

TEST REPORT



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

Report No.:
CTK-2019-02013
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1. Client

- Name : KAONMEDIA Co., Ltd.
- Address : KAONMEDIA Building, 884-3 Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2019-05-07

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 Mesh Repeater / AR3030W



5. Date of Test : 2019-05-13 to 2019-06-25

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

7. Testing Environment: Temp.: (24 ± 5) °C, 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		Technical Manager	
	Ji-Hye Kim: (Signature)		Won-Jae, Hwang: (Signature)	

2019-06-25

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



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REPORT REVISION HISTORY

Date	Revision	Page No
2019-06-25	Issued (CTK-2019-02013)	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-AR3030W
Product Description	WiFi Mesh Repeater
Model name	AR3030W
Variant Model name	AR3030IL and AR3030
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 : 28.37 dBm (687.07 mW) CDD Mode_802.11n_HT20 : 28.40 dBm (691.83 mW) CDD Mode_802.11n_HT40 : 28.64 dBm (731.14 mW) CDD Mode_802.11ac_VHT20 : 28.53 dBm (712.85 mW) CDD Mode_802.11ac_VHT40 : 28.74 dBm (748.17 mW) CDD Mode_802.11ac_VHT80 : 28.17 dBm (656.15 mW) SDM Mode_802.11n_HT20 : 28.10 dBm (645.65 mW) SDM Mode_802.11n_HT40 : 28.28 dBm (672.98 mW) SDM Mode_802.11ac_VHT20 : 28.15 dBm (653.13 mW) SDM Mode_802.11ac_VHT40 : 28.27 dBm (671.43 mW) SDM Mode_802.11ac_VHT80 : 27.14 dBm (517.61 mW)
Antenna Specification	ANT1, ANT2, ANT3 type : PCB Antenna ANT1, ANT2, ANT3 Peak Gain : 2 dBi
Type of Modulation	OFDM
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 450 Mbps 802.11ac : up to 1.3 Gbps
Power Source	DC 12 V (Adapter)
Hardware Rev	Rev 1.0
Software Rev	v.2.00.80



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1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-CA40	-
AD/DC Adapter	SHENZHEN FRECOM ELECTRONICS CO., LTD.	F18L16-120150SPAU	-



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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.



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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
<i>Note 1:</i> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<i>Note 2:</i> The data in this test report are traceable to the national or international standards.			
<i>Note 3:</i> The sample was tested according to the following specification: FCC Part 15.247, ANSI C63.10-2013			
<i>Note 4:</i> 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	DSSS	6 Mbps	97.4%	0.12 dB
802.11n_HT20	OFDM	MCS 0	96.7%	0.15 dB
802.11n_HT40	OFDM	MCS 0	93.7%	0.28 dB
802.11ac_VHT20	OFDM	MNSS 0	96.1%	0.17 dB
802.11ac_VHT40	OFDM	MNSS 0	92.6%	0.33 dB
802.11ac_VHT80	OFDM	MNSS 0	89.1%	0.50 dB

- SDM mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11n_HT20	OFDM	MCS 16	93.5%	0.29 dB
802.11n_HT40	OFDM	MCS 16	86.1%	0.65 dB
802.11ac_VHT20	OFDM	MNSS 0	90.9%	0.41 dB
802.11ac_VHT40	OFDM	MNSS 0	87.2%	0.60 dB
802.11ac_VHT80	OFDM	MNSS 0	79.2%	1.02 dB



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3.3 Model Differences

AR3030W, AR3030IL and AR3030 are no technical difference from each model only except for Color(AR3030) and WPS Key delete(AR3030IL) 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 ($f \leq 1$ 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. 5.1.0
Line Conducted Test	ESCI7, ESCI3 : EMC32 Ver. 8.50.0 ESR7 : EMC32 Ver. 8.53.0



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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 $\geq 3 \times$ 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	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	15.13	14.79	15.13
5 785 MHz	15.92	15.09	15.65
5 825 MHz	15.95	15.69	15.68
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	35.07	35.06
5 795 MHz	35.06	35.07
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	75.09
Measurement uncertainty	± 0.1 MHz

ANT2

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	15.66	16.54	16.33
5 785 MHz	15.61	16.32	15.75
5 825 MHz	15.46	15.72	16.31
Measurement uncertainty	± 0.1 MHz		



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6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	35.05	35.12
5 795 MHz	35.04	35.07
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	75.13
Measurement uncertainty	± 0.1 MHz

ANT3

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	15.15	16.27	16.52
5 785 MHz	15.50	16.27	15.20
5 825 MHz	15.53	14.79	15.33
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	35.08	35.11
5 795 MHz	35.09	35.10
Measurement uncertainty	± 0.1 MHz	

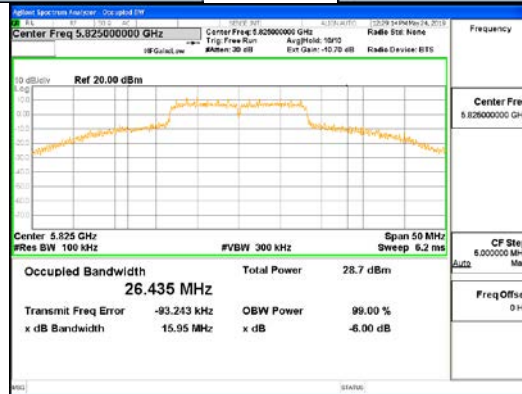
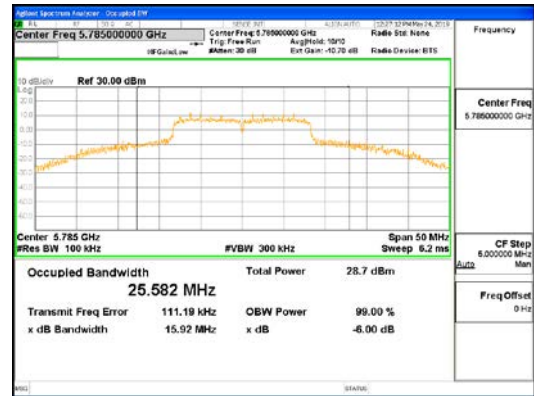
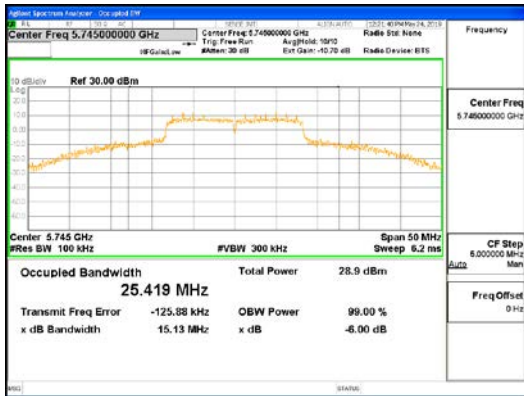
6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	75.18
Measurement uncertainty	± 0.1 MHz

See next pages for actual measured spectrum plots.

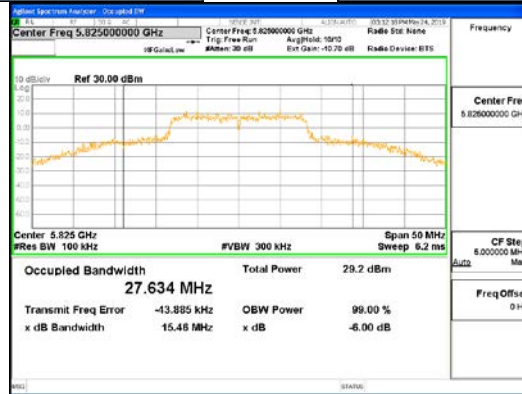
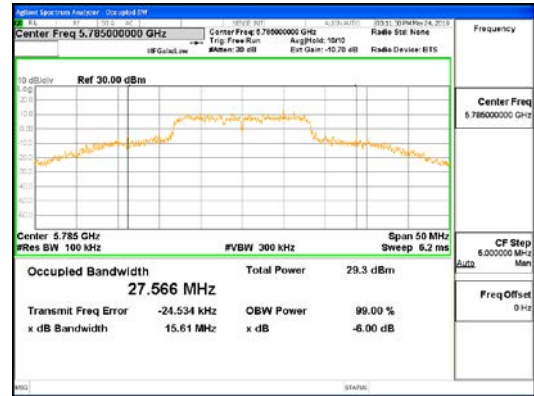
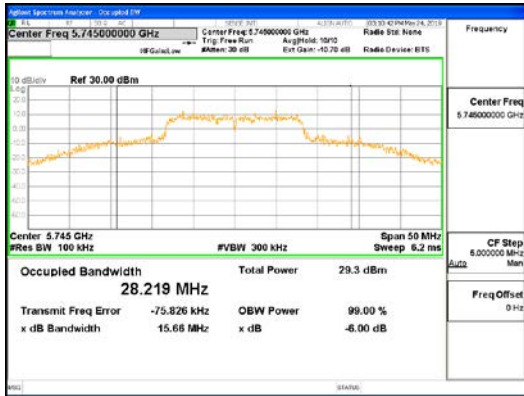


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ANT1_802.11a

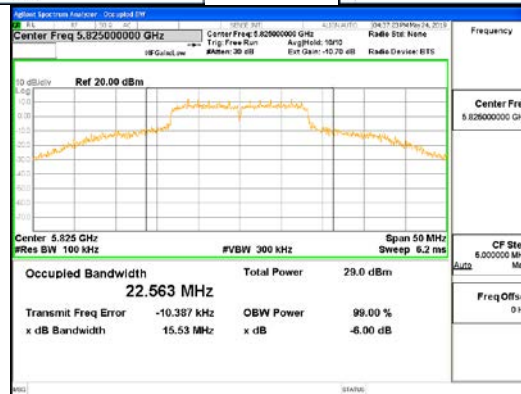
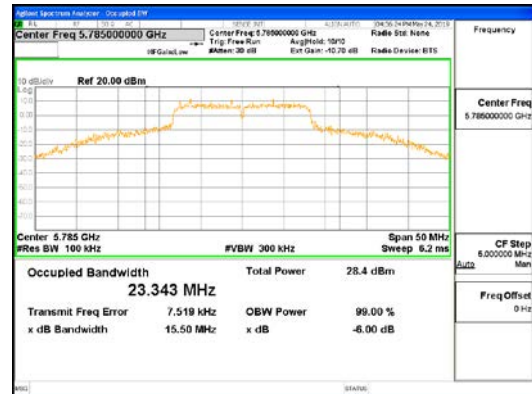
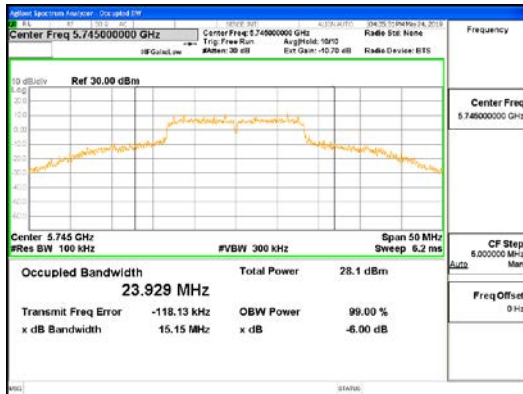


ANT2_802.11a



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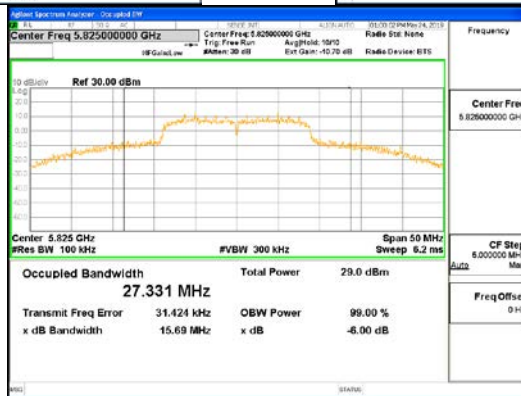


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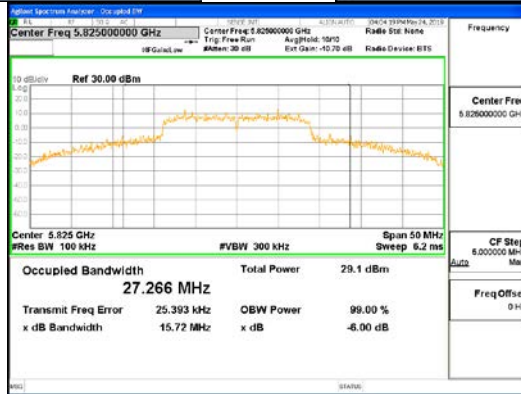
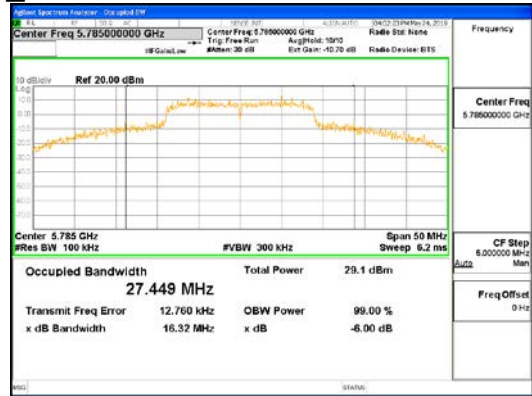
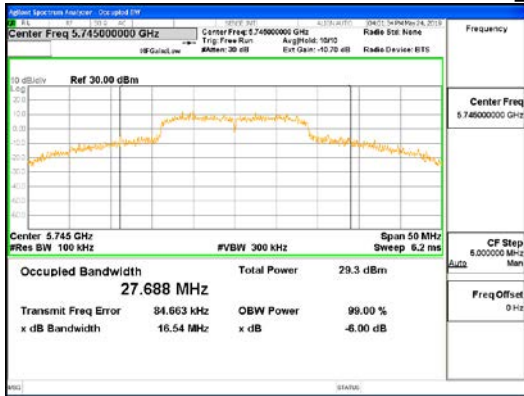


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ANT1_802.11n_HT20

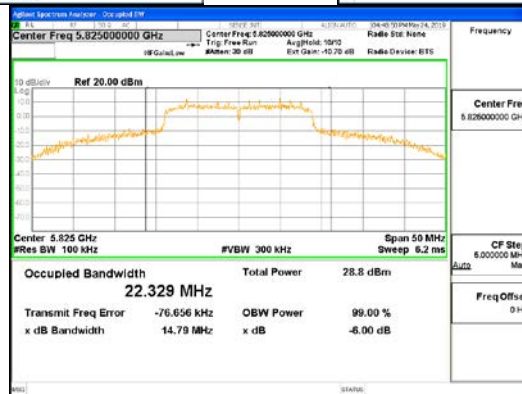
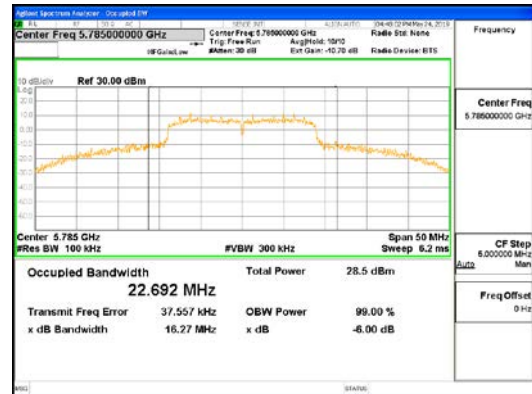


ANT2_802.11n_HT20



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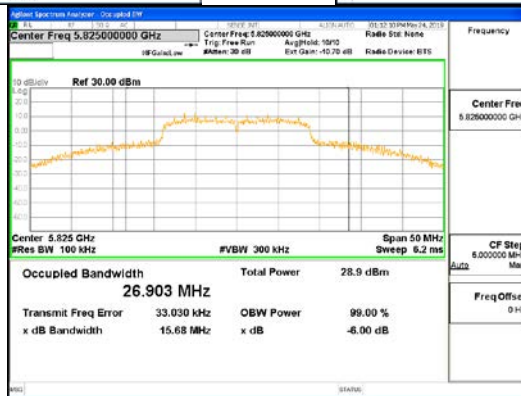
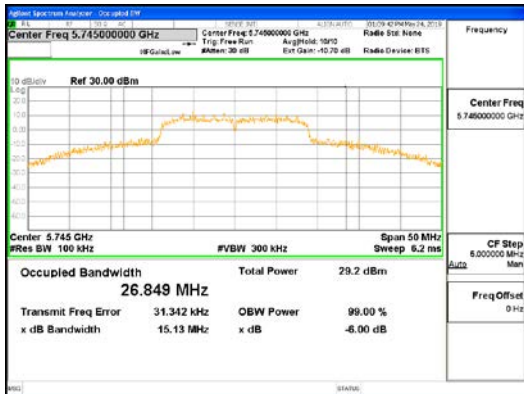


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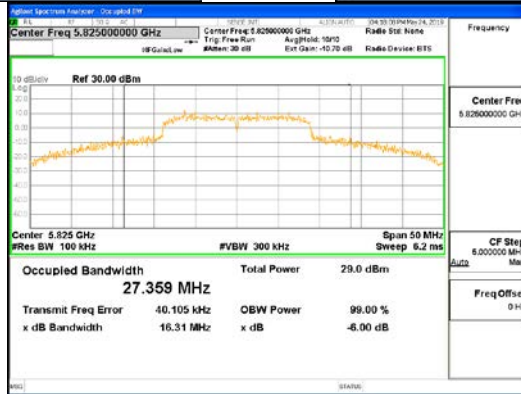
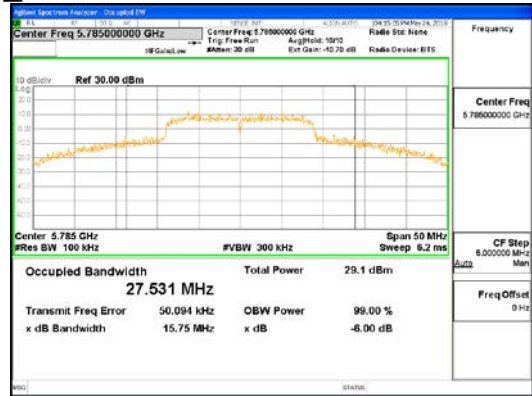
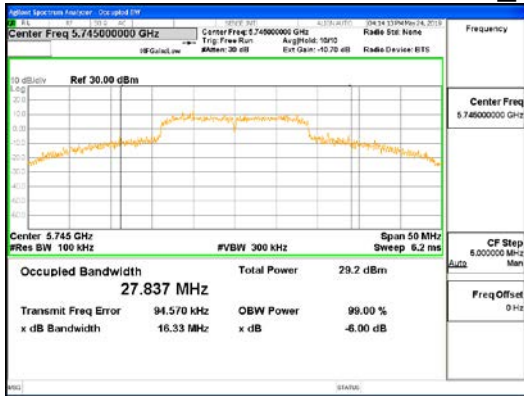


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ANT1_802.11ac_VHT20

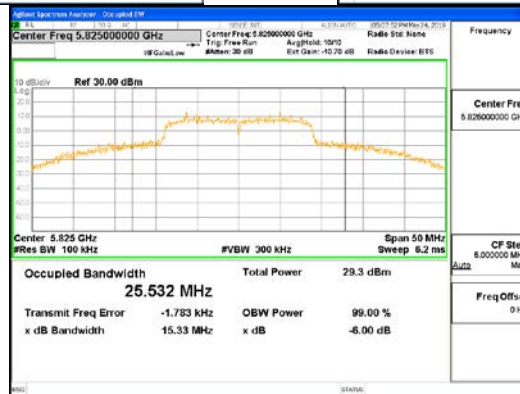
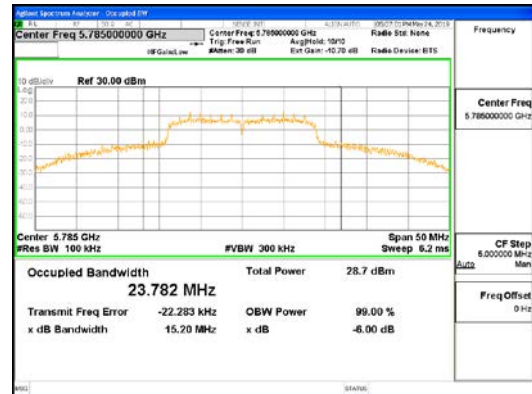


ANT2_802.11ac_VHT20



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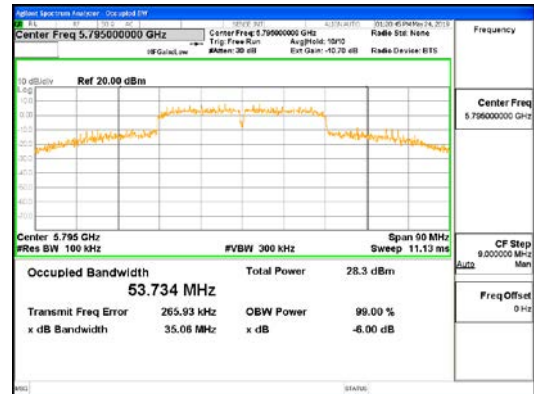
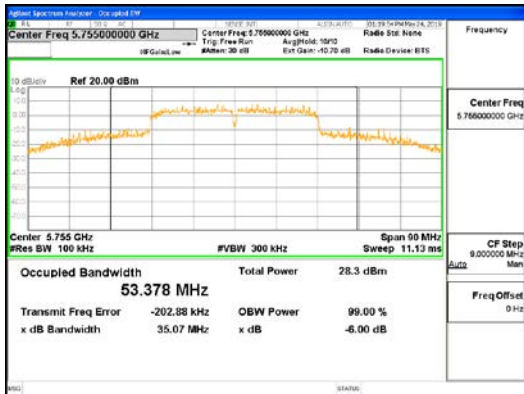


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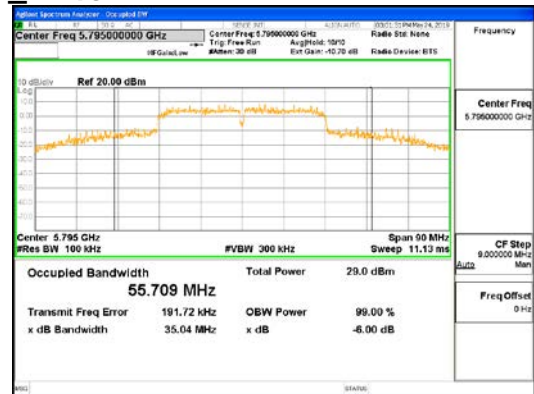
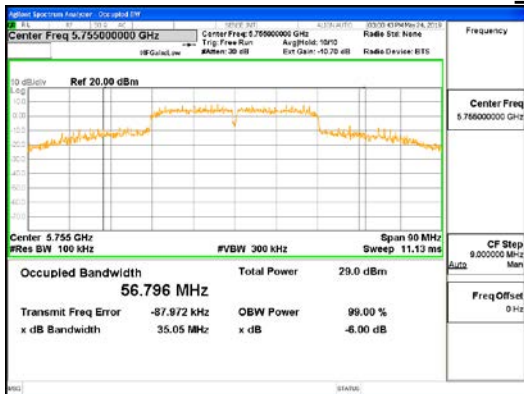


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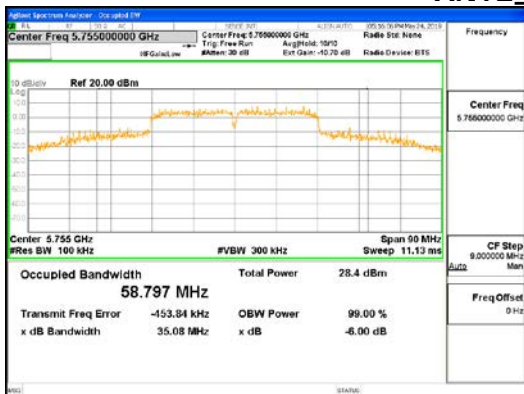
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ANT1_802.11n_HT40



ANT2_802.11n_HT40

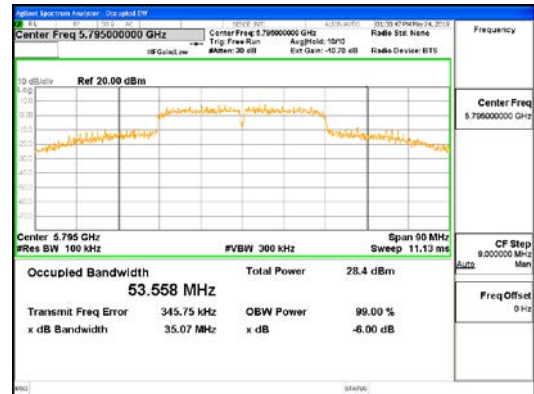
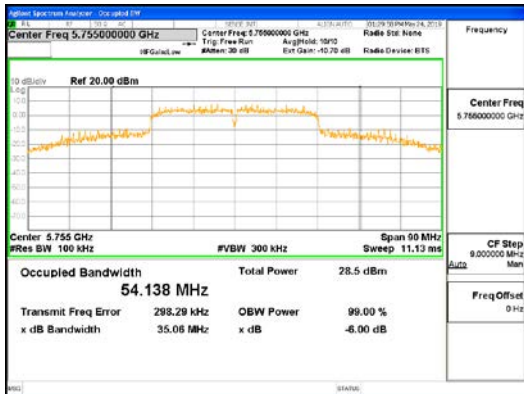


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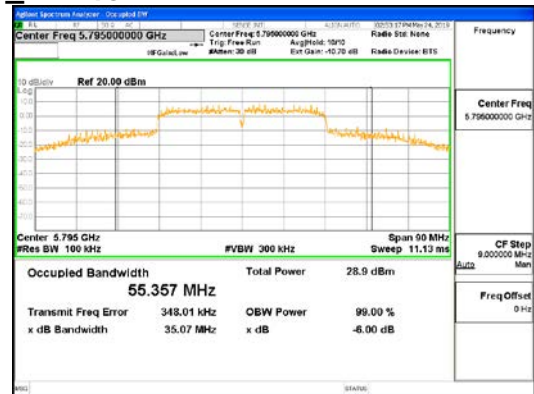
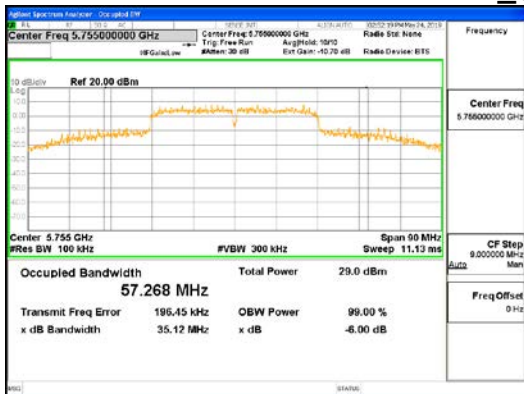


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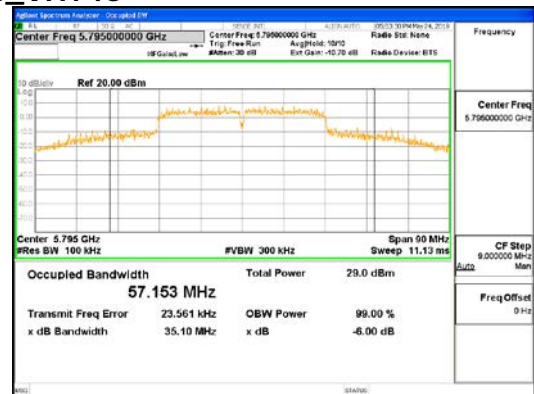
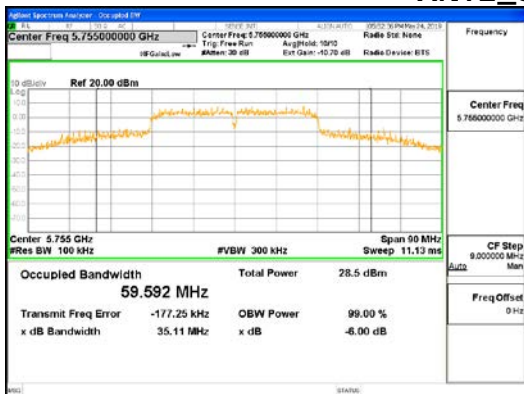
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ANT1_802.11ac_VHT40



ANT2_802.11ac_VHT40

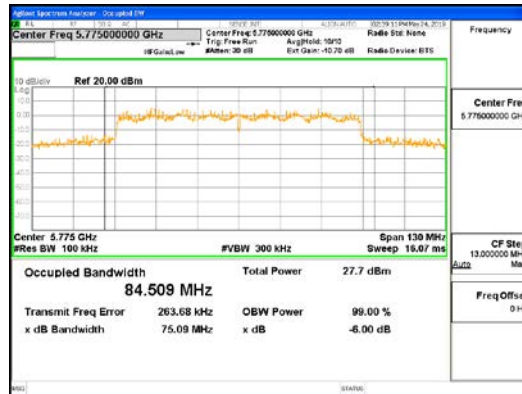


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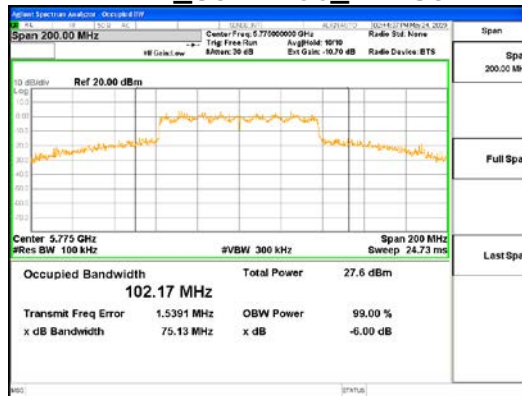


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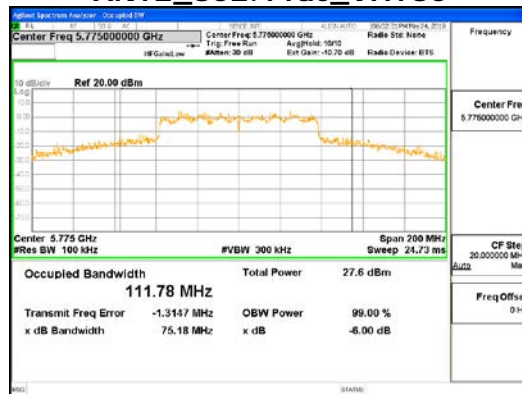
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ANT1_802.11ac_VHT80



ANT2_802.11ac_VHT80



ANT3_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 \geq 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

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)					
	802.11a		802.11n_HT20		802.11ac_VHT20	
	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	23.34	16.48	24.10	17.56	21.20	17.50
5 200 MHz	23.27	16.47	21.53	17.52	20.38	17.48
5 240 MHz	23.19	16.45	21.61	17.50	21.25	17.50
5 745 MHz	42.76	28.28	44.93	30.37	45.07	31.20
5 785 MHz	42.06	28.21	44.92	30.88	44.91	30.66
5 825 MHz	43.52	28.81	45.37	30.51	44.98	31.02
Measurement uncertainty	± 0.1 MHz					

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)			
	802.11n_HT40		802.11ac_VHT40	
	26 dB	99 %	26 dB	99 %
5 190 MHz	58.79	35.93	55.67	35.90
5 230 MHz	58.75	35.90	56.18	35.87
5 755 MHz	87.00	56.43	88.80	56.54
5 795 MHz	86.18	55.96	88.59	55.44
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	80.83	75.25
5 775 MHz	187.20	116.42
Measurement uncertainty	± 0.1 MHz	



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ANT2

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)					
	802.11a		802.11n_HT20		802.11ac_VHT20	
	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	35.07	16.86	33.30	17.79	31.88	17.69
5 200 MHz	29.29	16.68	29.60	17.61	29.52	17.59
5 240 MHz	25.70	16.58	26.19	17.54	22.14	17.56
5 745 MHz	43.32	31.25	46.29	31.62	46.37	31.31
5 785 MHz	43.27	30.64	46.16	30.71	46.12	30.83
5 825 MHz	43.34	30.57	46.43	30.32	45.98	30.76
Measurement uncertainty	± 0.1 MHz					

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)			
	802.11n_HT40		802.11ac_VHT40	
	26 dB	99 %	26 dB	99 %
5 190 MHz	57.97	35.99	54.79	35.97
5 230 MHz	54.30	35.96	53.03	35.90
5 755 MHz	87.65	59.43	89.04	59.02
5 795 MHz	87.34	57.90	88.96	57.90
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	81.15	75.33
5 775 MHz	188.70	115.00
Measurement uncertainty	± 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	26.30	16.61	21.43	17.50	20.83	17.52
5 200 MHz	24.54	16.50	20.79	17.47	20.23	17.49
5 240 MHz	23.29	16.46	20.14	17.44	20.19	17.46
5 745 MHz	40.64	27.73	44.89	28.87	44.70	28.61
5 785 MHz	40.44	26.73	44.31	27.83	43.99	28.11
5 825 MHz	40.71	26.04	44.18	27.39	44.76	29.92
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	64.19	36.17	68.99	36.42
5 230 MHz	56.49	36.02	63.18	36.11
5 755 MHz	89.60	61.19	89.48	61.29
5 795 MHz	87.92	59.20	88.93	59.24
Measurement uncertainty	± 0.1 MHz			

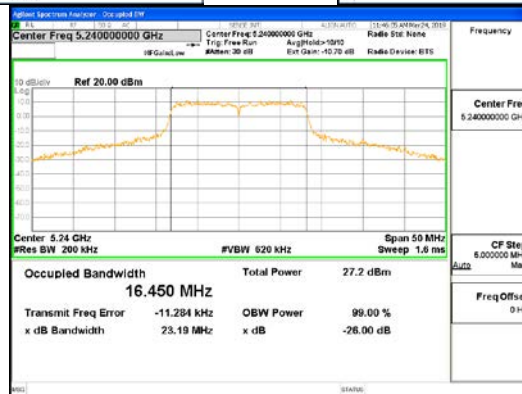
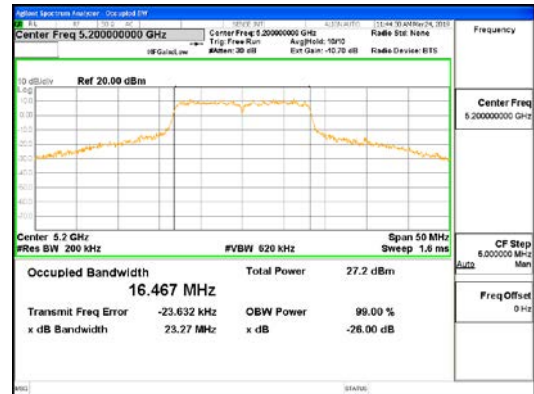
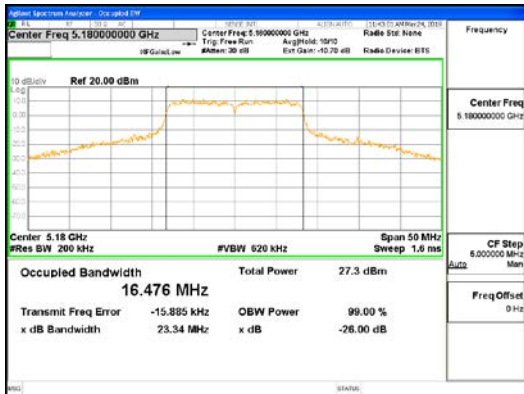
26 dB Bandwidth and 99% Bandwidth (MHz)		
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	81.34	75.39
5 775 MHz	190.80	123.87
Measurement uncertainty	± 0.1 MHz	

See next pages for actual measured spectrum plots.

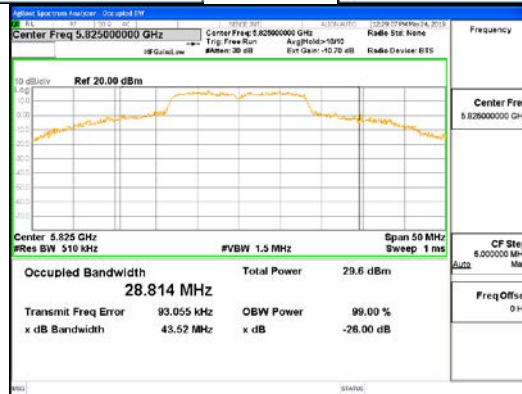
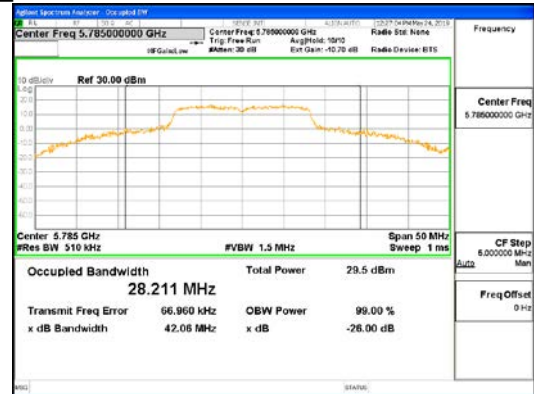
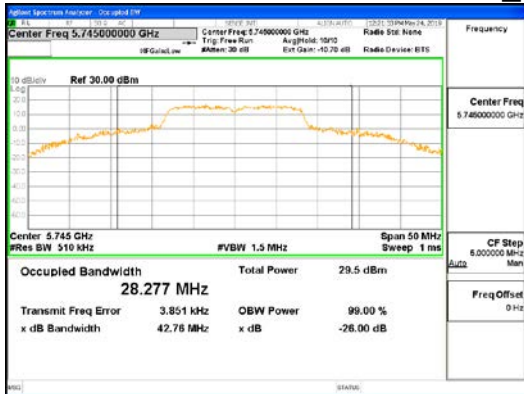


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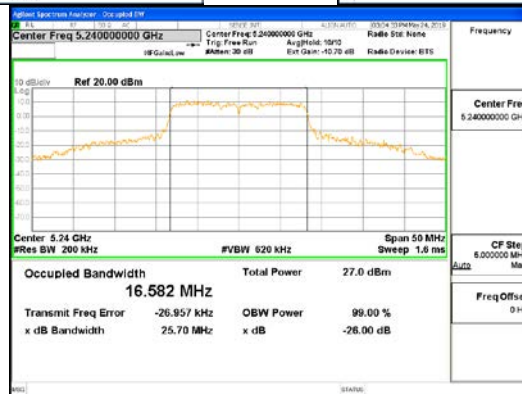
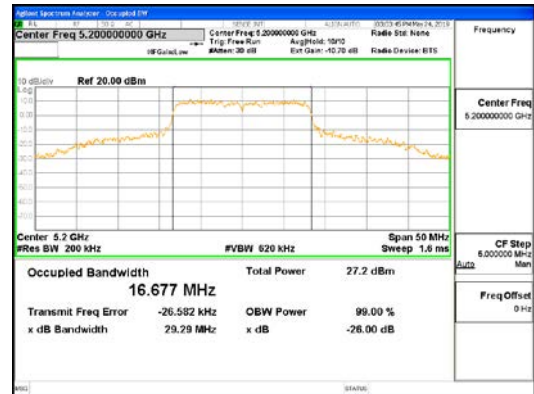
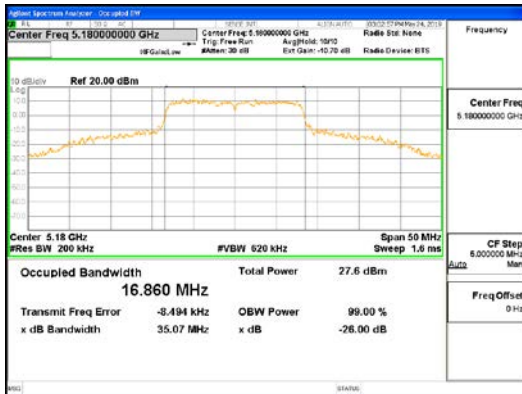


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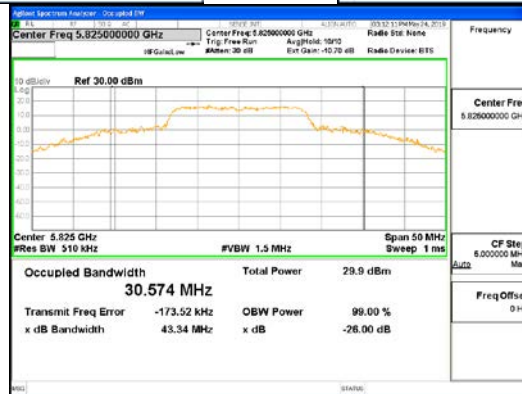
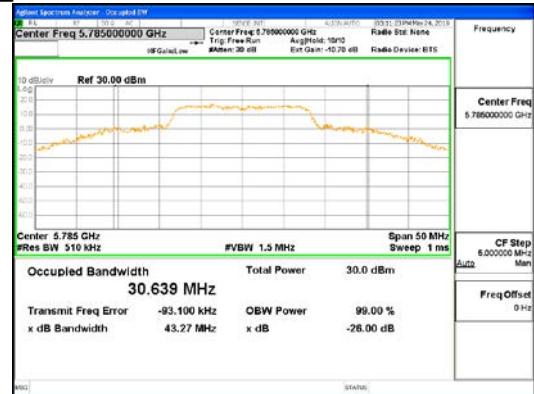
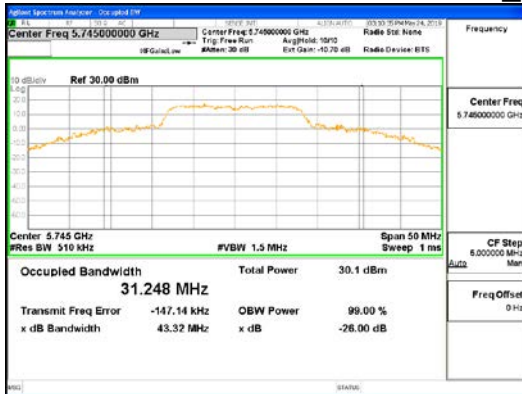


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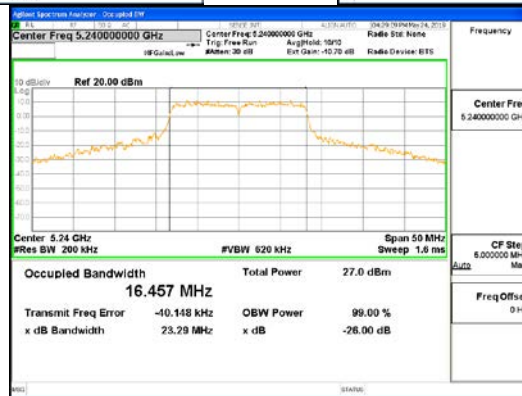
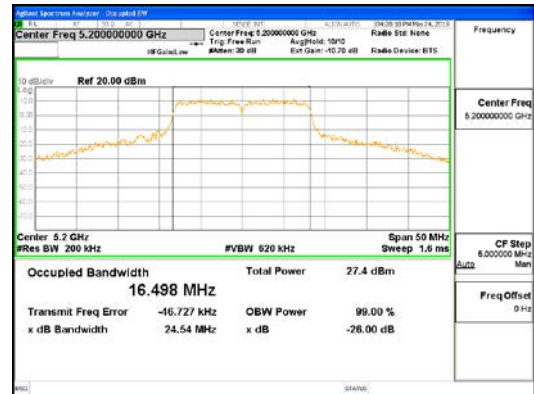
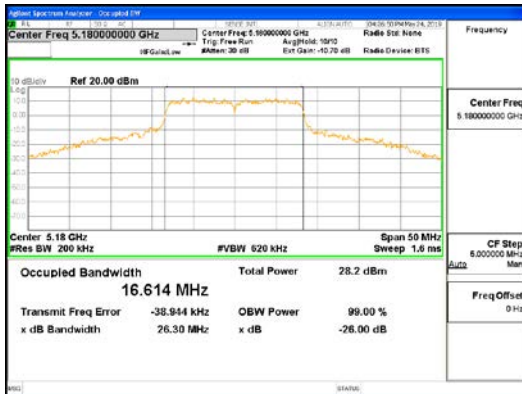


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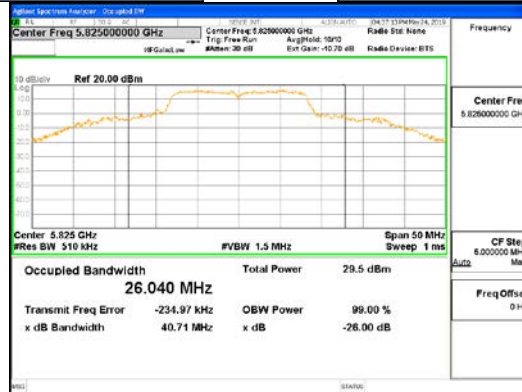
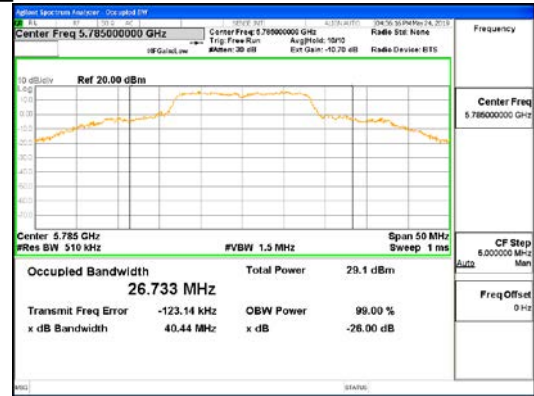
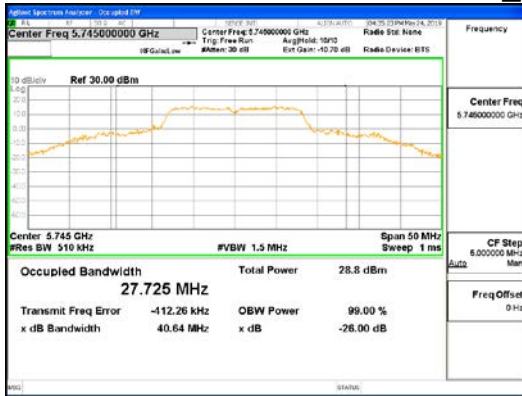


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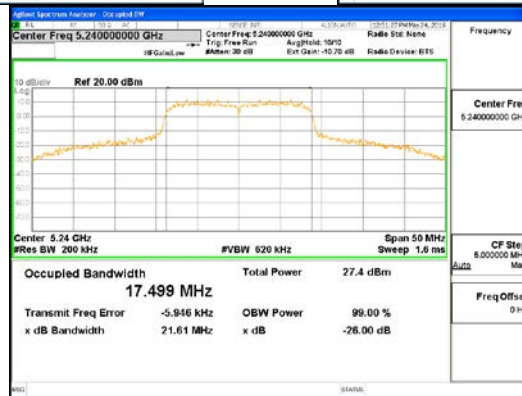
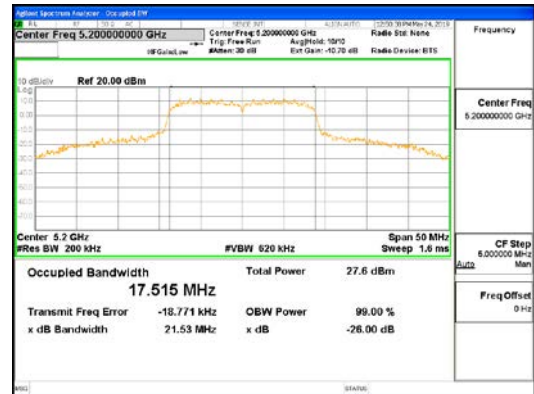
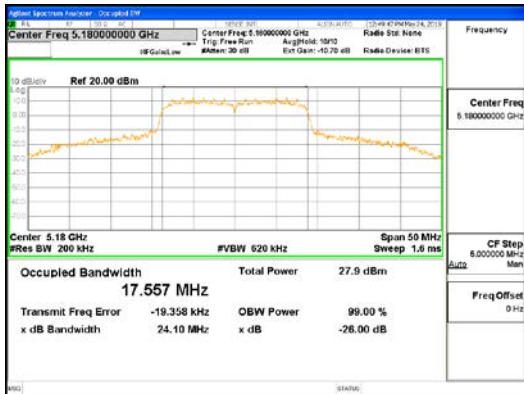


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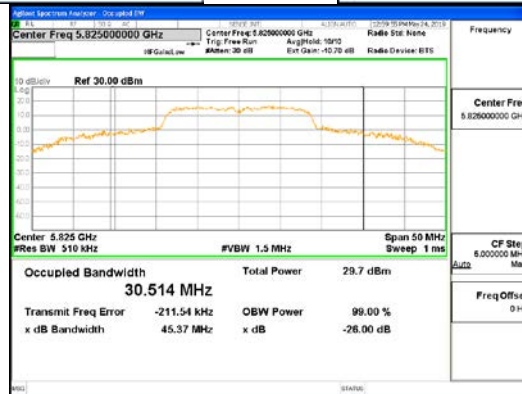
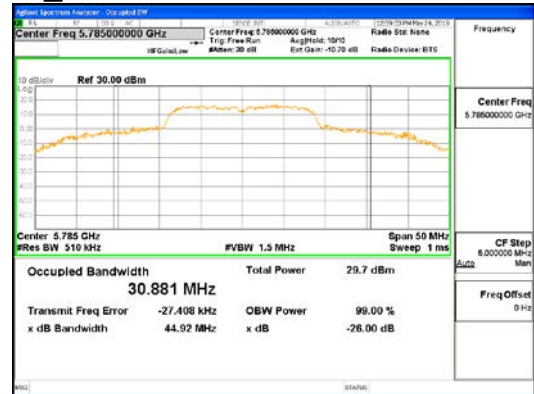
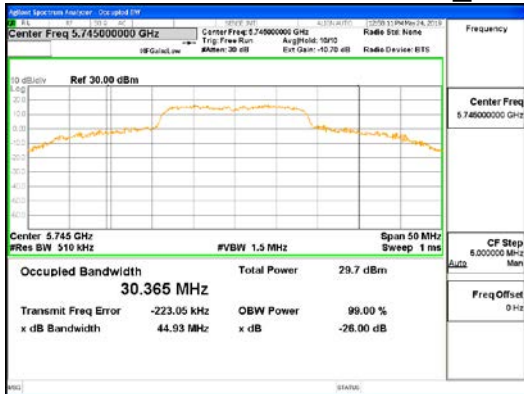


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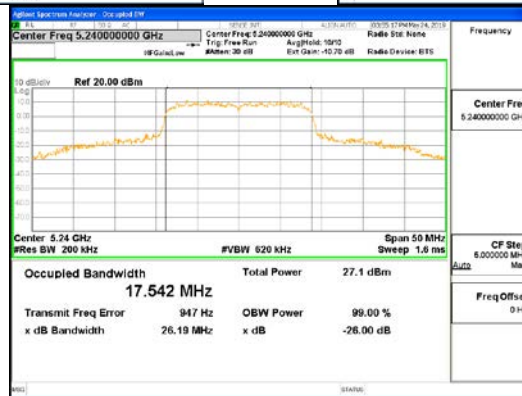
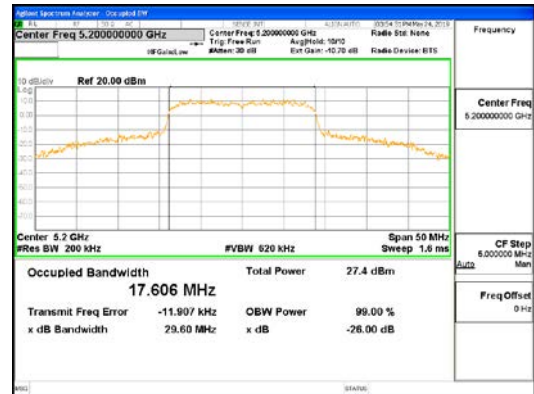
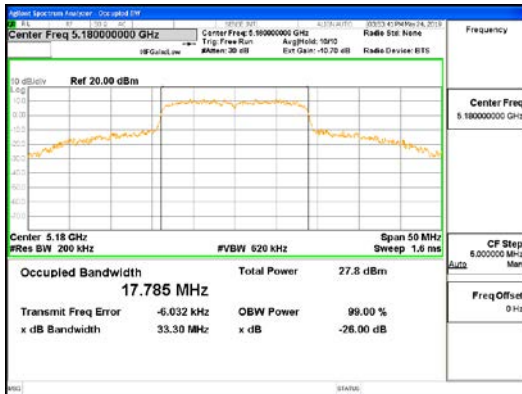


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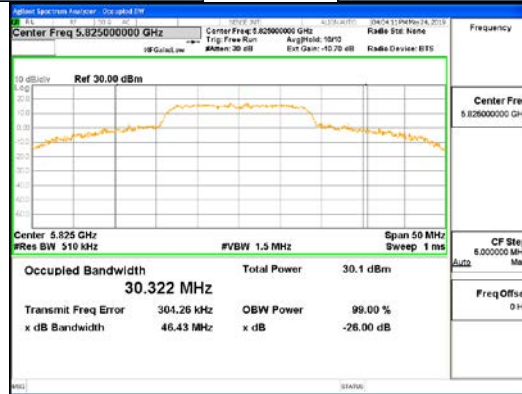
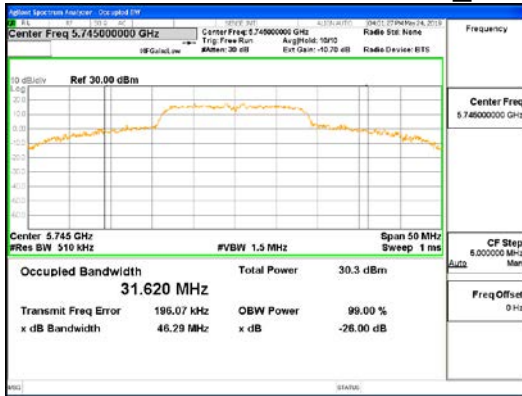


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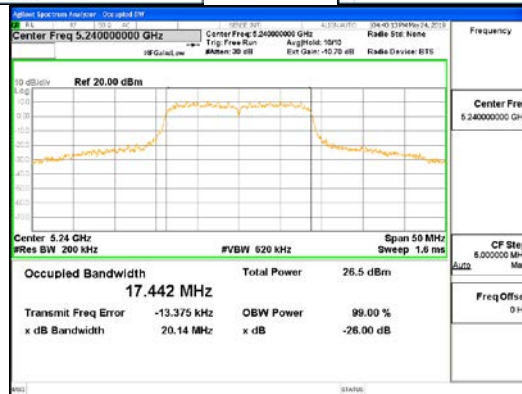
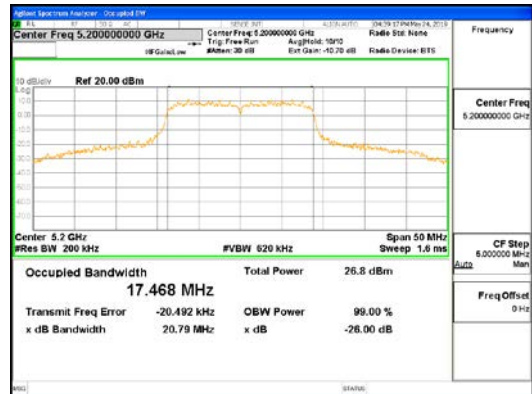
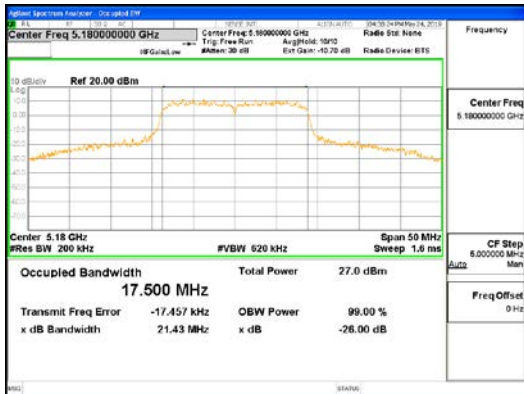


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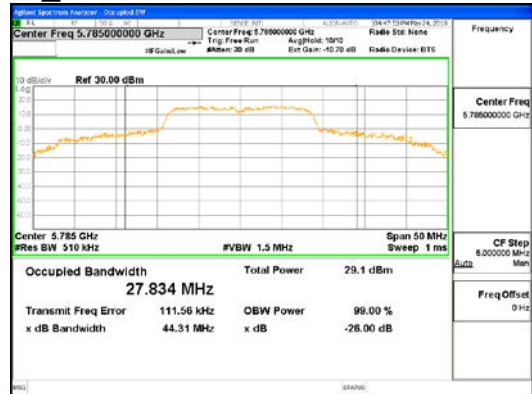
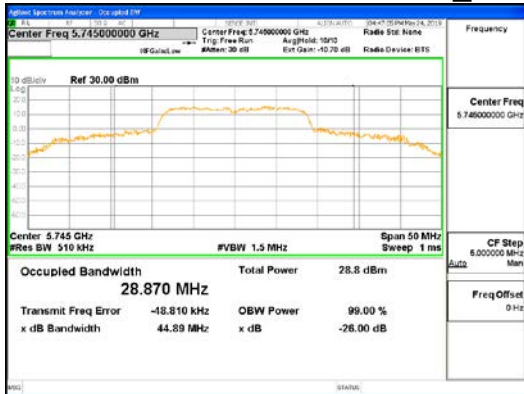


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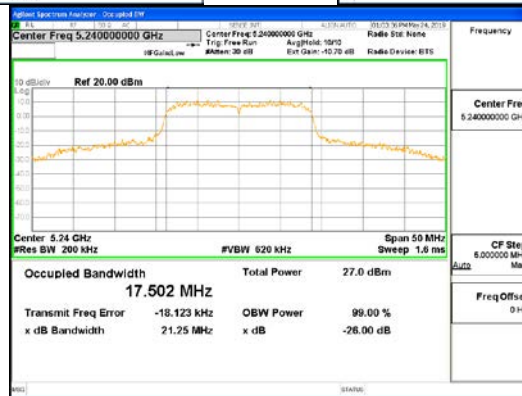
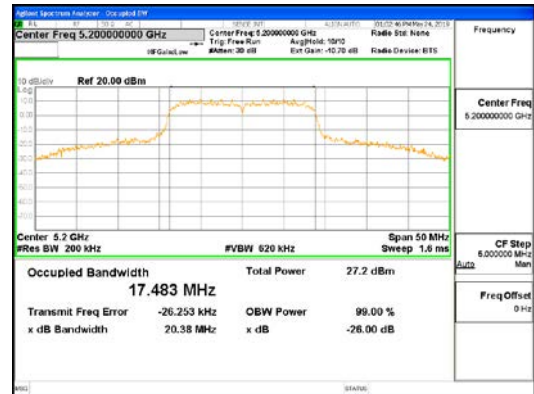
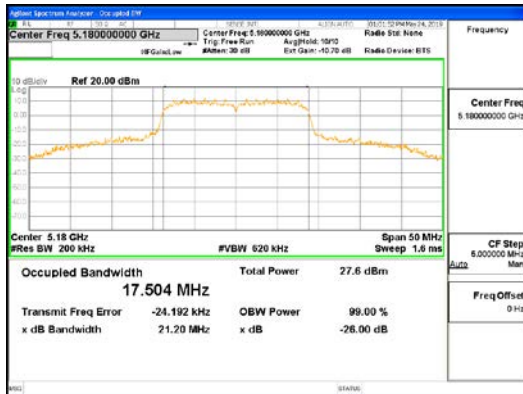


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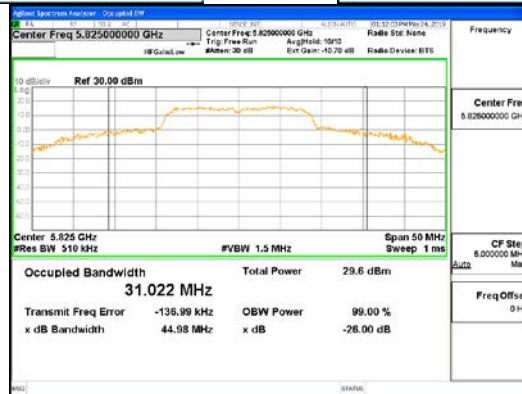
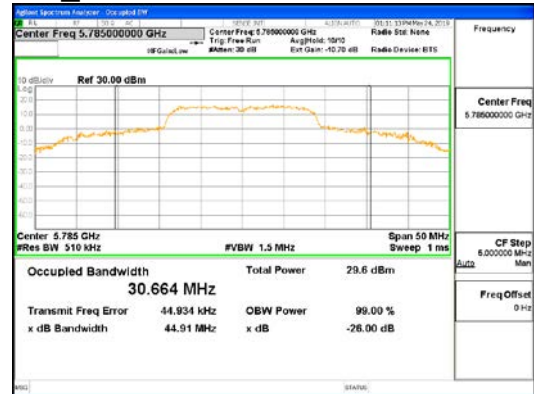
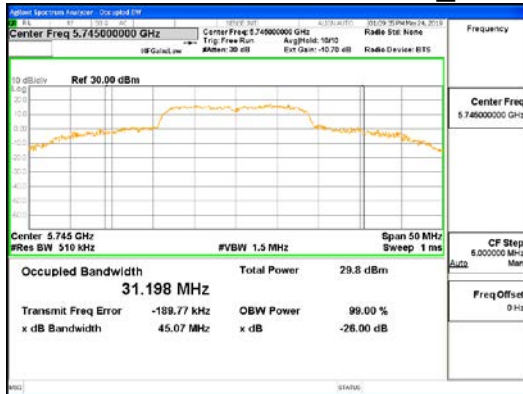


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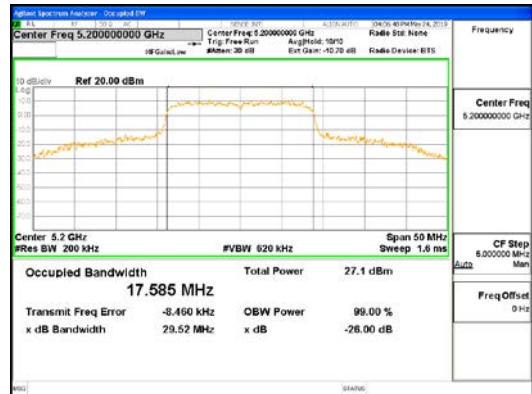
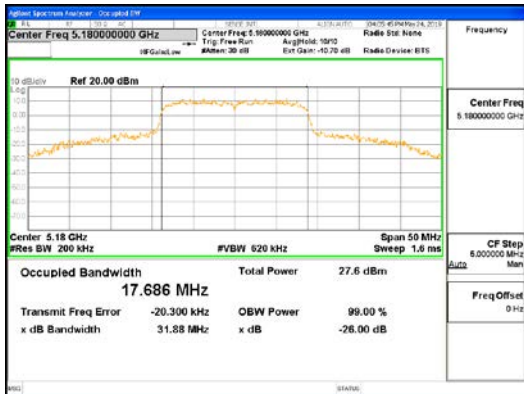


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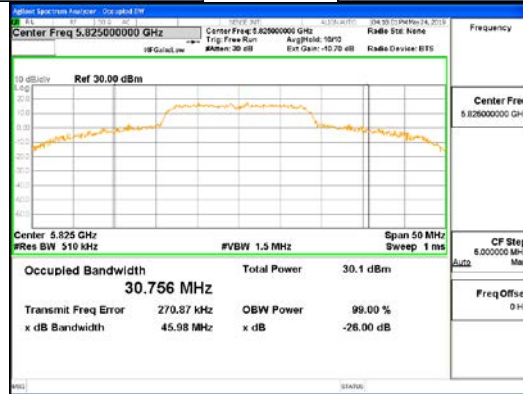
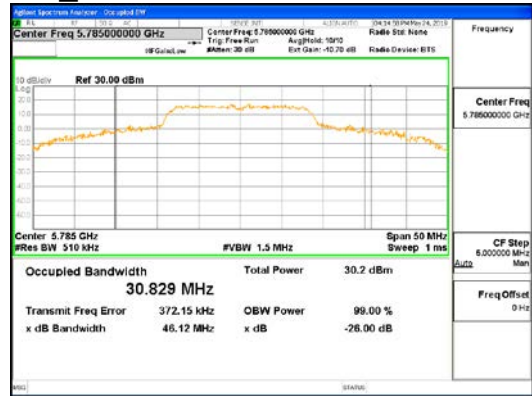
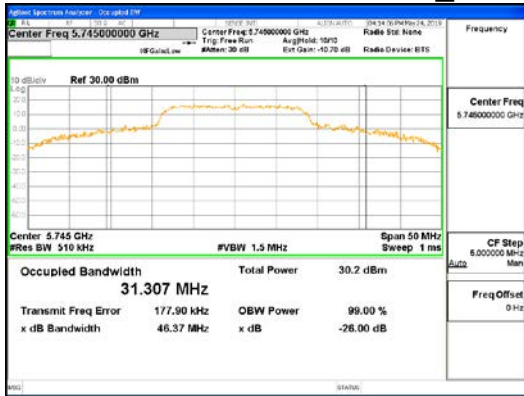


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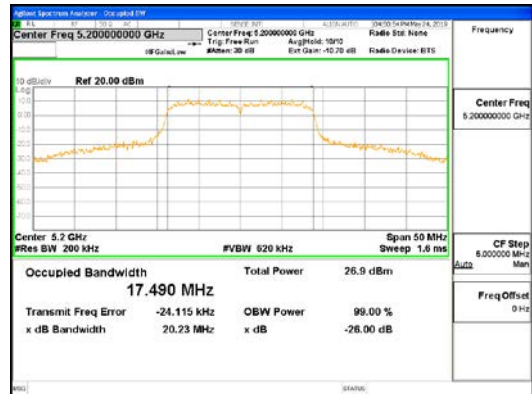


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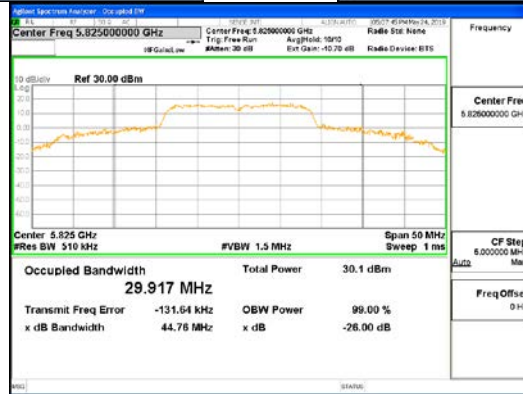
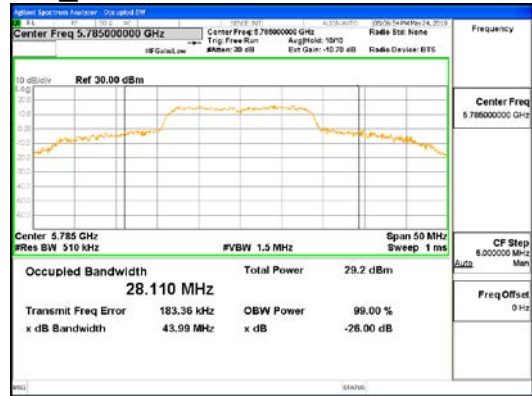
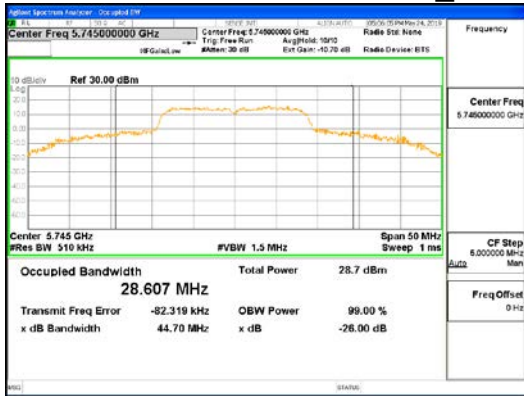


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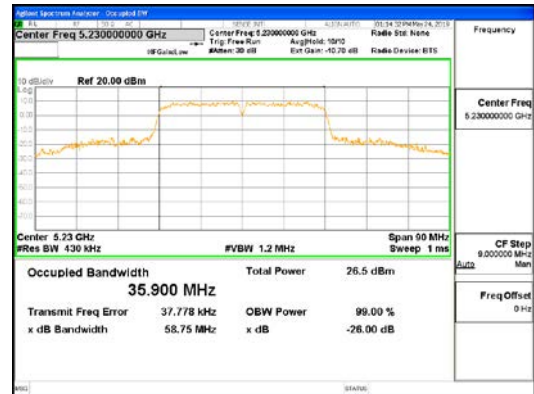
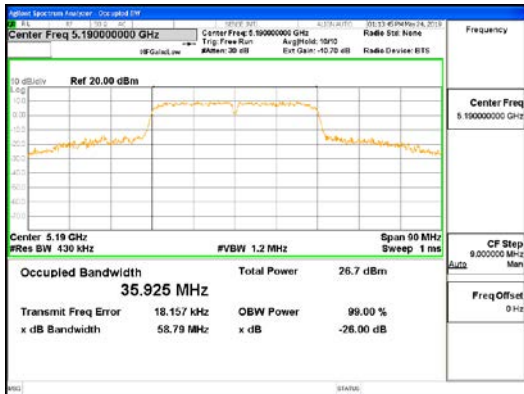


ANT3_802.11ac_VHT20_UNII-3

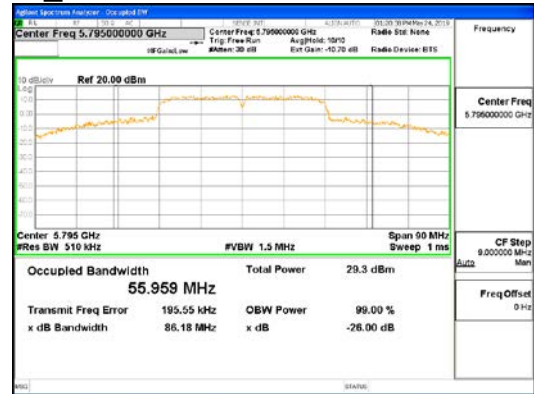
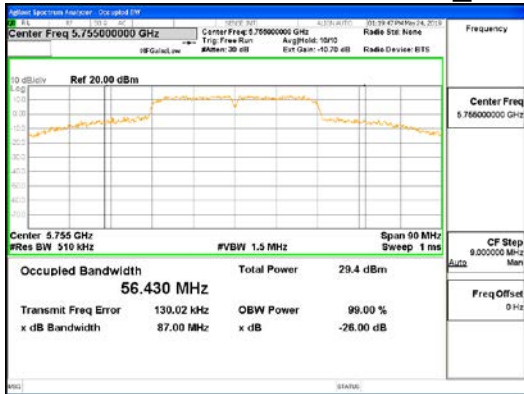


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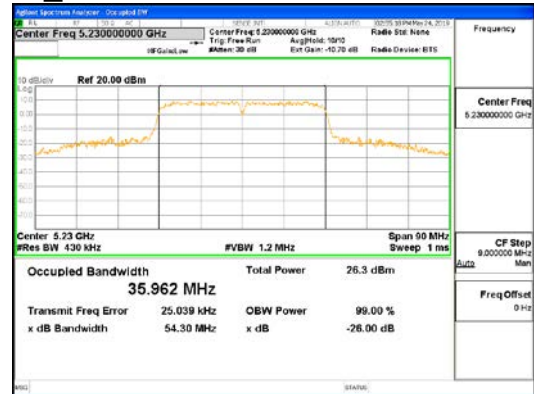
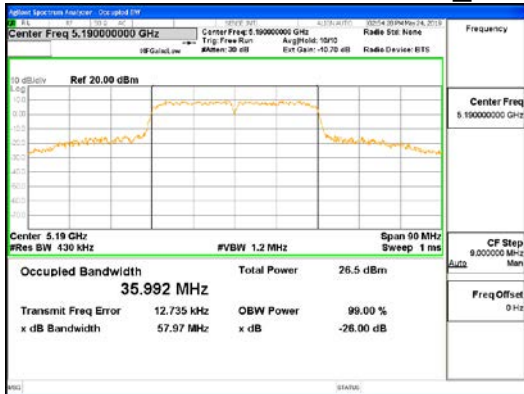
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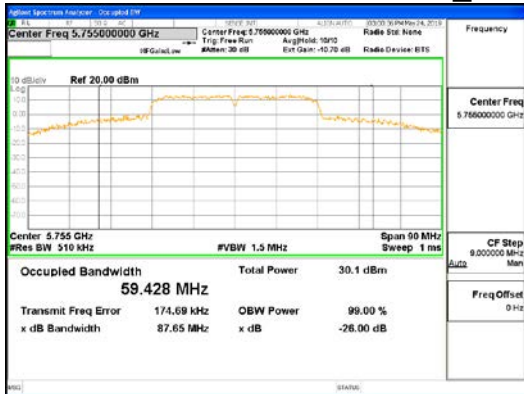
ANT1_802.11n_HT40_UNII-1



ANT1_802.11n_HT40_UNII-3



ANT2_802.11n_HT40_UNII-1

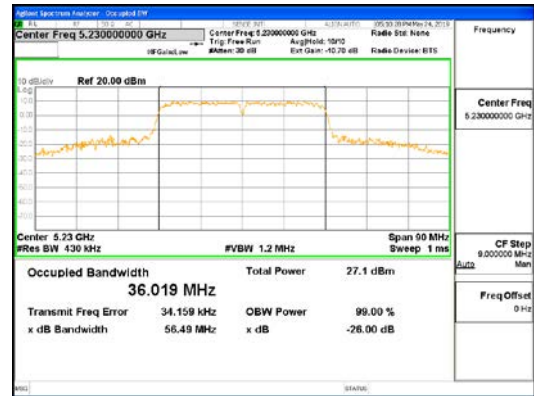
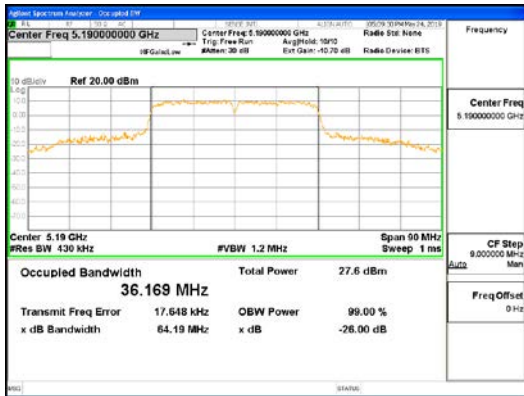


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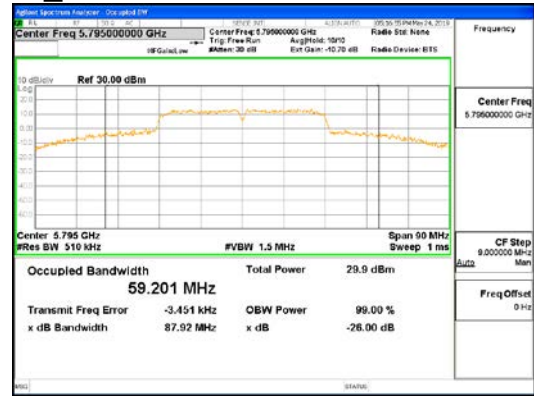
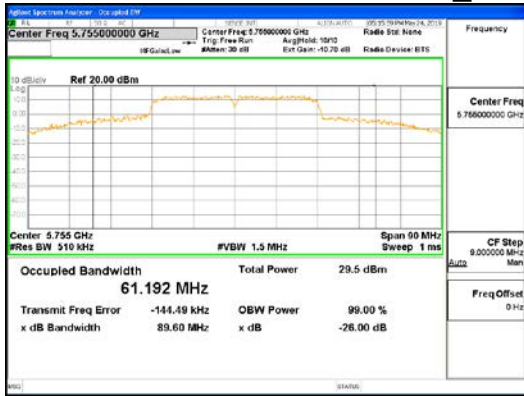


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ANT3_802.11n_HT40_UNII-1

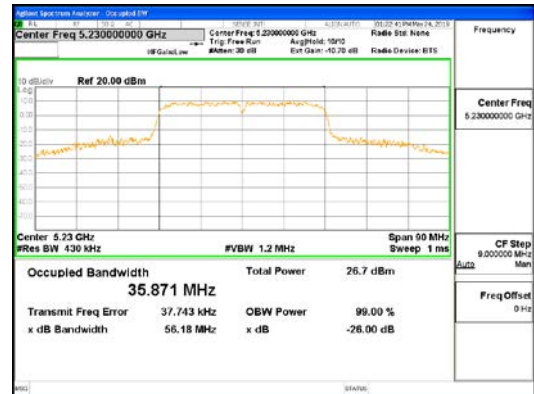
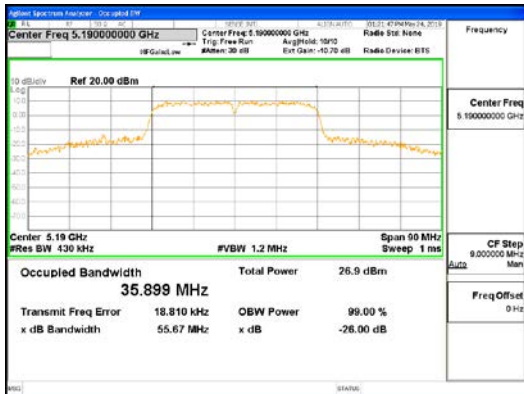


ANT3_802.11n_HT40_UNII-3

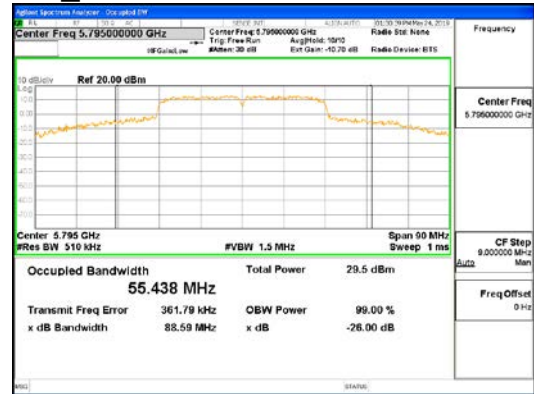
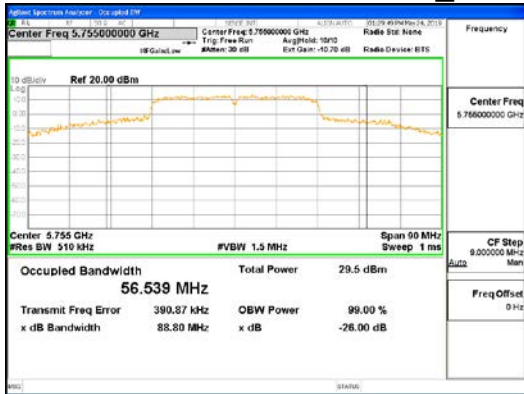


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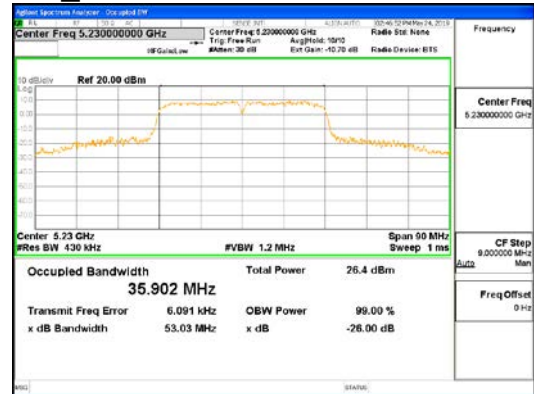
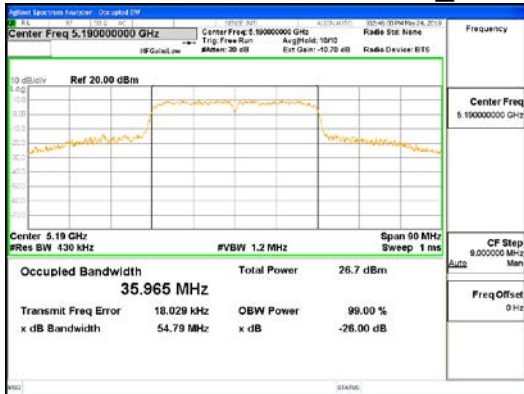
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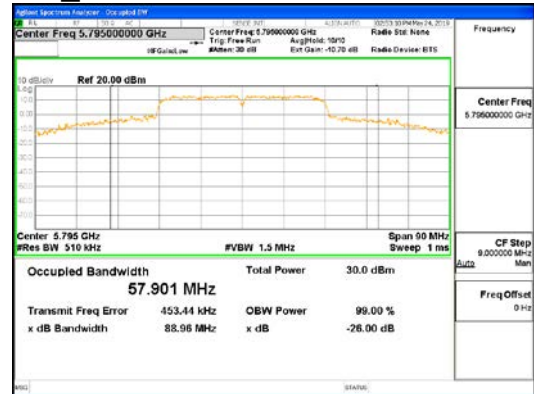
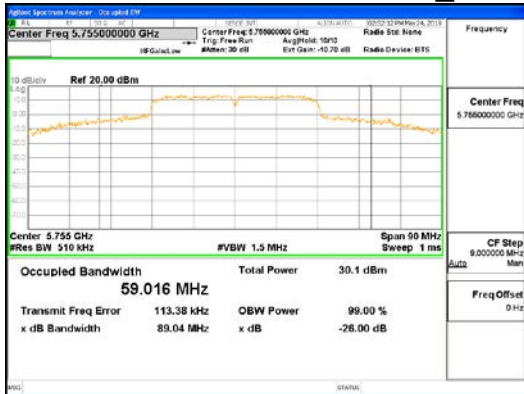
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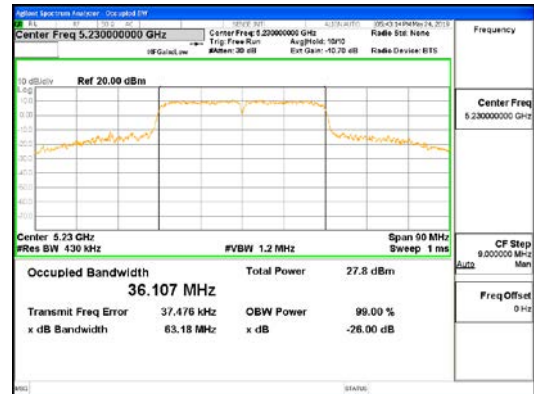
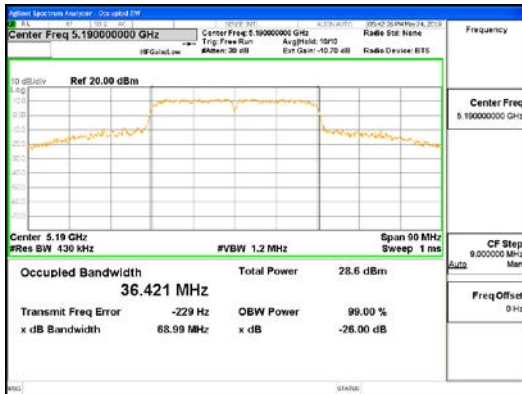
ANT1_802.11ac_VHT40_UNII-3



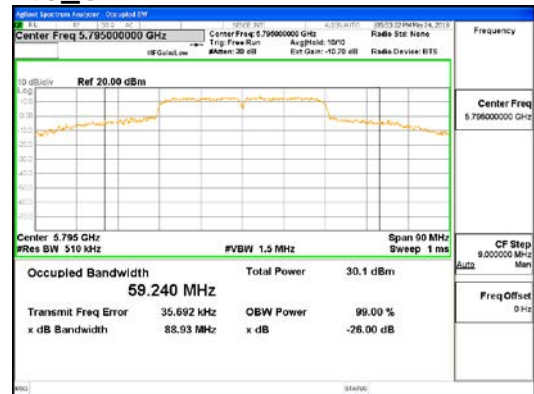
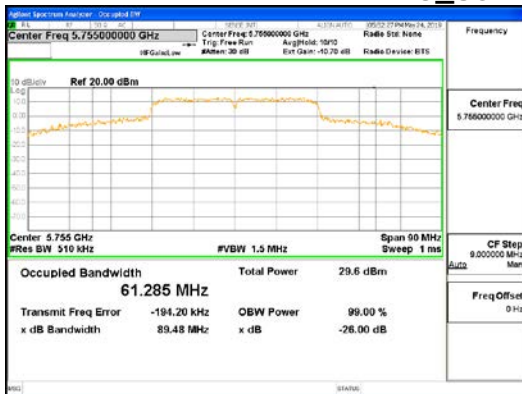
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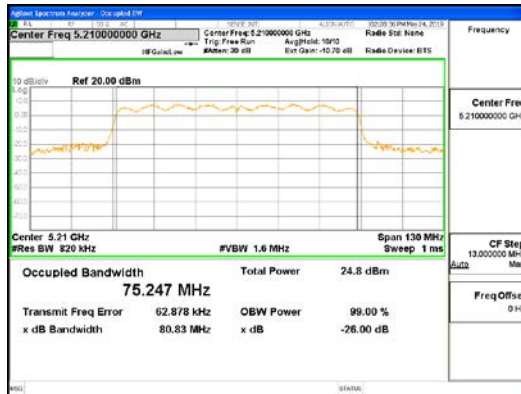
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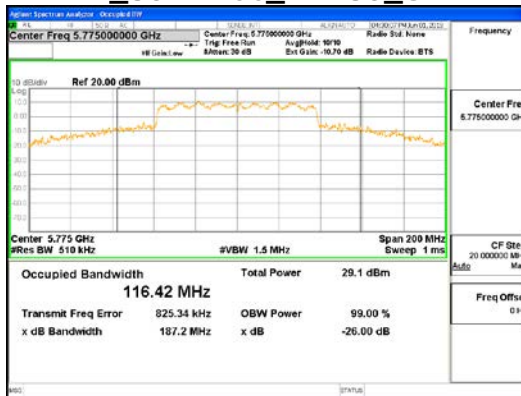
ANT3_802.11ac_VHT40_UNII-1



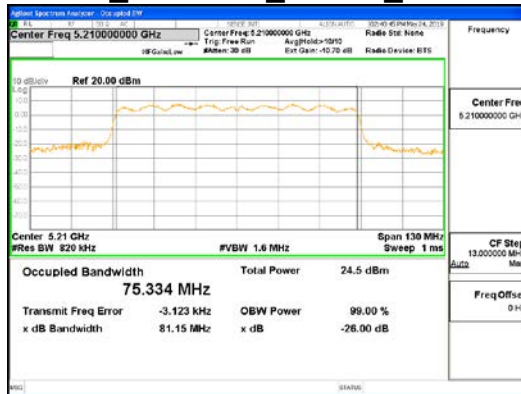
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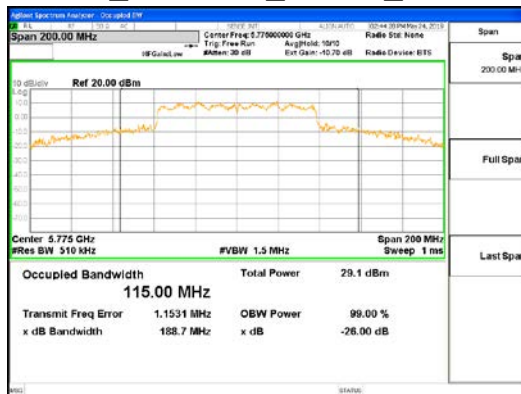
ANT1_802.11ac_VHT80_UNII-1



ANT1_802.11ac_VHT80_UNII-3



ANT2_802.11ac_VHT80_UNII-1

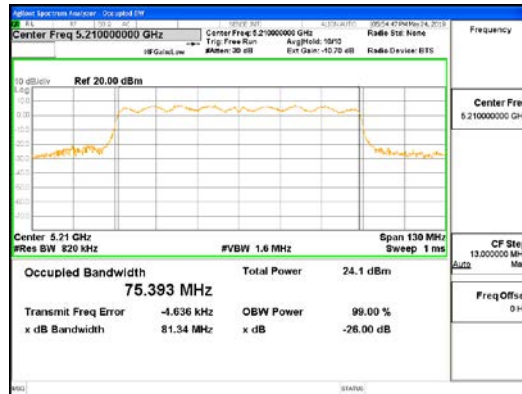


ANT2_802.11ac_VHT80_UNII-3

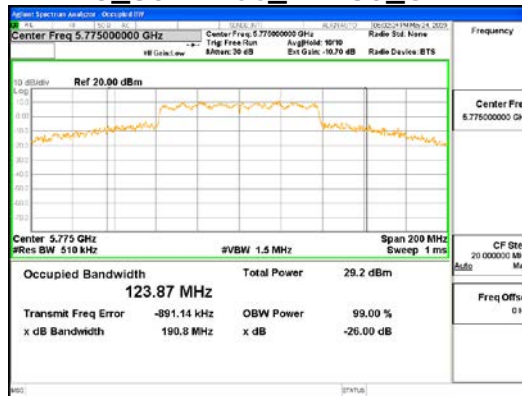


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ANT3_802.11ac_VHT80_UNII-1



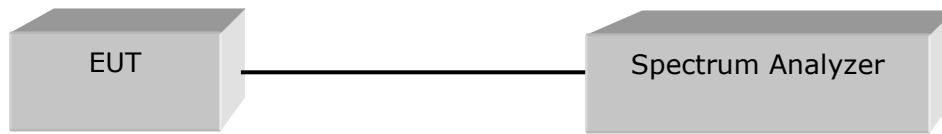
ANT3_802.11ac_VHT80_UNII-3

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 $\geq 3 \times$ RBW
- c) Sweep time = auto
- d) Detector = power averaging (rms)
- e) Trace mode = Average at least 100
- f) Duty cycle factor = $10\log(1/x)$

Test mode		Duty Cycle Factor (dB)
CDD Mode	802.11a	0.12
	802.11n_HT20	0.15
	802.11n_HT40	0.28
	802.11ac_VHT20	0.17
	802.11ac_VHT40	0.33
	802.11ac_VHT80	0.50
SDM Mode	802.11n_HT20	0.29
	802.11n_HT40	0.65
	802.11ac_VHT20	0.41
	802.11ac_VHT40	0.60
	802.11ac_VHT80	1.02



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Limit

Operating Mode	Band	Mode	ANT Configuration	ANT Gain (dBi)	Limit (dBm)
SISO	UNII 1	802.11a/n/ac	ANT1, ANT2, ANT3	2.00	30.00
	UNII 3				
MIMO (2Tx)	UNII 1	802.11a/n/ac	ANT1 + ANT2	5.01	30.00
	UNII 3				
MIMO (3Tx)	UNII 1	802.11a/n/ac	ANT1 + ANT2 + ANT3	6.77	29.23
	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	21.13	0.12	21.25	30.00	8.75
	5 200	21.06	0.12	21.18	30.00	8.82
	5 240	20.94	0.12	21.06	30.00	8.94
	5 745	23.45	0.12	23.57	30.00	6.43
	5 785	23.40	0.12	23.52	30.00	6.48
	5 825	23.38	0.12	23.50	30.00	6.50
802.11n _HT20	5 180	21.69	0.15	21.84	30.00	8.16
	5 200	21.38	0.15	21.53	30.00	8.47
	5 240	21.24	0.15	21.39	30.00	8.61
	5 745	23.58	0.15	23.73	30.00	6.27
	5 785	23.55	0.15	23.70	30.00	6.30
	5 825	23.58	0.15	23.73	30.00	6.27
802.11ac _VHT20	5 180	21.35	0.17	21.52	30.00	8.48
	5 200	20.98	0.17	21.15	30.00	8.85
	5 240	20.95	0.17	21.12	30.00	8.88
	5 745	23.67	0.17	23.84	30.00	6.16
	5 785	23.53	0.17	23.70	30.00	6.30
	5 825	23.56	0.17	23.73	30.00	6.27
802.11n _HT40	5 190	20.56	0.28	20.84	30.00	9.16
	5 230	20.59	0.28	20.87	30.00	9.13
	5 755	23.13	0.28	23.41	30.00	6.59
	5 795	23.21	0.28	23.49	30.00	6.51
802.11ac _VHT40	5 190	20.57	0.33	20.90	30.00	9.10
	5 230	20.45	0.33	20.78	30.00	9.22
	5 755	23.26	0.33	23.59	30.00	6.41
	5 795	23.30	0.33	23.63	30.00	6.37
802.11ac _VHT80	5 210	18.63	0.50	19.13	30.00	10.87
	5 775	22.61	0.50	23.11	30.00	6.89
Measurement uncertainty		± 1.5 dB				



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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	20.74	0.12	20.86	30.00	9.14
	5 200	20.70	0.12	20.82	30.00	9.18
	5 240	20.53	0.12	20.65	30.00	9.35
	5 745	23.51	0.12	23.63	30.00	6.37
	5 785	23.50	0.12	23.62	30.00	6.38
	5 825	23.47	0.12	23.59	30.00	6.41
802.11n _HT20	5 180	20.93	0.15	21.08	30.00	8.92
	5 200	20.53	0.15	20.68	30.00	9.32
	5 240	20.39	0.15	20.54	30.00	9.46
	5 745	23.46	0.15	23.61	30.00	6.39
	5 785	23.37	0.15	23.52	30.00	6.48
	5 825	23.37	0.15	23.52	30.00	6.48
802.11ac _VHT20	5 180	20.62	0.17	20.79	30.00	9.21
	5 200	20.29	0.17	20.46	30.00	9.54
	5 240	20.20	0.17	20.37	30.00	9.63
	5 745	23.39	0.17	23.56	30.00	6.44
	5 785	23.37	0.17	23.54	30.00	6.46
	5 825	23.30	0.17	23.47	30.00	6.53
802.11n _HT40	5 190	20.41	0.28	20.69	30.00	9.31
	5 230	20.07	0.28	20.35	30.00	9.65
	5 755	23.80	0.28	24.08	30.00	5.92
	5 795	23.79	0.28	24.07	30.00	5.93
802.11ac _VHT40	5 190	20.59	0.33	20.92	30.00	9.08
	5 230	20.34	0.33	20.67	30.00	9.33
	5 755	23.75	0.33	24.08	30.00	5.92
	5 795	23.80	0.33	24.13	30.00	5.87
802.11ac _VHT80	5 210	18.47	0.50	18.97	30.00	11.03
	5 775	23.00	0.50	23.50	30.00	6.50
Measurement uncertainty		± 1.5 dB				



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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	21.83	0.12	21.95	30.00	8.05
	5 200	21.06	0.12	21.18	30.00	8.82
	5 240	20.85	0.12	20.97	30.00	9.03
	5 745	22.88	0.12	23.00	30.00	7.00
	5 785	23.21	0.12	23.33	30.00	6.67
	5 825	23.59	0.12	23.71	30.00	6.29
802.11n_HT20	5 180	20.92	0.15	21.07	30.00	8.93
	5 200	20.62	0.15	20.77	30.00	9.23
	5 240	20.41	0.15	20.56	30.00	9.44
	5 745	22.67	0.15	22.82	30.00	7.18
	5 785	23.06	0.15	23.21	30.00	6.79
	5 825	23.48	0.15	23.63	30.00	6.37
802.11ac_VHT20	5 180	20.91	0.17	21.08	30.00	8.92
	5 200	20.62	0.17	20.79	30.00	9.21
	5 240	20.46	0.17	20.63	30.00	9.37
	5 745	22.69	0.17	22.86	30.00	7.14
	5 785	23.30	0.17	23.47	30.00	6.53
	5 825	23.89	0.17	24.06	30.00	5.94
802.11n_HT40	5 190	21.36	0.28	21.64	30.00	8.36
	5 230	20.92	0.28	21.20	30.00	8.80
	5 755	23.25	0.28	23.53	30.00	6.47
	5 795	23.73	0.28	24.01	30.00	5.99
802.11ac_VHT40	5 190	22.13	0.33	22.46	30.00	7.54
	5 230	21.53	0.33	21.86	30.00	8.14
	5 755	23.27	0.33	23.60	30.00	6.40
	5 795	23.79	0.33	24.12	30.00	5.88
802.11ac_VHT80	5 210	18.43	0.50	18.93	30.00	11.07
	5 775	23.08	0.50	23.58	30.00	6.42
Measurement uncertainty		± 1.5 dB				



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CDD Mode_ANT1 + 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	23.95	0.12	24.07	30.00	5.93
	5 200	23.89	0.12	24.01	30.00	5.99
	5 240	23.75	0.12	23.87	30.00	6.13
	5 745	26.49	0.12	26.61	30.00	3.39
	5 785	26.46	0.12	26.58	30.00	3.42
	5 825	26.44	0.12	26.56	30.00	3.44
802.11n _HT20	5 180	24.34	0.15	24.49	30.00	5.51
	5 200	23.99	0.15	24.14	30.00	5.86
	5 240	23.85	0.15	24.00	30.00	6.00
	5 745	26.53	0.15	26.68	30.00	3.32
	5 785	26.47	0.15	26.62	30.00	3.38
	5 825	26.49	0.15	26.64	30.00	3.36
802.11ac _VHT20	5 180	24.01	0.17	24.18	30.00	5.82
	5 200	23.66	0.17	23.83	30.00	6.17
	5 240	23.60	0.17	23.77	30.00	6.23
	5 745	26.54	0.17	26.71	30.00	3.29
	5 785	26.46	0.17	26.63	30.00	3.37
	5 825	26.44	0.17	26.61	30.00	3.39
802.11n _HT40	5 190	23.50	0.28	23.78	30.00	6.22
	5 230	23.35	0.28	23.63	30.00	6.37
	5 755	26.49	0.28	26.77	30.00	3.23
	5 795	26.52	0.28	26.80	30.00	3.20
802.11ac _VHT40	5 190	23.59	0.33	23.92	30.00	6.08
	5 230	23.41	0.33	23.74	30.00	6.26
	5 755	26.52	0.33	26.85	30.00	3.15
	5 795	26.57	0.33	26.90	30.00	3.10
802.11ac _VHT80	5 210	21.56	0.50	22.06	30.00	7.94
	5 775	25.82	0.50	26.32	30.00	3.68
Measurement uncertainty		± 1.5 dB				



CDD Mode_ANT1 + ANT2 + 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	26.03	0.12	26.15	29.23	3.08
	5 200	25.71	0.12	25.83	29.23	3.40
	5 240	25.55	0.12	25.67	29.23	3.56
	5 745	28.06	0.12	28.18	29.23	1.05
	5 785	28.14	0.12	28.26	29.23	0.97
	5 825	28.25	0.12	28.37	29.23	0.86
802.11n _HT20	5 180	25.97	0.15	26.12	29.23	3.11
	5 200	25.63	0.15	25.78	29.23	3.45
	5 240	25.47	0.15	25.62	29.23	3.61
	5 745	28.03	0.15	28.18	29.23	1.05
	5 785	28.10	0.15	28.25	29.23	0.98
	5 825	28.25	0.15	28.40	29.23	0.83
802.11ac _VHT20	5 180	25.74	0.17	25.91	29.23	3.32
	5 200	25.41	0.17	25.58	29.23	3.65
	5 240	25.32	0.17	25.49	29.23	3.74
	5 745	28.04	0.17	28.21	29.23	1.02
	5 785	28.17	0.17	28.34	29.23	0.89
	5 825	28.36	0.17	28.53	29.23	0.70
802.11n _HT40	5 190	25.57	0.28	25.85	29.23	3.38
	5 230	25.31	0.28	25.59	29.23	3.64
	5 755	28.17	0.28	28.45	29.23	0.78
	5 795	28.36	0.28	28.64	29.23	0.59
802.11ac _VHT40	5 190	25.93	0.33	26.26	29.23	2.97
	5 230	25.58	0.33	25.91	29.23	3.32
	5 755	28.20	0.33	28.53	29.23	0.70
	5 795	28.41	0.33	28.74	29.23	0.49
802.11ac _VHT80	5 210	23.28	0.50	23.78	29.23	5.45
	5 775	27.67	0.50	28.17	29.23	1.06
Measurement uncertainty		± 1.5 dB				



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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	21.38	0.29	21.67	30.00	8.33
	5 200	20.86	0.29	21.15	30.00	8.85
	5 240	20.63	0.29	20.92	30.00	9.08
	5 745	22.55	0.29	22.84	30.00	7.16
	5 785	22.47	0.29	22.76	30.00	7.24
	5 825	22.44	0.29	22.73	30.00	7.27
802.11ac _VHT20	5 180	20.54	0.41	20.95	30.00	9.05
	5 200	20.11	0.41	20.52	30.00	9.48
	5 240	20.02	0.41	20.43	30.00	9.57
	5 745	22.50	0.41	22.91	30.00	7.09
	5 785	22.44	0.41	22.85	30.00	7.15
	5 825	22.40	0.41	22.81	30.00	7.19
802.11n _HT40	5 190	20.01	0.65	20.66	30.00	9.34
	5 230	19.53	0.65	20.18	30.00	9.82
	5 755	21.89	0.65	22.54	30.00	7.46
	5 795	21.89	0.65	22.54	30.00	7.46
802.11ac _VHT40	5 190	18.17	0.60	18.77	30.00	11.23
	5 230	17.98	0.60	18.58	30.00	11.42
	5 755	21.86	0.60	22.46	30.00	7.54
	5 795	21.90	0.60	22.5	30.00	7.50
802.11ac _VHT80	5 210	14.74	1.02	15.76	30.00	14.24
	5 775	20.69	1.02	21.71	30.00	8.29
Measurement uncertainty		± 1.5 dB				



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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	21.61	0.29	21.90	30.00	8.10
	5 200	21.02	0.29	21.31	30.00	8.69
	5 240	20.63	0.29	20.92	30.00	9.08
	5 745	22.86	0.29	23.15	30.00	6.85
	5 785	22.86	0.29	23.15	30.00	6.85
	5 825	22.81	0.29	23.10	30.00	6.90
802.11ac _VHT20	5 180	19.08	0.41	19.49	30.00	10.51
	5 200	18.76	0.41	19.17	30.00	10.83
	5 240	18.57	0.41	18.98	30.00	11.02
	5 745	22.76	0.41	23.17	30.00	6.83
	5 785	22.61	0.41	23.02	30.00	6.98
	5 825	22.66	0.41	23.07	30.00	6.93
802.11n _HT40	5 190	17.95	0.65	18.60	30.00	11.40
	5 230	17.51	0.65	18.16	30.00	11.84
	5 755	23.21	0.65	23.86	30.00	6.14
	5 795	23.17	0.65	23.82	30.00	6.18
802.11ac _VHT40	5 190	17.50	0.60	18.10	30.00	11.90
	5 230	17.26	0.60	17.86	30.00	12.14
	5 755	23.34	0.60	23.94	30.00	6.06
	5 795	23.33	0.60	23.93	30.00	6.07
802.11ac _VHT80	5 210	16.22	1.02	17.24	30.00	12.76
	5 775	21.82	1.02	22.84	30.00	7.16
Measurement uncertainty		± 1.5 dB				



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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	21.14	0.29	21.43	30.00	8.57
	5 200	20.44	0.29	20.73	30.00	9.27
	5 240	20.72	0.29	21.01	30.00	8.99
	5 745	23.08	0.29	23.37	30.00	6.63
	5 785	23.44	0.29	23.73	30.00	6.27
	5 825	23.76	0.29	24.05	30.00	5.95
802.11ac _VHT20	5 180	19.77	0.41	20.18	30.00	9.82
	5 200	19.23	0.41	19.64	30.00	10.36
	5 240	19.05	0.41	19.46	30.00	10.54
	5 745	23.07	0.41	23.48	30.00	6.52
	5 785	23.40	0.41	23.81	30.00	6.19
	5 825	23.72	0.41	24.13	30.00	5.87
802.11n _HT40	5 190	19.58	0.65	20.23	30.00	9.77
	5 230	18.97	0.65	19.62	30.00	10.38
	5 755	22.82	0.65	23.47	30.00	6.53
	5 795	23.38	0.65	24.03	30.00	5.97
802.11ac _VHT40	5 190	18.51	0.60	19.11	30.00	10.89
	5 230	17.88	0.60	18.48	30.00	11.52
	5 755	22.84	0.60	23.44	30.00	6.56
	5 795	23.32	0.60	23.92	30.00	6.08
802.11ac _VHT80	5 210	16.44	1.02	17.46	30.00	12.54
	5 775	21.47	1.02	22.49	30.00	7.51
Measurement uncertainty		± 1.5 dB				



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SDM Mode_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	24.51	0.29	24.80	30.00	5.20
	5 200	23.95	0.29	24.24	30.00	5.76
	5 240	23.64	0.29	23.93	30.00	6.07
	5 745	25.72	0.29	26.01	30.00	3.99
	5 785	25.68	0.29	25.97	30.00	4.03
	5 825	25.64	0.29	25.93	30.00	4.07
802.11ac _VHT20	5 180	22.88	0.41	23.29	30.00	6.71
	5 200	22.50	0.41	22.91	30.00	7.09
	5 240	22.37	0.41	22.78	30.00	7.22
	5 745	25.64	0.41	26.05	30.00	3.95
	5 785	25.54	0.41	25.95	30.00	4.05
	5 825	25.54	0.41	25.95	30.00	4.05
802.11n _HT40	5 190	22.11	0.65	22.76	30.00	7.24
	5 230	21.65	0.65	22.30	30.00	7.70
	5 755	25.61	0.65	26.26	30.00	3.74
	5 795	25.59	0.65	26.24	30.00	3.76
802.11ac _VHT40	5 190	20.86	0.60	21.46	30.00	8.54
	5 230	20.65	0.60	21.25	30.00	8.75
	5 755	25.67	0.60	26.27	30.00	3.73
	5 795	25.68	0.60	26.28	30.00	3.72
802.11ac _VHT80	5 210	18.55	1.02	19.57	30.00	10.43
	5 775	24.30	1.02	25.32	30.00	4.68
Measurement uncertainty		± 1.5 dB				



SDM Mode_ANT1 + ANT2 + ANT3

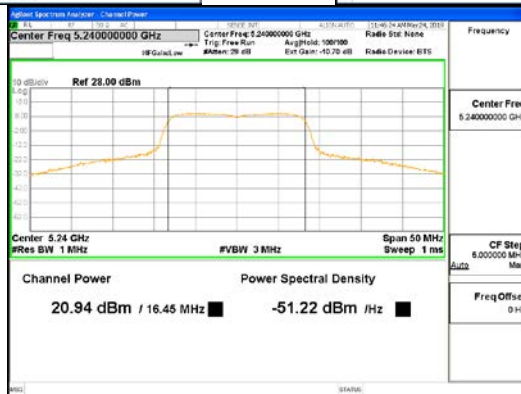
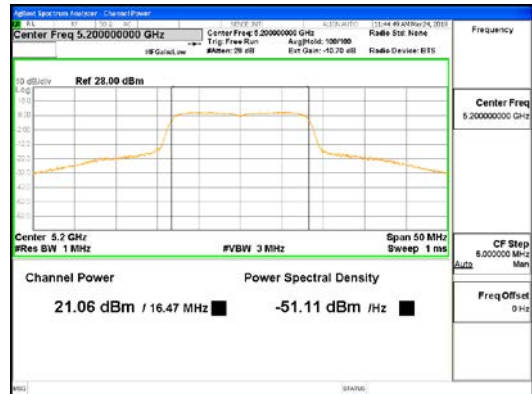
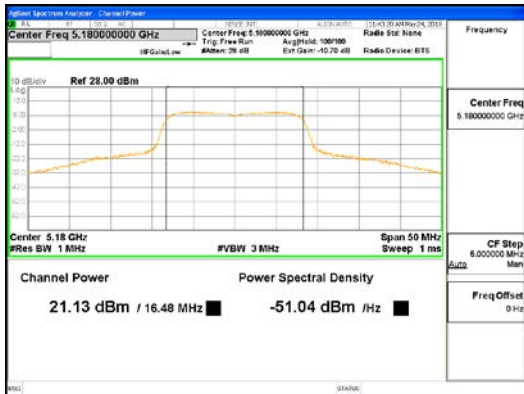
Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
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	5 200	25.55	0.29	25.84	29.23	3.39
	5 240	25.43	0.29	25.72	29.23	3.51
	5 745	27.61	0.29	27.90	29.23	1.33
	5 785	27.71	0.29	28.00	29.23	1.23
	5 825	27.81	0.29	28.10	29.23	1.13
802.11ac _VHT20	5 180	24.61	0.41	25.02	29.23	4.21
	5 200	24.17	0.41	24.58	29.23	4.65
	5 240	24.03	0.41	24.44	29.23	4.79
	5 745	27.55	0.41	27.96	29.23	1.27
	5 785	27.61	0.41	28.02	29.23	1.21
	5 825	27.74	0.41	28.15	29.23	1.08
802.11n _HT40	5 190	24.04	0.65	24.69	29.23	4.54
	5 230	23.52	0.65	24.17	29.23	5.06
	5 755	27.45	0.65	28.10	29.23	1.13
	5 795	27.63	0.65	28.28	29.23	0.95
802.11ac _VHT40	5 190	22.85	0.60	23.45	29.23	5.78
	5 230	22.49	0.60	23.09	29.23	6.14
	5 755	27.49	0.60	28.09	29.23	1.14
	5 795	27.67	0.60	28.27	29.23	0.96
802.11ac _VHT80	5 210	20.63	1.02	21.65	29.23	7.58
	5 775	26.12	1.02	27.14	29.23	2.09
Measurement uncertainty		± 1.5 dB				

See next pages for actual measured spectrum plots.

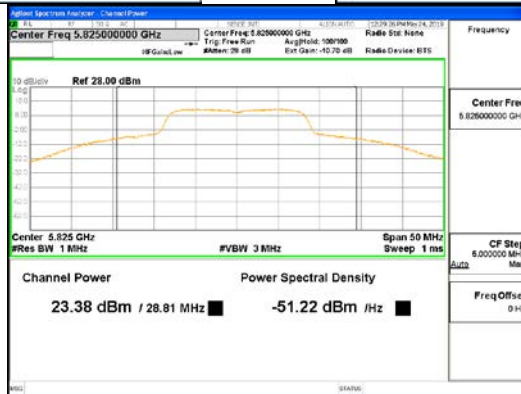
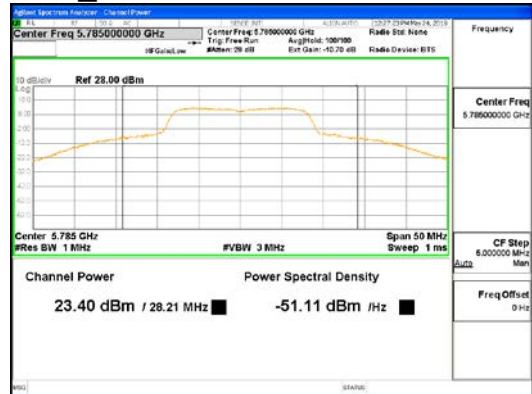


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CDD Mode_ANT1_802.11a_UNII-1

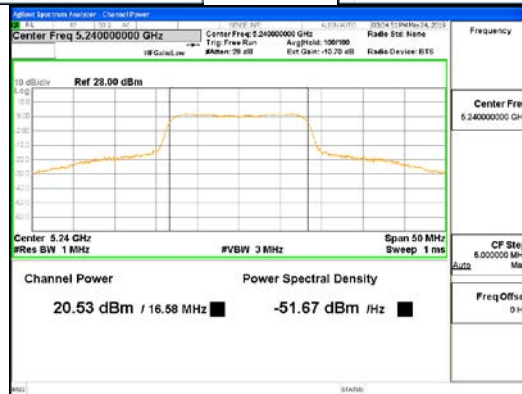
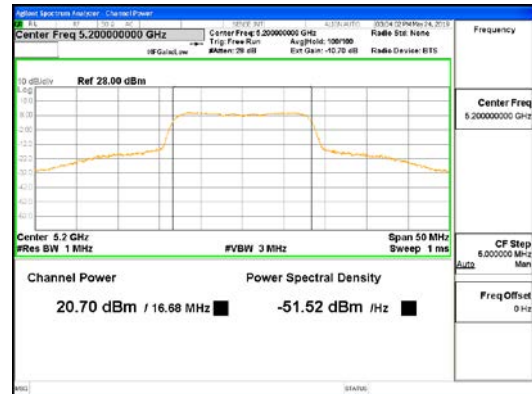
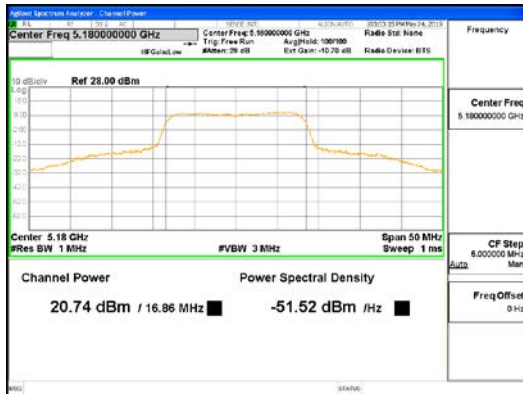


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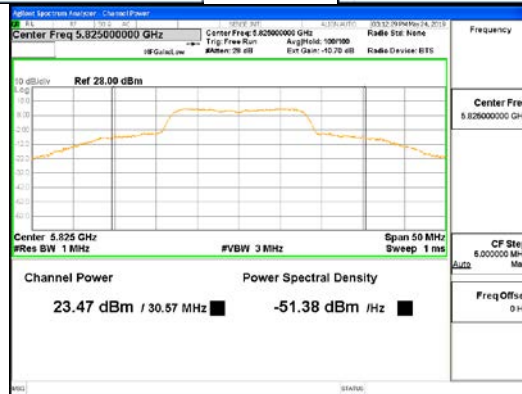
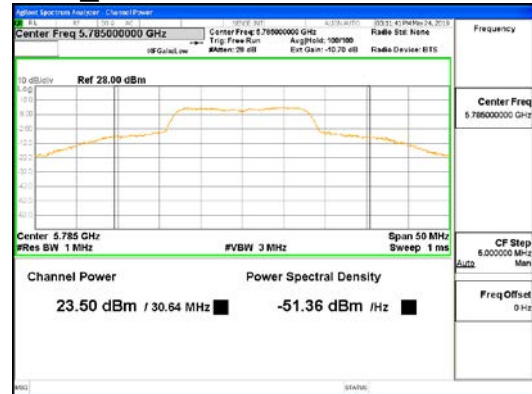
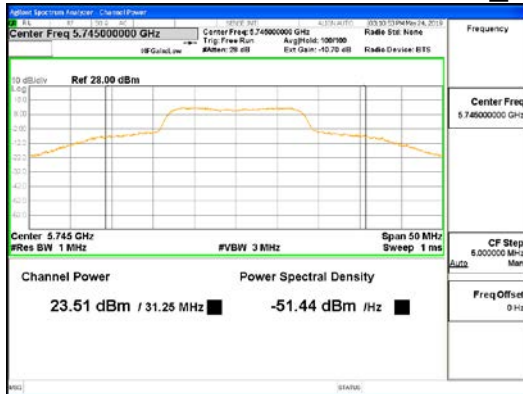


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CDD Mode_ANT2_802.11a_UNII-1

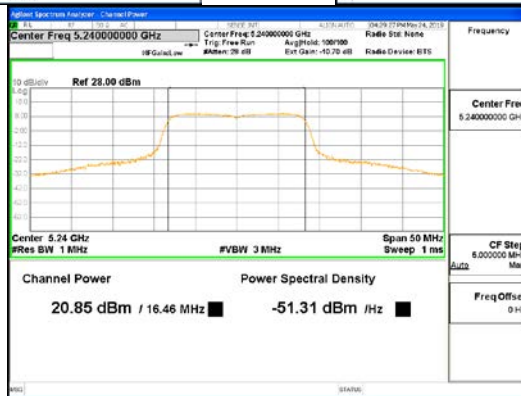
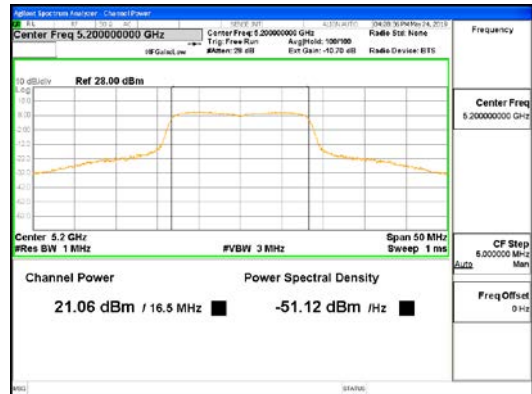
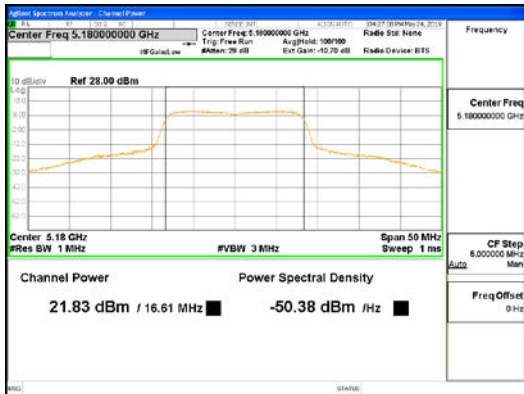


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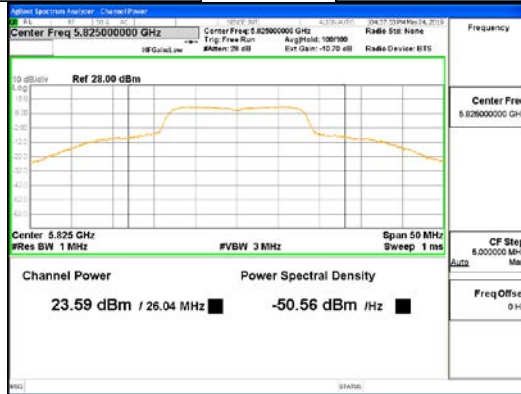
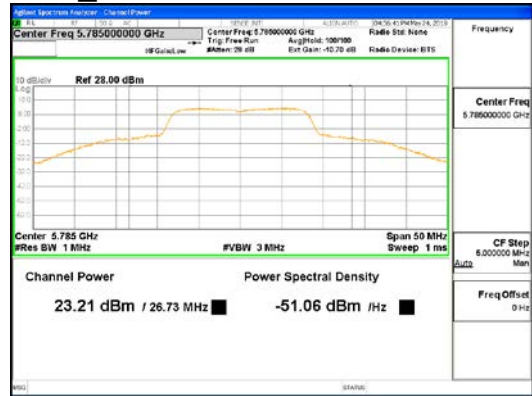


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CDD Mode_ANT3_802.11a_UNII-1

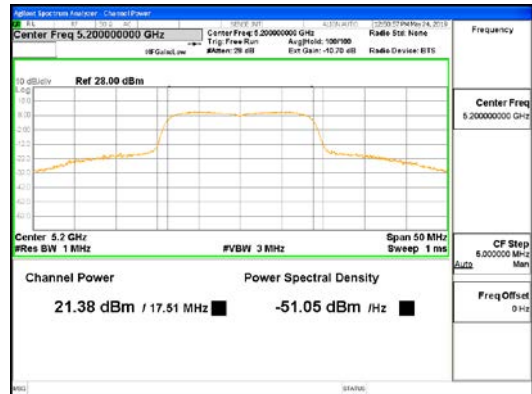
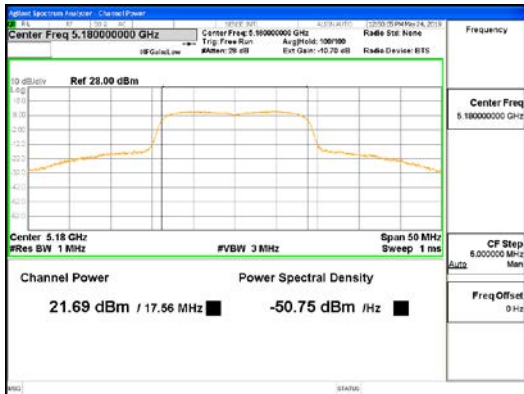


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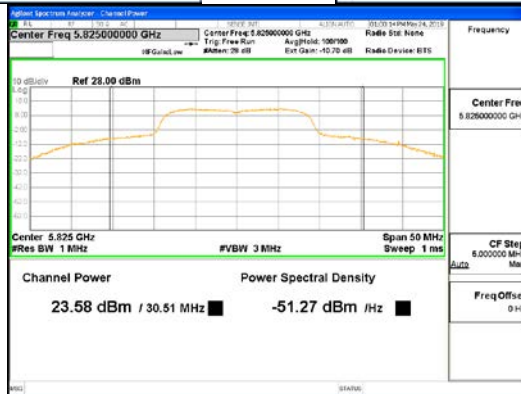
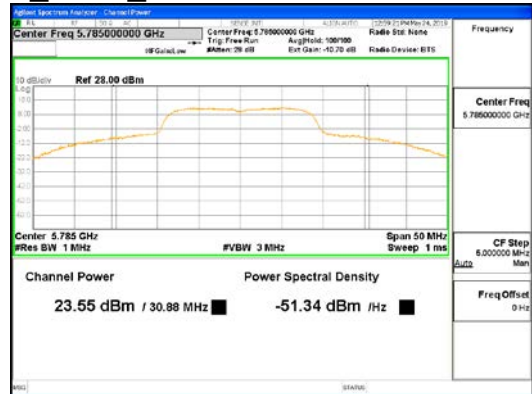
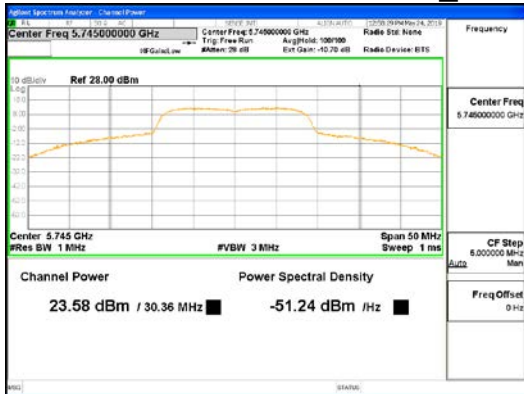


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CDD Mode_ANT1_802.11n_HT20_UNII-1



CDD Mode_ANT1_802.11n_HT20_UNII-3

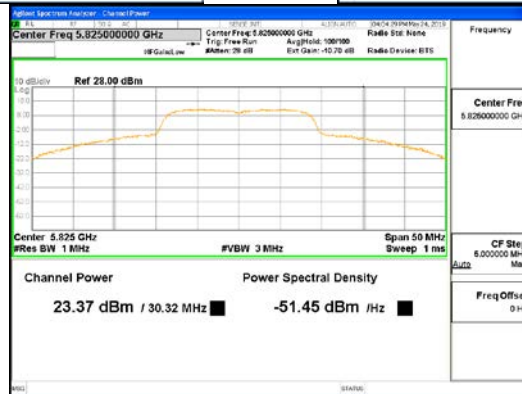
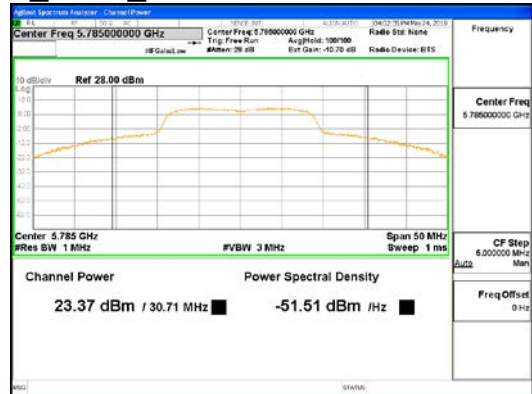
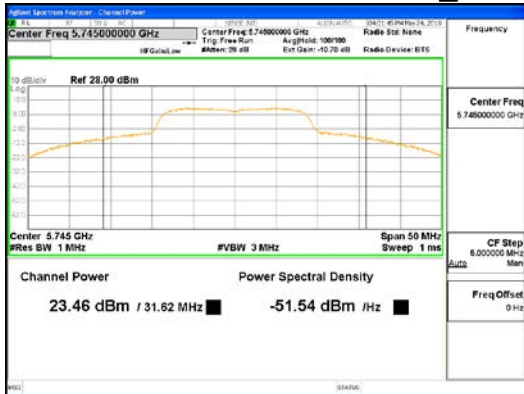


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CDD Mode_ANT2_802.11n_HT20_UNI I-1

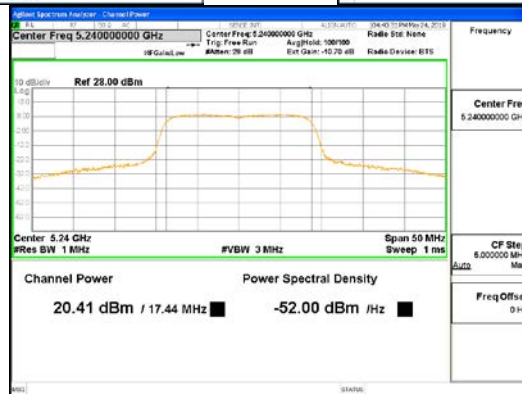
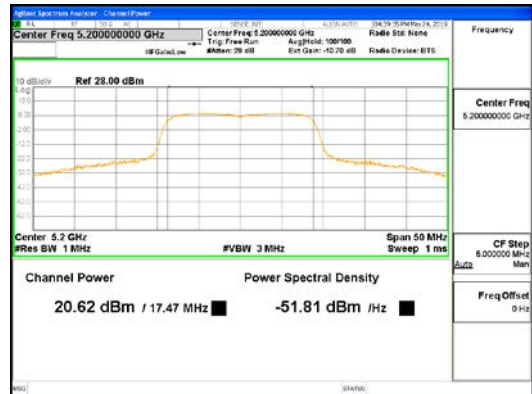
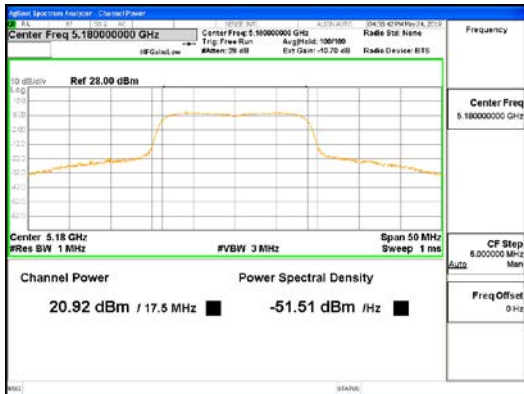


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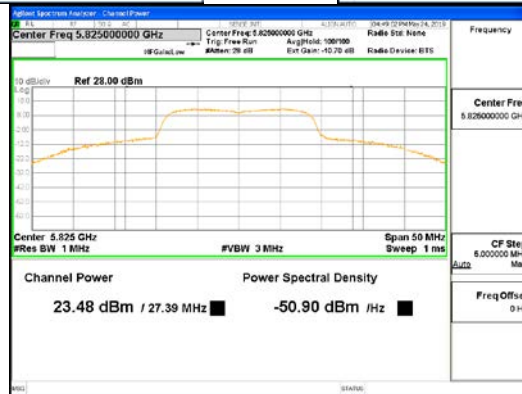


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CDD Mode_ANT3_802.11n_HT20_UNII-1

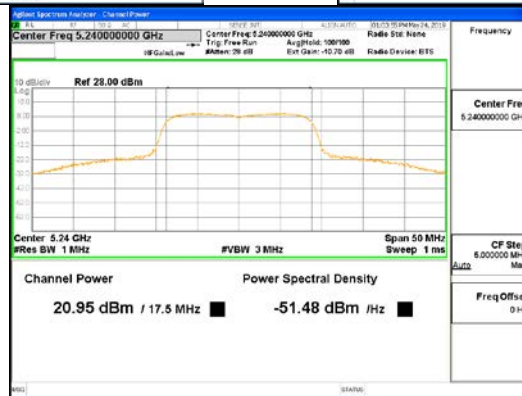
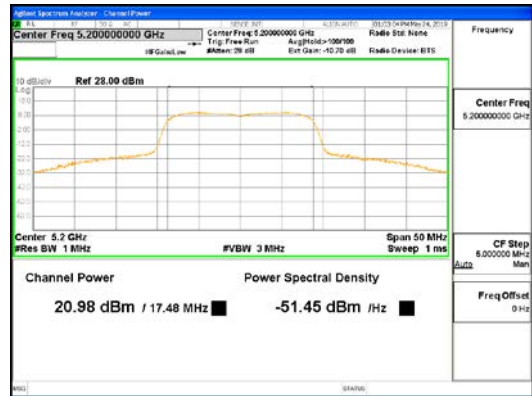
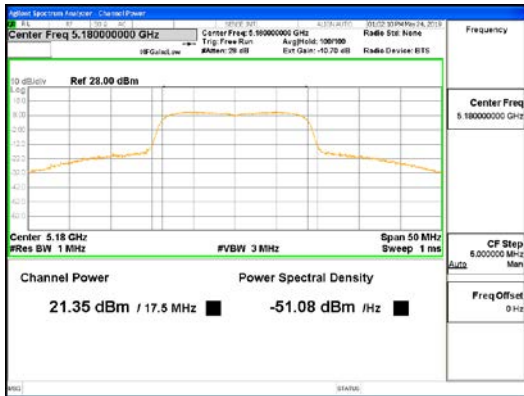


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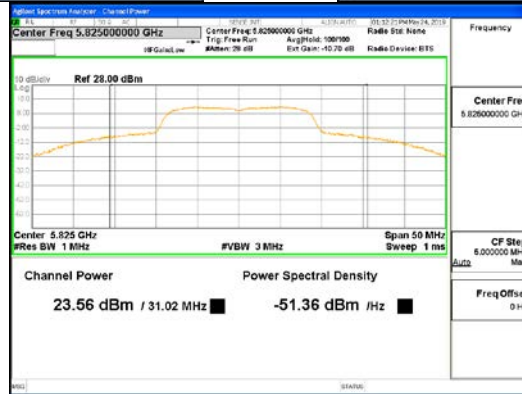
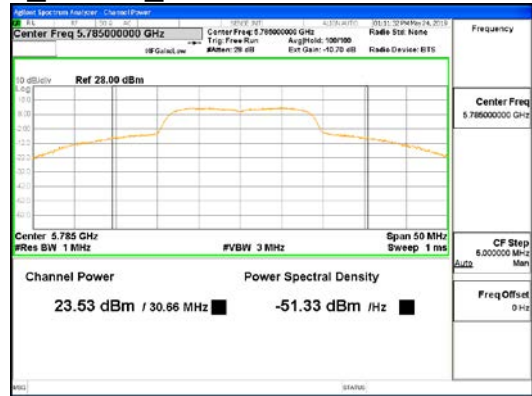


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CDD Mode_ANT1_802.11ac_VHT20_UNII-1

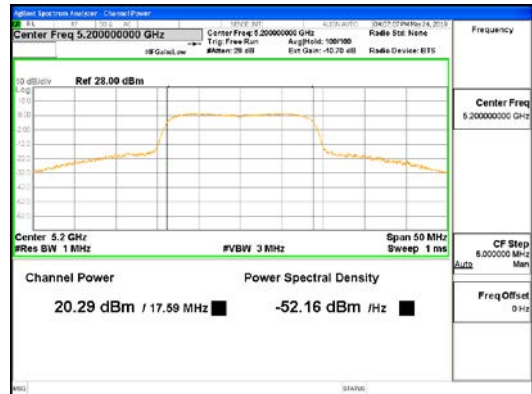
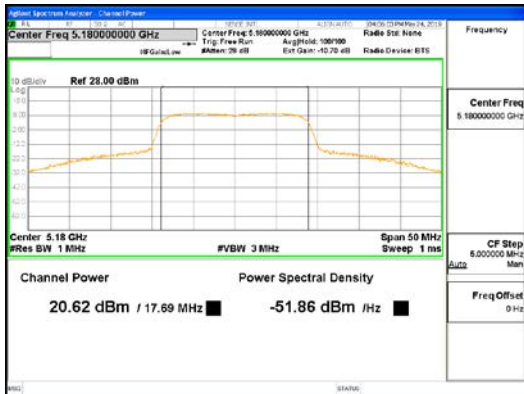


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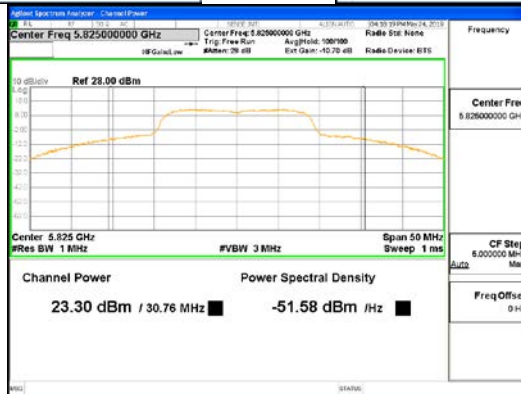
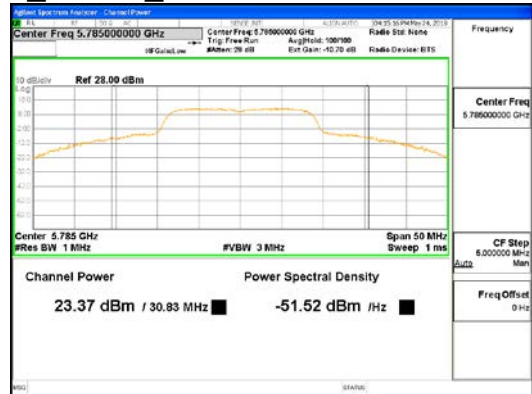


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CDD Mode_ANT2_802.11ac_VHT20_UNII-1

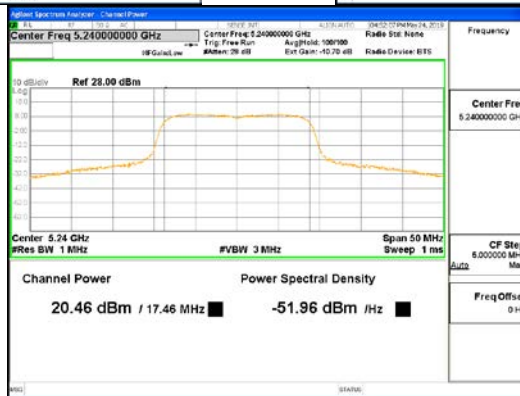
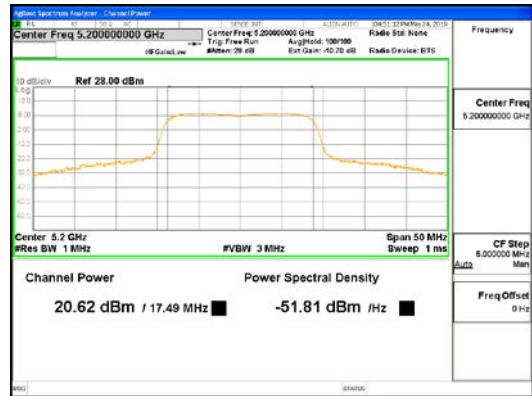
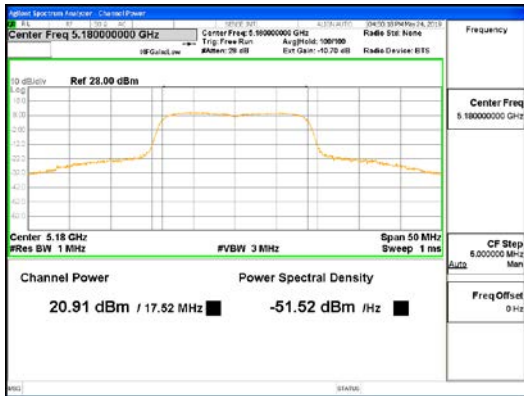


CDD Mode_ANT2_802.11ac_VHT20_UNII-3

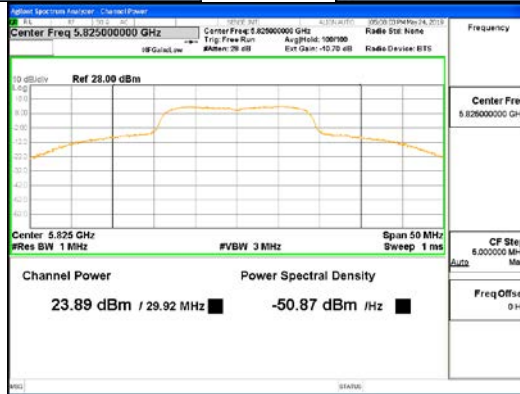
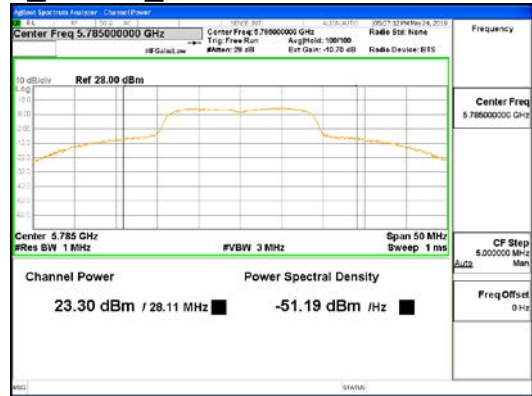


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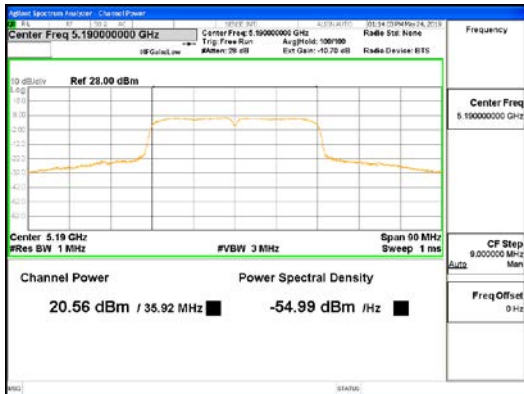


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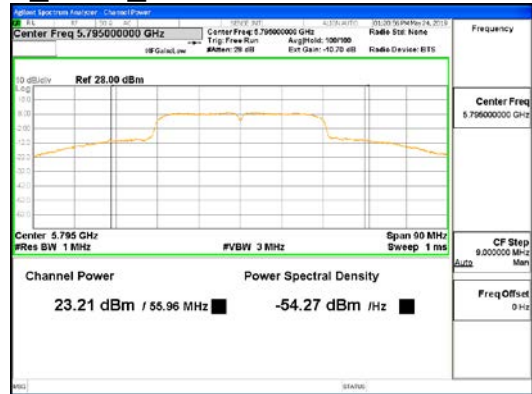
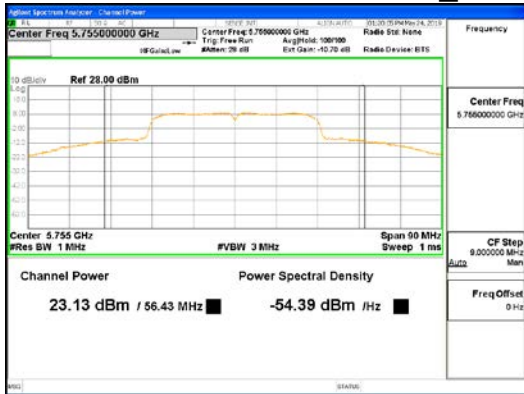
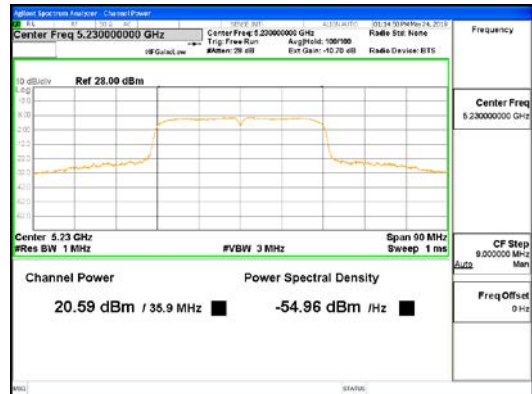


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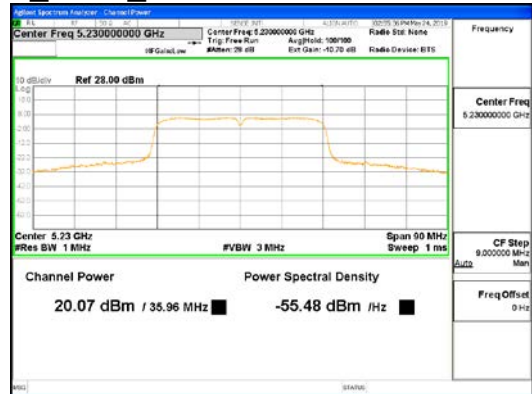
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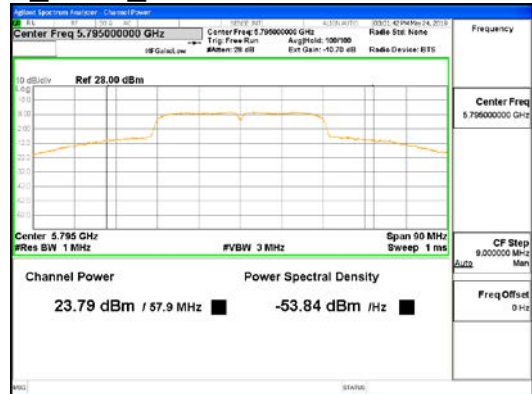
CDD Mode_ANT1_802.11n_HT40_UNII-1



CDD Mode_ANT1_802.11n_HT40_UNII-3



CDD Mode_ANT2_802.11n_HT40_UNII-1

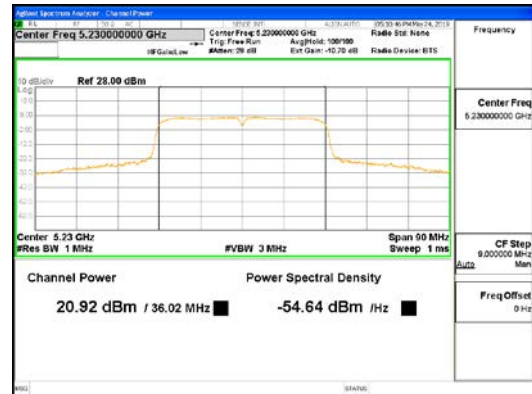
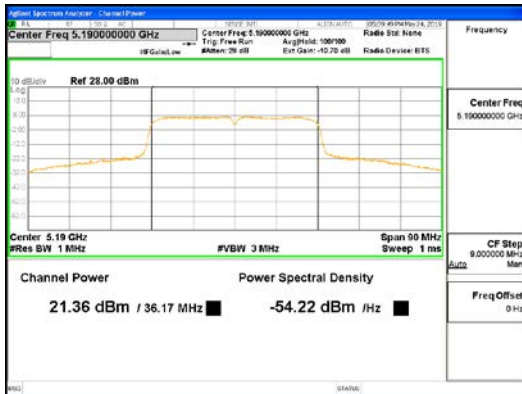


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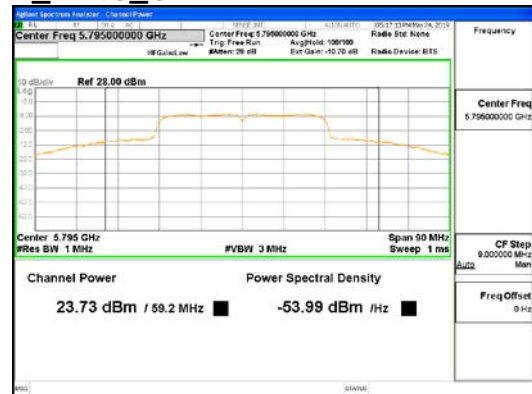
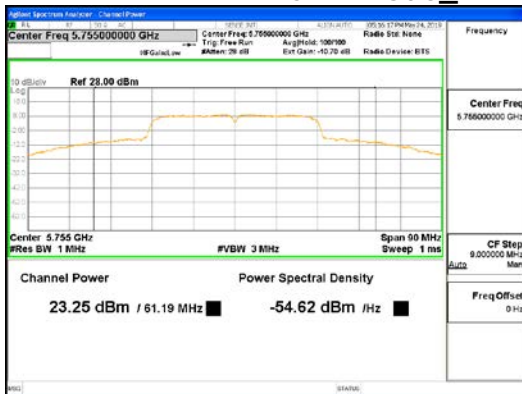


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CDD Mode_ANT3_802.11n_HT40_UNII-3

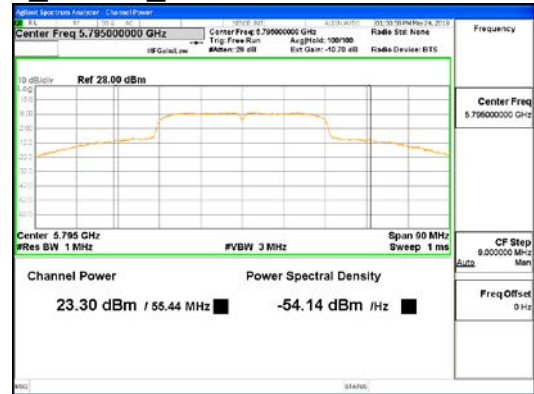
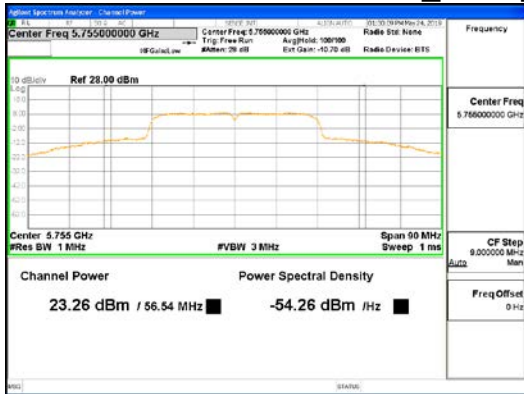
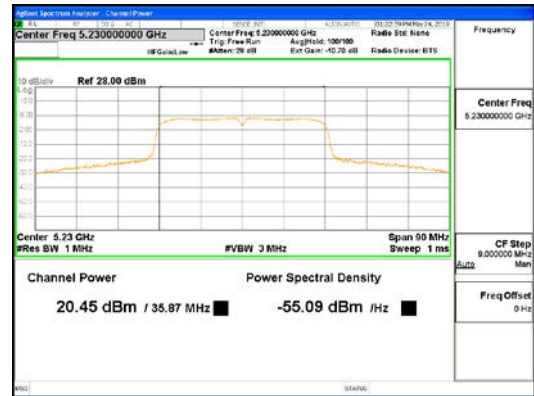


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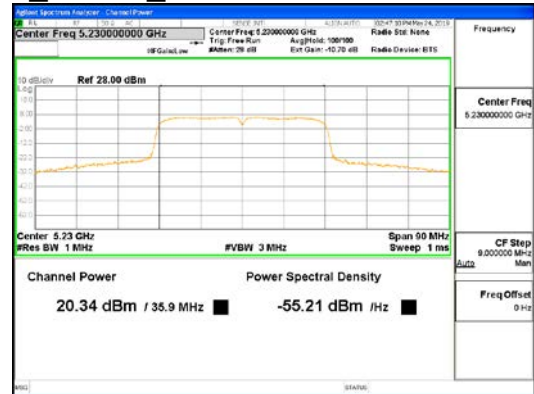
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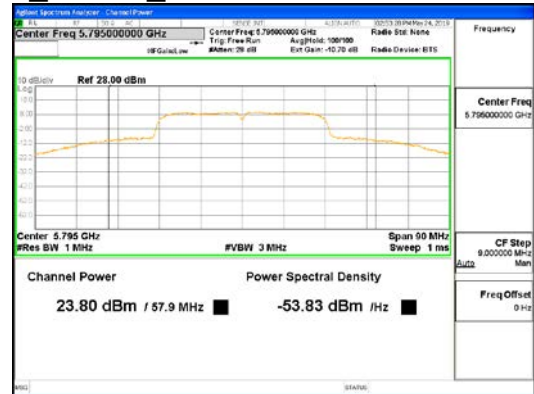
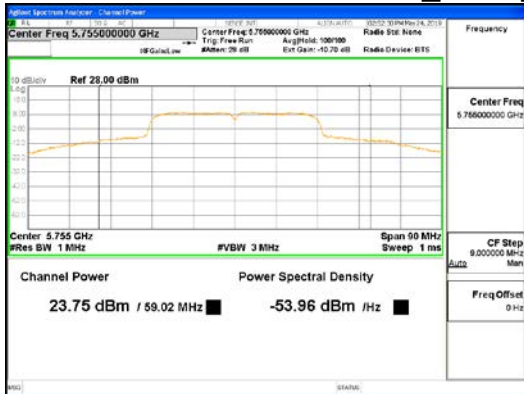
CDD Mode_ANT1_802.11ac_VHT40_UNII-1



CDD Mode_ANT1_802.11ac_VHT40_UNII-3



CDD Mode_ANT2_802.11ac_VHT40_UNII-1

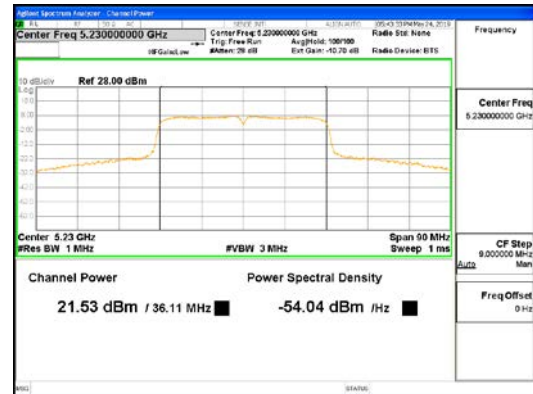
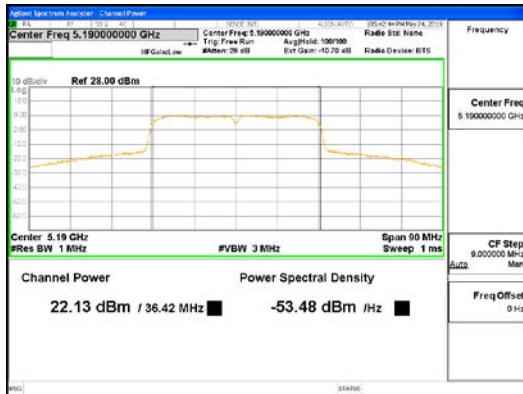


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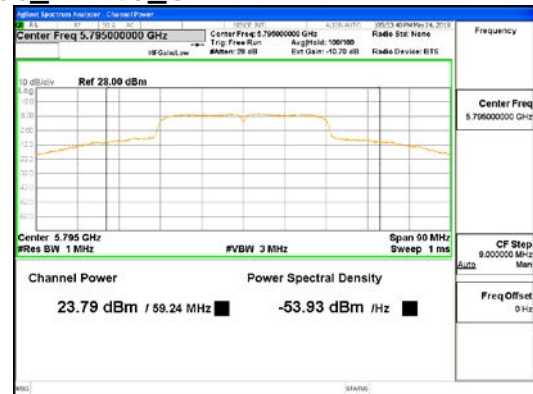
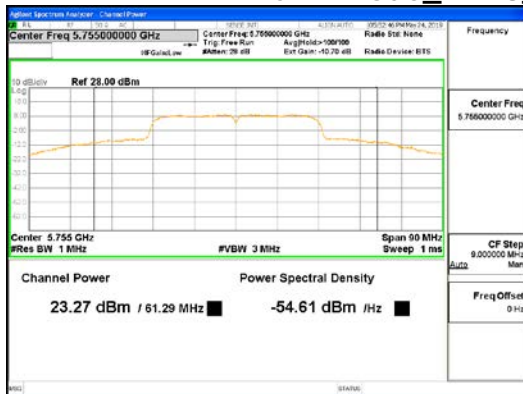


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