



TEST REPORT

APPLICANT : Nubia Technology Co., Ltd.
PRODUCT NAME : 5G Digital Mobile Phone
MODEL NAME : NX659J
BRAND NAME : REDMAGIC
FCC ID : 2AHJO-NX659J
STANDARD(S) : 47 CFR Part 15 Subpart E
RECEIPT DATE : 2020-01-17
TEST DATE : 2020-02-26 to 2020-03-24
ISSUE DATE : 2020-04-01

Edited by: Peng Mi
Peng Mi (Rapporteur)
Approved by: Peng Huarui
Peng Huarui (Supervisor)

NOTE: This document is issued by MORLAB, the test report shall not be reproduced except in full without prior written permission of the company. The test results apply only to the particular sample(s) tested and to the specific tests carried out which is available on request for validation and information confirmed at our website.





DIRECTORY

1. Technical Information	4
1.1. Applicant and Manufacturer Information	4
1.2. Equipment Under Test (EUT) Description	4
1.3. Modulation Type and Test Mode of EUT	6
1.4. The Channel Number and Frequency	7
1.5. Test Standards and Results	8
1.6. Environmental Conditions	9
2. 47 CFR Part 15E Requirements	10
2.1. Antenna requirement	10
2.2. Duty Cycle of the Test Signal	10
2.3. Maximum Conducted Output Power	17
2.4. Emission Bandwidth	26
2.5. Maximum Power Spectral Density	82
2.6. Frequency Stability	148
2.7. Conducted Emission	151
2.8. Restricted Frequency Bands	155
2.9. Radiated Emission	219
Annex A Test Uncertainty	311
Annex B Testing Laboratory Information	312



Change History		
Version	Date	Reason for change
1.0	2020-04-01	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Nubia Technology Co., Ltd.
Applicant Address:	16/F, Building 2, chongwen Park, Nanshan zhiyuan, 3370 Liuxian Road, Nanshan District, Shenzhen, China.
Manufacturer:	Nubia Technology Co., Ltd.
Manufacturer Address:	16/F, Building 2, chongwen Park, Nanshan zhiyuan, 3370 Liuxian Road, Nanshan District, Shenzhen, China.

1.2. Equipment Under Test (EUT) Description

Product Name:	5G Digital Mobile Phone	
Serial No:	(N/A, marked #1 by test site)	
Hardware Version:	NX659J_V1AMB	
Software Version:	NX659J_ENCommon_V1.22	
Modulation Type:	OFDM, OFDMA	
Modulation Mode:	802.11a, 802.11n(HT20), 802.11n(HT40) 802.11ac(VHT20), 802.11ac(VHT40), 802.11ac(VHT80) 802.11ax(HEW20), 802.11ax(HEW40), 802.11ax(HEW80)	
Operating Frequency Range:	5180MHz- 5240MHz; 5260MHz-5320MHz; 5500MHz-5700MHz; 5745-5825MHz;	
Channel Number:	Refer to 1.3	
Antenna Type:	PIFA Antenna	
Antenna Gain:	ANT 0: 1.38dBi; ANT 1: 1.38dBi	
Directional Gain:	4.39dBi _{Note 3}	
Accessory Information:	Battery	
	Brand Name:	ATL
	Model No.:	Li3945T44P8h526391
	Serial No.:	(N/A, marked #1 by test site)
	Capacity:	4400mAh
	Rated Voltage:	3.87V
	Charge Limit:	4.45 V



Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	CYNBY090200-A00
	Serial No.:	(N/A, marked #1 by test site)
	Rated Output:	12V=1.5A or 9V=2.0A or 5V=3A
	Rated Input:	100-240V~50/60Hz 0.5A

Note 1: WIFI hotspot does not support U-NII band.

Note 2: The EUT has two antennas and supports a MIMO function. Physically, the EUT provides two completed transmitters and two receivers for 802.11n, 802.11ac and 802.11ax modulation mode.

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

Note 3: According to KDB 662911 D01, the directional gain = $G_{ANT} + 10\log(N_{ANT})$ 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, 802.11ac and 802.11ax 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 Test Mode of EUT

Mode	Bandwidth (MHz)	Modulation Technology	Modulation Type	Data Rate	RU Size
802.11a	20	OFDM	DBPSK	1/2/5.5/11Mbps	NA
			DQPSK		
			CCK		
802.11n	20/40 (HT20/40)	OFDM	BPSK	MCS0~MCS7	NA
			QPSK		
			16QAM		
			64QAM		
802.11ac	20/40/80 (VHT20/40/80)	OFDM	BPSK	MSC0~MCS9	NA
			QPSK		
			16QAM		
			64QAM		
			256QAM		
802.11ax	20/40/80 (HEW20/40/80)	OFDMA	BPSK	MSC0~MCS11	26/52/106/242/484/996
			QPSK		
			16QAM		
			64QAM		
			256QAM		
			1024QAM		

Note1: The worst-case mode(bold face) 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

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: 5260MHz-5320MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	52	5260	56	5280
	60	5300	64	5320
40MHz	54	5270	62	5310
80MHz	58	5290		
Frequency Range: 5500MHz-5720MHz				
Bandwidth	Channel	Frequency (MHz)	Channel	Frequency (MHz)
20MHz	100	5500	105	5520
	108	5540	112	5560
	116	5580	120	5600
	124	5620	128	5640
	132	5660	136	5680
	140	5700	144	5720
40MHz	102	5510	110	5550
	118	5590	126	5630
	134	5670	142	5710
80MHz	106	5530	122	5610
	138	5690		
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	No deviation
2	ANSI C63.10	Duty Cycle of the test signal	Mar 22, 2020	Tu Yanan	PASS	No deviation
3	15.407(a)	Maximum conducted output Power	Mar 20, 2020	Tu Yanan	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Mar 22, 2020	Tu Yanan	PASS	No deviation
5	15.407(a)	Maximum Power spectral density	Mar 22, 2020	Tu Yanan	PASS	No deviation
6	15.407(g)	Frequency Stability	Mar 24, 2020	Tu Yanan	PASS	No deviation
7	15.207	Conducted Emission	Feb 24, 2020	Huang Zhiye	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Mar 22, 2020	Li Zihao	PASS	No deviation
9	15.407(b)	Radiated Emission	Mar 24, 2020	Li Zihao	PASS	No deviation

Note1: The DFS test report was documented in a separate report (Report No.: SZ20010191W10).

Note2: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

Note3: 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.



Note 4: The path loss during the RF test is calibrated to correct the results by the offset setting in the test equipments. The ref offset 12dB contains two parts that cable loss 2dB and Attenuator 10dB.

Note 5: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall 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. 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

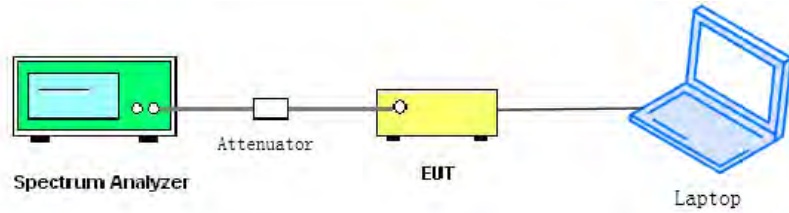
2.2.1. Requirement

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 $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



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.

Test Procedure

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

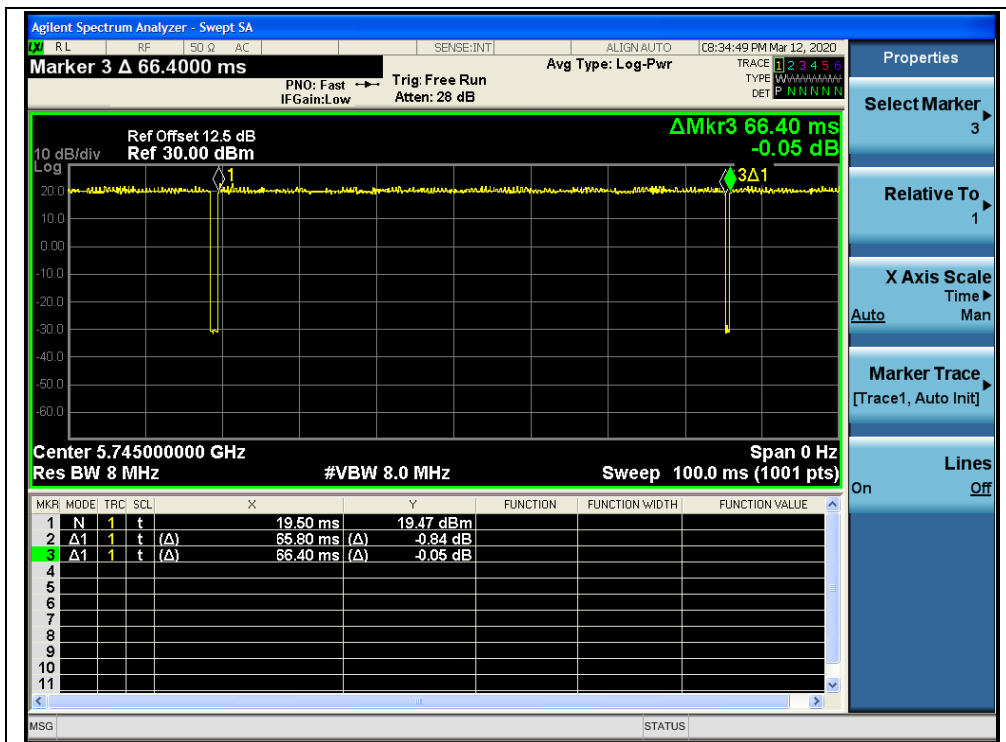


2.2.3. Test Result

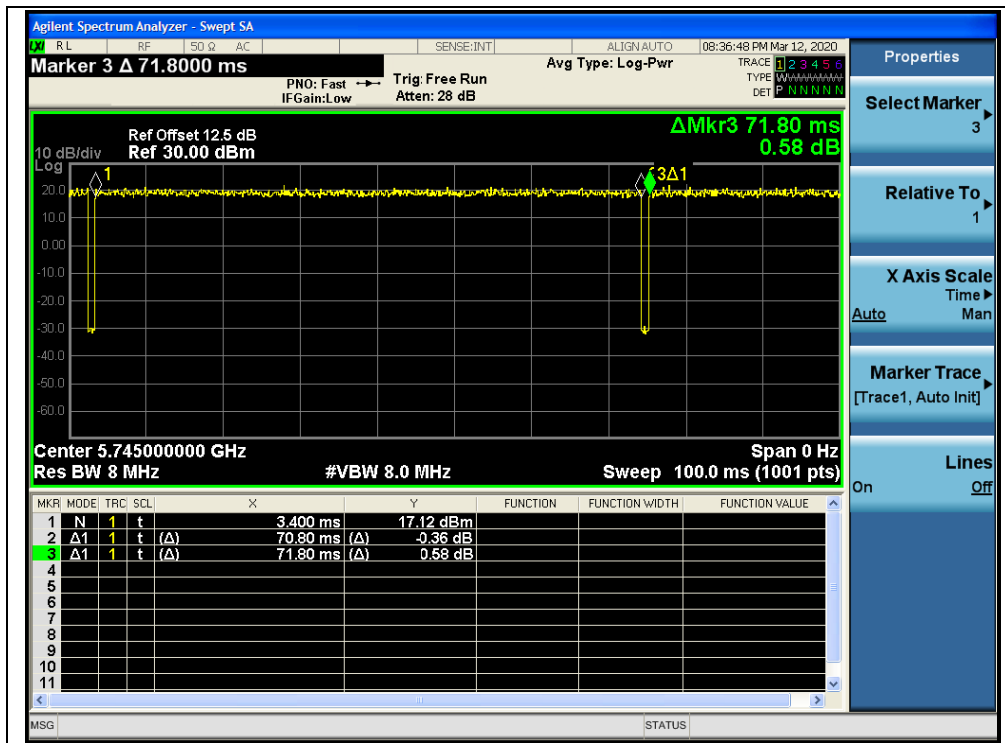
A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	99.10	0.04
802.11n(HT20)	98.61	0.06
802.11n(HT40)	98.33	0.07
802.11ac(VHT20)	98.61	0.06
802.11ac(VHT40)	98.47	0.07
802.11ac(VHT80)	98.74	0.06
802.11ax(HEW20)	98.50	0.07
802.11ax(HEW40)	98.35	0.07
802.11ax(HEW80)	98.64	0.06

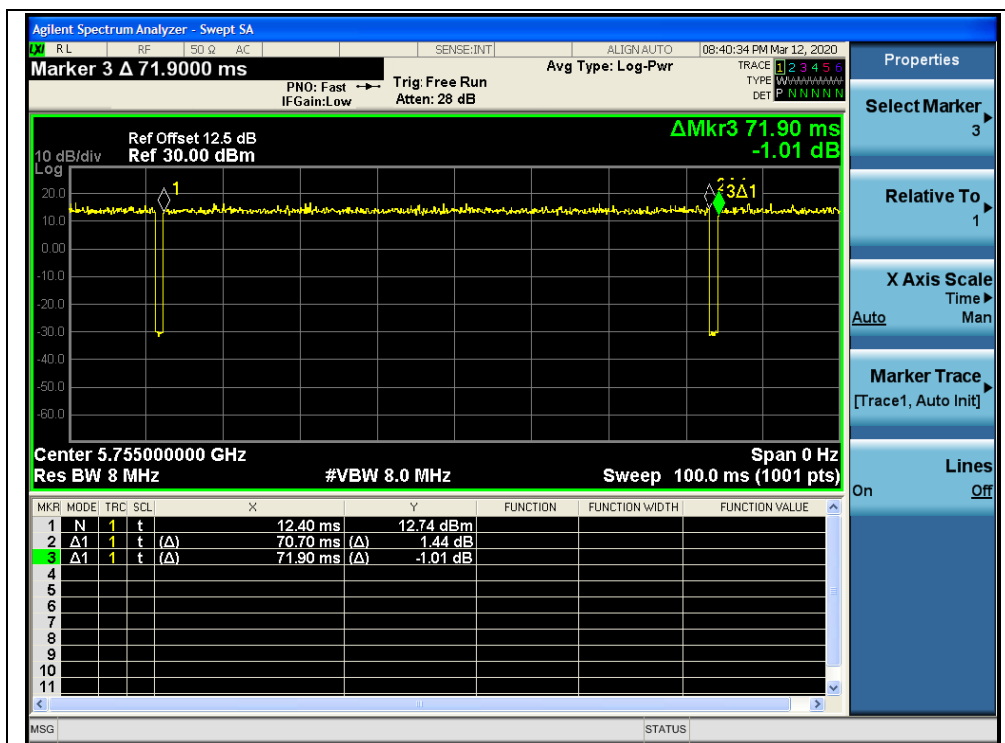
B. Test Plots



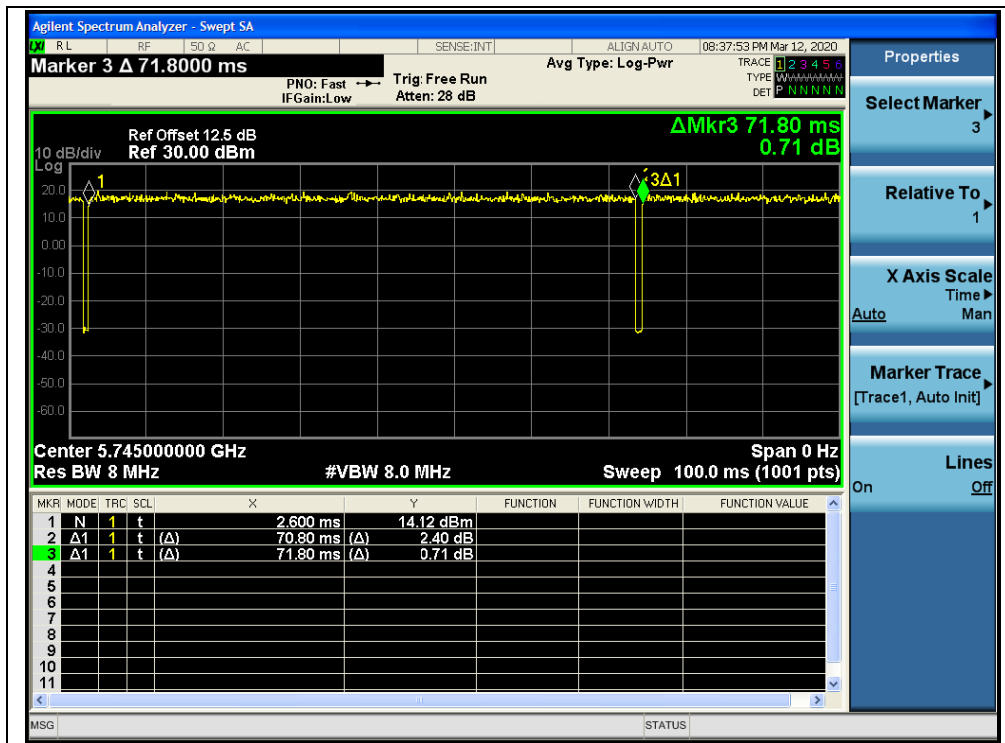
(CH36_5180MHz_802.11a)



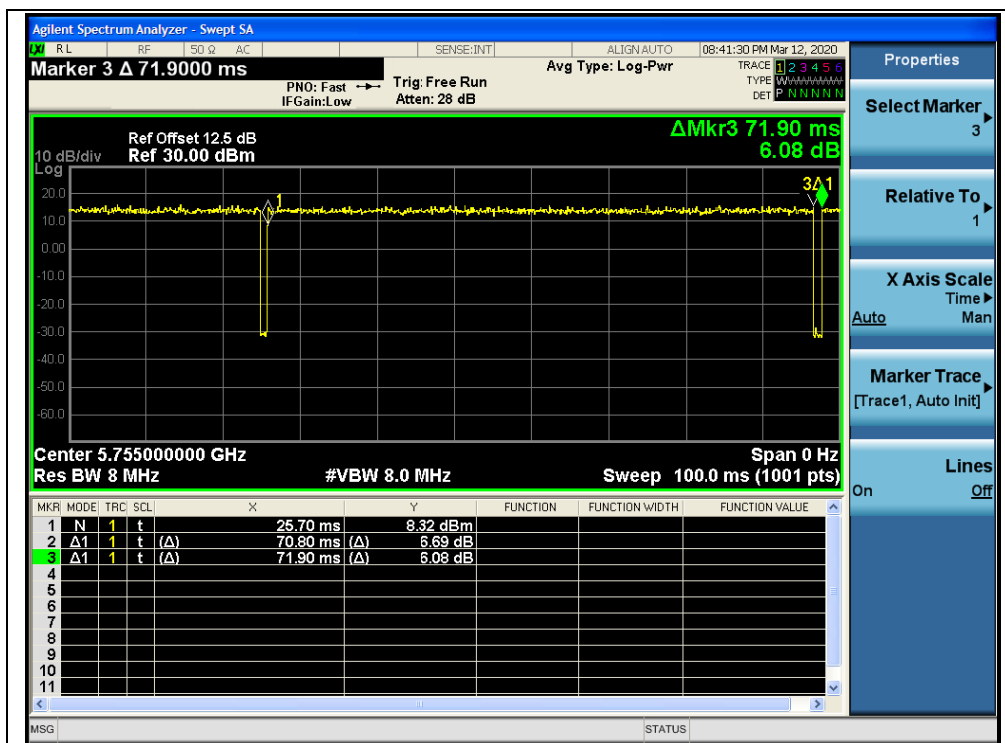
(CH36_5180MHz_802.11n(HT20))



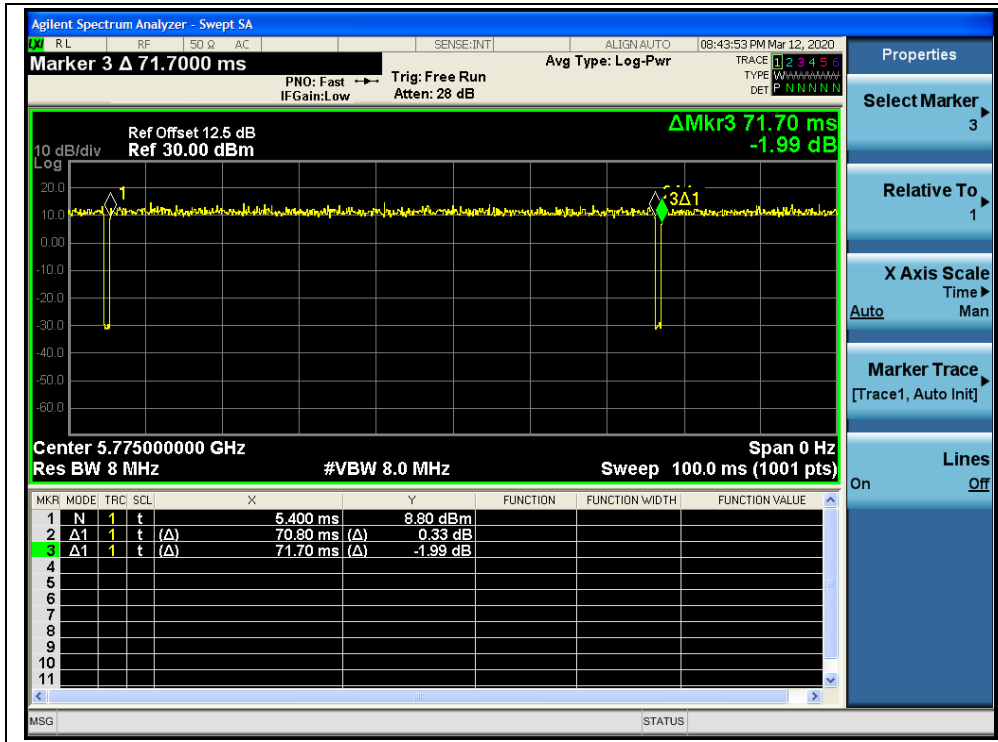
(CH38_5190MHz_802.11n(HT40))



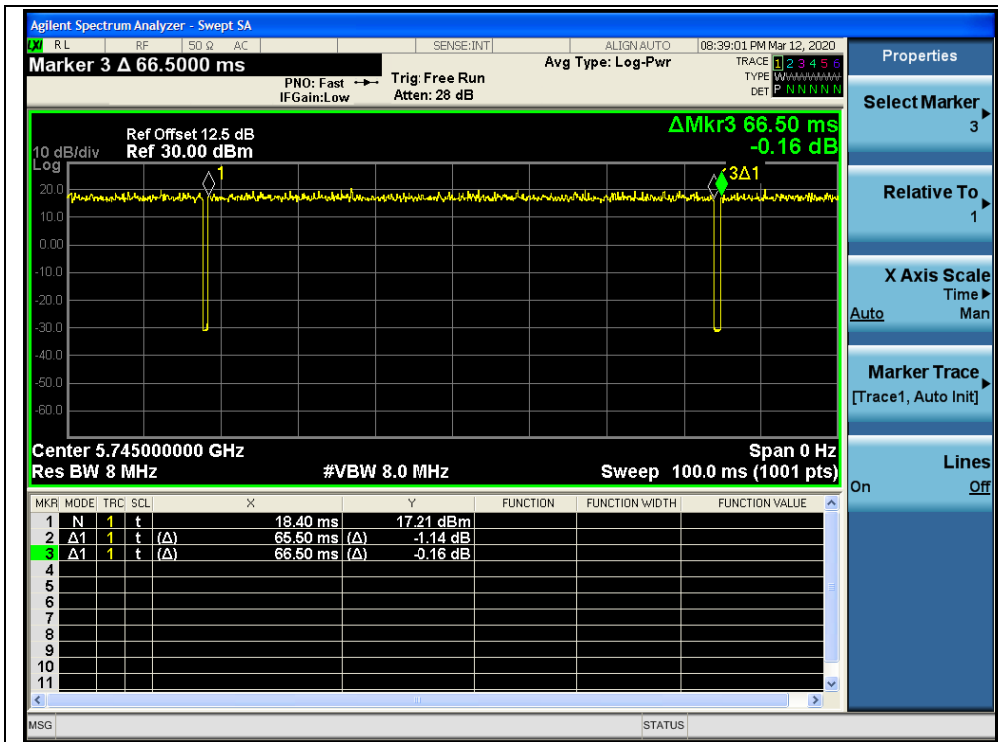
(CH36_5180MHz_802.11ac(VHT20))



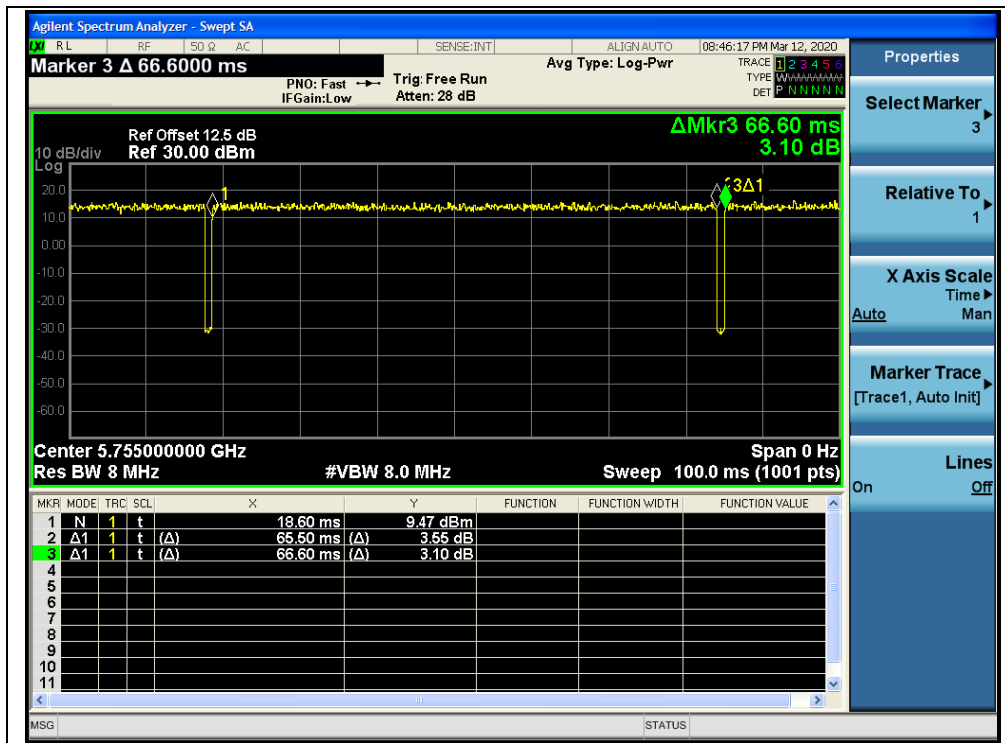
(CH38_5190MHz_802.11ac(VHT40))



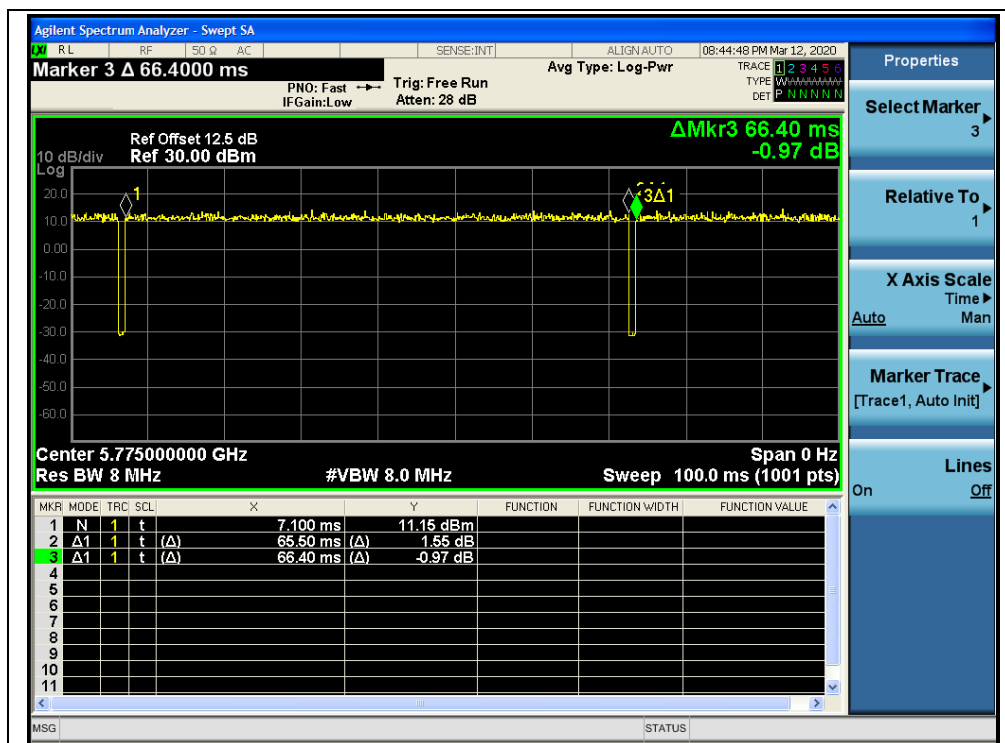
(CH42_5210MHz_802.11 ac(VHT80))



(CH36_5180MHz_802.11 ax(HEW20))



(CH38_5190MHz_802.11 ax(HEW40))



(CH42_5210MHz_802.11 ax(HEW80))

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 $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz.

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

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.

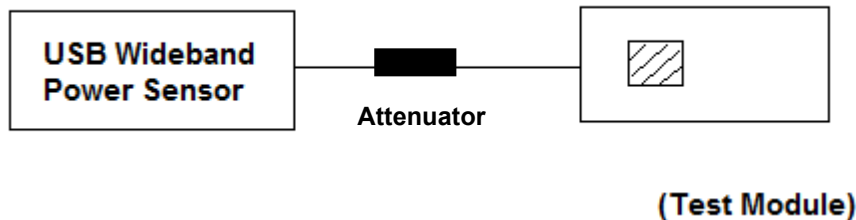
(4) According to KDB662911D01 Measure-and-sum technique, the conducted emission level (e.g., transmit power or power in specified bandwidth) is measured at each antenna port. The measured results at the various antenna ports are then summed mathematically to determine the total emission level from the device. Summing is performed in units that are directly proportional to power.

(5) According to KDB 662911 D01, the directional gain = $G_{\text{ANT}} + 10 \log(N_{\text{ANT}})$ 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.

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 50 Ohm; the path loss as the factor is calibrated to correct the reading, all test result in USB Wideband Power Sensor.



2.3.3. Limits

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.

Mode	Band	Channel (MHz)	26dB BW (MHz)	11+10log(26dB BW)	Limits (dBm)
a	UNII-2a	5260	22.66	24.55	24.00
		5300	22.12	24.45	24.00
		5320	22.61	24.54	24.00
	UNII-2c	5500	22.79	24.58	24.00
		5600	22.61	24.54	24.00
		5720	22.88	24.59	24.00
n20	UNII-2a	5260	23.11	24.64	24.00
		5300	22.97	24.61	24.00
		5320	23.99	24.80	24.00
	UNII-2c	5500	22.76	24.57	24.00
		5600	22.47	24.52	24.00
		5720	22.94	24.61	24.00
ac20	UNII-2a	5260	23.2	24.65	24.00
		5300	23.07	24.63	24.00
		5320	23.39	24.69	24.00
	UNII-2c	5500	23.58	24.73	24.00
		5600	22.45	24.51	24.00
		5720	23.15	24.65	24.00



2.3.4. Test Result

Maximum Average Conducted Output Power

802.11a Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor		dBm	W	
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	7.28	7.76	0.04	0.011	10.41	24	0.25	PASS
5200	7.31	7.68		0.011	10.41			
5240	7.76	7.86		0.012	10.79			
5260	7.83	8.13		0.013	11.14			
5300	7.52	8.24		0.012	10.79			
5320	7.29	8.33		0.012	10.79			
5500	7.72	8.41		0.013	11.14			
5600	7.38	8.26		0.012	10.79			
5720	7.98	8.54		0.014	11.46			
5745	7.72	8.17		0.013	11.14			30
5785	7.72	8.22		0.013	11.14			
5825	7.14	8.24		0.012	10.79			

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.



802.11n (HT20) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1		W	dBm			
	dBm	dBm				dBm	W	
5180	7.02	7.55	0.06	0.011	10.41	24	0.25	PASS
5200	7.19	7.46		0.011	10.41			
5240	7.74	7.62		0.012	10.79			
5260	7.73	7.81		0.012	10.79			
5300	7.41	7.91		0.012	10.79			
5320	7.14	8.01		0.012	10.79			
5500	7.65	7.89		0.012	10.79			
5600	7.28	8.03		0.012	10.79			
5720	7.87	8.46		0.013	11.14			
5745	7.60	8.11		0.012	10.79			30
5785	7.57	8.36		0.013	11.14			
5825	7.02	8.14		0.012	10.79			

Note: Directional gain = 1.38dBi +10log(2) =4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm 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				
	ANT0	ANT1		W	dBm			
	dBm	dBm				dBm	W	
5190	7.78	7.83	0.07	0.012	10.79	24	0.25	PASS
5230	7.86	8.18		0.013	11.14			
5270	8.38	8.52		0.014	11.46			
5310	7.65	8.44		0.013	11.14			
5510	8.11	8.36		0.014	11.46			
5590	7.73	8.40		0.013	11.14			
5710	8.42	9.12		0.015	11.76			
5755	8.21	8.55		0.014	11.46	30	1	
5795	8.14	8.39		0.014	11.46			

Note: Directional gain = 1.38dBi +10log(2) =4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm 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		dBm		W
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	7.02	7.61	0.06	0.011	10.41	24	0.25	PASS
5200	7.13	7.62		0.011	10.41			
5240	7.21	7.81		0.011	10.41			
5260	7.66	8.11		0.012	10.79			
5300	7.41	8.23		0.012	10.79			
5320	7.36	8.17		0.012	10.79			
5500	7.51	8.32		0.013	11.14			
5600	7.47	8.28		0.012	10.79			
5720	7.91	8.34		0.013	11.14			
5745	7.52	8.52		0.013	11.14			
5785	7.36	8.36		0.012	10.79			
5825	7.64	8.24		0.013	11.14			

Note: Directional gain = 1.38dBi +10log(2) =4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm 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		dBm		W
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5190	7.62	8.20	0.07	0.013	11.14	24	0.25	PASS
5230	7.39	8.14		0.012	10.79			
5270	8.20	8.23		0.013	11.14			
5310	8.14	8.34		0.014	11.46			
5510	8.03	8.33		0.013	11.14			
5590	7.79	8.25		0.013	11.14			
5710	8.54	8.86		0.015	11.76			
5755	8.09	8.34		0.013	11.14	30	1	
5795	8.12	8.27		0.013	11.14			

Note: Directional gain = 1.38dBi +10log(2) =4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.



802.11ac (VHT80) Test mode

Frequency (MHz)	Average Power (dBm)					Limit (dBm)		Verdict
	Measured		Duty Factor	Total Power with Duty Factor		dBm	W	
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5210	7.38	7.75	0.06	0.012	10.79	24	0.25	PASS
5290	7.24	7.82		0.012	10.79			
5530	7.55	7.67		0.012	10.79			
5610	7.44	7.81		0.012	10.79			
5690	7.84	8.34		0.013	11.14			
5775	7.53	7.79		0.012	10.79	30	1	

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.

802.11ax (HEW20_RU26) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor		dBm	W	
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	6.83	7.69	0.07	0.011	10.41	24	0.25	PASS
5200	6.92	7.58		0.011	10.41			
5240	6.74	7.66		0.011	10.41			
5260	6.68	7.84		0.011	10.41			
5300	7.05	8.01		0.012	10.79			
5320	6.94	7.63		0.011	10.41			
5500	7.11	7.74		0.011	10.41			
5600	6.78	7.83		0.011	10.41			
5720	7.68	8.23		0.013	11.14			
5745	7.21	7.95		0.012	10.79			
5785	6.89	7.78		0.011	10.41			
5825	6.76	7.64		0.011	10.41			

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.



802.11ax (HEW20_RU52) Test mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor		dBm		W
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	6.78	7.44	0.07	0.010	10.00	24	0.25	PASS
5200	6.81	7.35		0.010	10.00			
5240	6.83	7.37		0.010	10.00			
5260	6.85	7.28		0.010	10.00			
5300	6.91	7.56		0.011	10.41			
5320	6.70	7.37		0.010	10.00			
5500	7.04	7.22		0.010	10.00			
5600	6.72	7.40		0.010	10.00			
5720	7.55	8.16		0.012	10.79			
5745	7.18	7.91		0.012	10.79			
5785	6.78	7.60		0.011	10.41			
5825	6.77	7.53		0.011	10.41			

Note: Directional gain = 1.38dBi +10log(2) =4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.

802.11ax (HEW20_RU106) Test mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor		dBm		W
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	6.64	7.26	0.07	0.010	10.00	24	0.25	PASS
5200	6.55	7.22		0.010	10.00			
5240	6.53	7.23		0.010	10.00			
5260	6.61	7.32		0.010	10.00			
5300	6.48	7.20		0.010	10.00			
5320	6.52	7.35		0.010	10.00			
5500	6.50	7.33		0.010	10.00			
5600	6.63	7.36		0.010	10.00			
5720	7.47	8.23		0.012	10.79			
5745	7.21	7.81		0.011	10.41			
5785	6.60	7.66		0.011	10.41			
5825	6.59	7.61		0.010	10.00			



Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.

802.11ax (HEW20_RU242) Test mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor		dBm	W	
	ANT0	ANT1		W	dBm			
	dBm	dBm						
5180	6.95	7.70	0.07	0.011	10.41	24	0.25	PASS
5200	6.82	7.68		0.011	10.41			
5240	6.74	7.82		0.011	10.41			
5260	6.91	7.66		0.011	10.41			
5300	6.64	7.59		0.011	10.41			
5320	6.59	7.67		0.011	10.41			
5500	6.81	7.74		0.011	10.41			
5600	6.77	7.79		0.011	10.41			
5720	7.73	8.28		0.013	11.14			
5745	7.34	7.88		0.012	10.79			
5785	6.73	7.81		0.011	10.41			
5825	6.58	7.69		0.011	10.41			

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.



802.11ax (HEW40_RU484) Test mode

Frequency (MHz)	Average Power				Limit		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1		W	dBm	dBm		W
	dBm	dBm						
5190	7.39	7.72	0.07	0.012	10.79	24	0.25	PASS
5230	7.22	7.81		0.011	10.41			
5270	7.34	7.64		0.011	10.41			
5310	7.41	7.68		0.012	10.79			
5510	7.56	7.81		0.012	10.79			
5590	7.39	7.63		0.011	10.41			
5710	8.14	8.33		0.014	11.46	30	1	
5755	7.28	7.74		0.011	10.41			
5795	7.33	7.56		0.011	10.41			

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.

802.11ax (HEW80_RU996) Test mode

Frequency (MHz)	Average Power (dBm)				Limit (dBm)		Verdict	
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1		W	dBm	dBm		W
	dBm	dBm						
5210	7.37	7.78	0.06	0.012	10.79	24	0.25	PASS
5290	7.29	7.69		0.011	10.41			
5530	7.40	7.82		0.012	10.79			
5610	7.26	7.91		0.012	10.79			
5690	7.94	8.47		0.013	11.14			
5775	7.42	8.11		0.012	10.79	30	1	

Note: Directional gain = 1.38dBi + 10log(2) = 4.39dBi < 6dBi, so the power limit shall be 24dBm for 5.18-5.24 GHz, 5.260-5.320 GHz, 5.500-5.720 GHz band and 30dBm for 5.745-5.825 GHz band.

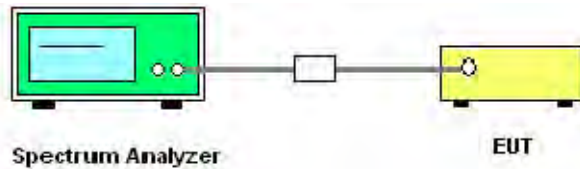
2.4. Emission Bandwidth

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 emission 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

Test Setup:



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

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 5.725-5.85 GHz was used in order to prove compliance.

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

 - a) Set RBW = 100 kHz.
 - b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
 - c) Detector = Peak.
 - d) Trace mode = max hold.



- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

2.4.3. Test Result

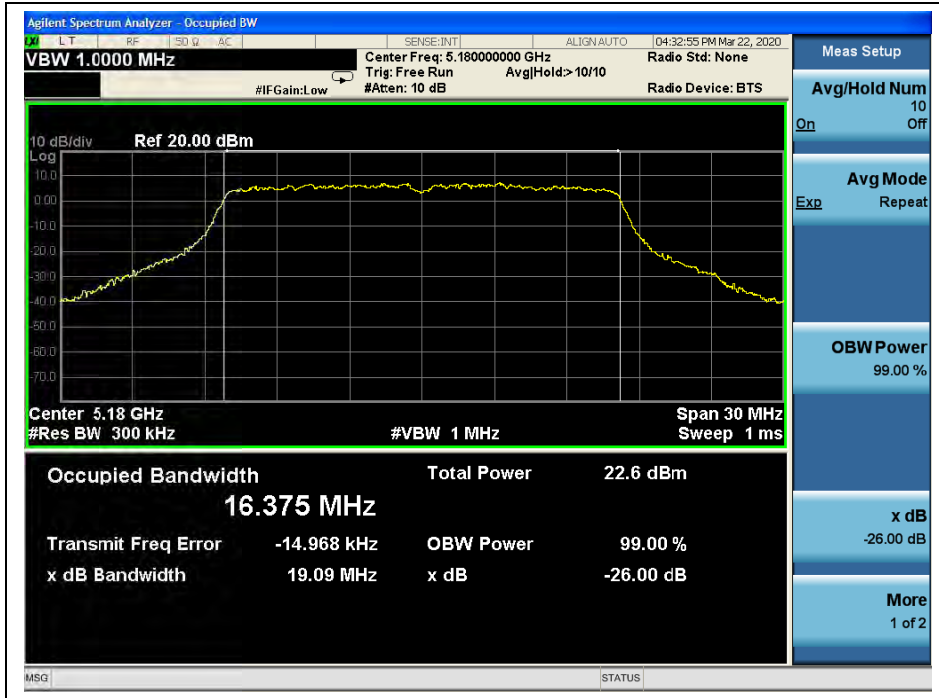
802.11a Test mode

A. Test Verdict:

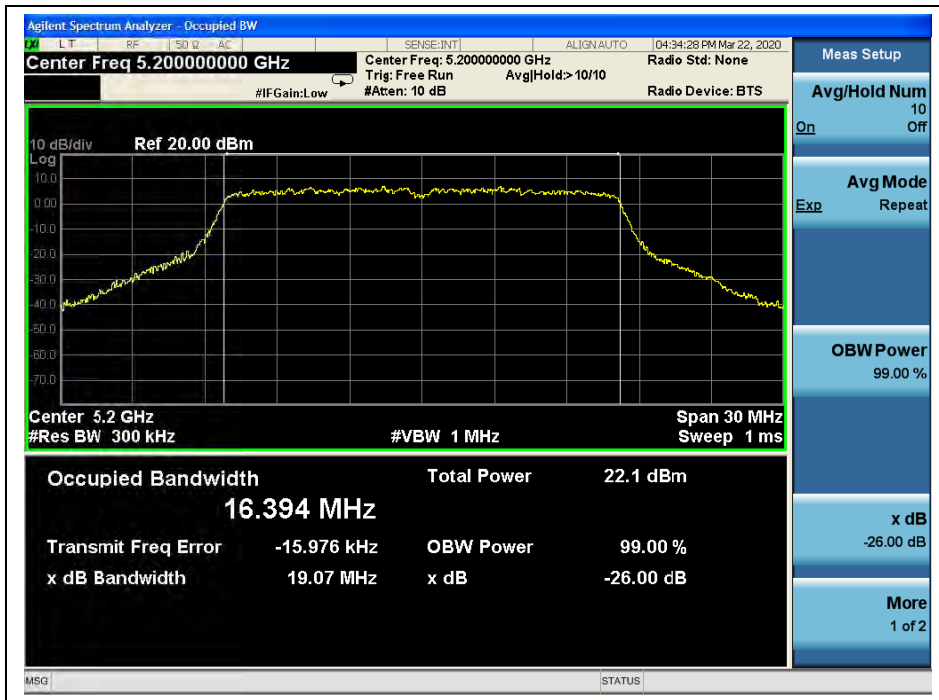
Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.09
44	5200	19.07
48	5240	19.07
52	5260	18.96
60	5300	19.12
64	5320	19.03
100	5500	18.94
120	5600	19.11
144	5720	19.28
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	16.36
149	5745	15.77
157	5785	15.72
165	5825	16.08



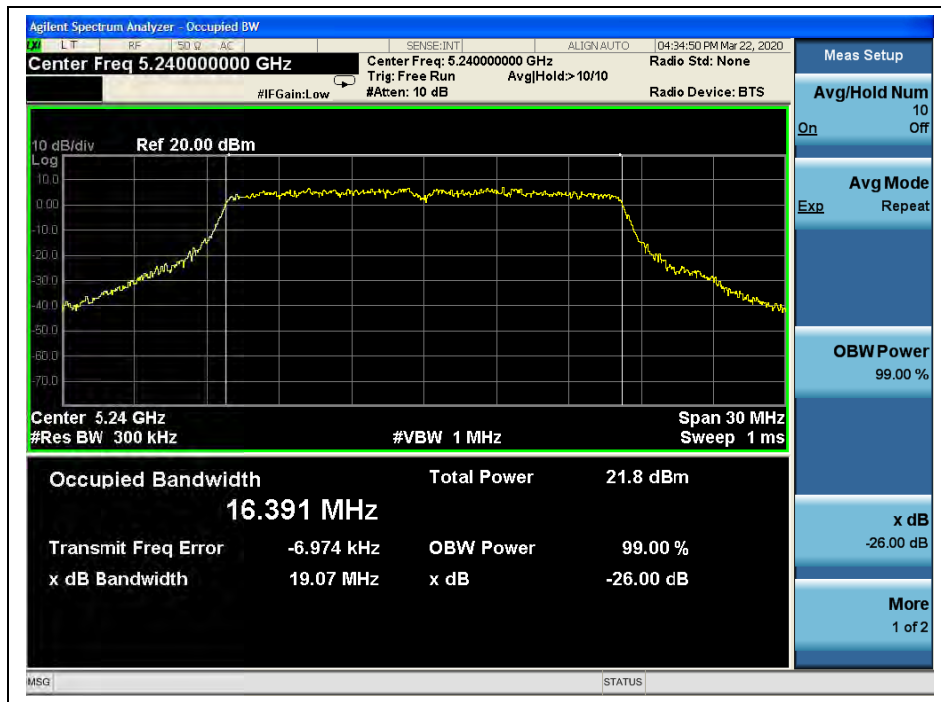
B. Test Plots



(Channel 36,5180MHz, 802.11a)



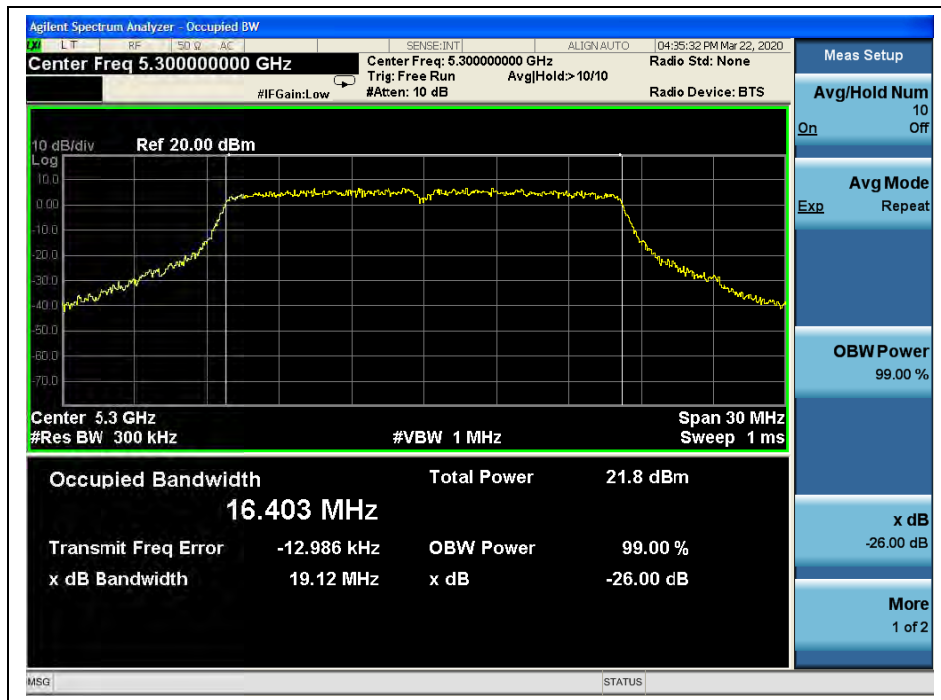
(Channel 40, 5200 MHz, 802.11a)



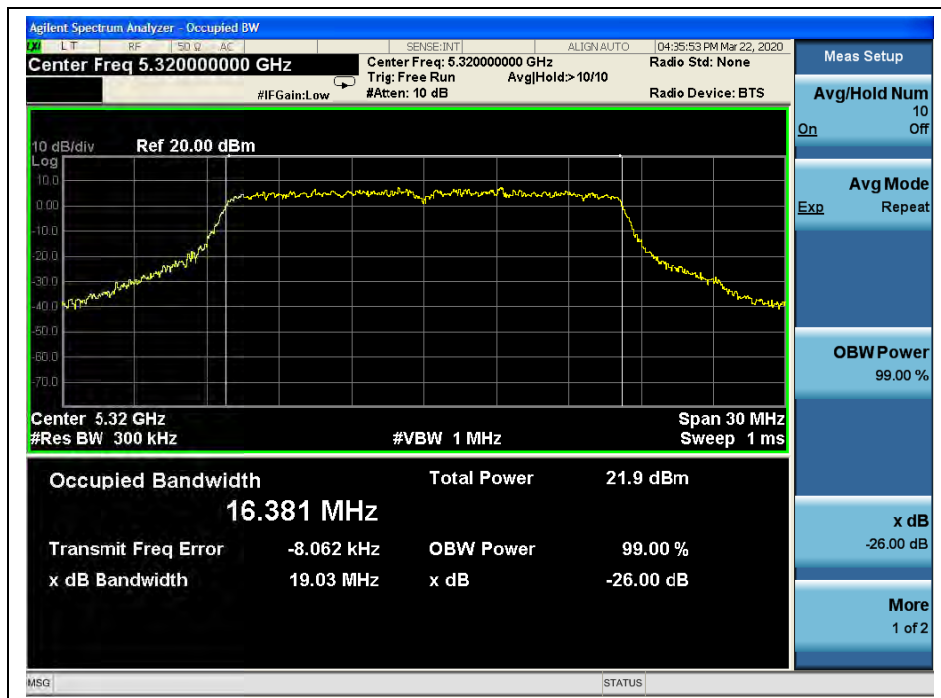
(Channel 48, 5240MHz, 802.11a)



(Channel 52, 5260MHz, 802.11a)



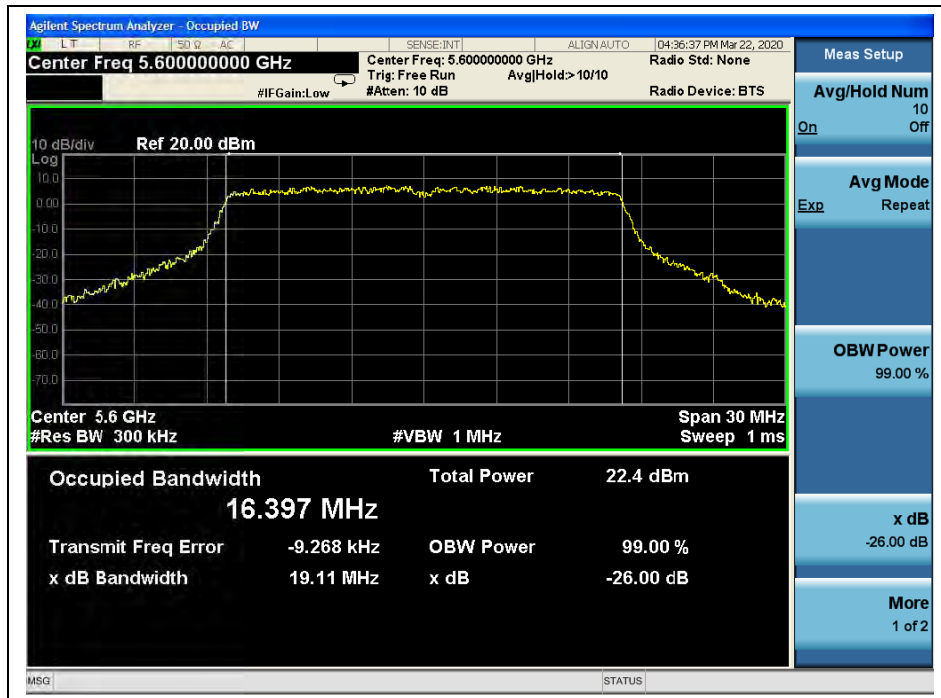
(Channel 60, 5300 MHz, 802.11a)



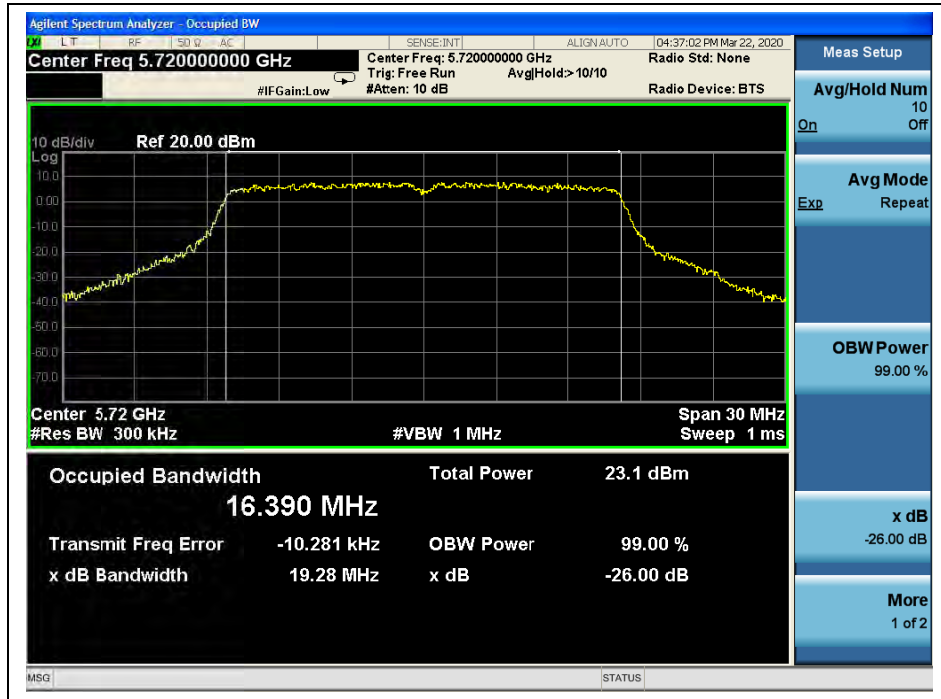
(Channel 64, 5320MHz, 802.11a)



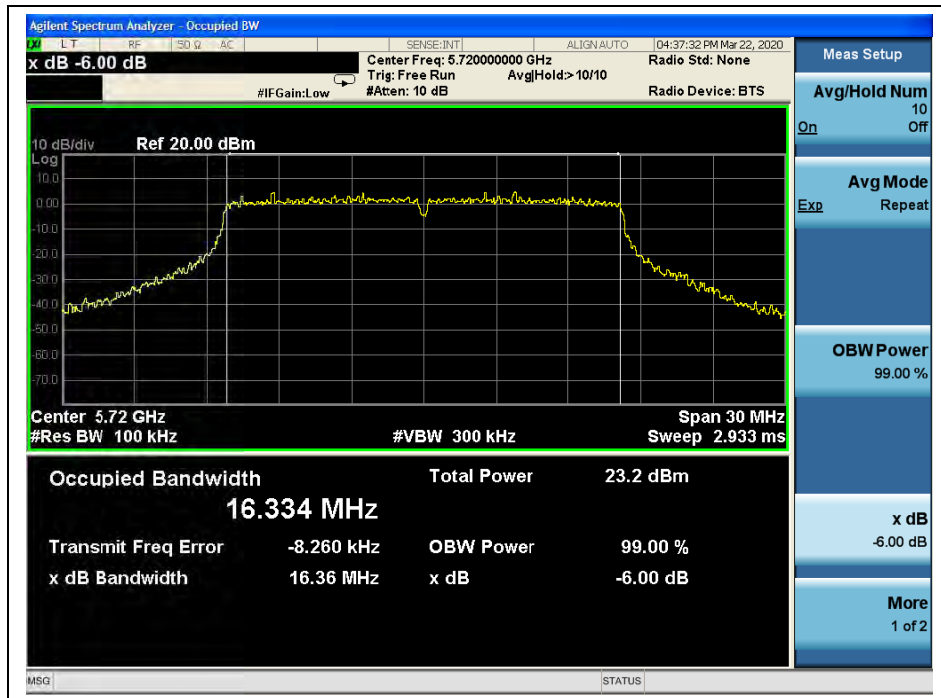
(Channel 100, 5500 MHz, 802.11a)



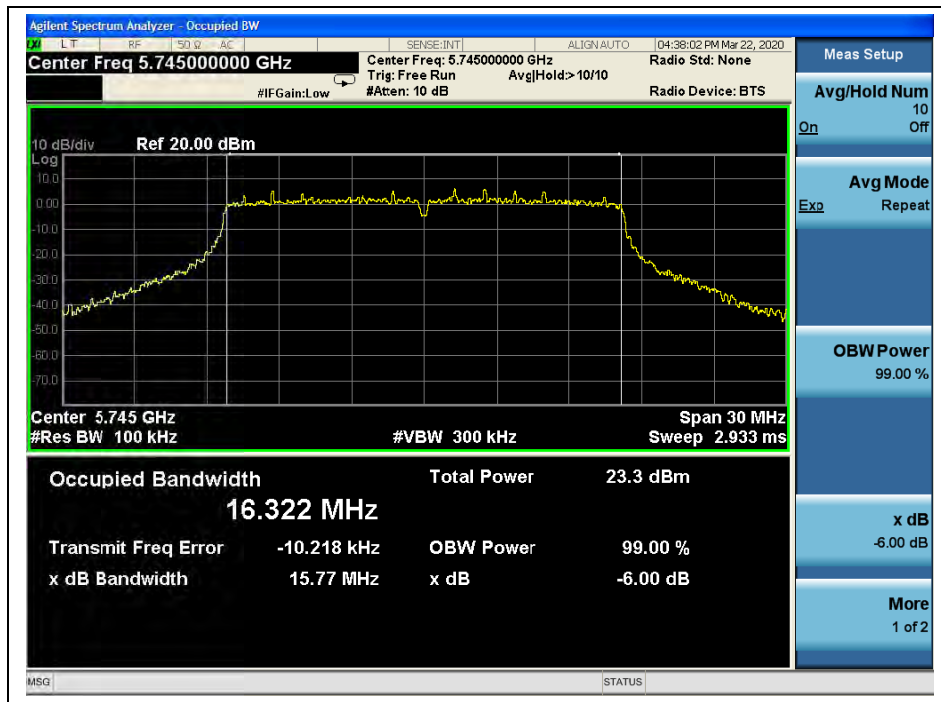
(Channel 120, 5600 MHz, 802.11a)



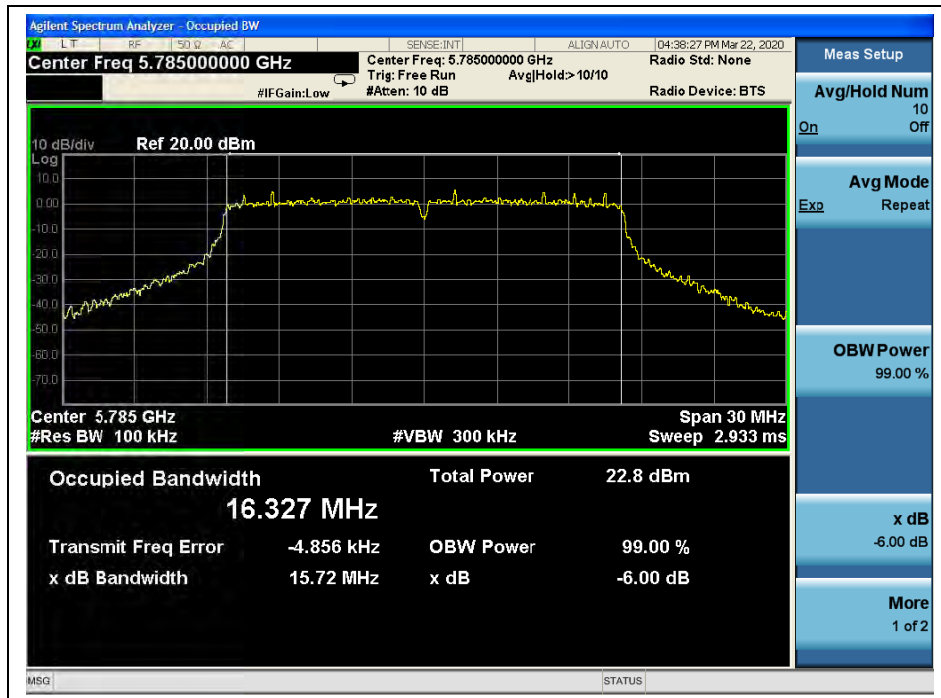
(Channel 144, 5720MHz, 802.11a)



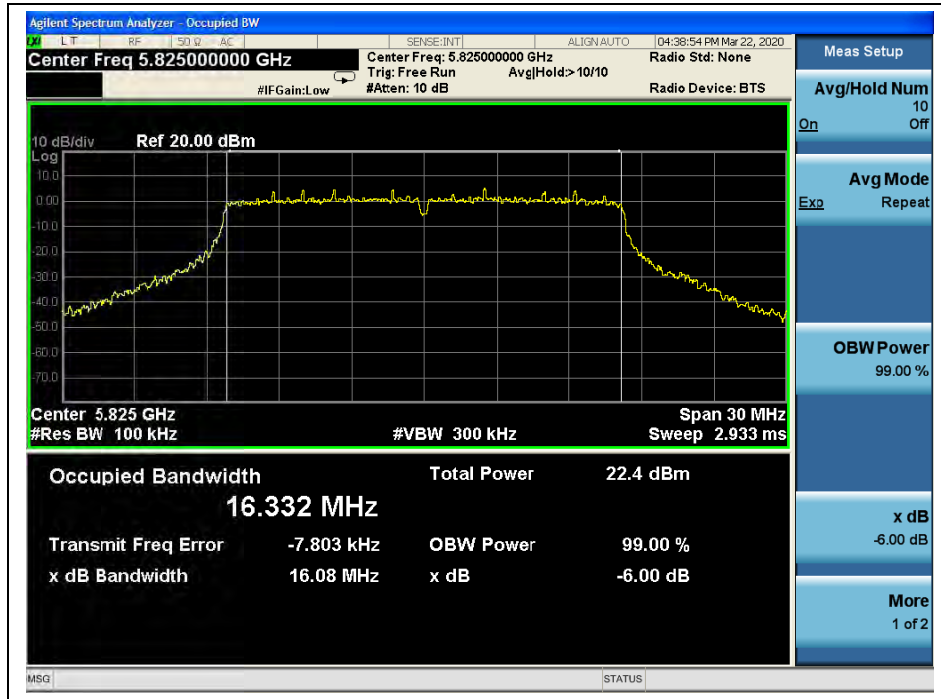
(Channel 144, 5720MHz, 802.11a)



(Channel 149,5745MHz, 802.11a)



(Channel 157,5785MHz, 802.11a)



(Channel 165,5825MHz, 802.11a)



802.11n (HT20) Test mode

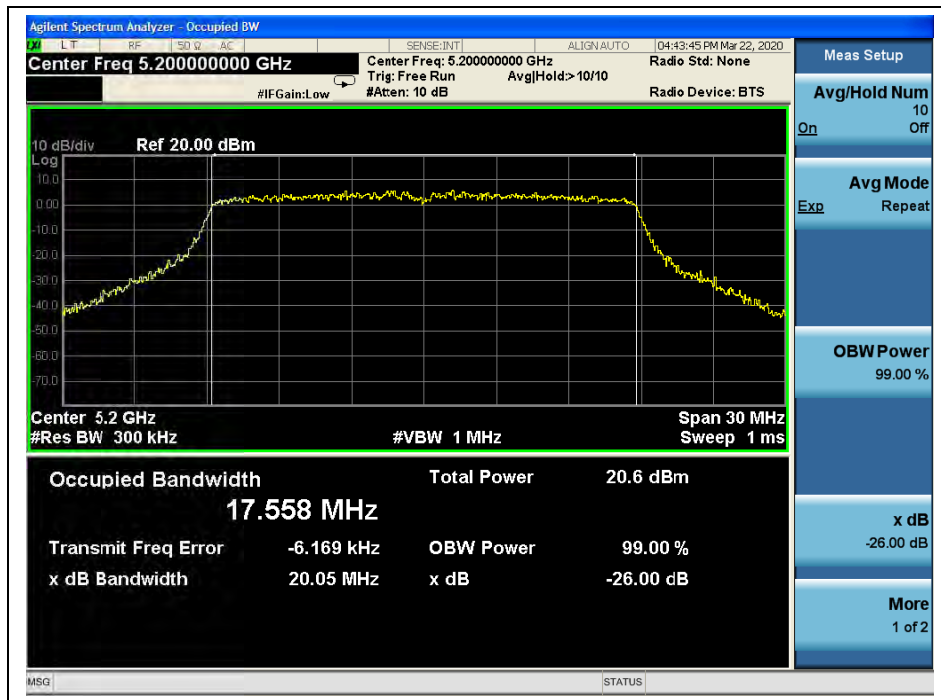
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	19.95
44	5200	20.05
48	5240	19.86
52	5260	19.89
60	5300	20.02
64	5320	20.24
100	5500	20.09
120	5600	19.65
144	5720	19.90
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	17.07
149	5745	17.26
157	5785	17.62
165	5825	17.30

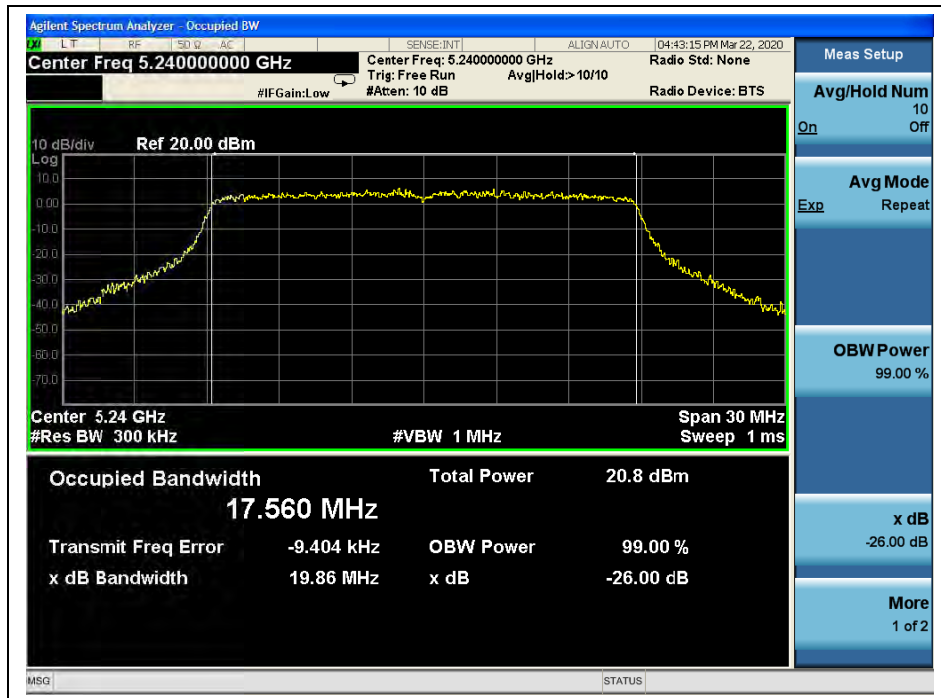
B. Test Plots



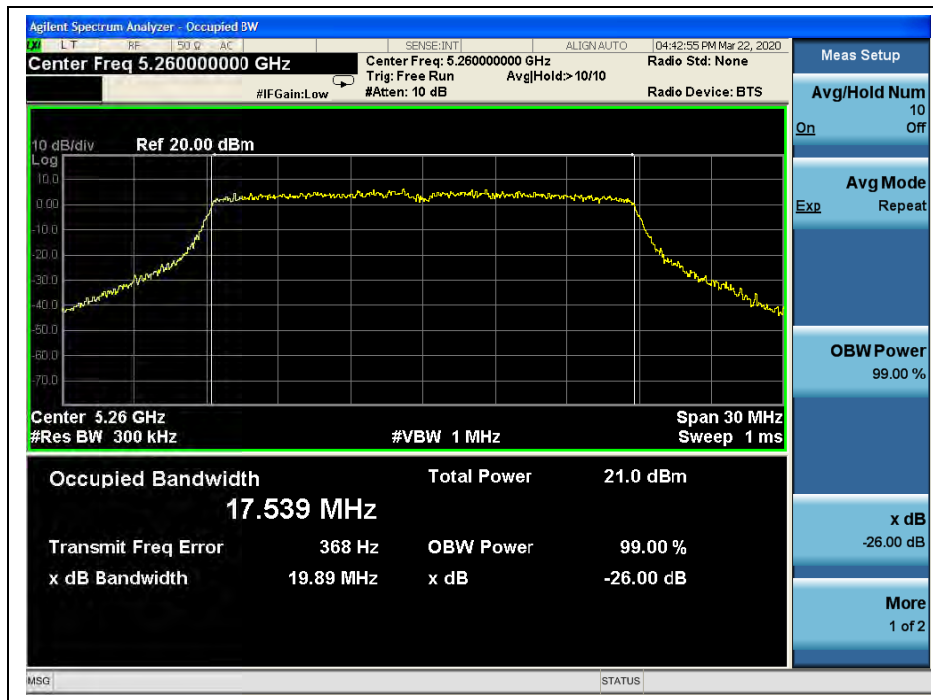
(Channel 36, 5180 MHz, 802.11 n (HT20))



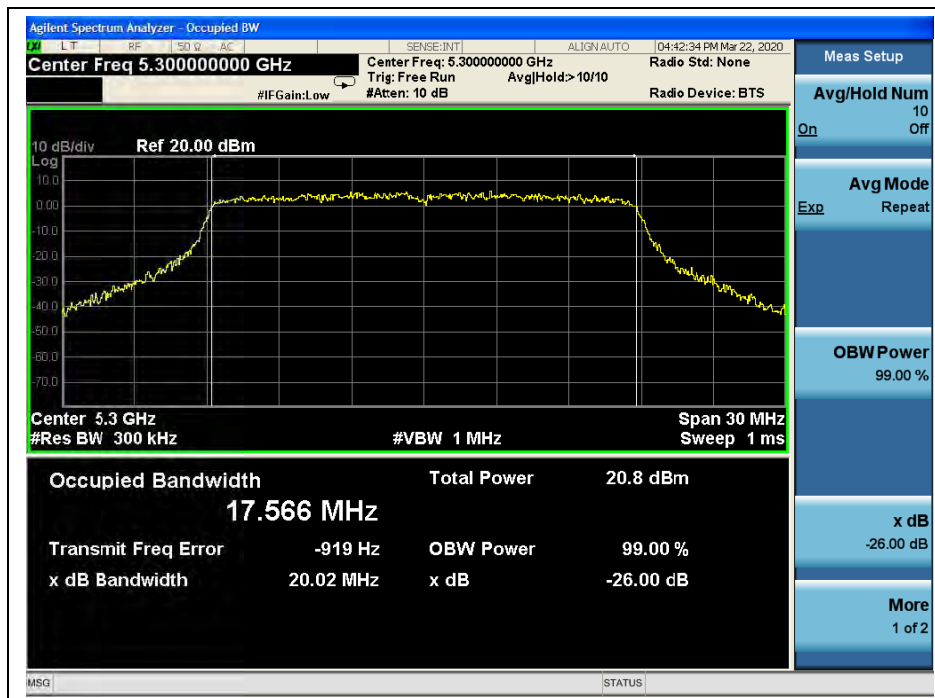
(Channel 44, 5200 MHz, 802.11 n (HT20))



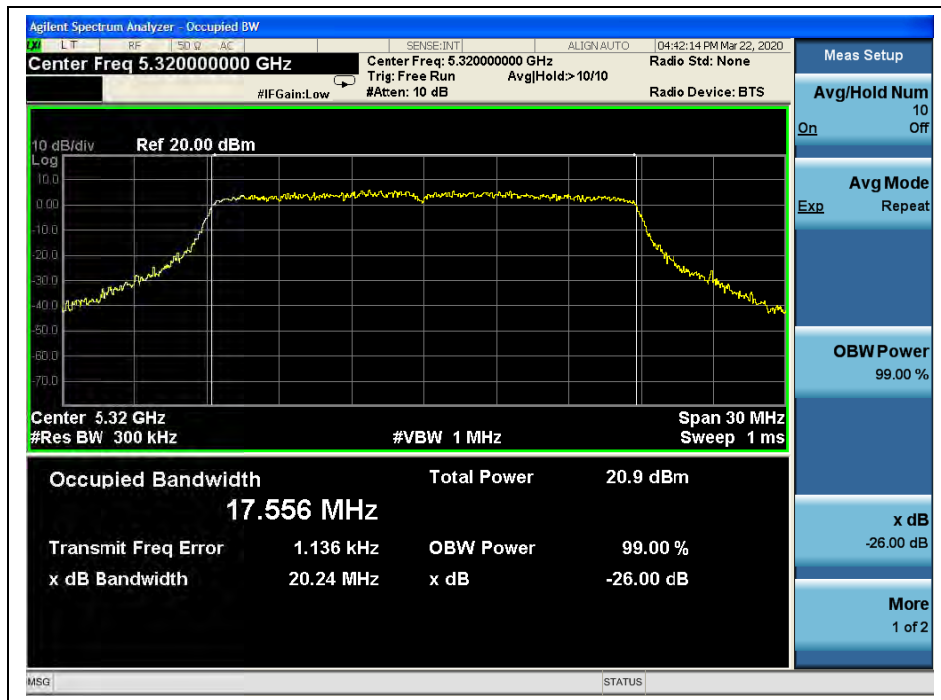
(Channel 48, 5240MHz, 802.11 n (HT20))



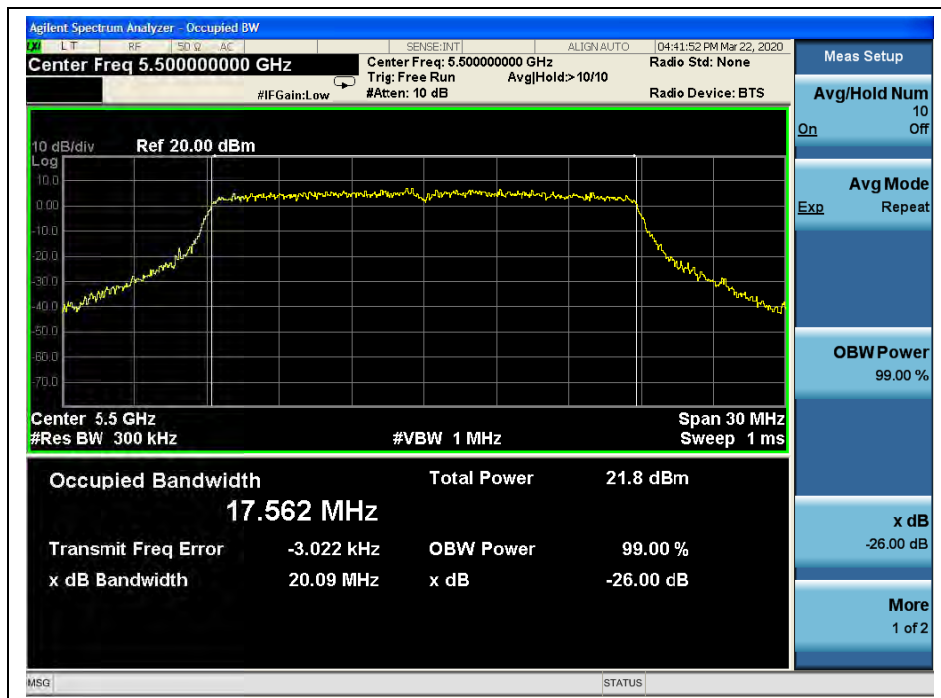
(Channel 48, 5260MHz, 802.11 n (HT20))



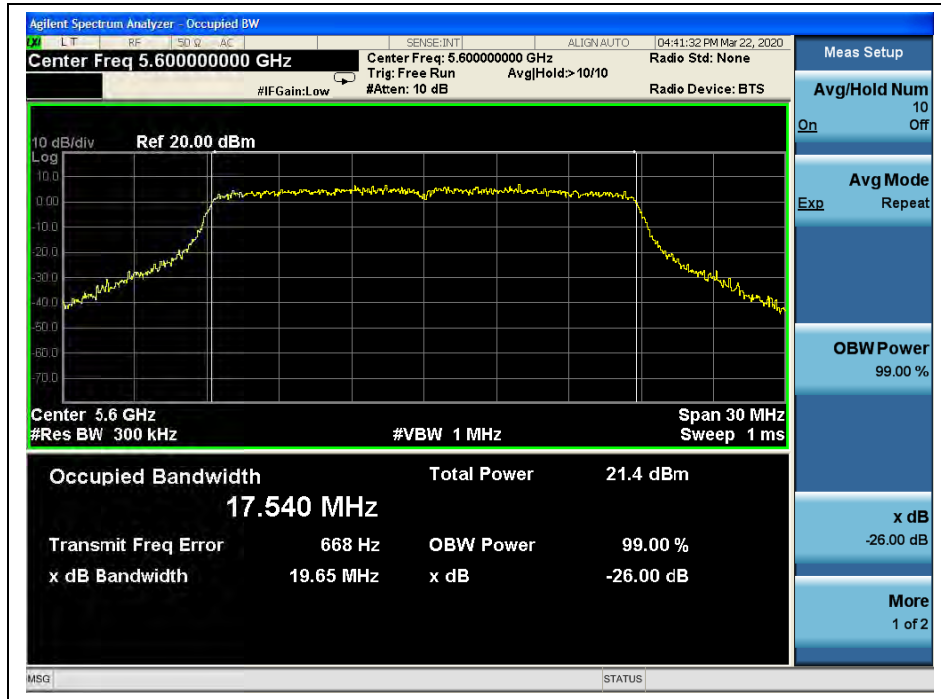
(Channel 52, 5300MHz, 802.11 n (HT20))



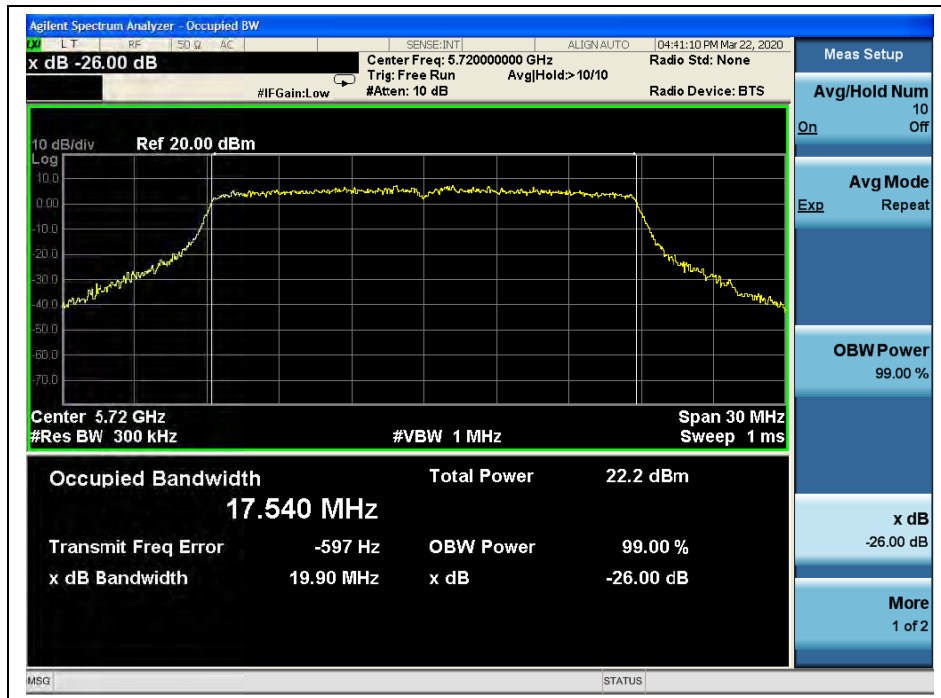
(Channel 60, 5320 MHz, 802.11 n (HT20))



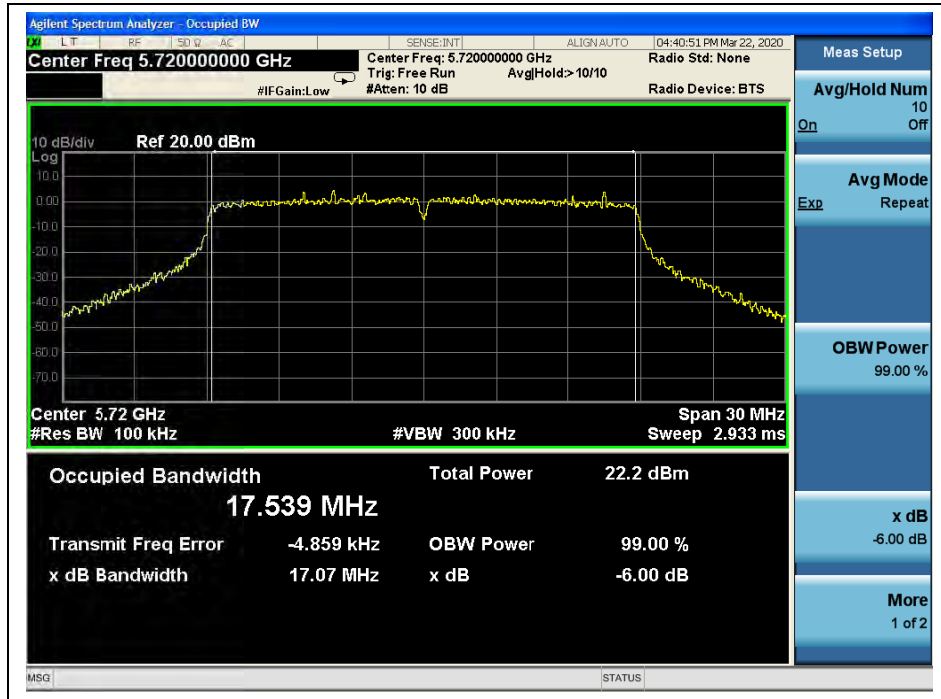
(Channel 64, 5500MHz, 802.11 n (HT20))



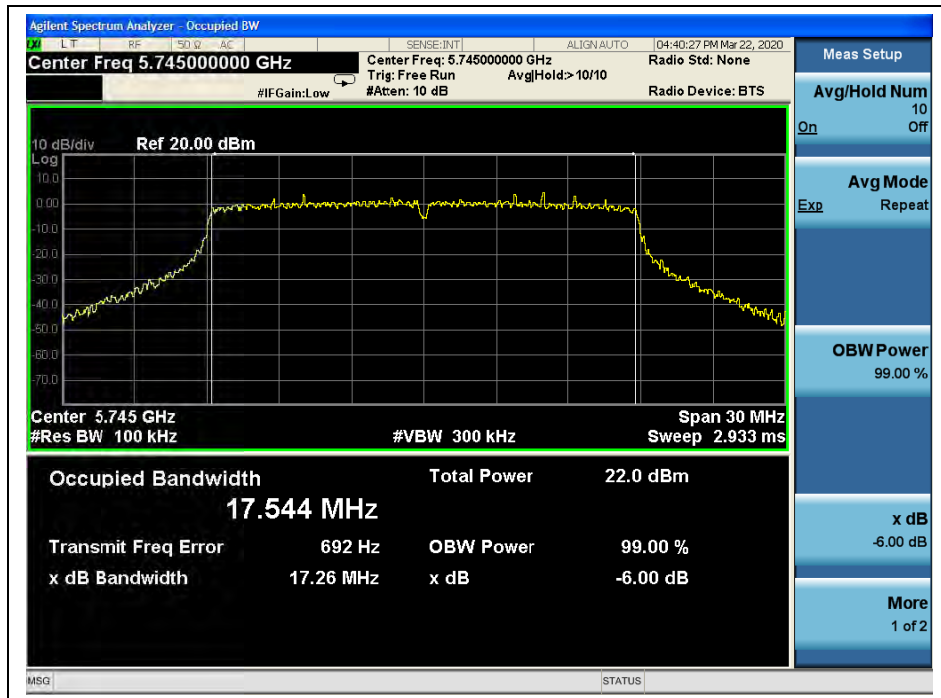
(Channel 100,5600MHz, 802.11 n (HT20))



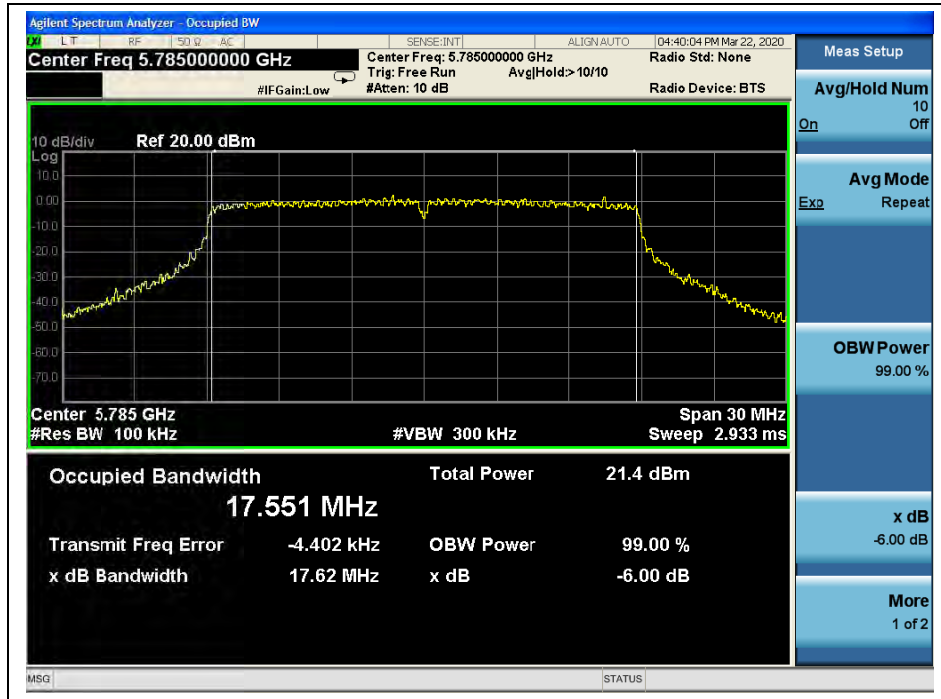
(Channel 120, 5720 MHz, 802.11 n (HT20))



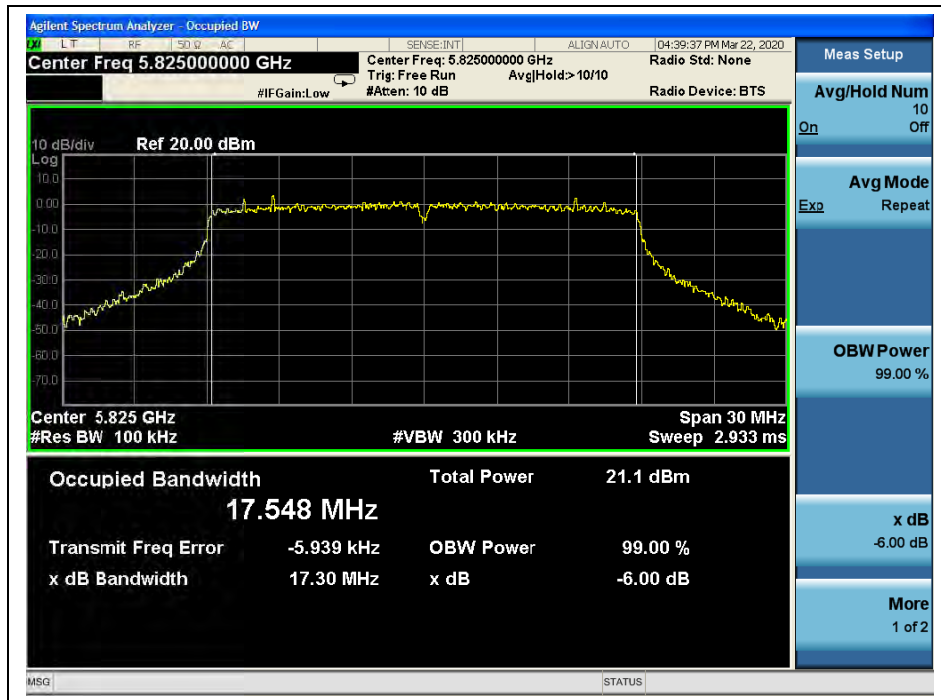
(Channel 144, 5720MHz, 802.11 n (HT20))



(Channel 144, 5745MHz, 802.11 n (HT20))



(Channel 149,5785MHz, 802.11 n (HT20))



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

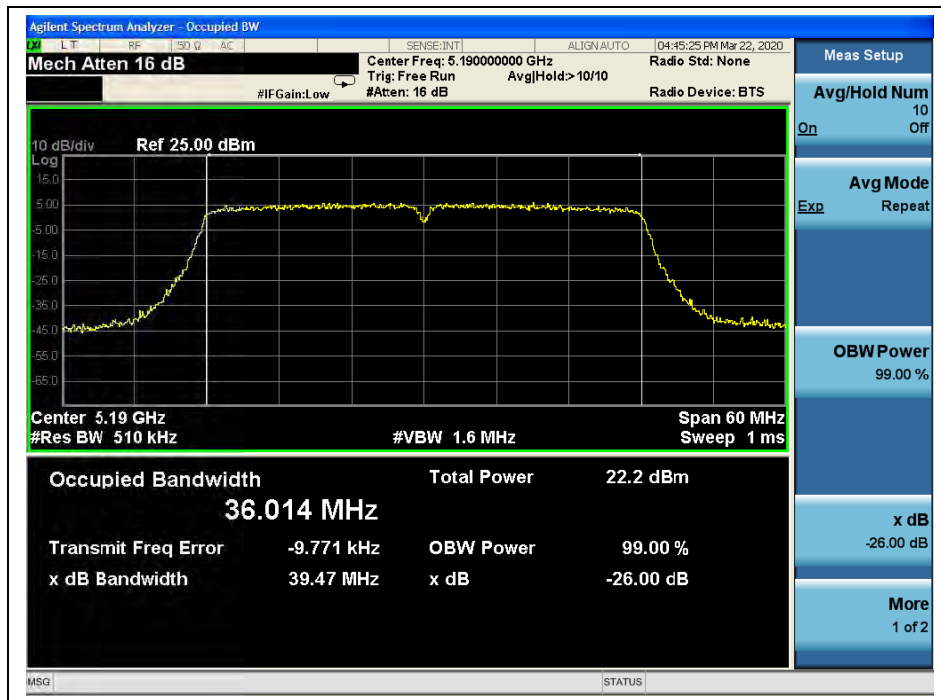


802.11n (HT40) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	39.47
46	5230	39.32
54	5270	39.48
62	5310	39.50
102	5510	39.64
118	5590	39.32
142	5710	39.58
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
142	5710	36.34
151	5755	35.83
159	5795	35.32

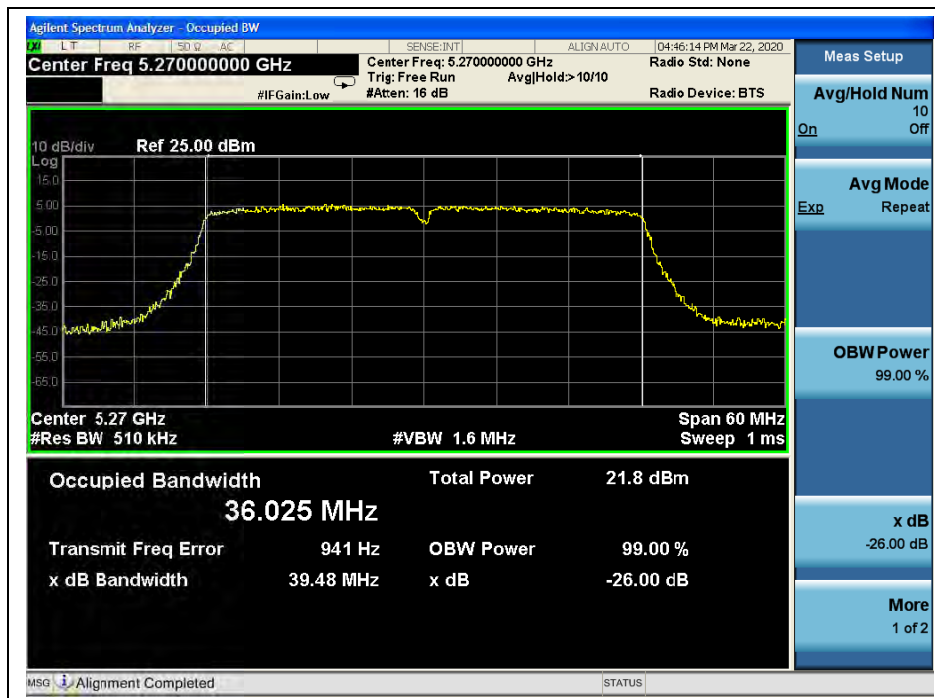
B. Test Plots



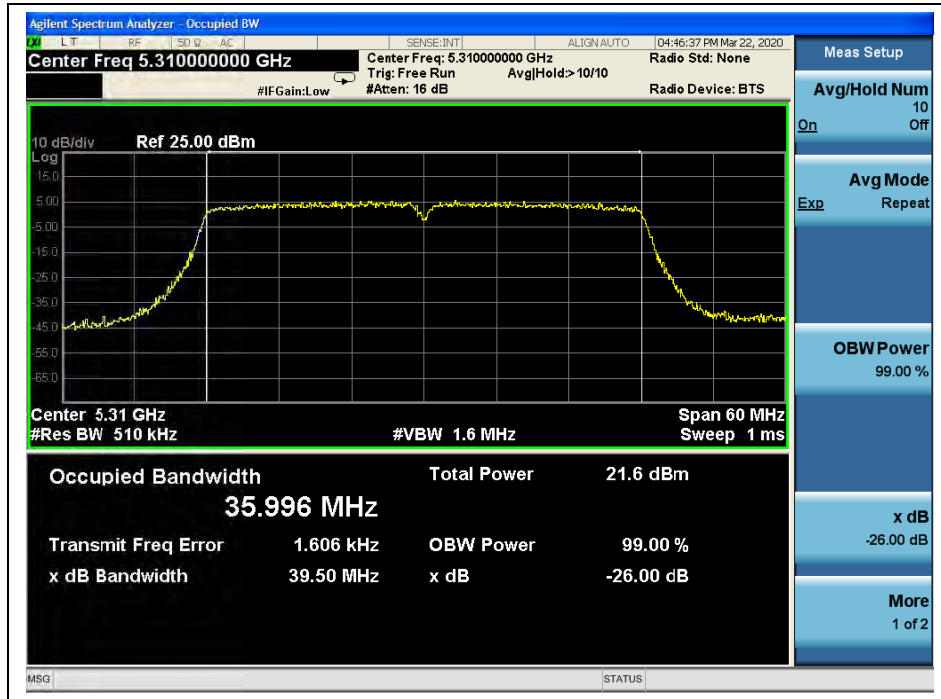
(Channel 38, 5190MHz, 802.11n(HT40))



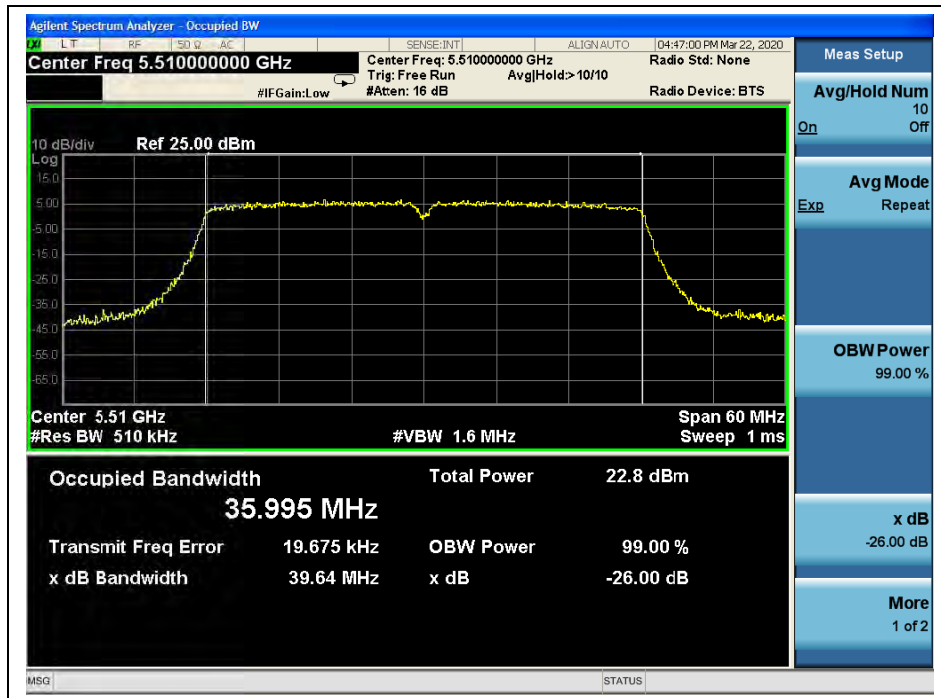
(Channel 46, 5230 MHz, 802.11n(HT40))



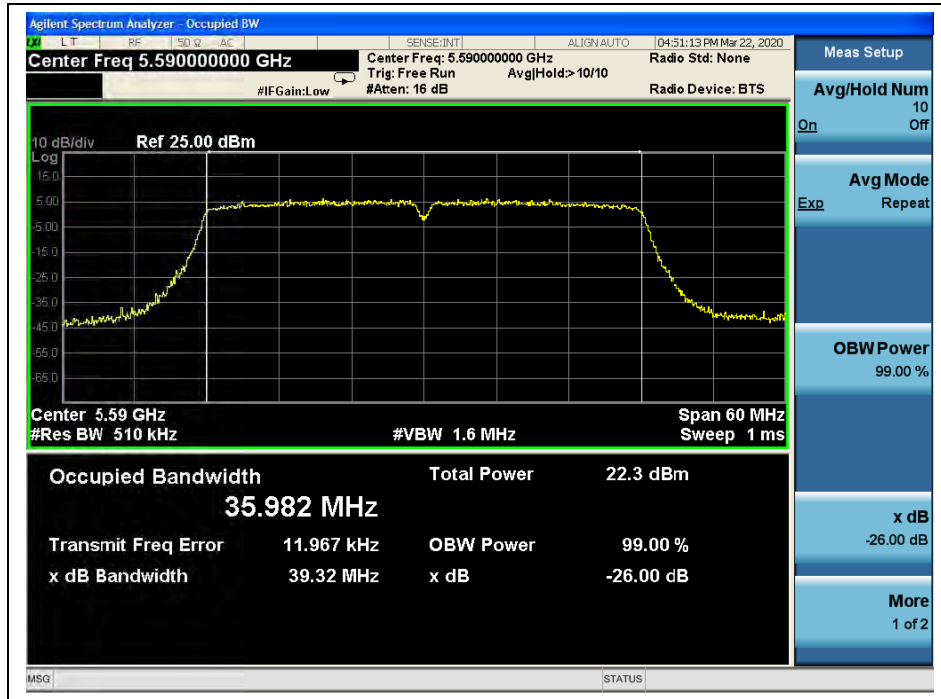
(Channel 54, 5270MHz, 802.11n(HT40))



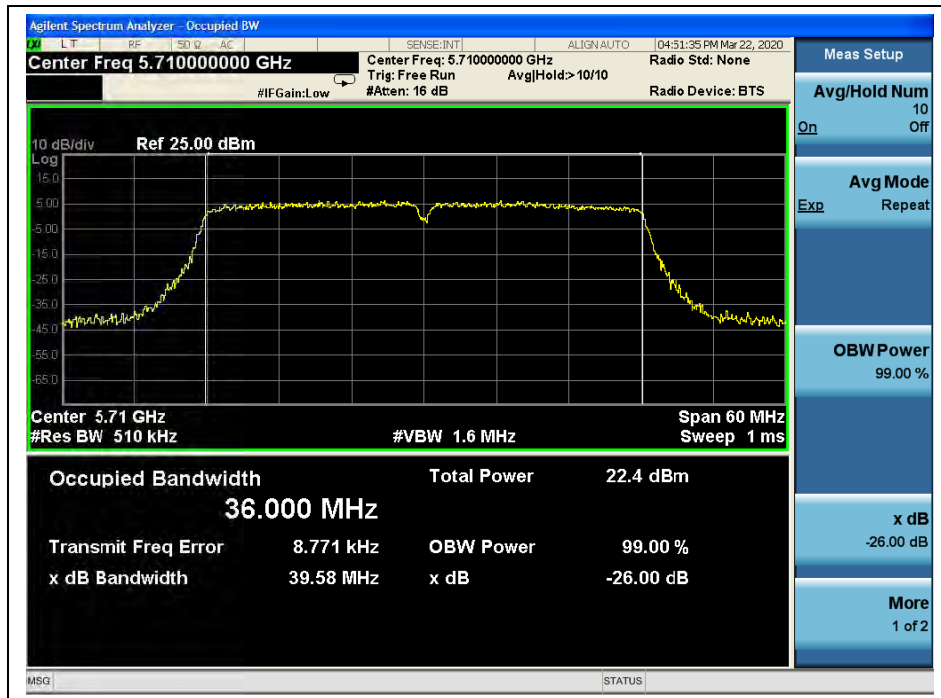
(Channel 62, 5310 MHz, 802.11n(HT40))



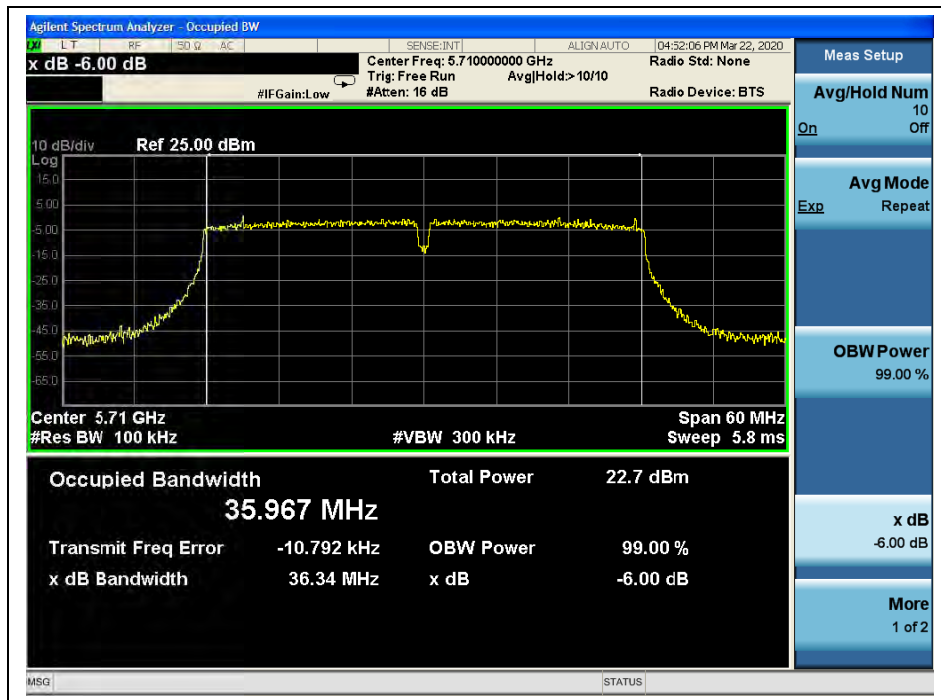
(Channel 102,5510MHz, 802.11n(HT40))



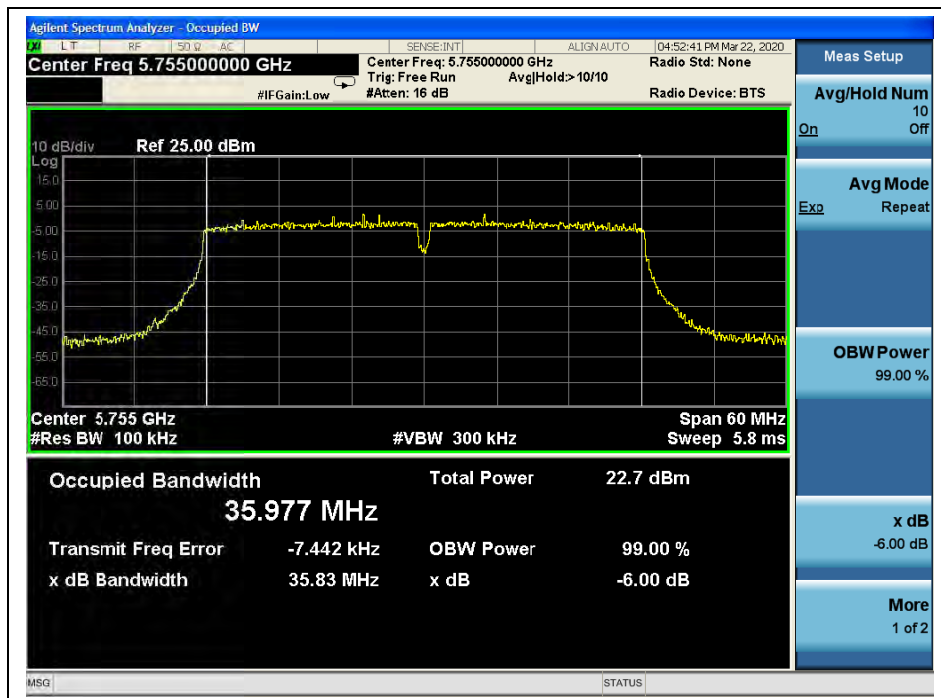
(Channel 118, 5590 MHz, 802.11n(HT40))



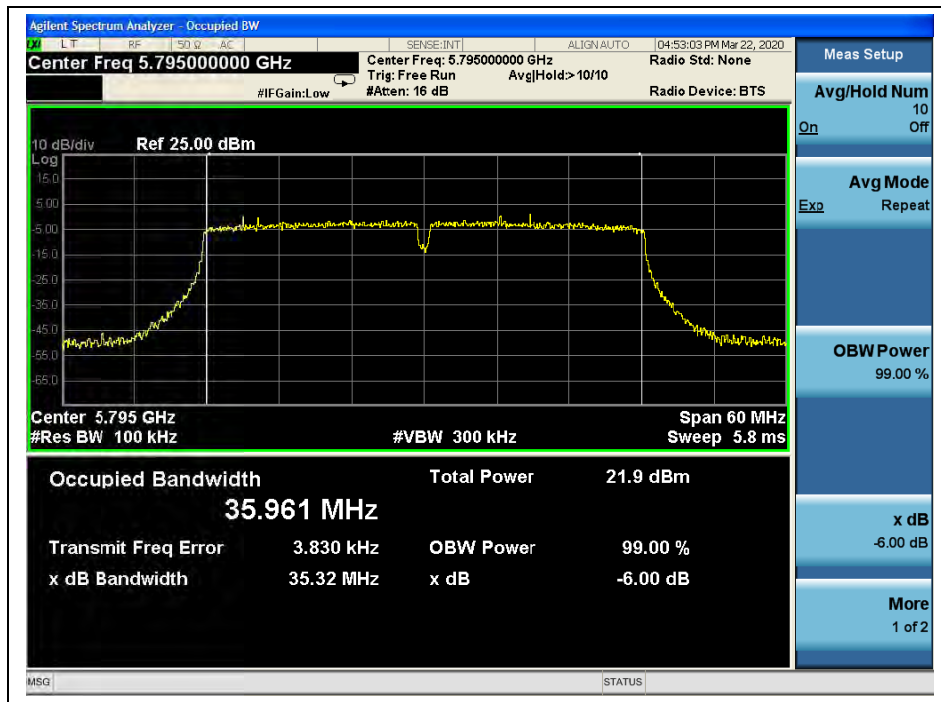
(Channel 142,5710MHz, 802.11n(HT40))



(Channel 142,5710MHz, 802.11n(HT40))



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



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



802.11ac (VHT20) Test mode

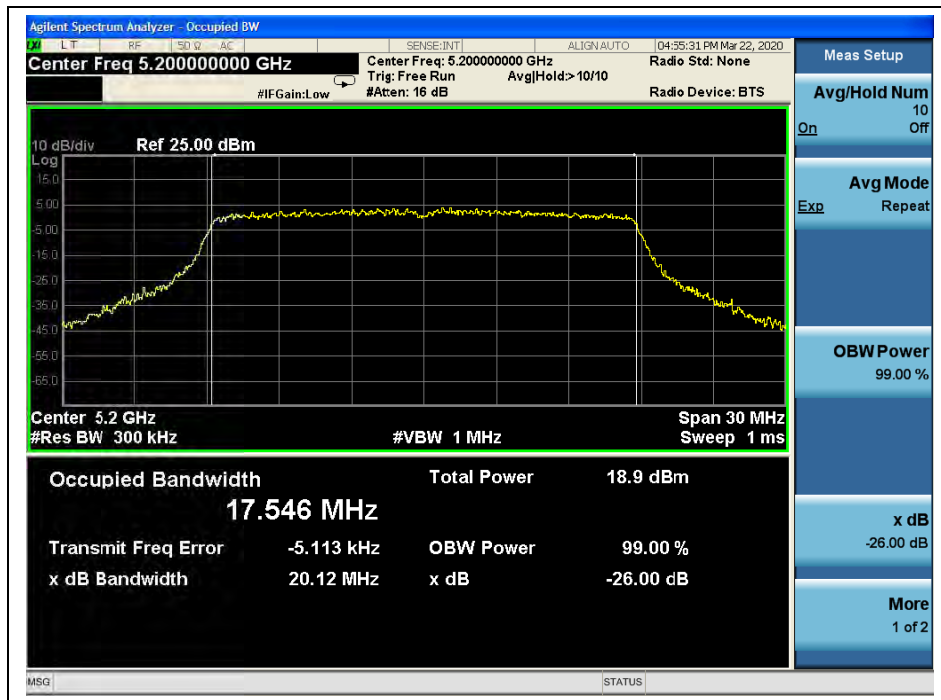
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.70
44	5200	20.12
48	5240	19.87
52	5260	19.79
60	5300	20.08
64	5320	19.98
100	5500	20.01
120	5600	20.06
144	5720	19.87
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	17.57
149	5745	16.89
157	5785	16.58
165	5825	17.57

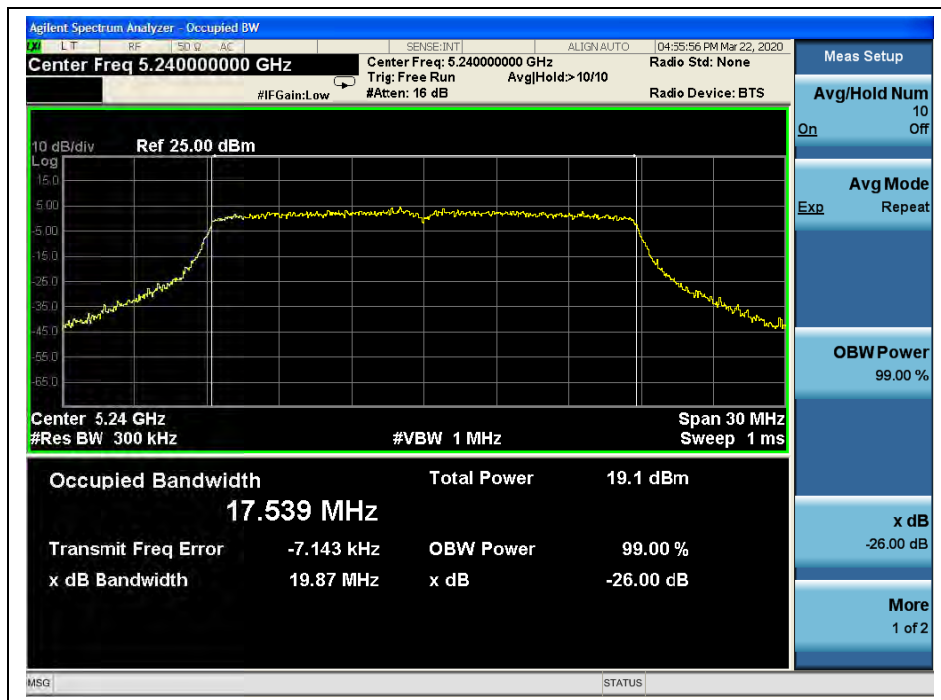
B. Test Plots



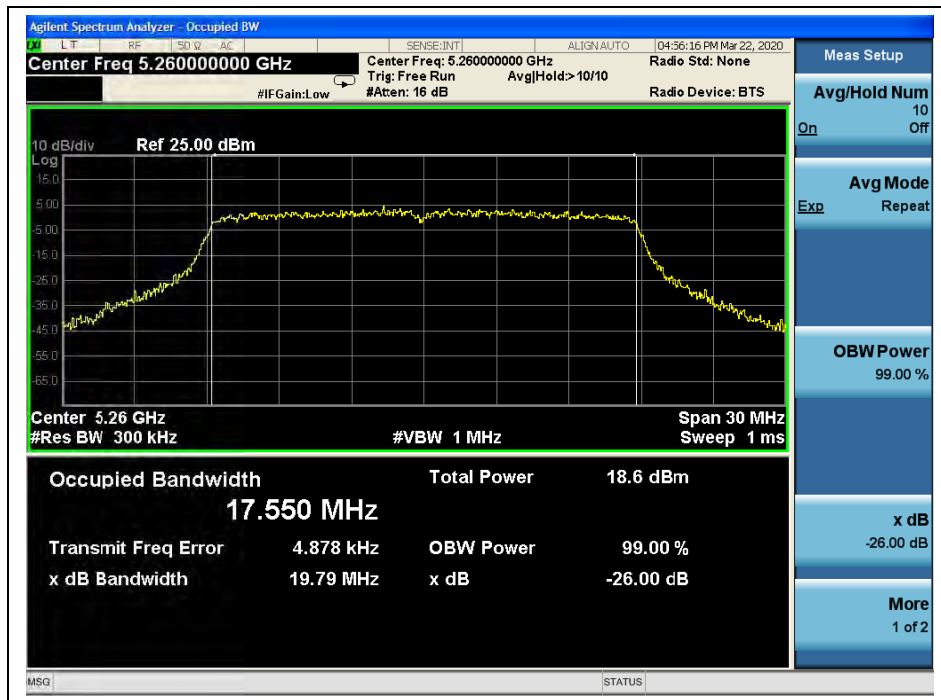
(Channel 36, 5180 MHz, 802.11 ac (VHT20))



(Channel 44, 5200 MHz, 802.11 ac (VHT20))



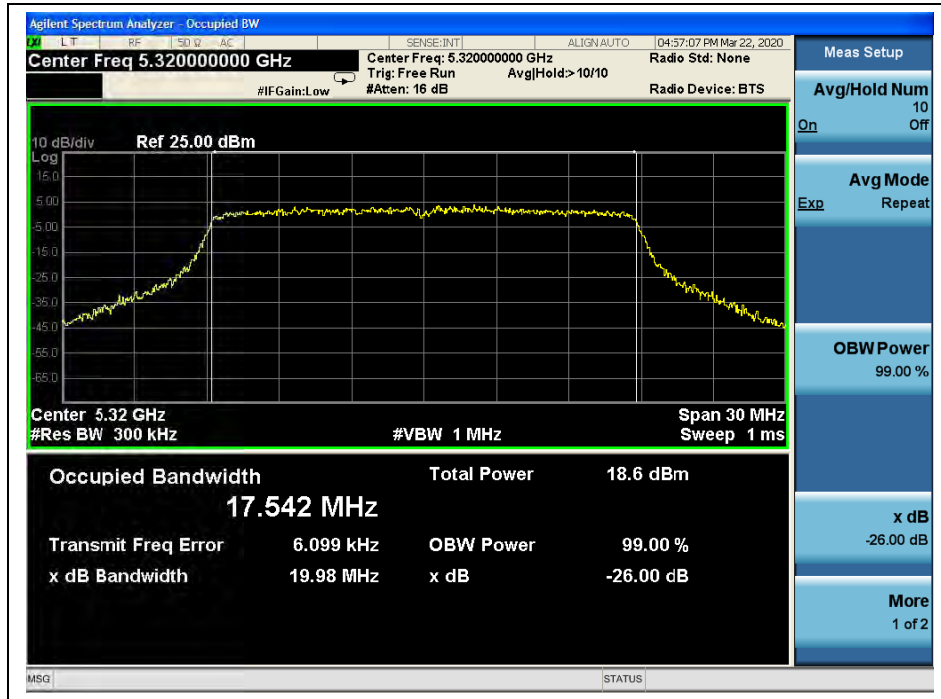
(Channel 48, 5240MHz, 802.11 ac (VHT20))



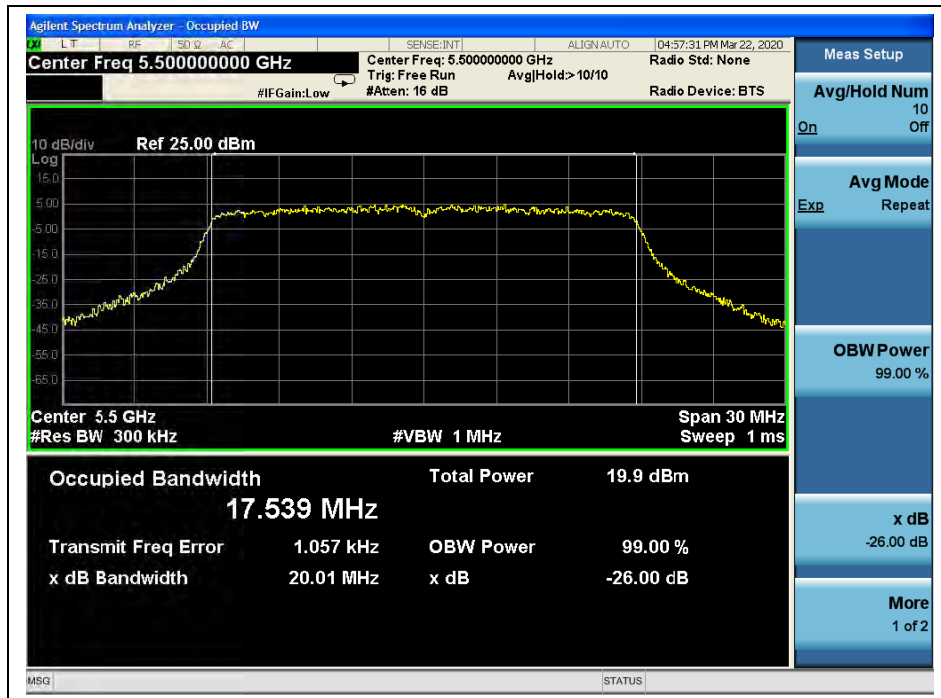
(Channel 52, 5260MHz, 802.11 ac (VHT20))



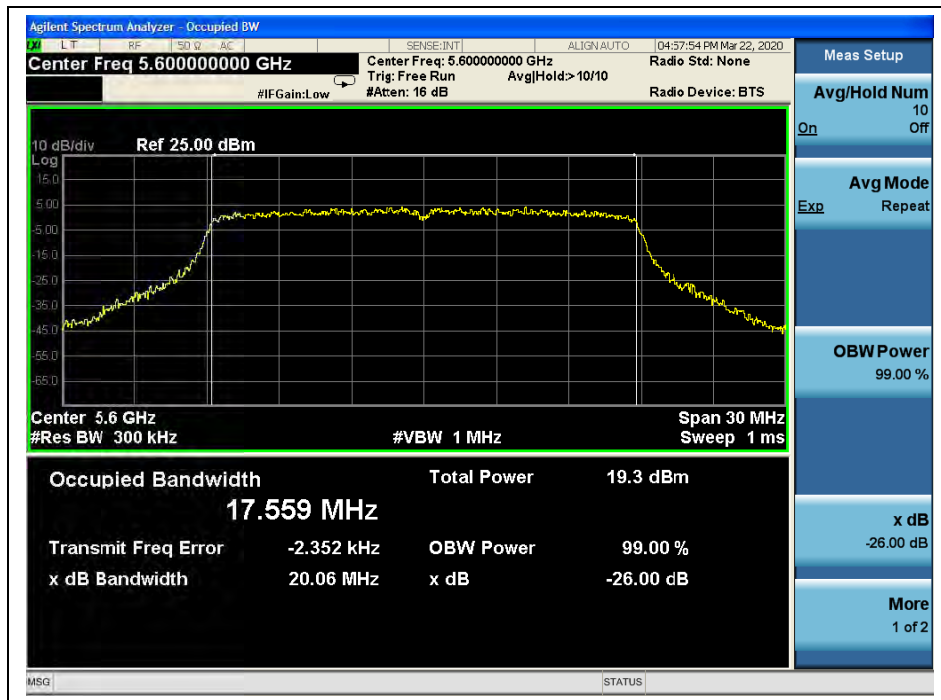
(Channel 60, 5300 MHz, 802.11 ac (VHT20))



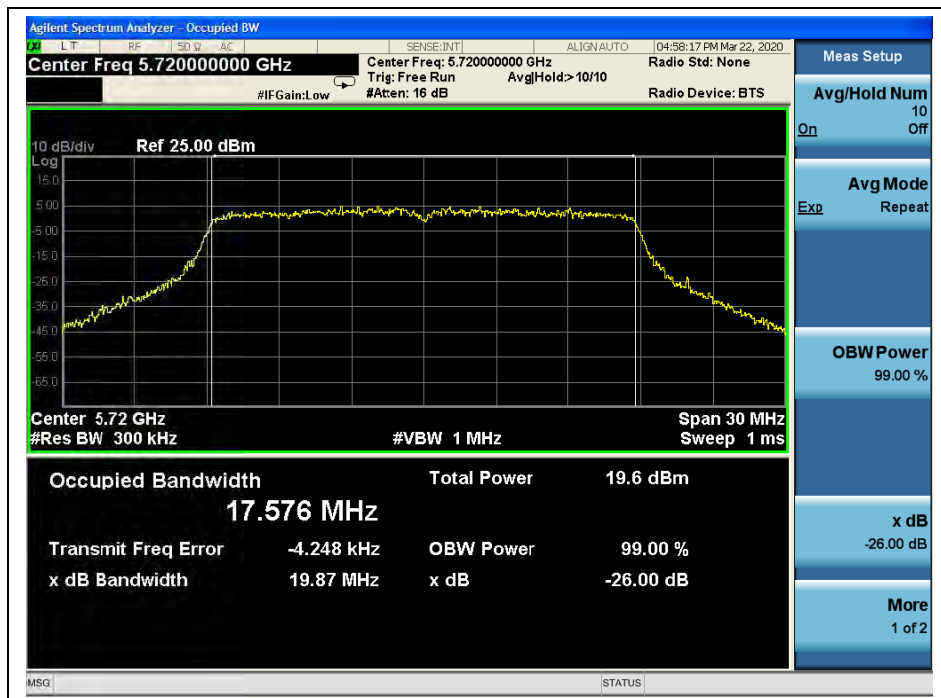
(Channel 64, 5320MHz, 802.11 ac (VHT20))



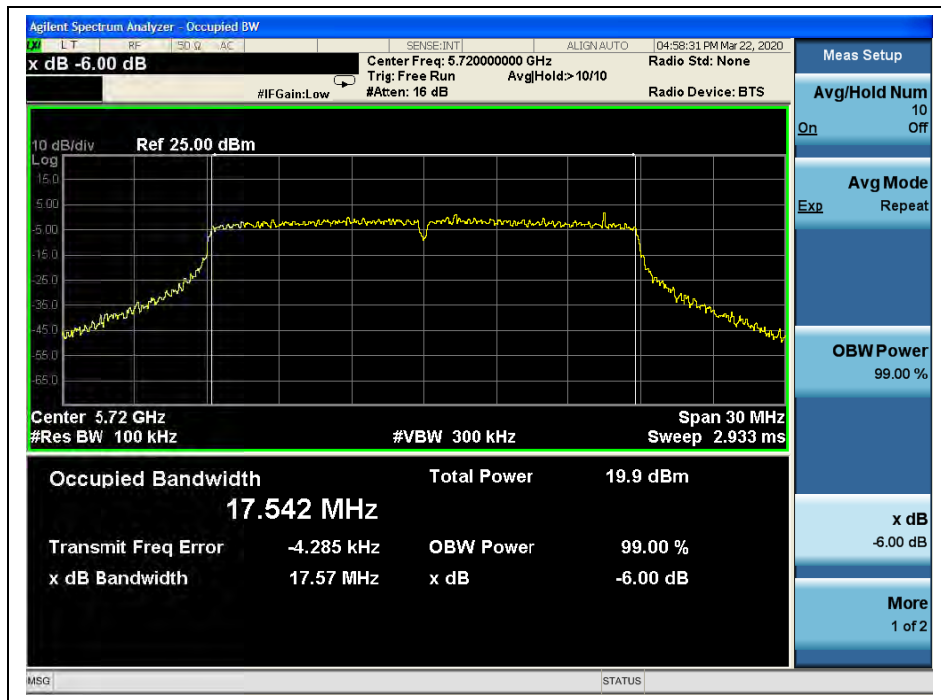
(Channel 100,5500MHz, 802.11 ac (VHT20))



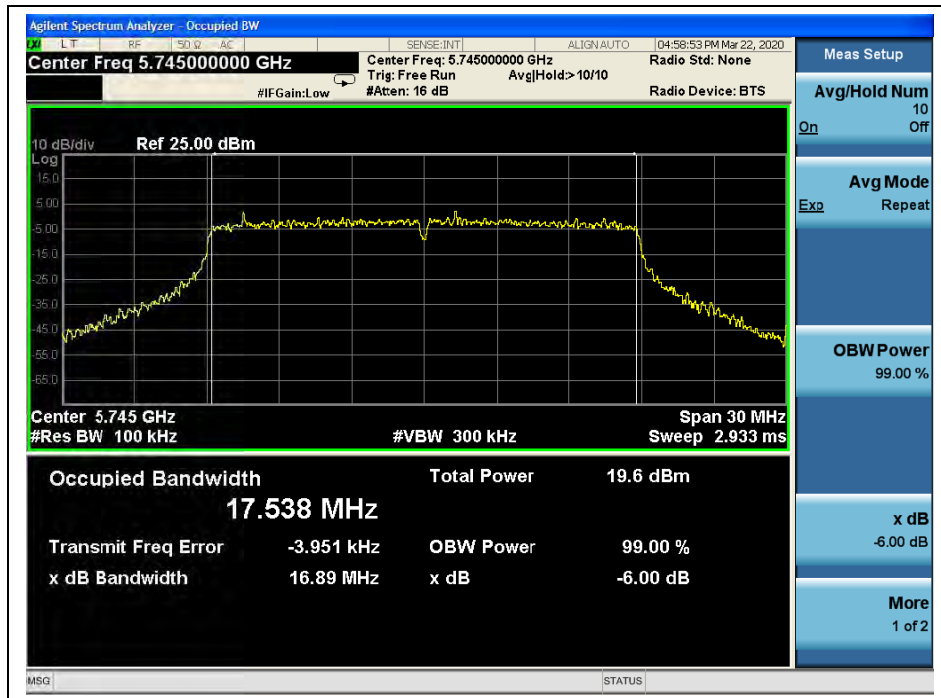
(Channel 120, 5600 MHz, 802.11 ac (VHT20))



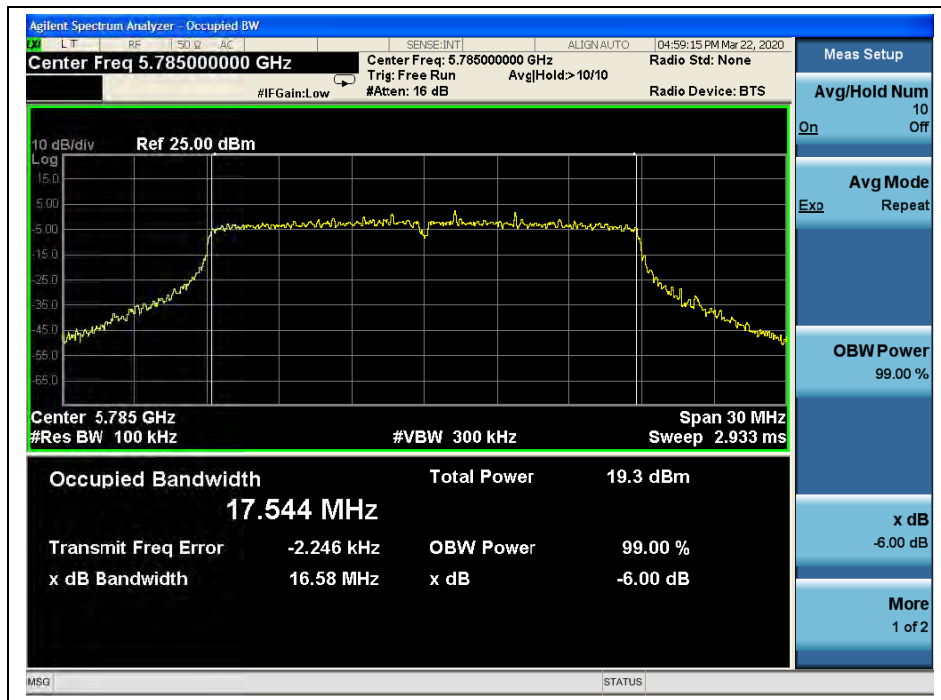
(Channel 144, 5720MHz, 802.11 ac (VHT20))



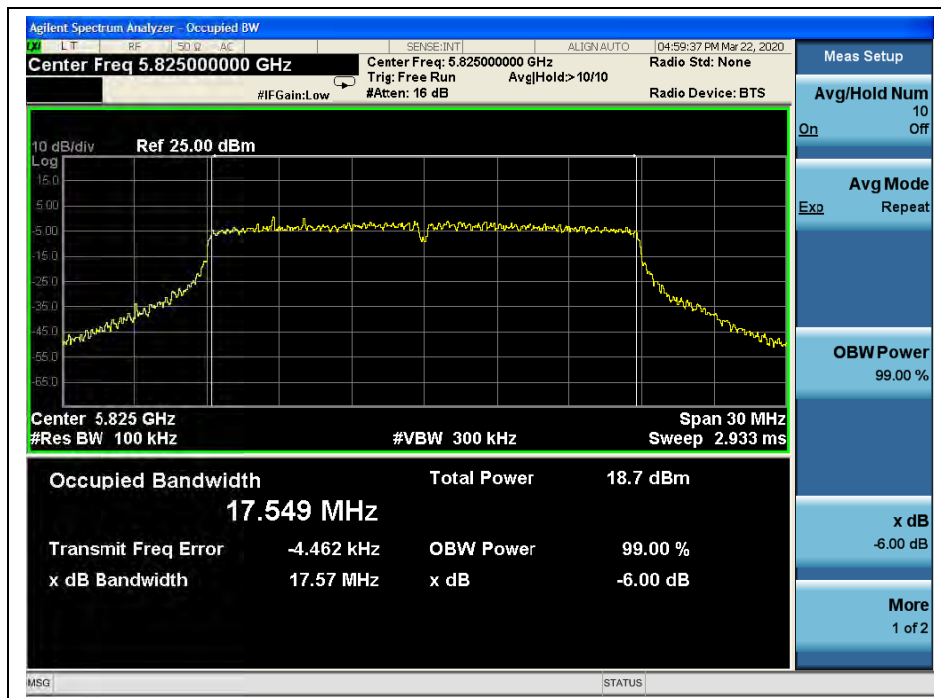
(Channel 144, 5720MHz, 802.11 ac (VHT20))



(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

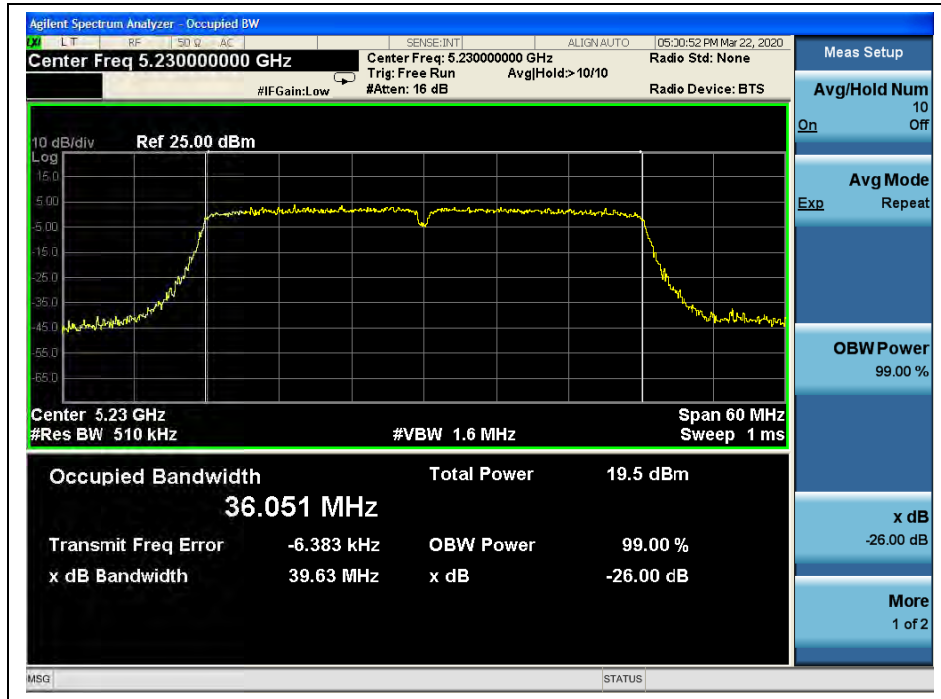
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	39.63
46	5230	39.63
54	5270	39.45
62	5310	39.42
102	5510	39.38
118	5590	39.69
142	5710	39.38
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
142	5710	36.35
151	5755	36.36
159	5795	36.10

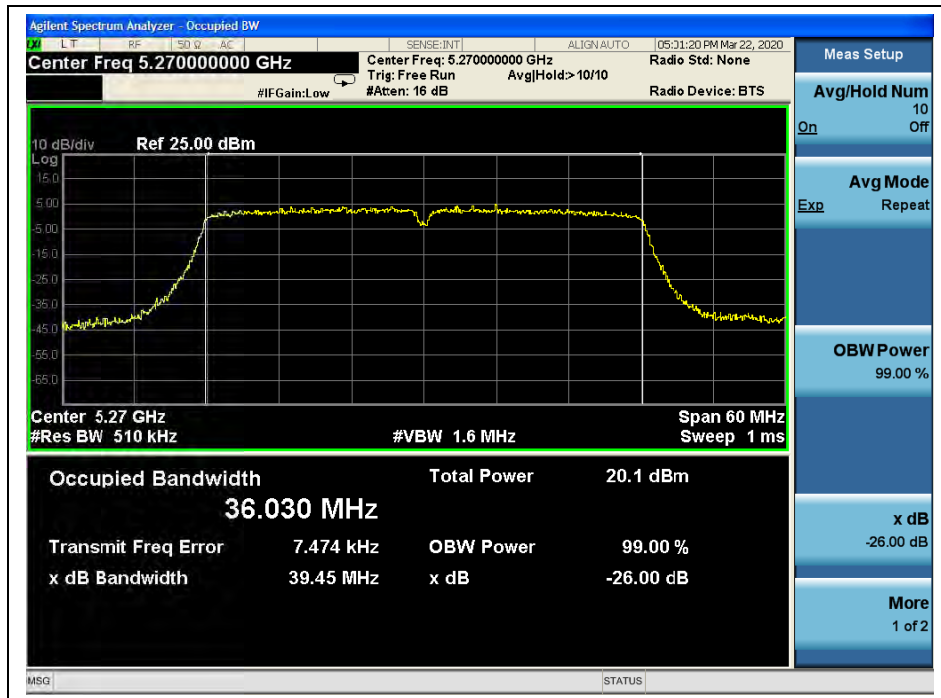
B. Test Plots



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



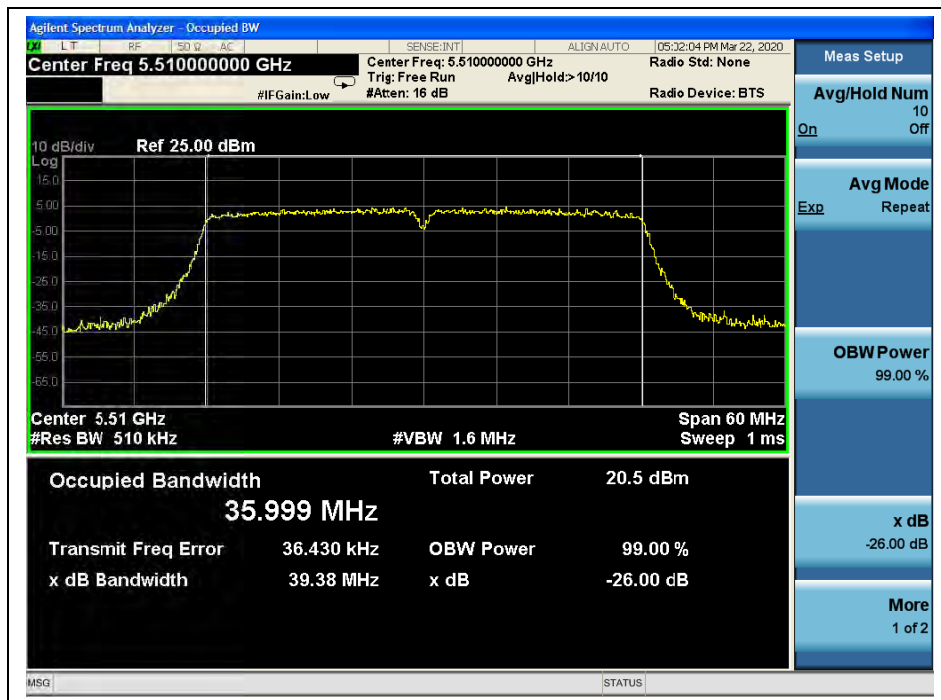
(Channel 46, 5230 MHz, 802.11 ac(VHT40))



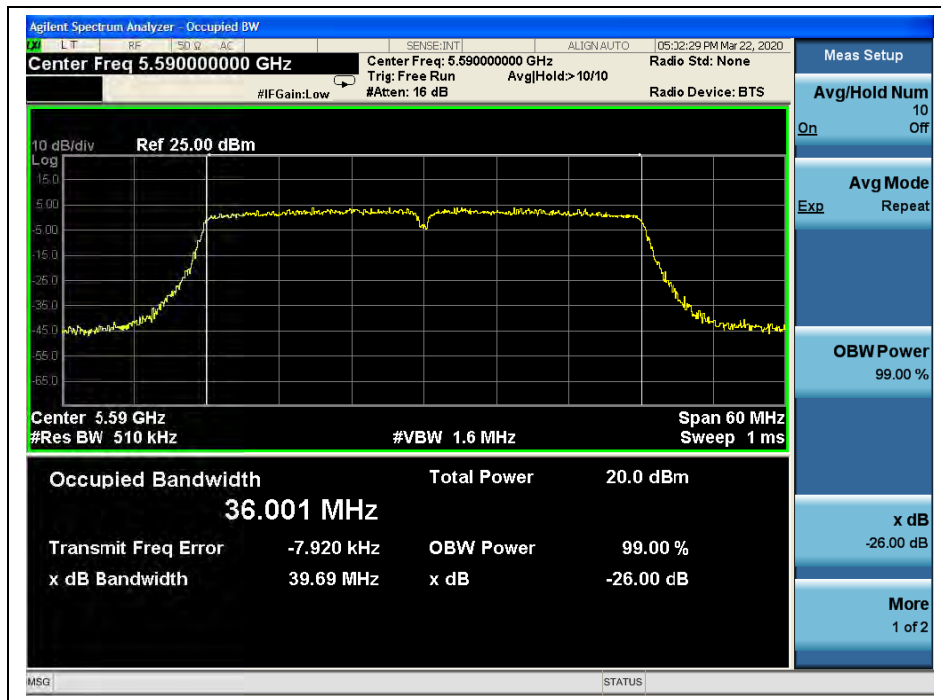
(Channel 54, 5270 MHz, 802.11 ac(VHT40))



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



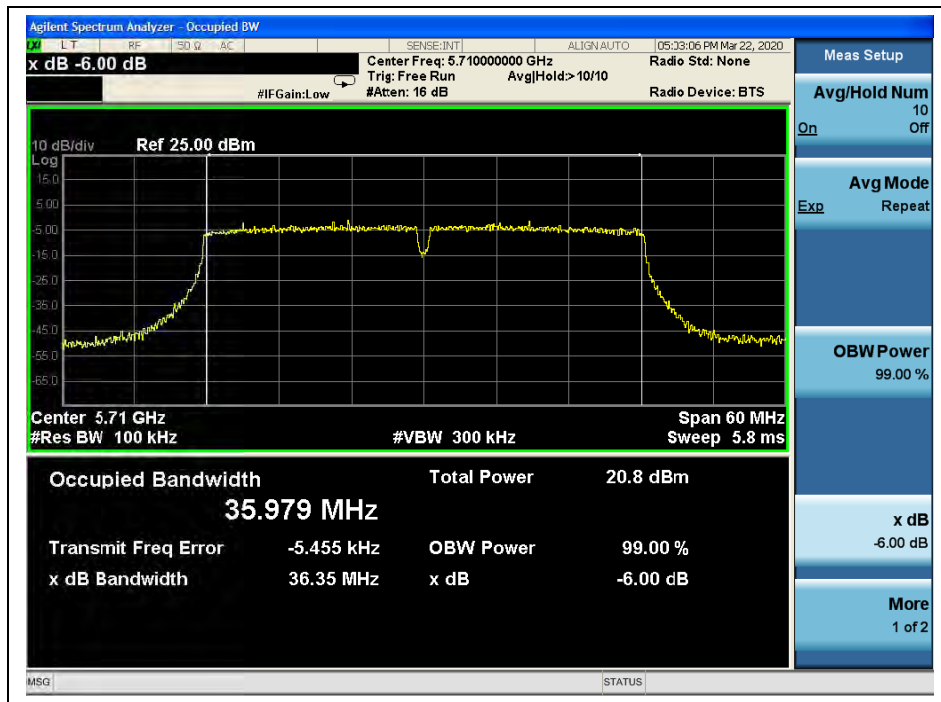
(Channel 102,5510MHz, 802.11 ac(VHT40))



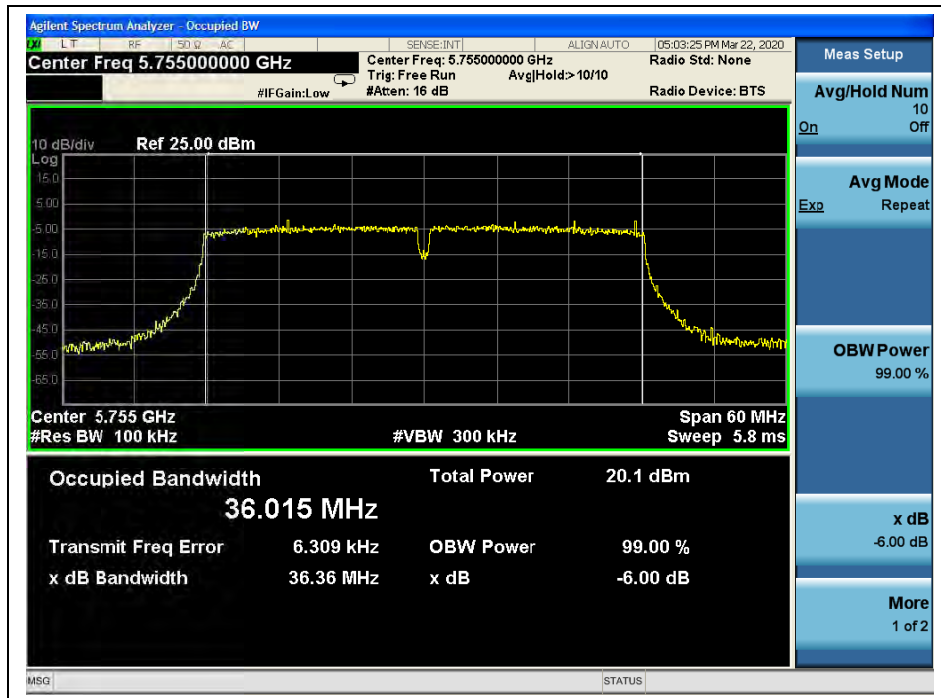
(Channel 118, 5590 MHz, 802.11 ac(VHT40))



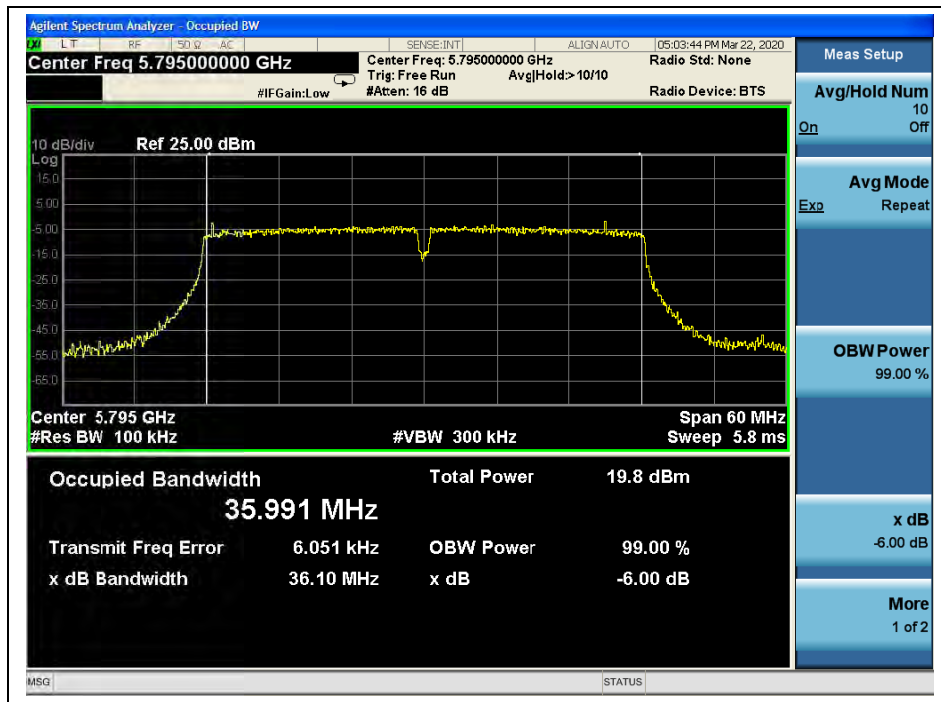
(Channel 142, 5710 MHz, 802.11 ac(VHT40))



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



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



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

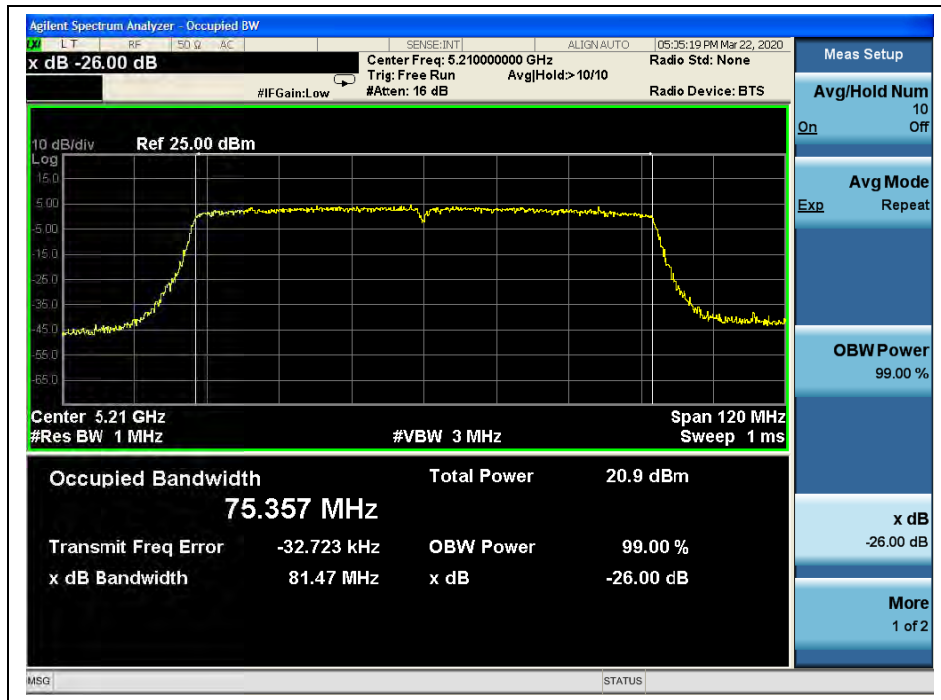


802.11ac (VHT80) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	81.47
58	5290	81.48
106	5530	81.57
122	5610	81.17
138	5690	81.50
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
138	5690	75.74
155	5775	75.58

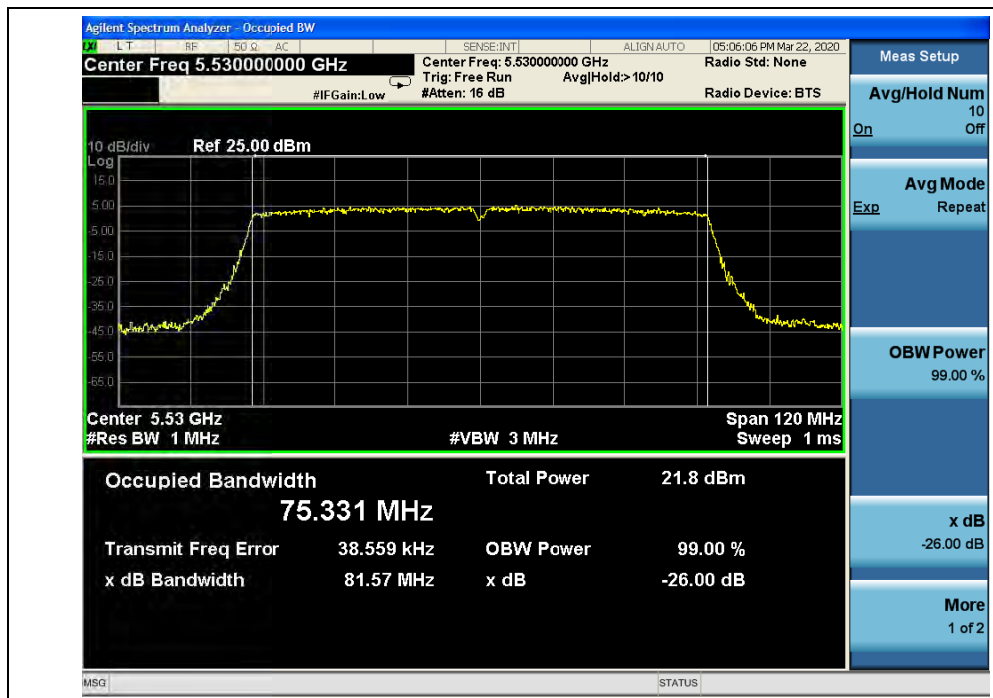
B. Test Plots



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



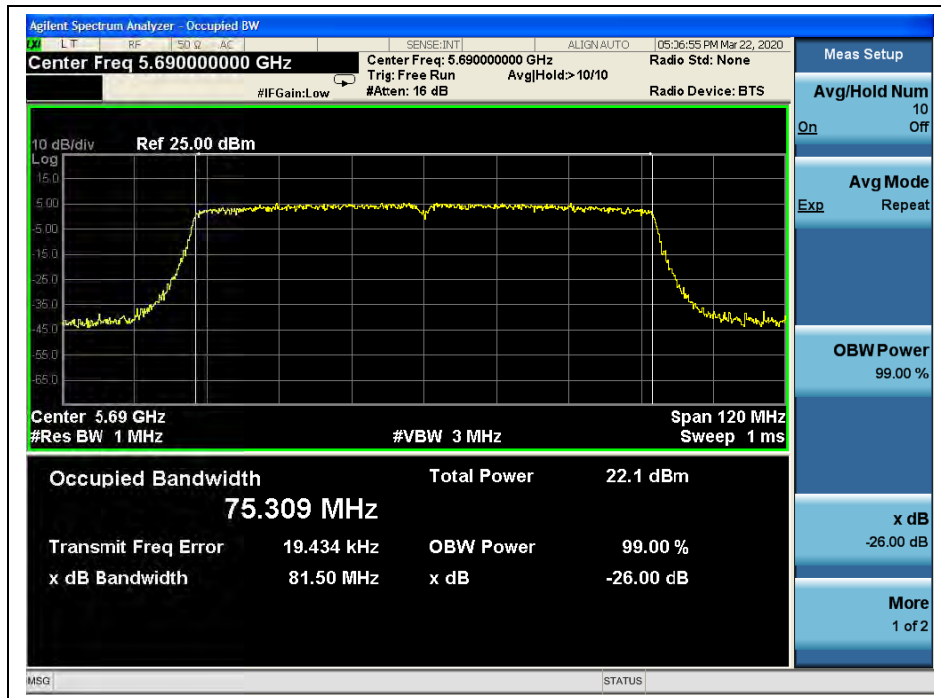
(Channel 58, 5290 MHz, 802.11 ac(VHT80))



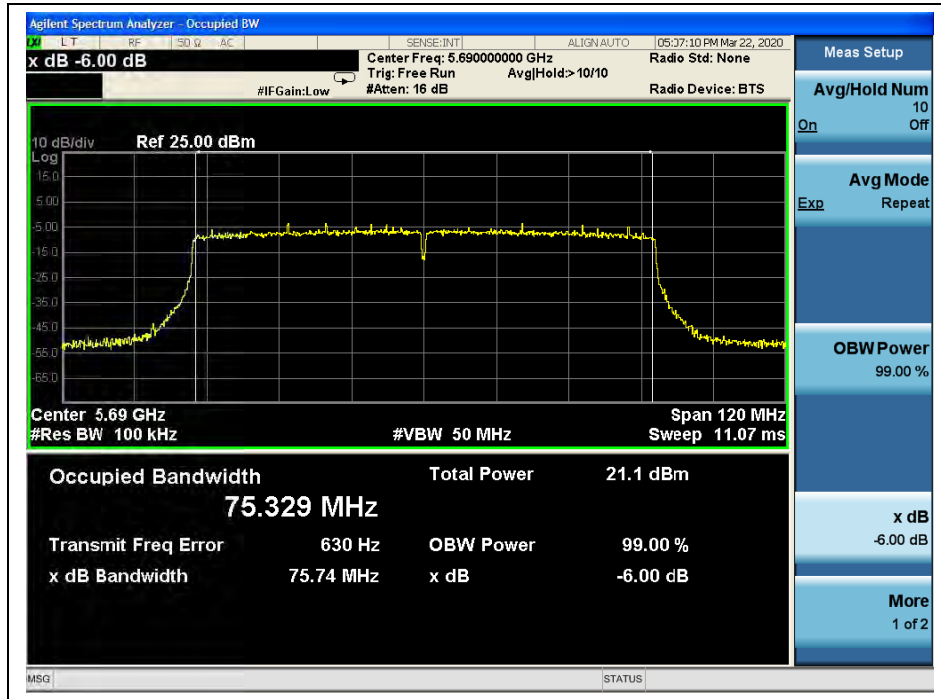
(Channel 106, 5530 MHz, 802.11 ac(VHT80))



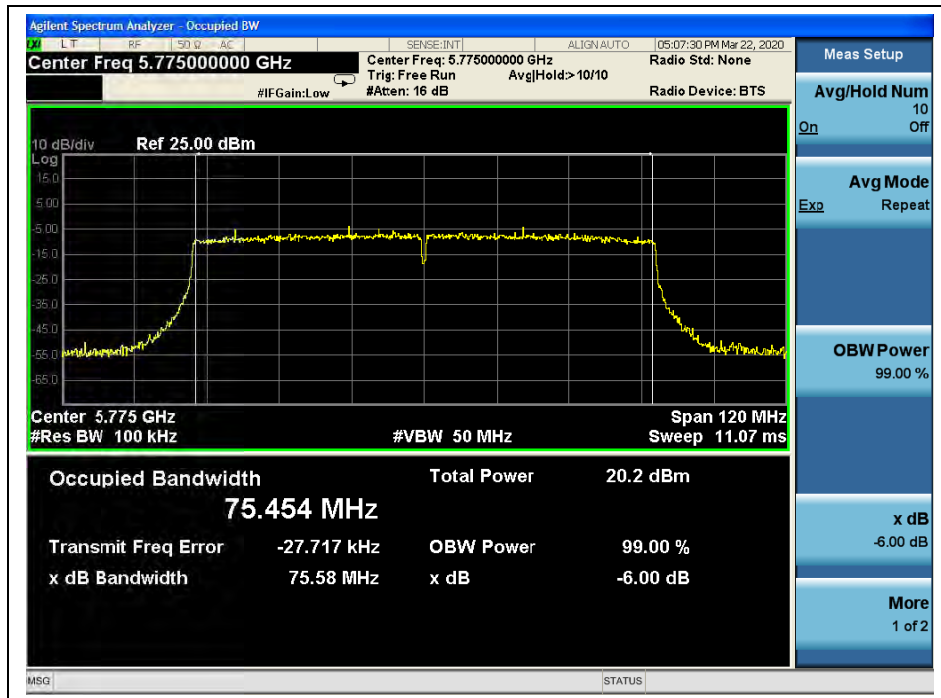
(Channel 122, 5610 MHz, 802.11 ac(VHT80))



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



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



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

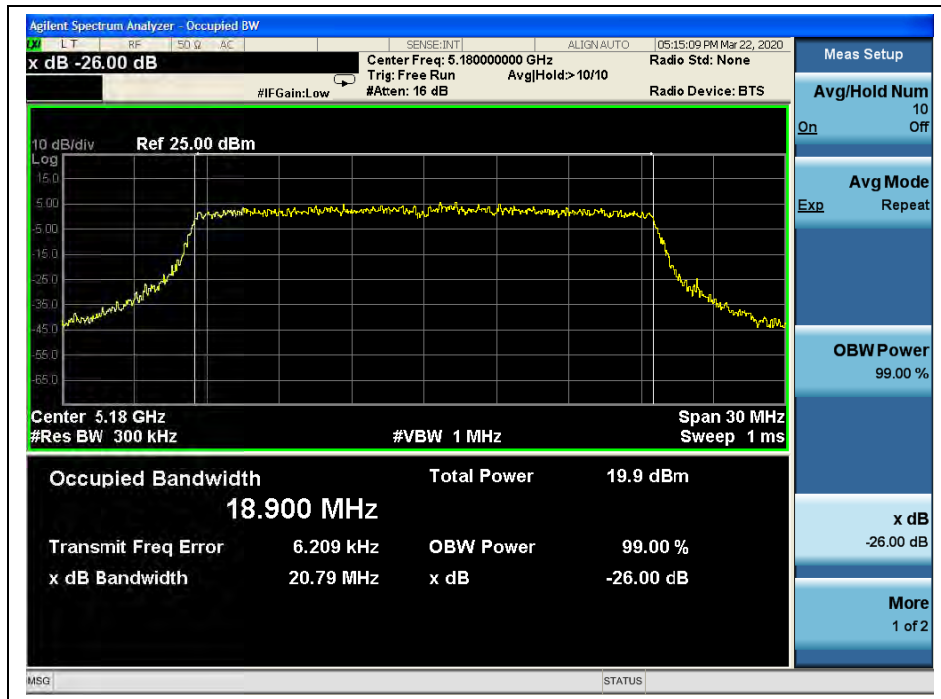


802.11ax (HEW20) Test mode

A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	20.79
44	5200	20.55
48	5240	20.55
52	5260	20.48
60	5300	20.57
64	5320	20.63
100	5500	20.58
120	5600	20.81
144	5720	20.58
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
144	5720	18.42
149	5745	18.96
157	5785	17.41
165	5825	18.55

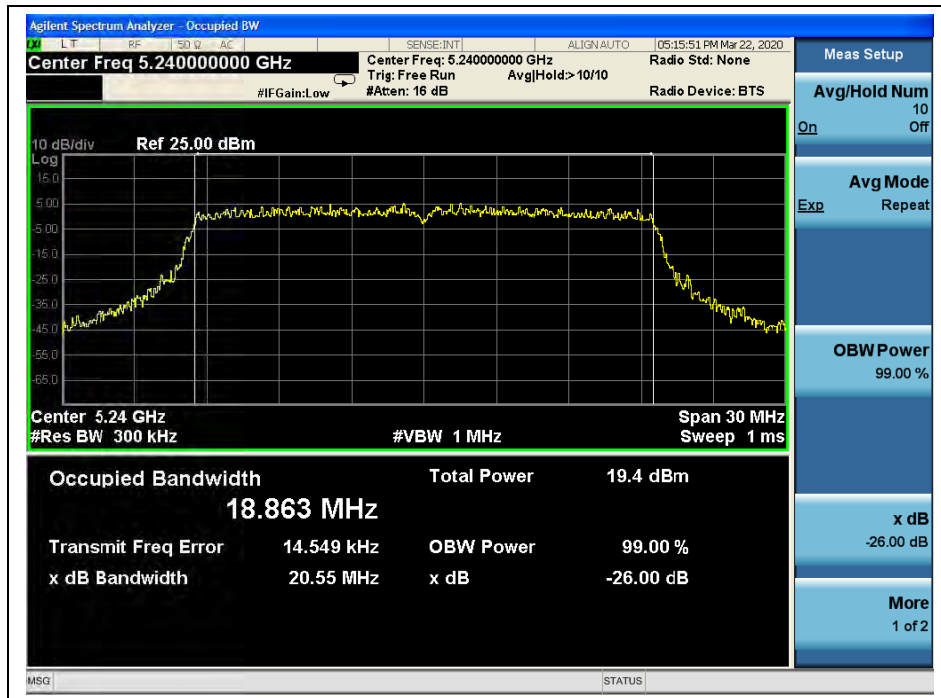
B. Test Plots



(Channel 36,5180MHz, 802.11 ax (HEW20))



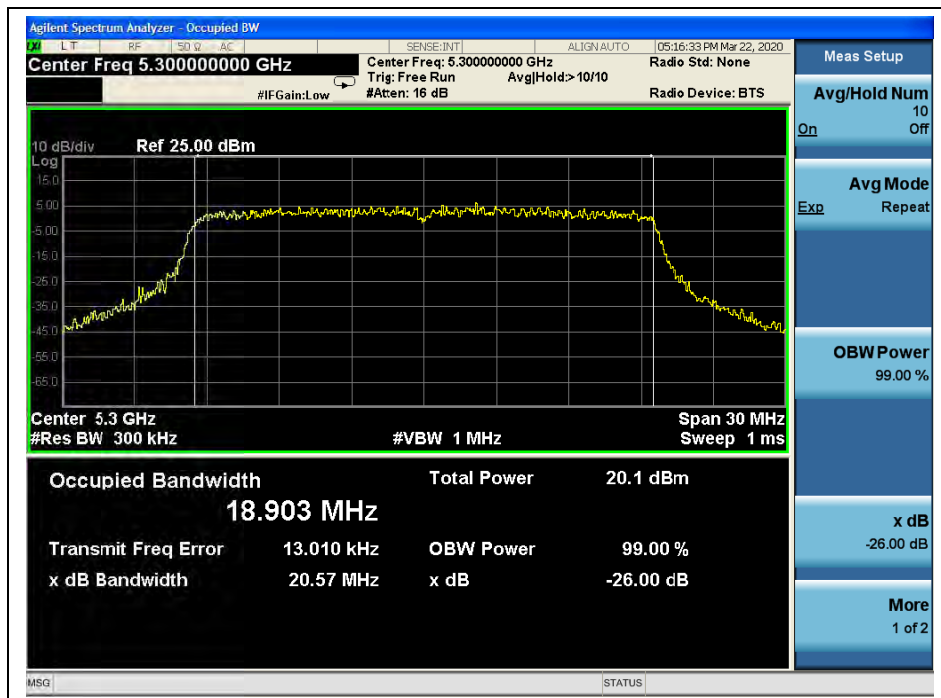
(Channel 44, 5200 MHz, 802.11 ax (HEW20))



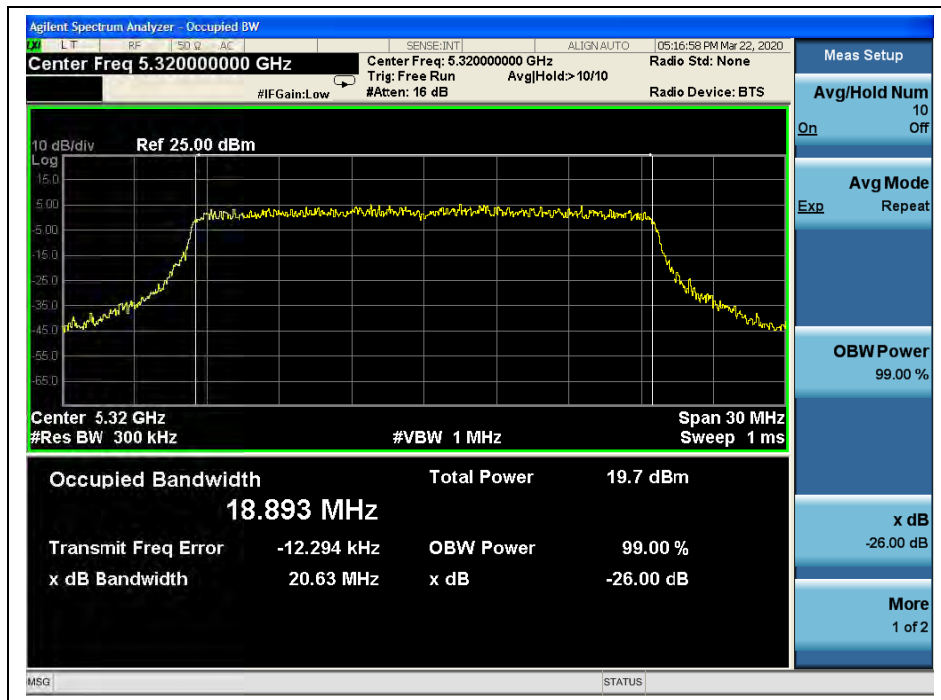
(Channel 48, 5240MHz, 802.11 ax (HEW20))



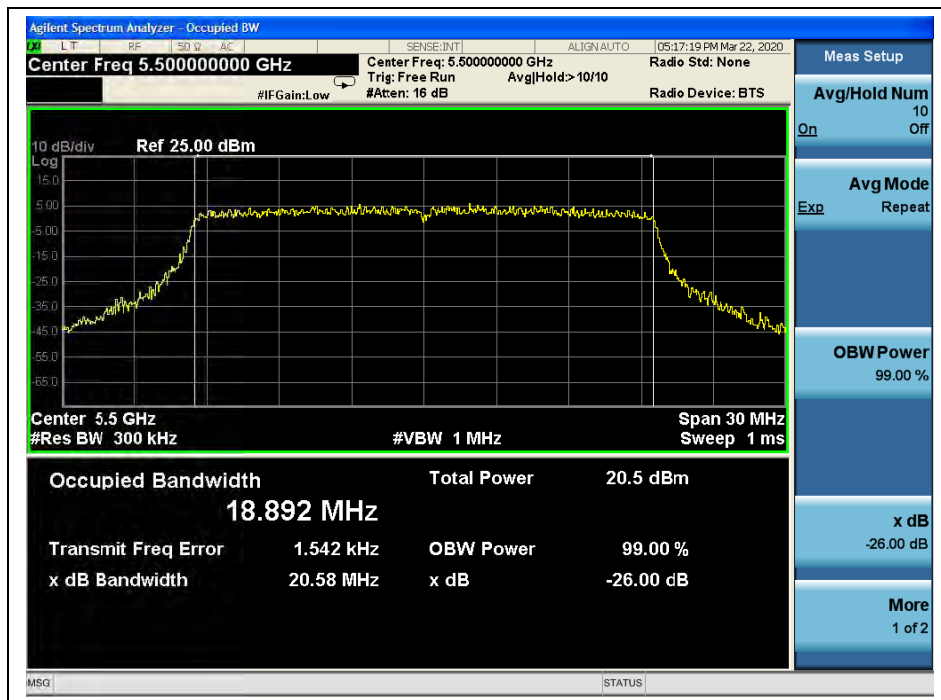
(Channel 52,5260MHz, 802.11 ax (HEW20))



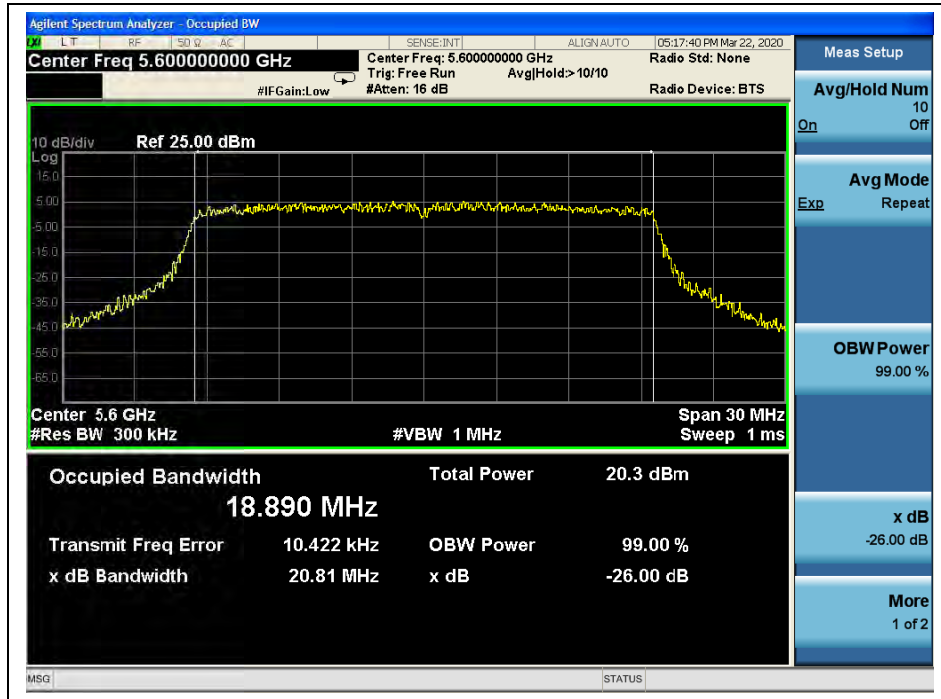
(Channel 60, 5300 MHz, 802.11 ax (HEW20))



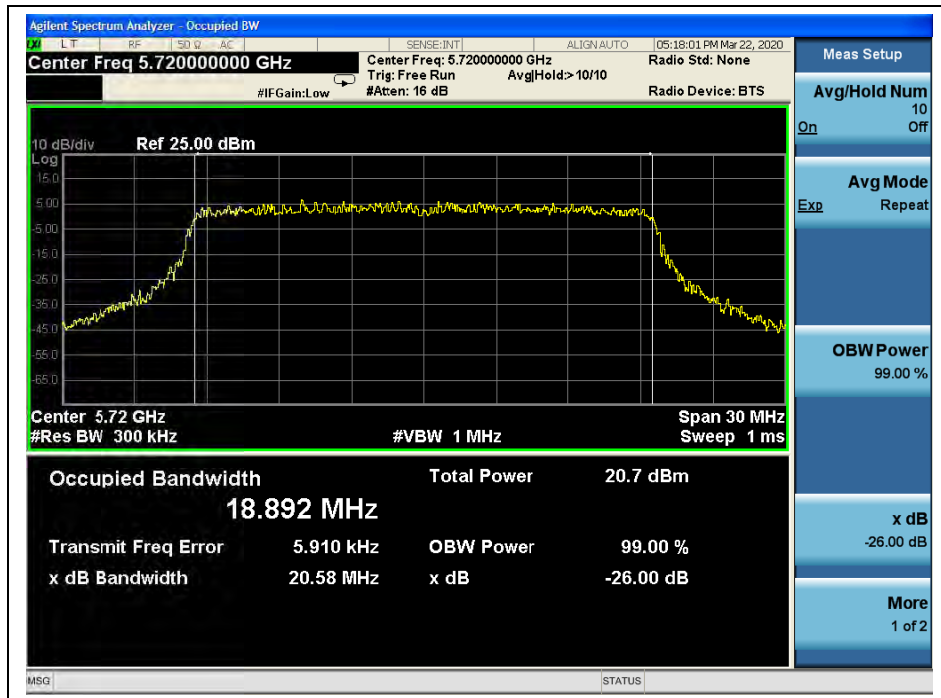
(Channel 64, 5320MHz, 802.11 ax (HEW20))



(Channel 100,5500MHz, 802.11 ax (HEW20))



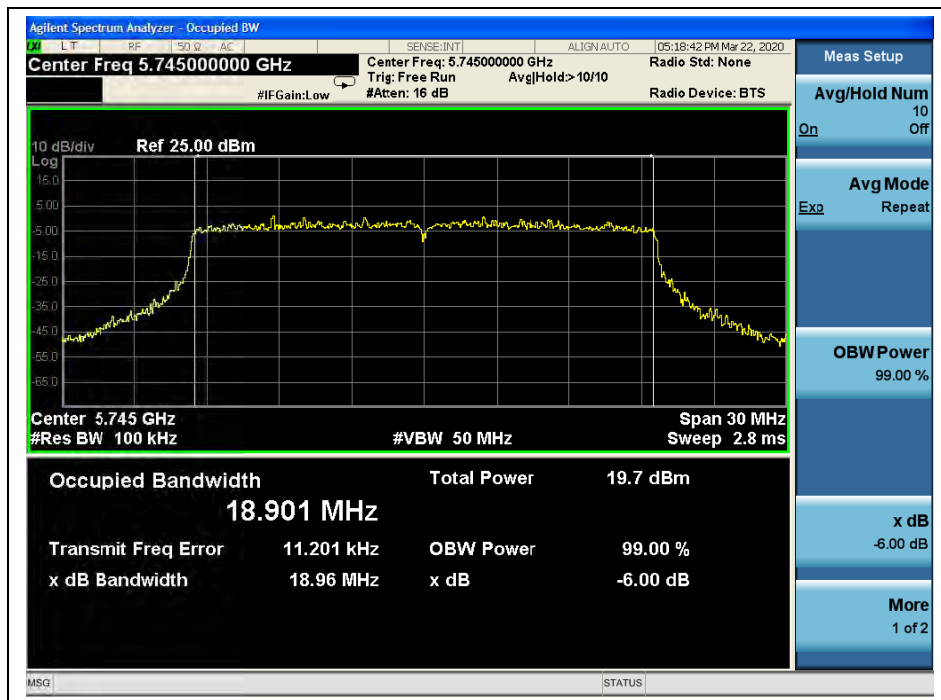
(Channel 120, 5600 MHz, 802.11 ax (HEW20))



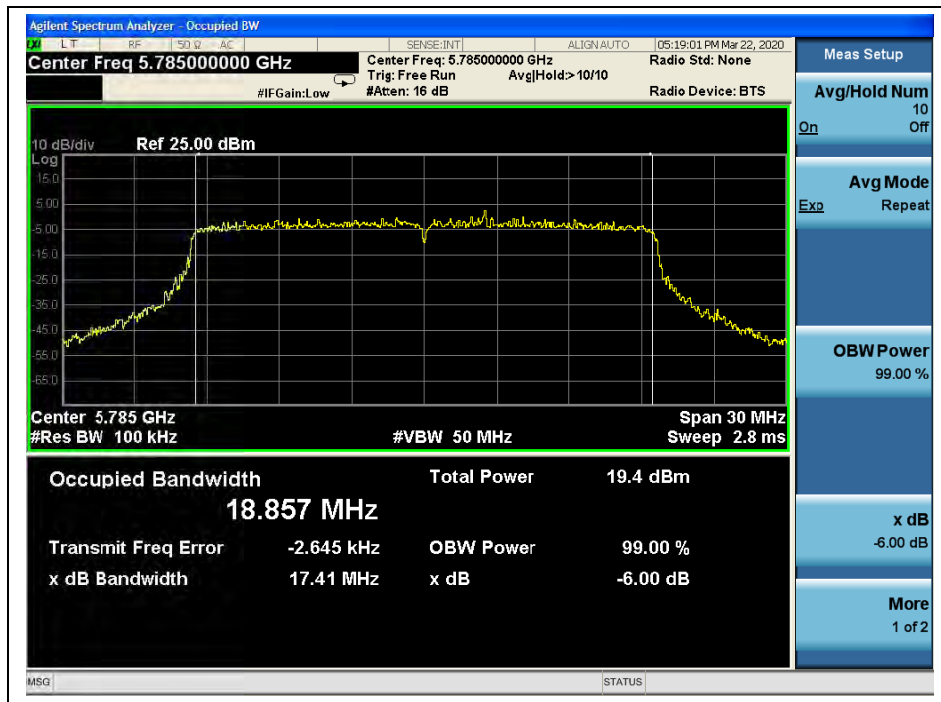
(Channel 144, 5720MHz, 802.11 ax (HEW20))



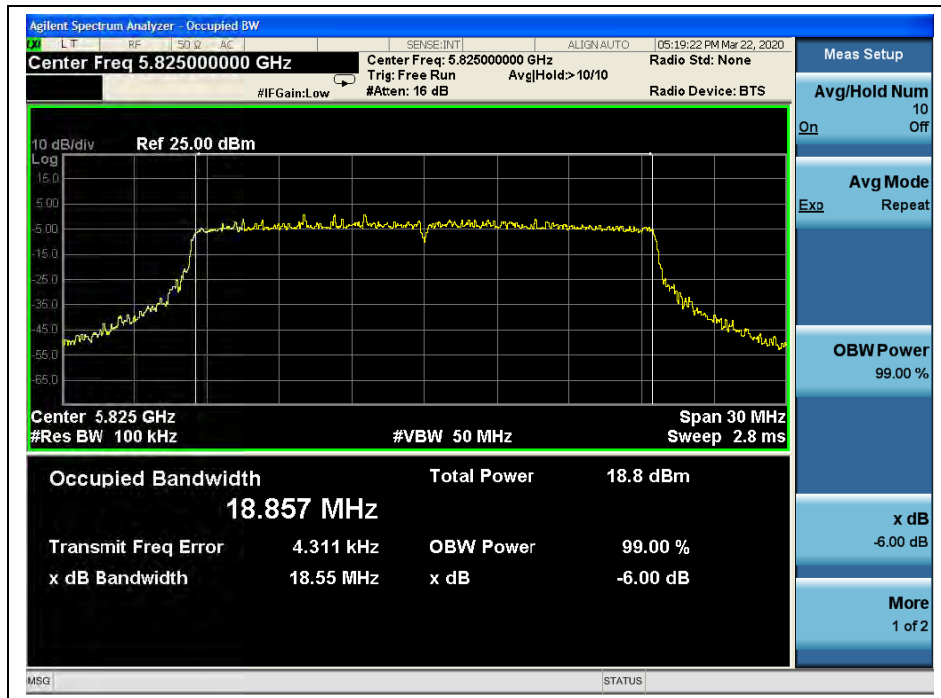
(Channel 144, 5720MHz, 802.11 ax (HEW20))



(Channel 149, 5745MHz, 802.11 ax (HEW20))



(Channel 157,5785MHz, 802.11 ax (HEW20))



(Channel 165,5825MHz, 802.11 ax (HEW20))

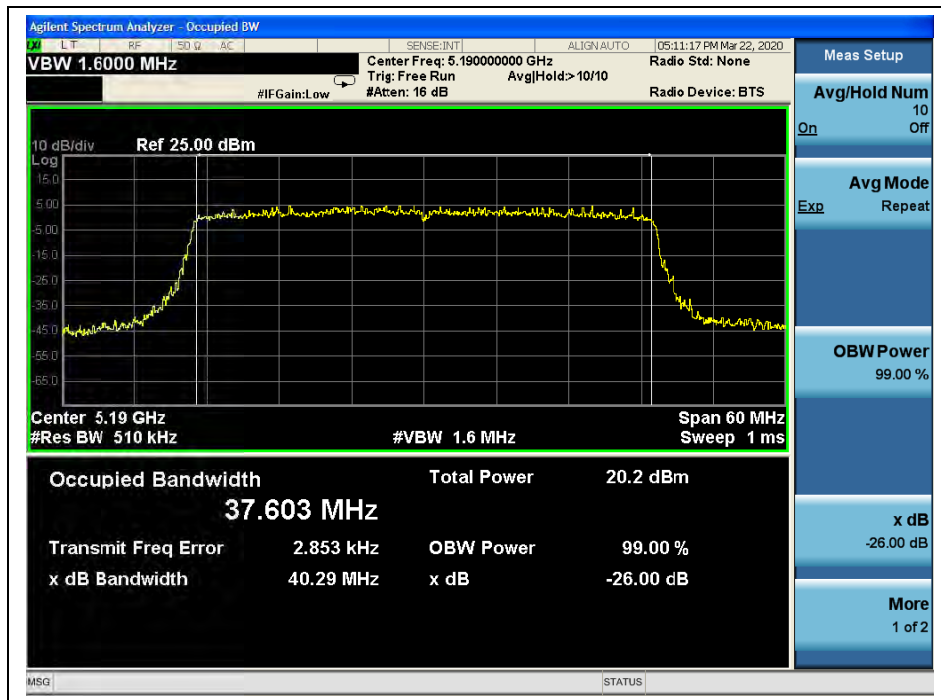


802.11 ax (HEW40) Test mode

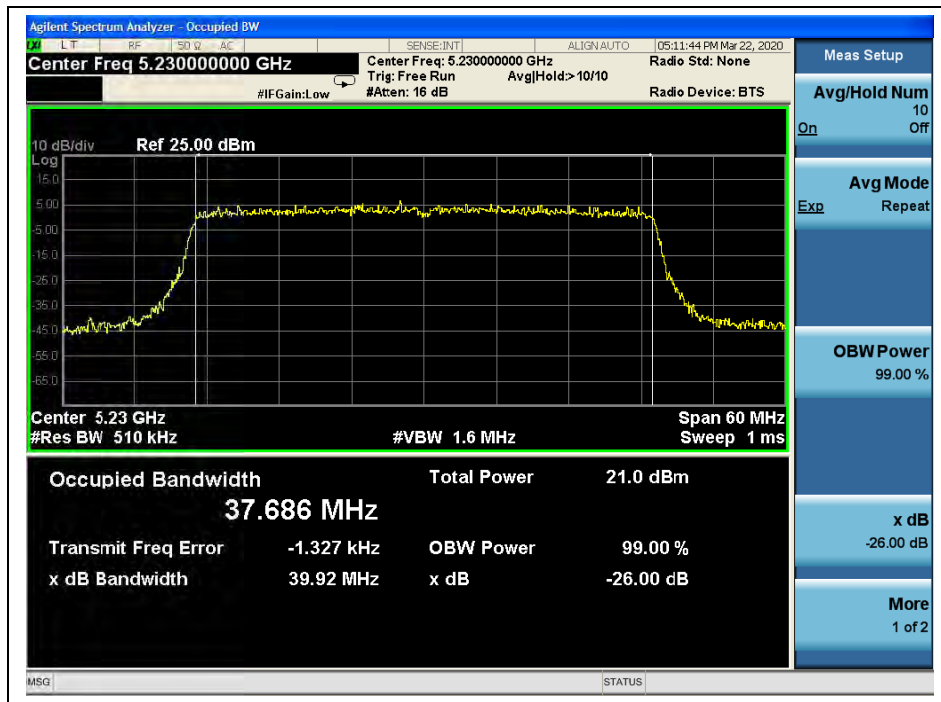
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	40.29
46	5230	39.92
54	5270	40.47
62	5310	40.22
102	5510	39.81
118	5590	40.38
142	5710	40.52
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
142	5710	37.78
151	5755	37.60
159	5795	37.89

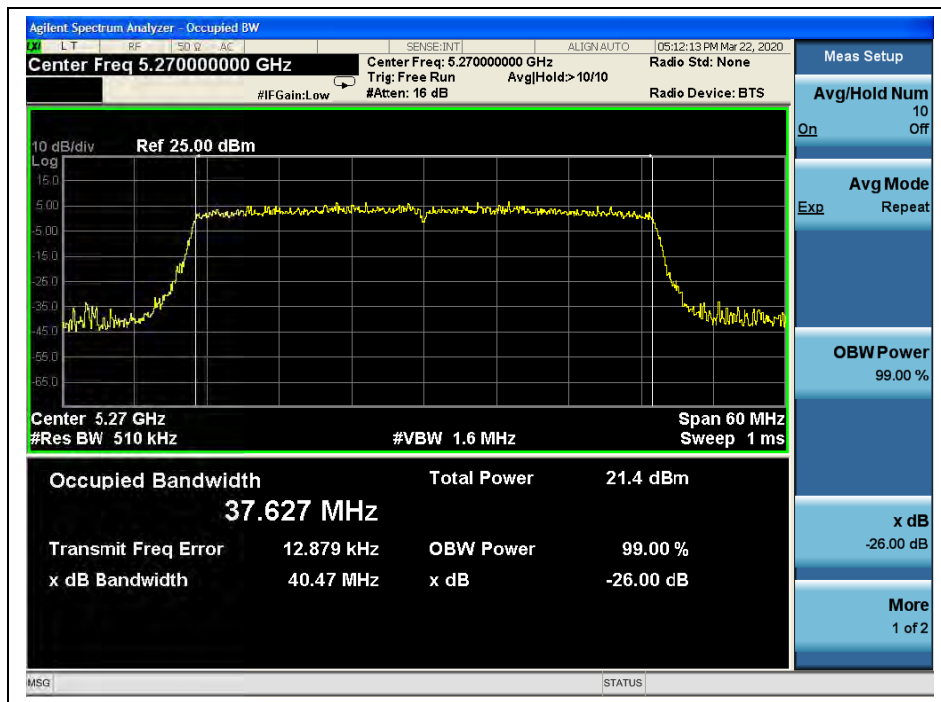
B. Test Plots



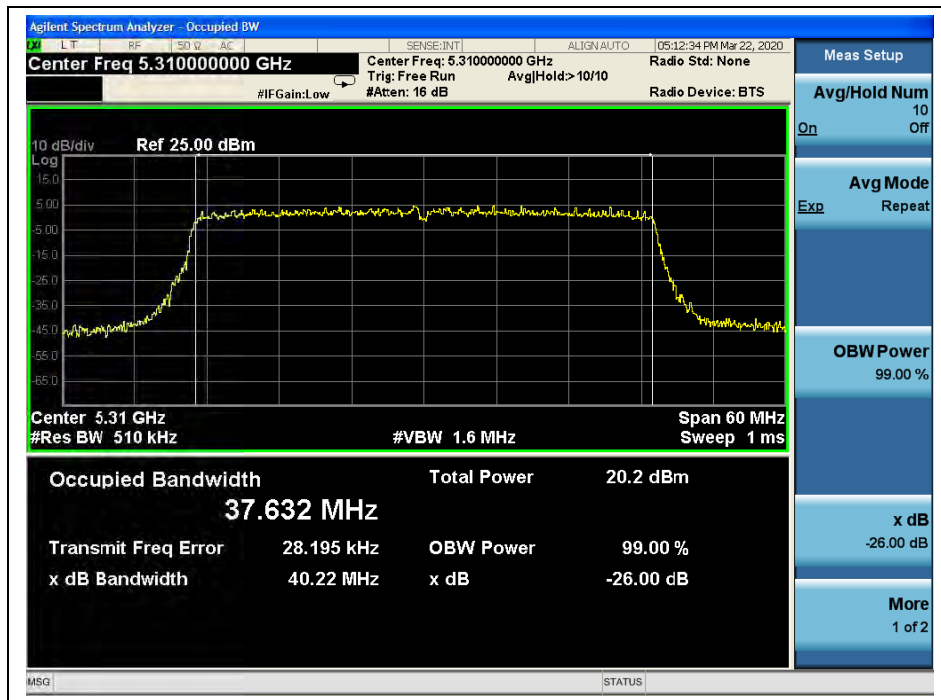
(Channel 38, 5190 MHz, 802.11 ax (HEW40))



(Channel 46, 5230 MHz, 802.11 ax(HEW 40))



(Channel 54, 5270MHz, 802.11 ax(HEW 40))



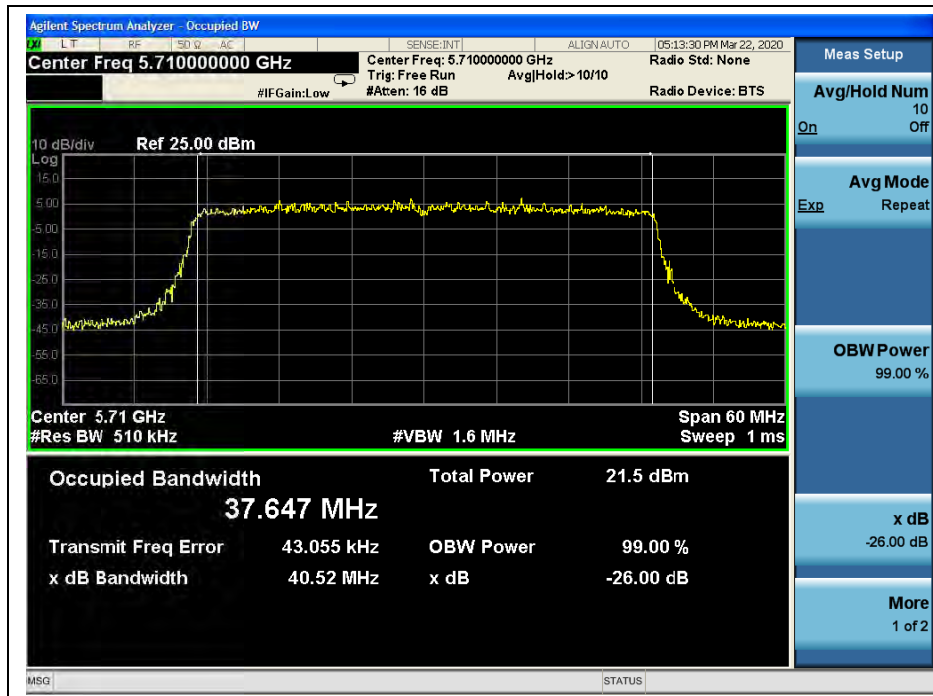
(Channel 62, 5310 MHz, 802.11 ax(HEW 40))



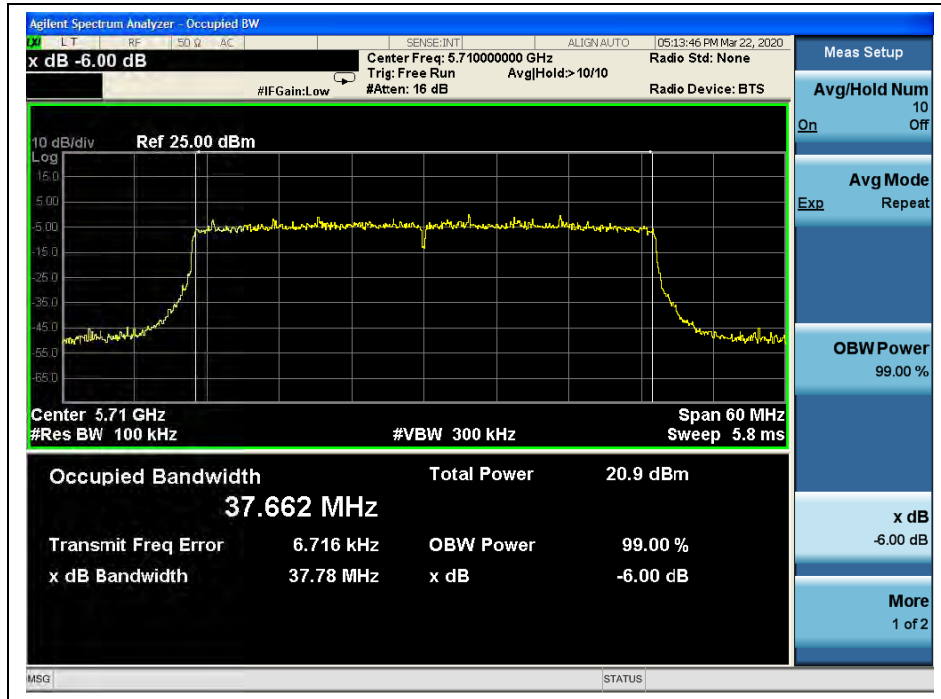
(Channel 102, 5510 MHz, 802.11 ax(HEW 40))



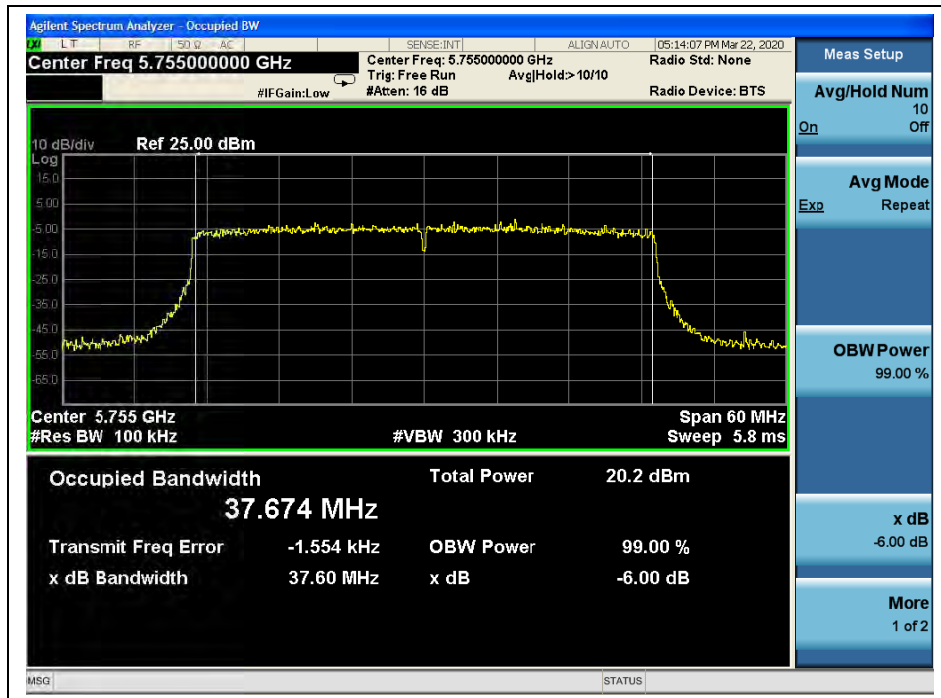
(Channel 118, 5590 MHz, 802.11 ax(HEW 40))



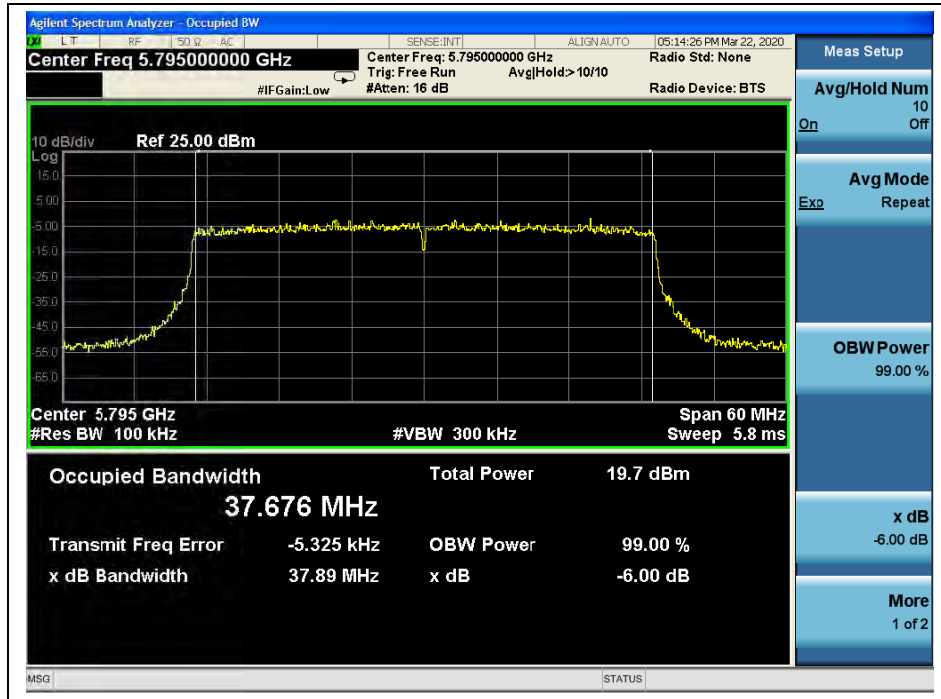
(Channel 142, 5710 MHz, 802.11 ax(HEW 40))



(Channel 142,5710MHz, 802.11 ax(HEW 40))



(Channel 151, 5755 MHz, 802.11 ax(HEW 40))



(Channel 159,5795MHz, 802.11ax(HEW 40))



802.11ax (HEW80) Test mode

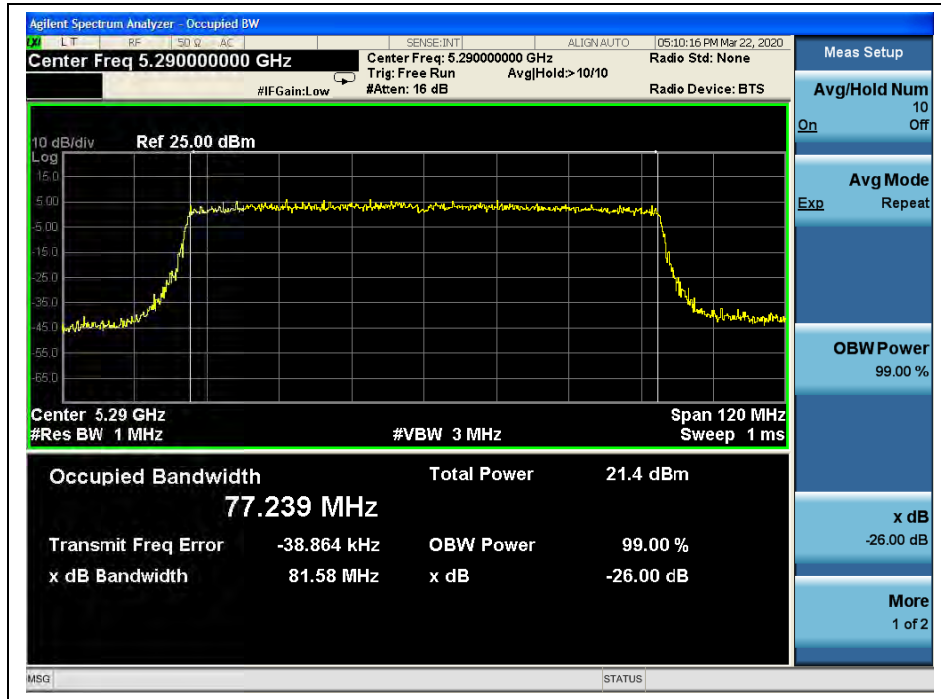
A. Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	82.07
58	5290	81.58
106	5530	82.47
122	5610	81.30
138	5690	81.81
Channel	Frequency (MHz)	6dB Bandwidth (MHz)
138	5690	76.71
155	5775	77.75

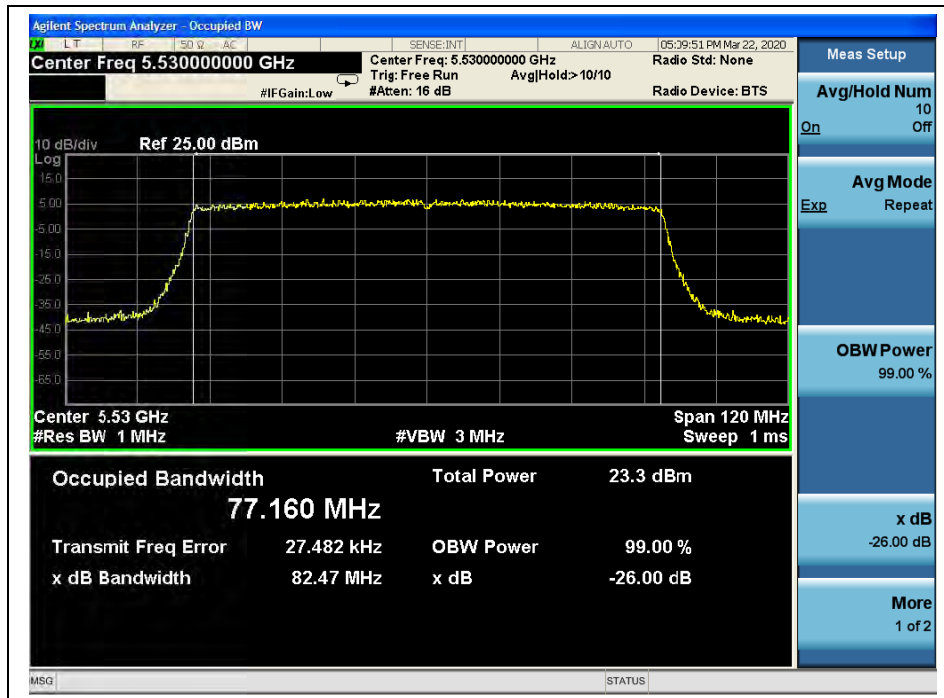
B. Test Plots



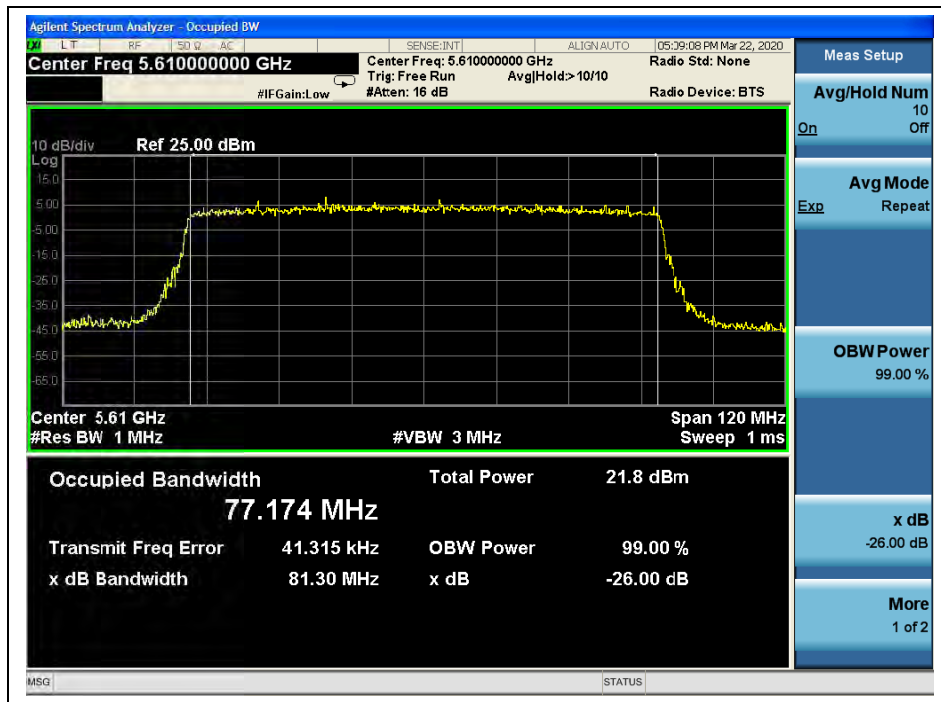
(Channel 42,5210MHz, 802.11 ax(HEW 80))



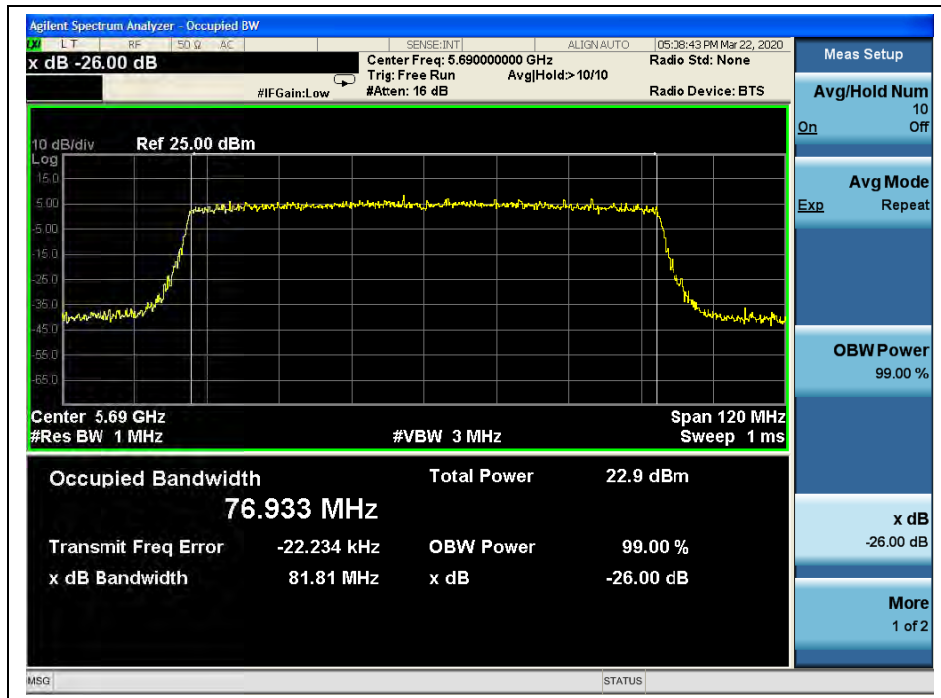
(Channel 58, 5290 MHz, 802.11 ax(HEW 80))



(Channel 106, 5530 MHz, 802.11 ax(HEW 80))



(Channel 122, 5610 MHz, 802.11 ax(HEW 80))



(Channel 138, 5690 MHz, 802.11 ax(HEW 80))