



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

FOR

802.11A/B/G/N MINI PCIE CARD INSIDE CLIENT DEVICE

MODEL NUMBER: PLAY:3

**FCC ID: SBVRM004
IC: 5373A-RM004**

REPORT NUMBER: 13U16283-1

ISSUE DATE: FEBRUARY 17, 2014

Prepared for
**SONOS, INC.
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	02/17/14	Initial Issue	G. Quizon

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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: 802.11A/B/G/N MINI PCIE CARD INSIDE CLIENT DEVICETYPE

MODEL: PLAY:3

SERIAL NUMBER: CONDUCTED: 1308000E58FD27FA1/ 1011000E5870014E7
RADIATED: 1111000E587BD2BCE

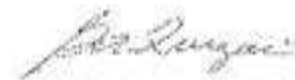
DATE TESTED: NOVEMBER 23 – FEBRUARY 11, 2014

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:



GEORGE QUIZON
WISE PROJECT LEADER
UL Verification Services Inc.

Tested By:



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
☐ Chamber A	☒ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☐ Chamber F

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at www.UL.com.

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 is an 802.11a/b/g/n mini pcie card inside client device.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

This is a Class II permissive change project, adding 802.11b mode, 3x3. The original report was issued Bureau Veritas Consumer Products Services (H.K.) Ltd.

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	27.89	615.18

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

There are three antennas provided to this EUT, please refer to the following table:

Transmitter	Manufacturer	Model name	2.4G Antenna gain (dBi)	Antenna Type	Connector
Chain (0) Antenna (1)	WHA YU INDUSTRIAL CO., LTD.	N/A	6.4	PCB	I-PEX
Chain (1) Antenna (2)	WHA YU INDUSTRIAL CO., LTD.	N/A	5.49	PCB	I-PEX
Chain (2) Antenna (3)	WHA YU INDUSTRIAL CO., LTD.	N/A	2.74	PCB	I-PEX

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Atheros Radio Test 2 (ART2-GUI).

5.6. WORST-CASE CONFIGURATION AND MODE

For Radiated Emissions below 1 GHz and Power line Conducted Emissions, the channel with the highest conducted output power was selected as worst-case scenario.

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

For 11b 20MHz mode: 24Mbps

The orientation of the EUT was X orientation; Therefore, all final radiated emissions were performed with the EUT laid in the X orientation.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	32492FU	R9-3V9YR 10/05	QDS-BRCM1046
Laptop AC Adapter	Lenovo	ADLX65NCT2A	5N0323Z1Z6ZH34A	DoC
Router	Netgear	FS105	1D52163D0AADA	N10947
Router AC adapter	Netgear	MU08A9075100-A1	332-10239-01	DoC

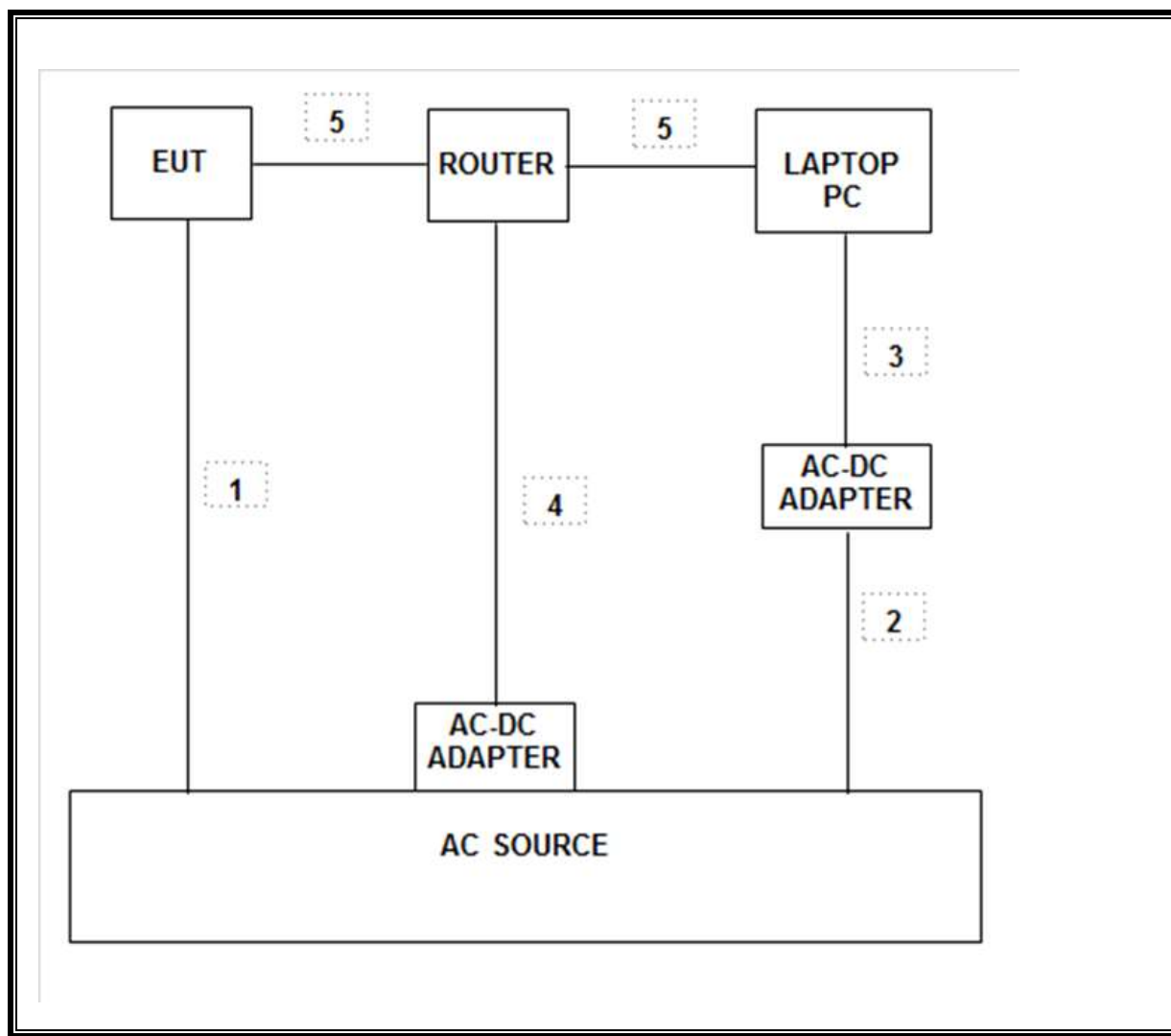
I/O CABLES

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	DC	1	DC	Un-shielded	1.8m	N/A
5	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	02/19/14
Horn Antenna 1-18GHz	ETS Lindgren	3117	F00133	02/19/14
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
Preamplifier, 1-18GHz	Miteq	-	F00352	08/30/14
Preamplifier, 1-18GHz	Miteq	-	F00353	08/24/14
Spectrum Analyzer, 3Hz-44GHz	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)
2.4GHz Band						
802.11b 1TX	8.383	8.550	0.980	98.05%	0.00	0.010

7.2. MEASUREMENT METHODS

6 dB BW: KDB 558074 D01

Output Power: KDB 558074 D01

Power Spectral Density: KDB 558074

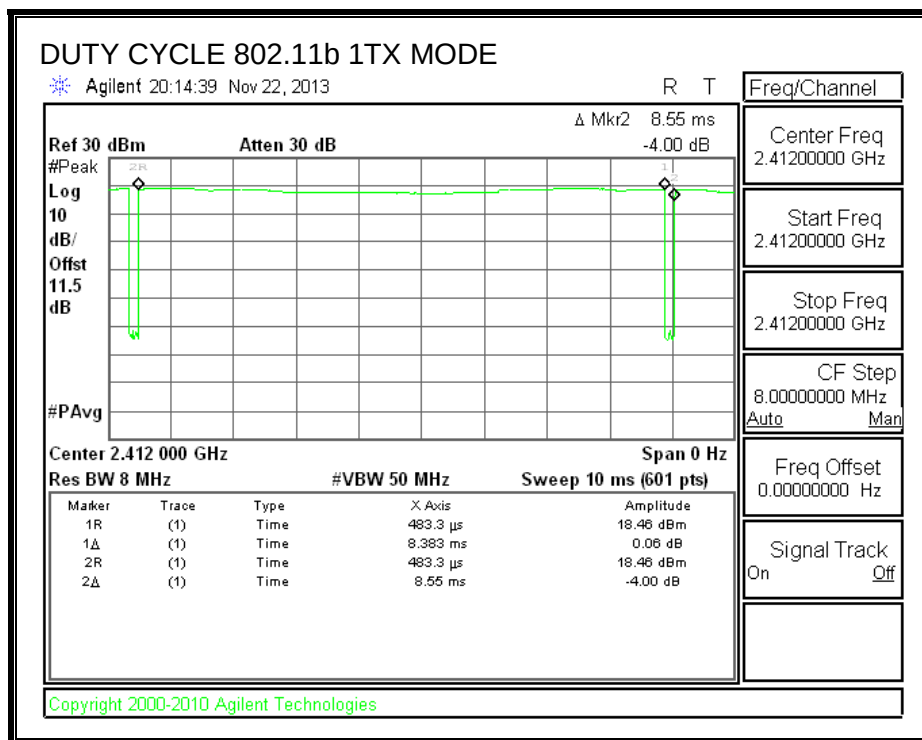
Out-of-band emissions in non-restricted bands: KDB 558074 D01

Out-of-band emissions in restricted bands: KDB

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)

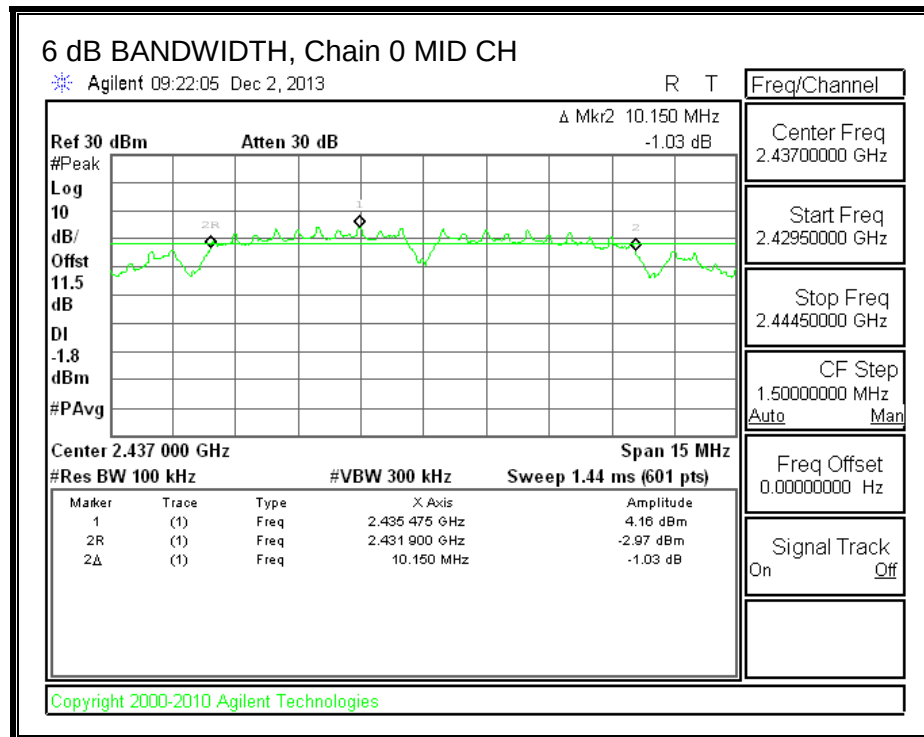
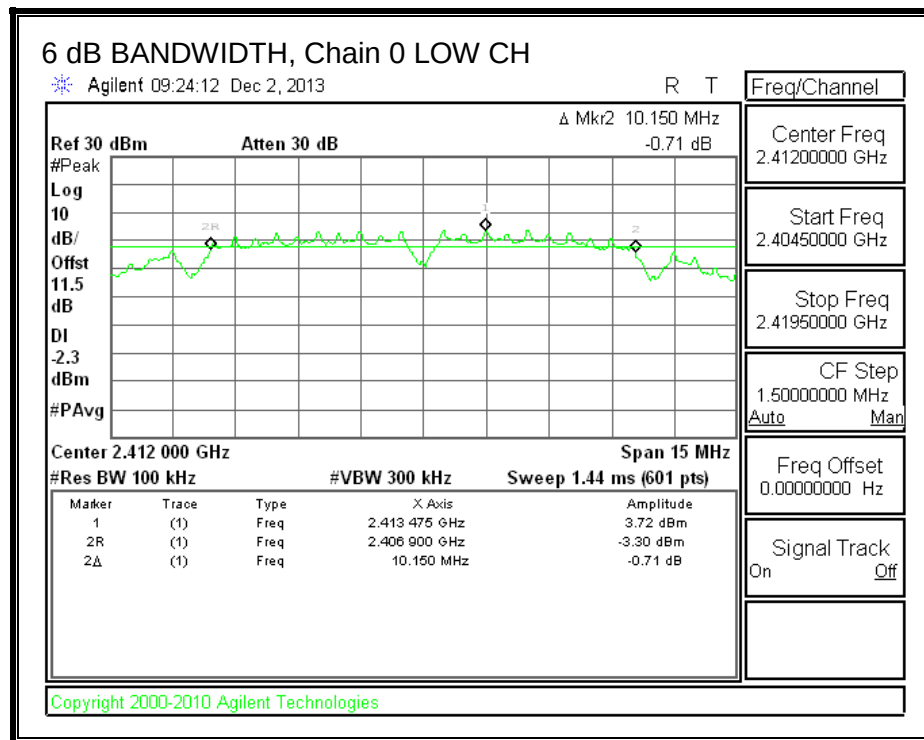
IC RSS-210 A8.2 (a)

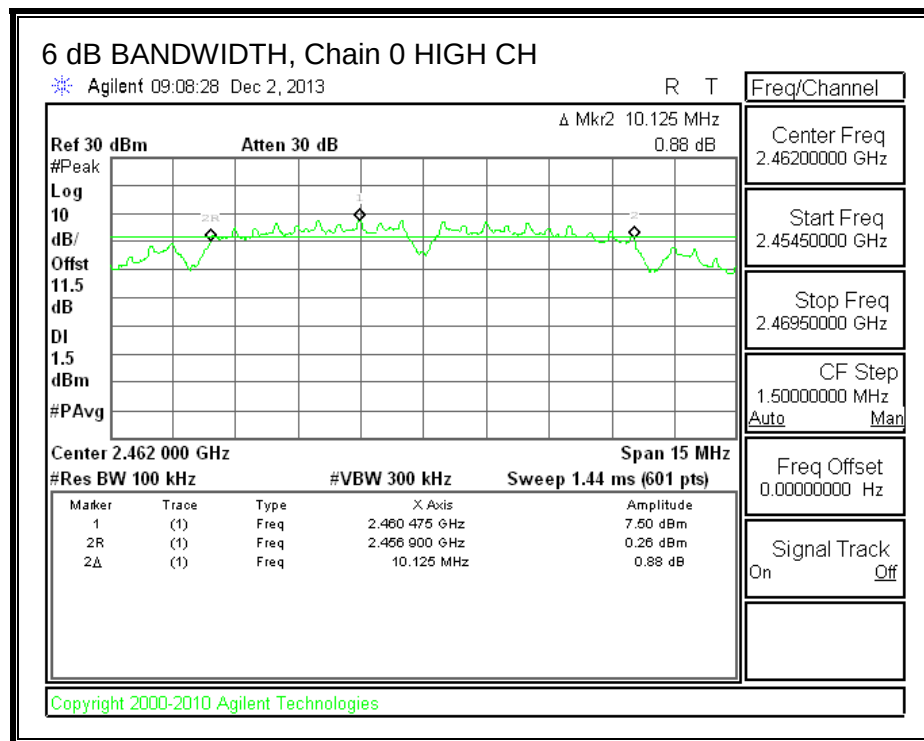
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

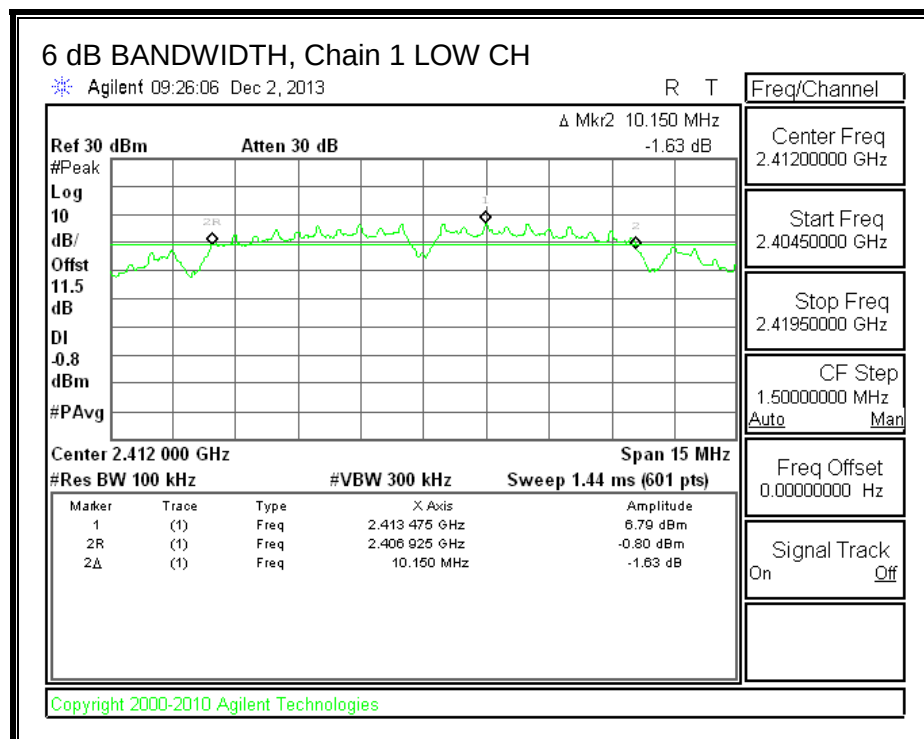
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	6 dB BW Chain 2 (MHz)	Minimum Limit (MHz)
Low	2412	10.150	10.150	10.125	0.5
Mid	2437	10.150	10.125	10.175	0.5
High	2462	10.125	9.650	10.075	0.5

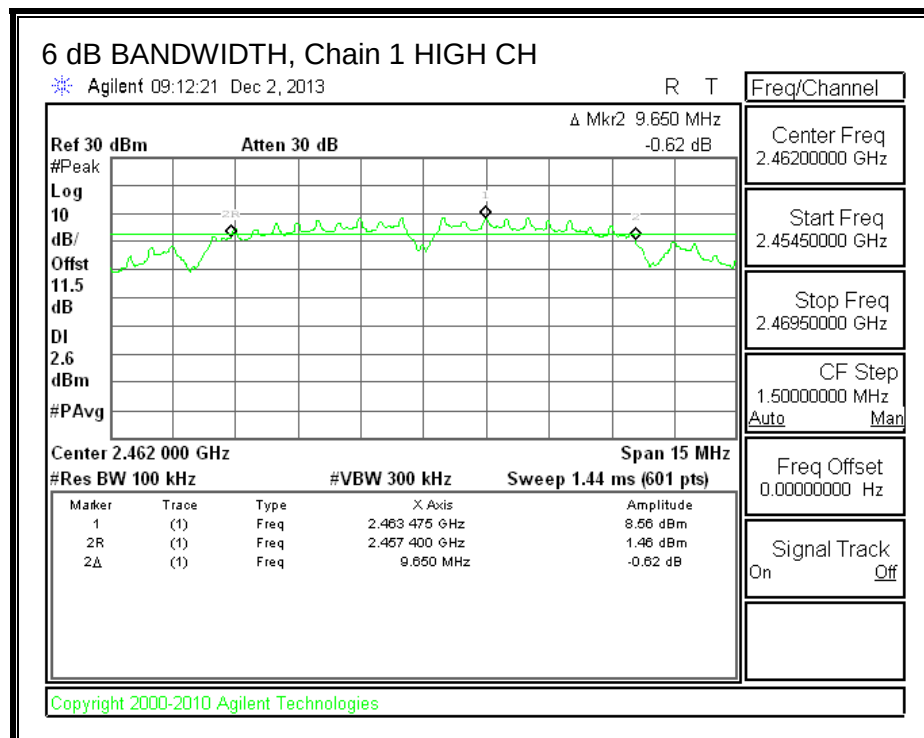
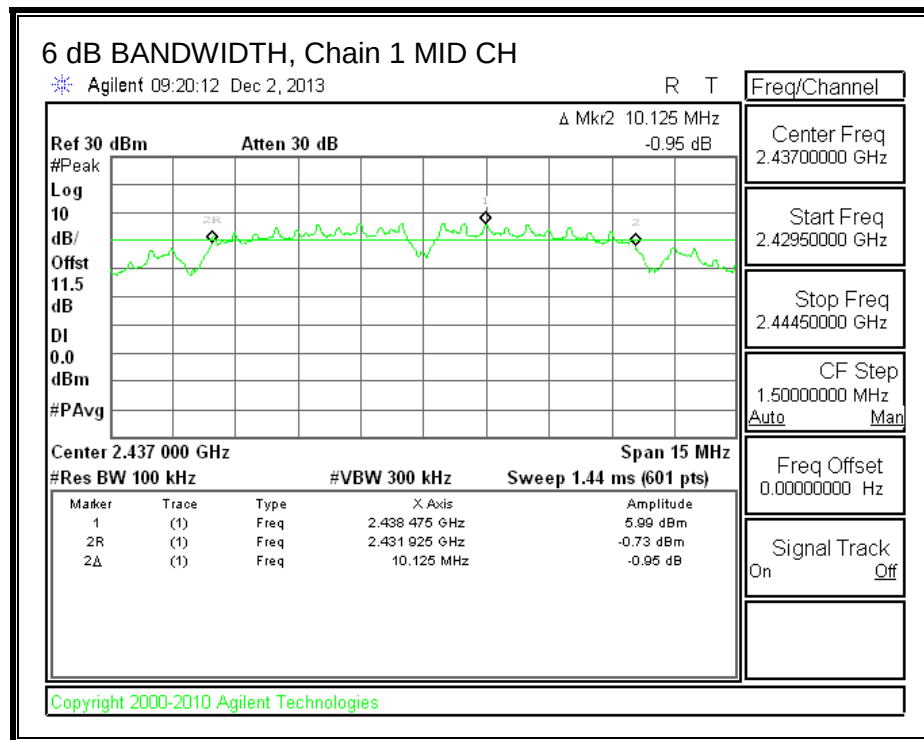
6 dB BANDWIDTH, CHAIN 0



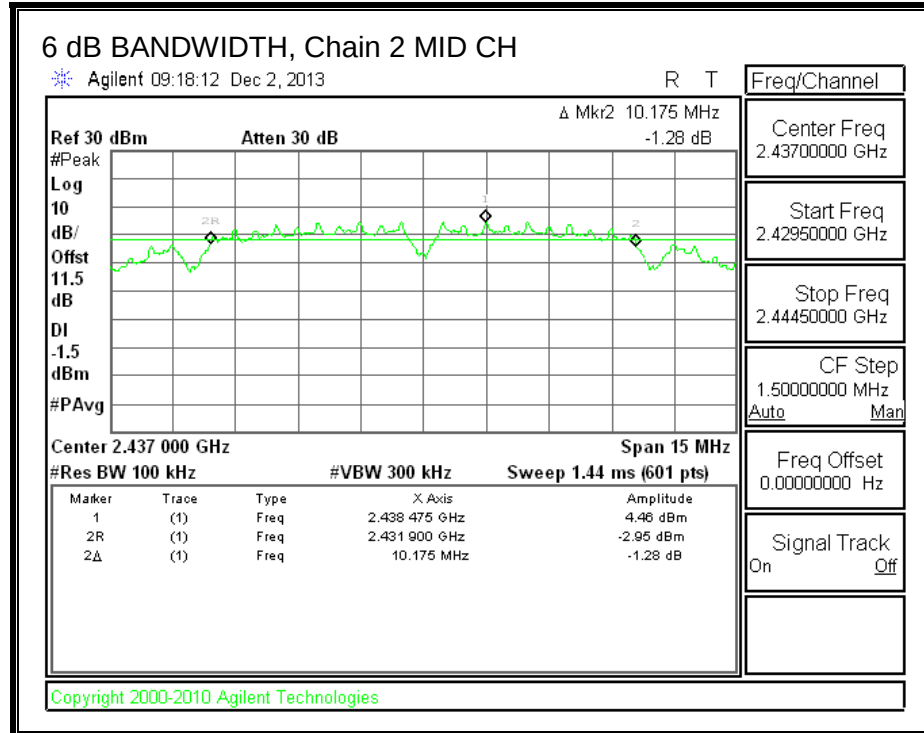
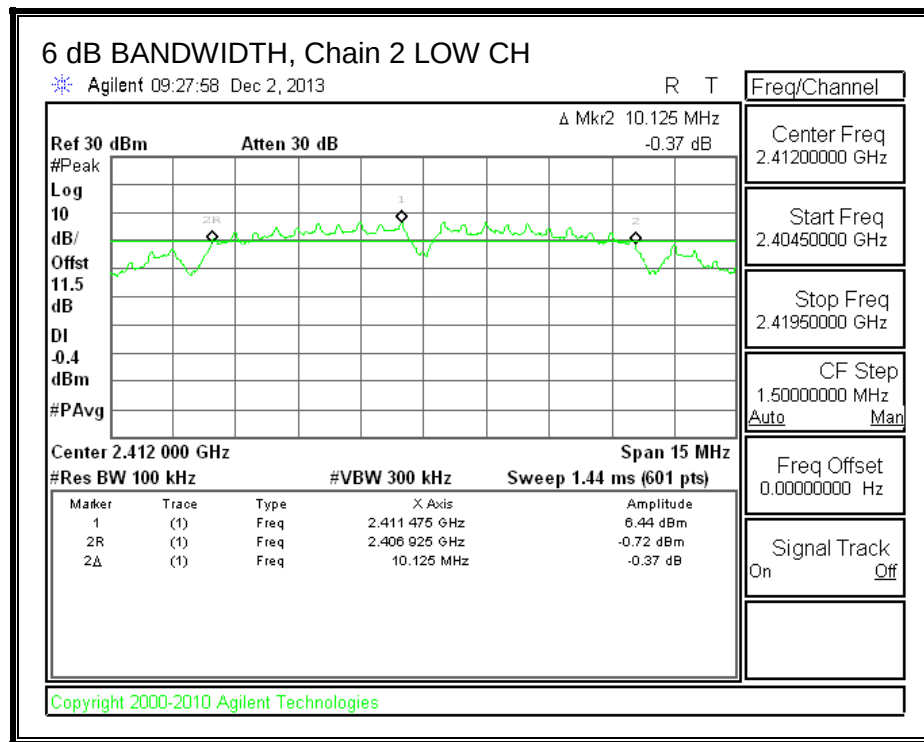


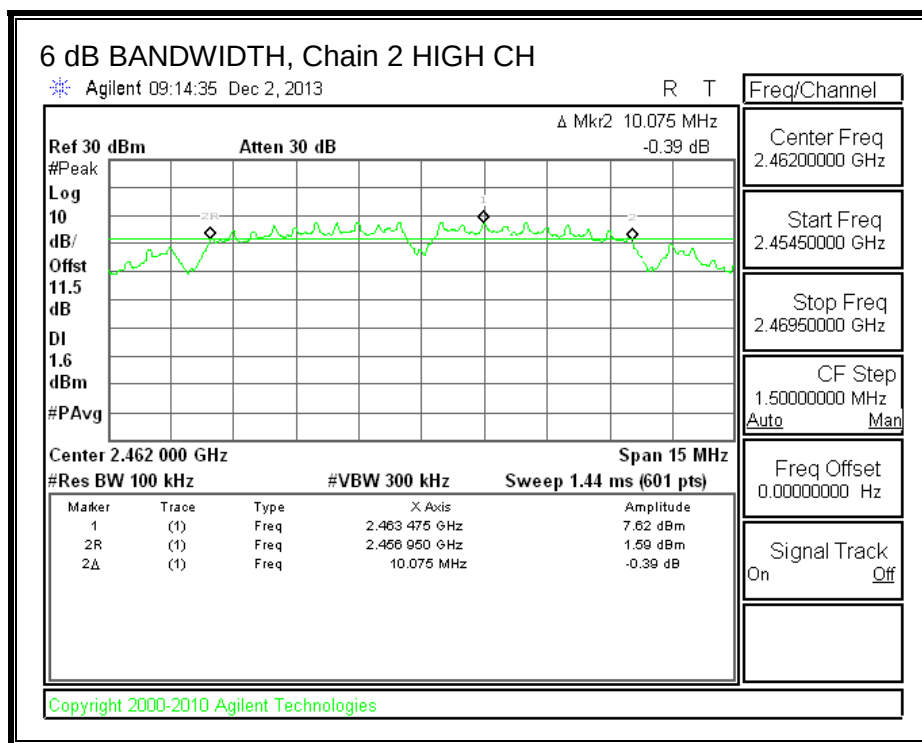
6 dB BANDWIDTH, CHAIN 1





6 dB BANDWIDTH, CHAIN 2





8.1.2. 99% BANDWIDTH

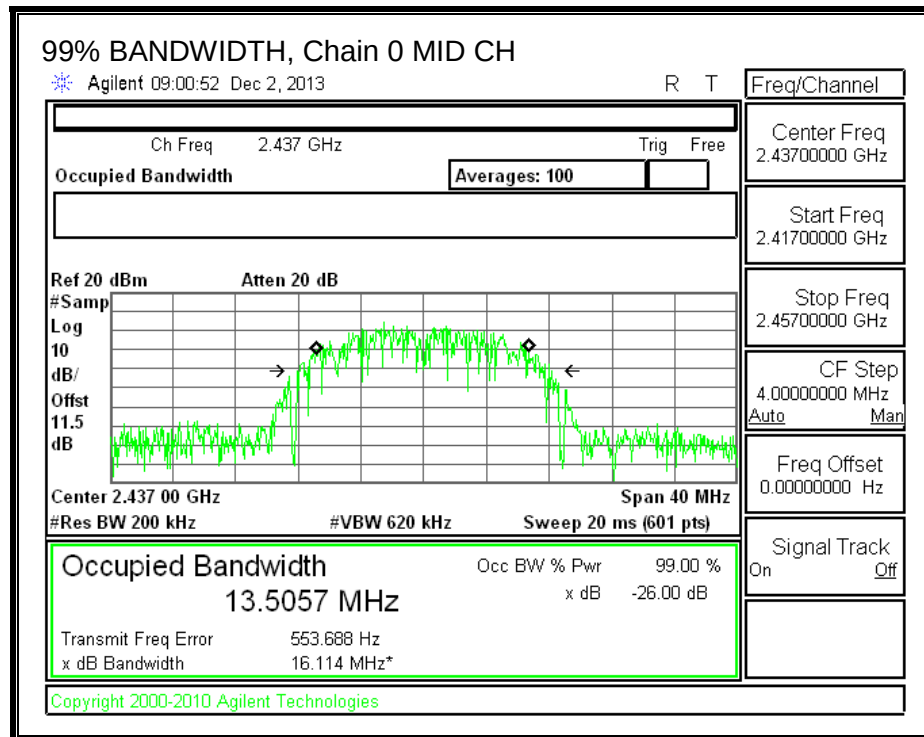
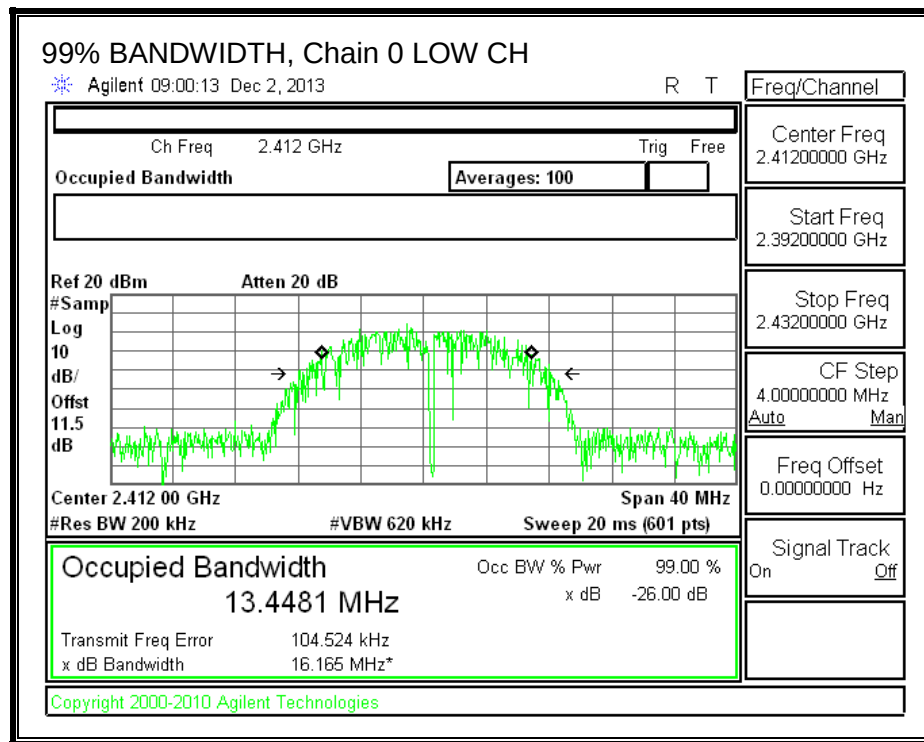
LIMITS

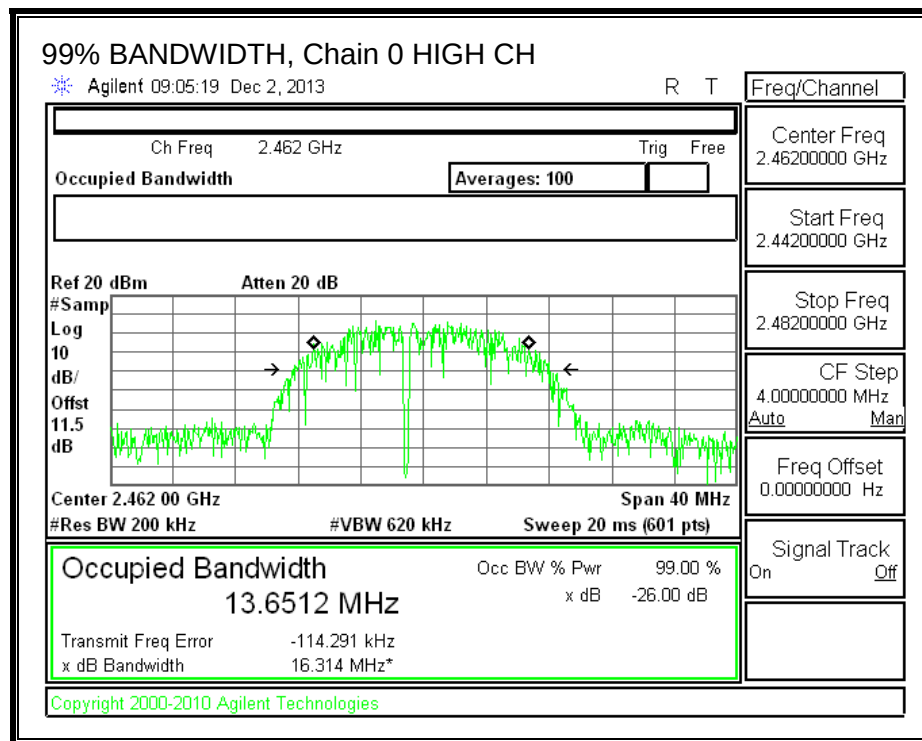
None; for reporting purposes only.

RESULTS

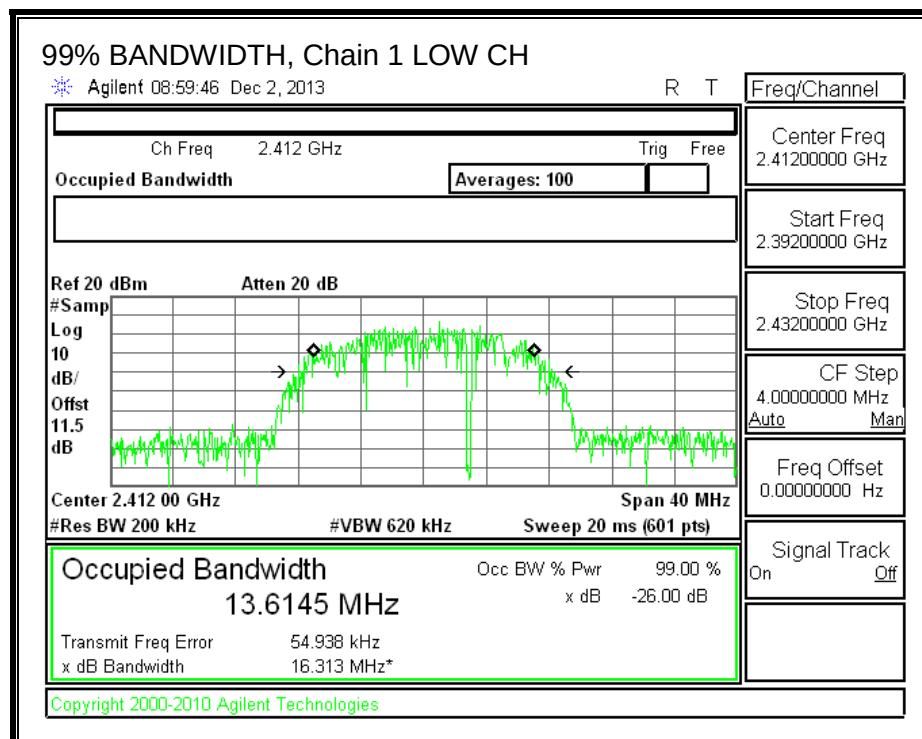
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)	99% BW Chain 2 (MHz)
Low	2412	13.4481	13.6145	13.5978
Mid	2437	13.5057	13.4910	13.5069
High	2462	13.6512	13.3892	13.3947

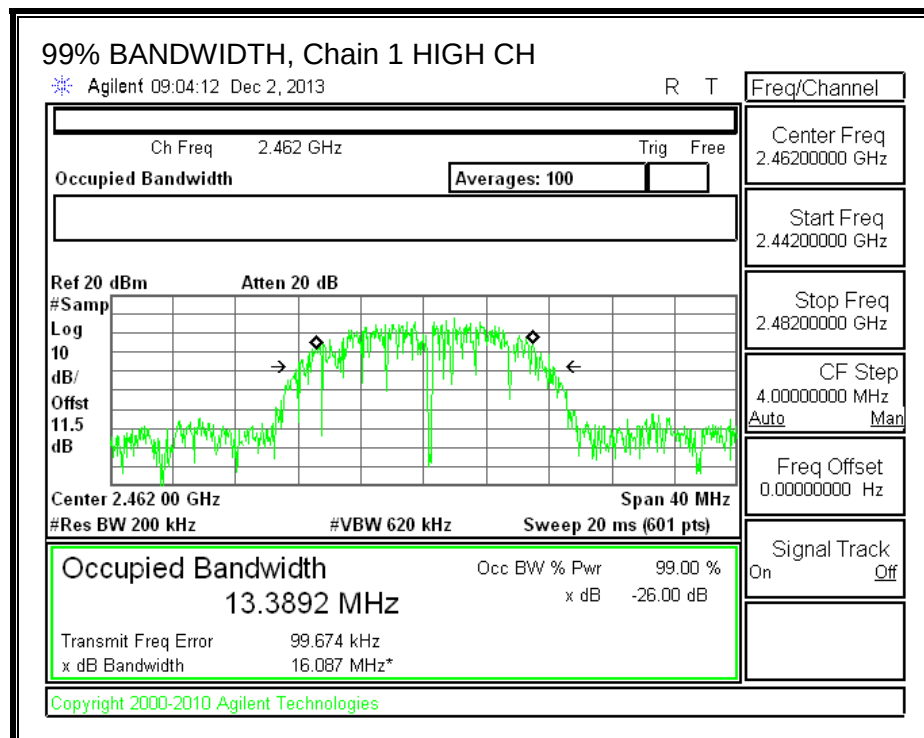
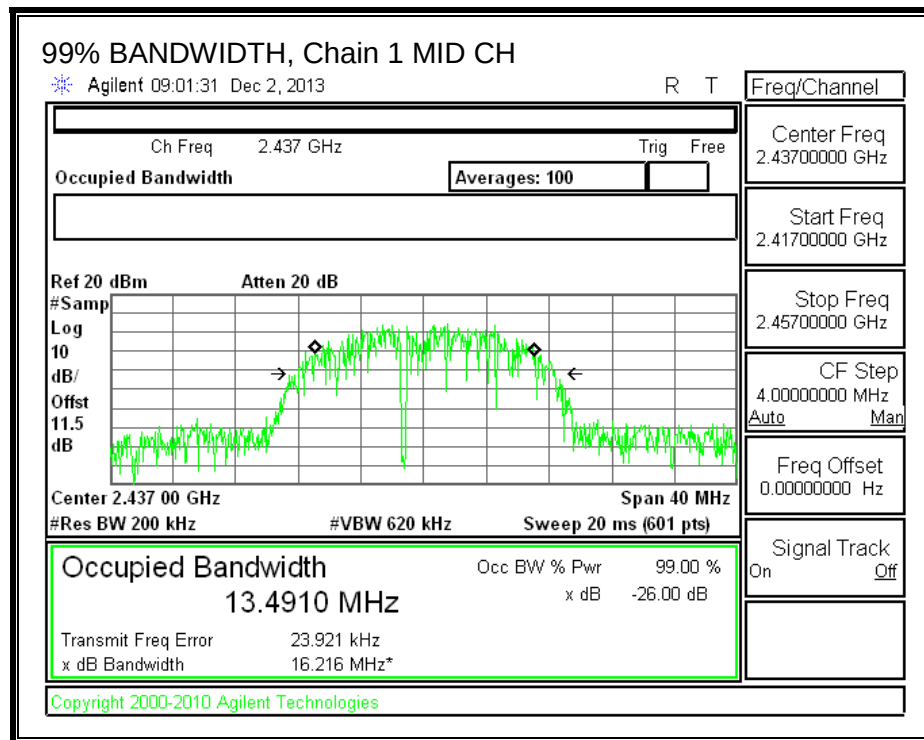
99% BANDWIDTH, CHAIN 0



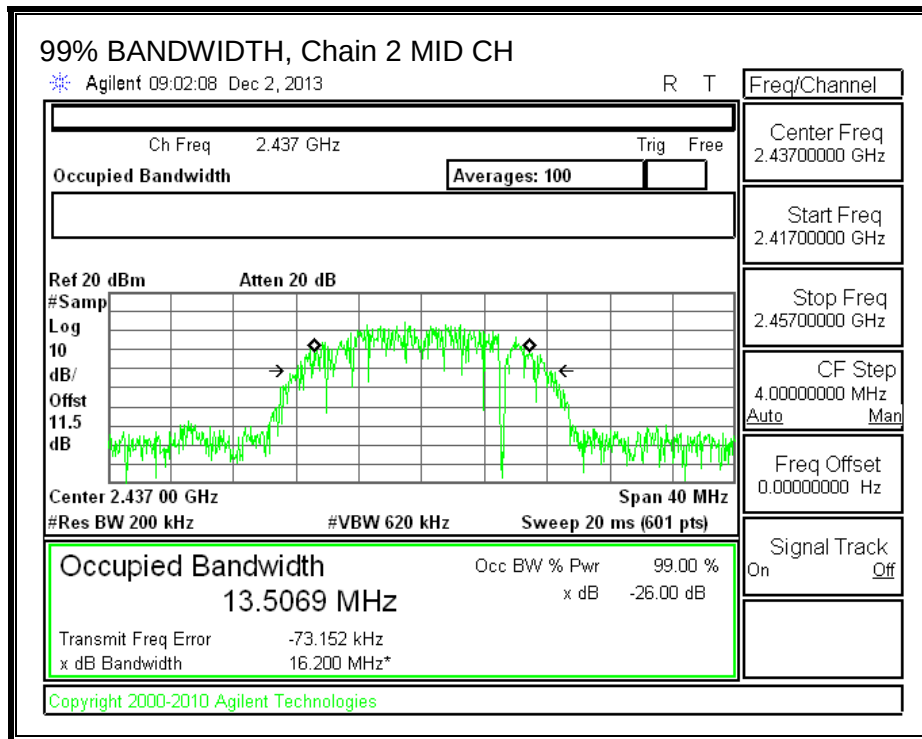
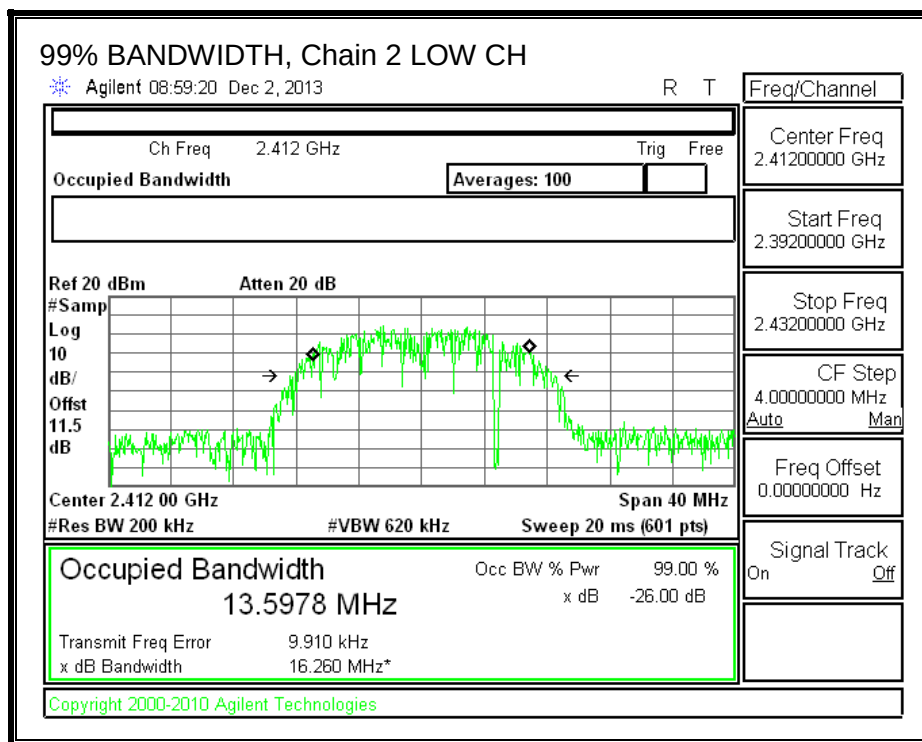


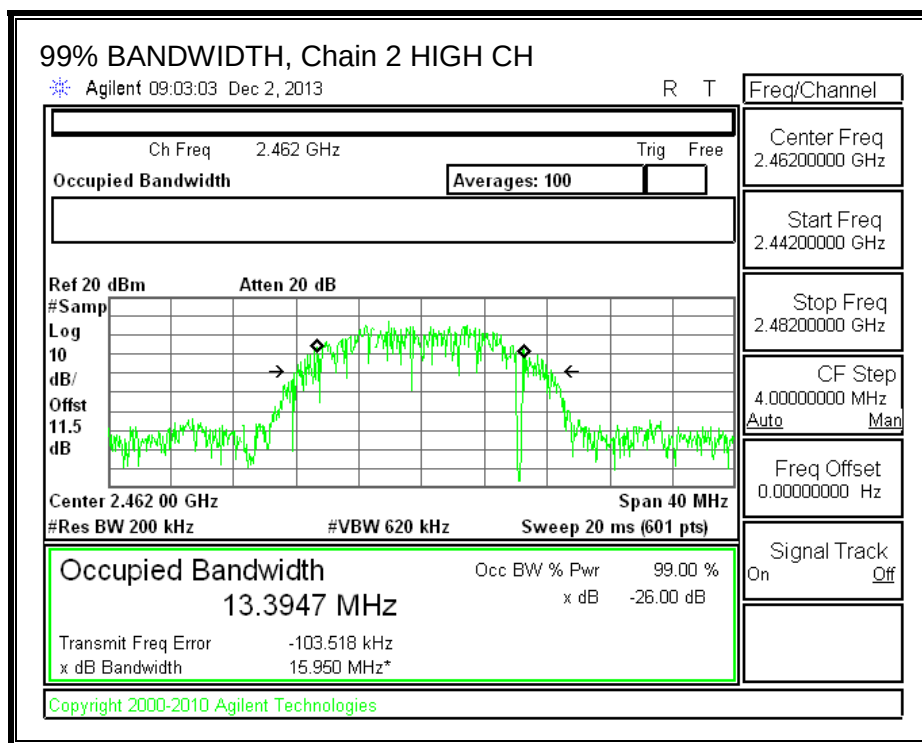
99% BANDWIDTH, CHAIN 1





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	19.12	22.37	20.98	25.79
Mid	2437	19.93	21.67	20.74	25.61
High	2462	19.54	21.94	21.15	25.76

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 the same for each chain. The directional gain is equal to the 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)
6.40	5.49	2.74	5.13

RESULTS

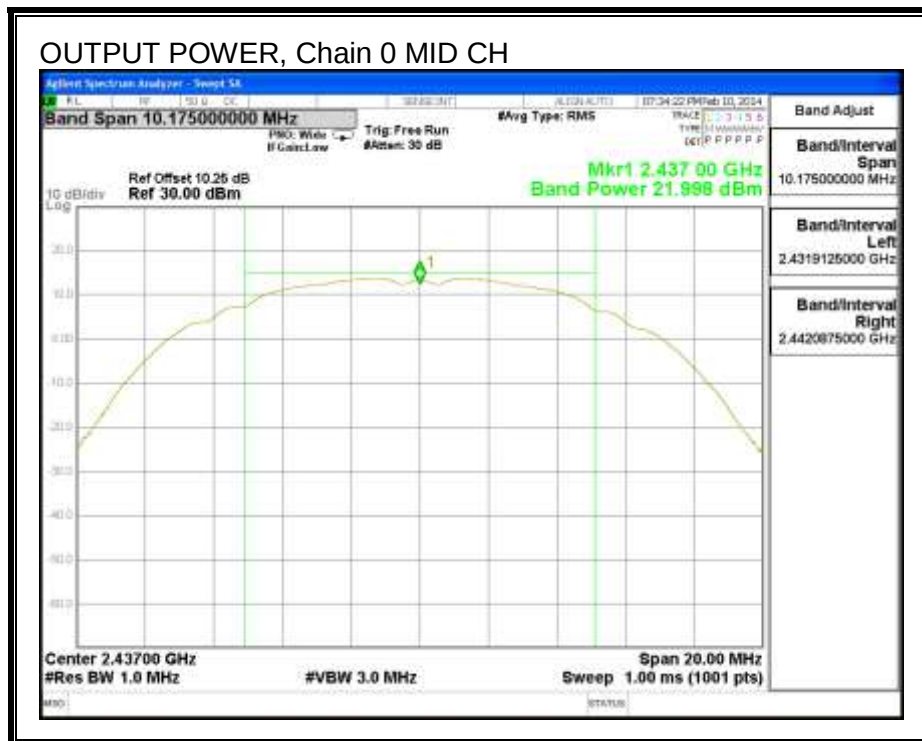
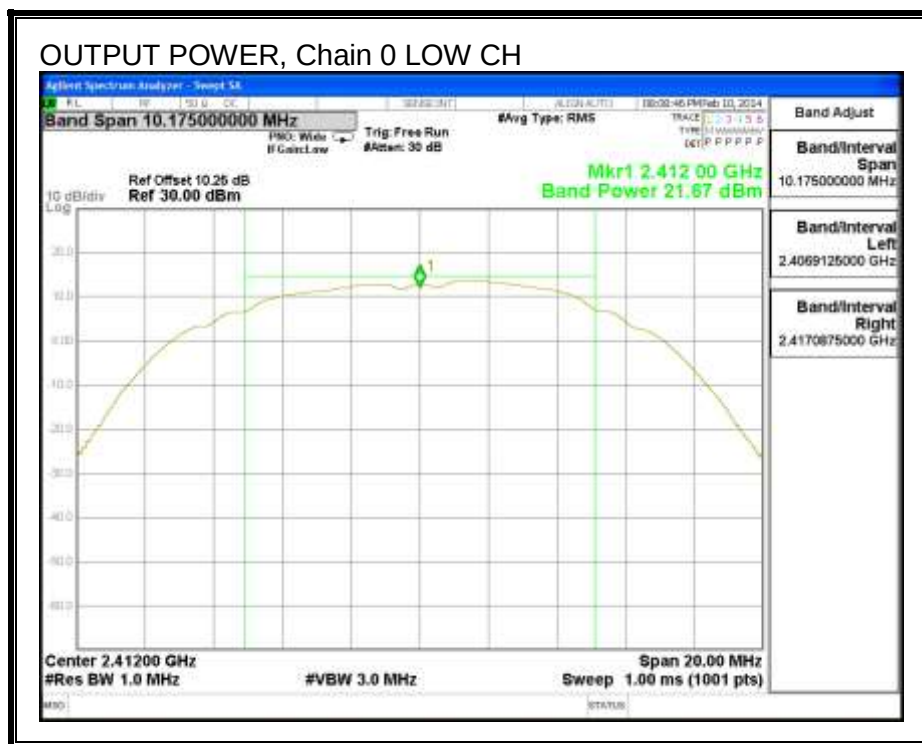
Limits

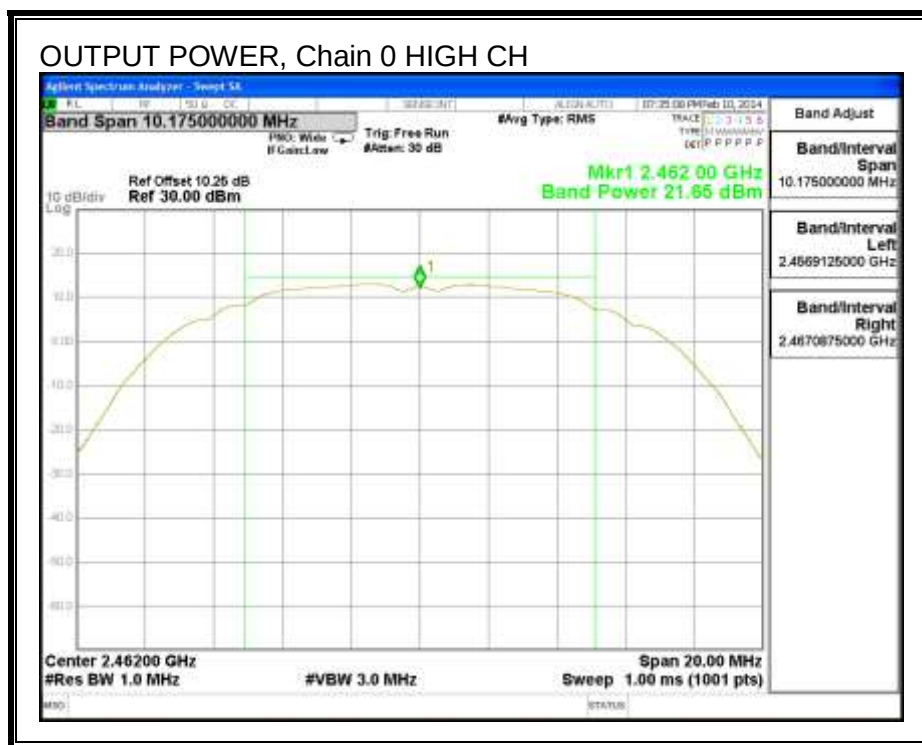
Channel	Frequency (MHz)	Directional Gain (dBi)	FCC Power Limit (dBm)	IC Power Limit (dBm)	IC EIRP Limit (dBm)	Max Power (dBm)
Low	2412	5.13	30.00	30	36	30.00
Mid	2437	5.13	30.00	30	36	30.00
High	2462	5.13	30.00	30	36	30.00

Results

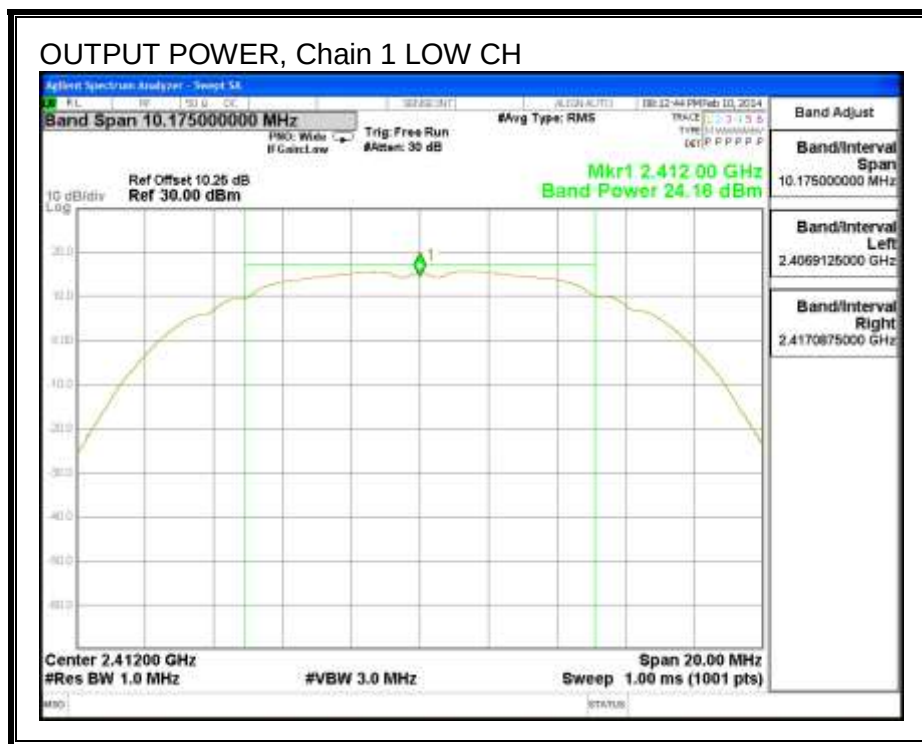
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Chain 2 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Margin (dB)
Low	2412	21.67	24.16	22.89	27.80	30.00	-2.20
Mid	2437	22.00	24.00	22.89	27.81	30.00	-2.19
High	2462	21.65	23.92	23.48	27.89	30.00	-2.11

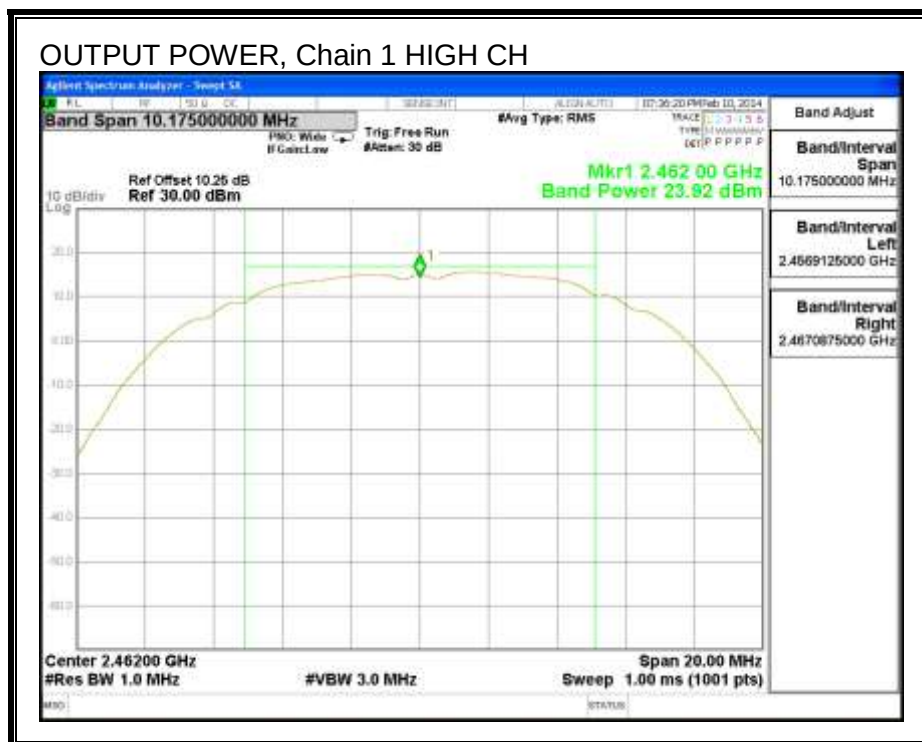
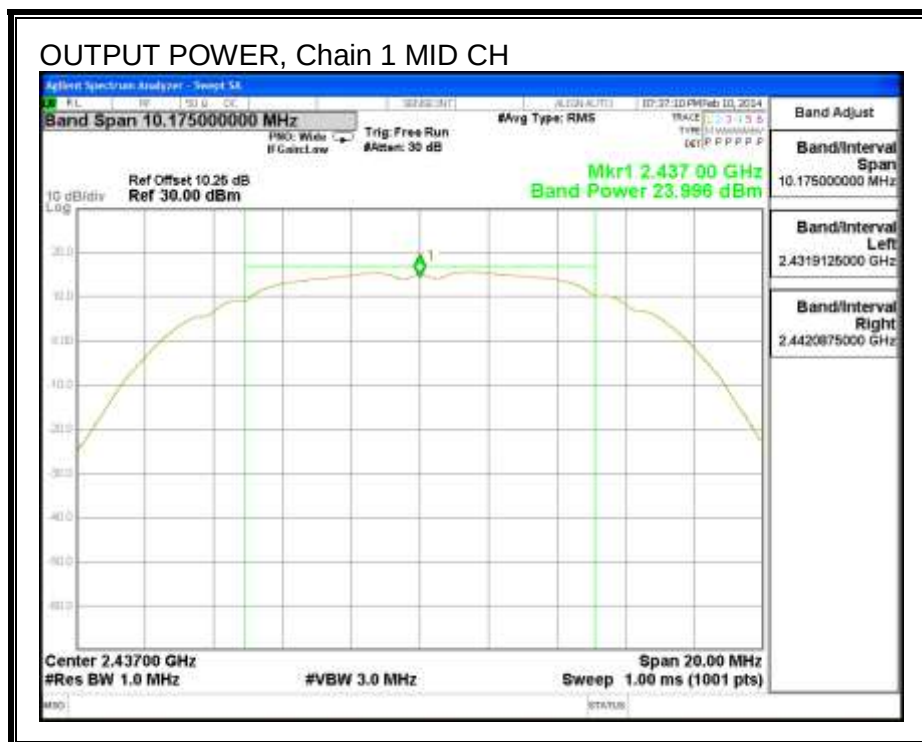
OUTPUT POWER, CHAIN 0



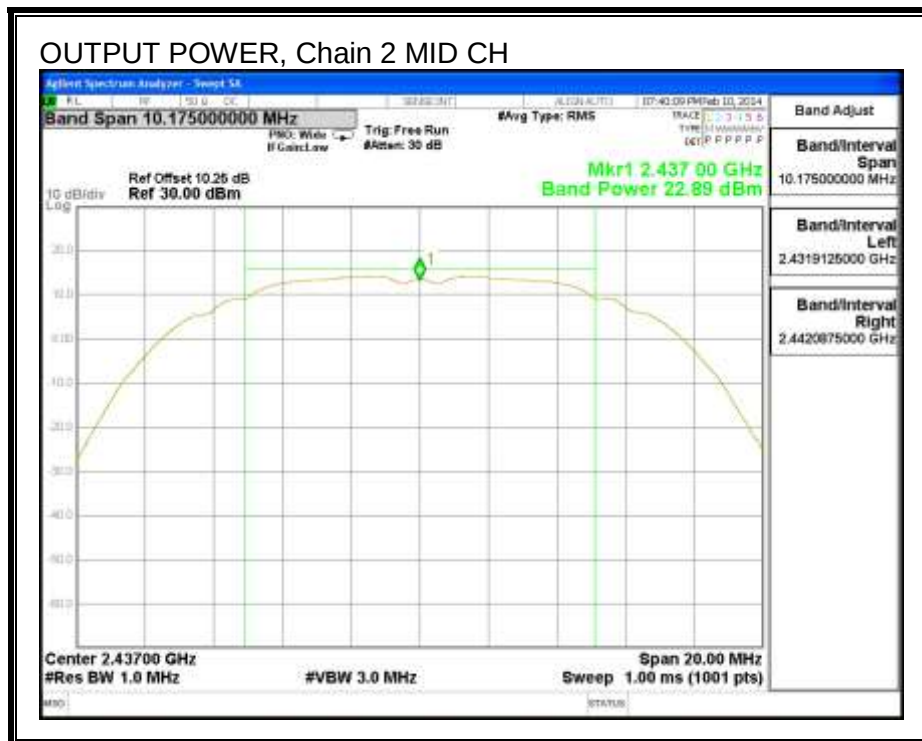
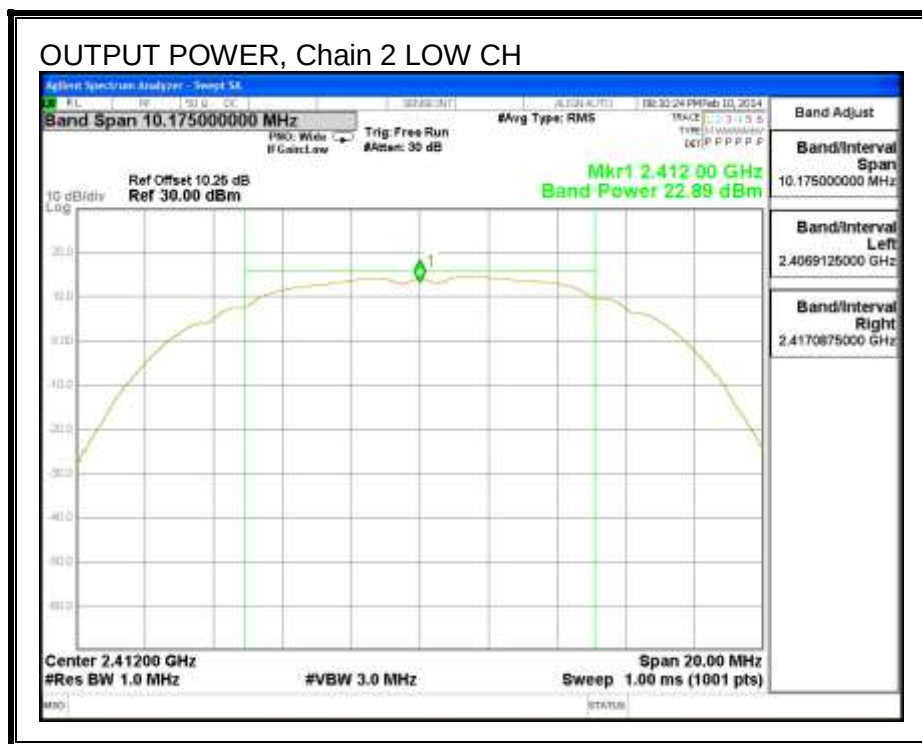


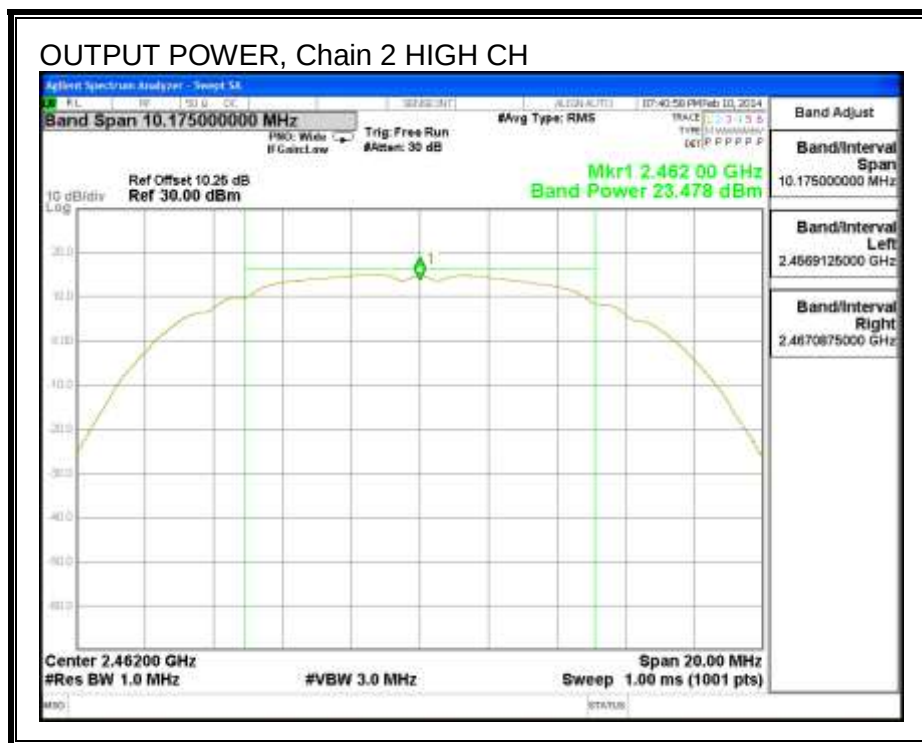
OUTPUT POWER, CHAIN 1





OUTPUT POWER, CHAIN 2





8.1.5. PSD

LIMITS

FCC §15.247

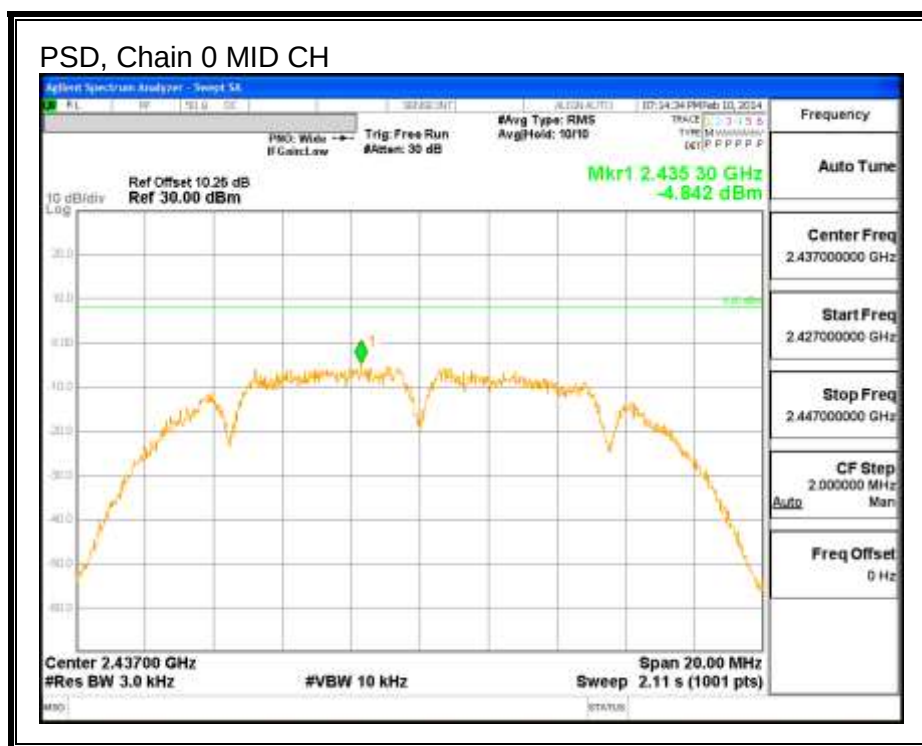
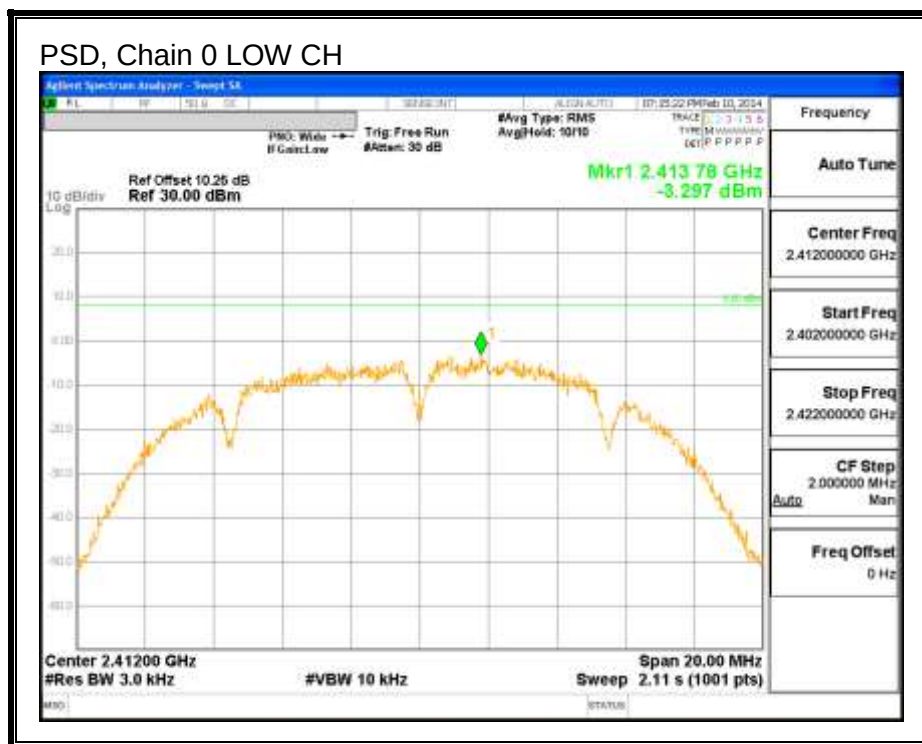
IC RSS-210 A8.2

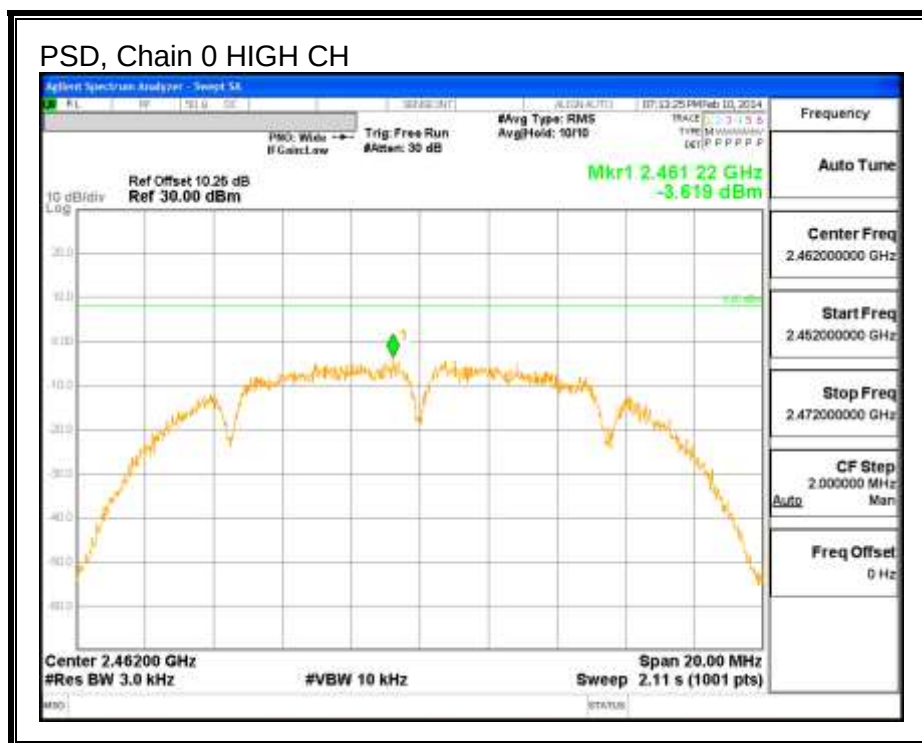
RESULTS

PSD Results

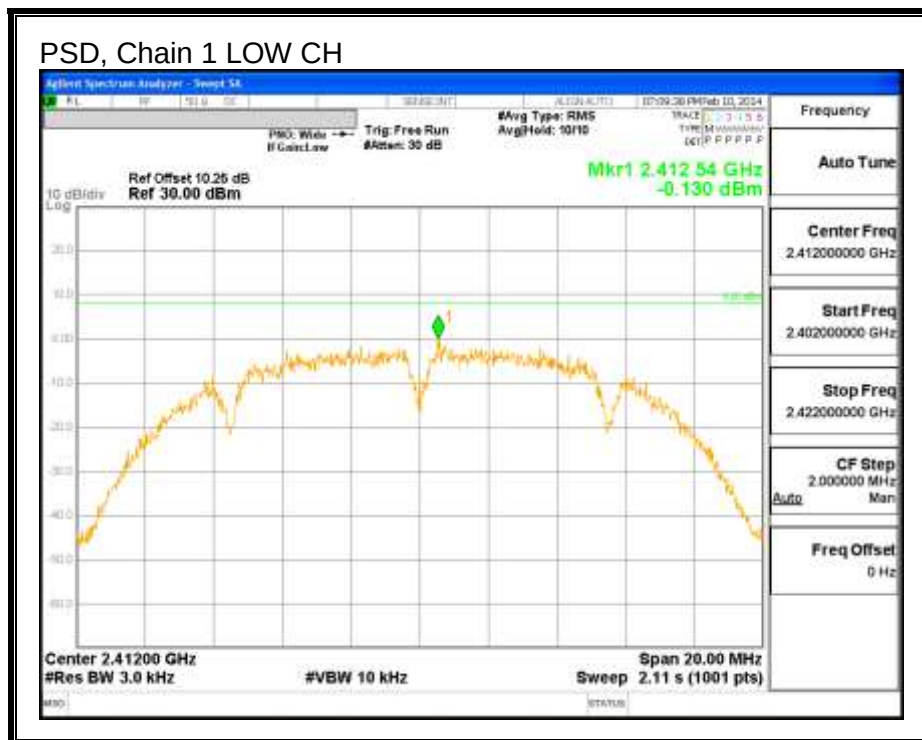
Channel	Frequency (MHz)	Chain 0 Meas (dBm)	Chain 1 Meas (dBm)	Chain 2 Meas (dBm)	Total PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-3.30	-0.13	-2.00	3.16	8.0	-4.8
Mid	2437	-4.84	-1.72	-0.33	2.85	8.0	-5.1
High	2462	-3.62	-0.71	-1.18	3.11	8.0	-4.9

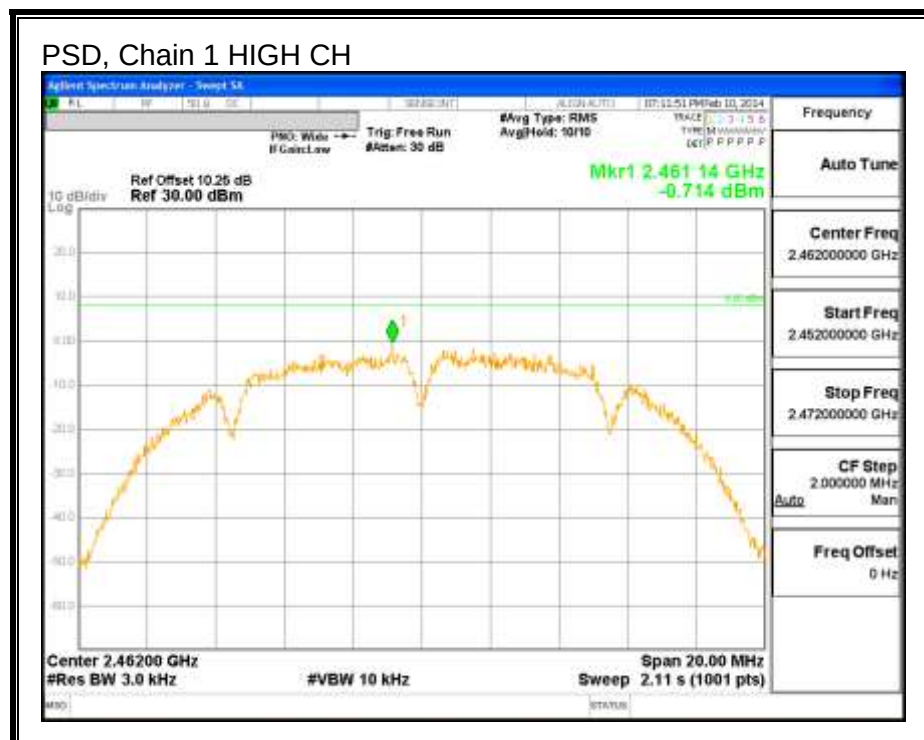
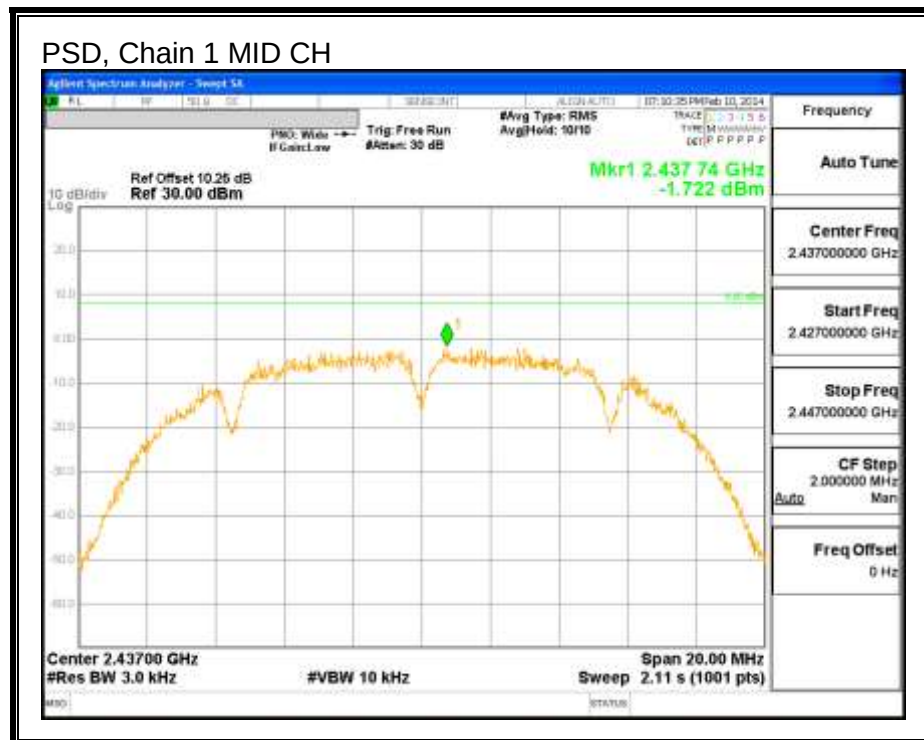
PSD, CHAIN 0



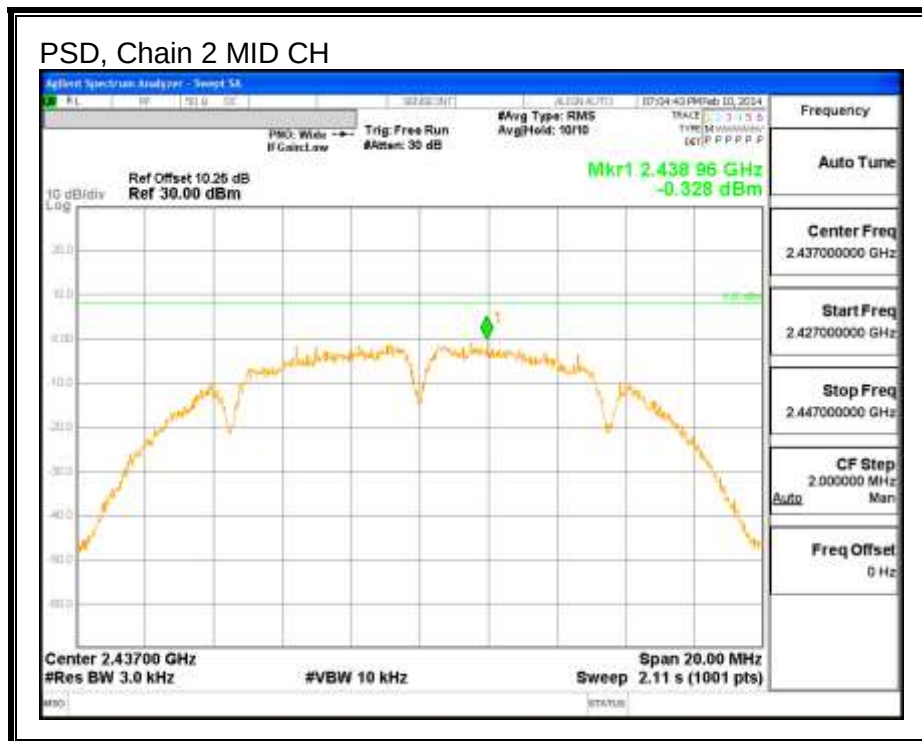
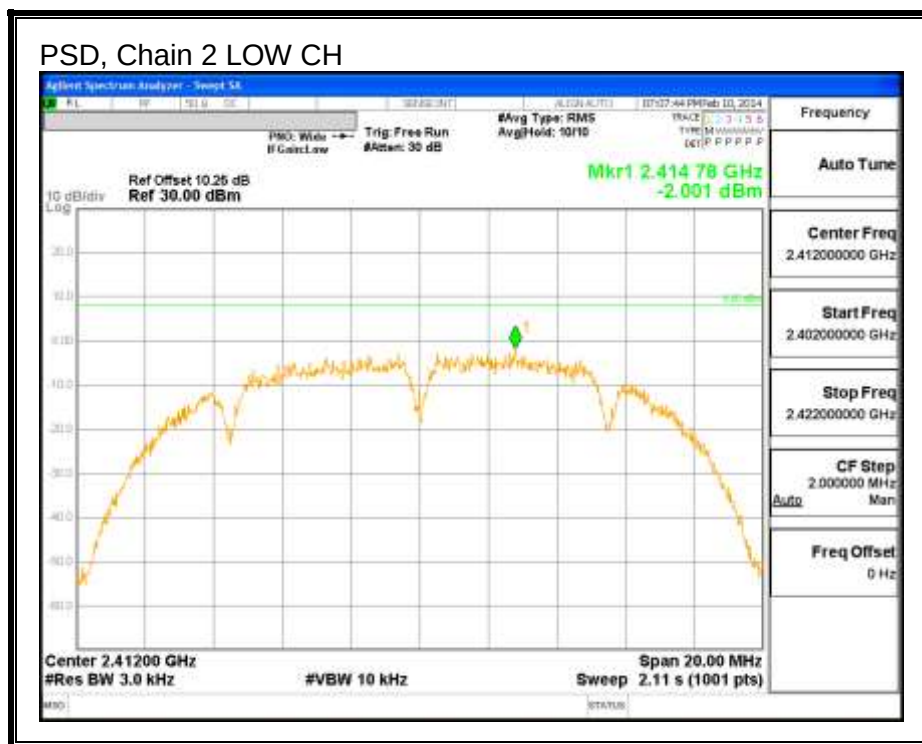


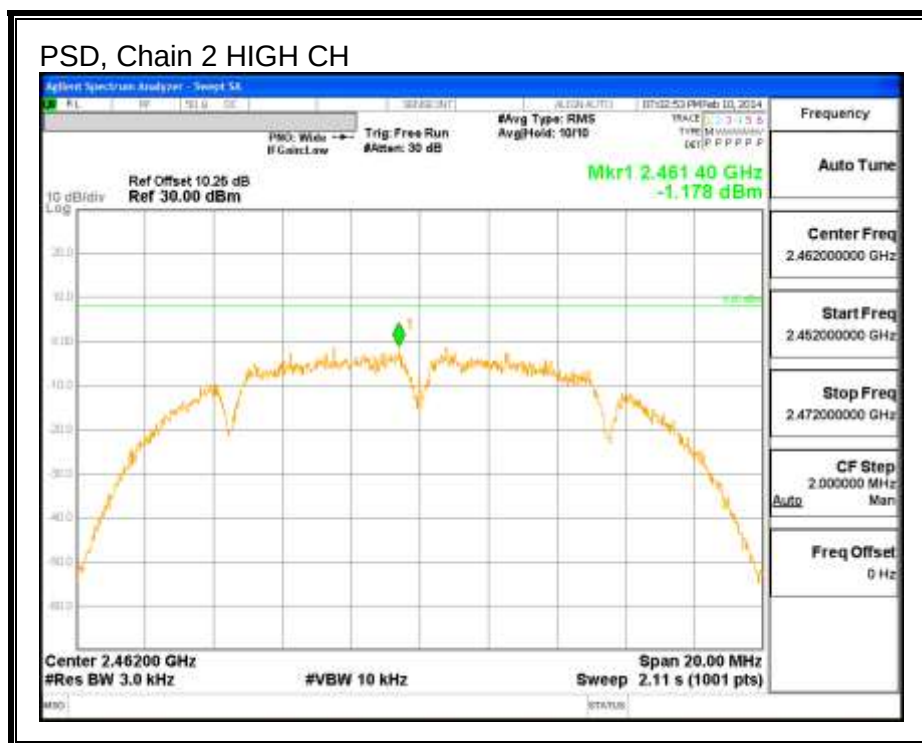
PSD, CHAIN 1





PSD, CHAIN 2





8.1.6. OUT-OF-BAND EMISSIONS

LIMITS

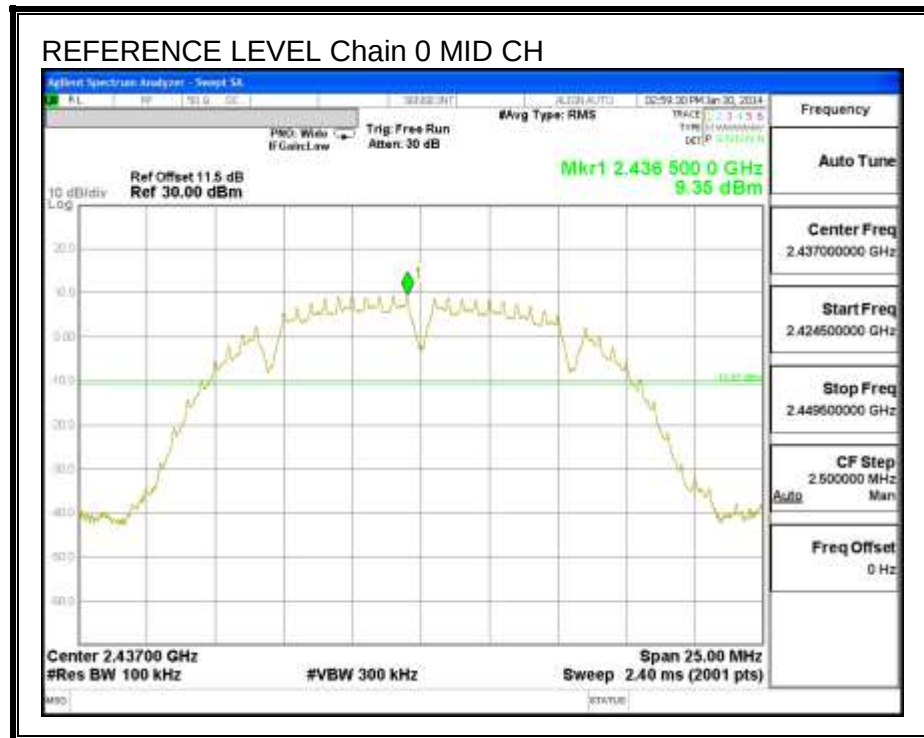
FCC §15.247 (d)

IC RSS-210 A8.5

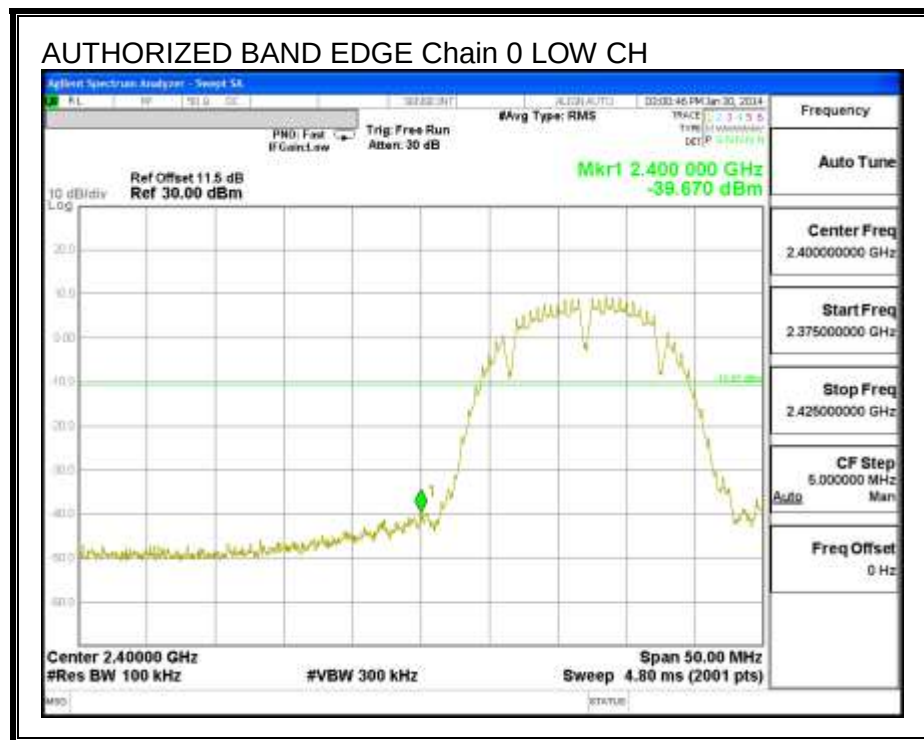
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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

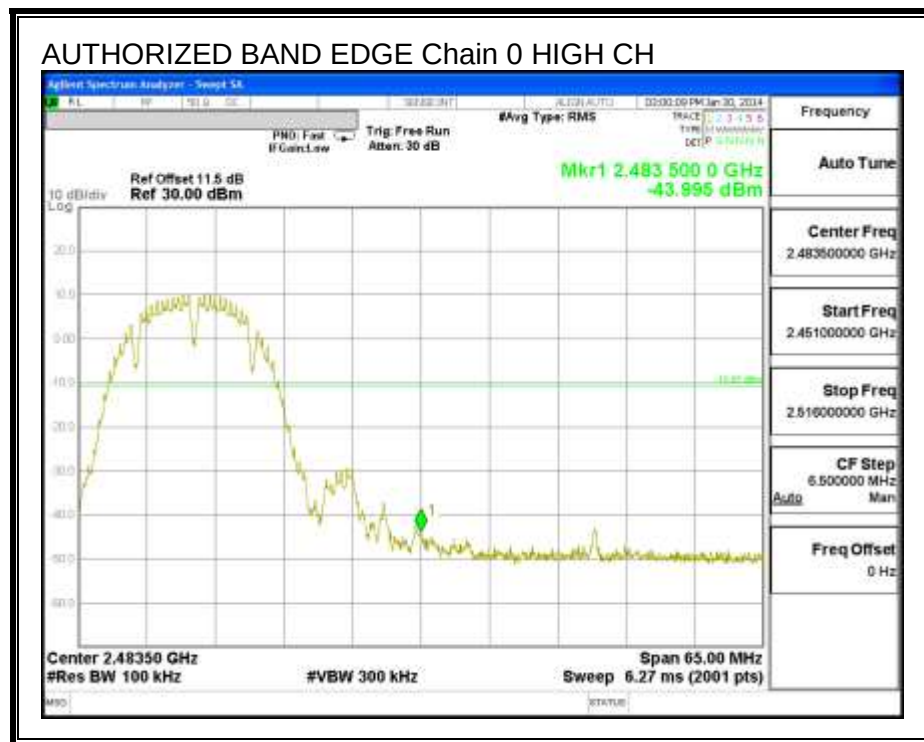
IN-BAND REFERENCE LEVEL, Chain 0



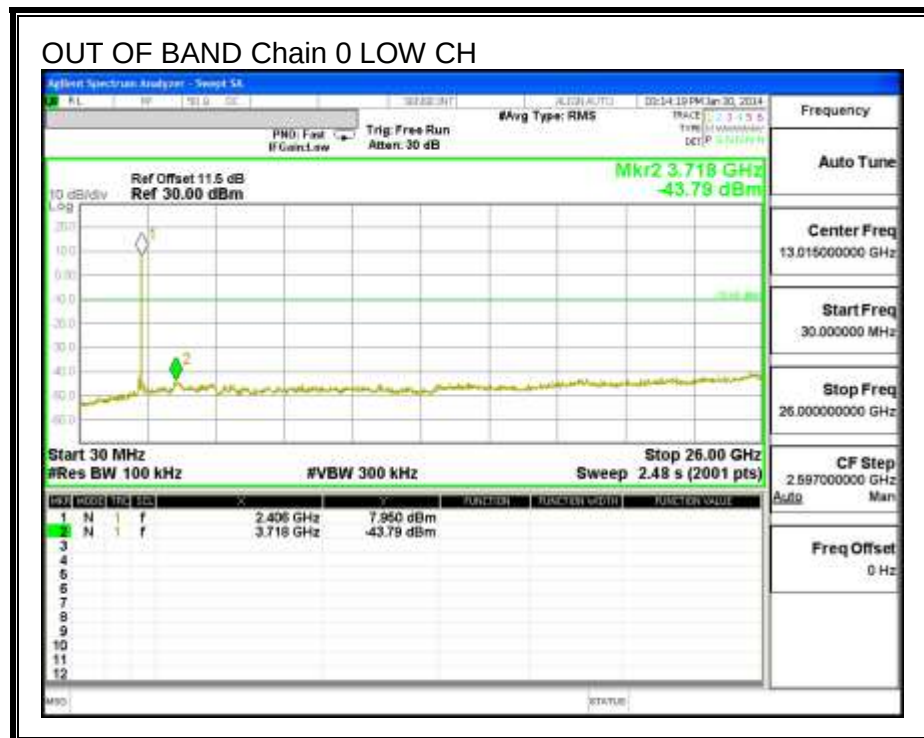
LOW CHANNEL BANDEDGE, Chain 0

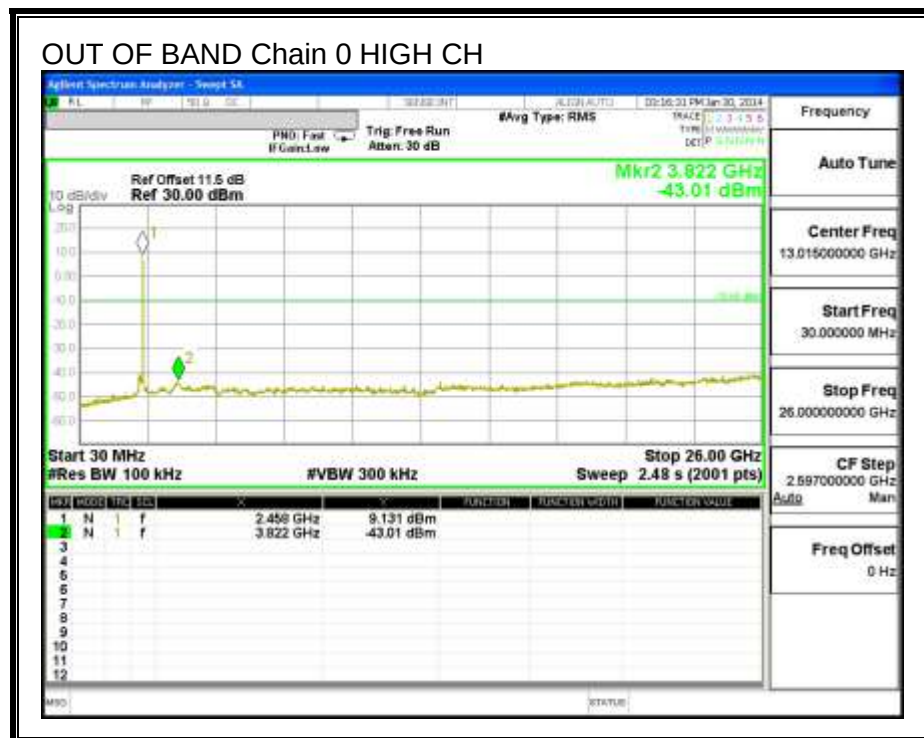
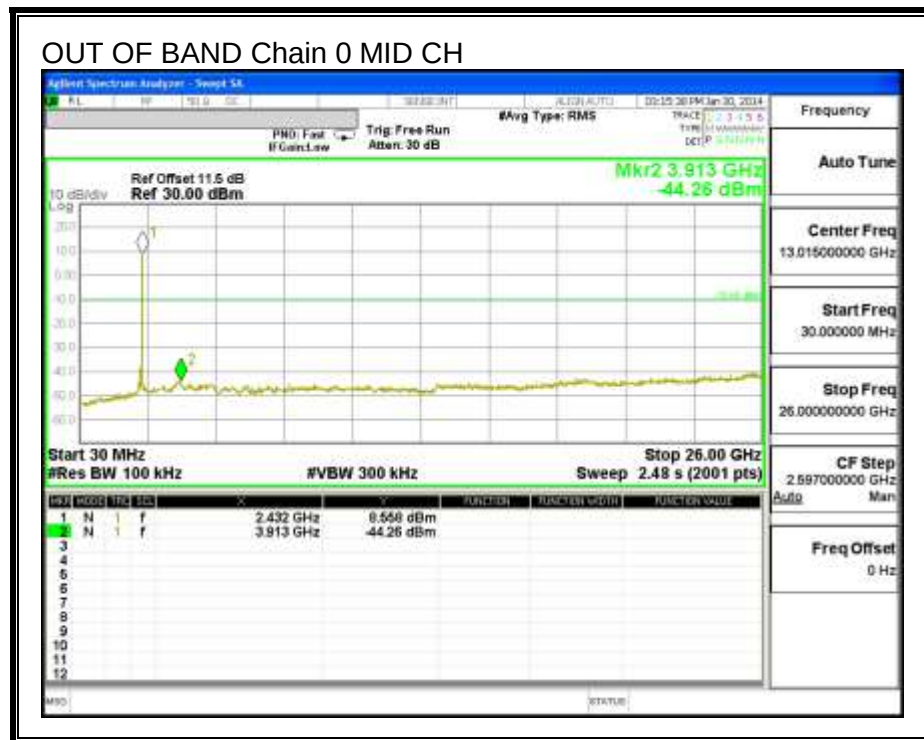


HIGH CHANNEL BANDEDGE, CHAIN 0

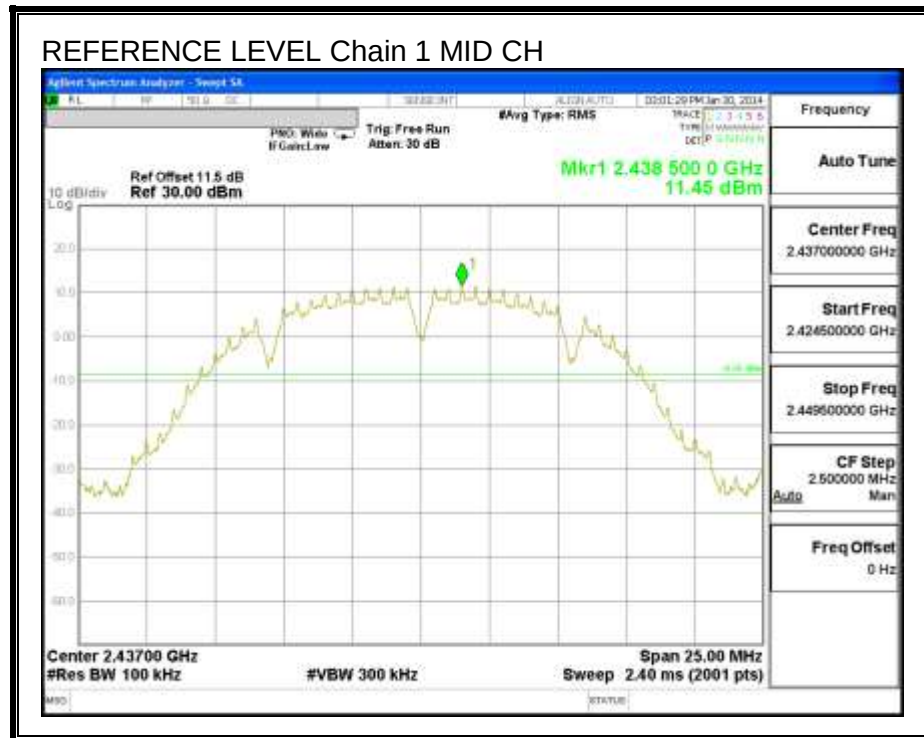


OUT-OF-BAND EMISSIONS, CHAIN 0

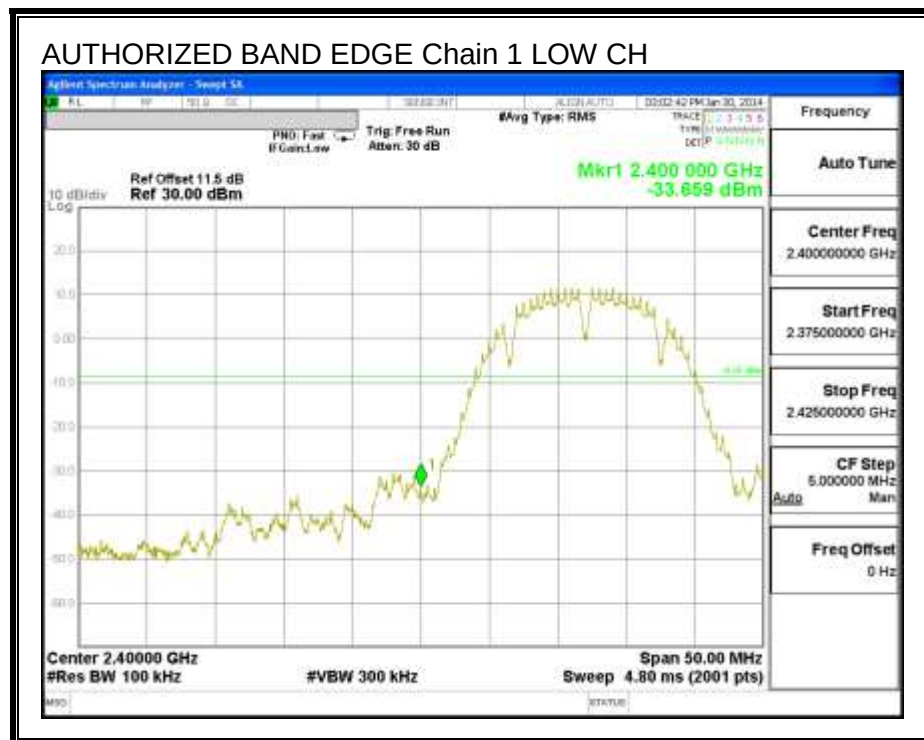




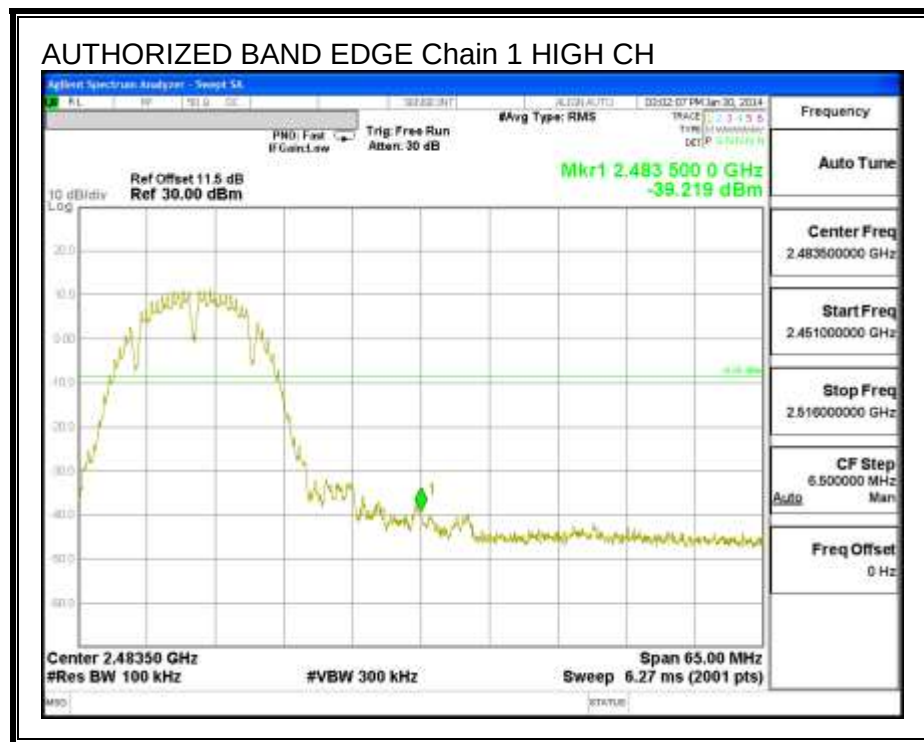
IN-BAND REFERENCE LEVEL, CHAIN 1



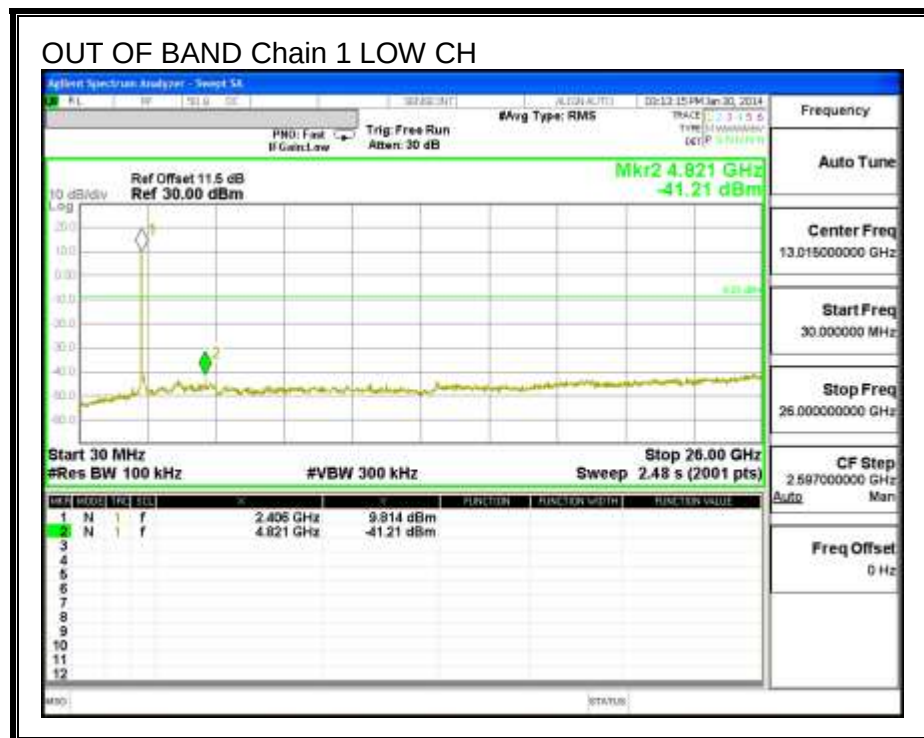
LOW CHANNEL BANDEDGE, CHAIN 1

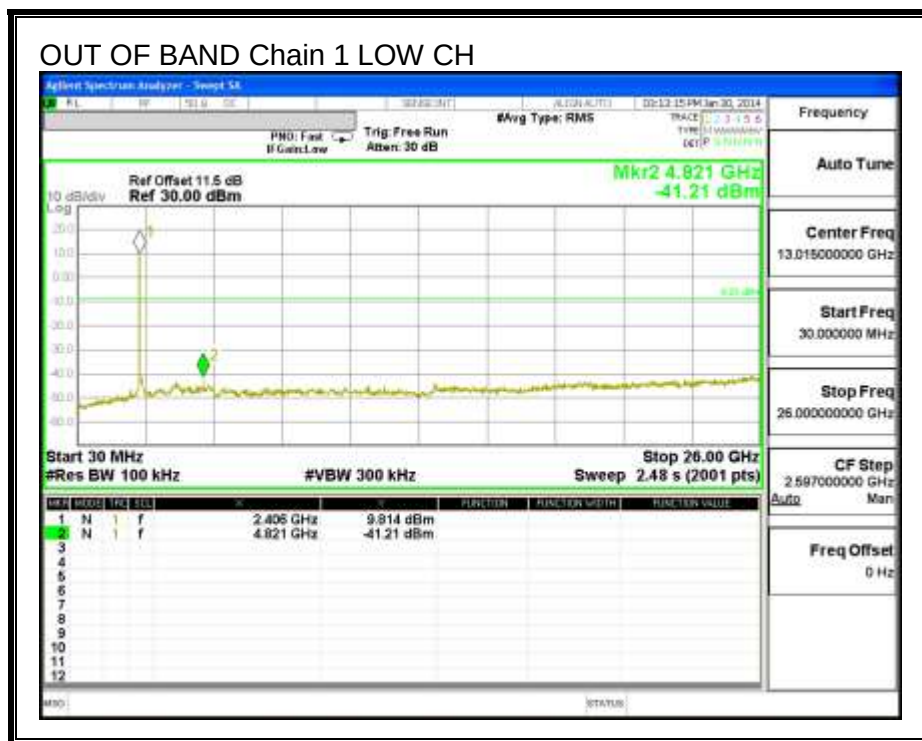


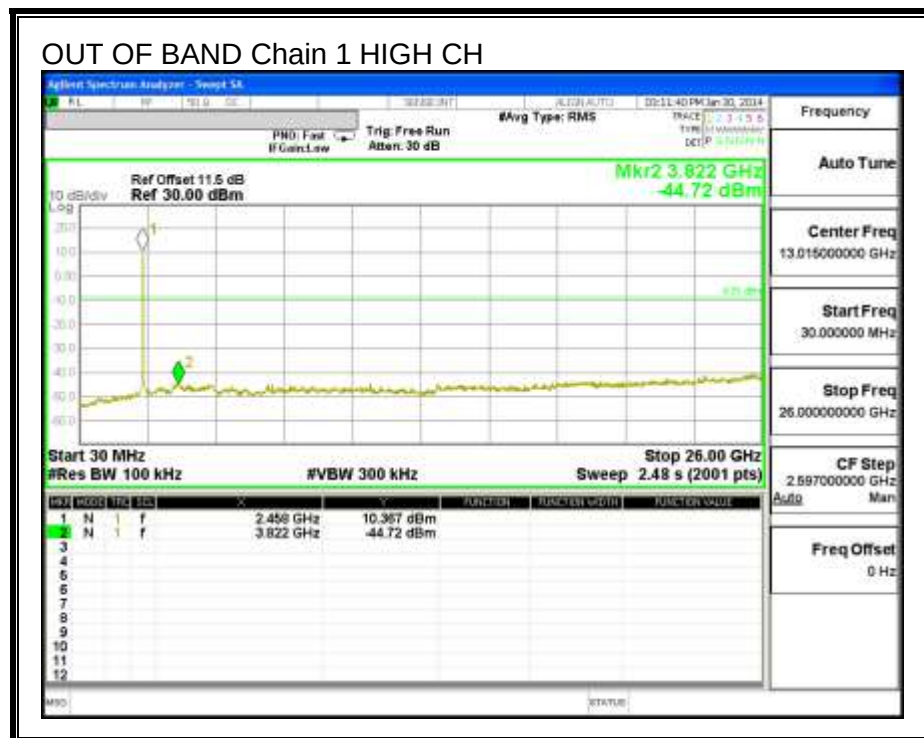
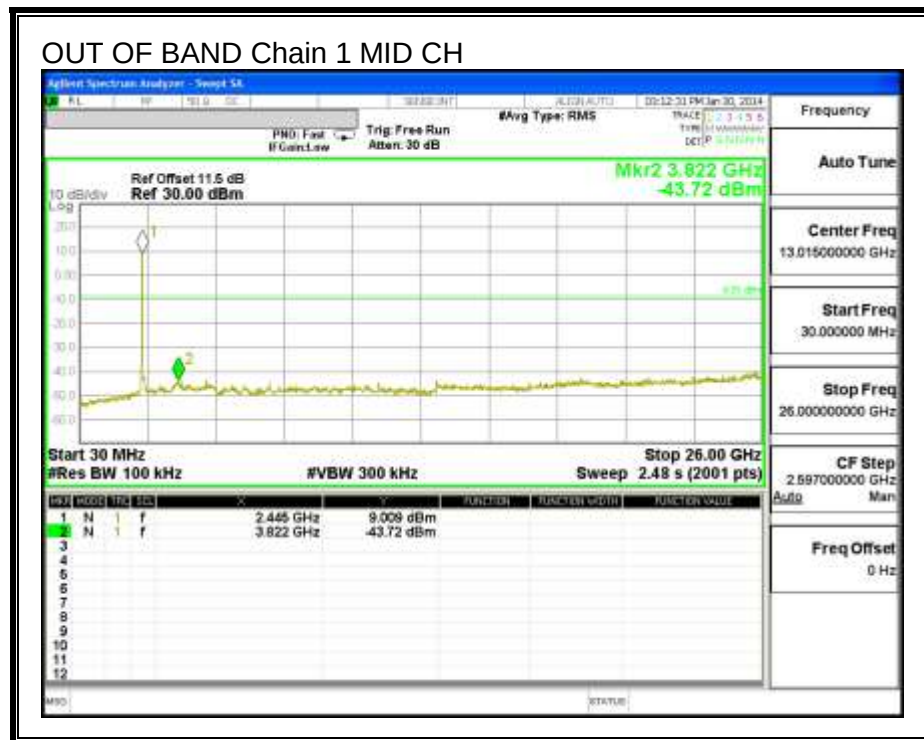
HIGH CHANNEL BANDEDGE, CHAIN 1



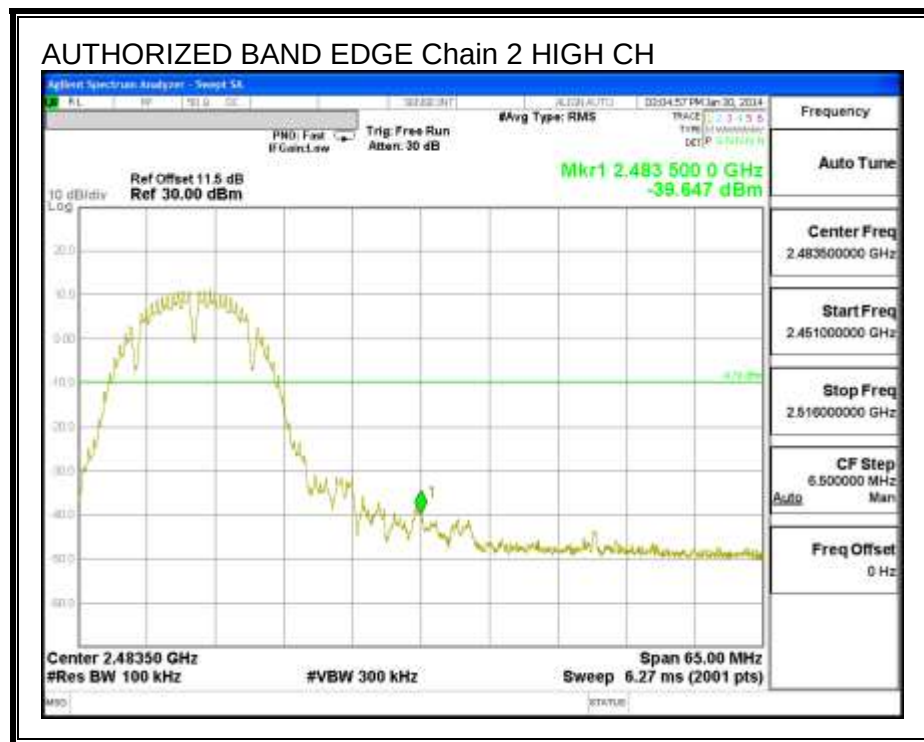
OUT-OF-BAND EMISSIONS, CHAIN 1



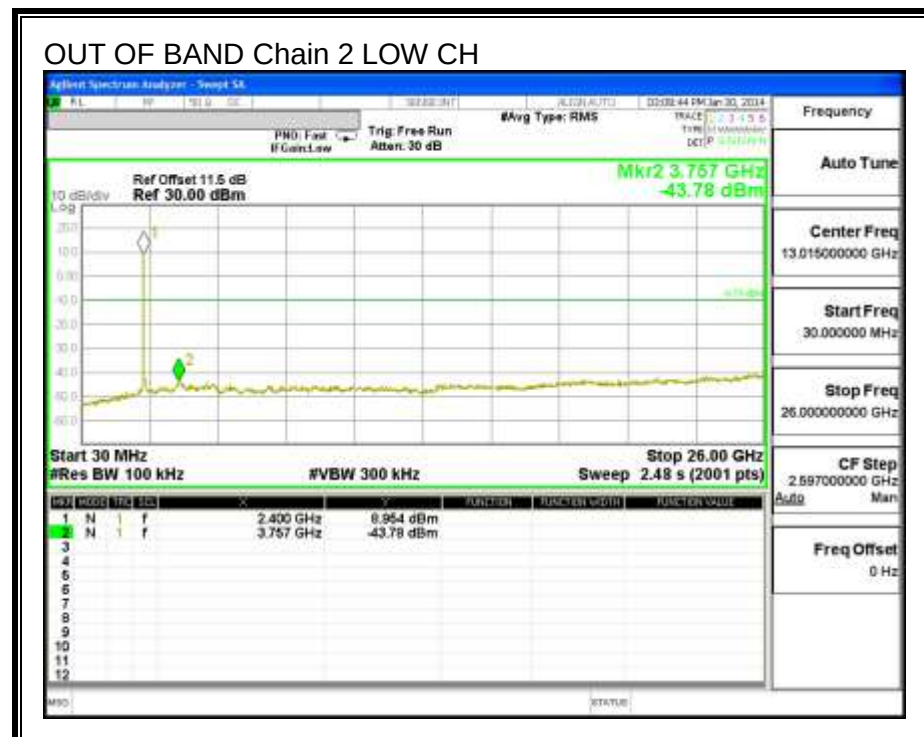


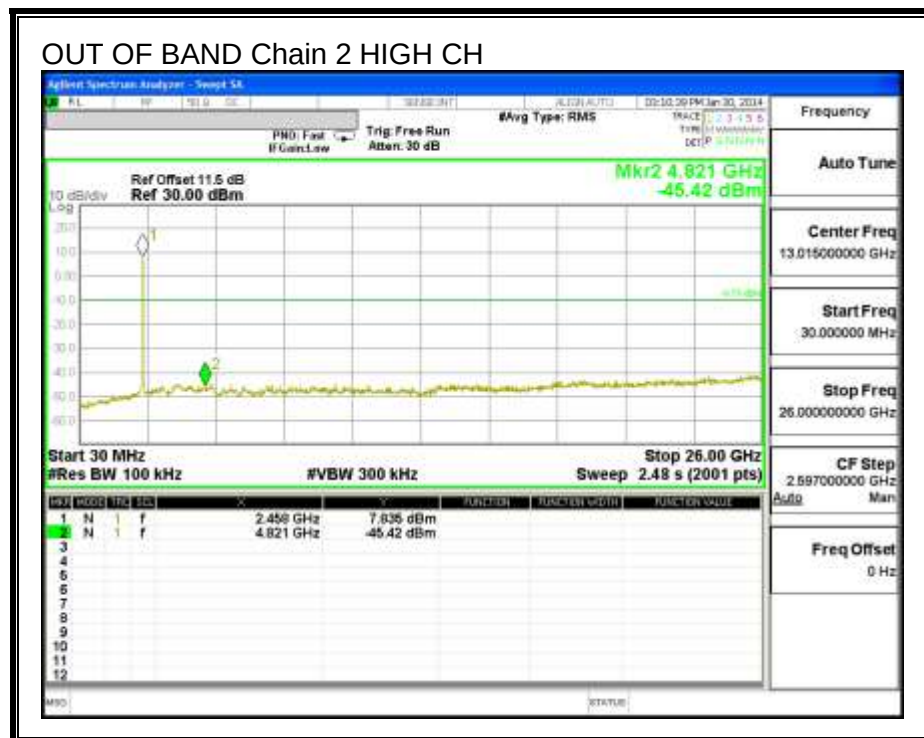
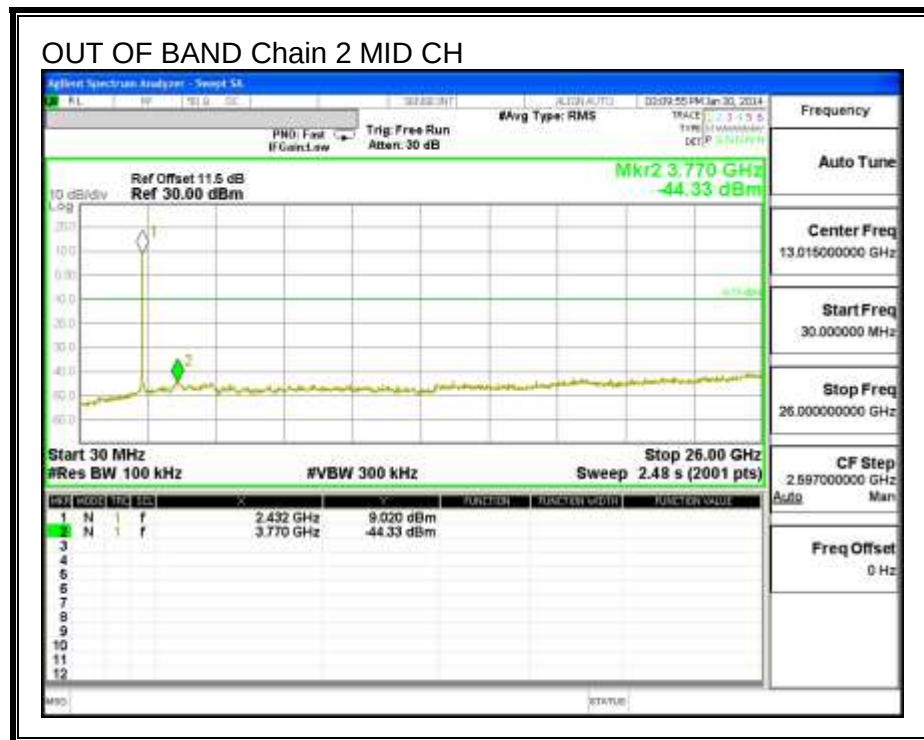


HIGH CHANNEL BANDEDGE, CHAIN 2



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)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit ($\mu\text{V/m}$) at 3 m	Field Strength Limit (dB $\mu\text{V/m}$) 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.

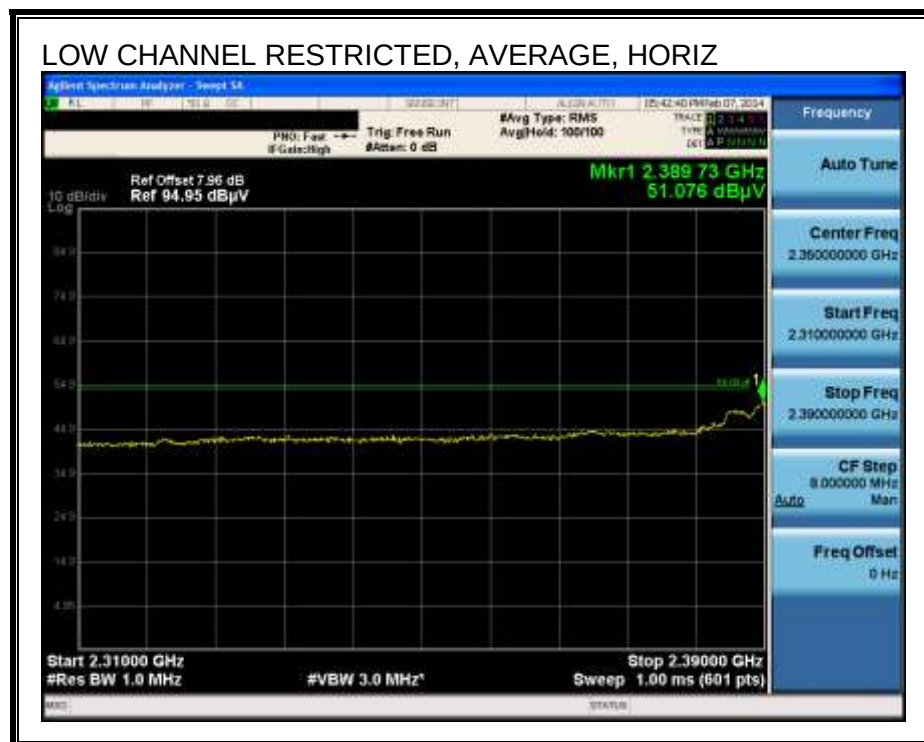
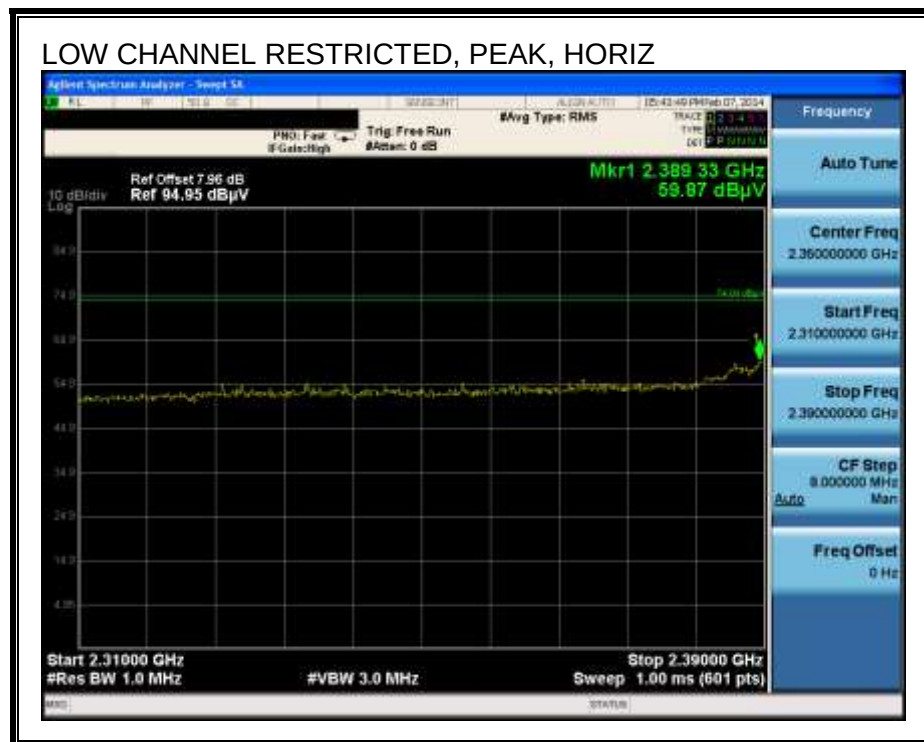
For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

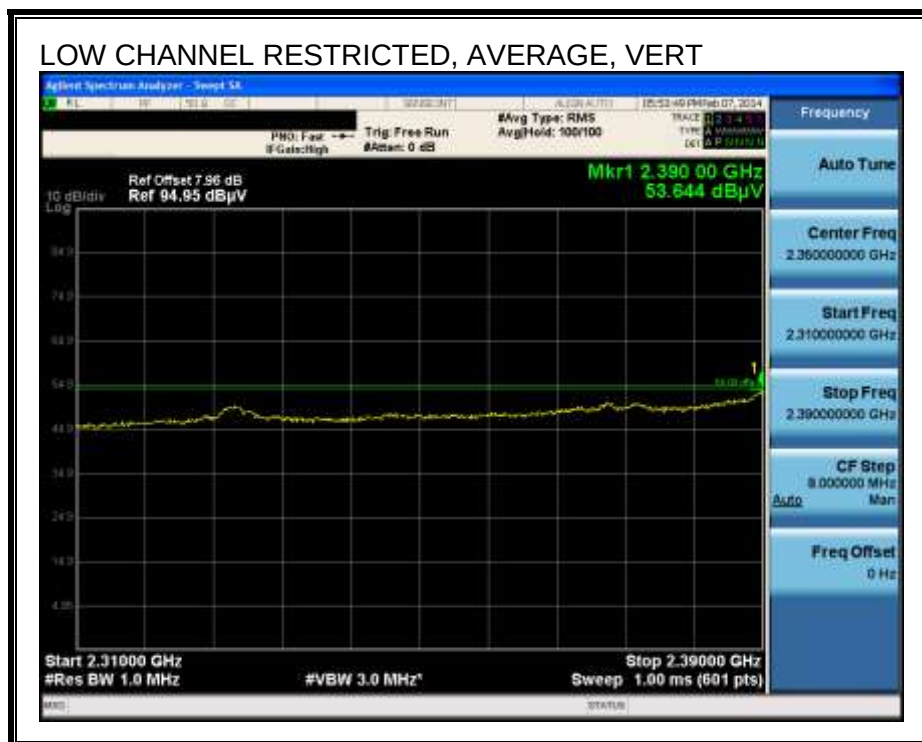
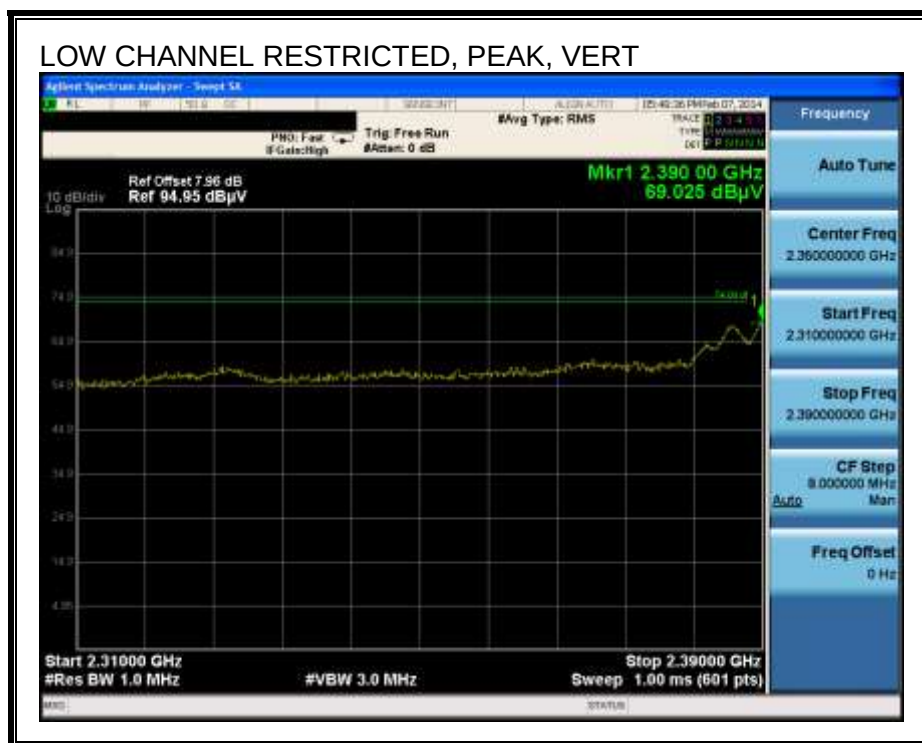
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

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.

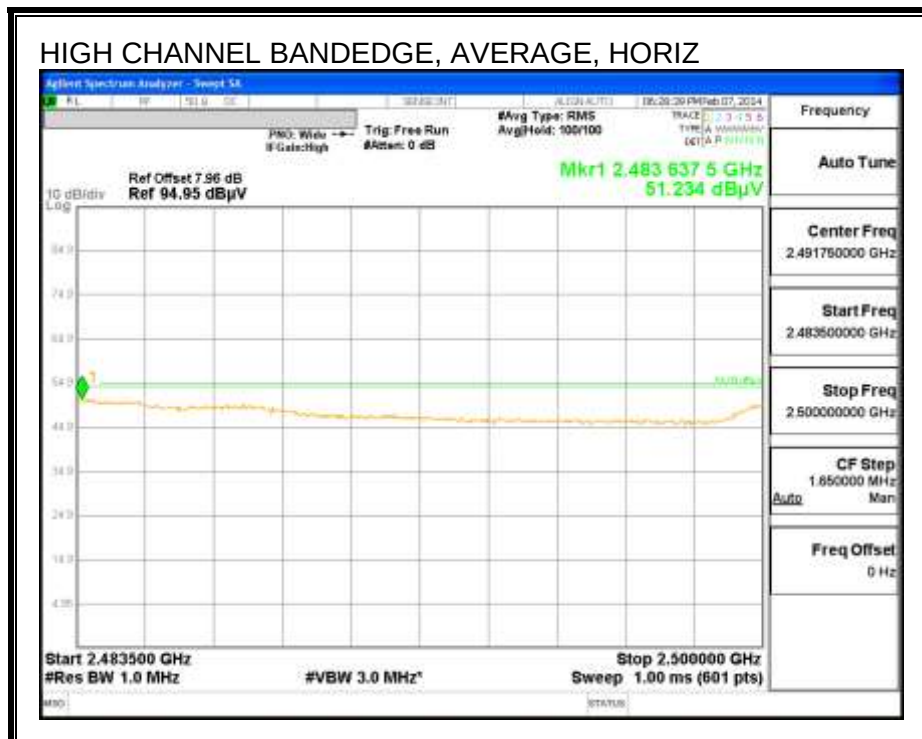
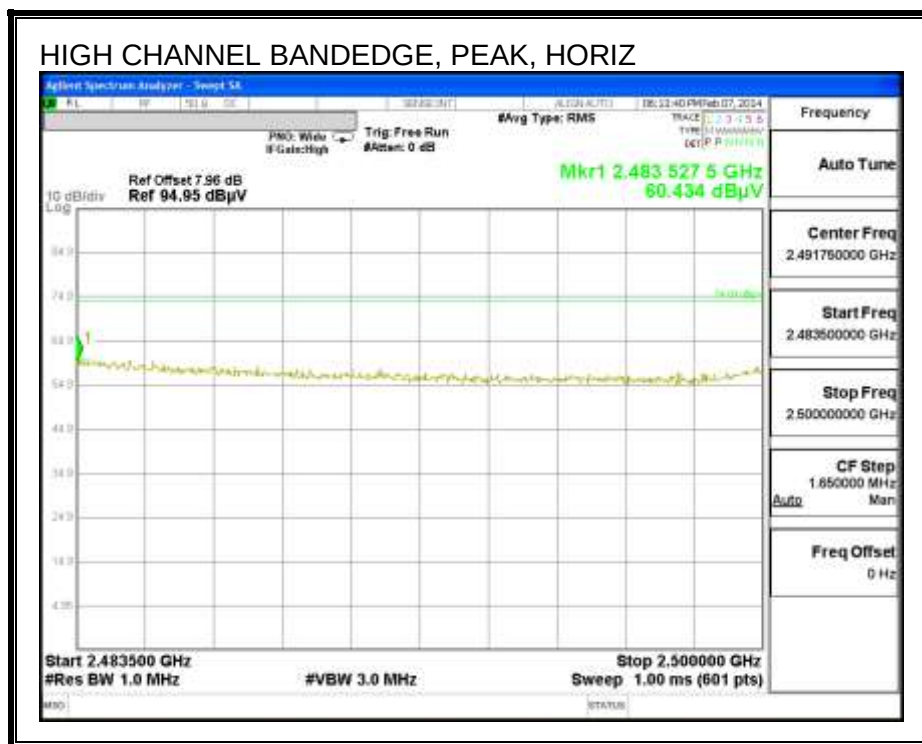
9.2. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

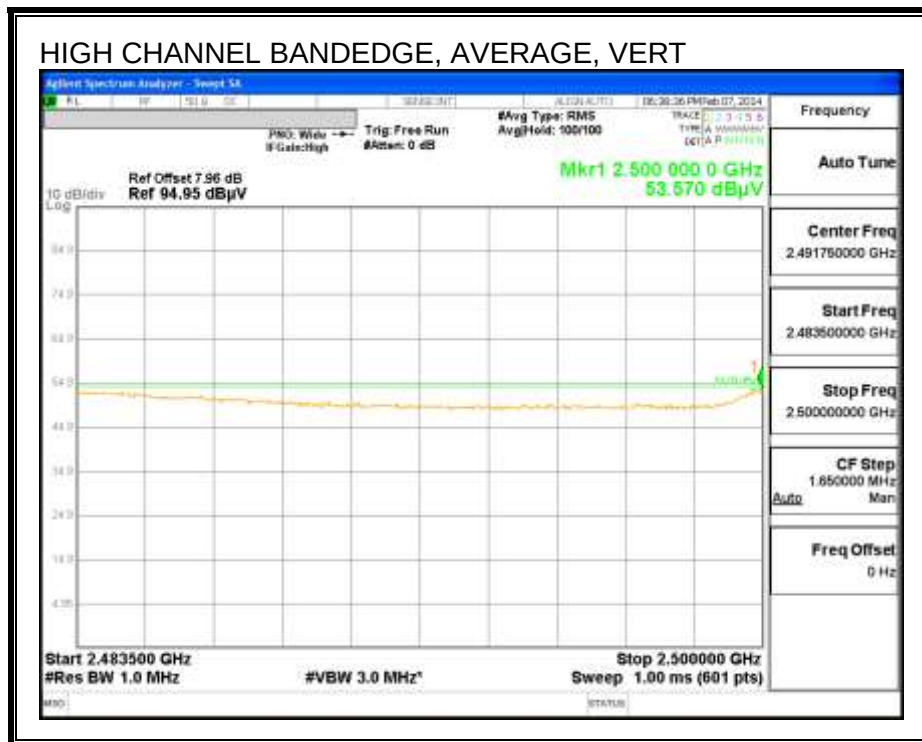
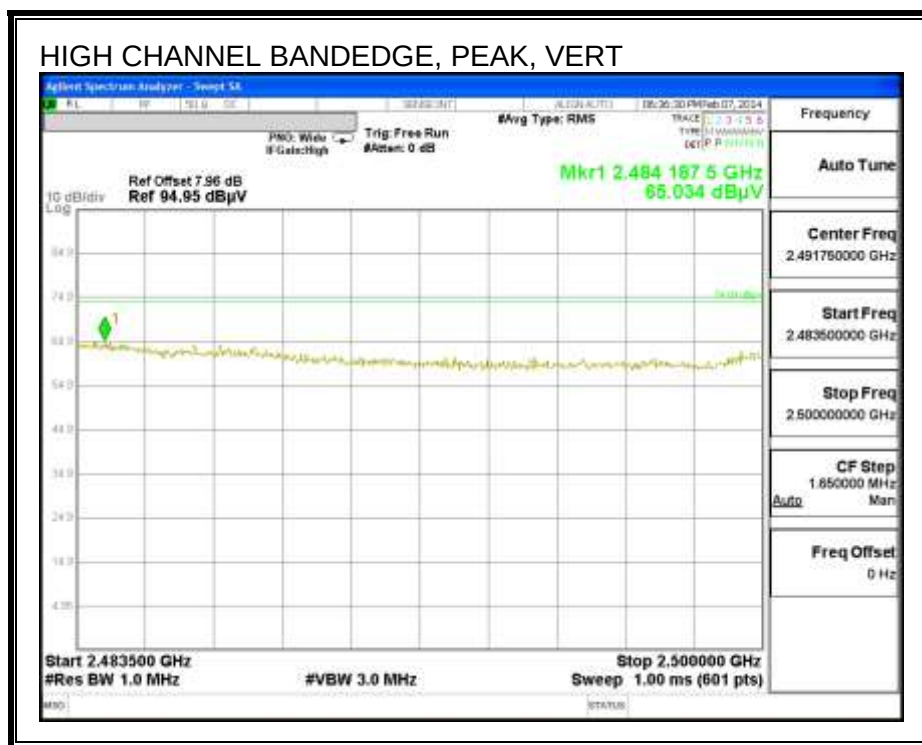
RESTRICTED BANDEDGE (LOW CHANNEL)





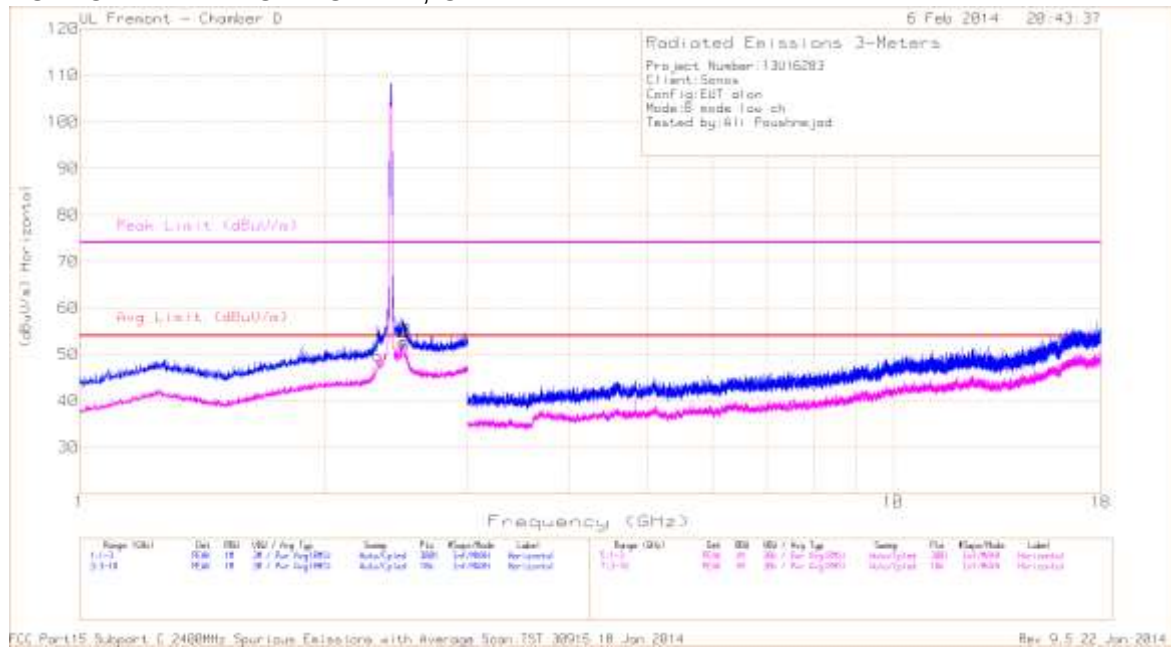
AUTHORIZED BANDEDGE (HIGH CHANNEL)



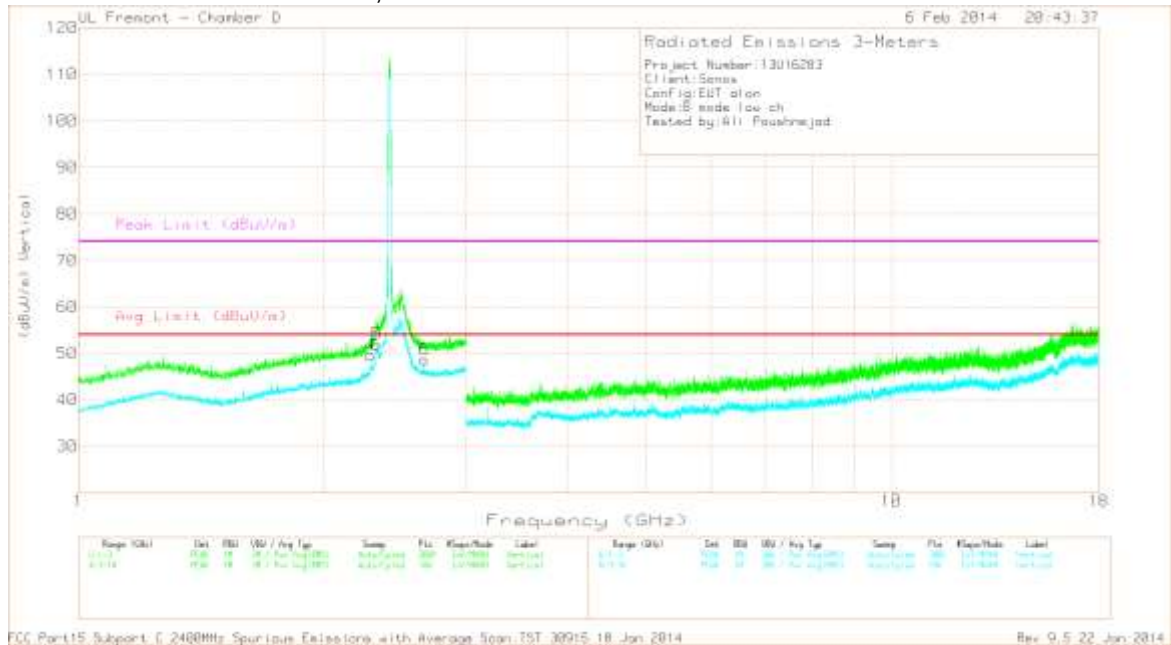


HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL, CH 1



LOW CHANNEL VERTICAL, CH 1



Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T712 (dB/m)	Amp/Cbl/FI tr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 2.323	46.2	PK2	31.1	-20.7	56.6	-	-	74	-17.4	116	173	H
* 2.326	36.94	MAV1	31.1	-20.7	47.34	53.97	-6.63	-	-	116	173	H
* 2.5	47.84	PK2	32.2	-20.8	59.24	-	-	74	-14.76	154	160	H
* 2.5	38.75	MAV1	32.2	-20.8	50.15	53.97	-3.82	-	-	164	167	H
* 2.326	47.74	PK2	31.1	-20.7	58.14	-	-	74	-15.86	150	234	V
* 2.326	37.32	MAV1	31.1	-20.7	47.72	53.97	-6.25	-	-	150	234	V
* 2.655	41.74	PK2	31.8	-20.3	53.24	-	-	74	-20.76	165	188	V
* 2.655	30.43	MAV1	31.7	-20.4	41.73	53.97	-12.24	-	-	165	188	V
* 2.662	41.42	PK2	31.7	-20.4	52.72	-	-	74	-21.28	276	273	V
* 2.662	30.26	MAV1	31.7	-20.4	41.56	53.97	-12.41	-	-	276	273	V
2.305	45.32	PK2	30.9	-20.8	55.42	-	-	74	-18.58	167	180	V
2.305	33.58	MAV1	31	-20.7	43.88	53.97	-10.09	-	-	167	180	V

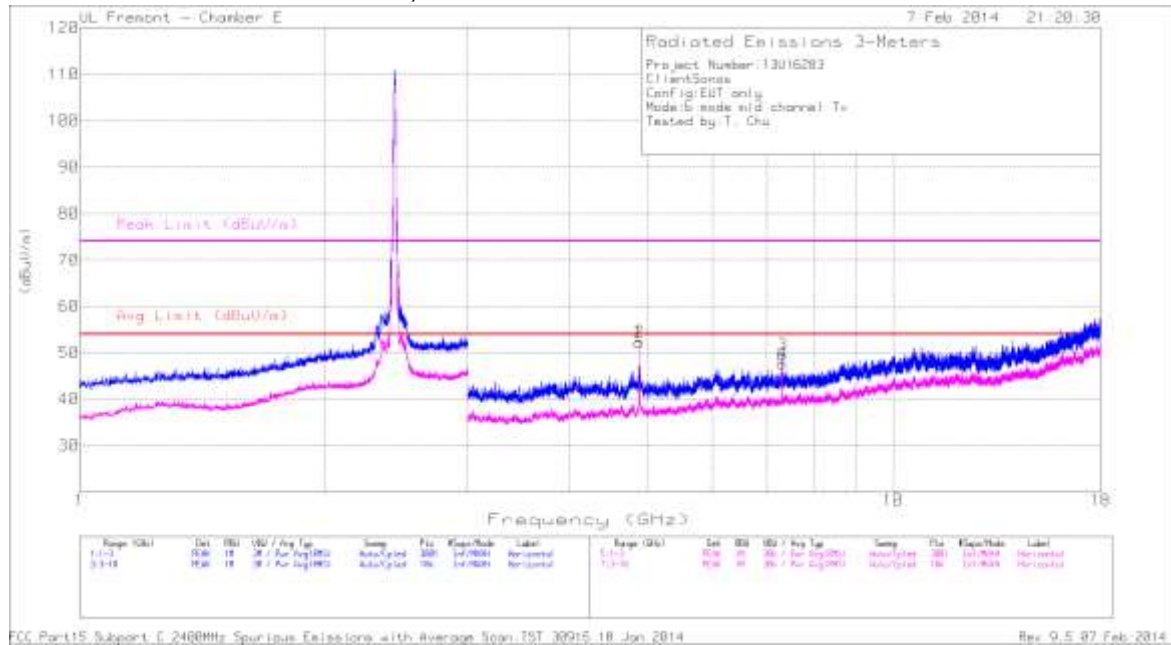
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK2 - KDB558074 Method: Maximum Peak

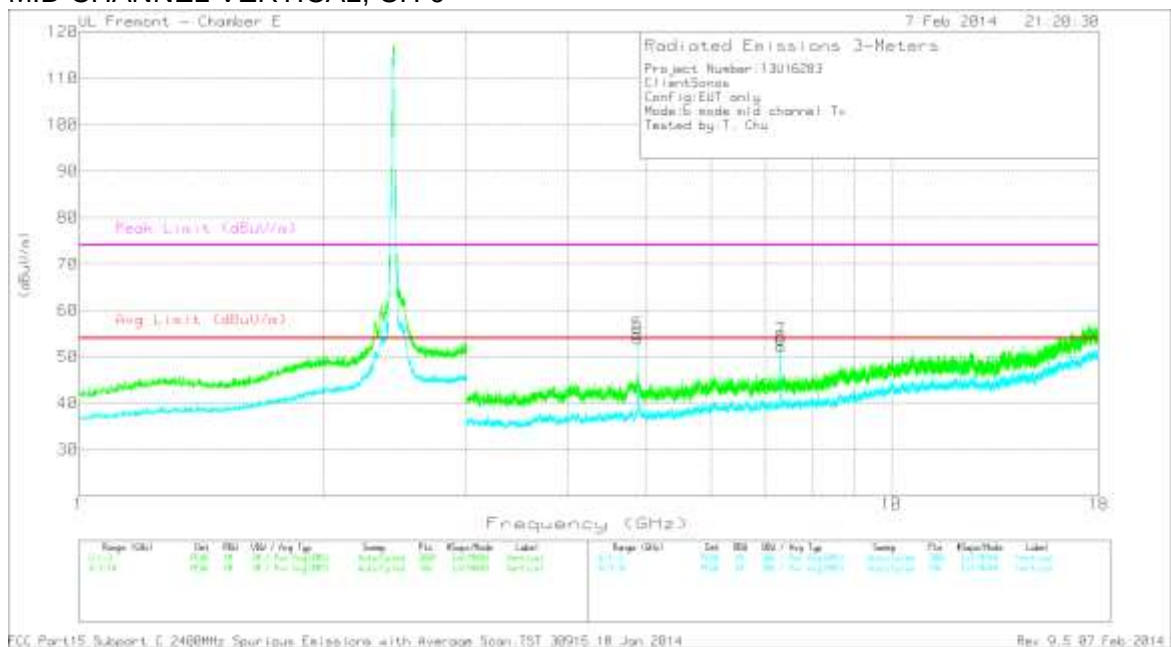
MAV1 - KDB558074 Option 1 Maximum RMS Average

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 18 Jan 2014 Rev 9.5 22 Jan 2014

MID CHANNEL HORIZONTAL, CH 6



MID CHANNEL VERTICAL, CH 6



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	* 4.874	48.76	PK	34.4	-31	52.16	-	-	74	-21.84	0-360	199	H
2	* 4.874	43.67	MA v1	34.4	-31	47.07	53.97	-6.9	-	-	300	101	H
3	* 7.314	41.48	PK	36	-27.9	49.58	-	-	74	-24.42	0-360	199	H
4	* 7.312	39.72	Avg	36	-28	47.72	53.97	-6.25	-	-	0-360	199	H
5	* 4.875	51.43	PK	34.4	-31	54.83	-	-	74	-19.17	0-360	200	V
6	* 4.874	49.18	MA v1	34.4	-31	52.58	53.97	-1.39	-	-	216	153	V
7	* 7.313	45.59	PK	36	-27.9	53.69	-	-	74	-20.31	0-360	101	V
8	* 7.312	40.66	MA v1	36	-28	48.66	53.97	-5.31	-	-	268	142	V

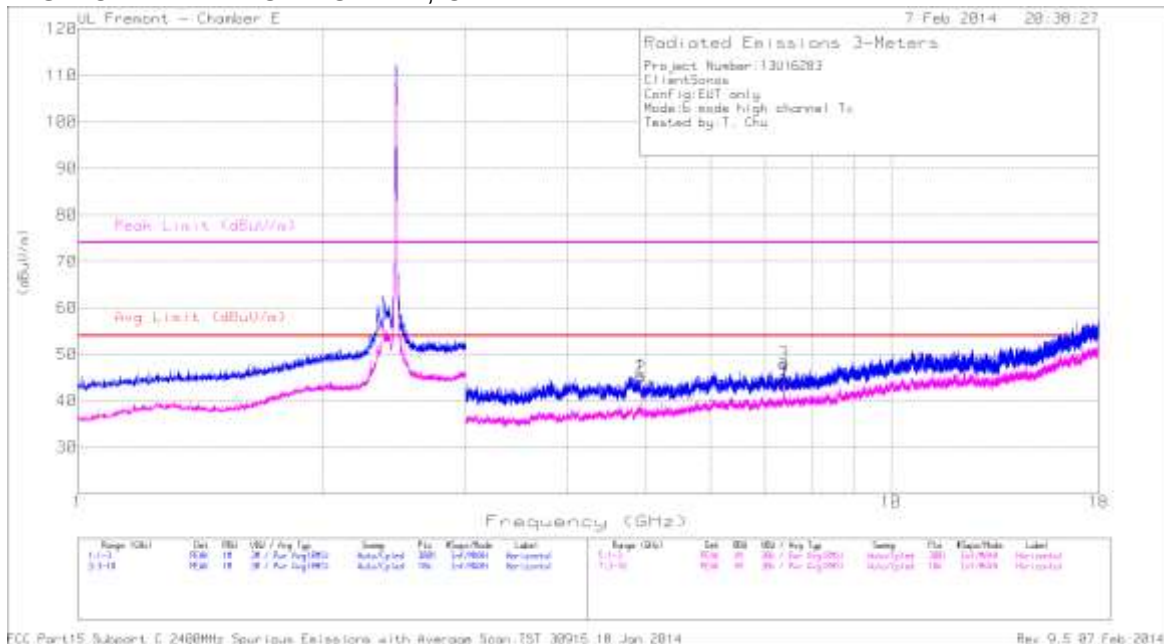
* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

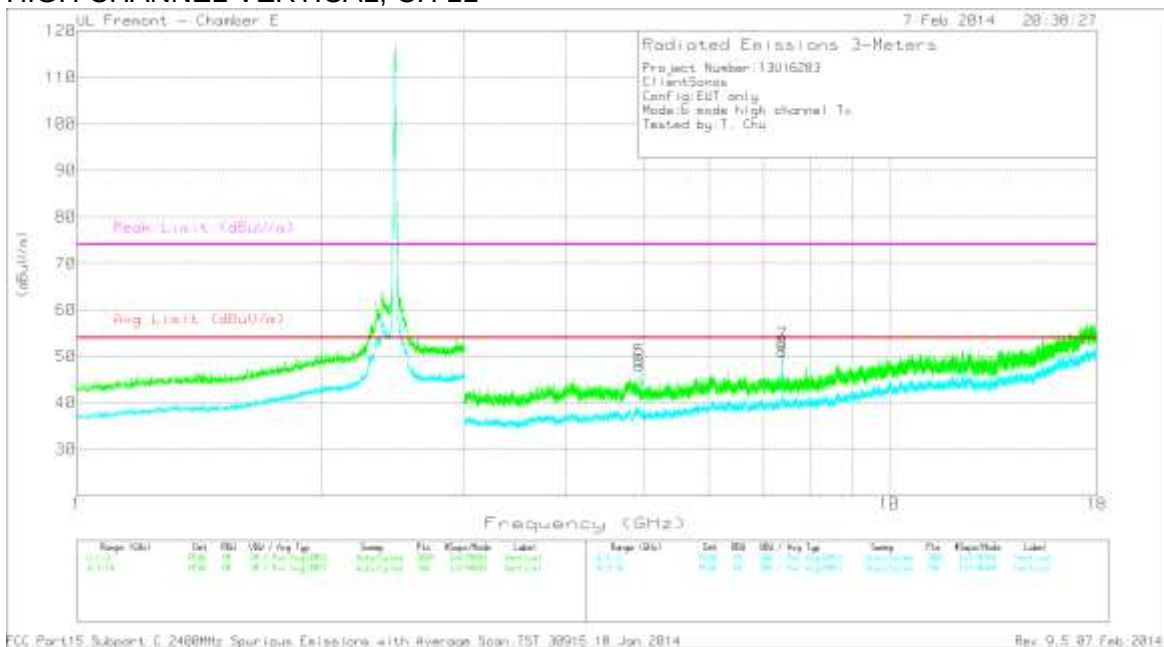
Avg - Video bandwidth < Resolution bandwidth

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/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	* 4.925	41.66	PK	34.4	-30.6	45.46	-	-	74	-28.54	0-360	199	H
2	* 4.924	41.26	Avg	34.4	-30.6	45.06	53.97	-8.91	-	-	0-360	199	H
3	* 7.387	39.09	PK	36.1	-27.2	47.99	-	-	74	-26.01	0-360	101	H
4	* 7.386	36.31	Avg	36.1	-27.2	45.21	53.97	-8.76	-	-	0-360	199	H
5	* 4.925	45.3	PK	34.4	-30.6	49.1	-	-	74	-24.9	0-360	101	V
6	* 4.924	44.16	Avg	34.4	-30.6	47.96	53.97	-6.01	-	-	0-360	200	V
7	* 7.386	43.65	PK	36.1	-27.2	52.55	-	-	74	-21.45	0-360	101	V
8	* 7.387	39.98	MA v1	36.1	-27.2	48.88	53.97	-5.09	-	-	281	118	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK - Peak detector

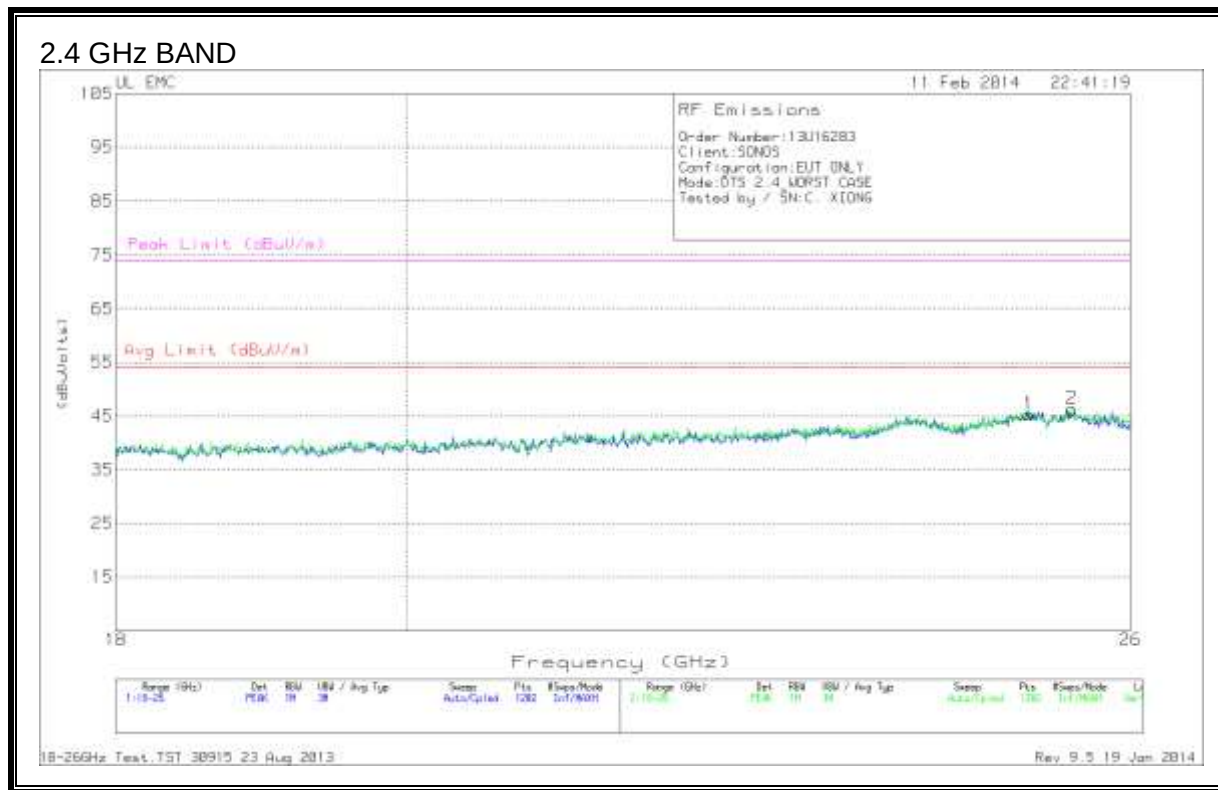
Avg - Video bandwidth < Resolution bandwidth

FCC Part15 Subpart C 2400MHz Spurious Emissions with Average Scan.TST 30915 18 Jan 2014

Rev 9.5 07 Feb 2014

9.3. WORST-CASE ABOVE 18 GHz

SPURIOUS EMISSIONS 18 TO 26 GHz (HORIZONTAL & VERTICAL)



Trace Markers

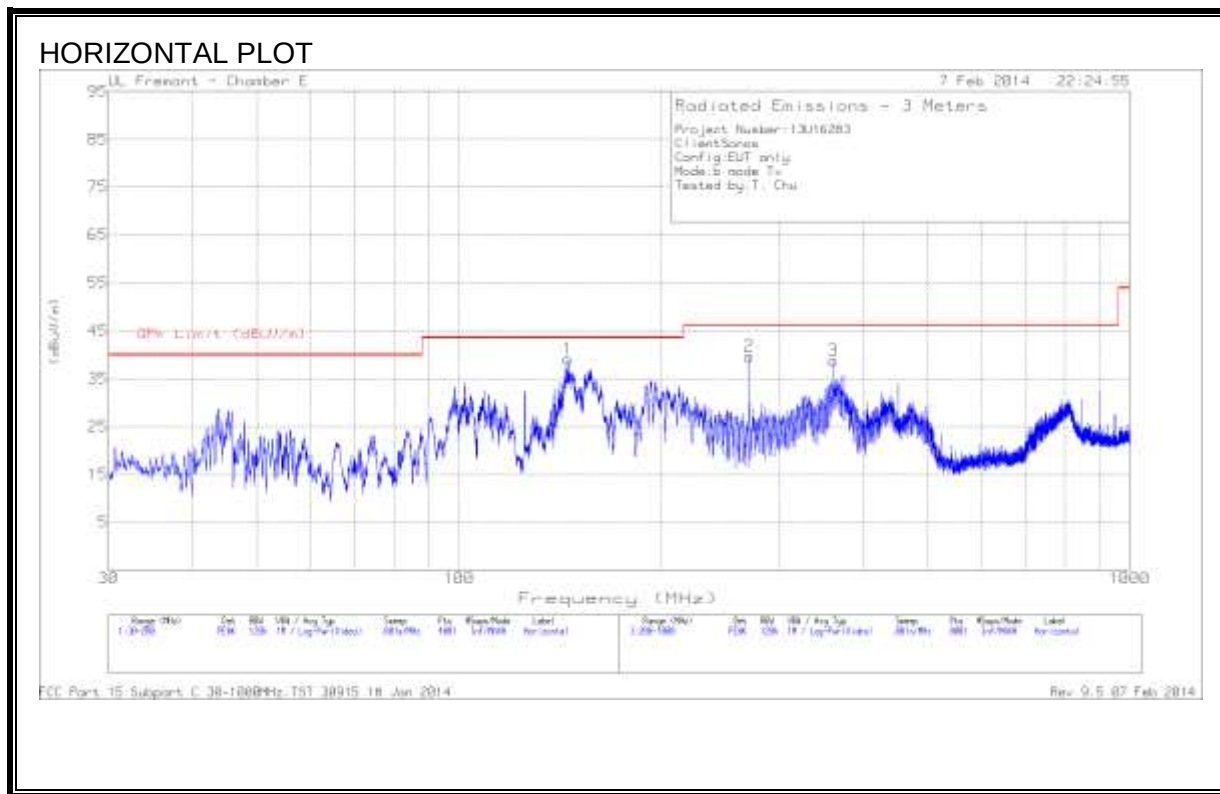
Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T89 (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	25.061	43.43	PK	34	-22.6	-9.5	45.33	54	-8.67	74	-28.67
2	25.454	44.23	PK	34.1	-22.5	-9.5	46.33	54	-7.67	74	-27.67

PK - Peak detector

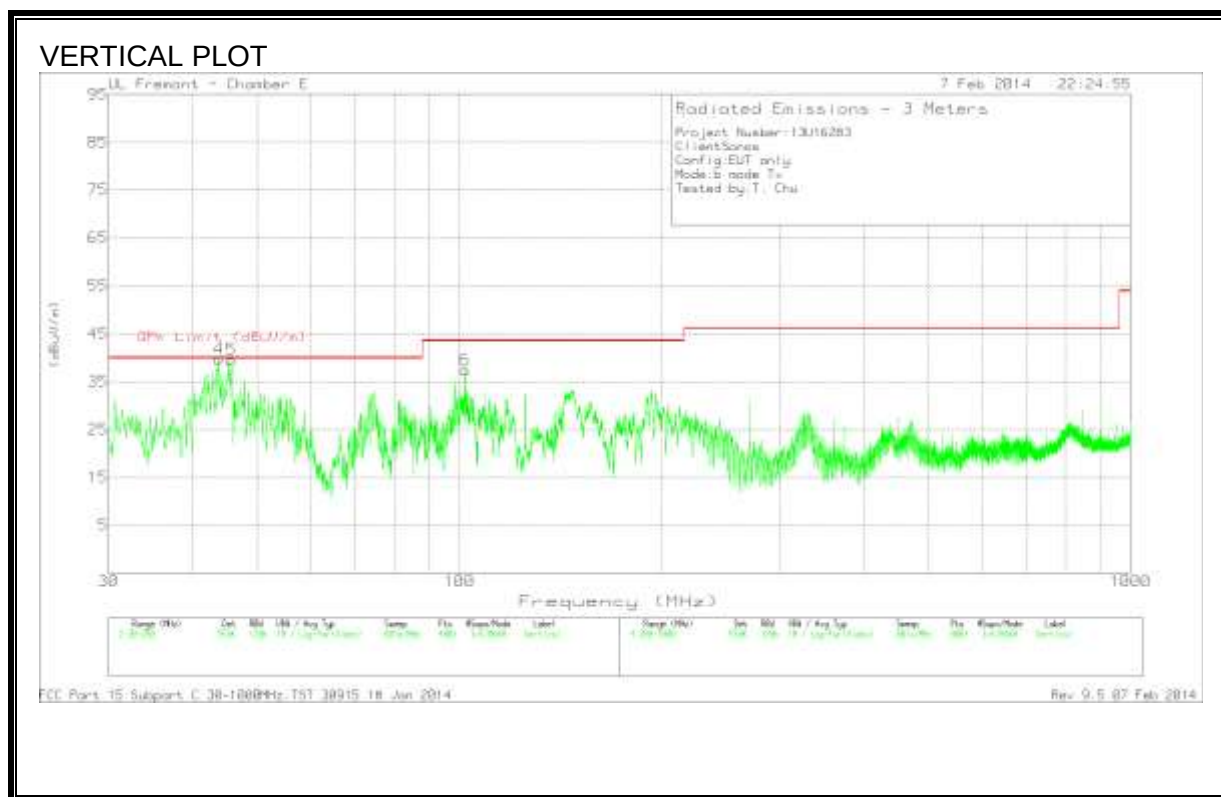
18-26GHz Test.TST 30915 23 Aug 2013 Rev 9.5 19 Jan 2014

9.4. WORST-CASE BELOW 1 GHz

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



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



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T408 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	145.26	57.56	PK	12.5	-31	39.06	43.52	-4.46	0-360	201	H
	145.26	54	QP	12.6	-30.9	35.7	43.52	-7.82	326	222	H
2	* 270.9	57	PK	13.1	-30.4	39.7	46.02	-6.32	0-360	100	H
3	361.3	54.12	PK	14.9	-30.2	38.82	46.02	-7.2	0-360	100	H
4	43.8125	60.6	PK	11.2	-32	39.8	40	-.2	0-360	100	V
	43.8125	57.75	QP	11.2	-32	36.95	40	-3.05	282	122	V
5	45.725	61.59	PK	10	-32	39.59	40	-.41	0-360	100	V
	45.725	55.8	QP	10	-32.1	33.7	40	-6.3	33	102	V
6	101.91	58.41	PK	10.6	-31.6	37.41	43.52	-6.11	0-360	100	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

QP - Quasi-Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 18 Jan 2014

Rev 9.5 07 Feb 2014

PK - 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.

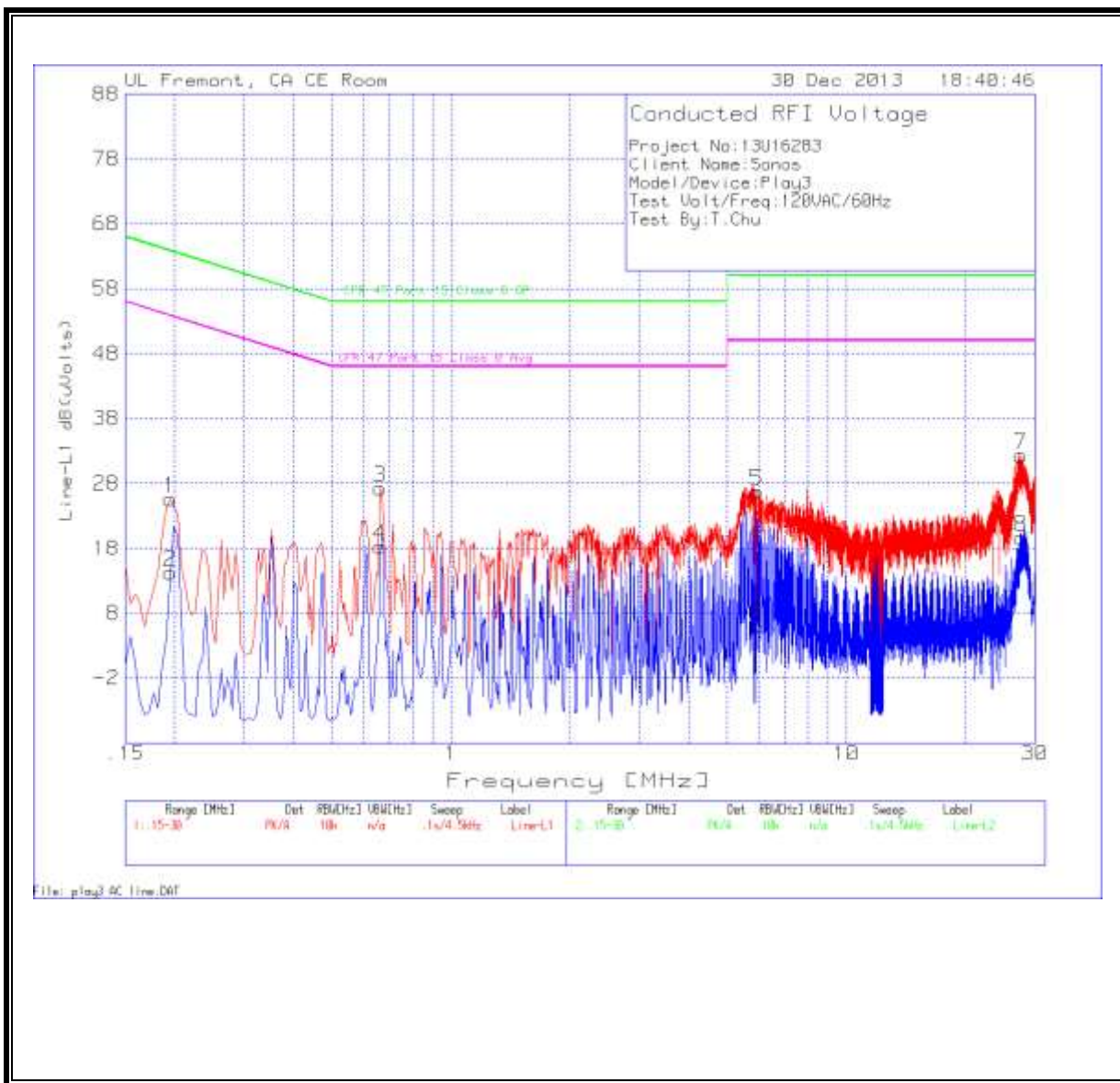
RESULTS

WORST EMISSIONS

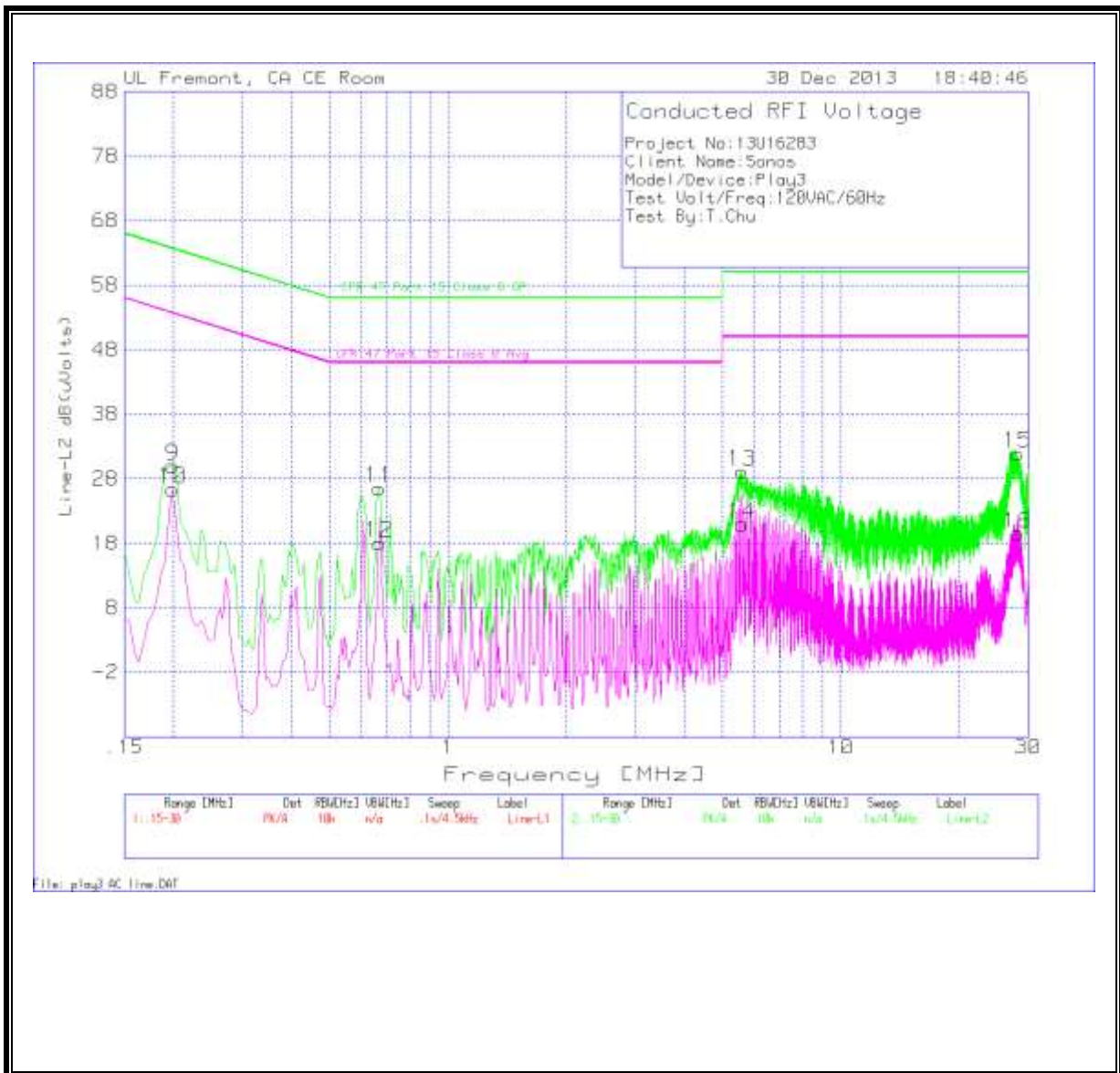
Trace Markers										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CFR 47 Part 15 Class B QP	Margin to Limit (dB)	CFR 47 Part 15 Class B Avg	Margin to Limit (dB)
1	.195	25.46	PK	.1	0	25.56	63.8	-38.24	-	-
2	.195	14.2	Av	.1	0	14.3	-	-	53.8	-39.5
3	.663	27.16	PK	.1	0	27.26	56	-28.74	-	-
4	.663	18.2	Av	.1	0	18.3	-	-	46	-27.7
5	5.9325	26.55	PK	.1	.1	26.75	60	-33.25	-	-
6	5.9325	5.94	Av	.1	.1	6.14	-	-	50	-43.86
7	27.6945	31.56	PK	.5	.3	32.36	60	-27.64	-	-
8	27.6945	18.92	Av	.5	.3	19.72	-	-	50	-30.28

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	.1995	29.92	PK	.1	0	30.02	63.6	-33.58	-	-
10	.1995	26.31	Av	.1	0	26.41	-	-	53.6	-27.19
11	.6675	26.38	PK	.1	0	26.48	56	-29.52	-	-
12	.6675	17.84	Av	.1	0	17.94	-	-	46	-28.06
13	5.5995	28.89	PK	.1	.1	29.09	60	-30.91	-	-
14	5.5995	20.7	Av	.1	.1	20.9	-	-	50	-29.1
15	28.2165	31.17	PK	.5	.3	31.97	60	-28.03	-	-
16	28.2165	18.68	Av	.5	.3	19.48	-	-	50	-30.52

LINE 1 RESULTS



LINE 2 RESULTS



11. POWER SETTINGS

Frequency(MHz)	Power setting (Q)
2412	18.5
2437	18.5
2462	18.5