8.5 Frequency Stability

▣ Test requirements

Manufacturers 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.

▣ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -20 ℃ and +50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

▣ Test Result : Comply

U-NII-1 & U-NII-2 : (5150 MHz ~ 5350 MHz)

26 dB Bandwidth Reference	
Low edge(MHz)	**High edge(MHz)**
5169.618750	5330.662500

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency					
		5180 MHz			5320 MHz		
		Measured Frequency (Hz)	Deviation (%)	26dBc low edge Note 1 (Hz)	Measured Frequency (Hz)	Deviation (%)	26dBc High edge Note 2 (Hz)
3.800	+25(Ref)	5,179,997,286	-0.000052	5,169,616,036	5,319,998,040	-0.000037	5,330,660,540
	+50	5,179,996,995	-0.000058	5,169,615,745	5,319,996,959	-0.000057	5,330,659,459
	+40	5,179,997,055	-0.000057	5,169,615,805	5,319,997,340	-0.000050	5,330,659,840
	+30	5,179,997,153	-0.000055	5,169,615,903	5,319,997,440	-0.000048	5,330,659,940
	+20	5,179,997,243	-0.000053	5,169,615,993	5,319,997,715	-0.000043	5,330,660,215
	+10	5,179,997,346	-0.000051	5,169,616,096	5,319,998,005	-0.000038	5,330,660,505
	0	5,179,997,857	-0.000041	5,169,616,607	5,319,998,455	-0.000029	5,330,660,955
	-10	5,180,004,166	0.000080	5,169,622,916	5,319,998,429	-0.000030	5,330,660,929
	-20	5,180,004,345	0.000084	5,169,623,095	5,319,998,660	-0.000025	5,330,661,160
3.230	+25	5,179,997,004	-0.000058	5,169,615,754	5,319,998,060	-0.000036	5,330,660,560
4.370	+25	5,179,997,345	-0.000051	5,169,616,095	5,319,998,153	-0.000035	5,330,660,653

Note 1: **26 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc low edge (Hz)**

Note 2: **26 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc High edge (Hz)**

U-NII-3 : (5470 MHz ~ 5725 MHz)

26 dB Bandwidth Reference	
Low edge	**High edge**
5489.575000	5710.437500

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency					
		5500 MHz			5700 MHz		
		Measured Frequency (Hz)	Deviation (%)	26dBc low edge Note 1 (Hz)	Measured Frequency (Hz)	Deviation (%)	26dBc high edge Note 2 (Hz)
3.800	+25(Ref)	5,499,997,962	-0.000037	5,489,572,962	5,699,997,851	-0.000038	5,710,435,351
	+50	5,499,997,165	-0.000052	5,489,572,165	5,699,997,005	-0.000053	5,710,434,505
	+40	5,499,997,518	-0.000045	5,489,572,518	5,699,997,157	-0.000050	5,710,434,657
	+30	5,499,997,846	-0.000039	5,489,572,846	5,699,997,486	-0.000044	5,710,434,986
	+20	5,499,997,994	-0.000036	5,489,572,994	5,699,997,926	-0.000036	5,710,435,426
	+10	5,499,998,043	-0.000036	5,489,573,043	5,699,998,528	-0.000026	5,710,436,028
	0	5,499,998,346	-0.000030	5,489,573,346	5,699,999,046	-0.000017	5,710,436,546
	-10	5,499,998,529	-0.000027	5,489,573,529	5,699,999,659	-0.000006	5,710,437,159
	-20	5,499,998,640	-0.000025	5,489,573,640	5,700,004,785	0.000084	5,710,442,285
3.230	+25	5,499,997,894	-0.000038	5,489,572,894	5,699,997,966	-0.000036	5,710,435,466
4.370	+25	5,499,997,995	-0.000036	5,489,572,995	5,699,997,949	-0.000036	5,710,435,449

Note 1: **26 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc low edge (Hz)**

Note 2: **26 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **26dBc High edge (Hz)**

U-NII-4 : (5725 MHz ~ 5850 MHz)

6 dB Bandwidth Reference Note 1	
Low edge	**High edge**
5736.725000	5833.237500

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency					
		5745 MHz			5825 MHz		
		Measured Frequency (Hz)	Deviation (%)	6dBc low edge Note 1 (Hz)	Measured Frequency (Hz)	Deviation (%)	6dBc high edge Note 2 (Hz)
3.800	+25(Ref)	5,745,004,969	0.000086	5,736,729,969	5,825,005,620	0.000096	5,833,243,120
	+50	5,745,004,297	0.000075	5,736,729,297	5,825,004,851	0.000083	5,833,242,351
	+40	5,745,004,348	0.000076	5,736,729,348	5,825,005,159	0.000089	5,833,242,659
	+30	5,745,004,852	0.000084	5,736,729,852	5,825,005,518	0.000095	5,833,243,018
	+20	5,745,004,957	0.000086	5,736,729,957	5,825,005,649	0.000097	5,833,243,149
	+10	5,745,005,746	0.000100	5,736,730,746	5,825,006,155	0.000106	5,833,243,655
	0	5,745,005,957	0.000104	5,736,730,957	5,825,006,660	0.000114	5,833,244,160
	-10	5,745,006,346	0.000110	5,736,731,346	5,825,006,958	0.000119	5,833,244,458
	-20	5,745,006,758	0.000118	5,736,731,758	5,825,007,346	0.000126	5,833,244,846
3.230	+25	5,745,004,995	0.000087	5,736,729,995	5,825,005,775	0.000099	5,833,243,275
4.370	+25	5,745,005,007	0.000087	5,736,730,007	5,825,005,766	0.000099	5,833,243,266

Note 1: **6 dB Bandwidth Reference Low edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **6dBc low edge (Hz)**

Note 2: **6 dB Bandwidth Reference High edge (Hz)** + (**Measured Frequency (Hz)** - **Operating Frequency (Hz)**) = **6dBc High edge (Hz)**

8.6 Radiated Spurious Emission Measurements

▣ Test Procedure

▪ **FCC Part 15.209(a) and (b)**

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

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

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

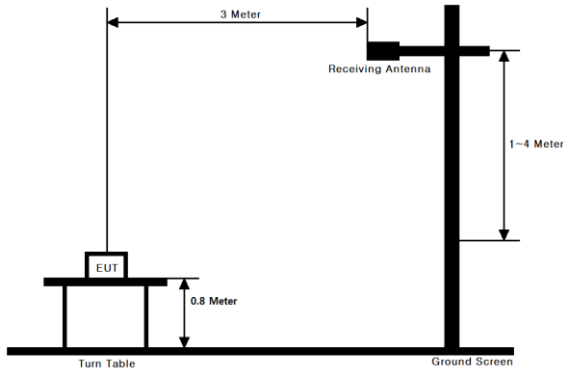
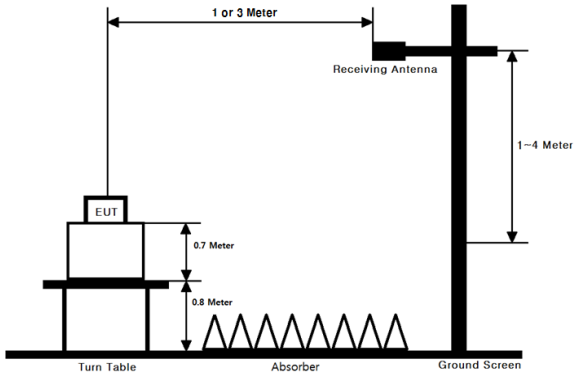
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	160.52475 ~ 160.52525	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	160.7 ~ 160.9	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		
			3600 ~ 4000		

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

▪ **FCC Part 15.407 (b):** Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the **5.15 - 5.25 GHz band**: all emissions outside of the **5.15 - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm / MHz**.
(2) For transmitters operating in the **5.25 - 5.35 GHz band**: all emissions outside of the **5.15 - 5.35 GHz band** shall not exceed an **EIRP of -27 dBm / MHz**.
(3) For transmitters operating in the **5.47 - 5.725 GHz band**: all emissions outside of the **5.47 - 5.725 GHz band** shall not exceed an **EIRP of -27 dBm / MHz.**
(4) For transmitters operating in the **5.725 - 5.85 GHz band**: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm / MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm / MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.
(7) The provisions of §15.205 apply to intentional radiators operating under this section
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

▣ Test Procedure

Below 1GHz	Above 1GHz
	

▣ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02 V01**

► **General Requirements for Unwanted Emissions Measurements**

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

- EUT Duty Cycle

(1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

(2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:

- The EUT shall be configured to operate at the maximum achievable duty cycle.
- Measure the duty cycle, x, of the transmitter output signal.
- Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
- The test report shall include the following additional information:
  - The reason for the duty cycle limitation.
  - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
  - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.

(3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

► **Measurements below 1000 MHz**

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► **Measurements Above 1000 MHz (Peak)**

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Peak emission levels are measured by setting the analyzer as follows:

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = Peak.**

(iv) Sweep time = Auto.

(v) Trace mode = Max hold.

(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000 MHz (Method AD)**

(i) **RBW = 1 MHz.**

(ii) **VBW ≥ 3 MHz.**

(iii) **Detector = RMS**, if span / (# of points in sweep) ≤ RBW / 2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.

(iv) Averaging type = power (i.e., RMS)

• As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.

(v) Sweep time = Auto.

(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.

(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

• **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.**

For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.

• If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log (1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.

• If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

▣ Measurement Data:

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-1***

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36 (5180 MHz)	5121.120	H	X	PK	46.44	10.04	N/A	N/A	56.48	74.00	17.52
	5121.120	H	X	AV	35.45	10.04	3.19	N/A	48.68	54.00	5.32
	5120.756	V	Y	PK	45.47	10.04	N/A	N/A	55.51	74.00	18.49
	5120.756	V	Y	AV	35.64	10.04	3.19	N/A	48.87	54.00	5.13
40 (5200 MHz)	5148.052	H	X	PK	46.01	10.02	N/A	N/A	56.03	74.00	17.97
	5148.052	H	X	AV	35.52	10.02	3.19	N/A	48.73	54.00	5.27
	5098.708	V	Y	PK	47.27	10.06	N/A	N/A	57.33	74.00	16.67
	5098.708	V	Y	AV	35.89	10.06	3.19	N/A	49.14	54.00	4.86
48 (5240 MHz)	10479.912	V	X	PK	46.16	13.02	N/A	-9.54	49.64	68.20	18.56
	10480.056	H	Z	PK	45.05	13.02	N/A	-9.54	48.53	68.20	19.67

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-2***

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
52 (5260 MHz)	10520.276	V	Y	PK	46.10	13.12	N/A	-9.54	49.68	68.20	18.52
	10520.048	H	Z	PK	46.66	13.12	N/A	-9.54	50.24	68.20	17.96
60 (5300 MHz)	5373.946	H	Y	PK	47.22	10.55	N/A	N/A	57.77	74.00	16.23
	5373.946	H	Y	AV	35.82	10.55	3.19	N/A	49.56	54.00	4.44
	5355.552	V	Z	PK	46.70	10.55	N/A	N/A	57.25	74.00	16.75
	5355.552	V	Z	AV	36.10	10.55	3.19	N/A	49.84	54.00	4.16
64 (5320 MHz)	5359.940	H	Y	PK	47.33	10.57	N/A	N/A	57.90	74.00	16.10
	5359.940	H	Y	AV	35.16	10.57	3.19	N/A	48.92	54.00	5.08
	5358.920	V	Z	PK	47.03	10.57	N/A	N/A	57.60	74.00	16.40
	5358.920	V	Z	AV	36.01	10.57	3.19	N/A	49.77	54.00	4.23

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-3***

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100 (5500 MHz)	5447.696	H	X	PK	46.50	10.77	N/A	N/A	57.27	74.00	16.73
	5447.696	H	X	AV	35.90	10.77	3.19	N/A	49.86	54.00	4.14
	5451.824	V	X	PK	46.48	10.78	N/A	N/A	57.26	74.00	16.74
	5451.824	V	X	AV	35.65	10.78	3.19	N/A	49.62	54.00	4.38
116 (5580 MHz)	11160.136	H	X	PK	46.77	14.23	N/A	-9.54	51.46	74.00	22.54
	11159.908	H	X	AV	37.78	14.23	3.19	-9.54	45.66	54.00	8.34
	11159.972	V	X	PK	42.63	14.23	N/A	-9.54	47.32	74.00	26.68
	11159.872	V	X	AV	35.00	14.23	3.19	-9.54	42.88	54.00	11.12
140 (5700 MHz)	11399.952	H	X	PK	45.17	14.61	N/A	-9.54	50.24	74.00	23.76
	11399.976	H	X	AV	37.67	14.61	3.19	-9.54	45.93	54.00	8.07
	11400.260	V	X	PK	45.69	14.61	N/A	-9.54	50.76	74.00	23.24
	11400.040	V	X	AV	37.76	14.61	3.19	-9.54	46.02	54.00	7.98

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-4***

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
149 (5745 MHz)	11489.952	V	X	PK	45.96	14.75	N/A	-9.54	51.17	74.00	22.83
	11489.884	V	X	AV	39.74	14.75	3.19	-9.54	48.14	54.00	5.86
	11490.420	H	Y	PK	45.03	14.75	N/A	-9.54	50.24	74.00	23.76
	11489.996	H	Y	AV	38.87	14.75	3.19	-9.54	47.27	54.00	6.73
157 (5785 MHz)	11570.220	V	X	PK	44.73	14.86	N/A	-9.54	50.05	74.00	23.95
	11570.140	V	X	AV	38.63	14.86	3.19	-9.54	47.14	54.00	6.86
	11570.220	H	Y	PK	43.89	14.86	N/A	-9.54	49.21	74.00	24.79
	11569.992	H	Y	AV	37.67	14.86	3.19	-9.54	46.18	54.00	7.82
165 (5825 MHz)	11650.388	V	X	PK	44.61	14.95	N/A	-9.54	50.02	74.00	23.98
	11650.012	V	X	AV	37.09	14.95	3.19	-9.54	45.69	54.00	8.31
	11649.836	H	Y	PK	44.84	14.95	N/A	-9.54	50.25	74.00	23.75
	11650.020	H	Y	AV	38.56	14.95	3.19	-9.54	47.16	54.00	6.84

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

▣ Measurement Data:

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & U-NII-1*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
36 (5180 MHz)	5141.560	H	Y	PK	46.92	10.03	N/A	N/A	56.95	74.00	17.05
	5141.560	H	Y	AV	35.33	10.03	3.38	N/A	48.74	54.00	5.26
	5142.932	V	Z	PK	45.99	10.03	N/A	N/A	56.02	74.00	17.98
	5142.932	V	Z	AV	35.33	10.03	3.38	N/A	48.74	54.00	5.26
40 (5200 MHz)	5144.820	H	Y	PK	46.32	10.02	N/A	N/A	56.34	74.00	17.66
	5144.820	H	Y	AV	35.62	10.02	3.38	N/A	49.02	54.00	4.98
	5143.924	V	Z	PK	47.32	10.02	N/A	N/A	57.34	74.00	16.66
	5143.924	V	Z	AV	35.24	10.02	3.38	N/A	48.64	54.00	5.36
48 (5240 MHz)	10479.752	H	Y	PK	46.04	13.02	N/A	-9.54	49.52	68.20	18.68
	10479.756	V	Z	PK	47.62	13.02	N/A	-9.54	51.10	68.20	17.10

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11 n(HT20) & U-NII-2*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
52 (5260 MHz)	10520.084	V	Y	PK	46.72	13.12	N/A	-9.54	50.30	68.20	17.90
	10520.064	H	Z	PK	47.09	13.12	N/A	-9.54	50.67	68.20	17.53
60 (5300 MHz)	5354.226	V	X	PK	46.07	10.56	N/A	N/A	56.63	74.00	17.37
	5354.226	V	X	AV	35.66	10.56	3.38	N/A	49.60	54.00	4.40
	5353.172	H	Y	PK	47.43	10.56	N/A	N/A	57.99	74.00	16.01
	5353.172	H	Y	AV	36.45	10.56	3.38	N/A	50.39	54.00	3.61
64 (5320 MHz)	5372.900	V	X	PK	46.47	10.60	N/A	N/A	57.07	74.00	16.93
	5372.900	V	X	AV	35.90	10.60	3.38	N/A	49.88	54.00	4.12
	5366.210	H	Y	PK	46.83	10.59	N/A	N/A	57.42	74.00	16.58
	5366.210	H	Y	AV	35.68	10.59	3.38	N/A	49.65	54.00	4.35

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & U-NII-3*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
100 (5500 MHz)	5455.312	H	Y	PK	46.65	10.79	N/A	N/A	57.44	74.00	16.56
	5455.312	H	Y	AV	35.78	10.79	3.38	N/A	49.95	54.00	4.05
	5448.304	V	Z	PK	47.85	10.77	N/A	N/A	58.62	74.00	15.38
	5448.304	V	Z	AV	36.12	10.77	3.38	N/A	50.27	54.00	3.73
116 (5580 MHz)	11160.368	H	Y	PK	45.50	14.23	N/A	-9.54	50.19	74.00	23.81
	11159.992	H	Y	AV	37.64	14.23	3.38	-9.54	45.71	54.00	8.29
	11160.060	V	Z	PK	44.87	14.23	N/A	-9.54	49.56	74.00	24.44
	11160.004	V	Z	AV	36.04	14.23	3.38	-9.54	44.11	54.00	9.89
140 (5700 MHz)	11399.620	H	Y	PK	43.38	14.61	N/A	-9.54	48.45	74.00	25.55
	11399.924	H	Y	AV	36.56	14.61	3.38	-9.54	45.01	54.00	8.99
	11399.976	V	Z	PK	43.91	14.61	N/A	-9.54	48.98	74.00	25.02
	11400.020	V	Z	AV	37.01	14.61	3.38	-9.54	45.46	54.00	8.54

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & U-NII-4*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
149 (5745 MHz)	11490.012	V	X	PK	46.27	14.75	N/A	-9.54	51.48	74.00	22.52
	11490.116	V	X	AV	39.78	14.75	3.38	-9.54	48.37	54.00	5.63
	11490.256	H	Z	PK	44.23	14.75	N/A	-9.54	49.44	74.00	24.56
	11489.844	H	Z	AV	36.45	14.75	3.38	-9.54	45.04	54.00	8.96
157 (5785 MHz)	11569.956	V	X	PK	44.61	14.86	N/A	-9.54	49.93	74.00	24.07
	11569.876	V	X	AV	38.48	14.86	3.38	-9.54	47.18	54.00	6.82
	11569.928	H	Z	PK	43.91	14.86	N/A	-9.54	49.23	74.00	24.77
	11569.928	H	Z	AV	36.96	14.86	3.38	-9.54	45.66	54.00	8.34
165 (5825 MHz)	11649.740	V	X	PK	43.19	14.95	N/A	-9.54	48.60	74.00	25.40
	11649.968	V	X	AV	36.02	14.95	3.38	-9.54	44.81	54.00	9.19
	11649.808	H	Z	PK	44.90	14.86	N/A	-9.54	50.22	74.00	23.78
	11650.000	H	Z	AV	38.77	14.86	3.38	-9.54	47.47	54.00	6.53

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

▣ Measurement Data:

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-1*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
38 (5190 MHz)	5149.904	V	Y	PK	46.72	10.02	N/A	N/A	56.74	74.00	17.26
	5149.904	V	Y	AV	34.63	10.02	4.82	N/A	49.47	54.00	4.53
	5147.344	H	Z	PK	44.73	10.02	N/A	N/A	54.75	74.00	19.25
	5147.344	H	Z	AV	33.81	10.02	4.82	N/A	48.65	54.00	5.35
46 (5230 MHz)	10460.036	V	Y	PK	46.52	12.97	N/A	-9.54	49.95	68.20	18.25
	10459.844	H	Z	PK	46.25	12.97	N/A	-9.54	49.68	68.20	18.52

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11 n(HT40) & U-NII-2*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
54 (5270 MHz)	5358.480	H	X	PK	44.07	10.57	N/A	N/A	54.64	74.00	19.36
	5358.480	H	X	AV	34.15	10.57	4.82	N/A	49.54	54.00	4.46
	5352.856	V	X	PK	44.16	10.56	N/A	N/A	54.72	74.00	19.28
	5352.856	V	X	AV	33.67	10.56	4.82	N/A	49.05	54.00	4.95
62 (5310 MHz)	5359.166	H	X	PK	44.44	10.57	N/A	N/A	55.01	74.00	18.99
	5359.166	H	X	AV	33.81	10.57	4.82	N/A	49.20	54.00	4.80
	5363.790	V	X	PK	45.23	10.58	N/A	N/A	55.81	74.00	18.19
	5363.790	V	X	AV	33.77	10.58	4.82	N/A	49.17	54.00	4.83

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-3*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
102 (5510 MHz)	5443.096	H	Y	PK	44.04	10.76	N/A	N/A	54.80	74.00	19.20
	5443.096	H	Y	AV	33.36	10.76	4.82	N/A	48.94	54.00	5.06
	5457.856	V	Z	PK	43.93	10.79	N/A	N/A	54.72	74.00	19.28
	5457.856	V	Z	AV	33.13	10.79	4.82	N/A	48.74	54.00	5.26
110 (5550 MHz)	11100.040	V	X	PK	44.53	14.14	N/A	-9.54	49.13	74.00	24.87
	11100.036	V	X	AV	37.09	14.14	4.82	-9.54	46.51	54.00	7.49
	11100.184	H	Y	PK	44.22	14.14	N/A	-9.54	48.82	74.00	25.18
	11100.008	H	Y	AV	38.38	14.14	4.82	-9.54	47.80	54.00	6.20
134 (5670 MHz)	11339.672	V	X	PK	43.90	14.52	N/A	-9.54	48.88	74.00	25.12
	11339.944	V	X	AV	36.34	14.52	4.82	-9.54	46.14	54.00	7.86
	11339.688	H	Y	PK	42.23	14.52	N/A	-9.54	47.21	74.00	26.79
	11340.208	H	Y	AV	34.76	14.52	4.82	-9.54	44.56	54.00	9.44

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & U-NII-4*

Tested Channel	Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
151 (5755 MHz)	11510.132	V	Y	PK	45.39	14.78	N/A	-9.54	50.63	74.00	23.37
	11509.984	V	Y	AV	39.09	14.78	4.82	-9.54	49.15	54.00	4.85
	11509.772	H	Z	PK	44.88	14.78	N/A	-9.54	50.12	74.00	23.88
	11510.020	H	Z	AV	38.52	14.78	4.82	-9.54	48.58	54.00	5.42
159 (5795 MHz)	11589.764	V	Y	PK	45.02	14.88	N/A	-9.54	50.36	74.00	23.64
	11589.940	V	Y	AV	38.19	14.88	4.82	-9.54	48.35	54.00	5.65
	11590.076	H	Z	PK	43.54	14.88	N/A	-9.54	48.88	74.00	25.12
	11589.792	H	Z	AV	36.50	14.88	4.82	-9.54	46.66	54.00	7.34

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor (DCF) : - 9.54 dB = 20*log (1m / 3m)
4. The limit is converted to field strength.
   E [dBuV/m] = EIRP [dBm] + 95.2 dB = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m
5. If peak measurement satisfy the average limit, then average measurement are not required.

8.7 AC Conducted Emissions

▣ **TEST PROCEDURE:**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

▣ **Measurement Data: Comply**

Note 1: See next pages for actual measured spectrum plots and data.

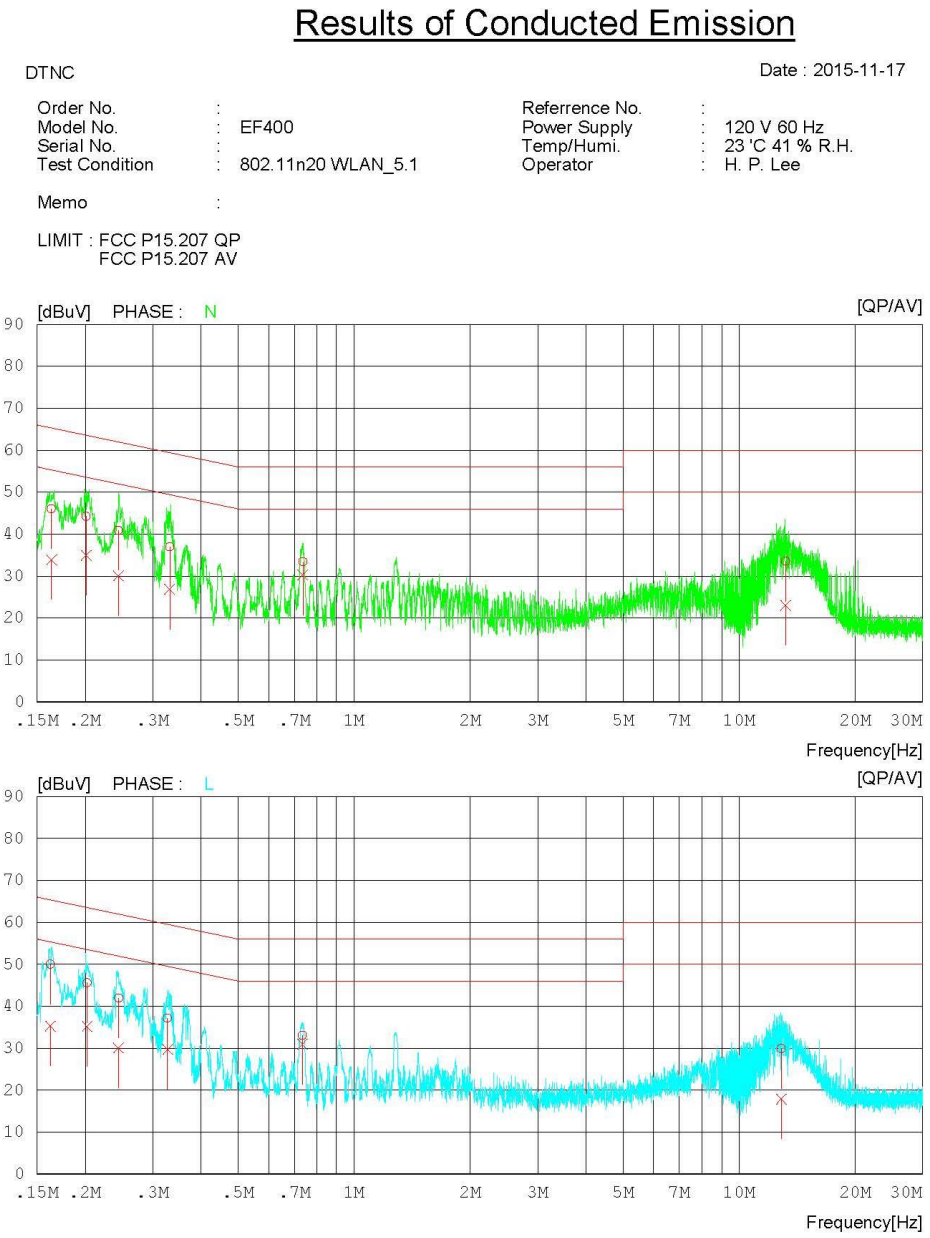
▣ **Minimum Standard: FCC Part 15.207(a)**

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 1 & 802.11n(HT20) & 5180MHz



AC Line Conducted Emissions (Data List)

Test Mode: U-NII 1 & 802.11n(HT20) & 5180MHz

Results of Conducted Emission

DTNC Date : 2015-11-17

Order No.	:		Referrence No.	:	
Model No.	:	EF400	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 41 % R.H.
Test Condition	:	802.11n20 WLAN_5.1	Operator	:	H. P. Lee

Memo :

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16350	36.0	23.8	10.1	46.1	33.9	65.3	55.3	19.2	21.4	N
2	0.20139	34.1	24.8	10.1	44.2	34.9	63.6	53.6	19.4	18.7	N
3	0.24384	30.9	20.0	10.1	41.0	30.1	62.0	52.0	21.0	21.9	N
4	0.33161	26.9	16.8	10.1	37.0	26.9	59.4	49.4	22.4	22.5	N
5	0.73546	23.4	20.2	10.1	33.5	30.3	56.0	46.0	22.5	15.7	N
6	13.22000	22.9	12.4	10.6	33.5	23.0	60.0	50.0	26.5	27.0	N
7	0.16248	39.9	25.2	10.1	50.0	35.3	65.3	55.3	15.3	20.0	L
8	0.20250	35.4	25.0	10.1	45.5	35.1	63.5	53.5	18.0	18.4	L
9	0.24421	31.8	19.9	10.1	41.9	30.0	62.0	52.0	20.1	22.0	L
10	0.32737	27.0	19.5	10.1	37.1	29.6	59.5	49.5	22.4	19.9	L
11	0.73404	23.0	20.8	10.1	33.1	30.9	56.0	46.0	22.9	15.1	L
12	12.88300	19.1	7.2	10.7	29.8	17.9	60.0	50.0	30.2	32.1	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 2 & 802.11n(HT20) & 5260MHz

Results of Conducted Emission

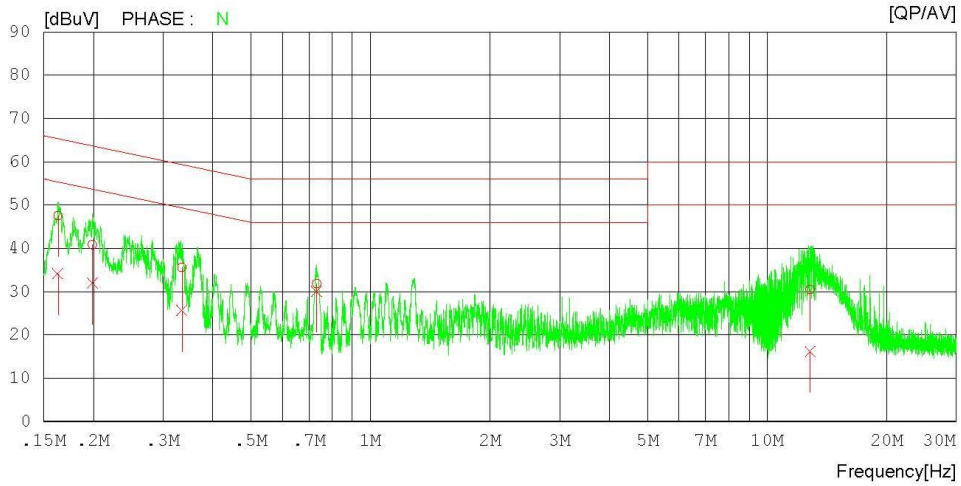
DTNC

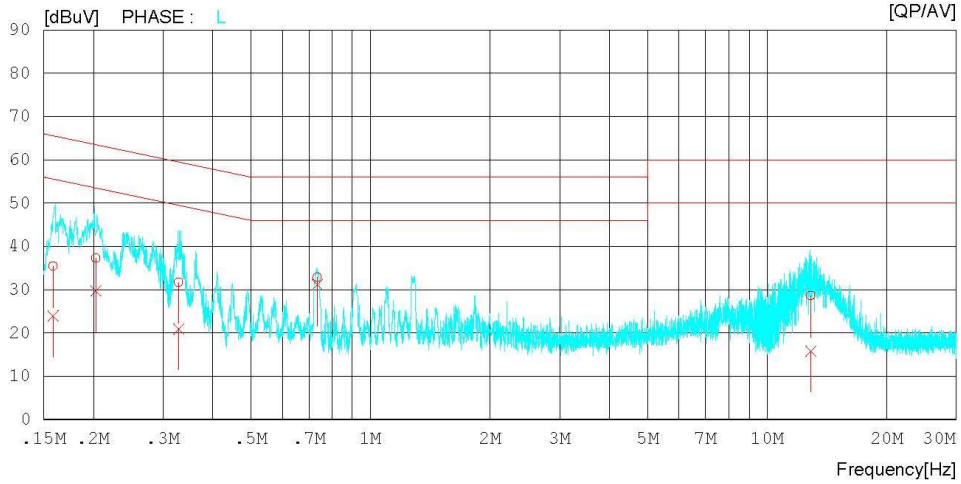
Date : 2015-11-17

Order No.	:		Referrence No.	:	
Model No.	:	EF400	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 41 % R.H.
Test Condition	:	802.11n20 WLAN_5.3	Operator	:	H. P. Lee

Memo :

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





AC Line Conducted Emissions (Data List)

Test Mode: U-NII 2 & 802.11n(HT20) & 5260MHz

Results of Conducted Emission

DTNC Date : 2015-11-17

Order No.	:		Referrence No.	:	
Model No.	:	EF400	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 41 % R.H.
Test Condition	:	802.11n20 WLAN_5.3	Operator	:	H. P. Lee

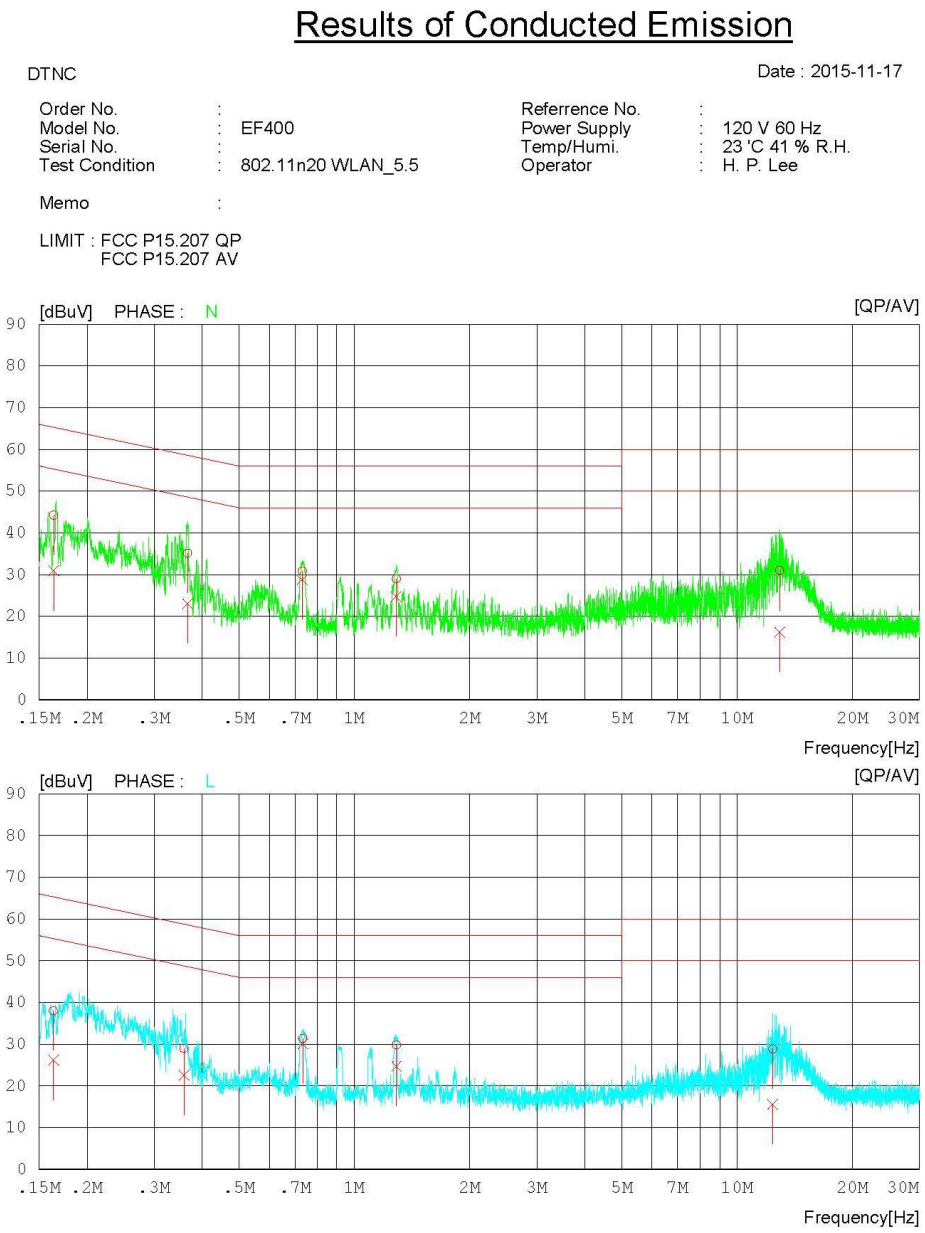
Memo :

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16288	37.4	24.0	10.1	47.5	34.1	65.3	55.3	17.8	21.2	N
2	0.19894	30.7	21.9	10.1	40.8	32.0	63.7	53.7	22.9	21.7	N
3	0.33427	25.5	15.5	10.1	35.6	25.6	59.3	49.3	23.7	23.7	N
4	0.73174	21.7	20.0	10.1	31.8	30.1	56.0	46.0	24.2	15.9	N
5	12.83900	19.8	5.6	10.6	30.4	16.2	60.0	50.0	29.6	33.8	N
6	0.15831	25.3	13.8	10.1	35.4	23.9	65.6	55.6	30.2	31.7	L
7	0.20315	27.2	19.5	10.1	37.3	29.6	63.5	53.5	26.2	23.9	L
8	0.32843	21.6	10.8	10.1	31.7	20.9	59.5	49.5	27.8	28.6	L
9	0.73457	22.7	20.9	10.1	32.8	31.0	56.0	46.0	23.2	15.0	L
10	12.89580	17.9	5.1	10.7	28.6	15.8	60.0	50.0	31.4	34.2	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11n(HT20) & 5500MHz



AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11n(HT20) & 5500MHz

Results of Conducted Emission

DTNC

Date : 2015-11-17

Order No.	:		Referrence No.	:	
Model No.	:	EF400	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 41 % R.H.
Test Condition	:	802.11n20 WLAN_5.5	Operator	:	H. P. Lee

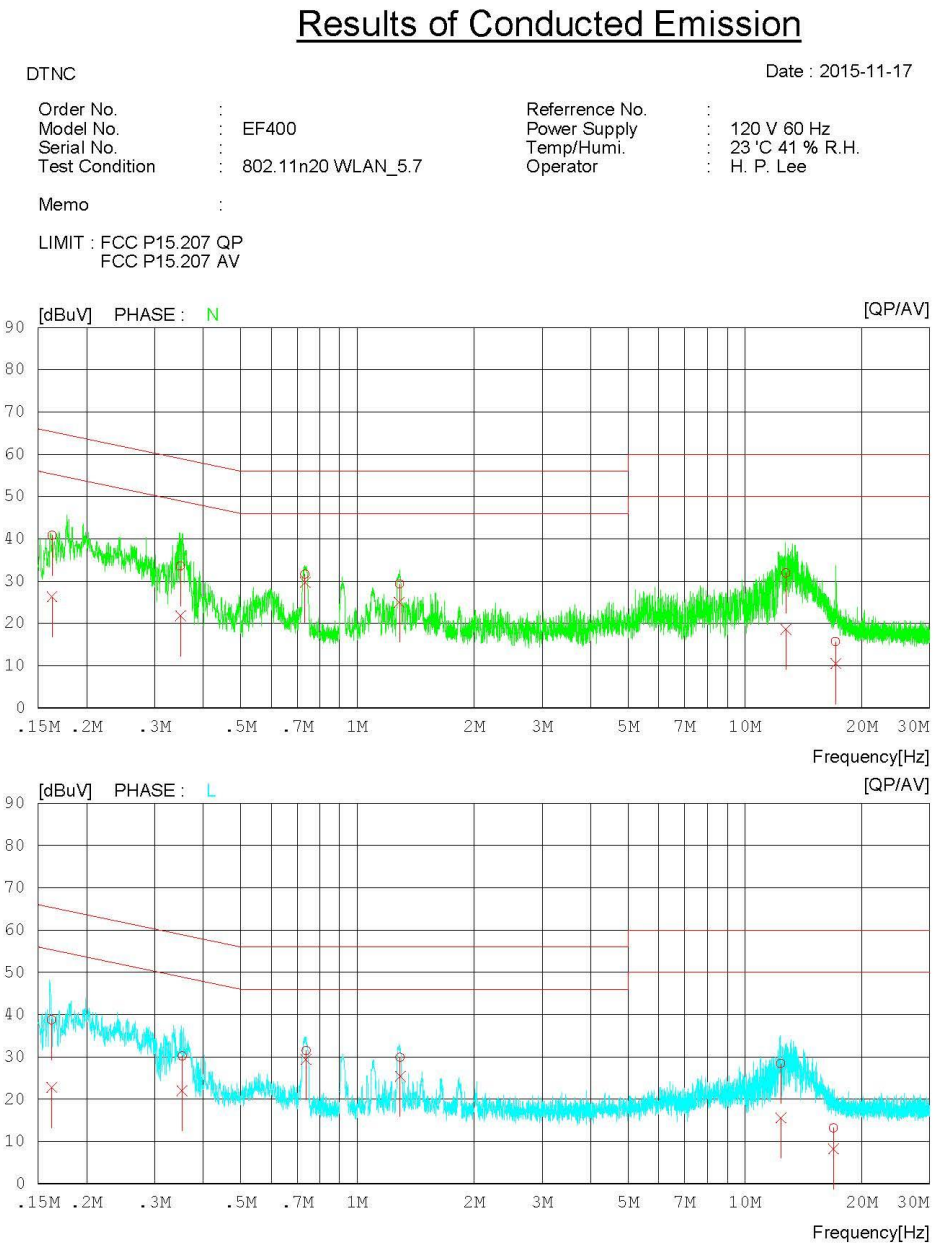
Memo :

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16385	34.1	20.9	10.1	44.2	31.0	65.3	55.3	21.1	24.3	N
2	0.36646	25.0	12.9	10.1	35.1	23.0	58.6	48.6	23.5	25.6	N
3	0.73177	20.7	18.7	10.1	30.8	28.8	56.0	46.0	25.2	17.2	N
4	1.28680	18.7	14.5	10.2	28.9	24.7	56.0	46.0	27.1	21.3	N
5	12.93680	20.4	5.6	10.6	31.0	16.2	60.0	50.0	29.0	33.8	N
6	0.16355	27.9	16.0	10.1	38.0	26.1	65.3	55.3	27.3	29.2	L
7	0.35897	18.9	12.4	10.1	29.0	22.5	58.8	48.8	29.8	26.3	L
8	0.73427	21.3	19.9	10.1	31.4	30.0	56.0	46.0	24.6	16.0	L
9	1.28820	19.5	14.5	10.2	29.7	24.7	56.0	46.0	26.3	21.3	L
10	12.40100	18.1	4.9	10.7	28.8	15.6	60.0	50.0	31.2	34.4	L

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 4 & 802.11n(HT20) & 5745MHz



AC Line Conducted Emissions (Data List)

Test Mode: U-NII 4 & 802.11n(HT20) & 5745MHz

Results of Conducted Emission

DTNC Date : 2015-11-17

Order No.	:		Referrence No.	:	
Model No.	:	EF400	Power Supply	:	120 V 60 Hz
Serial No.	:		Temp/Humi.	:	23 'C 41 % R.H.
Test Condition	:	802.11n20 WLAN_5.7	Operator	:	H. P. Lee

Memo :

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

NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16292	30.7	16.2	10.1	40.8	26.3	65.3	55.3	24.5	29.0	N
2	0.34951	23.4	11.7	10.1	33.5	21.8	59.0	49.0	25.5	27.2	N
3	0.73303	21.5	19.6	10.1	31.6	29.7	56.0	46.0	24.4	16.3	N
4	1.28480	19.1	14.9	10.2	29.3	25.1	56.0	46.0	26.7	20.9	N
5	12.77280	21.3	7.9	10.6	31.9	18.5	60.0	50.0	28.1	31.5	N
6	17.15400	5.0	-0.2	10.7	15.7	10.5	60.0	50.0	44.3	39.5	N
7	0.16251	28.6	12.7	10.1	38.7	22.8	65.3	55.3	26.6	32.5	L
8	0.35315	20.1	11.8	10.1	30.2	21.9	58.9	48.9	28.7	27.0	L
9	0.73752	21.3	19.2	10.1	31.4	29.3	56.0	46.0	24.6	16.7	L
10	1.28900	19.6	15.1	10.2	29.8	25.3	56.0	46.0	26.2	20.7	L
11	12.39220	17.7	4.9	10.7	28.4	15.6	60.0	50.0	31.6	34.4	L
12	16.95080	2.3	-2.7	10.8	13.1	8.1	60.0	50.0	46.9	41.9	L

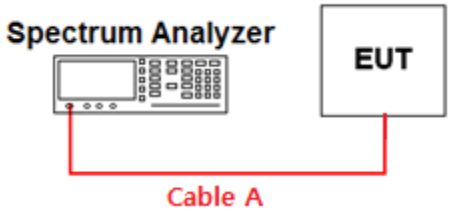
9. List of Test Equipment

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	15/02/26	16/02/26	MY50200816
PXA Signal Analyzer	Agilent Technologies	N9030A	15/10/19	16/10/19	MY53310140
Temp & Humi Test Chamber	SJ Science	SJ-TH-S50	15/02/26	16/02/26	SJ-TH-S50-140205
Multimeter	Agilent Technologies	34401A	15/01/06	16/01/06	US36099541
DC Power Supply	SM techno	SDP30-5D	15/01/06	16/01/06	305DLJ204
Vector Signal Generator	Rohde Schwarz	SMBV100A	15/01/06	16/01/06	255571
Signal Generator	Rohde Schwarz	SMF100A	15/06/29	16/06/29	102341
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A MA2490A	15/03/26	16/03/26	1306007 1249001
Thermohygrometer	BODYCOM	BJ5478	15/05/08	16/05/08	120612-2
10dB Attenuator	Aeroflex/Weinschel	86-10-11	15/09/09	16/09/09	446
Highpass Filter (8GHz)	Wainwright Instruments	WHNX6-6320-8000-26500-40CC	15/09/23	16/09/23	1
Low Noise Pre Amplifier	TSJ	MLA-010K01-B01-27	15/04/09	16/04/09	1844538
PreAmplifier	Agilent	8449B	15/02/26	16/02/26	3008A00370
PreAmplifier	A.H. SYSTEMS	PAM-1840VH	14/12/12	15/12/12	163
Loop Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB 9160	14/04/30	16/04/30	3358
HORN ANT	ETS	3117	14/05/12	16/05/12	00140394
HORN ANT	A.H.Systems	SAS-574	15/04/30	17/04/30	154
EMI TEST RECEIVER	R&S	ESR7	15/10/19	16/10/19	101109
EMI TEST RECEIVER	R&S	ESCI	15/02/25	16/02/25	100364
SINGLE-PHASE MASTER	NF	4420	15/09/09	16/09/09	3049354420023
ARTIFICIAL MAINS NETWORK	Narda S.T.S. / PMM	PMM L2-16B	15/06/26	16/06/26	000WX20305

APPENDIX I

Conducted Test set up Diagram

- **Conducted Measurement**



APPENDIX II

Duty Cycle Information

▣ **Test Procedure**

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02 V01**

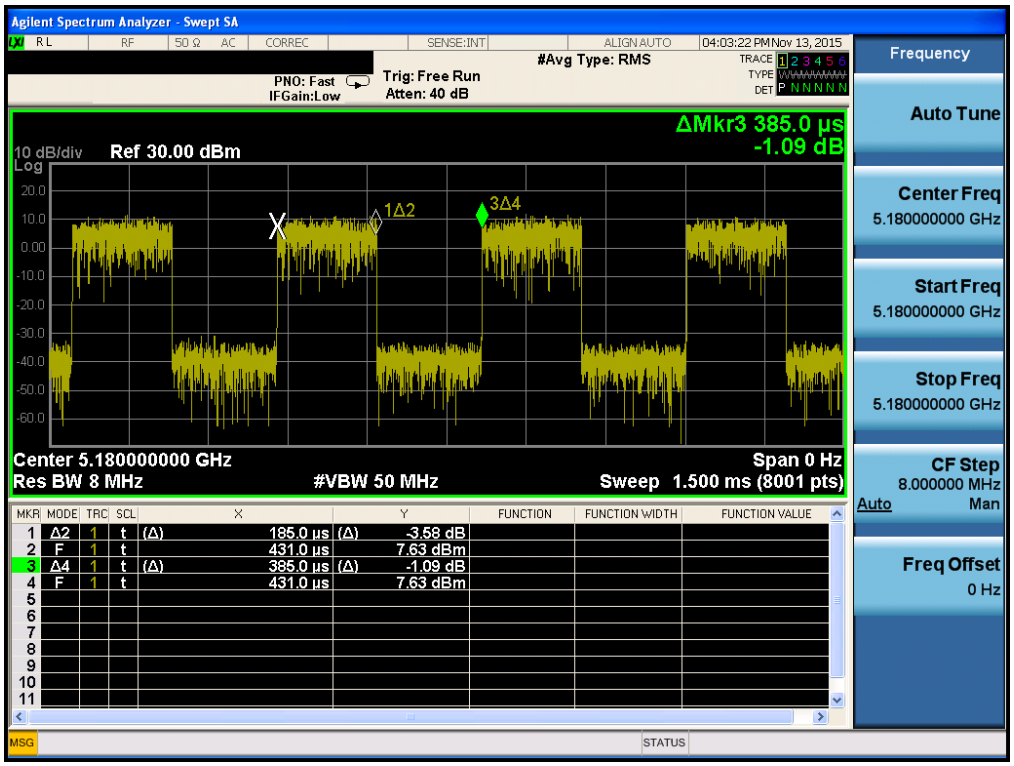
1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are > 50 / *T***, where *T* is defined in section II.B.1.a), and **the number of sweep points across duration *T* exceeds 100**. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

T: The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
(***T* = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

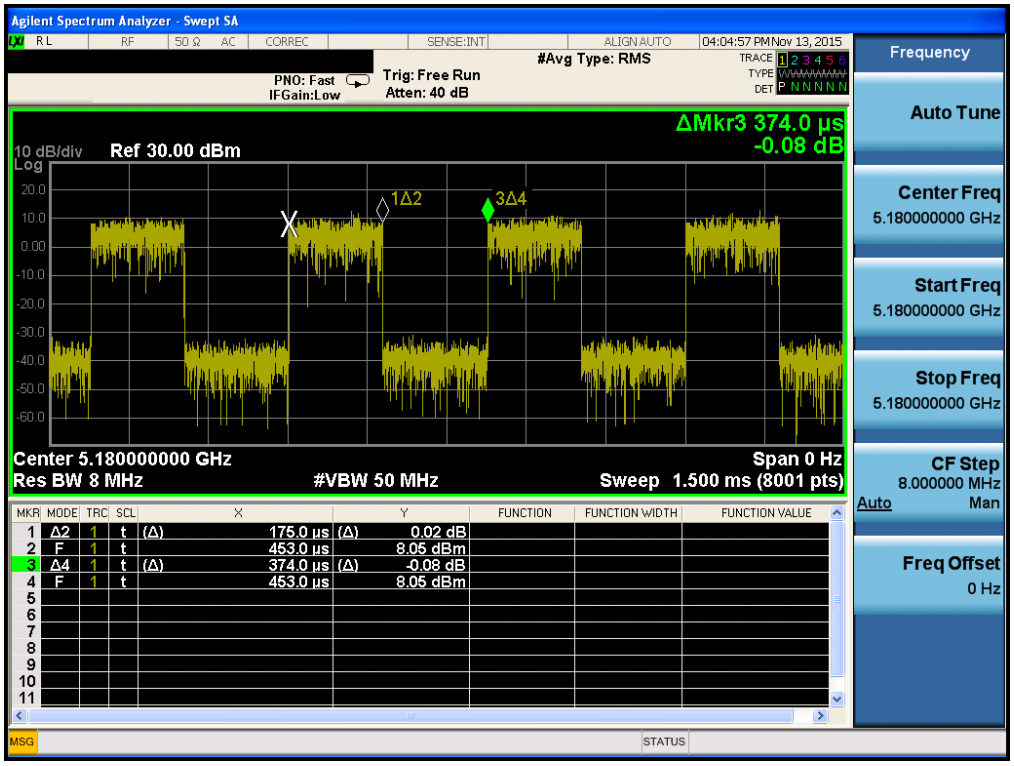
TEST DATA

Mode	Channel	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (*x*) = On / (On+Off)			Duty Cycle Correction Factor [dB]	50/*T* [kHz]
			On Time [ms]	On+OffTime [ms]	*x*		
802.11a	36	5180	0.185	0.385	0.48	3.19	270.27
802.11n (HT20)	36	5180	0.175	0.374	0.46	3.38	285.71
802.11n (HT40)	38	5190	0.101	0.303	0.33	4.82	495.05

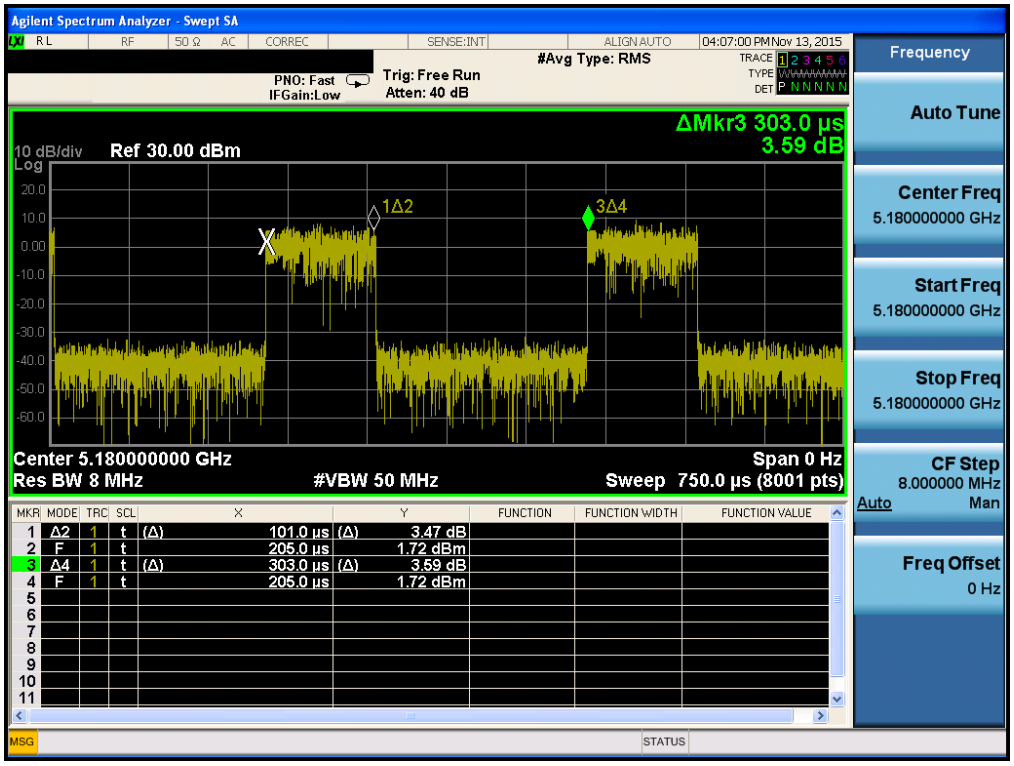
Duty Cycle Test Mode: 802.11a & Ch.36



Duty Cycle Test Mode: 802.11n(HT20) & Ch.36



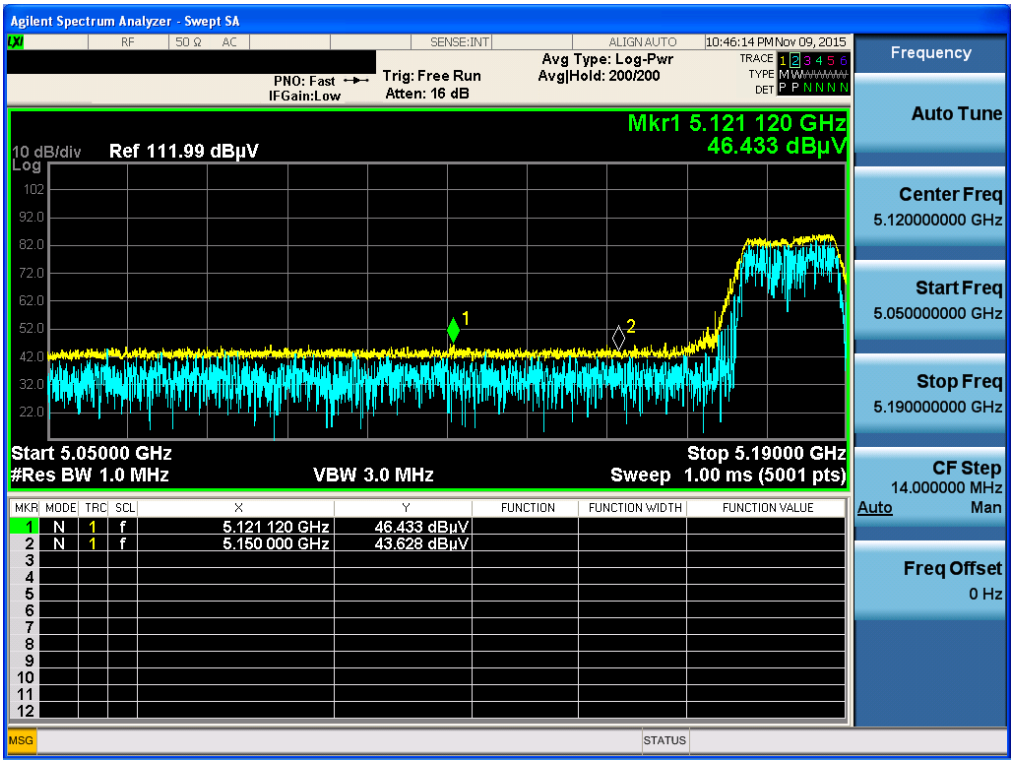
Duty Cycle Test Mode: 802.11n HT40 & Ch.38



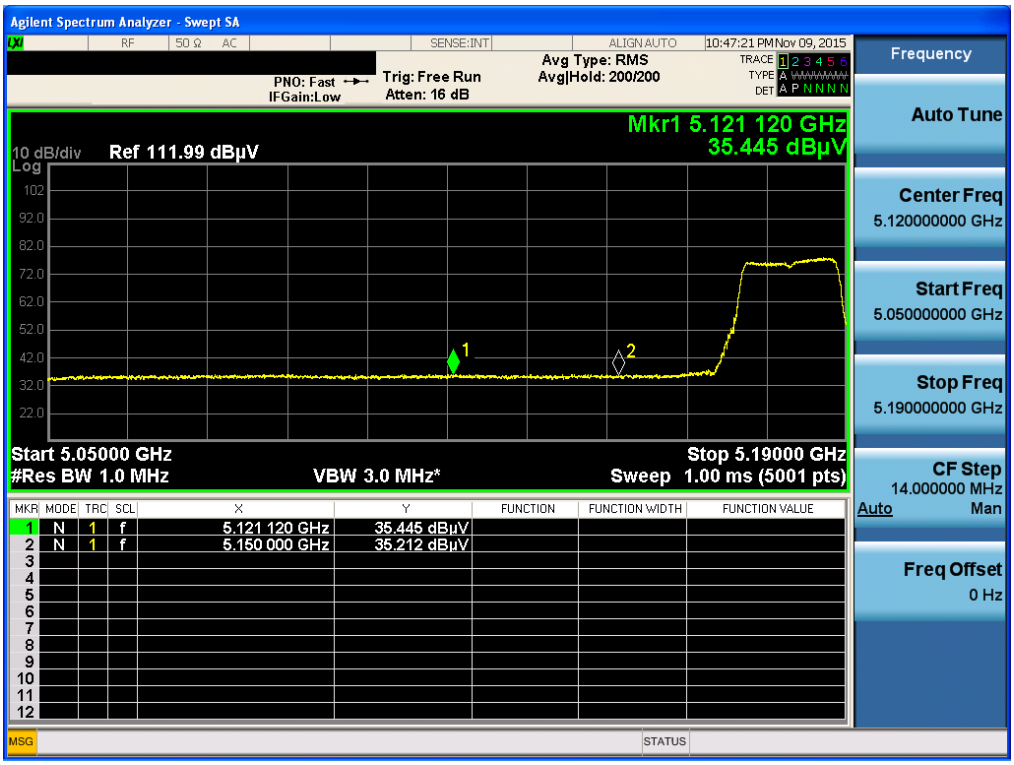
APPENDIX III

Unwanted Emissions (Radiated) Test Plot

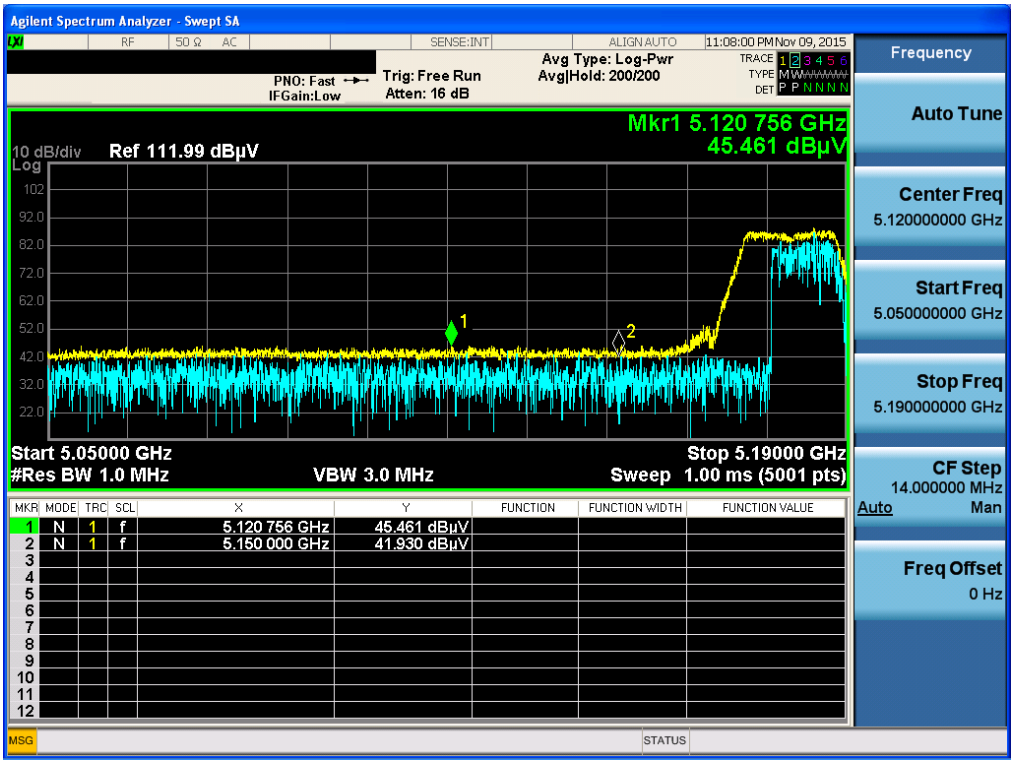
802.11a & U-NII 1 & Lowest & X axis & Hor Detector Mode : PK



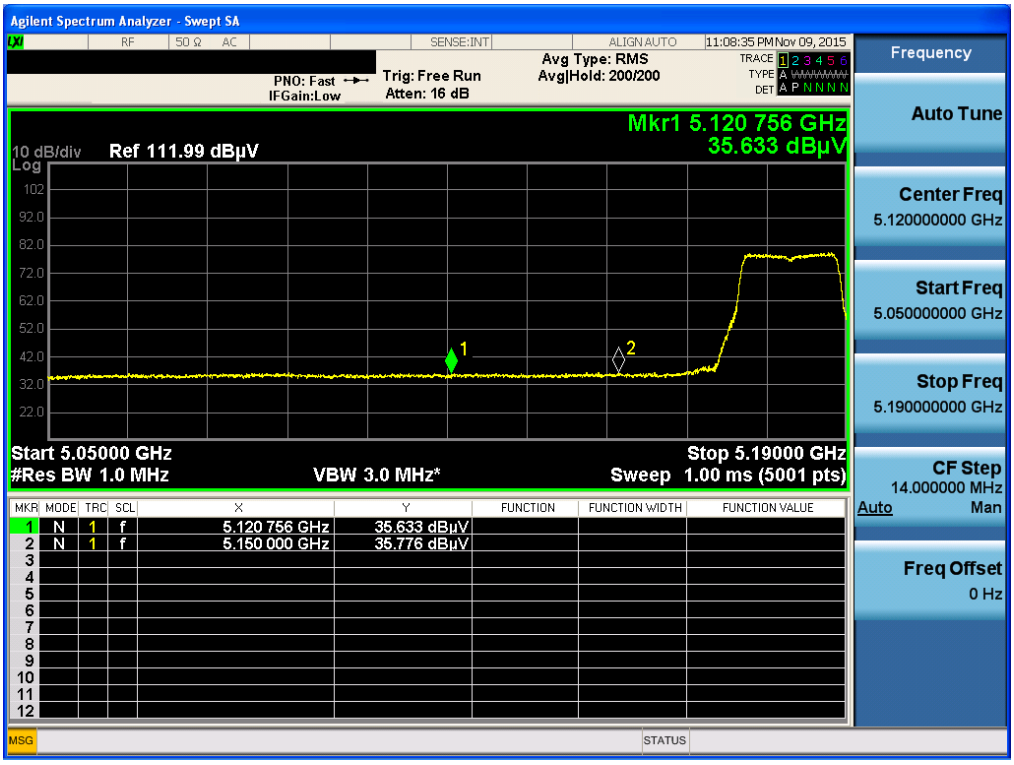
802.11a & U-NII 1 & Lowest & X axis & Hor Detector Mode : AV



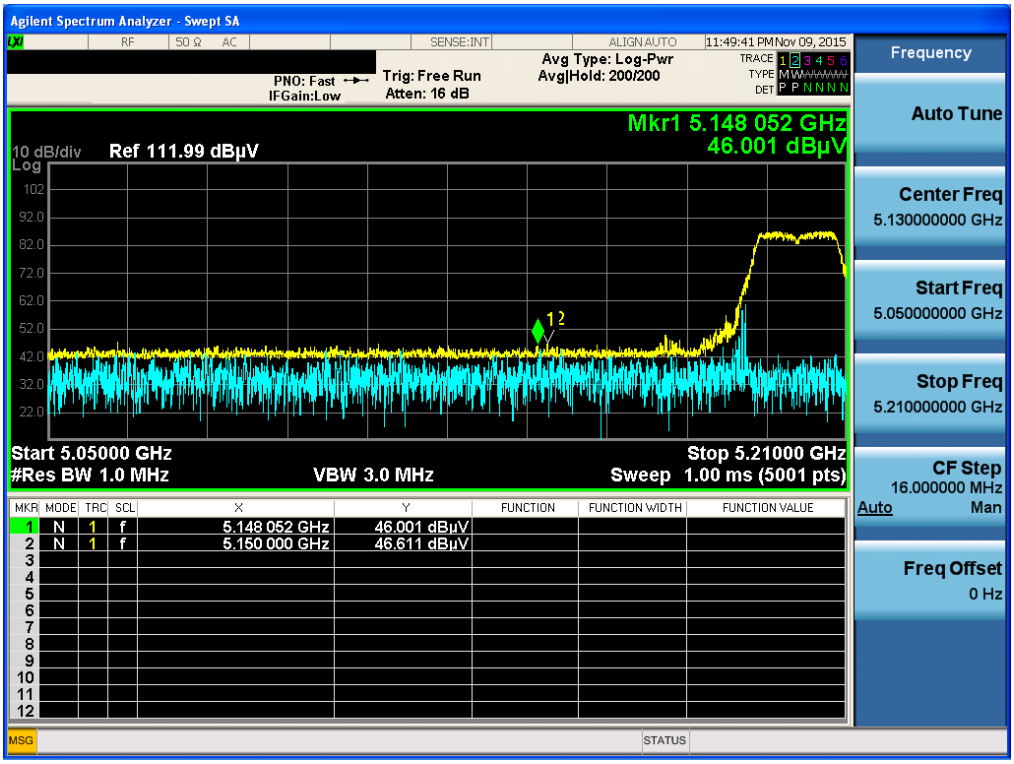
802.11a & U-NII 1 & Lowest & Y axis & Ver **Detector Mode : PK**



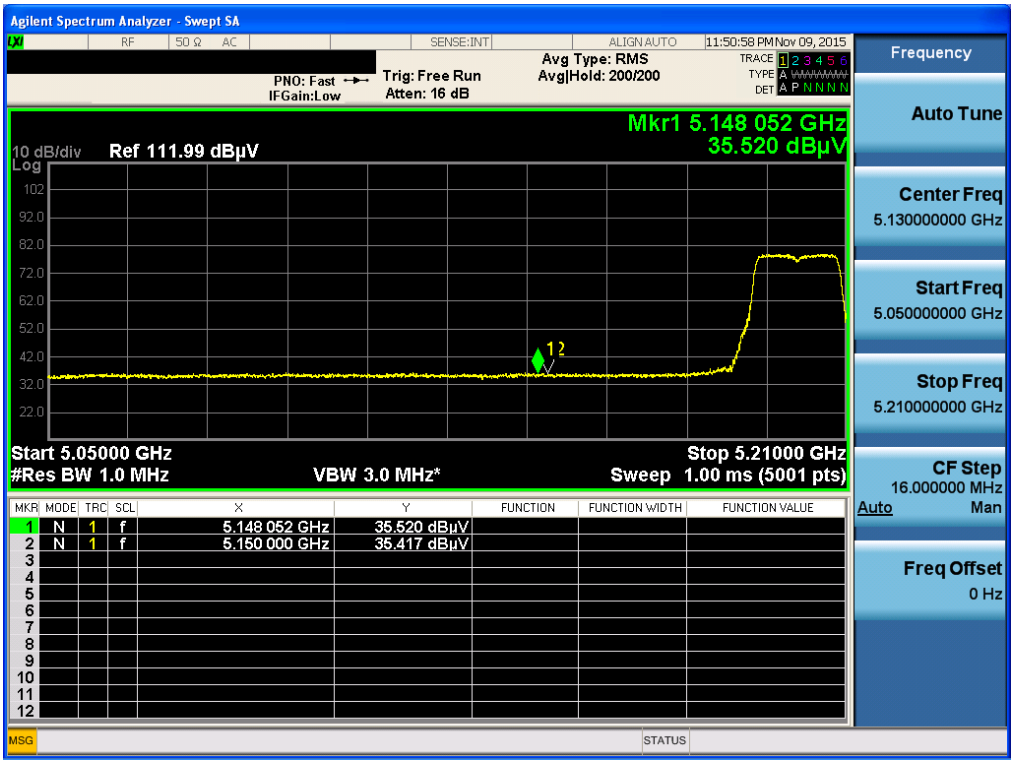
802.11a & U-NII 1 & Lowest & Y axis & Ver **Detector Mode : AV**



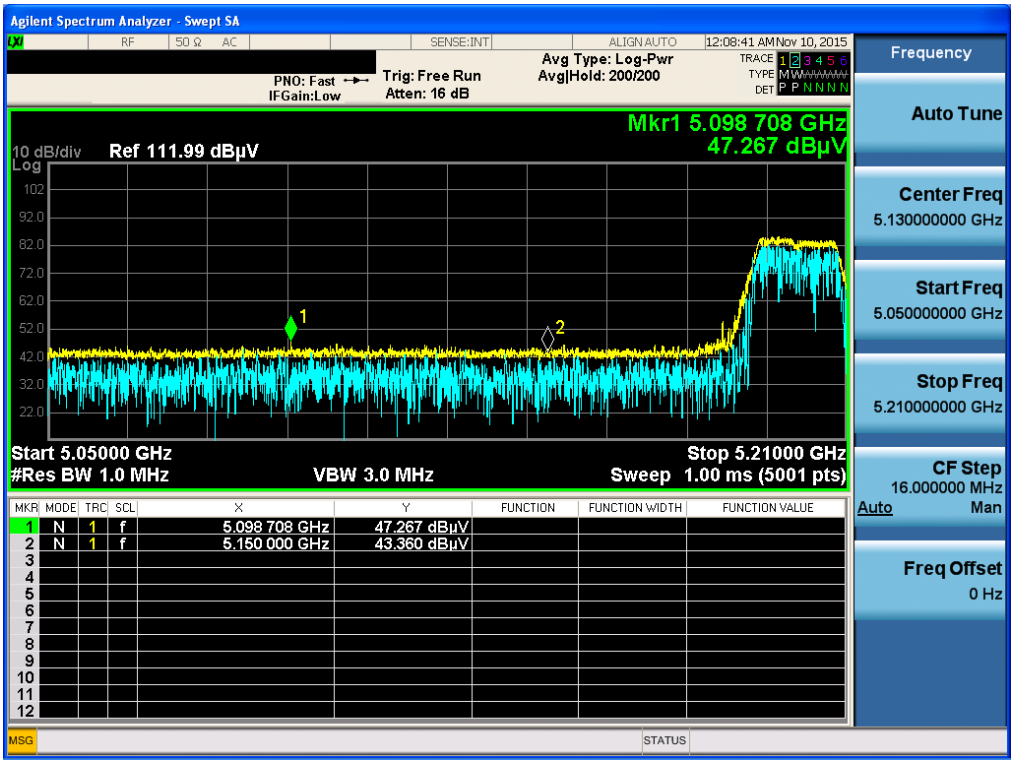
802.11a & U-NII 1 & Middle & X axis & Hor **Detector Mode : PK**



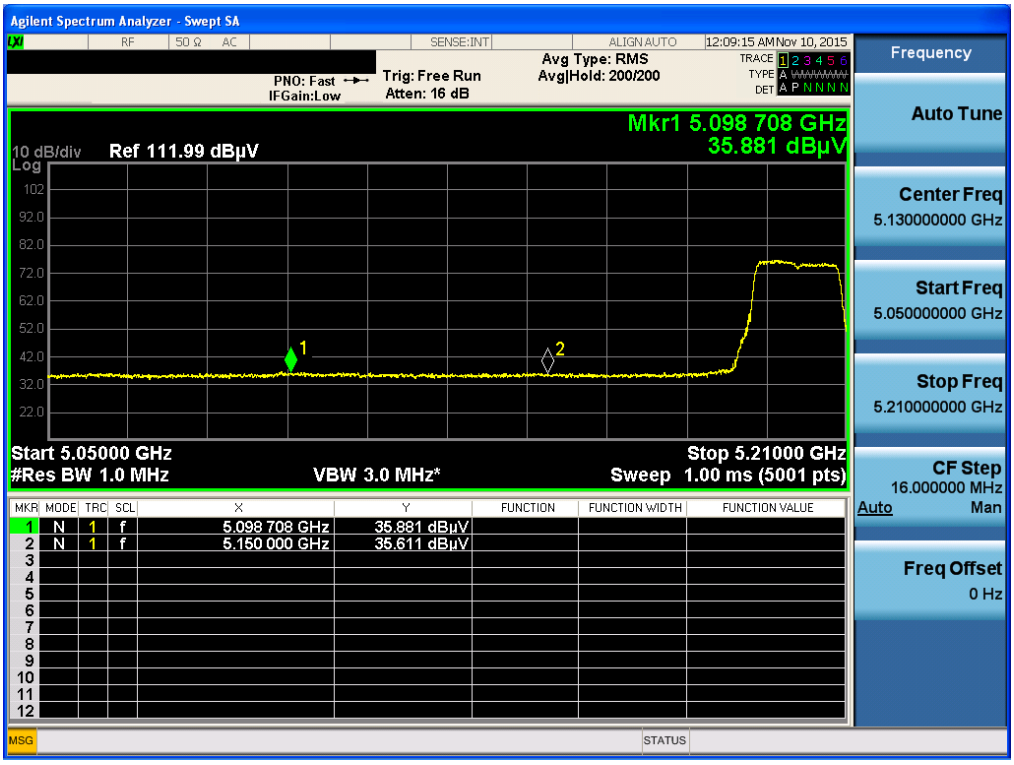
802.11a & U-NII 1 & Middle & X axis & Hor **Detector Mode : AV**



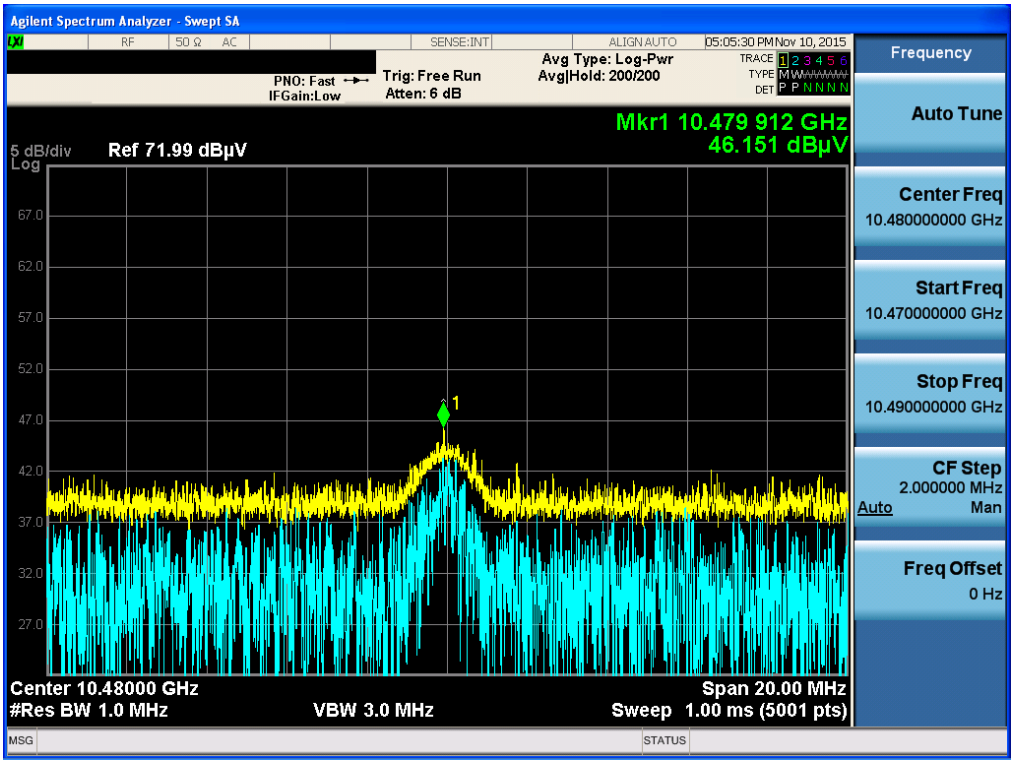
802.11a & U-NII 1 & Middle & Y axis & Ver **Detector Mode : PK**



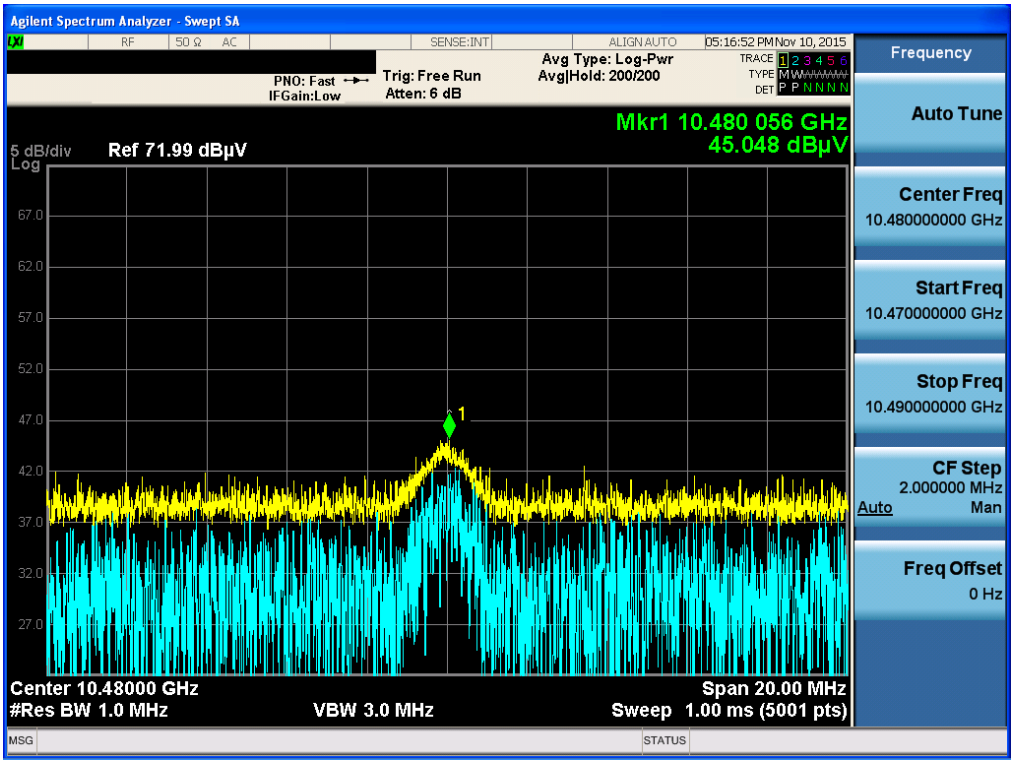
802.11a & U-NII 1 & Middle & Y axis & Ver **Detector Mode : AV**



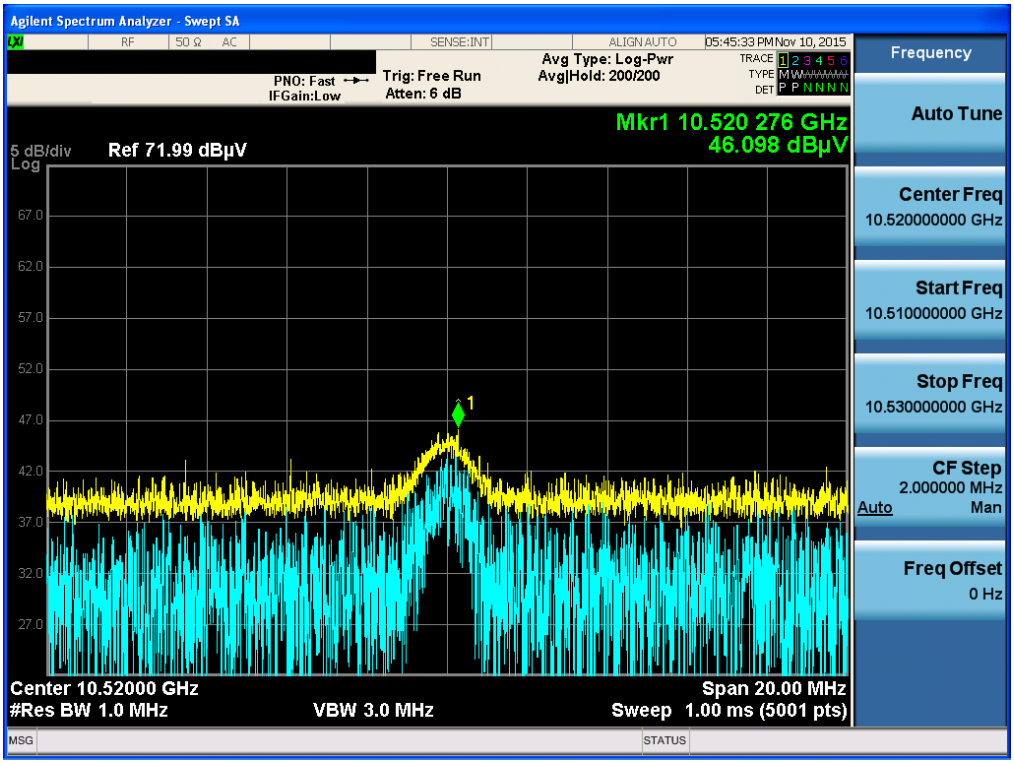
802.11a & U-NII 1 & Highest & X axis & Ver **Detector Mode : PK**



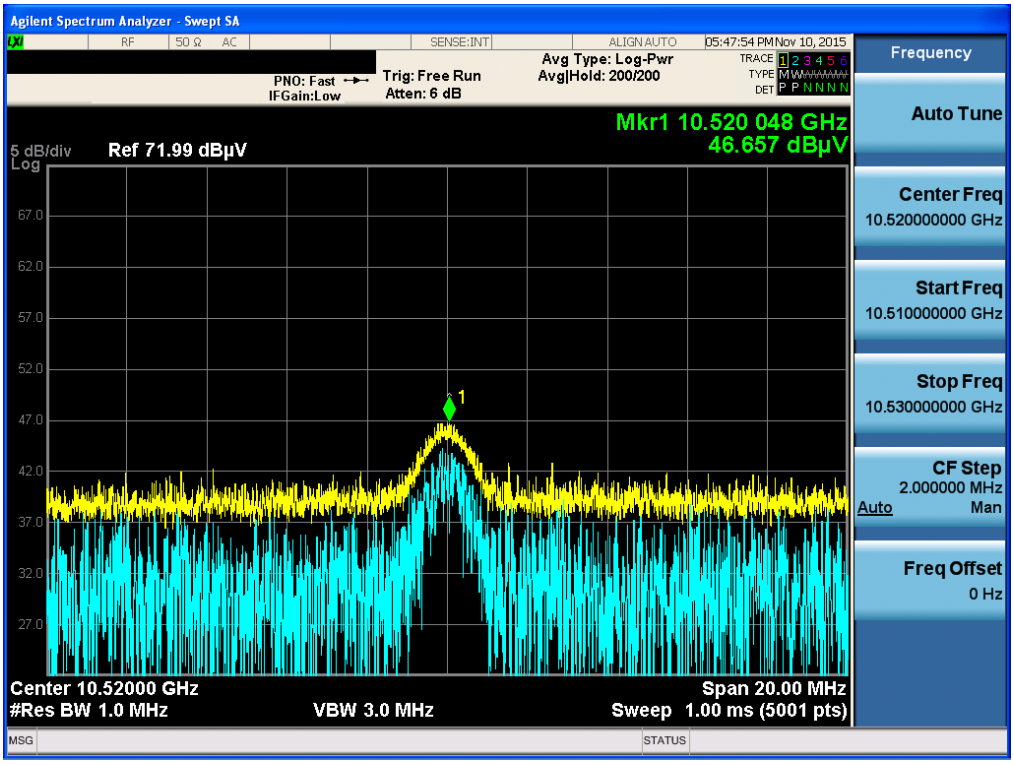
802.11a & U-NII 1 & Highest & Z axis & Hor **Detector Mode : PK**



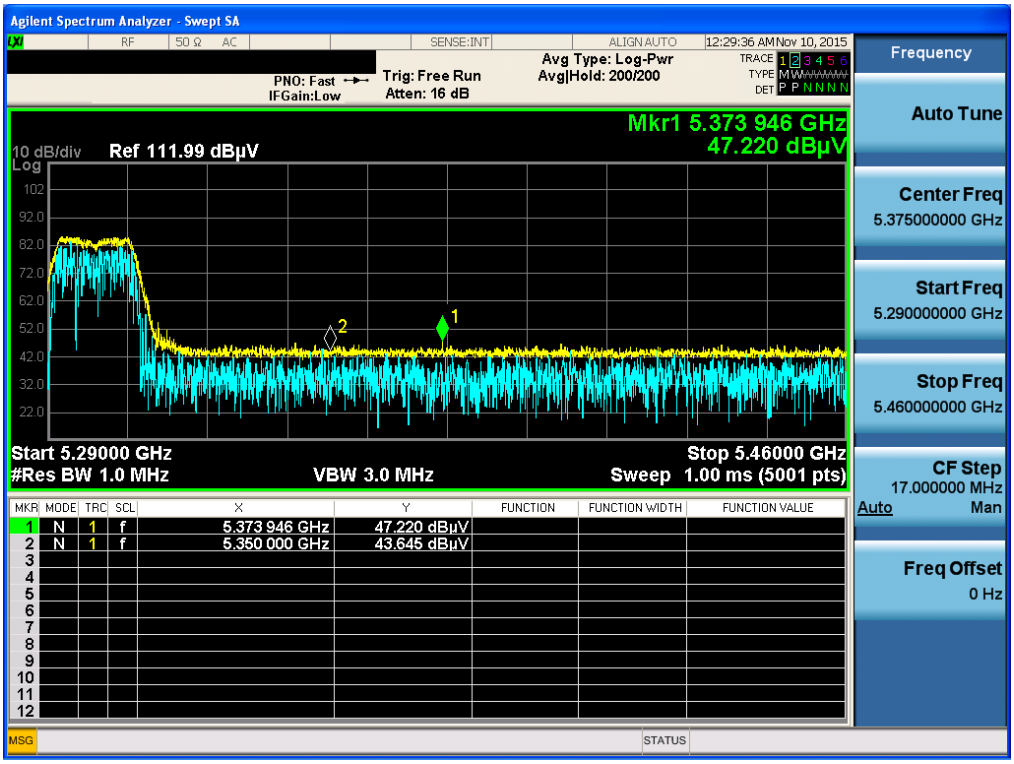
802.11a & U-NII 2 & Lowest & Y axis & Ver **Detector Mode : PK**



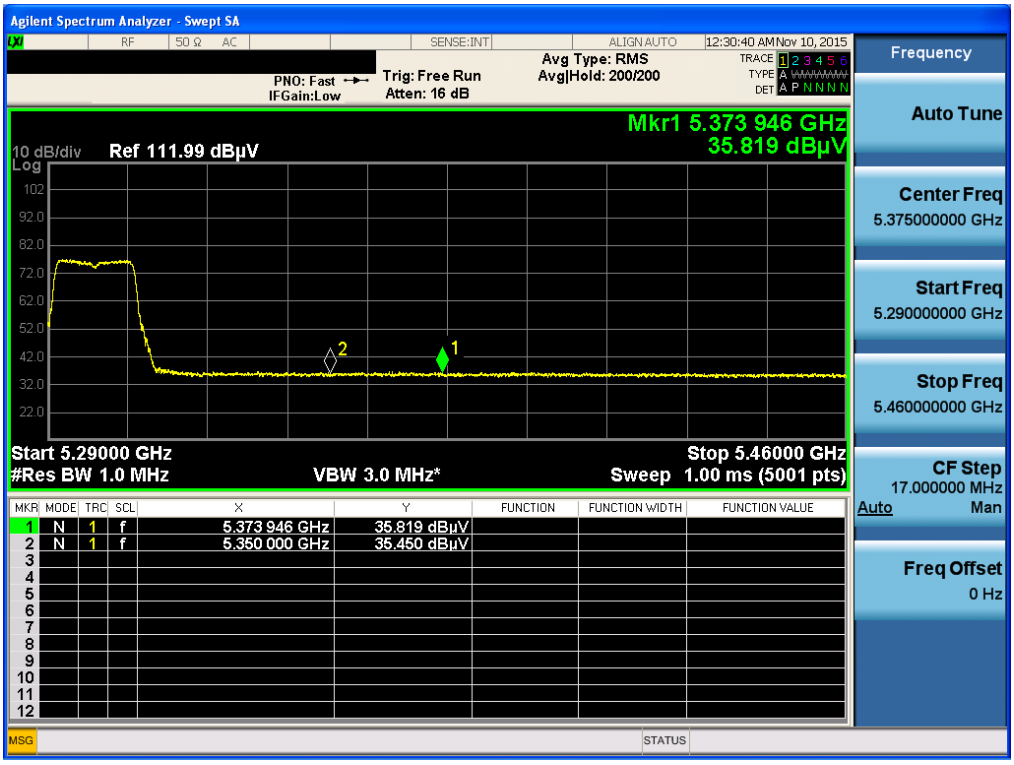
802.11a & U-NII 2 & Lowest & Z axis & Hor **Detector Mode : PK**



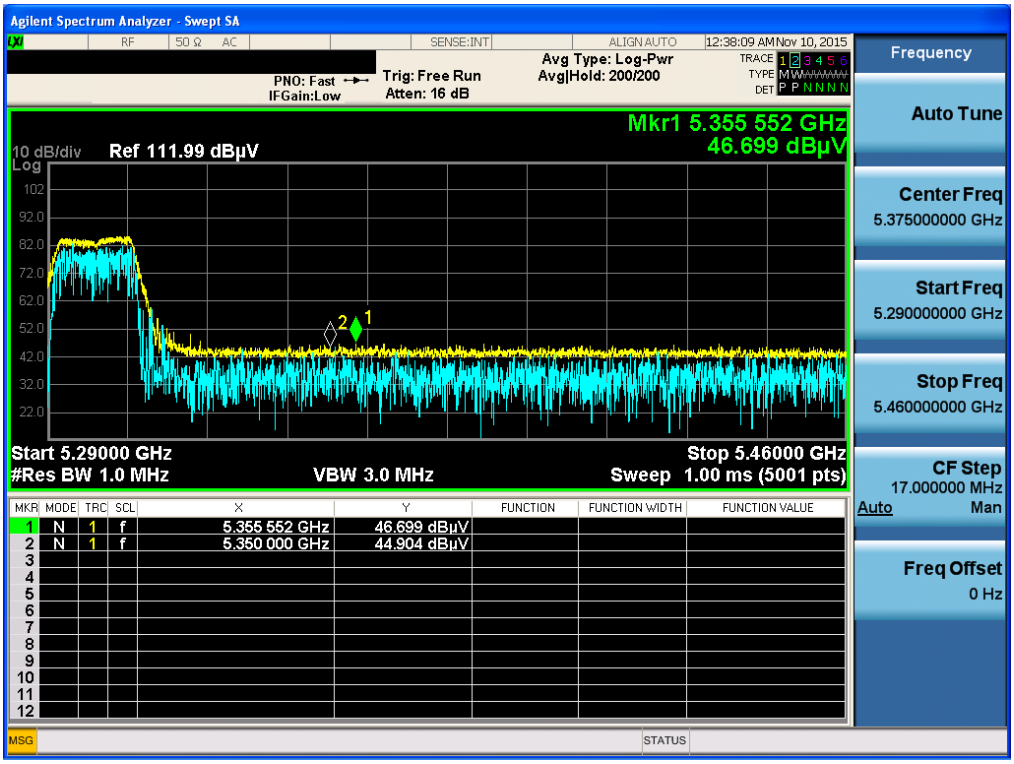
802.11a & U-NII 2 & Middle & Y axis & Hor **Detector Mode : PK**



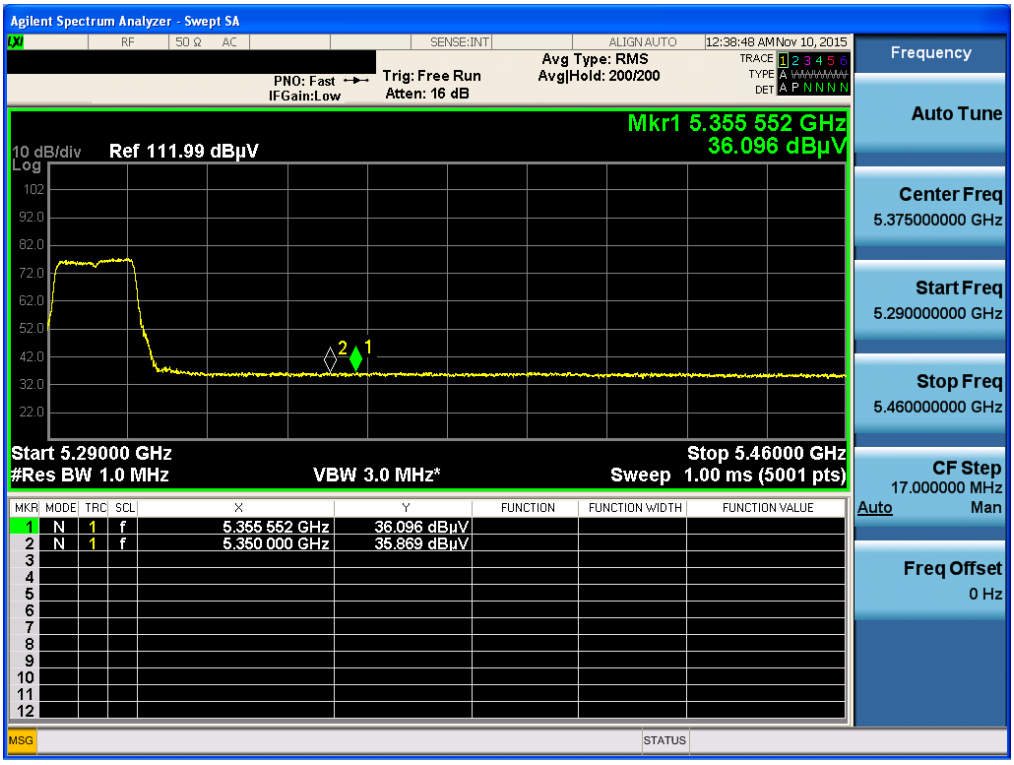
802.11a & U-NII 2 & Middle & Y axis & Hor **Detector Mode : AV**



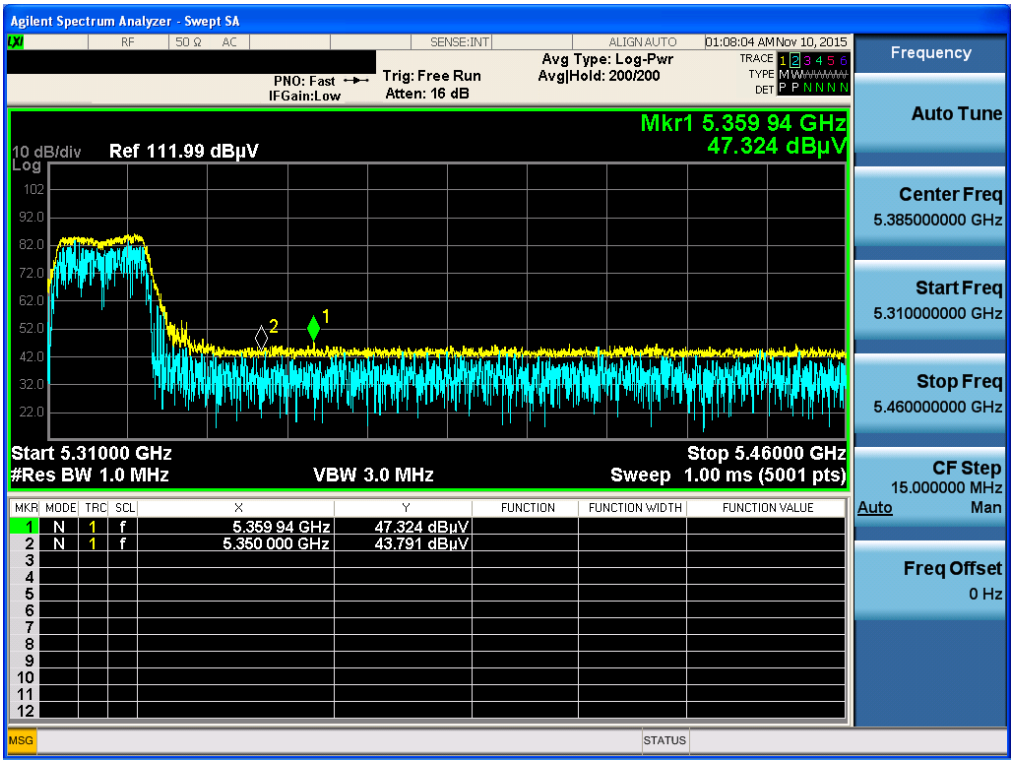
802.11a & U-NII 2 & Middle & Z axis & Ver **Detector Mode : PK**



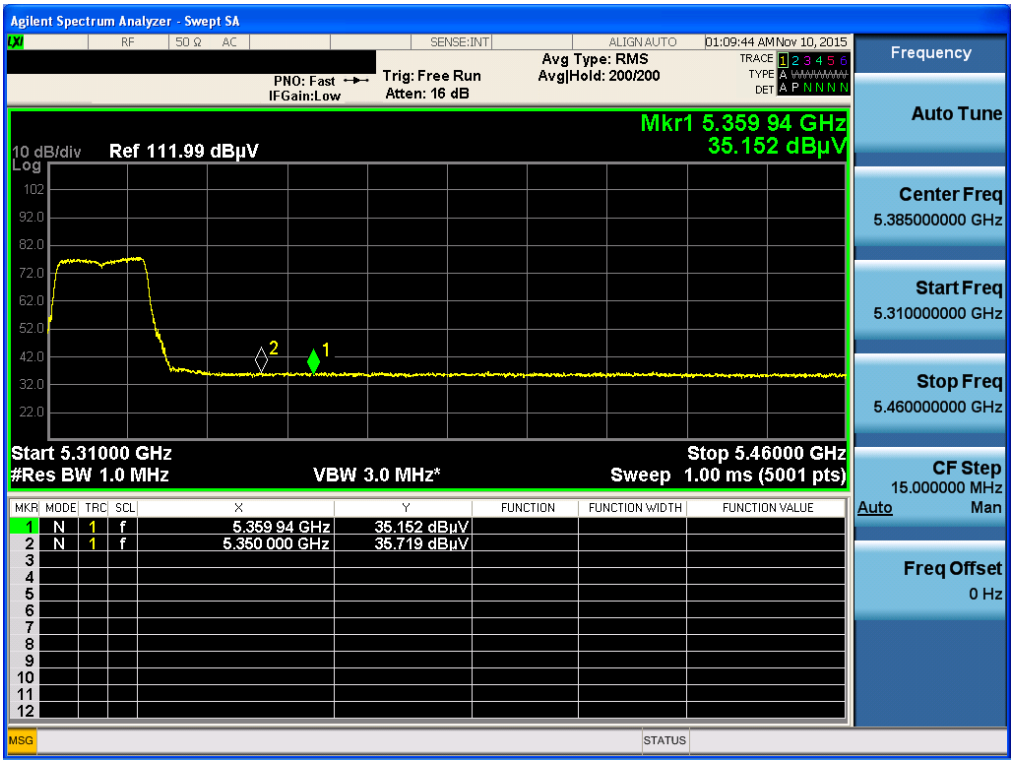
802.11a & U-NII 2 & Middle & Z axis & Ver **Detector Mode : AV**



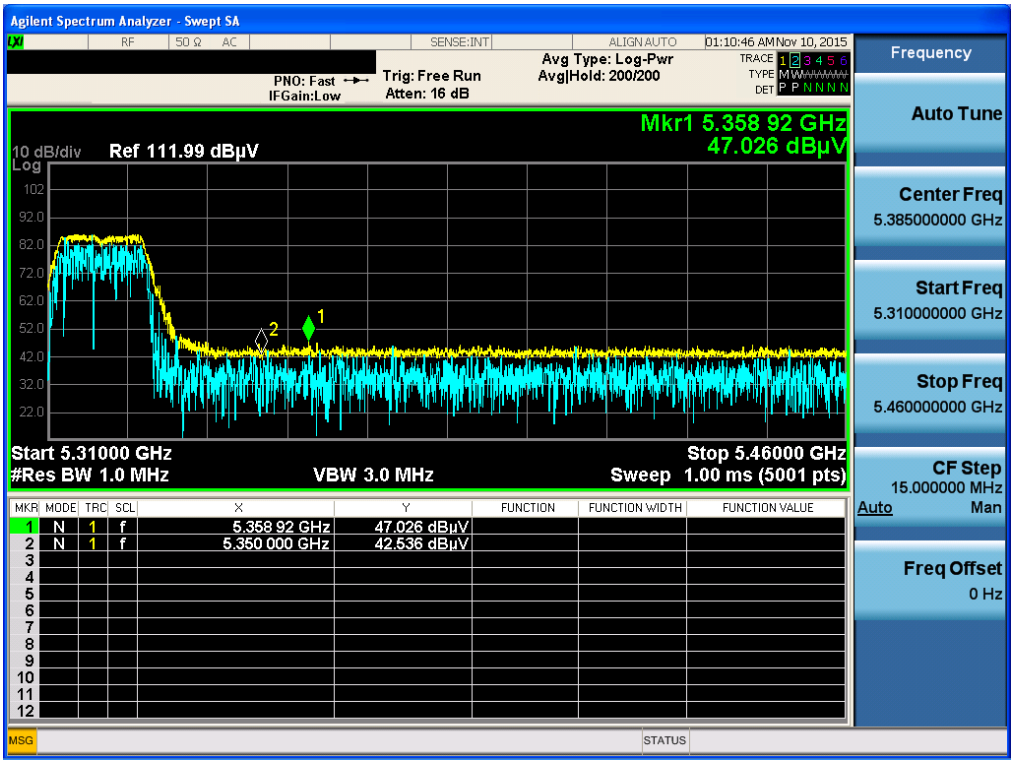
802.11a & U-NII 2 & Highest & Y axis & Hor **Detector Mode : PK**



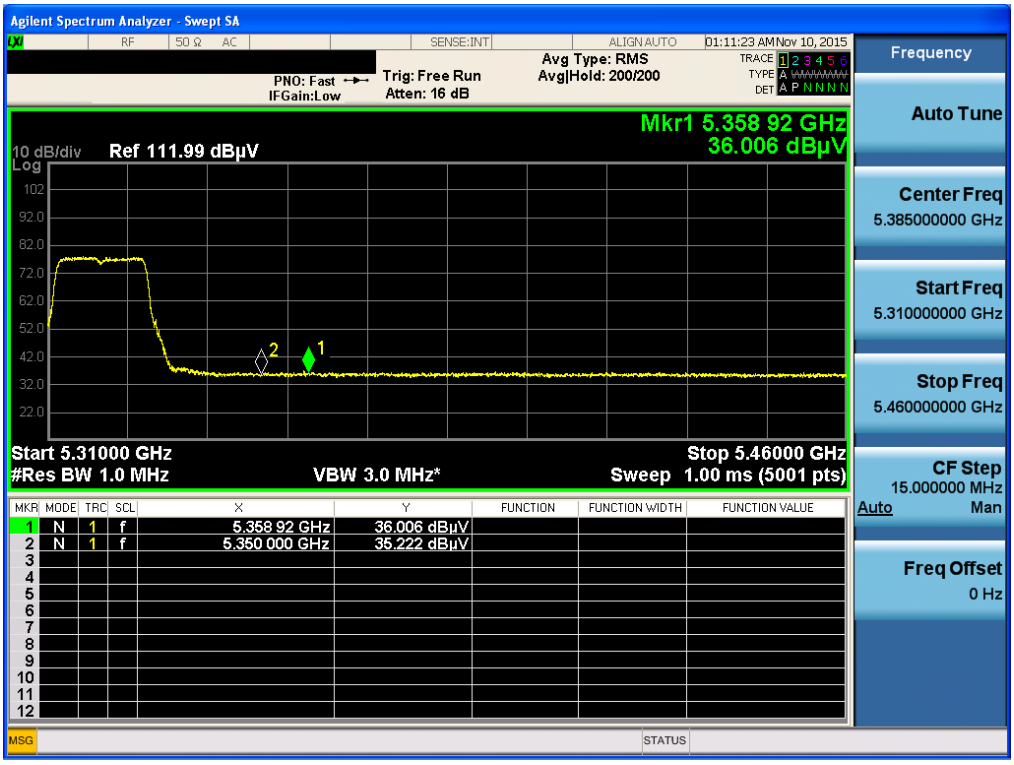
802.11a & U-NII 2 & Highest & Y axis & Hor **Detector Mode : AV**



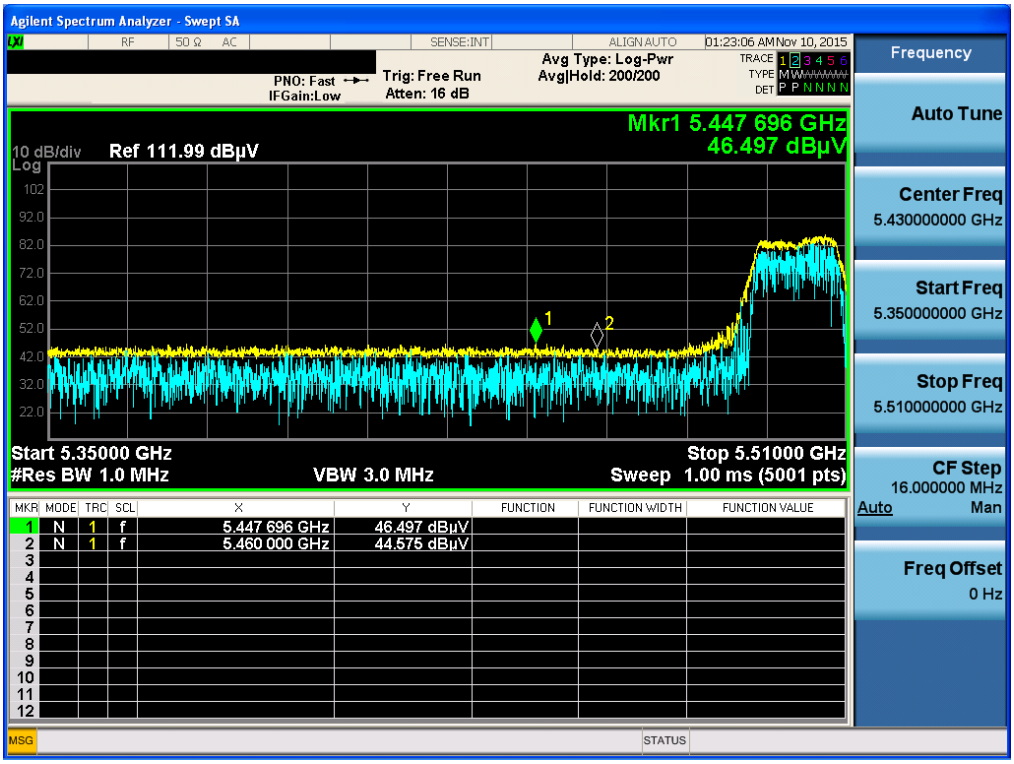
802.11a & U-NII 2 & Highest & Z axis & Ver **Detector Mode : PK**



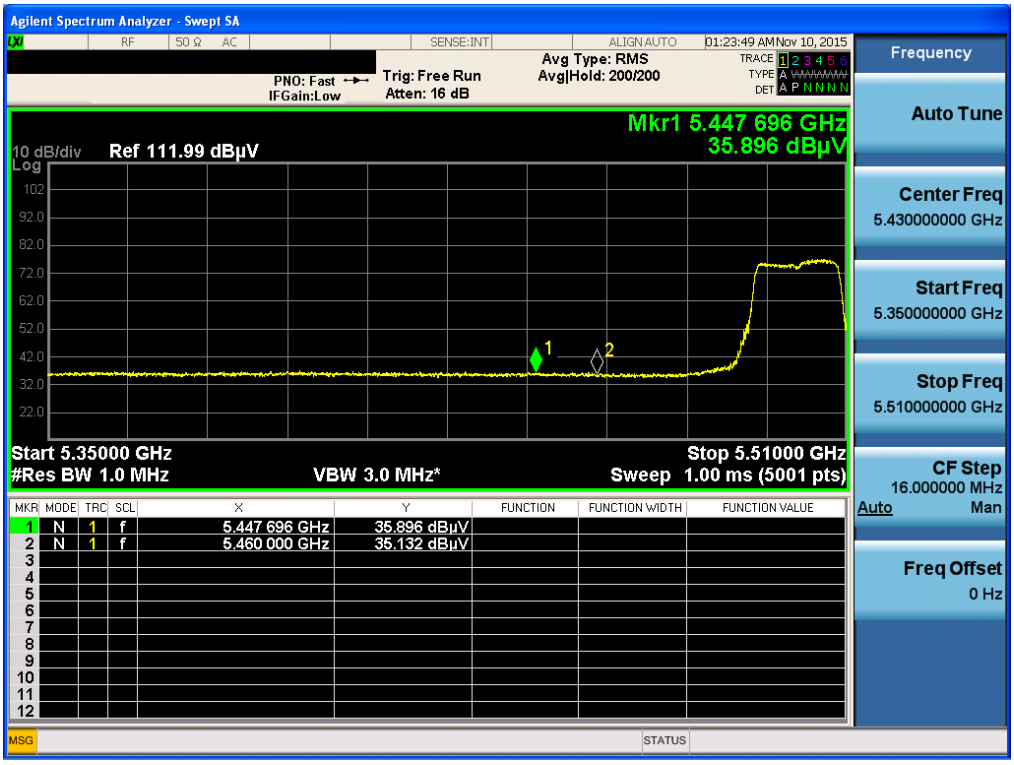
802.11a & U-NII 2 & Highest & Z axis & Ver **Detector Mode : AV**



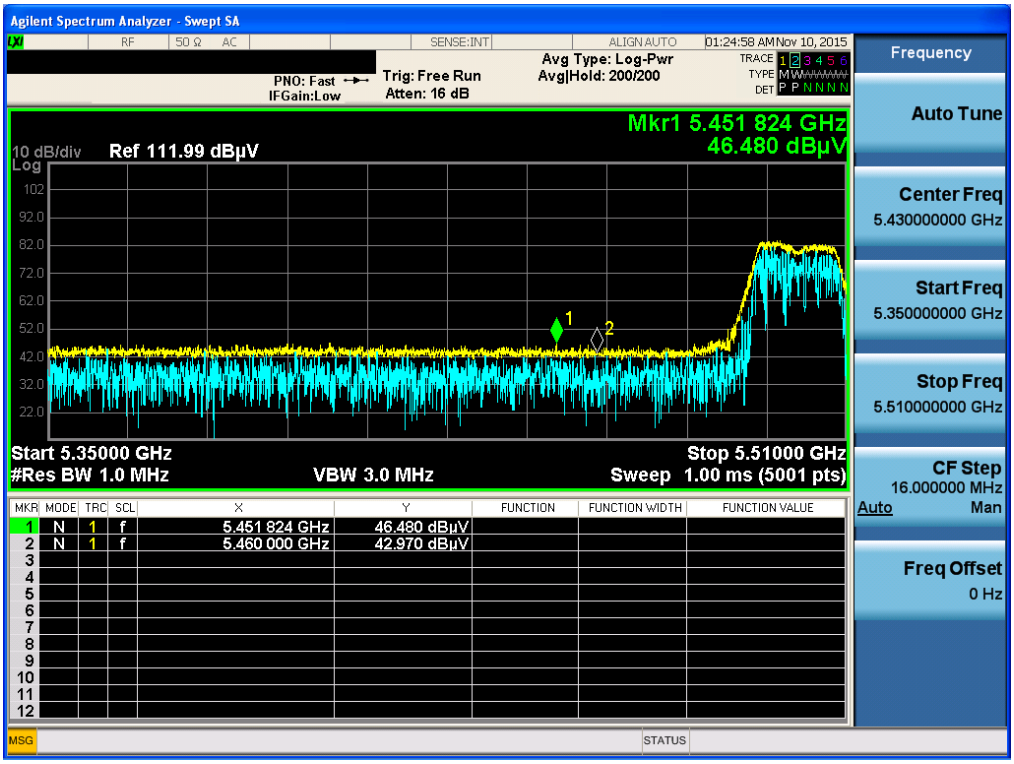
802.11a & U-NII 3 & Lowest & X axis & Hor **Detector Mode : PK**



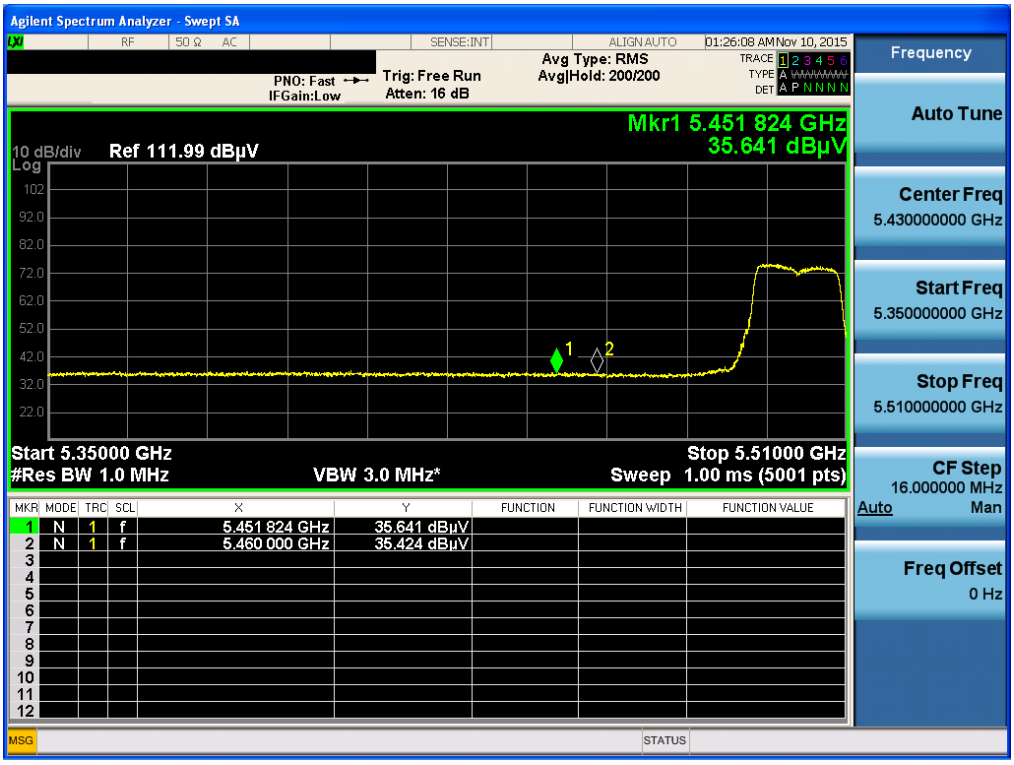
802.11a & U-NII 3 & Lowest & X axis & Hor **Detector Mode : AV**



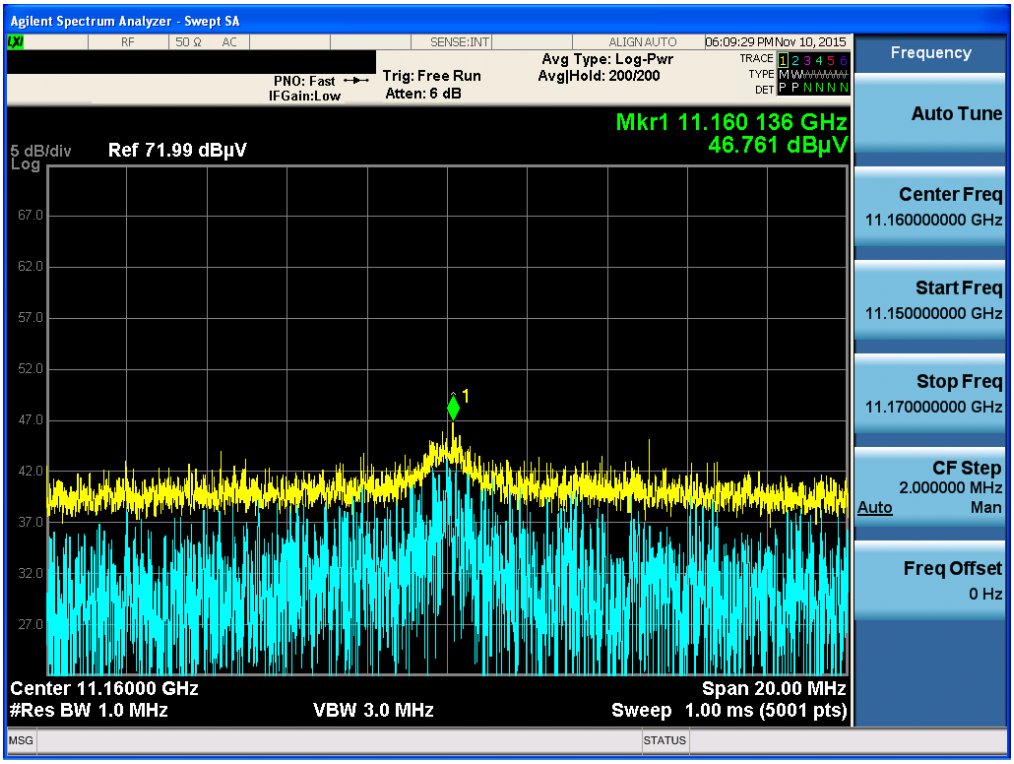
802.11a & U-NII 3 & Lowest & X axis & Ver **Detector Mode : PK**



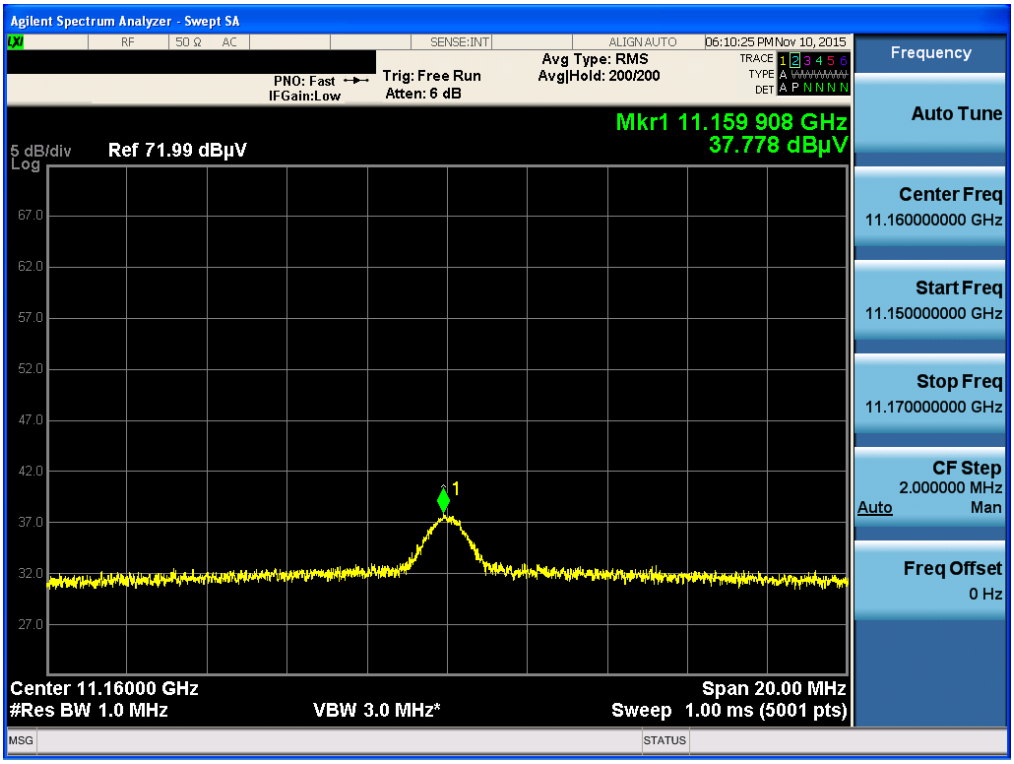
802.11a & U-NII 3 & Lowest & X axis & Ver **Detector Mode : AV**



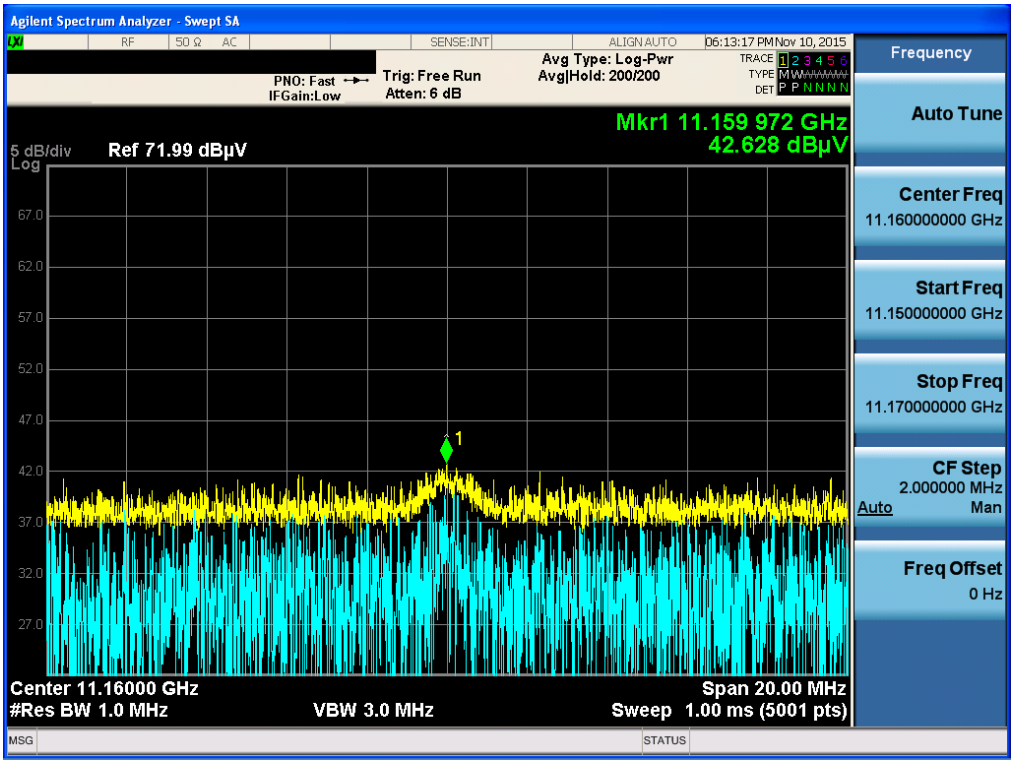
802.11a & U-NII 3 & Middle & X axis & Hor **Detector Mode : PK**



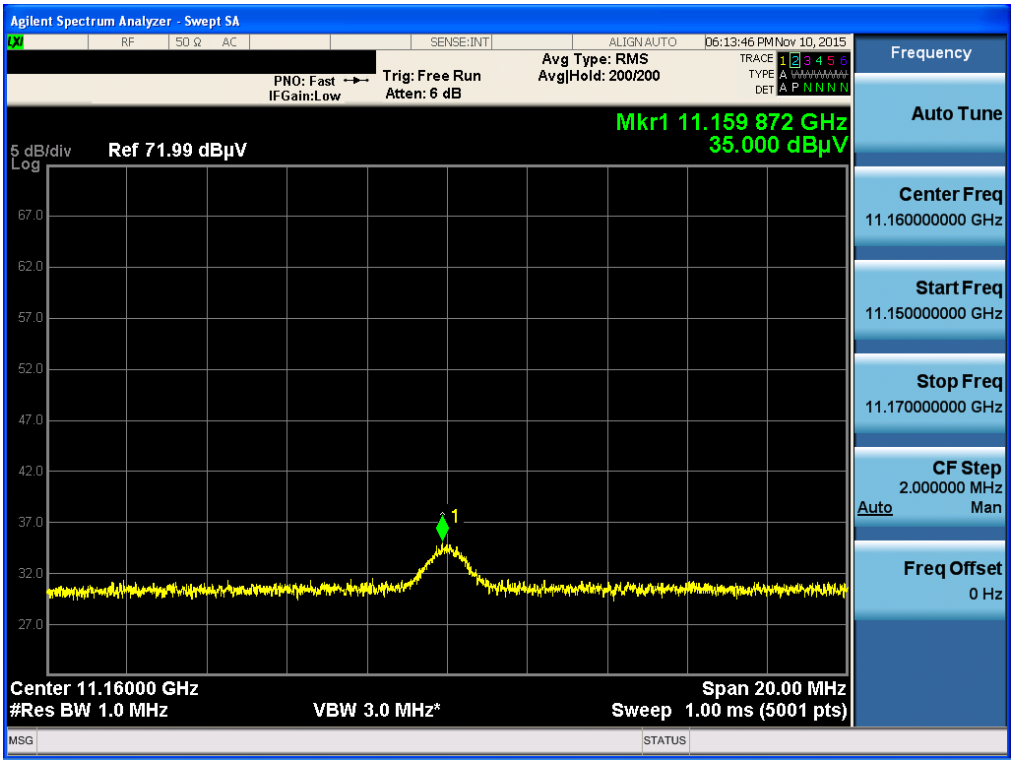
802.11a & U-NII 3 & Middle & X axis & Hor **Detector Mode : AV**



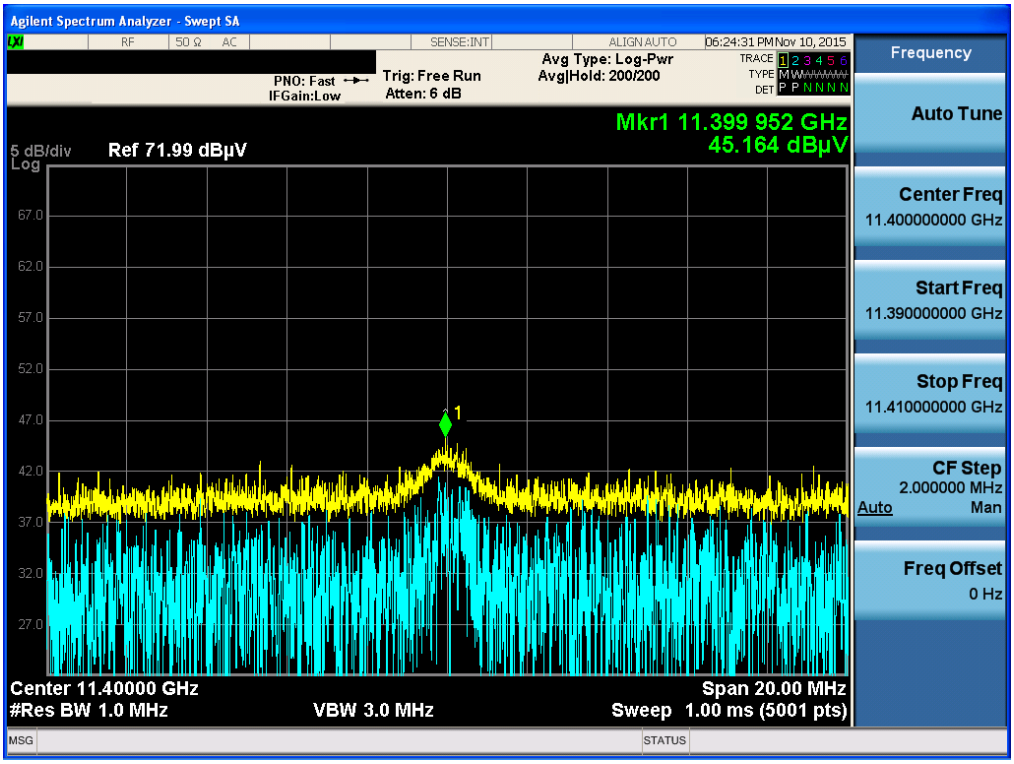
802.11a & U-NII 3 & Middle & X axis & Ver **Detector Mode : PK**



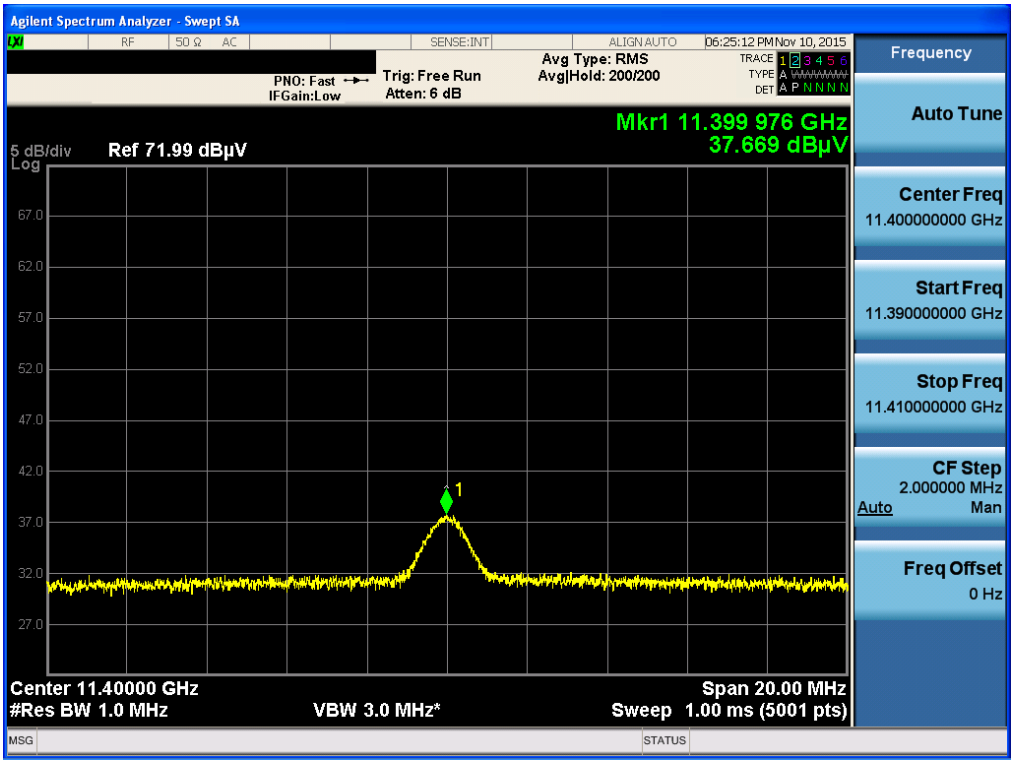
802.11a & U-NII 3 & Middle & X axis & Ver **Detector Mode : AV**



802.11a & U-NII 3 & Highest & X axis & Hor **Detector Mode : PK**



802.11a & U-NII 3 & Highest & X axis & Hor **Detector Mode : AV**



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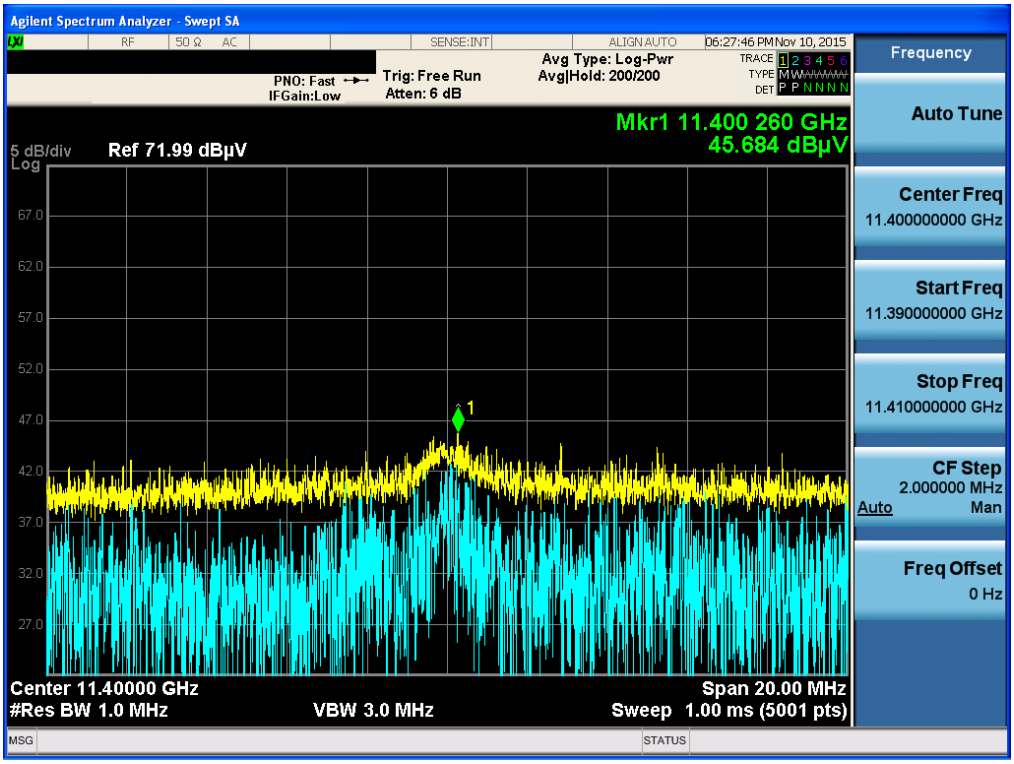

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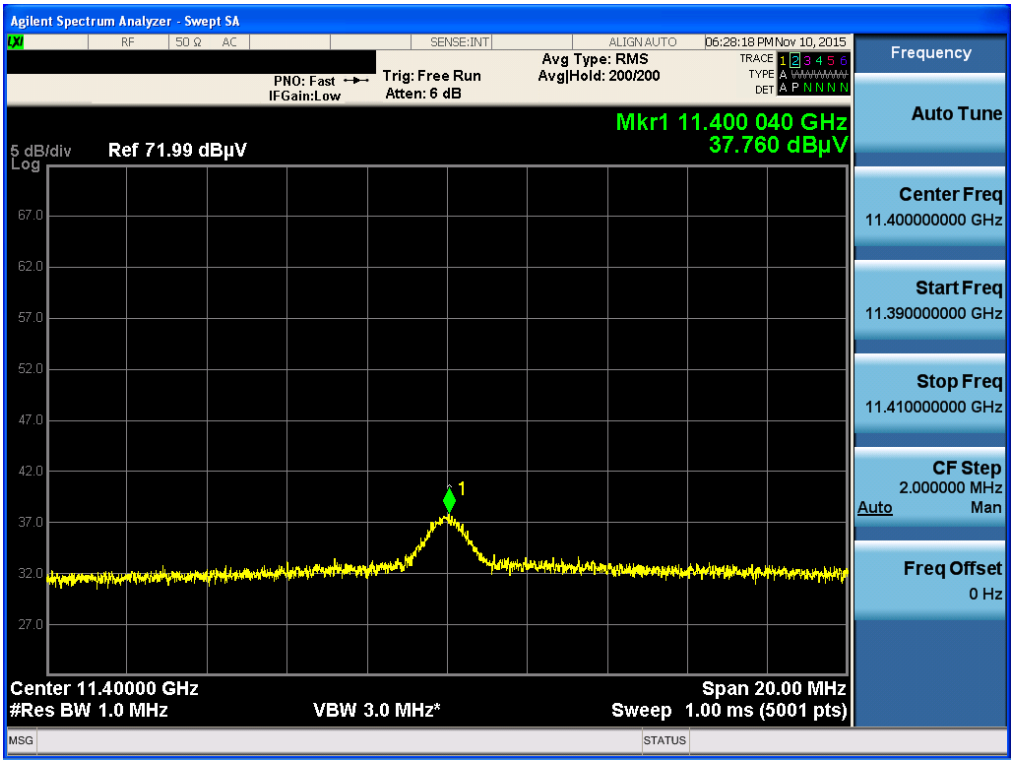
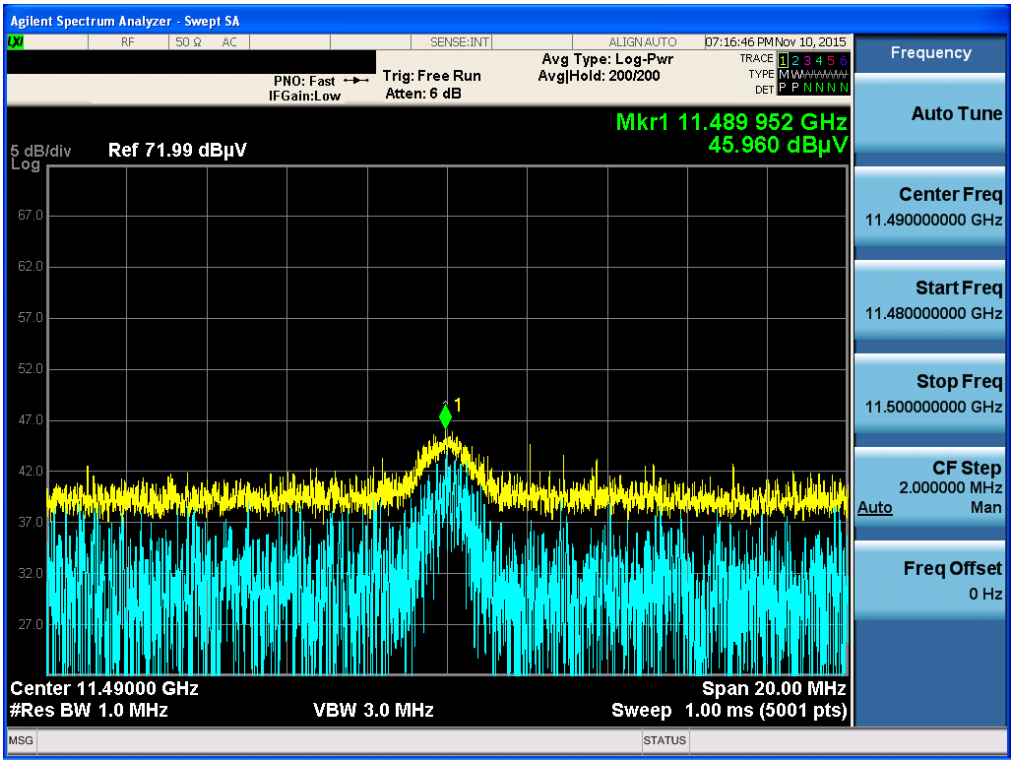


802.11a & U-NII 4 & Lowest & X axis & Ver **Detector Mode : PK**



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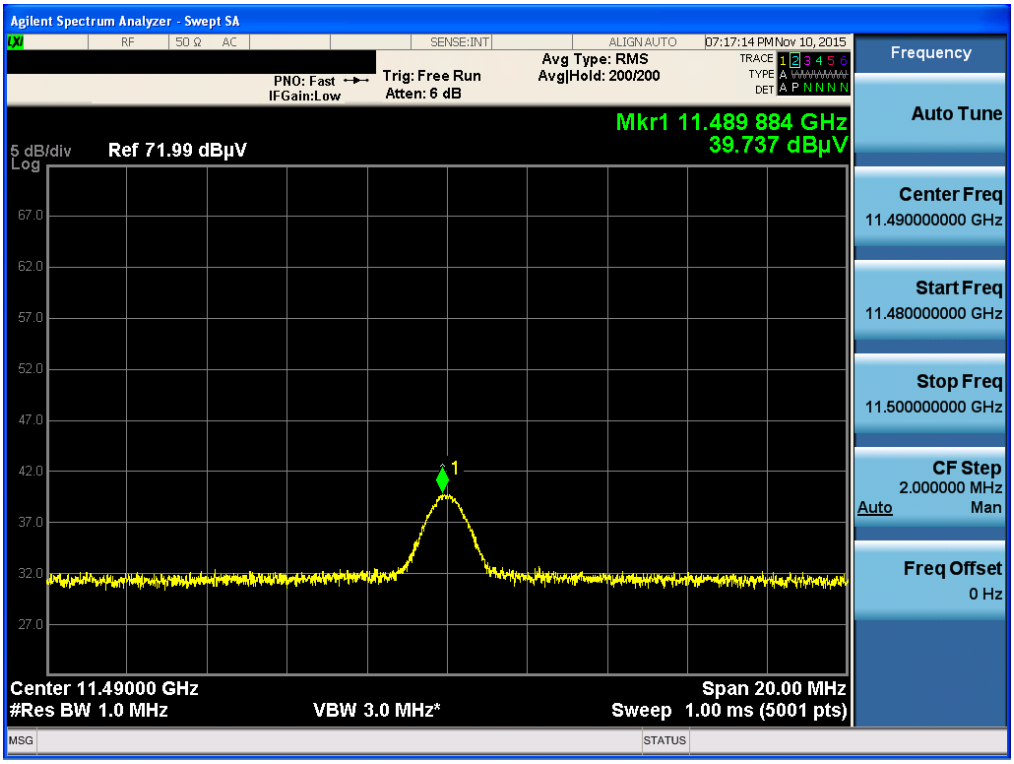

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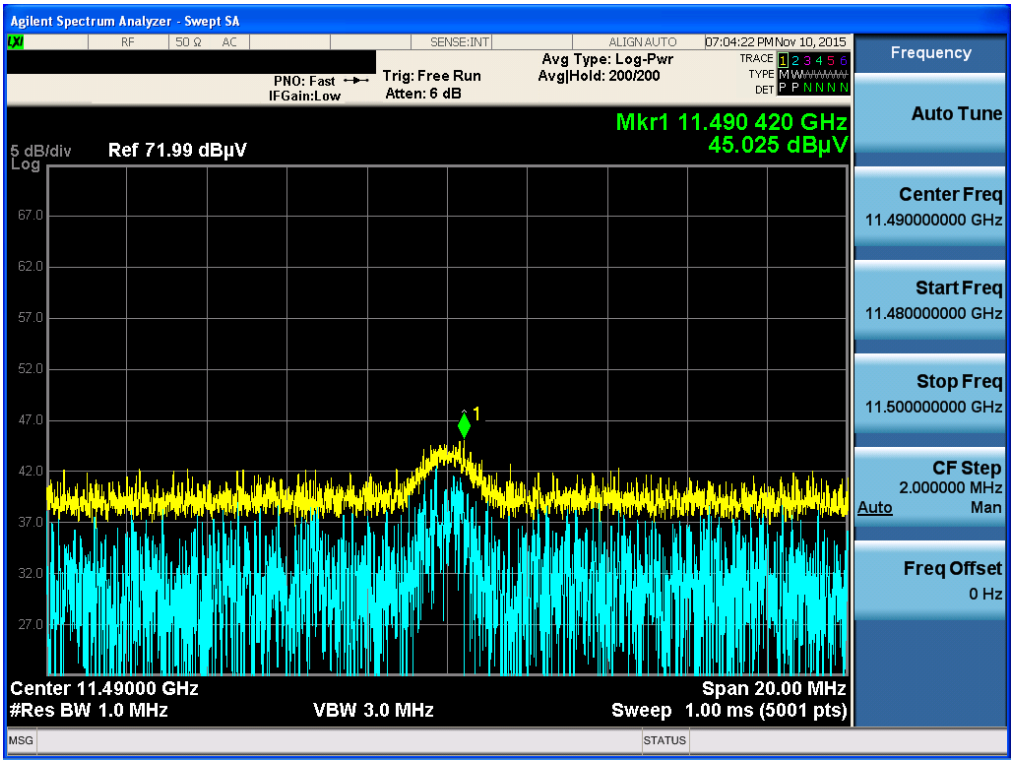

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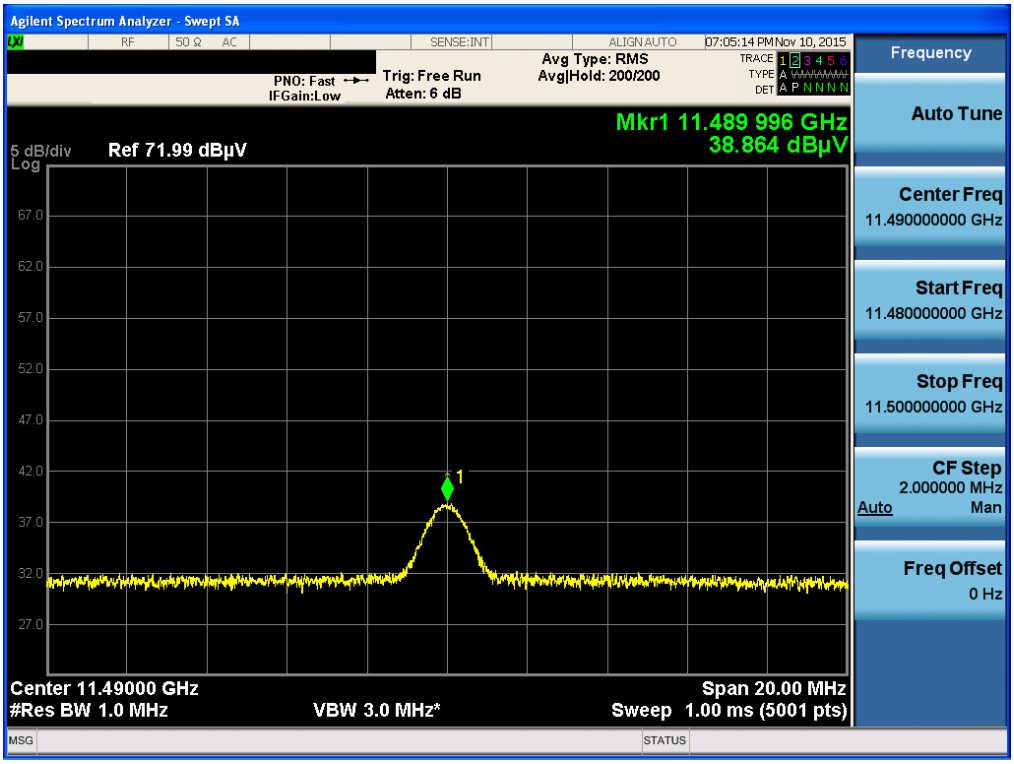

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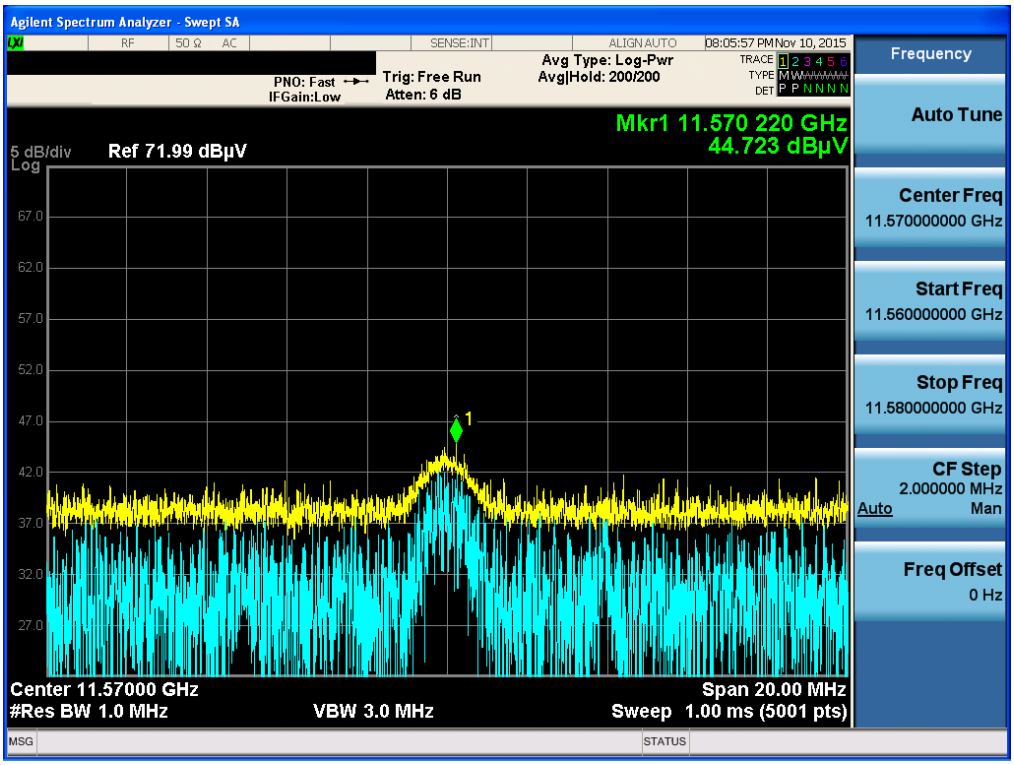

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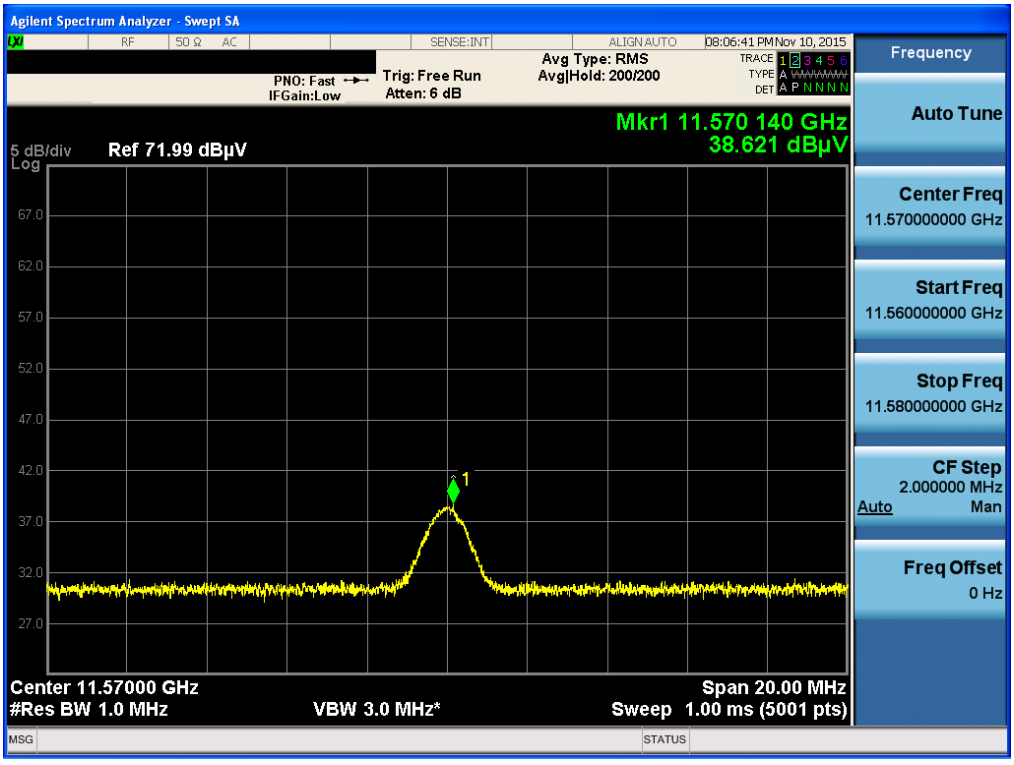
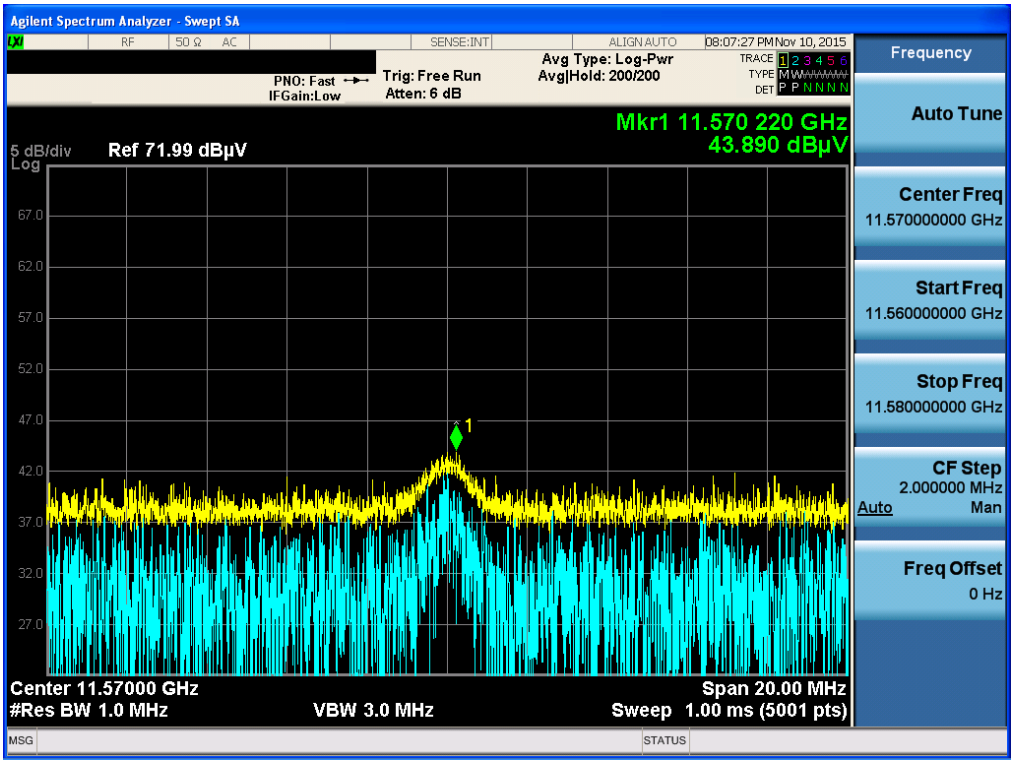
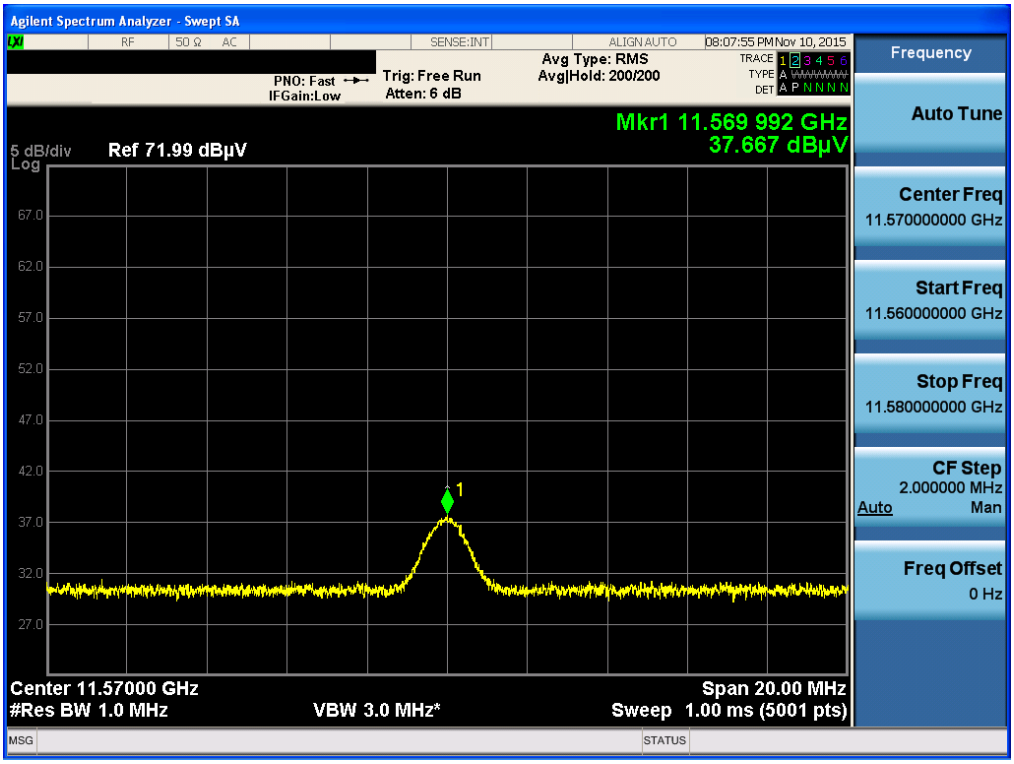


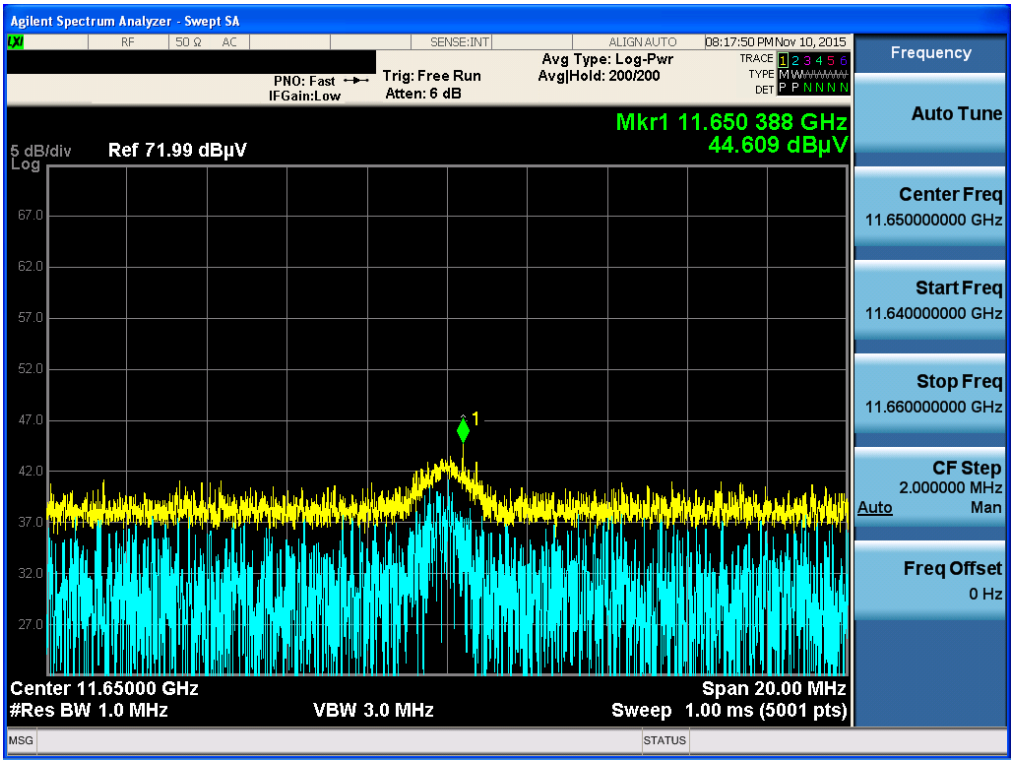
802.11a & U-NII 4 & Middle & Y axis & Hor **Detector Mode : PK**



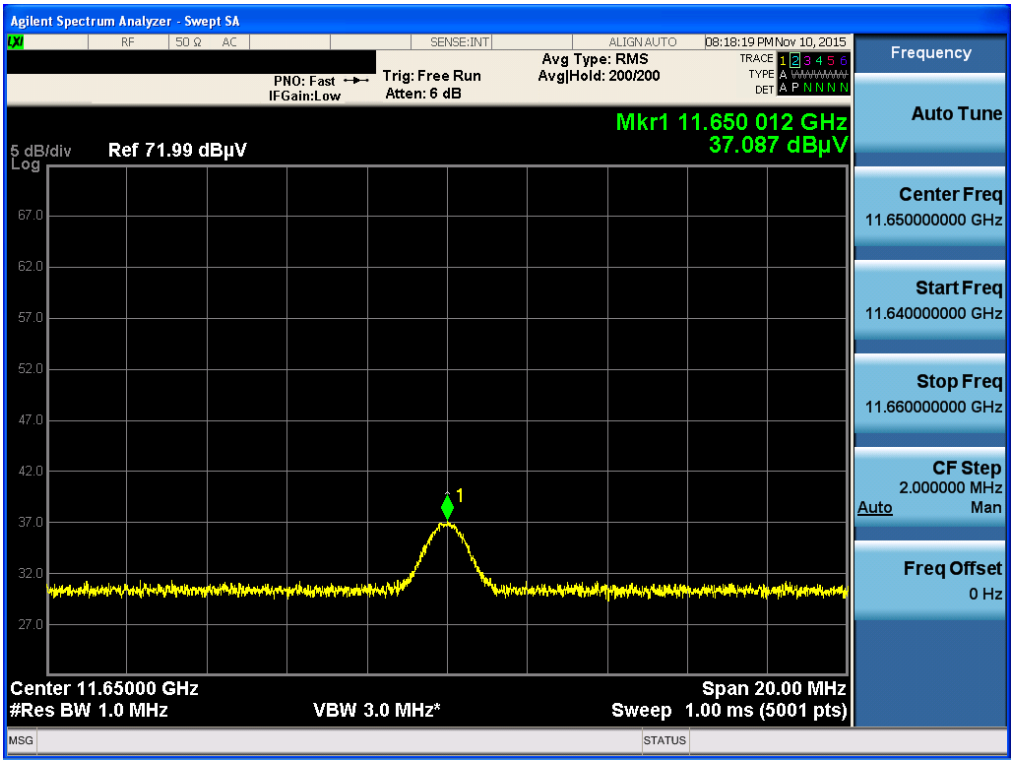
802.11a & U-NII 4 & Middle & Y axis & Hor **Detector Mode : AV**



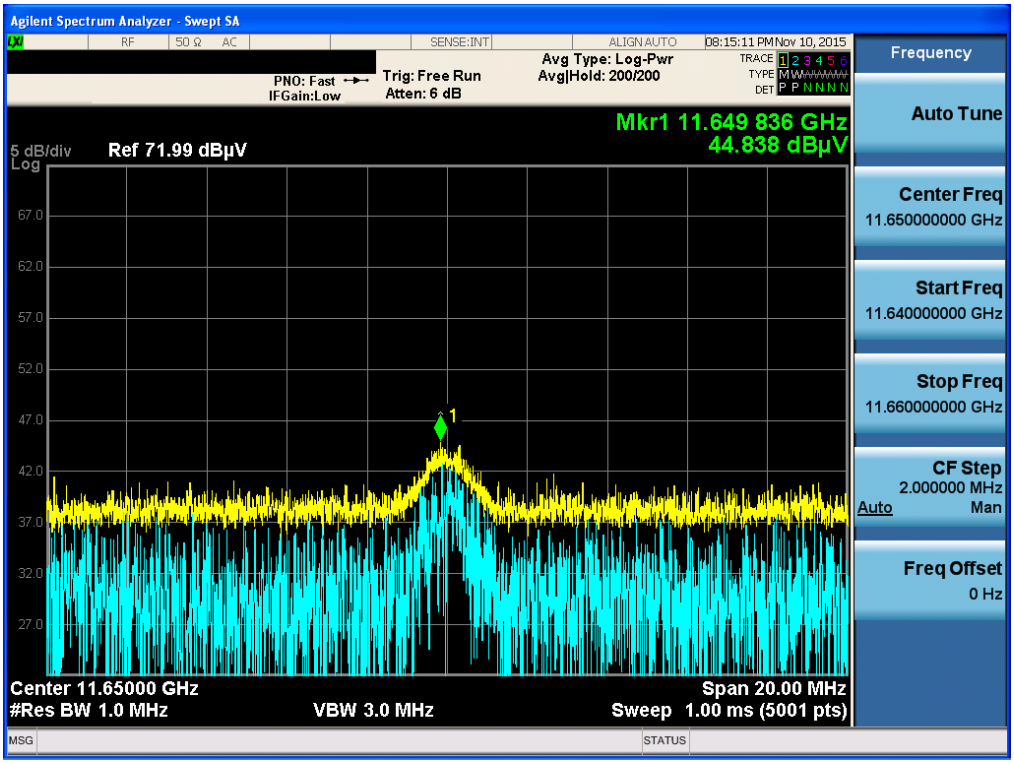
802.11a & U-NII 4 & Highest & X axis & Ver **Detector Mode : PK**



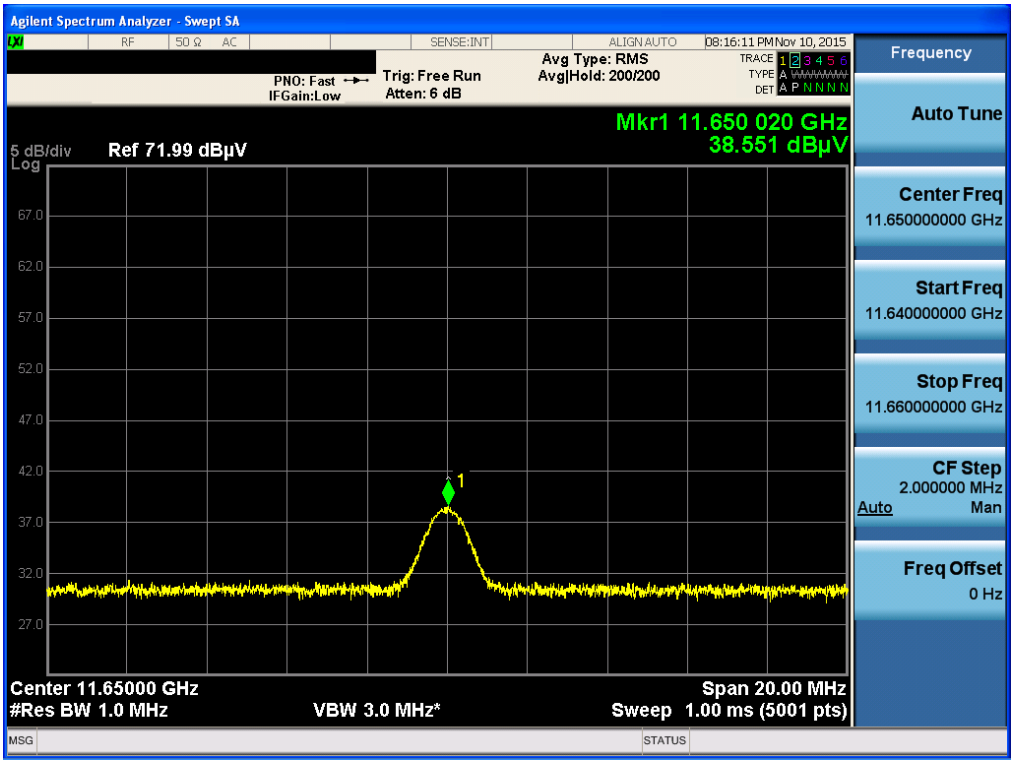
802.11a & U-NII 4 & Highest & X axis & Ver **Detector Mode : AV**



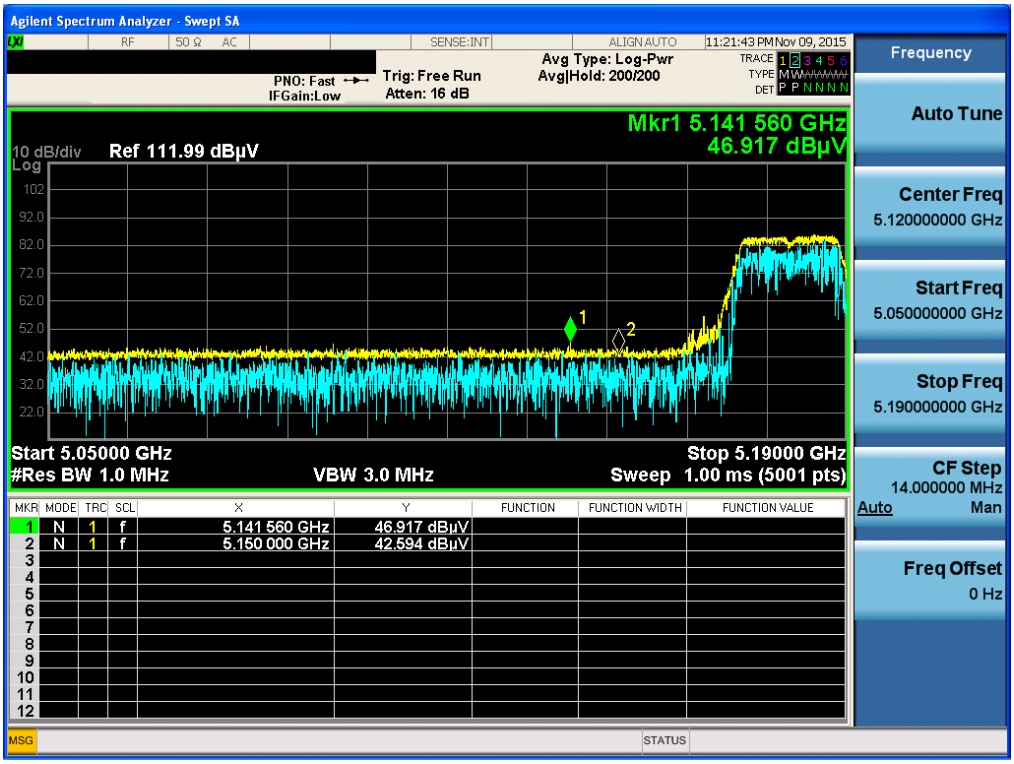
802.11a & U-NII 4 & Highest & Y axis & Hor **Detector Mode : PK**



802.11a & U-NII 4 & Highest & Y axis & Hor **Detector Mode : AV**



802.11n(HT20) & U-NII 1 & Lowest & Y axis & Hor Detector Mode : PK



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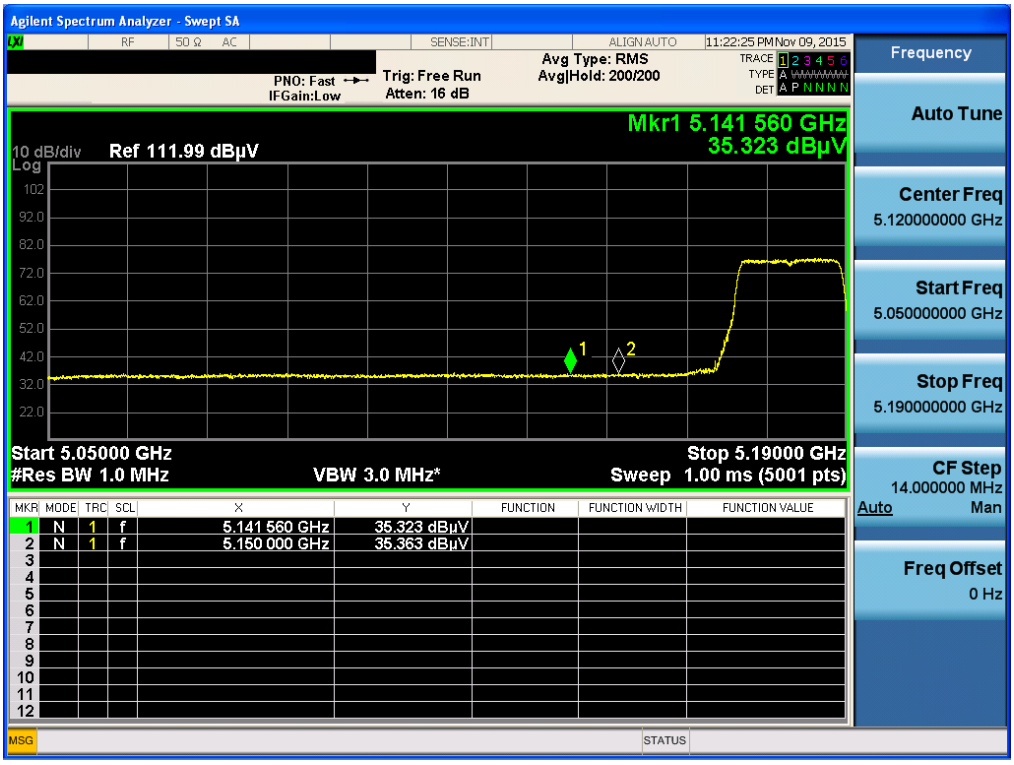

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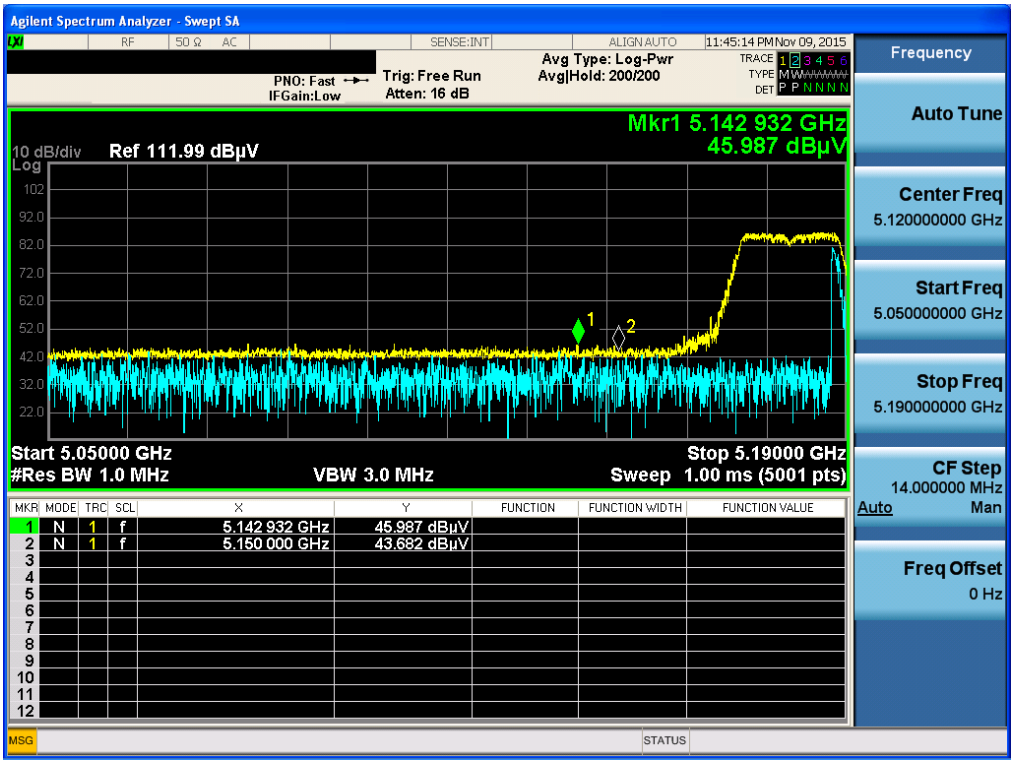

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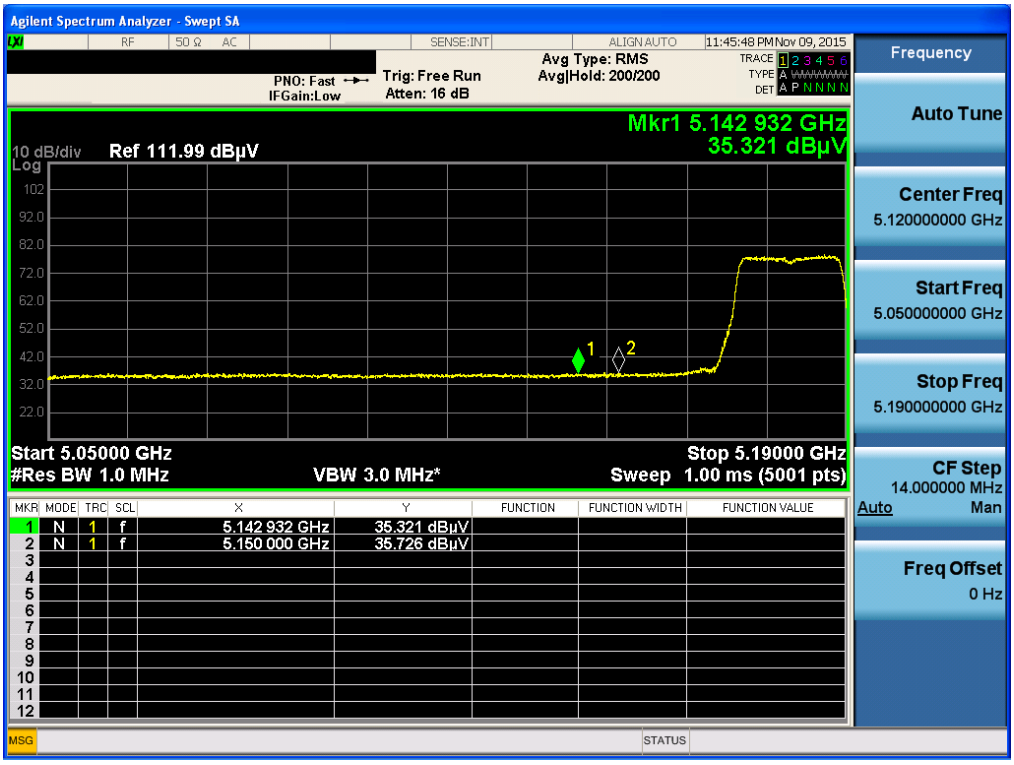
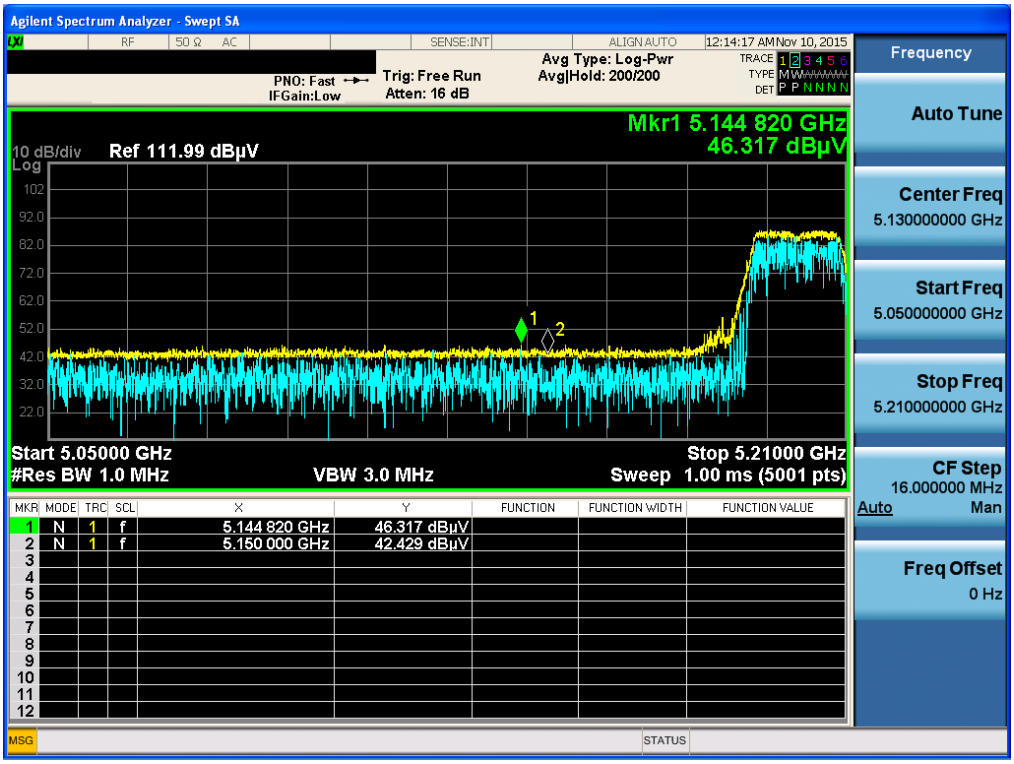
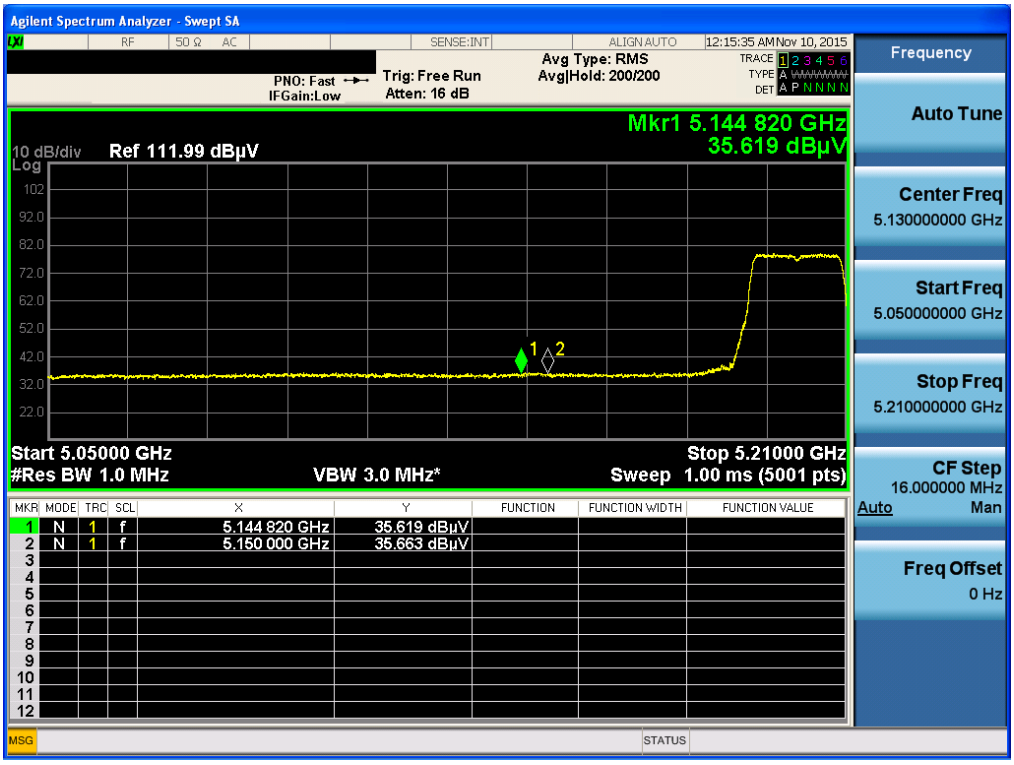


802.11n(HT20) & U-NII 1 & Middle & Y axis & Hor Detector Mode : PK



802.11n(HT20) & U-NII 1 & Middle & Y axis & Hor Detector Mode : AV



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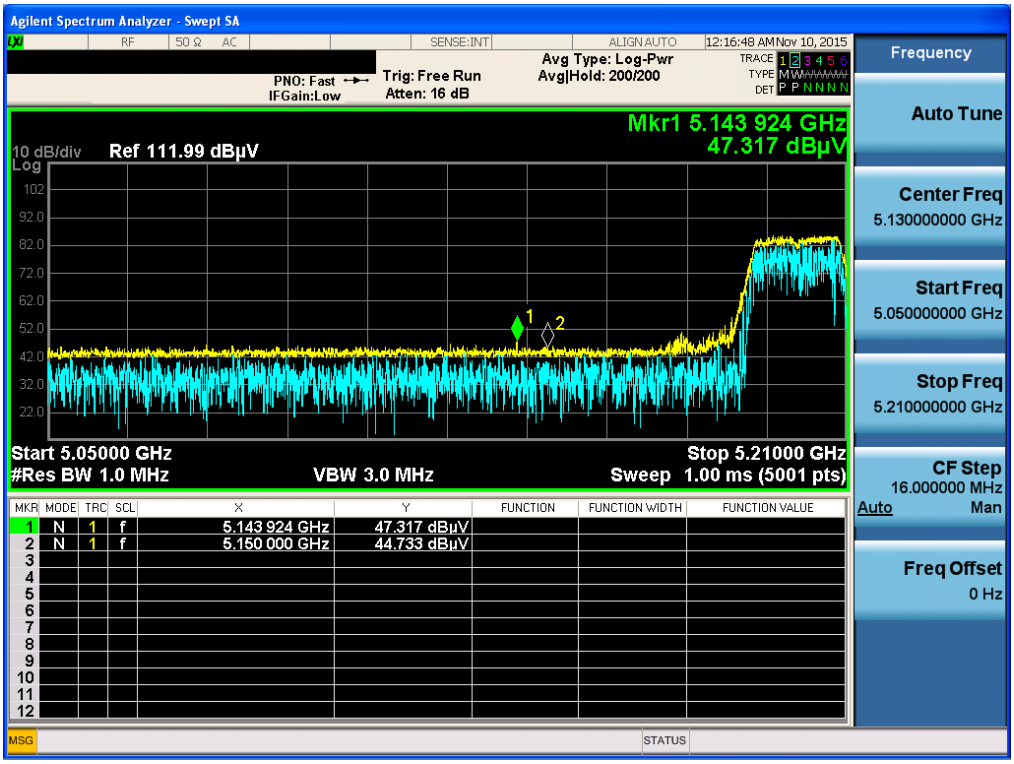
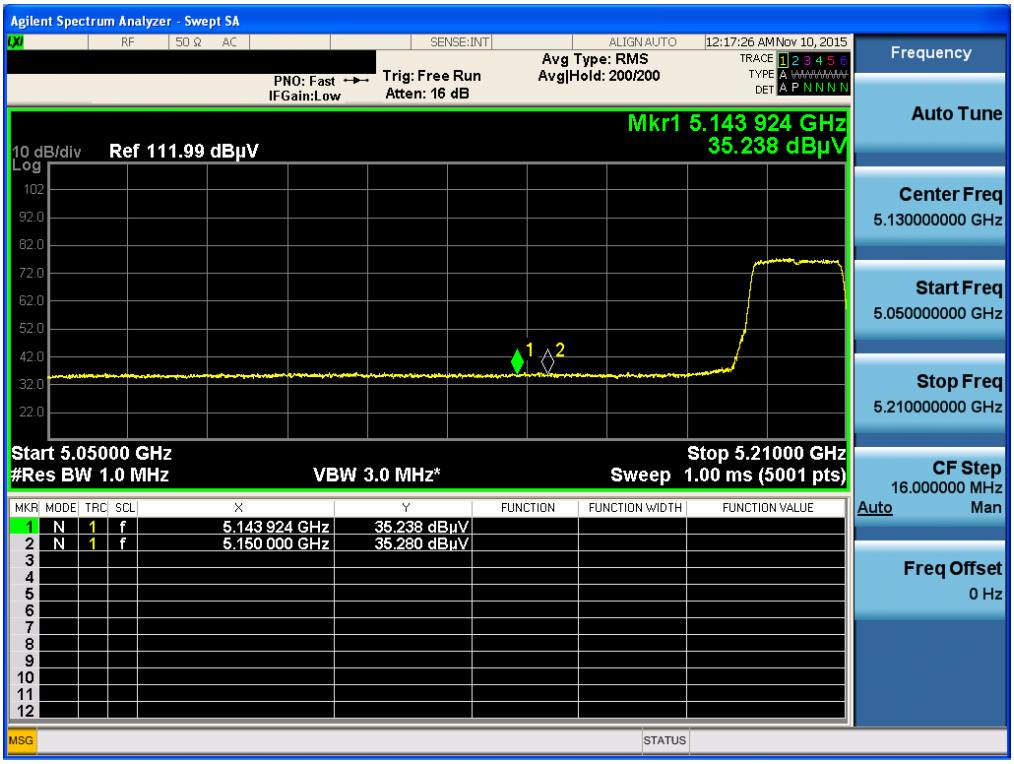


802.11n(HT20) & U-NII 1 & Middle & Z axis & Ver Detector Mode : AV



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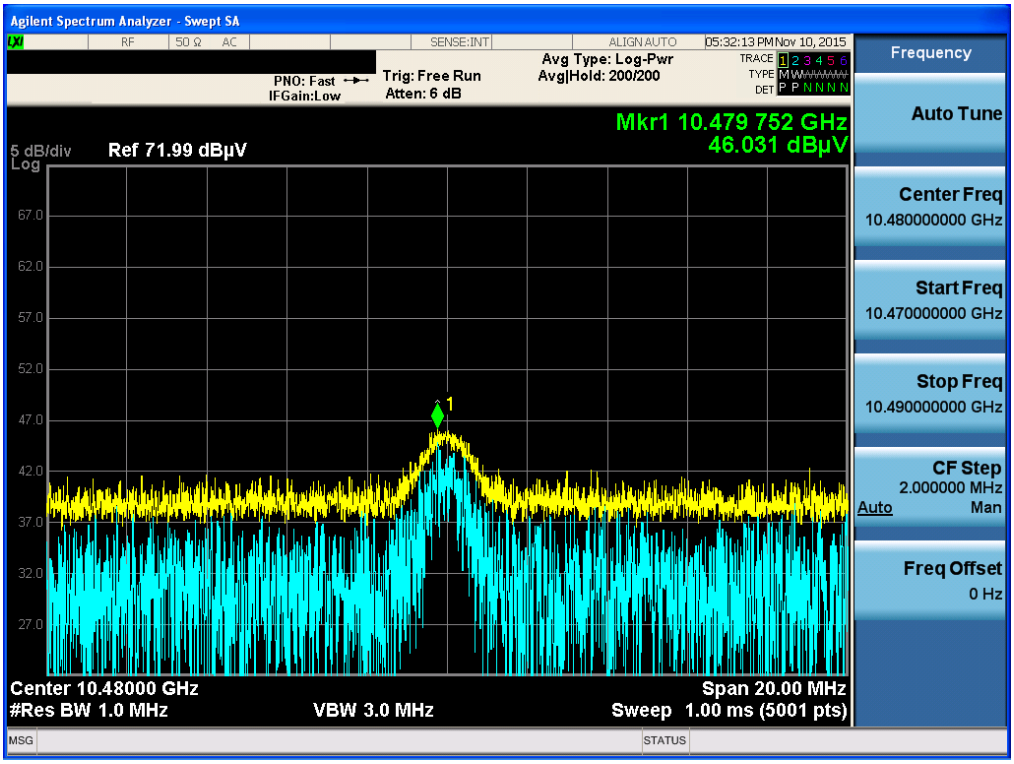

802.11n(HT20) & U-NII 1 & Highest & Z axis & Ver Detector Mode : PK