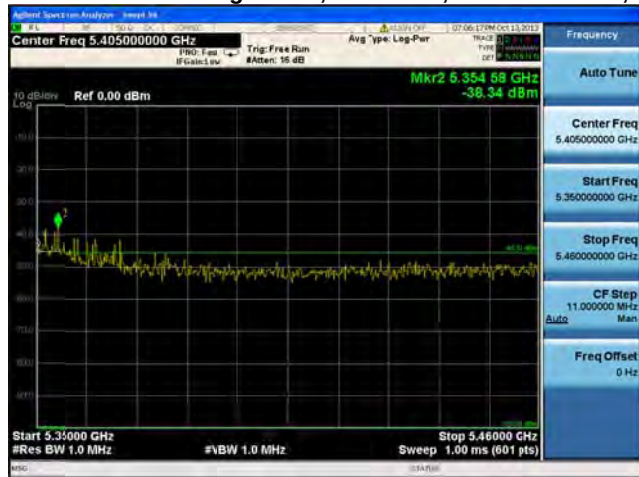
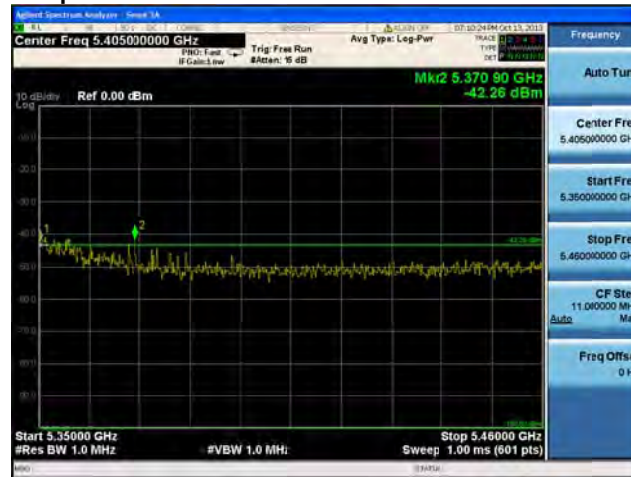
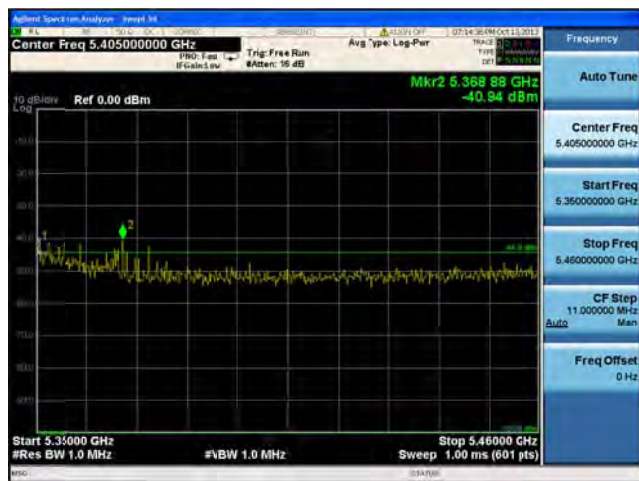
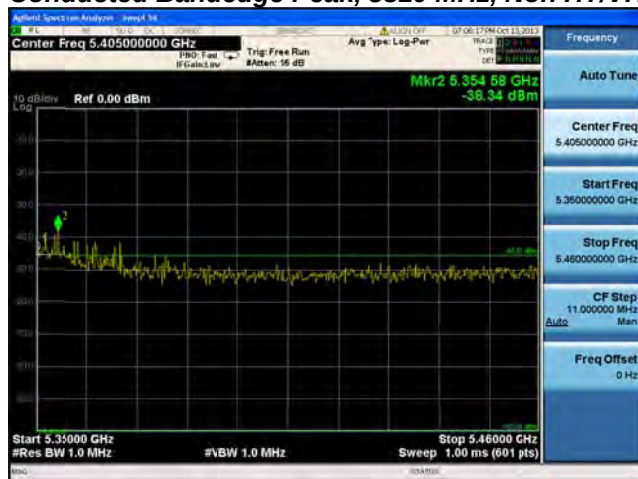
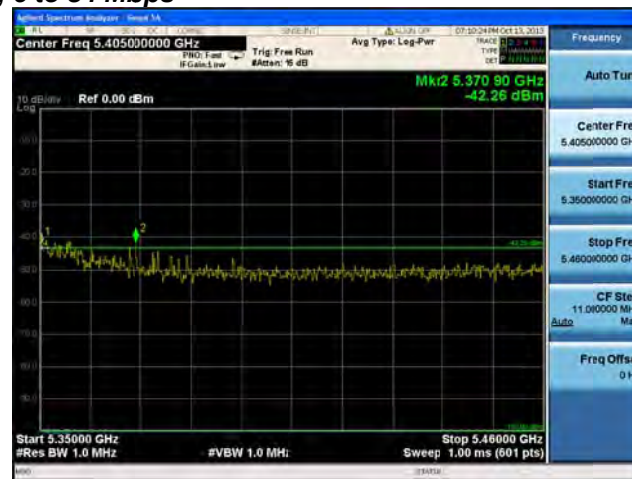
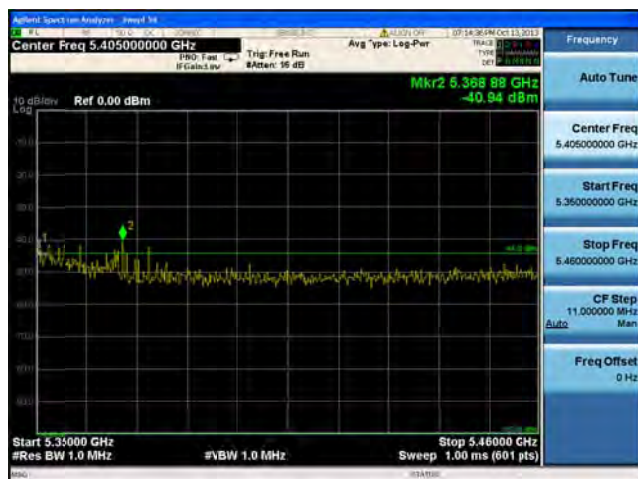
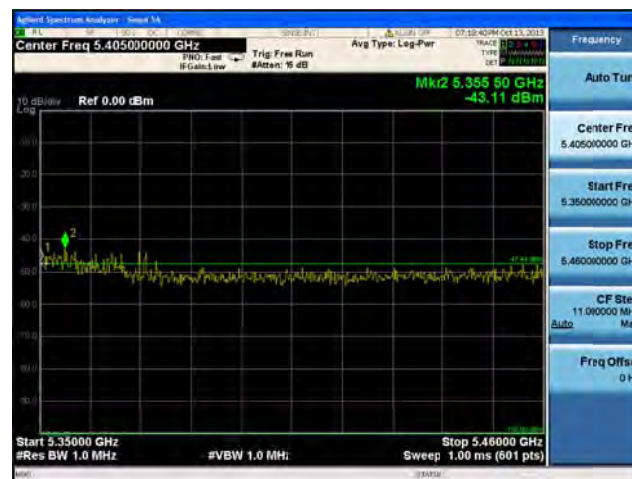
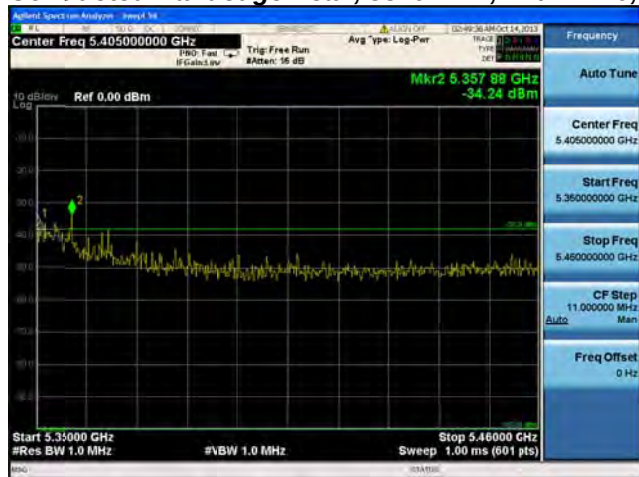
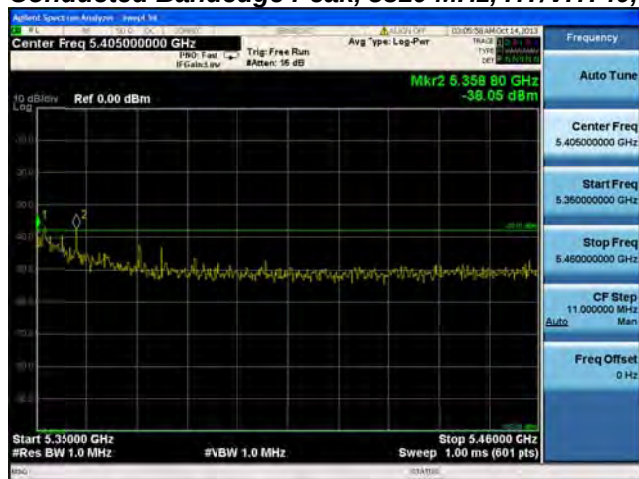
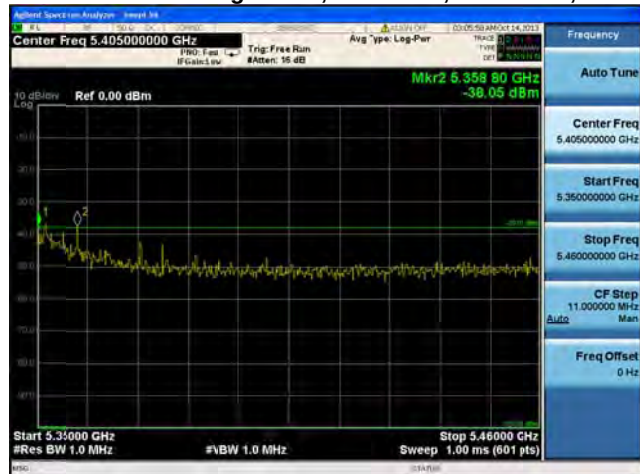
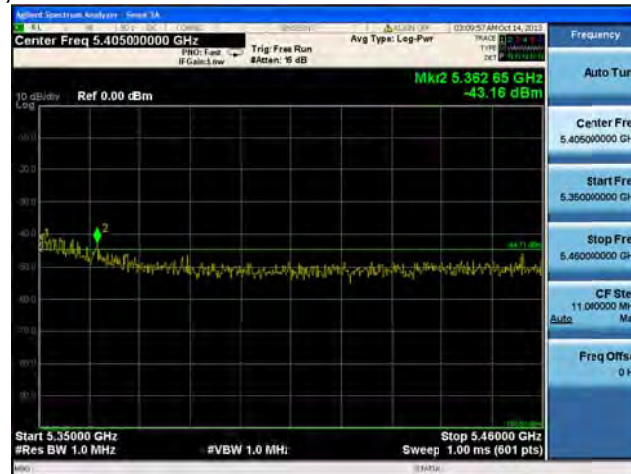


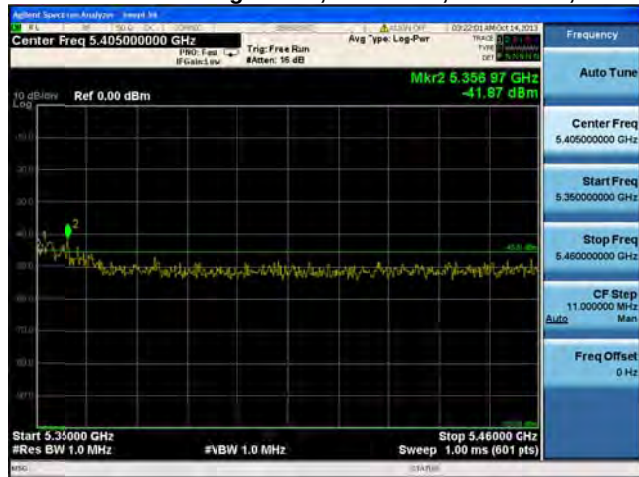
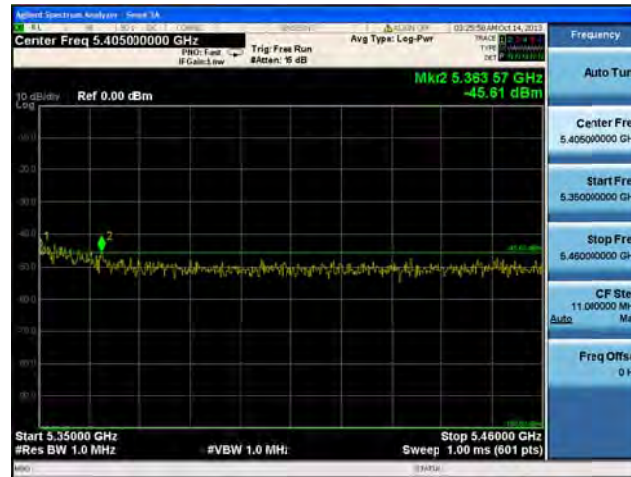
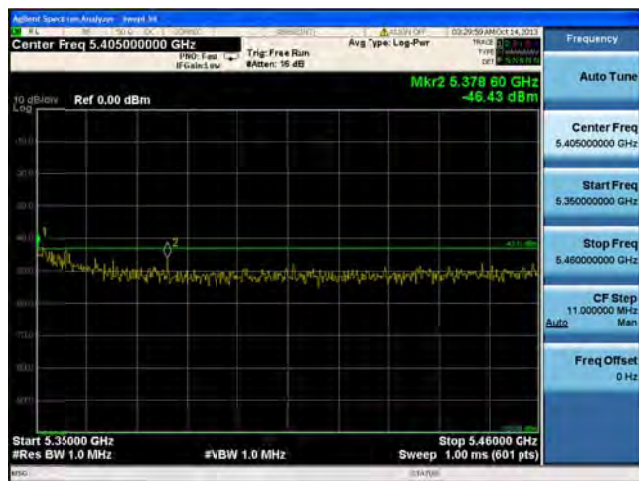
Conducted Bandedge Peak, 5310 MHz, Non HT/VHT40, 6 to 54 Mbps**Antenna A****Antenna B****Antenna C**

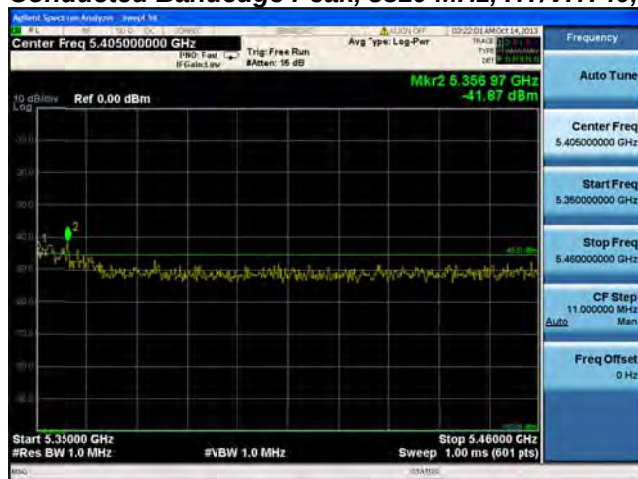
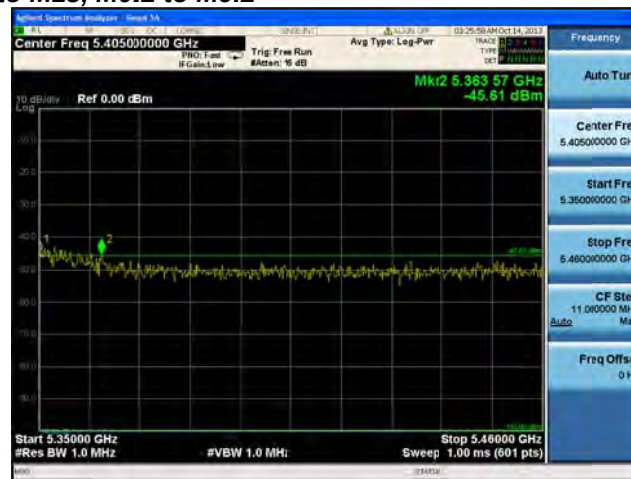
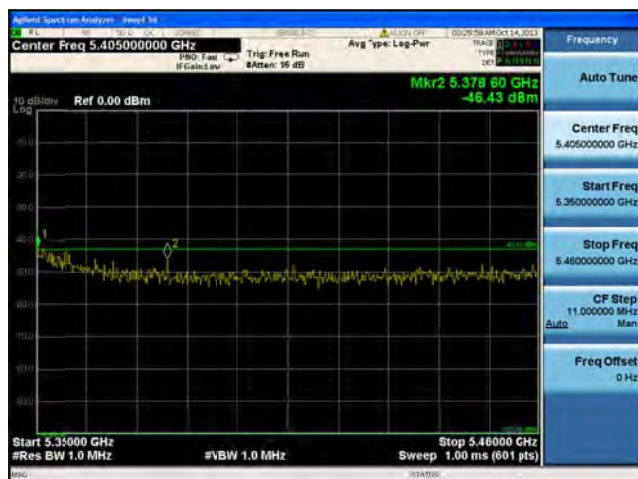
Conducted Bandedge Peak, 5310 MHz, Non HT/VHT40, 6 to 54 Mbps**Antenna A****Antenna B****Antenna C****Antenna D**

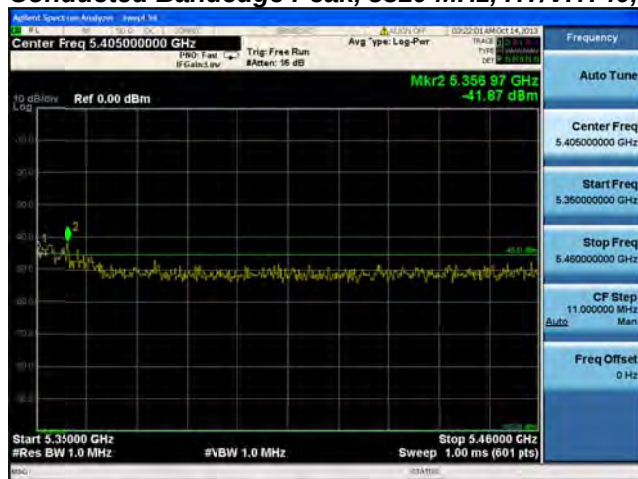
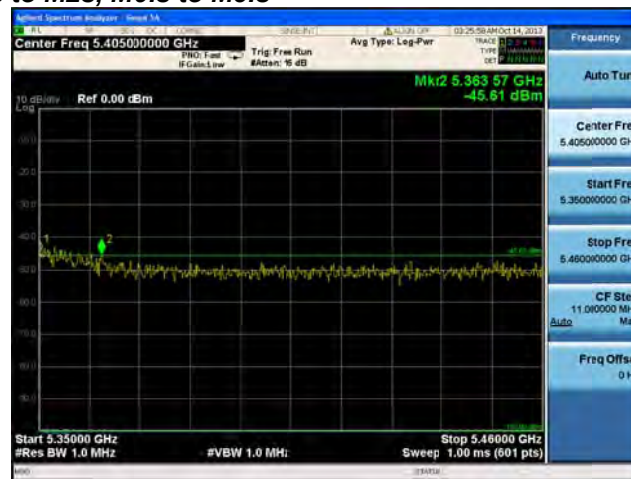
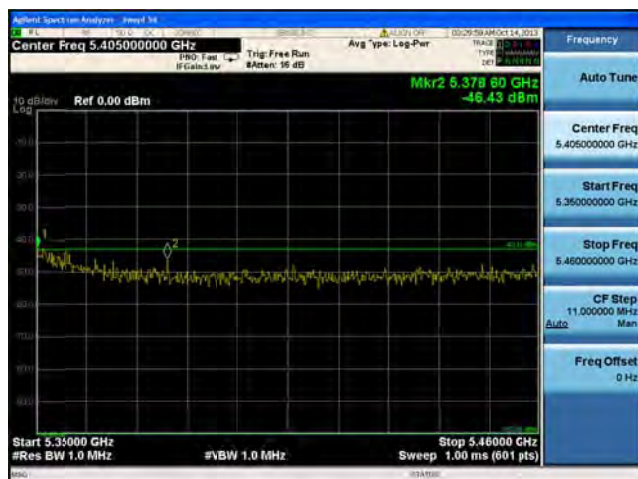
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1**Antenna A**

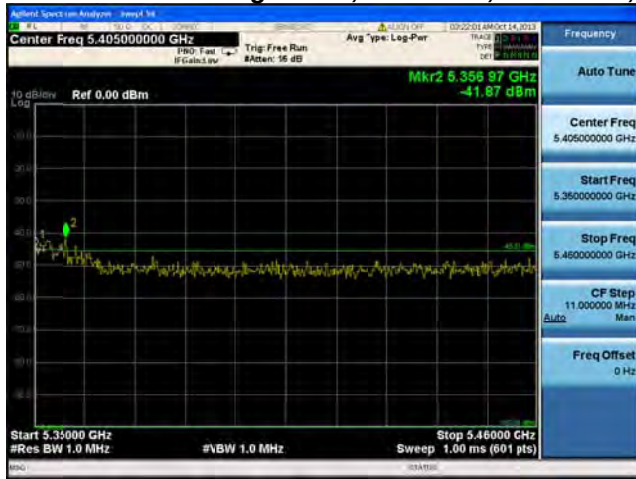
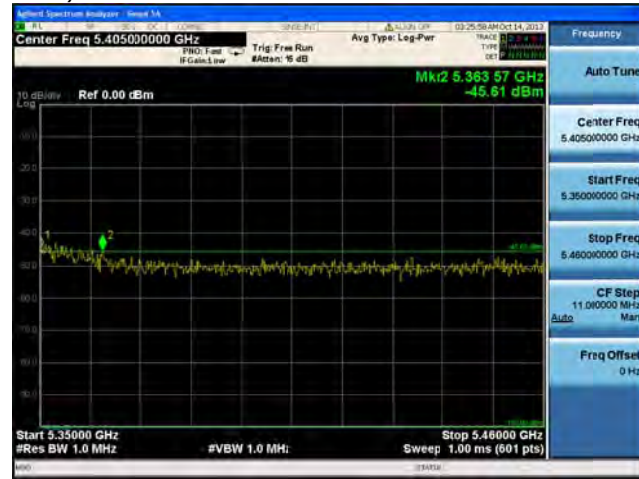
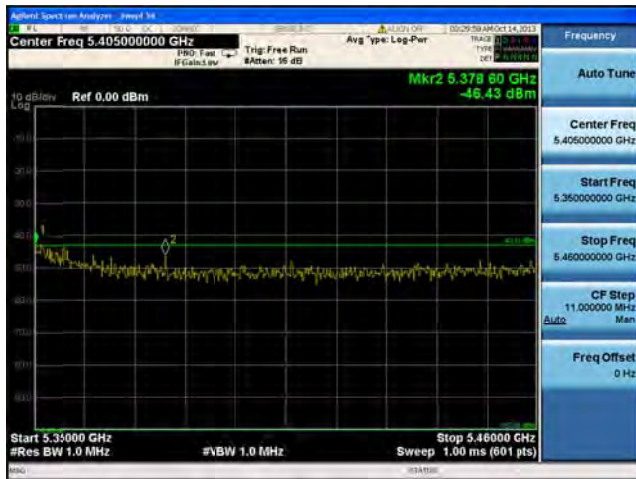
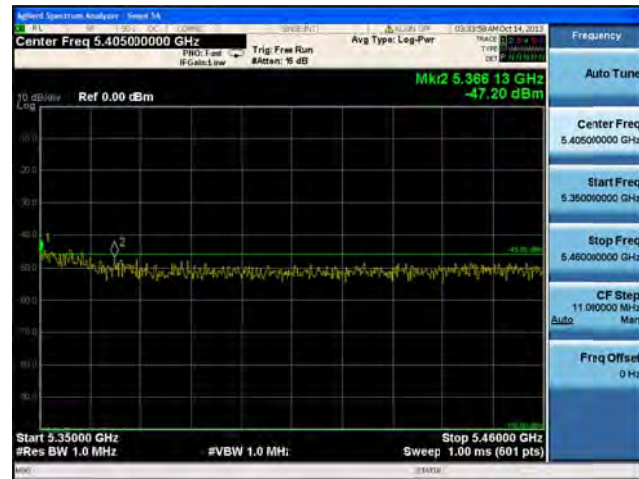
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

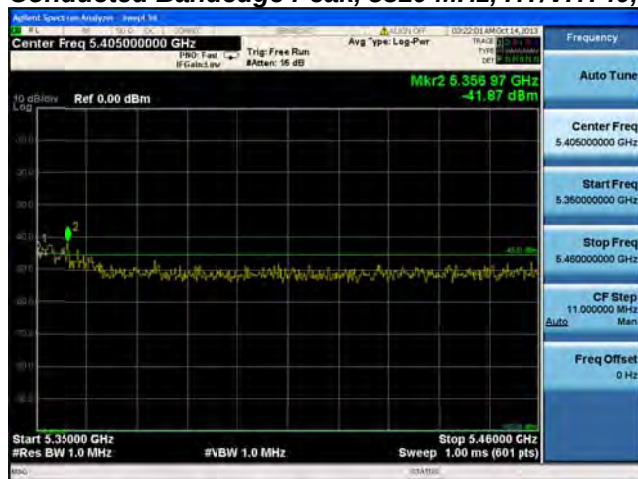
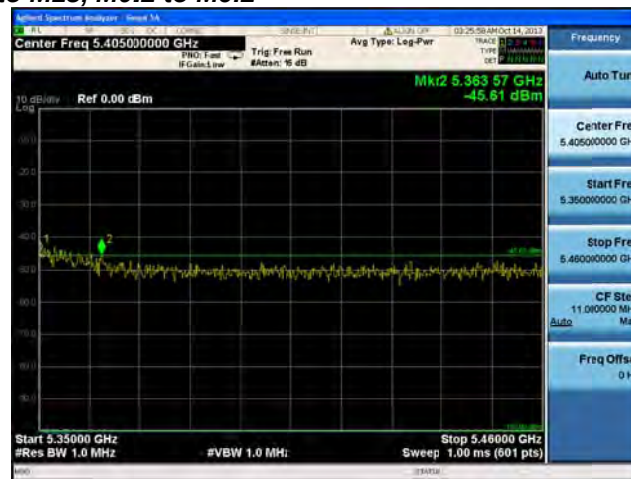
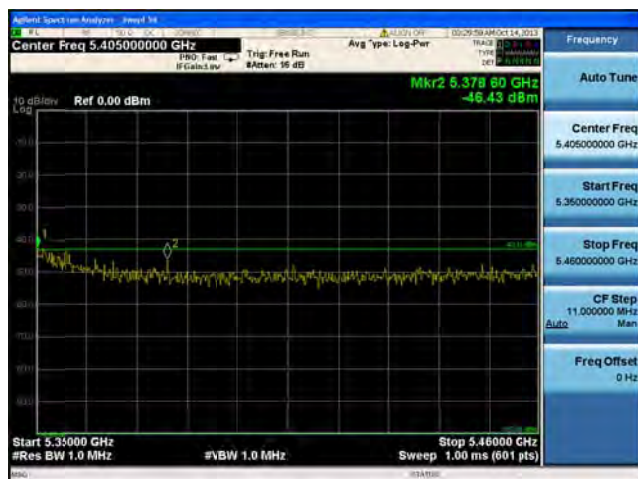
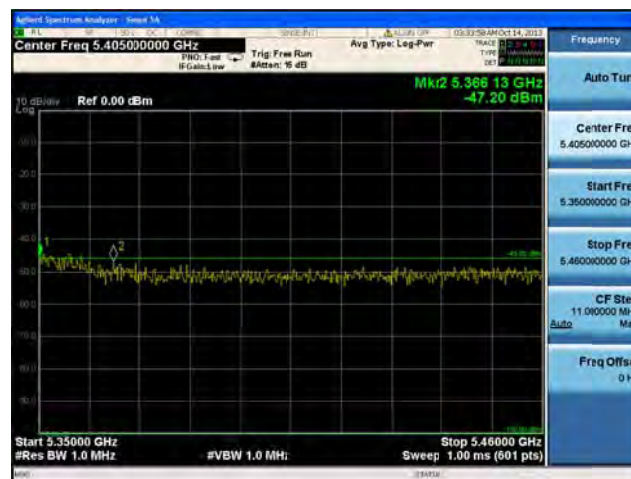
**Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2****Antenna A****Antenna B**

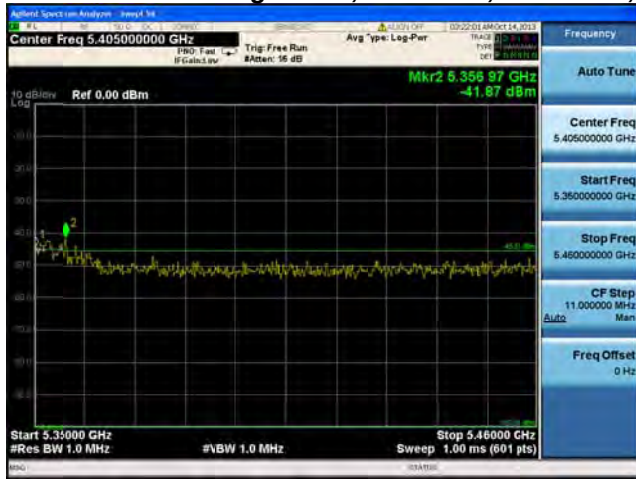
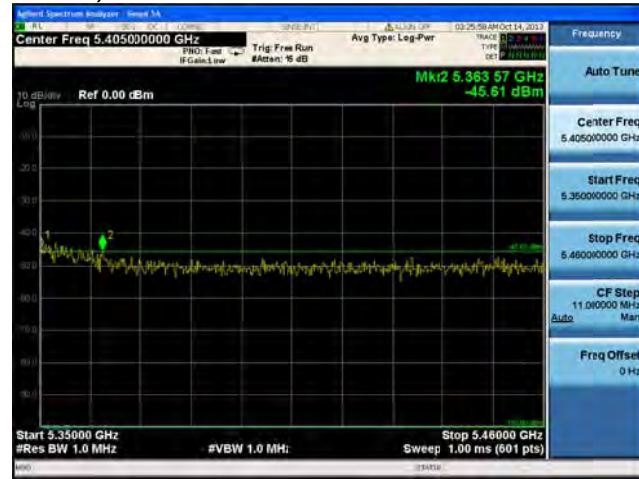
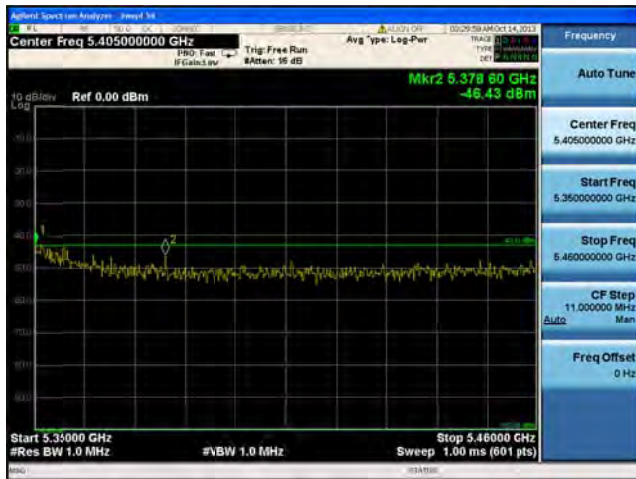
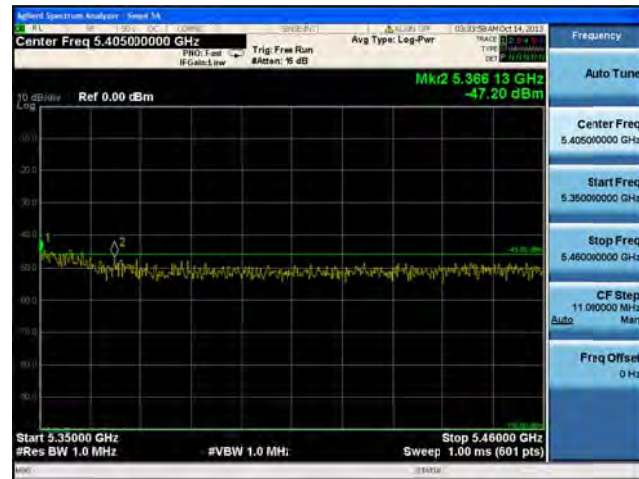
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

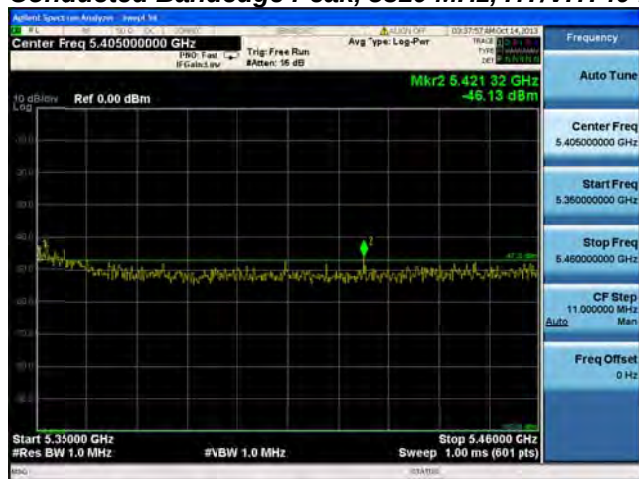
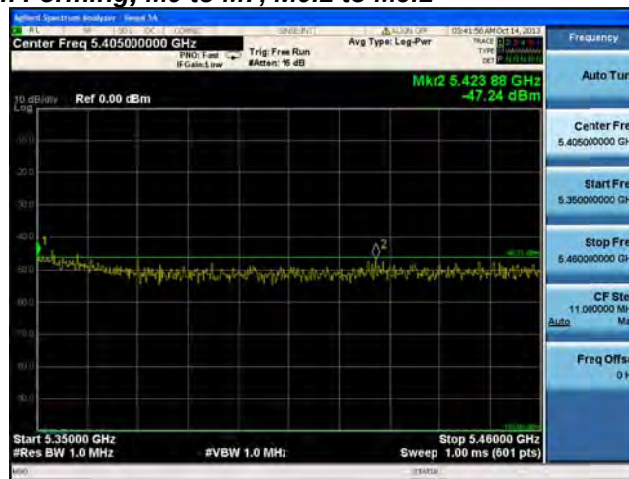
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C**

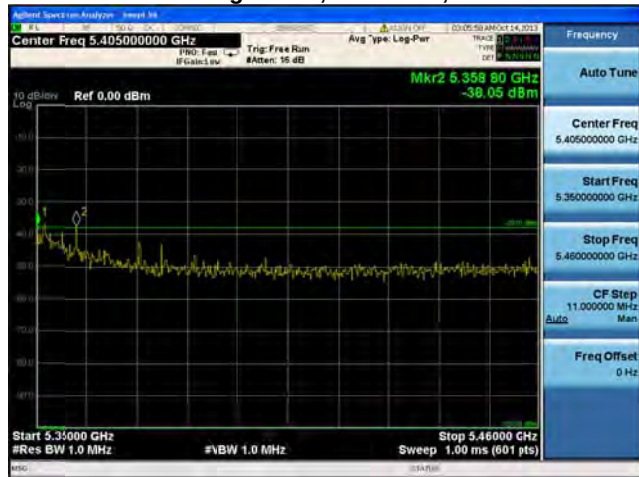
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C**

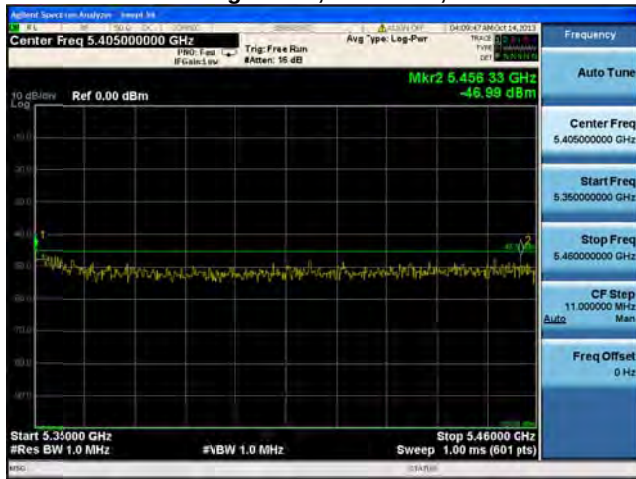
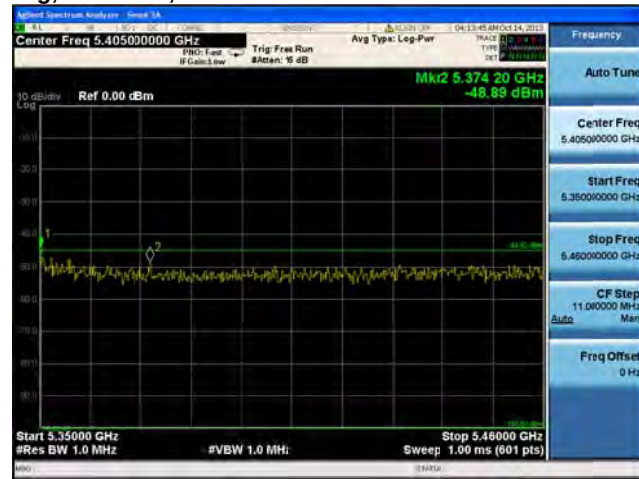
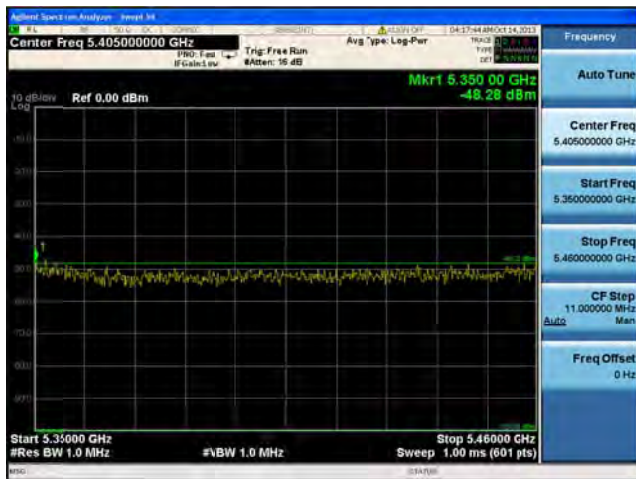
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C****Antenna D**

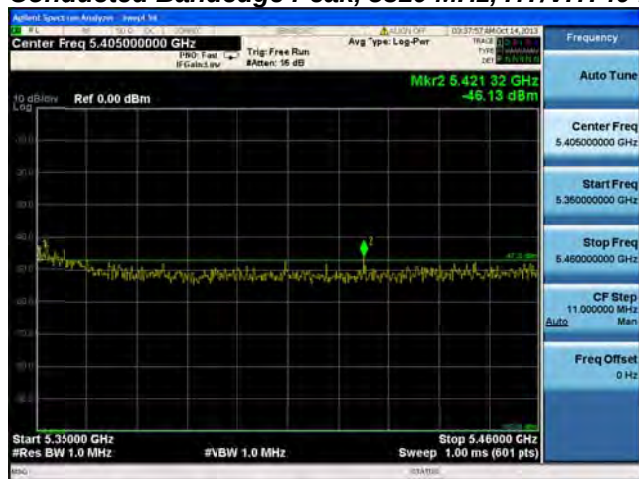
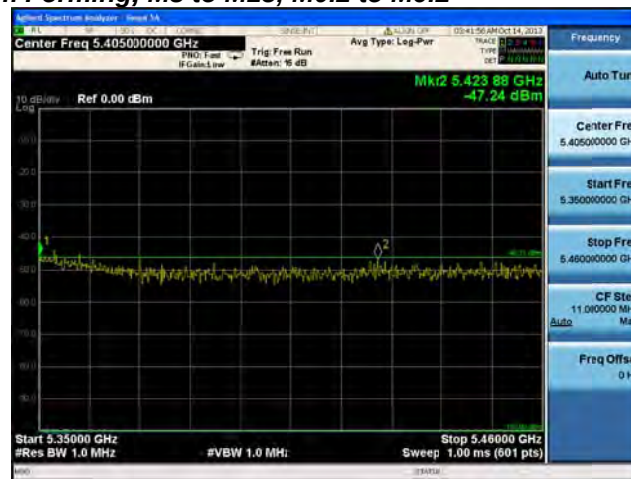
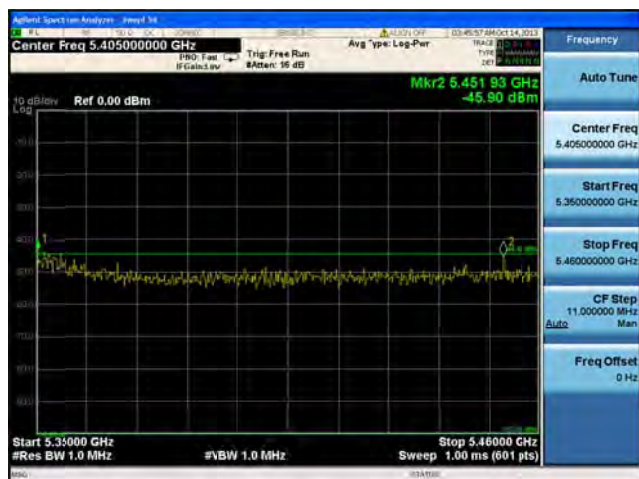
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C****Antenna D**

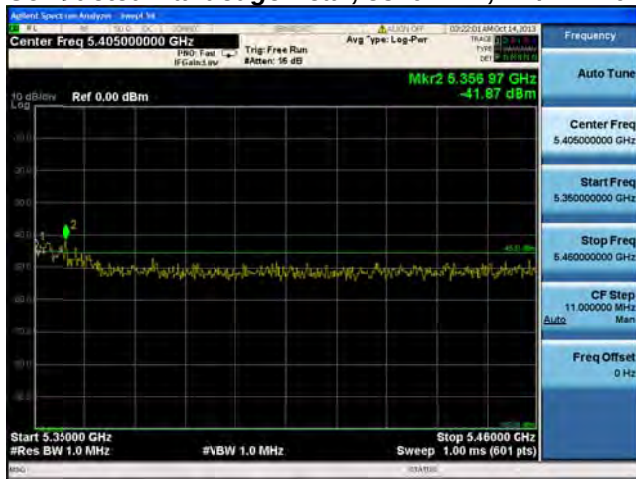
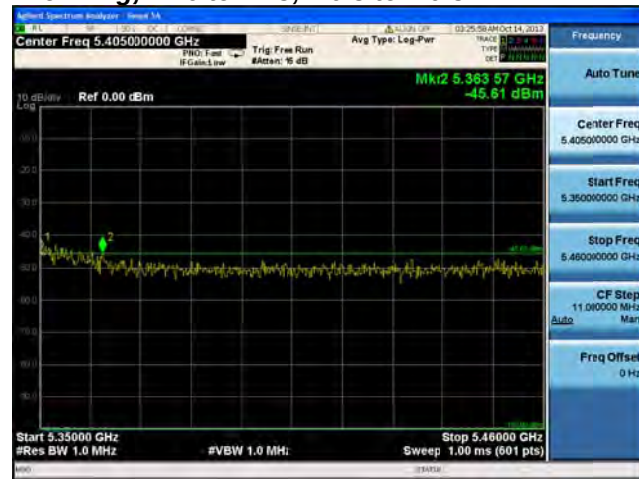
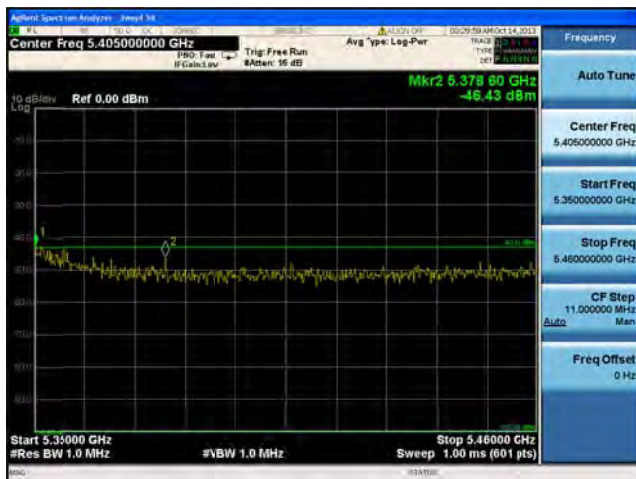
Conducted Bandedge Peak, 5310 MHz, HT/VHT40, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C****Antenna D**

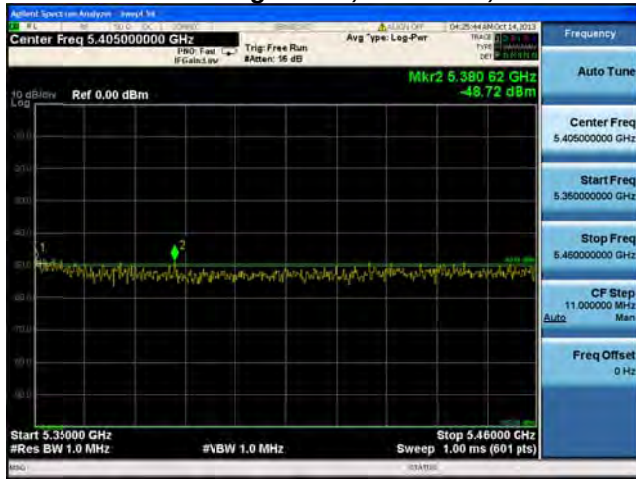
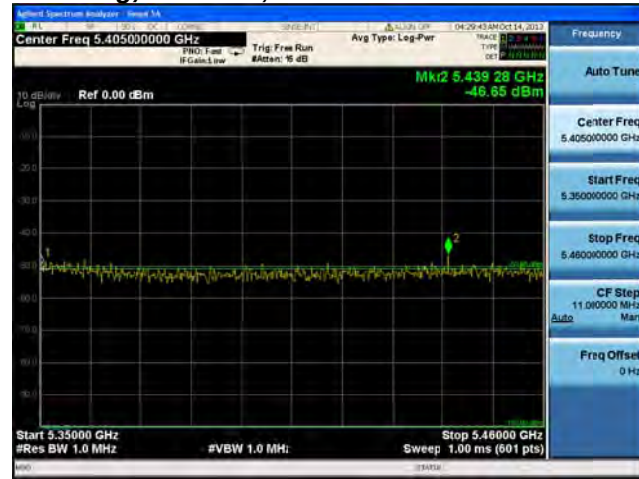
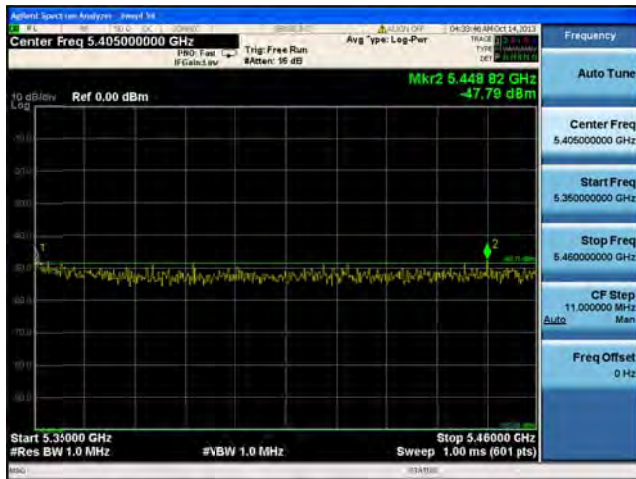
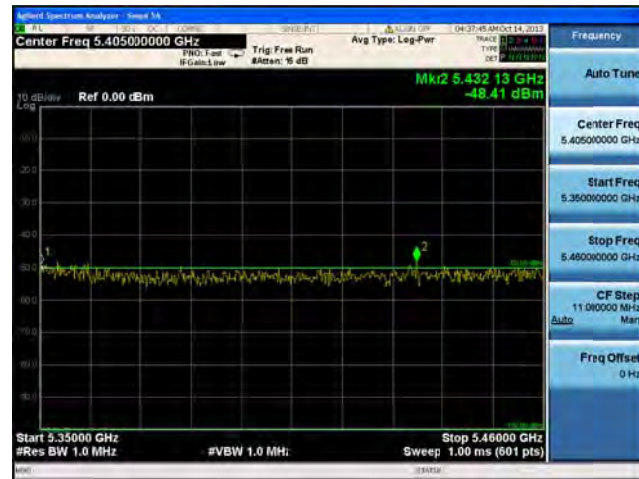
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

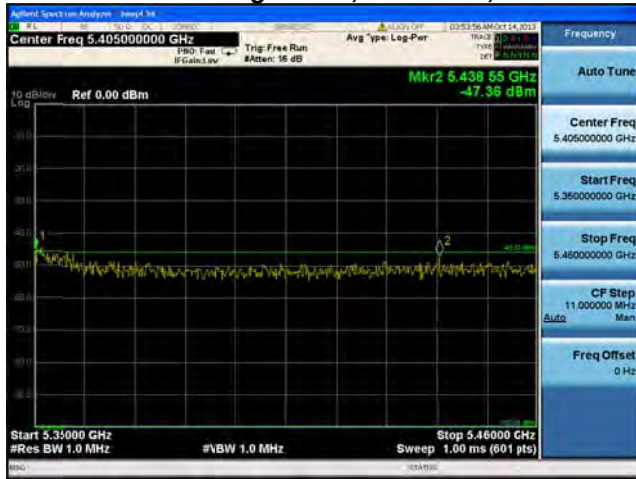
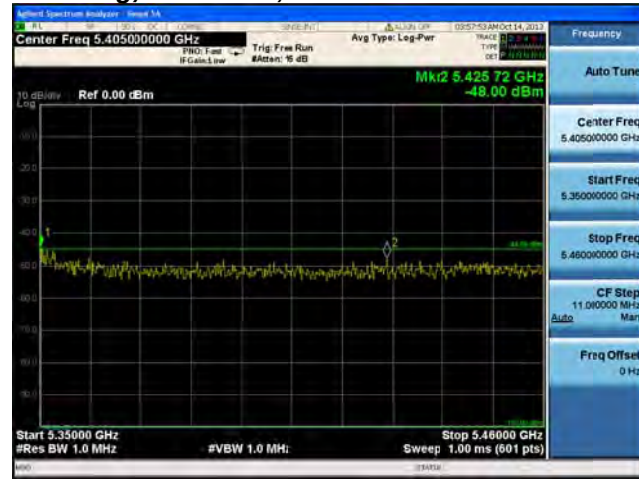
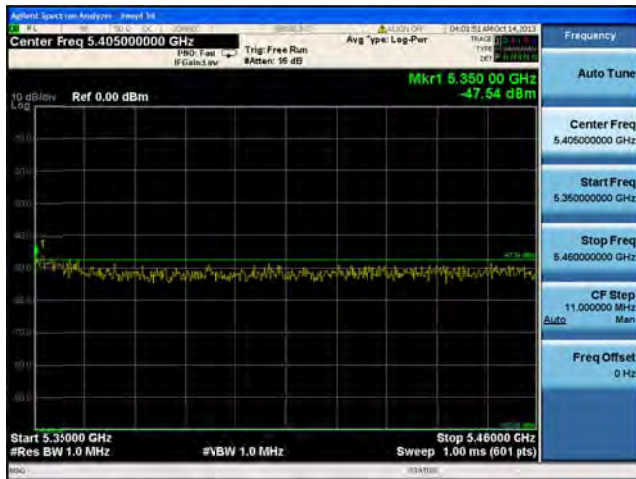
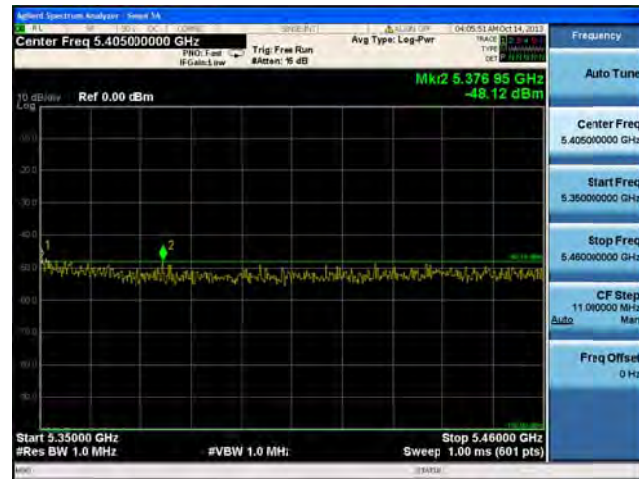
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B**

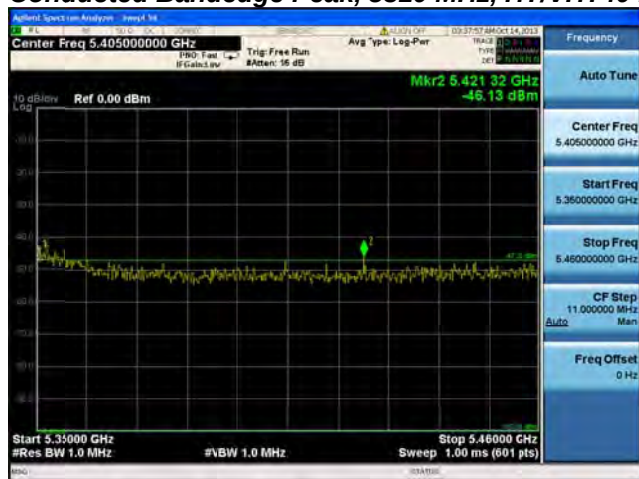
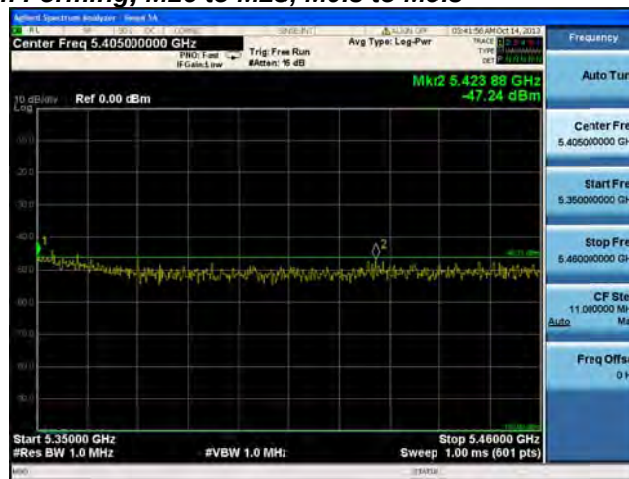
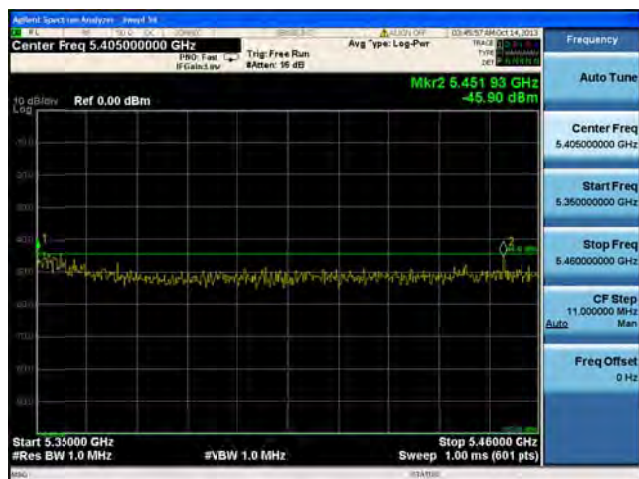
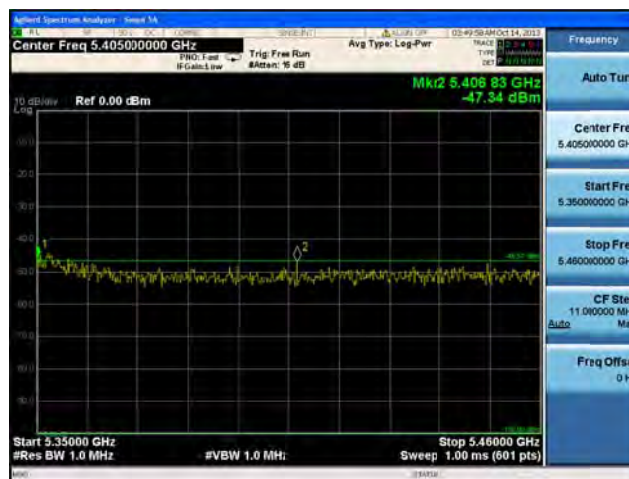
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

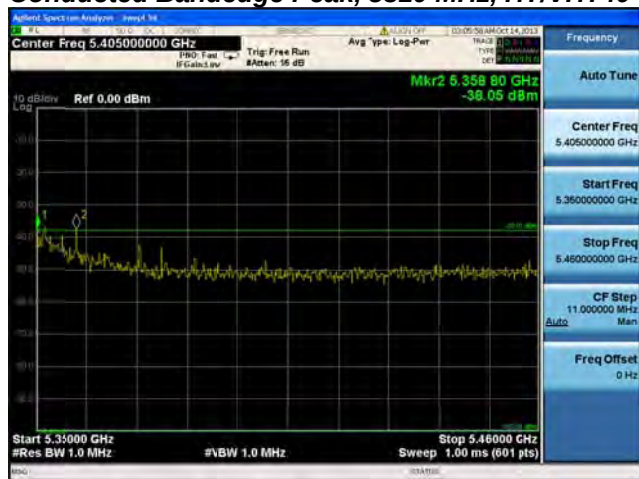
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C**

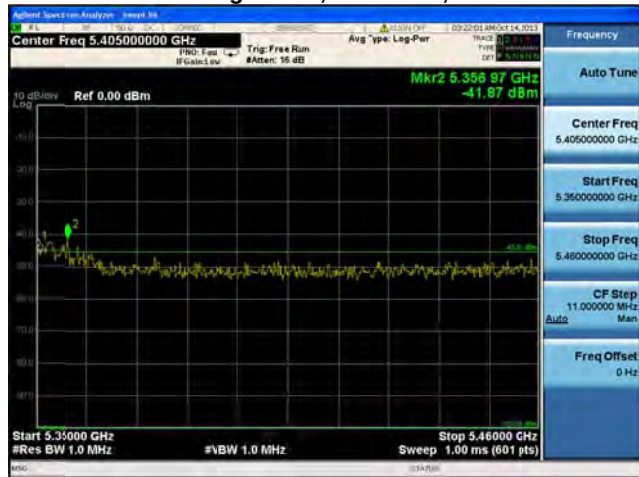
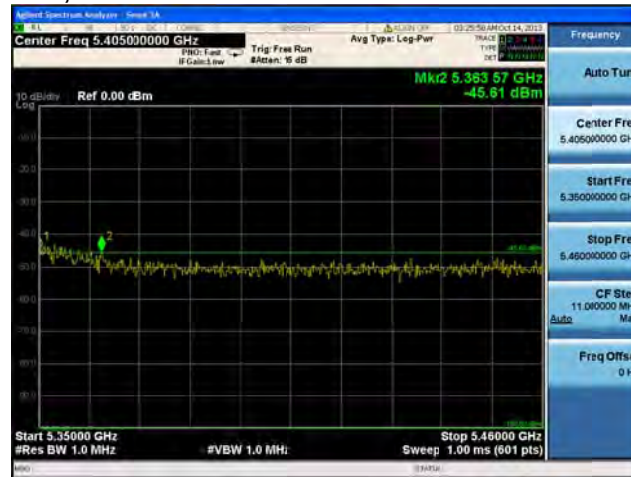
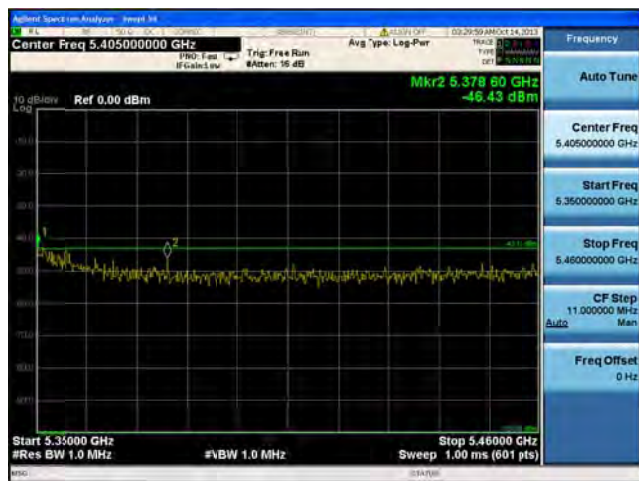
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C**

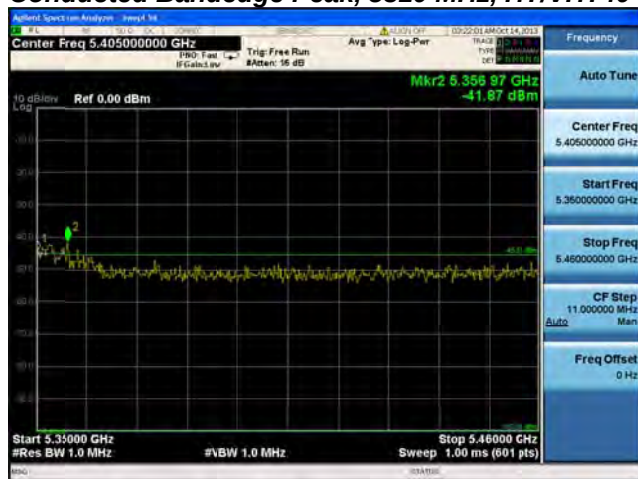
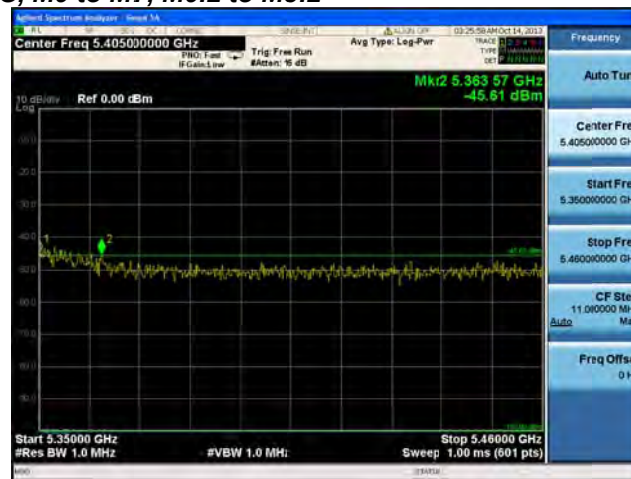
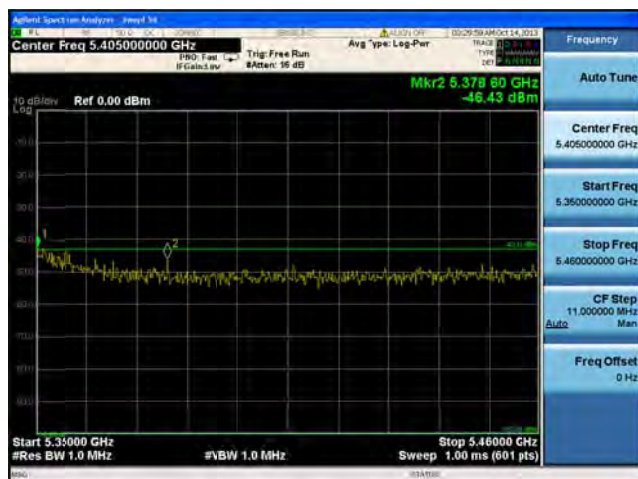
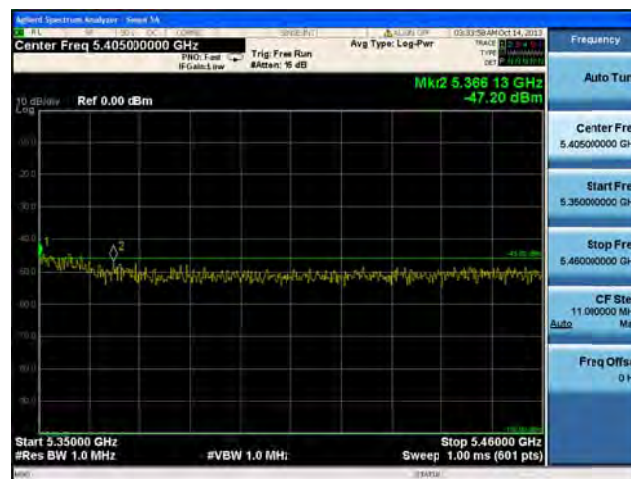
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C****Antenna D**

**Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M8 to M15, M0.2 to M9.2****Antenna A****Antenna B****Antenna C****Antenna D**

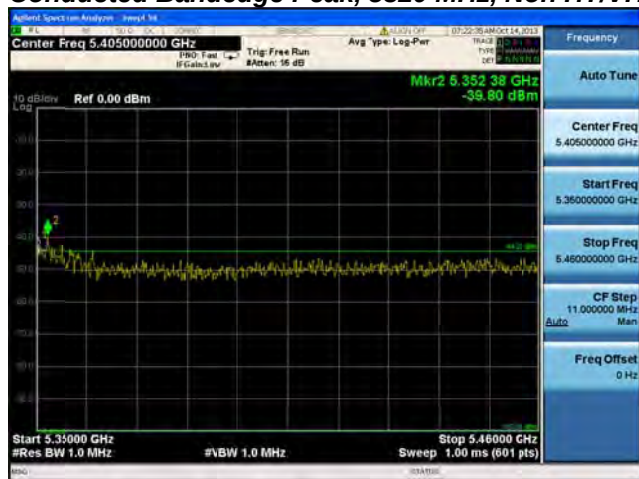
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 Beam Forming, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C****Antenna D**

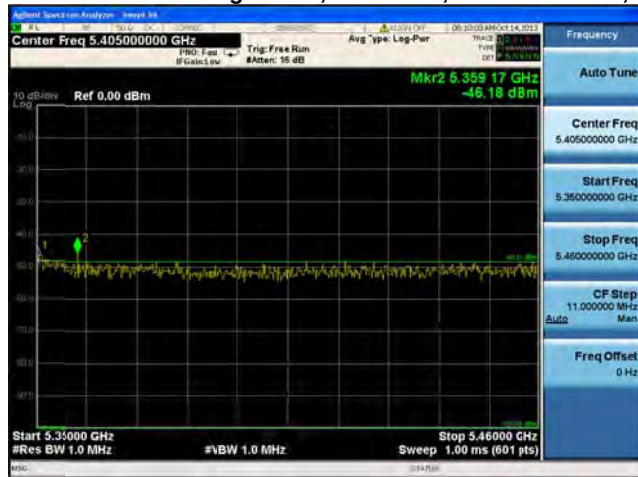
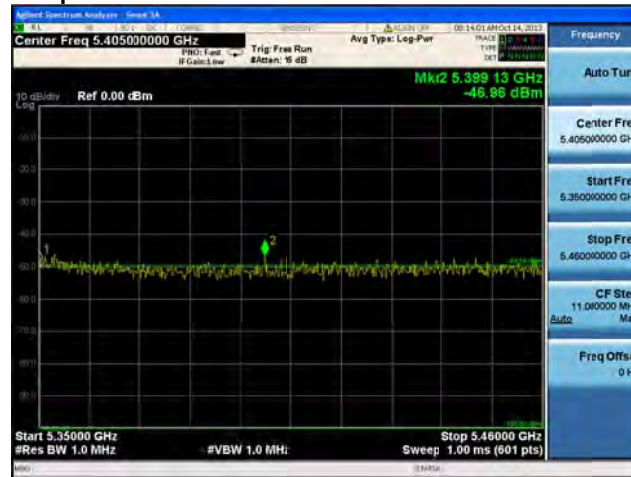
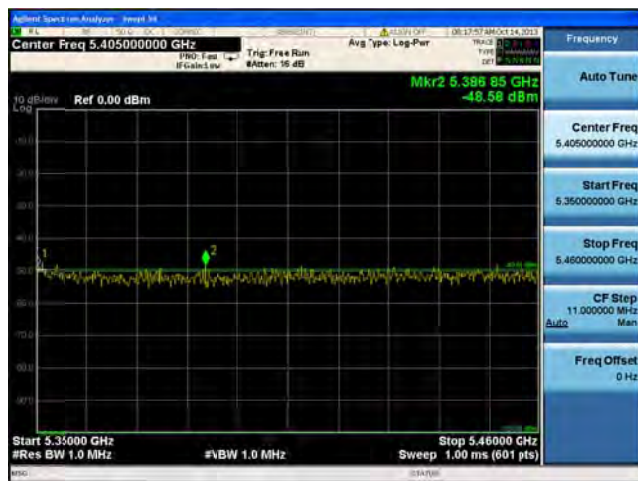
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

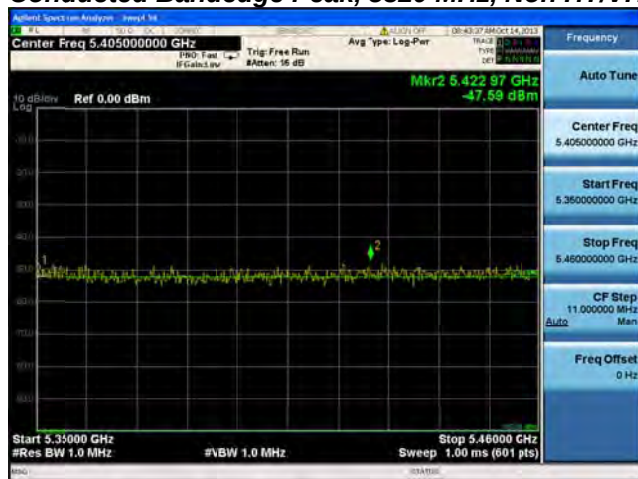
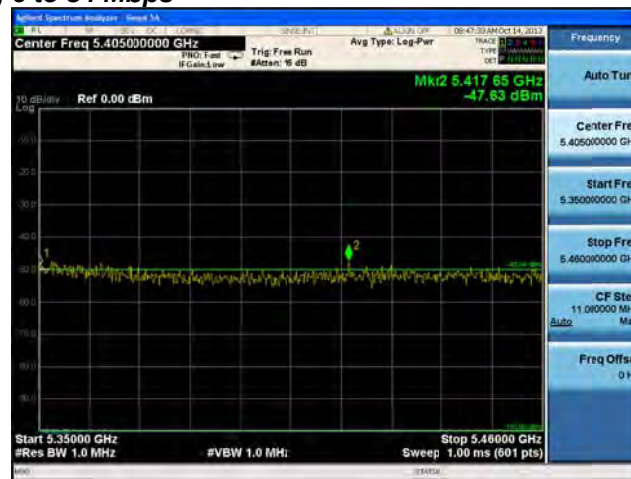
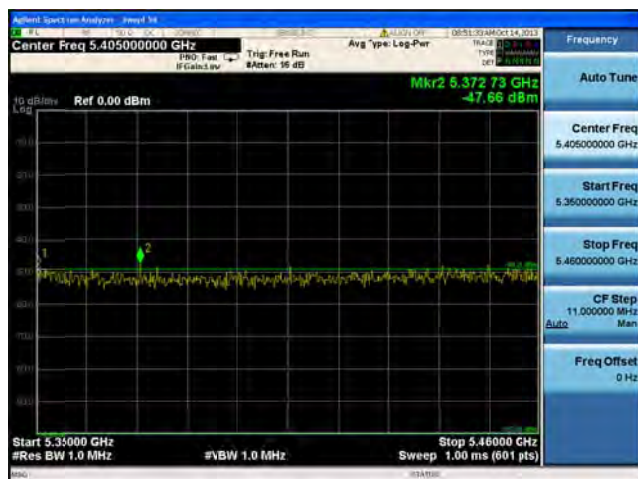
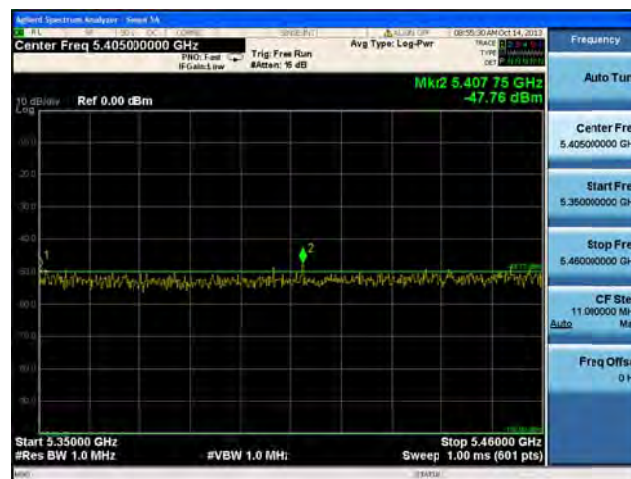
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

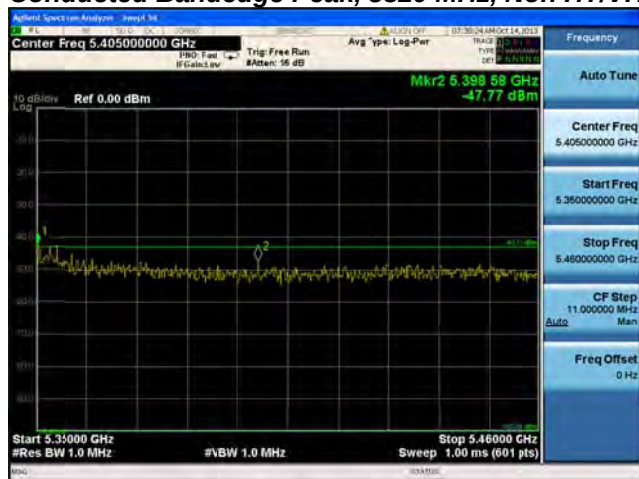
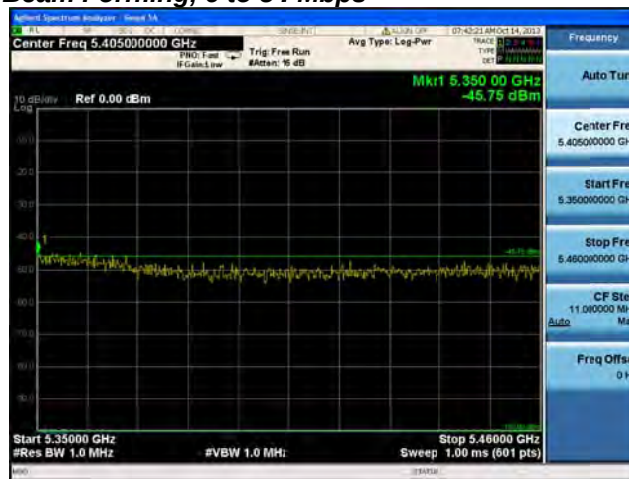
Conducted Bandedge Peak, 5310 MHz, HT/VHT40 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C****Antenna D**

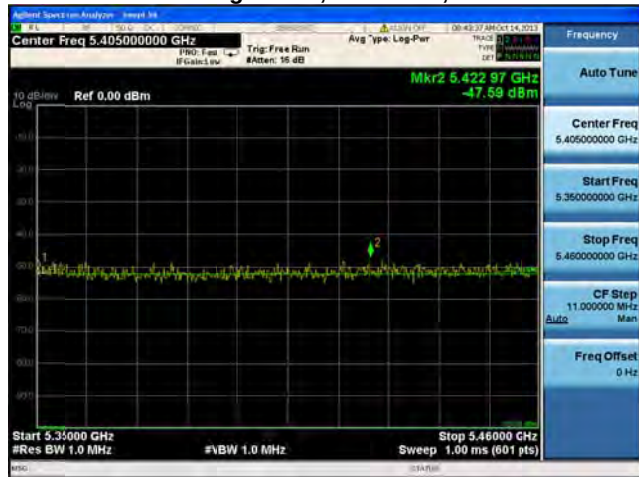
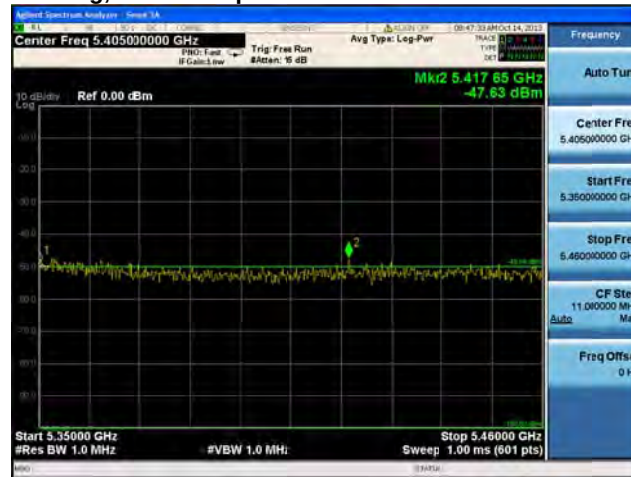
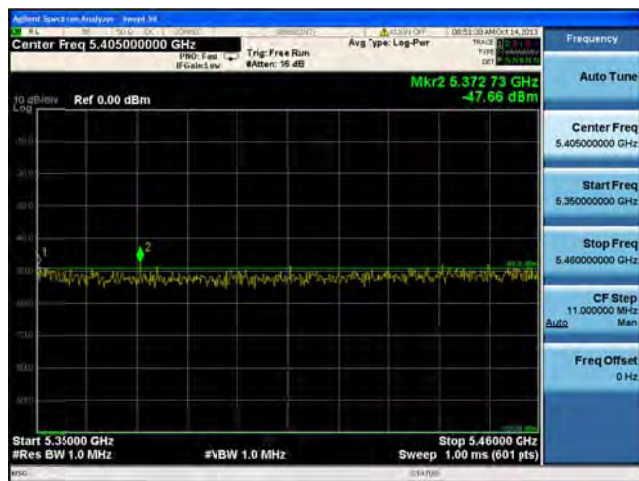
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20, 6 to 54 Mbps**Antenna A**

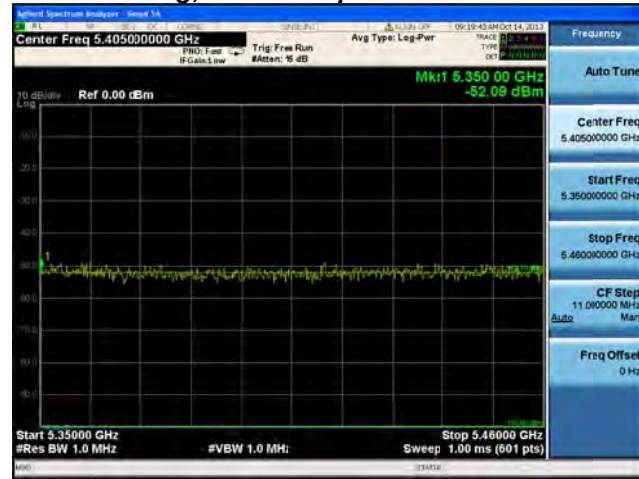
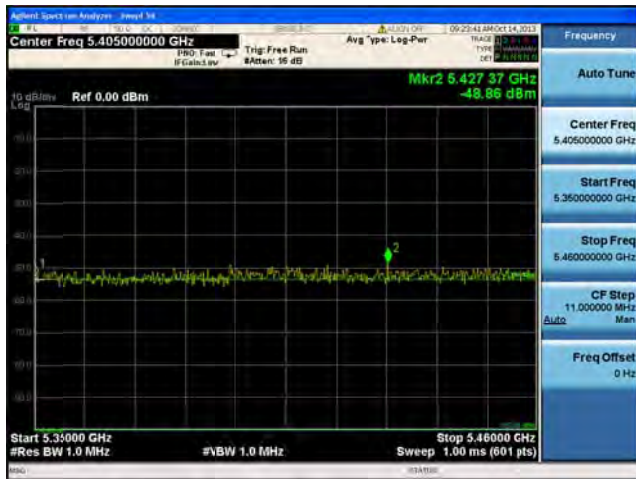
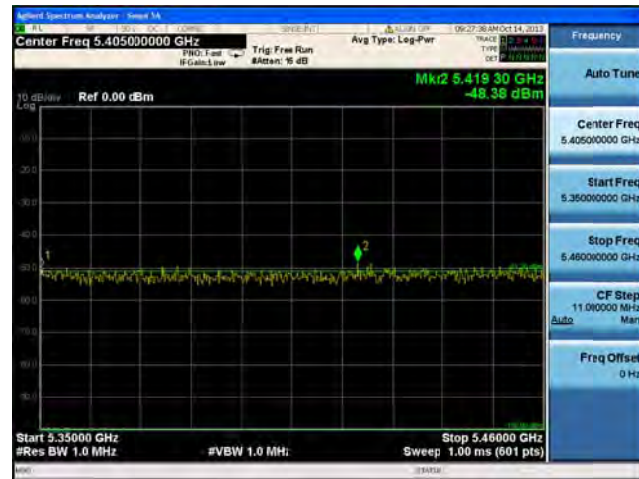
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20, 6 to 54 Mbps**Antenna A****Antenna B**

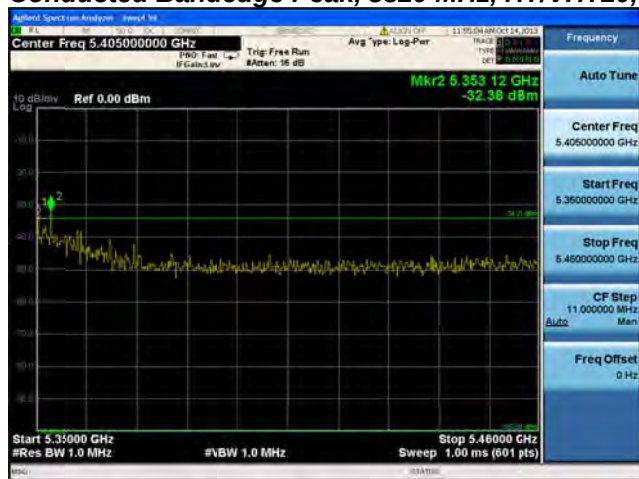
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20, 6 to 54 Mbps**Antenna A****Antenna B****Antenna C**

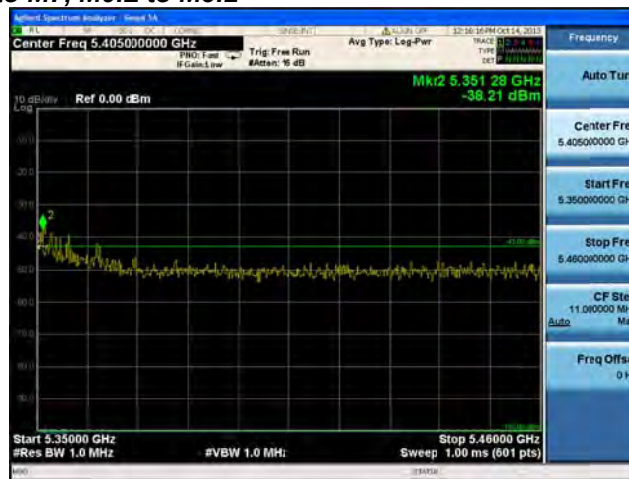
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20, 6 to 54 Mbps**Antenna A****Antenna B****Antenna C****Antenna D**

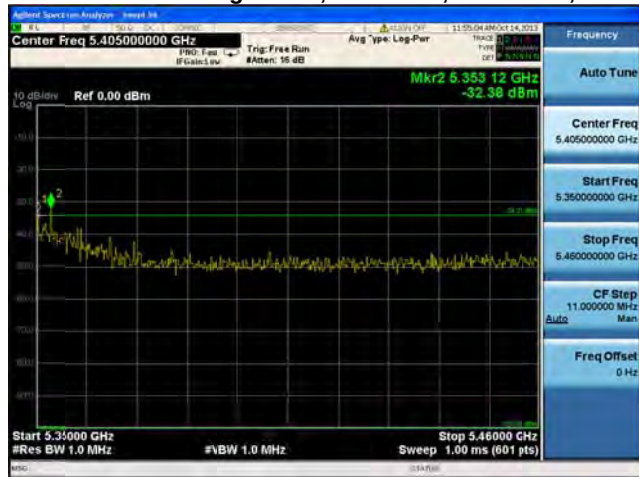
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps**Antenna A****Antenna B**

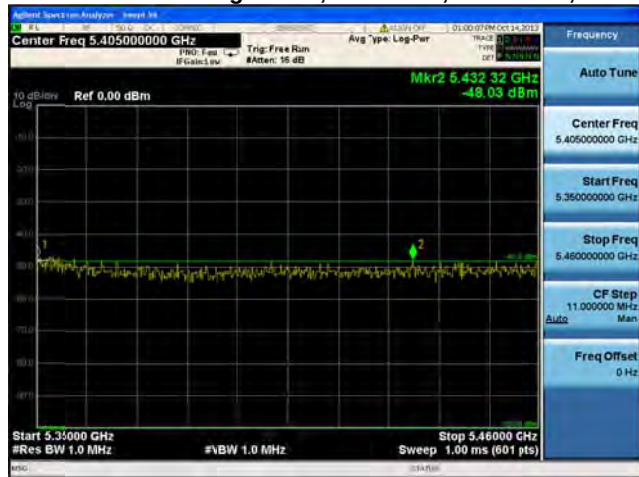
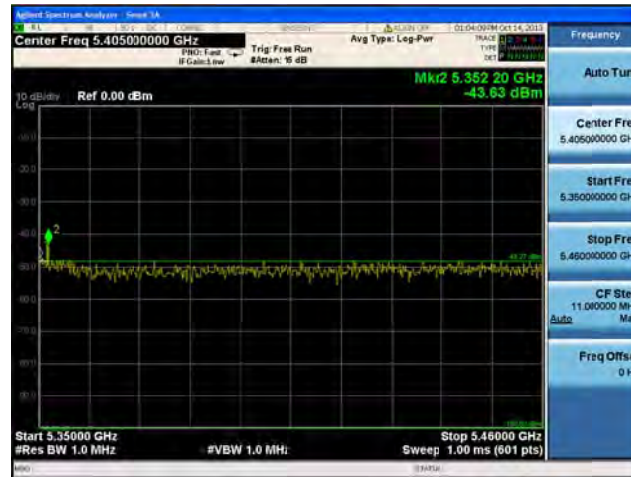
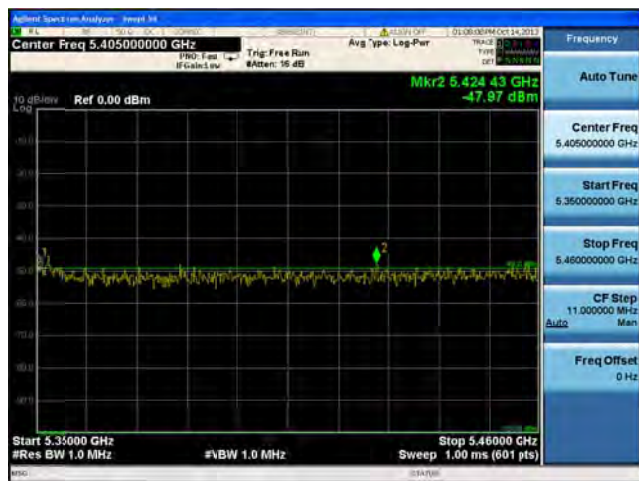
Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps**Antenna A****Antenna B****Antenna C**

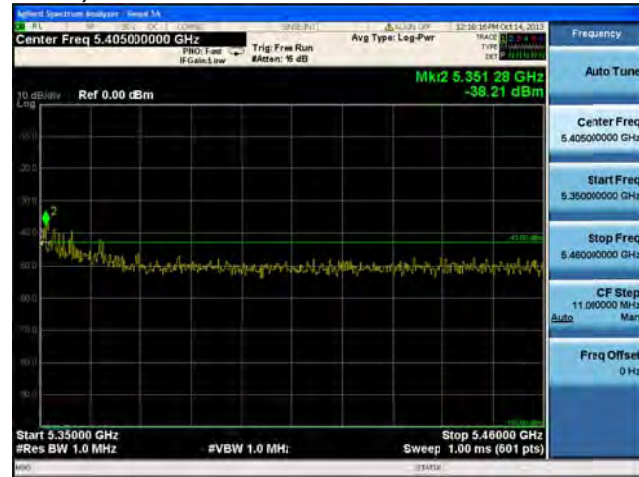
**Conducted Bandedge Peak, 5320 MHz, Non HT/VHT20 Beam Forming, 6 to 54 Mbps****Antenna A****Antenna B****Antenna C****Antenna D**

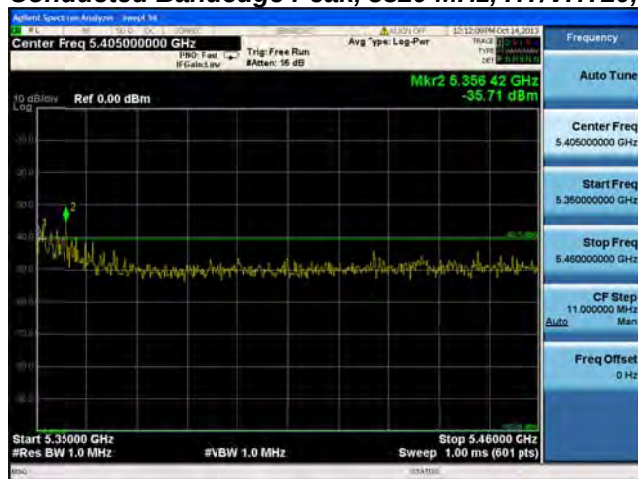
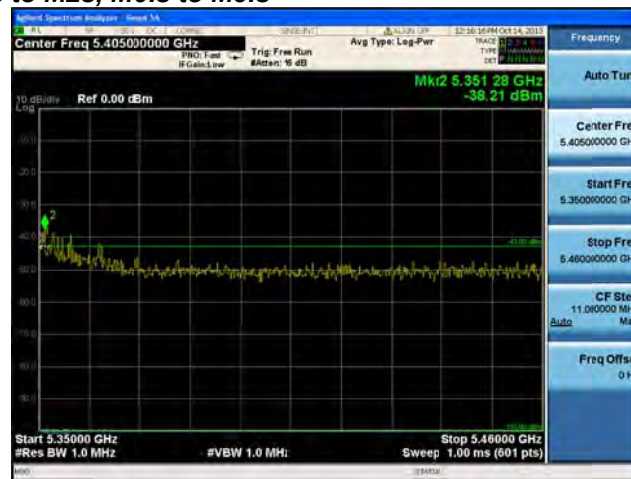
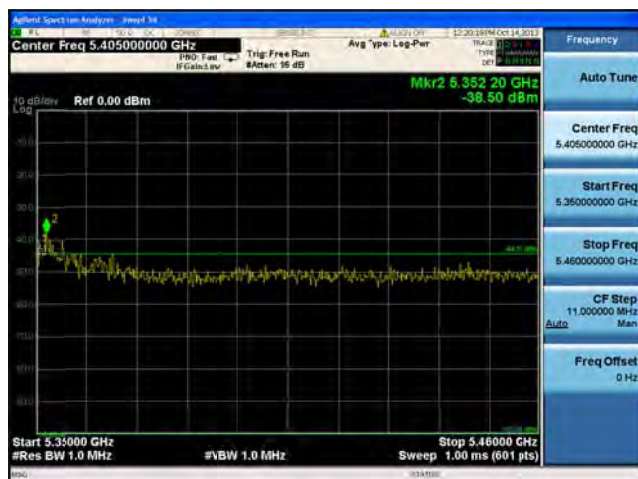
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1**Antenna A**

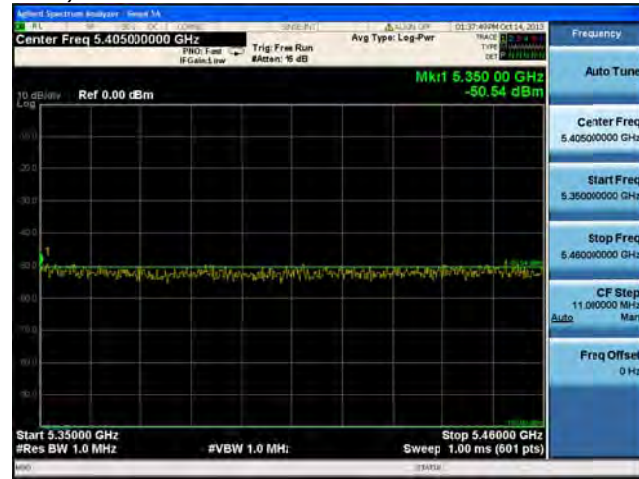
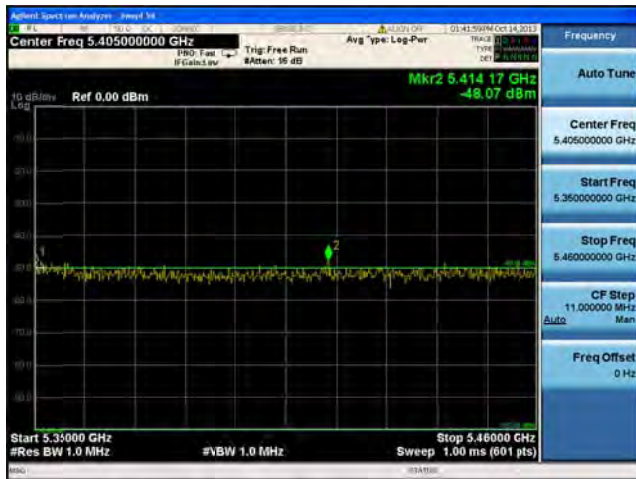
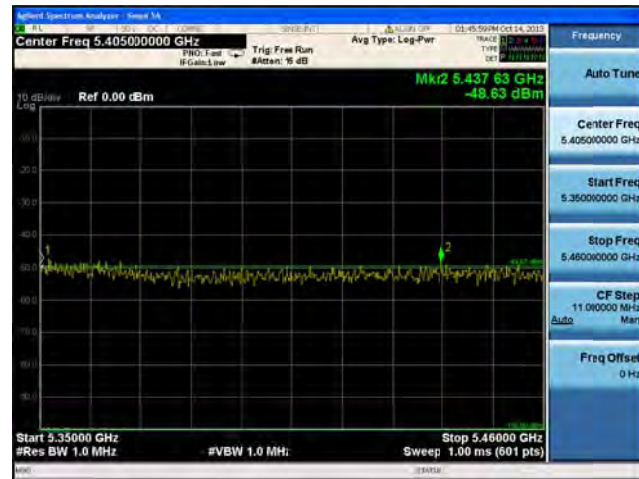
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

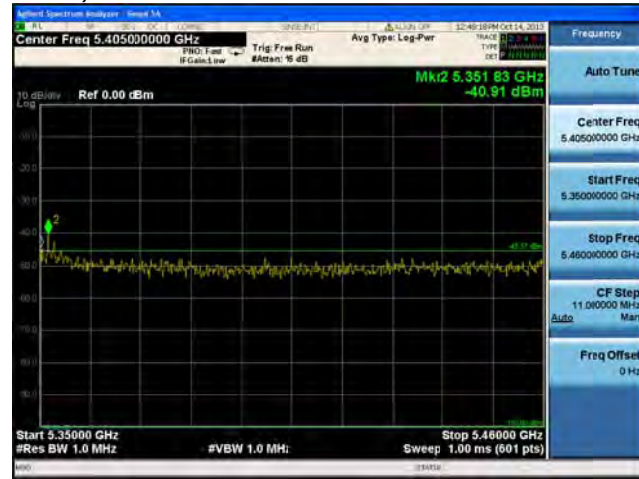
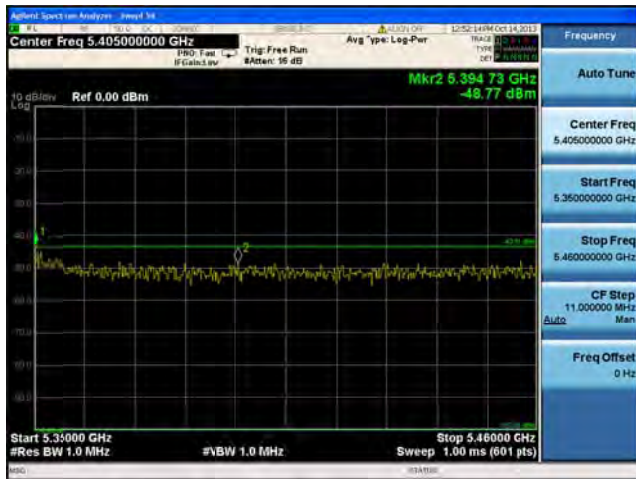
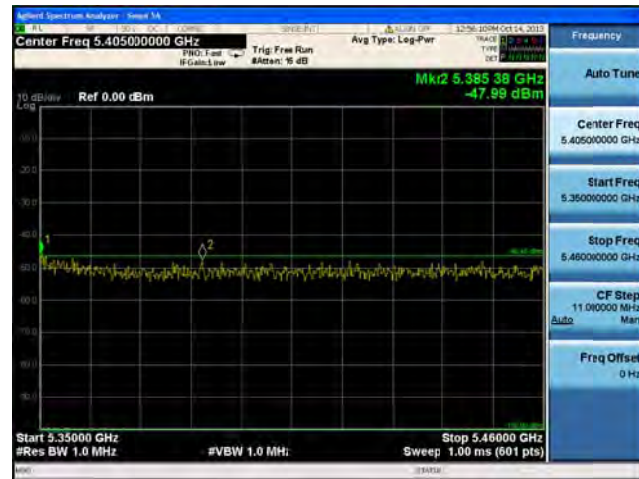
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B**

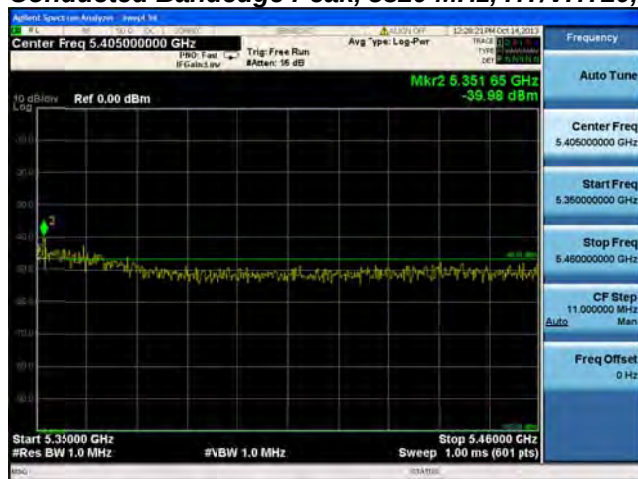
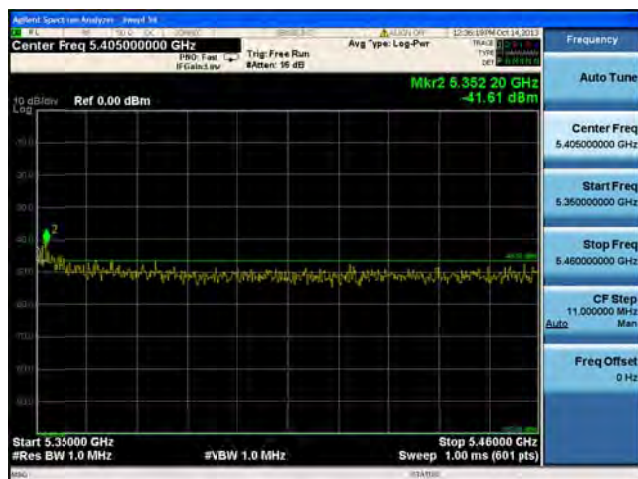
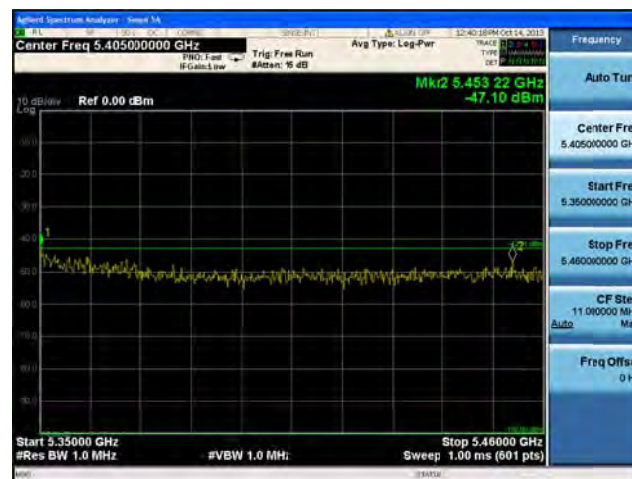
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

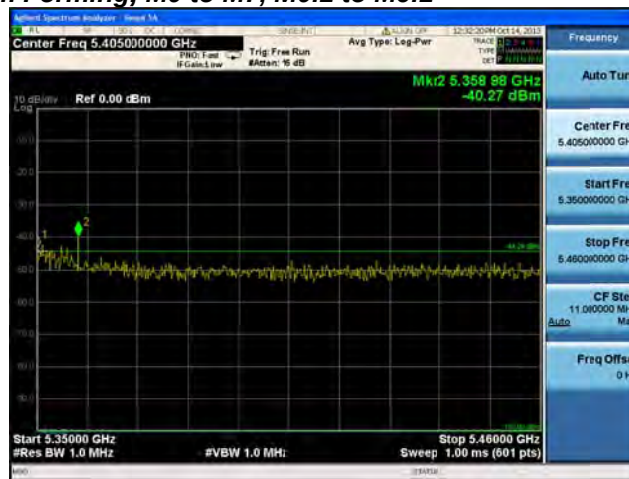
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C**

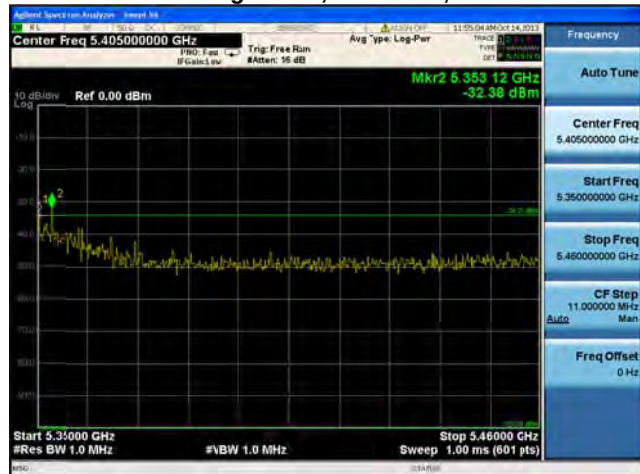
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C**

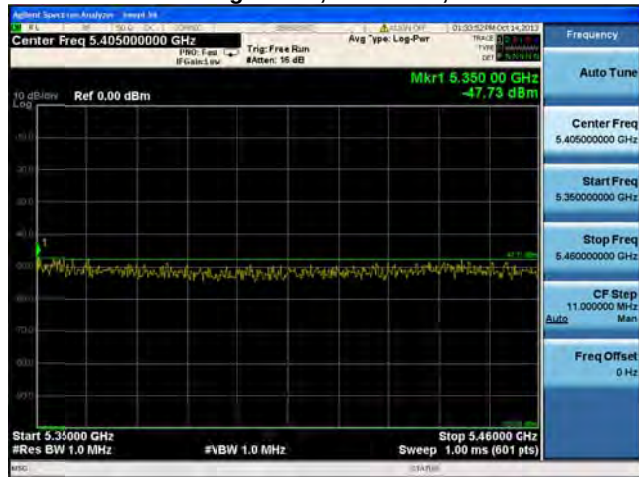
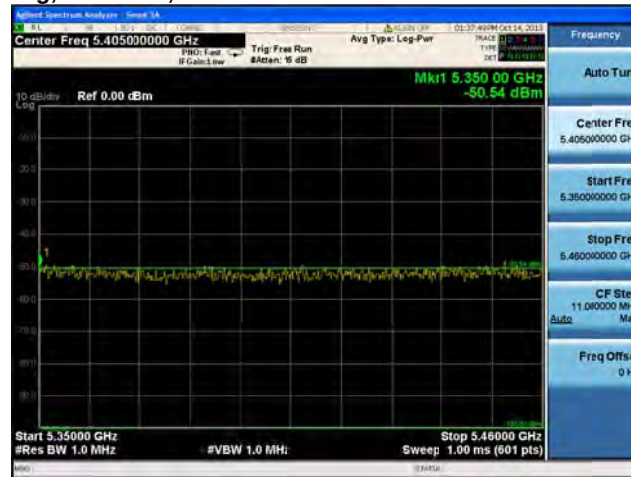
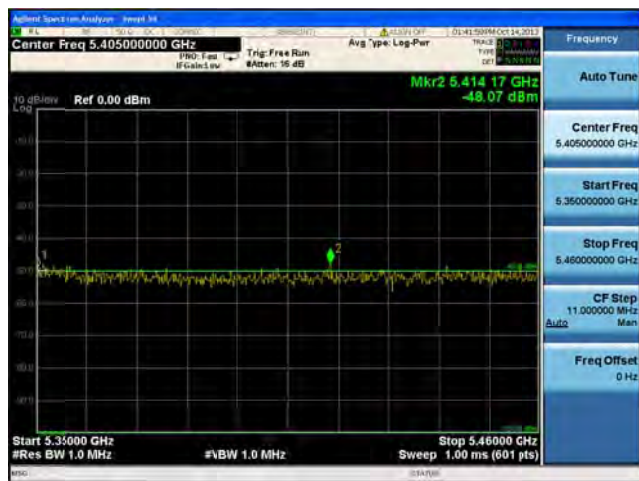
**Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M0 to M7, M0.1 to M9.1****Antenna A****Antenna B****Antenna C****Antenna D**

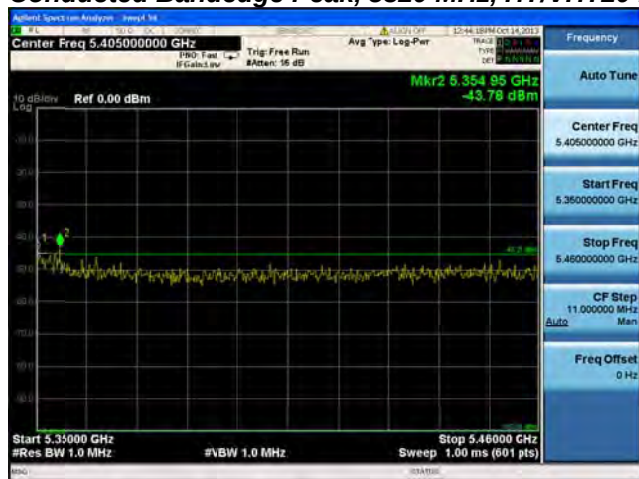
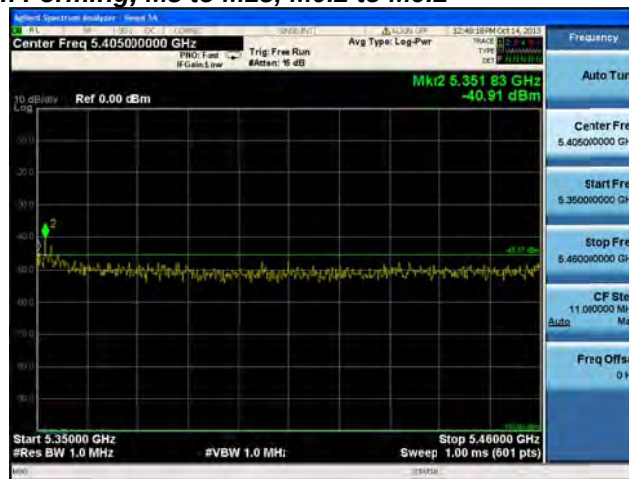
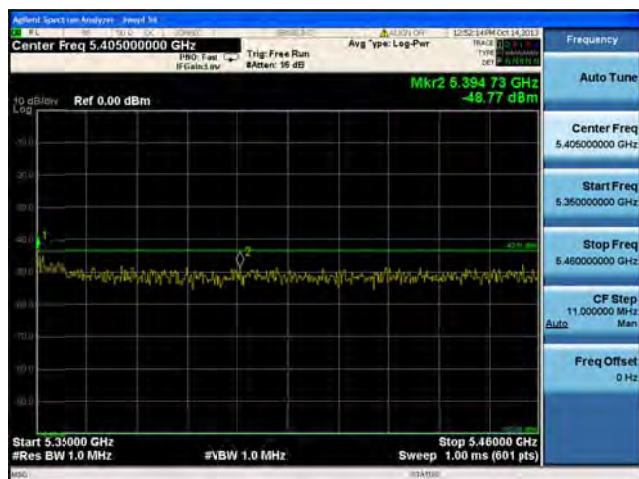
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C****Antenna D**

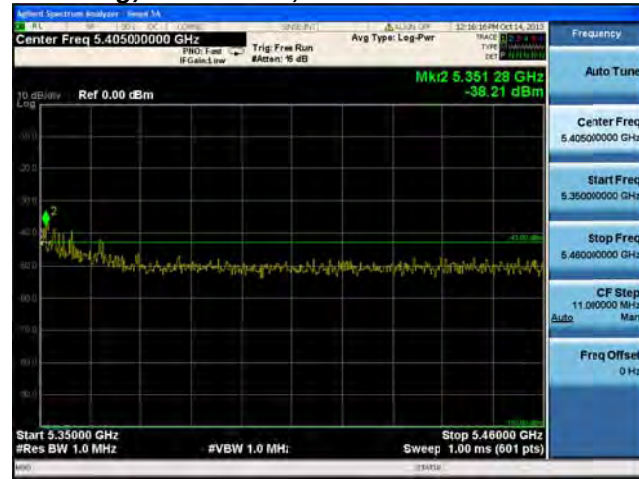
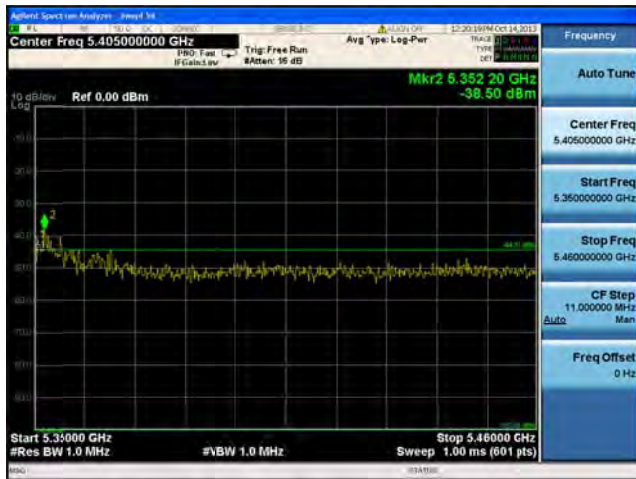
Conducted Bandedge Peak, 5320 MHz, HT/VHT20, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C****Antenna D**

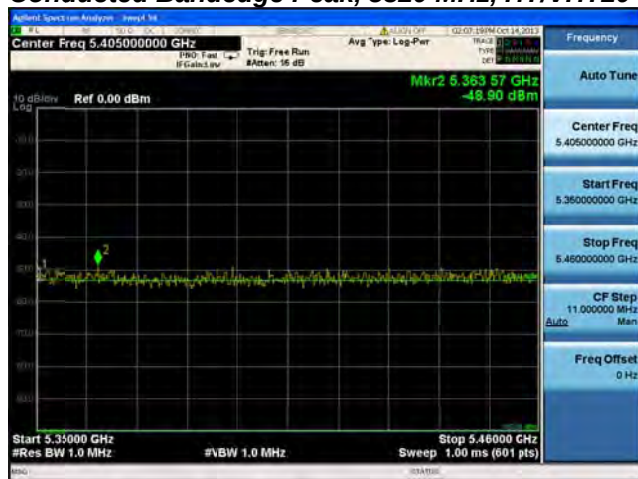
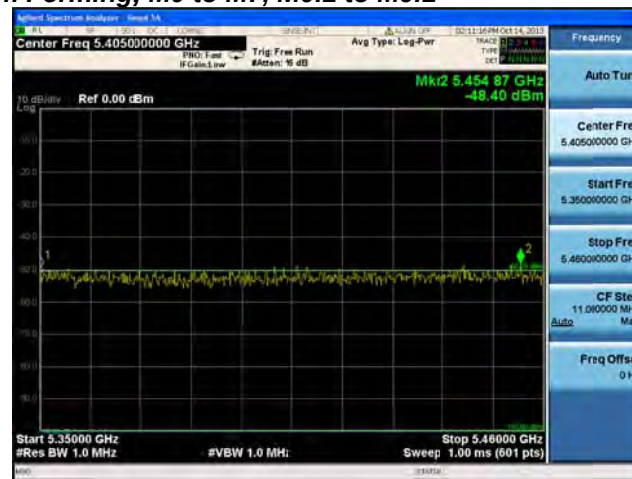
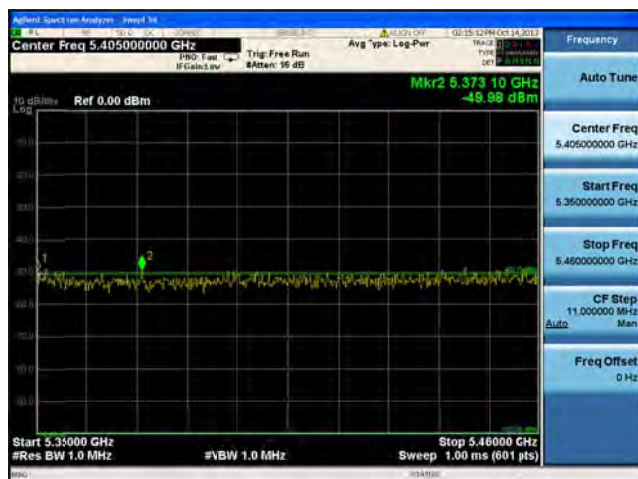
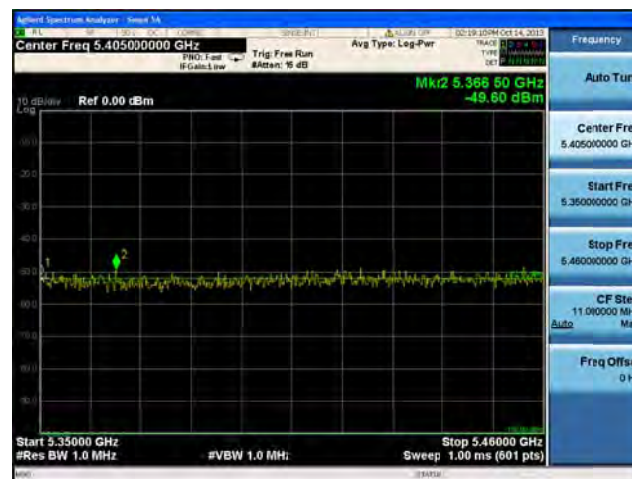
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

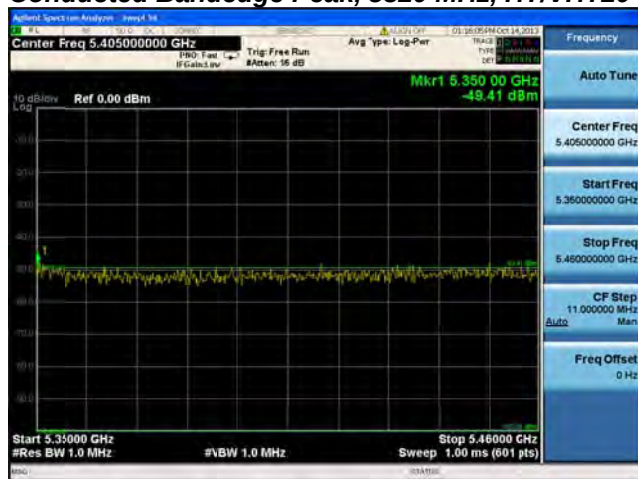
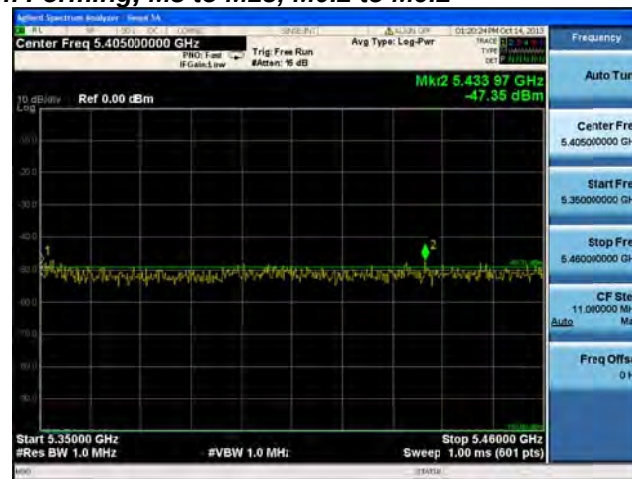
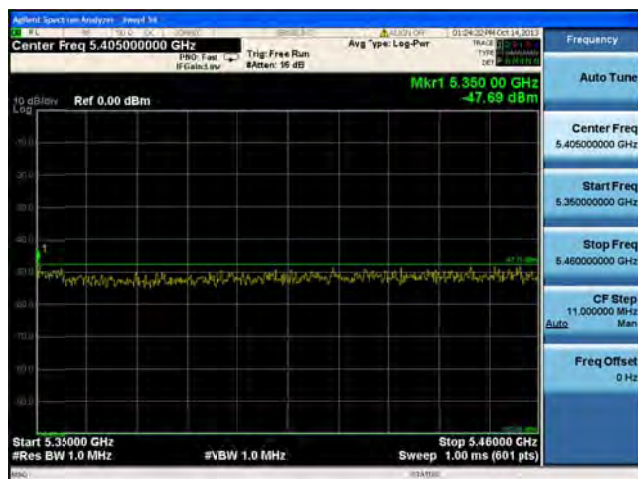
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B**

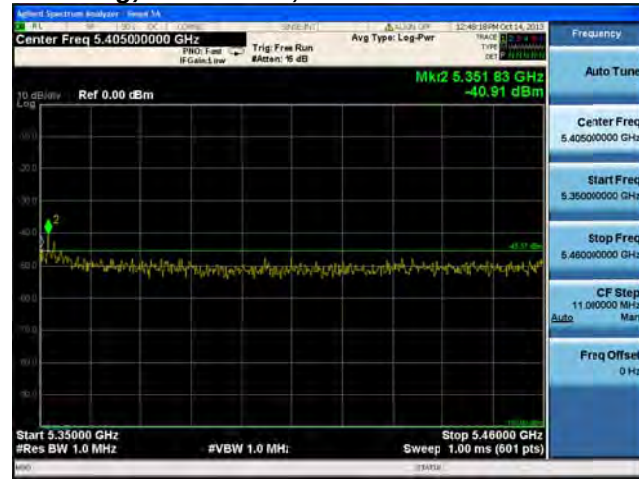
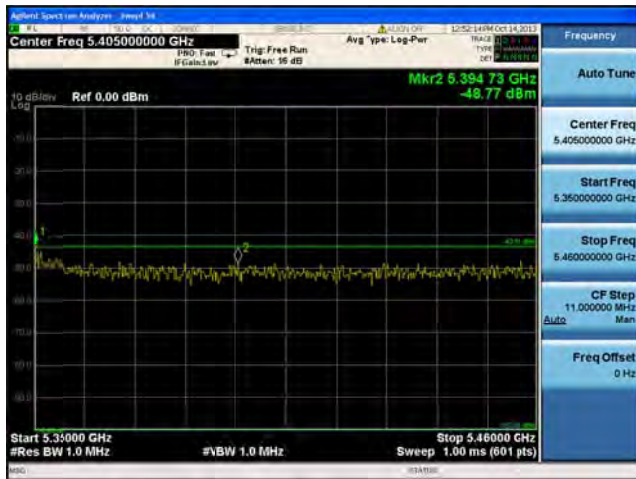
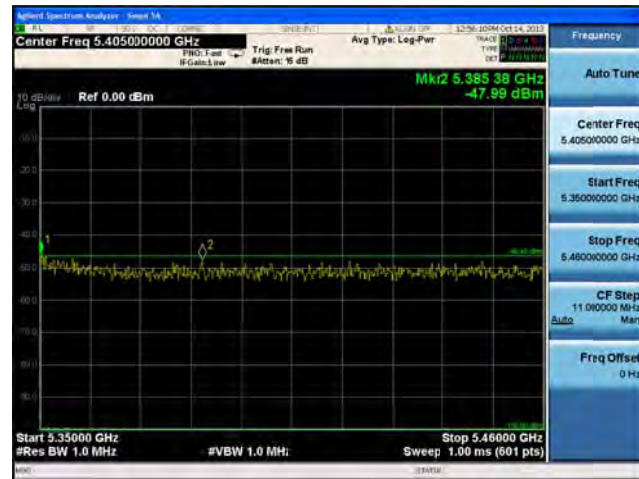
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

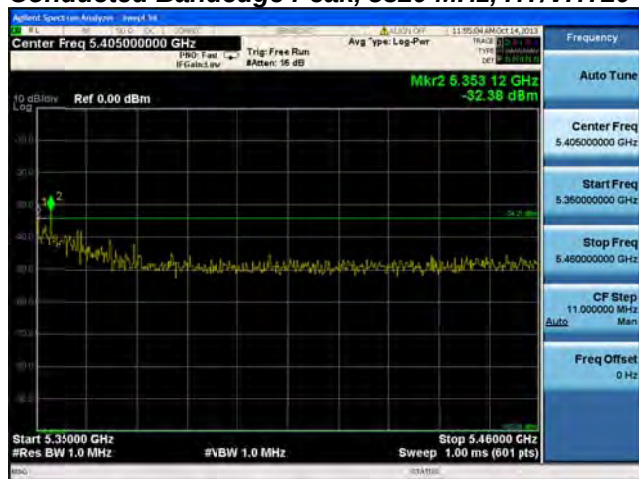
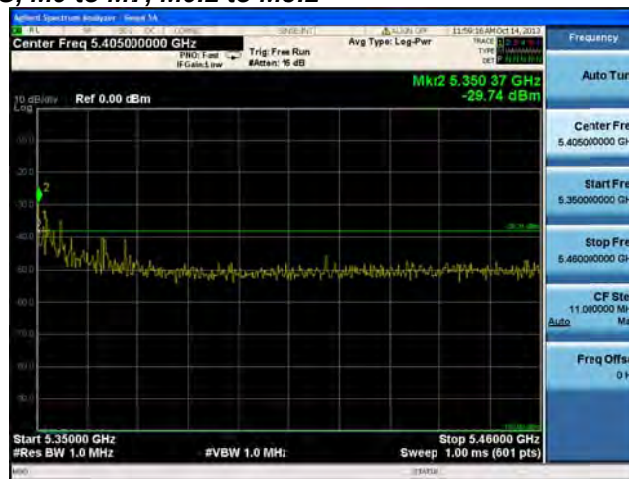
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C**

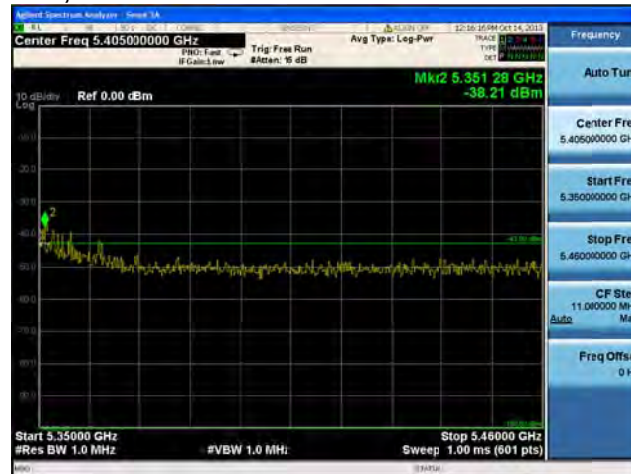
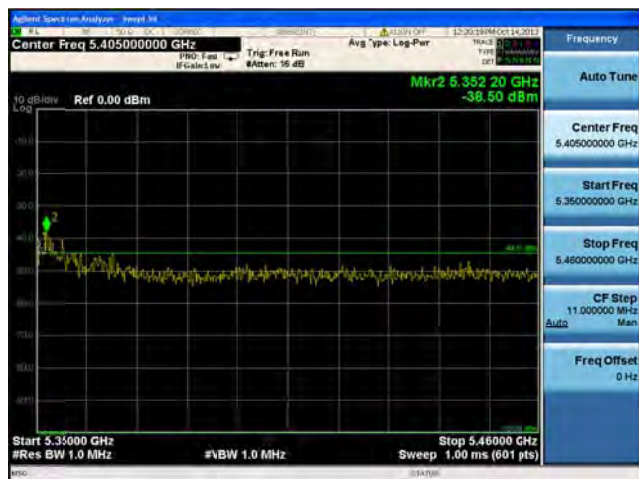
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3**Antenna A****Antenna B****Antenna C**

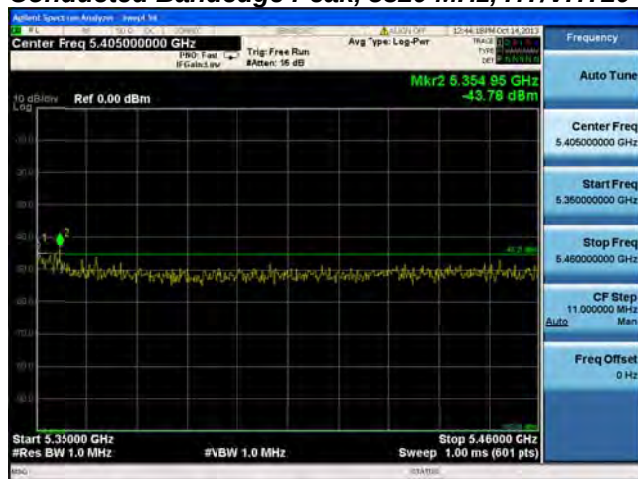
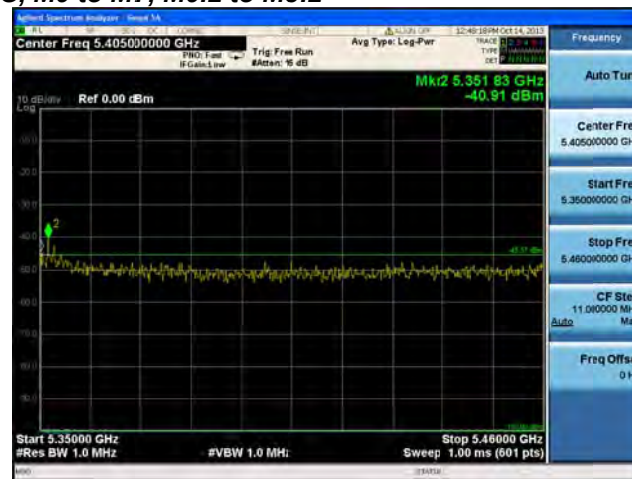
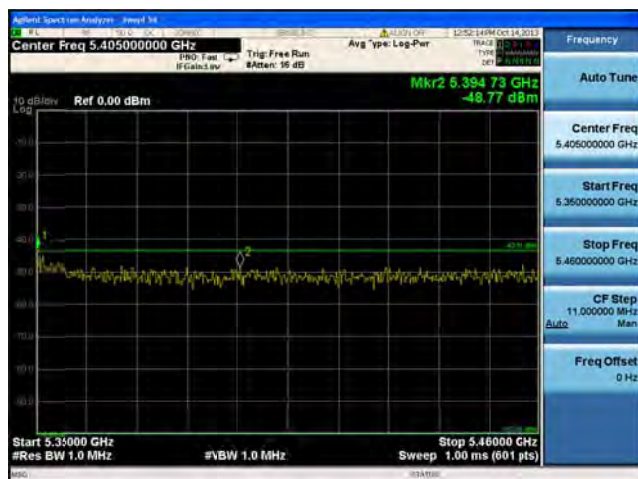
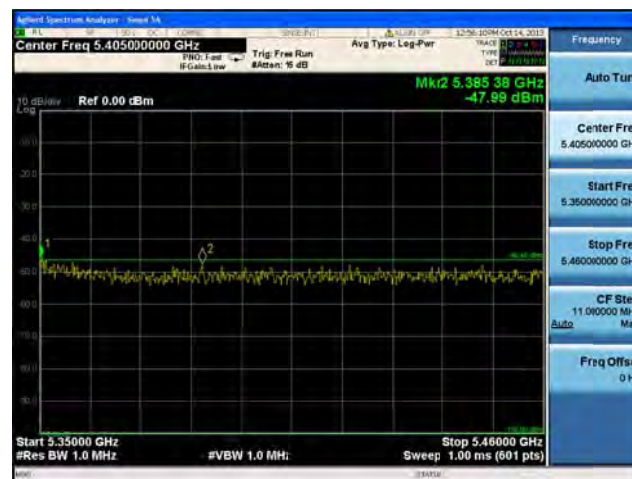
Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C****Antenna D**

Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M8 to M15, M0.2 to M9.2**Antenna A****Antenna B****Antenna C****Antenna D**

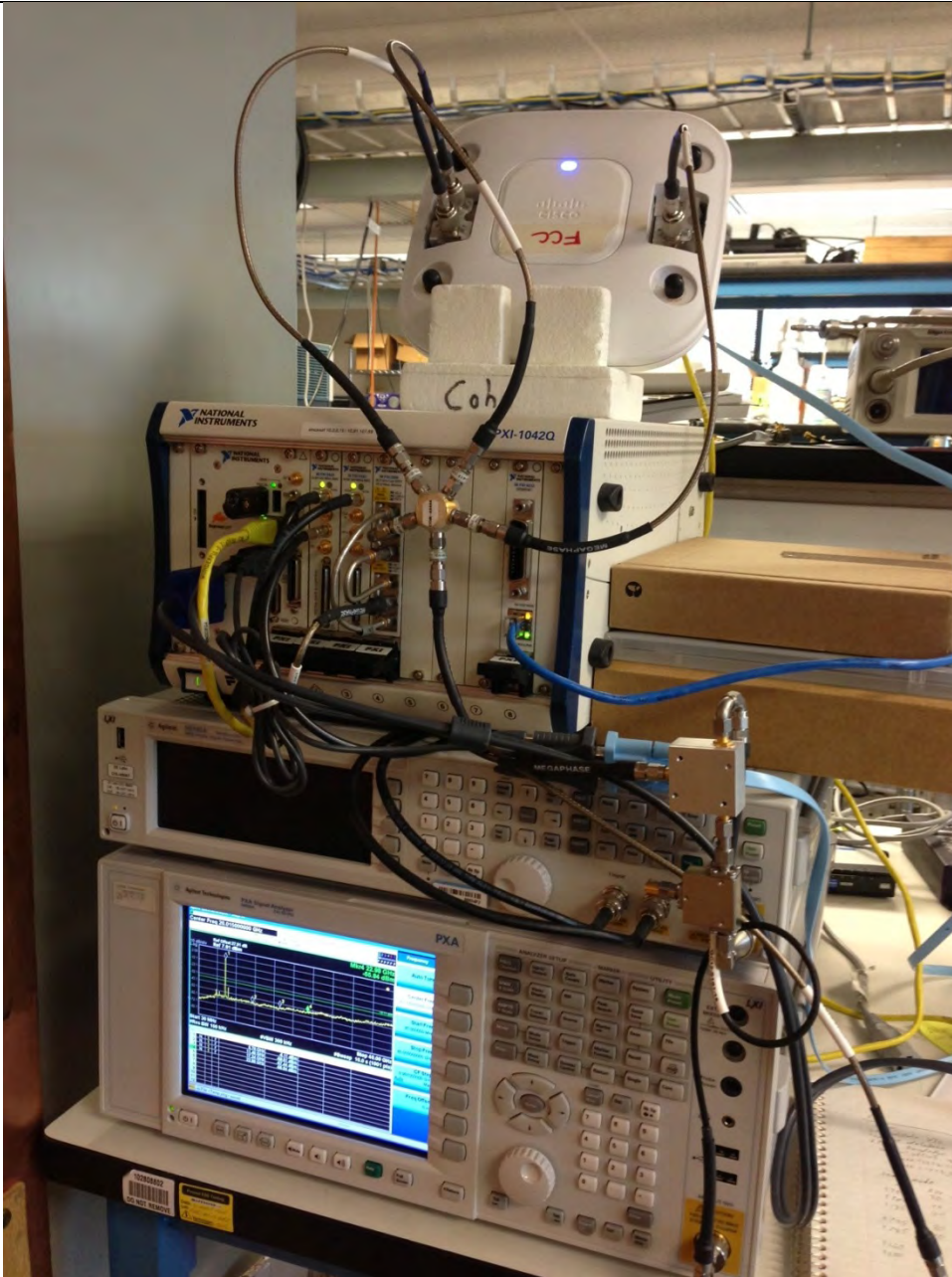
**Conducted Bandedge Peak, 5320 MHz, HT/VHT20 Beam Forming, M16 to M23, M0.3 to M9.3****Antenna A****Antenna B****Antenna C****Antenna D**

Conducted Bandedge Peak, 5320 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B**

Conducted Bandedge Peak, 5320 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C**

Conducted Bandedge Peak, 5320 MHz, HT/VHT20 STBC, M0 to M7, M0.1 to M9.1**Antenna A****Antenna B****Antenna C****Antenna D**

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Title: Conducted Test Setup



Appendix B: Emission Test Results

Testing Laboratory: Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134, USA

Radiated Spurious Emissions

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Using Vasona, configure the spectrum analyzer as shown below (be sure to enter all losses between the transmitter output and the spectrum analyzer). Place the radio in continuous transmit mode.

Span:	1GHz – 18 GHz
Reference Level:	80 dBuV
Attenuation:	10 dB
Sweep Time:	Coupled
Resolution Bandwidth:	1MHz
Video Bandwidth:	1 MHz for peak, 10 Hz for average
Detector:	Peak

Maximize Turntable (find worst case table angle), Maximize Antenna (find worst case height)

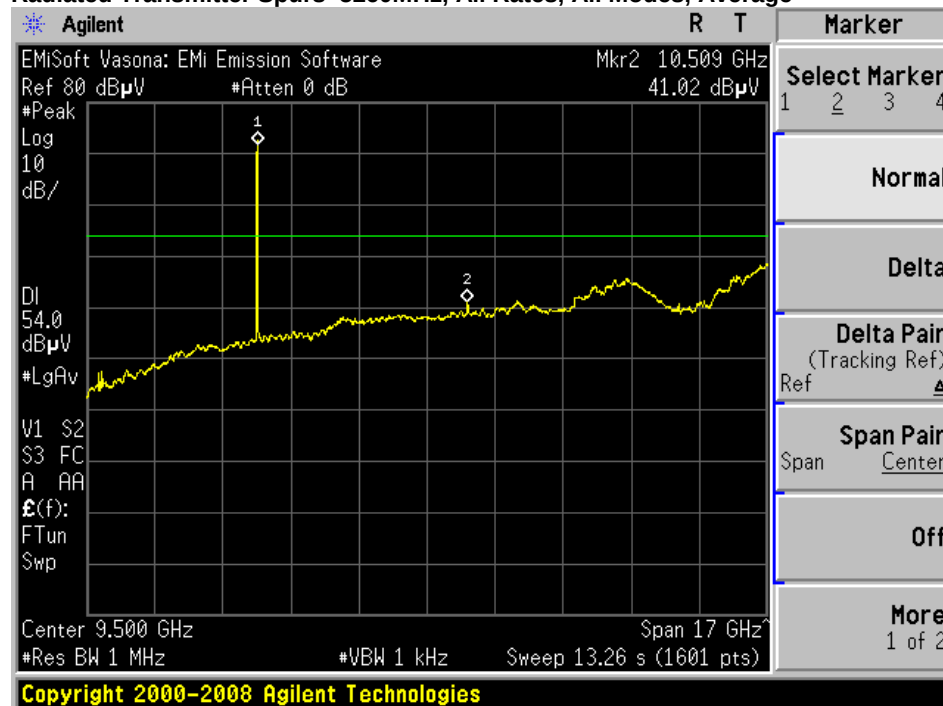
Save 2 plots: 1) Average Plot (Vertical and Horizontal), Limit= 54dBuV @3m
 2) Peak plot (Vertical and Horizontal), Limit = 74dBuV @3m

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance.
Also measure any emissions in the restricted bands.

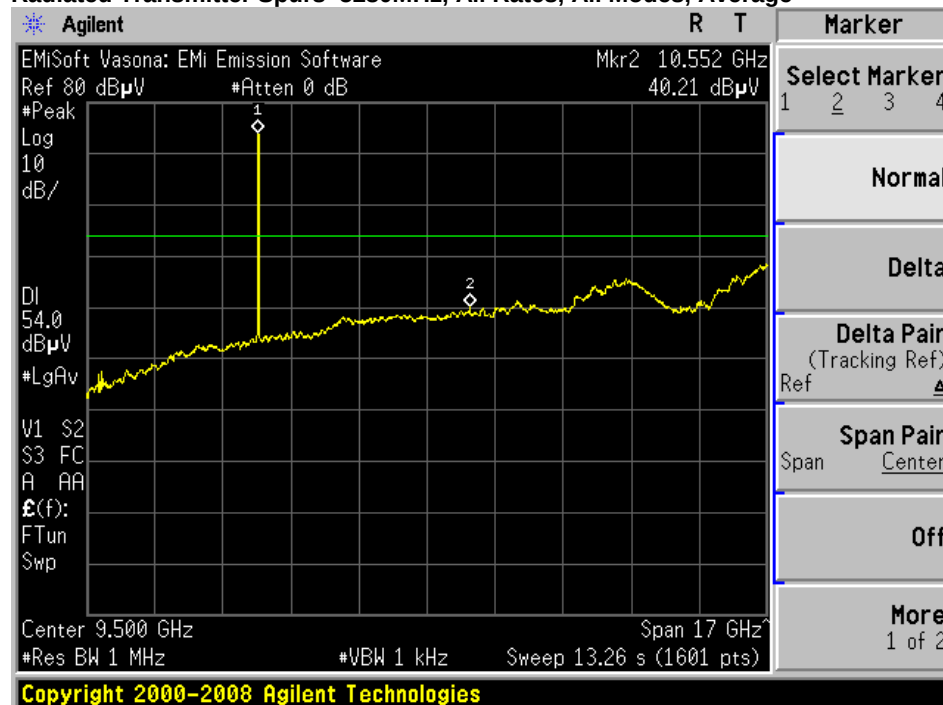
This report represents the worst case data for all supported operating modes and antennas.
There are no measurable emissions above 18 GHz.

Transmitter Radiated Spurious Emissions

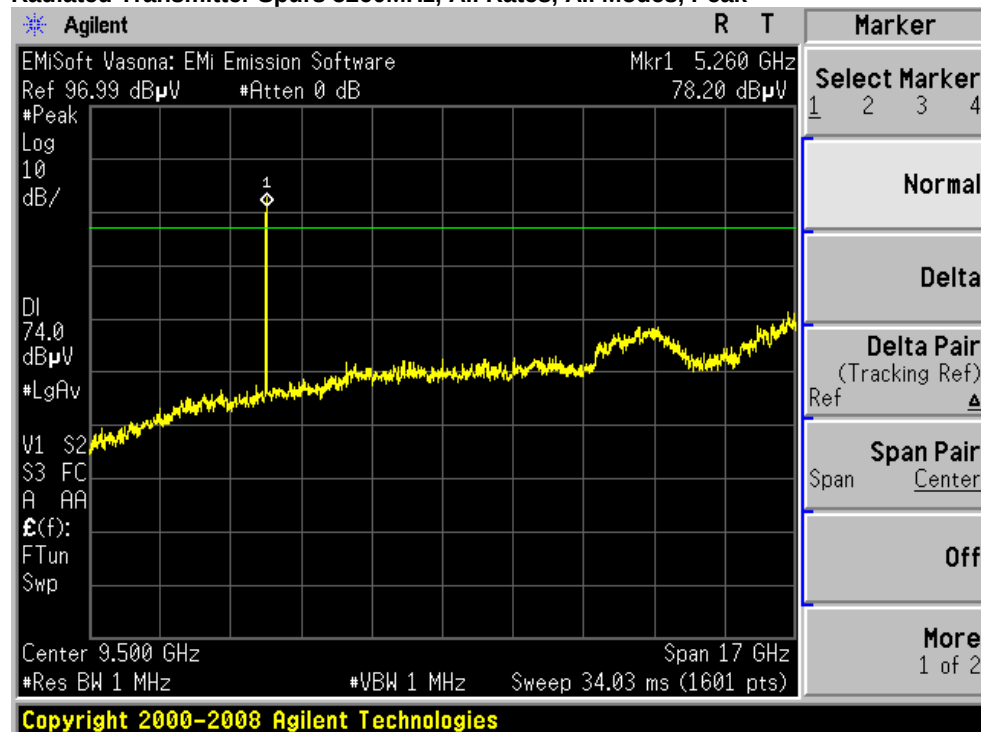
Radiated Transmitter Spurs 5260MHz, All Rates, All Modes, Average



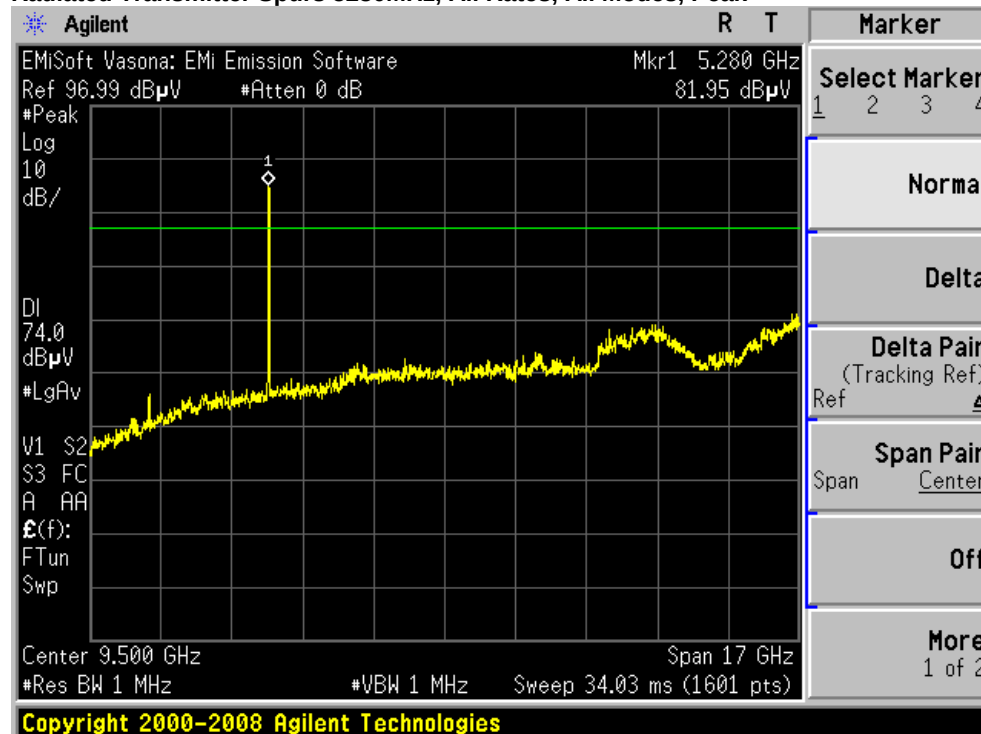
Radiated Transmitter Spurs 5280MHz, All Rates, All Modes, Average



Radiated Transmitter Spurs 5260MHz, All Rates, All Modes, Peak



Radiated Transmitter Spurs 5280MHz, All Rates, All Modes, Peak



Receiver Radiated Spurious Emissions

Radiated Receiver Spurs, All Rates, All Modes, Average

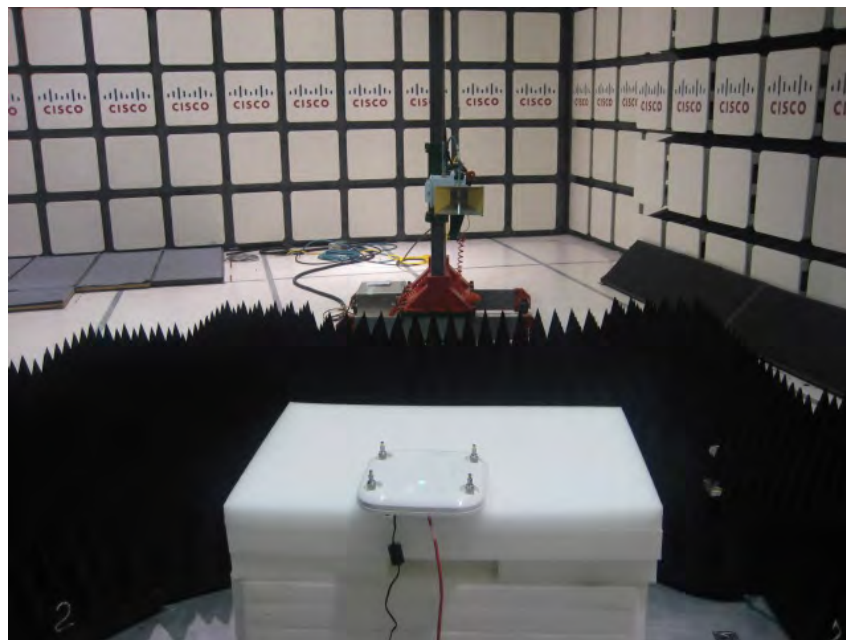


Radiated Receiver Spurs, All Rates, All Modes, Peak



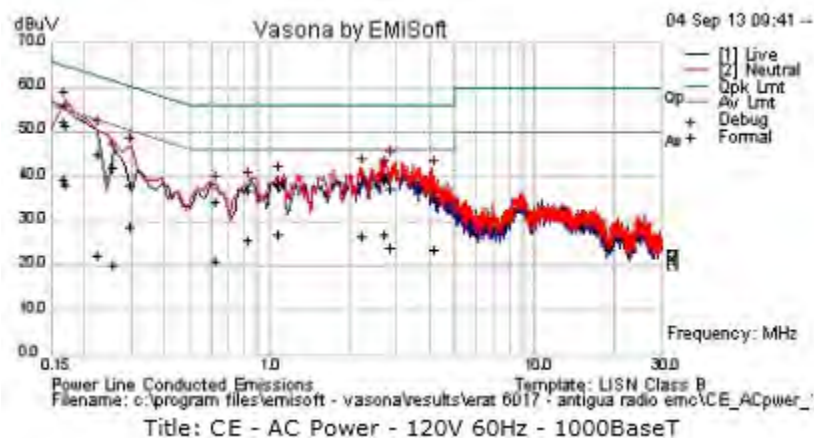


Test Setup for Conducted Measurements



Test Setup for Radiated Measurements

Conducted Emissions



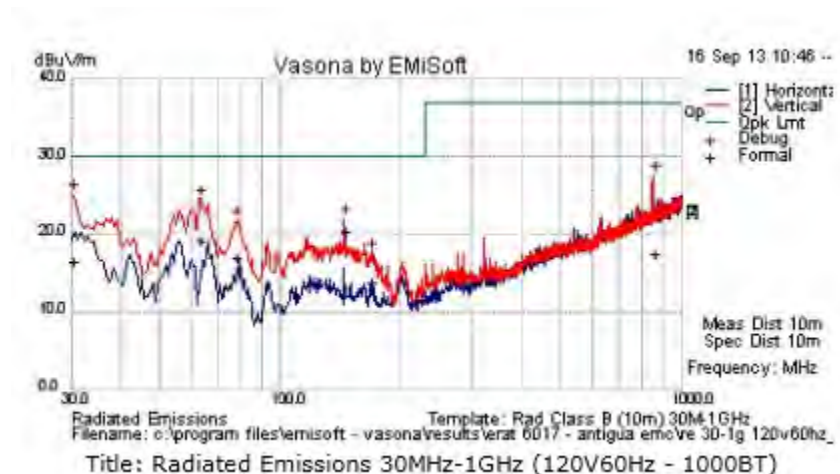
Test Result Table

Frequency MHz	Raw dBuV	Cable Loss	Factors dB	Level dBuV	Measurement Type	Line	Limit dBuV	Margin dB	Pass /Fail	Comments
0.168	29.9	21.2	0.2	51.3	Qp	L	65.1	-13.7	Pass	
0.256	21.3	20.7	0.1	42.1	Qp	L	61.6	-19.5	Pass	
0.222	23.9	20.9	0.1	44.9	Qp	L	62.7	-17.9	Pass	
2.695	19	20	0	39	Qp	L	56	-17	Pass	
0.826	16.7	20	0	36.7	Qp	L	56	-19.3	Pass	
0.618	14.2	20	0	34.3	Qp	L	56	-21.7	Pass	
0.293	17.7	20.6	0	38.3	Qp	N	60.4	-22.1	Pass	
1.07	18.4	20	0	38.4	Qp	N	56	-17.6	Pass	
2.834	17.2	20	0	37.2	Qp	N	56	-18.8	Pass	
0.166	30.8	21.3	0.2	52.3	Qp	N	65.2	-12.9	Pass	
2.221	18.6	20	0	38.7	Qp	N	56	-17.3	Pass	
4.111	15.3	20	0	35.4	Qp	N	56	-20.6	Pass	
0.168	17	21.2	0.2	38.4	Av	L	55.1	-16.7	Pass	
0.256	-0.4	20.7	0.1	20.4	Av	L	51.6	-31.2	Pass	
0.222	1.4	20.9	0.1	22.4	Av	L	52.7	-30.3	Pass	
2.695	7	20	0	27.1	Av	L	46	-18.9	Pass	
0.826	5.5	20	0	25.6	Av	L	46	-20.4	Pass	
0.618	0.9	20	0	21	Av	L	46	-25	Pass	
0.293	8	20.6	0	28.6	Av	N	50.4	-21.8	Pass	
1.07	7	20	0	27	Av	N	46	-19	Pass	
2.834	4	20	0	24	Av	N	46	-22	Pass	
0.166	18.2	21.3	0.2	39.6	Av	N	55.2	-15.5	Pass	
2.221	6.5	20	0	26.5	Av	N	46	-19.5	Pass	
4.111	3.5	20	0	23.6	Av	N	46	-22.4	Pass	



Test Setup for Conducted Measurements

Radiated emissions



Test Result Table

Frequency MHz	Raw dBuV	Cable Loss	AF dB	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass /Fail	Comments
30.449	22.5	0.7	-6.8	16.3	Qp	V	149	290	30	-13.7	Pass	
63.207	38.4	1	-20.2	19.2	Qp	V	197	87	30	-10.8	Pass	
144.011	34	1.4	-14.9	20.5	Qp	V	119	255	30	-9.5	Pass	
77.91	35.5	1.1	-19.8	16.8	Qp	V	119	19	30	-13.2	Pass	
853.084	20.6	3.3	-6.4	17.5	Qp	V	274	6	37	-19.5	Pass	
168.944	27.9	1.5	-15.7	13.7	Qp	V	115	34	30	-16.3	Pass	



Maximum Permissible Exposure (MPE) Calculations

15.407: U-NII devices are subject to the radio frequency radiation exposure requirements specified in Sec. 1.1307(b), Sec. 2.1091 and Sec. 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Given

$$E = \sqrt{(30 \cdot P \cdot G)/d} \quad \text{and} \quad S = E^2/3770$$

where

E=Field Strength in Volts/meter

P=Power in Watts

G=Numerical Antenna Gain

d=Distance in meters

S=Power Density in mW/cm²

Combine equations and rearrange the terms to express the distance as a function of the remaining variables:

$$d = \sqrt{((30 \cdot P \cdot G)/(3770 \cdot S))}$$

Changing to units of power in mW and distance in cm, using:

$$P(\text{mW}) = P(\text{W})/1000 \quad d(\text{cm}) = 100 \cdot d(\text{m})$$

yields

$$d = 100 \cdot \sqrt{((30 \cdot (P/1000) \cdot G)/(3770 \cdot S))}$$

$$d = 0.282 \cdot \sqrt{(P \cdot G/S)}$$

where

d=Distance in cm

P=Power in mW

G=Numerical Antenna Gain

S=Power Density in mW/cm²

Substituting the logarithmic form of power and gain using:

$$P(\text{mW}) = 10^{(P(\text{dBm})/10)} \quad G(\text{numeric}) = 10^{(G(\text{dBi})/10)}$$

yields

$$d = 0.282 \cdot 10^{((P+G)/20)} / \sqrt{S} \quad \text{Equation (1)}$$

and

$$S = ((0.282 \cdot 10^{((P+G)/20)})/d)^2 \quad \text{Equation (2)}$$

where

d=MPE distance in cm

P=Power in dBm

G=Antenna Gain in dBi

S=Power Density in mW/cm²



Equation (1) and the measured peak power are used to calculate the MPE distance. Note that for mobile or fixed location transmitters such as an access point, the minimum separation distance is 20 cm even if the calculations indicate that the MPE distance may be less.

$S=1\text{mW/cm}^2$ maximum. The highest supported antenna gain is 6 dBi (9dBi with beamforming). Using the peak power levels recorded in the test report along with Equation 1 above, the MPE distances are calculated as follows.

MPE Calculations:

Frequency (MHz)	Power Density (mW/cm ²)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)	Limit (cm)	Margin (cm)
5260	1	19.7	6	5.44	20	14.56
5270	1	19.9	6	5.56	20	14.44

To maintain compliance, installations will assure a separation distance of at least 20cm.

Using Equation 2, the MPE levels (s) at 20 cm are calculated as follows:

Frequency (MHz)	MPE Distance (cm)	Peak Transmit Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Margin (mW/cm ²)
5260	20	19.7	6	0.07	1	0.93
5270	20	19.9	6	0.08	1	0.92

**Appendix C: Test Equipment/Software Used to perform the test**

Equip No	Manufacturer	Model	Description	Cal Due Date
30562	Micro-Coax	UFB311A-1-0950-504504	RF Coaxial Cable, to 18GHz, 95 in	6/26/2014
46702	Stanley	33-605	10 Meter Tape Measure	11/1/2013
32806	Sunol Sciences	JB1	Combination Antenna	1/24/2014
27234	York	CNE V	Comparison Noise Emitter	
41929	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	12/12/2013
25651	Micro-Coax	UFB311A-1-3150-504504	Rf Coaxial Cable 315.0 in to 18GHz	2/13/2014
8320	Times Microwave Systems	RG-214	3 ft RG-214 Cable	11/19/2013
47410	Agilent	N9038A	EMI Receiver	1/15/2014
21116	Micro-Coax	UFB311A-0-3540-520520	RF Coaxial Cable, to 18GHz, 354 in	2/20/2014
18313	HP	8447D	RF Preamplifier	1/8/2014
8195	TTE	H613-150K-50-21378	Hi Pass Filter - 150KHz cutoff	1/4/2014
8496	Fischer Custom Communications	FCC-450B-2.4-N	Instrumentation Limiter	5/20/2014
47300	Agilent Technologies	N9038A	MXE EMI Receiver 20Hz to 26.5 Ghz	11/13/2013
49560	Bird	5-T-MB	5W 50 Ohm BNC Termination 4GHz	8/9/2014
27234	York	CNE V	Comparison Noise Emitter	
45990	Fischer Custom Communications	F-090527-1009-1	Line Impedance Stabilization Network	6/21/2014
45991	Fischer Custom Communications	F-090527-1009-2	Lisn Adapter	6/21/2014
21606	Coleman	RG-223	4ft BNC cable	10/31/2013
41928	Newport	iBTHP-5-DB9	5 inch Temp/RH/Press Sensor w/20ft cable	4/12/2014
5687	Fluke	73 III	Digital Multimeter	9/11/2013
35248	Stanley	33-696	5 Meter Tape Measure	7/9/2014
39110	Coleman	RG-223	25 ft BNC cable	11/29/2013
30526	Midwest Microwave	TRM-2048-MC-BNC-10	50 Ohm Terminator, BNC w/chain	3/11/2014
44038	Fischer Custom Communications	F-071115-1057-1	Balanced Telecom Impedance Stabilization Network	5/29/2014
4003	Fischer Custom Communications	FCC-801-M2-32A	CDN, 2-LINE, 32A	3/14/2014