



REPORT No.: SZ17040271W04

FCC RF TEST REPORT

APPLICANT : GREAT TALENT TECHNOLOGY LIMITED

PRODUCT NAME : Android device

MODEL NAME : TEL-TE-VR-U2

TRADE NAME : UMX

BRAND NAME : UMX

FCC ID : 2ALZM-TEL-TE-VR-U2

STANDARD(S) : 47 CFR Part 15 Subpart E

ISSUE DATE : 2017-05-17

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

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Change History

Issue	Date	Reason for change
1.0	2017-05-17	First edition



TEST REPORT DECLARATION

Applicant	GREAT TALENT TECHNOLOGY LIMITED
Applicant Address	RM602,T3 Software Park, Nanshan, Shenzhen, China
Manufacturer	SIM Technology Group Limited
Manufacturer Address	NO.888 Shengli Road QingPu District Shanghai
Product Name	Android device
Model Name	TEL-TE-VR-U2
Brand Name	UMX
HW Version	V1.0
SW Version	Andiod V7.1.1
Test Standards	47 CFR Part 15 Subpart E
Test Date	2017-05-11 to 2017-05-17
Test Result	PASS

Tested by : Su Hang
Su Hang

Approved by : Qiu Xiaojun
Qiu Xiaojun



1. GENERAL INFORMATION

1.1 EUT Description

Product Name.....:	Android device
Serial No.:	(n.a, marked #1 by test site)
Hardware Version.....:	V1.0
Software Version.....:	Andiod V7.1.1
Applicant.....:	GREAT TALENT TECHNOLOGY LIMITED RM602,T3 Software Park,Nanshan,Shenzhen,China
Manufacturer	SIM Technology Group Limited NO.888 Shengli Road QingPu District Shanghai
Frequency Range.....:	802.11a/ac/n: 5.150GHz- 5.250GHz 5.725GHz- 5.850GHz
Channel Number	Refer Note(2)
Modulation Type.....:	DSSS, OFDM
Antenna Type.....:	PIFA Antenna
Antenna Gain.....:	-1.5 dBi

Note 1: The U-NII band is applicable to this report, another bands of operation (2.4GHz) is documented in a separate report.

Note 2 : The following tables are the channel number and frequency of the EUT, the black bold channels were selected for test.

20MHz Bandwidth:

Frequency Range	5150~5250MHz			
Channel Number	36	40	44	48
Frequency (MHz)	5180	5200	5220	5240

Frequency Range	5725~5850MHz				
Channel Number	149	153	157	161	165
Frequency (MHz)	5745	5765	5785	5805	5825



40MHz Bandwidth:

Frequency Range	5150~5250 MHz	
Channel Number	38	46
Frequency (MHz)	5190	5230

Frequency Range	5725~5850 MHz	
Channel Number	151	159
Frequency (MHz)	5755	5795

80MHz Bandwidth:

Frequency Range	5150~5250MHz
Channel Number	42
Frequency (MHz)	5210

Frequency Range	5725~5850MHz
Channel Number	155
Frequency (MHz)	5775

Note 3: During test, the duty cycle of the EUT was setting to 100%.

Note 4: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 5: The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.



1.2 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (UNII band) for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 15 (5-1-14 Edition)	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Result
1	15.203	Antenna Requirement	<u>PASS</u>
2	15.407(a) (e)	Emission Bandwidth	<u>PASS</u>
3	15.407(a)	Maximum conducted output Power	<u>PASS</u>
4	15.407(a)	Peak Power spectral density	<u>PASS</u>
5	15.407(b)	Restricted Frequency Bands	<u>PASS</u>
6	15.407(g)	Frequency Stability	<u>PASS</u>
7	15.207	Conducted Emission	<u>PASS</u>
8	15.407(b)	Radiated Emission	<u>PASS</u>
9	15.407(f)	RF exposure evaluation	<u>PASS</u>

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 v01r04 (05/02/2017), KDB905462 D03 v01r02 (08/22/2016) and KDB644545 D03 v01 (08/14/2014).

1.3 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 -60
Atmospheric Pressure (kPa):	86-106

2. 47 CFR PART 15E REQUIREMENTS

2.1 Antenna requirement

2.1.1 Applicable Standard

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

2.1.2 Result: Compliant

The EUT has a permanently and irreplaceable attached antenna. Please refer to the EUT internal photos.

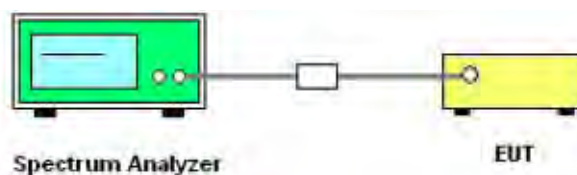
2.2 Emission Bandwidth

2.2.1 Requirement

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement. Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

2.2.2 Test Description

A. Test Set:



The EUT which is powered by the battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Test Procedure

1. KDB 789033 Section C) 1) Emission Bandwidth was used in order to prove compliance
- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.



3) Detector = Peak.

4) Trace mode = max hold.

5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

2. KDB 789033 Section C) 2) minimum emission bandwidth for the band 5.725-5.85GHz was used in order to prove compliance.

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



2.2.3 Test Result

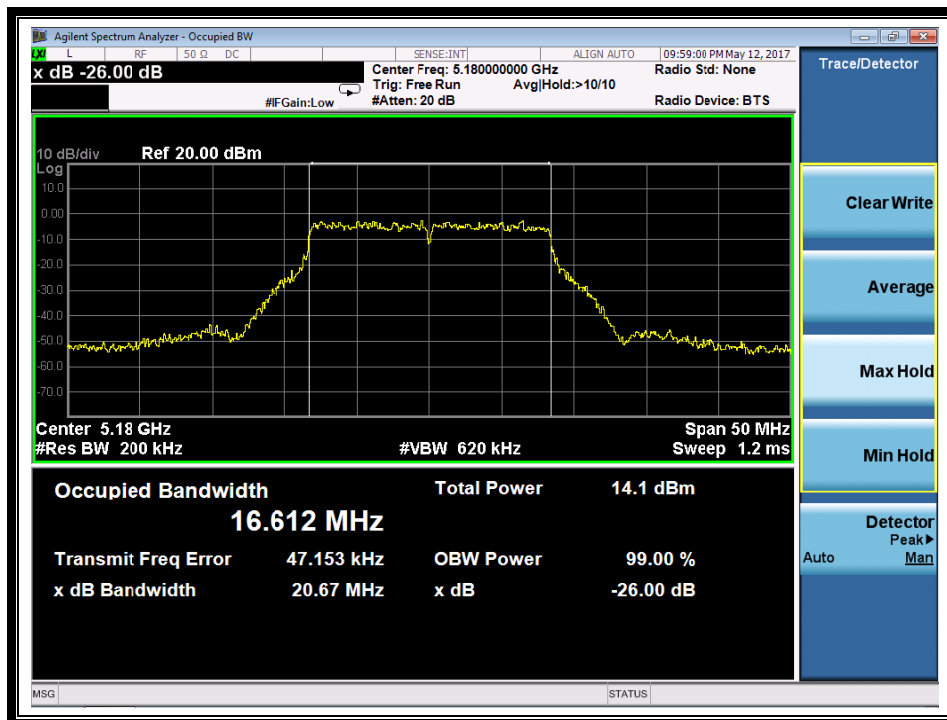
The lowest, middle and highest channels are selected to perform testing to record the 26 dB bandwidth of the Module.

2.2.3.1 802.11a-20MHz Test mode

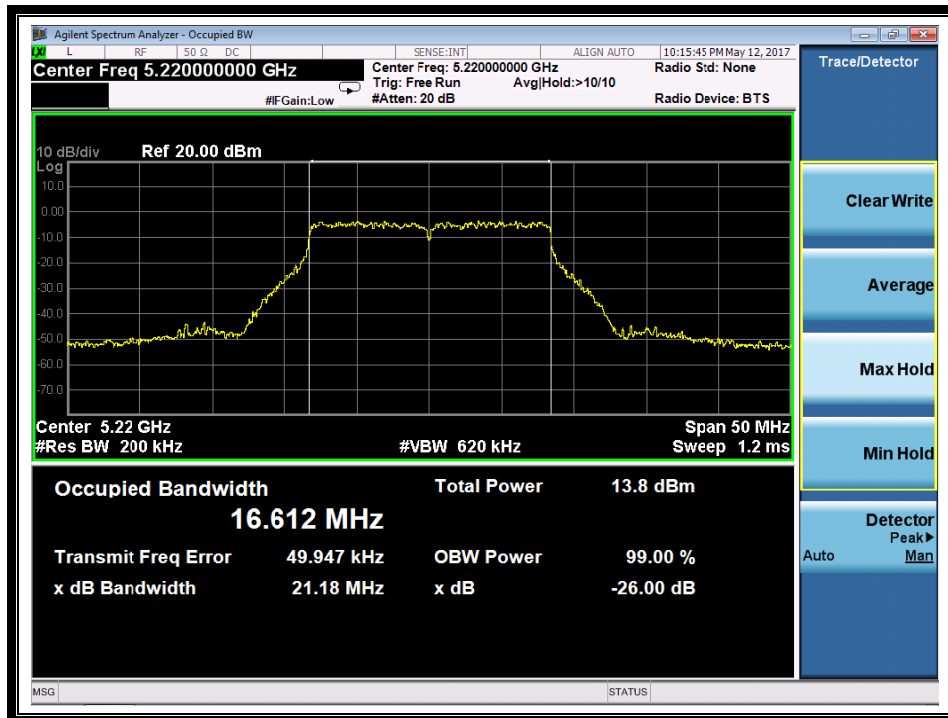
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.67
44	5220	21.18
48	5240	21.16
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	16.49
157	5785	16.51
165	5825	16.51

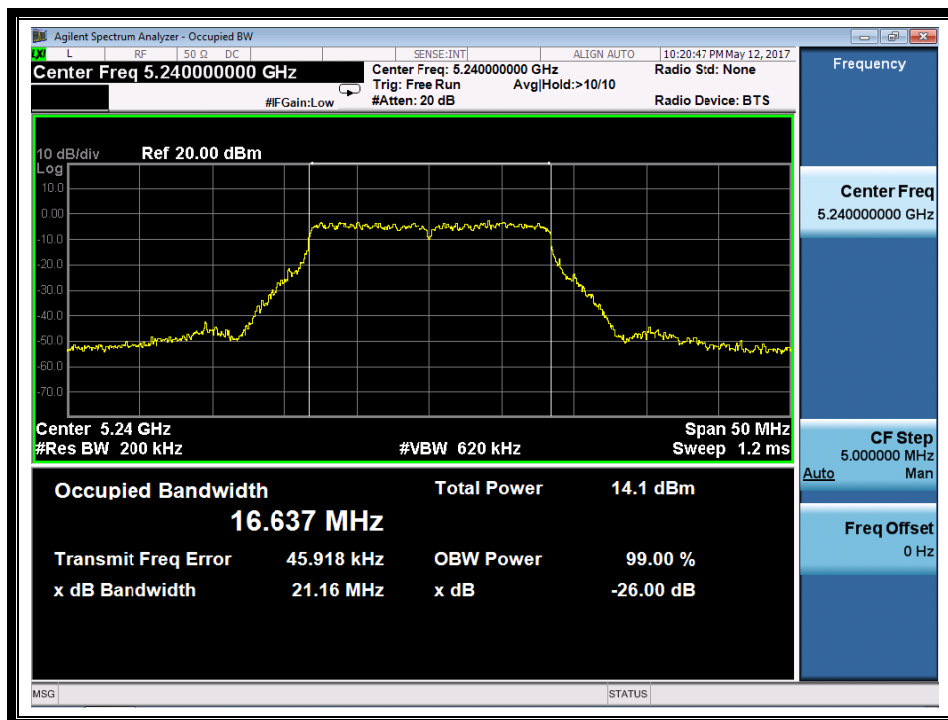
B. Test Plots



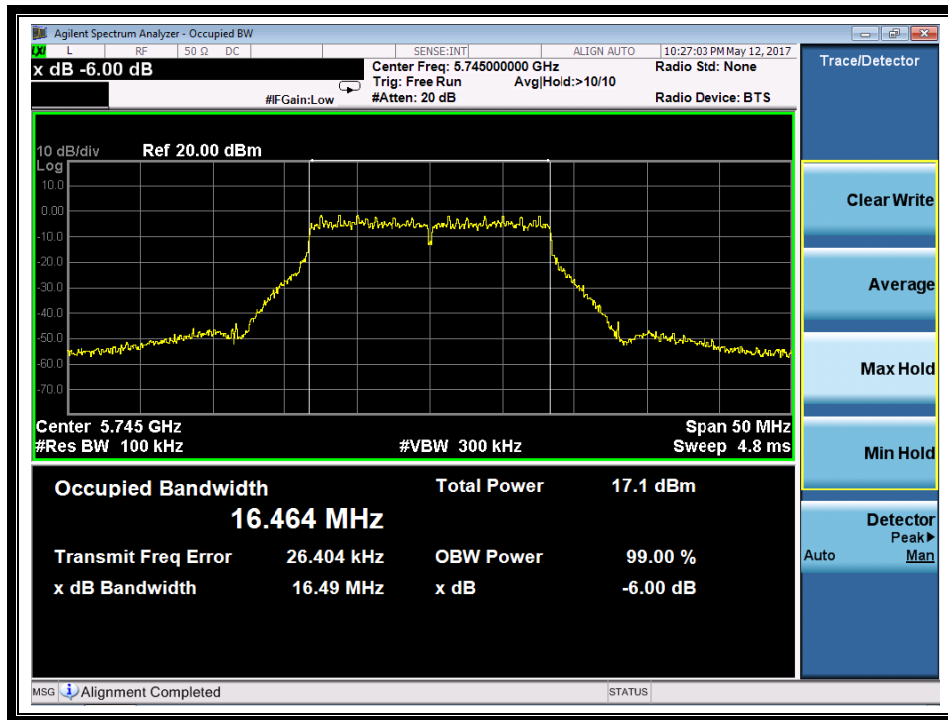
(Channel 36: 5180MHz @ 802.11a)



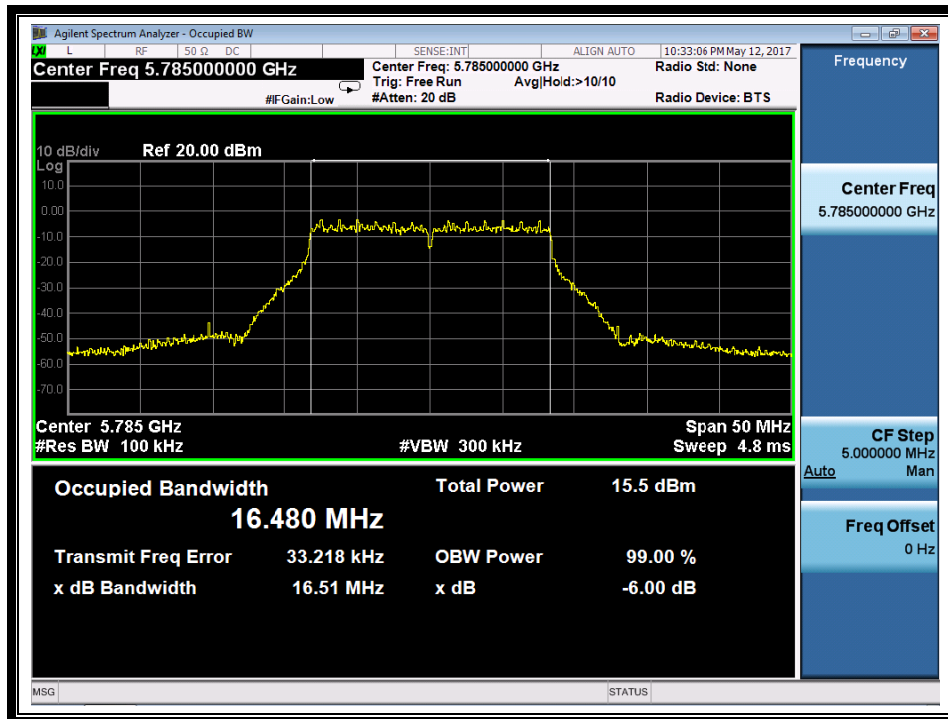
(Channel 44: 5220 MHz @ 802.11a)



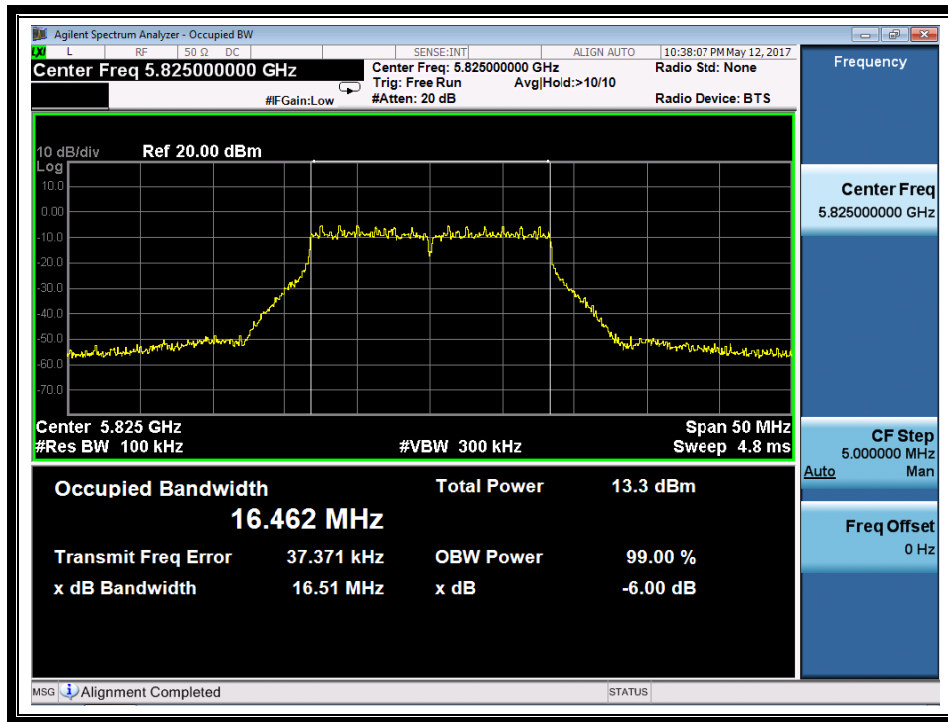
(Channel 48: 5240MHz @ 802.11a)



(Channel 149: 5745MHz @ 802.11a)



(Channel 157: 5785MHz @ 802.11a)



(Channel 165: 5825MHz @ 802.11a)

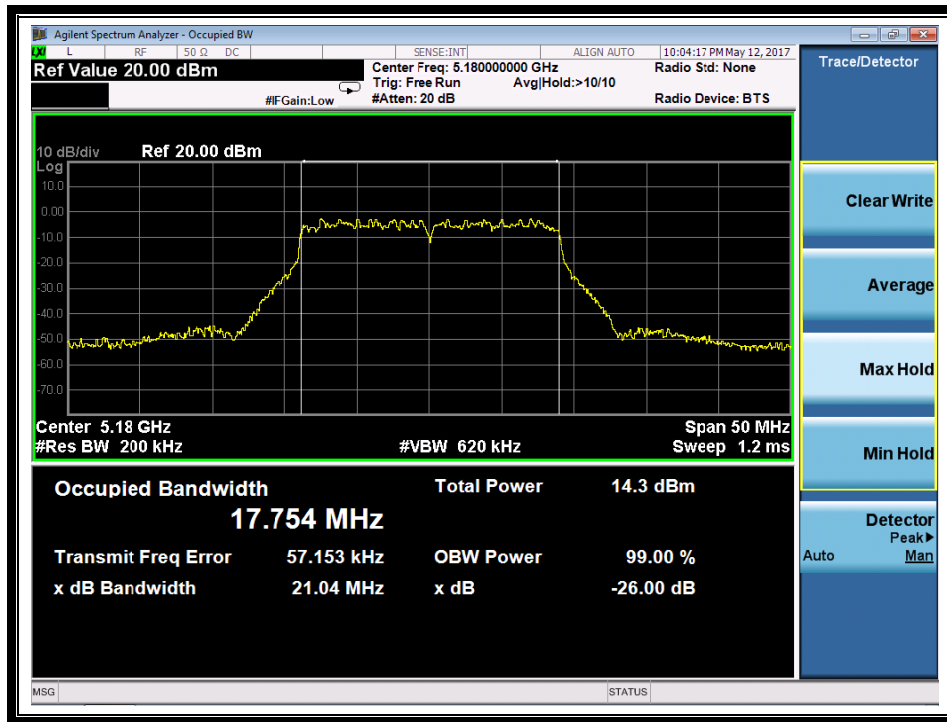
2.2.3.2 802.11ac-20MHz Test mode

A. Test Verdict:

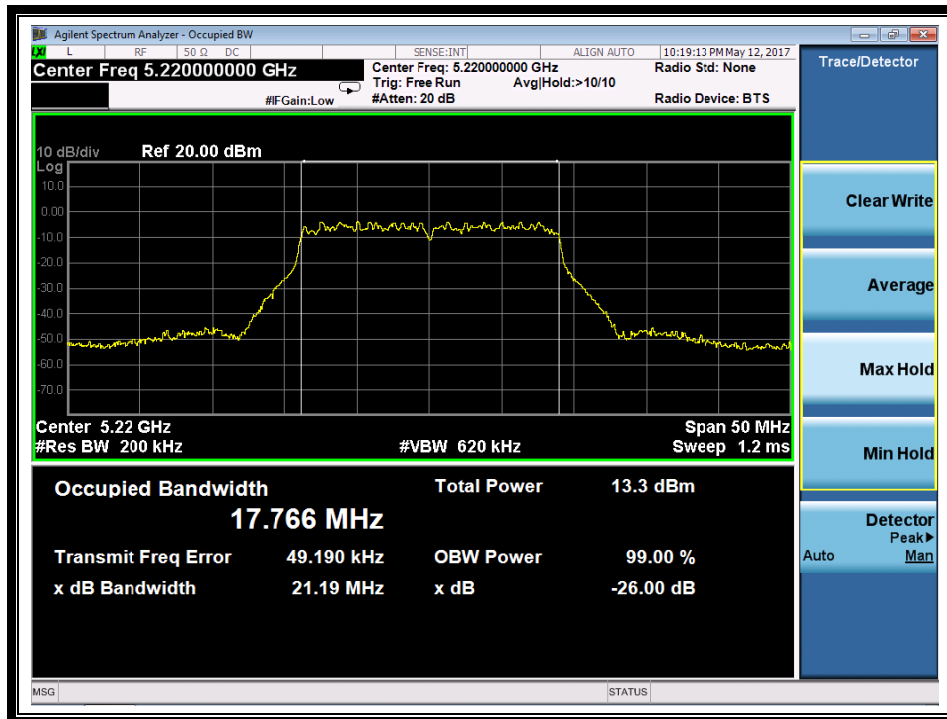
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	21.04
44	5220	21.19
48	5240	21.23
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	17.64
157	5785	17.64
165	5825	17.65



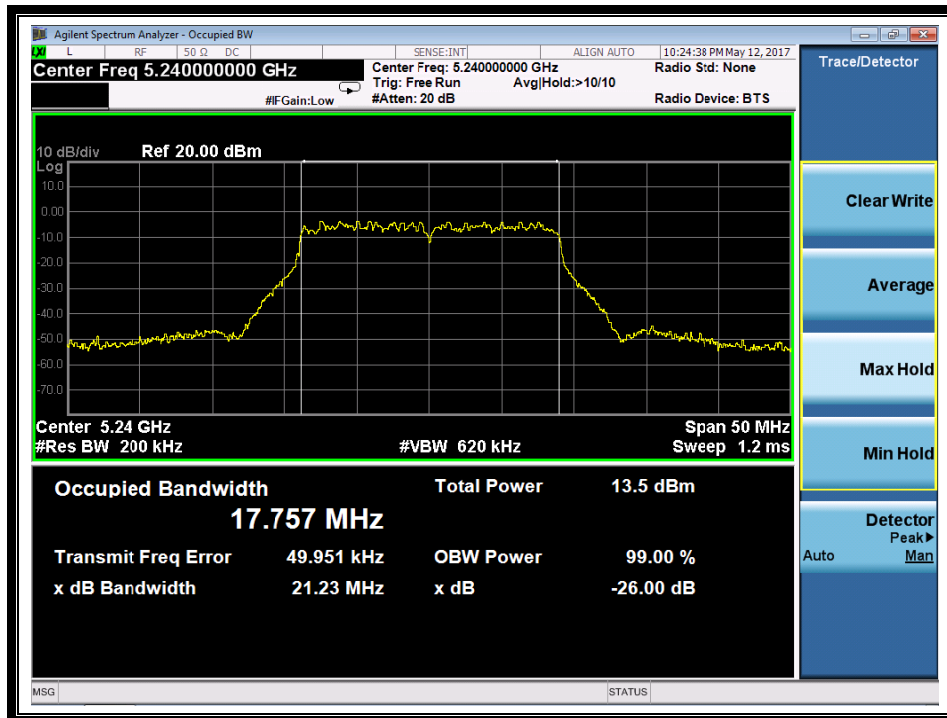
B. Test Plots



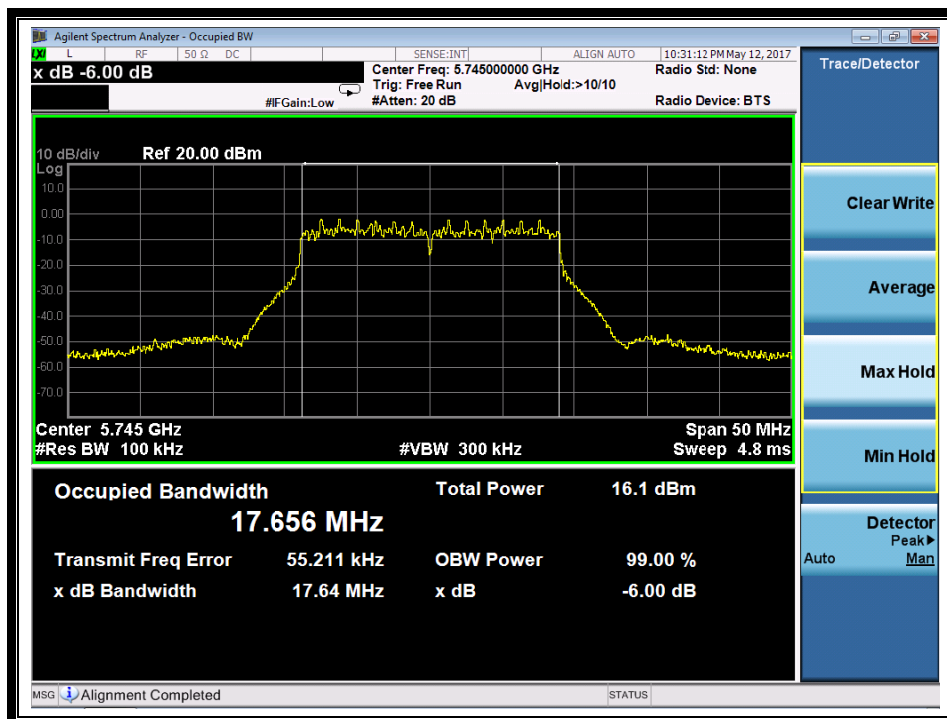
(Channel 36: 5180MHz @ 802.11ac)



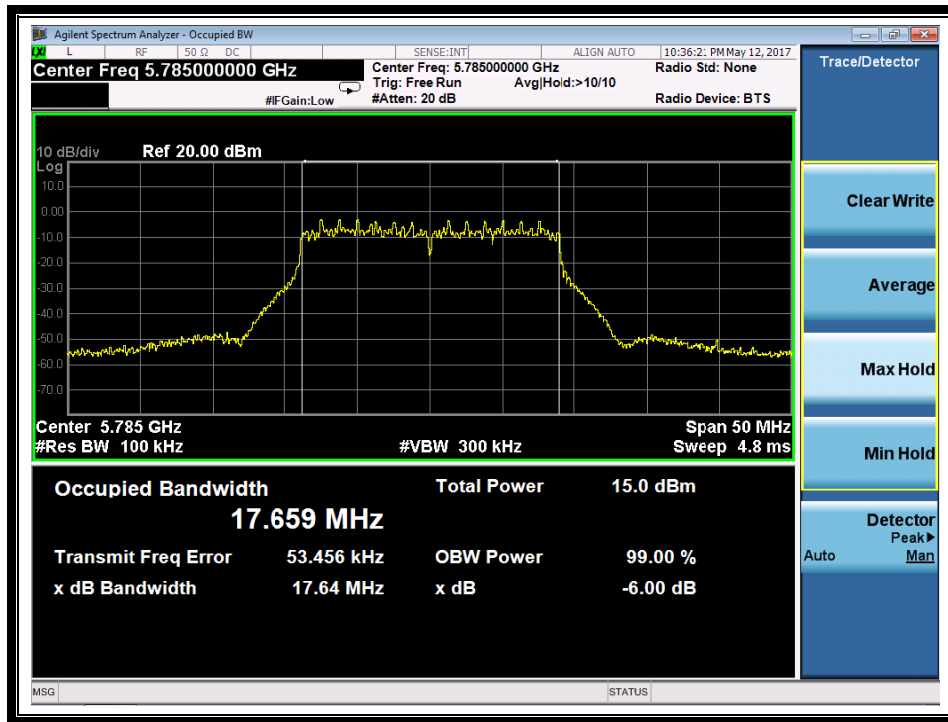
(Channel 44: 5220 MHz @ 802.11ac)



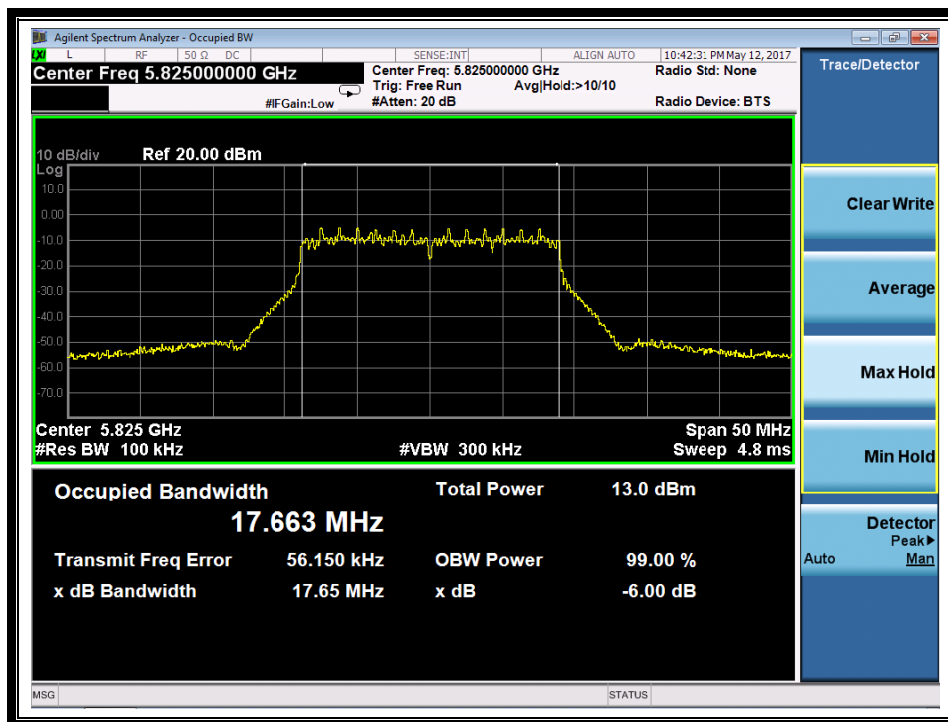
(Channel 48: 5240MHz @ 802.11ac)



(Channel 149: 5745MHz @ 802.11ac)



(Channel 157: 5785MHz @ 802.11ac)



(Channel 165: 5825MHz @ 802.11ac)

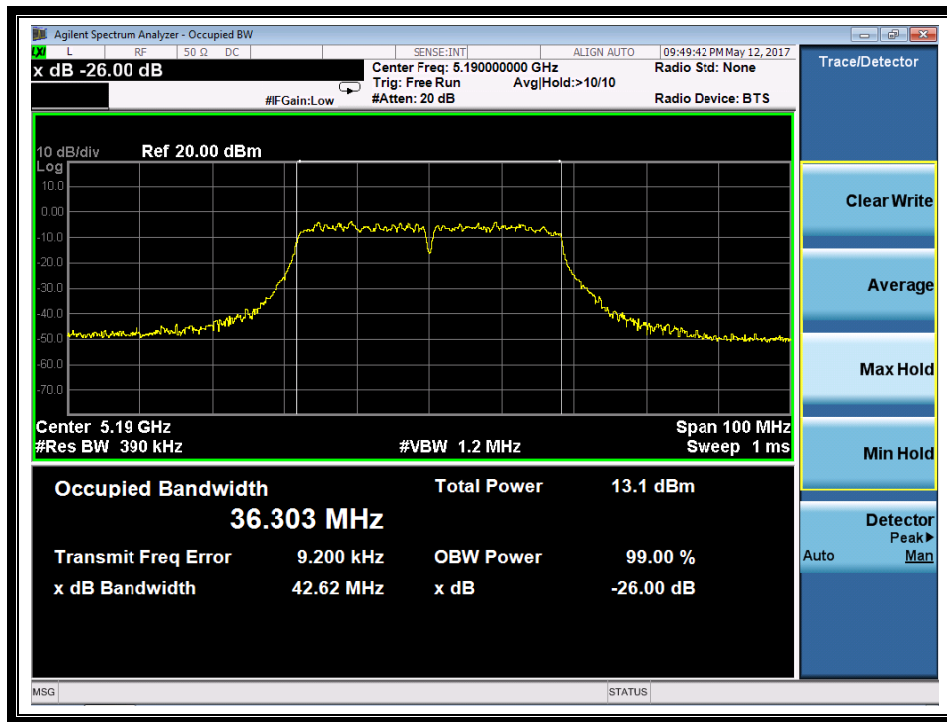


2.2.3.3 802.11ac-40MHz Test mode

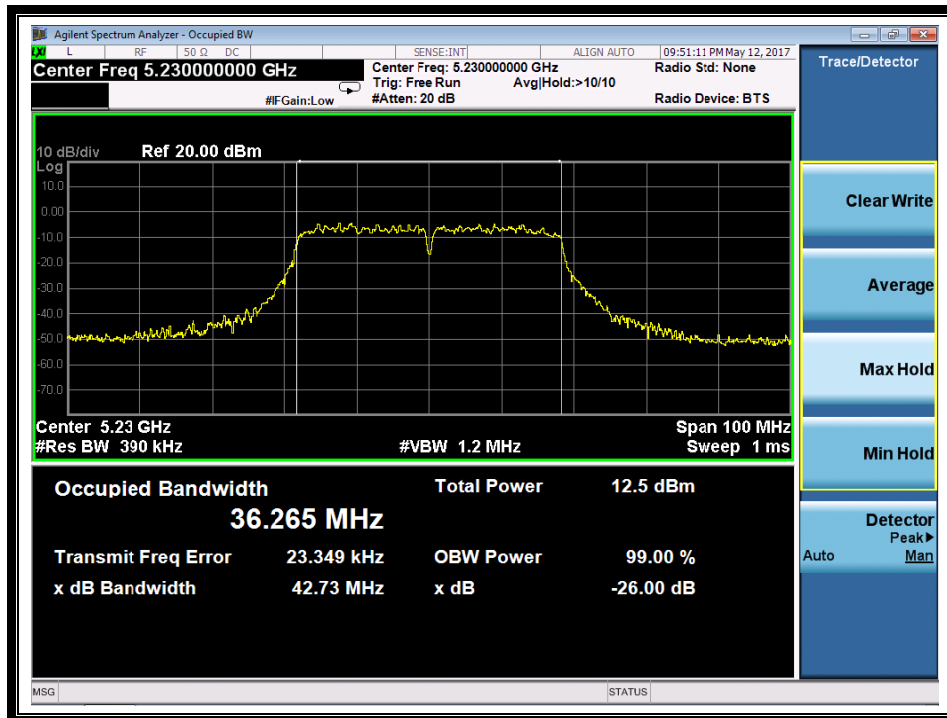
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	42.62
46	5230	42.73
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
151	5755	35.27
159	5795	35.24

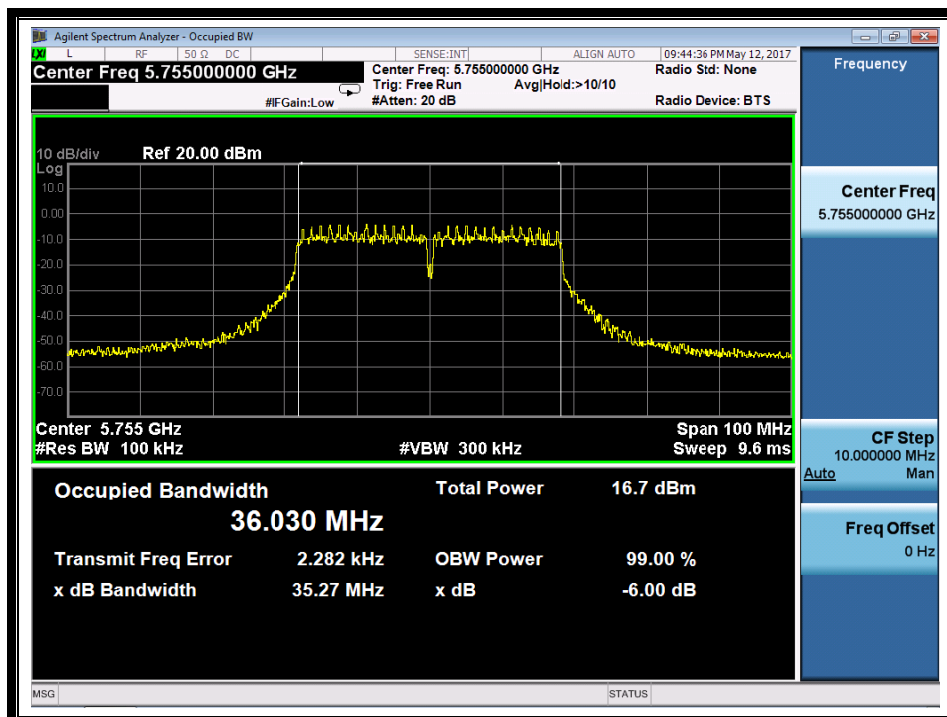
B. Test Plots



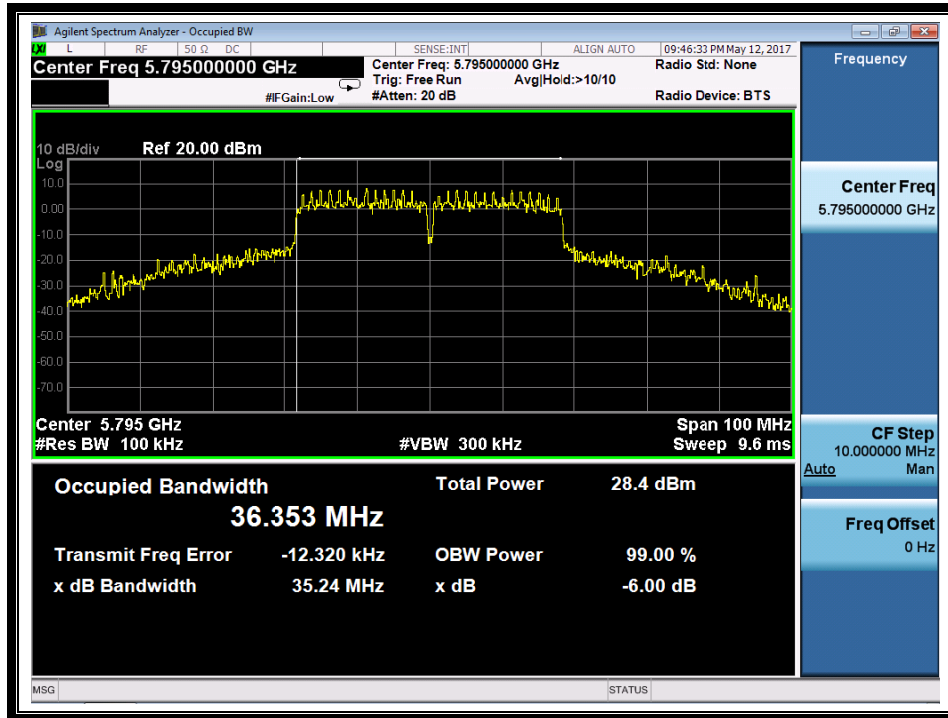
(Channel 38: 5190MHz @ 802.11ac)



(Channel 46: 5230 MHz @ 802.11ac)



(Channel 151: 5755MHz @ 802.11ac)



(Channel 159: 5795MHz @ 802.11ac)

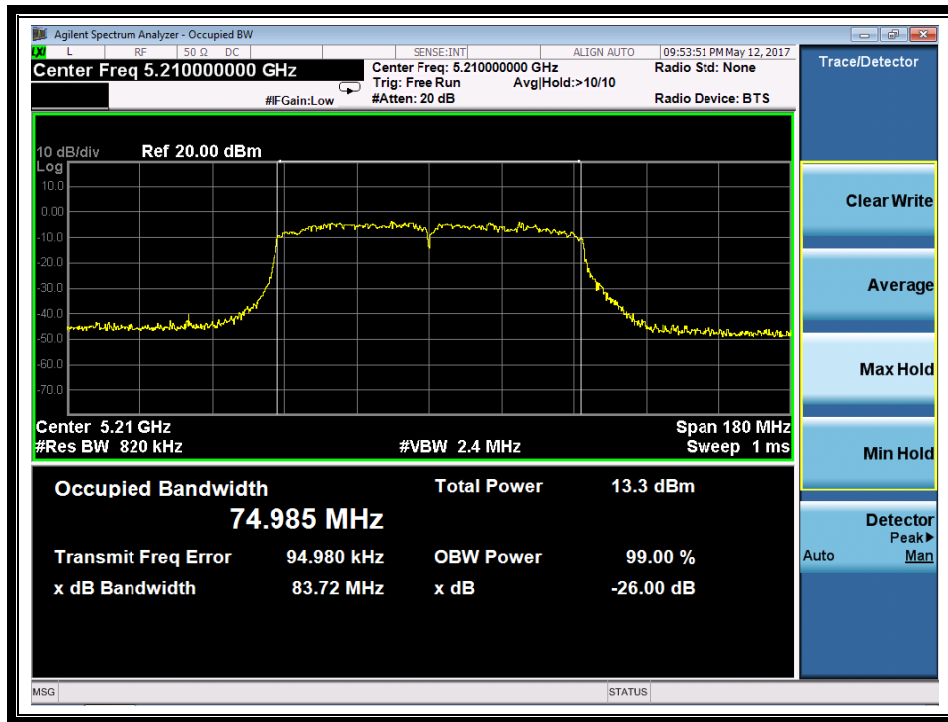
2.2.3.4 802.11ac-80MHz Test mode

A. Test Verdict:

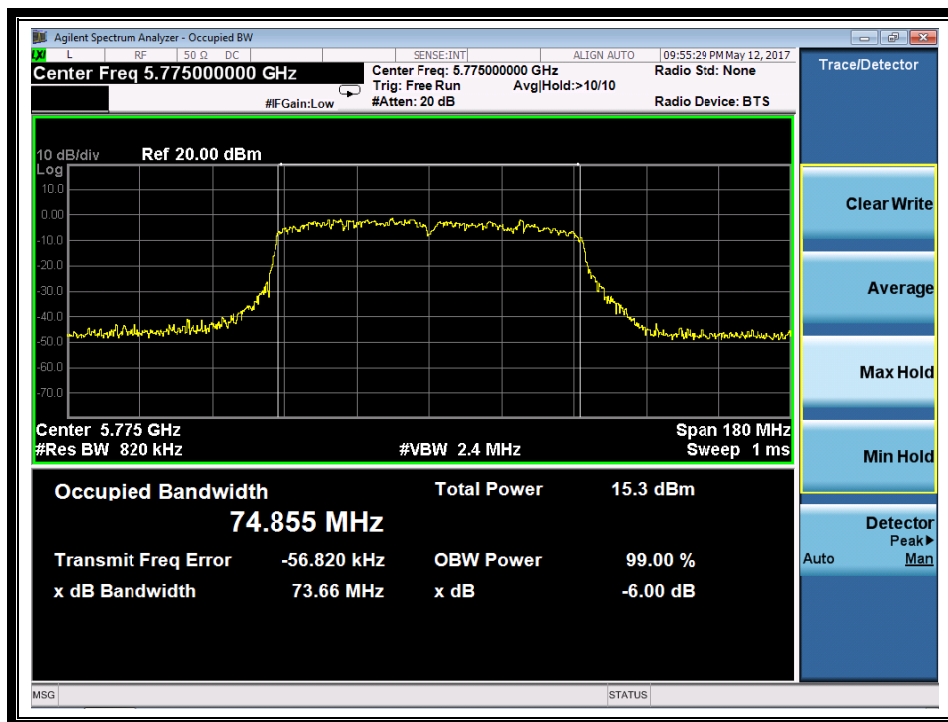
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	83.72
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
155	5775	73.66



B. Test Plots



(Channel 42: 5210MHz @ 802.11ac)



(Channel 155: 5775MHz @ 802.11ac)

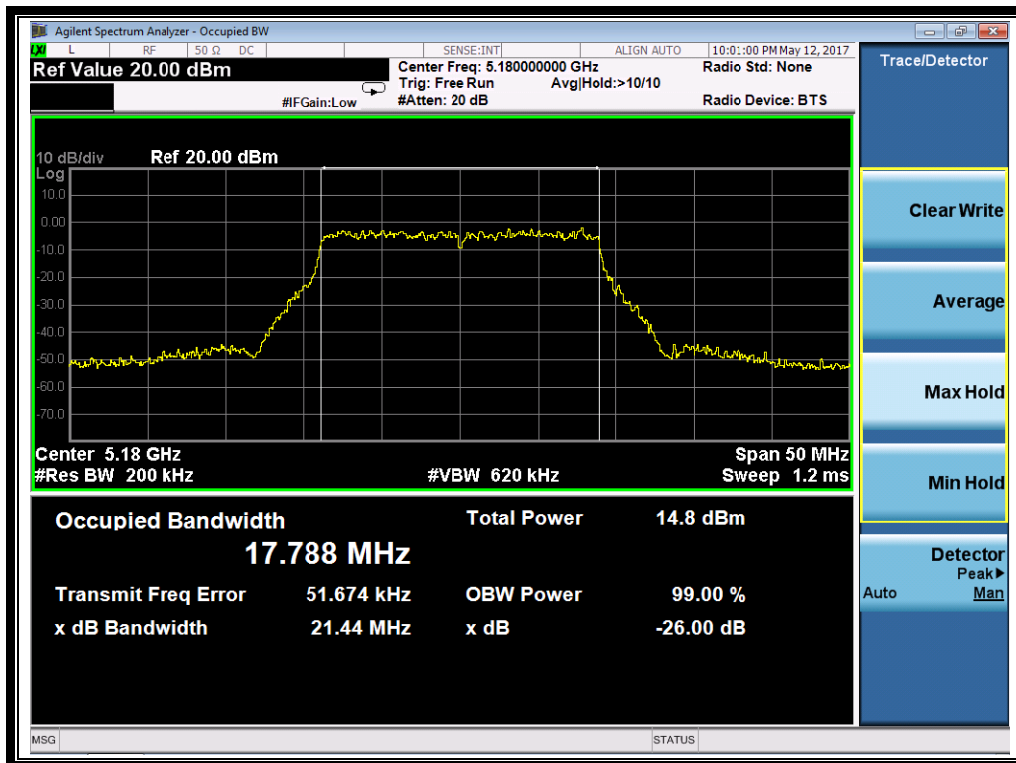


2.2.3.5 802.11n-20MHz Test mode

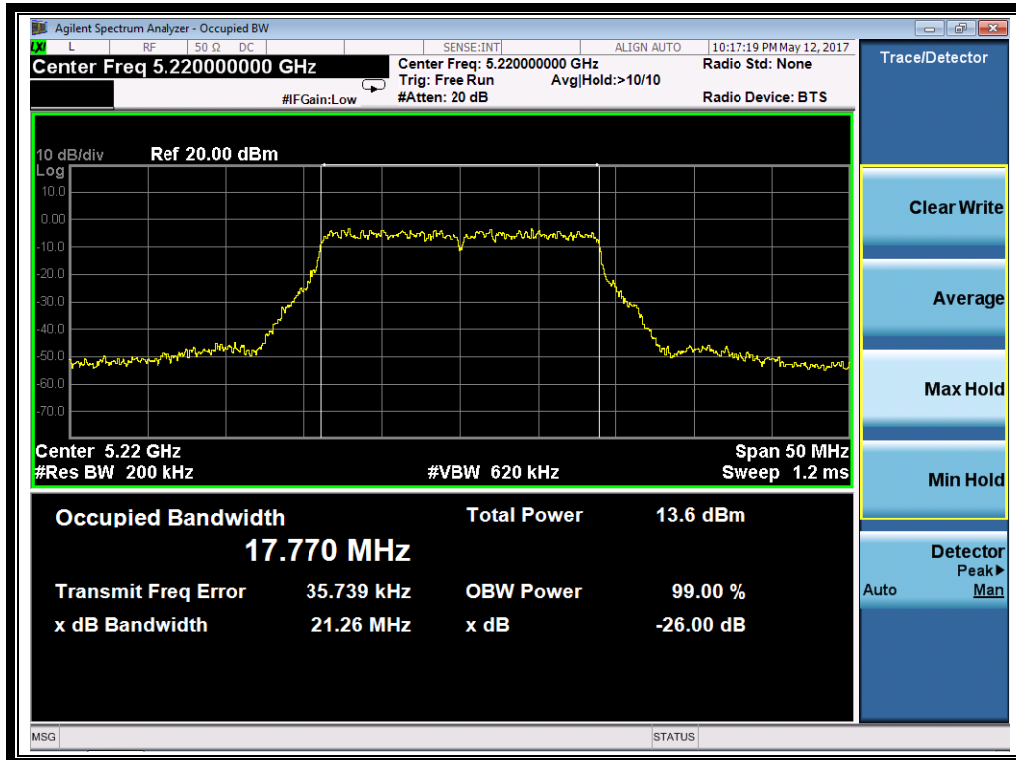
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	21.44
44	5220	21.26
48	5240	21.71
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	17.74
157	5785	17.73
165	5825	17.73

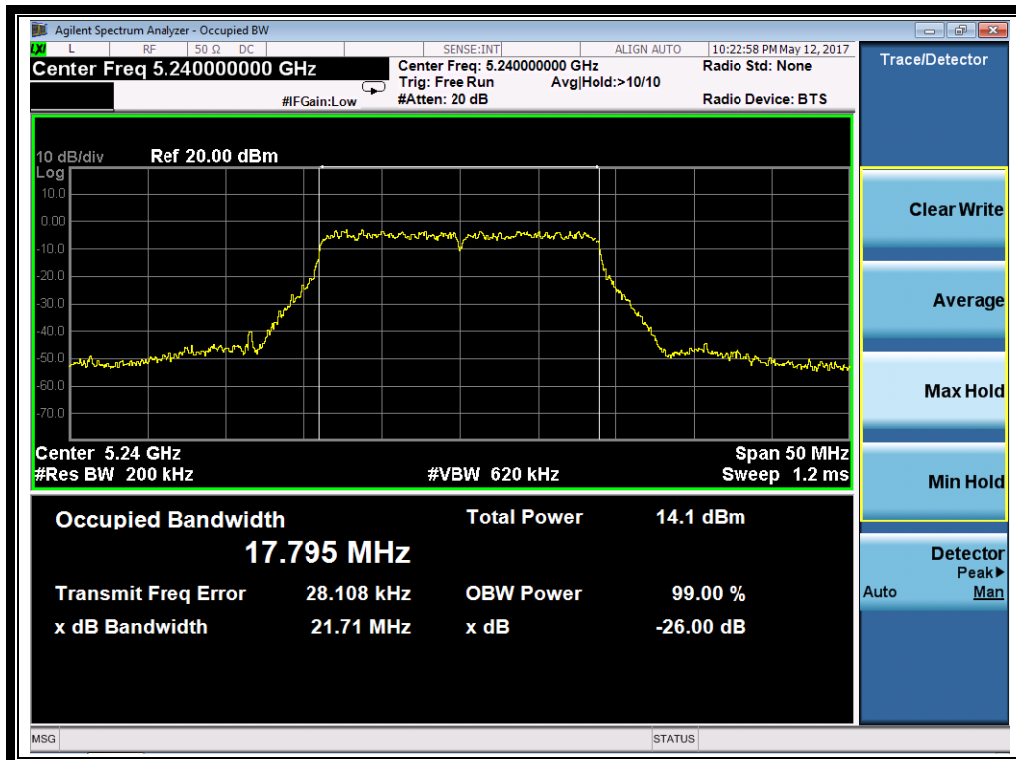
B. Test Plots



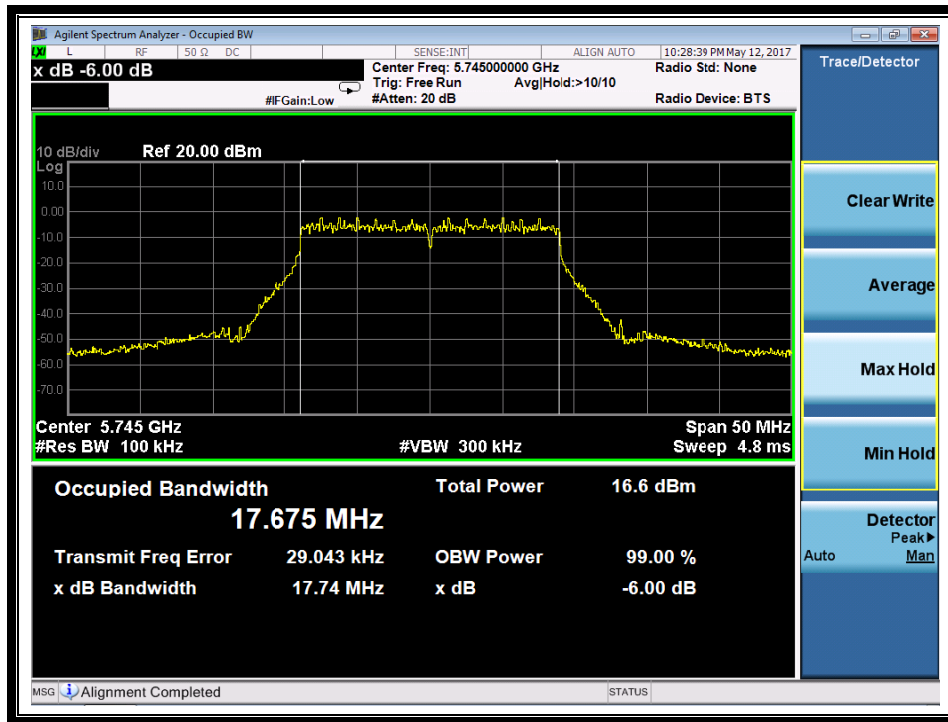
(Channel 36: 5180MHz @ 802.11n-20MHz)



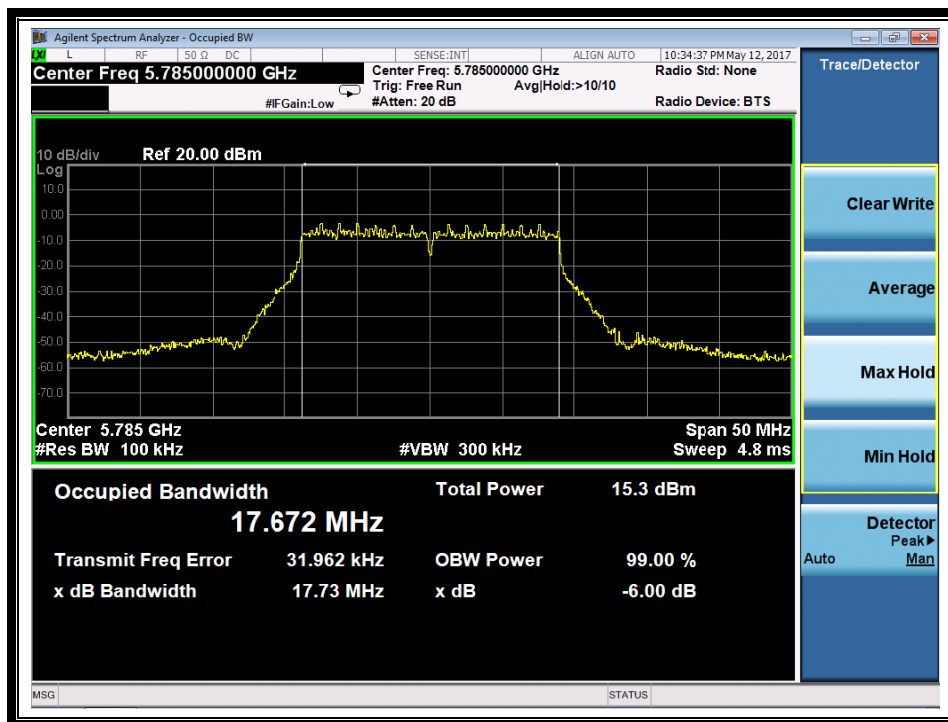
(Channel 44: 5220 MHz @ 802.11n-20MHz)



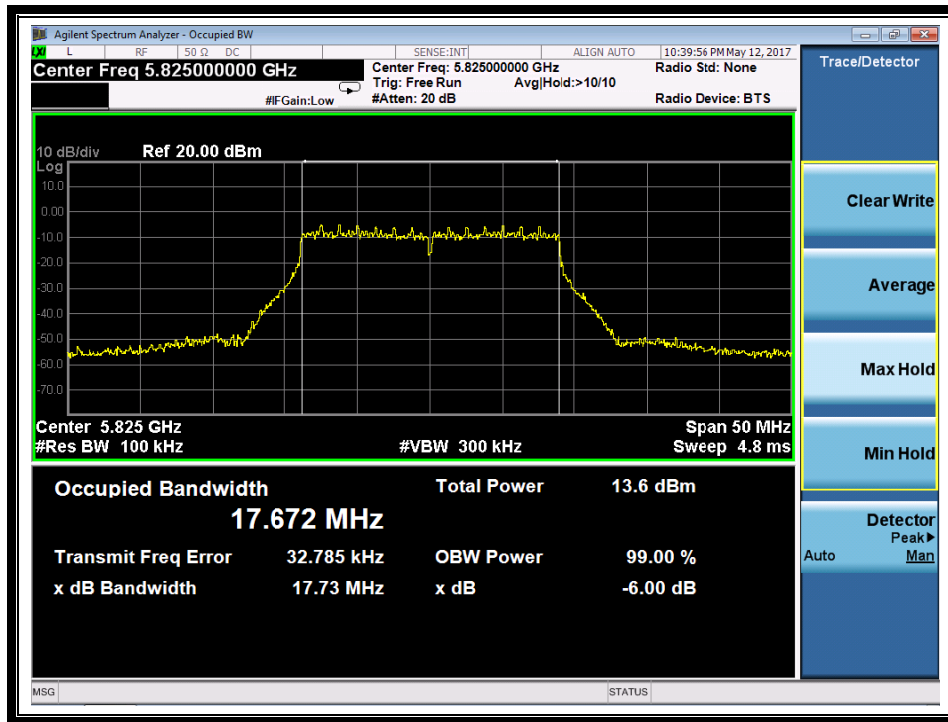
(Channel 48: 5240MHz @ 802.11n-20MHz)



(Channel 149: 5745MHz @ 802.11n-20MHz)



(Channel 157: 5785MHz @802.11n-20MHz)



(Channel 165: 5825MHz @ 802.11n-20MHz)

2.3 Maximum conducted output power

2.3.1 Requirement

(1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi.

(2) For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or $11\text{dBm} + 10\log B$, where B is the 26 dB emission bandwidth in megahertz.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

According FCC KDB644545 D03 D)1)b)3) requirement:

a) The maximum conducted output power within each band of operation shall comply with the limits for that band.

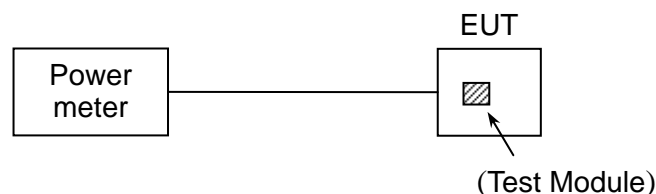
b) The limit on maximum conducted output power in each U-NII band is computed based on the portion of the emission bandwidth contained within that band

If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

2.3.2 Test Description

Section E) 3) of KDB 789033 defines a methodology using an RF average power meter.

A. Test Setup:



The EUT (Equipment under the test) which is powered by the Battery is coupled to the Power Meter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading, all test result in power meter.



2.3.3 Test Result

2.3.3.1 802.11a-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
36	5180	16.91	24	PASS
44	5220	14.79		
48	5240	16.39		
149	5745	19.11	30	
157	5785	17.68		
165	5825	15.51		

2.3.3.2 802.11ac-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
36	5180	14.73	24	PASS
44	5220	13.86		
48	5240	14.64		
149	5745	17.18	30	
157	5785	16.06		
165	5825	13.86		

2.3.3.3 802.11ac-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
38	5190	13.64	24	PASS
46	5230	13.19		
151	5755	16.38	30	
159	5795	24.82		

2.3.3.4 802.11ac-80MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
42	5210	13.95	24	PASS
155	5775	16.04	30	



2.3.3.5 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
36	5180	15.94	24	PASS
44	5220	14.34		
48	5240	16.79		
149	5745	18.38	30	
157	5785	16.96		
165	5825	14.87		

2.4 Peak Power spectral density

2.4.1 Requirement

- (1) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
- (2) For the 5.25–5.35 GHz and 5.47–5.725GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.
- (3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500KHz band.

According FCC KDB644545 D03 D)1)b)2) requirement:

Emissions in each band shall comply with the PSD limits applicable to that band under the appropriate rule section.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

2.4.2 Test Description

A. Test Set:



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading.

B. Test Procedure

KDB 789033 Section F) Maximum Power Spectral Density (PSD) Method SA-1 was used in order to prove compliance

- 1) Set span to encompass the entire 26-dB emission bandwidth
- 2) Set RBW = 1 MHz. Set VBW \geq 3 MHz.
- 3) Number of points in sweep \geq 2 Span / RBW. Sweep time = auto.
- 4) Detector = RMS (i.e., power averaging)
- 5) Trace average at least 100 traces in power averaging (i.e., RMS) mode
- 6) Record the max value



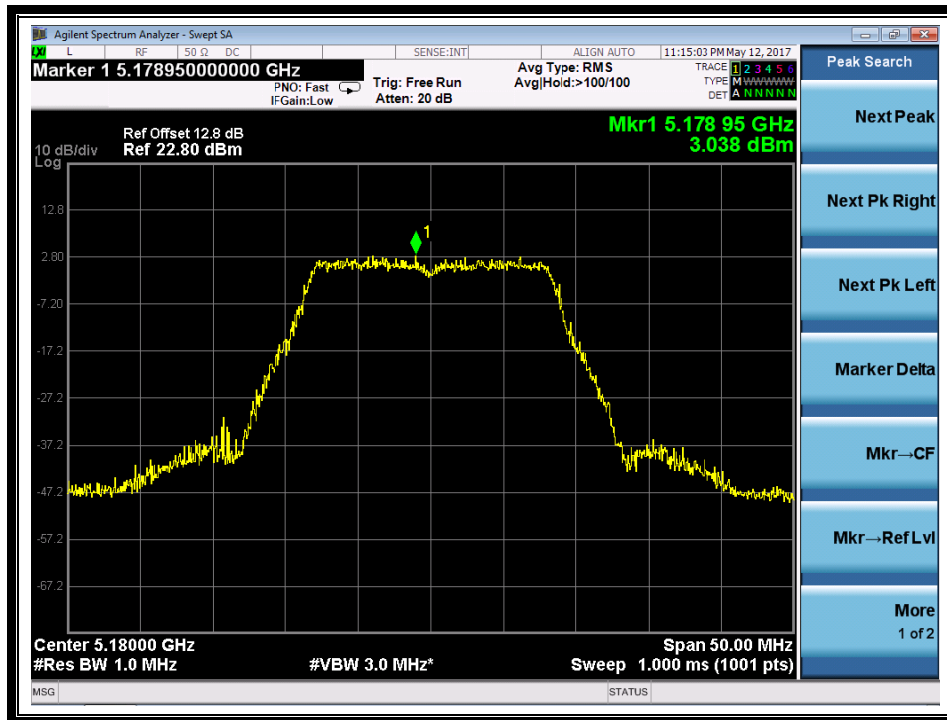
2.4.3 Test Result

2.4.3.1 802.11a Test mode

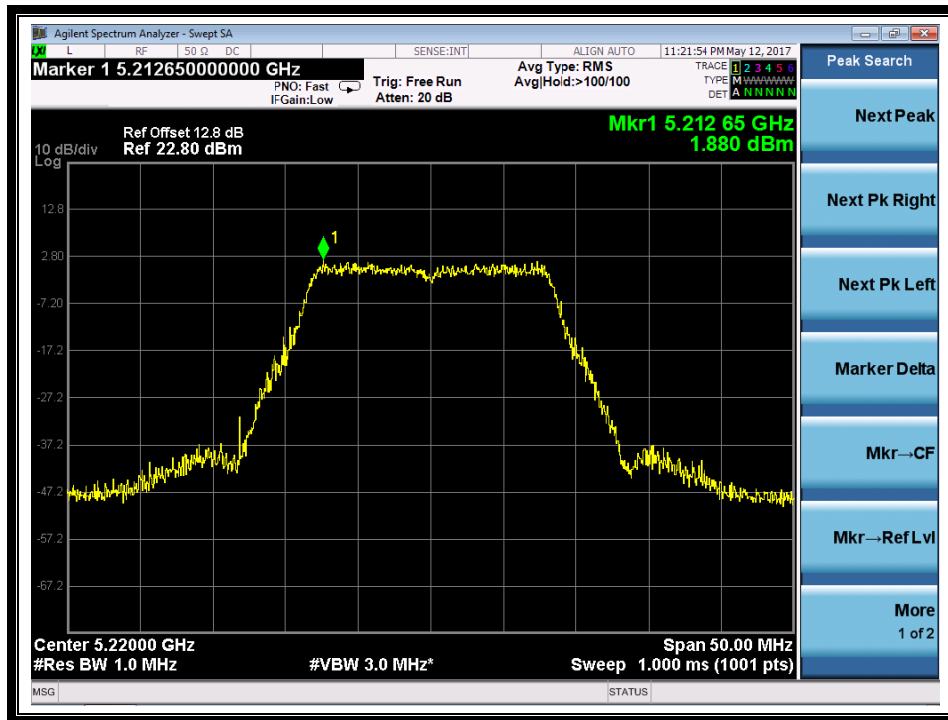
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	3.04	11	PASS
44	5220	1.88		
48	5240	2.24		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	3.30	30	PASS
157	5785	1.12		
165	5825	-0.66		

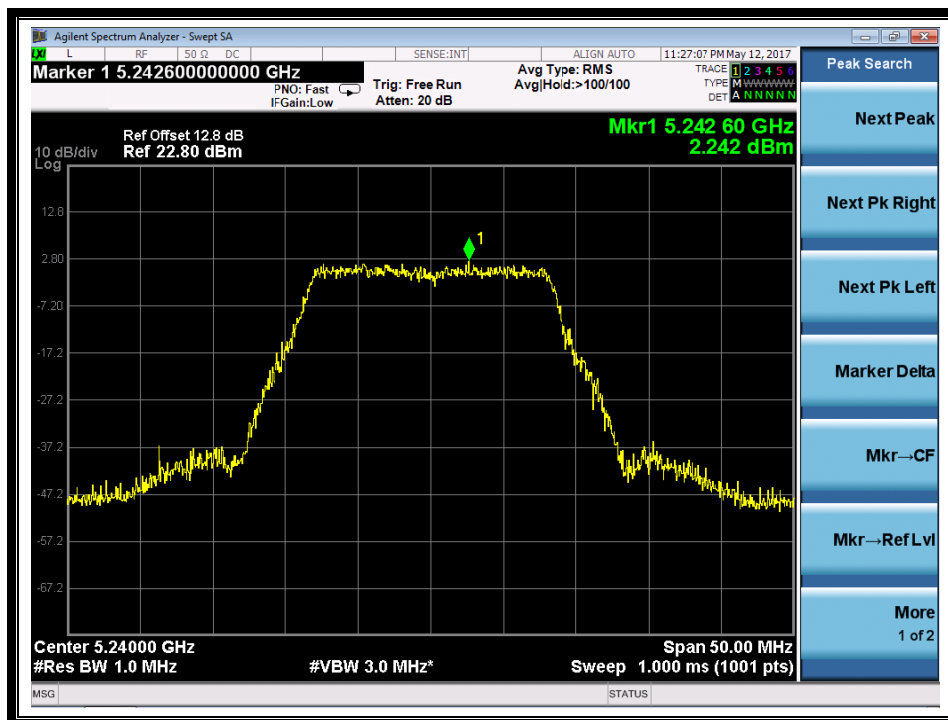
B. Test Plots



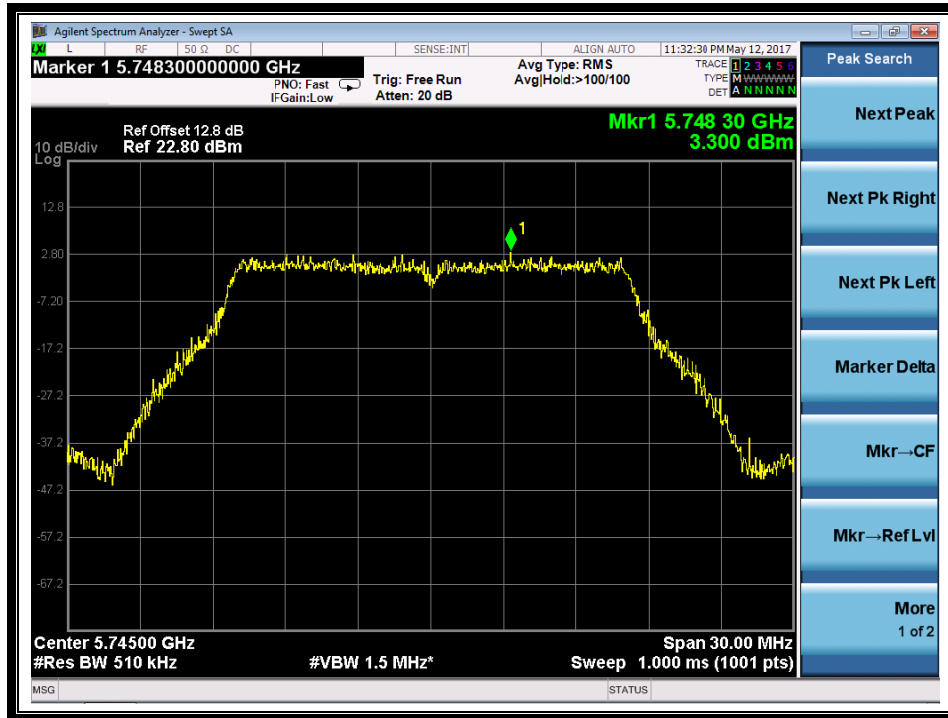
(Channel 36: 5180MHz @ 802.11a)



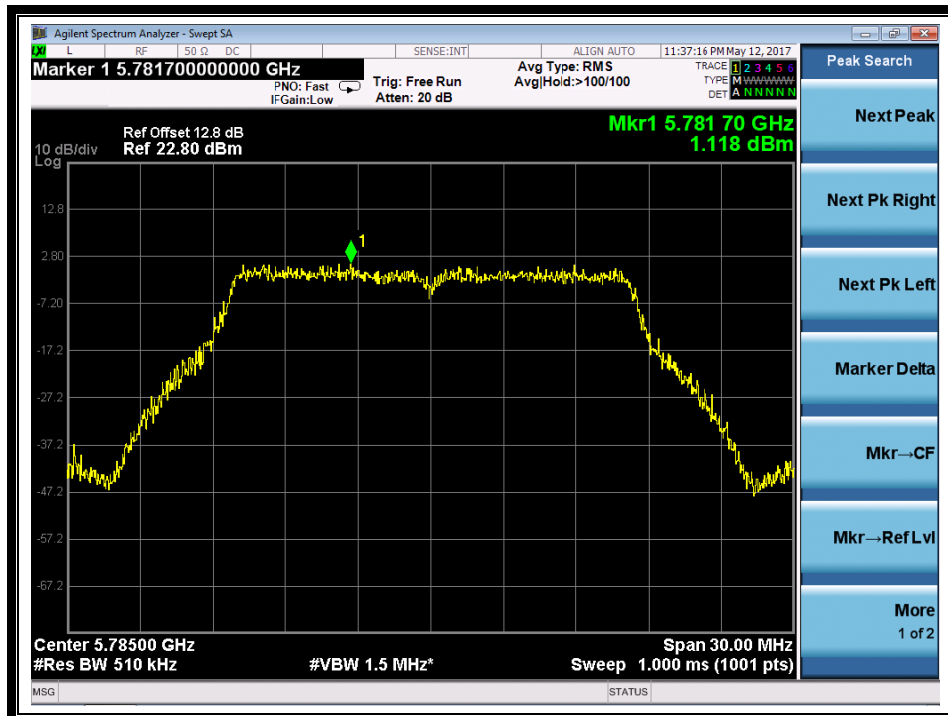
(Channel 44: 5220 MHz @802.11a)



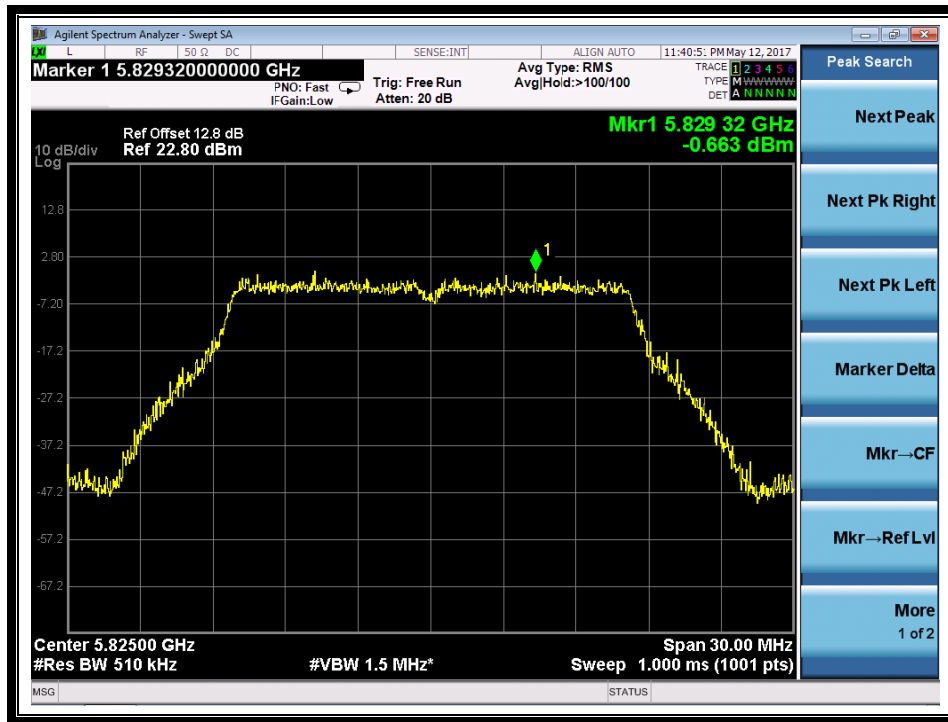
(Channel 48: 5240MHz @802.11a)



(Channel 149: 5745MHz @ 802.11a)



(Channel 157: 5785MHz @ 802.11a)



(Channel 165: 5825MHz @ 802.11a)

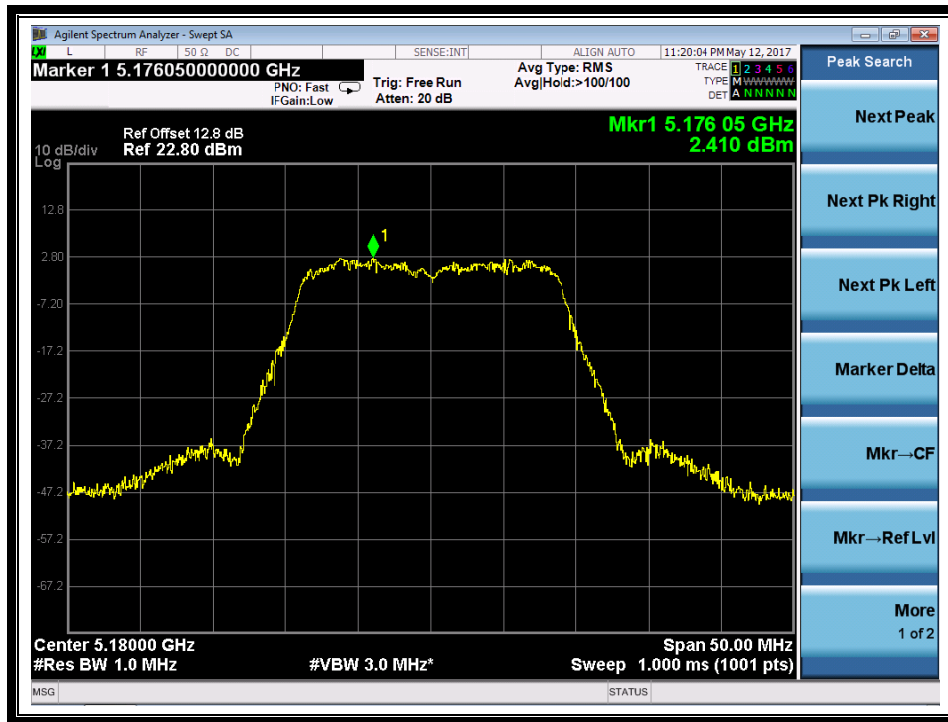
2.4.3.2 802.11ac-20MHz Test mode

A. Test Verdict:

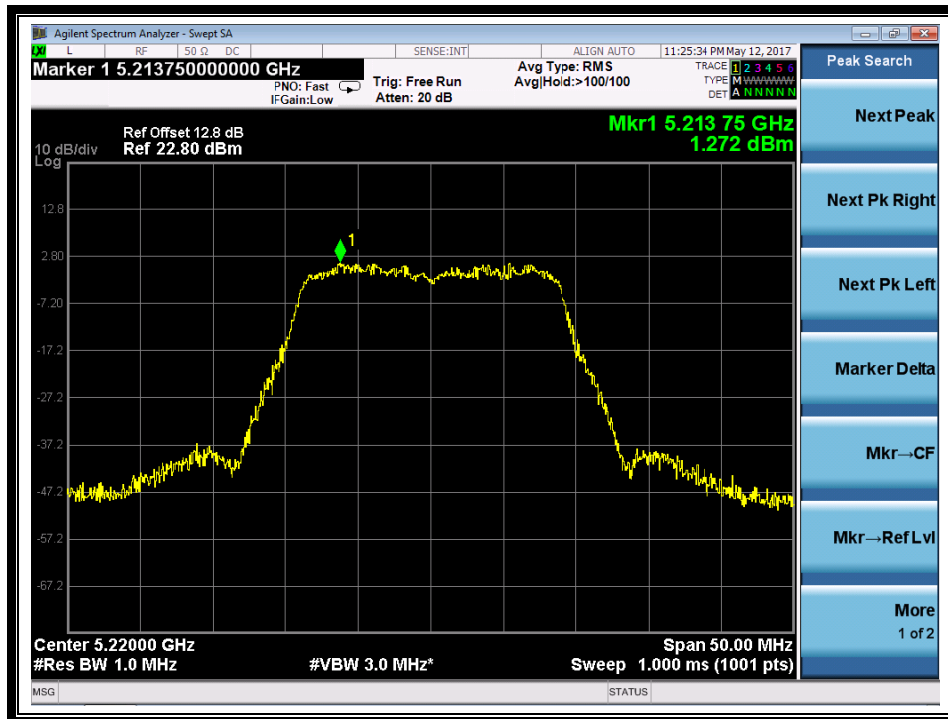
Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	2.41	11	PASS
44	5220	1.27		
48	5240	1.81		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	2.42	30	PASS
157	5785	0.97		
165	5825	-1.19		



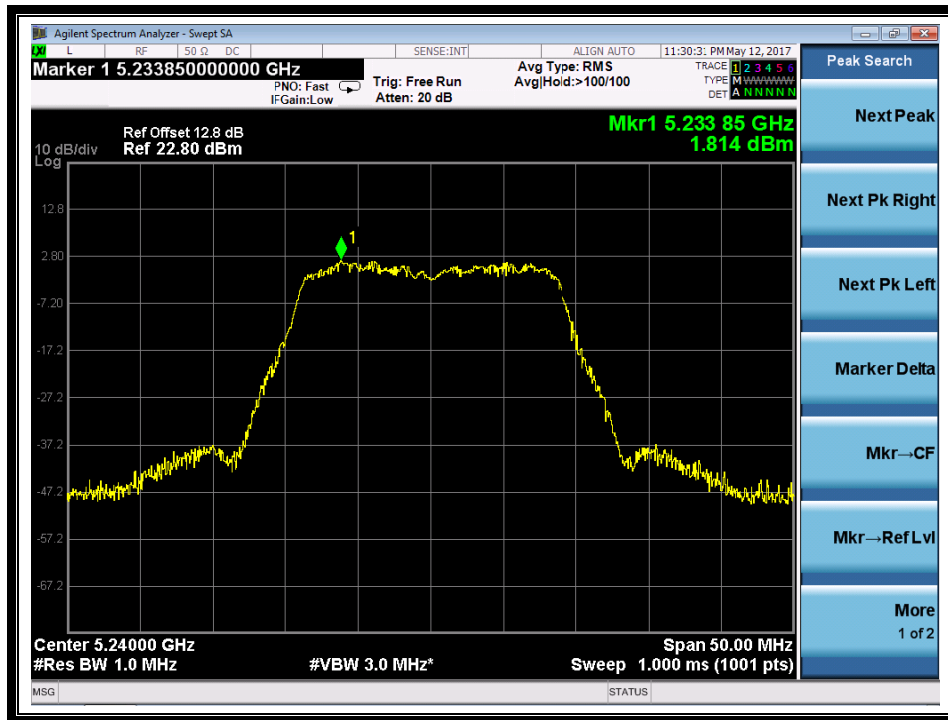
B. Test Plots



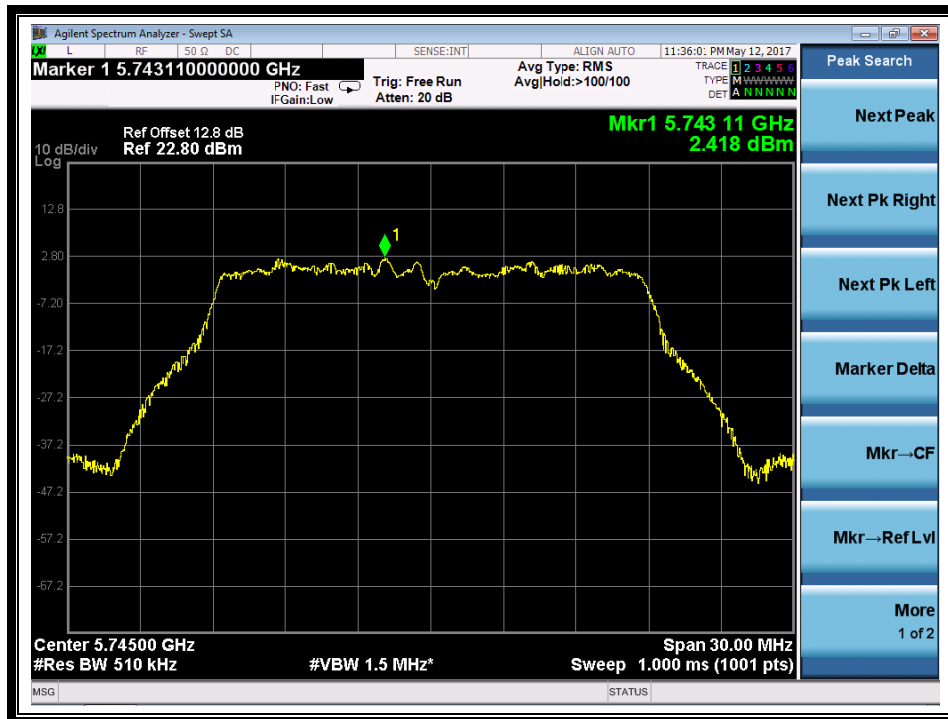
(Channel 36: 5180MHz @ 802.11ac)



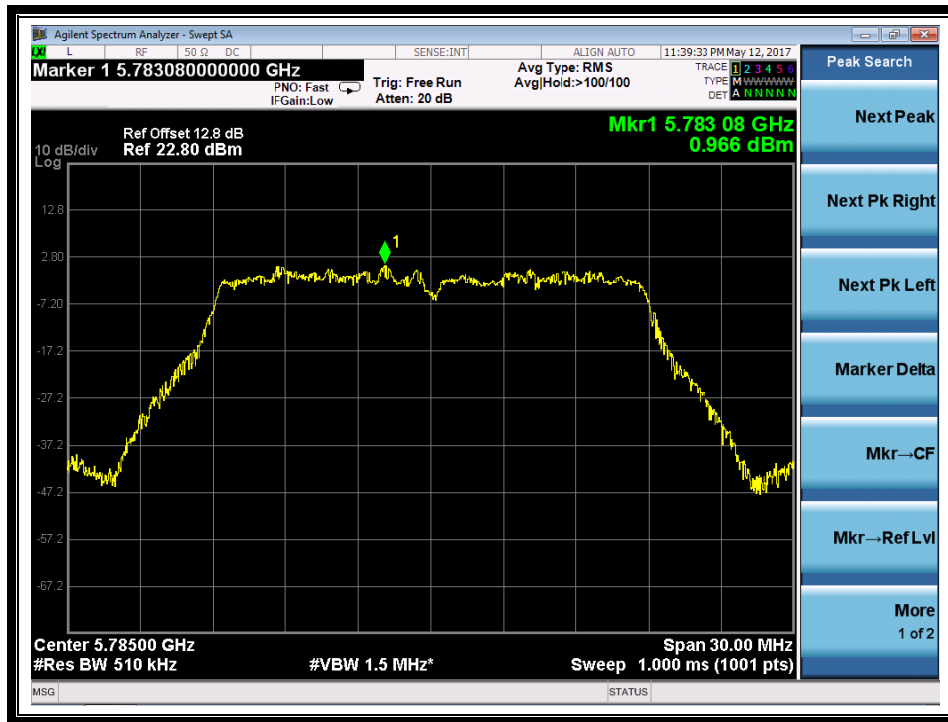
(Channel 44: 5220 MHz @ 802.11ac)



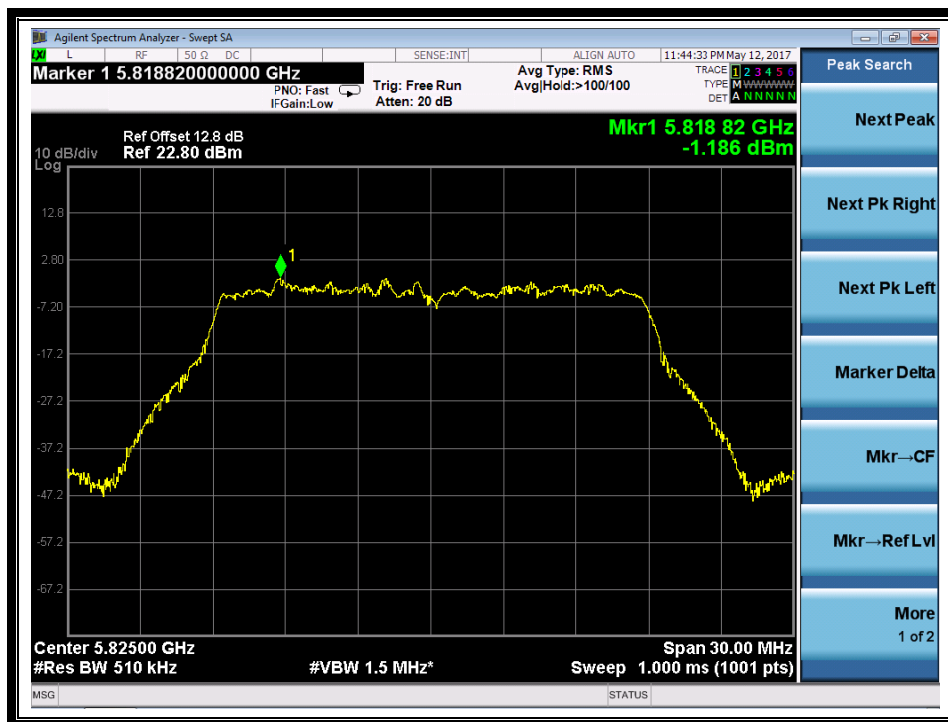
(Channel 48: 5240MHz @ 802.11ac)



(Channel 149: 5745MHz @ 802.11ac)



(Channel 157: 5785MHz @ 802.11ac)



(Channel 165: 5825MHz @ 802.11ac)

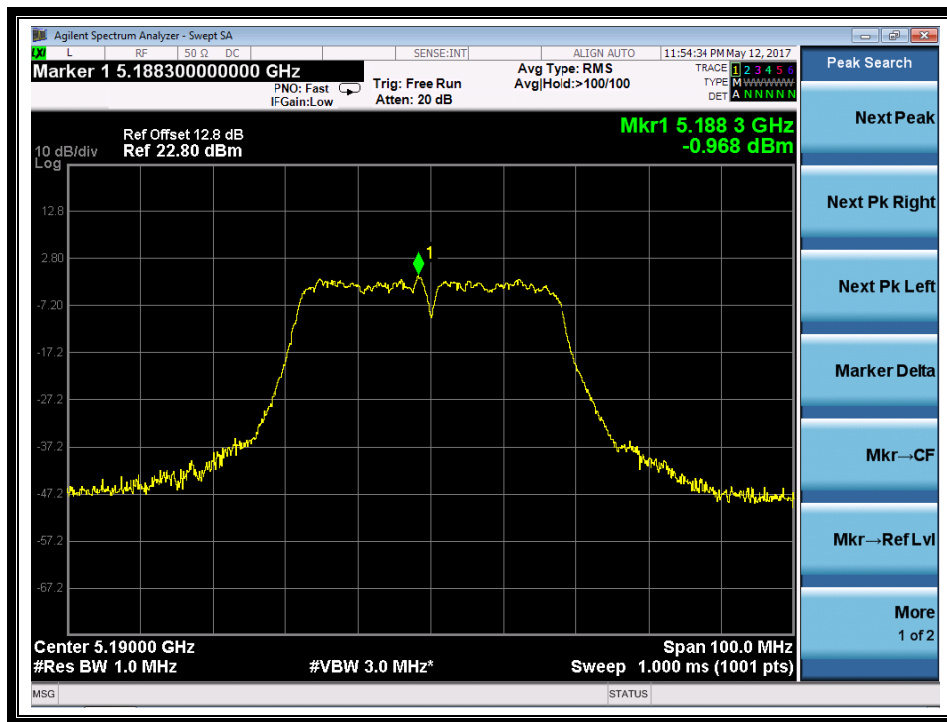


2.4.3.3 802.11ac-40MHz Test mode

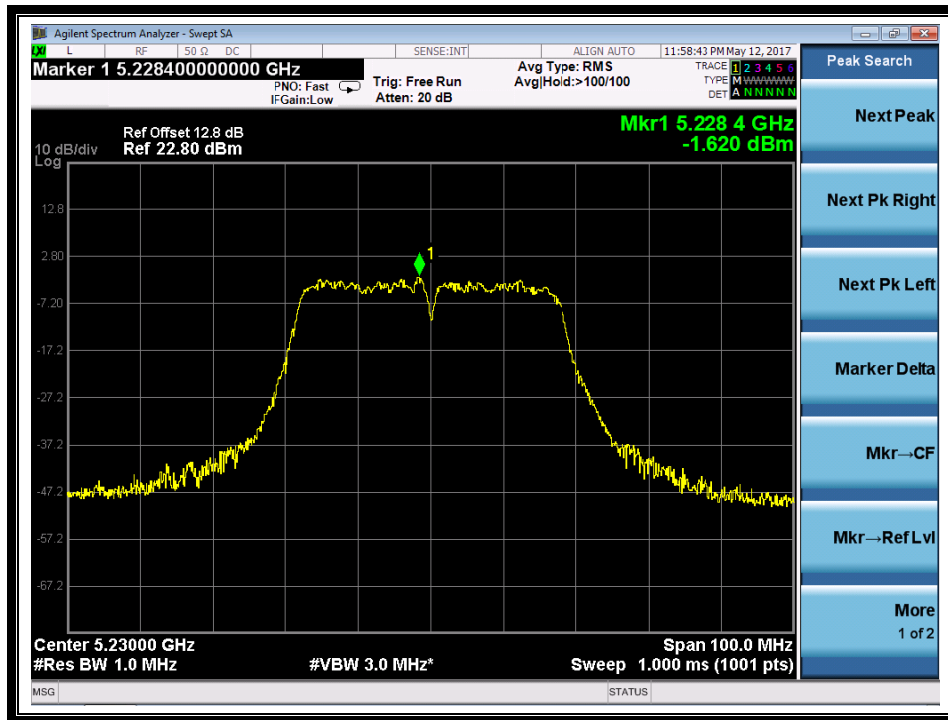
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
38	5190	-0.97	11	PASS
46	5230	-1.62		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
151	5755	-0.84	30	PASS
159	5795	11.26		

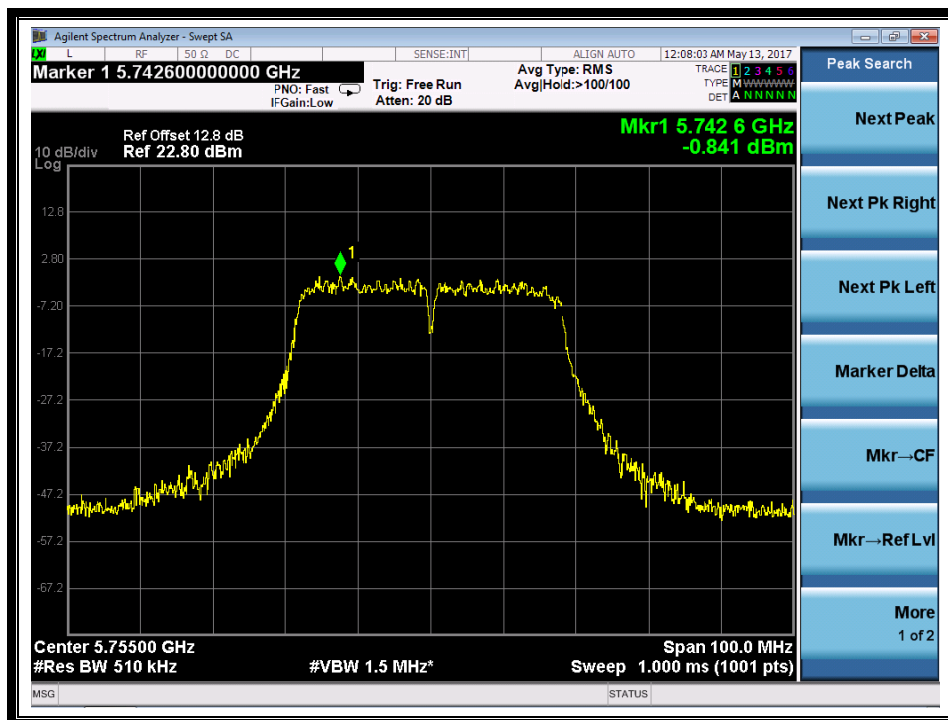
B. Test Plots



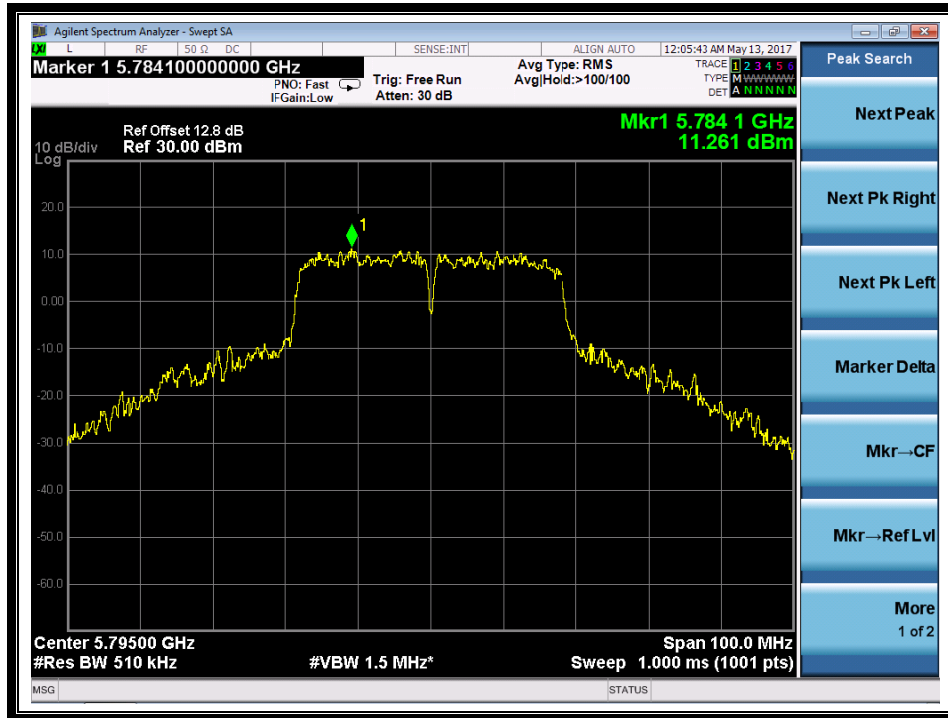
(Channel 38: 5190MHz @ 802.11ac)



(Channel 46: 5230 MHz @ 802.11ac)



(Channel 151: 5755MHz @ 802.11ac)



(Channel 159: 5795MHz @ 802.11ac)

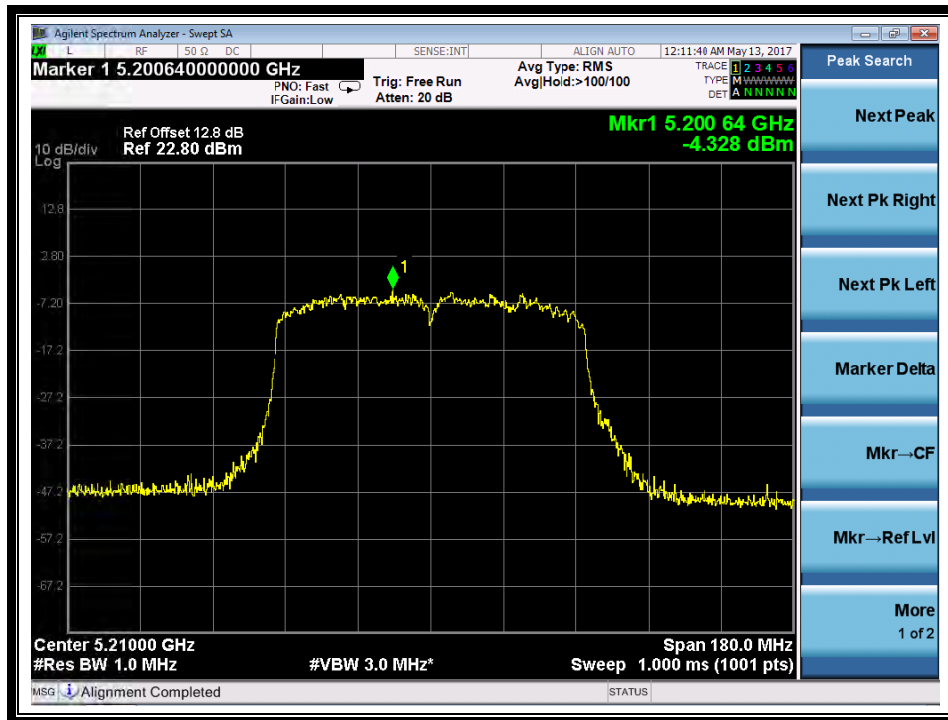
2.4.3.4 802.11ac-80MHz Test mode

A. Test Verdict:

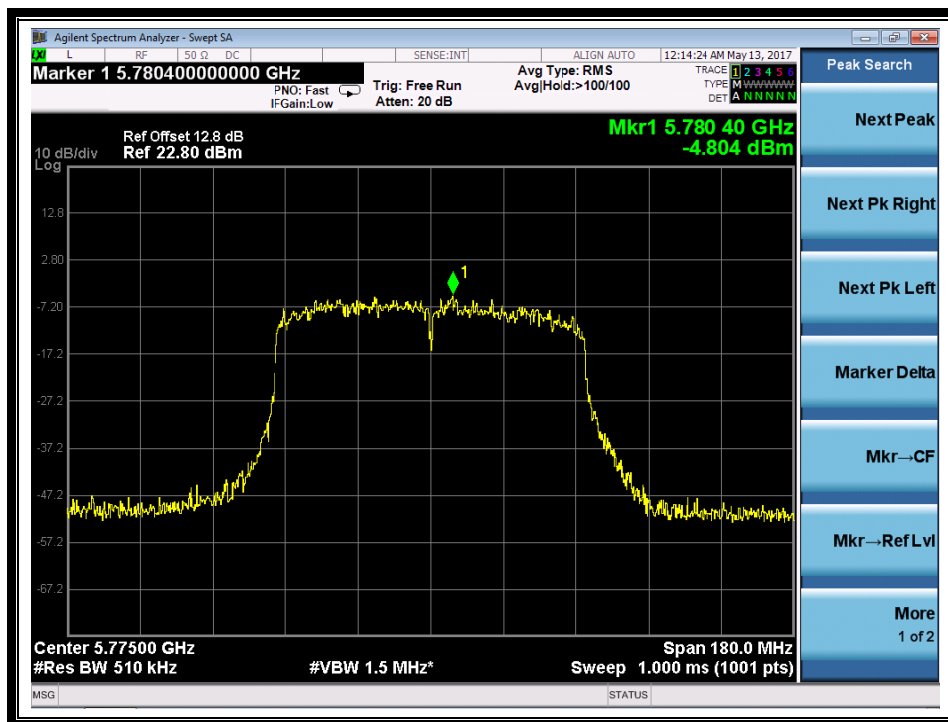
Channel	Frequency (MHz)	Measured PSD (dBm)	Limit (dBm/MHz)	Verdict
42	5210	-4.33	11	PASS
Channel	Frequency (MHz)	Measured PSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
155	5775	-4.80	30	PASS



B. Test Plots



(Channel 42: 5210MHz @ 802.11ac)



(Channel 155: 5775MHz @ 802.11ac)

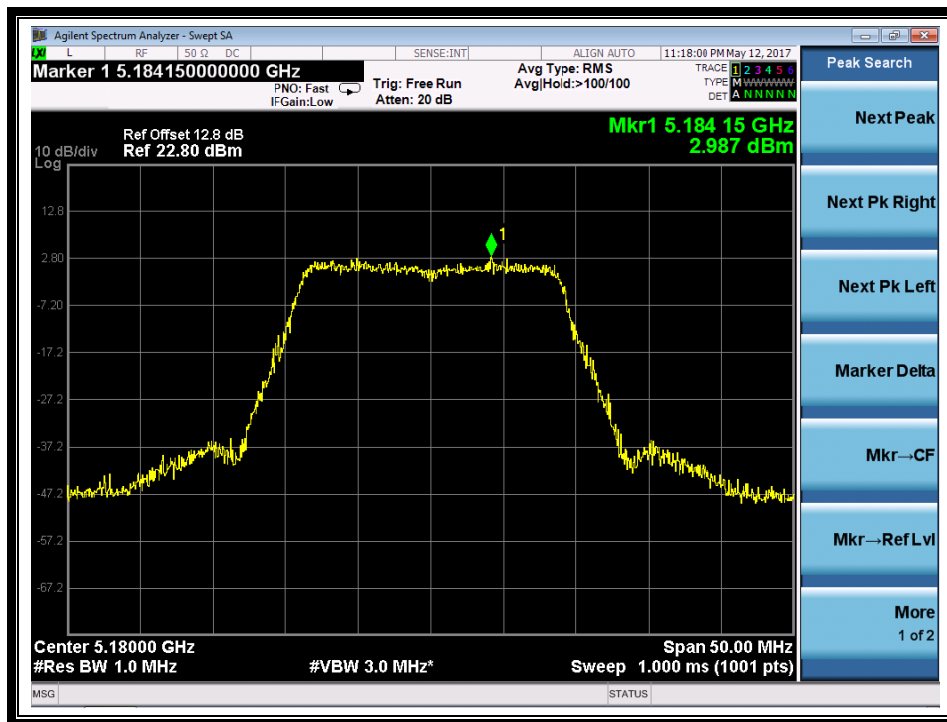


2.4.3.5 802.11n-20MHz Test mode

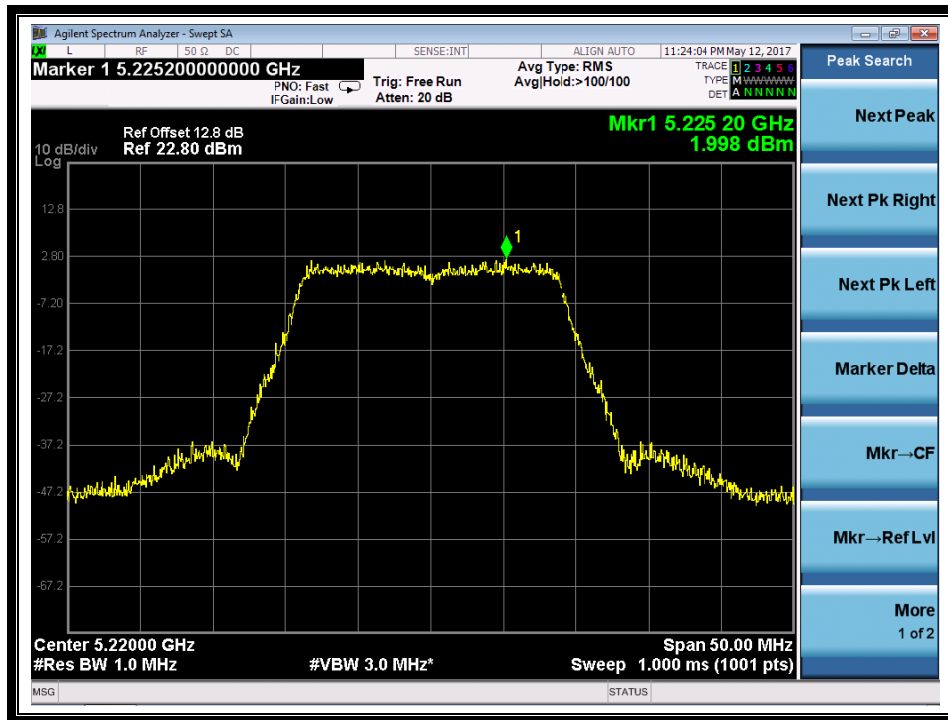
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	2.99	11	PASS
44	5220	2.00		
48	5240	2.11		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	3.45	30	PASS
157	5785	1.11		
165	5825	-0.97		

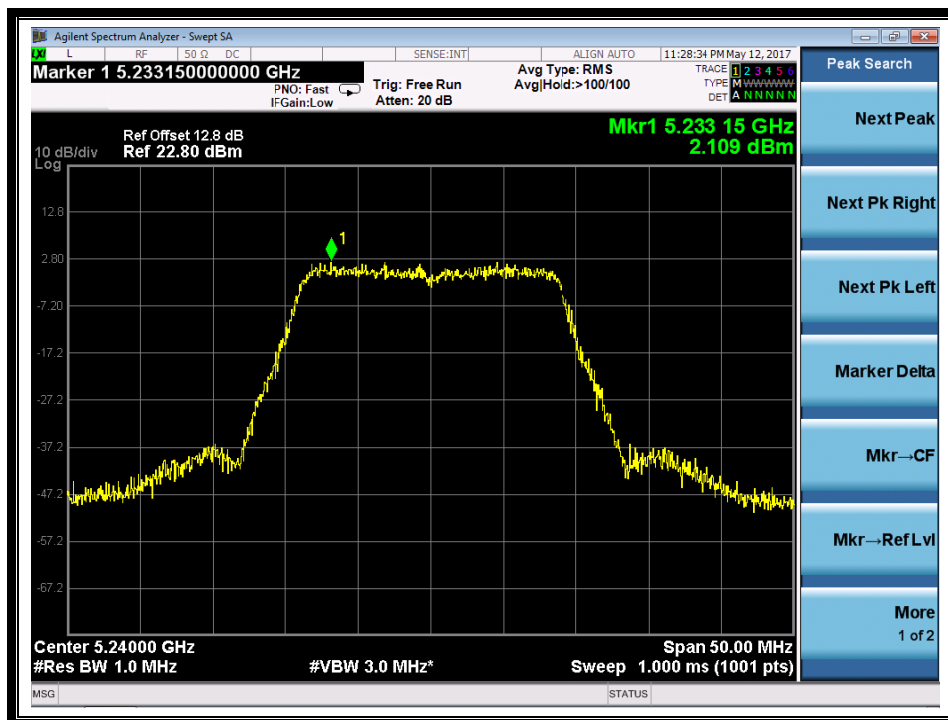
B. Test Plots



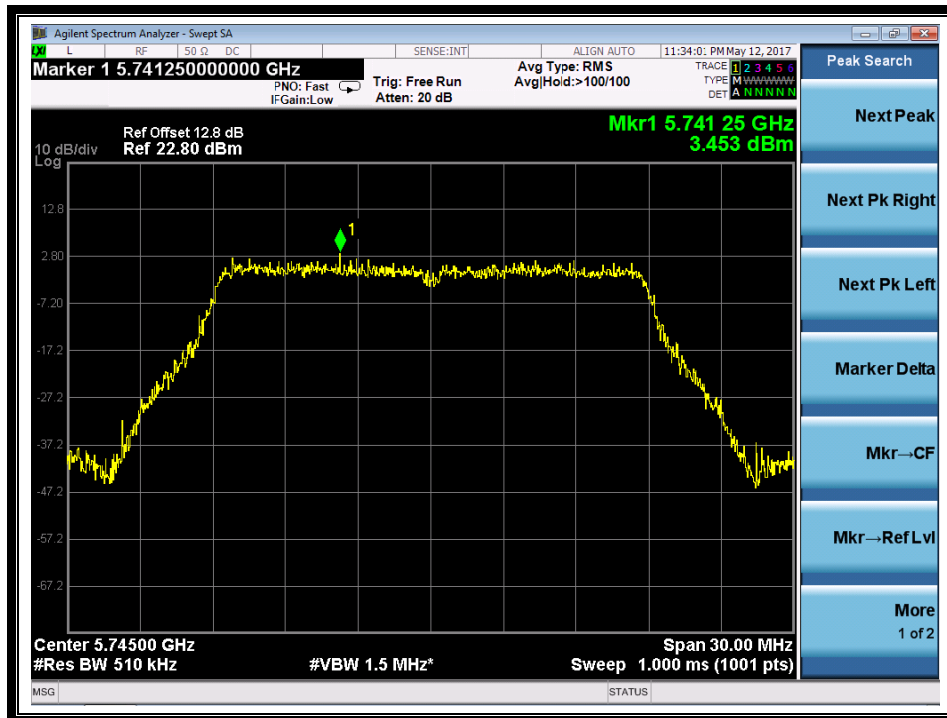
(Channel 36: 5180MHz @ 802.11n-20MHz)



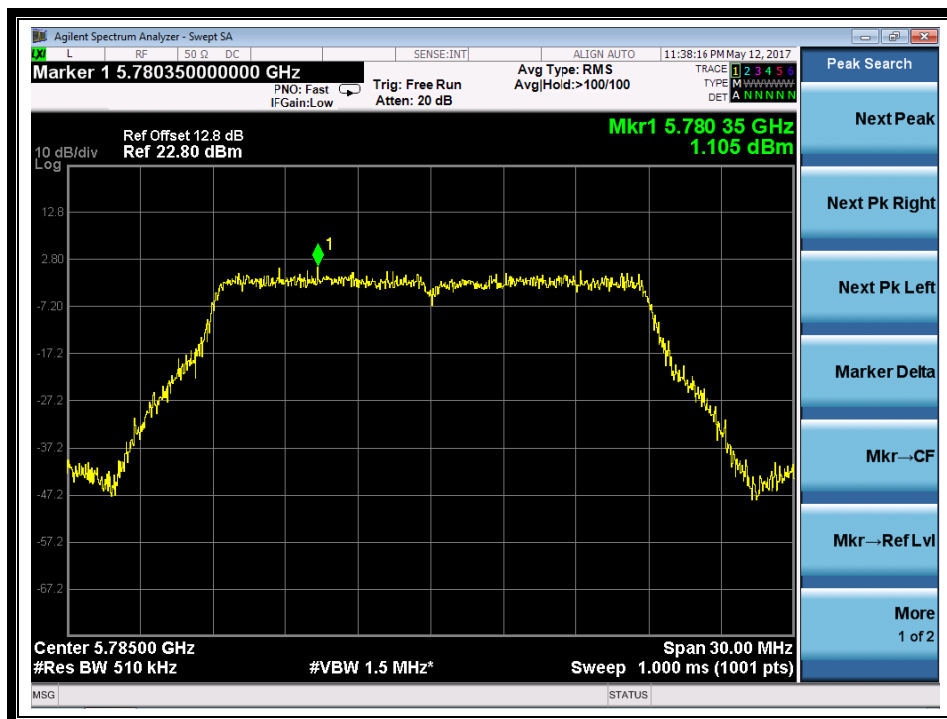
(Channel 44: 5220 MHz @ 802.11n-20MHz)



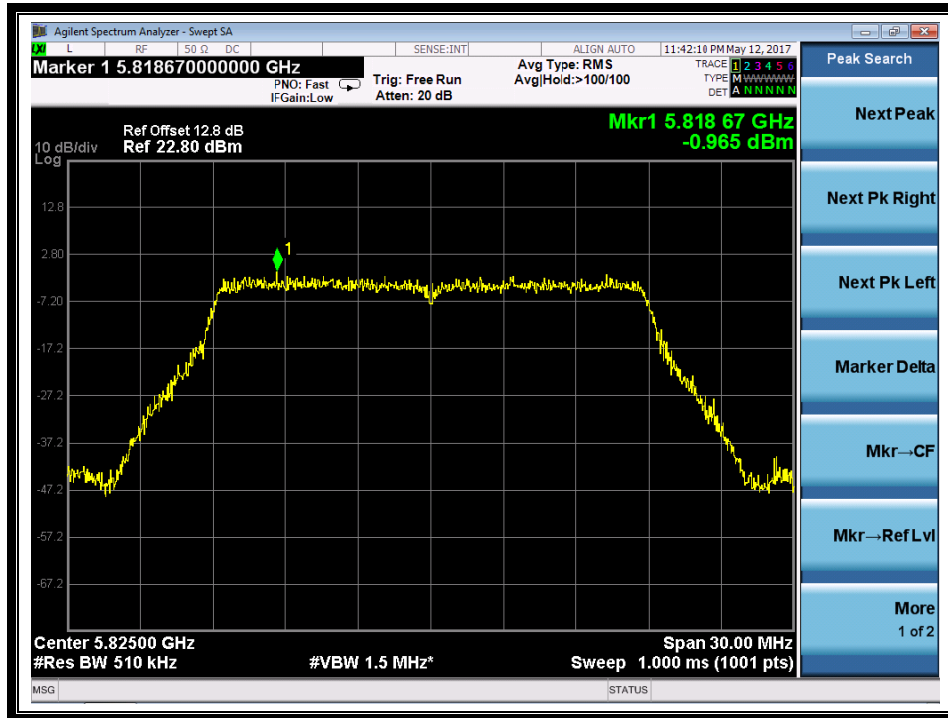
(Channel 48: 5240MHz @ 802.11n-20MHz)



(Channel 149: 5745MHz @ 802.11n-20MHz)



(Channel 157: 5785MHz @ 802.11n-20MHz)



(Channel 165: 5825MHz @ 802.11n-20MHz)

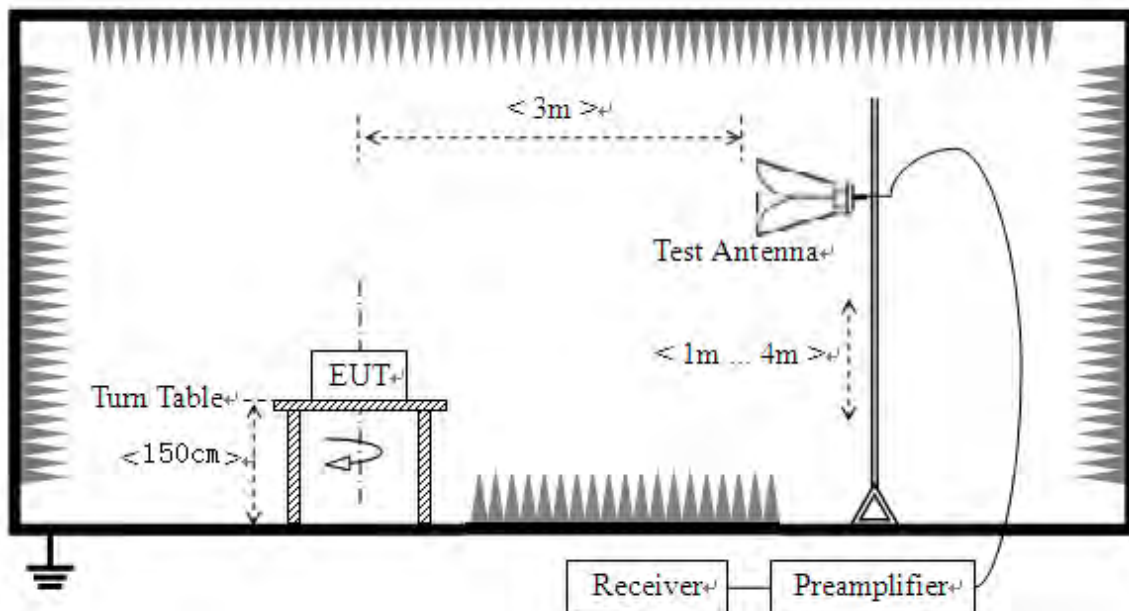
2.5 Restricted Frequency Bands

2.5.1 Requirement

According to FCC section 15.407(b)(7), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.5.2 Test Description

A. Test Setup



The Module 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.



2.5.3 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_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

Note: 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.

2.5.3.1 802.11a Test mode

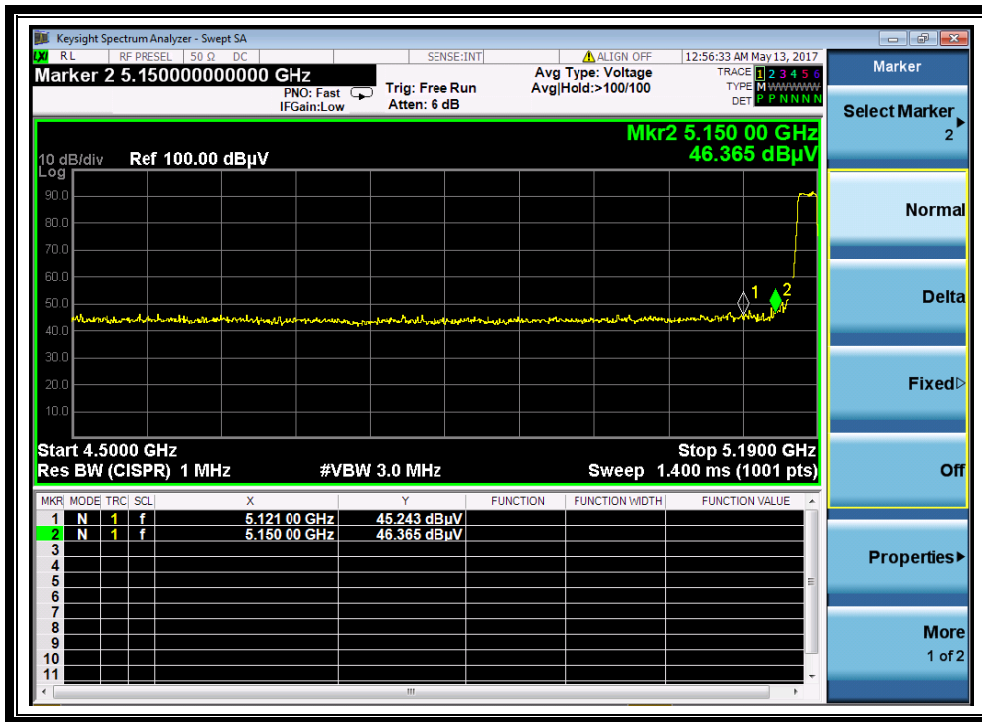
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

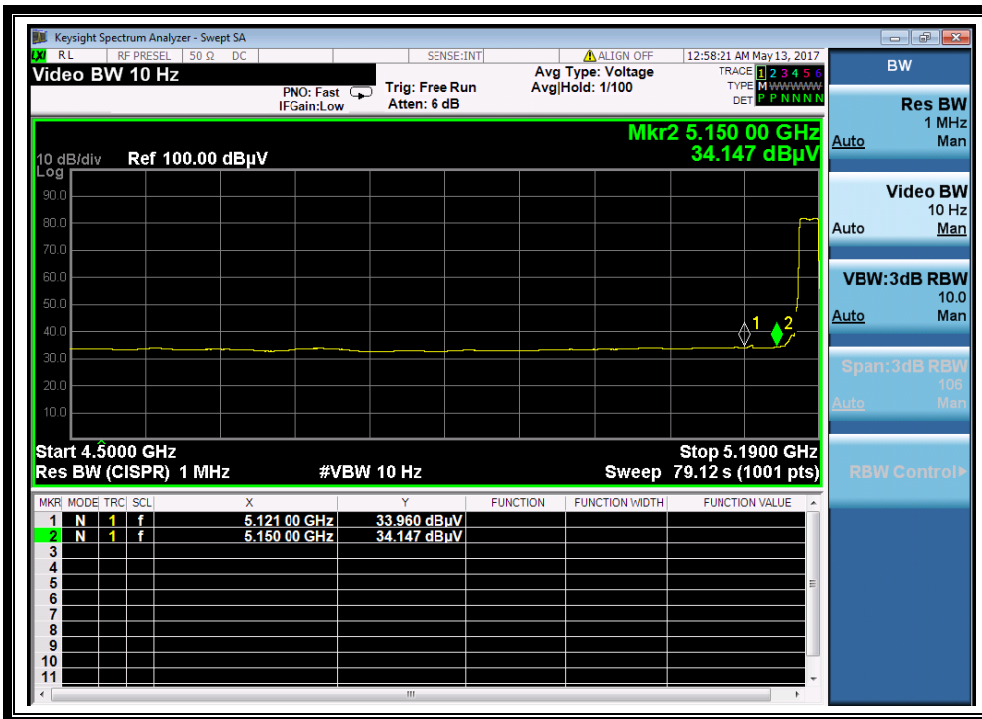
Channel	Frequency (MHz)	Detector	Receiver Reading	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dB μ V/m)	Limit (dB μ V/m)	Verdict
		PK/ AV	U_R (dB μ V)					
36	5121.00	PK	45.24	-50.65	32.11	26.70	74	Pass
36	5121.00	AV	33.96	-50.65	32.11	15.42	54	Pass
38	5375.00	PK	41.98	-50.65	32.11	23.44	74	Pass
38	5375.00	AV	32.31	-50.65	32.11	13.77	54	Pass



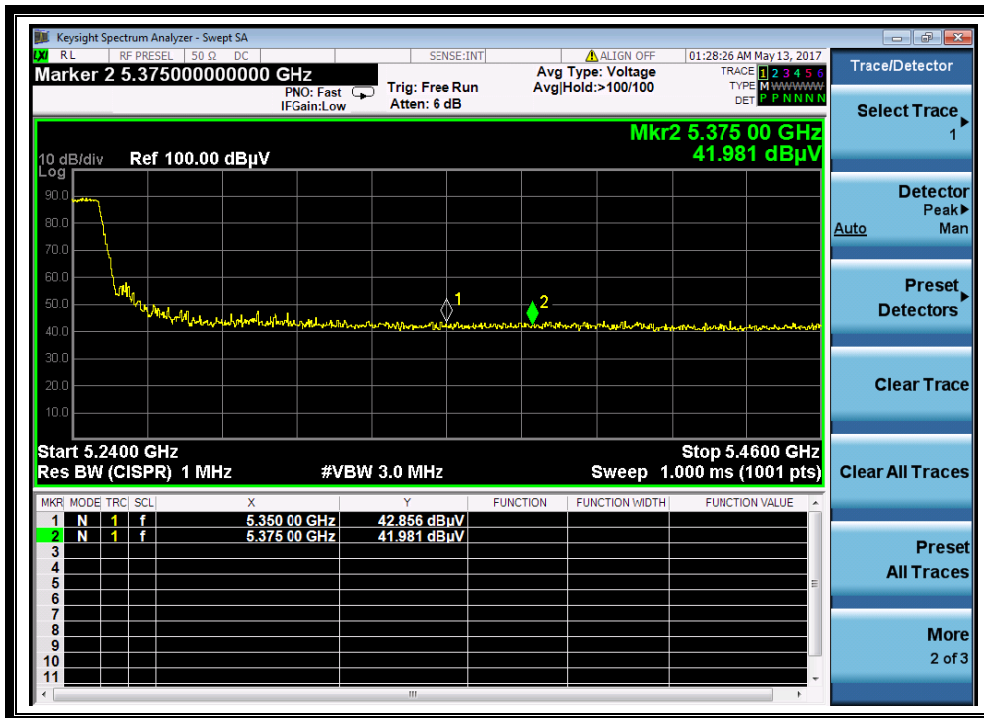
B. Test Plots:



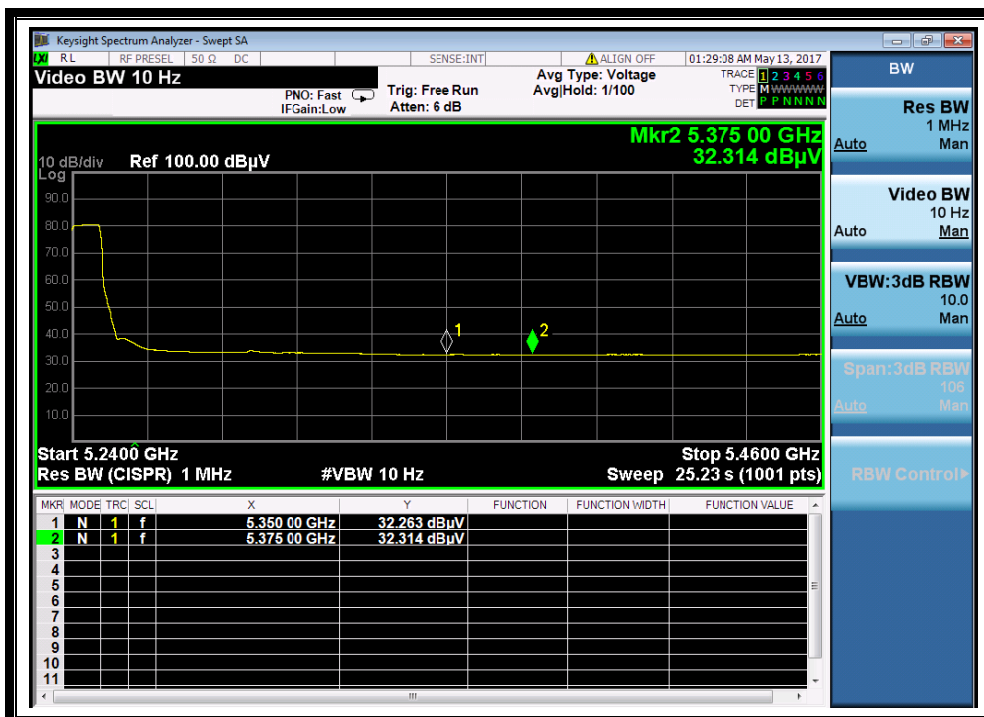
(Channel = 36 PEAK @ 802.11a)



(Channel = 36 AVG @ 802.11a)



(Channel = 48 PEAK @ 802.11a)



(Channel = 48 AVG @ 802.11a)



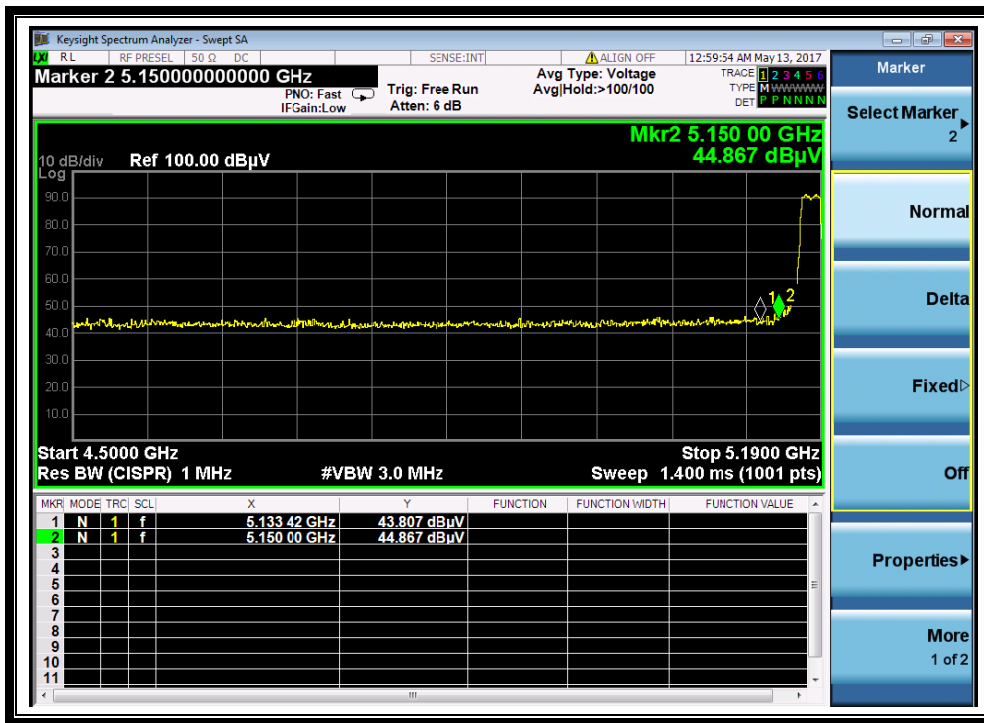
2.5.3.2 802.11ac-20MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

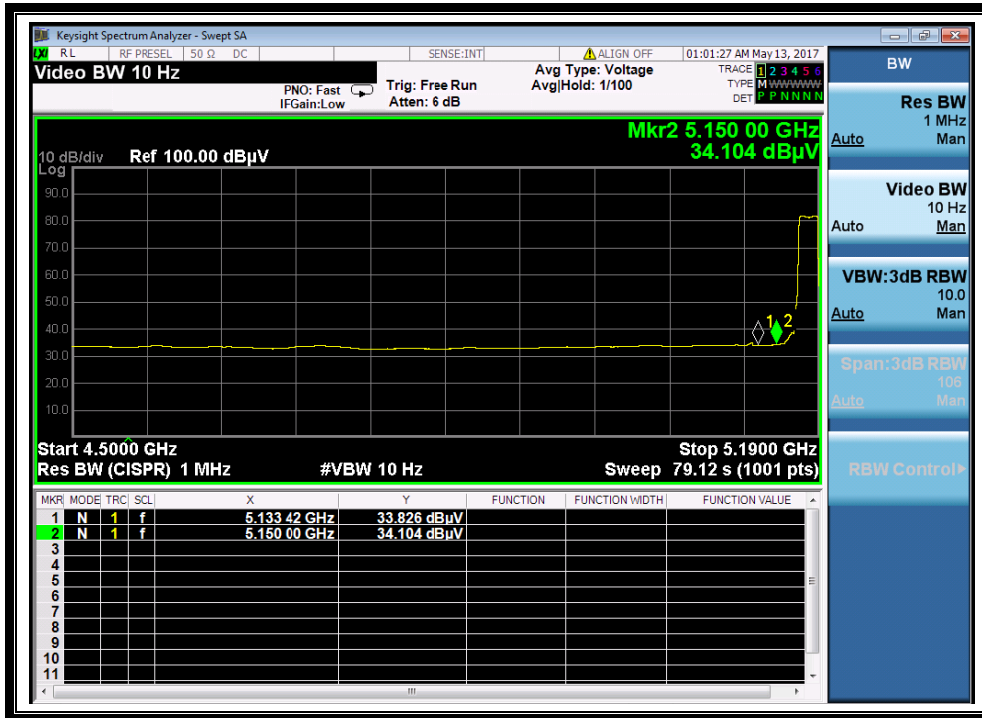
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV	U _R (dBuV)					
36	5133.42	PK	43.81	-50.65	32.11	25.27	74	Pass
36	5133.42	AV	33.83	-50.65	32.11	15.29	54	Pass
48	5375.00	PK	41.03	-50.65	32.11	22.49	74	Pass
48	5375.00	AV	32.33	-50.65	32.11	13.79	54	Pass

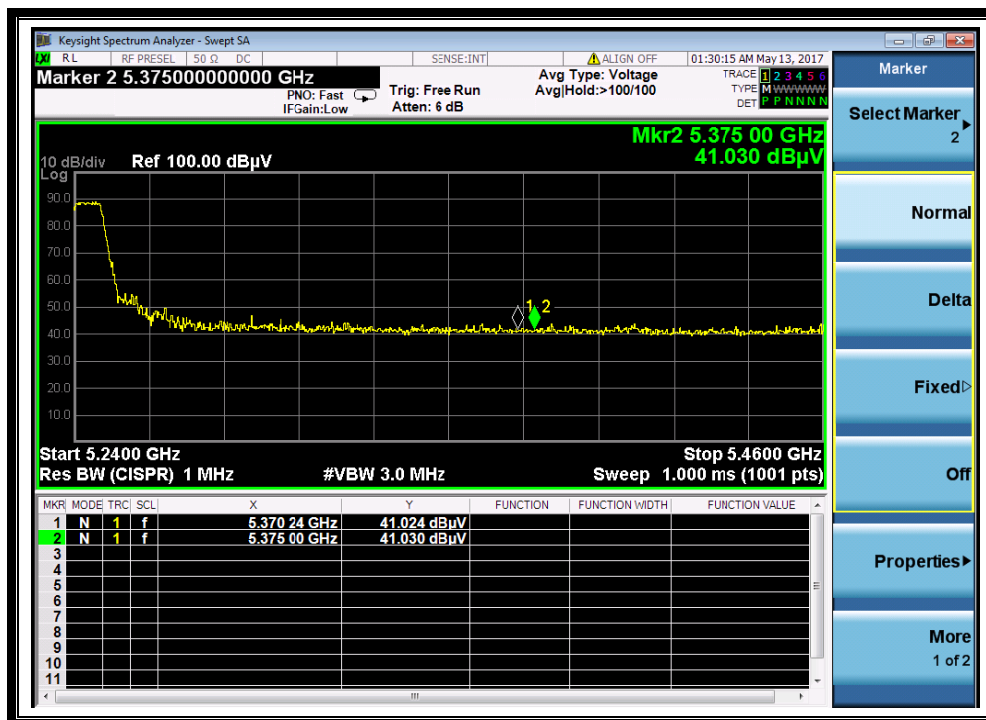
B. Test Plots:



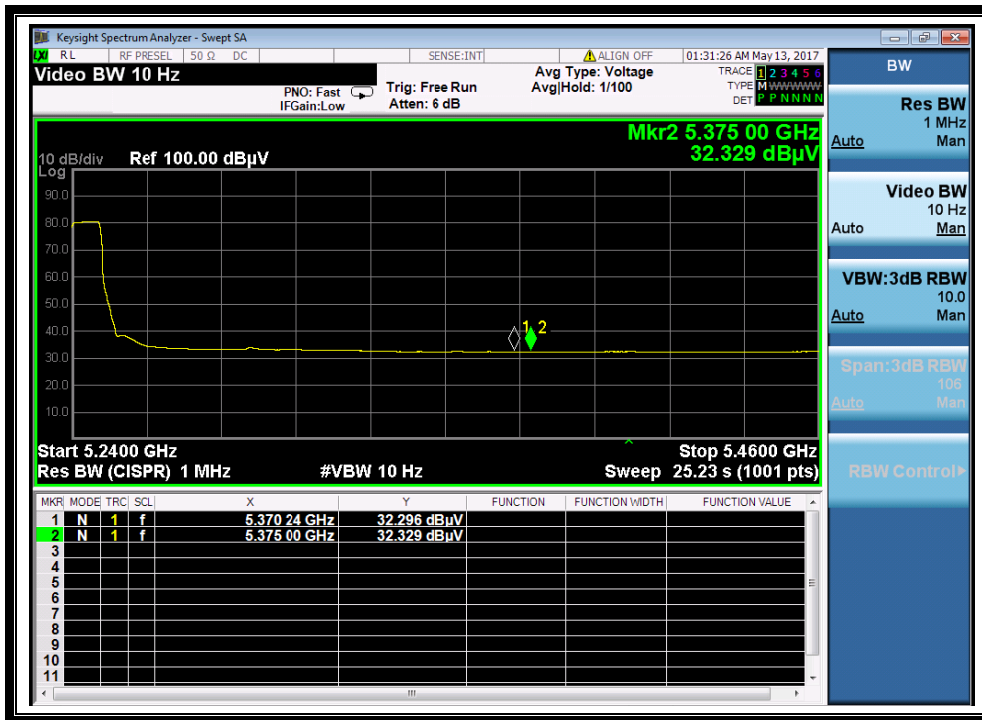
(Channel = 36 PEAK @ 802.11ac)



(Channel = 36 AVG @ 802.11ac)



(Channel = 48 PEAK @ 802.11ac)



(Channel = 48 AVG @ 802.11ac)

2.5.3.3 802.11ac-40MHz Test mode

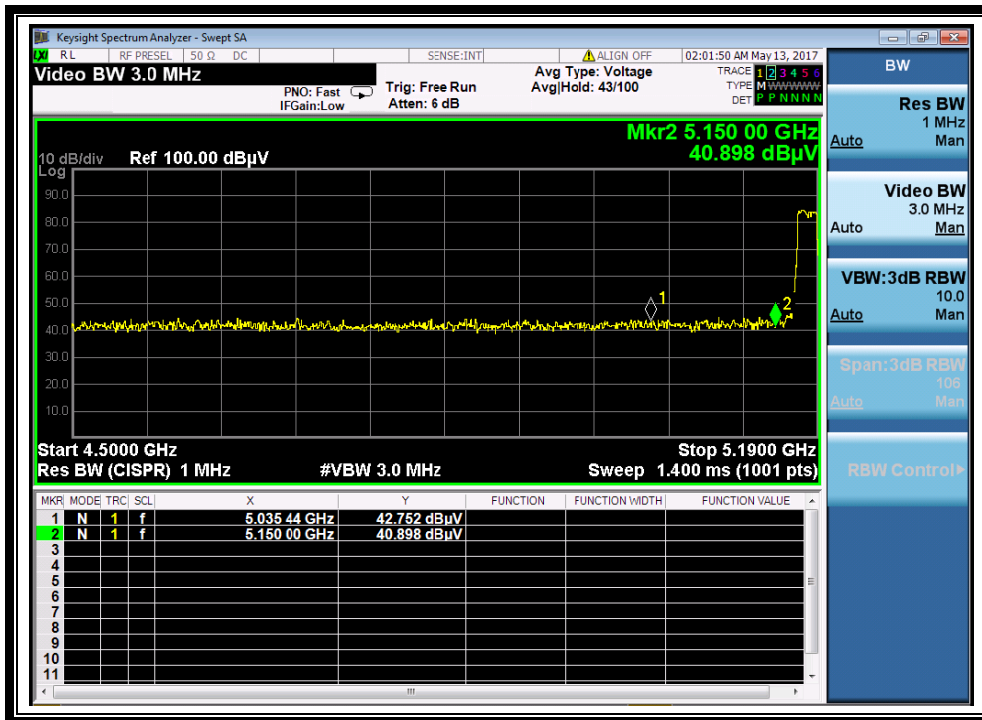
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

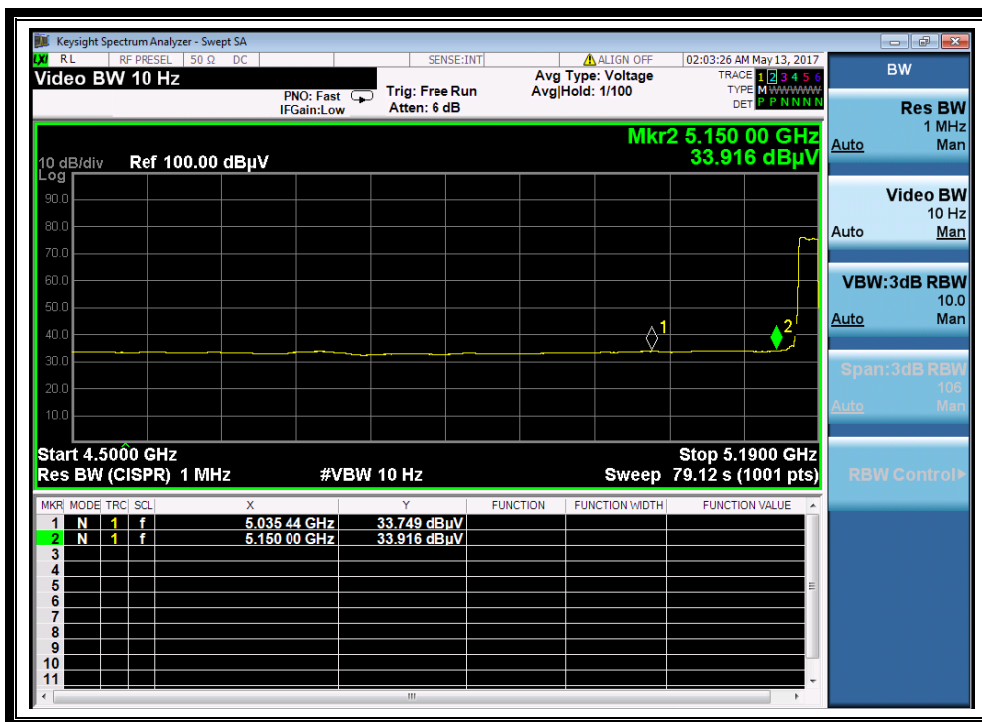
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBuV/m)	Limit (dBuV/m)	Verdict
		PK/ AV						
38	5035.44	PK	42.75	-50.65	32.11	41.68	74	Pass
38	5035.44	AV	33.75	-50.65	32.11	32.68	54	Pass
46	5374.12	PK	43.03	-50.65	32.11	42.35	74	Pass
46	5374.12	AV	32.33	-50.65	32.11	31.65	54	Pass



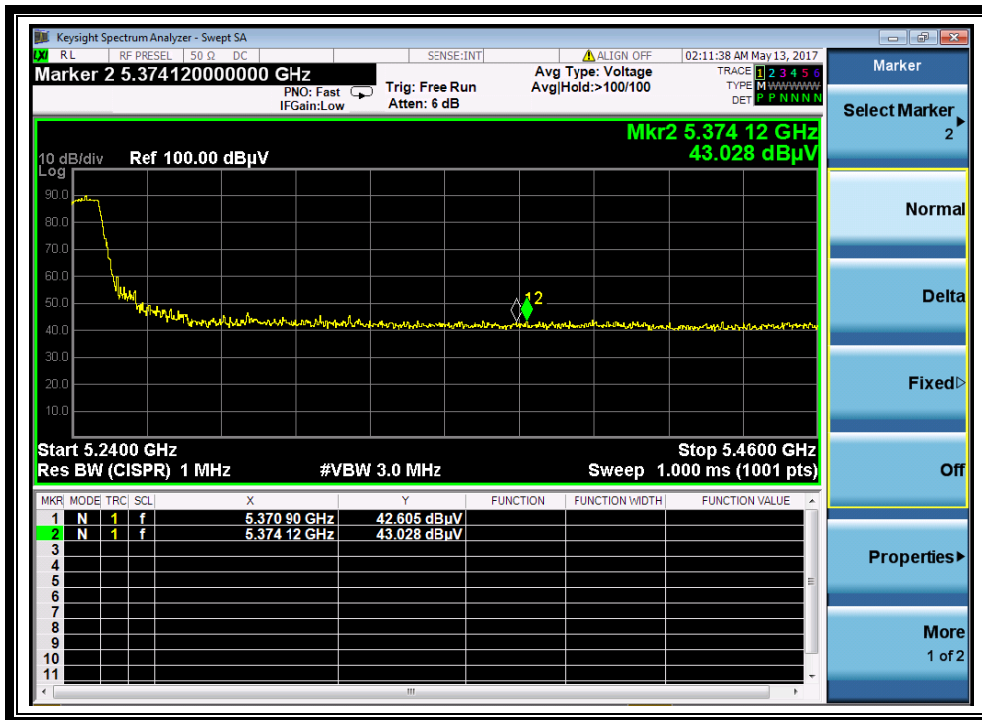
B. Test Plots:



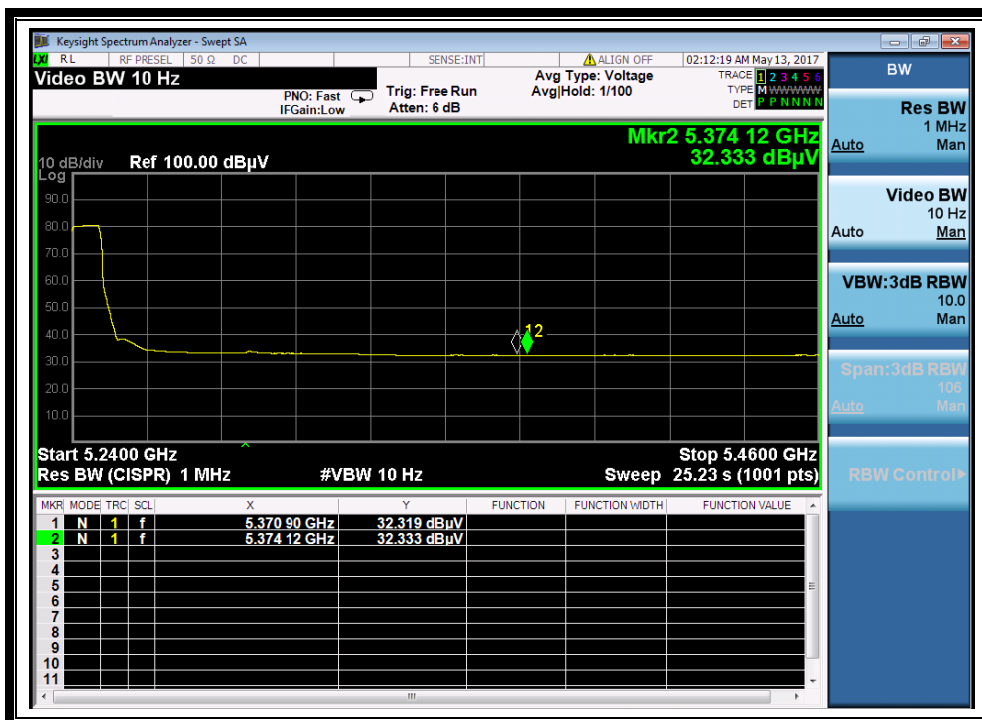
(Channel = 38 PEAK @ 802.11ac)



(Channel = 38 AVG @ 802.11ac)



(Channel = 46 PEAK @ 802.11ac)



(Channel = 46 AVG @ 802.11ac)



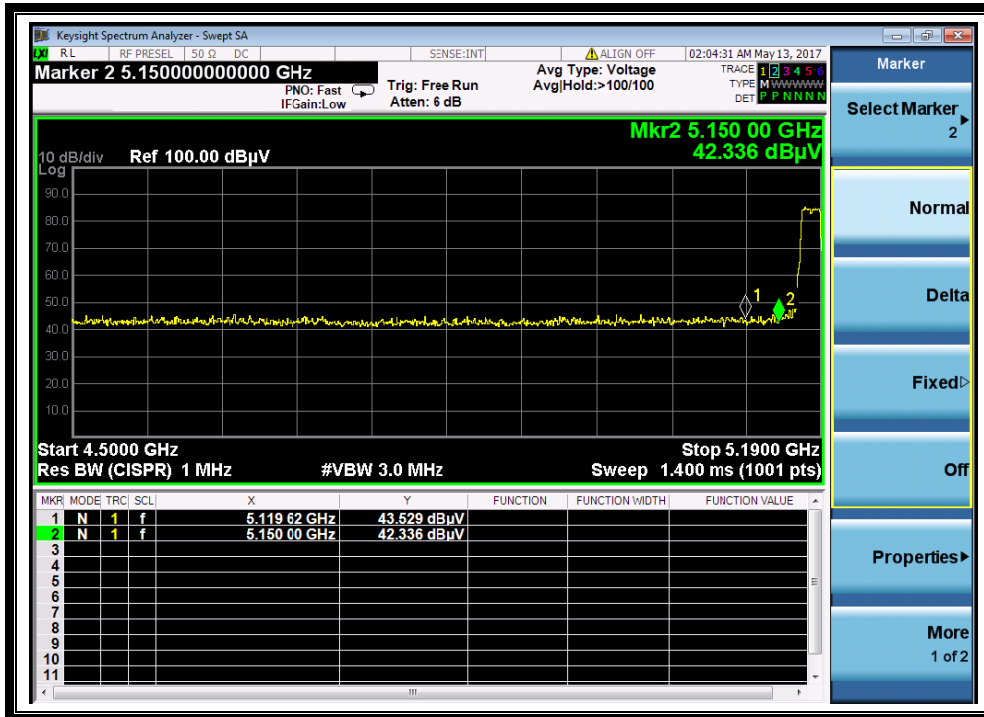
2.5.3.4 802.11ac-80MHz Test mode

The lowest and highest channels are tested to verify the band edge emissions.

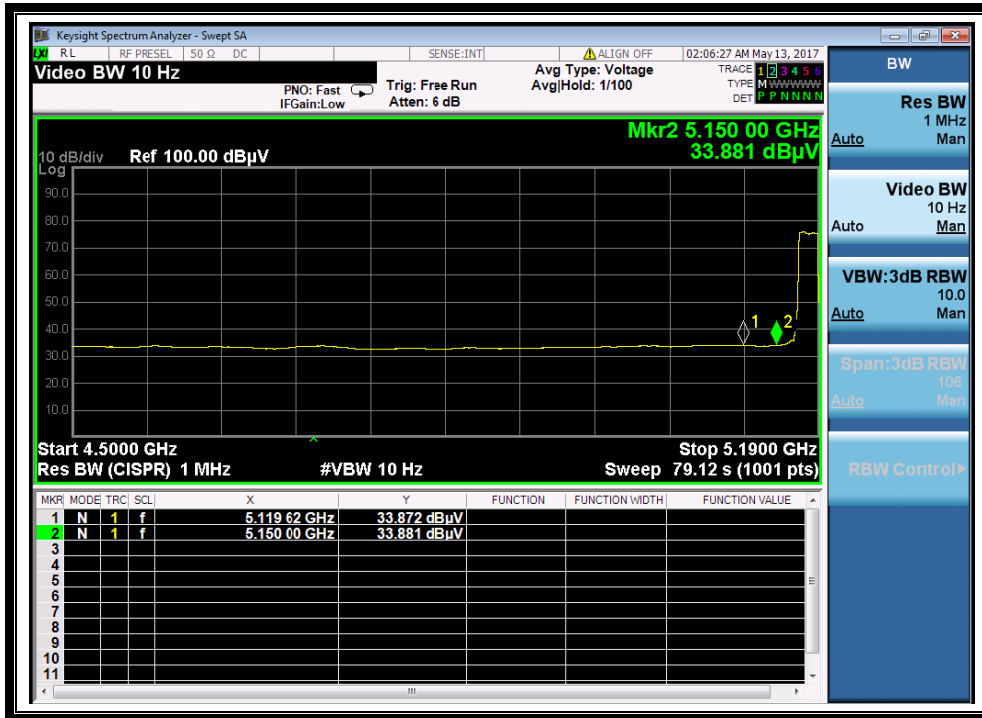
A. Test Verdict:

Channel	Frequency (MHz)	Detector	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV	U _R (dBuV)					
42	5119.62	PK	43.53	-50.65	32.11	24.99	74	Pass
42	5119.62	AV	33.87	-50.65	32.11	15.33	54	Pass
42	5380.70	PK	45.36	-50.65	32.11	26.82	74	Pass
42	5380.70	AV	34.22	-50.65	32.11	15.68	54	Pass

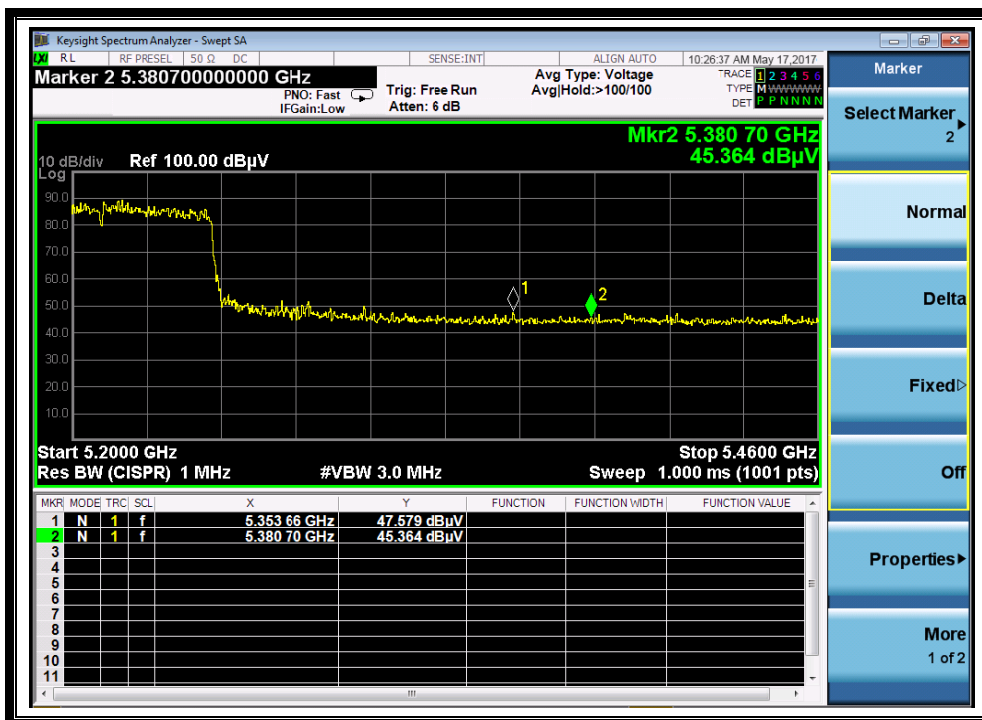
B. Test Plots:



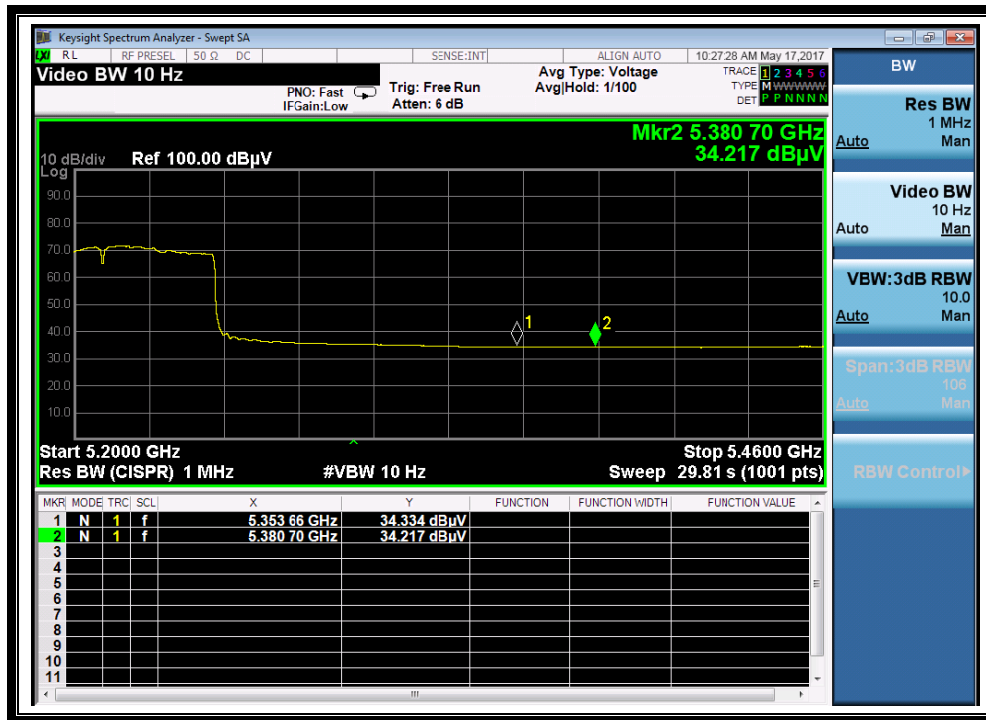
(Channel = 42 PEAK @ 802.11ac)



(Channel = 42 AVG @ 802.11ac)



(Channel = 42 PEAK @ 802.11ac)



(Channel = 42 AVG @ 802.11ac)

2.5.3.5 802.11n-20MHz Test mode

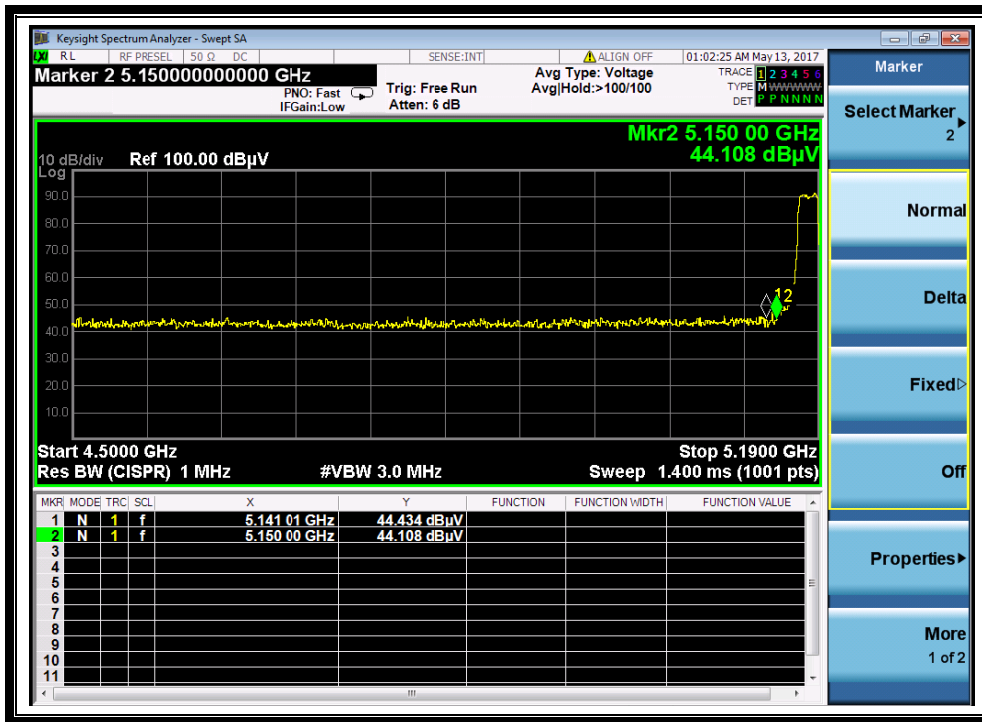
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

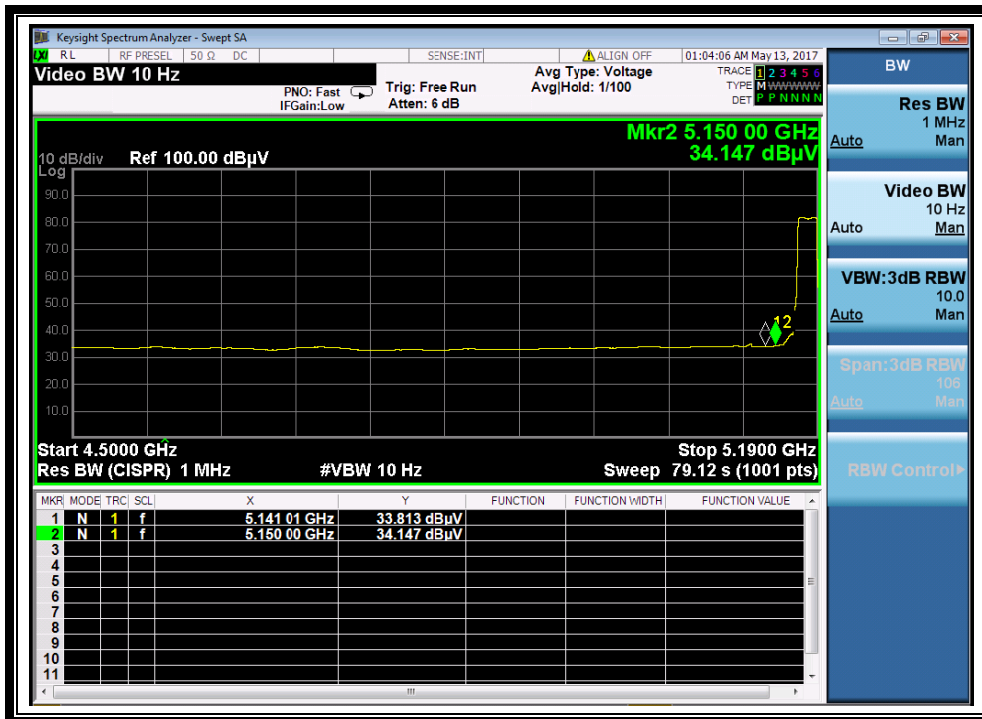
Channel	Frequency (MHz)	Detector	Receiver Reading U_R (dBuV)	A_T (dB)	A_{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
36	5141.01	PK	44.43	-50.65	32.11	25.89	74	Pass
36	5141.01	AV	33.81	-50.65	32.11	15.27	54	Pass
48	5375.00	PK	41.94	-50.65	32.11	23.40	74	Pass
48	5375.00	AV	32.36	-50.65	32.11	13.82	54	Pass



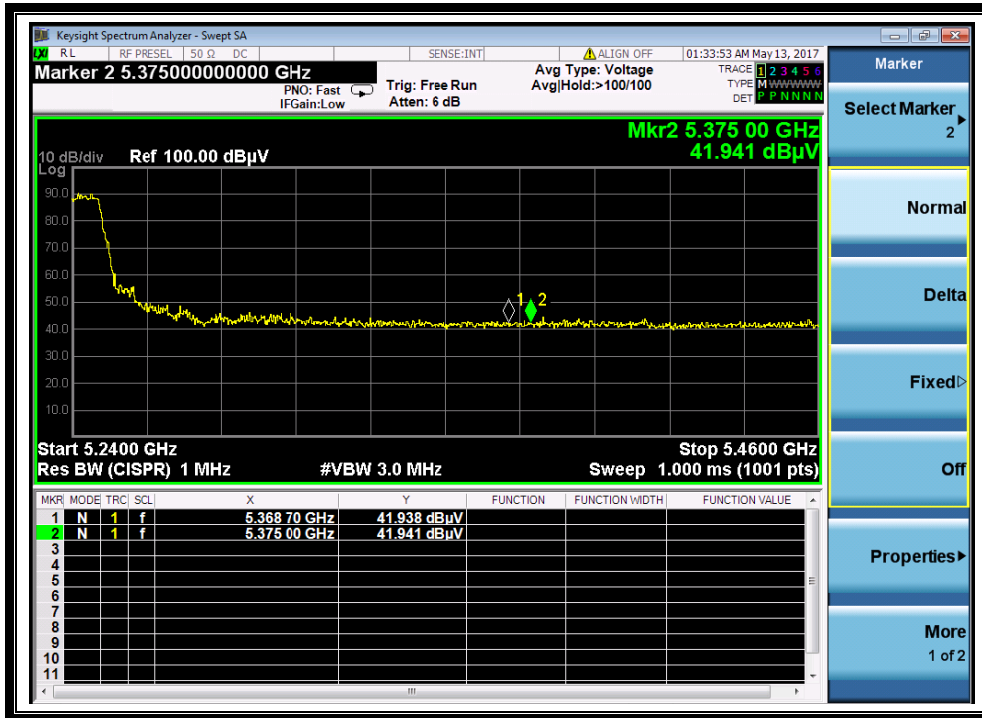
B. Test Plots:



(Channel = 36 PEAK @ 802.11n 20MHz)



(Channel = 36 AVG @ 802.11n 20MHz)



(Channel = 48 PEAK @ 802.11n 20MHz)



(Channel = 48 AVG @ 802.11n 20MHz)



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 -30°C and +50°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

Frequency Stability Measurements for UNII Band 1 (Ch. 36)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	3.7	+20(Ref)	5,179,999,985	15	0.00000029
100%		-30	5,180,000,011	11	0.00000021
100%		-20	5,179,999,998	2	0.00000004
100%		-10	5,179,999,977	23	0.00000044
100%		0	5,180,000,021	21	0.00000041
100%		+10	5,180,000,014	14	0.00000027
100%		+20	5,179,999,985	15	0.00000029
100%		+30	5,180,000,027	27	0.00000052
100%		+40	5,180,000,002	2	0.00000004
100%		+50	5,180,000,001	1	0.00000002
85%		3.55	+20	5,179,999,981	19
115%	4.35	+20	5,179,999,977	23	0.00000044



Frequency Stability Measurements for UNII Band 3 (Ch. 149)

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq Dev. (Hz)	Deviation (%)
100%	3.7	+20(Ref)	5,745,000,012	12	0.00000021
100%		-30	5,744,999,999	1	0.00000002
100%		-20	5,745,000,011	11	0.00000019
100%		-10	5,744,999,995	5	0.00000009
100%		0	5,745,000,001	1	0.00000002
100%		+10	5,744,999,996	4	0.00000007
100%		+20	5,745,000,004	4	0.00000007
100%		+30	5,745,000,012	12	0.00000021
100%		+40	5,744,999,997	3	0.00000005
100%		+50	5,745,000,016	16	0.00000028
85%		3.55	+20	5,744,999,989	11
115%	4.35	+20	5,745,000,016	16	0.00000028

Note: Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

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 50 μ H/50 Ω line impedance stabilization network (LISN).

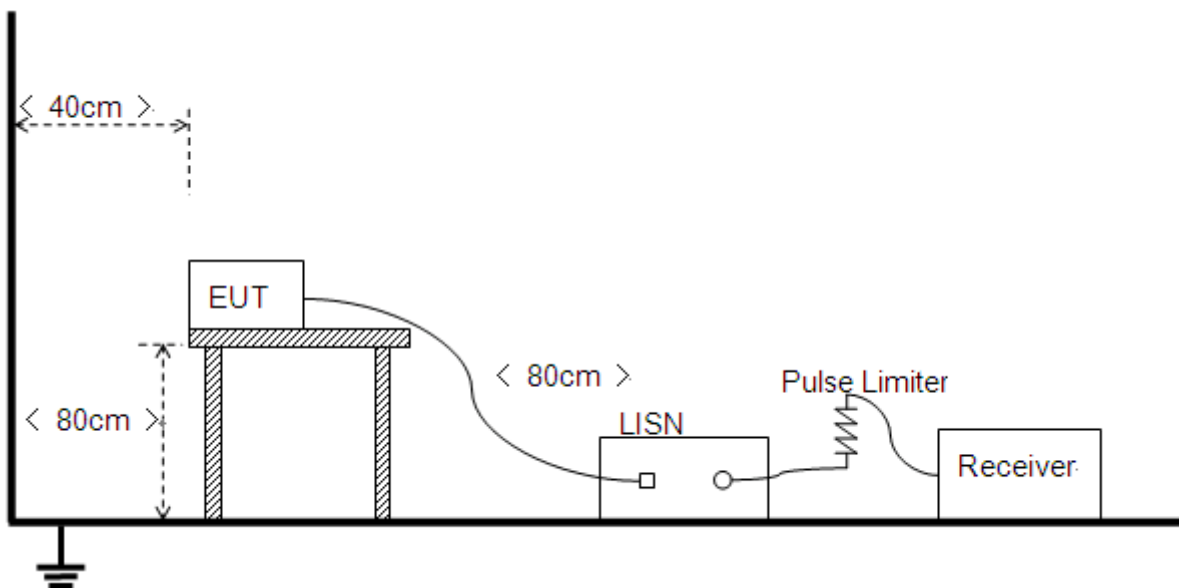
Frequency range (MHz)	Conducted Limit (dB μ V)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

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

A. 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.

The EUT is powered by the Battery charged with the AC Adapter which is powered by 120V, 60Hz AC mains supply. The factors of the site are calibrated to correct the reading. During the



measurement, the EUT is activated and controlled by the Wi-Fi Service Supplier (SS) via a Common Antenna.

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. Refer to recorded points and plots below.

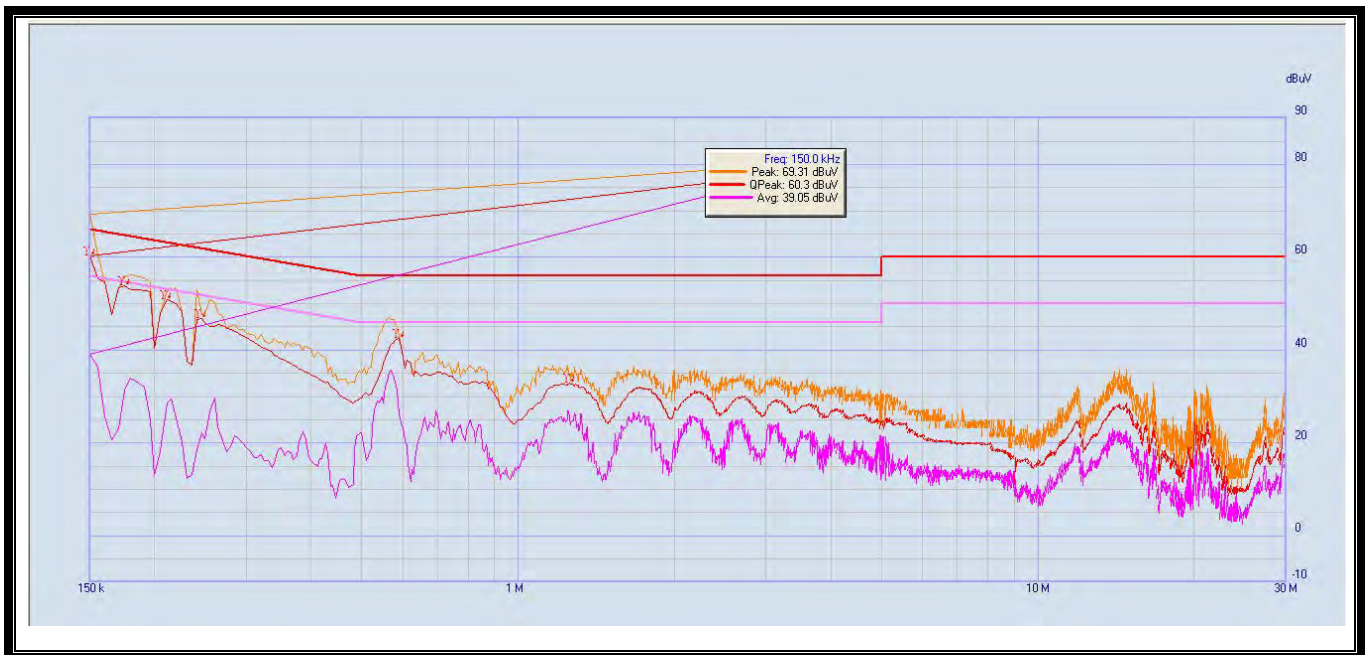
Note: All test modes are performed, only the worst case is recorded in this report.

A. Test setup:

The EUT configuration of the emission tests is EUT + Link.

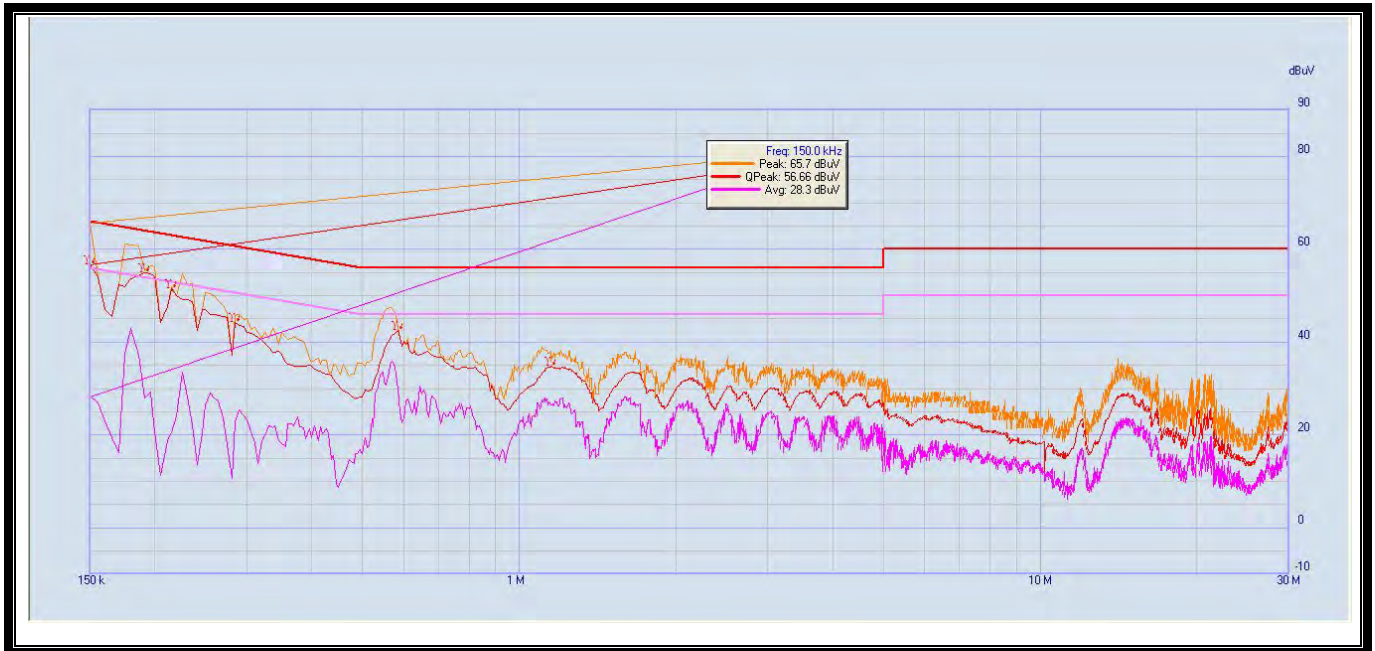
Note: The test voltage is AC 120V/60Hz.

B. Test Plots:



(Plot A: L Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.15	60.30	39.05	66	56	Line	PASS
2	0.175	53.80	31.45	65.29	55.29		PASS
3	0.21	50.83	28.63	64.29	54.29		PASS
4	0.245	46.75	22.12	63.29	53.29		PASS
5	0.59	42.54	26.21	56	46		PASS
6	1.255	32.91	25.32	56	46		PASS



(Plot B: N Phase)

NO.	Fre. (MHz)	Emission Level (dBµV)		Limit (dBµV)		Power-line	Verdict
		Quai-peak	Average	Quai-peak	Average		
1	0.15	56.66	28.30	66	56	Neutral	PASS
2	0.19	54.96	27.98	64.86	54.86		PASS
3	0.215	51.63	20.58	64.14	54.14		PASS
4	0.285	44.25	22.85	62.14	52.14		PASS
5	0.585	42.45	29.85	56	46		PASS
6	1.145	34.61	26.49	56	46		PASS



2.8 Radiated Emission

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: 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(eirp) 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

Note:

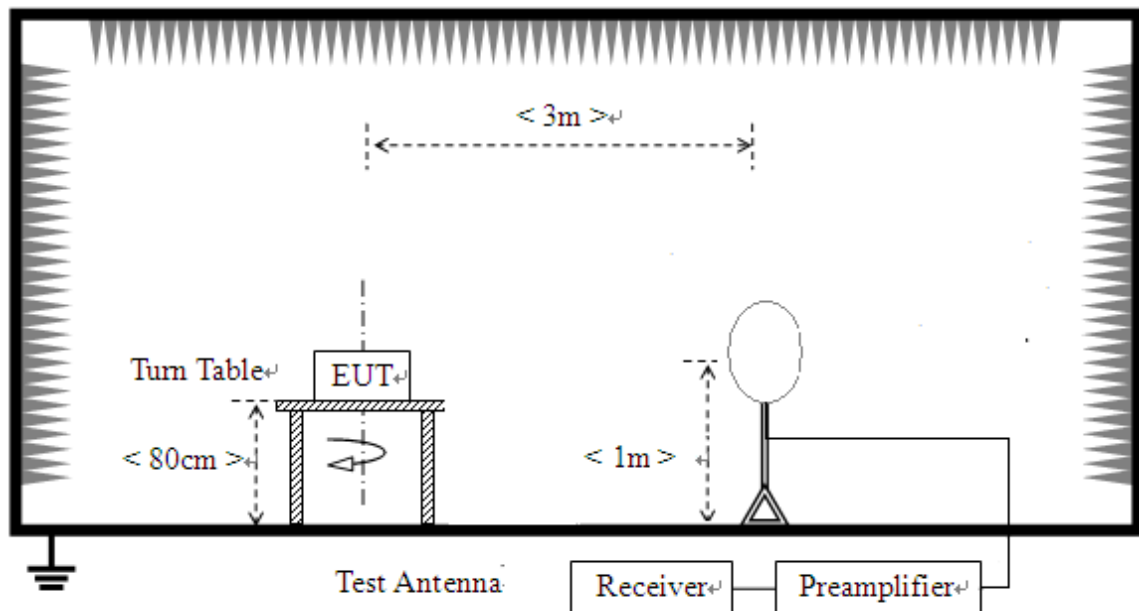
For Above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.

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)

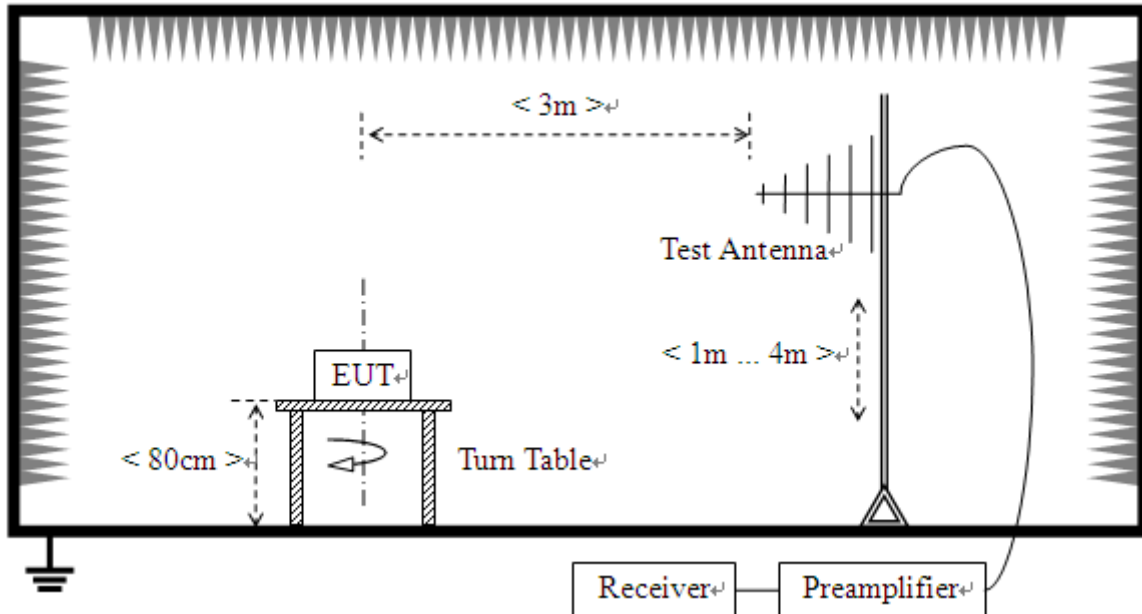
2.8.2 Test Description

A. Test Setup:

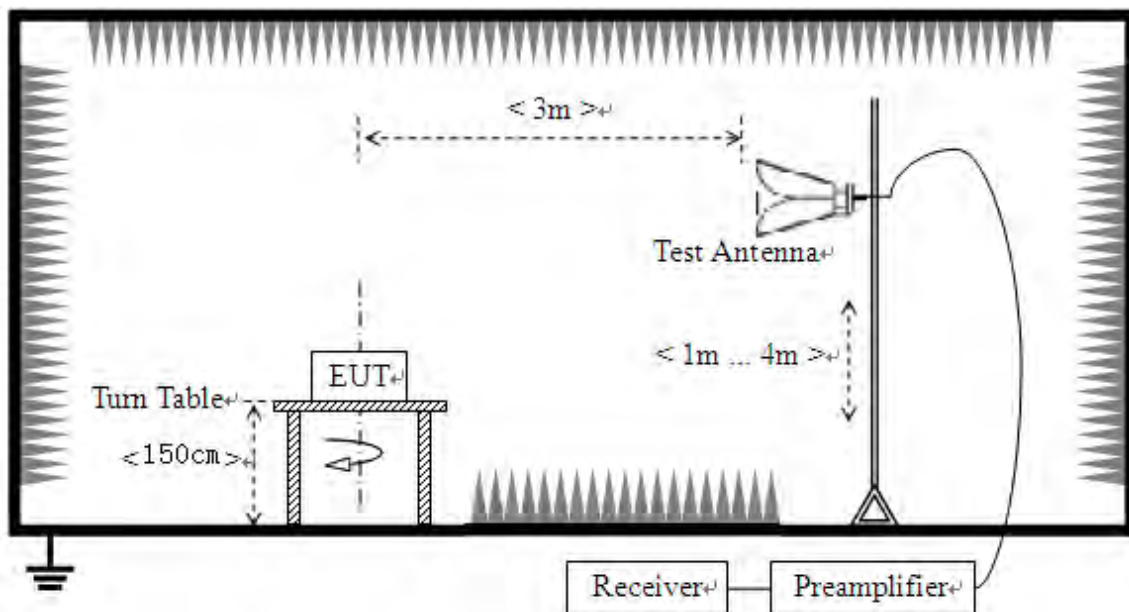
- 1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz



3) For radiated emissions above 1GHz



The RF absorbing material used on the reference ground plane and on the turntable have a maximum height (thickness) of 30 cm (12 in) and have a minimum-rated attenuation of 20 dB at all frequencies from 1 GHz to 18 GHz. Test site have a minimum area of the ground plane covered with RF absorbing material as specified in Figure 6 of ANSI C63.4: 2014.

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to



the standards: ANSI C63.10 (2013). For radiated emissions below or equal to 1GHz, The EUT was set-up on insulator 80cm above the Ground Plane, For radiated emissions above 1GHz, The EUT was set-up on insulator 150cm above the Ground Plane. The set-up and test methods were according to ANSI C63.10

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 1 m to 4 m above the ground or reference ground plane.

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

For the Test Antenna:

(a) In the frequency range of 9kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.

(b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Place the test antenna at 3m away from area of the EUT, while keeping the test antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The test 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 test antenna elevation shall be that which maximizes the emissions. The test antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. The emission levels at both horizontal and vertical polarizations should be tested.



2.8.3 Test Result

According to ANSI C63.4 selection 4.2.2, 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 limit, it is unnecessary to perform an quasi-peak measurement.

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_{preamp} : Preamplifier Gain

A_{Factor} : Antenna Factor at 3m

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

Note1: 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.

Note2: The low frequency, which started from 9KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

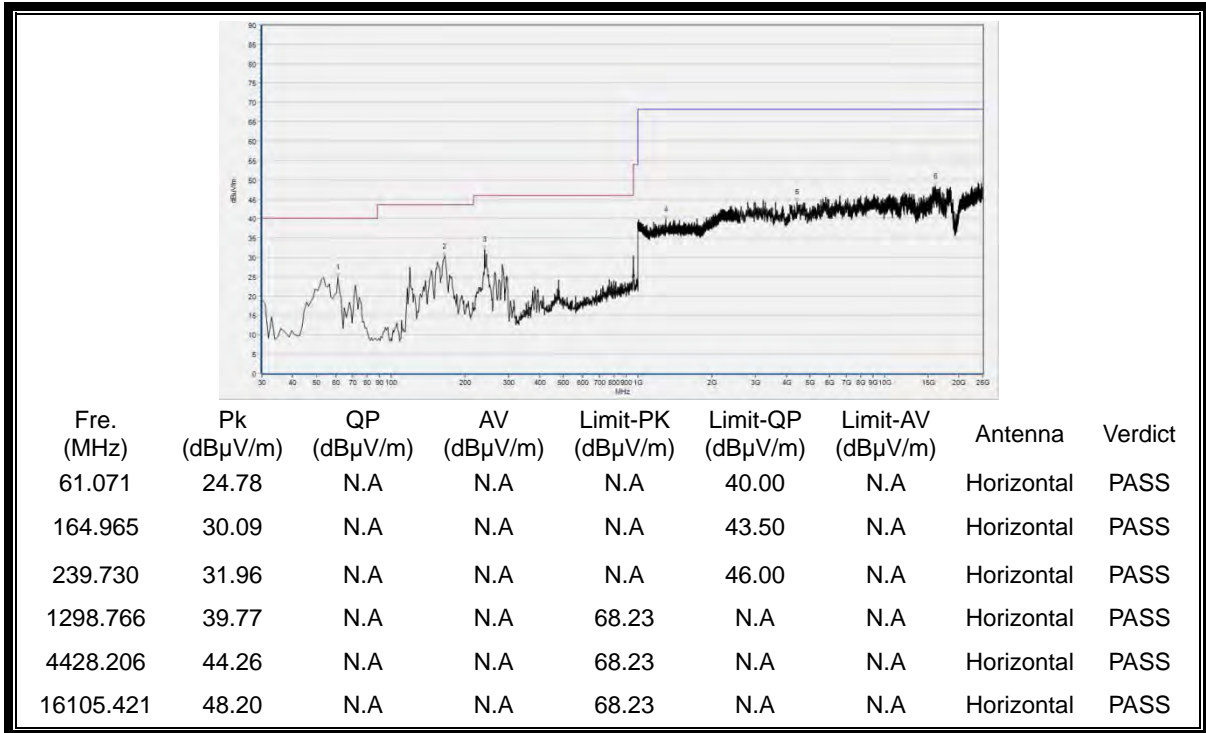
For the frequency, which started from 25G to 40G, was pre-scanned and the result which was 10dB lower than the limit.



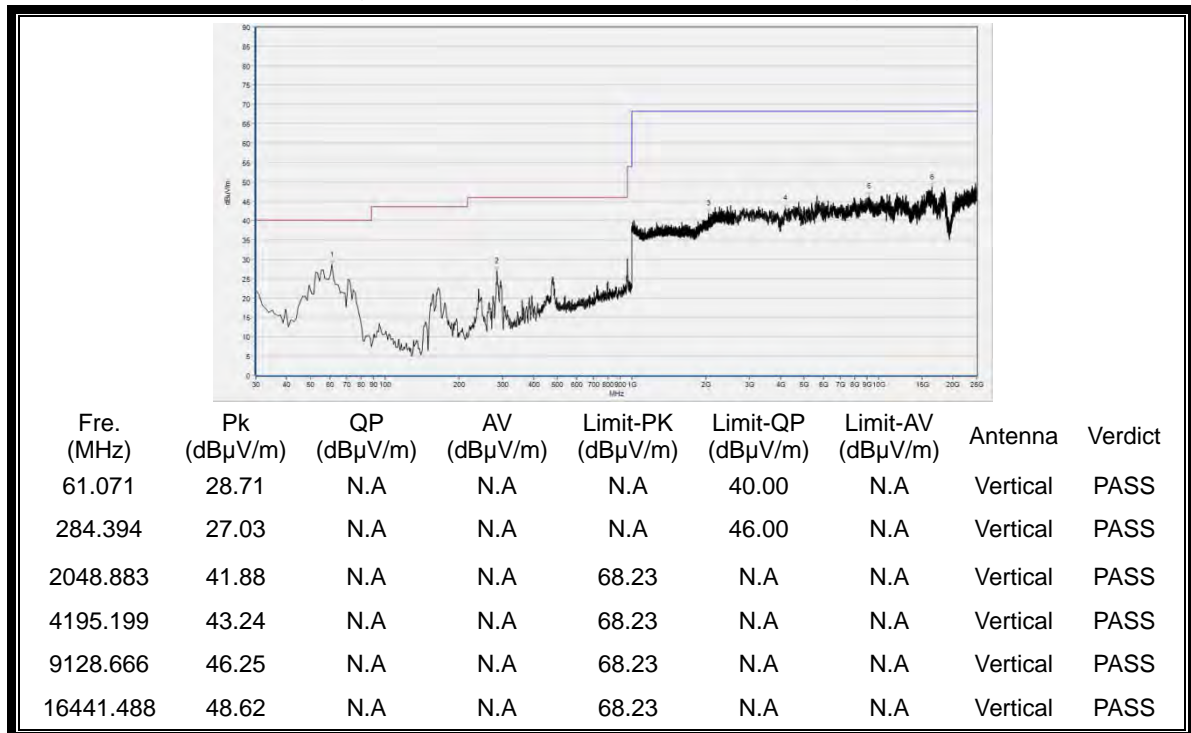
2.8.3.1 802.11a-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 36



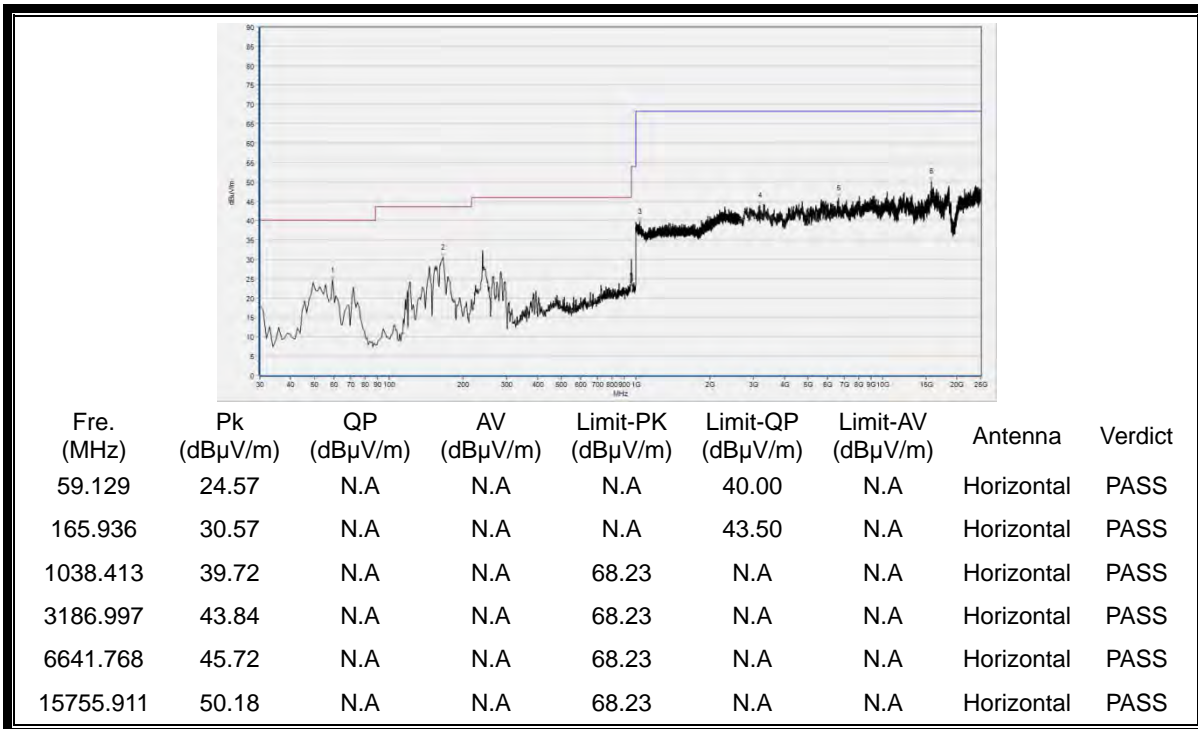
(Antenna Horizontal, 30MHz to 25GHz)



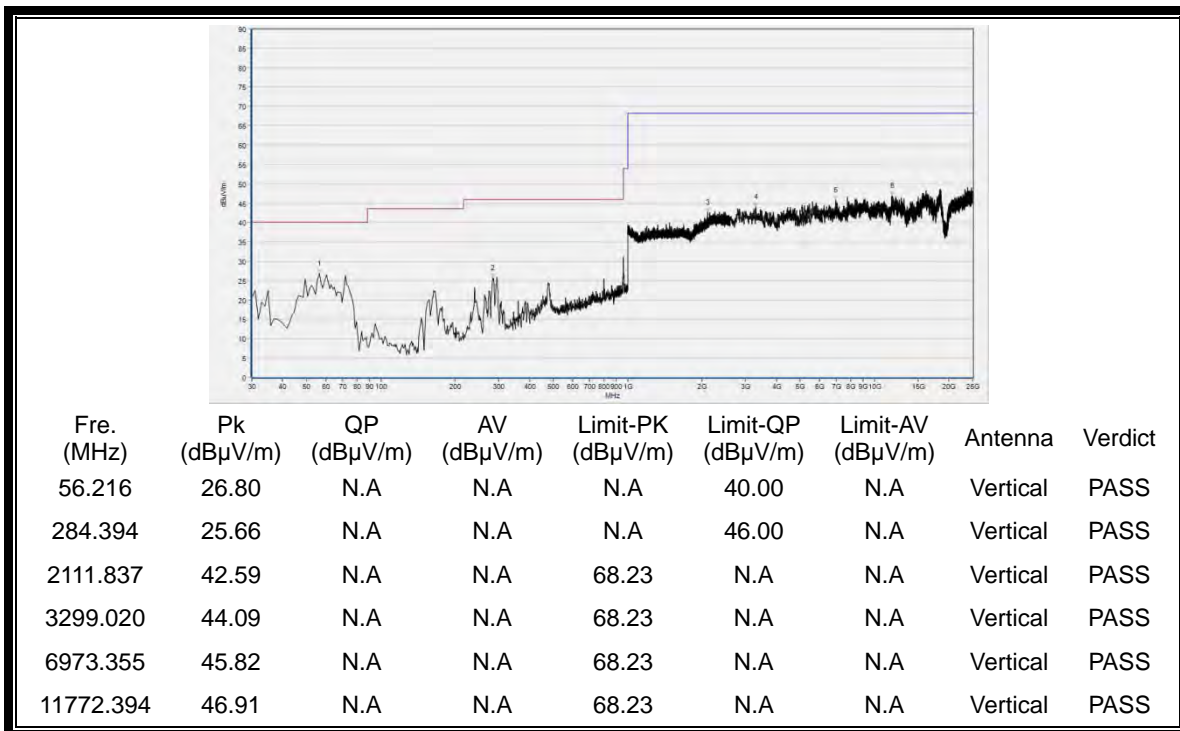
(Antenna Vertical, 30MHz to 25GHz)



Plot for Channel = 48



(Antenna Horizontal, 30MHz to 25GHz)

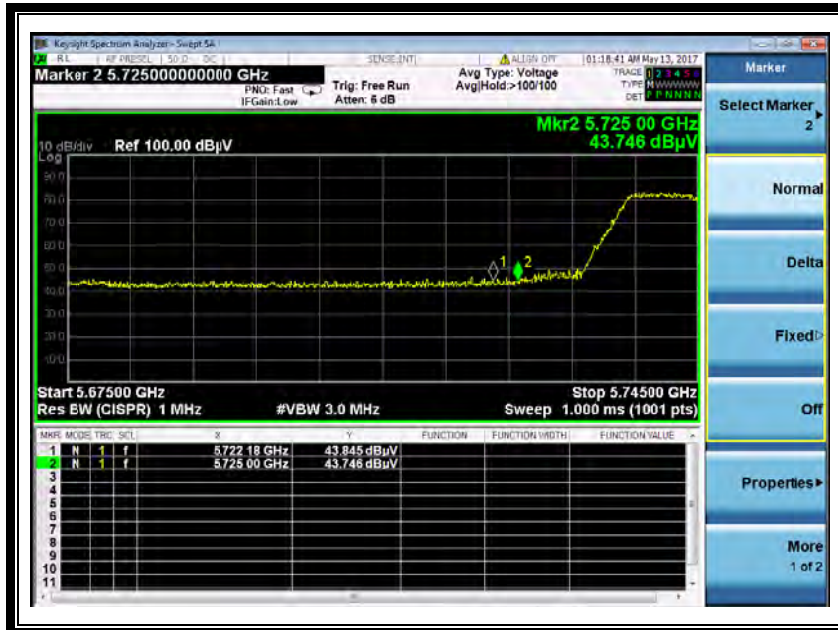


(Antenna Vertical, 30MHz to 25GHz)



Plots for Channel = 149

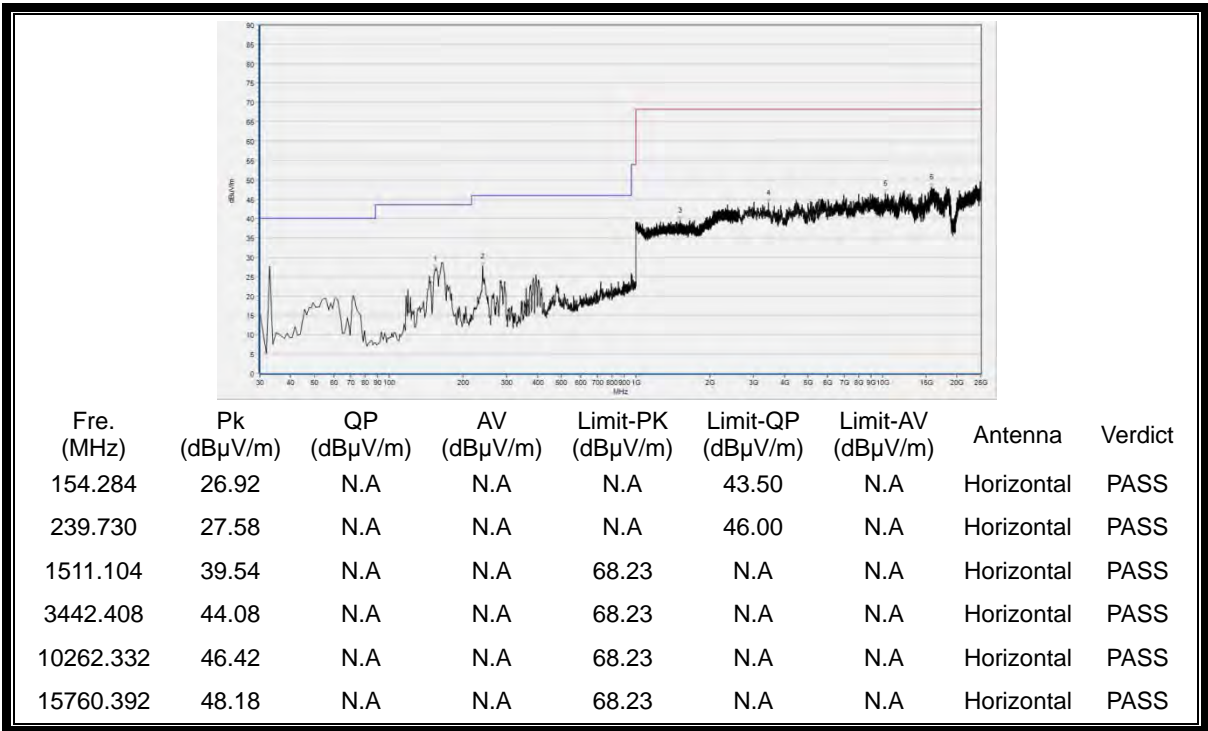
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
149	5722.18	Horizontal	43.85	-50.65	32.11	25.31	78.2	Pass
149	5722.18	Vertical	33.72	-50.65	32.11	15.18	78.2	Pass



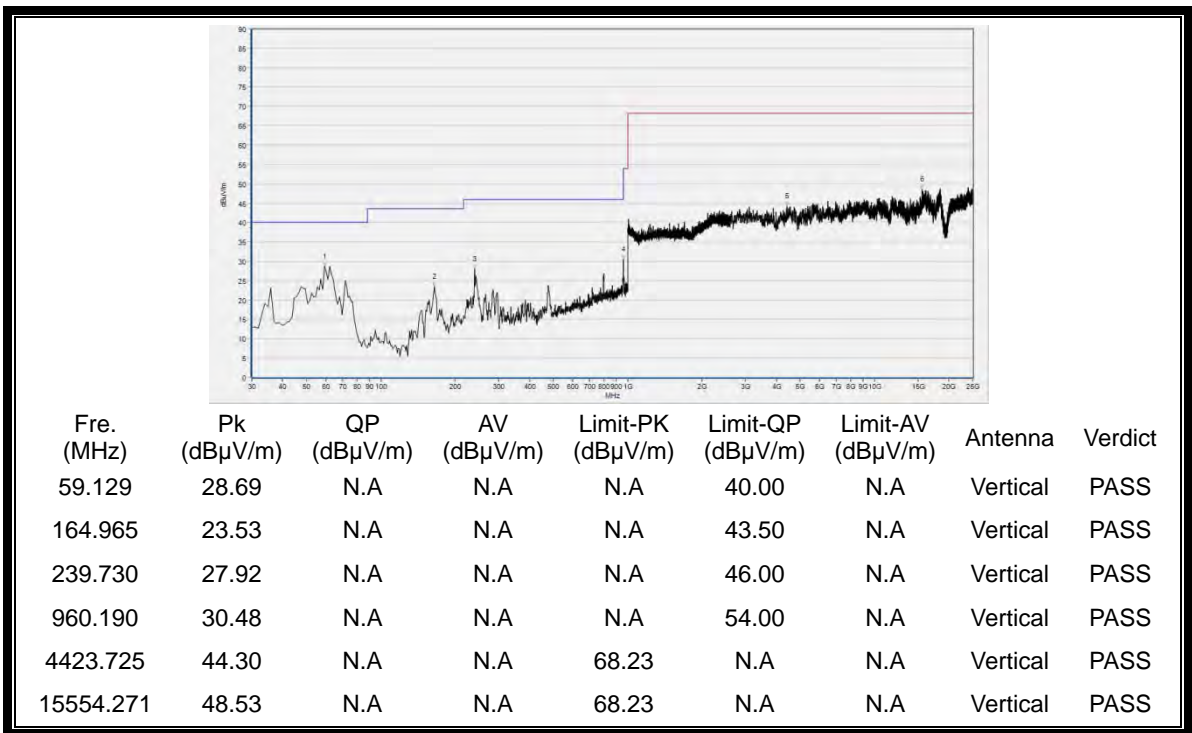
(Channel = 149 Horizontal @ 802.11a)



(Channel = 149 Vertical @ 802.11a)



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)

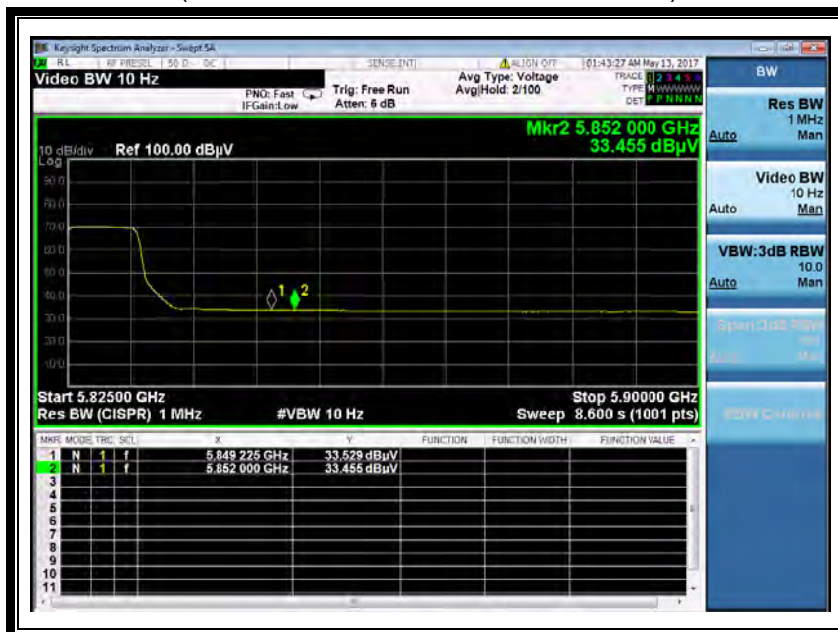


Plot for Channel = 165

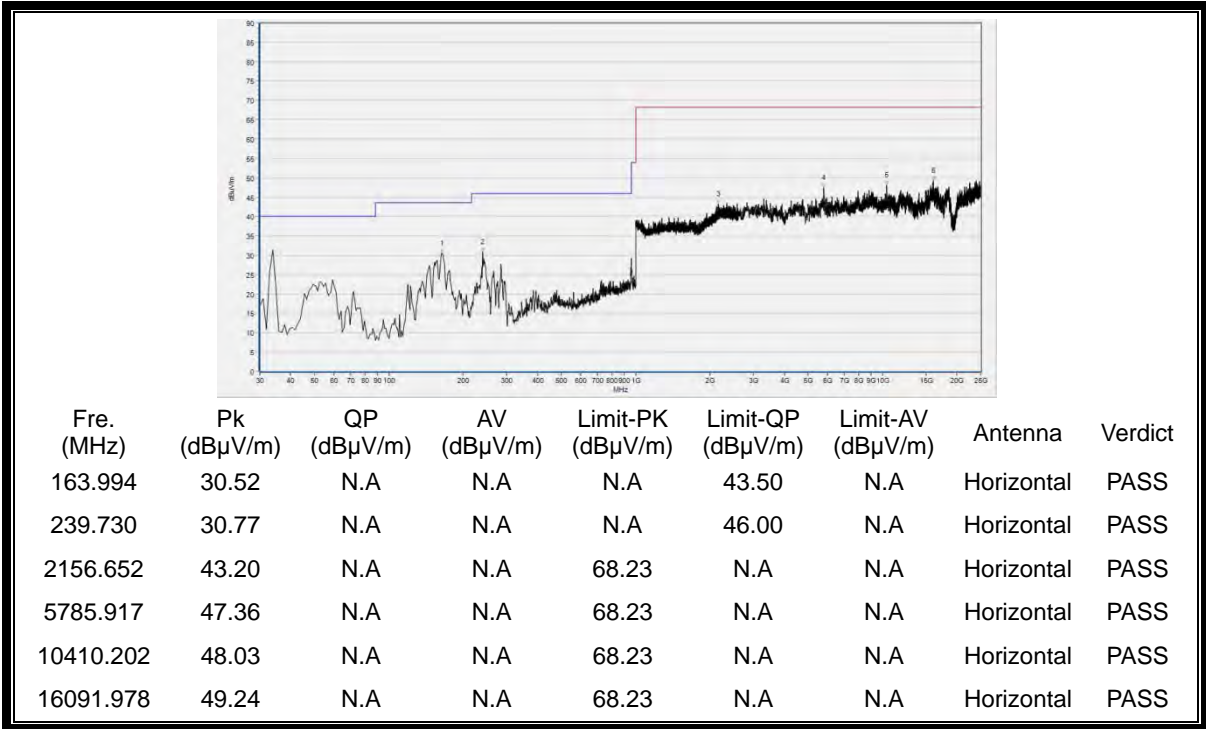
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
165	5852.00	Horizontal	42.45	-50.65	32.11	23.91	78.2	Pass
165	5852.00	Vertical	33.46	-50.65	32.11	14.92	78.2	Pass



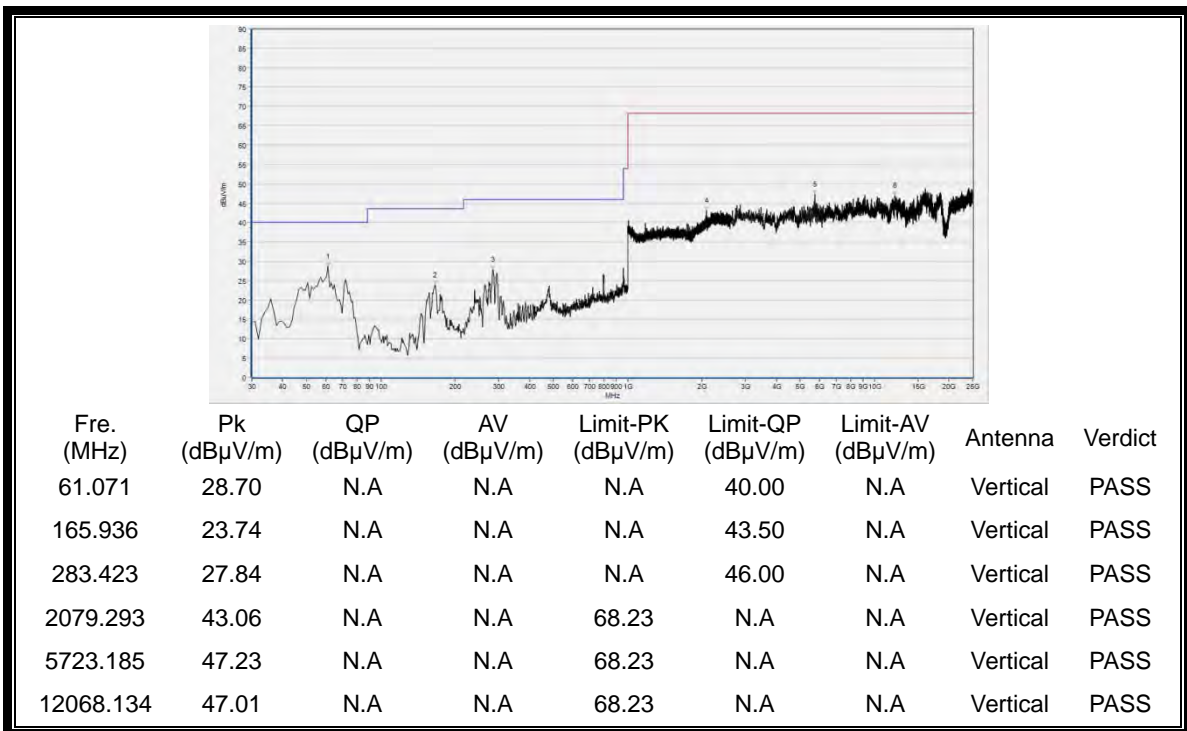
(Channel = 165 Horizontal @ 802.11a)



(Channel = 165 Vertical @ 802.11a)



(Antenna Horizontal, 30MHz to 25GHz)



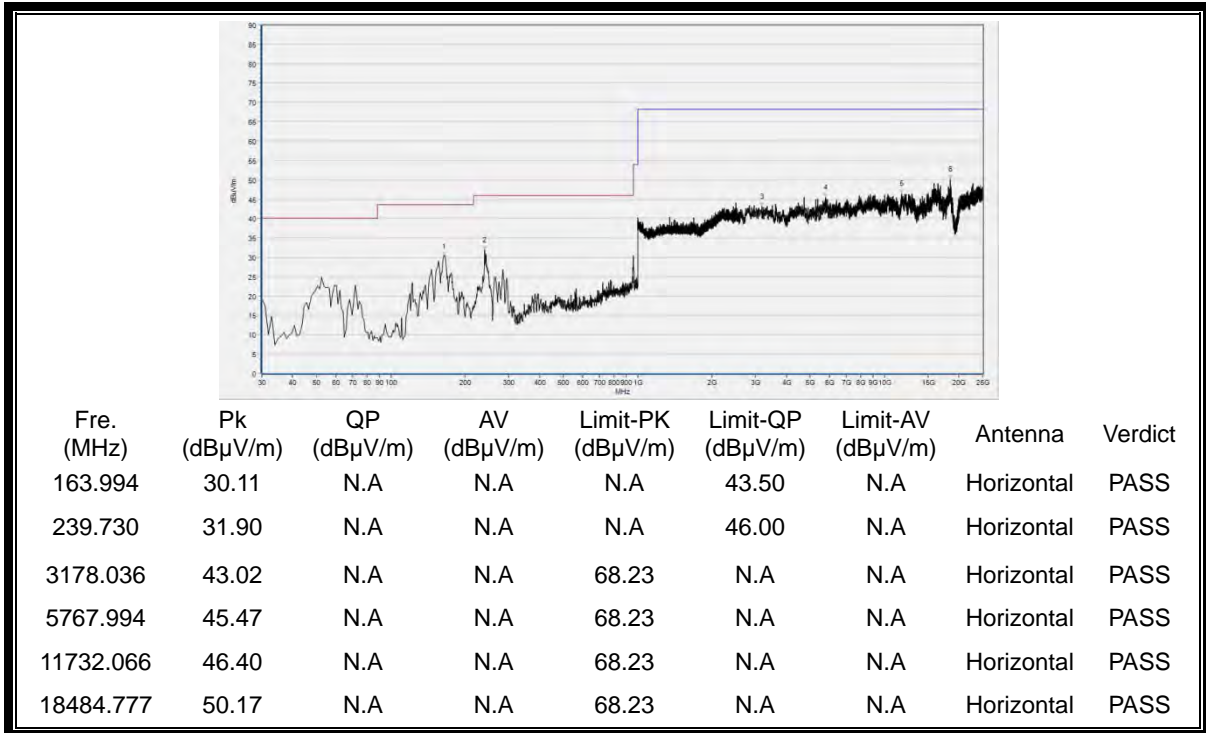
(Antenna Vertical, 30MHz to 25GHz)



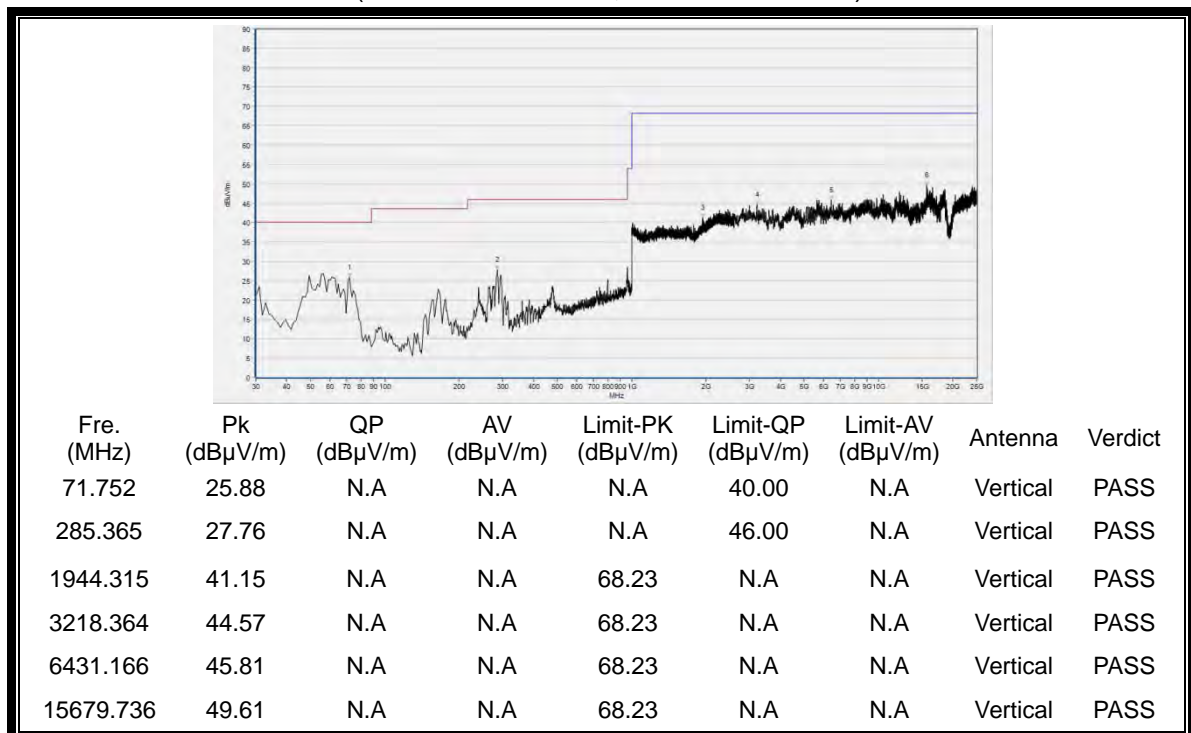
2.8.3.2 802.11ac-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 36

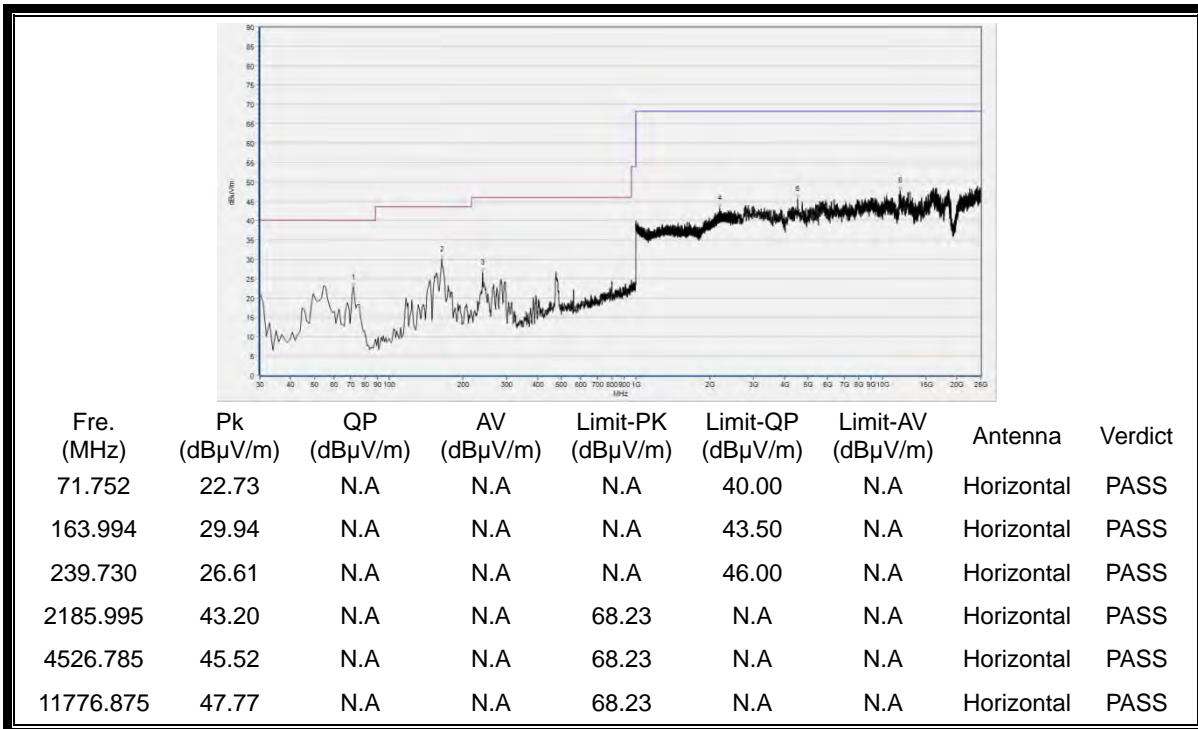


(Antenna Horizontal, 30MHz to 40GHz)

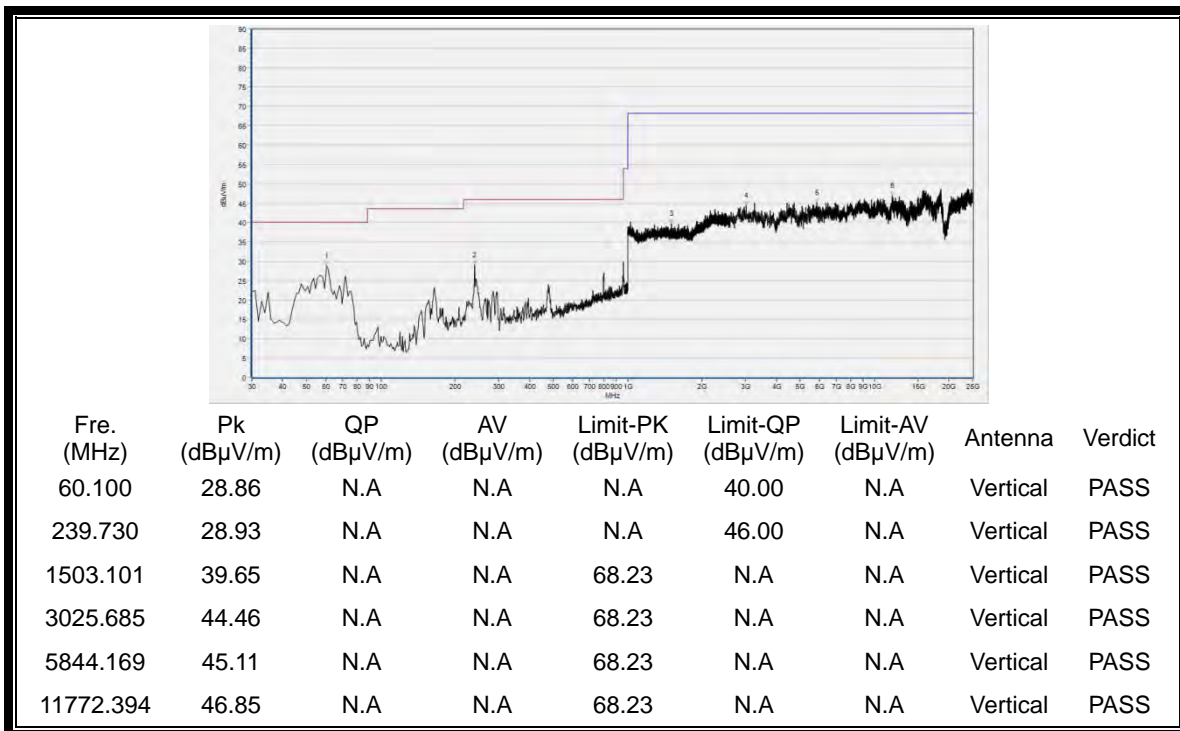


(Antenna Vertical, 30MHz to 40GHz)

Plot for Channel = 48



(Antenna Horizontal, 30MHz to 40GHz)

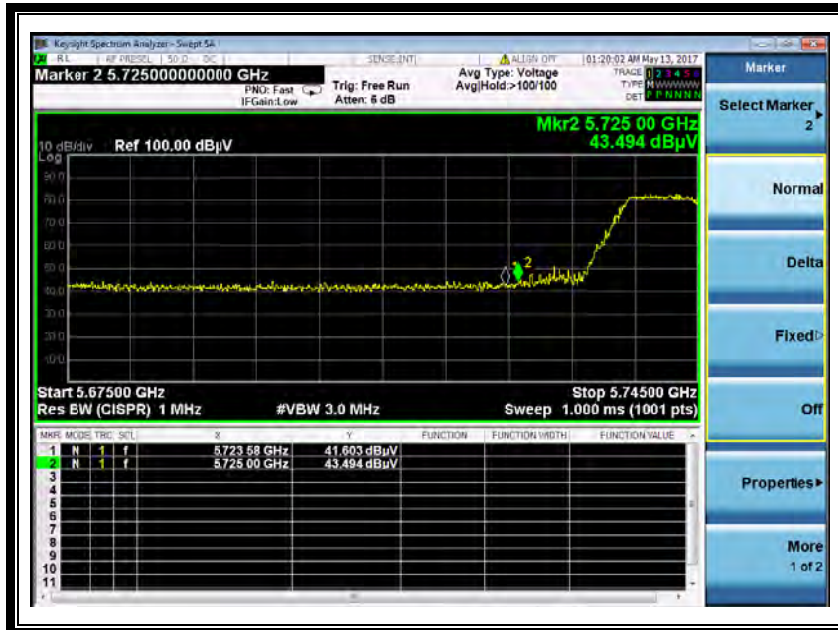


(Antenna Vertical, 30MHz to 40GHz)

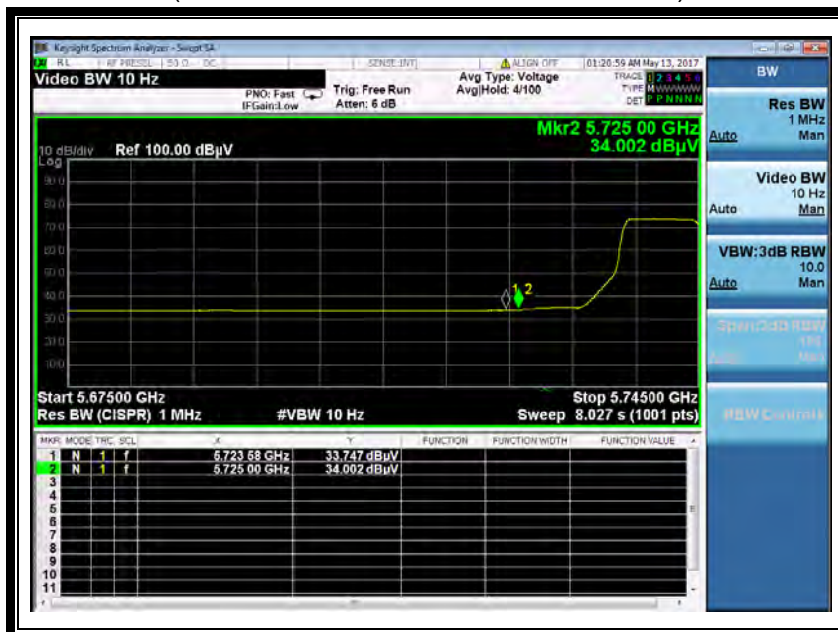


Plots for Channel = 149

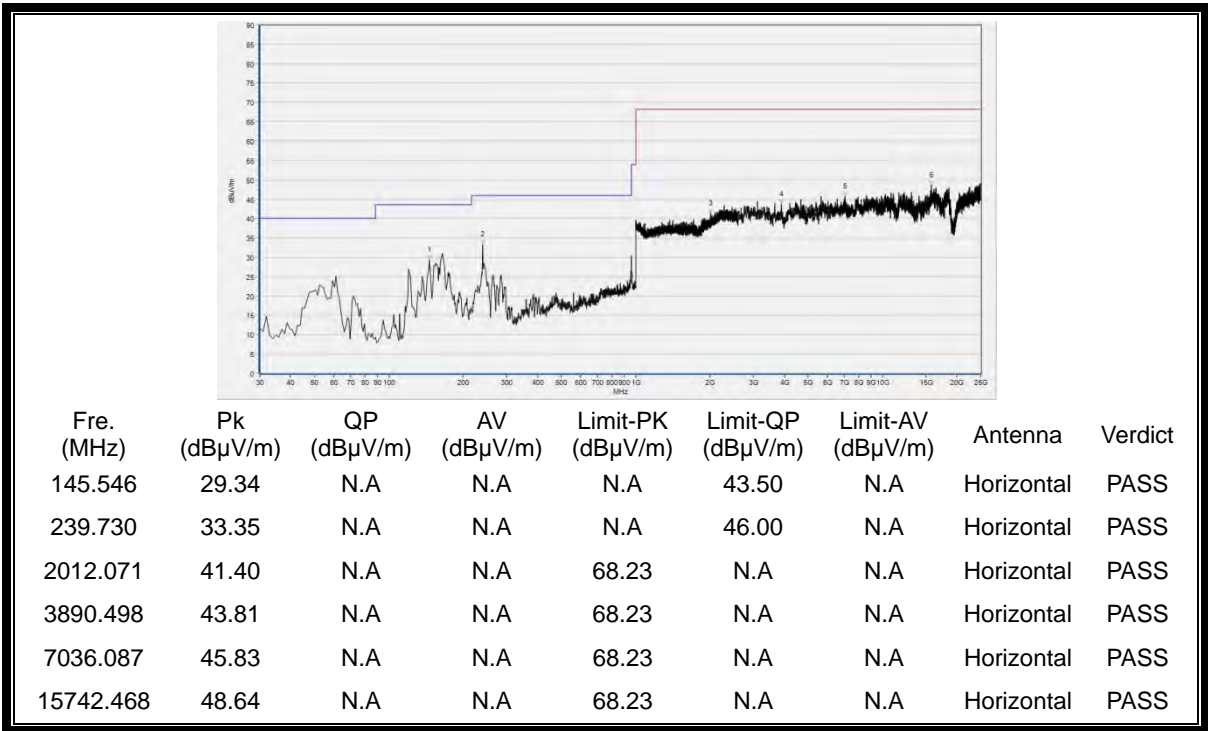
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
149	5723.58	Horizontal	41.60	-50.65	32.11	23.06	78.2	Pass
149	5723.58	Vertical	33.75	-50.65	32.11	15.21	78.2	Pass



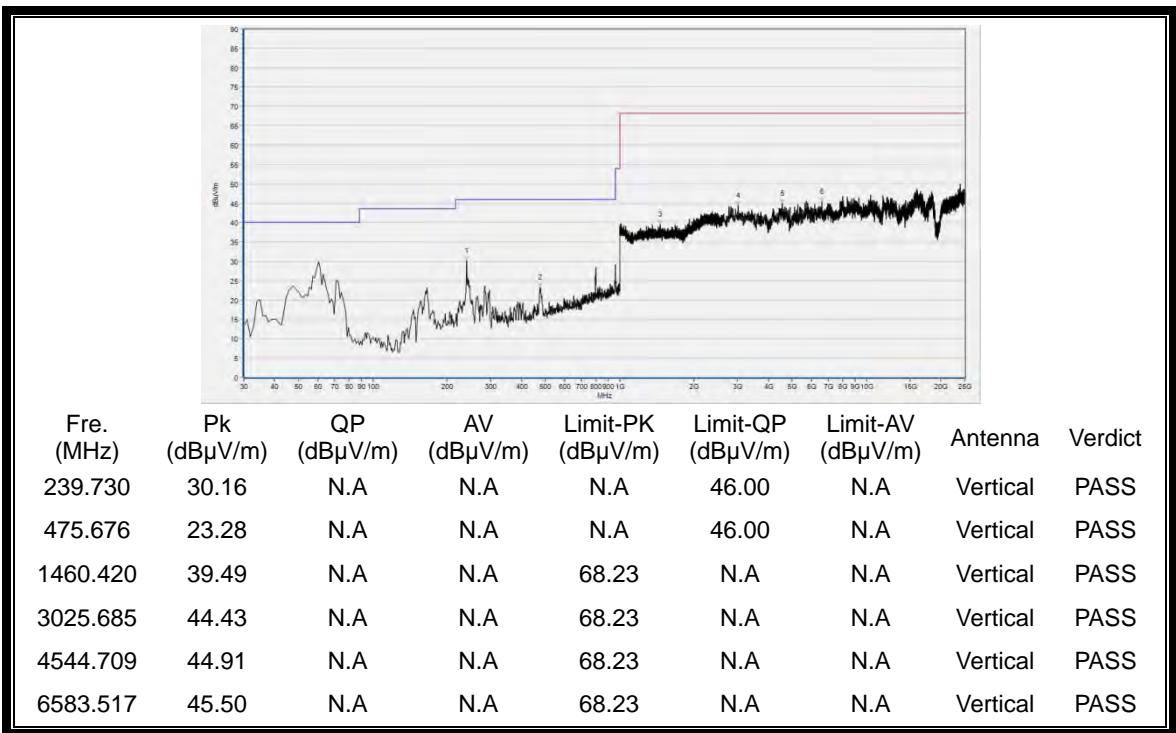
(Channel = 149 Horizontal @ 802.11ac)



(Channel = 149 Vertical @ 802.11ac)



(Antenna Horizontal, 30MHz to 40GHz)

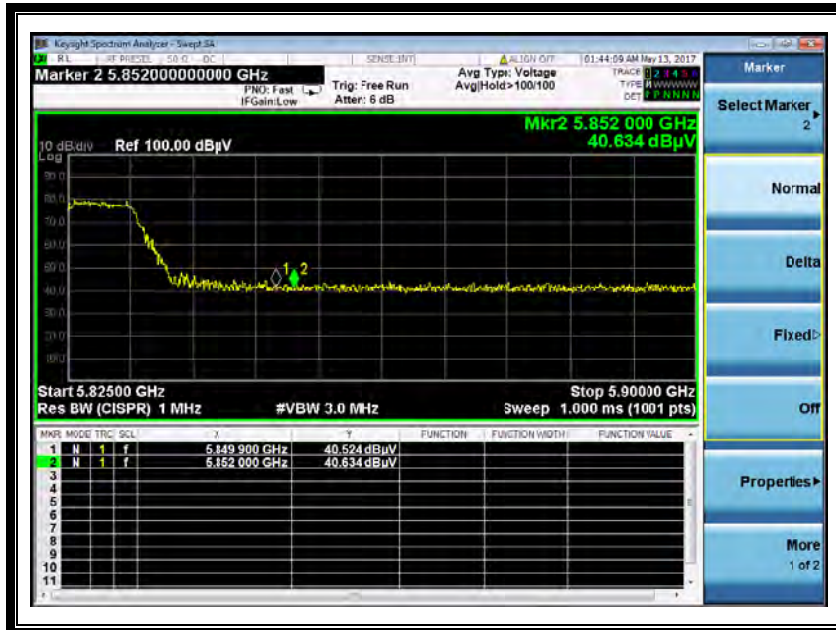


(Antenna Vertical, 30MHz to 40GHz)

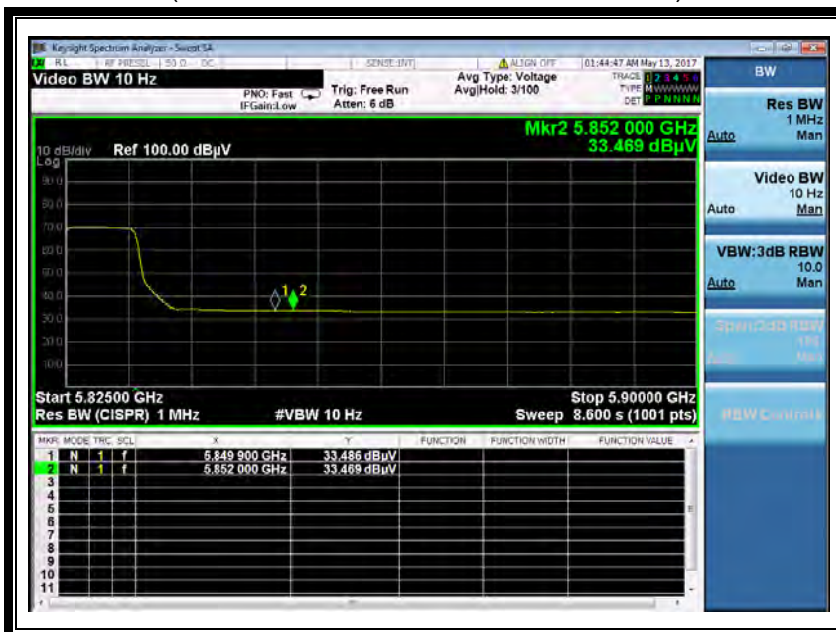


Plot for Channel = 165

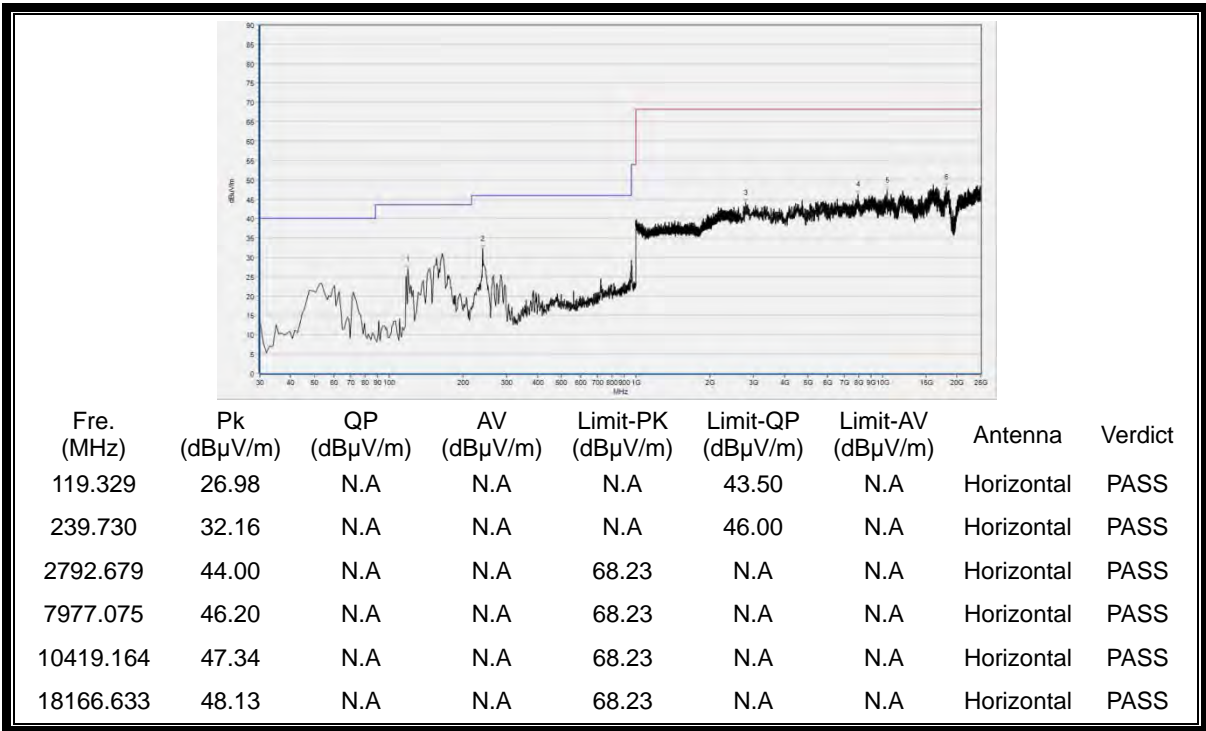
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
165	5852.00	Horizontal	40.63	-50.65	32.11	22.09	78.2	Pass
165	5852.00	Vertical	33.47	-50.65	32.11	14.93	78.2	Pass



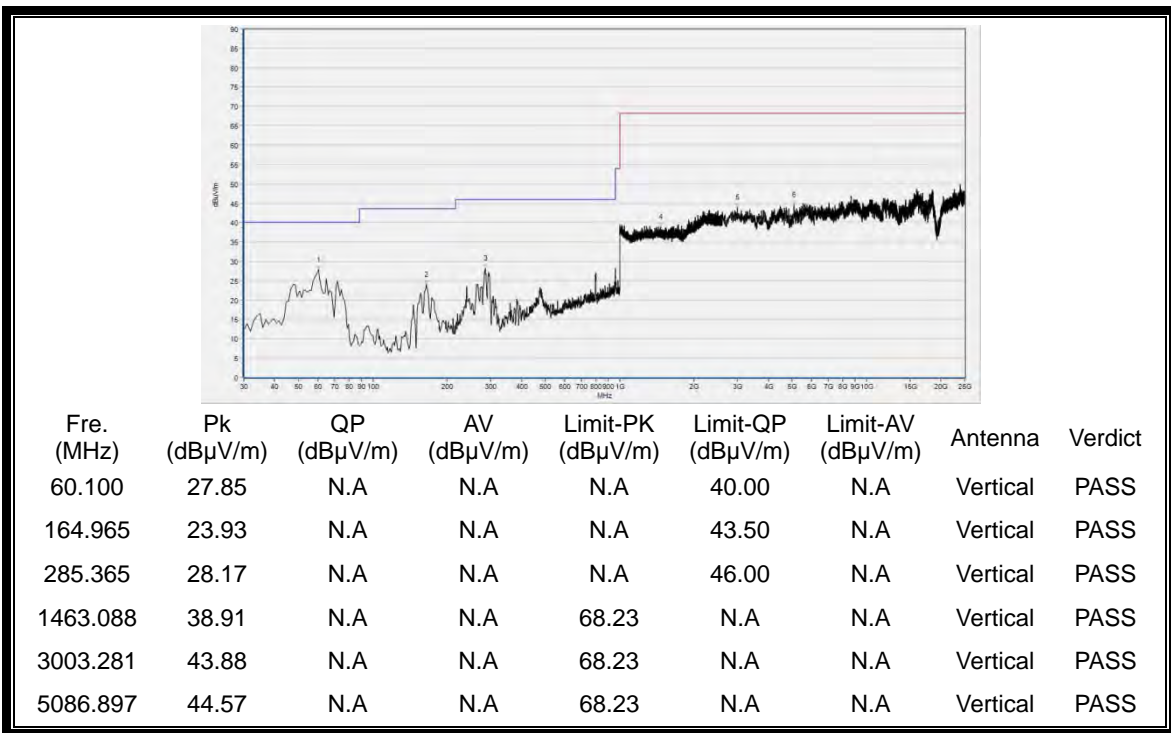
(Channel = 165 Horizontal @ 802.11ac)



(Channel = 165 Vertical @ 802.11ac)



(Antenna Horizontal, 30MHz to 40GHz)



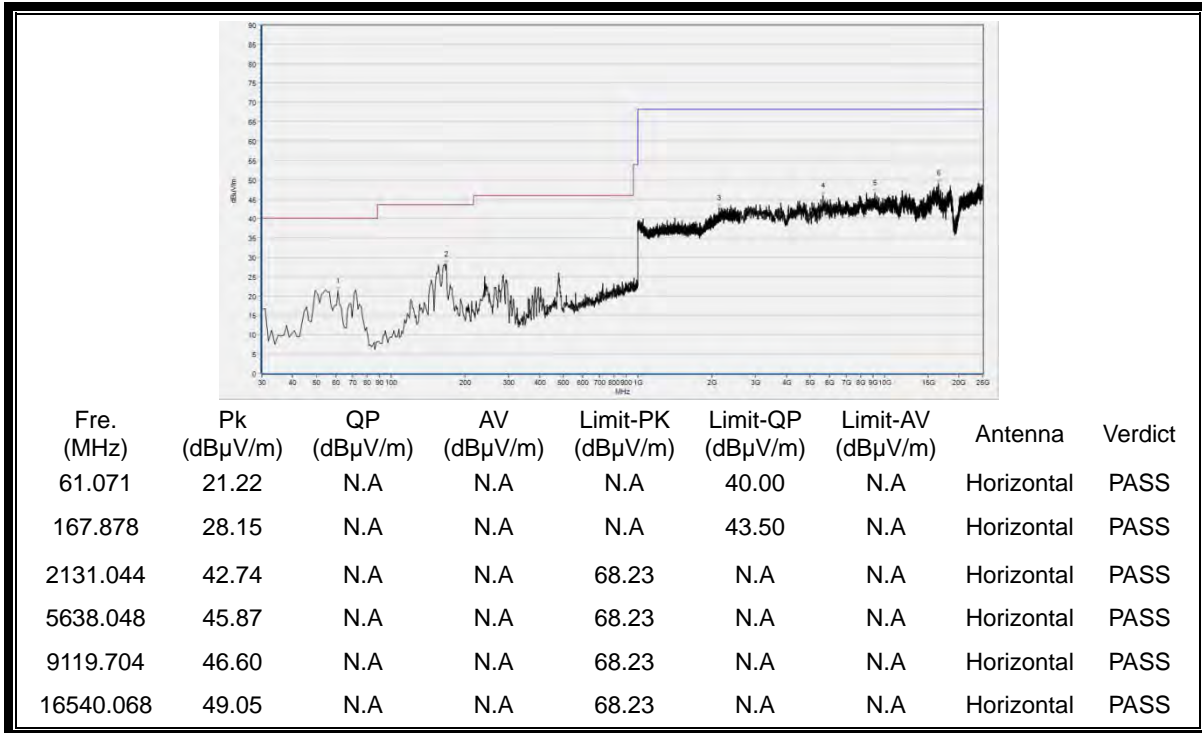
(Antenna Vertical, 30MHz to 40GHz)



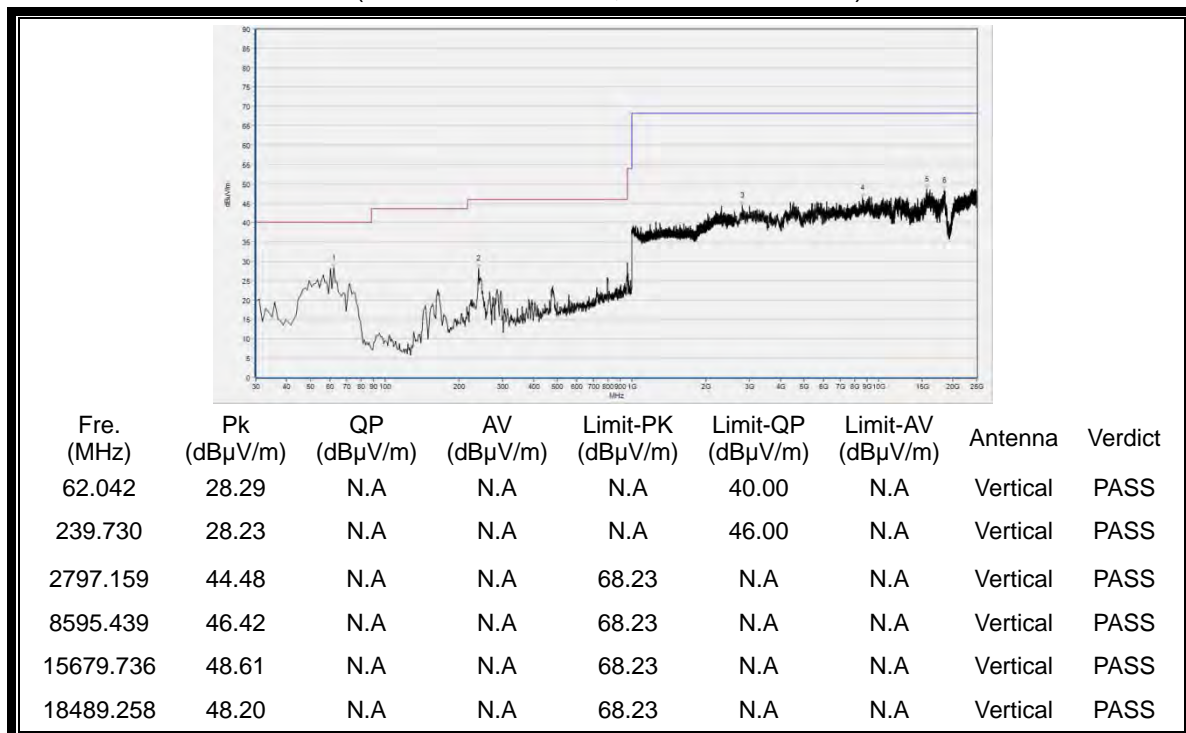
2.8.3.3 802.11ac-40MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 38



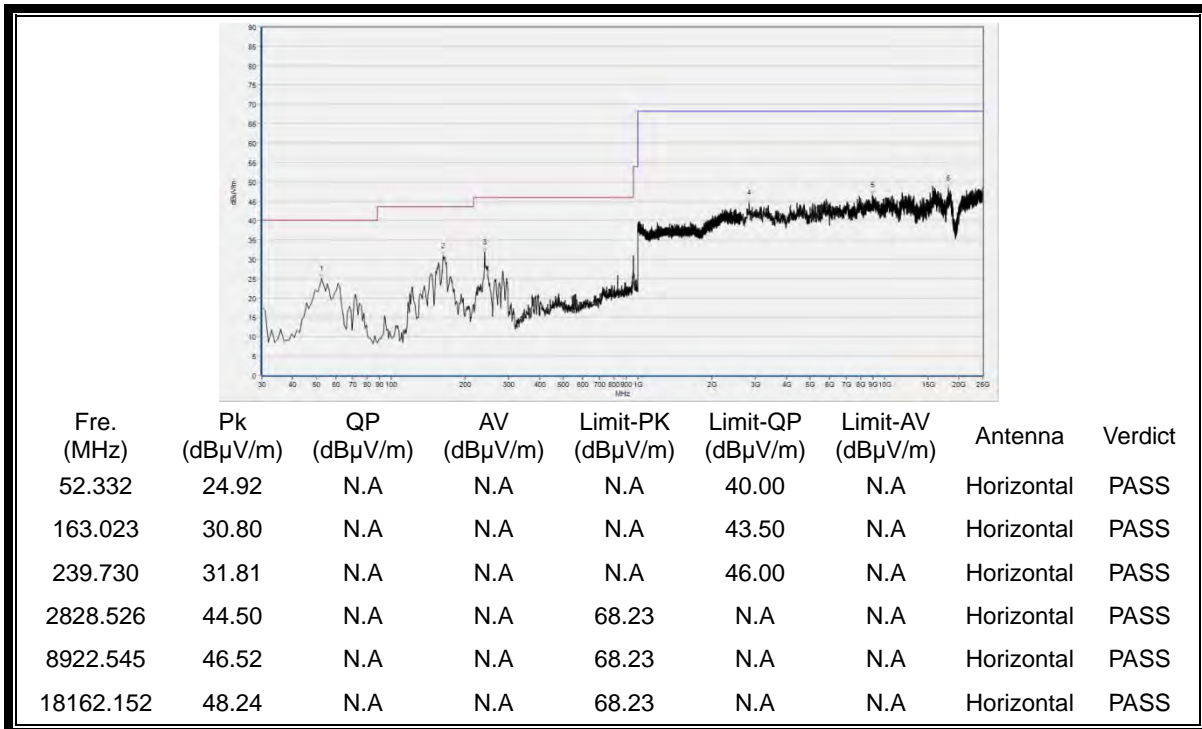
(Antenna Horizontal, 30MHz to 40GHz)



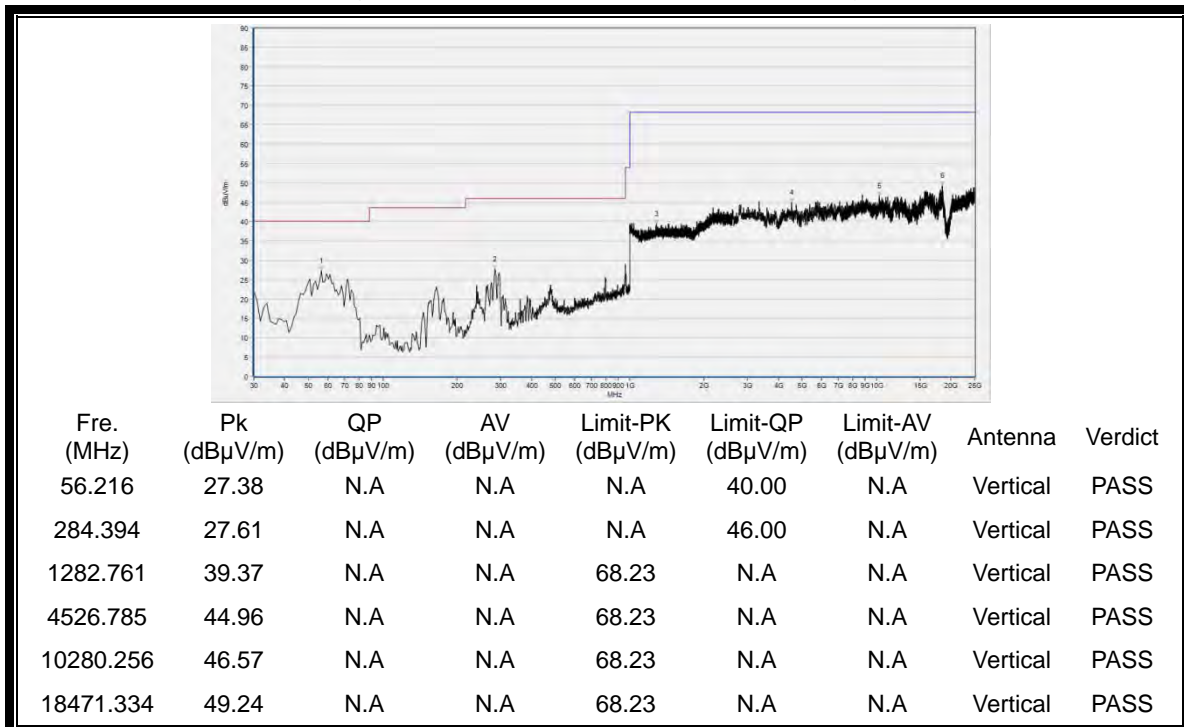
(Antenna Vertical, 30MHz to 40GHz)



Plot for Channel = 46



(Antenna Horizontal, 30MHz to 25GHz)

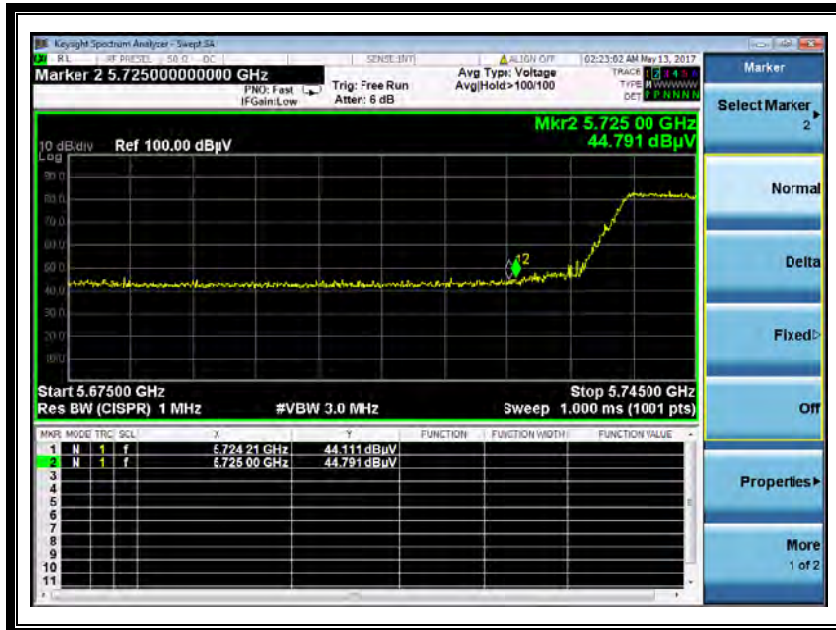


(Antenna Vertical, 30MHz to 40GHz)

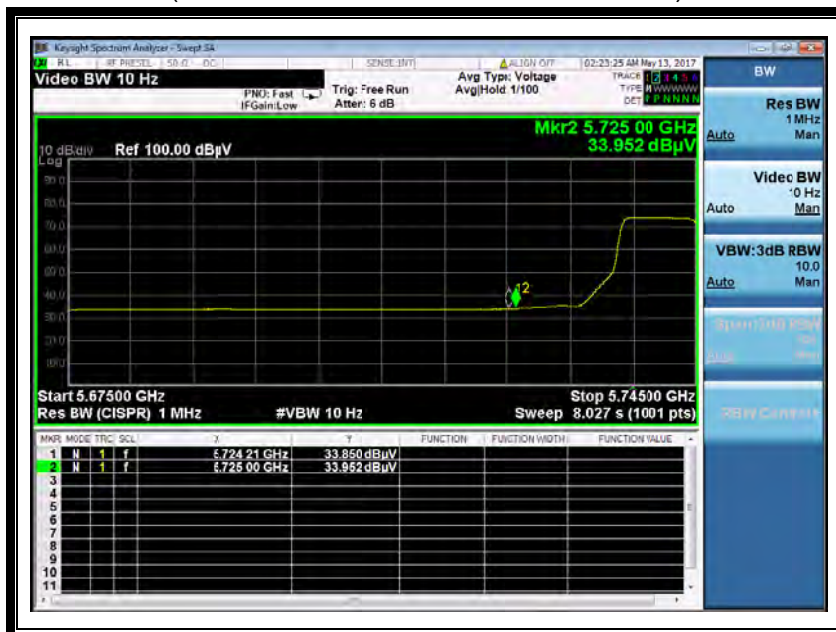


Plot for Channel = 151

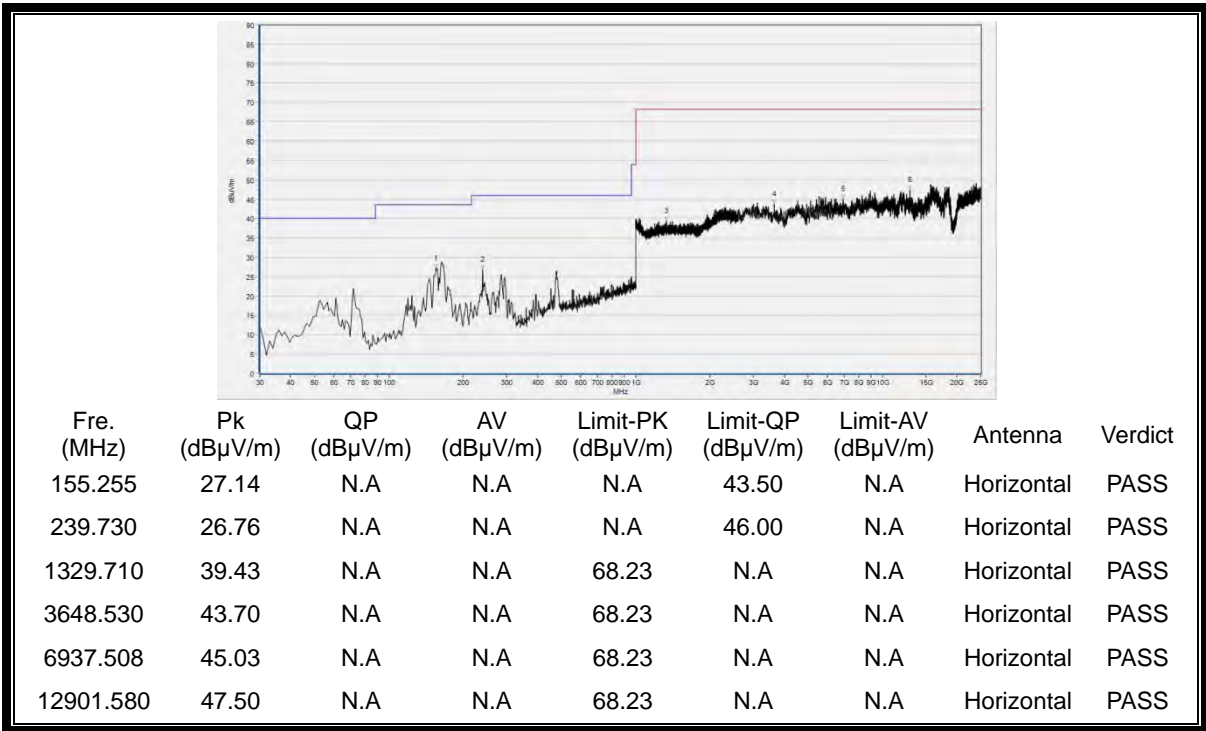
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
151	5724.21	Horizontal	44.11	-50.65	32.11	25.57	78.2	Pass
151	5724.21	Vertical	33.85	-50.65	32.11	15.31	78.2	Pass



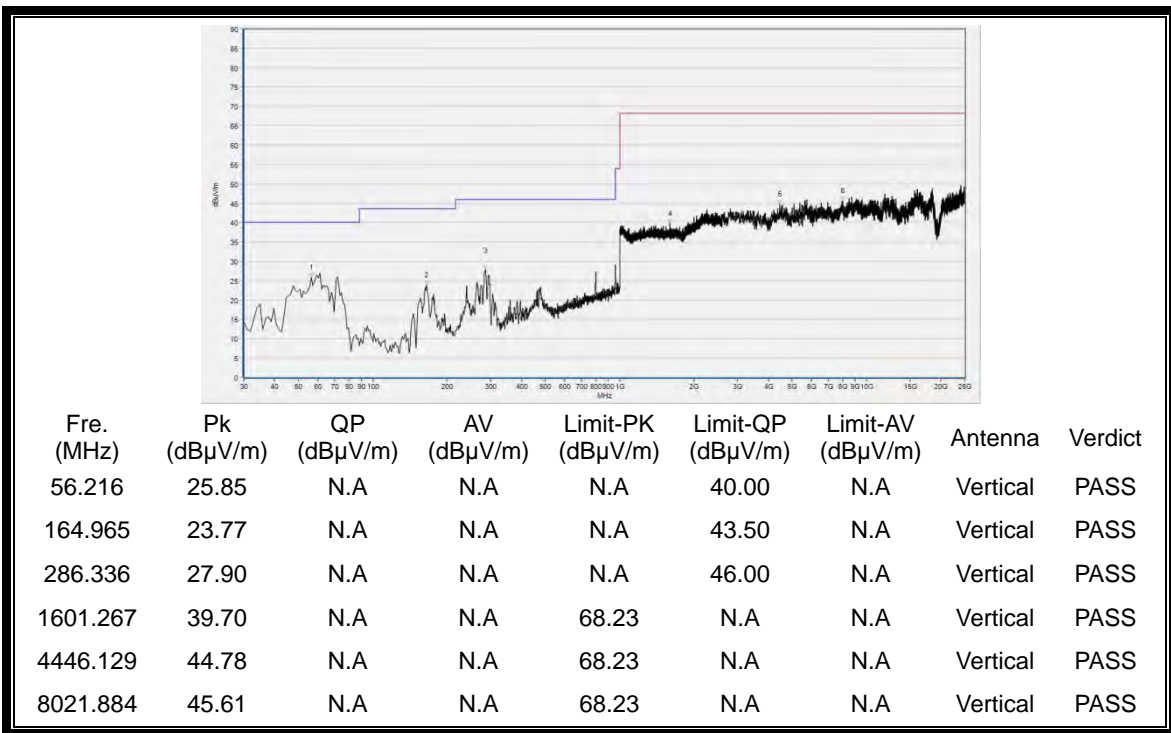
(Channel = 151 Horizontal @ 802.11ac)



(Channel = 151 Vertical @ 802.11ac)



(Antenna Horizontal, 30MHz to 40GHz)

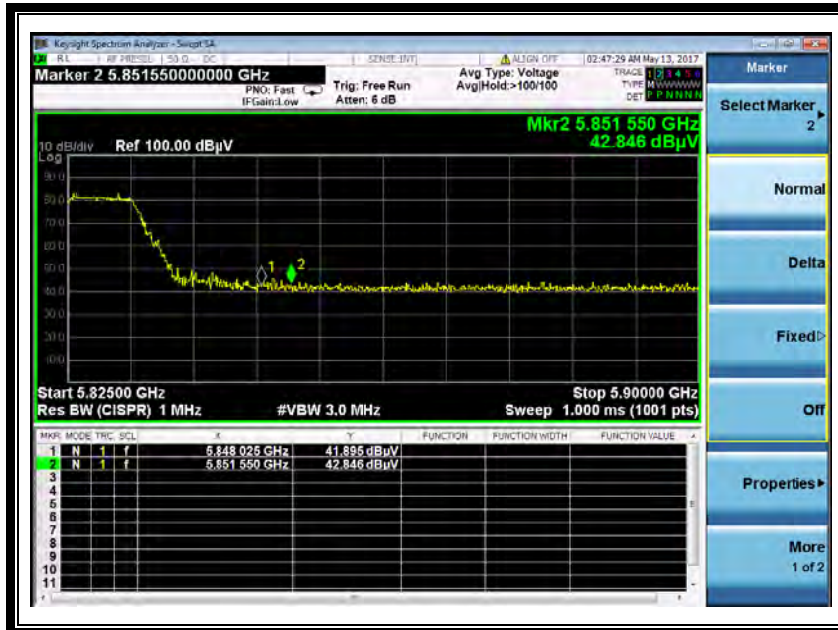


(Antenna Vertical, 30MHz to 40GHz)

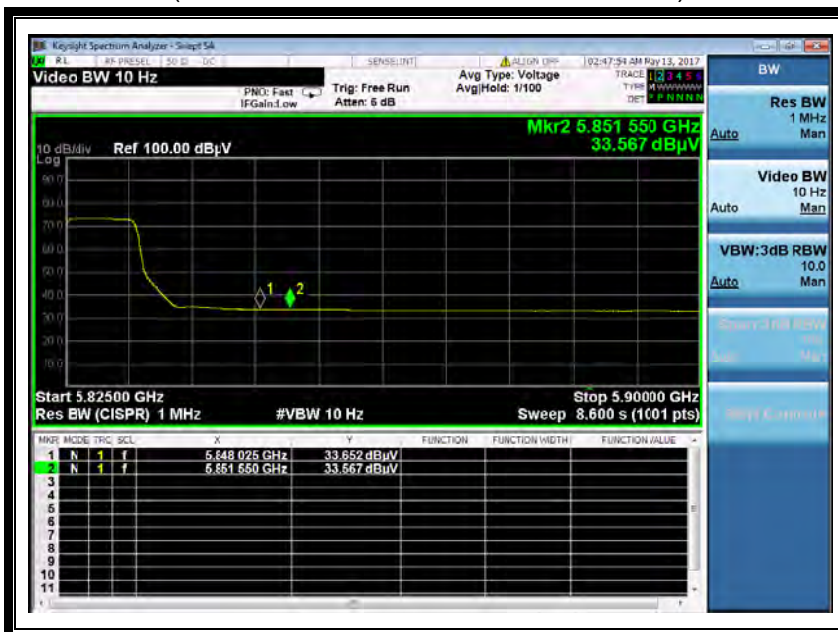


Plots for Channel = 159

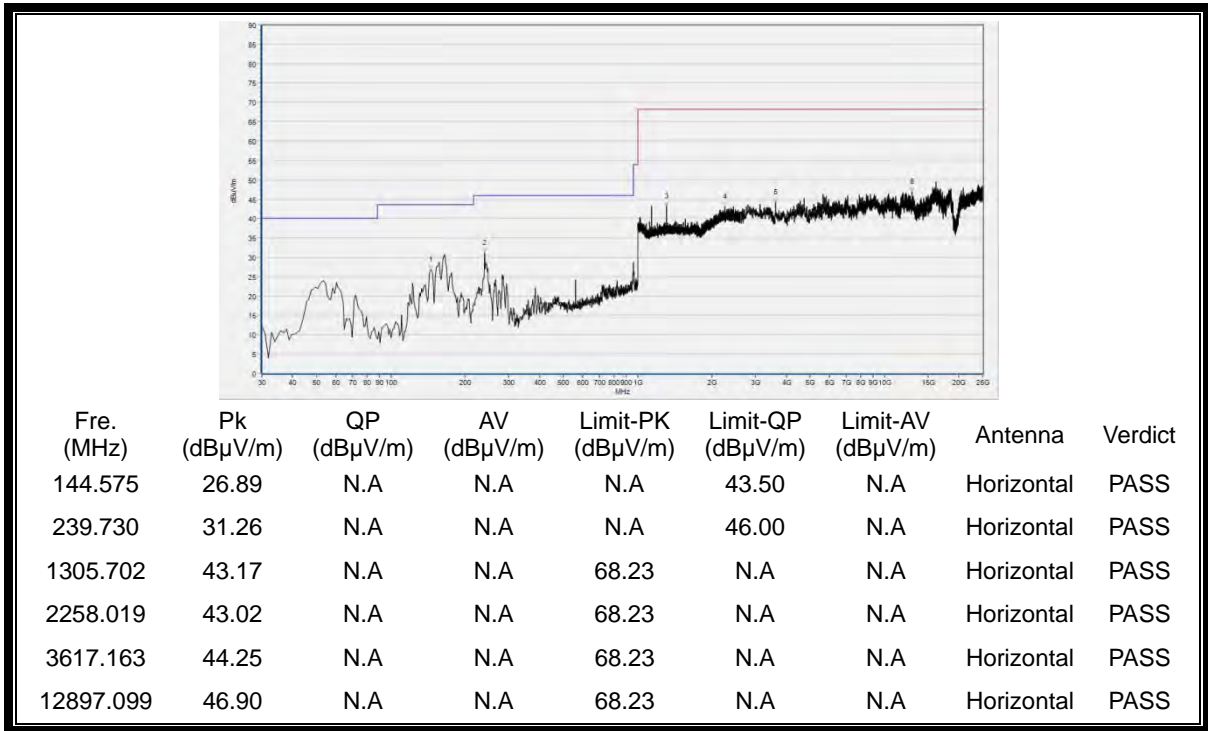
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
159	5851.55	Horizontal	42.85	-50.65	32.11	24.31	78.2	Pass
159	5851.55	Vertical	33.57	-50.65	32.11	15.03	78.2	Pass



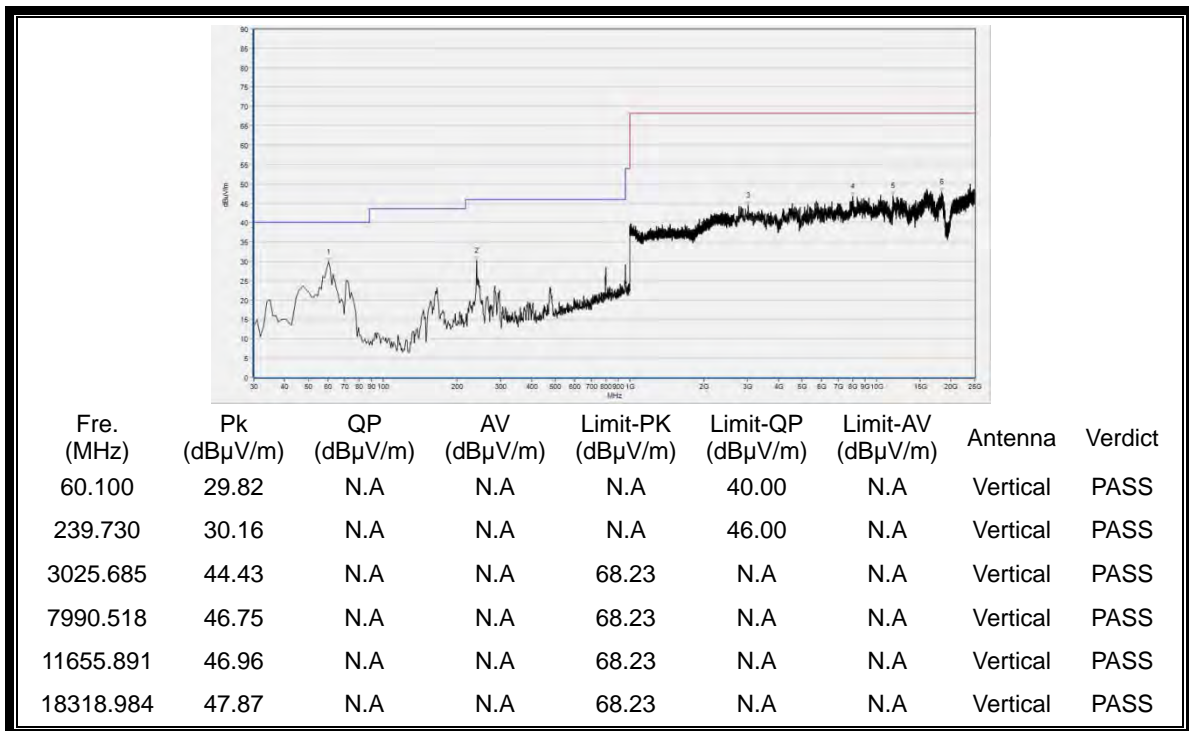
(Channel = 151 Horizontal @ 802.11ac)



(Channel = 151 Vertical @ 802.11ac)



(Antenna Horizontal, 30MHz to 40GHz)



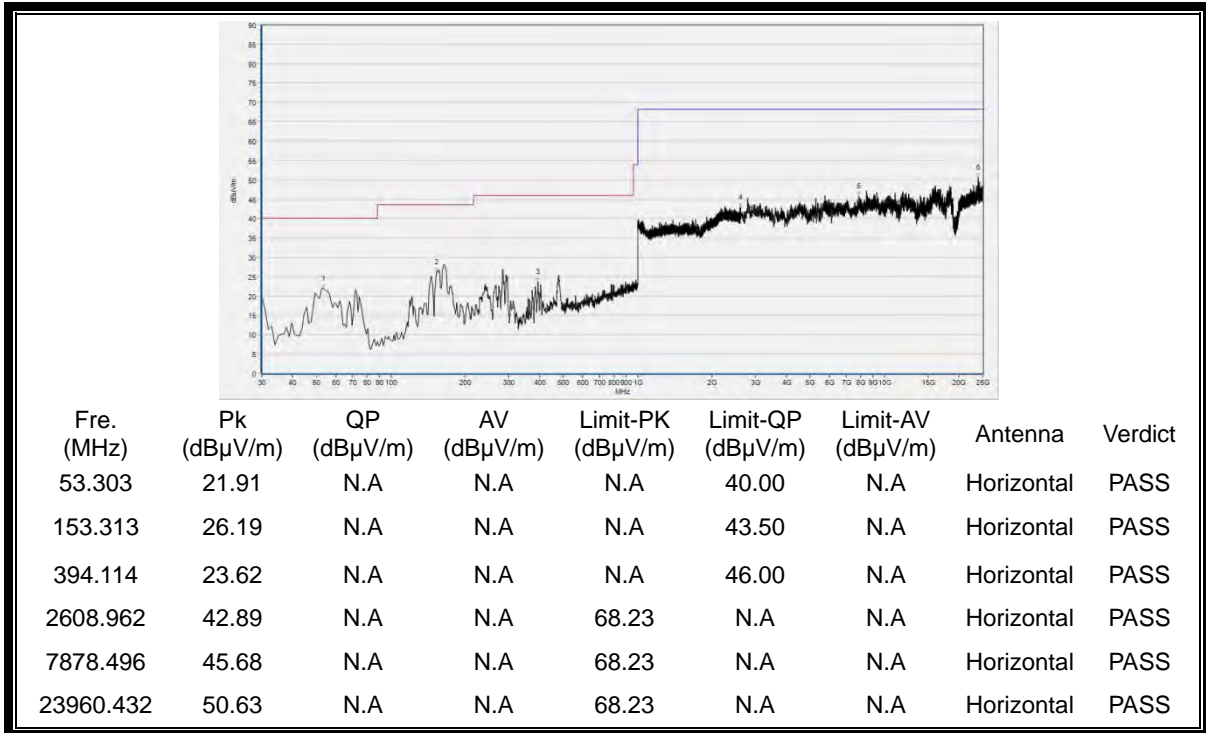
(Antenna Vertical, 30MHz to 40GHz)



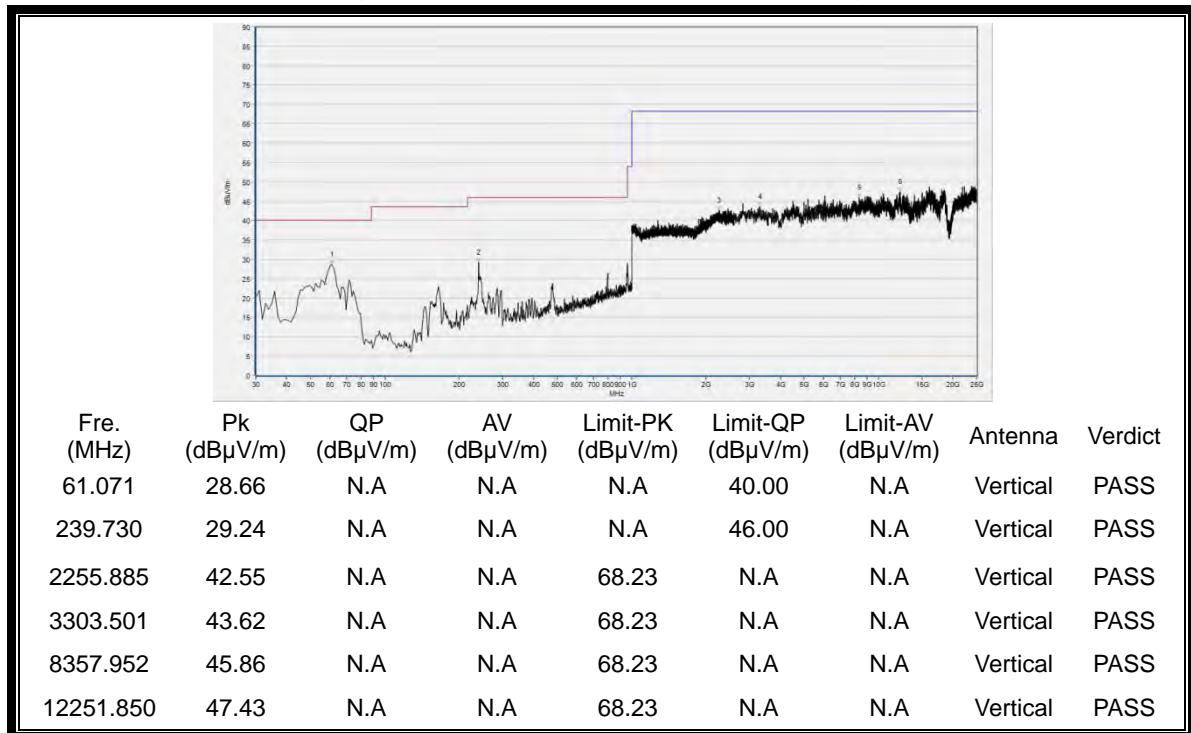
2.8.3.4 802.11ac-80MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 42



(Antenna Horizontal, 30MHz to 40GHz)

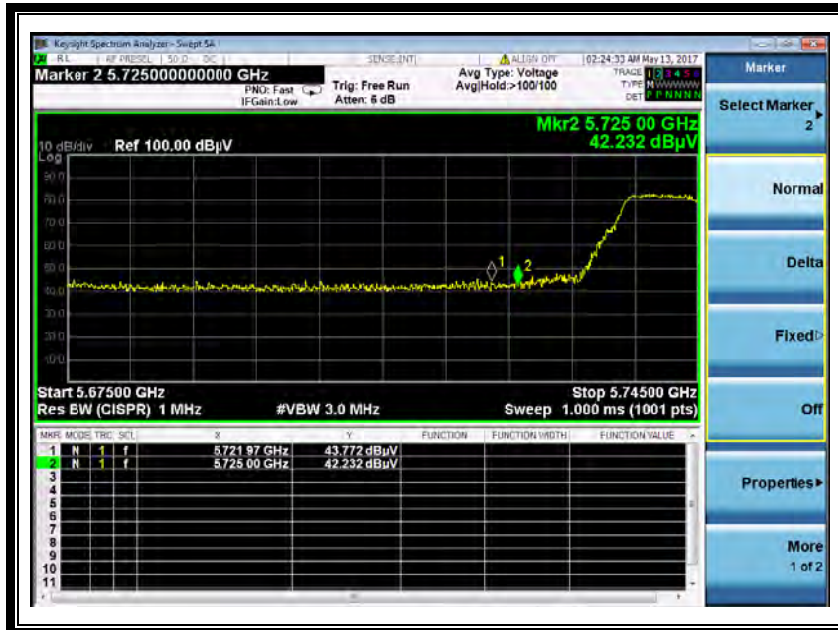


(Antenna Vertical, 30MHz to 40GHz)



Plot for Channel = 155

Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
155	5721.97	Horizontal	43.77	-50.65	32.11	25.23	78.2	Pass
155	5721.97	Vertical	33.72	-50.65	32.11	15.18	78.2	Pass



(Channel = 155 Horizontal @ 802.11ac)



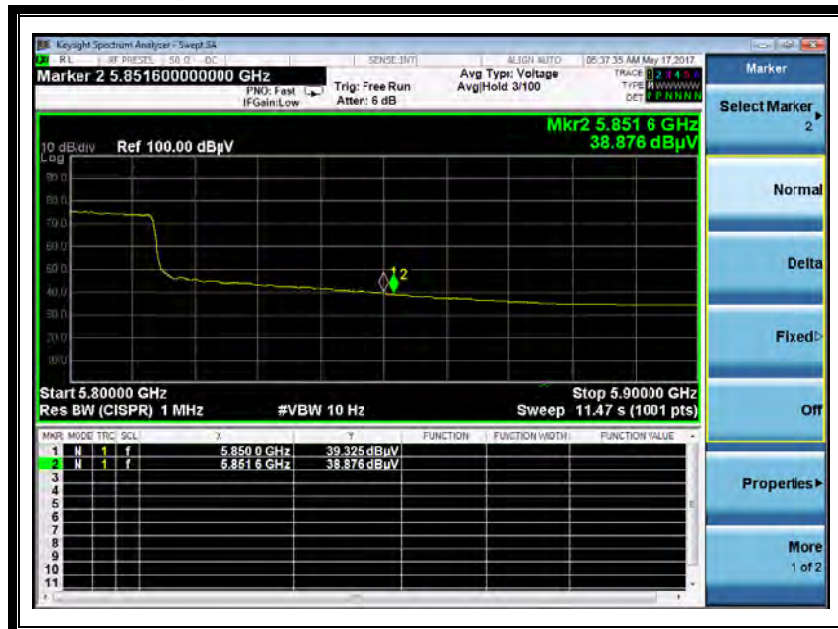
(Channel = 155 Vertical @ 802.11ac)



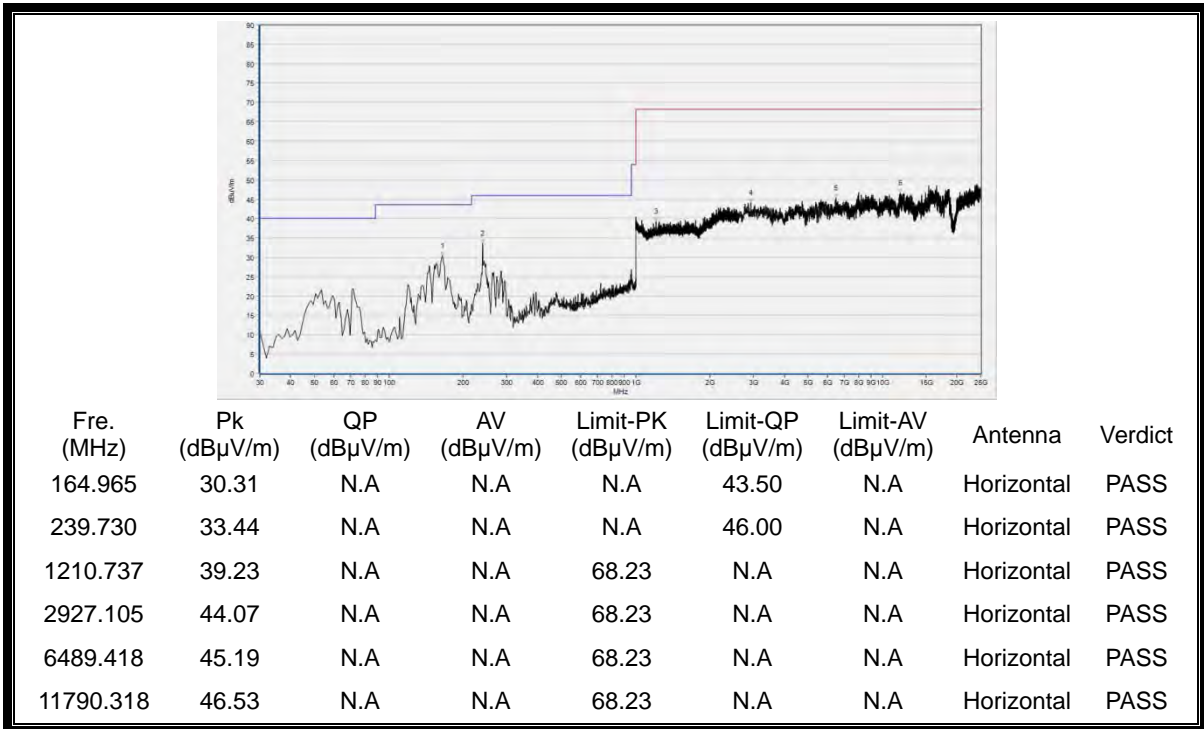
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
155	5852.00	Horizontal	51.74	-50.65	32.11	33.20	78.2	Pass
155	5851.60	Vertical	38.88	-50.65	32.11	20.34	78.2	Pass



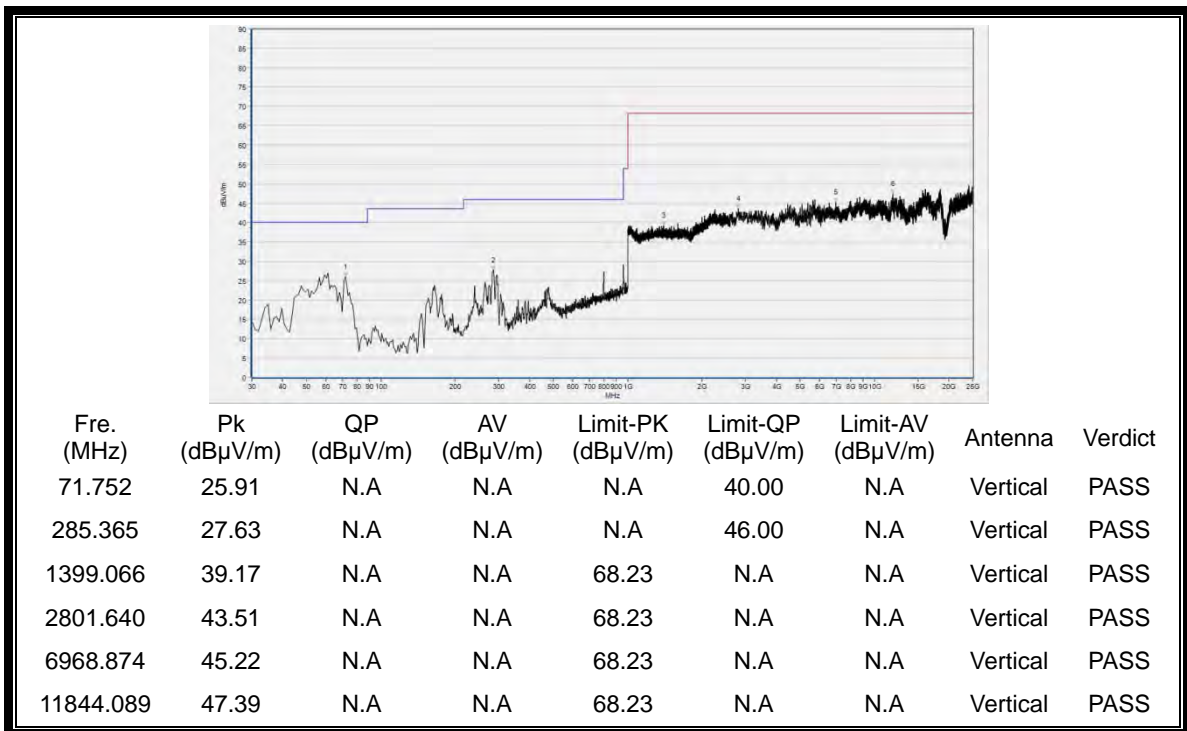
(Channel = 155 Horizontal @ 802.11ac)



(Channel = 155 Vertical @ 802.11ac)



(Antenna Horizontal, 30MHz to 25GHz)



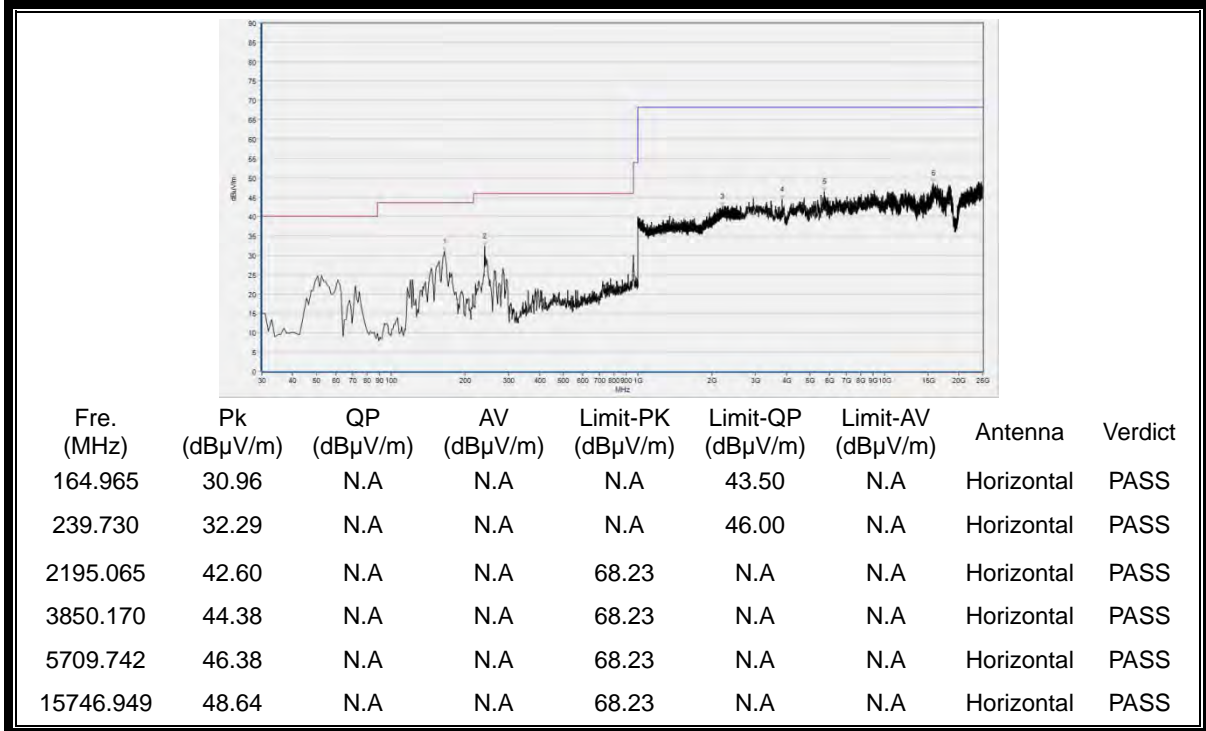
(Antenna Vertical, 30MHz to 25GHz)



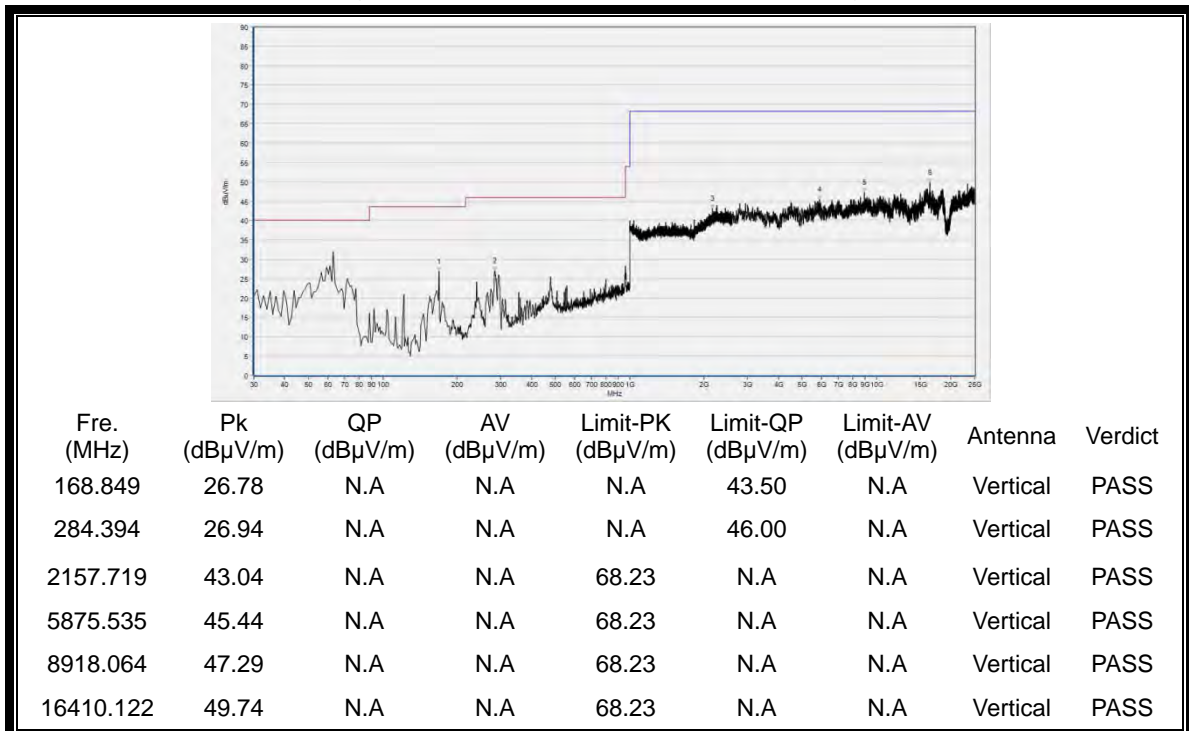
2.8.3.5 802.11n-20MHz Test mode

A. Test Plots for the Whole Measurement Frequency Range:

Plots for Channel = 36



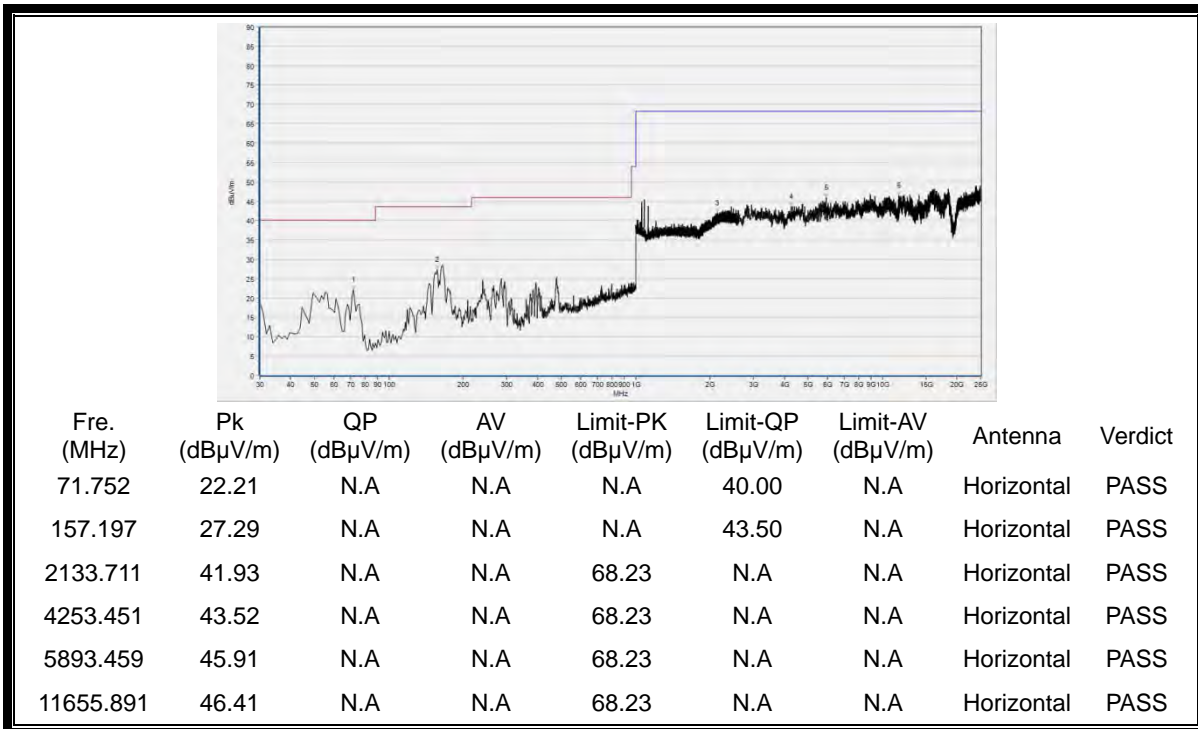
(Antenna Horizontal, 30MHz to 25GHz)



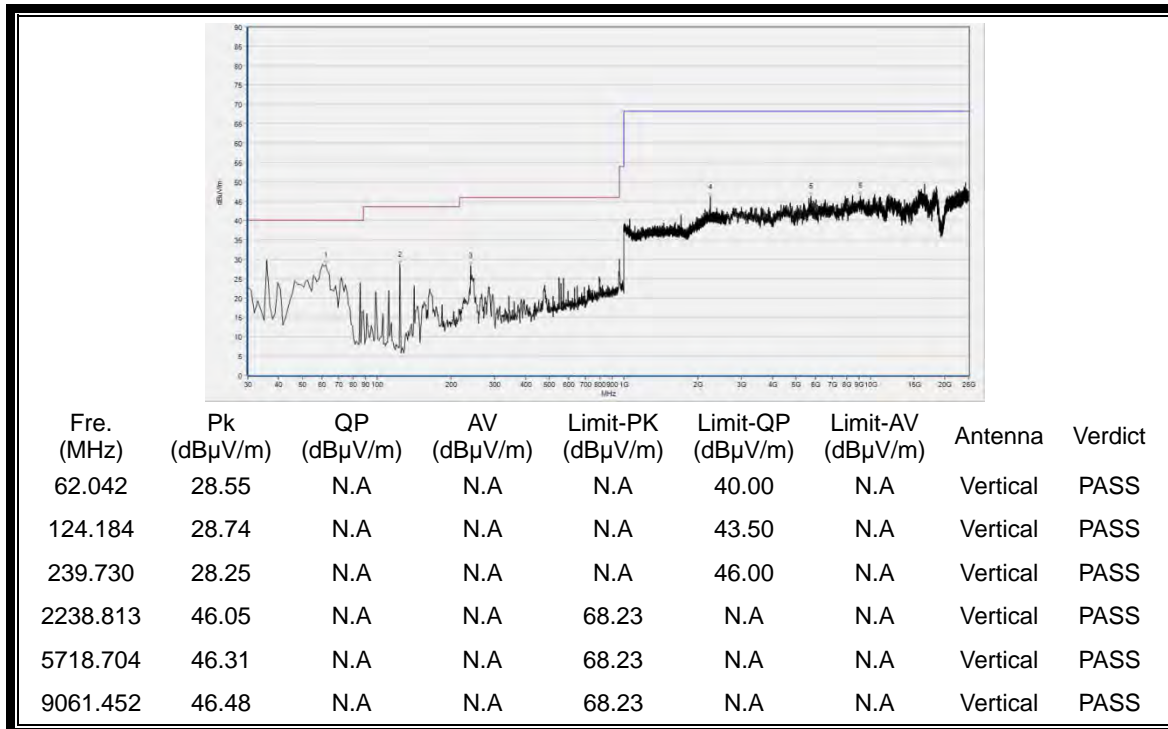
(Antenna Vertical, 30MHz to 25GHz)



Plot for Channel = 48



(Antenna Horizontal, 30MHz to 25GHz)

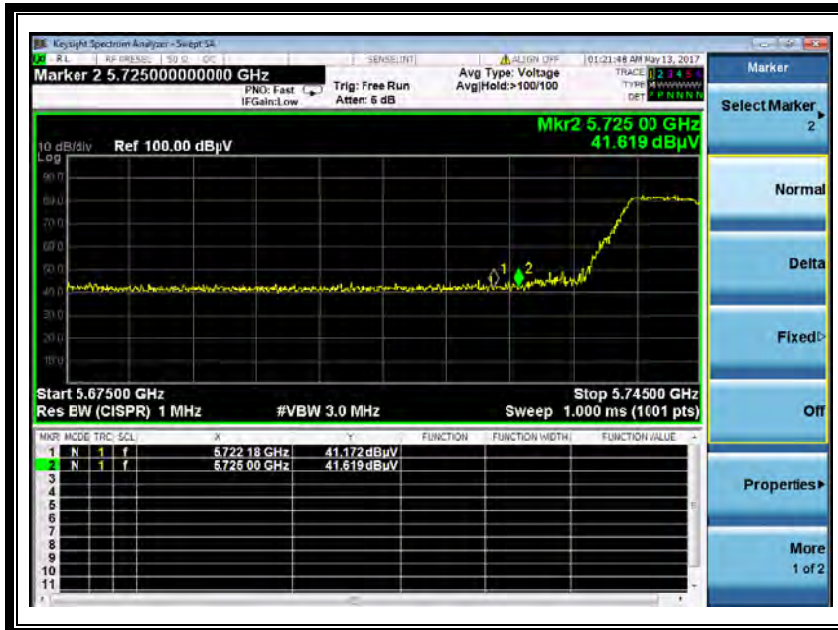


(Antenna Vertical, 30MHz to 25GHz)

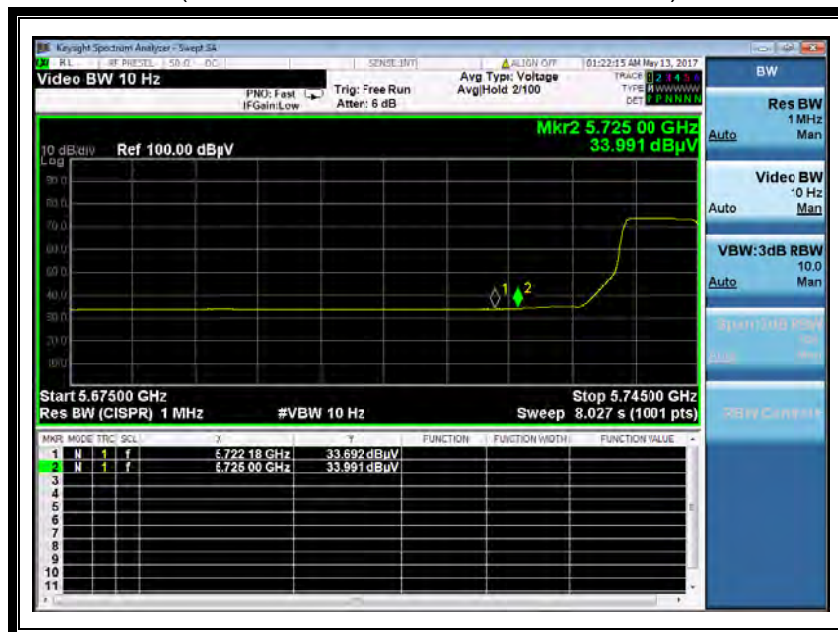


Plots for Channel = 149

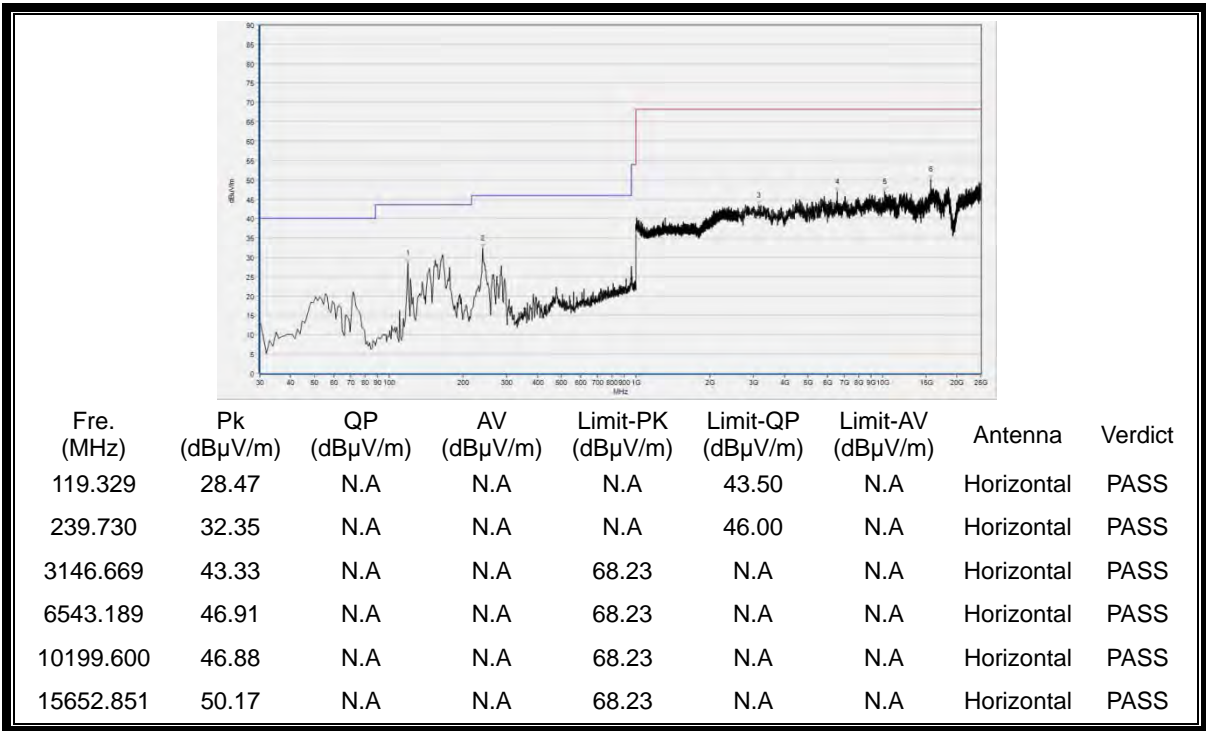
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
		Horiz./ Vert.	U _R (dBuV)	(dB)	(dB@3m)	E (dBuV/m)	(dBuV/m)	
149	5722.18	Horizontal	41.17	-50.65	32.11	23.08	78.2	Pass
149	5722.18	Vertical	33.69	-50.65	32.11	15.45	78.2	Pass



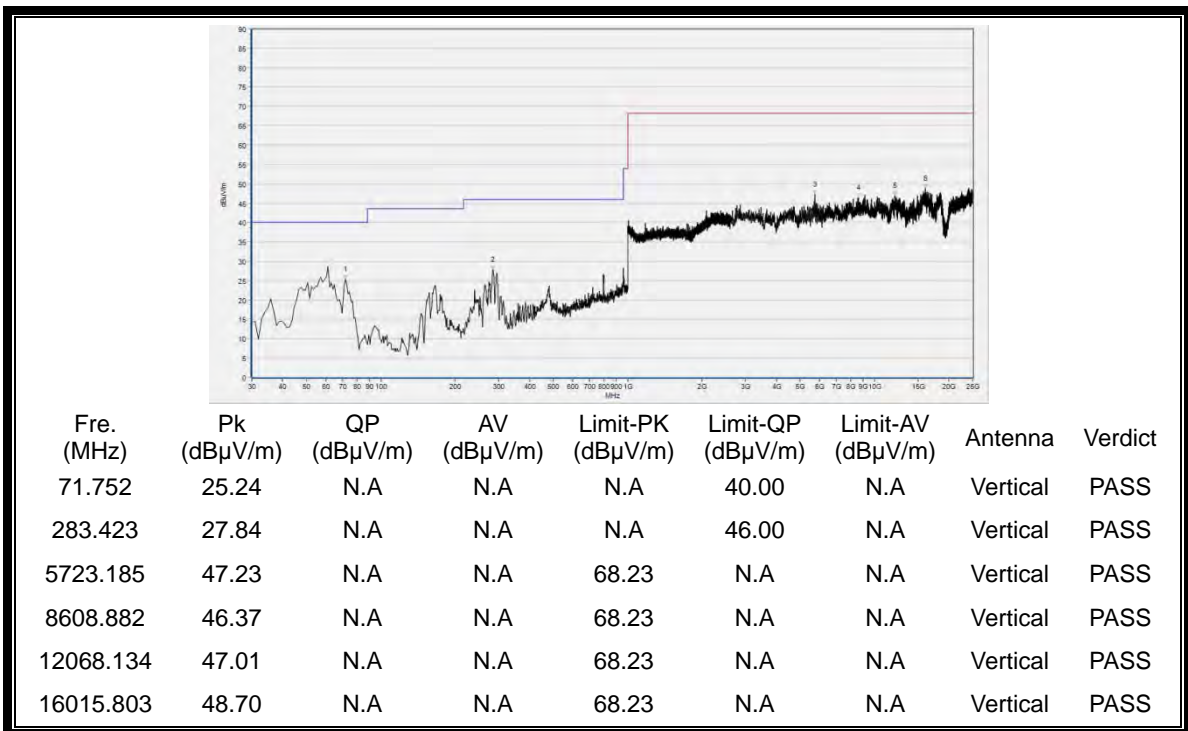
(Channel = 149 Horizontal @ 802.11n)



(Channel = 149 Vertical @ 802.11n)



(Antenna Horizontal, 30MHz to 25GHz)

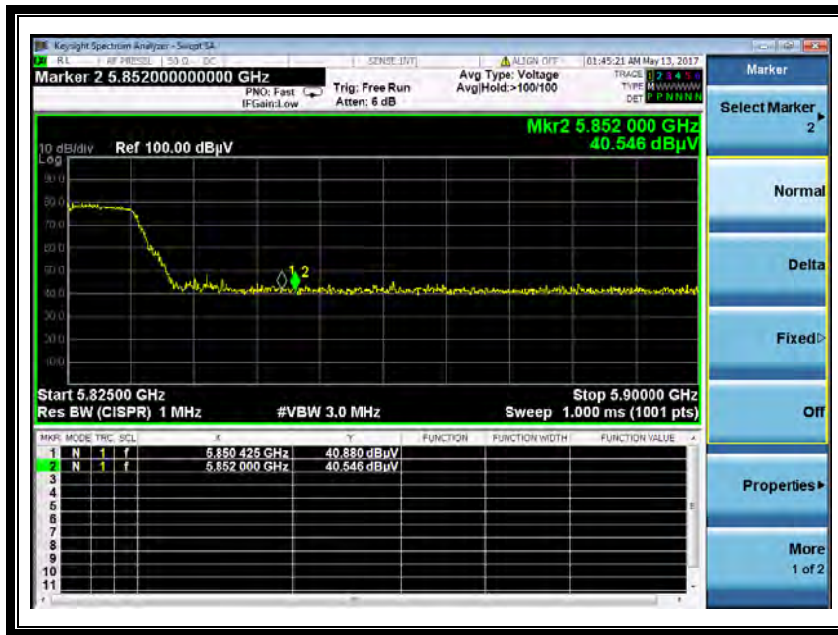


(Antenna Vertical, 30MHz to 25GHz)

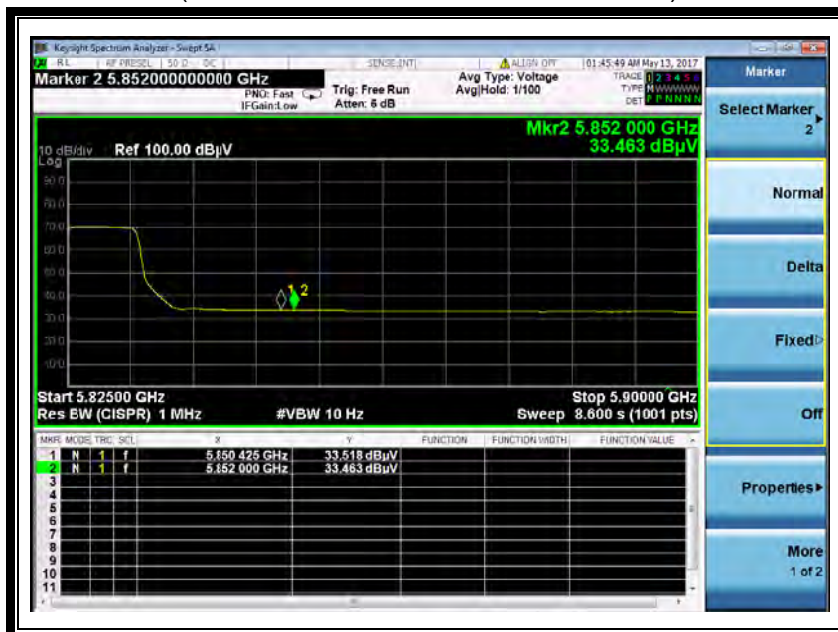


Plot for Channel = 165

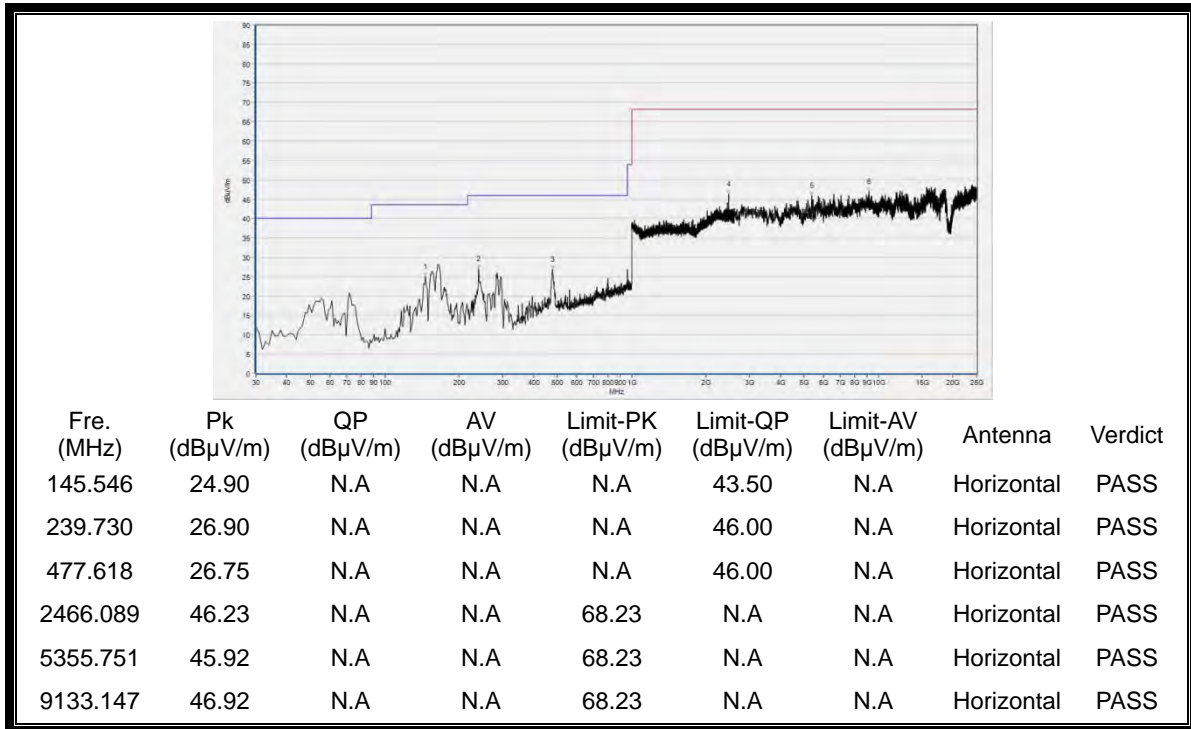
Channel	Frequency (MHz)	Antenna	Receiver Reading	A _T (dB)	A _{Factor} (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		Horiz./ Vert.	U _R (dBuV)					
165	5852.00	Horizontal	40.55	-50.65	32.11	22.01	78.2	Pass
165	5852.00	Vertical	33.46	-50.65	32.11	14.92	78.2	Pass



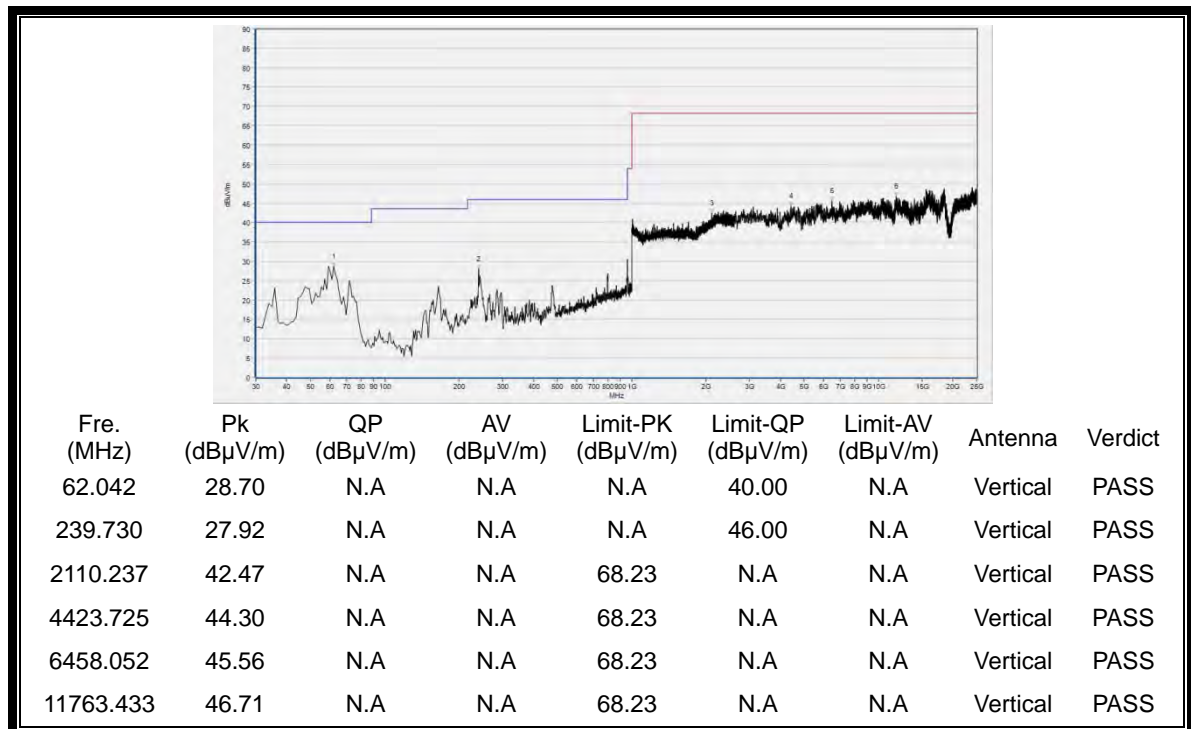
(Channel = 165 Horizontal @ 802.11n)



(Channel = 165 Vertical @ 802.11n)



(Antenna Horizontal, 30MHz to 25GHz)



(Antenna Vertical, 30MHz to 25GHz)



2.9 RF exposure evaluation

2.9.1 Requirement

According to § 1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of Commission's guideline.

2.9.2 Result

Please refer to SAR report.



ANNEX A GENERAL INFORMATION

1.1 Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Responsible Test Lab Manager:	Mr. Su Feng
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 Identification of the Responsible Testing Location

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

1.3 Facilities and Accreditations

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at FL.1, 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 registration number is 695796.

1.4 Maximum measurement 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	±2.22dB
Power spectral density (PSD)	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77 dB
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB



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

1.5 Test Equipments Utilized

1.5.1 Conducted Test Equipments

Conducted Test Equipment						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
1	Spectrum Analyzer	MY45101810	E4407B	Agilent	2016.06.02	2017.06.01
2	Power Splitter	NW521	1506A	Weinschel	2016.06.02	2017.06.01
3	Attenuator 1	(N/A.)	10dB	Resnet	2016.06.02	2017.06.01
4	Attenuator 2	(N/A.)	3dB	Resnet	2016.06.02	2017.06.01
5	EXA Signal Analyzer	MY53470836	N9010A	Agilent	2016.06.02	2017.06.01
6	RF cable (30MHz-26GHz)	CB01	RF01	Morlab	N/A	N/A
7	Coaxial cable	CB02	RF02	Morlab	N/A	N/A
8	SMA connector	CN01	RF03	HUBER-SUHNER	N/A	N/A

1.5.2 Conducted Emission Test Equipments

Conducted Emission Test Equipments						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal. Due
1	Receiver	US44210471	E7405A	Agilent	2016.06.02	2017.06.01
2	LISN	812744	NSLK 8127	Schwarzbeck	2016.06.02	2017.06.01
3	Service Supplier	100448	CMU200	R&S	2016.06.02	2017.06.01
4	Pulse Limiter (20dB)	9391	VTSD 9561-D	Schwarzbeck	2016.06.02	2017.06.01
5	Coaxial cable(BNC) (30MHz-26GHz)	CB01	EMC01	Morlab	N/A	N/A

1.5.3 Auxiliary Test Equipment

Auxiliary Test Equipment						
No.	Equipment Name	Model No.	Brand Name	Manufacturer	Cal.Date	Cal.Due Date
1	Computer	T430i	Think Pad	Lenovo	N/A	N/A

**1.5.4 Radiated Test Equipments**

Radiated Test Equipments						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal. Date	Cal.Due Date
1	System Simulator	GB45360846	8960-E5515C	Agilent	2016.06.02	2017.06.01
2	Receiver	MY54130016	N9038A	Agilent	2016.06.02	2017.06.01
3	Test Antenna - Bi-Log	N/A	VULB9163	Schwarzbeck	2016.07.05	2017.07.04
4	Test Antenna - Horn	9170C-531	BBHA9170	Schwarzbeck	2016.07.05	2017.07.04
5	Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2016.07.05	2017.07.04
6	Test Antenna - Horn	71688	BBHA 9120D	Schwarzbeck	2016.07.05	2017.07.04
7	Coaxial cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
8	Coaxial cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
9	Coaxial cable(N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
10	1-18GHz pre-Amplifier	MA02	TS-PR18	Rohde& Schwarz	2016.07.05	2017.07.04
11	18-26.5GHz pre-Amplifier	MA03	TS-PR18	Rohde& Schwarz	2016.07.05	2017.07.04

1.5.5 Climate Chamber

Climate Chamber						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
1	Climate Chamber	2004012	HL4003T	Yinhe	2017.01.11	2018.01.10

1.5.6 Vibration Table

Vibration Table						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
1	Vibration Table	N/A	ACT2000-S015L	CMI-COM	2017.01.11	2018.01.10

1.5.7 Anechoic Chamber

Anechoic Chamber						
No.	Equipment Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
1	Anechoic Chamber	N/A	9m*6m*6m	Changning	2017.01.11	2018.01.10

***** END OF REPORT *****