TEST REPORT

APPLICANT	:	Anker Innovations Limited
PRODUCT NAME	:	Nebula Soundbar-Fire TV Edition
MODEL NAME	:	D3000
BRAND NAME	:	NEBULA
FCC ID	:	2AOKB-D3000
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2019-07-31
TEST DATE	:	2019-08-27 to 2019-09-25
ISSUE DATE	:	2019-09-25

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Peng Huarui (Supervisor)

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Change History		
Version	**Date**	**Reason for change**
1.0	2019-09-25	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Anker Innovations Limited
Applicant Address:	Room 1318-19,Hollywood Plaza,610 Nathan Road, Mongkok, Kowloon, Hong Kong
Manufacturer:	Anker Innovations Limited
Manufacturer Address:	Room 1318-19,Hollywood Plaza,610 Nathan Road, Mongkok, Kowloon, Hong Kong

1.2. Equipment Under Test (EUT) Description

Product Name:	Nebula Soundbar-Fire TV Edition
Serial No:	(N/A, marked #1 by test site)
Hardware Version:	V0.3
Software Version:	V1.1.13
Modulation Type:	OFDM
Modulation Mode:	802.11a, 802.11n(HT20), 802.11n(HT40) 802.11ac(VHT20), 802.11ac(VHT40), 802.11ac(VHT80),
Operating Frequency Range:	5.180 GHz- 5.240 GHz; 5.745GHz- 5.825GHz
Channel Number:	Refer to 1.3
Antenna Type:	Fixed Internal Antenna
Antenna Gain:	Ant1: 1.15 dBi; Ant2: 5.70dBi
Directional Gain:	8.71 dBi Note 3

Note 1: The EUT contains two modules, and the information of two modules are shown as below. This report recorded the results of WIFI5G for the module 2.

Module	**Model name**
Module 1	ActionsBlue Stack Dual 5.0
Module 2	E9L29Y

Note 2: The EUT has two antennas and supports a MIMO function. Physically, the EUT provides two completed transmitters and two receivers for all modulation mode.

Modulation Mode:	**TX Function**
802.11a	1TX
802.11n	2TX
802.11ac	2TX

Note 3: According to KDB 662911 D01, the directional gain = G_{ANT} + 10log(N_{ANT}) dBi, where G_{ANT} is the maximum antenna gain in dBi, N_{ANT} is the number of outputs.

Note 4: For conducted test item Maximum conducted output Power and Peak Power spectral density of each modulation mode, we recorded the test result of two antennas separately, for other conducted test items both of the two antennas were tested separately, we only recorded the worst test result(Ant 1) in this report.

Note 5: All radiation test items for 802.11n and 802.11ac modulation mode operate at MIMO mode during the test. Other modulation mode operate at SISO mode, both of the two antennas were tested separately, we only recorded the worst test result(ANT1) in this report.

Note 6: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation technology	Modulation Type	Data Rate (Mbps) Note1
OFDM (802.11a)	BPSK	**6**/9
	QPSK	12/18
	16QAM	24/36
	64QAM	48/54
OFDM (802.11n)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
OFDM (802.11ac)	BPSK	**6.5**
	QPSK	13/19.5
	16QAM	26/39
	64QAM	52/58.5/65
	256QAM	78

Note1: The worst-case mode (black bold) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.

1.4. The channel number and frequency of EUT

Frequency Range: 5180MHz-5240MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**36**	**5180**	40	5200
	44	**5220**	**48**	**5240**
40MHz	**38**	**5190**	**46**	**5230**
80MHz	**42**	**5210**		
Frequency Range: 5745-5825MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	**149**	**5745**	153	5765
	157	**5785**	161	5805
	165	**5825**		
40MHz	**151**	**5775**	**159**	**5795**
80MHz	**155**	**5775**		

Note 1: The black bold channels were selected for test.

1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart E (U-NII 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	Test Date	Test Engineer	Result	Method determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	N/A
2	ANSI C63.10	Duty Cycle of the test signal	Sep 24, 2019	Zhou Chuang	PASS	No deviation
3	15.407(a)	Maximum conducted output Power	Sep 24, 2019	Zhou Chuang	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Sep 24&25, 2019	Zhou Chuang	PASS	No deviation
5	15.407(a)	Peak Power spectral density	Sep 24&25, 2019	Zhou Chuang	PASS	No deviation
6	15.407(g)	Frequency Stability	Sep 24, 2019	Zhou Chuang	PASS	No deviation
7	15.207	Conducted Emission	Aug 27, 2019	Lin Jiayong	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Aug 29, 2019	Peng Xuewei	PASS	No deviation
9	15.407(b)	Radiated Emission	Aug 30, 2019 Sep 02, 2019	Peng Xuewei	PASS	No deviation

Note1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10 2013.

Note2: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 General UNII Test Procedures New Rules v02r01, KDB662911 D01 Multiple Transmitter Output v02r01.

Note3: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12.5dB contains two parts that cable loss 2.5dB and Attenuator 10dB.

Note 3: Additions to, deviation, or exclusions from the method should be judged in the "method

determination" column of add, deviate or exclude from the specific method should be explained in the "Remark" of the above table.

1.6. Environmental 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. 2.1.2 Result: Compliant

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

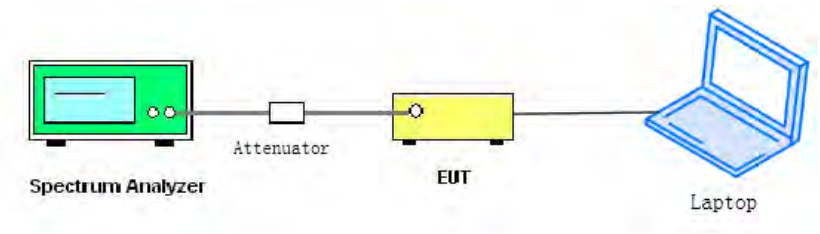
2.2. Duty Cycle of the test signal

2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

A. Test Set:



The EUT 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

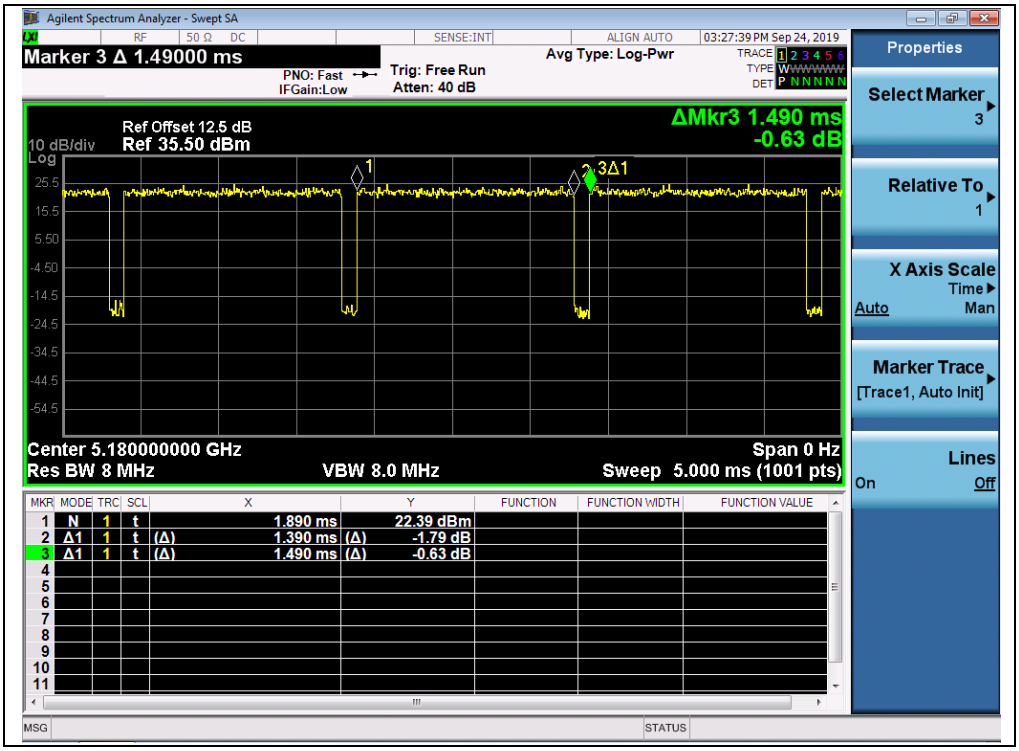
KDB 789033 Section B was used in order to prove compliance.

2.2.3. Test Result

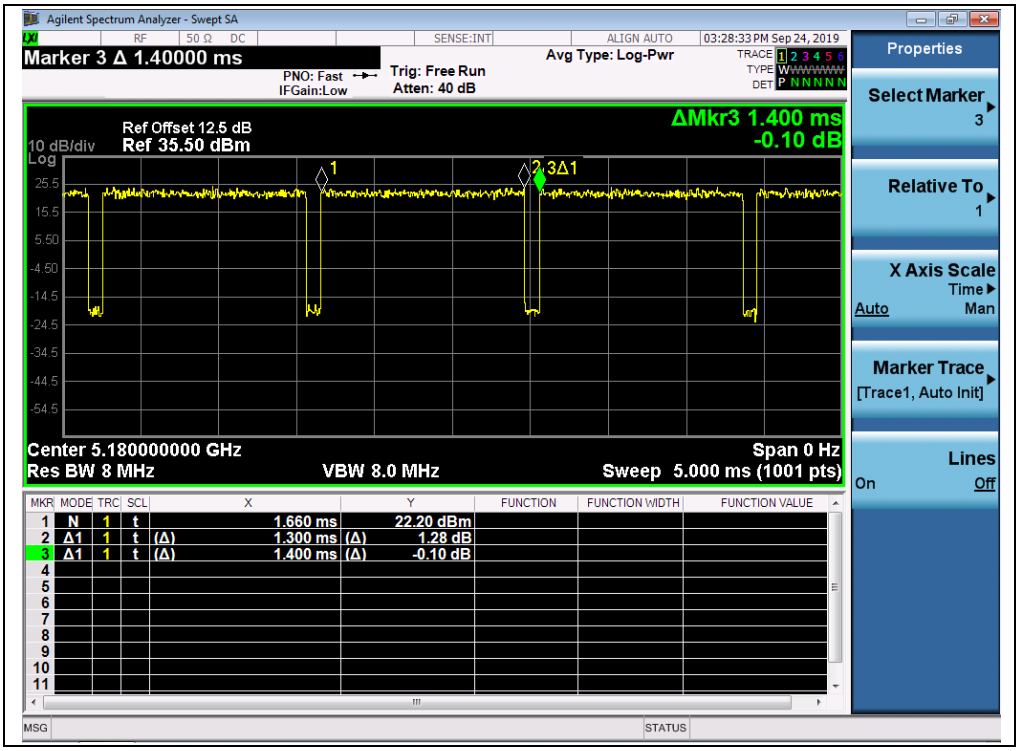
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	93.22	0.30
802.11n(HT20)	92.86	0.32
802.11n(HT40)	87.10	0.60
802.11ac(VHT20)	93.26	0.30
802.11ac(VHT40)	87.20	0.59
802.11ac(VHT80)	76.78	1.15

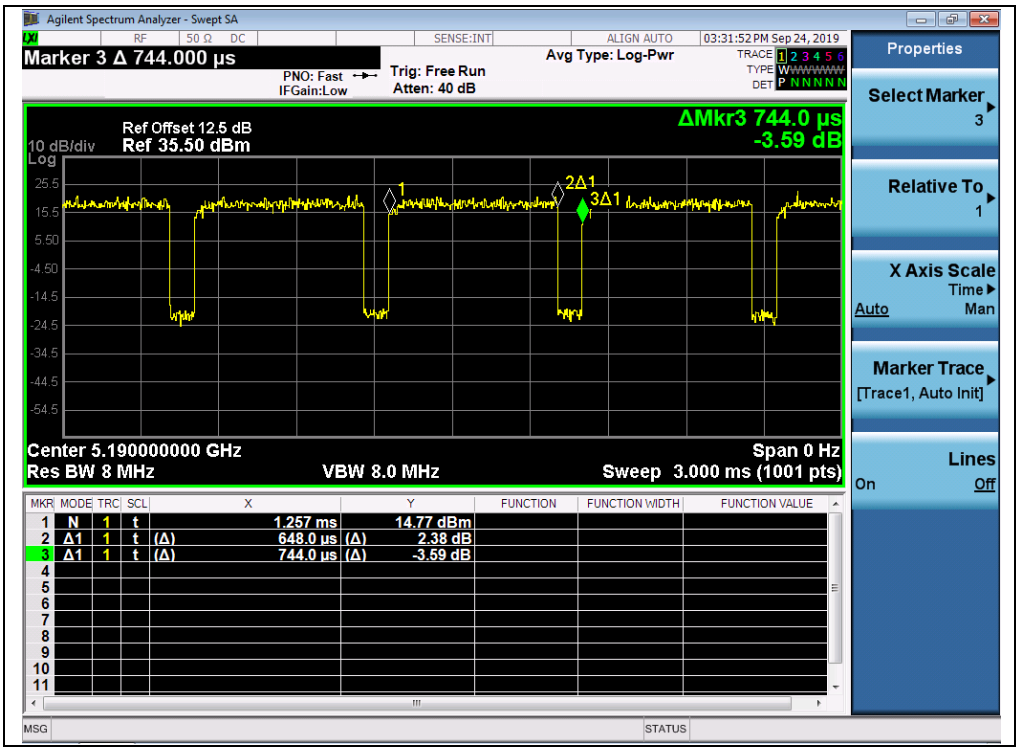
B. Test Plots



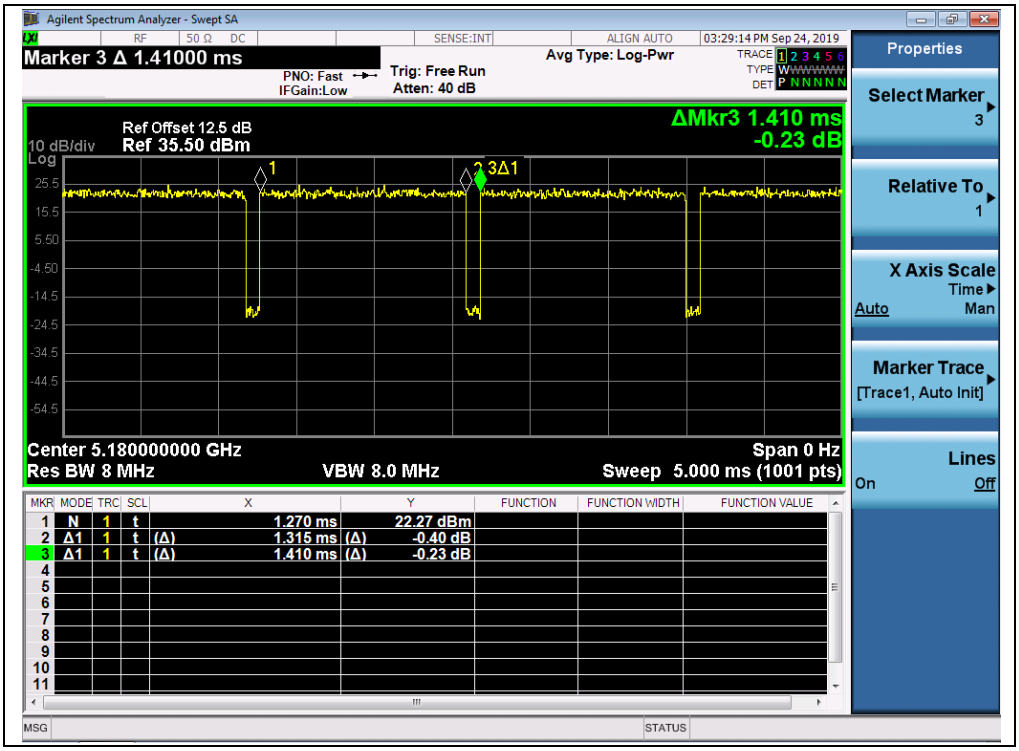
(CH36_5180MHz_802.11a)



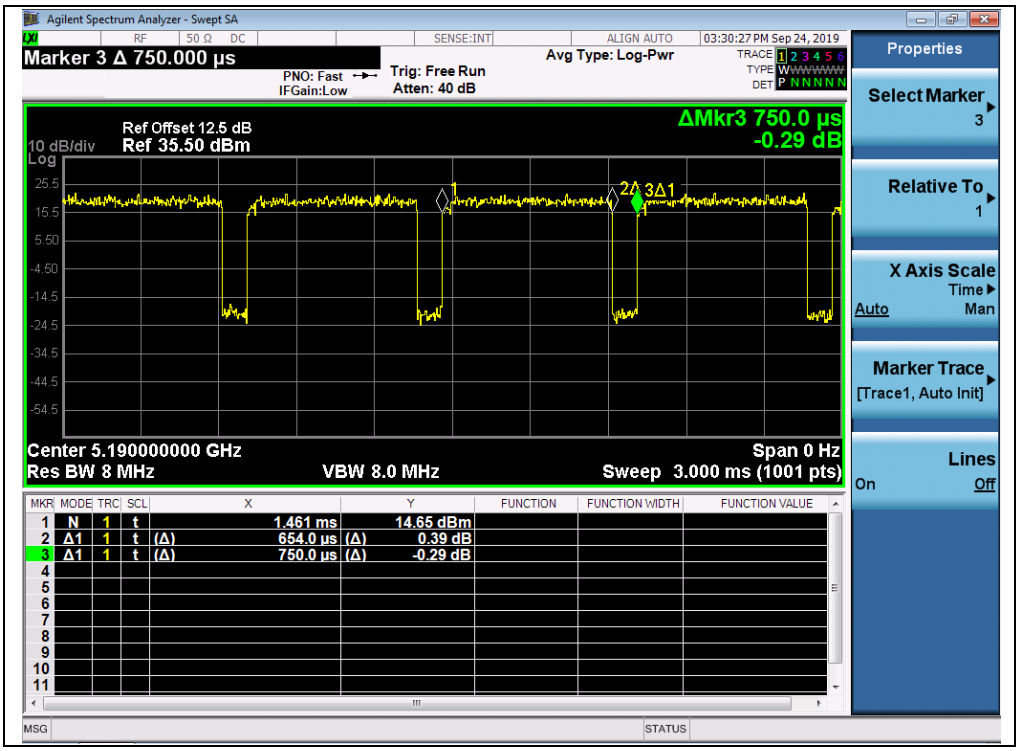
(CH36_5180MHz _802.11n(HT20))



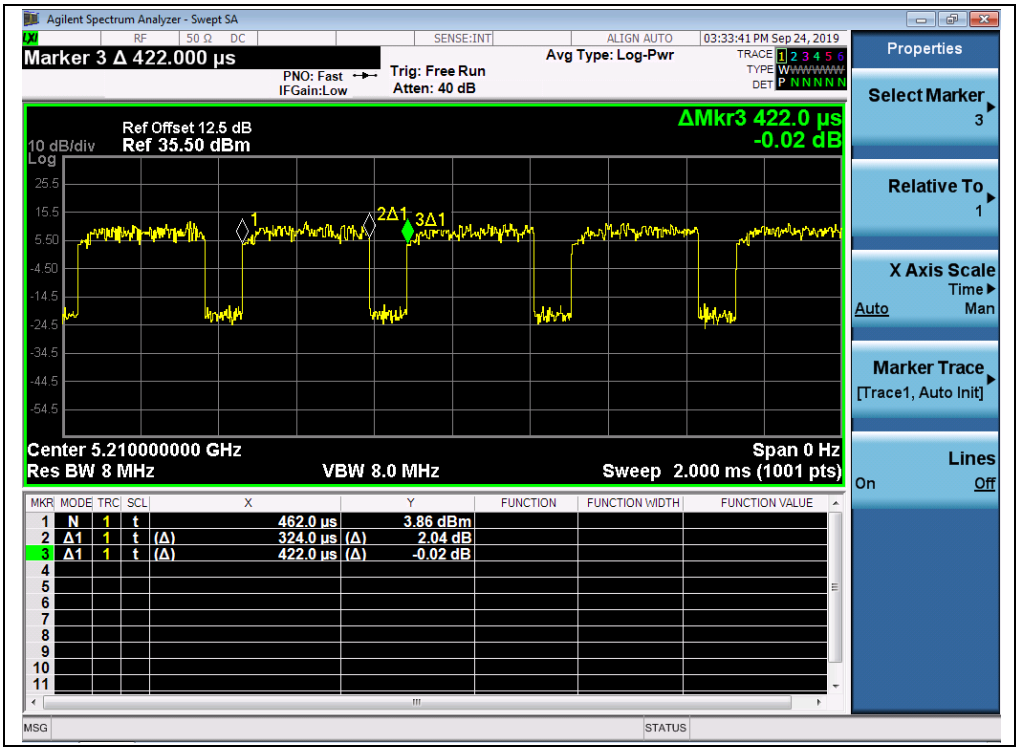
(CH38_5190MHz _802.11n(HT40))



(CH36_5180MHz _802.11ac(VHT20))



(CH38_5190MHz _802.11 ac(VHT40))



(CH42_5210MHz _802.11 ac(VHT80))

2.3. Maximum conducted output power

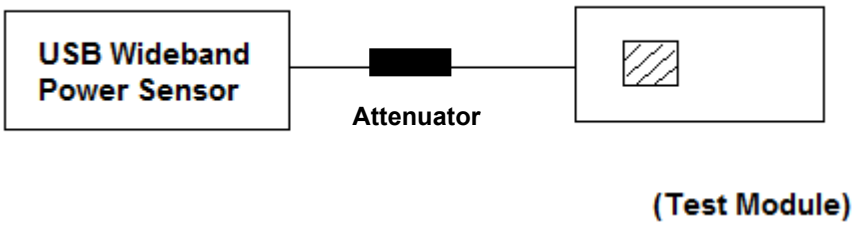
2.3.1. Requirement

(1) For 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 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.
(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.3.2. Test Description

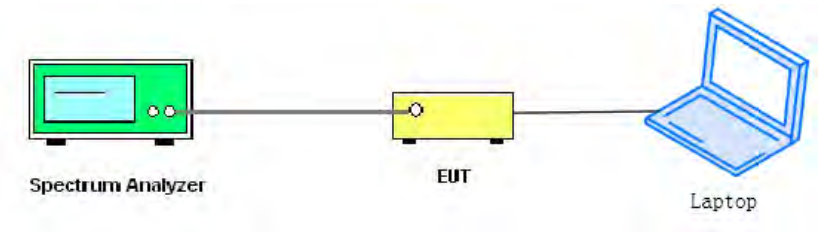
Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.

A. Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; 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 USB Wideband Power Sensor.

For ac (VHT80) mode power



The EUT (Equipment under the test) 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, all test result in Spectrum analyzer.

2.3.3. Test Result

Maximum Average Conducted Output Power

802.11a Test mode

Frequency (MHz)	Average Power							Limit		Verdict
	Measured		Duty Factor	Duty factor Calculated						
	ANT1	ANT2		ANT1		ANT2				
	dBm	dBm		dBm	W	dBm	W	dBm	W	
5180	10.68	9.83	0.30	10.98	0.013	10.13	0.010	24	0.25	PASS
5220	10.43	9.80		10.73	0.012	10.10	0.010			PASS
5240	10.47	9.89		10.77	0.012	10.19	0.010			PASS
5745	19.86	20.19		20.16	0.104	**20.49**	**0.112**	30	1	PASS
5785	20.20	20.06		20.50	0.112	20.36	0.109			PASS
5825	20.74	19.77		**21.04**	**0.127**	20.07	0.102			PASS

802.11n (HT20) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT1	ANT2						
	dBm	dBm		W	dBm	dBm	W	
5180	10.29	9.79	0.32	0.022	13.38	21.29	0.135	PASS
5220	10.01	9.68		0.021	13.18			PASS
5240	10.05	9.64		0.021	13.18			PASS
5745	19.64	19.55		0.196	22.93	27.29	0.536	PASS
5785	19.75	19.52		0.198	22.97			PASS
5825	20.13	19.35		**0.204**	**23.09**			PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the power limit shall be reduced to 24-(8.71-6) = 21.29dBm for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm for 5.745-5.825 GHz band.

802.11n (HT40) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT1	ANT2						
	dBm	dBm		W	dBm	dBm	W	
5190	10.22	9.62	0.60	0.023	13.54	21.29	0.135	PASS
5230	10.09	9.56		0.022	13.44			PASS
5755	18.97	18.80		0.178	22.50	27.29	0.536	PASS
5795	19.07	18.71		**0.178**	**22.50**			PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the power limit shall be reduced to 24-(8.71-6) = 21.29dBm for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm for 5.745-5.825 GHz band.

802.11ac (VHT20) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT1	ANT2						
	dBm	dBm		W	dBm	dBm	W	
5180	10.30	10.01	0.30	0.022	13.47	21.29	0.135	PASS
5220	10.53	9.76		0.022	13.48			PASS
5240	10.19	9.83		0.022	13.33			PASS
5745	19.84	**19.22**		**0.193**	**22.85**	27.29	0.536	PASS
5785	19.67	19.19		0.188	22.75			PASS
5825	**19.91**	18.93		0.189	22.76			PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the power limit shall be reduced to 24-(8.71-6) = 21.29dBm for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm for 5.745-5.825 GHz band.

802.11ac (VHT40) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT1	ANT2						
	dBm	dBm		W	dBm	dBm	W	
5190	10.25	9.66	0.59	0.023	13.57	21.29	0.135	PASS
5230	10.04	9.57		0.022	13.42			PASS
5755	19.02	**18.83**		**0.179**	**22.53**	27.29	0.536	PASS
5795	**19.09**	18.72		0.178	22.51			PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the power limit shall be reduced to 24-(8.71-6) = 21.29dBm for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm for 5.745-5.825 GHz band.

802.11ac (VHT80) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT1	ANT2						
	dBm	dBm		W	dBm	dBm	W	
5210	8.96	8.47	1.15	0.019	12.88	21.29	0.135	PASS
5775	**19.15**	**19.00**		**0.211**	**23.23**	27.29	0.536	PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the power limit shall be reduced to 24-(8.71-6) = 21.29dBm for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm for 5.745-5.825 GHz band.

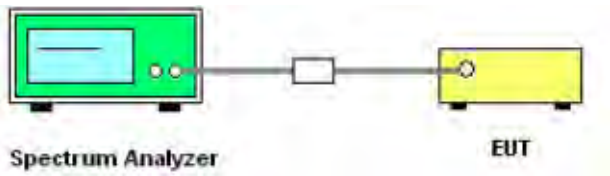
2.4. Emission Bandwidth

2.4.1. 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.

2.4.2. Test Description

A. Test Set:



The EUT 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

a) Set RBW = approximately 1% of the emission bandwidth.

b) Set the VBW > RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) 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.

2.4.3. Test Result

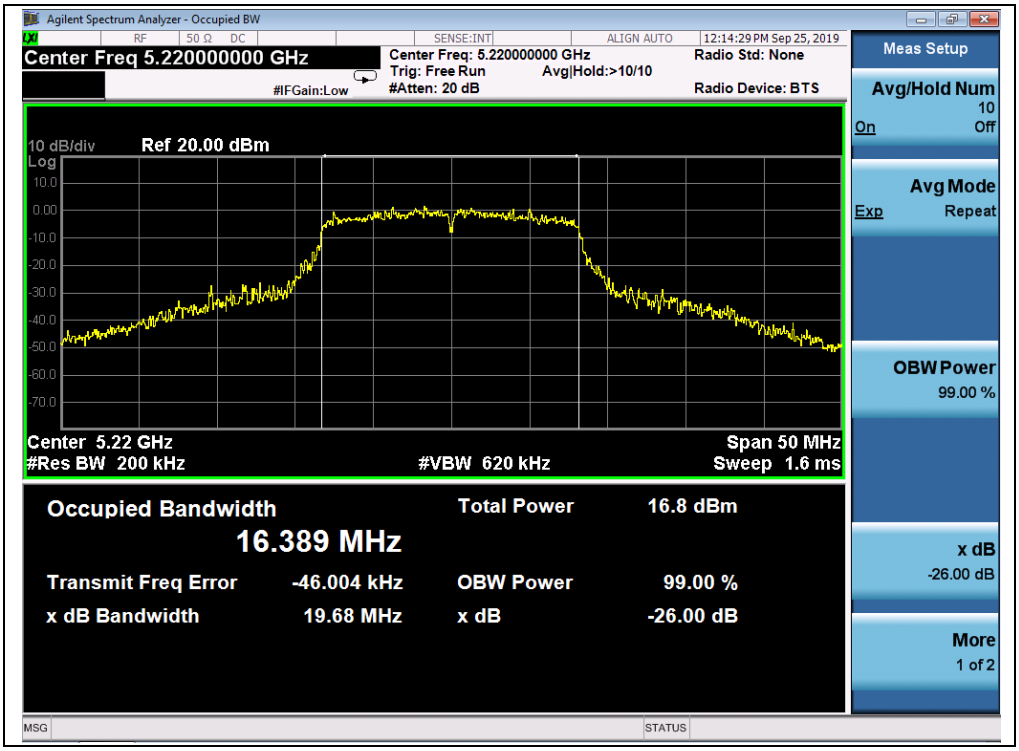
802.11a Test mode

A. Test Verdict:

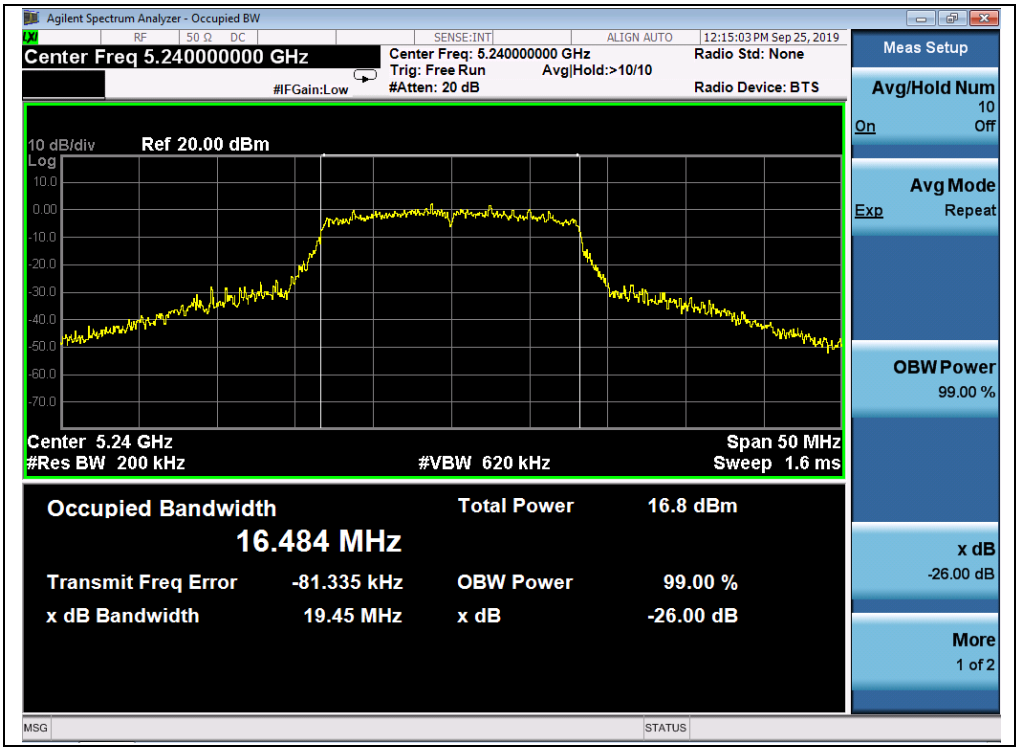
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.39
44	5220	19.68
48	5240	19.45
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	16.22
157	5785	14.40
165	5825	16.35

B. Test Plots

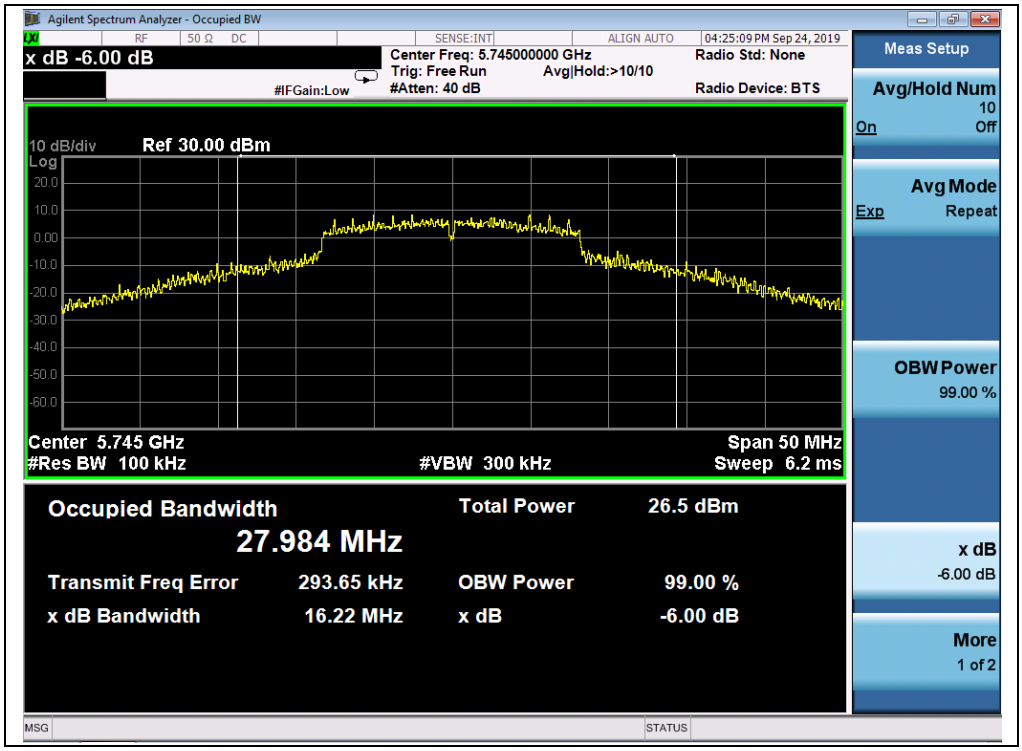
(Channel 36, 5180MHz, 802.11a,)



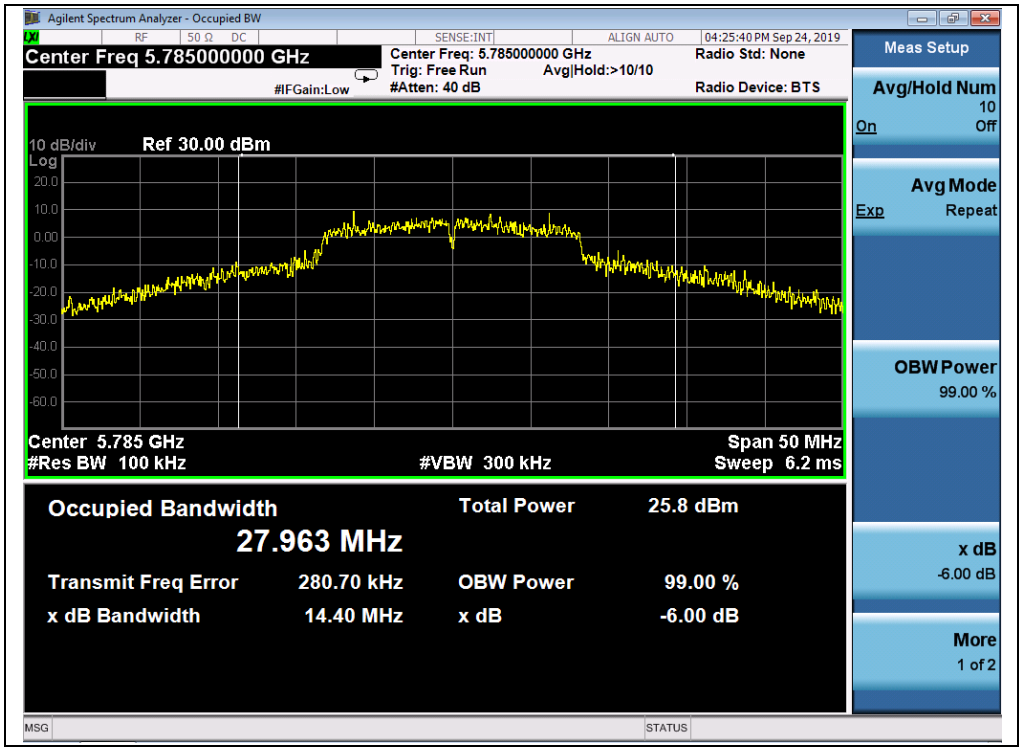
(Channel 44, 5220 MHz, 802.11a,)



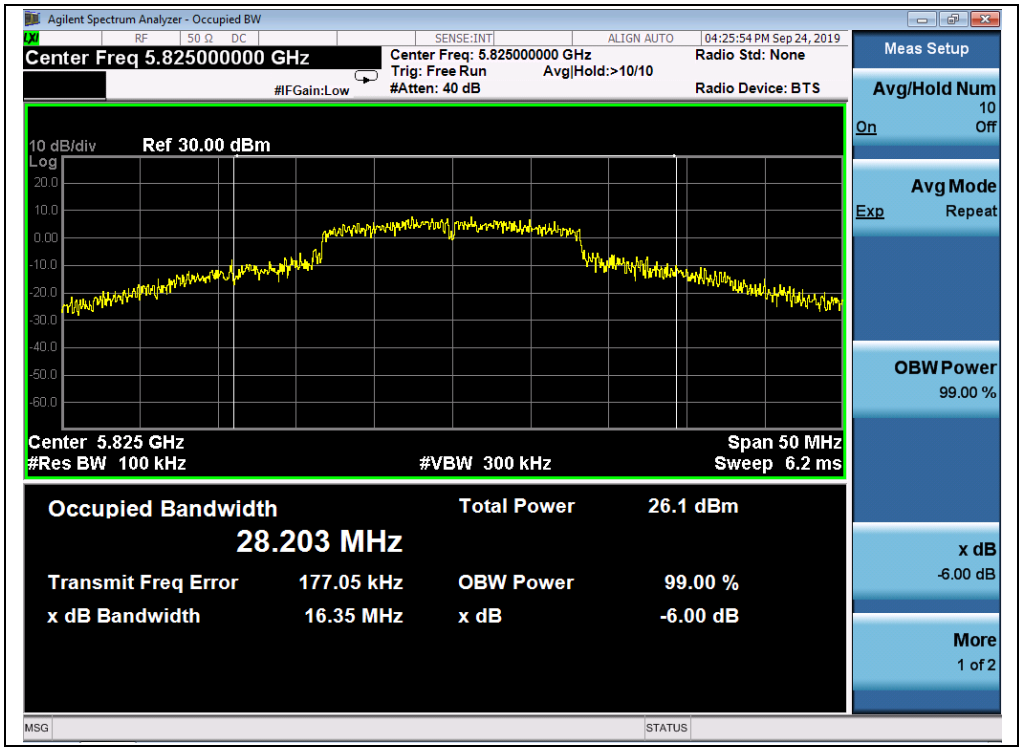
(Channel 48, 5240MHz, 802.11a,)



(Channel 149, 5745MHz, 802.11a)



(Channel 157, 5785MHz, 802.11a)



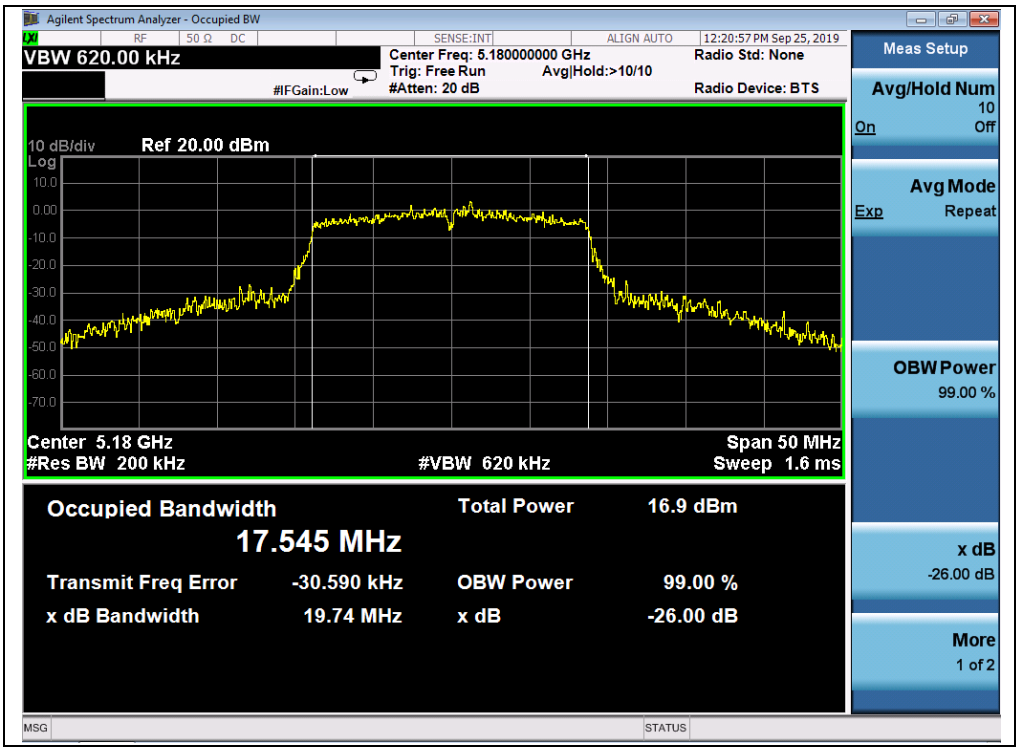
(Channel 165, 5825MHz, 802.11a)

802.11n (HT20) Test mode

A. Test Verdict:

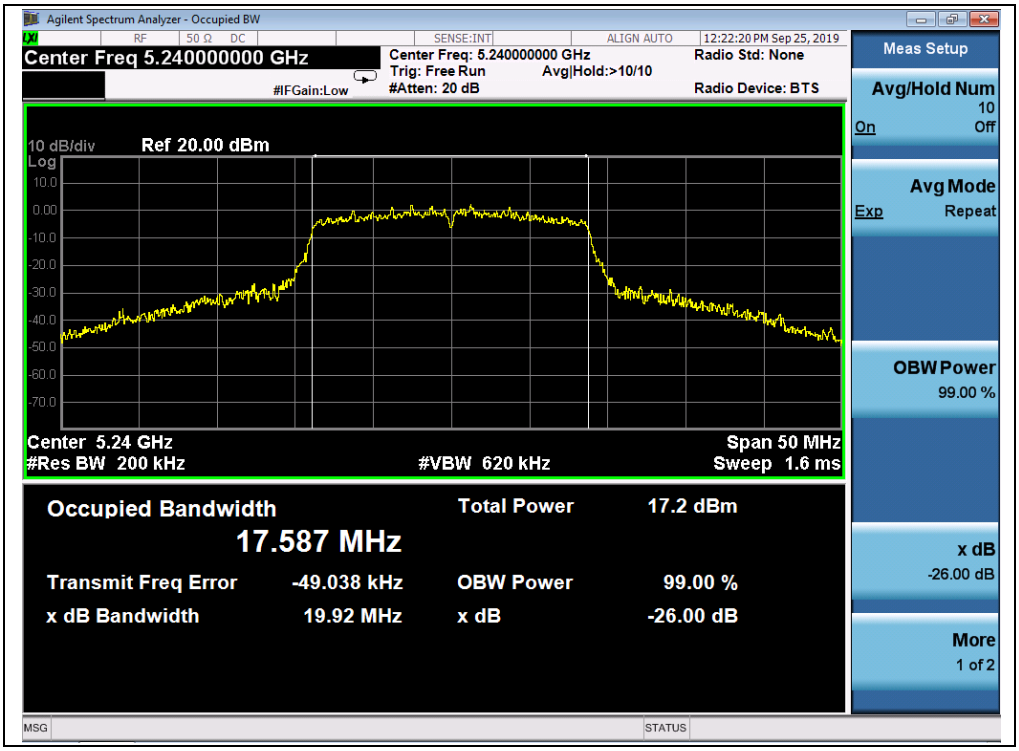
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.74
44	5220	19.77
48	5240	19.92
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	15.06
157	5785	17.67
165	5825	17.66

B. Test Plots

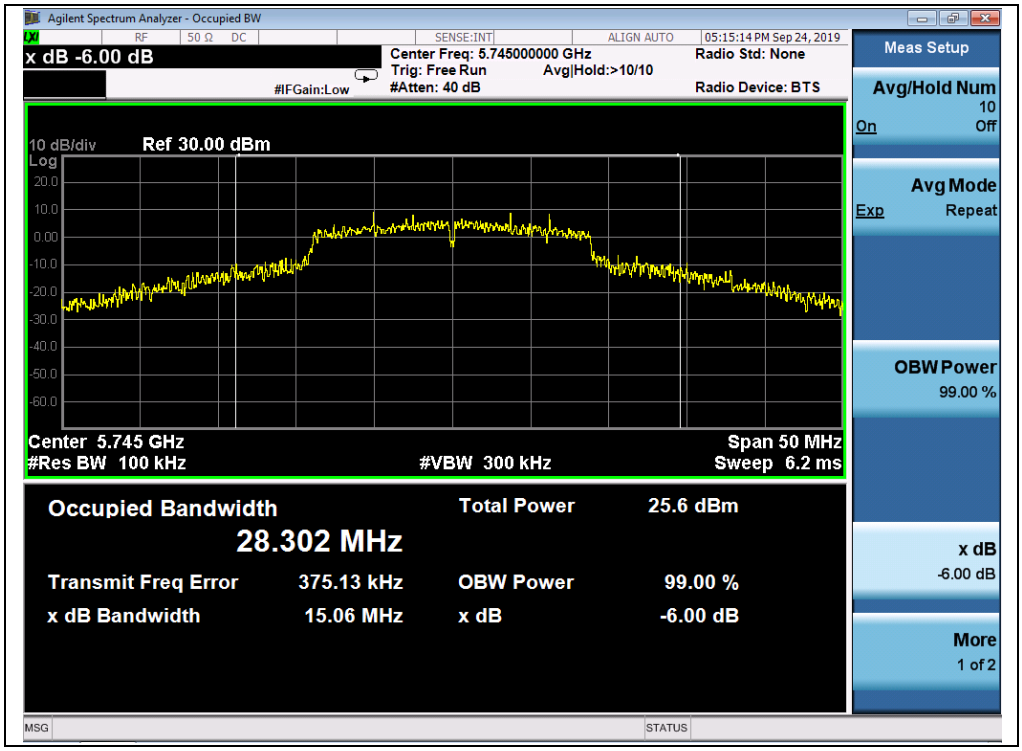


(Channel 36, 5180MHz, 802.11 n (HT20))

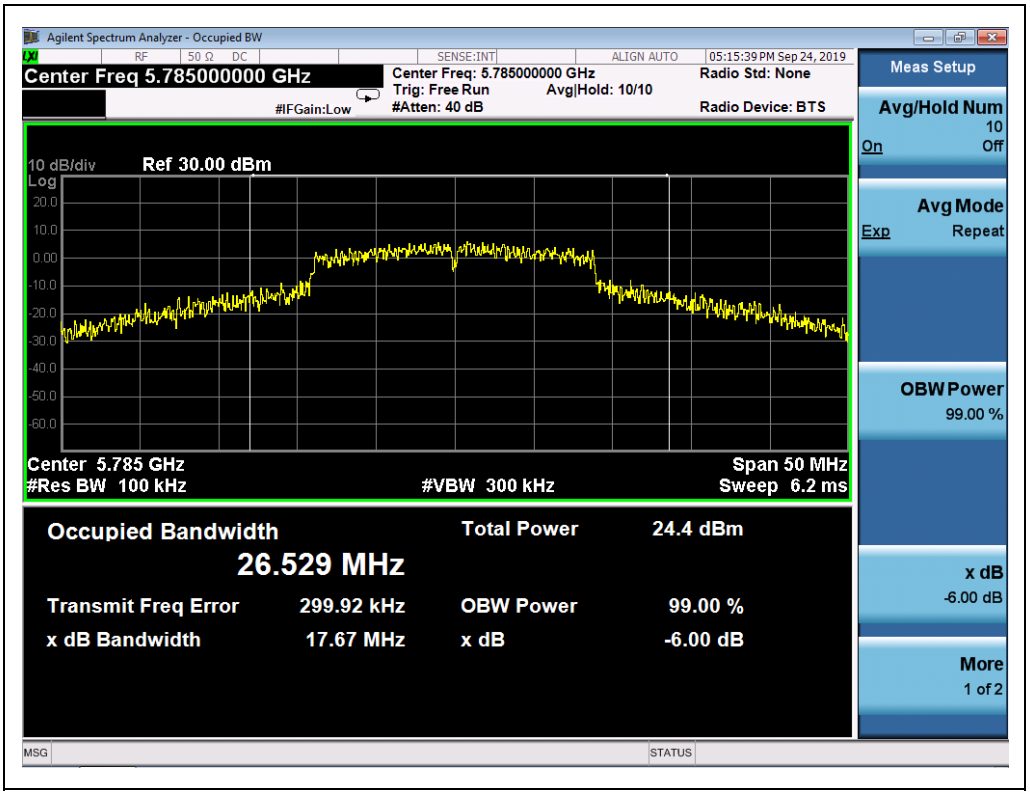
(Channel 44, 5220 MHz, 802.11 n (HT20))



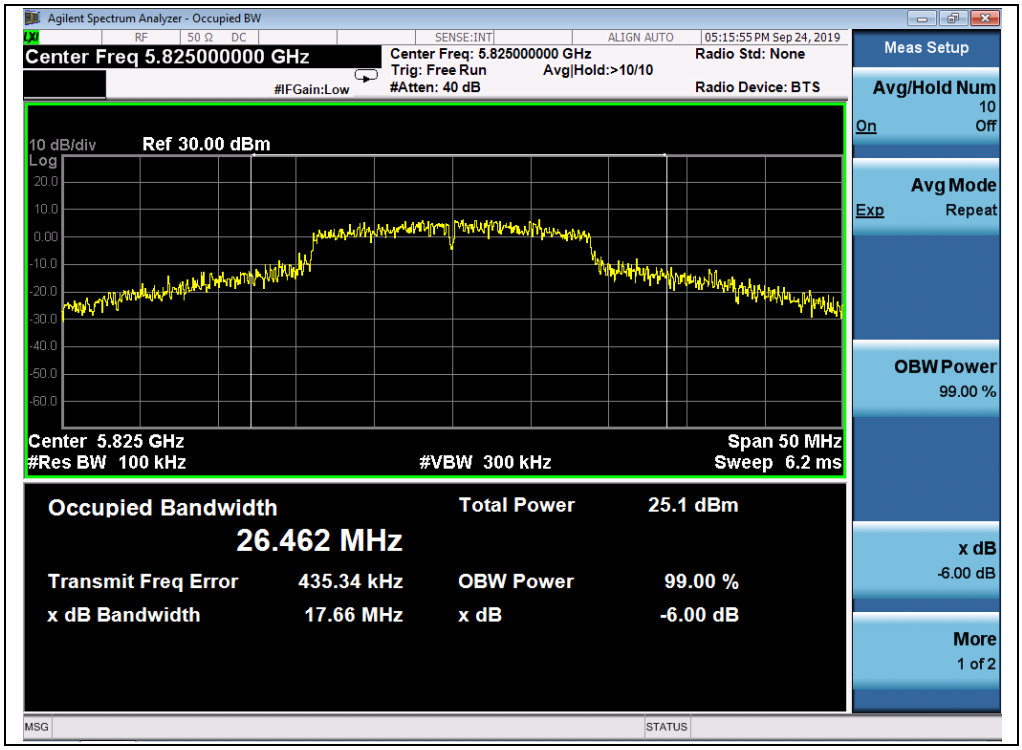
(Channel 48, 5240MHz, 802.11 n (HT20))



(Channel 149, 5745MHz, 802.11 n (HT20))



(Channel 157, 5785MHz, 802.11 n (HT20))



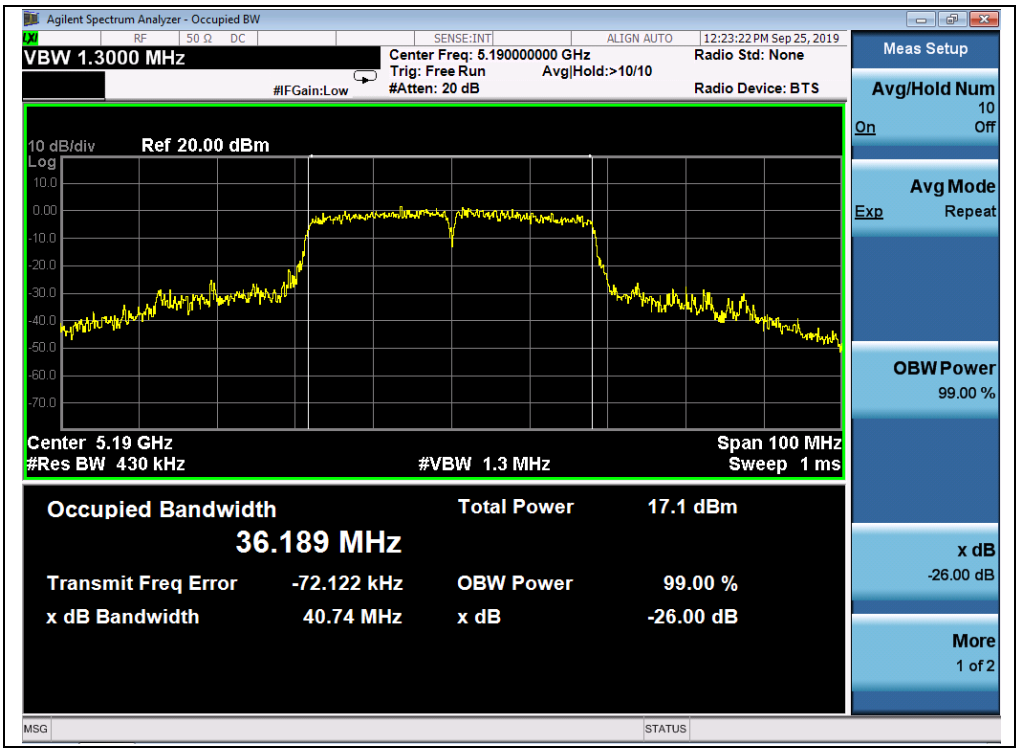
(Channel 165, 5825MHz, 802.11 n (HT20))

802.11n (HT40) Test mode

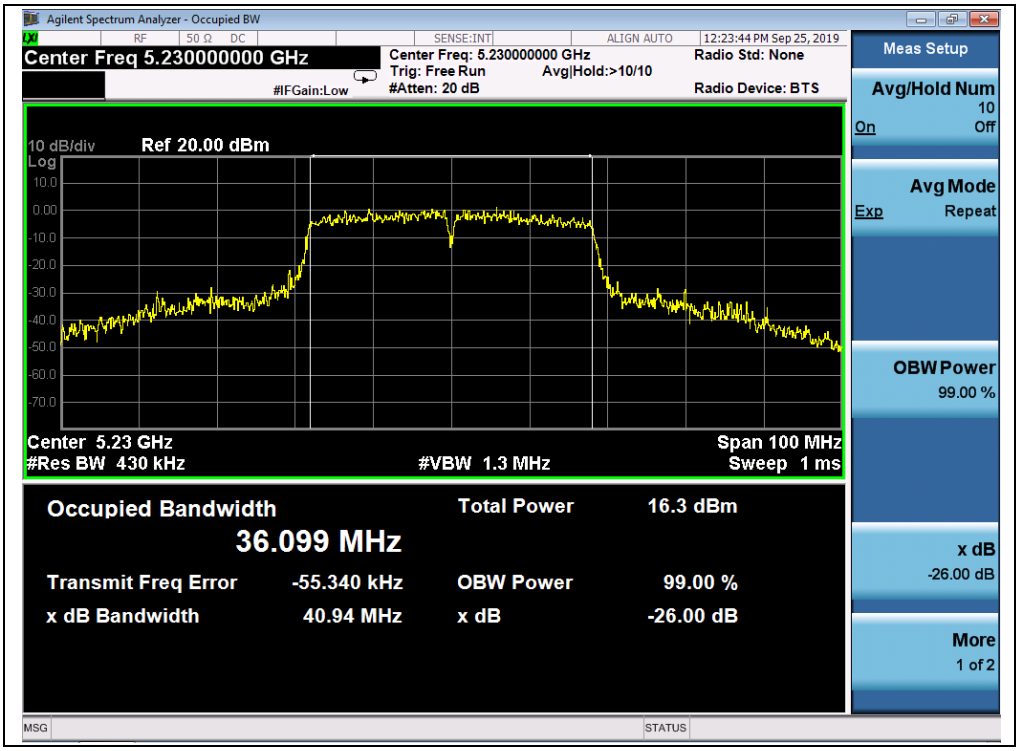
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.74
46	5230	40.94
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	32.63
159	5795	33.16

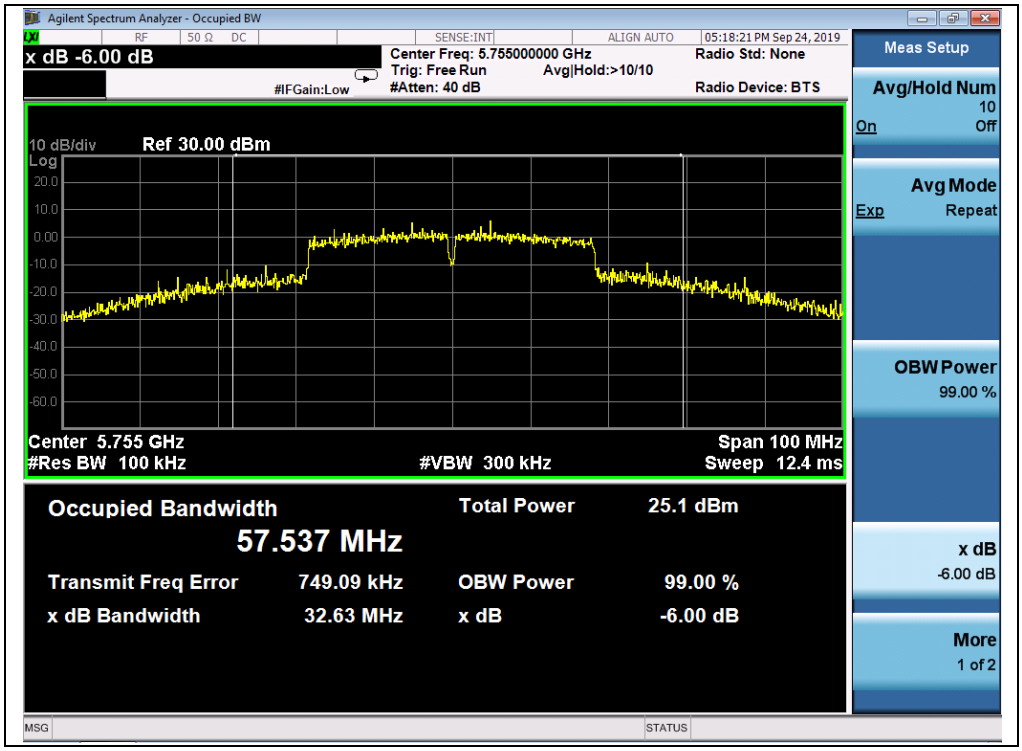
B. Test Plots



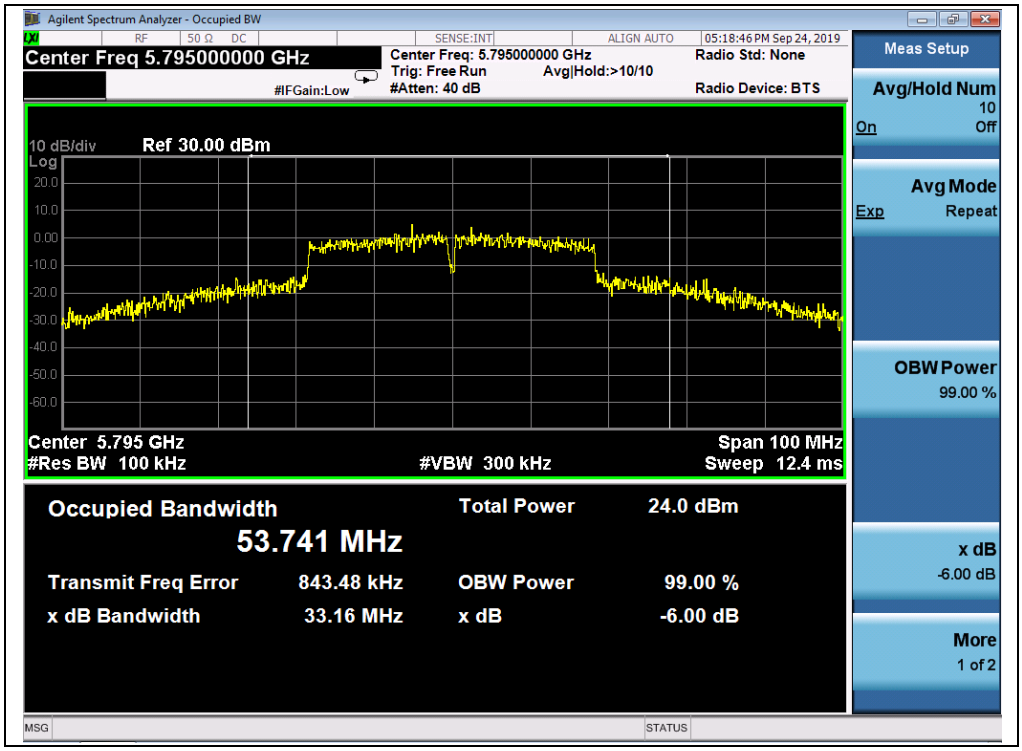
(Channel 38, 5190MHz, 802.11n (HT40))



(Channel 46, 5230 MHz, 802.11n (HT40))



(Channel 151, 5755 MHz, 802.11n (HT40))



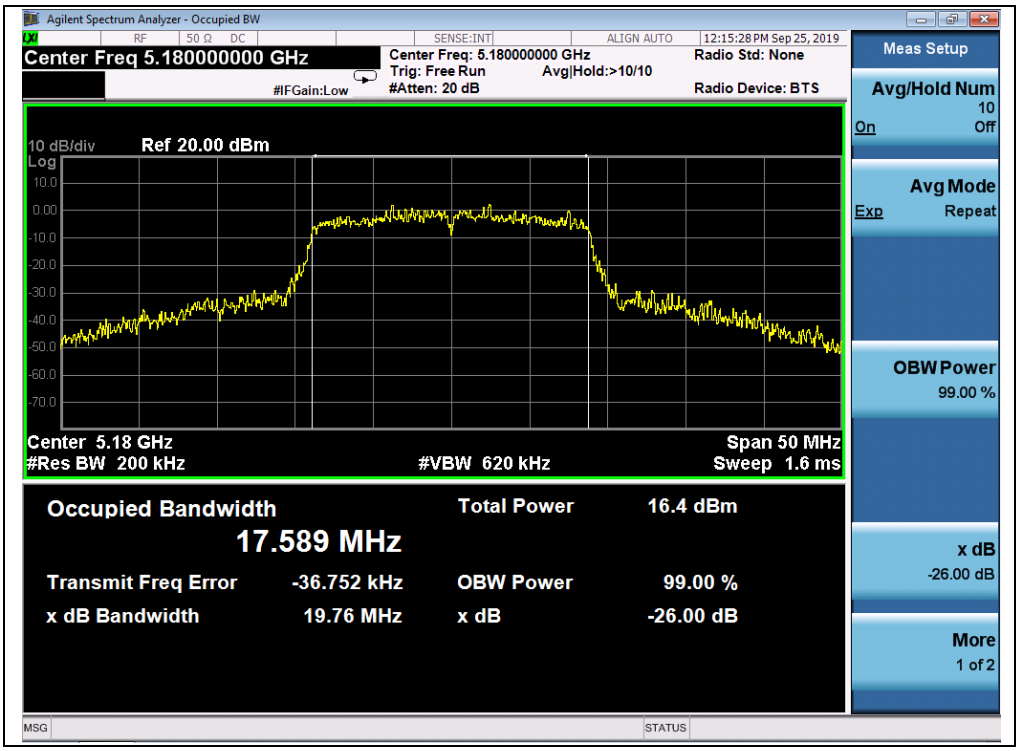
(Channel 159, 5795MHz, 802.11n (HT40))

802.11ac (VHT20) Test mode

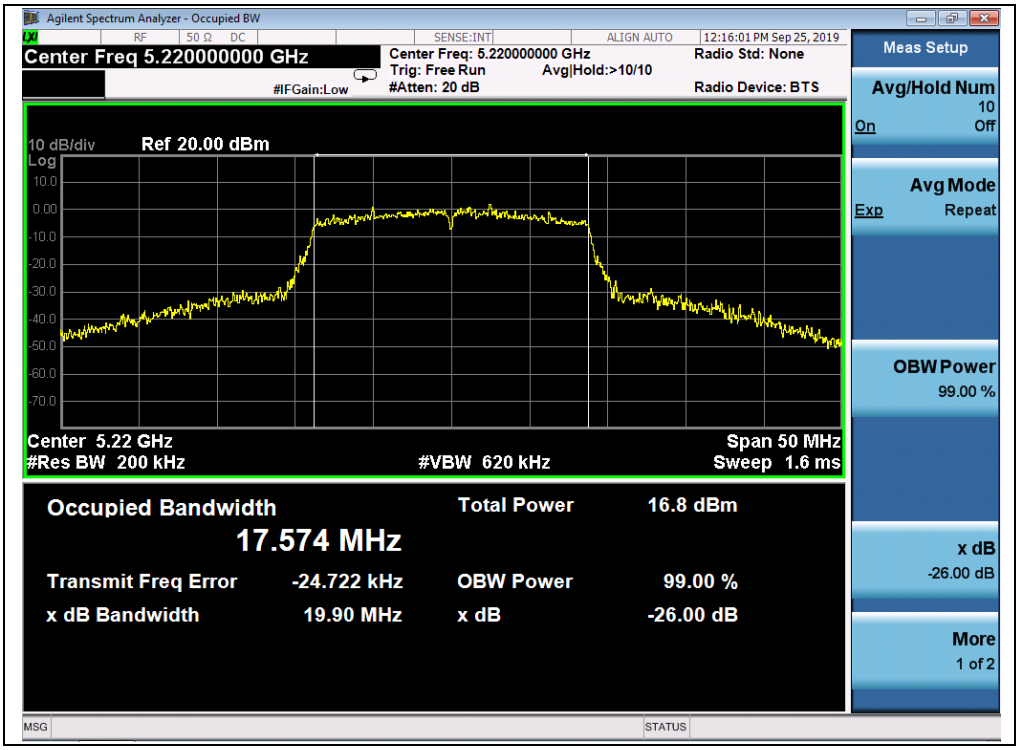
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.76
44	5220	19.90
48	5240	19.83
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
149	5745	15.08
157	5785	17.65
165	5825	12.97

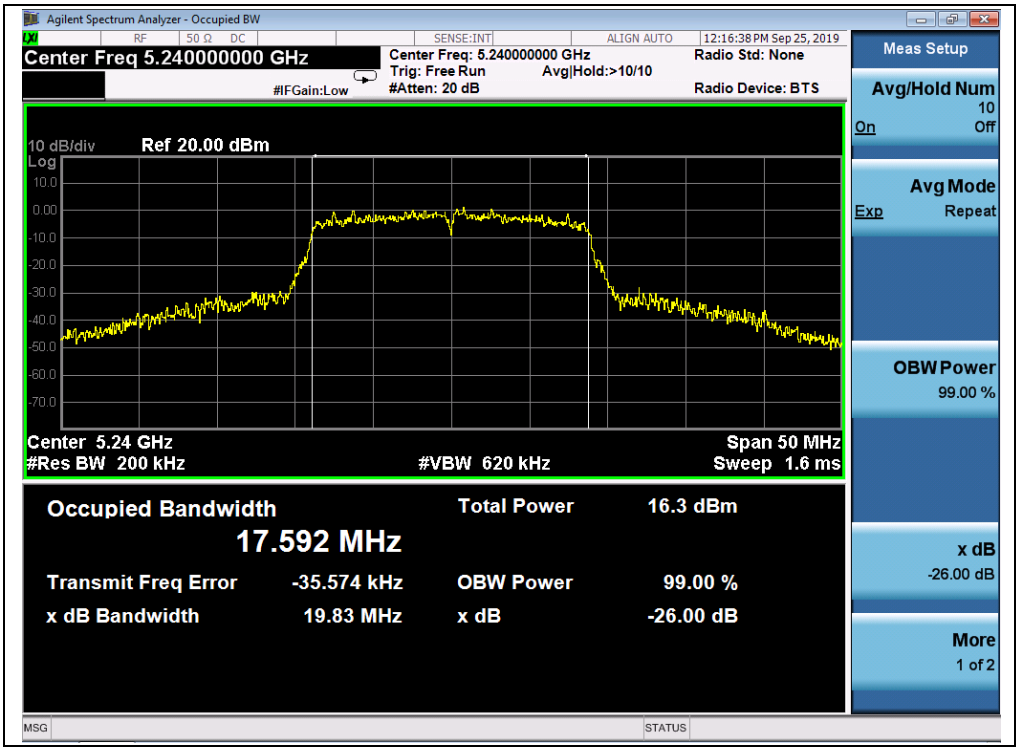
B. Test Plots



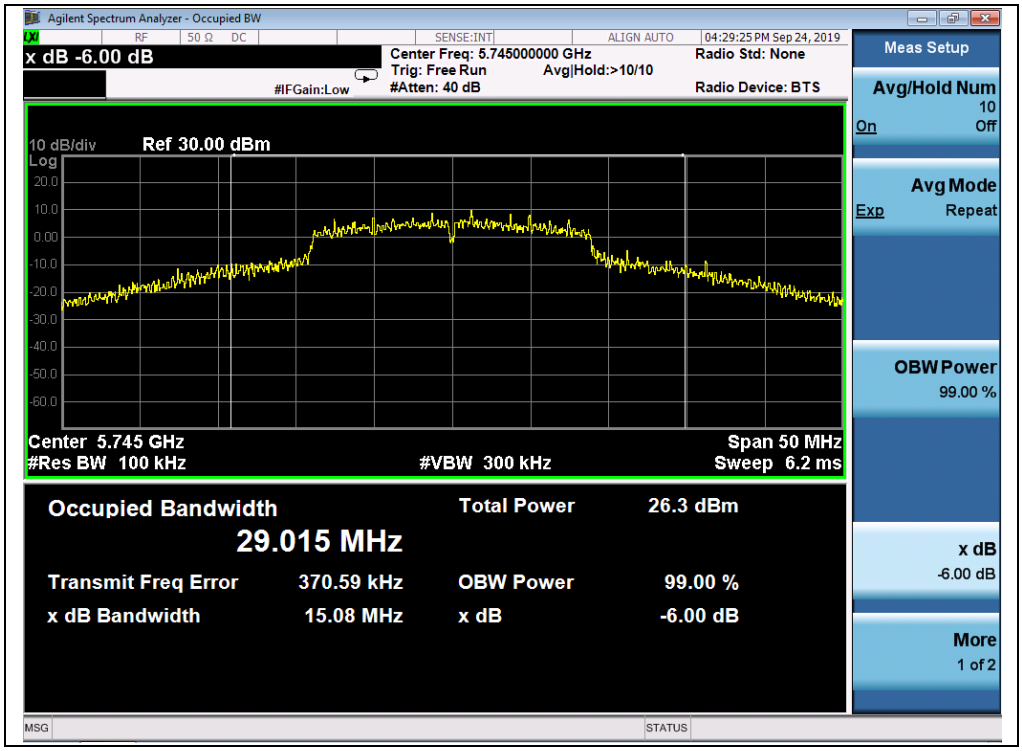
(Channel 36, 5180MHz, 802.11 ac (VHT20))



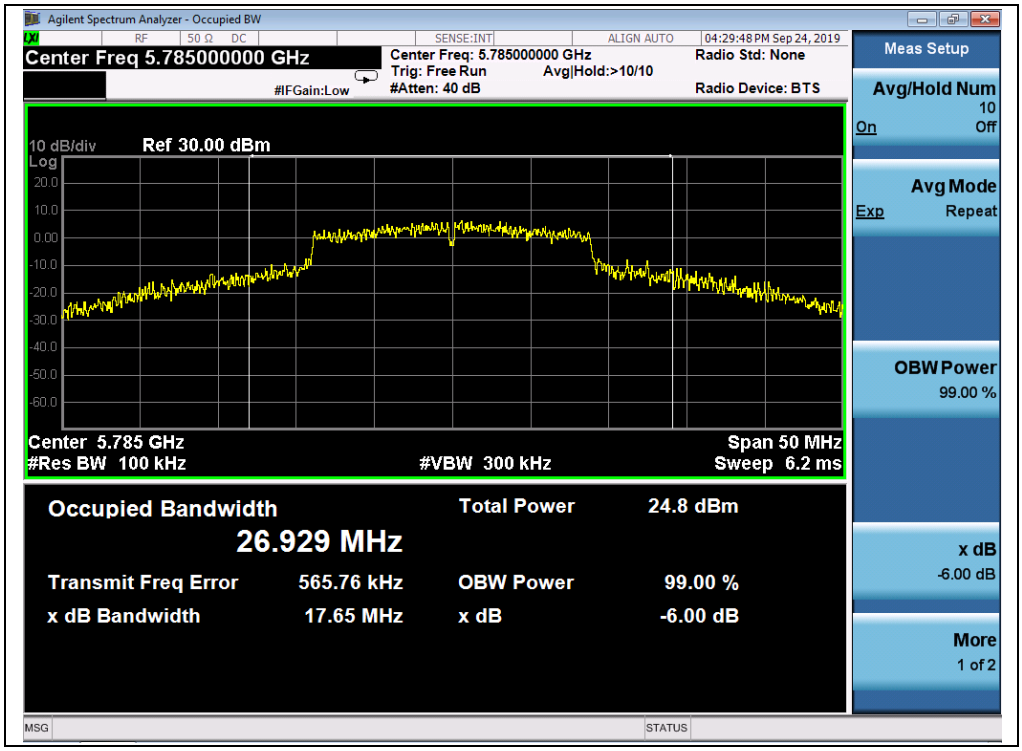
(Channel 44, 5220 MHz, 802.11 ac (VHT20))



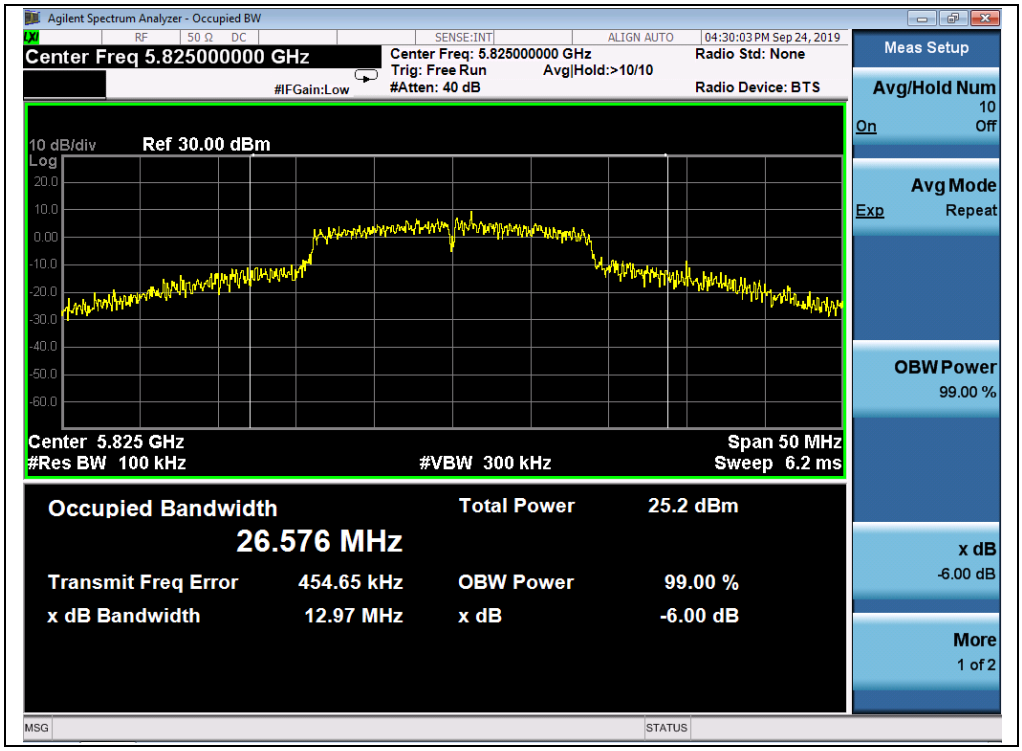
(Channel 48, 5240MHz, 802.11 ac (VHT20))



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



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



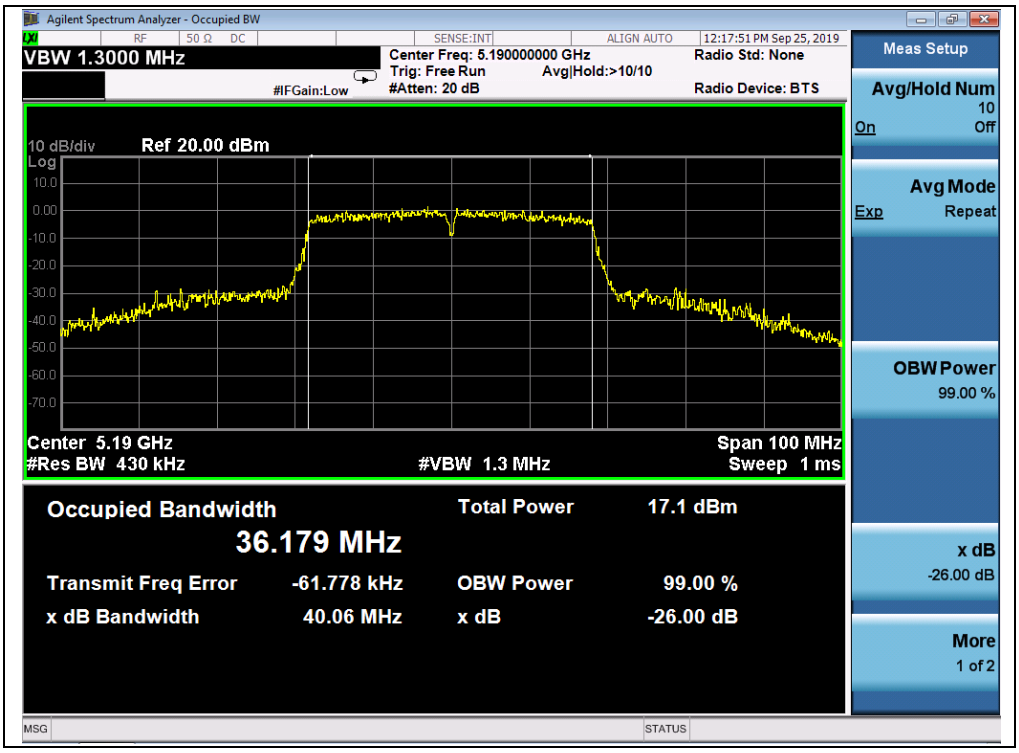
(Channel 165, 5825MHz, 802.11 ac (VHT20))

802.11 ac (VHT40) Test mode

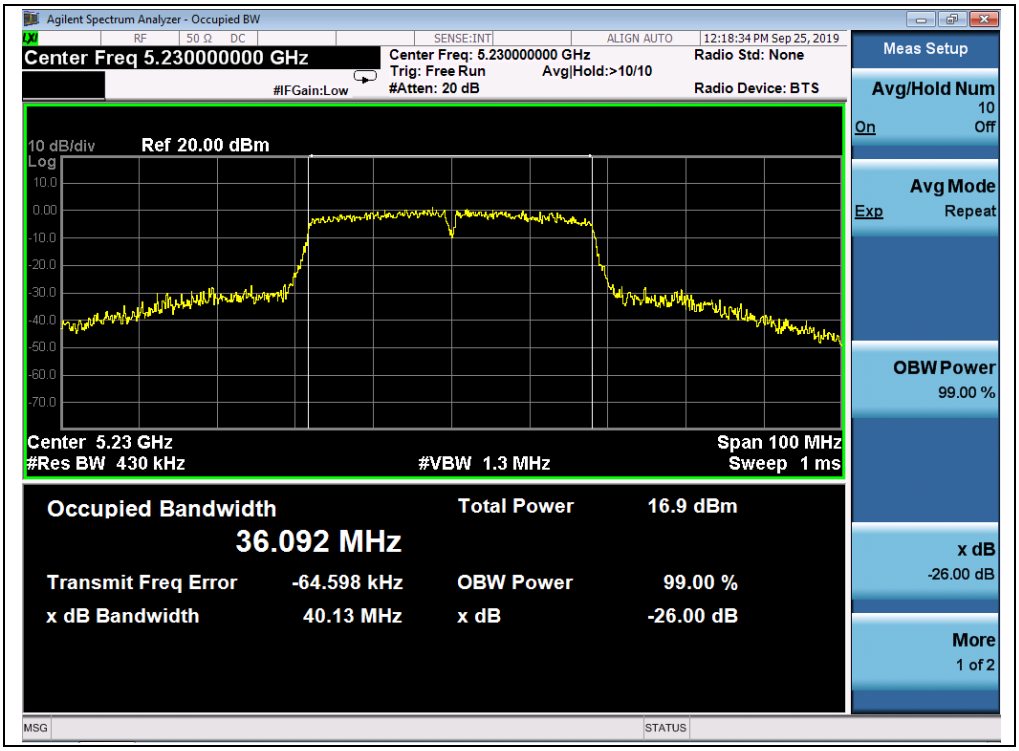
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.06
46	5230	40.13
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
151	5755	35.32
159	5795	36.40

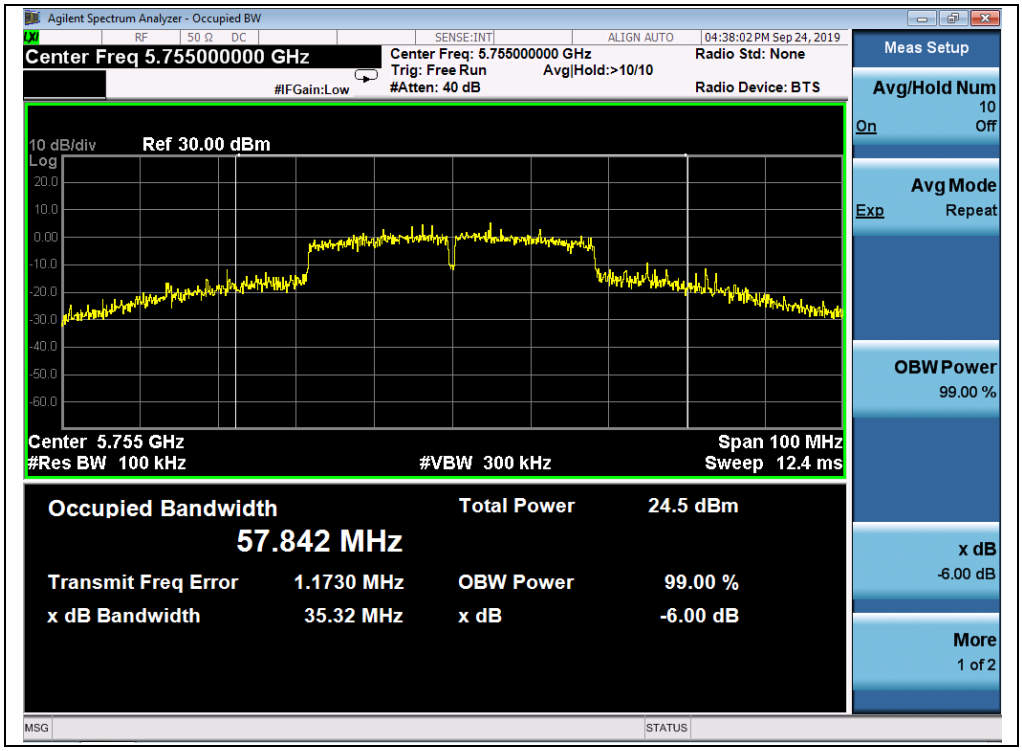
B. Test Plots



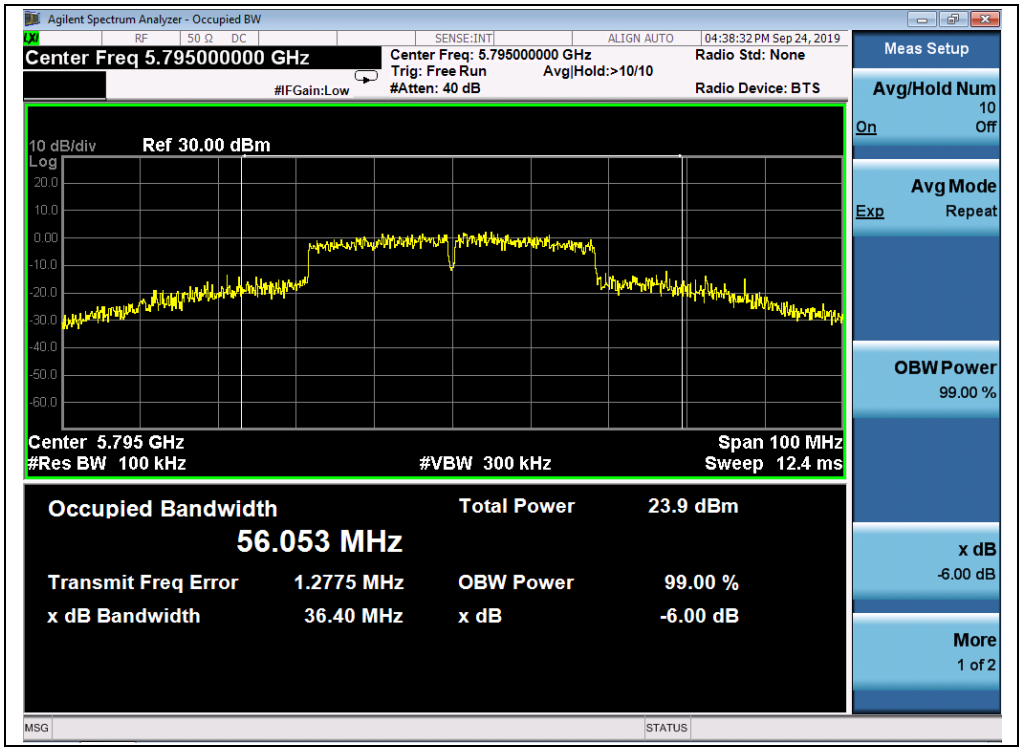
(Channel 38, 5190MHz, 802.11 ac (VHT40))



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



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



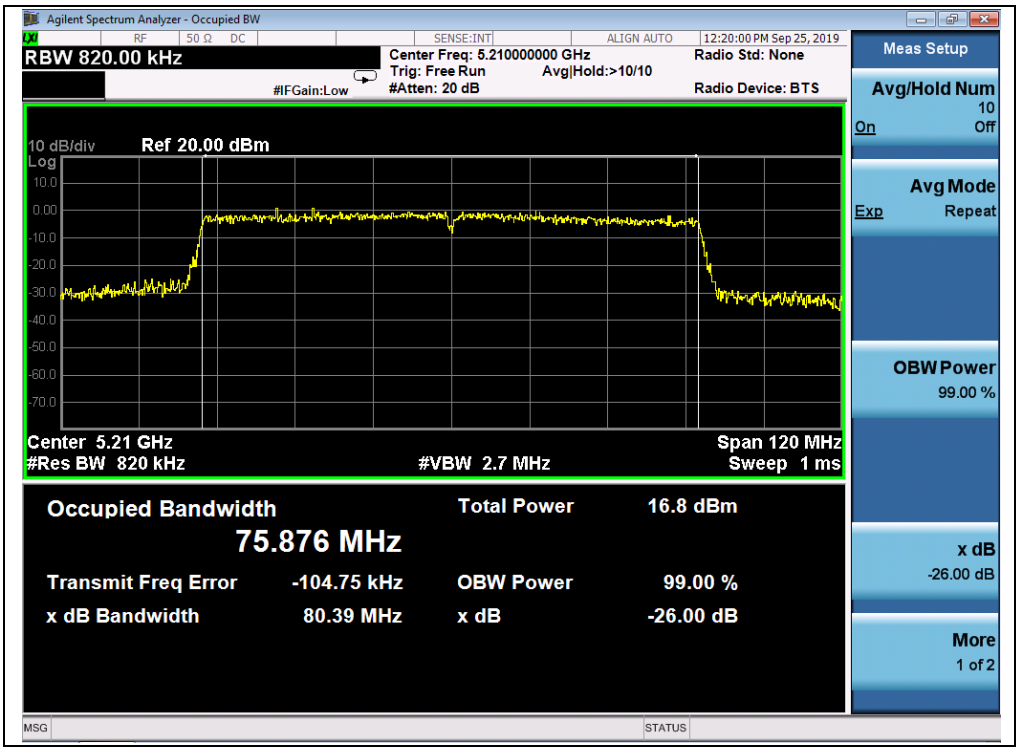
(Channel 159, 5795MHz, 802.11 ac (VHT40))

802.11 ac (VHT80) Test mode

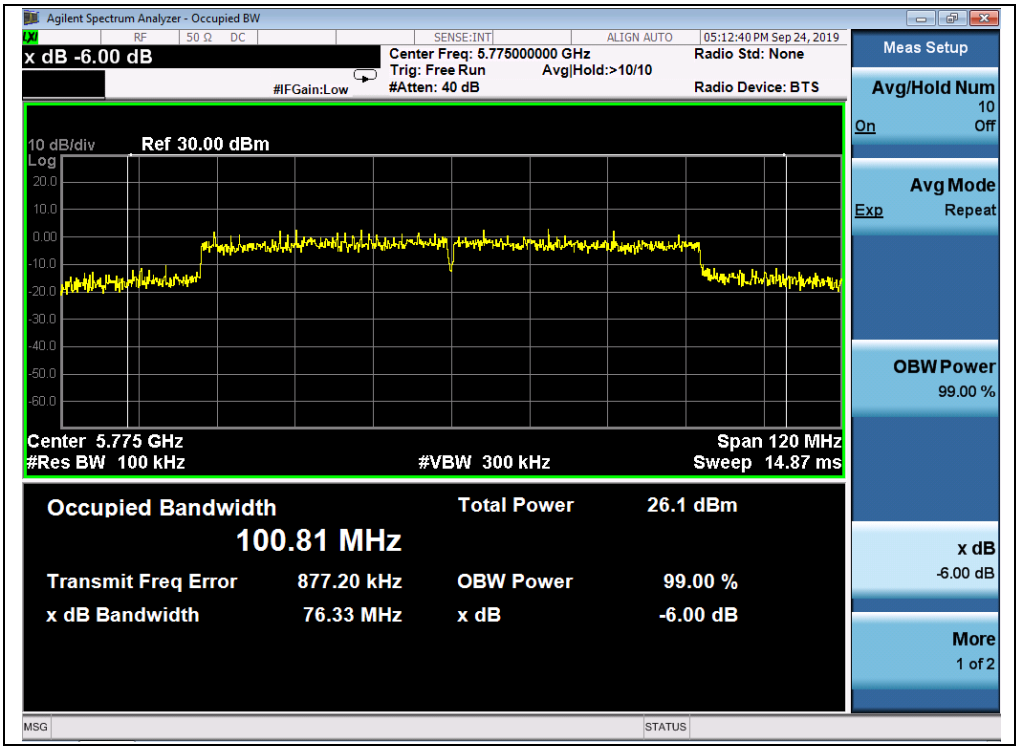
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	80.39
Channel	**Frequency (MHz)**	**6dB Bandwidth (MHz)**
155	5775	76.33

B. Test Plots



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



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

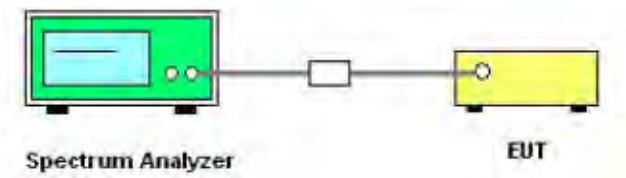
2.5. Maximum Power Spectral Density

2.5.1. Requirement

(1) For 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 5.47-5.725 GHz 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.
If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(4) According to KDB662911D01Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.
(5) According to KDB 662911 D01, the directional gain = G_{ANT} +10log(N_{ANT}) dBi, where G_{ANT} is the antenna gain in dBi, N_{ANT} is the number of outputs.

2.5.2. Test Description

A. Test Set:



The EUT 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-3 was used in order to prove compliance

1) Set span to encompass the entire -26dB 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 = Average (RMS)
5) Trace mode=Max hold
6) Record the max value

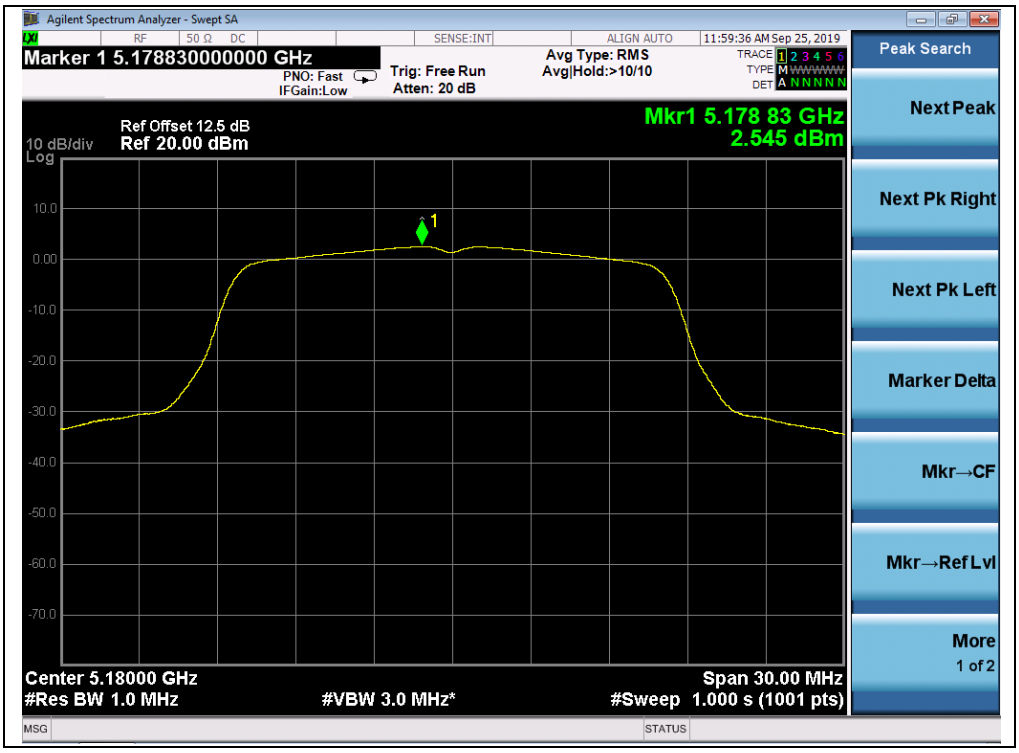
2.5.3. Test Result

802.11a Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2		
36	5180	2.55	2.49	11	PASS
44	5220	1.92	2.17		
48	5240	1.60	2.12		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2		
149	5745	7.91	8.08	30	PASS
157	5785	8.37	7.93		
165	5825	9.07	8.07		

B. Test Plots



(Channel 36, 5180MHz, 802.11a, ANT 1)

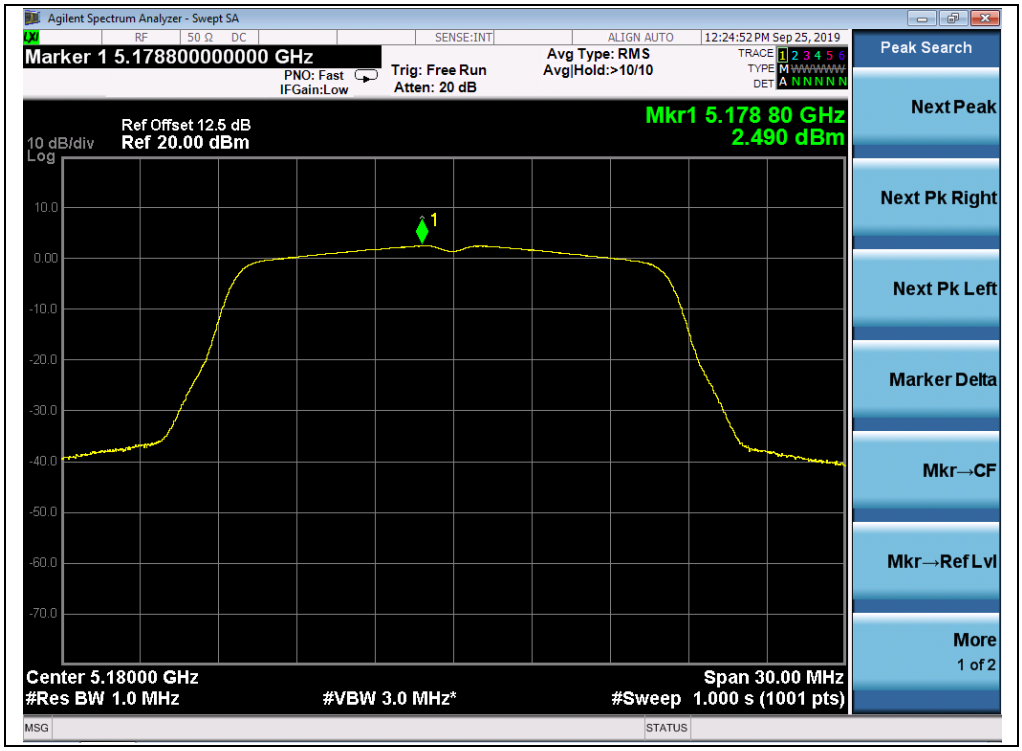
(Channel 44, 5220 MHz, 802.11a, ANT 1)

(Channel 48, 5240MHz, 802.11a, ANT 1)

(Channel 149, 5745MHz, 802.11a, ANT 1)

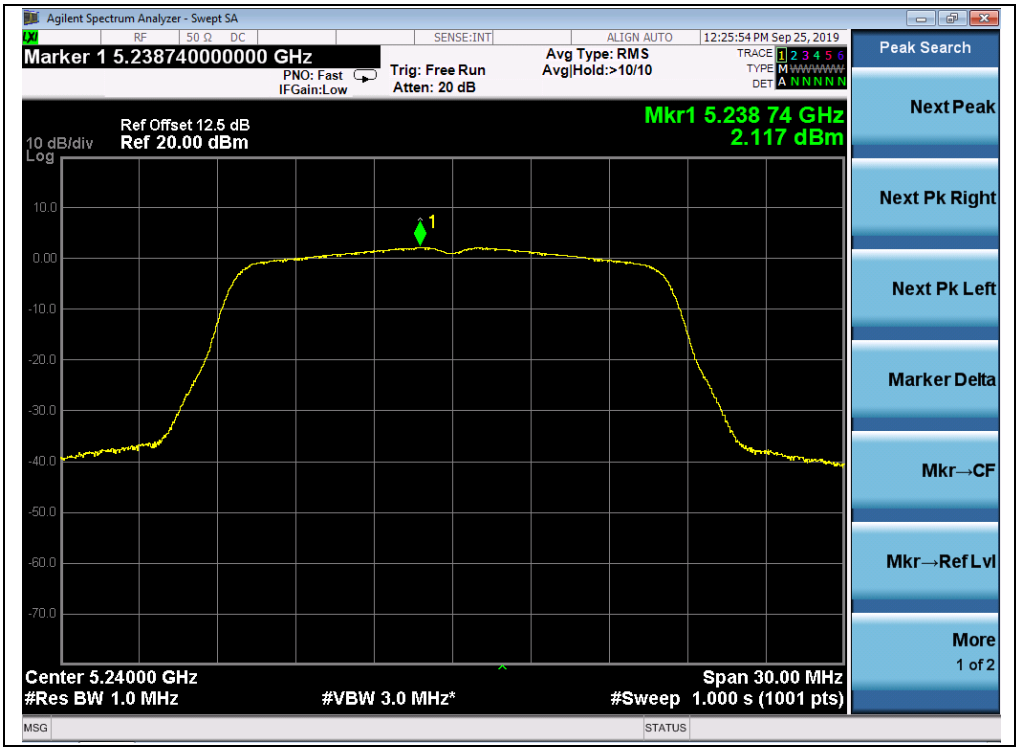
(Channel 157, 5785MHz, 802.11a, ANT 0)

(Channel 165, 5825MHz, 802.11a, ANT 1)



(Channel 36, 5180MHz, 802.11a, ANT 2)

(Channel 44, 5220 MHz, 802.11a, ANT 2)



(Channel 48, 5240MHz, 802.11a, ANT 2)

(Channel 149, 5745MHz, 802.11a, ANT 2)

(Channel 157, 5785MHz, 802.11a, ANT 2)

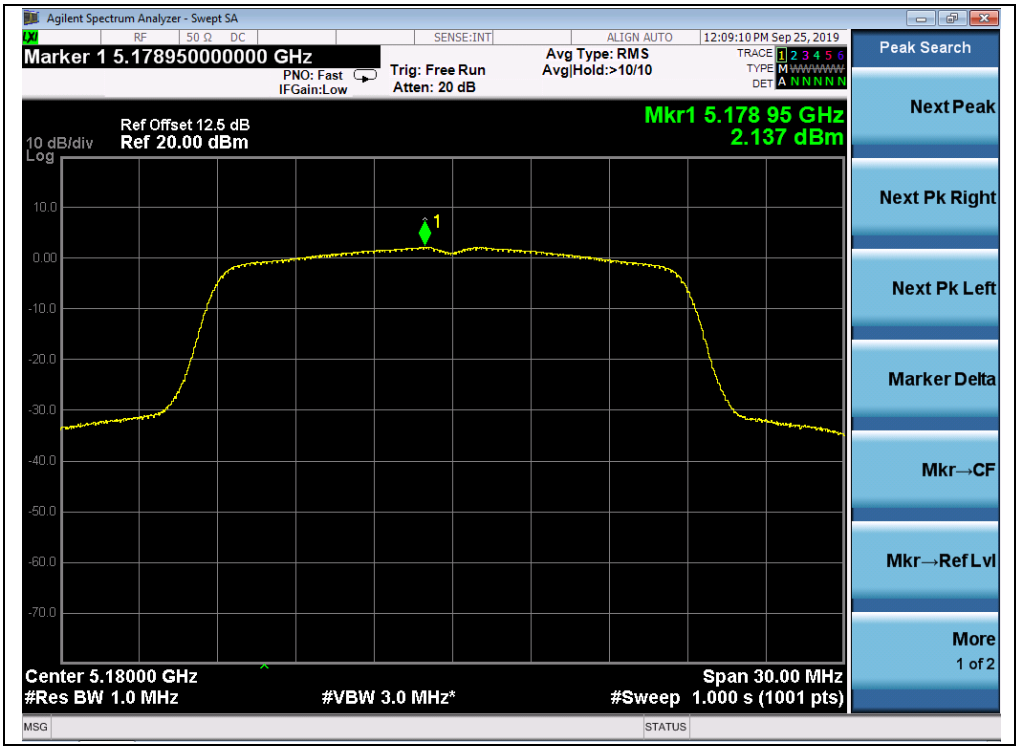
(Channel 165, 5825MHz, 802.11a, ANT 2)

802.11n (HT20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Tatal PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2			
36	5180	2.14	2.22	5.19	8.29	PASS
44	5220	1.60	1.81	4.72		
48	5240	1.36	1.63	4.51		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Tatal PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2			
149	5745	7.41	7.19	10.31	27.29	PASS
157	5785	7.54	6.99	10.28		
165	5825	8.24	7.15	10.74		
Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the limit shall be reduced to 11-(8.71-6) = 8.29dBm dBm/MHz for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm dBm/500KHz for 5.745-5.825 GHz band.						

B. Test Plots



(Channel 36, 5180MHz, 802.11 n (HT20), ANT1)

(Channel 44, 5220 MHz, 802.11 n (HT20), ANT1)

(Channel 48, 5240MHz, 802.11 n (HT20), ANT1)

(Channel 149, 5745MHz, 802.11 n (HT20), ANT1)

(Channel 157, 5785MHz, 802.11 n (HT20), ANT1)

(Channel 165, 5825MHz, 802.11 n (HT20), ANT1)

(Channel 36, 5180MHz, 802.11 n (HT20), ANT2)

(Channel 44, 5220 MHz, 802.11 n (HT20), ANT2)

(Channel 48, 5240MHz, 802.11 n (HT20), ANT2)

(Channel 149, 5745MHz, 802.11 n (HT20), ANT2)

(Channel 157, 5785MHz, 802.11 n (HT20), ANT2)

(Channel 165, 5825MHz, 802.11 n (HT20), ANT2)

802.11n (HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Tatal PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2			
38	5190	-1.59	-1.41	1.51	8.29	PASS
46	5230	-2.08	-1.81	1.07		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Tatal PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2			
151	5755	3.23	2.75	6.01	27.29	PASS
159	5795	3.41	2.83	6.14		
Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the limit shall be reduced to 11-(8.71-6) = 8.29dBm dBm/MHz for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm dBm/500KHz for 5.745-5.825 GHz band.						

B. Test Plots

(Channel 38, 5190MHz, 802.11n (HT40), ANT1)

(Channel 46, 5230 MHz, 802.11n (HT40), ANT1)

(Channel 151, 5755 MHz, 802.11n (HT40), ANT1)

(Channel 159, 5795MHz, 802.11n (HT40), ANT1)

(Channel 38, 5190MHz, 802.11n (HT40), ANT2)

(Channel 46, 5230 MHz, 802.11n (HT40), ANT2)

(Channel 151, 5755 MHz, 802.11n (HT40), ANT2)

(Channel 159, 5795MHz, 802.11n (HT40), ANT2)

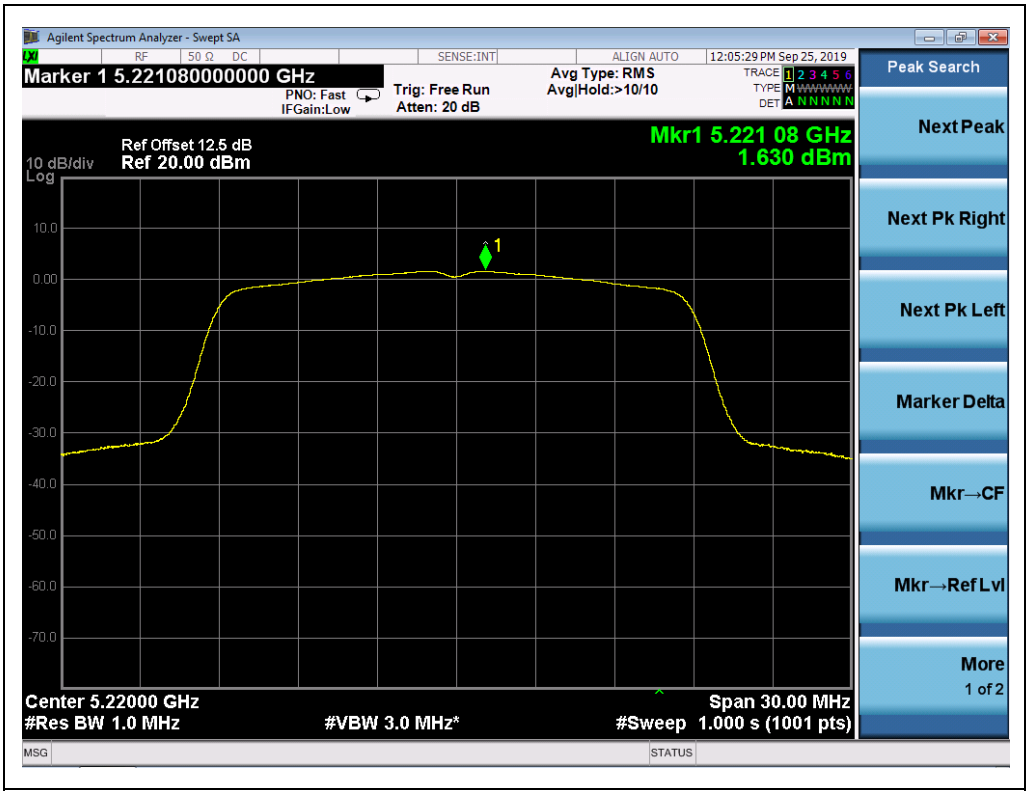
802.11 ac (VHT20) Test mode

A. Test Verdict:

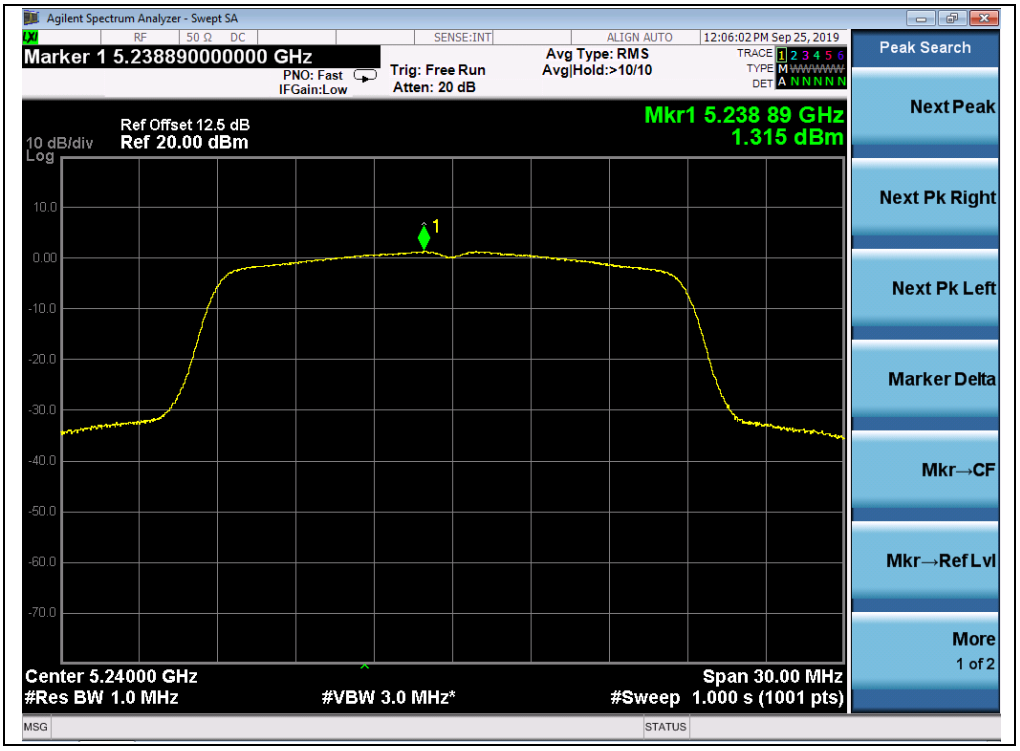
Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Tatal PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2			
36	5180	2.12	2.08	5.11	8.29	PASS
44	5220	1.63	1.87	4.76		
48	5240	1.32	1.50	4.42		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Tatal PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2			
149	5745	7.37	7.11	10.25	27.29	PASS
157	5785	7.40	7.03	10.23		
165	5825	8.13	7.22	10.71		
Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the limit shall be reduced to 11-(8.71-6) = 8.29dBm dBm/MHz for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm dBm/500KHz for 5.745-5.825 GHz band.						

B. Test Plots

(Channel 36, 5180MHz, 802.11 ac (VHT20), ANT1)



(Channel 44, 5220 MHz, 802.11 ac (VHT20), ANT1)

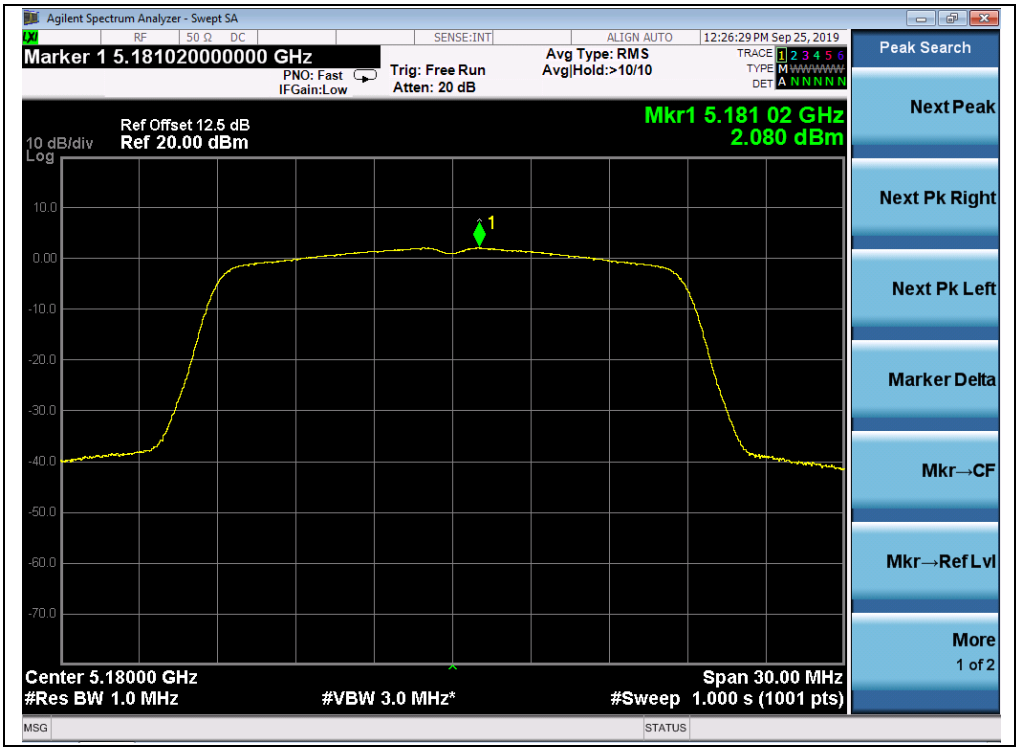


(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT1)

(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT1)

(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT1)

(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT1)



(Channel 36, 5180MHz, 802.11 ac (VHT20), ANT2)

(Channel 44, 5220 MHz, 802.11 ac (VHT20), ANT2)

(Channel 48, 5240MHz, 802.11 ac (VHT20), ANT2)

(Channel 149, 5745MHz, 802.11 ac (VHT20), ANT2)

(Channel 157, 5785MHz, 802.11 ac (VHT20), ANT2)

(Channel 165, 5825MHz, 802.11 ac (VHT20), ANT2)

802.11 ac (VHT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Tatal PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2			
38	5190	-1.61	-1.53	1.44	8.29	PASS
46	5230	-2.10	-1.91	1.01		
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Tatal PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2			
151	5755	3.33	2.97	6.16	27.29	PASS
159	5795	3.48	2.94	6.23		
Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the limit shall be reduced to 11-(8.71-6) = 8.29dBm dBm/MHz for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm dBm/500KHz for 5.745-5.825 GHz band.						

B. Test Plots

(Channel 38, 5190MHz, 802.11 ac (VHT40), ANT1)

(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT1)

(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT1)

(Channel 159, 5795MHz, 802.11 ac (VHT40), ANT1)

(Channel 38, 5190MHz, 802.11 ac (VHT40), ANT2)

(Channel 46, 5230 MHz, 802.11 ac (VHT40), ANT2)

(Channel 151, 5755 MHz, 802.11 ac (VHT40), ANT2)

(Channel 159, 5795MHz, 802.11ac (VHT40), ANT2)

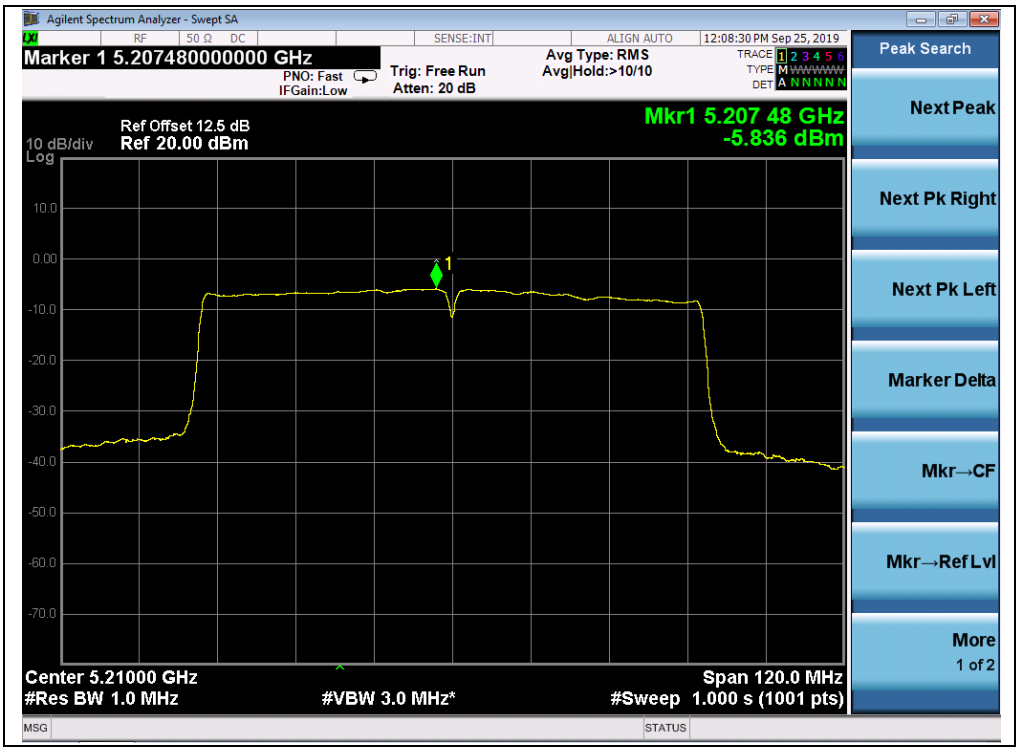
802.11 ac (VHT80) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	Measured PPSD (dBm/MHz)		Tatal PPSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
		ANT 1	ANT 2			
42	5210	-5.84	-5.60	-2.71	8.29	PASS
Channel	Frequency (MHz)	Measured PPSD (dBm/500KHz)		Tatal PPSD (dBm/500KHz)	Limit (dBm/500KHz)	Verdict
		ANT 1	ANT 2			
155	5775	0.71	0.61	3.67	27.29	PASS

Note: Directional gain = 5.70dBi +10log(2) = 8.71dBi＞6dBi, so the limit shall be reduced to 11-(8.71-6) = 8.29dBm dBm/MHz for 5.18-5.24 GHz band and reduced to 30-(8.71-6) = 27.29dBm dBm/500KHz for 5.745-5.825 GHz band.

B. Test Plots



(Channel 42, 5210MHz, 802.11 ac (VHT80), ANT1)

(Channel 155, 5775 MHz, 802.11 ac (VHT80), ANT1)

(Channel 42, 5210MHz, 802.11 ac (VHT80), ANT2)

(Channel 155, 5775 MHz, 802.11 ac (VHT80), ANT2)