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. Client

◦ Name : KAONMEDIA Co., Ltd.

◦ Address : KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

◦ Date of Receipt : 2019-12-10

2. Manufacturer

◦ Name : KAONMEDIA Co., Ltd.

◦ Address : KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: WiFi Extender / AR2040

5. Date of Test : 2020-01-03 to 2020-01-31

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

7. Testing Environment: Temp.: (24 ± 5) ℃, Humidity: (50 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

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

2020-02-03

Republic of KOREA **CTK Co., Ltd.**

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REPORT REVISION HISTORY

Date	Revision	Page No
2020-02-03	Issued (CTK-2020-00483)	all

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1. General Product Description

1.1 Client Information

Company	KAONMEDIA Co., Ltd.
Contact Point	KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
Contact Person	Name : Kim Tae-Yong E-mail : tykim@kaonmedia.com Tel : +82-31-724-8904

1.2 Product Information

FCC ID	WQT-EX5500
Product Description	WiFi Extender
Model name	AR2040
Variant Model name	EVO5500EXT
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 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	CDD Mode_802.11a : 24.83 dBm (304.09 mW) CDD Mode_802.11n_HT20 : 23.44 dBm (220.80 mW) CDD Mode_802.11n_HT40 : 23.16 dBm (207.01 mW) CDD Mode_802.11ac_VHT20 : 24.01 dBm (251.77 mW) CDD Mode_802.11ac_VHT40 : 23.36 dBm (216.77 mW) CDD Mode_802.11ac_VHT80 : 23.43 dBm (220.29 mW) SDM Mode_802.11n_HT20 : 23.07 dBm (202.77 mW) SDM Mode_802.11n_HT40 : 22.56 dBm (180.30 mW) SDM Mode_802.11ac_VHT20 : 23.76 dBm (237.68 mW) SDM Mode_802.11ac_VHT40 : 23.15 dBm (206.54 mW) SDM Mode_802.11ac_VHT80 : 23.11 dBm (204.64 mW)
Antenna Specification	Type : PCB Antenna Peak Gain : 2 dBi (ANT1, ANT2, ANT3, ANT4)
Type of Modulation	OFDM
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 600 Mbps 802.11ac : up to 1.733 Gbps
Power Source	DC 12 V (Adapter)
Hardware Rev	1.0
Software Rev	1.18.03

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253QPR
AC/DC Adapter	HP	HSTNN-LA40	-
AD/DC Adapter	SHENZHEN FRECOM ELECTRONICS CO., LTD.	F18L16-120150SPAU	-

2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-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)	Status (Note 1)	Test Condition
15.407(e)	6 dB Bandwidth	C	Conducted
15.407(a)	26 dB Bandwidth and 99% Bandwidth	C	
15.407(a)(1)	Conducted Output Power	C	
15.407(a)(1)	Power Spectral Density	C	
15.407(g)	Frequency Stability	C	
15.407 (b)	Undesirable emission	C	Radiated
15.205, 15.407 (b)(5),(6)	Radiated Spurious Emission	C	
15.207	AC Conducted Emissions	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 15.247, 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 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 3	5 755 MHz	-	5 795 MHz

- 802.11ac_VHT80

	Lowest channel	Middle channel	Highest channel
UNII 1	5 210 MHz	-	-
UNII 3	5 775 MHz	-	-

Test mode

- CDD mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	OFDM	6 Mbps	95.1 %	0.22 dB
802.11n_HT20	OFDM	MCS 0	95.3 %	0.21 dB
802.11n_HT40	OFDM	MCS 0	91.0 %	0.20 dB
802.11ac_VHT20	OFDM	MNSS 0	95.4 %	0.41 dB
802.11ac_VHT40	OFDM	MNSS 0	97.3 %	0.12 dB
802.11ac_VHT80	OFDM	MNSS 0	94.7 %	0.24 dB

- SDM mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11n_HT20	OFDM	MCS 0	95.3 %	0.21 dB
802.11n_HT40	OFDM	MCS 0	91.0 %	0.20 dB
802.11ac_VHT20	OFDM	MNSS 0	95.4 %	0.41 dB
802.11ac_VHT40	OFDM	MNSS 0	97.3 %	0.12 dB
802.11ac_VHT80	OFDM	MNSS 0	94.7 %	0.24 dB

3.3 Model Differences

AR2040 and EVO5500EXT are no technical difference from each model only except for Model name because of marketing purposes.

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
Power Spectral Density	± 1.5 dB
Occupied Bandwidth	± 0.1 MHz
Unwanted Emission(conducted)	± 3.0 dB
Radiated Emissions (f ≤ 1 GHz)	± 4.0 dB
Radiated Emissions (f > 1 GHz)	± 5.0 dB

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. 8.53.0

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	16.39	17.68	17.61
5 785 MHz	16.38	17.61	17.65
5 825 MHz	16.38	17.61	17.62
Measurement	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	36.39	36.38
5 795 MHz	36.40	36.39
Measurement	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	75.98
Measurement	± 0.1 MHz

ANT2

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	16.45	17.62	17.63
5 785 MHz	16.37	17.62	17.62
5 825 MHz	16.37	17.62	17.62
Measurement	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	36.41	36.41
5 795 MHz	36.41	36.39
Measurement	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	76.06
Measurement	± 0.1 MHz

ANT3

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	16.42	17.63	17.63
5 785 MHz	16.38	17.62	17.62
5 825 MHz	16.37	17.64	17.62
Measurement	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	36.36	36.35
5 795 MHz	36.39	36.36
Measurement	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	76.17
Measurement	± 0.1 MHz

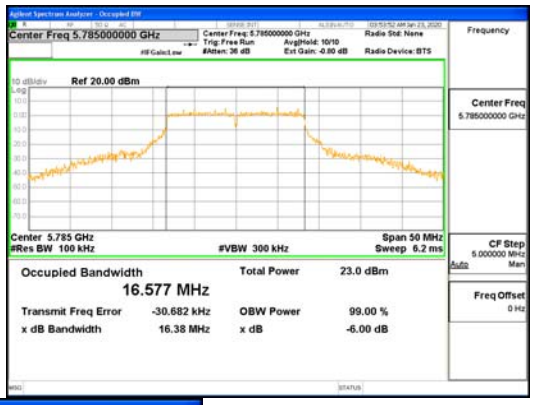
ANT4

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	16.45	17.64	17.64
5 785 MHz	16.44	17.62	17.66
5 825 MHz	16.42	17.64	17.62
Measurement	± 0.1 MHz		

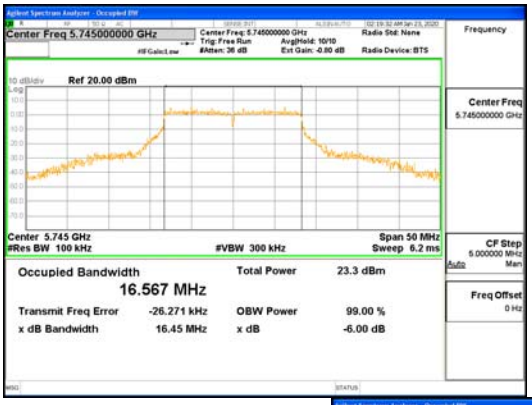
	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	36.35	36.37
5 795 MHz	36.40	36.37
Measurement	± 0.1 MHz	

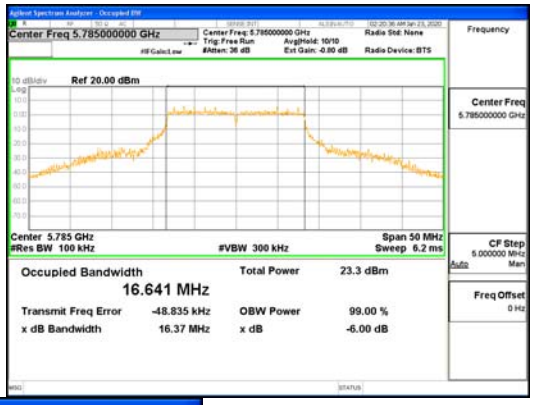
	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	76.04
Measurement	± 0.1 MHz

See next pages for actual measured spectrum plots.



ANT1_802.11a





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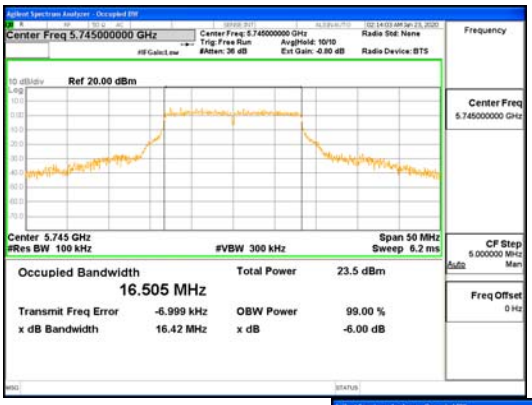
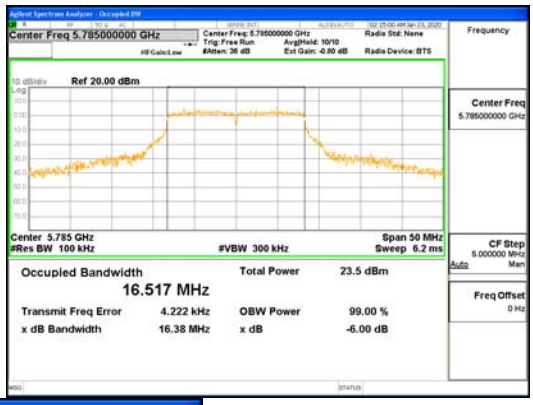
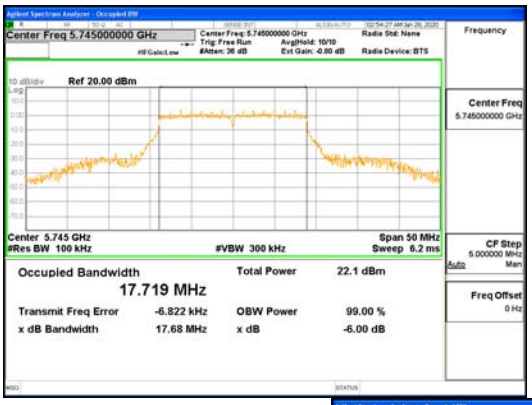
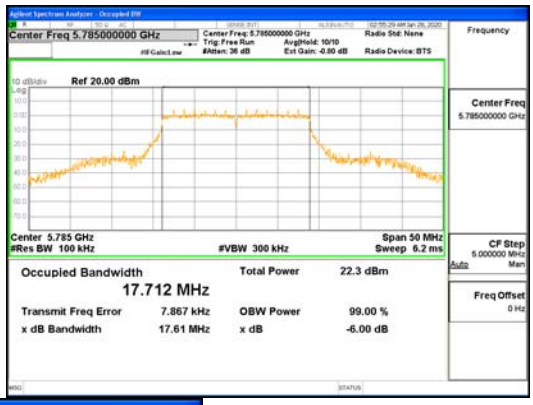




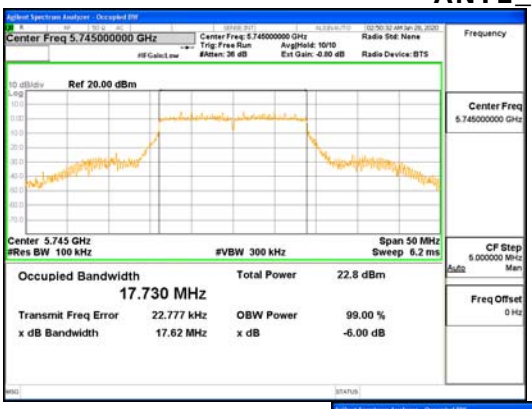
ANT3_802.11a

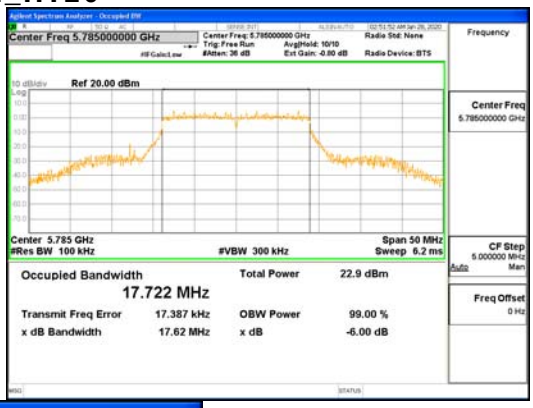
ANT4_802.11a

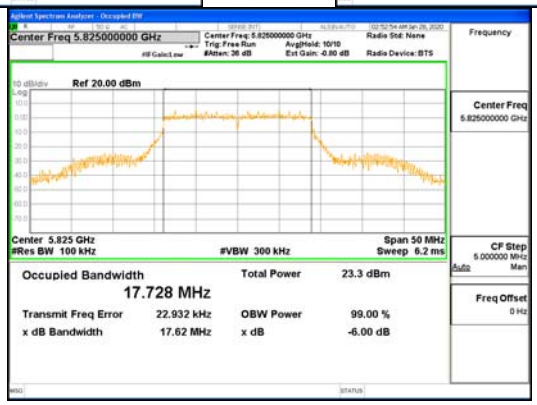




ANT1_802.11n_HT20







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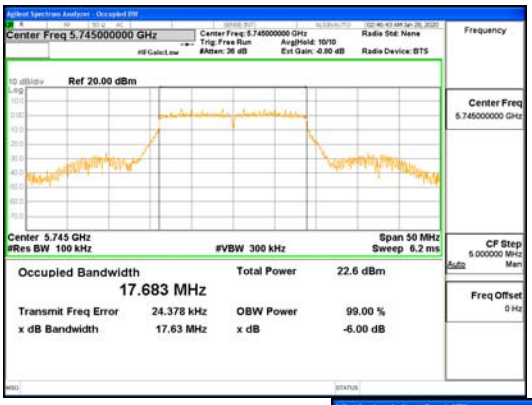

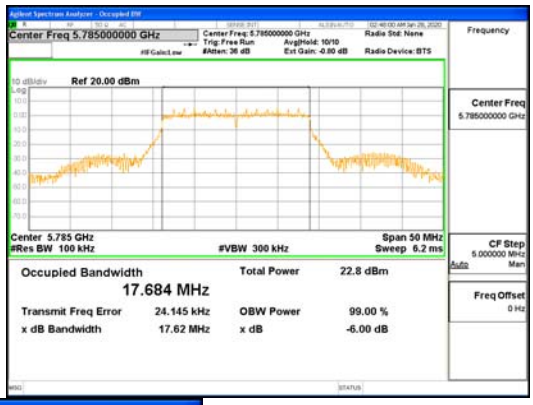

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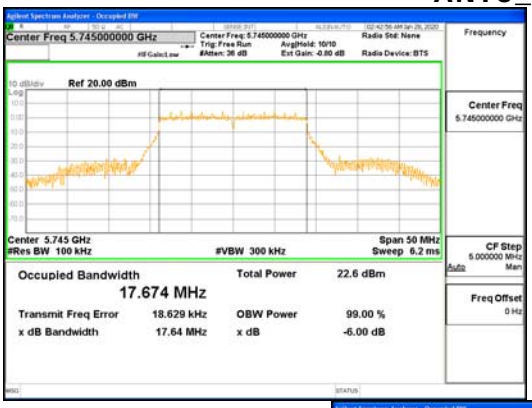

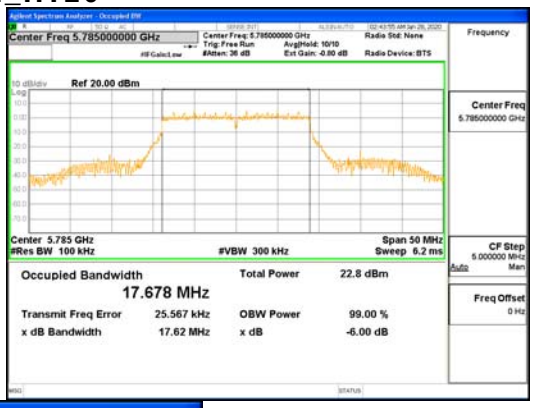

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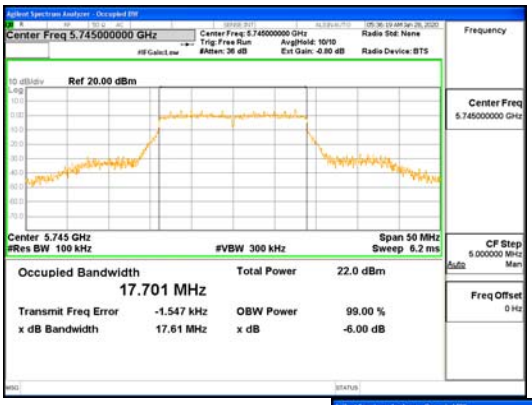
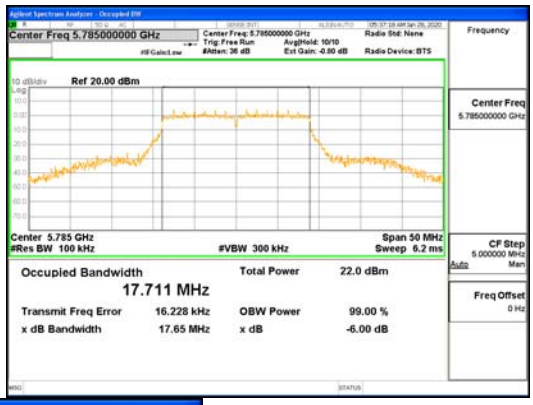
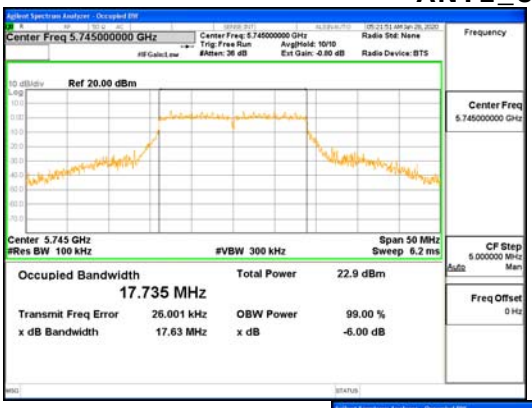
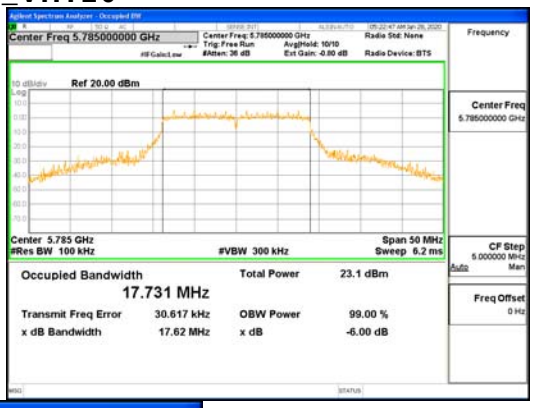




ANT1_802.11ac_VHT20





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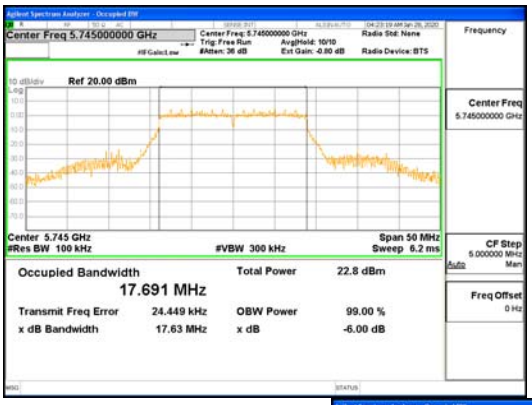

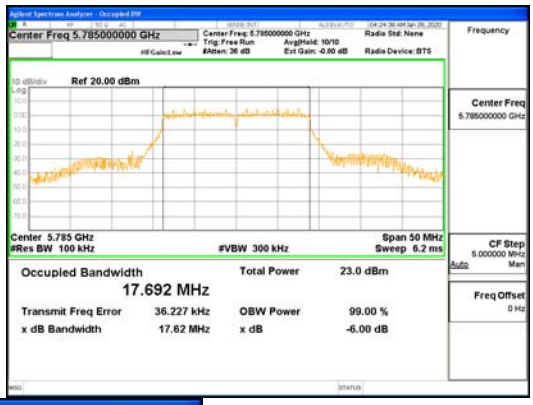

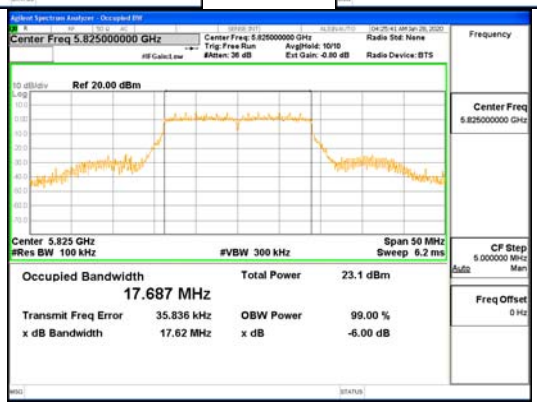

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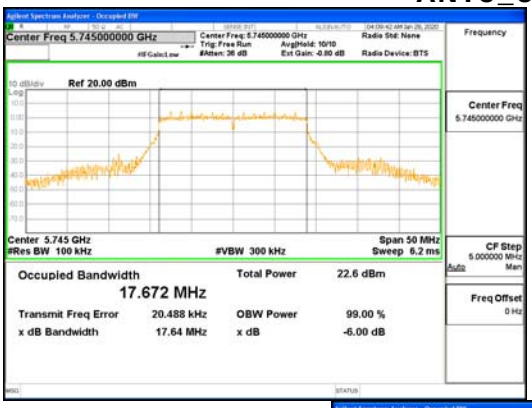

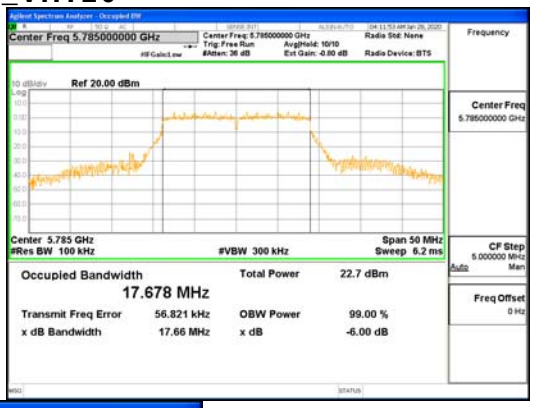

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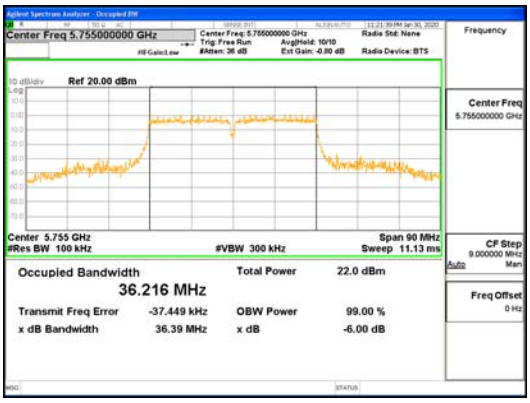

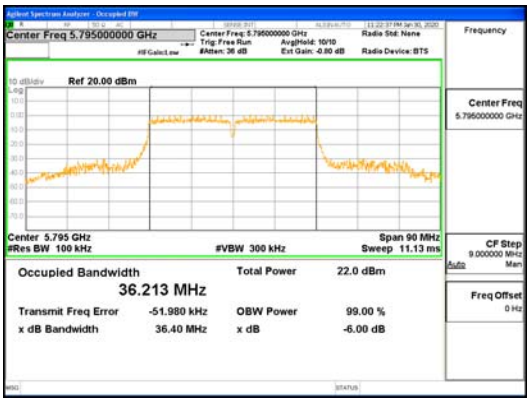

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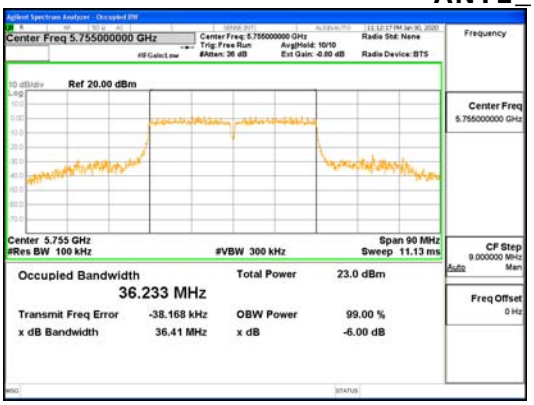

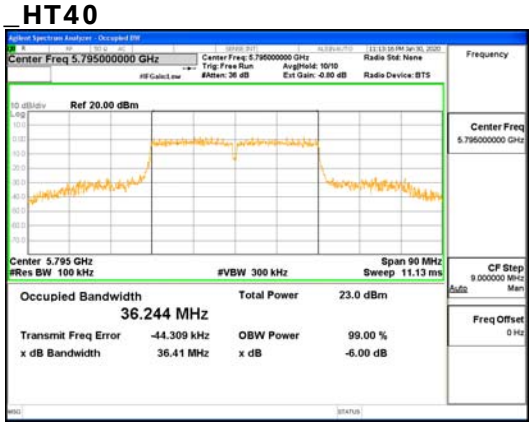

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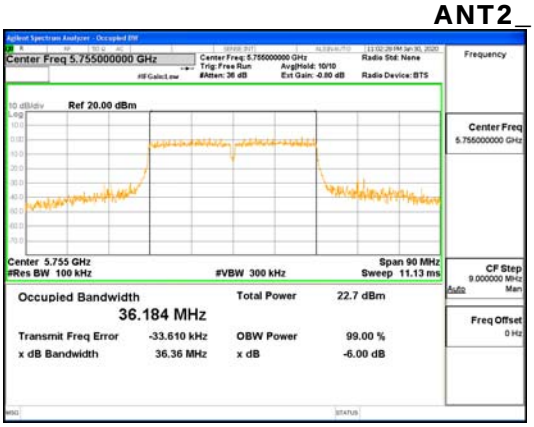
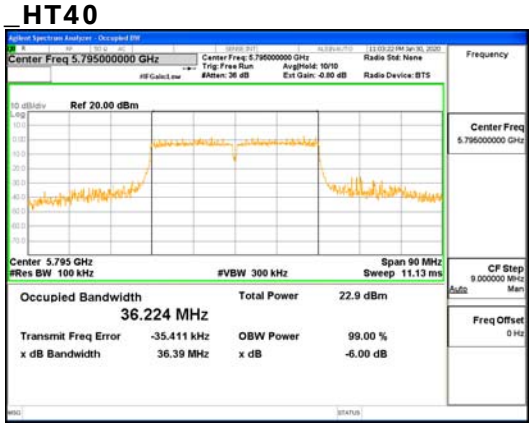
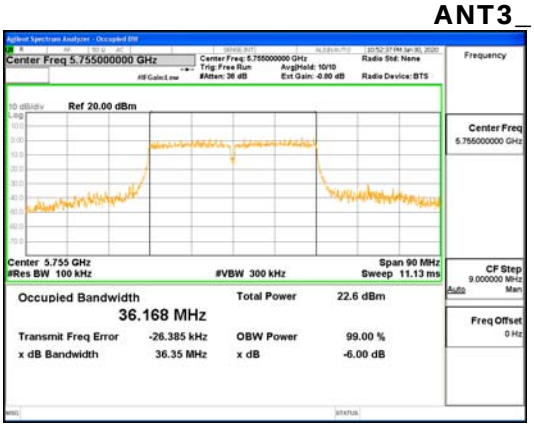
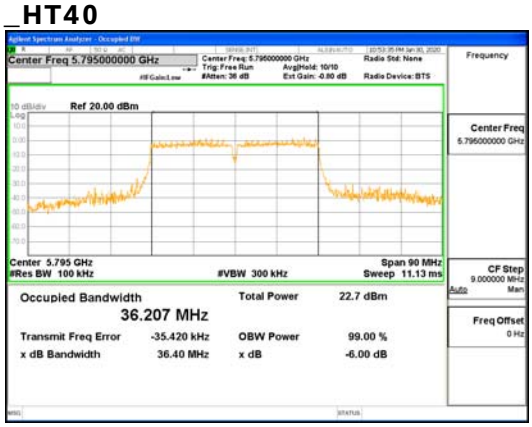


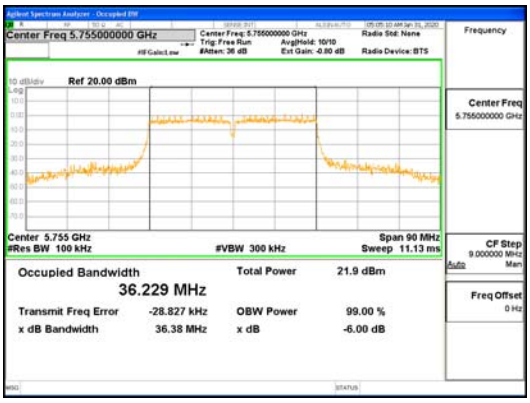


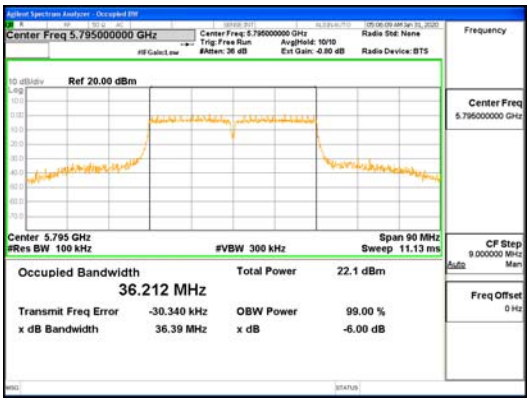
ANT3_802.11n_HT40



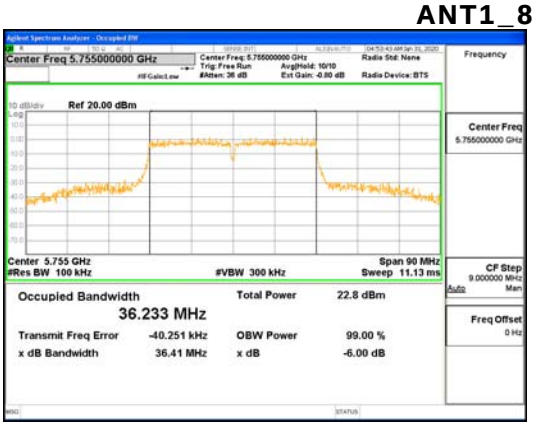


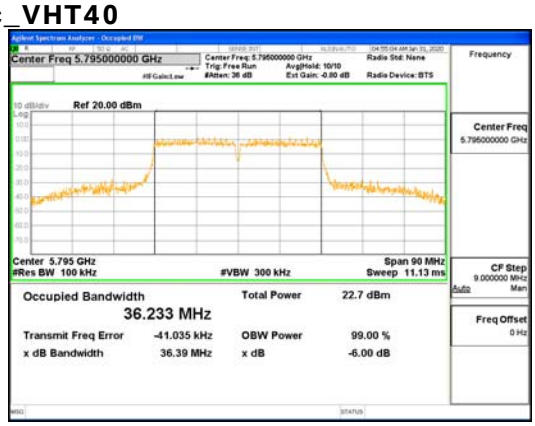
ANT4_802.11n_HT40



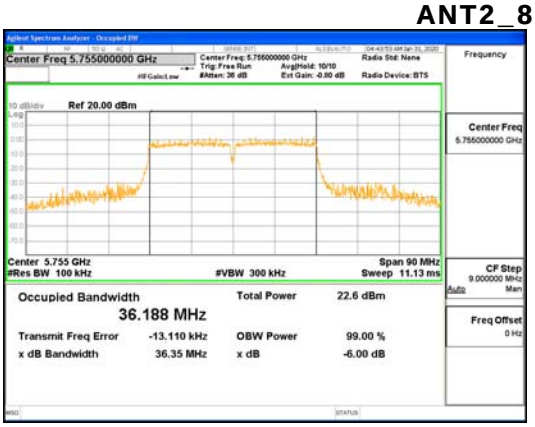


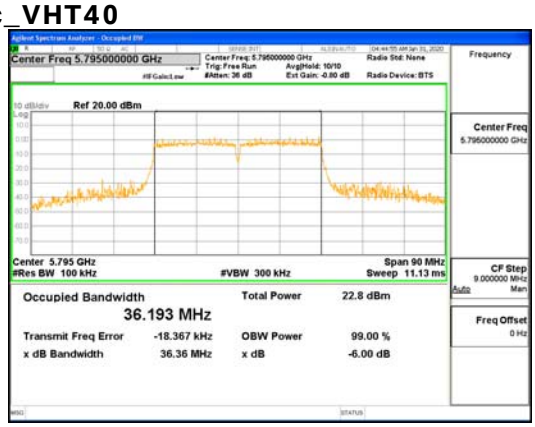
ANT1_802.11ac_VHT40





ANT2_802.11ac_VHT40

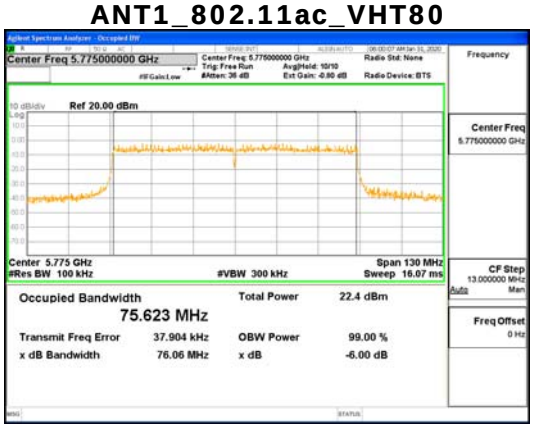




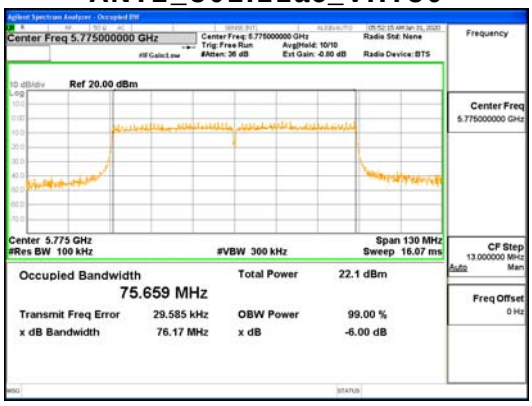
ANT3_802.11ac_VHT40

ANT4_802.11ac_VHT40

ANT1_802.11ac_VHT80



ANT2_802.11ac_VHT80



ANT3_802.11ac_VHT80

ANT4_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	22.42	18.15	22.48	18.96	22.63	18.98
5 200 MHz	22.41	18.16	22.67	18.95	22.31	18.90
5 240 MHz	22.25	18.09	22.76	19.01	22.33	18.89
5 745 MHz	34.67	18.20	34.71	18.63	32.44	18.62
5 785 MHz	31.52	17.97	35.15	18.68	33.11	18.64
5 825 MHz	31.77	17.93	35.11	18.71	33.49	18.61
Measurement	± 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	41.02	36.71	40.63	36.67
5 230 MHz	41.05	36.73	40.58	36.68
5 755 MHz	53.97	36.54	57.37	36.53
5 795 MHz	66.57	36.59	60.08	36.51
Measurement	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.93	75.09
5 775 MHz	103.07	75.74
Measurement	± 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	22.49	18.05	22.23	18.78	22.54	18.82
5 200 MHz	22.50	18.11	22.30	18.77	22.64	18.78
5 240 MHz	22.50	18.08	22.38	18.76	22.45	18.75
5 745 MHz	28.81	17.82	30.96	18.42	31.91	18.46
5 785 MHz	32.06	18.08	28.52	18.55	30.34	18.60
5 825 MHz	31.89	18.11	33.16	18.47	29.94	18.53
Measurement	± 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	40.44	36.72	40.66	36.74
5 230 MHz	40.09	36.70	40.63	36.75
5 755 MHz	54.84	36.49	42.66	36.52
5 795 MHz	50.68	36.56	53.93	36.54
Measurement	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.68	75.13
5 775 MHz	80.41	75.82
Measurement	± 0.1 MHz	

ANT3

	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	22.06	17.88	22.28	18.72	22.40	18.71
5 200 MHz	22.00	17.91	22.18	18.77	22.34	18.76
5 240 MHz	21.98	17.89	22.20	18.78	22.55	18.77
5 745 MHz	24.79	17.45	28.27	18.36	26.45	18.32
5 785 MHz	25.00	17.45	32.99	18.41	26.98	18.35
5 825 MHz	26.69	17.47	33.59	18.43	30.63	18.37
Measurement	± 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	40.09	36.64	40.45	36.64
5 230 MHz	40.17	36.64	40.49	36.71
5 755 MHz	39.90	36.30	52.82	36.37
5 795 MHz	56.18	36.40	58.70	36.43
Measurement	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.51	75.00
5 775 MHz	80.35	75.83
Measurement	± 0.1 MHz	

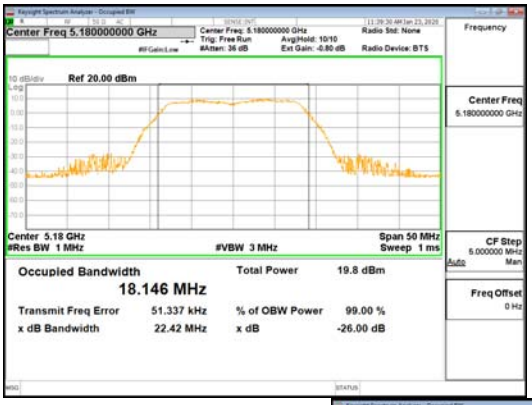
ANT4

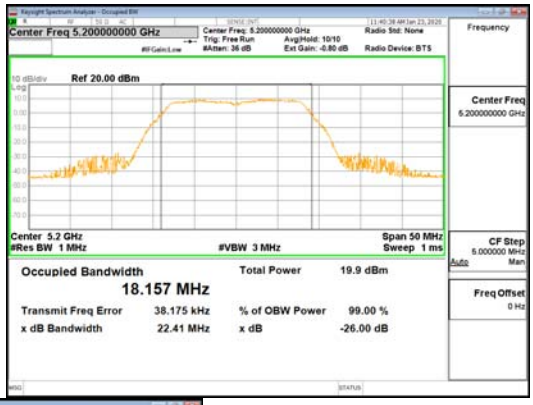
	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	22.15	17.84	22.28	18.81	22.38	18.76
5 200 MHz	22.04	17.80	22.67	18.72	22.27	18.71
5 240 MHz	22.19	17.93	22.25	18.77	22.51	18.72
5 745 MHz	22.33	17.29	23.72	18.33	21.76	18.29
5 785 MHz	24.14	17.41	30.77	18.35	21.79	18.28
5 825 MHz	26.26	17.49	28.76	18.43	21.78	18.32
Measurement	± 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	39.98	36.72	40.62	36.74
5 230 MHz	40.48	36.67	40.76	36.71
5 755 MHz	49.11	36.33	48.83	36.36
5 795 MHz	50.52	36.38	53.05	36.40
Measurement	± 0.1 MHz			

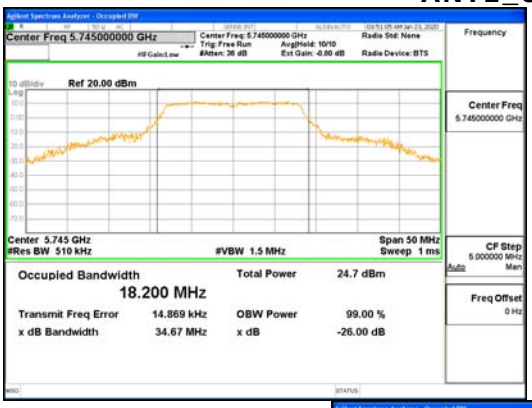
	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.75	75.04
5 775 MHz	81.18	75.76
Measurement	± 0.1 MHz	

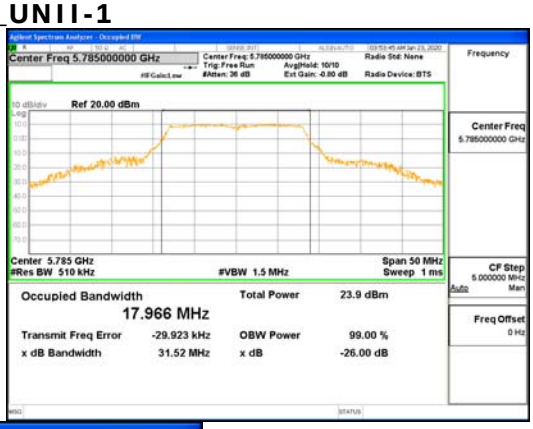
See next pages for actual measured spectrum plots.



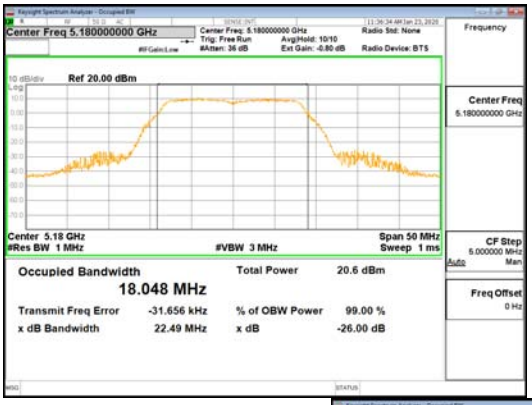


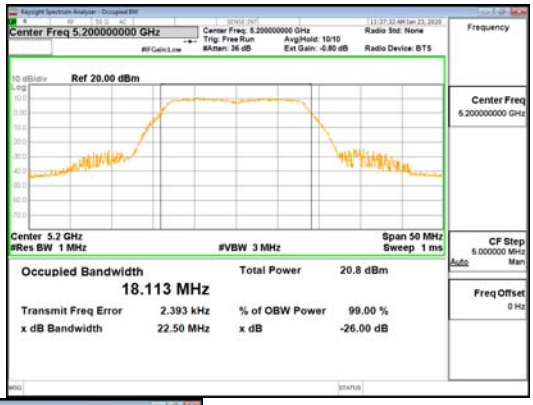
ANT1_802.11a_UNII-1





ANT1_802.11a_UNII-3





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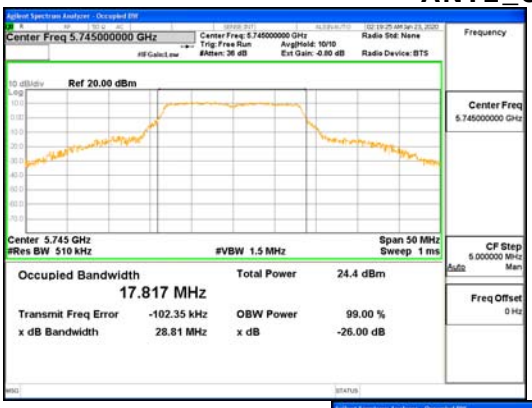

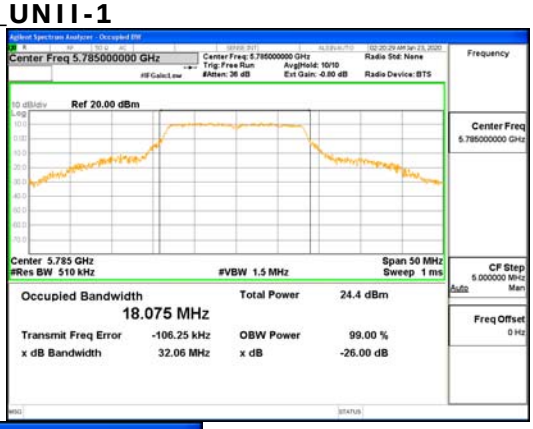

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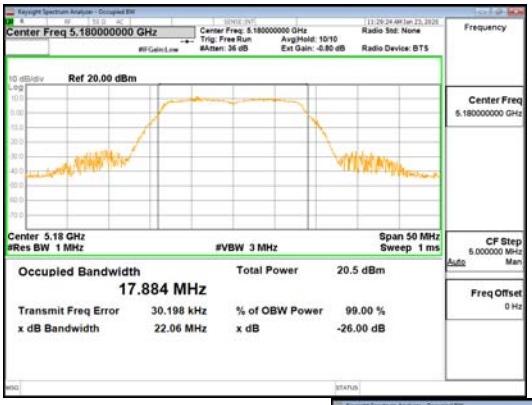

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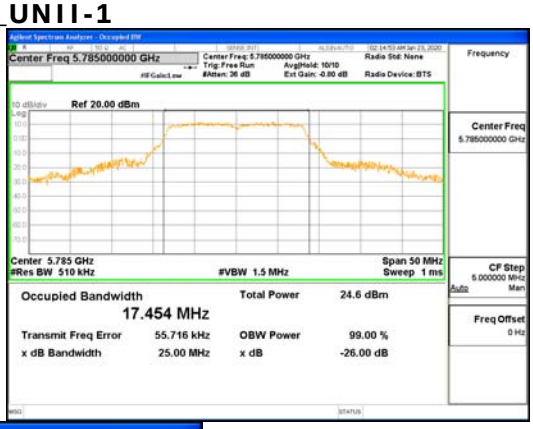
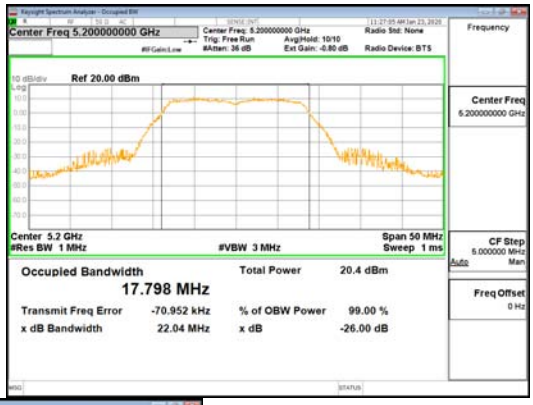


ANT3_802.11a_UNII-3



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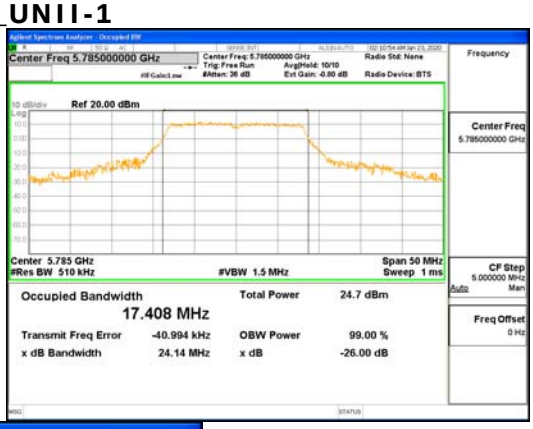
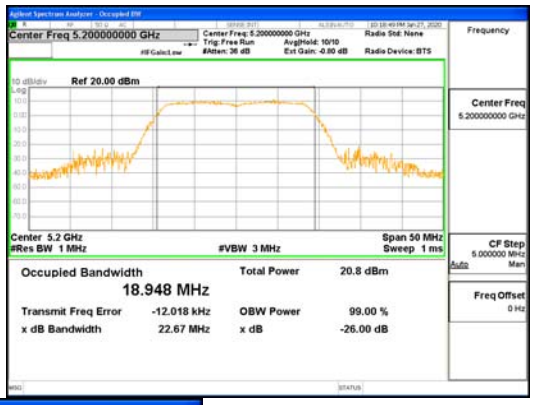
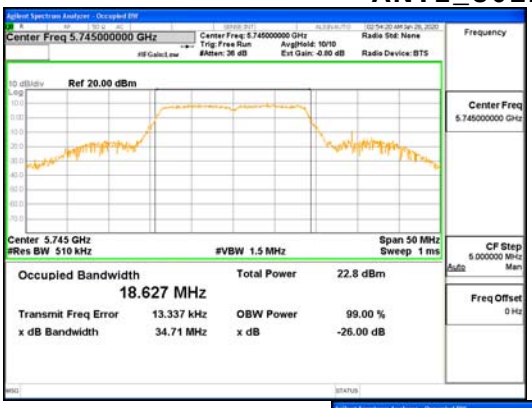


ANT4_802.11a_UNII-3



ANT1_802.11n_HT20_UNII-1



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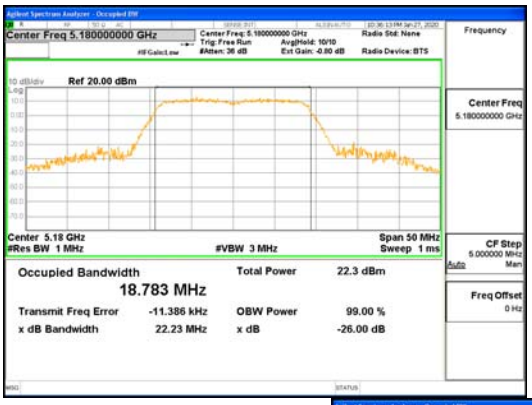
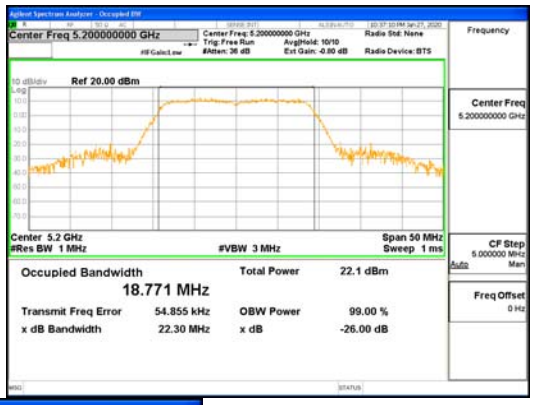
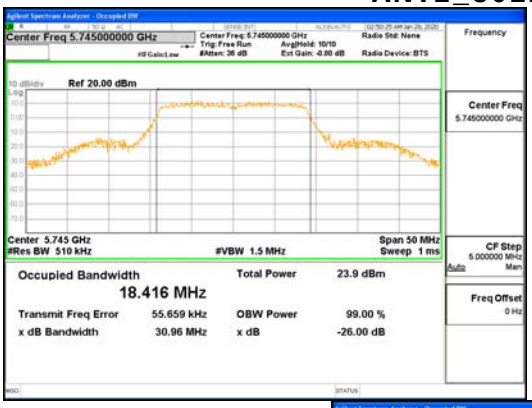
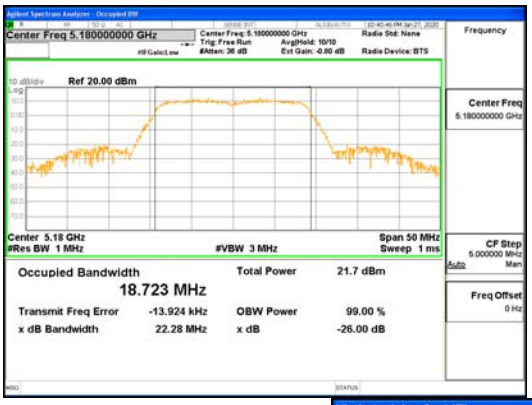


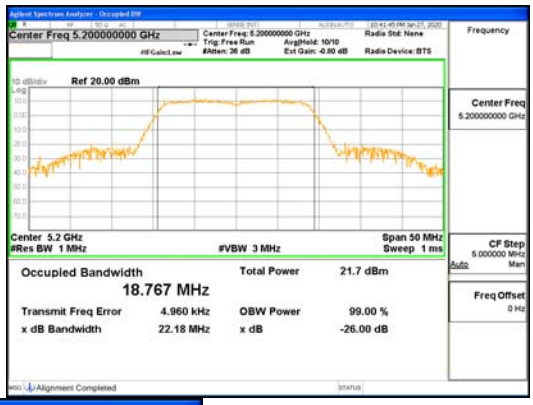


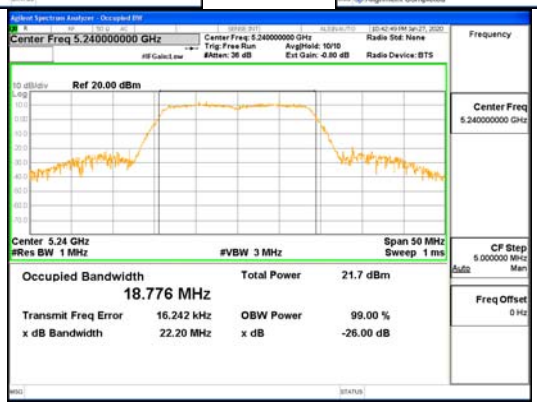
ANT2_802.11n_HT20_UNII-1



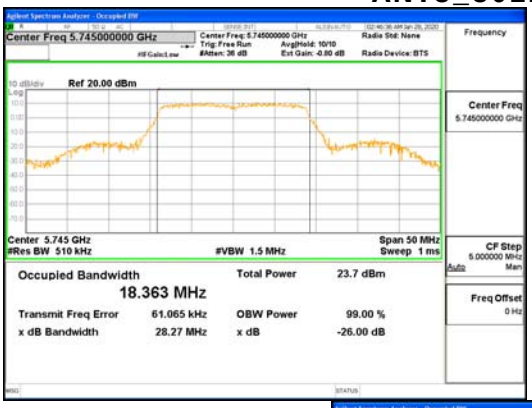
ANT2_802.11n_HT20_UNII-3

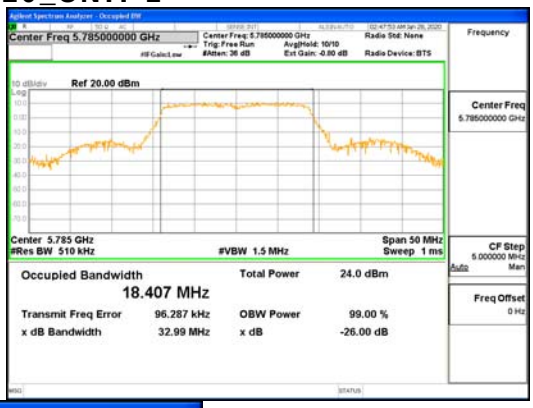




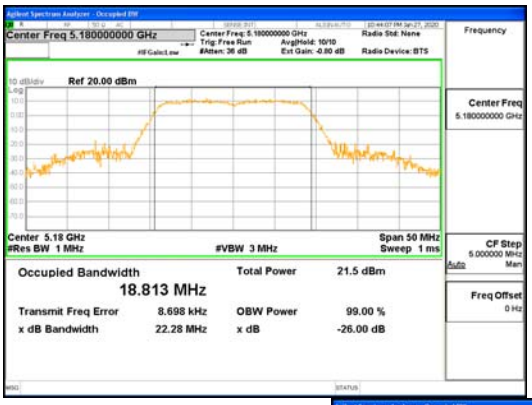


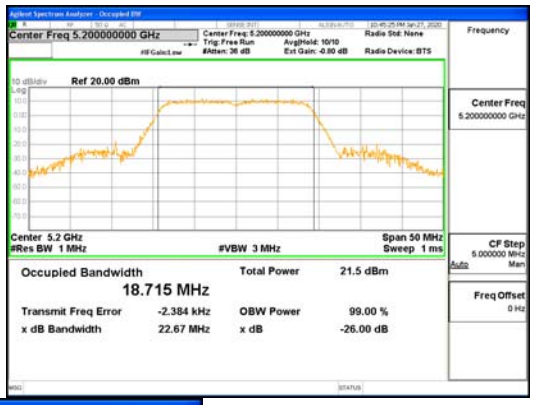
ANT3_802.11n_HT20_UNII-1



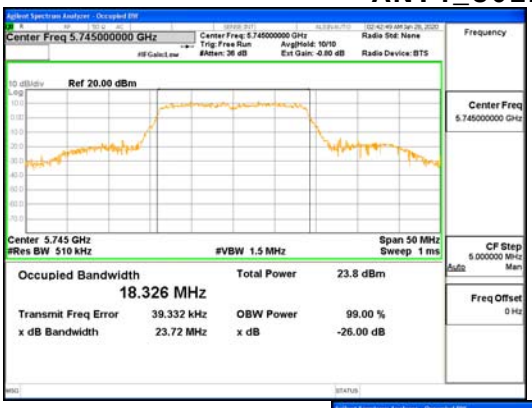


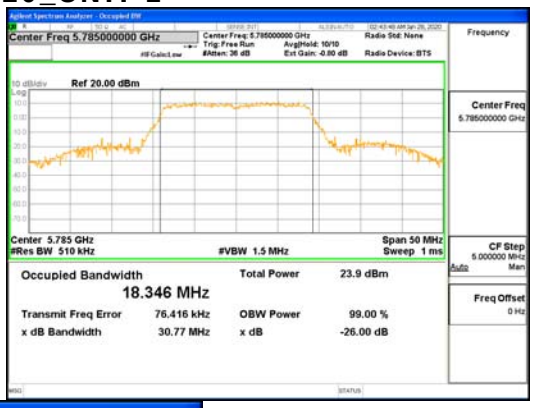
ANT3_802.11n_HT20_UNII-3



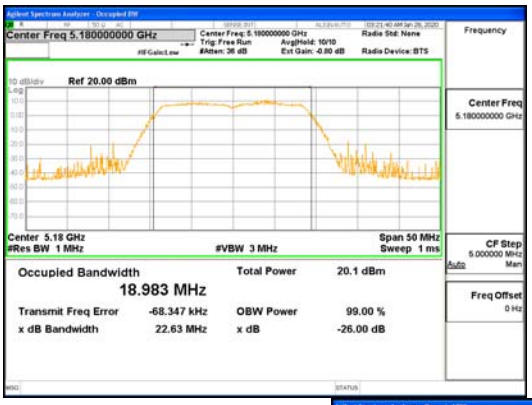


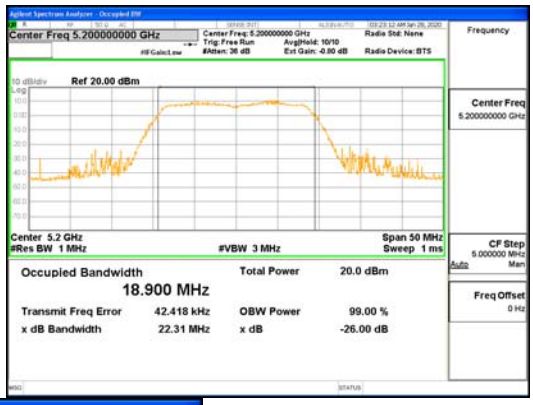
ANT4_802.11n_HT20_UNII-1



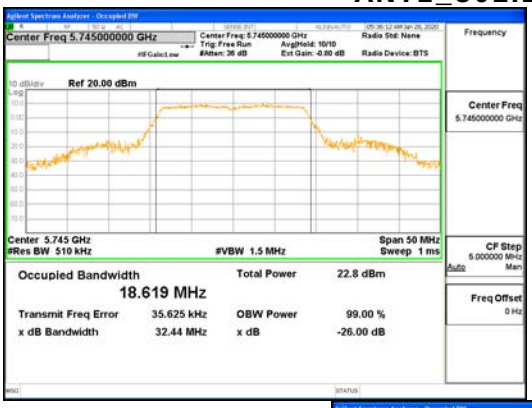


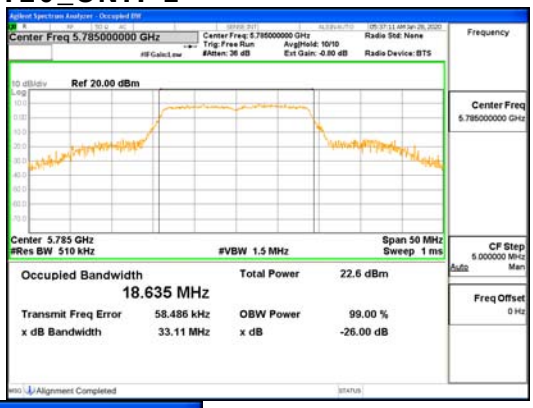
ANT4_802.11n_HT20_UNII-3



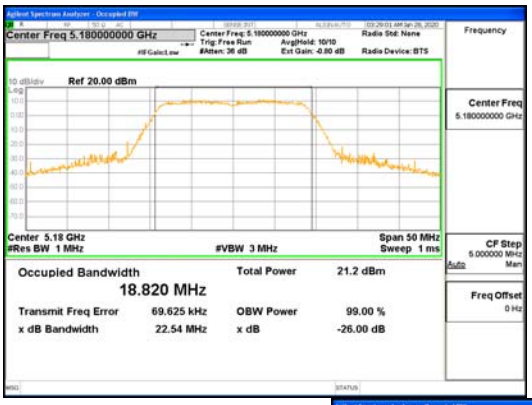


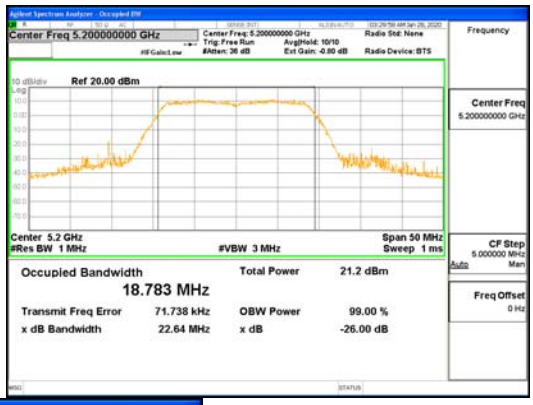
ANT1_802.11ac_VHT20_UNII-1

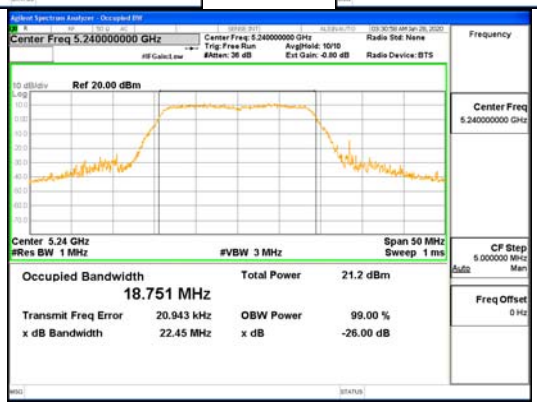




ANT1_802.11ac_VHT20_UNII-3

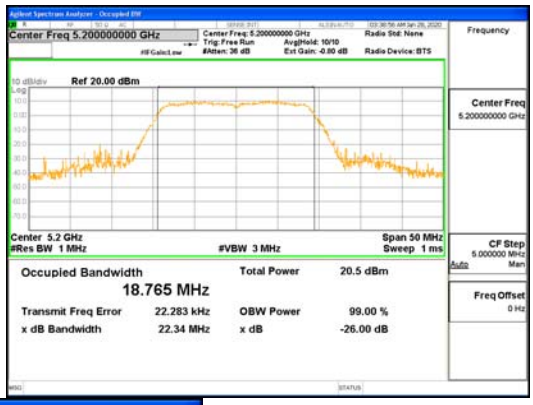


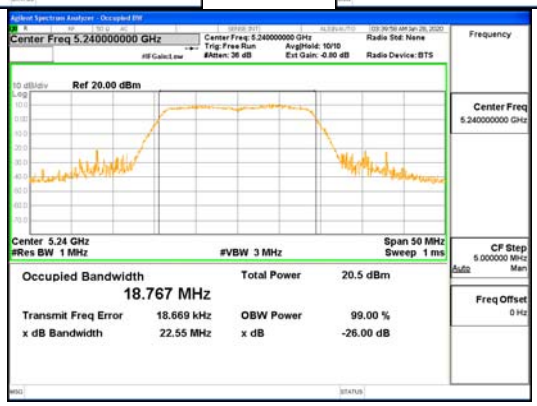




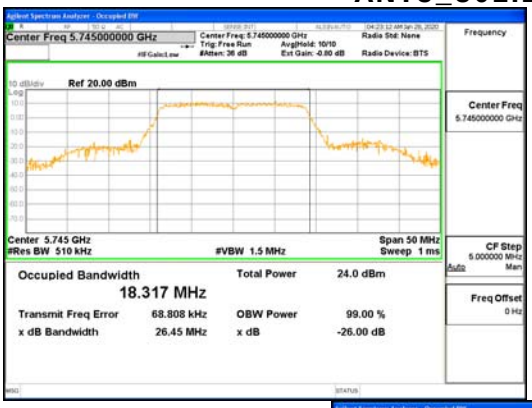
ANT2_802.11ac_VHT20_UNII-1

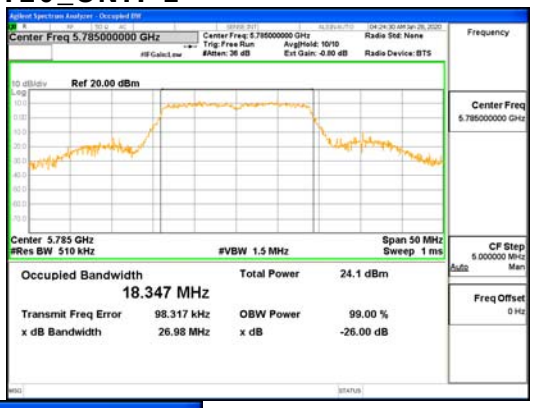
ANT2_802.11ac_VHT20_UNII-3



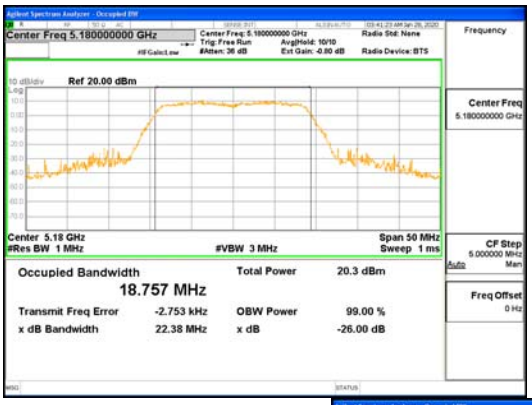


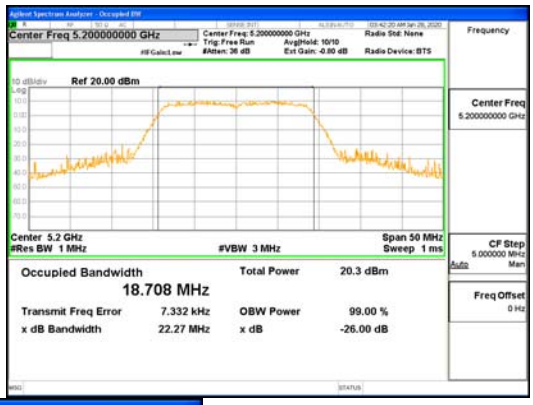
ANT3_802.11ac_VHT20_UNII-1



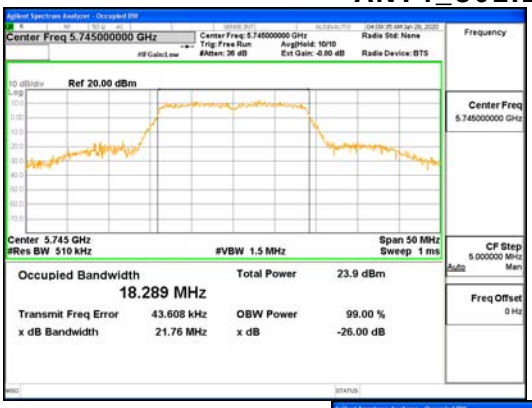


ANT3_802.11ac_VHT20_UNII-3

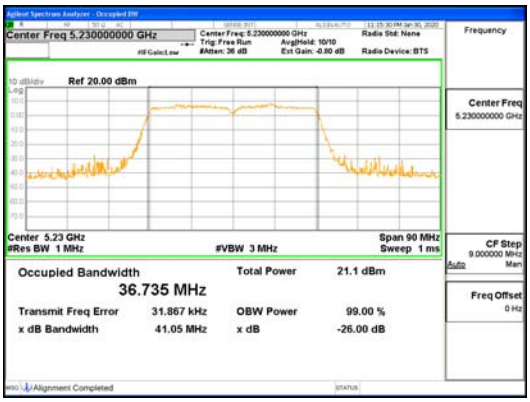




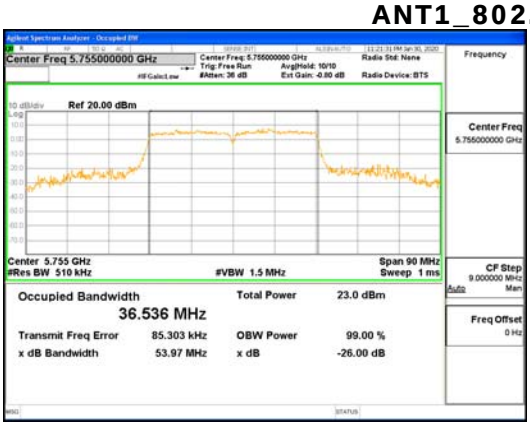
ANT4_802.11ac_VHT20_UNII-1

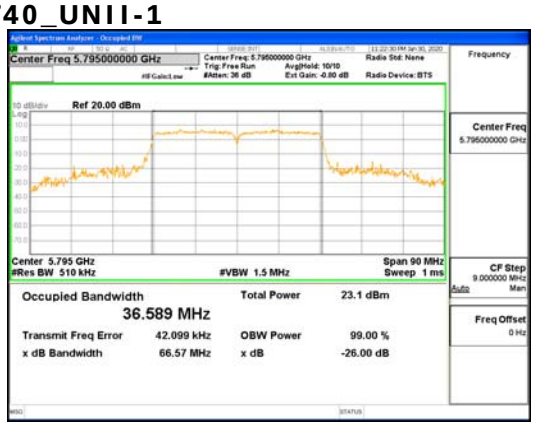


ANT4_802.11ac_VHT20_UNII-3

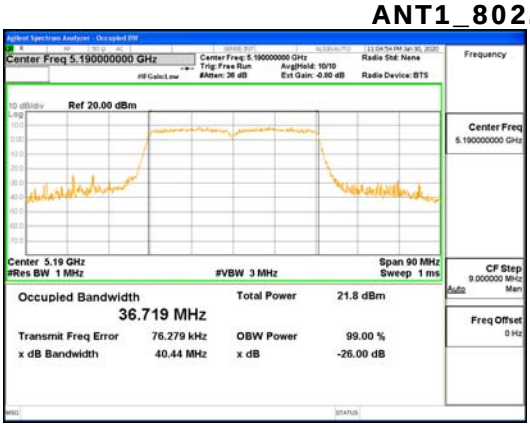


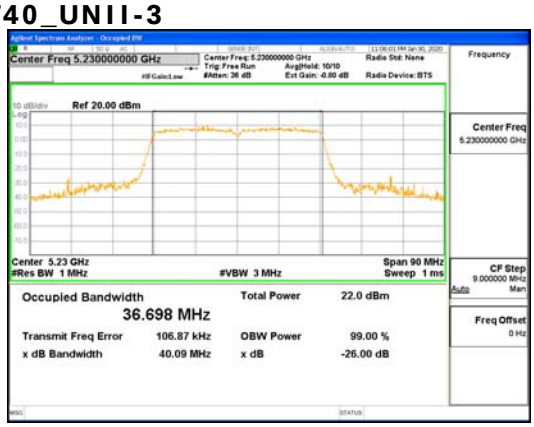
ANT1_802.11n_HT40_UNII-1



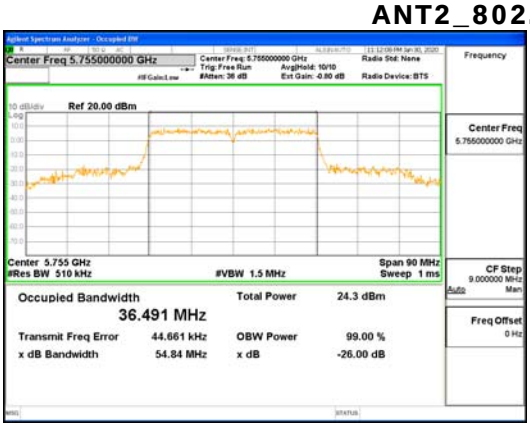


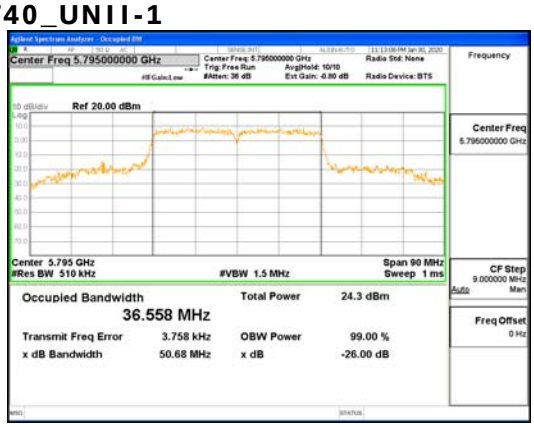
ANT1_802.11n_HT40_UNII-3



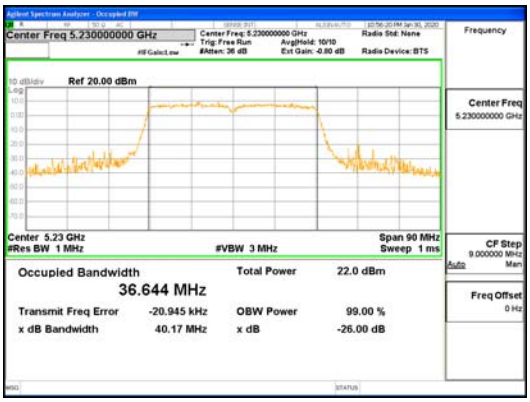


ANT2_802.11n_HT40_UNII-1

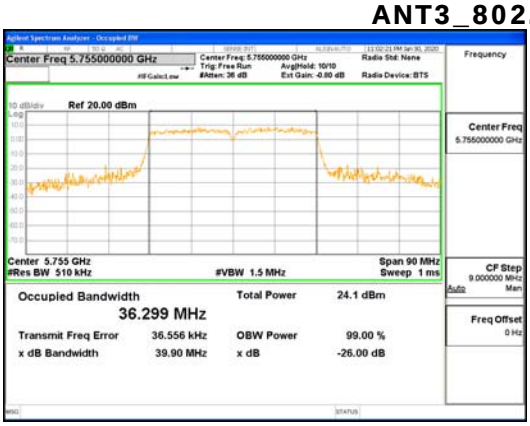


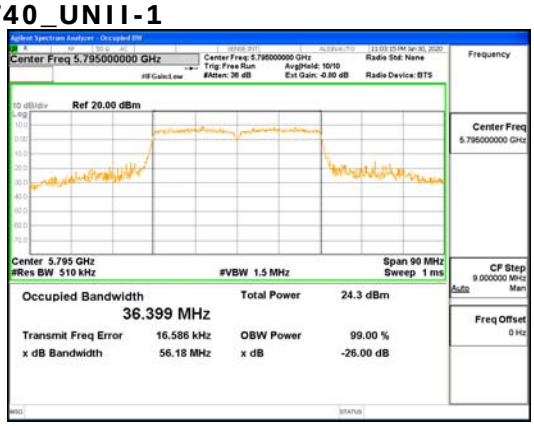


ANT2_802.11n_HT40_UNII-3

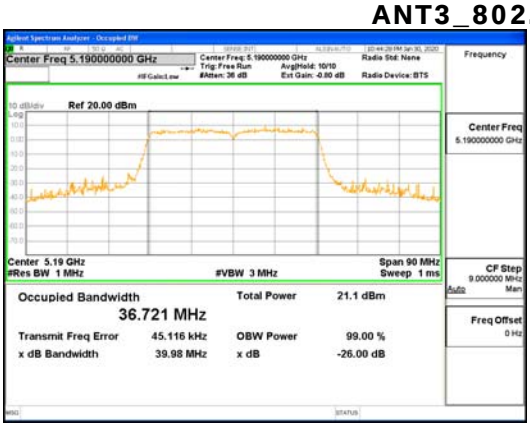


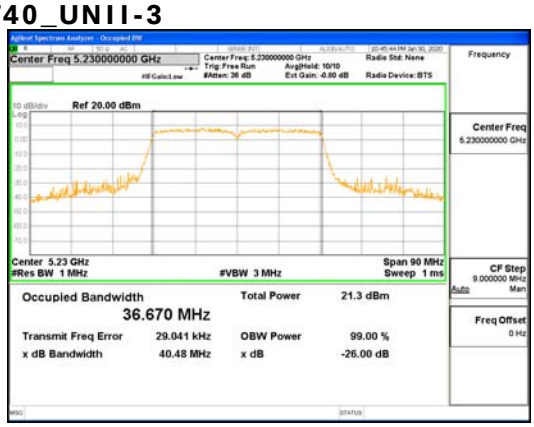
ANT3_802.11n_HT40_UNII-1



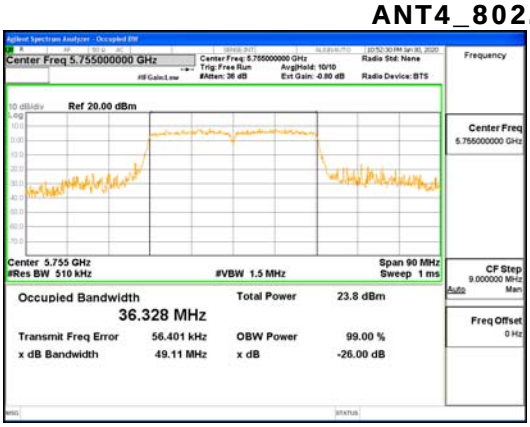


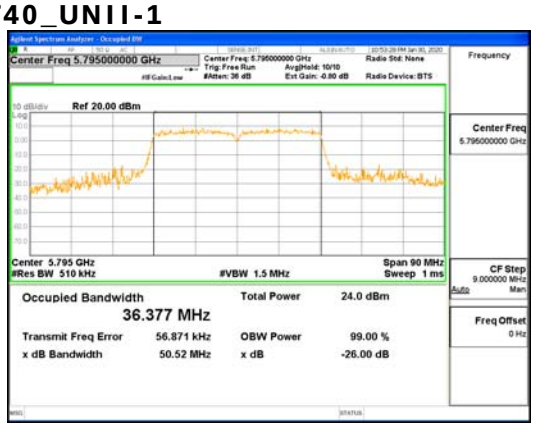
ANT3_802.11n_HT40_UNII-3



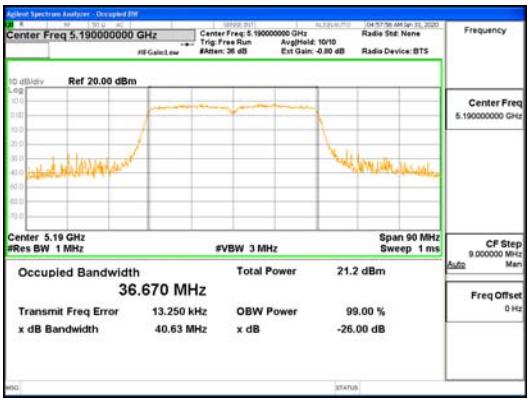


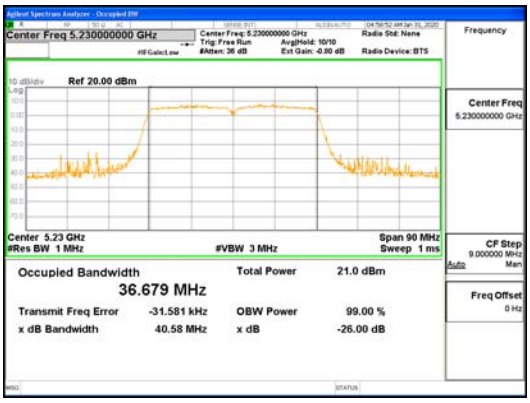
ANT4_802.11n_HT40_UNII-1



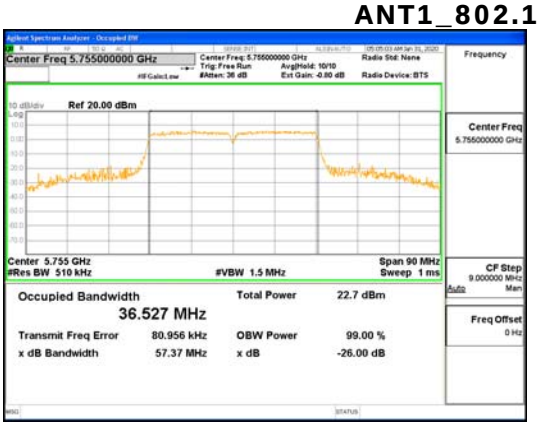


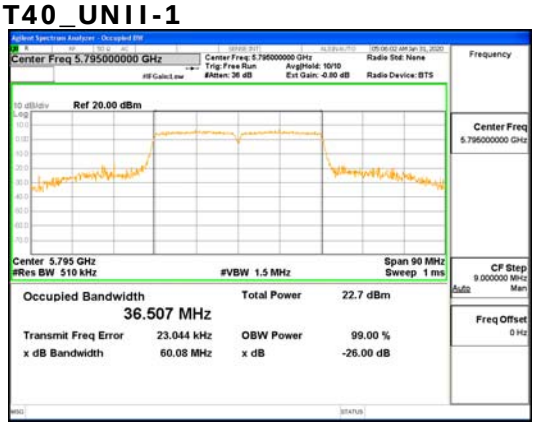
ANT4_802.11n_HT40_UNII-3



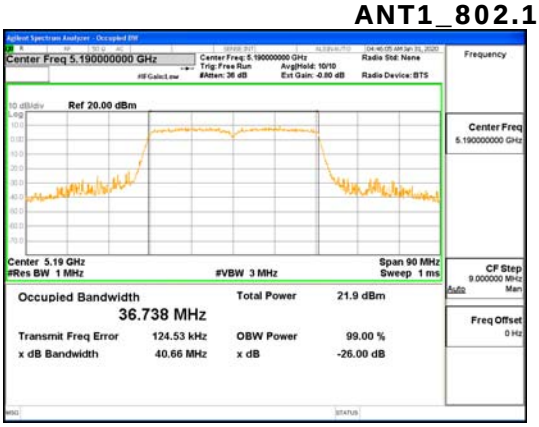


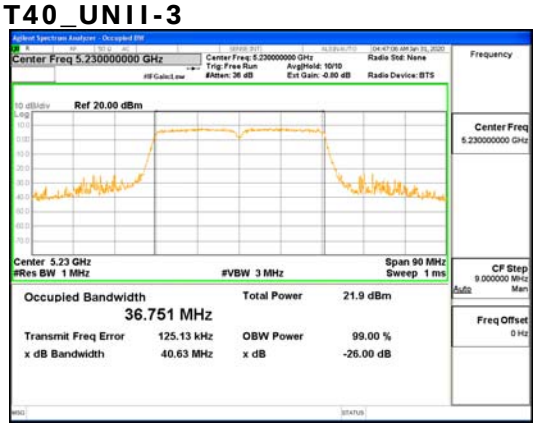
ANT1_802.11ac_VHT40_UNII-1



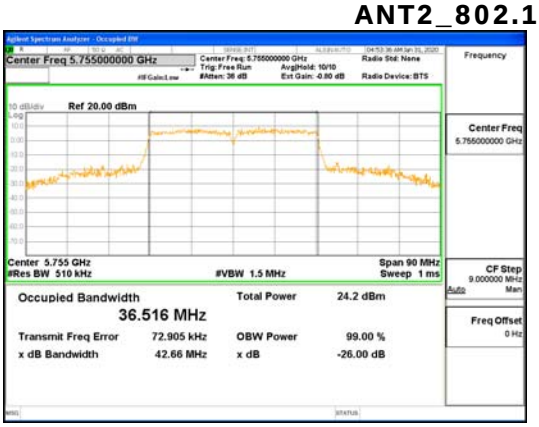


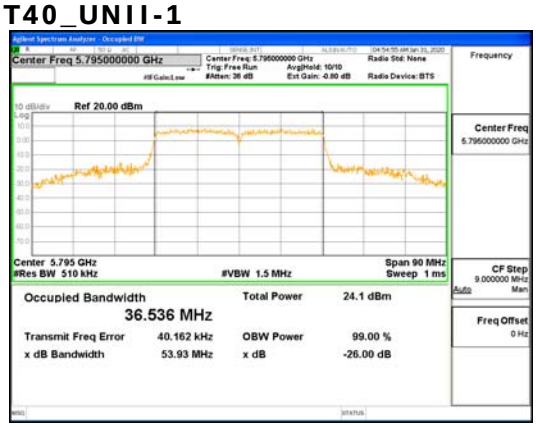
ANT1_802.11ac_VHT40_UNII-3





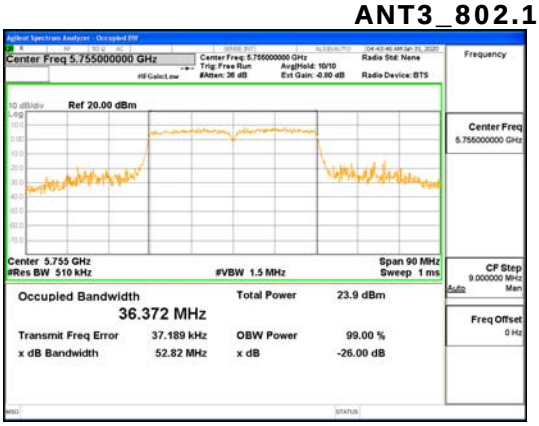
ANT2_802.11ac_VHT40_UNII-1

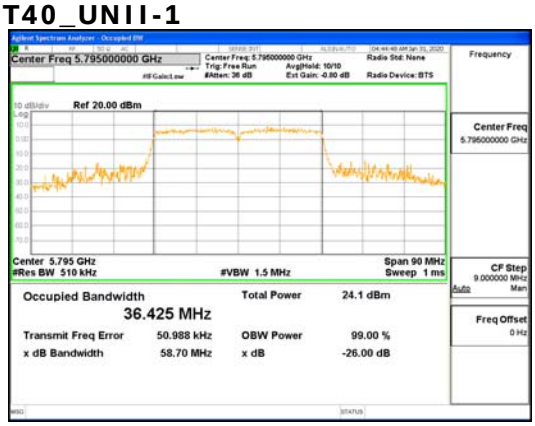




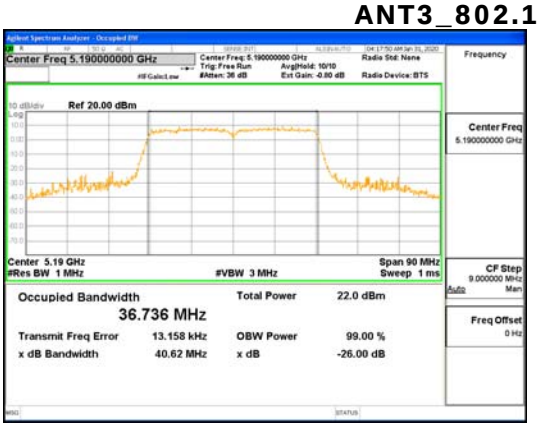
ANT2_802.11ac_VHT40_UNII-3

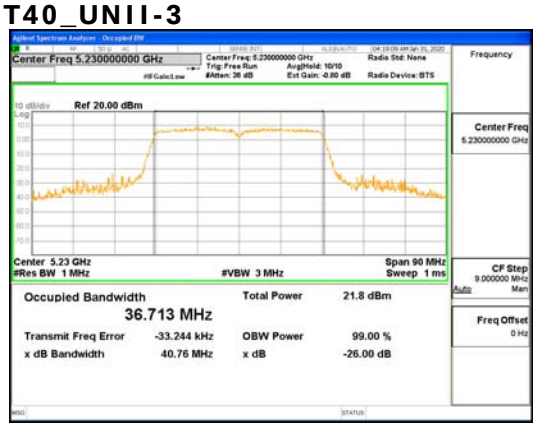
ANT3_802.11ac_VHT40_UNII-1



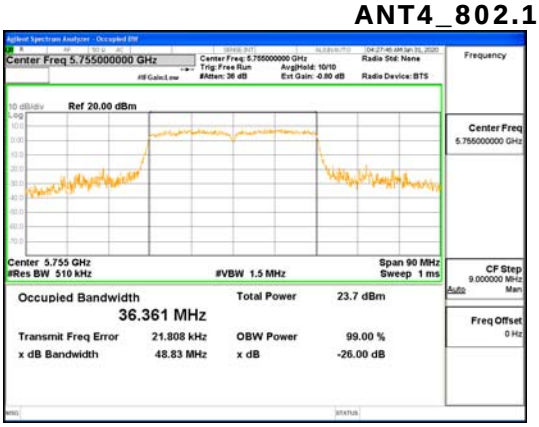


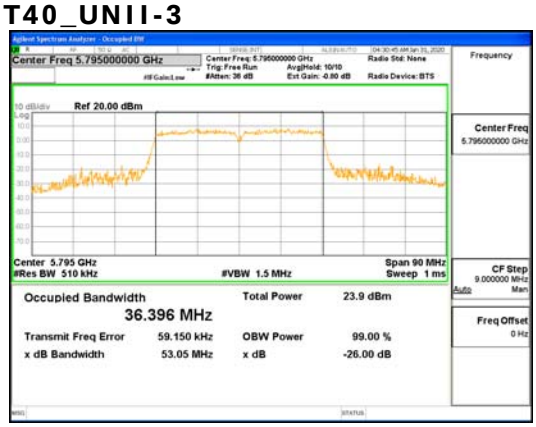
ANT3_802.11ac_VHT40_UNII-3





ANT4_802.11ac_VHT40_UNII-3

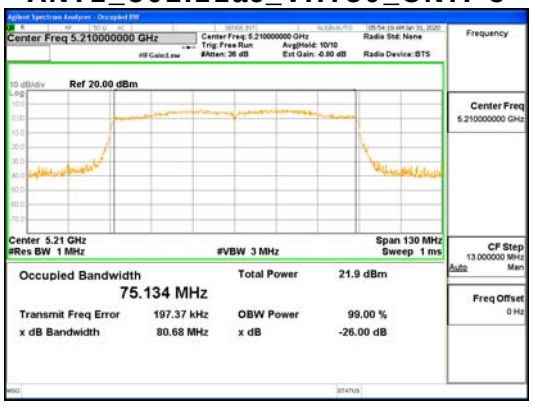




ANT4_802.11ac_VHT40_UNII-3

ANT1_802.11ac_VHT80_UNII-1

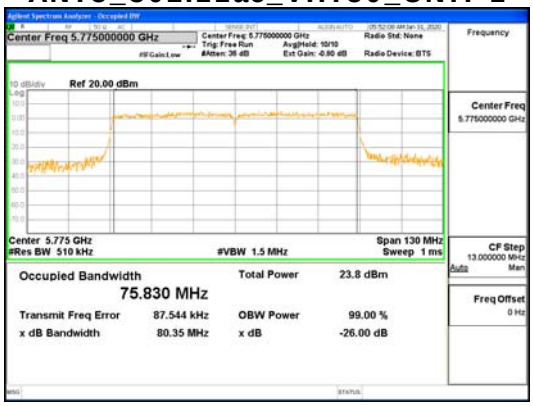
ANT1_802.11ac_VHT80_UNII-3



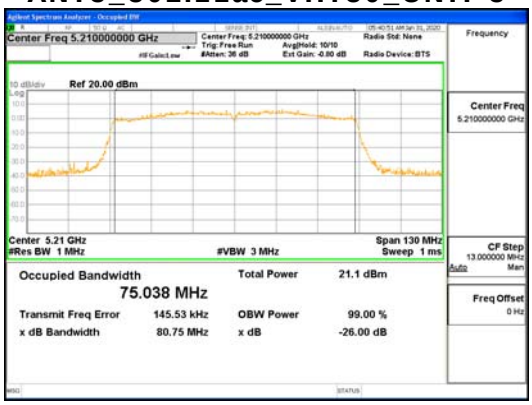
ANT2_802.11ac_VHT80_UNII-1

ANT2_802.11ac_VHT80_UNII-3

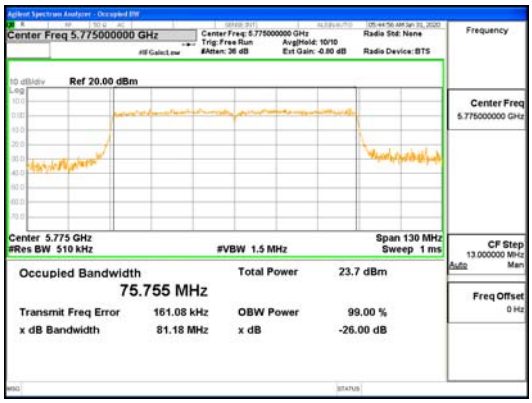
ANT3_802.11ac_VHT80_UNII-1



ANT3_802.11ac_VHT80_UNII-3



ANT4_802.11ac_VHT80_UNII-1



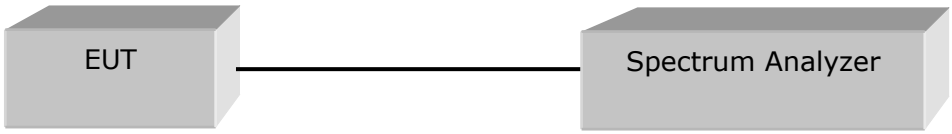
ANT4_802.11ac_VHT80_UNII-3

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)

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 (dB)
CDD Mode	802.11a	0.22
	802.11n_HT20	0.21
	802.11n_HT40	0.20
	802.11ac_VHT20	0.41
	802.11ac_VHT40	0.12
	802.11ac_VHT80	0.24
SDM Mode	802.11n_HT20	0.21
	802.11n_HT40	0.20
	802.11ac_VHT20	0.41
	802.11ac_VHT40	0.12
	802.11ac_VHT80	0.24

Limit

Operating Mode	Band	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)
SISO	UNII 1	802.11a/n/ac	ANT1, ANT2, ANT3, ANT4	2.00	30.00
	UNII 3				
MIMO	UNII 1	802.11a/n/ac	Multiple ANT (ANT1 + ANT2 + ANT3 + ANT4)	8.02	27.98
	UNII 3				

Test Data

CDD Mode_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	14.10	0.22	14.32	30.00	15.68
	5 200	14.06	0.22	14.28	30.00	15.72
	5 240	14.19	0.22	14.41	30.00	15.59
	5 745	18.79	0.22	19.01	30.00	10.99
	5 785	17.82	0.22	18.04	30.00	11.96
	5 825	18.48	0.22	18.70	30.00	11.30
802.11n _HT20	5 180	15.28	0.21	15.49	30.00	14.51
	5 200	15.35	0.21	15.56	30.00	14.44
	5 240	15.23	0.21	15.44	30.00	14.56
	5 745	16.51	0.21	16.72	30.00	13.28
	5 785	16.42	0.21	16.63	30.00	13.37
	5 825	16.56	0.21	16.77	30.00	13.23
802.11ac _VHT20	5 180	14.40	0.41	14.81	30.00	15.19
	5 200	14.20	0.41	14.61	30.00	15.39
	5 240	14.34	0.41	14.75	30.00	15.25
	5 745	16.75	0.41	17.16	30.00	12.84
	5 785	16.68	0.41	17.09	30.00	12.91
	5 825	17.29	0.41	17.70	30.00	12.30
802.11n _HT40	5 190	15.58	0.20	15.78	30.00	14.22
	5 230	15.45	0.20	15.65	30.00	14.35
	5 755	16.31	0.20	16.51	30.00	13.49
	5 795	16.16	0.20	16.36	30.00	13.64
802.11ac _VHT40	5 190	15.13	0.12	15.25	30.00	14.75
	5 230	15.14	0.12	15.26	30.00	14.74
	5 755	16.62	0.12	16.74	30.00	13.26
	5 795	16.68	0.12	16.80	30.00	13.20
802.11ac _VHT80	5 210	15.55	0.24	15.79	30.00	14.21
	5 775	17.18	0.24	17.42	30.00	12.58
Measurement uncertainty		± 1.5 dB				

CDD Mode_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	14.97	0.22	15.19	30.00	14.81
	5 200	15.03	0.22	15.25	30.00	14.75
	5 240	15.21	0.22	15.43	30.00	14.57
	5 745	18.16	0.22	18.38	30.00	11.62
	5 785	18.52	0.22	18.74	30.00	11.26
	5 825	18.84	0.22	19.06	30.00	10.94
802.11n _HT20	5 180	15.64	0.21	15.85	30.00	14.15
	5 200	15.66	0.21	15.87	30.00	14.13
	5 240	16.04	0.21	16.25	30.00	13.75
	5 745	17.30	0.21	17.51	30.00	12.49
	5 785	17.03	0.21	17.24	30.00	12.76
	5 825	17.54	0.21	17.75	30.00	12.25
802.11ac _VHT20	5 180	14.75	0.41	15.16	30.00	14.84
	5 200	14.55	0.41	14.96	30.00	15.04
	5 240	15.09	0.41	15.50	30.00	14.50
	5 745	17.24	0.41	17.65	30.00	12.35
	5 785	17.22	0.41	17.63	30.00	12.37
	5 825	17.82	0.41	18.23	30.00	11.77
802.11n _HT40	5 190	15.05	0.20	15.25	30.00	14.75
	5 230	15.04	0.20	15.24	30.00	14.76
	5 755	16.90	0.20	17.10	30.00	12.90
	5 795	17.18	0.20	17.38	30.00	12.62
802.11ac _VHT40	5 190	16.16	0.12	16.28	30.00	13.72
	5 230	15.90	0.12	16.02	30.00	13.98
	5 755	17.58	0.12	17.70	30.00	12.30
	5 795	17.50	0.12	17.62	30.00	12.38
802.11ac _VHT80	5 210	15.50	0.24	15.74	30.00	14.26
	5 775	17.11	0.24	17.35	30.00	12.65
Measurement uncertainty		± 1.5 dB				

CDD Mode_ANT3

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	14.53	0.22	14.75	30.00	15.25
	5 200	14.68	0.22	14.90	30.00	15.10
	5 240	14.55	0.22	14.77	30.00	15.23
	5 745	18.27	0.22	18.49	30.00	11.51
	5 785	18.41	0.22	18.63	30.00	11.37
	5 825	18.52	0.22	18.74	30.00	11.26
802.11n _HT20	5 180	15.03	0.21	15.24	30.00	14.76
	5 200	15.10	0.21	15.31	30.00	14.69
	5 240	15.14	0.21	15.35	30.00	14.65
	5 745	17.16	0.21	17.37	30.00	12.63
	5 785	17.22	0.21	17.43	30.00	12.57
	5 825	17.47	0.21	17.68	30.00	12.32
802.11ac _VHT20	5 180	14.71	0.41	15.12	30.00	14.88
	5 200	14.44	0.41	14.85	30.00	15.15
	5 240	14.51	0.41	14.92	30.00	15.08
	5 745	17.24	0.41	17.65	30.00	12.35
	5 785	17.28	0.41	17.69	30.00	12.31
	5 825	17.72	0.41	18.13	30.00	11.87
802.11n _HT40	5 190	15.25	0.20	15.45	30.00	14.55
	5 230	15.05	0.20	15.25	30.00	14.75
	5 755	16.98	0.20	17.18	30.00	12.82
	5 795	17.22	0.20	17.42	30.00	12.58
802.11ac _VHT40	5 190	15.78	0.12	15.90	30.00	14.10
	5 230	15.59	0.12	15.71	30.00	14.29
	5 755	17.34	0.12	17.46	30.00	12.54
	5 795	17.45	0.12	17.57	30.00	12.43
802.11ac _VHT80	5 210	14.83	0.24	15.07	30.00	14.93
	5 775	17.30	0.24	17.54	30.00	12.46
Measurement uncertainty		± 1.5 dB				

CDD Mode_ANT4

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	14.52	0.22	14.74	30.00	15.26
	5 200	14.49	0.22	14.71	30.00	15.29
	5 240	14.42	0.22	14.64	30.00	15.36
	5 745	18.17	0.22	18.39	30.00	11.61
	5 785	18.08	0.22	18.30	30.00	11.70
	5 825	18.50	0.22	18.72	30.00	11.28
802.11n _HT20	5 180	15.30	0.21	15.51	30.00	14.49
	5 200	14.98	0.21	15.19	30.00	14.81
	5 240	15.24	0.21	15.45	30.00	14.55
	5 745	16.83	0.21	17.04	30.00	12.96
	5 785	16.85	0.21	17.06	30.00	12.94
	5 825	17.19	0.21	17.40	30.00	12.60
802.11ac _VHT20	5 180	14.04	0.41	14.45	30.00	15.55
	5 200	14.05	0.41	14.46	30.00	15.54
	5 240	14.39	0.41	14.80	30.00	15.20
	5 745	17.11	0.41	17.52	30.00	12.48
	5 785	16.99	0.41	17.40	30.00	12.60
	5 825	17.47	0.41	17.88	30.00	12.12
802.11n _HT40	5 190	15.07	0.20	15.27	30.00	14.73
	5 230	15.12	0.20	15.32	30.00	14.68
	5 755	16.75	0.20	16.95	30.00	13.05
	5 795	17.12	0.20	17.32	30.00	12.68
802.11ac _VHT40	5 190	15.13	0.12	15.25	30.00	14.75
	5 230	15.34	0.12	15.46	30.00	14.54
	5 755	17.16	0.12	17.28	30.00	12.72
	5 795	17.19	0.12	17.31	30.00	12.69
802.11ac _VHT80	5 210	14.95	0.24	15.19	30.00	14.81
	5 775	17.07	0.24	17.31	30.00	12.69
Measurement uncertainty		± 1.5 dB				

CDD Mode_Multiple ANT

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	20.56	0.22	20.78	27.98	7.20
	5 200	20.60	0.22	20.82	27.98	7.16
	5 240	20.63	0.22	20.85	27.98	7.13
	5 745	24.38	0.22	24.60	27.98	3.38
	5 785	24.24	0.22	24.46	27.98	3.52
	5 825	24.61	0.22	24.83	27.98	3.15
802.11n _HT20	5 180	21.34	0.21	21.55	27.98	6.43
	5 200	21.30	0.21	21.51	27.98	6.47
	5 240	21.45	0.21	21.66	27.98	6.32
	5 745	22.98	0.21	23.19	27.98	4.79
	5 785	22.91	0.21	23.12	27.98	4.86
	5 825	23.23	0.21	23.44	27.98	4.54
802.11ac _VHT20	5 180	20.50	0.41	20.91	27.98	7.07
	5 200	20.34	0.41	20.75	27.98	7.23
	5 240	20.61	0.41	21.02	27.98	6.96
	5 745	23.11	0.41	23.52	27.98	4.46
	5 785	23.07	0.41	23.48	27.98	4.50
	5 825	23.60	0.41	24.01	27.98	3.97
802.11n _HT40	5 190	21.26	0.20	21.46	27.98	6.52
	5 230	21.19	0.20	21.39	27.98	6.59
	5 755	22.76	0.20	22.96	27.98	5.02
	5 795	22.96	0.20	23.16	27.98	4.82
802.11ac _VHT40	5 190	21.59	0.12	21.71	27.98	6.27
	5 230	21.52	0.12	21.64	27.98	6.34
	5 755	23.21	0.12	23.33	27.98	4.65
	5 795	23.24	0.12	23.36	27.98	4.62
802.11ac _VHT80	5 210	21.24	0.24	21.48	27.98	6.50
	5 775	23.19	0.24	23.43	27.98	4.55
Measurement uncertainty		± 1.5 dB				

SDM Mode_ANT1

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	14.80	0.21	15.01	30.00	14.99
	5 200	14.56	0.21	14.77	30.00	15.23
	5 240	14.68	0.21	14.89	30.00	15.11
	5 745	16.09	0.21	16.30	30.00	13.70
	5 785	16.10	0.21	16.31	30.00	13.69
	5 825	16.36	0.21	16.57	30.00	13.43
802.11ac _VHT20	5 180	14.09	0.41	14.50	30.00	15.50
	5 200	13.98	0.41	14.39	30.00	15.61
	5 240	14.15	0.41	14.56	30.00	15.44
	5 745	16.56	0.41	16.97	30.00	13.03
	5 785	16.53	0.41	16.94	30.00	13.06
	5 825	16.96	0.41	17.37	30.00	12.63
802.11n _HT40	5 190	14.27	0.20	14.47	30.00	15.53
	5 230	14.43	0.20	14.63	30.00	15.37
	5 755	15.87	0.20	16.07	30.00	13.93
	5 795	15.74	0.20	15.94	30.00	14.06
802.11ac _VHT40	5 190	15.06	0.12	15.18	30.00	14.82
	5 230	15.06	0.12	15.18	30.00	14.82
	5 755	16.50	0.12	16.62	30.00	13.38
	5 795	16.58	0.12	16.70	30.00	13.30
802.11ac _VHT80	5 210	15.37	0.24	15.61	30.00	14.39
	5 775	16.77	0.24	17.01	30.00	12.99
Measurement uncertainty		± 1.5 dB				

SDM Mode_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	15.41	0.21	15.62	30.00	14.38
	5 200	15.21	0.21	15.42	30.00	14.58
	5 240	15.47	0.21	15.68	30.00	14.32
	5 745	16.61	0.21	16.82	30.00	13.18
	5 785	16.50	0.21	16.71	30.00	13.29
	5 825	17.11	0.21	17.32	30.00	12.68
802.11ac _VHT20	5 180	14.70	0.41	15.11	30.00	14.89
	5 200	14.57	0.41	14.98	30.00	15.02
	5 240	14.80	0.41	15.21	30.00	14.79
	5 745	17.13	0.41	17.54	30.00	12.46
	5 785	17.18	0.41	17.59	30.00	12.41
	5 825	17.43	0.41	17.84	30.00	12.16
802.11n _HT40	5 190	14.38	0.20	14.58	30.00	15.42
	5 230	14.65	0.20	14.85	30.00	15.15
	5 755	16.62	0.20	16.82	30.00	13.18
	5 795	16.44	0.20	16.64	30.00	13.36
802.11ac _VHT40	5 190	15.30	0.12	15.42	30.00	14.58
	5 230	15.31	0.12	15.43	30.00	14.57
	5 755	17.09	0.12	17.21	30.00	12.79
	5 795	17.12	0.12	17.24	30.00	12.76
802.11ac _VHT80	5 210	15.30	0.24	15.54	30.00	14.46
	5 775	16.92	0.24	17.16	30.00	12.84
Measurement uncertainty		± 1.5 dB				

SDM Mode_ANT3

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	15.22	0.21	15.43	30.00	14.57
	5 200	15.05	0.21	15.26	30.00	14.74
	5 240	14.98	0.21	15.19	30.00	14.81
	5 745	16.70	0.21	16.91	30.00	13.09
	5 785	16.78	0.21	16.99	30.00	13.01
	5 825	17.01	0.21	17.22	30.00	12.78
802.11ac _VHT20	5 180	14.13	0.41	14.54	30.00	15.46
	5 200	14.13	0.41	14.54	30.00	15.46
	5 240	14.30	0.41	14.71	30.00	15.29
	5 745	17.16	0.41	17.57	30.00	12.43
	5 785	17.28	0.41	17.69	30.00	12.31
	5 825	17.53	0.41	17.94	30.00	12.06
802.11n _HT40	5 190	14.70	0.20	14.90	30.00	15.10
	5 230	14.74	0.20	14.94	30.00	15.06
	5 755	16.38	0.20	16.58	30.00	13.42
	5 795	16.71	0.20	16.91	30.00	13.09
802.11ac _VHT40	5 190	15.34	0.12	15.46	30.00	14.54
	5 230	15.33	0.12	15.45	30.00	14.55
	5 755	17.05	0.12	17.17	30.00	12.83
	5 795	17.20	0.12	17.32	30.00	12.68
802.11ac _VHT80	5 210	14.41	0.24	14.65	30.00	15.35
	5 775	16.90	0.24	17.14	30.00	12.86
Measurement uncertainty		± 1.5 dB				

SDM Mode_ANT4

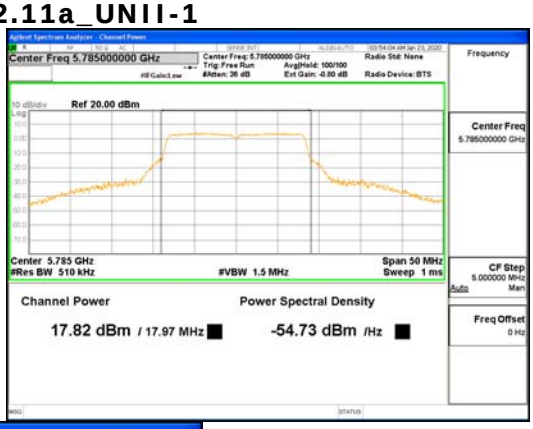
Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11n _HT20	5 180	14.89	0.21	15.10	30.00	14.90
	5 200	14.93	0.21	15.14	30.00	14.86
	5 240	15.18	0.21	15.39	30.00	14.61
	5 745	16.41	0.21	16.62	30.00	13.38
	5 785	16.53	0.21	16.74	30.00	13.26
	5 825	16.84	0.21	17.05	30.00	12.95
802.11ac _VHT20	5 180	13.87	0.41	14.28	30.00	15.72
	5 200	13.90	0.41	14.31	30.00	15.69
	5 240	14.15	0.41	14.56	30.00	15.44
	5 745	17.06	0.41	17.47	30.00	12.53
	5 785	17.11	0.41	17.52	30.00	12.48
	5 825	17.37	0.41	17.78	30.00	12.22
802.11n _HT40	5 190	14.05	0.20	14.25	30.00	15.75
	5 230	14.33	0.20	14.53	30.00	15.47
	5 755	16.15	0.20	16.35	30.00	13.65
	5 795	16.41	0.20	16.61	30.00	13.39
802.11ac _VHT40	5 190	15.50	0.12	15.62	30.00	14.38
	5 230	15.43	0.12	15.55	30.00	14.45
	5 755	16.90	0.12	17.02	30.00	12.98
	5 795	17.12	0.12	17.24	30.00	12.76
802.11ac _VHT80	5 210	14.73	0.24	14.97	30.00	15.03
	5 775	16.80	0.24	17.04	30.00	12.96
Measurement uncertainty		± 1.5 dB				

SDM Mode_Multiple ANT

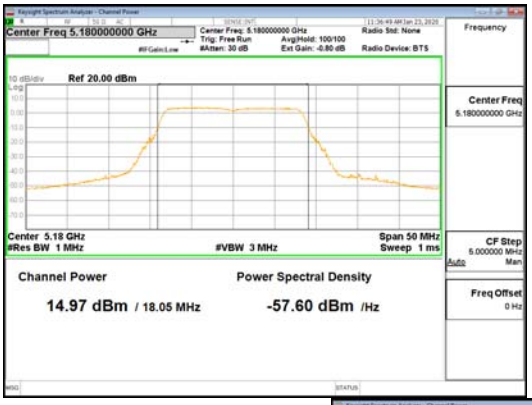
Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11n _HT20	5 180	21.11	0.21	21.32	27.98	6.66
	5 200	20.96	0.21	21.17	27.98	6.81
	5 240	21.11	0.21	21.32	27.98	6.66
	5 745	22.48	0.21	22.69	27.98	5.29
	5 785	22.50	0.21	22.71	27.98	5.27
	5 825	22.86	0.21	23.07	27.98	4.91
802.11ac _VHT20	5 180	20.23	0.41	20.64	27.98	7.34
	5 200	20.17	0.41	20.58	27.98	7.40
	5 240	20.38	0.41	20.79	27.98	7.19
	5 745	23.00	0.41	23.41	27.98	4.57
	5 785	23.06	0.41	23.47	27.98	4.51
	5 825	23.35	0.41	23.76	27.98	4.22
802.11n _HT40	5 190	20.38	0.20	20.58	27.98	7.40
	5 230	20.56	0.20	20.76	27.98	7.22
	5 755	22.28	0.20	22.48	27.98	5.50
	5 795	22.36	0.20	22.56	27.98	5.42
802.11ac _VHT40	5 190	21.32	0.12	21.44	27.98	6.54
	5 230	21.31	0.12	21.43	27.98	6.55
	5 755	22.91	0.12	23.03	27.98	4.95
	5 795	23.03	0.12	23.15	27.98	4.83
802.11ac _VHT80	5 210	20.99	0.24	21.23	27.98	6.75
	5 775	22.87	0.24	23.11	27.98	4.87
Measurement uncertainty		± 1.5 dB				

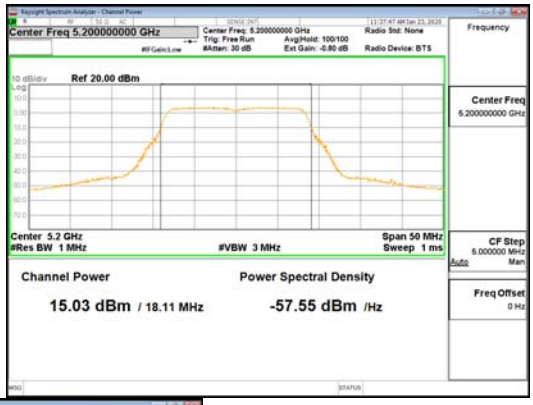
See next pages for actual measured spectrum plots.

CDD Mode_ANT1_802.11a_UNII-1

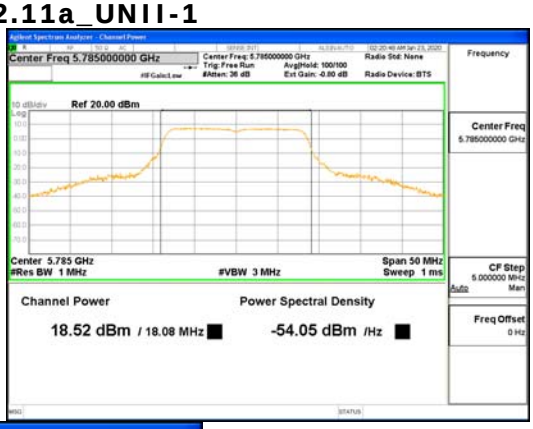


CDD Mode_ANT1_802.11a_UNII-3





CDD Mode_ANT2_802.11a_UNII-1



CDD Mode_ANT2_802.11a_UNII-3