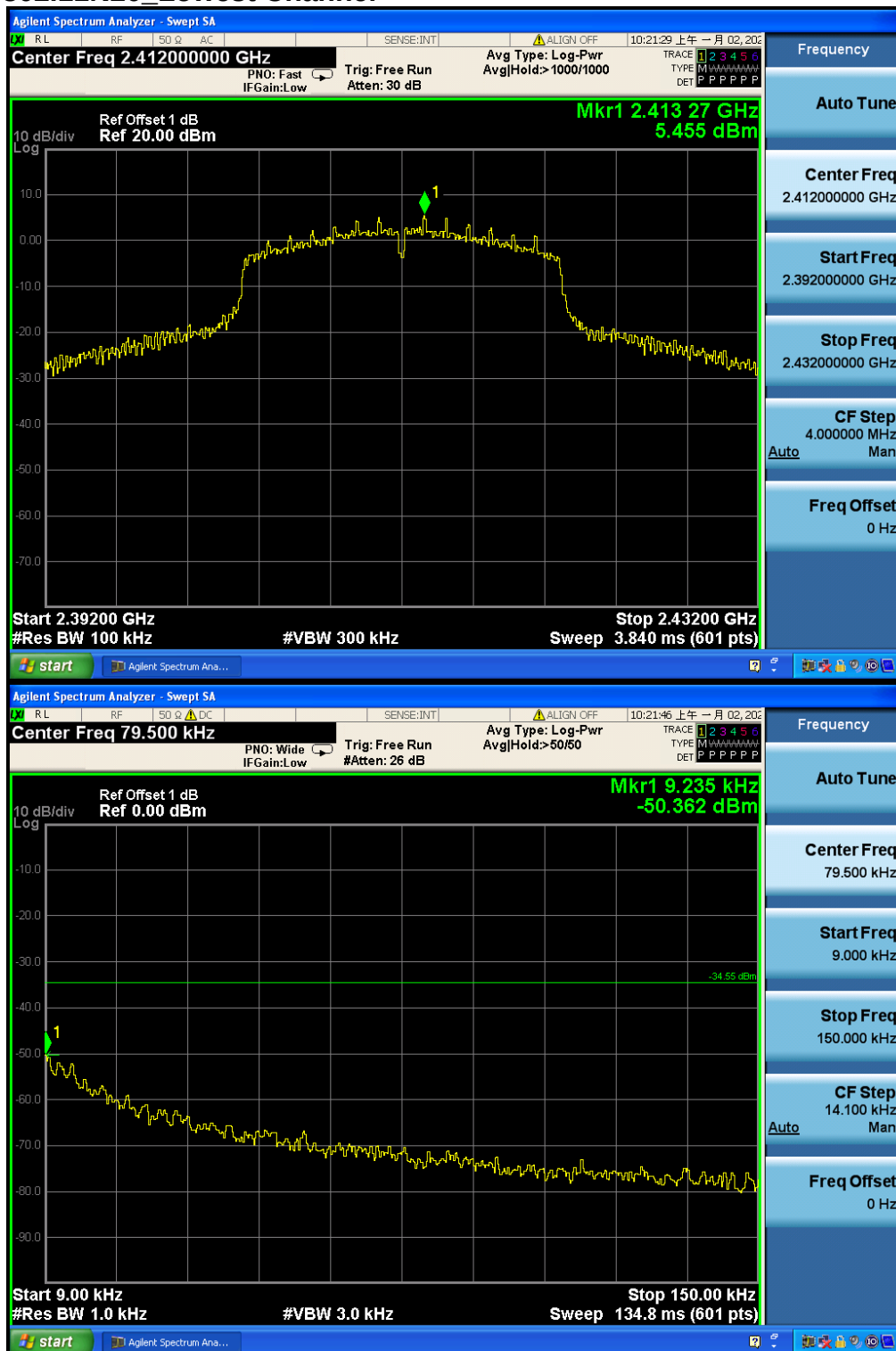
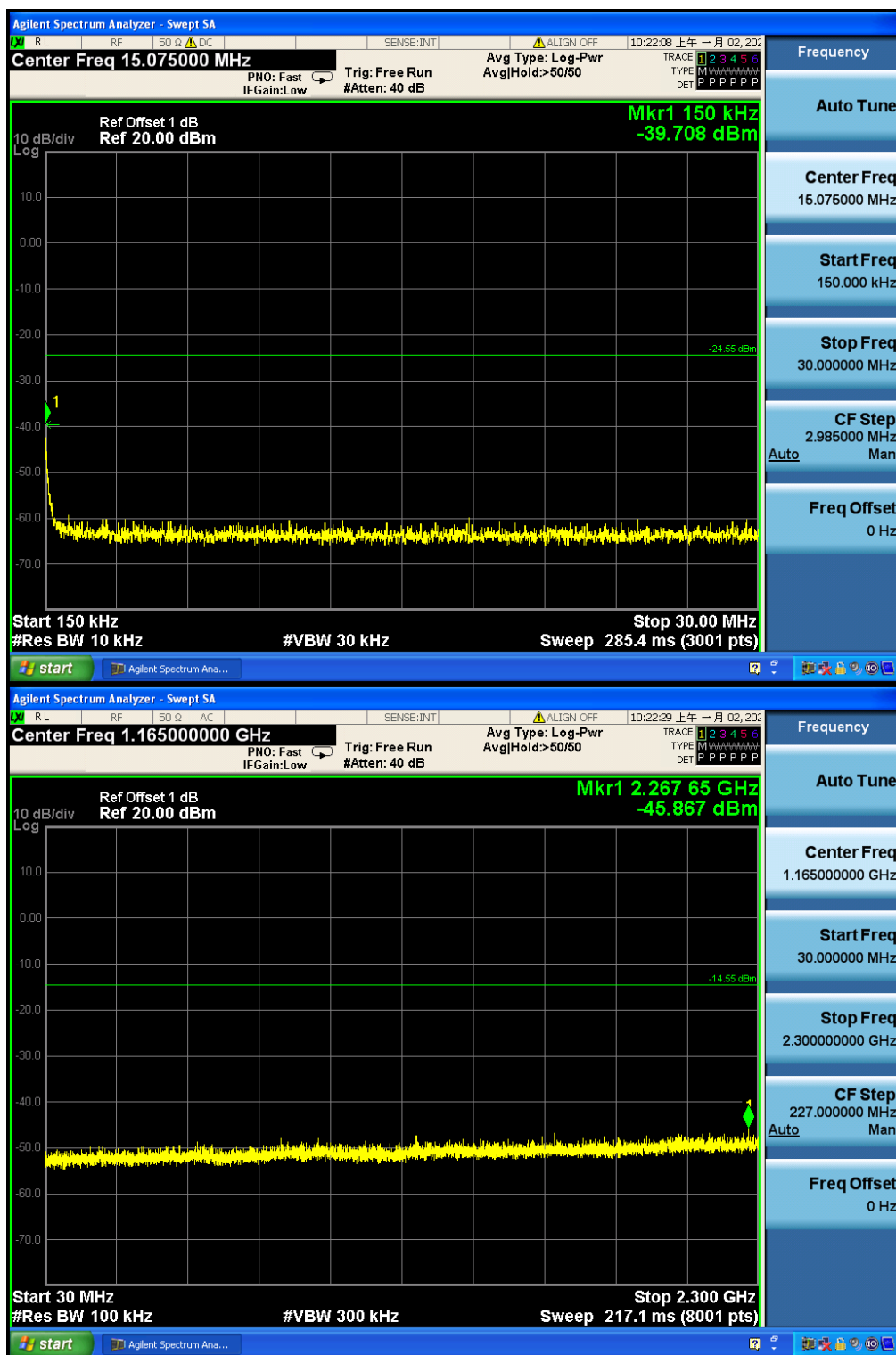






4.8.1.1.7 802.11N20 Lowest Channel





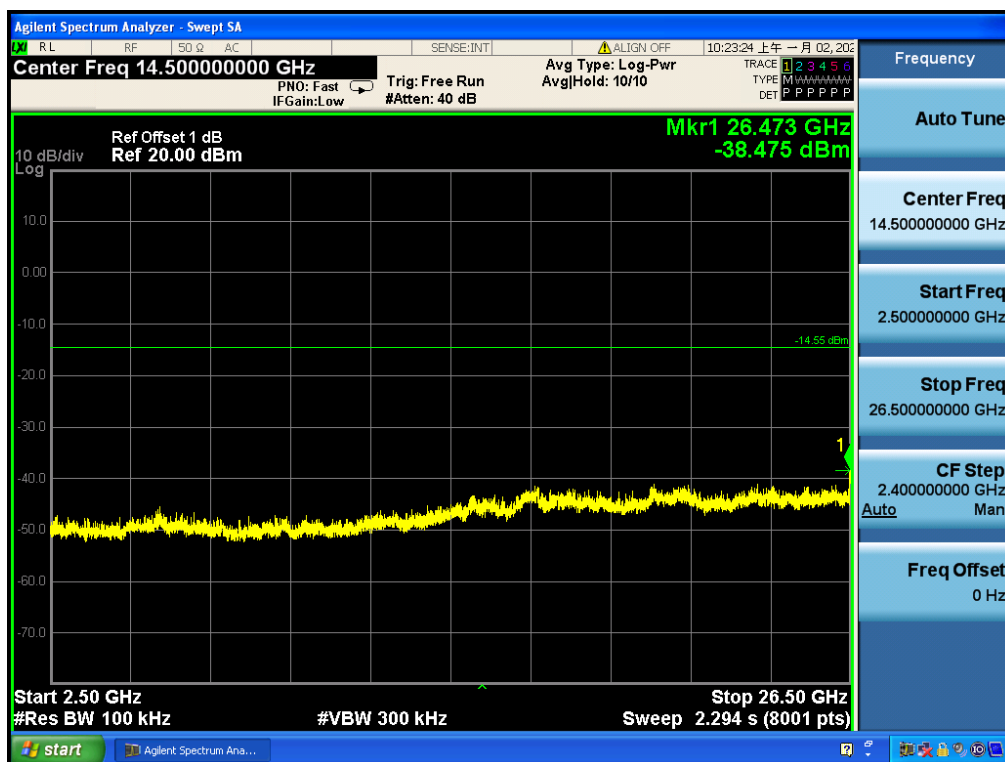


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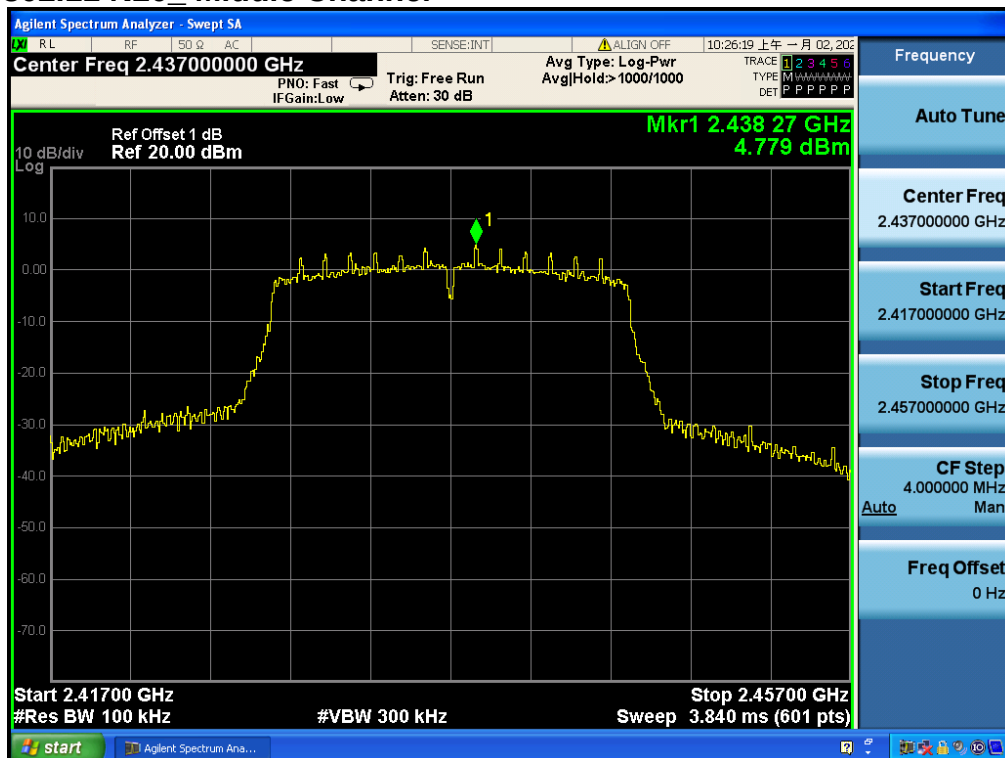
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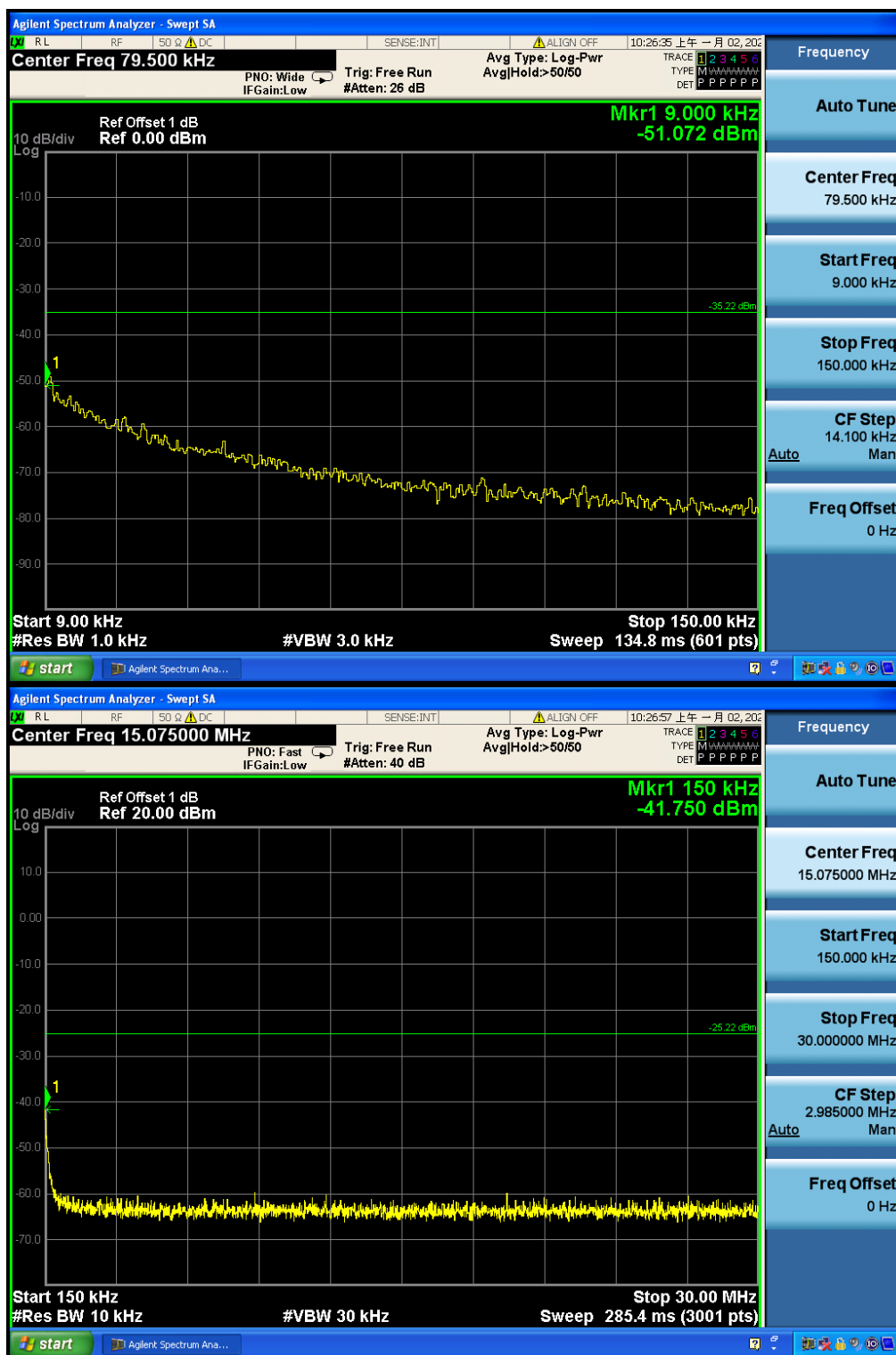
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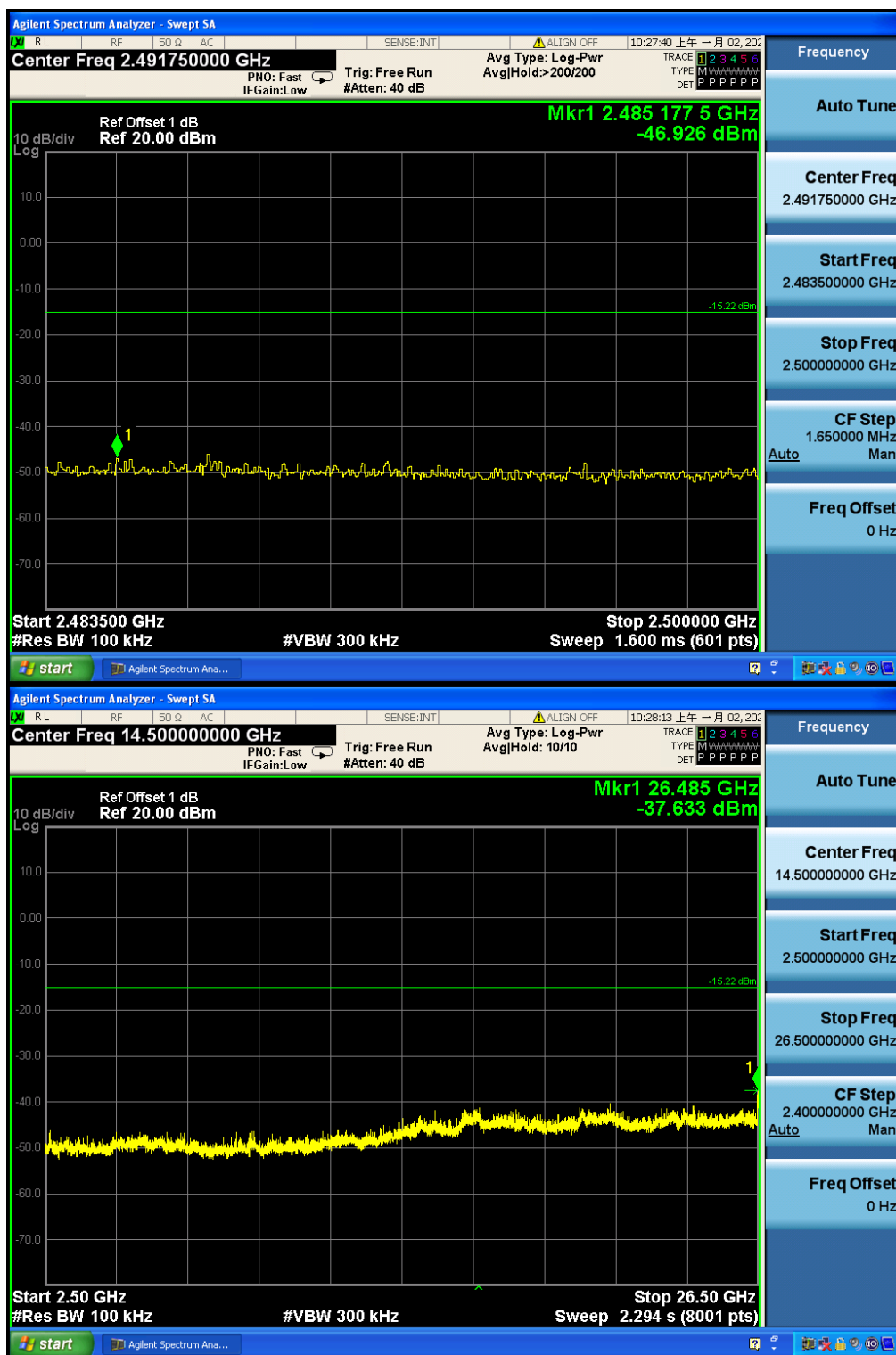


4.8.1.1.8 802.11 N20_Middle Channel

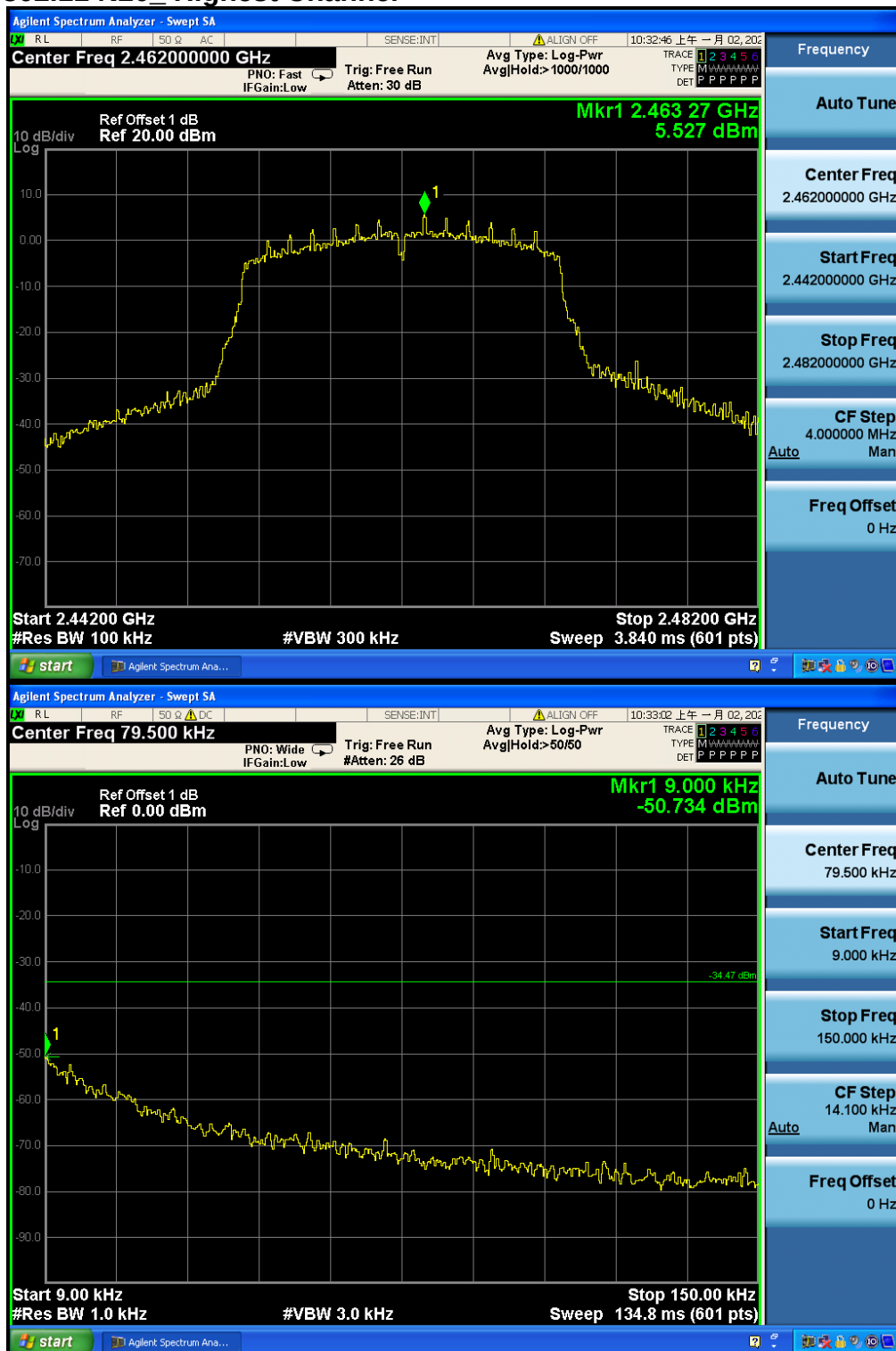


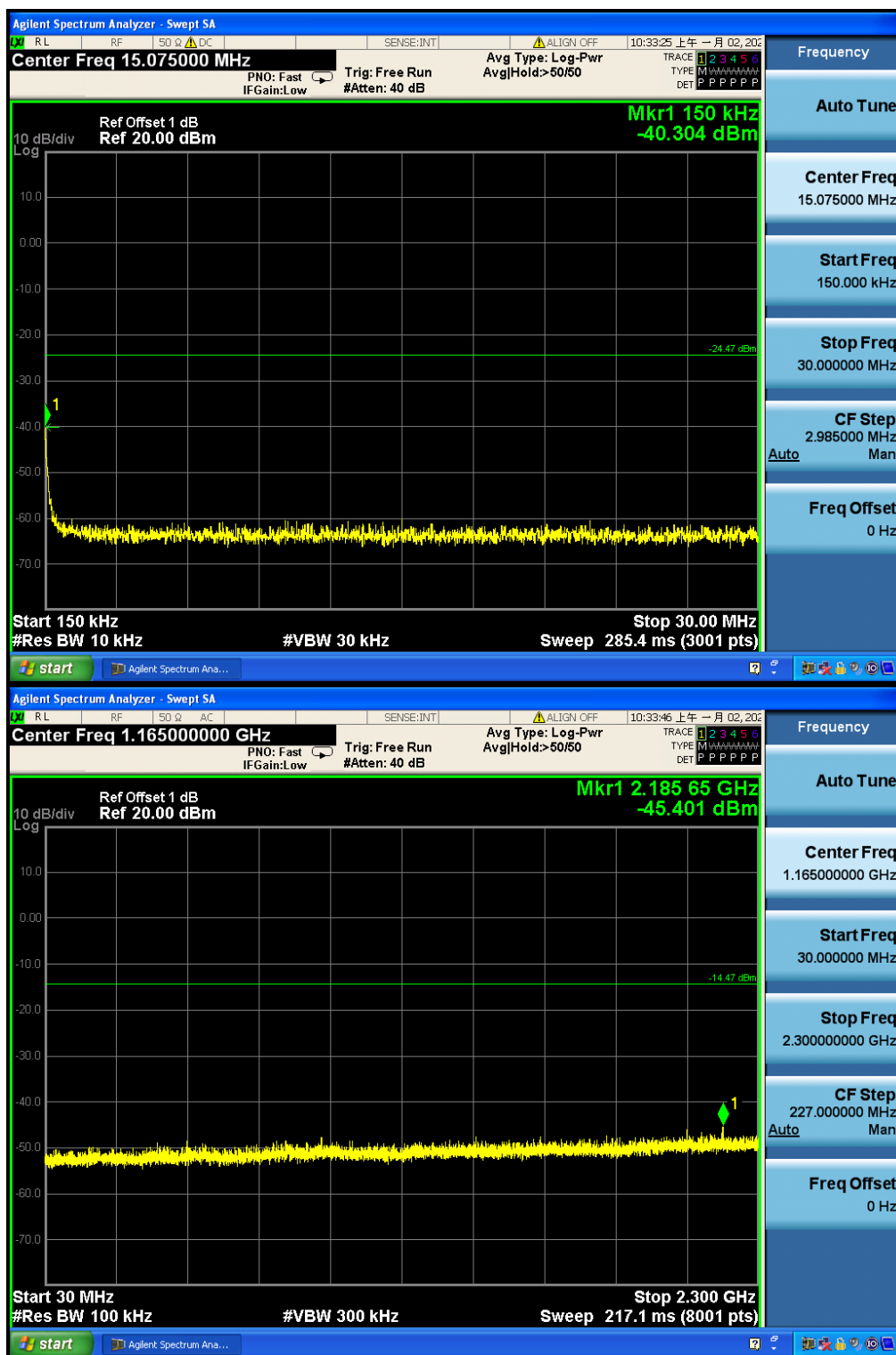






4.8.1.1.9 802.11 N20_Highest Channel

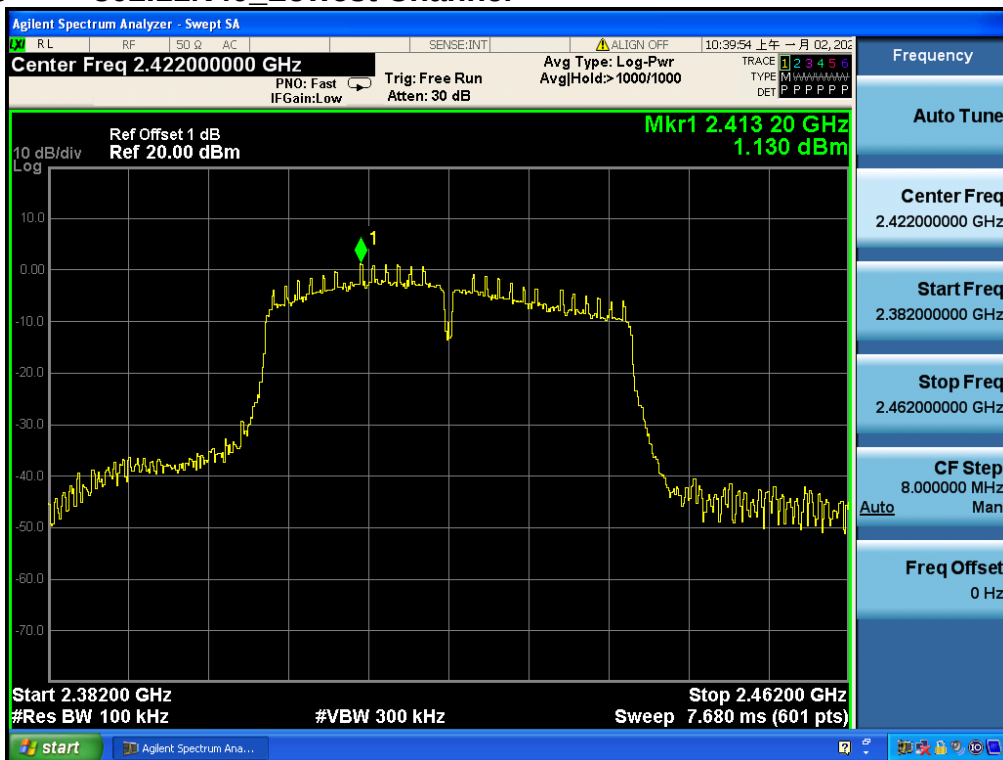


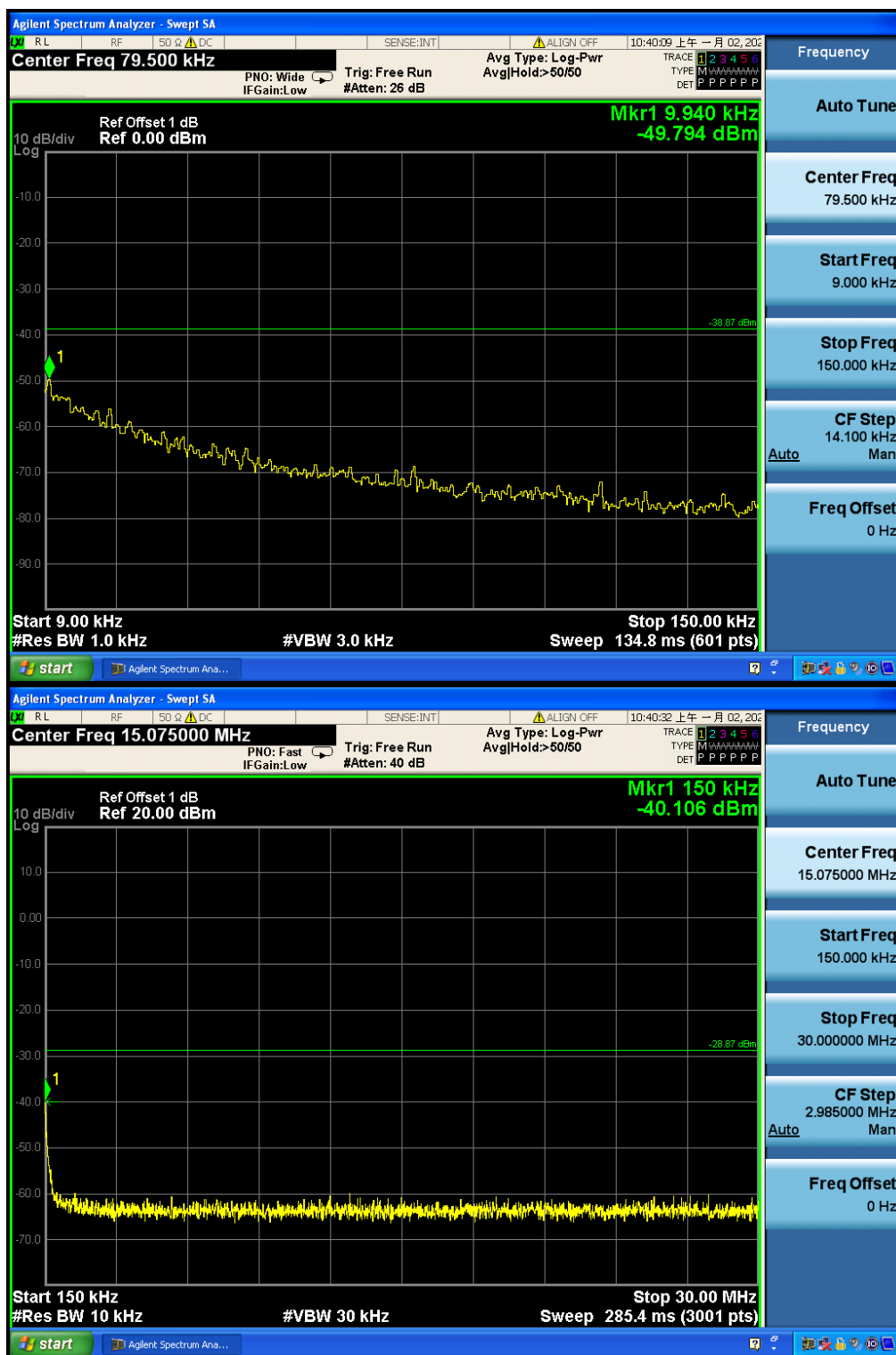


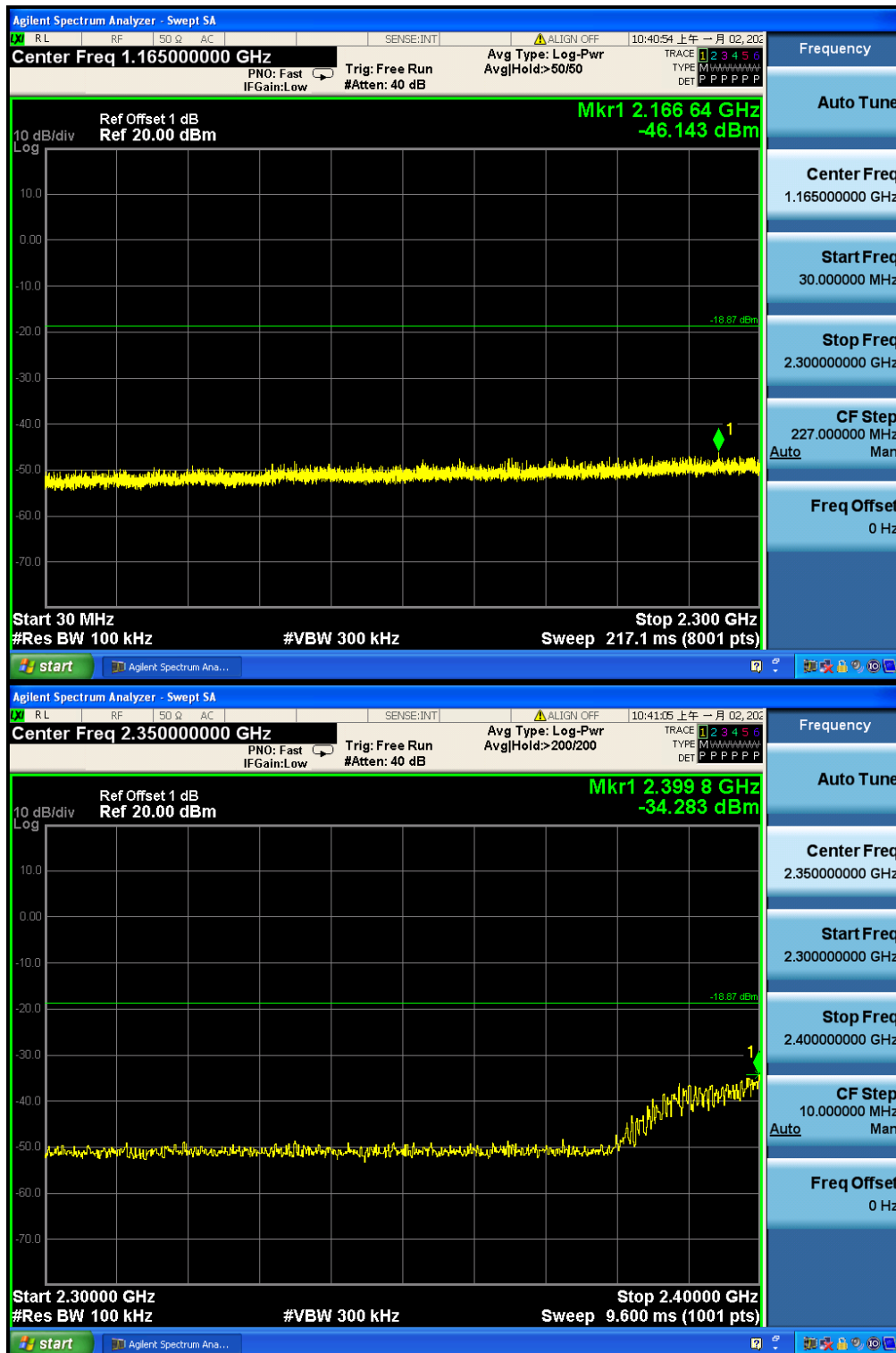




4.8.1.1.10 802.11N40_Lowest Channel

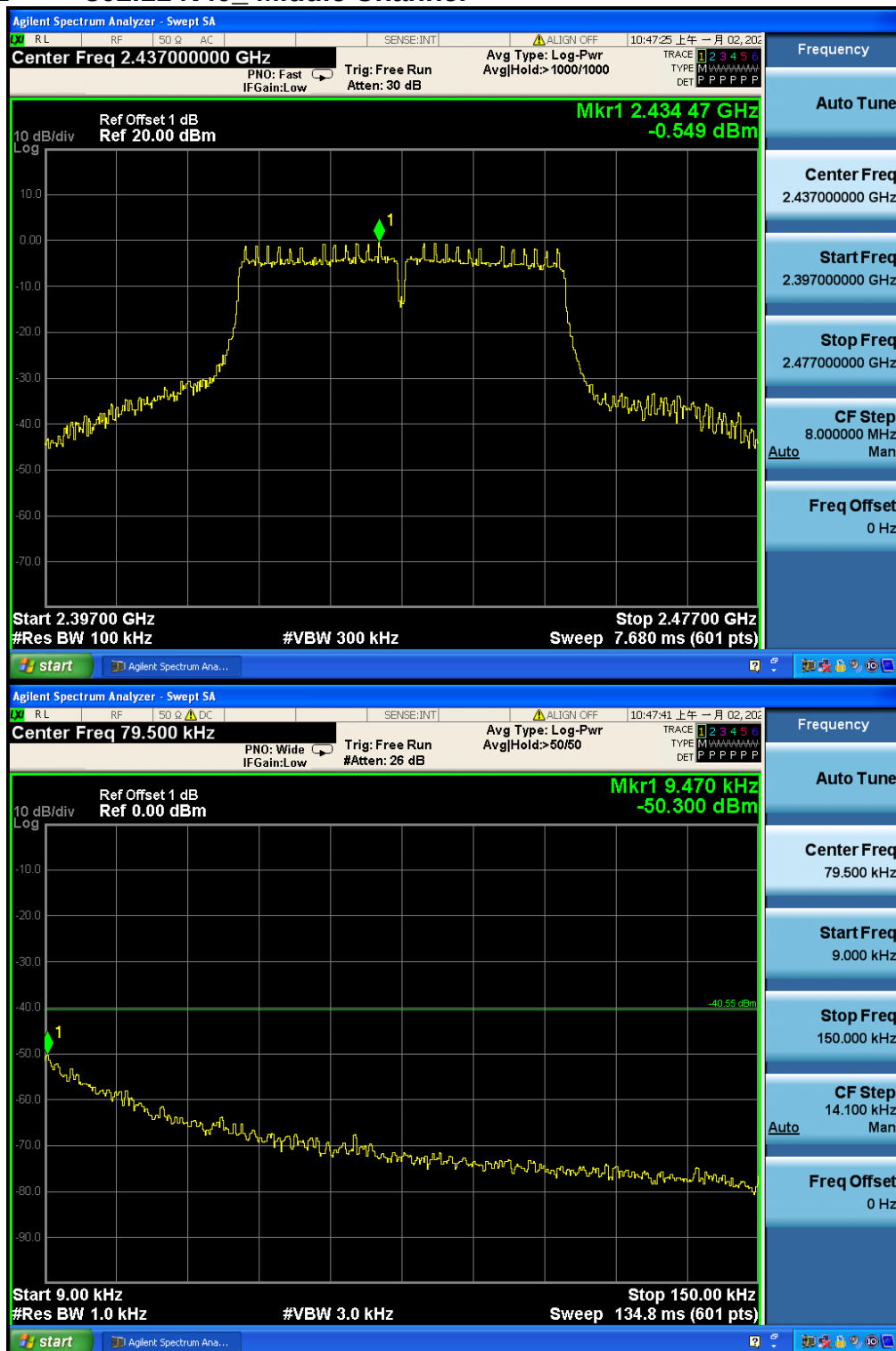


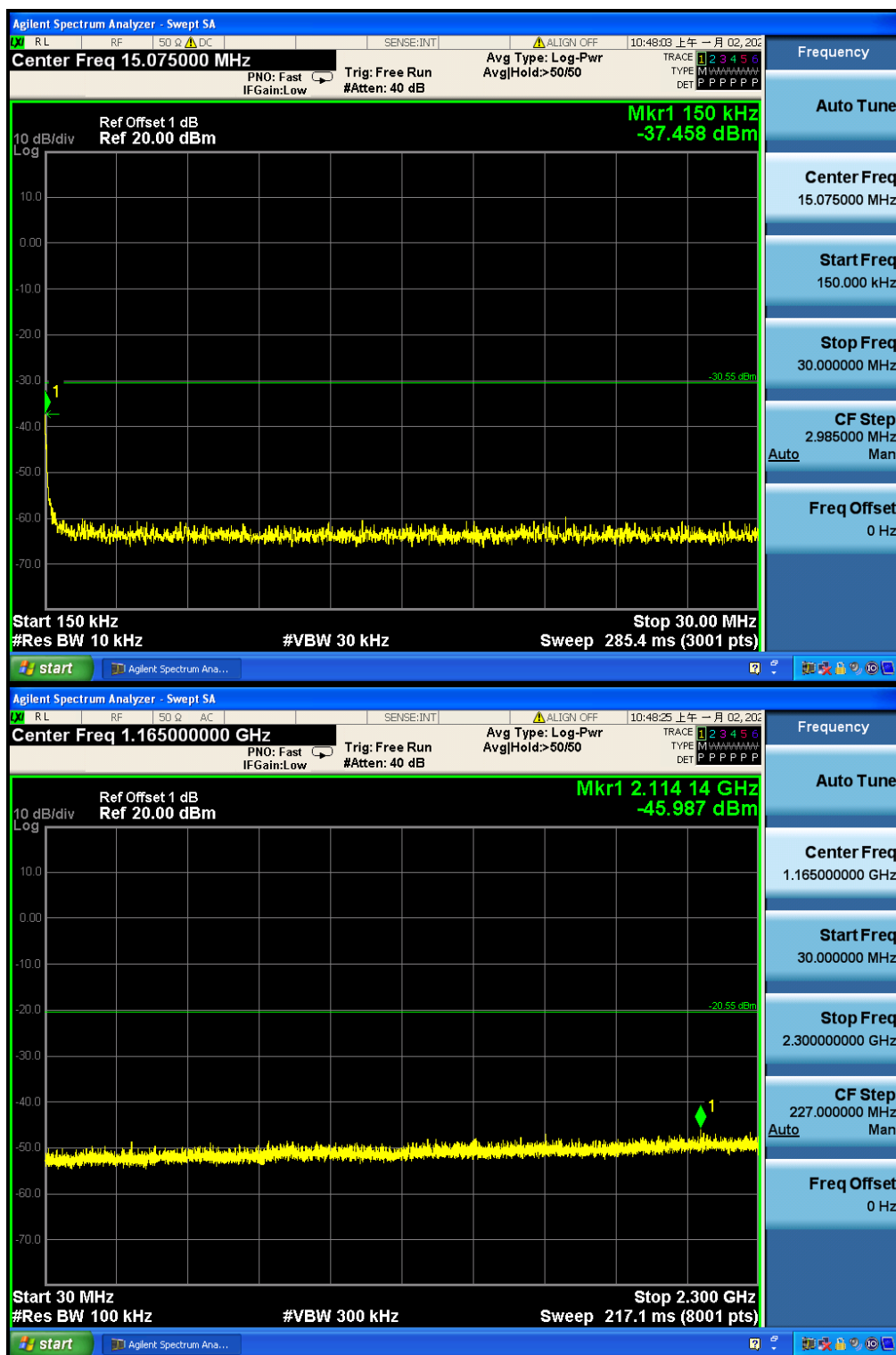


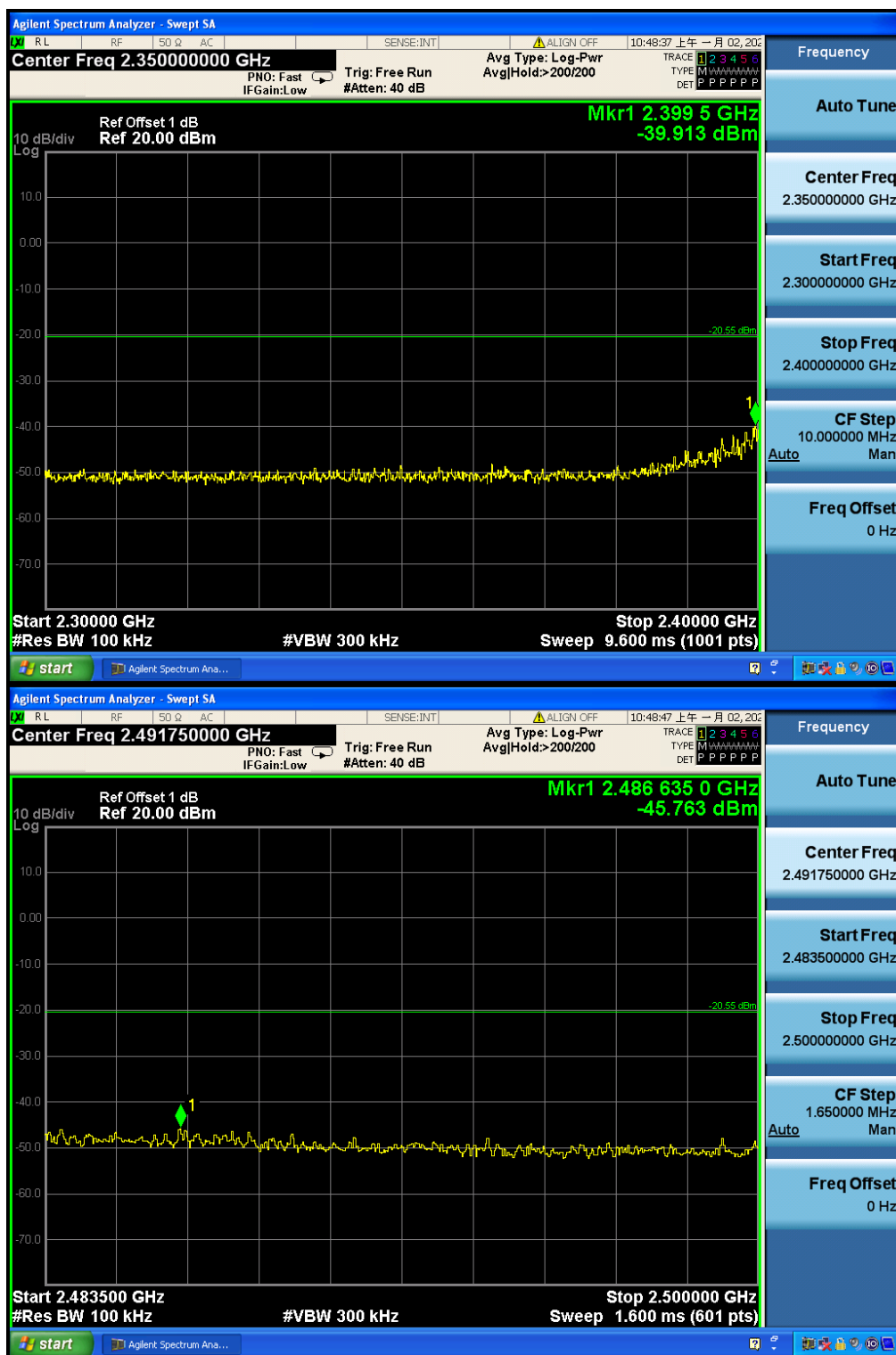


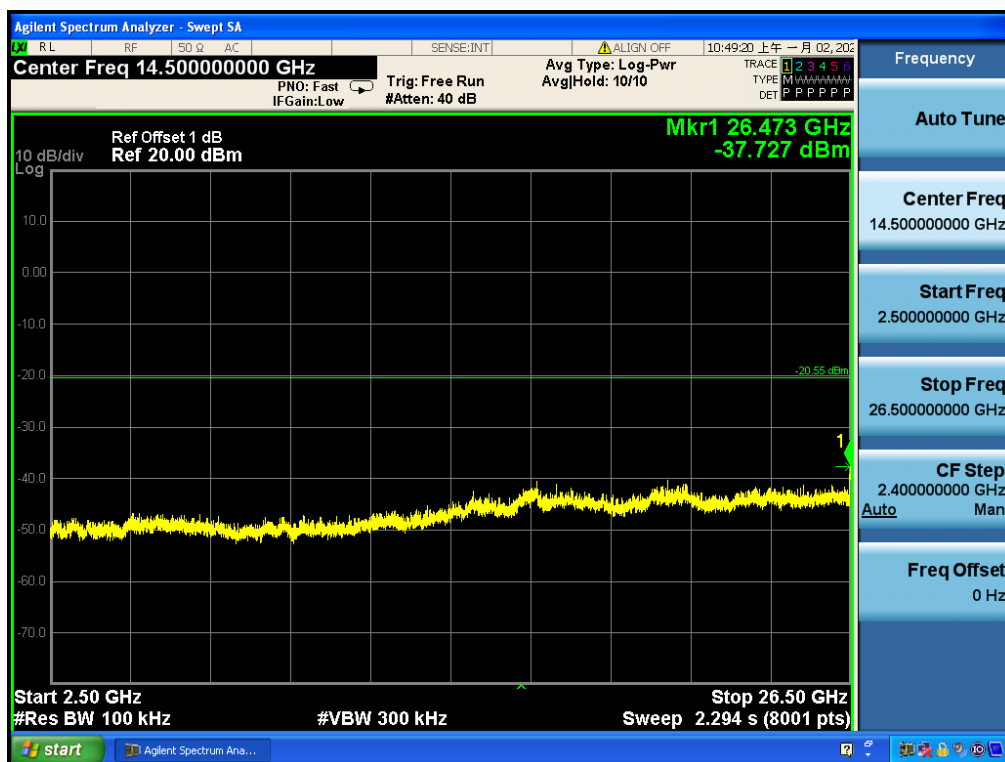


4.8.1.1.11 802.11 N40_ Middle Channel

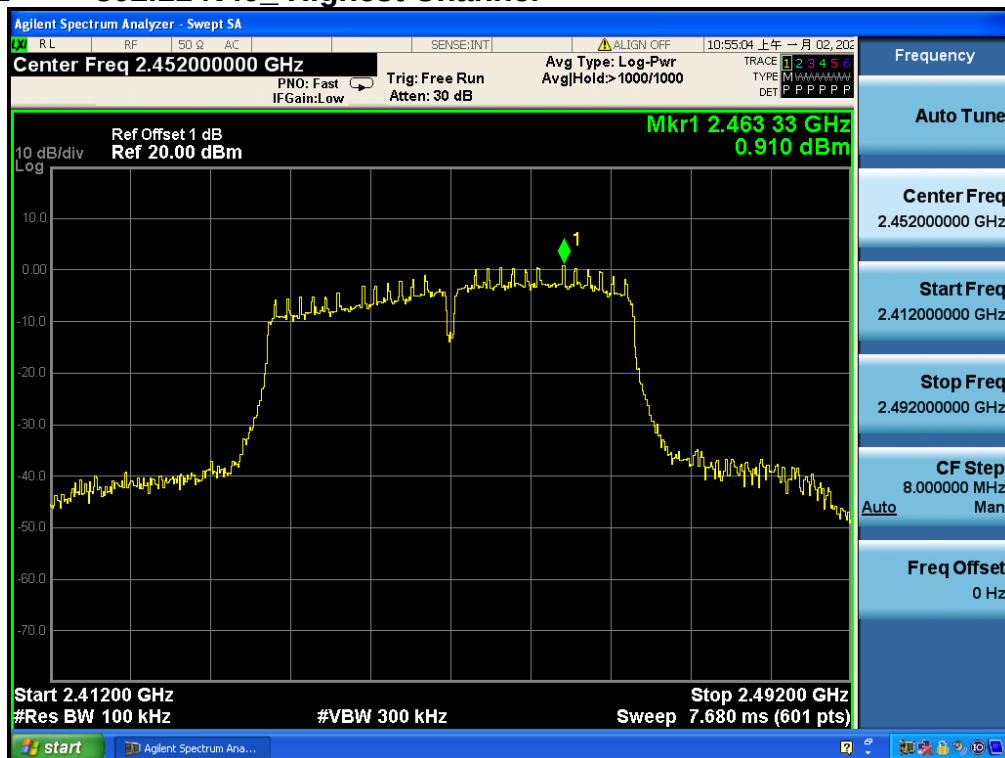


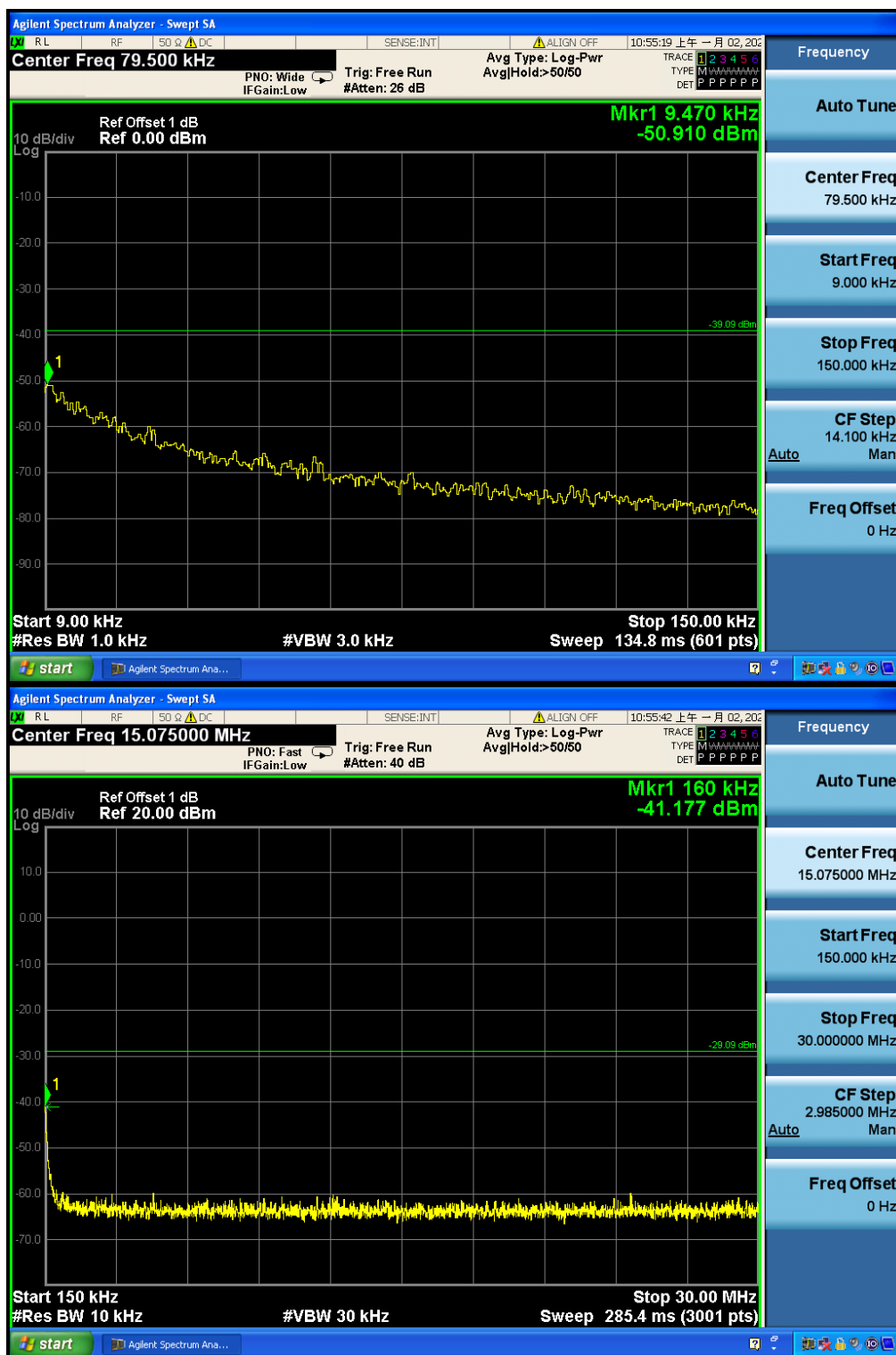






4.8.1.1.12 802.11 N40_Highest Channel









Remark:

Scan from 9KHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.



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4.9 Radiated Spurious Emissions

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205				
Test Method:	ANSI C63.10 :2013 Section 11.12				
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average
Limit:	Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
	1.705MHz-30MHz	30	-	-	30
	30MHz-88MHz	100	40.0	Quasi-peak	3
	88MHz-216MHz	150	43.5	Quasi-peak	3
	216MHz-960MHz	200	46.0	Quasi-peak	3
	960MHz-1GHz	500	54.0	Quasi-peak	3
	Above 1GHz	500	54.0	Average	3
	Remark: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.				

Test Setup:	
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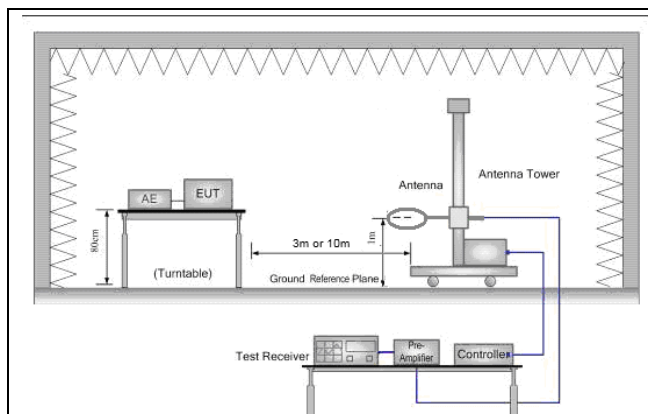


Figure 1. Below 30MHz

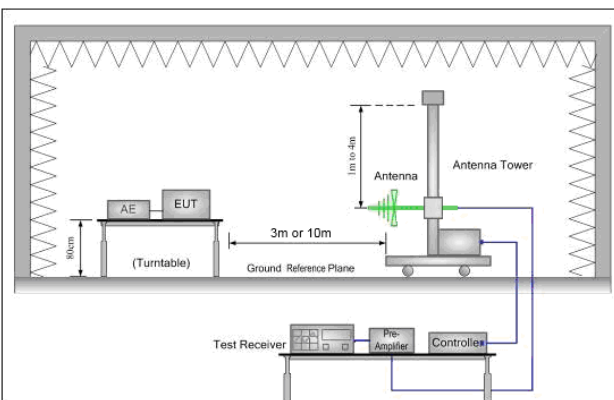


Figure 2. 30MHz to 1GHz

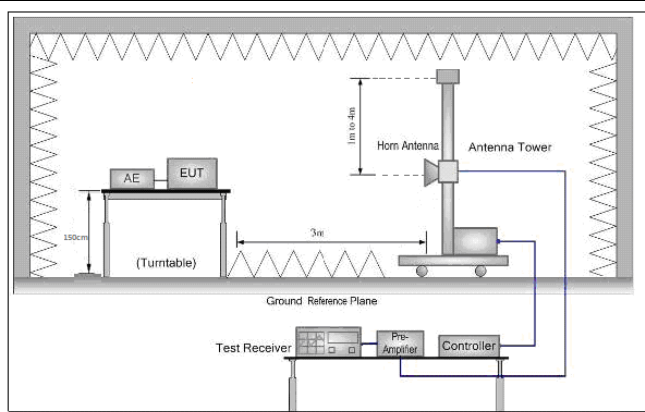


Figure 3. Above 1 GHz

Test Procedure:

- For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation
- The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be





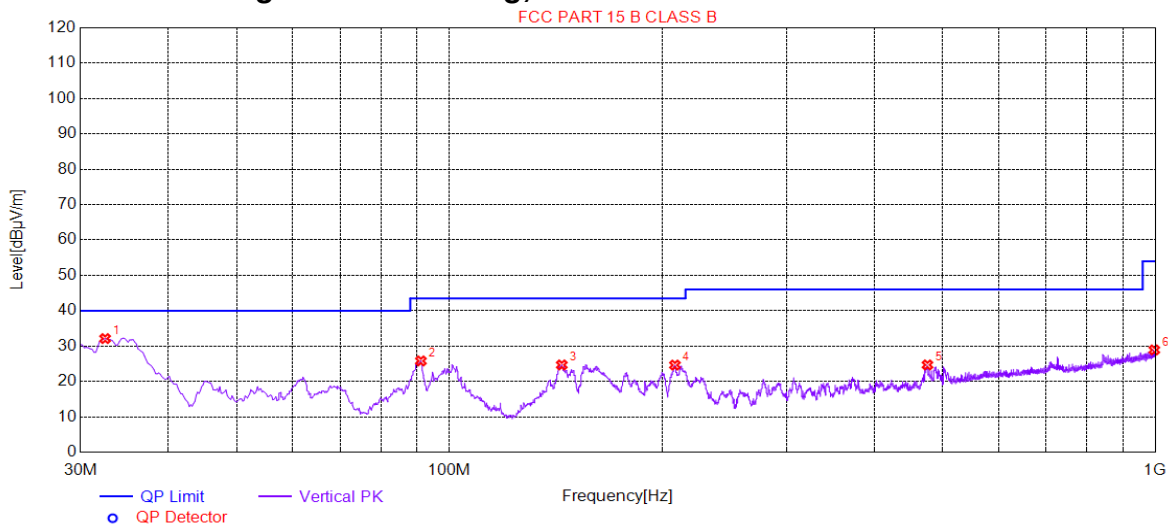
	re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. h. Test the EUT in the lowest channel, the middle channel ,the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge + Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40) For below 1GHz, through Pre-scan, find the 1Mbps of rate of 802.11B at lowest channel is the worst case. Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



4.9.1 Radiated emission below 1GHz

The 5029E data:

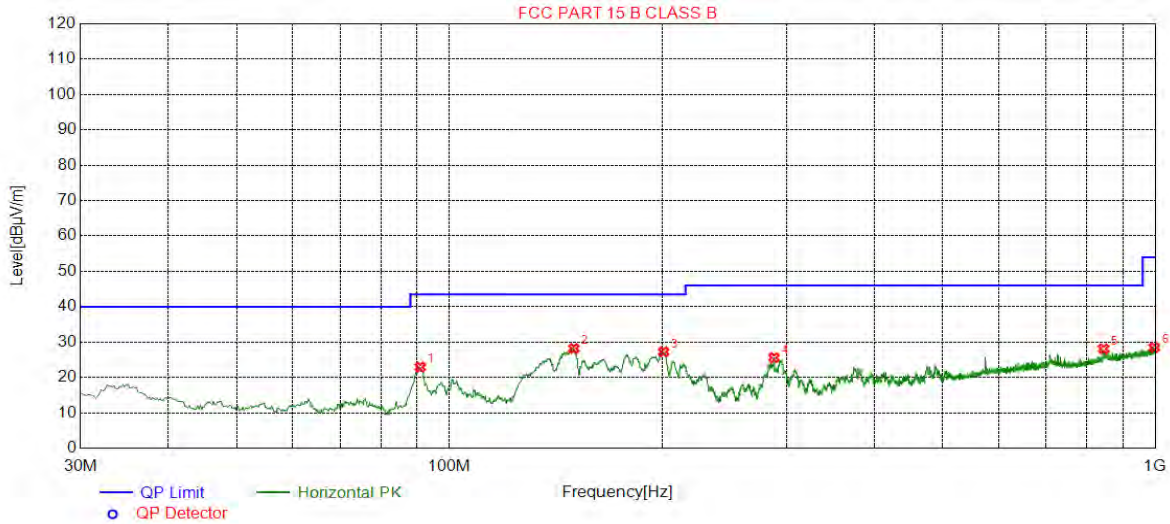
4.9.1.1 Charge + Transmitting, Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	32.5225	32.12	-30.02	40.00	7.88	291	14	Vertical
2	91.1222	25.80	-33.53	43.50	17.70	176	272	Vertical
3	144.2889	24.67	-35.34	43.50	18.83	200	336	Vertical
4	208.7097	24.63	-31.01	43.50	18.87	210	343	Vertical
5	475.7071	24.68	-23.91	46.00	21.32	228	25	Vertical
6	997.0894	28.92	-14.83	54.00	25.08	227	346	Vertical



4.9.1.2 Charge + Transmitting, Horizontal



Suspected List

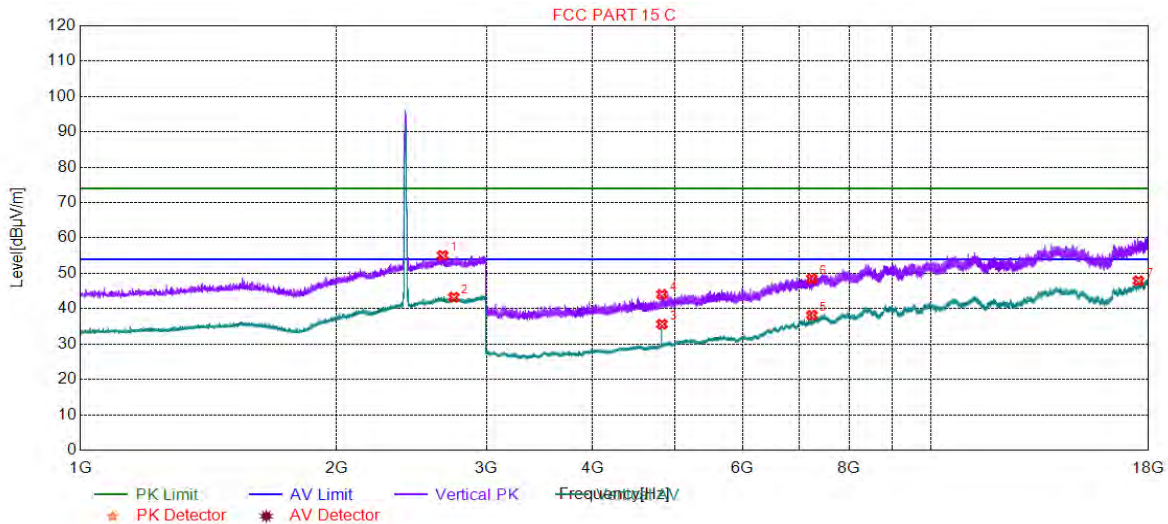
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	90.9282	22.96	-33.56	43.50	20.54	214	187	Horizontal
2	150.1100	28.19	-35.08	43.50	15.31	187	245	Horizontal
3	201.1422	27.26	-31.16	43.50	16.24	102	239	Horizontal
4	288.2657	25.61	-28.71	46.00	20.39	175	34	Horizontal
5	844.9630	28.12	-16.97	46.00	17.88	236	228	Horizontal
6	997.0894	28.48	-14.83	54.00	25.52	116	274	Horizontal



4.9.2 Transmitter emission above 1GHz

4.9.2.1 ANT1

4.9.2.1.1 802.11B_Lowest Channel_ Vertical



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2664.9162	55.08	8.67	74.00	18.92	169	303	Vertical
2	2746.4366	43.24	9.07	54.00	10.76	289	45	Vertical
3	4824.0000	35.62	-18.21	54.00	18.38	271	99	Vertical
4	4824.0000	44.03	-18.21	74.00	29.97	297	262	Vertical
5	7236.0000	38.16	-9.99	54.00	15.84	170	266	Vertical
6	7236.0000	48.47	-9.99	74.00	25.53	265	266	Vertical
7	17509.9255	47.88	1.96	54.00	6.12	277	359	Vertical



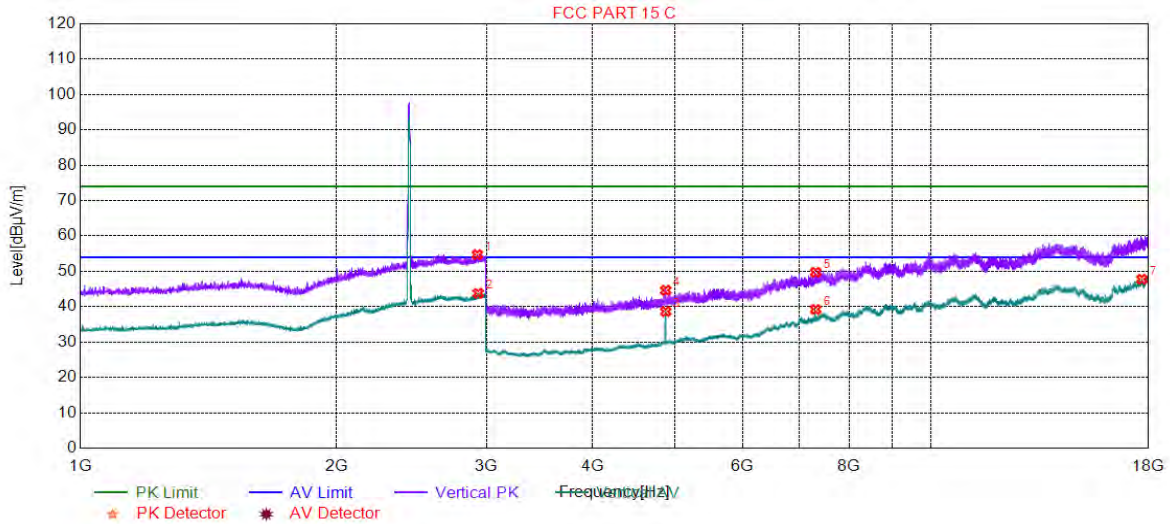
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4.9.2.1.2 802.11B_ Middle Channel_ Vertical



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2927.4819	54.73	9.44	74.00	19.27	245	86	Vertical
2	2934.4836	43.82	9.51	54.00	10.18	153	249	Vertical
3	4874.0000	38.63	-17.99	54.00	15.37	234	71	Vertical
4	4874.0000	44.64	-17.99	74.00	29.36	189	97	Vertical
5	7311.0000	49.75	-9.74	74.00	24.25	246	267	Vertical
6	7311.0000	39.23	-9.74	54.00	14.77	174	68	Vertical
7	17673.8337	47.77	2.35	54.00	6.23	299	18	Vertical



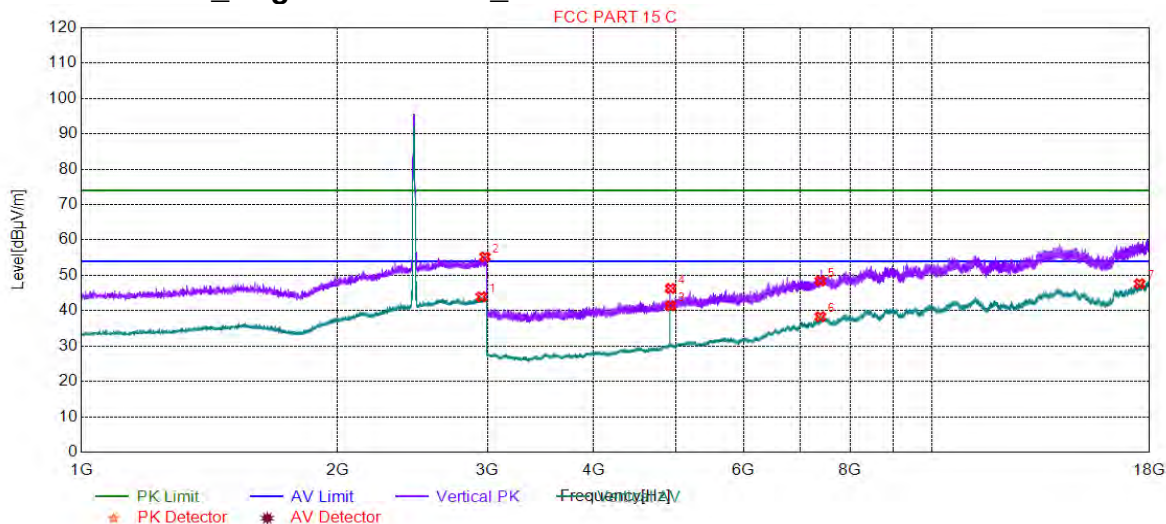
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4.9.2.1.3 802.11B_ Highest Channel_ Vertical

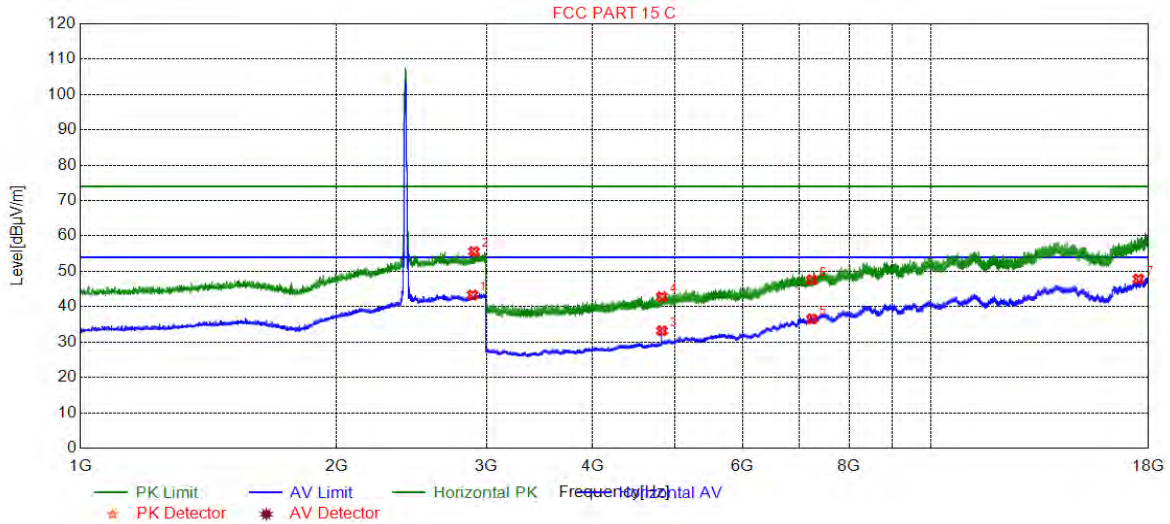


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2951.9880	43.94	9.67	54.00	10.06	191	44	Vertical
2	2980.9952	55.22	9.54	74.00	18.78	278	44	Vertical
3	4924.0000	41.35	-17.72	54.00	12.65	229	288	Vertical
4	4924.0000	46.30	-17.72	74.00	27.70	240	260	Vertical
5	7386.0000	48.42	-9.55	74.00	25.58	270	267	Vertical
6	7386.0000	38.32	-9.55	54.00	15.68	290	217	Vertical
7	17517.0759	47.64	1.99	54.00	6.36	153	360	Vertical



4.9.2.1.4 802.11B_Lowest Channel_ Horizontal

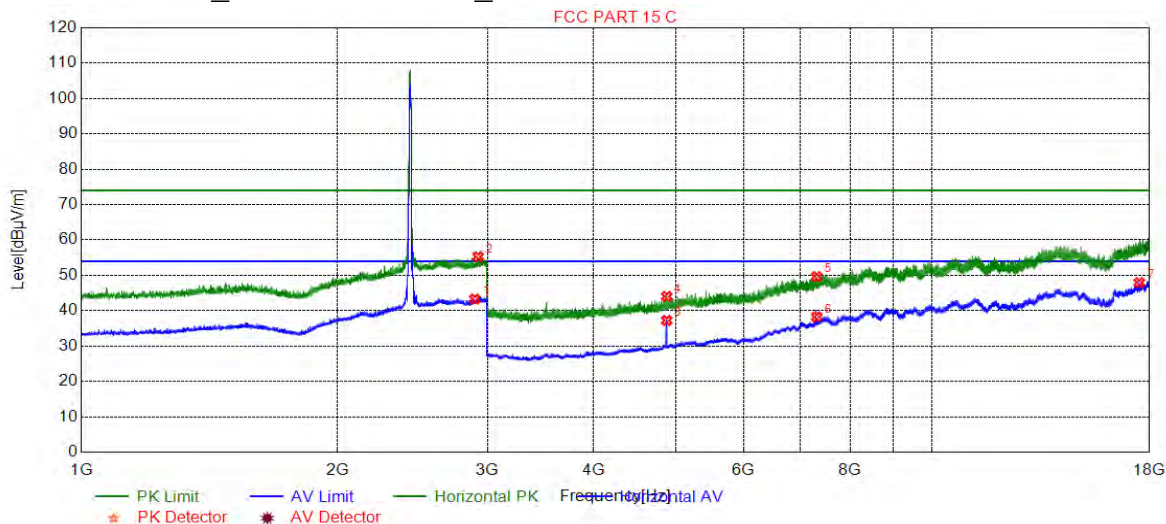


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2889.4724	43.30	9.16	54.00	10.70	180	342	Horizontal
2	2901.4754	55.60	9.16	74.00	18.40	150	0	Horizontal
3	4824.0000	33.19	-18.21	54.00	20.81	213	342	Horizontal
4	4824.0000	42.81	-18.21	74.00	31.19	171	342	Horizontal
5	7236.0000	36.50	-9.99	54.00	17.50	124	18	Horizontal
6	7236.0000	47.60	-9.99	74.00	26.40	140	167	Horizontal
7	17506.6253	47.84	1.95	54.00	6.16	103	266	Horizontal



4.9.2.1.5 802.11B_ Middle Channel_ Horizontal

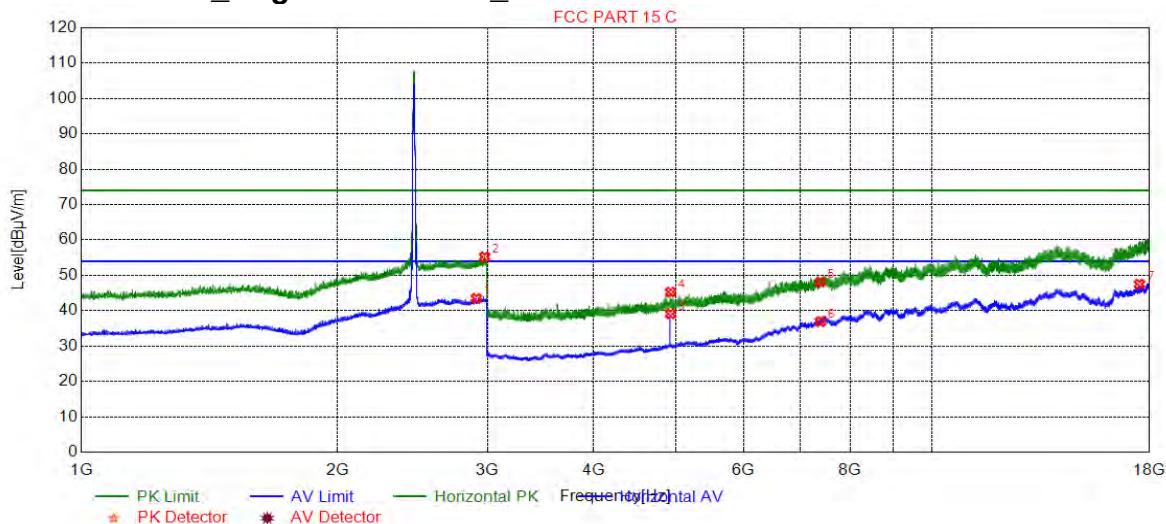


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2899.4749	43.30	9.14	54.00	10.70	146	219	Horizontal
2	2925.4814	55.29	9.42	74.00	18.71	174	82	Horizontal
3	4874.0000	37.25	-17.99	54.00	16.75	229	342	Horizontal
4	4874.0000	44.04	-17.99	74.00	29.96	187	315	Horizontal
5	7311.0000	49.63	-9.74	74.00	24.37	204	68	Horizontal
6	7311.0000	38.26	-9.74	54.00	15.74	222	18	Horizontal
7	17505.5253	47.94	1.94	54.00	6.06	128	218	Horizontal



4.9.2.1.6 802.11B_ Highest Channel_ Horizontal

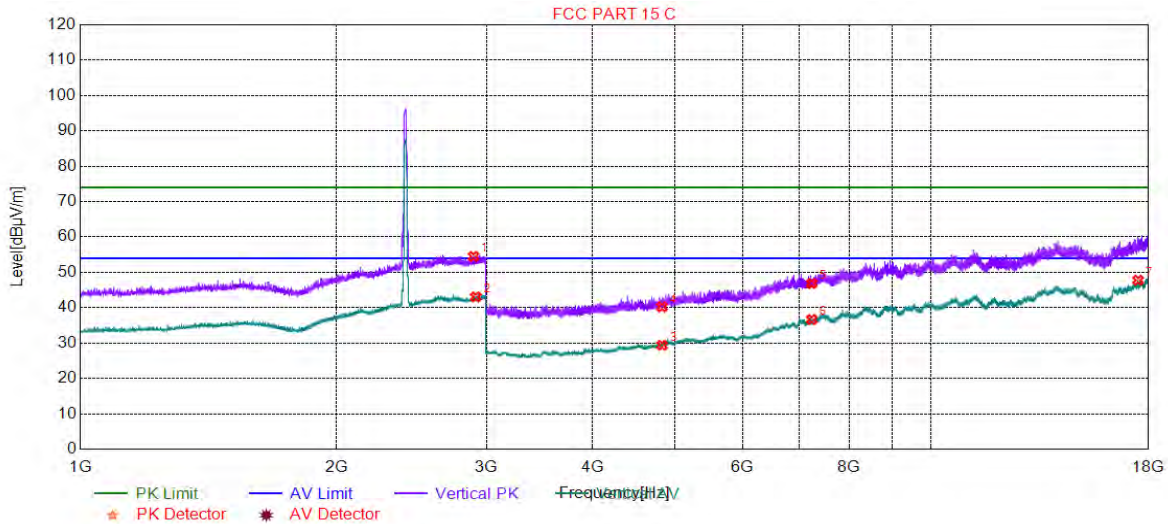


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2911.9780	43.47	9.27	54.00	10.53	176	342	Horizontal
2	2978.4946	55.23	9.55	74.00	18.77	186	261	Horizontal
3	4924.0000	39.12	-17.72	54.00	14.88	188	342	Horizontal
4	4924.0000	45.25	-17.72	74.00	28.75	109	342	Horizontal
5	7386.0000	48.05	-9.55	74.00	25.95	206	68	Horizontal
6	7386.0000	36.90	-9.55	54.00	17.10	108	274	Horizontal
7	17508.8254	47.53	1.95	54.00	6.47	104	119	Horizontal



4.9.2.1.7 802.11G_Lowest Channel_Vertical

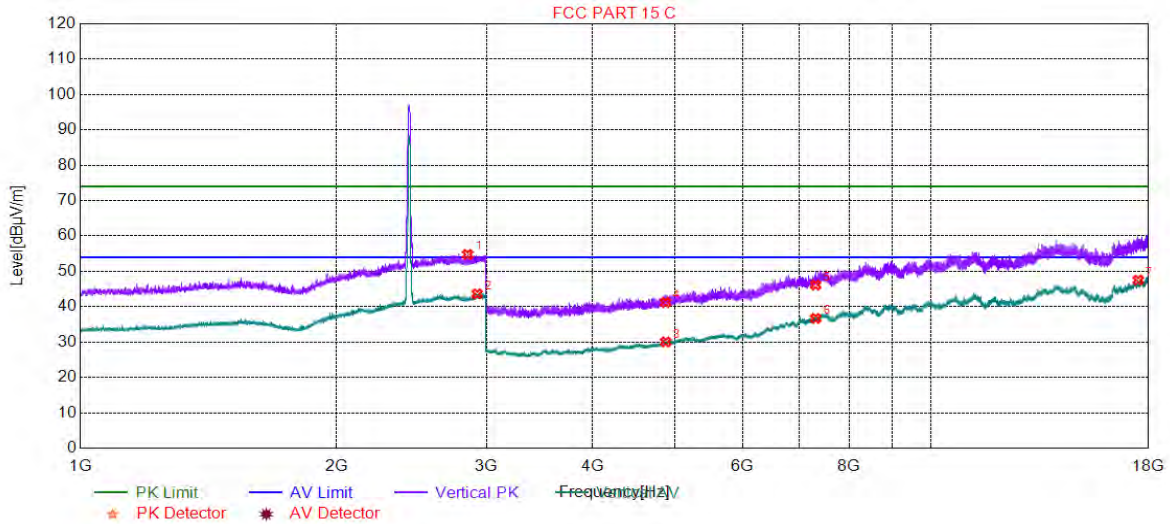


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2896.9742	54.50	9.15	74.00	19.50	214	59	Vertical
2	2915.4789	43.06	9.31	54.00	10.94	248	305	Vertical
3	4824.0000	29.39	-18.21	54.00	24.61	192	315	Vertical
4	4824.0000	40.22	-18.21	74.00	33.78	229	17	Vertical
5	7236.0000	46.83	-9.99	74.00	27.17	260	268	Vertical
6	7236.0000	36.66	-9.99	54.00	17.34	187	168	Vertical
7	17495.6248	47.78	1.89	54.00	6.22	210	317	Vertical



4.9.2.1.8 802.11G_ Middle Channel_ Vertical

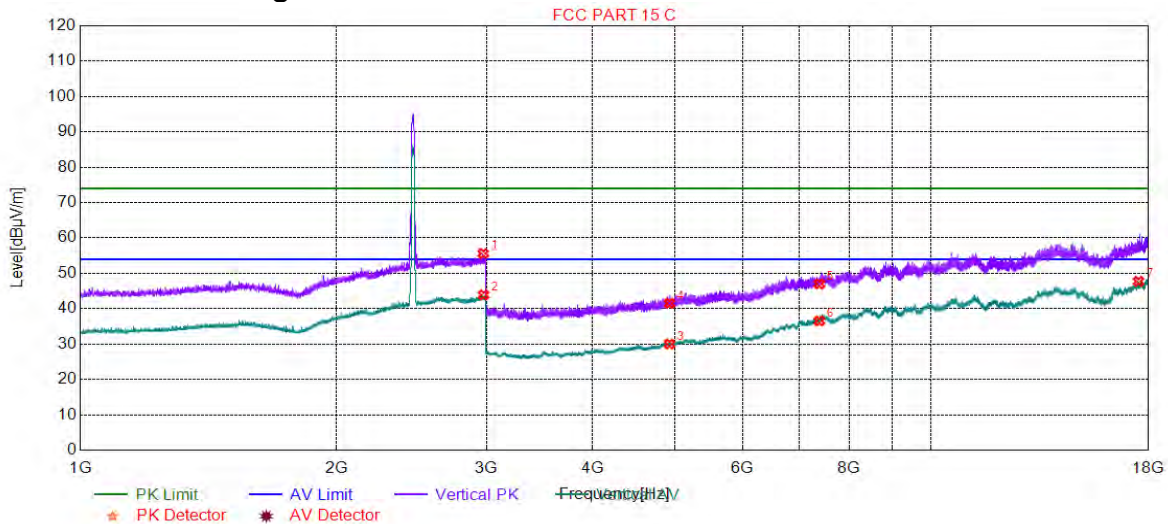


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2851.9630	54.79	9.24	74.00	19.21	214	196	Vertical
2	2925.9815	43.64	9.42	54.00	10.36	282	32	Vertical
3	4874.0000	30.05	-17.99	54.00	23.95	296	0	Vertical
4	4874.0000	41.20	-17.99	74.00	32.80	238	314	Vertical
5	7311.0000	46.13	-9.74	74.00	27.87	268	276	Vertical
6	7311.0000	36.70	-9.74	54.00	17.30	204	276	Vertical
7	17501.6751	47.53	1.93	54.00	6.47	254	72	Vertical



4.9.2.1.9 802.11G_ Highest Channel_ Vertical

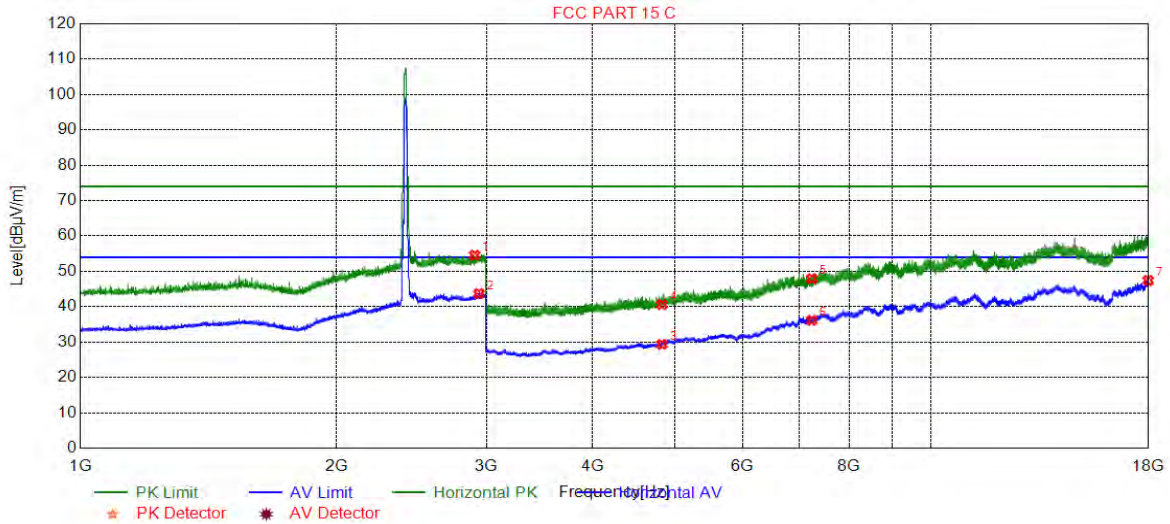


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2974.4936	55.62	9.57	74.00	18.38	192	345	Vertical
2	2976.9942	43.90	9.56	54.00	10.10	177	168	Vertical
3	4924.0000	30.03	-17.72	54.00	23.97	292	16	Vertical
4	4924.0000	41.55	-17.72	74.00	32.45	221	260	Vertical
5	7386.0000	47.00	-9.55	74.00	27.00	173	117	Vertical
6	7386.0000	36.54	-9.55	54.00	17.46	287	18	Vertical
7	17515.9758	47.75	1.98	54.00	6.25	252	67	Vertical



4.9.2.1.10 802.11G_Lowest Channel_Horizontal

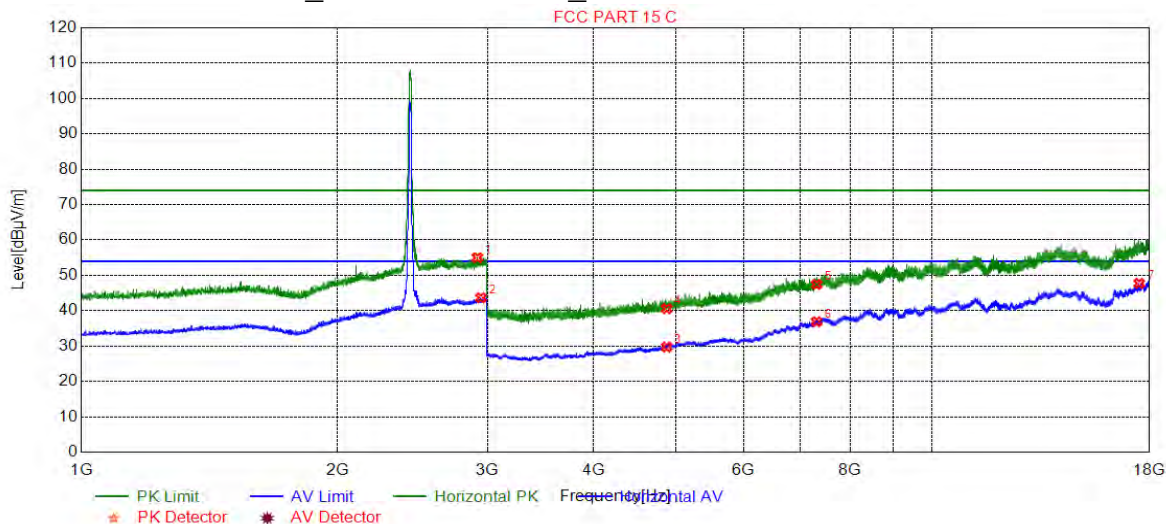


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2905.9765	54.57	9.20	74.00	19.43	200	15	Horizontal
2	2939.9850	43.73	9.57	54.00	10.27	236	152	Horizontal
3	4824.0000	29.35	-18.21	54.00	24.65	133	342	Horizontal
4	4824.0000	40.59	-18.21	74.00	33.41	241	71	Horizontal
5	7236.0000	47.94	-9.99	74.00	26.06	133	67	Horizontal
6	7236.0000	36.17	-9.99	54.00	17.83	223	359	Horizontal
7	17977.9989	47.42	1.71	54.00	6.58	171	359	Horizontal



4.9.2.1.11 802.11G_ Middle Channel_ Horizontal

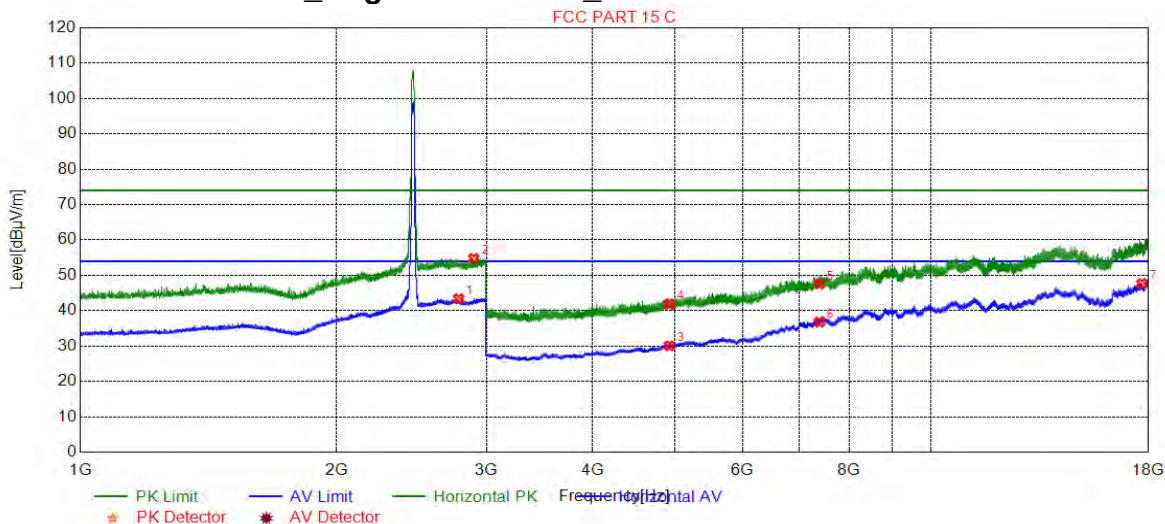


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2919.4799	55.01	9.35	74.00	18.99	156	342	Horizontal
2	2948.4871	43.66	9.66	54.00	10.34	133	246	Horizontal
3	4874.0000	29.76	-17.99	54.00	24.24	202	179	Horizontal
4	4874.0000	40.57	-17.99	74.00	33.43	113	206	Horizontal
5	7311.0000	47.43	-9.74	74.00	26.57	153	18	Horizontal
6	7311.0000	36.90	-9.74	54.00	17.10	104	315	Horizontal
7	17503.8752	47.74	1.94	54.00	6.26	188	216	Horizontal

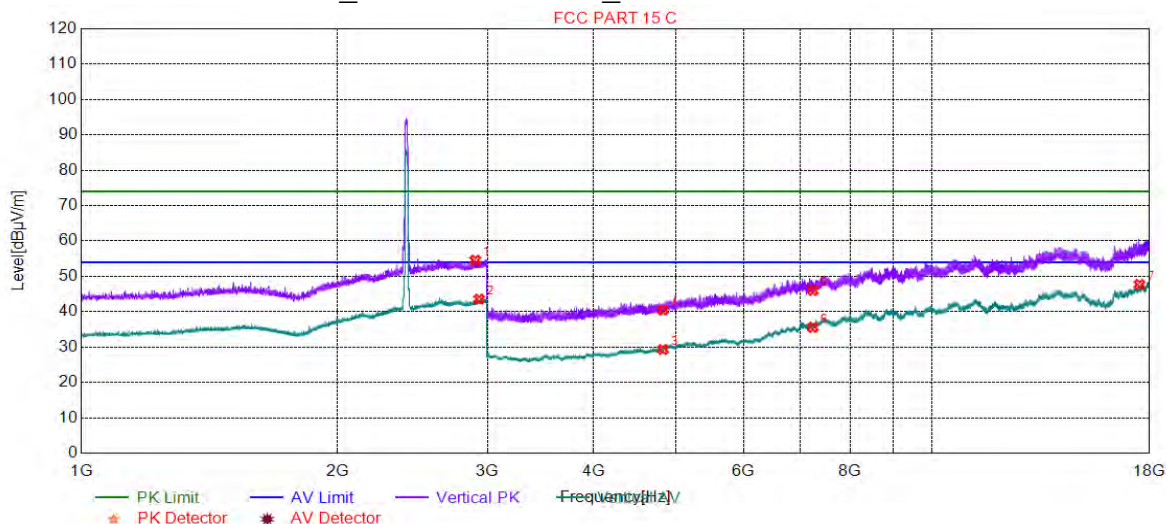


4.9.2.1.12 802.11G_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2782.9457	43.36	9.02	54.00	10.64	184	17	Horizontal
2	2898.9747	54.78	9.14	74.00	19.22	227	276	Horizontal
3	4924.0000	30.08	-17.72	54.00	23.92	190	178	Horizontal
4	4924.0000	41.89	-17.72	74.00	32.11	192	44	Horizontal
5	7386.0000	47.58	-9.55	74.00	26.42	189	217	Horizontal
6	7386.0000	36.80	-9.55	54.00	17.20	115	267	Horizontal
7	17685.3843	47.70	2.35	54.00	6.30	201	18	Horizontal

4.9.2.1.13 802.11N20_Lowest Channel_Vertical

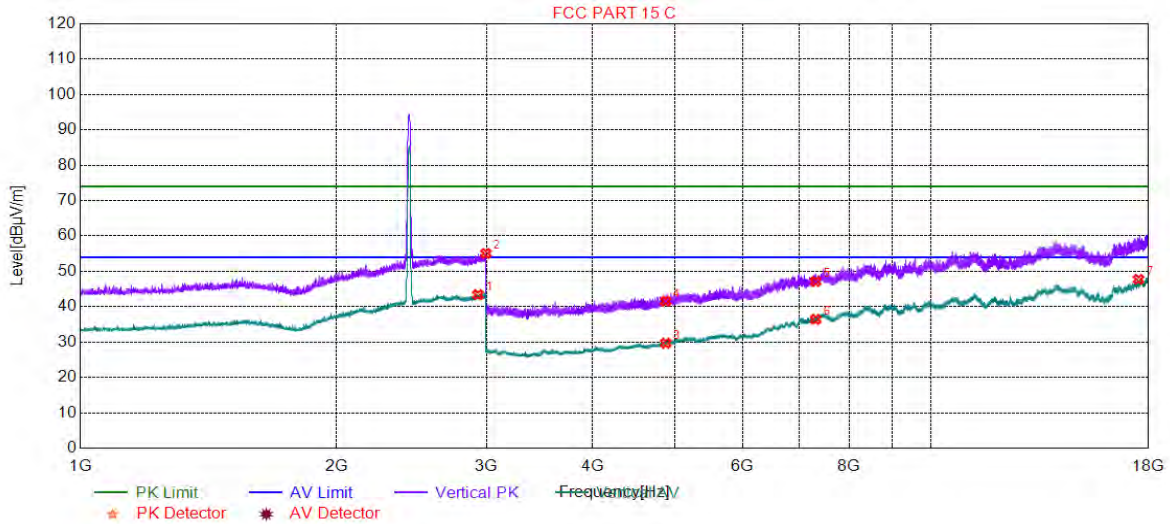


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2903.9760	54.57	9.18	74.00	19.43	180	100	Vertical
2	2933.9835	43.56	9.51	54.00	10.44	250	168	Vertical
3	4824.0000	29.31	-18.21	54.00	24.69	154	0	Vertical
4	4824.0000	40.44	-18.21	74.00	33.56	237	288	Vertical
5	7236.0000	46.04	-9.99	74.00	27.96	169	167	Vertical
6	7236.0000	35.57	-9.99	54.00	18.43	231	18	Vertical
7	17512.6756	47.71	1.97	54.00	6.29	187	118	Vertical



4.9.2.1.14 802.11N20_ Middle Channel_ Vertical

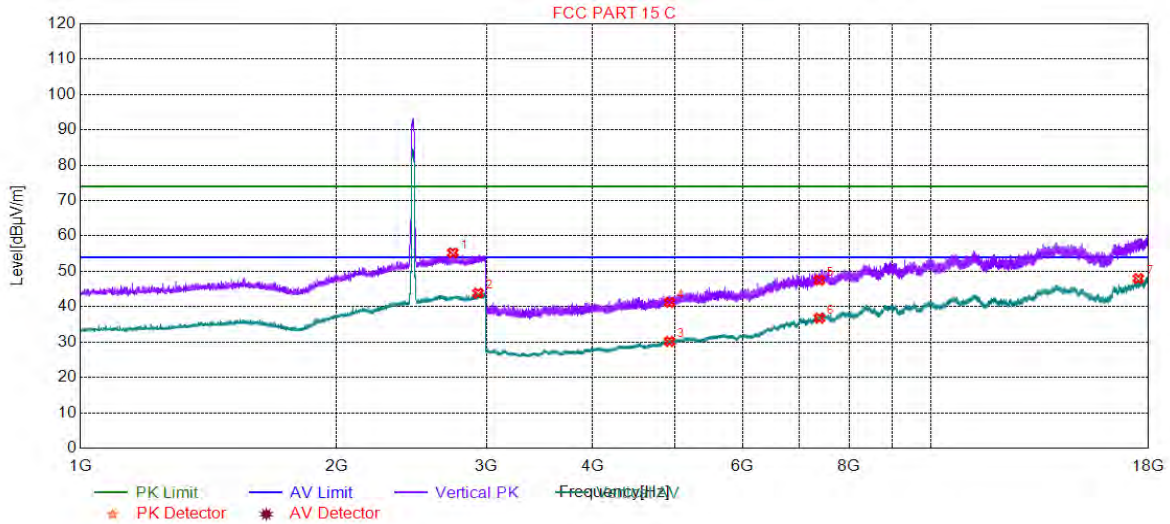


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2932.4831	43.39	9.49	54.00	10.61	236	302	Vertical
2	2996.4991	55.08	9.47	74.00	18.92	206	275	Vertical
3	4874.0000	29.69	-17.99	54.00	24.31	181	207	Vertical
4	4874.0000	41.57	-17.99	74.00	32.43	220	44	Vertical
5	7311.0000	47.12	-9.74	74.00	26.88	267	217	Vertical
6	7311.0000	36.41	-9.74	54.00	17.59	288	68	Vertical
7	17515.4258	47.75	1.98	54.00	6.25	183	118	Vertical



4.9.2.1.15 802.11N20_ Highest Channel_ Vertical

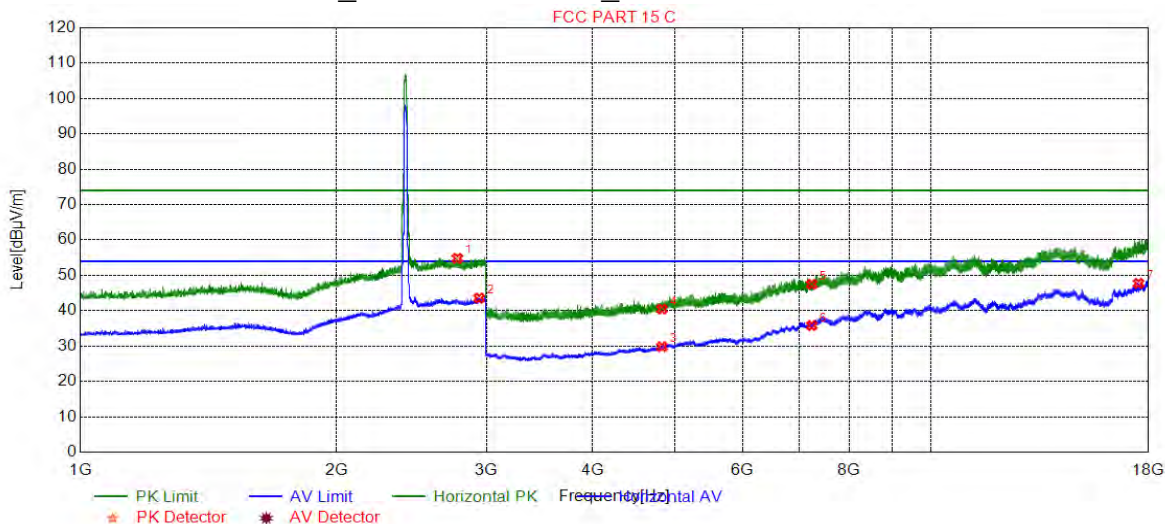


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2739.4349	55.28	9.00	74.00	18.72	219	318	Vertical
2	2932.9832	43.87	9.50	54.00	10.13	277	236	Vertical
3	4924.0000	30.16	-17.72	54.00	23.84	292	0	Vertical
4	4924.0000	41.22	-17.72	74.00	32.78	161	342	Vertical
5	7386.0000	47.49	-9.55	74.00	26.51	207	167	Vertical
6	7386.0000	36.78	-9.55	54.00	17.22	259	68	Vertical
7	17506.0753	47.95	1.94	54.00	6.05	242	267	Vertical



4.9.2.1.16 802.11N20_Lowest Channel_Horizontal

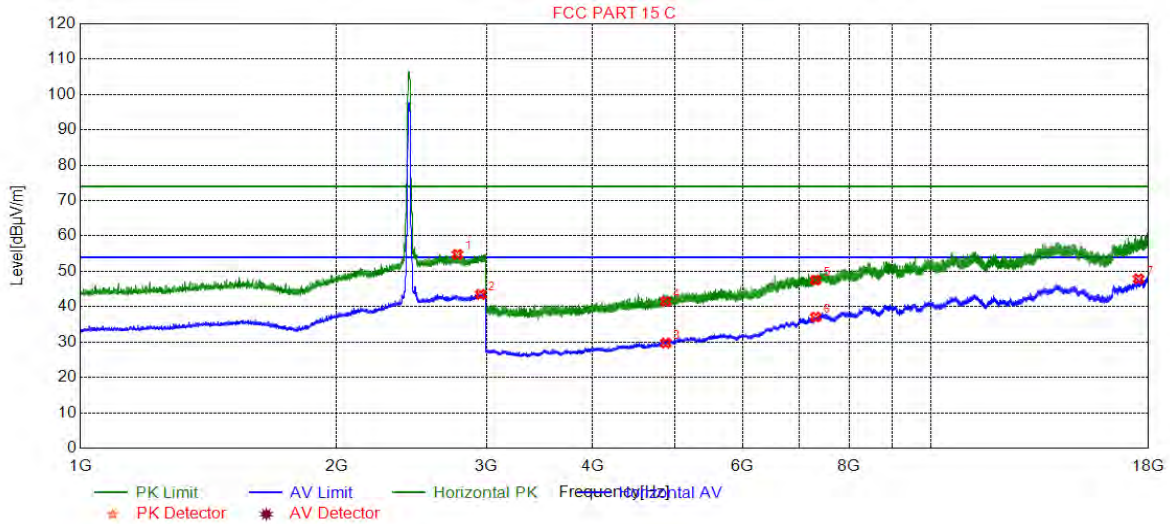


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2773.4434	54.82	9.05	74.00	19.18	101	342	Horizontal
2	2941.4854	43.57	9.59	54.00	10.43	145	274	Horizontal
3	4824.0000	29.82	-18.21	54.00	24.18	173	124	Horizontal
4	4824.0000	40.44	-18.21	74.00	33.56	124	0	Horizontal
5	7236.0000	47.48	-9.99	74.00	26.52	198	169	Horizontal
6	7236.0000	35.82	-9.99	54.00	18.18	181	219	Horizontal
7	17517.0759	47.73	1.99	54.00	6.27	214	169	Horizontal



4.9.2.1.17 802.11N20_ Middle Channel_ Horizontal

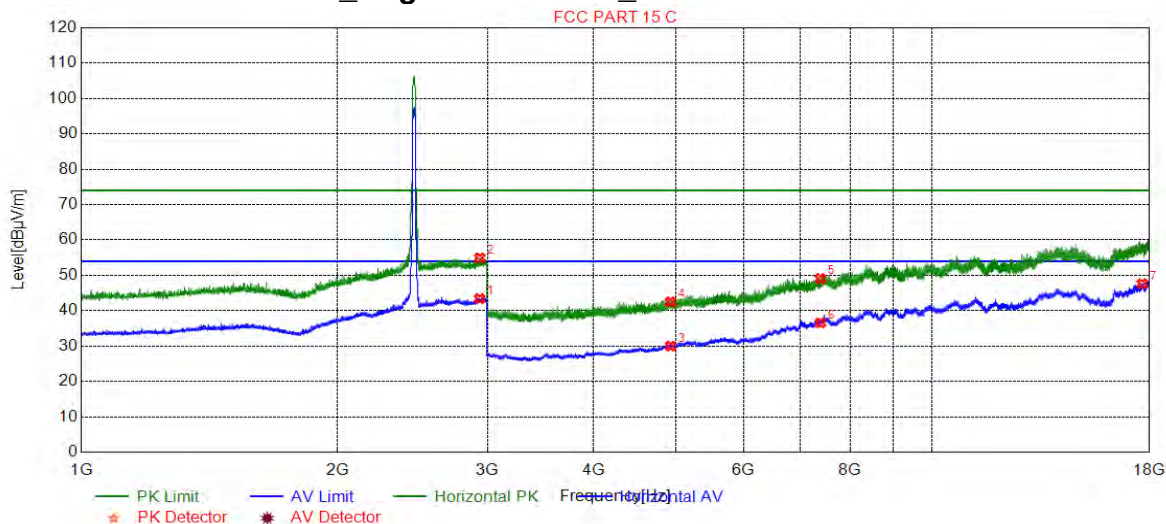


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2773.9435	54.79	9.05	74.00	19.21	128	3	Horizontal
2	2954.4886	43.48	9.66	54.00	10.52	168	220	Horizontal
3	4874.0000	29.72	-17.99	54.00	24.28	220	98	Horizontal
4	4874.0000	41.49	-17.99	74.00	32.51	152	342	Horizontal
5	7311.0000	47.53	-9.74	74.00	26.47	248	359	Horizontal
6	7311.0000	37.06	-9.74	54.00	16.94	144	217	Horizontal
7	17518.1759	47.87	1.99	54.00	6.13	176	18	Horizontal



4.9.2.1.18 802.11N20_ Highest Channel_ Horizontal

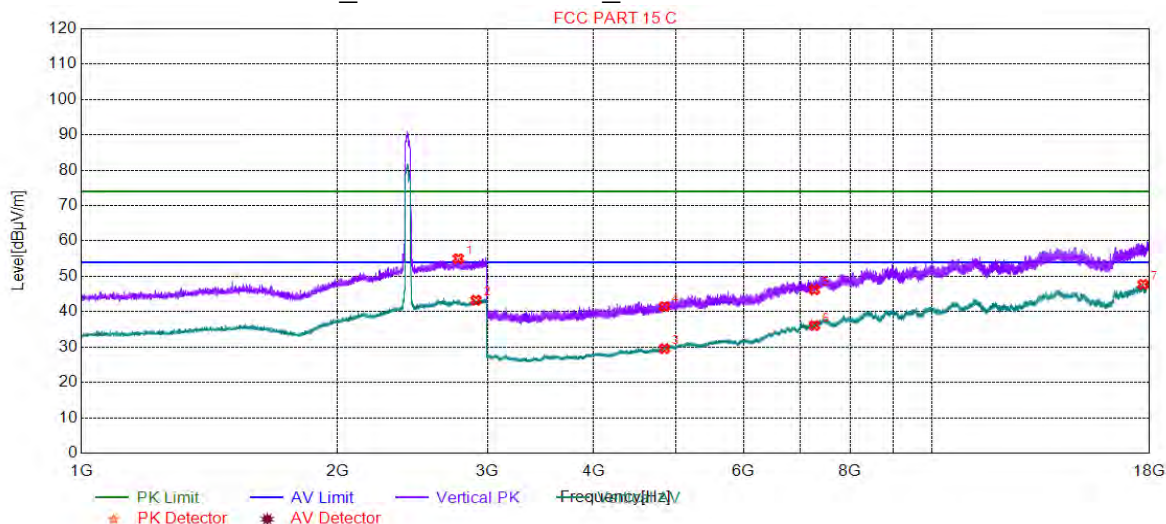


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2937.4844	43.41	9.54	54.00	10.59	101	194	Horizontal
2	2938.9847	54.93	9.56	74.00	19.07	145	194	Horizontal
3	4924.0000	30.00	-17.72	54.00	24.00	173	179	Horizontal
4	4924.0000	42.49	-17.72	74.00	31.51	124	260	Horizontal
5	7386.0000	49.09	-9.55	74.00	24.91	198	359	Horizontal
6	7386.0000	36.57	-9.55	54.00	17.43	181	267	Horizontal
7	17645.7823	47.63	2.33	54.00	6.37	214	18	Horizontal



4.9.2.1.19 802.11N40_Lowest Channel_Vertical

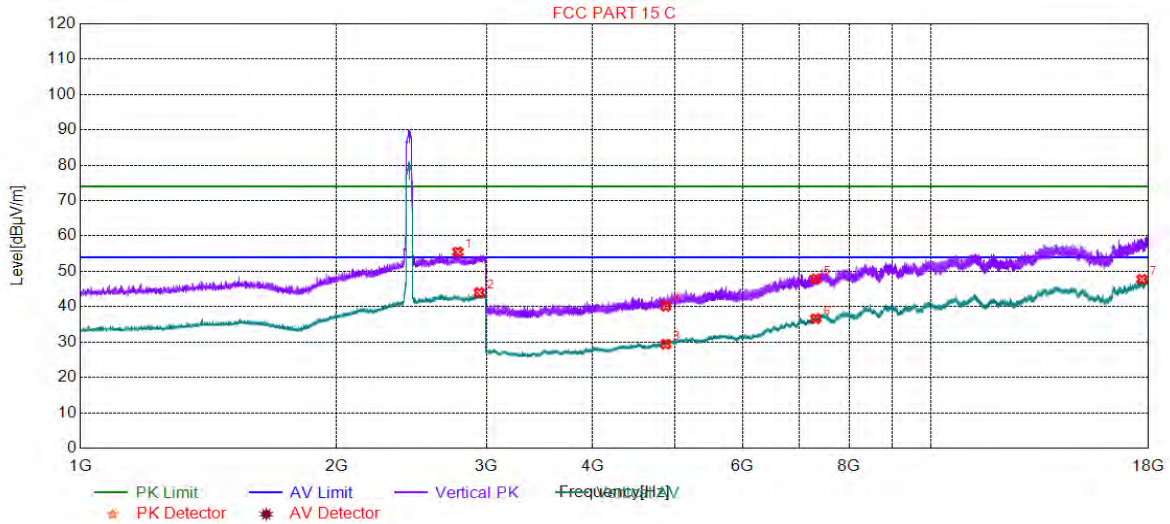


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2772.9432	55.02	9.05	74.00	18.98	231	154	Vertical
2	2908.4771	43.26	9.23	54.00	10.74	188	194	Vertical
3	4844.0000	29.56	-18.13	54.00	24.44	211	44	Vertical
4	4844.0000	41.46	-18.13	74.00	32.54	278	0	Vertical
5	7266.0000	46.24	-9.88	74.00	27.76	213	217	Vertical
6	7266.0000	36.10	-9.88	54.00	17.90	195	117	Vertical
7	17685.9343	47.73	2.35	54.00	6.27	201	217	Vertical



4.9.2.1.20 802.11N40_ Middle Channel_ Vertical

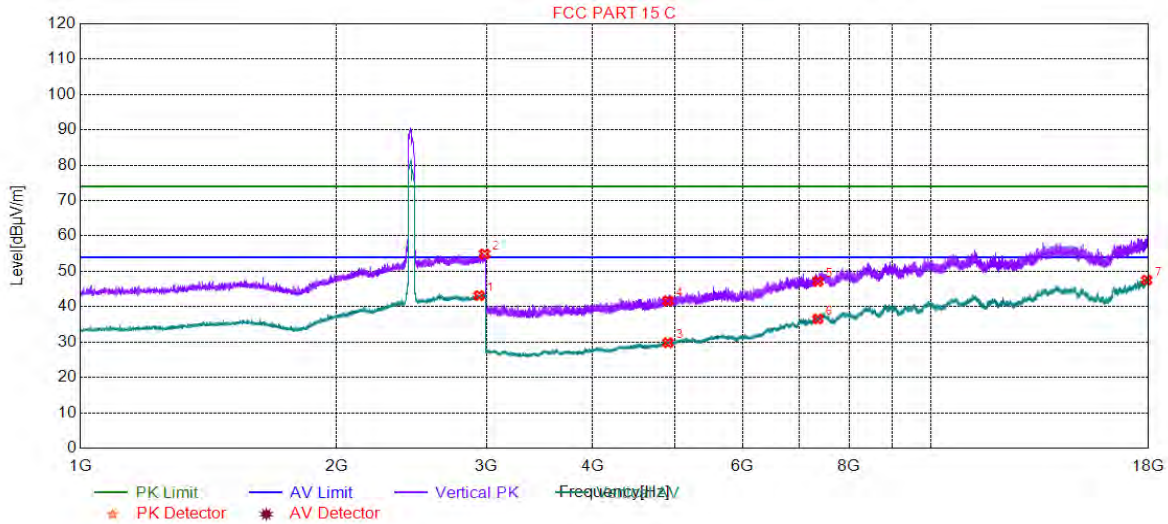


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2776.4441	55.50	9.04	74.00	18.50	205	345	Vertical
2	2942.4856	43.97	9.60	54.00	10.03	182	140	Vertical
3	4874.0000	29.42	-17.99	54.00	24.58	269	71	Vertical
4	4874.0000	40.16	-17.99	74.00	33.84	177	0	Vertical
5	7311.0000	47.86	-9.74	74.00	26.14	191	317	Vertical
6	7311.0000	36.63	-9.74	54.00	17.37	197	267	Vertical
7	17677.1339	47.74	2.35	54.00	6.26	220	118	Vertical



4.9.2.1.21 802.11N40_ Highest Channel_ Vertical

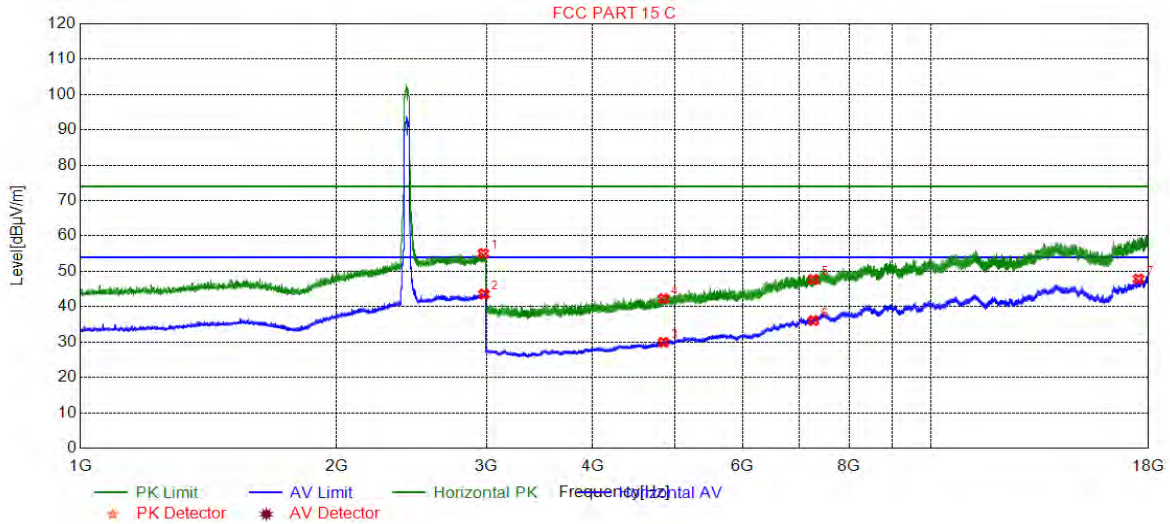


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2941.4854	43.15	9.59	54.00	10.85	273	139	Vertical
2	2985.9965	54.93	9.51	74.00	19.07	294	261	Vertical
3	4904.0000	29.81	-17.85	54.00	24.19	159	234	Vertical
4	4904.0000	41.65	-17.85	74.00	32.35	289	288	Vertical
5	7356.0000	47.17	-9.62	74.00	26.83	277	360	Vertical
6	7356.0000	36.52	-9.62	54.00	17.48	214	68	Vertical
7	17907.5954	47.55	1.69	54.00	6.45	246	168	Vertical



4.9.2.1.22 802.11N40_Lowest Channel_Horizontal

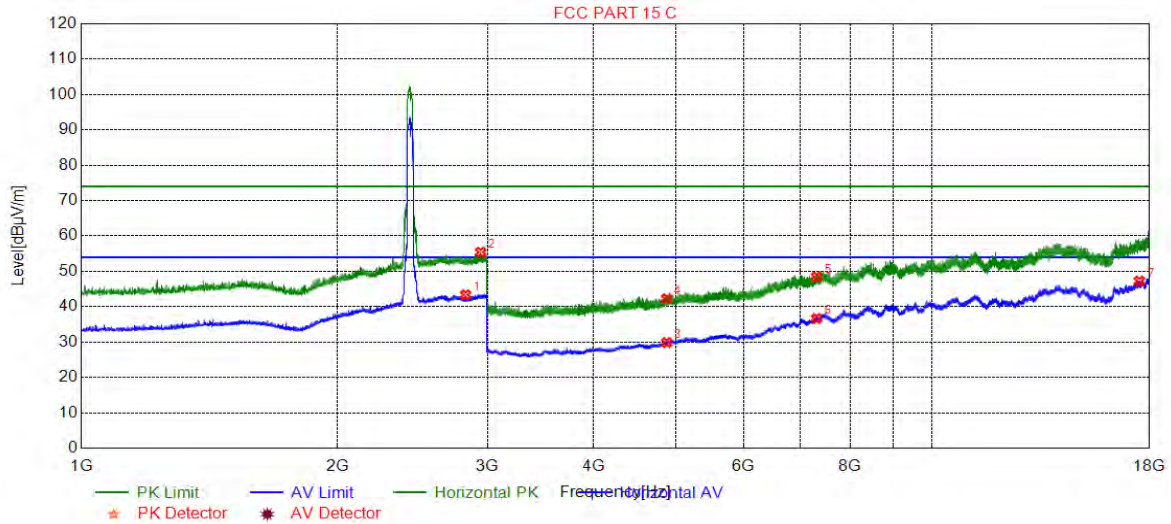


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2974.4936	55.08	9.57	74.00	18.92	119	29	Horizontal
2	2980.9952	43.54	9.54	54.00	10.46	213	315	Horizontal
3	4844.0000	29.93	-18.13	54.00	24.07	161	45	Horizontal
4	4844.0000	42.28	-18.13	74.00	31.72	149	234	Horizontal
5	7266.0000	47.69	-9.88	74.00	26.31	130	67	Horizontal
6	7266.0000	36.06	-9.88	54.00	17.94	129	118	Horizontal
7	17517.6259	47.84	1.99	54.00	6.16	189	317	Horizontal

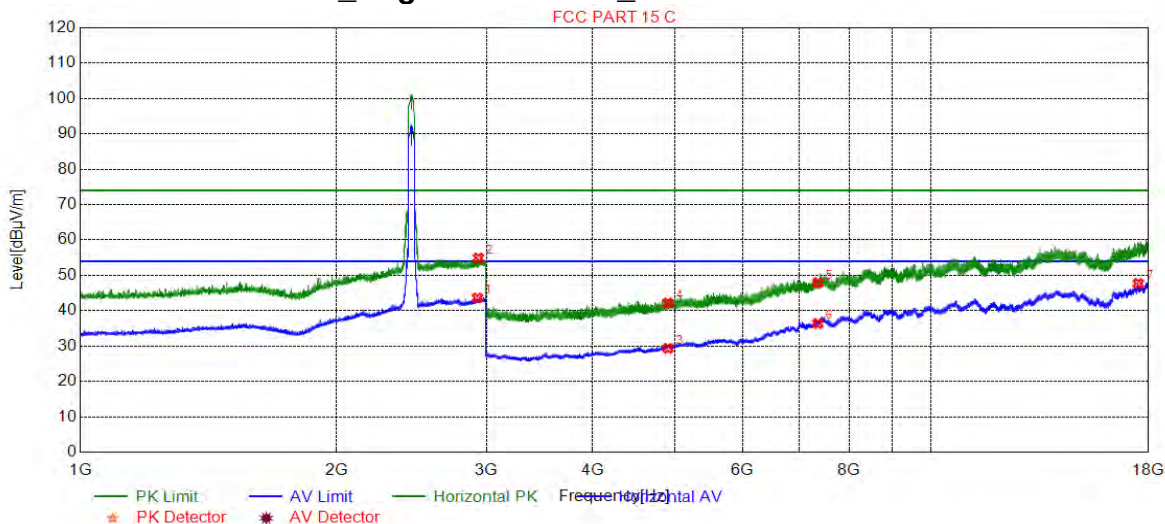


4.9.2.1.23 802.11N40_ Middle Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2828.4571	43.36	9.13	54.00	10.64	245	54	Horizontal
2	2946.4866	55.42	9.64	74.00	18.58	167	27	Horizontal
3	4874.0000	29.87	-17.99	54.00	24.13	176	260	Horizontal
4	4874.0000	42.25	-17.99	74.00	31.75	148	72	Horizontal
5	7311.0000	48.45	-9.74	74.00	25.55	105	166	Horizontal
6	7311.0000	36.68	-9.74	54.00	17.32	225	18	Horizontal
7	17508.8254	47.25	1.95	54.00	6.75	220	68	Horizontal

4.9.2.1.24 802.11N40_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2927.9820	43.59	9.44	54.00	10.41	148	2	Horizontal
2	2935.4839	54.90	9.52	74.00	19.10	116	67	Horizontal
3	4904.0000	29.37	-17.85	54.00	24.63	126	137	Horizontal
4	4904.0000	42.17	-17.85	74.00	31.83	133	169	Horizontal
5	7356.0000	47.88	-9.62	74.00	26.12	195	360	Horizontal
6	7356.0000	36.39	-9.62	54.00	17.61	241	360	Horizontal
7	17504.4252	47.70	1.94	54.00	6.30	112	119	Horizontal





The 5029F data:

The detailed test data see: Appendix C.1 - RSE for WLAN 2.4G

Remark:

- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor
- 2) Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz and 18GHz to 25GHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.
- 3) As shown in this section, for frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. So, only the peak measurements were shown in the report.
- 4) All Modes have been tested, but only the worst case data displayed in this report.



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4.10 Restricted bands around fundamental frequency

Test Requirement:	47 CFR Part 15C Section 15.209 and 15.205		
Test Method:	ANSI C63.10: 2013 Section 11.12		
Test Site:	Measurement Distance: 3m or 10m (Semi-Anechoic Chamber)		
Limit:	Frequency	Limit (dBuV/m @3m)	Remark
	30MHz-88MHz	40.0	Quasi-peak Value
	88MHz-216MHz	43.5	Quasi-peak Value
	216MHz-960MHz	46.0	Quasi-peak Value
	960MHz-1GHz	54.0	Quasi-peak Value
	Above 1GHz	54.0	Average Value
		74.0	Peak Value
Test Setup:			

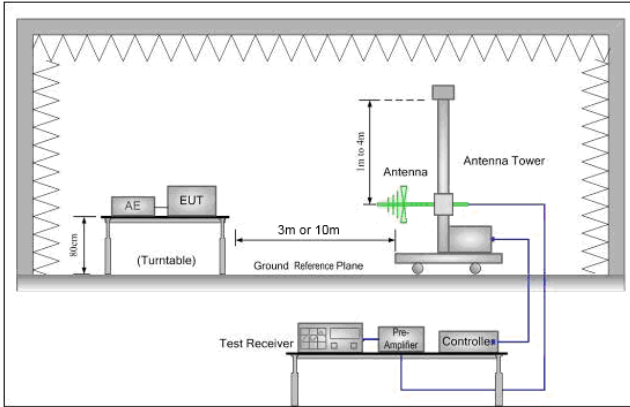


Figure 1. 30MHz to 1GHz

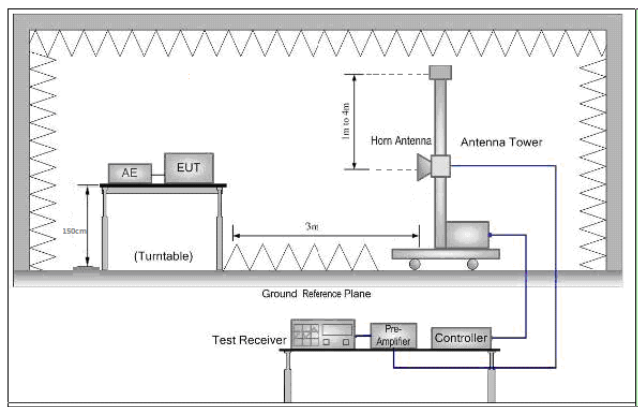


Figure 2. Above 1 GHz

Test Procedure:	a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 or 10 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel h. Test the EUT in the lowest channel , the Highest channel i. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, And found the X axis positioning which it is worse case. j. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with all kind of modulations, data rates. Charge + Transmitting mode.
Final Test Mode:	Pretest the EUT at Charge +Transmitting mode. Through Pre-scan, find the 1Mbps of rate is the worst case of 802.11B; 6Mbps of rate is the worst case of 802.11G ; 6.5Mbps of rate is the worst case of 802.11N(HT20); 13.5Mbps of rate is the worst case of 802.11N(HT40). Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass



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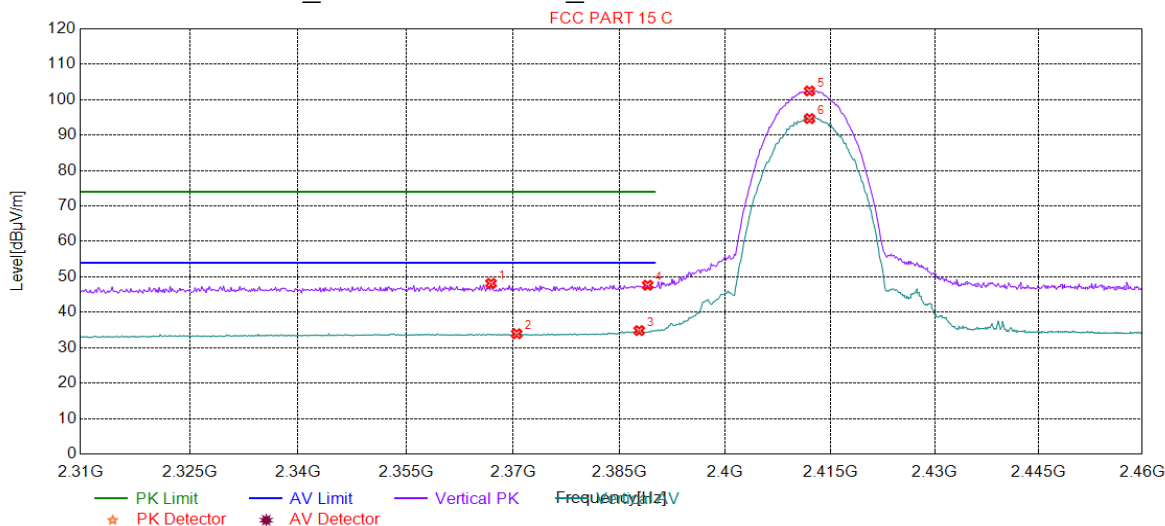


The 5029E data:

Test plot as follows:

4.10.1 ANT1

4.10.1.1 802.11B_Lowest Channel_Vertical



Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2366.9069	48.16	7.79	74.00	25.84	199	100	Vertical
2	2370.5105	33.95	7.79	54.00	20.05	222	29	Vertical
3	2387.7778	34.84	7.77	54.00	19.16	256	274	Vertical
4	2388.9790	47.64	7.77	74.00	26.36	230	294	Vertical
5	2412.0000	102.46	7.81	0.00	-102.46	181	227	Vertical
6	2412.0000	94.67	7.81	0.00	-94.67	232	223	Vertical



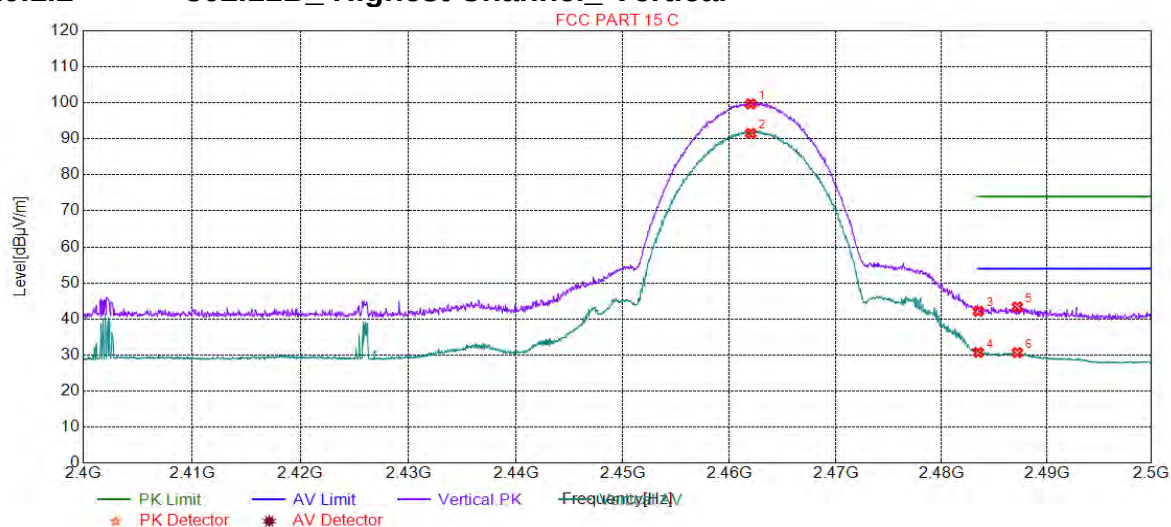
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4.10.1.2 802.11B_Highest Channel_Vertical

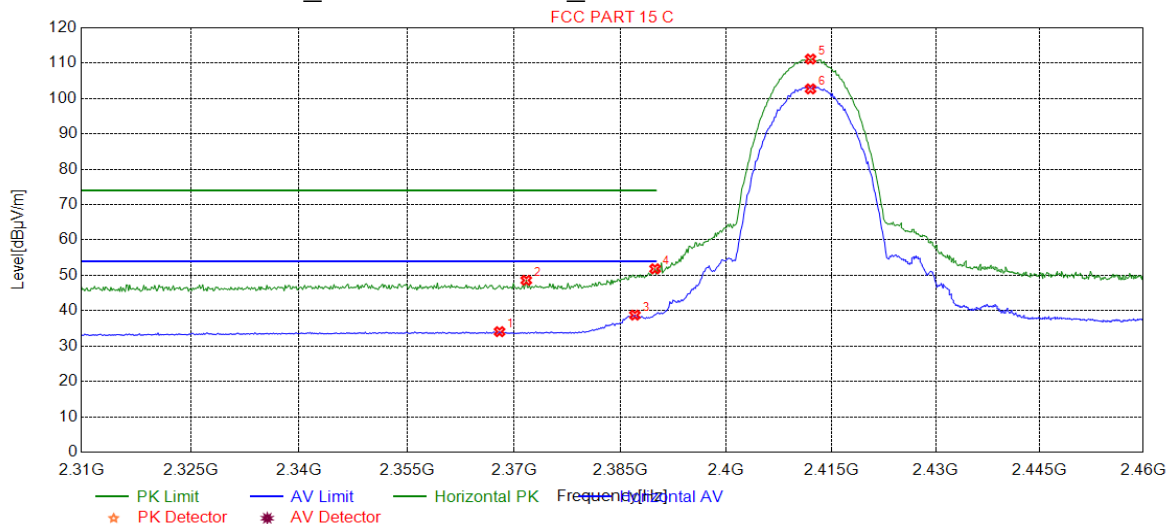


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	99.70	7.98	0.00	-99.70	219	62	Vertical
2	2462.0000	91.52	7.98	0.00	-91.52	186	62	Vertical
3	2483.5000	42.15	8.01	74.00	31.85	282	106	Vertical
4	2483.5000	30.72	8.01	54.00	23.28	202	89	Vertical
5	2487.1936	43.37	8.01	74.00	30.63	221	315	Vertical
6	2487.1936	30.68	8.01	54.00	23.32	286	94	Vertical

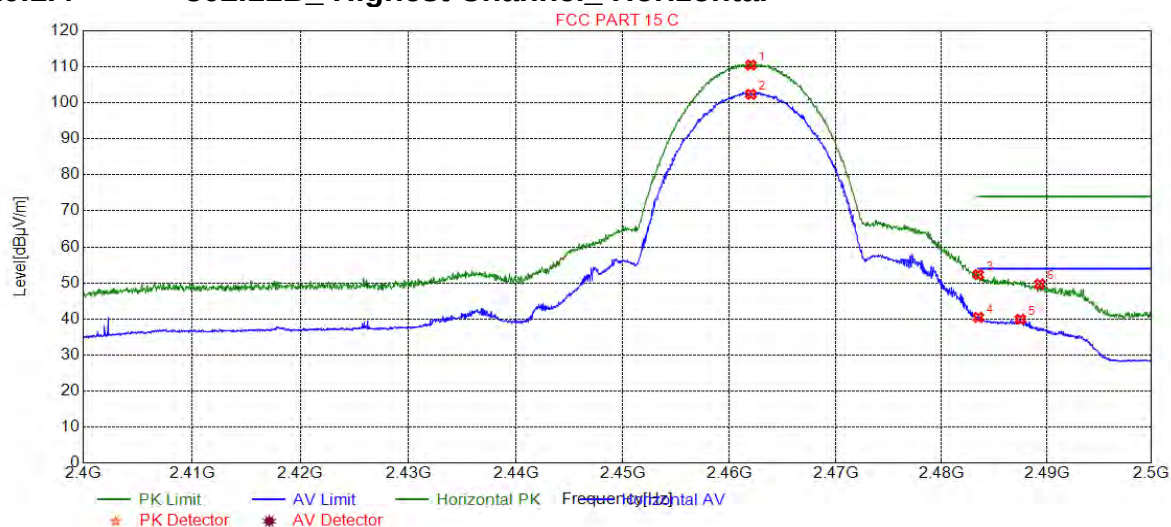


4.10.1.3 802.11B_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2367.9580	34.08	7.79	54.00	19.92	161	107	Horizontal
2	2371.7117	48.60	7.79	74.00	25.40	140	360	Horizontal
3	2387.0270	38.76	7.77	54.00	15.24	217	338	Horizontal
4	2389.8799	51.84	7.77	74.00	22.16	143	354	Horizontal
5	2412.0000	111.16	7.81	0.00	-111.16	121	342	Horizontal
6	2412.0000	102.72	7.81	0.00	-102.72	157	338	Horizontal

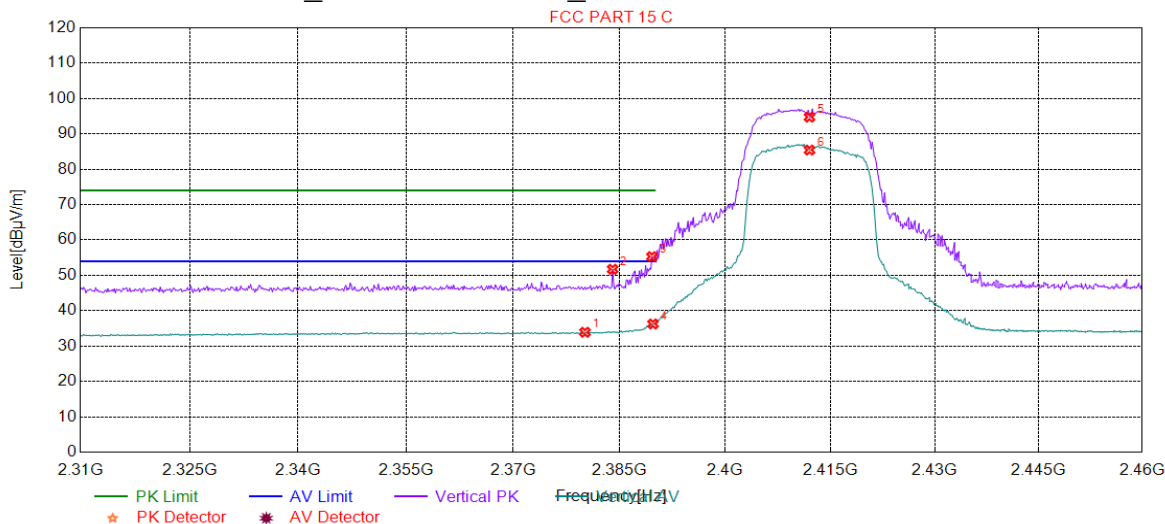
4.10.1.4 802.11B_Highest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	110.48	7.98	0.00	-110.48	172	346	Horizontal
2	2462.0000	102.36	7.98	0.00	-102.36	109	346	Horizontal
3	2483.5000	52.30	8.01	74.00	21.70	155	346	Horizontal
4	2483.5000	40.44	8.01	54.00	13.56	234	346	Horizontal
5	2487.4937	39.93	8.01	54.00	14.07	209	346	Horizontal
6	2489.3447	49.70	8.02	74.00	24.30	156	188	Horizontal

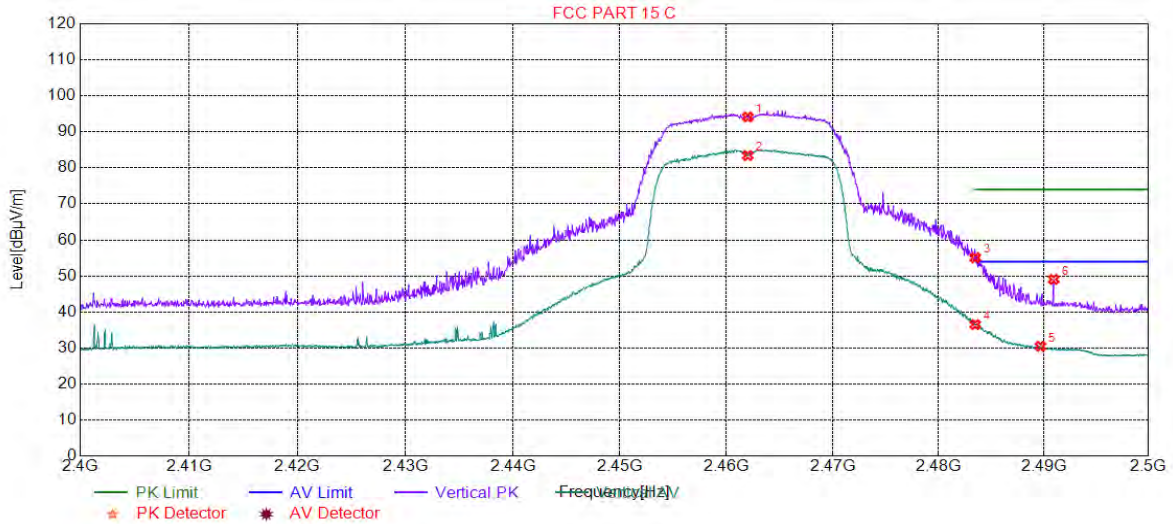


4.10.1.5 802.11G_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2380.1201	33.91	7.78	54.00	20.09	260	123	Vertical
2	2384.0240	51.72	7.78	74.00	22.28	188	119	Vertical
3	2389.5796	55.30	7.77	74.00	18.70	179	82	Vertical
4	2389.7297	36.26	7.77	54.00	17.74	207	102	Vertical
5	2412.0000	94.74	7.81	0.00	-94.74	285	119	Vertical
6	2412.0000	85.43	7.81	0.00	-85.43	247	123	Vertical

4.10.1.6 802.11G_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	94.13	7.98	0.00	-94.13	266	310	Vertical
2	2462.0000	83.42	7.98	0.00	-83.42	241	96	Vertical
3	2483.5000	55.07	8.01	74.00	18.93	223	79	Vertical
4	2483.5000	36.51	8.01	54.00	17.49	191	107	Vertical
5	2489.6948	30.48	8.02	54.00	23.52	167	107	Vertical
6	2490.9455	49.05	8.02	74.00	24.95	191	123	Vertical



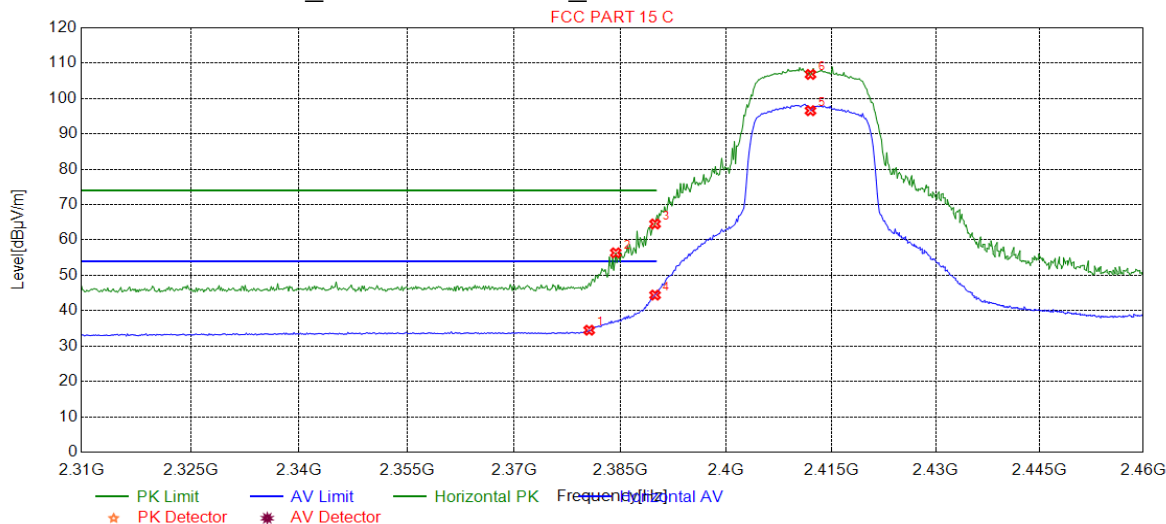
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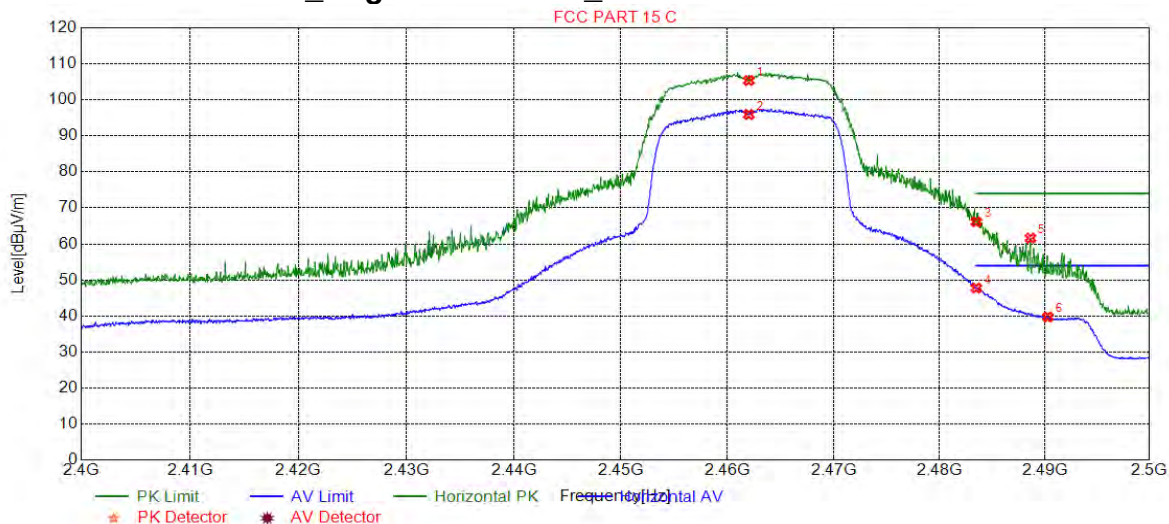
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4.10.1.7 802.11G_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2380.5706	34.49	7.78	54.00	19.51	162	346	Horizontal
2	2384.3243	56.37	7.78	74.00	17.63	205	346	Horizontal
3	2389.8799	64.53	7.77	74.00	9.47	230	346	Horizontal
4	2389.8799	44.42	7.77	54.00	9.58	225	346	Horizontal
5	2412.0000	96.56	7.81	0.00	-96.56	170	346	Horizontal
6	2412.0000	106.81	7.81	0.00	-106.81	179	346	Horizontal

4.10.1.8 802.11G_ Highest Channel_ Horizontal

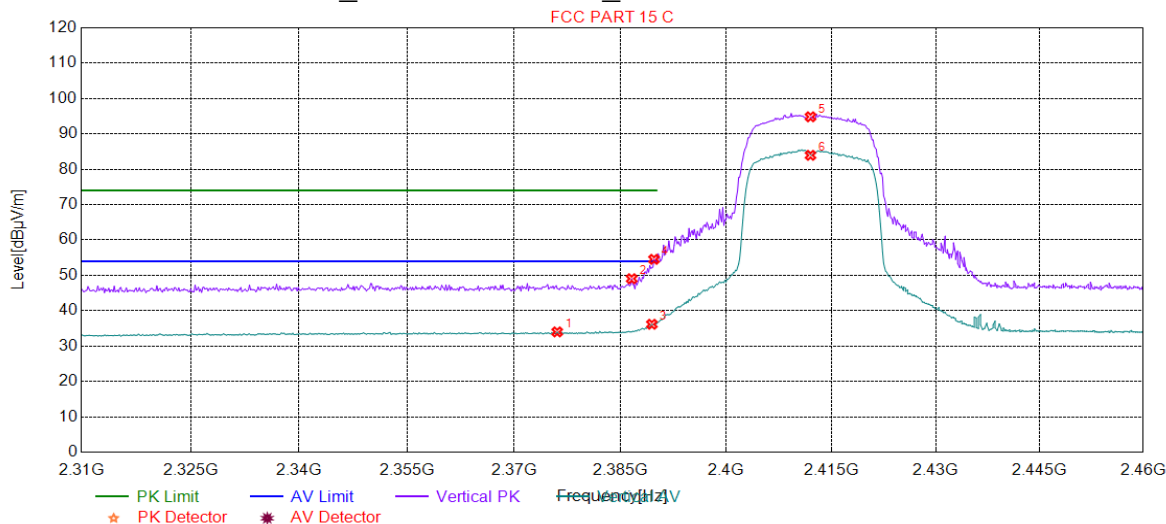


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	105.36	7.98	0.00	-105.36	234	3	Horizontal
2	2462.0000	95.93	7.98	0.00	-95.93	178	3	Horizontal
3	2483.5000	66.12	8.01	74.00	7.88	227	195	Horizontal
4	2483.5000	47.74	8.01	54.00	6.26	215	0	Horizontal
5	2488.6443	61.59	8.02	74.00	12.41	240	216	Horizontal
6	2490.2951	39.72	8.02	54.00	14.28	198	205	Horizontal

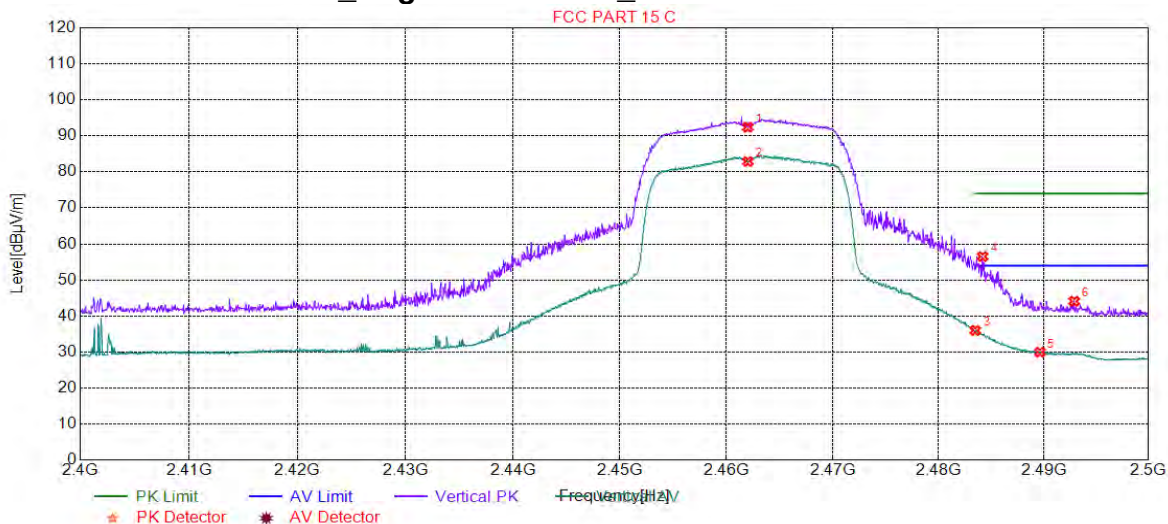


4.10.1.9 802.11N20_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2376.0661	34.01	7.78	54.00	19.99	275	305	Vertical
2	2386.5766	49.05	7.77	74.00	24.95	252	100	Vertical
3	2389.4294	36.17	7.77	54.00	17.83	268	100	Vertical
4	2389.7297	54.53	7.77	74.00	19.47	169	96	Vertical
5	2412.0000	94.83	7.81	0.00	-94.83	278	120	Vertical
6	2412.0000	83.94	7.81	0.00	-83.94	205	120	Vertical

4.10.1.10 802.11N20_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	92.40	7.98	0.00	-92.40	234	78	Vertical
2	2462.0000	82.87	7.98	0.00	-82.87	242	78	Vertical
3	2483.5000	36.00	8.01	54.00	18.00	262	288	Vertical
4	2484.1921	56.52	8.01	74.00	17.48	283	282	Vertical
5	2489.6448	29.96	8.02	54.00	24.04	225	271	Vertical
6	2492.8964	44.10	8.02	74.00	29.90	226	271	Vertical



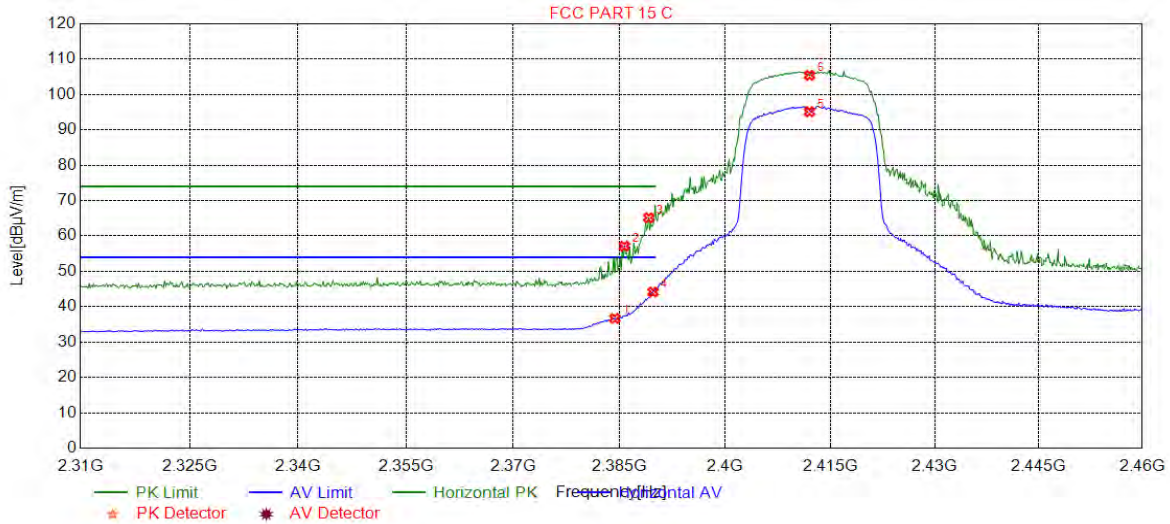
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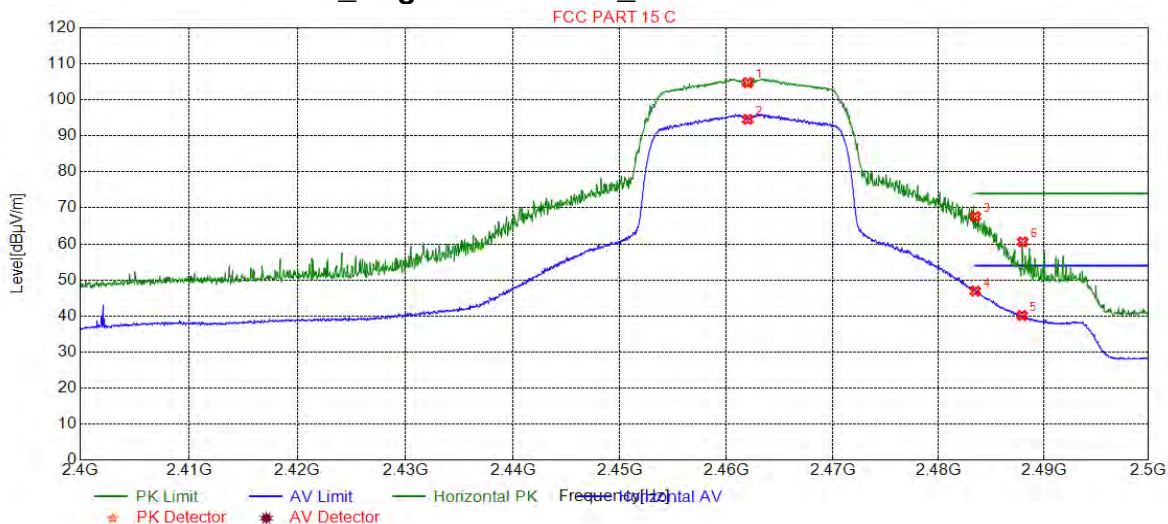
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4.10.1.11 802.11N20_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2384.3243	36.70	7.78	54.00	17.30	104	346	Horizontal
2	2385.6757	57.12	7.77	74.00	16.88	176	164	Horizontal
3	2389.1291	65.16	7.77	74.00	8.84	108	202	Horizontal
4	2389.7297	44.15	7.77	54.00	9.85	236	0	Horizontal
5	2412.0000	95.12	7.81	0.00	-95.12	118	1	Horizontal
6	2412.0000	105.42	7.81	0.00	-105.42	137	214	Horizontal

4.10.1.12 802.11N20_ Highest Channel_ Horizontal

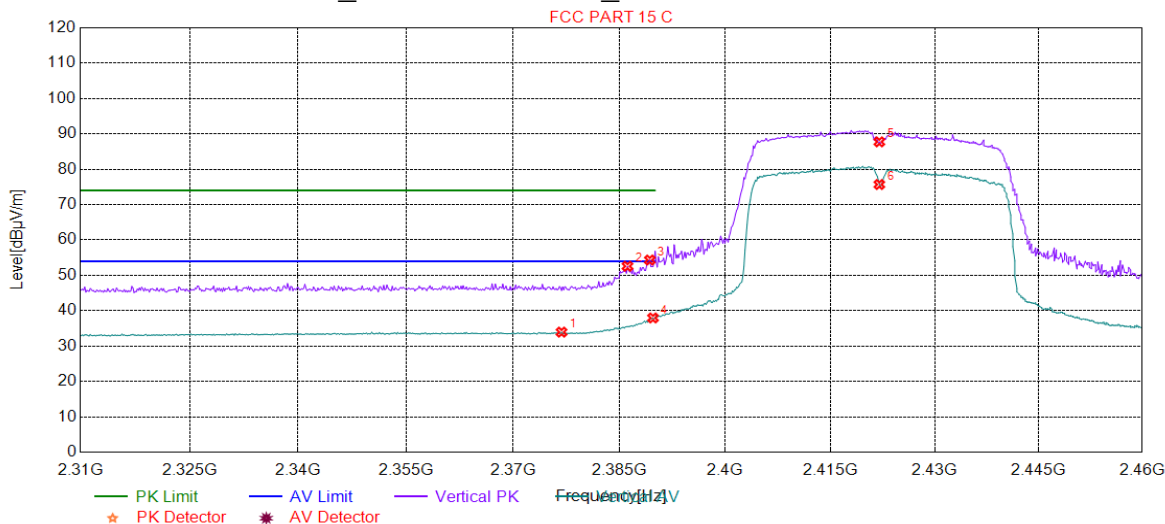


Suspected List

NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.0000	104.75	7.98	0.00	-104.75	128	258	Horizontal
2	2462.0000	94.57	7.98	0.00	-94.57	172	0	Horizontal
3	2483.5000	67.60	8.01	74.00	6.40	191	0	Horizontal
4	2483.5000	46.90	8.01	54.00	7.10	224	198	Horizontal
5	2487.9440	40.11	8.02	54.00	13.89	243	198	Horizontal
6	2487.9940	60.57	8.02	74.00	13.43	173	187	Horizontal

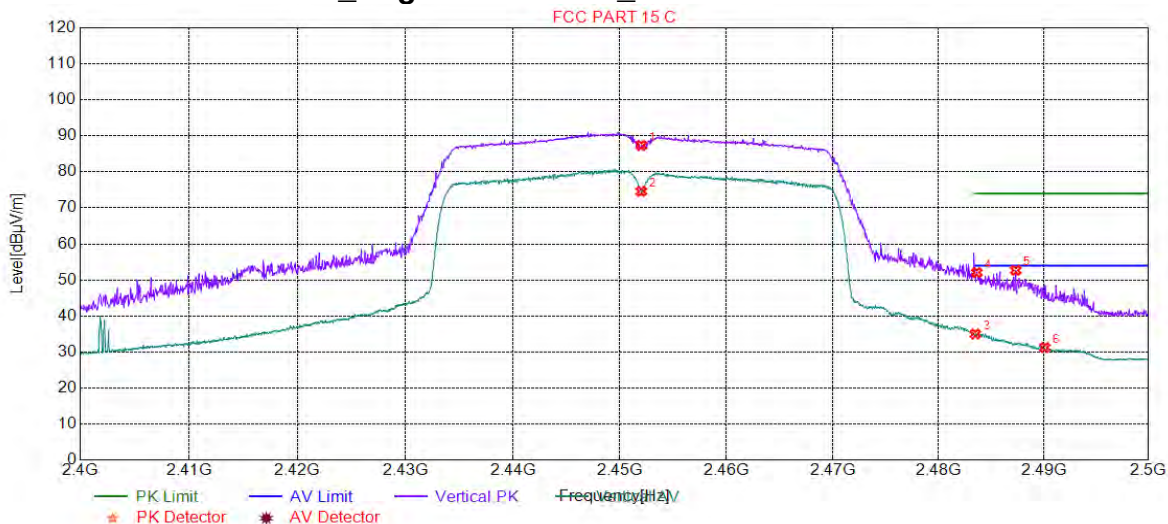


4.10.1.13 802.11N40_Lowest Channel_Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2376.8168	33.95	7.78	54.00	20.05	195	279	Vertical
2	2386.1261	52.58	7.77	74.00	21.42	269	103	Vertical
3	2389.2793	54.34	7.77	74.00	19.66	289	58	Vertical
4	2389.7297	37.96	7.77	54.00	16.04	165	99	Vertical
5	2422.0000	87.75	7.85	0.00	-87.75	183	124	Vertical
6	2422.0000	75.69	7.85	0.00	-75.69	288	124	Vertical

4.10.1.14 802.11N40_ Highest Channel_ Vertical



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.0000	87.36	7.97	0.00	-87.36	164	78	Vertical
2	2452.0000	74.60	7.97	0.00	-74.60	172	100	Vertical
3	2483.5000	35.00	8.01	54.00	19.00	193	307	Vertical
4	2483.6418	52.07	8.01	74.00	21.93	288	296	Vertical
5	2487.3437	52.68	8.01	74.00	21.32	229	313	Vertical
6	2490.0950	31.23	8.02	54.00	22.77	161	307	Vertical



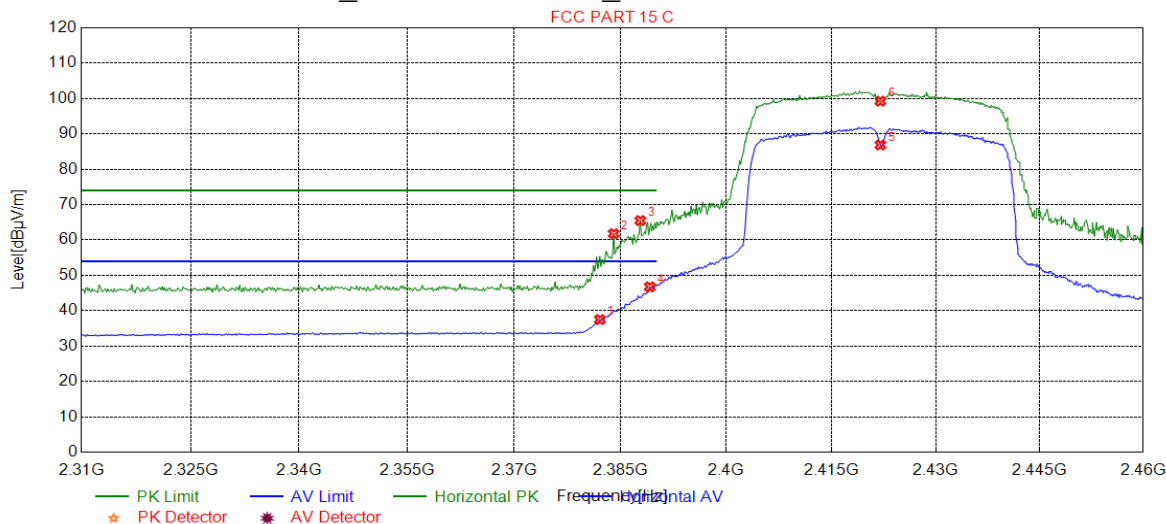
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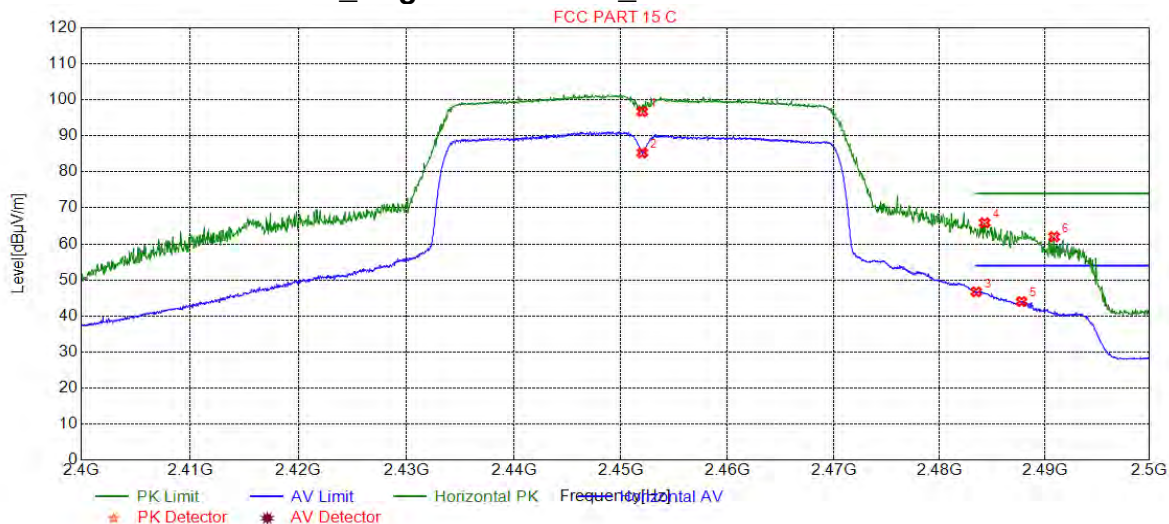
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4.10.1.15 802.11N40_Lowest Channel_Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2382.0721	37.50	7.78	54.00	16.50	142	346	Horizontal
2	2384.0240	61.78	7.78	74.00	12.22	244	346	Horizontal
3	2387.7778	65.48	7.77	74.00	8.52	204	346	Horizontal
4	2389.1291	46.75	7.77	54.00	7.25	244	346	Horizontal
5	2422.0000	86.86	7.85	0.00	-86.86	142	346	Horizontal
6	2422.0000	99.26	7.85	0.00	-99.26	173	194	Horizontal

4.10.1.16 802.11N40_ Highest Channel_ Horizontal



Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2452.0000	96.71	7.97	0.00	-96.71	163	9	Horizontal
2	2452.0000	85.27	7.97	0.00	-85.27	113	346	Horizontal
3	2483.5000	46.69	8.01	54.00	7.31	228	346	Horizontal
4	2484.2921	65.87	8.01	74.00	8.13	102	199	Horizontal
5	2487.7939	44.02	8.02	54.00	9.98	113	199	Horizontal
6	2490.8954	62.01	8.02	74.00	11.99	248	9	Horizontal

The 5029F data:

The detailed test data see: Appendix C.1 - RSE for WLAN 2.4G

Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

All Modes have been tested, but only the worst case data displayed in this report.



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5 Measurement Uncertainty (95% confidence levels, k=2)

Lab A:

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	$\pm 0.75\text{dB}$
2	RF power density, conducted	$\pm 2.84\text{dB}$
3	Spurious emissions, conducted	$\pm 0.75\text{dB}$
4	Temperature test	$\pm 1^{\circ}\text{C}$
5	Humidity test	$\pm 3\%$
6	DC and low frequency voltages	$\pm 0.5\%$

Lab B:

No.	Item	Measurement Uncertainty
1	Conduction Emission	$\pm 3.0\text{dB}$ (150kHz to 30MHz)
2	Radiated Emission	$\pm 4.8\text{dB}$ (Below 1GHz)
		$\pm 4.8\text{dB}$ (1GHz to 6GHz)
		$\pm 4.5\text{dB}$ (6GHz to 18GHz)
		$\pm 5.02\text{dB}$ (Above 18GHz)



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6 Equipment List

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal. Due date
				(yyyy-mm-dd)	(yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2019/7/15	2020/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/4/9	2020/4/8
Coaxial Cable	SGS	N/A	SEM031-01	2019/6/12	2020/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019/7/14	2020/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2019/10/27	2020/10/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019/7/14	2020/7/14



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CE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2019-09-07	2020-09-06
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2019-07-16	2020-07-15
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR

RSE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2019-06-27	2020-06-26
				2020-04-02	2021-04-01
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2019-09-15	2020-09-14
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR
Filter bank	Tonscend	JS0806-F	XAW03-05-01	NCR	NCR
Filter bank	Tonscend	JS0806s	XAW03-05-02	NCR	NCR
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2019-11-18	2020-11-17
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2019-12-03	2020-12-02
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2019-11-18	2020-11-17
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2019-12-06	2020-12-05
Measurement Software	Tonscend	TS+ RSE V3.0.0.2	XAW02-05-01	NCR	NCR



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7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/80027.

The End



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