TEST REPORT

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
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Report No.: CTK-2023-01326

1. Applicant

◦ Name : Samsung Electronics Co Ltd

◦ Address : 19 Chapin Rd, Building D. Pine Brook, New Jersey, United States

◦ Date of Receipt : 2023-03-20

2. Manufacturer

◦ Name : Samsung Electronics Co., Ltd.

◦ Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Republic of Korea

3. Factory

◦ Name #1: CHEMTRONICS CO.,LTD.

◦ Address #1: 35, Buk-ri, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea

◦ Name #2: Chengdu Xuguang Technology Co., Ltd.

◦ Address #2: No.86 2nd Section, Park Road, Longquanyi District, Chengdu City, Sichuan Province, P.R.China

◦ Name #3: CHEMTROVINA COMPANY LIMITED

◦ Address #3: Nhon Trach 2 - Loc Khang IZ, Hiep Phuoc Town, Nhon Trach District, Dong Nai Province, Vietnam

4. Use of Report : For FCC Conformance

5. Test Sample / Model: Wi-Fi/BT Transceiver / WCC941M

6. Date of Test : 2023-04-10 to 2023-06-08

7. Test Standard(method) used : FCC 47 CFR part 15 subpart E 15.407

8. Testing Environment: Temp.: (23 ± 1) ℃, Humidity: (36 ± 3) % R.H.

9. Test Results : Compliance

10. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

(Address : (Unhak-Dong) 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea)

Approval	Tested by Ji-Hye, Kim: (Signature)	Technical Manager Won-Jae, Hwang: (Signature)

Remark. This report is not related to KOLAS accreditation and relevant regulation.

2023-06-14

CTK Co., Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-06-14	Issued (CTK-2023-01326)	all

CONTENTS

1. General Product Description

1.1 Applicant Information

Company	Samsung Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Republic of Korea
Contact Person	Name : Minhyung Cho E-mail : mh719.cho@samsung.com Tel : +82-31-277-2688 Fax : -

1.2 Product Information

FCC ID	A3LWCC941M	
Product Description	Wi-Fi/BT Transceiver	
Model name	WCC941M	
Variant Model name	-	
Operating Frequency	UNII 1	20 MHz_BW : 5 180 MHz – 5 240 MHz 40 MHz_BW : 5 190 MHz – 5 230 MHz 80 MHz_BW : 5 210 MHz
	UNII 2A	20 MHz_BW : 5 260 MHz – 5 320 MHz 40 MHz_BW : 5 270 MHz – 5 310 MHz 80 MHz_BW : 5 290 MHz
	UNII 2C	20 MHz_BW : 5 500 MHz – 5 720 MHz 40 MHz_BW : 5 510 MHz – 5 710 MHz 80 MHz_BW : 5 530 MHz – 5 690 MHz
	UNII 3	20 MHz_BW : 5 745 MHz – 5 825 MHz 40 MHz_BW : 5 755 MHz – 5 795 MHz 80 MHz_BW : 5 775 MHz
RF Output Power	802.11a : 20.22 dBm (105.20 mW) 802.11n_HT20 : 19.15 dBm (82.22 mW) 802.11n_HT40 : 19.57 dBm (90.57 mW) 802.11ac_VHT20 : 20.13 dBm (103.04 mW) 802.11ac_VHT40 : 19.54 dBm (89.95 mW) 802.11ac_VHT80 : 21.85 dBm (153.11 mW) 802.11ax_HE20 : 18.56 dBm (71.78 mW) 802.11ax_HE40 : 18.92 dBm (77.98 mW) 802.11ax_HE80 : 19.05 dBm (80.35 mW)	
Antenna Specification	Antenna type : Metal Antenna	
	UNII 1, UNII 2A	Peak Gain : 1.36 dBi (ANT L), 1.95 dBi (ANT R)
	UNII 2C, UNII 3	Peak Gain : 1.49 dBi (ANT L), 1.98 dBi (ANT R)
Antenna Configurations	802.11a : SISO(ANT L, ANT R) 802.11n : SISO(ANT L, ANT R), MIMO(ANT L+ANT R) 802.11ac : SISO(ANT L, ANT R), MIMO(ANT L+ANT R) 802.11ax : SISO(ANT L, ANT R), MIMO(ANT L+ANT R)	
Type of Modulation	802.11a/n/ac : OFDM 802.11ax : OFDMA	
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 300 Mbps 802.11ac : up to 867 Mbps	

	802.11ax : up to 1 200 Mbps
Power Source	DC 5 V
Hardware Rev	V2.1
Software Rev	FC 3
Dynamic Frequency Selection	Slave without radar detection

RF Power setting in Test SW

Mode		Frequency Band	Power Setting Value
802.11a		UNII 1	13.0
		UNII 2A	14.5
		UNII 2C	10.0
		UNII 3	14.0
802.11n_HT20		UNII 1	7.0
		UNII 2A	11.0
		UNII 2C	11.0
		UNII 3	13.0
802.11n_HT40		UNII 1	11.0
		UNII 2A	12.0
		UNII 2C	11.0
		UNII 3	15.0
802.11ac_VHT20		UNII 1	7.0
		UNII 2A	11.0
		UNII 2C	11.0
		UNII 3	12.0
802.11ac_VHT40		UNII 1	11.0
		UNII 2A	13.0
		UNII 2C	11.0
		UNII 3	15.0
802.11ac_VHT80		UNII 1	11.0
		UNII 2A	15.5
		UNII 2C	14.0
		UNII 3	16.0
802.11ax _HE20	26T	UNII 1	-1.0
		UNII 2A	3.5
		UNII 2C	4.0
		UNII 3	8.0
	52T	UNII 1	1.5
		UNII 2A	6.0
		UNII 2C	6.5
		UNII 3	8.0
	106T	UNII 1	4.5
		UNII 2A	9.5
		UNII 2C	7.5
		UNII 3	10.0
	242T	UNII 1	7.5

		UNII 2A	11.5
		UNII 2C	9.5
		UNII 3	12.0
802.11ax _HE40	26T	UNII 1	-0.5
		UNII 2A	4.5
		UNII 2C	4.5
		UNII 3	9.0
	52T	UNII 1	2.5
		UNII 2A	7.0
		UNII 2C	7.0
		UNII 3	9.0
	106T	UNII 1	5.5
		UNII 2A	10.5
		UNII 2C	8.5
		UNII 3	10.0
	242T	UNII 1	8.0
		UNII 2A	11.5
		UNII 2C	9.0
		UNII 3	11.0
	484T	UNII 1	9.5
		UNII 2A	12.0
		UNII 2C	9.0
		UNII 3	14.0
802.11ax _HE80	26T	UNII 1	-0.5
		UNII 2A	4.5
		UNII 2C	4.5
		UNII 3	8.0
	52T	UNII 1	2.0
		UNII 2A	7.0
		UNII 2C	7.0
		UNII 3	7.0
	106T	UNII 1	5.0
		UNII 2A	10.0
		UNII 2C	10.5
		UNII 3	9.0
	242T	UNII 1	8.5
		UNII 2A	11.0
		UNII 2C	11.0
		UNII 3	10.0
	484T	UNII 1	9.5
		UNII 2A	11.5
		UNII 2C	9.0
		UNII 3	11.0
	996T	UNII 1	9.5
		UNII 2A	10.5

		UNII 2C	9.0
		UNII 3	12.5

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-LA40	-
Note Computer	Samsung Electronics Co., Ltd.	NT-RC530-WS55	HPFG91EC300116B
AC/DC Adapter	Samsung Electronics Co., Ltd.	PA-1600-66	-

1.4 Model Differences

Not applicable

2. Accreditations

2.1 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A
KOREA	NRRA	KR0025

2.2 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
15.407 (e)	6 dB Bandwidth	> 500 kHz (5 725 – 5 850 MHz)	C	Conducted
15.407 (a)	26 dB Bandwidth and 99% Bandwidth	NA	C	
15.407 (a)(1),(2),(3)	Conducted Output Power	< 250 mW (5 150 – 5 250 MHz) < 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < 1 W (5 725 – 5 850 MHz)	C	
15.407 (a)(1),(2),(3)	Power Spectral Density	< 11 dBm/MHz (5 150 – 5 250 MHz) < 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < 30 dBm/500 KHz (5 725 – 5 850 MHz)	C	
15.407 (g)	Frequency Stability	NA	C	
15.407 (b)	Undesirable emission	< -27 dBm/MHz EIRP (5 150 – 5 250 MHz, 5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < -27 dBm/MHz EIRP < 10 dBm/MHz EIRP < 15.6 dBm/MHz EIRP < 27 dBm/MHz EIRP (5 725 – 5 850 MHz)	C	Radiated
15.205, 15.407 (b)(9),(10)	Radiated Spurious Emission	15.209(a)	C	
15.407 (b)(9)	AC Conducted Emissions	15.207(a)	C	Line Conducted
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				
Note 2: The data in this test report are traceable to the national or international standards.				
Note 3: The sample was tested according to the following specification: FCC Part 15.407, ANSI C63.10-2013				
Note 4: The tests were performed according to the method of measurements prescribed in KDB No.789033, KDB No.987594				

3.2 Mode of operation during the test

The EUT is operated in a manner representative of the typical of the equipments.
During at testing, system components were manipulated within the confines of typical usage to maximize each emission.
For WLAN function, the engineering test program was provided and enabled to make EUT continuous transmit.
All modulation modes were tests. The results are only attached worst cases.

The Output power and Power Spectral Density for the 802.11 ax mode were investigated between all different tones, and we found that the highest tone had the highest output power and lowest tone had the highest PSD readings. Therefore, full testing was performed on both the highest and lowest tones.

Test Frequency & Bandwidth

- 802.11a, 802.11n_HT20, 802.11ac_VHT20, 802.11ax_HE20

	Lowest channel	Middle channel	Highest channel
UNII 1	5 180 MHz	5 200 MHz	5 240 MHz
UNII 2A	5 260 MHz	5 300 MHz	5 320 MHz
UNII 2C	5 500 MHz	5 600 MHz	5 700 MHz, 5 720 MHz
UNII 3	5 745 MHz	5 785 MHz	5 825 MHz

- 802.11n_HT40, 802.11ac_VHT40, 802.11ax_HE40

	Lowest channel	Middle channel	Highest channel
UNII 1	5 190 MHz	-	5 230 MHz
UNII 2A	5 270 MHz	-	5 310 MHz
UNII 2C	5 510 MHz	5 590 MHz	5 670 MHz, 5 710 MHz
UNII 3	5 755 MHz	-	5 795 MHz

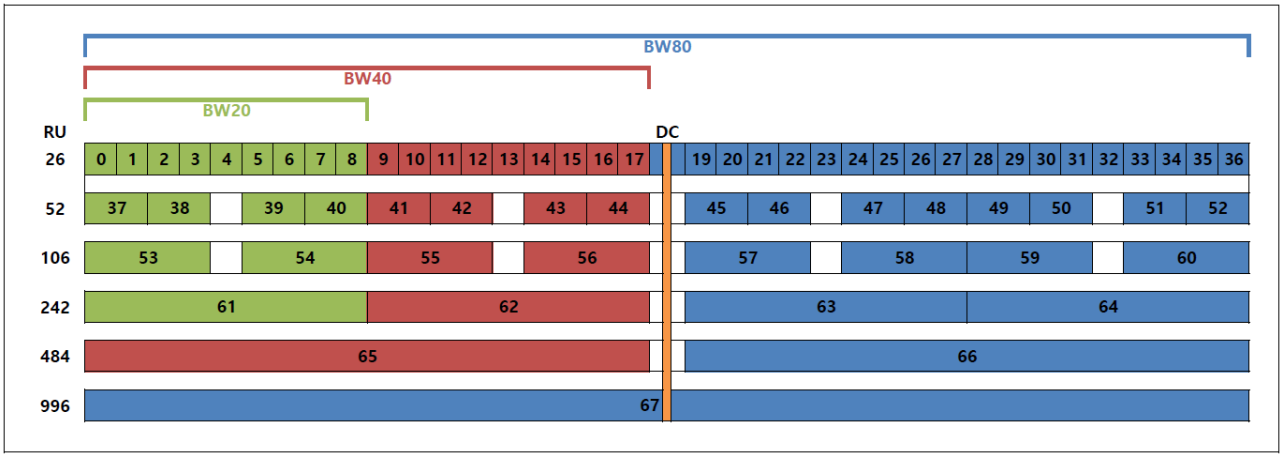
- 802.11ac_VHT80, 802.11ax_HE80

	Lowest channel	Middle channel	Highest channel
UNII 1	5 210 MHz	-	-
UNII 2A	5 290 MHz	-	-
UNII 2C	5 530 MHz	5 610 MHz	5 690 MHz
UNII 3	5 775 MHz	-	-

Test mode & Worst case

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	OFDM	6 Mbps	97.1 %	0.13 dB
802.11n_HT20	OFDM	MCS 0	96.9 %	0.13 dB
802.11n_HT40		MCS 0	93.8 %	0.28 dB
802.11ac_VHT20		MNSS 0	94.2 %	0.26 dB
802.11ac_VHT40		MNSS 0	89.1 %	0.50 dB
802.11ac_VHT80		MNSS 0	81.5 %	0.89 dB
802.11ax_HE20_26T	OFDMA	MCS 0	95.3 %	0.21 dB
802.11ax_HE20_52T			95.2 %	0.21 dB
802.11ax_HE20_106T			94.8 %	0.23 dB
802.11ax_HE20_242T			94.2 %	0.26 dB
802.11ax_HE40_26T			95.2 %	0.21 dB
802.11ax_HE40_52T			95.0 %	0.22 dB
802.11ax_HE40_106T			94.6 %	0.24 dB
802.11ax_HE40_242T			94.0 %	0.27 dB
802.11ax HE40 484T			93.8 %	0.28 dB
802.11ax HE80 26T			95.3 %	0.21 dB
802.11ax HE80 52T			95.1 %	0.22 dB
802.11ax HE80 106T			94.8 %	0.23 dB
802.11ax HE80 242T			94.0 %	0.27 dB
802.11ax HE80 484T			94.0 %	0.27 dB
802.11ax HE80 996T			93.6 %	0.29 dB

802.11ax RU Locations



Test RU Index for Tones

Mode	Tones	RU Index	
802.11ax_HE20	26T	Low	0
		Mid	4
		High	8
	52T	Low	37
		Mid	39
		High	40
	106T	Low	53
		Mid	-
		High	54
	242T / SU	61 / NA	61 / NA
802.11ax_HE40	26T	Low	0
		Mid	9
		High	17
	52T	Low	37
		Mid	41
		High	44
	106T	Low	53
		Mid	55
		High	56
	242T	Low	61
		Mid	-
		High	62
	484T / SU	65 / NA	65 / NA
802.11ax_HE80	26T	Low	0
		Mid	18
		High	36
	52T	Low	37
		Mid	45
		High	52
	106T	Low	53
		Mid	57
		High	60
	242T	Low	61
		Mid	63
		High	64
	484T	Low	65
		Mid	-
		High	66
	996T / SU	67 / NA	67 / NA

Full RU(Resource Unit) mode and SU(Single Unit) mode have no difference in physical waveform. This Report has been reported the Full RU(Resource Unit) mode with worst output power.

3.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

3.4 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.
Coverage factor k = 2, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB (C.L.: Approx. 95 %, k = 2)
Power Spectral Density	1.5 dB (C.L.: Approx. 95 %, k = 2)
Occupied Bandwidth	0.1 MHz (C.L.: Approx. 95 %, k = 2)
Unwanted Emission(conducted)	3.0 dB (C.L.: Approx. 95 %, k = 2)
Radiated Emissions (f ≤ 1 GHz)	3.88 dB (C.L.: Approx. 95 %, k = 2)
Radiated Emissions (f > 1 GHz)	4.50 dB (C.L.: Approx. 95 %, k = 2)
Line Conducted Emission	2.08 dB (C.L.: Approx. 95 %, k = 2)

3.5 Test Software

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	EP5RE Ver. 6.0.1.0, ES10 Ver. 10.001
Line Conducted Test	EMC32 Ver. 10.50.00

4. Technical Characteristic Test

4.1 6dB Bandwidth

Test Procedures

KDB 789033 – Section C.2
ANSI C63.10-2013 - Section 6.9.2

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.

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = 100 kHz
b) VBW ≥ 3 x RBW
c) Detector = peak
d) Trace mode = Max hold
e) Sweep = auto couple
f) Allow trace to fully 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.

Minimum Standard:

6 dB Bandwidth	>	500 kHz

Test Data:

ANT L

	6 dB Bandwidth (MHz)			
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20	802.11ax_HE20_242T
5 745 MHz	16.33	16.83	17.27	18.78
5 785 MHz	16.27	17.15	17.29	18.66
5 825 MHz	16.36	17.55	17.18	18.44
Measurement uncertainty	± 0.1 MHz			

	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE20_26T		
Frequency	Low	Mid	High
5 745 MHz	2.09	2.68	2.06
5 785 MHz	2.07	2.66	2.06
5 825 MHz	2.10	2.65	2.10
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11n_HT40	802.11ac_VHT40	802.11ax_HE40_484T
5 755 MHz	34.99	34.98	35.07
5 795 MHz	33.78	33.78	35.01
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE40_26T		
Frequency	Low	Mid	High
5 755 MHz	2.07	2.06	2.07
5 795 MHz	2.12	2.10	2.00
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11ac_VHT80	802.11ax_HE80_996T
5 775 MHz	75.12	75.12
Measurement uncertainty	± 0.1 MHz	

	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE80_26T		
Frequency	Low	Mid	High
5 775 MHz	2.08	2.16	2.06
Measurement uncertainty	± 0.1 MHz		

ANT R

	6 dB Bandwidth (MHz)			
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20	802.11ax_HE20_242T
5 745 MHz	15.99	17.57	17.59	18.69
5 785 MHz	16.35	17.58	17.54	18.70
5 825 MHz	16.34	17.59	17.61	18.81
Measurement uncertainty	± 0.1 MHz			

	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE20_26T		
Frequency	Low	Mid	High
5 745 MHz	2.13	2.66	2.12
5 785 MHz	2.05	2.66	2.08
5 825 MHz	2.08	2.67	2.08
Measurement uncertainty	± 0.1 MHz		

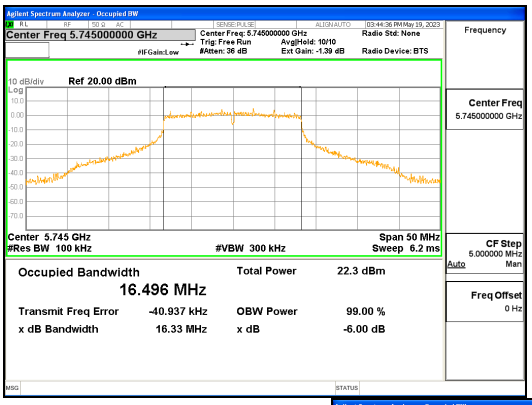
	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11n_HT40	802.11ac_VHT40	802.11ax_HE40_484T
5 755 MHz	32.57	35.01	33.85
5 795 MHz	33.82	35.00	35.12
Measurement uncertainty	± 0.1 MHz		

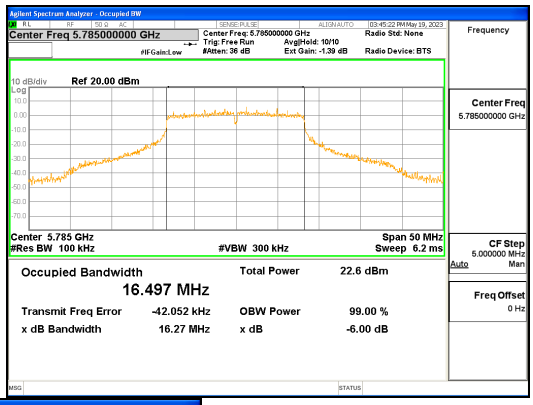
	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE40_26T		
Frequency	Low	Mid	High
5 755 MHz	2.11	2.10	2.11
5 795 MHz	2.06	2.13	2.13
Measurement uncertainty	± 0.1 MHz		

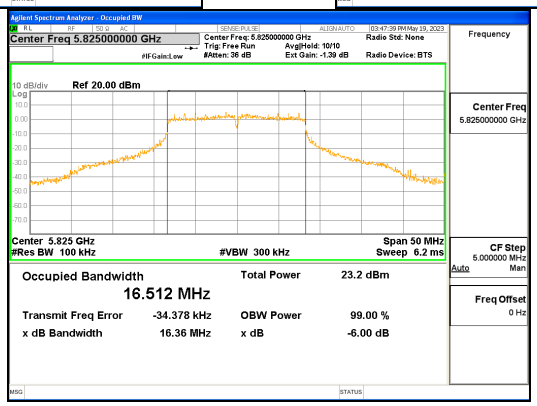
	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11ac_VHT80	802.11ax_HE80_996T
5 775 MHz	75.33	75.07
Measurement uncertainty	± 0.1 MHz	

	6 dB Bandwidth (MHz)		
Mode	802.11ax_HE80_26T		
Frequency	Low	Mid	High
5 775 MHz	1.92	2.16	2.11
Measurement uncertainty	± 0.1 MHz		

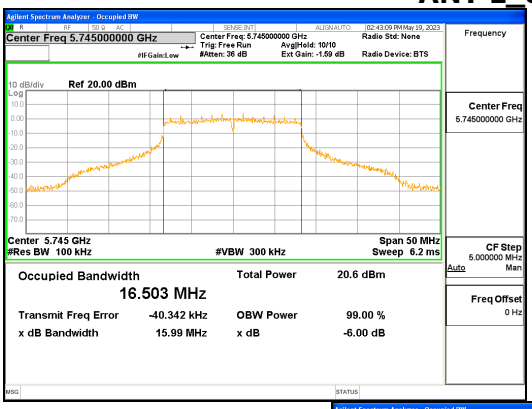
See next pages for actual measured spectrum plots.

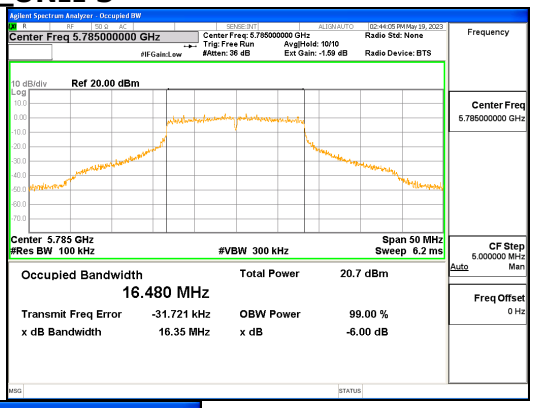


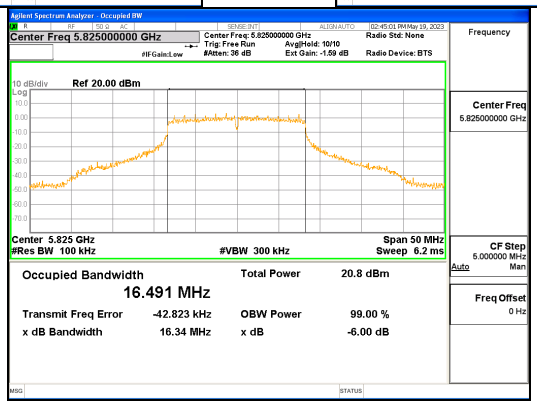




ANT L_802.11a_UNII 3







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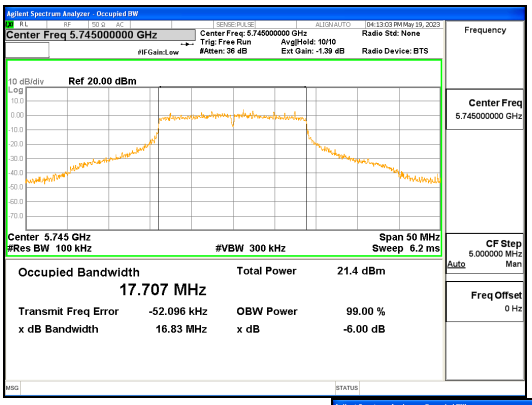
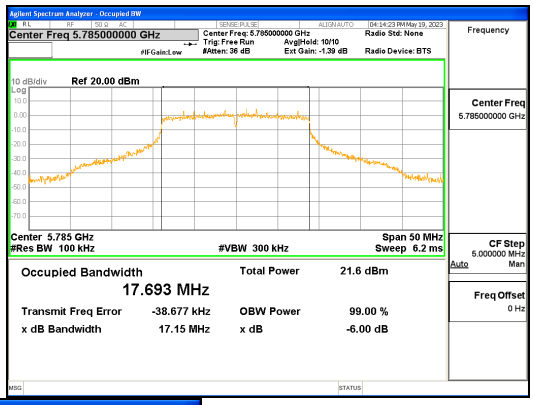
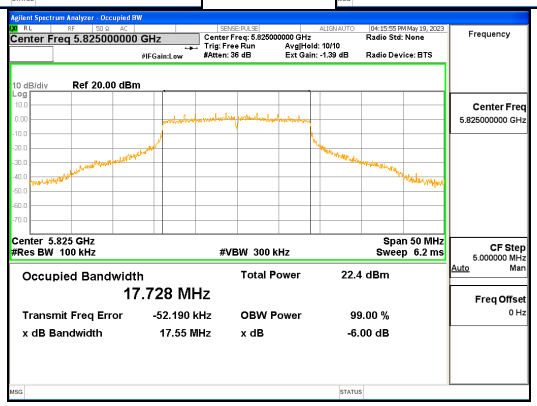
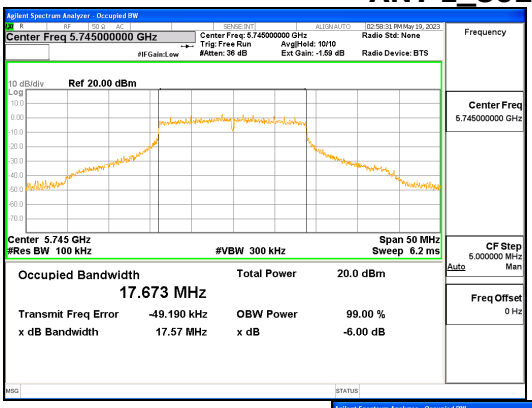
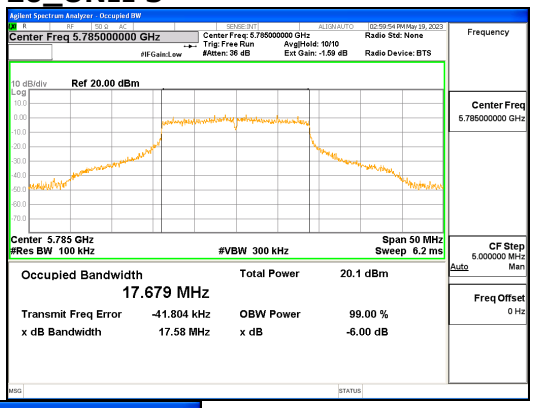


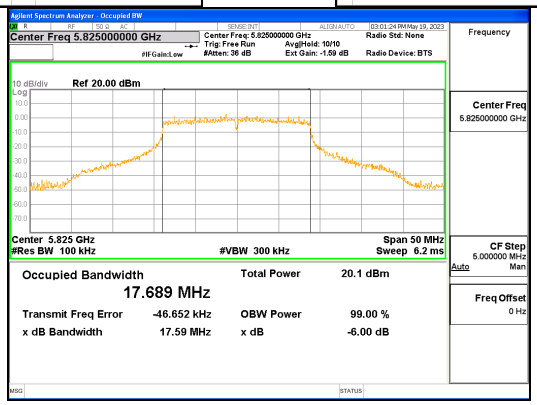




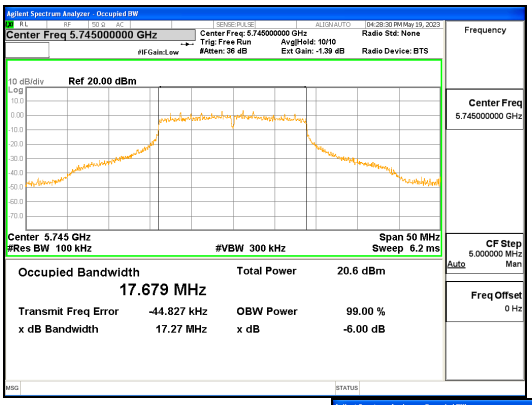
ANT L_802.11n_HT20_UNII 3

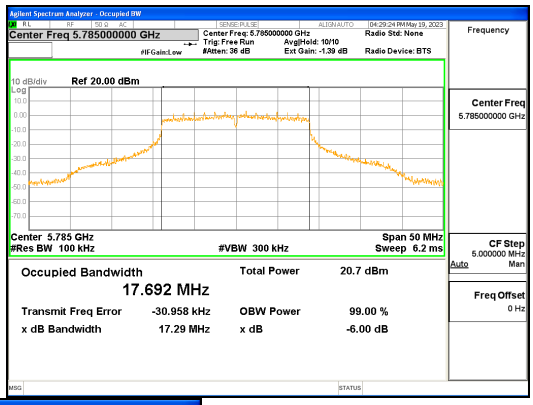


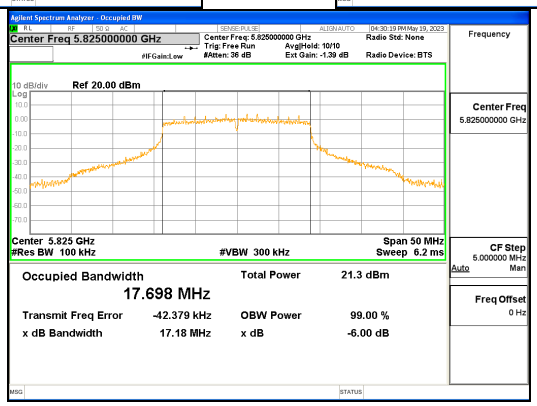




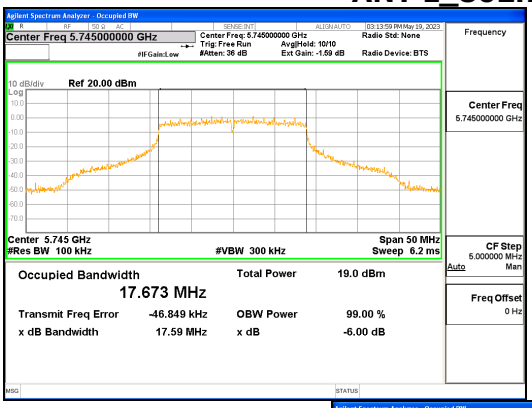
ANT R_802.11n_HT20_UNII 3

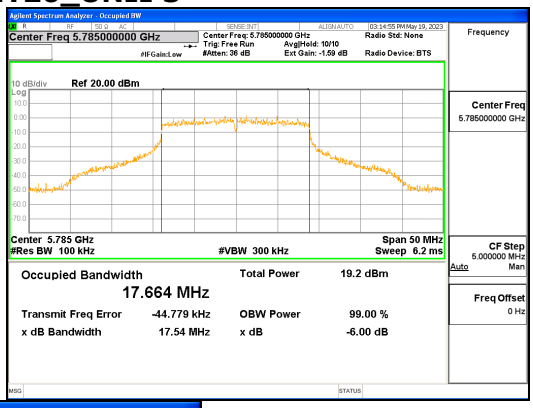


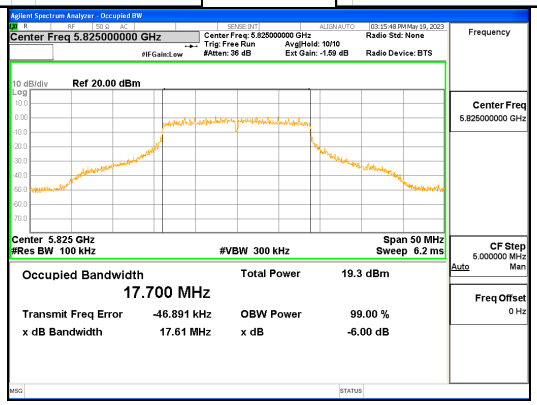




ANT L_802.11ac_VHT20_UNII 3







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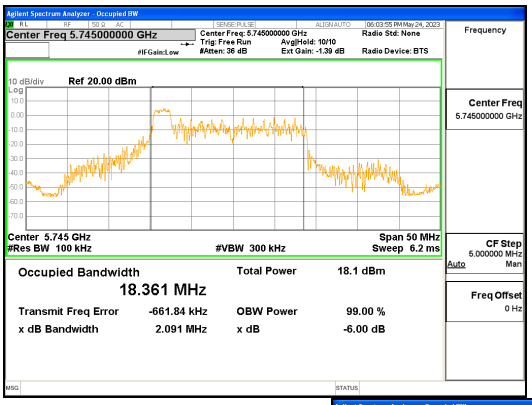
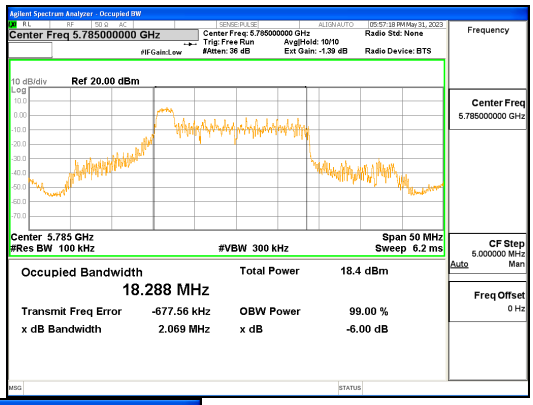
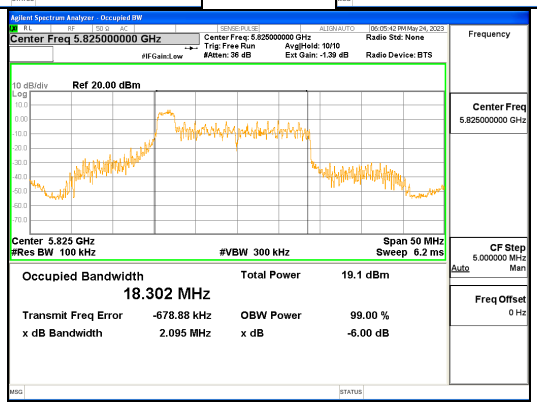
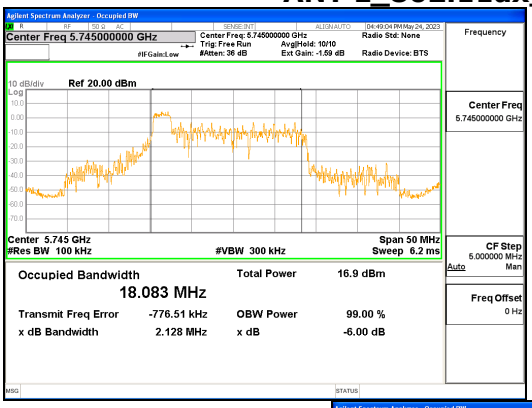
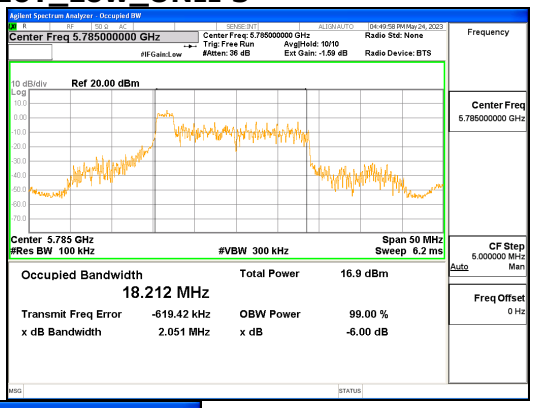


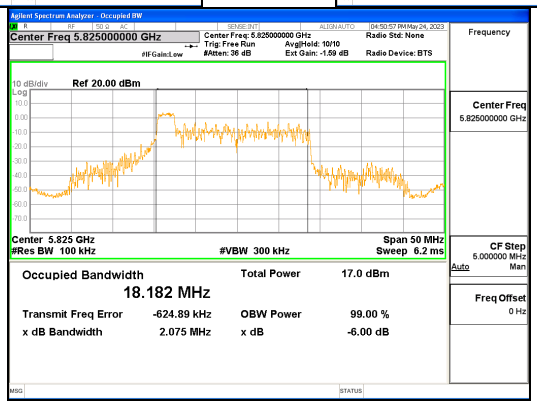




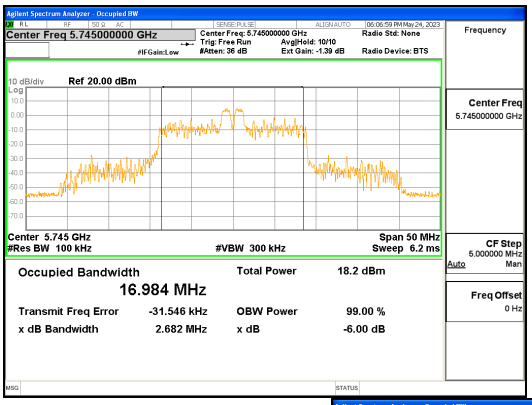
ANT L_802.11ax_HE20_26T_Low_UNII 3

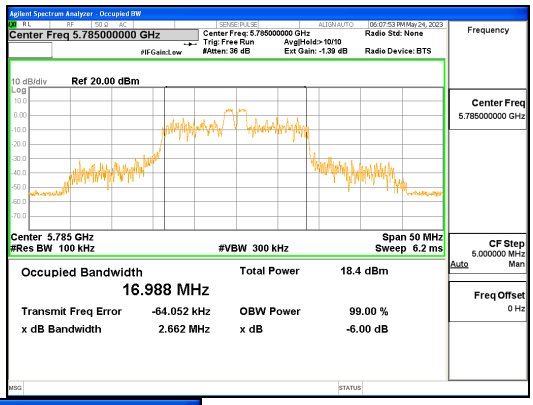


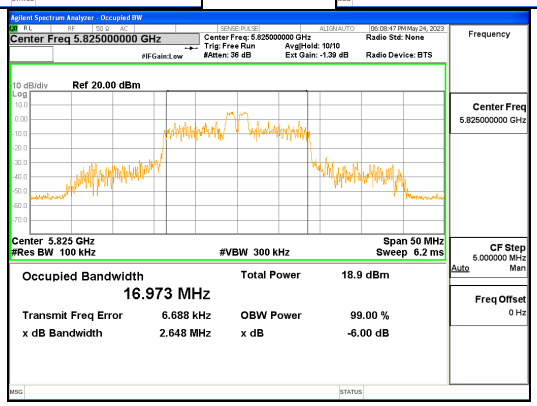




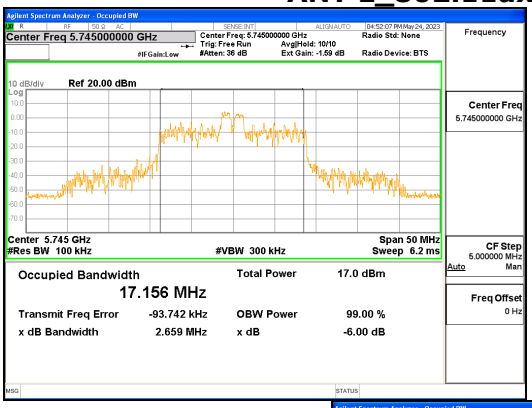
ANT R_802.11ax_HE20_26T_Low_UNII 3

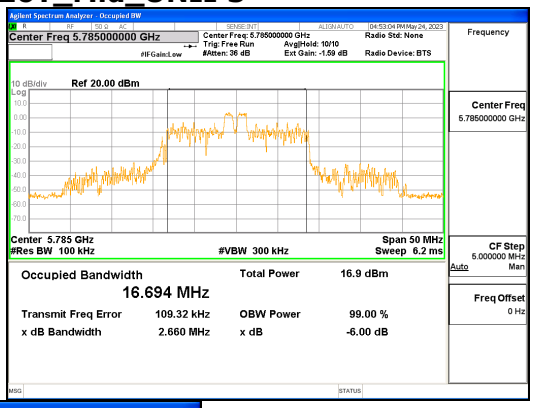


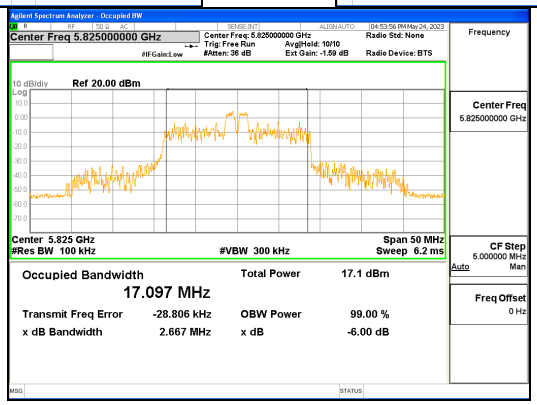




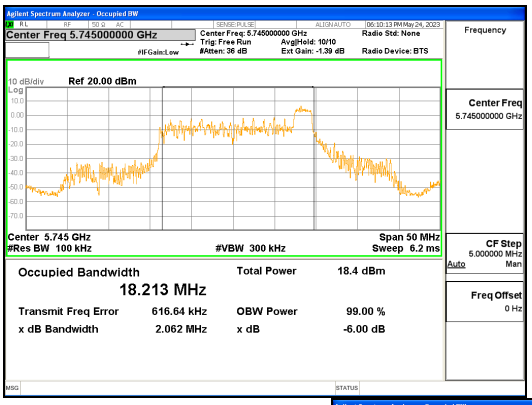
ANT L_802.11ax_HE20_26T_Mid_UNII 3

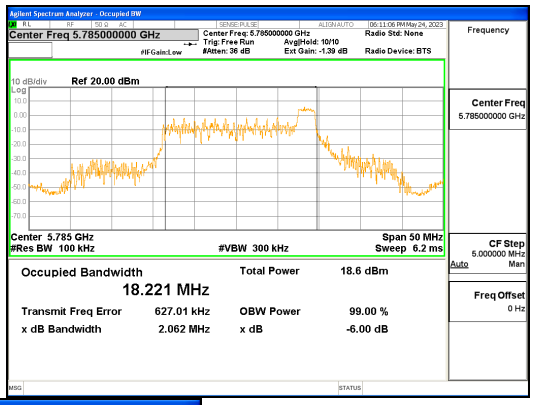


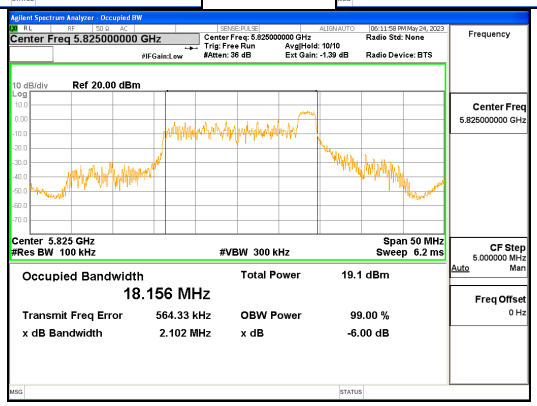




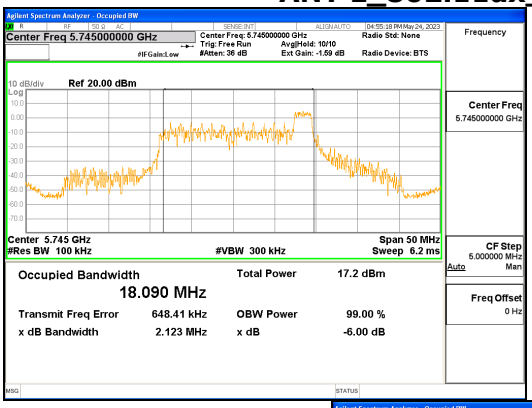
ANT R_802.11ax_HE20_26T_Mid_UNII 3

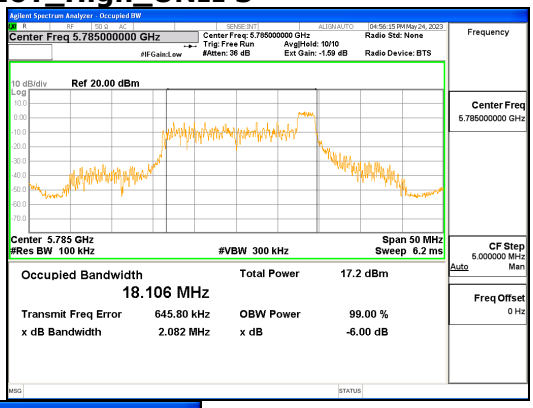


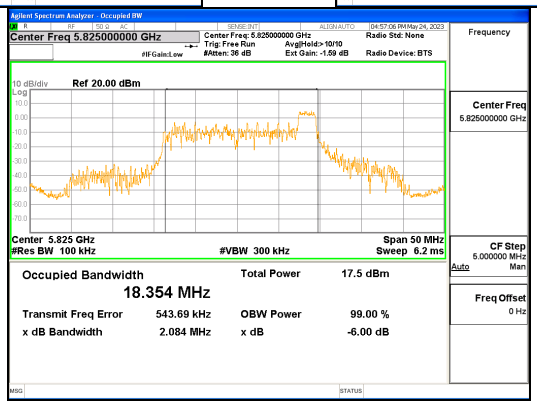




ANT L_802.11ax_HE20_26T_High_UNII 3







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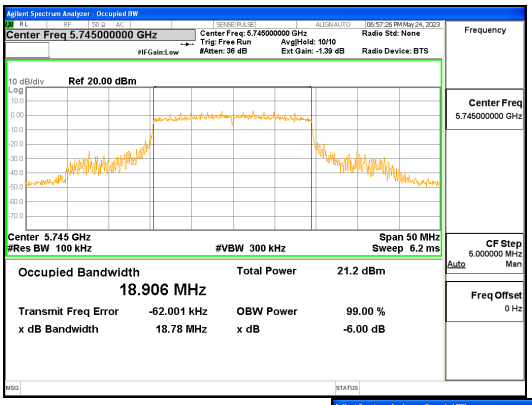
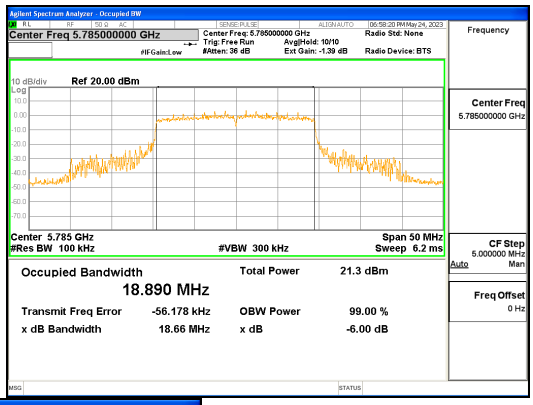
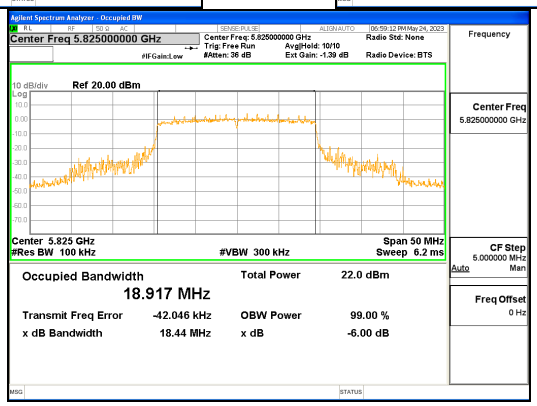
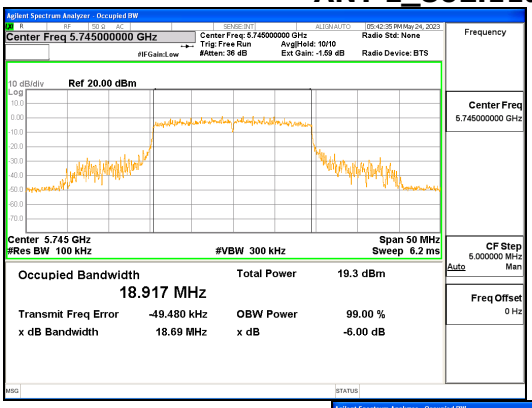
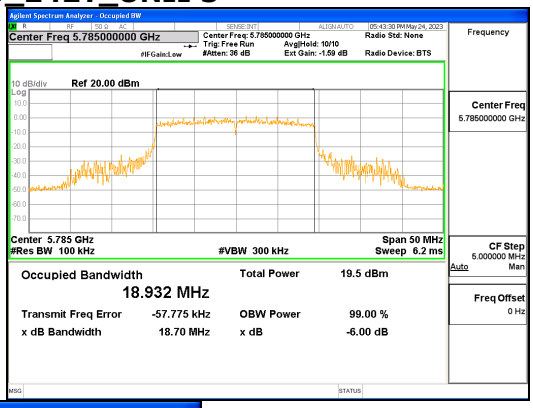


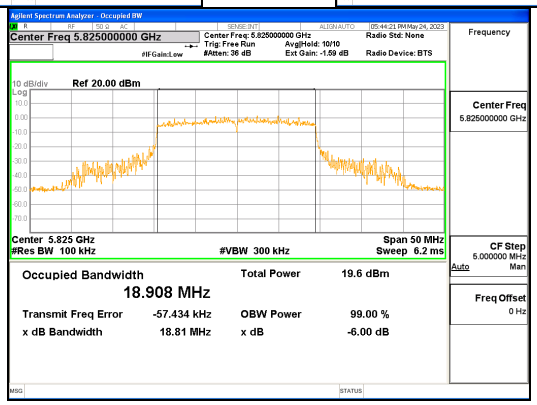




ANT L_802.11ax_HE20_242T_UNII 3







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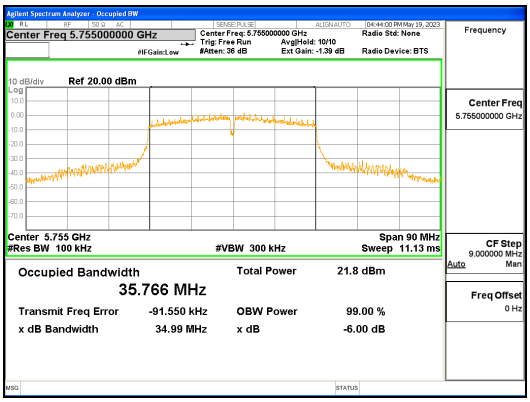
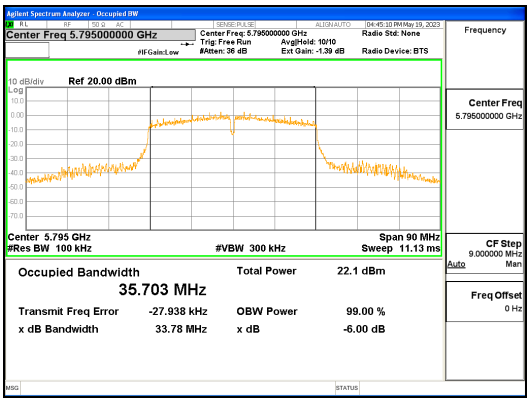
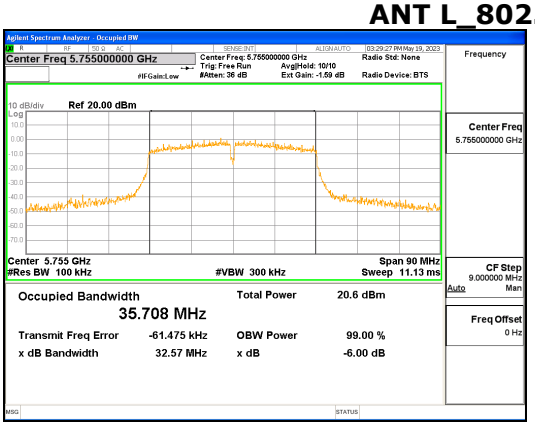
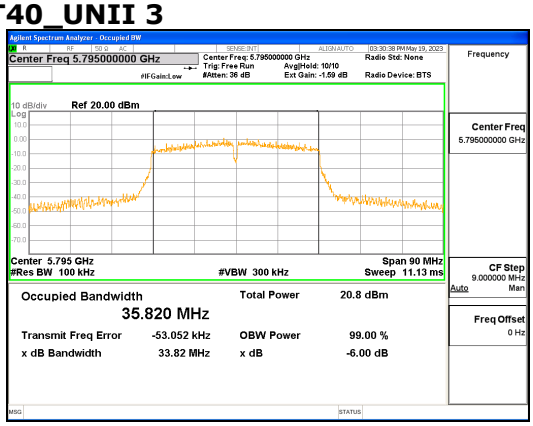




ANT L_802.11n_HT40_UNII 3





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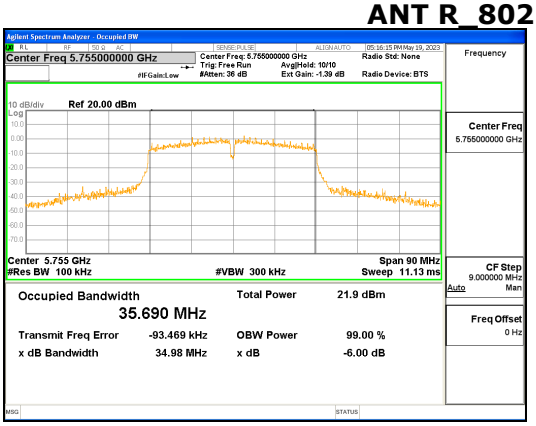
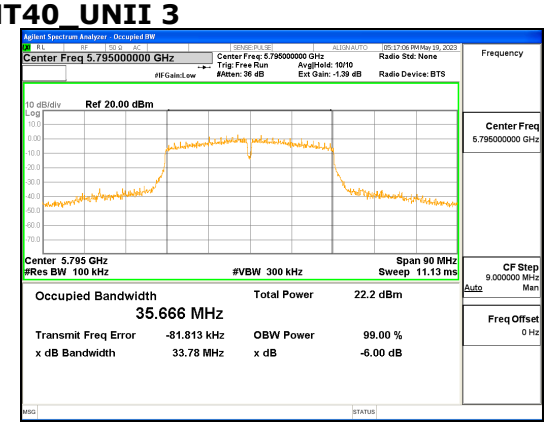
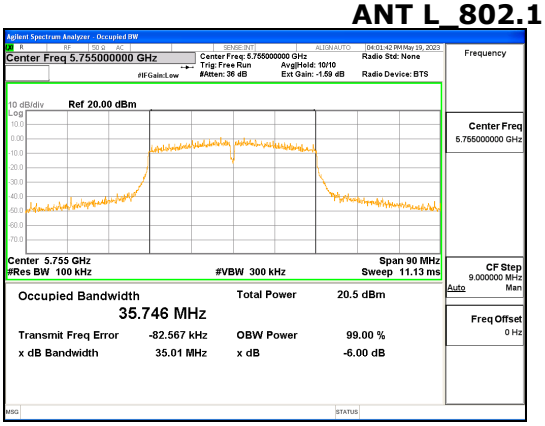
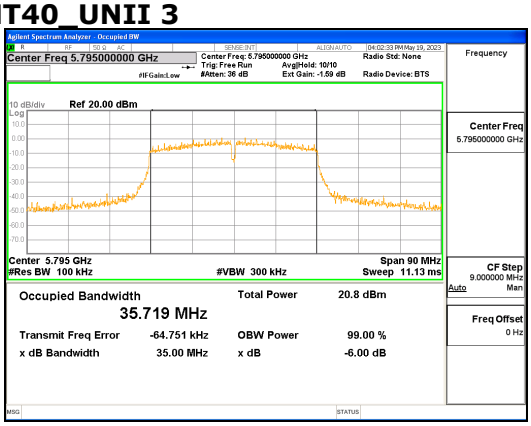




ANT L_802.11ac_VHT40_UNII 3





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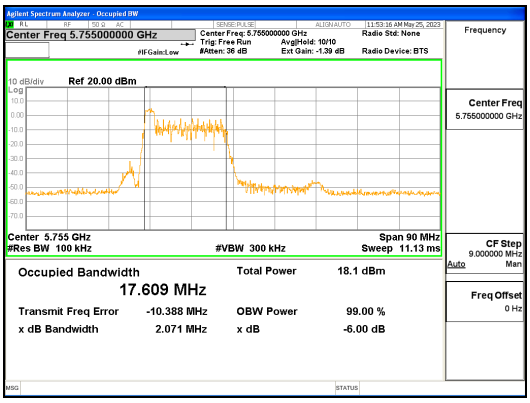
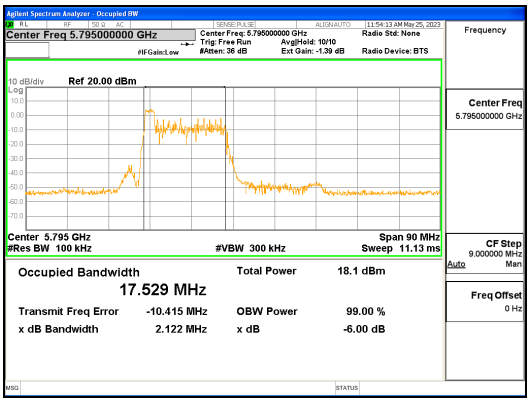
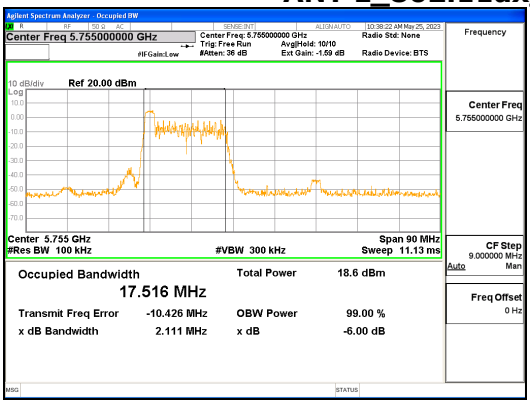
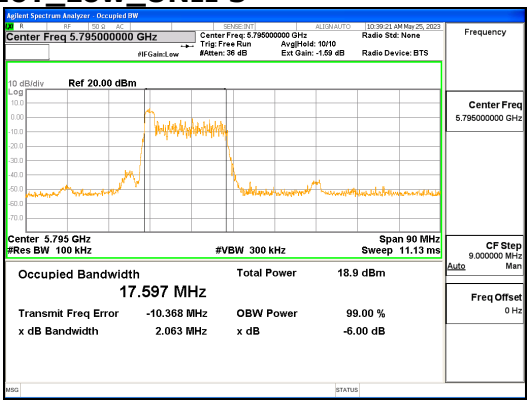


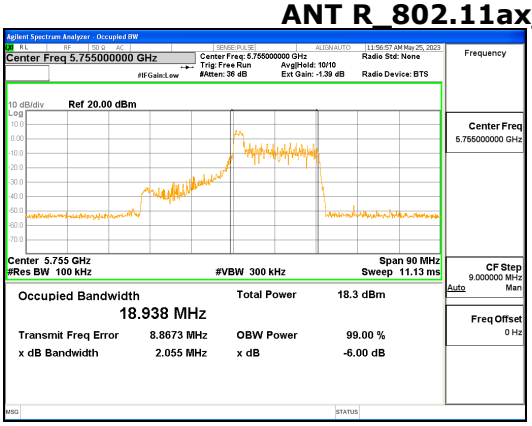


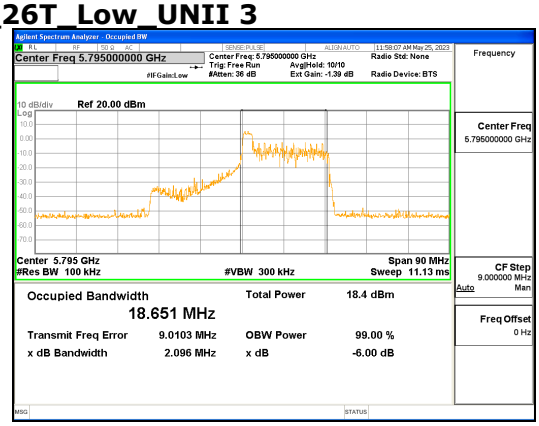
ANT L_802.11ax_HE40_26T_Low_UNII 3



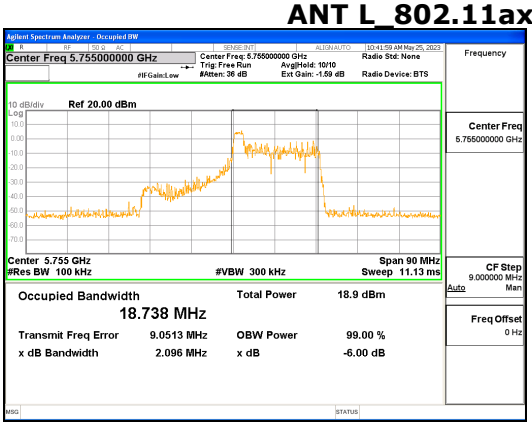


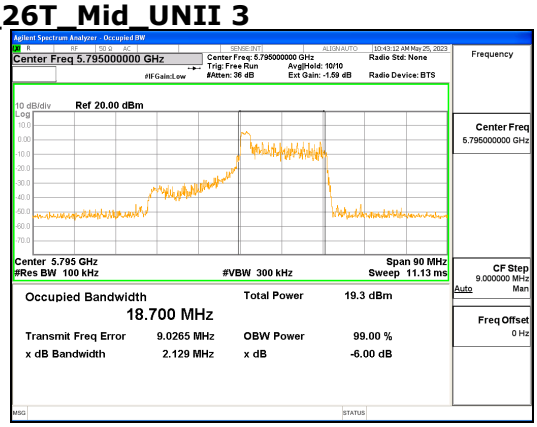
ANT R_802.11ax_HE40_26T_Low_UNII 3



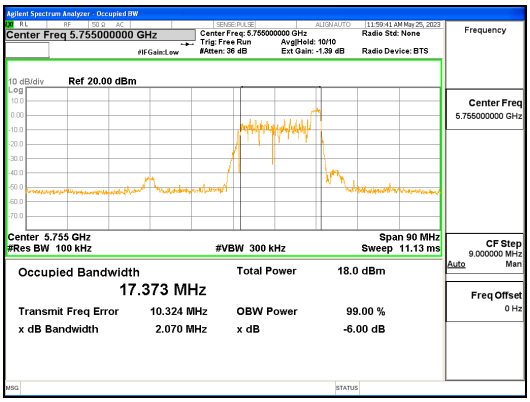


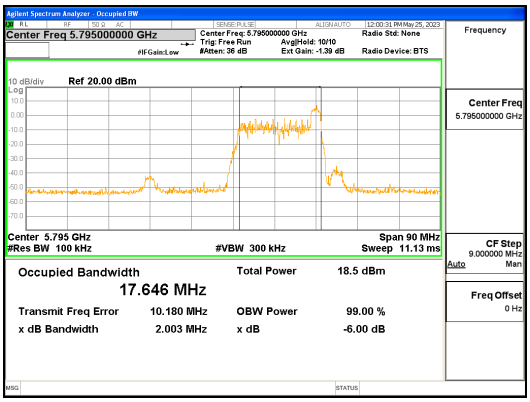
ANT L_802.11ax_HE40_26T_Mid_UNII 3



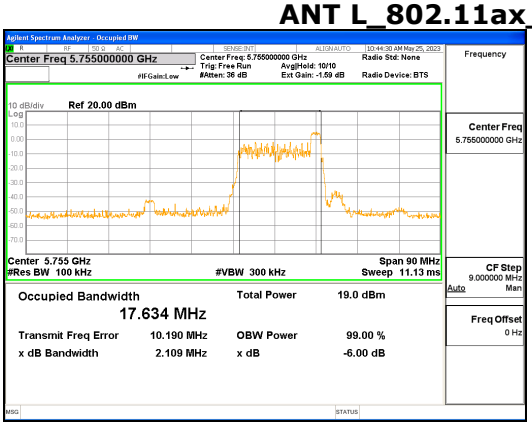


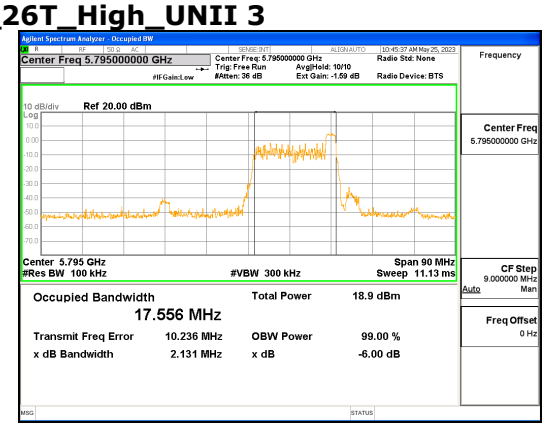
ANT R_802.11ax_HE40_26T_Mid_UNII 3



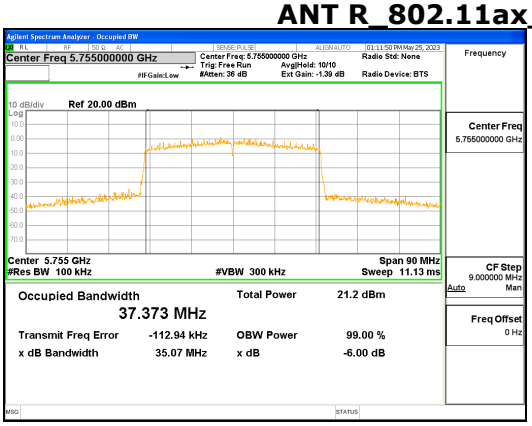


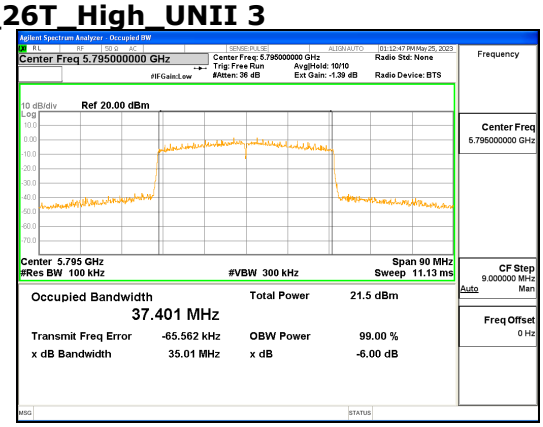
ANT L_802.11ax_HE40_26T_High_UNII 3



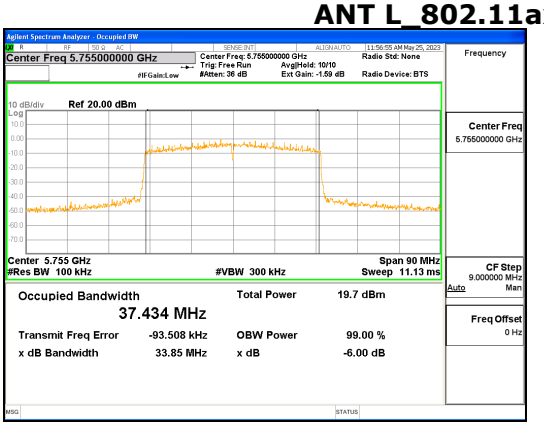


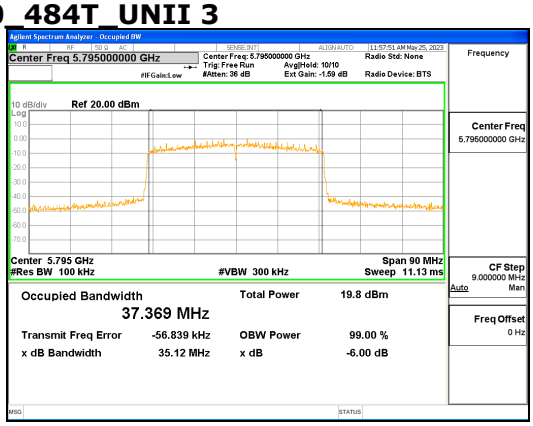
ANT R_802.11ax_HE40_26T_High_UNII 3





ANT L_802.11ax_HE40_484T_UNII 3





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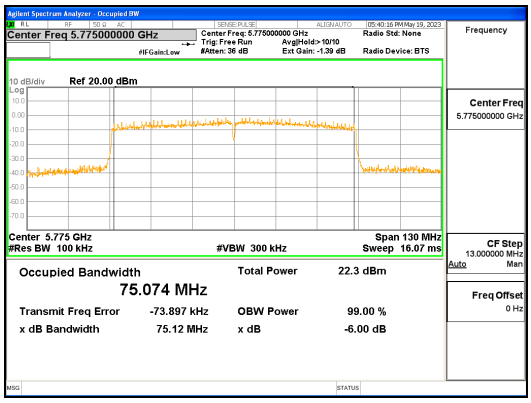
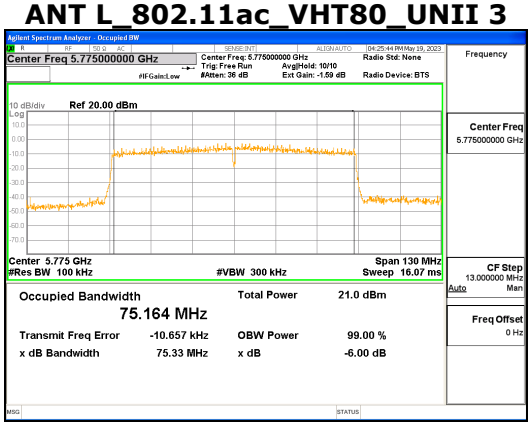


ANT L_802.11ac_VHT80_UNII 3



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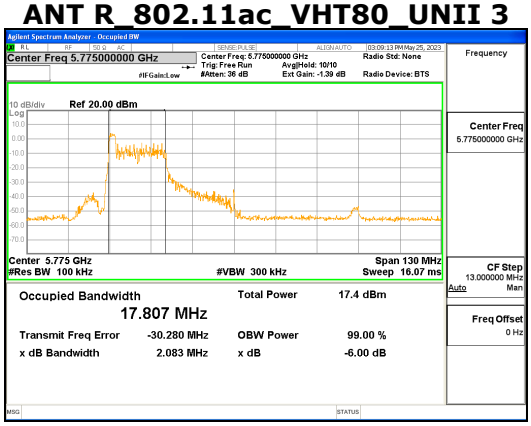

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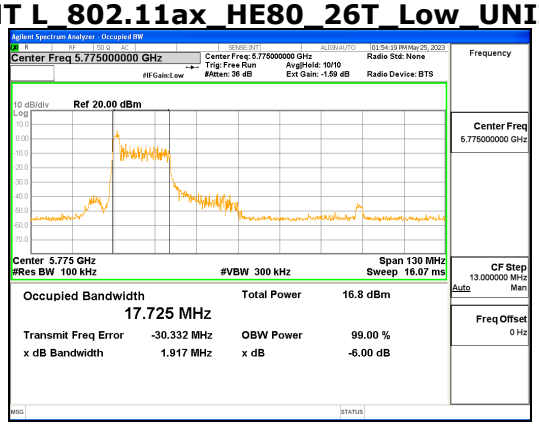
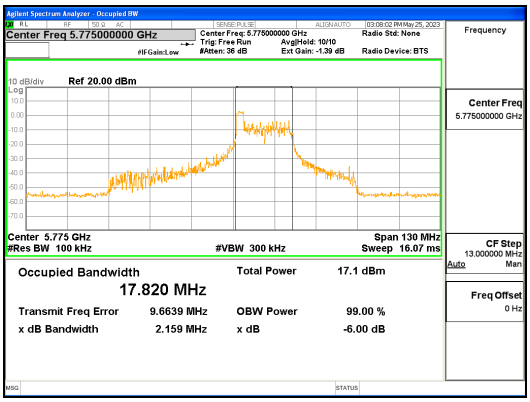
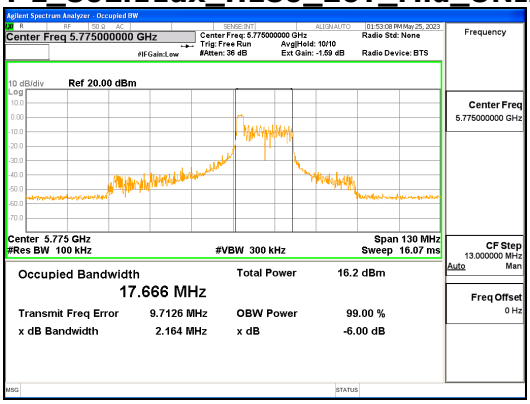


ANT R_802.11ax_HE80_26T_Low_UNII 3



ANT L_802.11ax_HE80_26T_Mid_UNII 3



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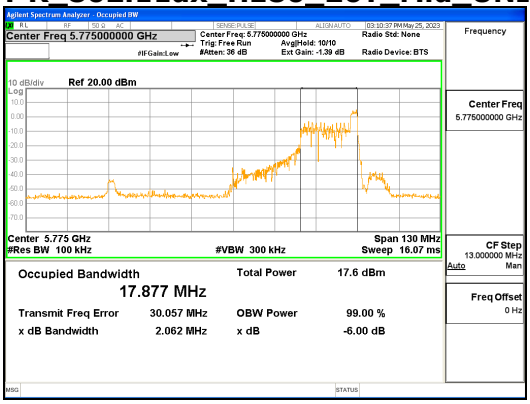
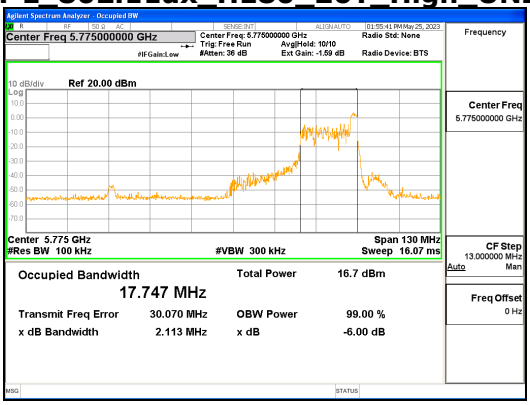


ANT L_802.11ax_HE80_26T_High_UNII 3



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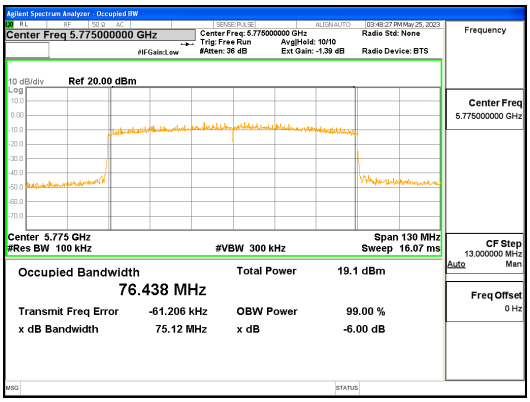
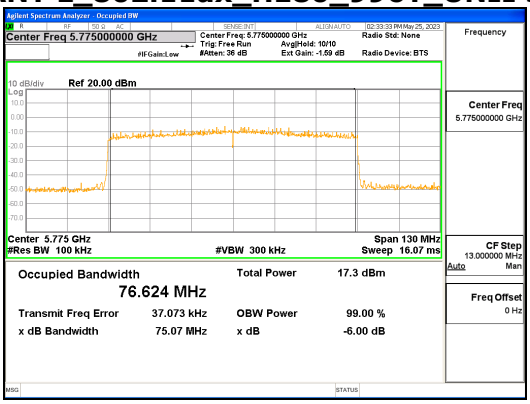


ANT L_802.11ax_HE80_996T_UNII 3



ANT R_802.11ax_HE80_996T_UNII 3

4.2 26 dB Bandwidth and 99% Bandwidth

Test Procedures

KDB 789033 – Section C.1
ANSI C63.10-2013 - Section 6.9.2

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 26 dB relative to the maximum level measured in the fundamental emission.

Test Procedures

KDB 789033 – Section C.1
ANSI C63.10-2013 - Section 6.9.3

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
Use the 99% power bandwidth function of the instrument and report the measured bandwidth.

Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = approximately 1 % of the emission bandwidth

b) 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 maximum 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%.

Minimum Standard:

NA

Test Data:

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	26 dB Bandwidth and 99 % Bandwidth (MHz)							
Mode	802.11a		802.11n_HT20		802.11ac_VHT20		802.11ax_HE20_242T	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 180 MHz	23.12	16.77	29.73	17.95	23.88	17.93	22.98	19.00
5 200 MHz	23.31	16.78	25.15	17.93	24.09	17.91	24.72	19.01
5 240 MHz	19.82	16.46	20.10	17.53	20.00	17.54	19.88	18.81
5 260 MHz	24.87	16.89	24.62	17.94	23.72	17.91	25.71	19.04
5 300 MHz	25.31	16.81	24.52	17.99	23.94	17.92	24.13	18.99
5 320 MHz	24.21	16.80	26.91	17.97	24.04	17.91	26.30	18.99
5 500 MHz	25.54	16.79	24.62	17.93	24.43	17.91	25.50	19.01
5 600 MHz	23.72	16.78	24.97	17.94	25.21	17.93	24.24	19.02
5 700 MHz	23.72	16.79	24.22	17.97	24.31	17.92	22.67	18.99
5 720 MHz	23.74	16.82	25.48	17.95	24.76	17.97	24.97	19.03
5 745 MHz	23.46	16.74	24.63	17.92	23.16	17.84	22.59	18.98
5 785 MHz	23.17	16.75	24.19	17.89	24.26	17.89	22.65	19.00
5 825 MHz	23.41	16.79	23.79	17.91	23.59	17.91	24.98	19.01
Measurement uncertainty	± 0.1 MHz							

	26 dB Bandwidth and 99 % Bandwidth (MHz)					
Mode	802.11ax_HE20_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 180 MHz	20.21	18.50	18.10	17.01	20.40	18.40
5 200 MHz	20.52	18.68	18.09	17.05	20.84	18.50
5 240 MHz	19.01	18.16	18.13	16.92	19.04	18.15
5 260 MHz	20.79	18.67	18.18	17.06	20.27	18.53
5 300 MHz	20.69	18.59	18.17	17.01	20.68	18.52
5 320 MHz	20.82	18.51	18.08	16.96	20.33	18.49
5 500 MHz	20.71	18.55	18.11	17.00	20.47	18.46
5 600 MHz	20.16	18.51	18.14	17.01	20.37	18.51
5 700 MHz	20.72	18.64	18.28	17.11	20.17	18.49
5 720 MHz	20.43	18.61	18.34	17.14	20.62	18.57
5 745 MHz	21.33	18.67	18.09	16.93	20.28	18.40

5 785 MHz	20.82	18.62	18.11	17.01	20.88	18.66
5 825 MHz	21.37	18.64	18.10	17.01	20.59	18.53
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11n_HT40		802.11ac_VHT40		802.11ax_HE40_484T	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 190 MHz	39.94	35.79	40.02	35.84	39.59	37.55
5 230 MHz	40.09	35.89	40.25	35.86	39.51	37.54
5 270 MHz	40.24	35.87	40.07	35.86	39.64	37.47
5 310 MHz	39.79	35.85	40.47	35.86	39.48	37.47
5 510 MHz	39.83	35.87	40.02	35.82	39.44	37.50
5 590 MHz	39.75	35.85	39.90	35.83	39.37	37.45
5 670 MHz	39.95	35.82	39.74	35.82	39.52	37.47
5 710 MHz	40.00	35.77	40.06	35.81	39.34	37.41
5 755 MHz	40.17	35.91	40.08	35.88	39.43	37.48
5 795 MHz	39.95	35.94	39.99	35.83	39.58	37.47
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11ax_HE40_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 190 MHz	19.13	17.88	22.67	20.16	19.14	17.89
5 230 MHz	19.15	17.90	22.14	20.10	19.06	17.87
5 270 MHz	19.33	17.90	22.60	20.14	19.30	17.91
5 310 MHz	19.24	17.90	22.31	20.15	19.34	18.01
5 510 MHz	19.06	17.90	22.11	19.99	19.46	18.03
5 590 MHz	19.02	17.86	21.74	19.98	19.41	17.97
5 670 MHz	19.01	17.79	22.24	20.09	19.31	17.94
5 710 MHz	19.25	17.89	22.39	20.37	19.12	17.92
5 755 MHz	19.18	17.87	22.95	20.33	19.23	17.88
5 795 MHz	19.15	17.94	21.80	20.16	19.25	17.97
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11ac_VHT80		802.11ax_HE80_996T	
Frequency	26 dB	99 %	26 dB	99 %
5 210 MHz	79.61	75.20	80.07	76.67
5 290 MHz	79.22	75.31	79.86	76.78
5 530 MHz	79.36	75.26	79.81	76.84
5 610 MHz	79.44	74.96	79.85	76.45
5 690 MHz	79.53	75.18	79.96	76.82
5 775 MHz	79.83	75.23	79.97	76.72
Measurement uncertainty	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11ax_HE80_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 210 MHz	20.46	18.54	23.66	20.68	20.39	18.76
5 290 MHz	20.32	18.45	24.41	20.91	20.16	18.77
5 530 MHz	20.36	18.51	23.85	20.53	20.79	18.90
5 610 MHz	20.35	18.56	22.66	20.73	20.84	19.29
5 690 MHz	20.46	18.52	22.89	20.99	20.59	18.83
5 775 MHz	20.59	18.69	22.89	20.90	20.39	18.87
Measurement uncertainty	± 0.1 MHz					

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	26 dB Bandwidth and 99 % Bandwidth (MHz)							
Mode	802.11a		802.11n_HT20		802.11ac_VHT20		802.11ax_HE20_242T	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 180 MHz	23.00	16.75	24.04	17.88	23.37	17.83	21.81	18.94
5 200 MHz	23.23	16.75	23.86	17.86	24.08	17.86	22.29	19.03
5 240 MHz	19.72	16.43	19.85	17.56	19.99	17.55	19.89	18.84
5 260 MHz	23.70	16.77	22.91	17.82	23.45	17.82	21.88	19.01
5 300 MHz	23.94	16.80	25.53	17.84	23.83	17.85	22.25	18.98
5 320 MHz	23.77	16.79	25.04	17.87	23.45	17.81	23.47	19.00
5 500 MHz	23.36	16.77	23.55	17.89	23.17	17.83	22.31	18.99
5 600 MHz	23.29	16.80	24.06	17.84	23.81	17.81	21.91	19.02
5 700 MHz	23.83	16.75	24.56	17.86	22.97	17.82	21.46	18.99
5 720 MHz	23.36	16.79	24.43	17.87	23.22	17.87	21.95	19.01
5 745 MHz	23.16	16.74	23.36	17.82	24.10	17.82	23.07	18.97
5 785 MHz	23.36	16.72	22.66	17.79	22.59	17.81	22.39	18.98
5 825 MHz	23.10	16.72	22.77	17.81	22.82	17.79	22.76	19.01
Measurement uncertainty	± 0.1 MHz							

	26 dB Bandwidth and 99 % Bandwidth (MHz)					
Mode	802.11ax_HE20_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 180 MHz	19.86	18.44	18.11	17.10	20.42	18.52
5 200 MHz	19.94	18.56	18.12	17.15	20.21	18.40
5 240 MHz	19.01	18.09	18.05	16.90	19.05	18.03
5 260 MHz	20.21	18.40	18.11	17.03	20.00	18.41
5 300 MHz	20.29	18.39	18.04	17.03	20.22	18.53
5 320 MHz	19.91	18.42	18.02	17.05	20.26	18.56
5 500 MHz	20.20	18.38	18.06	17.05	20.26	18.47
5 600 MHz	20.04	18.40	18.02	17.08	20.63	18.49
5 700 MHz	20.23	18.43	18.16	17.08	20.54	18.60
5 720 MHz	20.18	18.50	18.15	17.05	20.19	18.63
5 745 MHz	20.39	18.51	18.05	17.06	20.17	18.47
5 785 MHz	20.86	18.50	18.05	17.03	20.17	18.43
5 825 MHz	20.15	18.46	18.07	17.08	21.31	18.51
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11n_HT40		802.11ac_VHT40		802.11ax_HE40_484T	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 190 MHz	39.33	35.75	39.73	35.79	39.41	37.53
5 230 MHz	39.35	35.78	39.25	35.78	39.38	37.43
5 270 MHz	39.32	35.84	39.17	35.76	39.32	37.45
5 310 MHz	39.25	35.82	39.85	35.74	39.40	37.45
5 510 MHz	39.30	35.84	39.42	35.80	39.36	37.50
5 590 MHz	39.00	35.92	39.47	35.80	39.44	37.43
5 670 MHz	39.48	35.83	39.56	35.81	39.42	37.39
5 710 MHz	39.82	35.80	39.30	35.81	39.51	37.55
5 755 MHz	39.63	35.91	39.53	35.78	39.44	37.52
5 795 MHz	39.80	35.86	39.26	35.85	39.41	37.53
Measurement uncertainty	± 0.1 MHz					

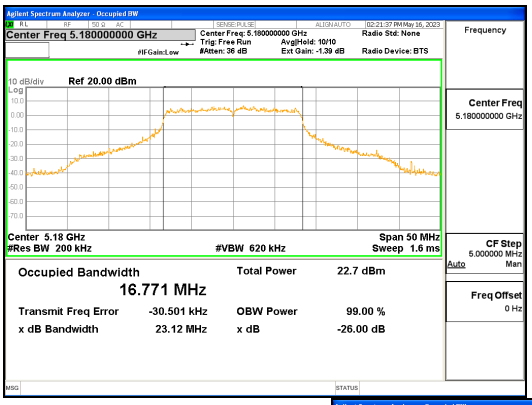
	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11ax_HE40_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 190 MHz	19.05	17.82	22.73	19.91	18.98	17.86
5 230 MHz	18.90	17.86	22.24	19.84	19.03	17.86
5 270 MHz	19.28	17.88	22.12	19.82	19.05	17.82
5 310 MHz	19.14	17.90	21.54	19.70	19.02	17.71
5 510 MHz	19.09	17.89	22.02	19.69	19.07	17.68
5 590 MHz	18.96	17.81	22.09	19.61	19.04	17.82
5 670 MHz	18.97	17.73	22.04	19.81	19.07	17.75
5 710 MHz	19.22	17.88	22.23	19.78	19.04	17.79
5 755 MHz	19.16	17.82	21.63	19.83	19.12	17.83
5 795 MHz	19.17	17.89	22.53	20.05	19.10	17.79
Measurement uncertainty	± 0.1 MHz					

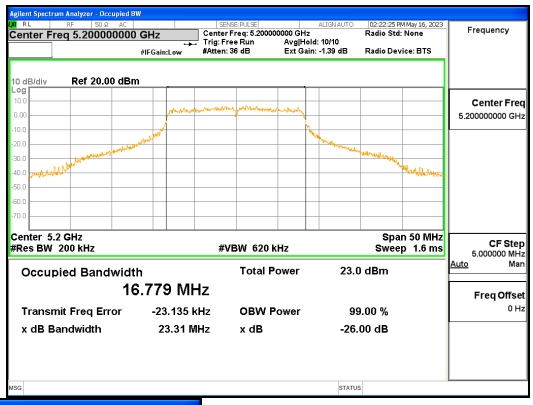
	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11ac_VHT80		802.11ax_HE80_996T	
Frequency	26 dB	99 %	26 dB	99 %
5 210 MHz	79.12	75.04	79.93	76.77
5 290 MHz	79.24	75.15	79.96	76.77
5 530 MHz	79.26	75.13	79.90	76.81
5 610 MHz	79.10	75.15	80.00	76.89
5 690 MHz	79.20	75.18	79.85	76.77
5 775 MHz	79.07	75.14	79.89	76.89
Measurement uncertainty	± 0.1 MHz			

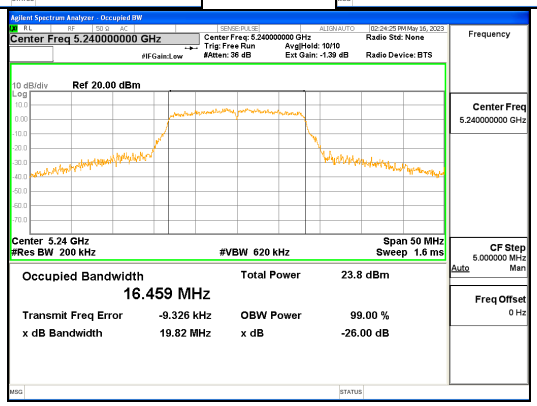
	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11ax_HE80_26T					
RU Index	Low		Mid		High	
Frequency	26 dB	99 %	26 dB	99 %	26 dB	99 %
5 210 MHz	19.65	18.31	22.49	20.33	19.54	18.28
5 290 MHz	19.66	18.25	22.28	20.19	19.62	18.31
5 530 MHz	20.14	18.39	22.65	20.40	19.72	18.32
5 610 MHz	20.03	18.30	22.16	20.18	19.57	18.34

5 690 MHz	19.68	18.27	22.27	20.19	19.46	18.34
5 775 MHz	19.83	18.30	21.79	19.85	19.59	18.29
Measurement uncertainty	± 0.1 MHz					

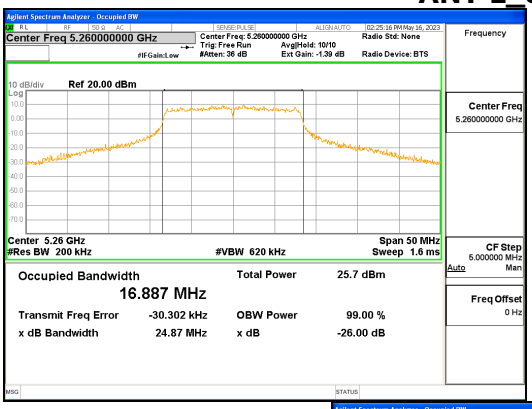
See next pages for actual measured spectrum plots.

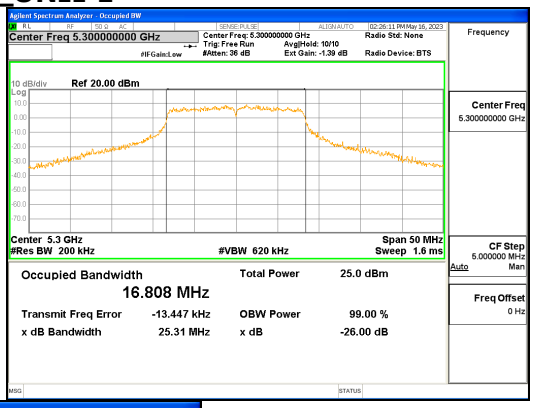


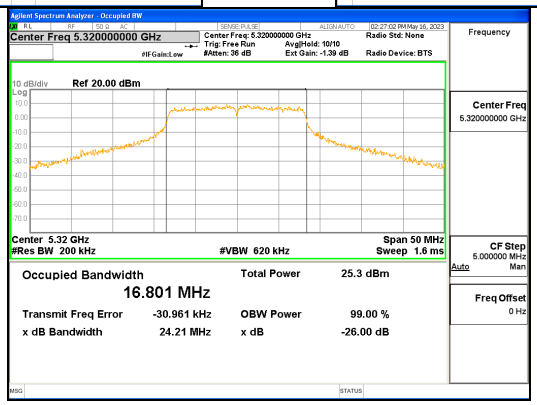




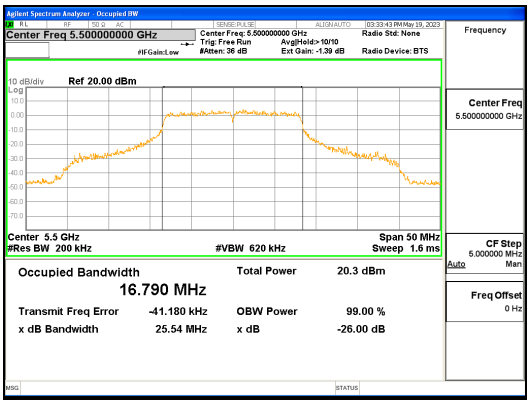
ANT L_802.11a_UNII 1

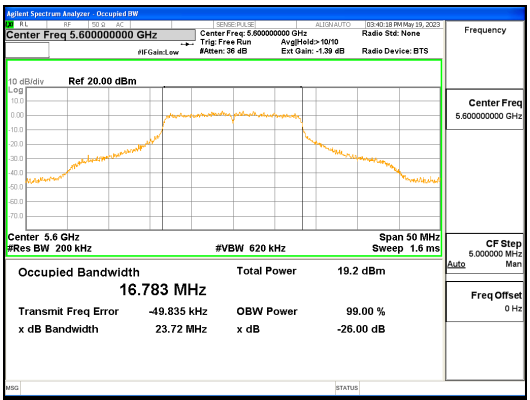


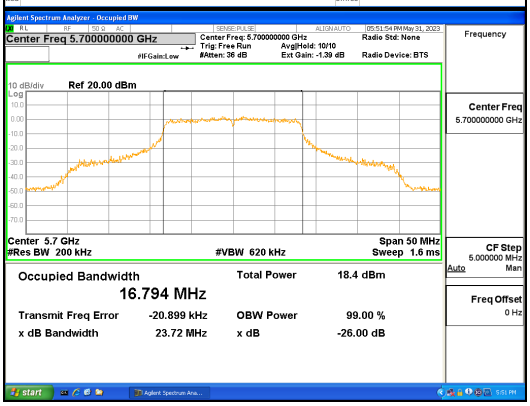


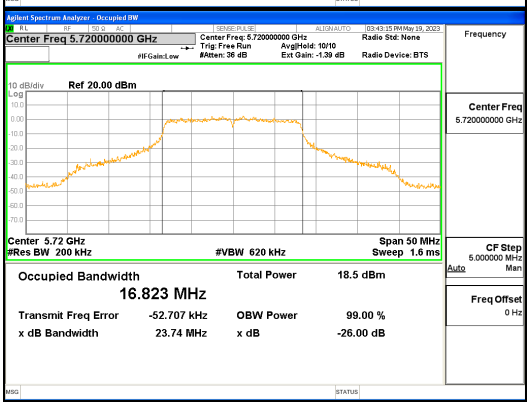


ANT L_802.11a_UNII 2A

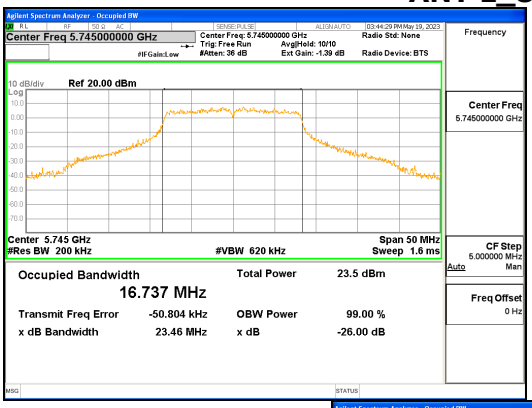


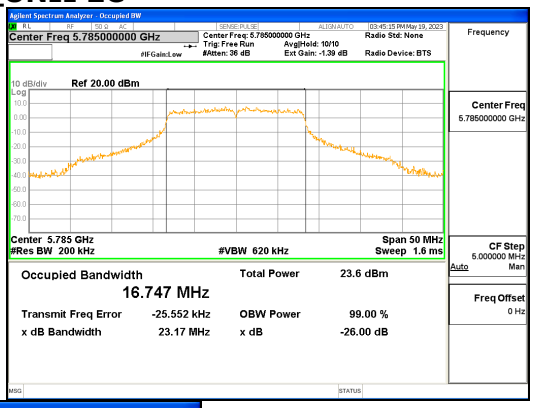


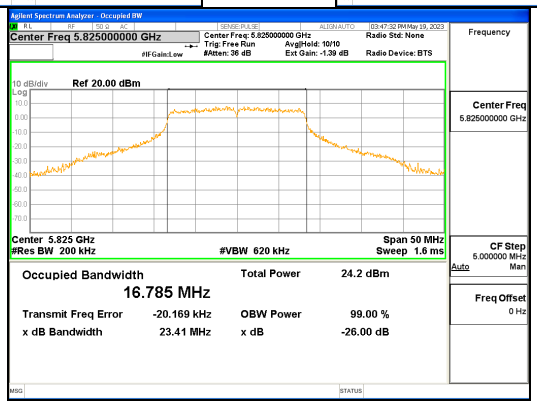




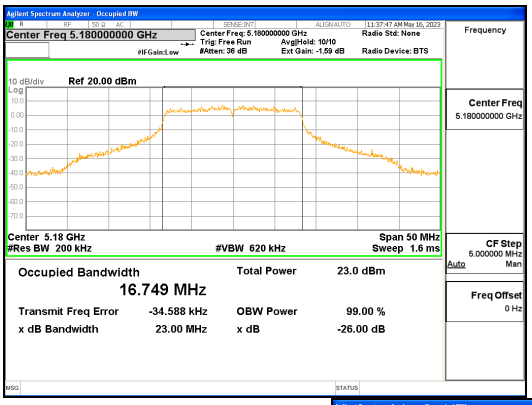
ANT L_802.11a_UNII 2C

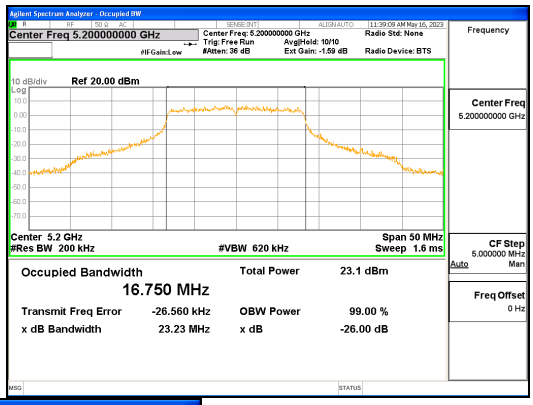


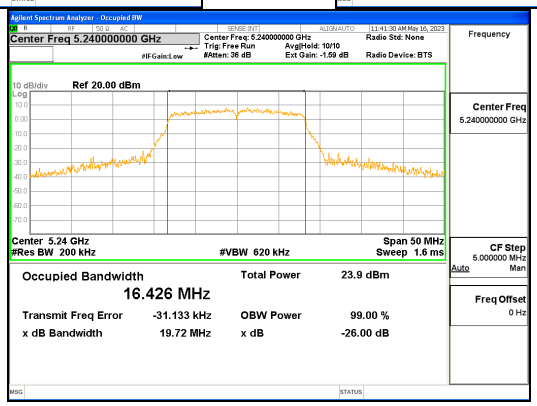




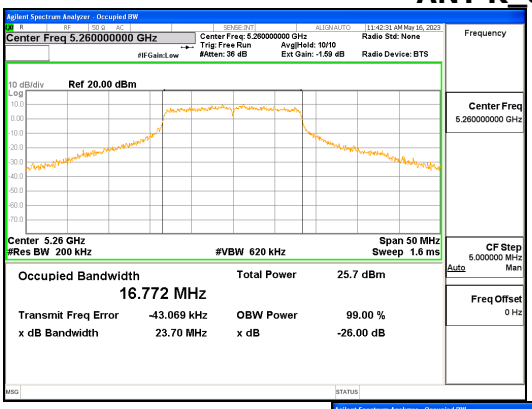
ANT L_802.11a_UNII 3

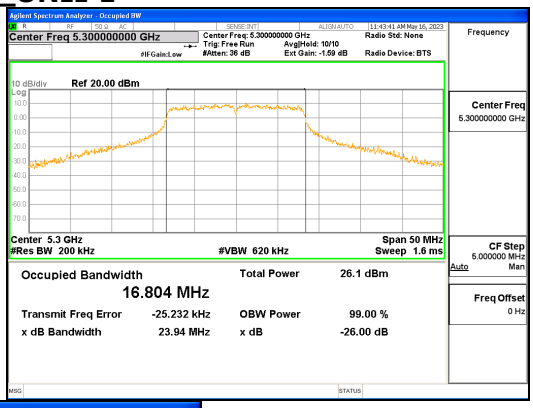


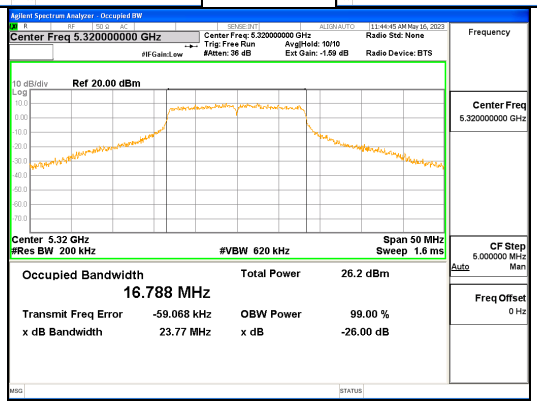




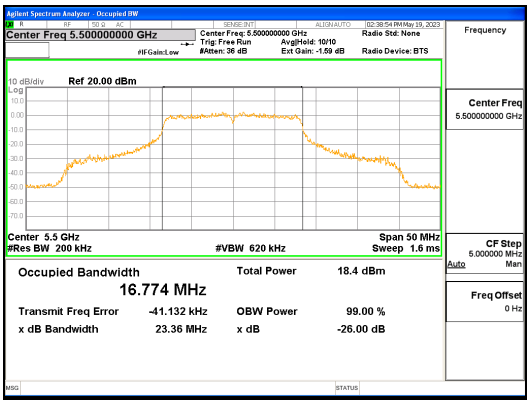
ANT R_802.11a_UNII 1

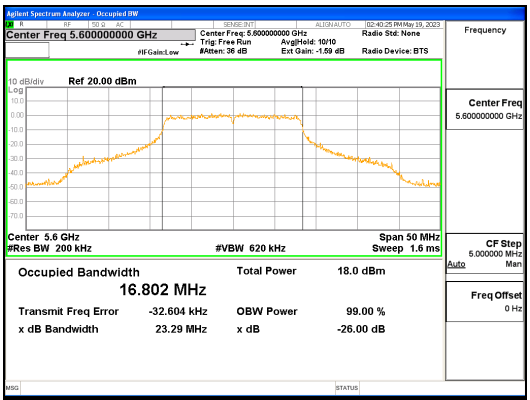


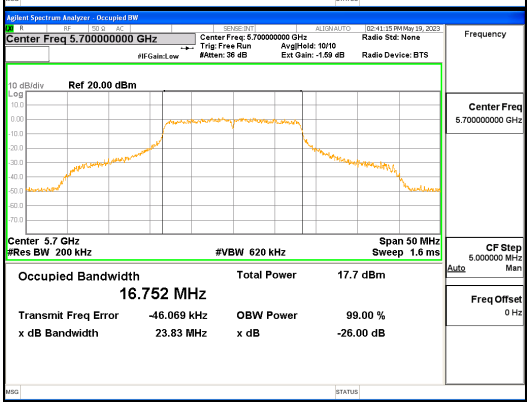


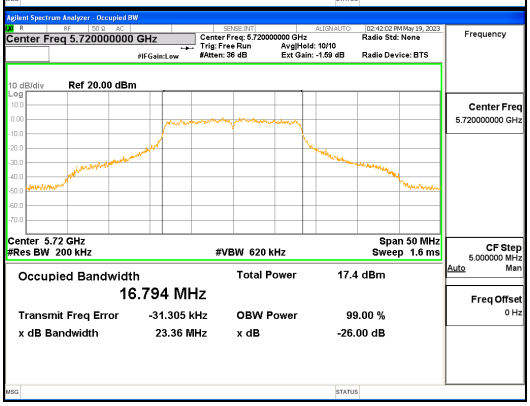


ANT R_802.11a_UNII 2A









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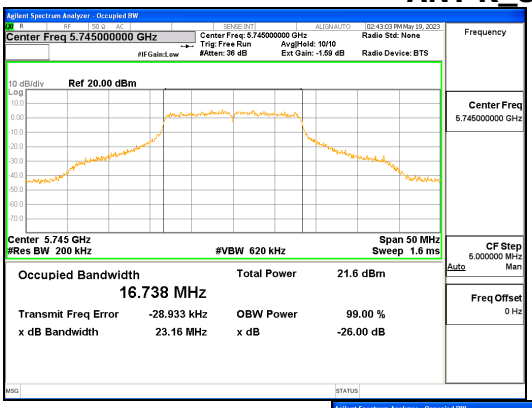
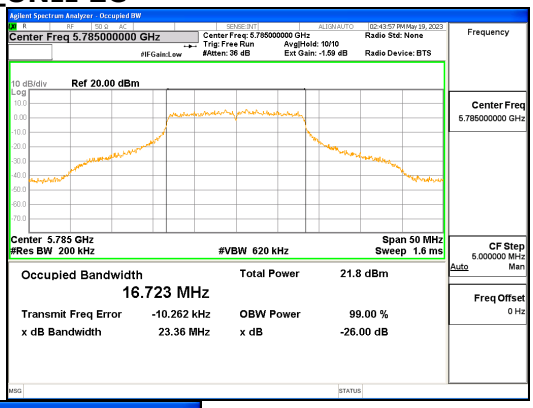
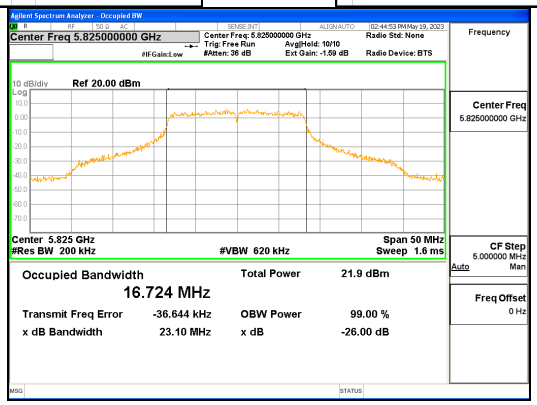
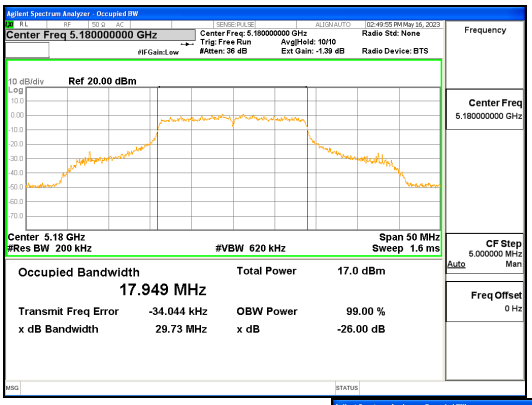
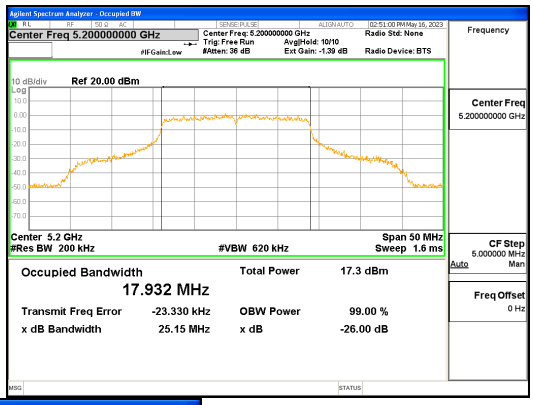


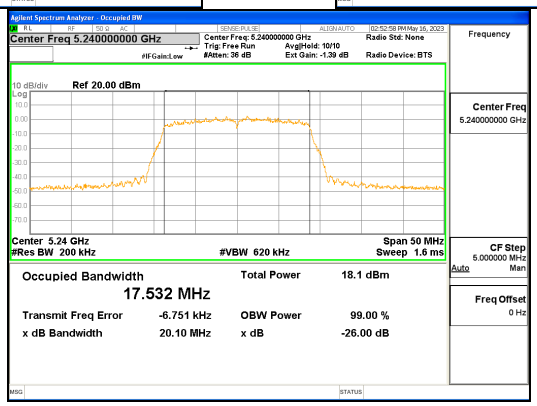




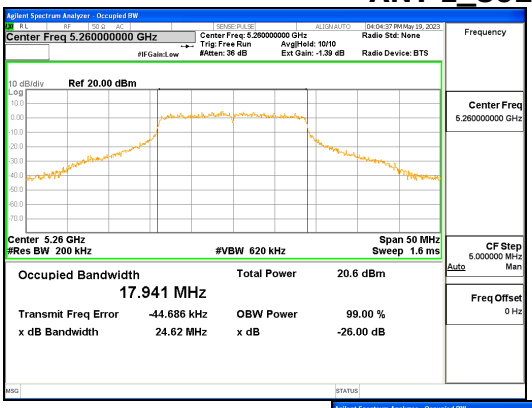
ANT R_802.11a_UNII 3

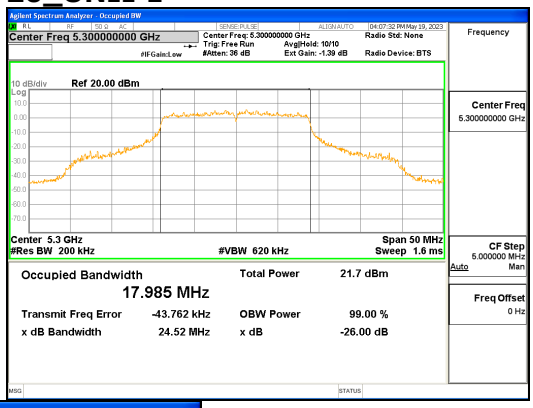


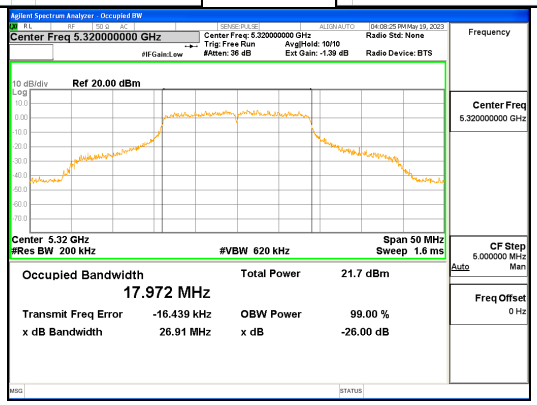




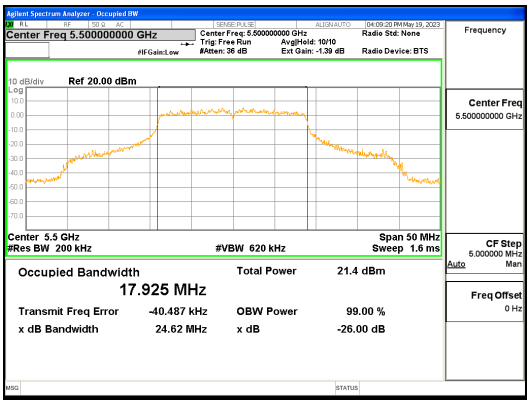
ANT L_802.11n_HT20_UNII 1

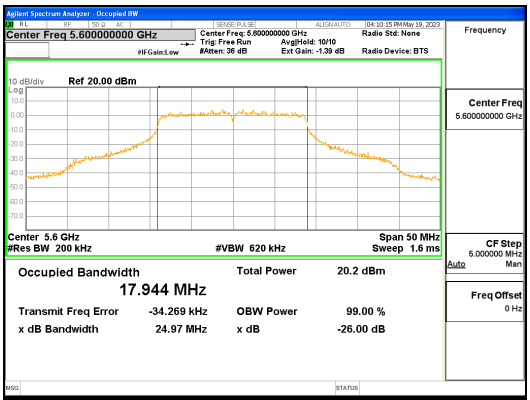


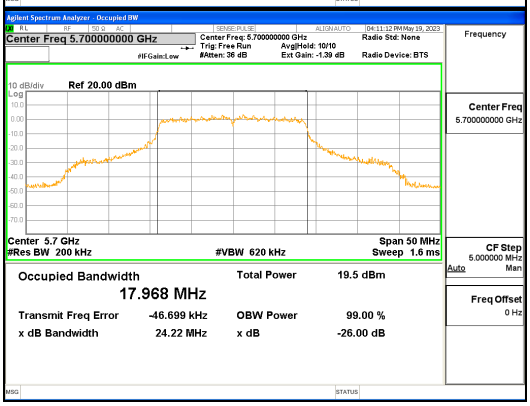


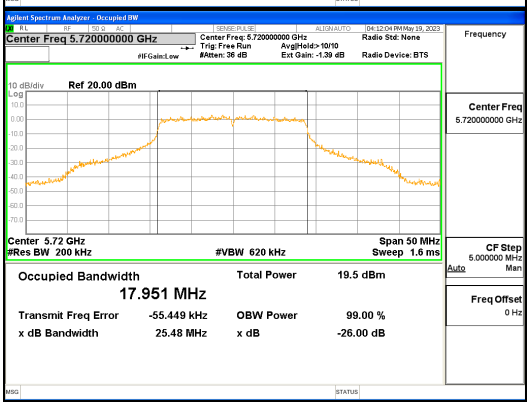


ANT L_802.11n_HT20_UNII 2A

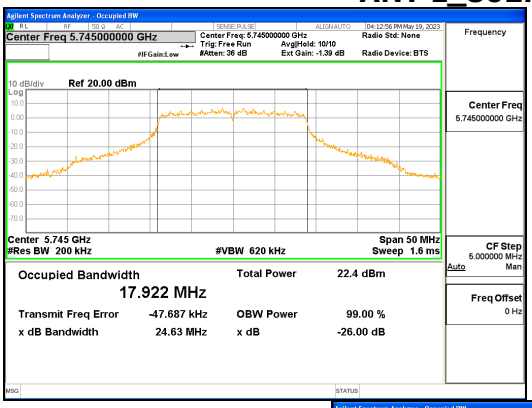


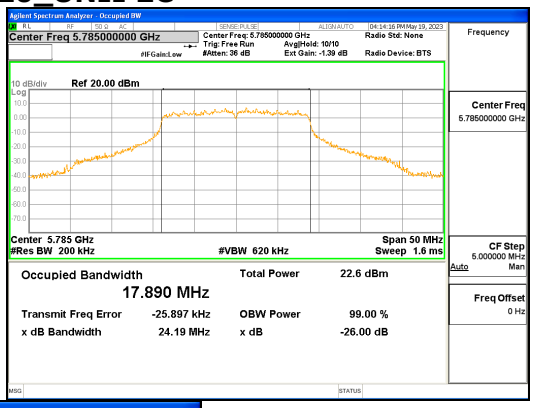


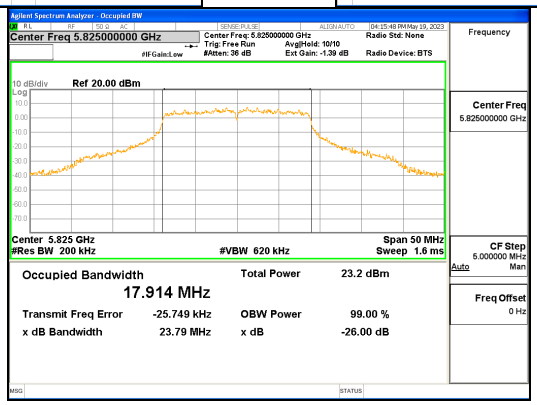




ANT L_802.11n_HT20_UNII 2C







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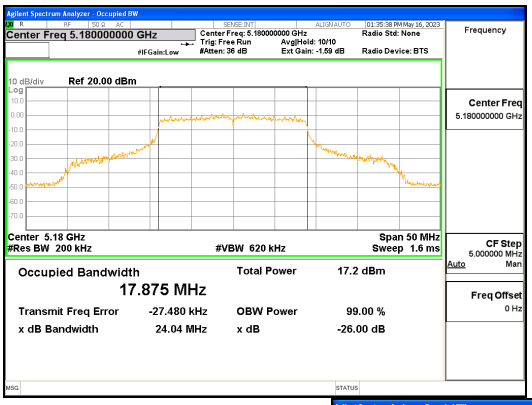

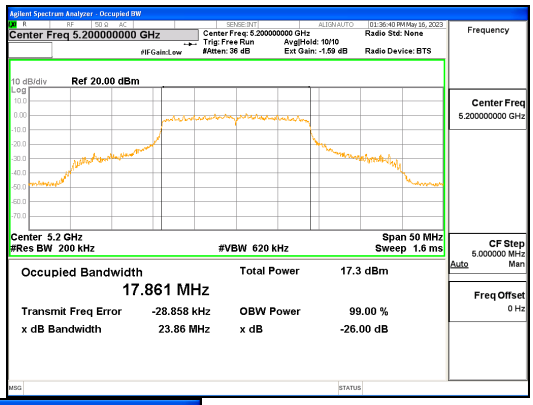

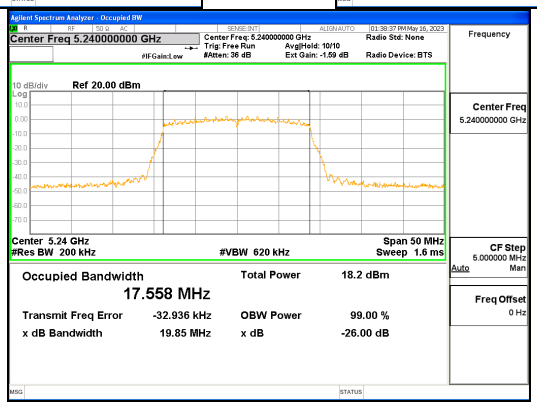

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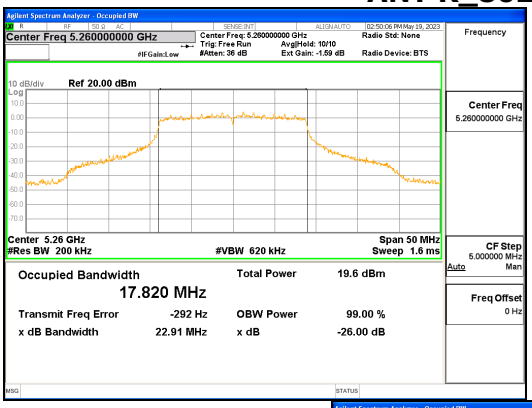
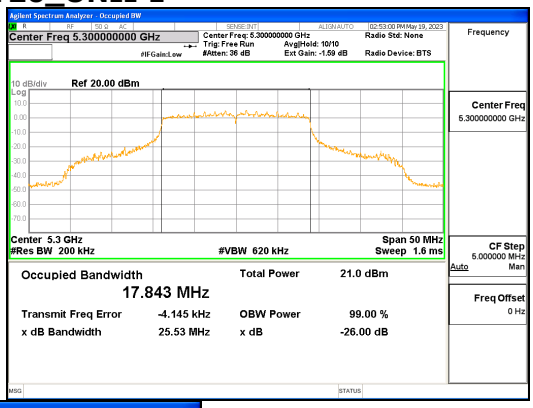
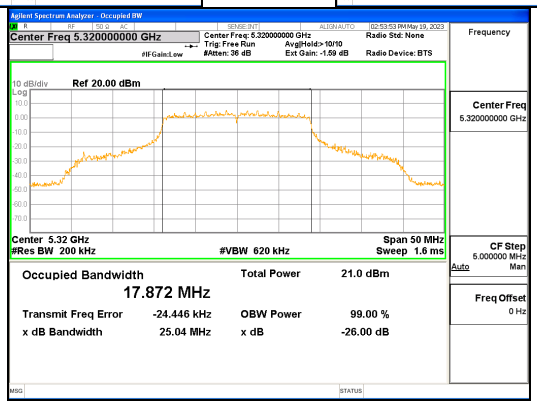
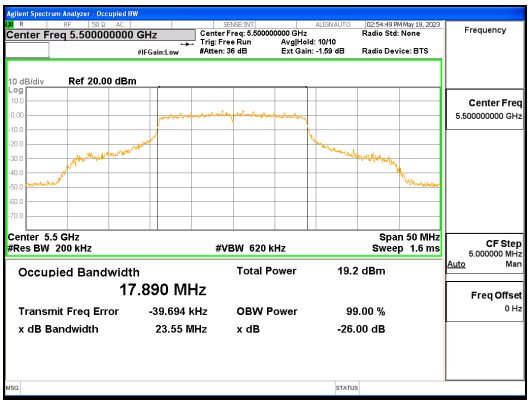
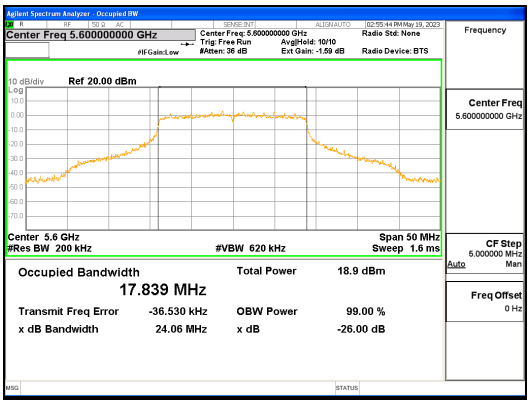


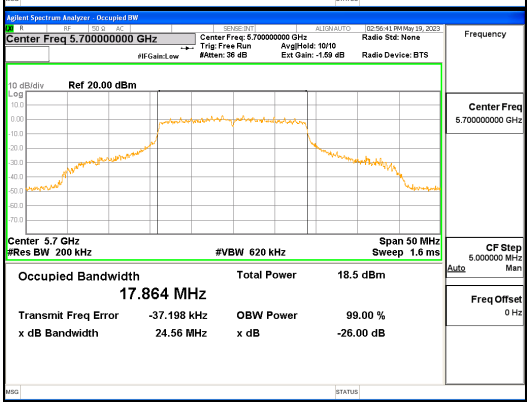


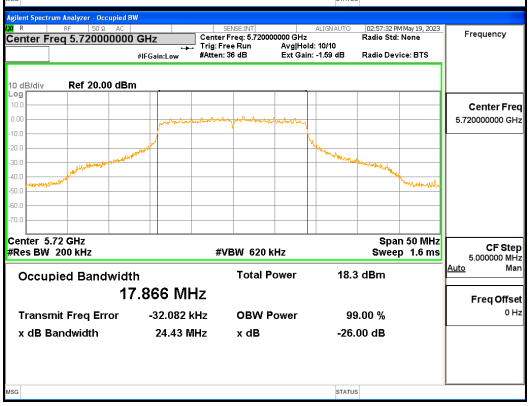


ANT R_802.11n_HT20_UNII 2A









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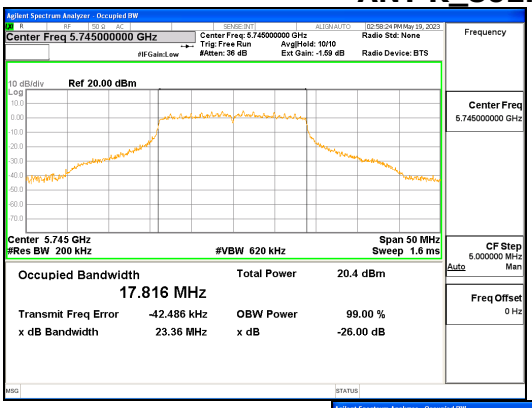
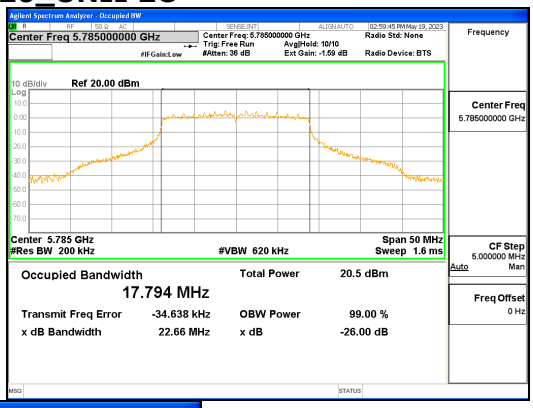
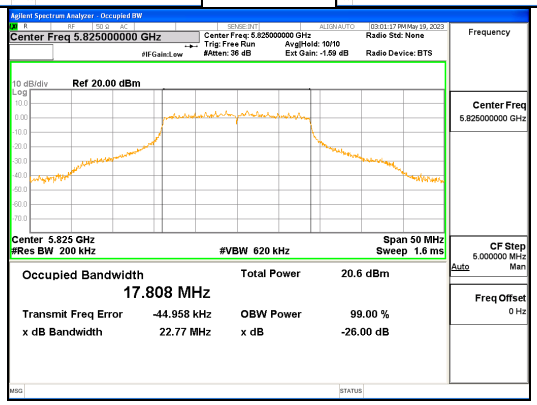
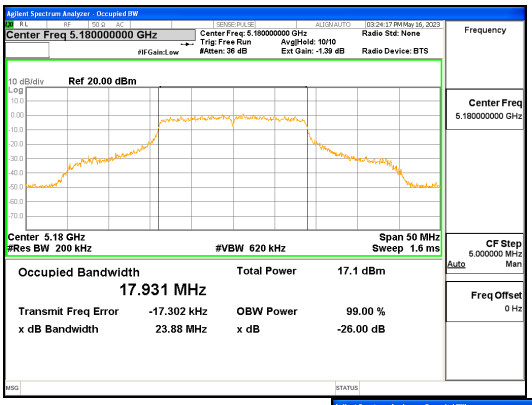
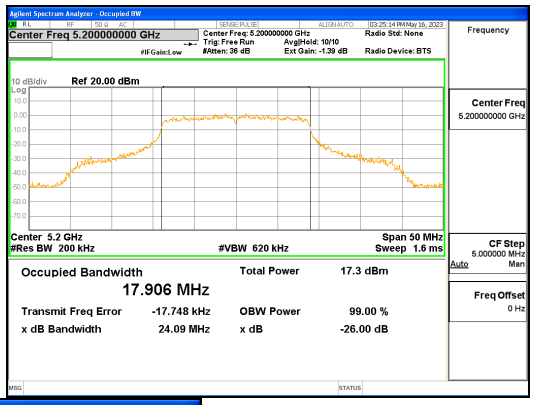


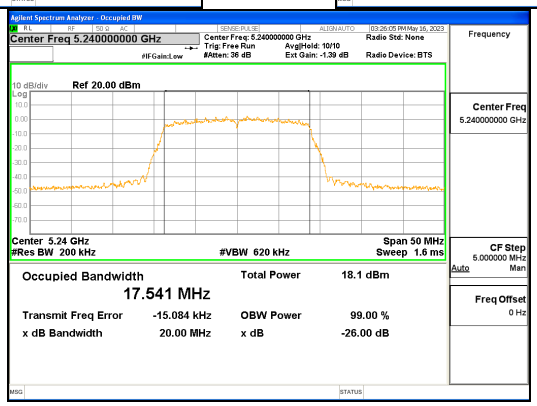




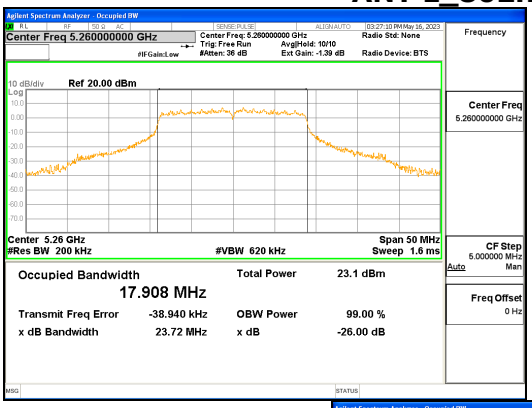
ANT R_802.11n_HT20_UNII 3

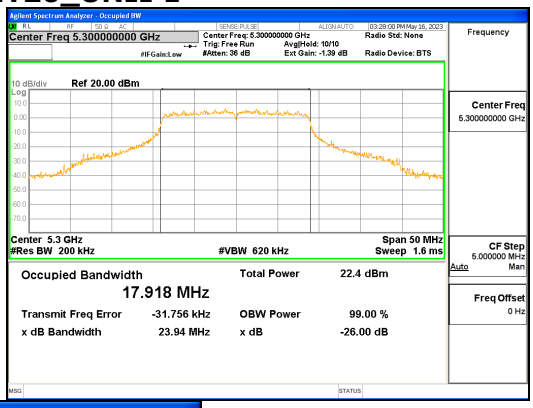


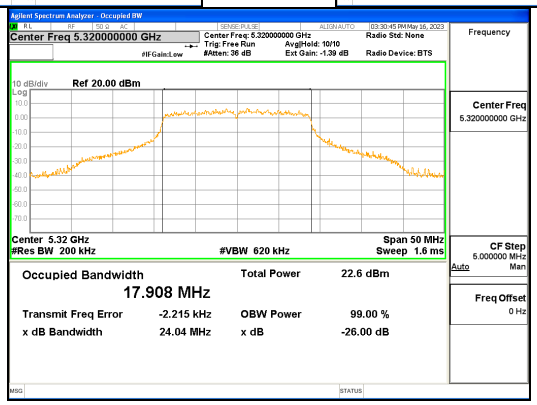




ANT L_802.11ac_VHT20_UNII 1







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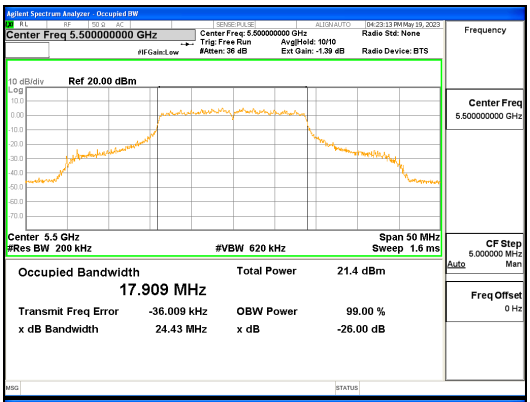

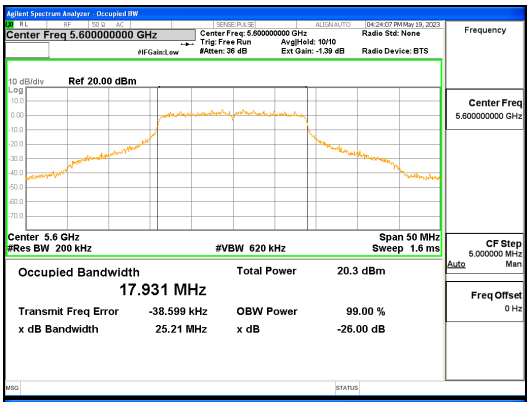

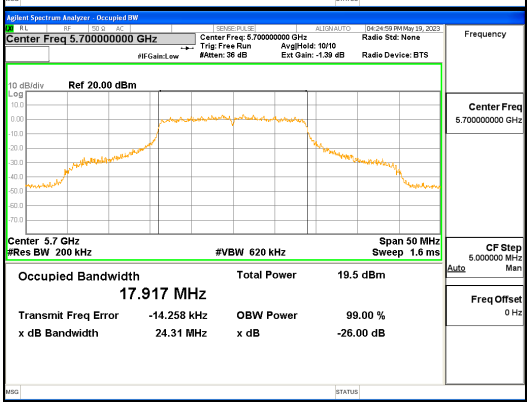

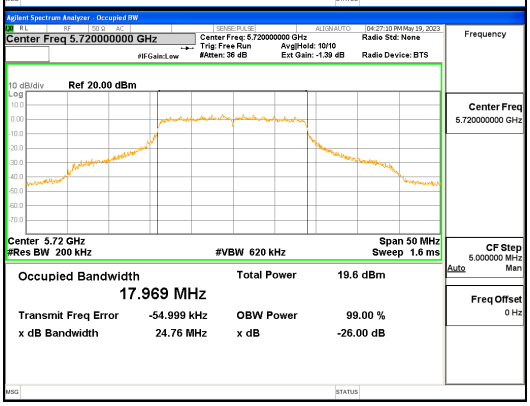

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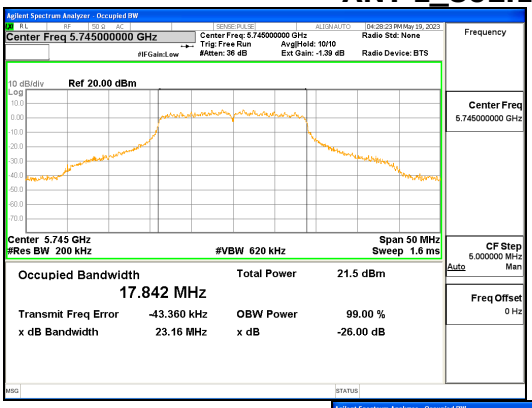
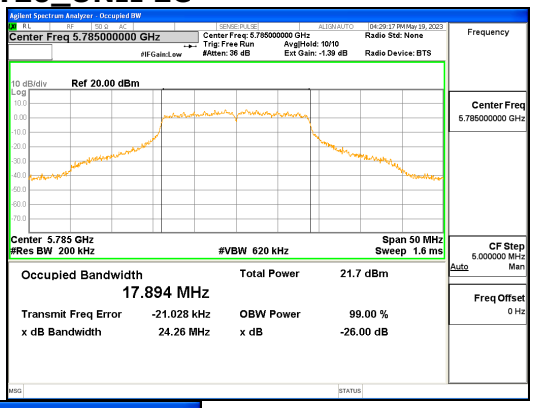
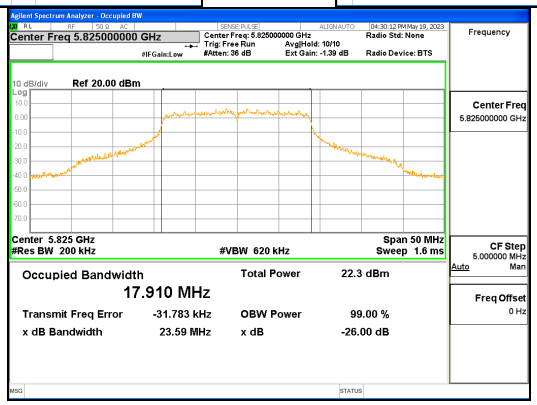
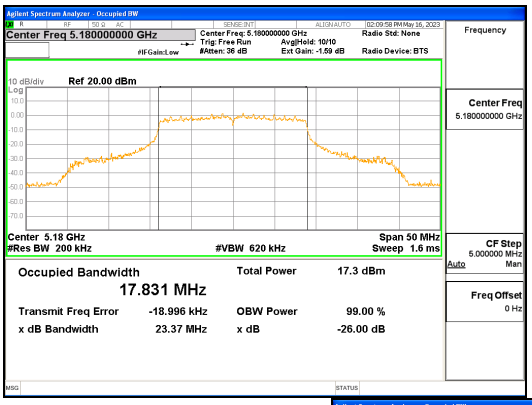
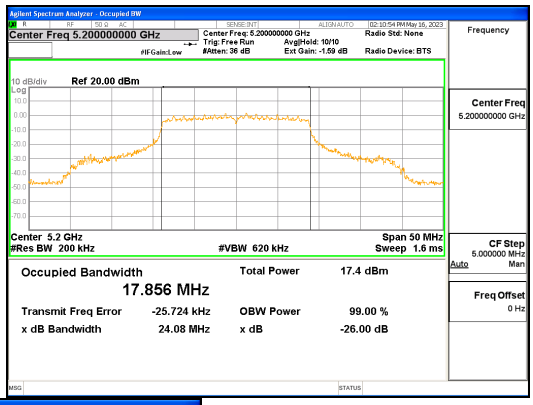


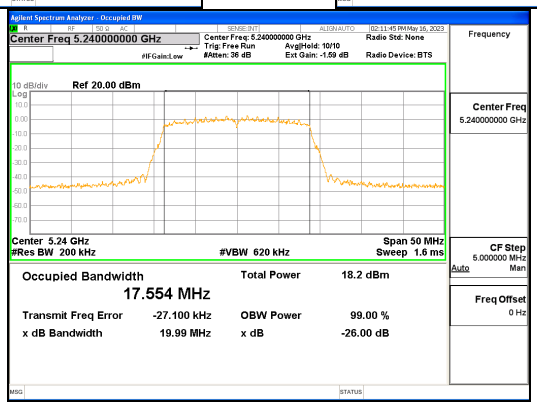




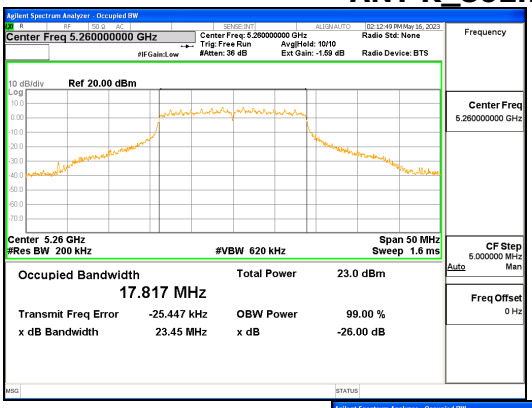
ANT L_802.11ac_VHT20_UNII 3

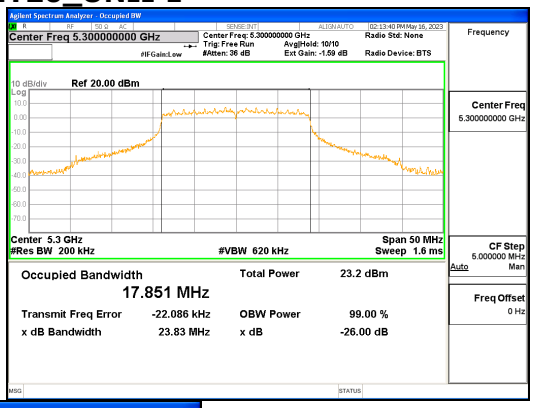


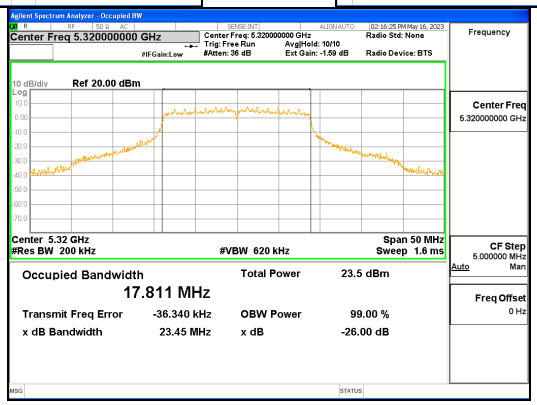




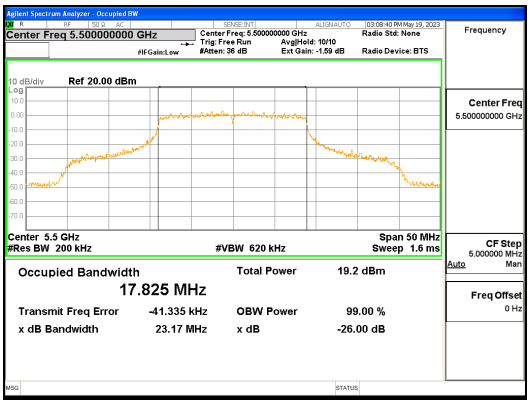
ANT R_802.11ac_VHT20_UNII 1

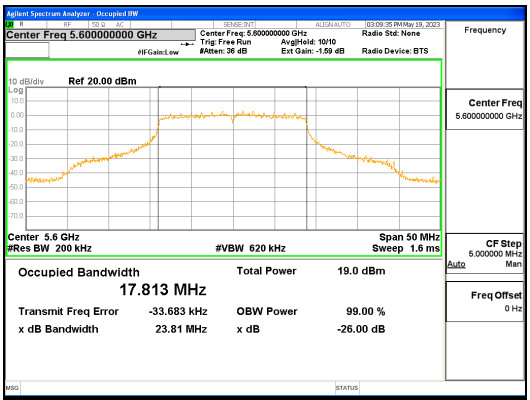


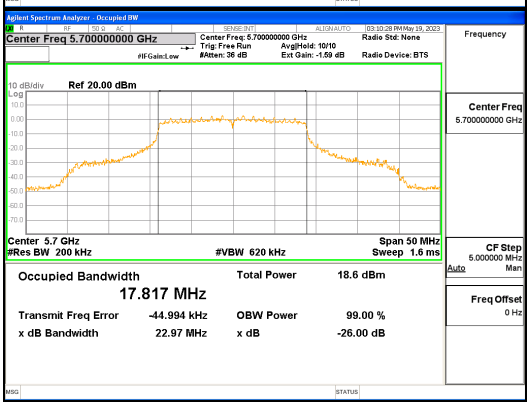


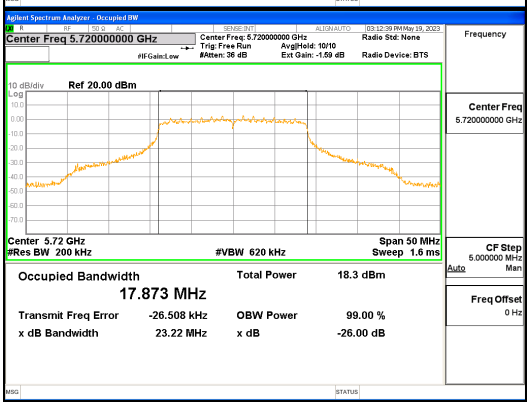


ANT R_802.11ac_VHT20_UNII 2A

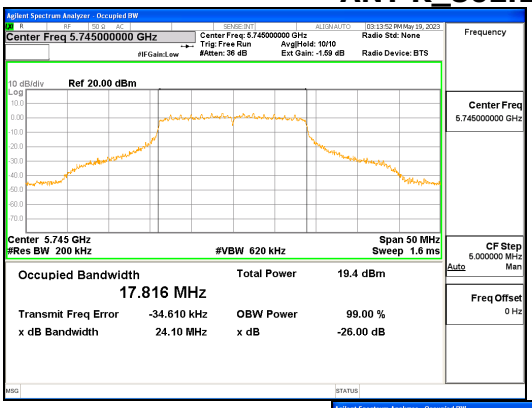


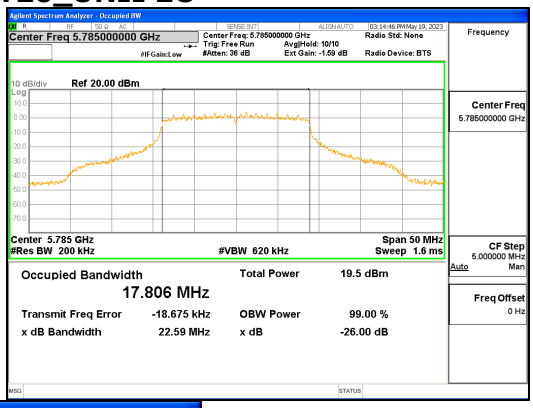


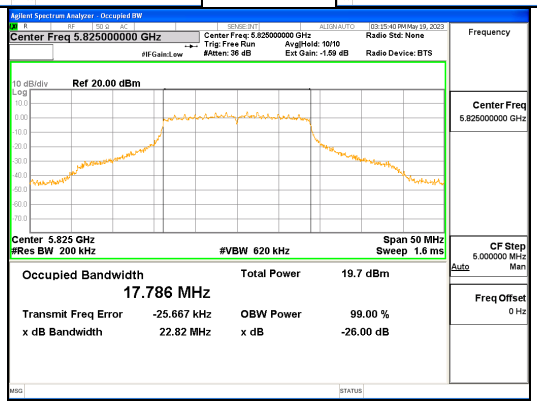




ANT R_802.11ac_VHT20_UNII 2C







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