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 : 2018-03-07

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: Entertainment Hub / HDRX4

5. Date of Test : 2018-07-24 to 2018-08-13

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

7. Testing Environment: Temp.: (25 ± 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)

2018-08-13

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

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REPORT REVISION HISTORY

Date	Revision	Page No
2018-08-13	Issued (CTK-2018-02469)	all

CONTENTS

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 : Lee Kee-Chul E-mail : kclee@kaonmedia.com Tel : +82-31-724-8676 Fax : -

1.2 Product Information

FCC ID	WQT-HDRX4
Product Description	Entertainment Hub
Model name	HDRX4
Variant Model name	-
Operating Frequency	UNII 1 : 5 180 MHz – 5 240 MHz (20 MHz_BW) 5 190 MHz – 5 230 MHz (40 MHz_BW) 5 210 MHz (80 MHz_BW) UNII 2A : 5 260 MHz – 5 320 MHz (20 MHz_BW) 5 270 MHz – 5 310 MHz (40 MHz_BW) 5 290 MHz (80 MHz_BW) UNII 2C : 5 500 MHz – 5 720 MHz (20 MHz_BW) 5 510 MHz – 5 710 MHz (40 MHz_BW) 5 530 MHz – 5 690 MHz (80 MHz_BW) UNII 3 : 5 745 MHz – 5 825 MHz (20 MHz_BW) 5 755 MHz – 5 795 MHz (40 MHz_BW) 5 775 MHz (80 MHz)
RF Output Power	802.11a : 15.52 dBm (35.61 mW) 802.11n_HT20 : 15.40 dBm (34.67 mW) 802.11n_HT40 : 16.61 dBm (45.82 mW) 802.11ac_VHT20 : 14.85 dBm (30.58 mW) 802.11ac_VHT40 :16.33 dBm (42.98 mW) 802.11ac_VHT80 : 16.79 dBm (47.72 mW)
Antenna Specification	Antenna type : PCB Antenna Peak Gain : 2.0 dBi
Type of Modulation	OFDM
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 270 Mbps 802.11ac : up to 867 Gbps
Power Source	DC 12 V (Adaptor)
Hardware Rev	1.0
Software Rev	1.1.0

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-CA40	-

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	Scope of Accreditation	Registration Number	Logo
USA	**FCC**	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
CANADA	**ISED**	ISED EMI (3/10m test site)	8737A-2	
JAPAN	**VCCI**	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	**MSIP**	EMI (Electromagnetic Interference / Emission) EMS (Electromagnetic Susceptibility / Immunity)	KR0025	

2.3 Calibration Details of Equipment Used for Measurement

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

3. Test Specifications

3.1 Standards

FCC Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
15.407(e)	6 dB Bandwidth	> 500 kHz	C	Conducted
15.407(a)	26 dB Bandwidth and 99% Bandwidth	NA	C	
15.407(a)(1)	Conducted Output Power	< 250 mW (5 150 – 5 250 MHz) < 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < 1 W (5 725 – 5 850 MHz)	C	
15.407(a)(1)	Power Spectral Density	< 11 dBm/MHz (5 150 – 5 250 MHz) < 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < 30 dBm/500 KHz (5 725 – 5 850 MHz)	C	
15.407(g)	Frequency Stability	NA	C	
15.407 (b)	Undesirable emission	< -27 dBm/MHz EIRP (5 150 – 5 250 MHz, 5250 – 5350 MHz, 5470 – 5725 MHz) < -17 dBm/MHz EIRP (5715 – 5725 MHz, 5 850 – 5 860 MHz) < -27 dBm/MHz EIRP outside (5 715 – 5 850 MHz)	C	Radiated
15.205, 15.407 (b)(5),(6)	Radiated Spurious Emission	15.209(a)	C	
15.207	AC Conducted Emissions	15.207(a)	C	Line Conducted

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 3: The sample was tested according to the following specification: FCC Part 15.247, 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 2A	5 260 MHz	5 300 MHz	5 320 MHz
UNII 2C	5 500 MHz	5 600 MHz	5 720 MHz
UNII 3	5 745 MHz	5 785 MHz	5 825 MHz

- 802.11n_HT40, 802.11ac_VHT40

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

- 802.11ac_VHT80

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

Test mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	DSSS	1 Mbps	87.49%	0.58 dB
802.11n_HT20	OFDM	MCS 0	86.74%	0.62 dB
802.11n_HT40	OFDM	MCS 0	76.87%	1.14 dB
802.11ac_VHT20	OFDM	MNSS 0	87.12%	0.60 dB
802.11ac_VHT40	OFDM	MNSS 0	77.10%	1.13 dB
802.11ac_VHT80	OFDM	MNSS 0	62.53%	2.04 dB

3.3 Device Modifications

The following modifications were necessary for compliance:

Not applicable

3.4 Maximum Measurement Uncertainty

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

Description	Uncertainty
Conducted RF Output Power	± 1.5 dB
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. 5.1.0
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

ANSI C63.10-2013 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:

ANT0

	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	16.33	17.57	17.52
5 785 MHz	16.30	17.54	17.58
5 825 MHz	16.29	17.00	17.08
Measurement uncertainty	± 0.1 MHz		

	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	35.34	35.36
5 795 MHz	35.08	34.54
Measurement uncertainty	± 0.1 MHz	

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

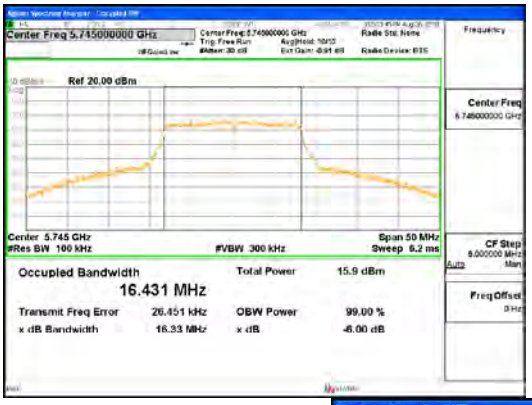
ANT1

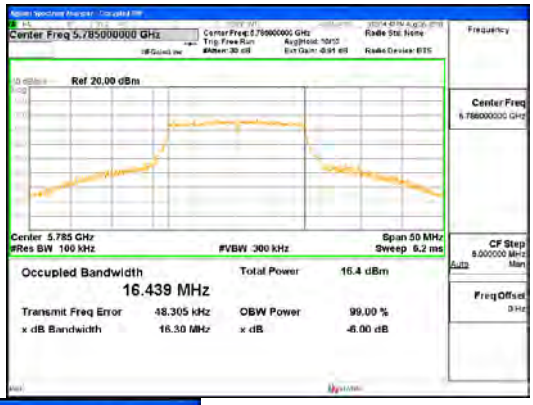
	6 dB Bandwidth (MHz)		
Mode / Frequency	802.11a	802.11n_HT20	802.11ac_VHT20
5 745 MHz	16.41	17.53	16.58
5 785 MHz	16.33	17.60	17.57
5 825 MHz	15.93	16.69	17.29
Measurement uncertainty	± 0.1 MHz		

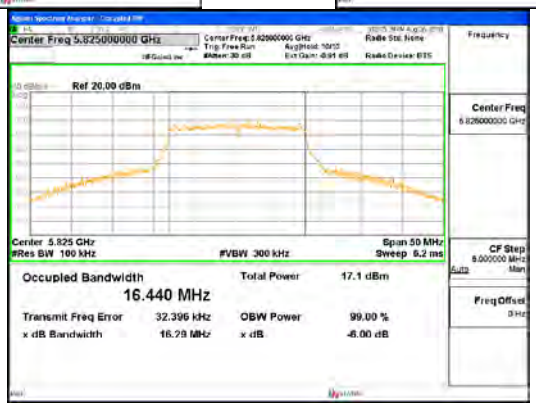
	6 dB Bandwidth (MHz)	
Mode / Frequency	802.11n_HT40	802.11ac_VHT40
5 755 MHz	35.17	35.22
5 795 MHz	35.34	34.60
Measurement uncertainty	± 0.1 MHz	

	6 dB Bandwidth (MHz)
Mode / Frequency	802.11ac_VHT80
5 775 MHz	75.15
Measurement uncertainty	± 0.1 MHz

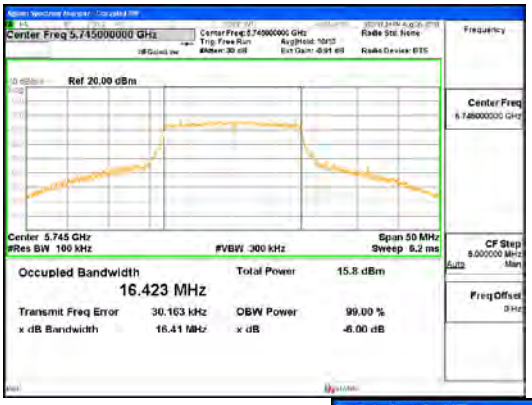
See next pages for actual measured spectrum plots.

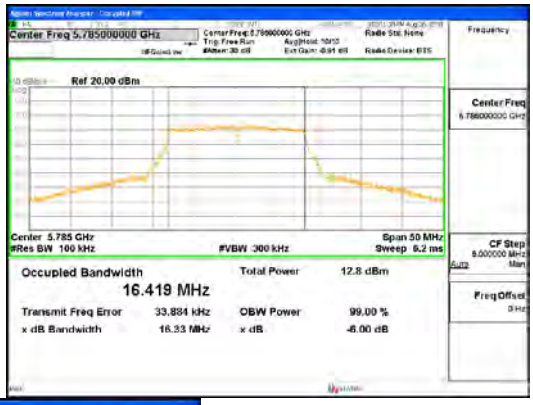


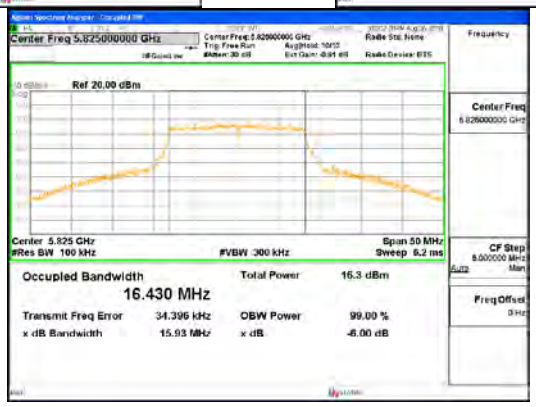




ANT0_802.11a







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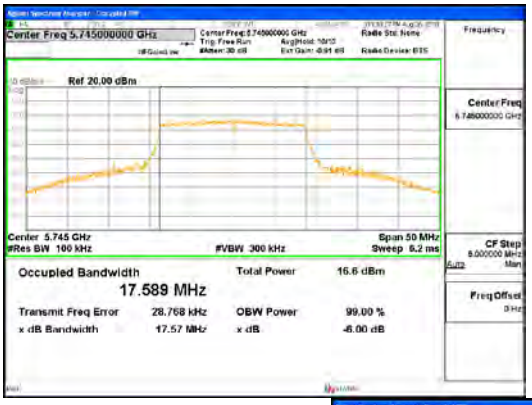
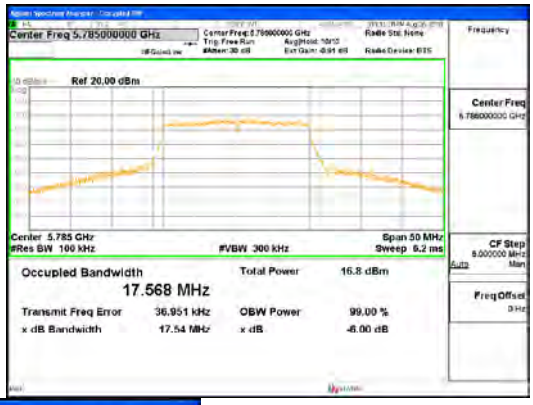
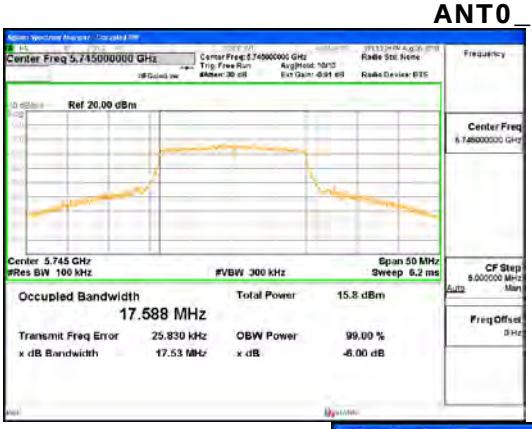
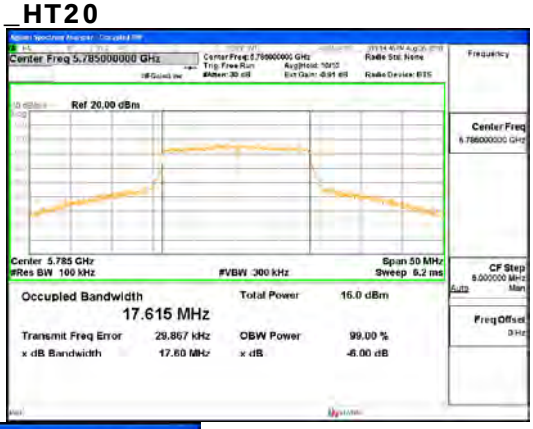
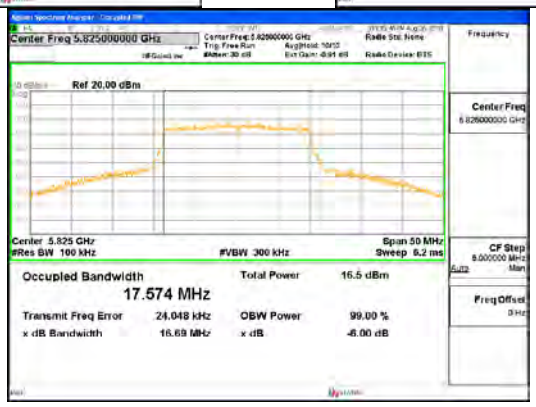




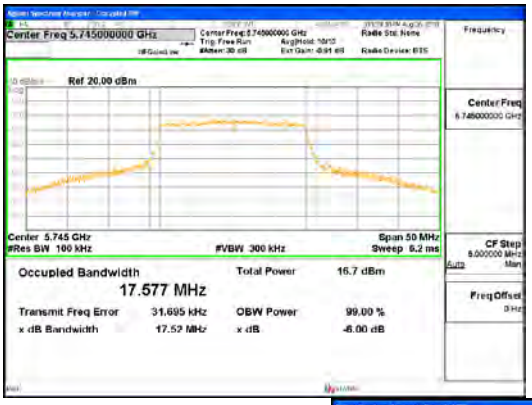
ANT0_802.11n_HT20

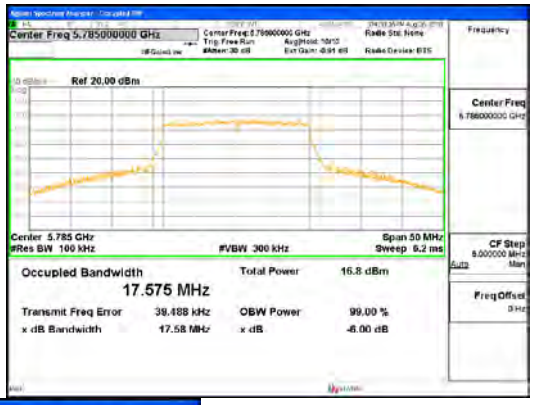


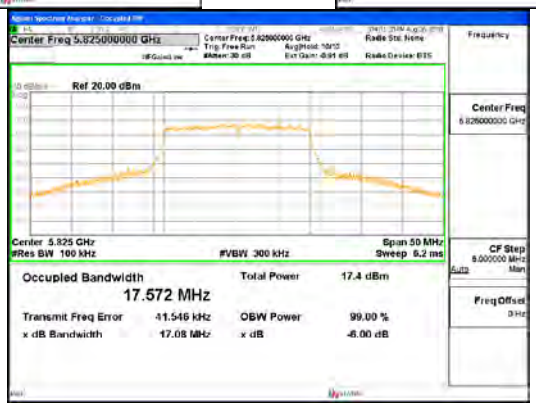




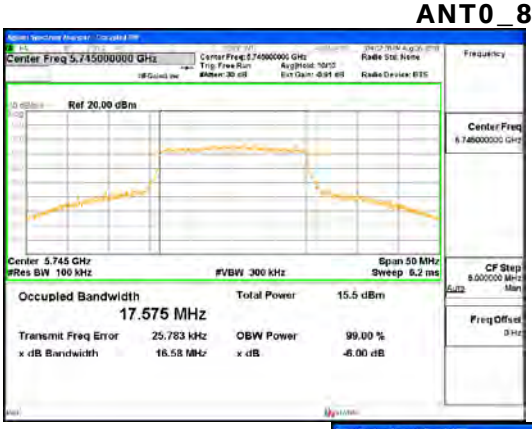
ANT1_802.11n_HT20

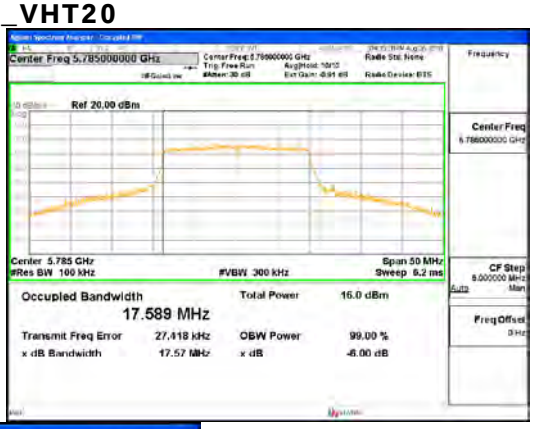


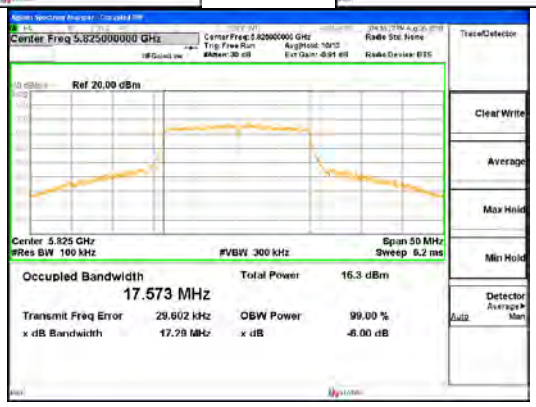




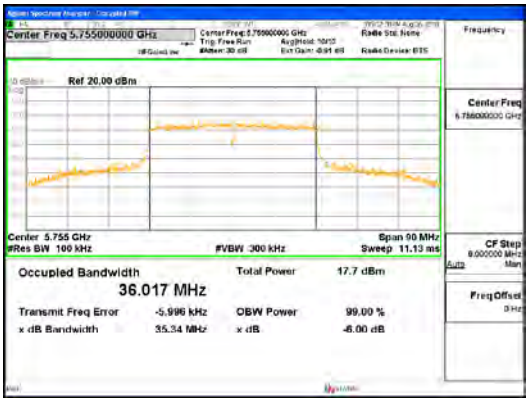
ANT0_802.11ac_VHT20

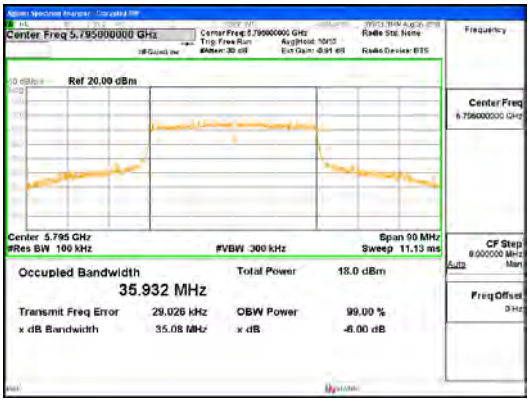




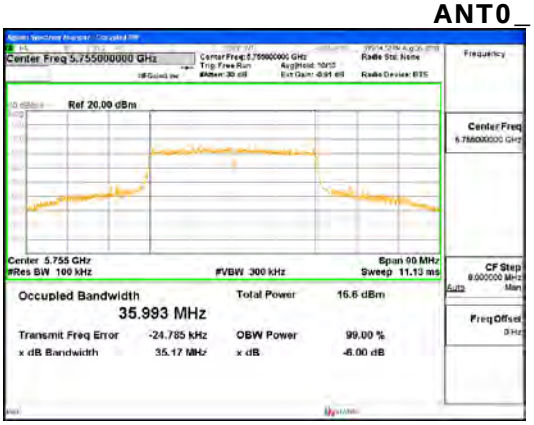


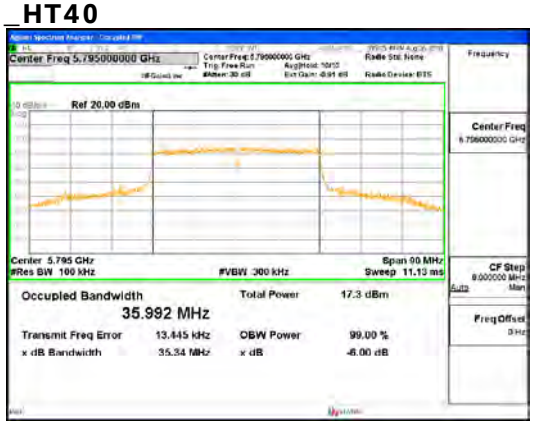
ANT1_802.11ac_VHT20



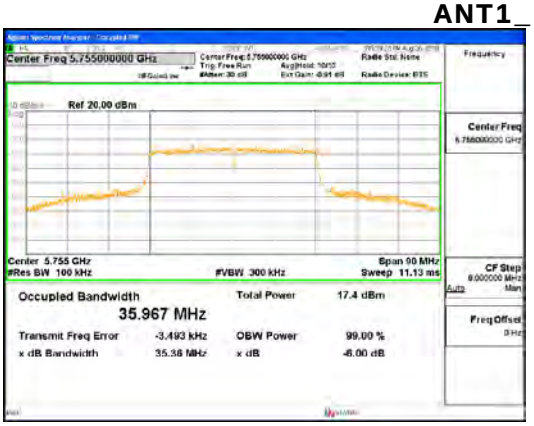


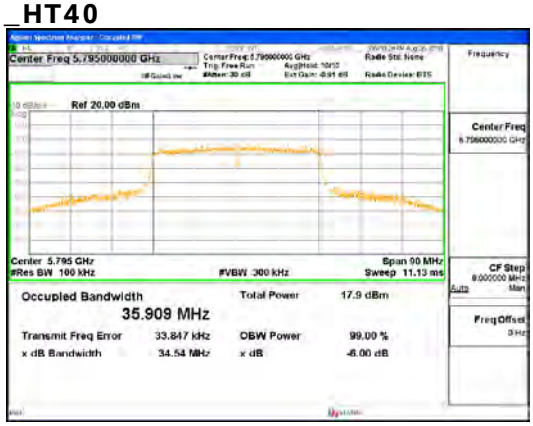
ANT0_802.11n_HT40





ANT1_802.11n_HT40





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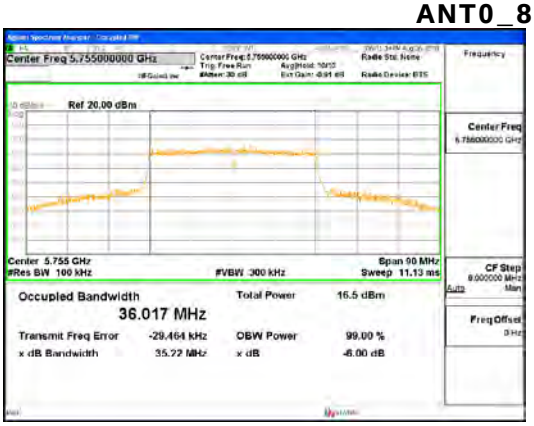

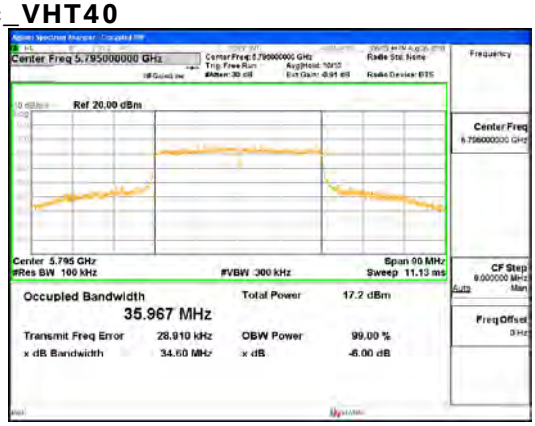

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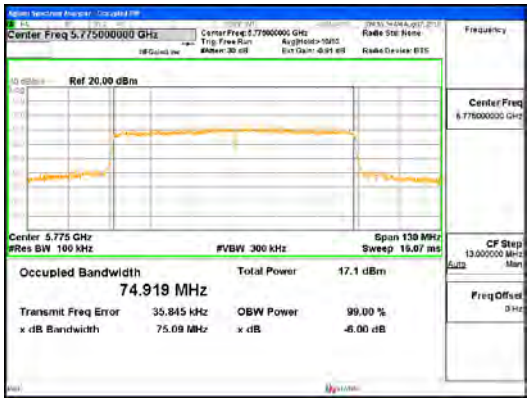
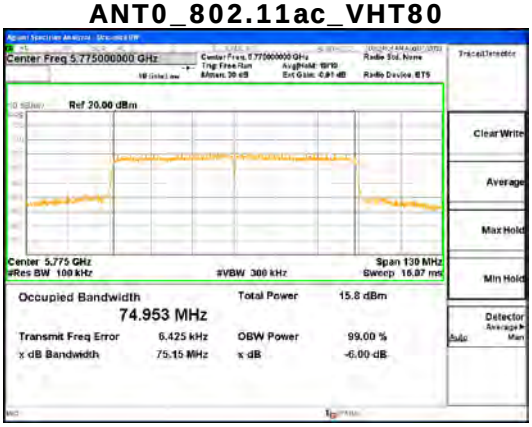


ANT0_802.11ac_VHT80



ANT1_802.11ac_VHT80

4.2 26 dB Bandwidth and 99% Bandwidth

Test Procedures

ANSI C63.10-2013 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

ANSI C63.10-2013 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:

ANT0

	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	21.68	17.56	21.24	18.28	22.06	18.33
5 200 MHz	22.21	17.49	21.16	18.35	22.65	18.31
5 240 MHz	22.92	17.68	22.42	18.30	23.67	18.33
5 260 MHz	21.79	17.58	21.26	18.34	21.87	18.28
5 300 MHz	23.02	17.56	23.16	18.38	22.85	18.33
5 320 MHz	22.55	17.44	23.87	18.43	21.56	18.29
5 500 MHz	23.21	17.68	21.39	18.32	21.90	18.27
5 600 MHz	20.91	17.49	21.15	18.30	21.00	18.33
5 720 MHz	20.79	17.47	21.23	18.32	21.21	18.27
5 745 MHz	20.54	17.05	22.74	17.93	20.75	17.99
5 785 MHz	21.23	17.09	20.73	17.93	22.20	17.96
5 825 MHz	20.53	17.06	20.76	17.94	20.88	17.91
Measurement uncertainty	± 0.1 MHz					

	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	40.91	36.38	41.27	36.34
5 230 MHz	41.33	36.43	41.43	36.45
5 270 MHz	41.30	36.40	41.25	36.37
5 310 MHz	44.39	36.40	43.15	36.45
5 510 MHz	42.17	36.47	41.55	36.44
5 590 MHz	41.09	36.37	41.30	36.35
5 710 MHz	41.40	36.42	41.70	36.36
5 755 MHz	40.75	36.20	40.52	36.23
5 795 MHz	40.41	36.10	40.48	36.12
Measurement uncertainty	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.88	74.99
5 290 MHz	80.05	75.03
5 530 MHz	81.22	75.07
5 690 MHz	80.54	74.93
5 775 MHz	79.61	74.97
Measurement uncertainty	± 0.1 MHz	

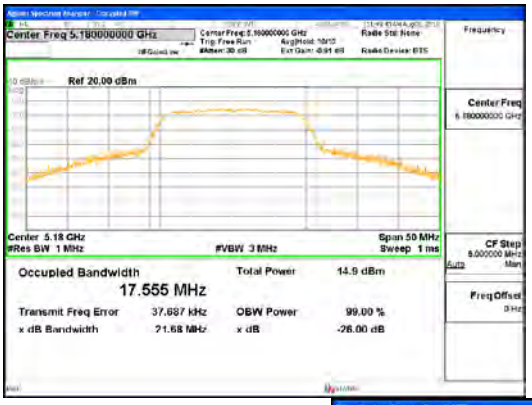
ANT1

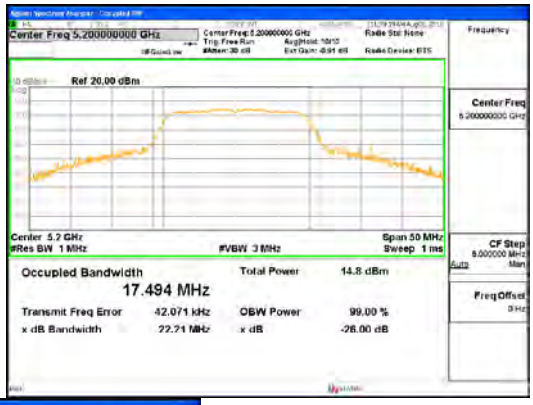
	26 dB Bandwidth and 99% Bandwidth (MHz)					
Mode	802.11a		802.11n_HT20		802.11ac_VHT20	
Frequency	26 dB	99%	26 dB	99%	26 dB	99%
5 180 MHz	20.88	17.52	21.33	18.25	21.36	18.30
5 200 MHz	20.77	17.44	21.30	18.30	21.38	18.29
5 240 MHz	20.86	17.51	21.25	18.28	21.32	18.32
5 260 MHz	20.77	17.48	21.33	18.27	21.25	18.27
5 300 MHz	20.85	17.50	21.22	18.32	21.20	18.35
5 320 MHz	20.60	17.51	21.18	18.30	21.21	18.30
5 500 MHz	21.07	17.54	21.24	18.34	21.12	18.28
5 600 MHz	20.76	17.49	21.20	18.30	21.14	18.31
5 720 MHz	21.35	17.56	21.25	18.32	21.09	18.24
5 745 MHz	20.36	17.12	20.48	17.93	21.20	17.93
5 785 MHz	20.20	17.03	20.77	17.94	21.53	17.93
5 825 MHz	20.22	17.07	22.32	17.95	20.65	17.89
Measurement uncertainty	± 0.1 MHz					

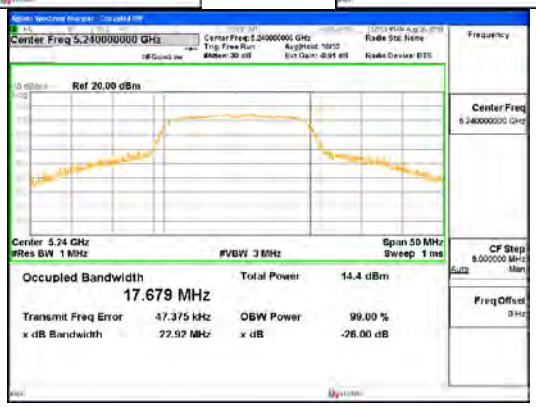
	26 dB Bandwidth and 99% Bandwidth (MHz)			
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 190 MHz	41.38	36.32	41.64	36.38
5 230 MHz	41.09	36.35	41.69	36.41
5 270 MHz	40.95	36.26	41.04	36.27
5 310 MHz	41.13	36.36	41.41	36.36
5 510 MHz	41.47	36.45	41.66	36.39
5 590 MHz	44.66	36.42	41.32	36.39
5 710 MHz	41.45	36.42	42.59	36.51
5 755 MHz	40.71	36.20	40.70	36.18
5 795 MHz	40.59	36.20	40.88	36.24
Measurement uncertainty	± 0.1 MHz			

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 210 MHz	80.55	75.02
5 290 MHz	80.24	75.03
5 530 MHz	81.93	75.02
5 690 MHz	80.22	74.93
5 775 MHz	79.96	75.07
Measurement uncertainty	± 0.1 MHz	

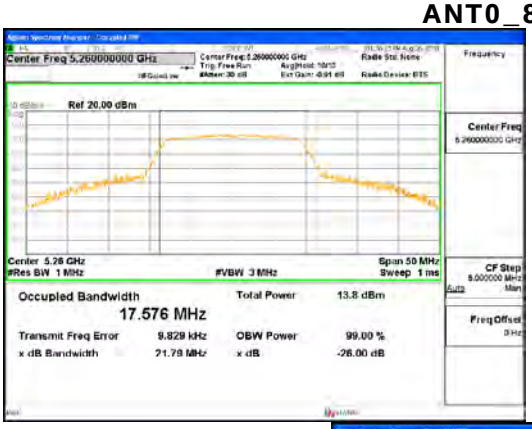
See next pages for actual measured spectrum plots.

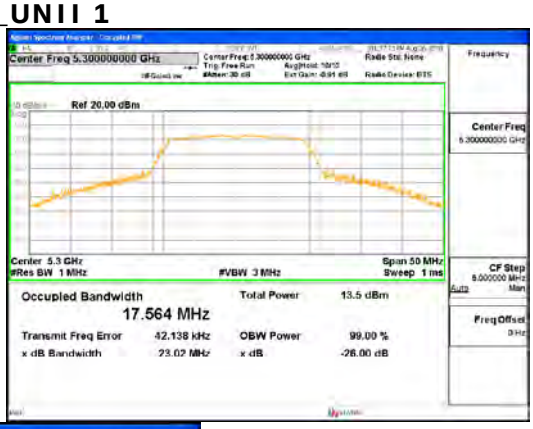


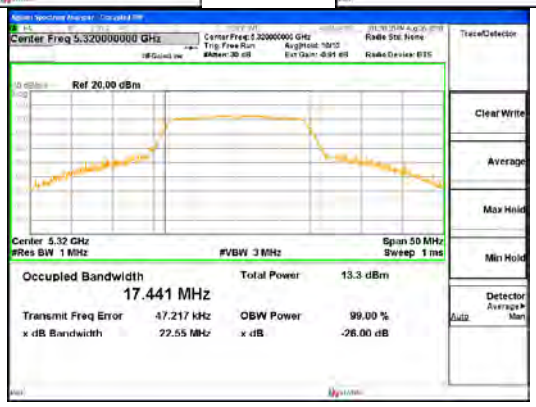




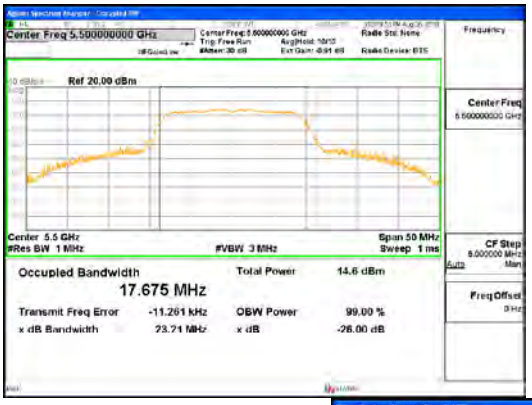
ANT0_802.11a_UNII 1

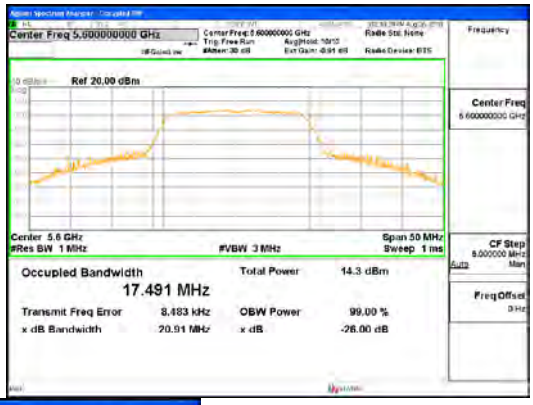




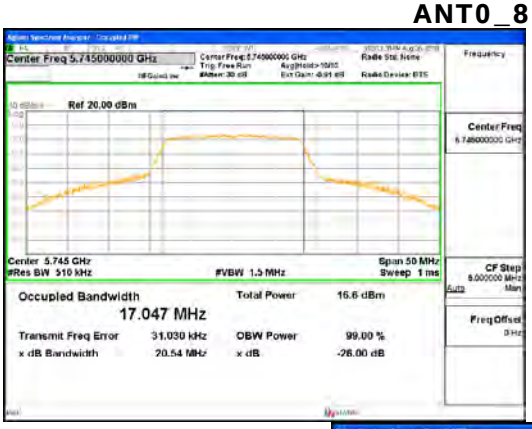


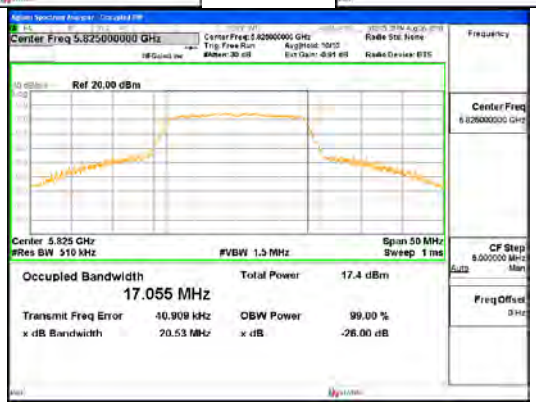
ANT0_802.11a_UNII 2A



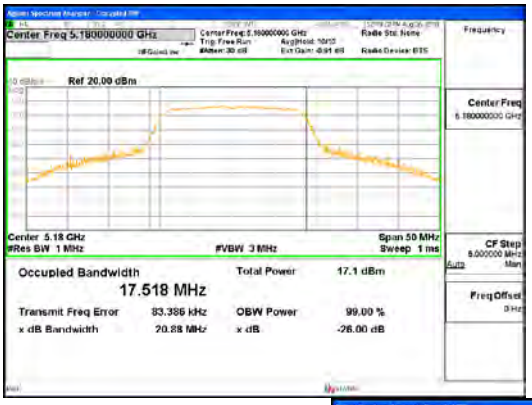


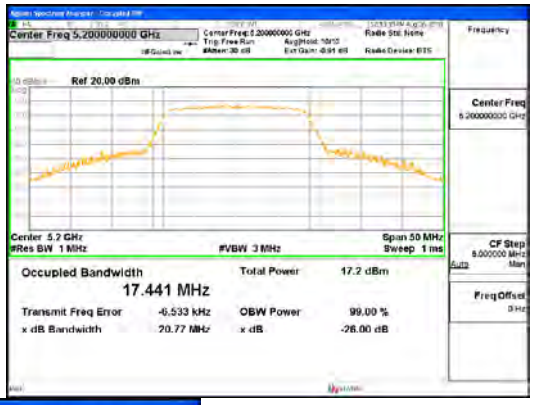
ANT0_802.11a_UNII 2C

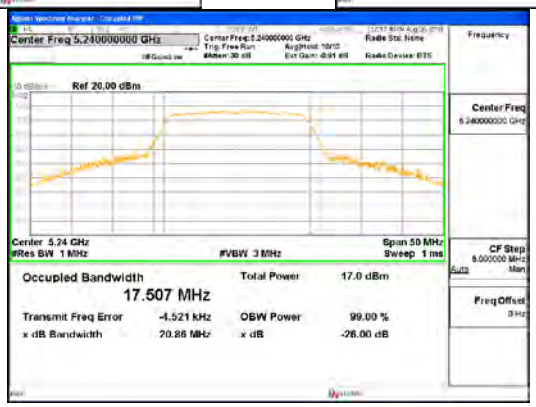




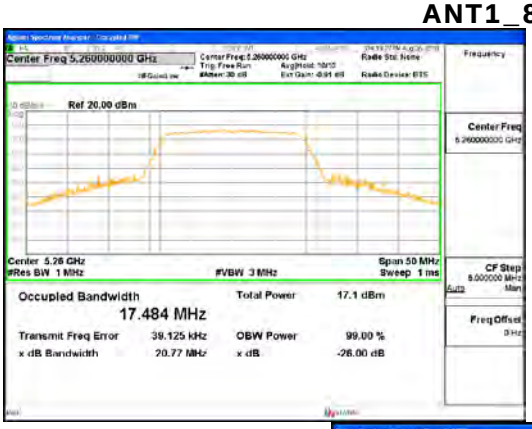
ANT0_802.11a_UNII 3

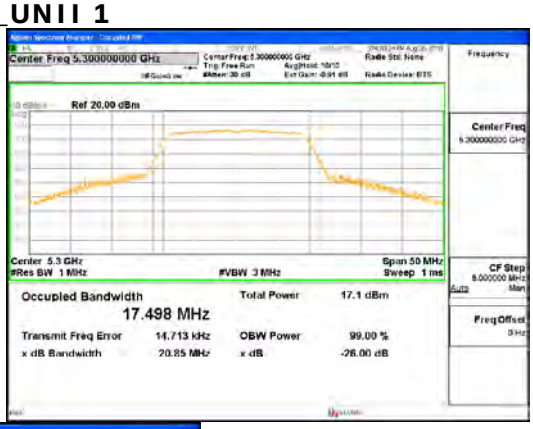


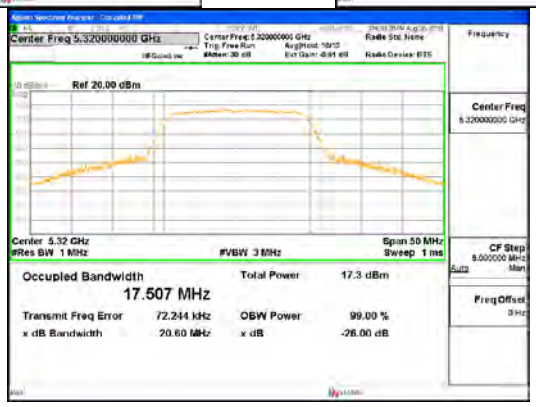




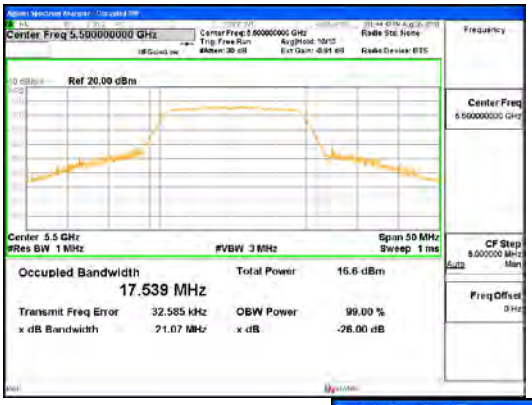
ANT1_802.11a_UNII 1

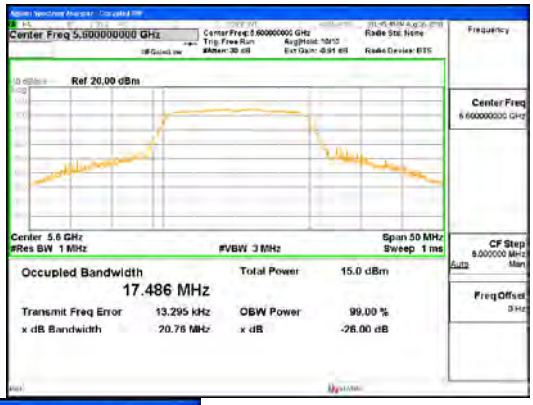




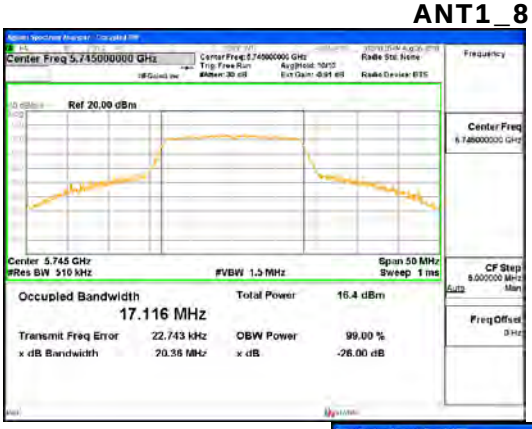


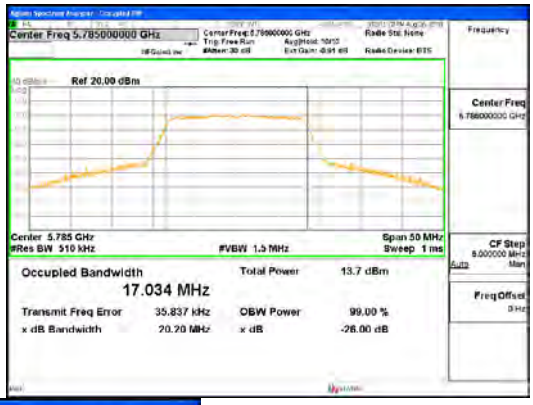
ANT1_802.11a_UNII 2A

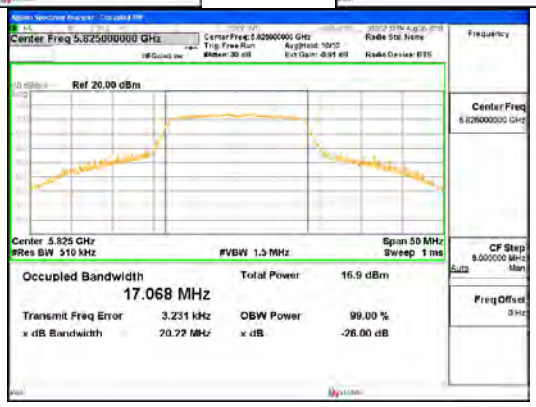




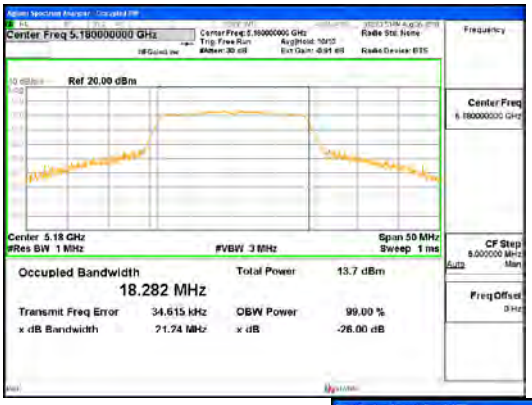
ANT1_802.11a_UNII 2C

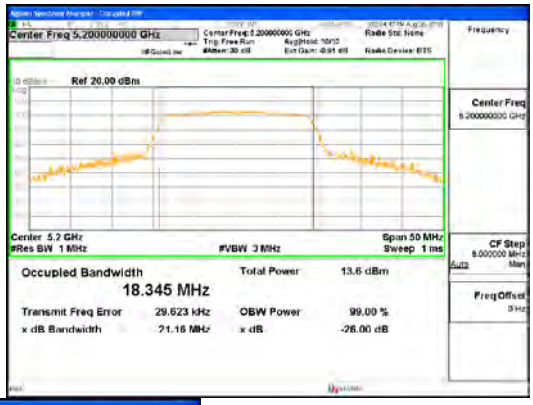




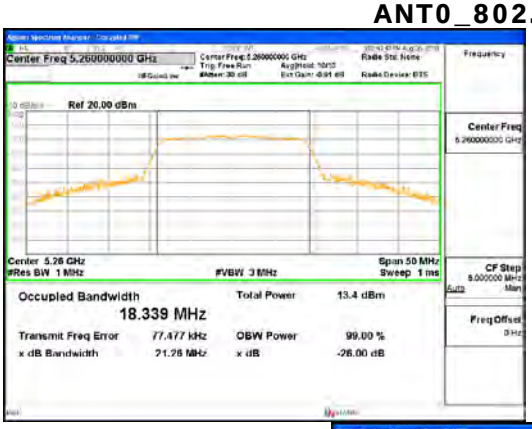


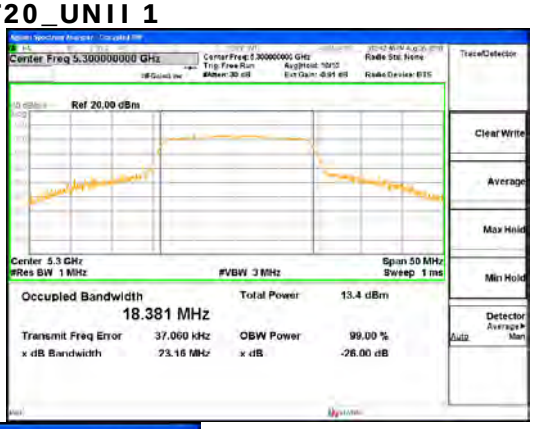
ANT1_802.11a_UNII 3

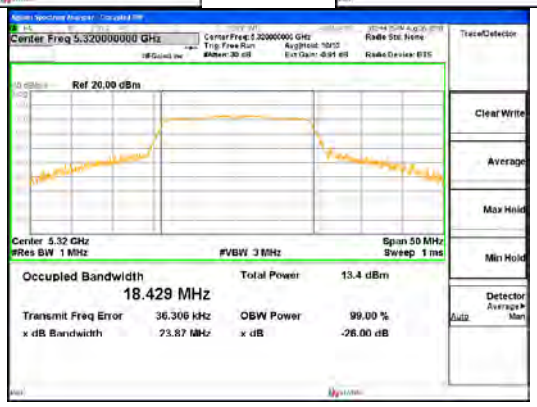




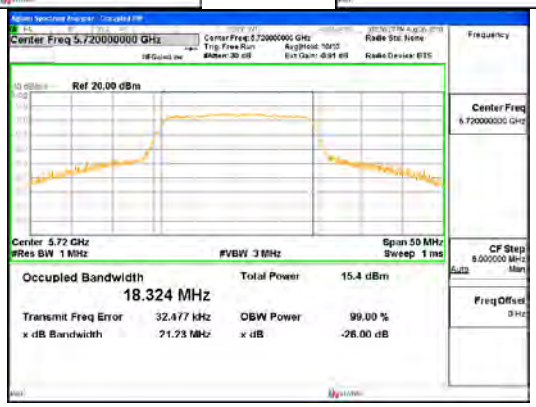
ANT0_802.11n_HT20_UNII 1



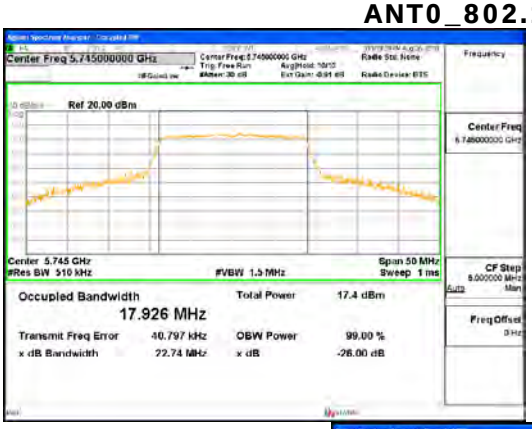


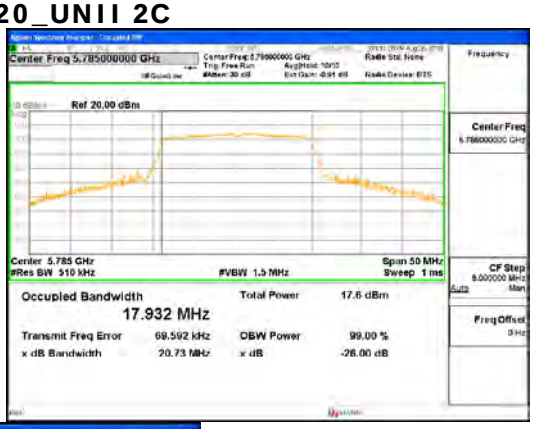


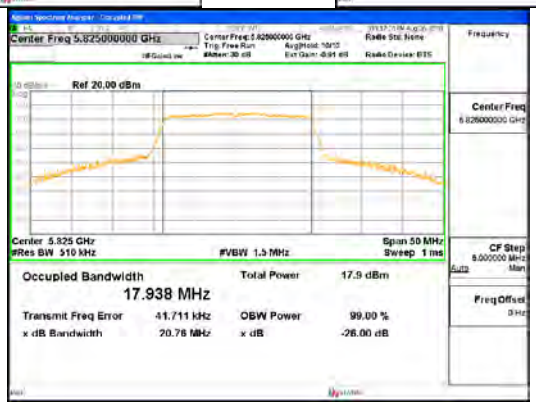
ANT0_802.11n_HT20_UNII 2A



ANT0_802.11n_HT20_UNII 2C







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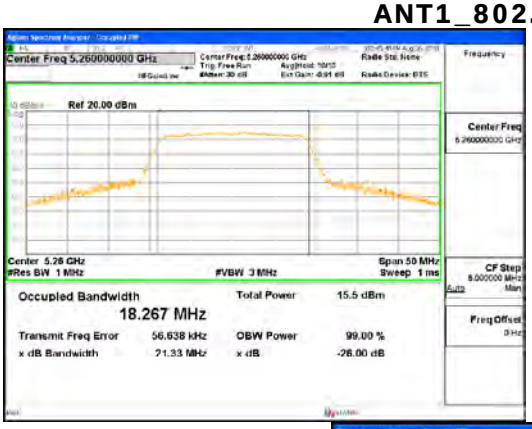
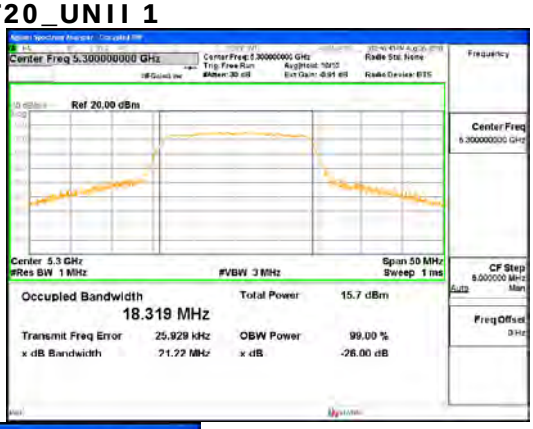
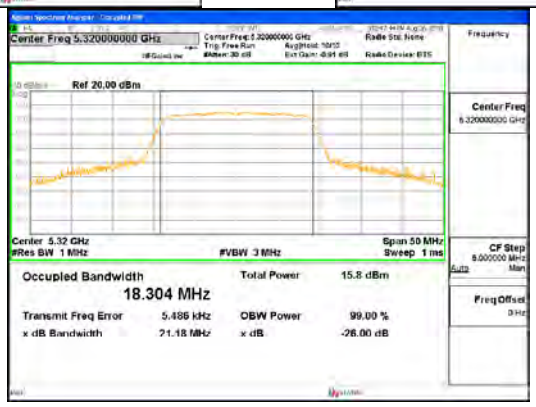
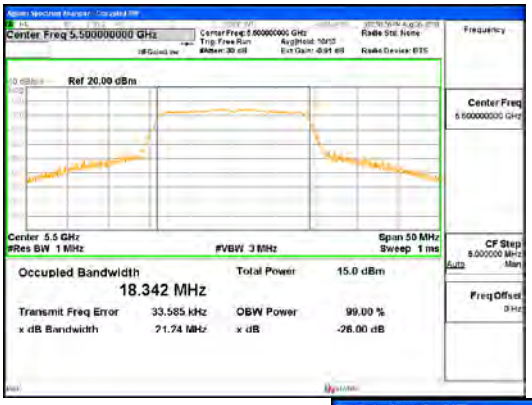
ANT1_802.11n_HT20_UNII 1

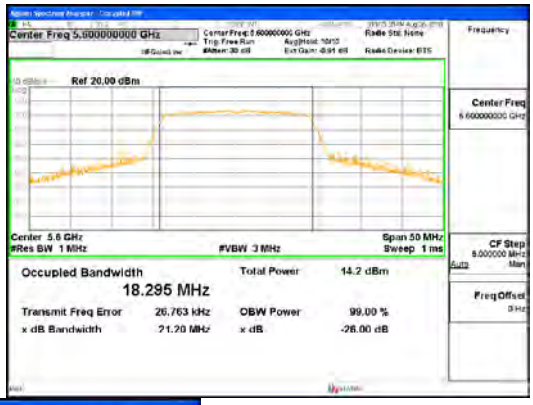


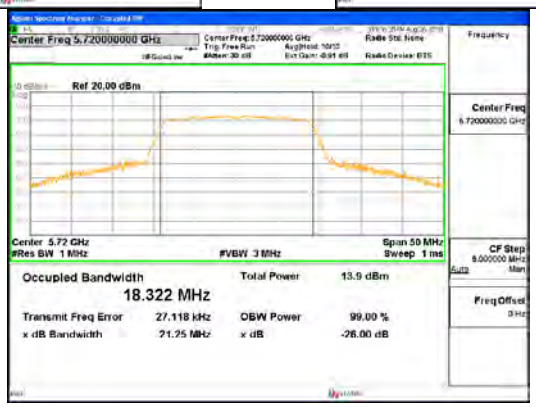




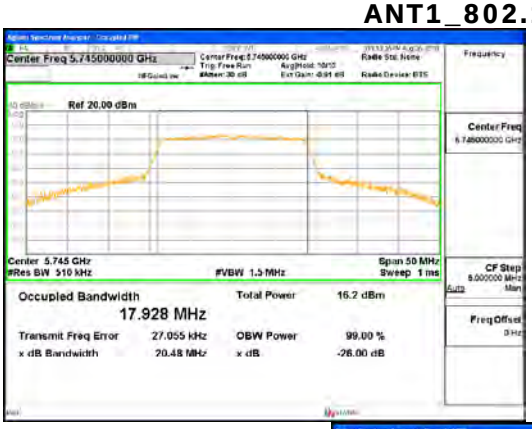
ANT1_802.11n_HT20_UNII 2A

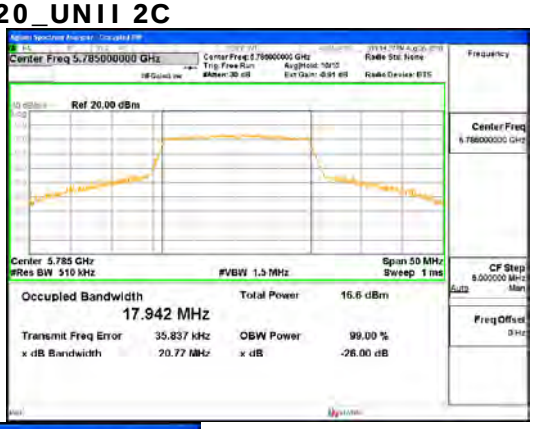


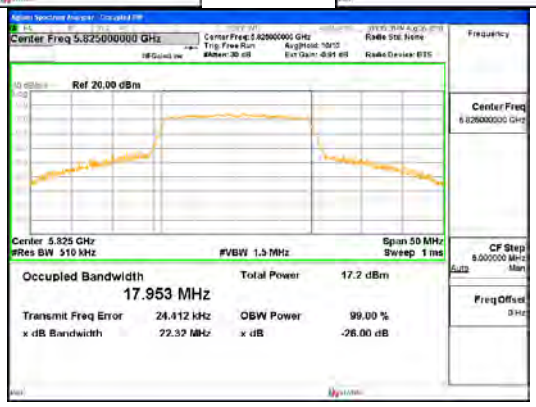




ANT1_802.11n_HT20_UNII 2C







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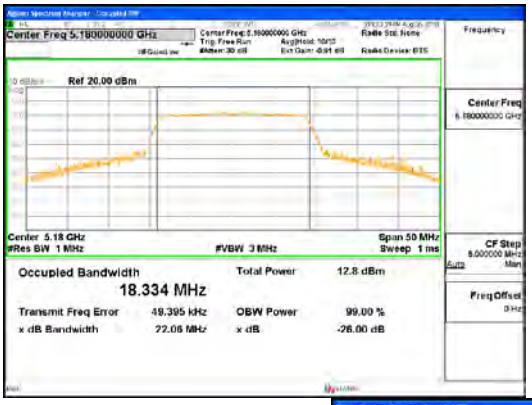
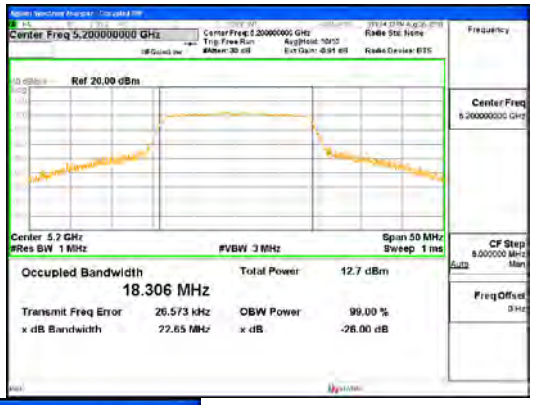
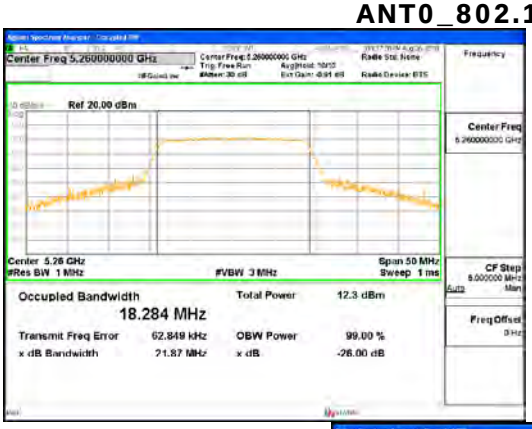
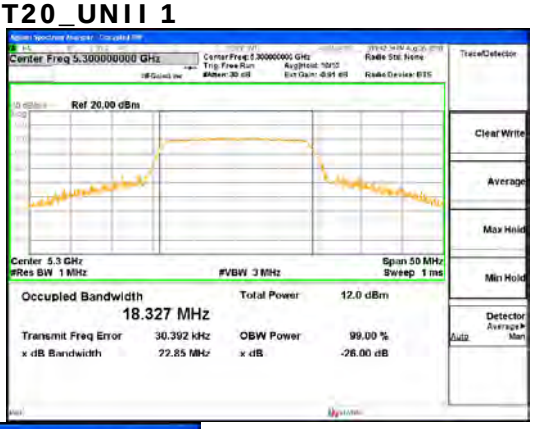
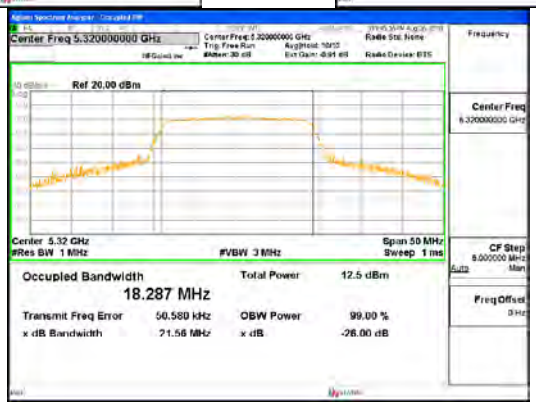




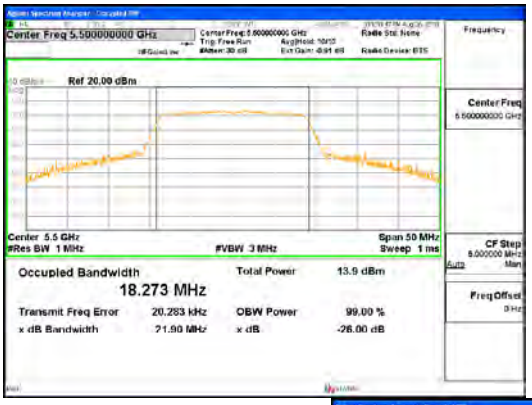
ANT0_802.11ac_VHT20_UNII 1

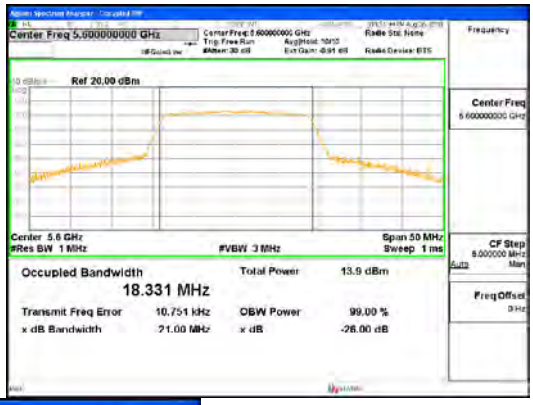




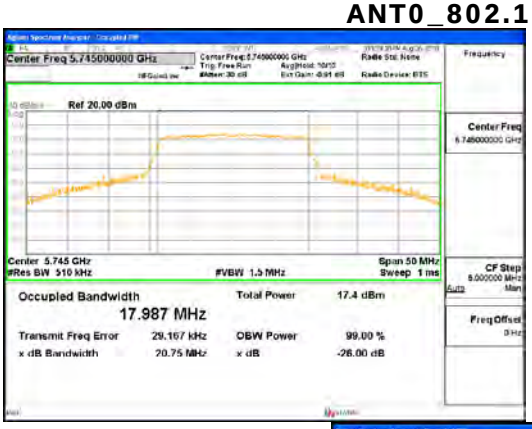


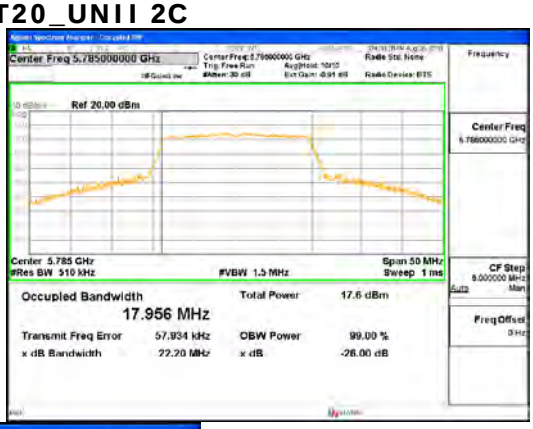
ANT0_802.11ac_VHT20_UNII 2A





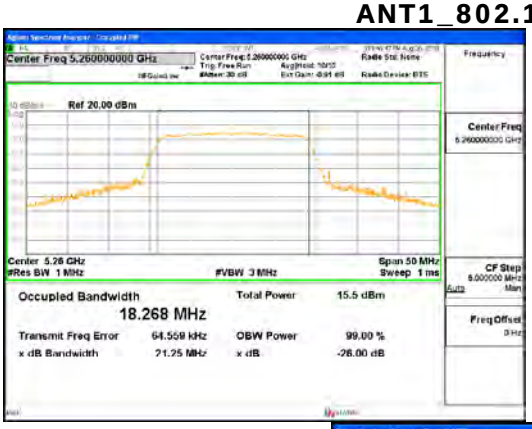
ANT0_802.11ac_VHT20_UNII 2C

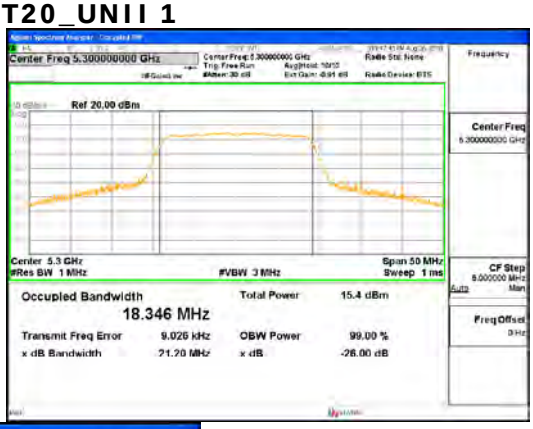


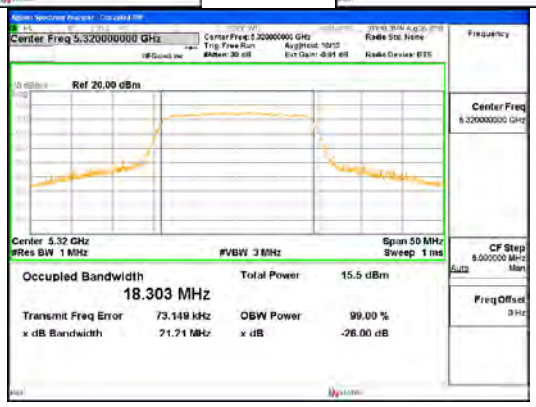


ANT0_802.11ac_VHT20_UNII 3

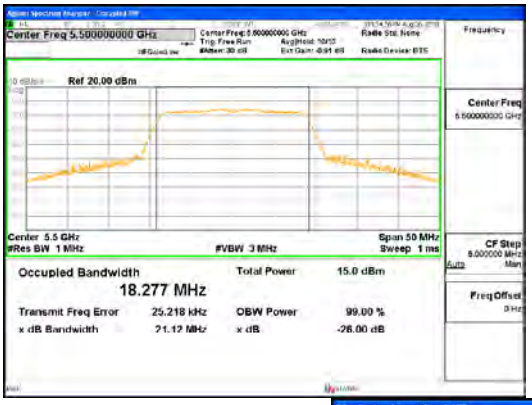
ANT1_802.11ac_VHT20_UNII 1

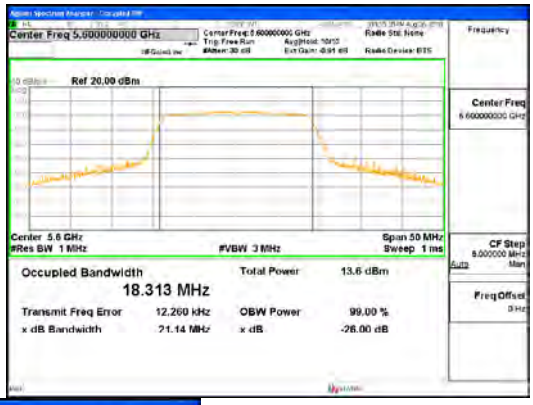


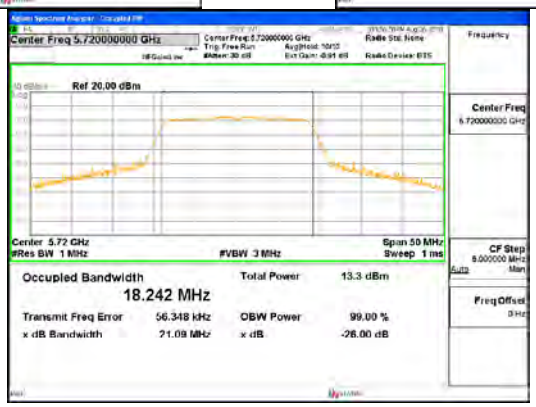




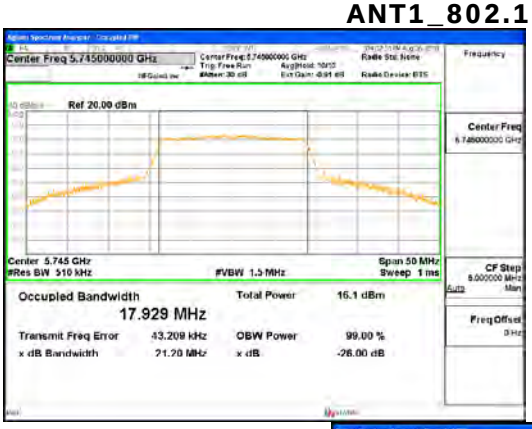
ANT1_802.11ac_VHT20_UNII 2A

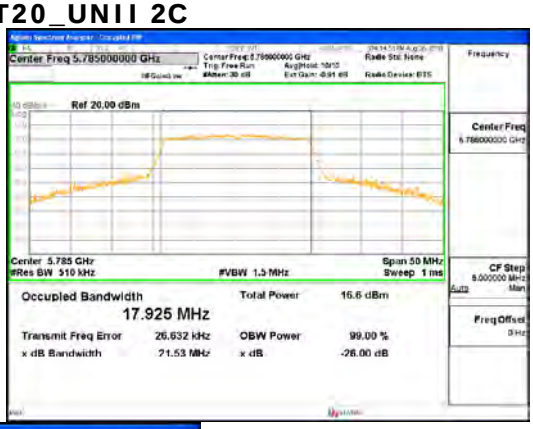


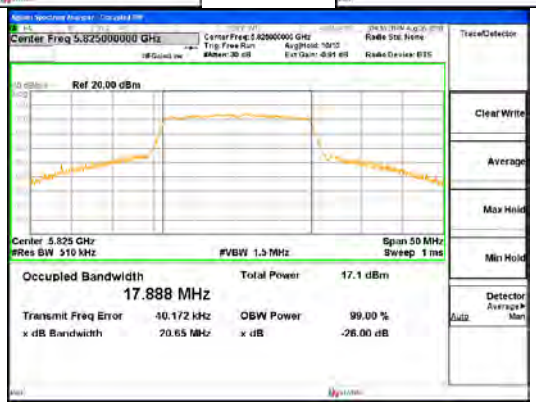




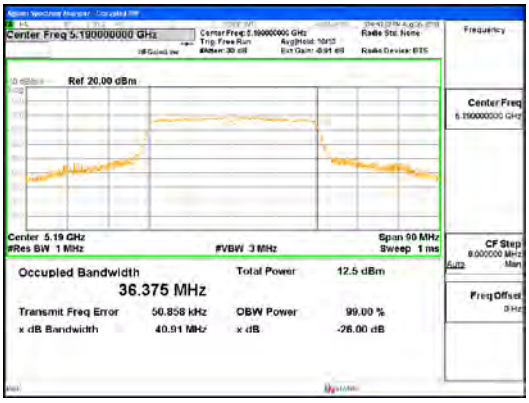
ANT1_802.11ac_VHT20_UNII 2C

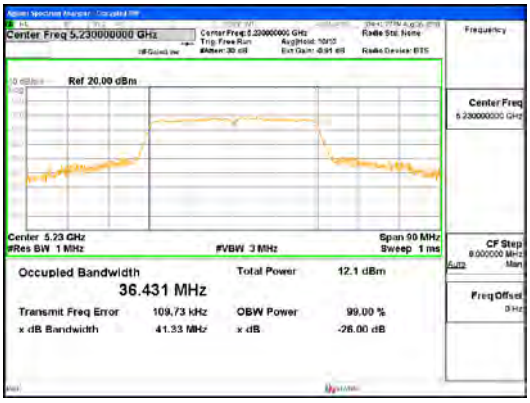






ANT1_802.11ac_VHT20_UNII 3





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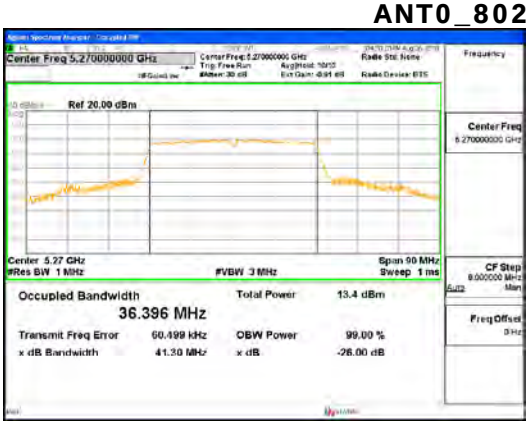

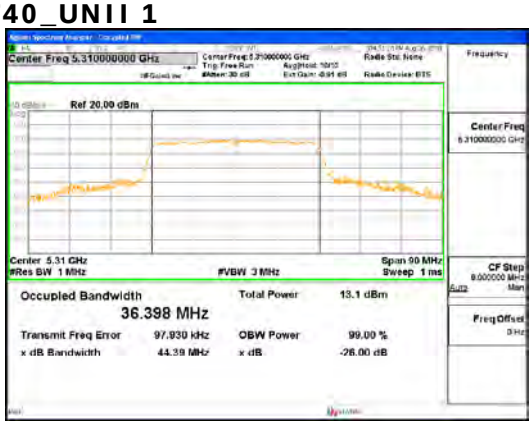

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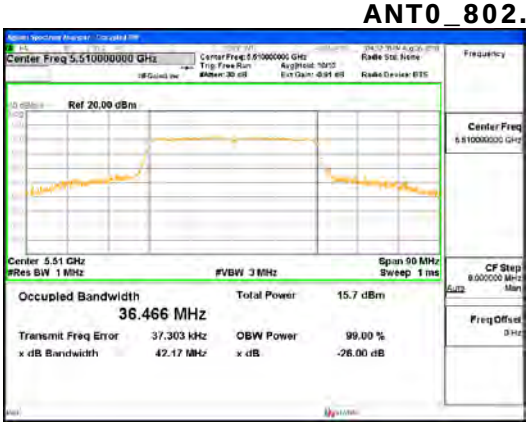

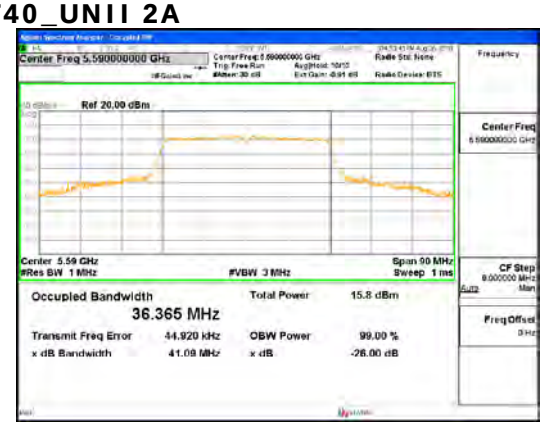

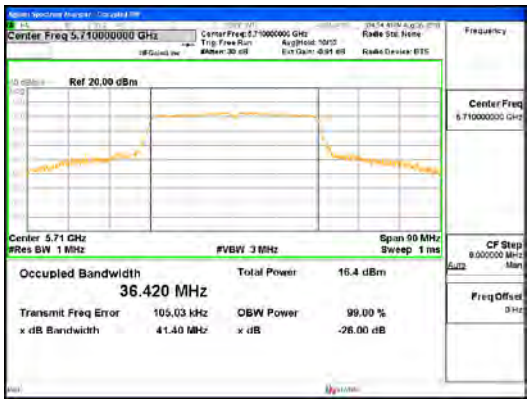

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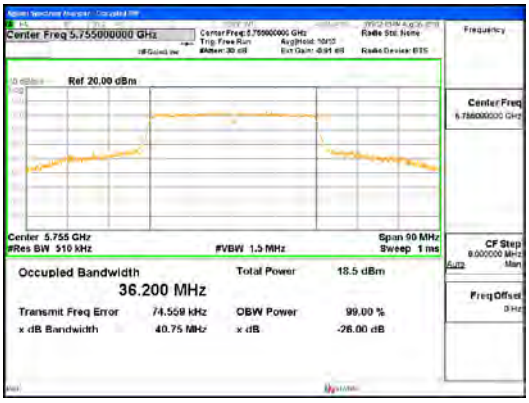

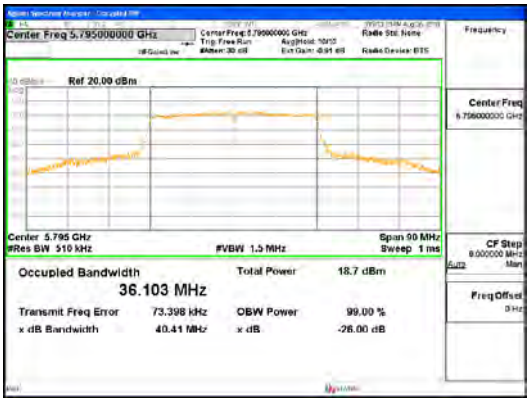

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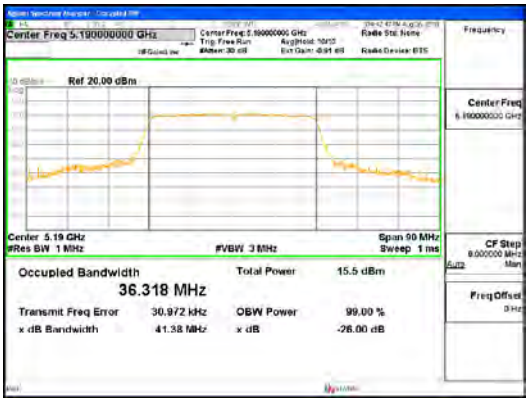
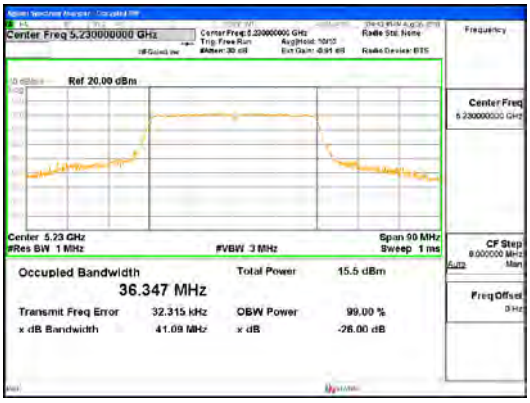
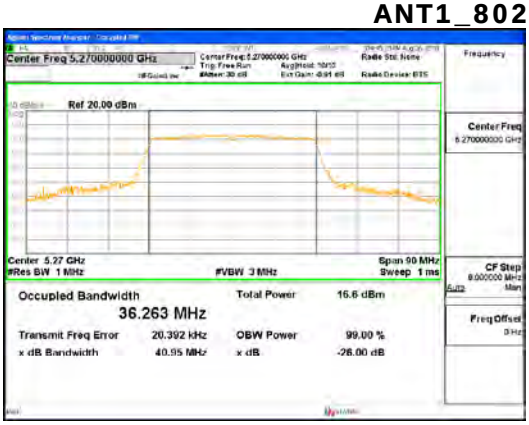
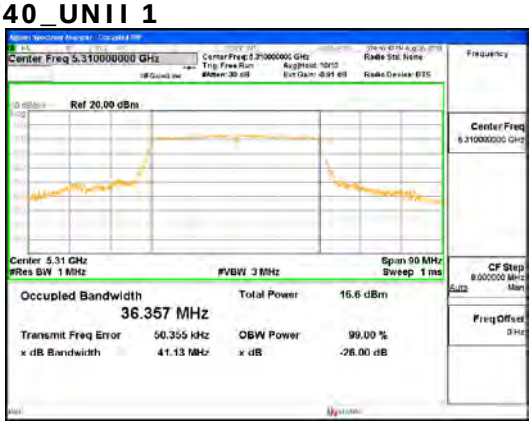


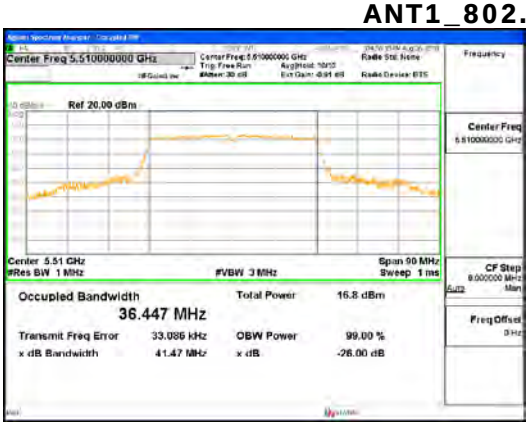


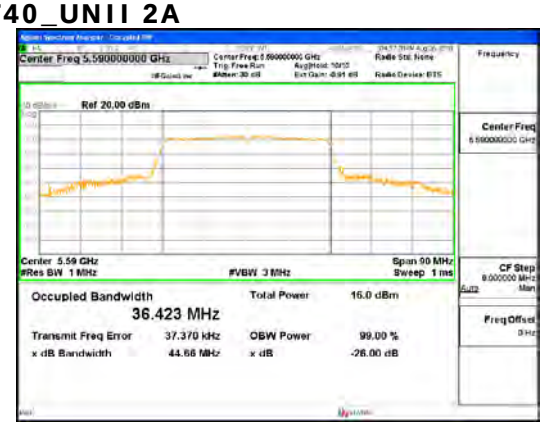
ANT1_802.11n_HT40_UNII 1



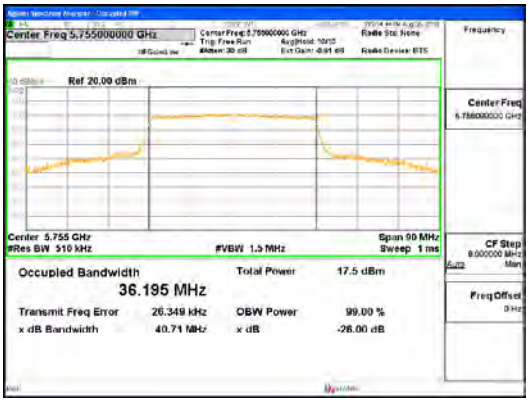


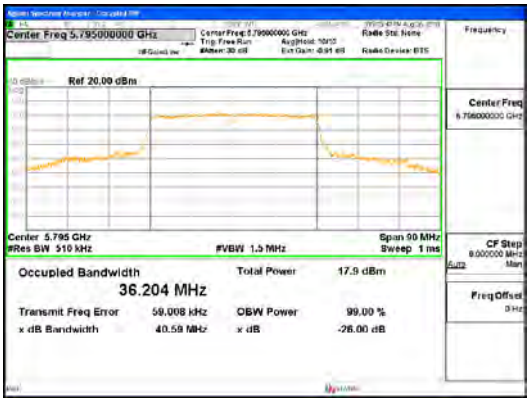
ANT1_802.11n_HT40_UNII 2A





ANT1_802.11n_HT40_UNII 2C





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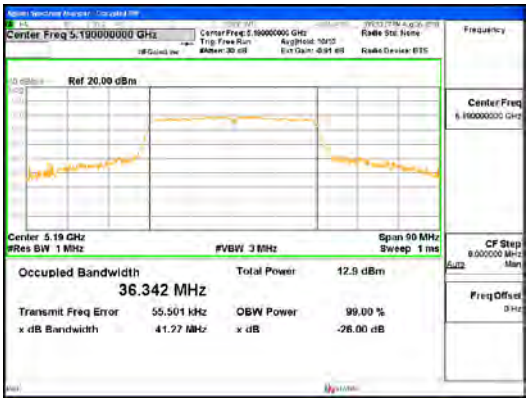
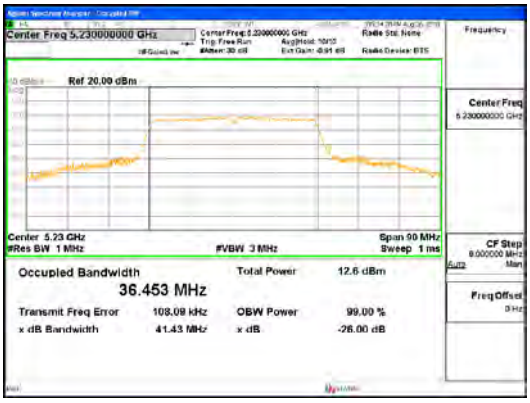
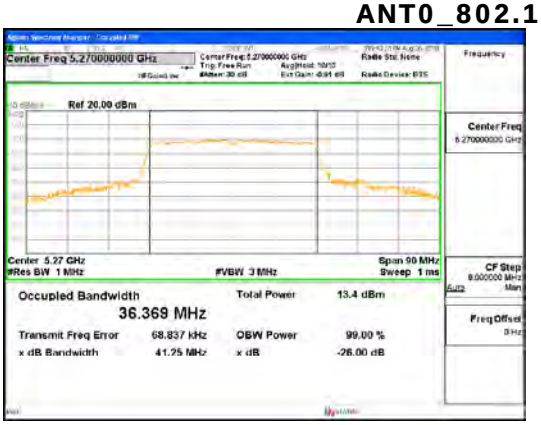
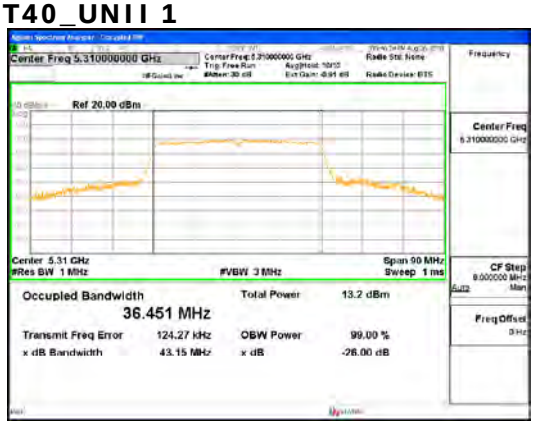




ANT0_802.11ac_VHT40_UNII 1





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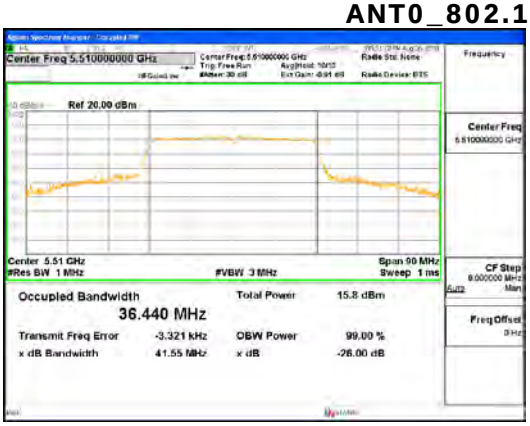

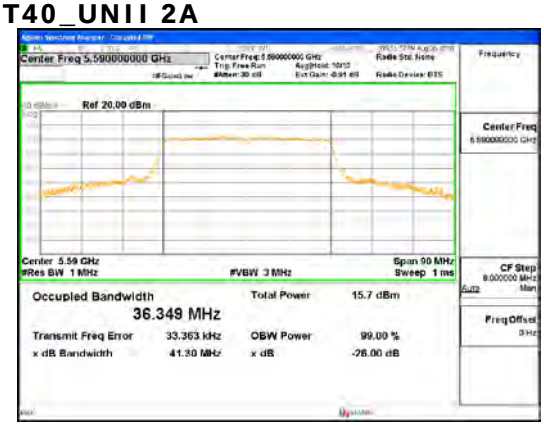

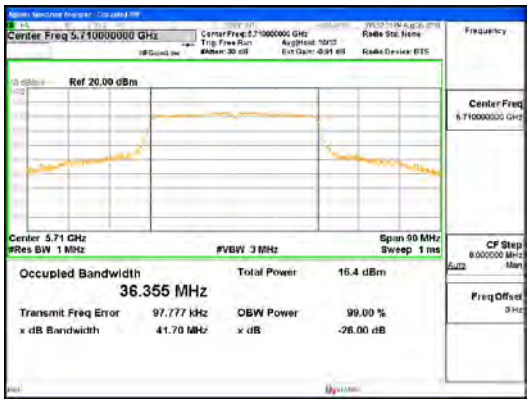

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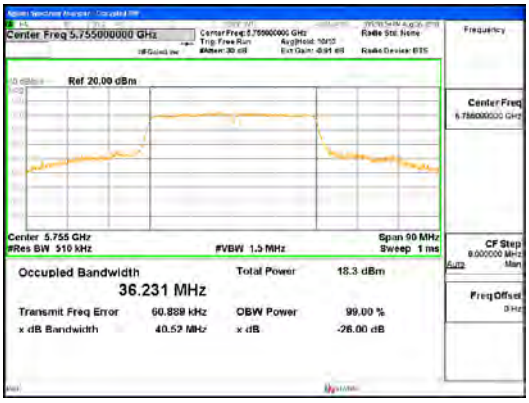
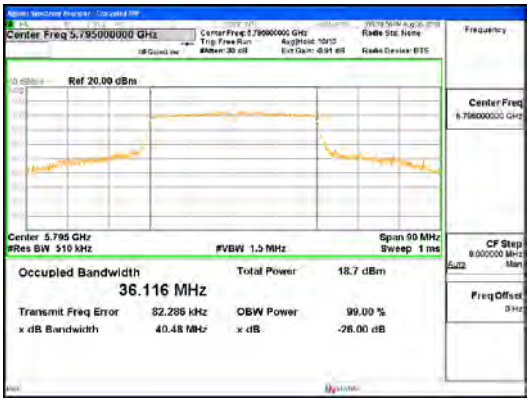
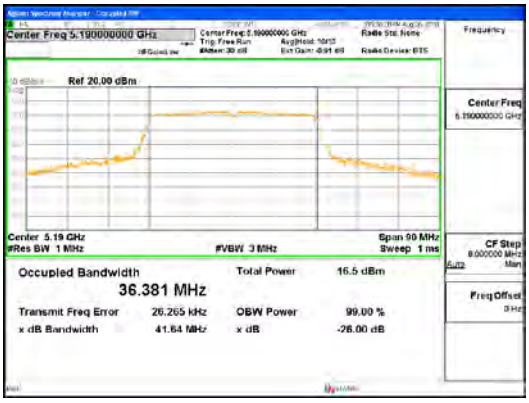
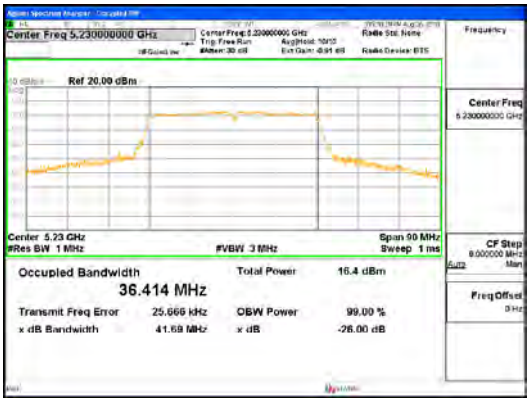




ANT0_802.11ac_VHT40_UNII 3





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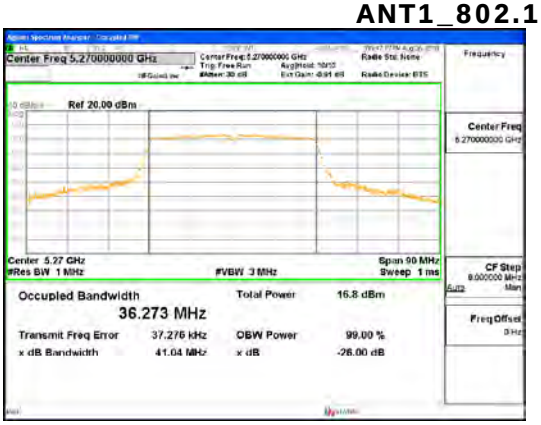
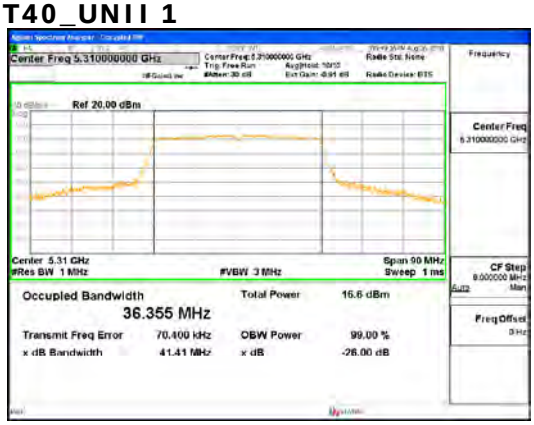
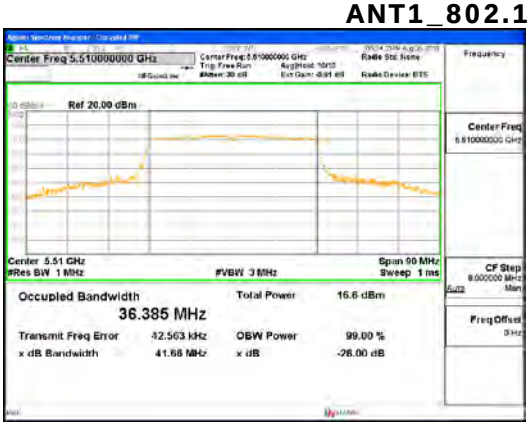
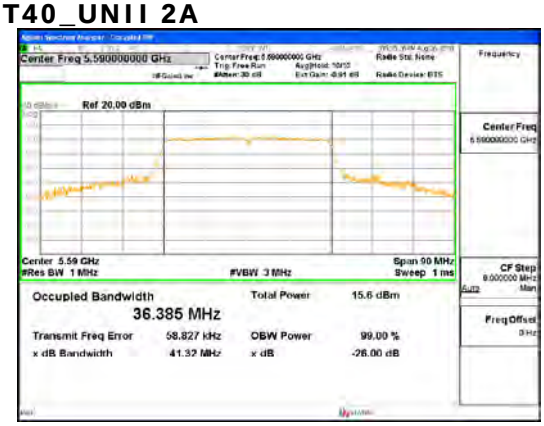
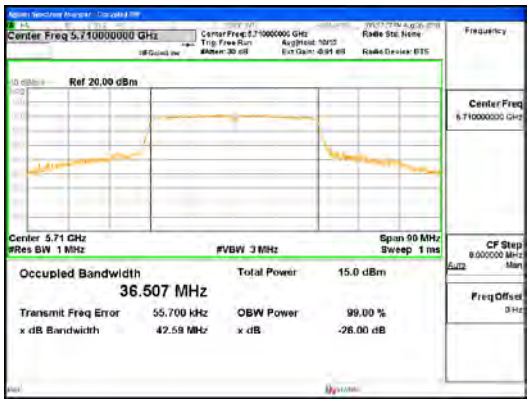




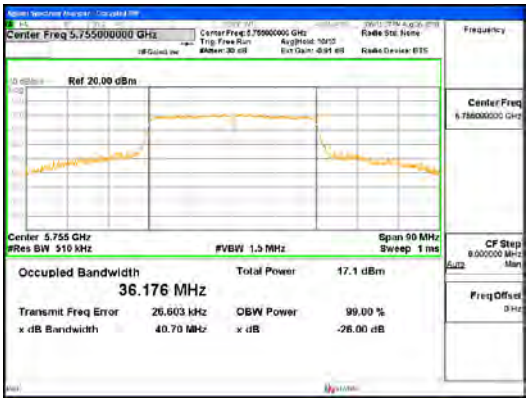
ANT1_802.11ac_VHT40_UNII 2A

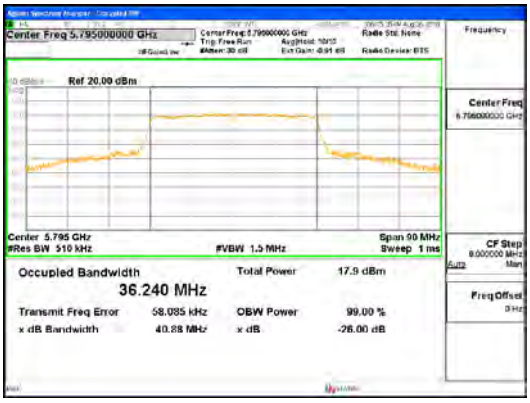




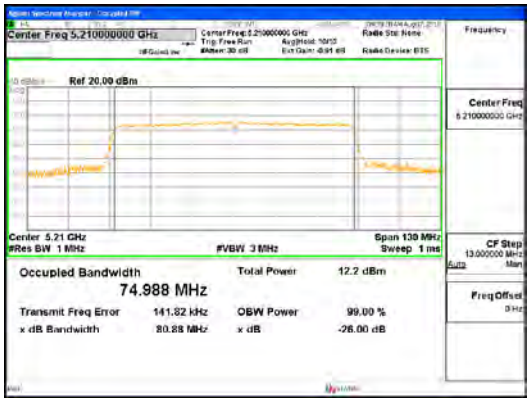


ANT1_802.11ac_VHT40_UNII 2C

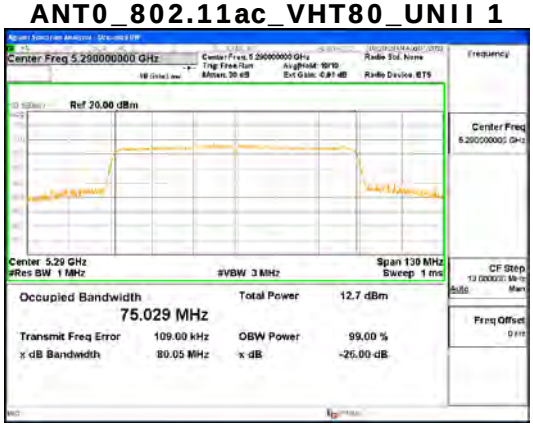




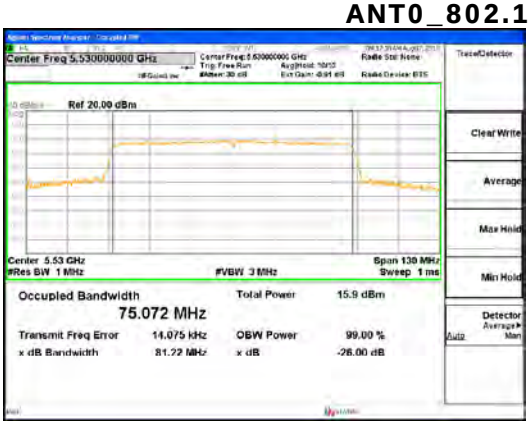
ANT1_802.11ac_VHT40_UNII 3

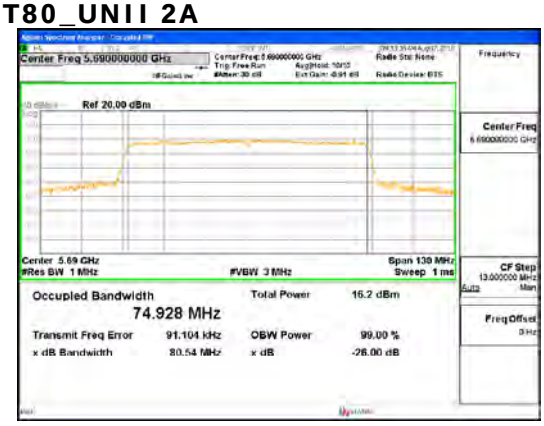


ANT0_802.11ac_VHT80_UNII 1



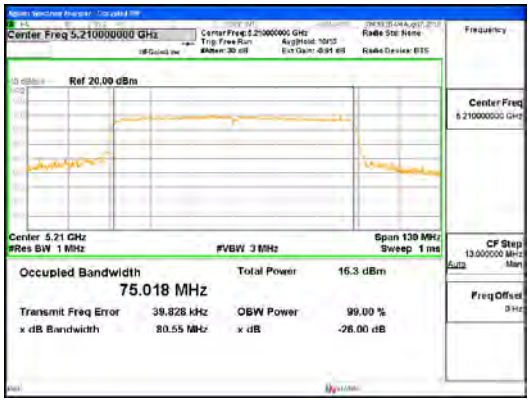
ANT0_802.11ac_VHT80_UNII 2A





ANT0_802.11ac_VHT80_UNII 2C

ANT0_802.11ac_VHT80_UNII 3



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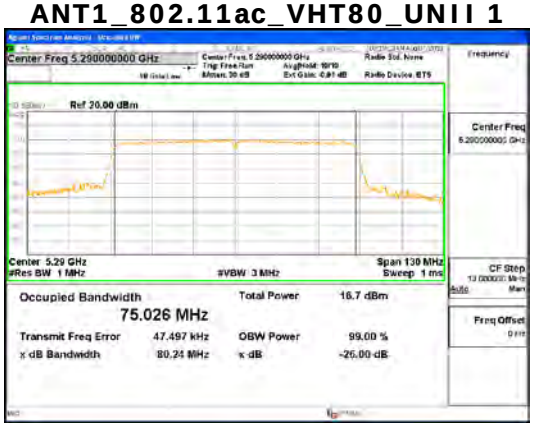
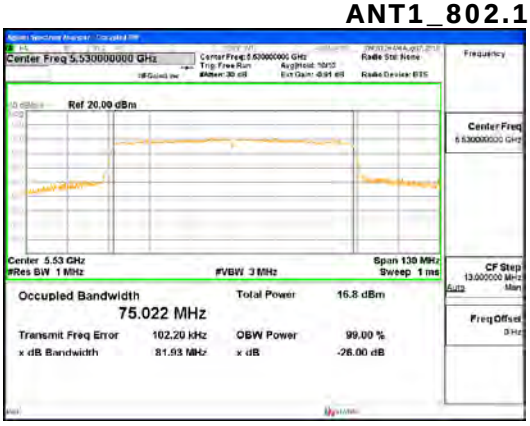
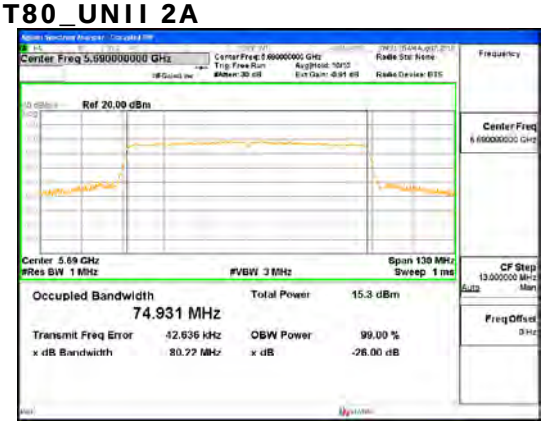
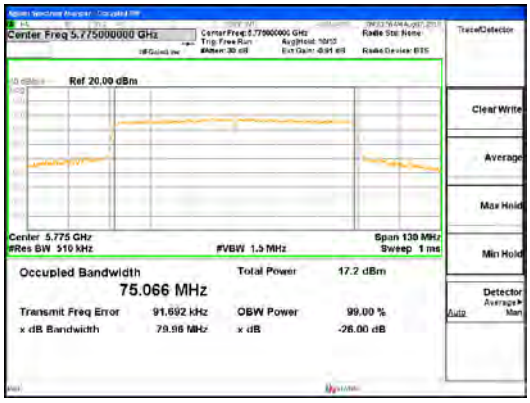


ANT1_802.11ac_VHT80_UNII 2A





ANT1_802.11ac_VHT80_UNII 2C



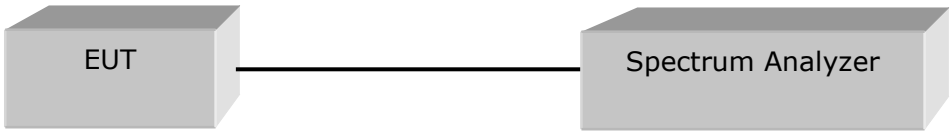
ANT1_802.11ac_VHT80_UNII 3

4.3 OUTPUT POWER

Test Procedures

Maximum Conducted Output Power(KDB 789033, Method SA-2)
Multiple Transmitter Output (KDB 662911 D01, D02)

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)
802.11a	0.58
802.11n_HT20	0.62
802.11n_HT40	1.14
802.11ac_VHT20	0.60
802.11ac_VHT40	1.13
802.11ac_VHT80	2.04

Limit

Operating Mode	ANT Configuration	ANT Gain (dBi)	Mode	Band	Limit (dBm)
SISO	ANT0	2.00	802.11a/n/ac	UNII 1	24
				UNII 2A	24
	ANT1	2.00		UNII 2C	24
				UNII 3	30
MIMO (2Tx)	ANT0 + ANT1	5.01	802.11a/n/ac	UNII 1	24
				UNII 2A	24
				UNII 2C	24
				UNII 3	30

Test Data

ANT0

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	8.72	0.58	9.30	24.00	14.70
	5 200	8.68	0.58	9.26	24.00	14.74
	5 240	8.07	0.58	8.65	24.00	15.35
	5 260	7.82	0.58	8.40	24.00	15.60
	5 300	7.93	0.58	8.51	24.00	15.49
	5 320	7.87	0.58	8.45	24.00	15.55
	5 500	8.41	0.58	8.99	24.00	15.01
	5 600	8.23	0.58	8.81	24.00	15.19
	5 720	8.86	0.58	9.44	24.00	14.56
	5 745	10.31	0.58	10.89	30.00	19.11
	5 785	11.02	0.58	11.60	30.00	18.40
	5 825	11.70	0.58	12.28	30.00	17.72
802.11n _HT20	5 180	7.61	0.62	8.23	24.00	15.77
	5 200	7.61	0.62	8.23	24.00	15.77
	5 240	7.17	0.62	7.79	24.00	16.21
	5 260	7.15	0.62	7.77	24.00	16.23
	5 300	7.24	0.62	7.86	24.00	16.14
	5 320	6.98	0.62	7.60	24.00	16.40
	5 500	8.85	0.62	9.47	24.00	14.53
	5 600	8.19	0.62	8.81	24.00	15.19
	5 720	9.30	0.62	9.92	24.00	14.08
	5 745	10.64	0.62	11.26	30.00	18.74
	5 785	10.94	0.62	11.56	30.00	18.44
	5 825	11.66	0.62	12.28	30.00	17.72
802.11ac _VHT20	5 180	6.77	0.60	7.37	24.00	16.63
	5 200	6.64	0.60	7.24	24.00	16.76
	5 240	6.35	0.60	6.95	24.00	17.05
	5 260	5.88	0.60	6.48	24.00	17.52
	5 300	5.82	0.60	6.42	24.00	17.58
	5 320	6.20	0.60	6.80	24.00	17.20
	5 500	7.72	0.60	8.32	24.00	15.68
	5 600	7.88	0.60	8.48	24.00	15.52
	5 720	8.54	0.60	9.14	24.00	14.86
	5 745	10.95	0.60	11.55	30.00	18.45

	5 785	10.97	0.60	11.57	30.00	18.43
	5 825	11.08	0.60	11.68	30.00	18.32
802.11n _HT40	5 190	5.70	1.14	6.84	24.00	17.16
	5 230	5.43	1.14	6.57	24.00	17.43
	5 270	6.89	1.14	8.03	24.00	15.97
	5 310	6.63	1.14	7.77	24.00	16.23
	5 510	8.98	1.14	10.12	24.00	13.88
	5 590	9.10	1.14	10.24	24.00	13.76
	5 710	9.49	1.14	10.63	24.00	13.37
	5 755	11.27	1.14	12.41	30.00	17.59
	5 795	11.72	1.14	12.86	30.00	17.14
802.11ac _VHT40	5 190	5.99	1.13	7.12	24.00	16.88
	5 230	6.06	1.13	7.19	24.00	16.81
	5 270	6.52	1.13	7.65	24.00	16.35
	5 310	6.45	1.13	7.58	24.00	16.42
	5 510	8.97	1.13	10.10	24.00	13.90
	5 590	8.89	1.13	10.02	24.00	13.98
	5 710	9.55	1.13	10.68	24.00	13.32
	5 755	11.17	1.13	12.30	30.00	17.70
	5 795	11.21	1.13	12.34	30.00	17.66
802.11ac _VHT80	5 210	4.67	2.04	6.71	24.00	17.29
	5 290	5.04	2.04	7.08	24.00	16.92
	5 530	8.12	2.04	10.16	24.00	13.84
	5 690	8.58	2.04	10.62	24.00	13.38
	5 775	10.26	2.04	12.30	30.00	17.70
Measurement uncertainty		± 1.5 dB				

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	10.79	0.58	11.37	24.00	12.63
	5 200	11.29	0.58	11.87	24.00	12.13
	5 240	10.63	0.58	11.21	24.00	12.79
	5 260	10.88	0.58	11.46	24.00	12.54
	5 300	11.30	0.58	11.88	24.00	12.12
	5 320	11.16	0.58	11.74	24.00	12.26
	5 500	10.97	0.58	11.55	24.00	12.45
	5 600	9.62	0.58	10.20	24.00	13.80
	5 720	9.34	0.58	9.92	24.00	14.08
	5 745	10.25	0.58	10.83	30.00	19.17
	5 785	7.52	0.58	8.10	30.00	21.90
	5 825	10.96	0.58	11.54	30.00	18.46
802.11n _HT20	5 180	9.73	0.62	10.35	24.00	13.65
	5 200	9.73	0.62	10.35	24.00	13.65
	5 240	9.71	0.62	10.33	24.00	13.67
	5 260	9.48	0.62	10.10	24.00	13.90
	5 300	9.39	0.62	10.01	24.00	13.99
	5 320	9.49	0.62	10.11	24.00	13.89
	5 500	8.79	0.62	9.41	24.00	14.59
	5 600	8.12	0.62	8.74	24.00	15.26
	5 720	7.79	0.62	8.41	24.00	15.59
	5 745	9.61	0.62	10.23	30.00	19.77
	5 785	9.93	0.62	10.55	30.00	19.45
	5 825	10.57	0.62	11.19	30.00	18.81
802.11ac _VHT20	5 180	10.00	0.60	10.60	24.00	13.40
	5 200	10.10	0.60	10.70	24.00	13.30
	5 240	9.99	0.60	10.59	24.00	13.41
	5 260	9.49	0.60	10.09	24.00	13.91
	5 300	9.15	0.60	9.75	24.00	14.25
	5 320	9.40	0.60	10.00	24.00	14.00
	5 500	8.67	0.60	9.27	24.00	14.73
	5 600	7.28	0.60	7.88	24.00	16.12
	5 720	7.28	0.60	7.88	24.00	16.12
	5 745	9.40	0.60	10.00	30.00	20.00
	5 785	10.17	0.60	10.77	30.00	19.23

	5 825	10.16	0.60	10.76	30.00	19.24
802.11n _HT40	5 190	8.72	1.14	9.86	24.00	14.14
	5 230	8.53	1.14	9.67	24.00	14.33
	5 270	9.89	1.14	11.03	24.00	12.97
	5 310	9.84	1.14	10.98	24.00	13.02
	5 510	10.26	1.14	11.40	24.00	12.60
	5 590	9.07	1.14	10.21	24.00	13.79
	5 710	8.24	1.14	9.38	24.00	14.62
	5 755	10.32	1.14	11.46	30.00	18.54
	5 795	10.88	1.14	12.02	30.00	17.98
802.11ac _VHT40	5 190	9.93	1.13	11.06	24.00	12.94
	5 230	9.54	1.13	10.67	24.00	13.33
	5 270	10.02	1.13	11.15	24.00	12.85
	5 310	9.50	1.13	10.63	24.00	13.37
	5 510	9.74	1.13	10.87	24.00	13.13
	5 590	9.12	1.13	10.25	24.00	13.75
	5 710	8.25	1.13	9.38	24.00	14.62
	5 755	10.44	1.13	11.57	30.00	18.43
	5 795	10.91	1.13	12.04	30.00	17.96
802.11ac _VHT80	5 210	8.69	2.04	10.73	24.00	13.27
	5 290	8.97	2.04	11.01	24.00	12.99
	5 530	9.25	2.04	11.29	24.00	12.71
	5 690	7.50	2.04	9.54	24.00	14.46
	5 775	9.05	2.04	11.09	30.00	18.91
Measurement uncertainty		± 1.5 dB				

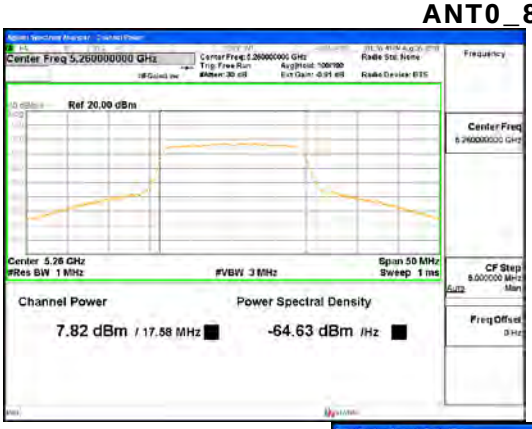
ANT0 + ANT1

Test Mode	Frequency (MHz)	Measured Output Power (dBm)	Duty cycle Factor (dB)	Result Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11a	5 180	13.47	0.58	14.05	24.00	9.95
	5 200	13.77	0.58	14.35	24.00	9.65
	5 240	13.13	0.58	13.71	24.00	10.29
	5 260	13.20	0.58	13.78	24.00	10.22
	5 300	13.52	0.58	14.10	24.00	9.90
	5 320	13.41	0.58	13.99	24.00	10.01
	5 500	13.47	0.58	14.05	24.00	9.95
	5 600	12.57	0.58	13.15	24.00	10.85
	5 720	12.70	0.58	13.28	24.00	10.72
	5 745	13.87	0.58	14.45	30.00	15.55
	5 785	13.20	0.58	13.78	30.00	16.22
	5 825	14.94	0.58	15.52	30.00	14.48
802.11n _HT20	5 180	12.43	0.62	13.05	24.00	10.95
	5 200	12.43	0.62	13.05	24.00	10.95
	5 240	12.25	0.62	12.87	24.00	11.13
	5 260	12.10	0.62	12.72	24.00	11.28
	5 300	12.08	0.62	12.70	24.00	11.30
	5 320	12.04	0.62	12.66	24.00	11.34
	5 500	12.45	0.62	13.07	24.00	10.93
	5 600	11.79	0.62	12.41	24.00	11.59
	5 720	12.24	0.62	12.86	24.00	11.14
	5 745	13.79	0.62	14.41	30.00	15.59
	5 785	14.09	0.62	14.71	30.00	15.29
	5 825	14.78	0.62	15.40	30.00	14.60
802.11ac _VHT20	5 180	12.29	0.60	12.89	24.00	11.11
	5 200	12.32	0.60	12.92	24.00	11.08
	5 240	12.15	0.60	12.75	24.00	11.25
	5 260	11.66	0.60	12.26	24.00	11.74
	5 300	11.41	0.60	12.01	24.00	11.99
	5 320	11.70	0.60	12.30	24.00	11.70
	5 500	11.83	0.60	12.43	24.00	11.57
	5 600	11.20	0.60	11.80	24.00	12.20
	5 720	11.57	0.60	12.17	24.00	11.83
	5 745	13.85	0.60	14.45	30.00	15.55

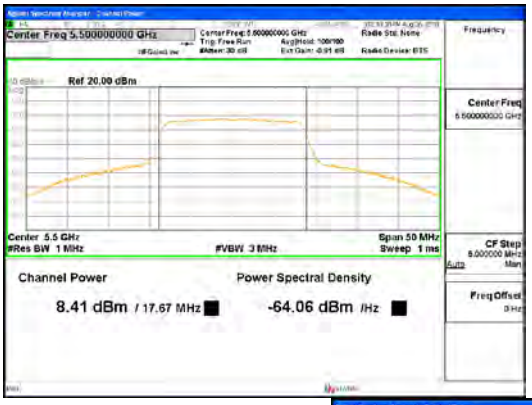
	5 785	14.20	0.60	14.80	30.00	15.20
	5 825	14.25	0.60	14.85	30.00	15.15
802.11n _HT40	5 190	11.62	1.14	12.76	24.00	11.24
	5 230	11.40	1.14	12.54	24.00	11.46
	5 270	12.79	1.14	13.93	24.00	10.07
	5 310	12.68	1.14	13.82	24.00	10.18
	5 510	13.82	1.14	14.96	24.00	9.04
	5 590	13.24	1.14	14.38	24.00	9.62
	5 710	13.06	1.14	14.20	24.00	9.80
	5 755	14.97	1.14	16.11	30.00	13.89
	5 795	15.47	1.14	16.61	30.00	13.39
802.11ac _VHT40	5 190	12.53	1.13	13.66	24.00	10.34
	5 230	12.28	1.13	13.41	24.00	10.59
	5 270	12.75	1.13	13.88	24.00	10.12
	5 310	12.38	1.13	13.51	24.00	10.49
	5 510	13.51	1.13	14.64	24.00	9.36
	5 590	13.15	1.13	14.28	24.00	9.72
	5 710	13.09	1.13	14.22	24.00	9.78
	5 755	14.96	1.13	16.09	30.00	13.91
	5 795	15.20	1.13	16.33	30.00	13.67
802.11ac _VHT80	5 210	12.18	2.04	14.22	24.00	9.78
	5 290	12.49	2.04	14.53	24.00	9.47
	5 530	13.77	2.04	15.81	24.00	8.19
	5 690	13.12	2.04	15.16	24.00	8.84
	5 775	14.75	2.04	16.79	30.00	13.21
Measurement uncertainty		± 1.5 dB				

See next pages for actual measured spectrum plots.

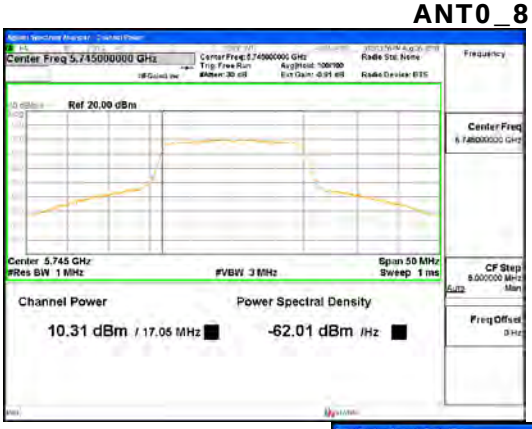
ANT0_802.11a_UNII 1



ANT0_802.11a_UNII 2A

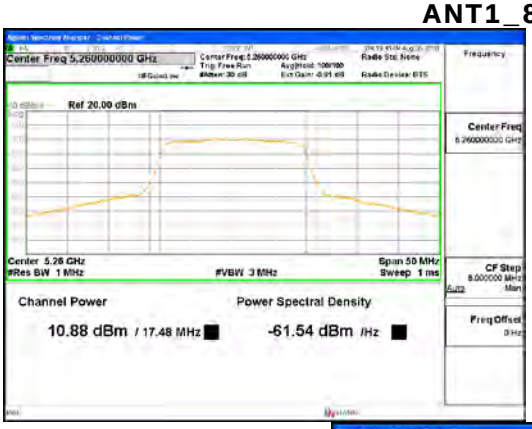


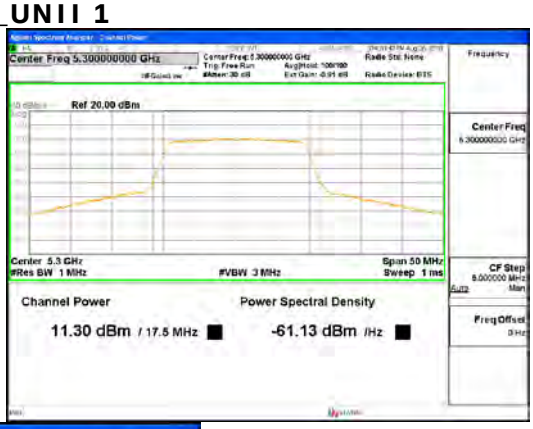
ANT0_802.11a_UNII 2C



ANT0_802.11a_UNII 3

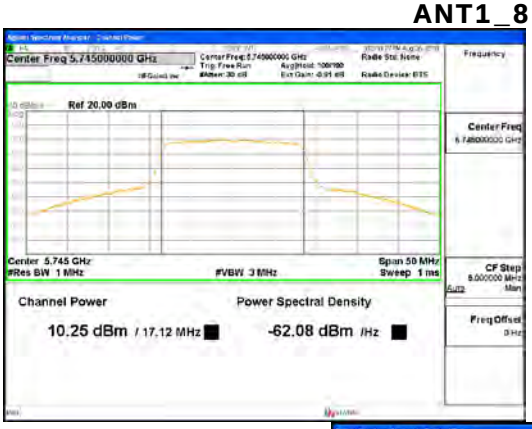
ANT1_802.11a_UNII 1





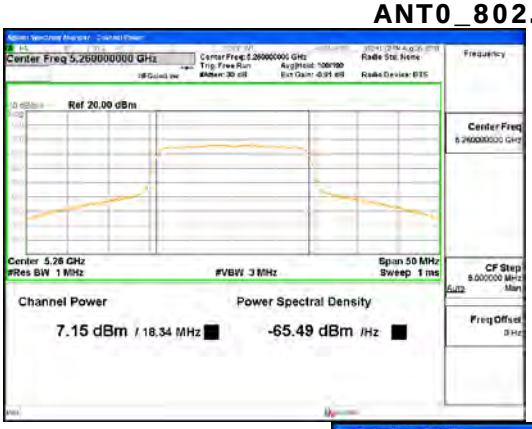
ANT1_802.11a_UNII 2A

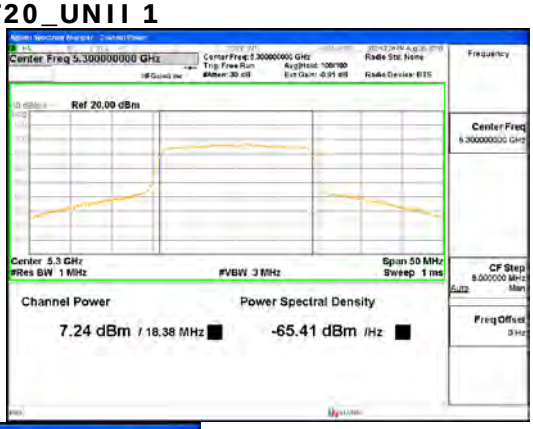
ANT1_802.11a_UNII 2C



ANT1_802.11a_UNII 3

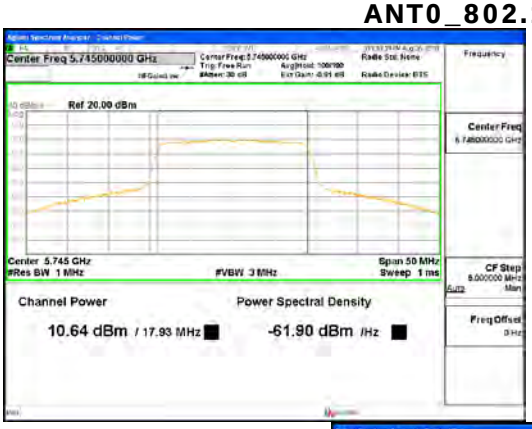
ANT0_802.11n_HT20_UNII 1

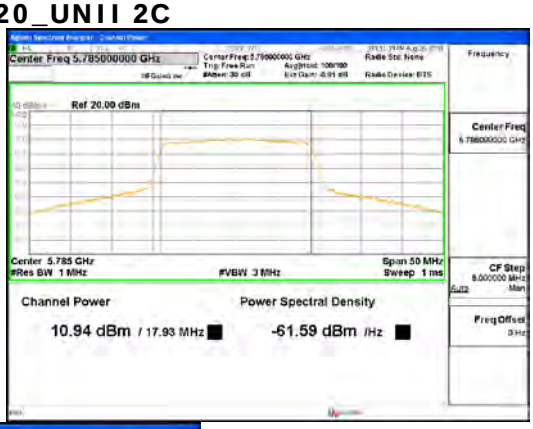




ANT0_802.11n_HT20_UNII 2A

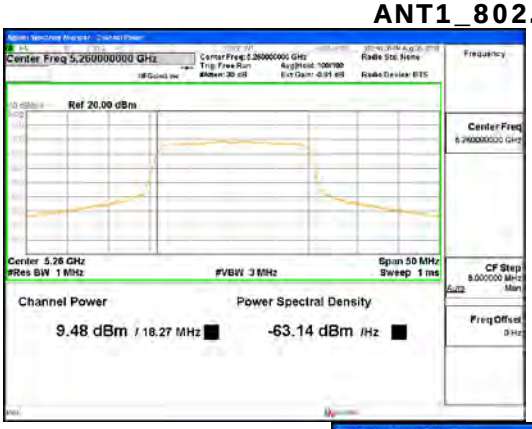
ANT0_802.11n_HT20_UNII 2C

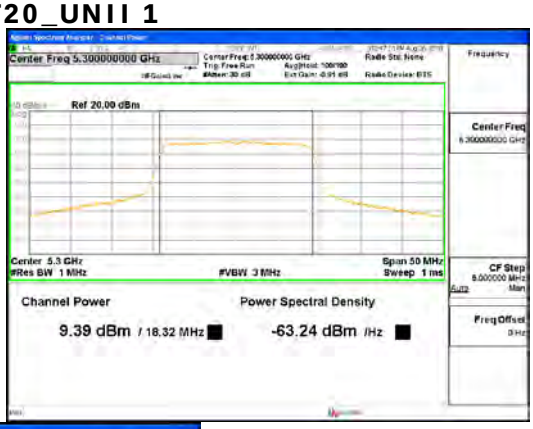




ANT0_802.11n_HT20_UNII 3

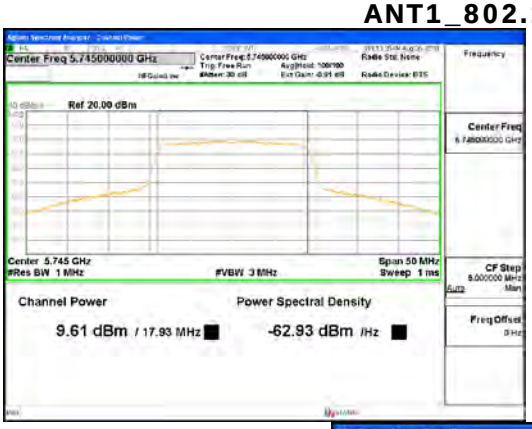
ANT1_802.11n_HT20_UNII 1

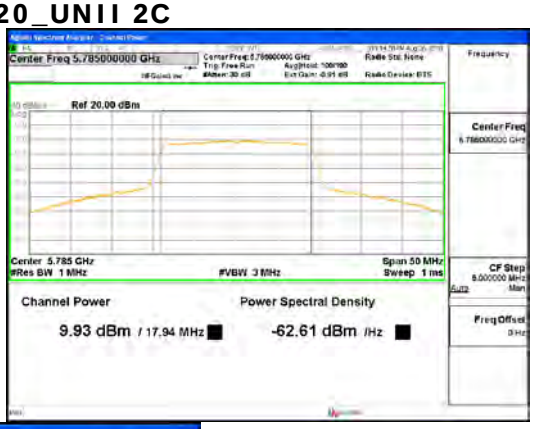




ANT1_802.11n_HT20_UNII 2A

ANT1_802.11n_HT20_UNII 2C





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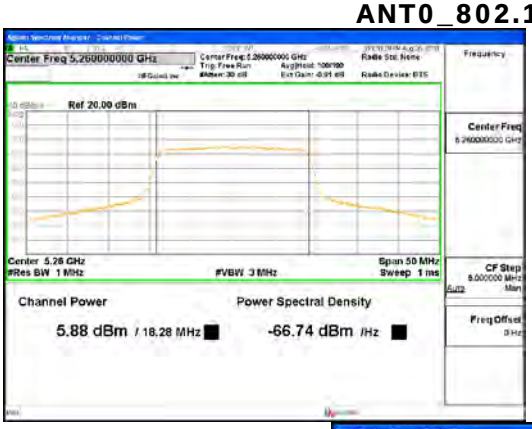
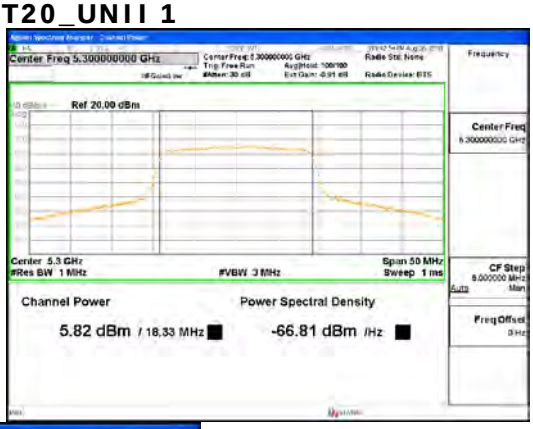
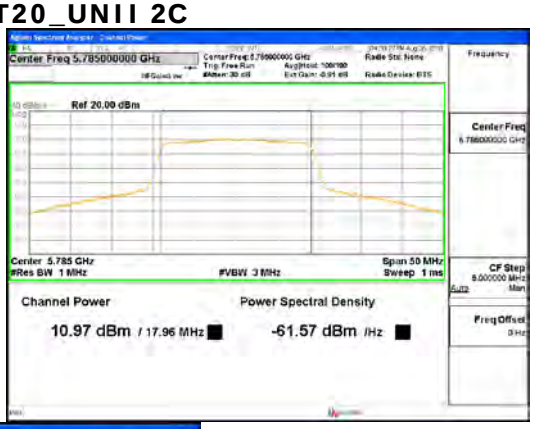




ANT0_802.11ac_VHT20_UNII 2A

ANT0_802.11ac_VHT20_UNII 2C



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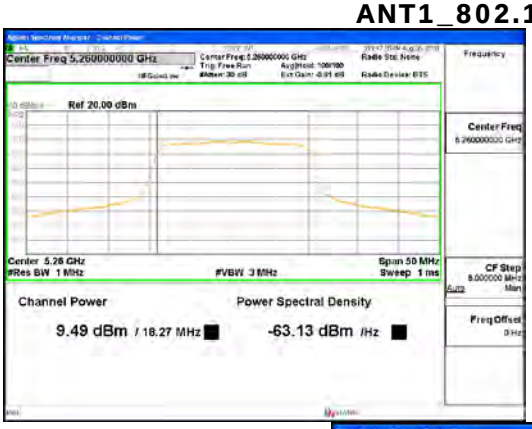

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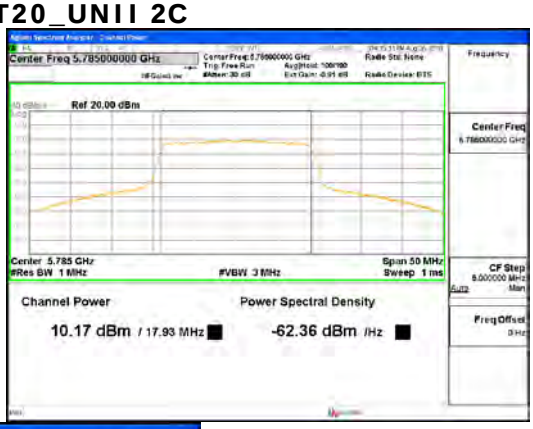
ANT1_802.11ac_VHT20_UNII 2C



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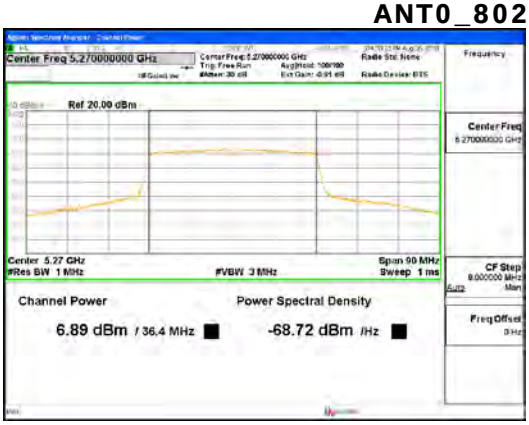

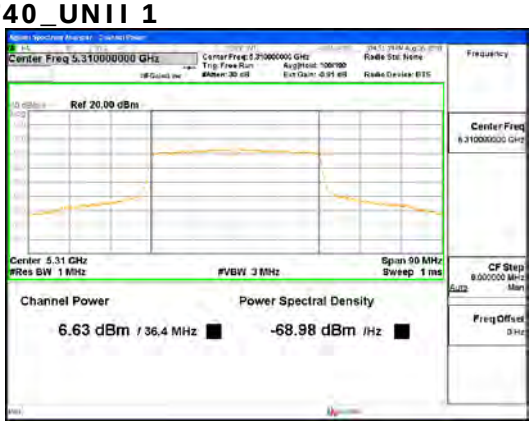

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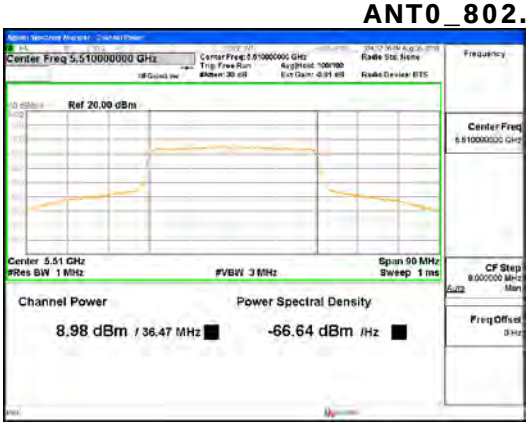

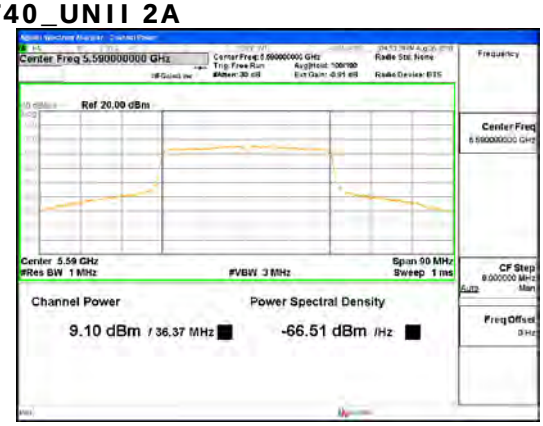

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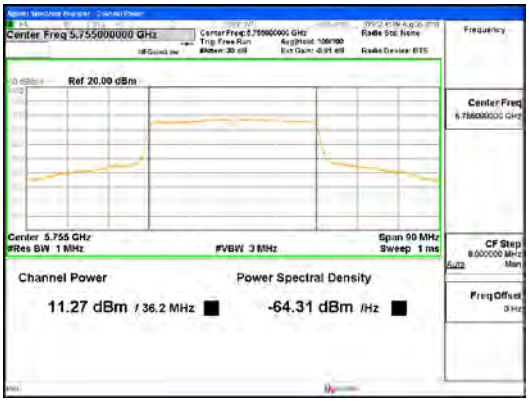

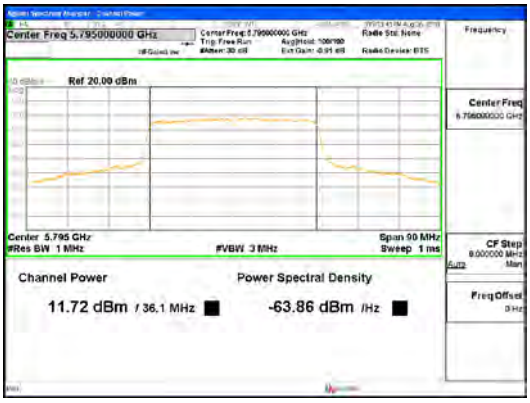

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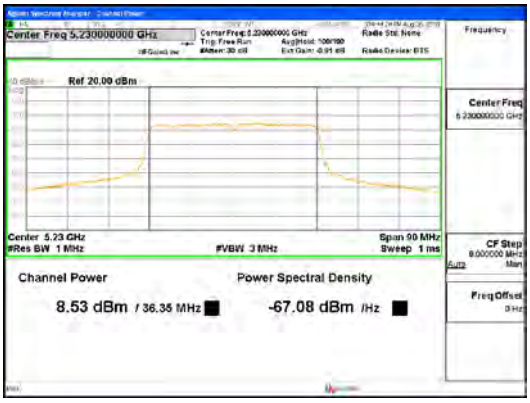

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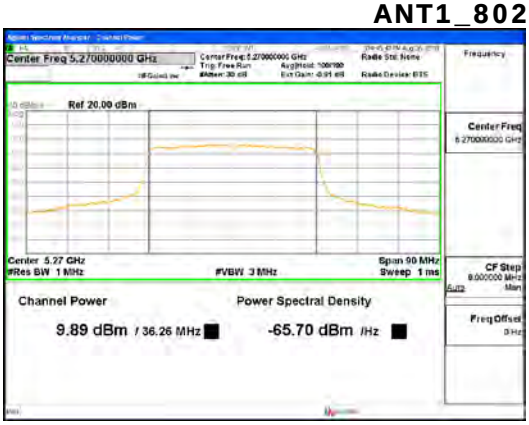

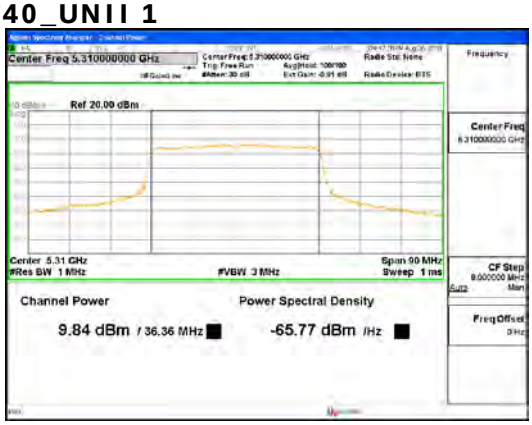

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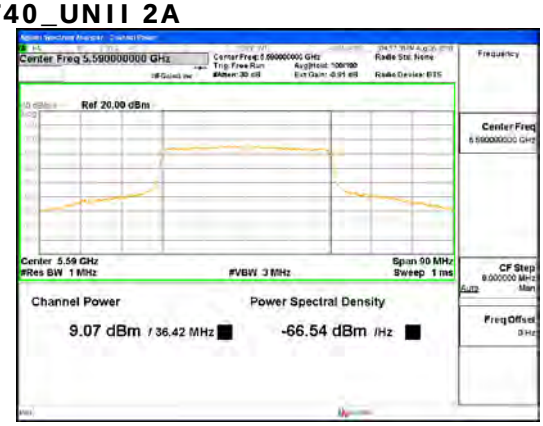
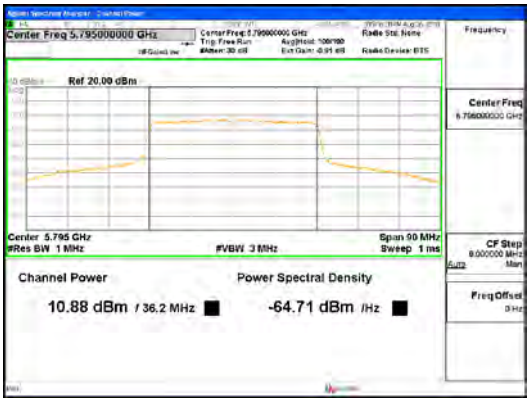
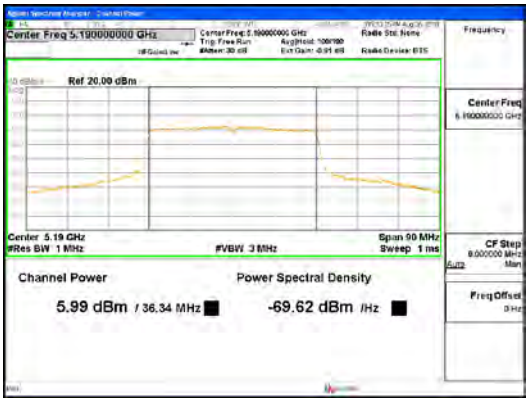


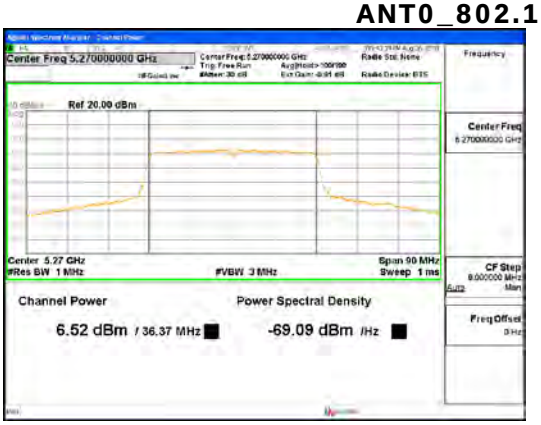
ANT1_802.11n_HT40_UNII 2C

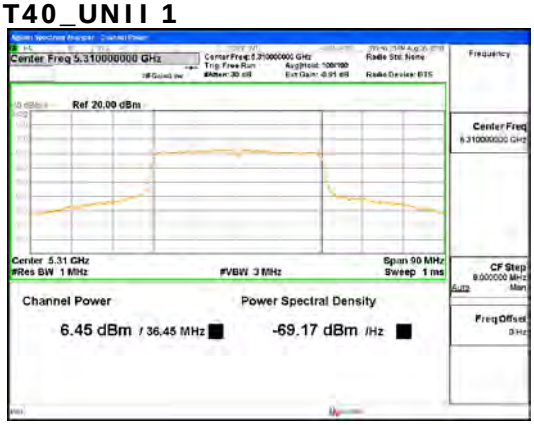


ANT1_802.11n_HT40_UNII 3

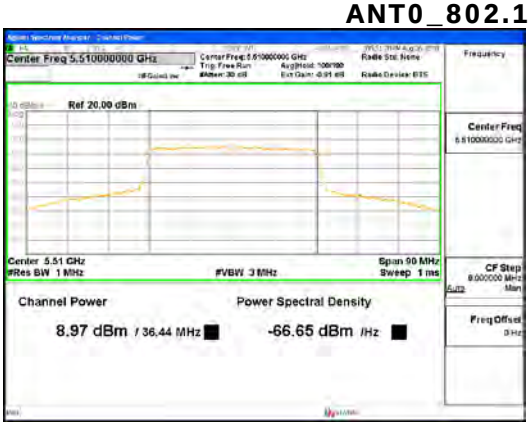


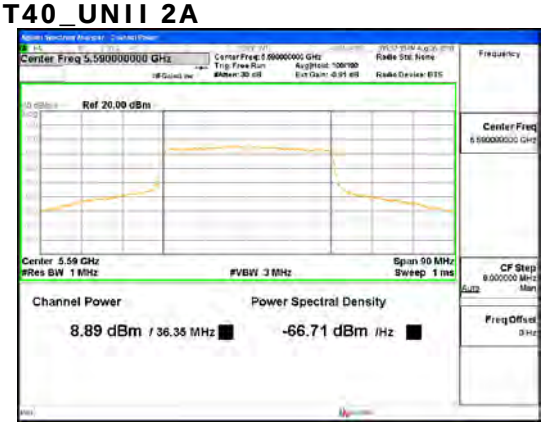
ANT0_802.11ac_VHT40_UNII 1





ANT0_802.11ac_VHT40_UNII 2A





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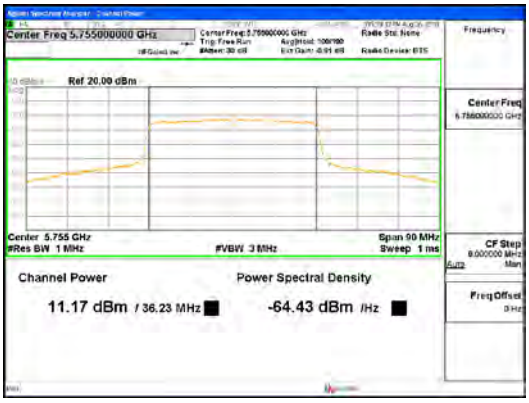
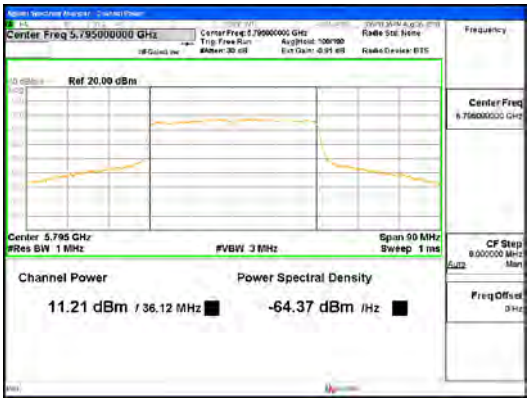
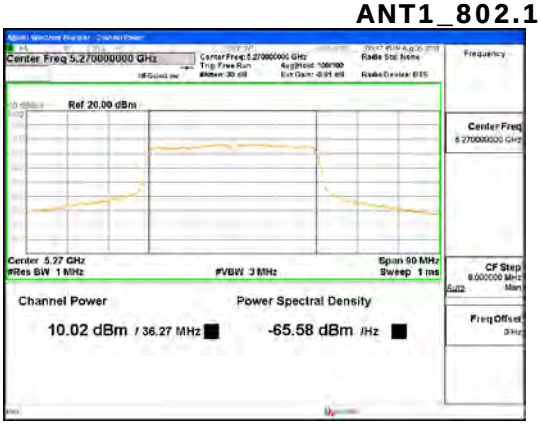
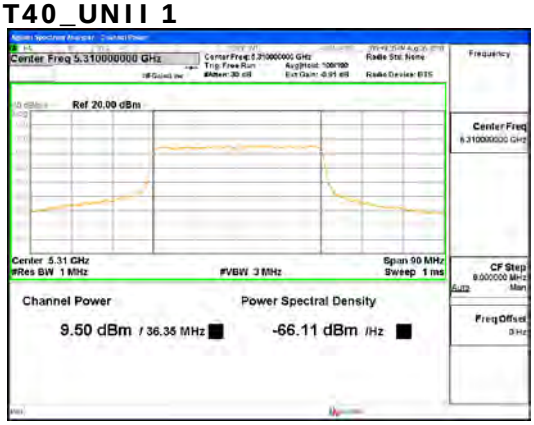




ANT0_802.11ac_VHT40_UNII 3

ANT1_802.11ac_VHT40_UNII 1





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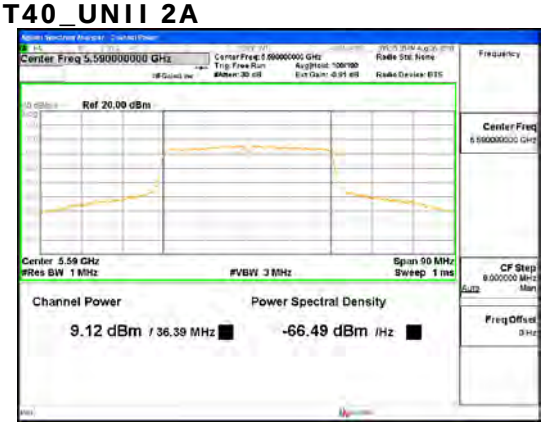

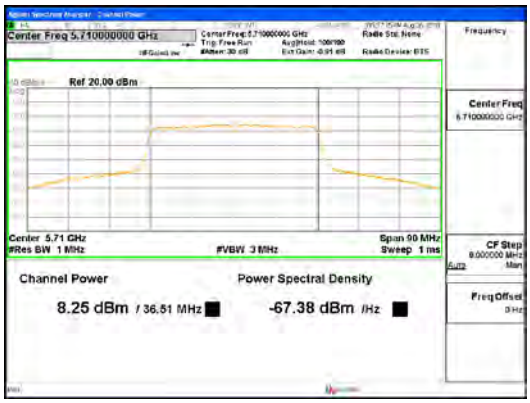

ANT1_802.11ac_VHT40_UNII 2C

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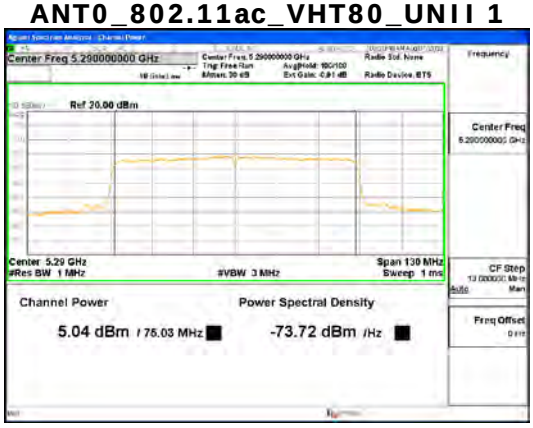
ANT0_802.11ac_VHT80_UNII 1



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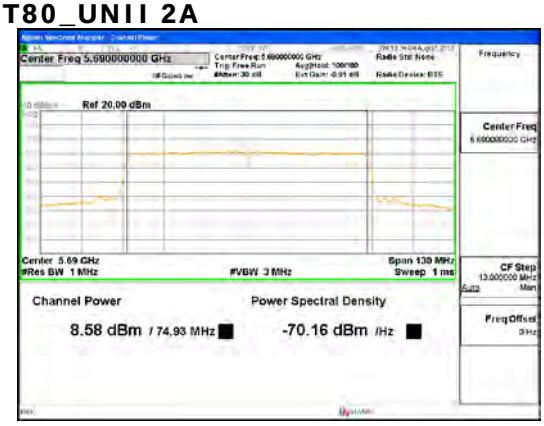
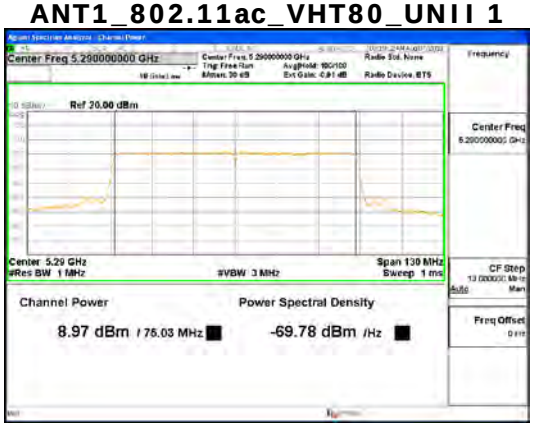


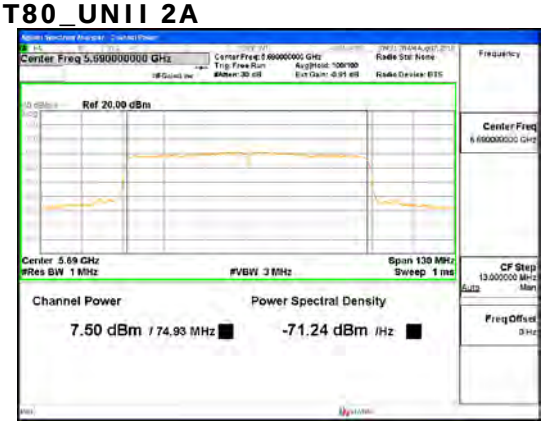
ANT0_802.11ac_VHT80_UNII 2C

ANT0_802.11ac_VHT80_UNII 3

ANT1_802.11ac_VHT80_UNII 1



ANT1_802.11ac_VHT80_UNII 2A



ANT1_802.11ac_VHT80_UNII 2C

ANT1_802.11ac_VHT80_UNII 3