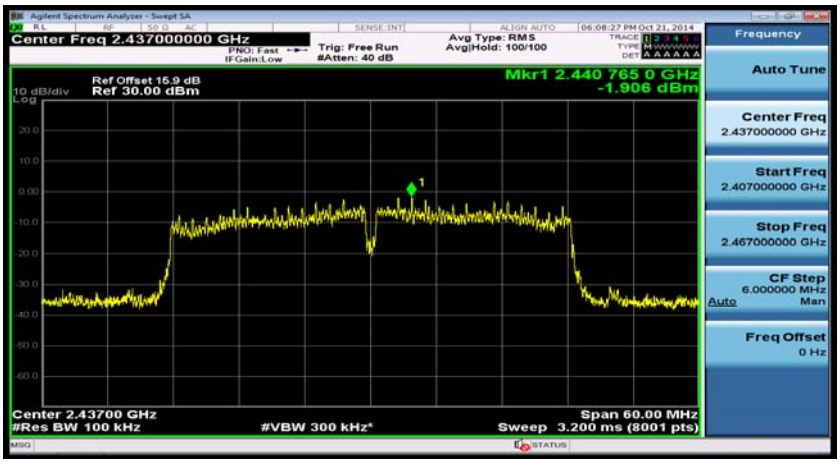
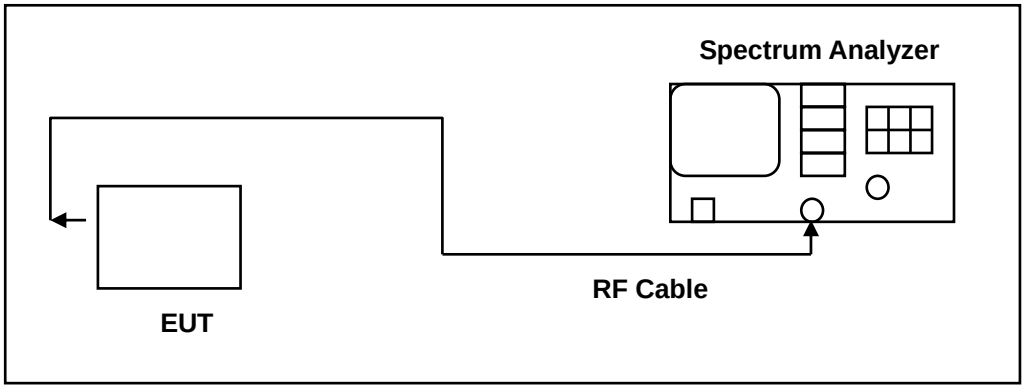
Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode	
2422	
2437	
2452	

9 Out of Band Conducted Emissions Measurement

9.1. Limit

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

9.2. Test Setup



9.3. Test Instruments

Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	N9020A	MY53420615	05/13/2014	(2)
Spectrum Analyzer	Agilent	E4408B	MY45107753	07/24/2014	(1)
RF Cable	Woken	/	S02-1404-09-077	2014.05.11	(1)
Test Site	ATL	TE05	TE05	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years. (3) Calibration period 3 years.
Note: N.C.R. = No Calibration Request.

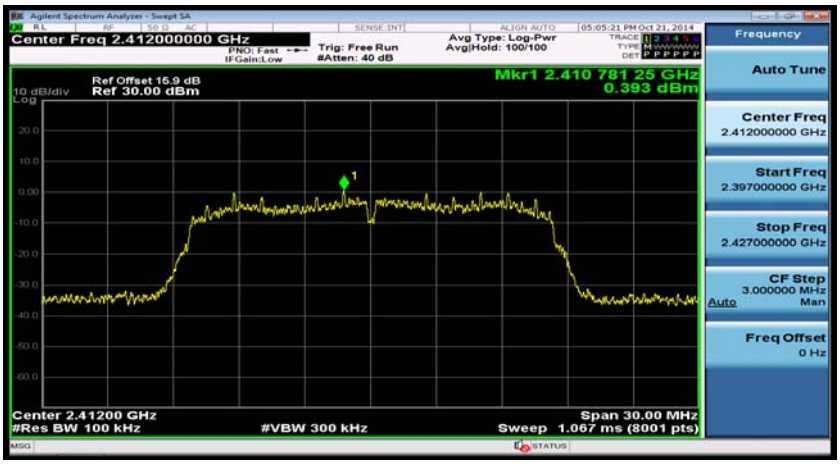
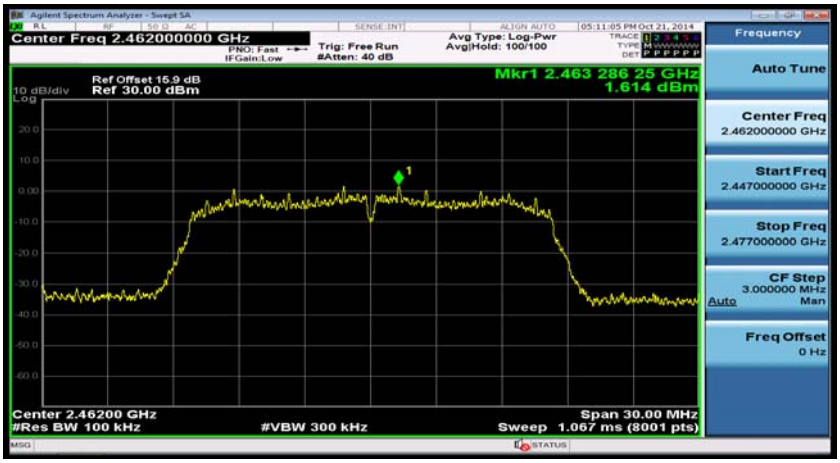
9.4. Test Procedure

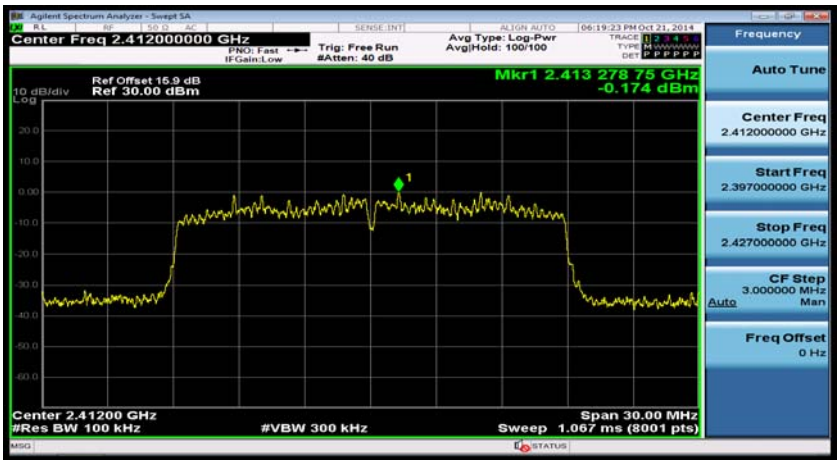
In any 100 kHz bandwidth outside the EUT pass band, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.
All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the pass band.
The test was performed at 3 channels.

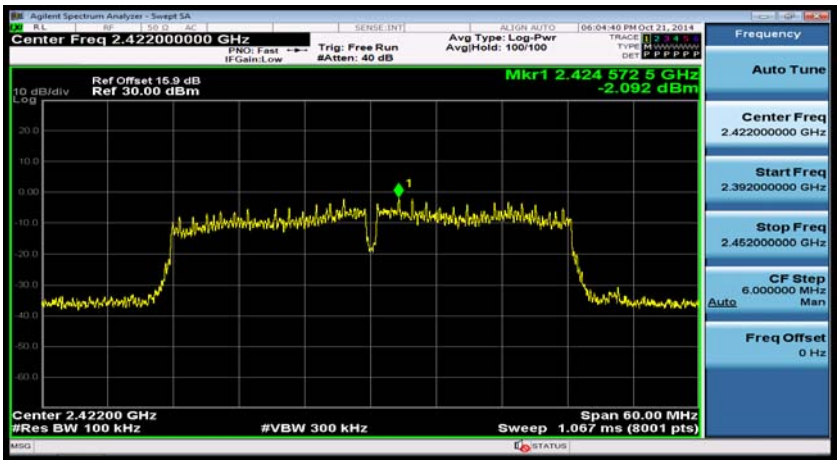
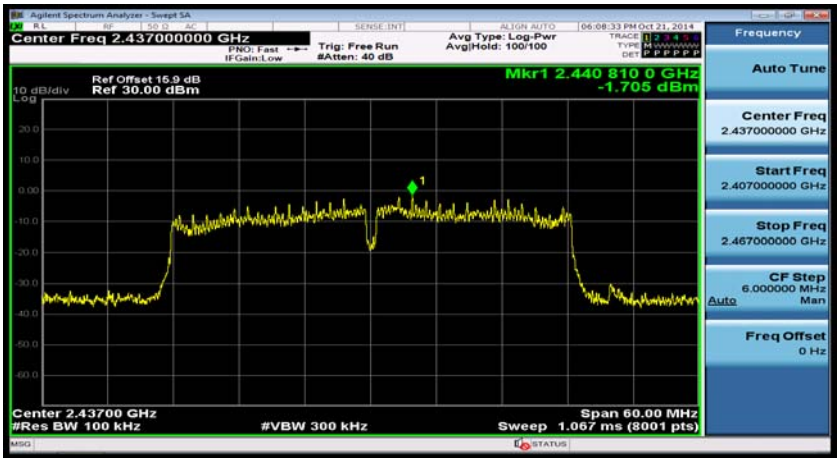
9.5. Test Graphs

Reference level

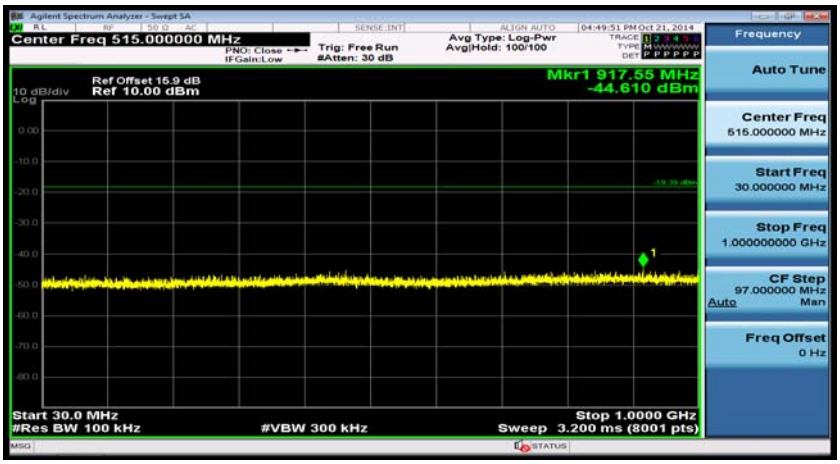
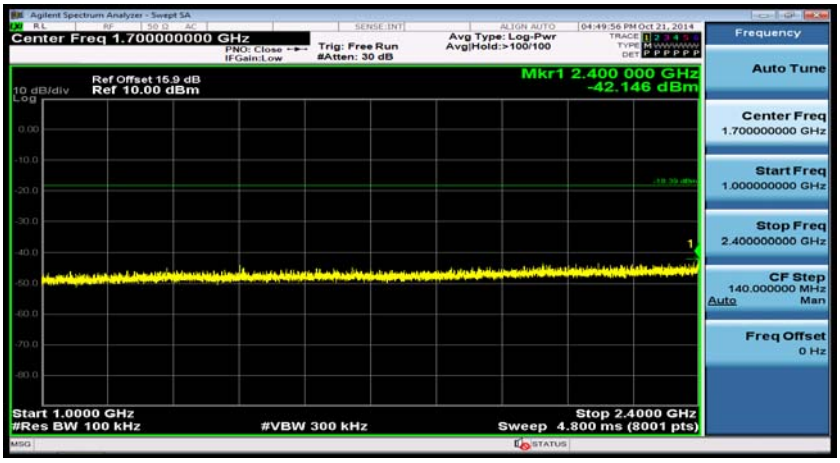
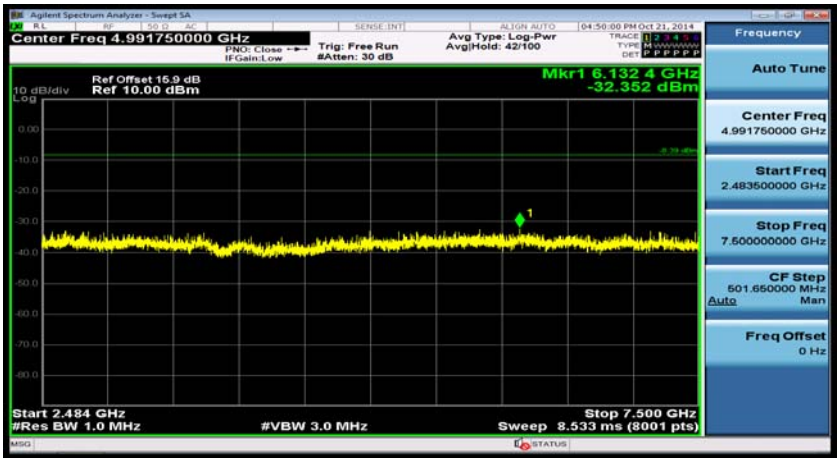
Mode 2: IEEE 802.11b Link Mode	
2412	
2437	
2462	

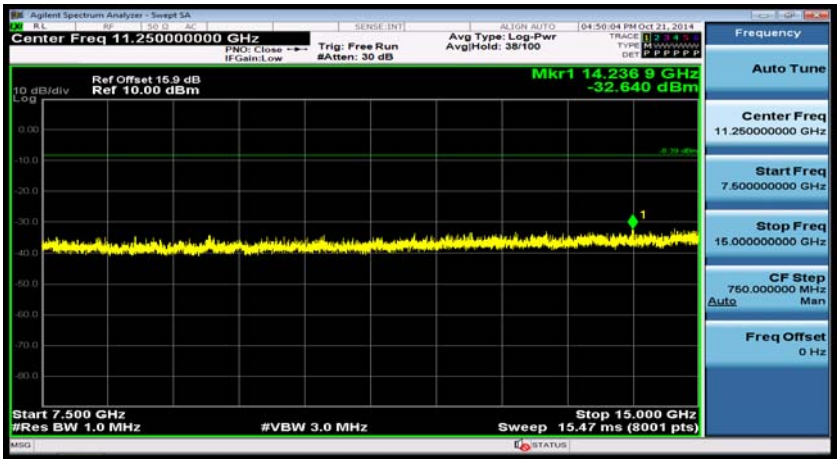
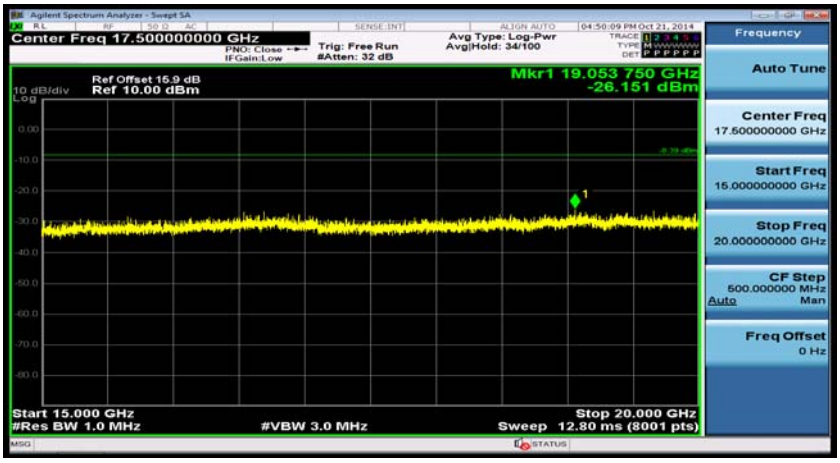
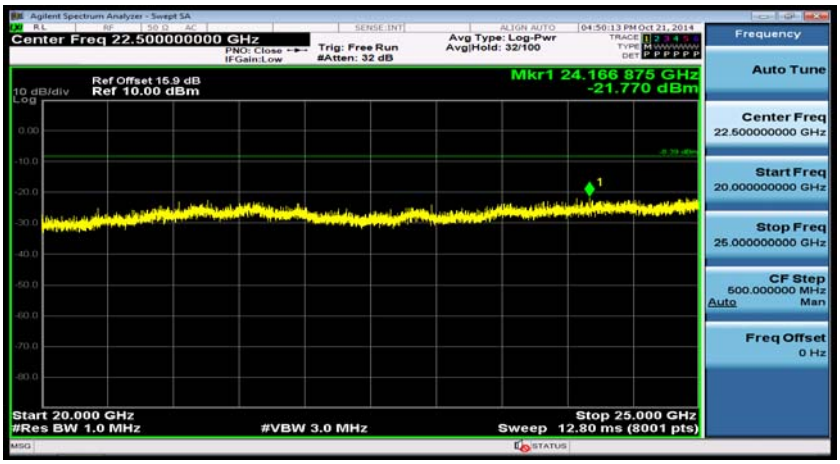
Mode 3: IEEE 802.11g Link Mode	
2412	
2437	
2462	

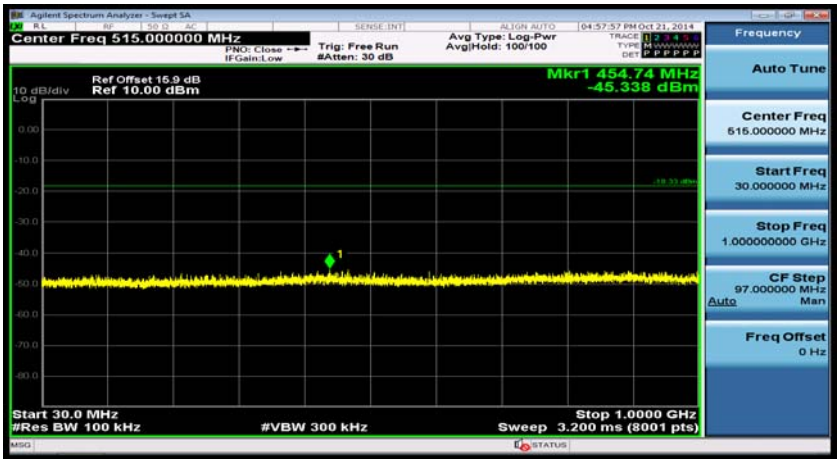
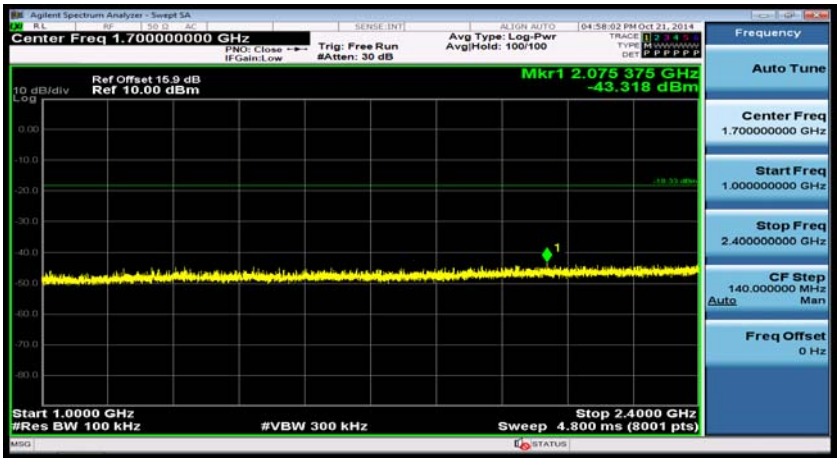
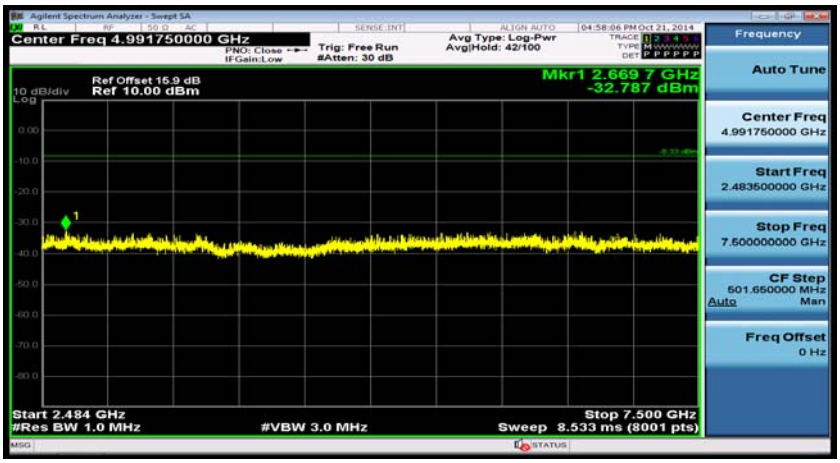
Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode	
2412	
2437	
2462	

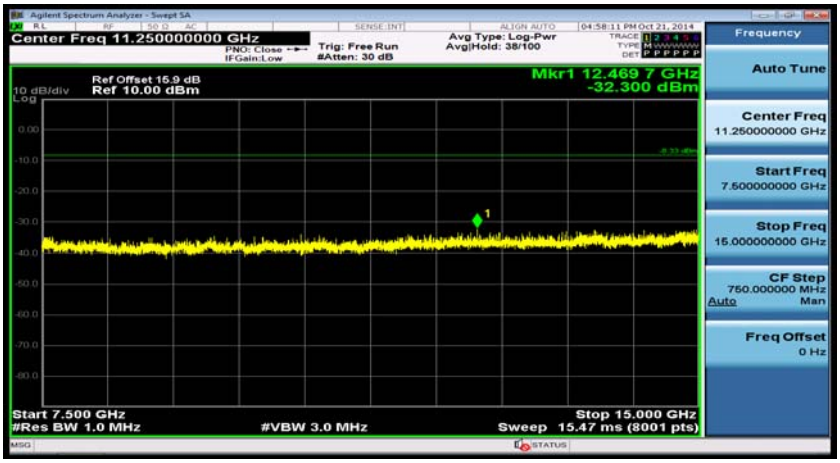
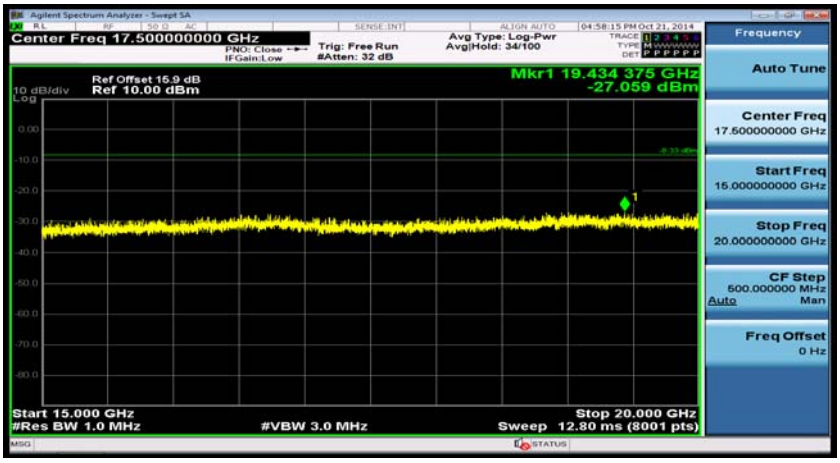
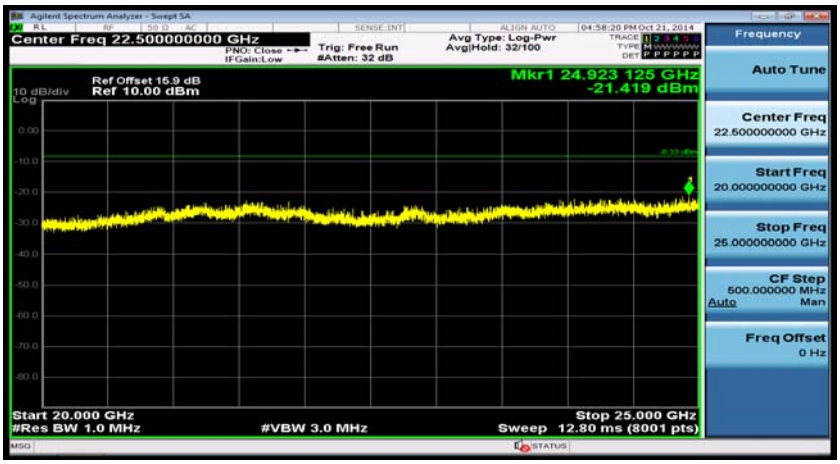
Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode	
2422	
2437	
2452	

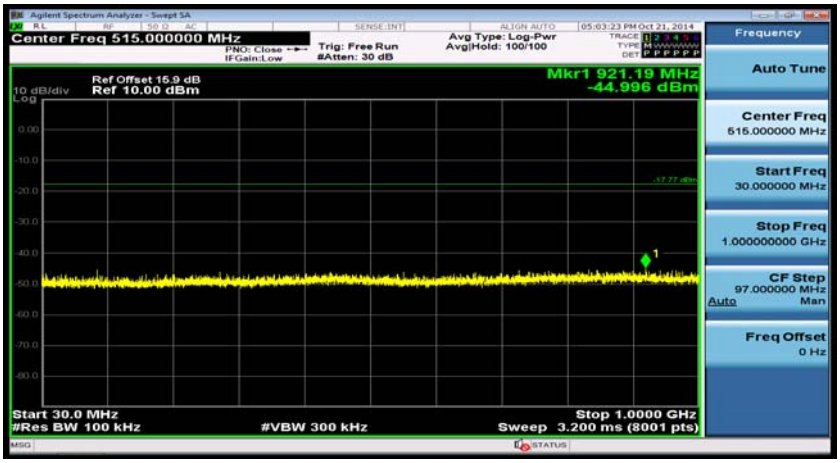
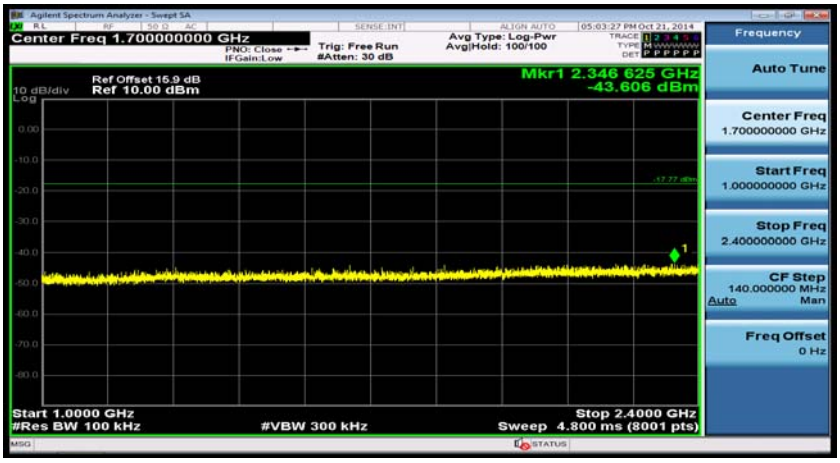
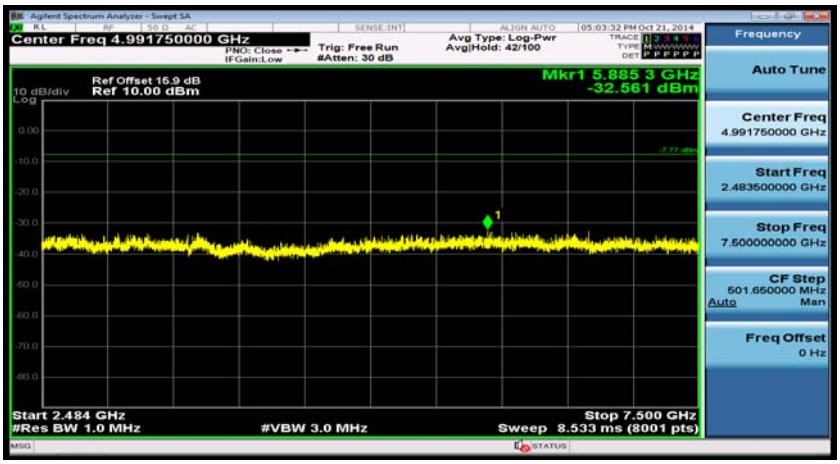
Out of Band Conducted Emissions

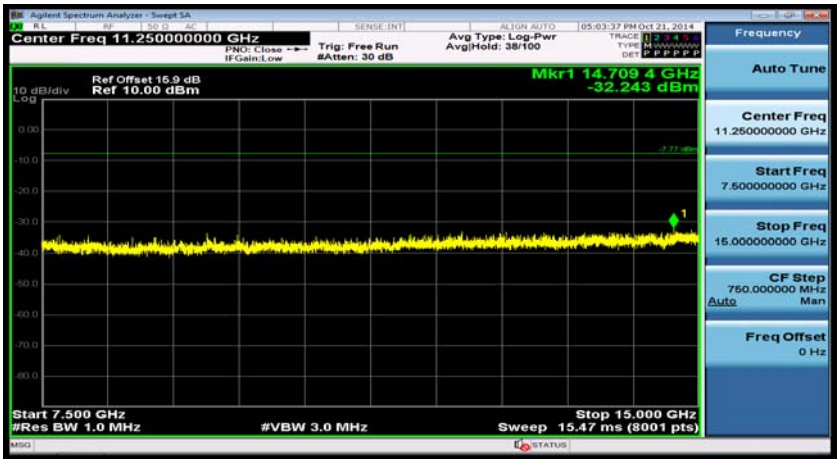
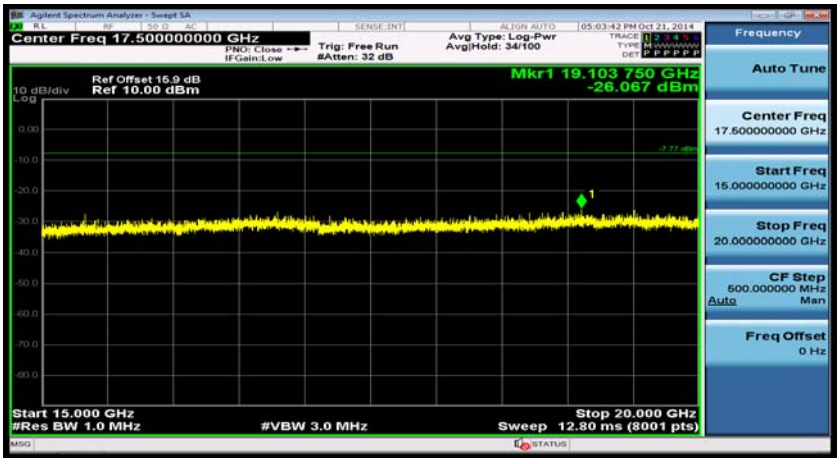
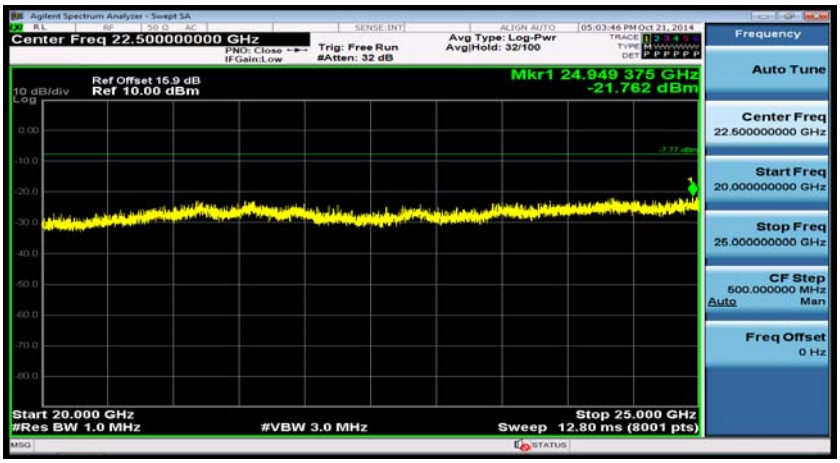
Mode 2: IEEE 802.11b Link Mode-2412	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

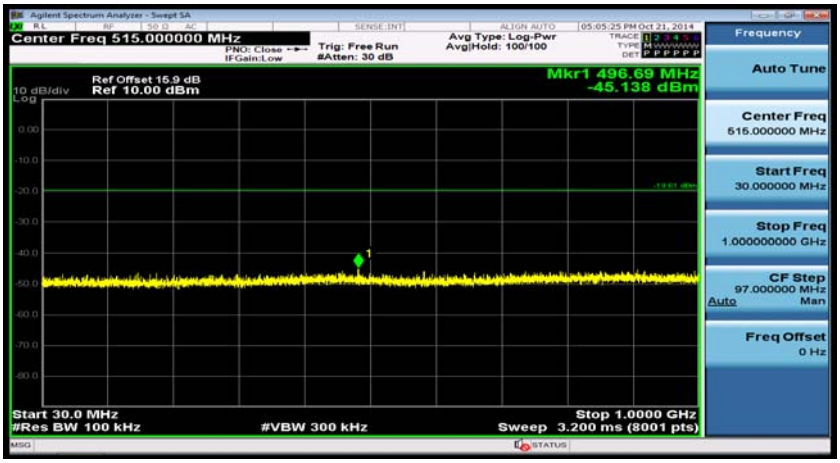
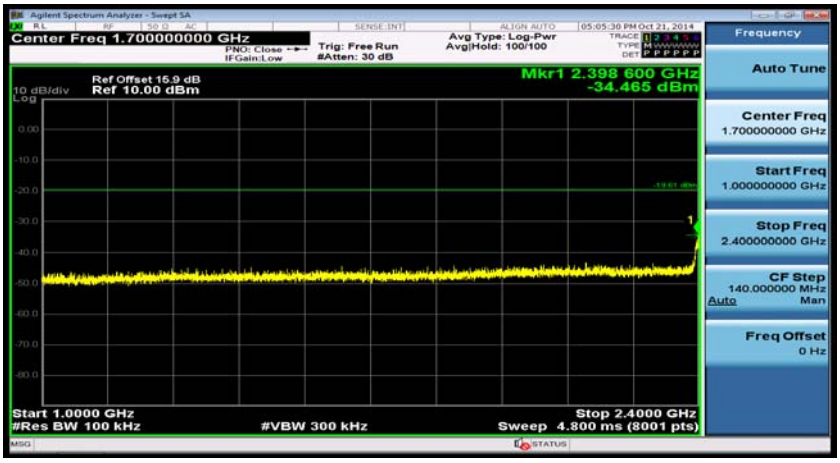
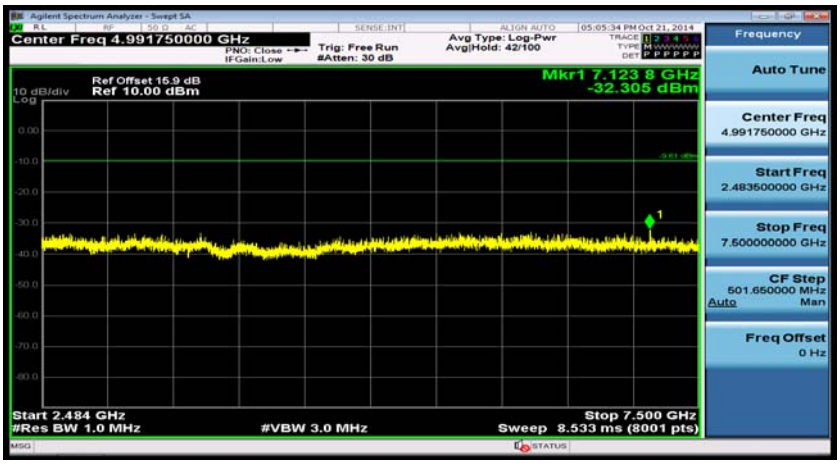
Mode 2: IEEE 802.11b Link Mode-2412	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

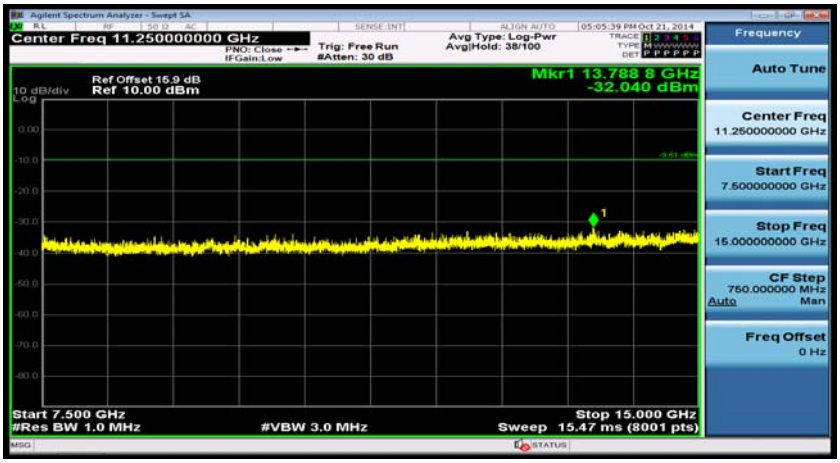
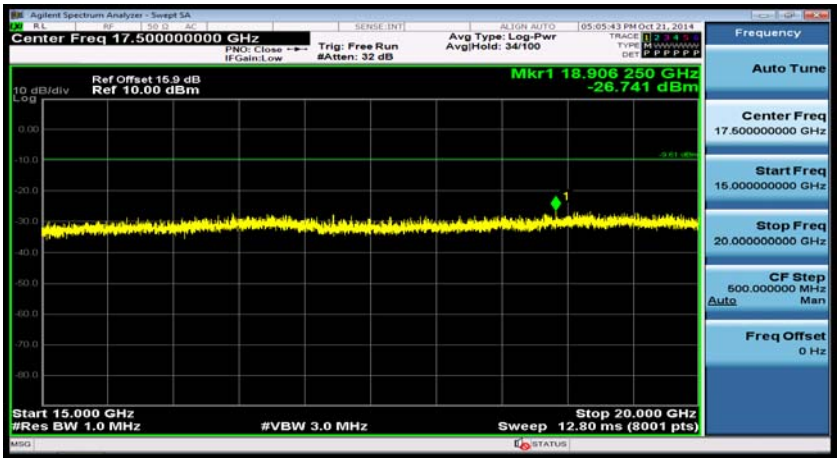
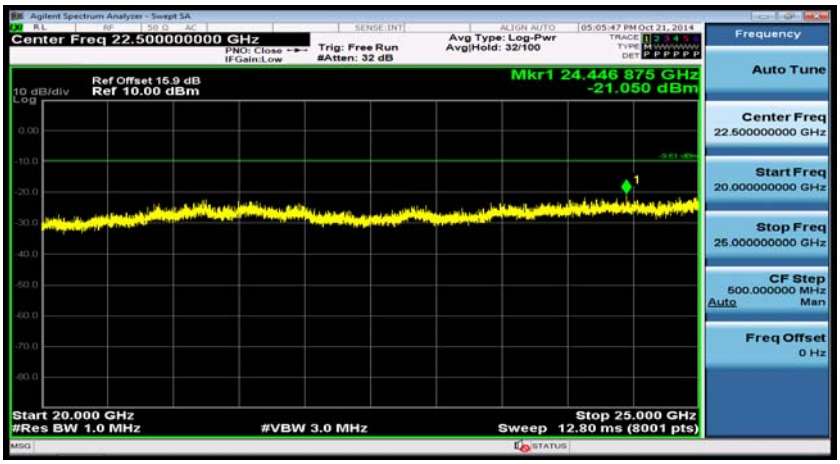
Mode 2: IEEE 802.11b Link Mode-2437	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

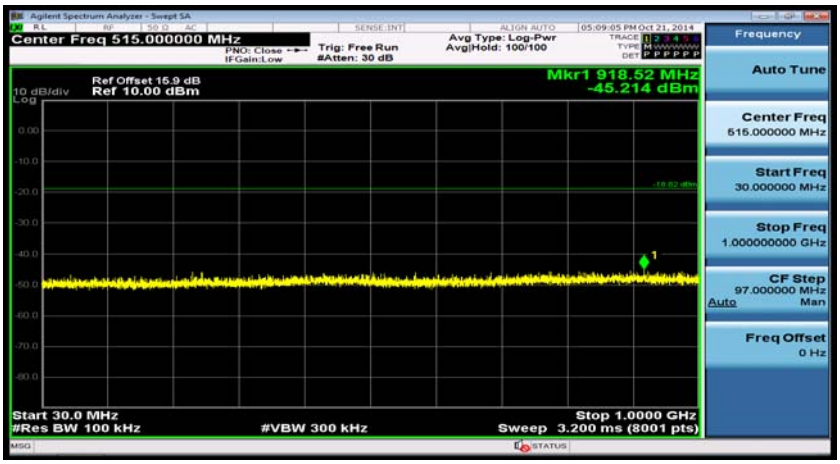
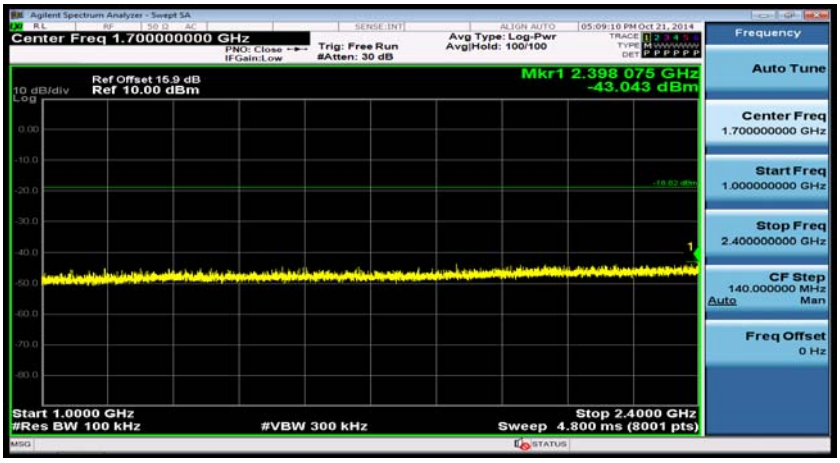
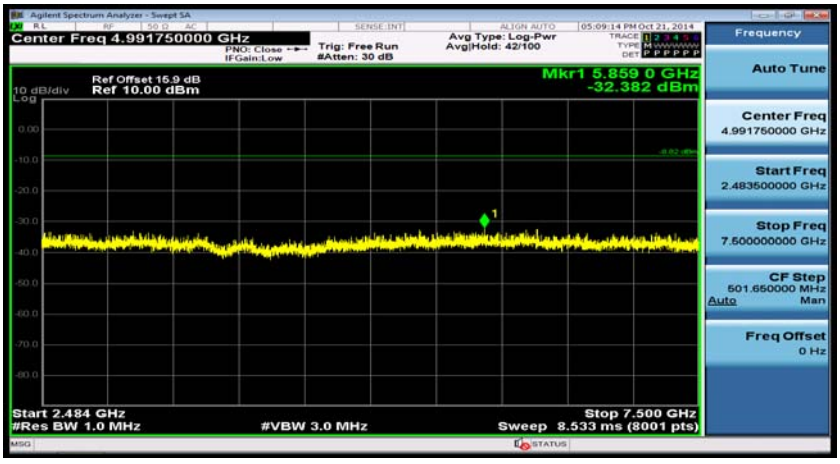
Mode 2: IEEE 802.11b Link Mode-2437	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

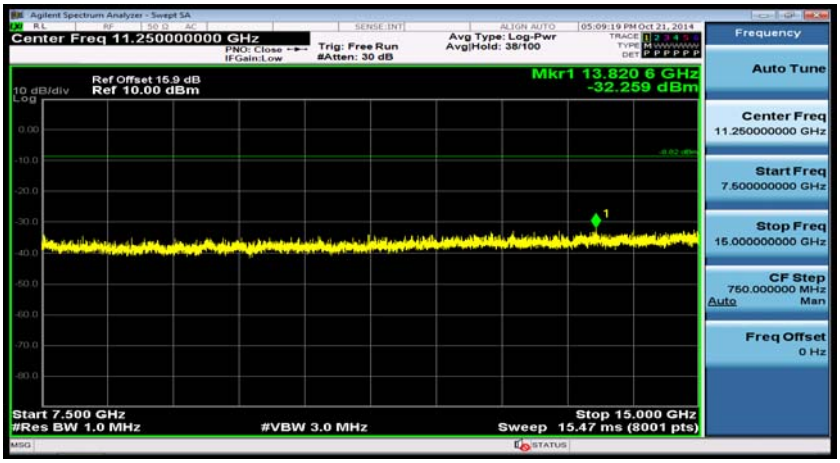
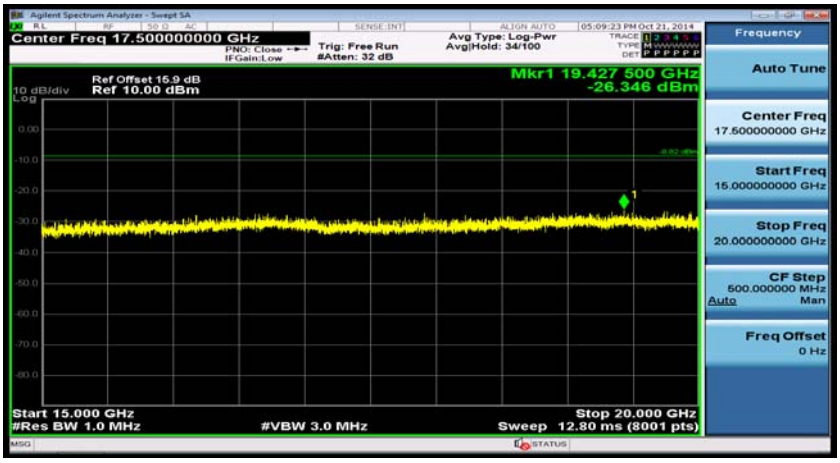
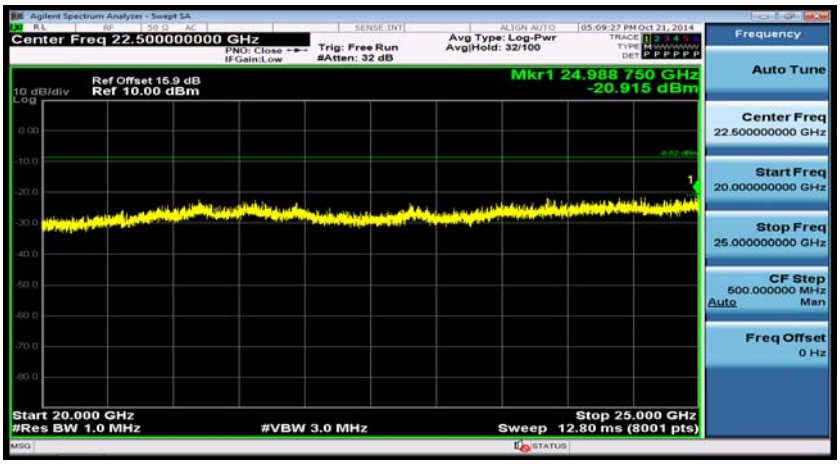
Mode 2: IEEE 802.11b Link Mode-2462	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

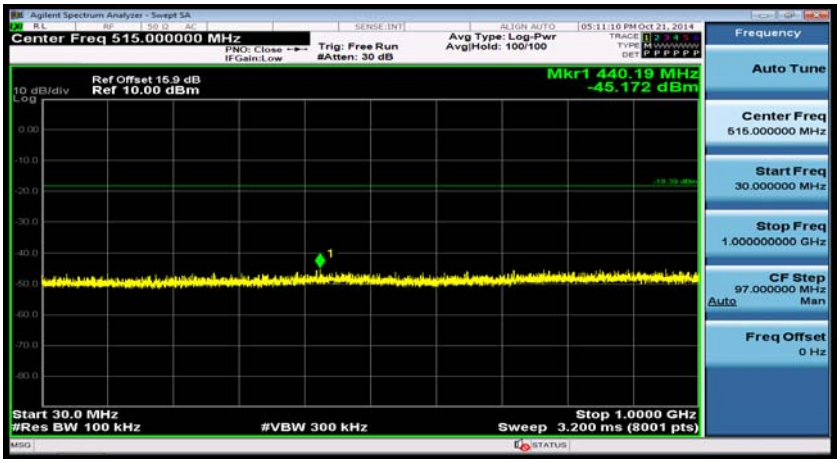
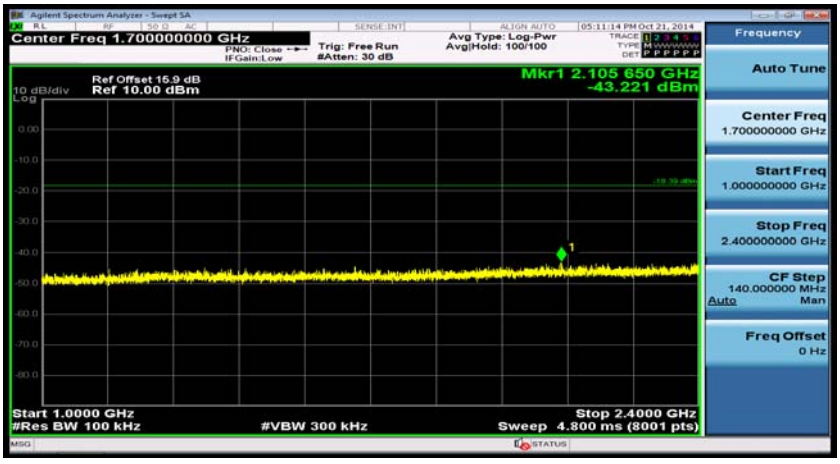
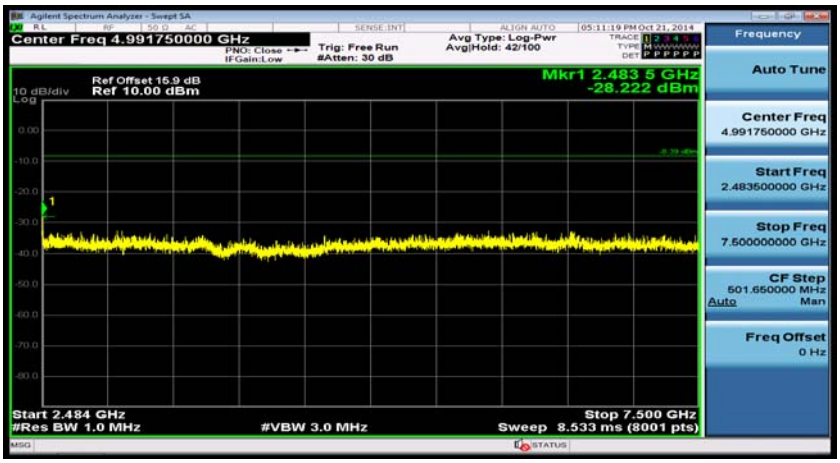
Mode 2: IEEE 802.11b Link Mode-2462	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

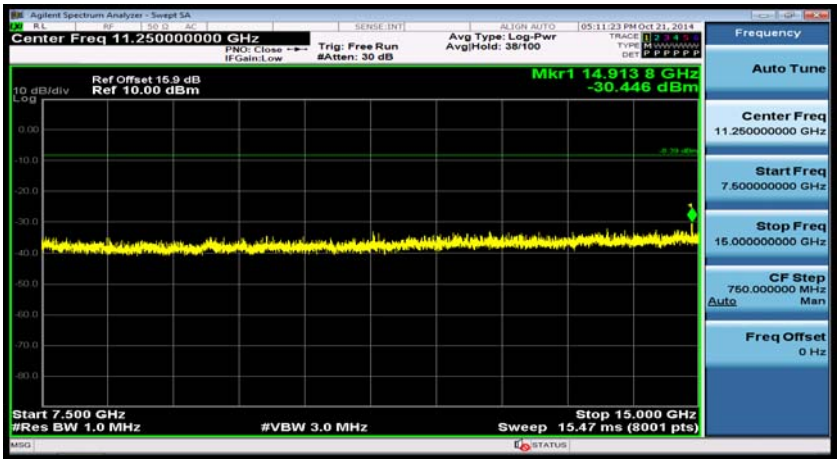
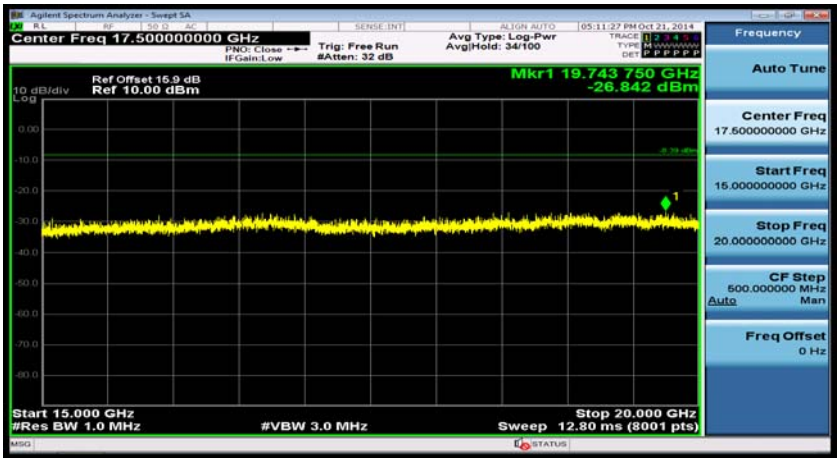
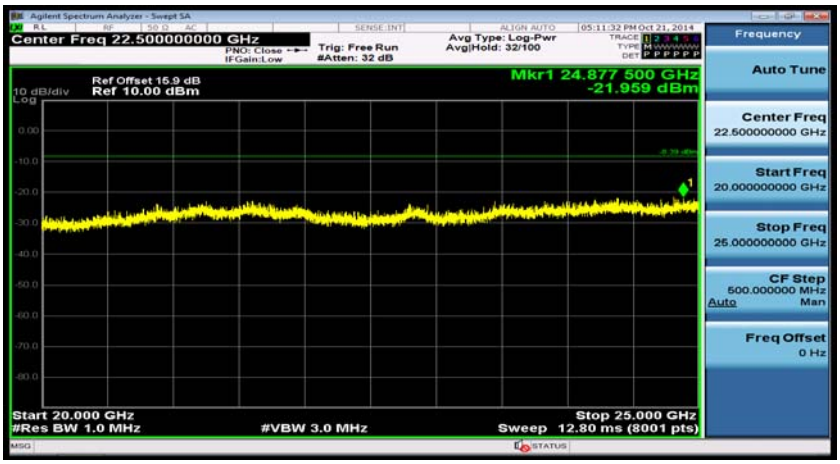
Mode 3: IEEE 802.11g Link Mode-2412	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

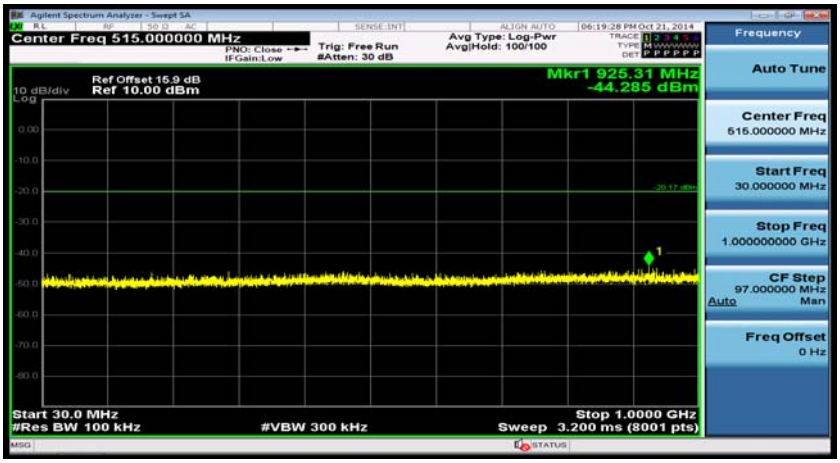
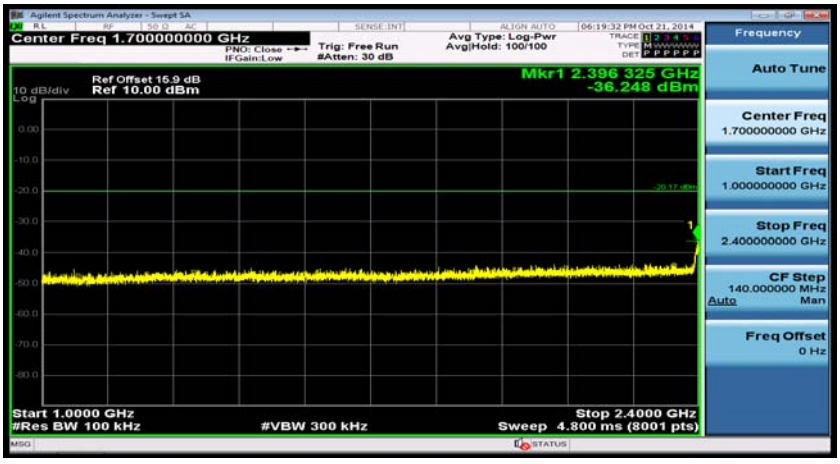
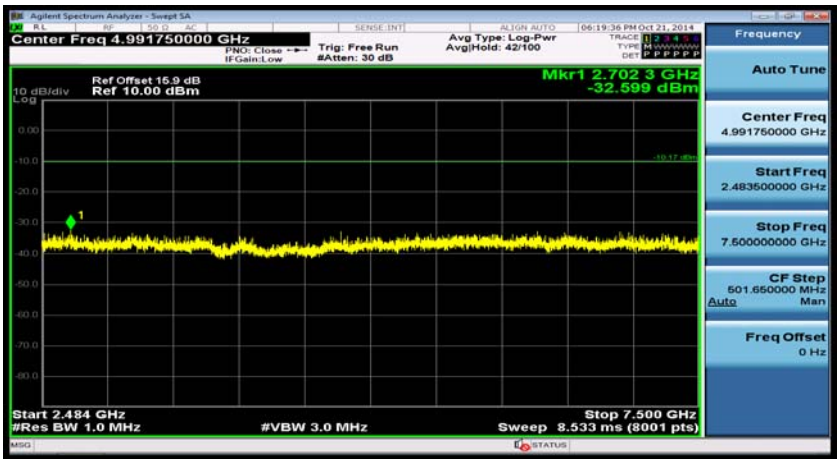
Mode 3: IEEE 802.11g Link Mode-2412	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

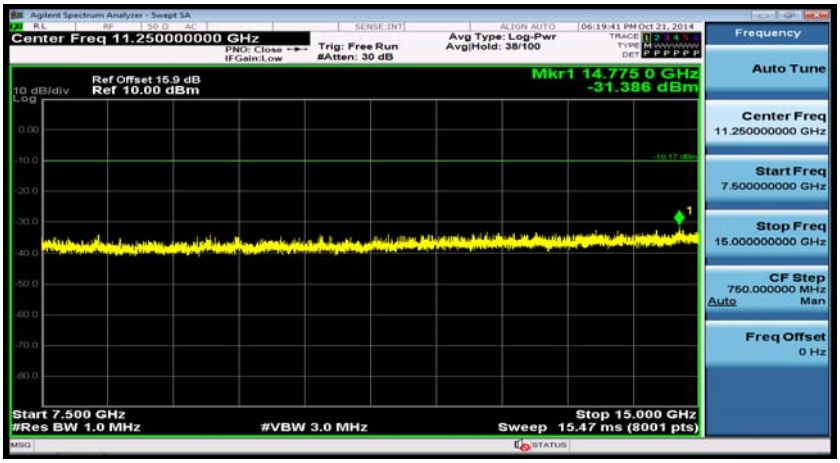
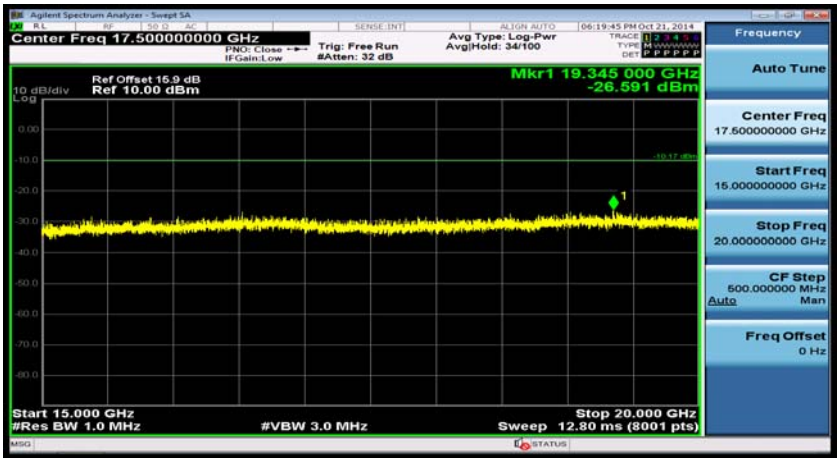
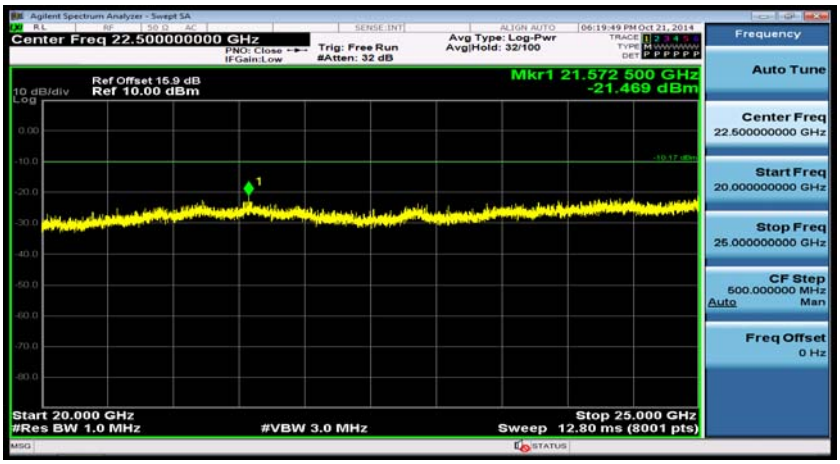
Mode 3: IEEE 802.11g Link Mode-2437	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

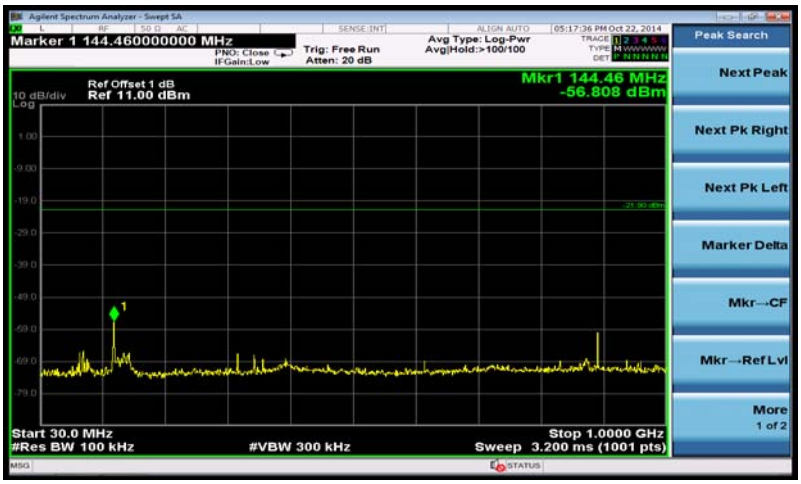
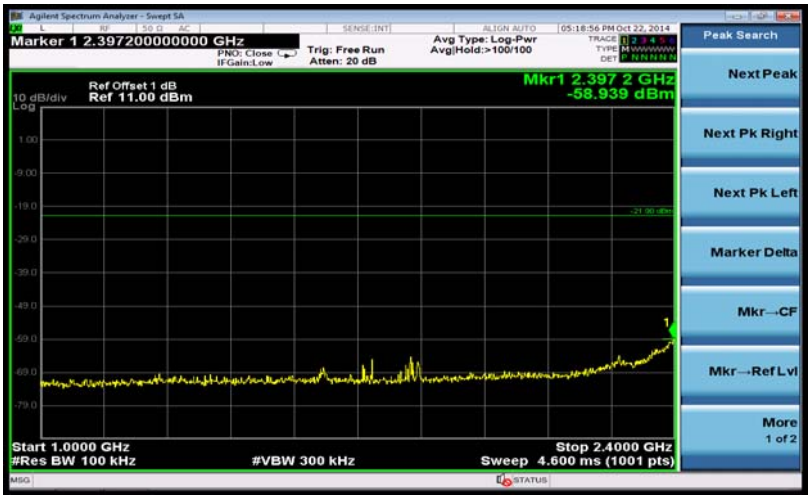
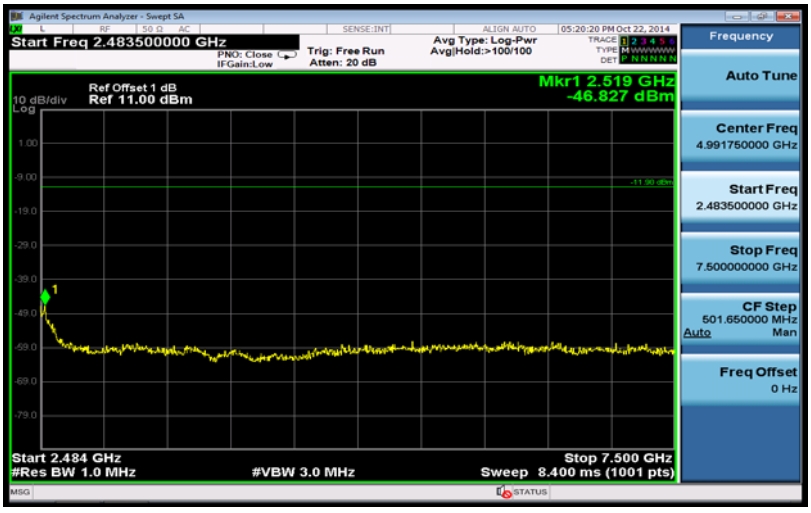
Mode 3: IEEE 802.11g Link Mode-2437	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

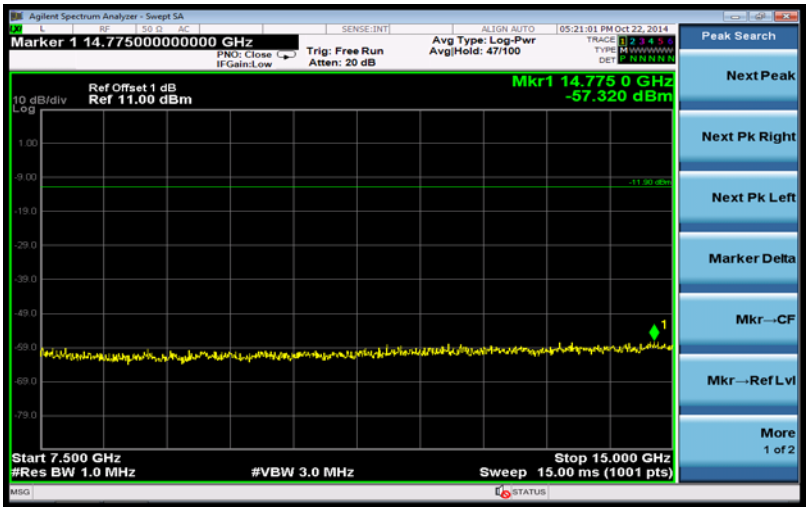
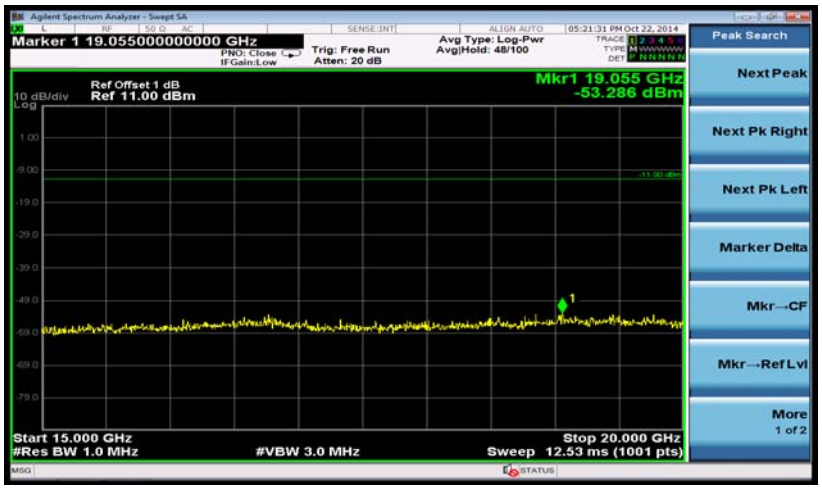
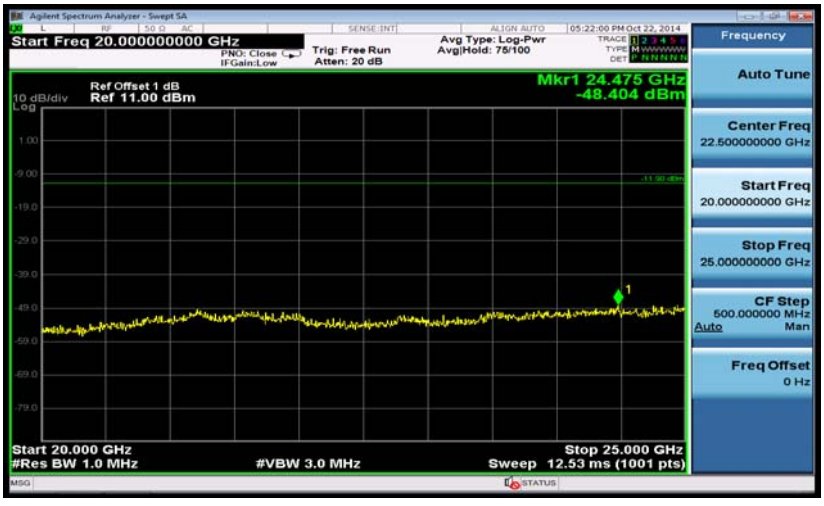
Mode 3: IEEE 802.11g Link Mode-2462	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

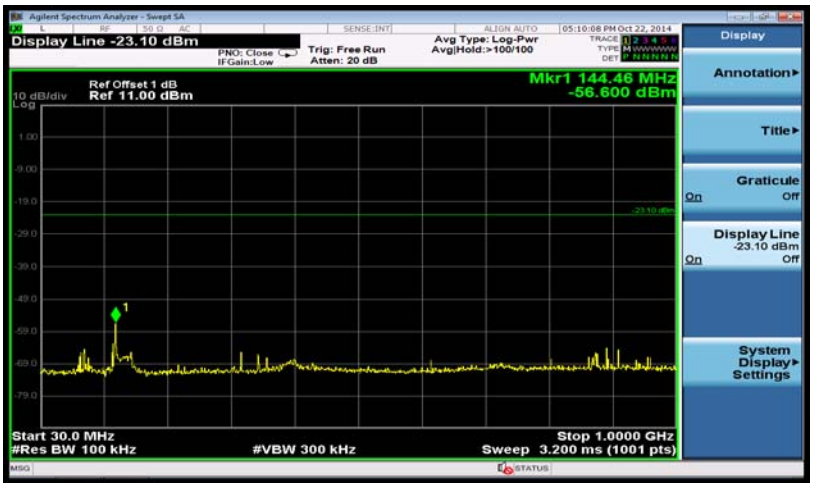
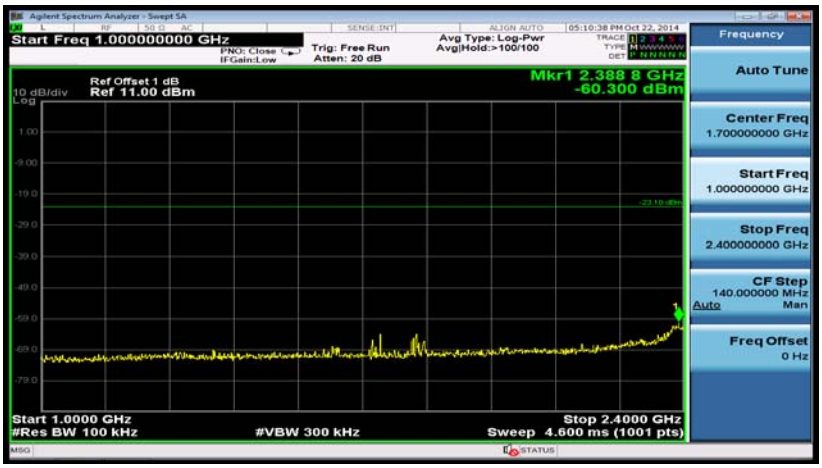
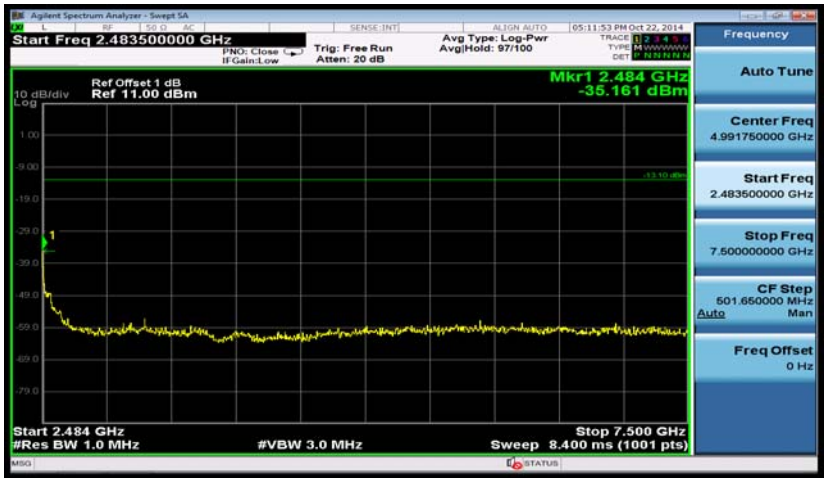
Mode 3: IEEE 802.11g Link Mode-2462	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

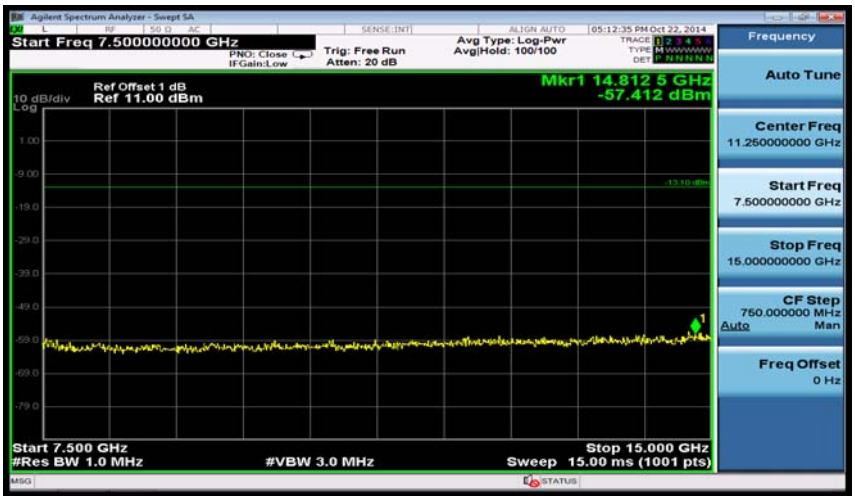
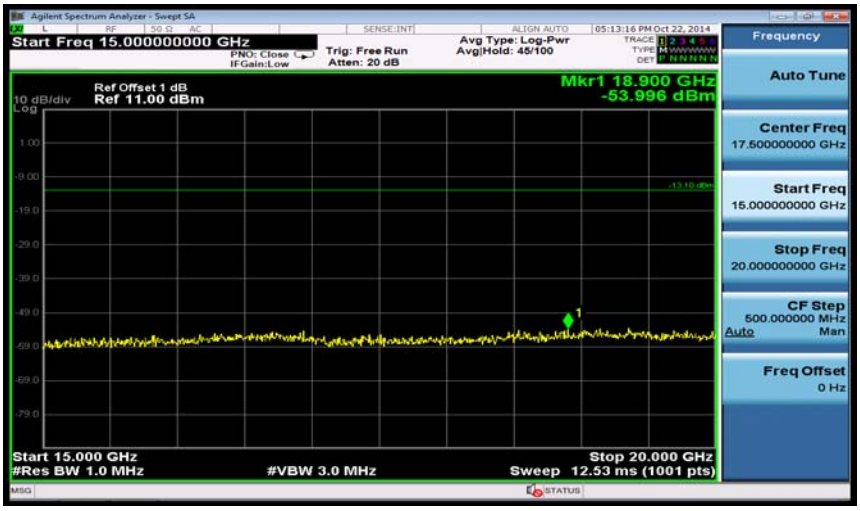
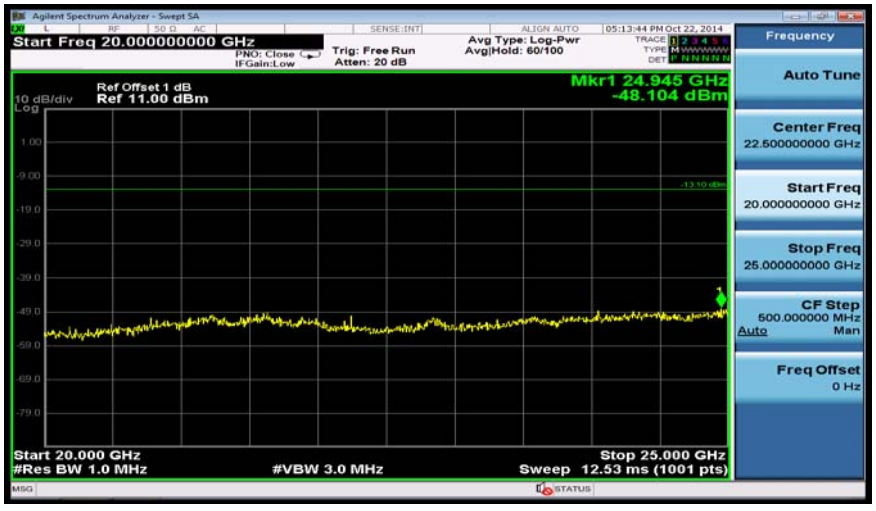
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2412	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

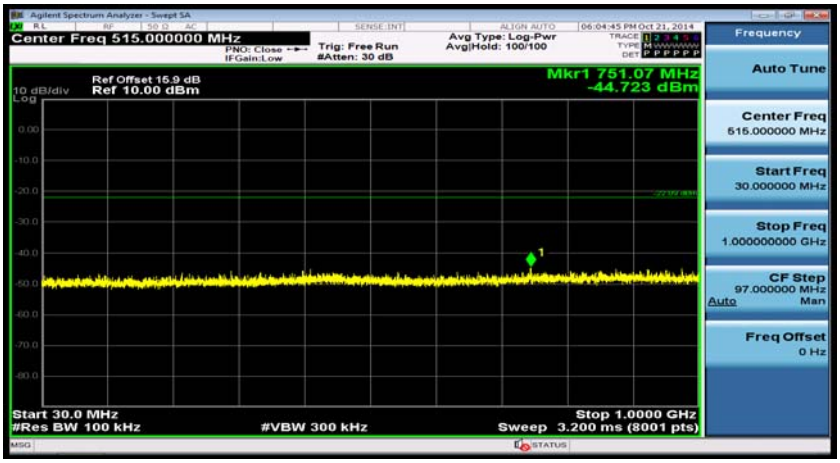
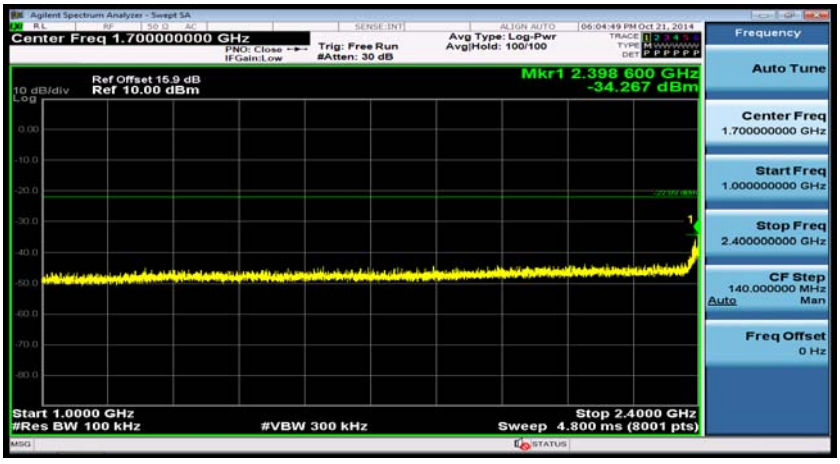
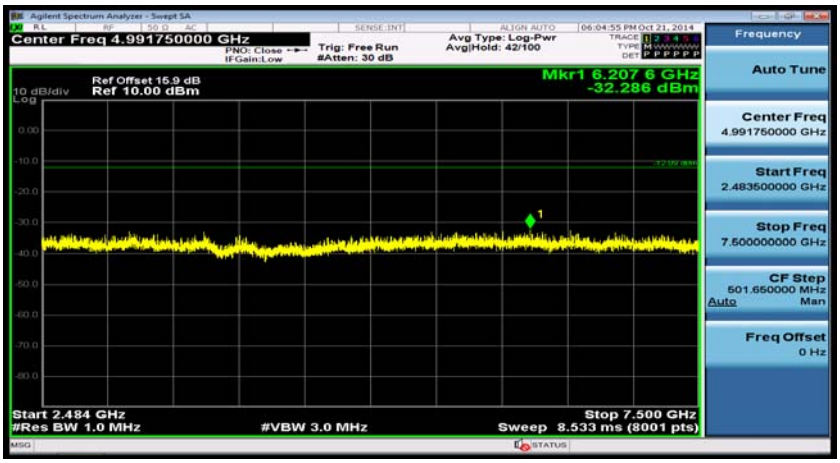
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2412	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

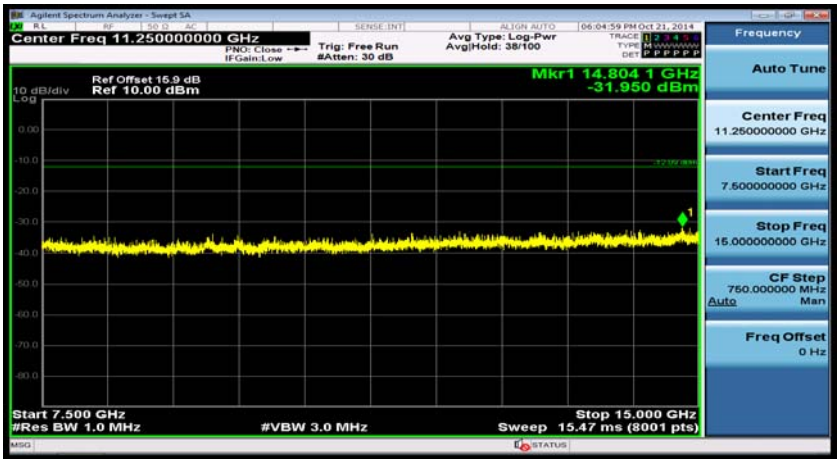
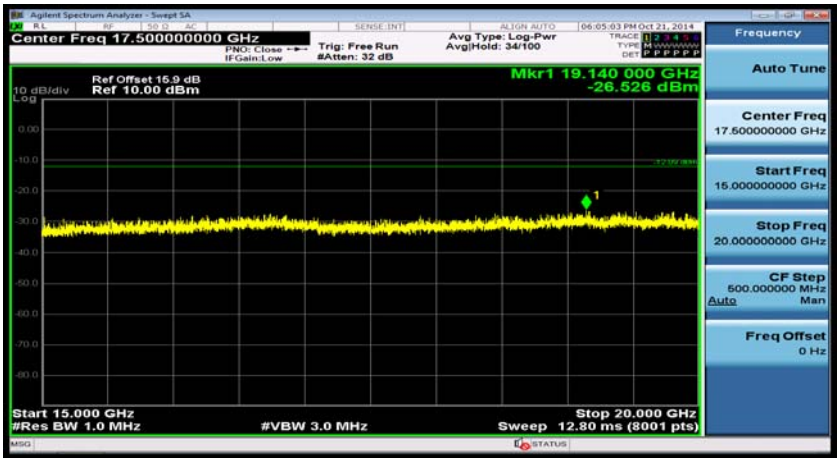
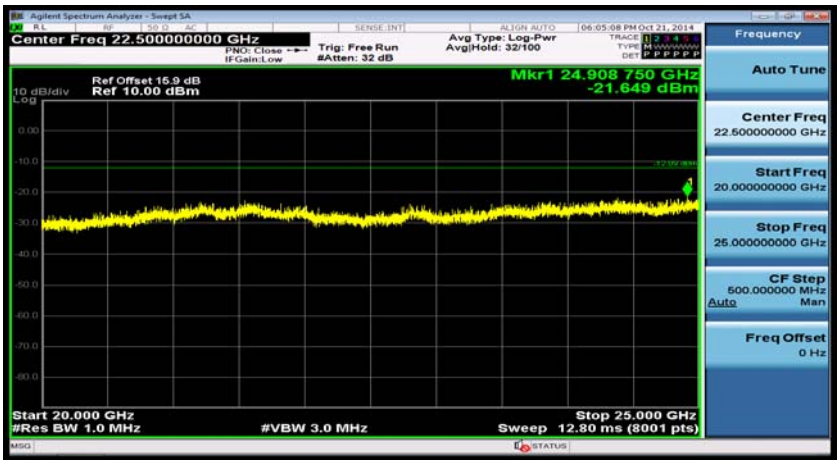
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2437	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

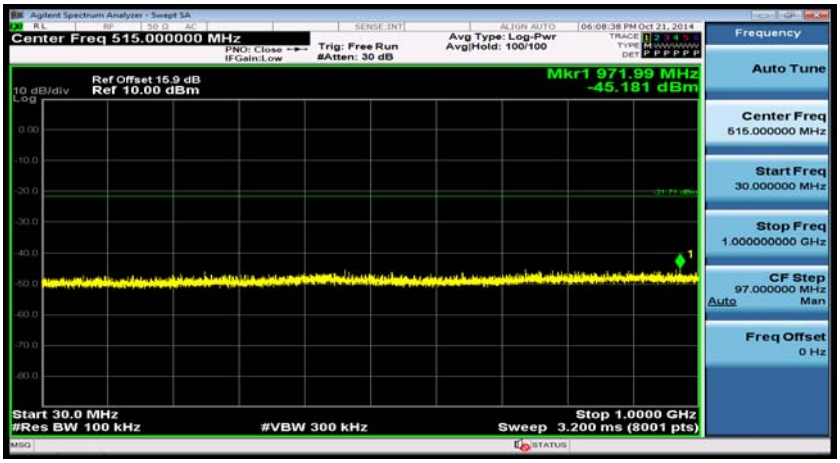
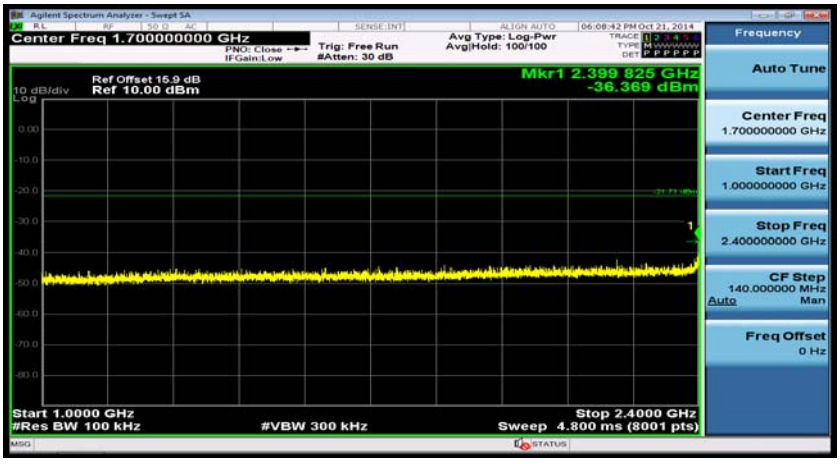
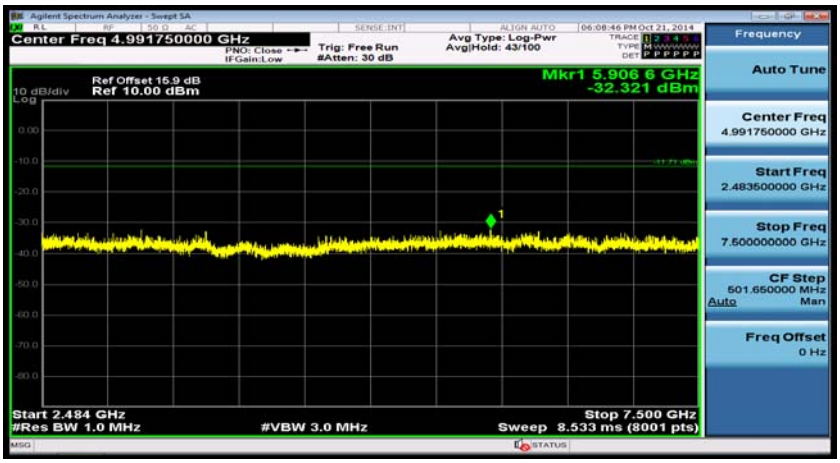
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2437	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

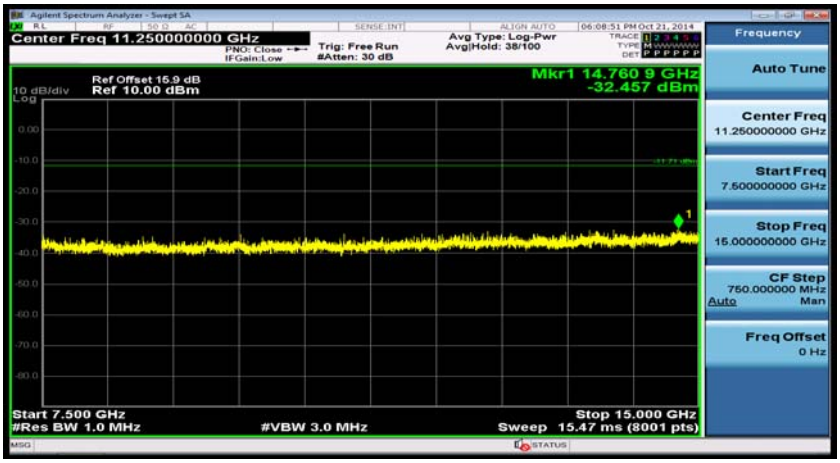
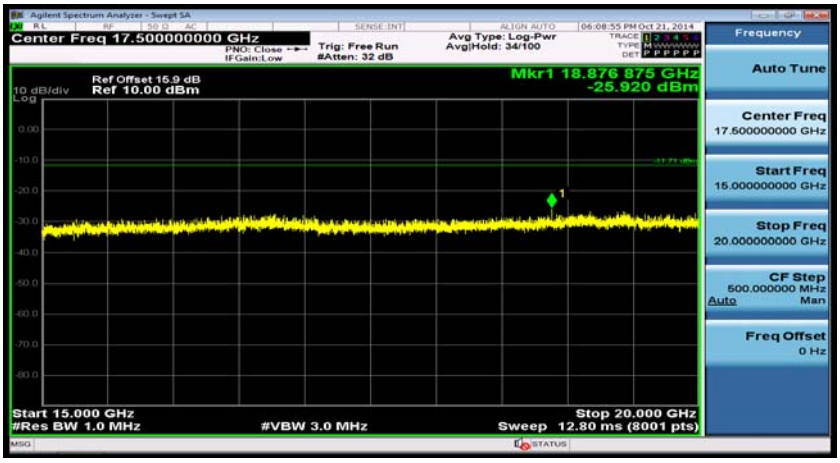
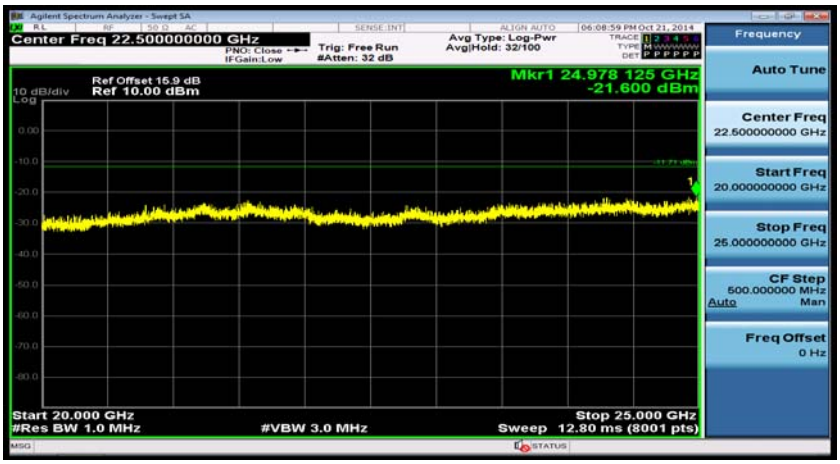
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2462	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

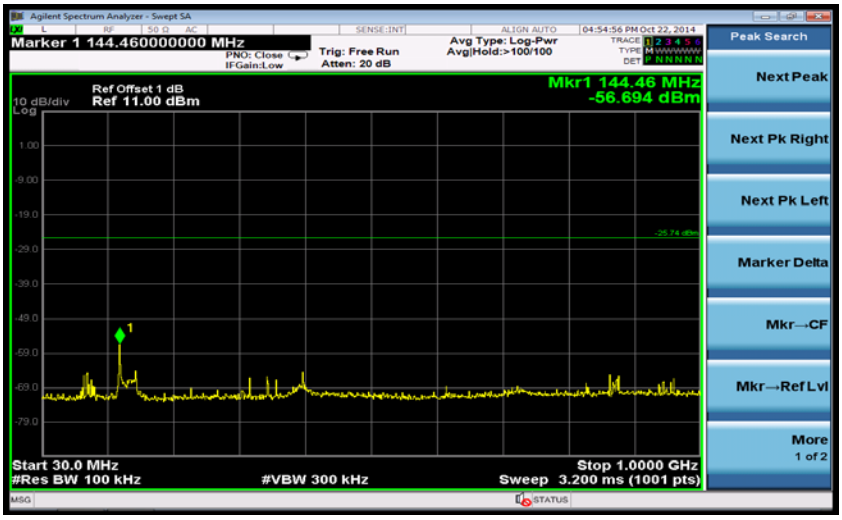
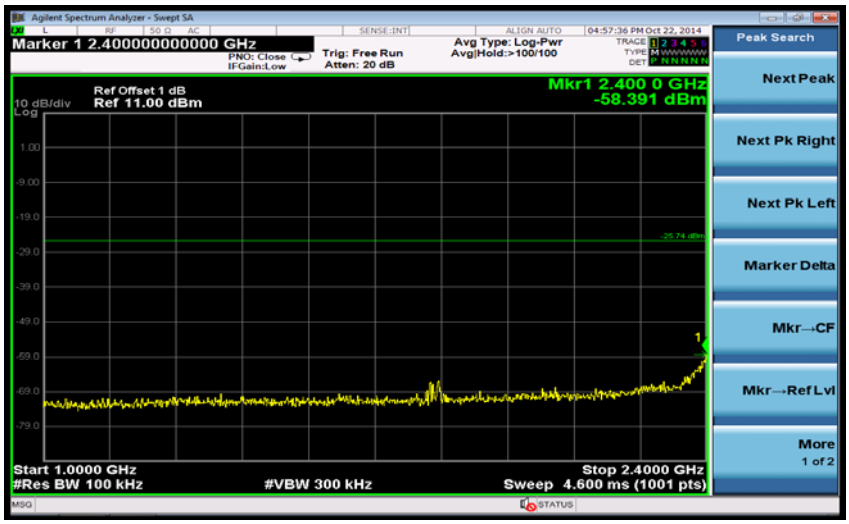
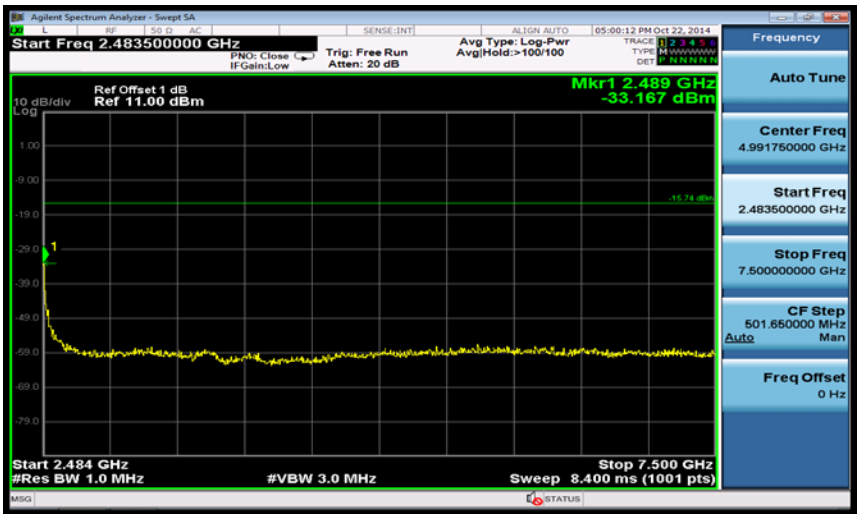
Mode 4: IEEE 802.11n 2.4G 20MHz Link Mode-2462	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

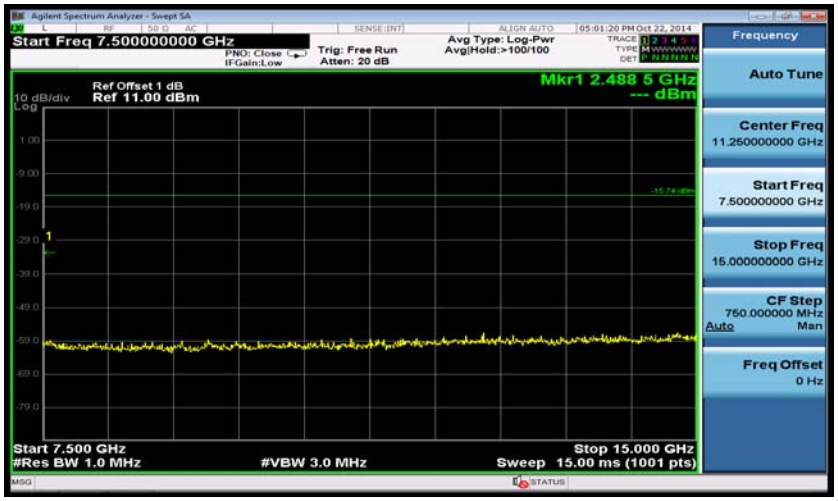
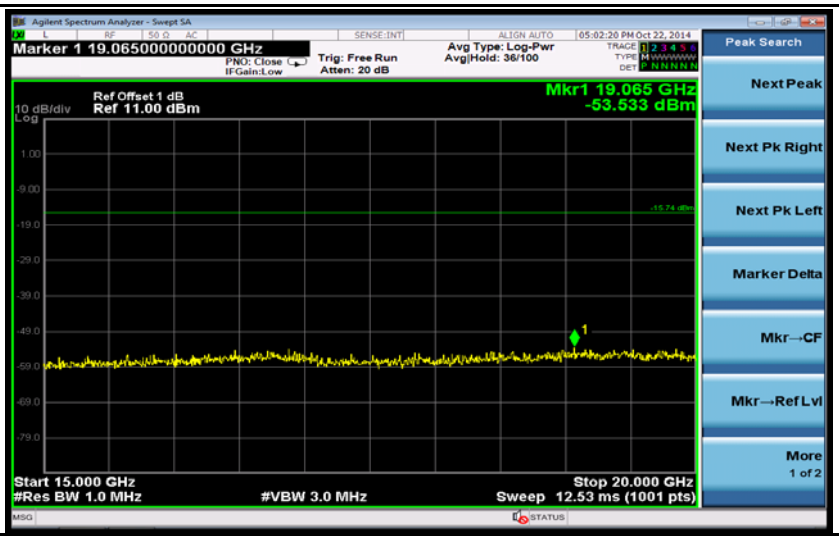
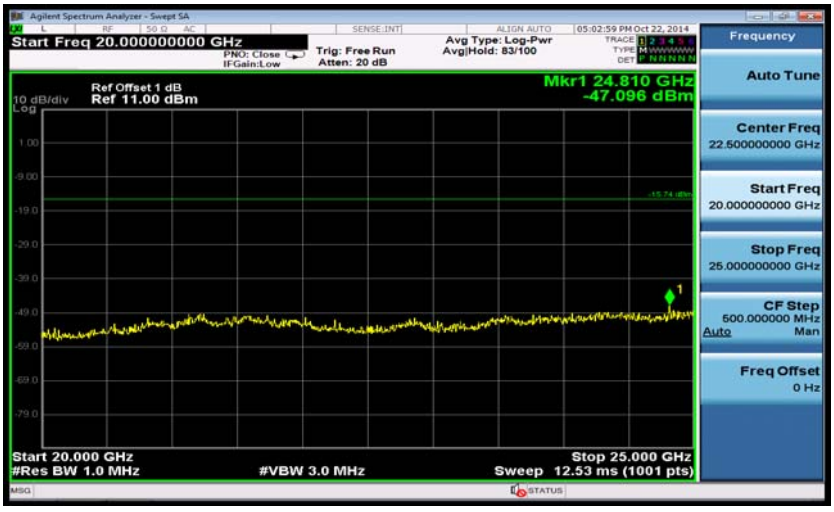
Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2422	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2422	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2437	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2437	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2452	
30MHz-1GHz	
1GHz-2.4GHz	
2.4835GHz-7.5GHz	

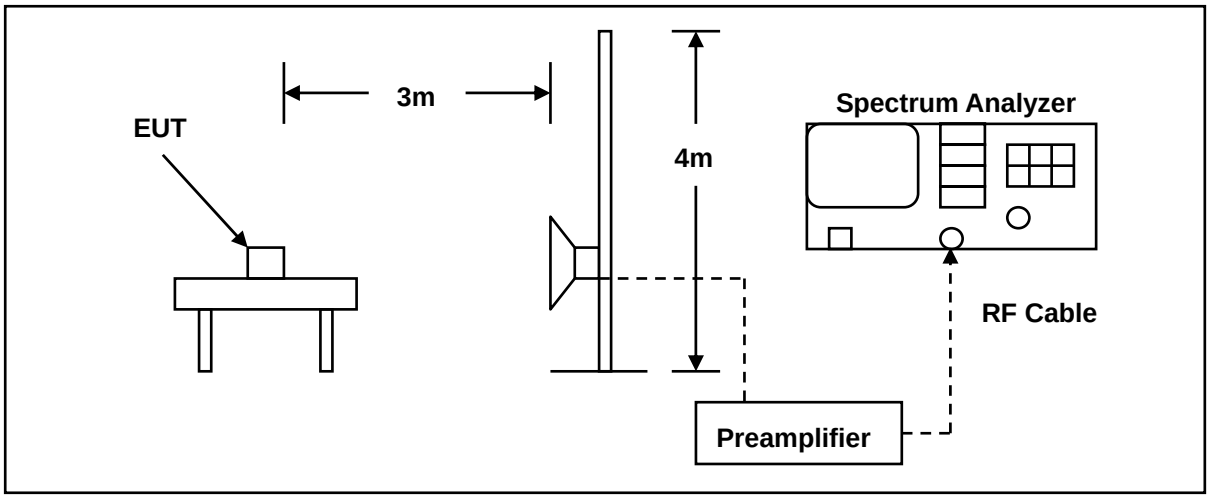
Mode 5: IEEE 802.11n 2.4G 40MHz Link Mode-2452	
7.5GHz-15GHz	
15GHz-20GHz	
20GHz-25GHz	

10 Band Edges Measurement

10.1.Limit

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

10.2.Test Setup



10.3.Test Instruments

3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
RF Pre-selector	Agilent	N9039A	MY46520256	01/10/2014	(1)
Spectrum Analyzer	Agilent	N9020A	MY53420615	05/13/2014	(1)
Pre Amplifier	Agilent	8449B	3008A02237	02/21/2014	(1)
Pre Amplifier	Agilent	8447D	2944A10961	02/21/2014	(1)
Horn Antenna (1~18GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9120D	9120D-550	06/11/2014	(1)
RF Cable	Woken	/	S02-1404-09-122	2014.05.11	(1)
RF Cable	Woken	/	S02-1404-09-124	2014.05.11	(1)
Test Site	ATL	TE01	888001	08/28/2014	(1)

10.4. Test Procedure

The EUT was setup to ANSI C63.4, 2009; tested to DTS test procedure of KDB558074D01 v03r02 for compliance to FCC 47CFR 15.247 requirements.

The emissions on the harmonics frequencies, the limits, and the margin of compliance are presented. These tests were made when the transmitter was in full radiated power. The additional test was performed to show compliance with the requirement at the band-edge frequency 2483.5 MHz and up to 2500 MHz and at 2390.0 MHz.

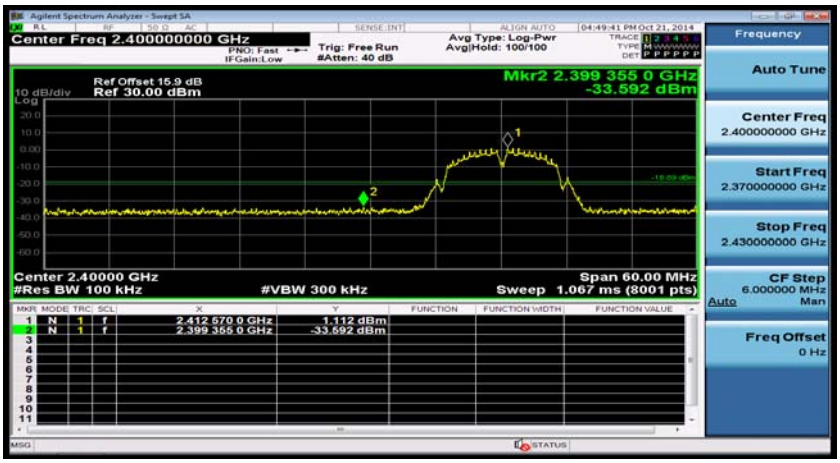
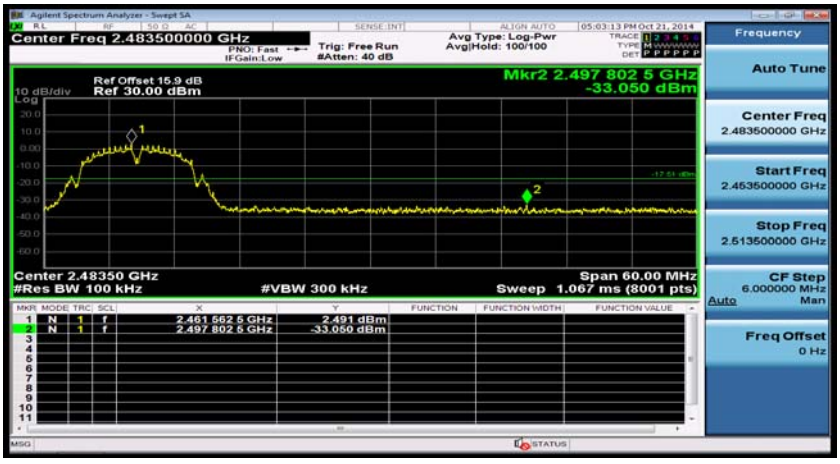
The transmitter was configured with the worst case antenna and setup to transmit at the highest channel. Then the field strength was measured at 2483.5 MHz.

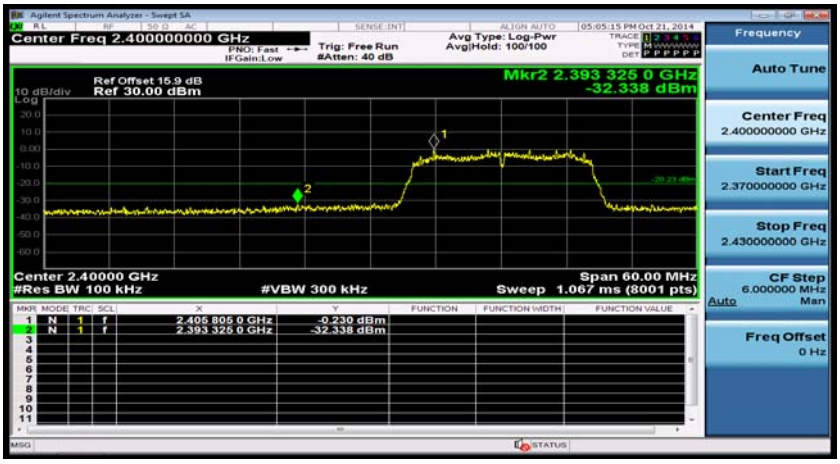
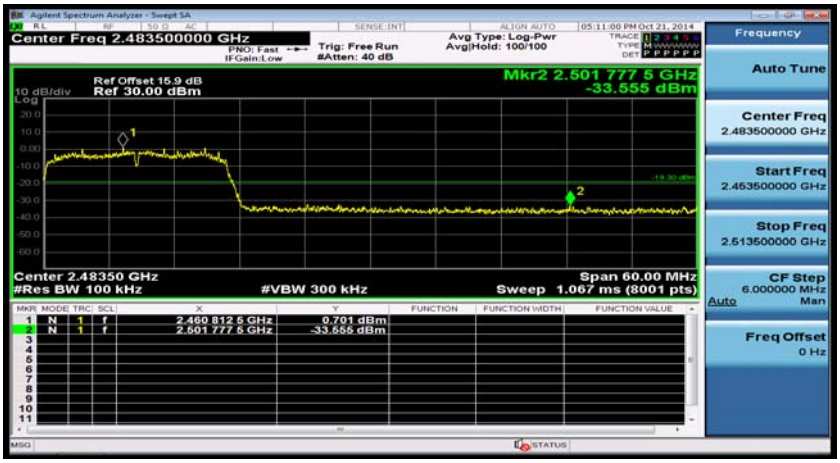
The transmitter was then configured with the worst case antenna and setup to transmit at the lowest channel. Then the field strength was measured at 2390.0 MHz. These tests were performed at 4 different bit rates.

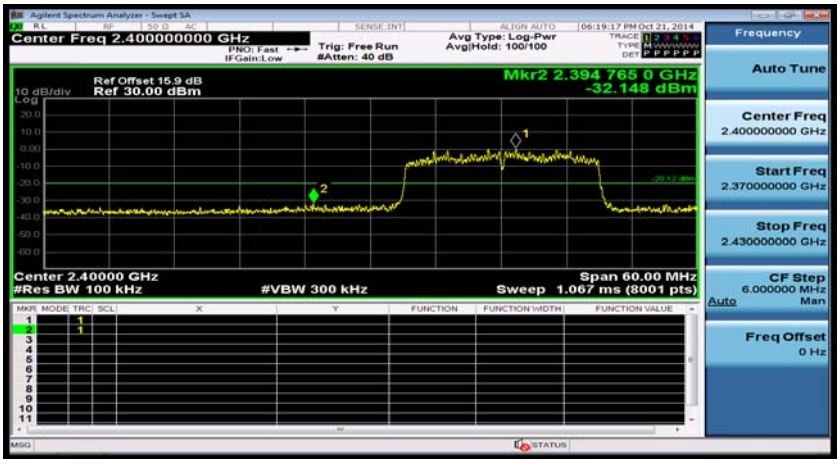
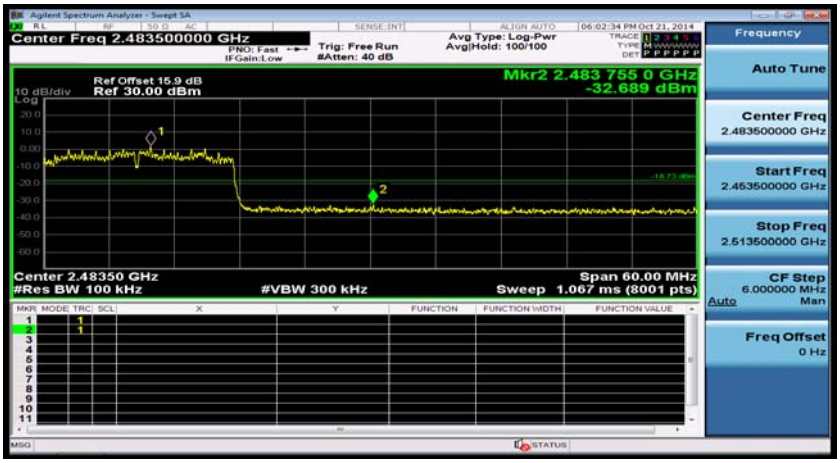
For measurements the resolution bandwidth is set to 1 MHz, and then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

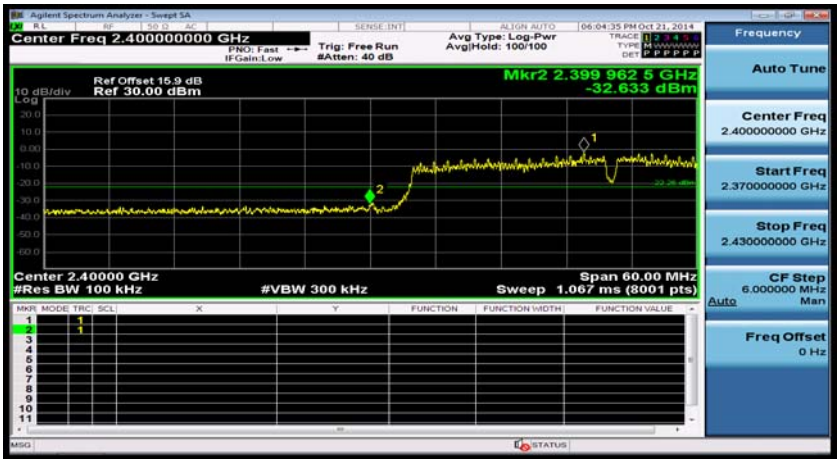
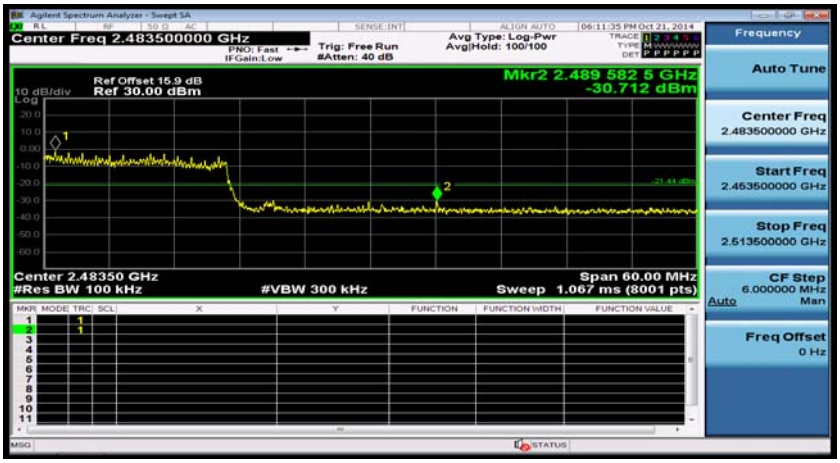
10.5.Test Result

Conducted Band Edge

Mode 2: IEEE 802.11b Link Mode	
2412	
2462	

Mode 3: IEEE 802.11g Link Mode	
2412	
2462	

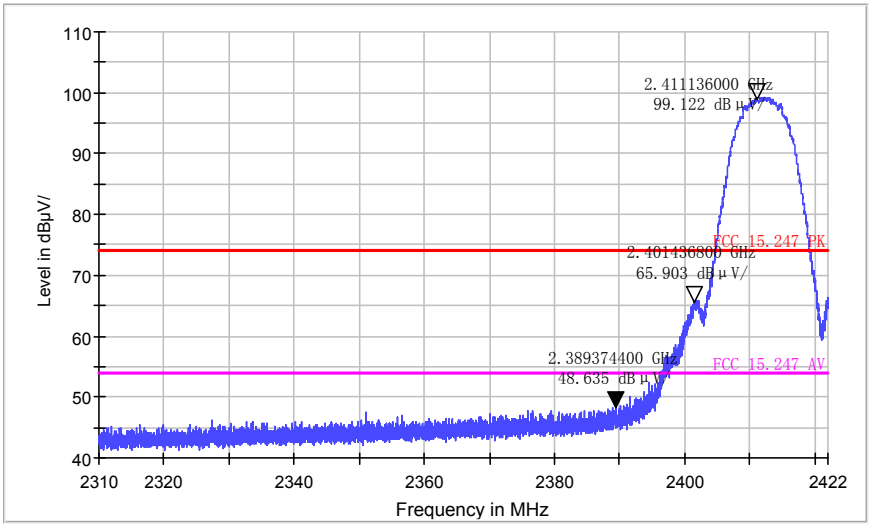
Mode 4: IEEE 802.11n 2.4GHz 20MHz Link Mode	
2412	
2462	

Mode 5: IEEE 802.11n 2.4GHz 40MHz Link Mode	
2422	
2452	

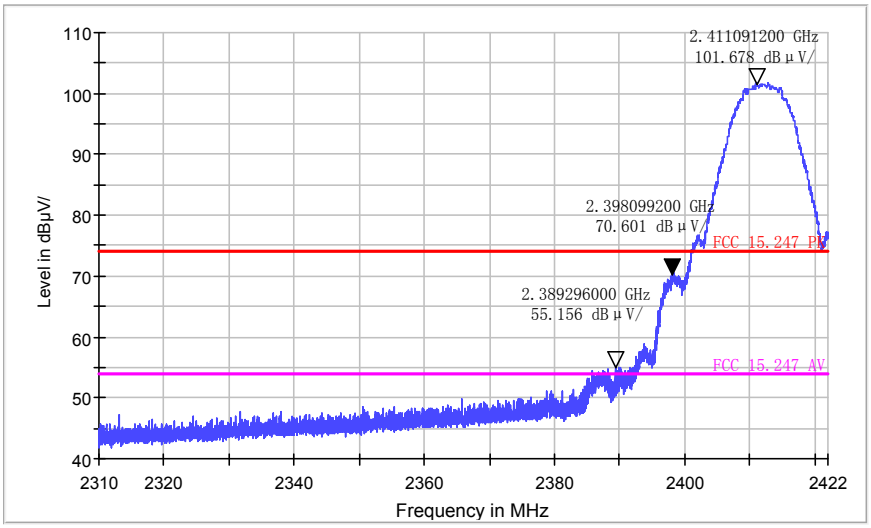
Radiated Band Edge spurious semission

Mode 2: IEEE 802.11b Link Mode

2412/H



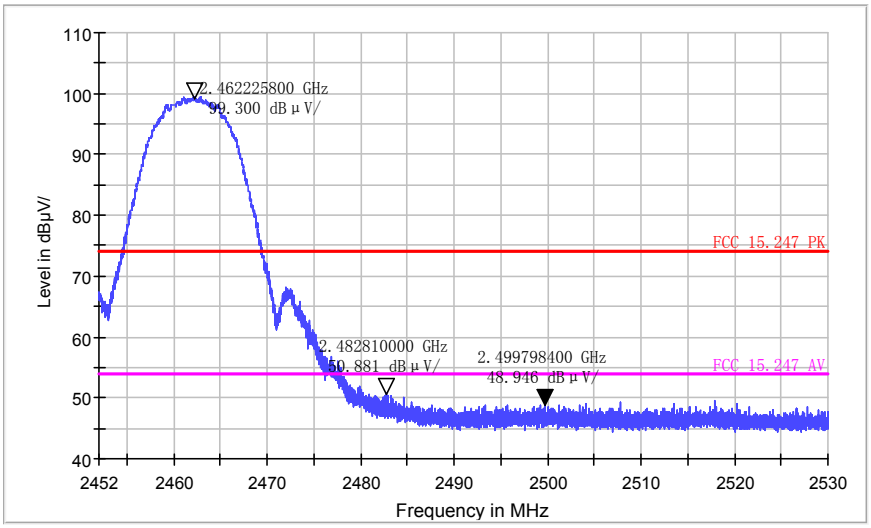
2412/V



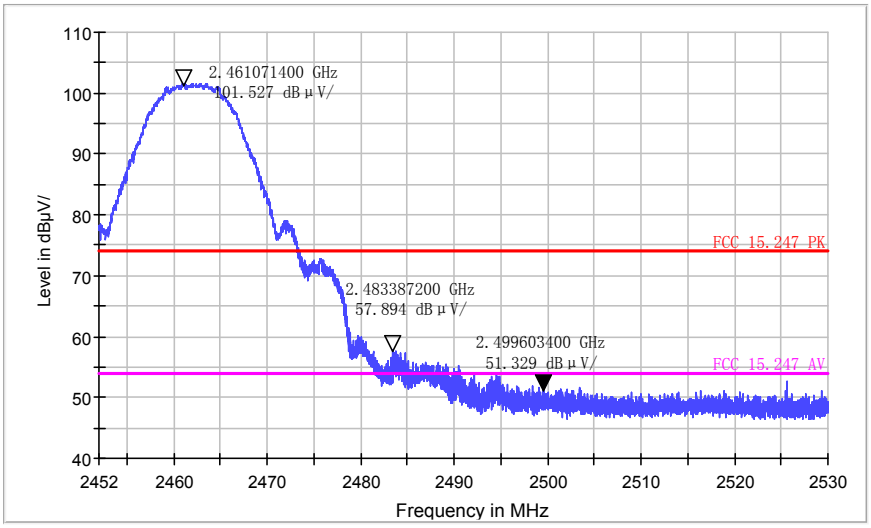
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2389.3	48.64	74	25.36	H	Peak
2390.2	35.63	54	18.37	H	Average
2389.3	55.15	74	18.85	V	Peak
2390.7	44.21	54	9.79	V	Average

Mode 2: IEEE 802.11b Link Mode

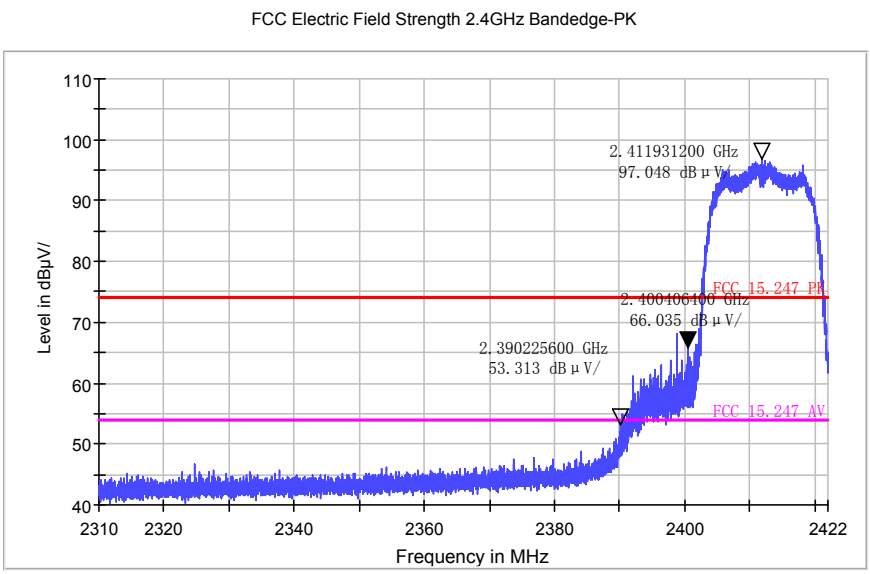
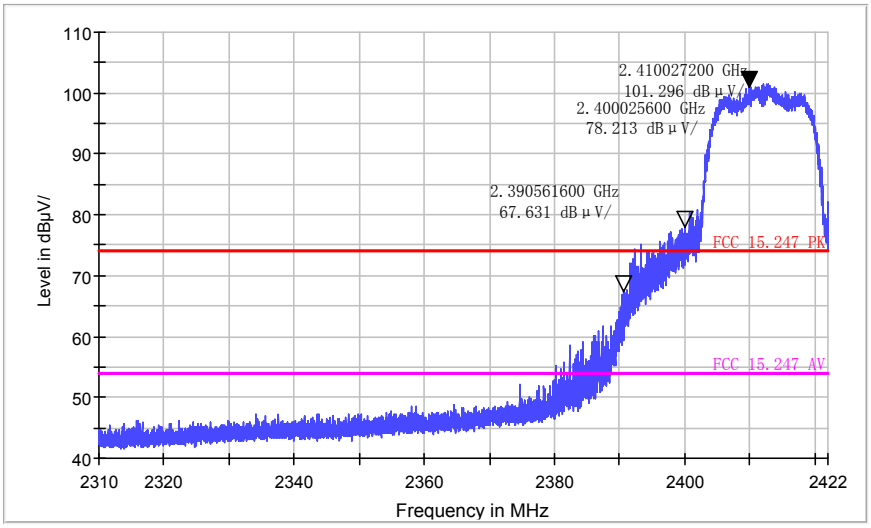
2462/H



2462/V



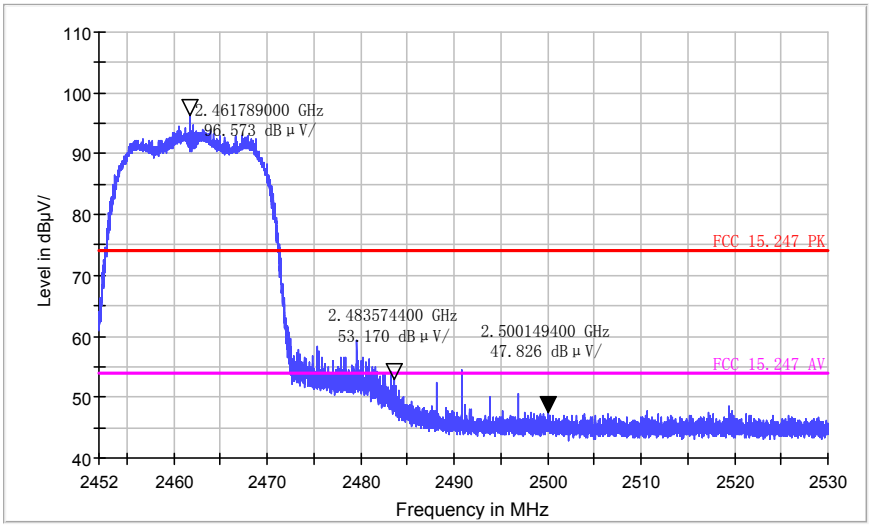
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2483.5	50.88	74	23.12	H	Peak
2483.5	39.93	54	14.07	H	Average
2483.5	57.89	74	16.11	V	Peak
2483.5	52.99	54	1.01	V	Average

Mode 3: IEEE 802.11g Link Mode	
2412/H	
2412/V	

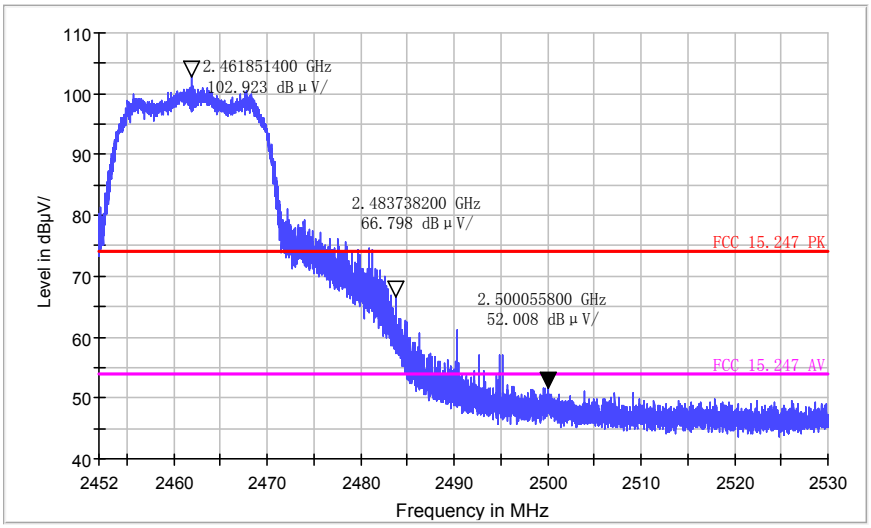
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2390.2	53.31	74	20.69	H	Peak
2390.7	40.26	54	13.74	H	Average
2390.6	67.63	74	6.37	V	Peak
2390.7	50.54	54	3.46	V	Average

Mode 3: IEEE 802.11g Link Mode

2462/H



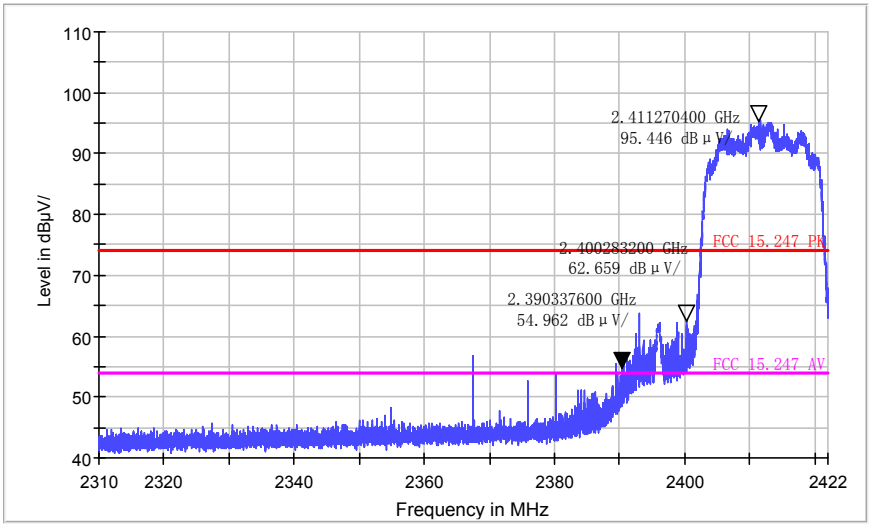
2462/V



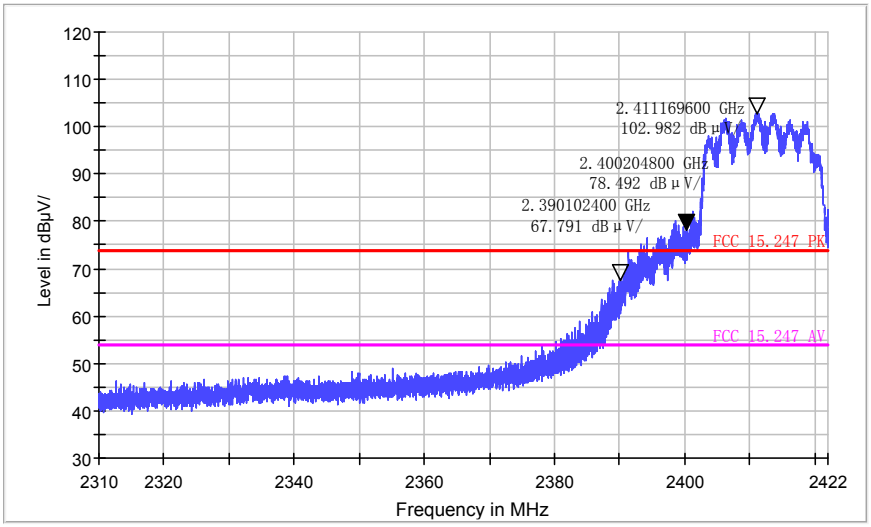
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2483.5	53.17	74	20.83	H	Peak
2483.5	39.21	54	14.79	H	Average
2483.5	66.80	74	7.20	V	Peak
2483.5	48.86	54	5.14	V	Average

Mode 4: IEEE 802.11n 20MHz Link Mode

2412/H



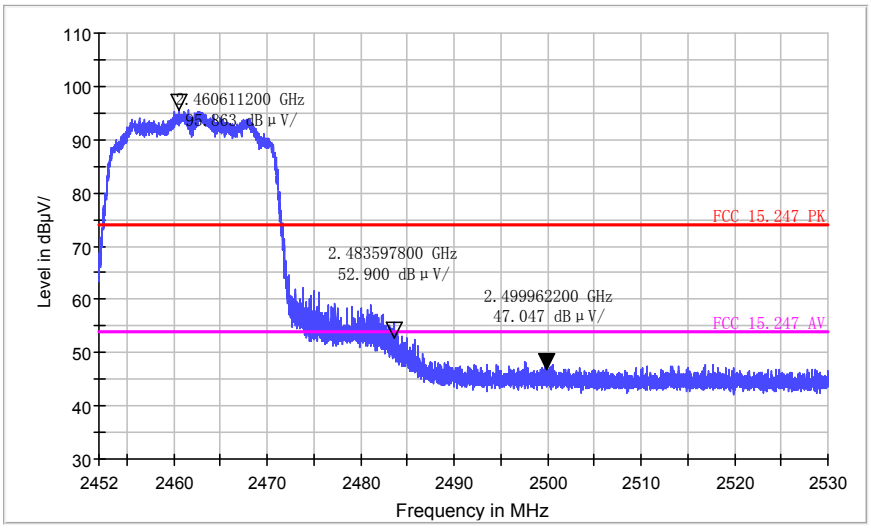
2412/V



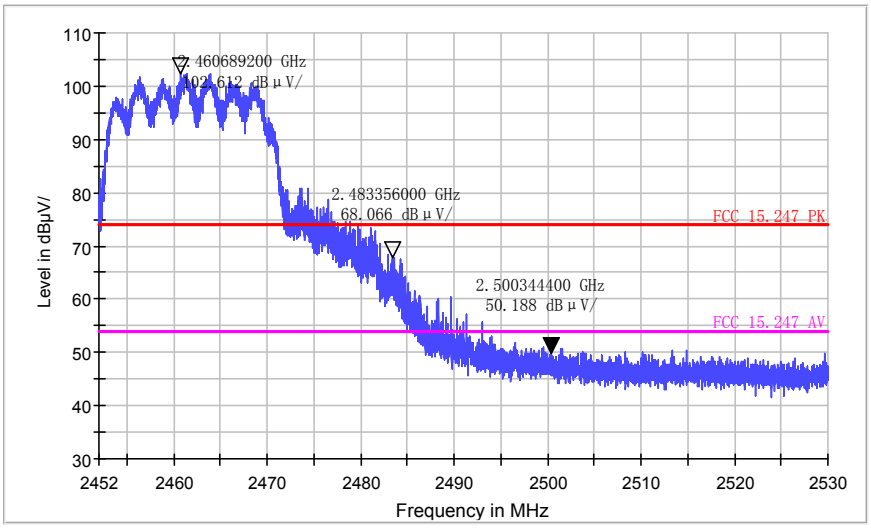
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2390.3	54.96	74	19.04	H	Peak
2390.9	44.19	54	9.81	H	Average
2390.1	67.79	74	6.21	V	Peak
2390.1	52.14	54	1.86	V	Average

Mode 4: IEEE 802.11n 20MHz Link Mode

2462/H



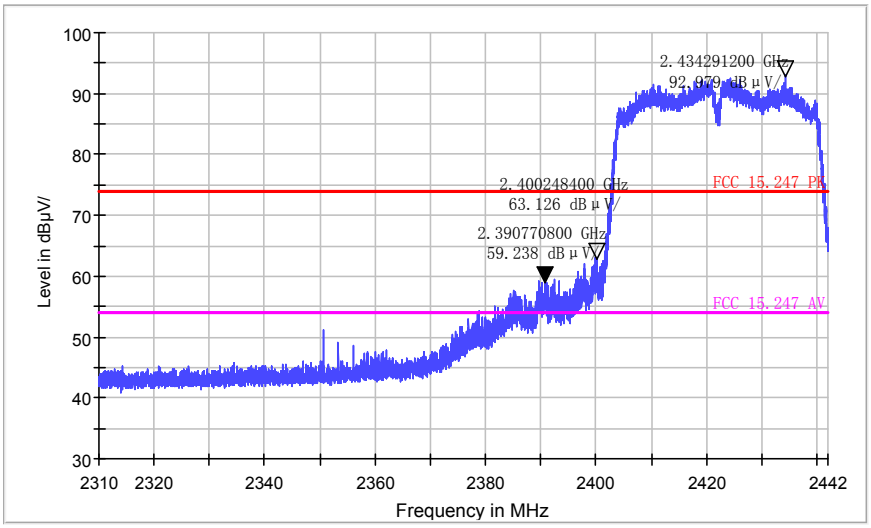
2462/V



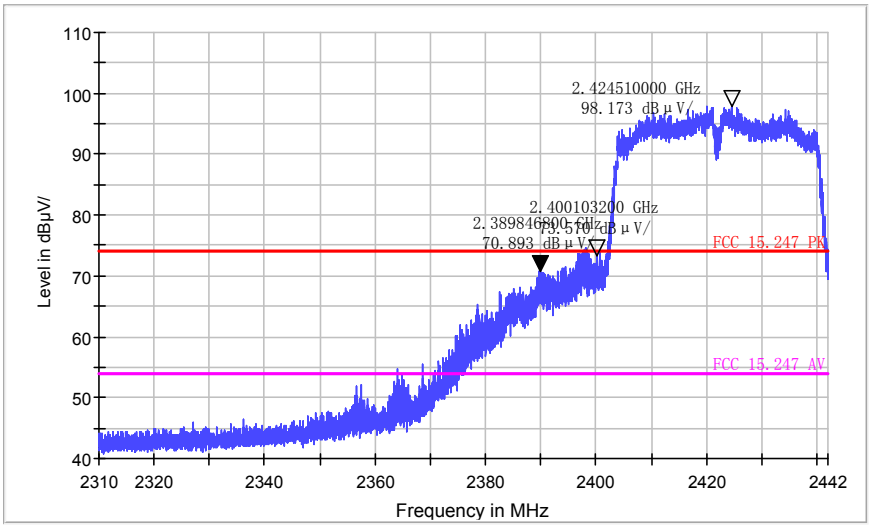
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2483.5	52.90	74	21.1	H	Peak
2483.5	39.83	54	14.17	H	Average
2483.5	66.07	74	7.93	V	Peak
2483.5	52.96	54	1.04	V	Average

Mode 5: IEEE 802.11n 40MHz Link Mode

2422/H



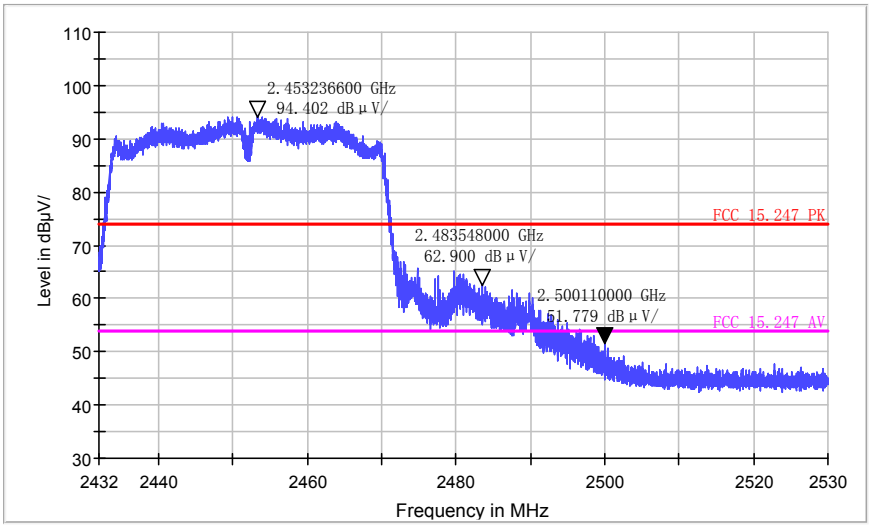
2422/V



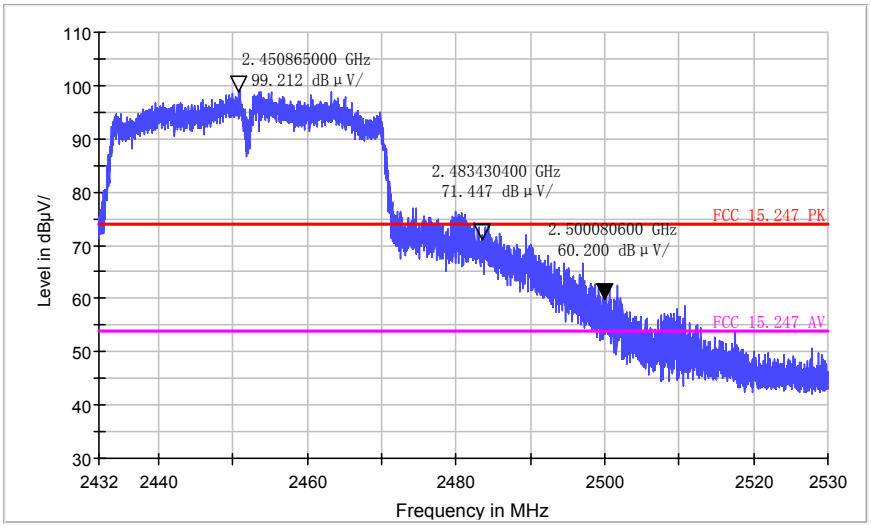
Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2390.7	59.24	74	14.76	H	Peak
2390.8	40.16	54	13.84	H	Average
2389.8	70.89	74	3.11	V	Peak
2390.4	52.38	54	1.62	V	Average

Mode 5: IEEE 802.11n 40MHz Link Mode

2452/H



2452/V



Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna	Remark
2483.5	62.90	74	11.1	H	Peak
2483.5	40.10	54	13.9	H	Average
2483.5	71.45	74	2.55	V	Peak
2483.5	49.63	54	4.37	V	Average

11 Antenna Measurement

11.1. Limit

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.
And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Antenna Connector Construction

The antenna used in this product is External Integral Antenna. And the maximum Gain of this antenna is only 5.0 dBi.