REPORT No.: SZ22090213W02

TEST REPORT

APPLICANT	:	Justice Tech Solutions, LLC
PRODUCT NAME	:	Securebook
MODEL NAME	:	securebook 6
BRAND NAME	:	Justice Tech Solutions
FCC ID	:	2AS4KJTS-SEBOOK6
STANDARD(S)	:	47 CFR Part 15 Subpart E
RECEIPT DATE	:	2022-10-11
TEST DATE	:	2022-10-15 to 2022-10-31
ISSUE DATE	:	2022-11-30

Edited by: Zeng Xiaoying (Rapporteur)

Approved by: Shen Junsheng (Supervisor)

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

DIRECTORY

1. Technical Information 3
1.1. Applicant and Manufacturer Information 3
1.2. Equipment Under Test (EUT) Description 3
1.3. Modulation Type and Data Rate of EUT 5
1.4. 802.11ax RU Allocation 6
1.5. The Channel Number and Frequency 7
1.6. Test Standards and Results 8
1.7. Environmental Conditions 9
2. 47 CFR Part 15E Requirements 10
2.1. Antenna Requirement 10
2.2. Duty Cycle of the Test Signal 11
2.3. Maximum Conducted Output Power 20
2.4. Emission Bandwidth 32
2.5. Peak Power Spectral Density 113
2.6. Frequency Stability 200
2.7. Conducted Emission 203
2.8. Restricted Frequency Bands 207
2.9. Radiated Emission 249
Annex A Test Uncertainty 331
Annex B Testing Laboratory Information 332

Change History		
Version	Date	Reason for change
1.0	2022-11-30	First edition

1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Justice Tech Solutions, LLC
Applicant Address:	13530 Fifth Street , Chino , CA
Manufacturer:	Justice Tech Solutions, LLC
Manufacturer Address:	13530 Fifth Street , Chino , CA

1.2. Equipment Under Test (EUT) Description

Product Name:	Securebook	
Sample No.:	2#	
Hardware Version:	N116FJL01	
Software Version:	Windows 11	
Modulation Technology:	OFDM	
Modulation Mode:	802.11a, 802.11n (HT20), 802.11n (HT40) 802.11ac (VHT20), 802.11ac (VHT40), 802.11ac (VHT80) , 802.11ac (VHT160) 802.11ax (HEW20), 802.11ax (HEW40), 802.11ax (HEW80) , 802.11ax (HEW160)	
Operating Frequency Range:	5180MHz-5240MHz; 5260MHz-5320MHz; 5500MHz-5720MHz; 5745MHz-5825MHz	
Channel Number:	Refer to 1.3	
Antenna Type:	FPC Antenna	
Antenna Gain:	ANT 0: 5.70dBi; ANT 1: 7.48dBi	
Directional Gain:	10.49dBi$_{\text{Note 2}}$	
Accessory Information:	Battery	
	Brand Name:	N/A
	Model No.:	SHT648262-3SR
	Serial No.:	N/A
	Capacity:	5000mAh
	Rated Voltage:	11.4V
	Charge Limit:	13.50V
	Manufacturer:	Shenzhen Sen HongTai New Energy

		Technology co., LTD
	AC Adapter	
	Brand Name:	N/A
	Model No.:	SOY48W-1900210
	Serial No.:	N/A
	Rated Output:	19V⎓2.1A
	Rated Input:	100-130V~50/60Hz, 1.2A
	Manufacturer:	SHENZHEN SOY TECHNOLOGY CO., LTD.

Note 1: The EUT 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**
802.11n	2TX
802.11ac	2TX
802.11ax	2TX

Note 2: 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 3: For conducted test item 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 (ANT0) in this report.

Note 4: 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(ANT0) in this report.

Note 5: We use the dedicated software to control the EUT continuous transmission.

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

Mode	Bandwidth (MHz)	Modulation Technology	Modulation Type	Data Rate	RU Size
802.11a	20	OFDM	**DBPSK**	**1**/2/5.5/11Mbps	N/A
			DQPSK		
			CCK		
802.11n	20/40 (HT20/40)	OFDM	**BPSK**	**MCS0**~MCS7	N/A
			QPSK		
			16QAM		
			64QAM		
802.11ac	20/40/80 (VHT20/40/80/160)	OFDM	**BPSK**	**MSC0**~MCS9	N/A
			QPSK		
			16QAM		
			64QAM		
			256QAM		
802.11ax	20/40/80 (HEW20/40/80/160)	OFDMA	**BPSK**	**MSC0**~MCS11	26/52/106/242/ 484/996
			QPSK		
			16QAM		
			64QAM		
			256QAM		
			1024QAM		

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. 802.11ax RU Allocation

Bandwidth (MHz)	RU Size			User	RU Offset	Power Setting
	Full (Tone)	Partial				
		(Tone)	Bandwidth (MHz)			
20	**242**	**26**	2	9	@**0**/1/2/3/4/5/6/7/**8**	Ant0:8; Ant1: 7
		52	4	4	@**37**/38/39/**40**	Ant0:10; Ant1:8
		106	8	2	@**53**/**54**	10
		242	20	1	@61	-
40	484	26	2	18	@0/1/2……15/16/17	-
		52	4	8	@37/38/39/40/41/42/43/44	
		106	8	4	@53/54/55/56	
		242	20	2	@61/62	
		484	40	1	@65	
80	996	26	2	37	@0/1/2……35/36	-
		52	4	16	@37/38/39……50/51/52	
		106	8	8	@53/54/55/56/57/58/59/60	
		242	20	4	@61/62/63/64	
		484	40	2	@65/66	
		996	80	1	@67	
160	996x2	26	2	74	@0/1/2……35/36 S0/S1……S35/S36	
		52	4	32	@37/38/39……50/51/52 S37/S38……S51/S52	
		106	8	16	@53/54/55/56/57/58/59/60 S53//S54……S59/S60	
		242	20	8	@61/62/63/64 S61/S62/S63/S64	
		484	40	4	@65/66/S65/S66	
		996	80	2	@67/S67	
		996x2	160	1	@S68	

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

Note 2: The worst case in Partial RU mode has been verified in the pre-scan phase before the test is at 20MHz bandwidth not at higher bandwidth, the test data of Full RU mode at lower bandwidth can cover the test data of Partial RU mode at higher bandwidth.

1.5. The Channel Number and Frequency

(U-NII-1) 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**		
(U-NII-2A) 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**		
160MHz	**50**	**5250**		
(U-NII-2C) 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**		
160MHz	**114**	**5570**		
(U-NII-3) 5745MHz-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.

1.6. 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	Oct. 18, 2022	He Yuyang	PASS	No deviation
3	15.407(a)	Maximum Conducted Output Power	Oct. 31, 2022	He Yuyang	PASS	No deviation
4	15.407(a)(e)	Emission Bandwidth	Oct. 28, 2022	He Yuyang	PASS	No deviation
5	15.407(a)	Peak Power Spectral Density	Oct. 22, 2022	He Yuyang	PASS	No deviation
6	15.407(g)	Frequency Stability	Oct. 28, 2022	He Yuyang	PASS	No deviation
7	15.207	Conducted Emission	Oct. 21, 2022	Fan Zehang	PASS	No deviation
8	15.407(b)	Restricted Frequency Bands	Oct. 25&26, 2022	Lin Jiayong	PASS	No deviation
9	15.407(b)	Radiated Emission	Oct. 30, 2022	Lin Jiayong	PASS	No deviation

Note 1: The DFS test report was documented in a separate report (Report No.: SZ22090213W03).

Note 2: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.102013.

Note 3: These RF tests were performed according to the method of measurements prescribed in KDB789033 D02 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 12.5dB contains two parts that cable loss 2.5dB 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.
Note 6: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.7. 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. Test Result: Compliant

Inside of the EUT has a FPC antenna coupled with the I-PEX connector. Please refer to the EUT internal photos.

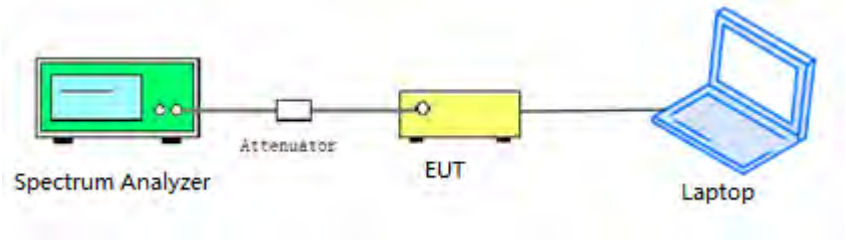
2.2. Duty Cycle of the Test Signal

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 sub clause, 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

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.

2.2.3. Test Procedure

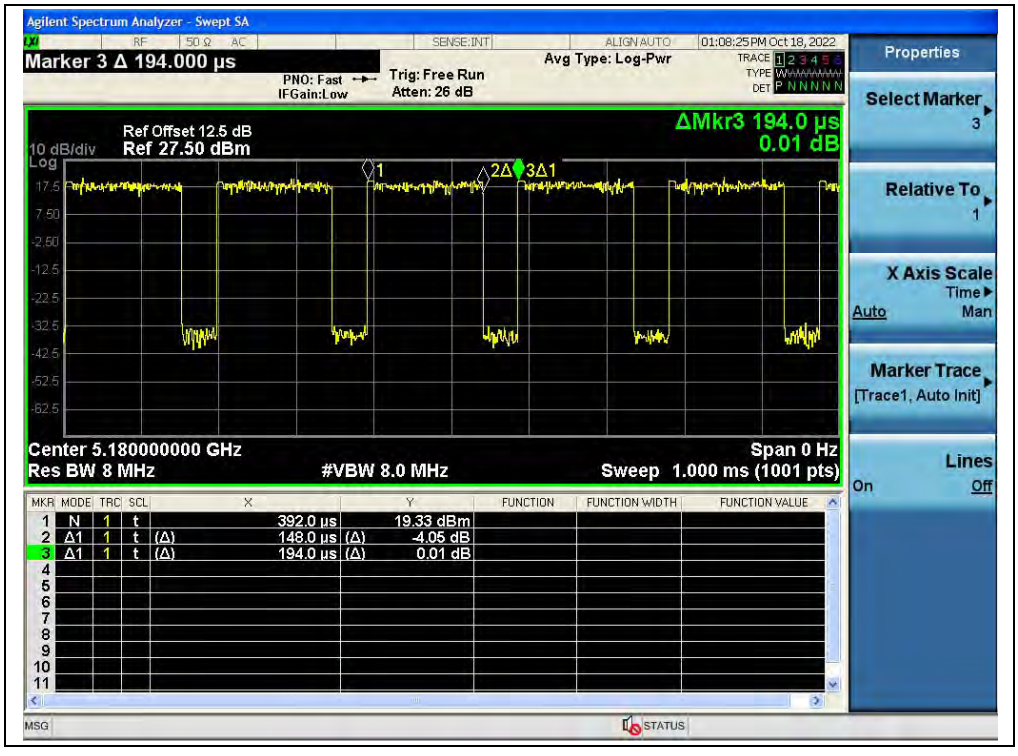
KDB 789033 Section B was used in order to prove compliance.

2.2.4. Test Result

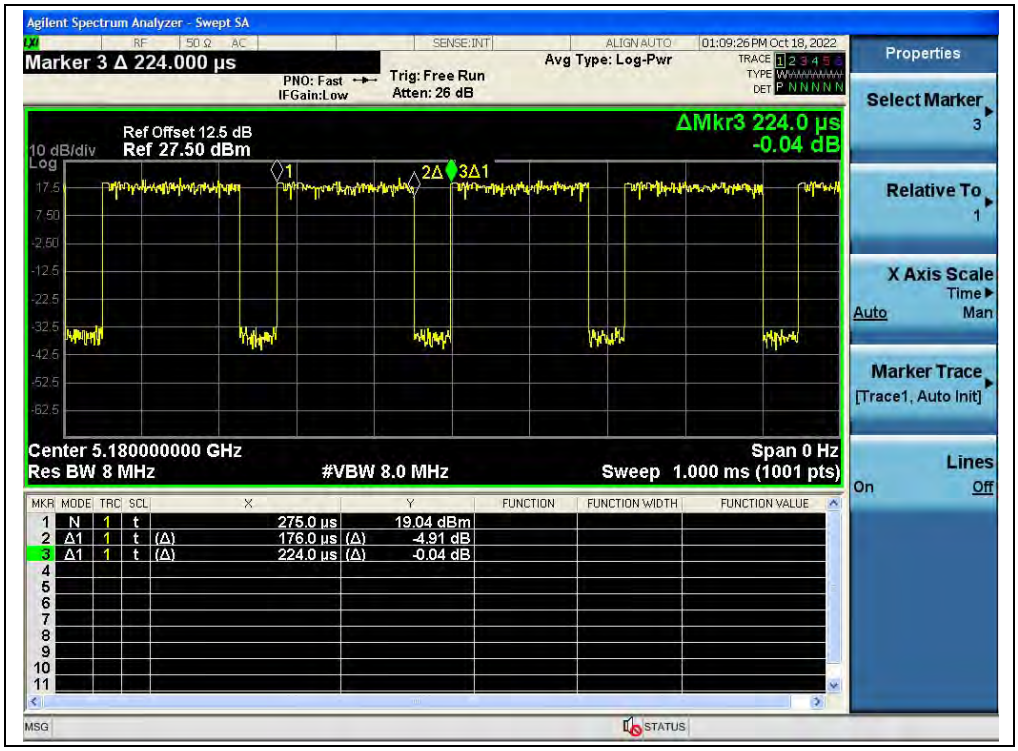
A.Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*log[1/D])
802.11a	76.29	1.18
802.11n(HT20)	78.57	1.05
802.11n(HT40)	79.65	0.99
802.11ac(VHT20)	77.73	1.09
802.11ac(VHT40)	76.85	1.14
802.11ac(VHT80)	77.73	1.09
802.11ac(VHT160)	77.73	1.09
802.11ax(HEW20)	85.03	0.70
802.11ax(HEW20) RU26	88.78	0.52
802.11ax(HEW20) RU52	81.07	0.91
802.11ax(HEW20) RU106	81.07	0.91
802.11ax(HEW40)	76.70	1.15
802.11ax(HEW80)	78.54	1.05
802.11ax(HEW160)	78.54	1.05

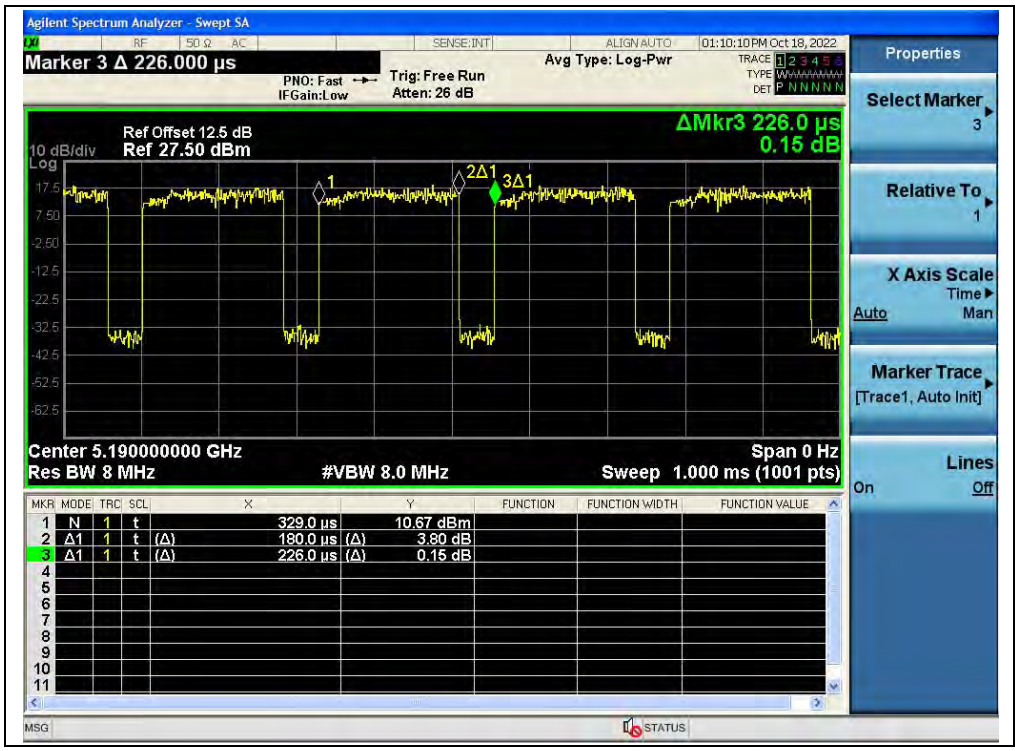
B.Test Plot:



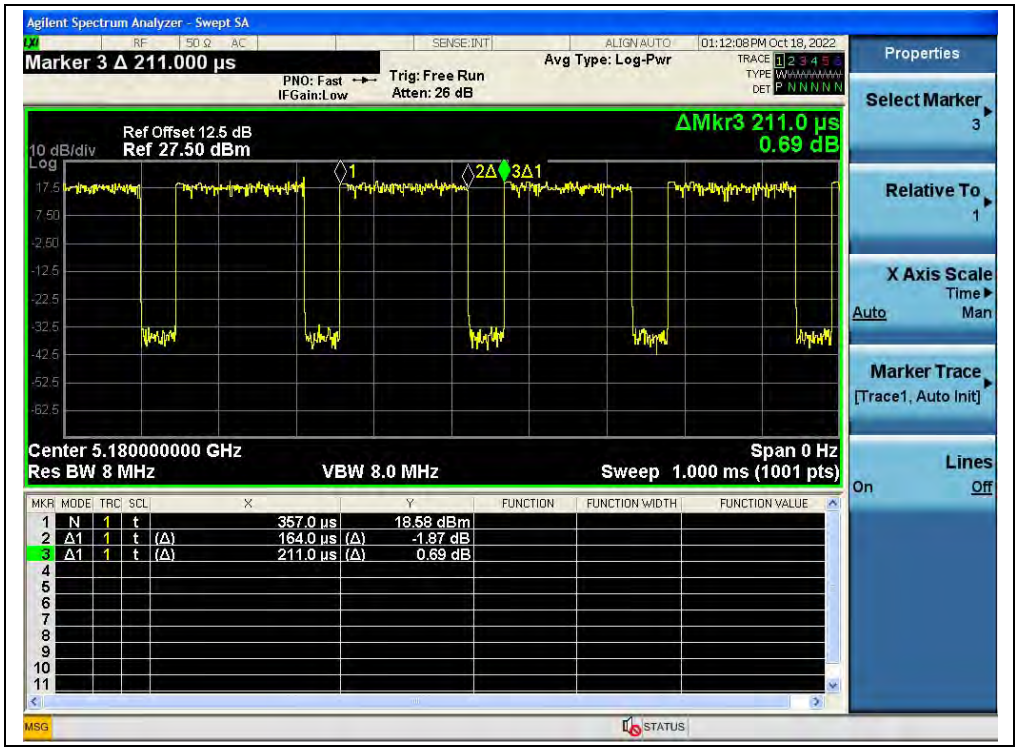
(Channel 36, 5180MHz, 802.11a)



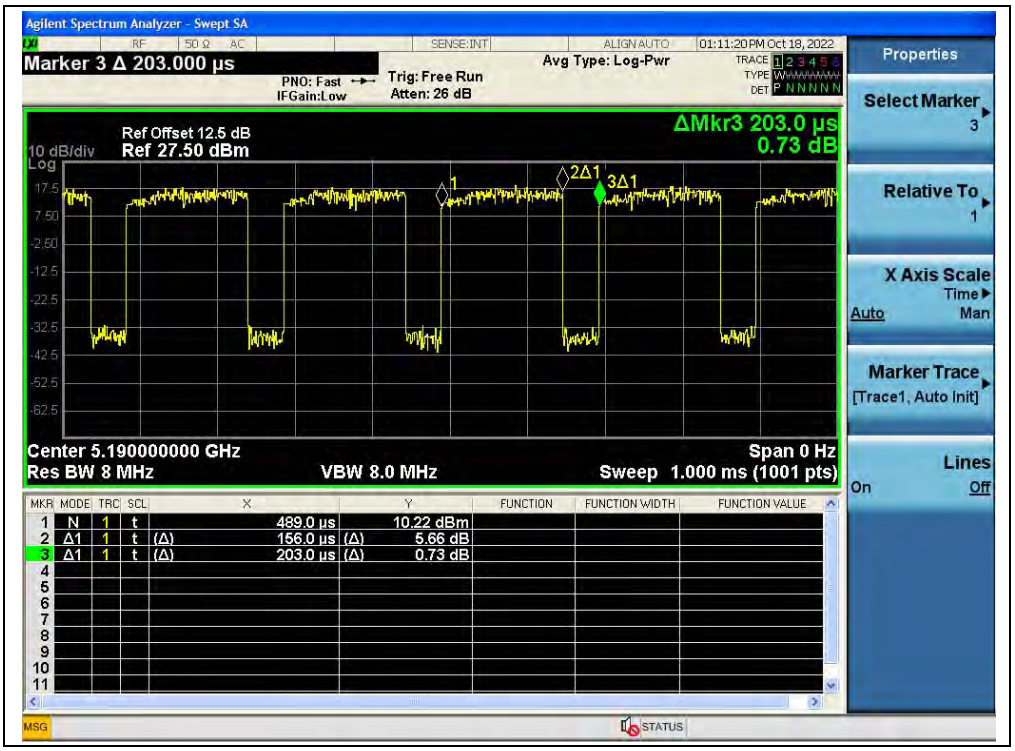
(Channel 36, 5180MHz, 802.11n (HT20))



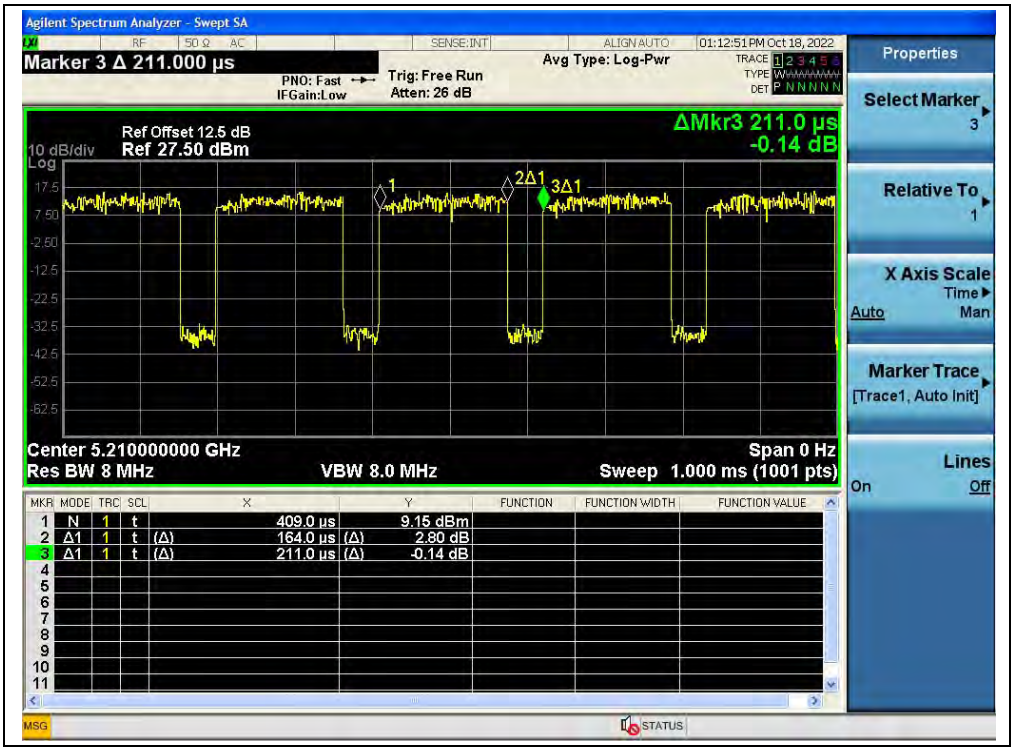
(Channel 38, 5190MHz, 802.11n (HT40))



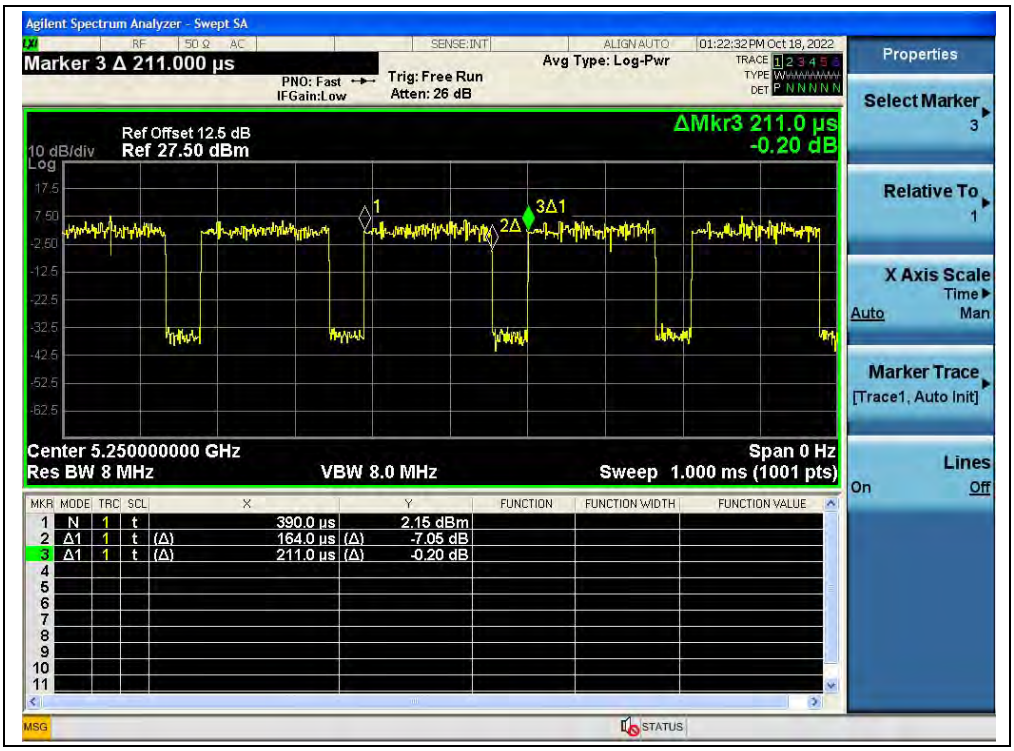
(Channel 36, 5180MHz, 802.11ac (VHT20))



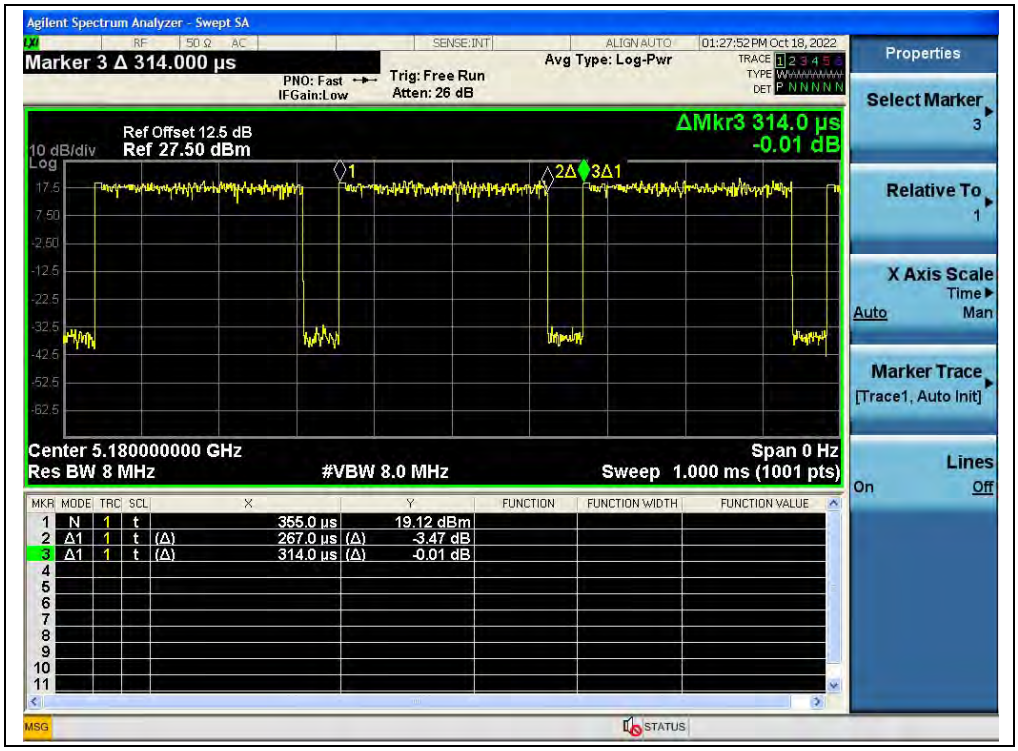
(Channel 38, 5190MHz, 802.11ac (VHT40))



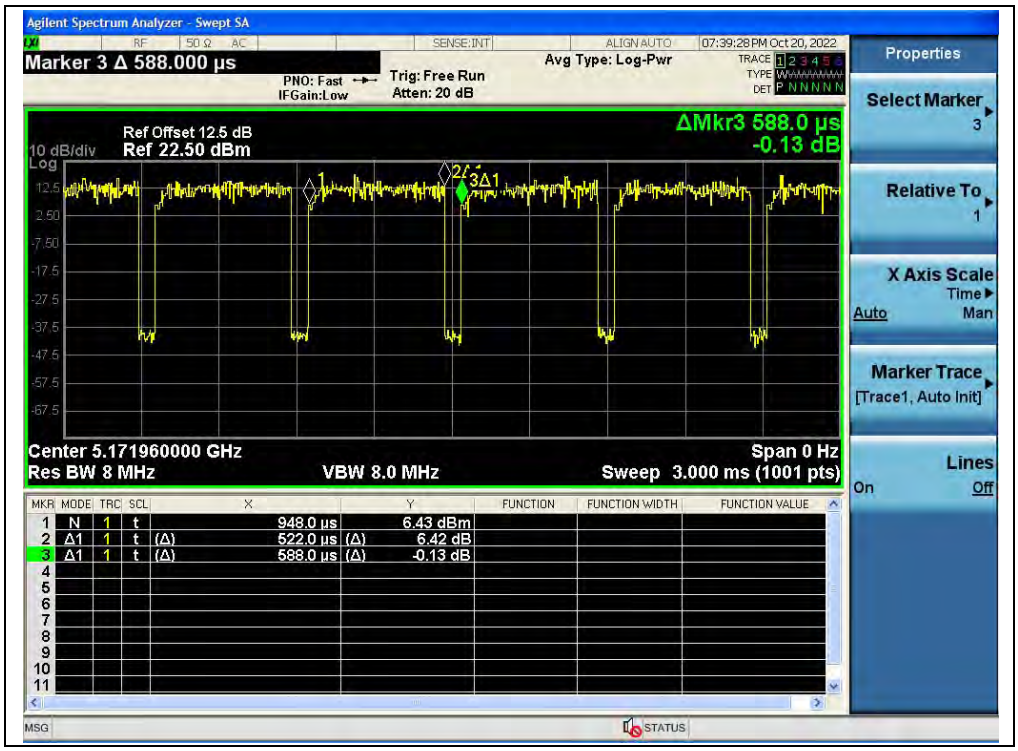
(Channel 42, 5210MHz, 802.11ac (VHT80))



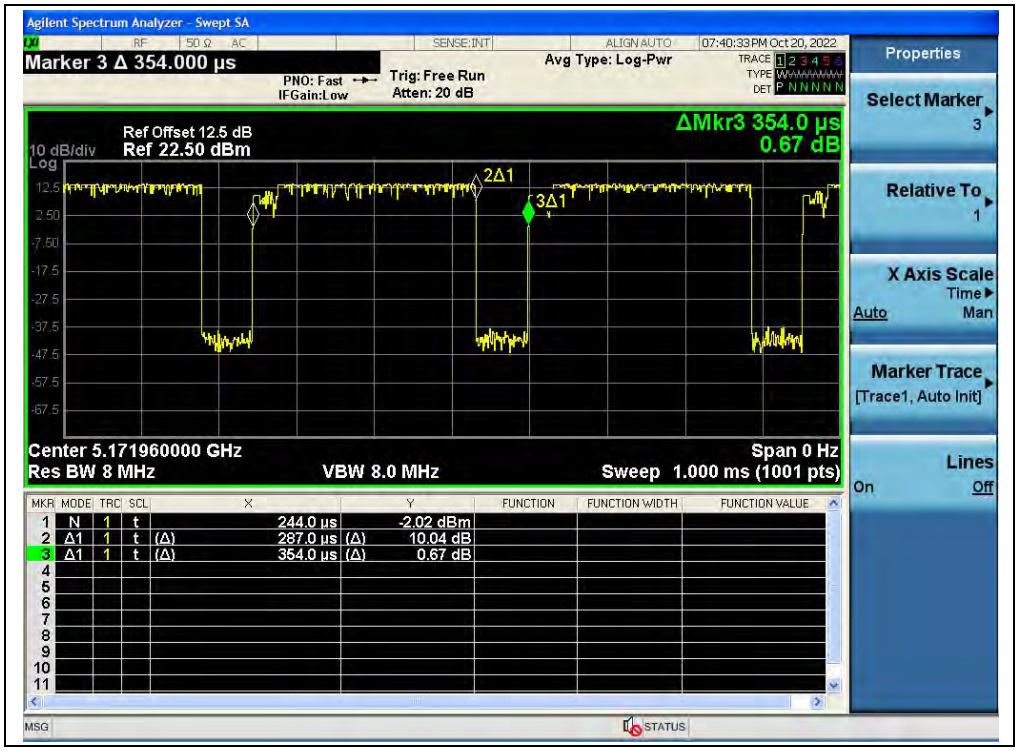
(Channel 42, 5210MHz, 802.11ac (VHT160))



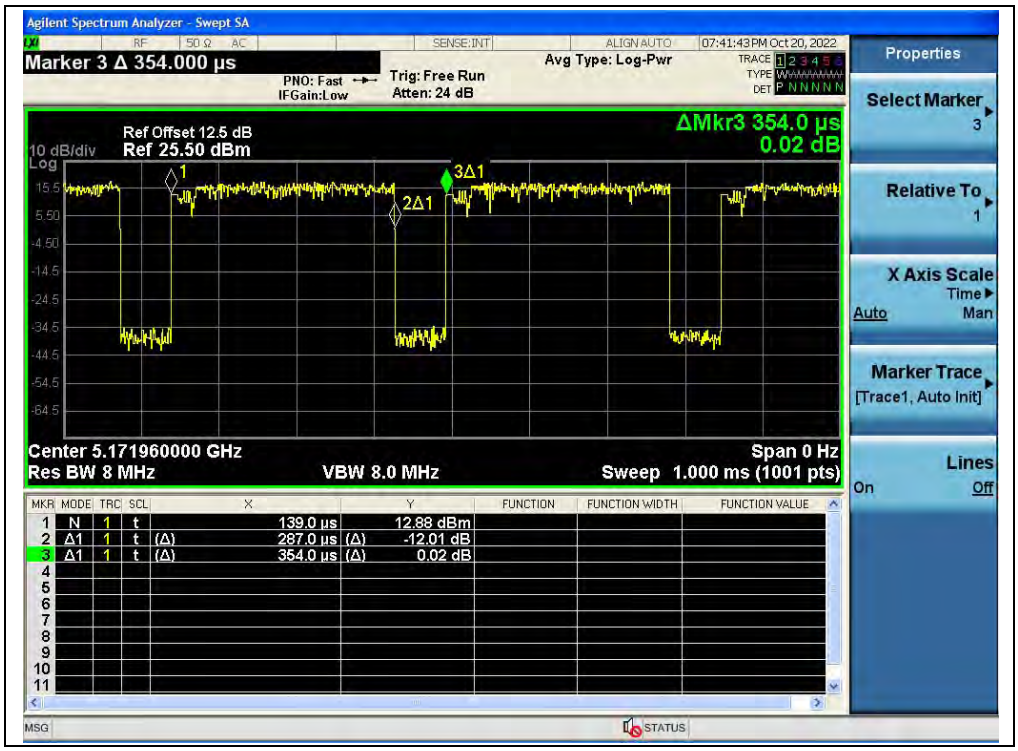
(CH36, 5180MHz, 802.11ax (HEW20))



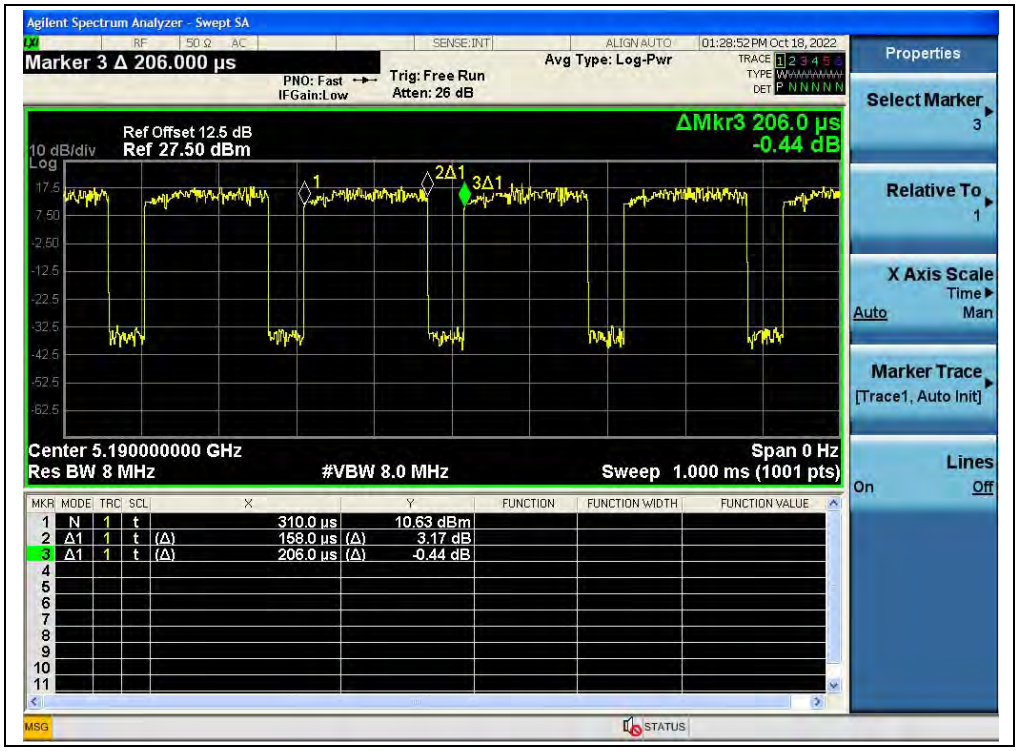
(CH36, 5180MHz, 802.11ax (HEW20) RU26)



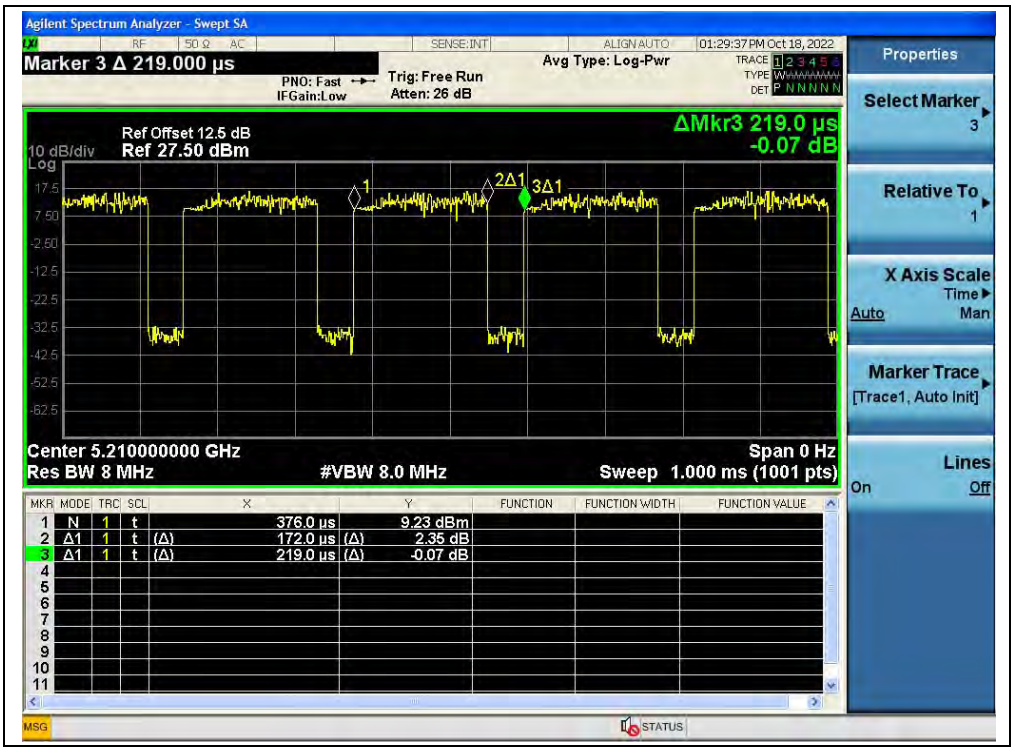
(CH36, 5180MHz, 802.11ax (HEW20) RU52)



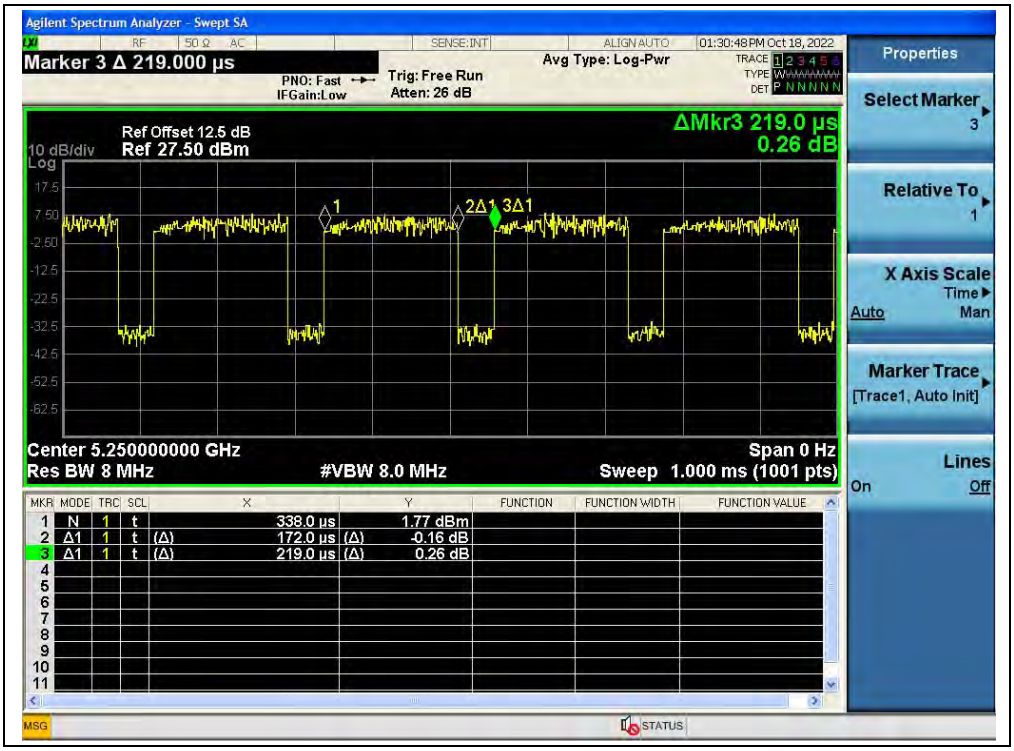
(CH36, 5180MHz, 802.11ax (HEW20) RU106)



(CH38, 5190MHz, 802.11ax (HEW40))



(CH42, 5210MHz, 802.11ax (HEW80))



(CH42, 5250MHz, 802.11ax (HEW160))

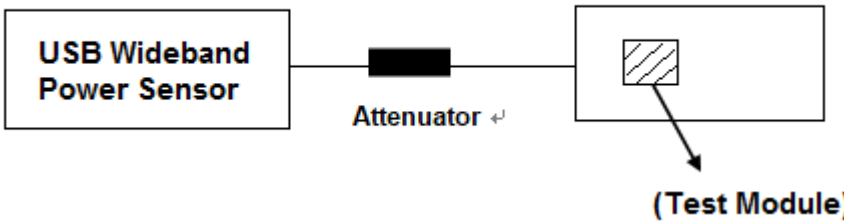
2.3. Maximum Conducted Output Power

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 250mW provided the maximum antenna gain does not exceed 6dBi.
(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 + 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 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.
(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.

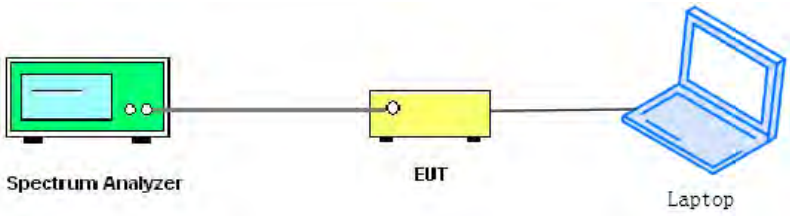
2.3.2. Test Description

Section E) 3) of KDB 789033 defines a methodology using a USB Wideband Power Sensor.
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. 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)	10+10log(26dB BW)	Limits (dBm)
a	UNII-2a	5260	22.35	24.49	24.00
		5300	22.74	24.57	24.00
		5320	23.13	24.64	24.00
	UNII-2c	5500	22.60	24.54	24.00
		5600	24.32	24.86	24.00
		5720	22.93	24.60	24.00
n20	UNII-2a	5260	23.14	24.64	24.00
		5300	23.45	24.70	24.00
		5320	23.66	24.74	24.00
	UNII-2c	5500	23.62	24.73	24.00
		5600	23.28	24.67	24.00
		5720	23.17	24.65	24.00
ac20	UNII-2a	5260	22.87	24.59	24.00
		5300	22.68	24.56	24.00
		5320	22.73	24.57	24.00
	UNII-2c	5500	22.57	24.54	24.00
		5600	23.81	24.77	24.00
		5720	23.08	24.63	24.00
ax20	UNII-2a	5260	23.41	24.69	24.00
		5300	23.09	24.63	24.00
		5320	22.59	24.54	24.00
	UNII-2c	5500	23.33	24.68	24.00
		5600	23.30	24.67	24.00
		5720	23.27	24.67	24.00
ax_RU26	UNII-2a	5260	20.41	24.10	24.00
		5300	20.27	24.07	24.00
		5320	20.24	24.06	24.00
	UNII-2c	5500	20.14	24.04	24.00
		5600	20.10	24.03	24.00
		5720	21.01	24.22	24.00

2.3.4. Test Result

Maximum Average Conducted Output Power

802.11a Mode

Frequency (MHz)	Average Power							Limit		Verdict
	Measured		Duty Factor	Duty Factor Calculated						
	ANT0	ANT1		ANT0		ANT1				
	dBm	dBm		dBm	W	dBm	W	dBm	W	
5180	14.16	14.38	1.18	15.34	0.034	**15.56**	**0.036**	24	0.25	PASS
5220	14.27	14.22		15.45	0.035	15.40	0.035			
5240	14.01	14.05		15.19	0.033	15.23	0.033			
5260	13.98	13.80		15.16	0.033	14.98	0.031			
5300	14.35	14.16		15.53	0.036	15.34	0.034			
5320	14.49	14.37		**15.67**	**0.037**	15.55	0.036			
5500	14.16	14.22		15.34	0.034	15.40	0.035			
5600	13.93	13.99		15.11	0.032	15.17	0.033			
5720	14.19	14.13		15.37	0.034	15.31	0.034			
5745	14.19	13.88		15.37	0.034	15.06	0.032	30	1	
5785	14.45	13.52		15.63	0.037	14.70	0.030			
5825	14.21	14.06		15.39	0.035	15.24	0.033			

802.11n (HT20) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	12.34	11.61	1.05	16.02	0.040	19.51	0.08	PASS
5220	12.04	11.59		15.91	0.039			
5240	12.39	11.47		16.02	0.040			
5260	11.86	11.34		15.68	0.037			
5300	11.81	11.56		15.80	0.038			
5320	11.96	11.52		15.80	0.038			
5500	11.64	12.41		16.13	0.041			
5600	11.23	12.05		15.68	0.037			
5720	11.78	12.01		15.91	0.039			
5745	14.38	13.76		18.13	0.065	25.51	0.35	
5785	14.47	13.51		18.06	0.064			
5825	14.29	14.10		**18.26**	**0.067**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11n (HT40) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5190	14.19	13.83	0.99	17.99	0.063	19.51	0.08	PASS
5230	14.18	13.81		17.99	0.063			
5270	14.06	13.54		17.78	0.060			
5310	14.13	13.73		17.92	0.062			
5510	13.68	13.64		17.63	0.058			
5630	13.85	13.76		17.78	0.060			
5710	14.08	13.36		17.71	0.059			
5755	15.91	15.40		19.68	0.093	25.51	0.35	
5795	15.90	15.42		**19.68**	**0.093**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ac (VHT20) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	11.21	12.34	1.09	15.91	0.039	19.51	0.08	PASS
5220	11.47	12.24		16.02	0.040			
5240	11.40	12.19		15.91	0.039			
5260	11.44	12.01		15.80	0.038			
5300	11.45	12.03		15.80	0.038			
5320	11.42	12.20		15.91	0.039			
5500	11.43	12.53		16.13	0.041			
5600	11.57	12.30		16.02	0.040			
5720	11.74	12.21		16.13	0.041			
5745	14.30	13.84		18.20	0.066	25.51	0.35	
5785	14.52	13.76		18.26	0.067			
5825	14.22	14.12		**18.26**	**0.067**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ac (VHT40) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5190	13.83	14.03	1.14	18.06	0.064	19.51	0.08	PASS
5230	13.80	13.92		17.99	0.063			
5270	13.86	13.67		17.92	0.062			
5310	14.10	13.92		18.13	0.065			
5510	13.57	13.88		17.85	0.061			
5630	13.75	13.85		17.92	0.062			
5710	13.79	13.51		17.78	0.060			
5755	15.71	15.45		19.73	0.094	25.51	0.35	
5795	15.79	15.40		**19.73**	**0.094**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ac (VHT80) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5210	14.21	14.35	1.09	18.39	0.069	19.51	0.08	PASS
5290	14.42	14.28		18.45	0.070			
5530	13.98	13.99		18.06	0.064			
5610	13.91	14.01		18.06	0.064			
5690	14.15	14.16		18.26	0.067			
5775	15.61	15.17		**19.49**	**0.089**	25.51	0.35	
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ac (VHT160) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5250	11.08	11.56	1.09	15.44	0.035	19.51	0.08	PASS
5570	12.80	13.02		**16.99**	**0.050**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ax (HEW20) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	12.01	12.02	0.70	15.68	0.037	19.51	0.08	PASS
5220	12.24	12.04		15.80	0.038			
5240	12.19	11.85		15.68	0.037			
5260	12.18	11.84		15.68	0.037			
5300	12.37	11.86		15.80	0.038			
5320	12.52	12.01		16.02	0.040			
5500	12.01	12.36		15.91	0.039			
5600	11.88	12.10		15.68	0.037			
5720	12.12	12.05		15.80	0.038			
5745	14.47	14.01		17.92	0.062	25.51	0.35	
5785	14.62	13.92		17.99	0.063			
5825	14.51	14.15		**18.06**	**0.064**			

Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.

802.11ax (HEW20) RU26 Mode

Frequency (MHz)	Average Power		Duty Factor	Total Power with Duty Factor		Limit		Verdict
	Measured							
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	2.97	3.63	0.52	6.99	0.005	19.51	0.08	PASS
5220	3.23	3.78		6.99	0.005			
5240	3.16	3.83		6.99	0.005			
5260	3.27	3.87		6.99	0.005			
5300	3.29	4.01		6.99	0.005			
5320	3.45	4.18		6.99	0.005			
5500	3.41	3.51		6.99	0.005			
5600	3.58	3.48		6.99	0.005			
5720	3.84	4.05		7.78	0.006			
5745	6.12	6.52		10.00	0.010	25.51	0.35	
5785	6.31	6.38		10.00	0.010			
5825	6.08	6.54		**10.00**	**0.010**			

Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.

802.11ax (HEW20) RU52 Mode

Frequency (MHz)	Average Power		Duty Factor	Total Power with Duty Factor		Limit		Verdict
	Measured							
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	6.05	6.39	0.91	10.00	0.010	19.51	0.08	PASS
5220	6.30	6.60		10.41	0.011			
5240	6.28	6.64		10.41	0.011			
5260	6.39	6.68		10.41	0.011			
5300	6.40	6.78		10.41	0.011			
5320	6.64	6.88		10.79	0.012			
5500	6.56	6.50		10.41	0.011			
5600	6.56	6.32		10.41	0.011			
5720	6.86	6.96		10.79	0.012			
5745	9.38	8.98		13.01	0.020	25.51	0.35	
5785	9.65	8.90		**13.22**	**0.021**			
5825	9.30	8.99		13.01	0.020			

Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.

802.11ax (HEW20) RU106 Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5180	9.01	8.99	0.91	13.01	0.020	19.51	0.08	PASS
5220	9.43	9.12		13.22	0.021			
5240	9.29	9.09		13.01	0.020			
5260	9.36	9.16		13.22	0.021			
5300	9.56	9.34		13.42	0.022			
5320	9.77	9.46		13.62	0.023			
5500	9.30	8.46		12.79	0.019			
5600	9.21	8.48		12.79	0.019			
5720	9.54	9.09		13.22	0.021			
5745	12.53	11.83		16.13	0.041	25.51	0.35	
5785	12.68	11.98		**16.23**	**0.042**			
5825	12.51	11.81		16.13	0.041			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ax (HEW40) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5190	14.20	13.87	1.15	18.20	0.066	19.51	0.08	PASS
5230	14.40	13.82		18.26	0.067			
5270	14.33	13.55		18.13	0.065			
5310	14.58	13.79		18.39	0.069			
5510	14.08	13.77		18.06	0.064			
5630	14.18	13.76		18.13	0.065			
5710	14.28	13.39		17.99	0.063			
5755	16.03	15.55		19.96	0.099	25.51	0.35	
5795	16.05	15.53		**19.96**	**0.099**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ax (HEW80) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5210	14.40	14.35	1.05	18.45	0.070	19.51	0.08	PASS
5290	14.55	14.48		18.57	0.072			
5530	14.25	14.38		18.39	0.069			
5610	14.18	14.20		18.26	0.067			
5690	14.41	14.57		18.57	0.072			
5775	15.95	15.03		**19.59**	**0.091**	25.51	0.35	
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

802.11ax (HEW160) Mode

Frequency (MHz)	Average Power					Limit		Verdict
	Measured		Duty Factor	Total Power with Duty Factor				
	ANT0	ANT1						
	dBm	dBm		dBm	W	dBm	W	
5250	10.71	11.51	1.05	15.19	0.033	19.51	0.08	PASS
5570	12.72	13.11		**16.99**	**0.050**			
Note: Directional gain = 7.48dBi +10log(2) = 10.49dBi＞6dBi, so the power limit shall be reduced to 24-(10.49-6) = 19.51dBm for 5.18-5.24GHz, 5.260-5.320GHz, 5.500-5.720GHz band and reduced to 30-(10.49-6) = 25.51dBm for 5.745-5.825GHz band.								

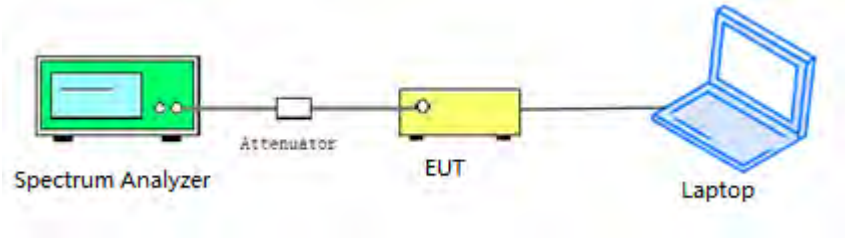
2.4. Emission Bandwidth

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

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.

2.4.3. 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 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 theband5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.
b) Set 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.

2.4.4. Test Result

802.11a Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	23.85
44	5220	23.35
48	5240	23.18
52	5260	22.35
60	5300	22.74
64	5320	23.13
100	5500	22.60
120	5600	24.32
144	5720	22.93
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
144	5720	15.12
149	5745	16.33
157	5785	16.34
165	5825	16.28

B.Test Plot:

(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 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)

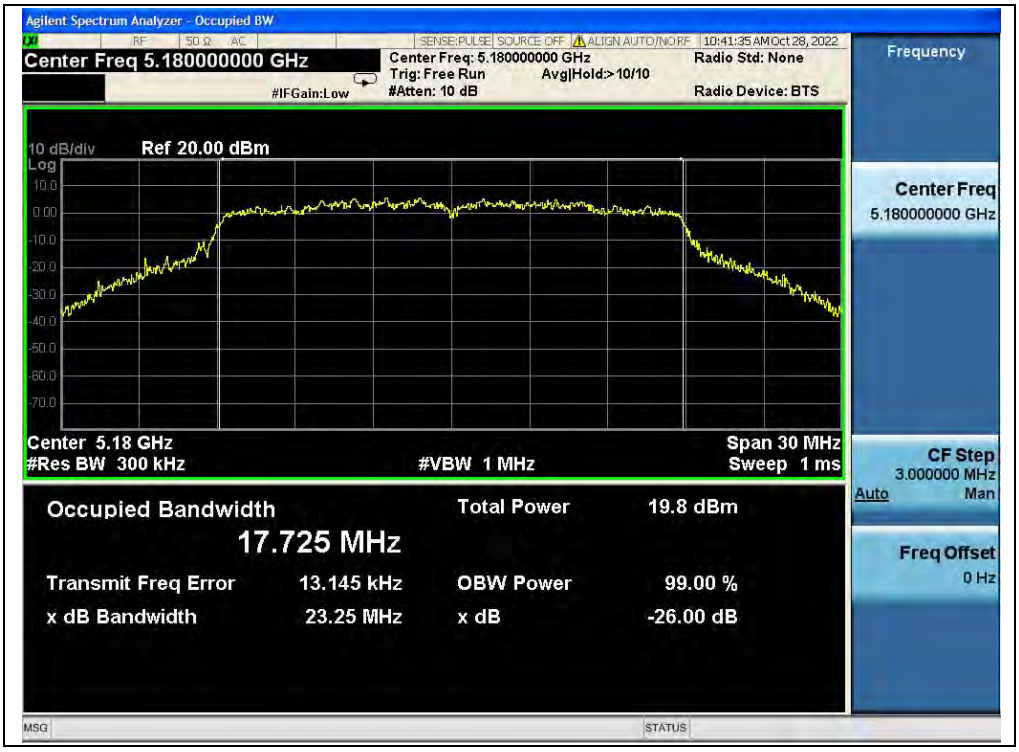
(Channel 165, 5825MHz, 802.11a)

802.11n (HT20) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	23.25
44	5220	23.37
48	5240	23.21
52	5260	23.14
60	5300	23.45
64	5320	23.66
100	5500	23.62
120	5600	23.28
144	5720	23.17
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
144	5720	15.06
149	5745	17.57
157	5785	17.58
165	5825	17.57

B.Test Plot:



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

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

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

(Channel 52, 5260MHz, 802.11n (HT20))

(Channel 60, 5300MHz, 802.11n (HT20))

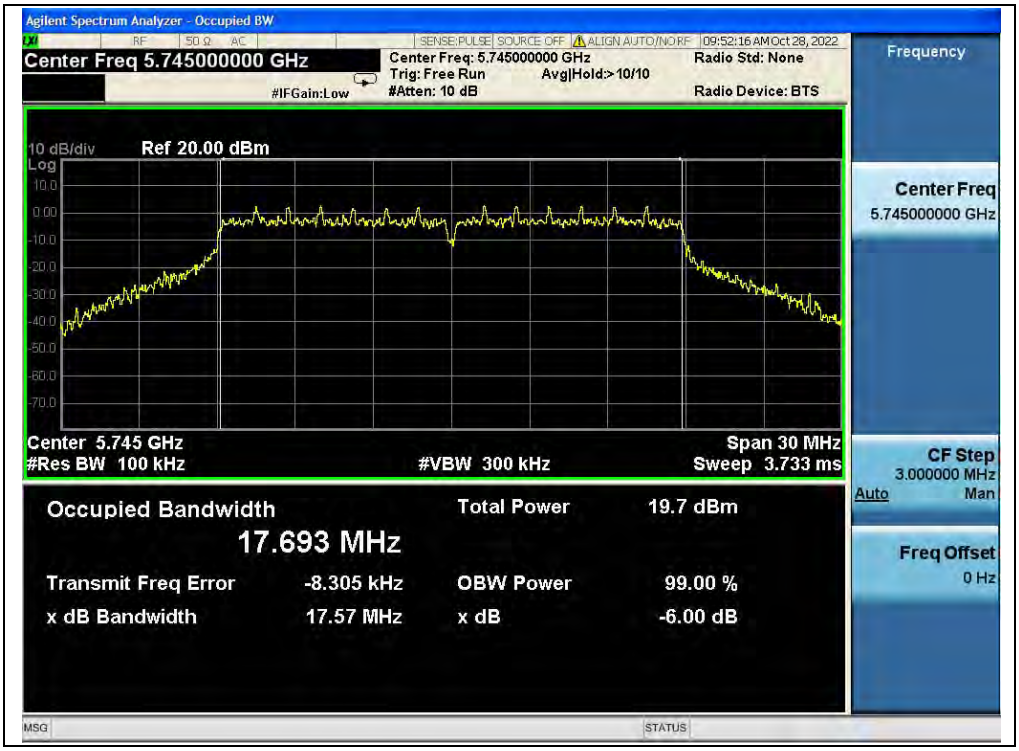
(Channel 64, 5320MHz, 802.11n (HT20))

(Channel 100, 5500MHz, 802.11n (HT20))

(Channel 120, 5600MHz, 802.11n (HT20))

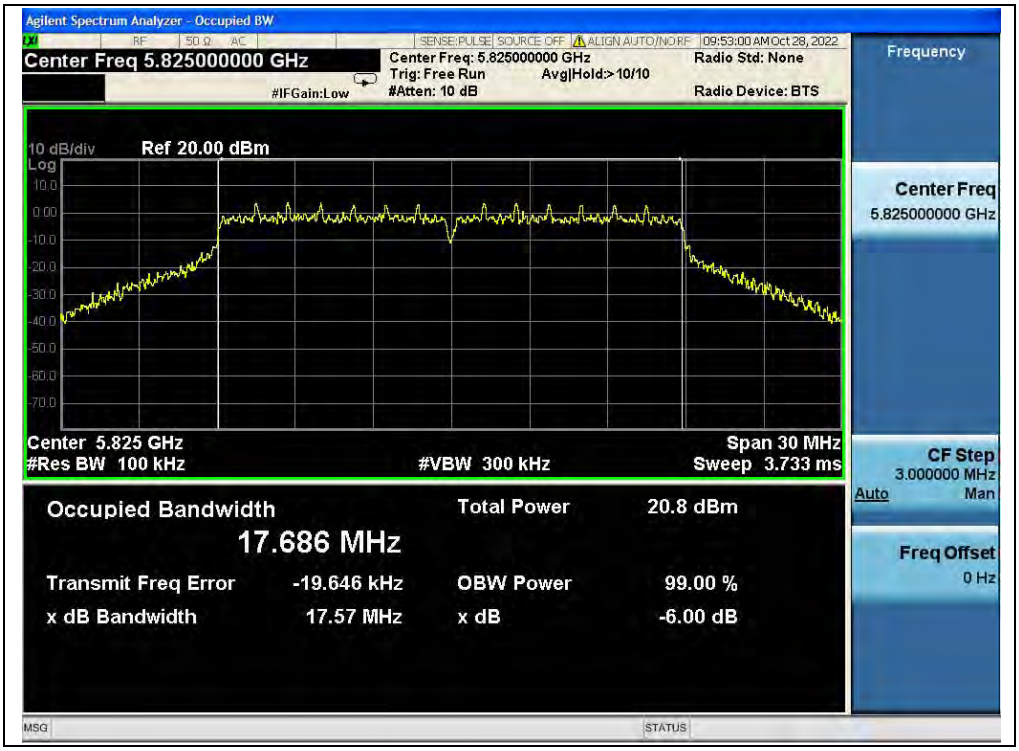
(Channel 144, 5720MHz, 802.11n (HT20))

(Channel 144, 5720MHz, 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	42.63
46	5230	43.08
54	5270	41.74
62	5310	43.77
102	5510	42.14
126	5630	42.69
142	5710	41.51
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
142	5710	35.02
151	5755	36.34
159	5795	36.36

B.Test Plot:

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

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

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

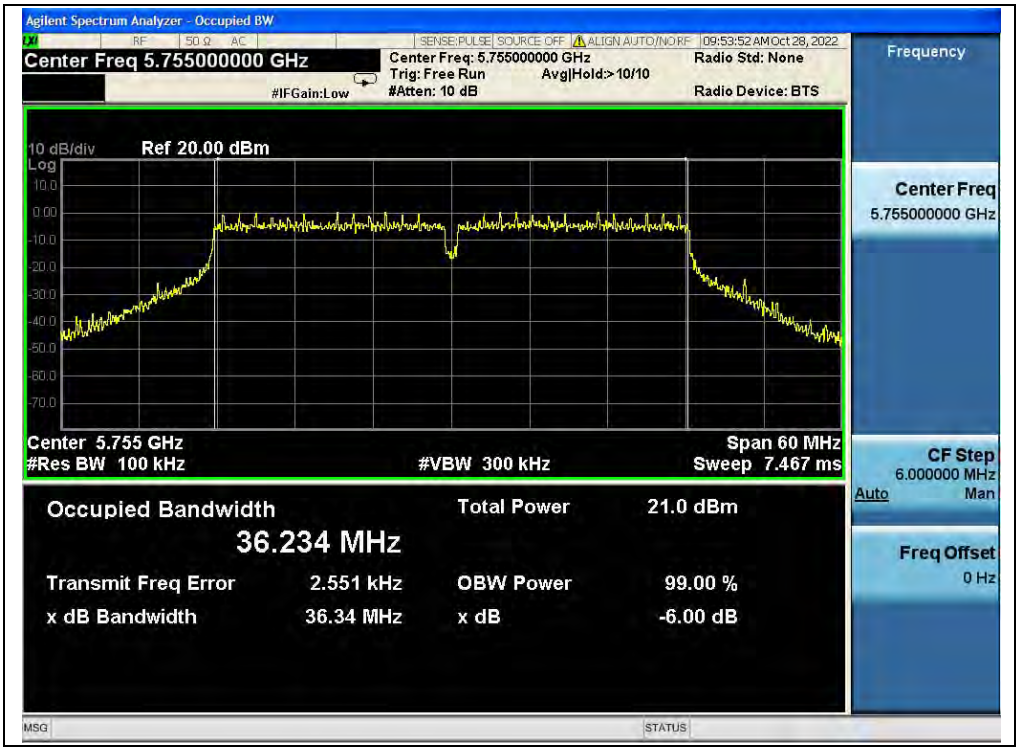
(Channel 62, 5310MHz, 802.11n (HT40))

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

(Channel 126, 5630MHz, 802.11n (HT40))

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

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



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

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

802.11ac (VHT20) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
36	5180	23.98
44	5220	22.86
48	5240	23.52
52	5260	22.87
60	5300	22.68
64	5320	22.73
100	5500	22.57
120	5600	23.81
144	5720	23.08
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
144	5720	15.12
149	5745	17.55
157	5785	17.54
165	5825	17.56

B.Test Plot:

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

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

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

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

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

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

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

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

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

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

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

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

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

802.11ac (VHT40) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
38	5190	43.17
46	5230	42.42
54	5270	42.44
62	5310	42.76
102	5510	43.11
126	5630	42.05
142	5710	42.80
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
142	5710	35.10
151	5755	36.31
159	5795	36.35

B.Test Plot:

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

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

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

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

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

(Channel 126, 5630MHz, 802.11ac (VHT40))

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

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

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

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

802.11ac (VHT80) Mode

A.Test Verdict:

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
42	5210	84.45
58	5290	86.09
106	5530	84.20
122	5610	83.90
138	5690	83.38
Channel	**Frequency (MHz)**	**6 dB Bandwidth (MHz)**
138	5690	72.56
155	5775	75.03

B.Test Plot:

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

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

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

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

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

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

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