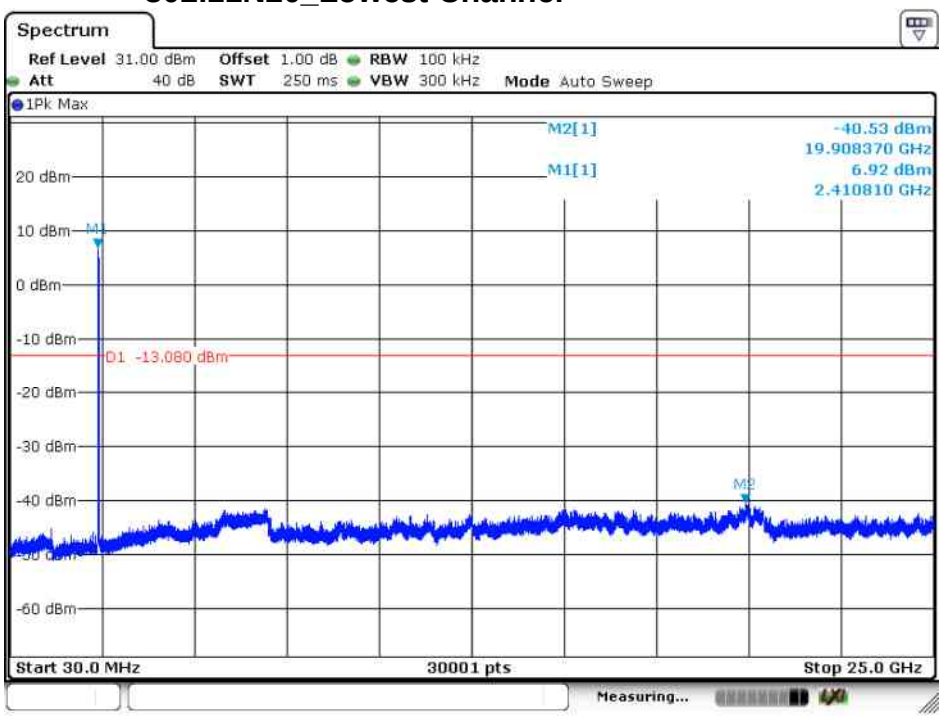
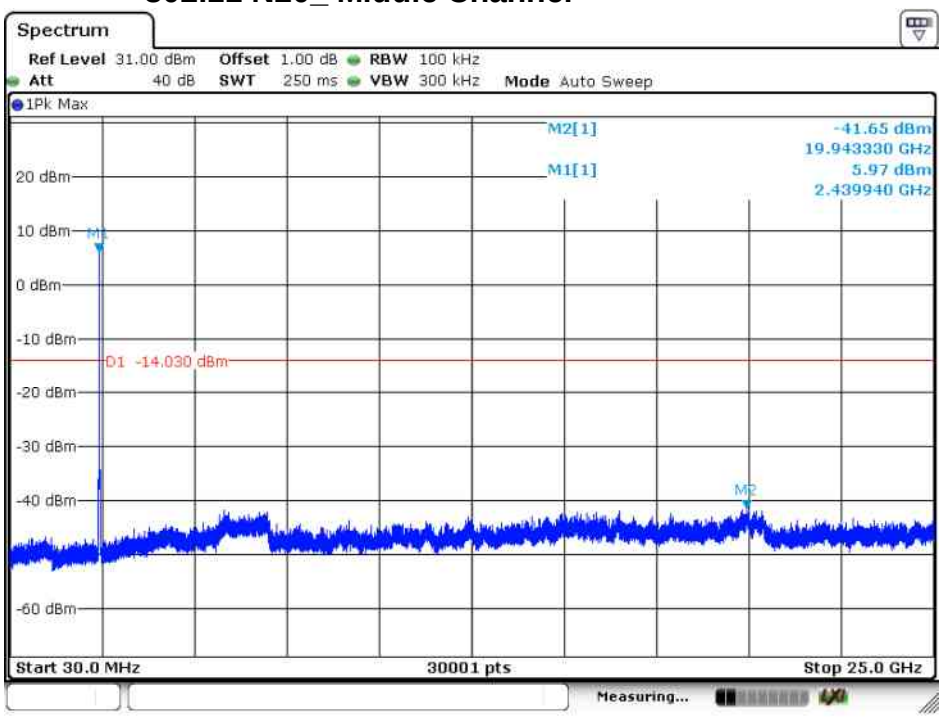
4.8.1.1.10 802.11N20_Lowest Channel



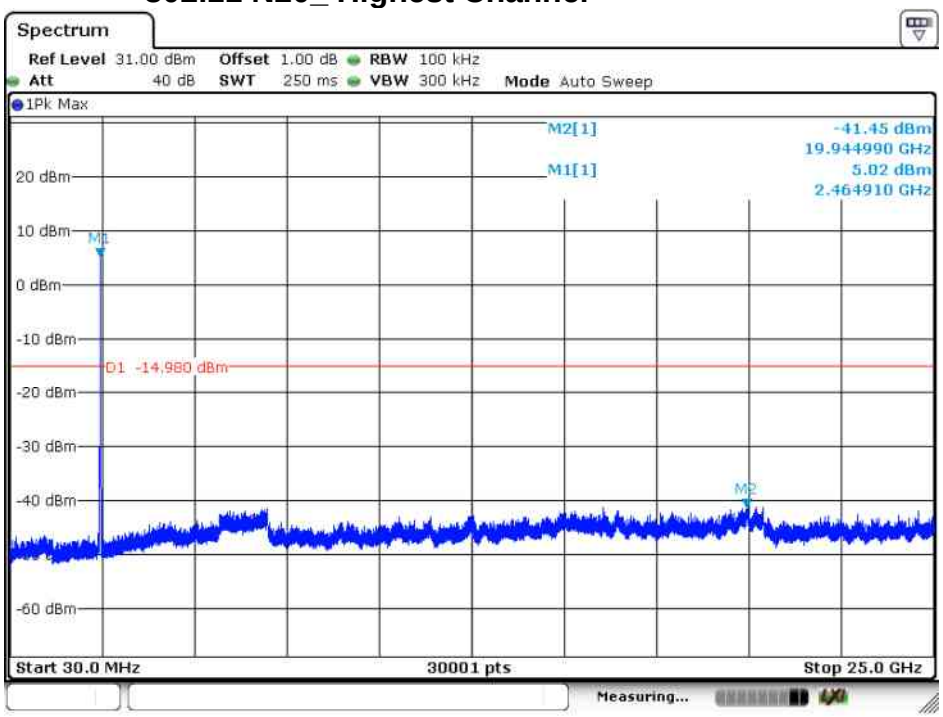
Date: 10.JUN.2020 07:23:44

4.8.1.1.11 802.11 N20_ Middle Channel

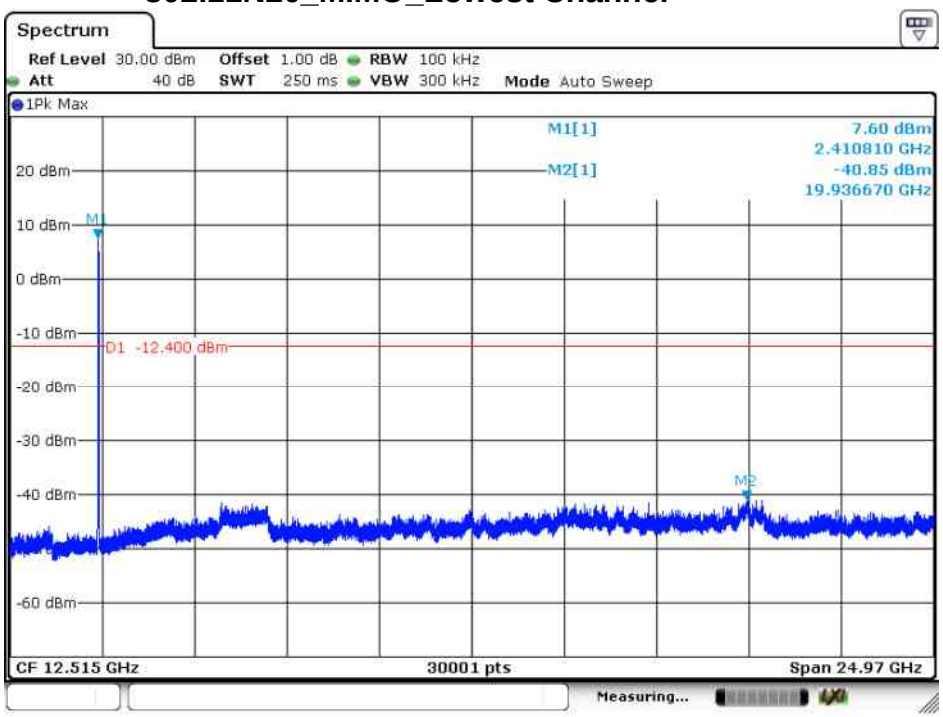


Date: 10.JUN.2020 07:26:32

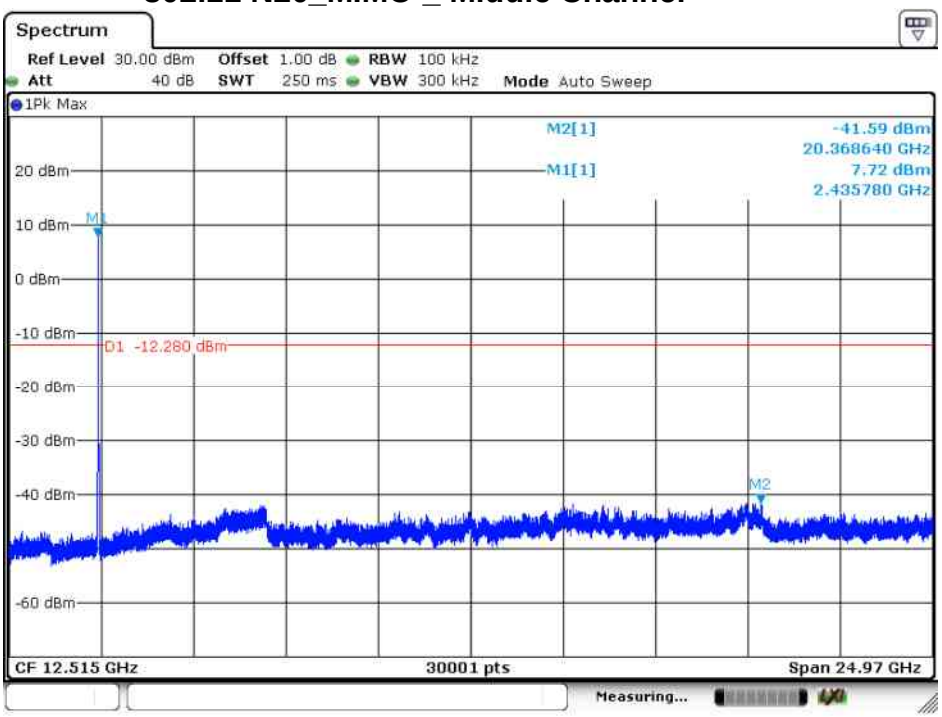
4.8.1.1.12 802.11 N20_ Highest Channel



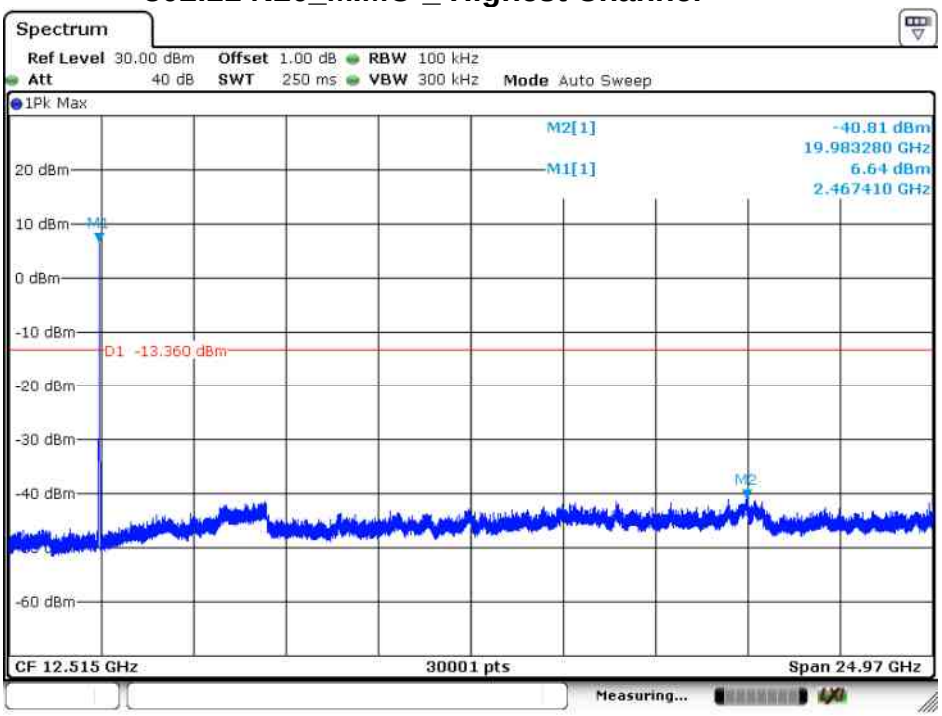
4.8.1.1.13 802.11N20_MIMO_Lowest Channel



4.8.1.1.14 802.11 N20_MIMO _ Middle Channel

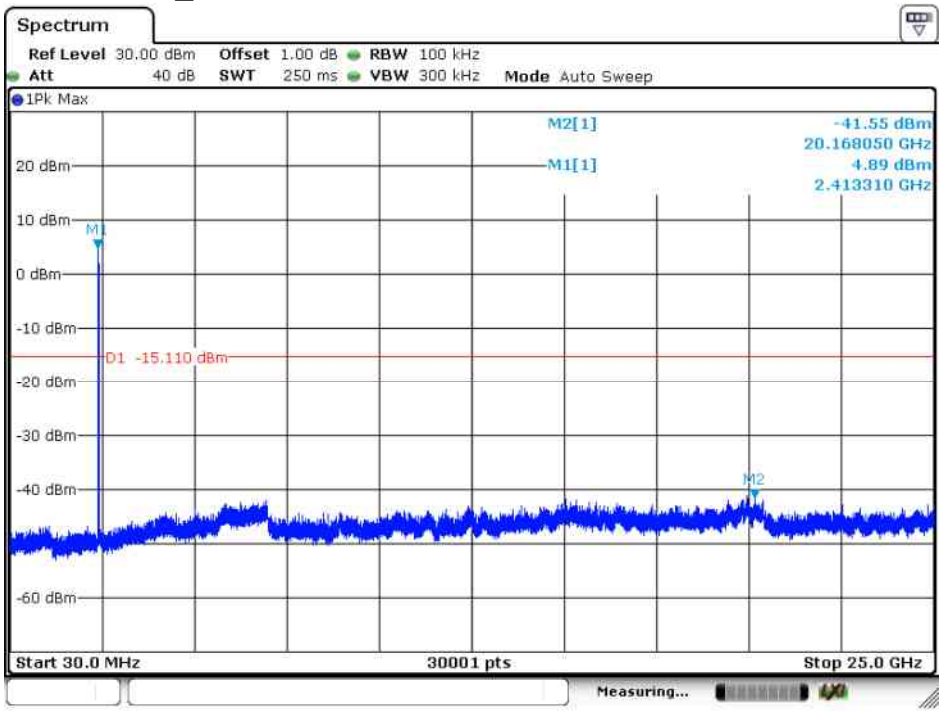


4.8.1.1.15 802.11 N20_MIMO _ Highest Channel



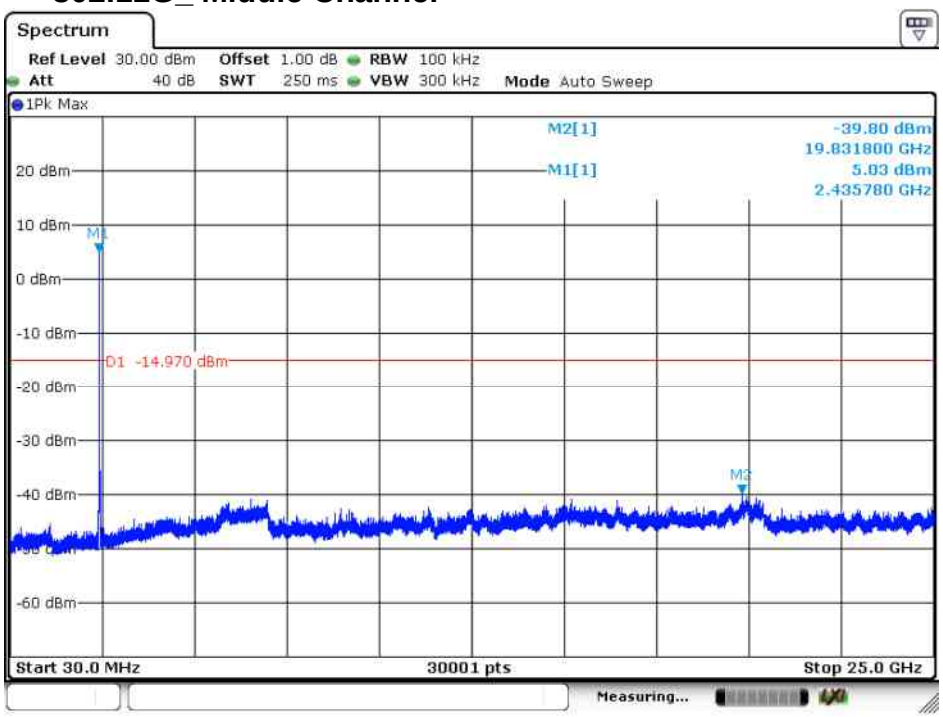
4.8.1.2 ANT2

4.8.1.2.1 802.11G_Lowest Channel



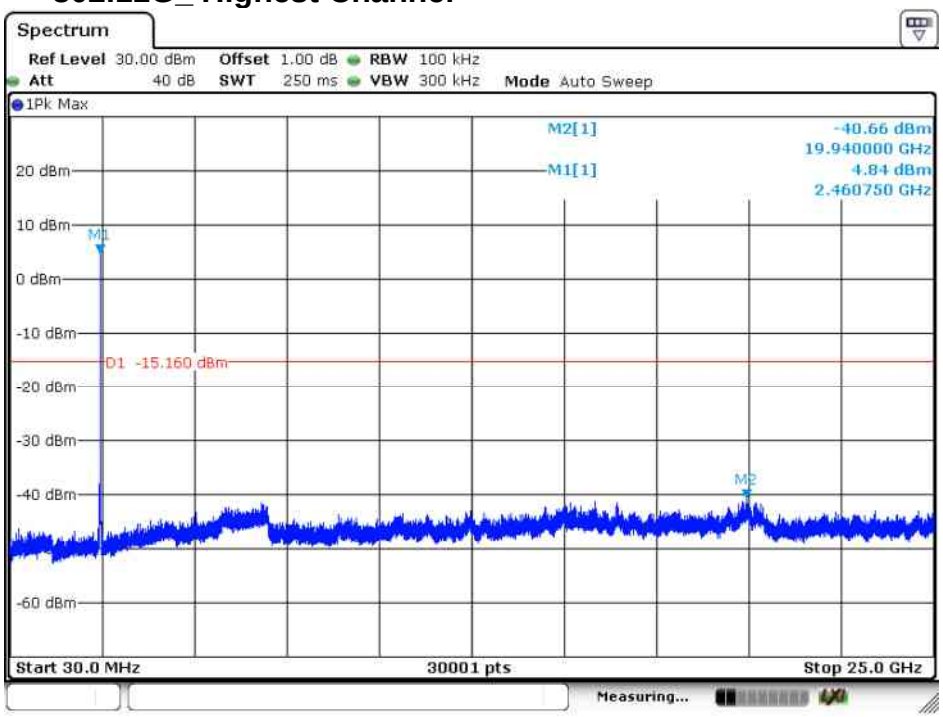
Date: 11.JUN.2020 08:26:48

4.8.1.2.2 802.11G_ Middle Channel



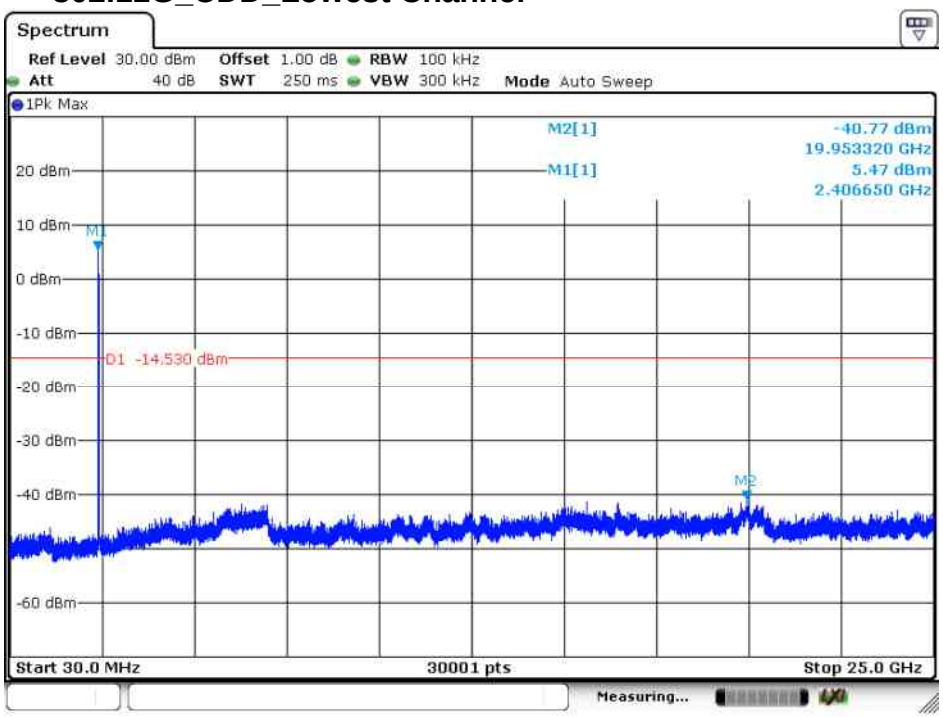
Date: 11.JUN.2020 08:25:43

4.8.1.2.3 802.11G_ Highest Channel



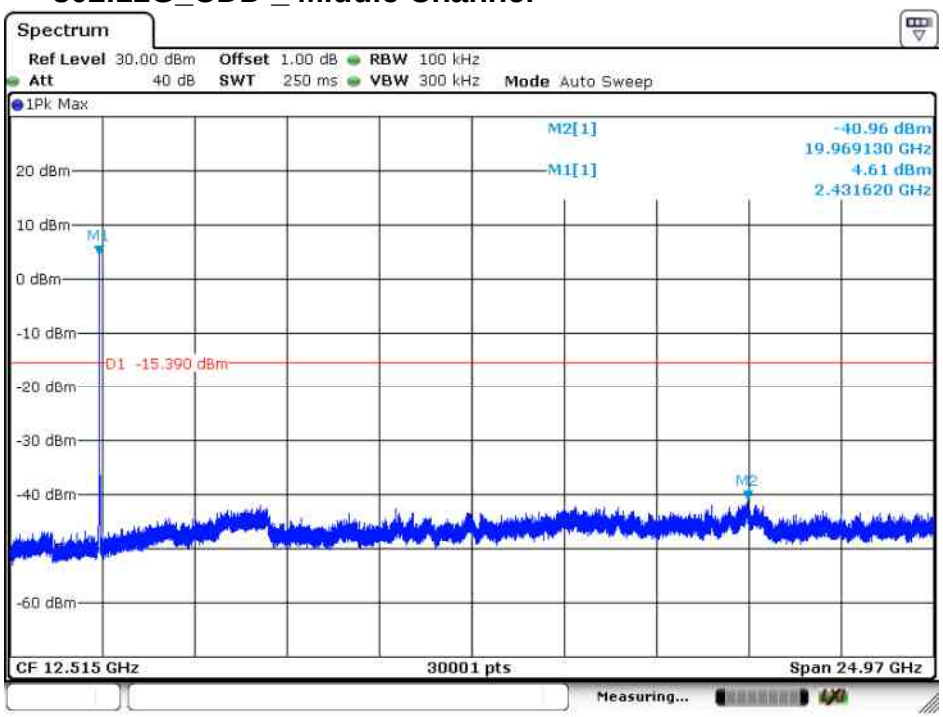
Date: 11.JUN.2020 08:19:26

4.8.1.2.4 802.11G_CDD_Lowest Channel



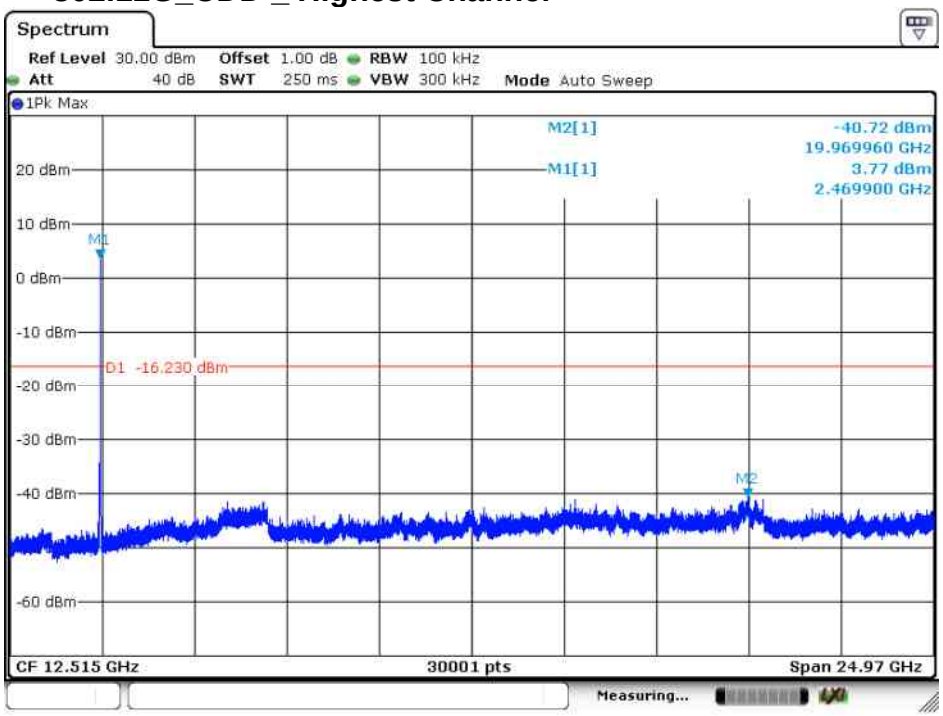
Date: 11.JUN.2020 07:40:10

4.8.1.2.5 802.11G_CDD _ Middle Channel



Date: 11.JUN.2020 07:41:41

4.8.1.2.6 802.11G_CDD _ Highest Channel



Date: 11.JUN.2020 07:43:19

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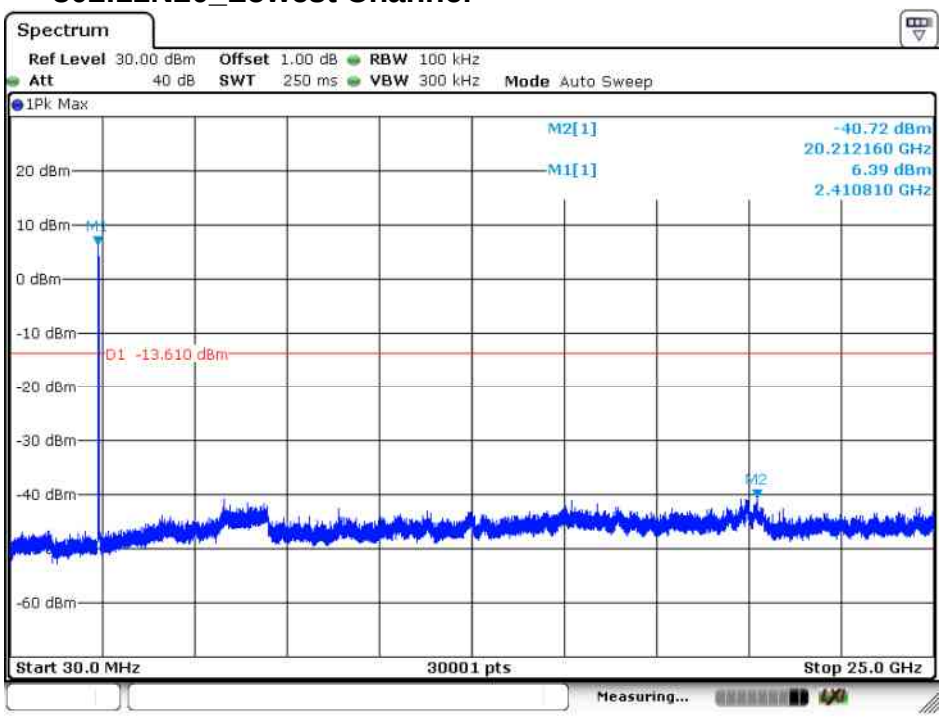
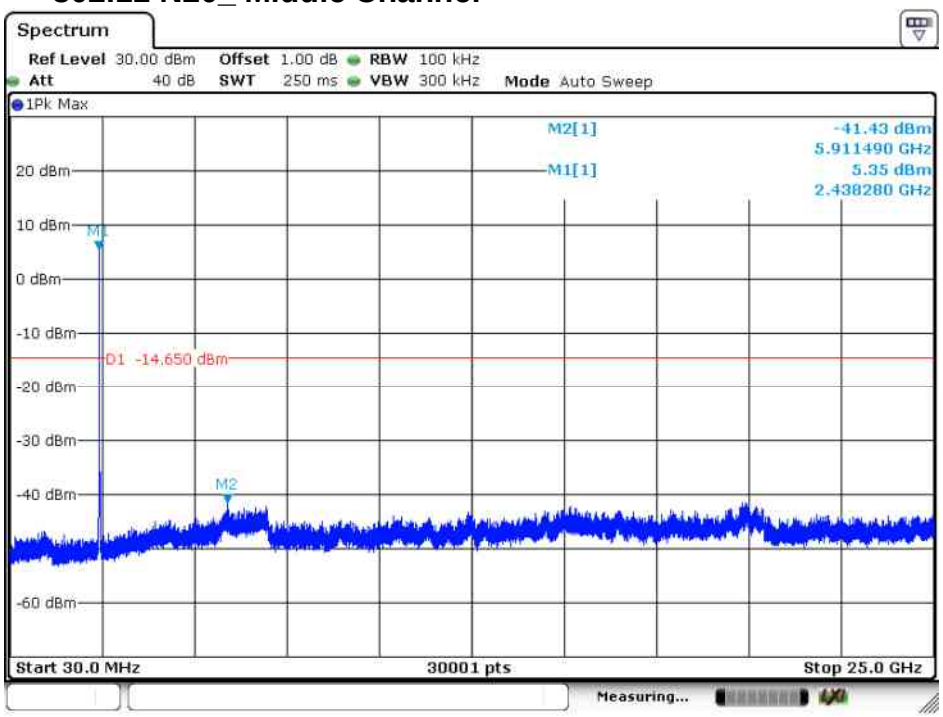
4.8.1.2.7 802.11N20_Lowest Channel



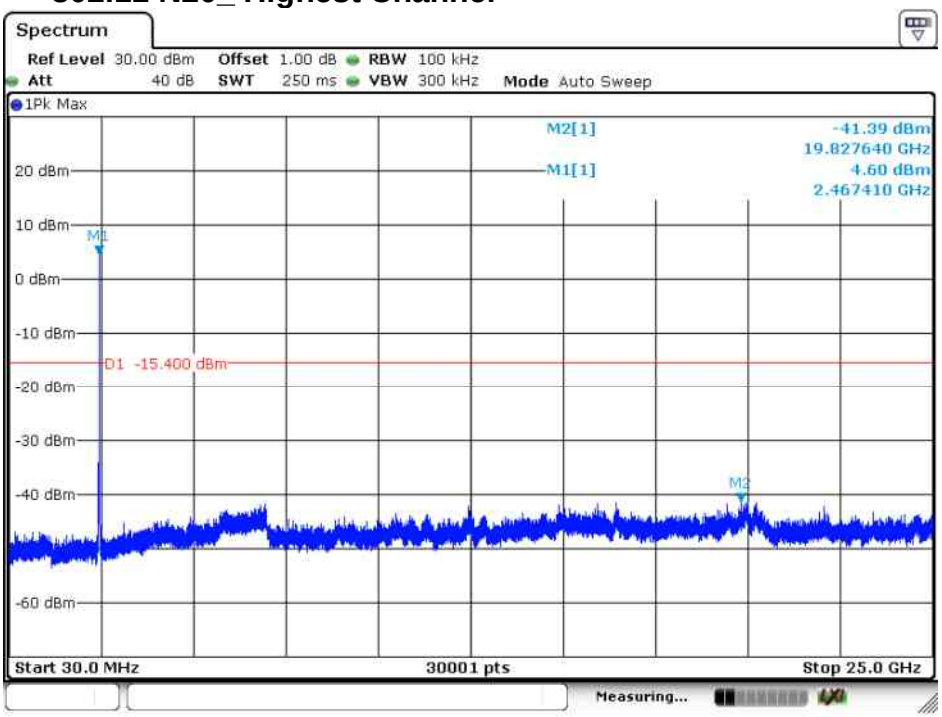
Date: 11.JUN.2020 08:01:58

4.8.1.2.8 802.11 N20_ Middle Channel

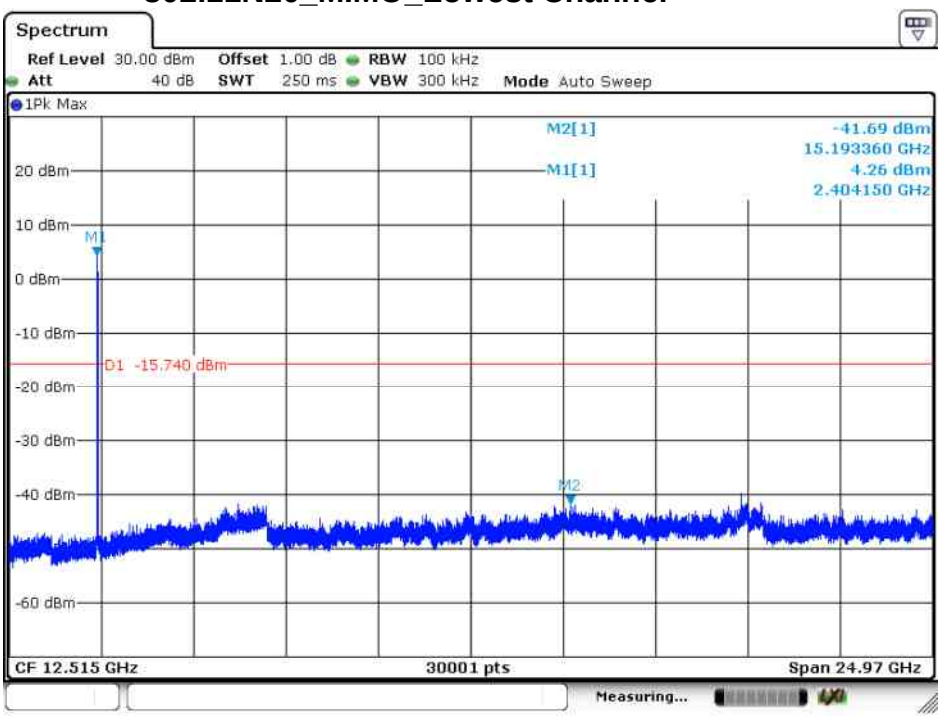


Date: 11.JUN.2020 08:13:36

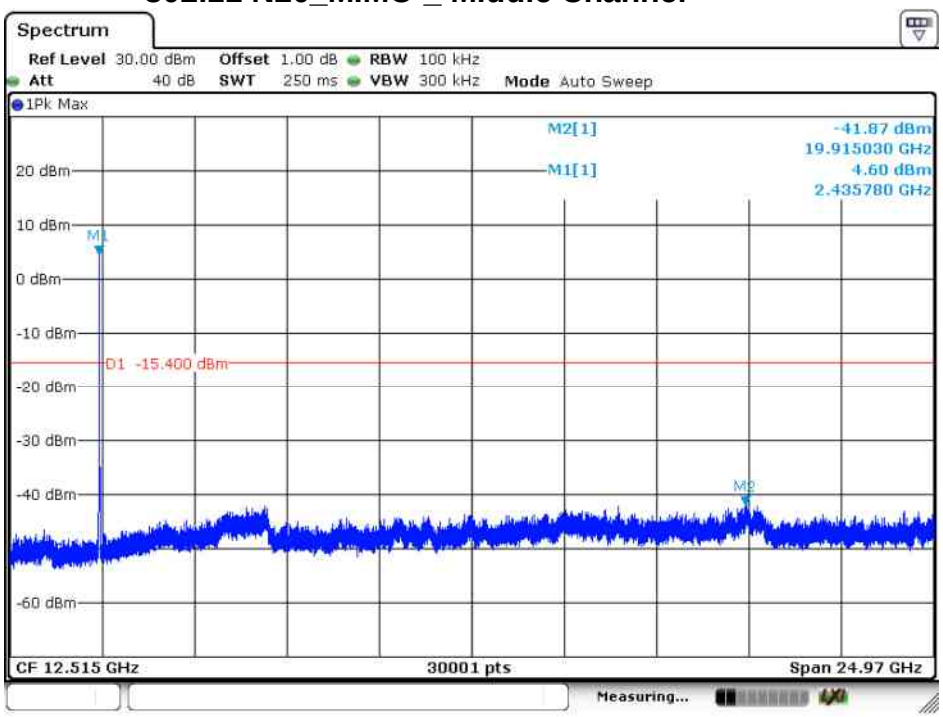
4.8.1.2.9 802.11 N20_ Highest Channel



4.8.1.2.10 802.11N20_MIMO_Lowest Channel

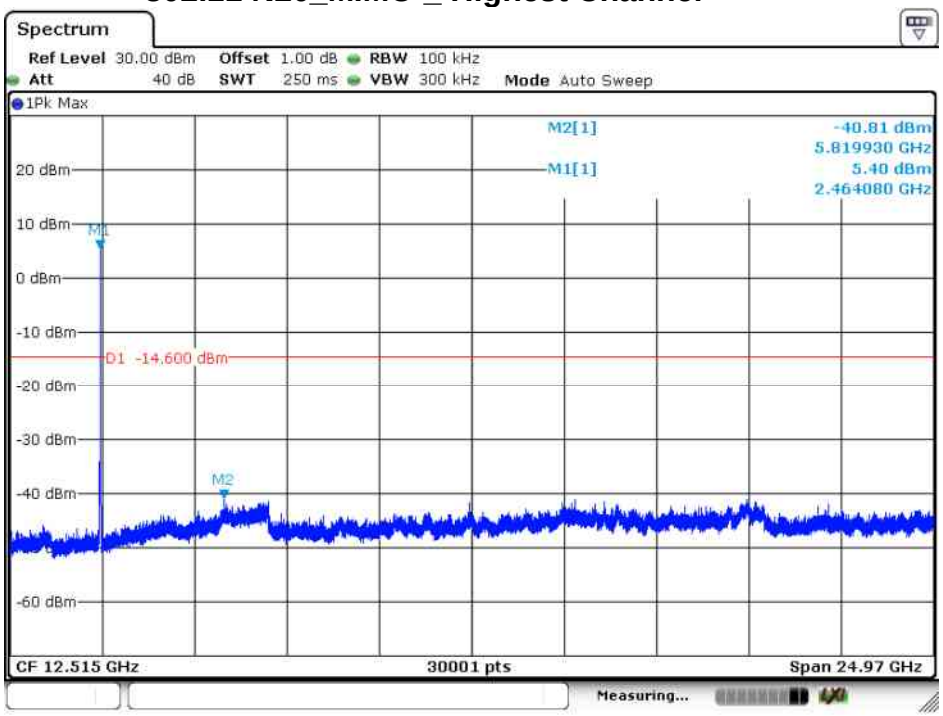


4.8.1.2.11 802.11 N20_MIMO _ Middle Channel



Date: 11.JUN.2020 07:46:20

4.8.1.2.12 802.11 N20_MIMO _ Highest Channel



Date: 11.JUN.2020 07:45:48

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.

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:	

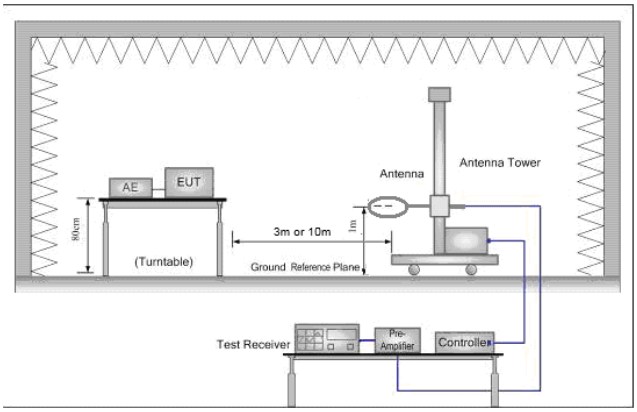


Figure 1. Below 30MHz

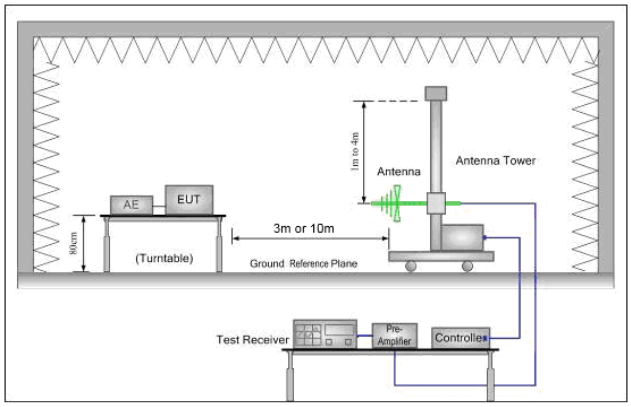


Figure 2. 30MHz to 1GHz

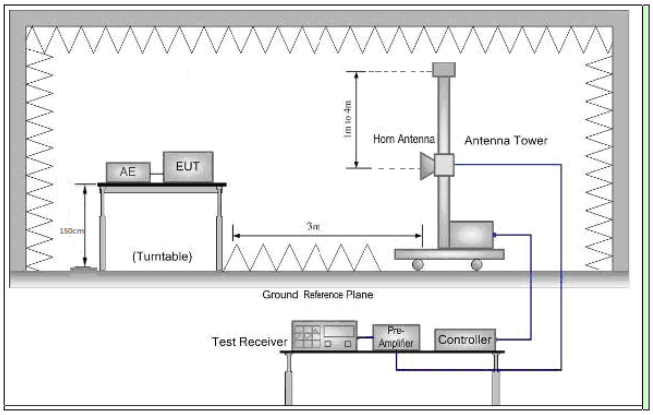


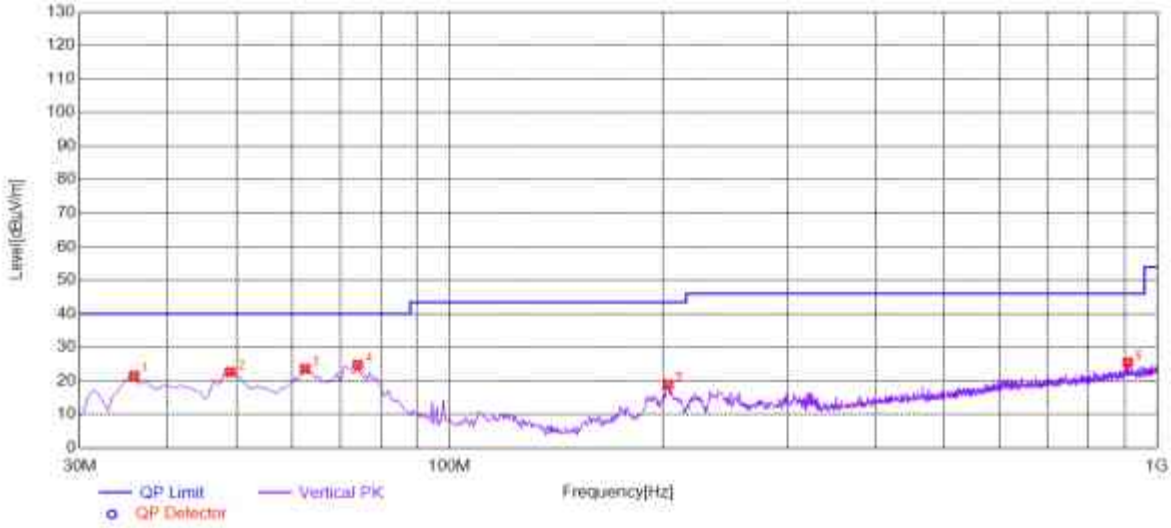
Figure 3. Above 1 GHz

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. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ⩾ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak (3) For average measurement: use duty cycle correction factor method per 15.35(c). Duty cycle = On time/100 milliseconds

	On time = N 1 *L 1 +N 2 *L 2 +...+N n-1 *LN n-1 +N n *L n Where N 1 is number of type 1 pulses, L 1 is length of type 1 pulses, etc. Average Emission Level = Peak Emission Level + 20*log(Duty cycl f. 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. g. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. h. 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. i. Test the EUT in the lowest channel, the middle channel ,the Highest channel j. 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. k. 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); 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

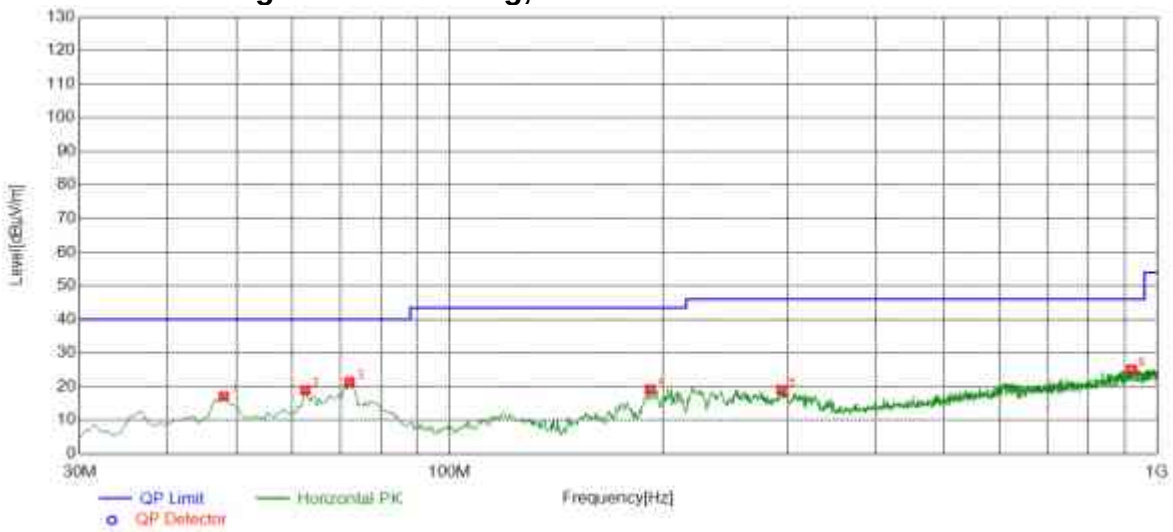
4.9.1.1 Charge + Transmitting, Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	35.8229	21.57	-32.50	40.00	18.43	150	159	Vertical
2	48.9245	22.67	-30.19	40.00	17.33	150	344	Vertical
3	62.5113	23.61	-32.29	40.00	16.39	150	286	Vertical
4	74.1571	24.82	-34.88	40.00	15.18	150	249	Vertical
5	203.716	18.98	-30.74	43.50	24.52	150	313	Vertical
6	909.259	25.56	-15.09	46.00	20.44	150	65	Vertical

4.9.1.2 Charge + Transmitting, Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	47.9540	17.13	-30.19	40.00	22.87	150	100	Horizontal
2	62.5113	18.97	-32.29	40.00	21.03	150	162	Horizontal
3	72.2161	21.46	-34.54	40.00	18.54	150	25	Horizontal
4	192.071	19.24	-31.66	43.50	24.26	150	230	Horizontal
5	294.457	19.06	-28.02	46.00	26.94	150	108	Horizontal
6	920.420	25.16	-14.92	46.00	20.84	150	106	Horizontal

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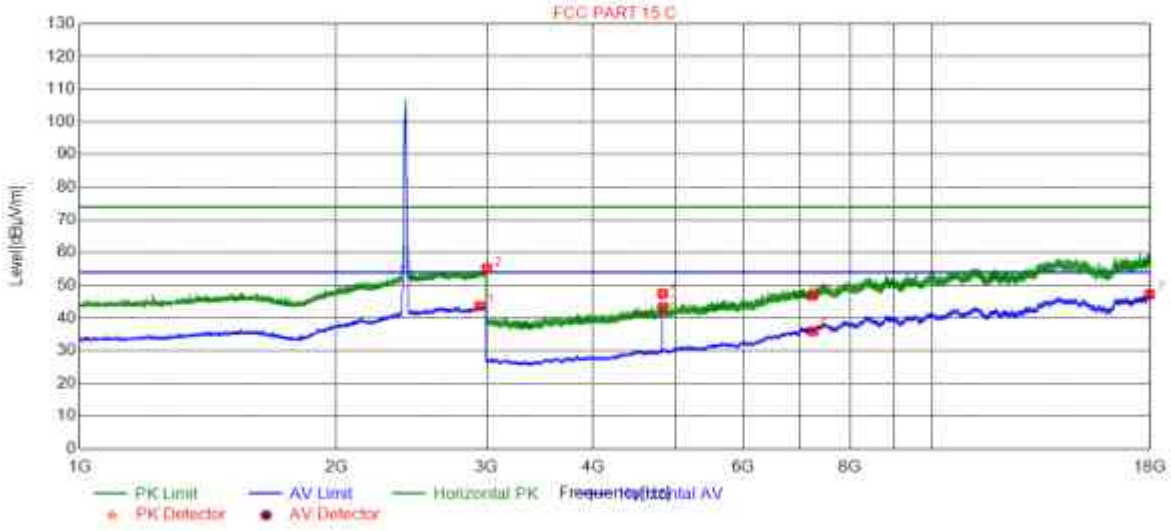
4.9.2 Transmitter emission above 1GHz

4.9.2.1 ANT1

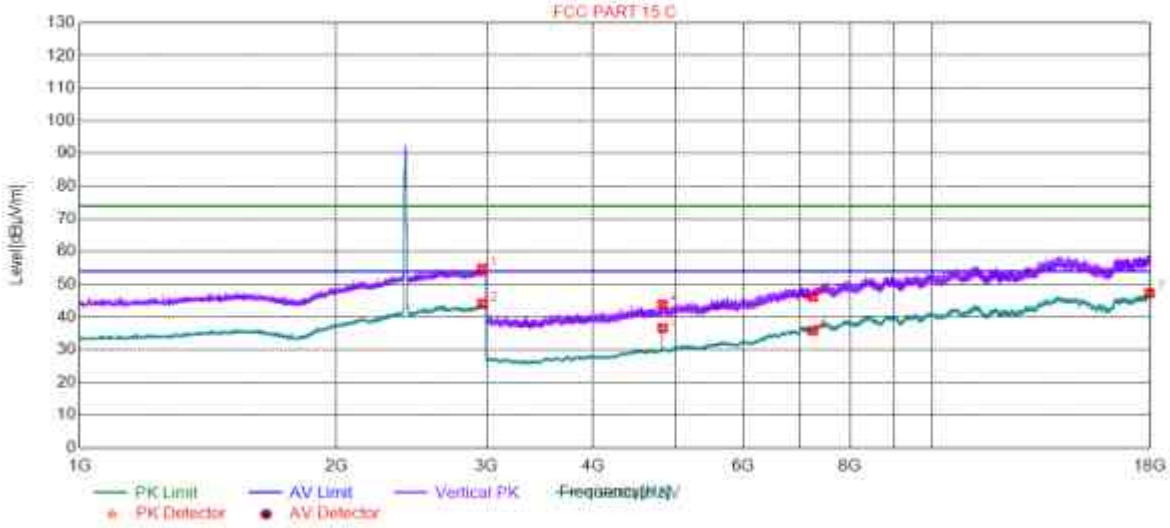
4.9.2.1.1 802.11B_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2943.98	43.72	9.62	54.00	10.28	150	219	Horizontal
2	2999.49	55.21	9.45	74.00	18.79	150	54	Horizontal
3	4824.00	43.16	-18.21	54.00	10.84	150	315	Horizontal
4	4824.00	47.52	-18.21	74.00	26.48	150	288	Horizontal
5	7236.00	46.96	-9.99	74.00	27.04	150	267	Horizontal
6	7236.00	36.01	-9.99	54.00	17.99	150	360	Horizontal
7	17960.9	47.34	0.71	54.00	6.66	150	68	Horizontal

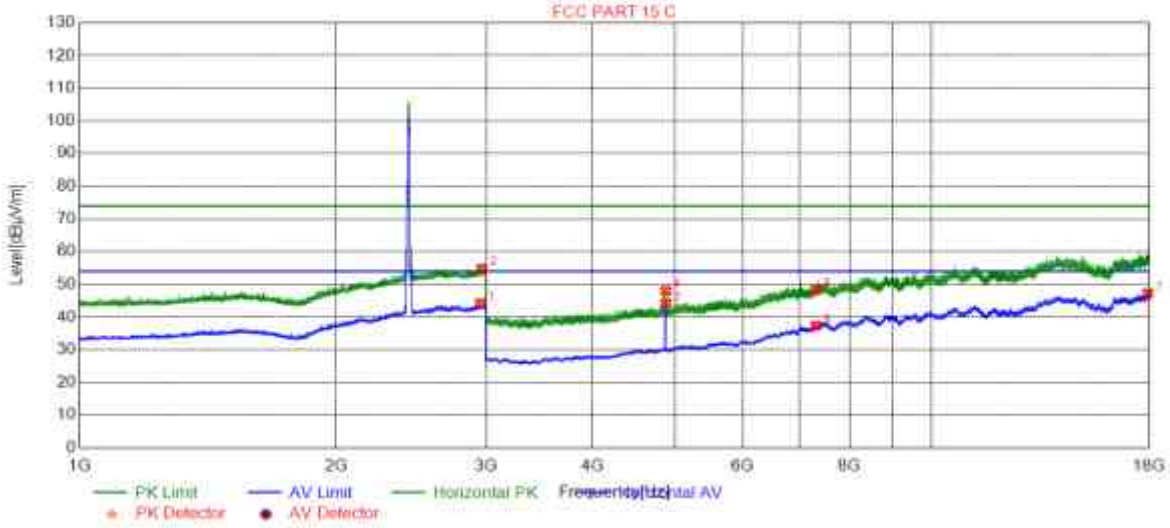
4.9.2.1.2 802.11B_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2965.49	54.94	9.61	74.00	19.06	150	114	Vertical
2	2965.99	44.20	9.61	54.00	9.80	150	114	Vertical
3	4824.00	36.65	-18.21	54.00	17.35	150	179	Vertical
4	4824.00	43.84	-18.21	74.00	30.16	150	288	Vertical
5	7236.00	46.25	-9.99	74.00	27.75	150	217	Vertical
6	7236.00	35.90	-9.99	54.00	18.10	150	68	Vertical
7	17957.6	47.38	0.71	54.00	6.62	150	316	Vertical

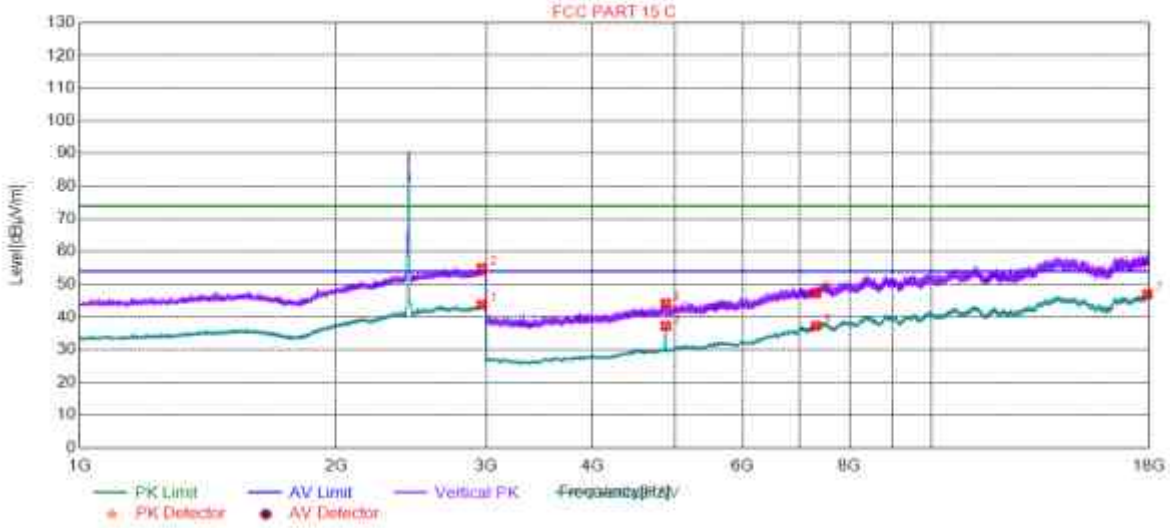
4.9.2.1.3 802.11B_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2952.98	44.23	9.67	54.00	9.77	150	136	Horizontal
2	2965.99	54.86	9.61	74.00	19.14	150	260	Horizontal
3	4874.00	44.26	-17.99	54.00	9.74	150	315	Horizontal
4	4874.00	48.03	-17.99	74.00	25.97	150	288	Horizontal
5	7311.00	48.43	-9.74	74.00	25.57	150	68	Horizontal
6	7311.00	37.35	-9.74	54.00	16.65	150	18	Horizontal
7	17916.9	47.24	0.70	54.00	6.76	150	18	Horizontal

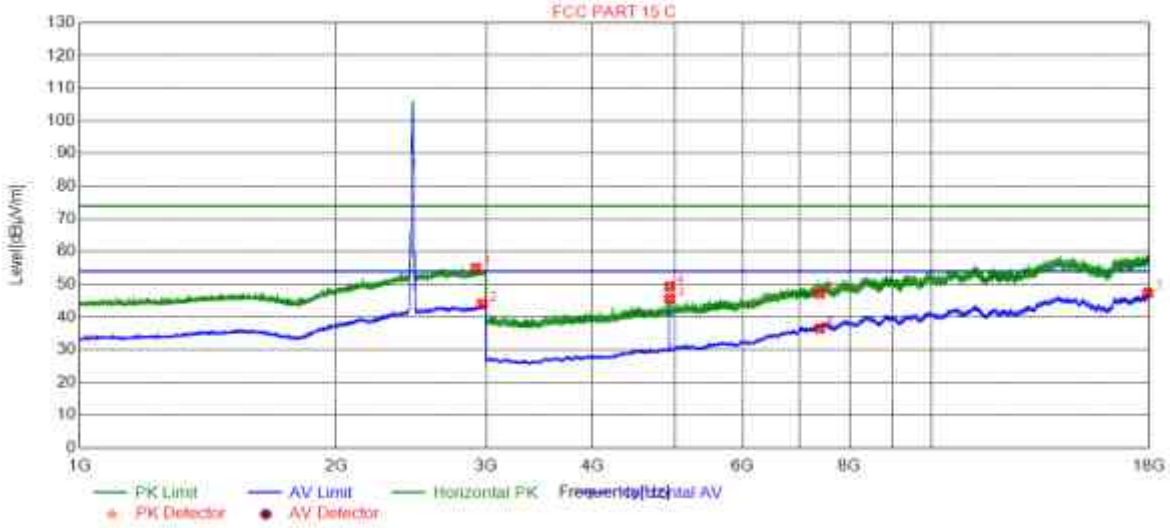
4.9.2.1.4 802.11B_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2964.99	43.80	9.61	54.00	10.20	150	59	Vertical
2	2965.49	55.01	9.61	74.00	18.99	150	113	Vertical
3	4874.00	37.33	-17.99	54.00	16.67	150	178	Vertical
4	4874.00	44.16	-17.99	74.00	29.84	150	151	Vertical
5	7311.00	37.36	-9.74	54.00	16.64	150	359	Vertical
6	7311.00	47.35	-9.74	74.00	26.65	150	359	Vertical
7	17905.9	47.05	0.69	54.00	6.95	150	18	Vertical

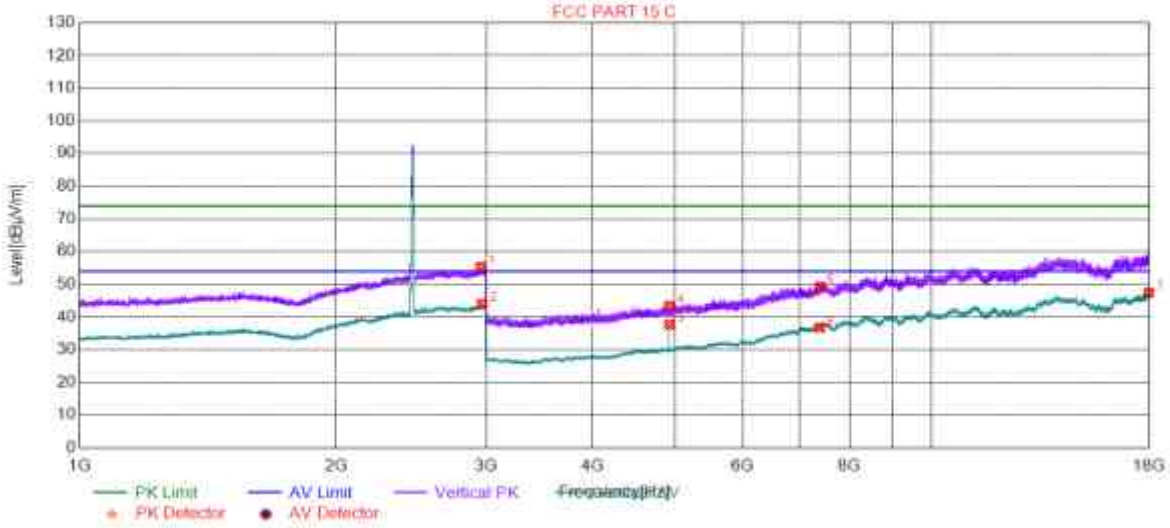
4.9.2.1.5 802.11B_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2917.97	55.03	9.33	74.00	18.97	150	273	Horizontal
2	2969.49	44.09	9.59	54.00	9.91	150	218	Horizontal
3	4924.00	45.59	-17.72	54.00	8.41	150	288	Horizontal
4	4924.00	49.42	-17.72	74.00	24.58	150	288	Horizontal
5	7386.00	47.18	-9.55	74.00	26.82	150	68	Horizontal
6	7386.00	36.54	-9.55	54.00	17.46	150	267	Horizontal
7	17917.4	47.47	0.70	54.00	6.53	150	118	Horizontal

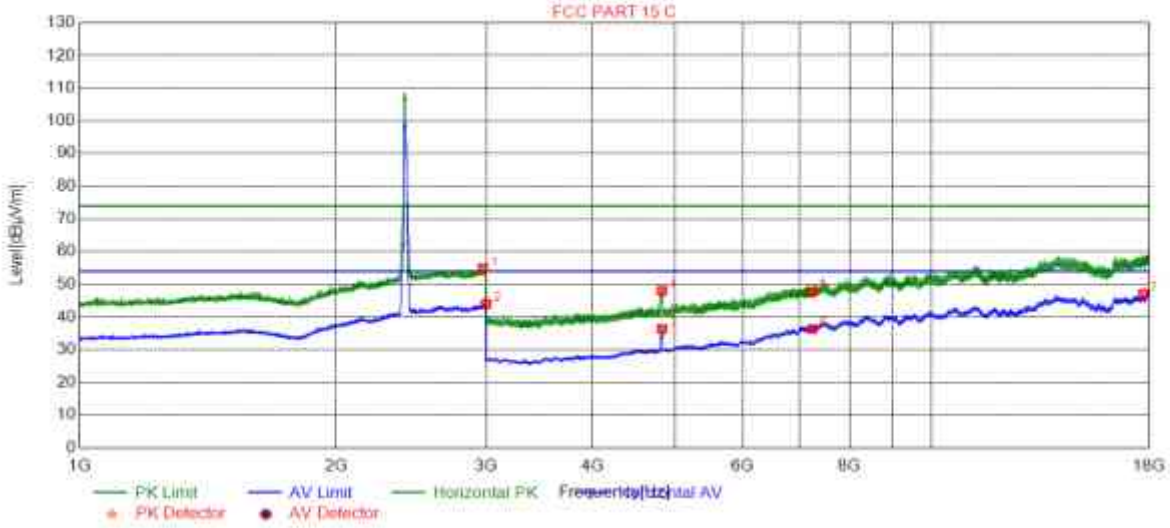
4.9.2.1.6 802.11B_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2956.98	55.41	9.65	74.00	18.59	150	306	Vertical
2	2968.49	44.08	9.59	54.00	9.92	150	141	Vertical
3	4924.00	37.77	-17.72	54.00	16.23	150	180	Vertical
4	4924.00	43.48	-17.72	74.00	30.52	150	154	Vertical
5	7386.00	49.38	-9.55	74.00	24.62	150	359	Vertical
6	7386.00	36.81	-9.55	54.00	17.19	150	167	Vertical
7	17957.0	47.45	0.71	54.00	6.55	150	266	Vertical

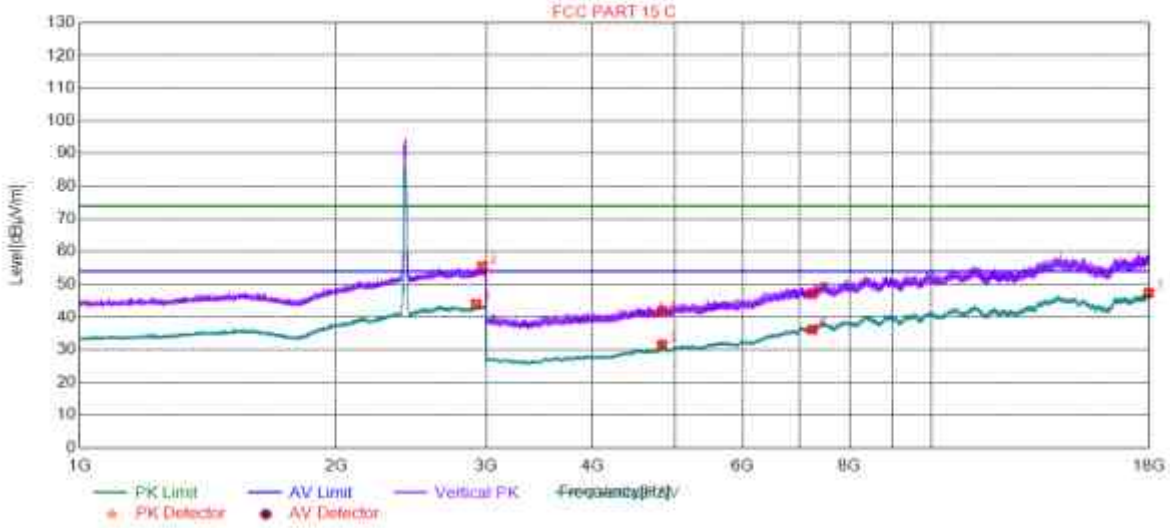
4.9.2.1.7 802.11G_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2973.99	54.98	9.57	74.00	19.02	150	327	Horizontal
2	3000.00	44.06	9.45	54.00	9.94	150	327	Horizontal
3	4824.00	36.44	-18.21	54.00	17.56	150	43	Horizontal
4	4824.00	48.09	-18.21	74.00	25.91	150	43	Horizontal
5	7236.00	47.87	-9.99	74.00	26.13	150	359	Horizontal
6	7236.00	36.37	-9.99	54.00	17.63	150	68	Horizontal
7	17698.5	47.15	1.36	54.00	6.85	150	18	Horizontal

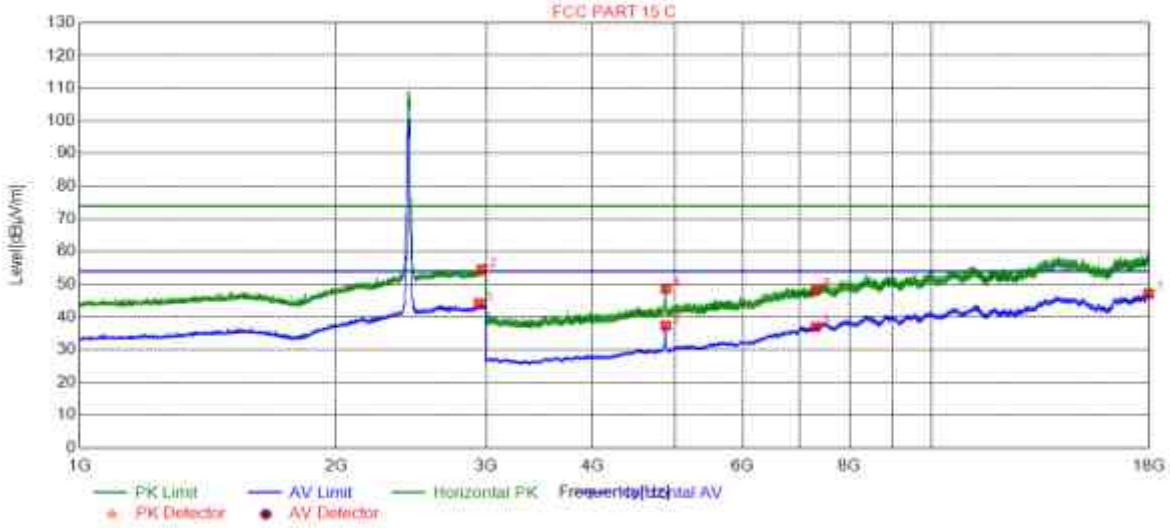
4.9.2.1.8 802.11G_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2918.97	44.00	9.34	54.00	10.00	150	18	Vertical
2	2968.49	55.56	9.59	74.00	18.44	150	360	Vertical
3	4824.00	31.53	-18.21	54.00	22.47	150	287	Vertical
4	4824.00	41.87	-18.21	74.00	32.13	150	124	Vertical
5	7236.00	47.13	-9.99	74.00	26.87	150	18	Vertical
6	7236.00	36.19	-9.99	54.00	17.81	150	317	Vertical
7	17957.0	47.37	0.71	54.00	6.63	150	118	Vertical

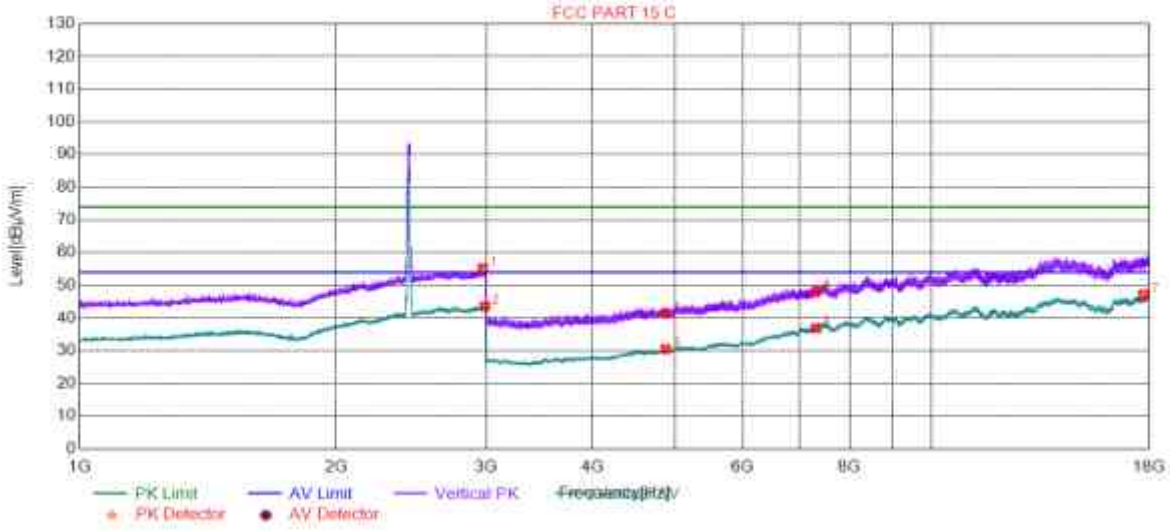
4.9.2.1.9 802.11G_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2942.98	44.25	9.60	54.00	9.75	150	28	Horizontal
2	2965.99	54.68	9.61	74.00	19.32	150	165	Horizontal
3	4874.00	37.43	-17.99	54.00	16.57	150	260	Horizontal
4	4874.00	48.71	-17.99	74.00	25.29	150	234	Horizontal
5	7311.00	48.43	-9.74	74.00	25.57	150	265	Horizontal
6	7311.00	36.97	-9.74	54.00	17.03	150	166	Horizontal
7	17962.5	47.16	0.71	54.00	6.84	150	265	Horizontal

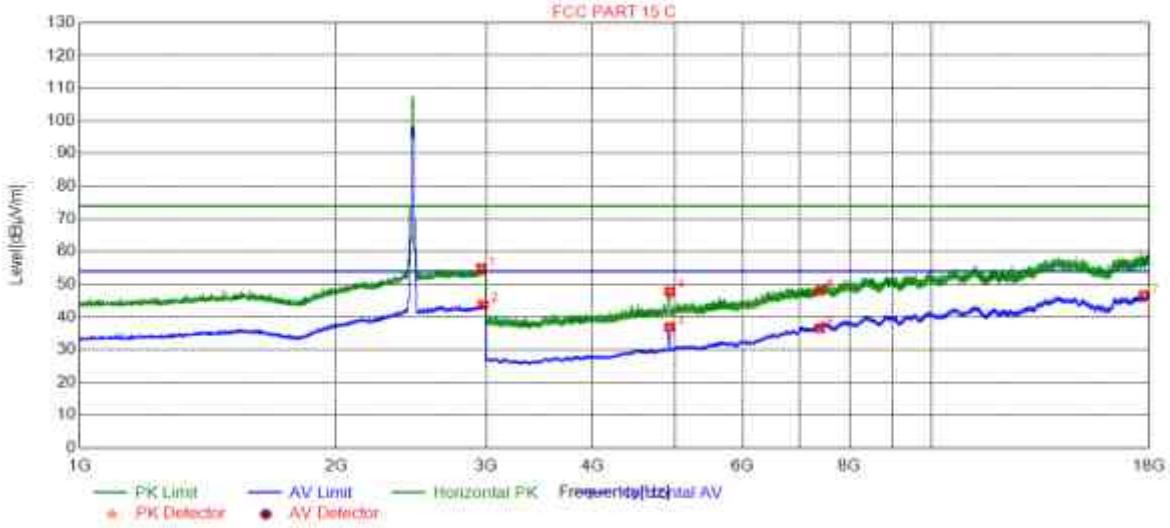
4.9.2.1.10 802.11G_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2971.99	55.28	9.58	74.00	18.72	150	45	Vertical
2	2989.49	43.62	9.50	54.00	10.38	150	45	Vertical
3	4874.00	30.51	-17.99	54.00	23.49	150	315	Vertical
4	4874.00	41.49	-17.99	74.00	32.51	150	206	Vertical
5	7311.00	48.13	-9.74	74.00	25.87	150	267	Vertical
6	7311.00	36.90	-9.74	54.00	17.10	150	267	Vertical
7	17706.2	47.24	1.23	54.00	6.76	150	117	Vertical

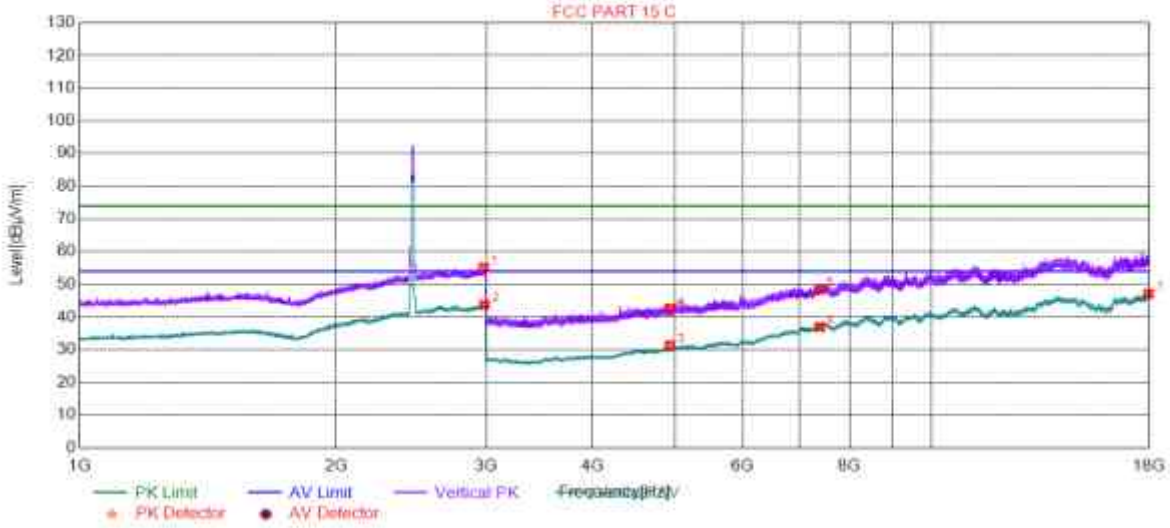
4.9.2.1.11 802.11G_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2960.99	54.99	9.63	74.00	19.01	150	192	Horizontal
2	2975.49	43.82	9.56	54.00	10.18	150	329	Horizontal
3	4924.00	36.93	-17.72	54.00	17.07	150	342	Horizontal
4	4924.00	47.87	-17.72	74.00	26.13	150	69	Horizontal
5	7386.00	48.11	-9.55	74.00	25.89	150	316	Horizontal
6	7386.00	36.61	-9.55	54.00	17.39	150	267	Horizontal
7	17721.1	46.65	0.94	54.00	7.35	150	267	Horizontal

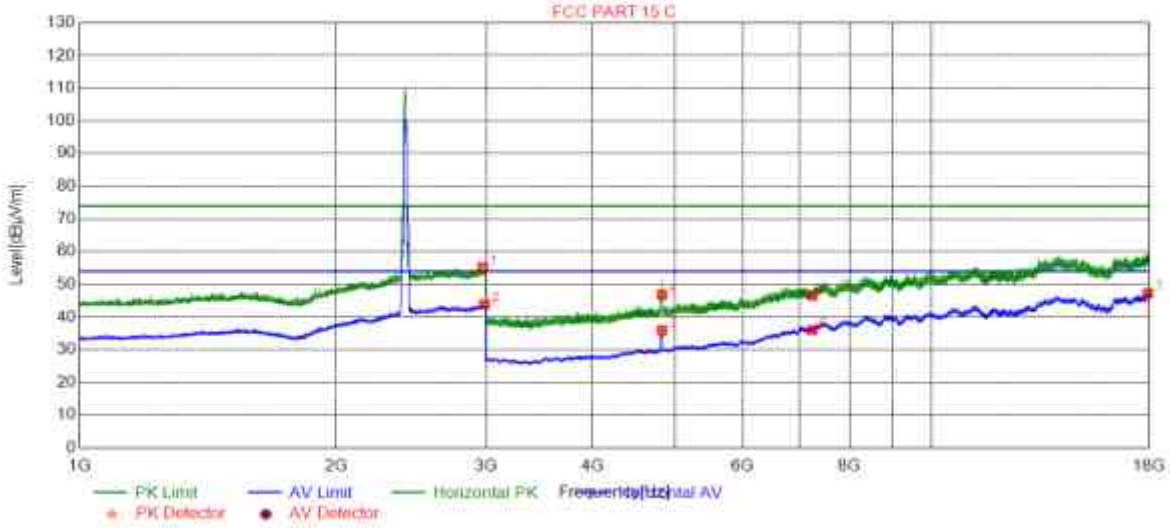
4.9.2.1.12 802.11G_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2979.99	55.17	9.54	74.00	18.83	150	317	Vertical
2	2986.49	43.80	9.51	54.00	10.20	150	248	Vertical
3	4924.00	31.32	-17.72	54.00	22.68	150	288	Vertical
4	4924.00	42.61	-17.72	74.00	31.39	150	15	Vertical
5	7386.00	48.46	-9.55	74.00	25.54	150	118	Vertical
6	7386.00	37.01	-9.55	54.00	16.99	150	18	Vertical
7	17954.8	47.13	0.71	54.00	6.87	150	317	Vertical

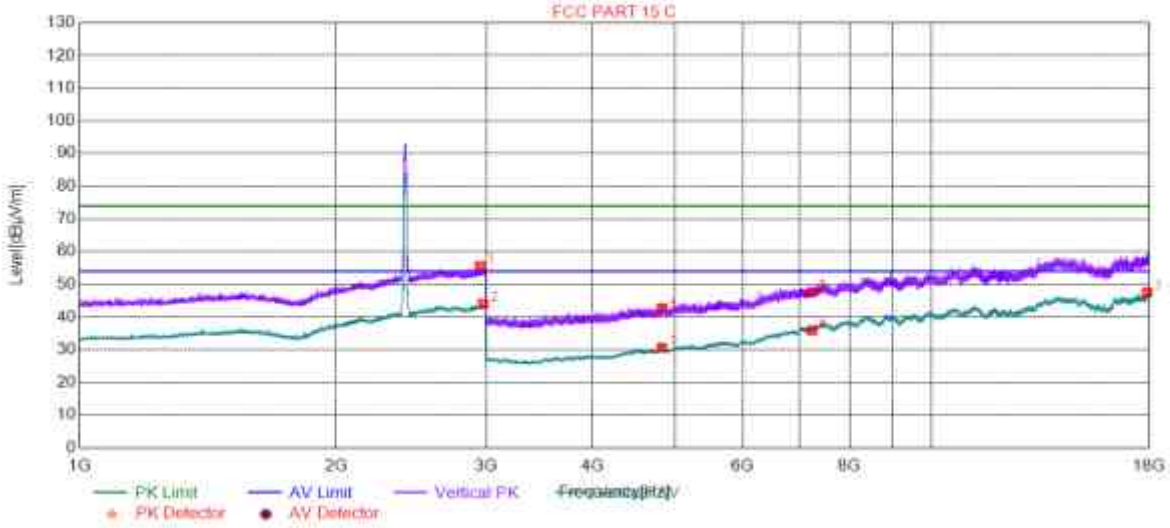
4.9.2.1.13 802.11N20_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2972.99	55.32	9.57	74.00	18.68	150	342	Horizontal
2	2985.49	43.91	9.52	54.00	10.09	150	15	Horizontal
3	4824.00	36.02	-18.21	54.00	17.98	150	44	Horizontal
4	4824.00	46.86	-18.21	74.00	27.14	150	342	Horizontal
5	7236.00	46.61	-9.99	74.00	27.39	150	267	Horizontal
6	7236.00	36.04	-9.99	54.00	17.96	150	217	Horizontal
7	17919.6	47.28	0.70	54.00	6.72	150	68	Horizontal

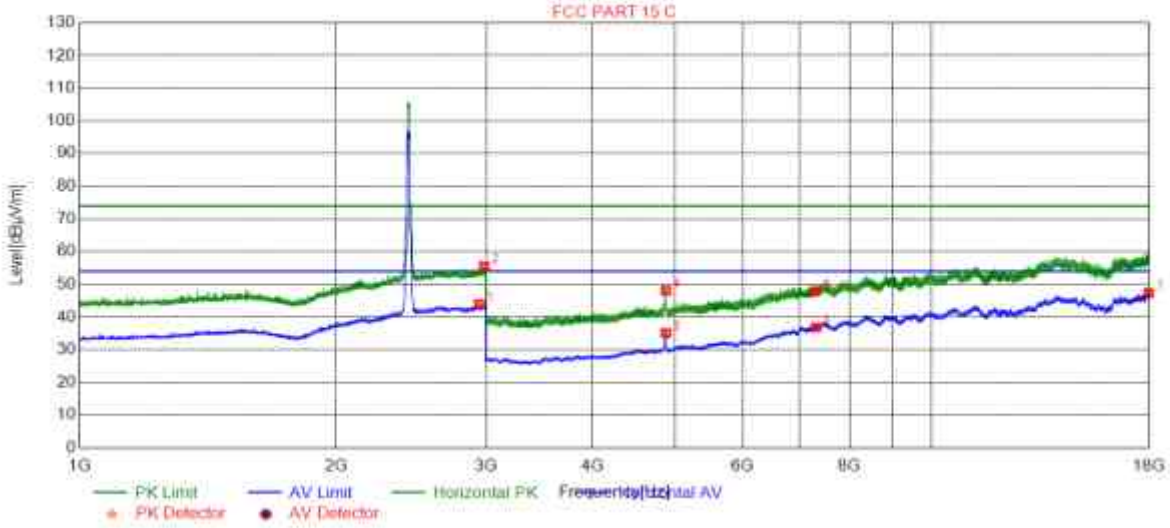
4.9.2.1.14 802.11N20_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2951.48	55.60	9.67	74.00	18.40	150	319	Vertical
2	2976.49	44.05	9.56	54.00	9.95	150	357	Vertical
3	4824.00	30.67	-18.21	54.00	23.33	150	152	Vertical
4	4824.00	42.77	-18.21	74.00	31.23	150	152	Vertical
5	7236.00	47.74	-9.99	74.00	26.26	150	18	Vertical
6	7236.00	35.95	-9.99	54.00	18.05	150	18	Vertical
7	17883.9	47.55	0.48	54.00	6.45	150	68	Vertical

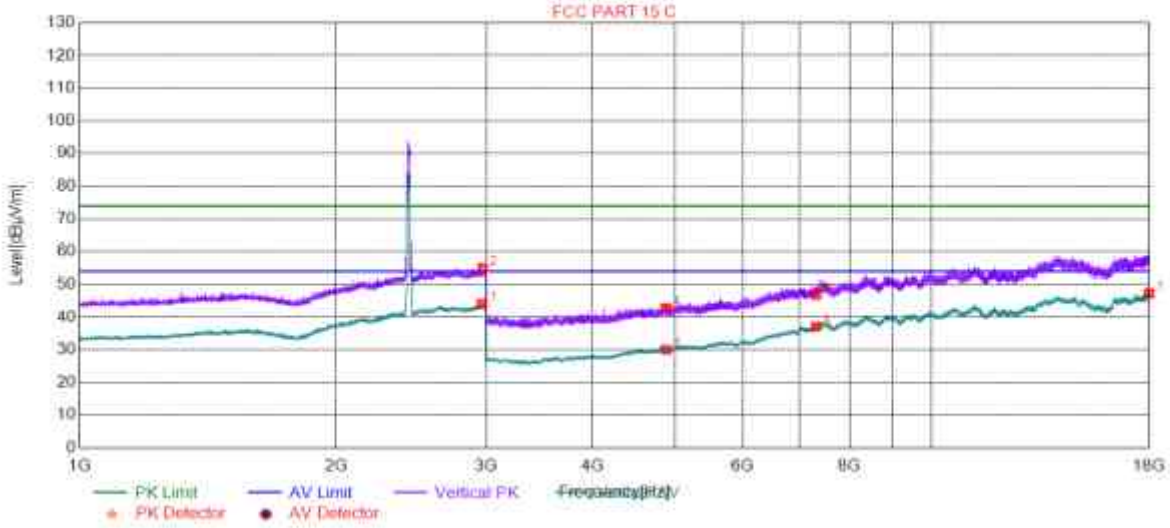
4.9.2.1.15 802.11N20_ Middle Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2943.48	44.02	9.61	54.00	9.98	150	68	Horizontal
2	2982.99	55.60	9.53	74.00	18.40	150	329	Horizontal
3	4874.00	35.18	-17.99	54.00	18.82	150	0	Horizontal
4	4874.00	48.15	-17.99	74.00	25.85	150	0	Horizontal
5	7311.00	47.91	-9.74	74.00	26.09	150	18	Horizontal
6	7311.00	36.89	-9.74	54.00	17.11	150	68	Horizontal
7	17961.4	47.36	0.71	54.00	6.64	150	118	Horizontal

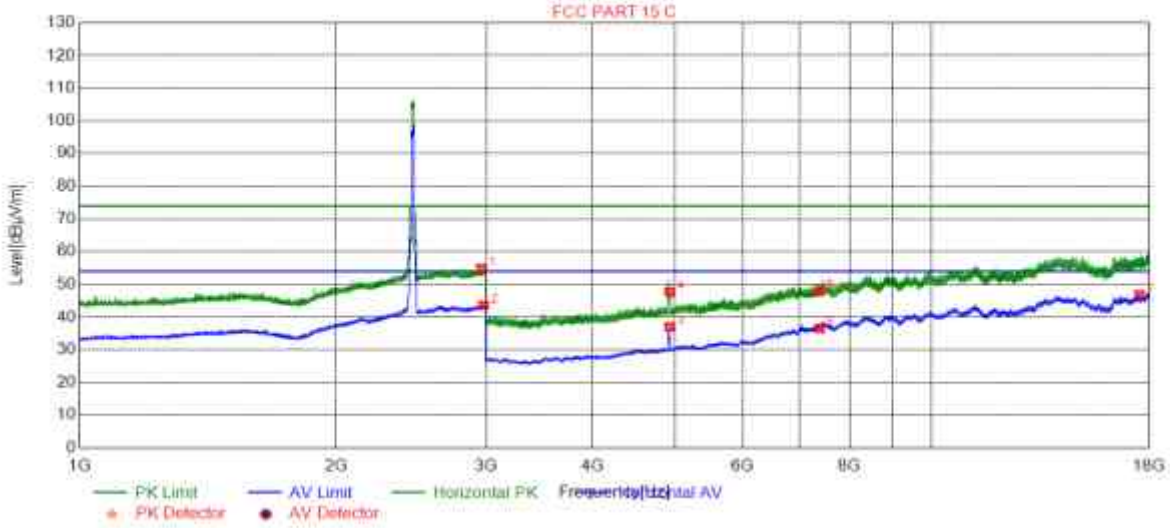
4.9.2.1.16 802.11N20_ Middle Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2965.49	44.04	9.61	54.00	9.96	150	278	Vertical
2	2972.49	55.02	9.58	74.00	18.98	150	183	Vertical
3	4874.00	30.08	-17.99	54.00	23.92	150	288	Vertical
4	4874.00	42.83	-17.99	74.00	31.17	150	180	Vertical
5	7311.00	46.86	-9.74	74.00	27.14	150	217	Vertical
6	7311.00	37.09	-9.74	54.00	16.91	150	267	Vertical
7	17975.7	47.25	0.71	54.00	6.75	150	267	Vertical

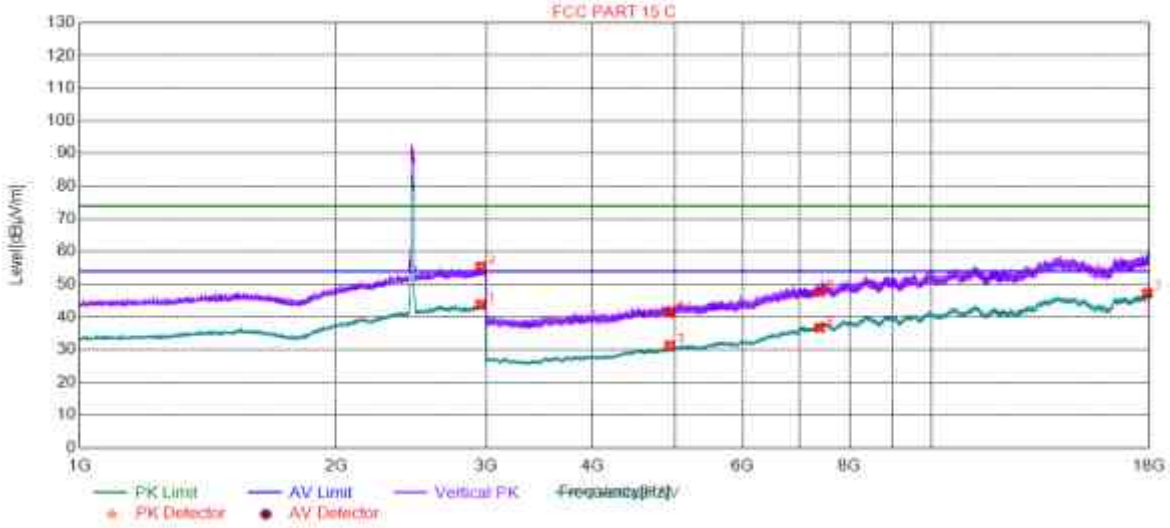
4.9.2.1.17 802.11N20_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2961.99	54.90	9.62	74.00	19.10	150	178	Horizontal
2	2978.49	43.62	9.55	54.00	10.38	150	219	Horizontal
3	4924.00	37.04	-17.72	54.00	16.96	150	234	Horizontal
4	4924.00	47.76	-17.72	74.00	26.24	150	315	Horizontal
5	7386.00	47.88	-9.55	74.00	26.12	150	359	Horizontal
6	7386.00	36.56	-9.55	54.00	17.44	150	316	Horizontal
7	17524.7	46.81	1.02	54.00	7.19	150	18	Horizontal

4.9.2.1.18 802.11N20_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2955.48	43.83	9.65	54.00	10.17	150	346	Vertical
2	2957.98	55.47	9.64	74.00	18.53	150	319	Vertical
3	4924.00	31.33	-17.72	54.00	22.67	150	179	Vertical
4	4924.00	41.48	-17.72	74.00	32.52	150	232	Vertical
5	7386.00	47.78	-9.55	74.00	26.22	150	167	Vertical
6	7386.00	36.83	-9.55	54.00	17.17	150	68	Vertical
7	17894.3	47.34	0.62	54.00	6.66	150	18	Vertical

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.

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:			

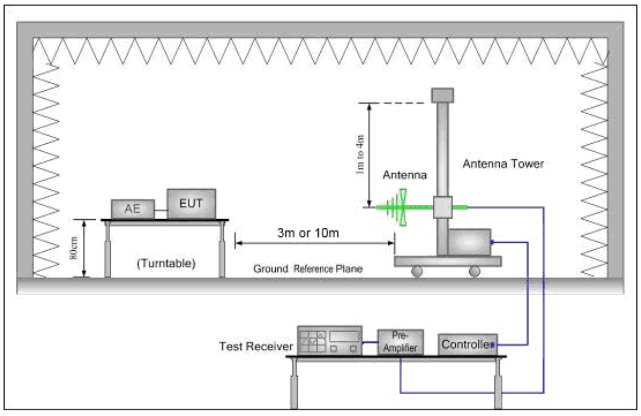


Figure 1. 30MHz to 1GHz

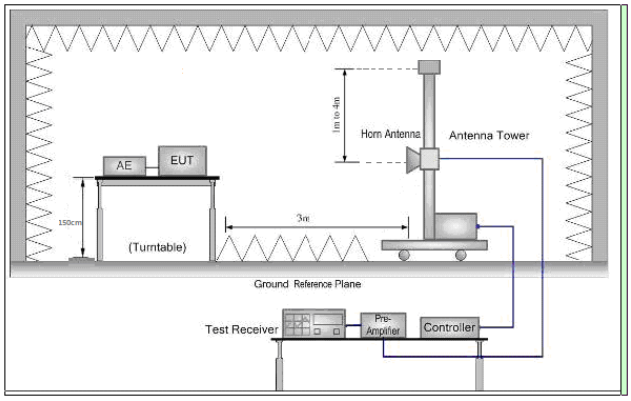


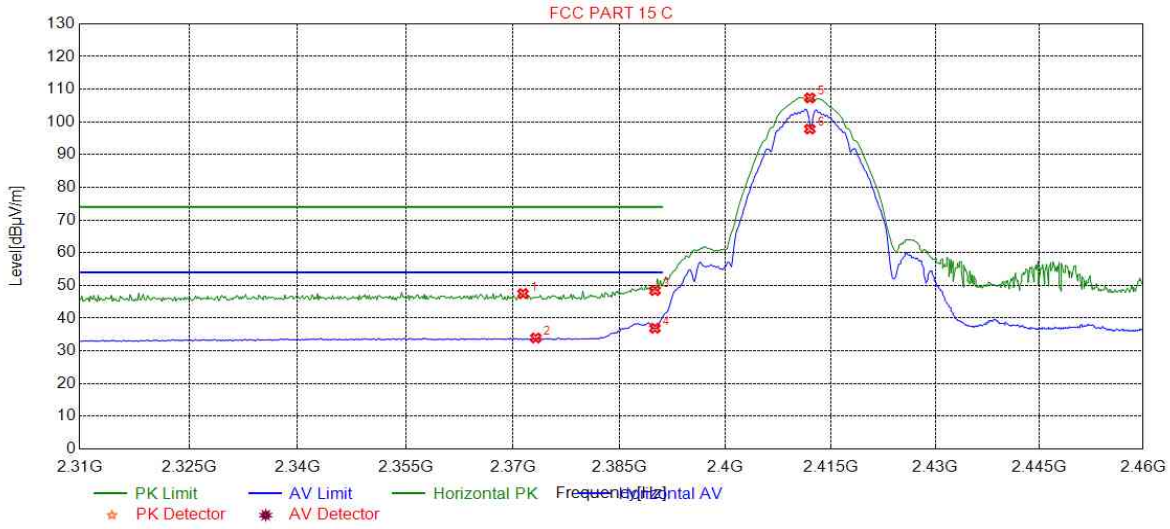
Figure 2. Above 1 GHz

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); Only the worst case is recorded in the report.
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Test plot as follows:

4.10.1 ANT1

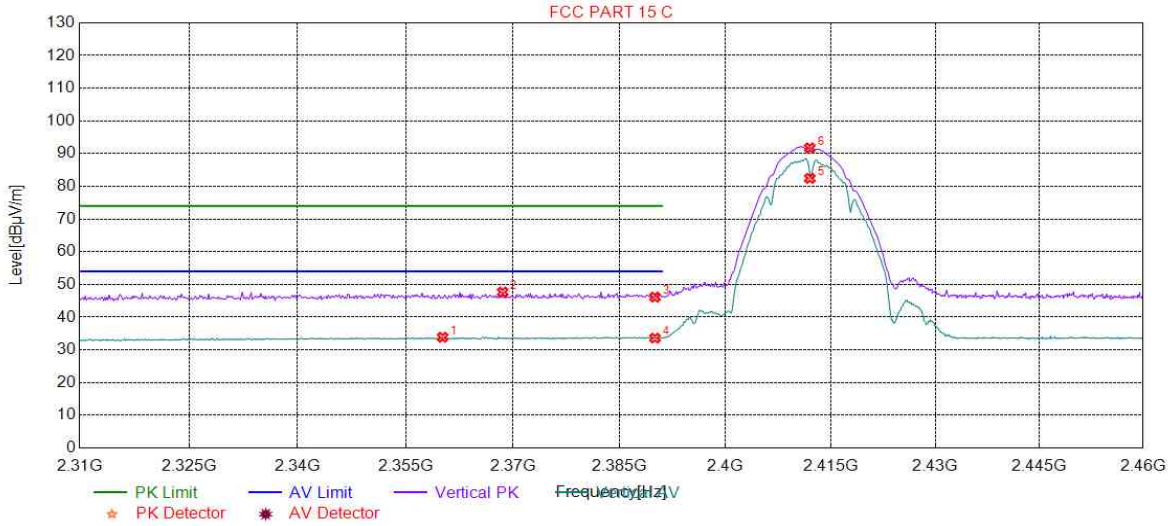
4.10.1.1 802.11B_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2371.41	47.53	7.79	74.00	26.47	150	260	Horizontal
2	2373.21	33.95	7.79	54.00	20.05	150	182	Horizontal
3	2390.00	48.47	7.77	74.00	25.53	150	137	Horizontal
4	2390.00	36.94	7.77	54.00	17.06	150	38	Horizontal
5	2412.00	107.34	7.81	0.00	-107.34	150	55	Horizontal
6	2412.00	97.83	7.81	0.00	-97.83	150	38	Horizontal

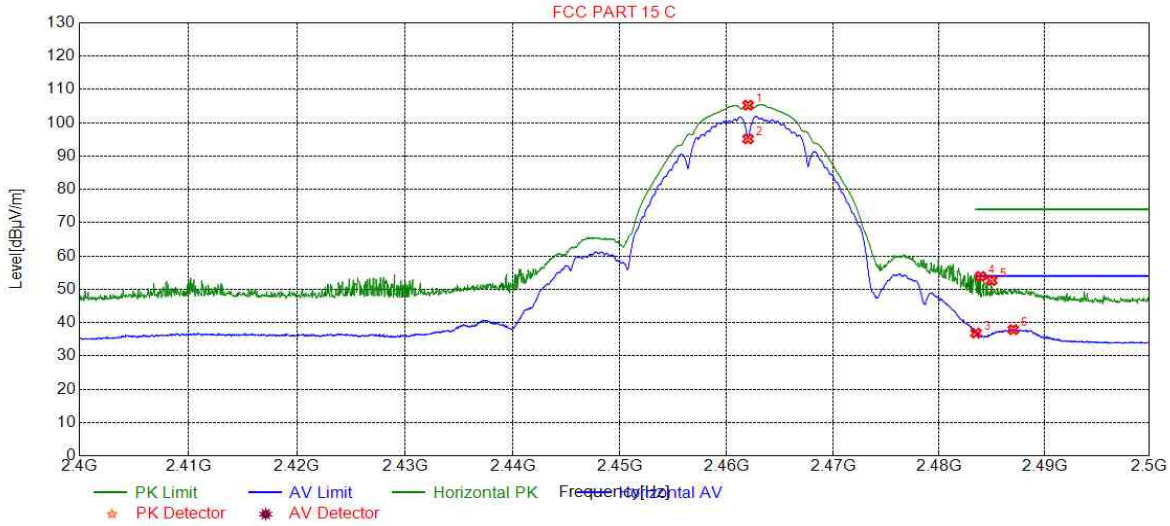
4.10.1.2 802.11B_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2360.15	33.86	7.80	54.00	20.14	150	346	Vertical
2	2368.55	47.68	7.79	74.00	26.32	150	249	Vertical
3	2390.00	46.14	7.77	74.00	27.86	150	273	Vertical
4	2390.00	33.60	7.77	54.00	20.40	150	233	Vertical
5	2412.00	82.45	7.81	0.00	-82.45	150	138	Vertical
6	2412.00	91.76	7.81	0.00	-91.76	150	134	Vertical

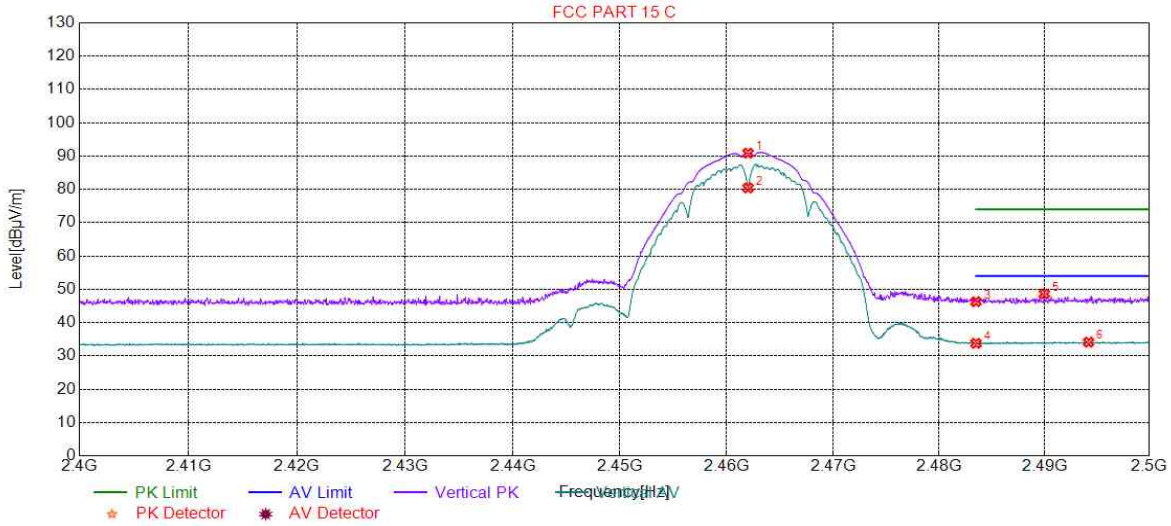
4.10.1.3 802.11B_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	105.29	7.98	0.00	-105.29	150	57	Horizontal
2	2462.00	95.15	7.98	0.00	-95.15	150	52	Horizontal
3	2483.50	36.87	8.01	54.00	17.13	150	57	Horizontal
4	2483.94	53.91	8.01	74.00	20.09	150	52	Horizontal
5	2484.99	52.69	8.01	74.00	21.31	150	57	Horizontal
6	2487.04	37.92	8.01	54.00	16.08	150	63	Horizontal

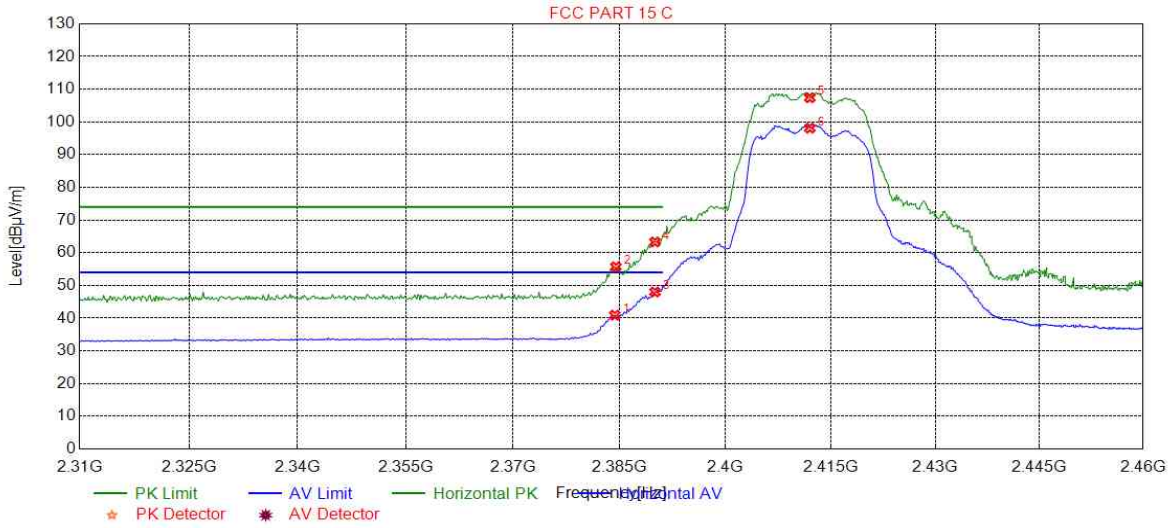
4.10.1.4 802.11B_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	90.88	7.98	0.00	-90.88	150	159	Vertical
2	2462.00	80.44	7.98	0.00	-80.44	150	159	Vertical
3	2483.50	46.30	8.01	74.00	27.70	150	325	Vertical
4	2483.50	33.80	8.01	54.00	20.20	150	198	Vertical
5	2489.99	48.66	8.02	74.00	25.34	150	33	Vertical
6	2494.19	34.15	8.02	54.00	19.85	150	39	Vertical

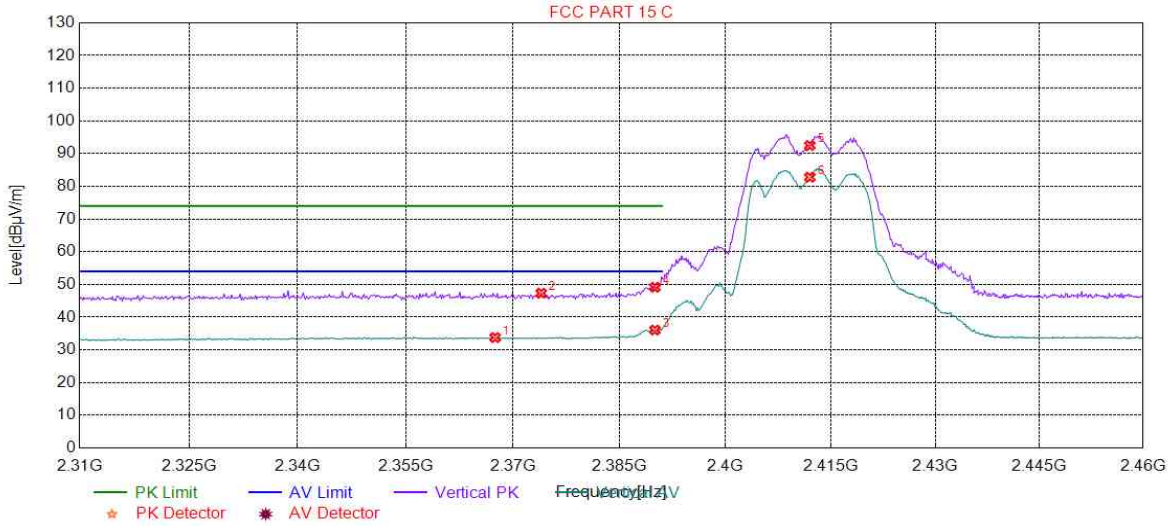
4.10.1.5 802.11G_Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2384.32	40.92	7.78	54.00	13.08	150	54	Horizontal
2	2384.47	55.70	7.78	74.00	18.30	150	54	Horizontal
3	2390.00	48.01	7.77	54.00	5.99	150	306	Horizontal
4	2390.00	63.30	7.77	74.00	10.70	150	306	Horizontal
5	2412.00	107.41	7.81	0.00	-107.41	150	54	Horizontal
6	2412.00	98.11	7.81	0.00	-98.11	150	54	Horizontal

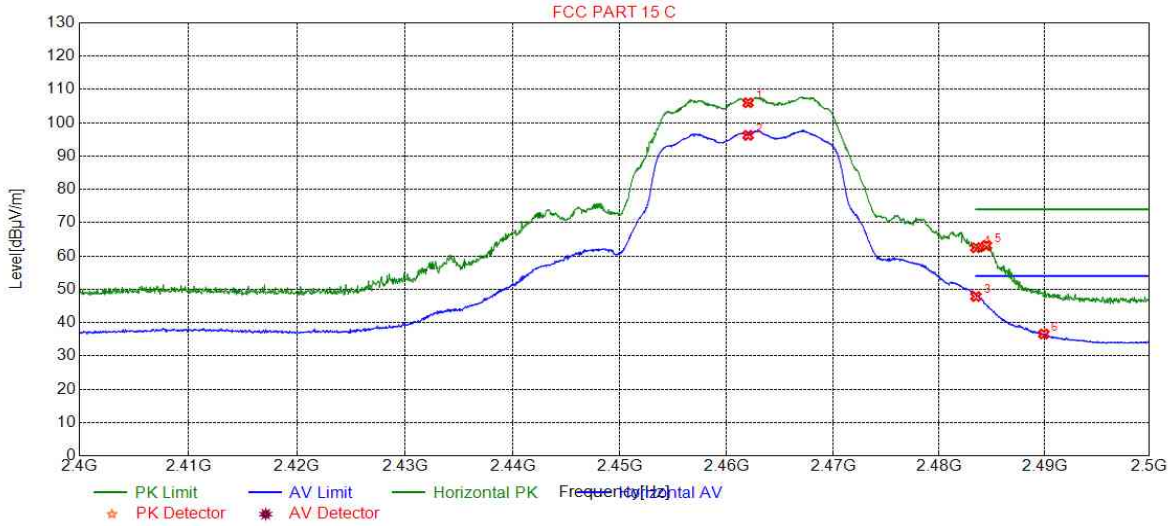
4.10.1.6 802.11G_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2367.50	33.77	7.79	54.00	20.23	150	282	Vertical
2	2373.96	47.35	7.79	74.00	26.65	150	179	Vertical
3	2390.00	36.07	7.77	54.00	17.93	150	11	Vertical
4	2390.00	49.15	7.77	74.00	24.85	150	6	Vertical
5	2412.00	92.50	7.81	0.00	-92.50	150	175	Vertical
6	2412.00	82.81	7.81	0.00	-82.81	150	171	Vertical

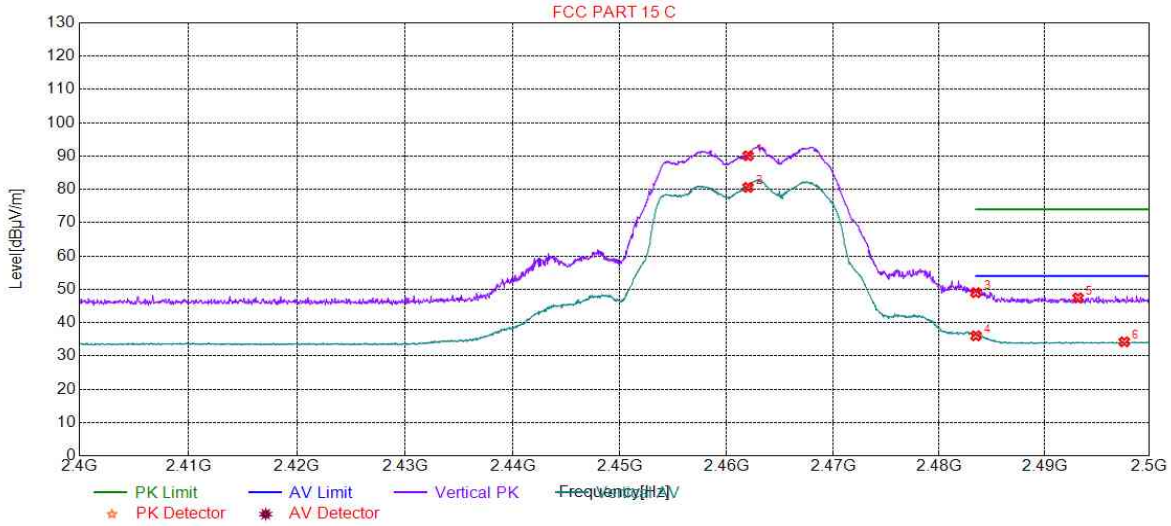
4.10.1.7 802.11G_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	106.01	7.98	0.00	-106.01	150	61	Horizontal
2	2462.00	96.22	7.98	0.00	-96.22	150	55	Horizontal
3	2483.50	47.86	8.01	54.00	6.14	150	61	Horizontal
4	2483.50	62.50	8.01	74.00	11.50	150	55	Horizontal
5	2484.49	63.14	8.01	74.00	10.86	150	61	Horizontal
6	2489.94	36.60	8.02	54.00	17.40	150	66	Horizontal

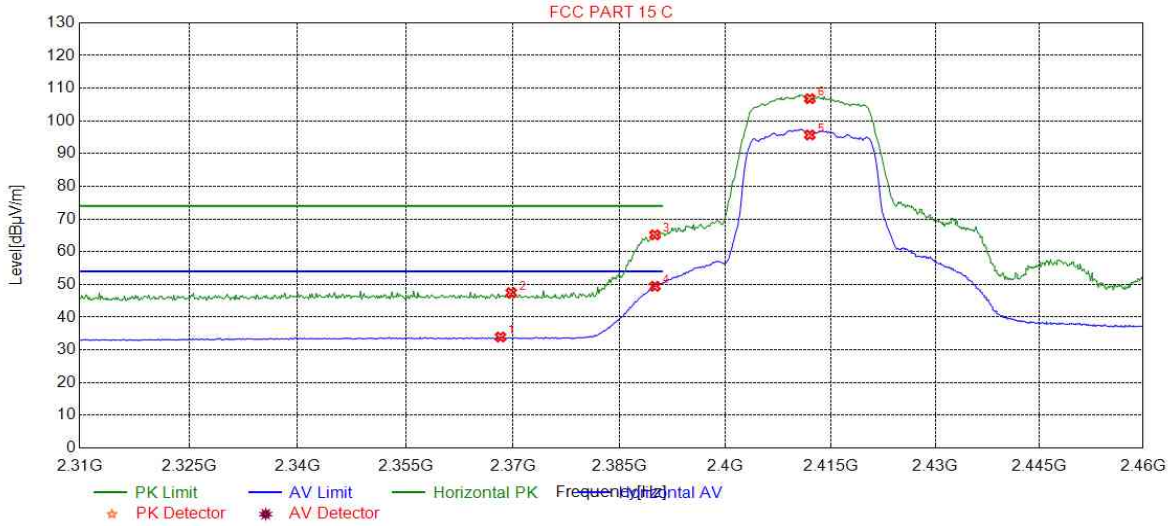
4.10.1.8 802.11G_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	90.10	7.98	0.00	-90.10	150	238	Vertical
2	2462.00	80.61	7.98	0.00	-80.61	150	238	Vertical
3	2483.50	49.01	8.01	74.00	24.99	150	144	Vertical
4	2483.50	36.06	8.01	54.00	17.94	150	6	Vertical
5	2493.19	47.45	8.02	74.00	26.55	150	264	Vertical
6	2497.59	34.24	8.03	54.00	19.76	150	232	Vertical

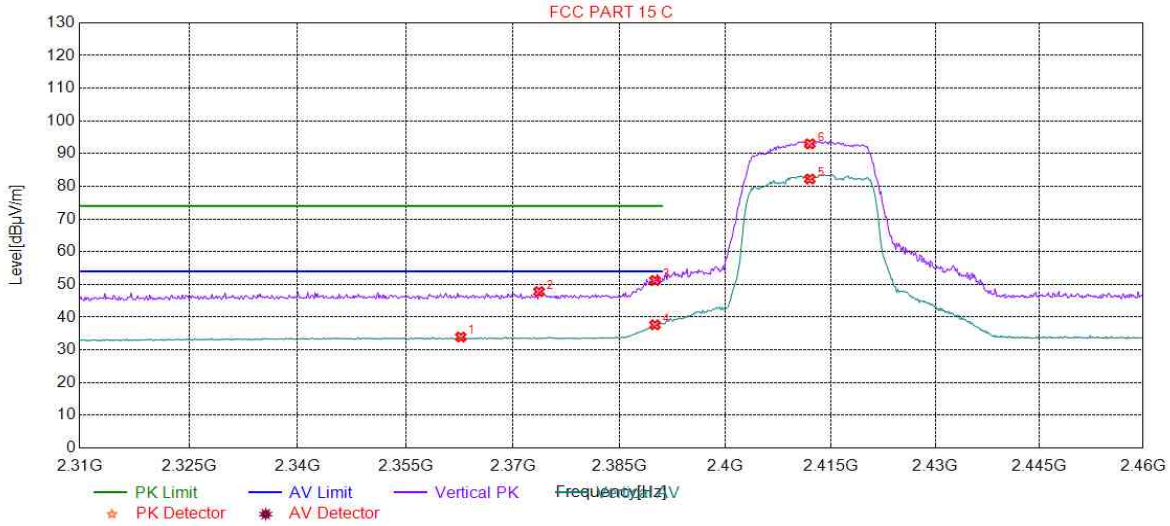
4.10.1.9 802.11N20_ Lowest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2368.25	33.95	7.79	54.00	20.05	150	97	Horizontal
2	2369.75	47.49	7.79	74.00	26.51	150	240	Horizontal
3	2390.00	65.17	7.77	74.00	8.83	150	31	Horizontal
4	2390.00	49.44	7.77	54.00	4.56	150	55	Horizontal
5	2412.00	95.72	7.81	0.00	-95.72	150	51	Horizontal
6	2412.00	106.81	7.81	0.00	-106.81	150	51	Horizontal

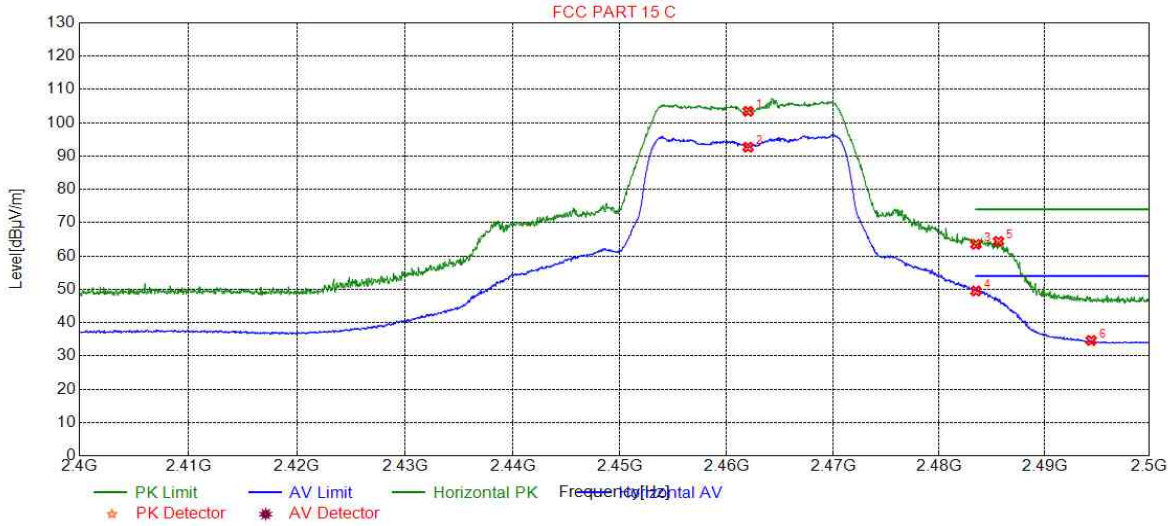
4.10.1.10 802.11N20_Lowest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2362.70	33.94	7.80	54.00	20.06	150	14	Vertical
2	2373.66	47.82	7.79	74.00	26.18	150	282	Vertical
3	2390.00	51.22	7.77	74.00	22.78	150	262	Vertical
4	2390.00	37.66	7.77	54.00	16.34	150	258	Vertical
5	2412.00	82.26	7.81	0.00	-82.26	150	163	Vertical
6	2412.00	93.00	7.81	0.00	-93.00	150	167	Vertical

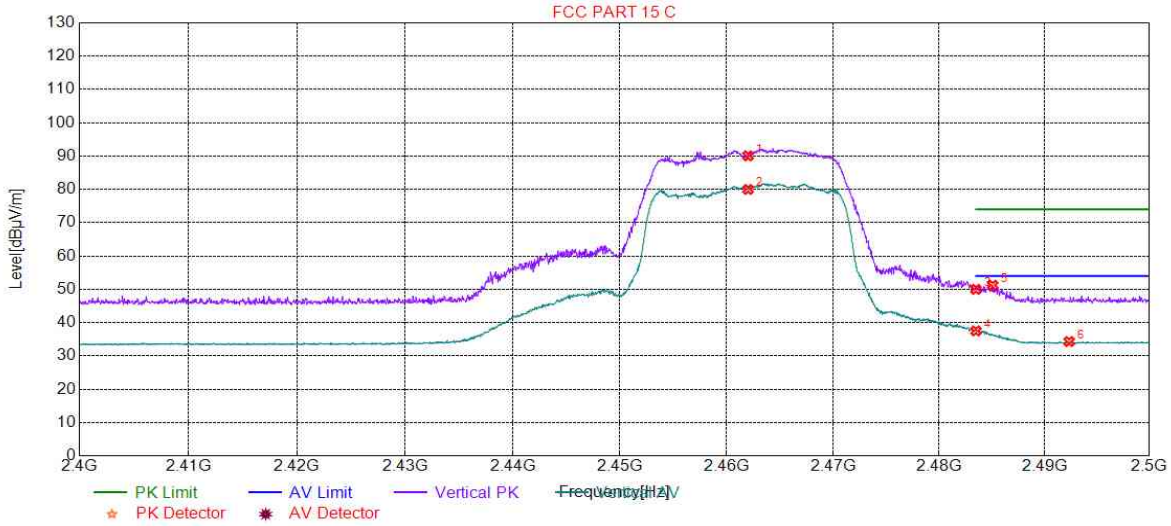
4.10.1.11 802.11N20_ Highest Channel_ Horizontal



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	103.44	7.98	0.00	-103.44	150	68	Horizontal
2	2462.00	92.67	7.98	0.00	-92.67	150	98	Horizontal
3	2483.50	63.50	8.01	74.00	10.50	150	62	Horizontal
4	2483.50	49.51	8.01	54.00	4.49	150	57	Horizontal
5	2485.64	64.41	8.01	74.00	9.59	150	68	Horizontal
6	2494.44	34.66	8.02	54.00	19.34	150	52	Horizontal

4.10.1.12 802.11N20_ Highest Channel_ Vertical



Suspected List

Suspected List								
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.00	90.07	7.98	0.00	-90.07	150	84	Vertical
2	2462.00	79.99	7.98	0.00	-79.99	150	84	Vertical
3	2483.50	49.99	8.01	74.00	24.01	150	150	Vertical
4	2483.50	37.52	8.01	54.00	16.48	150	150	Vertical
5	2485.09	51.25	8.01	74.00	22.75	150	144	Vertical
6	2492.34	34.35	8.02	54.00	19.65	150	249	Vertical

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)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Radiated Spurious emission test	±4.5dB (30MHz-1GHz)
		±4.8dB (1GHz-25GHz)
5	Conduct emission test	±3.12 dB (9KHz- 30MHz)
6	Temperature test	±1°C
7	Humidity test	±3%
8	DC and low frequency voltages	±0.5%

6 Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2020/5/10	2023/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019/7/14	2020/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	20120/4/1	2021/3/31
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019/7/12	2020/7/11
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2020/2/11	2021/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2020/3/2	2021/3/1

RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Duedate (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	2020/1/3	2021/1/2
Coaxial Cable	SGS	N/A	SEM031-01	2019/7/12	2020/7/11
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
Power Divider	Anritsu	K240B	996304	N/A	N/A

RE in Chamber					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2018/3/13	2021/3/12
Measurement Software	AUDIX	e3V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM026-01	2019/7/12	2020/7/11
EXA Signal Analyzer (10Hz-26.5GHz)	Agilent Technologies Inc	N9010A	SEM004-09	2020/3/12	2021/3/11
BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-01	2019/5/24	2022/5/23
Horn Antenna (0.8-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2018/4/13	2021/4/12
Pre-amplifier(0.1-1.3GHz)	HP	8447D	SEM005-02	2019/7/14	2020/7/14
Low Noise Amplifier(100MHz-18GHz)	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2019/9/3	2020/9/2
Horn Antenna (15-40GHz)	Schwarzbeck	BBHA 9170	SEM003-15	2017/10/17	2020/10/16
Pre-amplifier(18-26GHz)	Rohde & Schwarz	CH14-H052	SEM005-17	2020/3/2	2021/3/1
Band filter	N/A	N/A	SEM023-01	N/A	N/A
RE in Chamber					
Test Equipment	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. date (yyyy-mm-dd)**	**Cal.Due date (yyyy-mm-dd)**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2017/8/5	2020/8/4
Measurement Software	AUDIX	e3 V8.2014-6-27	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM025-01	2019/7/12	2020/7/11
MXE EMI Receiver (20Hz-8.4GHz)	Agilent Technologies	N9038A	SEM004-05	2019/7/14	2020/7/14
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2019/5/24	2022/5/23
Pre-amplifier (0.1-1.3GHz)	Agilent Technologies	8447D	SEM005-01	2020/3/2	2021/3/1

7 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of Set-Up for ZR/2020/50038.

The End

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