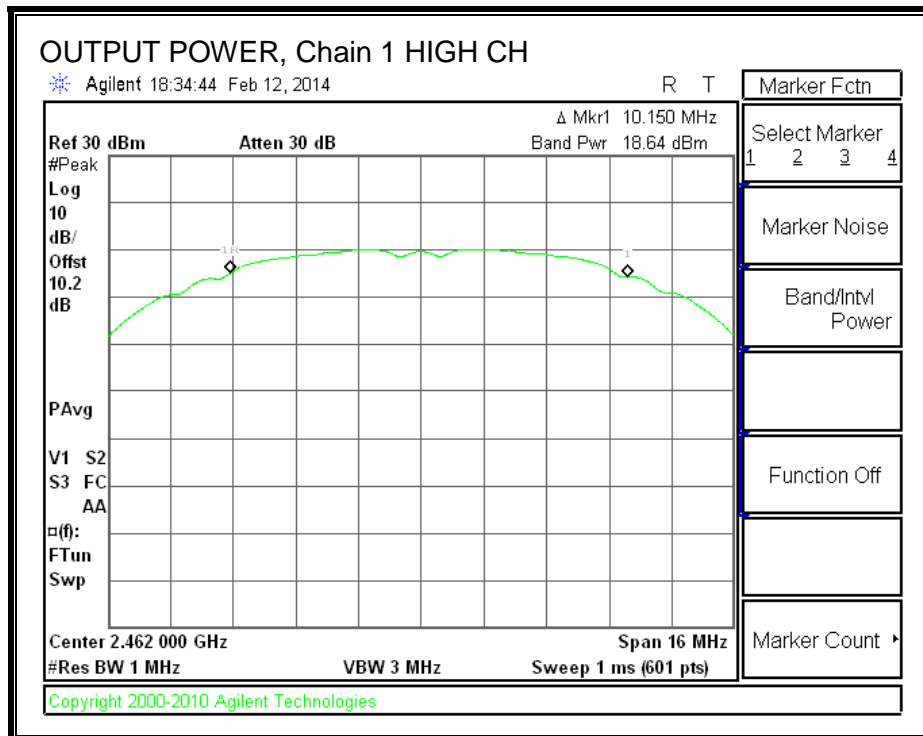
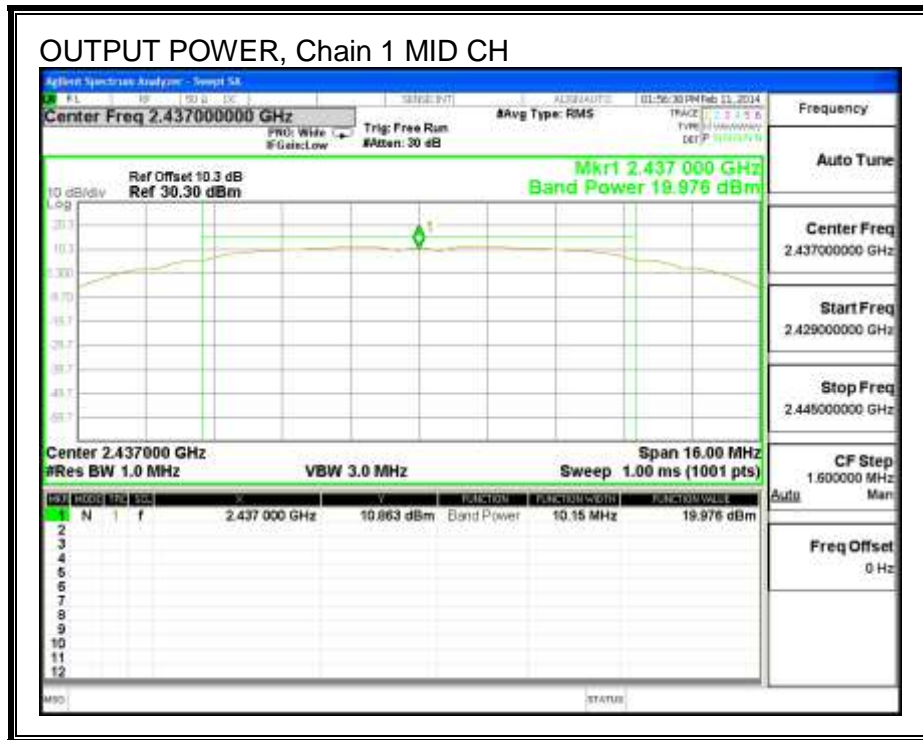
**OUTPUT POWER, Chain 0**



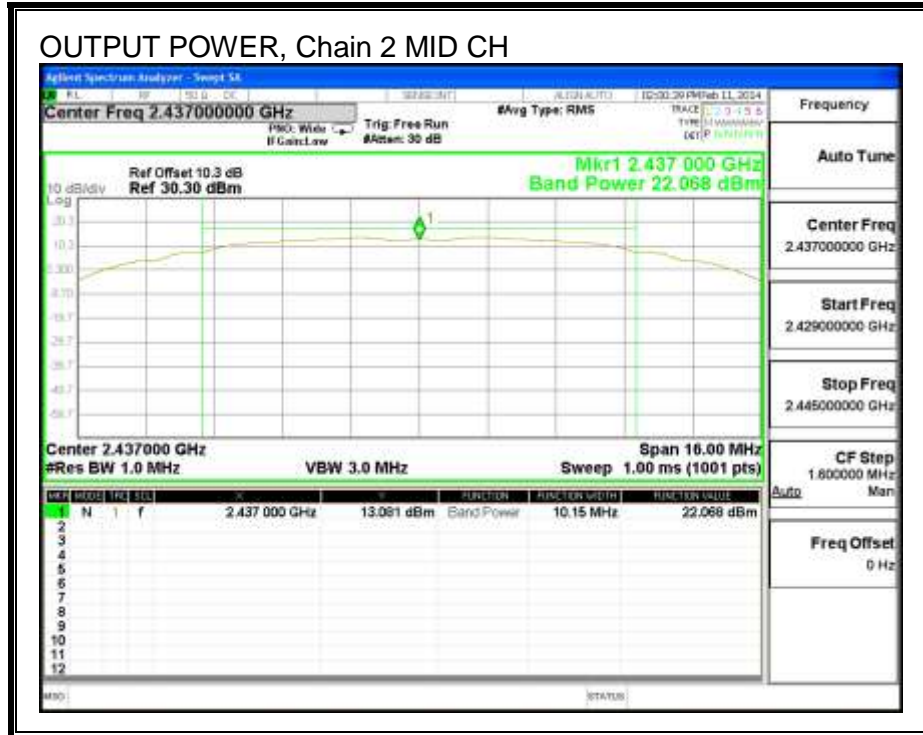
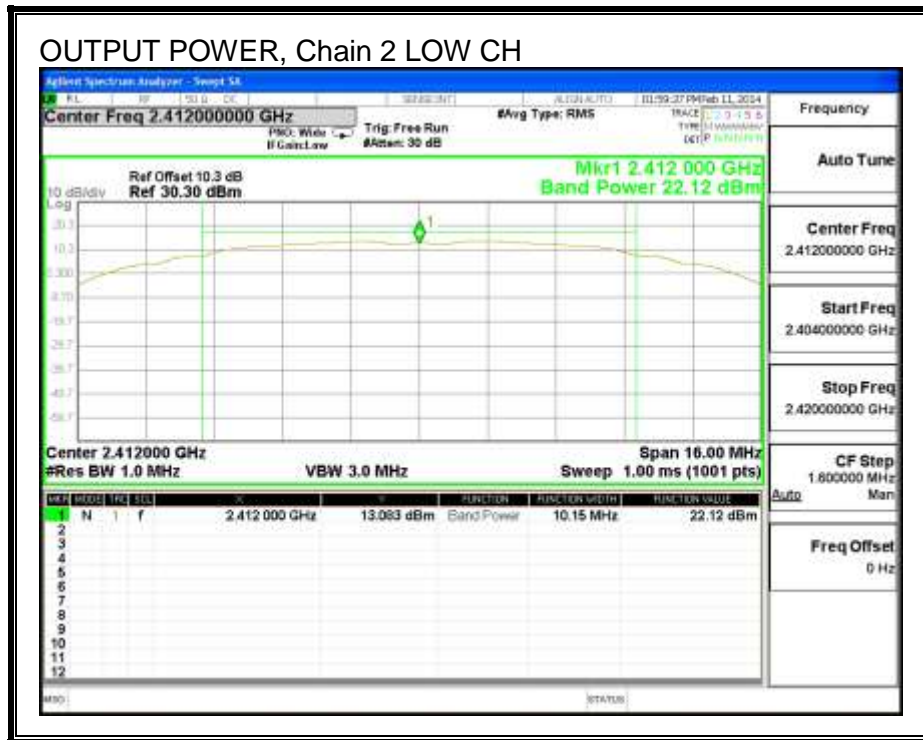


### OUTPUT POWER, Chain 1

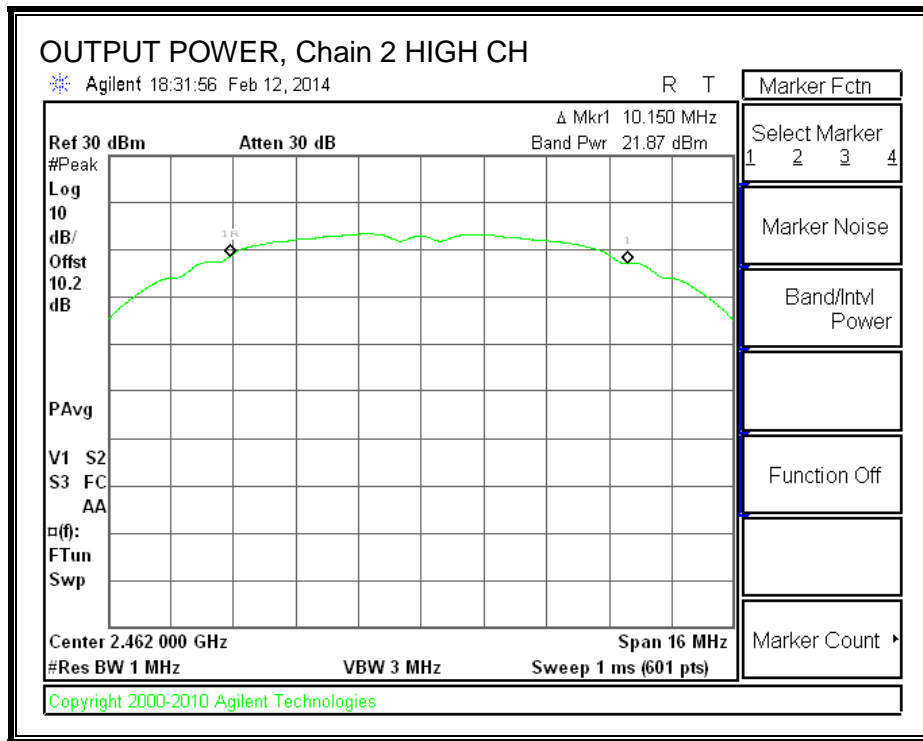




**OUTPUT POWER, Chain 2**







### 8.1.5. PSD

#### LIMITS

FCC §15.247

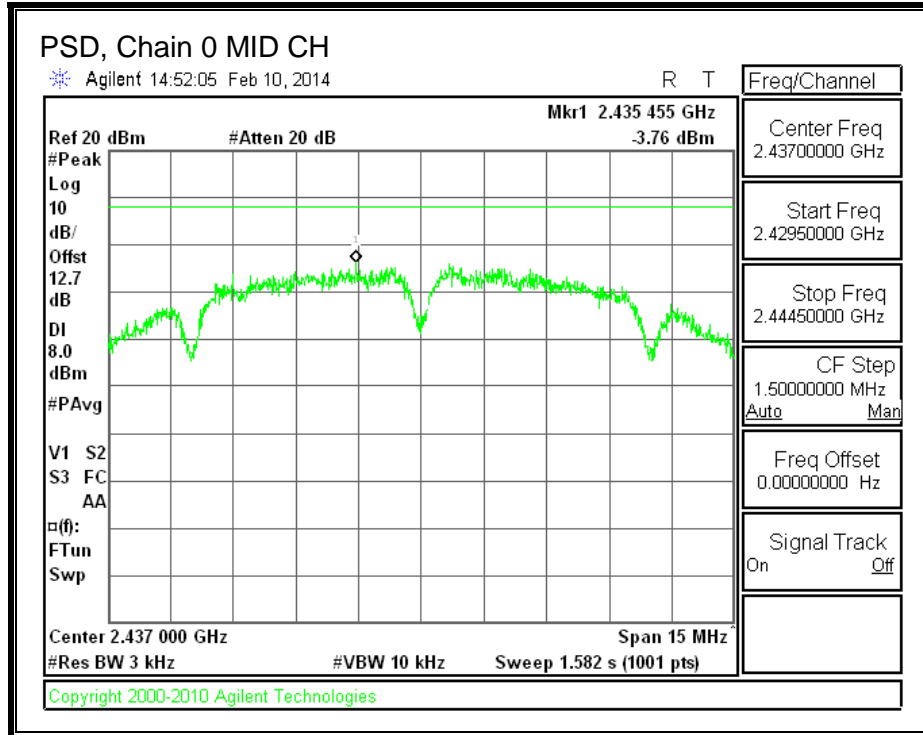
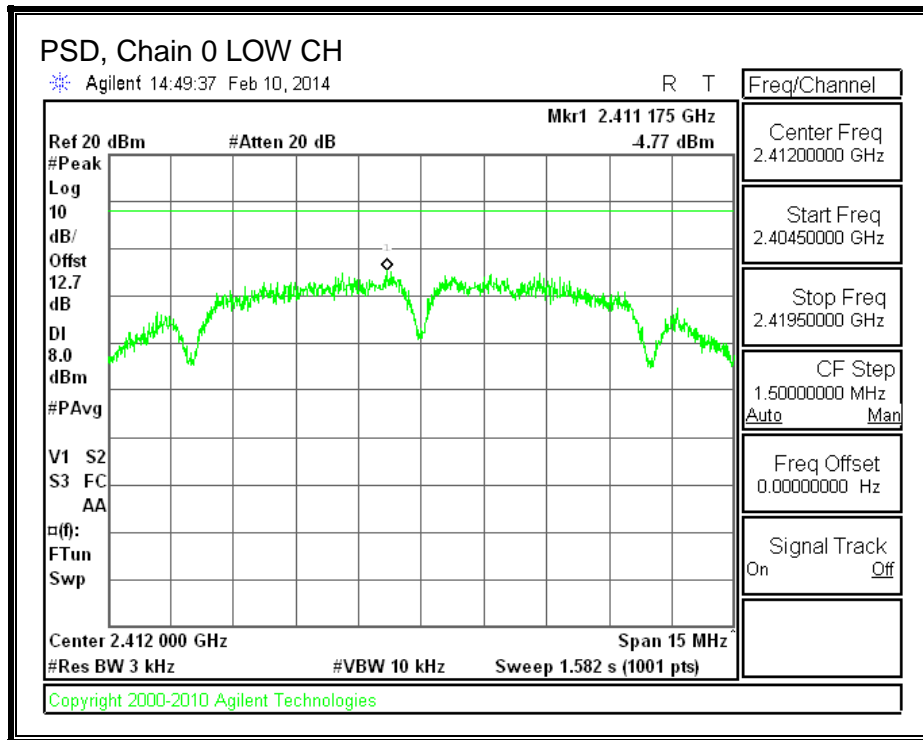
IC RSS-210 A8.2

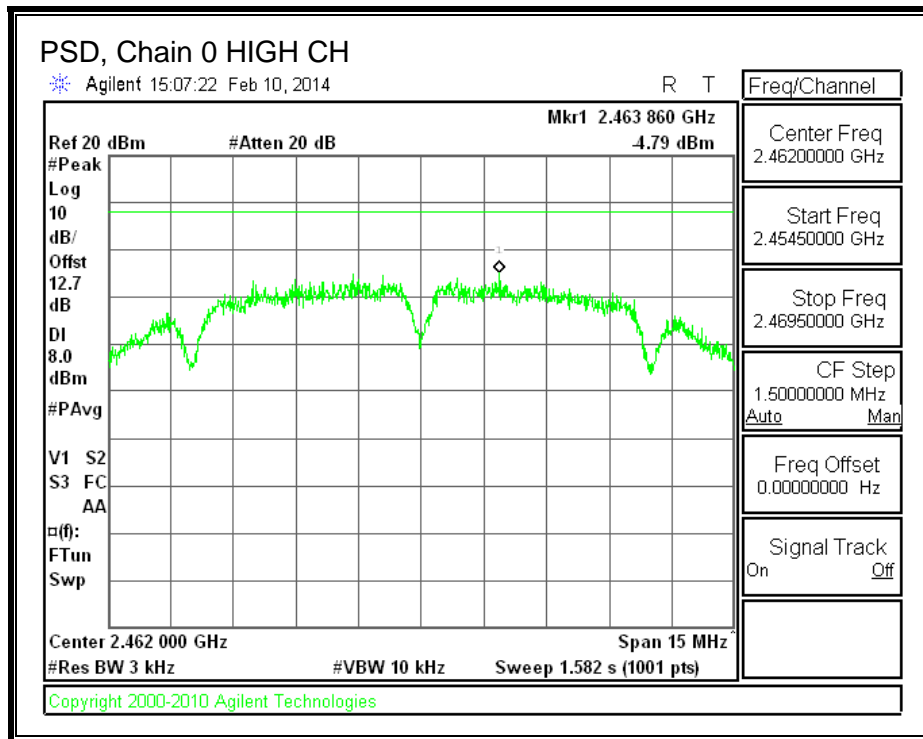
#### RESULTS

##### PSD Results

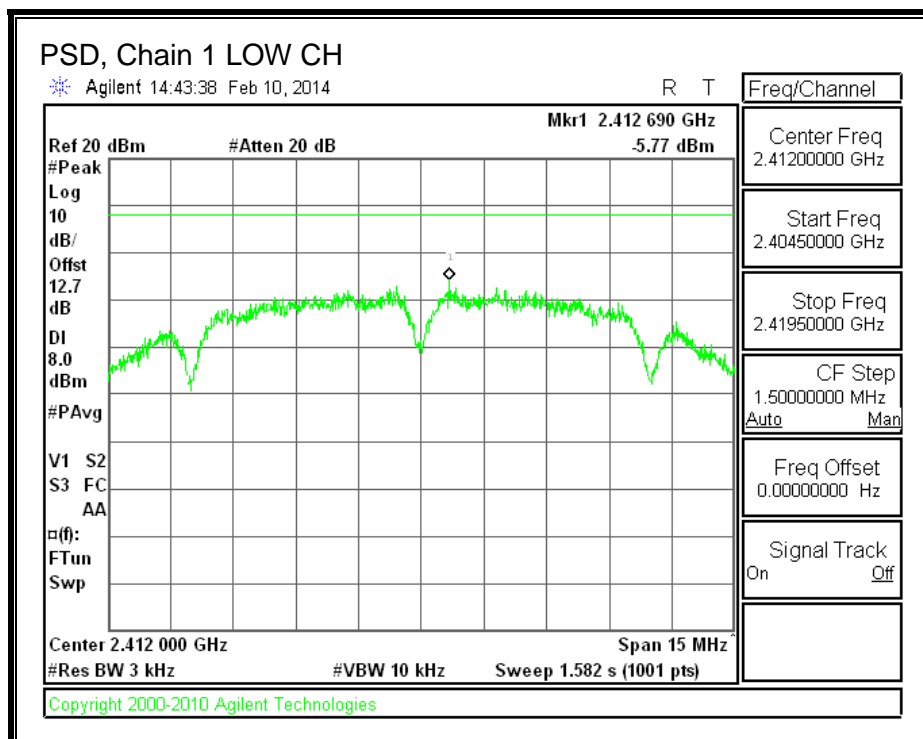
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Chain 2 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.77	-5.77	-4.28	-0.13	8.0	-8.1
Mid	2437	-3.76	-7.01	-4.33	-0.05	8.0	-8.0
High	2462	-4.79	-7.43	-4.02	-0.41	8.0	-8.4

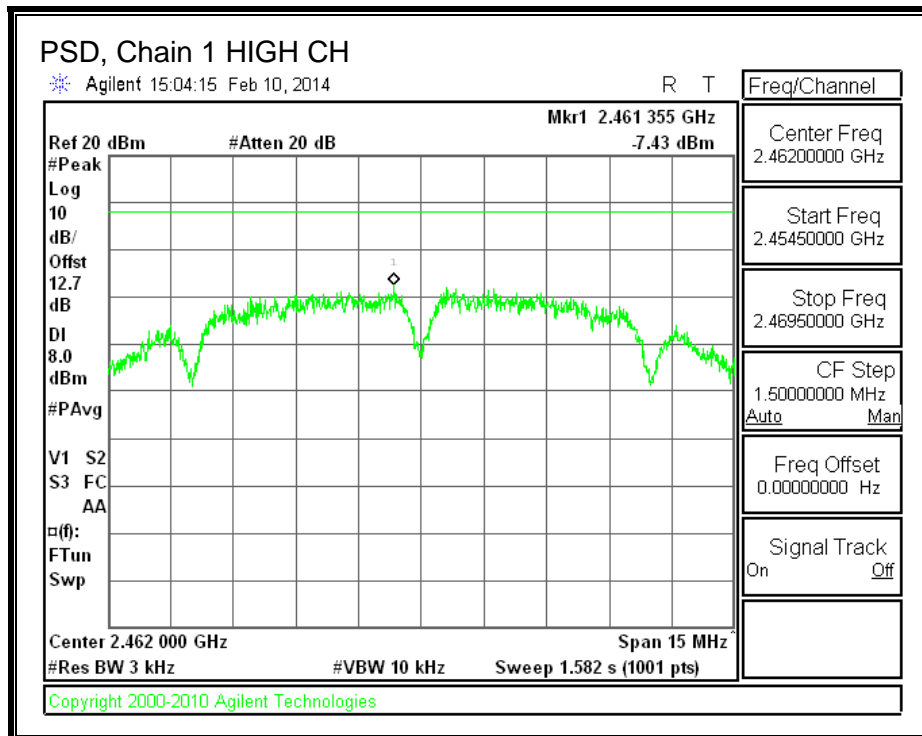
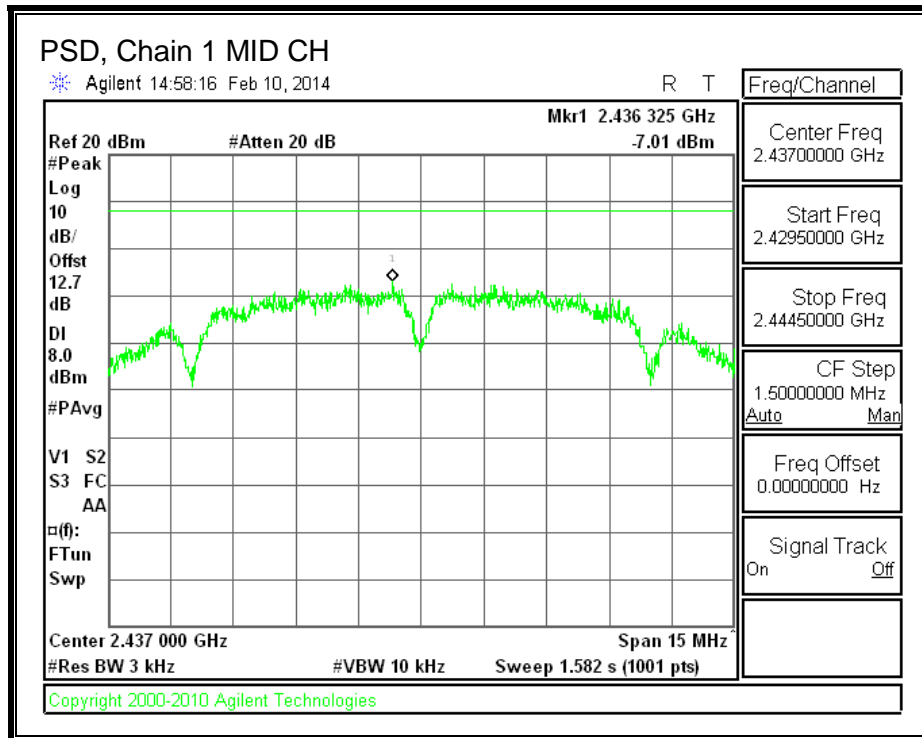
**PSD, Chain 0**



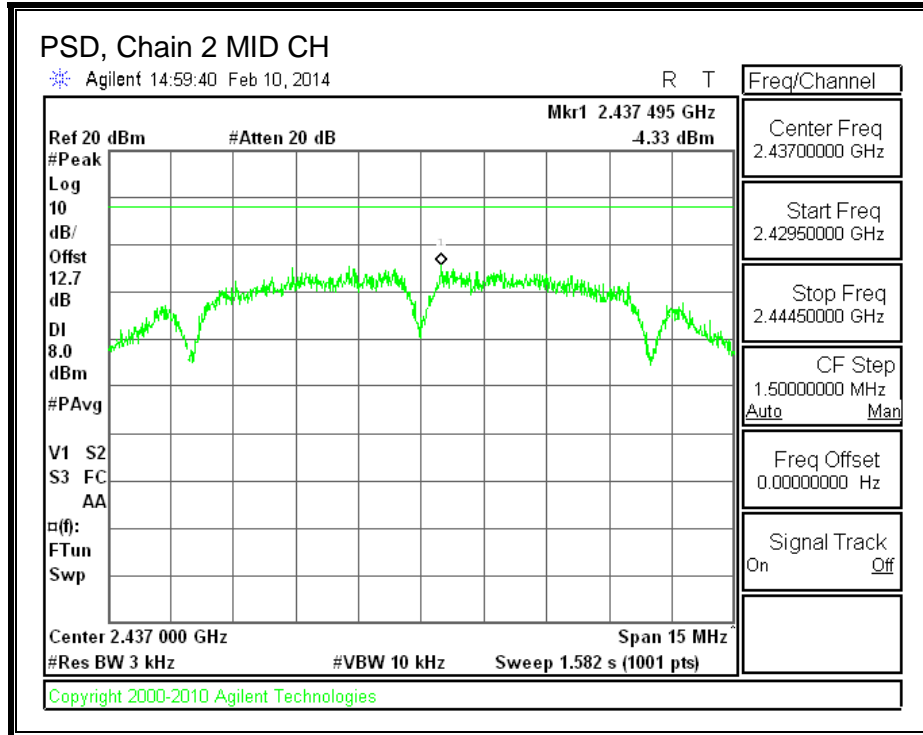
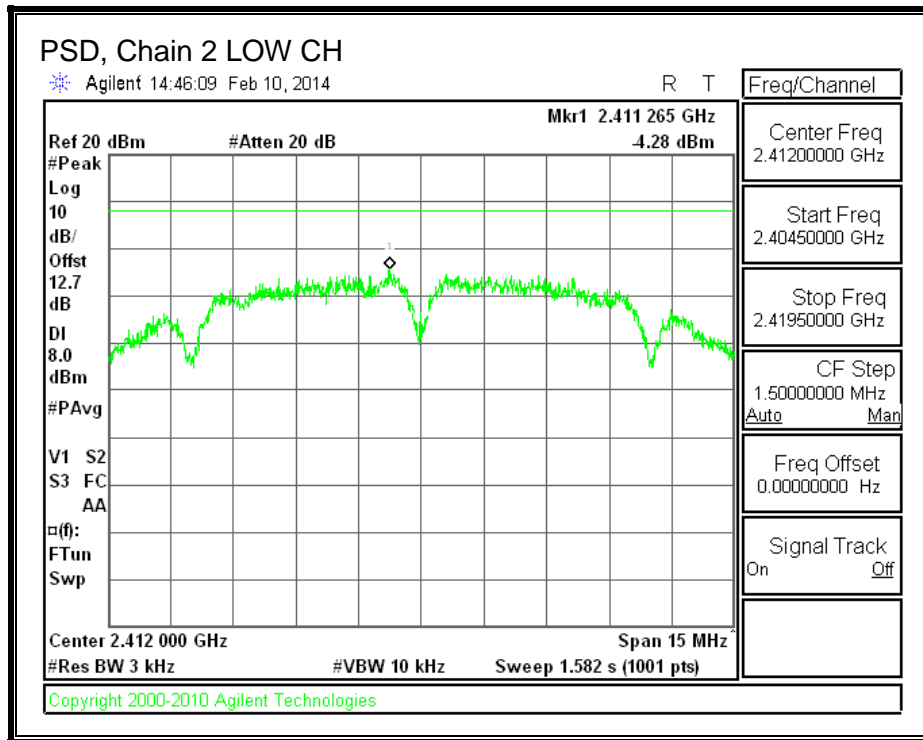


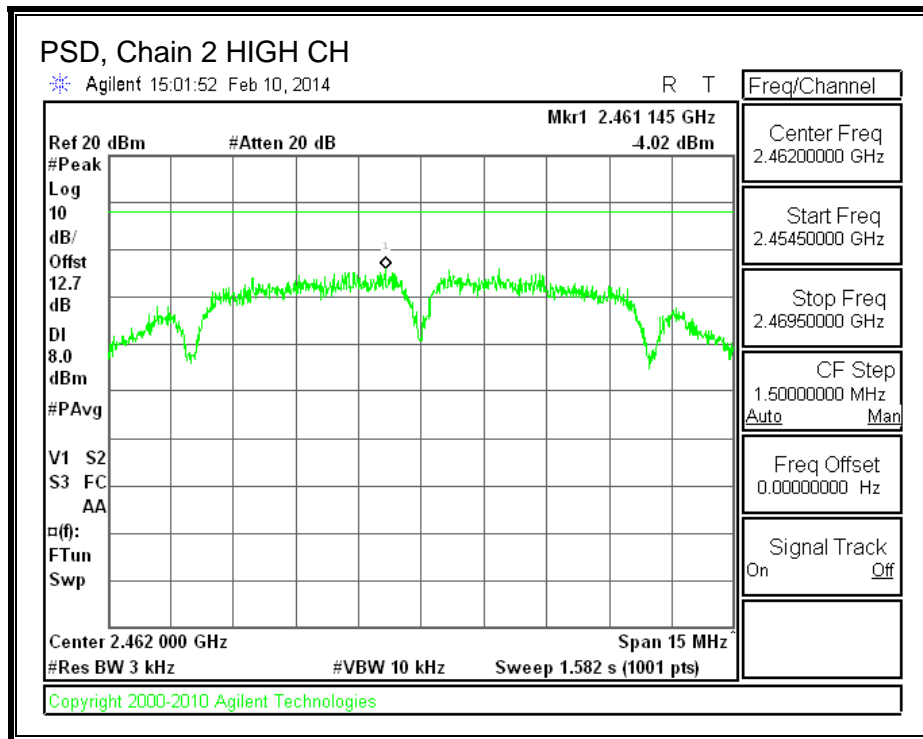
**PSD, Chain 1**





**PSD, Chain 2**





## 8.1.6. OUT-OF-BAND EMISSIONS

### LIMITS

FCC §15.247 (d)

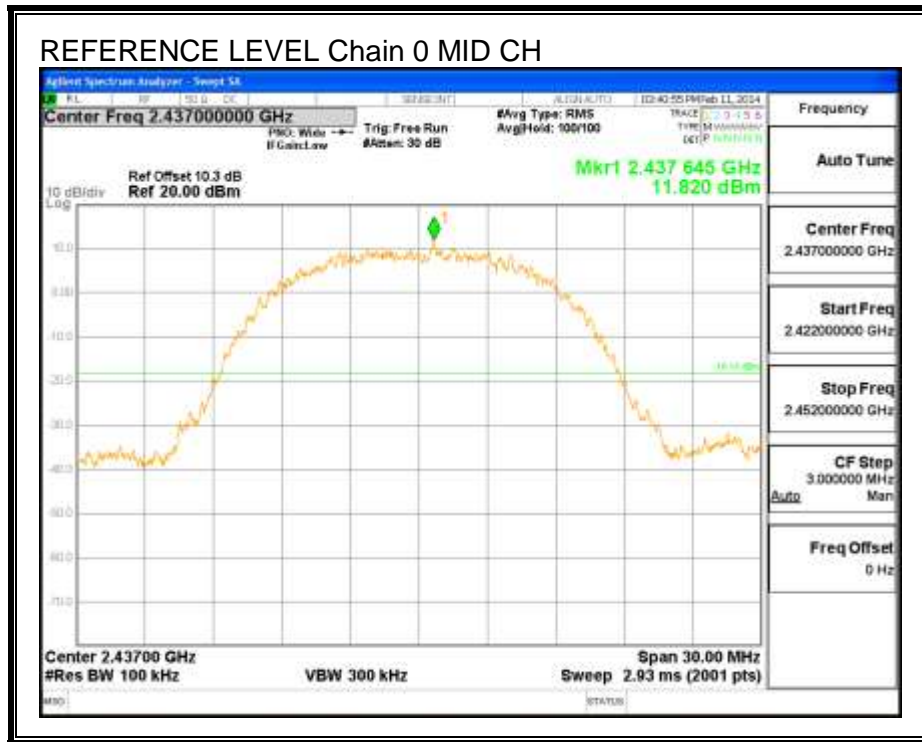
IC RSS-210 A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

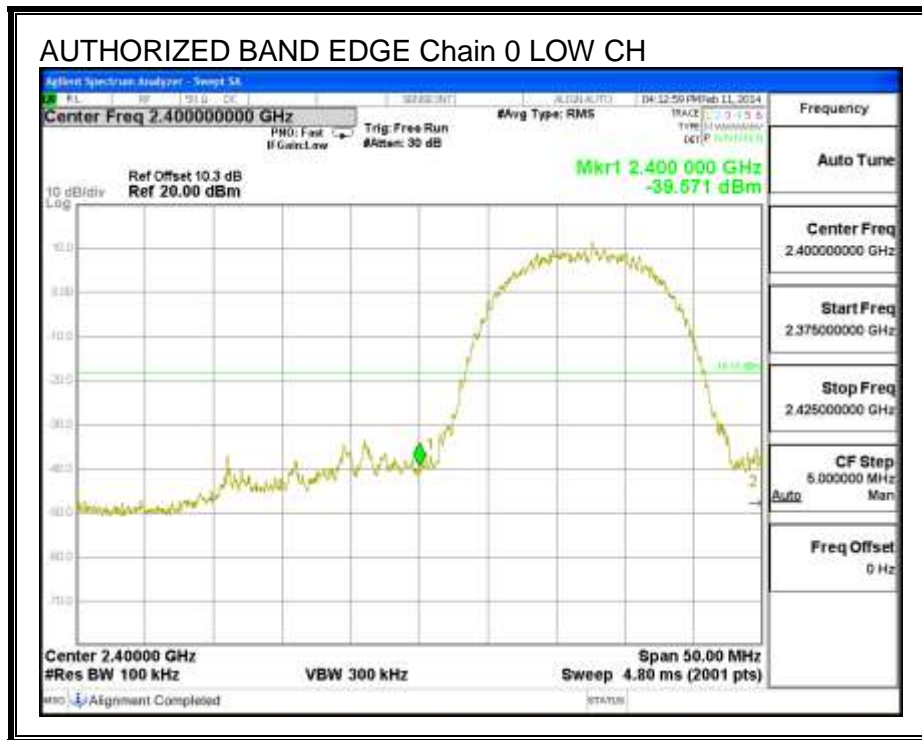


**RESULTS**

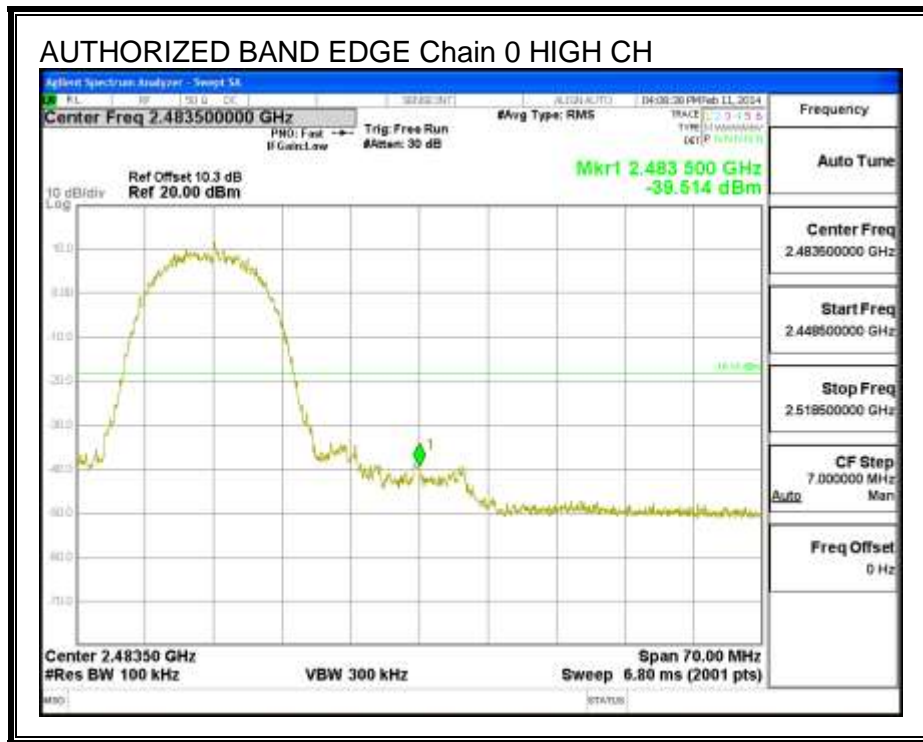
**IN-BAND REFERENCE LEVEL, Chain 0**



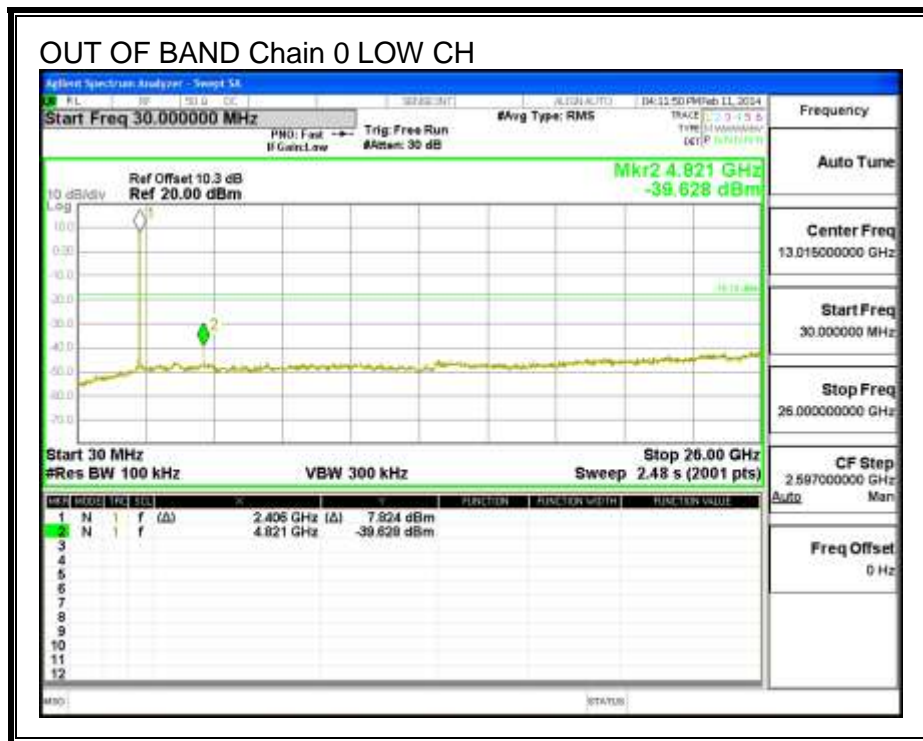
**LOW CHANNEL BANDEDGE, Chain 0**

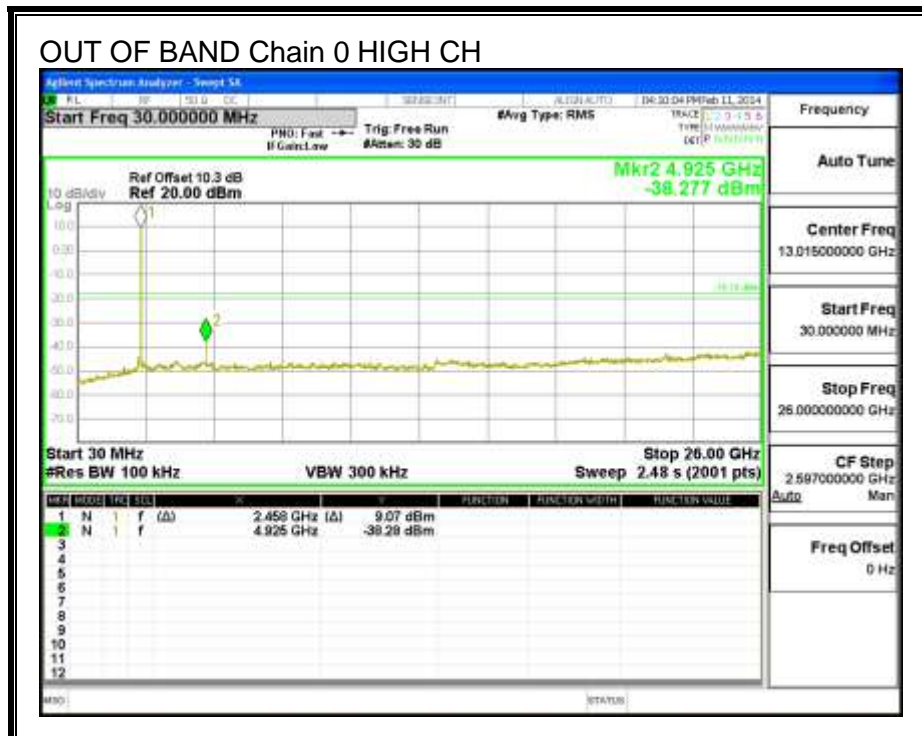
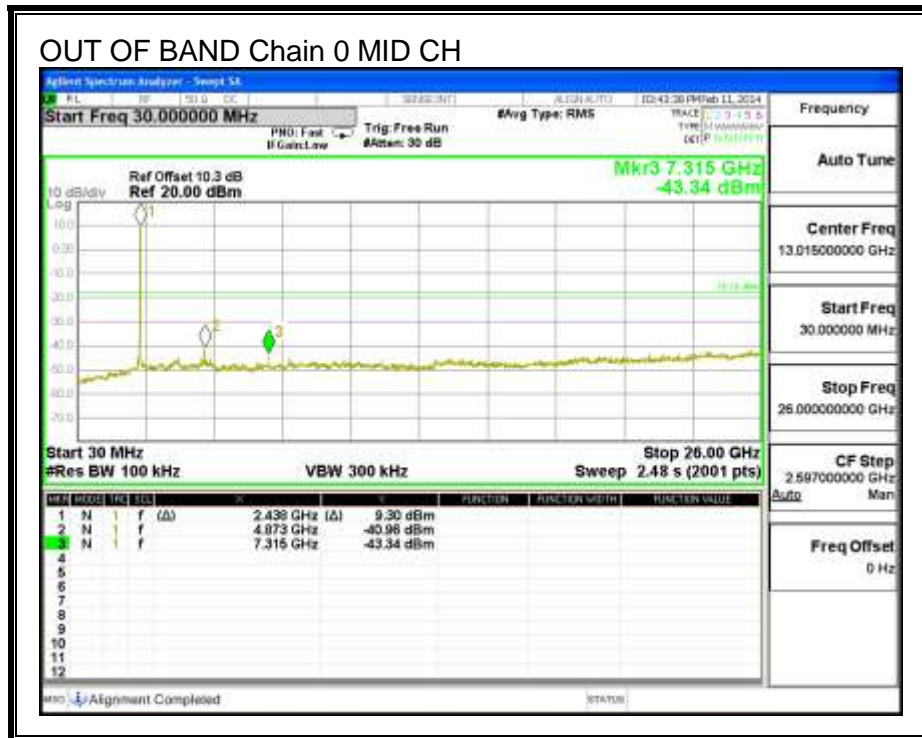


**HIGH CHANNEL BANDEDGE, Chain 0**

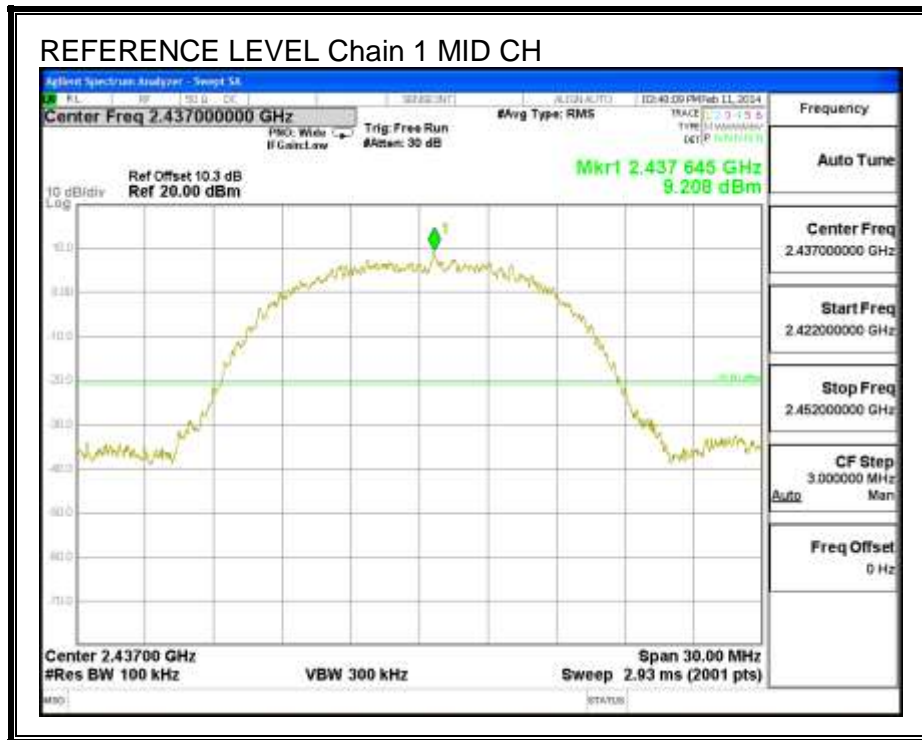


**OUT-OF-BAND EMISSIONS, Chain 0**

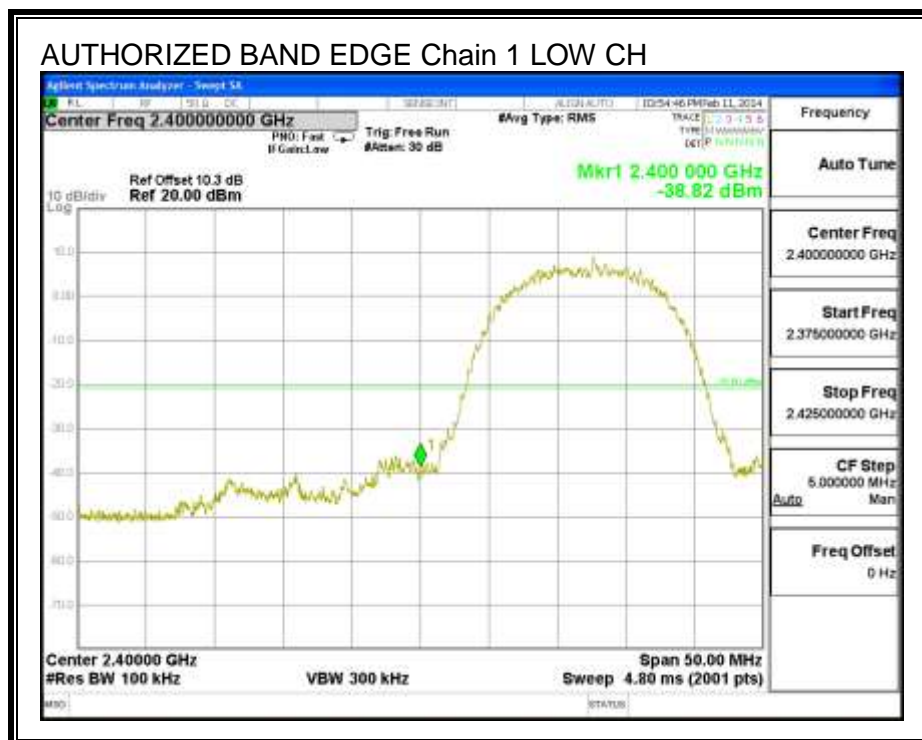




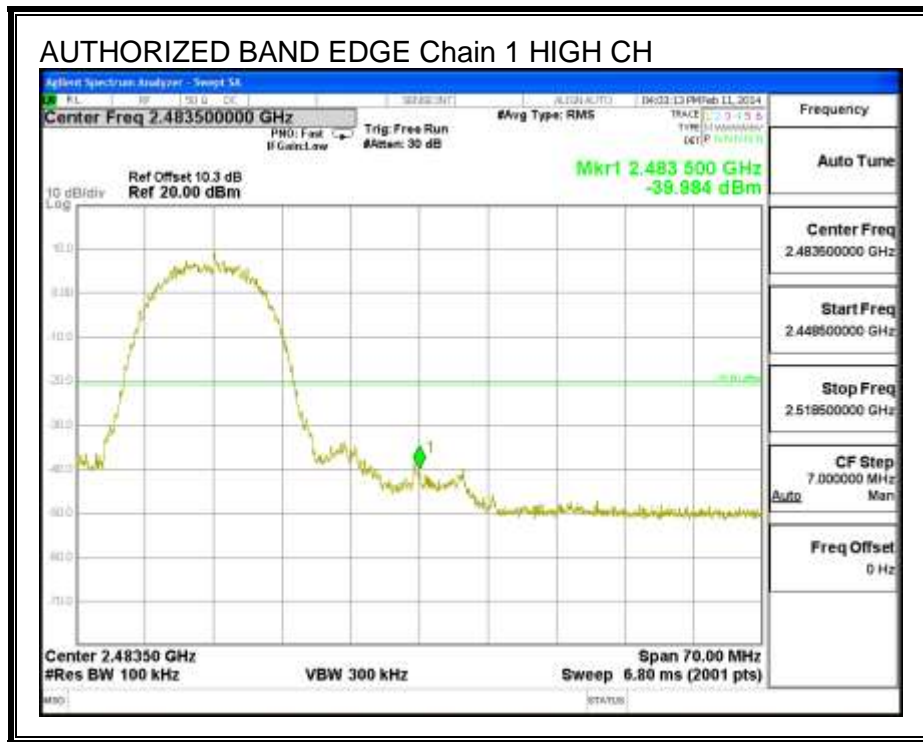
**IN-BAND REFERENCE LEVEL, Chain 1**



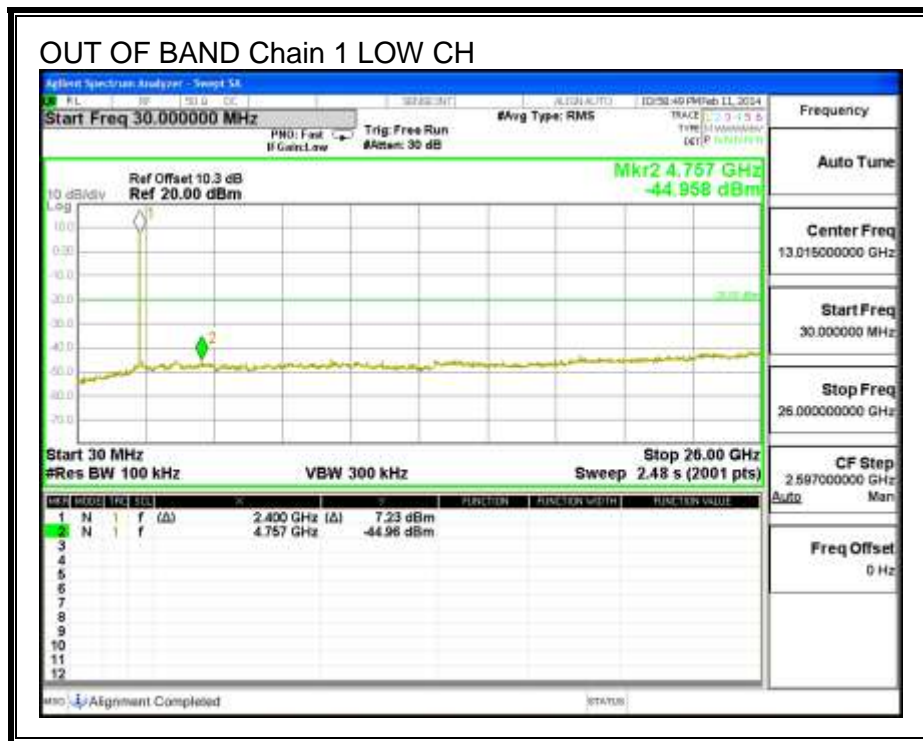
**LOW CHANNEL BANDEDGE, Chain 1**

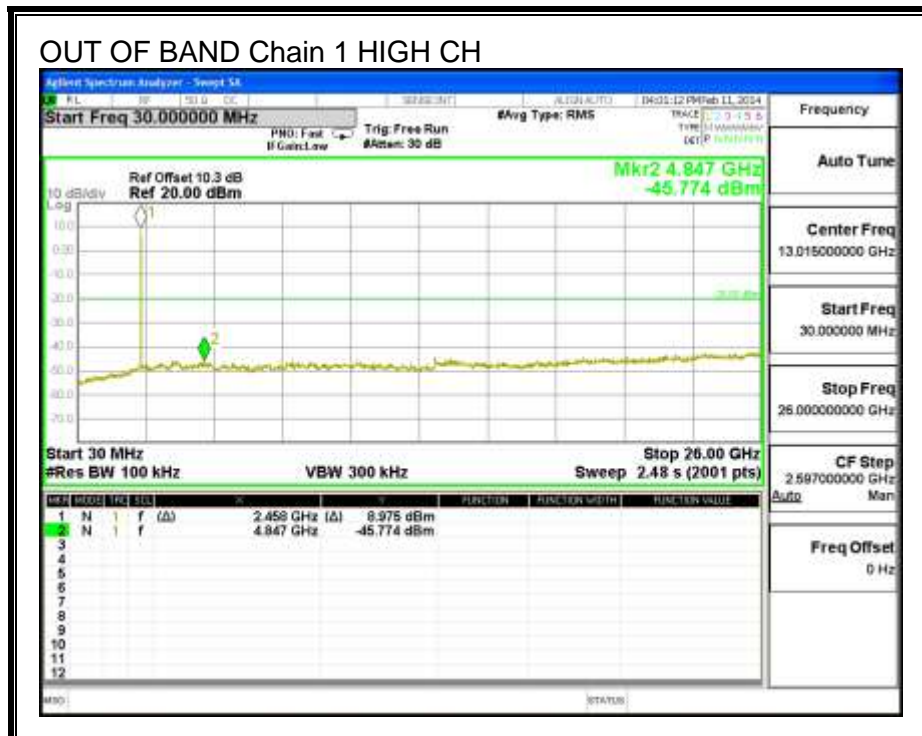
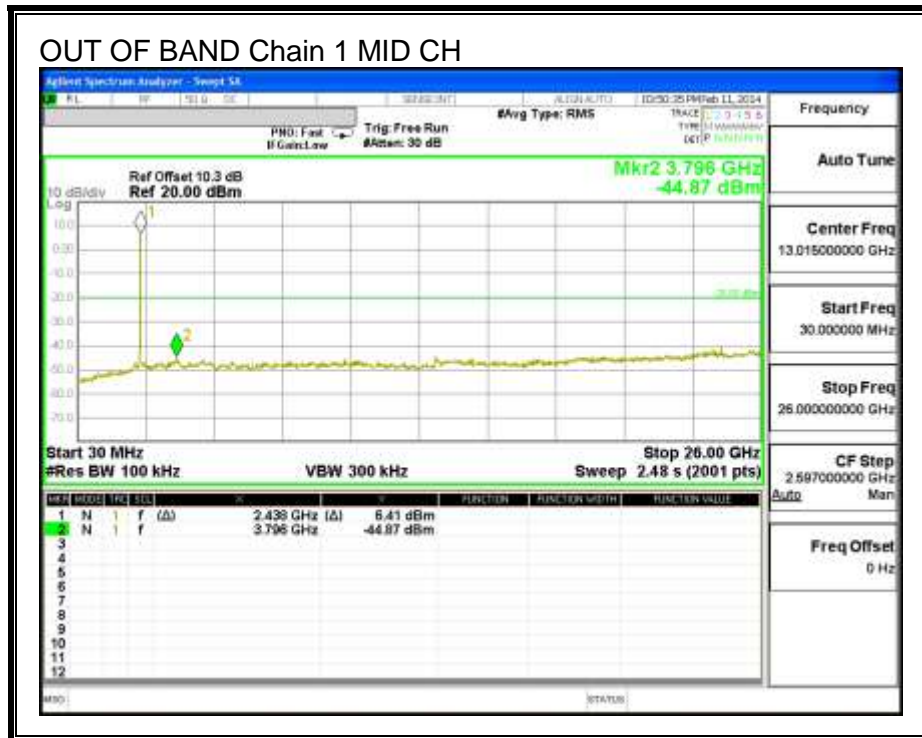


**HIGH CHANNEL BANDEDGE, Chain 1**

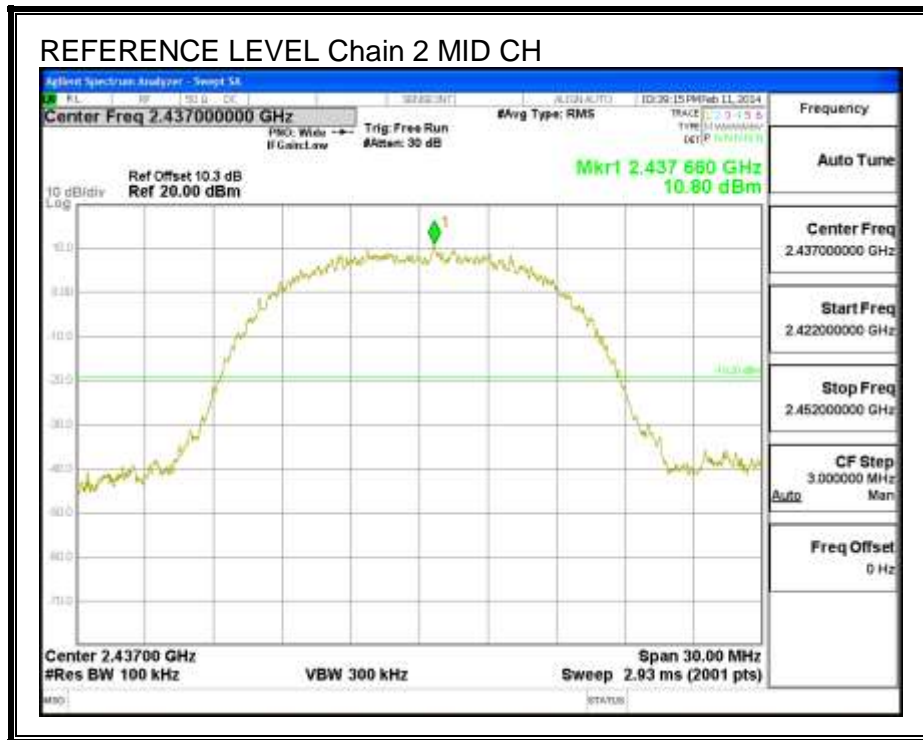


**OUT-OF-BAND EMISSIONS, Chain 1**

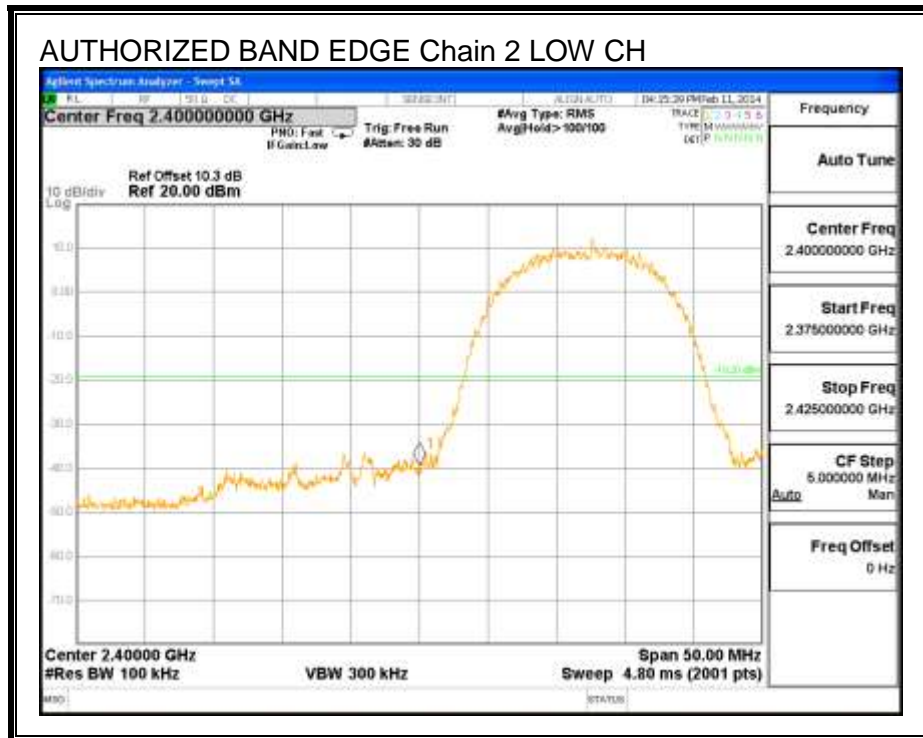




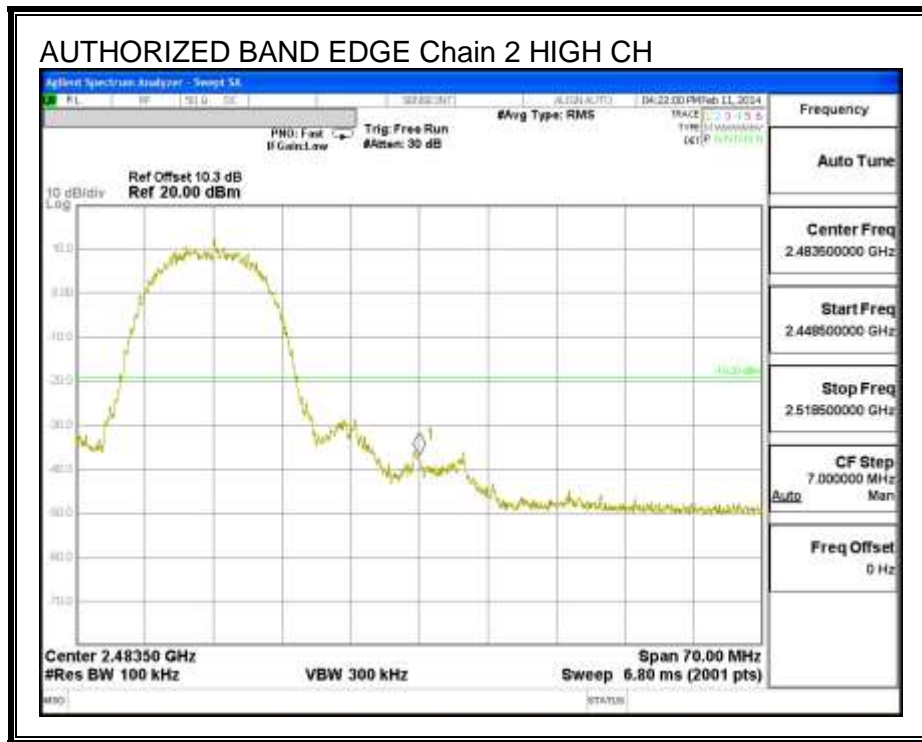
**IN-BAND REFERENCE LEVEL, Chain 2**



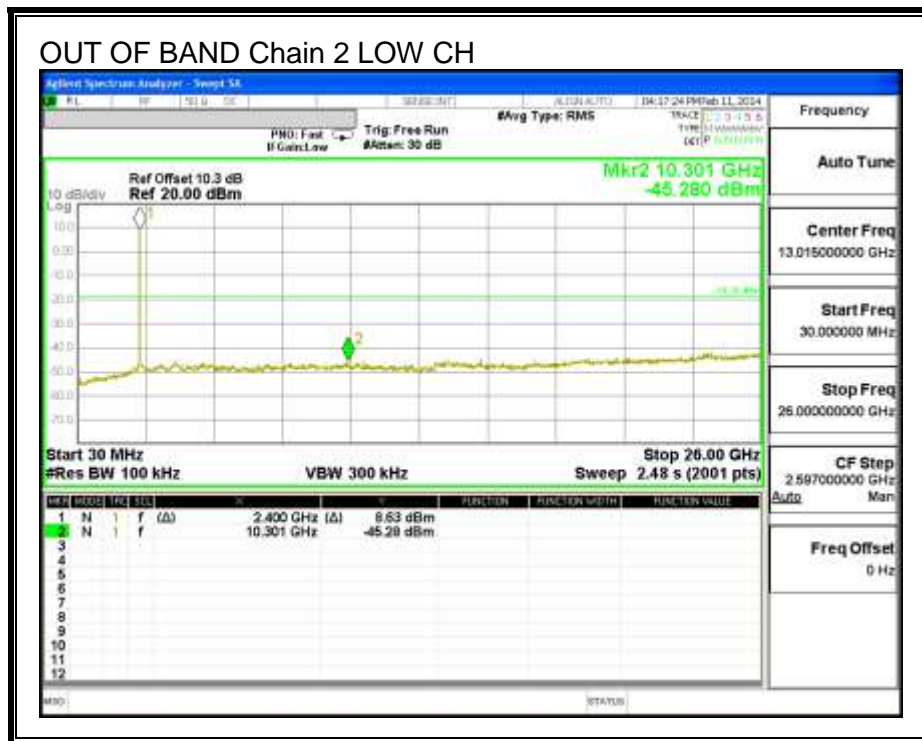
**LOW CHANNEL BANDEDGE, Chain 2**



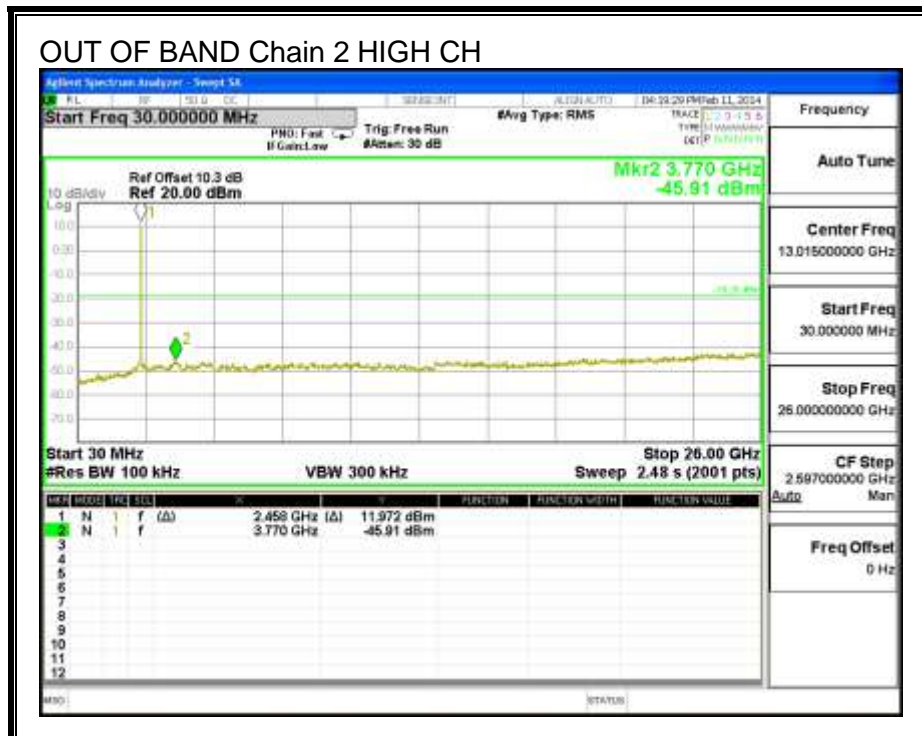
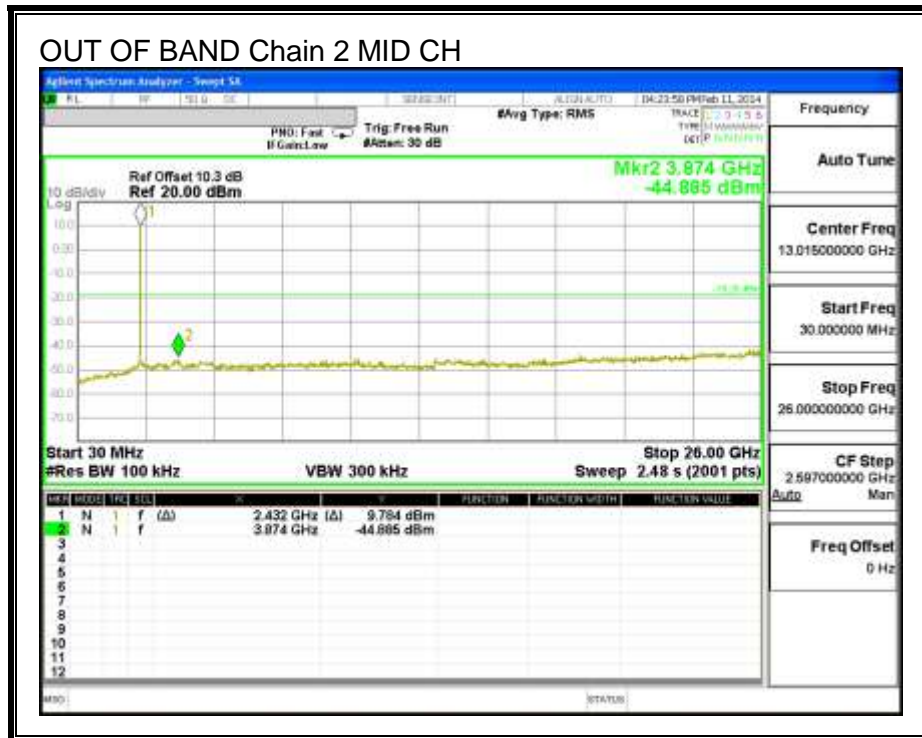
**HIGH CHANNEL BANDEDGE, Chain 2**



**OUT-OF-BAND EMISSIONS, Chain 2**







## 9. RADIATED TEST RESULTS

### 9.1. LIMITS AND PROCEDURE

#### LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

#### TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

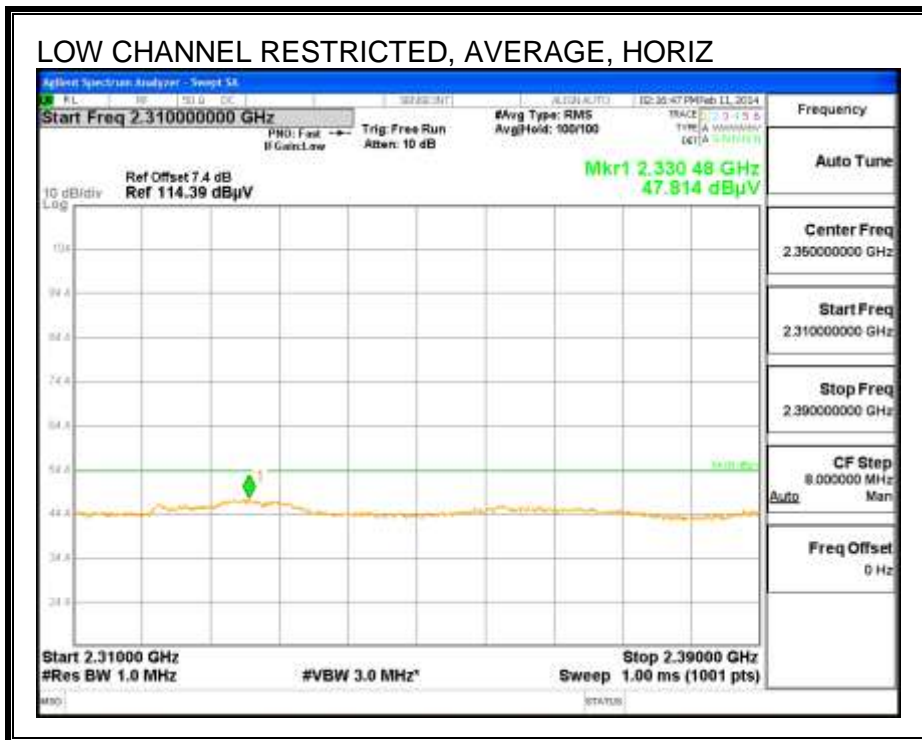
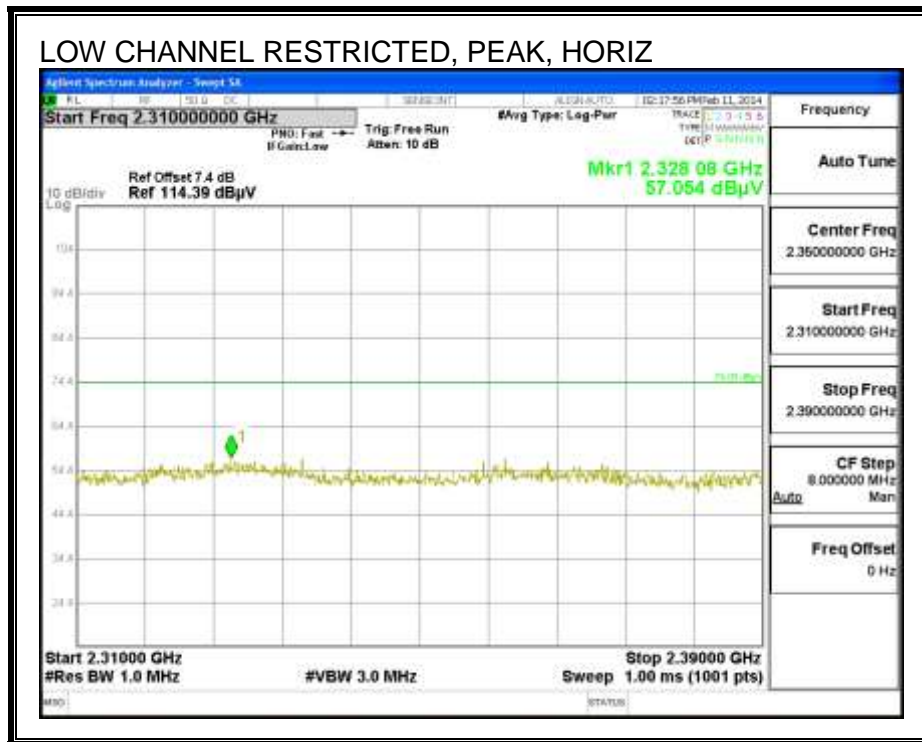
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

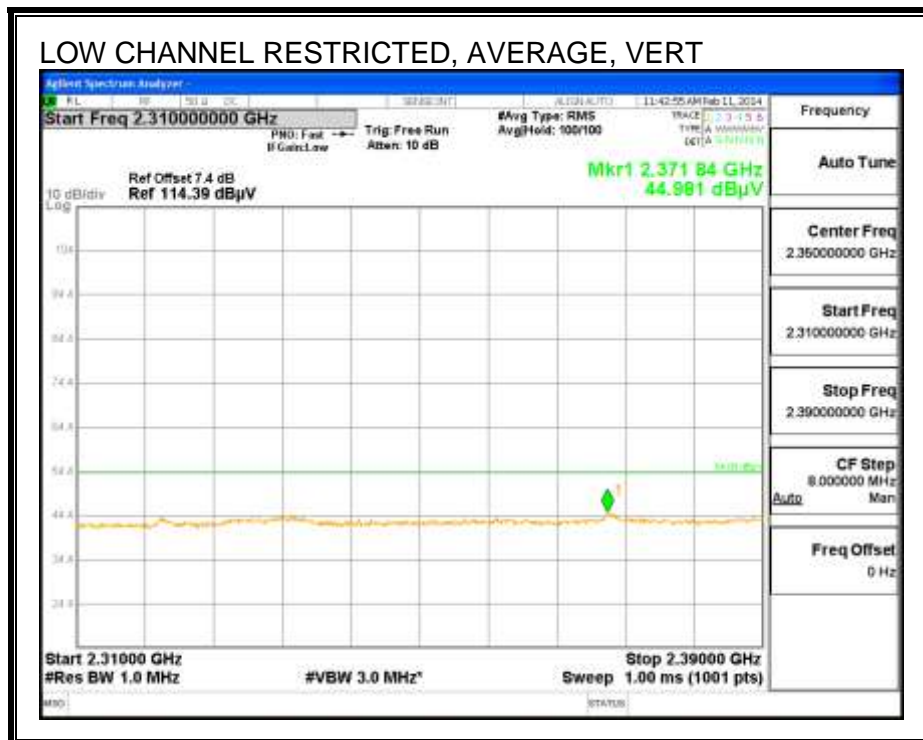
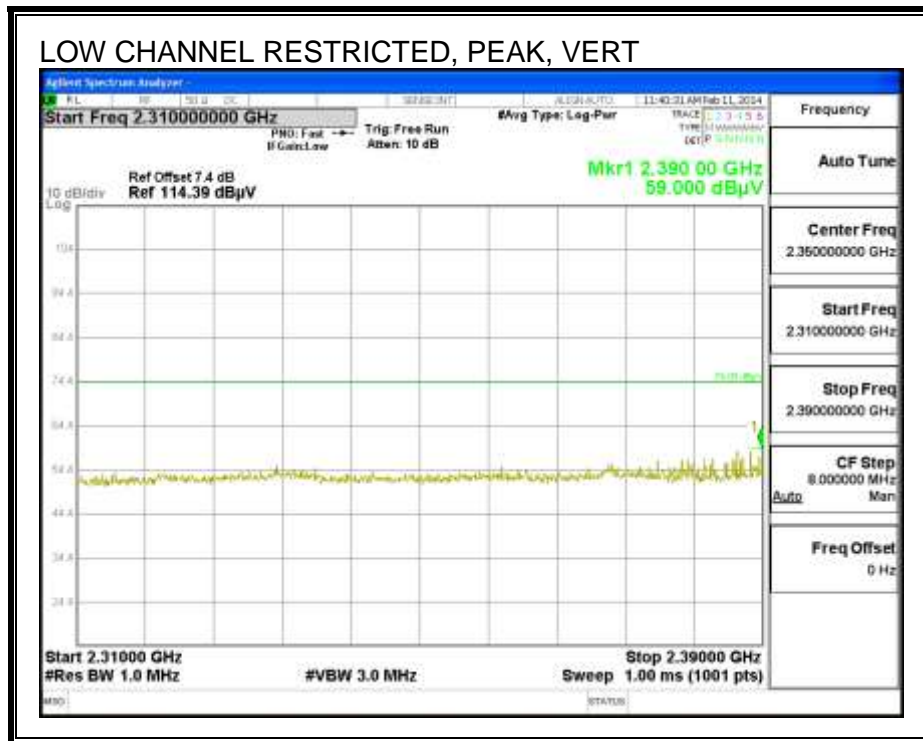
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

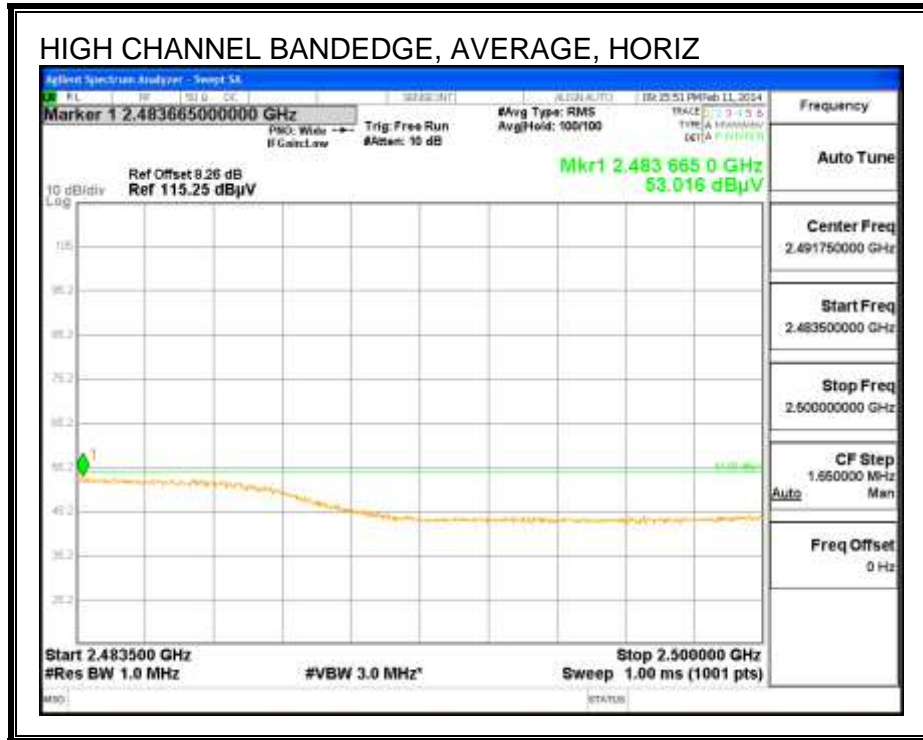
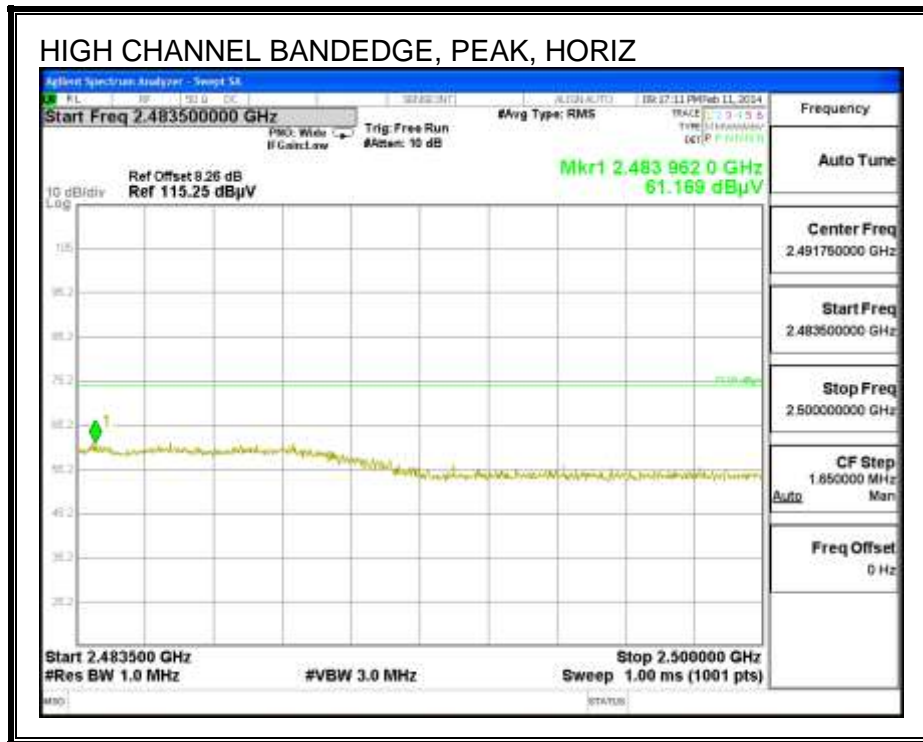
## 9.2. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

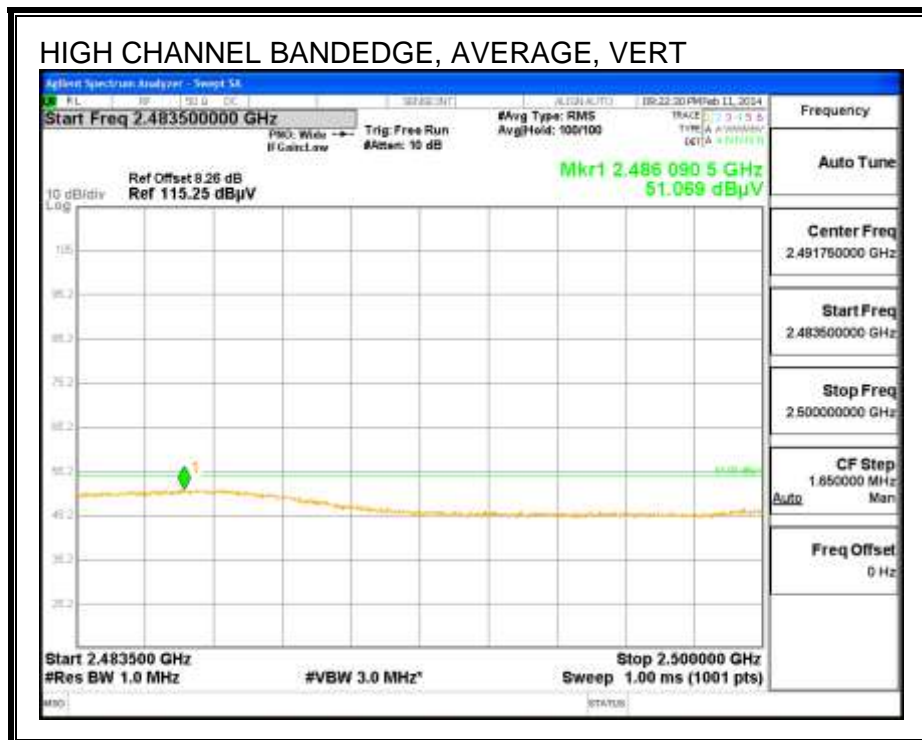
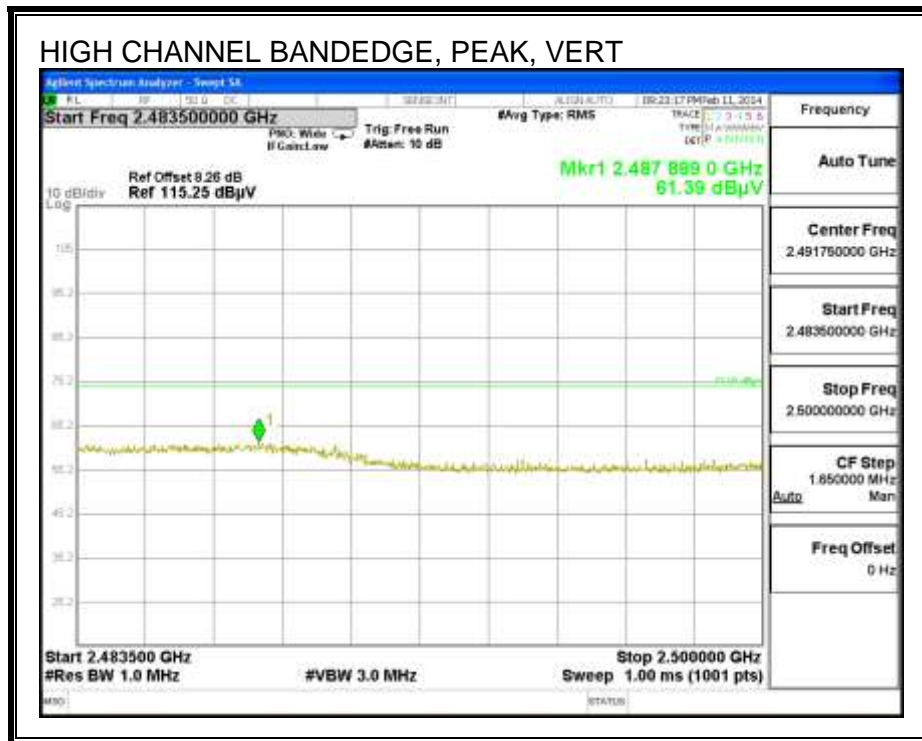
### RESTRICTED BANDEDGE (LOW CHANNEL)



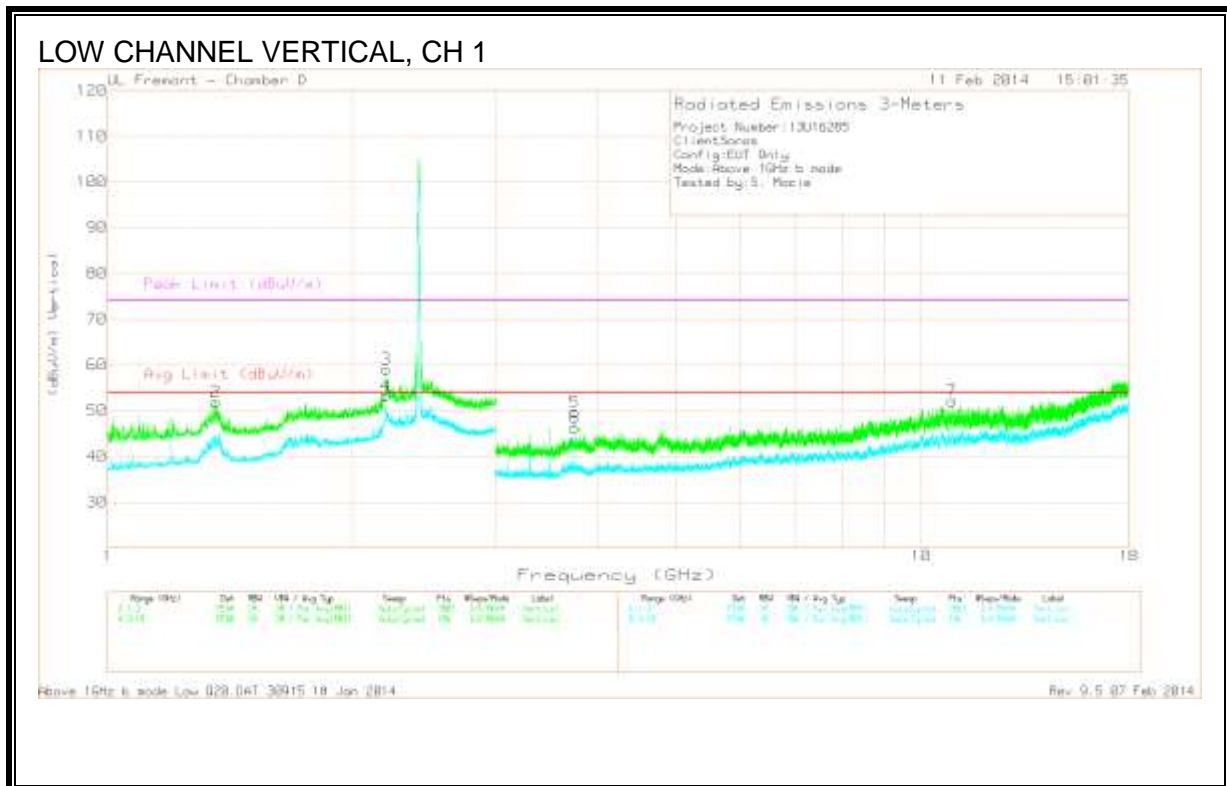
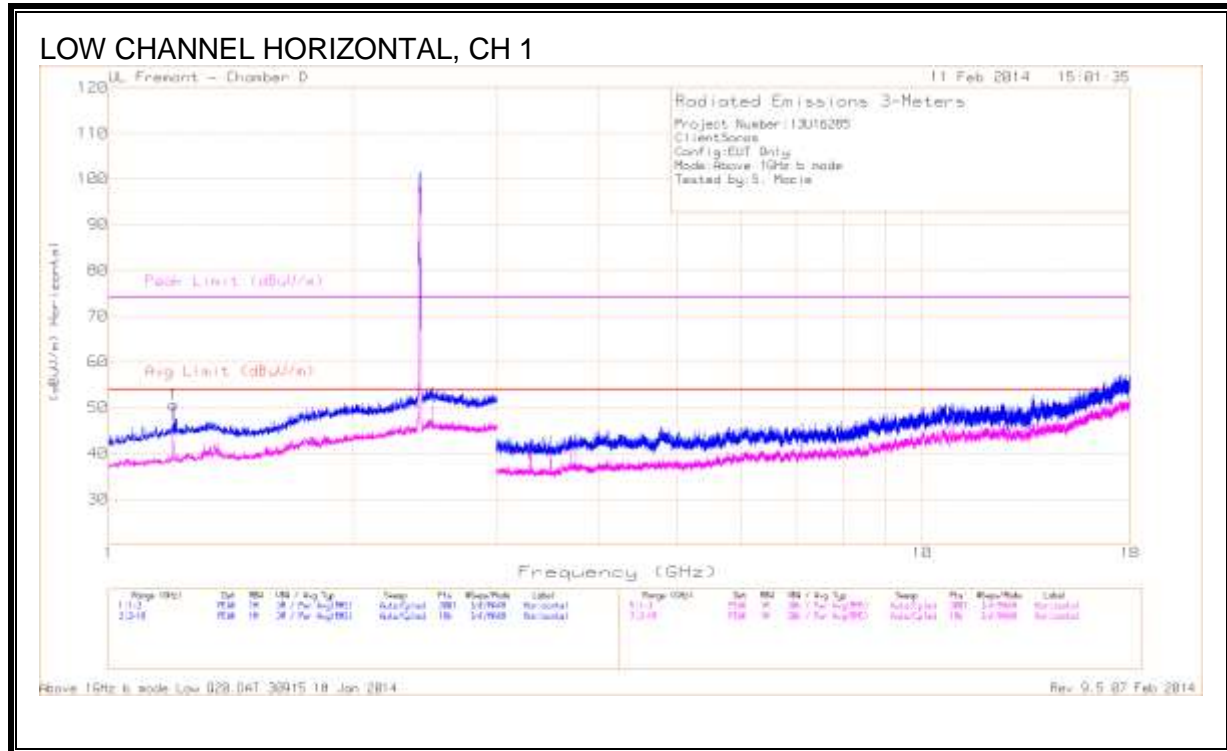


**AUTHORIZED BANDEGE (HIGH CHANNEL)**





**HARMONICS AND SPURIOUS EMISSIONS**



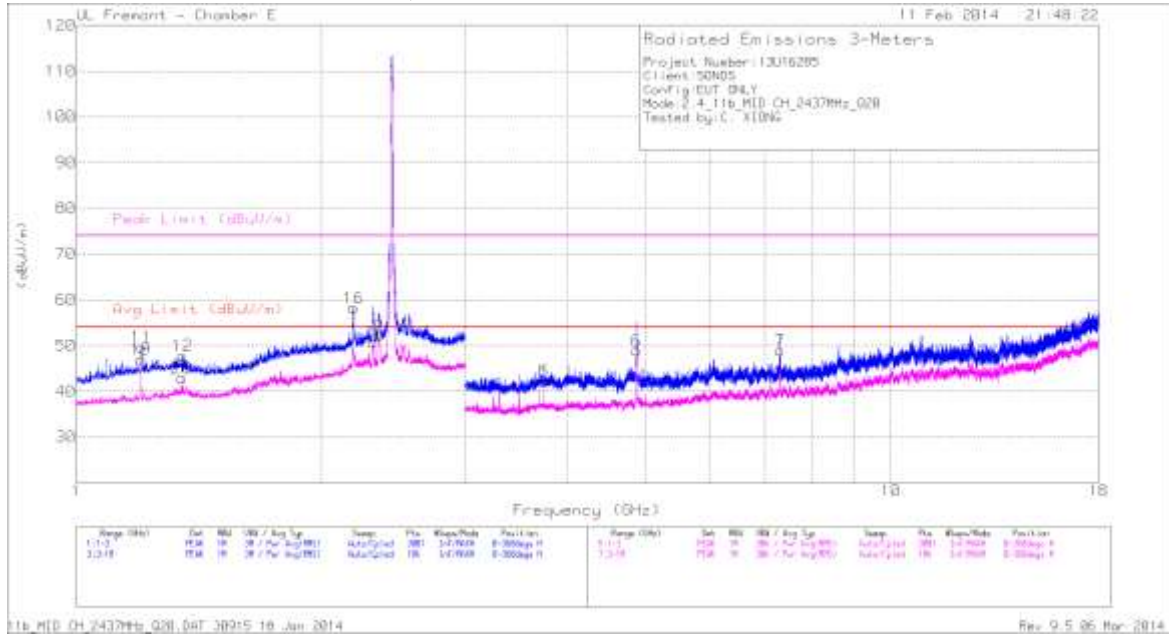
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbl/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.205	40.68	PK2	29	-27.6	42.08	-	-	74	-31.92	140	393	H
	* 1.209	30.31	MAv1	29	-27.6	31.71	53.97	-22.26	-	-	140	393	H
2	* 1.355	43.33	PK2	29	-26.8	45.53	-	-	74	-28.47	350	212	V
	* 1.351	32.83	MAv1	29	-26.8	35.03	53.97	-18.94	-	-	350	212	V
3	*2.198	50.4	PK2	32.3	-25.3	57.4	-	-	74	-16.6	246	125	V
4	*2.200	40.98	MAv1	32.3	-25.3	47.98	53.97	-5.99	-	-	246	125	V
5	* 3.749	40.62	PK2	33.7	-31.2	43.12	-	-	74	-30.88	20	318	V
6	* 3.750	33.77	MAv1	33.7	-31.2	36.27	53.97	-17.7	-	-	20	318	V
7	* 10.91	34.07	PK2	38.5	-23.9	48.67	-	-	74	-25.33	77	273	V
	* 10.913	23.6	MAv1	38.5	-23.8	38.3	53.97	-15.67	-	-	77	273	V

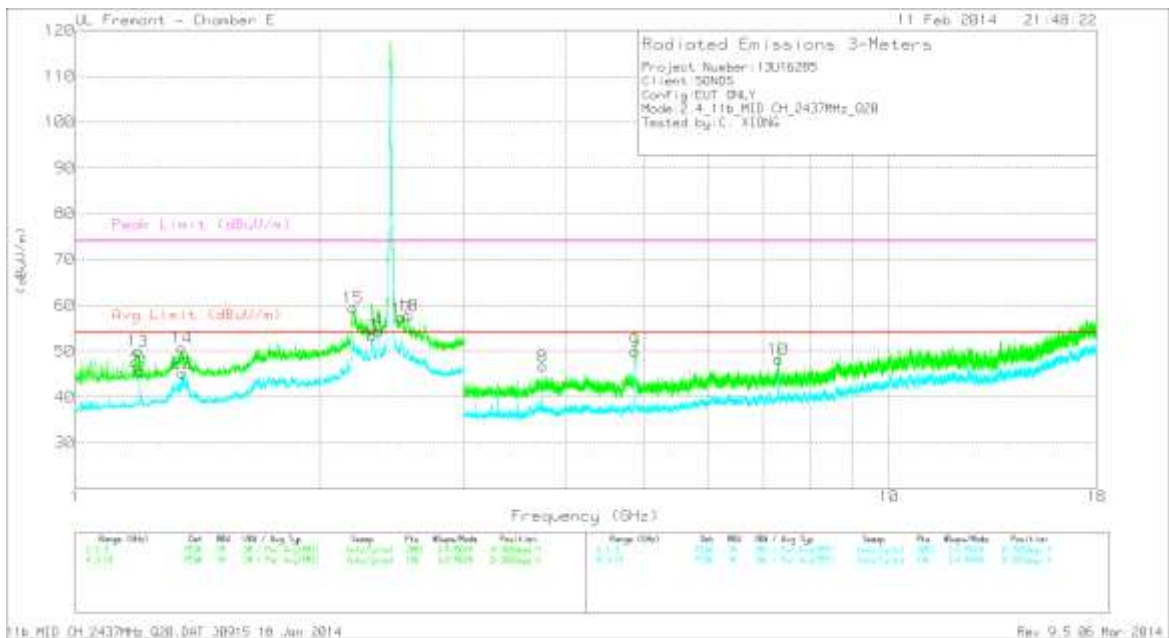
\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average



MID CHANNEL HORIZONTAL, CH 6



MID CHANNEL VERTICAL, CH 6

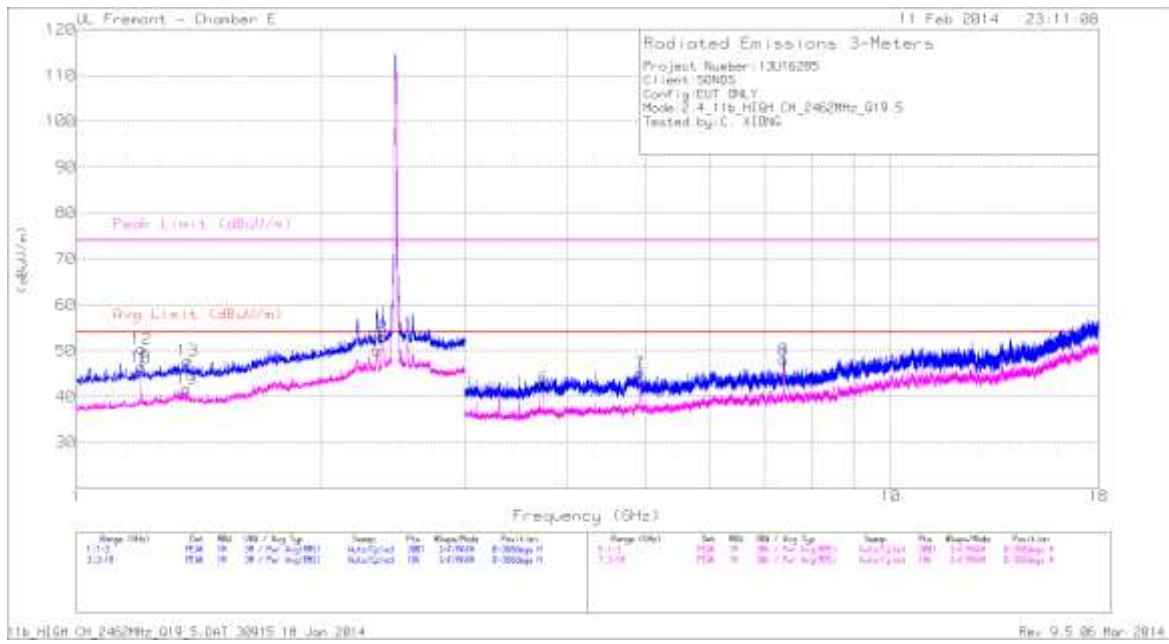


Trace Markers

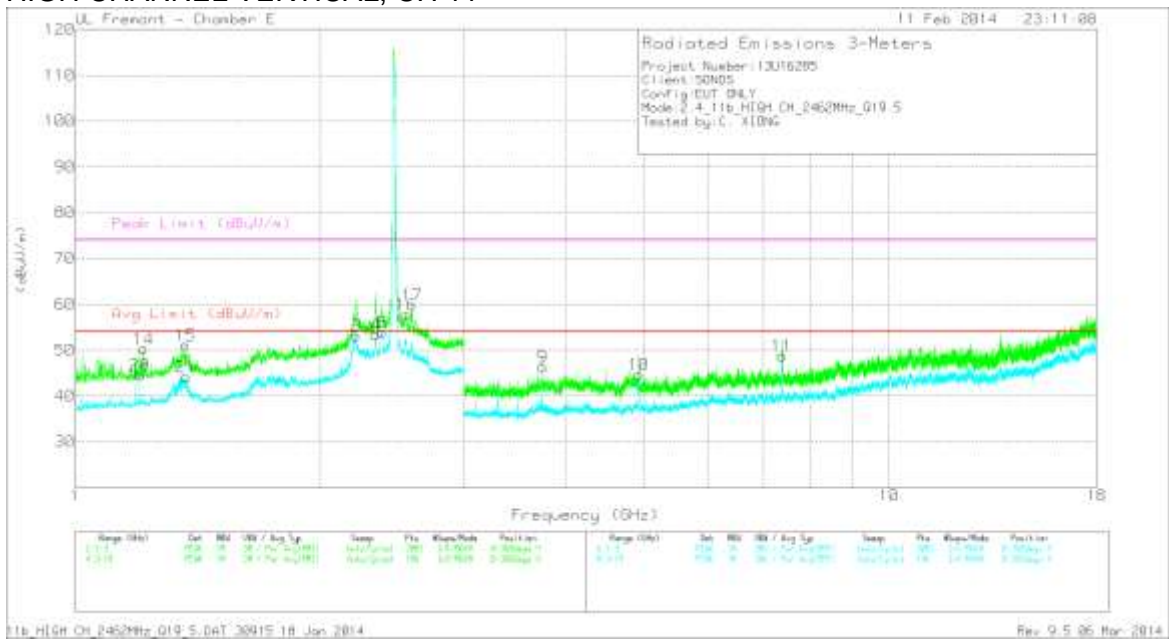
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cb/F ltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.313	48.16	PK2	32.5	-25.3	55.36	-	-	74	-18.64	250	104	H
	* 2.314	37.27	MAv1	32.5	-25.3	44.47	53.97	-9.5	-	-	250	104	H
2	* 2.35	50.38	PK2	32.5	-24.9	57.98	-	-	74	-16.02	264	132	H
	* 2.348	41.4	MAv1	32.5	-25	48.9	53.97	-5.07	-	-	264	132	H
3	* 2.314	54.61	PK2	32.5	-25.3	61.81	-	-	74	-12.19	247	121	V
	* 2.313	39.93	MAv1	32.5	-25.3	47.13	53.97	-6.84	-	-	247	121	V
4	* 2.356	52.82	PK2	32.5	-24.8	60.52	-	-	74	-13.48	246	135	V
	* 2.358	43.59	MAv1	32.5	-24.8	51.29	53.97	-2.68	-	-	246	135	V
5	* 3.75	39.68	Avg	33.7	-31.2	42.18	53.97	-11.79	-	-	0-360	199	H
6	* 4.874	53.13	PK2	34.4	-31	56.53	-	-	74	-17.47	300	217	H
	* 4.874	43.82	MAv1	34.4	-31	47.22	53.97	-6.75	-	-	300	217	H
7	* 7.309	48.67	PK2	36	-28.1	56.57	-	-	74	-17.43	294	160	H
	* 7.31	39.52	MAv1	36	-28.1	47.42	53.97	-6.55	-	-	294	160	H
8	* 3.75	44.2	Avg	33.7	-31.2	46.7	53.97	-7.27	-	-	0-360	200	V
9	* 4.874	53.26	PK2	34.4	-31	56.66	-	-	74	-17.34	4	200	V
	* 4.873	44.77	MAv1	34.4	-31	48.17	53.97	-5.8	-	-	4	200	V
10	* 7.309	48.47	PK2	36	-28.1	56.37	-	-	74	-17.63	338	259	V
	* 7.309	38.73	MAv1	36	-28.1	46.63	53.97	-7.34	-	-	338	259	V
11	* 1.201	48.28	PK	29	-27.6	49.68	-	-	74	-24.32	0-360	199	H
	* 1.2	45.69	Avg	29	-27.6	47.09	53.97	-6.88	-	-	0-360	199	H
12	* 1.348	45.61	PK	29	-26.8	47.81	-	-	74	-26.19	0-360	101	H
	* 1.347	40.58	Avg	29	-26.8	42.78	53.97	-11.19	-	-	0-360	101	H
13	* 1.194	48.55	PK	29	-27.6	49.95	-	-	74	-24.05	0-360	200	V
	* 1.2	44.32	Avg	29	-27.6	45.72	53.97	-8.25	-	-	0-360	101	V
14	* 1.351	48.49	PK	29	-26.8	50.69	-	-	74	-23.31	0-360	101	V
	* 1.354	43.07	Avg	29	-26.8	45.27	53.97	-8.7	-	-	0-360	101	V
15	2.192	52.49	PK	32.3	-25.3	59.49	-	-	68.2	-8.71	0-360	101	V
16	2.188	51.23	PK	32.3	-25.3	58.23	-	-	68.2	-9.97	0-360	101	H
17	2.516	48.98	PK	32.7	-24.4	57.28	-	-	68.2	-10.92	0-360	101	V
18	2.565	49.45	PK	32.8	-24.5	57.75	-	-	68.2	-10.45	0-360	101	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band  
 PK – Peak Detector  
 Avg - Video bandwidth < Resolution bandwidth  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average

### HIGH CHANNEL HORIZONTAL, CH 11



### HIGH CHANNEL VERTICAL, CH 11



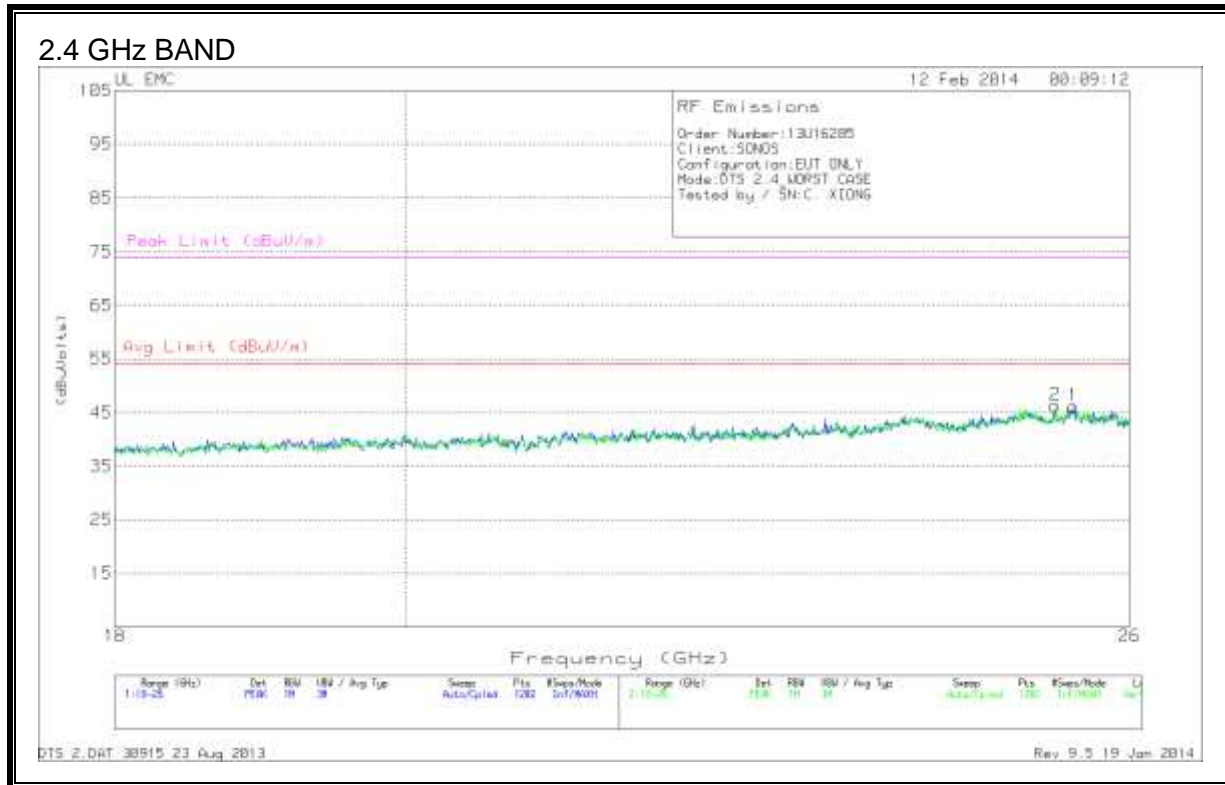
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T346 (dB/m)	Amp/Cbi/FI tr/Pad (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.338	53.19	PK2	32.5	-25.1	0	60.59	-	-	74	-13.41	239	102	H
	* 2.337	38.95	MAv1	32.5	-25.1	0	46.35	53.97	-7.62	-	-	239	102	H
2	* 2.376	52.13	PK2	32.6	-25	0	59.73	-	-	74	-14.27	46	135	H
	* 2.375	43.05	MAv1	32.5	-24.9	0	50.65	53.97	-3.32	-	-	46	135	H
3	* 2.21	55	PK2	32.4	-25.2	0	62.2	-	-	74	-11.8	230	104	V
	* 2.2	43.38	MAv1	32.3	-25.3	0	50.38	53.97	-3.59	-	-	230	104	V
4	* 2.336	55.47	PK2	32.5	-25.1	0	62.87	-	-	74	-11.13	182	156	V
	* 2.337	40.91	MAv1	32.5	-25.1	0	48.31	53.97	-5.66	-	-	182	156	V
5	* 2.379	51.89	PK2	32.6	-25	0	59.49	-	-	74	-14.51	178	216	V
	* 2.379	41.86	MAv1	32.6	-25	0	49.46	53.97	-4.51	-	-	178	216	V
6	* 3.75	39.36	Avg	33.7	-31.2	0	41.86	53.97	-12.11	-	-	0-360	199	H
7	* 4.923	41.43	Avg	34.4	-30.6	0	45.23	53.97	-8.74	-	-	0-360	199	H
8	* 7.388	46.26	PK2	36.1	-27.3	0	55.06	-	-	74	-18.94	284	253	H
	* 7.388	37.7	MAv1	36.1	-27.3	0	46.5	53.97	-7.47	-	-	284	253	H
9	* 3.75	43.85	Avg	33.7	-31.2	0	46.35	53.97	-7.62	-	-	0-360	200	V
10	* 4.924	40.84	Avg	34.4	-30.6	0	44.64	53.97	-9.33	-	-	0-360	200	V
11	* 7.387	46.16	PK2	36.1	-27.3	0	54.96	-	-	74	-19.04	360	268	V
	* 7.388	37.4	MAv1	36.1	-27.3	0	46.2	53.97	-7.77	-	-	360	268	V
12	* 1.201	49	PK	29	-27.6	0	50.4	-	-	74	-23.6	0-360	101	H
	* 1.2	44.86	Avg	29	-27.6	0	46.26	53.97	-7.71	-	-	0-360	200	H
13	* 1.37	45.63	PK	29	-26.7	0	47.93	-	-	74	-26.07	0-360	101	H
	* 1.365	39.44	Avg	29	-26.8	0	41.64	53.97	-12.33	-	-	0-360	101	H
14	* 1.211	48.86	PK	29	-27.6	0	50.26	-	-	74	-23.74	0-360	200	V
	* 1.199	43.18	Avg	29	-27.6	0	44.58	53.97	-9.39	-	-	0-360	200	V
15	* 1.365	48.83	PK	29	-26.8	0	51.03	-	-	74	-22.97	0-360	101	V
	* 1.367	41.91	Avg	29	-26.7	0	44.21	53.97	-9.76	-	-	0-360	101	V
16	2.551	49.35	PK	32.8	-24.4	0	57.75	-	-	68.2	-10.45	0-360	101	V
17	2.591	51.18	PK	32.9	-24.2	0	59.88	-	-	68.2	-8.32	0-360	101	V

\* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band  
 PK – Peak Detector  
 Avg - Video bandwidth < Resolution bandwidth  
 PK2 - KDB558074 Method: Maximum Peak  
 MAv1 - KDB558074 Option 1 Maximum RMS Average

### 9.3. WORST-CASE ABOVE 18 GHz

#### SPURIOUS EMISSIONS 18 TO 26 GHz (WORST-CASE CONFIGURATION, HORIZONTAL & VERTICAL)



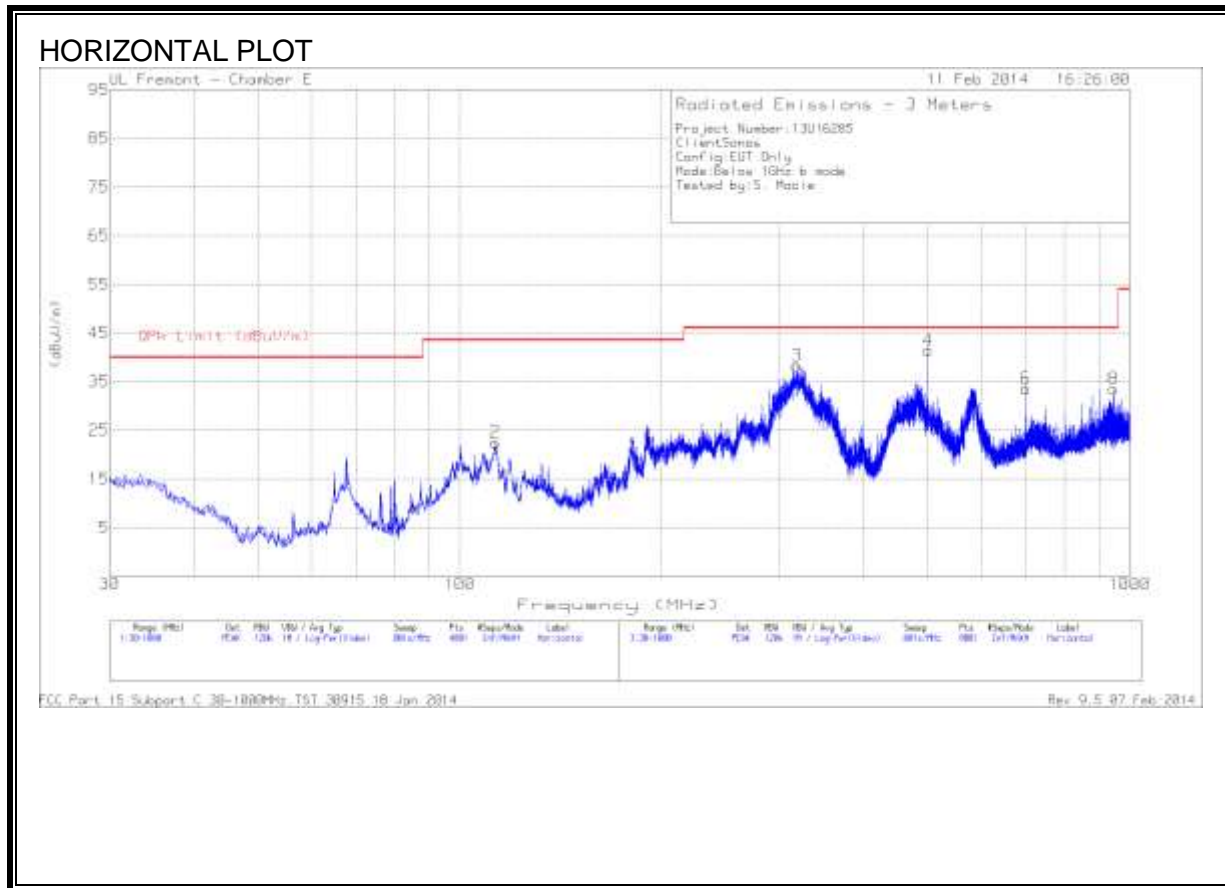
#### DATA

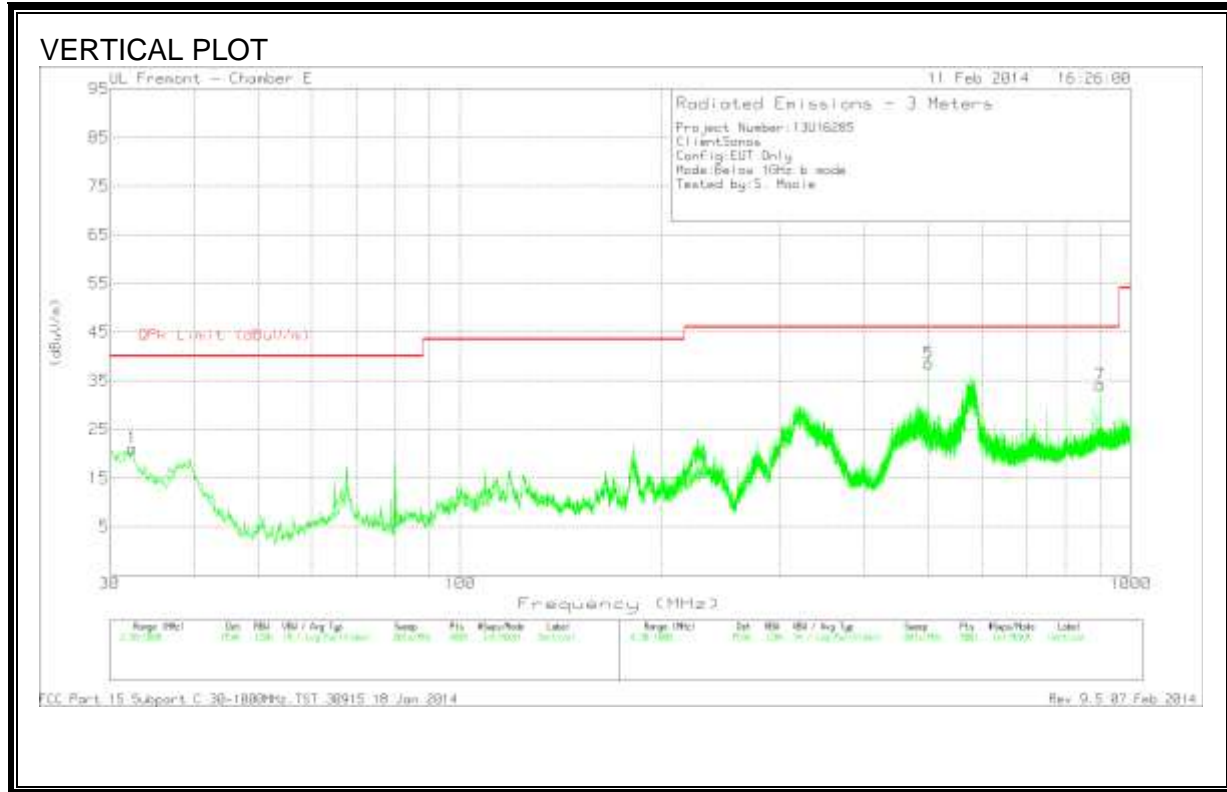
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T89 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	25.474	44.37	PK	34.1	-22.8	-9.5	46.17	54	-7.83	74	-27.83
2	25.307	44.43	PK	33.9	-22.5	-9.5	46.33	54	-7.67	74	-27.67

PK - Peak detector  
 DTS 2.DAT 30915 23 Aug 2013 Rev 9.5 19 Jan 2014

### 9.4. WORST-CASE BELOW 1 GHz

#### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)





Trace Markers

Marker	Frequenc y (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Correcte d Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	32.425	33.64	PK	19.3	-31.9	21.04	40	-18.96	0-360	100	V
2	112.935	40.82	PK	12.9	-31.2	22.52	43.52	-21.00	0-360	301	H
3	318.575	54.83	PK	13.8	-30.3	38.33	46.02	-7.69	0-360	100	H
4	499.9637	52.76	QP	17.8	-29.7	40.86	46.02	-5.16	230	156	H
5	499.965	50.49	PK	17.8	-29.7	38.59	46.02	-7.43	0-360	201	V
6	699.9063	43.17	PK	19.7	-29.3	33.57	46.02	-12.45	0-360	100	H
7	899.9688	39.96	PK	22.5	-28.4	34.06	46.02	-11.96	0-360	100	V
8	946.5288	39.1	PK	22.2	-27.8	33.5	46.02	-12.52	0-360	100	H

PK - Peak detector  
 QP - Quasi-Peak detector

## 10. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

### TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.



**RESULTS**

**6 WORST EMISSIONS**

**Line-L1 .15 - 30MHz**

**Trace Markers**

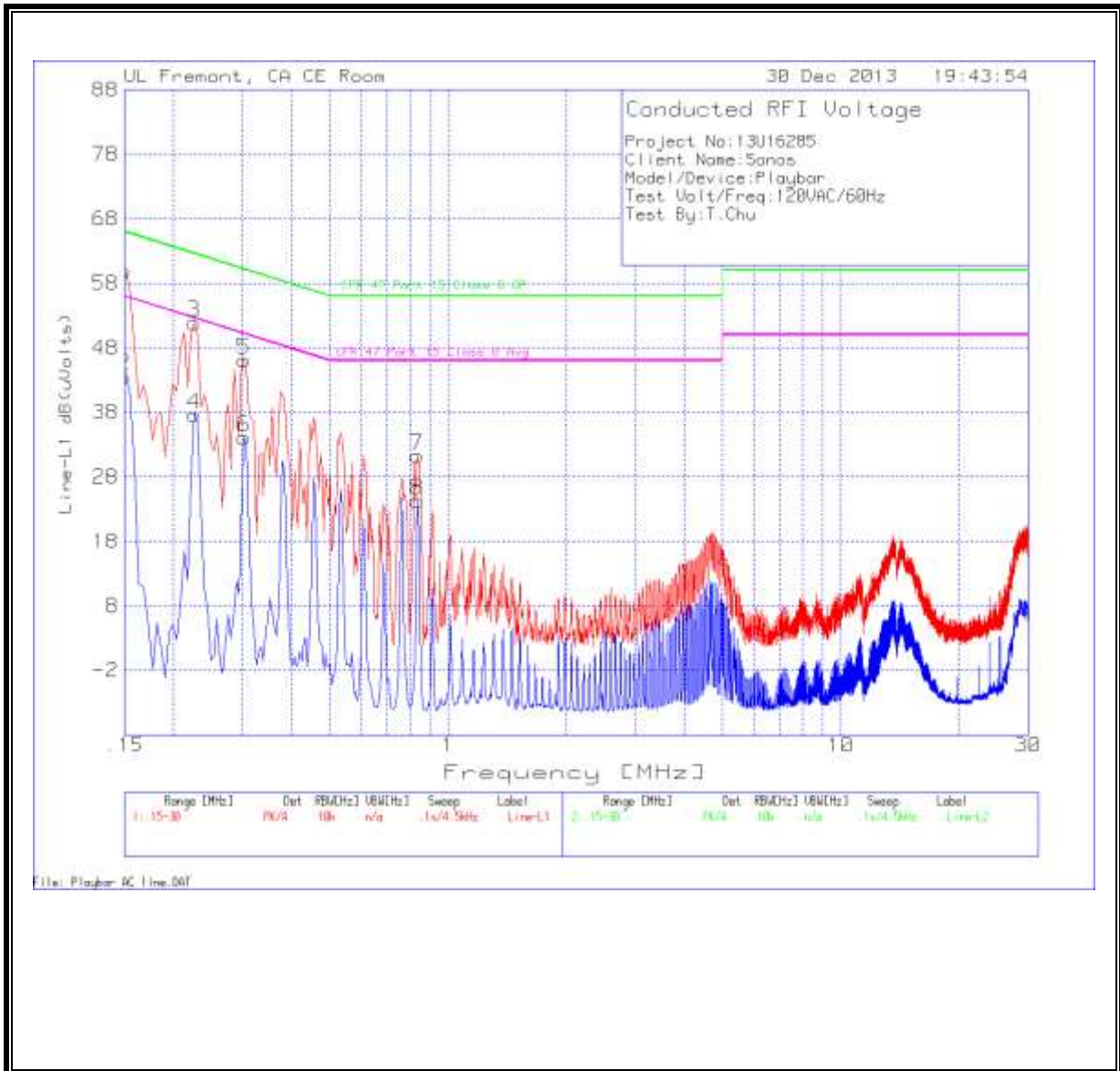
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
1	.15	59.78	PK	.1	0	59.88	66	-6.12	-	-
2	.15	43.55	Av	.1	0	43.65	-	-	56	-12.35
3	.2265	51.77	PK	.1	0	51.87	62.6	-10.73	-	-
4	.2265	37.55	Av	.1	0	37.65	-	-	52.6	-14.95
5	.303	46	PK	.1	0	46.1	60.2	-14.1	-	-
6	.303	34.04	Av	.1	0	34.14	-	-	50.2	-16.06
7	.8385	31.18	PK	.1	0	31.28	56	-24.72	-	-
8	.8385	24.21	Av	.1	0	24.31	-	-	46	-21.69

**Line-L2 .15 - 30MHz**

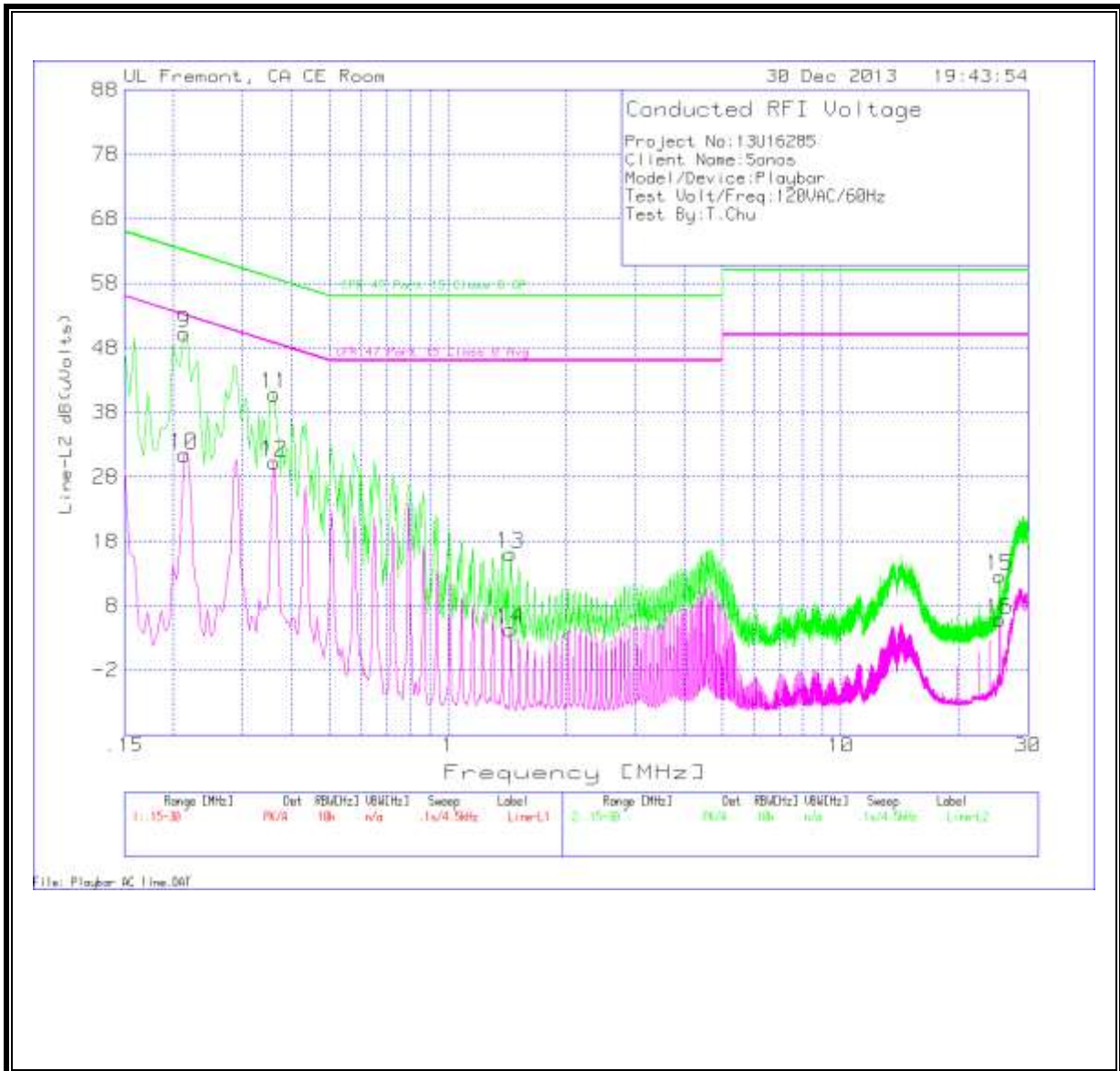
**Trace Markers**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
9	.213	50.1	PK	.1	0	50.2	63.1	-12.9	-	-
10	.213	31.27	Av	.1	0	31.37	-	-	53.1	-21.73
11	.3615	40.71	PK	.1	0	40.81	58.7	-17.89	-	-
12	.3615	30.09	Av	.1	0	30.19	-	-	48.7	-18.51
13	1.446	15.81	PK	.1	.1	16.01	56	-39.99	-	-
14	1.446	4.18	Av	.1	.1	4.38	-	-	46	-41.62
15	25.3995	11.83	PK	.5	.3	12.63	60	-47.37	-	-
16	25.3995	5.02	Av	.5	.3	5.82	-	-	50	-44.18

**LINE 1 RESULTS**



**LINE 2 RESULTS**



## 11. POWER SETTINGS

Frequency(MHz)	Power setting (Q)
2412	20
2437	20
2462	19.5