

7.9 Radiated Emission which fall in the restricted bands

Test Requirement:	47 CFR Part 15C Section 15.209 and Part 15E Section 15.407 (b)				
Test Method:	ANSI C63.10 2013				
Test Site:	Measurement Distance: 3m (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	10kHz	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
<p>*(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 e.i.r.p. of -27 dBm/MHz.</p> <p>(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 e.i.r.p. of -27 dBm/MHz.</p> <p>(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 e.i.r.p. of -27 dBm/MHz.</p> <p>(4) For transmitters operating in the 5.725-5.85 GHz band:</p> <p>(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</p> <p>Remark: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90kHz, 110-490kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector, 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.</p> <p>Note:</p> <p>(i) $EIRP = ((E*d)^2) / 30$</p>					

	<p>where:</p> <ul style="list-style-type: none">• E is the field strength in V/m;• d is the measurement distance in meters;• EIRP is the equivalent isotropically radiated power in watts. <p>(ii) Working in dB units, the above equation is equivalent to: $EIRP[dBm] = E[dB\mu V/m] + 20 \log(d[meters]) - 104.77$</p> <p>(iii) Or, if d is 3 meters: $EIRP[dBm] = E[dB\mu V/m] - 95.2$</p>
Test Setup:	

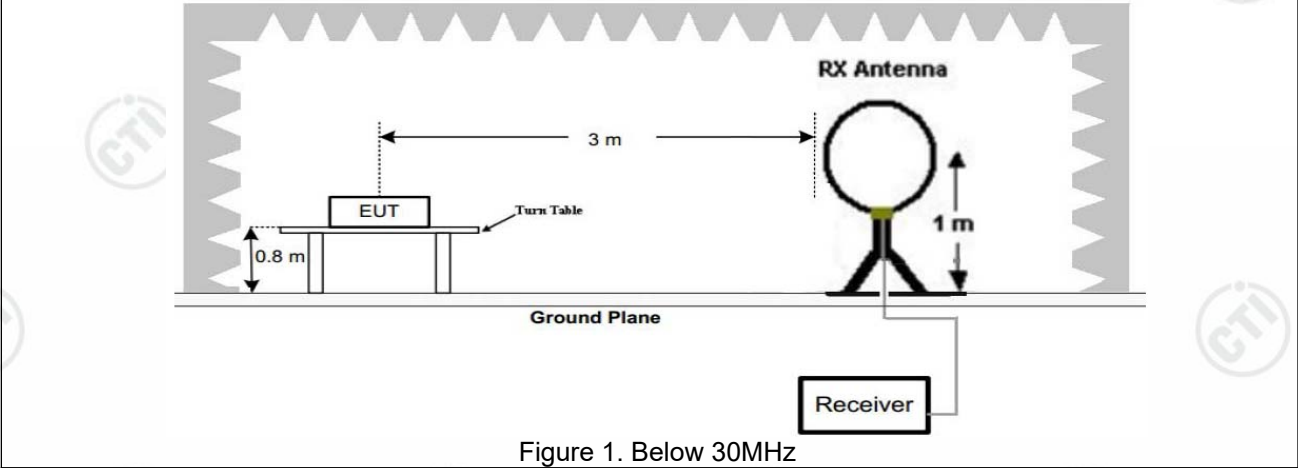


Figure 1. Below 30MHz

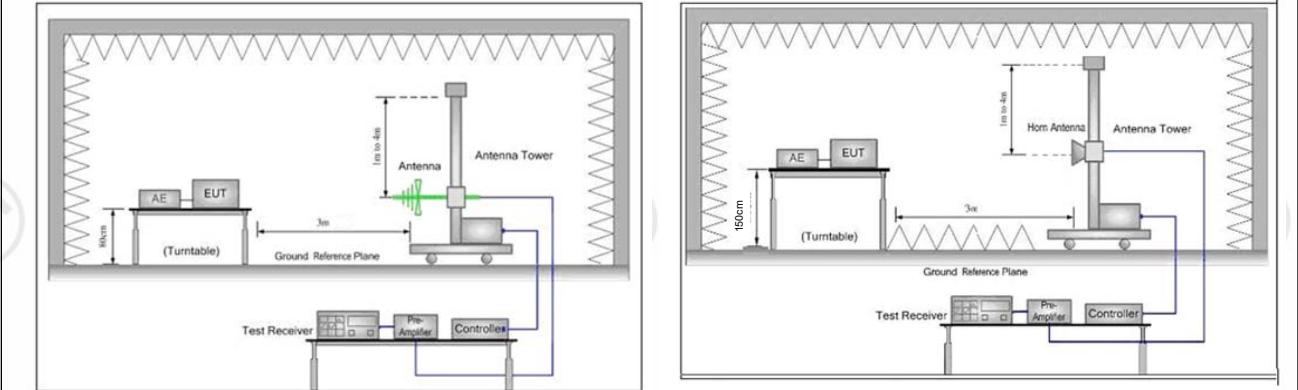


Figure 2. 30MHz to 1GHz

Figure 3. Above 1 GHz

Test Procedure:	<p>j. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 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.</p> <p>2) Above 1G: 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.</p> <p>Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from</p>
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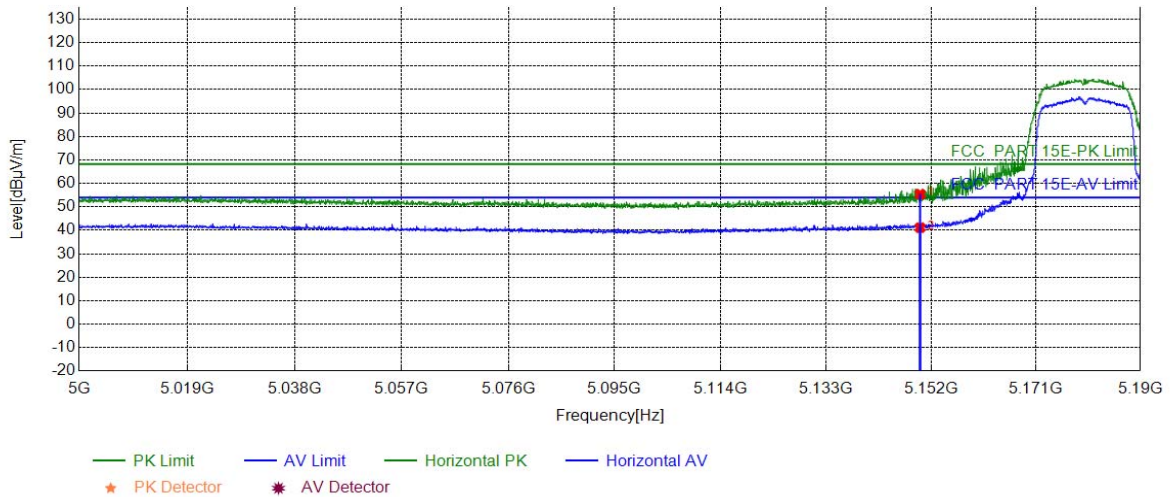
	<p>1 m to 4 m above the ground or reference ground plane.</p> <p>k. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>l. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>m. 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.</p> <p>n. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>o. 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.</p> <p>p. Test the EUT in the lowest channel, the Highest channel</p> <p>q. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is the worst case.</p> <p>r. Repeat above procedures until all frequencies measured was complete.</p>
Test Mode:	Transmitting mode with modulation
Test Results:	Pass

Remark: During the test, the Radiates Emission from 1GHz to 40GHz was performed in all modes,
for 20MHz Occupied Bandwidth, 802.11 n(HT20) mode was the worst case;
for 40MHz Occupied Bandwidth, 802.11 n(HT40) mode was the worst case;
for 80MHz Occupied Bandwidth, 802.11 ac(VHT80) mode was the worst case;
only the worst case was in the report.

Test Data:

Mode:	802.11 a Transmitting	Channel:	5180MHz
Remark:			

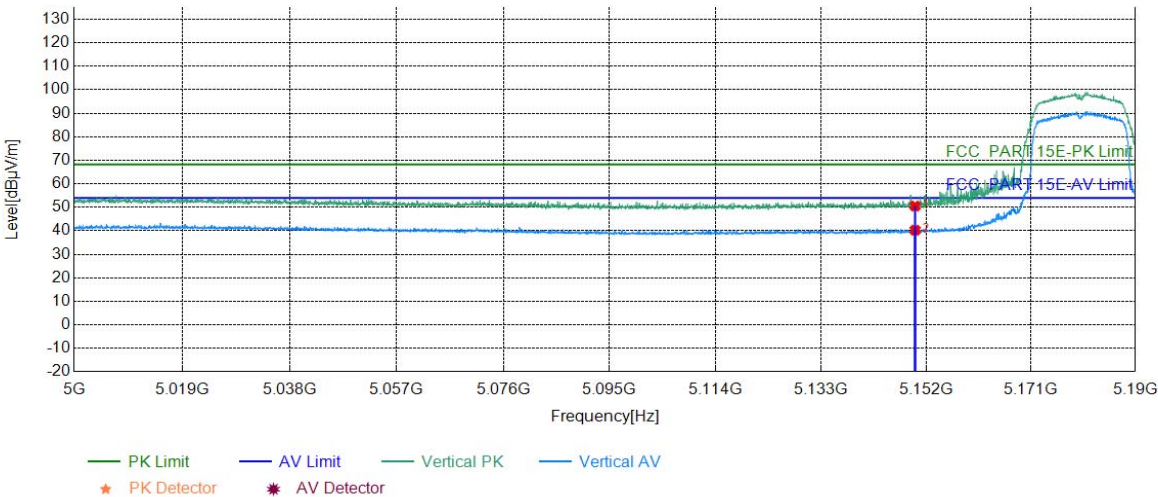
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	43.06	55.42	68.20	12.78	PASS	Horizontal	PK
2	5150.0000	12.36	28.79	41.15	54.00	12.85	PASS	Horizontal	AV

Mode:	802.11 a Transmitting	Channel:	5180MHz
Remark:			

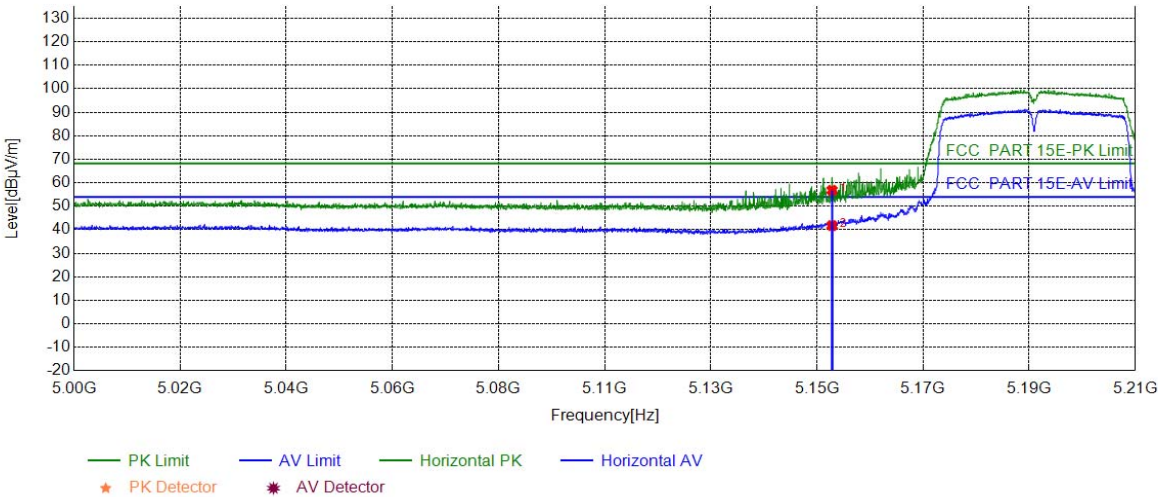
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	38.17	50.53	68.20	17.67	PASS	Vertical	PK
2	5150.0000	12.36	27.89	40.25	54.00	13.75	PASS	Vertical	AV

Mode:	802.11 n(HT40) Transmitting	Channel:	5190MHz
Remark:			

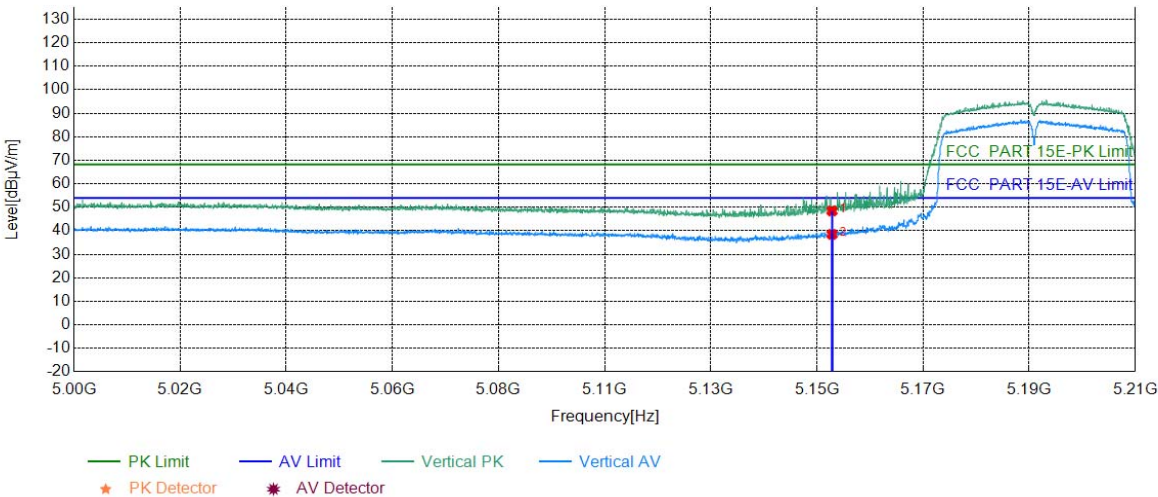
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	44.44	56.80	68.20	11.40	PASS	Horizontal	PK
2	5150.0000	12.36	29.44	41.80	54.00	12.20	PASS	Horizontal	AV

Mode:	802.11 n(HT40) Transmitting	Channel:	5190MHz
Remark:			

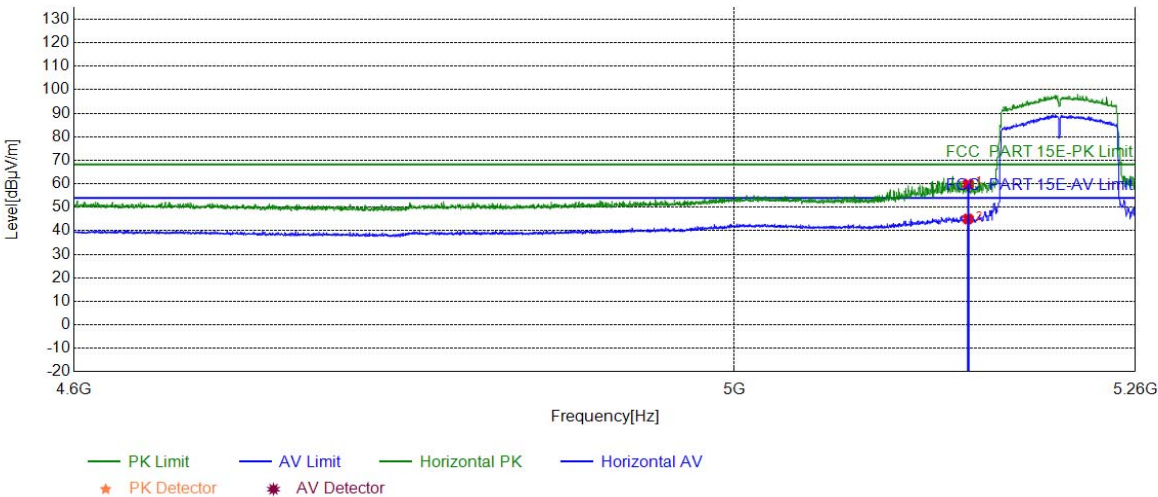
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	36.09	48.45	68.20	19.75	PASS	Vertical	PK
2	5150.0000	12.36	26.14	38.50	54.00	15.50	PASS	Vertical	AV

Mode:	802.11 ac(VHT80) Transmitting	Channel:	5210MHz
Remark:			

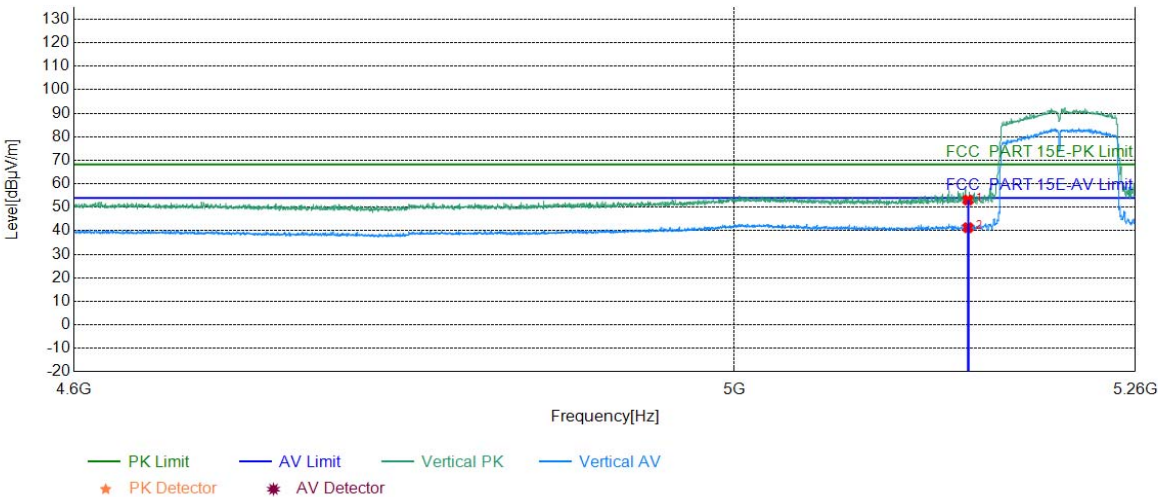
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	47.53	59.89	68.20	8.31	PASS	Horizontal	PK
2	5150.0000	12.36	32.68	45.04	54.00	8.96	PASS	Horizontal	AV

Mode:	802.11 ac(VHT80) Transmitting	Channel:	5210MHz
Remark:			

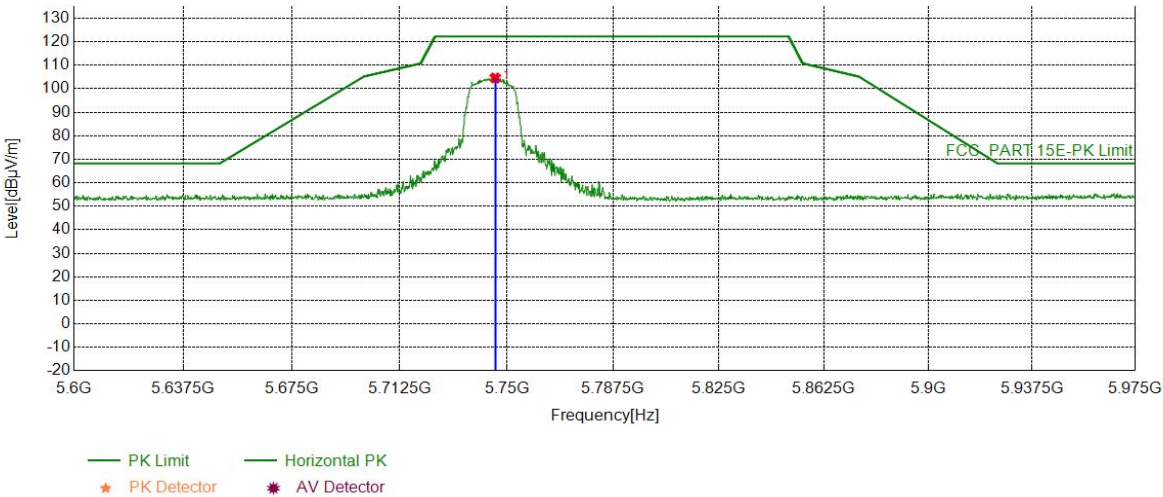
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5150.0000	12.36	40.74	53.10	68.20	15.10	PASS	Vertical	PK
2	5150.0000	12.36	28.97	41.33	54.00	12.67	PASS	Vertical	AV

Mode:	802.11 a Transmitting	Channel:	5745MHz
Remark:			

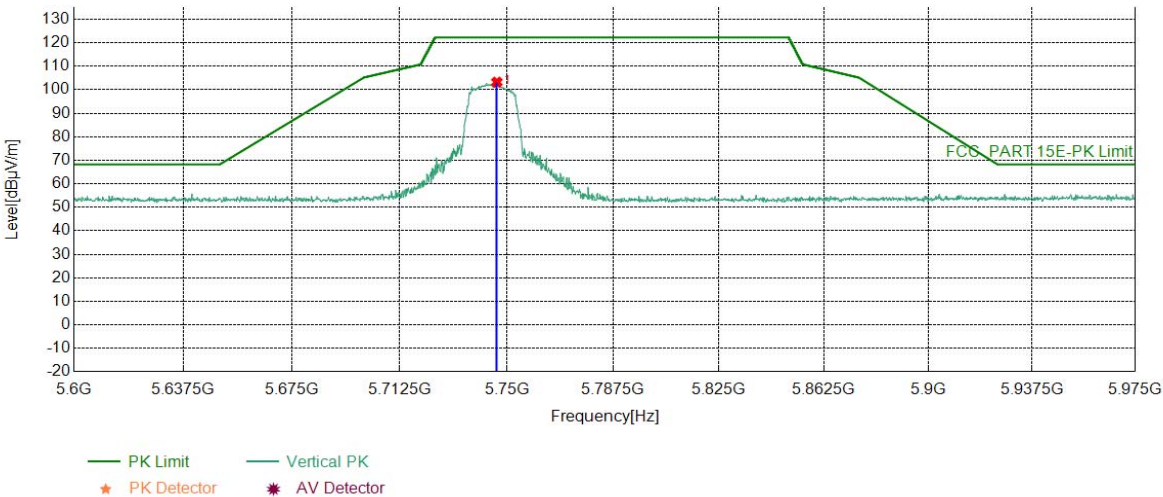
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5745.9480	13.85	90.74	104.59	122.20	17.61	PASS	Horizontal	PK

Mode:	802.11 a Transmitting	Channel:	5745MHz
Remark:			

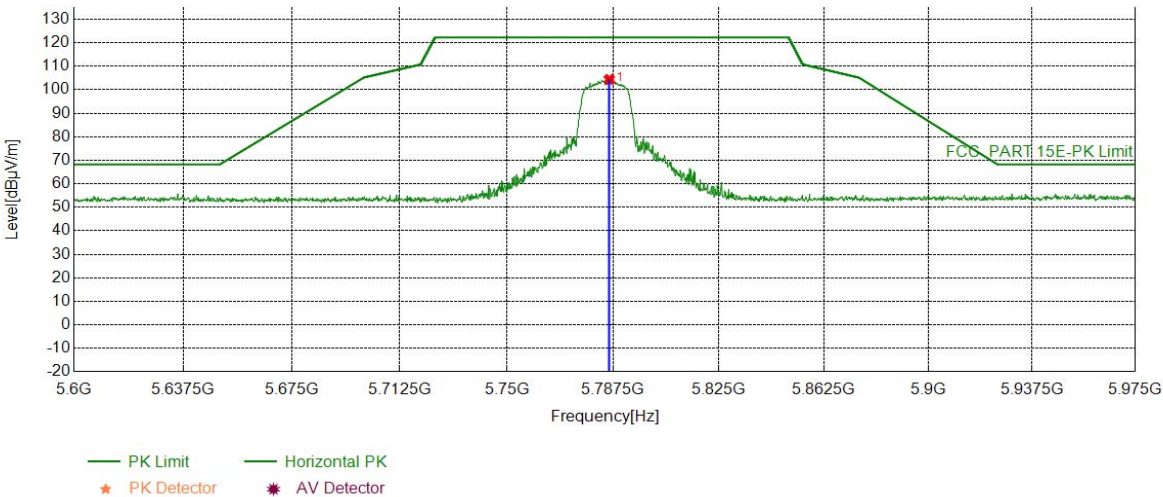
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5746.5108	13.85	89.39	103.24	122.20	18.96	PASS	Vertical	PK

Mode:	802.11 a Transmitting	Channel:	5785MHz
Remark:			

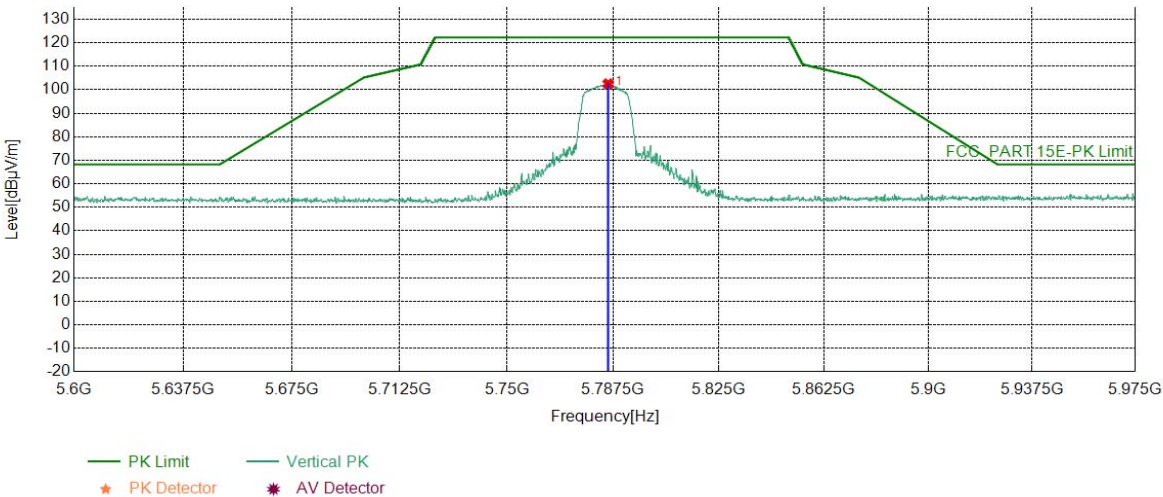
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5786.0930	13.92	90.47	104.39	122.20	17.81	PASS	Horizontal	PK

Mode:	802.11 a Transmitting	Channel:	5785MHz
Remark:			

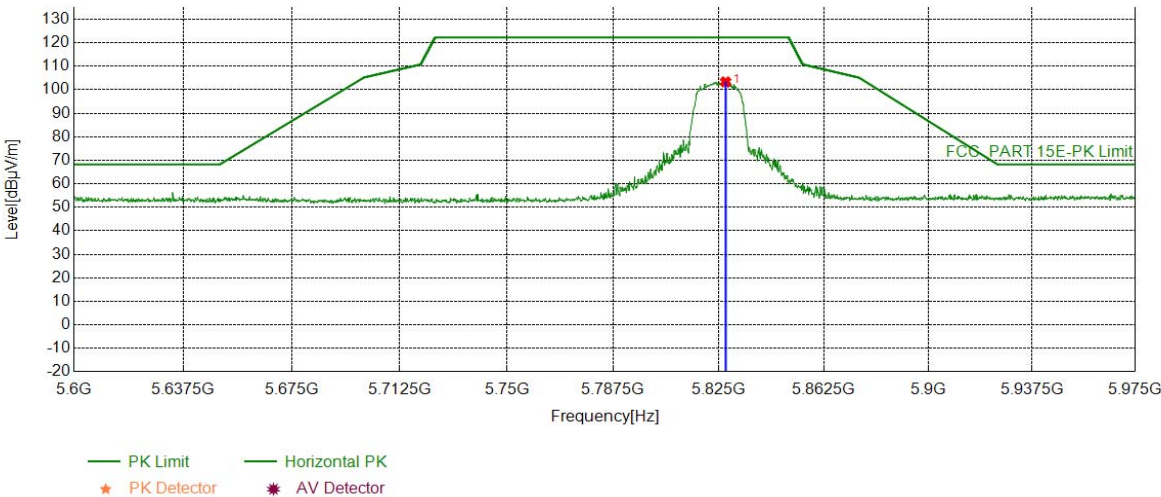
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5785.7179	13.92	88.60	102.52	122.20	19.68	PASS	Vertical	PK

Mode:	802.11 a Transmitting	Channel:	5825MHz
Remark:			

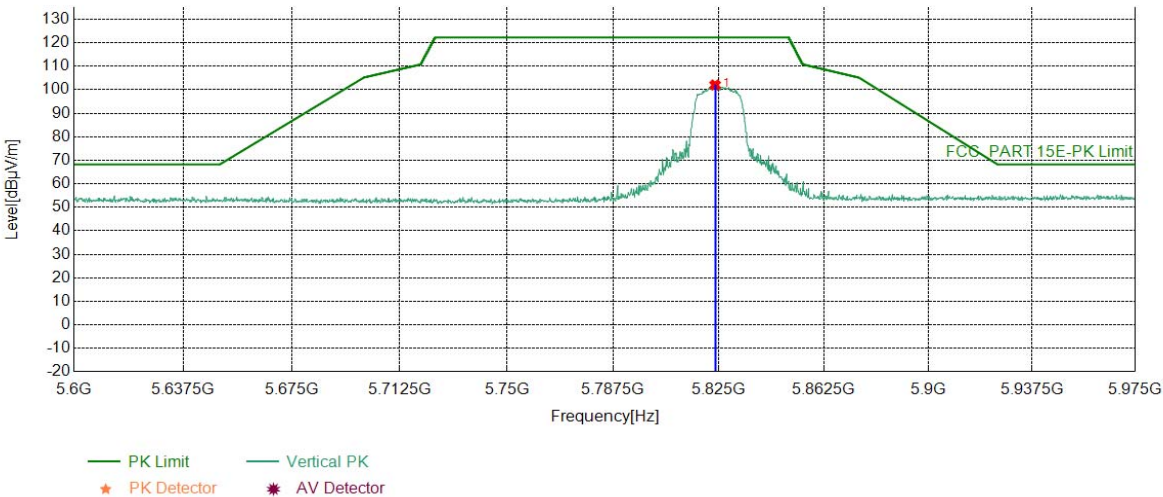
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5827.3637	14.04	89.31	103.35	122.20	18.85	PASS	Horizontal	PK

Mode:	802.11 a Transmitting	Channel:	5825MHz
Remark:			

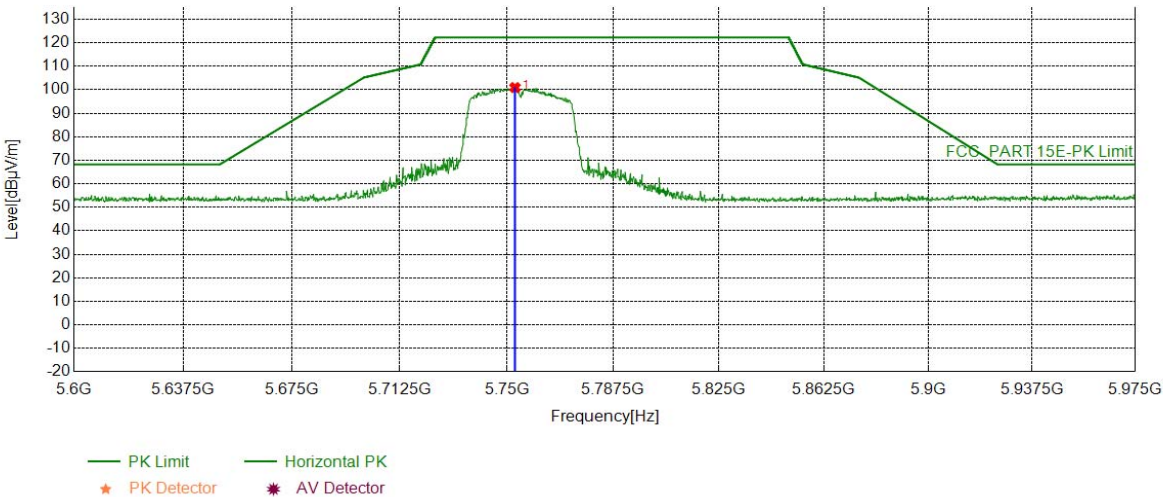
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5823.6118	14.03	88.01	102.04	122.20	20.16	PASS	Vertical	PK

Mode:	802.11 n(HT40) Transmitting	Channel:	5755MHz
Remark:			

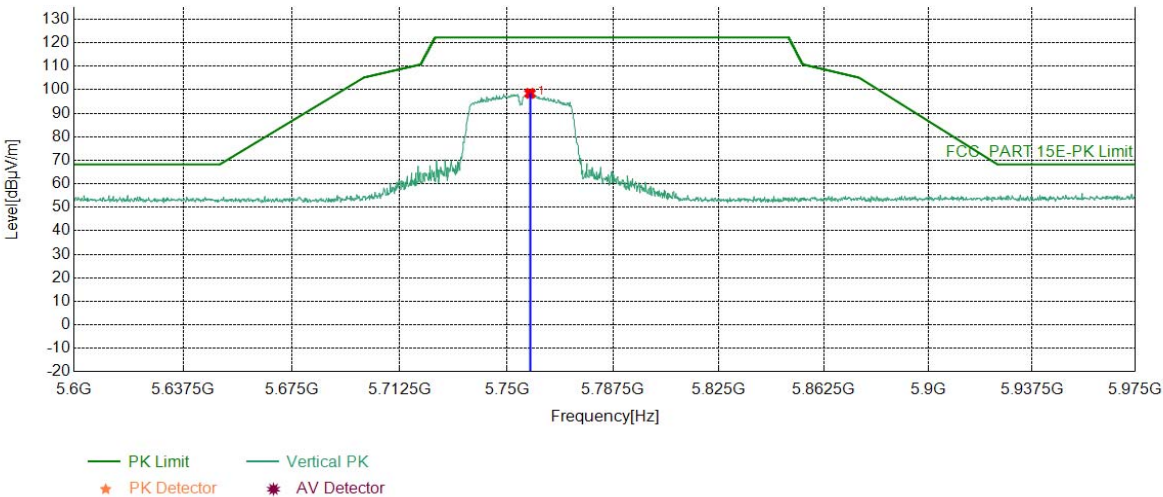
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5752.88	13.86	87.07	100.93	122.20	21.27	PASS	Horizontal	PK

Mode:	802.11 n(HT40) Transmitting	Channel:	5755MHz
Remark:			

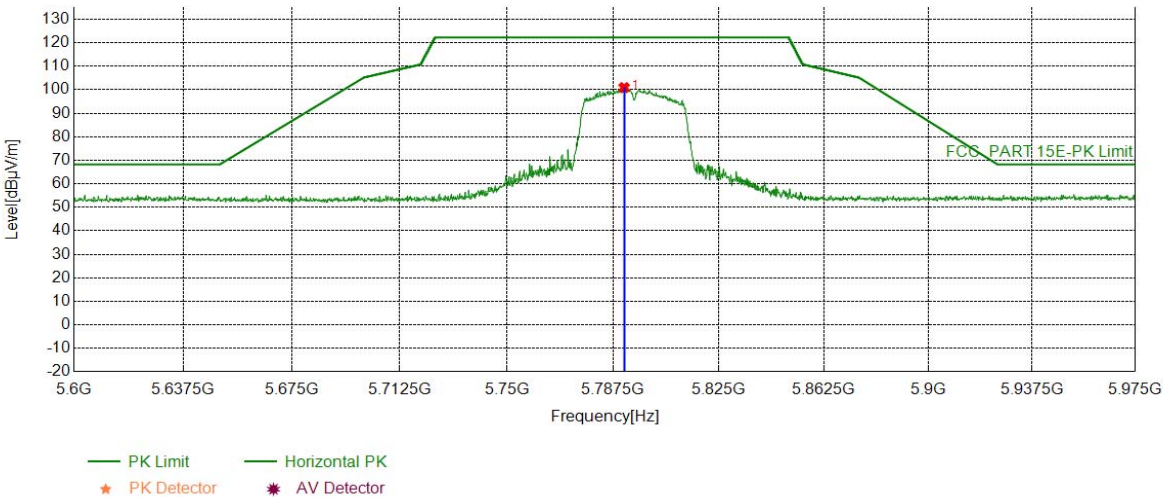
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5758.1416	13.87	84.60	98.47	122.20	23.73	PASS	Vertical	PK

Mode:	802.11 n(HT40) Transmitting	Channel:	5795MHz
Remark:			

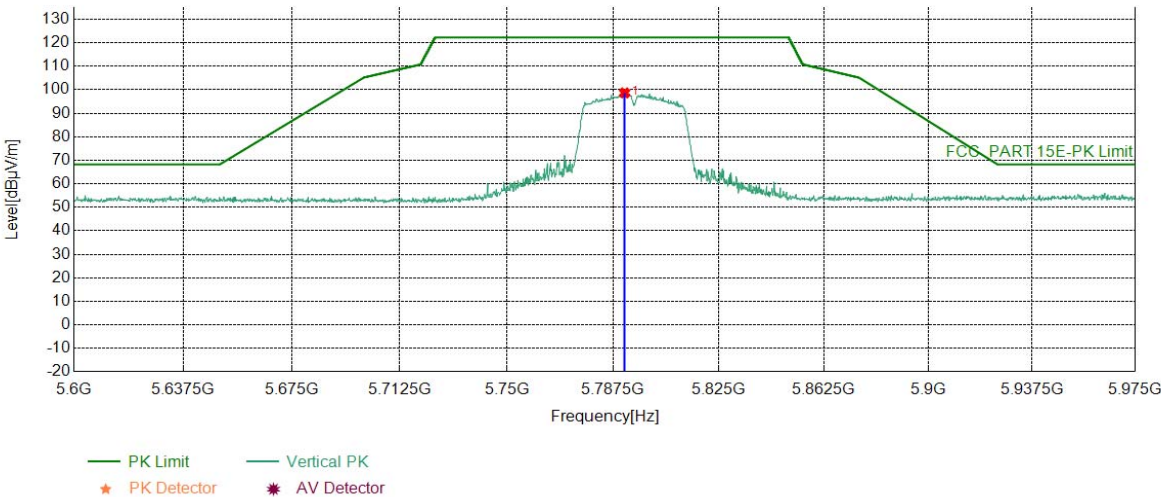
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5791.3457	13.93	87.00	100.93	122.20	21.27	PASS	Horizontal	PK

Mode:	802.11 n(HT40) Transmitting	Channel:	5795MHz
Remark:			

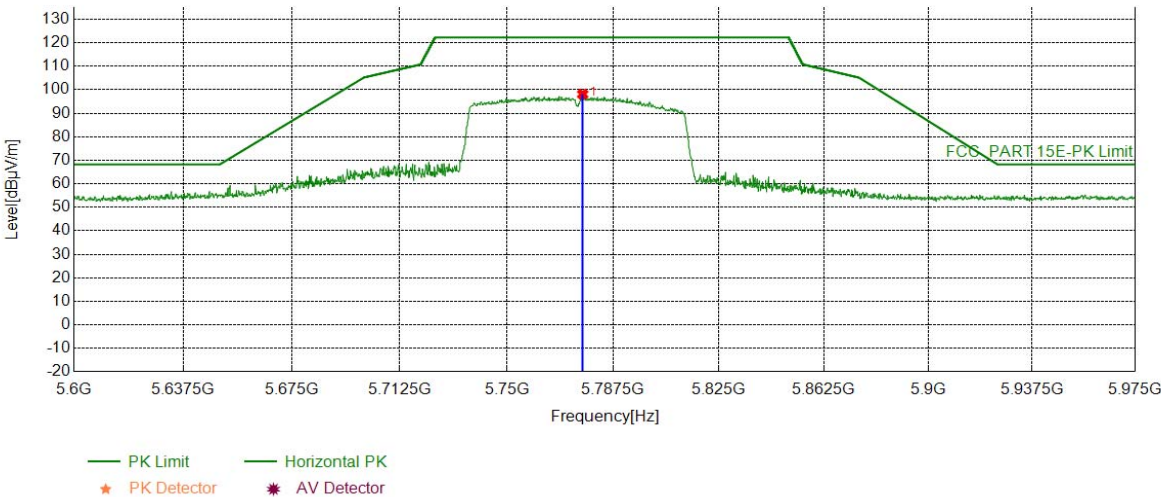
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5791.5333	13.93	84.74	98.67	122.20	23.53	PASS	Vertical	PK

Mode:	802.11 ac(VHT80) Transmitting	Channel:	5775MHz
Remark:			

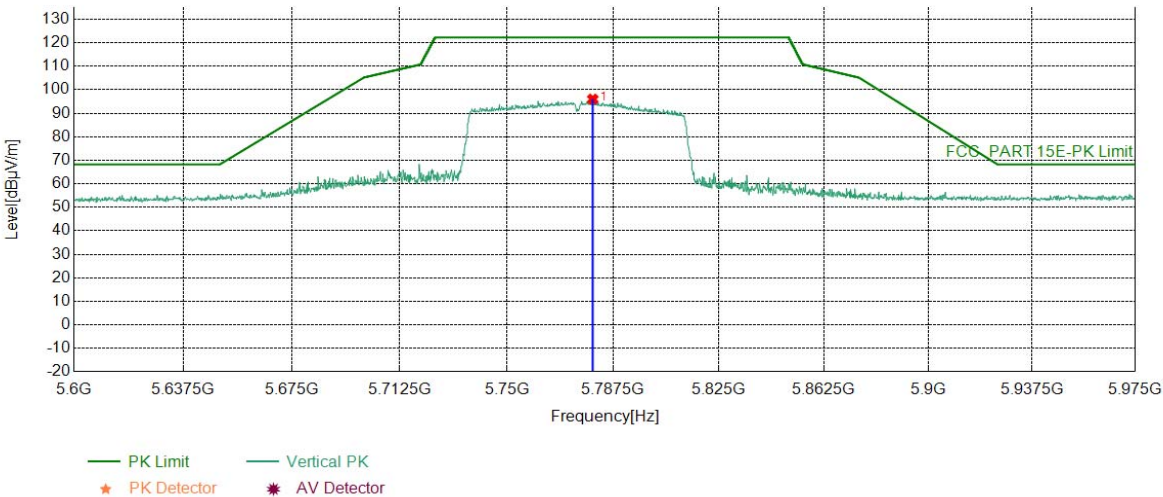
Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5776.7134	13.90	84.22	98.12	122.20	24.08	PASS	Horizontal	PK

Mode:	802.11 ac(VHT80) Transmitting	Channel:	5775MHz
Remark:			

Test Graph



Suspected List									
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	5780.2776	13.91	82.10	96.01	122.20	26.19	PASS	Vertical	PK

Note:

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 - Correct Factor
Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

2) Scan from 1GHz to 25GHz, the disturbance above 13GHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

8 Appendix A

Refer to Appendix: 5G WIFI of EED32N80998104.