FCC PART 15E TEST REPORT

TESTING
CNAS L3572

Issued to

GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP.,LTD

For

Mobile Phone

Model Name:	OPPO X9006
Trade Name:	OPPO
Brand Name:	OPPO
FCC ID:	R9C-X9006
Standard:	47 CFR Part 15 Subpart E
Test date:	2013-12-20 to 2014-4-1
Issue date:	2014-4-1

by

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Date	2014.4.1	***Date***	2014.4.1	***Date***	2014.4.1

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Change History		
Issue	Date	Reason for change
1.0	April 1, 2014	First Edition

1. General Information

1.1. EUT Description

EUT Type..... :	Mobile Phone
Serial No. ..... :	(n.a, marked #1 by test site)
Hardware Version..... :	213073
Software Version..... :	X9006_10_1.01_131216
Applicant..... :	GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP.,LTD NO. 18 HAIBIN ROAD, WUSHA, CHANG'AN, DONGGUAN, GUANGDONG, CHINA
Manufacturer ..... :	GUANGDONG OPPO MOBILE TELECOMMUNICATIONS CORP.,LTD NO. 18 HAIBIN ROAD, WUSHA, CHANG'AN, DONGGUAN, GUANGDONG, CHINA
Frequency Range..... :	802.11b/g/n: 2.400GHz - 2.4835GHz 802.11a/n/ac: 5.150GHz- 5.350GHz 5.470GHz- 5725GHz 5.725GHz- 5.850GHz
Channel Number ..... :	2.4GHz Band: 802.11b/g/n-20MHz: 11 802.11n-40MHz: 7 802.11a/n/ac-20MHz: 5.725GHz- 5.850GHz: 5 Channels 5.150GHz – 5.350GHz: 8 Channels 5.470GHz – 5.725GHz: 11Channels 802.11n/ac-40MHz: 5.725GHz- 5.850GHz: 2 Channels 5.150GHz – 5.350GHz: 4 Channels 5.470GHz – 5.725GHz: 5 Channels
Modulation Type..... :	DSSS, OFDM
Antenna Type ..... :	PIFA Antenna
Antenna Gain..... :	1.0dBi MAX

Note :

1. The U-NII band is applicable to this report, another bands of operation (2.4GHz and 5.8GHz) is documented in a separate report.
2. For 802.11a/n/ac-20MHz, the frequencies allocated is F (MHz) =5180+20*(n-1) (1<=n<=8). For 5.150GHz – 5.250GHz,The channel of the EUT used and tested in this report are separately 36 (5180MHz), 44 (5220MHz) and 48 (5240MHz). For 5.250GHz – 5.350GHz,The channel of the EUT used and tested in this report are separately 52 (5260MHz), 60 (5300MHz) and 48 (5240MHz). For 5.470GHz – 5725GHz ,The channel of the EUT used and tested in this report are separately 100(5500MHz), 116 (5580MHz) and 140(5700MHz).

3. For 802.11n/ac-40MHz (5150GHz–5350GHz),the frequencies allocated is F (MHz) =5190MHz+40*(n-1) (1<=n<=4). For 5.150GHz – 5.250GHz,The channel of the EUT used and tested in this report are separately 38 (5190MHz), 46 (5230MHz). For 5.250GHz – 5.350GHz,The channel of the EUT used and tested in this report are separately 54 (5270MHz), 62 (5310MHz)
4. For 802.11n/ac-40MHz (5470–5725GHz),the frequencies allocated is F (MHz) =5510MHz+40*(n-1) (1<=n<=5). The channel of the EUT used and tested in this report are separately 102 (5510MHz), 110 (5550MHz) ,102 (5670MHz),.
5. For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.
6. The antenna connector of EUT is designed with permanent attachment and no consideration of replacement.

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 (10-1-12 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)	26dB 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(a)	Peak Excursion	**PASS**
7	15.407(g)	Frequency Stability	**PASS**
8	15.207	Conducted Emission	**PASS**
9	15.407(b)	Radiated Emission	**PASS**
10	15.407(f)	RF exposure evaluation	**PASS**

The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.4 2009.

These RF tests were performed according to the method of measurements prescribed in KDB789033 D01 v01r03 (04/08/2013).

1.1. Facilities and Accreditations

1.1.1. Facilities

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 2009, ANSI C63.4 2009 and CISPR Publication 22; the FCC registration number is 695796.

1.1.2. 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.

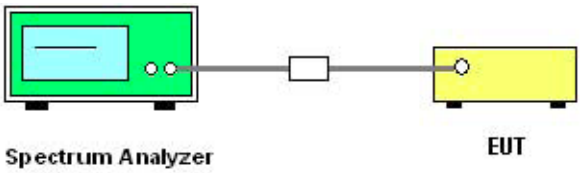
2.2. Duty Cycle

2.2.1. Requirement

None; for reporting purpose only.

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

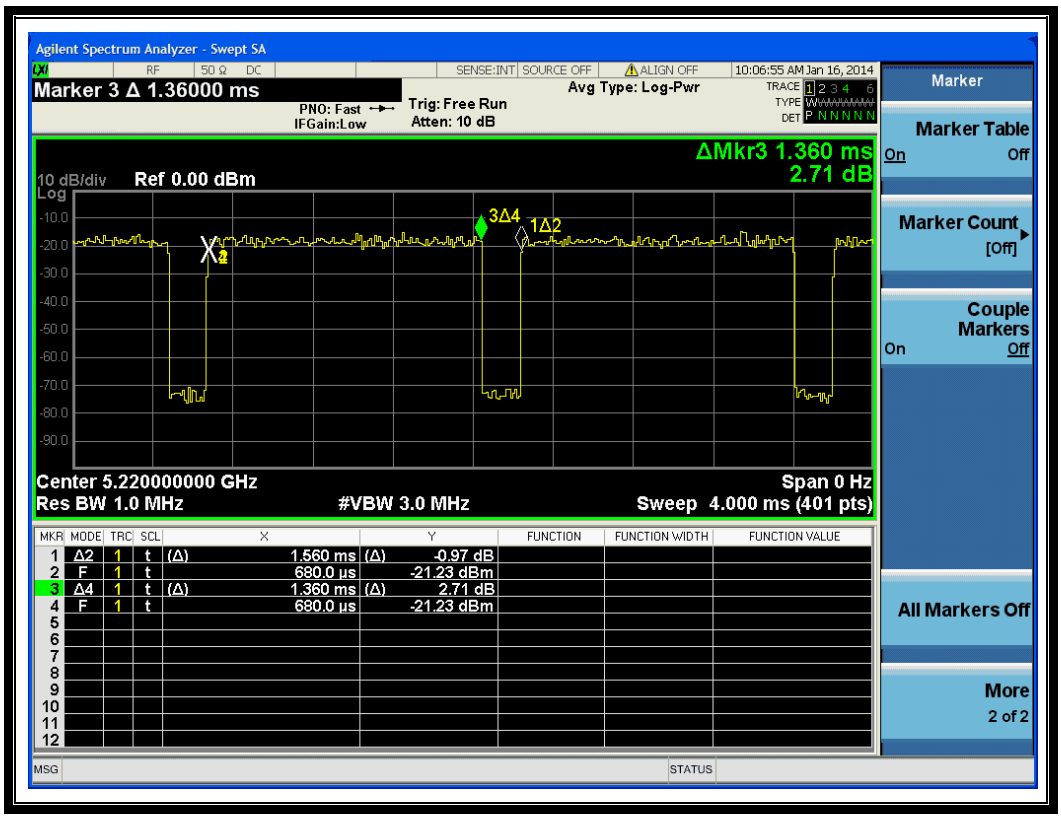
KDB 789033 Zero-Span Spectrum Analyzer

C. Equipments List:

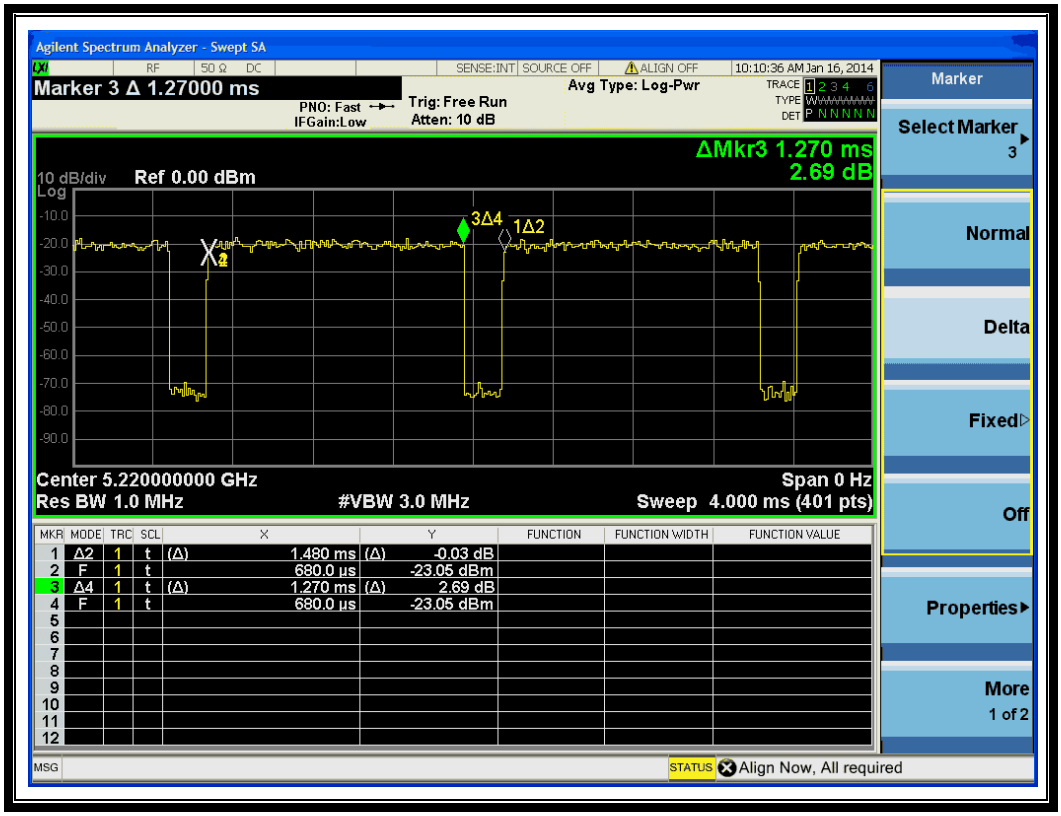
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EXA Signal Analzyer	Agilent	N9010A	MY51440152	2013.05.12	2014.05.11

2.2.3. Test Result

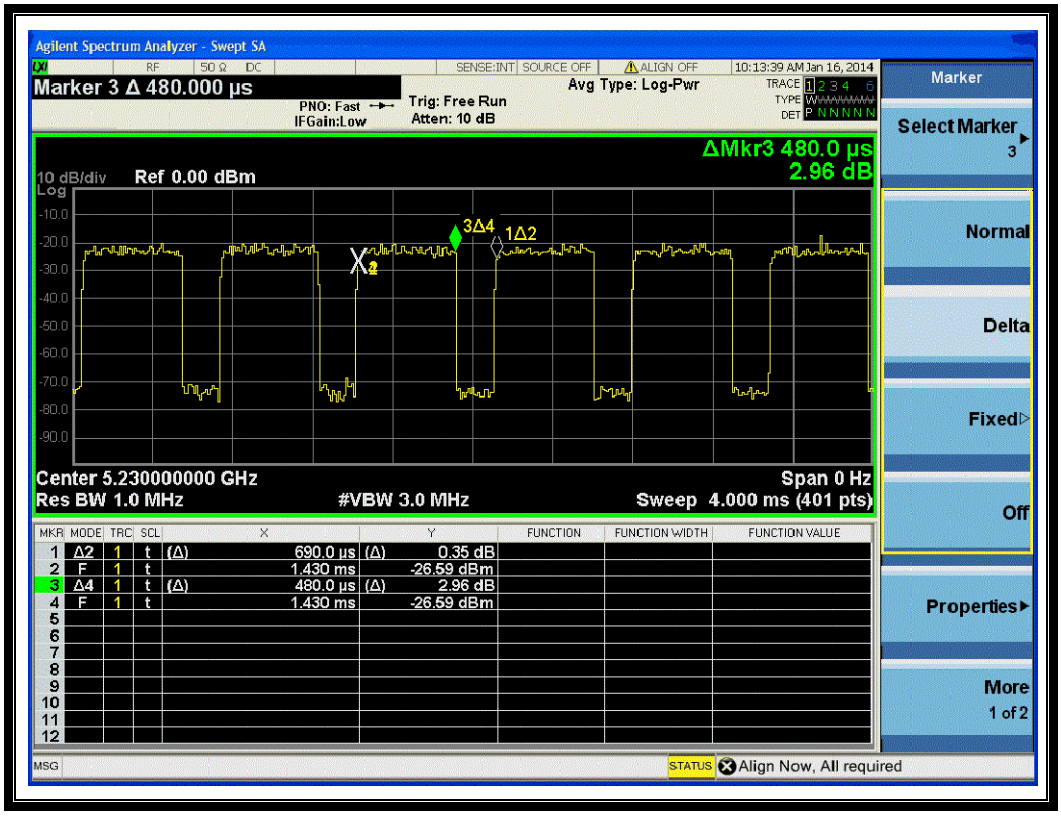
Mode	On Time (msec)	Period (msec)	Duty Cycle X(linear)	Duty Cycle (%)	Duty Cycle Correction Factor	1/T Minimum VBW (KHz)
802.11a	1.360	1.560	0.872	87.2%	0.59	0.735
802.11n-20MHz	1.270	1.480	0.858	85.8%	0.67	0.787
802.11n-40MHz	0.480	0.690	0.696	69.6%	1.57	2.083
802.11ac-20MHz	1.270	1.480	0.858	85.8%	0.67	0.787
802.11ac-40MHz	0.480	0.690	0.696	69.6%	1.57	2.083



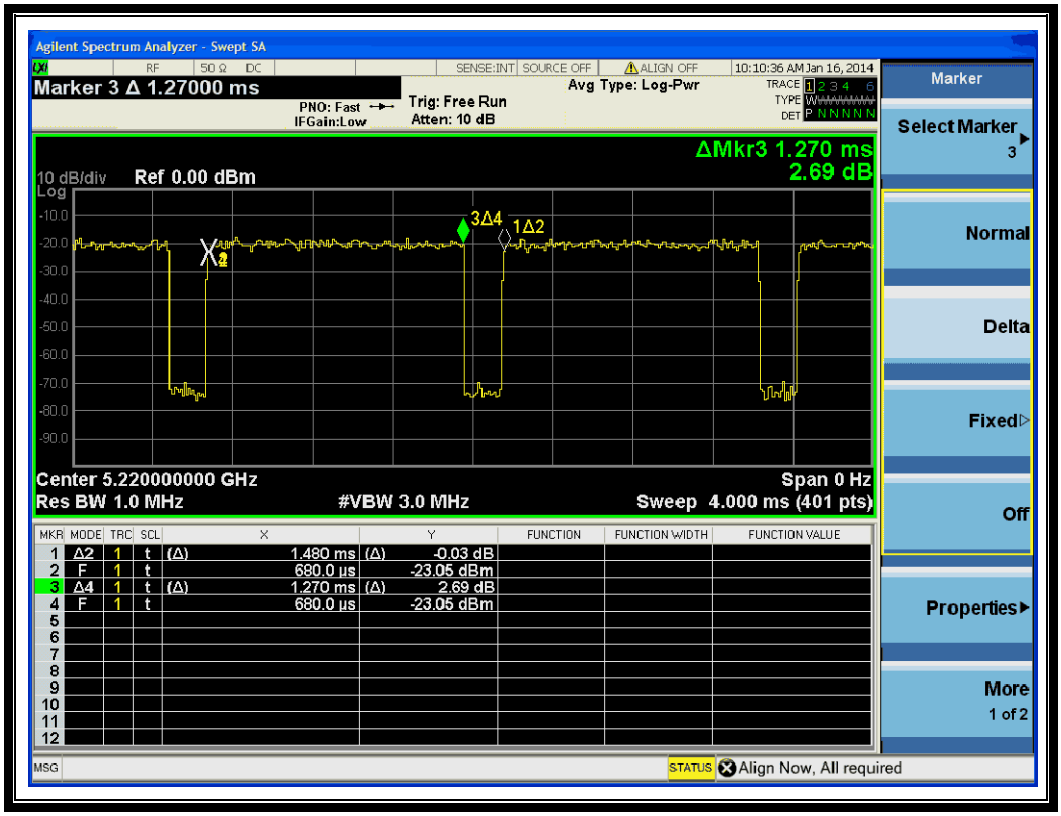
(802.11a)



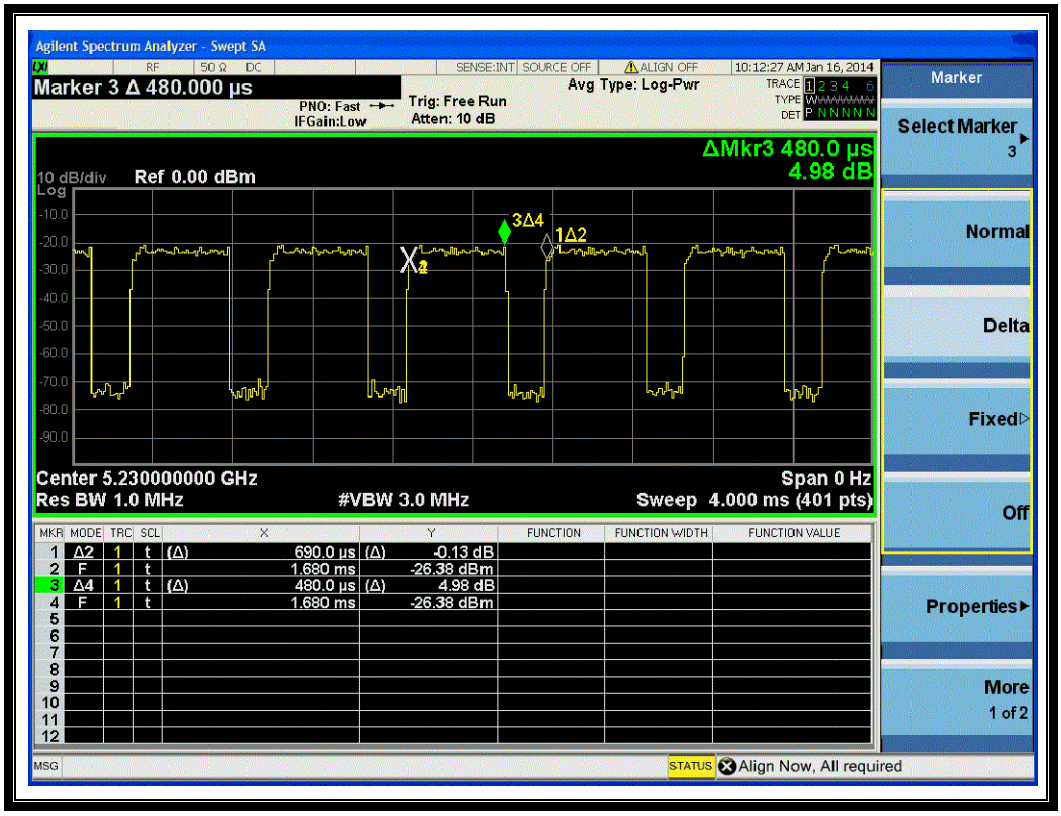
(802.11n-20MHz)



(802.11n-40MHz)



(802.11ac)



(802.11ac-40MHz)

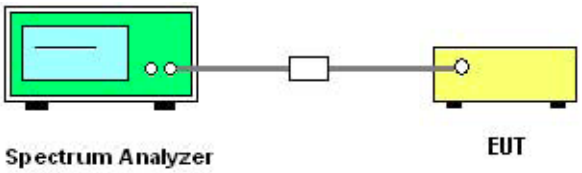
2.3. 26dB Emission Bandwidth

2.3.1. 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.

2.3.2. 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 C) 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%.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EXA Signal Analzyer	Agilent	N9010A	MY51440152	2013.05.12	2014.05.11

2.3.3. Test Result

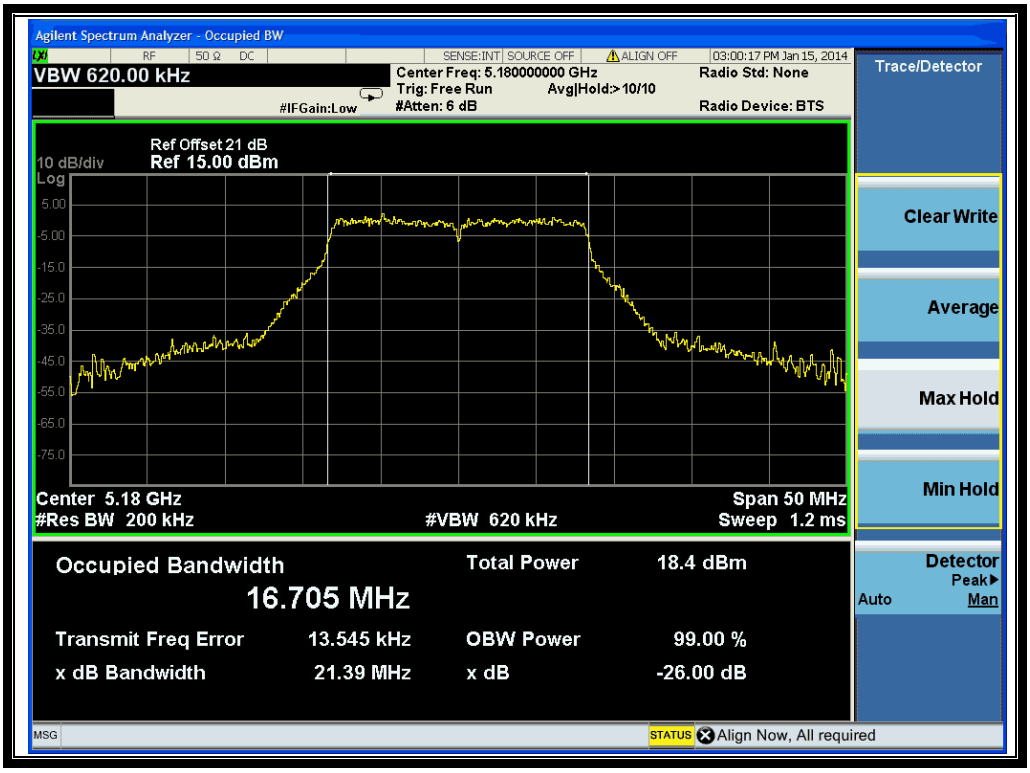
The lowest, middle and highest channels are selected to perform testing to record the 6 dB bandwidth of the Module.

2.3.3.1. 802.11a Test mode

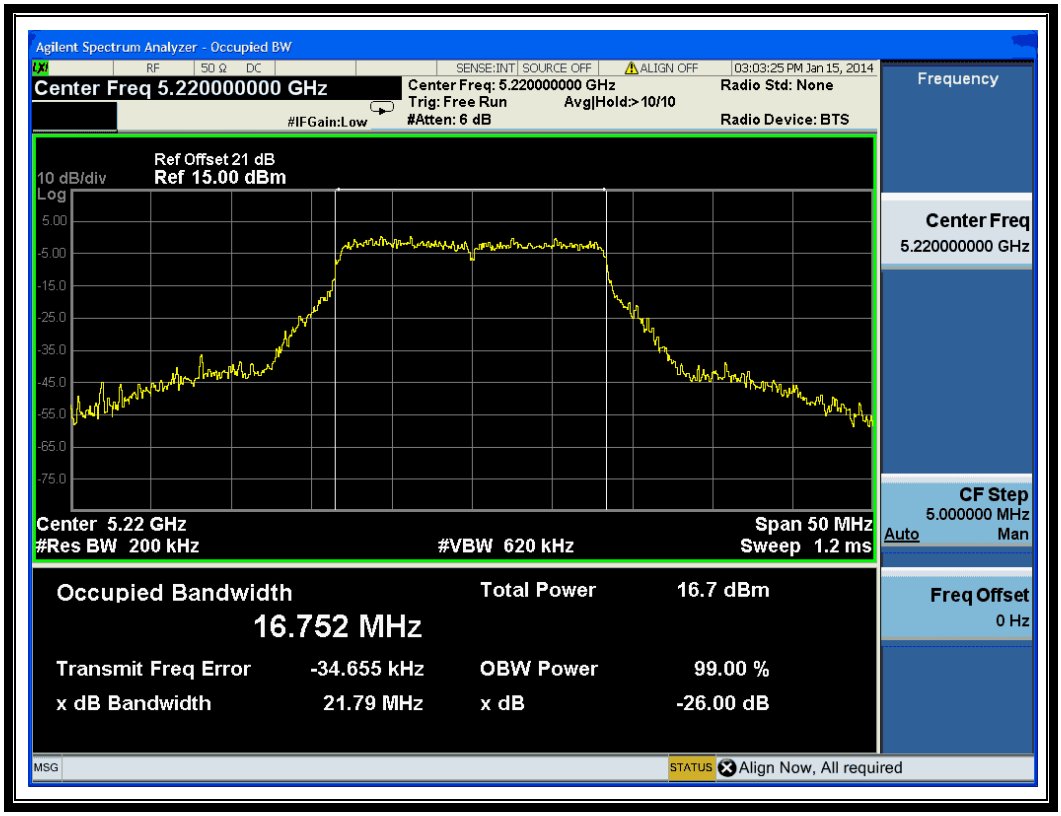
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	21.39
44	5220	21.79
48	5240	20.38
52	5260	21.04
60	5300	21.01
64	5320	21.14
100	5500	21.33
116	5580	20.88
140	5700	21.01

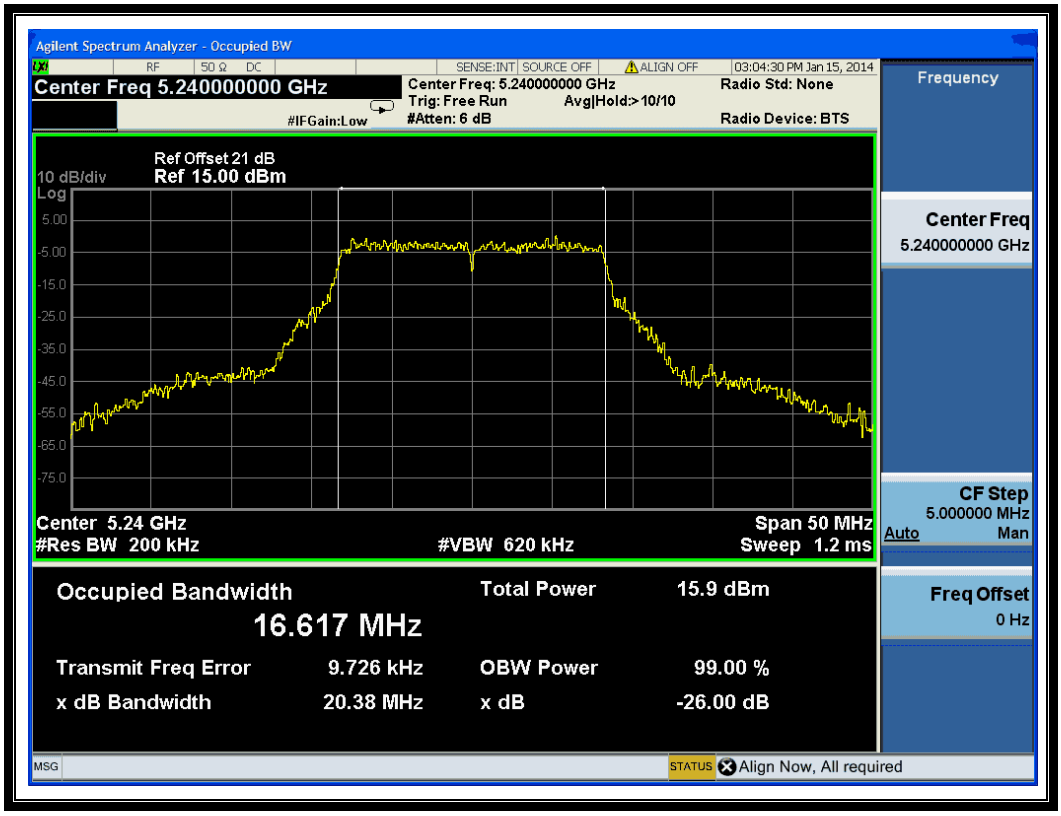
B. Test Plots



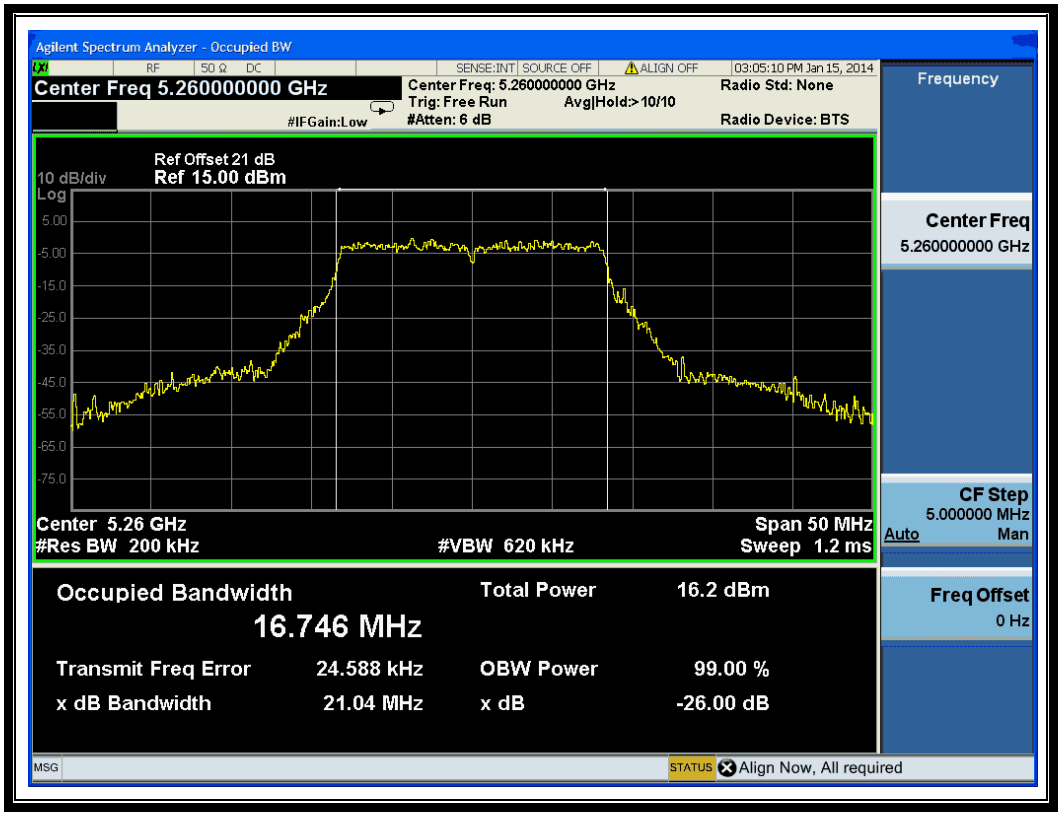
(Channel 36: 5180MHz @ 802.11a)



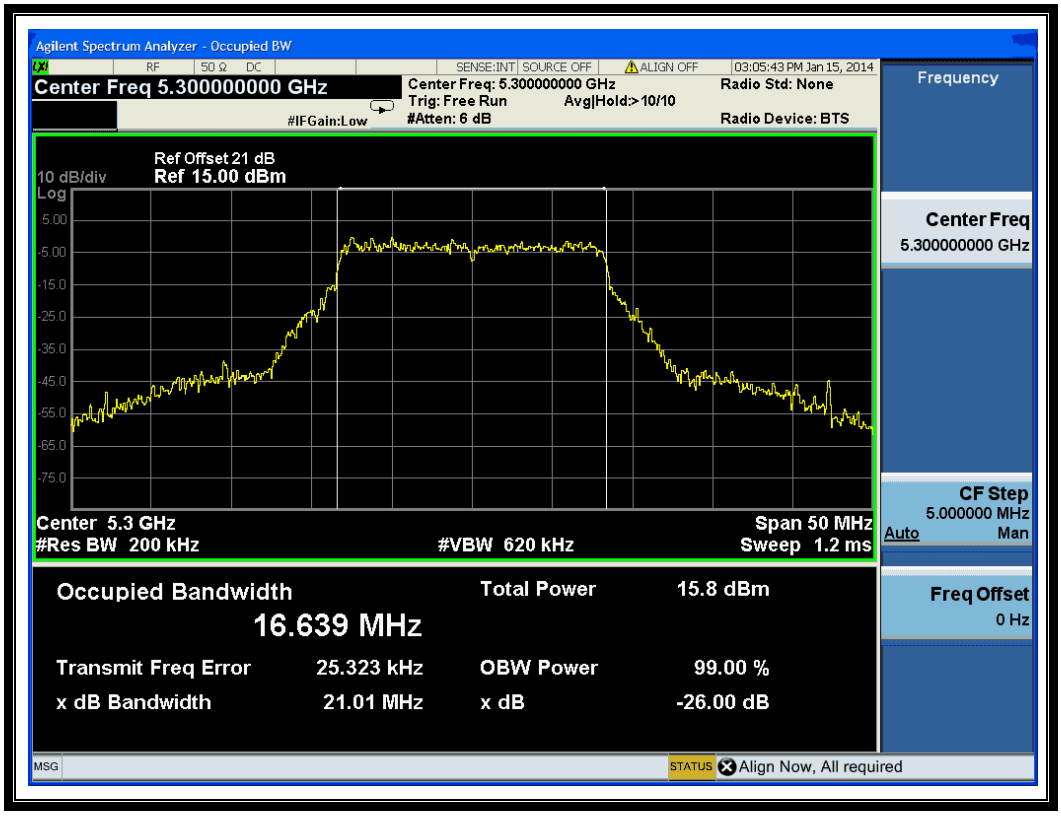
(Channel 44: 5220 MHz @ 802.11a)



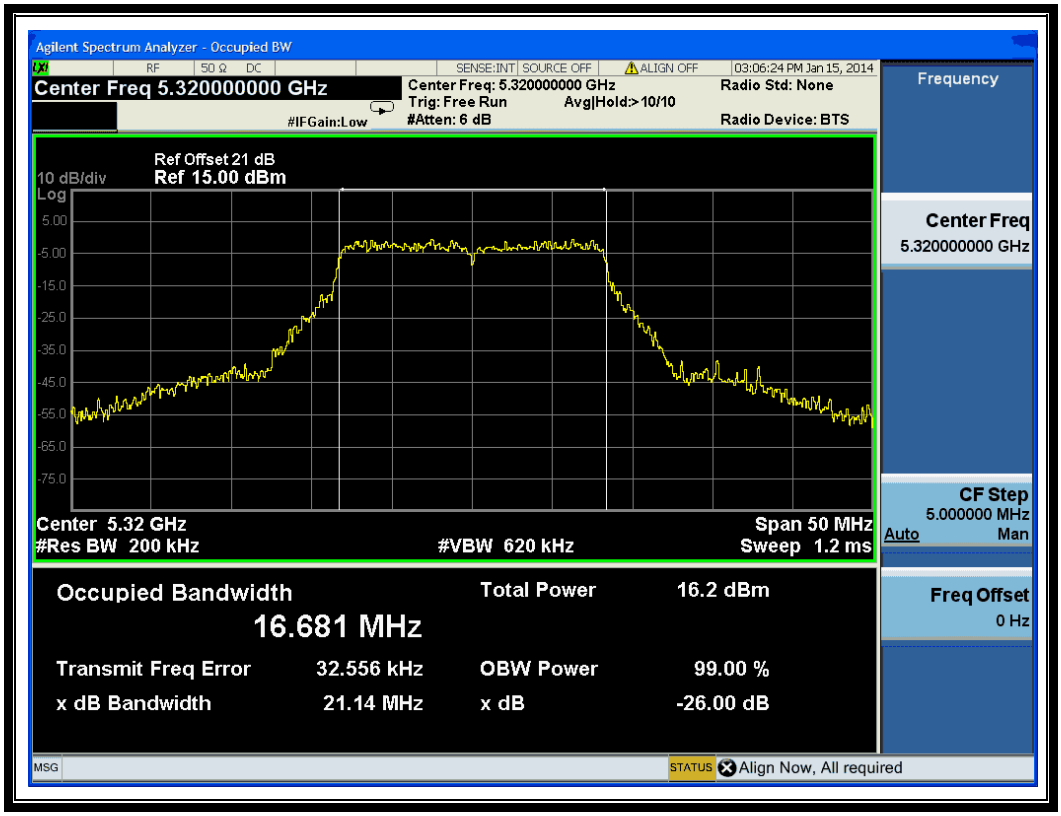
(Channel 48: 5240MHz @ 802.11a)



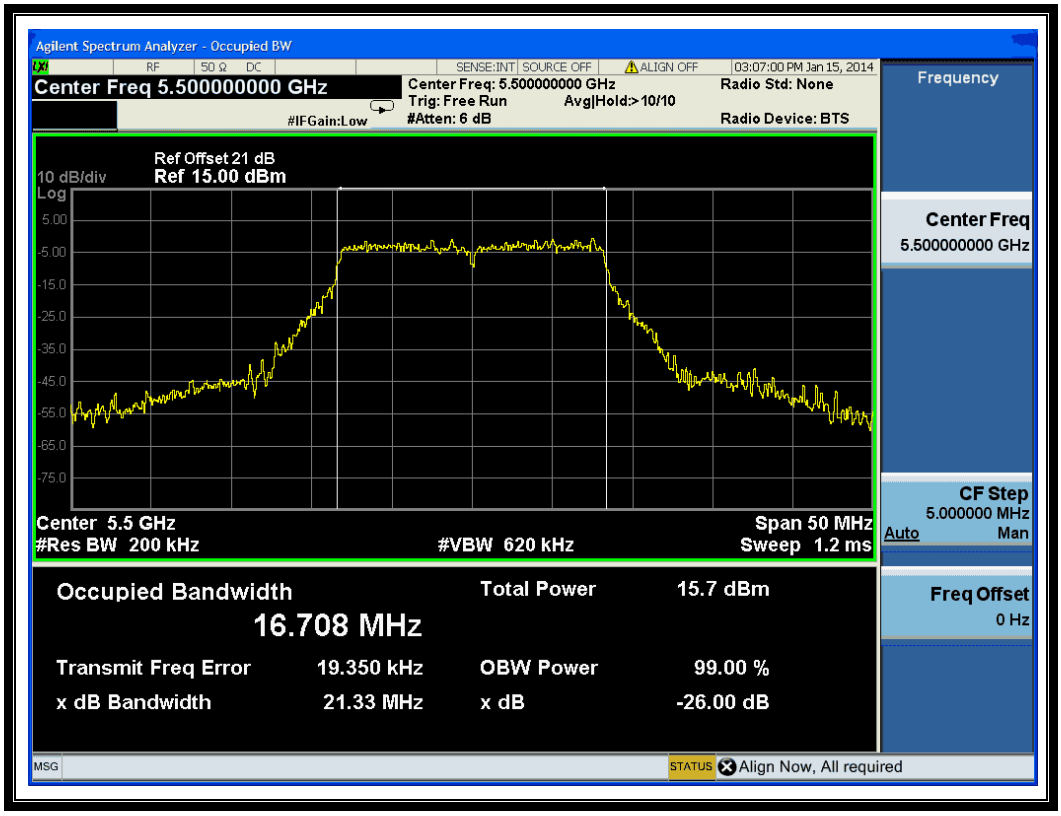
(Channel 52: 5260MHz @ 802.11a)



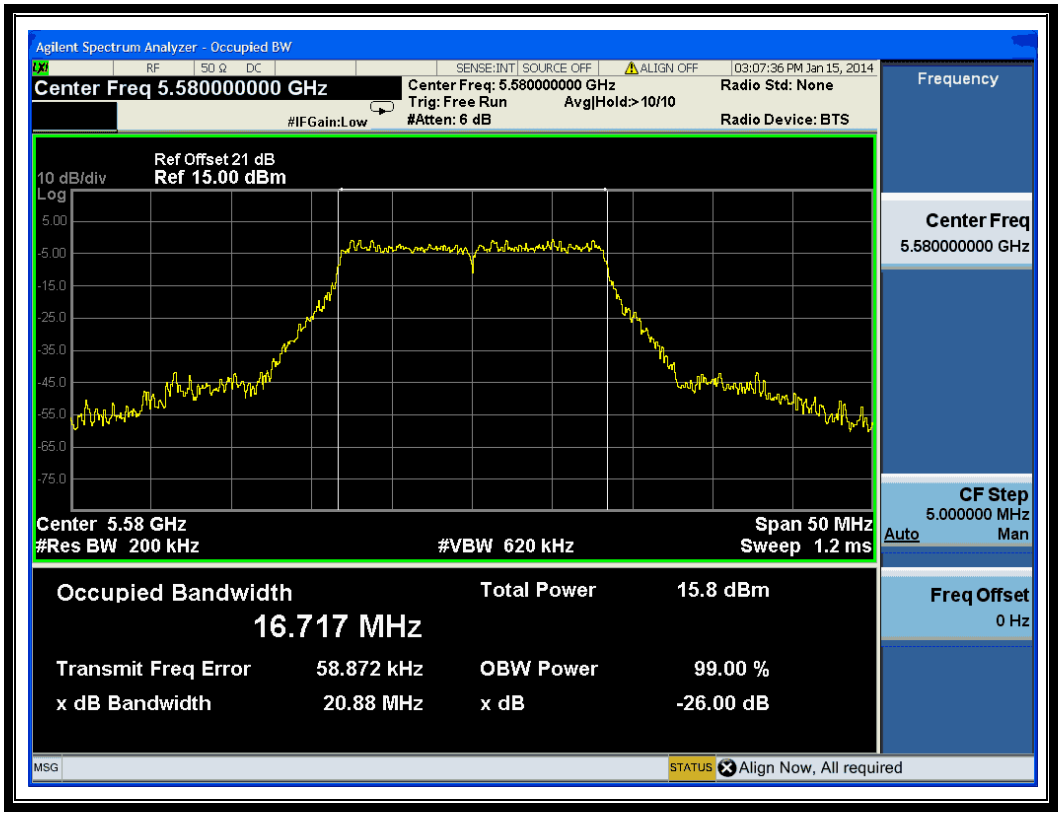
(Channel 60: 5300 MHz @ 802.11a)



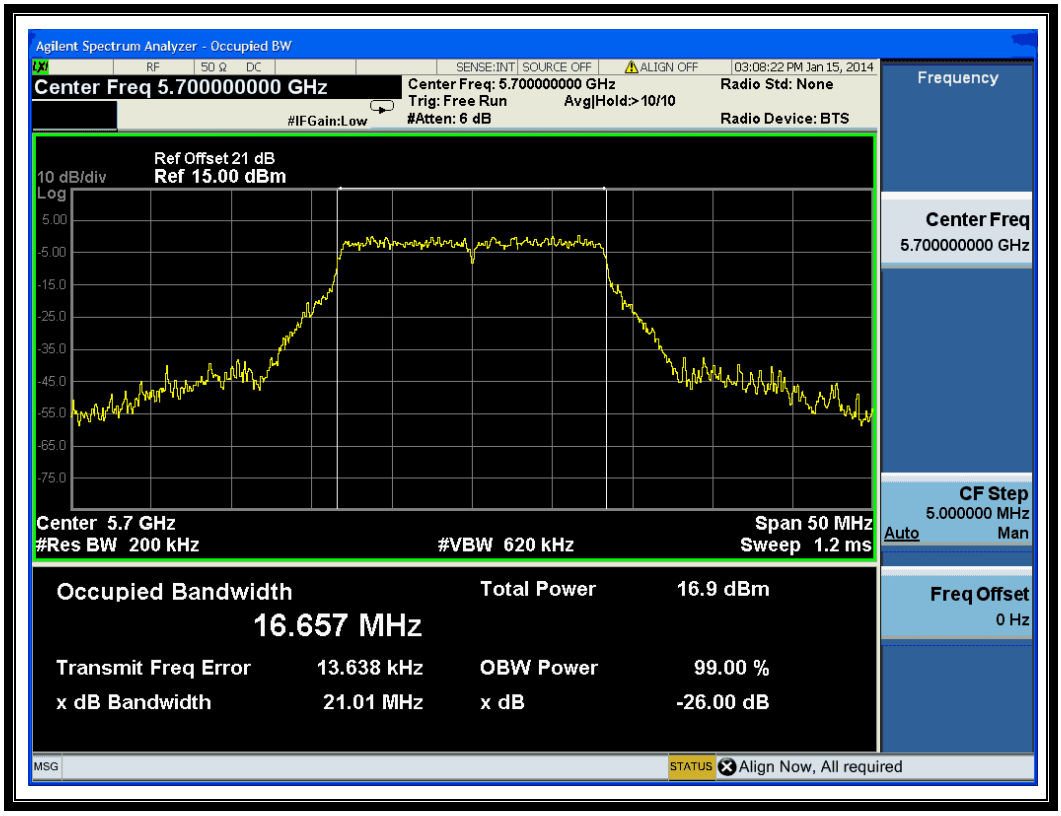
(Channel 64: 5320MHz @ 802.11a)



(Channel 100: 5500MHz @ 802.11a)



(Channel 116: 5580 MHz @ 802.11a)



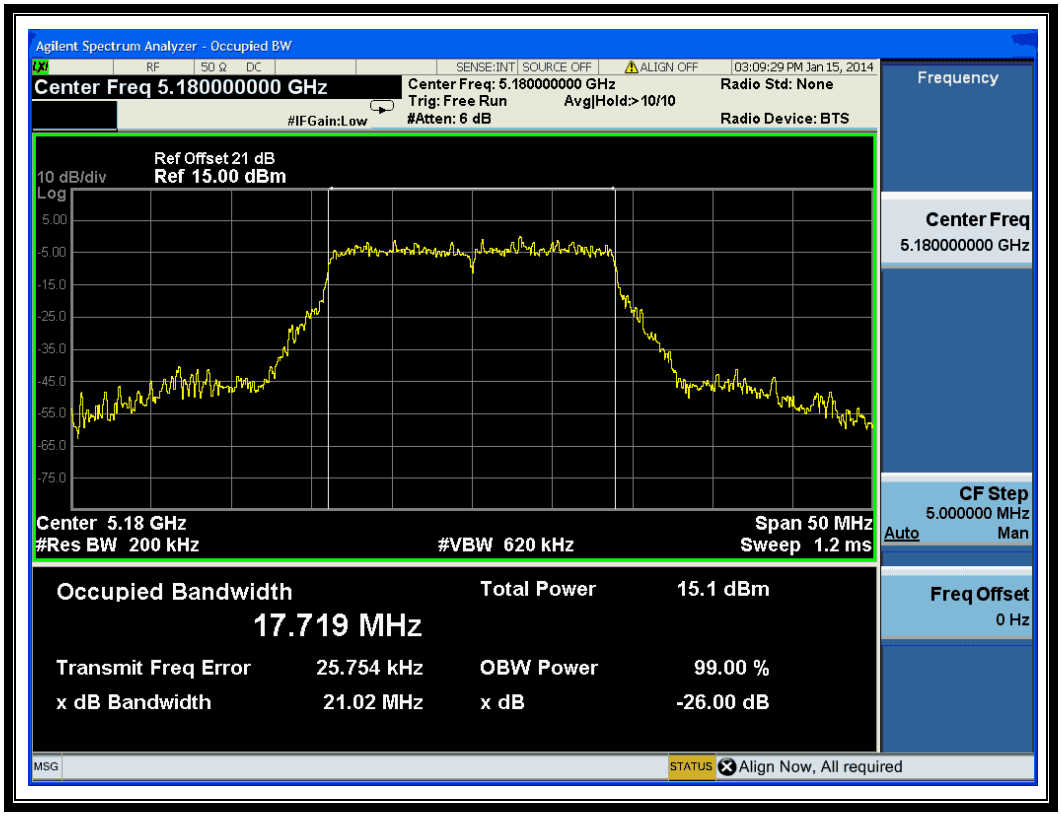
(Channel 140: 5700MHz @ 802.11a)

2.3.3.2. 802.11n-20MHz Test mode

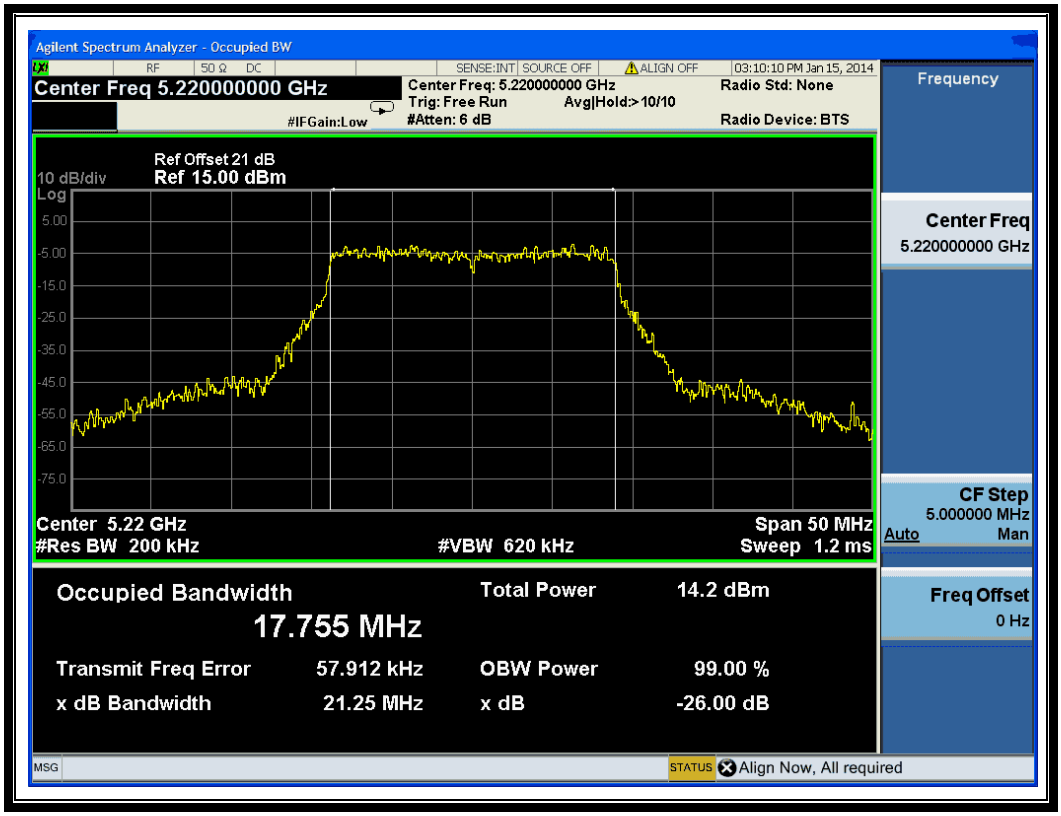
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	21.02
44	5220	21.25
48	5240	21.14
52	5260	22.06
60	5300	21.47
64	5320	21.72
100	5500	21.35
116	5580	21.17
140	5700	20.70

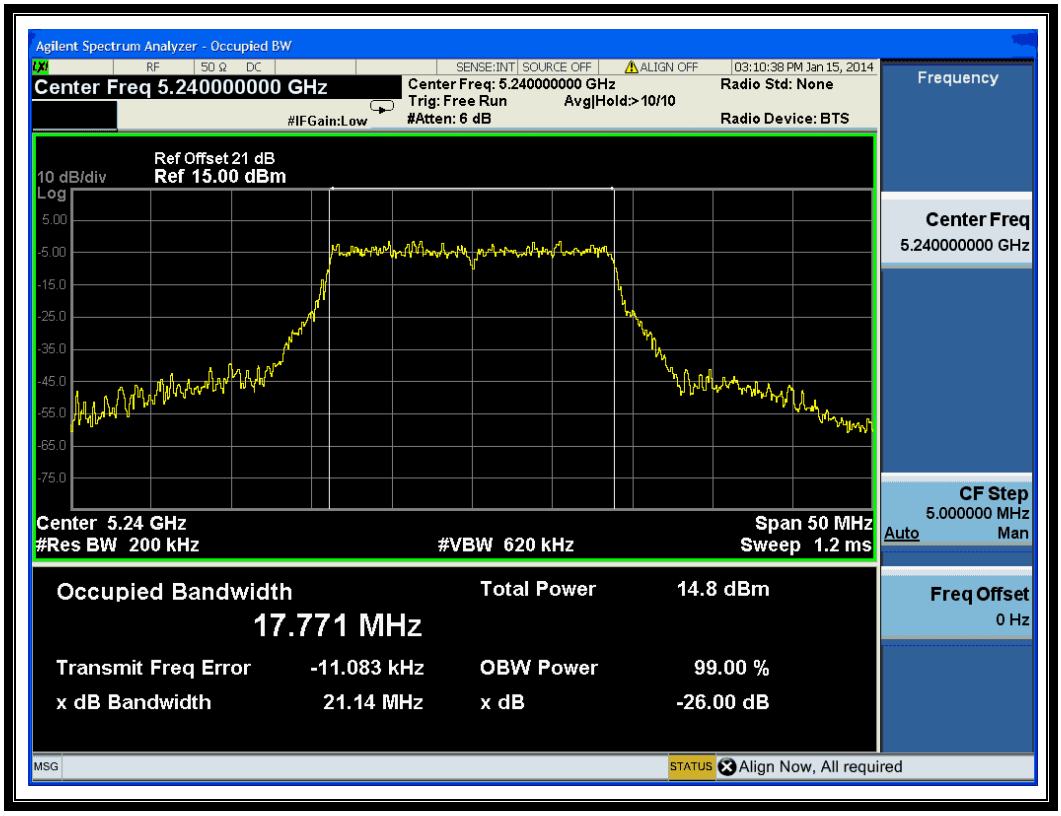
B. Test Plots



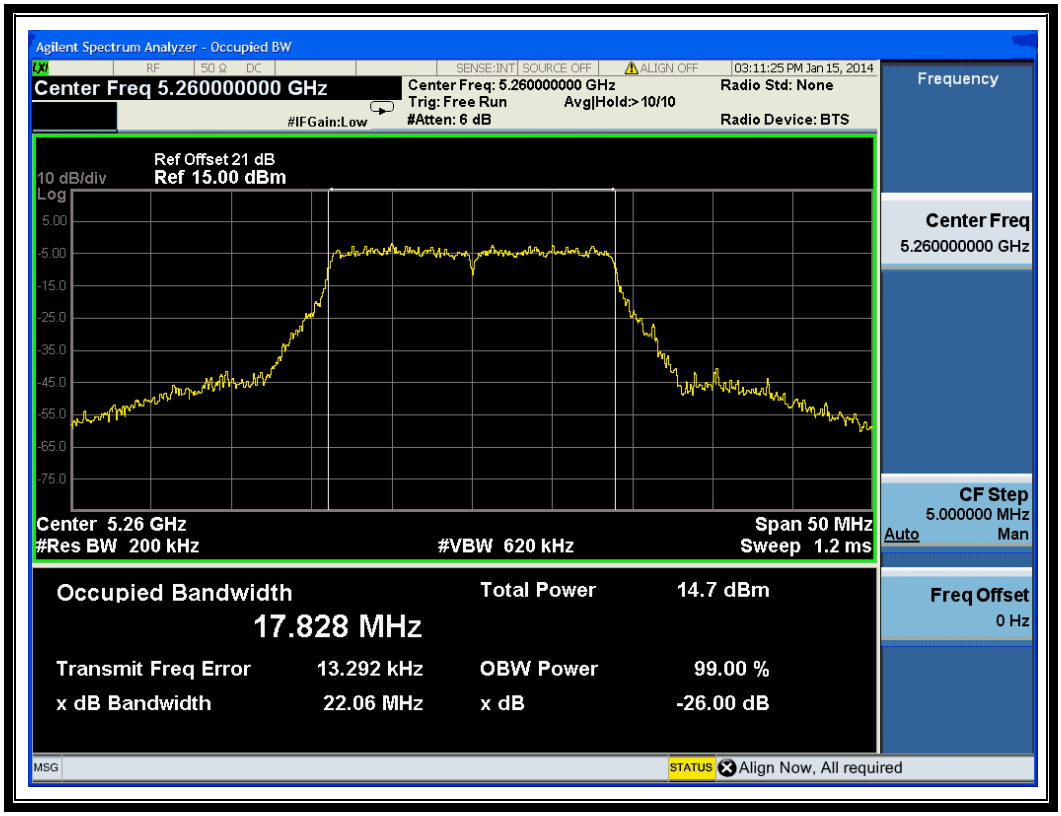
(Channel 36: 5180MHz @ 802.11n-20MHz)



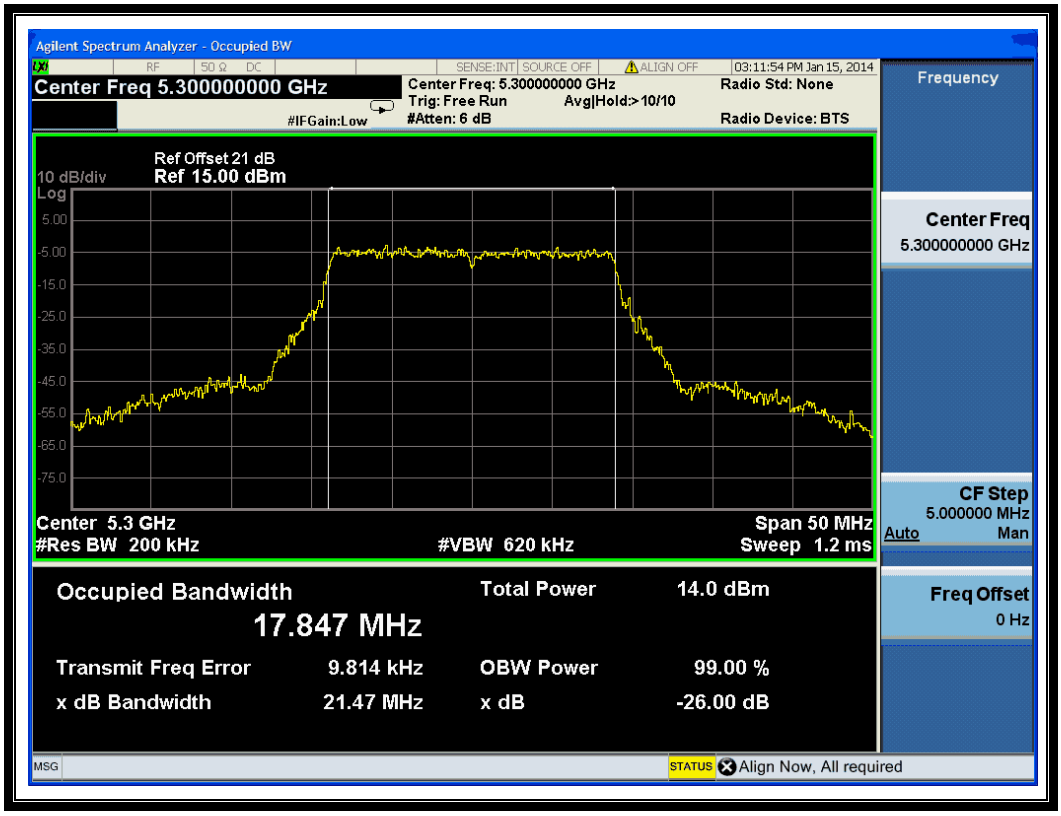
(Channel 44: 5220 MHz @ 802.11n-20MHz)



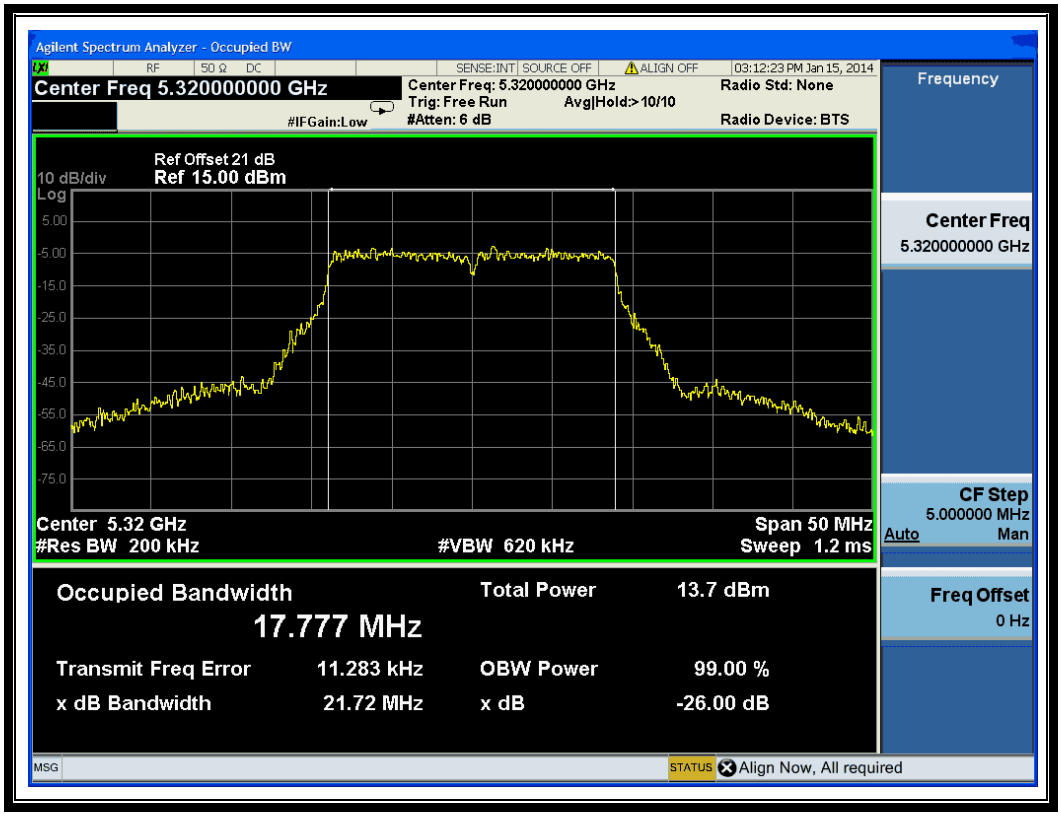
(Channel 48: 5240MHz @ 802.11n-20MHz)



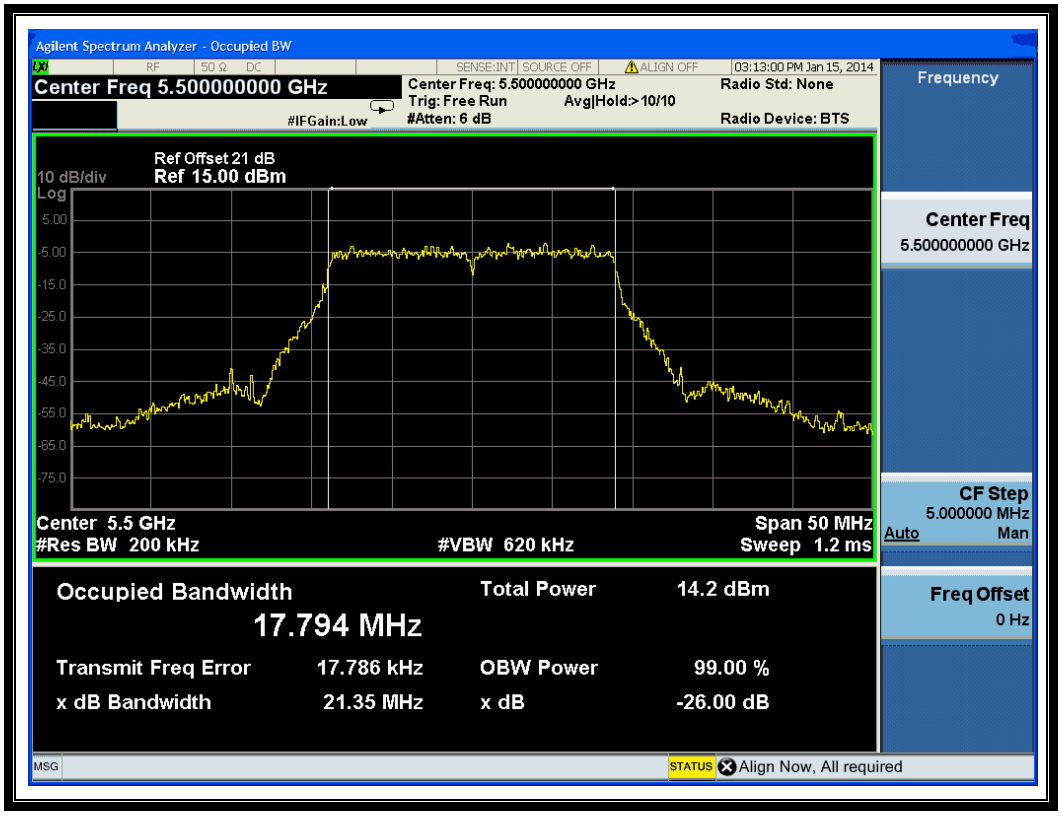
(Channel 52: 5260MHz @ 802.11n-20MHz)



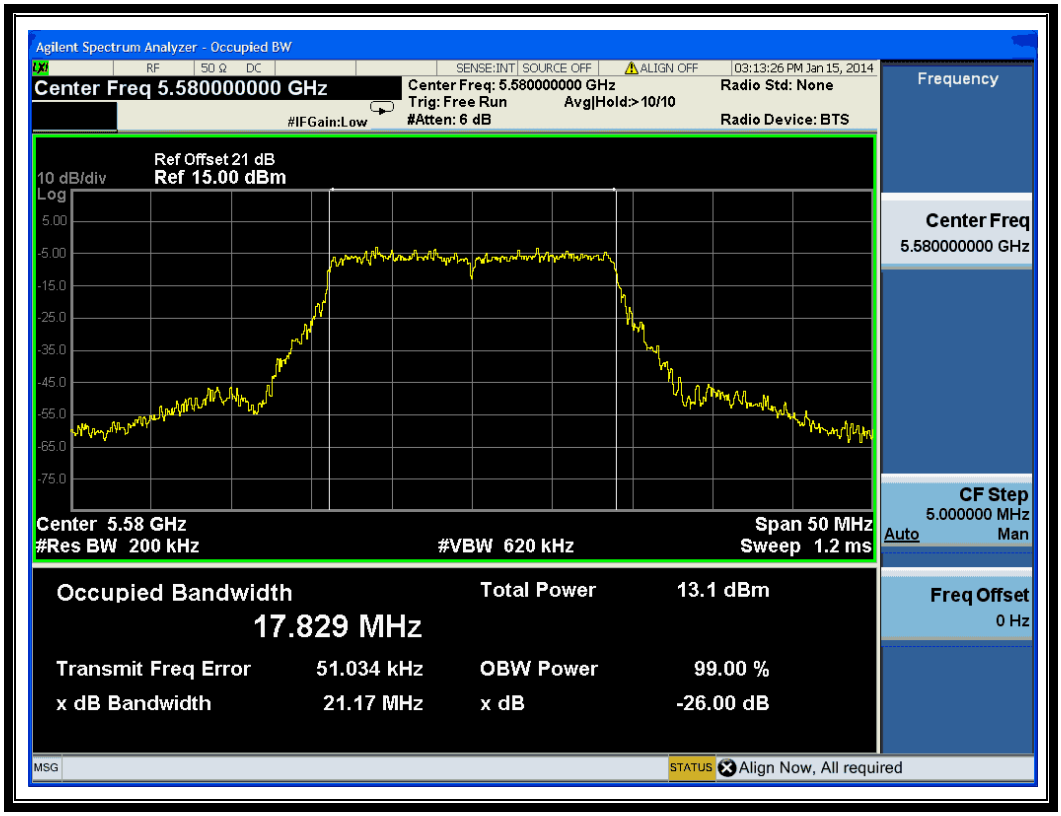
(Channel 60: 5300 MHz @ 802.11n-20MHz)



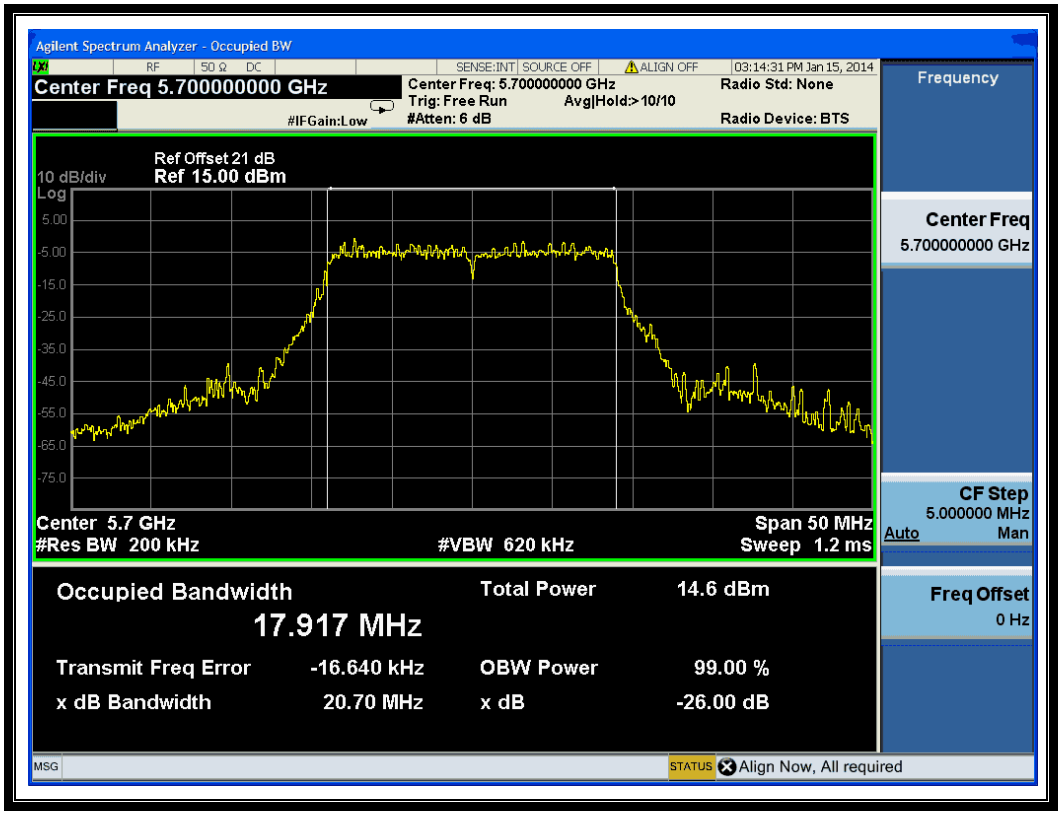
(Channel 64: 5320MHz @ 802.11n-20MHz)



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



(Channel 116: 5580 MHz @ 802.11n-20MHz)



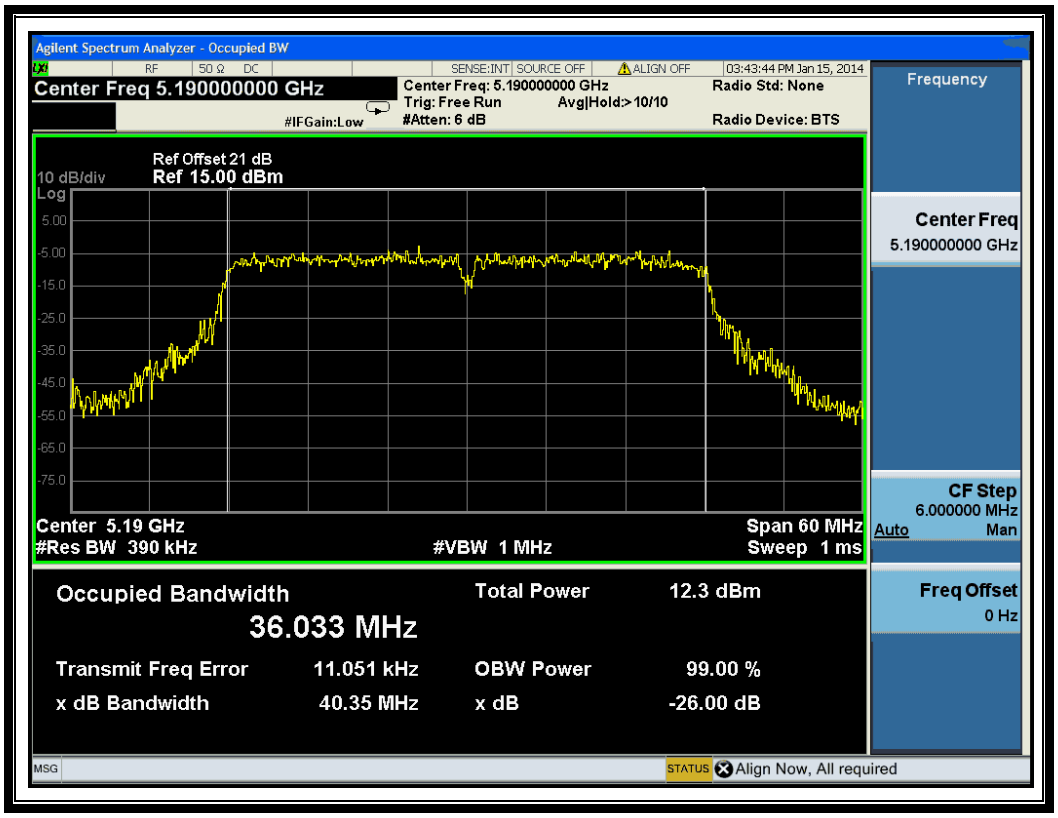
(Channel 140: 5700MHz @ 802.11n-20MHz)

2.3.3.3. 802.11n-40MHz Test mode

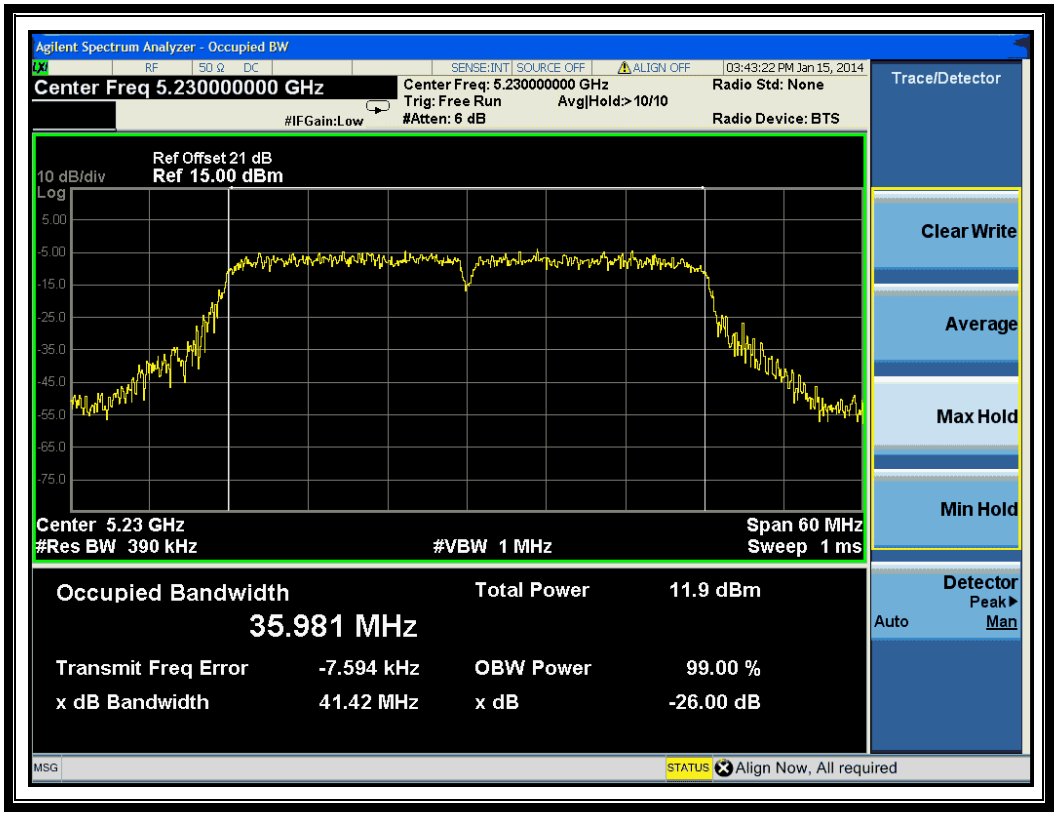
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.35
46	5230	41.42
54	5270	41.08
62	5310	39.58
102	5510	41.58
110	5550	40.93
134	5670	40.52

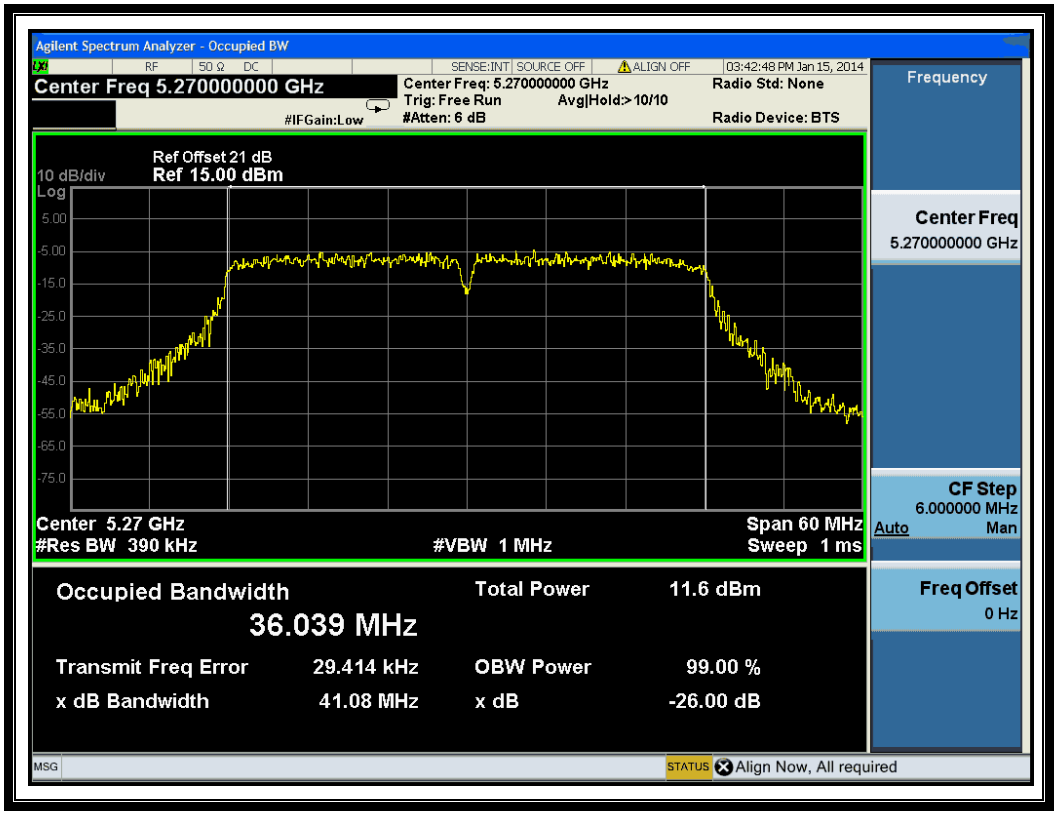
B. Test Plots



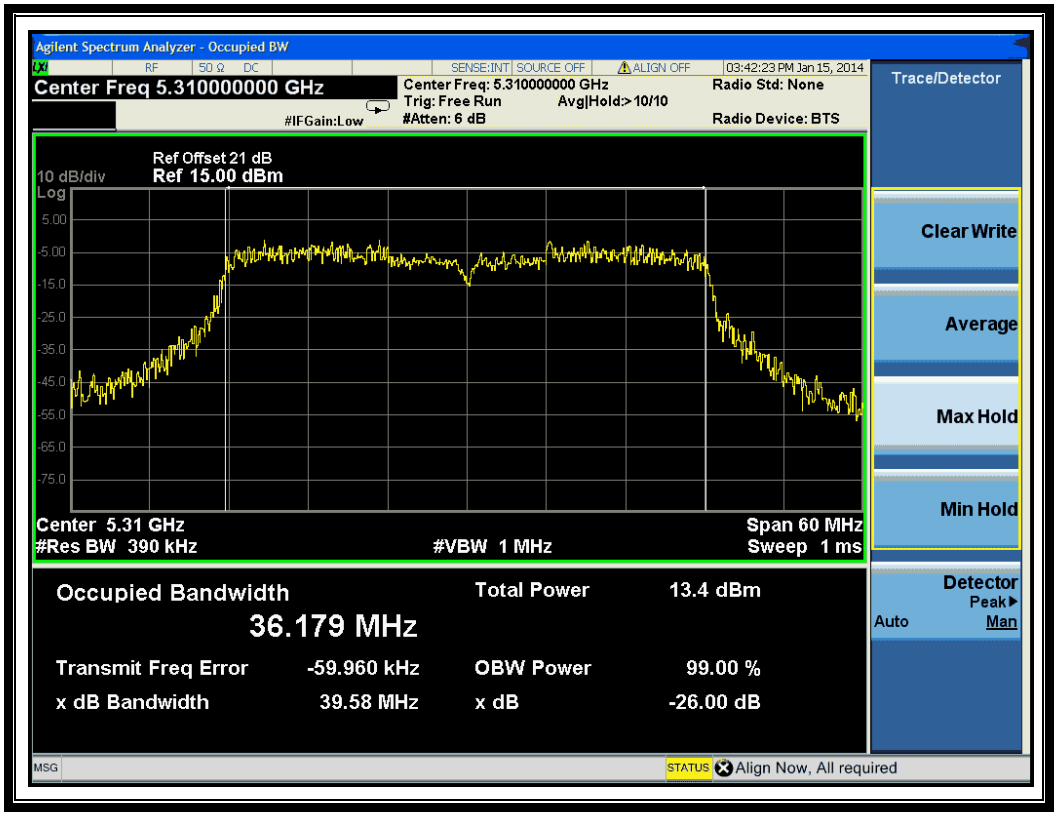
(Channel 38: 5190MHz @ 802.11n-40MHz)



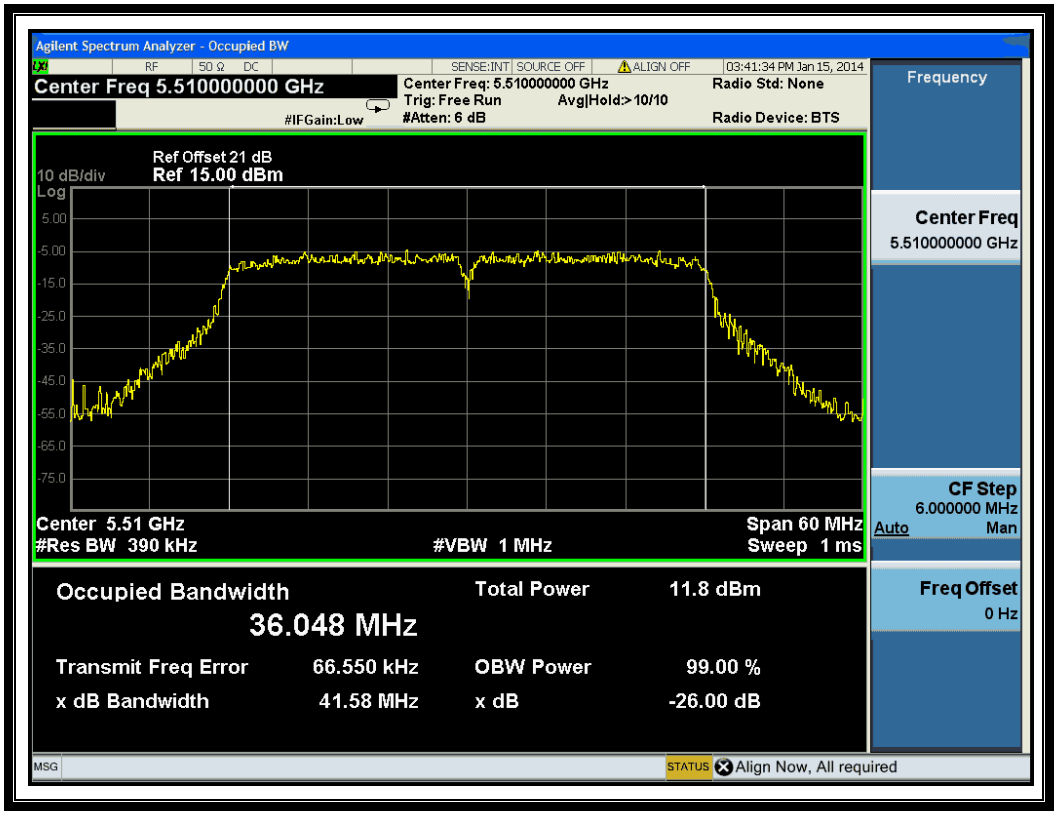
(Channel 46: 5230 MHz @ 802.11n-40MHz)



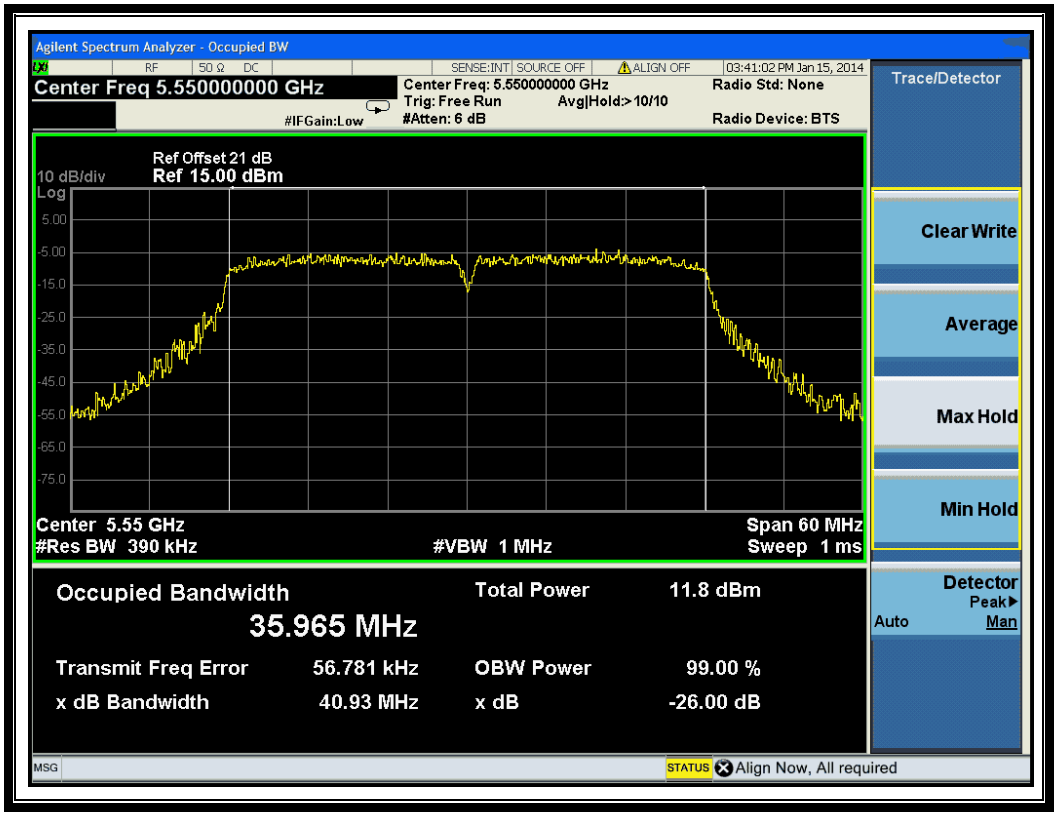
(Channel 54: 5270MHz @ 802.11n-40MHz)



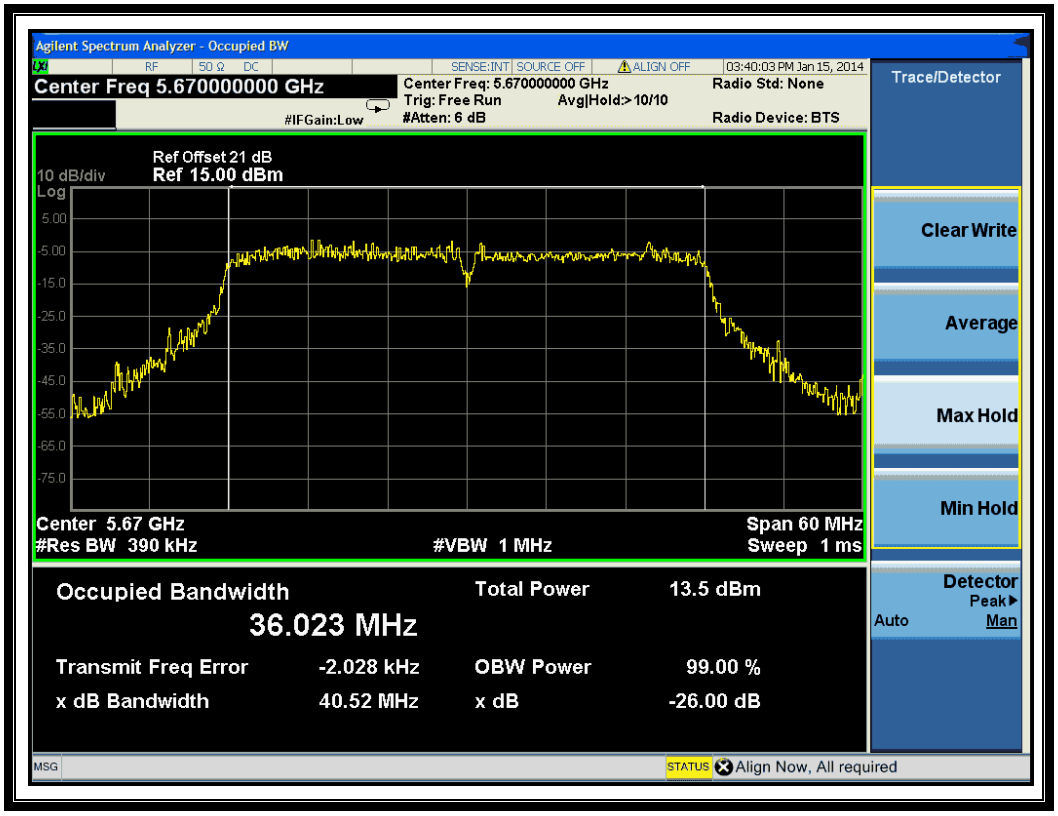
(Channel 62: 5310MHz @ 802.11n-40MHz)



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



(Channel 110: 5550MHz @ 802.11n-40MHz)



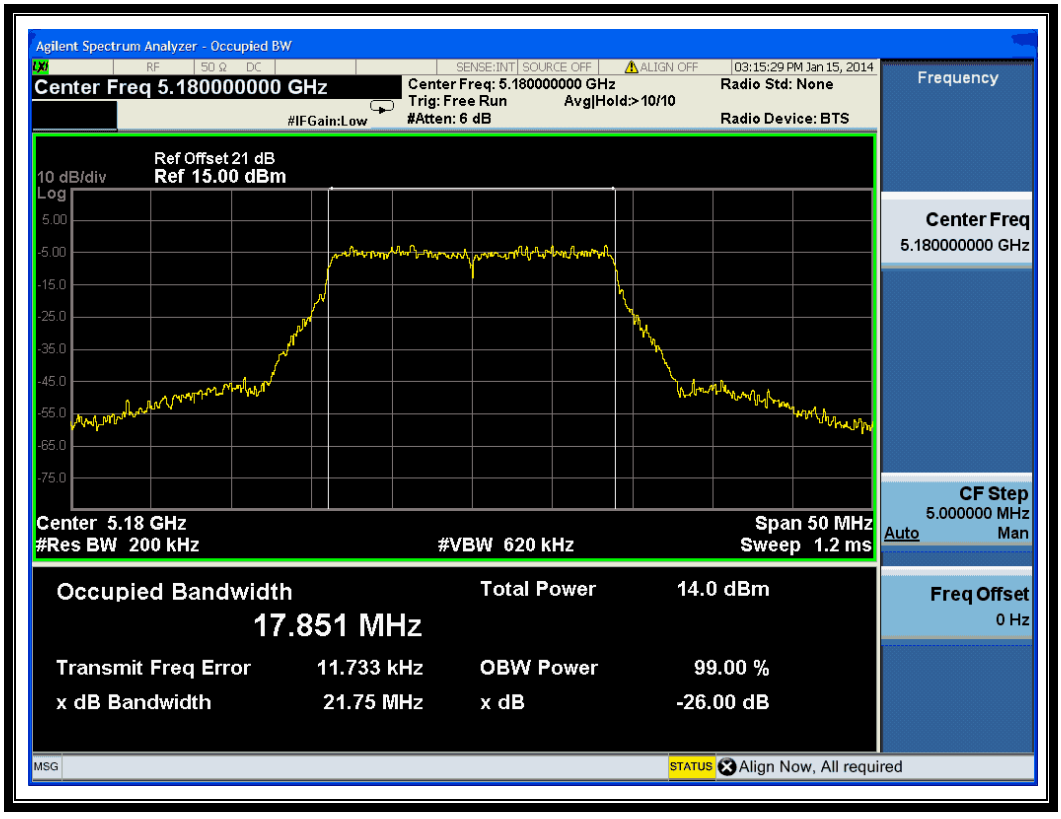
(Channel 134: 5670MHz @ 802.11n-40MHz)

2.3.3.4. 802.11ac-20 Test mode

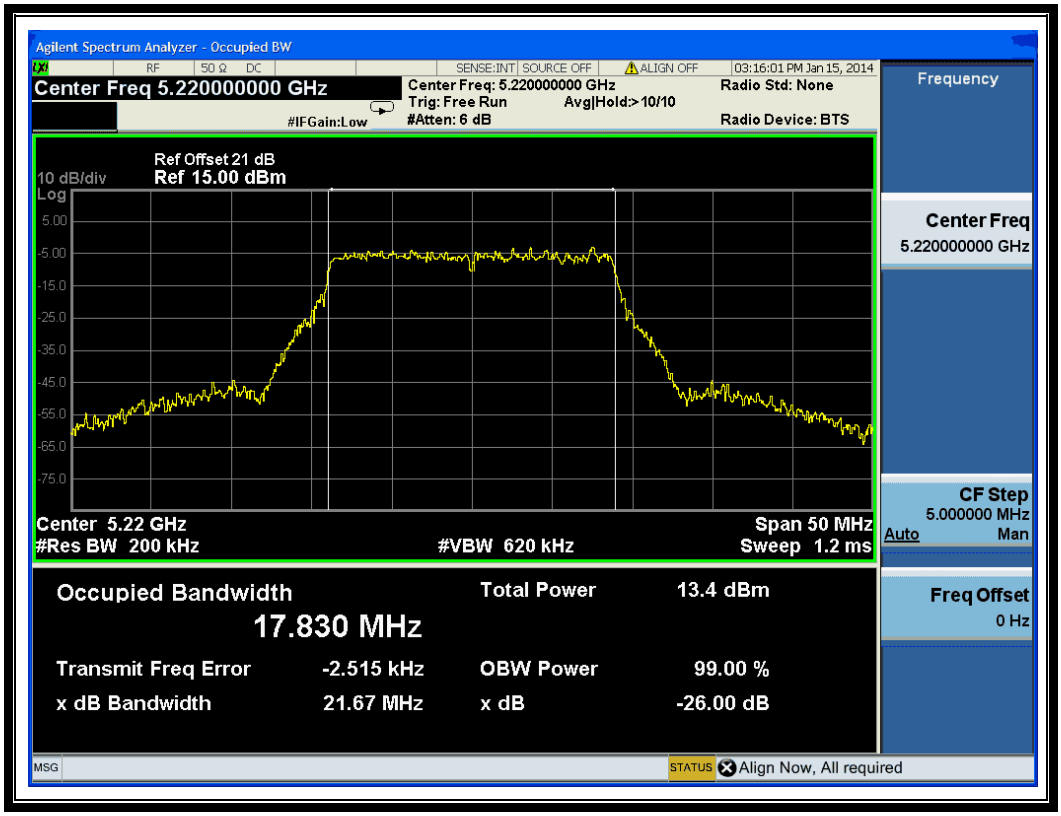
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	21.75
44	5220	21.67
48	5240	21.45
52	5260	21.34
60	5300	21.55
64	5320	21.17
100	5500	21.70
116	5580	21.59
140	5700	21.45

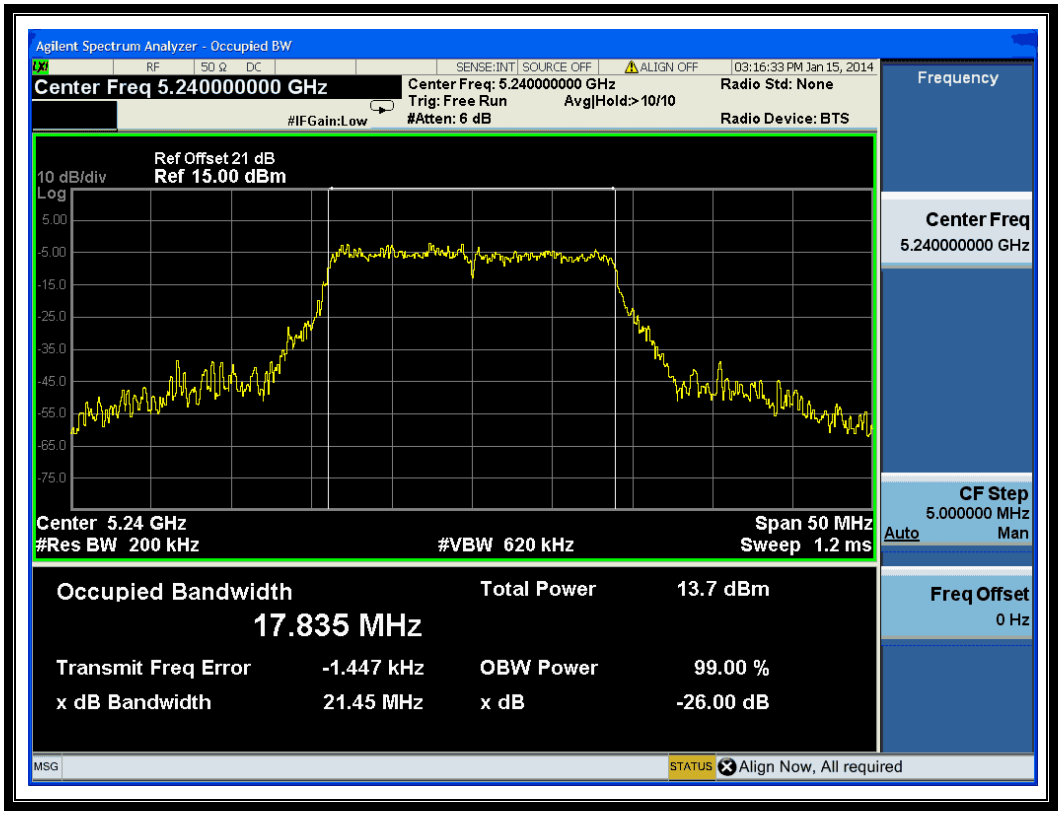
B. Test Plots



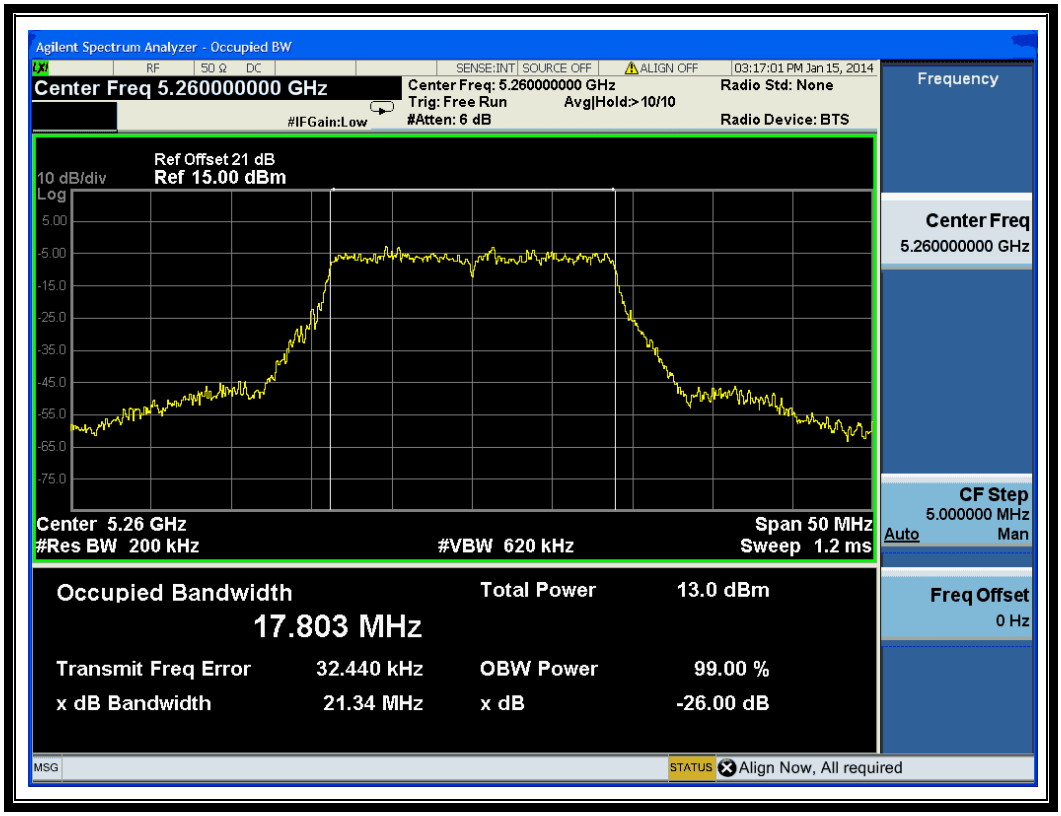
(Channel 36: 5180MHz @ 802.11ac-20MHz)



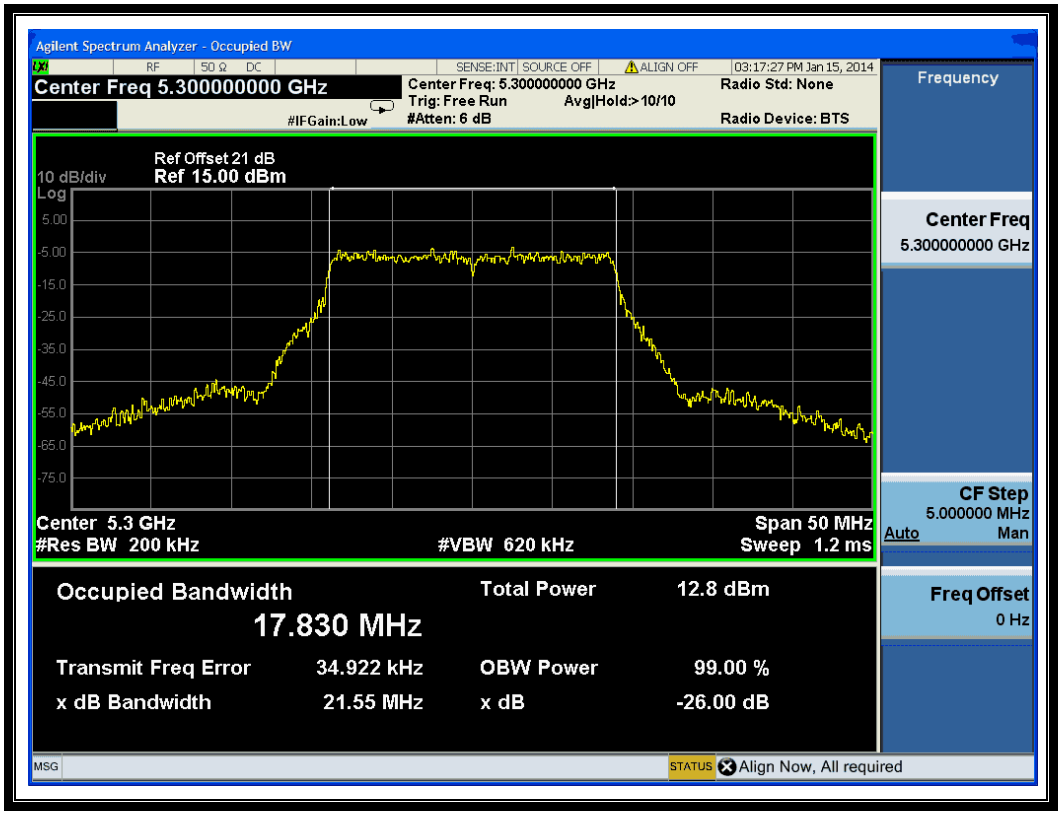
(Channel 44: 5220 MHz @ 802.11ac-20MHz)



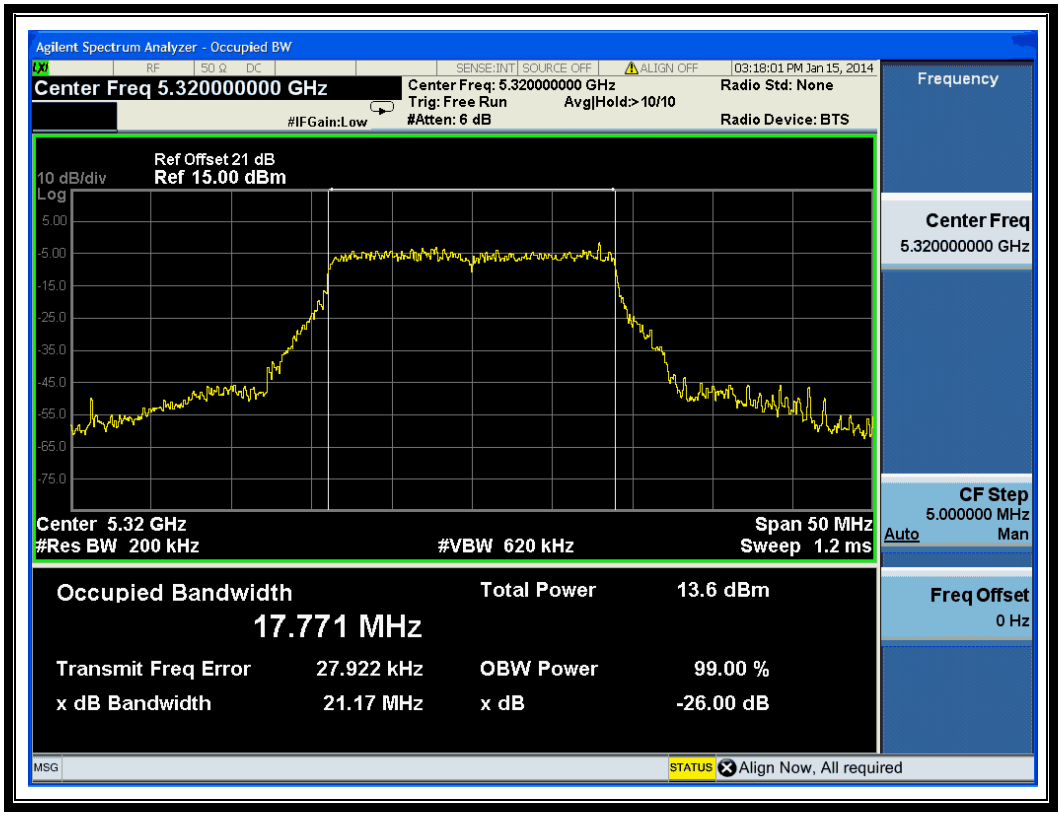
(Channel 48: 5240MHz @ 802.11ac-20MHz)



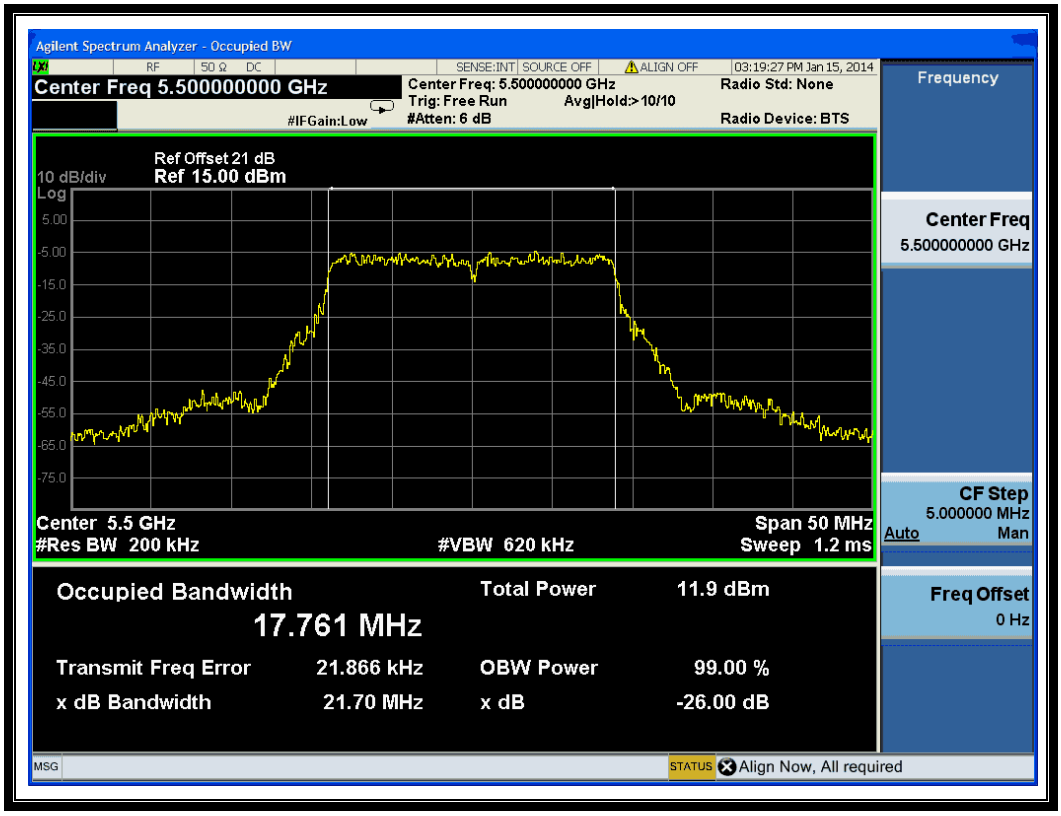
(Channel 52: 5260MHz @ 802.11ac-20MHz)



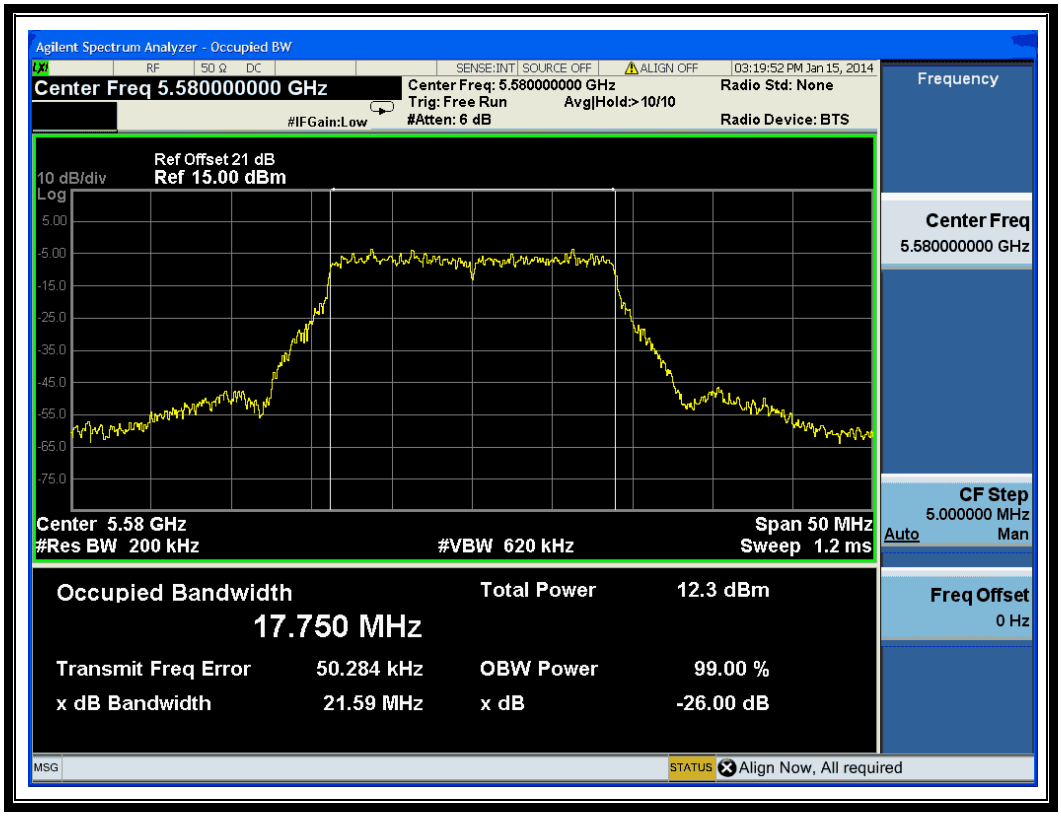
(Channel 60: 5300 MHz @ 802.11ac-20MHz)



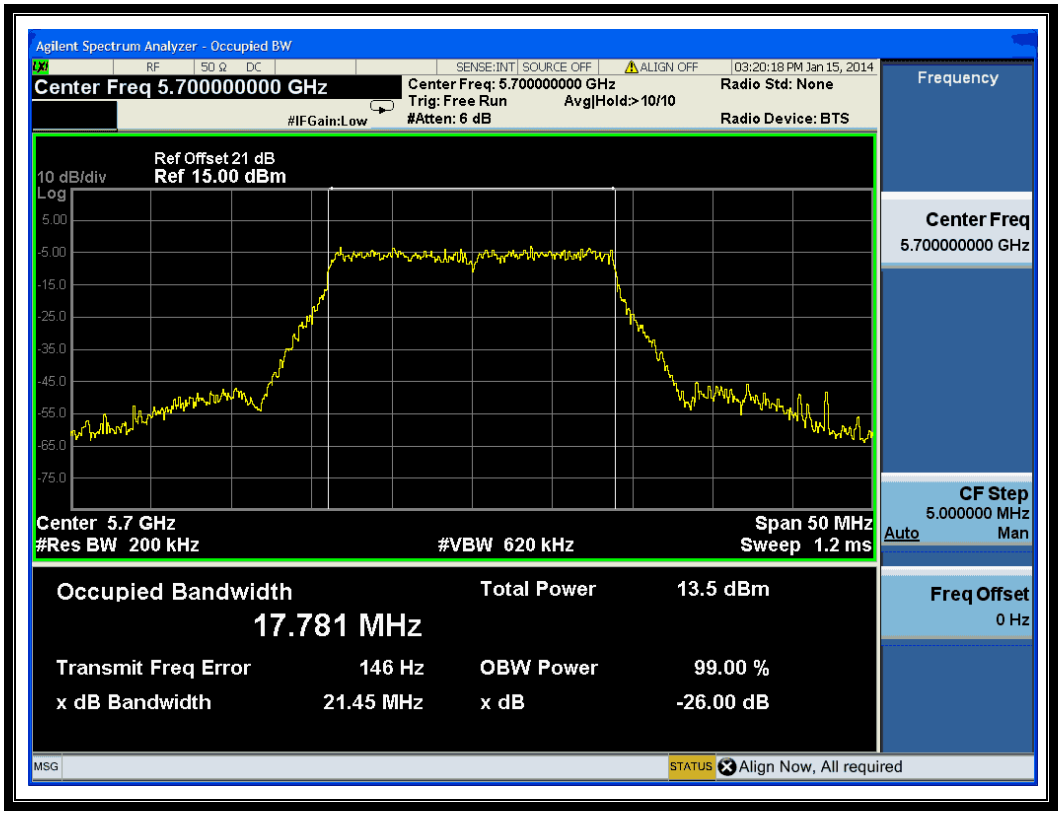
(Channel 64: 5320MHz @ 802.11ac-20MHz)



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



(Channel 116: 5580 MHz @ 802.11ac-20MHz)



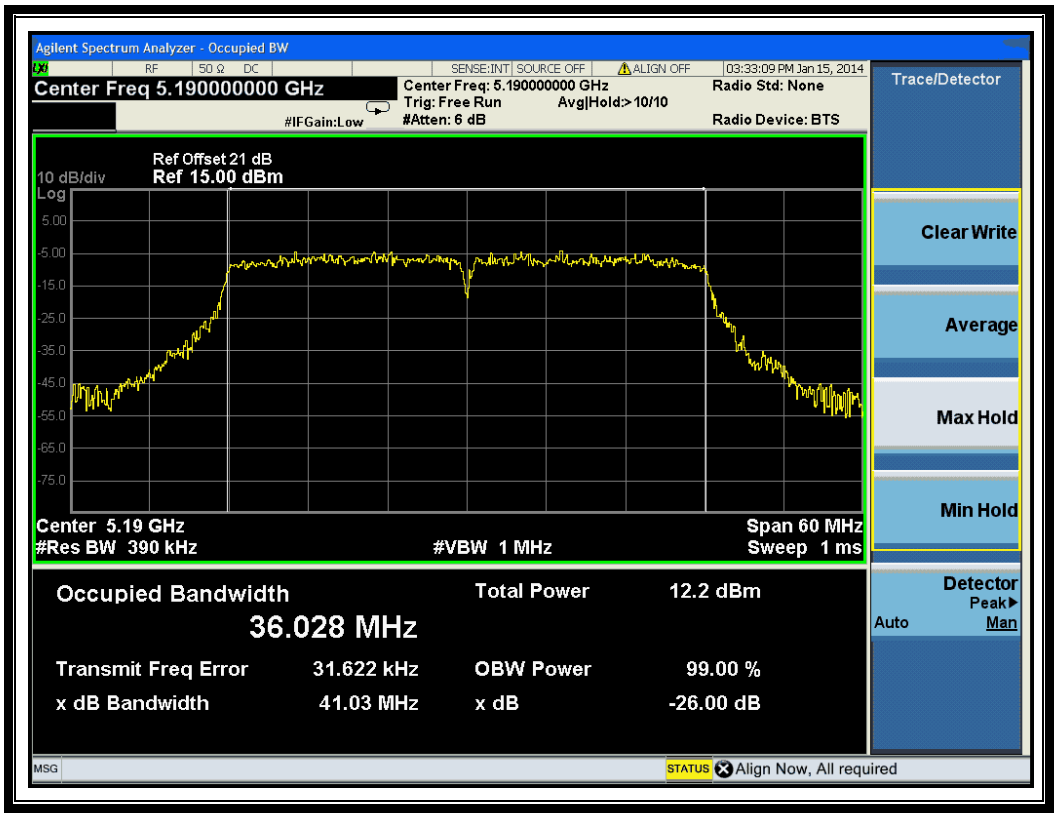
(Channel 140: 5700MHz @ 802.11ac-20MHz)

2.3.3.5. 802.11ac-40MHz Test mode

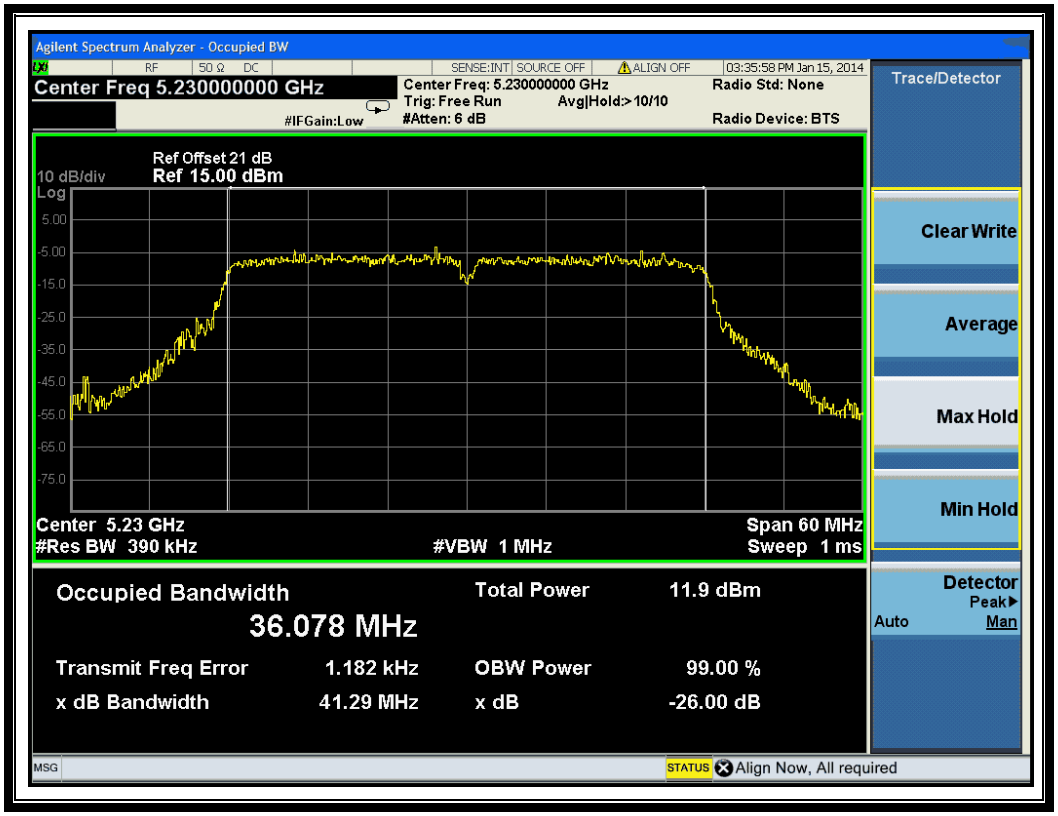
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	41.03
46	5230	41.29
54	5270	41.92
62	5310	40.89
102	5510	39.48
110	5550	41.42
134	5670	41.83

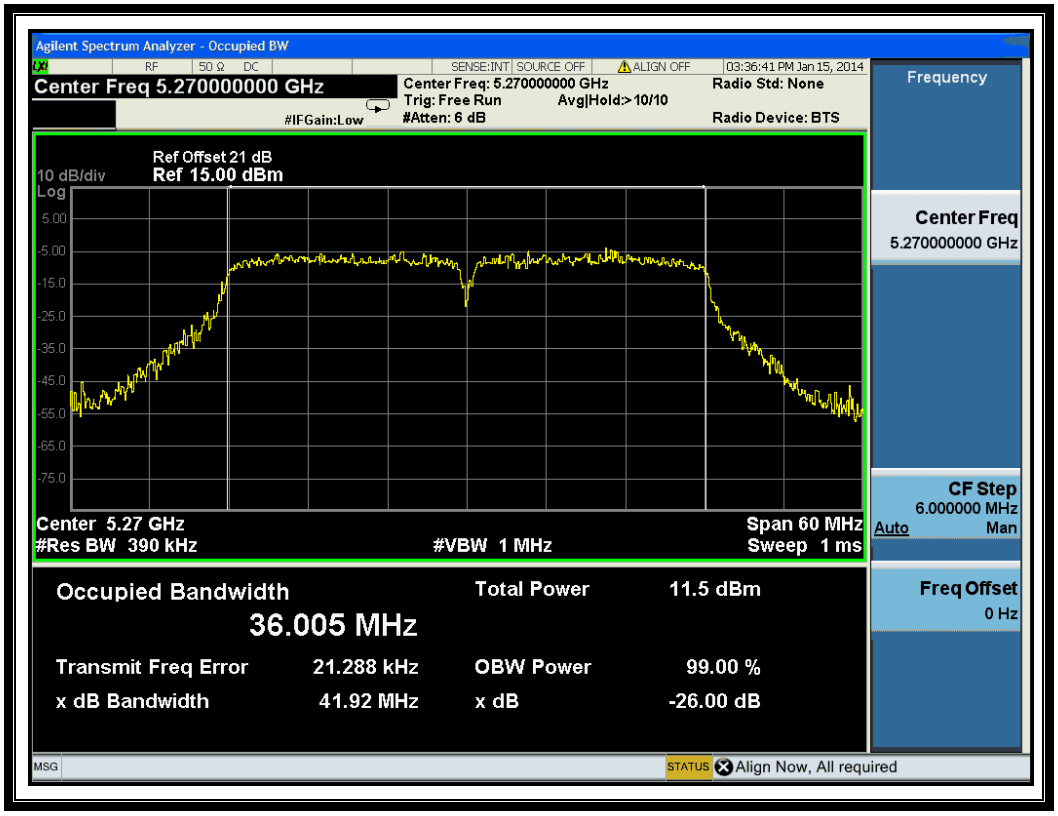
B. Test Plots



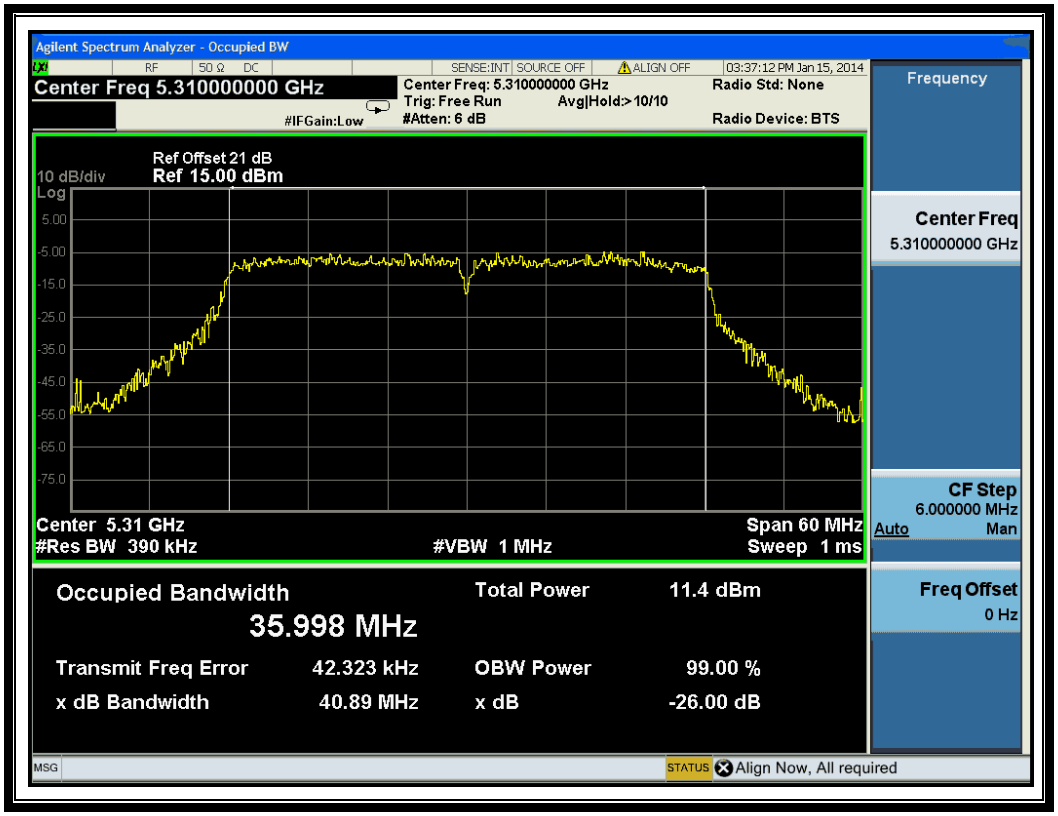
(Channel 38: 5190MHz @ 802.11ac-40MHz)



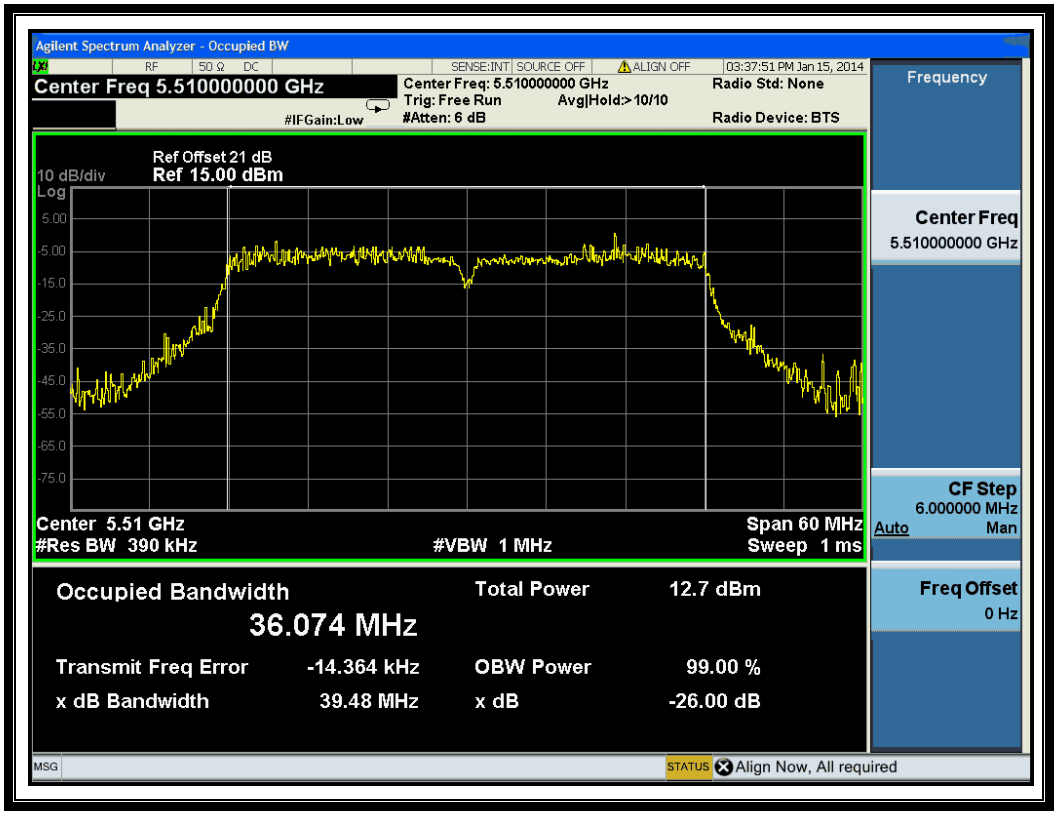
(Channel 46: 5230 MHz @ 802.11ac-40MHz)



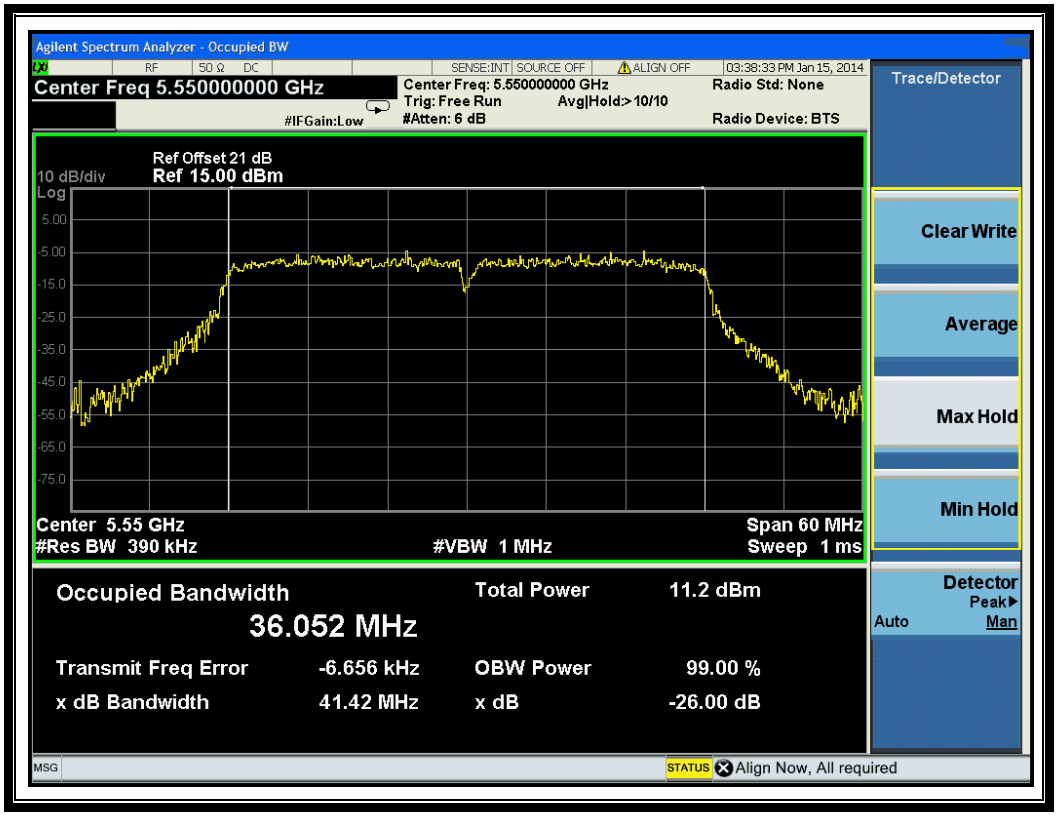
(Channel 54: 5270MHz @ 802.11ac-40MHz)



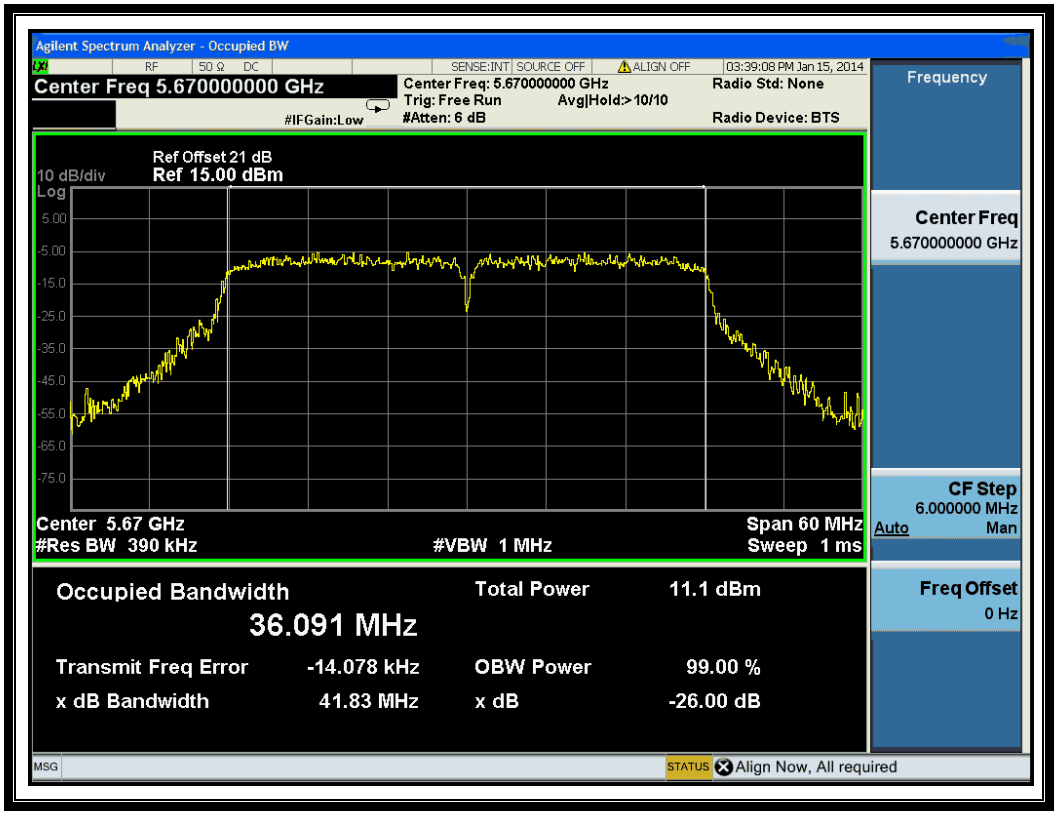
(Channel 62: 5310MHz @ 802.11ac-40MHz)



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



(Channel 110: 5550MHz @ 802.11ac-40MHz)



(Channel 134: 5670MHz @ 802.11ac-40MHz)

2.4. Maximum conducted output Power

2.4.1. Requirement

(1) For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50mW or 4dBm + 10logB, where B is the 26dB emission bandwidth in MHz.

(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.

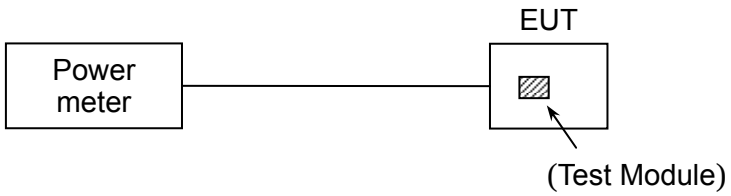
(3) For the band 5.725–5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17dBm+ 10logB, where B is the 26dB emission bandwidth in MHz.
If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted 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.

2.4.2. Test Description

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

The measured output power was calculated by the reading of the Power Meter. Then, record the max value and add 10log(1/duty cycle)

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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EPM Series Power Meter	Agilent	E4418B	GB43318055	2013.05.12	2014.05.11
Power Sensor	Agilent	8482A	MY41091706	2013.05.12	2014.05.11

2.4.3. Test Result

2.4.3.1. 802.11a Test mode

Channel	Frequency (MHz)	Measured Output Power without duty factor dBm	Duty factor	Measured Output Power with duty factor dBm	Limit dBm	Verdict
36	5180	11.11	0.59	11.70	17	PASS
44	5220	11.33		11.92		
48	5240	11.59		12.18		
52	5260	11.63		12.22	24	
60	5300	11.17		11.76		
64	5320	11.39		11.98		
100	5500	11.98		12.57		
116	5580	11.94		12.53		
140	5700	11.64		12.23		

2.4.3.2. 802.11n-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power without duty factor dBm	Duty factor	Measured Output Power with duty factor dBm	Limit dBm	Verdict
36	5180	9.49	0.67	10.16	17	PASS
44	5220	9.55		10.22		
48	5240	9.72		10.39		
52	5260	9.69		10.36	24	
60	5300	9.57		10.24		
64	5320	9.50		10.17		
100	5500	9.94		10.61		
116	5580	9.86		10.53		
140	5700	9.59		10.26		

2.4.3.3. 802.11n-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Power without duty factor dBm	Duty factor	Measured Output Power with duty factor dBm	Limit dBm	Verdict
38	5190	7.66	1.57	9.23	17	PASS
46	5230	7.86		9.43		
54	5270	7.83		9.40	24	
62	5310	7.62		9.19		
102	5510	7.99		9.56		
110	5550	7.93		9.50		
134	5670	7.56		9.13		

2.4.3.4. 802.11ac-20MHz Test mode

Channel	Frequency (MHz)	Measured Output Power without duty factor dBm	Duty factor	Measured Output Power with duty factor dBm	Limit dBm	Verdict
36	5180	8.40	0.67	9.07	17	PASS
44	5220	8.42		9.09		
48	5240	8.51		9.18		
52	5260	8.51		9.18	24	
60	5300	8.33		9.00		
64	5320	8.21		8.88		
100	5500	8.75		9.42		
116	5580	8.70		9.37		
140	5700	8.63		9.30		

2.4.3.5. 802.11ac-40MHz Test mode

Channel	Frequency (MHz)	Measured Output Power without duty factor dBm	Duty factor	Measured Output Power without duty factor dBm	Limit dBm	Verdict
38	5190	6.36	1.57	7.93	17	PASS
46	5230	6.55		8.12		
54	5270	6.58		8.15	24	
62	5310	6.34		7.91		
102	5510	6.74		8.31		
110	5550	6.61		8.18		
134	5670	6.52		8.09		

2.5. Peak Power spectral density

2.5.1. Requirement

(1)For the band 5.15–5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1–MHz band.

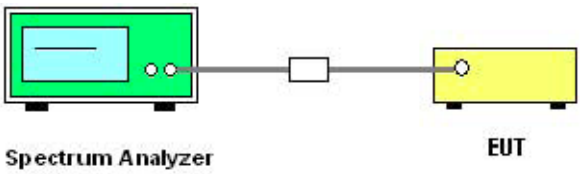
(2) For the 5.25–5.35 GHz and 5.47–5.725GHz bands, the peak power spectral density shall not exceed 11dBm in any 1 megahertz band.

(3) For the band 5.725–5.825 GHz, the peak power spectral density shall not exceed 17dBm in any 1–MHz band.

If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

2.5.2. 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) Peak power spectral density(PPSD) Method SA-2 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 and add 10log(1/duty cycle)

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EXA Signal Analzyer	Agilent	N9010A	MY51440152	2013.05.12	2014.05.11

2.5.3. Test Result

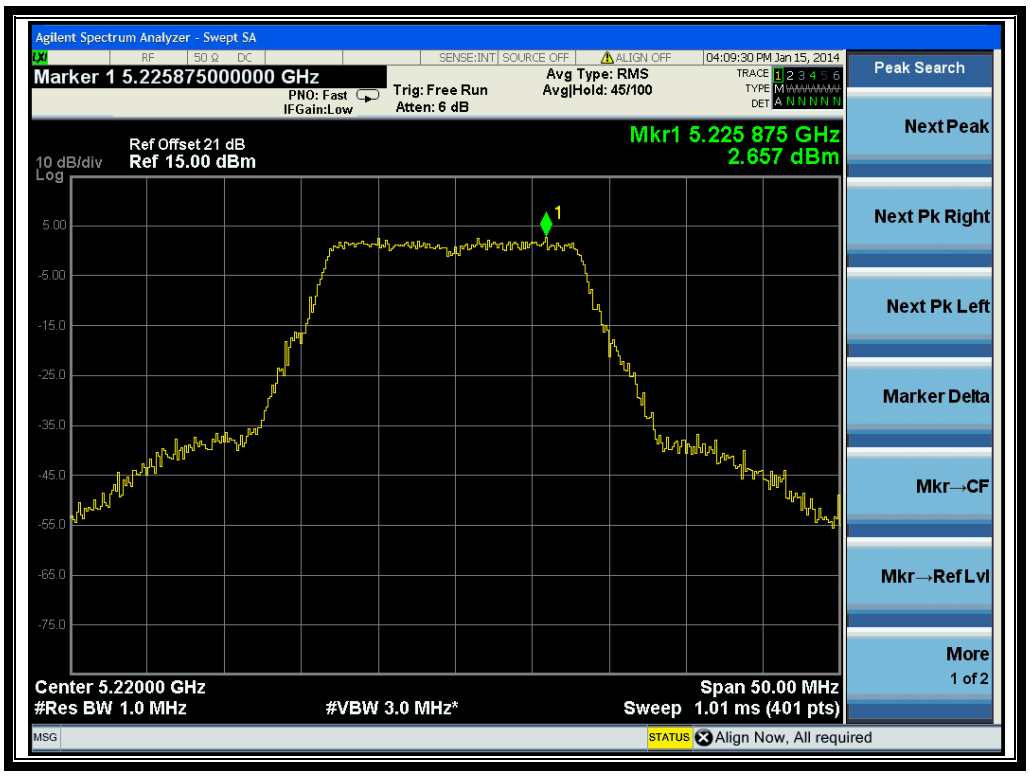
2.5.3.1. 802.11a Test mode

A. Test Verdict:

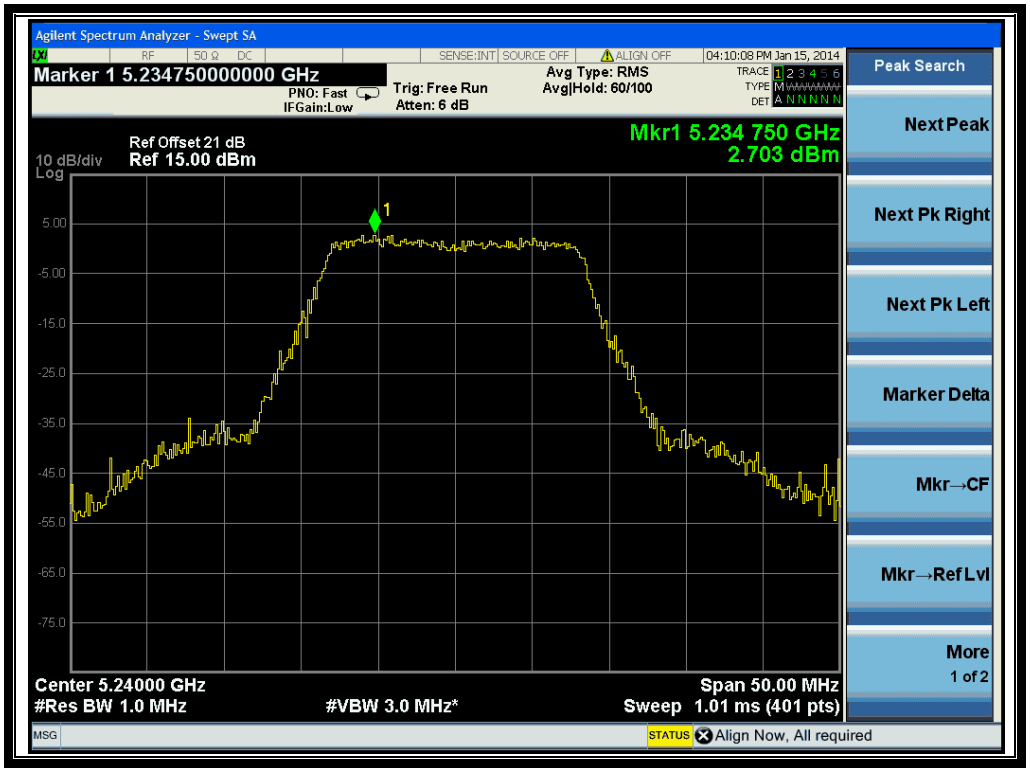
Channel	Frequency (MHz)	Measured PPSD Without Duty factor (dBm)	Duty factor	Measured PPSD With Duty factor (dBm)	Limit (dBm)	Verdict
36	5180	2.722	0.59	3.312	4	PASS
44	5220	2.657		3.247		
48	5240	2.703		3.293		
52	5260	2.034		2.624	11	
60	5300	1.858		2.448		
64	5320	2.311		2.901		
100	5500	1.706		2.296		
116	5580	1.697		2.287		
140	5700	2.606		3.196		

B. Test Plots:

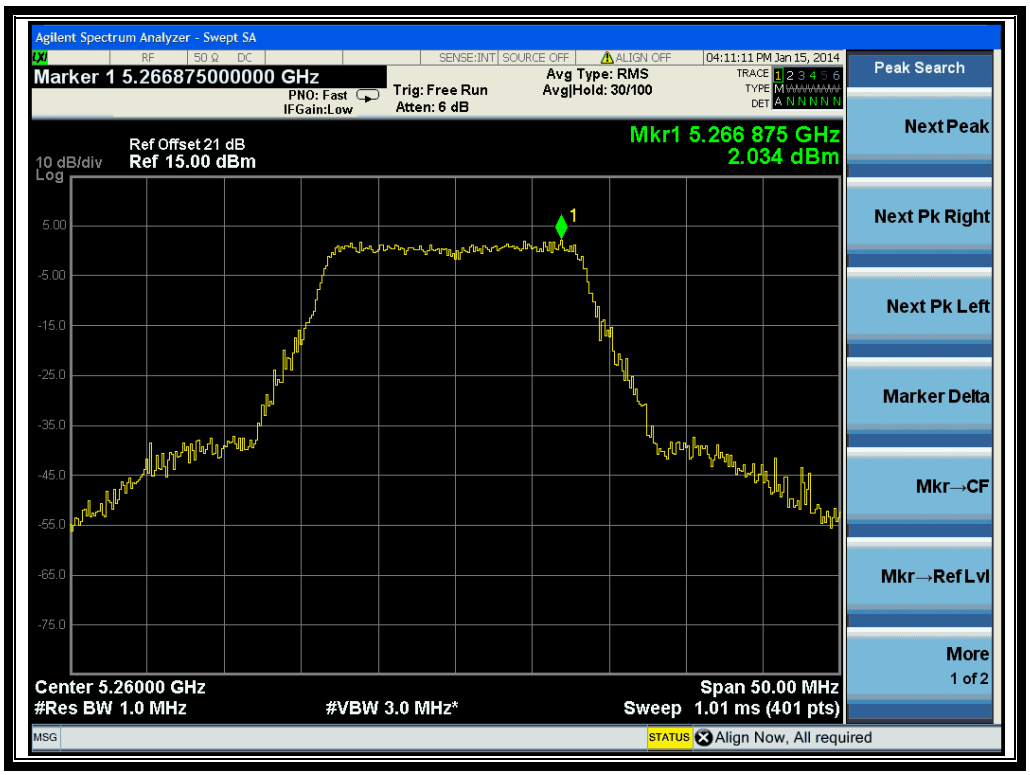
(Channel 36: 5180MHz @ 802.11a)



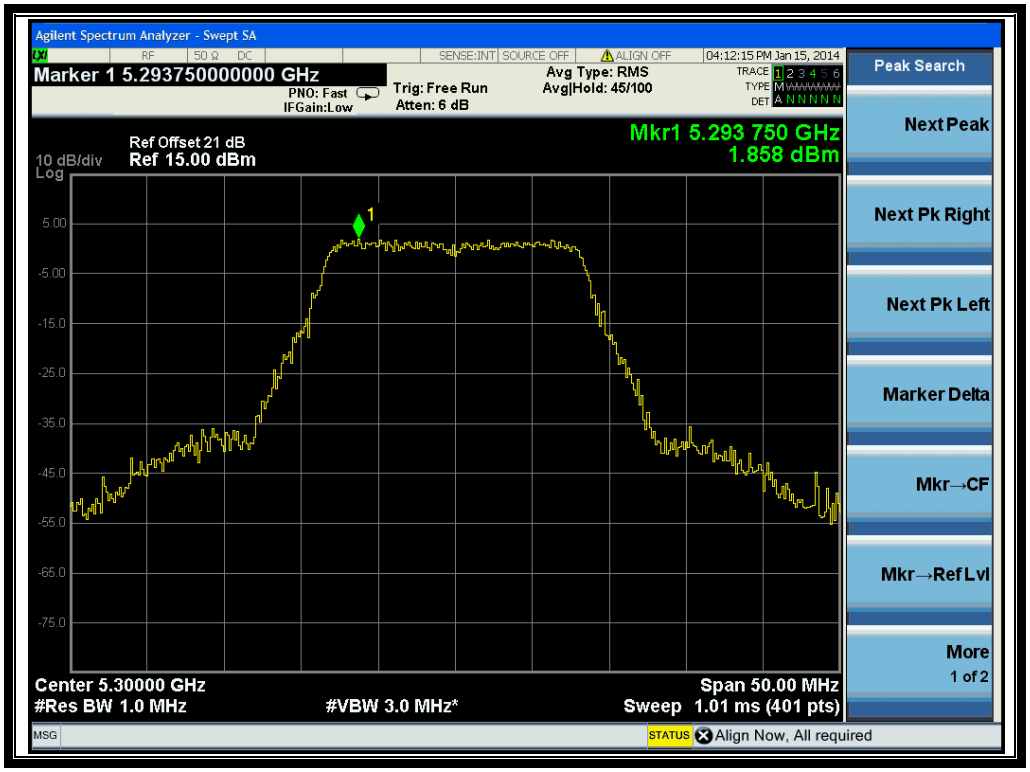
(Channel 44: 5220 MHz @ 802.11a)



(Channel 48: 5240MHz @ 802.11a)

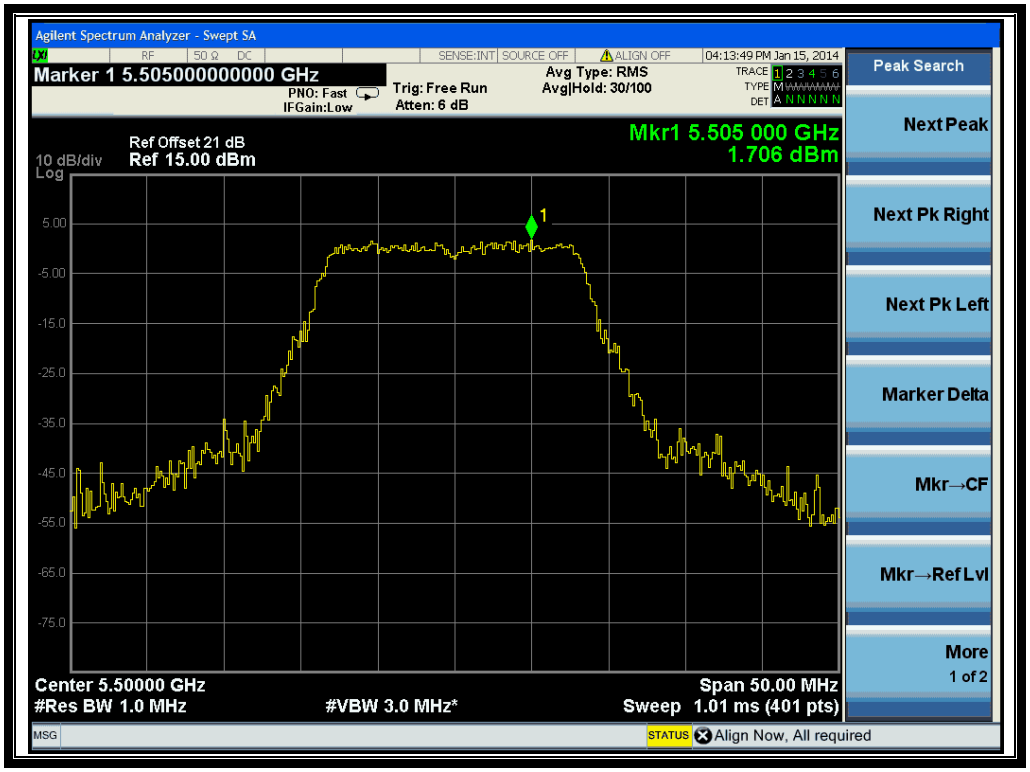


(Channel 52: 5260MHz @ 802.11a)

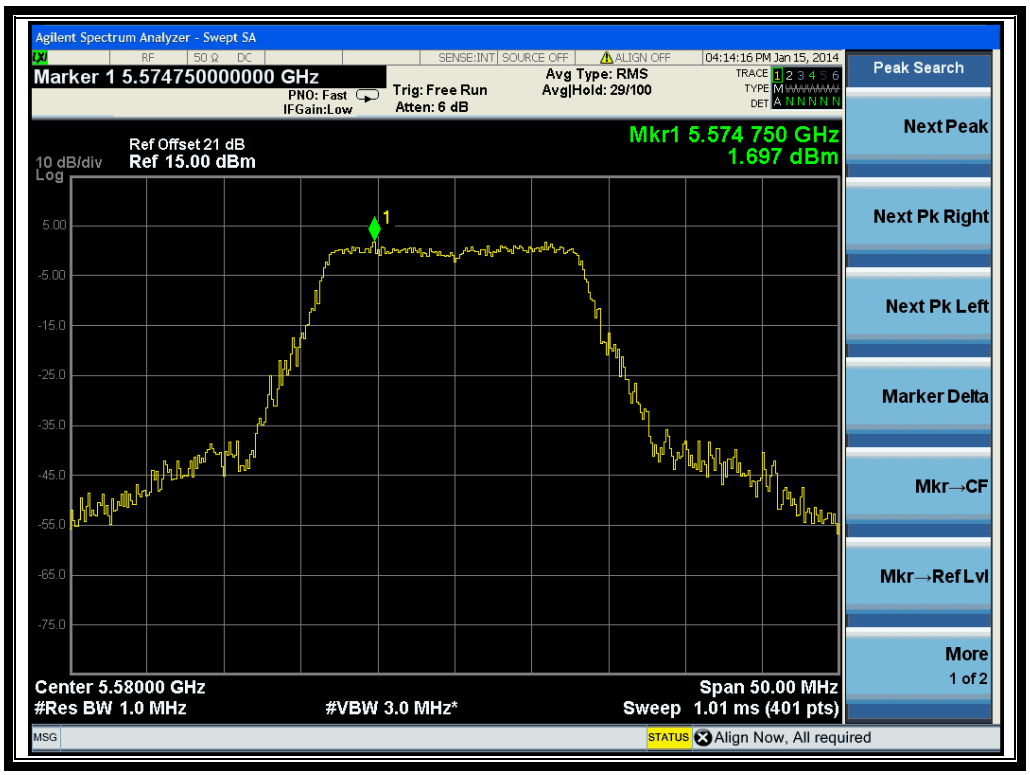


(Channel 60: 5300 MHz @ 802.11a)

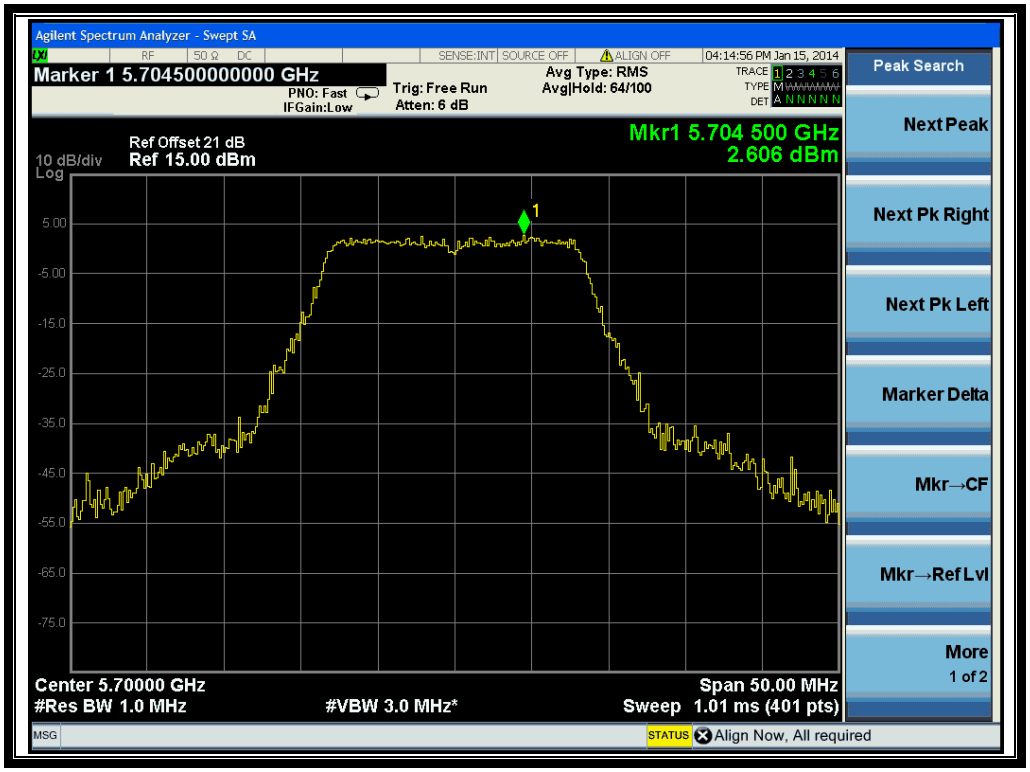
(Channel 64: 5320MHz @ 802.11a)



(Channel 100: 5500MHz @ 802.11a)



(Channel 116: 5580 MHz @ 802.11a)



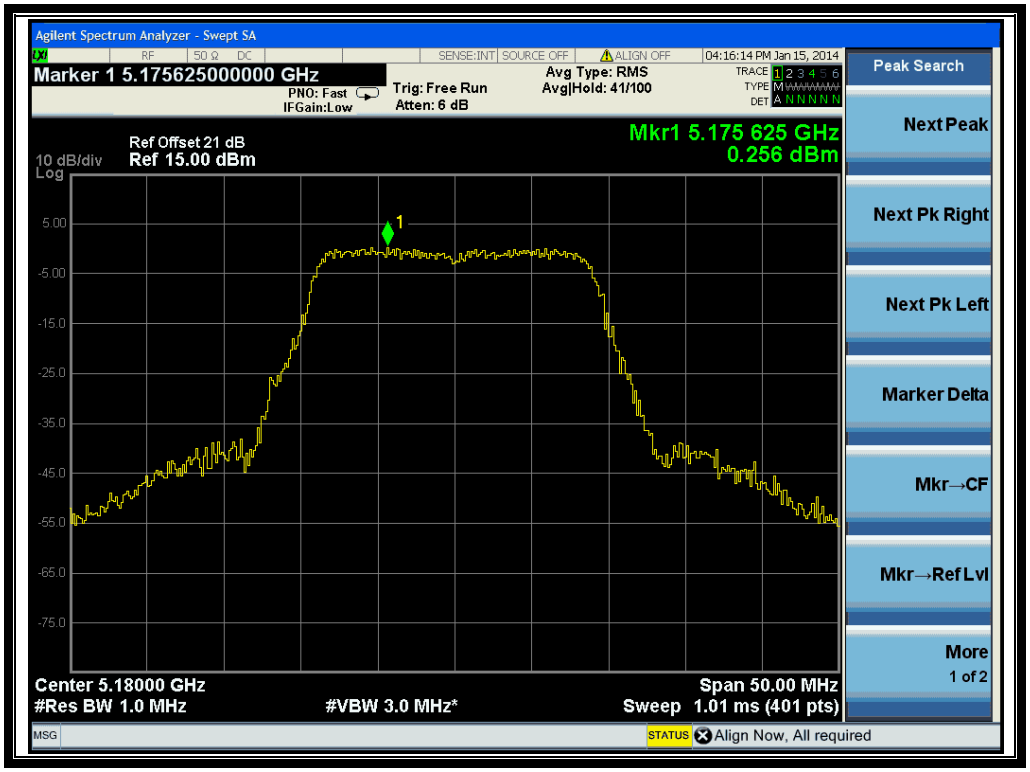
(Channel 140: 5700MHz @ 802.11a)

2.5.3.2. 802.11n-20MHz Test mode

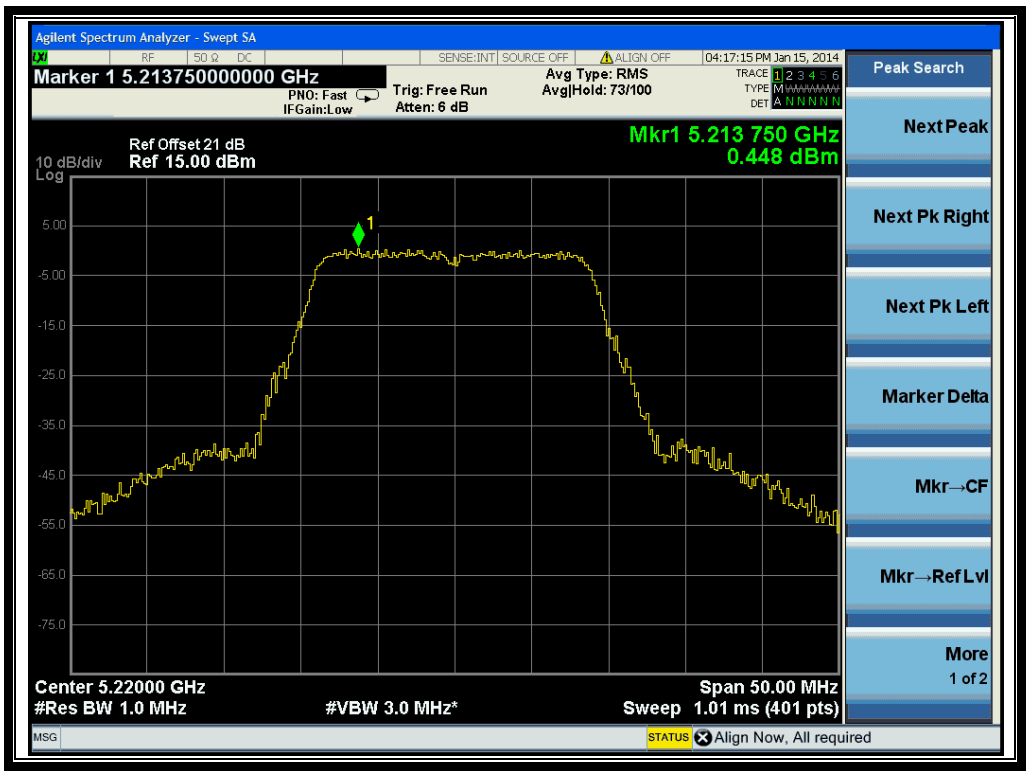
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD Without Duty factor (dBm)	Duty factor	Measured PPSD With Duty factor (dBm)	Limit (dBm)	Verdict
36	5180	0.256	0.67	0.926	4	PASS
44	5220	0.448		1.118		
48	5240	1.631		2.301		
52	5260	1.632		2.302	11	
60	5300	1.423		2.093		
64	5320	-0.009		0.661		
100	5500	-0.862		-0.192		
116	5580	0.937		1.607		
140	5700	2.108		2.778		

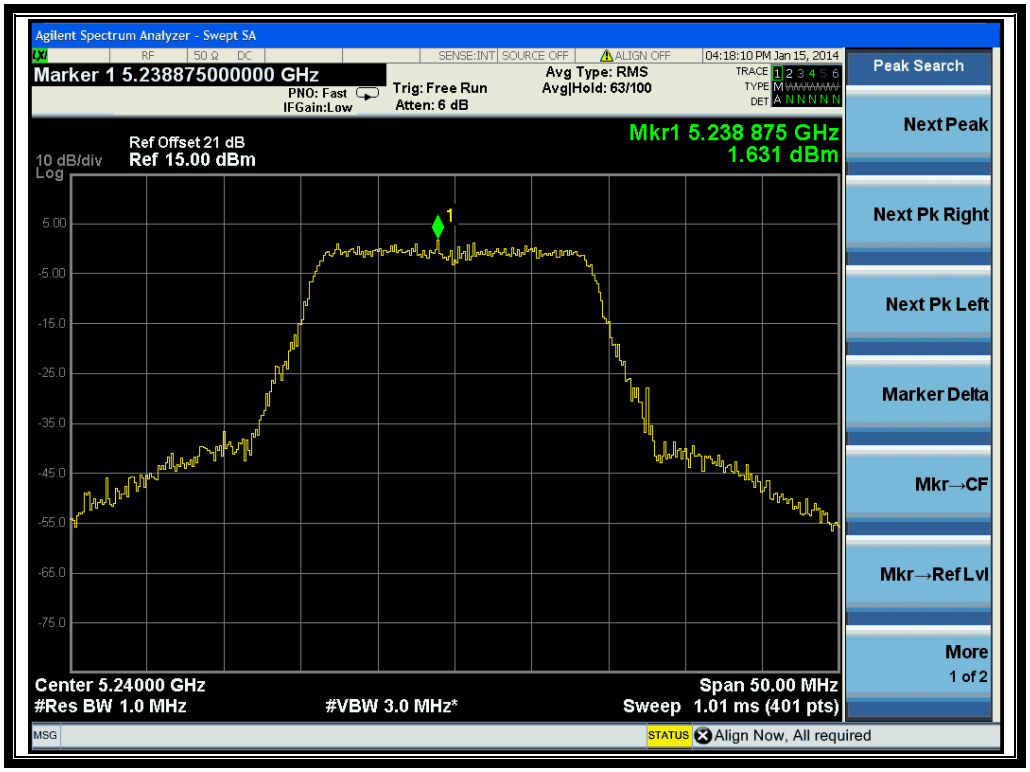
B. Test Plots:



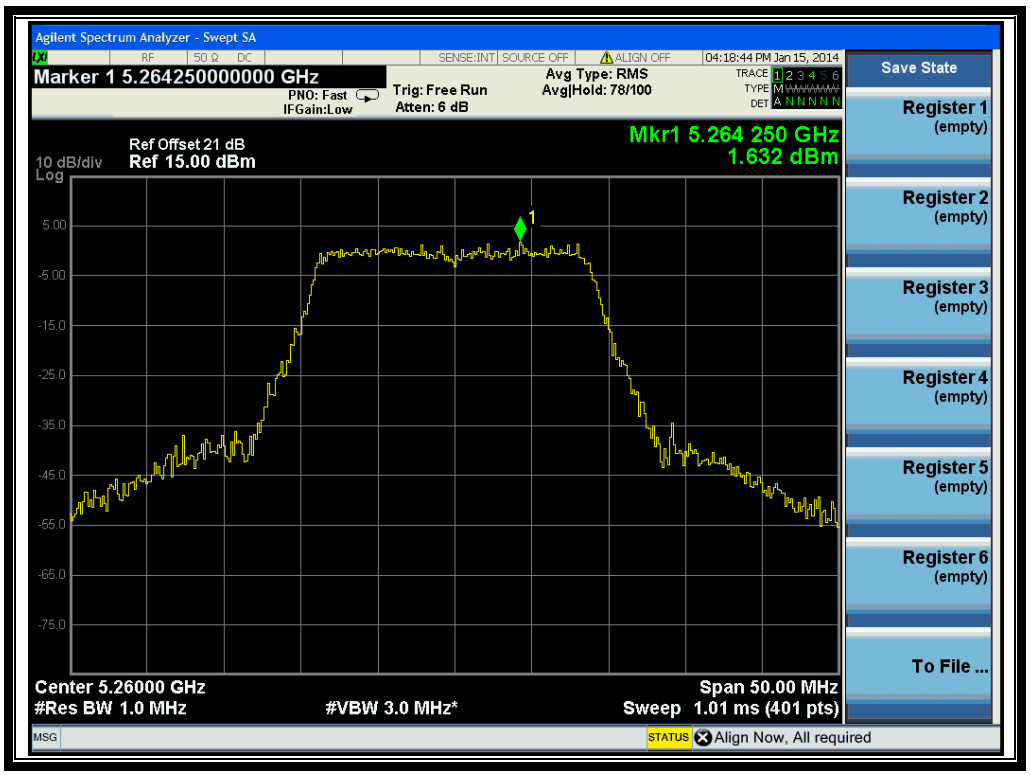
(Channel 36: 5180MHz @ 802.11n-20MHz)



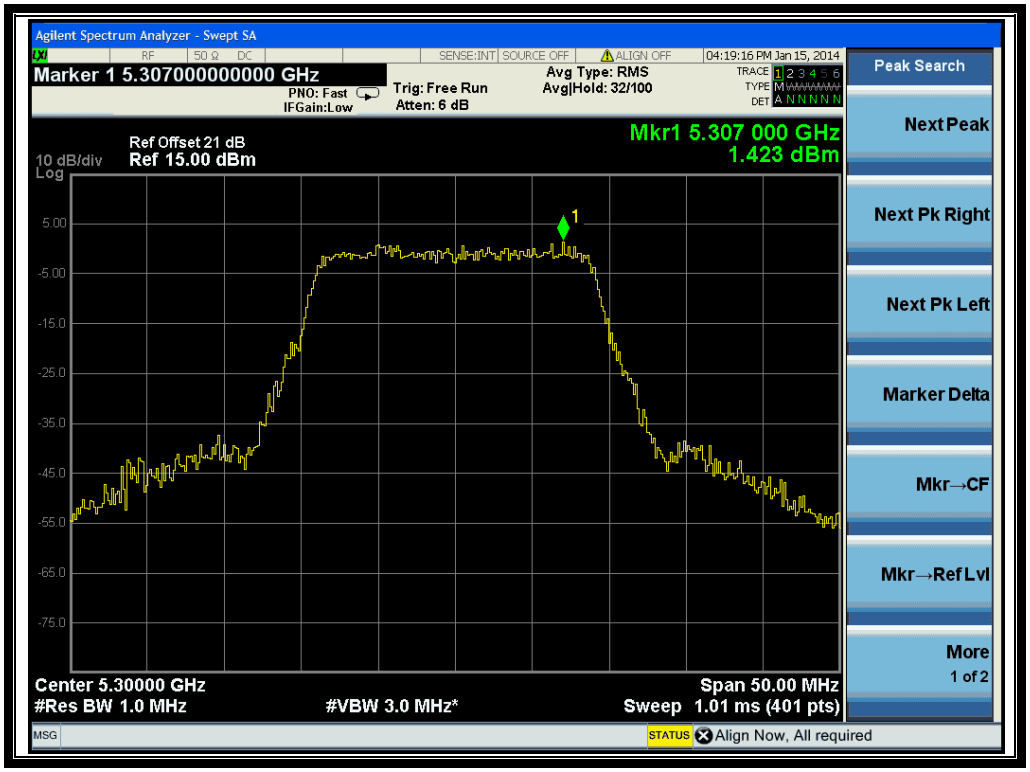
(Channel 44: 5220 MHz @ 802.11n-20MHz)



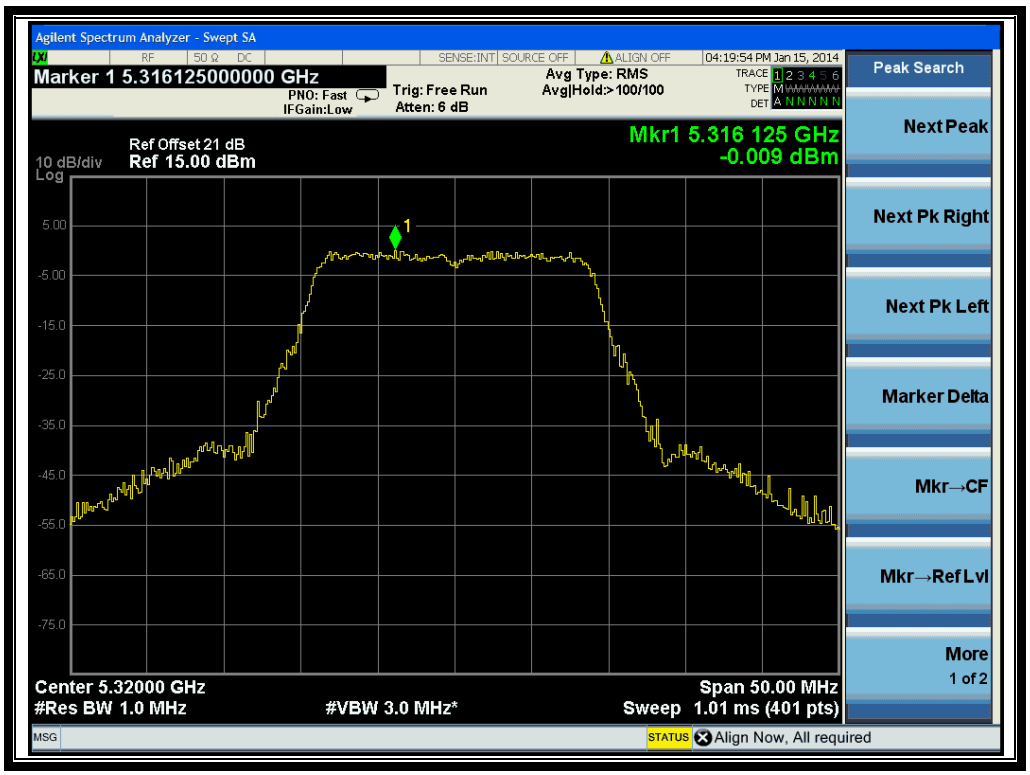
(Channel 48: 5240MHz @ 802.11n-20MHz)



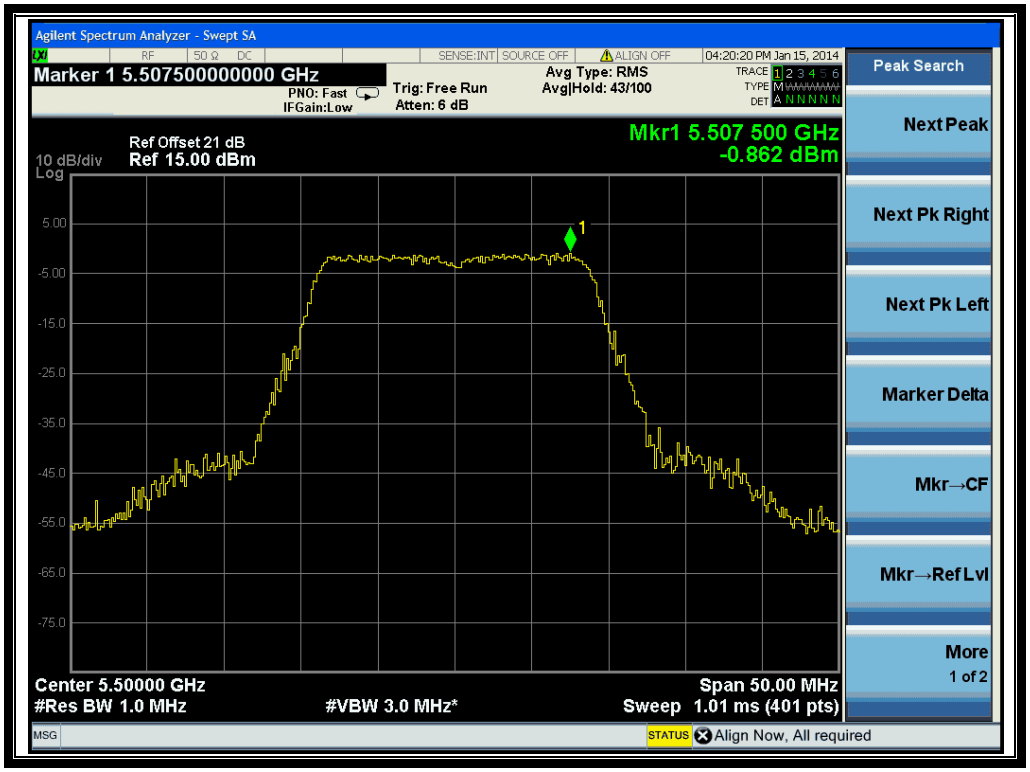
(Channel 52: 5260MHz @ 802.11n-20MHz)



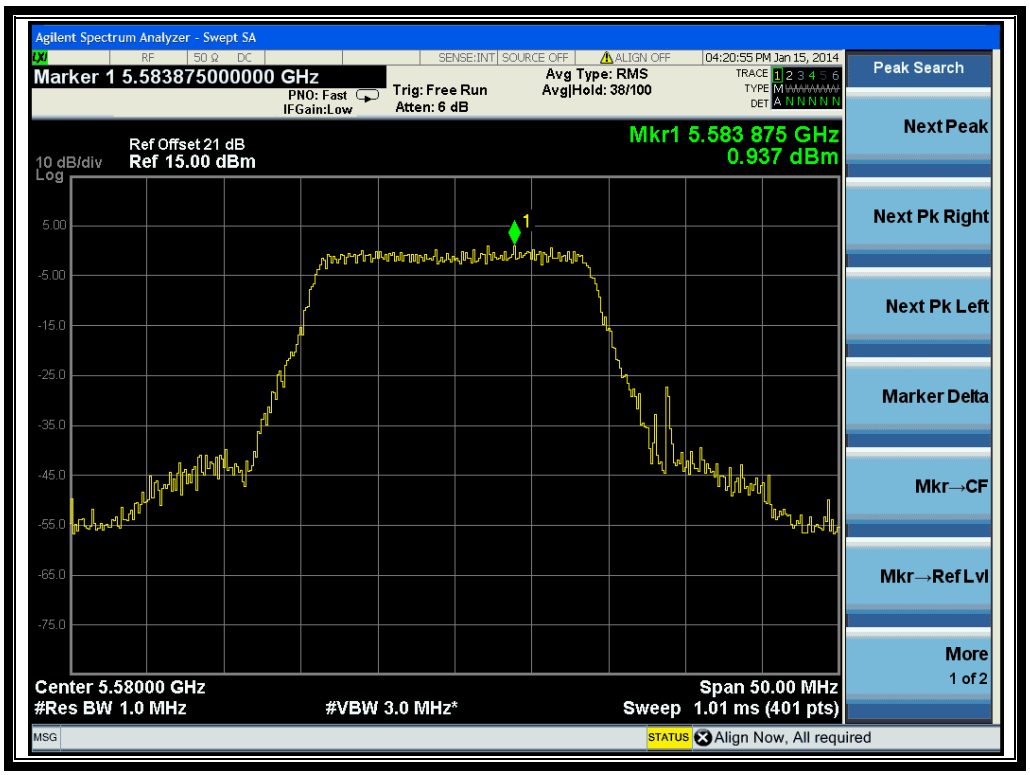
(Channel 60: 5300 MHz @ 802.11n-20MHz)



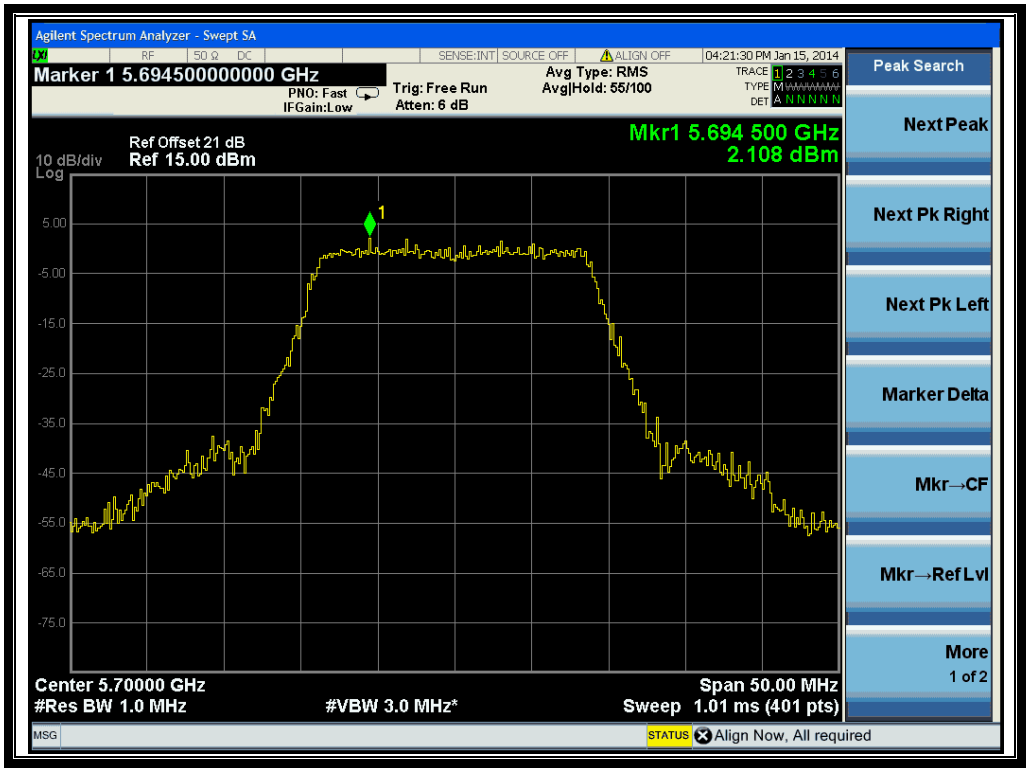
(Channel 64: 5320MHz @ 802.11n-20MHz)



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



(Channel 116: 5580 MHz @ 802.11n-20MHz)



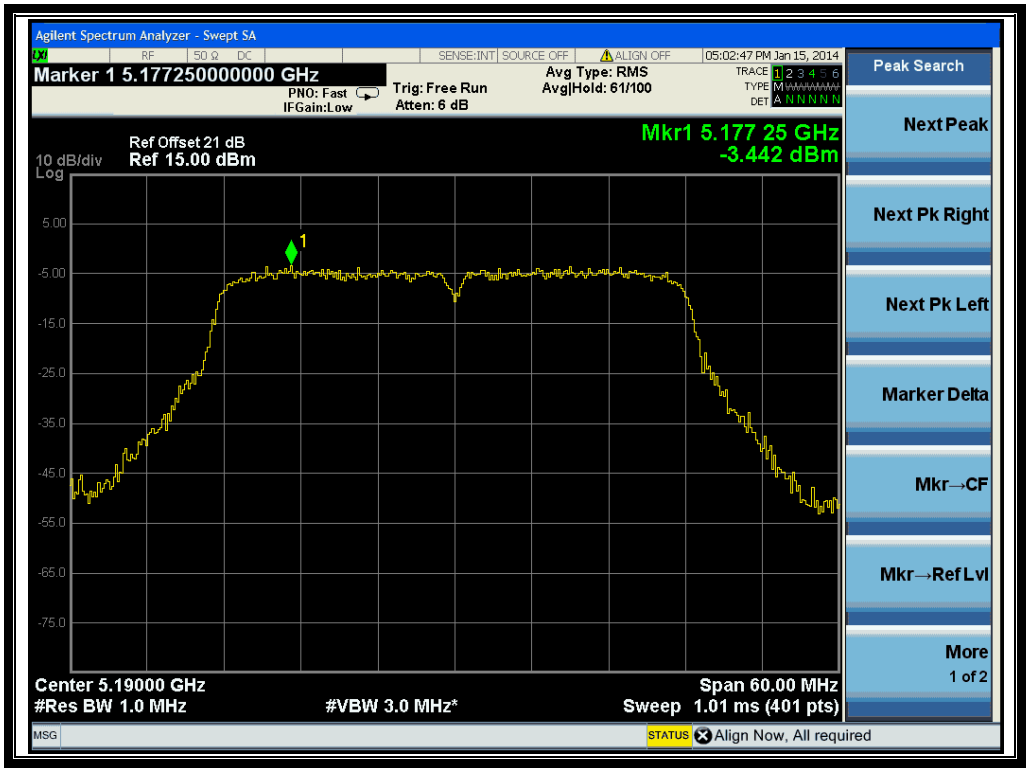
(Channel 140: 5700MHz @ 802.11n-20MHz)

2.5.3.3. 802.11n-40MHz Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD Without Duty factor (dBm)	Duty factor	Measured PPSD With Duty factor (dBm)	Limit (dBm)	Verdict
38	5190	-3.442	1.57	-1.872	4	PASS
46	5230	-1.503		0.067		
54	5270	-2.181		-0.611	11	
62	5310	-3.482		-1.912		
102	5510	-4.325		-2.755		
110	5550	-4.626		-3.056		
134	5670	-3.245		-1.675		

B. Test Plots:

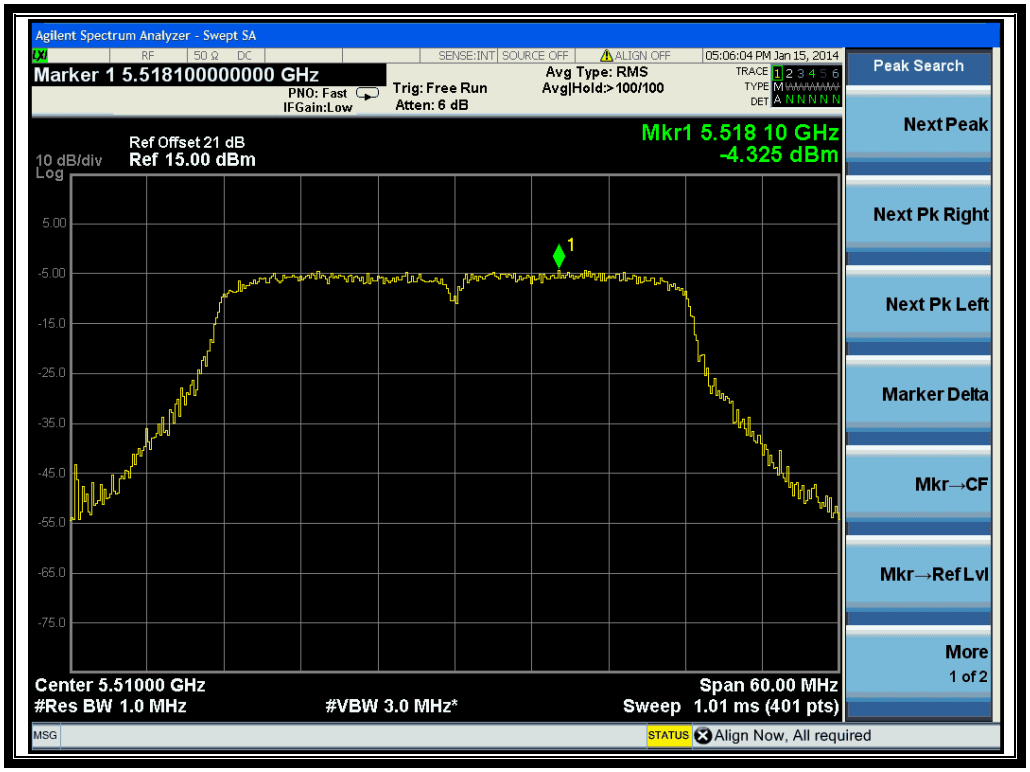


(Channel 38: 5190MHz @ 802.11n-40MHz)

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

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

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



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

(Channel 110: 5550MHz @ 802.11n-40MHz)

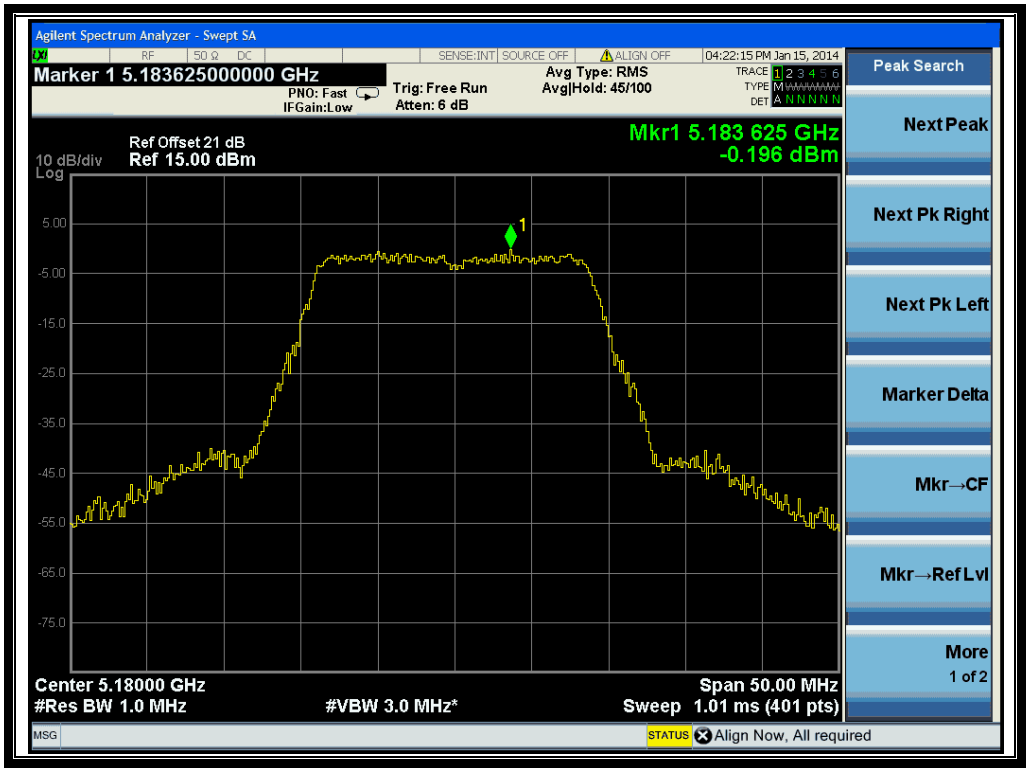
(Channel 134: 5670MHz @ 802.11n-40MHz)

2.5.3.4. 802.11ac-20MHz Test mode

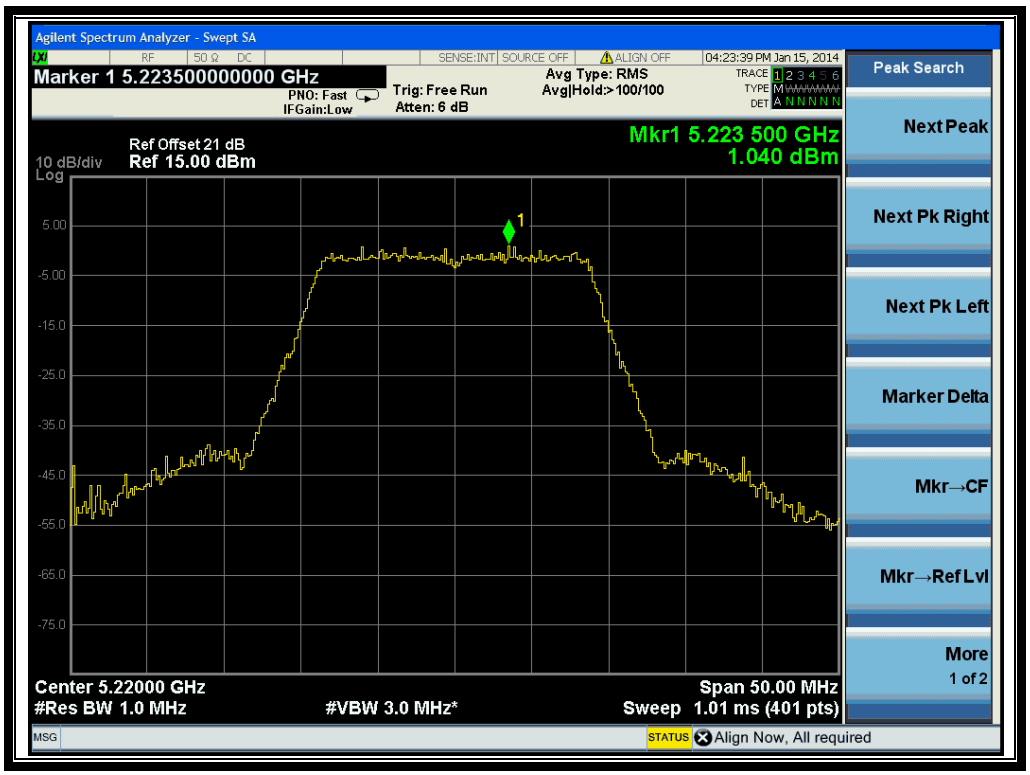
A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD Without Duty factor (dBm)	Duty factor	Measured PPSD With Duty factor (dBm)	Limit (dBm)	Verdict
36	5180	-0.196	0.67	0.474	4	PASS
44	5220	1.040		1.71		
48	5240	-1.028		-0.358		
52	5260	-1.241		-0.571	11	
60	5300	-0.986		-0.316		
64	5320	-1.027		-0.357		
100	5500	-1.375		-0.705		
116	5580	0.074		0.744		
140	5700	2.321		2.991		

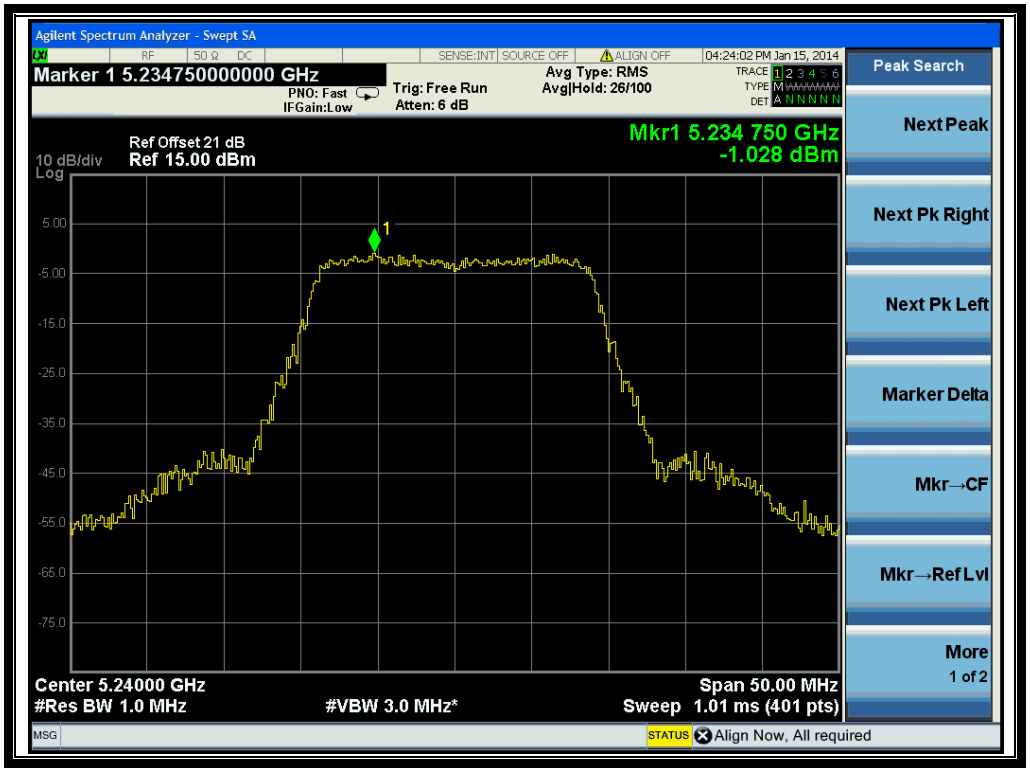
B. Test Plots:



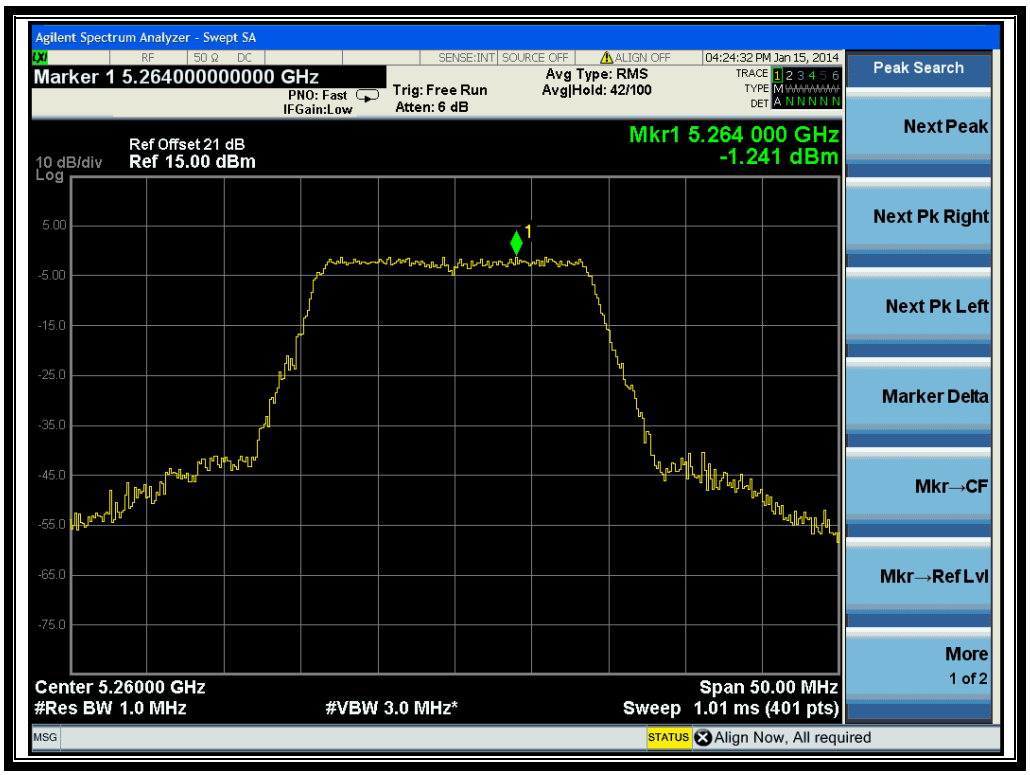
(Channel 36: 5180MHz @ 802.11ac-20MHz)



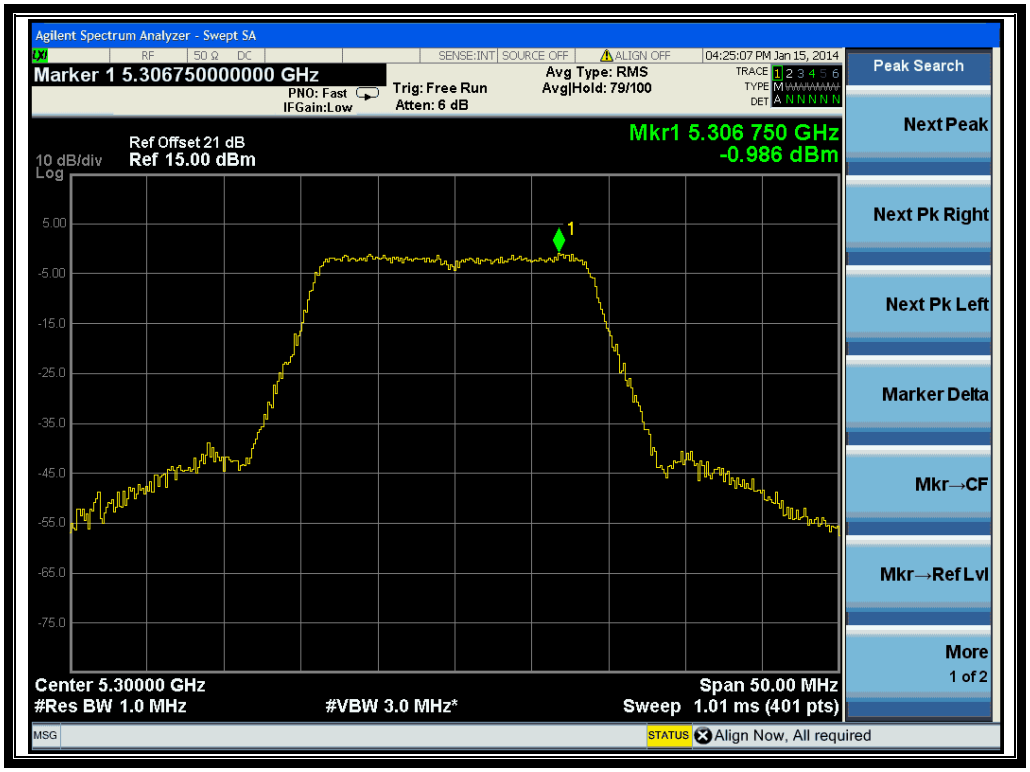
(Channel 44: 5220 MHz @ 802.11ac-20MHz)



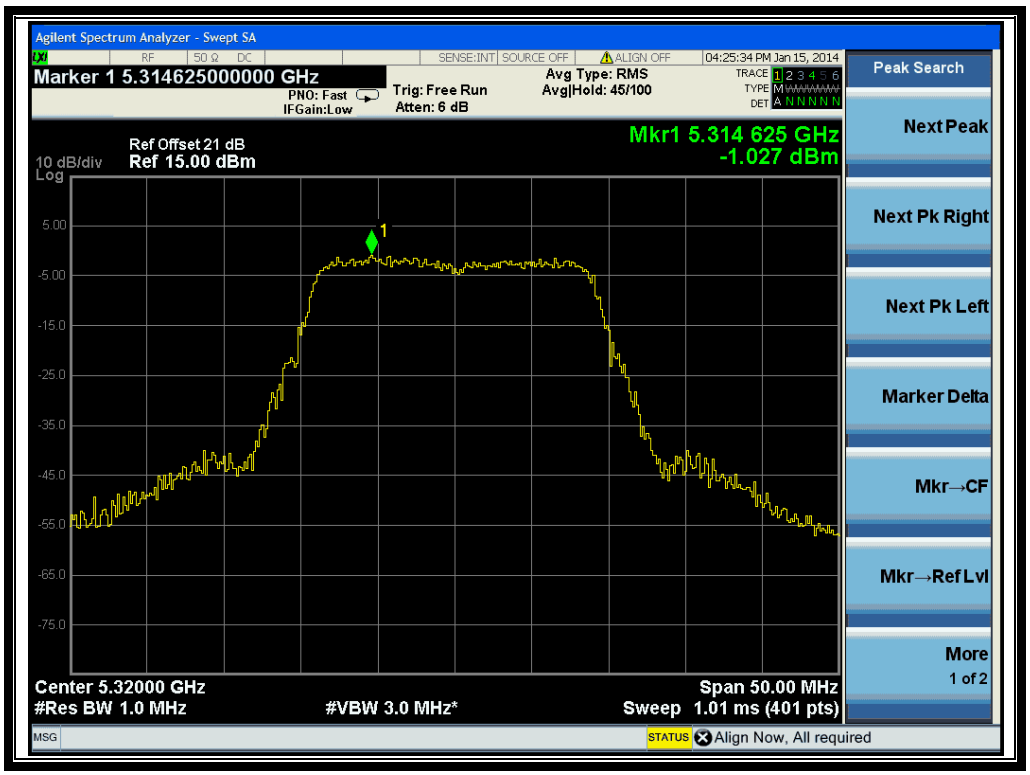
(Channel 48: 5240MHz @ 802.11ac-20MHz)



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

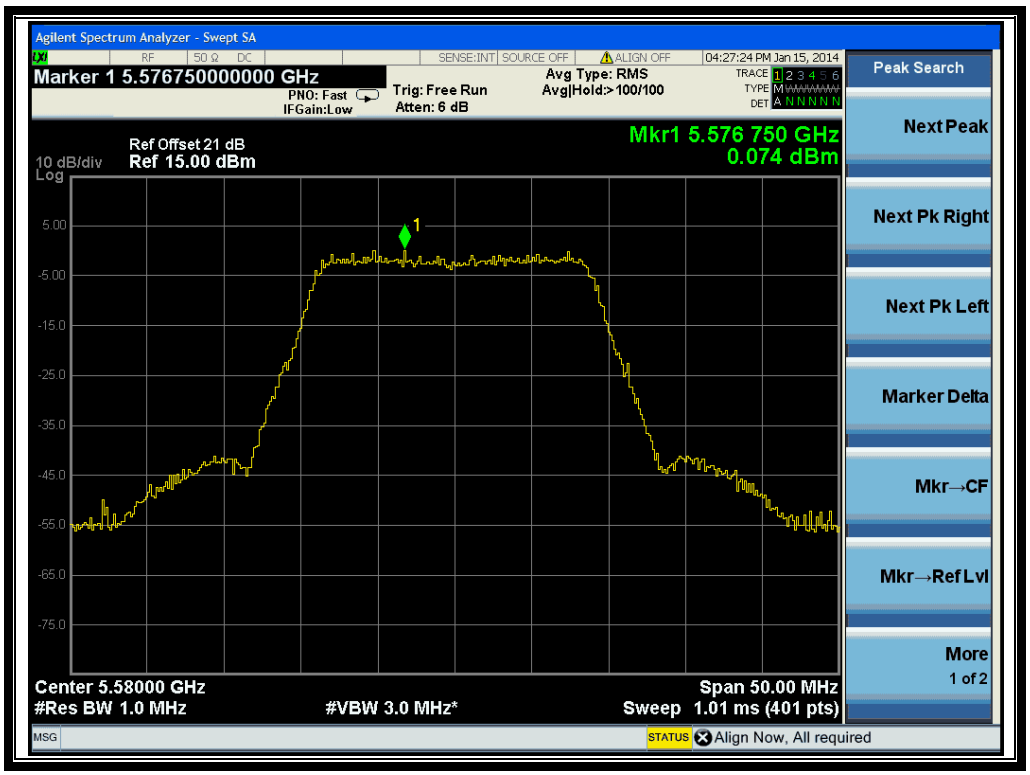


(Channel 60: 5300 MHz @ 802.11ac-20MHz)



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

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



(Channel 116: 5580 MHz @ 802.11ac-20MHz)

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

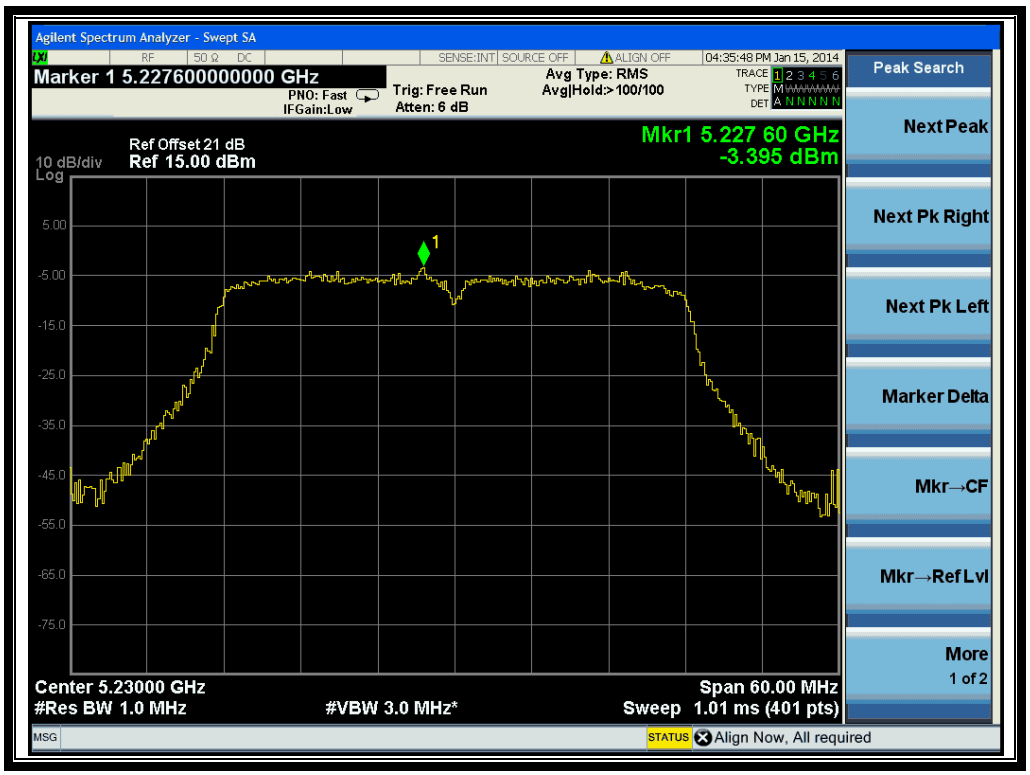
2.5.3.5. 802.11ac-40MHz Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD Without Duty factor (dBm)	Duty factor	Measured PPSD With Duty factor (dBm)	Limit (dBm)	Verdict
38	5190	-2.727	1.57	-1.157	4	PASS
46	5230	-3.395		-1.825		
54	5270	-4.334		-2.764	11	
62	5310	-4.955		-3.385		
102	5510	-4.724		-3.154		
110	5550	-4.318		-2.748		
134	5670	-3.995		-2.425		

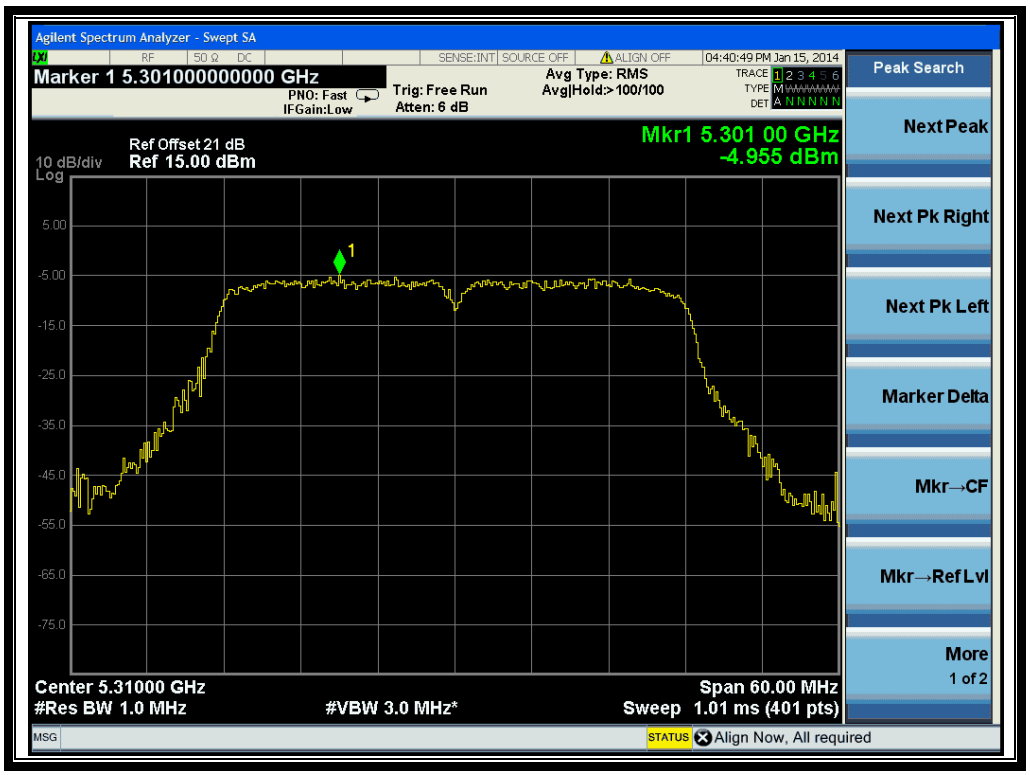
B. Test Plots:

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

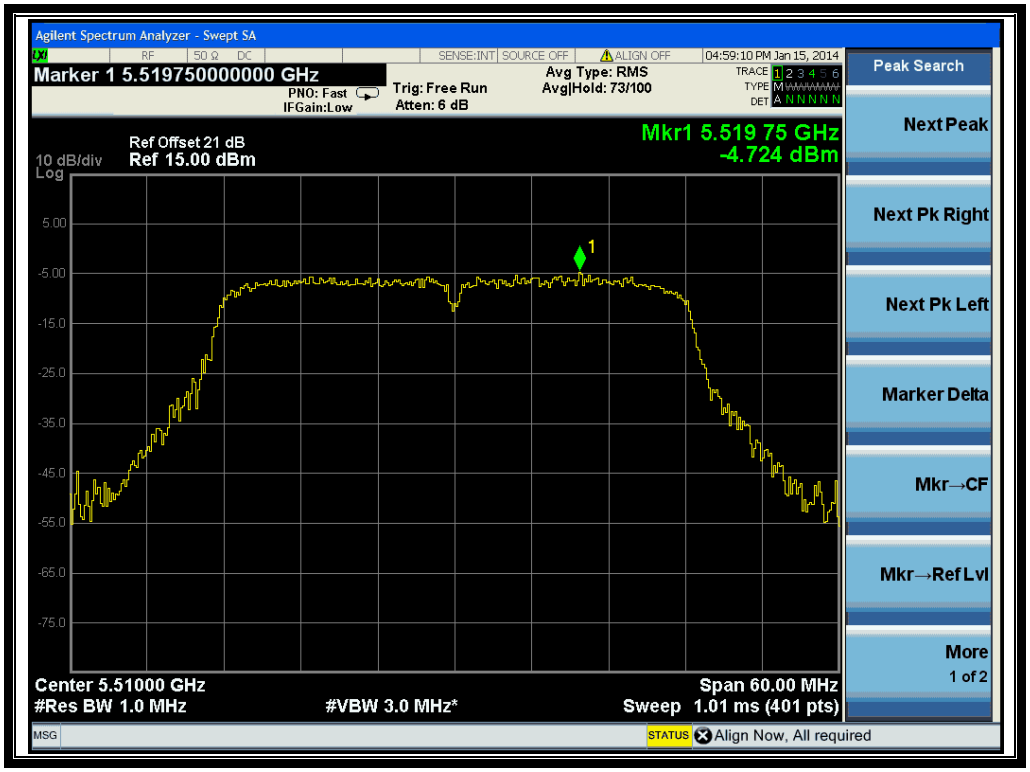


(Channel 46: 5230 MHz @ 802.11ac-40MHz)

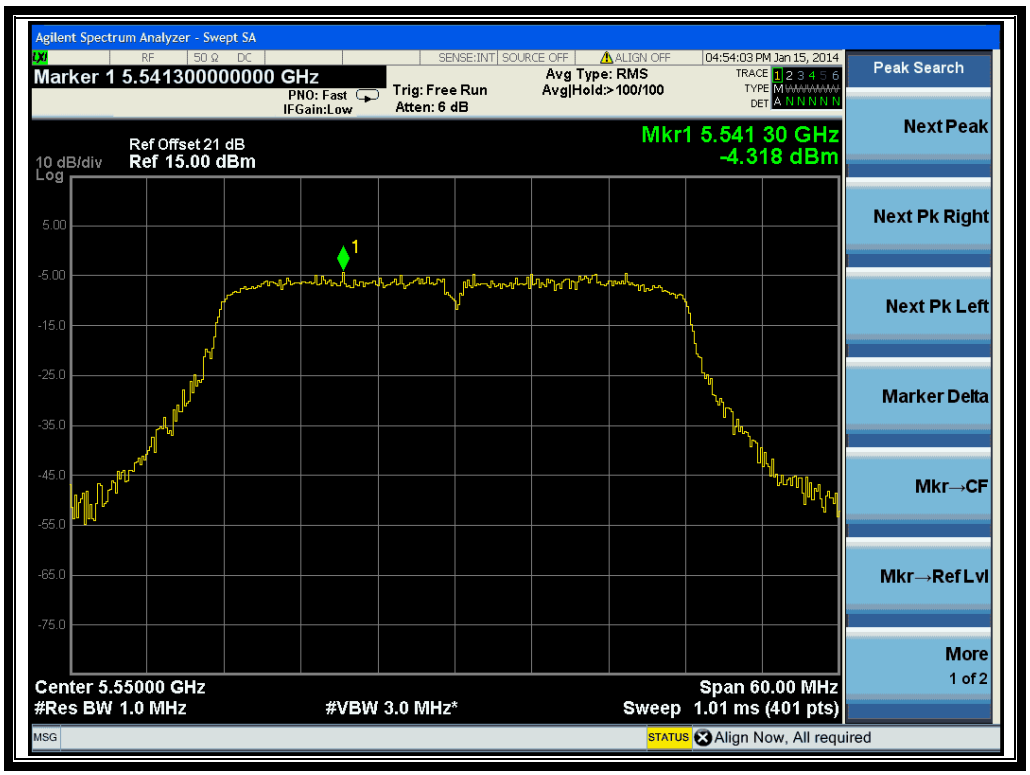
(Channel 54: 5270MHz @ 802.11ac-40MHz)



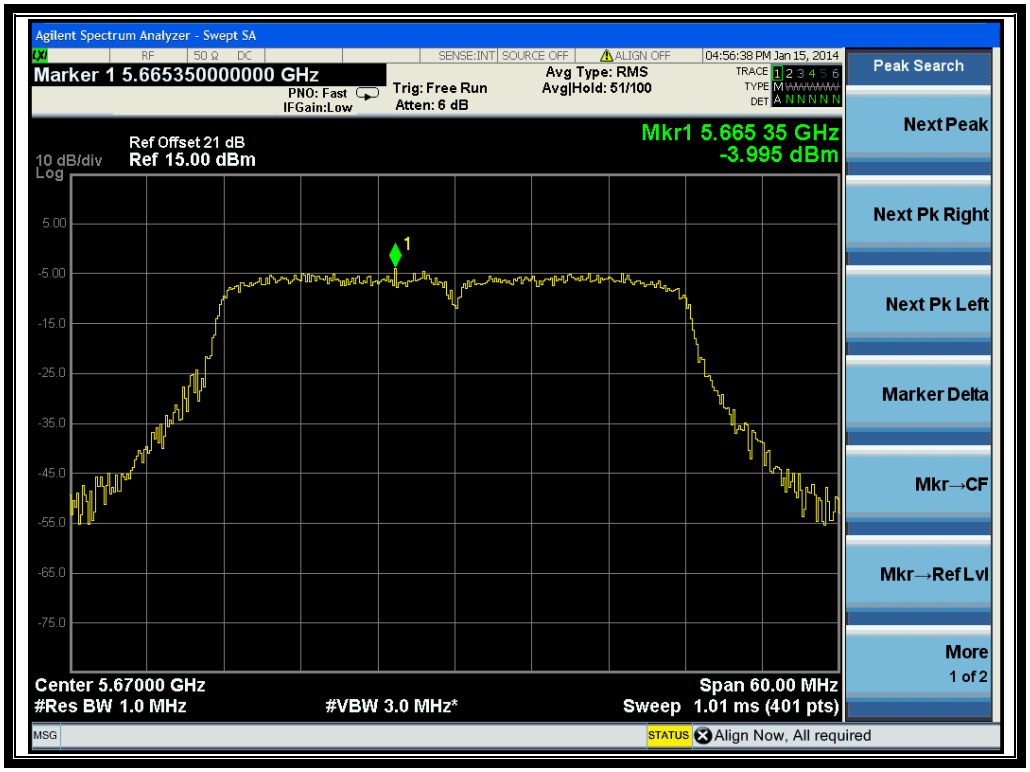
(Channel 62: 5310MHz @ 802.11ac-40MHz)



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



(Channel 110: 5550MHz @ 802.11ac-40MHz)



(Channel 134: 5670MHz @ 802.11ac-40MHz)

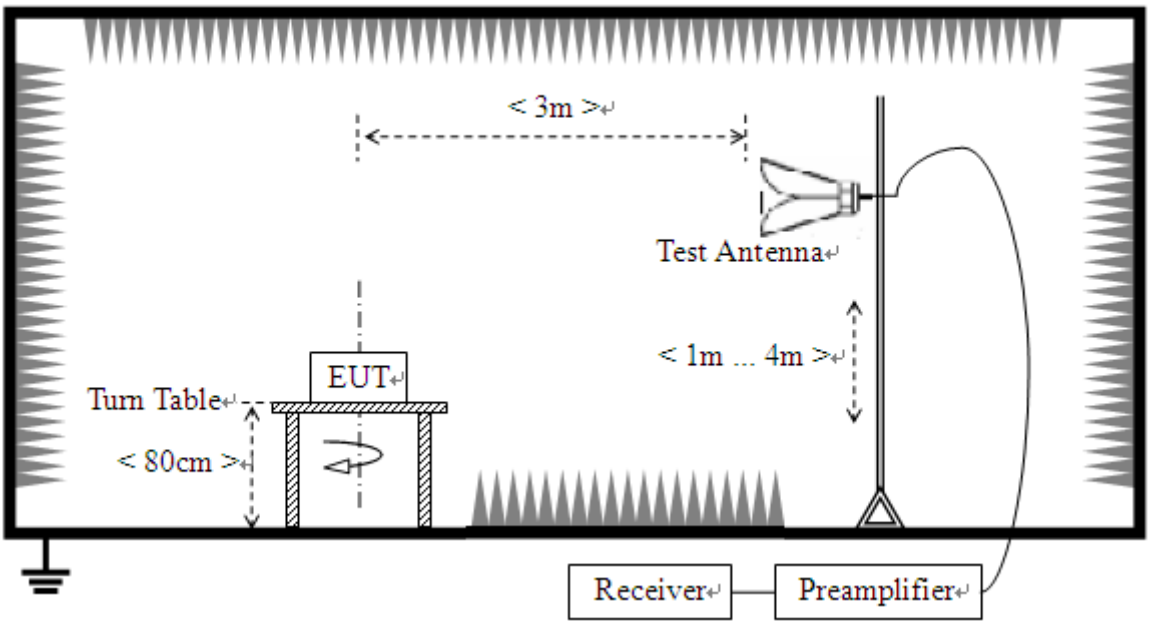
2.6. Restricted Frequency Bands

2.6.1. 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).

2.6.2. 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.

B. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Receiver	Agilent	E7405A	US44210471	2013.05.12	2014.05.11
Full-Anechoic Chamber	Albatross	9m*6m*6m	(n.a.)	2012.05.12	2014.05.11
Test Antenna - Horn	Schwarzbeck	BBHA 9120D	9120D-963	2013.05.12	2014.05.11

2.6.3. Test Result

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

The measurement results are obtained as below:
$E\ [dB\mu V/m] = U_R + A_T + A_{Factor}\ [dB]$; $A_T = L_{Cable\ loss}\ [dB] - G_{preamp}\ [dB]$
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.

2.6.3.1. 802.11a Test mode

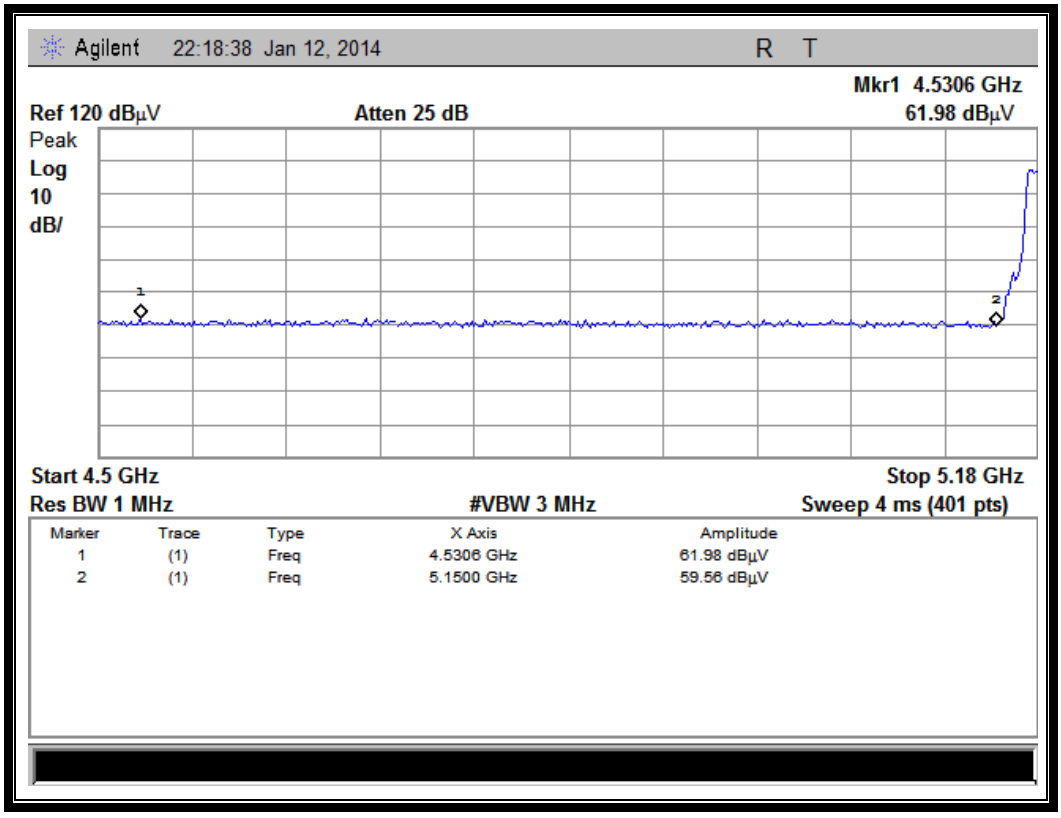
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

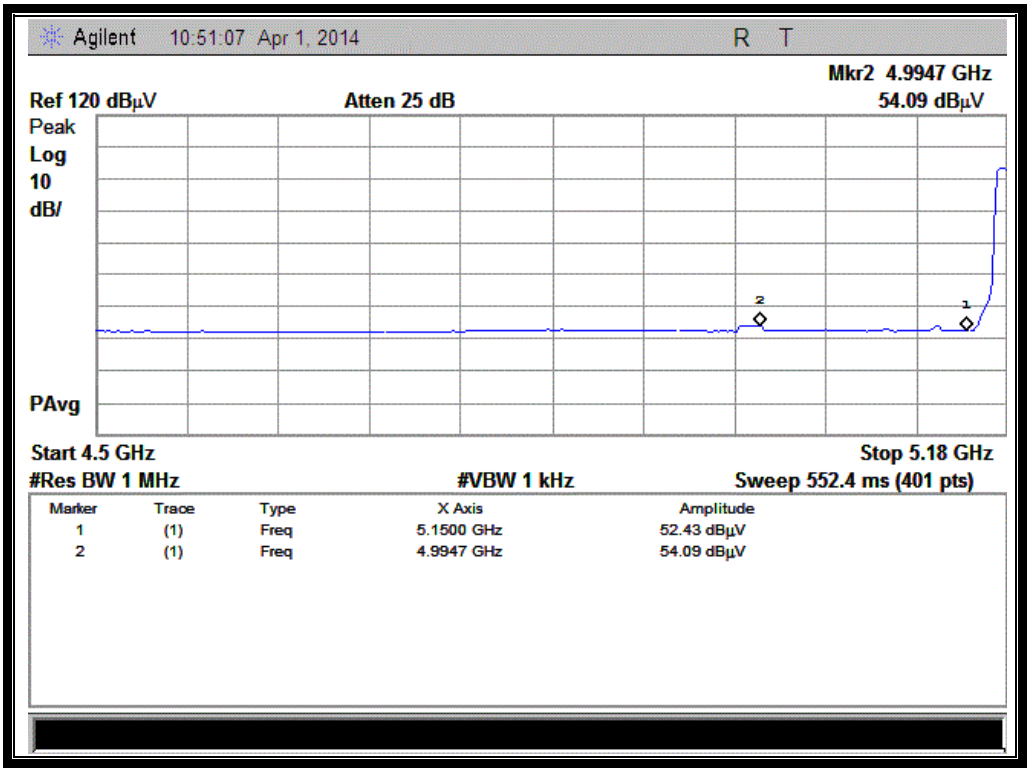
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
36	4530.60	PK	61.98	-43.13	32.11	50.96	74	Pass
36	4994.70	AV	54.09	-43.13	32.11	43.07	54	Pass
64	5443.90	PK	61.70	-42.79	31.69	50.60	74	Pass
64	5372.85	AV	52.90	-42.79	31.69	41.80	54	Pass
100	5427.63	PK	61.63	-42.79	31.69	50.53	74	Pass

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
100	5447.50	AV	53.94	-42.79	31.69	42.84	54	Pass
140	5740.60	PK	59.69	-42.79	31.69	48.59	74	Pass
140	5753.10	AV	52.85	-42.79	31.69	41.75	54	Pass

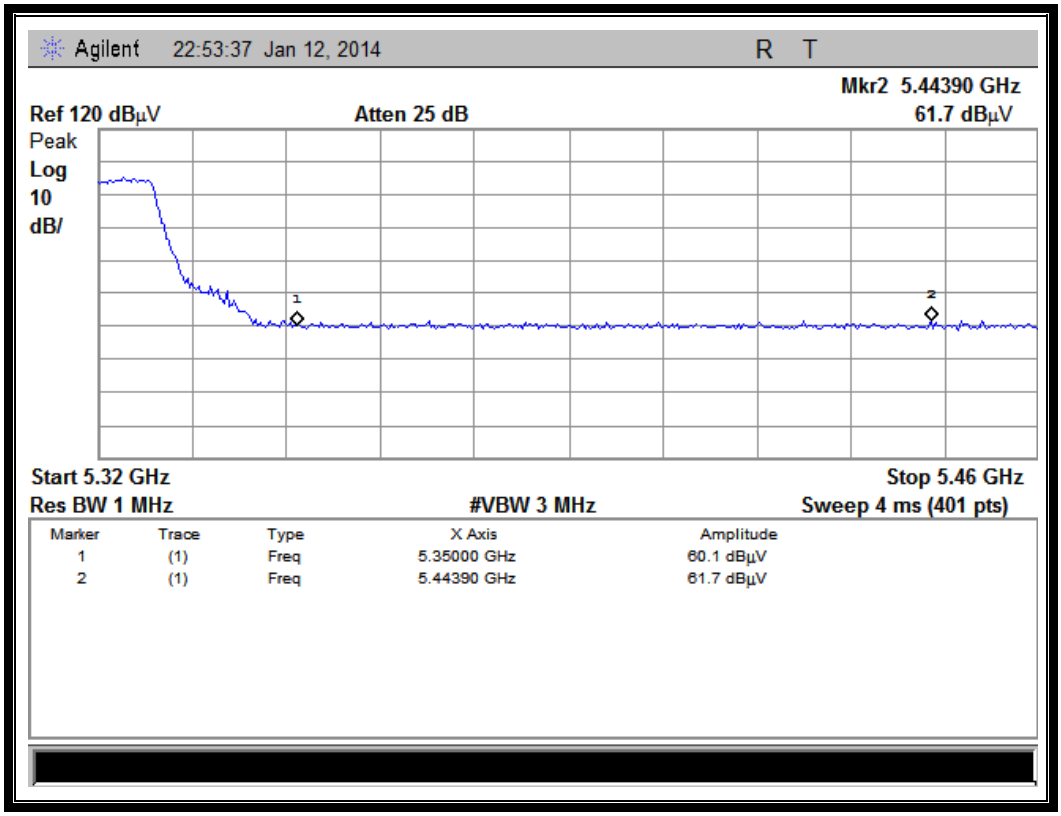
B. Test Plots:



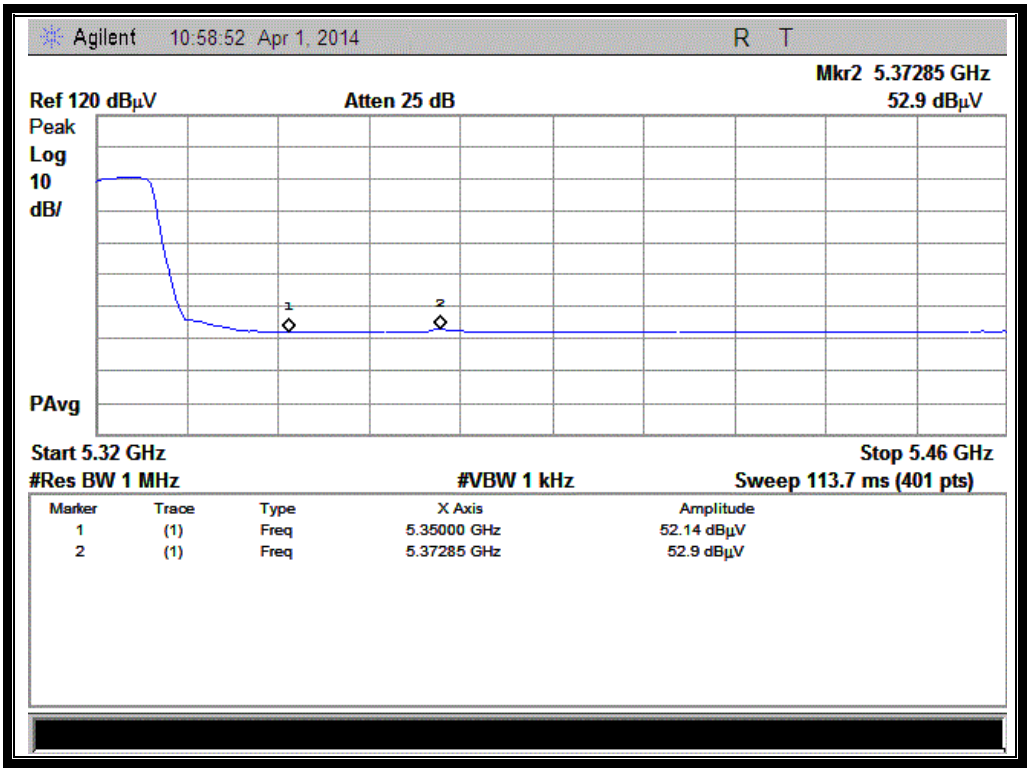
(Channel = 36 PEAK @ 802.11a)



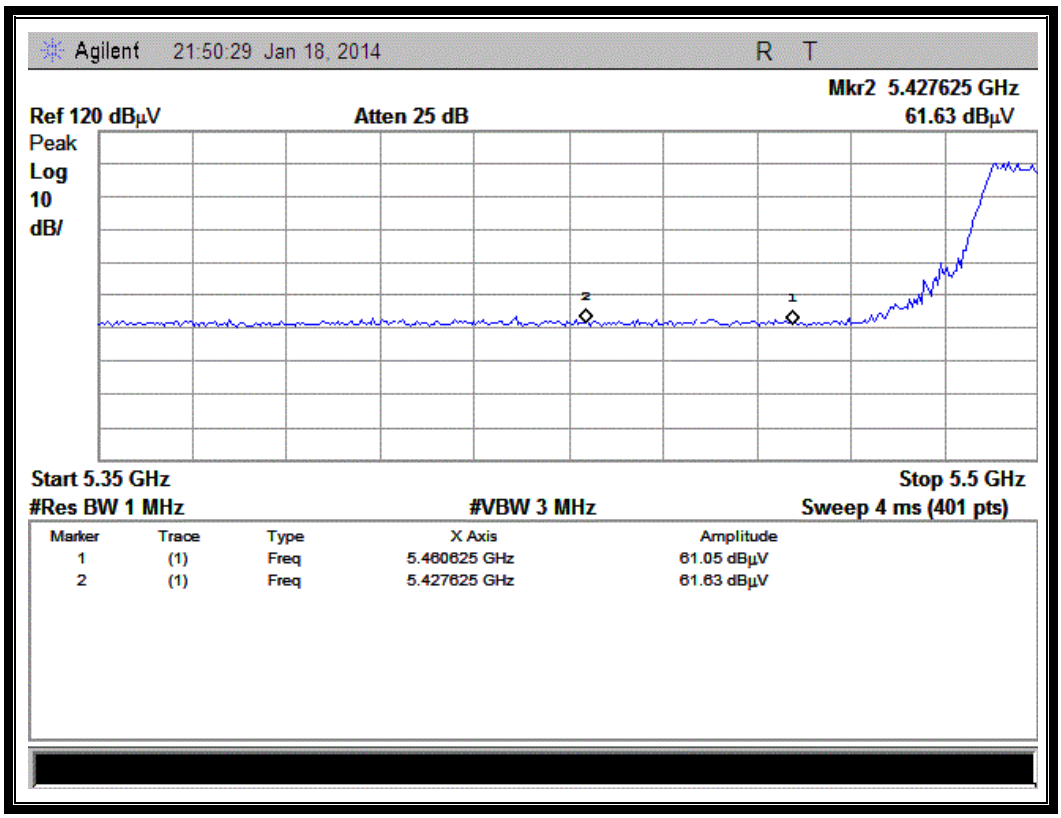
(Channel = 36 AVG @ 802.11a)



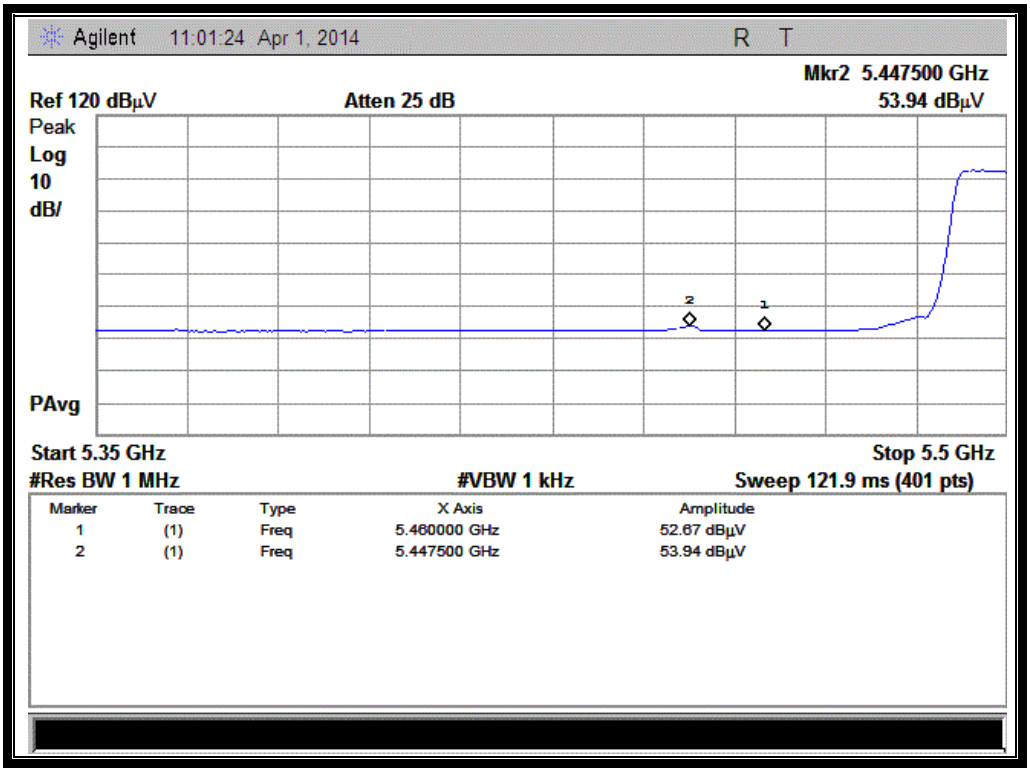
(Channel = 64 PEAK @ 802.11a)



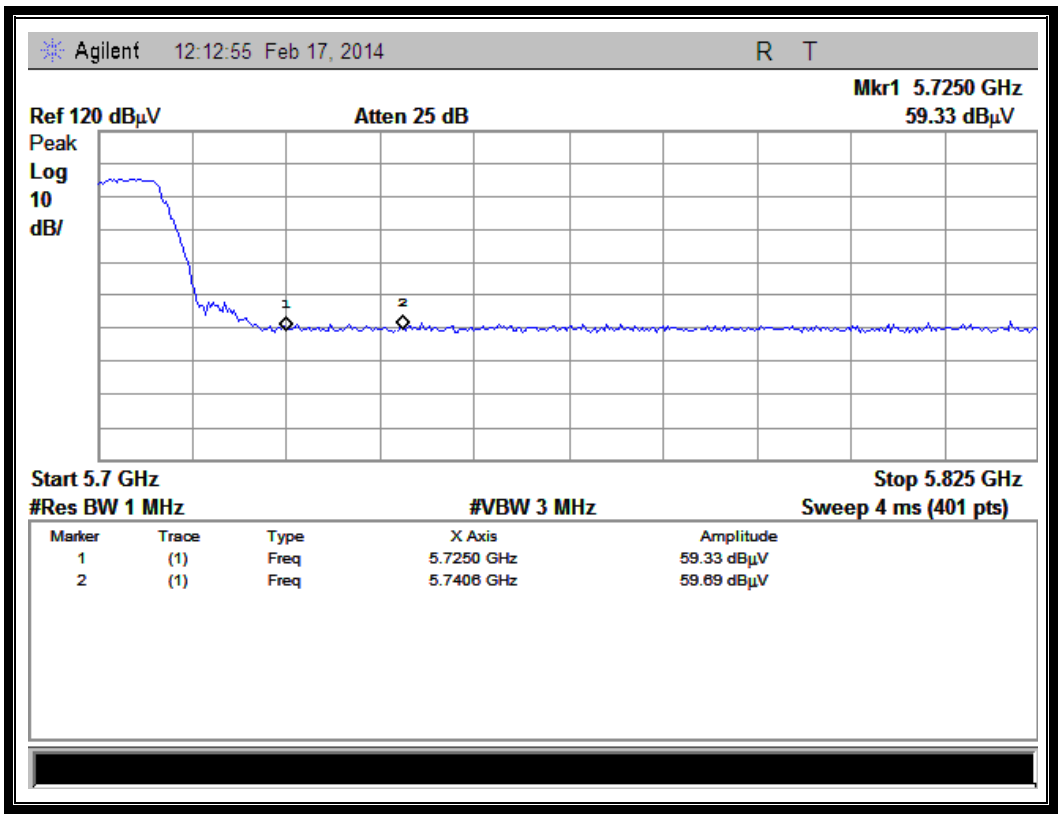
(Channel = 64 AVG @ 802.11a)



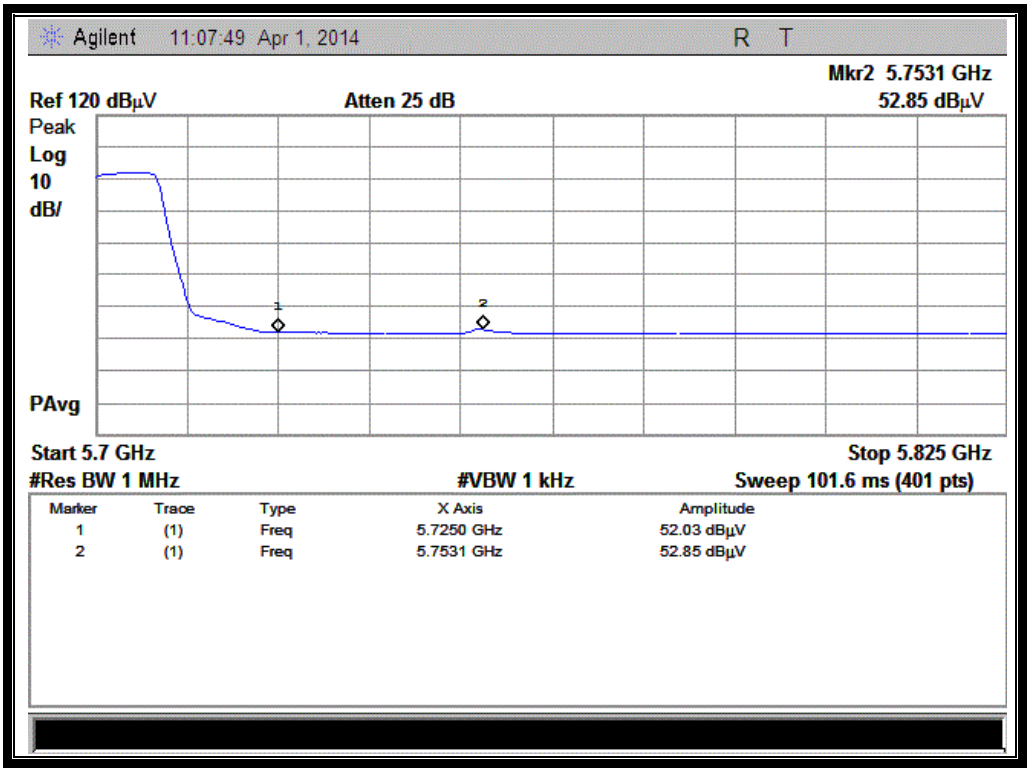
(Channel = 100 PEAK @ 802.11a)



(Channel = 100 AVG @ 802.11a)



(Channel = 140 PEAK @ 802.11a)



(Channel = 140 AVG @ 802.11a)

2.6.3.2. 802.11n-20MHz Test mode

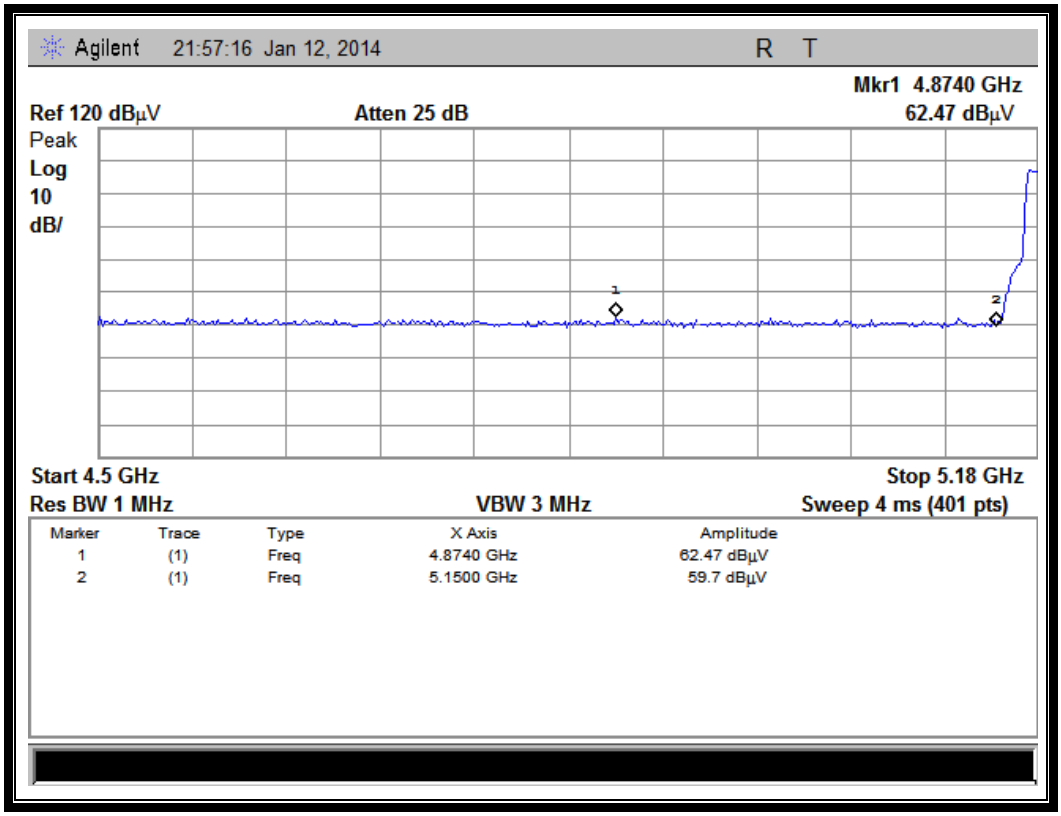
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

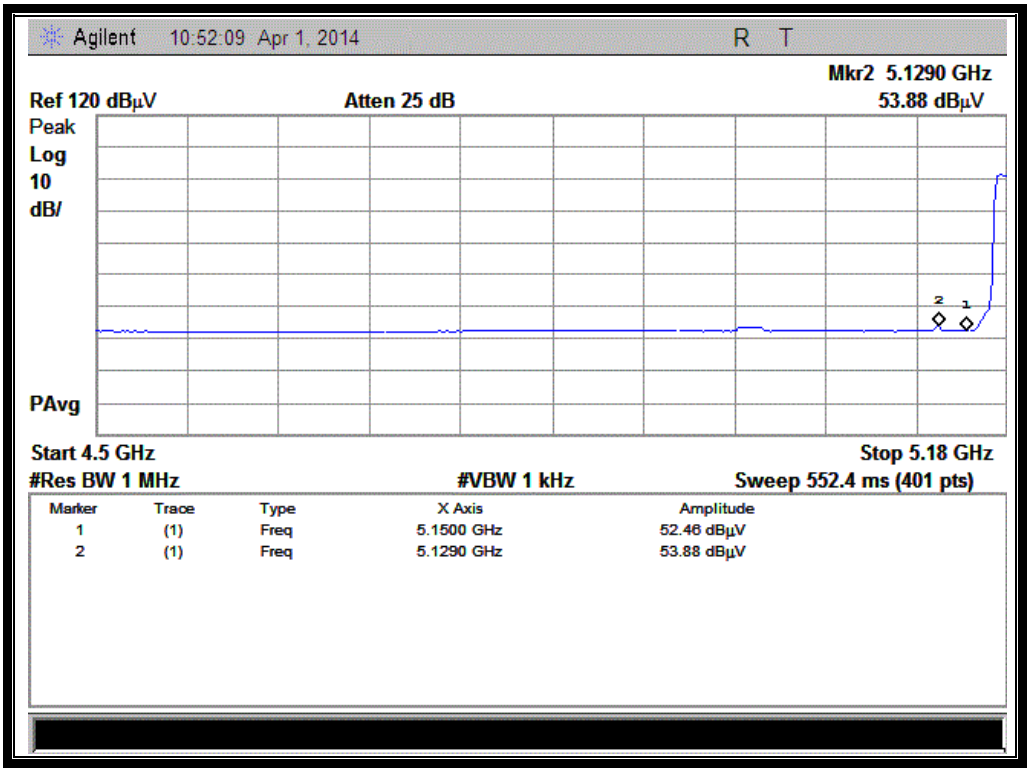
Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
		PK/ AV						
36	4874.00	PK	62.47	-43.13	32.11	51.45	74	Pass
36	5129.00	AV	53.88	-43.13	32.11	42.86	54	Pass
64	5358.85	PK	61.98	-42.79	31.69	50.88	74	Pass
64	5371.80	AV	53.38	-42.79	31.69	42.28	54	Pass
100	5442.25	PK	62.28	-42.79	31.69	51.18	74	Pass

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
100	5448.63	AV	53.81	-42.79	31.69	42.71	54	Pass
140	5740.60	PK	60.78	-42.79	31.69	49.68	74	Pass
140	5752.20	AV	52.91	-42.79	31.69	41.81	54	Pass

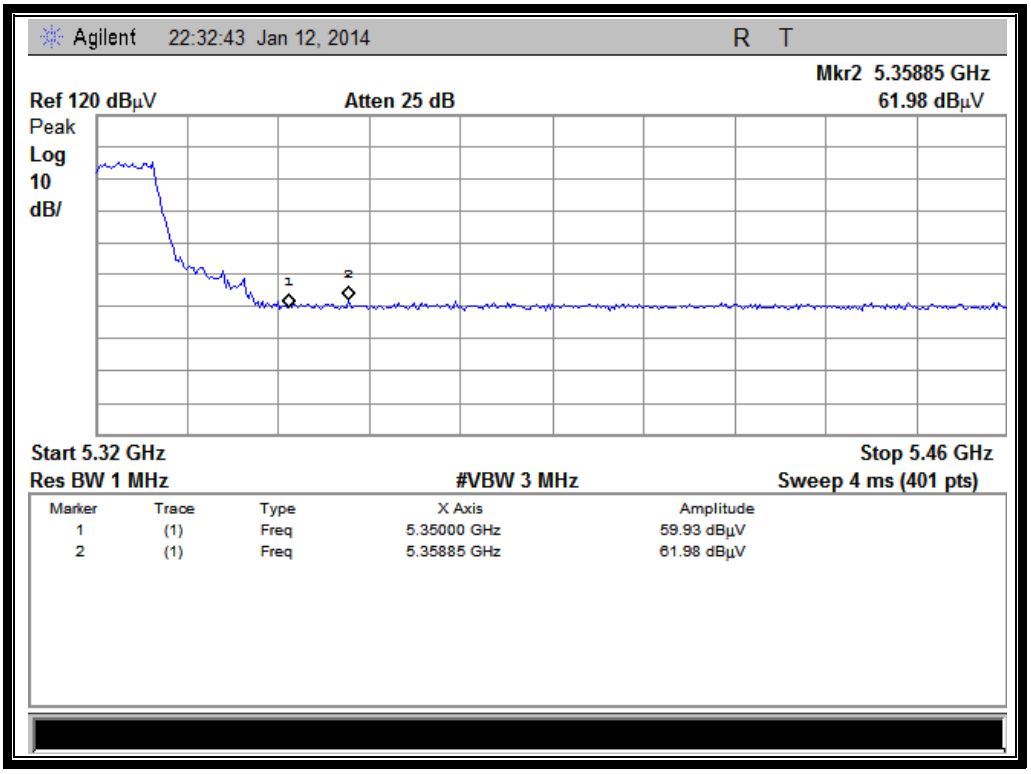
B. Test Plots:



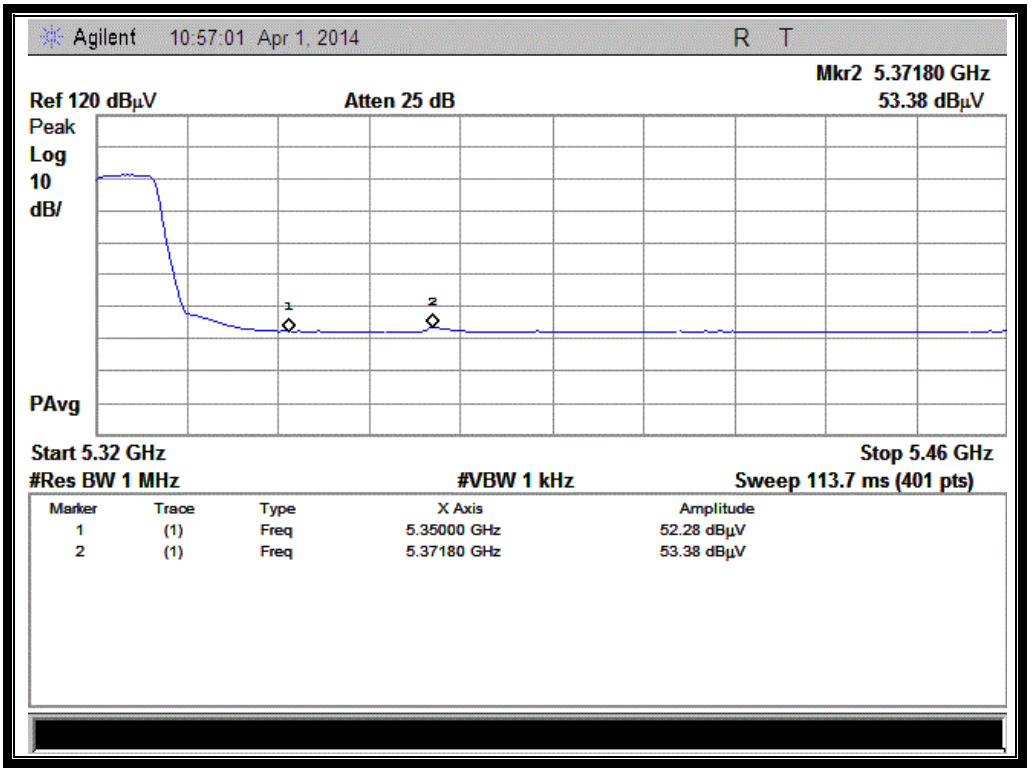
(Channel = 36 PEAK @ 802.11n-20MHz)



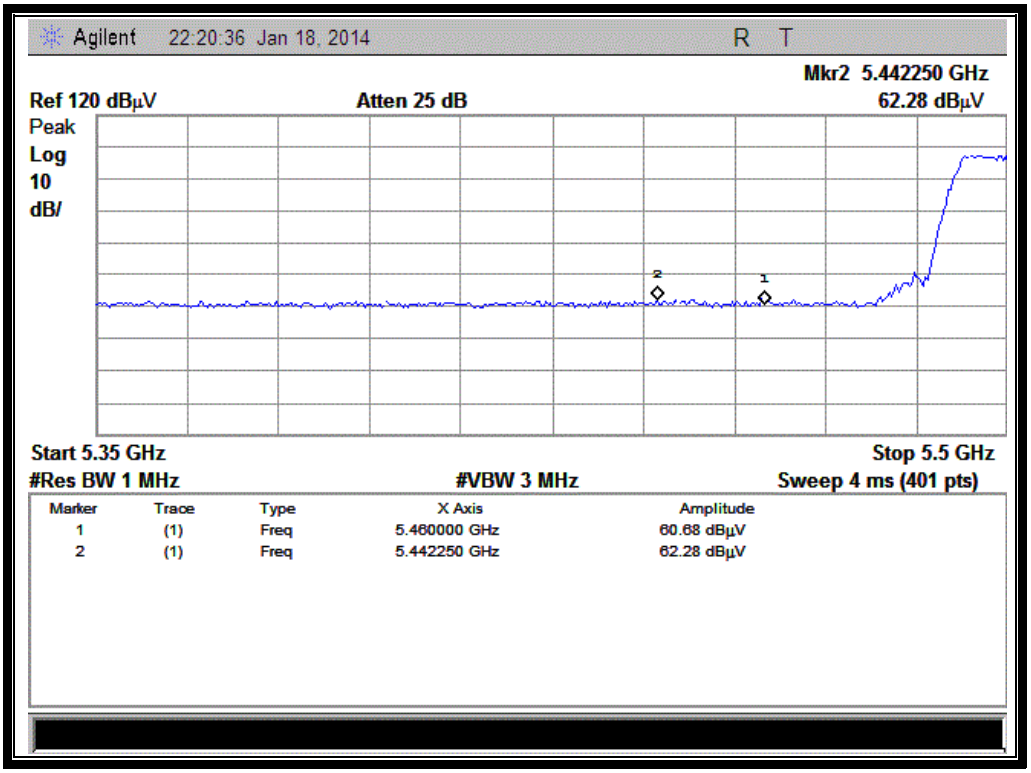
(Channel = 36 AVG @ 802.11n-20MHz)



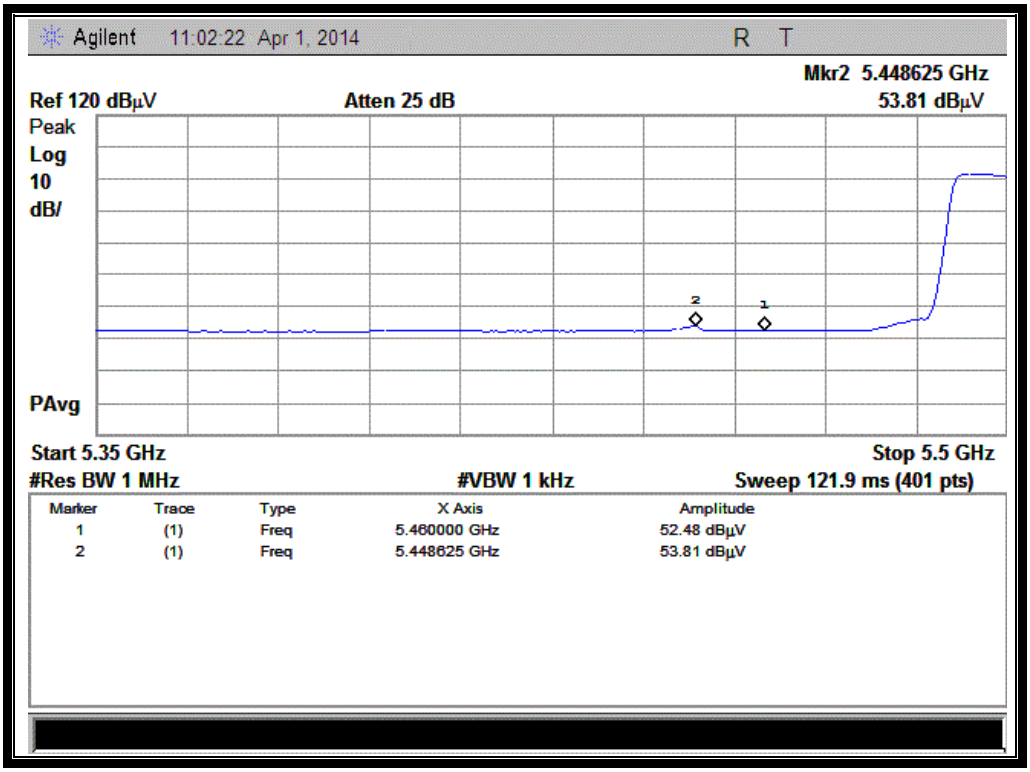
(Channel = 64 PEAK @ 802.11n-20MHz)



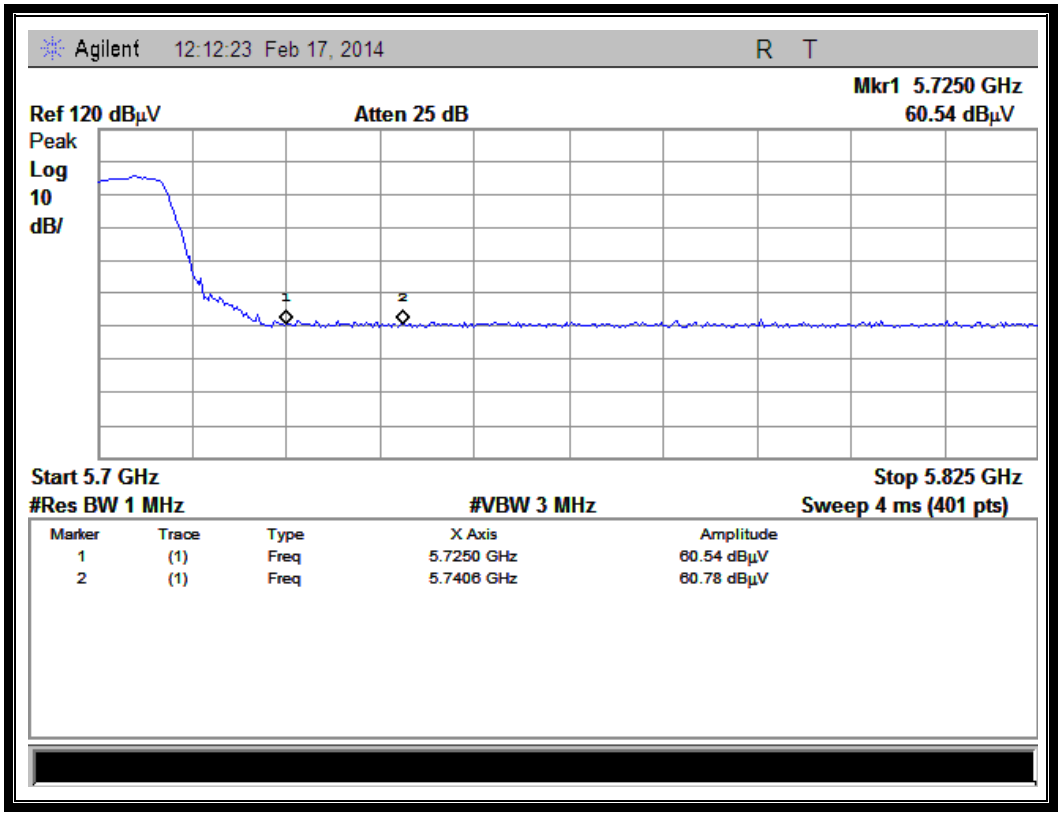
(Channel = 64 AVG @ 802.11n-20MHz)



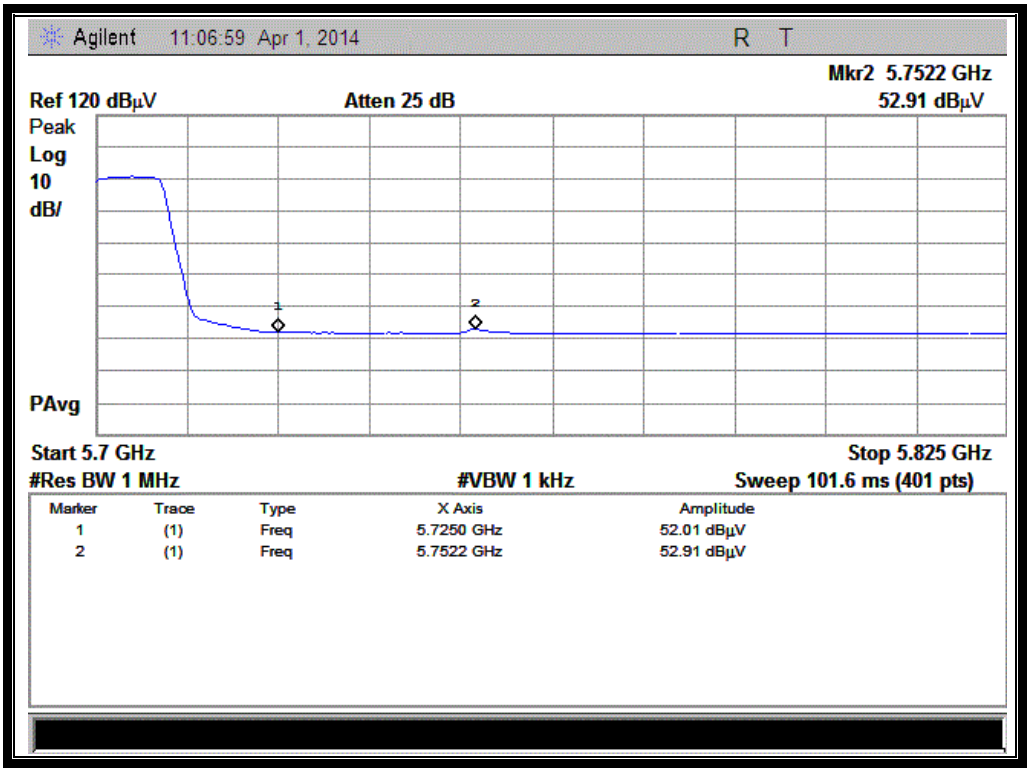
(Channel = 100 PEAK @ 802.11n-20MHz)



(Channel = 100 AVG @ 802.11n-20MHz)



(Channel = 140 PEAK @ 802.11n-20MHz)



(Channel = 140 AVG @ 802.11n-20MHz)

2.6.3.3. 802.11n-40MHz Test mode

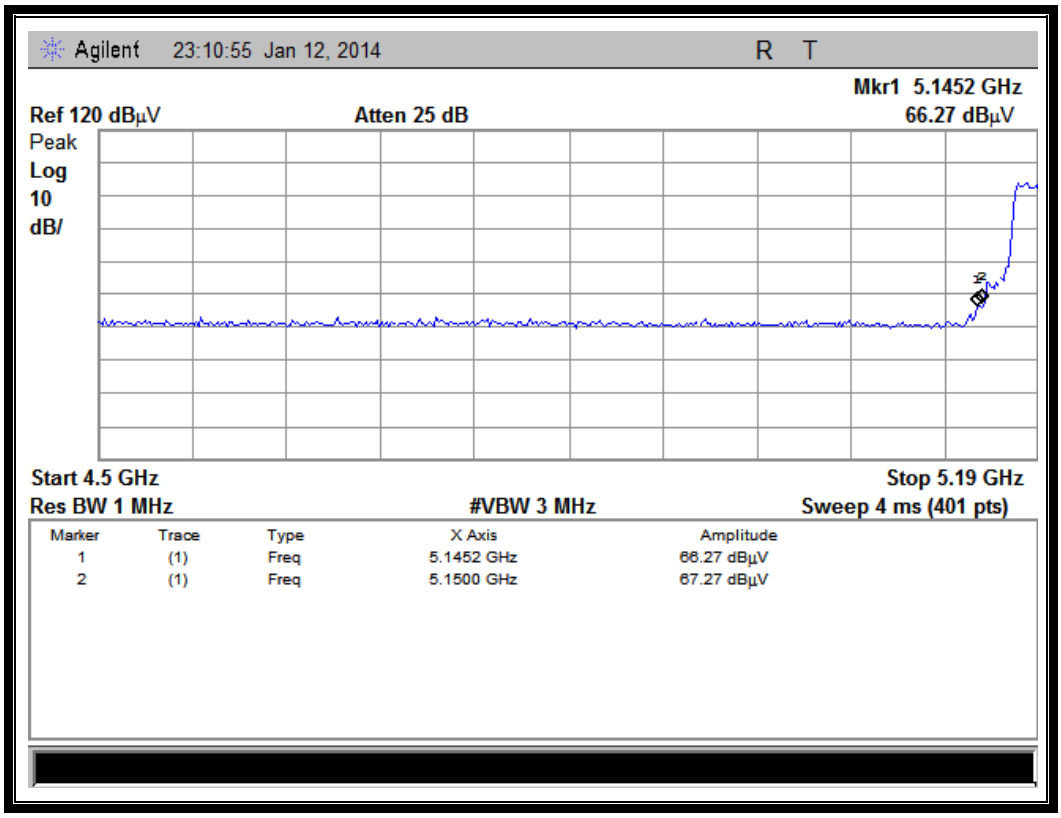
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

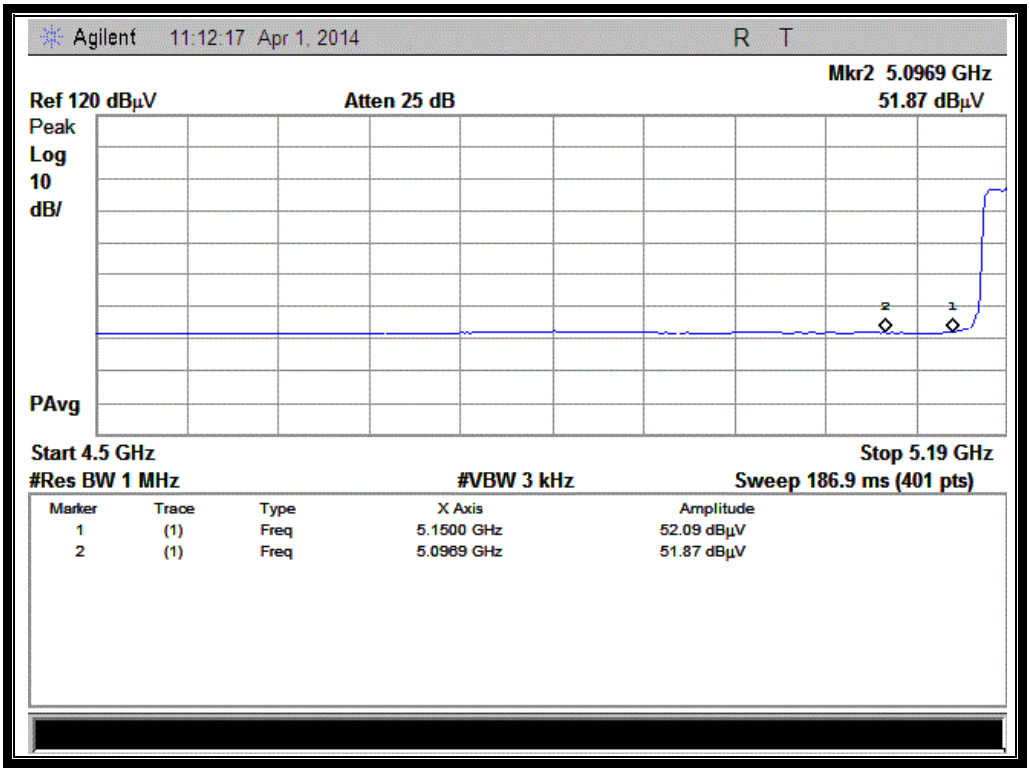
Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
		PK/ AV						
38	5150.00	PK	67.27	-43.13	32.11	56.25	74	Pass
38	5150.00	AV	52.09	-43.13	32.11	41.07	54	Pass
62	5350.88	PK	63.59	-42.79	31.69	52.49	74	Pass
62	5413.88	AV	52.83	-42.79	31.69	41.73	54	Pass
102	5442.25	PK	61.46	-42.79	31.69	50.36	74	Pass

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
102	5460.00	AV	52.83	-42.79	31.69	41.73	54	Pass

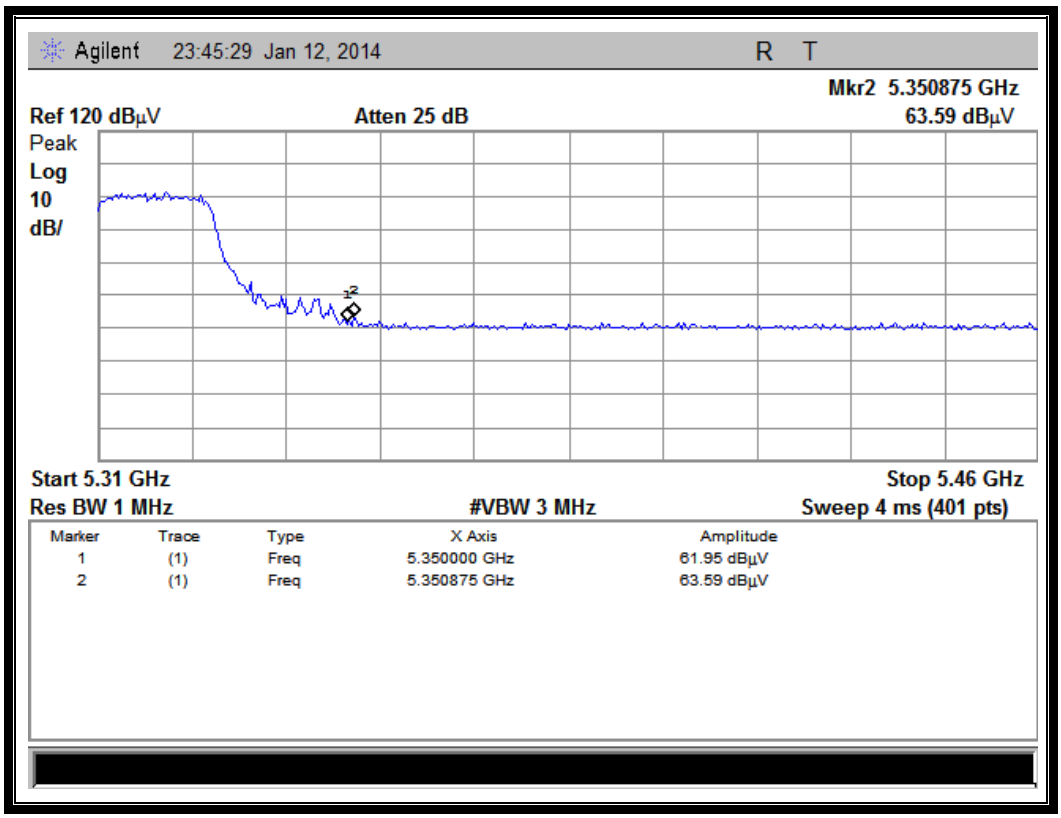
B. Test Plots:



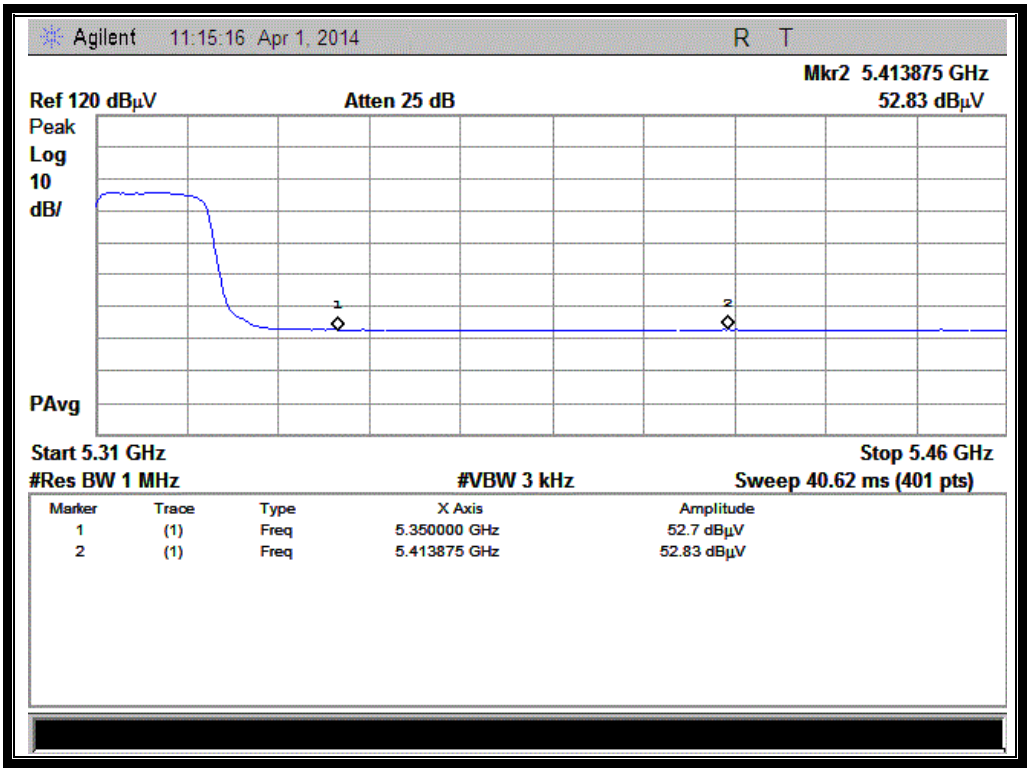
(Channel = 38 PEAK @ 802.11n-40MHz)



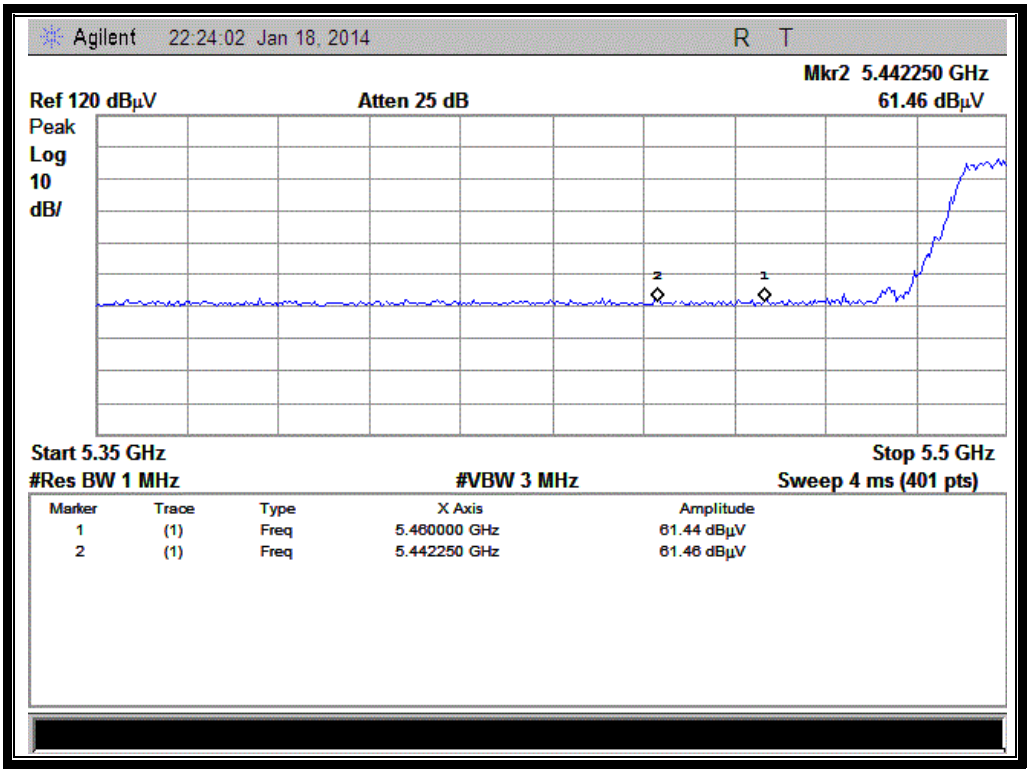
(Channel = 38 AVG @ 802.11n-40MHz)



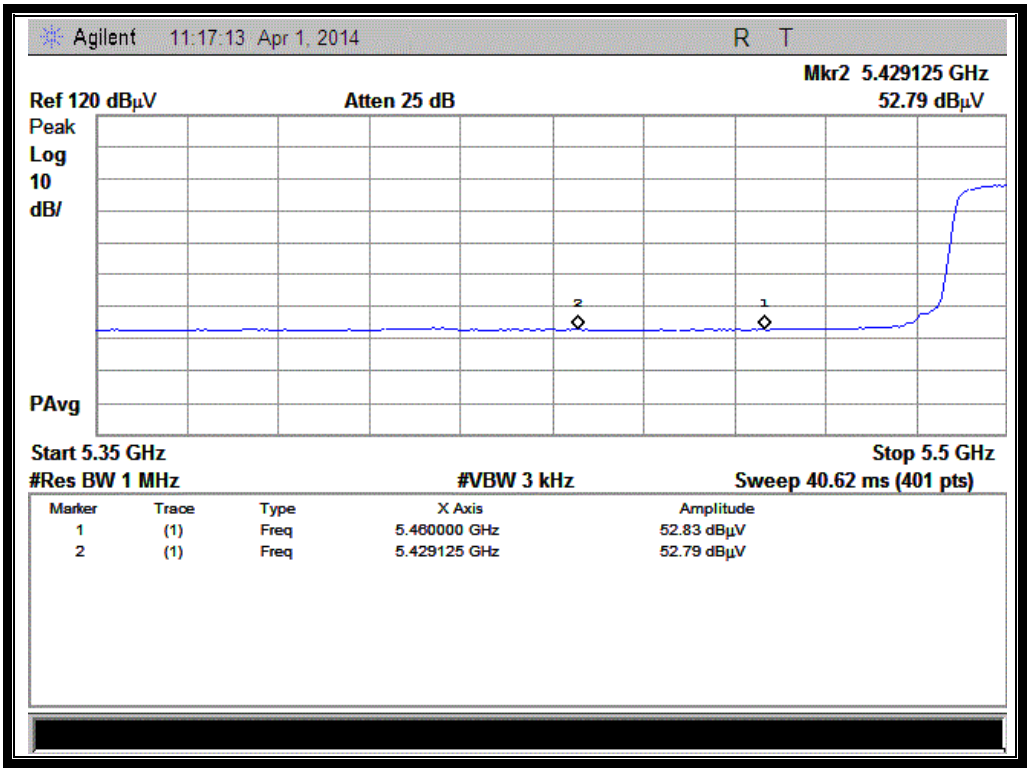
(Channel = 62 PEAK @ 802.11n-40MHz)



(Channel = 62 AVG @ 802.11n-40MHz)



(Channel = 102 PEAK @ 802.11n-40MHz)



(Channel = 102 AVG @ 802.11n-40MHz)

2.6.3.4. 802.11ac-20MHz Test mode

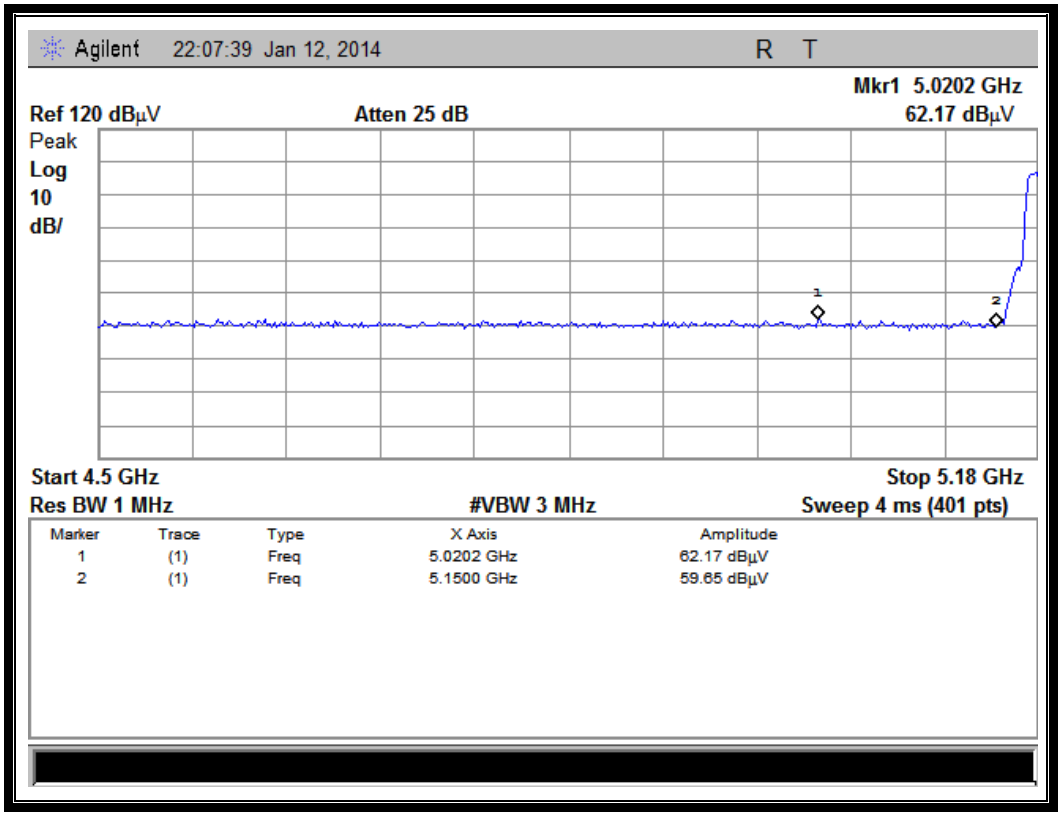
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

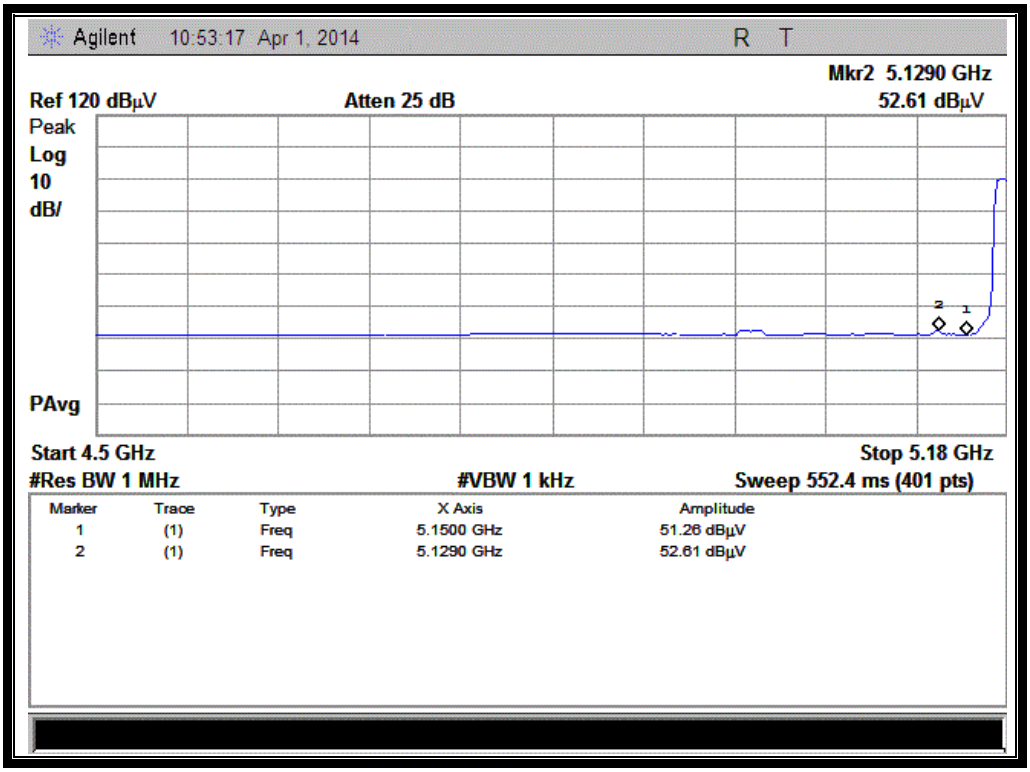
Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
		PK/ AV						
36	5020.20	PK	62.17	-43.13	32.11	51.15	74	Pass
36	5129.00	AV	52.61	-43.13	32.11	41.59	54	Pass
64	5380.90	PK	62.24	-42.79	31.69	51.14	74	Pass
64	5371.80	AV	53.19	-42.79	31.69	42.09	54	Pass
100	5411.50	PK	61.99	-42.79	31.69	58.89	74	Pass

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
100	5449.00	AV	53.34	-42.79	31.69	42.24	54	Pass
140	5725.00	PK	60.50	-42.79	31.69	49.40	74	Pass
140	5752.80	AV	52.50	-42.79	31.69	41.40	54	Pass

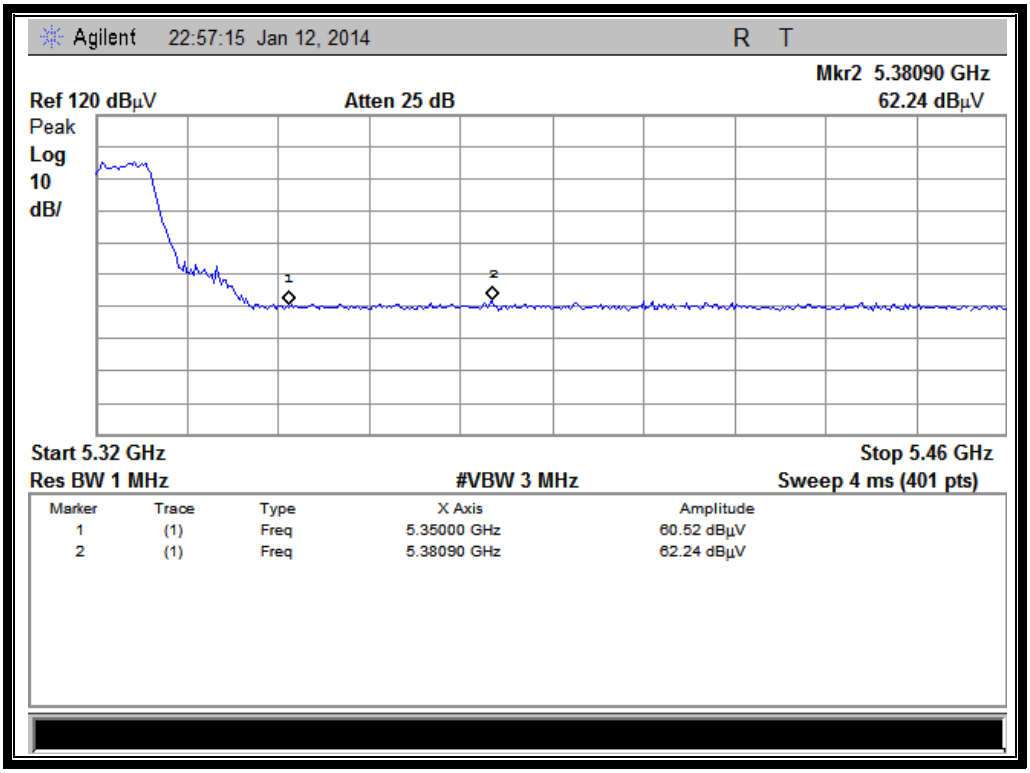
B. Test Plots:



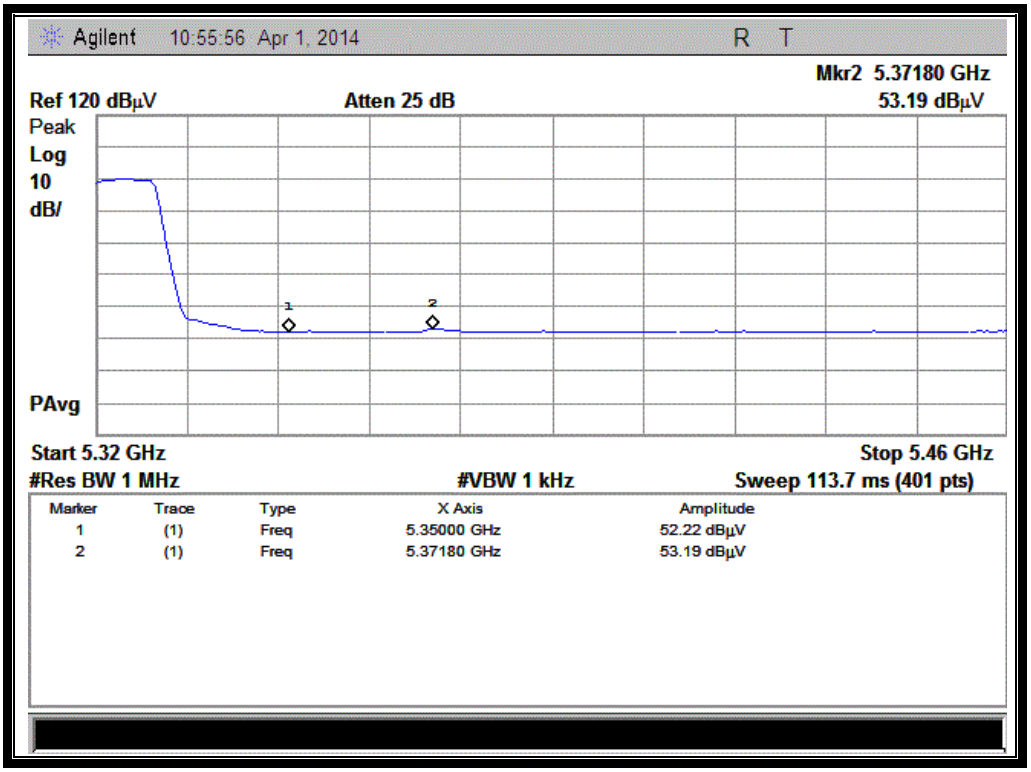
(Channel = 36 PEAK @ 802.11ac-20MHz)



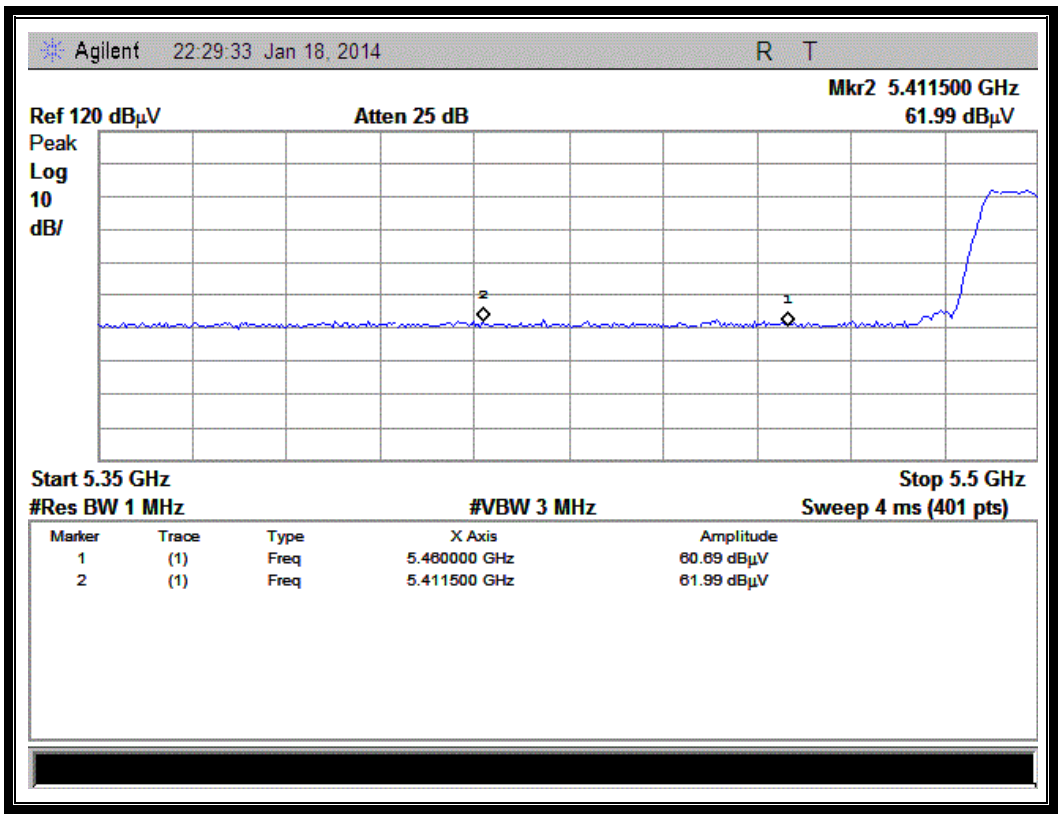
(Channel = 36 AVG @ 802.11ac-20MHz)



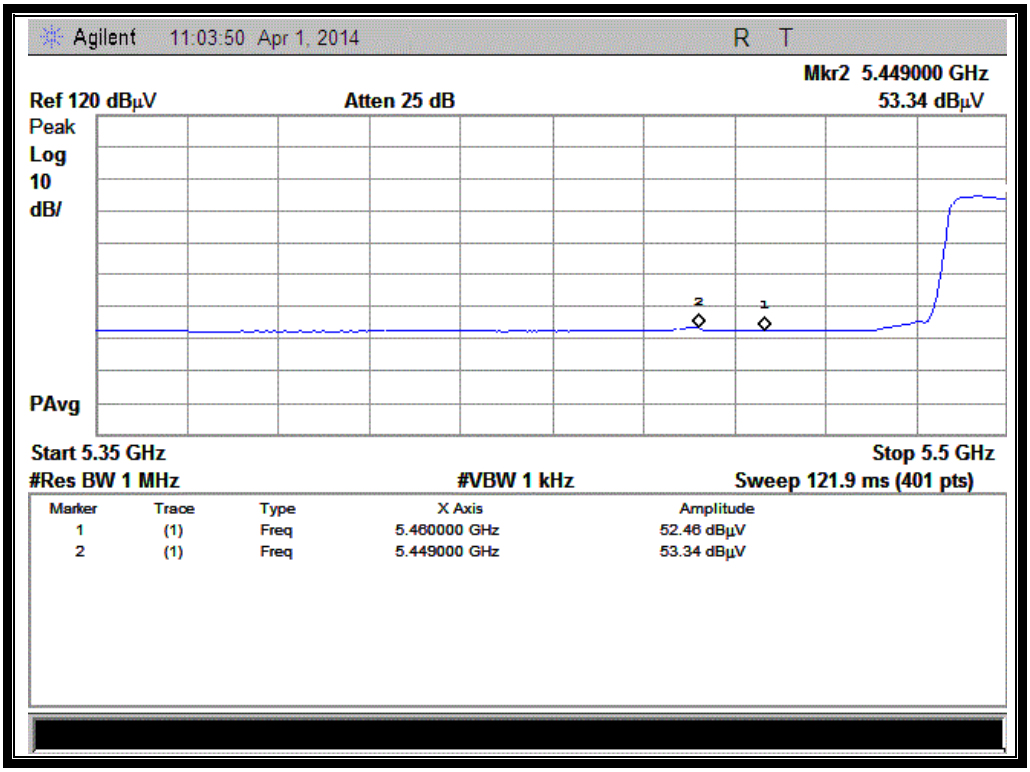
(Channel = 64 PEAK @ 802.11ac-20MHz)



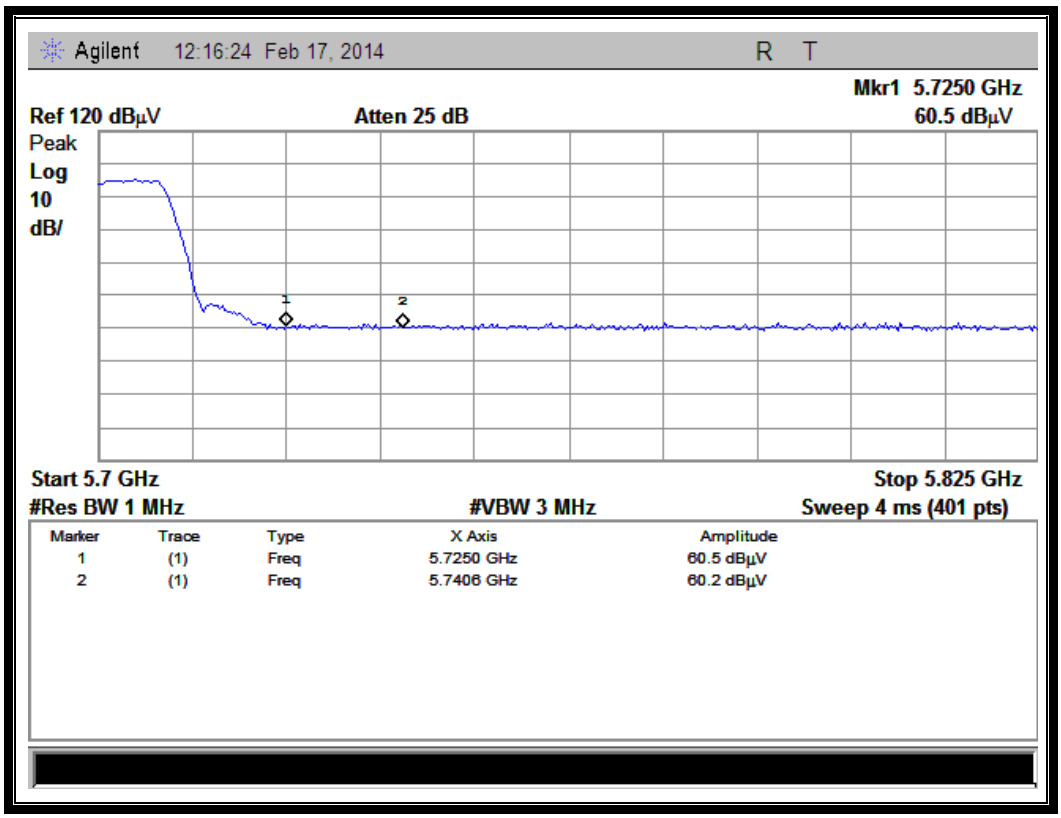
(Channel = 64 AVG @ 802.11ac-20MHz)



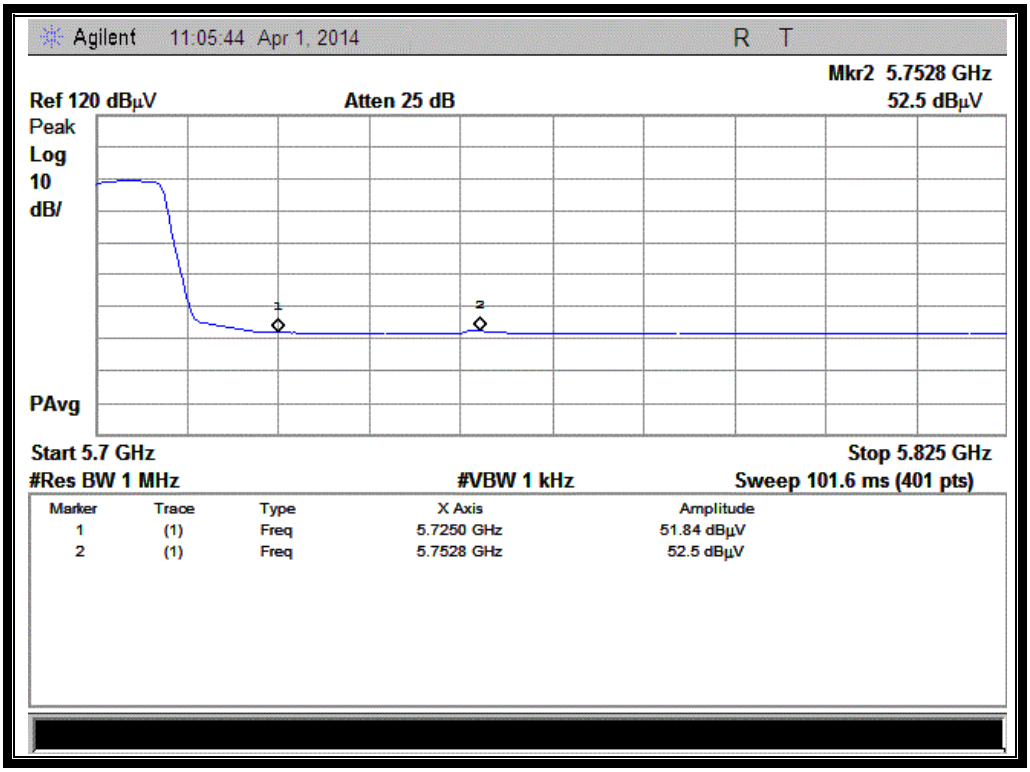
(Channel = 100 PEAK @ 802.11ac-20MHz)



(Channel = 100 AVG @ 802.11ac-20MHz)



(Channel = 140 PEAK @ 802.11ac-20MHz)



(Channel = 140 AVG @ 802.11ac-20MHz)

2.6.3.5. 802.11ac-40MHz Test mode

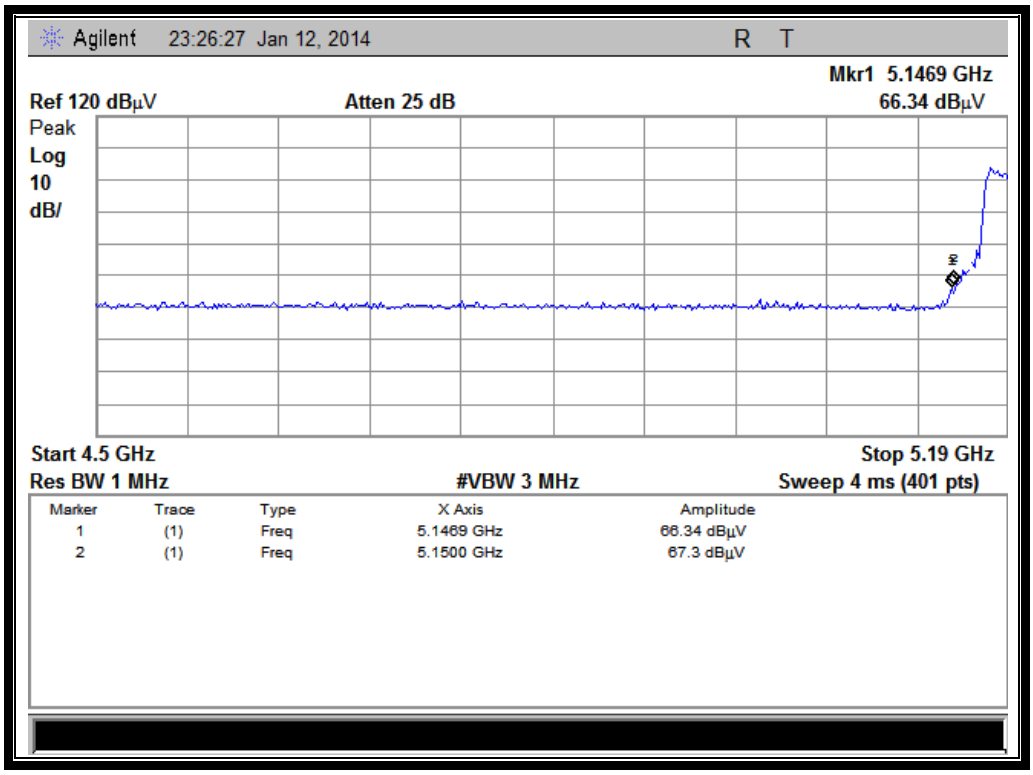
The lowest and highest channels are tested to verify the band edge emissions.

A. Test Verdict:

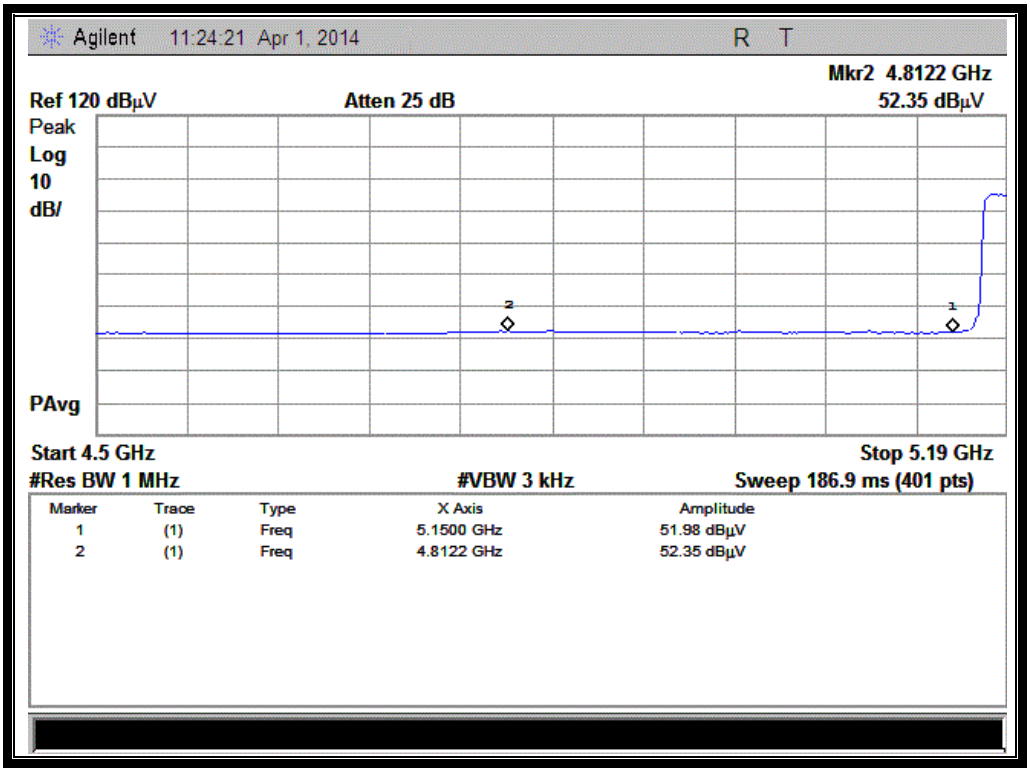
Channel	Frequency (MHz)	Detector PK/ AV	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBµV/m)	Limit (dBµV/m)	Verdict
38	5150.00	PK	67.30	-43.13	32.11	56.28	74	Pass
38	4812.20	AV	52.35	-43.13	32.11	41.33	54	Pass
62	5350.00	PK	62.73	-42.79	31.69	51.63	74	Pass
62	5417.25	AV	52.88	-42.79	31.69	41.78	54	Pass
102	5416.75	PK	61.91	-42.79	31.69	50.81	74	Pass

Channel	Frequency (MHz)	Detector	Receiver Reading UR (dBuV)	AT (dB)	AFactor (dB@3m)	Max. Emission E (dBμV/m)	Limit (dBμV/m)	Verdict
		PK/ AV						
102	5460.00	AV	52.74	-42.79	31.69	41.64	54	Pass

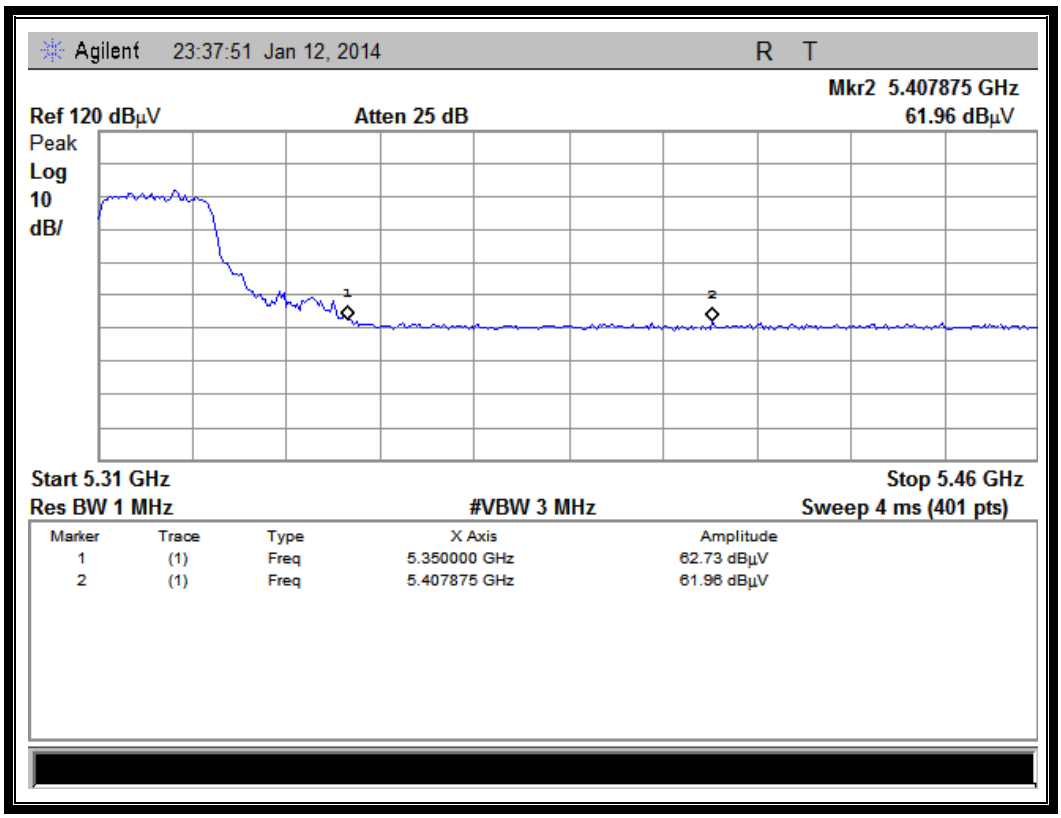
B. Test Plots:



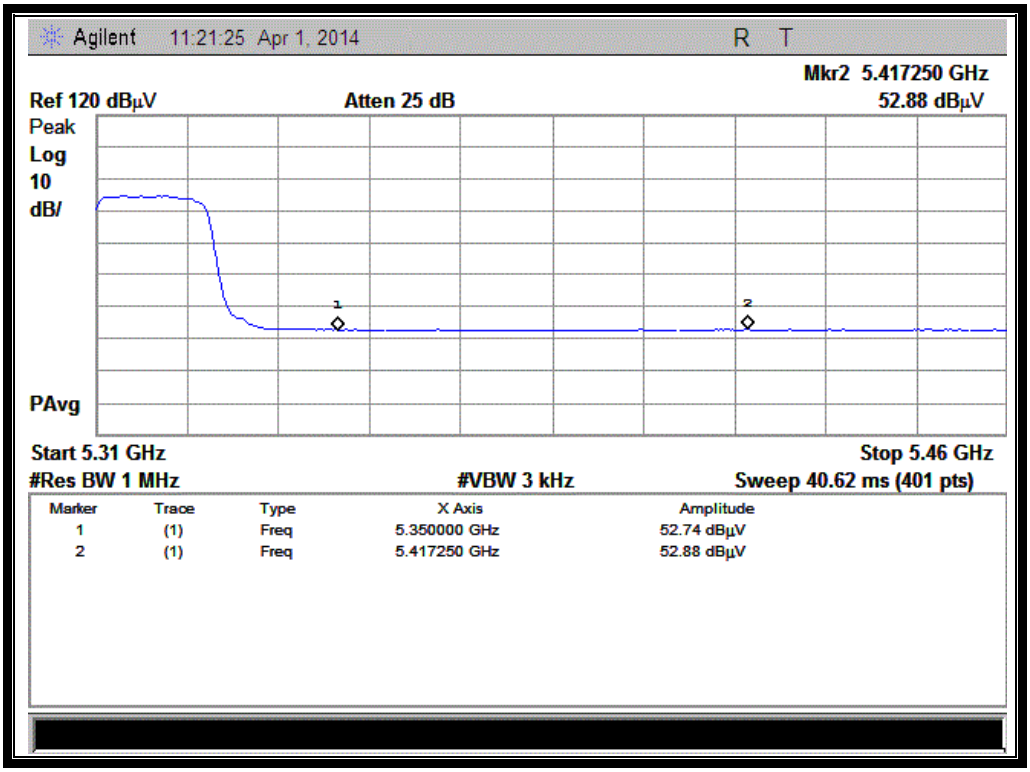
(Channel = 38 PEAK @ 802.11ac-40MHz)



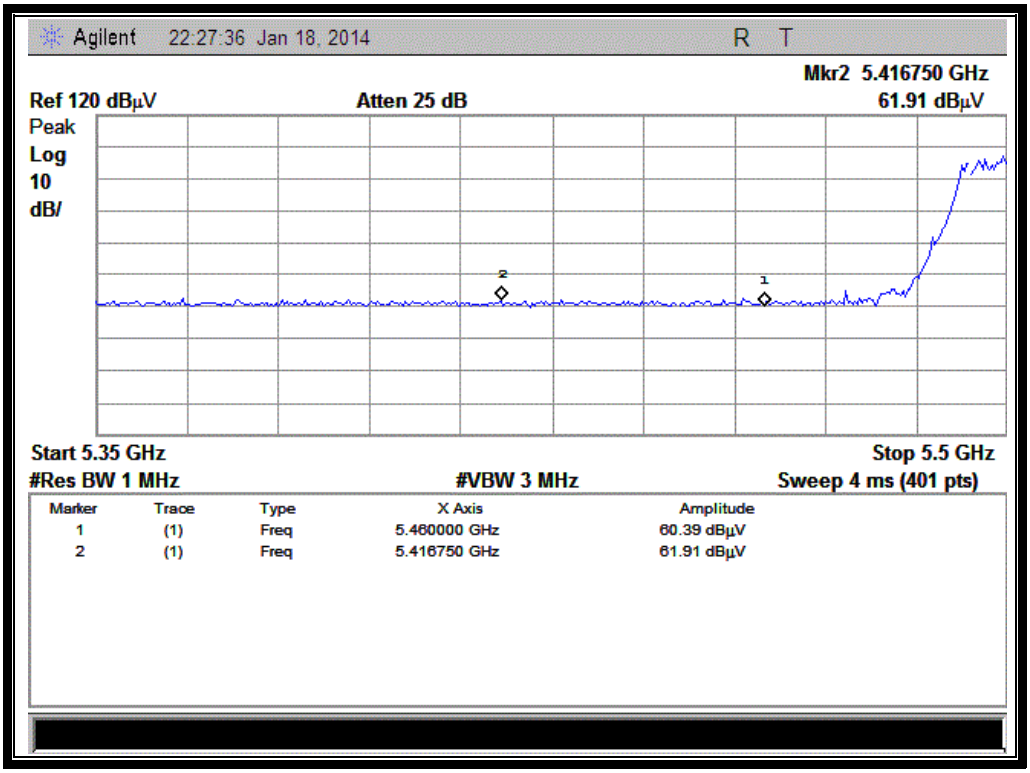
(Channel = 38 AVG @ 802.11ac-40MHz)



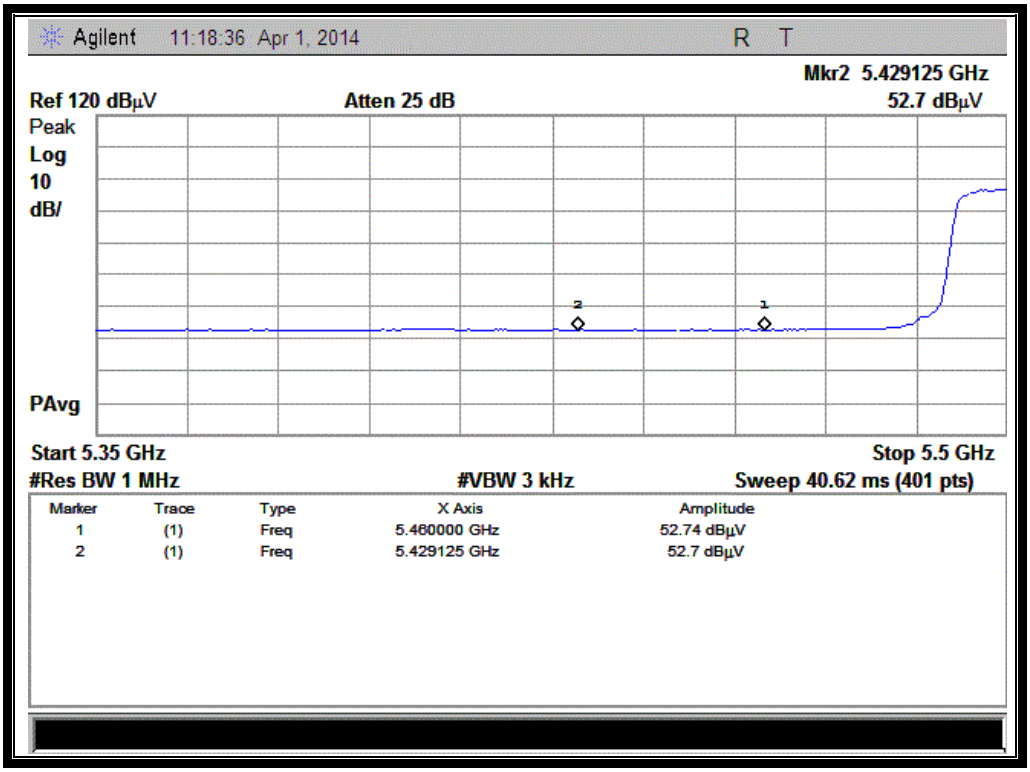
(Channel = 62 PEAK @ 802.11 ac-40MHz)



(Channel = 62 AVG @ 802.11 ac-40MHz)



(Channel = 102 PEAK @ 802.11ac-40MHz)



(Channel = 102 AVG @ 802.11ac-40MHz)

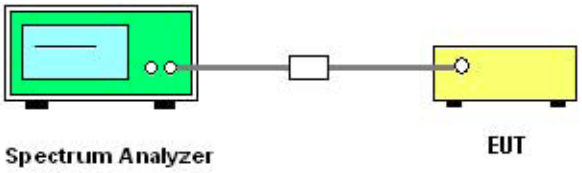
2.7. Peak Excursion

2.7.1. Requirement

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

2.7.2. Test Description

A. Test Setup:



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

Section G) of KDB 789033 was used in order to prove compliance

(1) Set RBW = 1 MHz. VBW ≥ 3 MHz. Detector = peak.

(2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.

(3) Use the peak search function to find the peak of the spectrum.

(4) measure the PPSD.

(5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

C. Equipments List:

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
EXA Signal Analzyer	Agilent	N9010A	MY51440152	2013.05.12	2014.05.11

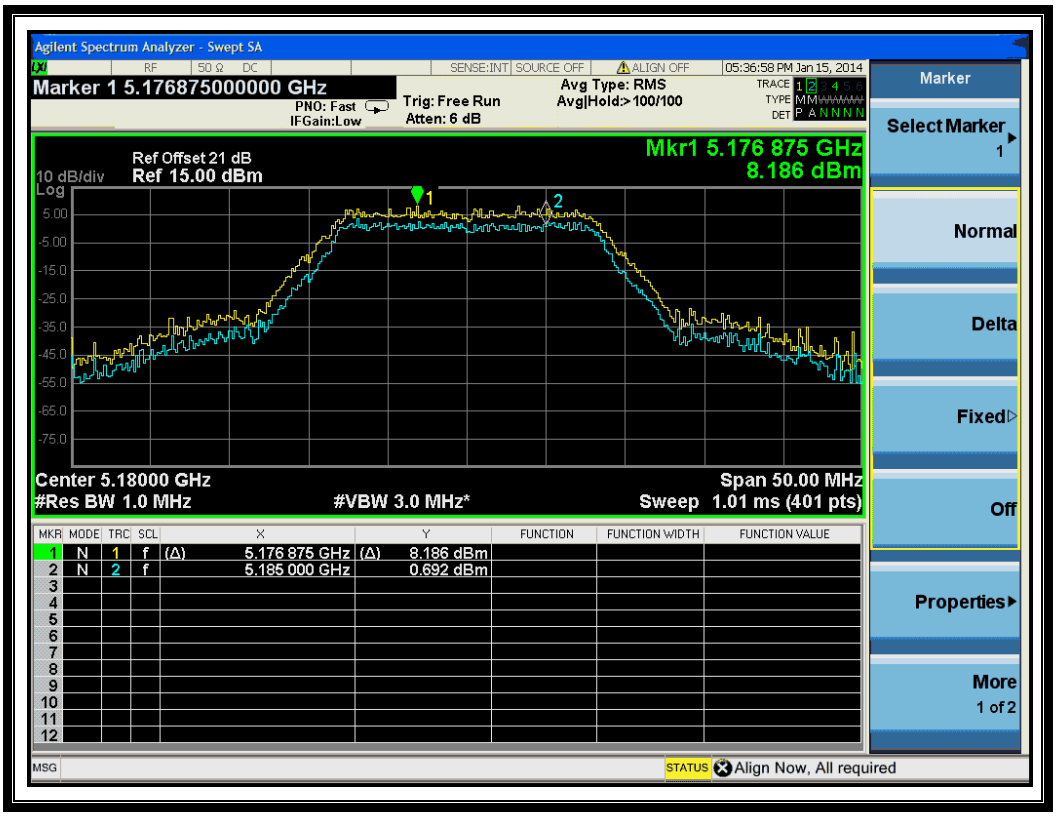
2.7.3. Test Result

2.7.3.1. 802.11a Test mode

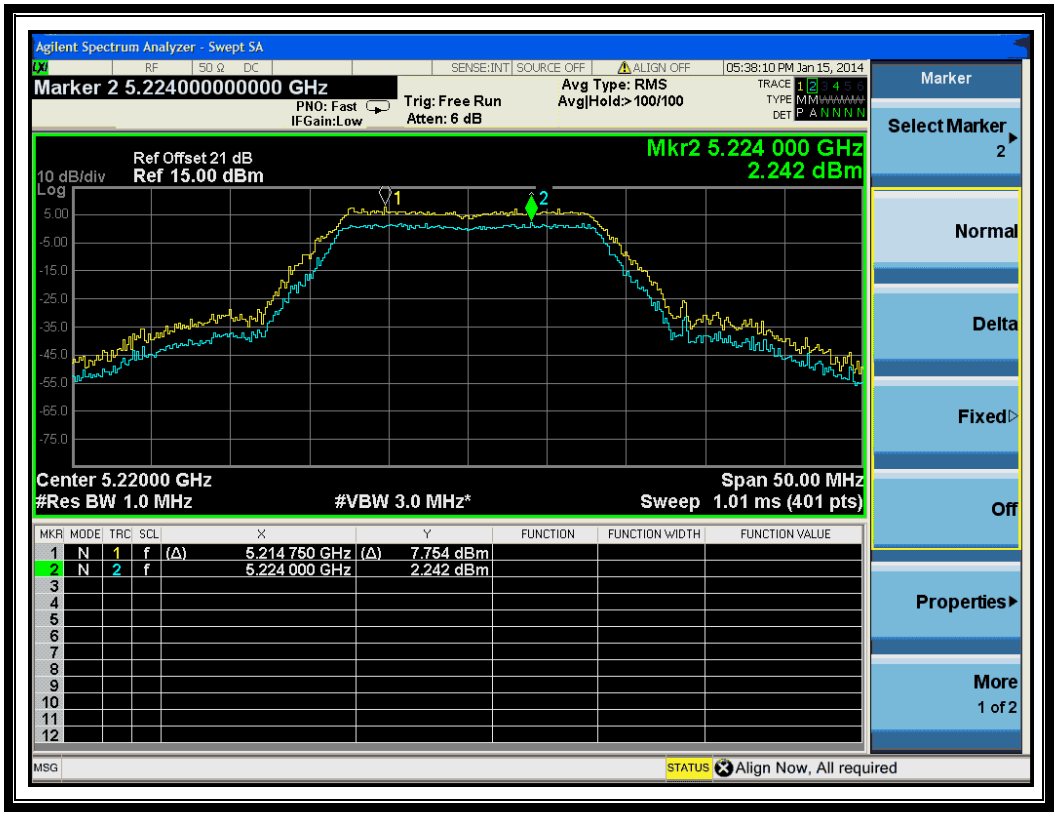
A. Test Verdict:

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Verdict
36	5180	7.494	13	PASS
44	5220	5.512	13	PASS
48	5240	6.439	13	PASS
52	5260	3.619	13	PASS
60	5300	5.207	13	PASS
64	5320	3.421	13	PASS
100	5500	5.843	13	PASS
116	5580	3.827	13	PASS
140	5700	6.368	13	PASS

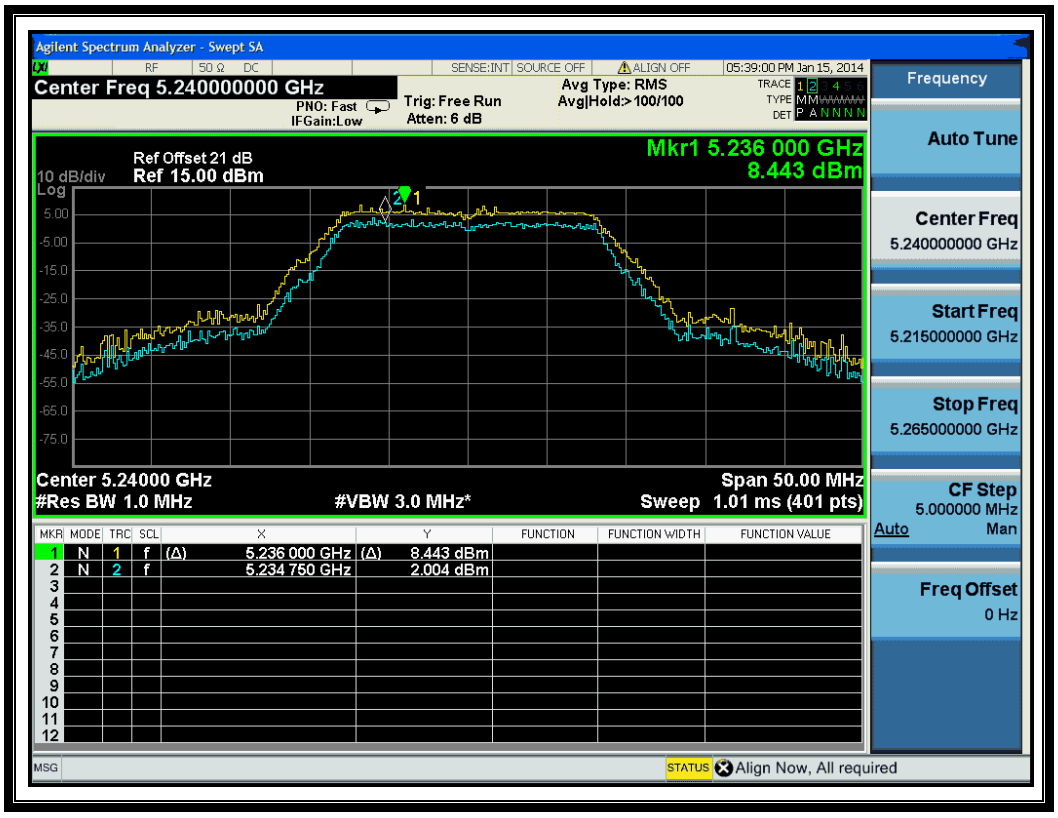
B. Test Plots:



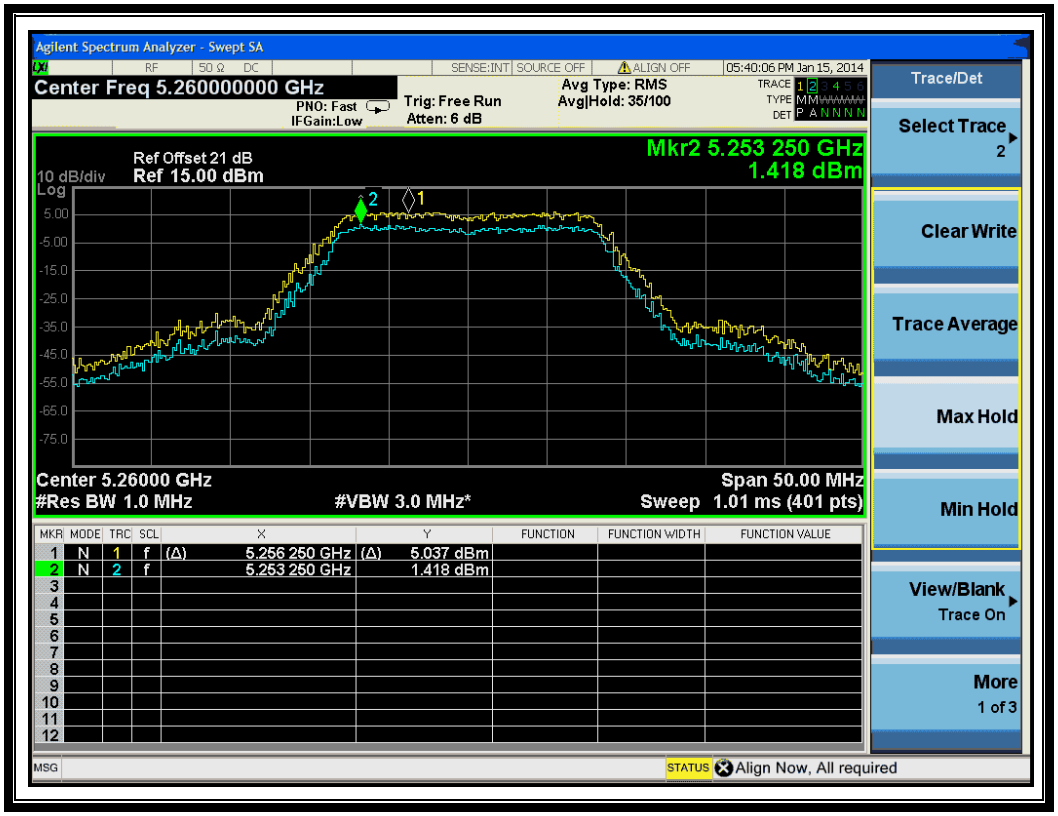
(Channel 36: 5180MHz @ 802.11a)



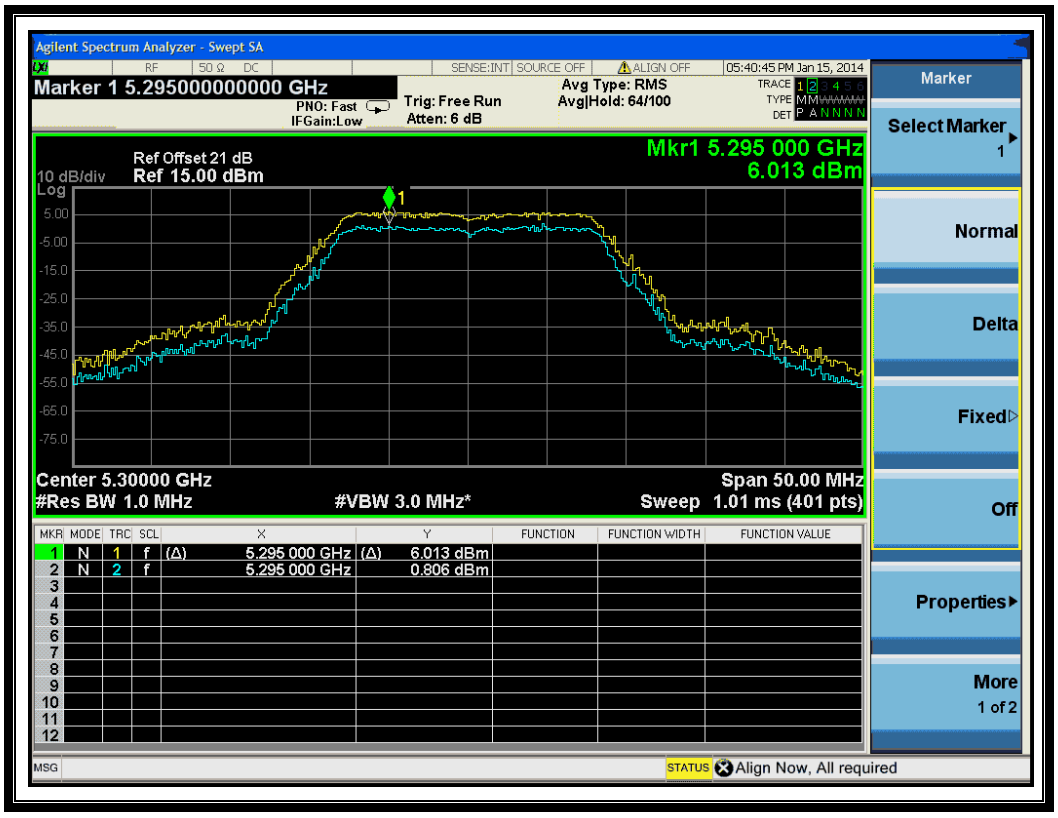
(Channel 44: 5220 MHz @ 802.11a)



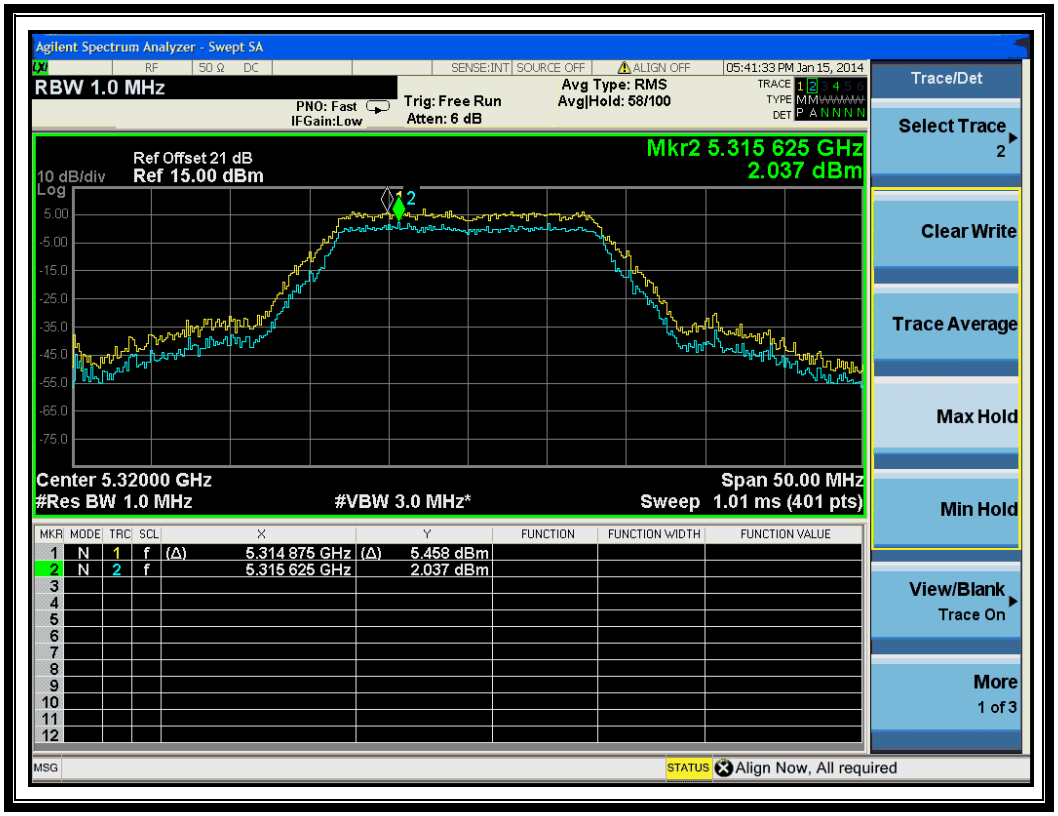
(Channel 48: 5240MHz @ 802.11a)



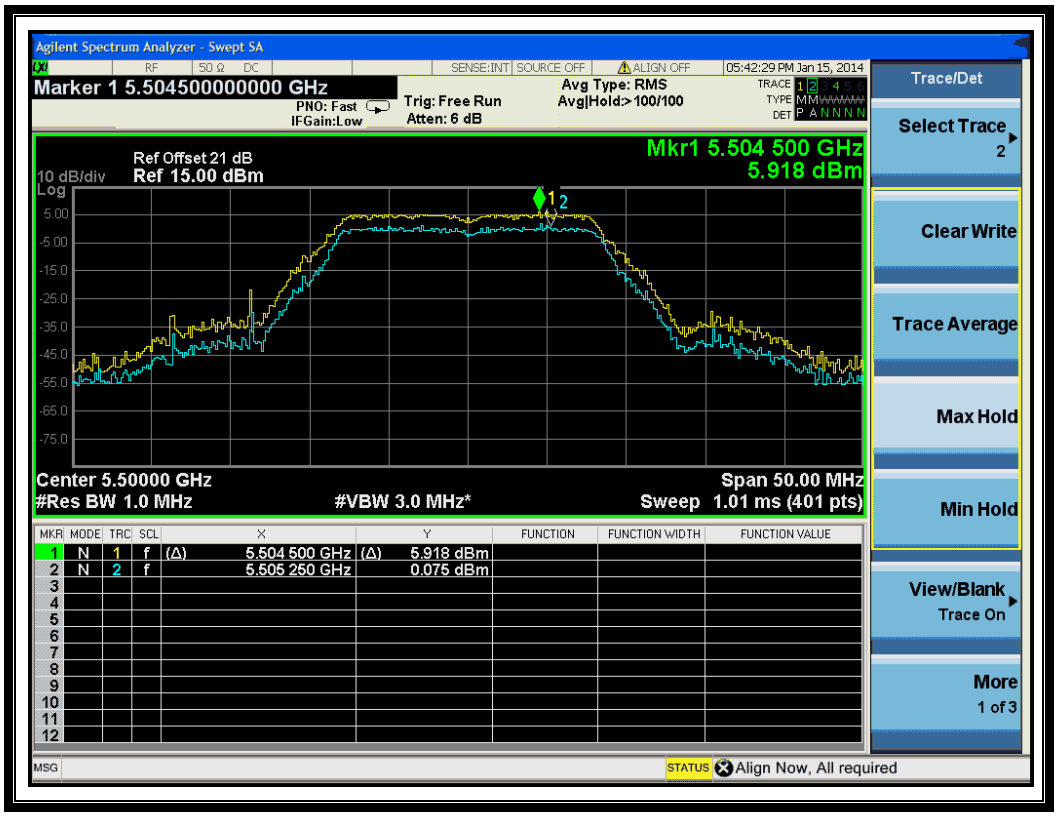
(Channel 52: 5260MHz @ 802.11a)



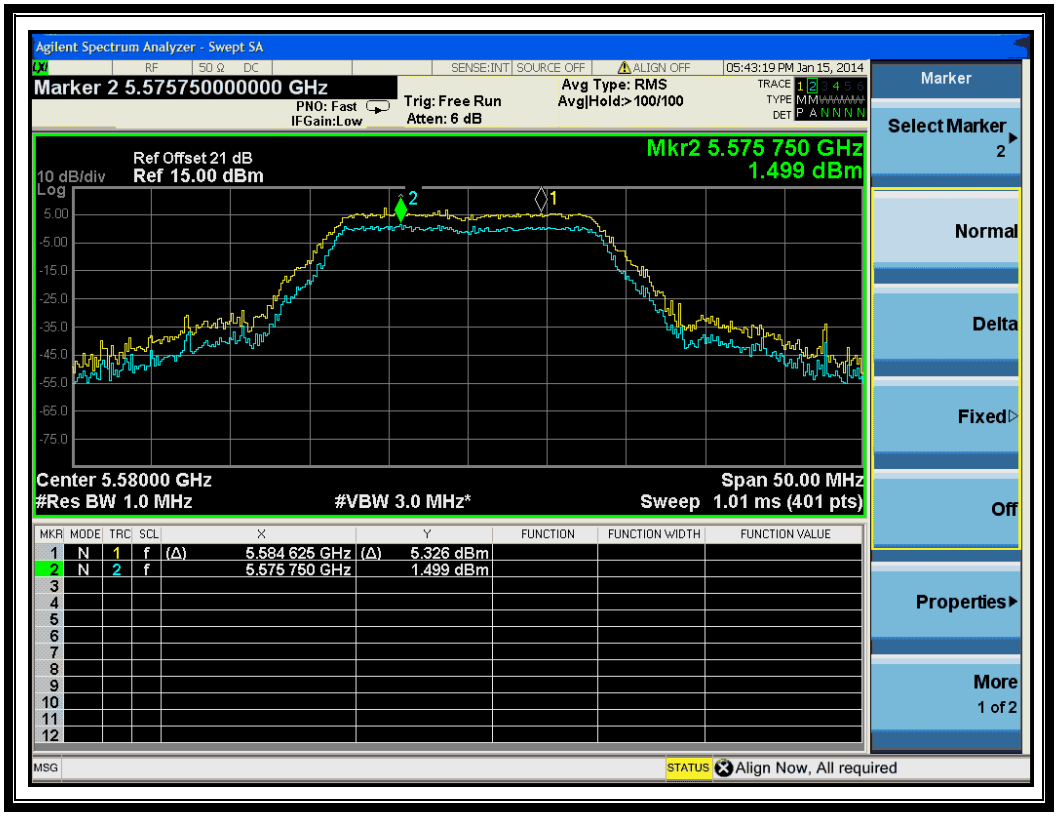
(Channel 60: 5300 MHz @ 802.11a)



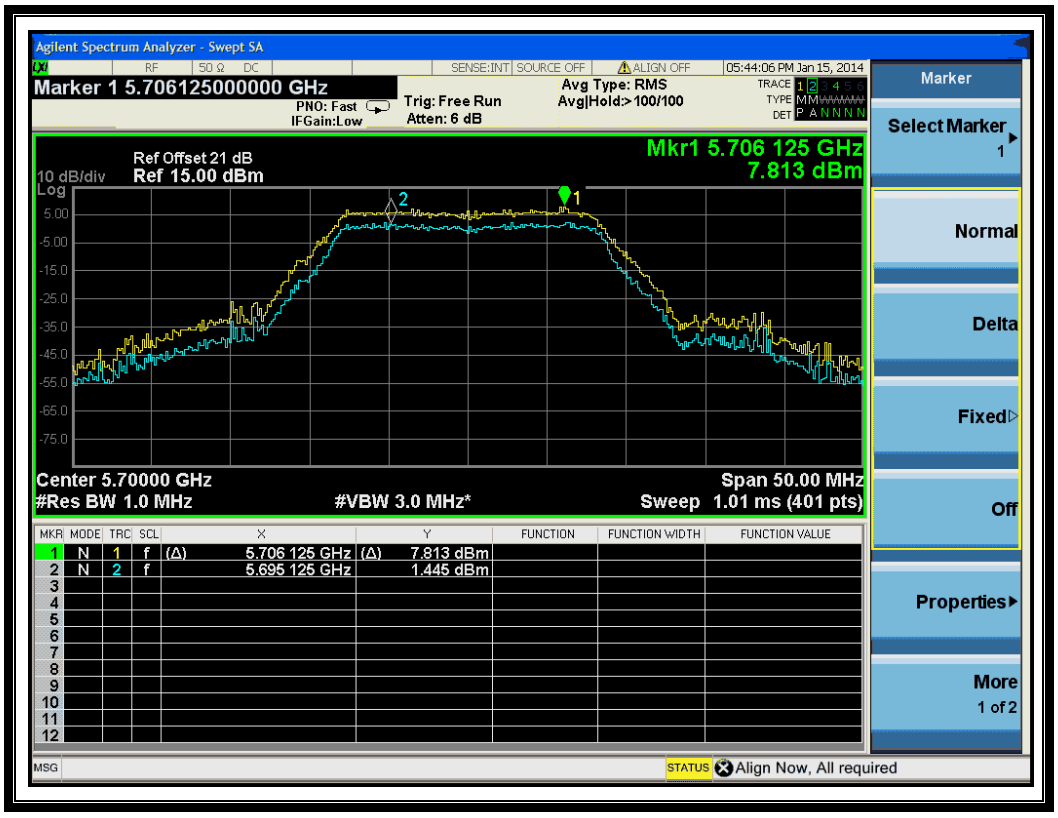
(Channel 64: 5320MHz @ 802.11a)



(Channel 100: 5500MHz @ 802.11a)



(Channel 116: 5580 MHz @ 802.11a)



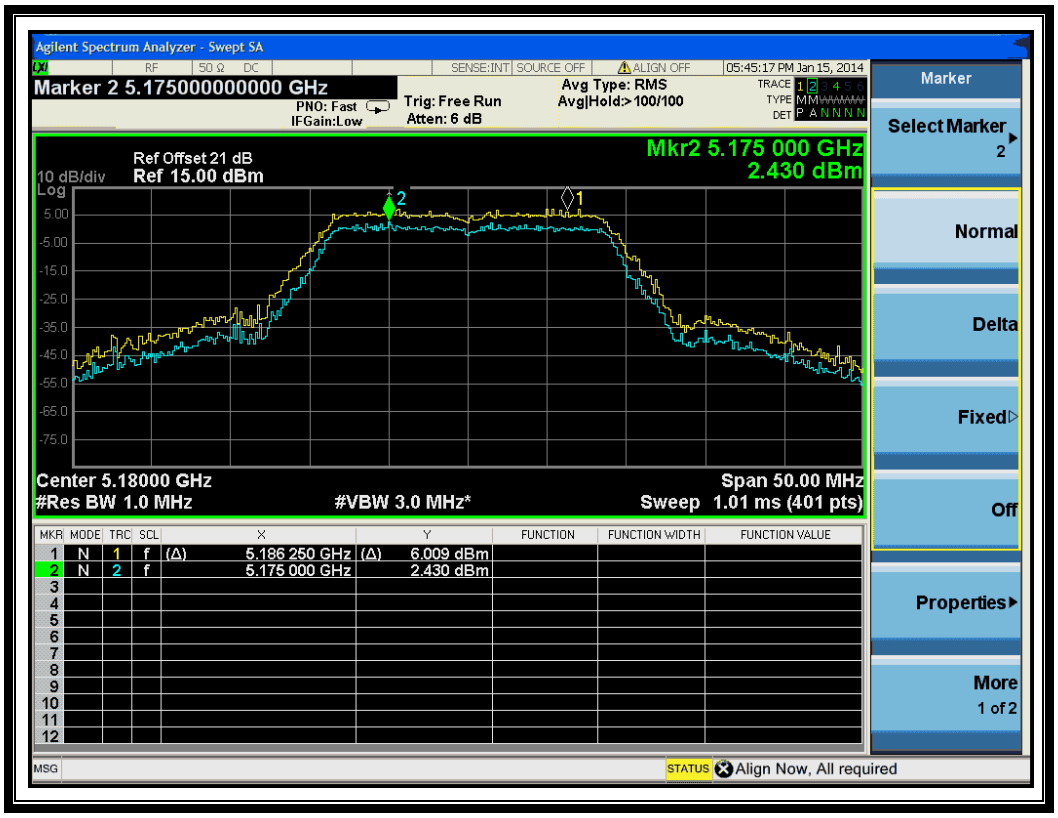
(Channel 140: 5700MHz @ 802.11a)

2.7.3.2. 802.11n-20MHz Test mode

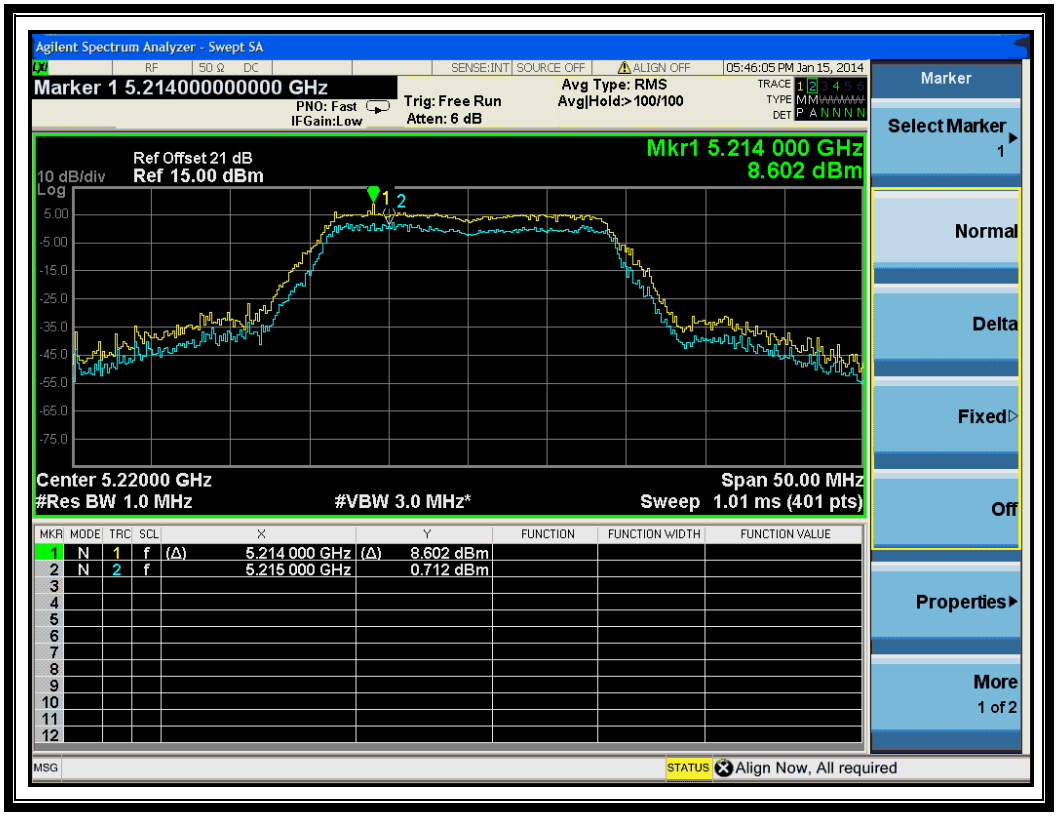
A. Test Verdict:

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Verdict
36	5180	3.579	13	PASS
44	5220	7.890	13	PASS
48	5240	4.604	13	PASS
52	5260	4.795	13	PASS
60	5300	5.042	13	PASS
64	5320	3.880	13	PASS
100	5500	5.197	13	PASS
116	5580	2.794	13	PASS
140	5700	4.852	13	PASS

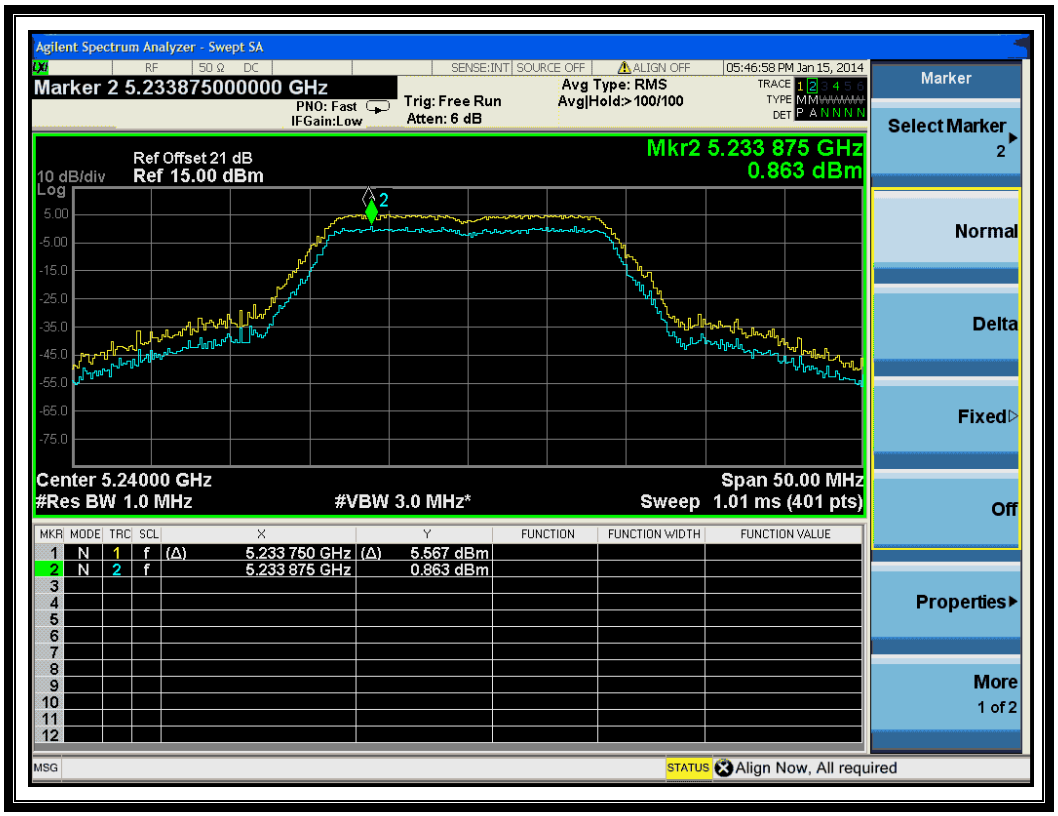
B. Test Plots:



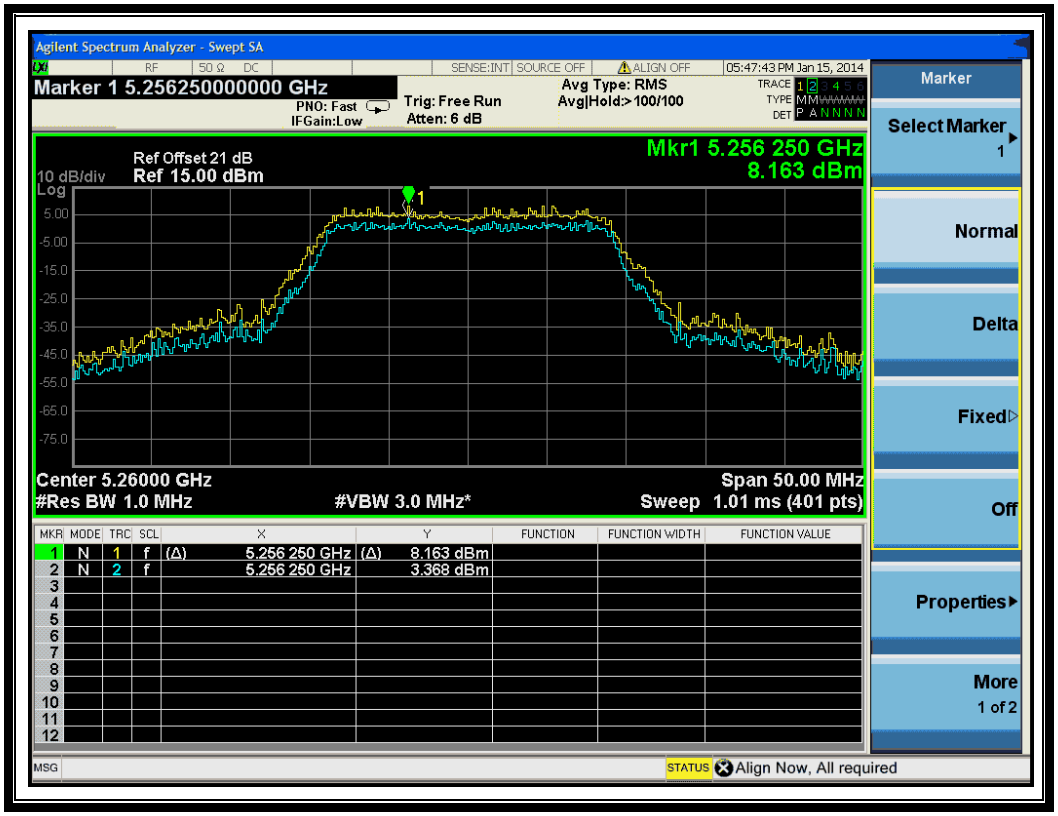
(Channel 36: 5180MHz @ 802.11n-20MHz)



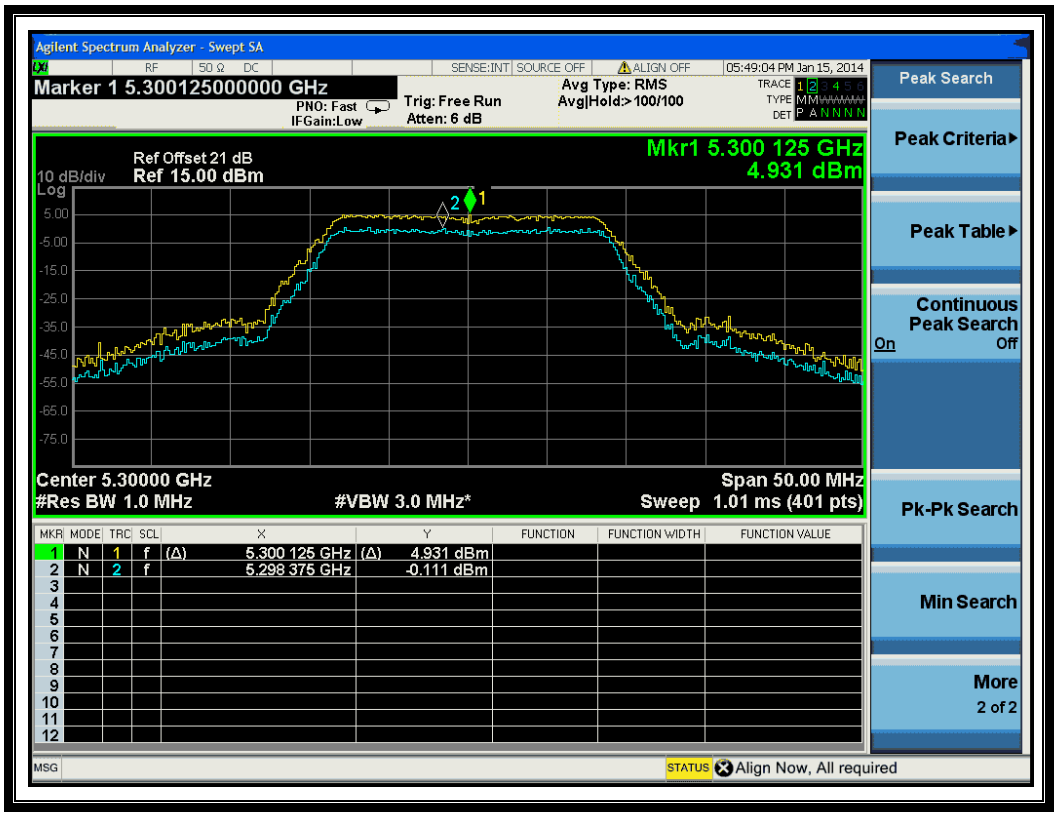
(Channel 44: 5220 MHz @ 802.11n-20MHz)



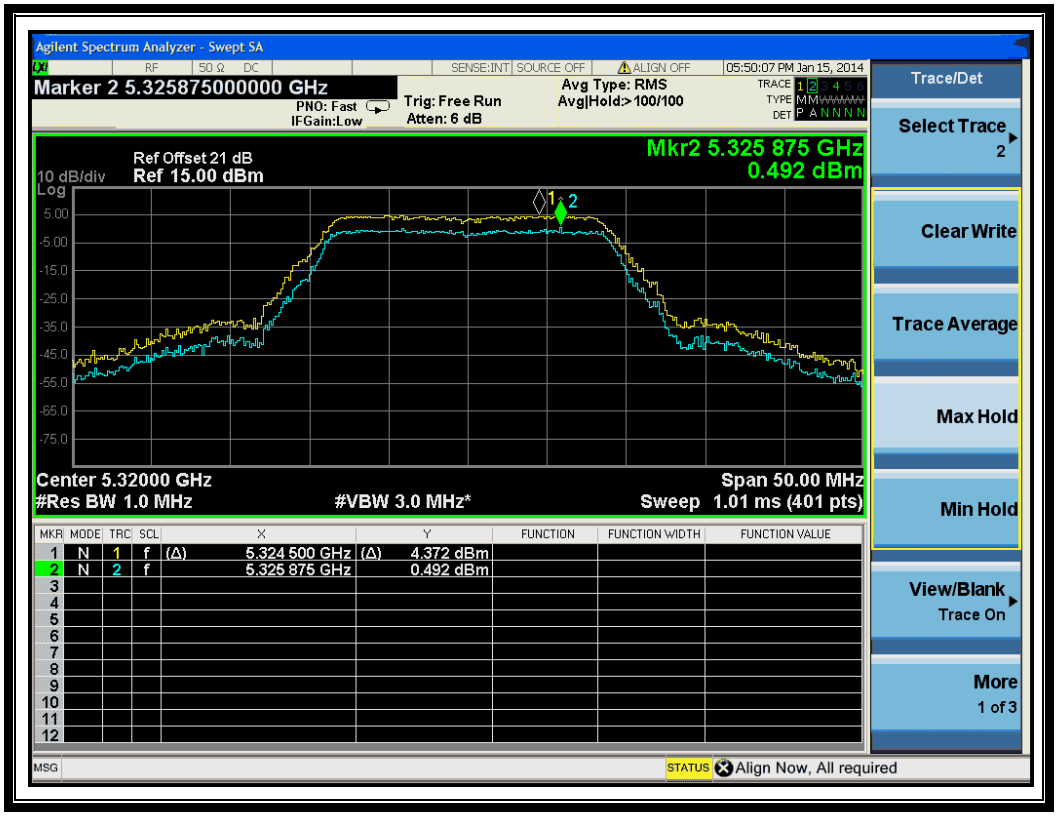
(Channel 48: 5240MHz @ 802.11n-20MHz)



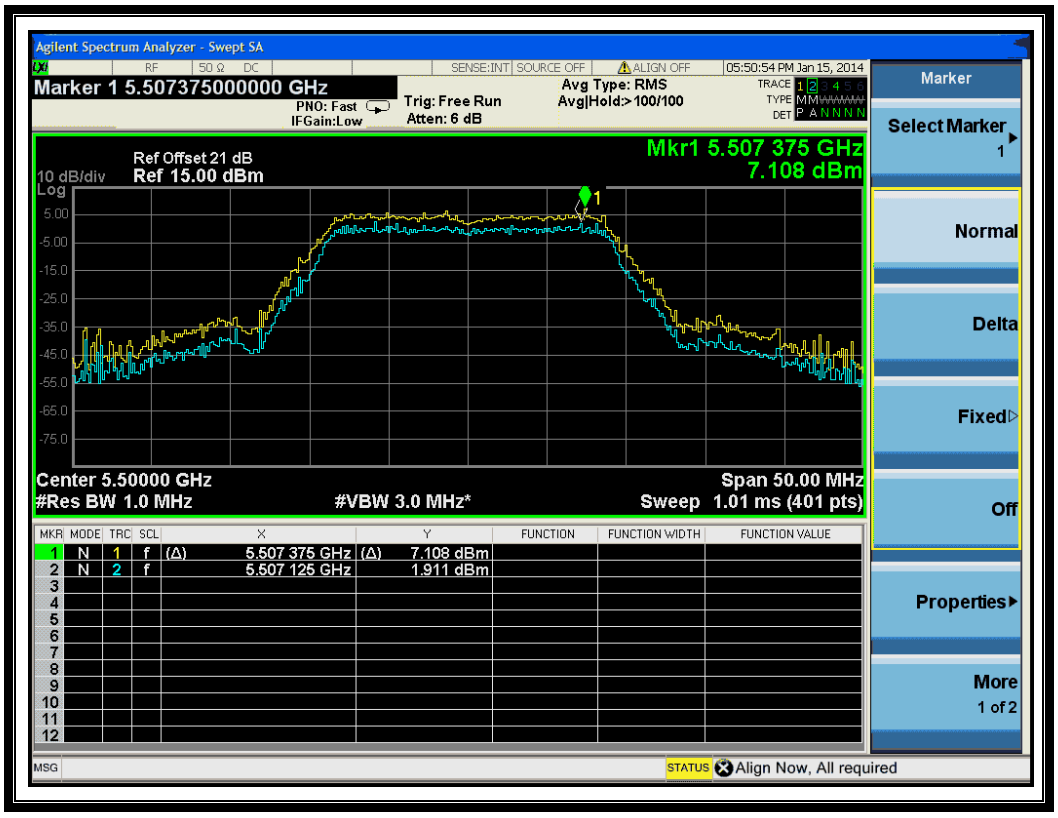
(Channel 52: 5260MHz @ 802.11n-20MHz)



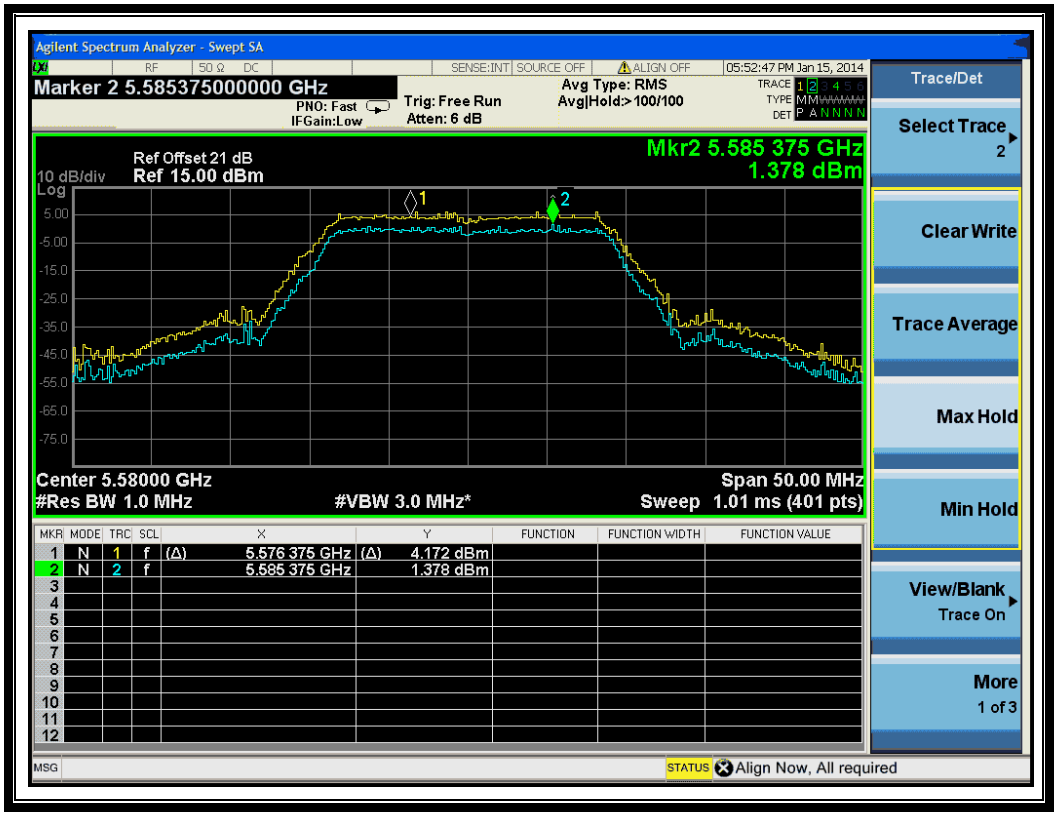
(Channel 60: 5300 MHz @ 802.11n-20MHz)



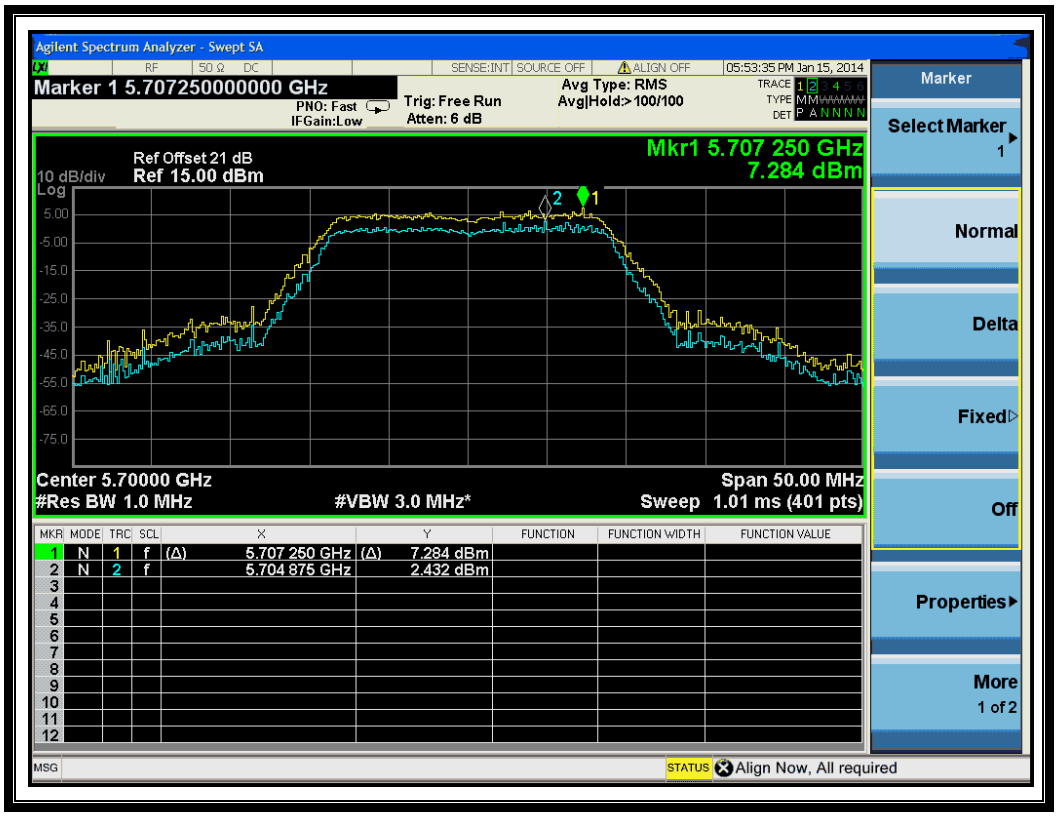
(Channel 64: 5320MHz @ 802.11n-20MHz)



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



(Channel 116: 5580 MHz @ 802.11n-20MHz)



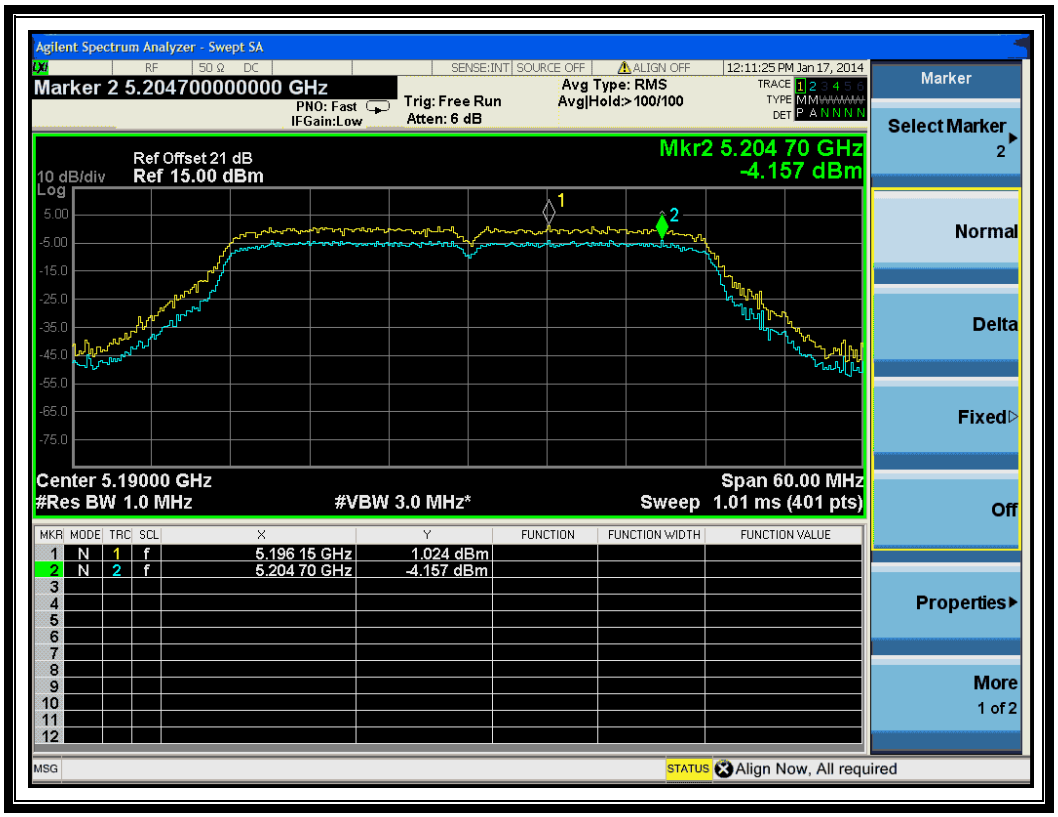
(Channel 140: 5700MHz @ 802.11n-20MHz)

2.7.3.3. 802.11n-40MHz Test mode

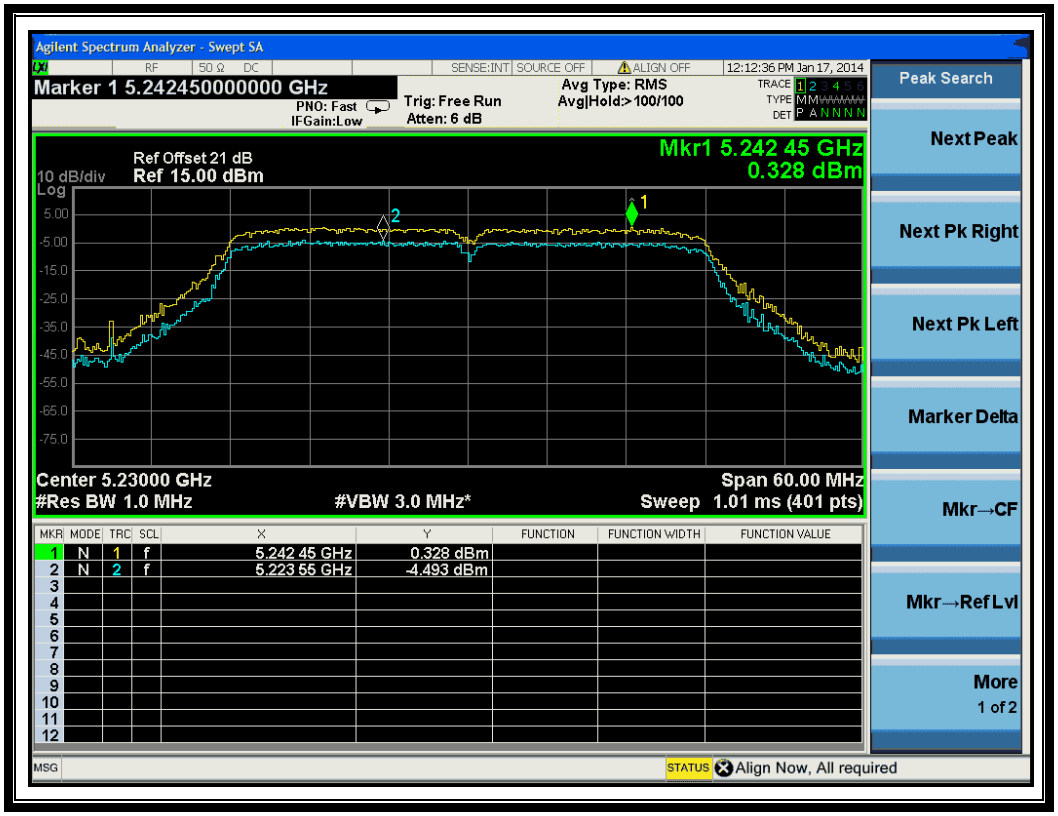
A. Test Verdict:

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Verdict
38	5190	5.181	13	PASS
46	5230	4.821	13	PASS
54	5270	4.487	13	PASS
62	5310	3.996	13	PASS
102	5510	4.751	13	PASS
110	5550	5.026	13	PASS
134	5670	5.507	13	PASS

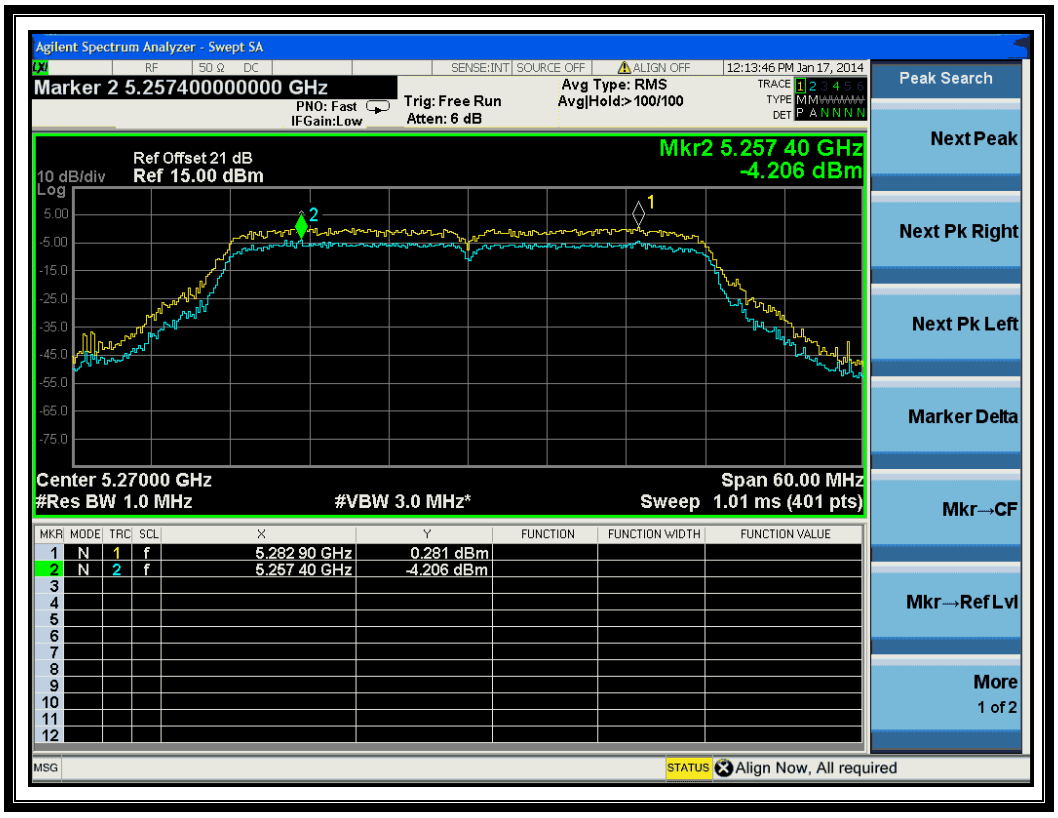
B. Test Plots:



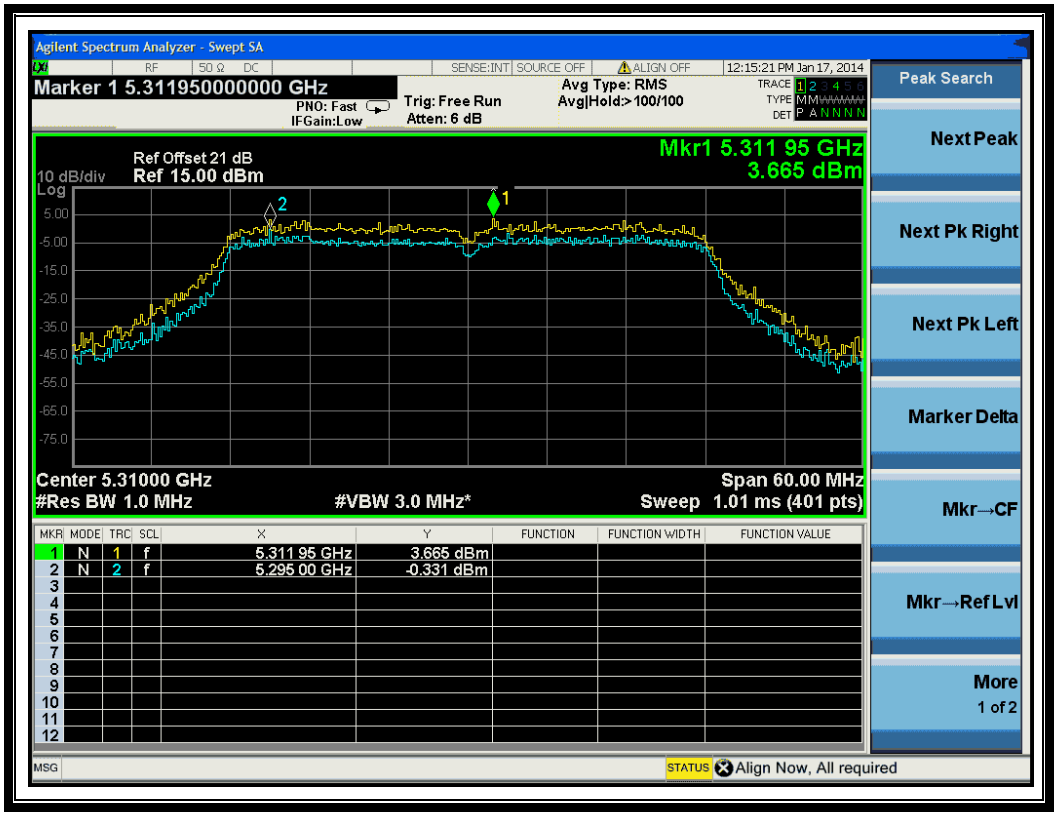
(Channel 38: 5190MHz @ 802.11n-40MHz)



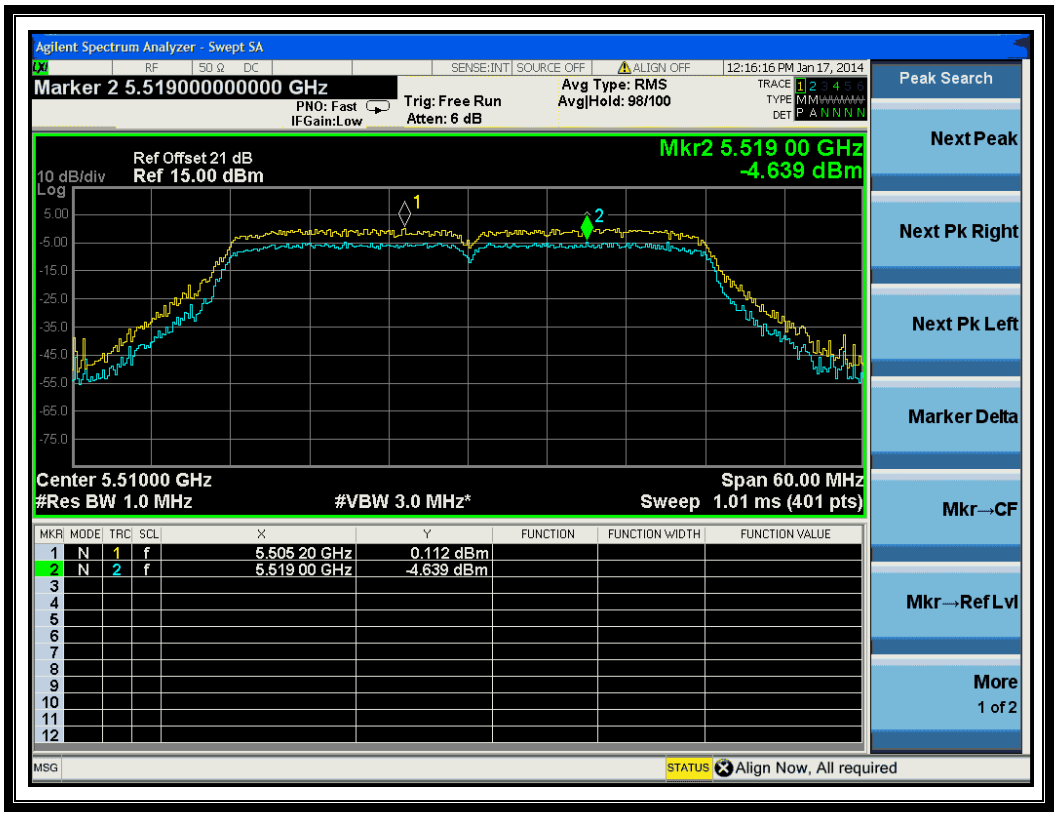
(Channel 46: 5310MHz @ 802.11n-40MHz)



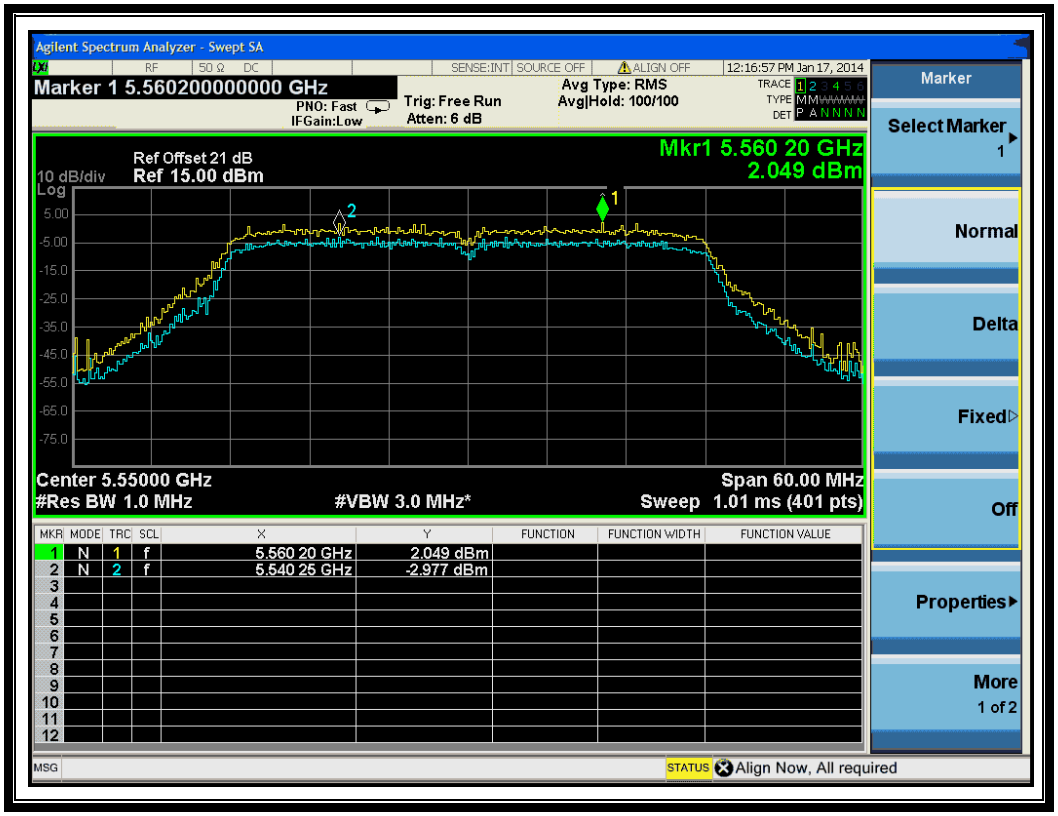
(Channel 54: 5270MHz @ 802.11n-40MHz)



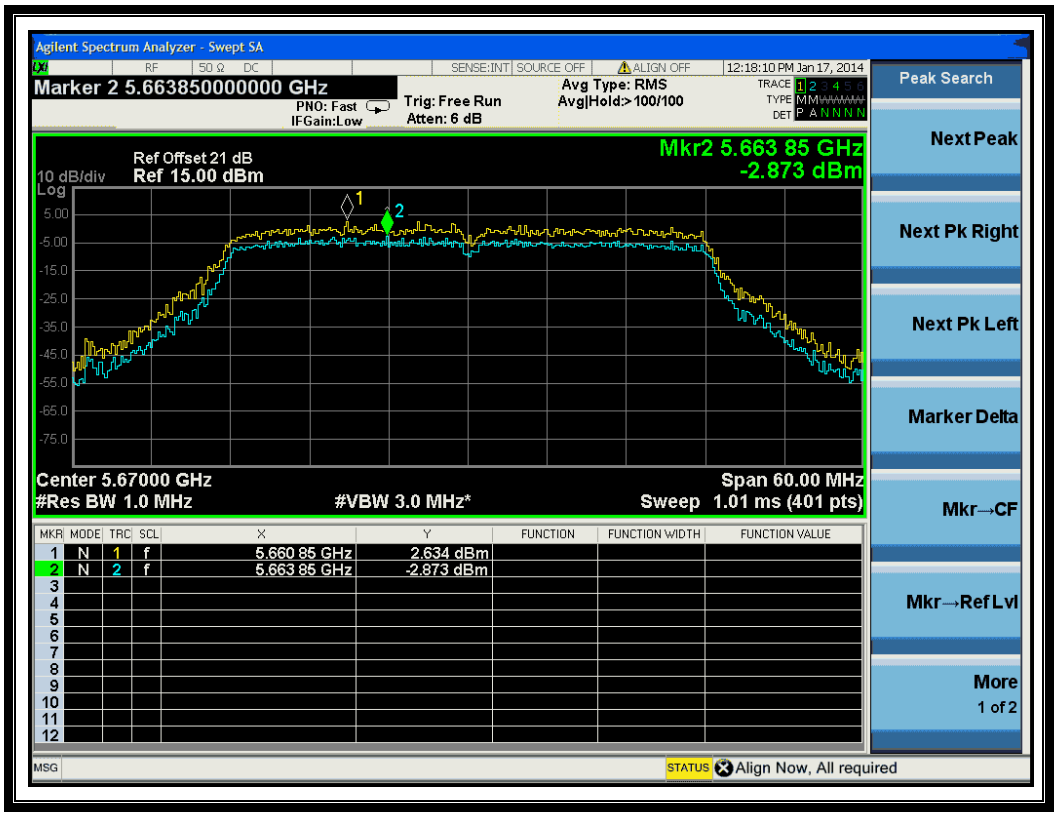
(Channel 62: 5310MHz @ 802.11n-40MHz)



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



(Channel 110: 5550MHz @ 802.11n-40MHz)



(Channel 134: 5670MHz @ 802.11n-40MHz)