REPORT No.: SZ16080097W02

FCC RF TEST REPORT

APPLICANT	:	Shenzhen Onething Technologies Co., Ltd
PRODUCT NAME	:	Seekr VR-3D Camera
MODEL NAME	:	WX1603
TRADE NAME	:	Seekr
BRAND NAME	:	Seekr
FCC ID	:	2AJ2EWX1603
STANDARD(S)	:	47 CFR Part 15 Subpart E
ISSUE DATE	:	2017-02-21

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

MORLAB GROUP
FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Tel: 86-755-36698555 Http://www.morlab.com
Fax: 86-755-36698525 E-mail: service@morlab.cn

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	2017-02-21	First edition

TEST REPORT DECLARATION

Applicant	Shenzhen Onething Technologies Co., Ltd
Applicant Address	4/F,Bldg.5,Vision Business Park Nanshan District, Shenzhen,China
Manufacturer	Shenzhen Onething Technologies Co., Ltd
Manufacturer Address	4/F,Bldg.5,Vision Business Park Nanshan District, Shenzhen,China
Product Name	Seekr VR-3D Camera
Model Name	WX1603
Brand Name	Seekr
HW Version	V1.3
SW Version	WX1603V1.0
Test Standards	47 CFR Part 15 Subpart E
Test Date	2016-09-14 to 2017-02-21
Test Result	PASS

Tested by : Li Jing zong

Li Jingzong

Reviewed by : Qiu Xiaojun

Qiu Xiaojun

Approved by : Peng Hua

Peng Huarui

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type.....:	Seekr VR-3D Camera
Serial No. .....:	(n.a, marked #1 by test site)
Hardware Version.....:	V1.3
Software Version.....:	WX1603V1.0
Applicant.....:	Shenzhen Onething Technologies Co., Ltd 4/F,Bldg.5,Vision Business Park Nanshan District, Shenzhen, China
Manufacturer .....:	Shenzhen Onething Technologies Co., Ltd 4/F,Bldg.5,Vision Business Park Nanshan District, Shenzhen, China
Frequency Range.....:	802.11b/g/n: 2.400GHz - 2.4835GHz 802.11a/n: 5.150GHz- 5.250GHz 5.25 GHz -5.35 GHz 5.47 GHz -5.725 GHz 5.725GHz- 5.850GHz
Channel Number .....:	Refer Note(2)
Modulation Type.....:	DSSS, OFDM
Antenna Type.....:	PIFA Antenna
Antenna Gain.....:	0 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				5250~5350MHz			
Channel Number	**36**	40	**44**	**48**	**52**	56	**60**	**64**
Frequency (MHz)	**5180**	5200	**5220**	**5240**	**5260**	5280	**5300**	**5320**

Frequency Range	5470~5725MHz										
Channel Number	**100**	105	108	112	116	**120**	124	128	132	136	**140**
Frequency (MHz)	**5500**	5520	5540	5560	5580	**5600**	5620	5640	5660	5680	**5700**

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		5250~5350 MHz	
Channel Number	**38**	**46**	**54**	**62**
Frequency (MHz)	**5190**	**5230**	**5270**	**5310**

Frequency Range	5470~5725MHz					
Channel Number	**102**	110	118	**126**	134	**142**
Frequency (MHz)	**5510**	5550	5590	**5630**	5670	**5710**

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

80MHz Bandwidth:

Frequency Range	5150~5250MHz	5250~5350MHz
Channel Number	**42**	**58**
Frequency (MHz)	**5210**	**5290**

Frequency Range	5470~5725MHz			5725~5850MHz
Channel Number	**106**	**122**	**138**	**155**
Frequency (MHz)	**5530**	**5610**	**5690**	**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	**PASS**
2	15.407(a) (e)	Emission Bandwidth	**PASS**
3	15.407(a)	Maximum conducted output Power	**PASS**
4	15.407(a)	Peak Power spectral density	**PASS**
5	15.407(b)	Restricted Frequency Bands	**PASS**
6	15.407(g)	Frequency Stability	**PASS**
7	15.407(h)	TPC and DFS	**PASS** (Note)
8	15.207	Conducted Emission	**PASS**
9	15.407(b)	Radiated Emission	**PASS**
10	15.407(f)	RF exposure evaluation	**PASS**
Note: EUT is a Client Device Without Radar Detection, WIFI hotspot does not support U-NII band; A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW.			

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 v01r03 (08/22/2016), KDB905462 D07 v02 (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.

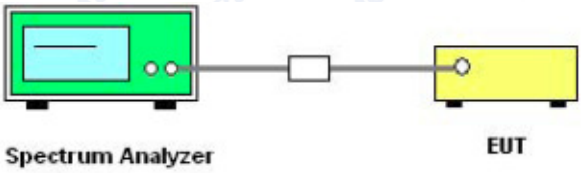
2.2 Emission Bandwidth

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) ≥ 3 × 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

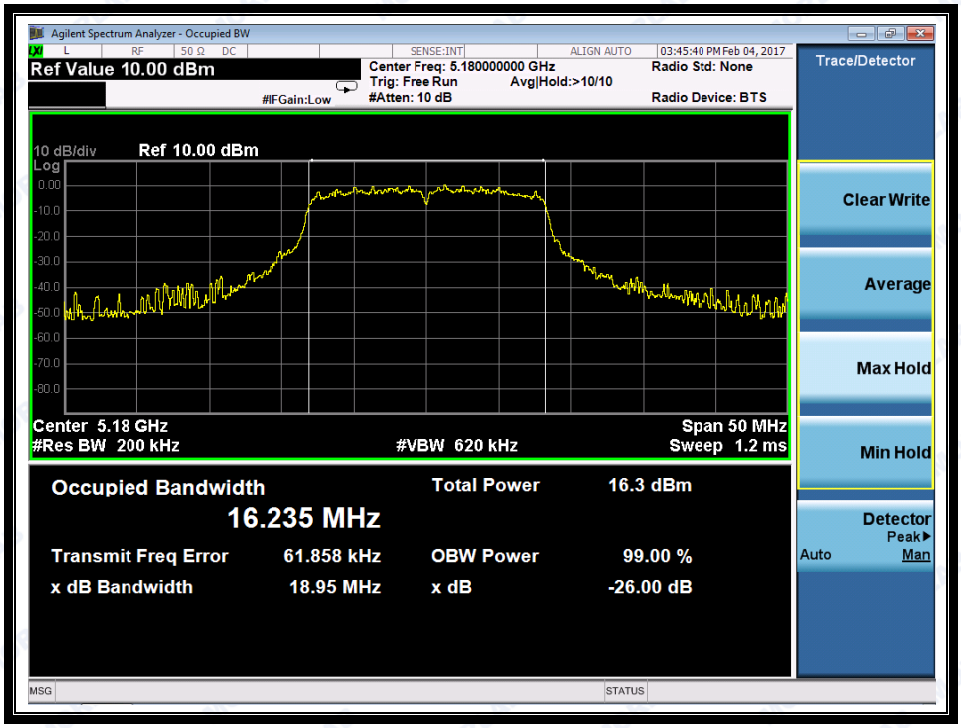
The lowest, middle and highest channels are selected to perform testing to record the 26 dB bandwidth of the Module.

2.2.3.1 802.11a-20MHz Test mode

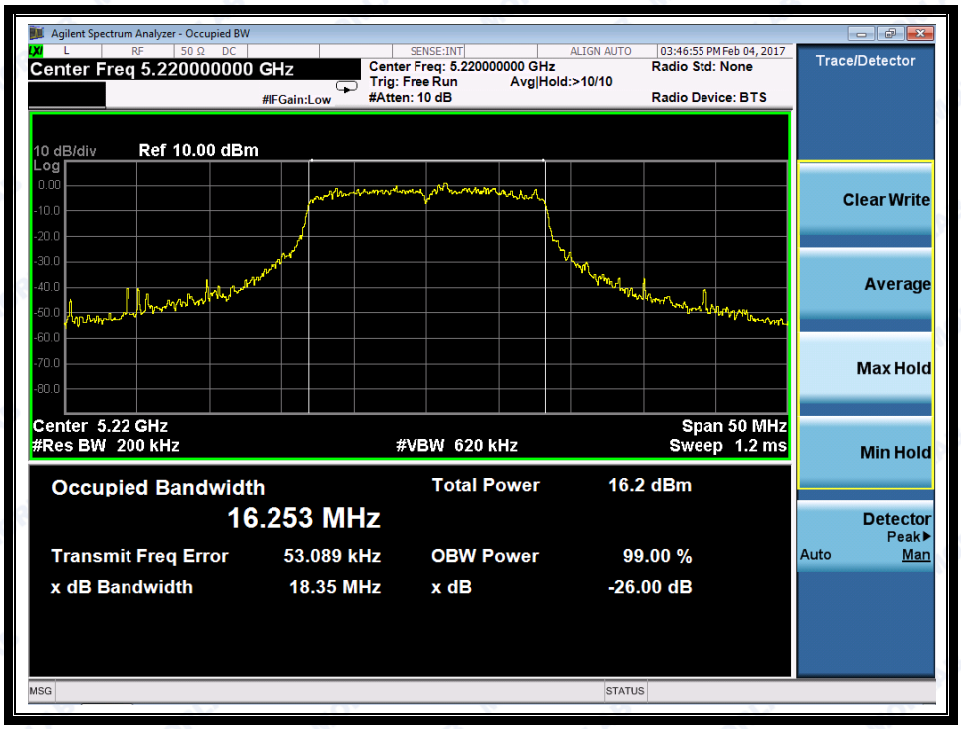
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	18.95
44	5220	18.35
48	5240	18.71
52	5260	18.77
60	5300	18.50
64	5320	18.72
100	5500	18.68
120	5600	19.42
140	5700	19.73
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	14.07
157	5785	14.64
165	5825	15.56

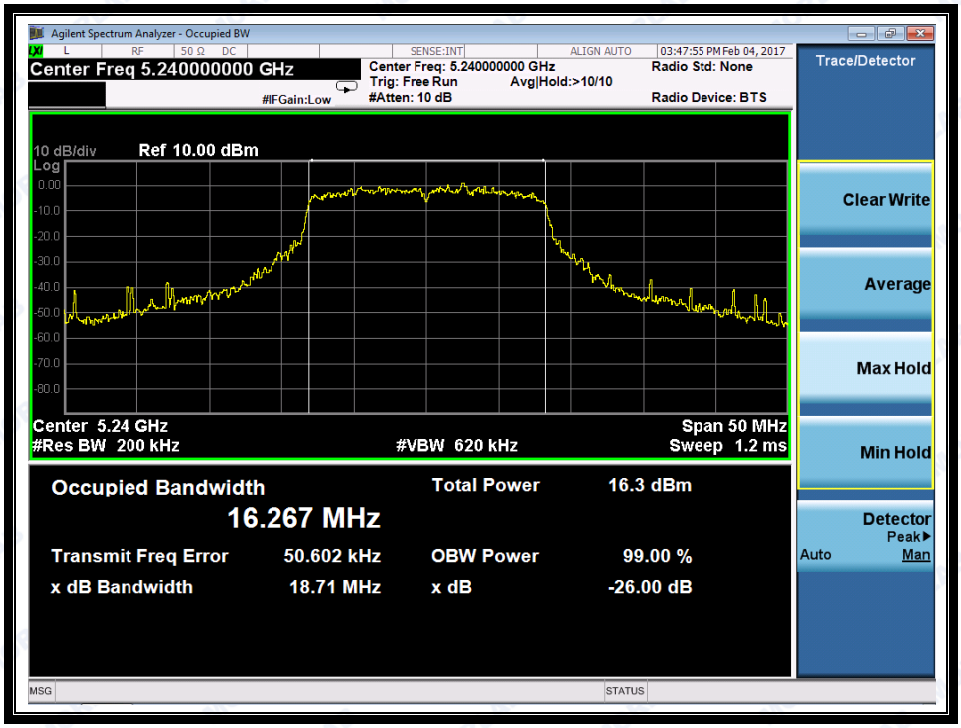
B. Test Plots



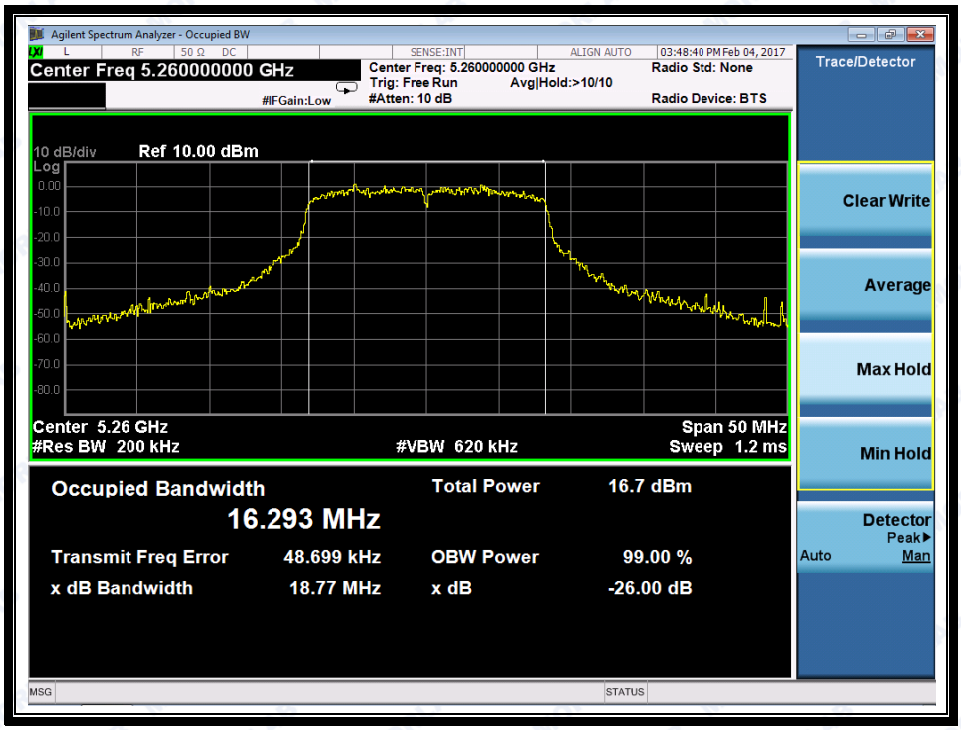
(Channel 36: 5180MHz @ 802.11a)



(Channel 44: 5220 MHz @ 802.11a)

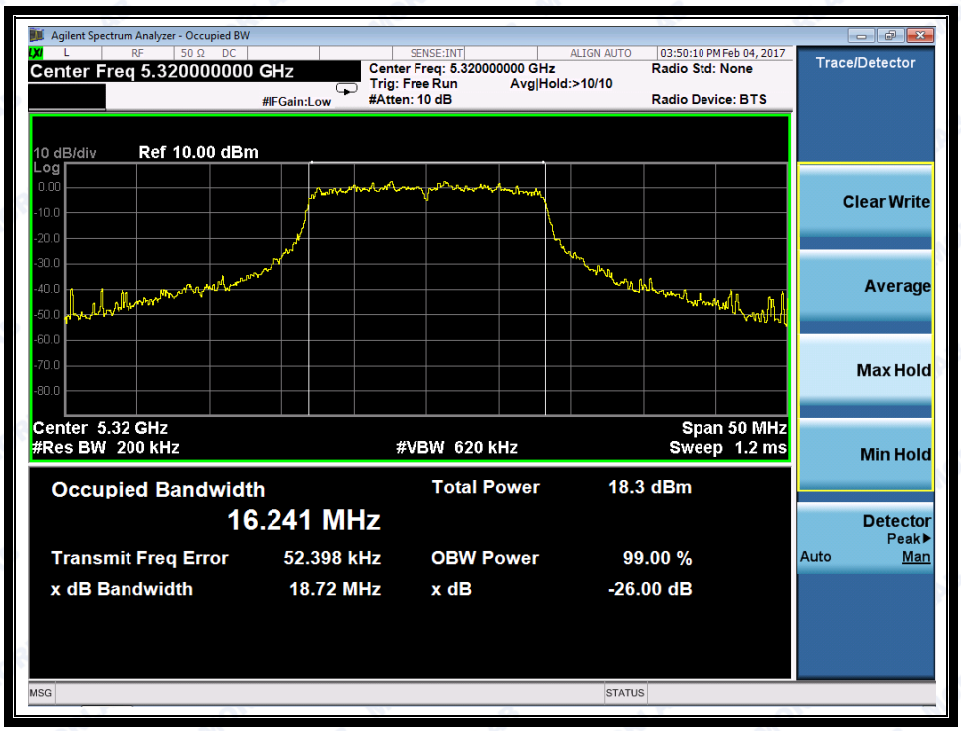


(Channel 48: 5240MHz @ 802.11a)

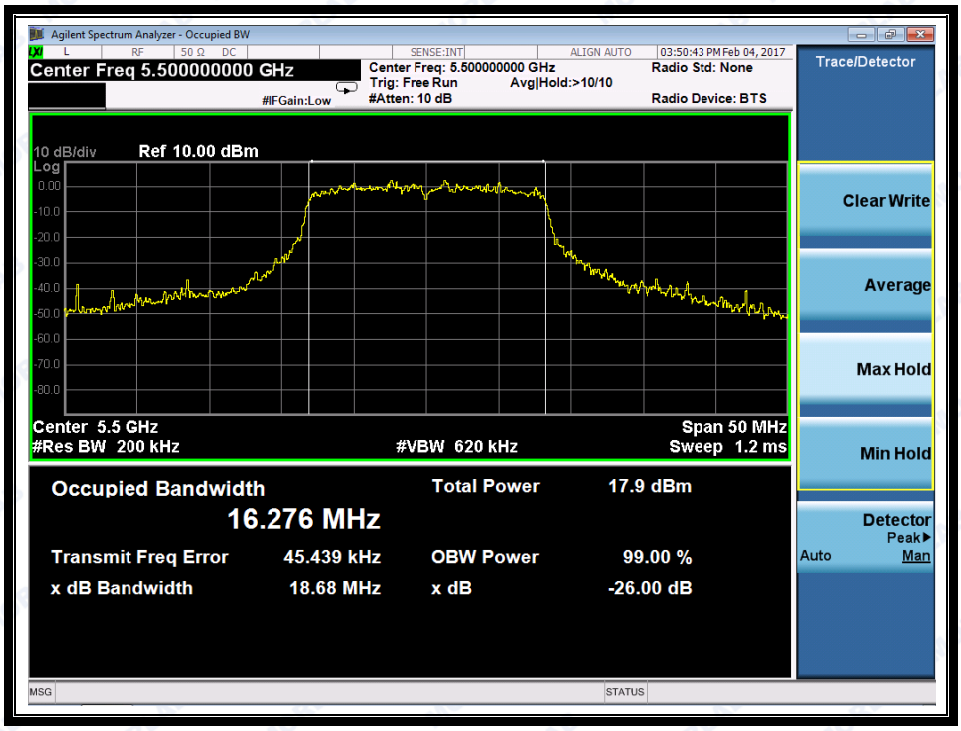


(Channel 52: 5260MHz @ 802.11a)

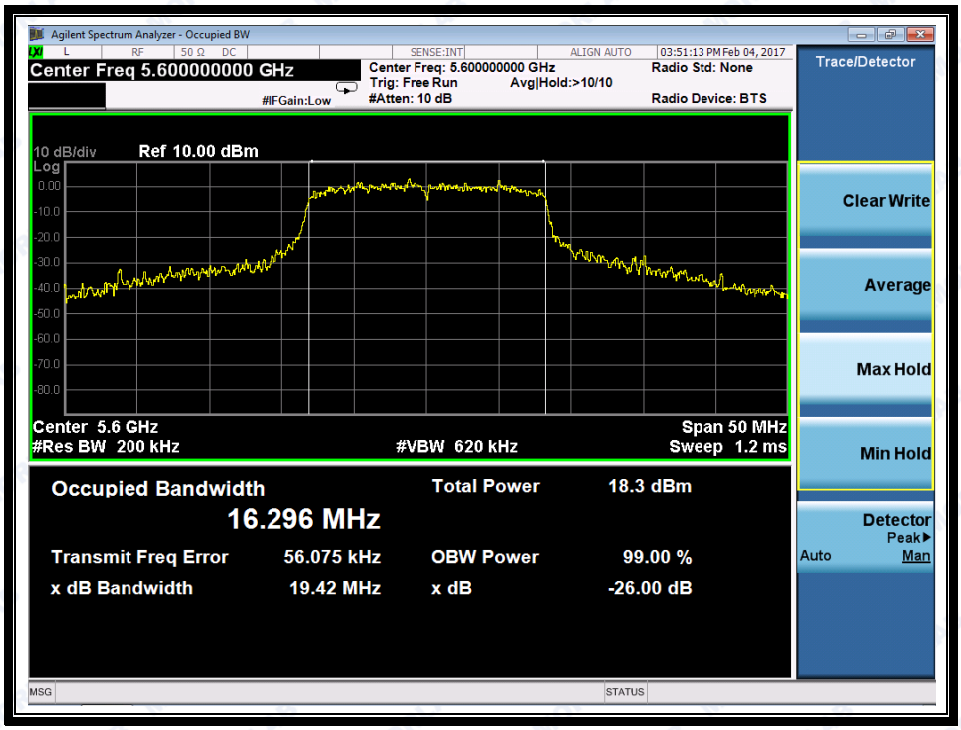
(Channel 60: 5300MHz @ 802.11a)



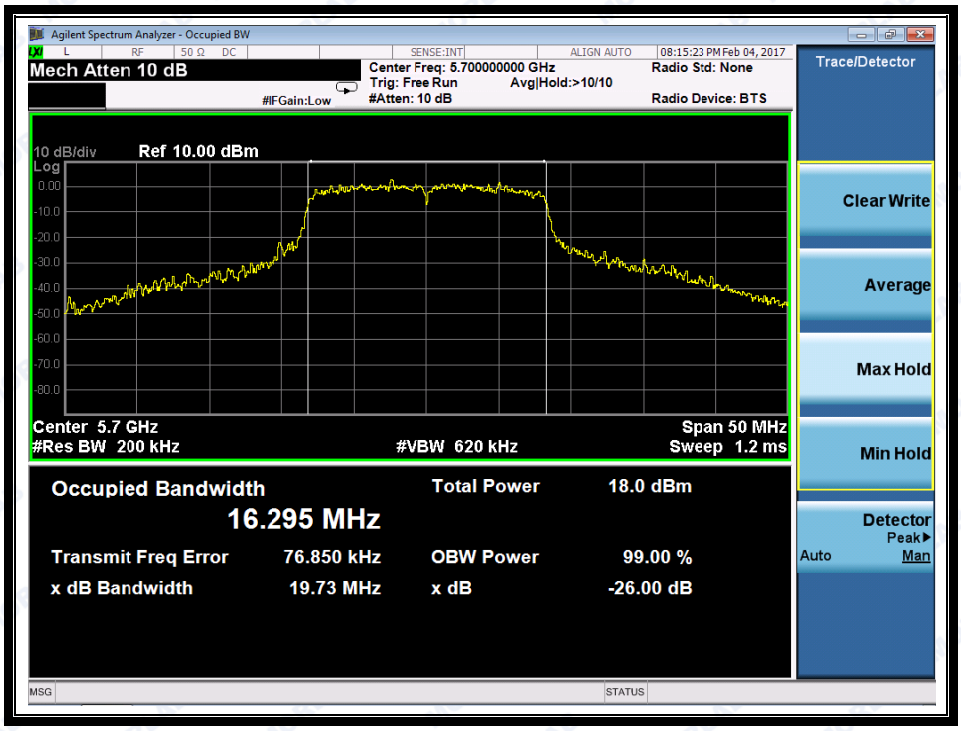
(Channel 64: 5320MHz @ 802.11a)



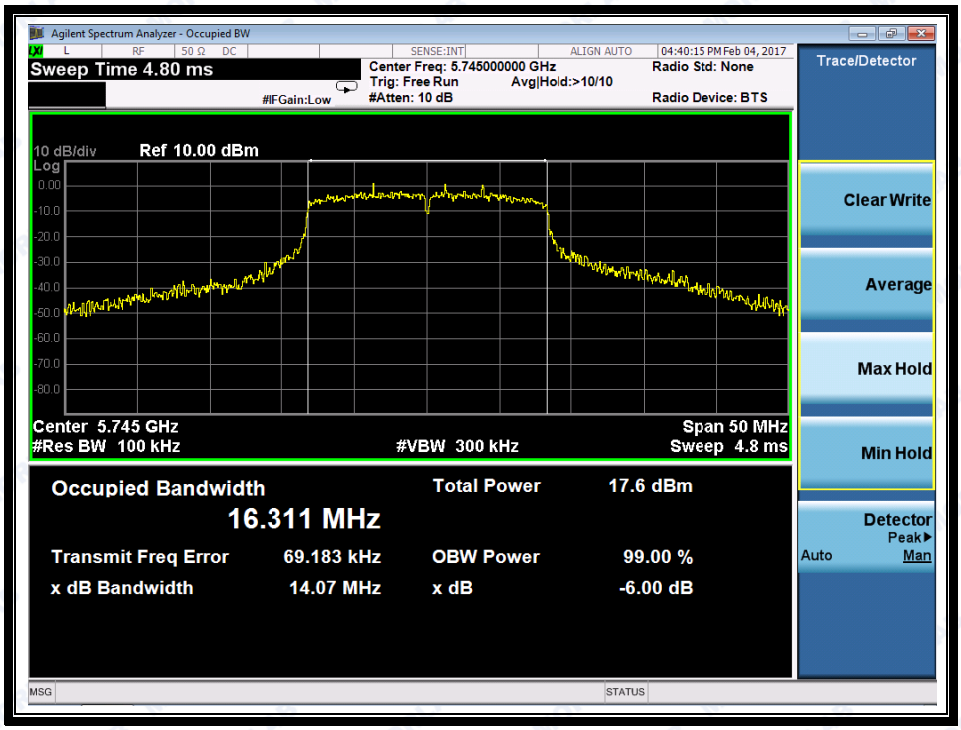
(Channel 100: 5500MHz @ 802.11a)



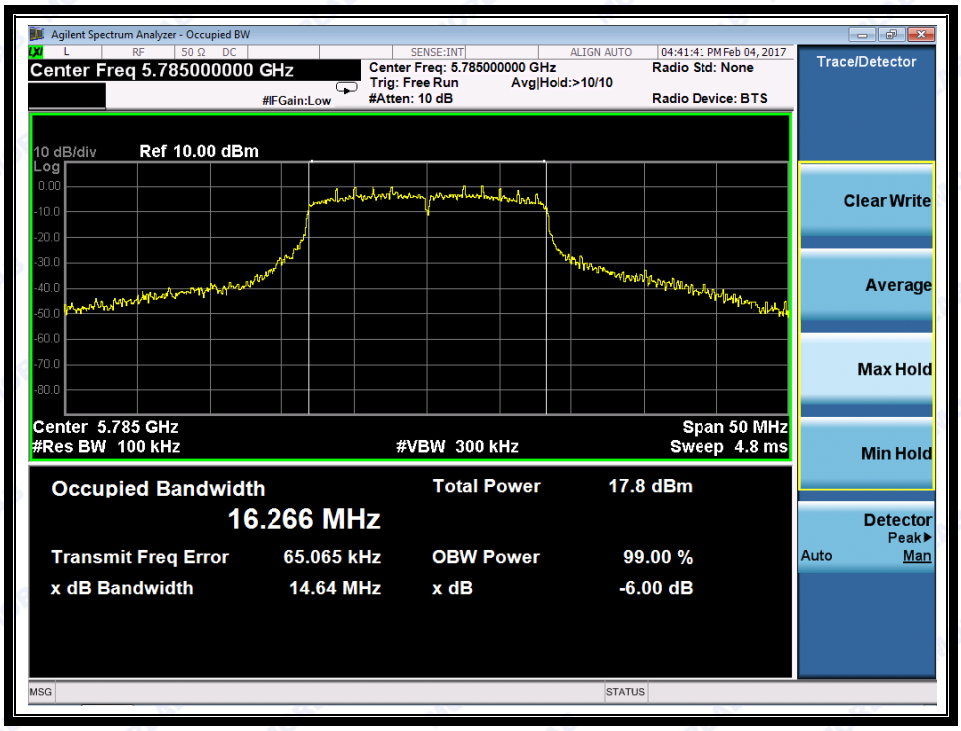
(Channel 120: 5600MHz @ 802.11a)



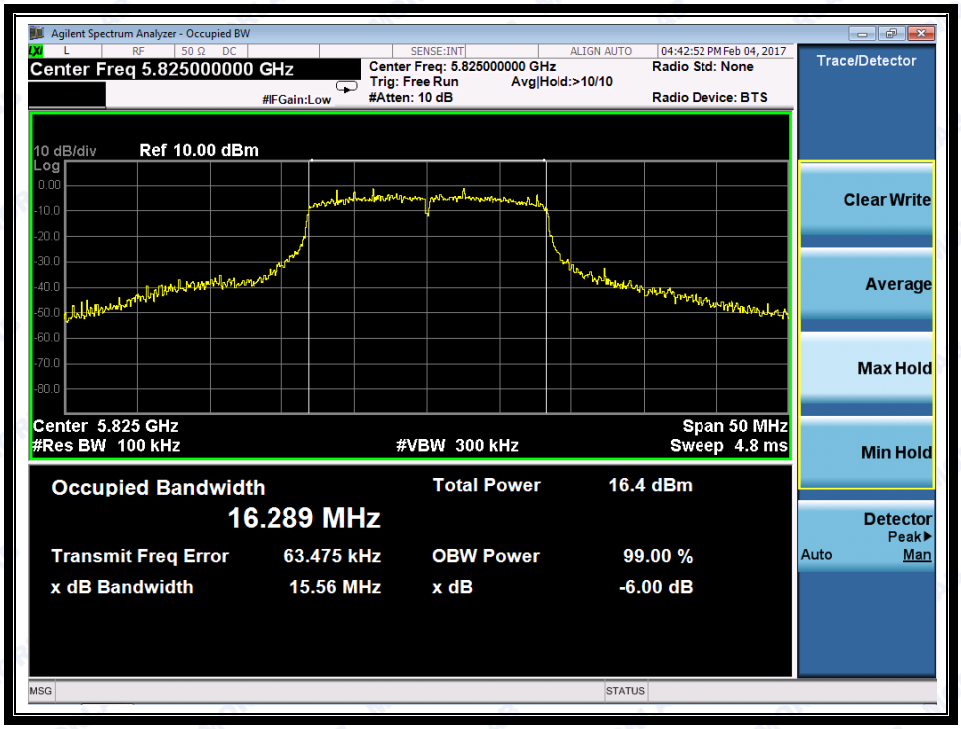
(Channel 140: 5700MHz @ 802.11a)



(Channel 149: 5745MHz @ 802.11a)



(Channel 157: 5785MHz @ 802.11a)



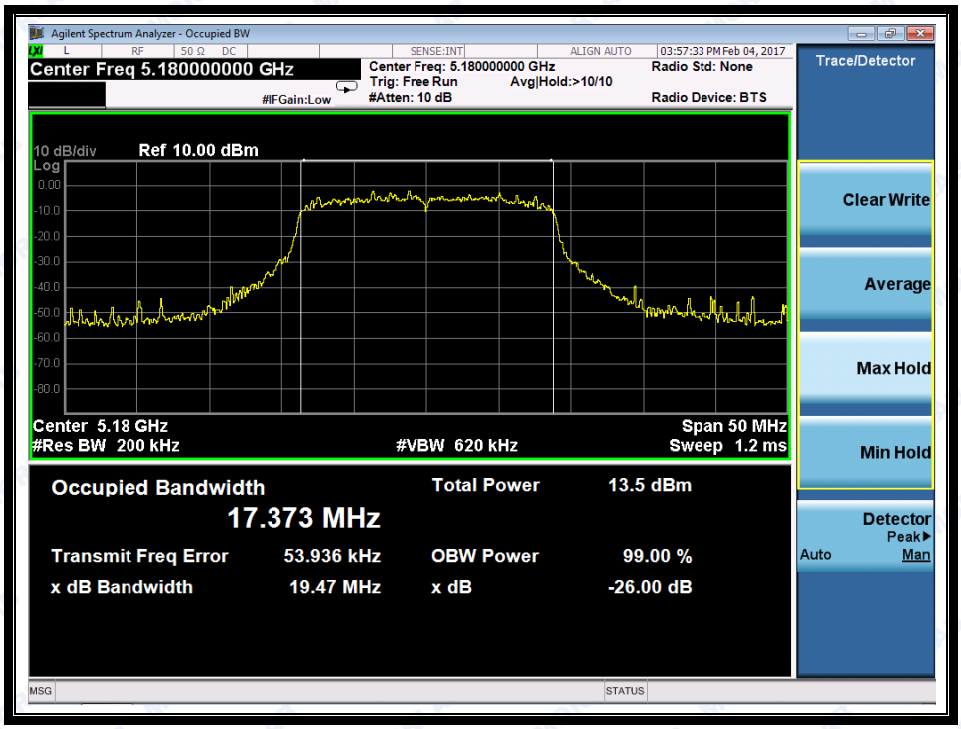
(Channel 165: 5825MHz @ 802.11a)

2.2.3.2 802.11ac-20MHz Test mode

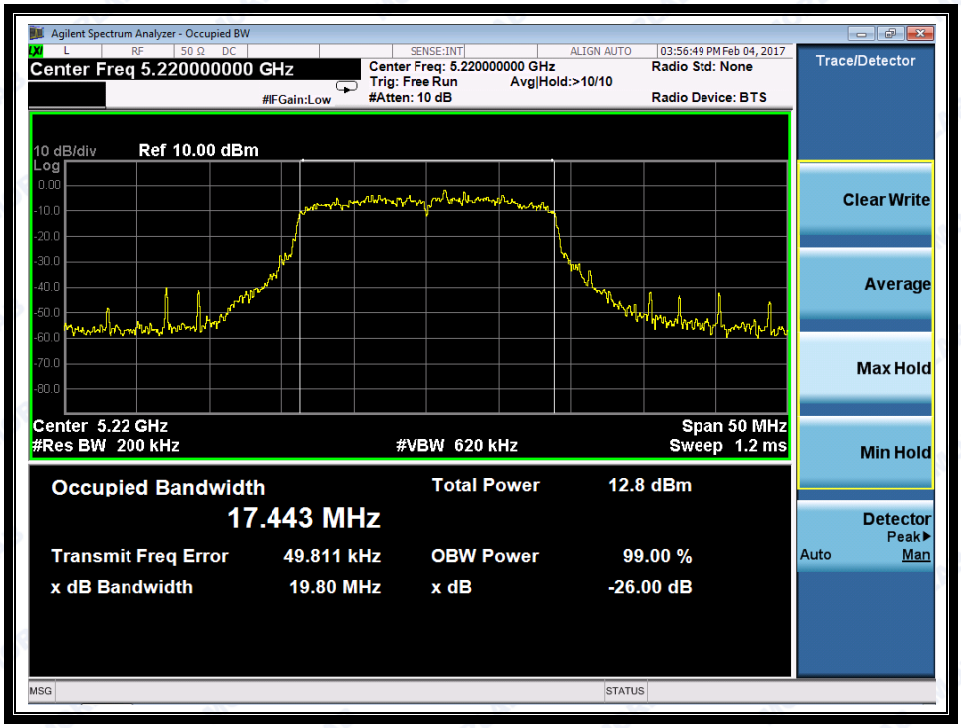
C. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.47
44	5220	19.80
48	5240	20.04
52	5260	19.48
60	5300	19.72
64	5320	20.17
100	5500	19.51
116	5600	20.10
140	5700	19.57
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	15.17
157	5785	15.20
165	5825	15.09

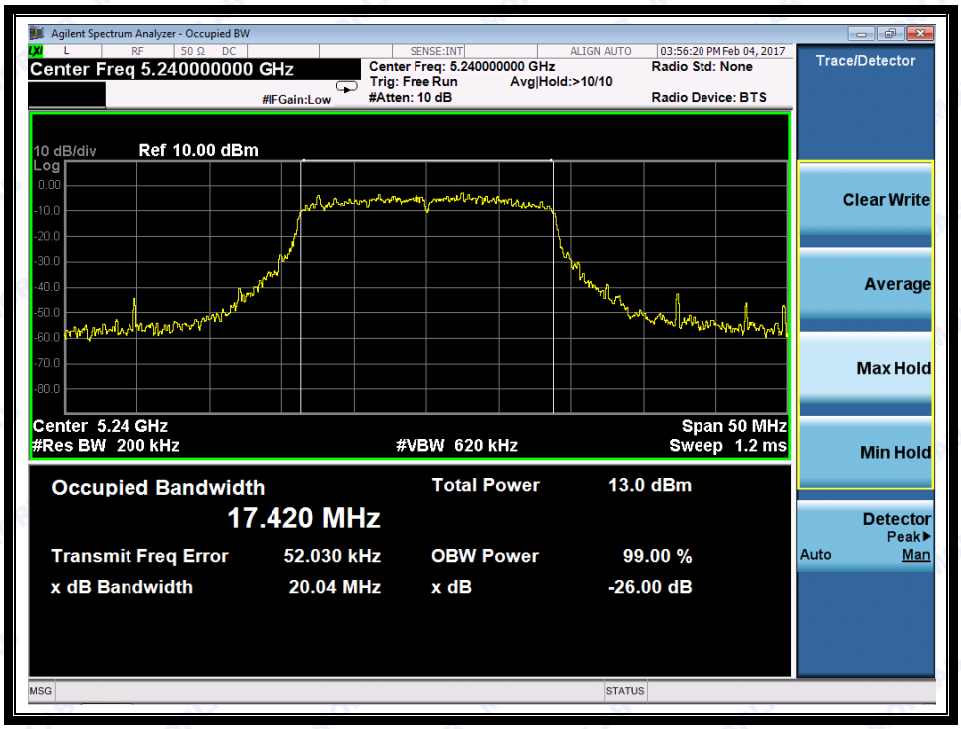
D. Test Plots



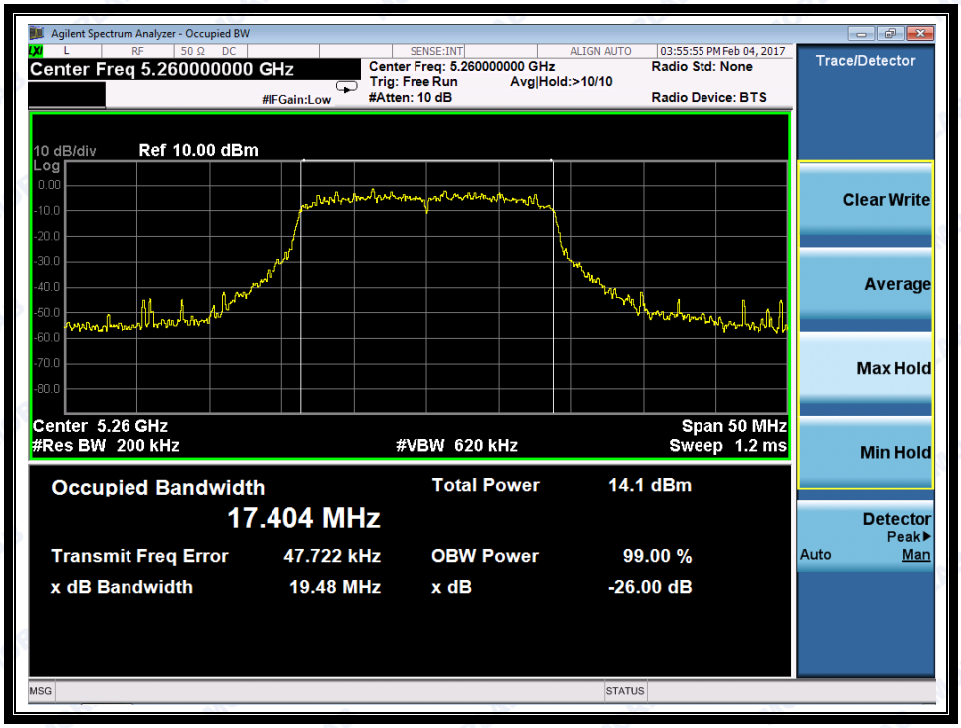
(Channel 36: 5180MHz @ 802.11ac)



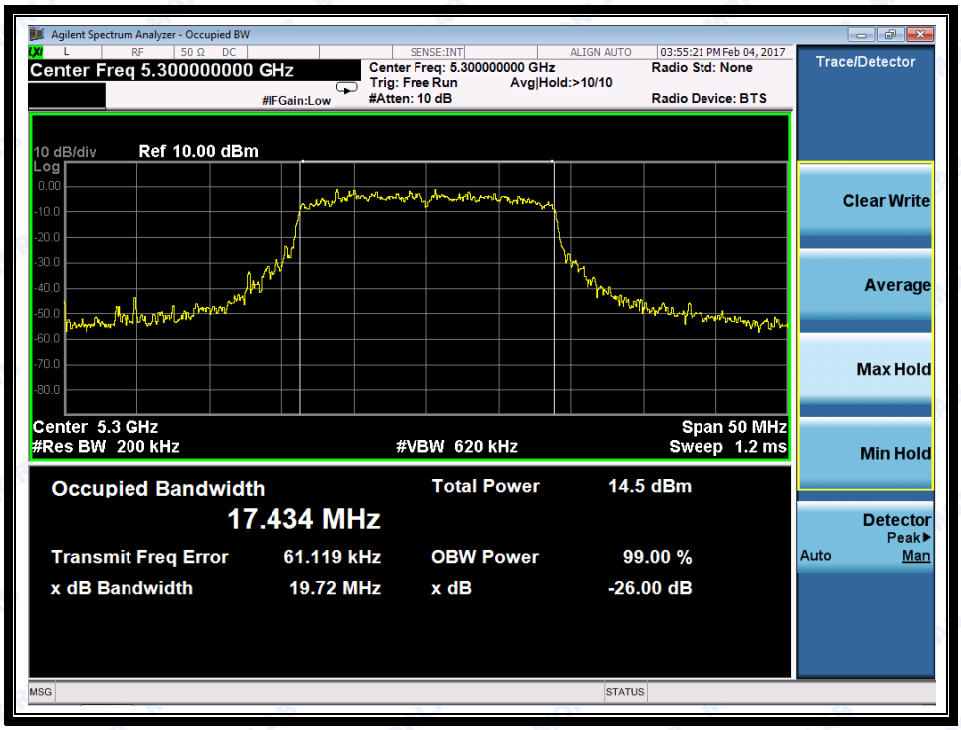
(Channel 44: 5220 MHz @ 802.11ac)



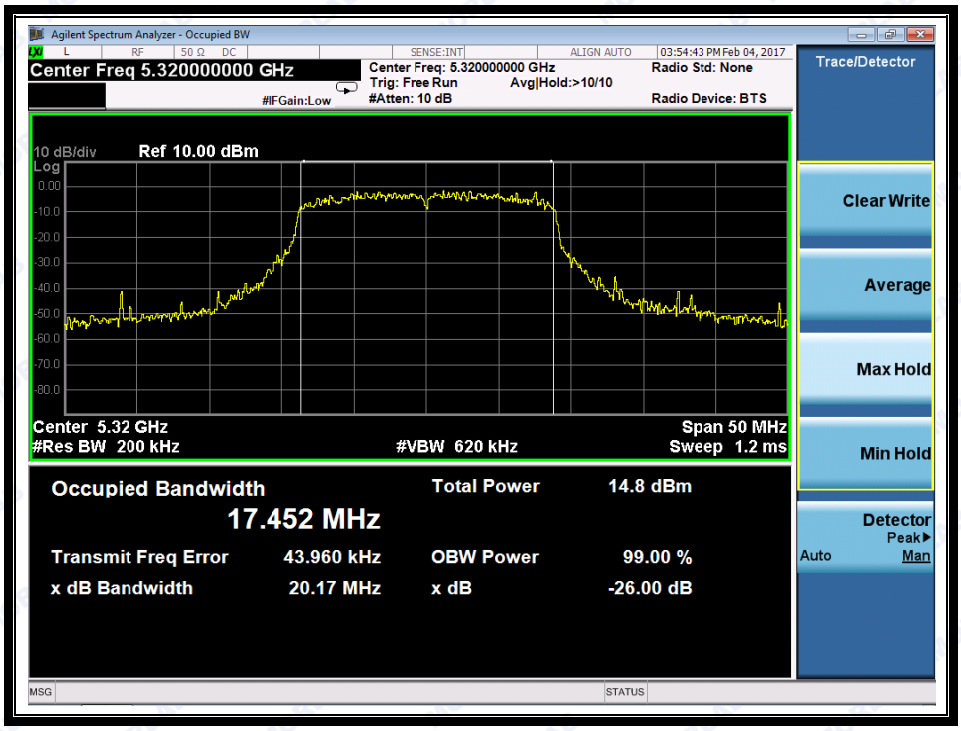
(Channel 48: 5240MHz @ 802.11ac)



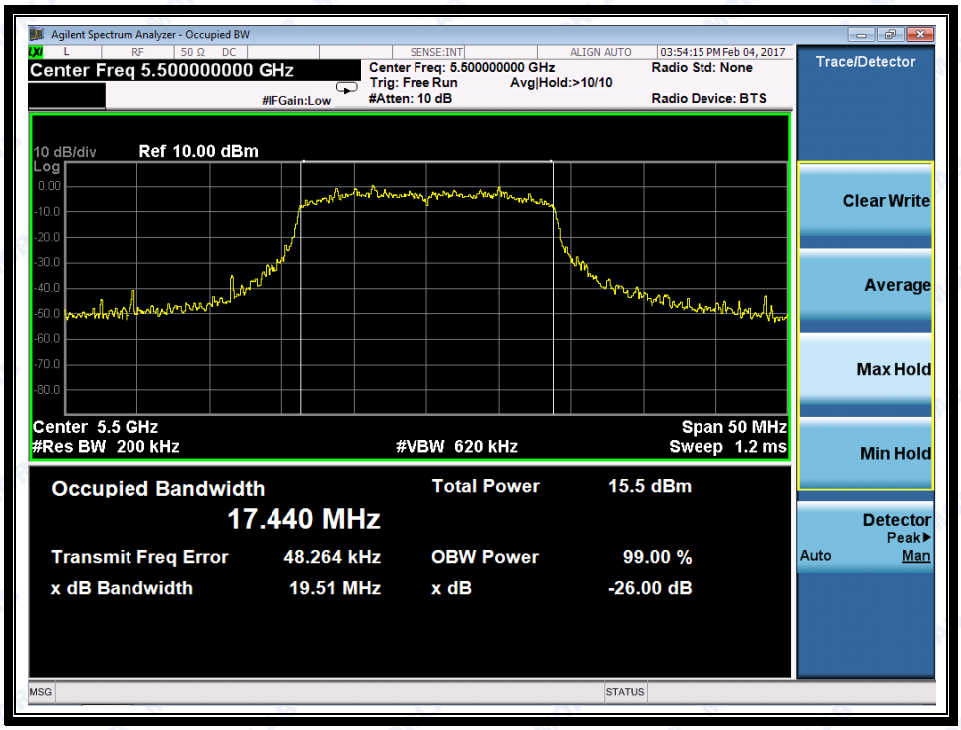
(Channel 52: 5260MHz @ 802.11ac)



(Channel 60: 5300MHz @ 802.11ac)

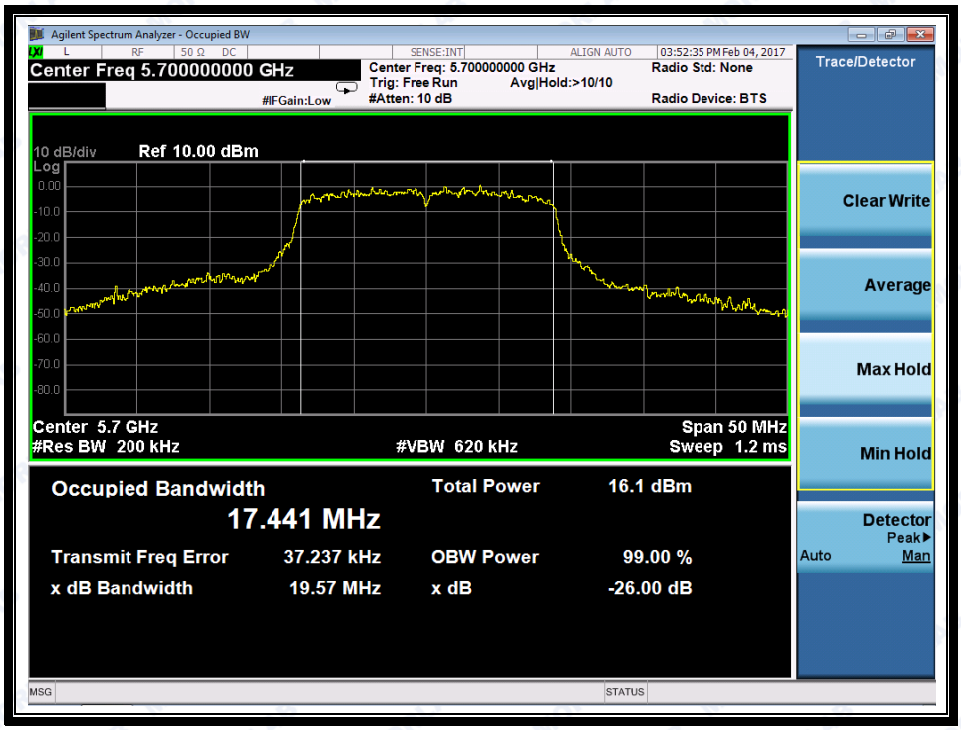


(Channel 64: 5320MHz @ 802.11ac

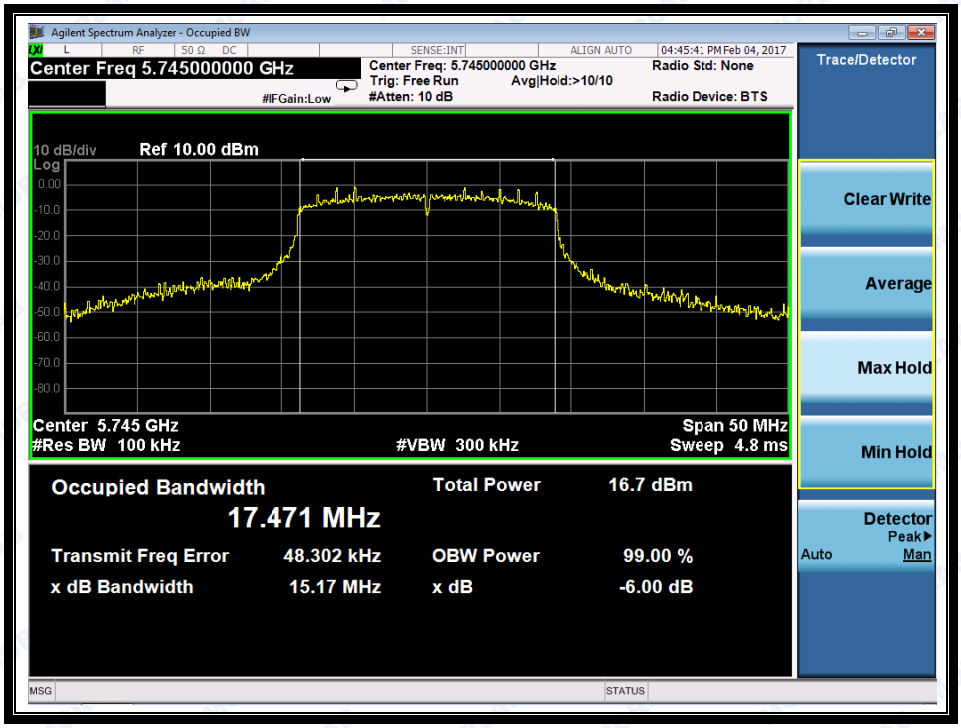


(Channel 100: 5500MHz @ 802.11ac)

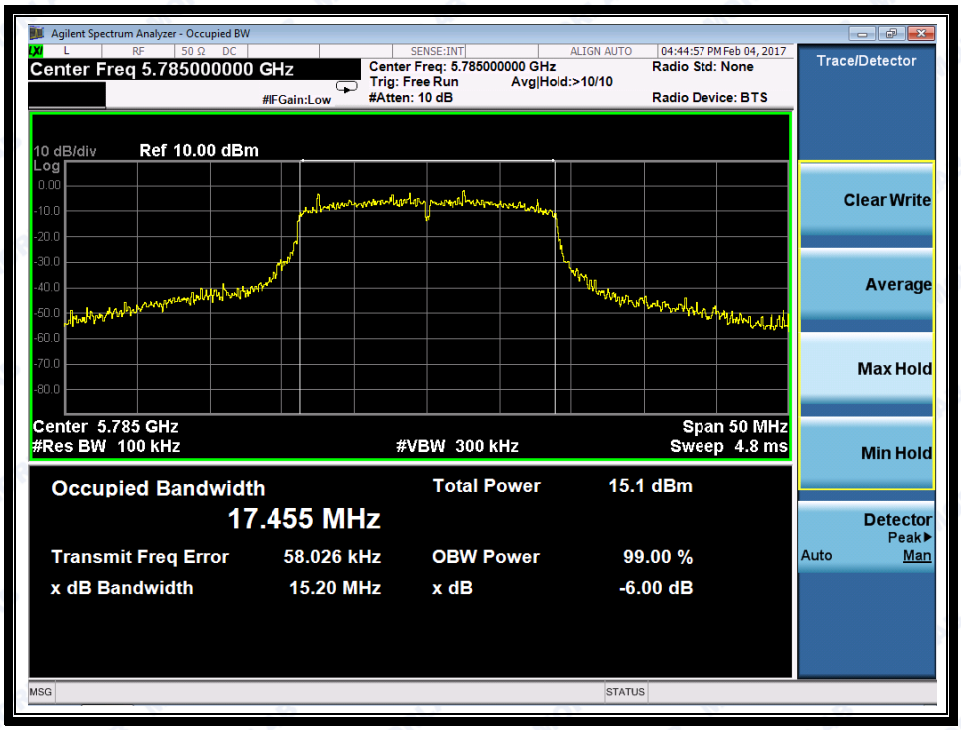
(Channel 120: 5600MHz @ 802.11ac)



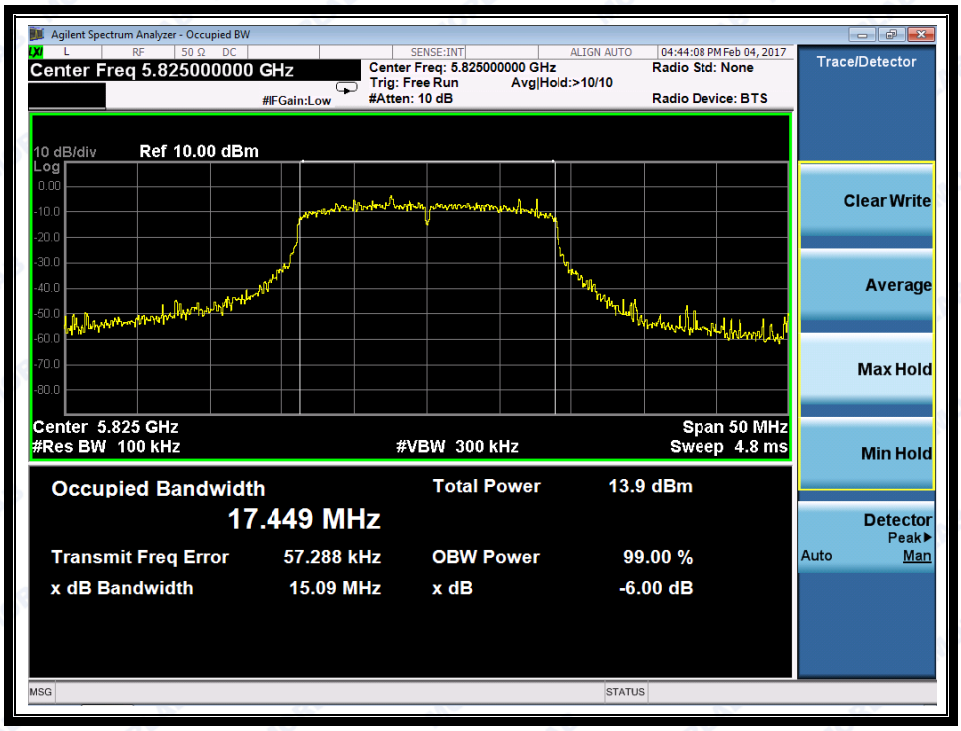
(Channel 140: 5700MHz @ 802.11ac)



(Channel 149: 5745MHz @ 802.11ac)



(Channel 157: 5785MHz @ 802.11ac)



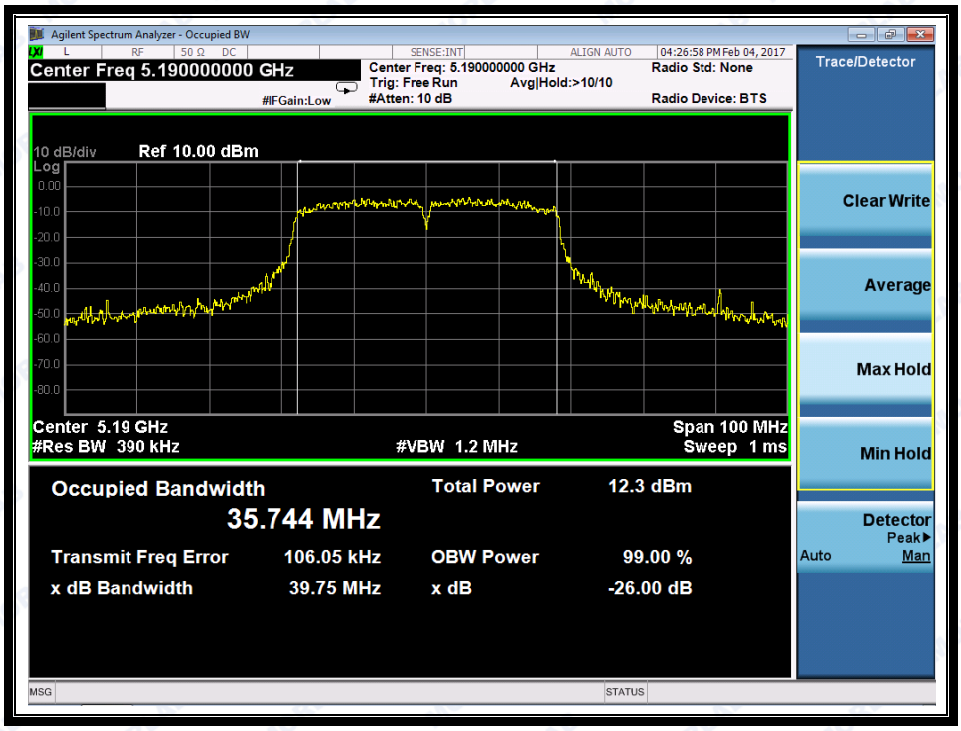
(Channel 165: 5825MHz @ 802.11ac)

2.2.3.3 802.11ac-40MHz Test mode

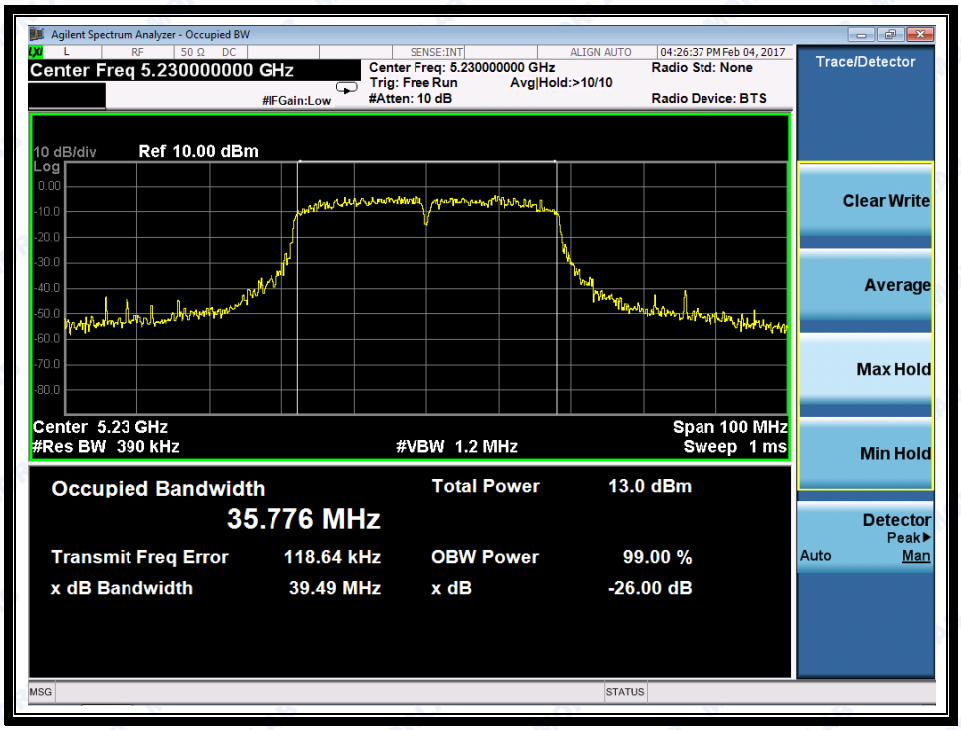
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	39.75
46	5230	39.49
54	5270	39.78
62	5310	39.63
102	5510	39.97
126	5630	40.83
142	5710	40.50
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
151	5755	35.07
159	5795	35.21

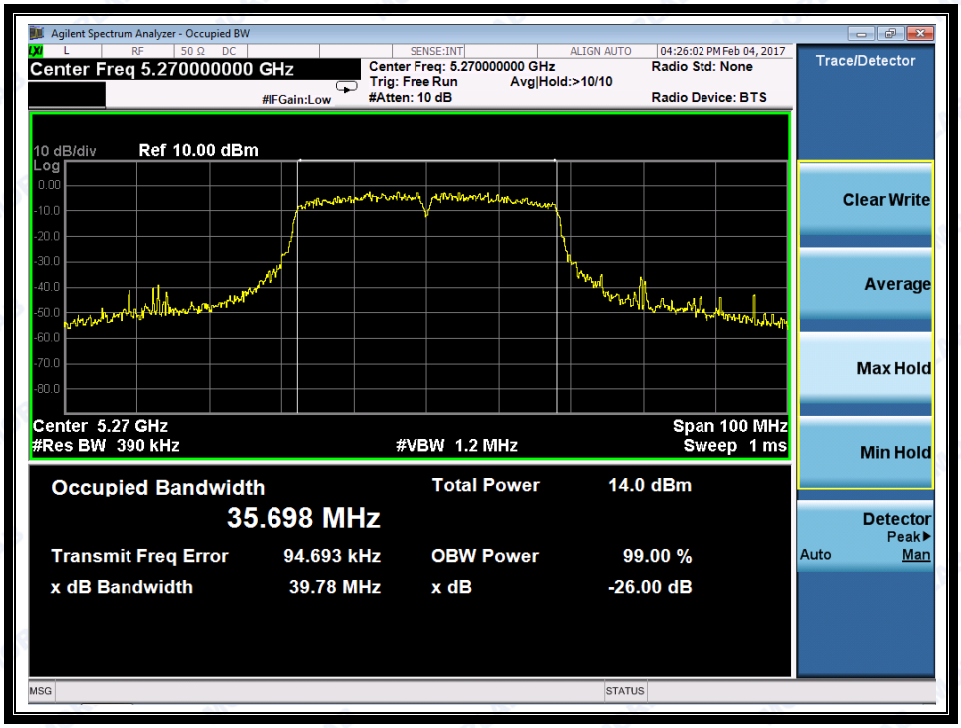
B. Test Plots



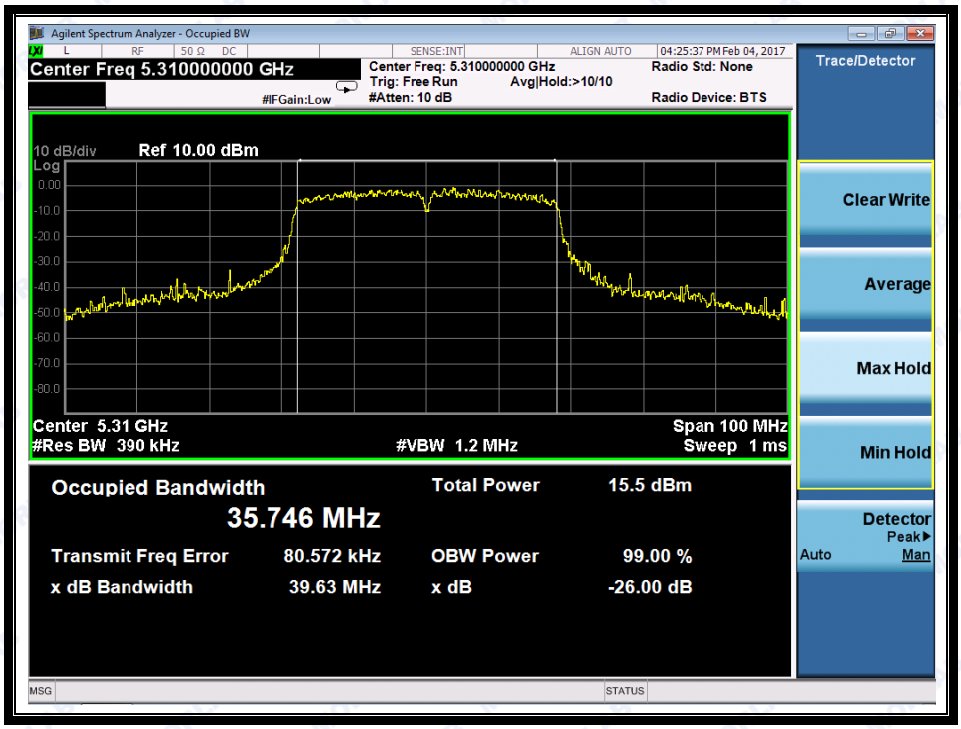
(Channel 38: 5190MHz @ 802.11ac)



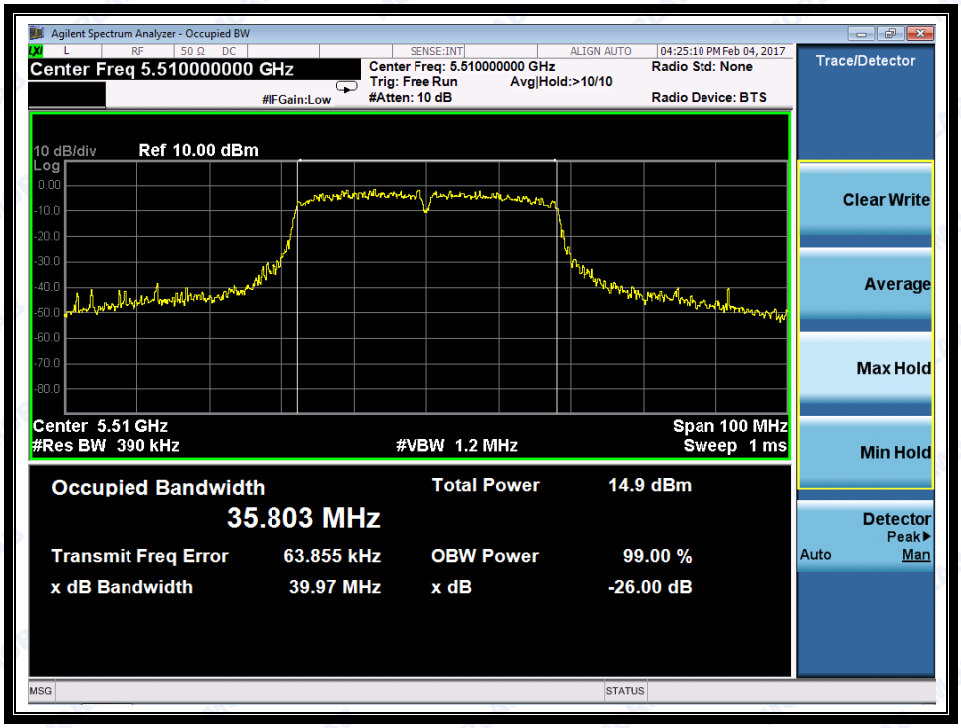
(Channel 46: 5230 MHz @ 802.11ac)



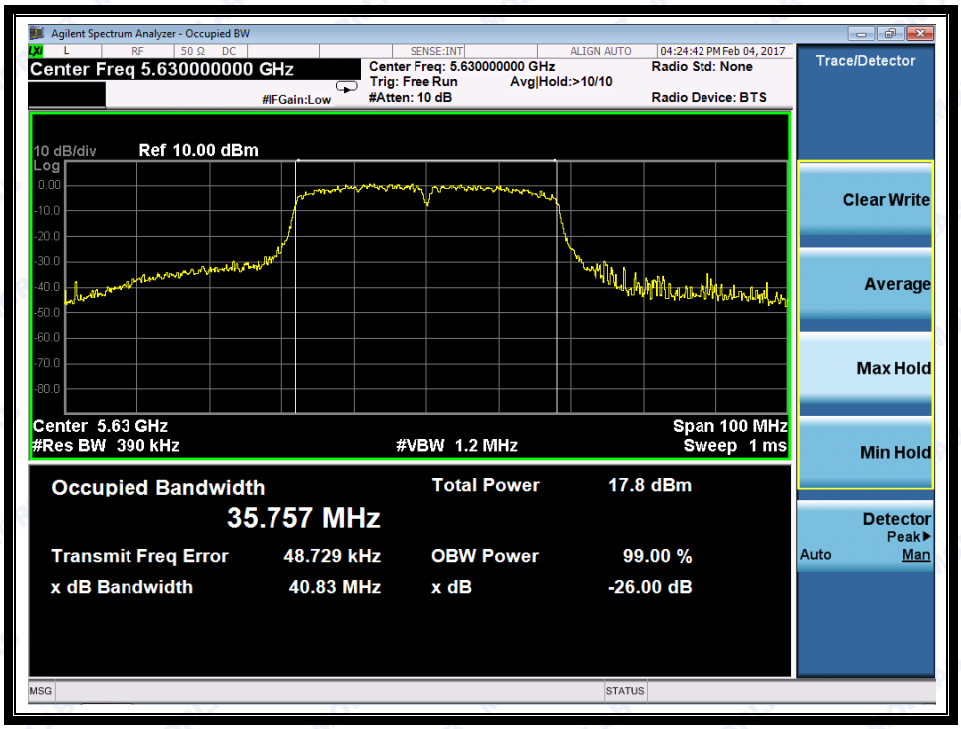
(Channel 54: 5270MHz @ 802.11ac)



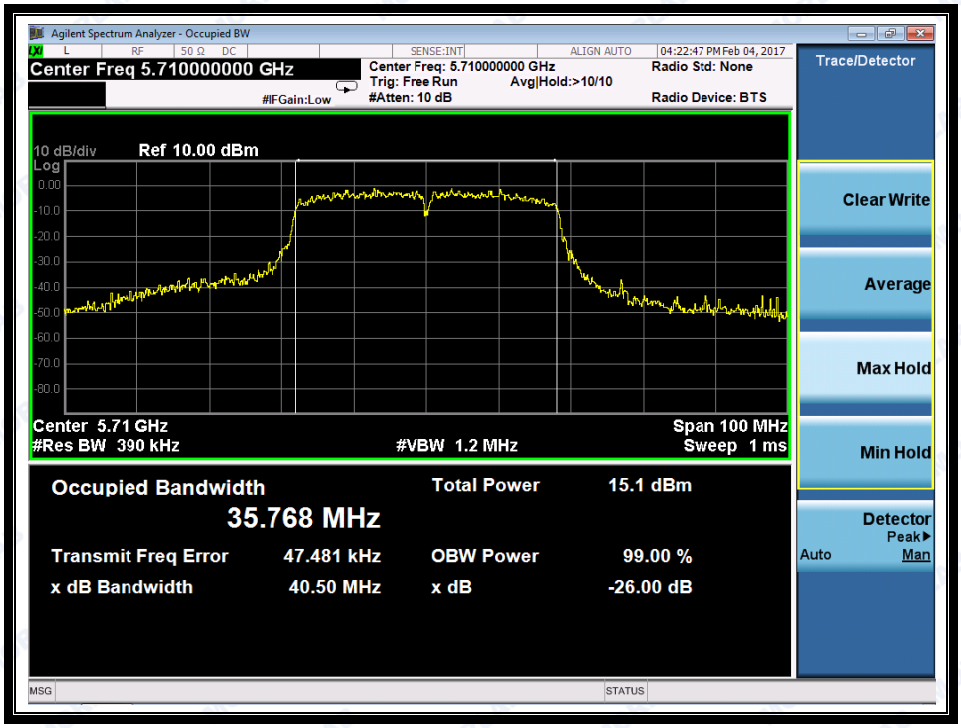
(Channel 62: 5310MHz @ 802.11ac)



(Channel 102: 5510MHz @ 802.11ac)

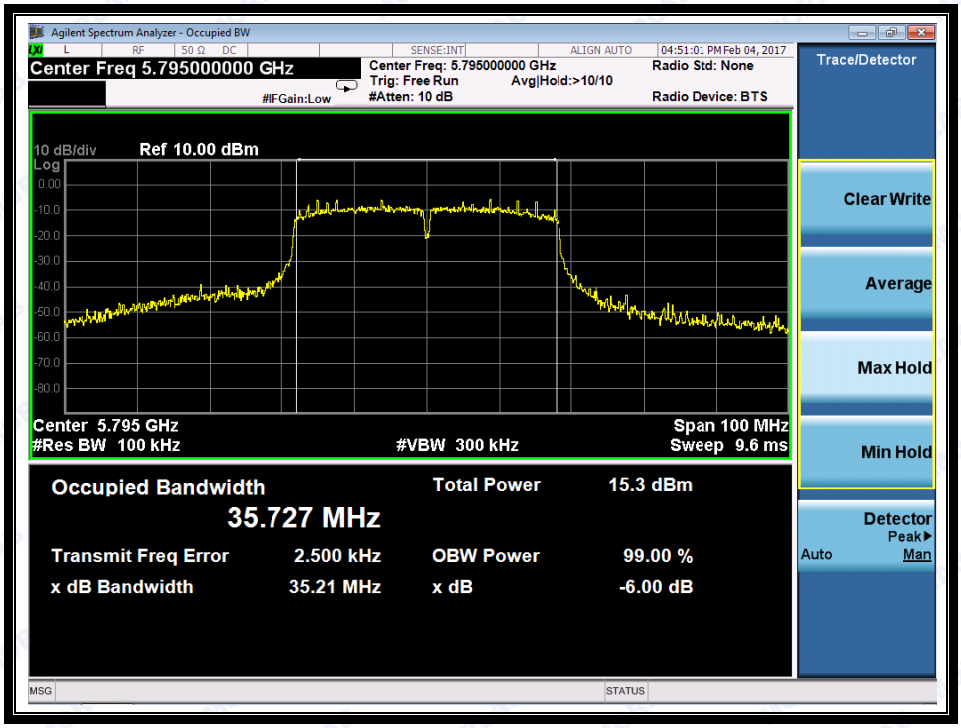


(Channel 126: 5630MHz @ 802.11ac)



(Channel 142: 5710MHz @ 802.11ac)

(Channel 151: 5755MHz @ 802.11ac)



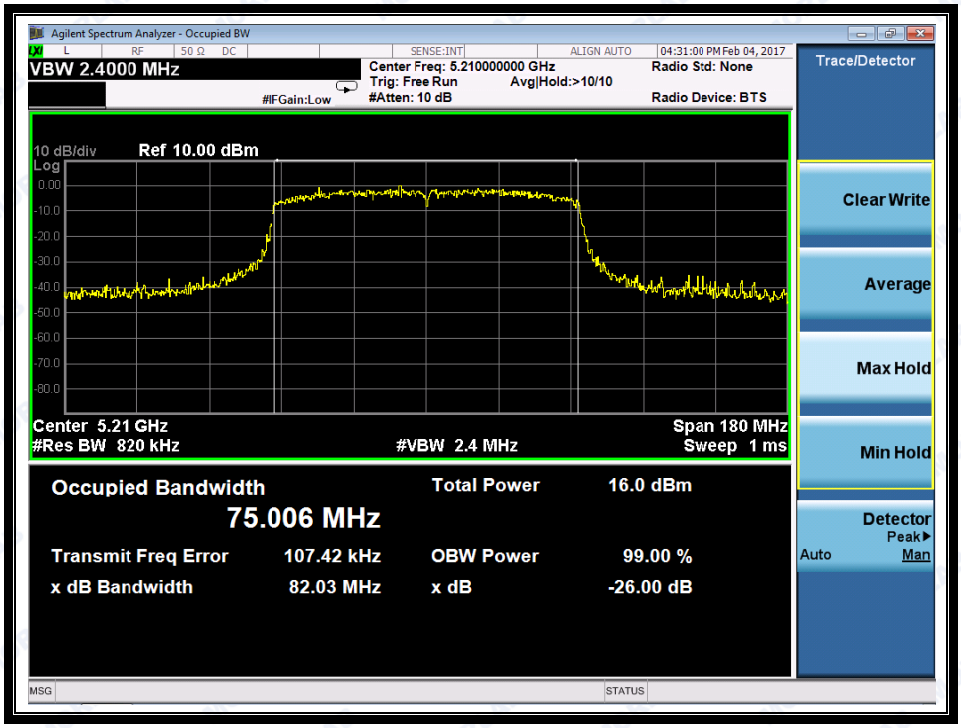
(Channel 159: 5795MHz @ 802.11ac)

2.2.3.4 802.11ac-80MHz Test mode

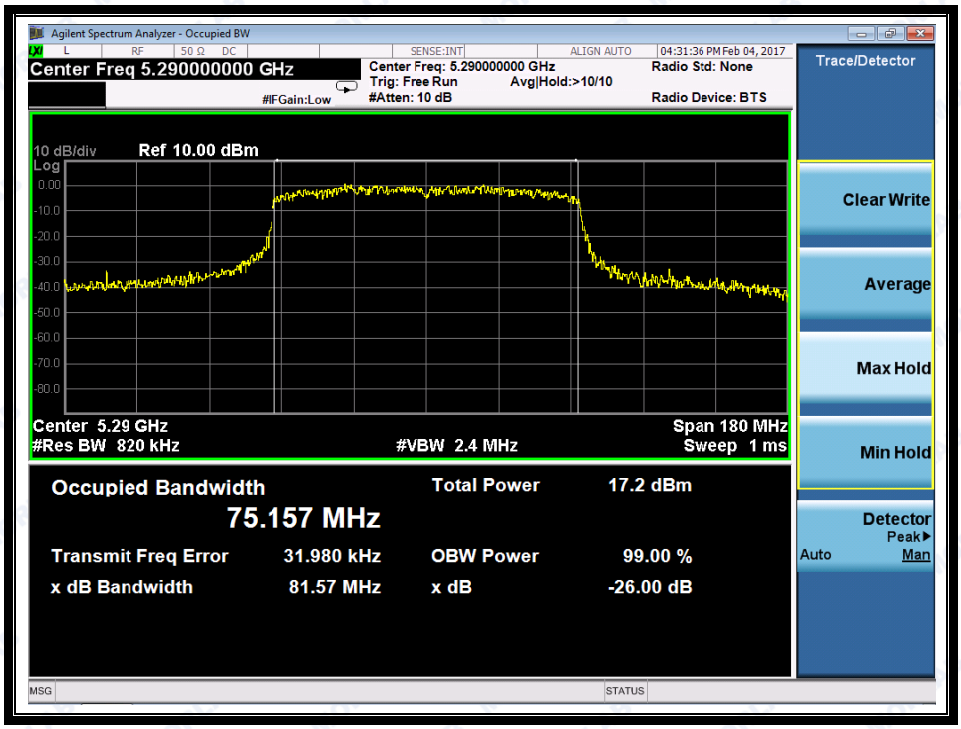
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	82.03
58	5290	81.57
106	5530	81.57
122	5610	82.25
138	5690	122.1
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
155	5775	75.15

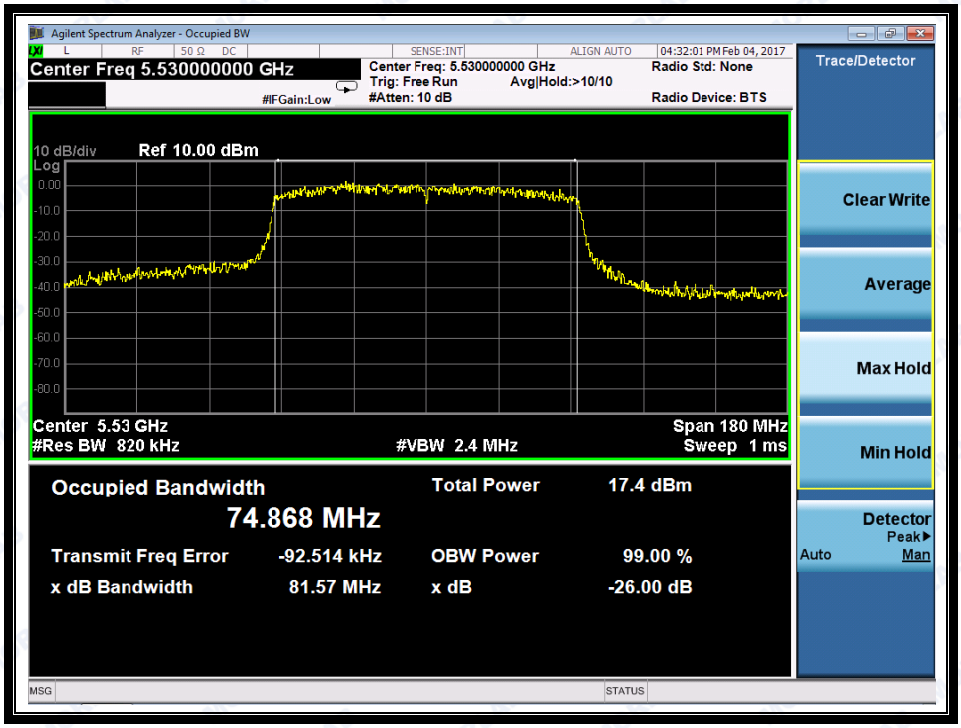
B. Test Plots



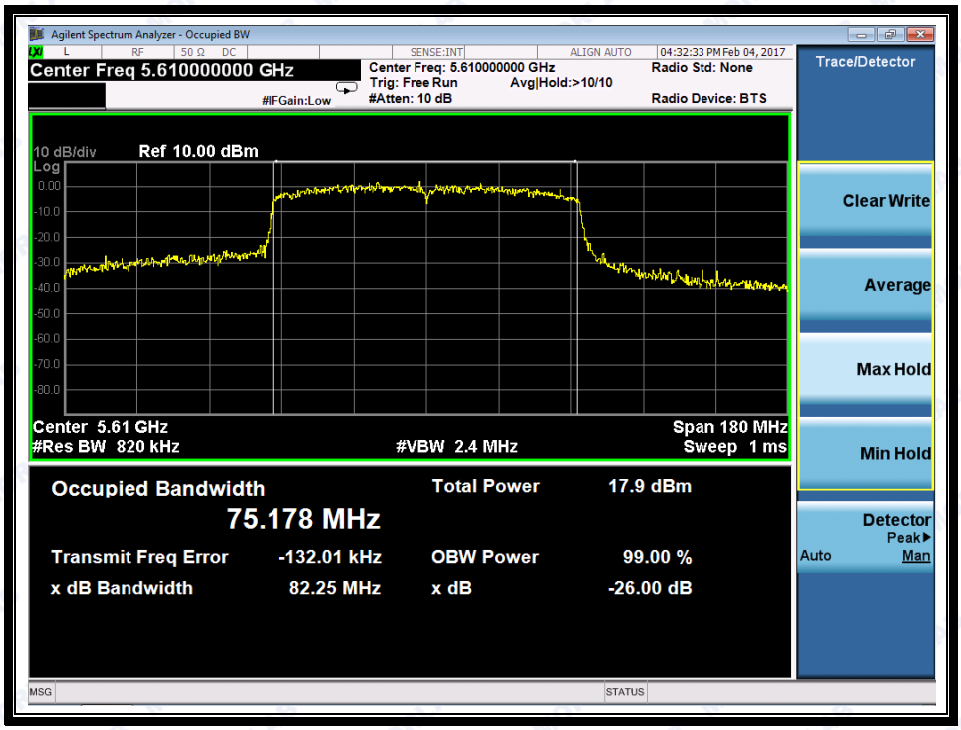
(Channel 42: 5210MHz @ 802.11ac)



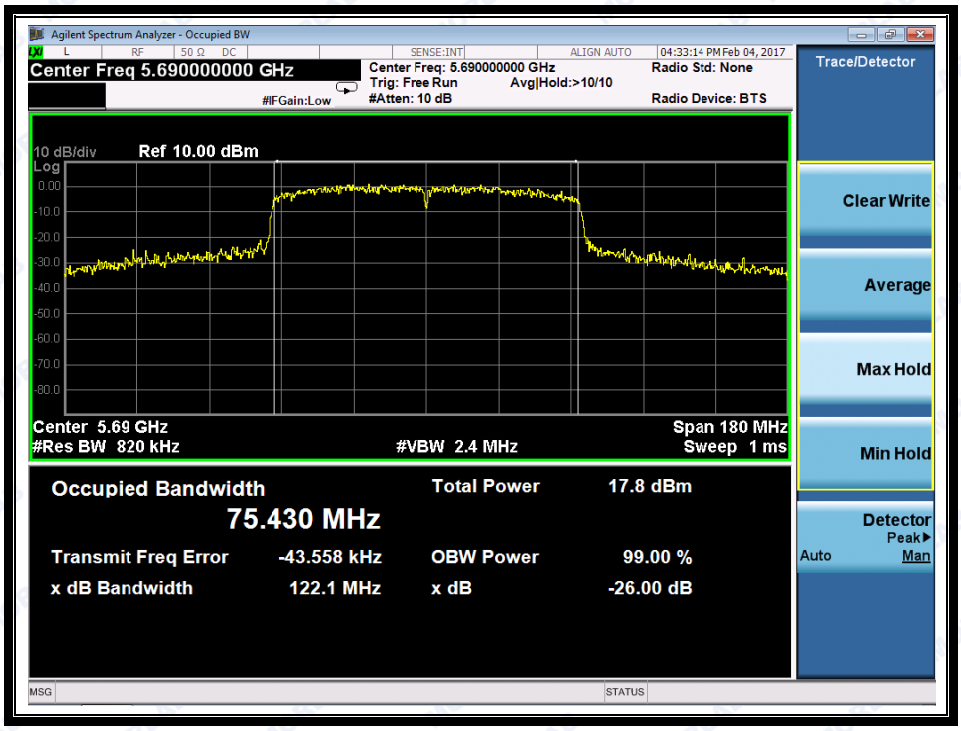
(Channel 58: 5290MHz @ 802.11ac)



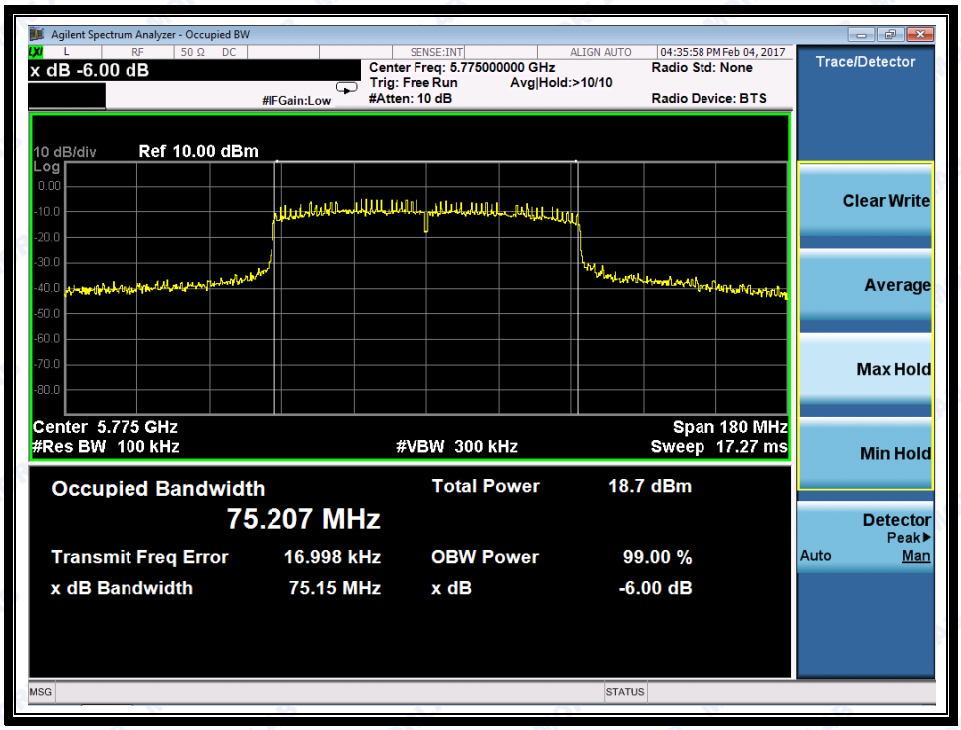
(Channel 106: 5530MHz @ 802.11ac)



(Channel 122: 5610MHz @ 802.11ac)



(Channel 138: 5690MHz @ 802.11ac)



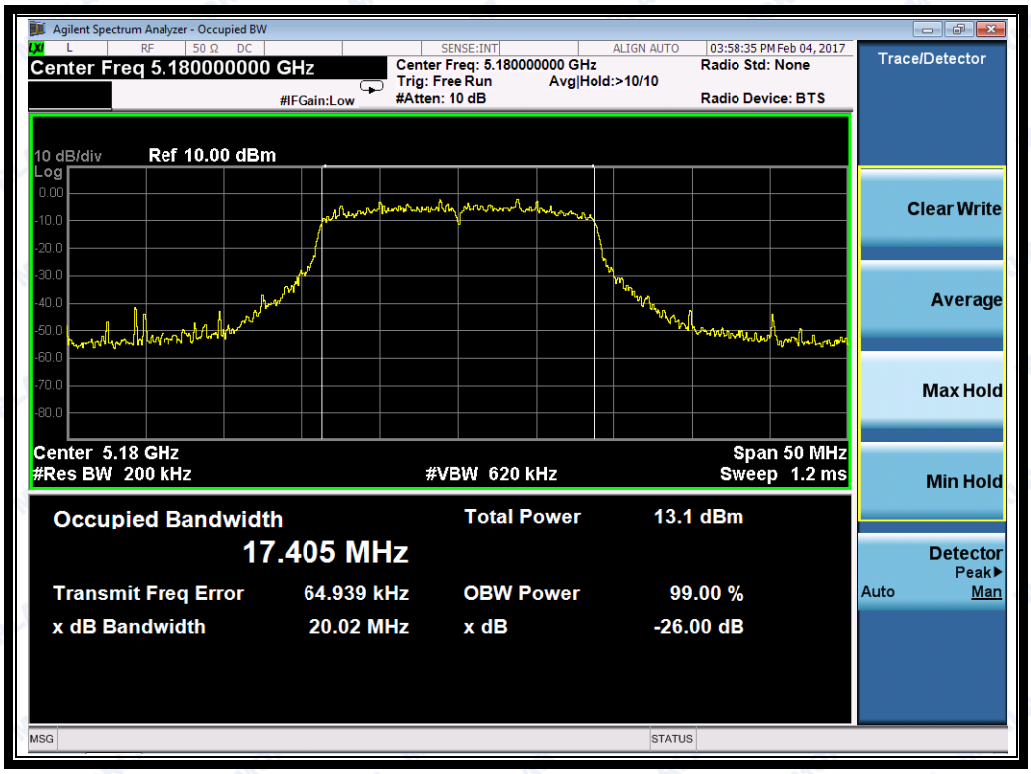
(Channel 155: 5775MHz @ 802.11ac)

2.2.3.5 802.11n-20MHz Test mode

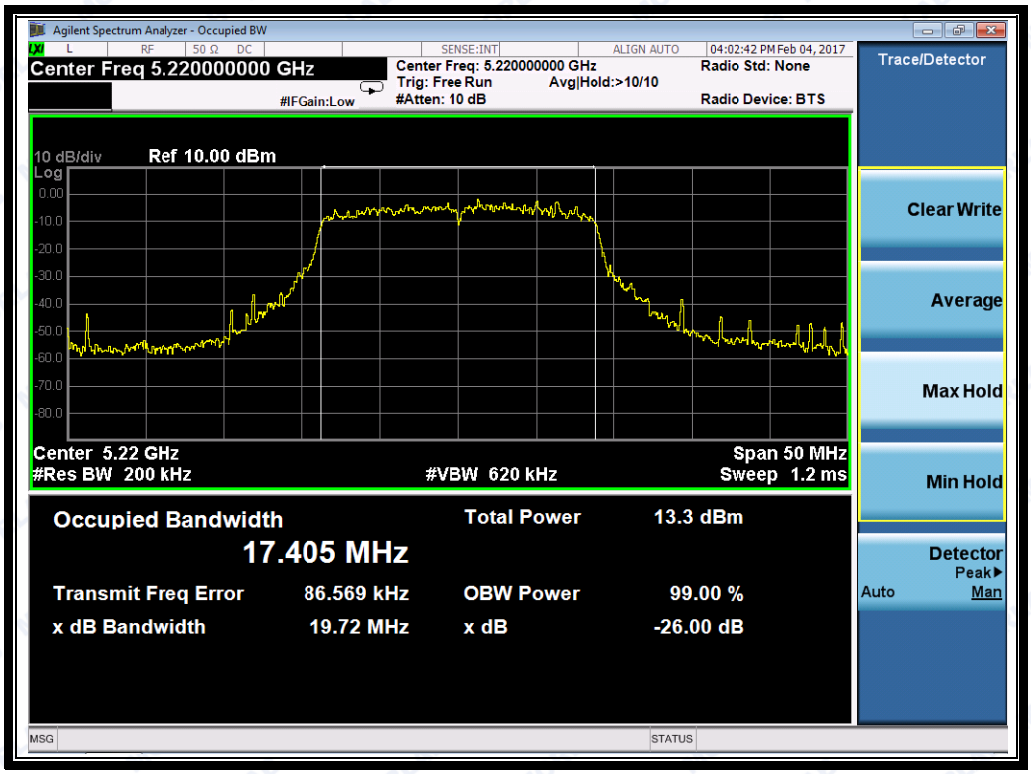
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.02
44	5220	19.72
48	5240	19.66
52	5260	19.48
60	5300	19.48
64	5320	19.56
100	5500	19.84
120	5600	19.10
140	5700	19.22
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
149	5745	14.76
157	5785	17.28
165	5825	15.37

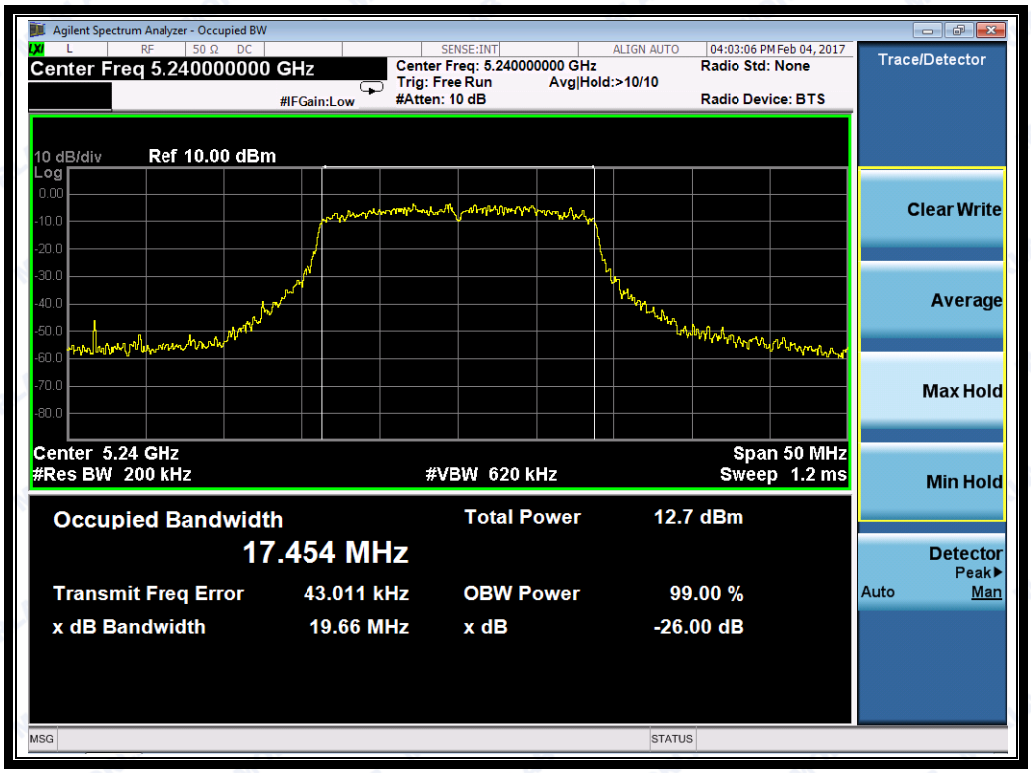
B. Test Plots



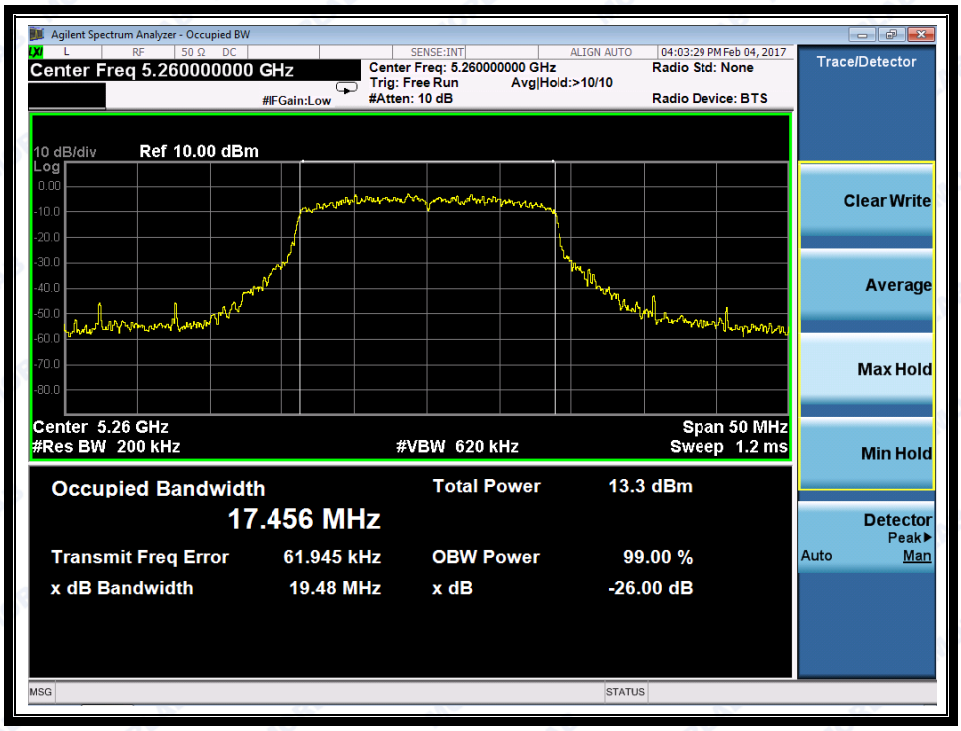
(Channel 36: 5180MHz @ 802.11n-20MHz)



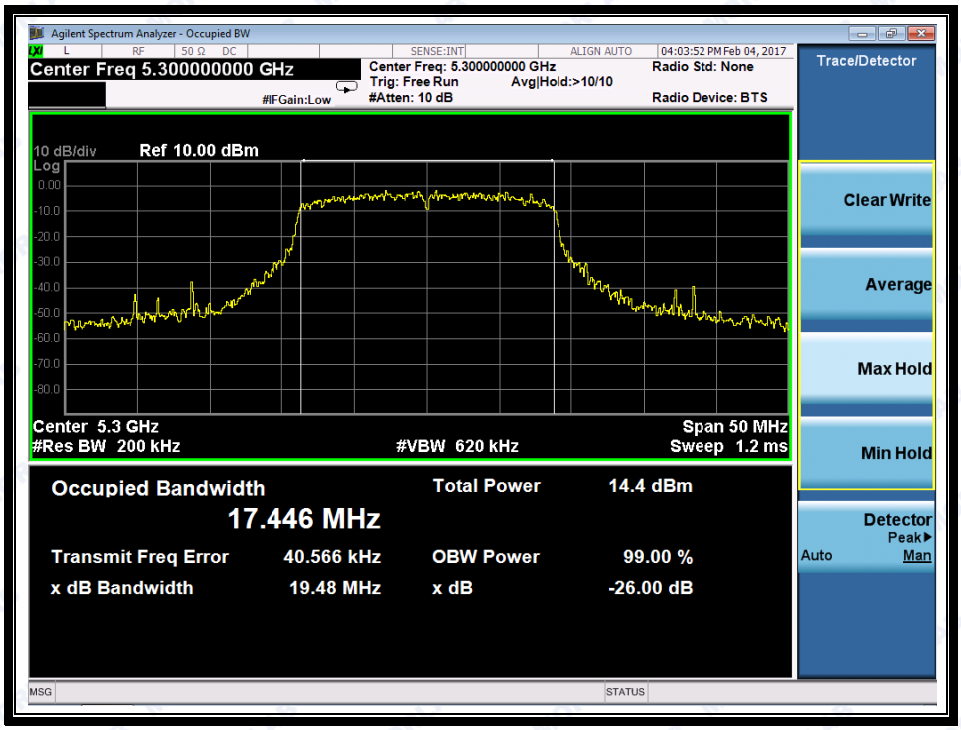
(Channel 44: 5220 MHz @ 802.11n-20MHz)



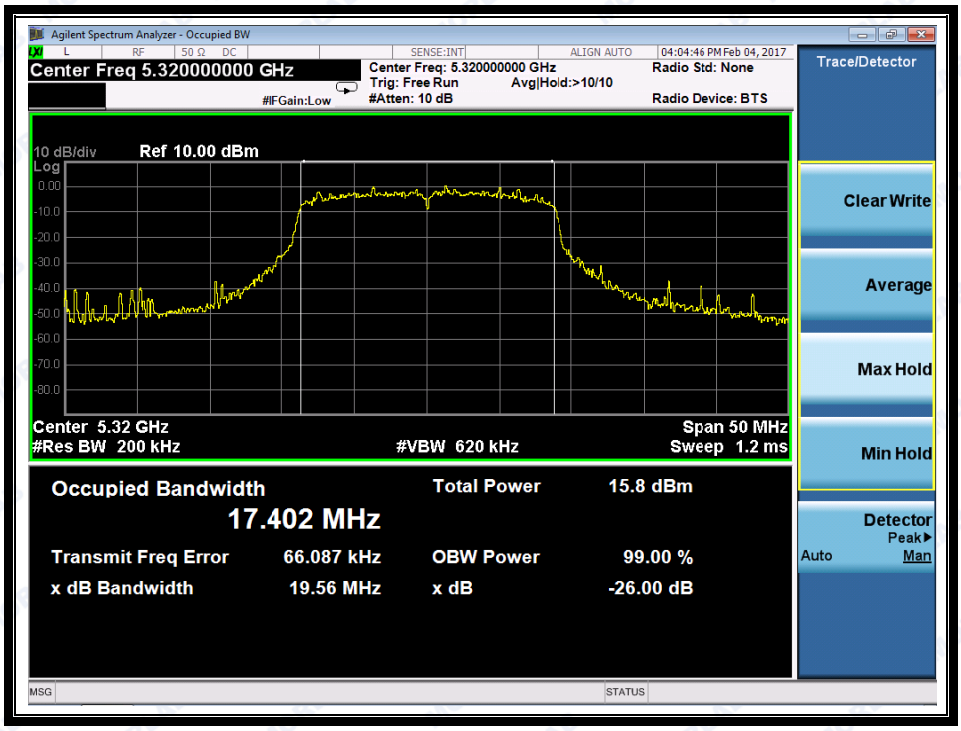
(Channel 48: 5240MHz @ 802.11n-20MHz)



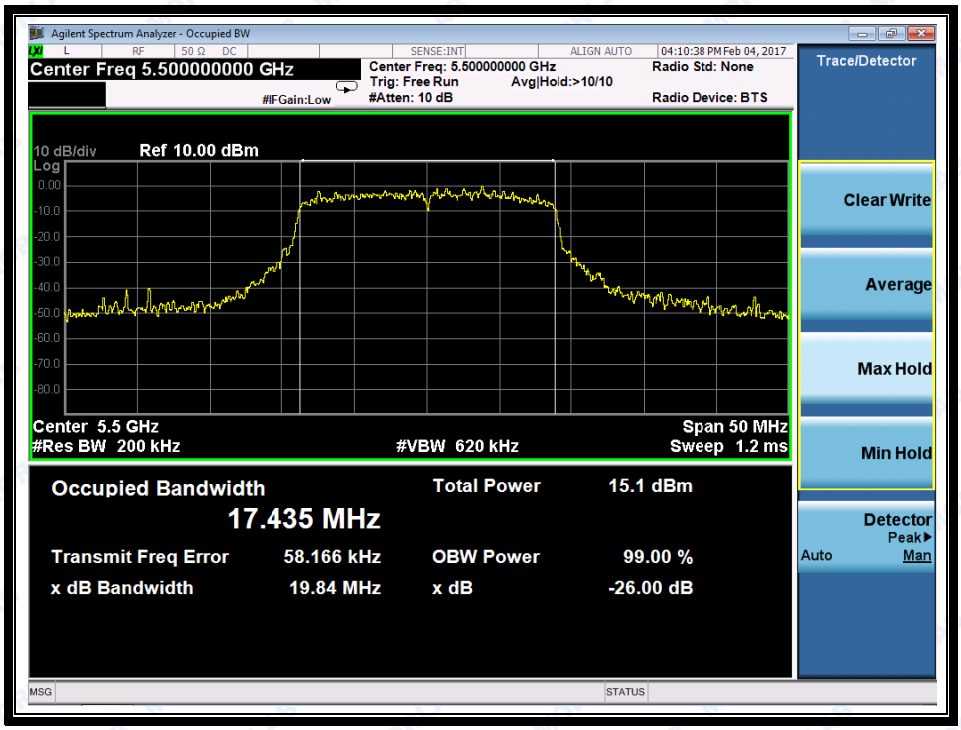
(Channel 52: 5260MHz @ 802.11n-20MHz)



(Channel 60: 5300MHz @ 802.11n-20MHz)



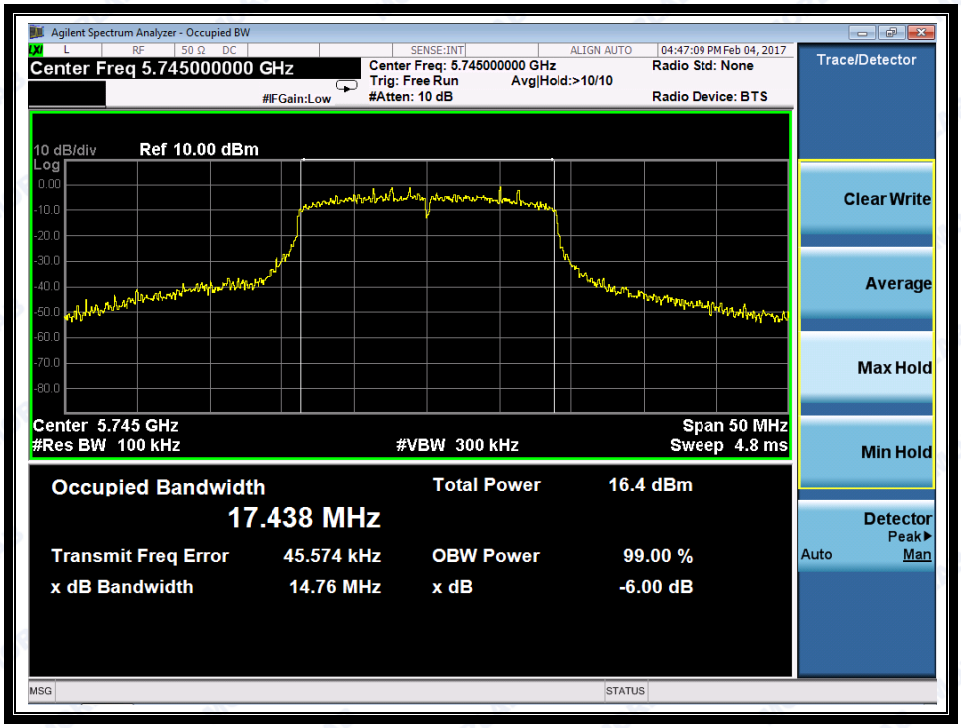
(Channel 64: 5320MHz @ 802.11n-20MHz)



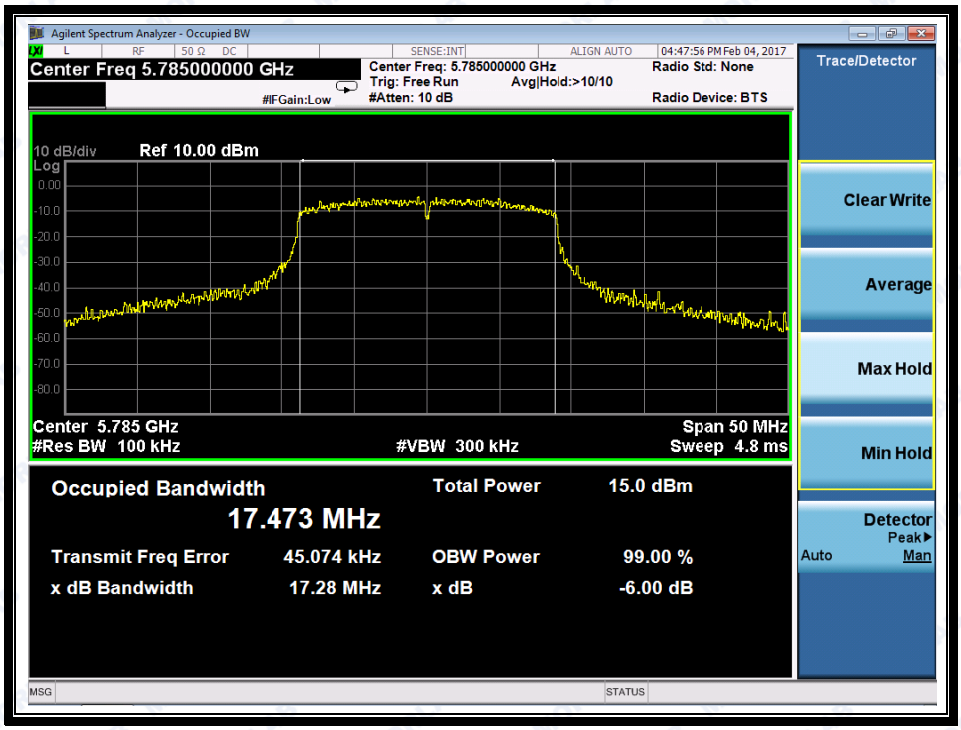
(Channel 100: 5500MHz @ 802.11n-20MHz)

(Channel 120: 5600MHz @ 802.11n-20MHz)

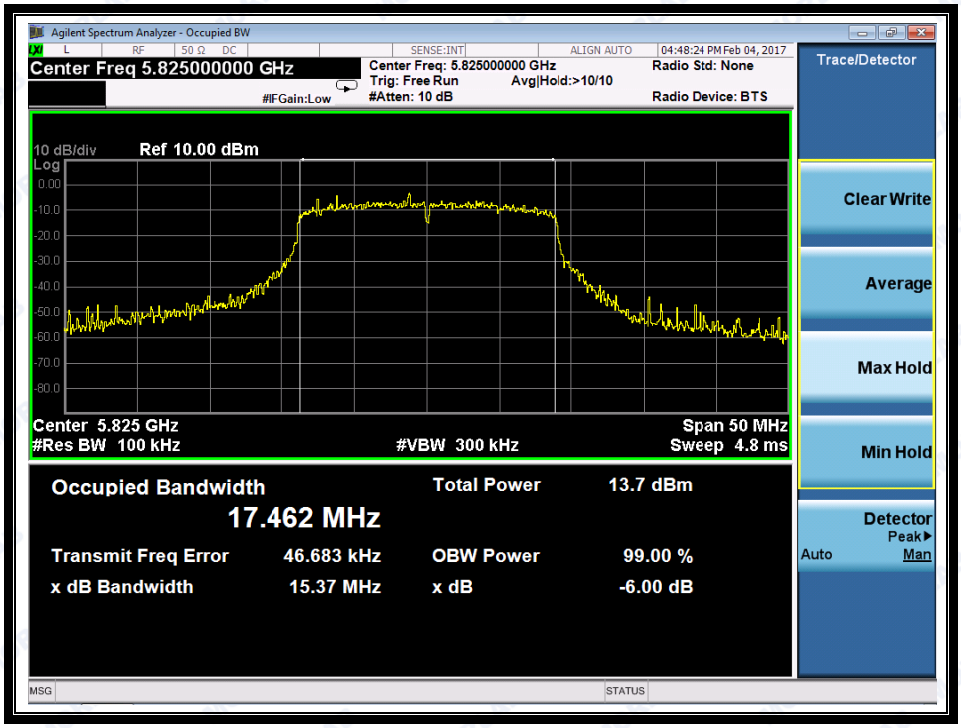
(Channel 140: 5700MHz @ 802.11n-20MHz)



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



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



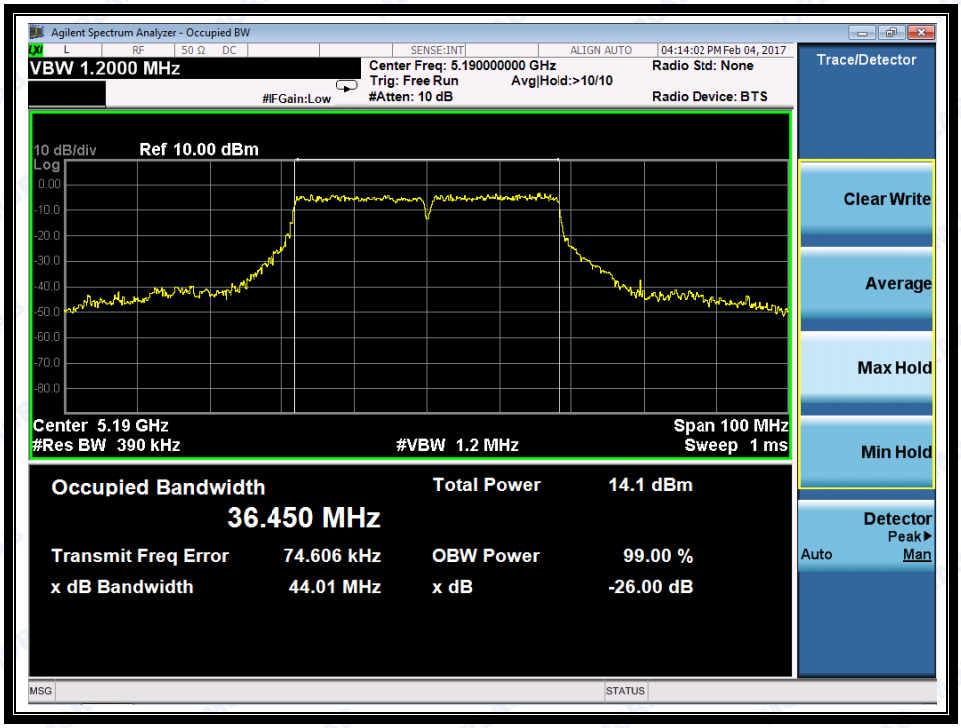
(Channel 165: 5825MHz @ 802.11n-20MHz)

2.2.3.6 802.11n-40MHz Test mode

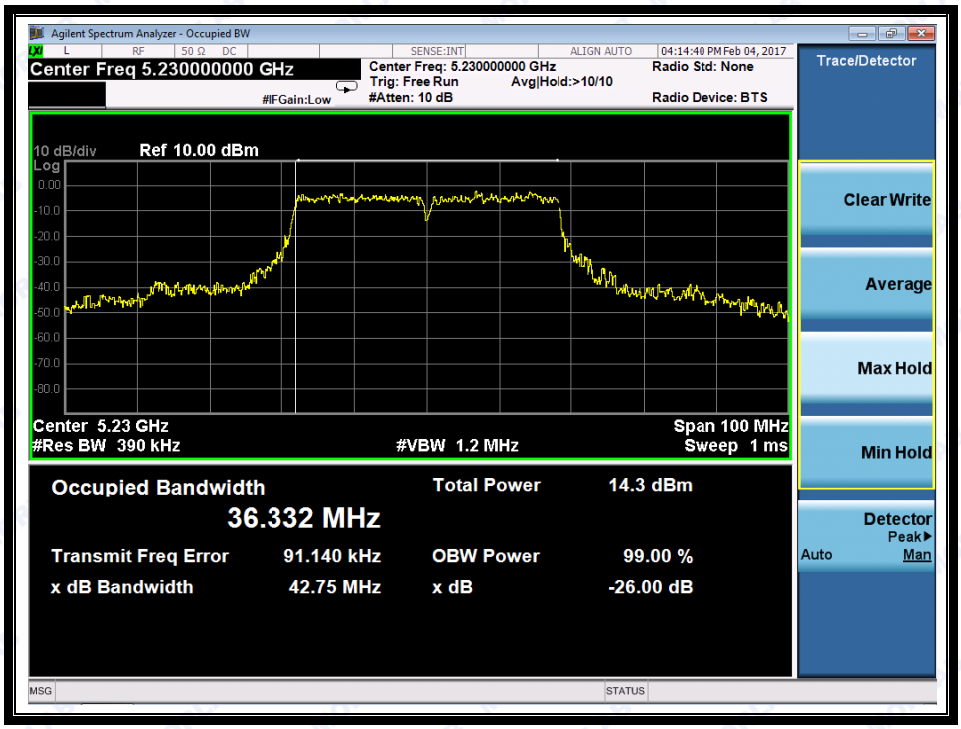
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	44.01
46	5230	42.75
54	5270	42.87
62	5310	42.44
102	5510	43.20
126	5630	44.21
142	5710	42.69
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
151	5755	36.45
159	5795	36.40

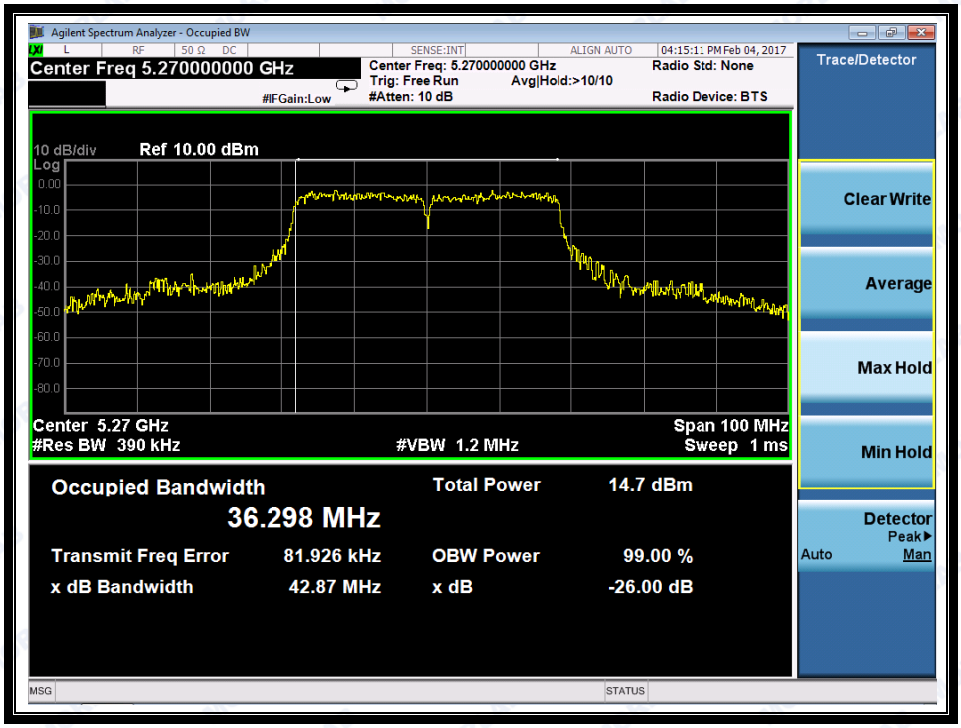
B. Test Plots



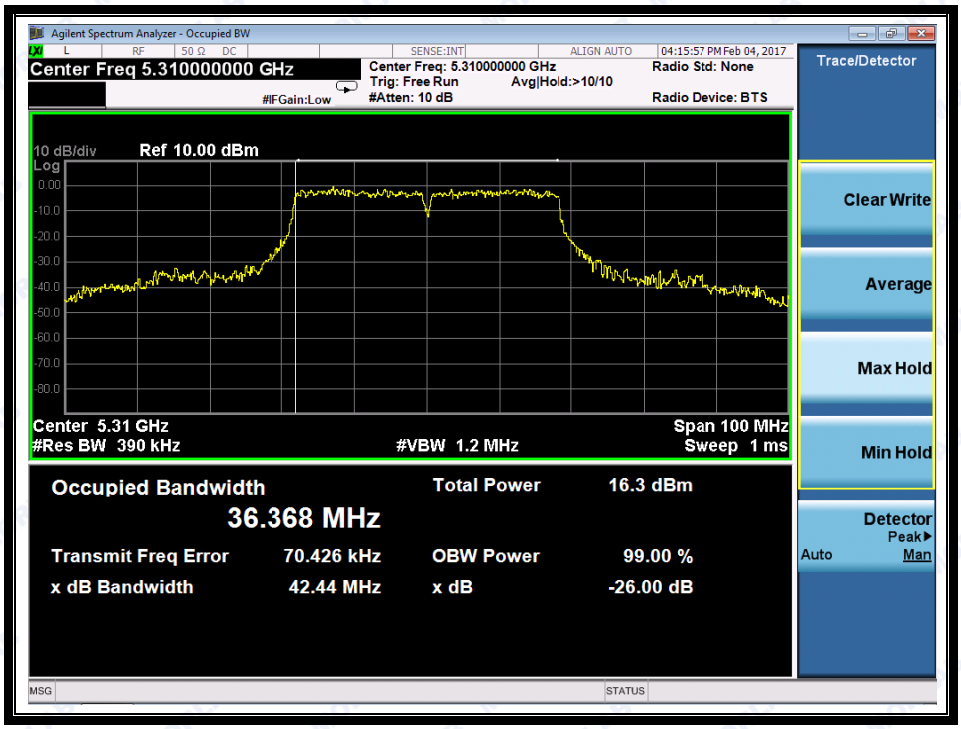
(Channel 38: 5190MHz @ 802.11n-40MHz)



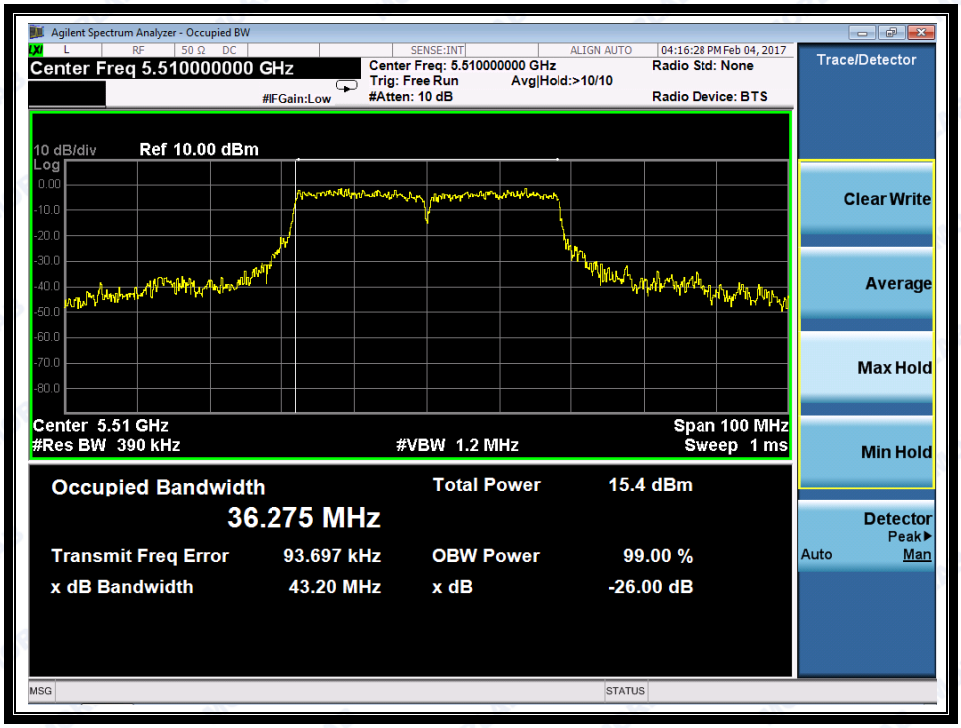
(Channel 46: 5230 MHz @ 802.11n-40MHz)



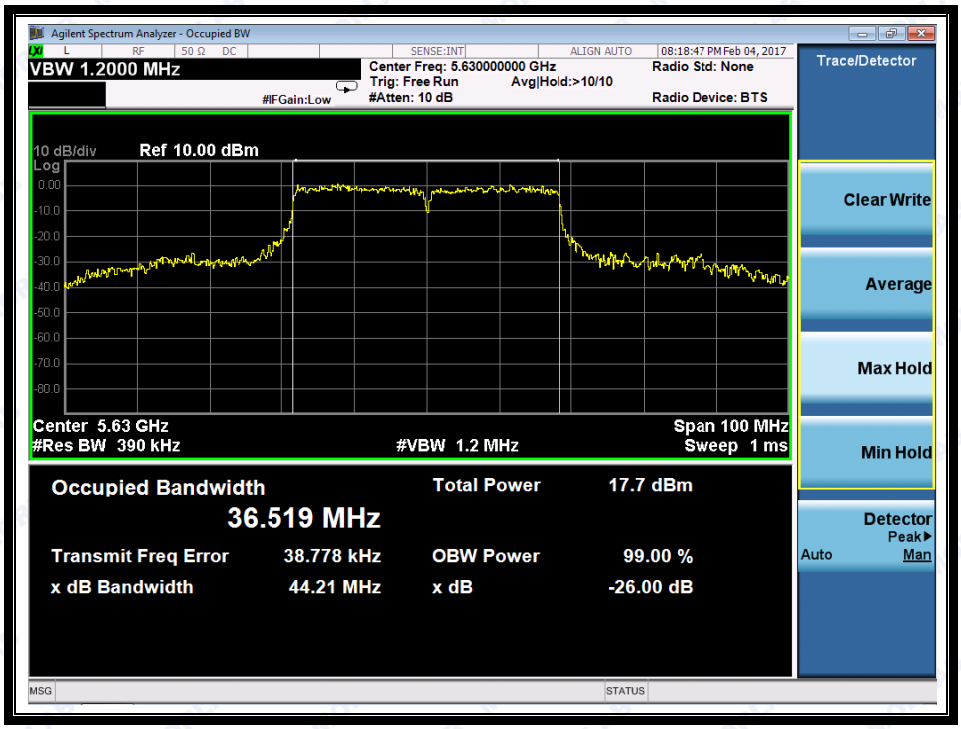
(Channel 54: 5270MHz @802.11n-40MHz)



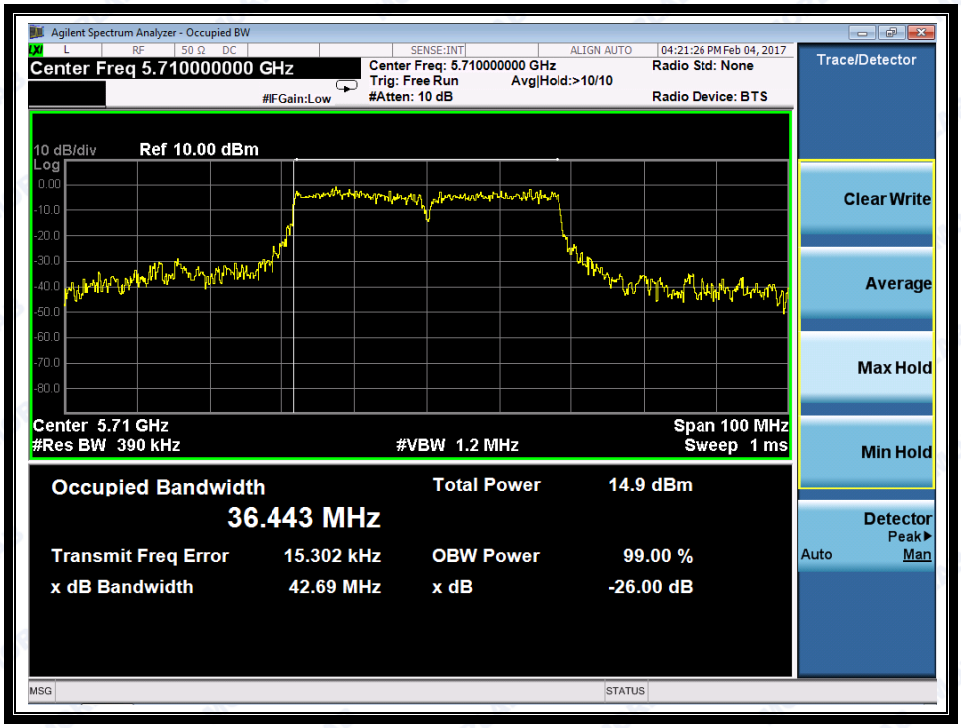
(Channel 62: 5310MHz @ 802.11n-40MHz)



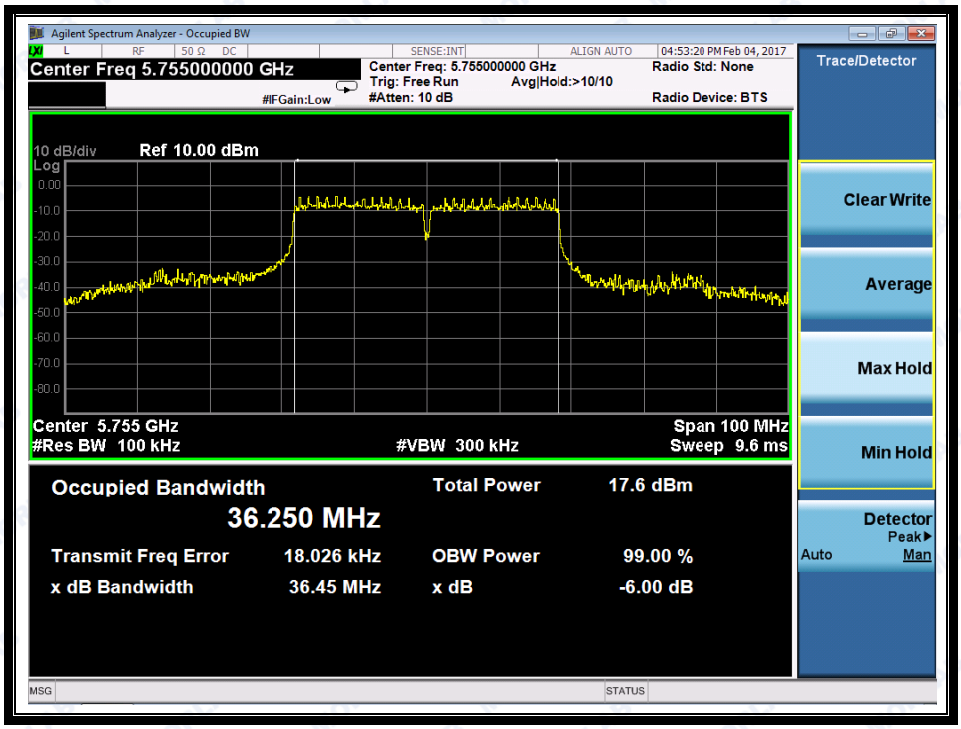
(Channel 102: 5510MHz @802.11n-40MHz)



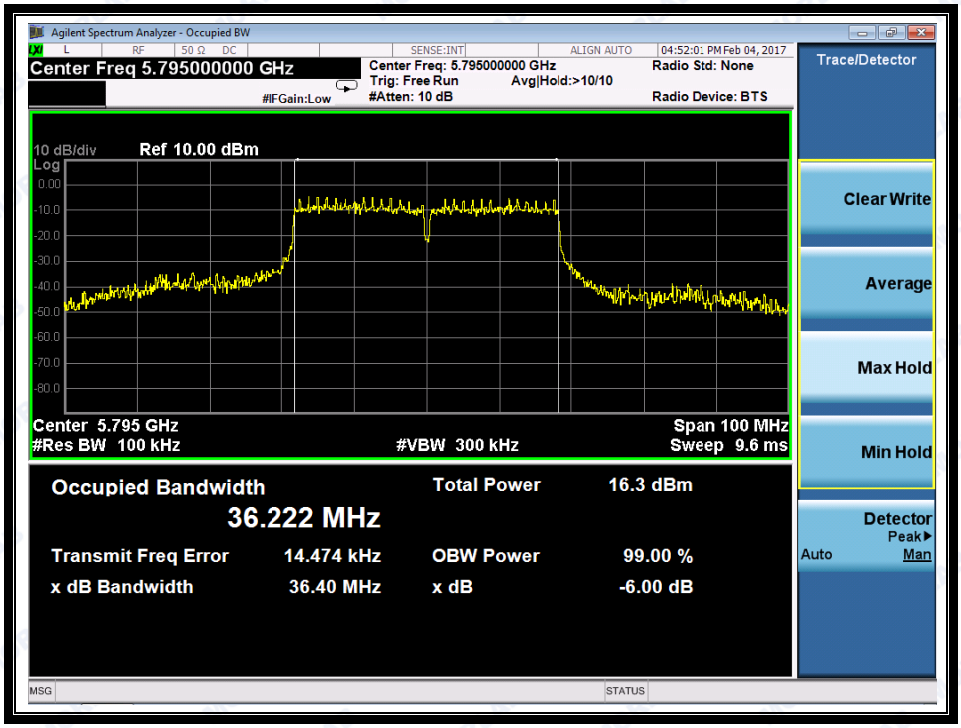
(Channel 126: 5630MHz @ 802.11n-40MHz)



(Channel 142: 5710MHz @ 802.11n-40MHz)



(Channel 151: 5755MHz @ 802.11n-40MHz)



(Channel 159: 5795MHz @802.11n-40MHz)

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 11dBm + 10log 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	13.84	24	PASS
44	5220	14.79		
48	5240	15.24		
52	5260	15.77		
60	5300	16.36		
64	5320	16.33		
100	5500	16.47		
120	5600	16.49		
140	5700	15.62		
149	5745	15.64	30	
157	5785	15.27		
165	5825	14.58		

2.3.3.2 802.11ac-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
36	5180	12.28	24	PASS
44	5220	12.71		
48	5240	13.15		
52	5260	13.26		
60	5300	15.19		
64	5320	15.05		
100	5500	15.09		
116	5600	16.04		
140	5700	15.02		
149	5745	15.01	30	
157	5785	14.22		
165	5825	12.34		

2.3.3.3 802.11ac-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
38	5190	12.12	24	PASS
46	5230	12.82		
54	5270	13.35		
62	5310	15.02		
102	5510	15.03		
126	5630	15.95		
142	5710	14.85	U-NII-2C:24 & U-NII-3:30	
151	5755	14.57	30	
159	5795	14.12		

2.3.3.4 802.11ac-80MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
42	5210	13.92	24	PASS
58	5290	16.03		
106	5530	16.98		
122	5610	16.18		
138	5690	15.15	U-NII-2C:24 & U-NII-3:30	
155	5775	14.87	30	

2.3.3.5 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
36	5180	12.09	24	PASS
44	5220	12.34		
48	5240	13.06		
52	5260	13.99		
60	5300	15.62		
64	5320	15.52		
100	5500	14.95		
120	5600	15.65		
140	5700	14.77		
149	5745	14.71	30	
157	5785	14.28		
165	5825	12.43		

2.3.3.6 802.11n-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Power(dBm)	Limit (dBm)	Verdict
38	5190	13.85	24	PASS
46	5230	15.24		
54	5270	15.74		
62	5310	15.99		
102	5510	16.86		
126	5630	16.55		
142	5710	15.08	U-NII-2C:24 & U-NII-3:30	
151	5755	14.89	30	
159	5795	14.71		

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.

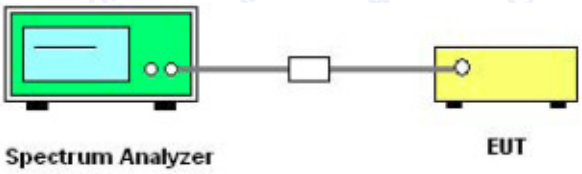
According FCC KDB644545 D03 D)1)b)2) requirement:

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 ≥ 3 MHz.
3) Number of points in sweep ≥ 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

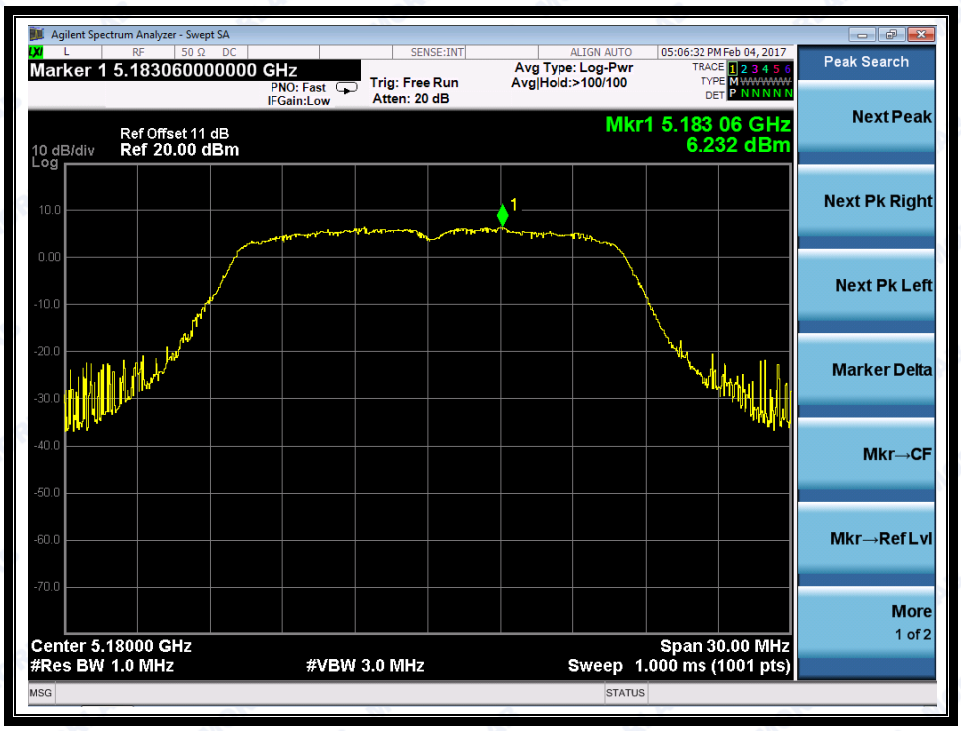
2.4.3 Test Result

2.4.3.1 802.11a Test mode

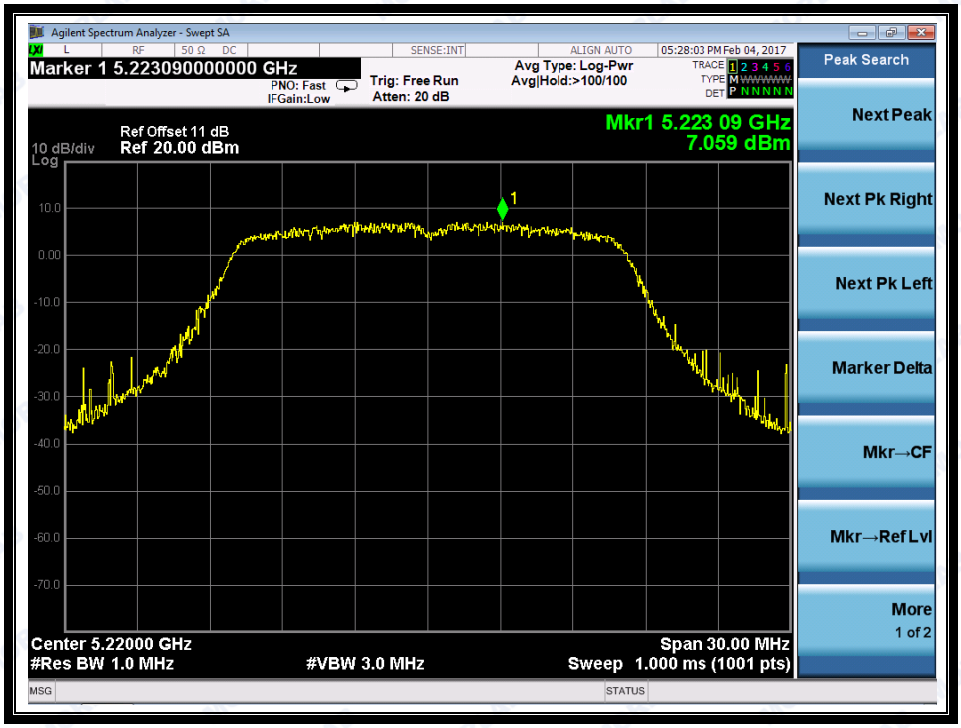
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
36	5180	6.23	11	PASS
44	5220	7.06		
48	5240	7.26		
52	5260	7.72		
60	5300	8.31		
64	5320	8.78		
100	5500	8.60		
120	5600	9.08		
140	5700	8.85		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
149	5745	5.85	30	PASS
157	5785	4.34		
165	5825	4.71		

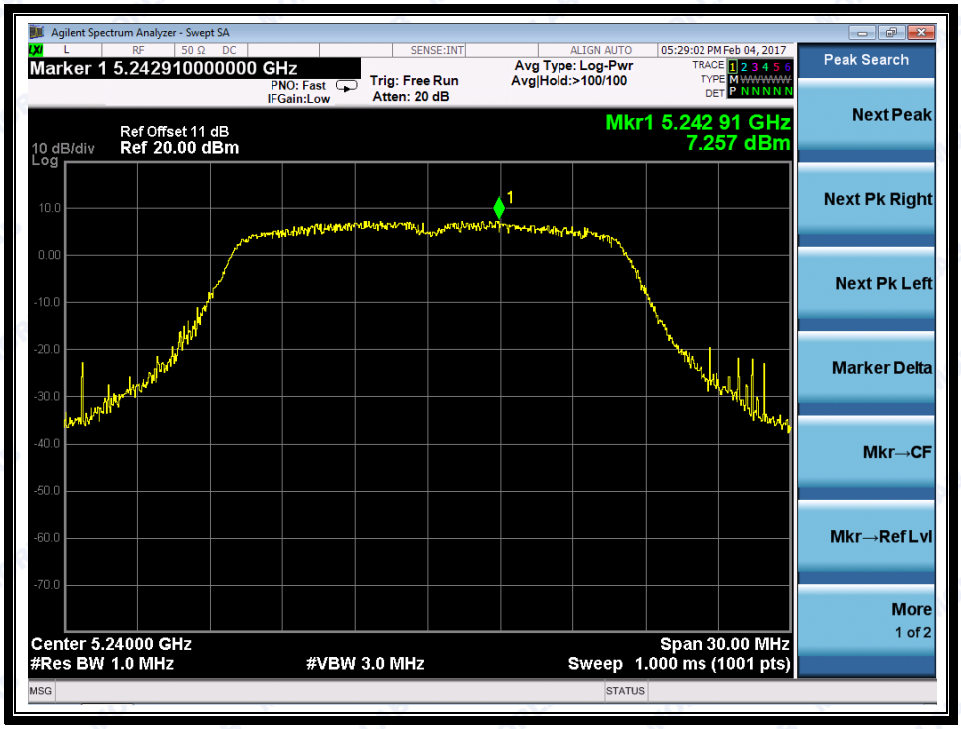
A. Test Plots



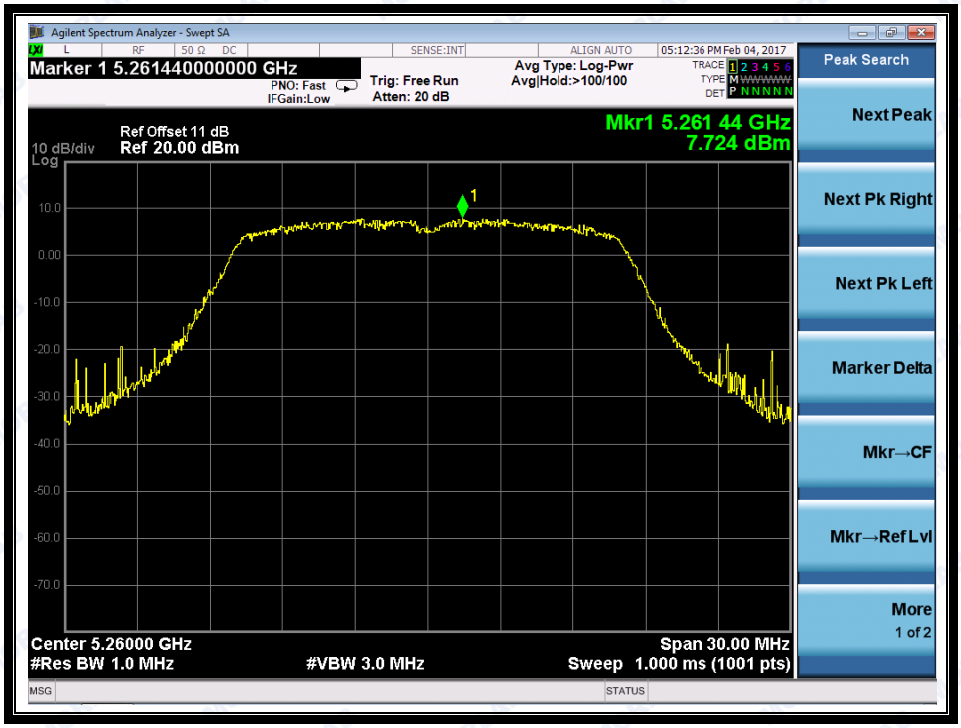
(Channel 36: 5180MHz @ 802.11a)



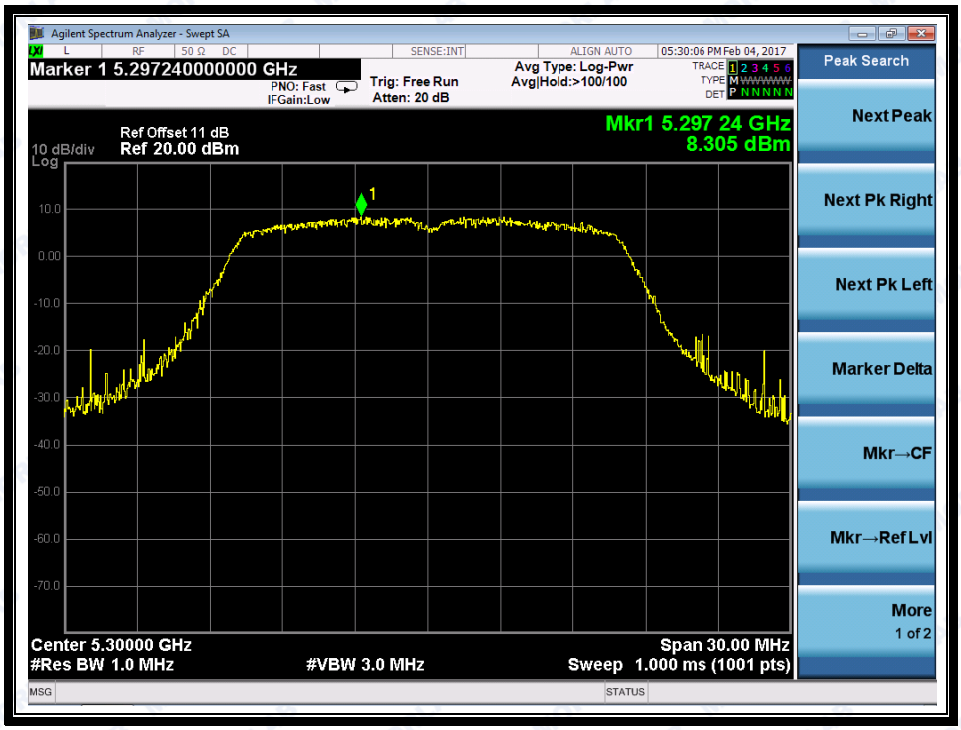
(Channel 44: 5220 MHz @802.11a)



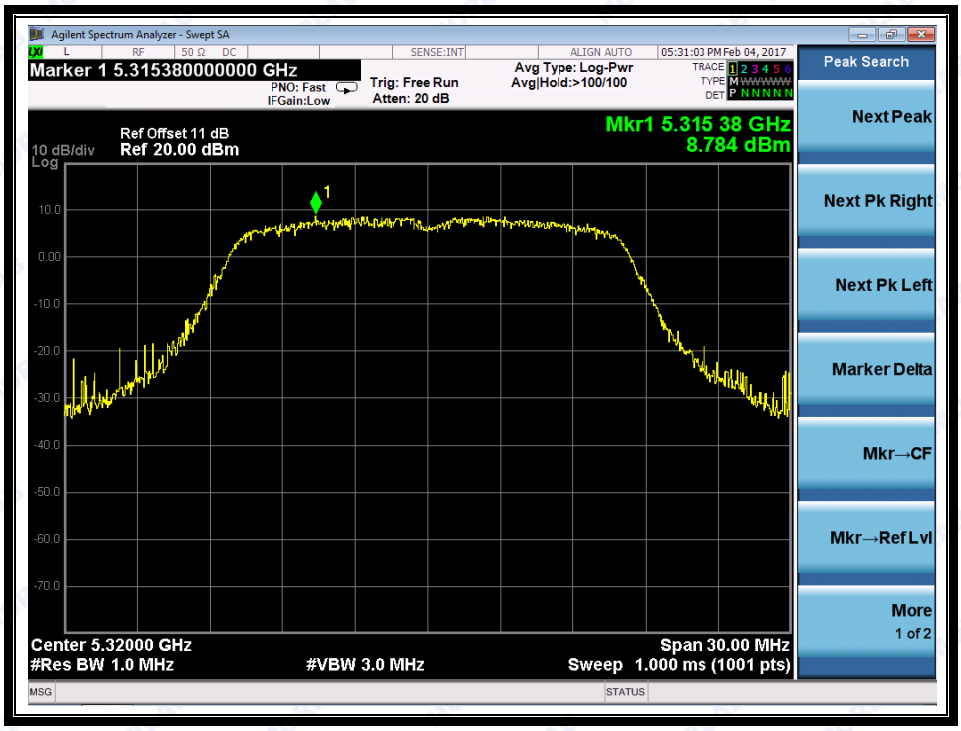
(Channel 48: 5240MHz @802.11a)



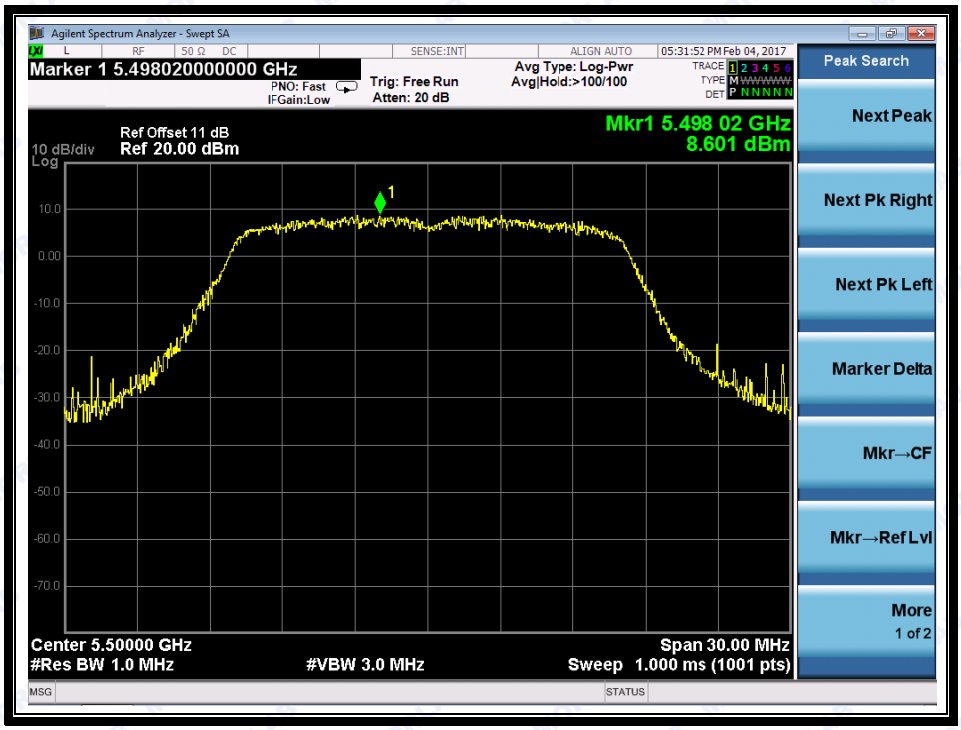
(Channel 52: 5260MHz @ 802.11a)



(Channel 60: 5300MHz @ 802.11a)



(Channel 64: 5320MHz @ 802.11a)



(Channel 100: 5500MHz @ 802.11a)