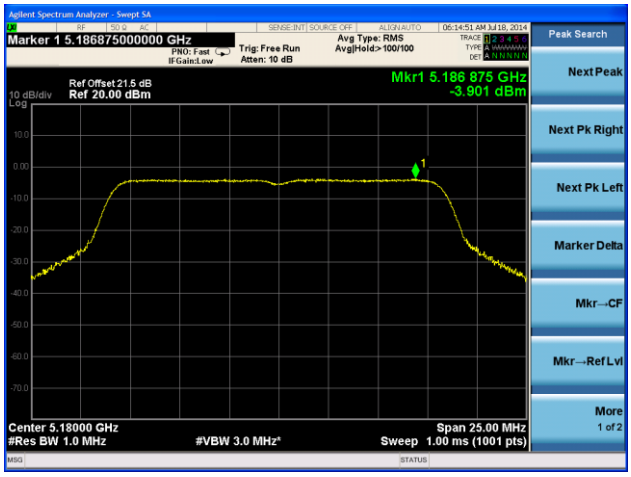
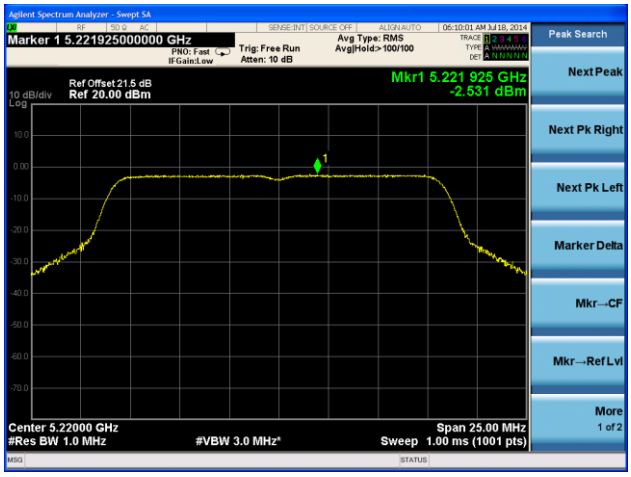
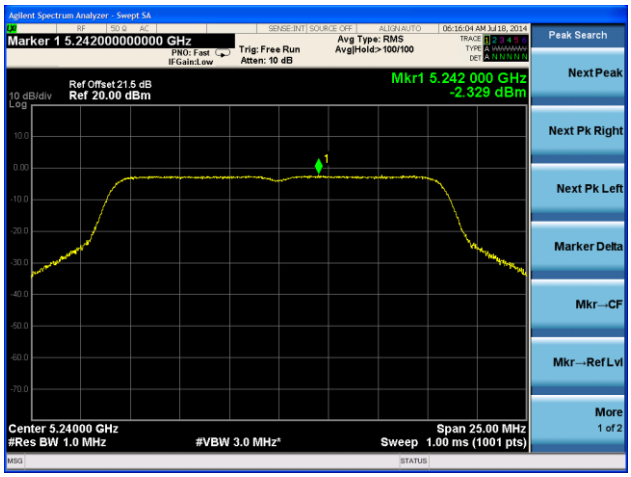
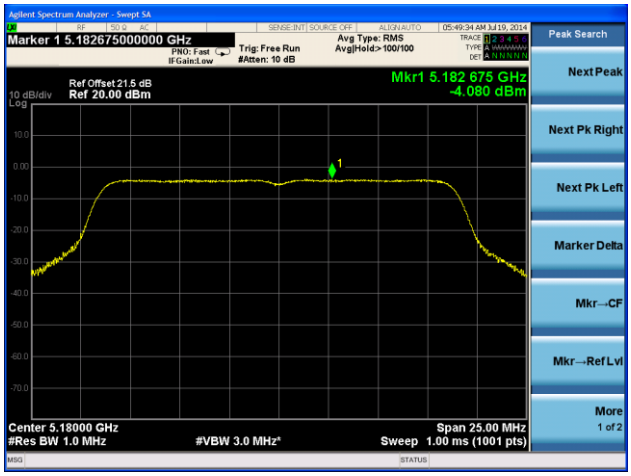
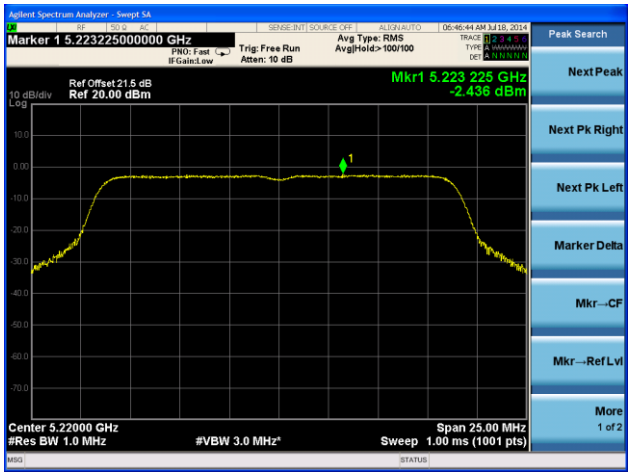
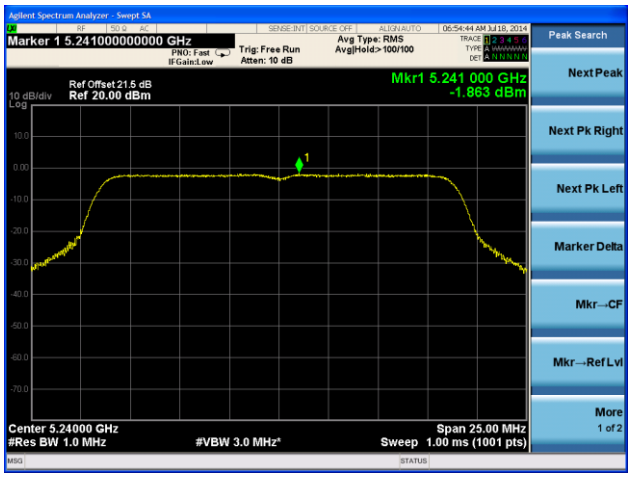
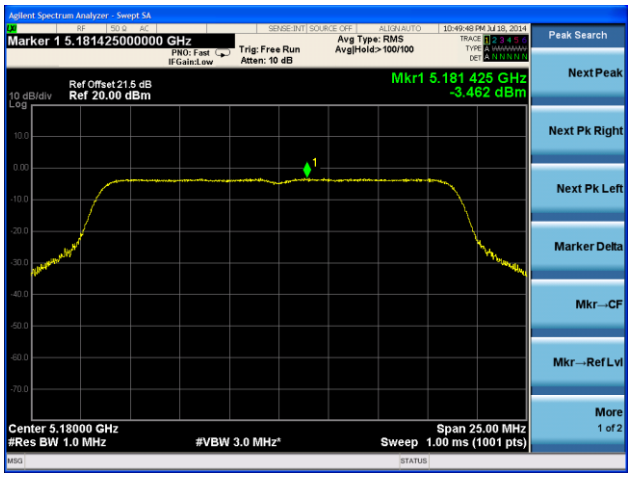
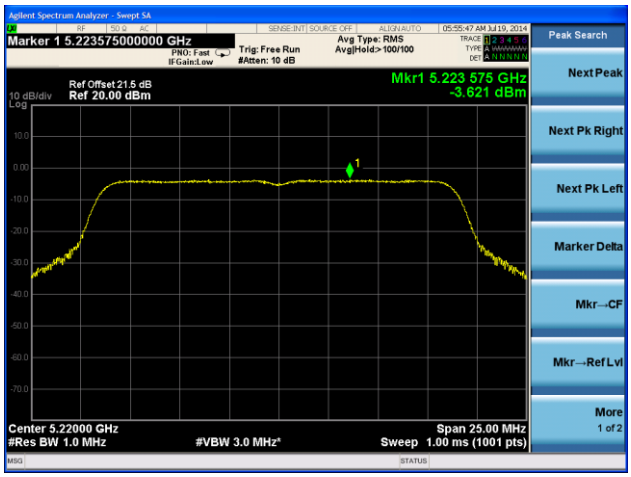
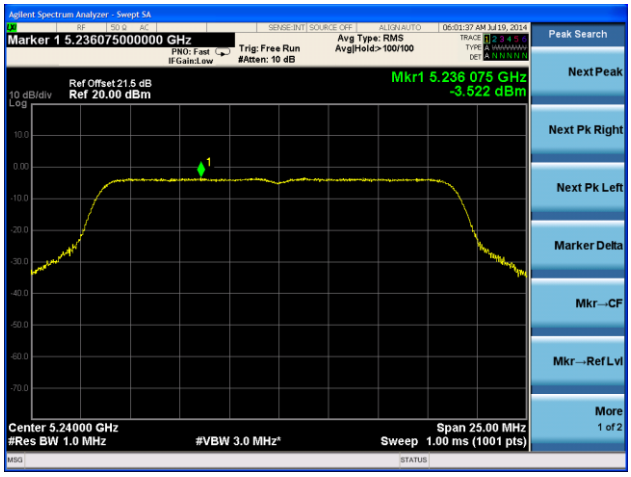
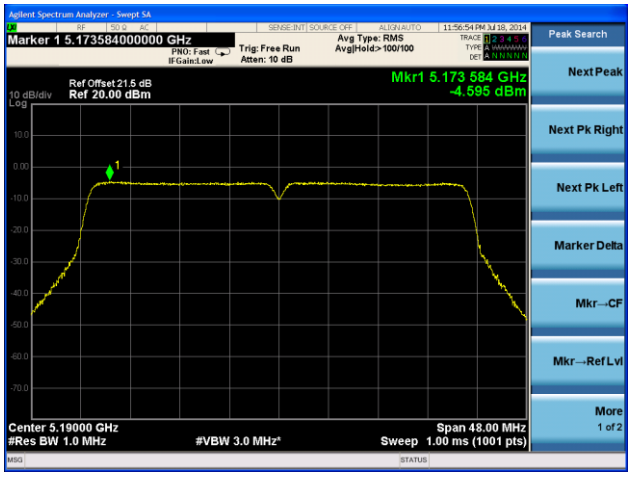
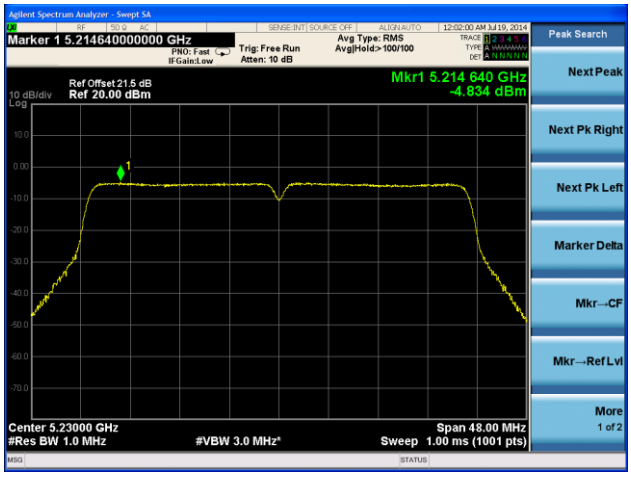
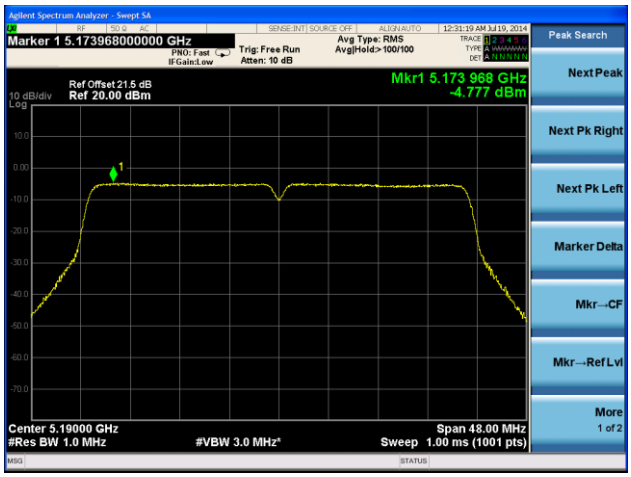
802.11a PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	
802.11n-HT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	

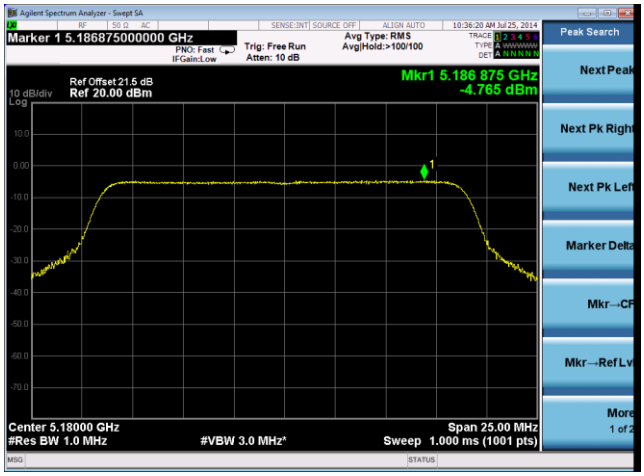
Channel 48 (5240MHz)	
	

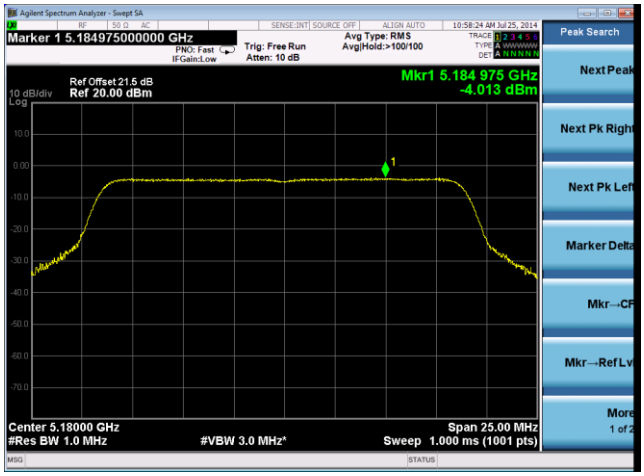
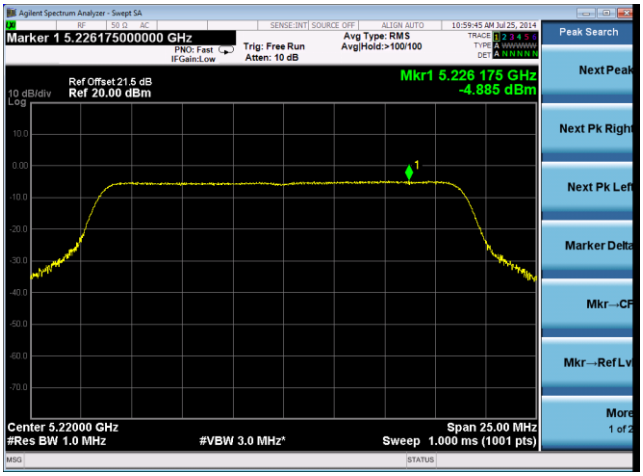
802.11ac-VHT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 36 (5180MHz)	**Channel 44 (5220MHz)**
	
Channel 48 (5240MHz)	
	

802.11n-HT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

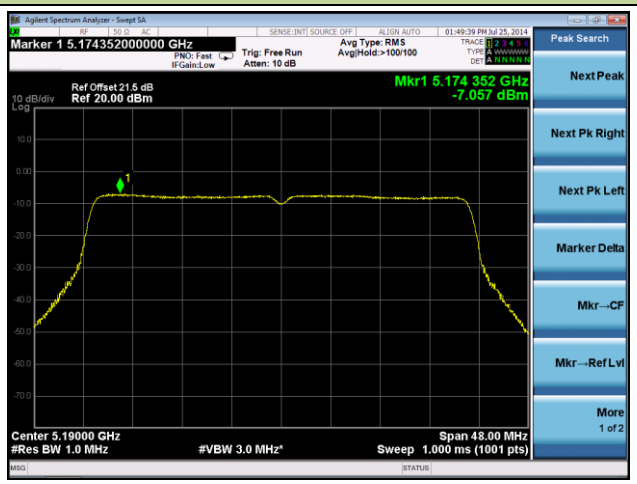
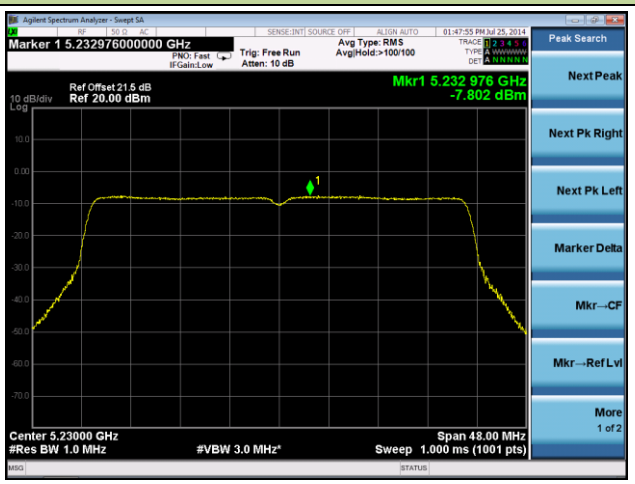
802.11ac-VHT80 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Non-Beam Forming	
Channel 42 (5210MHz)	
	

802.11n-HT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	
	

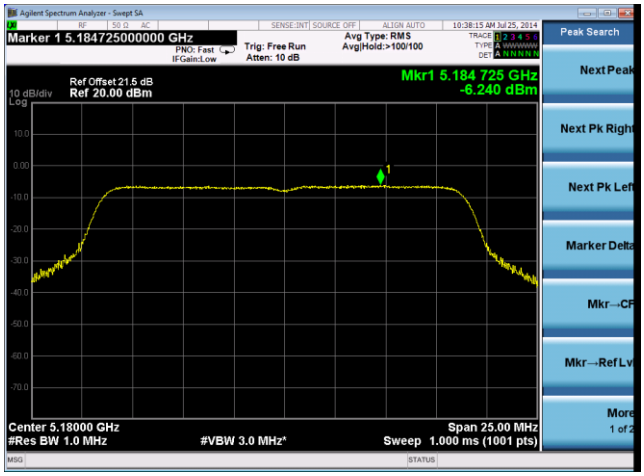
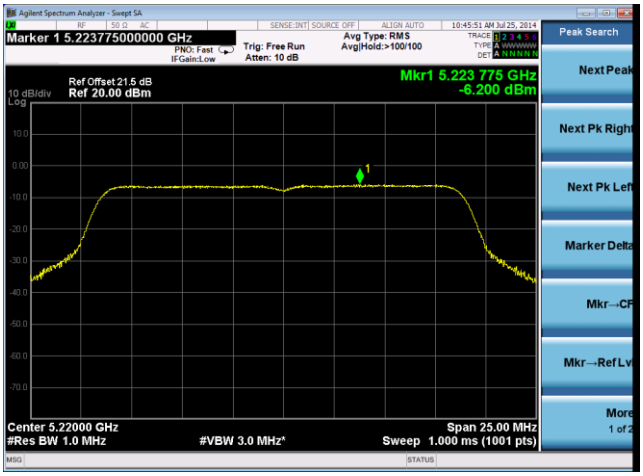
802.11ac-VHT20 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	

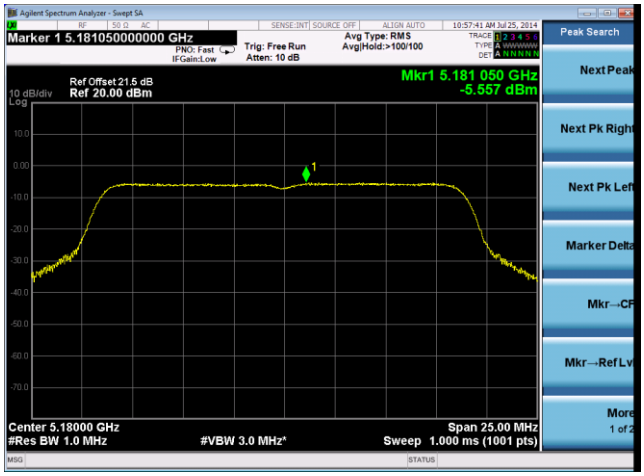
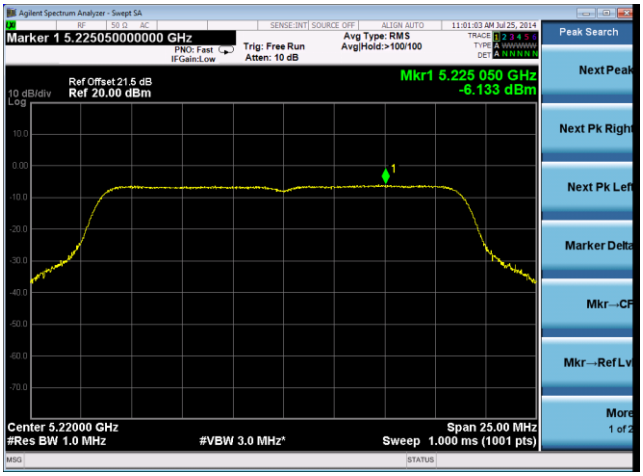
Channel 48 (5240MHz)	
	

802.11n-HT40 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT40 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

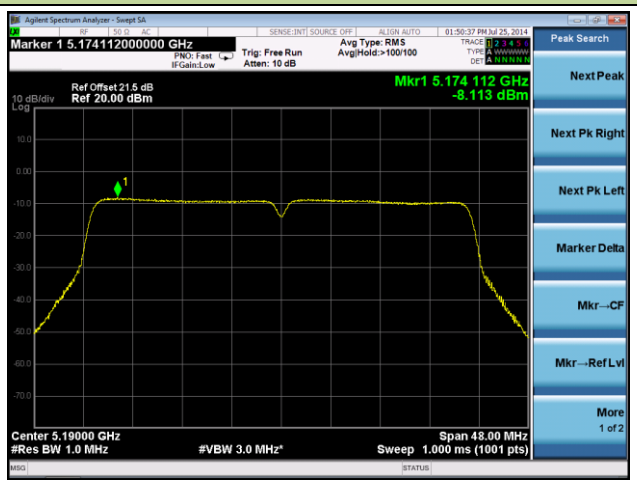
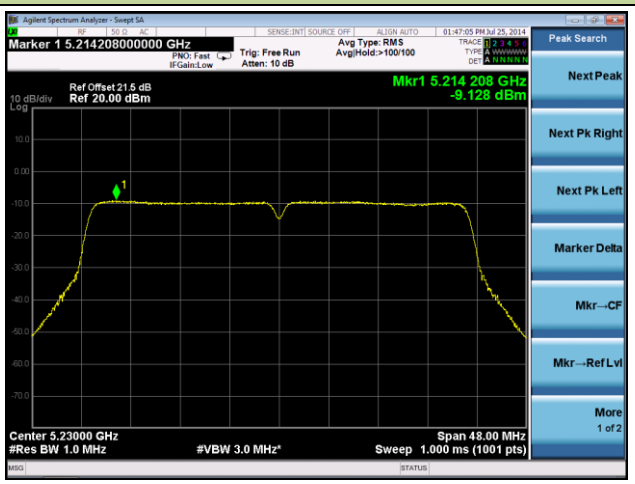
802.11ac-VHT80 PSD - Ant 0 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 42 (5210MHz)	
	

802.11n-HT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	
	

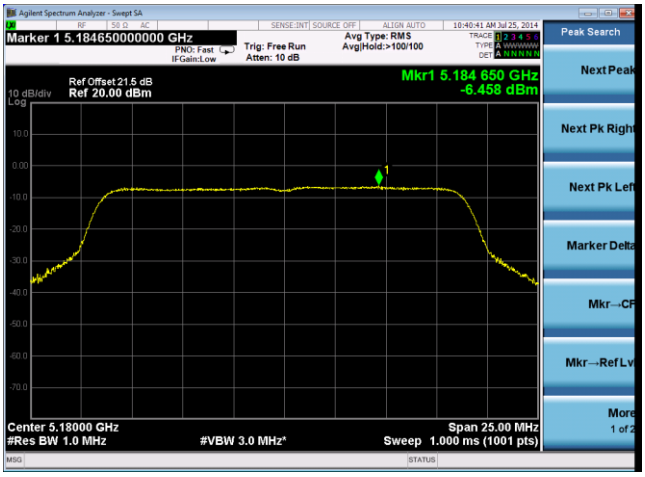
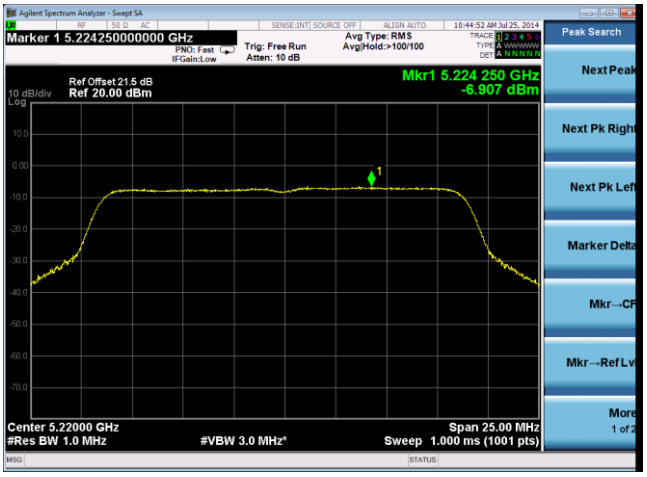
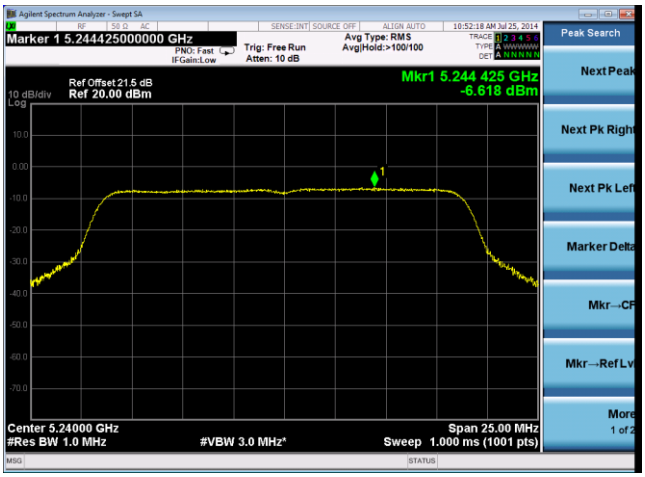
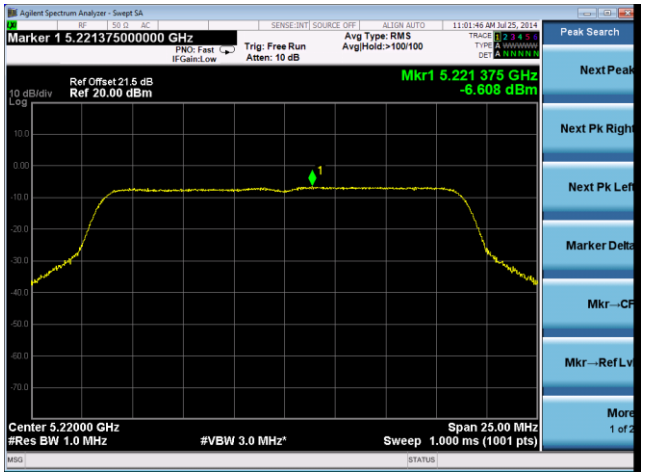
802.11ac-VHT20 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	

Channel 48 (5240MHz)	
	

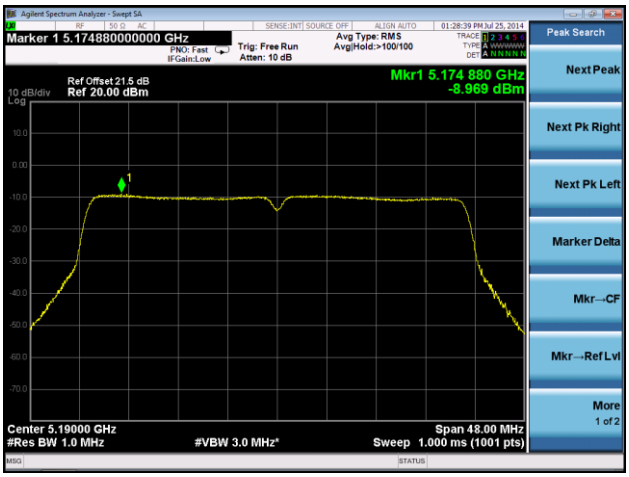
802.11n-HT40 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

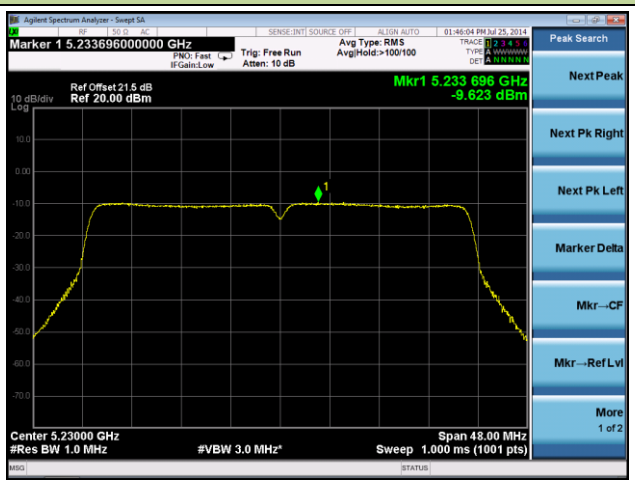
802.11ac-VHT40 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT80 PSD - Ant 1 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 42 (5210MHz)	
	

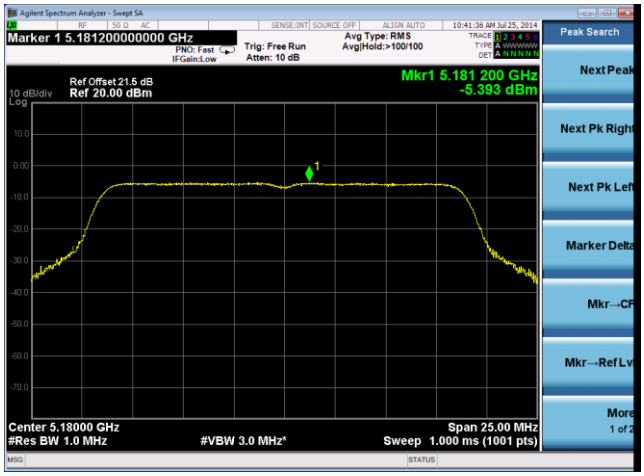
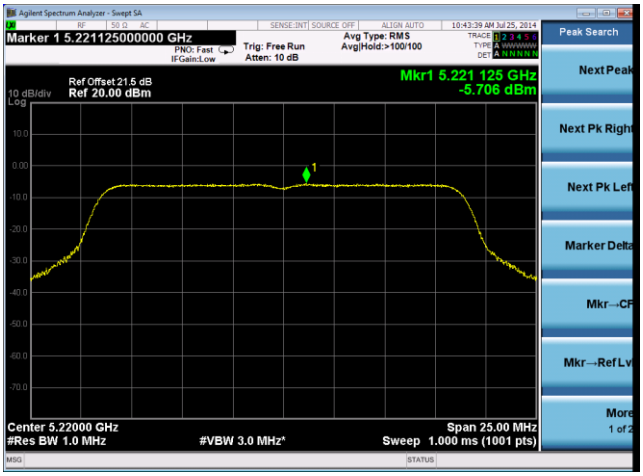
802.11n-HT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	
	
802.11ac-VHT20 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	

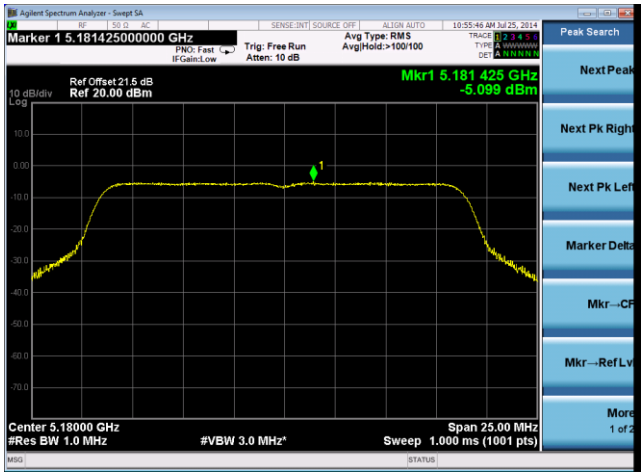
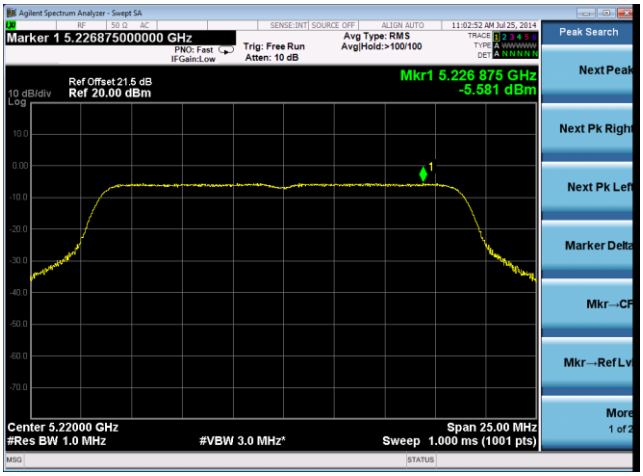
Channel 48 (5240MHz)	
	

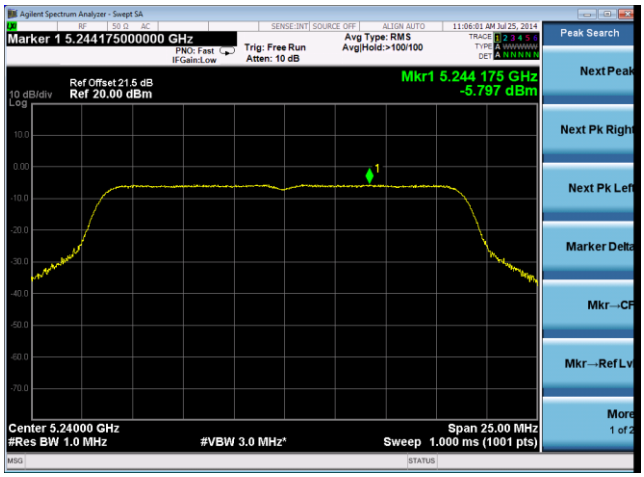
802.11n-HT40 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT40 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

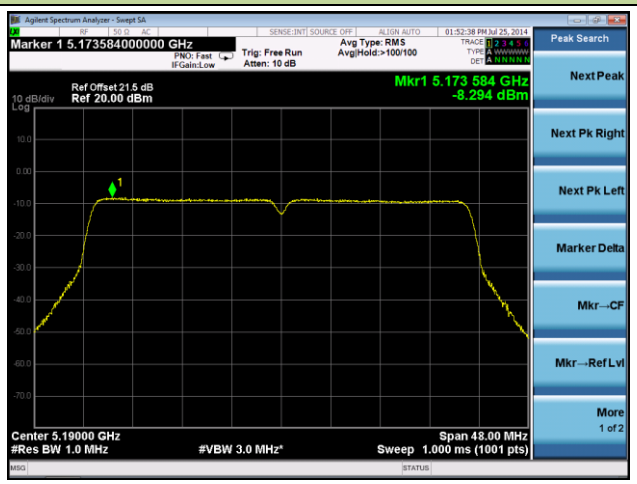
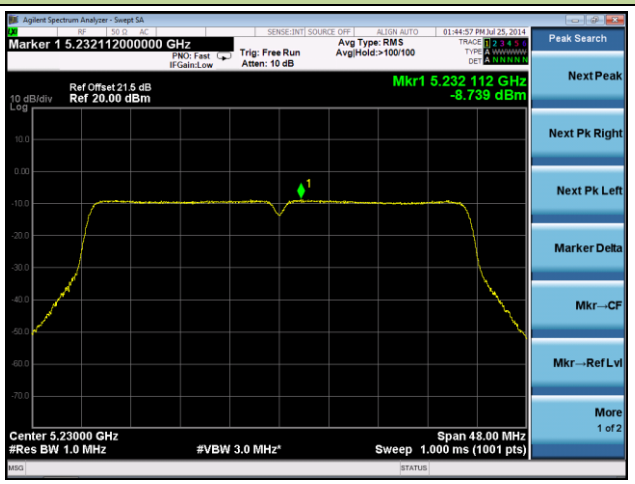
802.11ac-VHT80 PSD - Ant 2 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 42 (5210MHz)	
	

802.11n-HT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	
Channel 48 (5240MHz)	
	

802.11ac-VHT20 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 36 (5180MHz)	Channel 44 (5220MHz)
	

Channel 48 (5240MHz)	
	

802.11n-HT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT40 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 38 (5190MHz)	Channel 46 (5230MHz)
	

802.11ac-VHT80 PSD - Ant 3 / Ant 0 + 1 + 2 + 3, Beam Forming	
Channel 42 (5210MHz)	
	

7.6. Peak Excursion Ratio Measurement *§15.407(a)(6)*

7.6.1. Test Limit

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

7.6.2. Test Procedure Used

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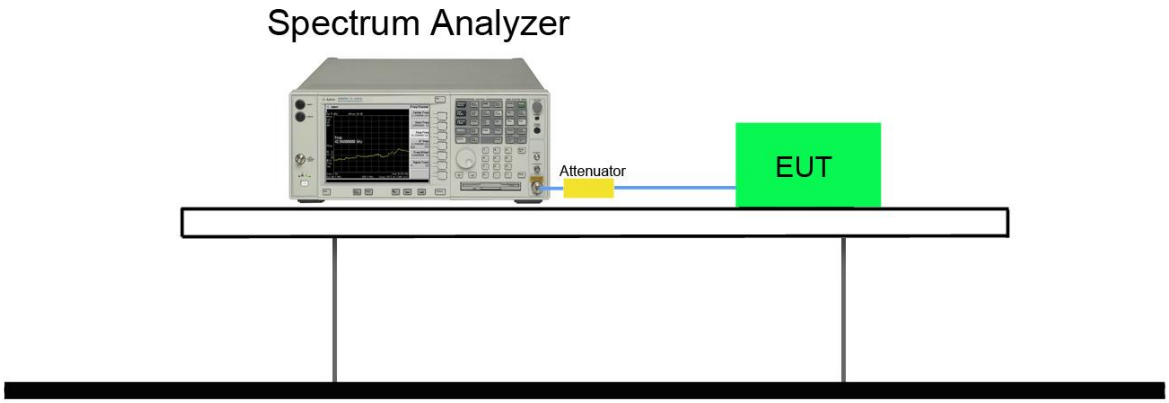
7.6.3. Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. RBW = 1MHz
4. VBW = 3MHz
5. Detector = Peak
6. Trace mode = max hold
7. Trace was allowed to stabilize
8. The peak search function of the spectrum analyzer was used to find the peak of the spectrum. This level was compared to the peak power density level found from the previous section to determine the peak excursion.

7.6.4. Test Setup

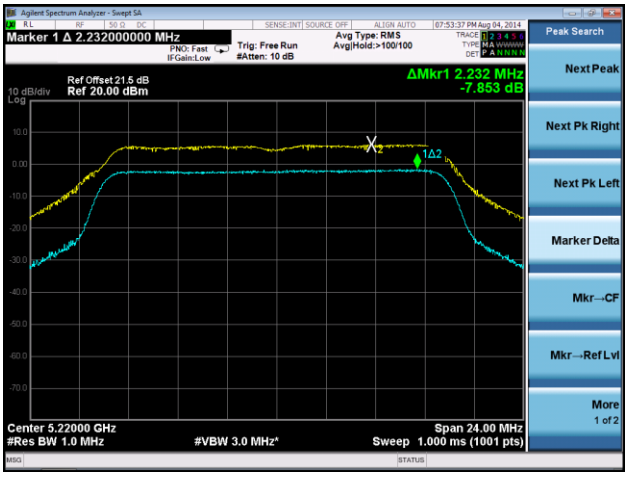


7.6.5. Test Result

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Peak Excursion Ratio (dB)	Limit (dB)	Result
802.11a	6	44	5220	7.853	13	Pass
802.11n-HT20	6.5	44	5220	7.745	13	Pass
802.11ac-VHT20	6.5	44	5220	7.844	13	Pass
802.11n-HT40	13.5	46	5230	7.546	13	Pass
802.11ac-VHT40	13.5	46	5230	7.833	13	Pass
802.11ac-VHT80	29.3	42	5210	8.312	13	Pass

Peak Excursion

802.11a Channel 44 (5220MHz)



802.11n-HT20 Channel 44 (5220MHz)

802.11ac-VHT20 Channel 44 (5220MHz)

802.11n-HT40 46 (5230MHz)

802.11ac-VHT40 46 (5230MHz)	802.11ac-VHT80 42 (5210MHz)
	

7.7. Frequency Stability Measurement *§15.407(g); RSS-210[7.2.6]*

7.7.1. Test Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

7.7.2. Test Procedure Used

Frequency Stability Under Temperature Variations:

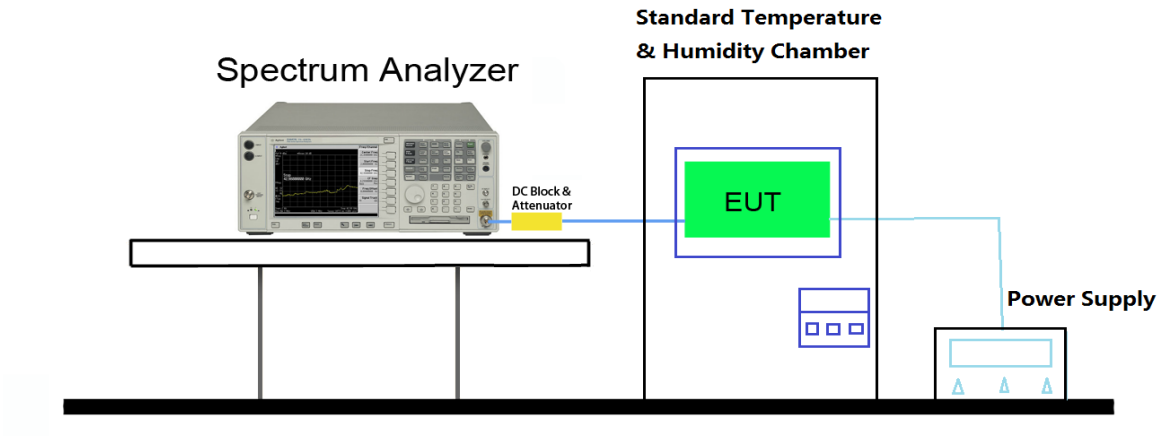
The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 20°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to highest. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C decreased per stage until the lowest temperature reached.

Frequency Stability Under Voltage Variations:

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

7.7.3. Test Setup



7.7.4. Test Result

Voltage (%)	Power (VAC)	Temp (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	120	+ 20 (Ref)	5180051870.830	37927.101	0.0000716
		- 10	5179995035.284	-12808.445	-0.0000241
		0	5180059213.201	51369.472	0.0000971
		+ 10	5179968273.839	-39569.890	-0.0000747
		+ 20	5180109982.983	102139.254	0.0001924
		+ 30	5180107392.385	99548.656	0.0001882
		+ 40	5179935641.725	-72202.004	-0.0001362
115%	138	+ 20	5180073584.823	65741.094	0.0001238
85%	102	+ 20	5179968214.354	-39629.375	-0.0000749

7.8. Radiated Spurious Emission Measurement *§15.407(b)(1)(2)(3); RSS-210[A9.2]*

7.8.1. Test Limit

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table per Section 15.209.

All out of band emissions appearing in a restricted band as specified in Section 7.2.2 of the RSS-Gen Issue 3 must not exceed the limits shown in Table per Section 7.2.5.

FCC Part 15 Subpart C Paragraph 15.209 & RSS-Gen Issue3 Section 7.2.5		
Frequency [MHz]	Field Strength [V/m]	Measured Distance [Meters]
0.009 – 0.490	2400/F (kHz)	300
0.490 – 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.8.2. Test Procedure Used

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7.8.3. Test Setting

Peak Measurements above 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold

7. Trace was allowed to stabilize

Quasi-Peak Measurements below 1GHz

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. Span was set greater than 1MHz
3. RBW = 120 kHz
4. Detector = CISPR quasi-peak
5. Sweep time = auto couple
6. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

1. RBW = 1 MHz.
2. Video bandwidth.

- If the EUT is configured to transmit with duty cycle ≥ 98 percent, set VBW ≤ RBW/100 (i.e., 10 kHz) but not less than 10 Hz.
- If the EUT duty cycle is < 98 percent, set VBW ≥ 1/*T*

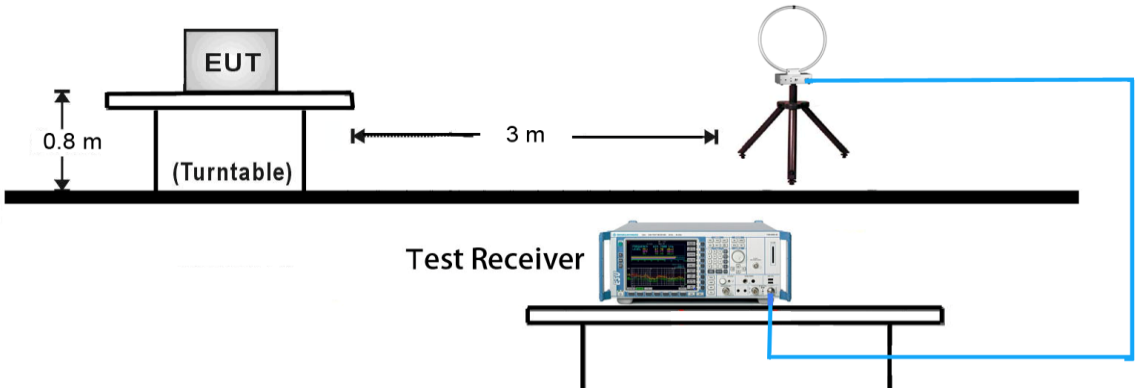
3. Video bandwidth mode

- The instrument shall be set to ensure that video filtering is applied in the power domain. Typically, this requires setting the detector mode to RMS and setting the Average-VBW Type to Power (RMS).

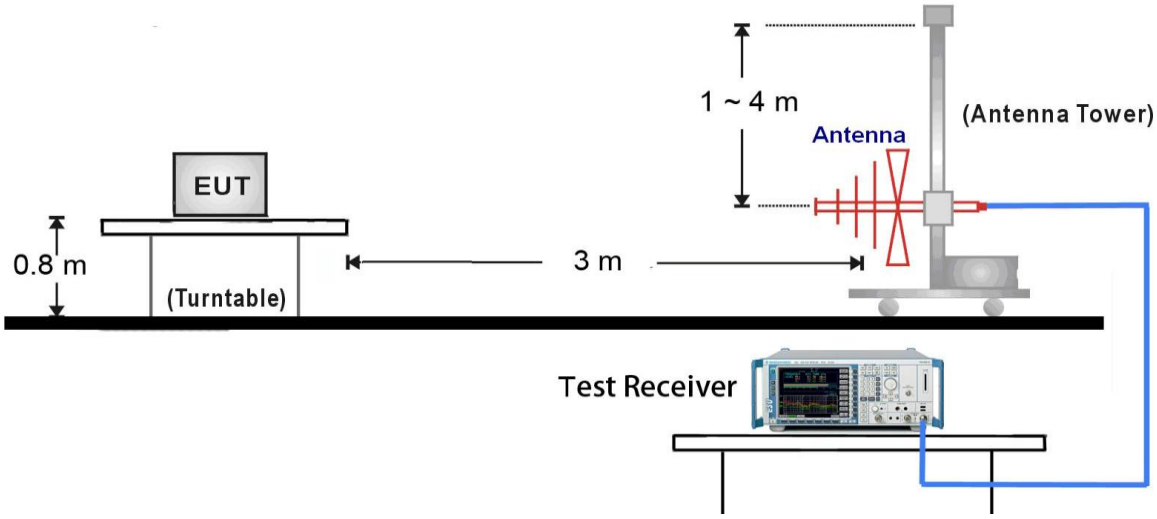
4. Detector = Peak.
5. Sweep time = auto.
6. Trace mode = max hold.
7. Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where x is the duty cycle. For example, use at least 200 traces if the duty cycle is 25 percent. (If a specific emission is demonstrated to be continuous—i.e., 100 percent duty cycle—rather than turning on and off with the transmit cycle, at least 50 traces shall be averaged.)

7.8.4. Test Setup

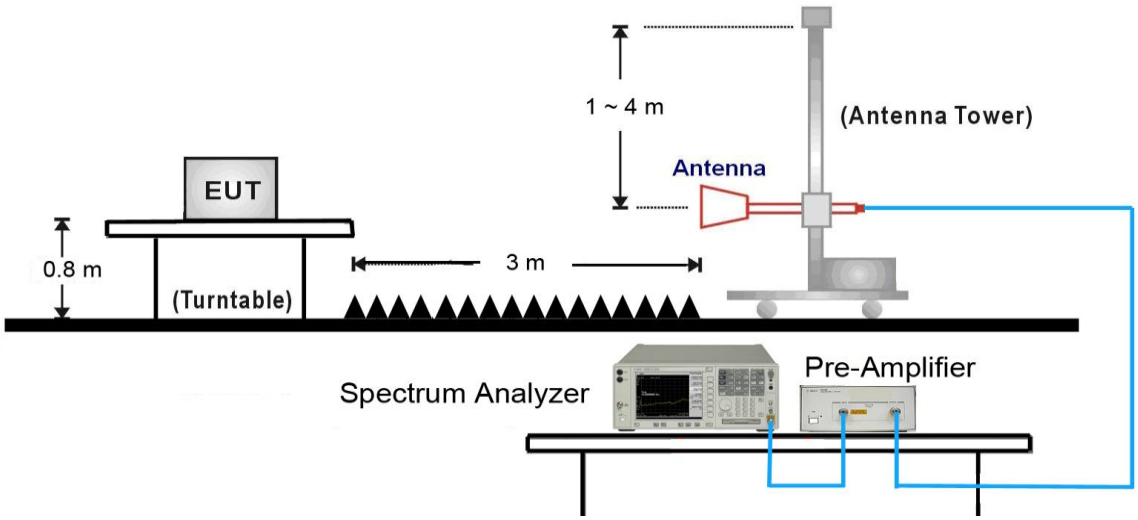
9kHz ~ 30MHz Test Setup:



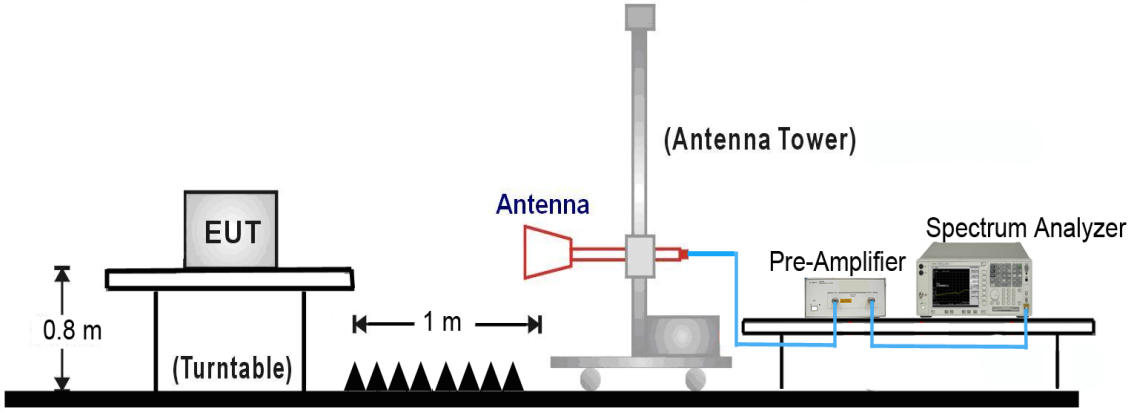
30MHz ~ 1GHz Test Setup:



1GHz ~18GHz Test Setup:



18GHz ~40GHz Test Setup:



7.8.5. Test Result

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	36	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	7008.0	37.7	12.8	50.5	68.2	-17.7	Peak	Horizontal
*	7869.0	35.9	15.0	50.9	68.2	-17.3	Peak	Horizontal
	9137.0	35.9	15.1	51.0	74.0	-23.0	Peak	Horizontal
	10698.5	33.4	17.7	51.1	74.0	-22.9	Peak	Horizontal
*	7132.5	37.0	13.5	50.5	68.2	-17.7	Peak	Vertical
*	7963.5	36.2	15.0	51.2	68.2	-17.0	Peak	Vertical
	9467.5	37.7	15.4	53.1	74.0	-20.9	Peak	Vertical
	10673.0	33.8	17.7	51.5	74.0	-22.5	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a "conversion" factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	44	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	6192.0	37.5	9.1	46.6	68.2	-21.6	Peak	Horizontal
*	7911.5	36.1	15.0	51.1	68.2	-17.1	Peak	Horizontal
	9137.5	34.5	15.1	49.6	74.0	-24.4	Peak	Horizontal
	10656.0	33.3	17.9	51.2	74.0	-22.8	Peak	Horizontal
*	7111.5	37.7	13.4	51.1	68.2	-17.1	Peak	Vertical
*	7794.5	35.4	15.0	50.4	68.2	-17.8	Peak	Vertical
	9364.5	37.1	15.3	52.4	74.0	-21.6	Peak	Vertical
	10639.0	34.2	18.0	52.2	74.0	-21.8	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11a	Test Site:	AC1
Test Channel:	48	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	7111.5	37.6	13.4	51.0	68.2	-17.2	Peak	Horizontal
*	7816.5	34.8	15.0	49.8	68.2	-18.4	Peak	Horizontal
	9169.5	34.9	15.3	50.2	74.0	-23.8	Peak	Horizontal
	10690.0	33.6	17.6	51.2	74.0	-22.8	Peak	Horizontal
*	7231.0	36.1	13.8	49.9	68.2	-18.3	Peak	Vertical
*	7769.5	35.1	14.9	50.0	68.2	-18.2	Peak	Vertical
	9466.5	37.8	15.4	53.2	74.0	-20.8	Peak	Vertical
	10681.5	33.4	17.6	51.0	74.0	-23.0	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	36	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	7215.7	34.2	13.7	47.9	68.2	-20.3	Peak	Horizontal
*	8513.5	34.2	14.6	48.8	68.2	-19.4	Peak	Horizontal
	9362.5	35.2	15.3	50.5	74.0	-23.5	Peak	Horizontal
	12536.4	33.8	19.9	53.7	74.0	-20.3	Peak	Horizontal
*	7025.6	36.0	12.9	48.9	68.2	-19.3	Peak	Vertical
*	7753.7	34.1	14.8	48.9	68.2	-19.3	Peak	Vertical
	9342.7	35.2	15.4	50.6	74.0	-23.4	Peak	Vertical
	12571.1	33.8	20.0	53.8	74.0	-20.2	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	44	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	7145.8	34.2	13.5	47.7	68.2	-20.5	Peak	Horizontal
*	8543.6	34.0	14.5	48.5	68.2	-19.7	Peak	Horizontal
	9471.8	35.2	15.4	50.6	74.0	-23.4	Peak	Horizontal
	12431.6	34.2	19.4	53.6	74.0	-20.4	Peak	Horizontal
*	7184.3	33.8	13.6	47.4	68.2	-20.8	Peak	Vertical
*	7762.4	33.4	14.8	48.2	68.2	-20.0	Peak	Vertical
	9326.5	35.1	15.4	50.5	74.0	-23.5	Peak	Vertical
	12662.0	33.3	19.9	53.2	74.0	-20.8	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Test Mode:	802.11n-HT20	Test Site:	AC1
Test Channel:	48	Test Engineer:	Roy Cheng
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	7045.5	36.2	13.1	49.3	68.2	-18.9	Peak	Horizontal
*	7625.5	35.1	14.6	49.7	68.2	-18.5	Peak	Horizontal
	9152.7	36.0	15.3	51.3	74.0	-22.7	Peak	Horizontal
	11803.5	33.7	19.3	53.0	74.0	-21.0	Peak	Horizontal
*	7152.6	34.1	13.6	47.7	68.2	-20.5	Peak	Vertical
*	7915.2	34.2	15.0	49.2	68.2	-19.0	Peak	Vertical
	9173.5	34.6	15.3	49.9	74.0	-24.1	Peak	Vertical
	11319.0	32.9	19.1	52.0	74.0	-22.0	Peak	Vertical

Note 1: “*” is not in restricted band, its limit is -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)