TEST REPORT

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

1. Applicant

◦ Name : Haier US Appliance Solutions, Inc.

◦ Address : Appliance Park AP5-2N-65, Louisville, Kentucky, United States, 40225

◦ Date of Receipt : 2022-04-13

2. Manufacturer

◦ Name : Haier US Appliance Solutions, Inc.

◦ Address : Appliance Park AP5-2N-65, Louisville, Kentucky, United States, 40225

3. Use of Report : For FCC Conformance

4. Test Sample / Model: Android Board for GEA Wall Oven / CBA-L80

5. Date of Test : 2022-04-20 to 2022-06-22

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

7. Testing Environment: Temp.: (23 ± 1) ℃, Humidity: (48 ± 3) % R.H.

8. Test Results : Compliance

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

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This report cannot be reproduced or copied without the written consent of CTK.

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.

2022-06-23

CTK Co., Ltd.

CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

REPORT REVISION HISTORY

Date	Revision	Page No
2022-06-23	Issued (CTK-2022-01661)	all

CONTENTS

1. General Product Description

1.1 Applicant Information

Company	Haier US Appliance Solutions, Inc.
Contact Point	Appliance Park AP5-2N-65, Louisville, Kentucky, United States, 40225
Contact Person	Name : Park, Hansung E-mail : hansung.park@geappliances.com Tel : +82-31-8094-6732 Fax : +82-31-8094-6888

1.2 Product Information

FCC ID	ZKJ-CBA-L80
ISED	10229A-CBAL80
Product Description	Android Board for GEA Wall Oven
Model name	CBA-L80
Variant Model name	-
Operating Frequency	UNII 1 : 5 180 MHz – 5 240 MHz (20 MHz_BW) 5 190 MHz – 5 230 MHz (40 MHz_BW) 5 210 MHz (80 MHz_BW) UNII 2A : 5 260 MHz – 5 320 MHz (20 MHz_BW) 5 270 MHz – 5 310 MHz (40 MHz_BW) 5 290 MHz (80 MHz_BW) UNII 2C : 5 500 MHz – 5 720 MHz (20 MHz_BW) 5 510 MHz – 5 710 MHz (40 MHz_BW) 5 530 MHz – 5 690 MHz (80 MHz_BW) UNII 3 : 5 745 MHz – 5 825 MHz (20 MHz_BW) 5 755 MHz – 5 795 MHz (40 MHz_BW) 5 775 MHz (80 MHz)
RF Output Power	802.11a : 18.79 dBm (75.68 mW) 802.11n_HT20 : 18.68 dBm (73.79 mW) 802.11n_HT40 : 18.32 dBm (67.92 mW) 802.11ac_VHT20 : 18.69 dBm (73.96 mW) 802.11ac_VHT40 : 18.34 dBm (68.23 mW) 802.11ac_VHT80 : 17.82 dBm (60.53 mW)
Antenna Specification	Antenna type : Chip Antenna Peak Gain : 2.69 dBi (ANT1), 2.74 dBi (ANT2)
Antenna Configurations	802.11a : SISO(ANT1, ANT2) 802.11n : SISO(ANT1, ANT2), MIMO(ANT1+ANT2) 802.11ac : SISO(ANT1, ANT2), MIMO(ANT1+ANT2)
Type of Modulation	OFDM
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
Power Source	DC 5 V
Hardware Rev	v4.0
Software Rev	v0.0.2.3
Dynamic Frequency Selection	Slave without radar detection

RF Power setting in Test SW

Mode	Frequency Band	Power Setting Value
802.11a	UNII 1	15.0
	UNII 2A	16.5
	UNII 2C	16.0
	UNII 3	17.0
802.11n_HT20	UNII 1	12.0
	UNII 2A	15.5
	UNII 2C	14.5
	UNII 3	17.0
802.11n_HT40	UNII 1	15.0
	UNII 2A	14.0
	UNII 2C	14.5
	UNII 3	17.0
802.11ac_VHT20	UNII 1	12.0
	UNII 2A	15.5
	UNII 2C	14.5
	UNII 3	17.0
802.11ac_VHT40	UNII 1	15.0
	UNII 2A	14.0
	UNII 2C	14.5
	UNII 3	17.0
802.11ac_VHT80	UNII 1	14.5
	UNII 2A	14.0
	UNII 2C	14.5
	UNII 3	17.0

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253QPR
AC/DC Adapter	HP	HSTNN-LA40	-
Note Computer	Samsung Electronics Co., Ltd.	NT270E5J	JLTR91KF400148T
AC/DC Adapter	Samsung Electronics Co., Ltd.	CPA09-004A	-

1.4 Model Differences

Not applicable

2. Facility and Accreditations

2.1 Test Facility

The radiated measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

The conducted measurement facility is located at 5, Dongbu-ro 221beon-gil, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
KOREA	NRRA	KR0025

2.3 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)	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)	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)(5),(6)	Radiated Spurious Emission	15.209(a)	C	
15.207	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.				

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.

Test Frequency

- 802.11a, 802.11n_HT20, 802.11ac_VHT20

	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

	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

	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

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	OFDM	6 Mbps	96.6 %	0.15 dB
802.11n_HT20	OFDM	MCS 0	96.4 %	0.16 dB
802.11n_HT40	OFDM	MCS 0	93.3 %	0.30 dB
802.11ac_VHT20	OFDM	MNSS 0	96.4 %	0.16 dB
802.11ac_VHT40	OFDM	MNSS 0	92.9 %	0.32 dB
802.11ac_VHT80	OFDM	MNSS 0	86.7 %	0.62 dB

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)	3.98 dB (C.L.: Approx. 95 %, k = 2)
Radiated Emissions (f > 1 GHz)	4.42 dB (C.L.: Approx. 95 %, k = 2)
Line Conducted Emission	2.06 dB (C.L.: Approx. 95 %, k = 2)

3.5 Test Software

Conducted Test	Ics Pro Ver. 6.0.3
Radiated Test	TOYO EMI software EP5RE Ver. 6.0.1.0
Line Conducted Test	ESCI7, ESCI3 : EMC32 Ver. 8.50.0 ESR7 : EMC32 Ver. 10.20.01

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:

ANT1

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	15.12	16.61	15.04
5 785 MHz	15.11	15.88	16.28
5 825 MHz	15.09	16.53	16.01
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	35.34	35.11
5 795 MHz	35.33	35.34
Measurement uncertainty	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	75.14
Measurement uncertainty	± 0.1 MHz

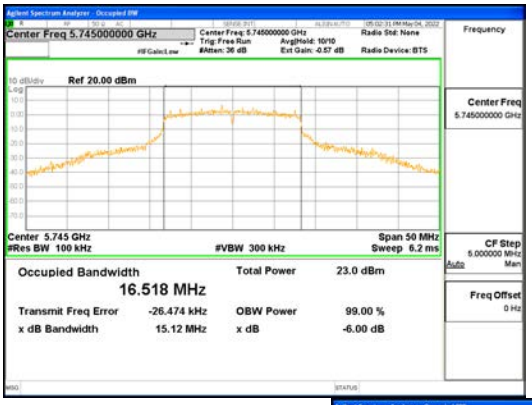
ANT2

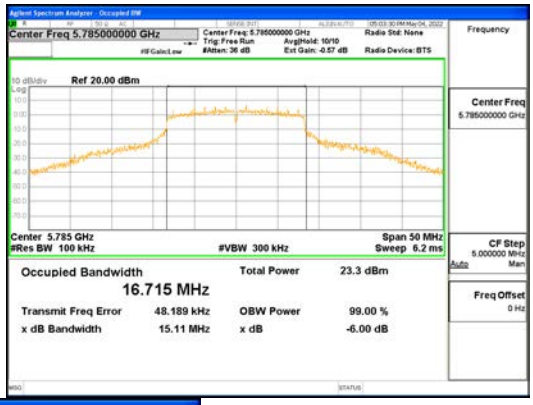
	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	13.20	15.08	15.09
5 785 MHz	15.06	15.11	15.05
5 825 MHz	15.12	16.05	15.01
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	35.14	35.11
5 795 MHz	35.09	35.10
Measurement uncertainty	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	75.11
Measurement uncertainty	± 0.1 MHz

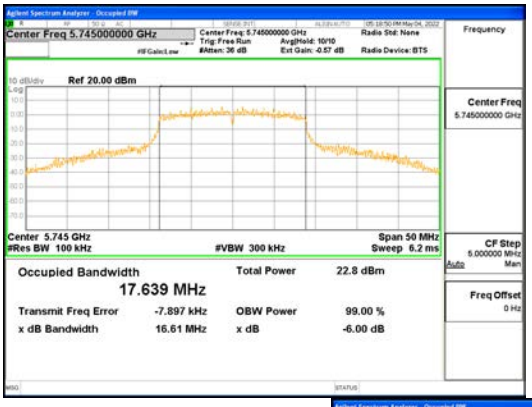
See next pages for actual measured spectrum plots.

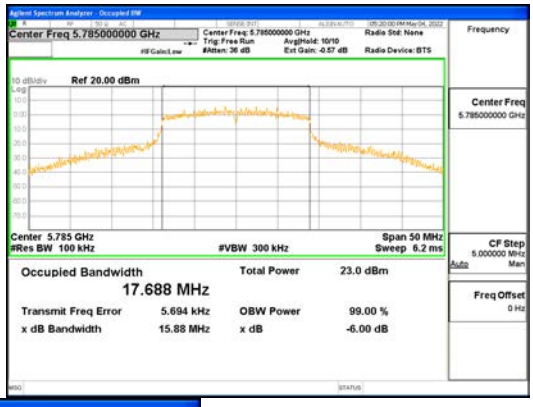




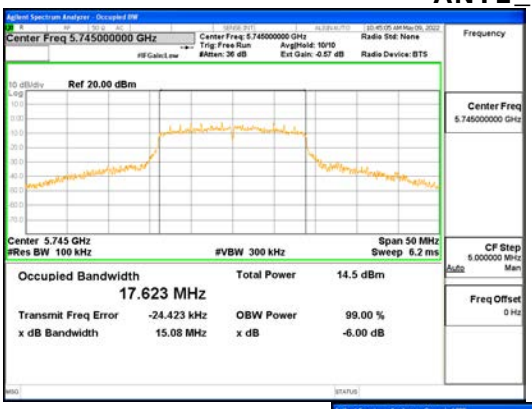
ANT1_802.11a

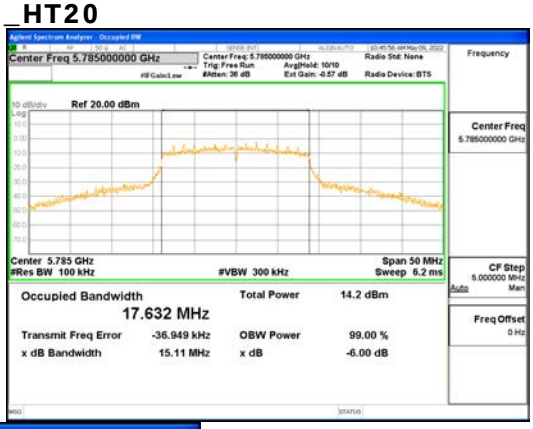
ANT2_802.11a



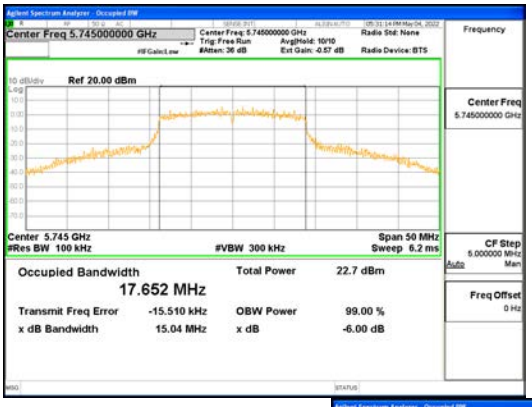


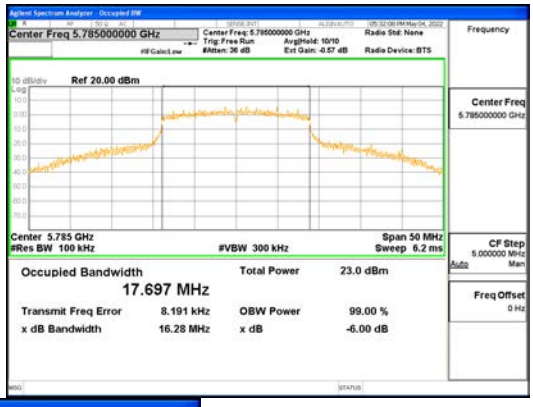
ANT1_802.11n_HT20



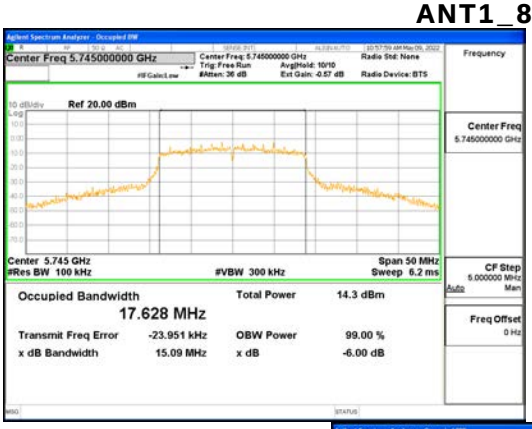


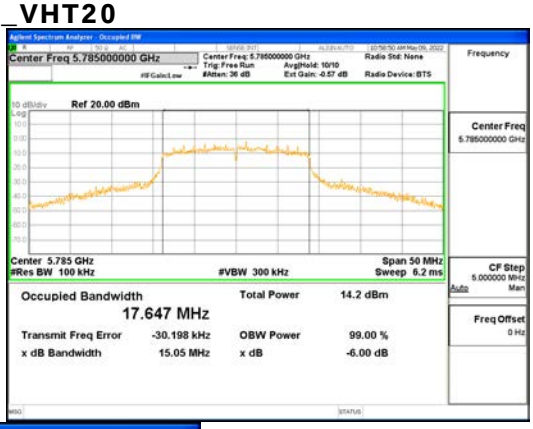
ANT2_802.11n_HT20



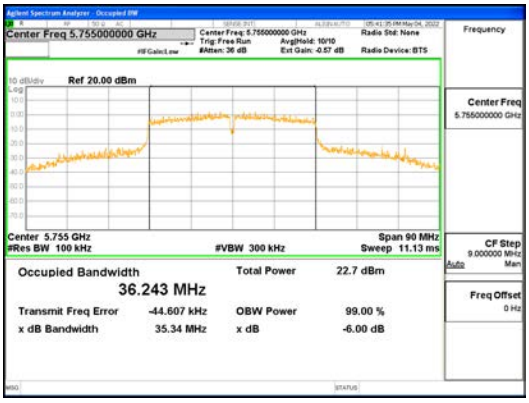


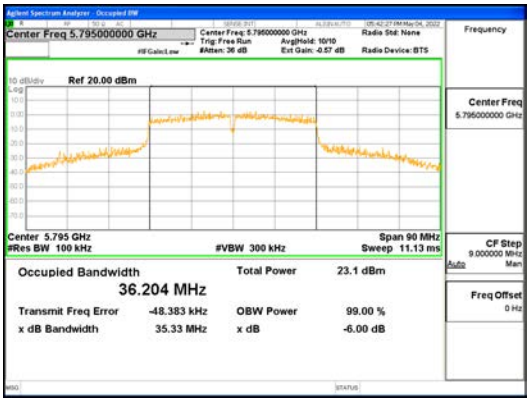
ANT1_802.11ac_VHT20



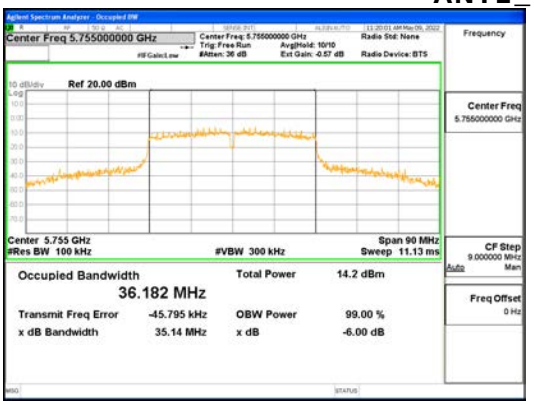


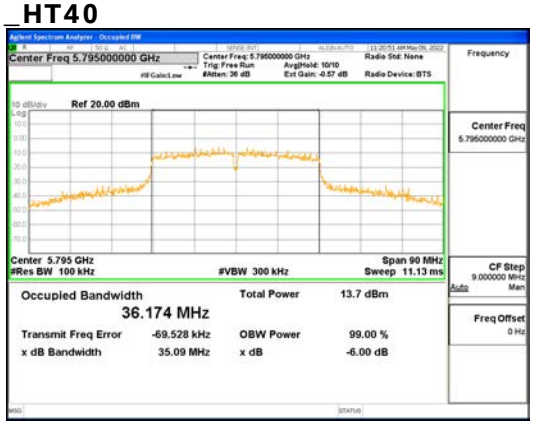
ANT2_802.11ac_VHT20



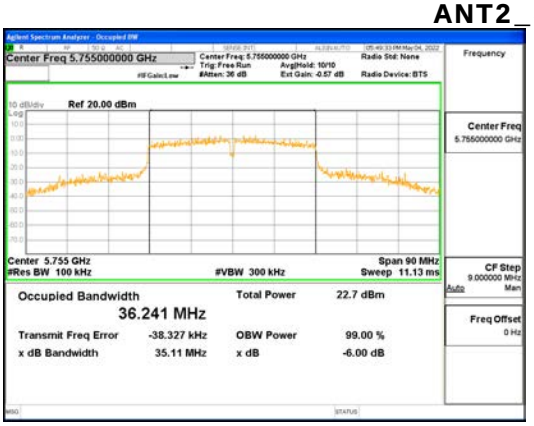


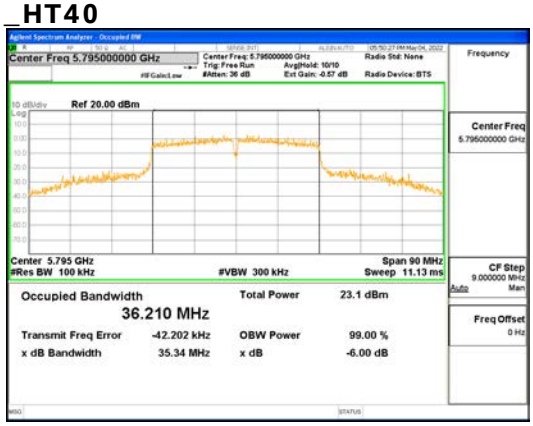
ANT1_802.11n_HT40



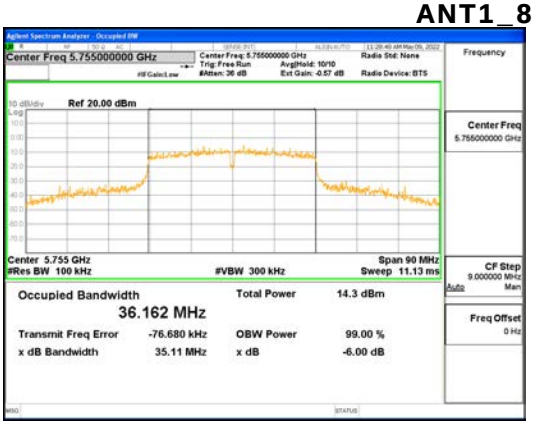


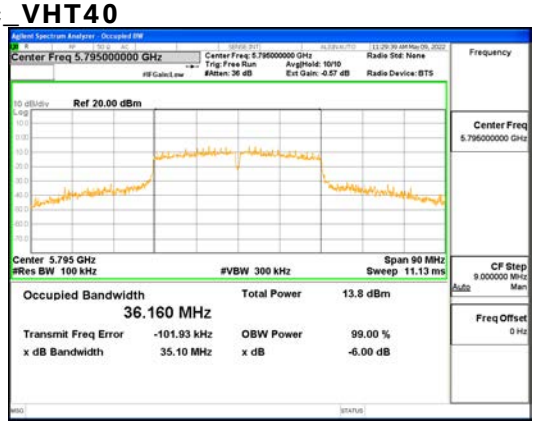
ANT2_802.11n_HT40





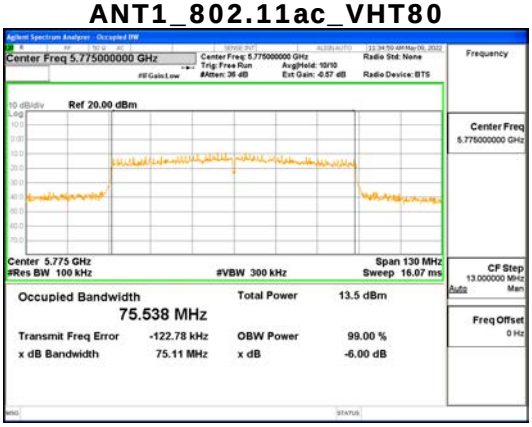
ANT1_802.11ac_VHT40





ANT2_802.11ac_VHT40

ANT1_802.11ac_VHT80



ANT2_802.11ac_VHT80

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:

ANT1

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	19.73	16.46	20.14	17.54	19.90	17.55
5 200 MHz	19.83	16.52	20.04	17.56	19.96	17.56
5 240 MHz	20.24	16.54	20.09	17.55	19.95	17.56
5 260 MHz	20.54	16.64	20.08	17.61	20.16	17.60
5 300 MHz	20.50	16.65	20.09	17.61	20.17	17.62
5 320 MHz	20.48	16.63	20.19	17.63	19.91	17.62
5 500 MHz	20.41	16.62	20.03	17.55	19.98	17.56
5 600 MHz	20.38	16.62	20.17	17.61	19.93	17.59
5 700 MHz	20.40	16.64	20.05	17.59	19.91	17.60
5 720 MHz	20.44	16.63	20.14	17.59	19.88	17.58
5 745 MHz	26.71	17.41	28.91	18.05	26.62	18.00
5 785 MHz	28.24	17.75	29.64	18.31	29.55	18.18
5 825 MHz	30.14	17.53	31.74	18.09	29.13	18.14
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	39.59	36.03	39.75	36.08
5 230 MHz	40.05	36.14	39.77	36.13
5 270 MHz	40.01	36.07	39.94	36.08
5 310 MHz	39.80	36.03	39.52	36.10
5 510 MHz	39.44	36.10	39.95	36.05
5 590 MHz	39.96	36.13	39.87	36.11
5 670 MHz	39.97	36.14	39.92	36.15
5 710 MHz	40.51	36.11	40.02	36.10
5 755 MHz	62.69	36.49	59.69	36.55
5 795 MHz	54.04	36.45	55.89	36.45
Measurement uncertainty	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	79.52	75.28
5 290 MHz	79.75	75.29
5 530 MHz	79.98	75.25
5 610 MHz	80.03	75.34
5 690 MHz	80.13	75.39
5 775 MHz	115.80	75.72
Measurement uncertainty	± 0.1 MHz	

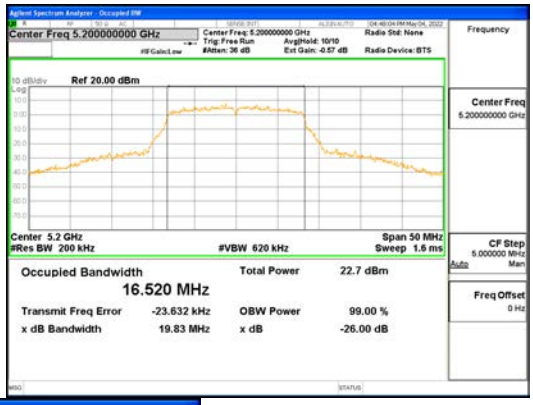
ANT2

	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	19.88	16.47	20.03	17.56	20.04	17.57
5 200 MHz	20.19	16.51	20.08	17.56	19.99	17.57
5 240 MHz	20.15	16.51	20.06	17.57	20.02	17.57
5 260 MHz	20.44	16.61	20.28	17.61	20.04	17.60
5 300 MHz	20.47	16.59	20.01	17.59	20.33	17.60
5 320 MHz	20.60	16.61	20.12	17.60	20.37	17.61
5 500 MHz	20.28	16.57	19.93	17.57	19.95	17.56
5 600 MHz	20.34	16.57	19.97	17.56	20.08	17.60
5 700 MHz	20.40	16.55	20.03	17.55	20.04	17.59
5 720 MHz	20.40	16.61	20.04	17.56	20.06	17.56
5 745 MHz	23.87	17.33	26.86	18.08	32.02	18.20
5 785 MHz	26.23	17.41	26.64	18.23	27.47	18.30
5 825 MHz	27.78	17.73	29.72	18.45	30.90	18.54
Measurement uncertainty	± 0.1 MHz					

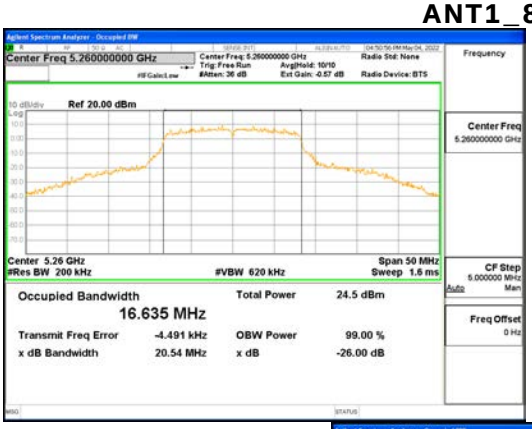
	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	40.11	36.00	40.34	36.00
5 230 MHz	40.73	36.05	40.46	36.07
5 270 MHz	40.63	36.06	40.61	36.08
5 310 MHz	40.22	35.97	39.94	36.00
5 510 MHz	40.42	36.03	40.21	36.01
5 590 MHz	40.46	36.01	40.50	36.02
5 670 MHz	40.35	36.01	40.47	36.10
5 710 MHz	40.67	36.02	40.39	35.99
5 755 MHz	55.99	36.48	67.63	36.48
5 795 MHz	62.98	36.51	69.08	36.51
Measurement uncertainty	± 0.1 MHz			

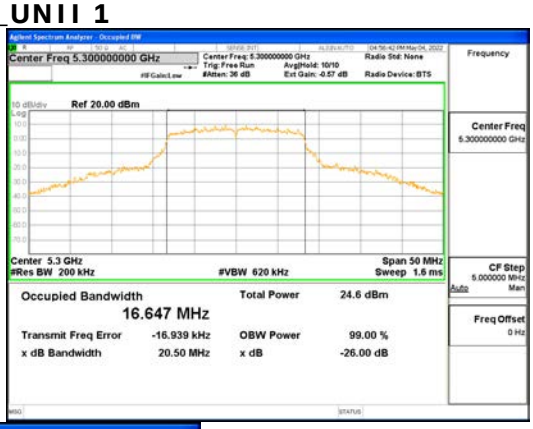
	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.00	75.36
5 290 MHz	80.78	75.34
5 530 MHz	81.18	75.58
5 610 MHz	80.68	75.43
5 690 MHz	80.97	75.50
5 775 MHz	111.30	75.77
Measurement uncertainty	± 0.1 MHz	

See next pages for actual measured spectrum plots.

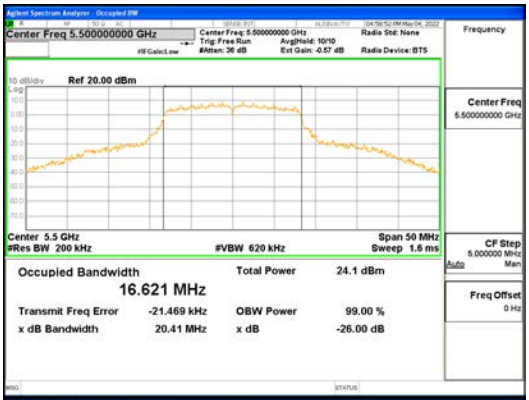


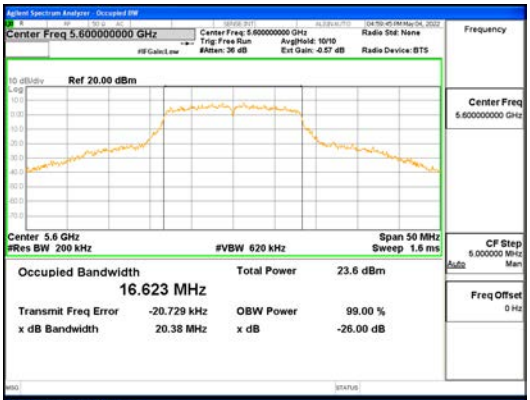
ANT1_802.11a_UNII 1

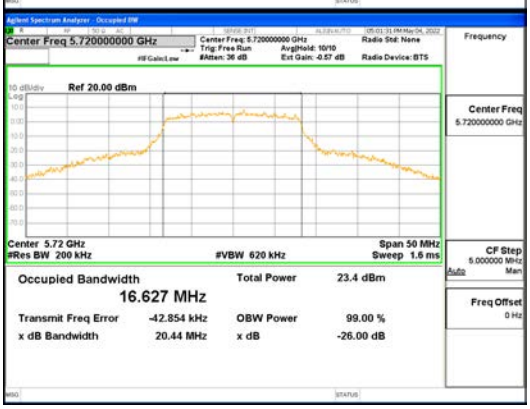




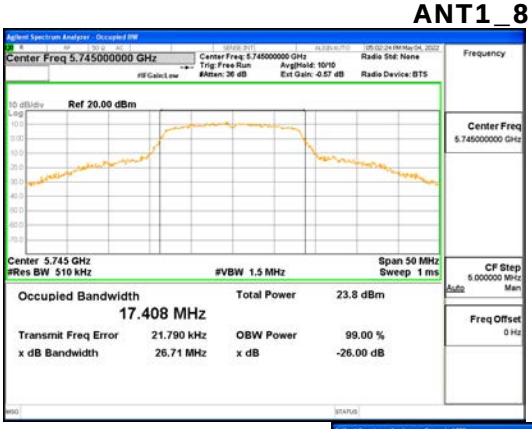
ANT1_802.11a_UNII 2A

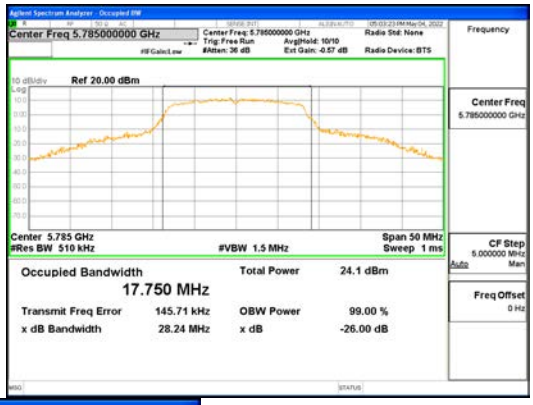




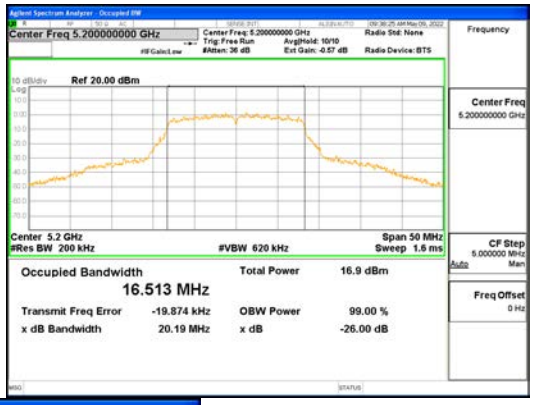


ANT1_802.11a_UNII 2C

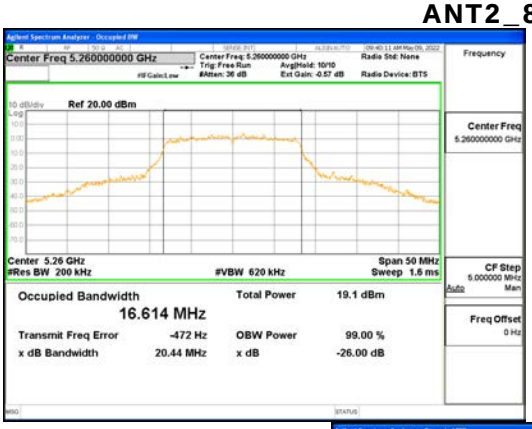


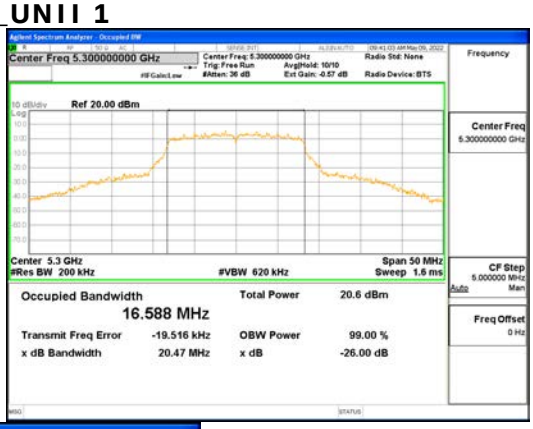


ANT1_802.11a_UNII 3

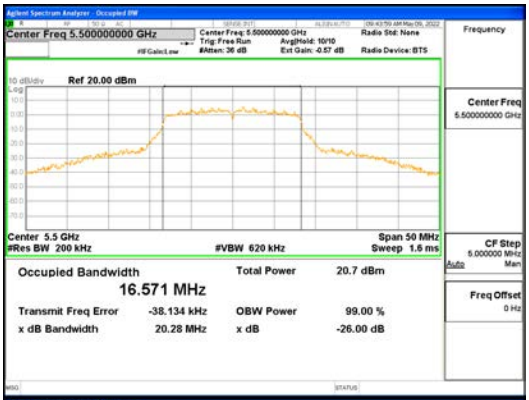


ANT2_802.11a_UNII 1

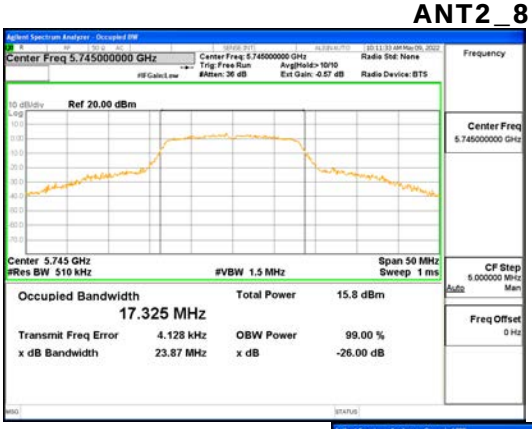




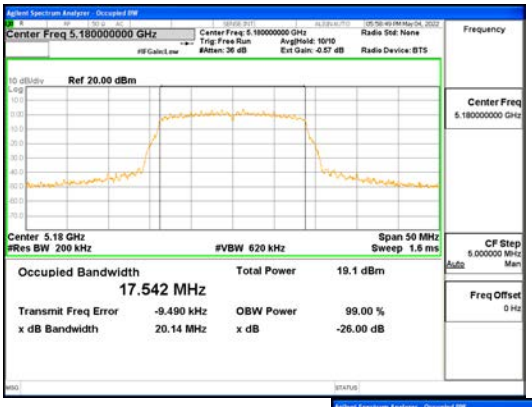
ANT2_802.11a_UNII 2A

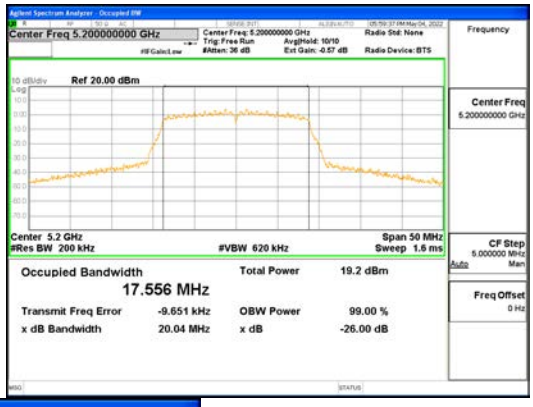


ANT2_802.11a_UNII 2C

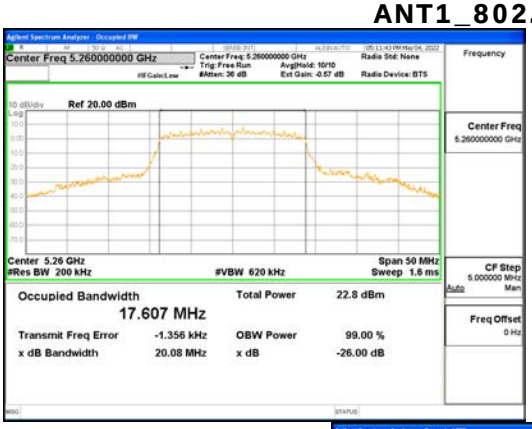


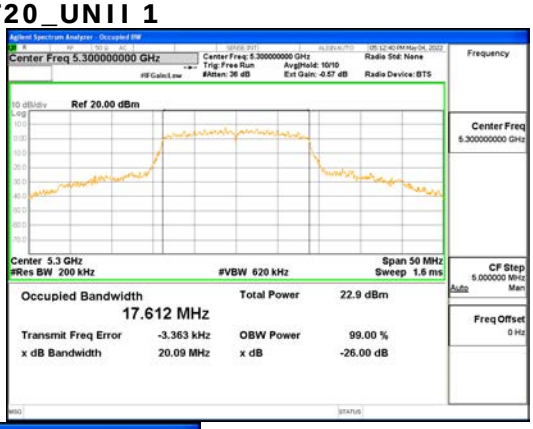
ANT2_802.11a_UNII 3



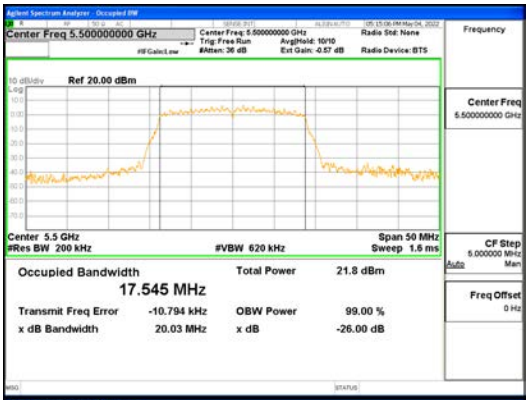


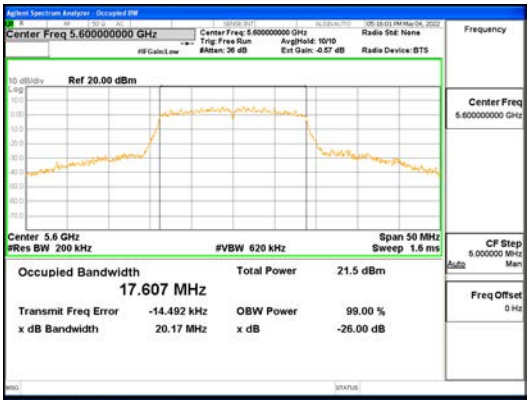
ANT1_802.11n_HT20_UNII 1



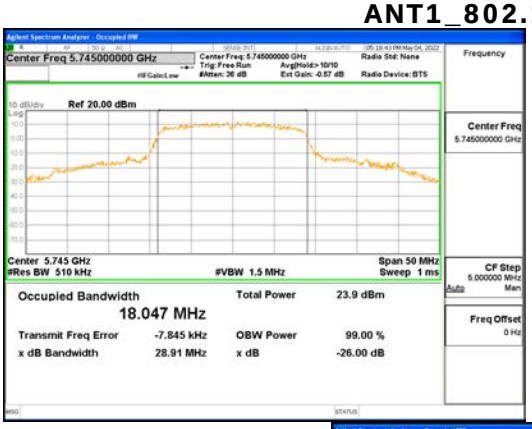


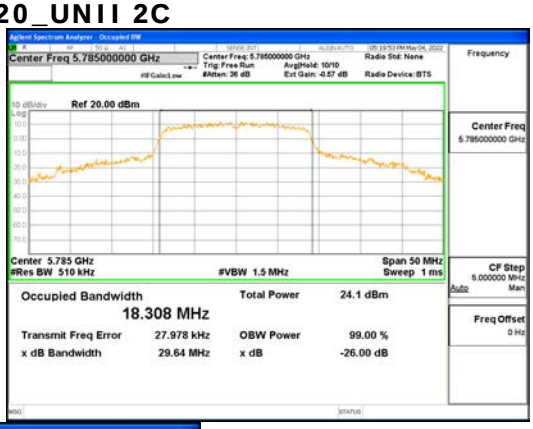
ANT1_802.11n_HT20_UNII 2A



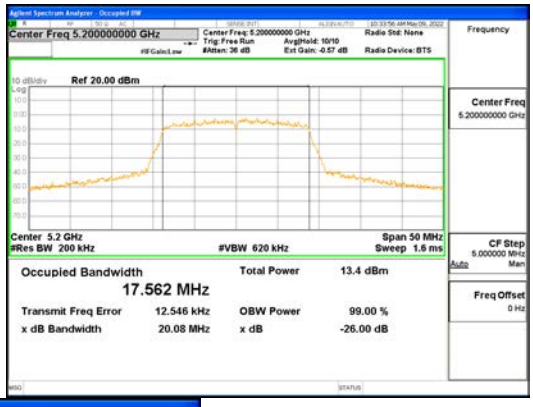


ANT1_802.11n_HT20_UNII 2C

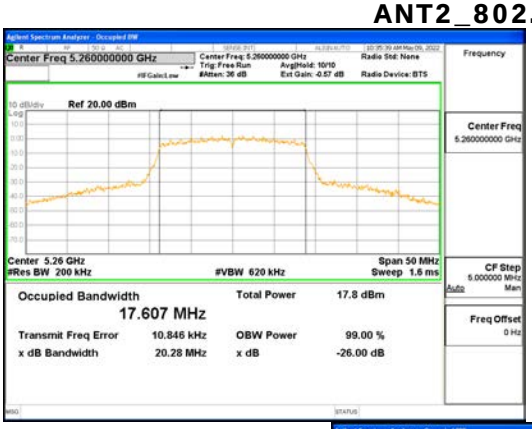


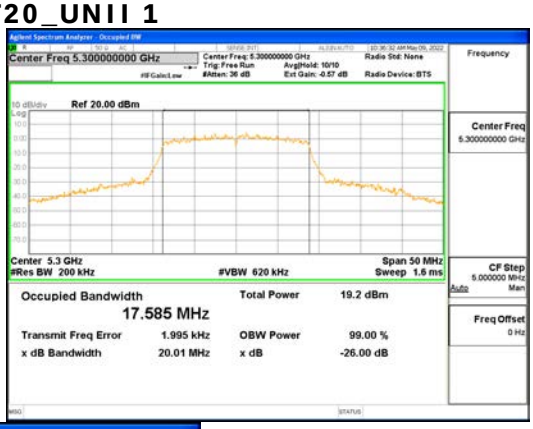


ANT1_802.11n_HT20_UNII 3

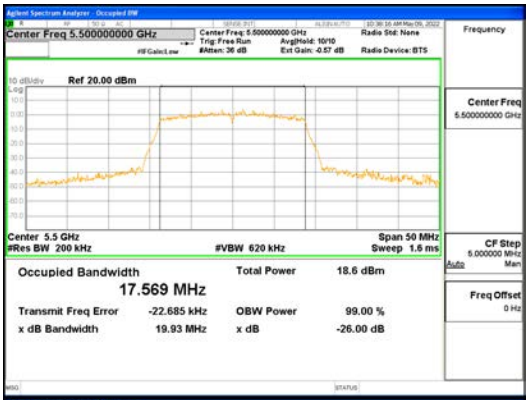


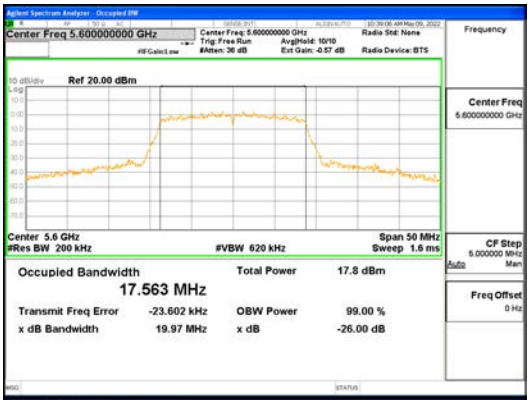
ANT2_802.11n_HT20_UNII 1



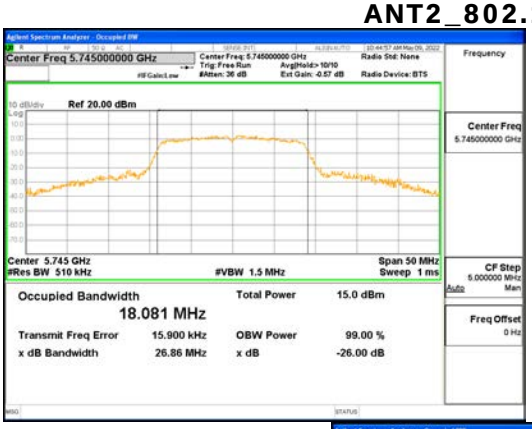


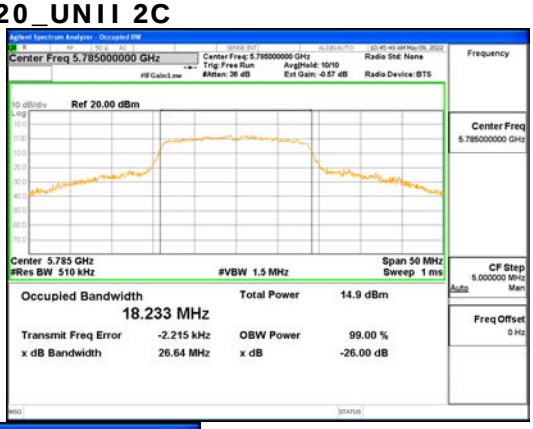
ANT2_802.11n_HT20_UNII 2A



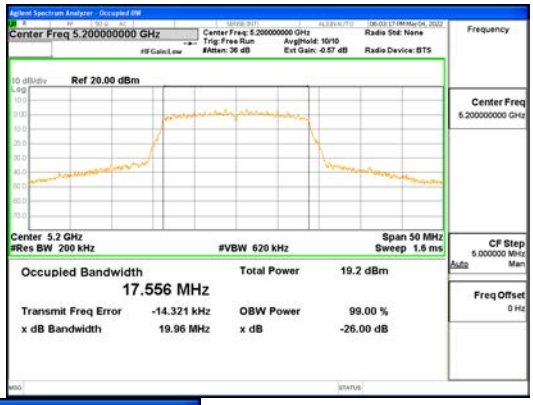


ANT2_802.11n_HT20_UNII 2C

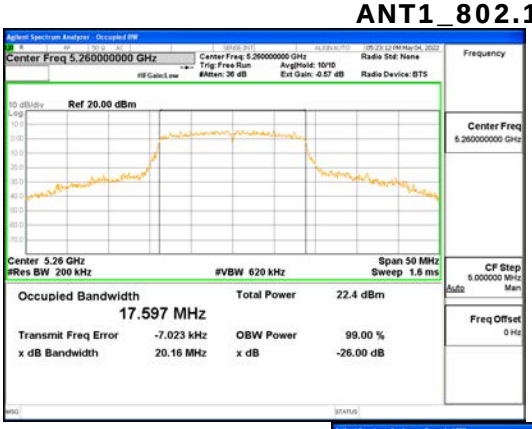


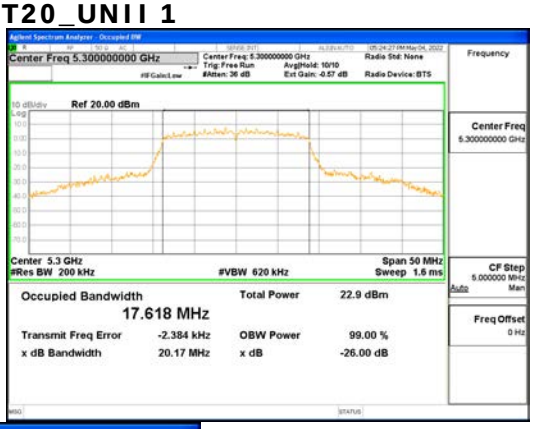


ANT2_802.11n_HT20_UNII 3

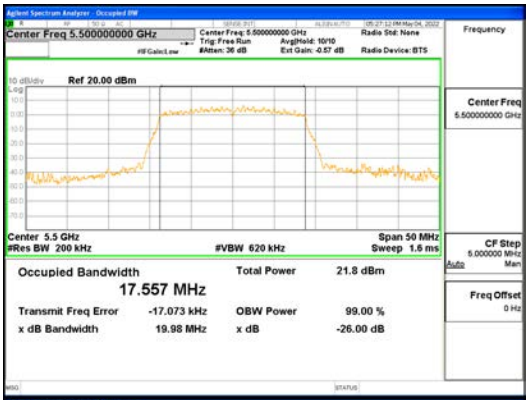


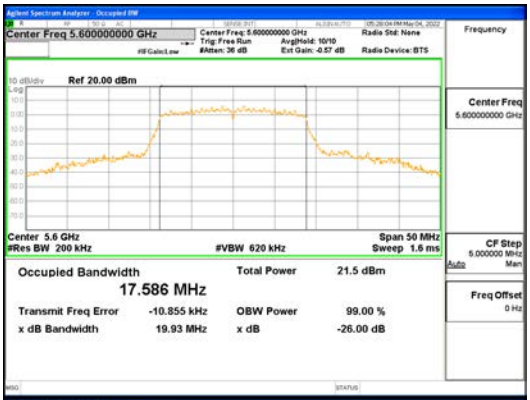
ANT1_802.11ac_VHT20_UNII 1



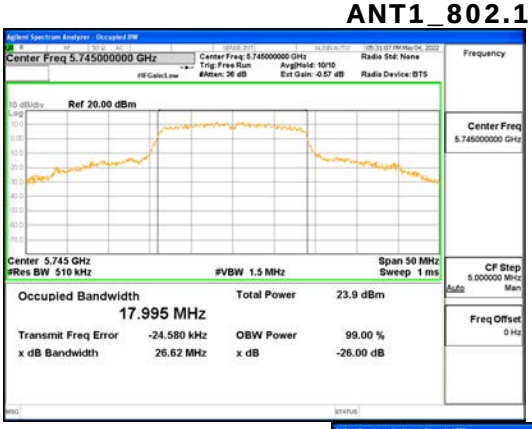


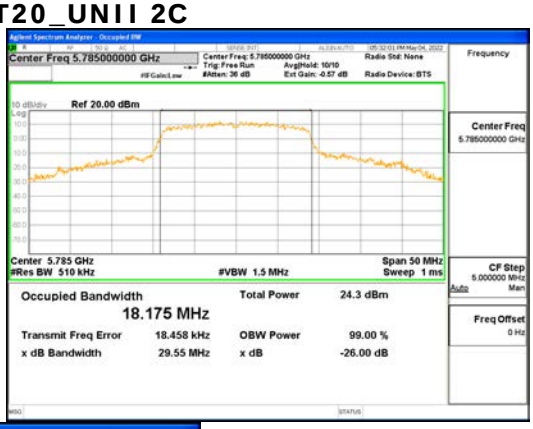
ANT1_802.11ac_VHT20_UNII 2A



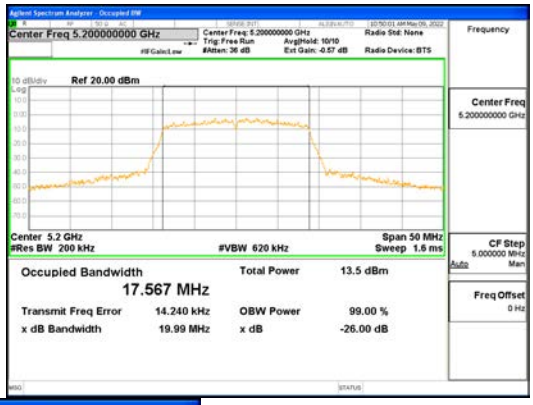


ANT1_802.11ac_VHT20_UNII 2C

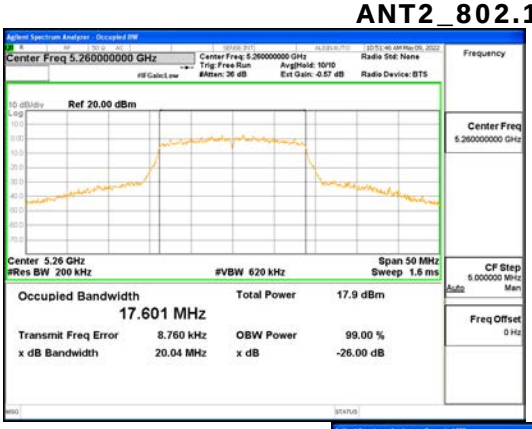


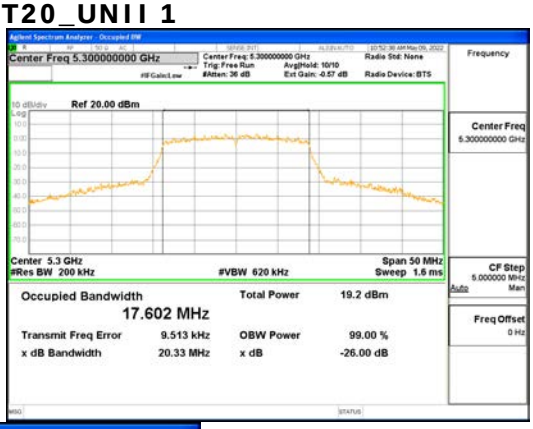


ANT1_802.11ac_VHT20_UNII 3

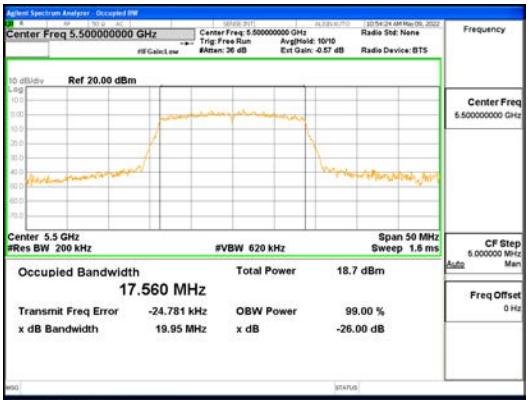


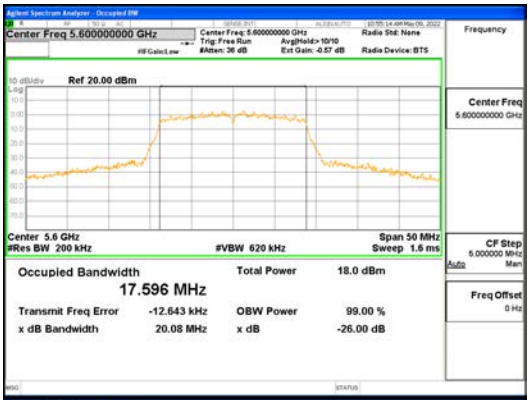
ANT2_802.11ac_VHT20_UNII 1



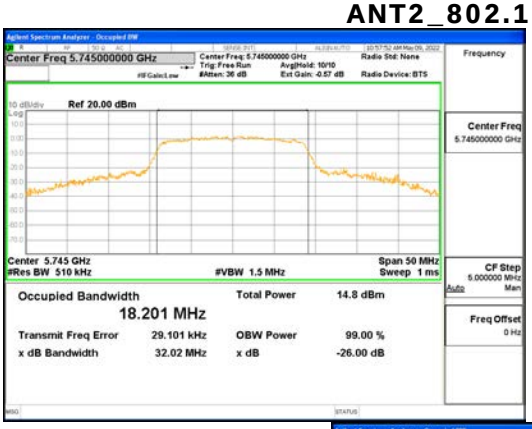


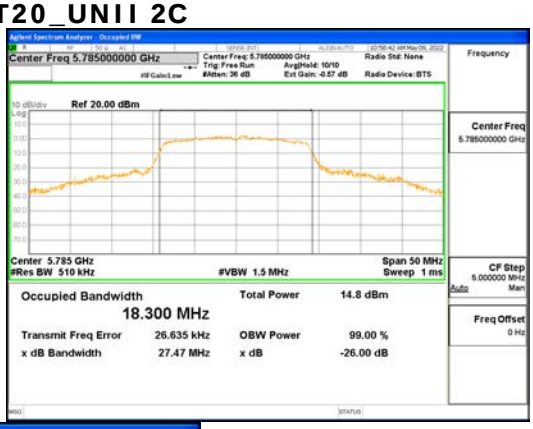
ANT2_802.11ac_VHT20_UNII 2A



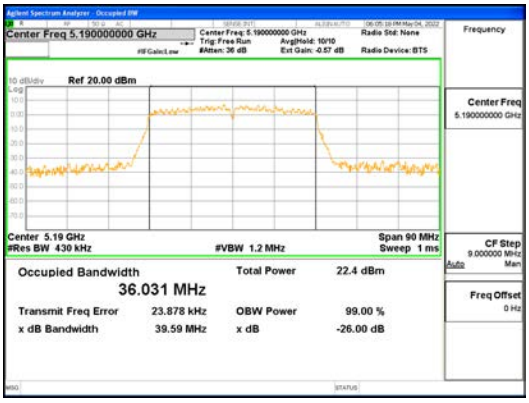


ANT2_802.11ac_VHT20_UNII 2C

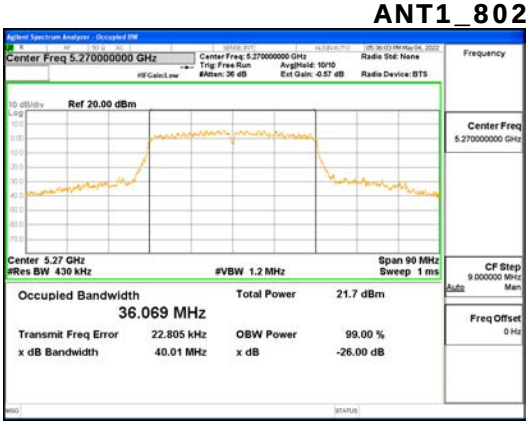


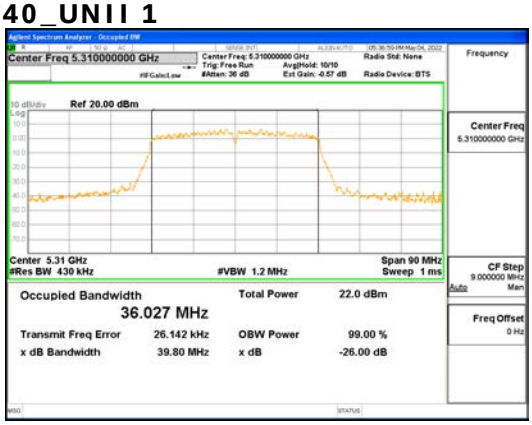


ANT2_802.11ac_VHT20_UNII 3

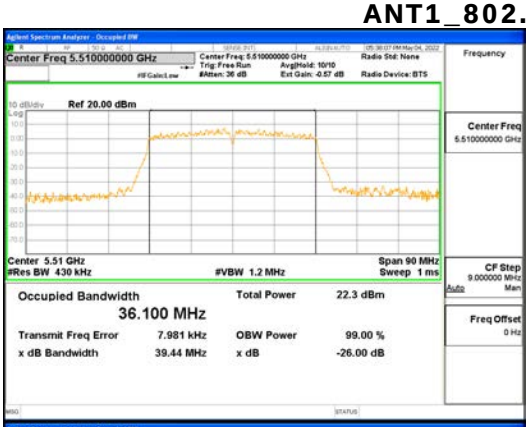


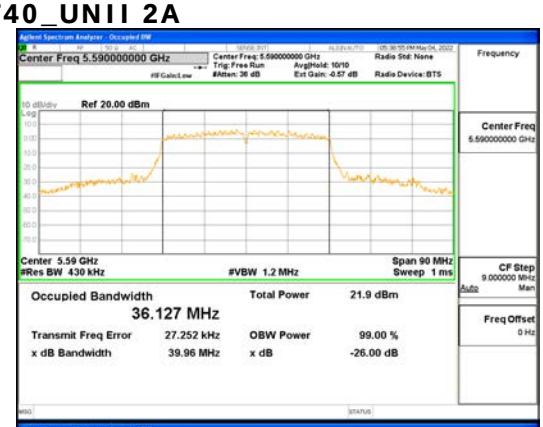
ANT1_802.11n_HT40_UNII 1

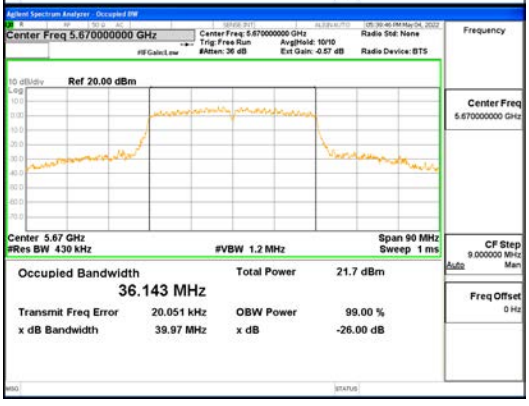


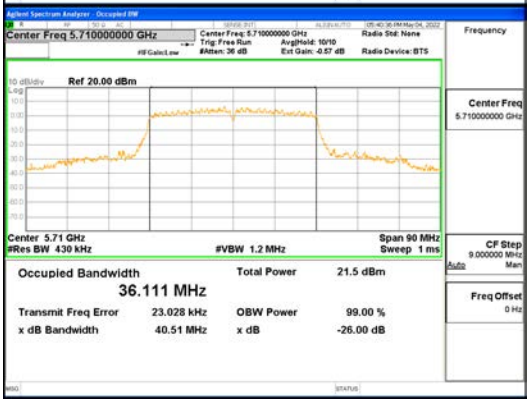


ANT1_802.11n_HT40_UNII 2A

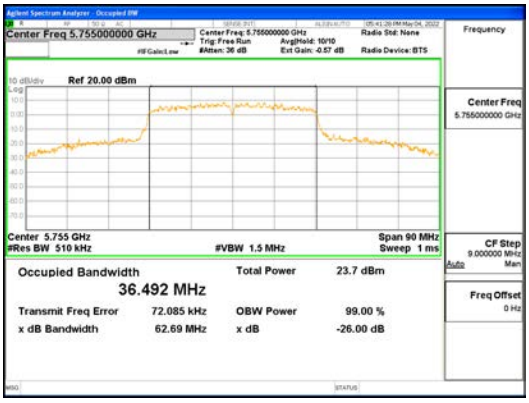




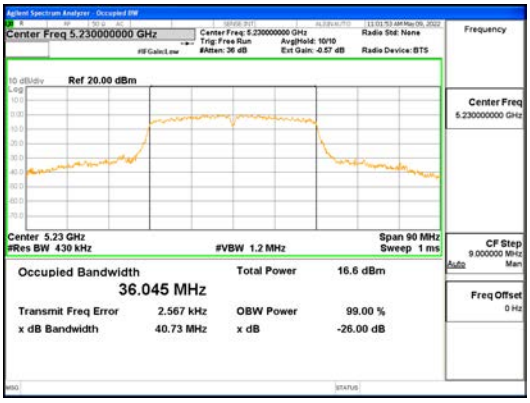




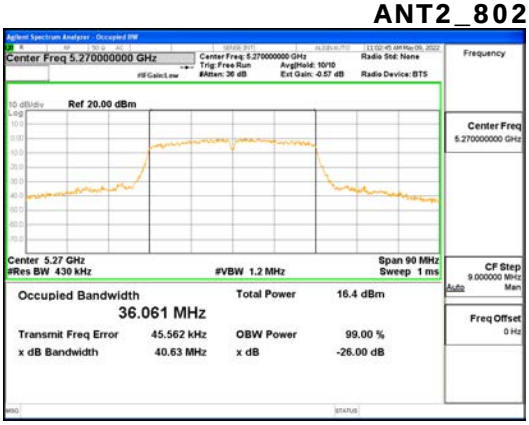
ANT1_802.11n_HT40_UNII 2C

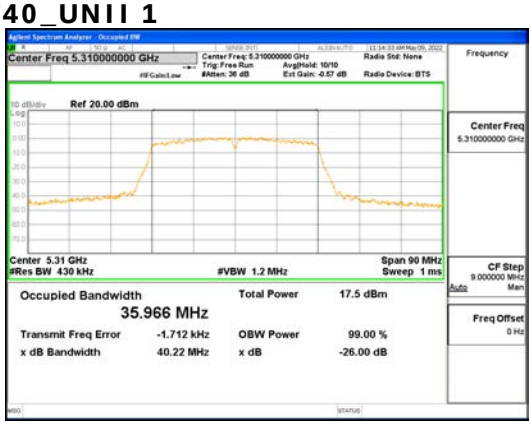


ANT1_802.11n_HT40_UNII 3

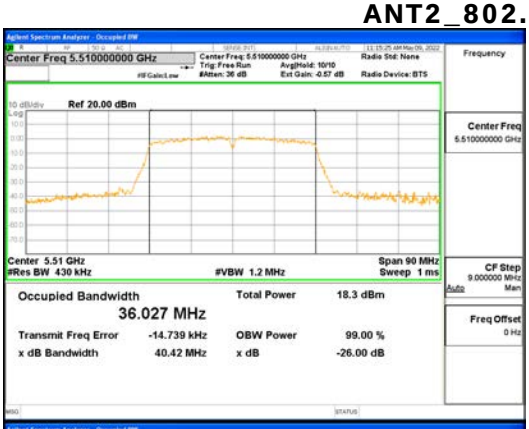


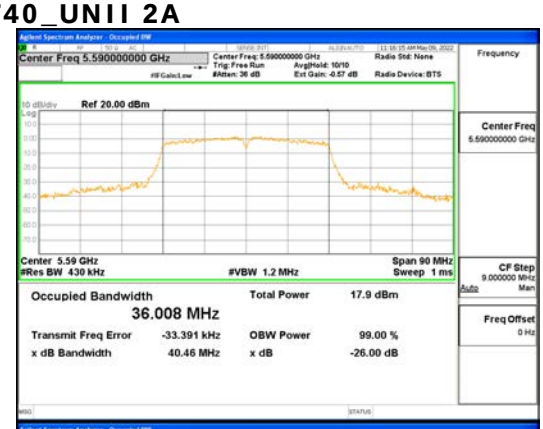
ANT2_802.11n_HT40_UNII 1

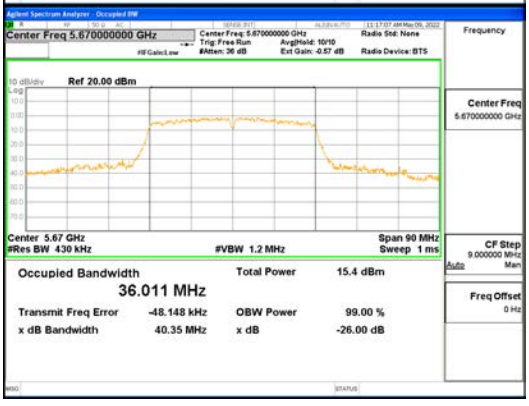




ANT2_802.11n_HT40_UNII 2A

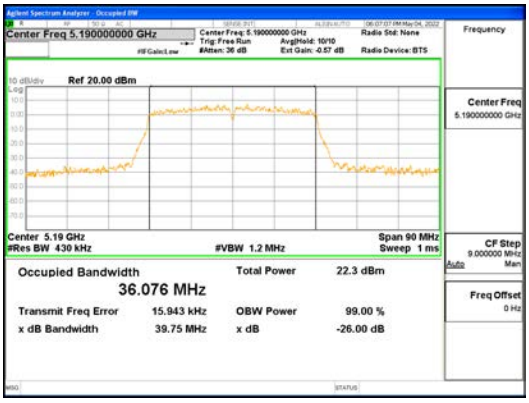




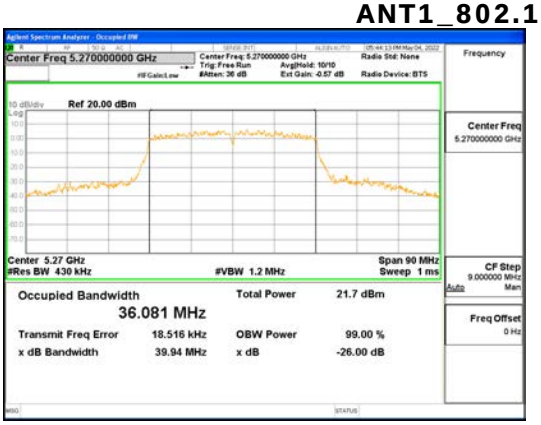


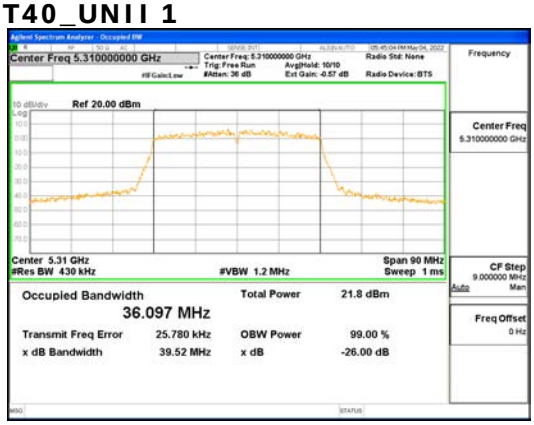
ANT2_802.11n_HT40_UNII 2C

ANT2_802.11n_HT40_UNII 3

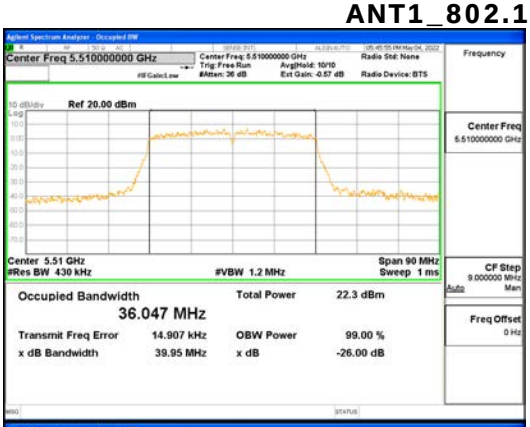


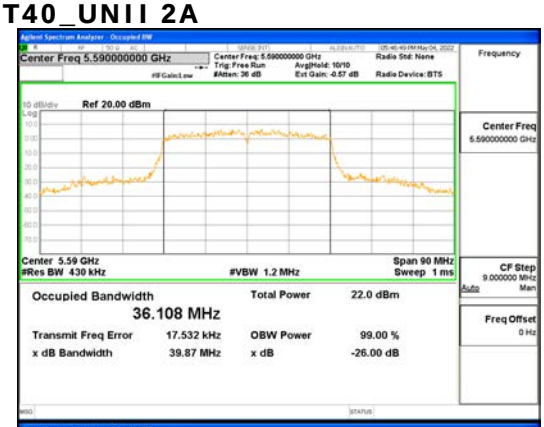
ANT1_802.11ac_VHT40_UNII 1

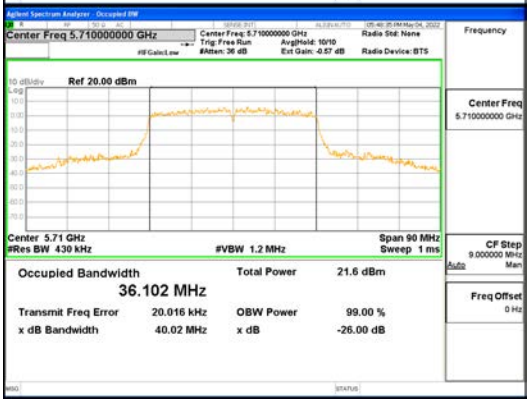




ANT1_802.11ac_VHT40_UNII 2A

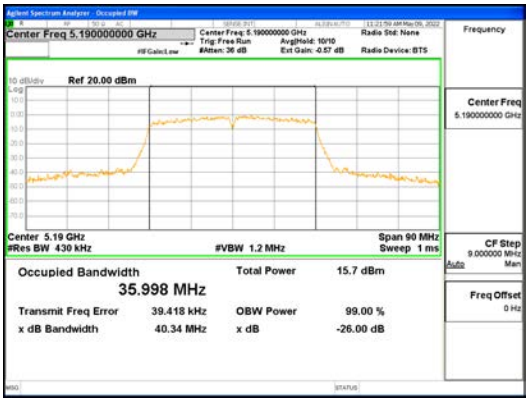




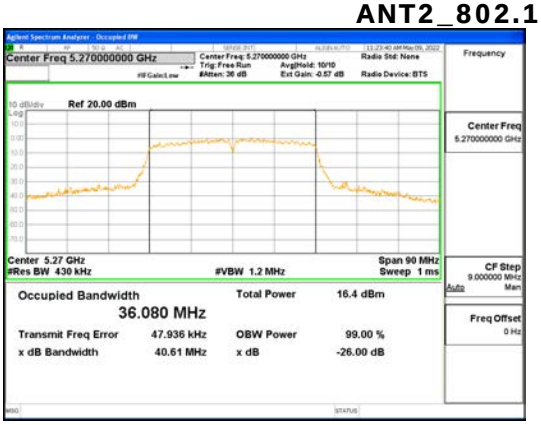


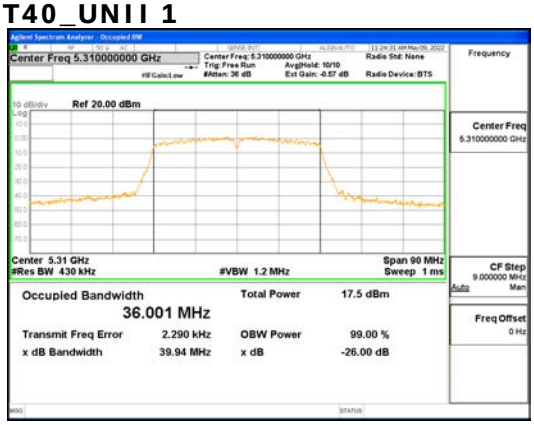
ANT1_802.11ac_VHT40_UNII 2C

ANT1_802.11ac_VHT40_UNII 3

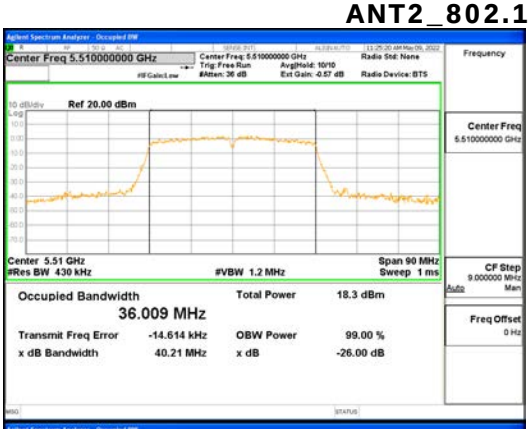


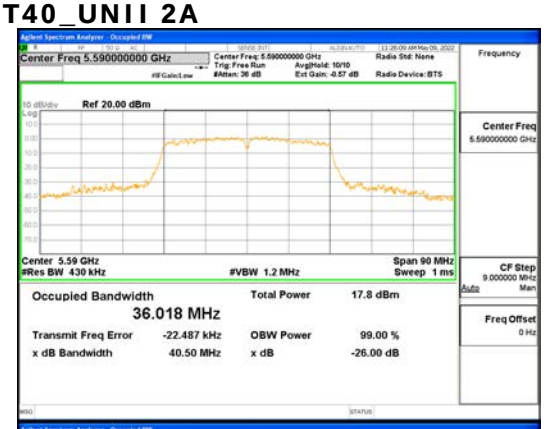
ANT2_802.11ac_VHT40_UNII 1

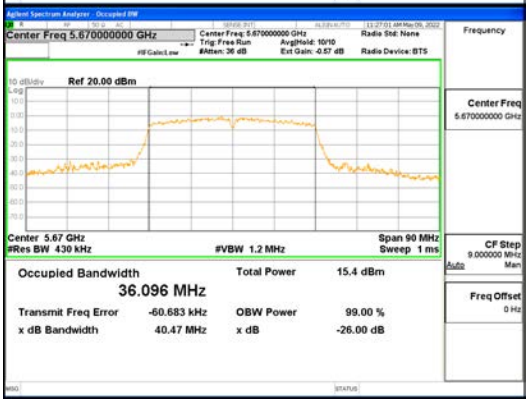




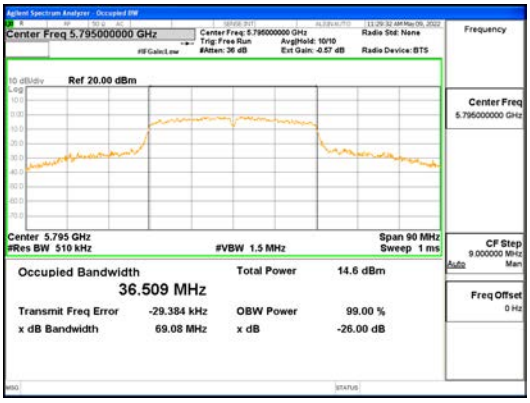
ANT2_802.11ac_VHT40_UNII 2A



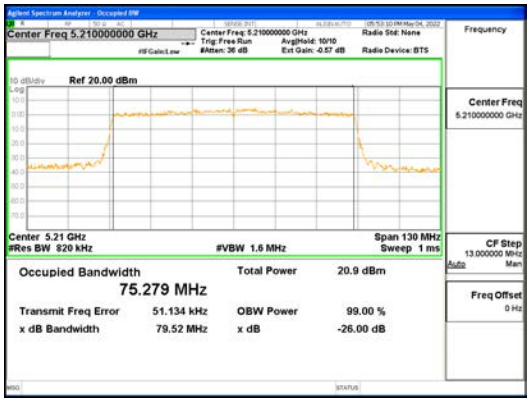




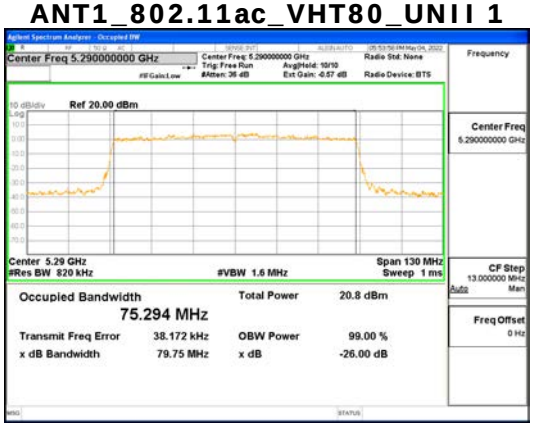
ANT2_802.11ac_VHT40_UNII 2C



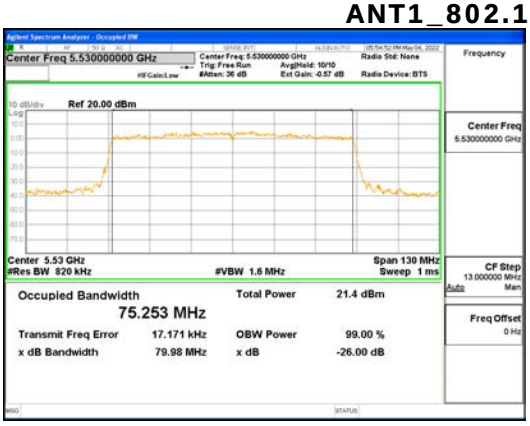
ANT2_802.11ac_VHT40_UNII 3

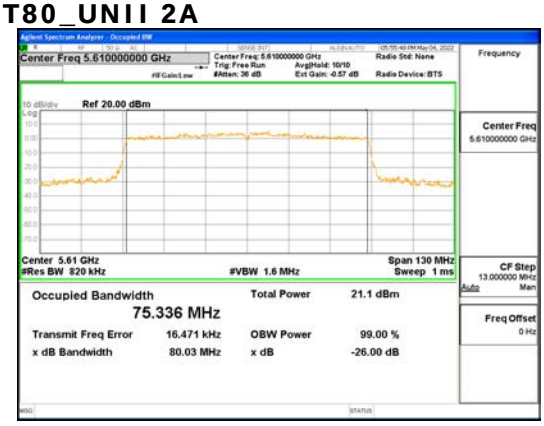


ANT1_802.11ac_VHT80_UNII 1

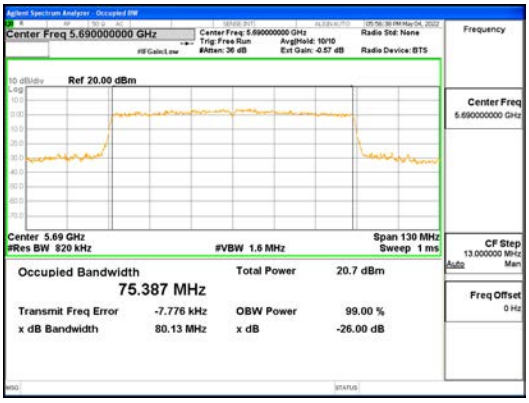


ANT1_802.11ac_VHT80_UNII 2A





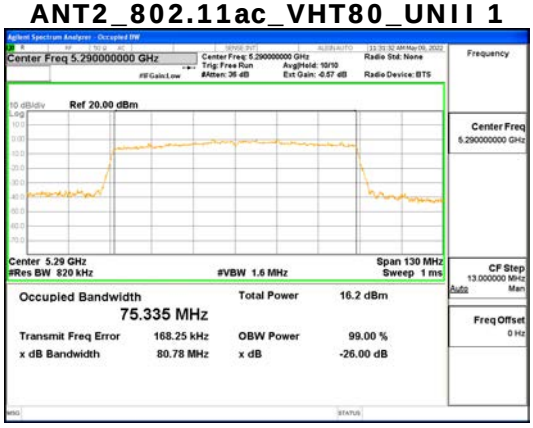
ANT1_802.11ac_VHT80_UNII 2C



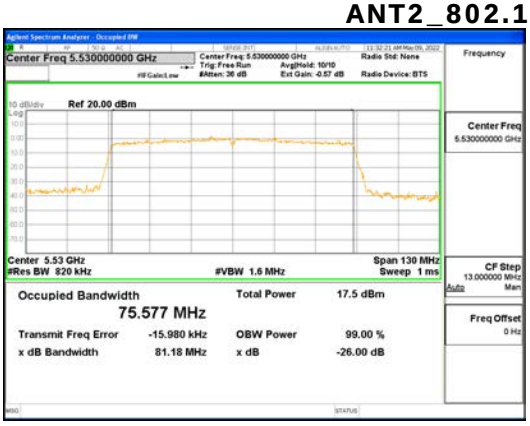
ANT1_802.11ac_VHT80_UNII 2C

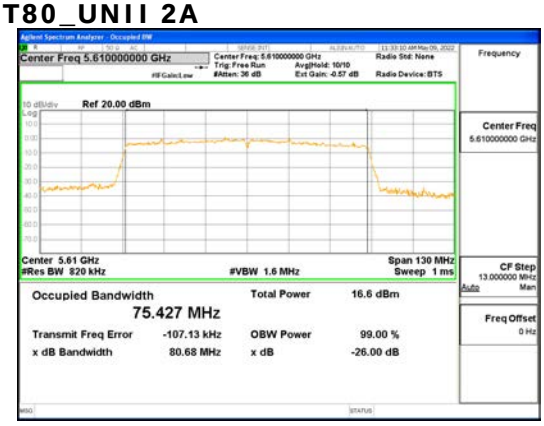
ANT1_802.11ac_VHT80_UNII 3

ANT2_802.11ac_VHT80_UNII 1

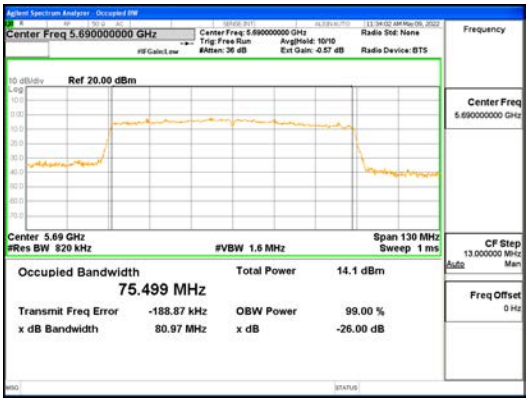


ANT2_802.11ac_VHT80_UNII 2A





ANT2_802.11ac_VHT80_UNII 2C



ANT2_802.11ac_VHT80_UNII 2C

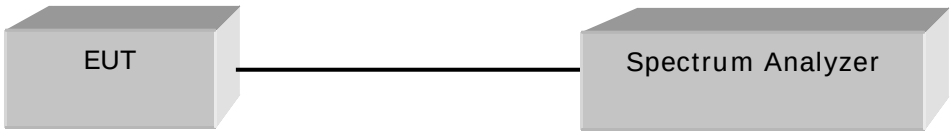
ANT2_802.11ac_VHT80_UNII 3

4.3 OUTPUT POWER

Test Procedures

KDB 789033 – Section E.2.d (Method SA-2, Maximum Conducted Output Power)
KDB 662911 D01, D02 (Multiple Transmitter Output)
ANSI C63.10-2013 – Section 12.3.2.4

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.



Test Settings :

Center frequency = the highest, middle and the lowest channels

a) RBW = 1 MHz

b) VBW ≥ 3 x RBW

c) Sweep time = auto

d) Detector = power averaging (rms)

e) Trace mode = Average at least 100

f) Duty cycle factor = 10log(1/x)

Test mode	Duty Cycle Factor
802.11a	0.15 dB
802.11n_HT20	0.16 dB
802.11n_HT40	0.30 dB
802.11ac_VHT20	0.16 dB
802.11ac_VHT40	0.32 dB
802.11ac_VHT80	0.62 dB

Limit

Operating Mode	ANT Configuration	ANT Gain (dBi)	Mode	Band	Limit (dBm)
SISO	ANT1, ANT2	2.69, 2.74	802.11a/n/ac	UNII 1	24.00
				UNII 2A	24.00
				UNII 2C	24.00
				UNII 3	30.00
MIMO (2Tx)	ANT1 + ANT2	5.73	802.11n/ac	UNII 1	24.00
				UNII 2A	24.00
				UNII 2C	24.00
				UNII 3	30.00

Test Data

ANT1

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	16.77	0.15	16.92	24.00	7.08
	5 200	16.65	0.15	16.80	24.00	7.20
	5 240	16.92	0.15	17.07	24.00	6.93
	5 260	18.38	0.15	18.53	24.00	5.47
	5 300	18.55	0.15	18.70	24.00	5.30
	5 320	18.64	0.15	18.79	24.00	5.21
	5 500	18.00	0.15	18.15	24.00	5.85
	5 600	17.54	0.15	17.69	24.00	6.31
	5 700	17.23	0.15	17.38	24.00	6.62
	5 720	17.32	0.15	17.47	24.00	6.53
	5 745	17.87	0.15	18.02	30.00	11.98
	5 785	18.22	0.15	18.37	30.00	11.63
	5 825	18.19	0.15	18.34	30.00	11.66
802.11n _HT20	5 180	13.12	0.16	13.28	24.00	10.72
	5 200	13.20	0.16	13.36	24.00	10.64
	5 240	13.35	0.16	13.51	24.00	10.49
	5 260	16.83	0.16	16.99	24.00	7.01
	5 300	16.95	0.16	17.11	24.00	6.89
	5 320	17.11	0.16	17.27	24.00	6.73
	5 500	15.90	0.16	16.06	24.00	7.94
	5 600	15.61	0.16	15.77	24.00	8.23
	5 700	15.18	0.16	15.34	24.00	8.66
	5 720	15.21	0.16	15.37	24.00	8.63
	5 745	17.26	0.16	17.42	30.00	12.58
	5 785	17.49	0.16	17.65	30.00	12.35
	5 825	17.48	0.16	17.64	30.00	12.36
802.11ac _VHT20	5 180	13.18	0.16	13.34	24.00	10.66
	5 200	13.26	0.16	13.42	24.00	10.58
	5 240	13.42	0.16	13.58	24.00	10.42
	5 260	16.75	0.16	16.91	24.00	7.09
	5 300	17.06	0.16	17.22	24.00	6.78
	5 320	17.06	0.16	17.22	24.00	6.78
	5 500	15.89	0.16	16.05	24.00	7.95

	5 600	15.60	0.16	15.76	24.00	8.24
	5 700	15.16	0.16	15.32	24.00	8.68
	5 720	15.19	0.16	15.35	24.00	8.65
	5 745	17.20	0.16	17.36	30.00	12.64
	5 785	17.55	0.16	17.71	30.00	12.29
	5 825	17.55	0.16	17.71	30.00	12.29
802.11n _HT40	5 190	15.66	0.30	15.96	24.00	8.04
	5 230	15.66	0.30	15.96	24.00	8.04
	5 270	14.95	0.30	15.25	24.00	8.75
	5 310	15.26	0.30	15.56	24.00	8.44
	5 510	15.51	0.30	15.81	24.00	8.19
	5 590	15.20	0.30	15.50	24.00	8.50
	5 670	14.94	0.30	15.24	24.00	8.76
	5 710	14.80	0.30	15.10	24.00	8.90
	5 755	17.03	0.30	17.33	30.00	12.67
	5 795	17.49	0.30	17.79	30.00	12.21
802.11ac _VHT40	5 190	15.63	0.32	15.95	24.00	8.05
	5 230	15.64	0.32	15.96	24.00	8.04
	5 270	14.93	0.32	15.25	24.00	8.75
	5 310	15.10	0.32	15.42	24.00	8.58
	5 510	15.59	0.32	15.91	24.00	8.09
	5 590	15.23	0.32	15.55	24.00	8.45
	5 670	14.88	0.32	15.20	24.00	8.80
	5 710	14.84	0.32	15.16	24.00	8.84
	5 755	17.02	0.32	17.34	30.00	12.66
	5 795	17.49	0.32	17.81	30.00	12.19
802.11ac _VHT80	5 210	14.28	0.62	14.90	24.00	9.10
	5 290	14.22	0.62	14.84	24.00	9.16
	5 530	14.86	0.62	15.48	24.00	8.52
	5 610	14.52	0.62	15.14	24.00	8.86
	5 690	14.16	0.62	14.78	24.00	9.22
	5 775	16.60	0.62	17.22	30.00	12.78
Measurement uncertainty		± 1.5 dB				

ANT2

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	10.16	0.15	10.31	24.00	13.69
	5 200	10.76	0.15	10.91	24.00	13.09
	5 240	11.26	0.15	11.41	24.00	12.59
	5 260	13.20	0.15	13.35	24.00	10.65
	5 300	14.53	0.15	14.68	24.00	9.32
	5 320	14.57	0.15	14.72	24.00	9.28
	5 500	14.71	0.15	14.86	24.00	9.14
	5 600	14.10	0.15	14.25	24.00	9.75
	5 700	10.90	0.16	11.06	24.00	12.94
	5 720	9.88	0.15	10.03	24.00	13.97
	5 745	9.91	0.15	10.06	30.00	19.94
	5 785	9.79	0.15	9.94	30.00	20.06
	5 825	8.81	0.15	8.96	30.00	21.04
802.11n _HT20	5 180	6.56	0.16	6.72	24.00	17.28
	5 200	7.12	0.16	7.28	24.00	16.72
	5 240	7.70	0.16	7.86	24.00	16.14
	5 260	11.49	0.16	11.65	24.00	12.35
	5 300	12.90	0.16	13.06	24.00	10.94
	5 320	12.96	0.16	13.12	24.00	10.88
	5 500	12.50	0.16	12.66	24.00	11.34
	5 600	11.67	0.16	11.83	24.00	12.17
	5 700	8.37	0.16	8.53	24.00	15.47
	5 720	7.74	0.16	7.90	24.00	16.10
	5 745	9.21	0.16	9.37	30.00	20.63
	5 785	9.03	0.16	9.19	30.00	20.81
	5 825	8.17	0.16	8.33	30.00	21.67
802.11ac _VHT20	5 180	6.64	0.16	6.80	24.00	17.20
	5 200	7.29	0.16	7.45	24.00	16.55
	5 240	7.77	0.16	7.93	24.00	16.07
	5 260	11.72	0.16	11.88	24.00	12.12
	5 300	13.09	0.16	13.25	24.00	10.75
	5 320	13.11	0.16	13.27	24.00	10.73
	5 500	12.53	0.16	12.69	24.00	11.31
	5 600	11.74	0.16	11.90	24.00	12.10

	5 700	8.47	0.16	8.63	24.00	15.37
	5 720	7.41	0.16	7.57	24.00	16.43
	5 745	8.95	0.16	9.11	30.00	20.89
	5 785	8.96	0.16	9.12	30.00	20.88
	5 825	8.19	0.16	8.35	30.00	21.65
802.11n _HT40	5 190	9.66	0.30	9.96	24.00	14.04
	5 230	10.42	0.30	10.72	24.00	13.28
	5 270	10.31	0.30	10.61	24.00	13.39
	5 310	11.45	0.30	11.75	24.00	12.25
	5 510	12.25	0.30	12.55	24.00	11.45
	5 590	11.86	0.30	12.16	24.00	11.84
	5 670	9.28	0.30	9.58	24.00	14.42
	5 710	7.81	0.30	8.11	24.00	15.89
	5 755	8.92	0.30	9.22	30.00	20.78
	5 795	8.62	0.30	8.92	30.00	21.08
802.11ac _VHT40	5 190	9.65	0.32	9.97	24.00	14.03
	5 230	10.57	0.32	10.89	24.00	13.11
	5 270	10.34	0.32	10.66	24.00	13.34
	5 310	11.40	0.32	11.72	24.00	12.28
	5 510	12.29	0.32	12.61	24.00	11.39
	5 590	11.78	0.32	12.10	24.00	11.90
	5 670	9.28	0.32	9.60	24.00	14.40
	5 710	7.82	0.32	8.14	24.00	15.86
	5 755	9.06	0.32	9.38	30.00	20.62
	5 795	8.59	0.32	8.91	30.00	21.09
802.11ac _VHT80	5 210	8.79	0.62	9.41	24.00	14.59
	5 290	10.01	0.62	10.63	24.00	13.37
	5 530	11.45	0.62	12.07	24.00	11.93
	5 610	10.58	0.62	11.20	24.00	12.80
	5 690	8.08	0.62	8.70	24.00	15.30
	5 775	8.30	0.62	8.92	30.00	21.08
Measurement uncertainty		± 1.5 dB				

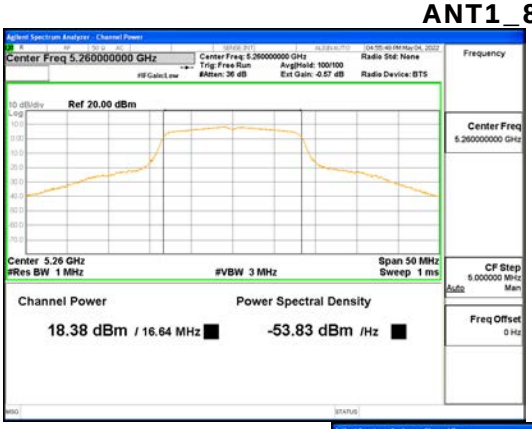
ANT1 + ANT2

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11n _HT20	5 180	13.99	0.16	14.15	24.00	9.85
	5 200	14.16	0.16	14.32	24.00	9.68
	5 240	14.40	0.16	14.56	24.00	9.44
	5 260	17.94	0.16	18.10	24.00	5.90
	5 300	18.39	0.16	18.55	24.00	5.45
	5 320	18.52	0.16	18.68	24.00	5.32
	5 500	17.53	0.16	17.69	24.00	6.31
	5 600	17.08	0.16	17.24	24.00	6.76
	5 700	16.00	0.16	16.16	24.00	7.84
	5 720	15.93	0.16	16.09	24.00	7.91
	5 745	17.89	0.16	18.05	30.00	11.95
	5 785	18.07	0.16	18.23	30.00	11.77
	5 825	17.96	0.16	18.12	30.00	11.88
802.11ac _VHT20	5 180	14.05	0.16	14.21	24.00	9.79
	5 200	14.24	0.16	14.40	24.00	9.60
	5 240	14.47	0.16	14.63	24.00	9.37
	5 260	17.94	0.16	18.10	24.00	5.90
	5 300	18.52	0.16	18.68	24.00	5.32
	5 320	18.53	0.16	18.69	24.00	5.31
	5 500	17.54	0.16	17.70	24.00	6.30
	5 600	17.10	0.16	17.26	24.00	6.74
	5 700	16.00	0.16	16.16	24.00	7.84
	5 720	15.86	0.16	16.02	24.00	7.98
	5 745	17.81	0.16	17.97	30.00	12.03
	5 785	18.11	0.16	18.27	30.00	11.73
	5 825	18.03	0.16	18.19	30.00	11.81
802.11n _HT40	5 190	16.63	0.30	16.93	24.00	7.07
	5 230	16.80	0.30	17.10	24.00	6.90
	5 270	16.23	0.30	16.53	24.00	7.47
	5 310	16.77	0.30	17.07	24.00	6.93
	5 510	17.19	0.30	17.49	24.00	6.51
	5 590	16.85	0.30	17.15	24.00	6.85
	5 670	15.98	0.30	16.28	24.00	7.72
	5 710	15.59	0.30	15.89	24.00	8.11

	5 755	17.65	0.30	17.95	30.00	12.05
	5 795	18.02	0.30	18.32	30.00	11.68
802.11ac _VHT40	5 190	16.61	0.32	16.93	24.00	7.07
	5 230	16.82	0.32	17.14	24.00	6.86
	5 270	16.23	0.32	16.55	24.00	7.45
	5 310	16.64	0.32	16.96	24.00	7.04
	5 510	17.26	0.32	17.58	24.00	6.42
	5 590	16.85	0.32	17.17	24.00	6.83
	5 670	15.94	0.32	16.26	24.00	7.74
	5 710	15.63	0.32	15.95	24.00	8.05
	5 755	17.66	0.32	17.98	30.00	12.02
	5 795	18.02	0.32	18.34	30.00	11.66
802.11ac _VHT80	5 210	15.36	0.62	15.98	24.00	8.02
	5 290	15.62	0.62	16.24	24.00	7.76
	5 530	16.49	0.62	17.11	24.00	6.89
	5 610	15.99	0.62	16.61	24.00	7.39
	5 690	15.12	0.62	15.74	24.00	8.26
	5 775	17.20	0.62	17.82	30.00	12.18
Measurement uncertainty		± 1.5 dB				

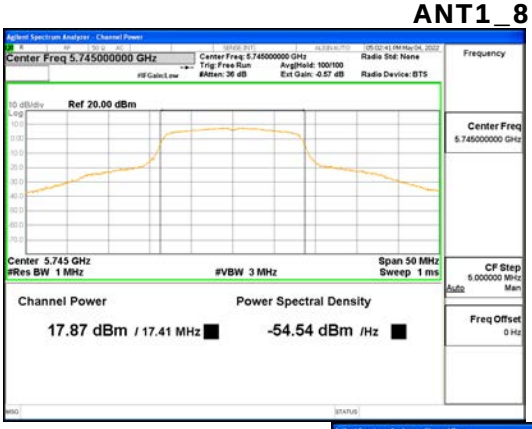
See next pages for actual measured spectrum plots.

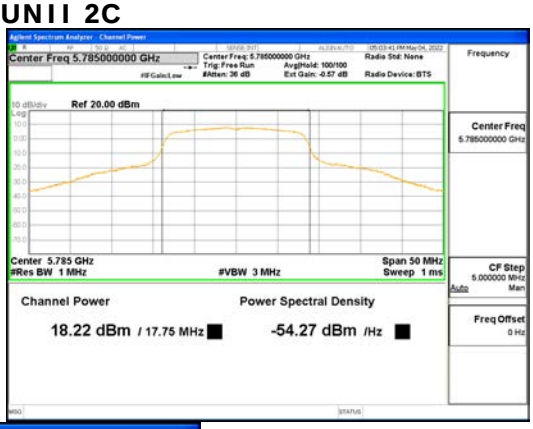
ANT1_802.11a_UNII 1



ANT1_802.11a_UNII 2A

ANT1_802.11a_UNII 2C





ANT1_802.11a_UNII 3