8.4 Out of Band Emissions at the Band Edge / Conducted Spurious Emissions

Test requirements and limit, §15.247(d)

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20 dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

▣TEST CONFIGURATION

Refer to the APPENDIX I.

▣TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

- Measurement Procedure 1 – Reference Level

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to ≥ 1.5 times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level

- Measurement Procedure 2 - Unwanted Emissions

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz.(Actual 1 MHz , See below note)**
3. Set the VBW ≥ **3 x RBW.(Actual 3 MHz, See below note)**
4. Detector = **peak**.
5. Ensure that the number of measurement points ≥ span/RBW
6. Sweep time = **auto couple.**
7. Trace mode = **max hold.**
8. **Allow the trace to stabilize** (this may take some time, depending on the extent of the span).
9. Use the peak marker function to determine the maximum amplitude level.

Note : The conducted spurious emission was tested each ranges were set as below.

Frequency range : 30MHz~10GHz, 10GHz~25GHz
RBW= 1MHz, VBW= 3MHz, SWEEP TIME = AUTO, DETECTOR = PEAK, TRACE = MAX HOLD, BINS : 40001

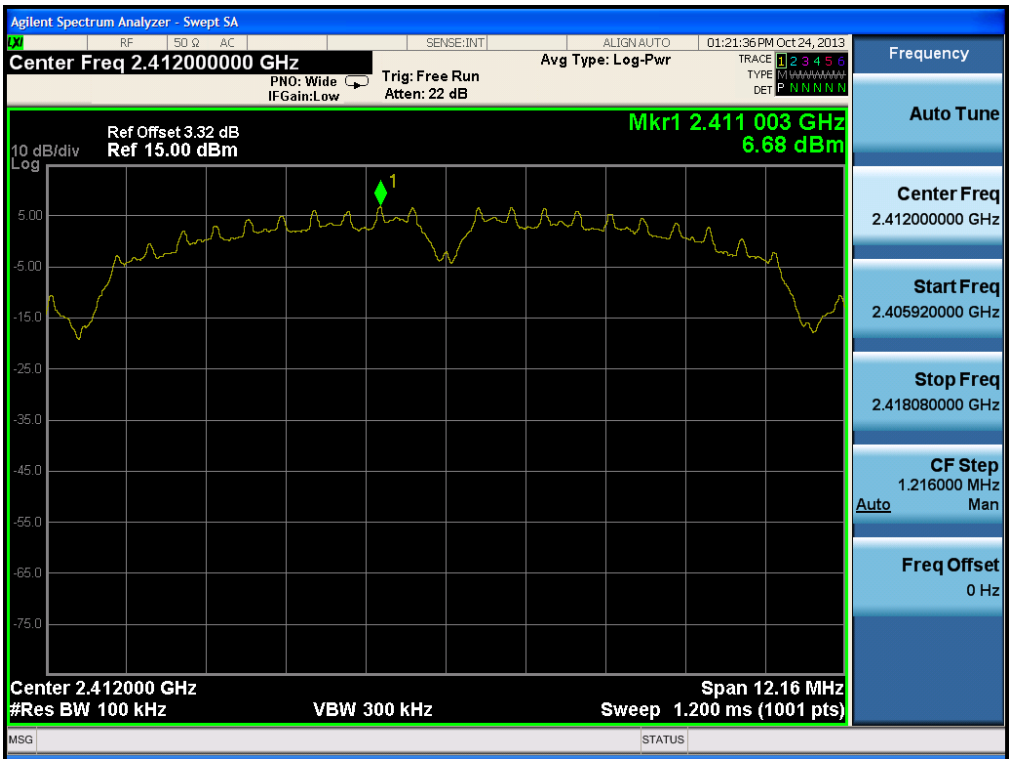
If the emission level with above setting was close to the limit (ie, less than 3 dB margin) then zoom scan is required using RBW = 100 KHz, VBW = 300KHz, SAPN = 100 MHz and BINS = 2001 to get accurate emission level within 100 KHz BW.

Also the path loss for conducted measurement setup was used as described on the Appendix I of this test report.

▣RESULT PLOTS

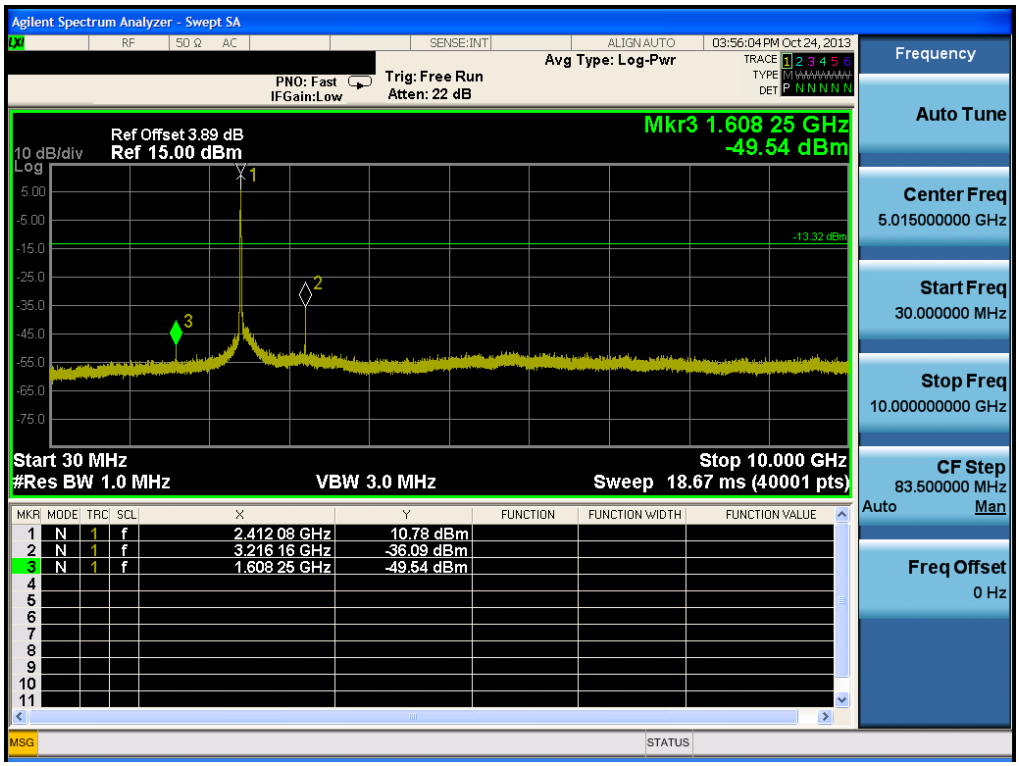
Test Mode: Chain 1 & 802.11b & 1 Mbps & 2412MHz

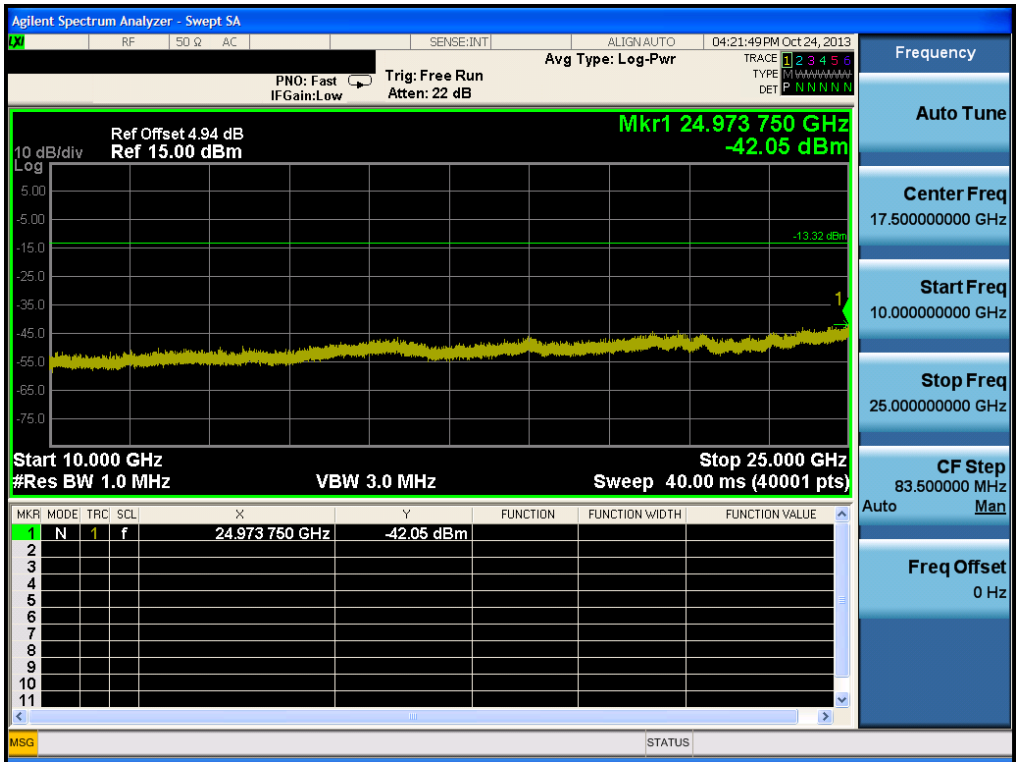
Reference



Low Band-edge

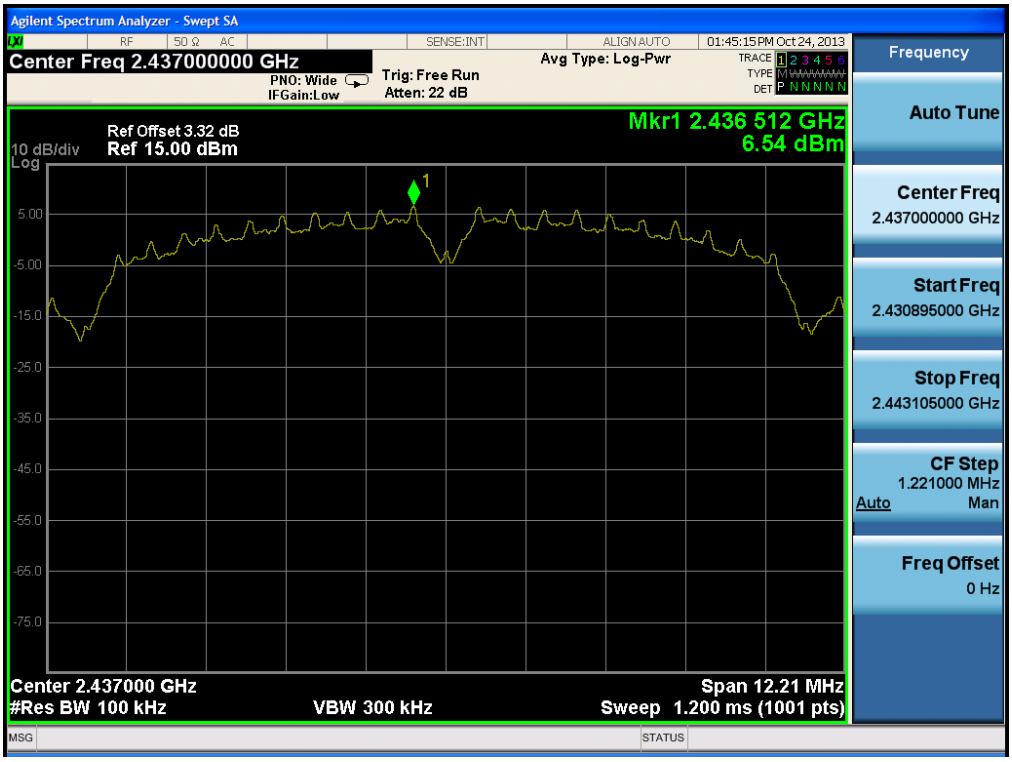
Conducted Spurious Emissions



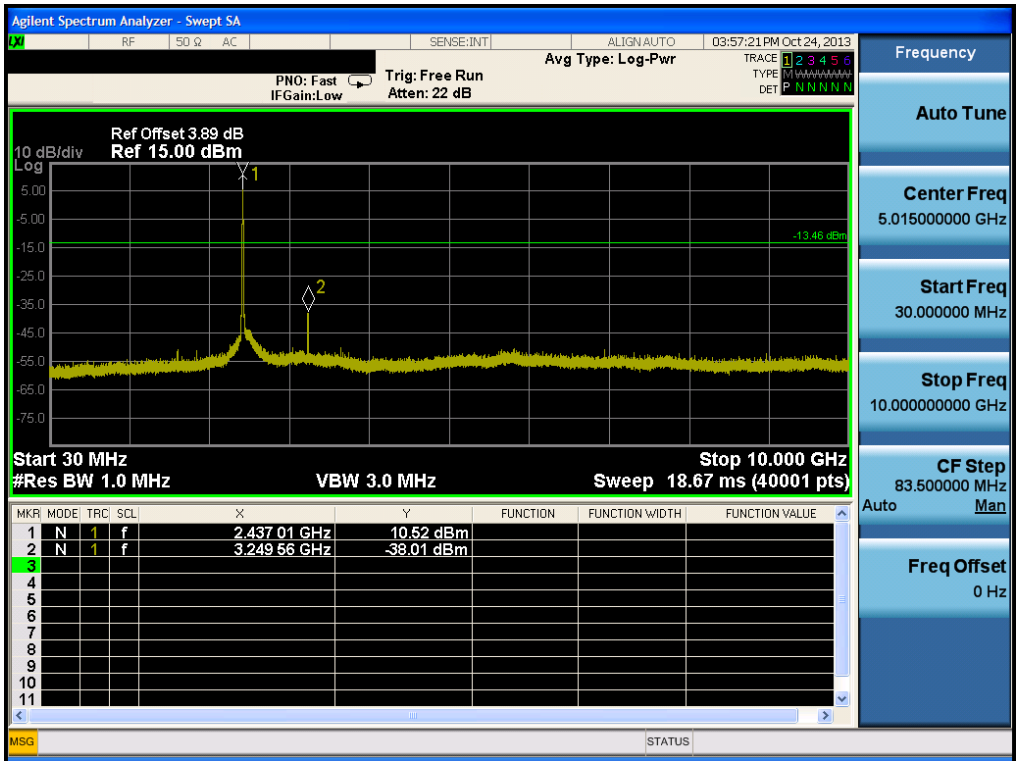


Test Mode: Chain 1 & 802.11b & 1 Mbps & 2437MHz

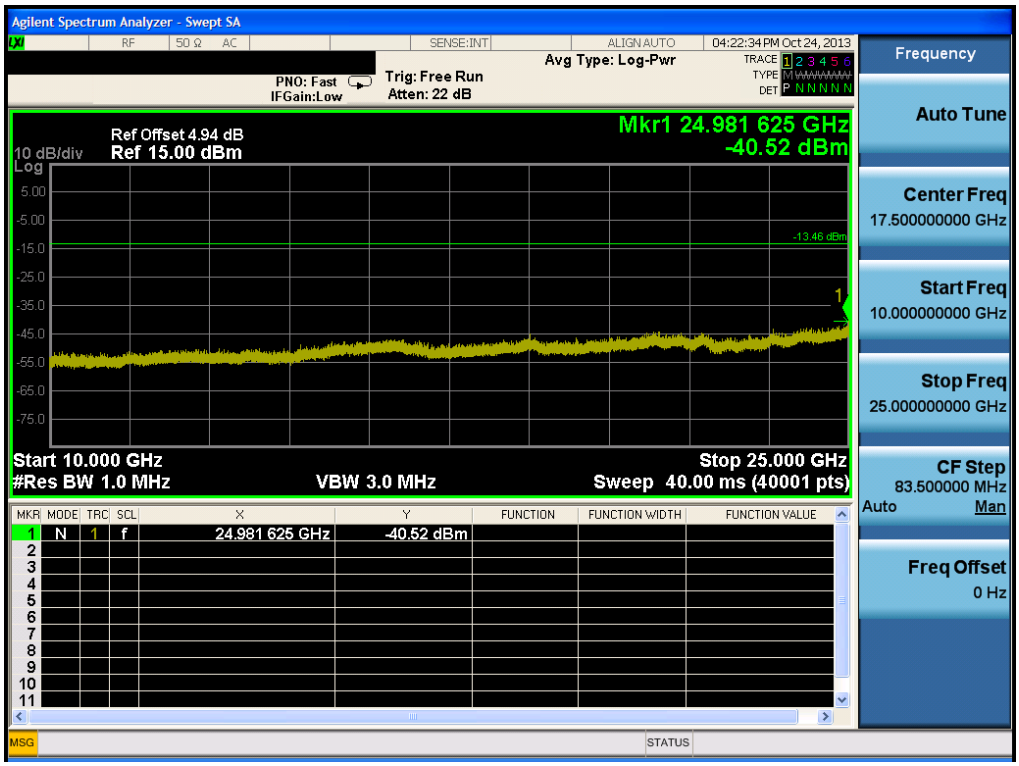
Reference



Conducted Spurious Emissions

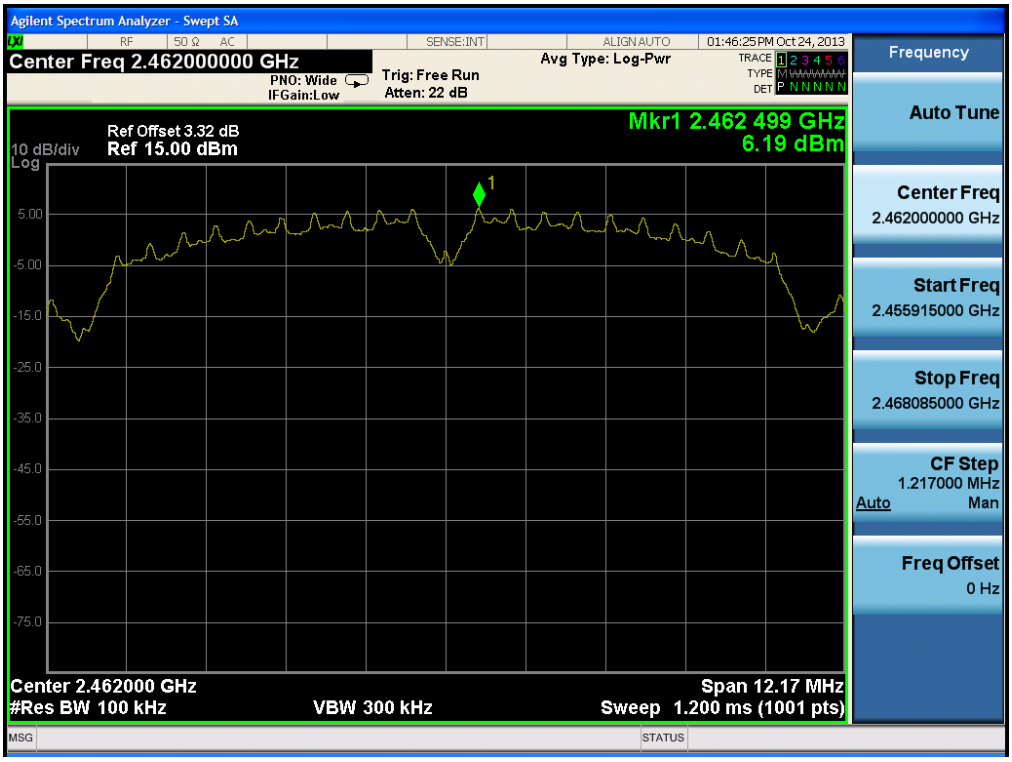


Conducted Spurious Emissions



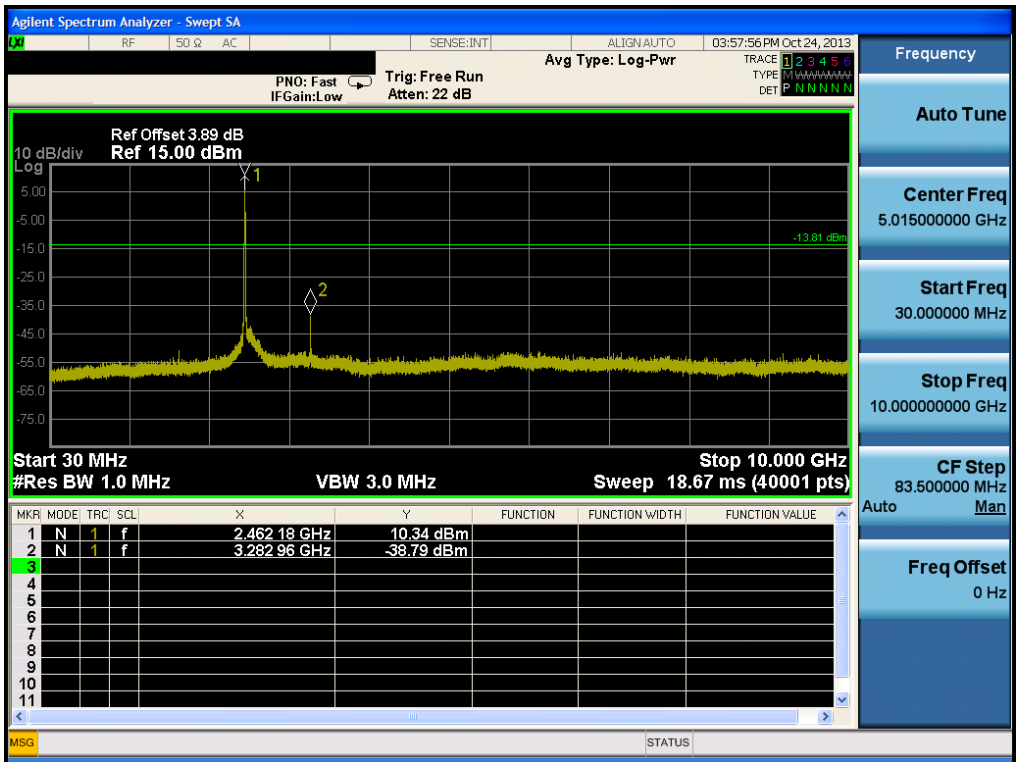
Test Mode: Chain 1 & 802.11b & 1 Mbps & 2462MHz

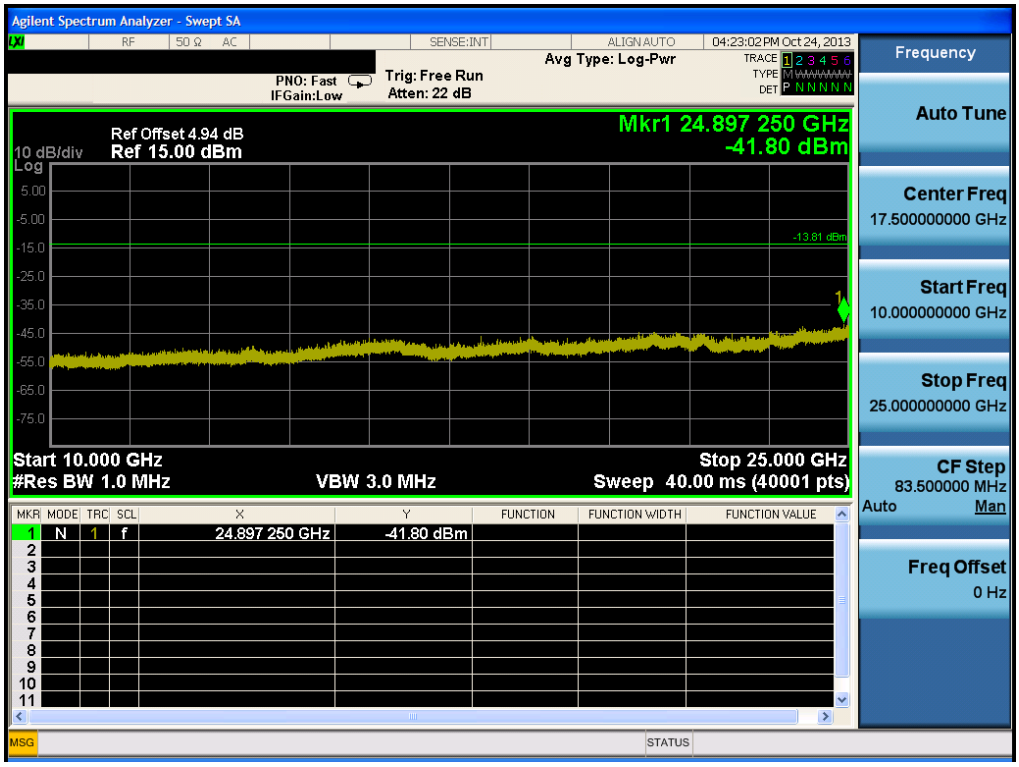
Reference



High Band-edge

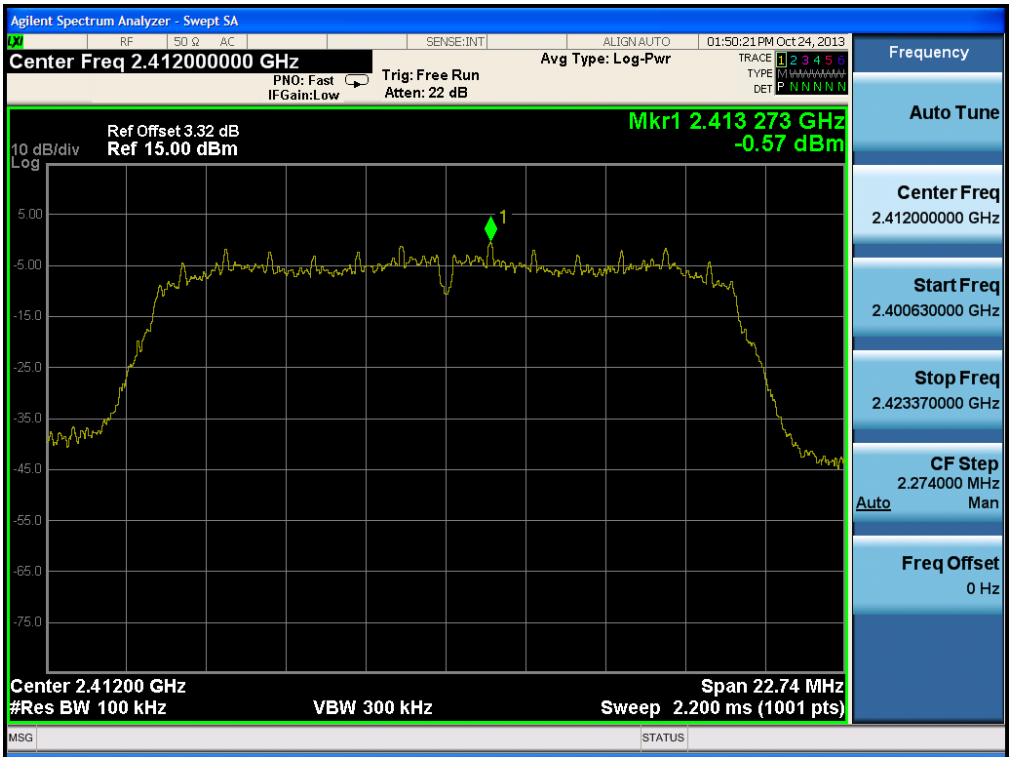
Conducted Spurious Emissions





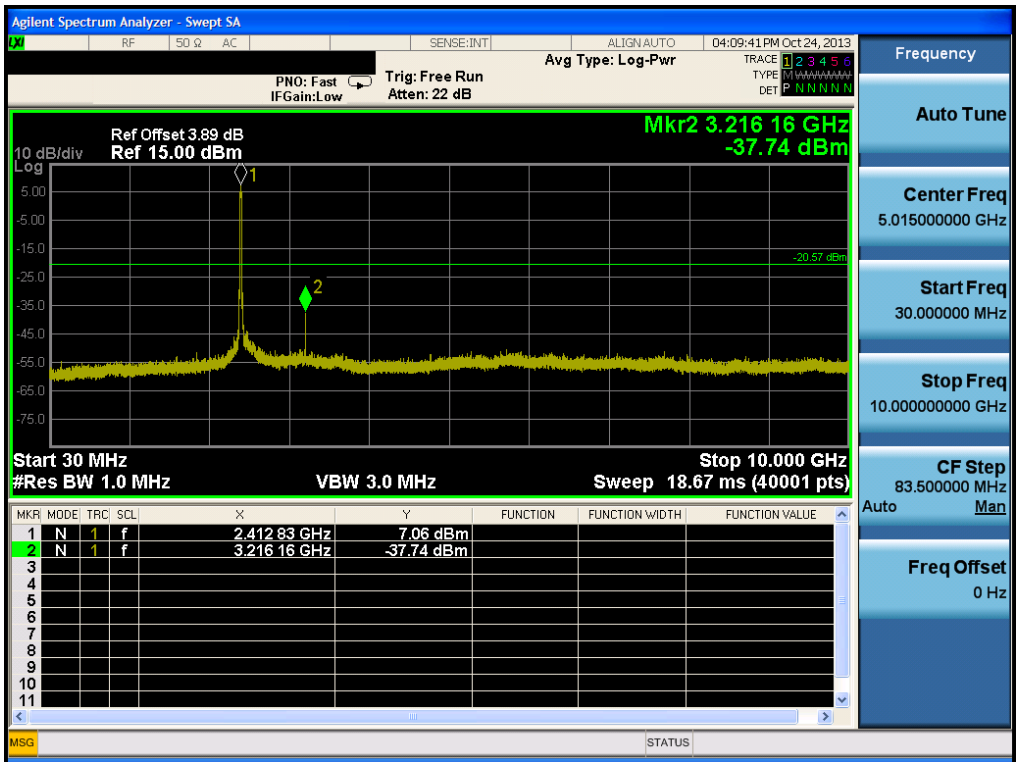
Test Mode: Chain 1 & 802.11g & 6 Mbps & 2412MHz

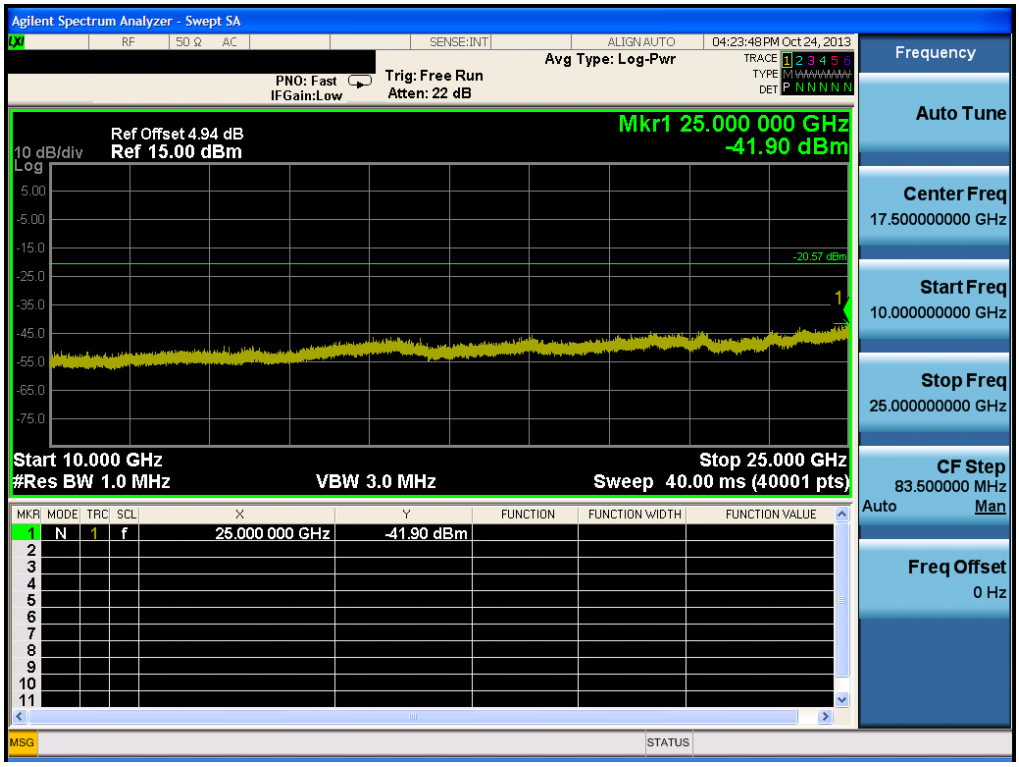
Reference



Low Band-edge

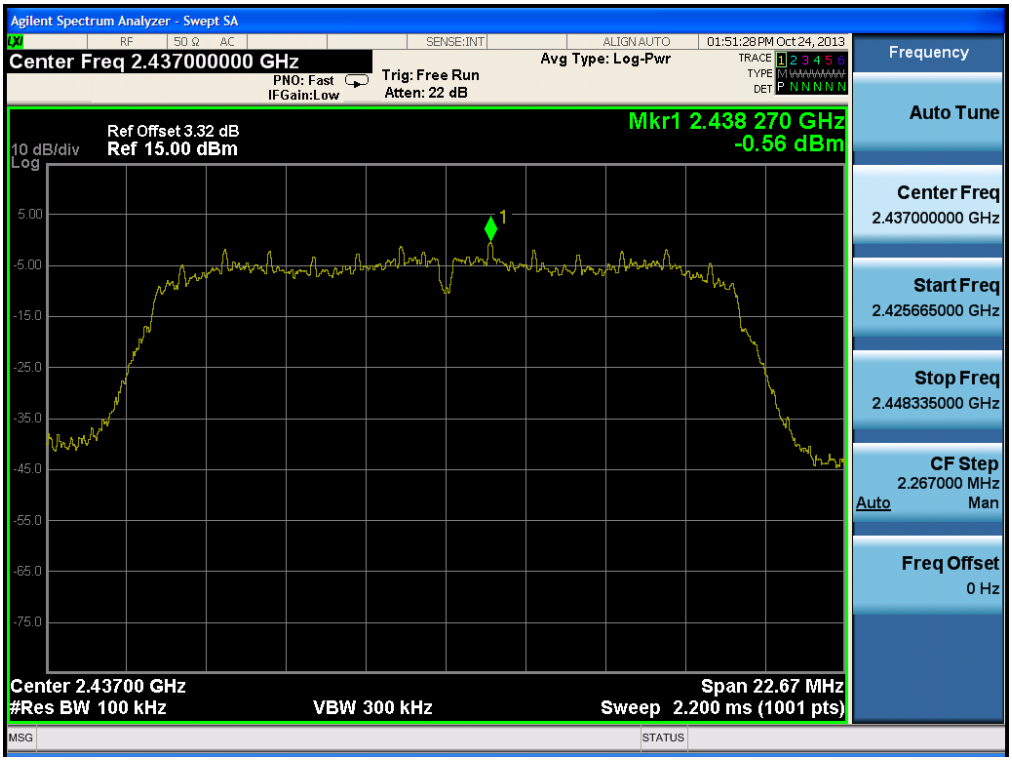
Conducted Spurious Emissions



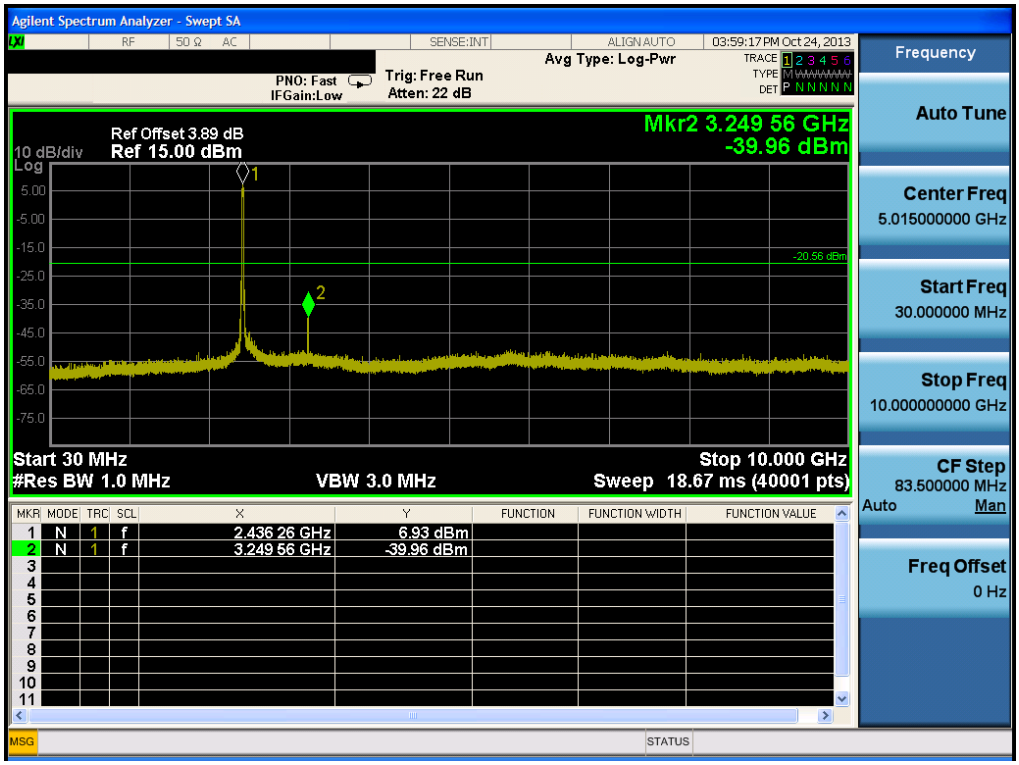


Test Mode: Chain 1 & 802.11g & 6 Mbps & 2437MHz

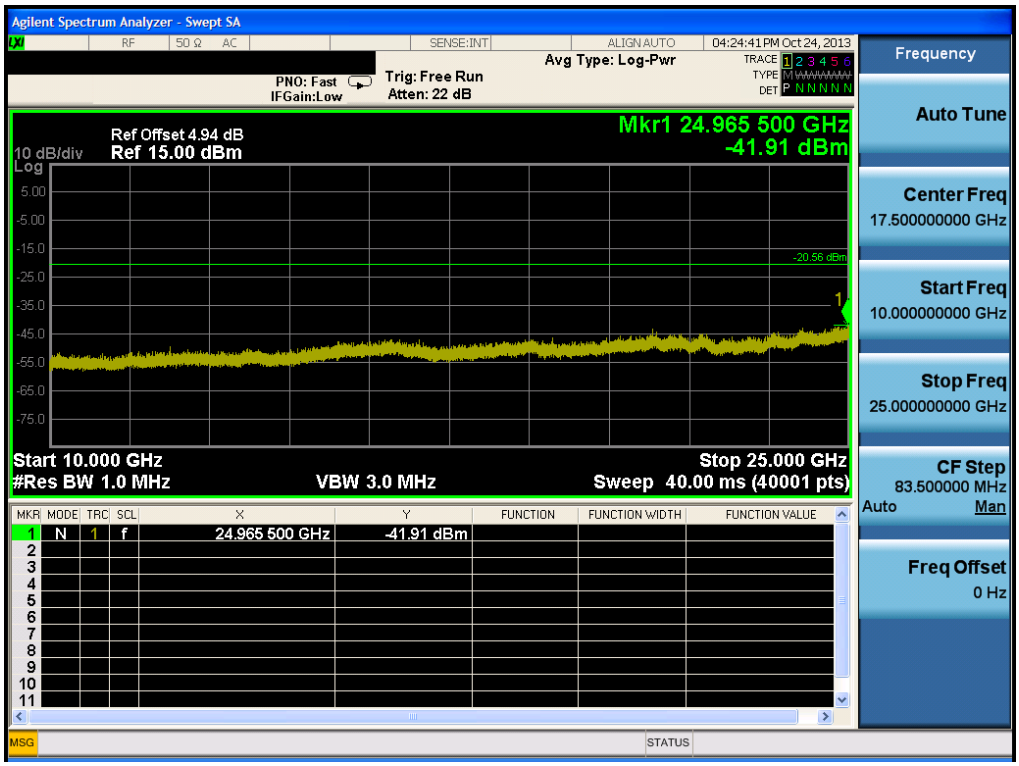
Reference



Conducted Spurious Emissions

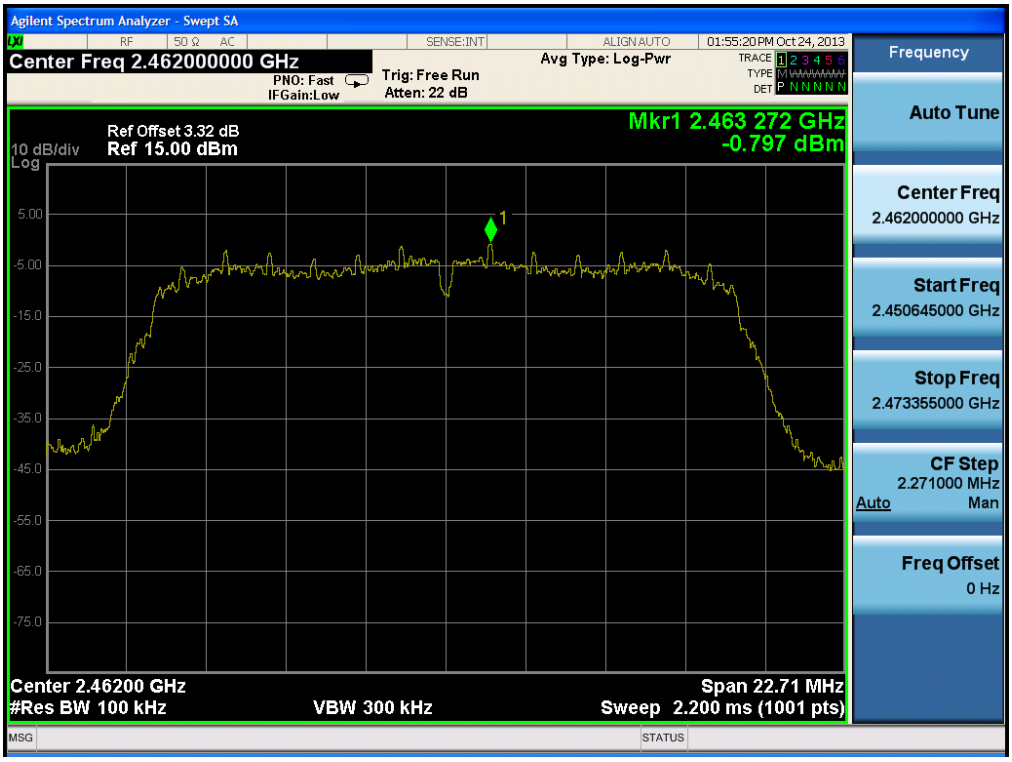


Conducted Spurious Emissions

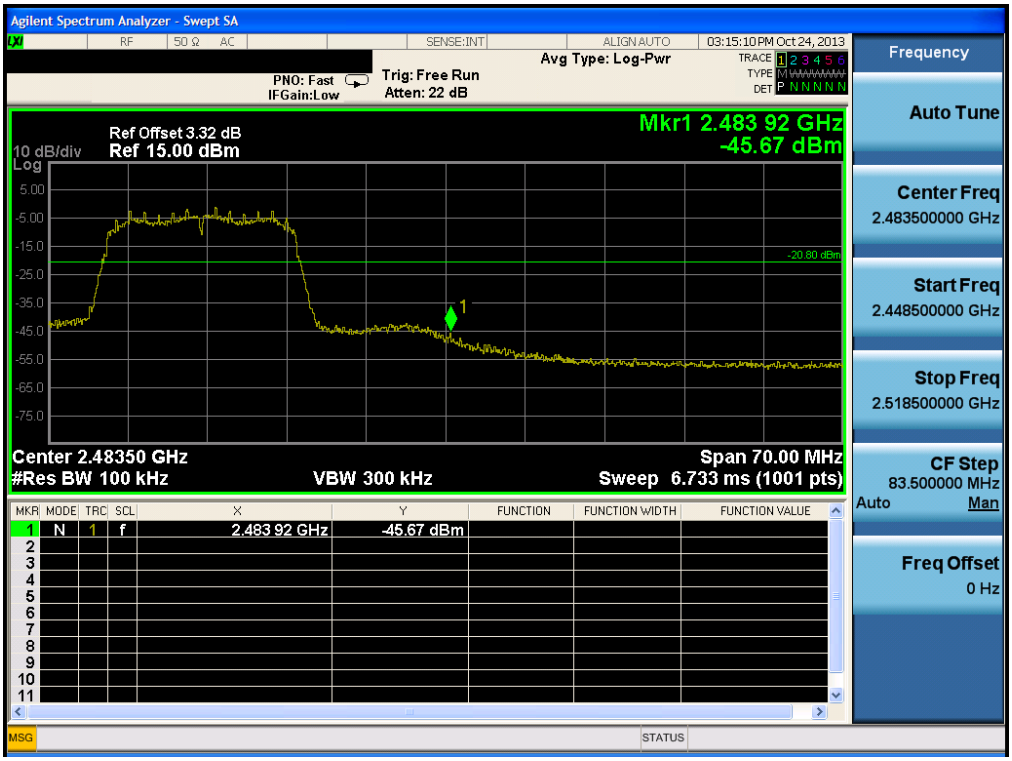


Test Mode: Chain 1 & 802.11g & 6 Mbps & 2462MHz

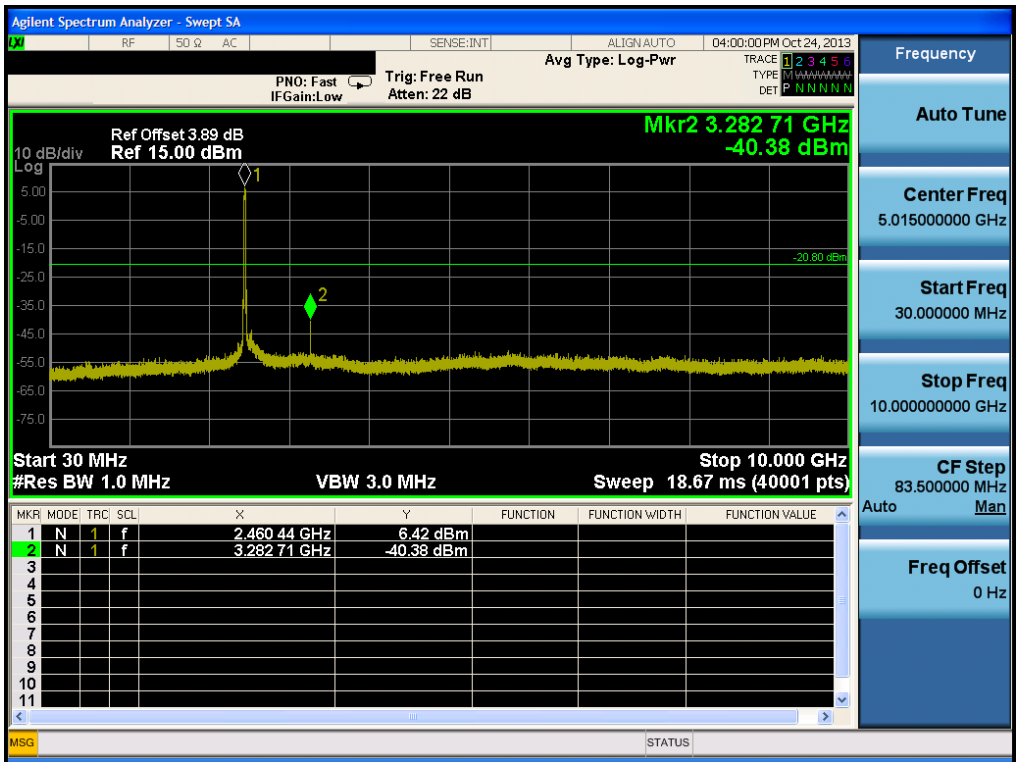
Reference

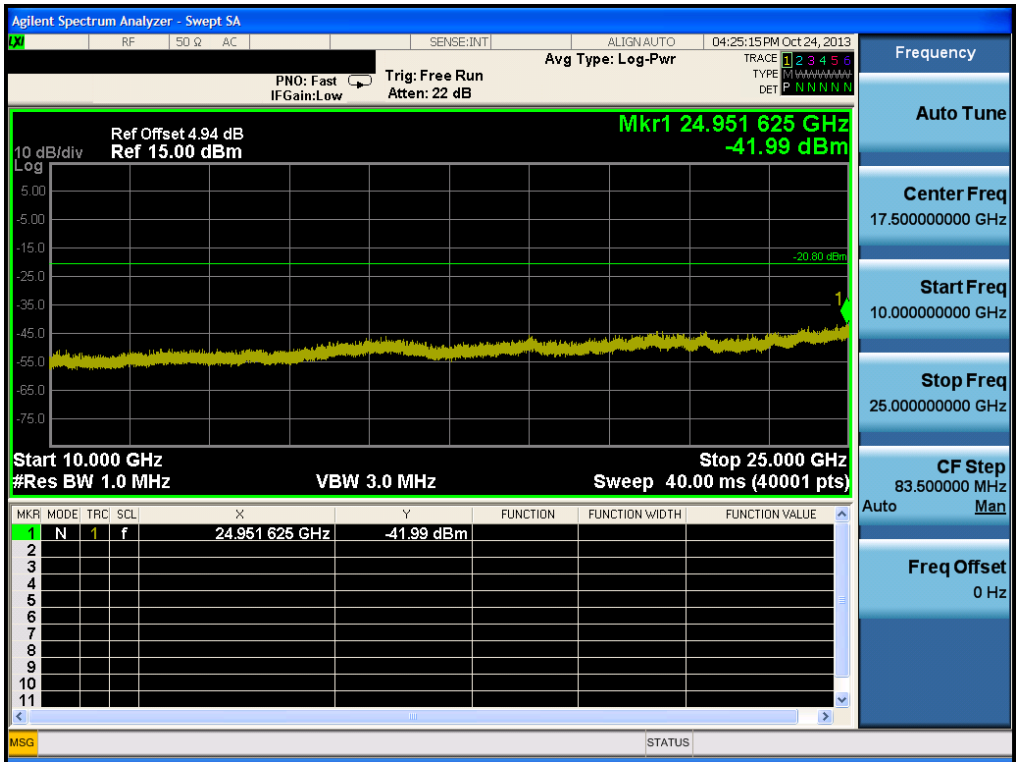


High Band-edge



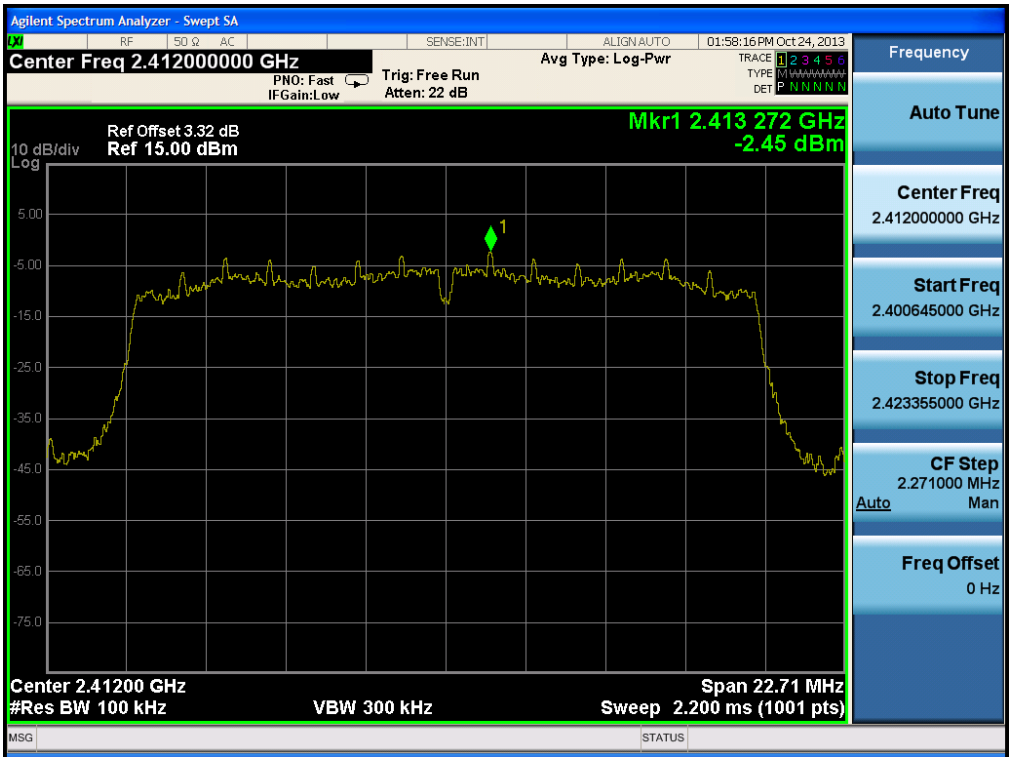
Conducted Spurious Emissions



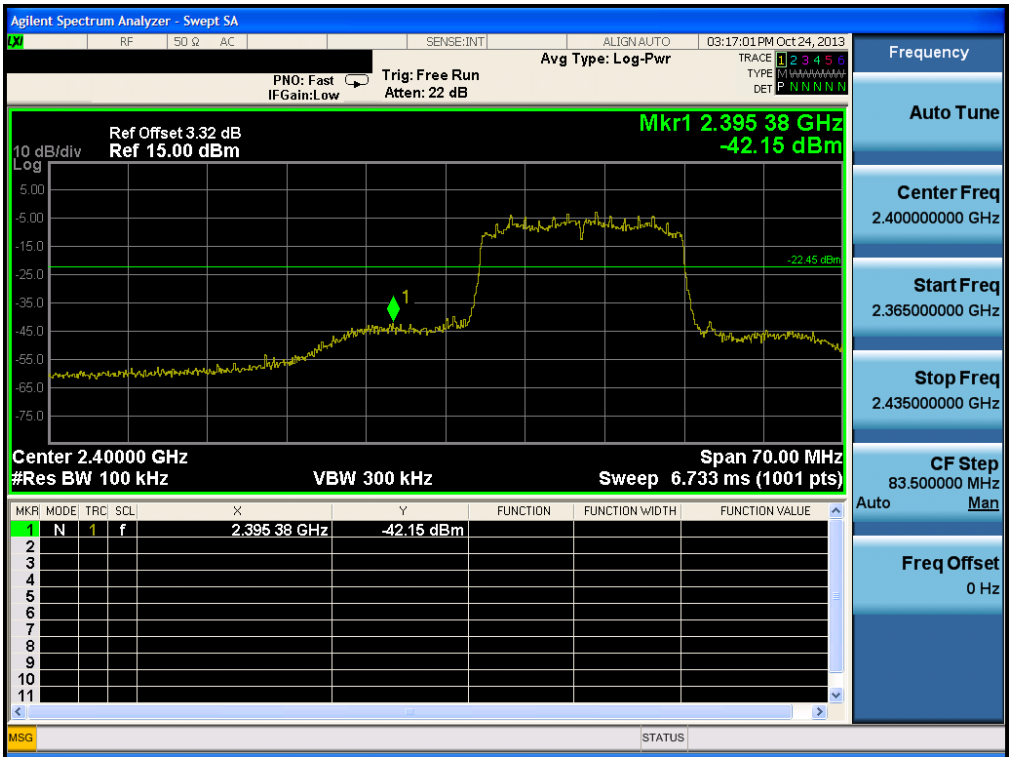


Test Mode: Chain 1 & 802.11n(HT20) & MCS8 & 2412MHz

Reference



Low Band-edge



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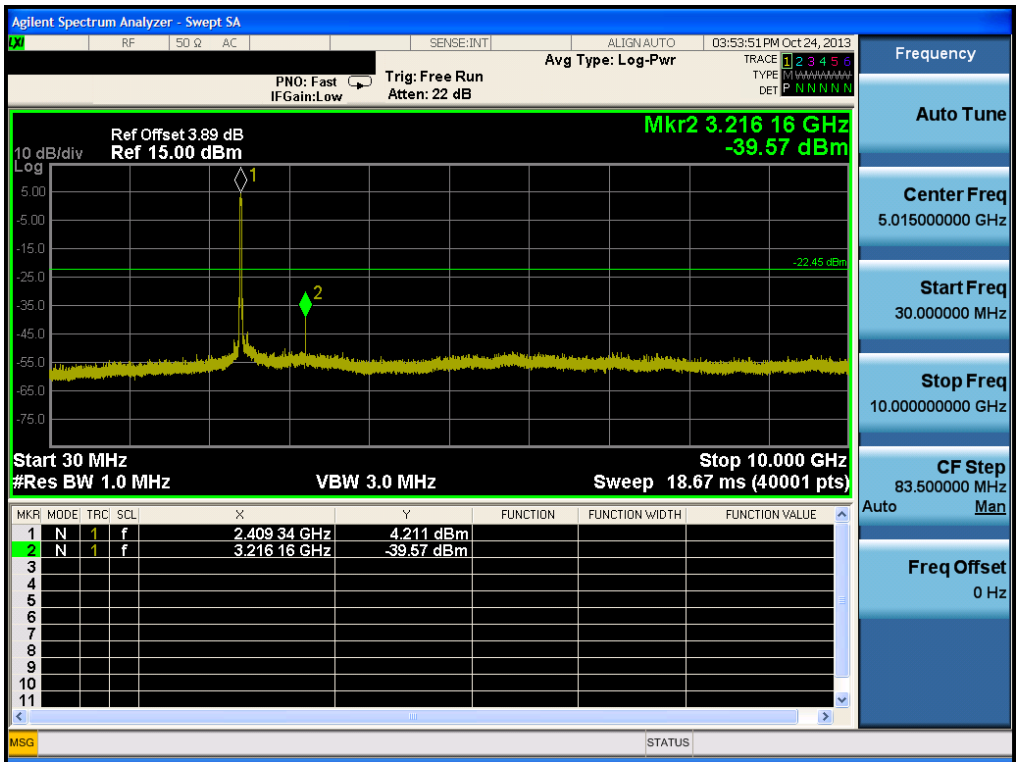
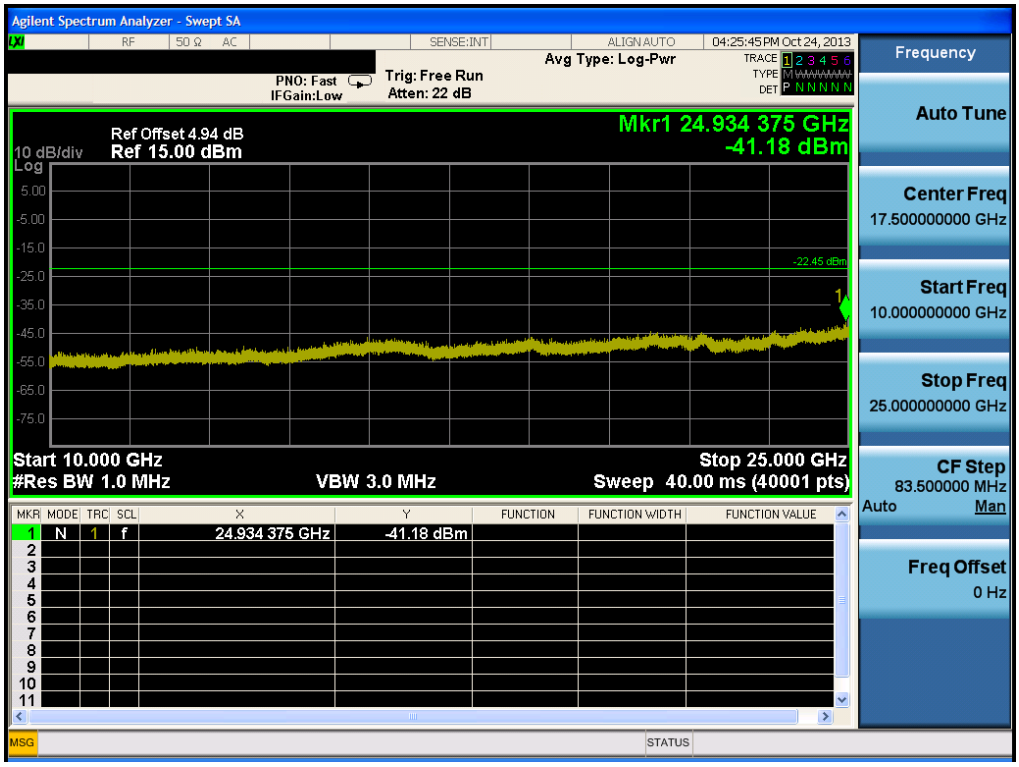
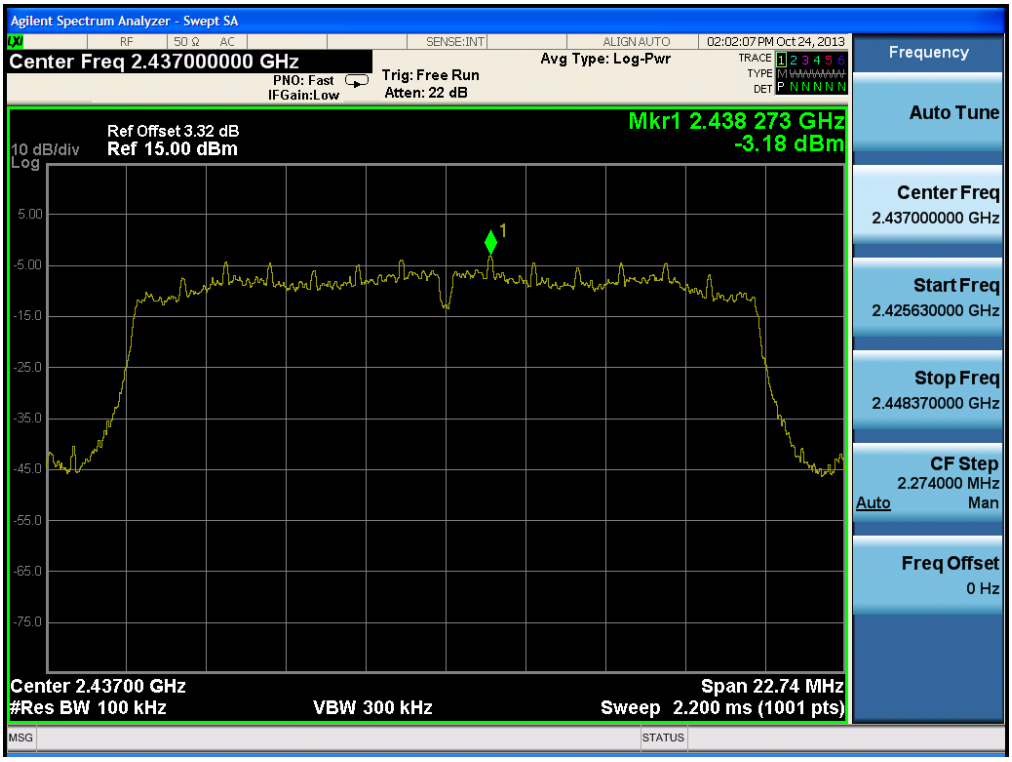




Test Mode: Chain 1 & 802.11n(HT20) & MCS8 & 2437MHz

Reference



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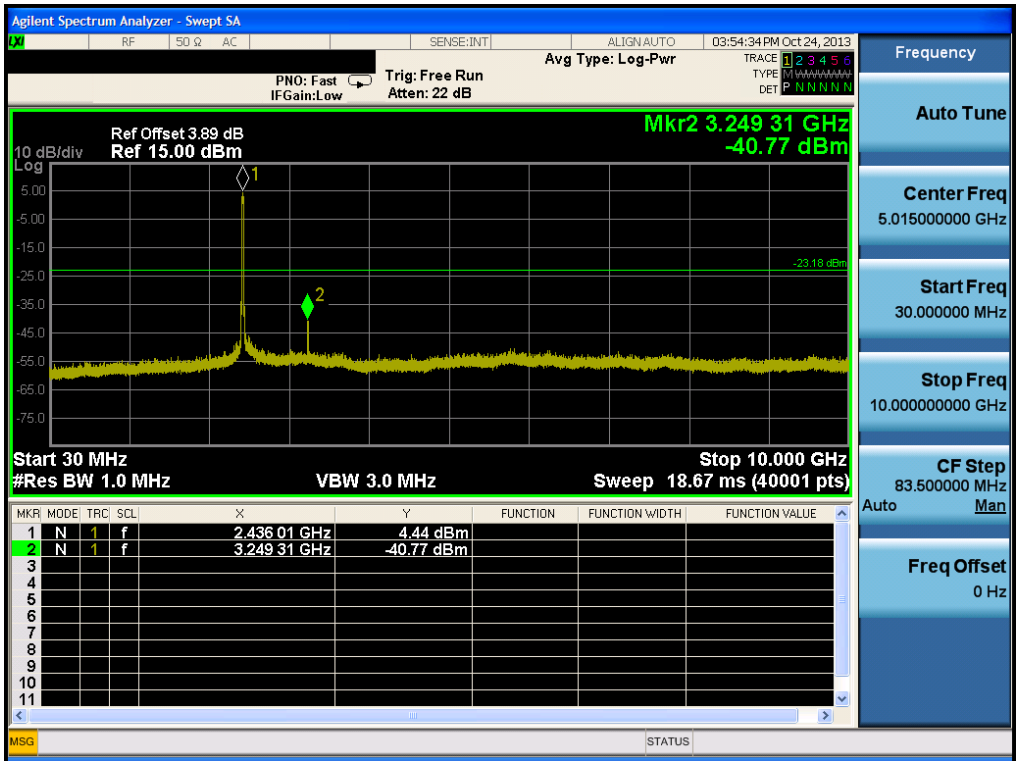

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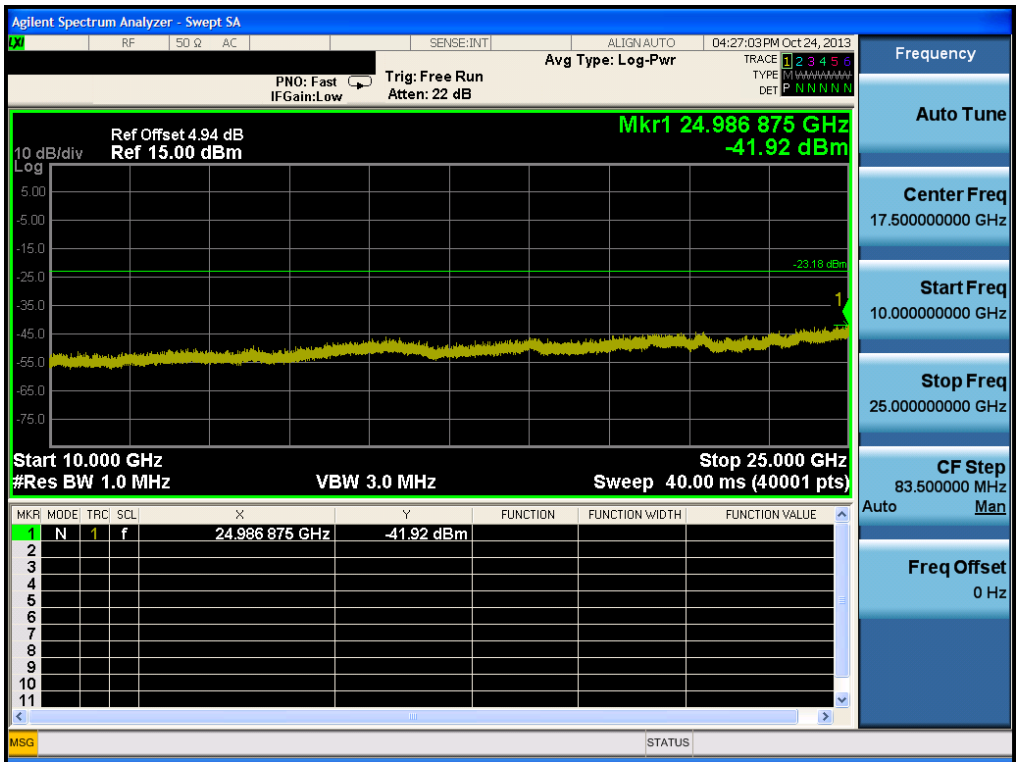
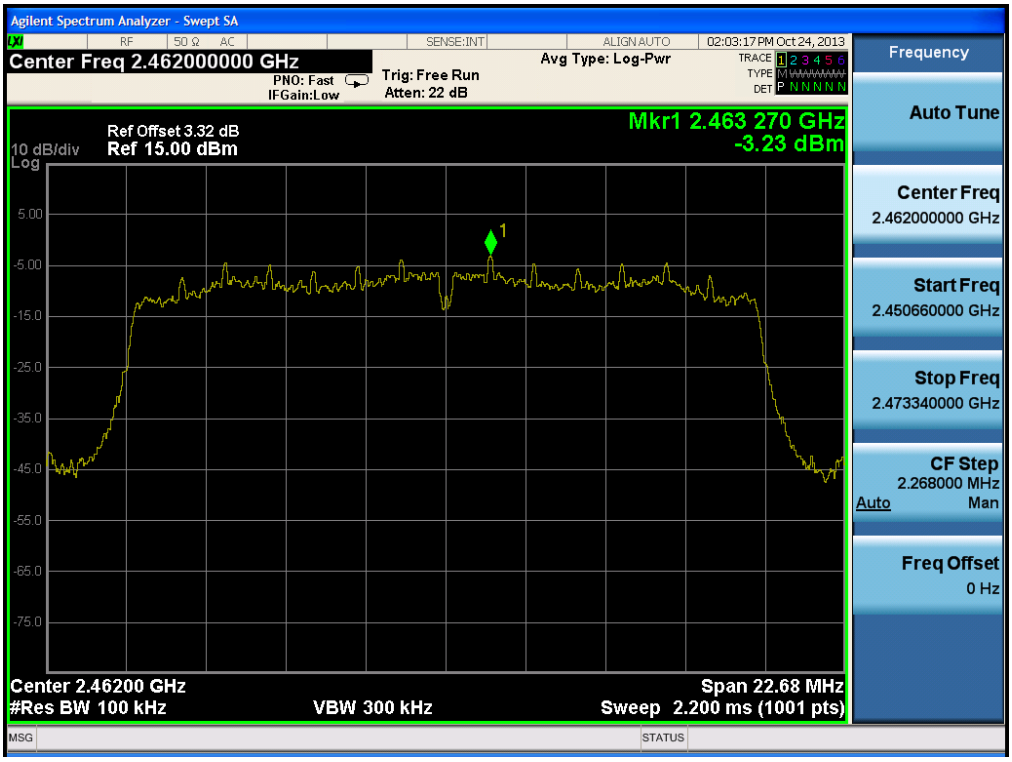
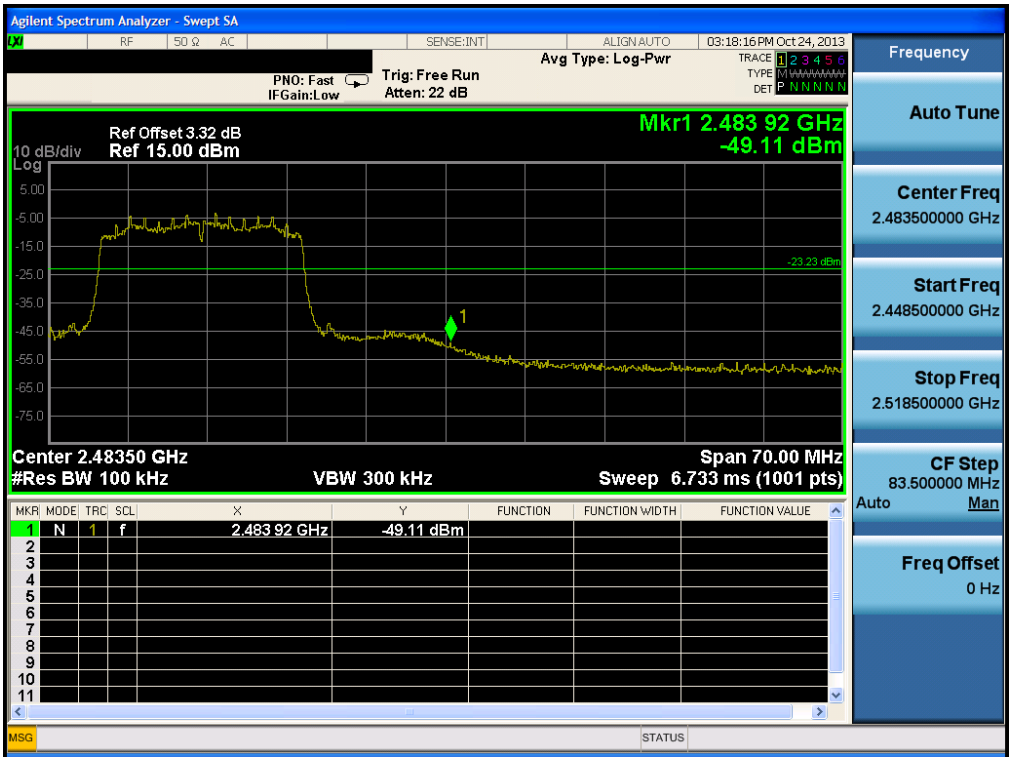


Test Mode: Chain 1 & 802.11n(HT20) & MCS8 & 2462MHz

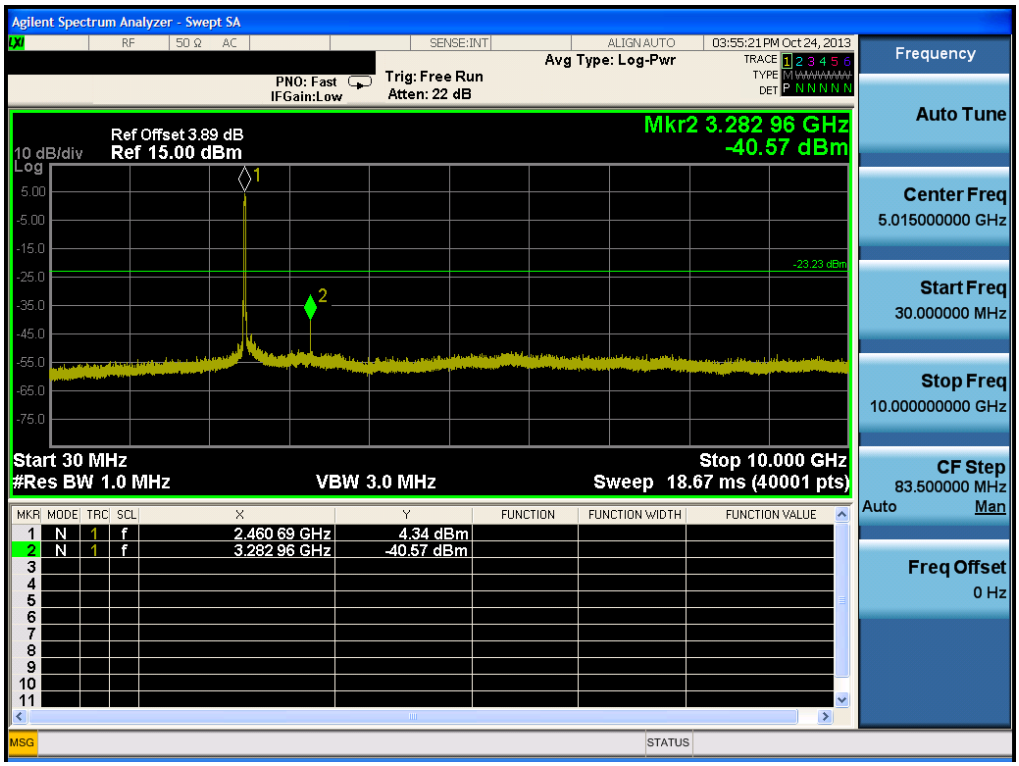
Reference

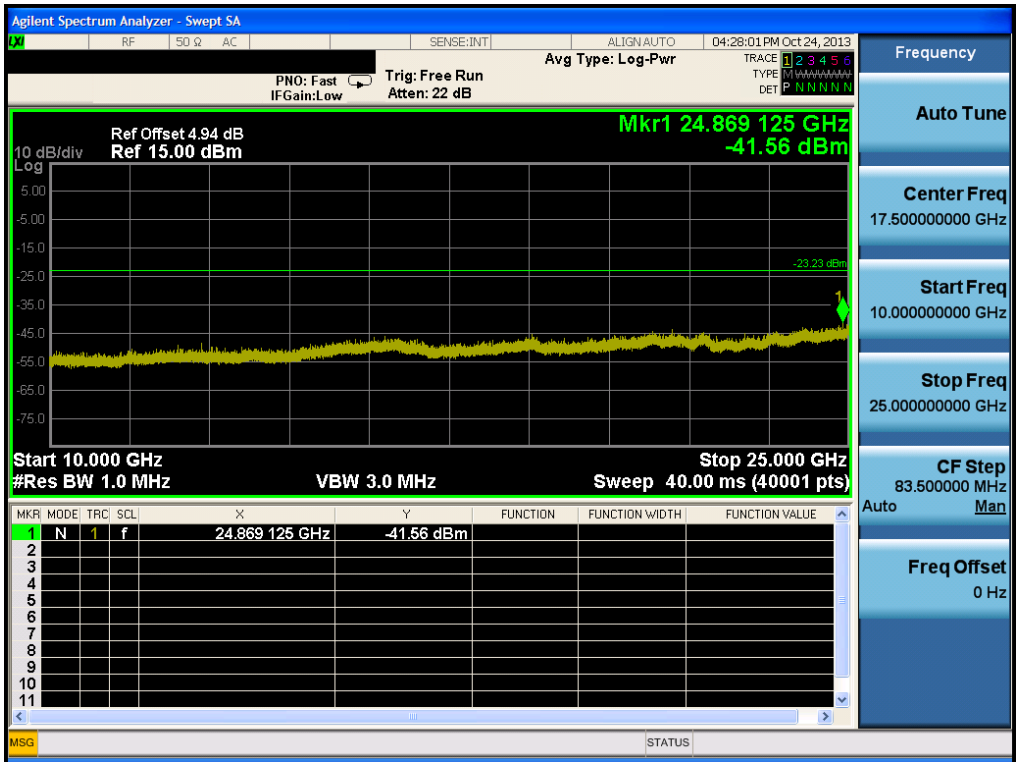


High Band-edge



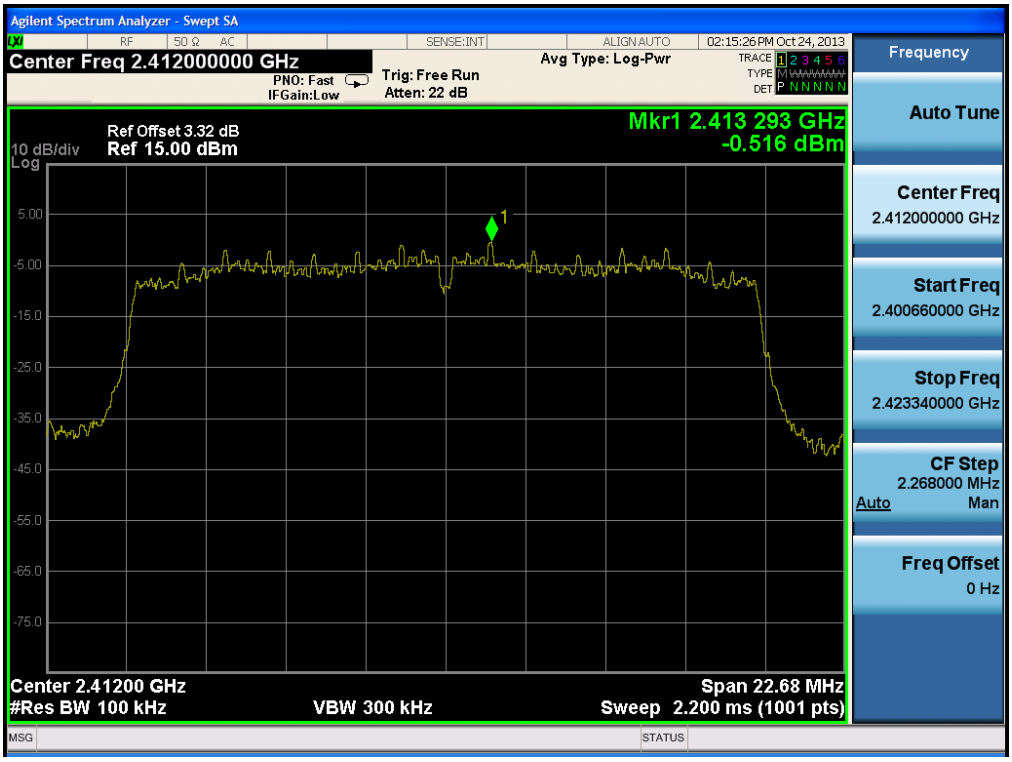
Conducted Spurious Emissions





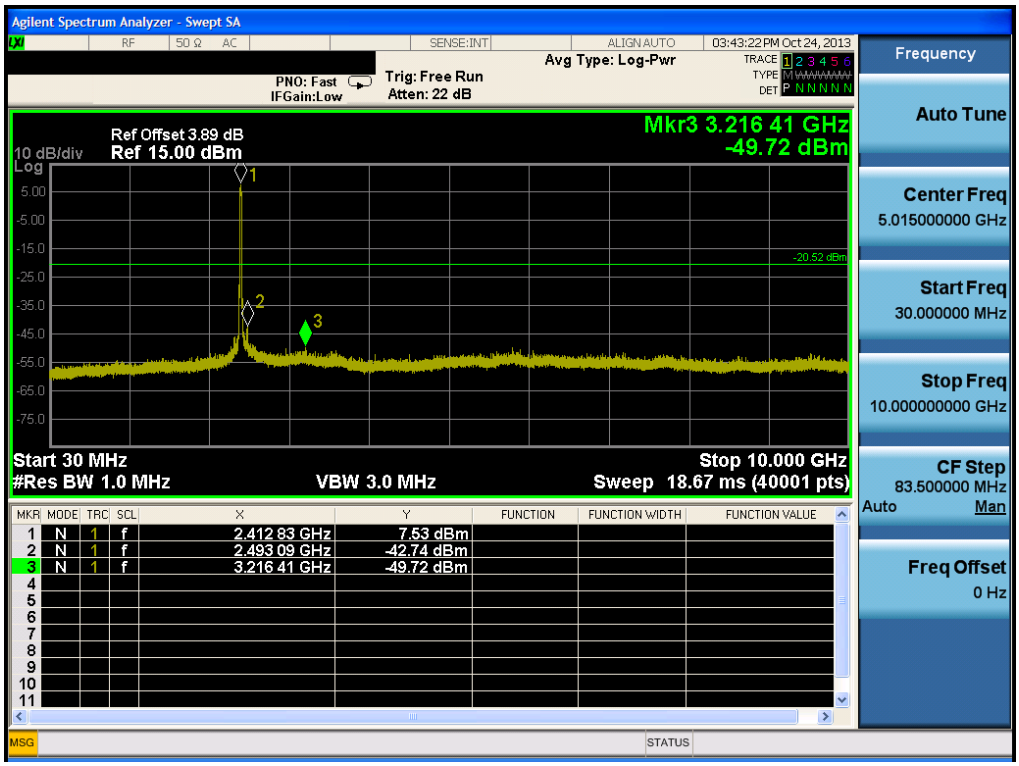
Test Mode: Chain 2 & 802.11n(HT20) & MCS8 & 2412MHz

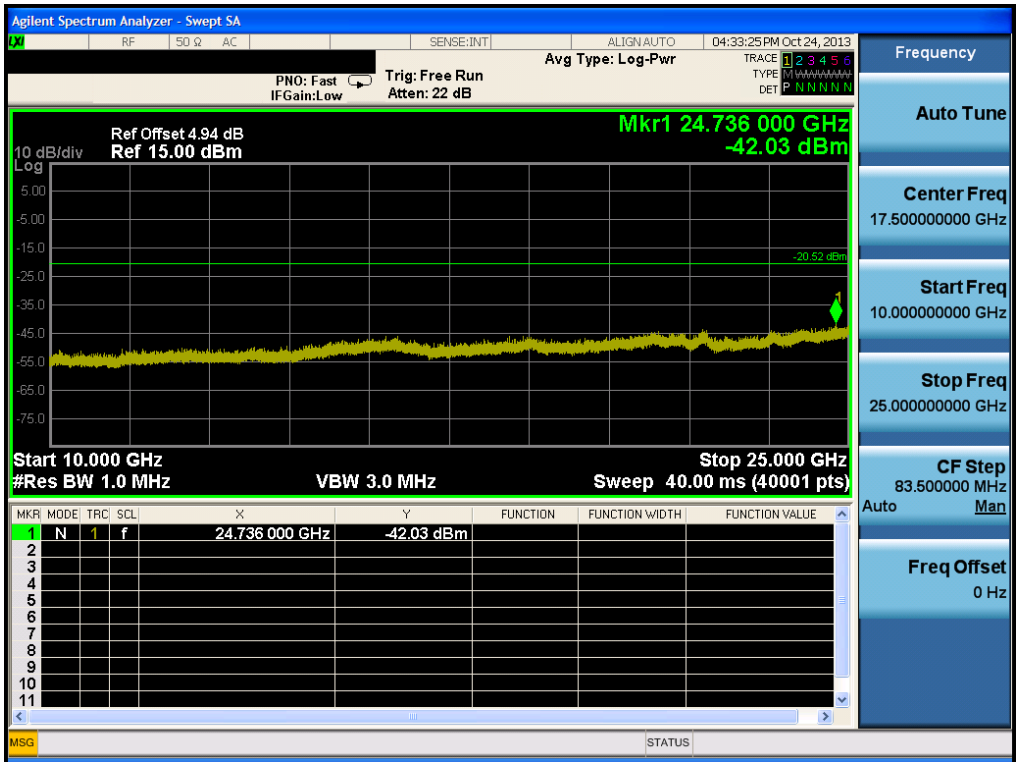
Reference



Low Band-edge

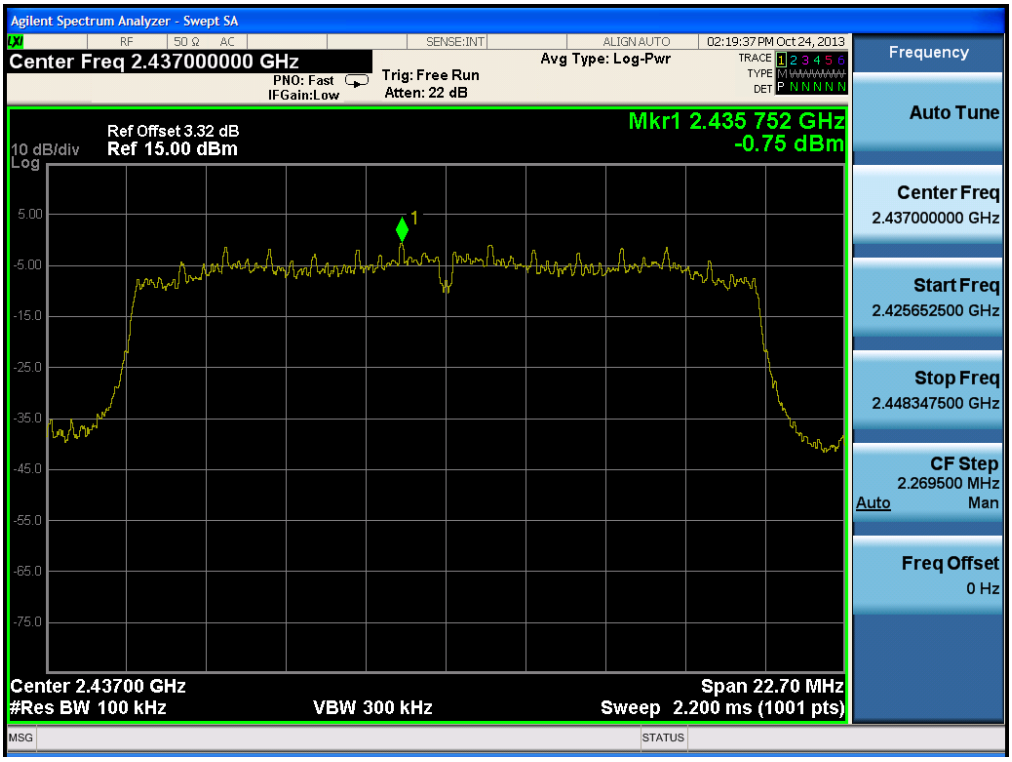
Conducted Spurious Emissions





Test Mode: Chain 2 & 802.11n(HT20) & MCS8 & 2437MHz

Reference



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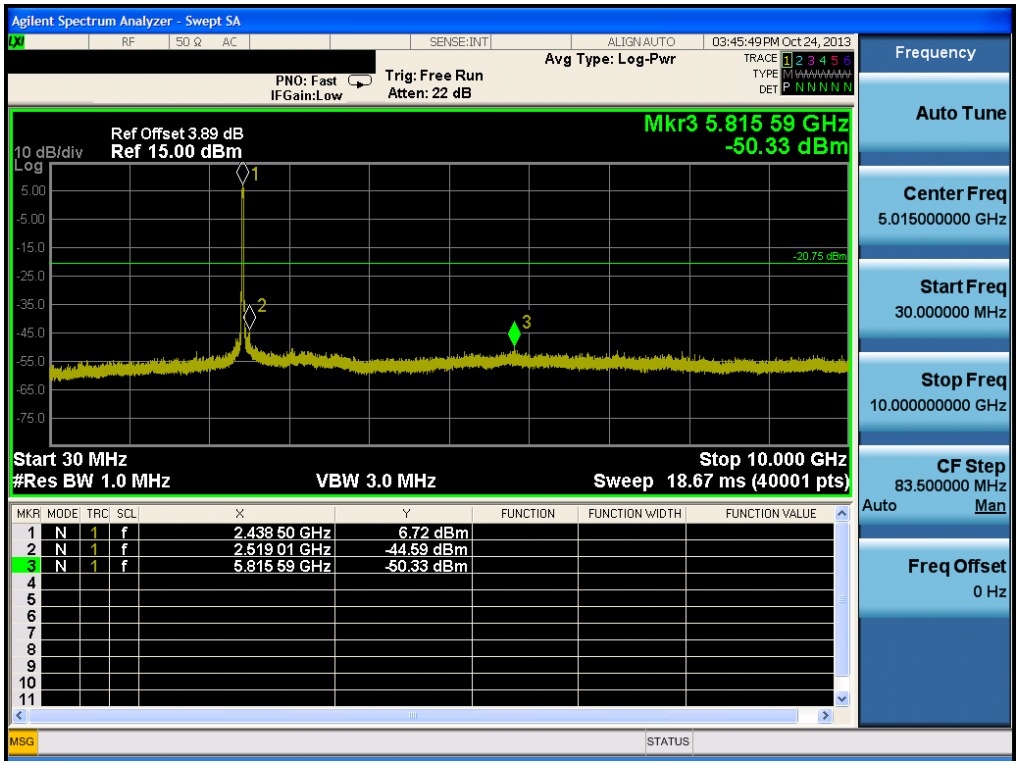

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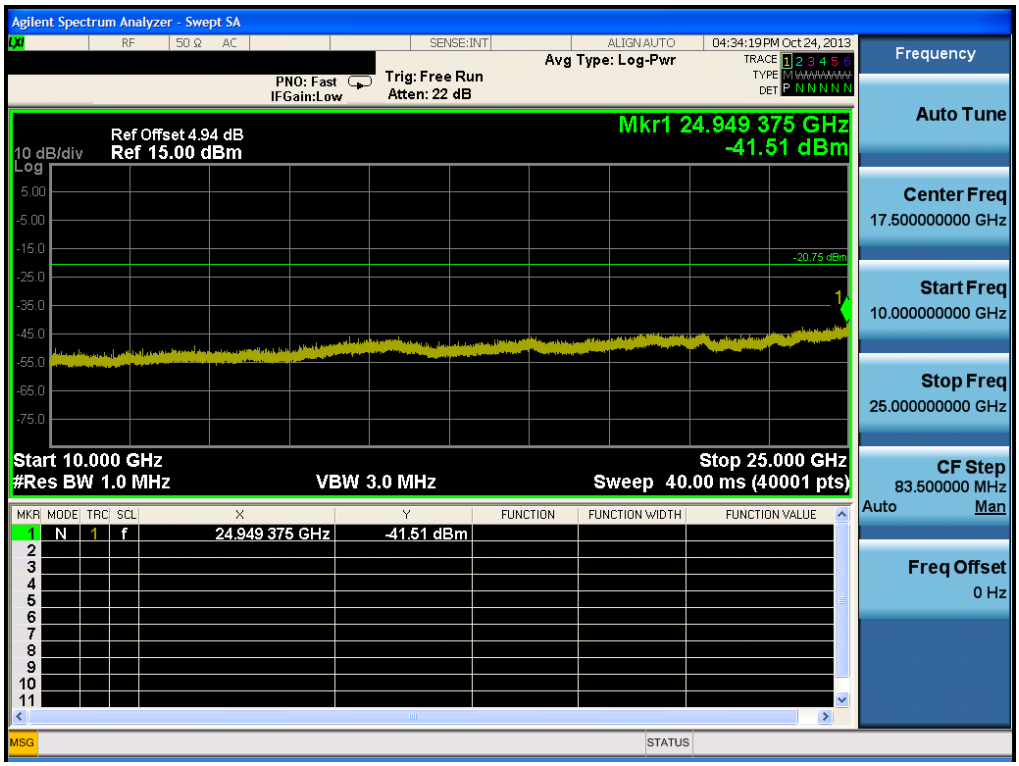
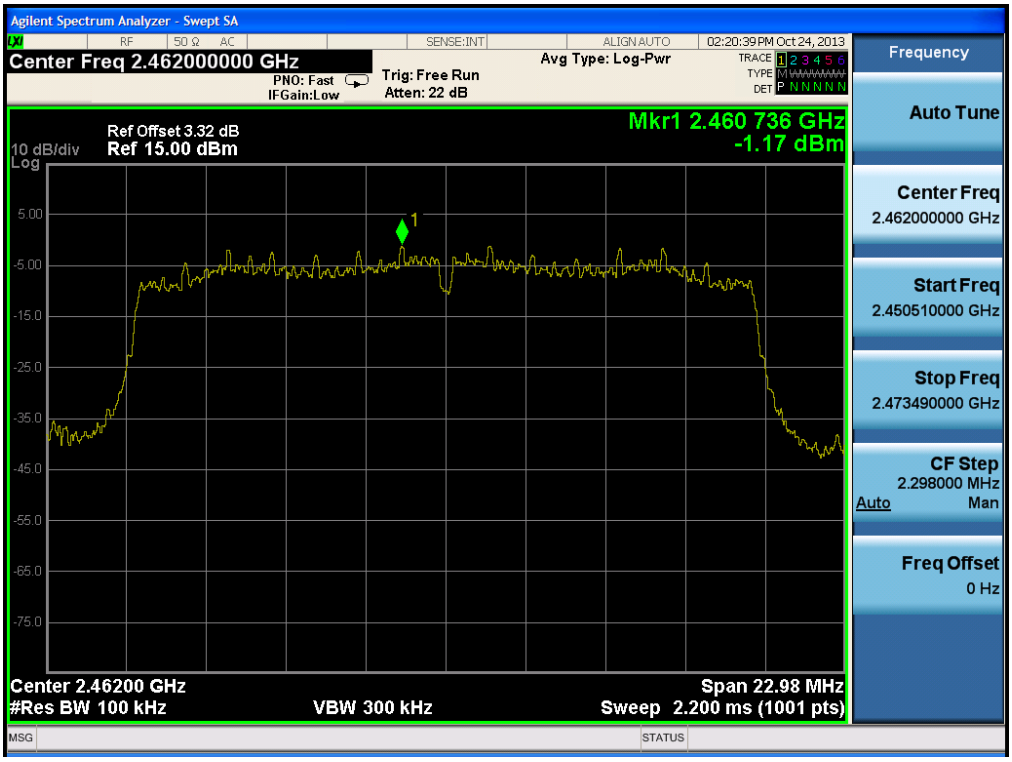
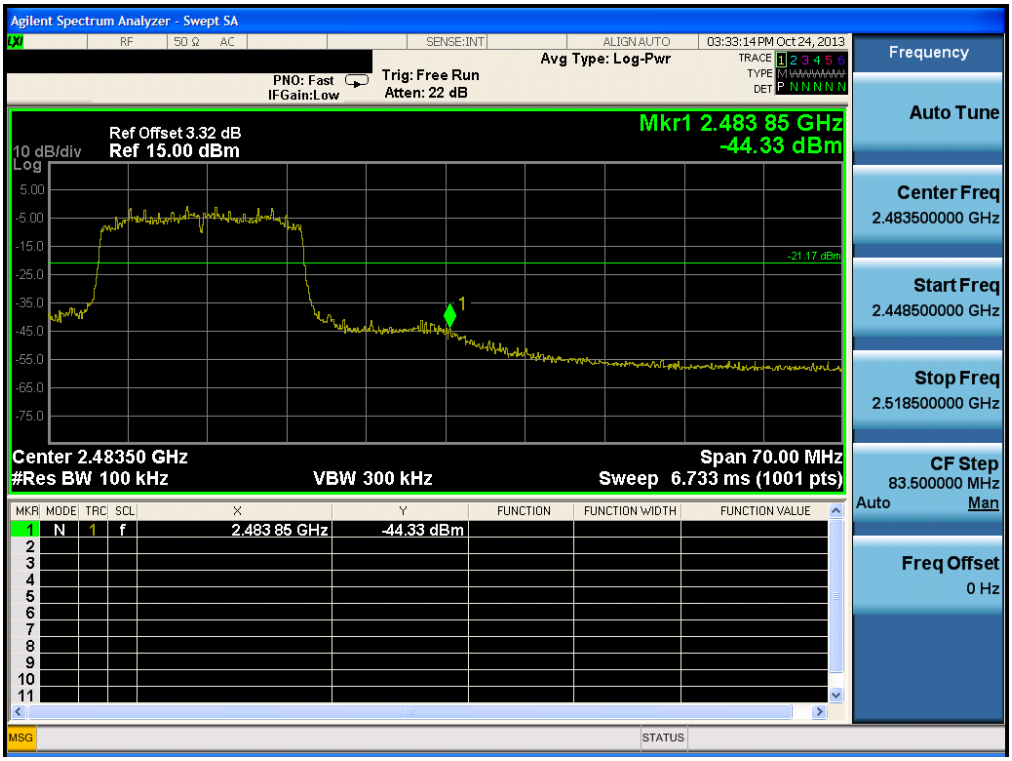


Test Mode: Chain 2 & 802.11n(HT20) & MCS8 & 2462MHz

Reference



High Band-edge



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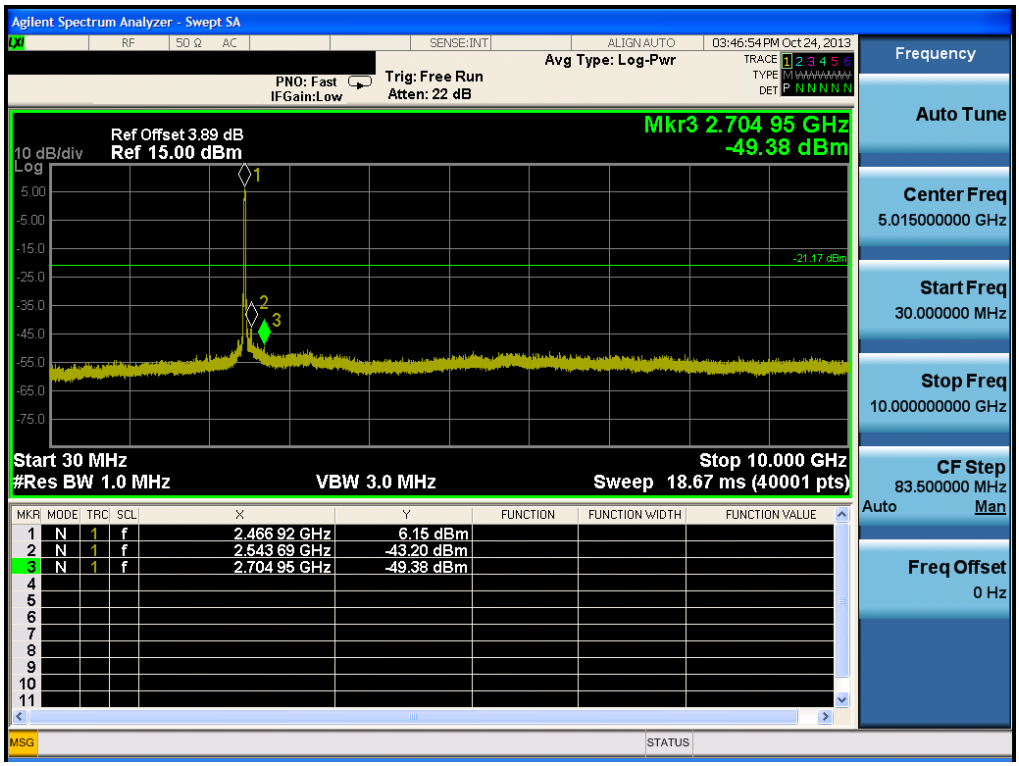
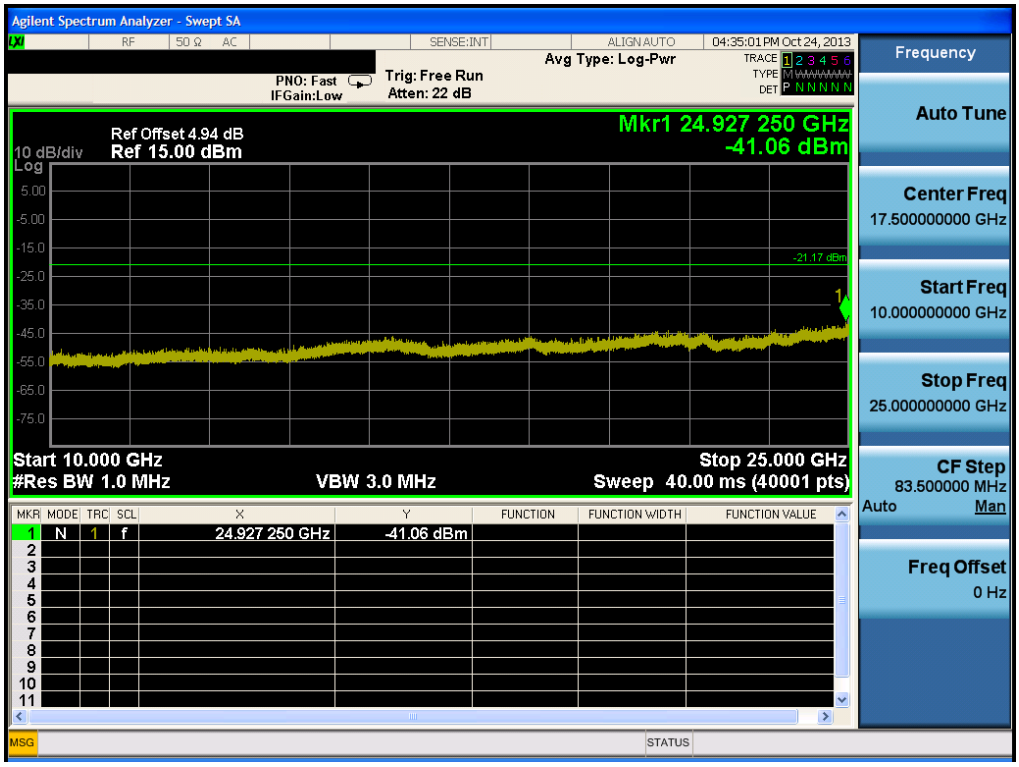
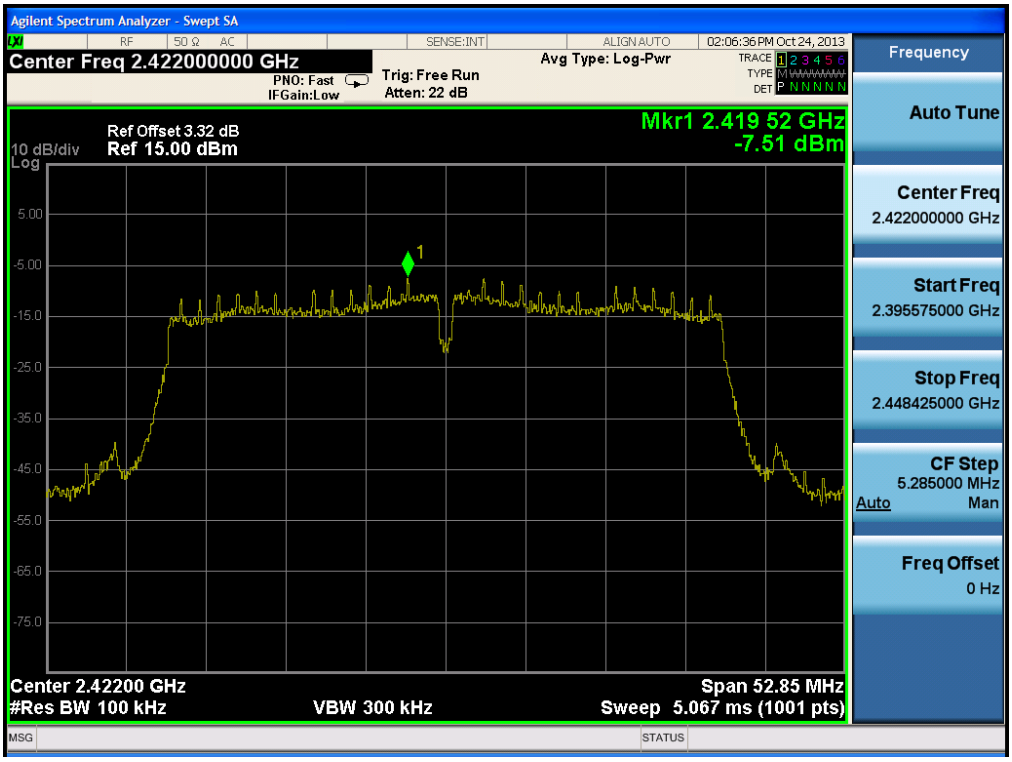




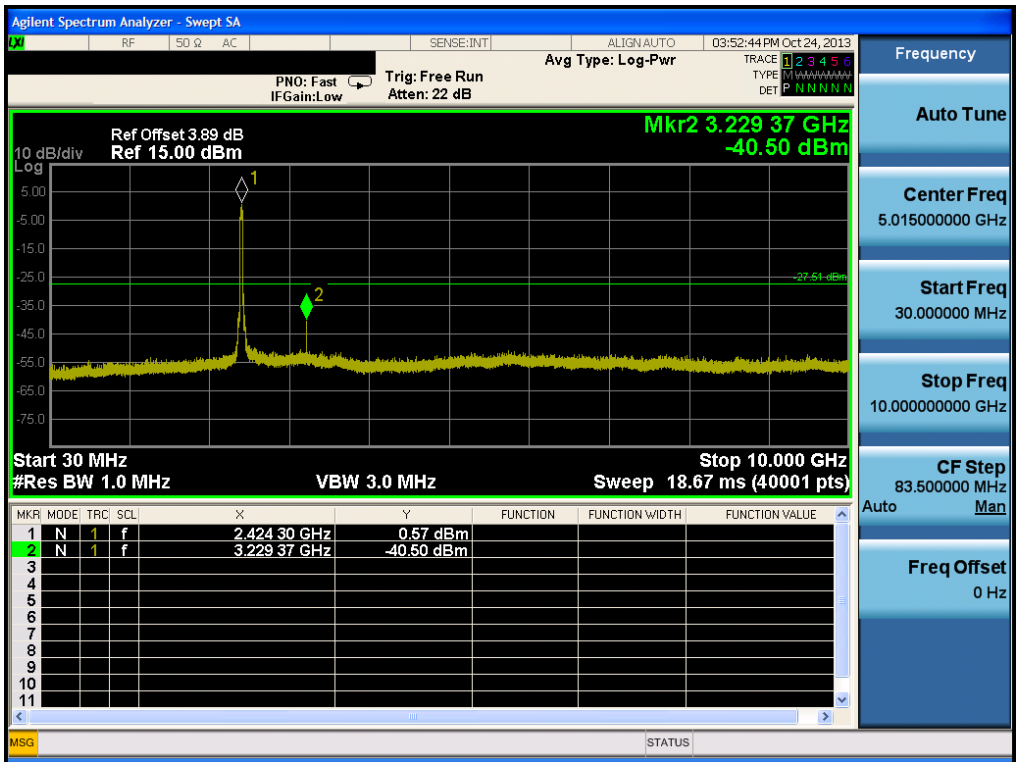
Test Mode: Chain 1 & 802.11n(HT40) & MCS8 & 2422MHz

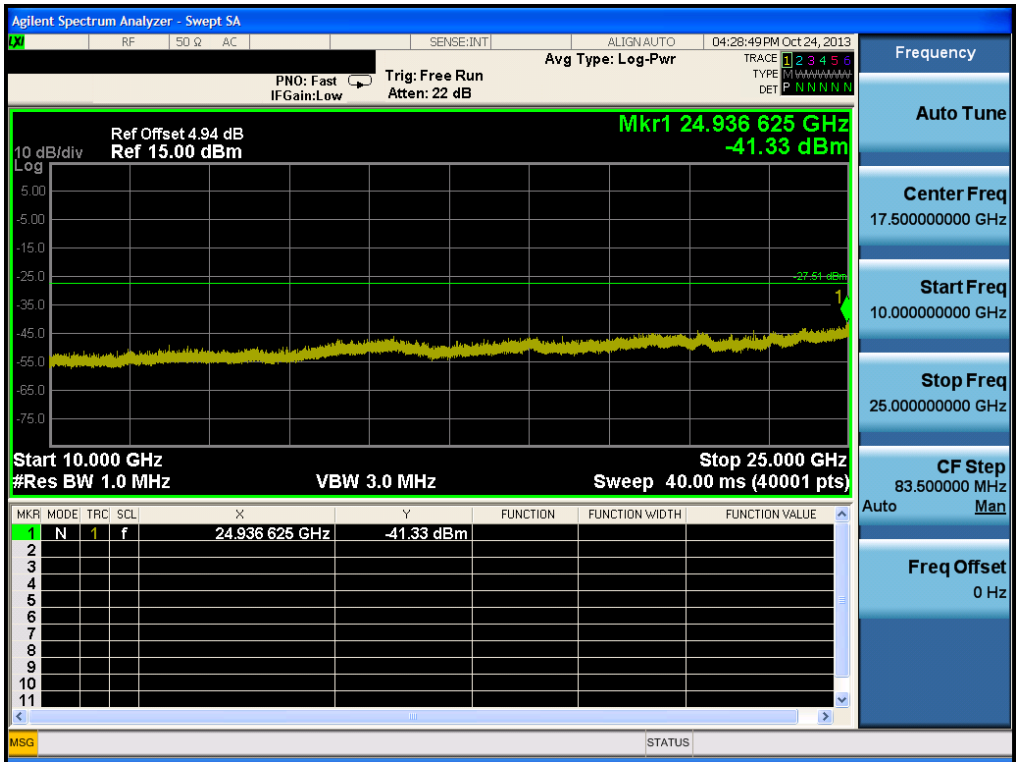
Reference



Low Band-edge

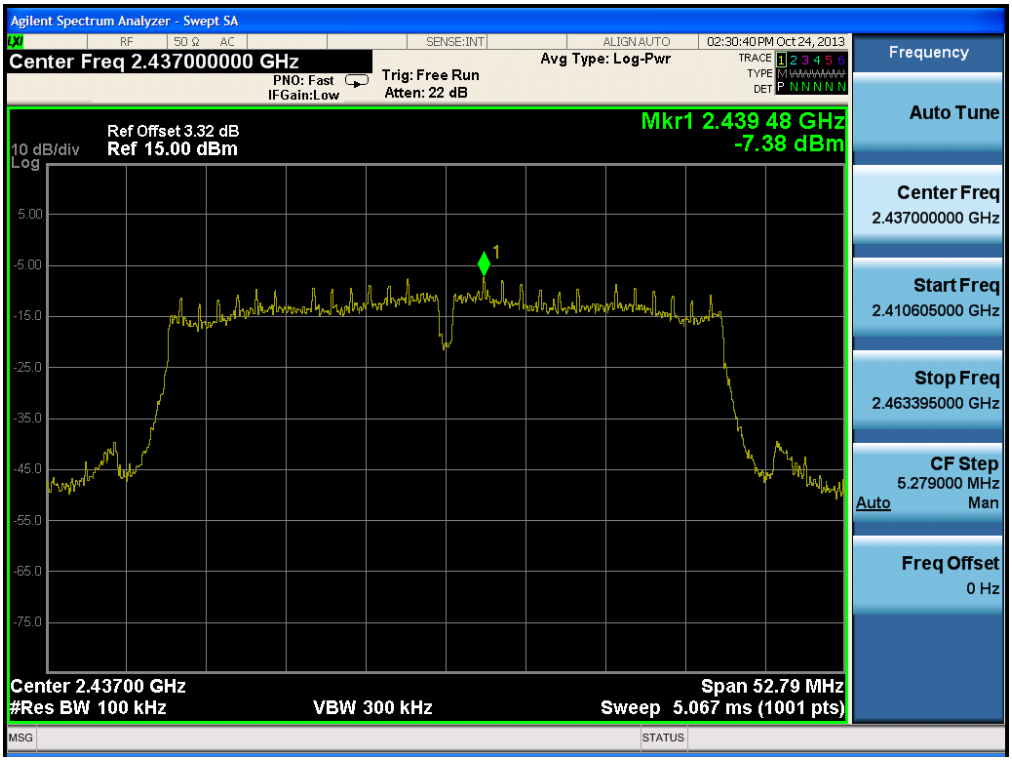
Conducted Spurious Emissions



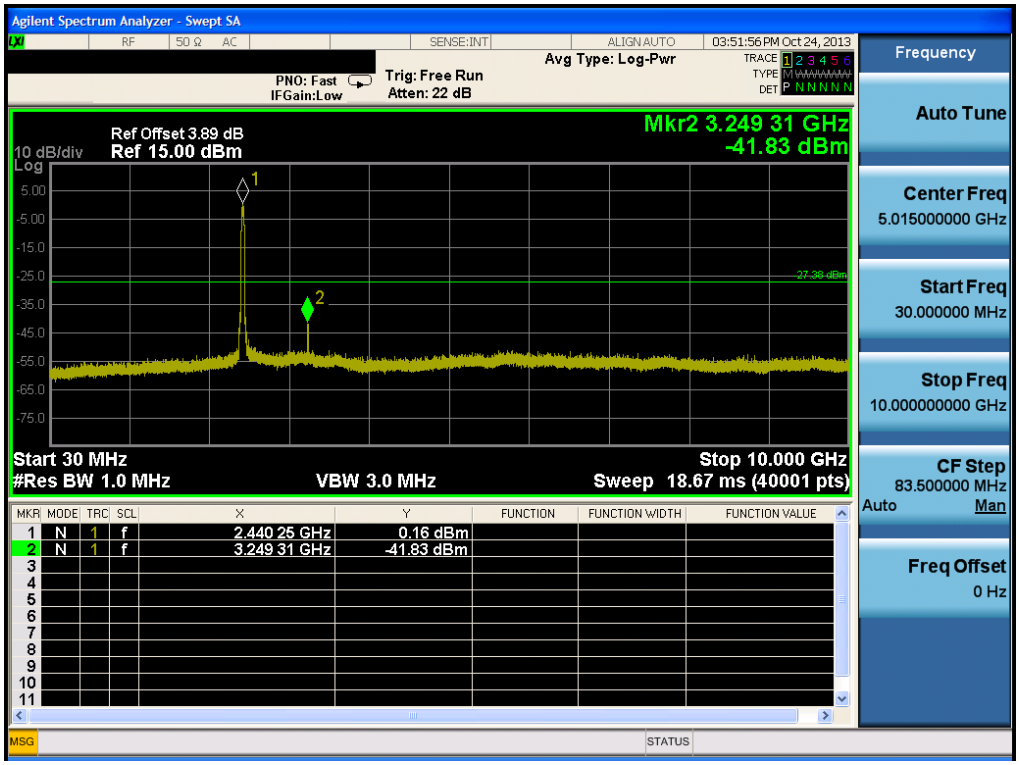


Test Mode: Chain 1 & 802.11n(HT40) & MCS8 & 2437MHz

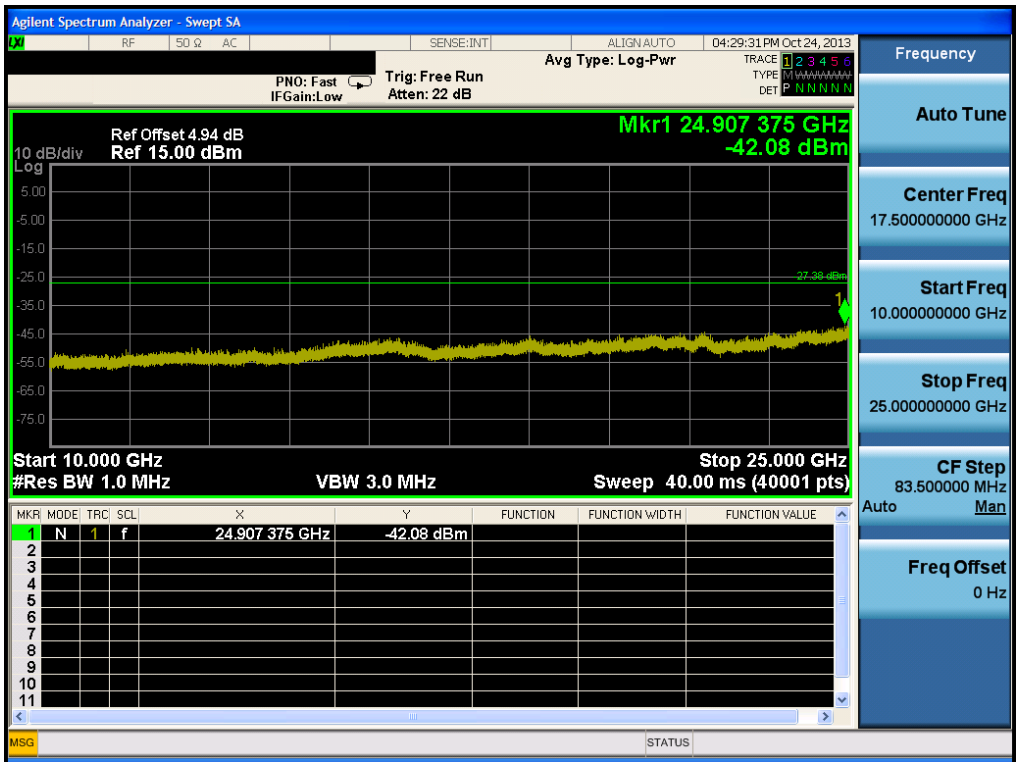
Reference



Conducted Spurious Emissions

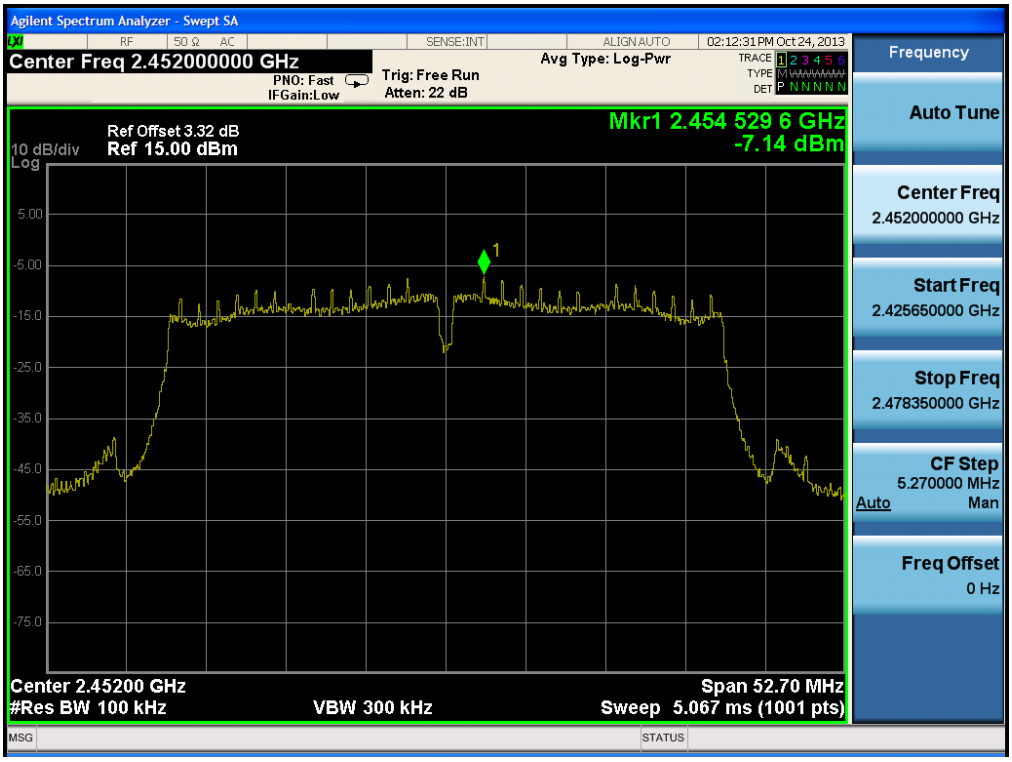


Conducted Spurious Emissions



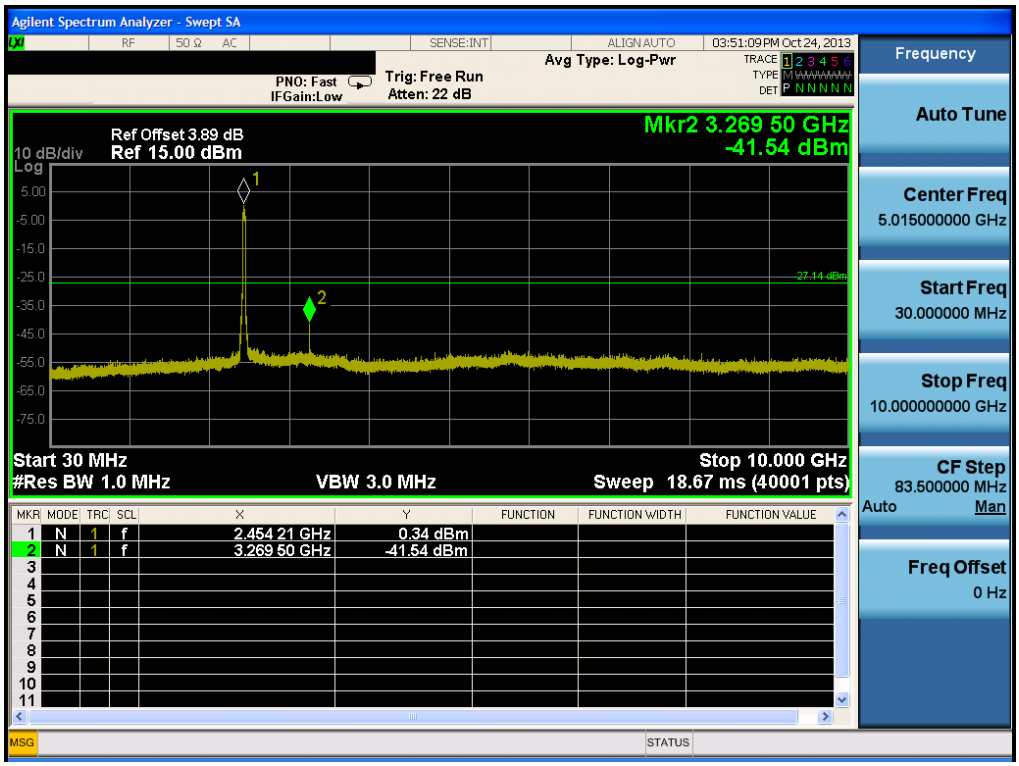
Test Mode: Chain 1 & 802.11n(HT40) & MCS8 & 2452MHz

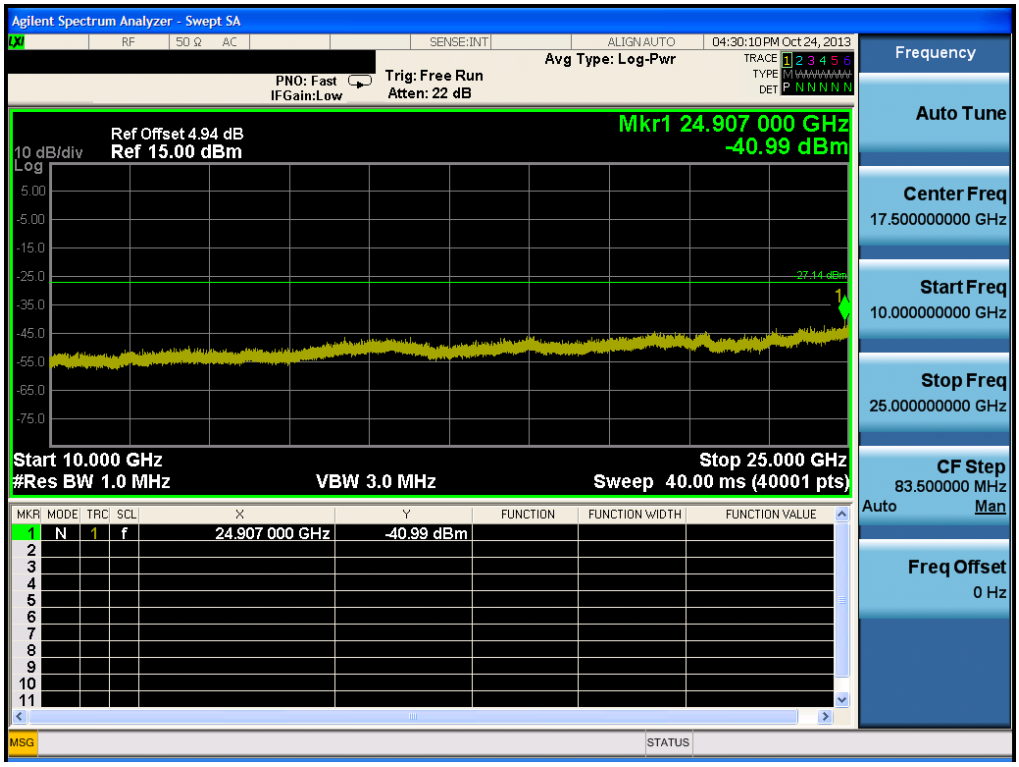
Reference



High Band-edge

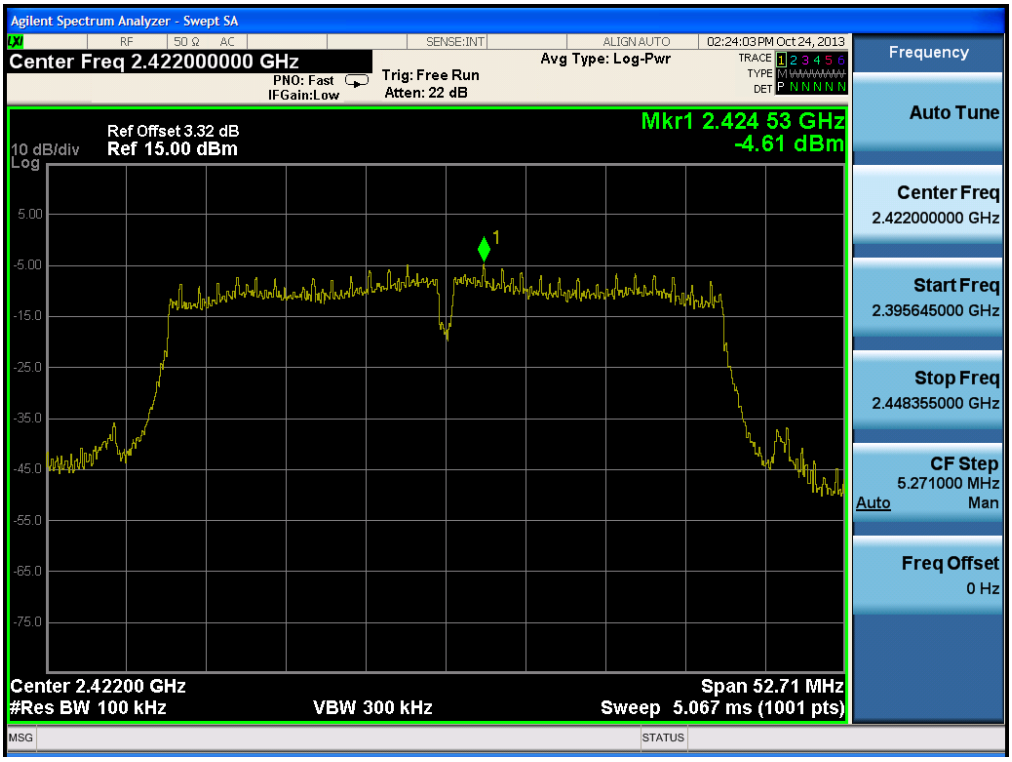
Conducted Spurious Emissions





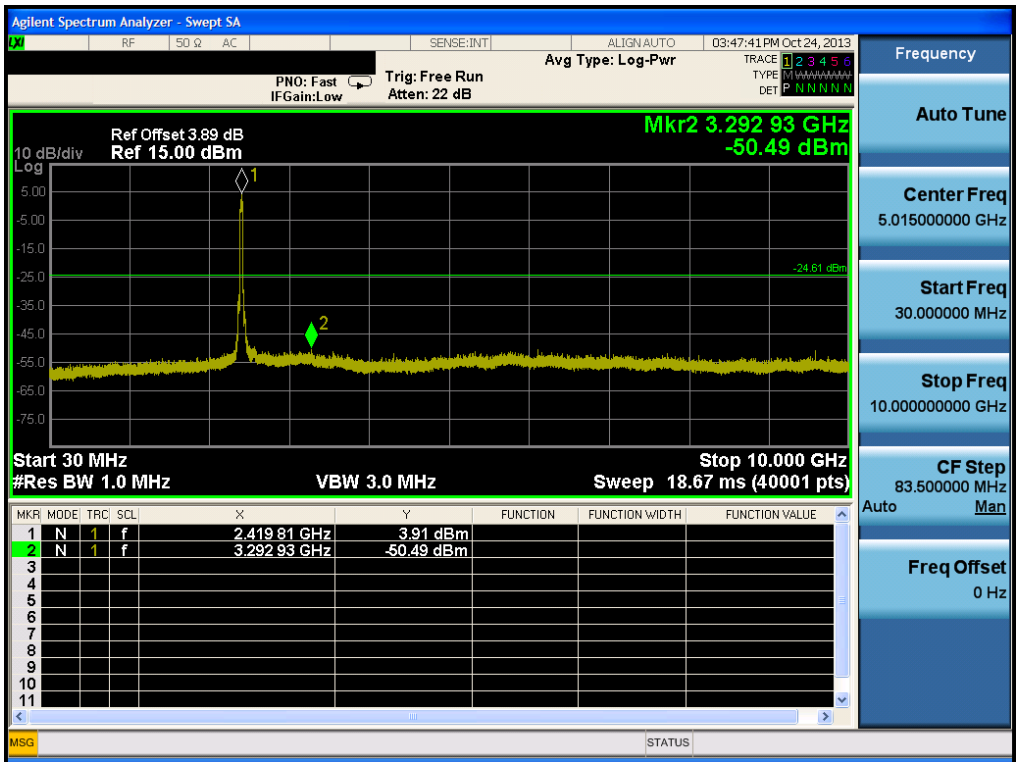
Test Mode: Chain 2 & 802.11n(HT40) & MCS8 & 2422MHz

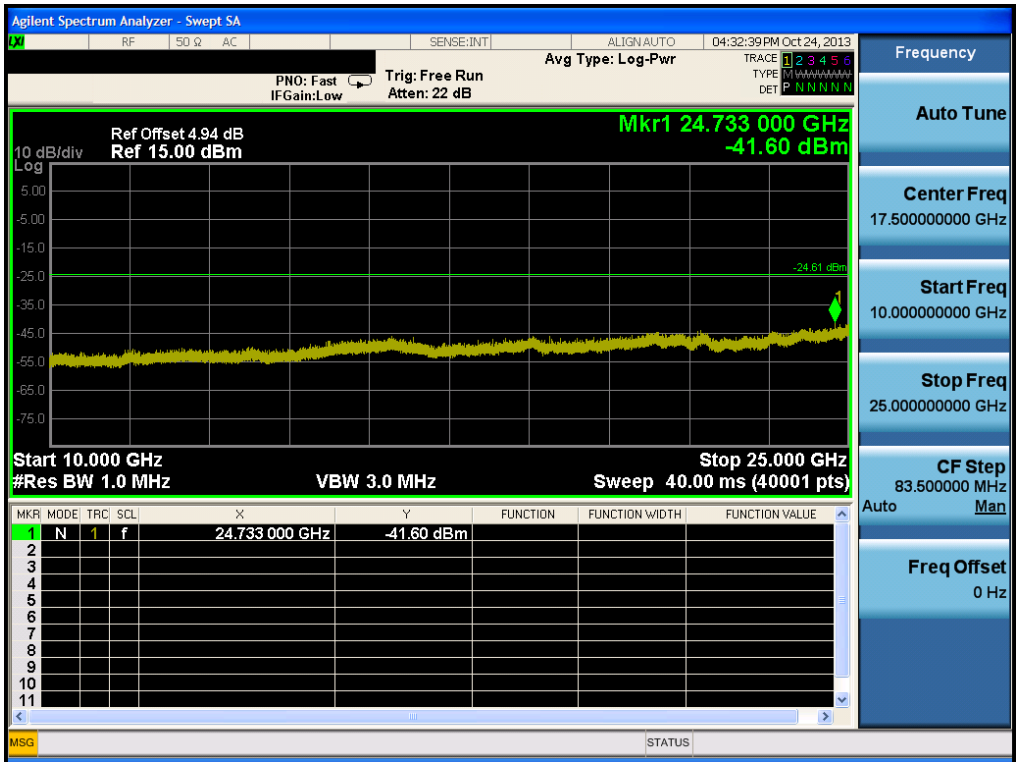
Reference



Low Band-edge

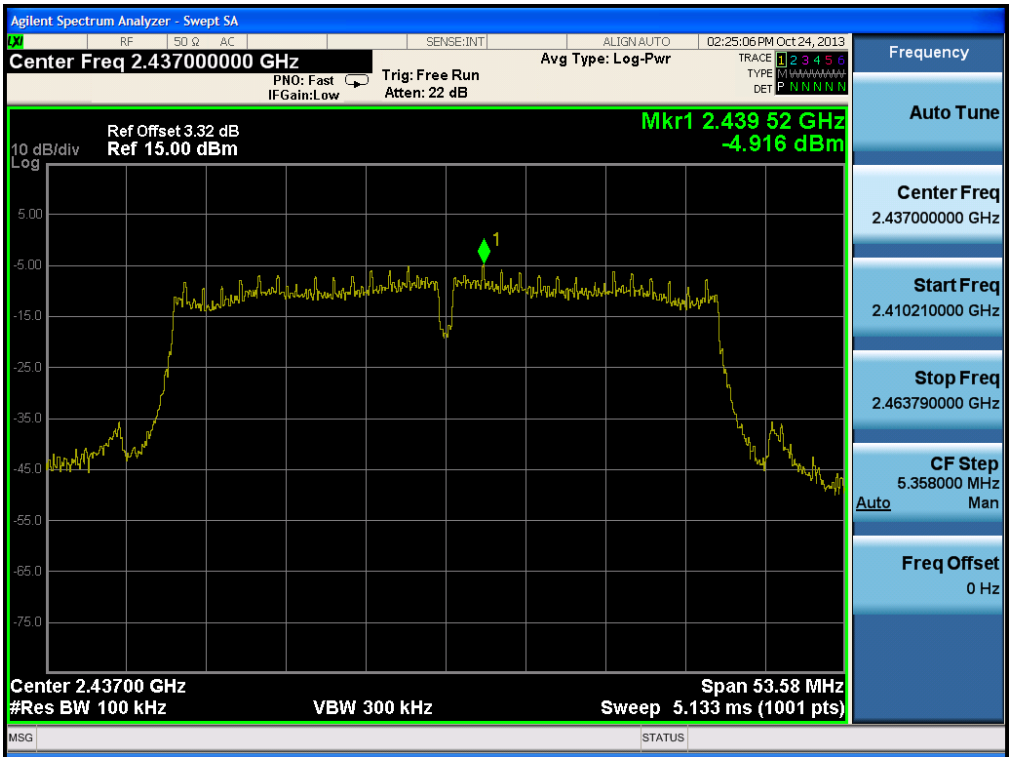
Conducted Spurious Emissions



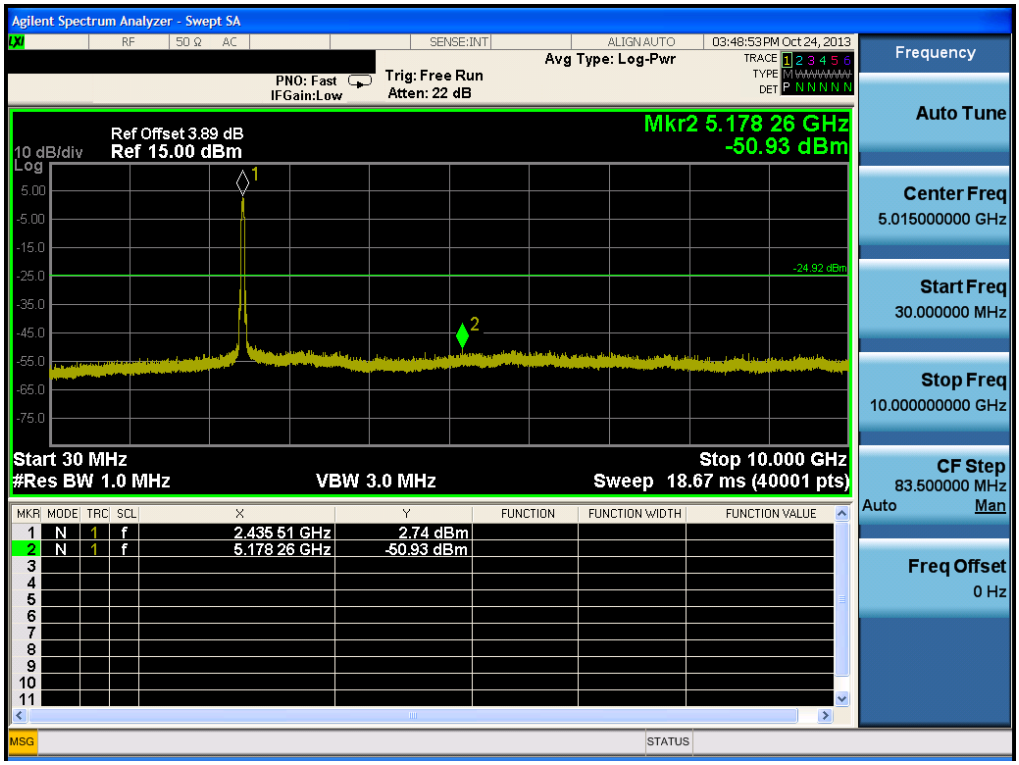


Test Mode: Chain 2 & 802.11n(HT40) & MCS8 & 2437MHz

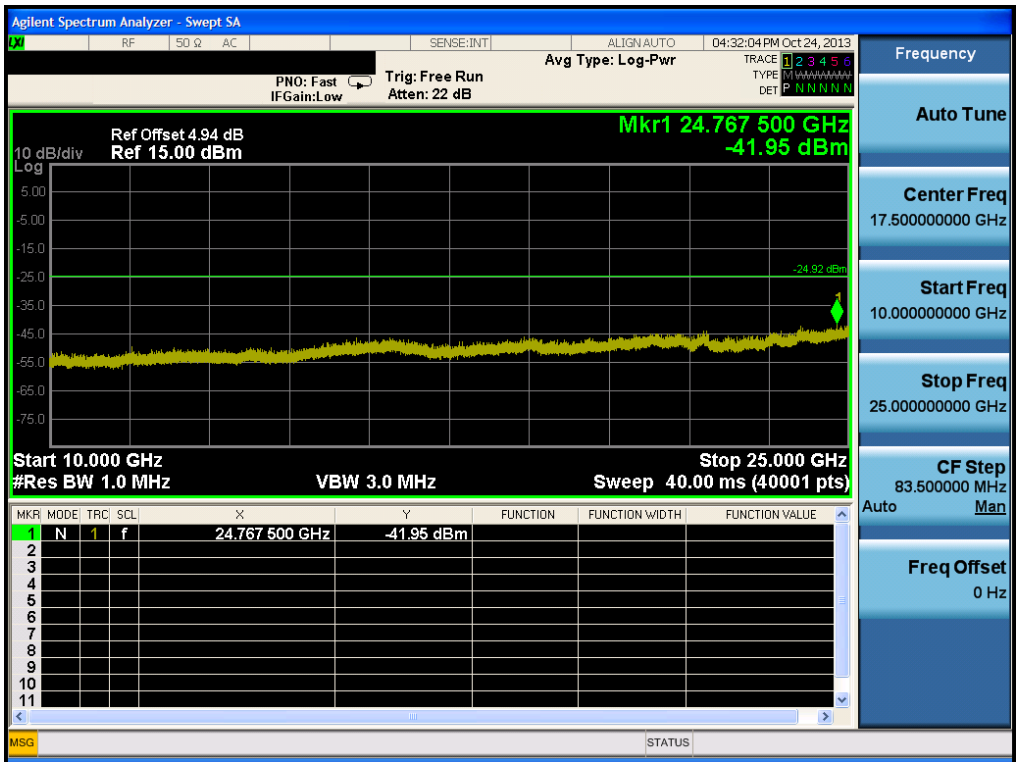
Reference



Conducted Spurious Emissions

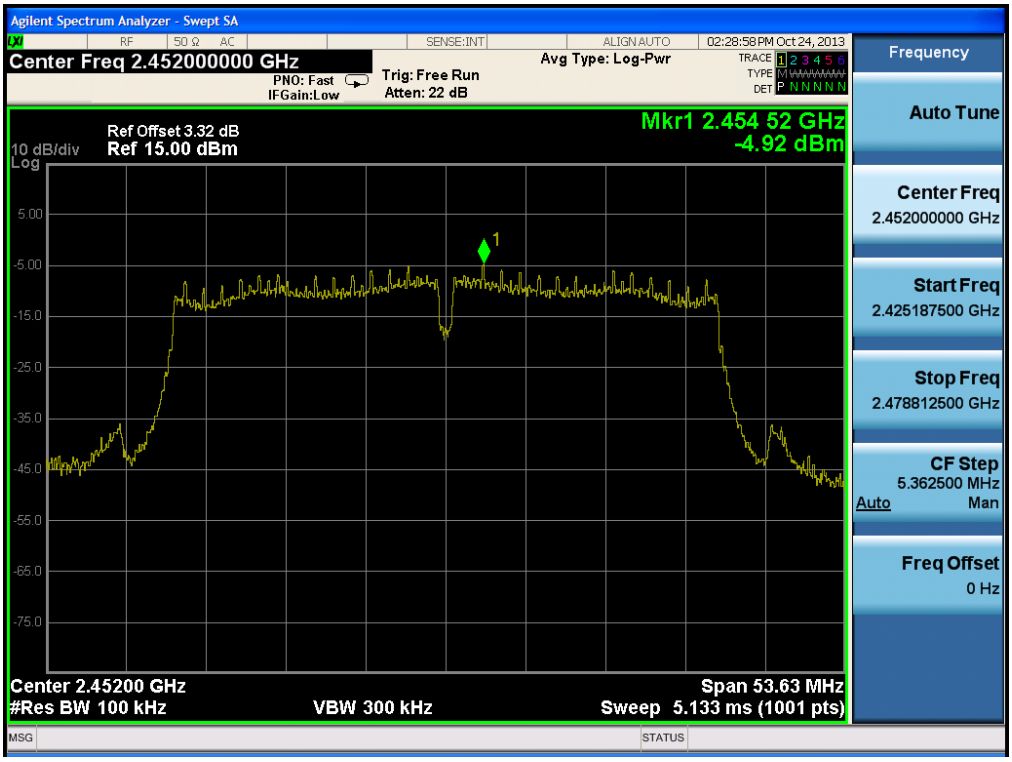


Conducted Spurious Emissions



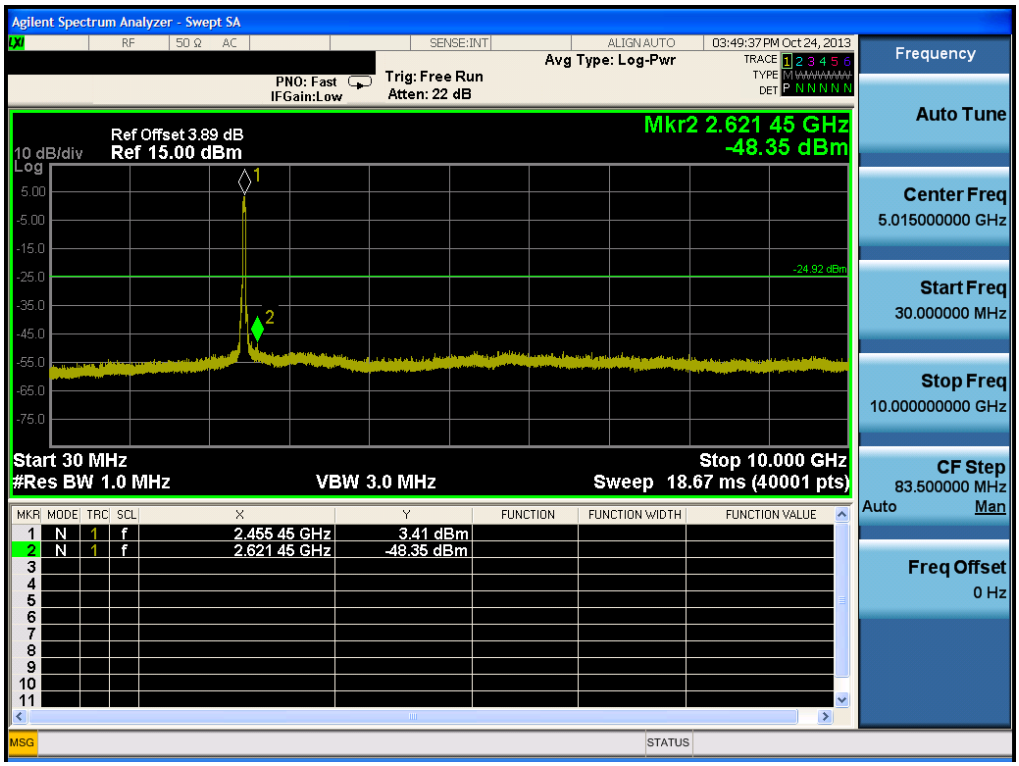
Test Mode: Chain 2 & 802.11n(HT40) & MCS8 & 2452MHz

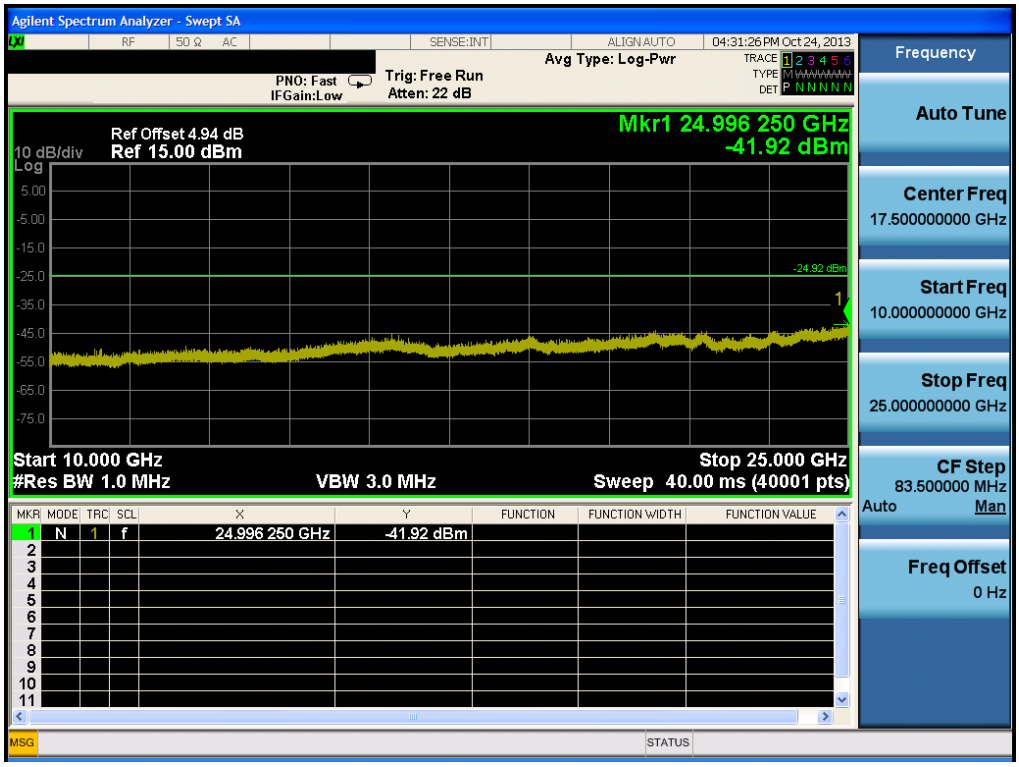
Reference



High Band-edge

Conducted Spurious Emissions





8.5 Radiated Spurious Emissions

Test Requirements and limit,§15.247(d), §15.205, §15.209& RSS-210 [A8.5], RSS-Gen [7.2.2]

In any 100kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

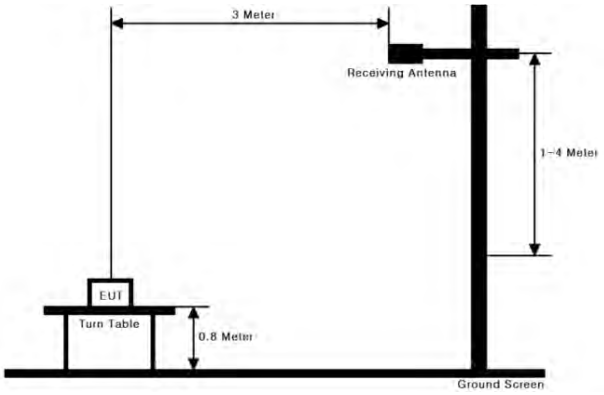
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240			
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

Test Configuration



▣ TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

▣ Measurement Instrument Setting for Radiated Emission Measurements.

Peak Measurement : 12.2.4 of KDB 558074 v03r1

RBW = As specified in below table , VBW ≥ 3 x RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

Average Measurement : 12.2.5 of KDB 558074 v03r1

1. RBW = 1 MHz (unless otherwise specified).
2. VBW ≥ 3 x RBW.
3. Detector = RMS (Number of points ≥ 2 x Span / RBW)
4. Averaging type = power (i.e., RMS).
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.
7. A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

1) If power averaging (RMS) mode was used in step 4, then the applicable correction factor is 10 log(1/x), where x is the duty cycle.
2) If linear voltage averaging mode was used in step 4, then the applicable correction factor is 20 log(1/x), where x is the duty cycle.
3) If a specific emission is demonstrated to be continuous (≥ 98 percent duty cycle) rather than turning on and off with the transmit cycle, then no duty cycle correction is required for that emission.

Mode	Rate	Duty Cycle (%)	T_{on}(ms)	T_{on}+ T_{off} (ms)	DCF = 10log(1/Duty) (dB)
802.11b	1 Mbps	98.36	8.420	8.560	-
802.11g	6 Mbps	90.29	1.395	1.545	0.44
802.11n(HT20)	MCS8	81.55	0.663	0.813	0.89
802.11n(HT40)	MCS8	69.42	0.336	0.484	1.59

9KHz ~ 25GHz Data(*802.11b & Chain 1 & 1 Mbps*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.52	H	Y	PK	62.57	- 3.38	-	-	59.19	74.00	14.81
2389.64	H	Y	AV	52.54	- 3.38	-	-	49.16	54.00	4.84
4824.08	V	Y	PK	49.08	5.43	-	-	54.51	74.00	19.49
4824.02	V	Y	AV	43.12	5.43	-	-	48.55	54.00	5.45
5000.49	V	X	PK	48.57	6.40			54.97	74.00	19.03
5000.38	V	X	AV	42.09	6.40	-	-	48.49	54.00	5.51

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4874.19	V	Y	PK	49.29	5.64	-	-	54.93	74.00	19.07
4873.96	V	Y	AV	43.55	5.64	-	-	49.19	54.00	4.81
5000.30	V	X	PK	47.88	6.40	-	-	54.28	74.00	19.72
5000.34	V	X	AV	41.55	6.40	-	-	47.95	54.00	6.05

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2487.89	H	Y	PK	64.59	- 2.79	-	-	61.80	74.00	12.20
2488.25	H	Y	AV	53.67	- 2.79	-	-	50.88	54.00	3.12
4924.08	V	Y	PK	49.81	5.99	-	-	55.80	74.00	18.20
4923.96	V	Y	AV	43.68	5.99	-	-	49.67	54.00	4.33
5000.26	V	X	PK	48.05	6.40			54.45	74.00	19.55
5000.28	V	X	AV	41.89	6.40	-	-	48.29	54.00	5.71

Note.

1. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   So Distance Correction Factor :- 9.54dB = 20*log(1m/3m)
2. No other spurious and harmonic emissions were found greater than listed emissions on above table.
3. Above listed point data is the worst case data.
4. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCF = Duty Cycle Correction Factor.

9KHz ~ 25GHz Data(*802.11g & Chain 1 & 6 Mbps*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.96	V	X	PK	73.89	- 3.38	-	-	70.51	74.00	3.49
2389.68	V	X	AV	55.34	- 3.38	0.44	-	52.40	54.00	1.60
5000.20	V	X	PK	47.01	6.40	-	-	53.41	74.00	20.59
5000.33	V	X	AV	41.10	6.40	0.44	-	47.94	54.00	6.06
-	-	-	-	-	-	-	-	-	-	-

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5000.10	V	X	PK	47.97	6.40	-	-	54.37	74.00	19.63
5000.16	V	X	AV	41.55	6.40	0.44	-	48.39	54.00	5.61
-	-	-	-	-	-	-	-	-	-	-

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.86	V	X	PK	69.28	- 2.79	-	-	66.49	74.00	7.51
2483.53	V	X	AV	53.95	- 2.79	0.44	-	51.60	54.00	2.40
5000.18	V	X	PK	48.53	6.40	-	-	54.93	74.00	19.07
5000.07	V	X	AV	42.36	6.40	0.44	-	49.20	54.00	4.80
-	-	-	-	-	-	-	-	-	-	-

Note.

1. Measurement Distance = 3 m for below 10 GHz , Measurement Distance = 1 m for above 10 GHz.
   So Distance Correction Factor :- 9.54dB = 20*log(1m/3m)
2. No other spurious and harmonic emissions were found greater than listed emissions on above table.
3. Above listed point data is the worst case data.
4. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCF = Duty Cycle Correction Factor.

9KHz ~ 25GHz Data(*802.11n HT20 & 2TX & MCS8*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.67	V	Z	PK	72.45	- 3.38	-	-	69.07	74.00	4.93
2389.91	V	Z	AV	54.86	- 3.38	0.89	-	52.37	54.00	1.63
5000.16	V	Y	PK	48.05	6.40	-	-	54.45	74.00	19.55
5000.24	V	Y	AV	41.57	6.40	0.89	-	48.86	54.00	5.14
-	-	-	-	-	-	-	-	-	-	-

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
5000.12	V	Y	PK	48.39	6.40	-	-	54.79	74.00	19.21
5000.28	V	Y	AV	41.40	6.40	0.89	-	48.69	54.00	5.31
-	-	-	-	-	-	-	-	-	-	-

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2484.01	H	Y	PK	70.12	- 2.79	-	-	67.33	74.00	6.67
2483.54	H	Y	AV	53.80	- 2.79	0.89	-	51.90	54.00	2.10
5000.42	V	Y	PK	48.88	6.40	-	-	55.28	74.00	18.72
5000.44	V	Y	AV	42.03	6.40	0.89	-	49.32	54.00	4.68
-	-	-	-	-	-	-	-	-	-	

Note.

1. Measurement Distance = 3 m for below 10 GHz , Measurement Distance = 1 m for above 10 GHz.
   So Distance Correction Factor :- 9.54dB = 20*log(1m/3m)
2. No other spurious and harmonic emissions were found greater than listed emissions on above table.
3. Above listed point data is the worst case data.
4. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCF = Duty Cycle Correction Factor.

9KHz ~ 25GHz Data(*802.11n HT40 & 2TX & MCS8*)

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2382.92	V	X	PK	72.52	- 3.38	-	-	69.14	74.00	4.86
2383.44	V	X	AV	54.03	- 3.38	1.59	-	52.24	54.00	1.76
5000.22	V	X	PK	47.44	6.40	-	-	53.84	74.00	20.16
5000.37	V	X	AV	41.02	6.40	1.59	-	49.01	54.00	4.99
-	-	-	-	-	-	-	-	-	-	-

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2389.60	V	X	PK	66.51	- 3.38	-	-	63.13	74.00	10.87
2389.84	V	X	AV	46.85	- 3.38	1.59	-	45.06	54.00	8.94
2483.66	V	X	PK	63.81	- 2.79	-	-	61.02	74.00	12.98
2483.63	V	X	AV	45.18	- 2.79	1.59	-	43.98	54.00	10.02
5000.34	V	X	PK	47.79	6.40	-	-	54.19	74.00	19.81
5000.35	V	X	AV	41.38	6.40	1.59	-	49.37	54.00	4.63
-	-	-	-	-	-	-	-	-	-	-

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF (dB)	Distance Factor(dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.58	V	X	PK	70.14	- 2.79	-	-	67.35	74.00	6.65
2483.86	V	X	AV	52.90	- 2.79	1.59	-	51.70	54.00	2.30
5000.18	V	X	PK	48.20	6.40	-	-	54.60	74.00	19.40
5000.26	V	X	AV	41.95	6.40	1.59	-	49.94	54.00	4.06
-	-	-	-	-	-	-	-	-	-	-

Note.

1. Measurement Distance = 3 m for below 10 GHz , Measurement Distance = 1 m for above 10 GHz.
   So Distance Correction Factor :- 9.54dB = 20*log(1m/3m)
2. No other spurious and harmonic emissions were found greater than listed emissions on above table.
3. Above listed point data is the worst case data.
4. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F+ DCF + Distance Factor / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCF = Duty Cycle Correction Factor.

8.6 Power-line Conducted Emissions

Test Requirements and limit, §15.207& RSS-Gen [7.2.2]

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (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

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs for the actual connections between EUT and supportequipment.

Test Mode

The all modes of EUT operation were investigated and the worst case mode was reported.

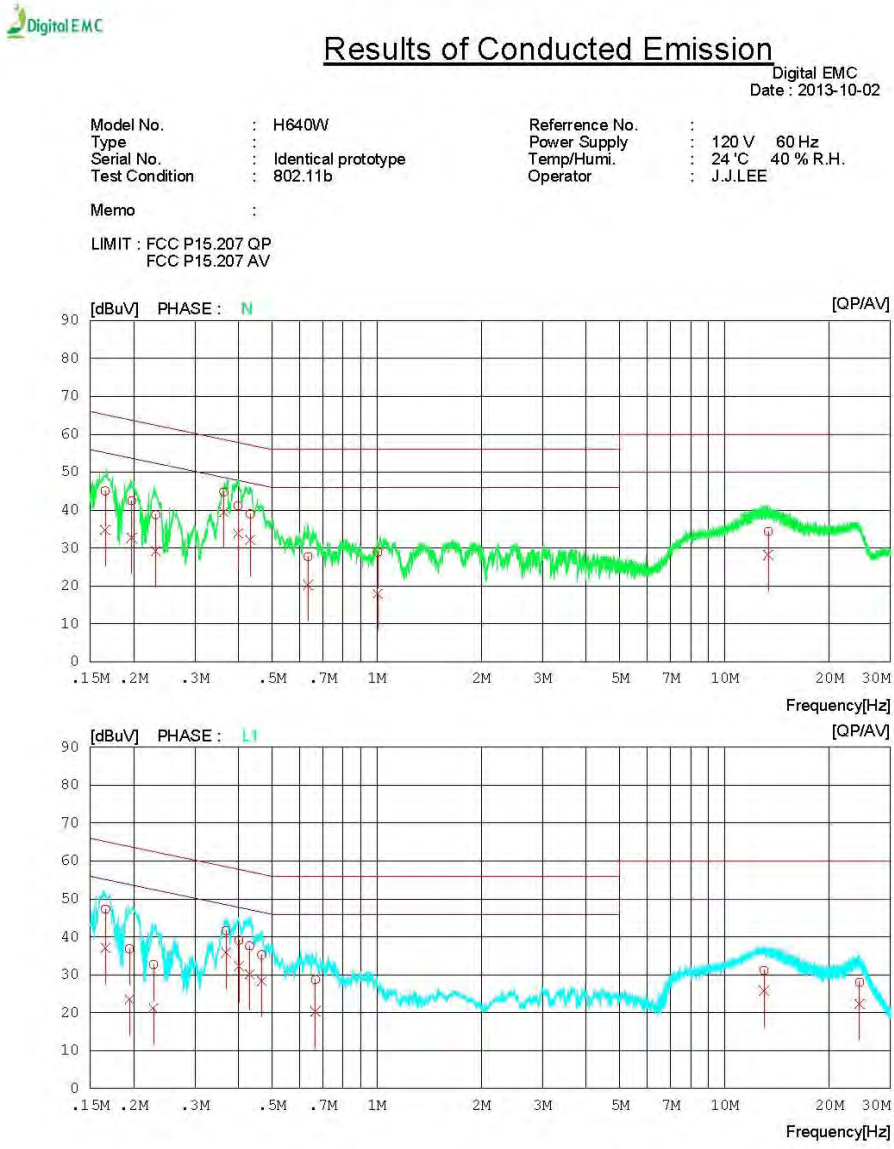
TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference groundplane.
2. The EUT is connected via LISN to the test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

▣RESULT PLOTS

AC Line Conducted Emissions (Graph)

Test Mode: 802.11b (2.4GHz Band)



AC Line Conducted Emissions (List)

Test Mode: 802.11b (2.4GHz Band)

Results of Conducted Emission

Digital EMC
Date : 2013-10-02

Model No.	: H640W	Referrence No.	:
Type	:	Power Supply	: 120 V 60 Hz
Serial No.	: Identical prototype	Temp/Humi.	: 24 'C 40 % R.H.
Test Condition	: 802.11b	Operator	: J.J.LEE

Memo :

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16567	45.0	34.6	0.1	45.1	34.7	65.2	55.2	20.1	20.5	N
2	0.19746	42.3	32.6	0.1	42.4	32.7	63.7	53.7	21.3	21.0	N
3	0.23144	38.7	29.1	0.1	38.8	29.2	62.4	52.4	23.6	23.2	N
4	0.36340	44.7	39.4	0.1	44.8	39.5	58.7	48.7	13.9	9.2	N
5	0.39939	41.1	33.7	0.1	41.2	33.8	57.9	47.9	16.7	14.1	N
6	0.43295	39.0	32.1	0.1	39.1	32.2	57.2	47.2	18.1	15.0	N
7	0.63468	27.6	20.1	0.1	27.7	20.2	56.0	46.0	28.3	25.8	N
8	1.00700	28.7	17.7	0.2	28.9	17.9	56.0	46.0	27.1	28.1	N
9	13.36720	33.8	27.6	0.6	34.4	28.2	60.0	50.0	25.6	21.8	N
10	0.16615	47.2	37.0	0.1	47.3	37.1	65.2	55.2	17.9	18.1	L1
11	0.19457	36.8	23.4	0.1	36.9	23.5	63.8	53.8	26.9	30.3	L1
12	0.22838	32.6	21.1	0.1	32.7	21.2	62.5	52.5	29.8	31.3	L1
13	0.36912	41.5	35.8	0.1	41.6	35.9	58.5	48.5	16.9	12.6	L1
14	0.40174	39.1	32.2	0.1	39.2	32.3	57.8	47.8	18.6	15.5	L1
15	0.43134	37.5	30.1	0.1	37.6	30.2	57.2	47.2	19.6	17.0	L1
16	0.46715	35.2	28.3	0.1	35.3	28.4	56.6	46.6	21.3	18.2	L1
17	0.66684	28.7	20.3	0.1	28.8	20.4	56.0	46.0	27.2	25.6	L1
18	12.98680	30.7	25.3	0.5	31.2	25.8	60.0	50.0	28.8	24.2	L1
19	24.44860	27.3	21.6	0.7	28.0	22.3	60.0	50.0	32.0	27.7	L1

8.7 Occupied Bandwidth

Test Requirements, RSS-Gen [4.6.1]

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.
Where practical,a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

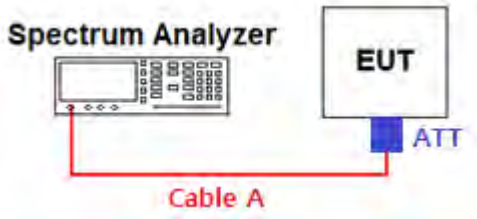
▣ TEST RESULTS:

9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	E4440A	13/01/08	14/01/08	MY44033778
Spectrum Analyzer	Agilent	N9020A	13/09/16	14/09/16	MY50410163
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A/ MA2411B	13/09/16	14/09/16	1111002 / 011290
DC Power Supply	SM techno	SDP30-5D	13/05/27	14/05/27	305DKA013
Multimeter	HP	34401A	13/02/27	14/02/27	3146A13475
Vector Signal Generator	Rohde Schwarz	SMBV100A	13/01/08	14/01/08	255571
Signal Generator	Rohde Schwarz	SMF100A	13/07/22	14/07/22	102341
Thermohygrometer	BODYCOM	BJ5478	13/06/01	14/06/01	120612-2
High-pass Filter	Wainwright Instruments	WHKX3.0	13/09/12	14/09/12	9
Loop Antenna	Schwarzbeck	FMZB1513	12/09/24	14/09/24	1513-128
BILOG ANTENNA	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
Horn Antenna	ETS	3115	13/02/28	15/02/28	00021097
Horn Antenna	A.H.Systems Inc.	SAS-574	13/03/20	15/03/20	154
Attenuator (3dB)	WEINSCHEL	56-3	13/09/12	14/09/12	Y2342
Amplifier (22dB)	HP	8447E	13/01/08	14/01/08	2945A02865
Amplifier (30dB)	Agilent	8449B	13/02/27	14/02/27	3008A00370
EMI TEST RECEIVER	R&S	ESU	13/01/08	14/01/08	100014
EMI TEST RECEIVER	R&S	ESCI	13/02/27	14/02/27	100364
CVCF	NF	4420	13/09/12	14/09/12	3049354420023
LISN	R&S	ESH2-Z5	13/09/12	14/09/12	828739/006

APPENDIX I
Conducted Test set up Diagram & Path loss Information

▪Conducted Measurement(30MHz ~ 25GHz)



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
1	3.07	15	4.17
2412& 2437 & 2462	**3.32**	20	4.62
5	3.59	25	4.94
10	3.89	-	-

Note. 1: The path loss from EUT to Spectrum analyzer was measured and used for test.
Path loss (=S/A's offset value) = Cable A + Attenuator(ATT)