



(Channel 159, 5795MHz, 802.11n (HT40))



**802.11ac (VHT20) Mode**

**A. Test Verdict:**

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Duty Factor	Corrected PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	6.55	0.15	6.70	11	PASS
44	5220	5.37		5.52		
48	5240	4.85		5.00		
52	5260	4.25		4.40		
60	5300	3.87		4.02		
64	5320	3.71		3.86		
100	5500	2.84		2.99		
120	5600	4.58		4.73		
144	5720	7.91		8.06		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
144	5720	5.16	0.15	5.31	30	PASS
149	5745	5.51		5.66		
157	5785	5.23		5.38		
165	5825	4.52		4.67		



B. Test Plot:



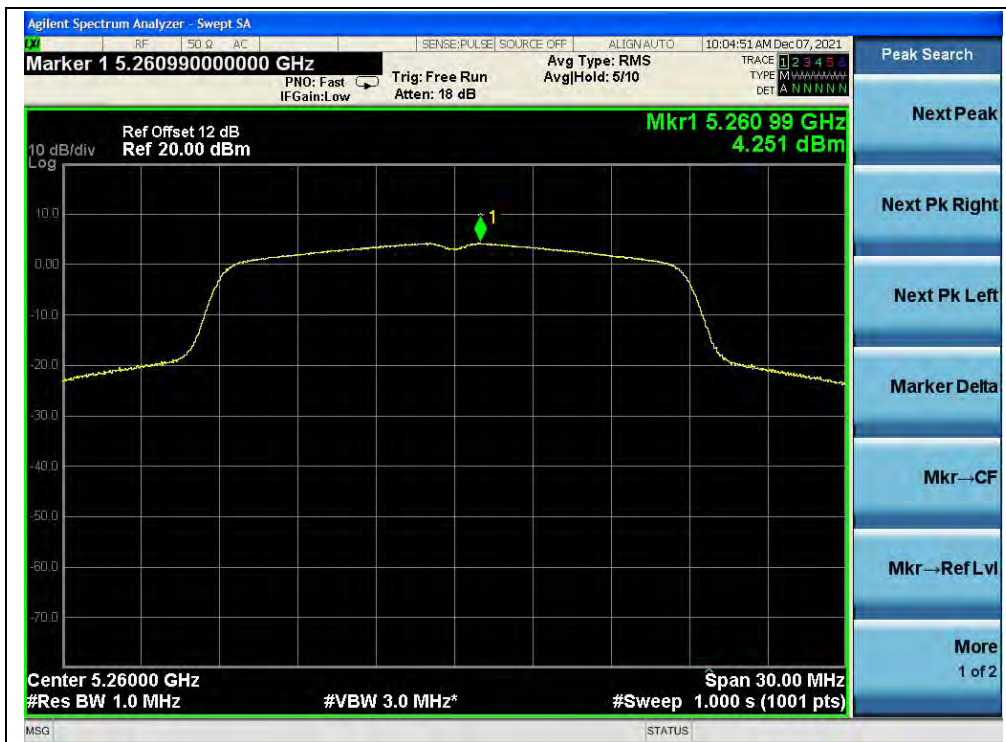
(Channel 36, 5180MHz, 802.11ac (VHT20))



(Channel 44, 5220MHz, 802.11ac (VHT20))



(Channel 48, 5240MHz, 802.11ac (VHT20))



(Channel 52, 5260MHz, 802.11ac (VHT20))





(Channel 60, 5300MHz, 802.11ac (VHT20))



(Channel 64, 5320MHz, 802.11ac (VHT20))



(Channel 100, 5500MHz, 802.11ac (VHT20))



(Channel 120, 5600MHz, 802.11ac (VHT20))



(Channel 144, 5720MHz, 802.11ac (VHT20))



(Channel 144, 5720MHz, 802.11ac(VHT20))





(Channel 149, 5745MHz, 802.11ac (VHT20))



(Channel 157, 5785MHz, 802.11ac (VHT20))





(Channel 165, 5825MHz, 802.11ac (VHT20))





(Channel 46, 5230MHz, 802.11ac (VHT40))



(Channel 54, 5270MHz, 802.11ac (VHT40))





(Channel 62, 5310MHz, 802.11ac (VHT40))



(Channel 102, 5510MHz, 802.11ac (VHT40))



(Channel 126, 5630MHz, 802.11ac (VHT40))



(Channel 142, 5710MHz, 802.11ac (VHT40))



(Channel 142, 5710MHz, 802.11ac (VHT40))



(Channel 151, 5755MHz, 802.11ac (VHT40))





(Channel 159, 5795MHz, 802.11ac (VHT40))



802.11ac (VHT80) Mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor	Corrected PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
42	5210	-2.03	0.57	-1.46	11	PASS
58	5290	-3.84		-3.27		
106	5530	-4.38		-3.81		
122	5610	-2.83		-2.26		
138	5690	-0.32		0.25		
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Duty Factor	Corrected (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
138	5690	-3.09	0.57	-2.52	30	PASS
155	5775	-2.48		-1.91		

B. Test Plot:



(Channel 42, 5210MHz, 802.11ac (VHT80))



(Channel 58, 5290MHz, 802.11ac (VHT80))



(Channel 106, 5530MHz, 802.11ac (VHT80))





(Channel 122, 5610MHz, 802.11ac (VHT80))



(Channel 138, 5690MHz, 802.11ac (VHT80))



(Channel 138, 5690MHz, 802.11ac (VHT80))



(Channel 155, 5775MHz, 802.11ac (VHT80))

## 2.6. Frequency Stability

### 2.6.1. Requirement

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 2.6.2. Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between 5°C to 40°C. The temperature was incremented by 10° intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded. Data for the worst case channel is shown below.

### 2.6.3. Test Result

U-NII-1 (Ch. 36)				
5180MHz				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.80	+20(Ref)	23	4.440
100%		-30	29	5.598
100%		-20	24	4.633
100%		-10	26	5.019
100%		0	25	4.826
100%		+10	21	4.054
100%		+20	23	4.440
100%		+30	26	5.019
100%		+40	26	5.019
100%		+50	23	4.440
115%		4.35	+20	28
85%	3.50	+20	27	5.212





<b>U-NII-2A (Ch. 52)</b>				
<b>5260MHz</b>				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.80	+20(Ref)	19	3.612
100%		-30	24	4.563
100%		-20	25	4.753
100%		-10	24	4.563
100%		0	19	3.612
100%		+10	17	3.232
100%		+20	21	3.992
100%		+30	26	4.943
100%		+40	30	5.703
100%		+50	25	4.753
115%	4.35	+20	19	3.612
85%	3.50	+20	21	3.992

<b>U-NII-2C (Ch. 100)</b>				
<b>5500MHz</b>				
VOLTAGE (%)	POWER (VDC)	TEMP (°C)	Fre. Dev. (kHz)	Deviation (ppm)
100%	3.80	+20(Ref)	21	3.818
100%		-30	25	4.545
100%		-20	30	5.455
100%		-10	29	5.273
100%		0	22	4.000
100%		+10	19	3.455
100%		+20	23	4.182
100%		+30	32	5.818
100%		+40	35	6.364
100%		+50	25	4.545
115%	4.35	+20	27	4.909
85%	3.50	+20	30	5.455



<b>U-NII-3 (Ch. 149)</b>				
<b>5745MHz</b>				
<b>VOLTAGE (%)</b>	<b>POWER (VDC)</b>	<b>TEMP (°C)</b>	<b>Fre. Dev. (kHz)</b>	<b>Deviation (ppm)</b>
100%	3.80	+20(Ref)	22	3.829
100%		-30	26	4.526
100%		-20	28	4.874
100%		-10	21	3.655
100%		0	24	4.178
100%		+10	25	4.352
100%		+20	26	4.526
100%		+30	26	4.526
100%		+40	28	4.874
100%		+50	19	3.307
115%		4.35	+20	31
85%	3.50	+20	29	5.048

## 2.7. Conducted Emission

### 2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN).

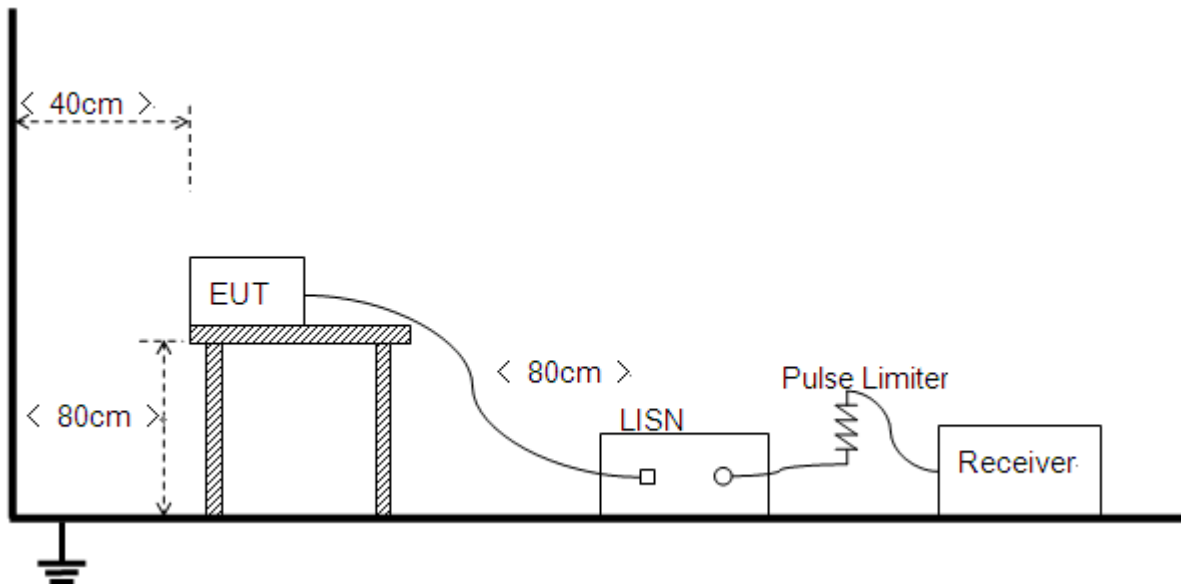
Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

**Note:**

- (a) The lower limit shall apply at the band edges.
- (b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

### 2.7.2. Test Description

**Test Setup:**



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10: 2013.





### 2.7.3. Test Result

The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and Plot below.

**Note:** Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

#### A. Test Setup:

Test Mode: EUT+ Adapter +WIFI TX

Test Voltage: AC 120V/60Hz

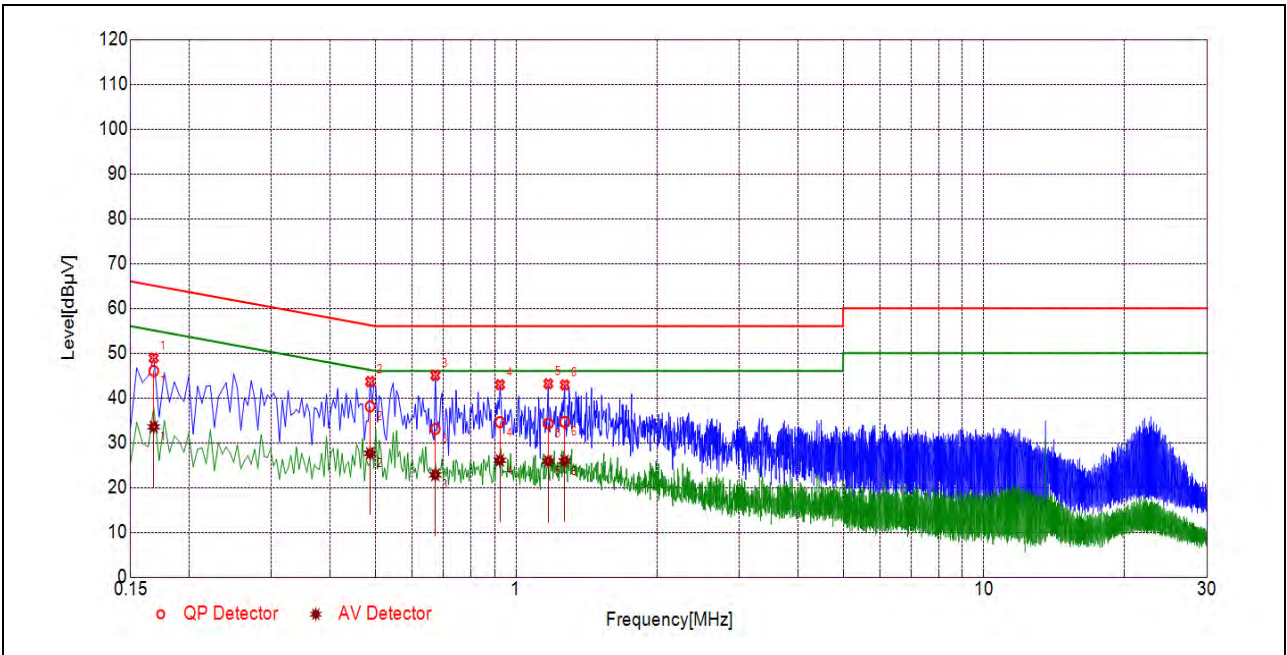
The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V]} = U_R + L_{\text{Cable loss}} \text{ [dB]} + A_{\text{Factor}}$$

$U_R$ : Receiver Reading

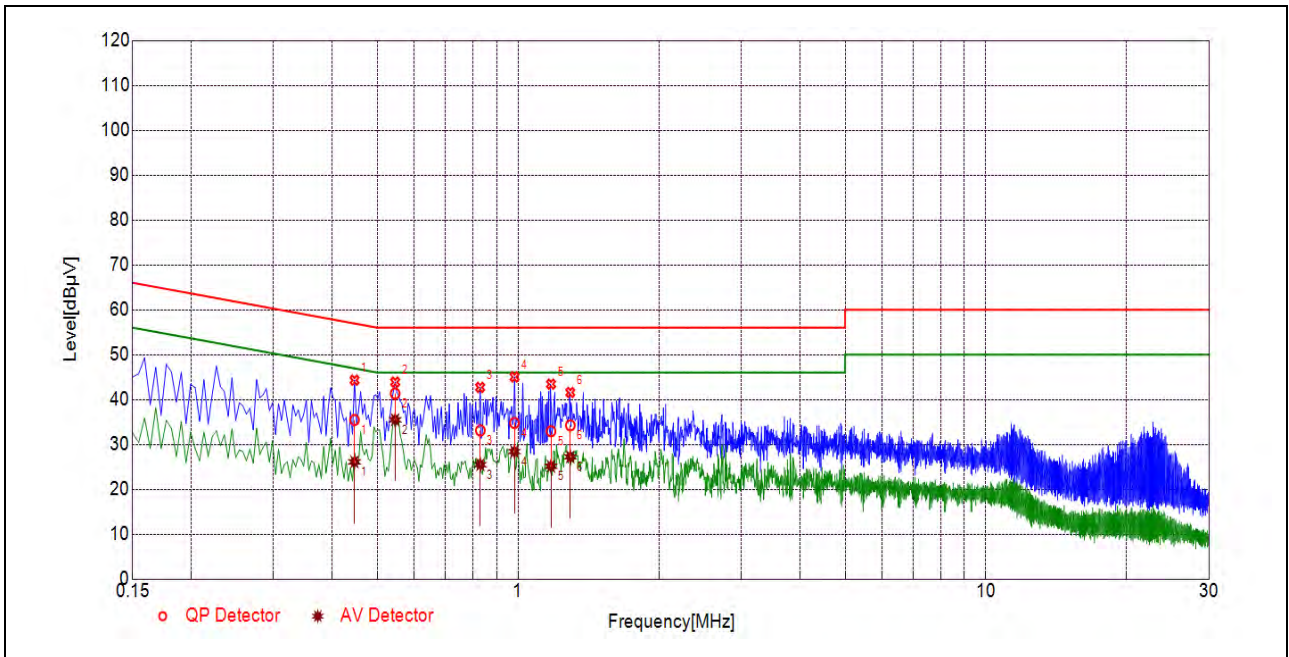
$A_{\text{Factor}}$ : Voltage division factor of LISN

**B. Test Plot:**



(L Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.1680	46.01	33.51	65.06	55.06	Line	PASS
2	0.4872	38.11	27.62	56.22	46.22		PASS
3	0.6717	33.04	22.81	56.00	46.00		PASS
4	0.9235	34.59	26.08	56.00	46.00		PASS
5	1.1712	34.27	25.87	56.00	46.00		PASS
6	1.2693	34.63	25.93	56.00	46.00		PASS



(N Phase)

No.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.4469	35.44	26.09	56.93	46.93	Neutral	PASS
2	0.5458	41.32	35.48	56.00	46.00		PASS
3	0.8303	33.11	25.47	56.00	46.00		PASS
4	0.9819	34.79	28.39	56.00	46.00		PASS
5	1.1753	32.93	25.13	56.00	46.00		PASS
6	1.2928	34.24	27.21	56.00	46.00		PASS



## 2.8. Restricted Frequency Bands

### 2.8.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band:
  - (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.

The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \mu\text{V/m}$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

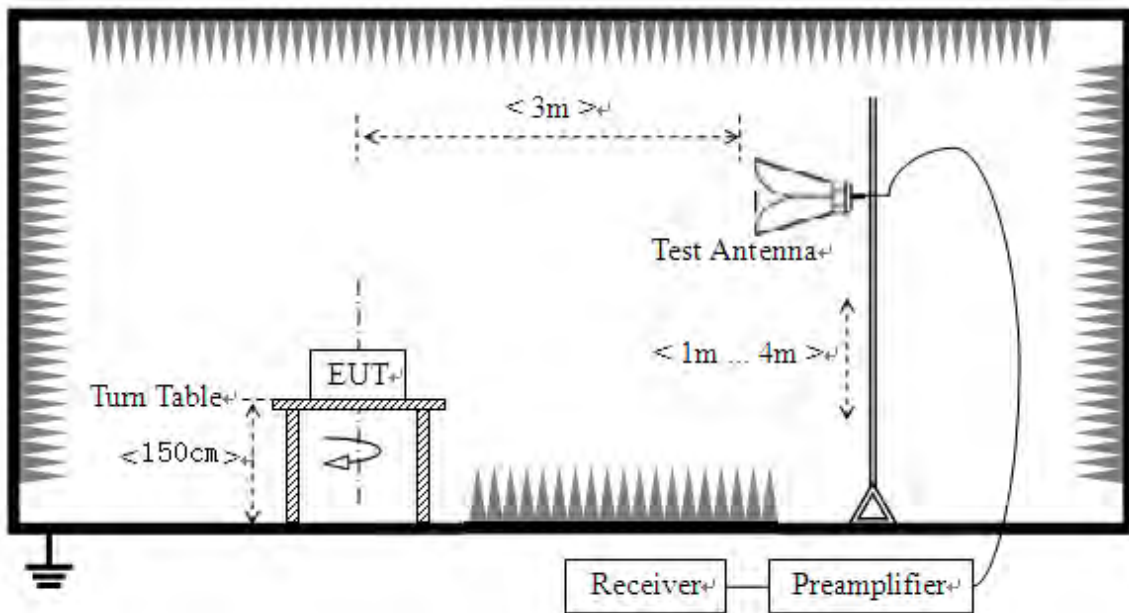
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

### 2.8.2. Test Description

#### Test Setup





The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

KDB 789033 Section H) 3)5)6(d)) was used in order to prove compliance

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.

### 2.8.3. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

$$E \text{ [dB}\mu\text{V/m]} = U_R + A_T + A_{\text{Factor}} \text{ [dB]}; A_T = L_{\text{Cable loss}} \text{ [dB]} - G_{\text{preamp}} \text{ [dB]}$$

$A_T$ : Total correction Factor except Antenna;  $U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain;  $A_{\text{Factor}}$ : Antenna Factor at 3m

**Note 1:** Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

**Note 2** All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.

### 802.11a Mode

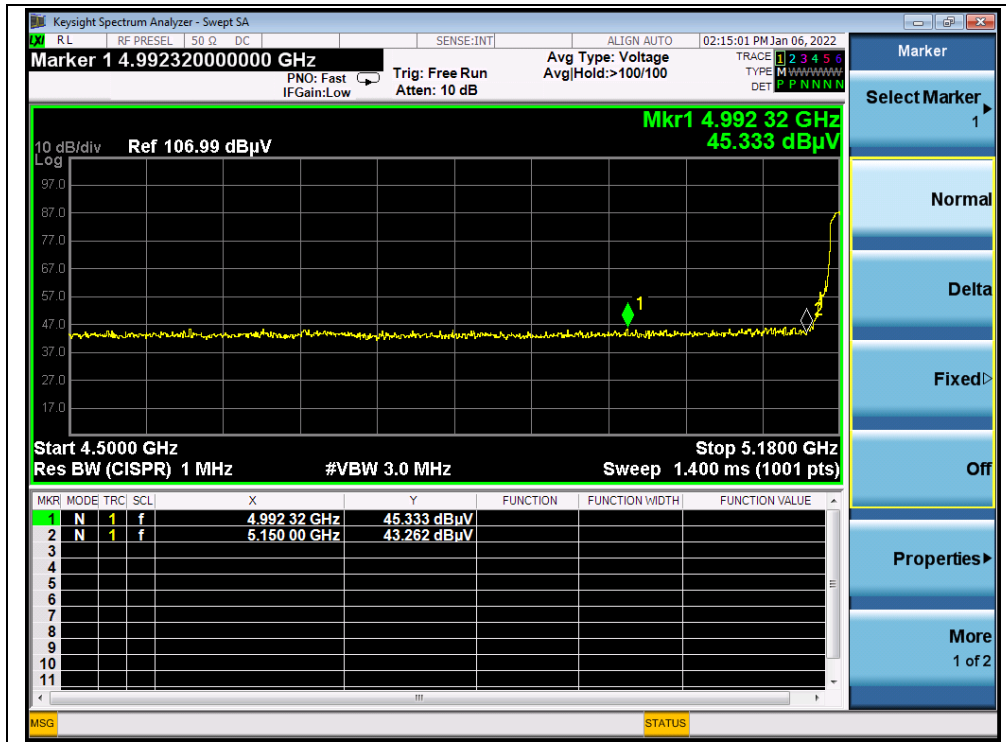
#### A.Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	$A_T$ (dB)	$A_{\text{Factor}}$ (dB@3m)	Max. Emission E (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Verdict
		PK/ AV	$U_R$ (dB $\mu$ V)					
36	4992.32	PK	45.33	-19.54	32.20	57.99	74	PASS
36	5250.00	AV	34.44	-19.54	32.20	47.10	54	PASS
64	5371.52	PK	42.32	-18.80	32.20	55.72	74	PASS
64	5350.00	AV	32.88	-18.80	32.20	46.28	54	PASS
100	5420.75	PK	44.11	-19.20	32.20	57.11	74	PASS
100	5470.00	AV	33.99	-19.20	32.20	46.99	54	PASS
144	5788.40	PK	48.54	-19.20	32.20	61.54	68.23	PASS
149	5725.00	PK	50.91	-19.01	32.20	64.10	122.23	PASS
165	5850.00	PK	41.60	-19.01	32.20	54.79	122.23	PASS

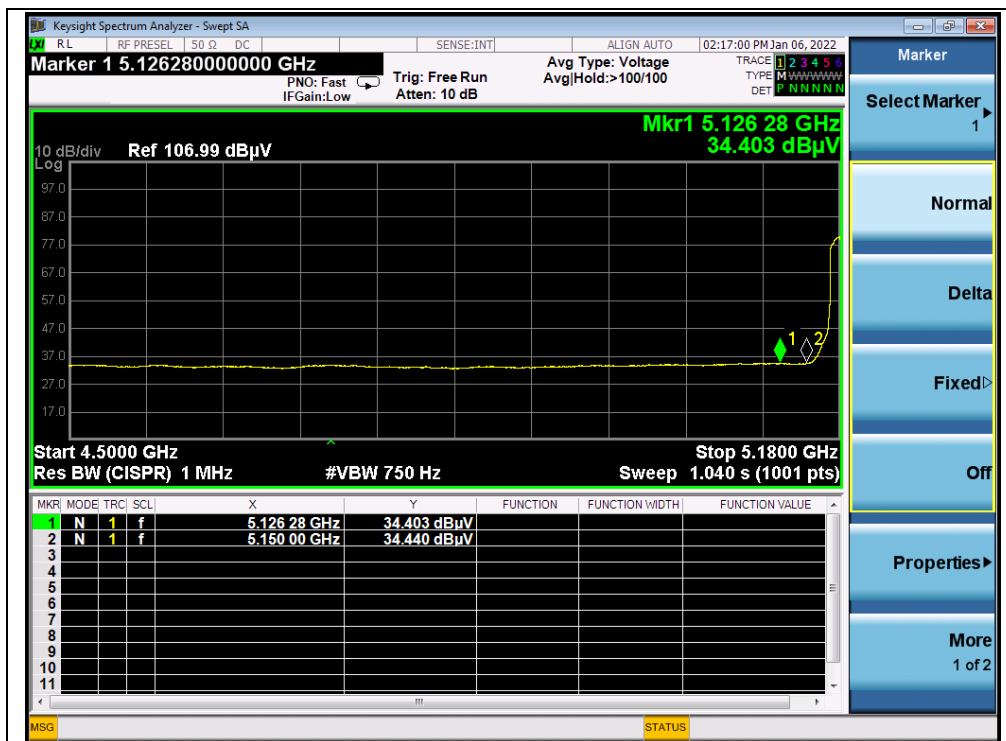




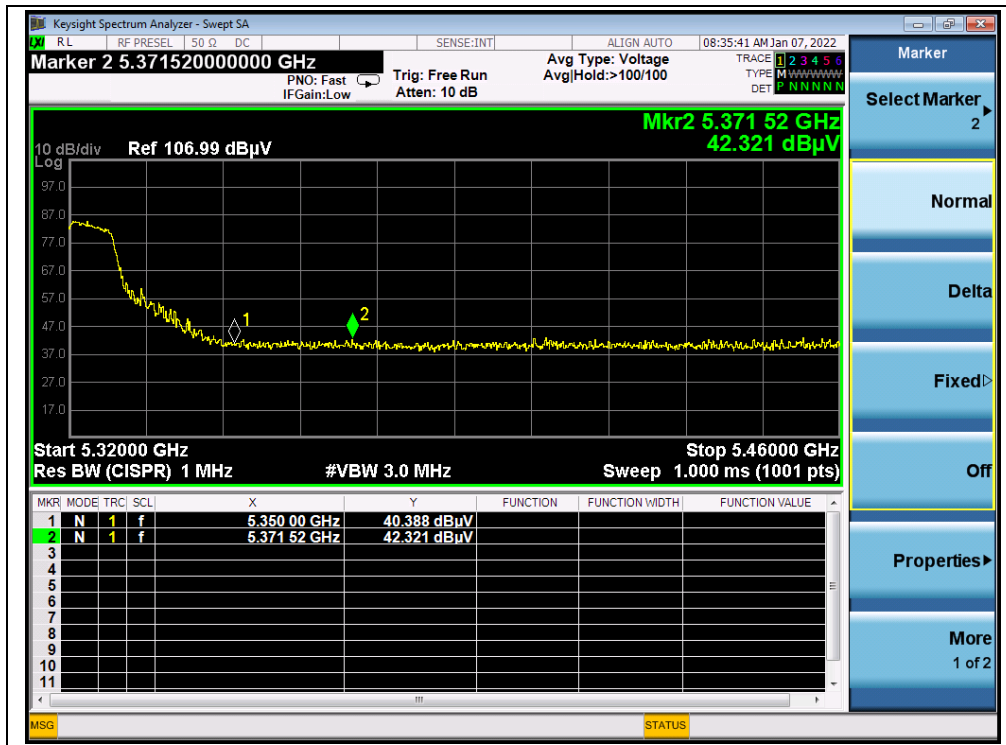
B.Test Plot:



(PEAK, Channel 36, 802.11a)



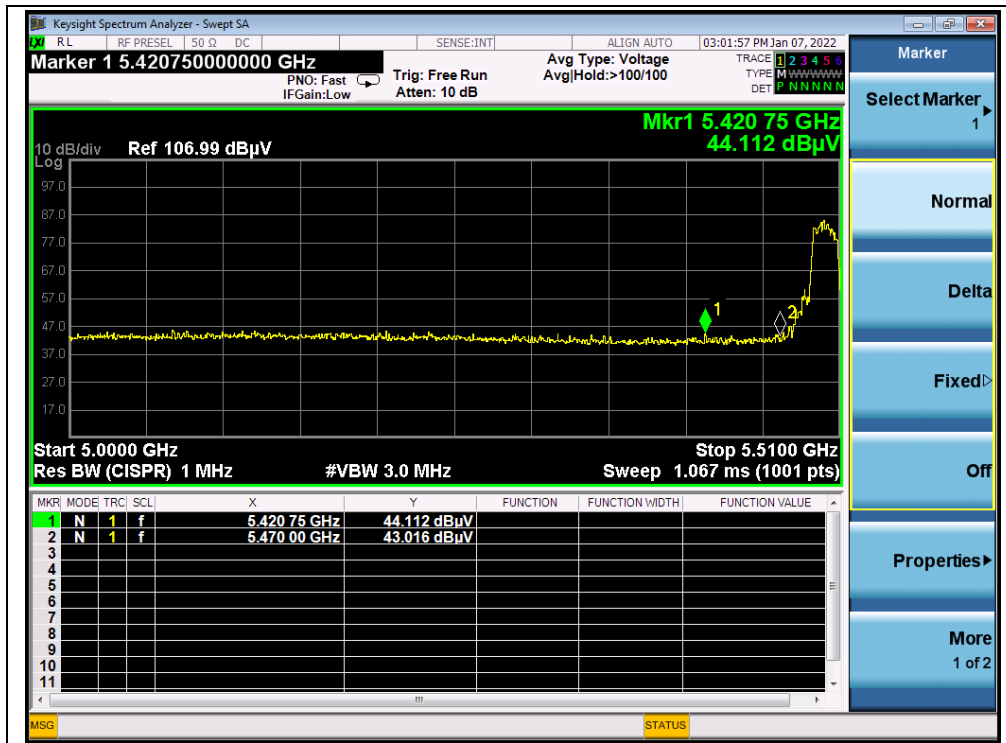
(AVERAGE, Channel 36, 802.11a)



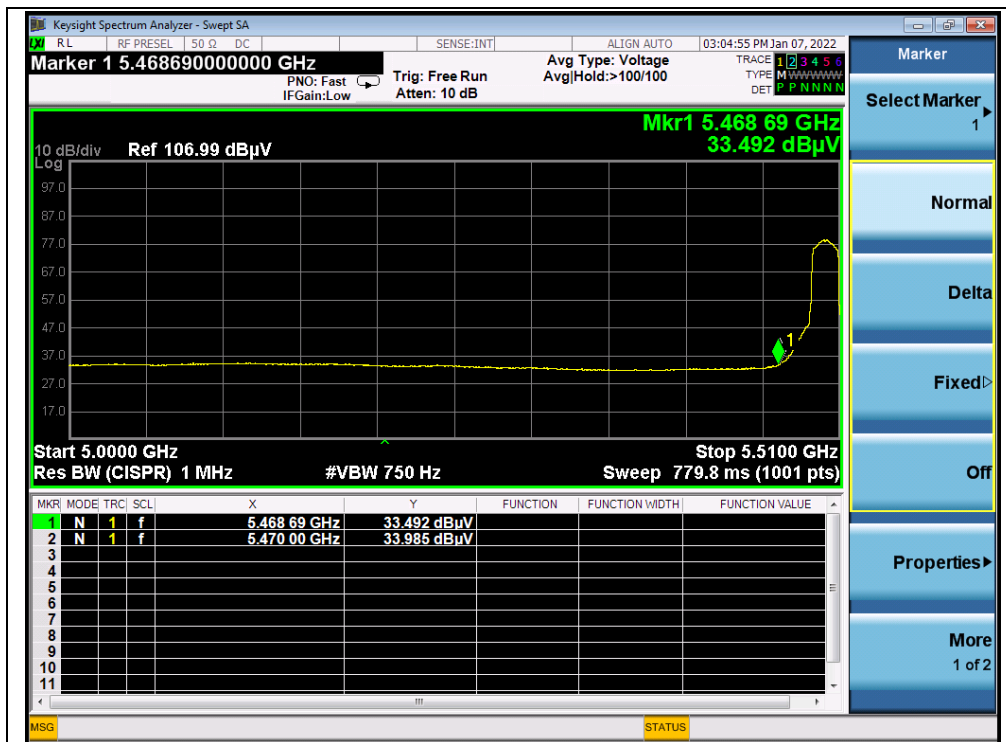
(PEAK, Channel 64, 802.11a)



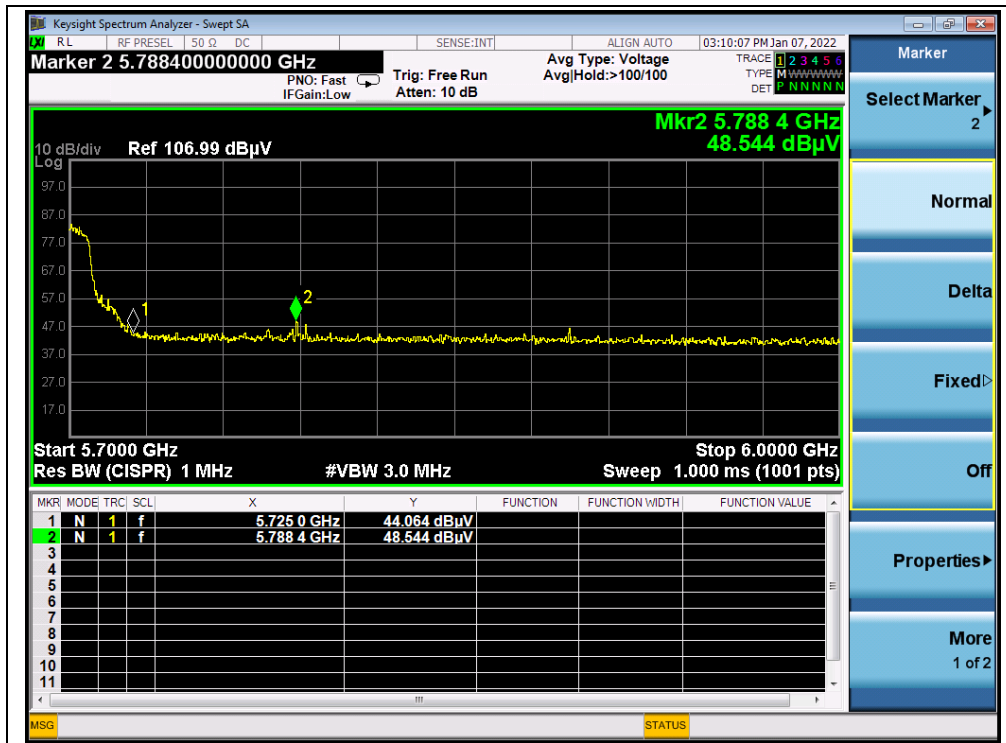
(AVERAGE, Channel 64, 802.11a)



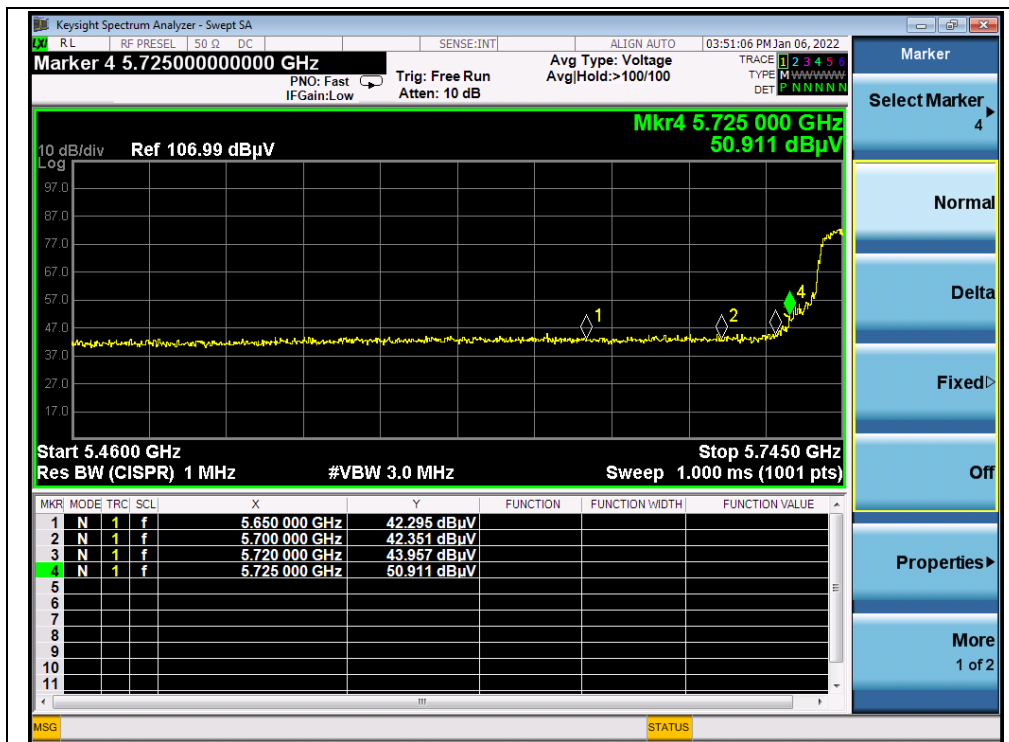
(PEAK, Channel 100, 802.11a)



(AVERAGE, Channel 100, 802.11a)

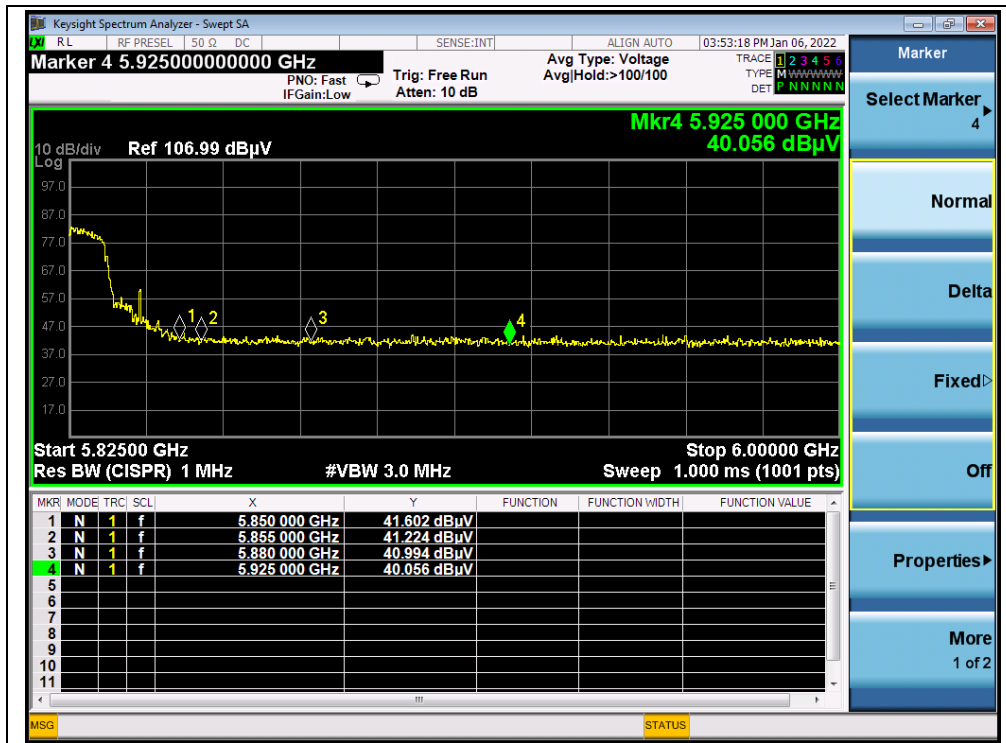


(PEAK, Channel 144, 802.11a)



(PEAK, Channel 149, 802.11a)





(PEAK, Channel 165, 802.11a)

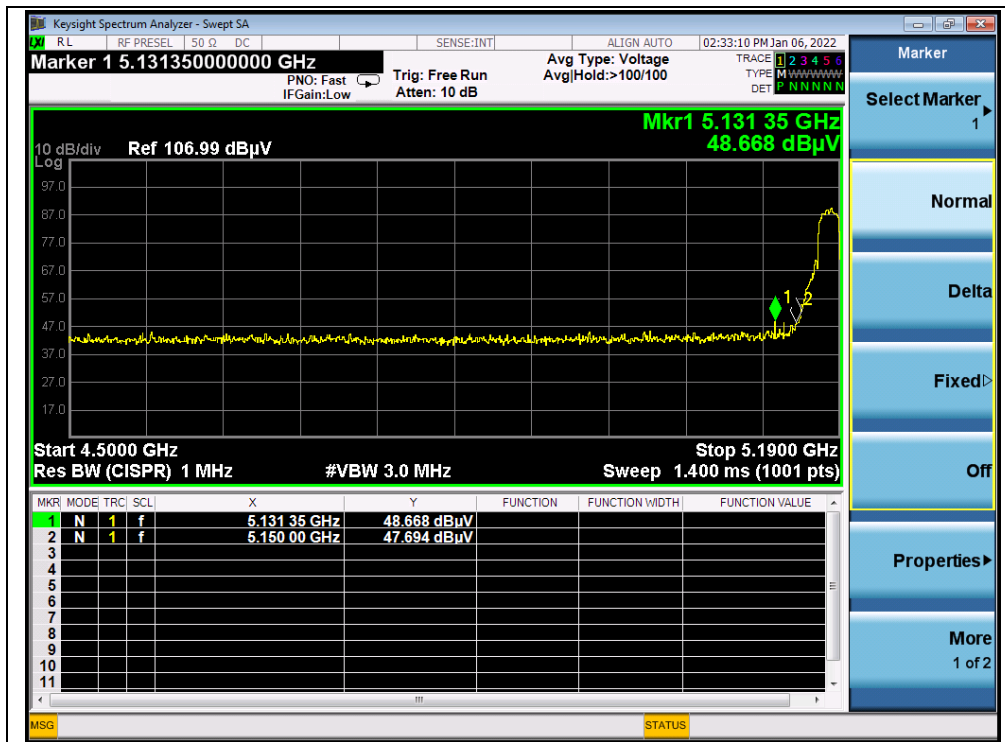


**802.11n (HT40) Mode**

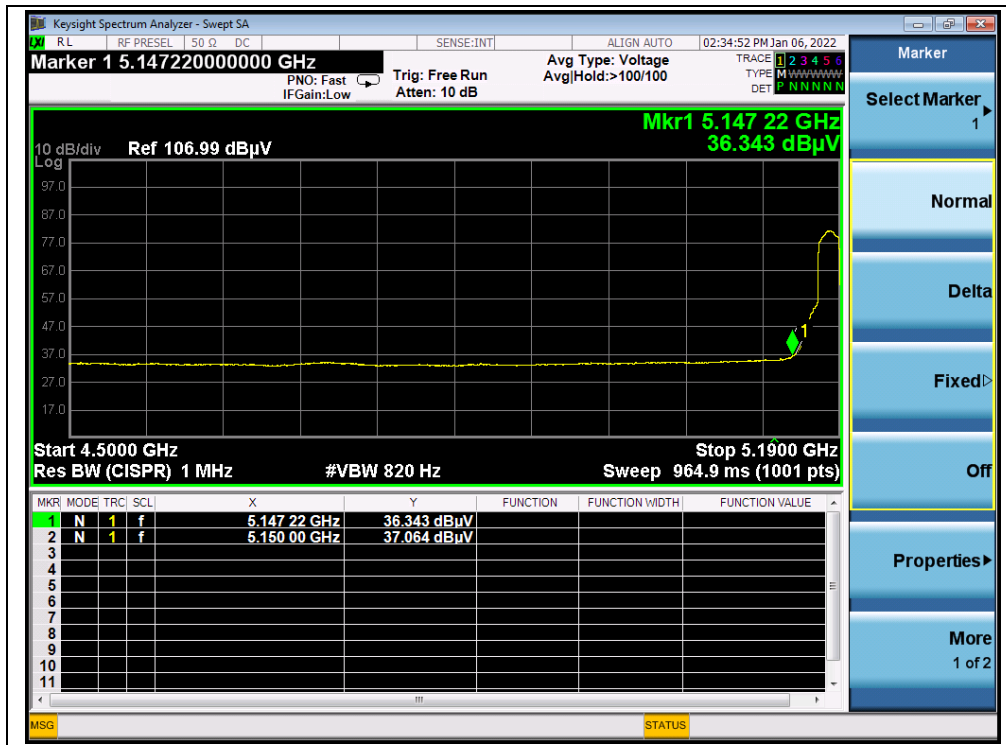
**A. Test Verdict:**

Channel	Frequency (MHz)	Detector	Receiver Reading	$A_T$	$A_{Factor}$	Max. Emission	Limit (dB $\mu$ V/m)	Verdict
		PK/ AV	$U_R$ (dB $\mu$ V)	(dB)	(dB@3m)	E (dB $\mu$ V/m)		
38	5131.35	PK	48.67	-19.54	32.20	61.33	74	PASS
38	5150.00	AV	37.06	-19.54	32.20	49.72	54	PASS
62	5370.22	PK	42.44	-18.80	32.20	55.84	74	PASS
62	5350.00	AV	32.47	-18.80	32.20	45.87	54	PASS
102	5470.00	PK	49.45	-19.20	32.20	62.45	68.23	PASS
102	5470.00	AV	38.40	-19.20	32.20	51.40	54	PASS
142	5725.00	PK	47.30	-19.20	32.20	60.30	68.23	PASS
151	5725.00	PK	53.65	-19.01	32.20	66.84	122.23	PASS
159	5850.00	PK	42.55	-19.01	32.20	55.74	122.23	PASS

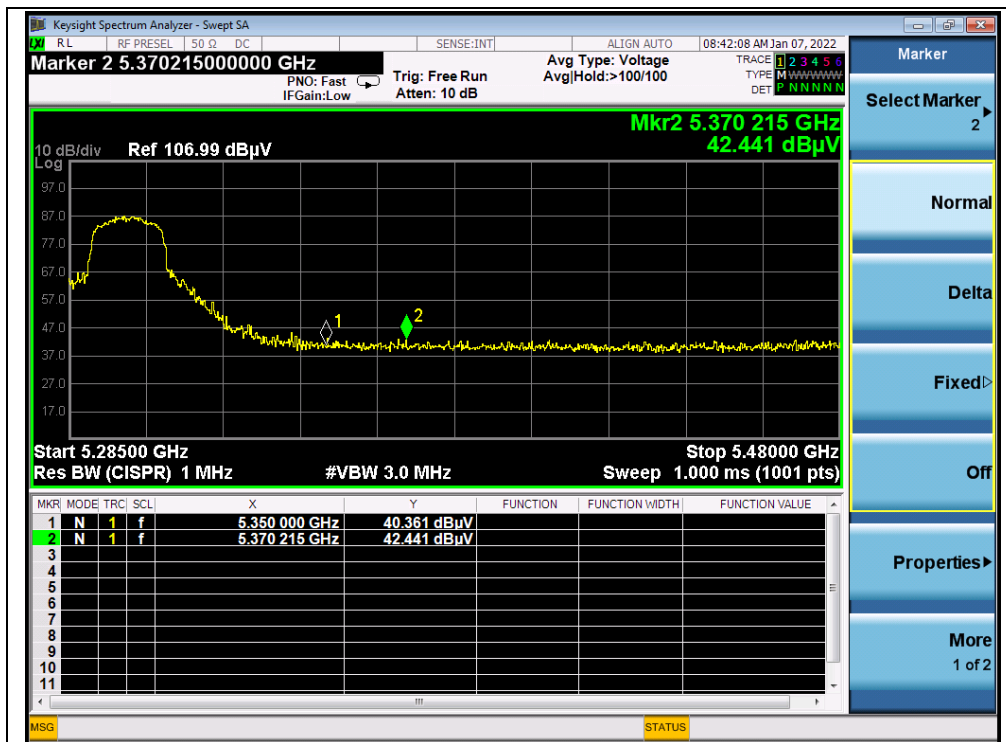
**B. Test Plot:**



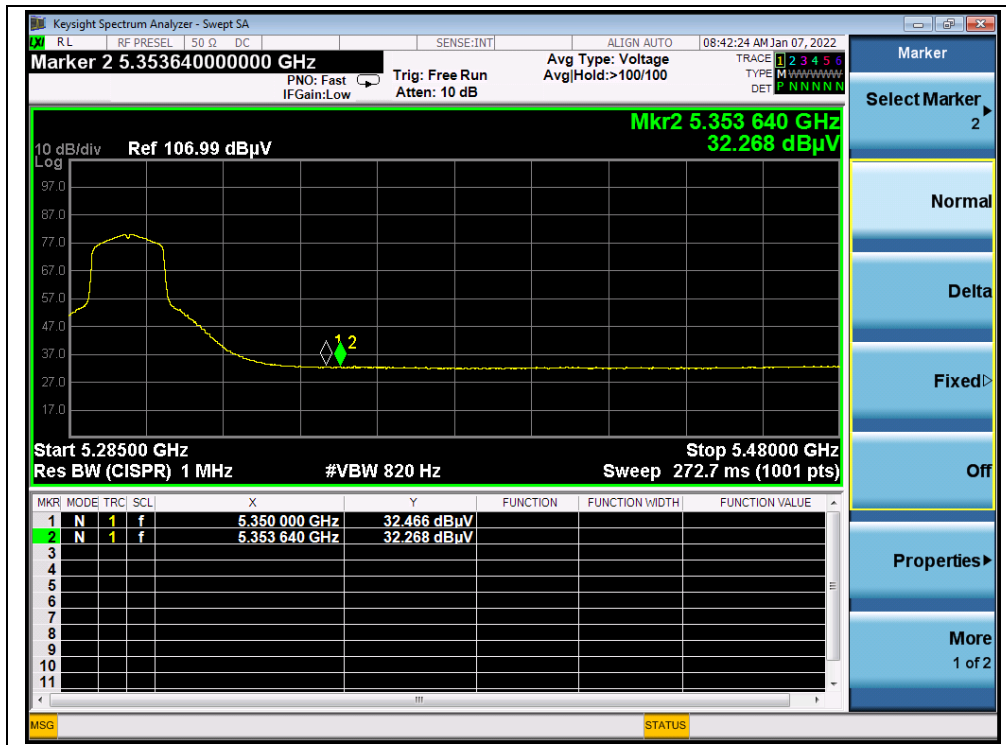
(PEAK, Channel 38, 802.11n (HT40))



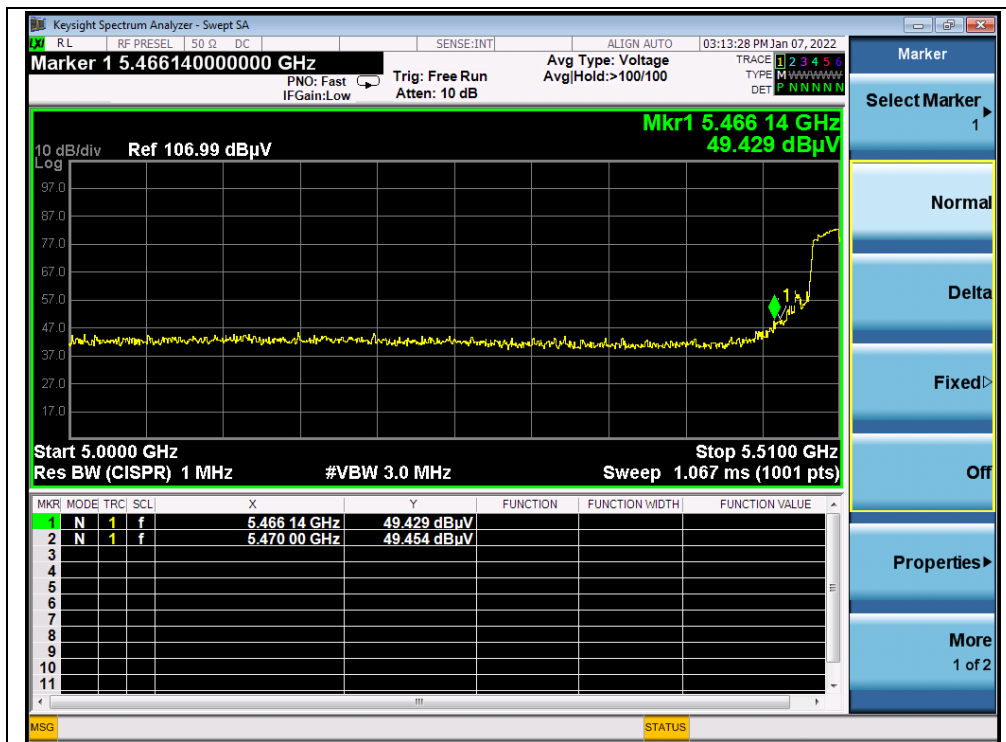
(AVERAGE, Channel 38, 802.11n (HT40))



(PEAK, Channel 62, 802.11n (HT40))

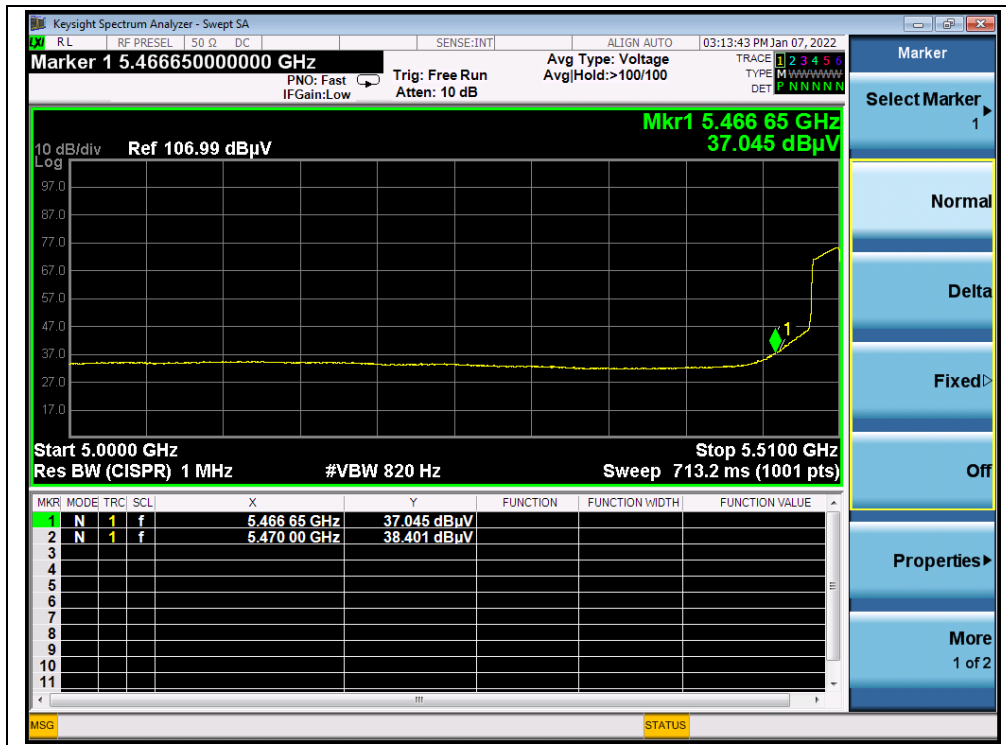


(AVERAGE, Channel 62, 802.11n (HT40))

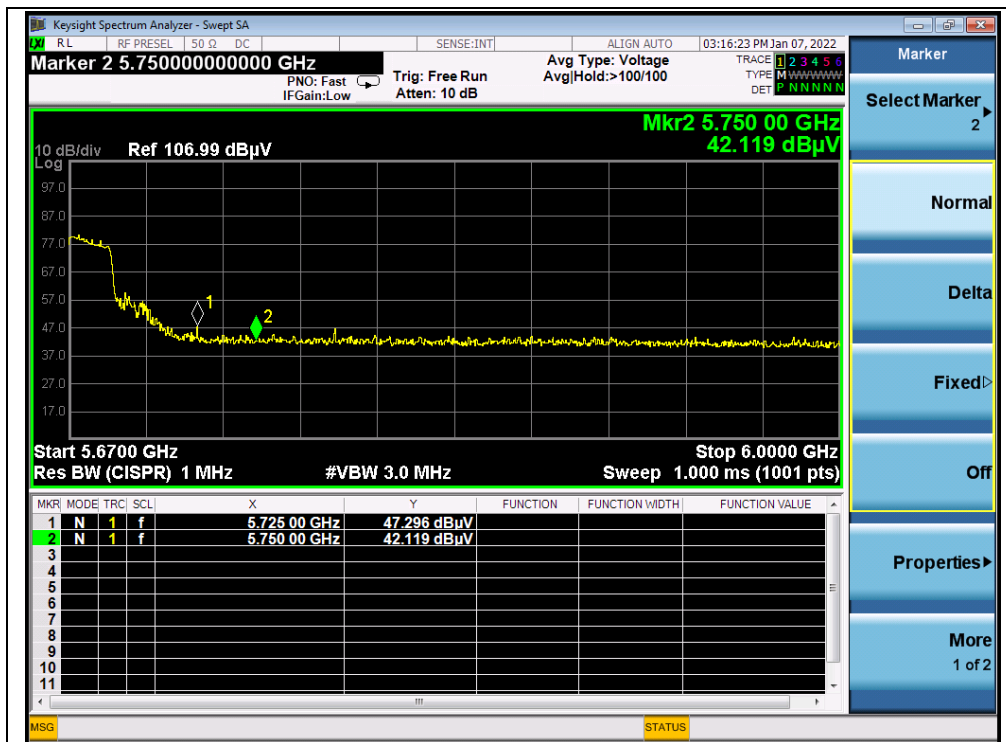


(PEAK, Channel 102, 802.11n (HT40))

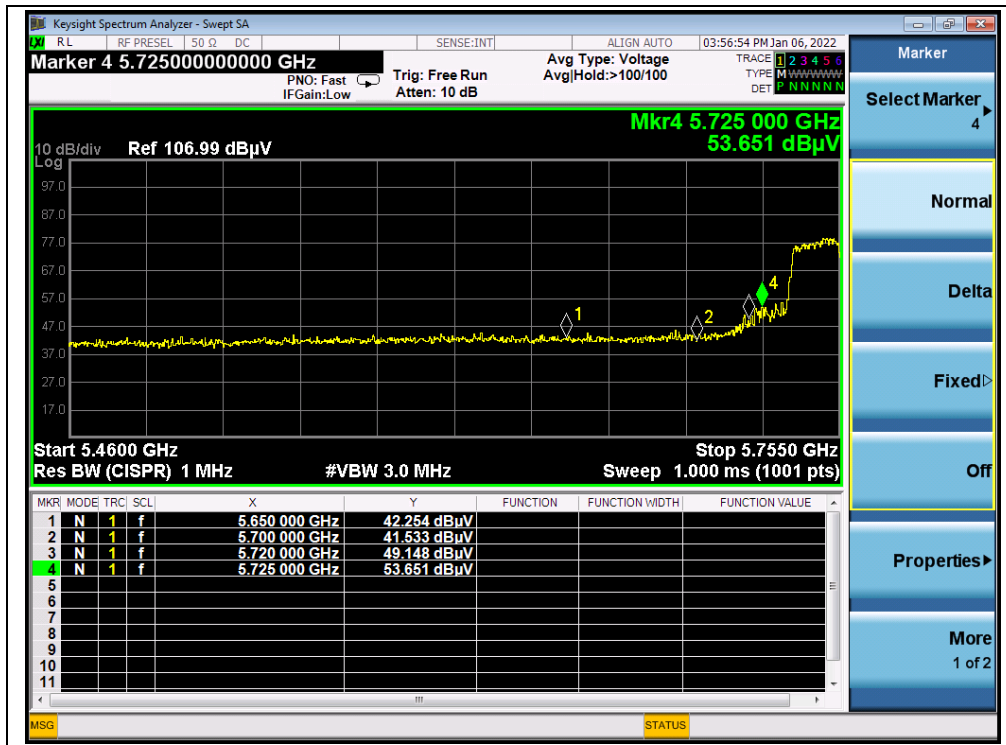




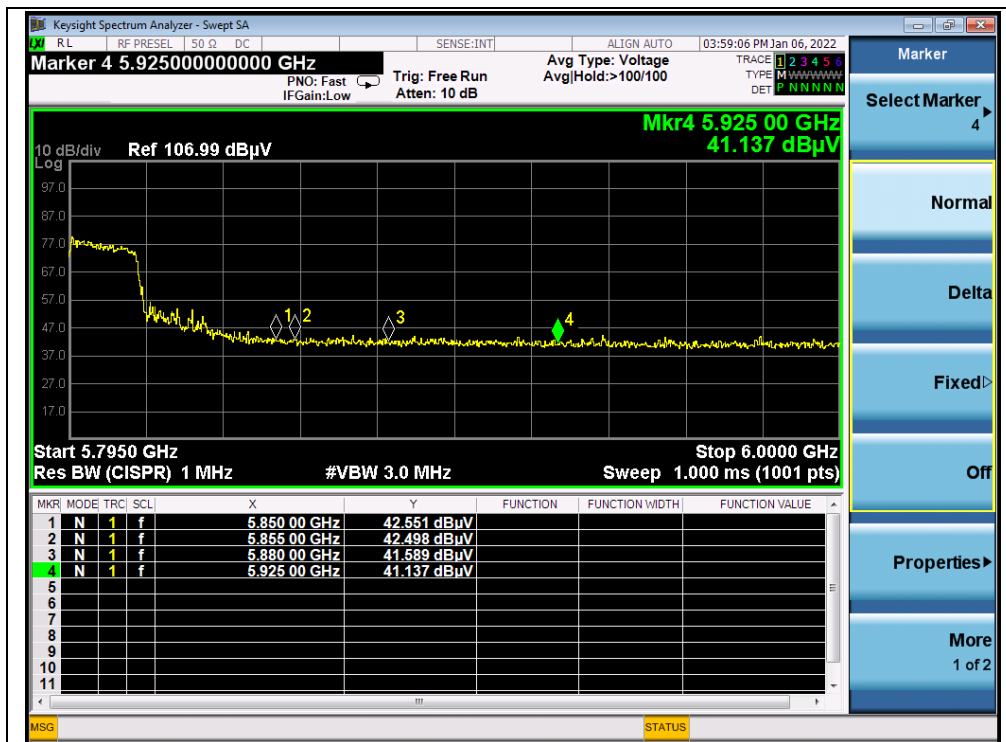
(AVERAGE, Channel 102, 802.11n (HT40))



(PEAK, Channel 142, 802.11n (HT40))



(PEAK, Channel 151, 802.11n (HT40))



(PEAK, Channel 159, 802.11n (HT40))

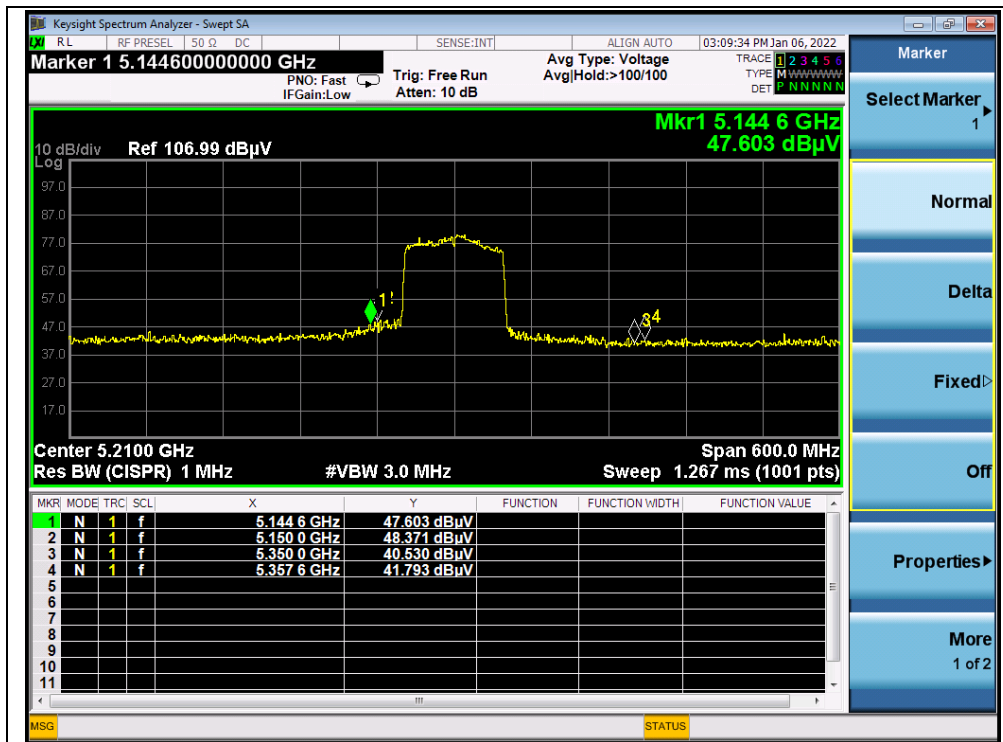


802.11ac (VHT80) Mode

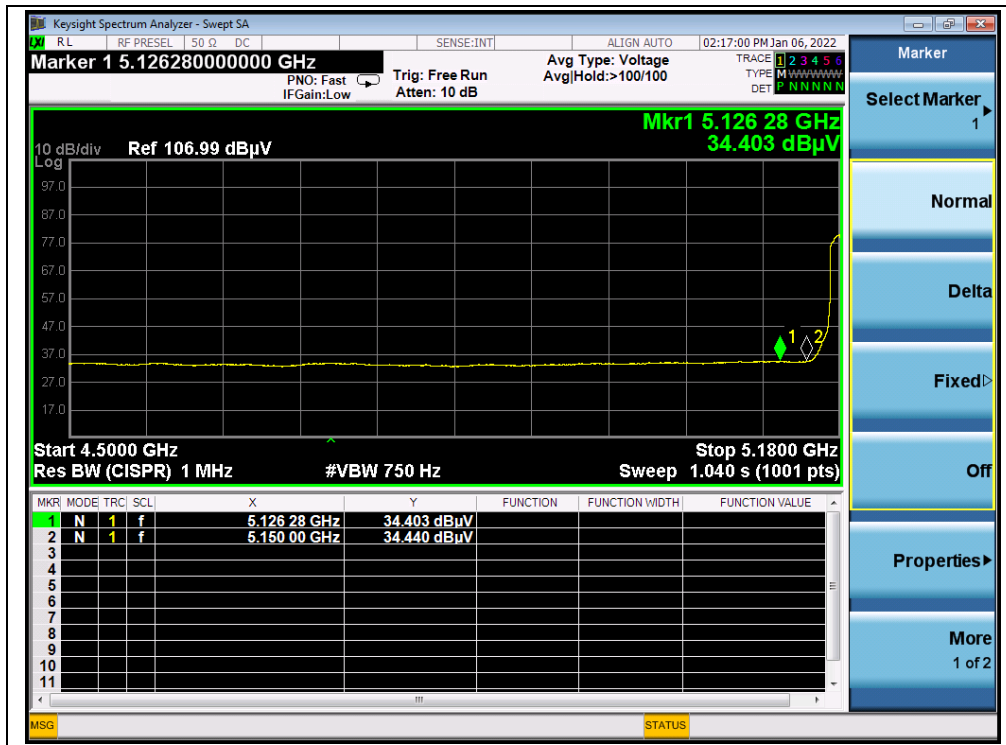
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	$A_T$	$A_{Factor}$	Max. Emission	Limit	Verdict
		PK/ AV	$U_R$ (dB $\mu$ V)	(dB)	(dB@3m)	E (dB $\mu$ V/m)	(dB $\mu$ V/m)	
42	5150.00	PK	48.37	-19.54	32.20	61.03	74	PASS
42	5150.00	AV	37.65	-19.54	32.20	50.31	54	PASS
58	5359.00	PK	49.92	-18.80	32.20	63.32	74	PASS
58	5350.00	AV	38.77	-18.80	32.20	52.17	54	PASS
106	5463.75	PK	48.75	-19.20	32.20	61.75	68.23	PASS
106	5470.00	AV	37.29	-19.20	32.20	50.29	54	PASS
138	5780.42	PK	44.56	-19.20	32.20	57.56	68.23	PASS
155	5700.00	PK	49.29	-19.01	32.20	62.48	105.23	PASS
155	5855.00	PK	46.65	-19.01	32.20	59.84	110.83	PASS

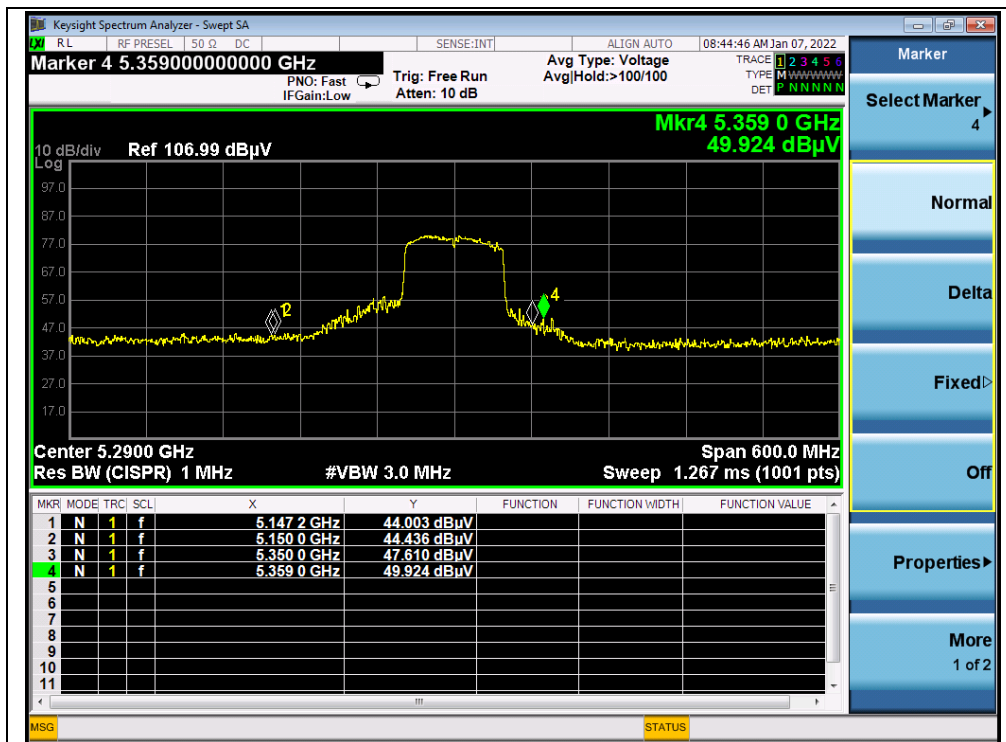
B. Test Plot:



(PEAK, Channel 42, 802.11ac (VHT80))

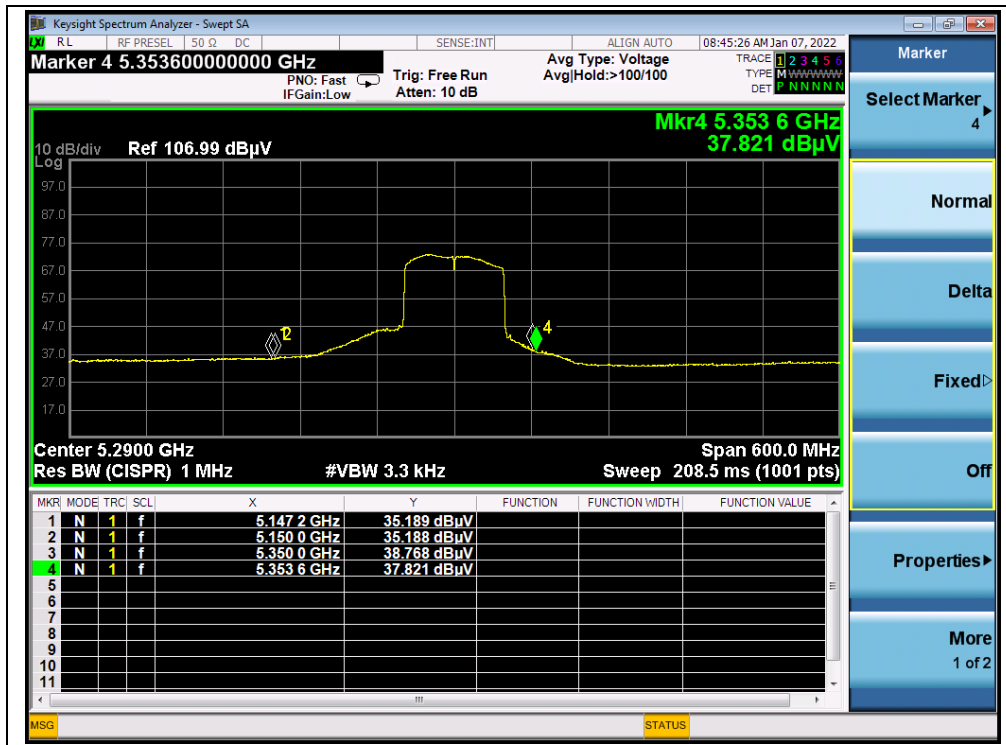


(AVERAGE, Channel 42, 802.11ac (VHT80))

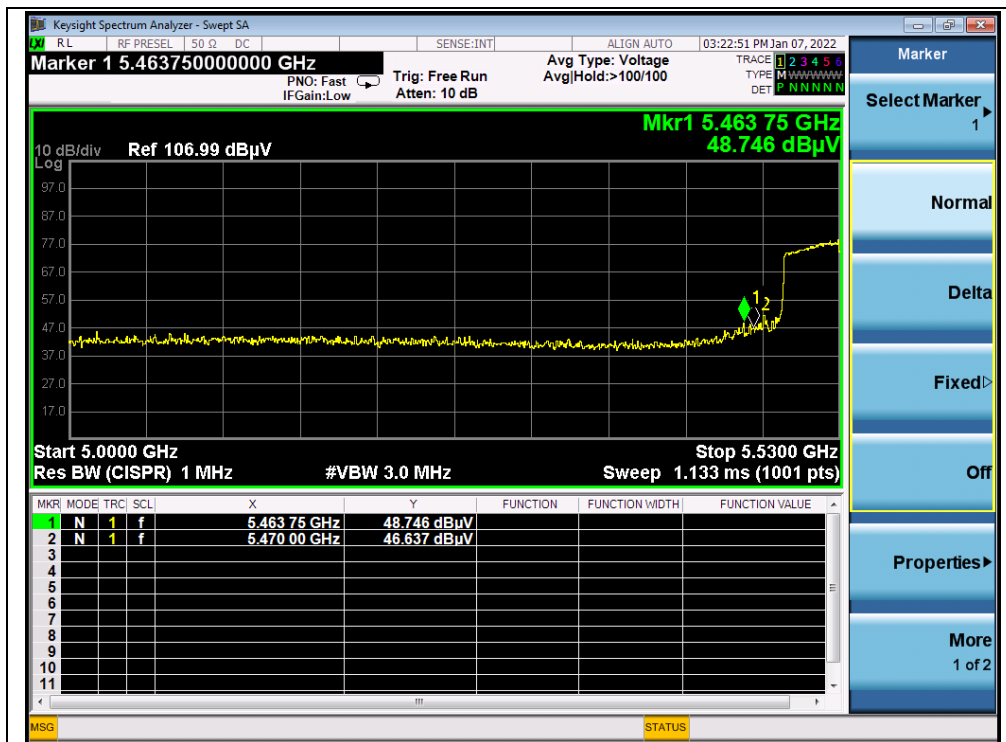


(PEAK, Channel 58, 802.11ac (VHT80))

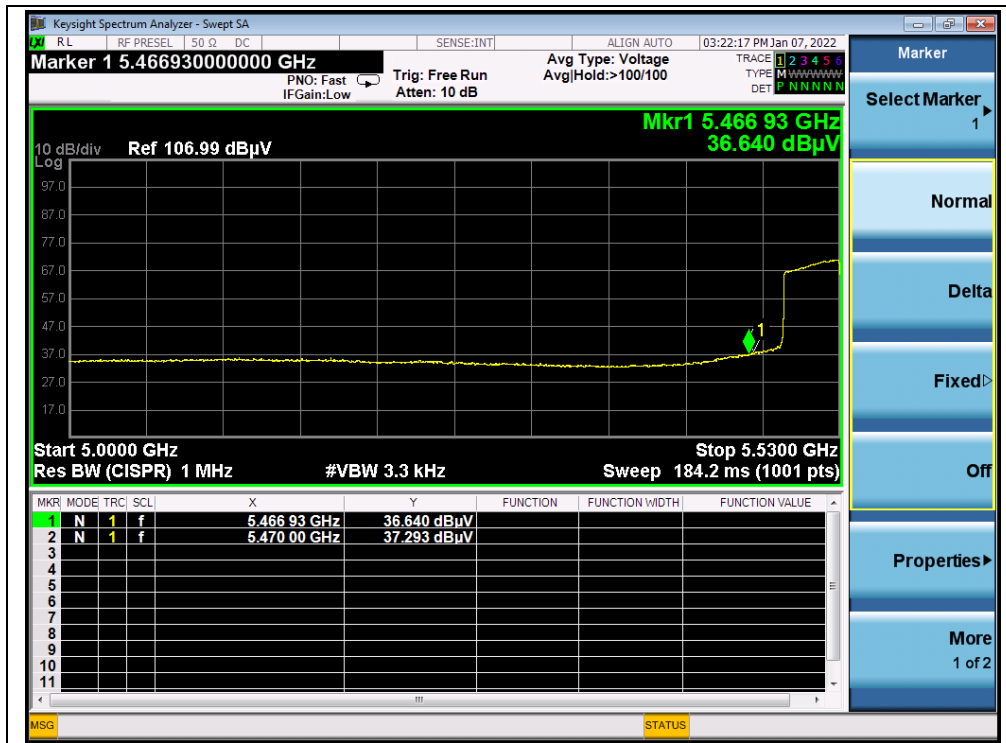




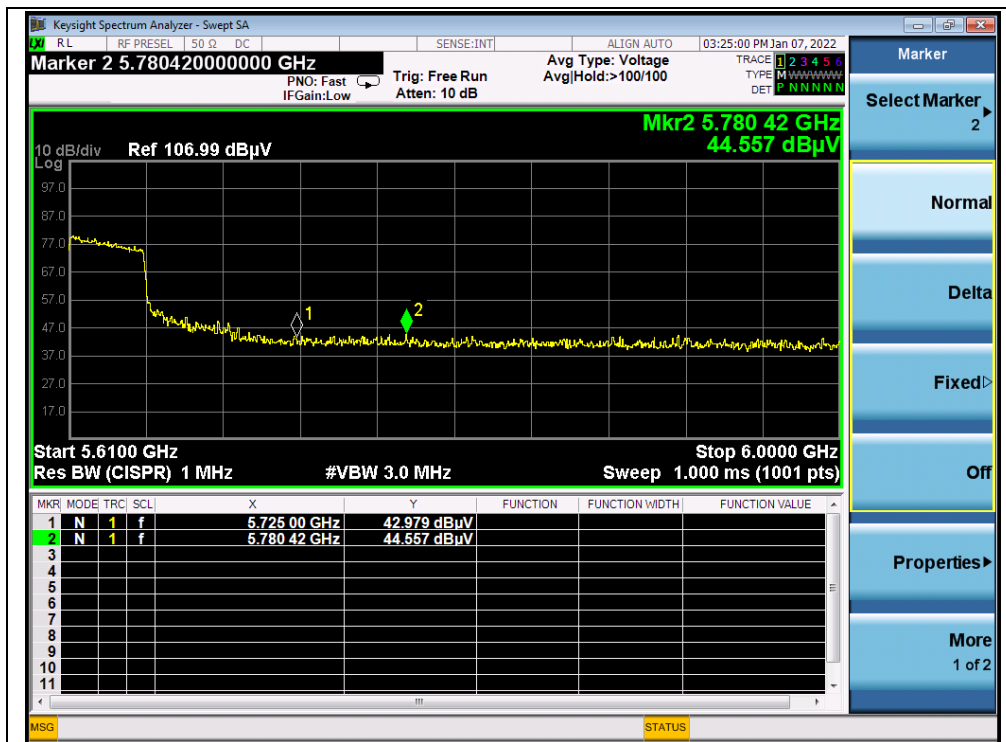
(AVERAGE, Channel 58, 802.11ac (VHT80))



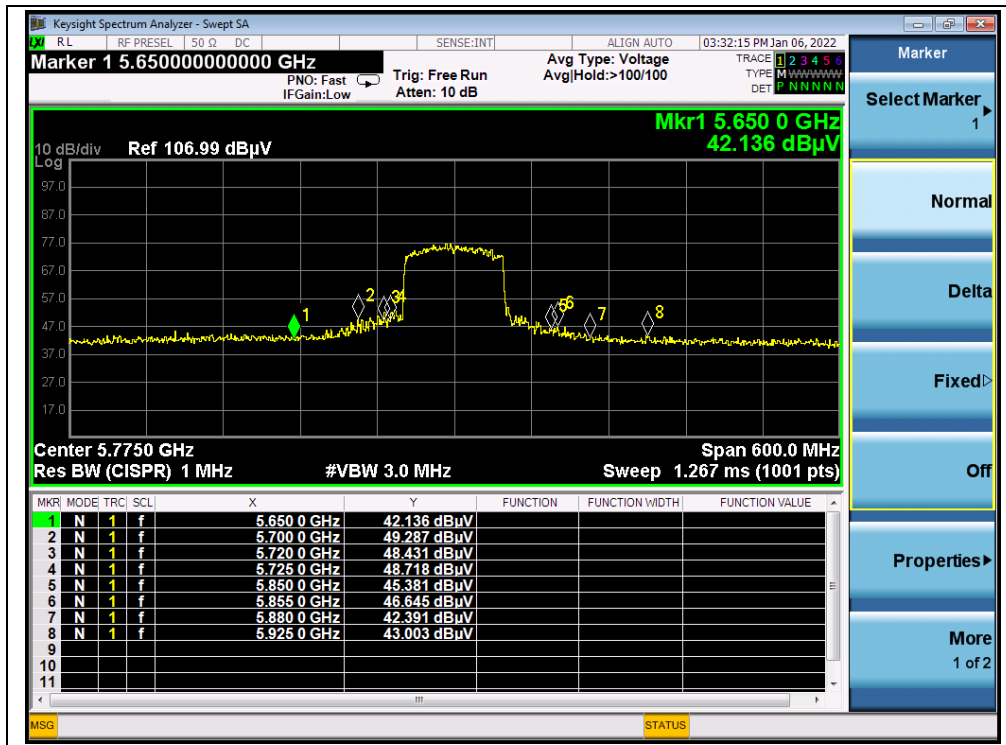
(PEAK, Channel 106, 802.11ac (VHT80))



(AVERAGE, Channel 106, 802.11ac (VHT80))



(PEAK, Channel 138, 802.11ac (VHT80))



(PEAK, Channel 155, 802.11ac (VHT80))



## 2.9. Radiated Emission

### 2.9.1. Requirement

The peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (2) For transmitters operating in the 5.25–5.35 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

The following formula is used to convert the equipment isotropic radiated power(e.i.r.p.) to field strength (dBμV/m);

$$E = 1000000 \times \sqrt{30P} / 3 \mu\text{V/m}$$

where P is the EIRP in Watts

Therefore: -27 dBm/MHz = 68.23 dBuV/m

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

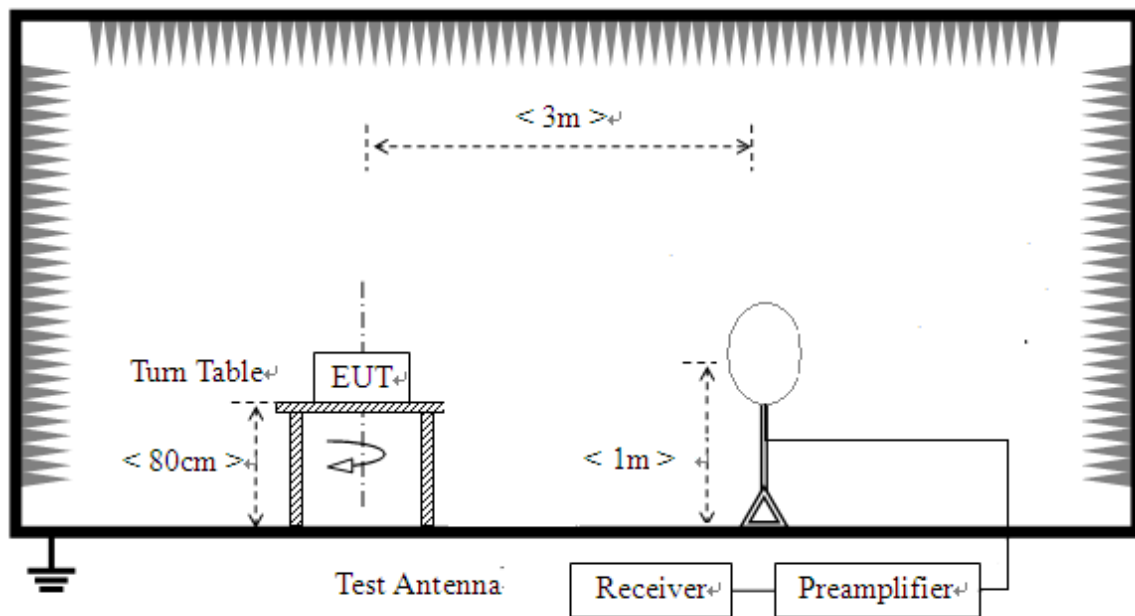


For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

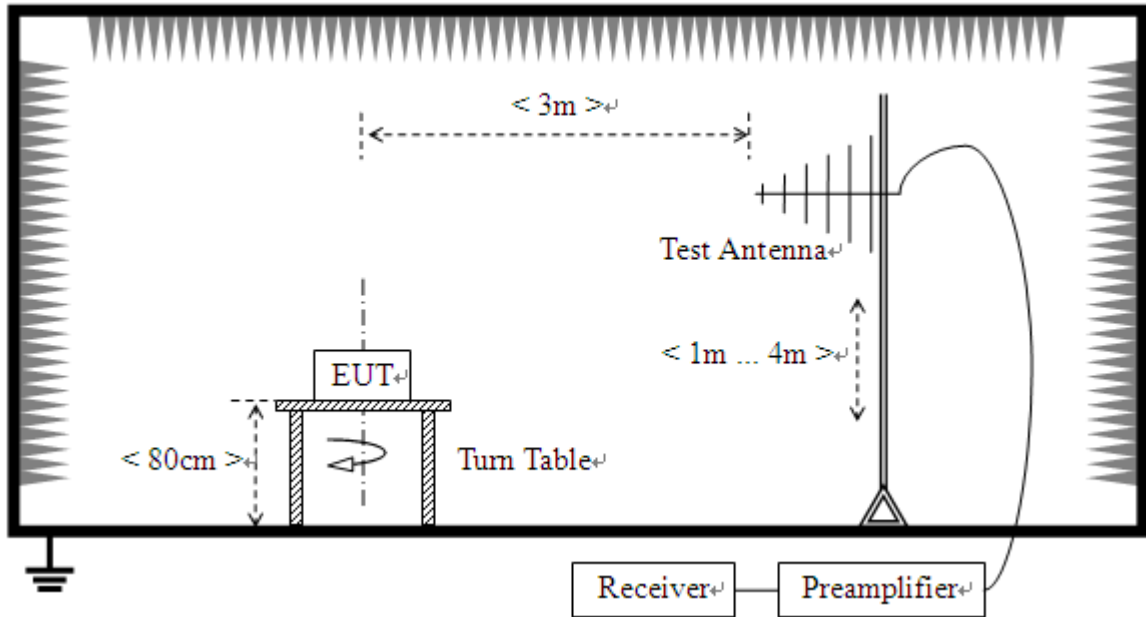
### 2.9.2. Test Description

#### Test Setup:

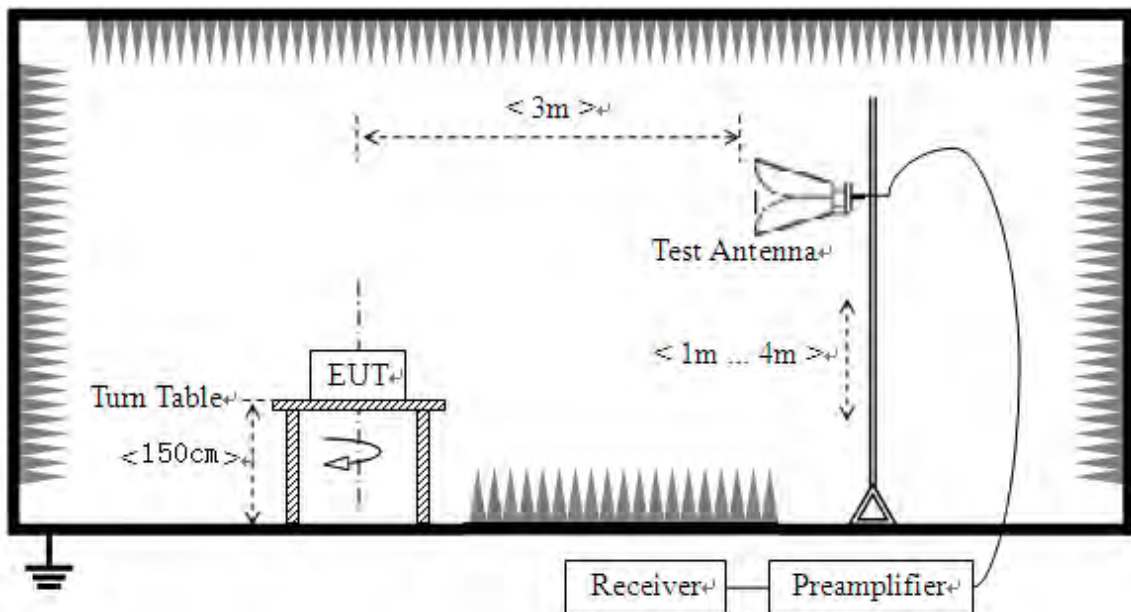
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.



For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

### 2.9.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform a quasi-peak measurement (or average).

The measurement results are obtained as below:

$$E [\text{dB}\mu\text{V}/\text{m}] = U_R + A_T + A_{\text{Factor}} [\text{dB}]; A_T = L_{\text{Cable loss}} [\text{dB}] - G_{\text{preamp}} [\text{dB}]$$

$A_T$ : Total correction Factor except Antenna

$U_R$ : Receiver Reading

$G_{\text{preamp}}$ : Preamplifier Gain

$A_{\text{Factor}}$ : Antenna Factor at 3m

During the test, the total correction Factor  $A_T$  and  $A_{\text{Factor}}$  were built in test software.

**Note 1:** All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

**Note 2:** For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

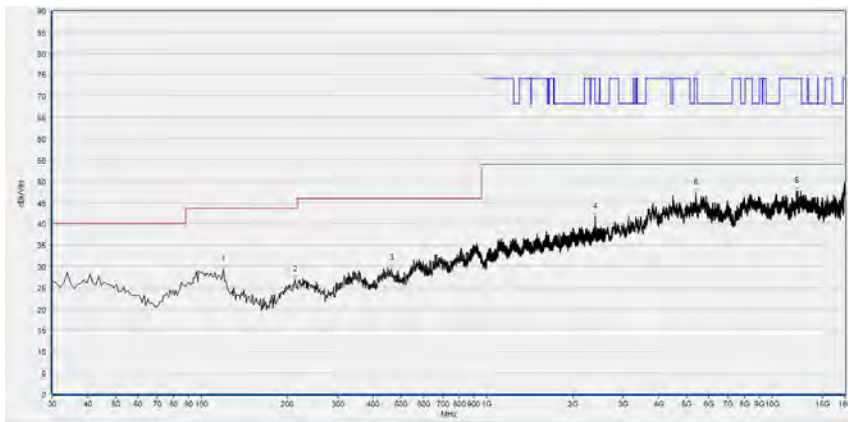
**Note 3:** For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

**Note 4:** All test modes and bandwidth were considered and evaluated respectively by performing full test, only the worst data were recorded for each bandwidth.



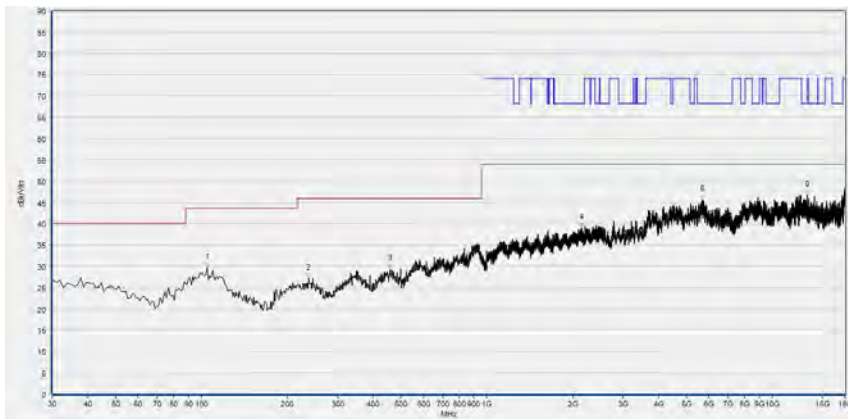
**802.11a Mode**

**Plot for Channel 36**



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
119.329	29.14	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
212.543	26.88	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
462.082	29.56	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2401.534	41.59	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5394.119	47.09	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12149.910	47.62	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

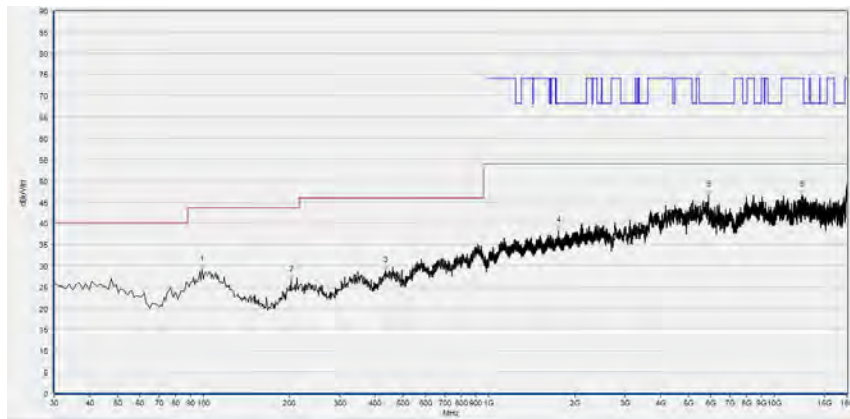
(Antenna Horizontal, 30MHz to 18GHz)



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
104.765	29.66	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
237.788	27.20	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
458.198	29.27	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2150.250	38.97	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5677.536	45.63	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
13243.529	46.75	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

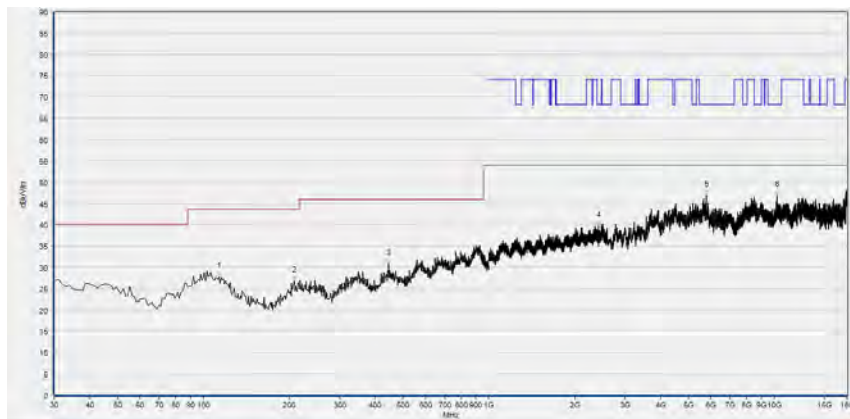
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 44



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
98.939	29.00	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
202.833	26.58	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
434.895	28.90	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1757.052	38.27	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5871.614	46.53	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12519.584	46.66	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)

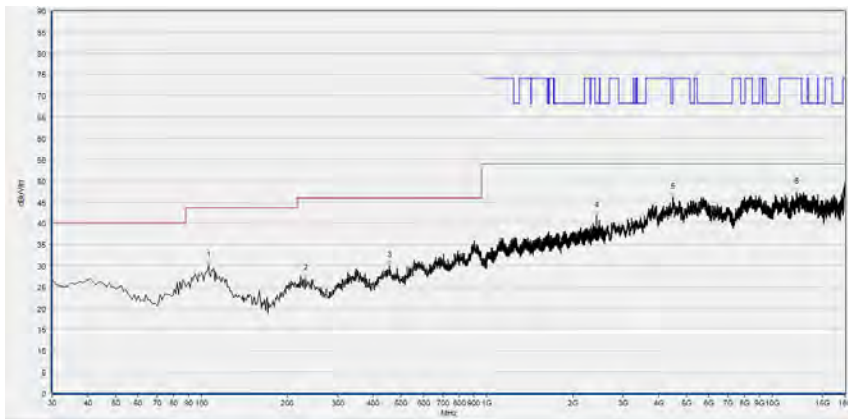


Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
113.504	27.74	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
207.688	26.89	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
445.576	30.88	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2427.142	39.77	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5769.954	46.95	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
10212.202	46.98	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

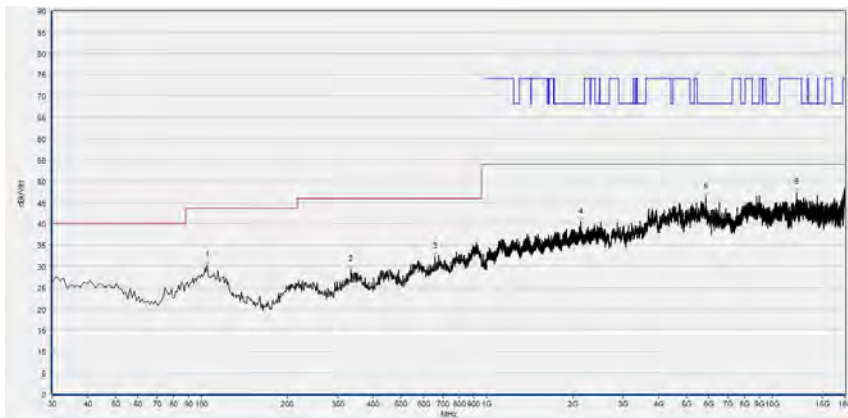


Plot for Channel 48



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
105.736	29.94	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
231.962	26.99	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
456.256	29.94	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2425.542	41.70	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
4479.176	46.17	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12143.749	47.27	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

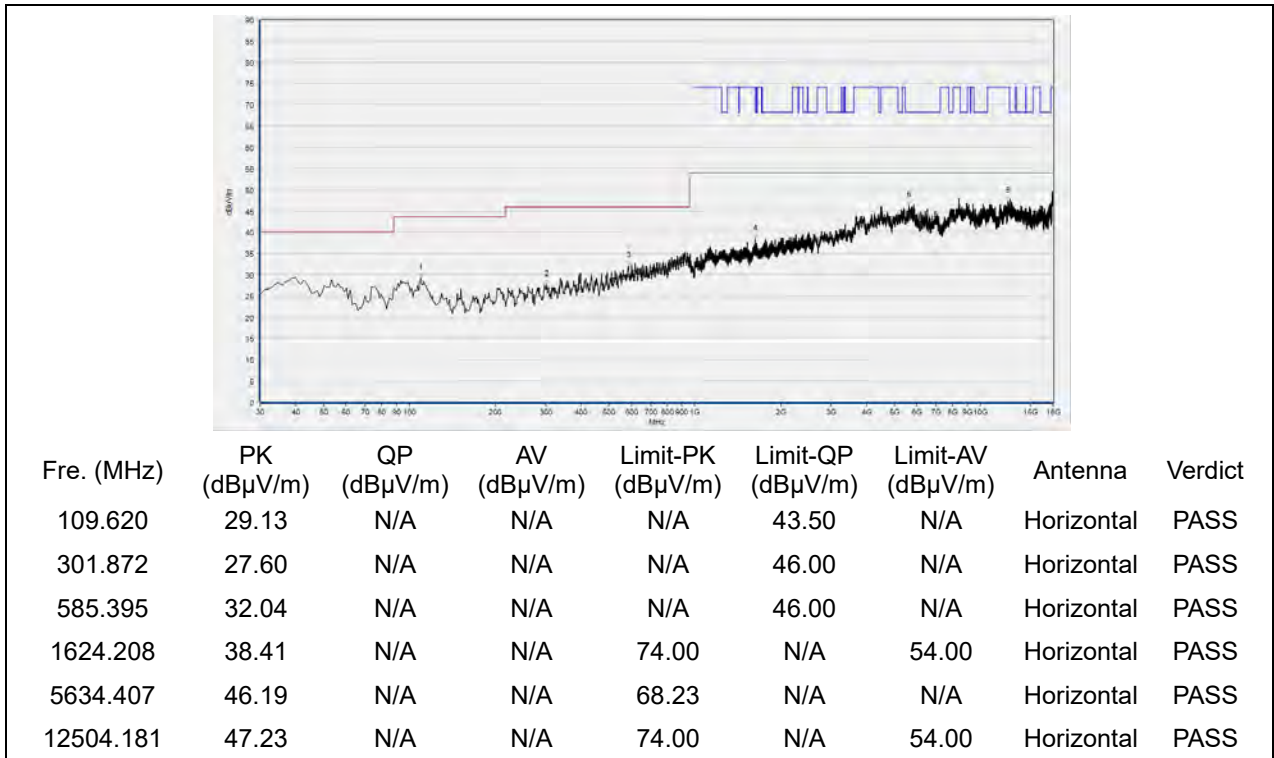
(Antenna Horizontal, 30MHz to 18GHz)



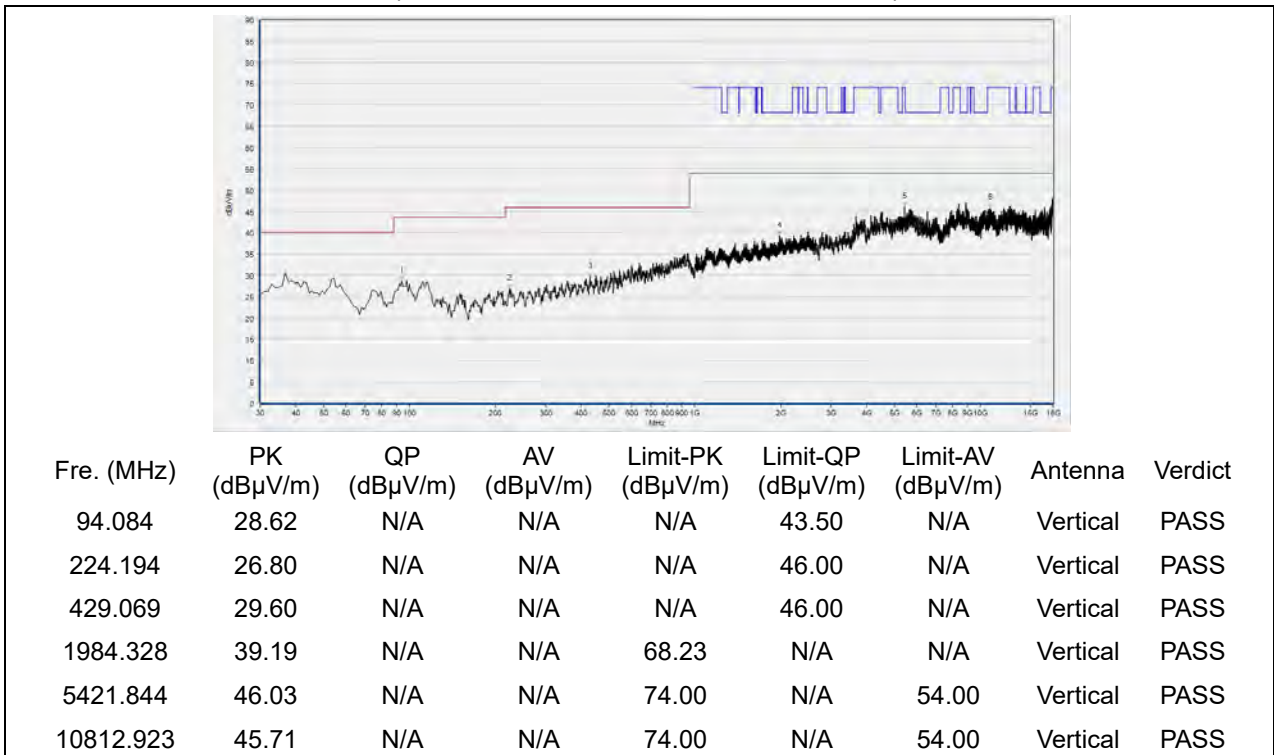
Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
104.765	30.12	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
333.914	29.17	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
659.189	32.12	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2137.446	40.37	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5859.292	46.20	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12156.071	47.31	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 52

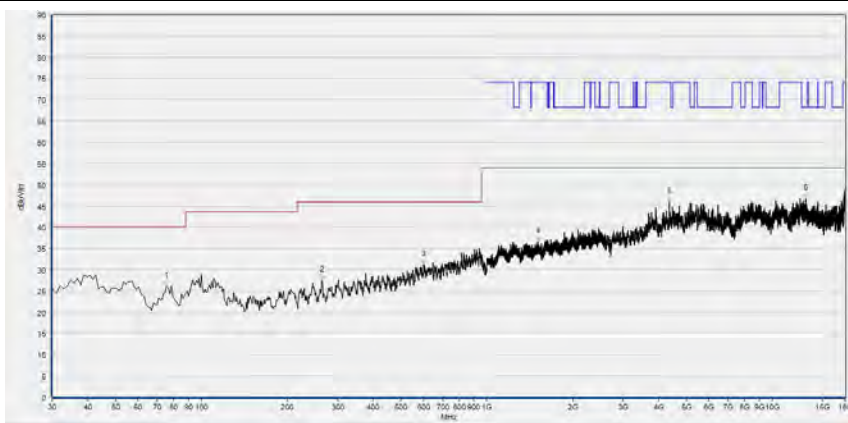


(Antenna Horizontal, 30MHz to 18GHz)



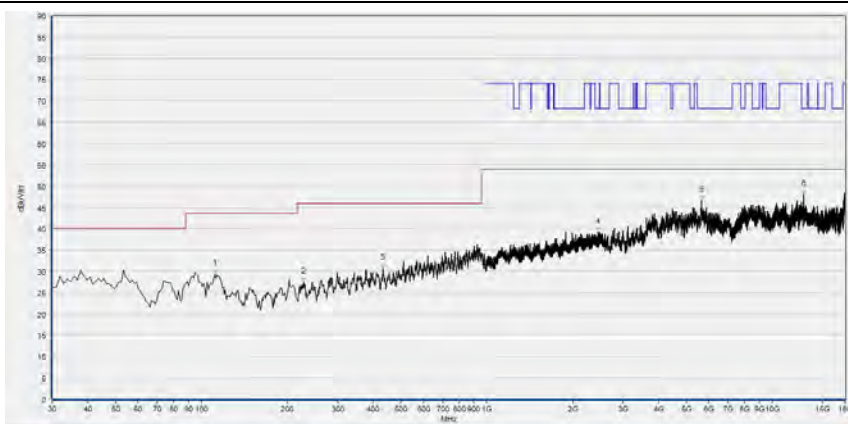
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 60



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
75.636	26.21	N/A	N/A	N/A	40.00	N/A	Horizontal	PASS
264.975	27.42	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
600.931	31.14	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1512.704	36.59	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
4368.274	45.92	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
13132.627	46.71	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS

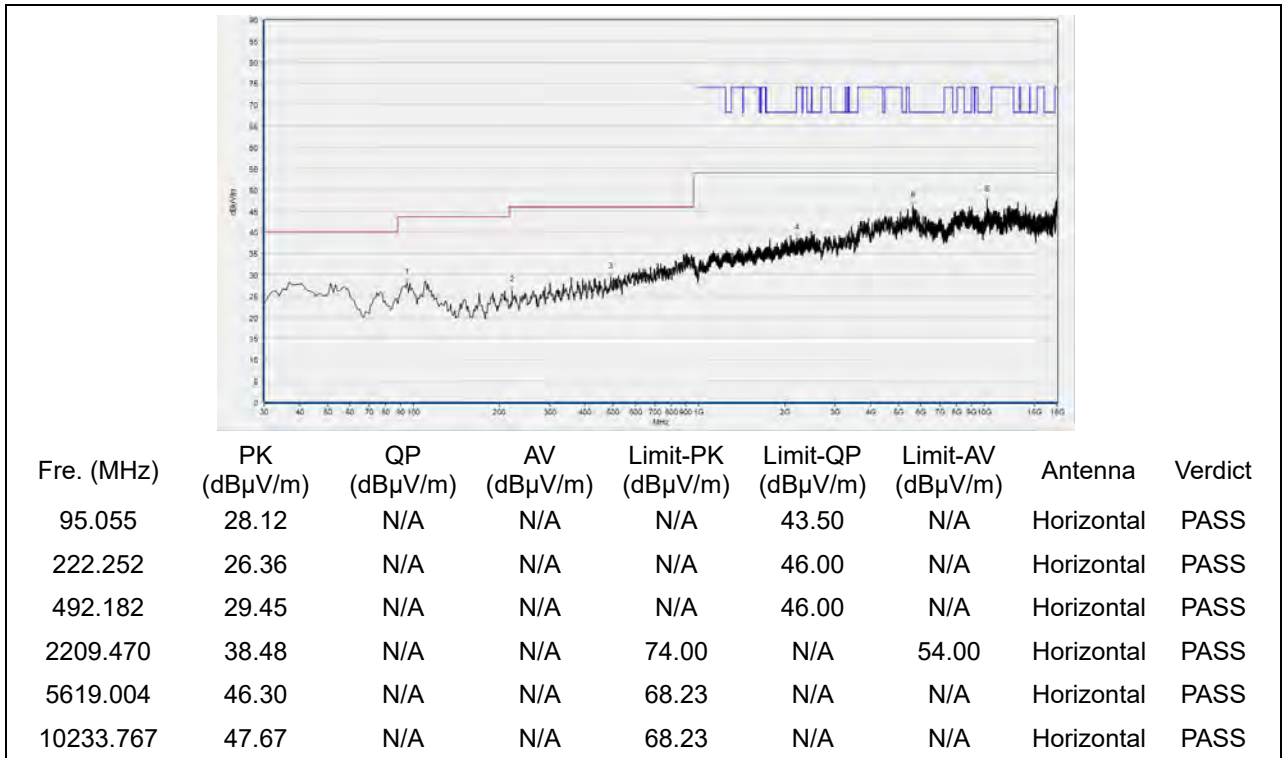
(Antenna Horizontal, 30MHz to 18GHz)



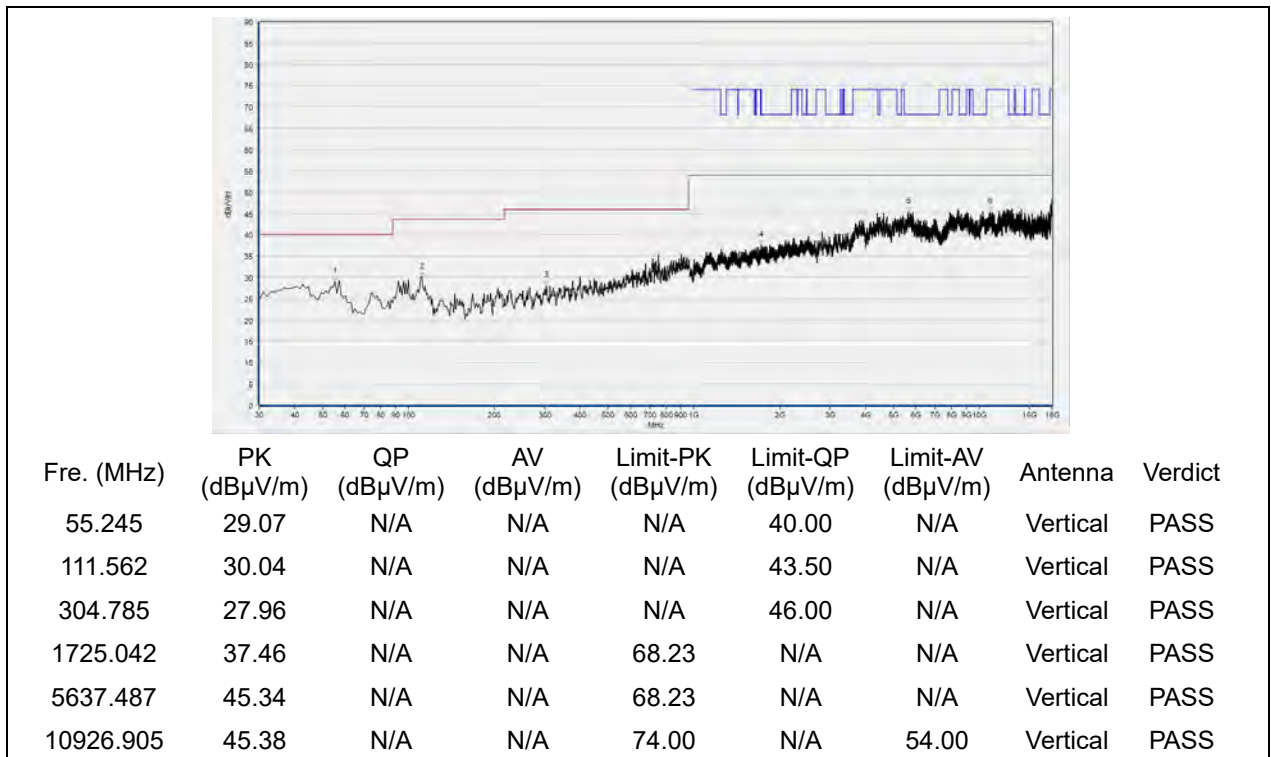
Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
111.562	29.30	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
228.078	27.49	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
432.953	30.62	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
2452.217	39.16	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5655.971	46.58	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12895.419	48.07	N/A	N/A	68.23	N/A	N/A	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 64

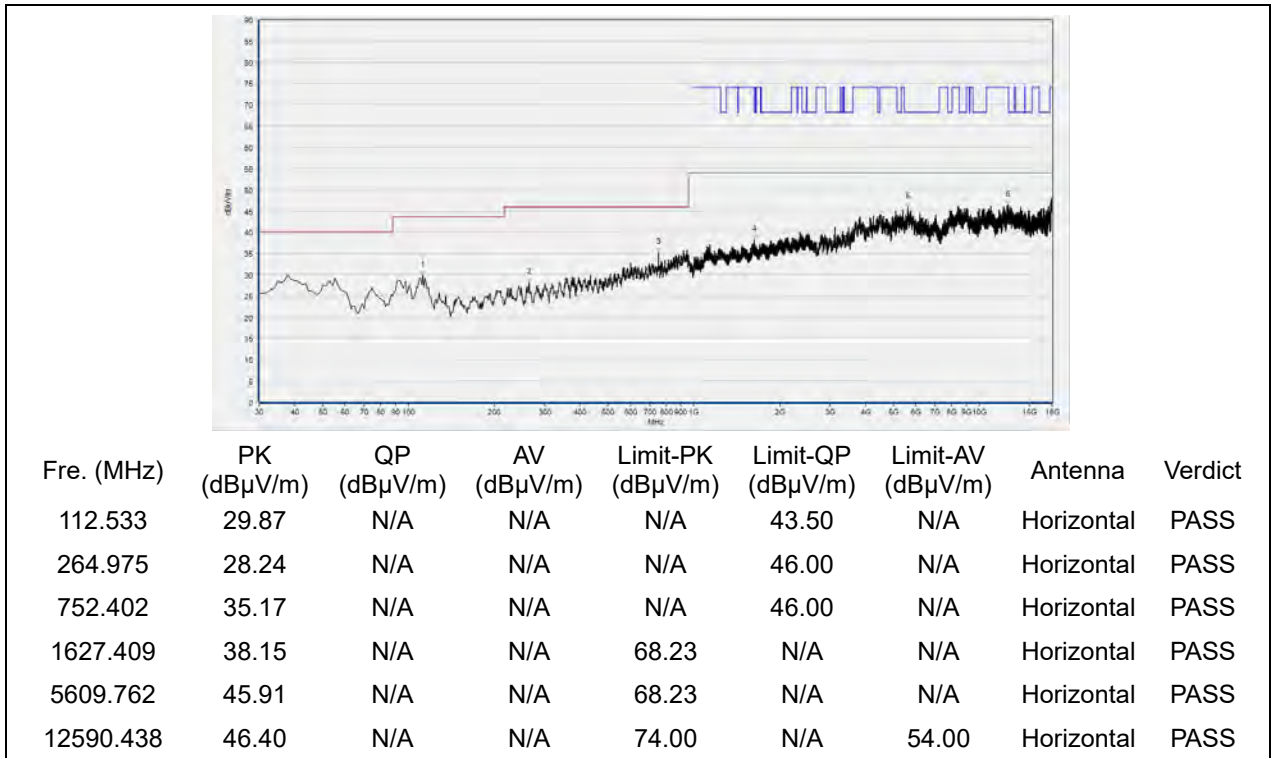


(Antenna Horizontal, 30MHz to 18GHz)

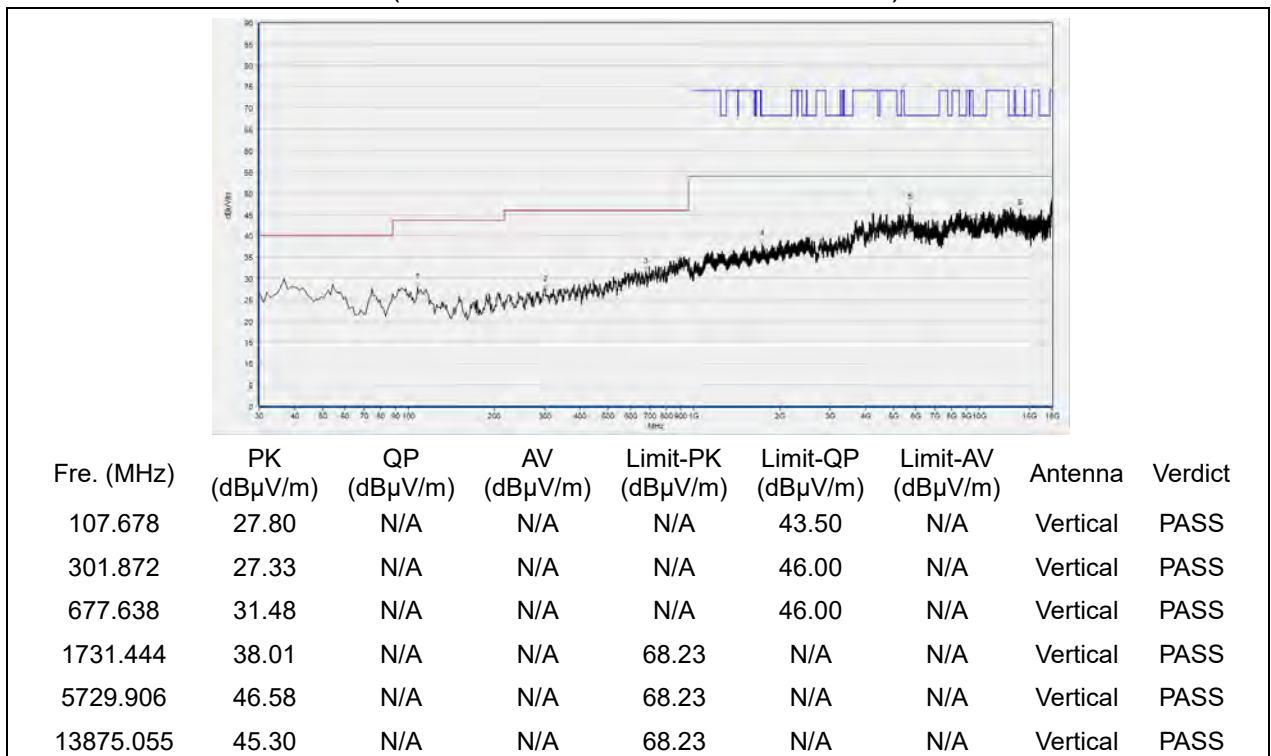


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 100



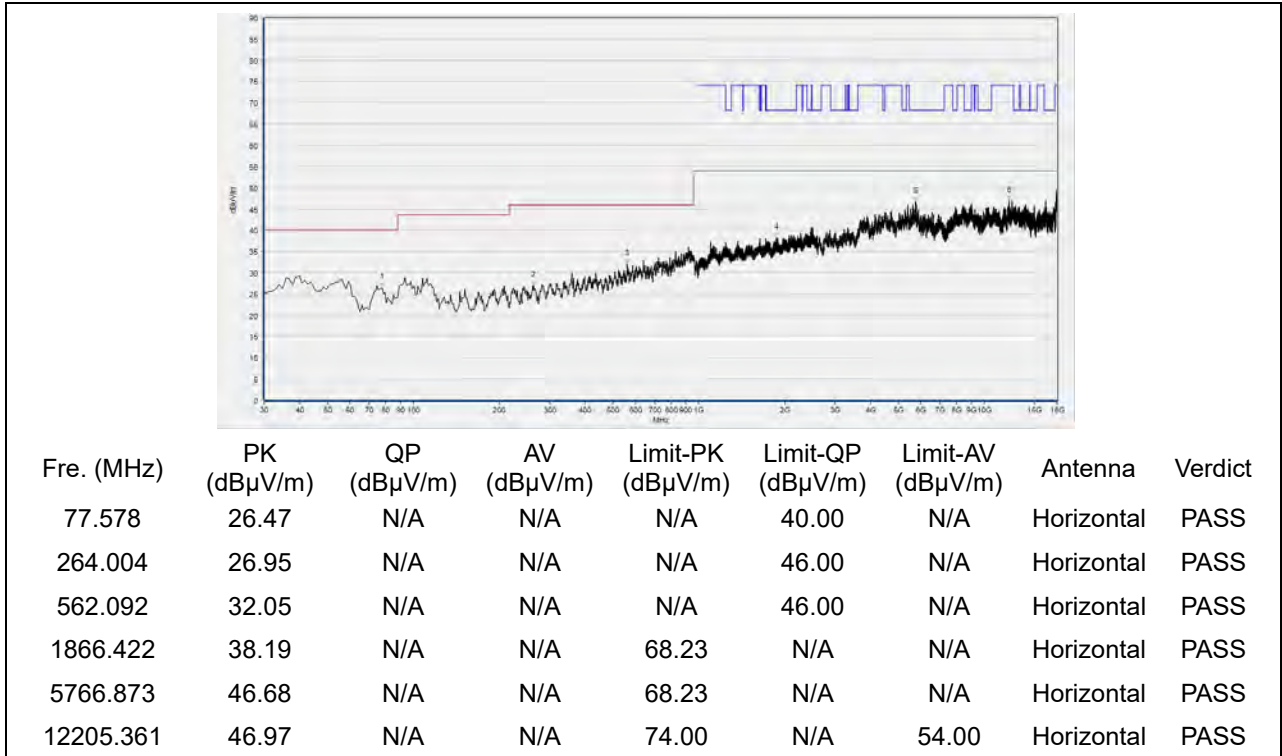
(Antenna Horizontal, 30MHz to 18GHz)



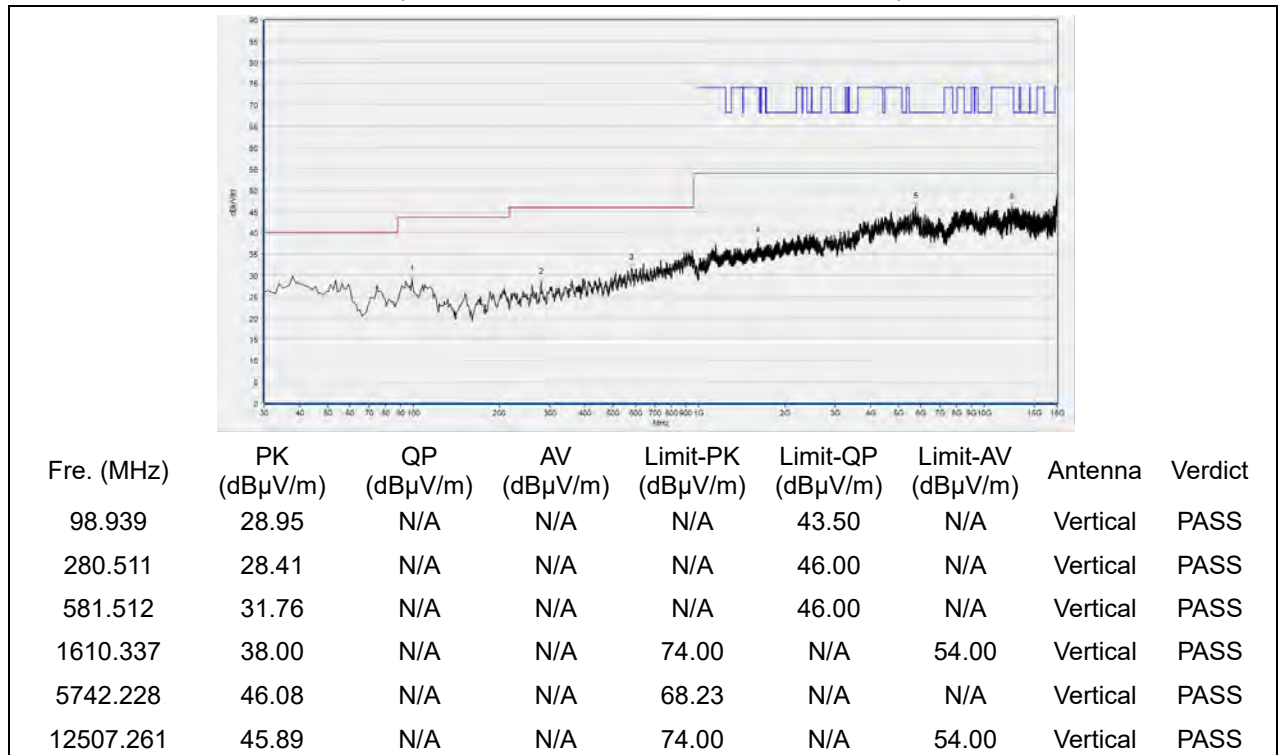
(Antenna Vertical, 30MHz to 18GHz)



Plot for Channel 120

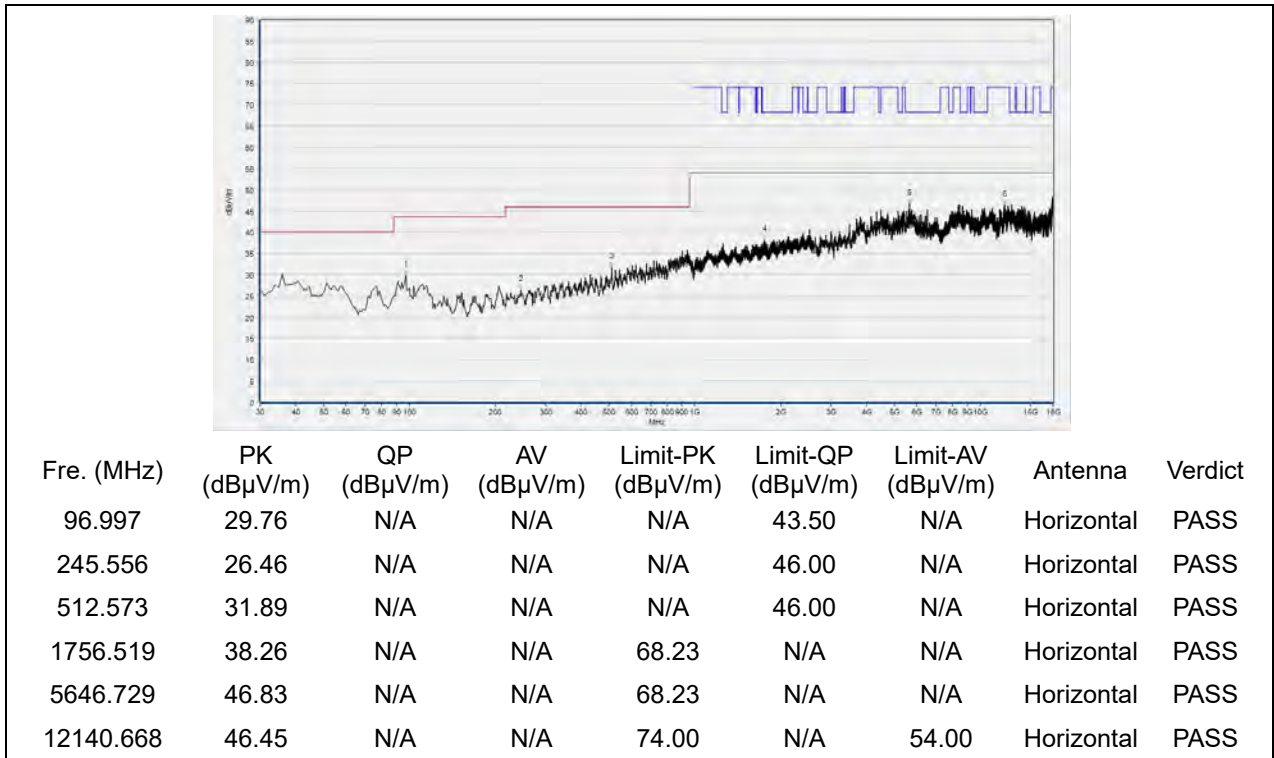


(Antenna Horizontal, 30MHz to 18GHz)

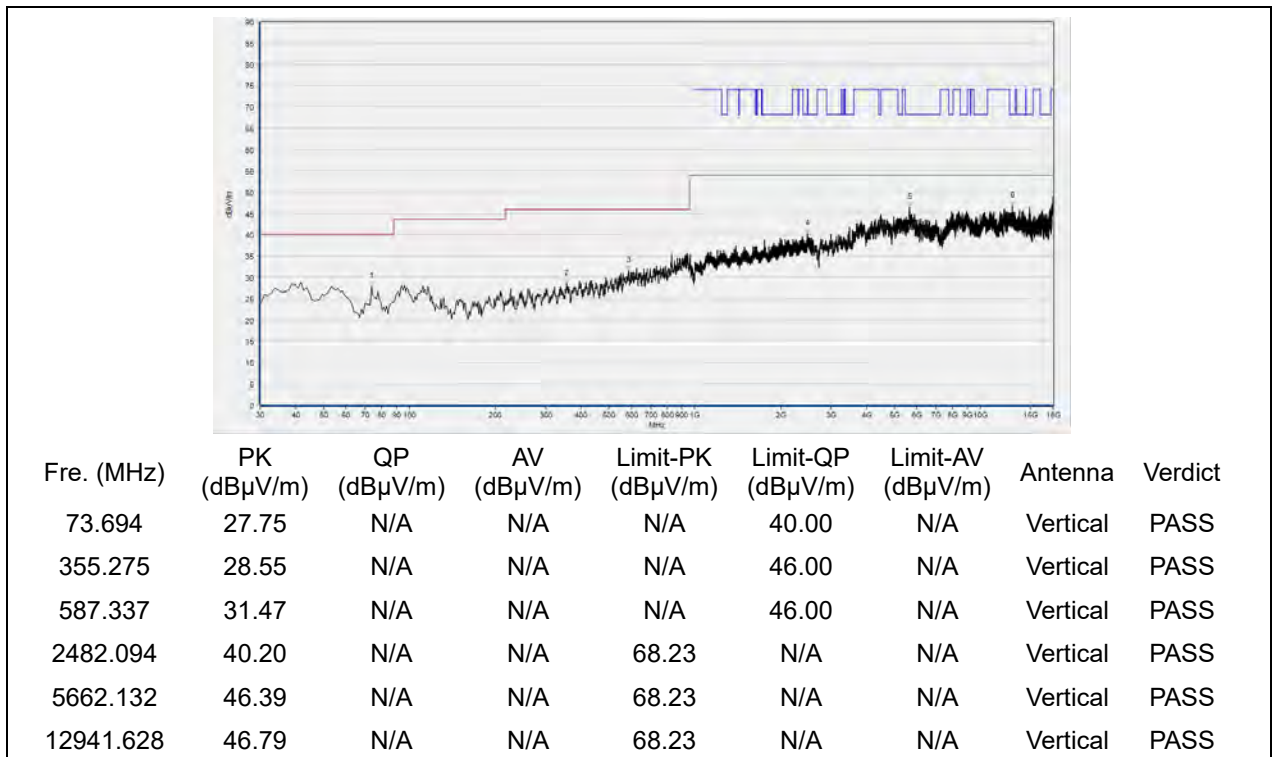


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 144

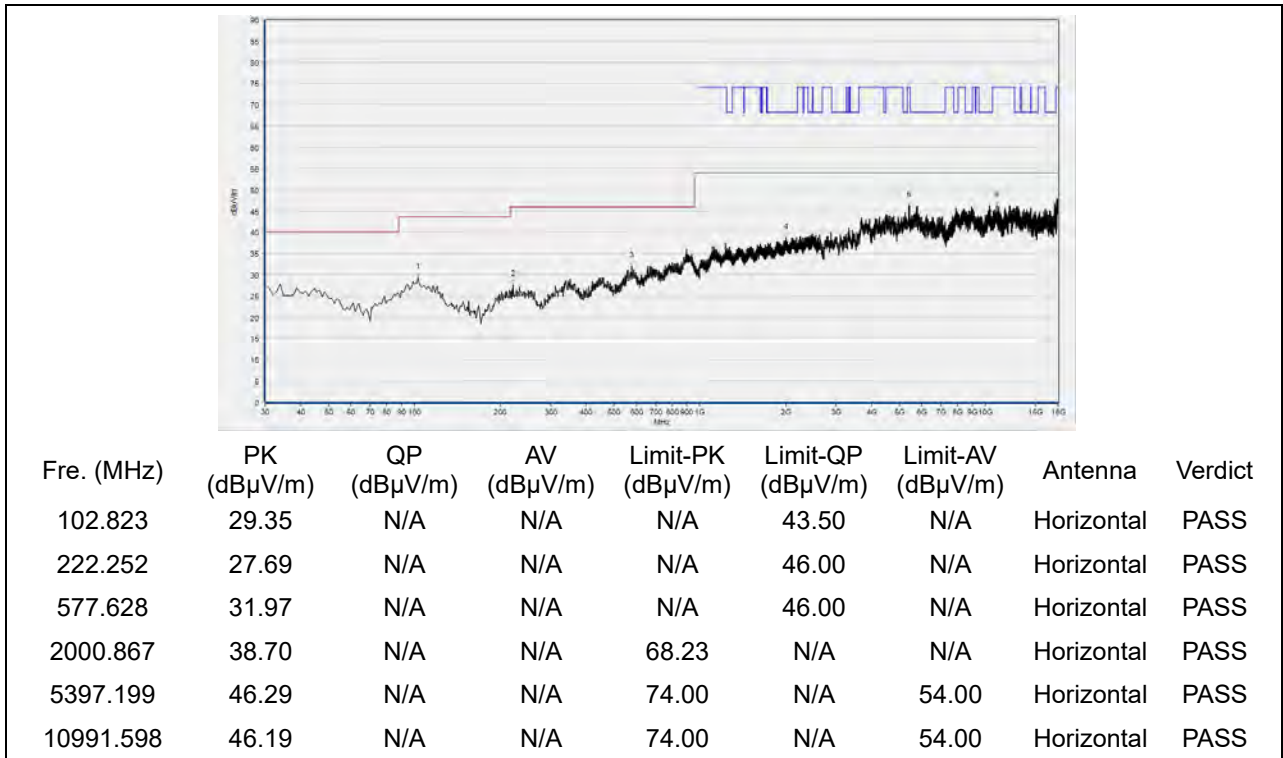


(Antenna Horizontal, 30MHz to 18GHz)

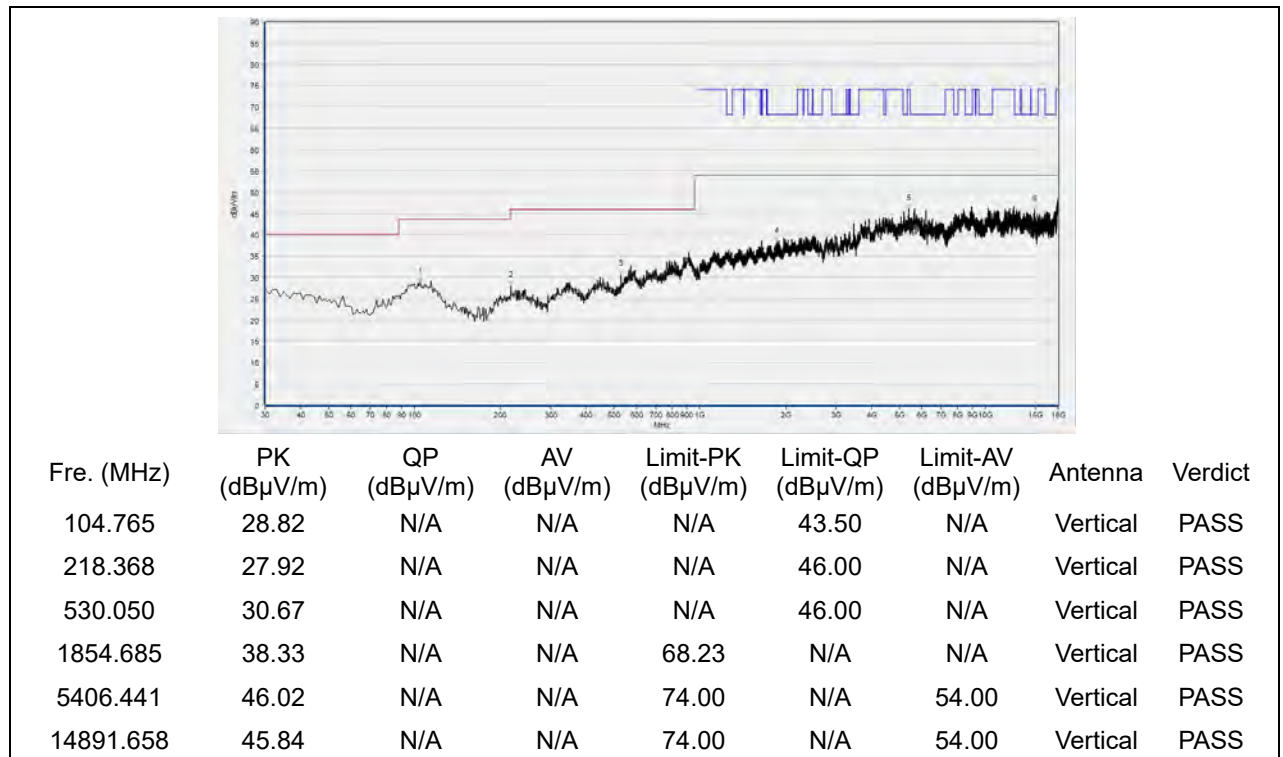


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 149

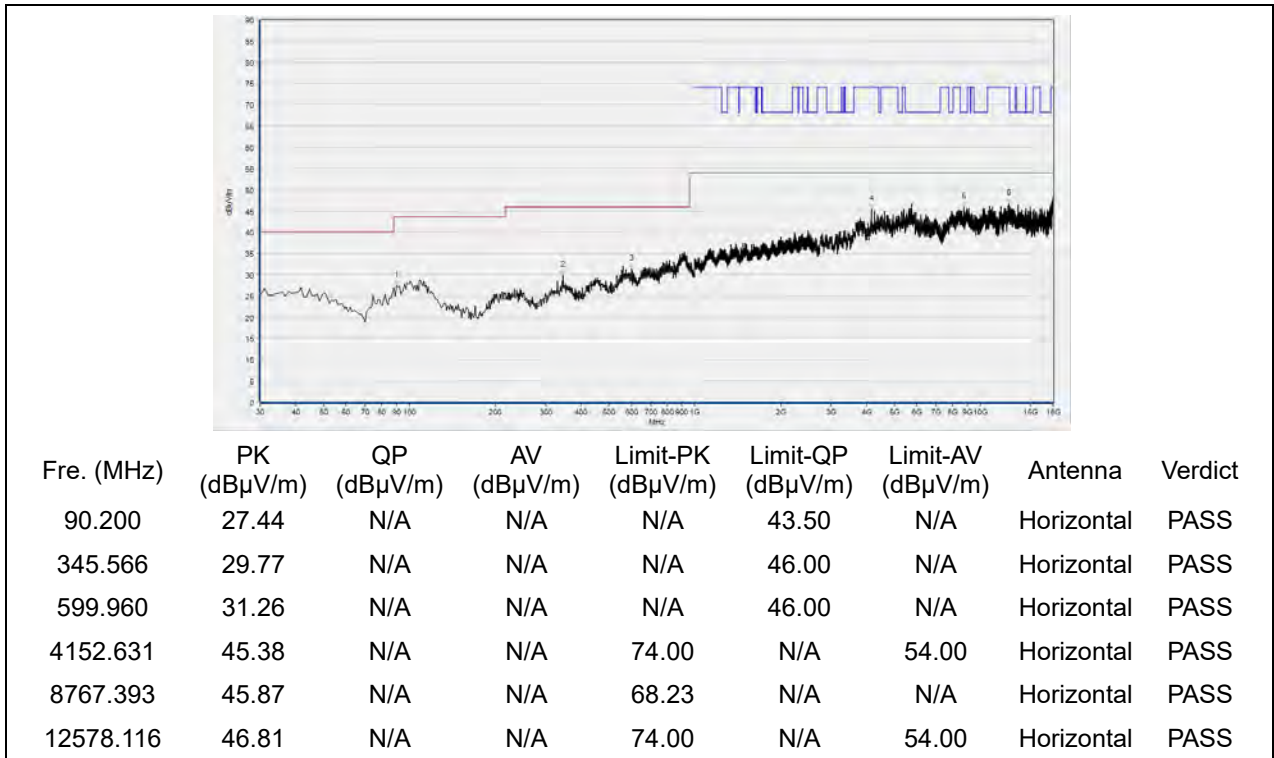


(Antenna Horizontal, 30MHz to 18GHz)

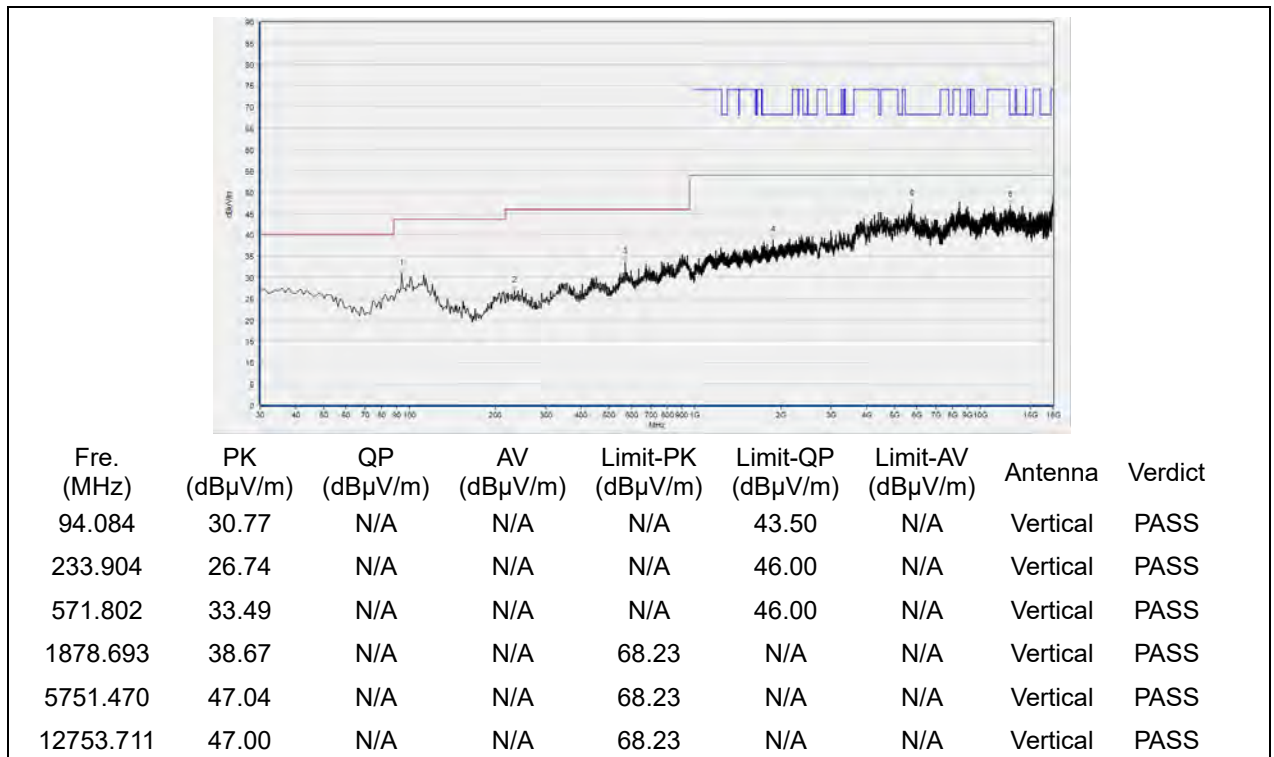


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 157

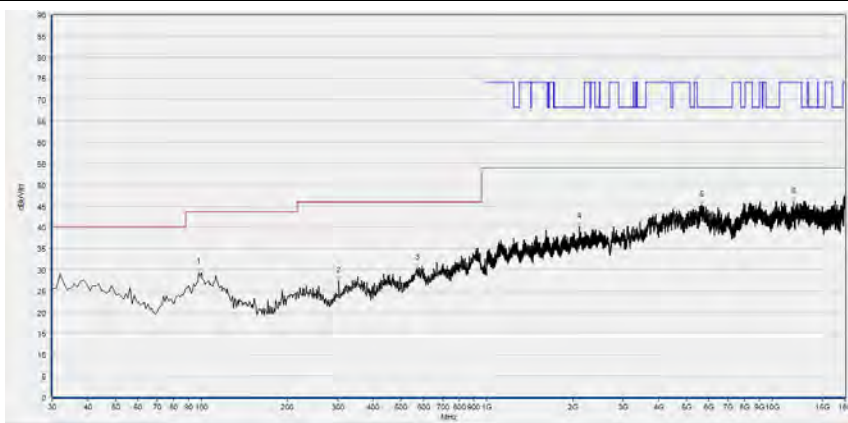


(Antenna Horizontal, 30MHz to 18GHz)



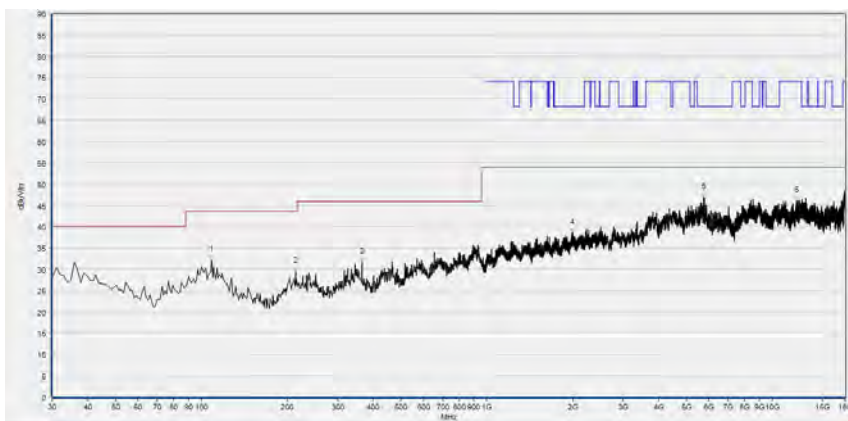
(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 165



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
97.968	29.31	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
302.843	27.27	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
571.802	30.29	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
2109.703	40.02	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5652.891	45.26	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
11881.896	45.89	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

(Antenna Horizontal, 30MHz to 18GHz)



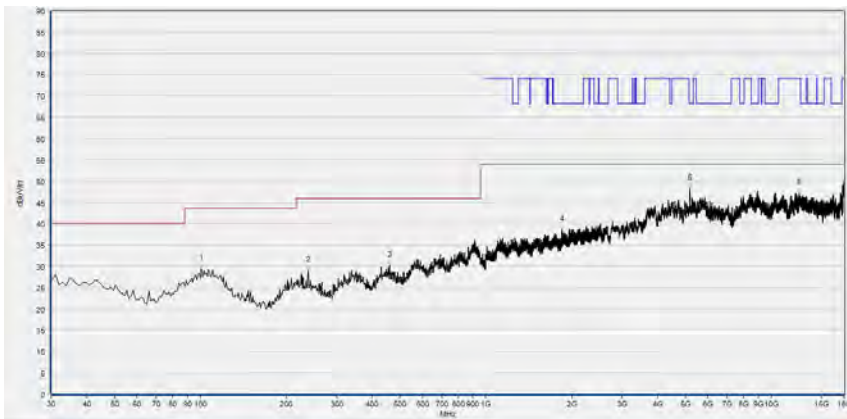
Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
108.649	32.19	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
213.514	29.49	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
364.985	31.71	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1994.465	38.51	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
5757.632	46.98	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12165.313	46.04	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)



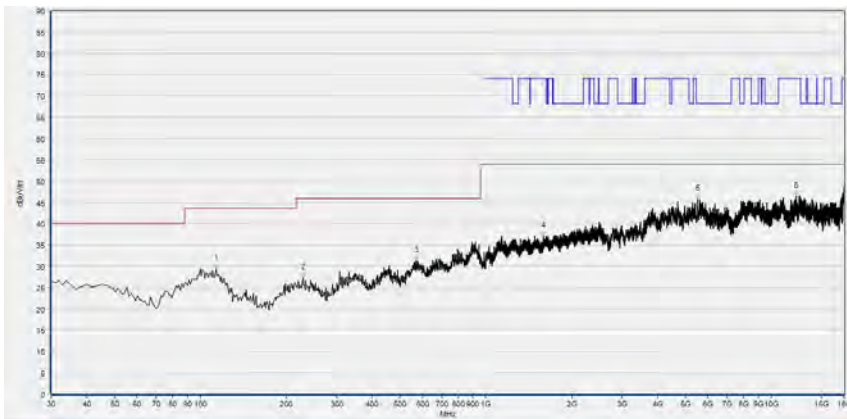
**802.11n (HT40) mode**

**Plot for Channel 38**



Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
100.881	29.47	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
238.759	29.00	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
460.140	30.09	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1844.015	38.54	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5181.556	48.28	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
12522.665	47.04	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

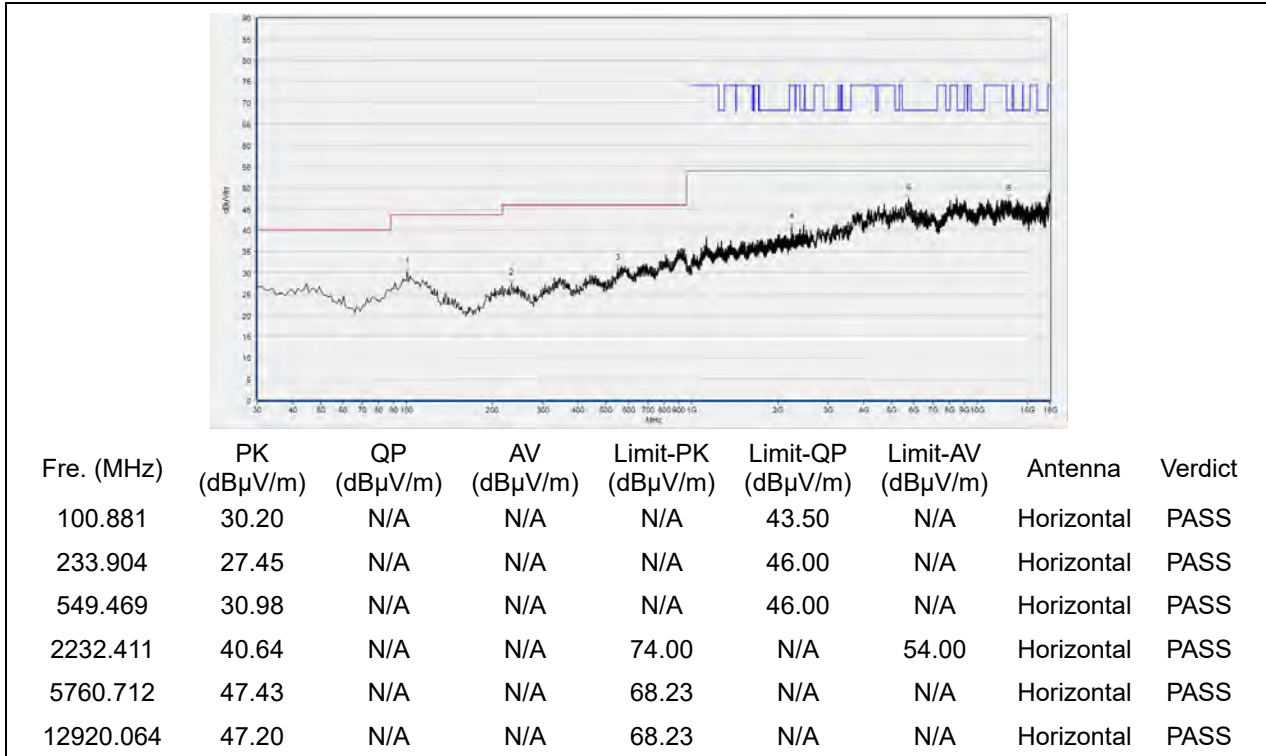
(Antenna Horizontal, 30MHz to 18GHz)



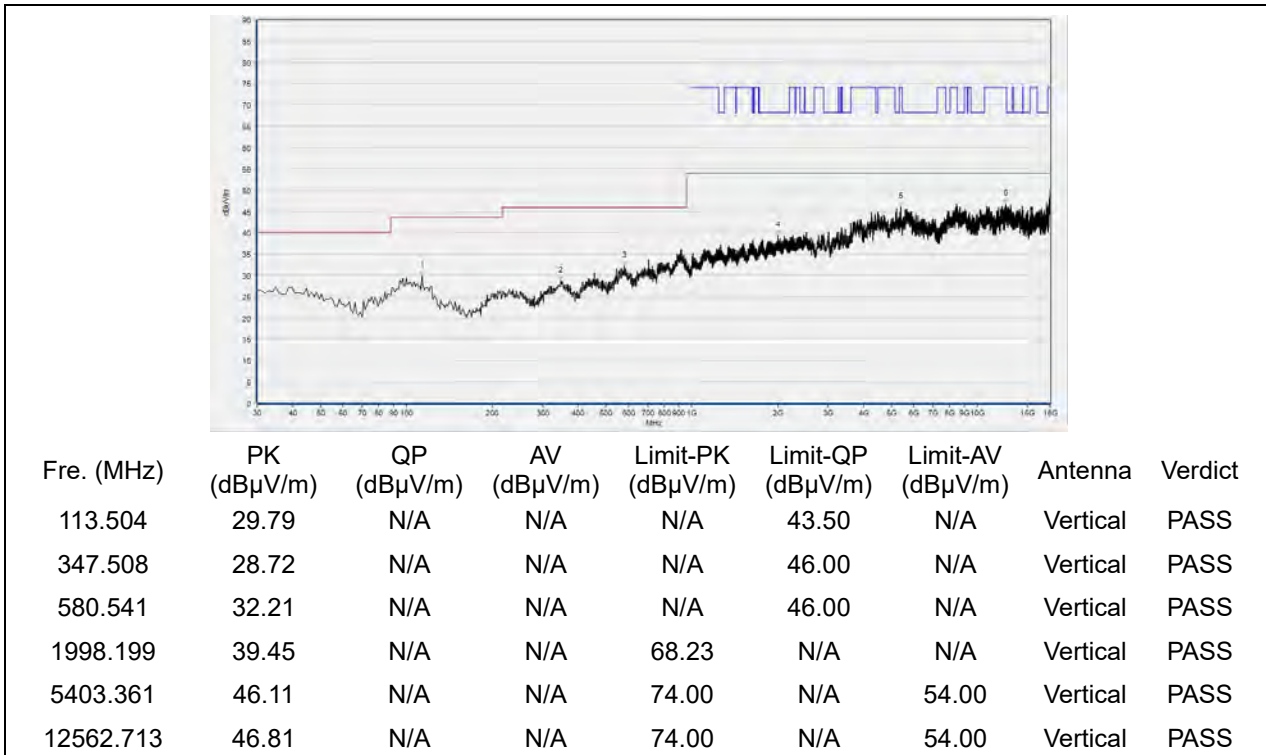
Fre. (MHz)	PK (dBμV/m)	QP (dBμV/m)	AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-QP (dBμV/m)	Limit-AV (dBμV/m)	Antenna	Verdict
113.504	29.52	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
229.049	27.37	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
569.860	31.32	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1588.996	36.96	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5523.505	45.71	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12211.522	46.43	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 46

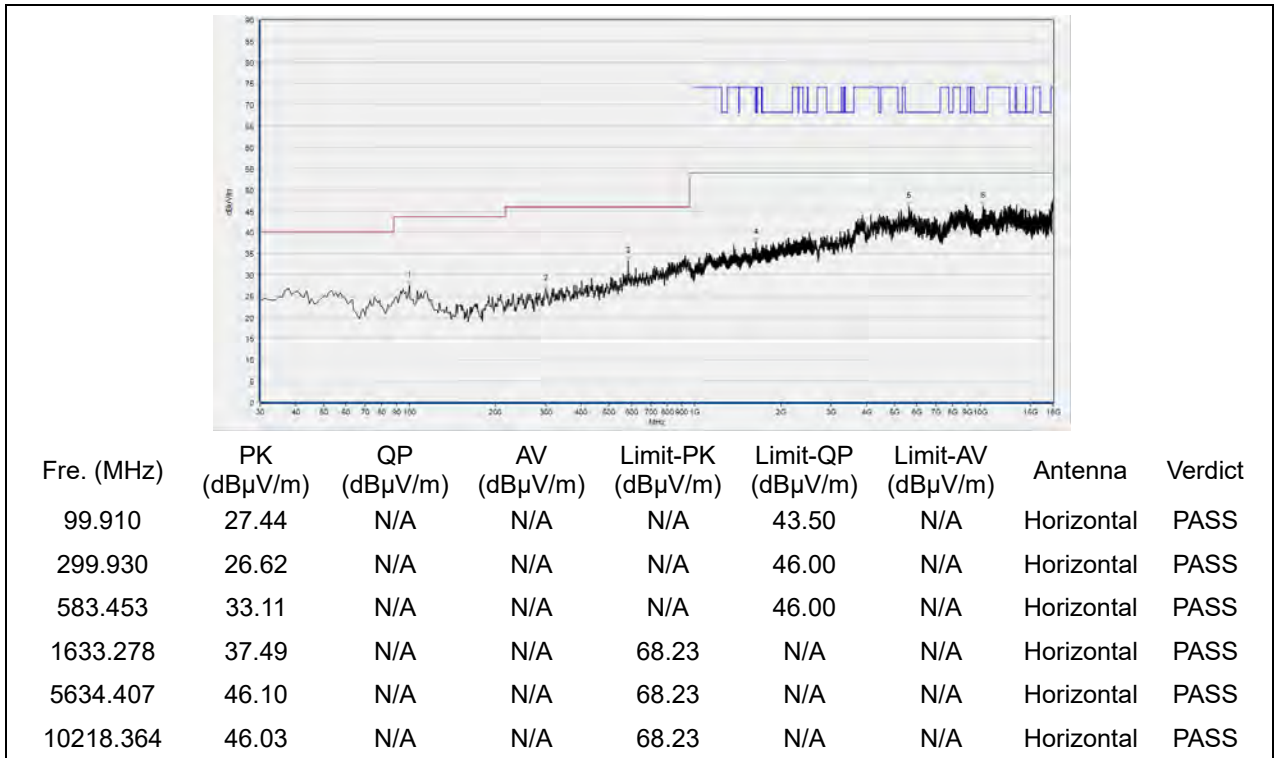


(Antenna Horizontal, 30MHz to 18GHz)

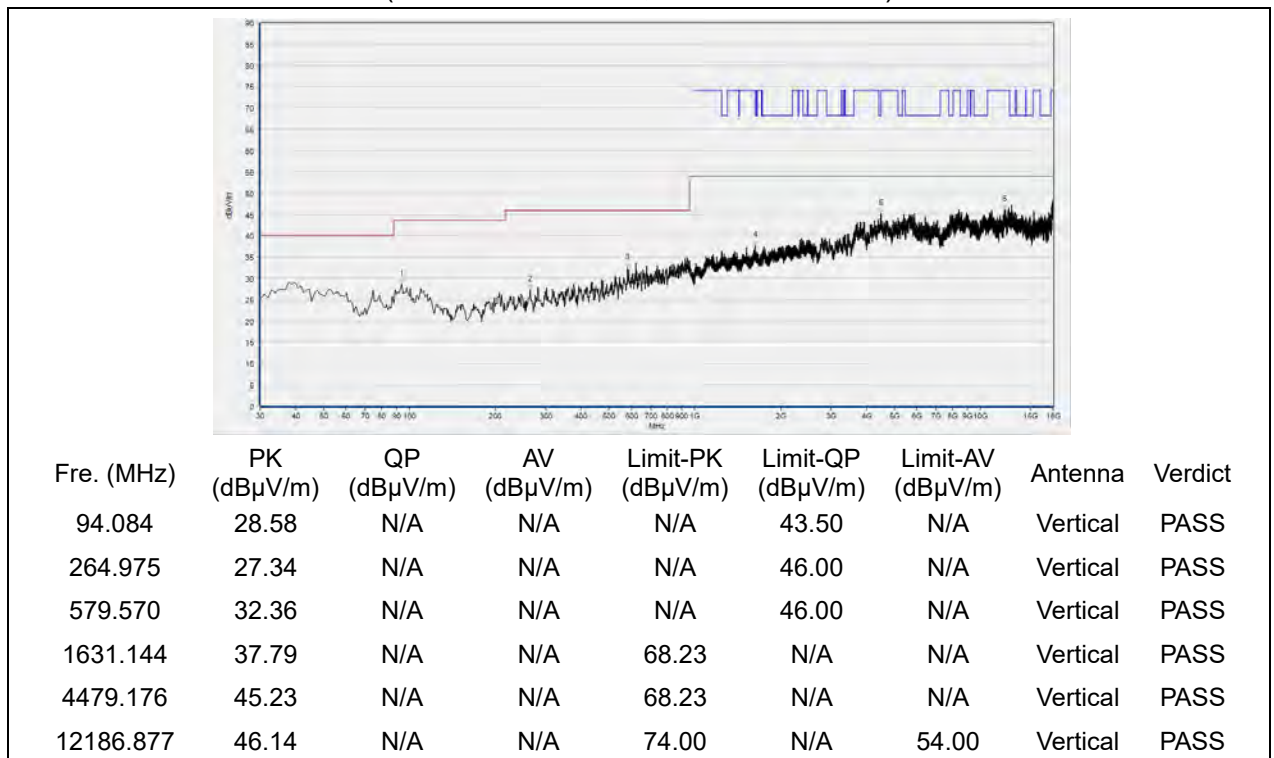


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 54

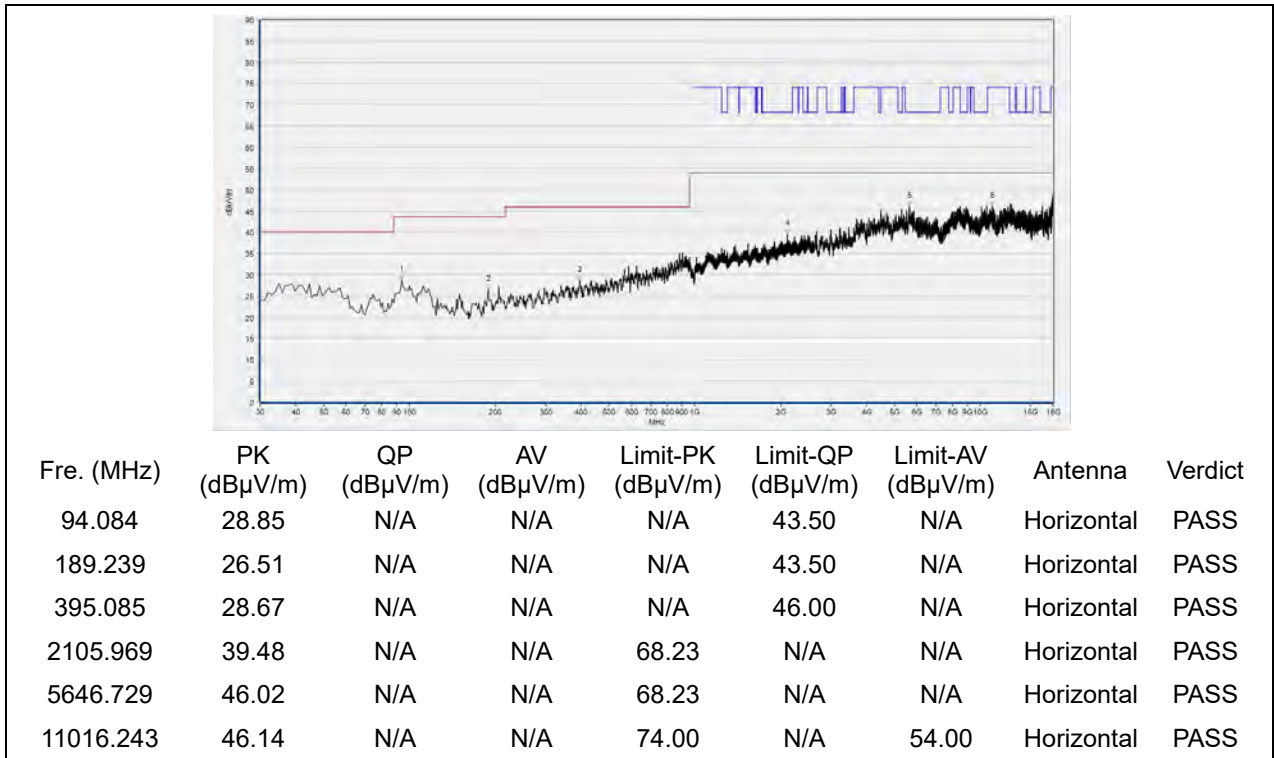


(Antenna Horizontal, 30MHz to 18GHz)

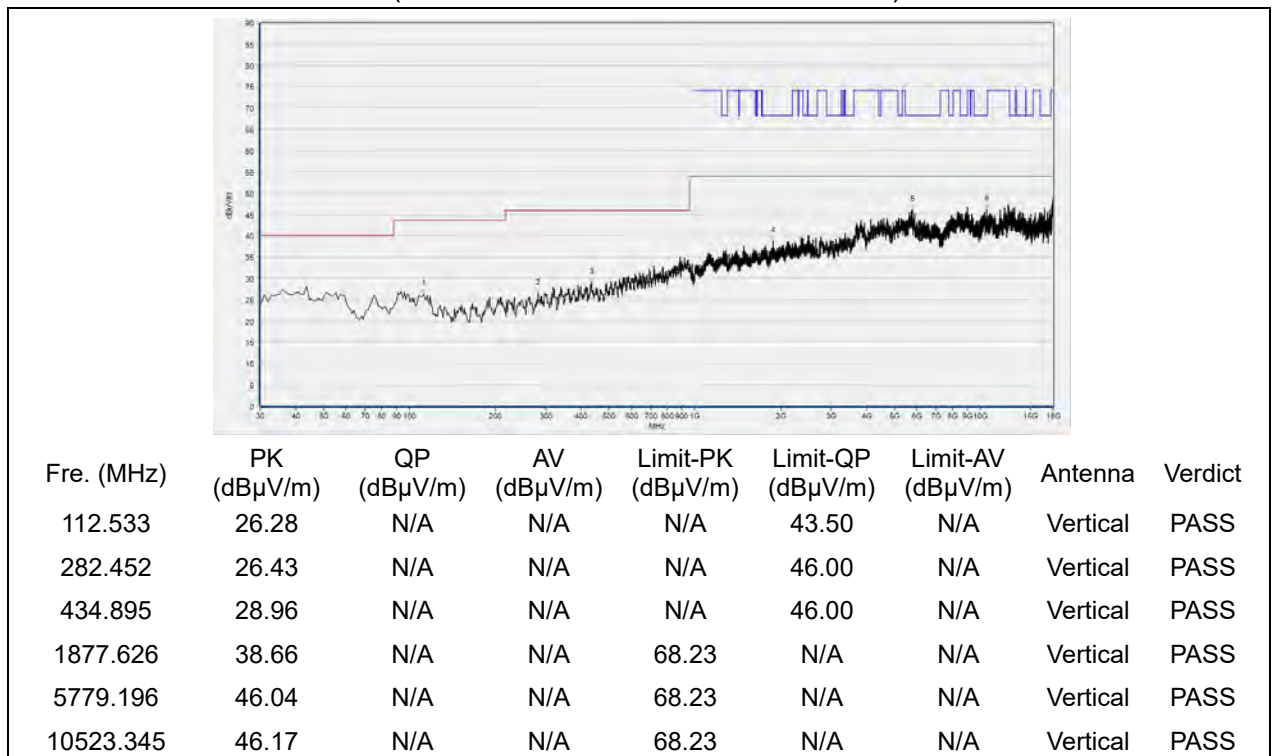


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 62

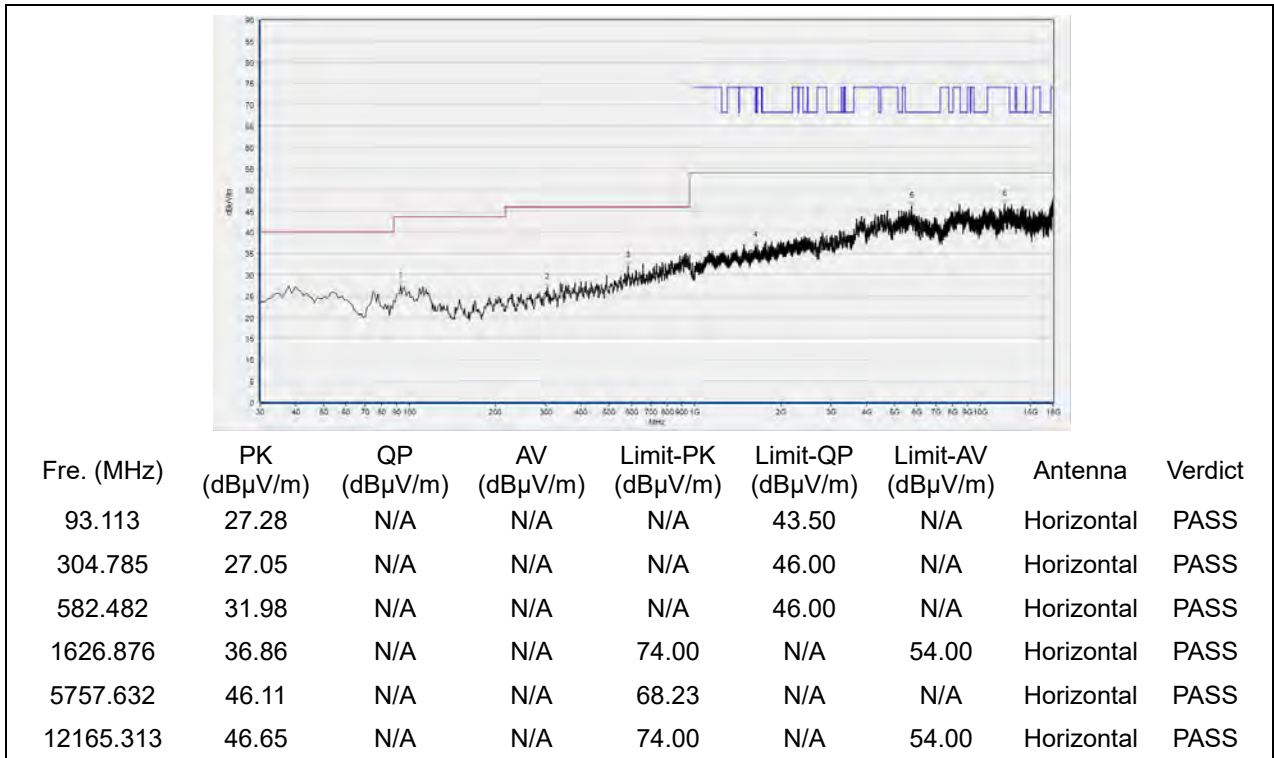


(Antenna Horizontal, 30MHz to 18GHz)

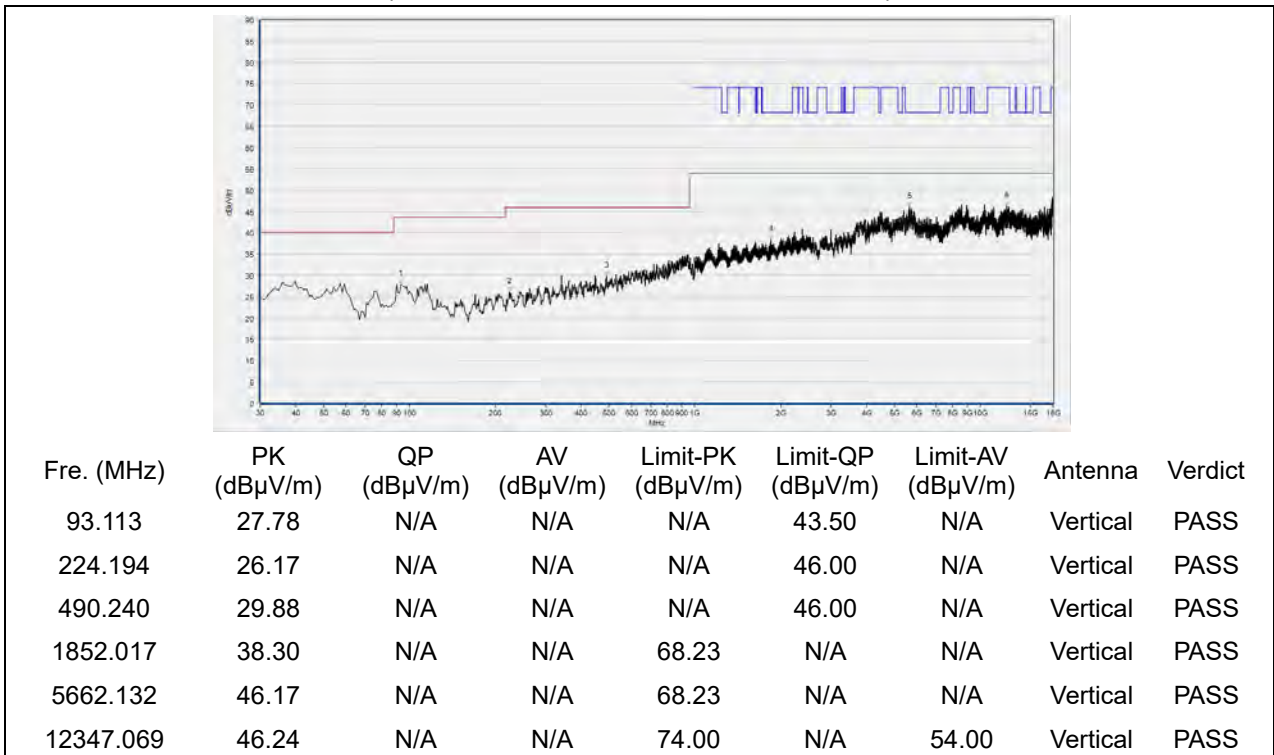


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 102



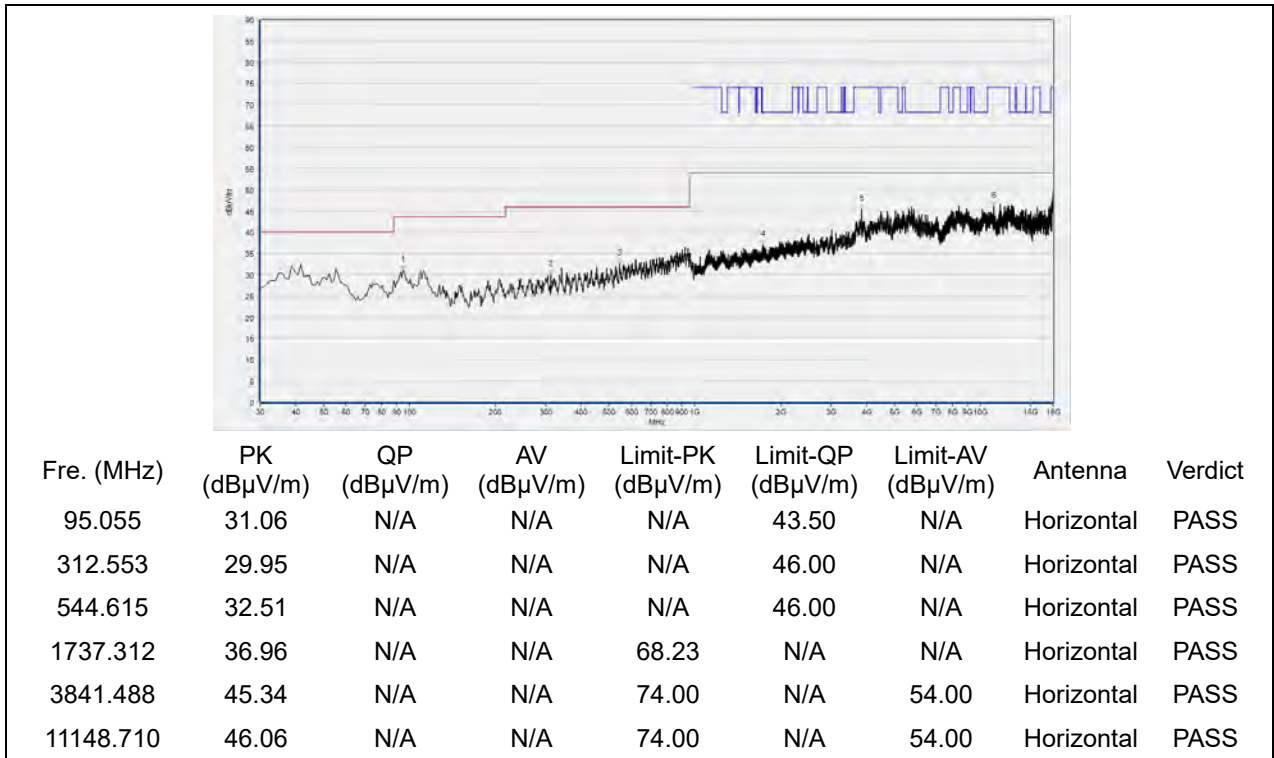
(Antenna Horizontal, 30MHz to 18GHz)



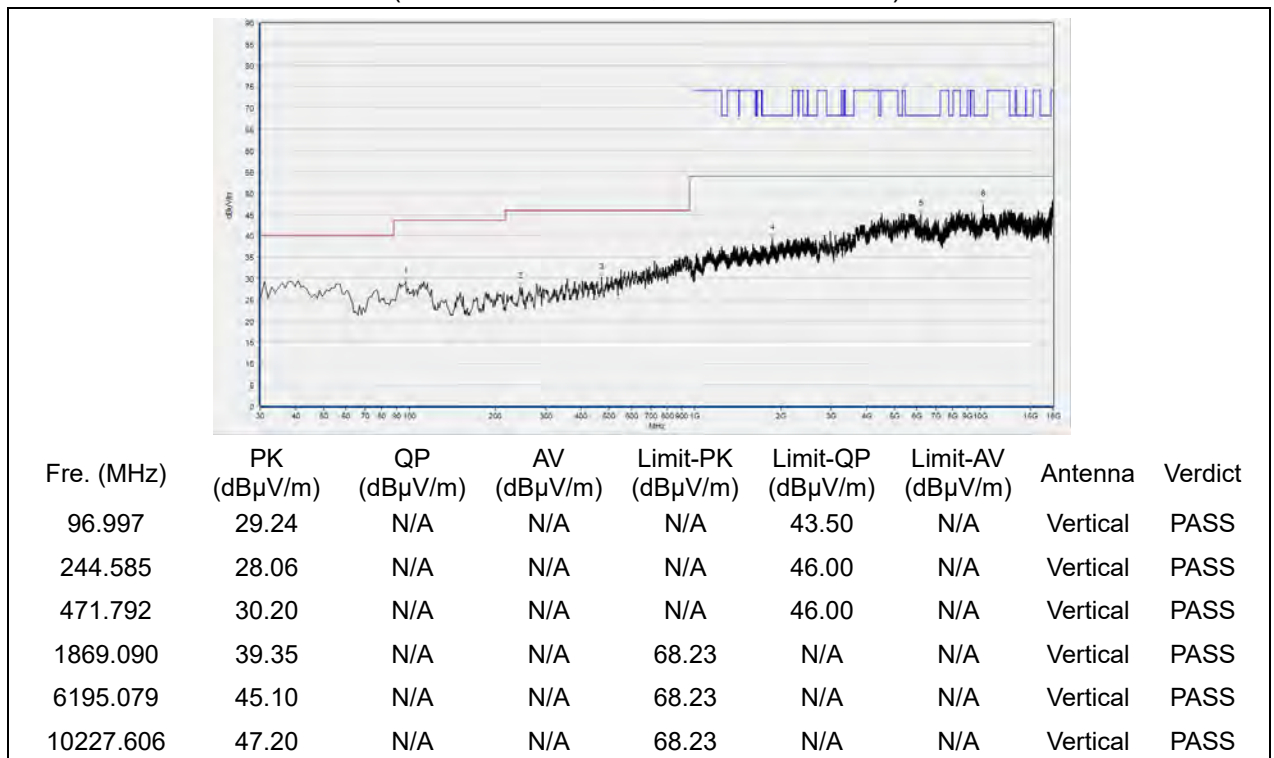
(Antenna Vertical, 30MHz to 18GHz)



Plot for Channel 126

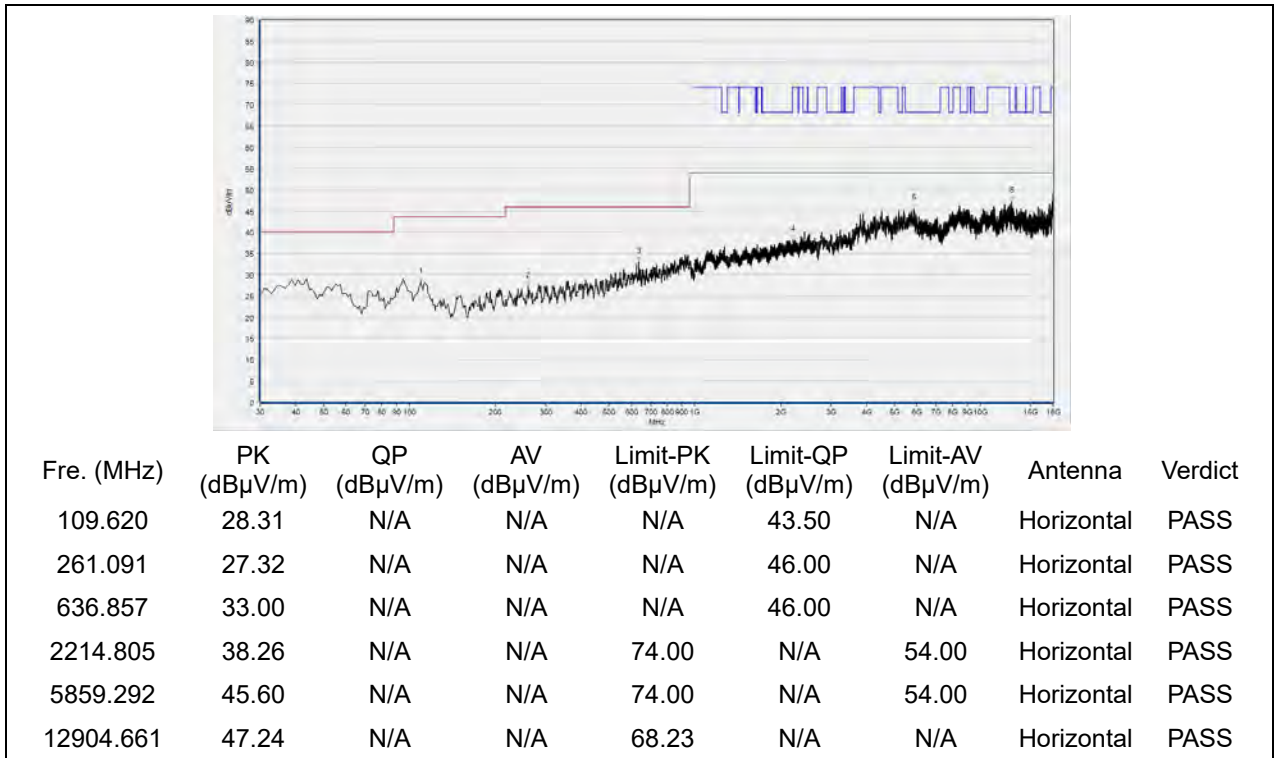


(Antenna Horizontal, 30MHz to 18GHz)

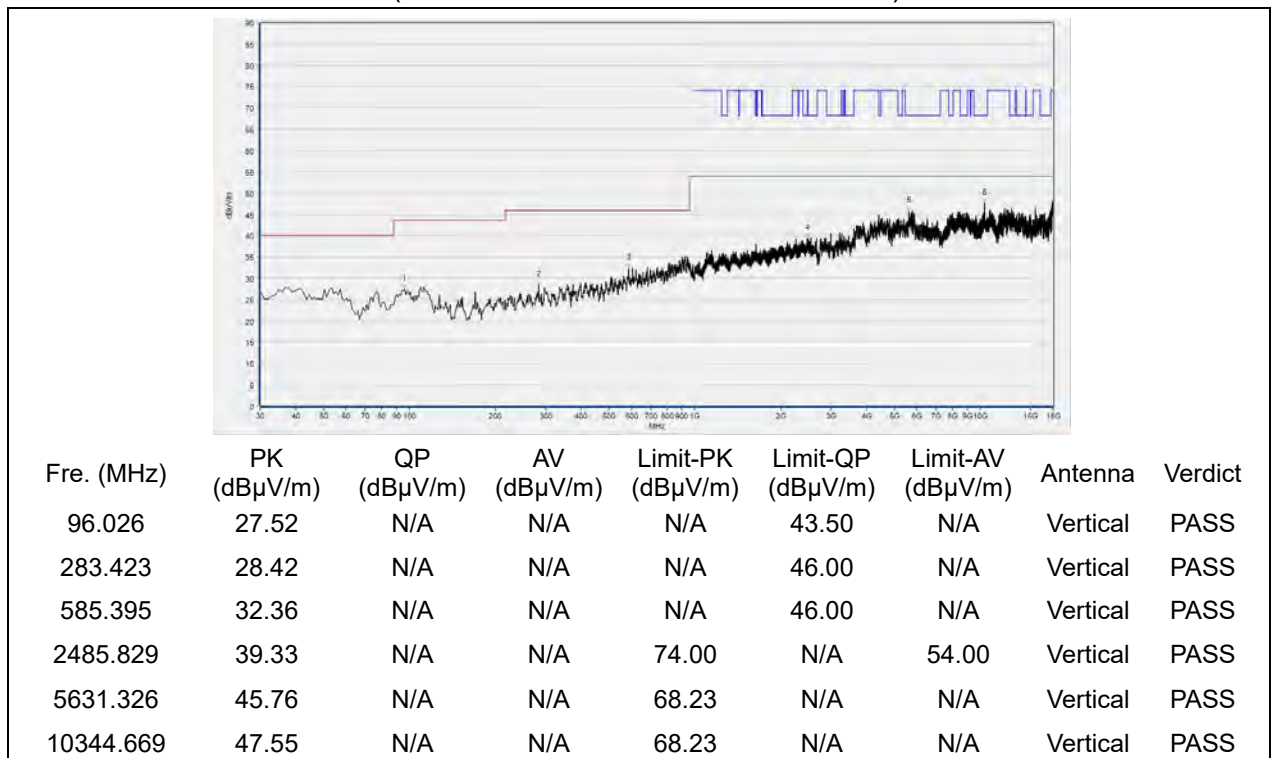


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 142

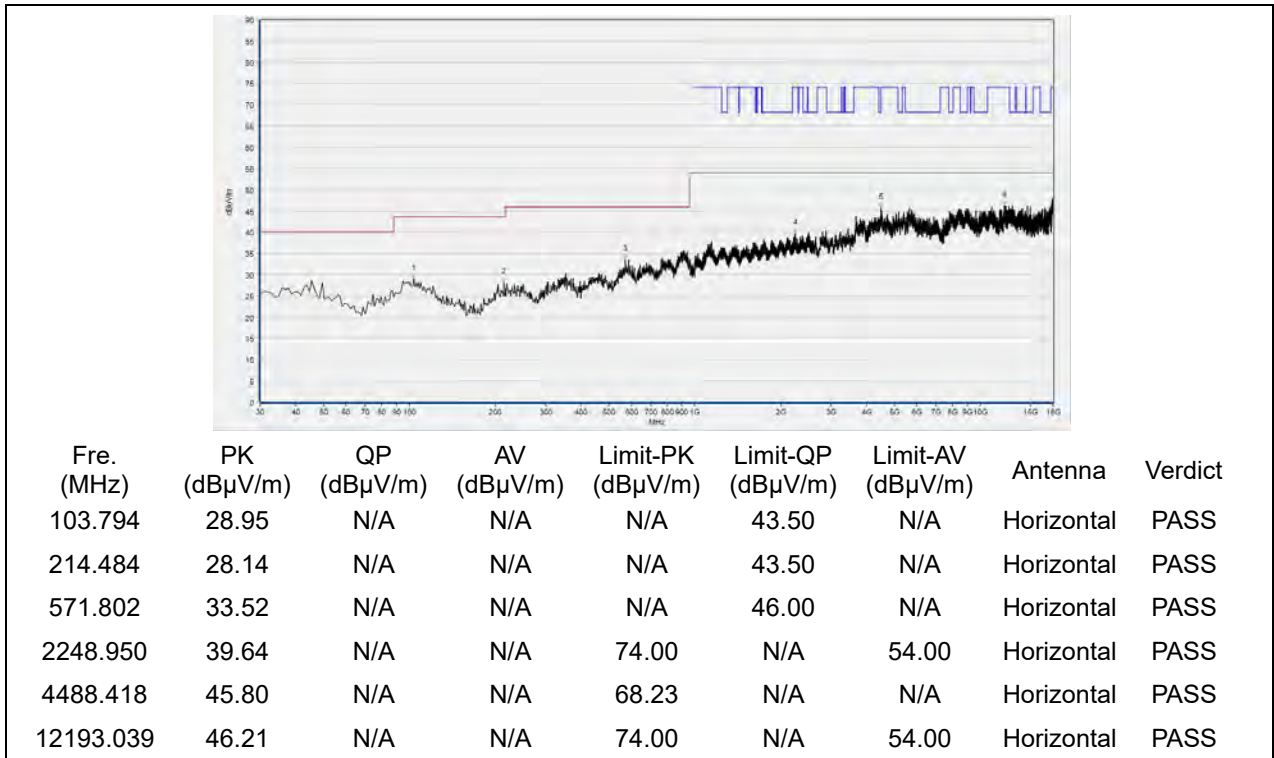


(Antenna Horizontal, 30MHz to 18GHz)

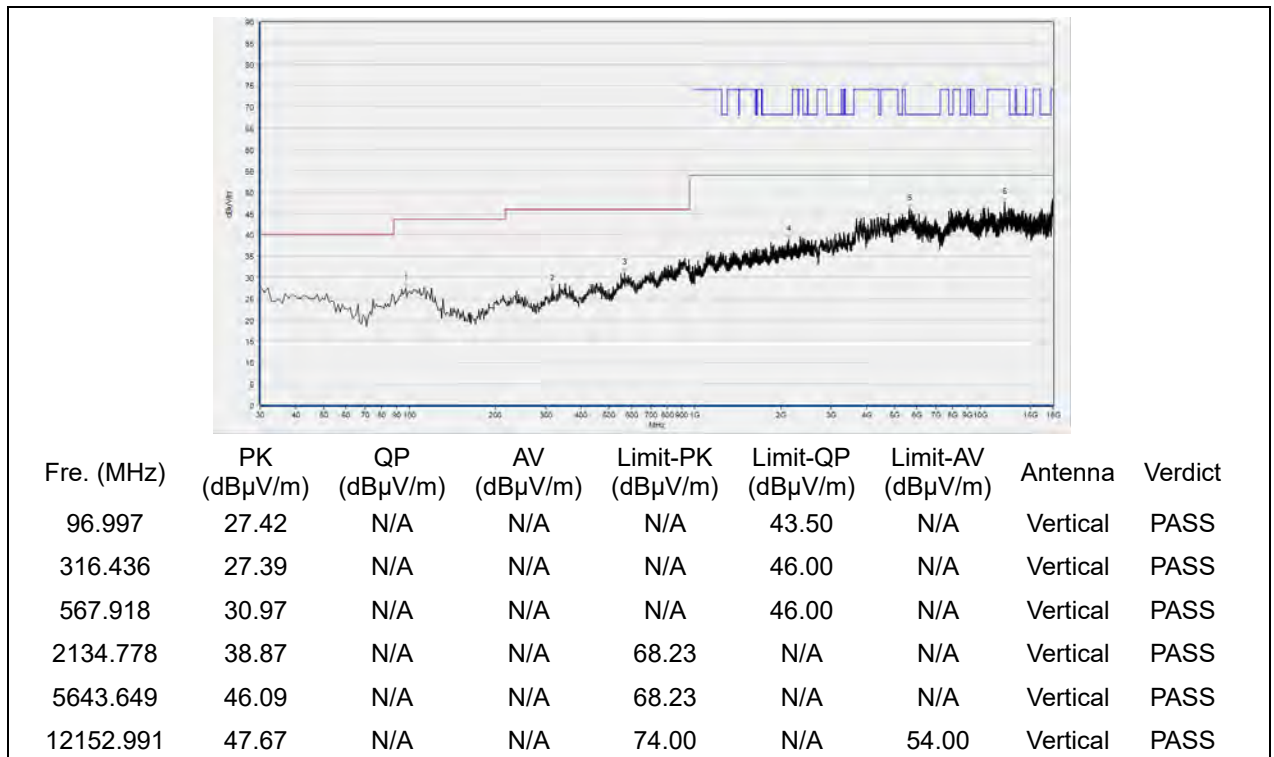


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 151

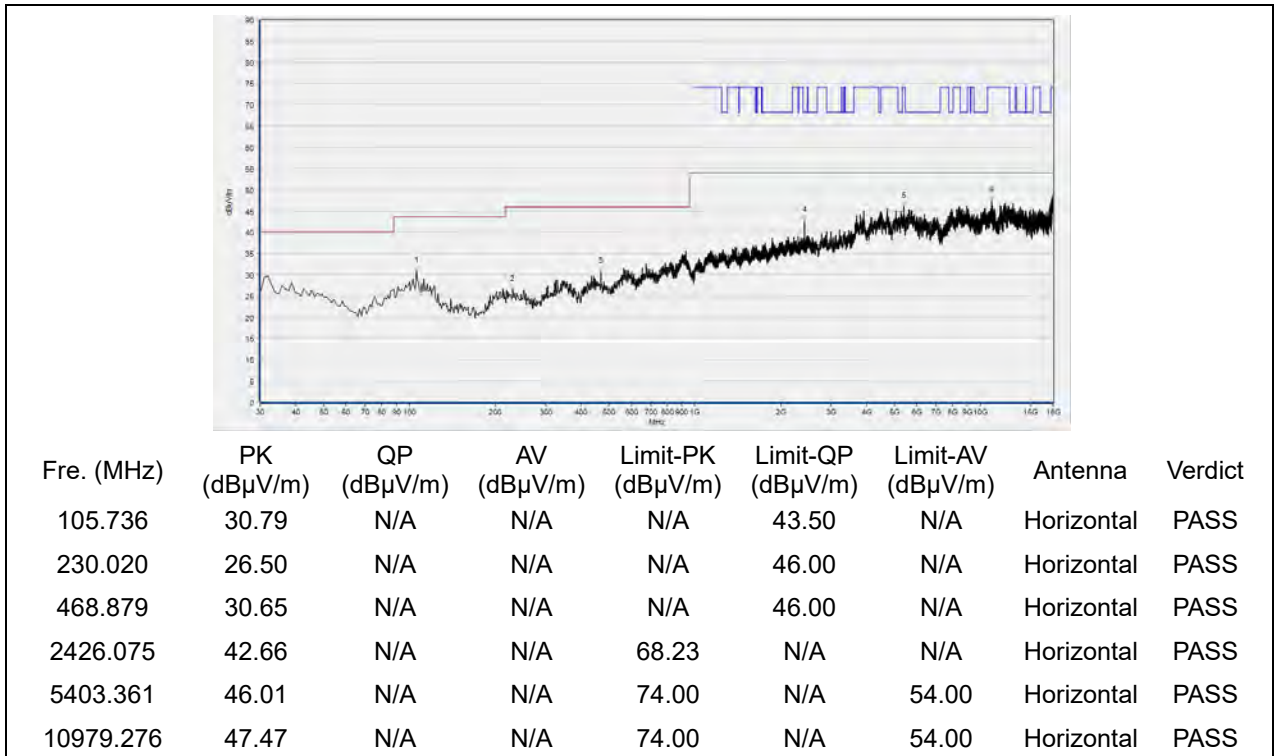


(Antenna Horizontal, 30MHz to 18GHz)

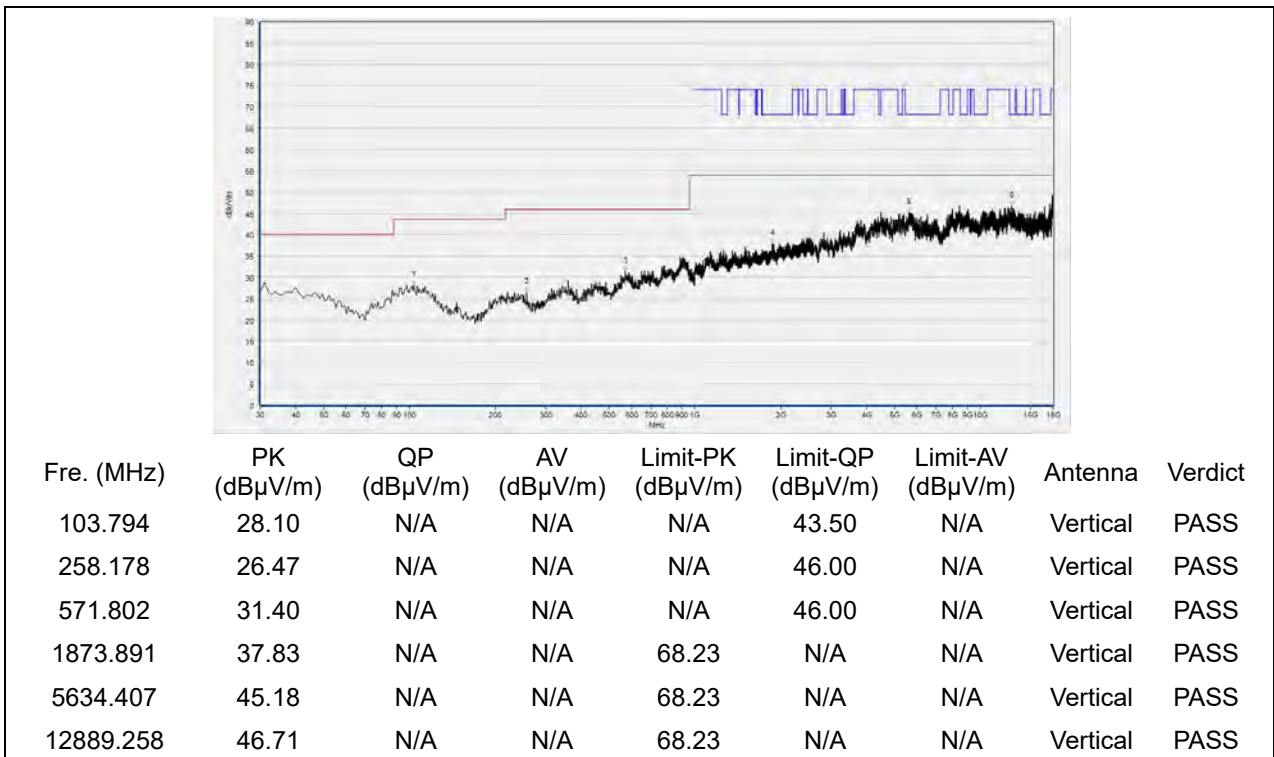


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 159



(Antenna Horizontal, 30MHz to 18GHz)

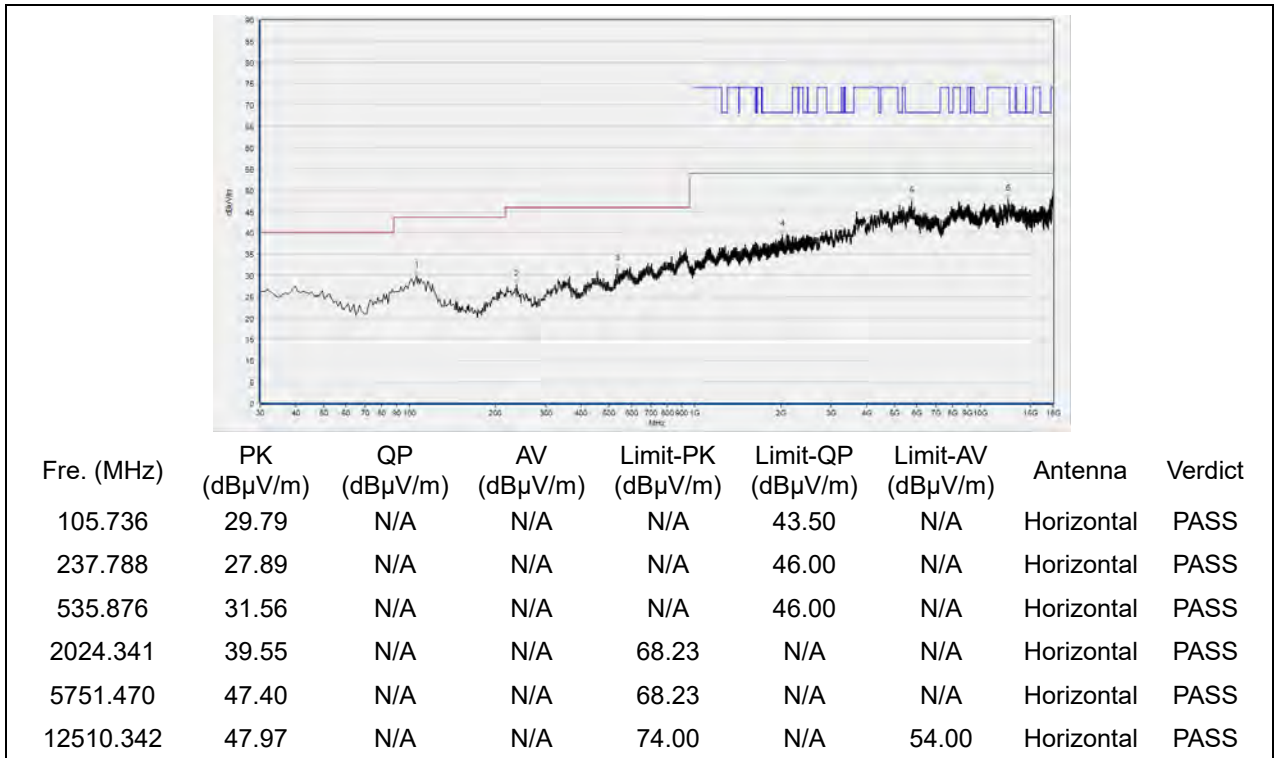


(Antenna Vertical, 30MHz to 18GHz)

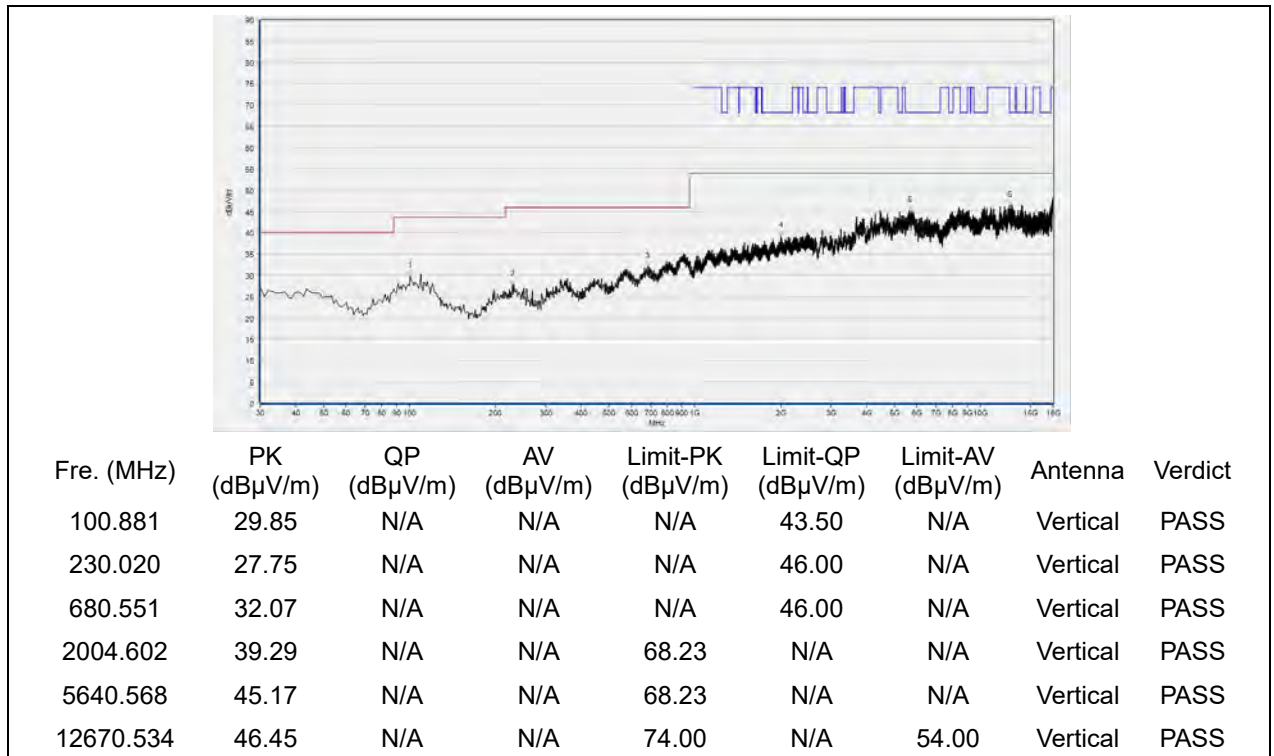


**802.11ac (VHT80) Mode**

Plot for Channel 42



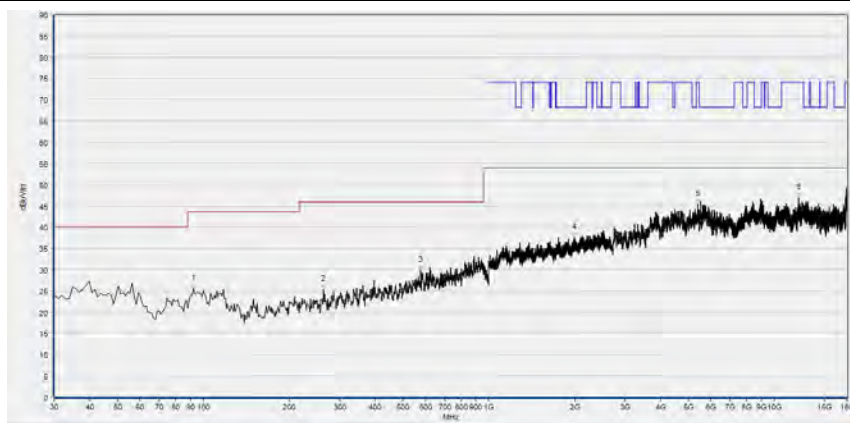
(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)

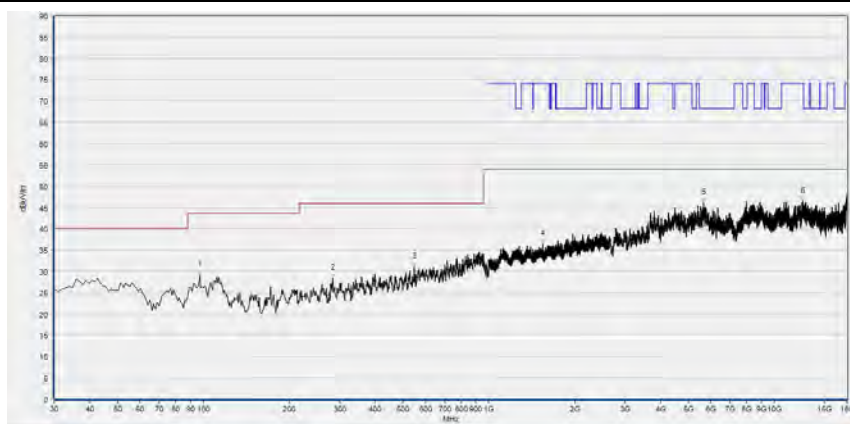


Plot for Channel 58



Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
92.142	25.44	N/A	N/A	N/A	43.50	N/A	Horizontal	PASS
264.004	25.31	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
576.657	29.75	N/A	N/A	N/A	46.00	N/A	Horizontal	PASS
1991.264	37.50	N/A	N/A	68.23	N/A	N/A	Horizontal	PASS
5403.361	45.42	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS
12168.394	46.88	N/A	N/A	74.00	N/A	54.00	Horizontal	PASS

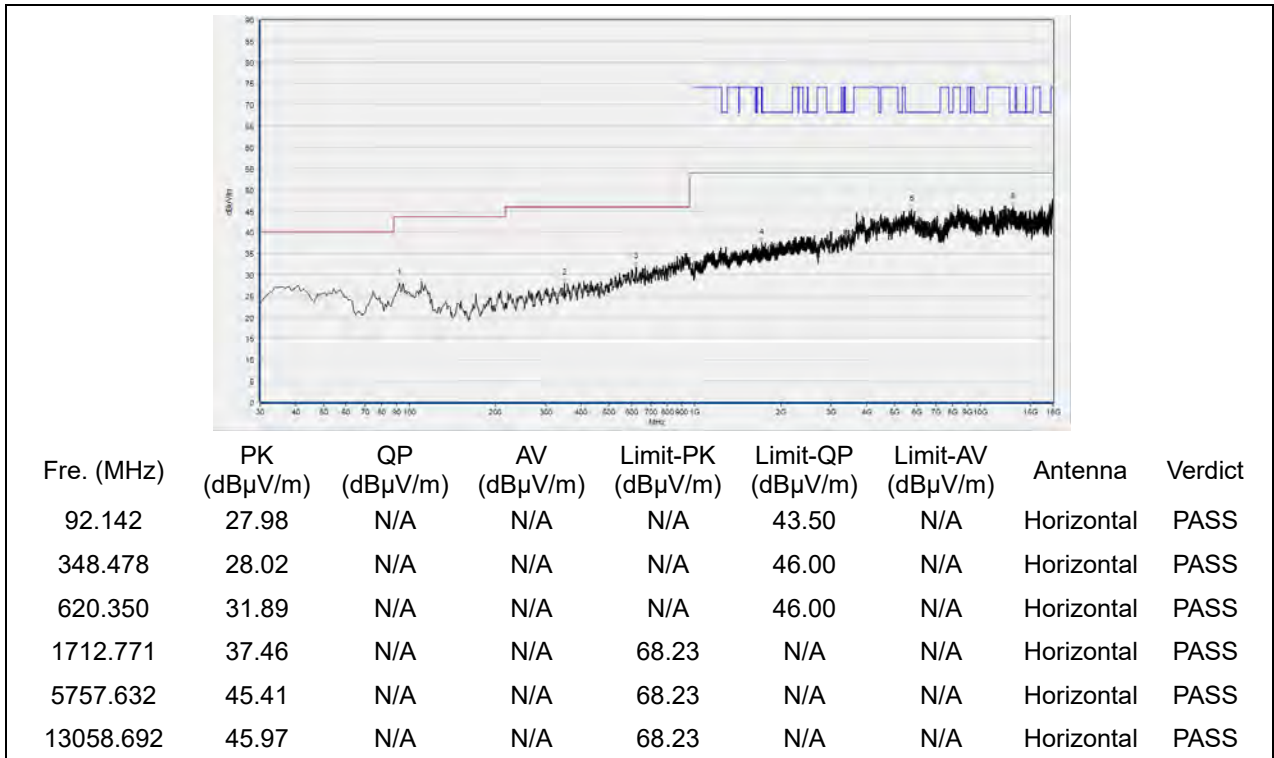
(Antenna Horizontal, 30MHz to 18GHz)



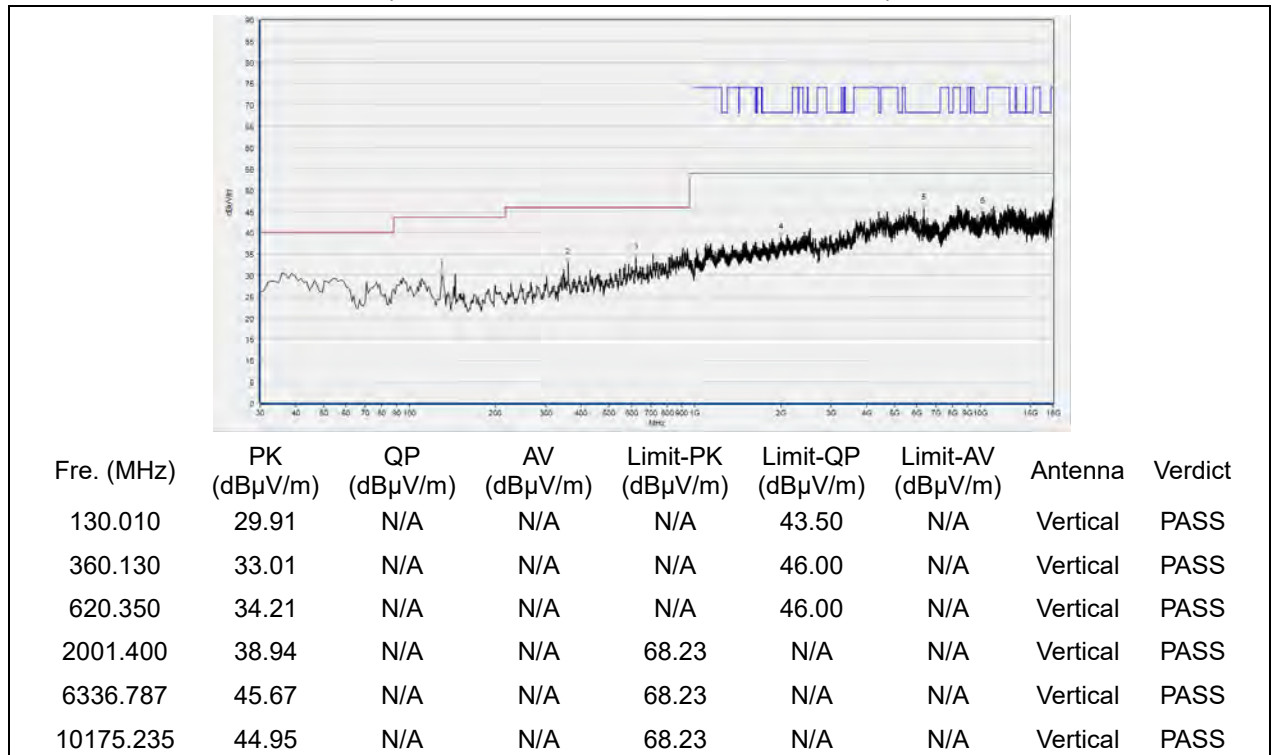
Fre. (MHz)	PK (dBµV/m)	QP (dBµV/m)	AV (dBµV/m)	Limit-PK (dBµV/m)	Limit-QP (dBµV/m)	Limit-AV (dBµV/m)	Antenna	Verdict
96.997	29.06	N/A	N/A	N/A	43.50	N/A	Vertical	PASS
283.423	28.30	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
547.528	30.96	N/A	N/A	N/A	46.00	N/A	Vertical	PASS
1545.782	36.33	N/A	N/A	74.00	N/A	54.00	Vertical	PASS
5649.810	46.01	N/A	N/A	68.23	N/A	N/A	Vertical	PASS
12596.599	46.39	N/A	N/A	74.00	N/A	54.00	Vertical	PASS

(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 106

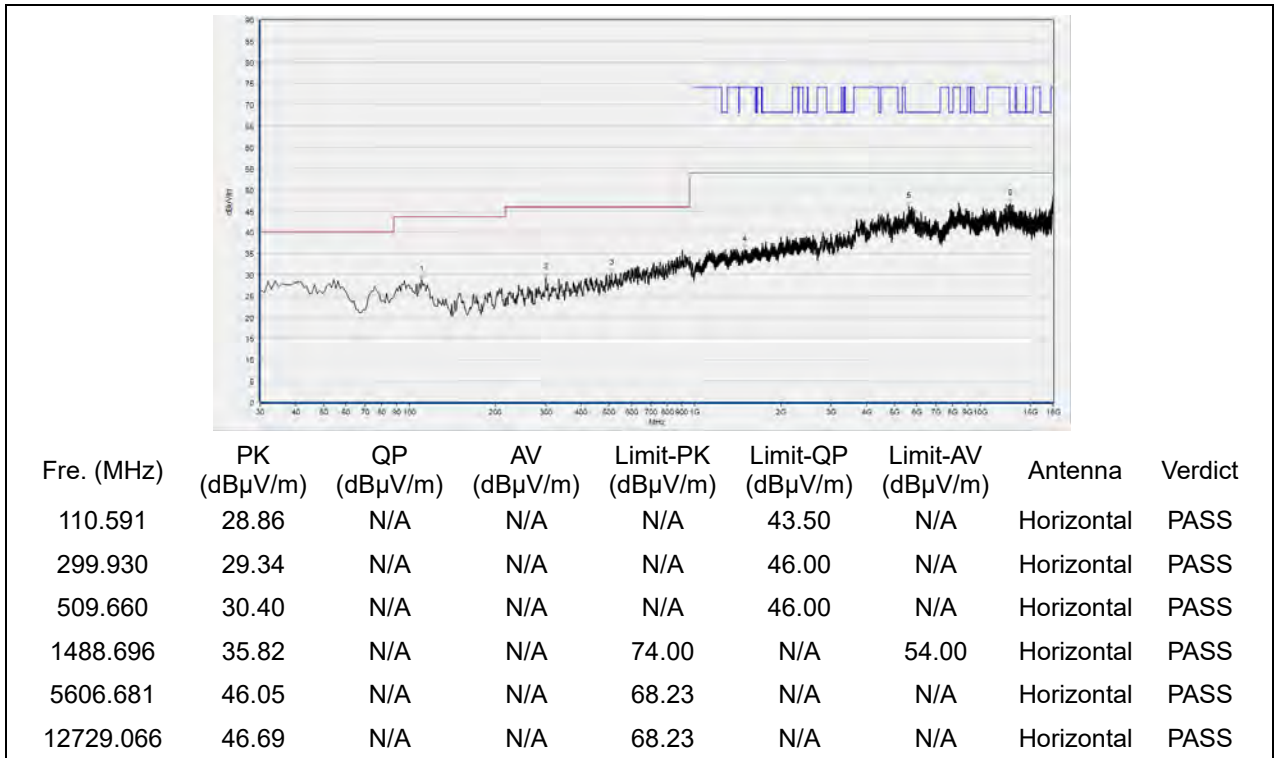


(Antenna Horizontal, 30MHz to 18GHz)

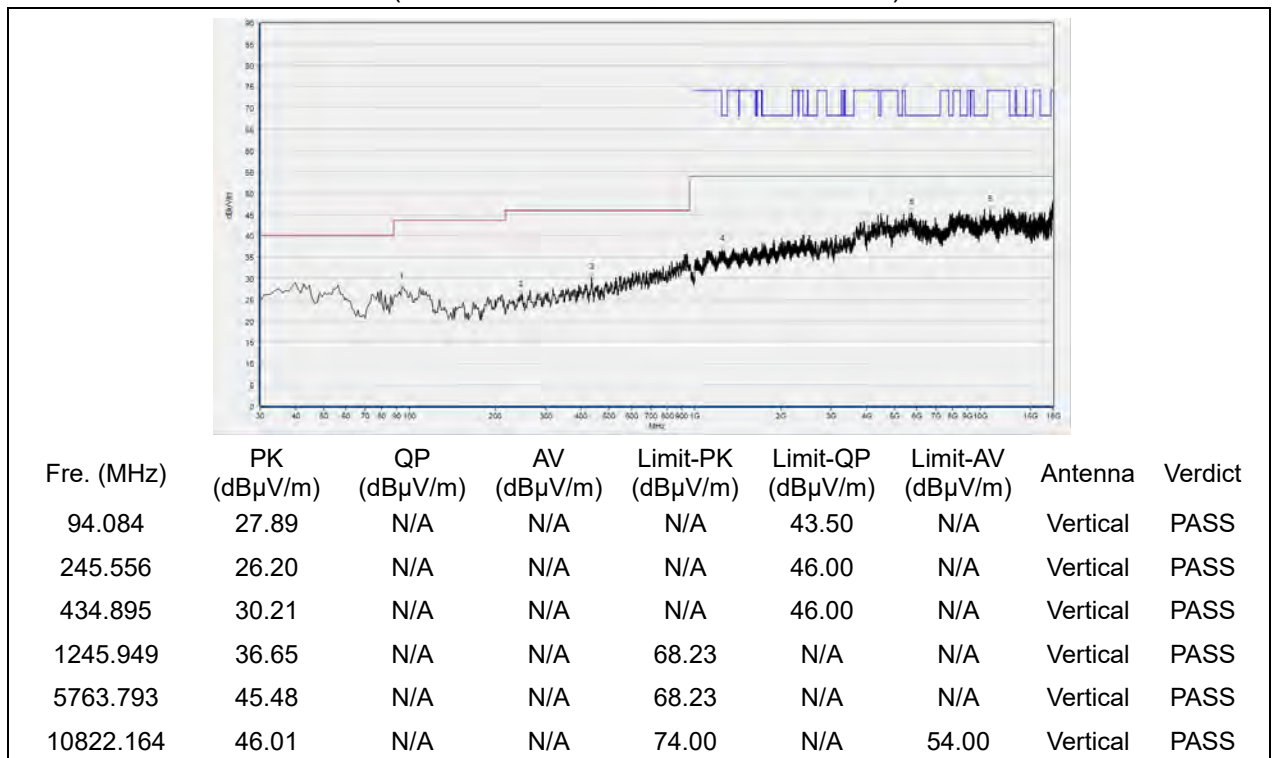


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 122

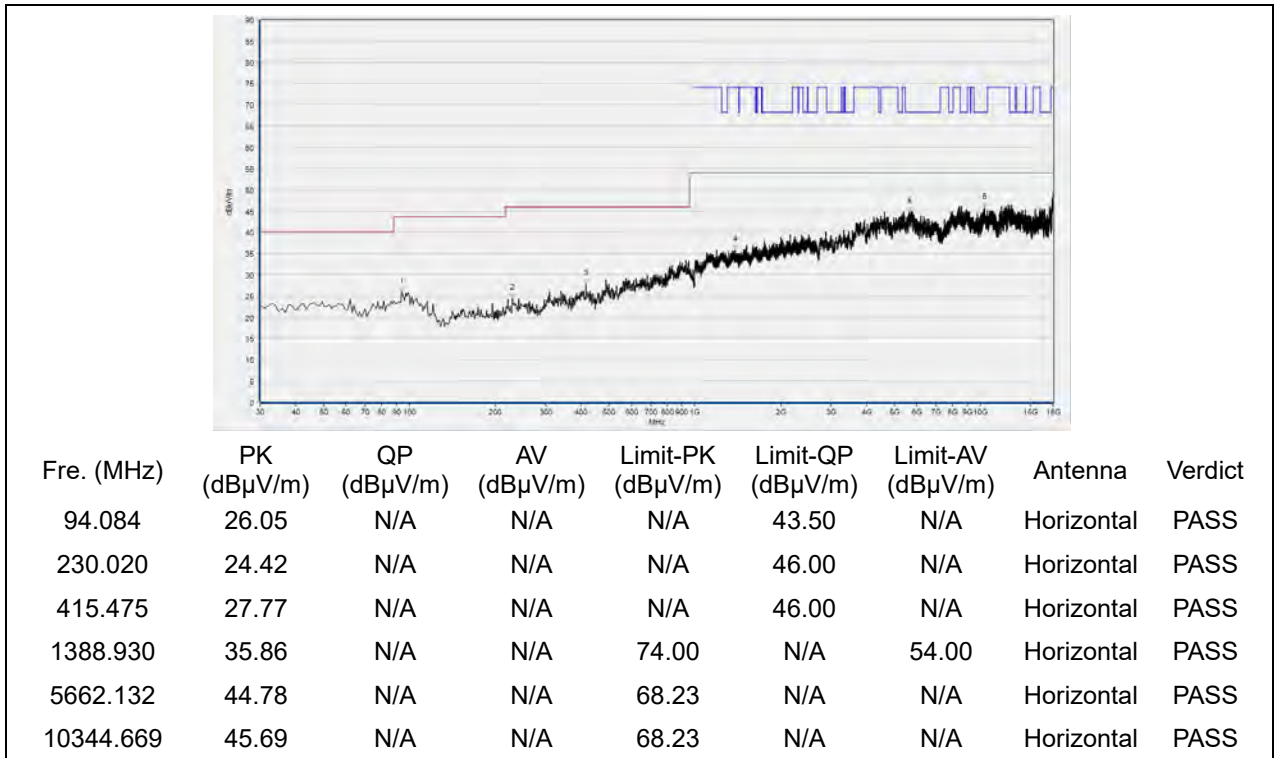


(Antenna Horizontal, 30MHz to 18GHz)

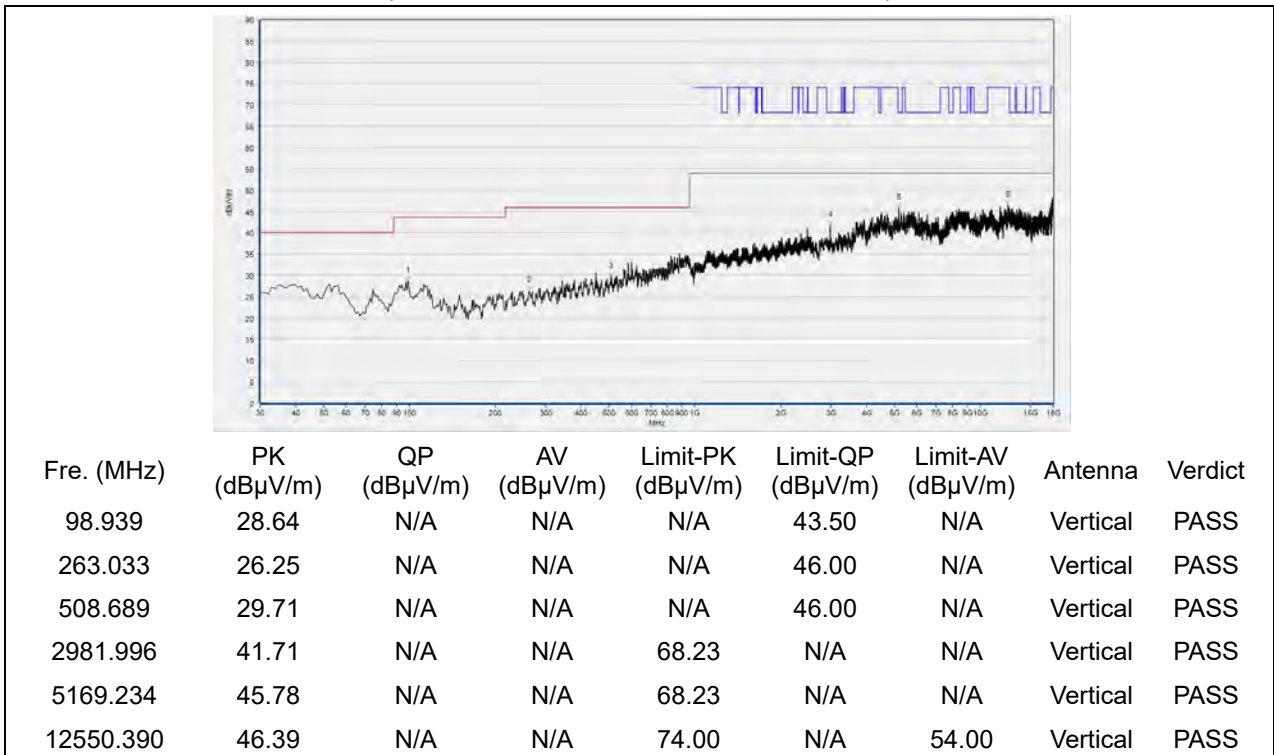


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 138

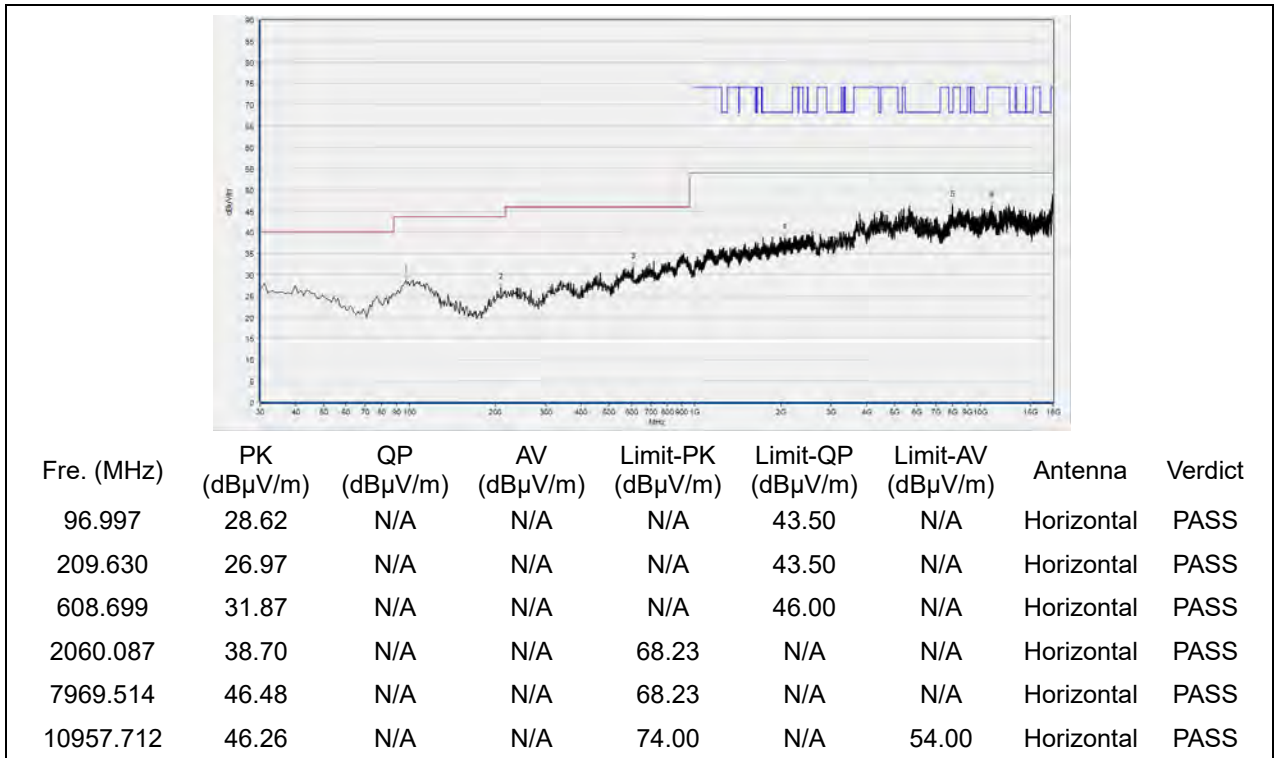


(Antenna Horizontal, 30MHz to 18GHz)

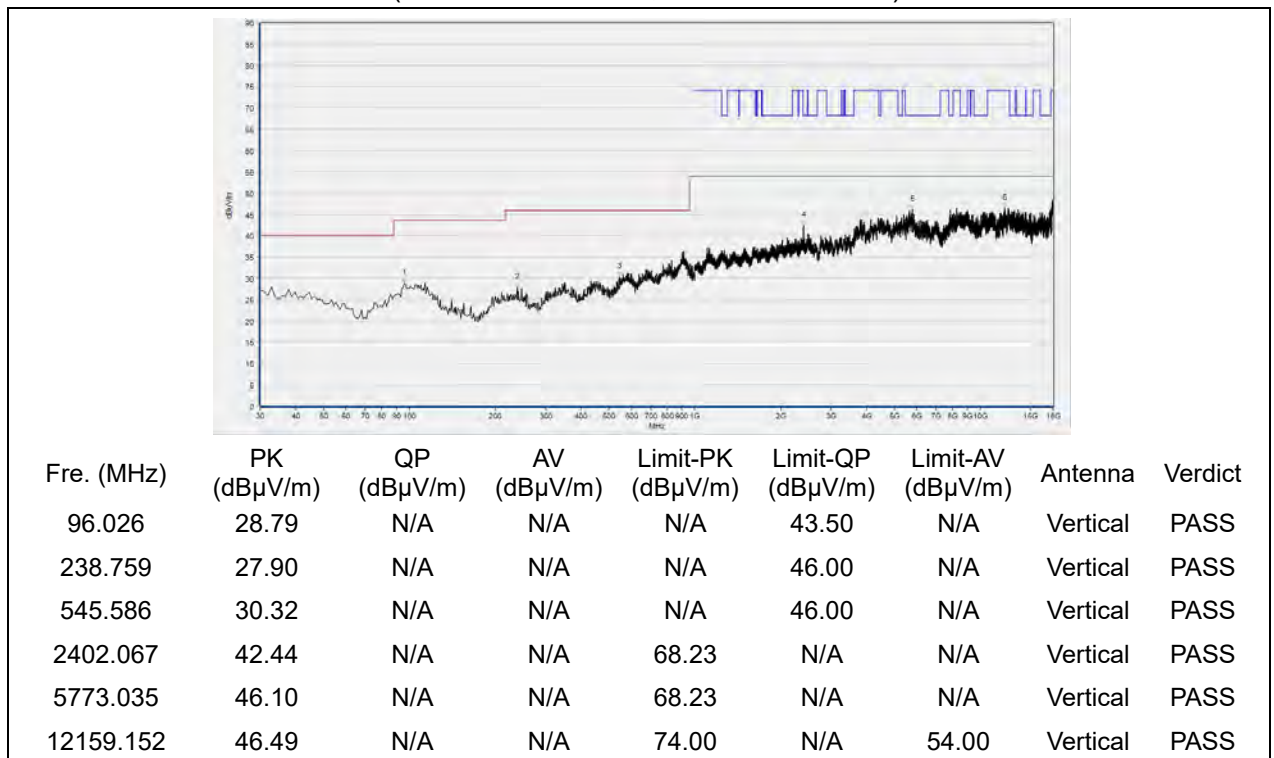


(Antenna Vertical, 30MHz to 18GHz)

Plot for Channel 155



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)





## Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test Items	Uncertainty
Peak Output Power	$\pm 2.22\text{dB}$
Power Spectral Density	$\pm 2.22\text{dB}$
Bandwidth	$\pm 5\%$
Restricted Frequency Bands	$\pm 5\%$
Radiated Emission	$\pm 2.95\text{dB}$
Conducted Emission	$\pm 2.44\text{dB}$

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .



## Annex B Testing Laboratory Information

### 1. Identification of the Responsible Testing Laboratory

<b>Laboratory Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd.
<b>Laboratory Address:</b>	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
<b>Telephone:</b>	+86 755 36698555
<b>Facsimile:</b>	+86 755 36698525

### 2. Identification of the Responsible Testing Location

<b>Name:</b>	Shenzhen Morlab Communications Technology Co., Ltd.
<b>Address:</b>	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

### 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.



#### 4. Test Equipments Utilized

##### 4.1 Conducted Test Equipments

Equipment	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Attenuator 1	N/A	10dB	Resnet	N/A	N/A
EXA Signal Analyzer	MY53470836	N9010A	Agilent	2021.03.25	2022.03.24
				2022.03.01	2023.02.28
USB Wideband Power Sensor	MY54180008	U2021XA	Agilent	2021.10.21	2022.10.20
RF Cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Temperature Chamber	12108015	DTL-003S101	YOMA	2021.10.20	2022.10.19

##### 4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2021.03.09	2022.03.08
				2022.03.03	2023.03.02
LISN	812744	NSLK 8127	Schwarzbeck	2021.03.09	2022.03.08
				2022.03.03	2023.03.02
Pulse Limiter (10dB)	VTSD 9561 F-B #206	VTSD 9561-F	Schwarzbeck	2021.07.21	2022.07.20
Coaxial Cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

##### 4.3 List of Software Used

Description	Manufacturer	Software Version
Test System	Tonscend	V2.5.77.0418
Morlab EMCR V1.2	Morlab	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0



**4.4 Radiated Test Equipments**

Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Receiver	MY54130016	N9038A	Agilent	2021.07.16	2022.07.15
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Horn	BBHA9170 #774	BBHA 9170	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
				2022.02.11	2025.02.10
Test Antenna - Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L32 03	Tonscend	2021.07.16	2022.07.15
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2021.07.16	2022.07.15
26-40GHz pre-Amplifier	56774	S40M400L40 02	Tonscend	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5150-5350	Wainwright	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5470-5725	Wainwright	2021.07.16	2022.07.15
Notch Filter	N/A	WRCG-5725-5850	Wainwright	2021.07.16	2022.07.15



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Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Due Date
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

————— END OF REPORT —————