

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

Report No.:
CTK-2018-02347
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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea
- Date of Receipt : 2018-05-24

2. Manufacturer

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea

3. Use of Report : For FCC Certification

4. Test Sample / Model: WLAN Access Point / WEA554d


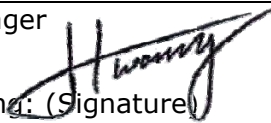
5. Date of Test : 2018-06-07 to 2018-07-27

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

7. Testing Environment: Temp.: (24 ± 5) °C, Humidity: (48 ± 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)	

2018-08-01

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



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REPORT REVISION HISTORY

Date	Revision	Page No
2018-08-01	Issued (CTK-2018-02347)	all

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1. General Product Description

1.1 Client Information

Company	Samsung Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu Suwon-si, Gyeonggi-do, 16677 Republic of Korea
Contact Person	Name : Kim, Jong-in E-mail : jered.kim@samsung.com Tel : +82-31-279-3096 Fax : -

1.2 Product Information

FCC ID	A3LWEA554
Product Description	WLAN Access Point
Model name	WEA554i
Variant Model name	WEA554d
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	802.11a : 20.85 dBm (121.60 mW) 802.11n_HT20 : 20.51 dBm (112.55 mW) 802.11n_HT40 : 20.75 dBm (118.95 mW) 802.11ac_VHT20 : 20.50 dBm (112.10 mW) 802.11ac_VHT40 : 20.70 dBm (117.54 mW) 802.11ac_VHT80 : 20.87 dBm (122.29 mW)
Antenna Specification	Antenna type : Directional Antenna <Antenna Peak Gain> ANT0 : 7.91 dBi ANT1 : 7.89 dBi ANT2 : 7.85 dBi ANT3 : 7.93 dBi
Type of Modulation	OFDM
Data Rate	802.11a : 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps 802.11n : up to 600 Mbps 802.11ac : up to 1.7 Gbps
Power Source	DC 48 V (PoE)
Hardware Rev	PCS01C
Software Rev	4.10.16.R



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1.3 Model Differences

WEA554i and WEA554d are no technical difference from each model only except for Model name and Antenna because of marketing purposes.

1.4 Peripheral Devices





Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6N
AC/DC Adapter	HP	HSTNN-CA40	-
PoE Injector	Shenzhen yichen technology development Co., Ltd.	NEXT-PEG4806JT	-

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.



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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	< 1 W (5 150 – 5 250 MHz) < 1 W (5 725 – 5 850 MHz)	C	
15.407(a)(1)	Power Spectral Density	< 17 dBm/MHz (5 150 – 5 250 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) < -17 dBm/MHz EIRP (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
<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

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	DSSS	1 Mbps	97.6%	0.11 dB
802.11n_HT20	OFDM	MCS 0	99.1%	0 dB (≥ 98%)
802.11n_HT40	OFDM	MCS 0	97.7%	0.10 dB
802.11ac_VHT20	OFDM	MNSS 0	99.1%	0 dB (≥ 98%)
802.11ac_VHT40	OFDM	MNSS 0	97.9%	0.09 dB
802.11ac_VHT80	OFDM	MNSS 0	94.7%	0.24 dB



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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 ($f \leq 1$ 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

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 $\geq 3 \times$ 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:

ANTO

		6 dB Bandwidth (MHz)		
Mode		802.11a	802.11n_HT20	802.11ac_VHT20
Frequency				
5 745 MHz		16.37	17.60	17.65
5 785 MHz		16.35	17.65	17.59
5 825 MHz		16.39	17.61	17.63
Measurement uncertainty		± 0.1 MHz		

		6 dB Bandwidth (MHz)	
Mode		802.11n_HT40	802.11ac_VHT40
Frequency			
5 755 MHz		35.66	35.73
5 795 MHz		34.70	35.69
Measurement uncertainty		± 0.1 MHz	

		6 dB Bandwidth (MHz)
Mode		802.11ac_VHT80
Frequency		
5 775 MHz		76.18
Measurement uncertainty		± 0.1 MHz

ANT1

		6 dB Bandwidth (MHz)		
Mode		802.11a	802.11n_HT20	802.11ac_VHT20
Frequency				
5 745 MHz		16.36	17.61	17.61
5 785 MHz		16.36	17.65	17.56
5 825 MHz		16.35	17.56	17.59
Measurement uncertainty		± 0.1 MHz		



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6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	36.00	36.33
5 795 MHz	36.32	36.39
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.46
Measurement uncertainty	± 0.1 MHz

ANT2

6 dB Bandwidth (MHz)			
Mode	802.11a	802.11n_HT20	802.11ac_VHT20
Frequency			
5 745 MHz	16.39	17.60	17.58
5 785 MHz	16.35	17.60	17.62
5 825 MHz	16.37	17.62	17.57
Measurement uncertainty	± 0.1 MHz		

6 dB Bandwidth (MHz)		
Mode	802.11n_HT40	802.11ac_VHT40
Frequency		
5 755 MHz	35.97	36.30
5 795 MHz	35.72	36.36
Measurement uncertainty	± 0.1 MHz	

6 dB Bandwidth (MHz)	
Mode	802.11ac_VHT80
Frequency	
5 775 MHz	76.42
Measurement uncertainty	± 0.1 MHz



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ANT3

		6 dB Bandwidth (MHz)		
Mode		802.11a	802.11n_HT20	802.11ac_VHT20
Frequency				
5 745 MHz		16.36	17.59	17.56
5 785 MHz		16.37	17.65	17.56
5 825 MHz		16.37	17.54	17.56
Measurement uncertainty		± 0.1 MHz		

		6 dB Bandwidth (MHz)	
Mode		802.11n_HT40	802.11ac_VHT40
Frequency			
5 755 MHz		35.12	36.32
5 795 MHz		36.28	36.28
Measurement uncertainty		± 0.1 MHz	

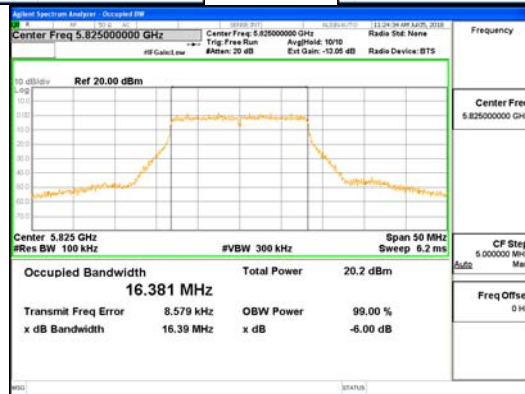
		6 dB Bandwidth (MHz)
Mode		802.11ac_VHT80
Frequency		
5 775 MHz		76.43
Measurement uncertainty		± 0.1 MHz

See next pages for actual measured spectrum plots.



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ANTO_802.11a

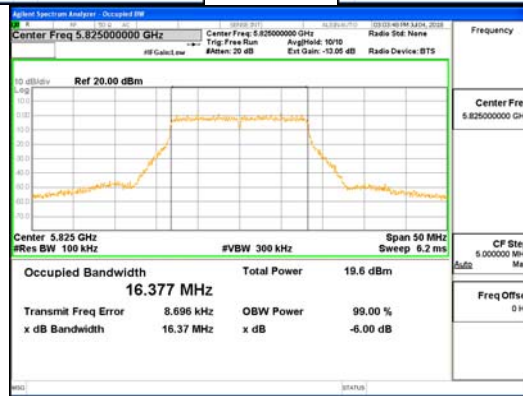
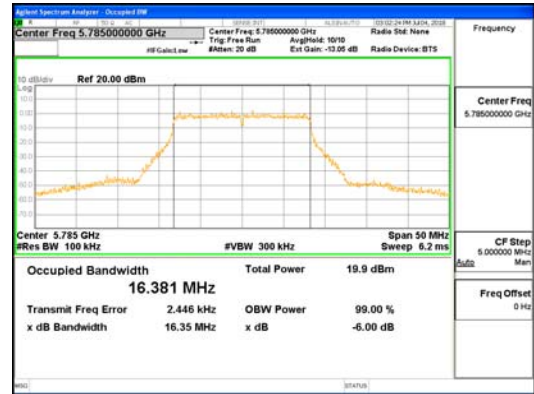
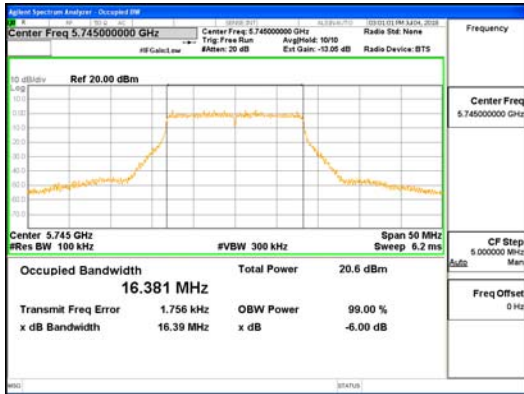


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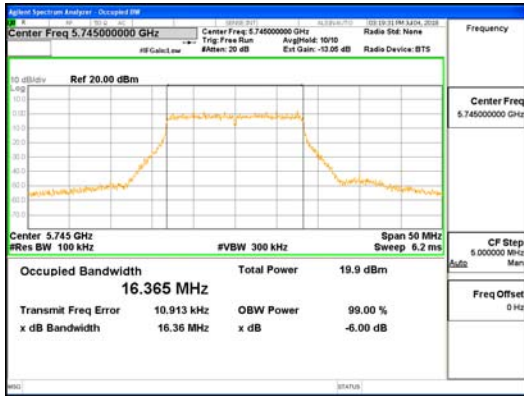


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ANT2_802.11a



ANT3_802.11a

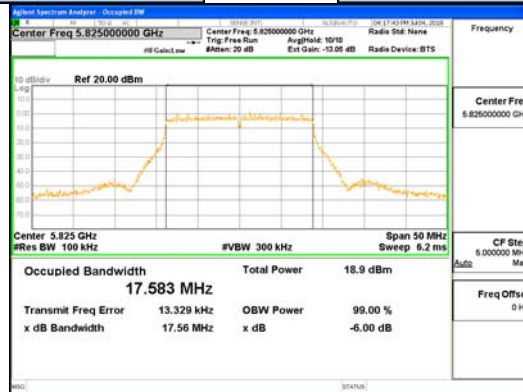
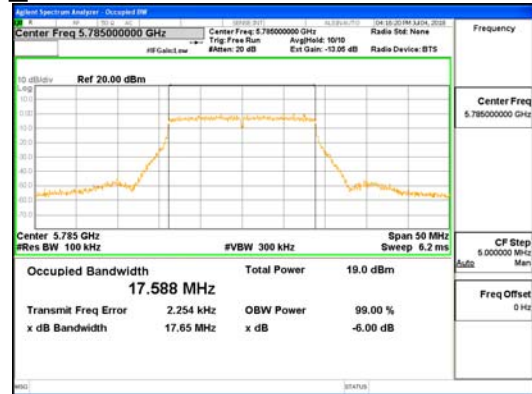


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ANTO_802.11n_HT20

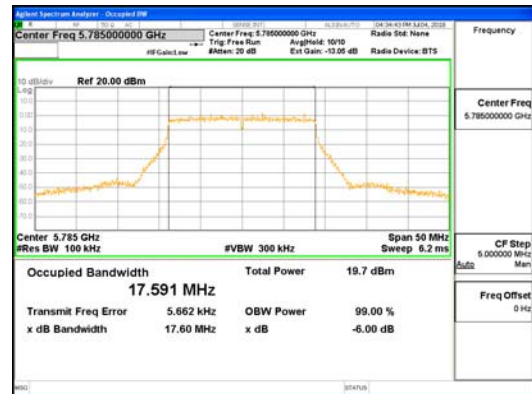


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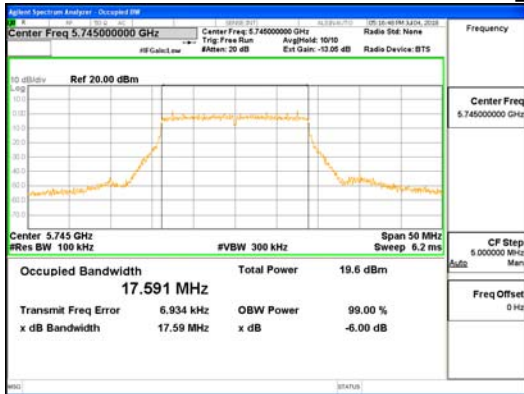


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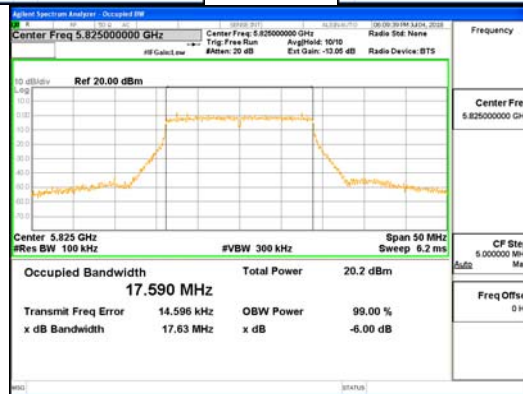


ANT3_802.11n_HT20



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ANTO_802.11ac_VHT20

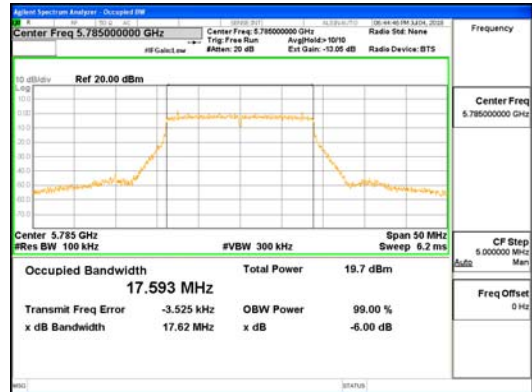


ANT1_802.11ac_VHT20



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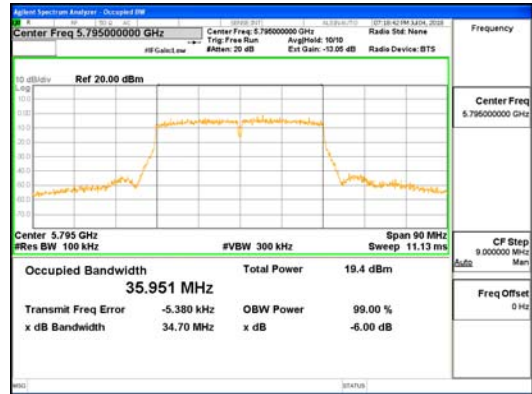
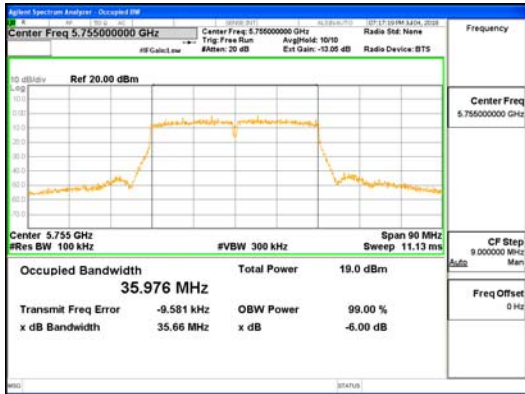
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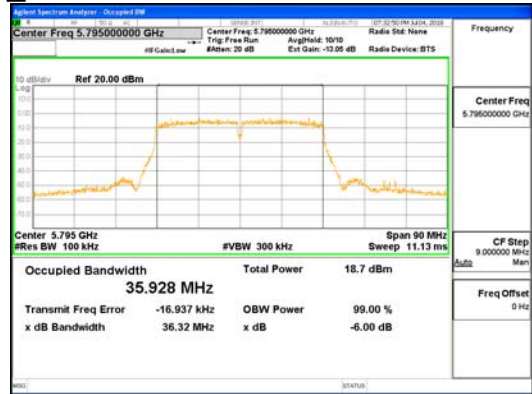
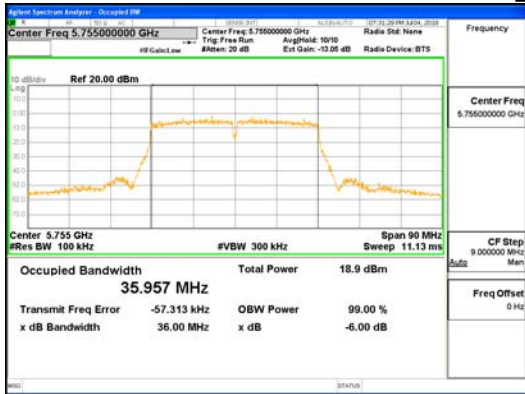
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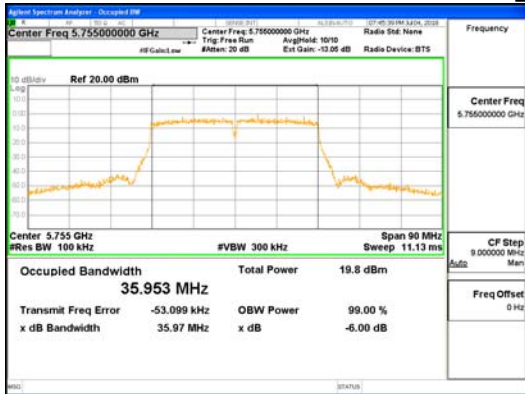
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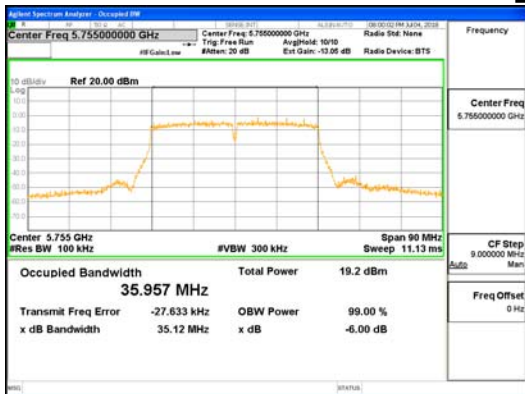
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ANT1_802.11n_HT40



ANT2_802.11n_HT40

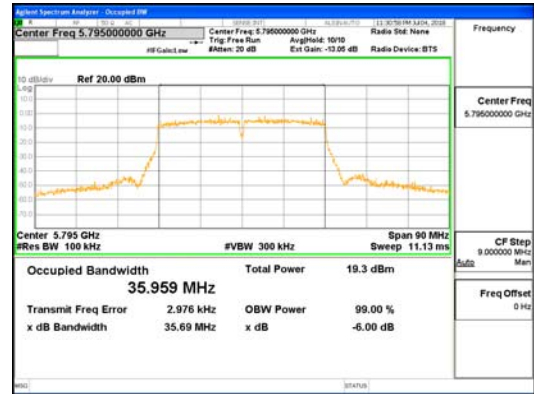
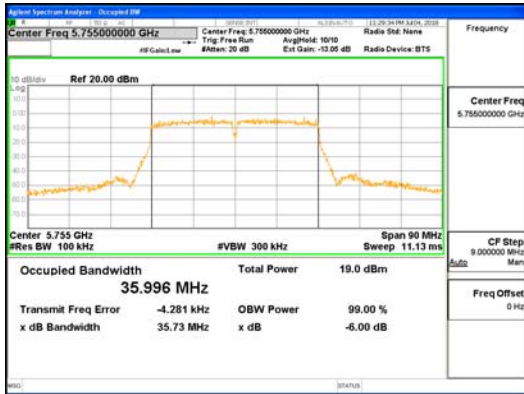


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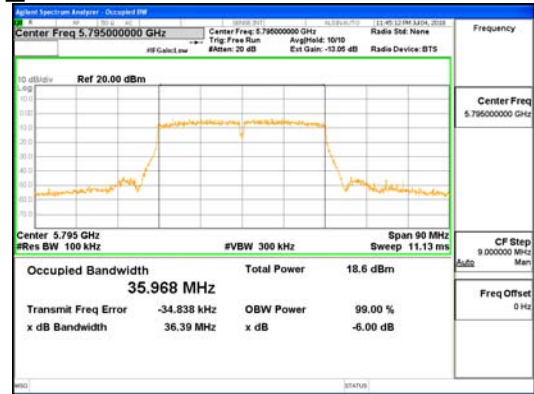
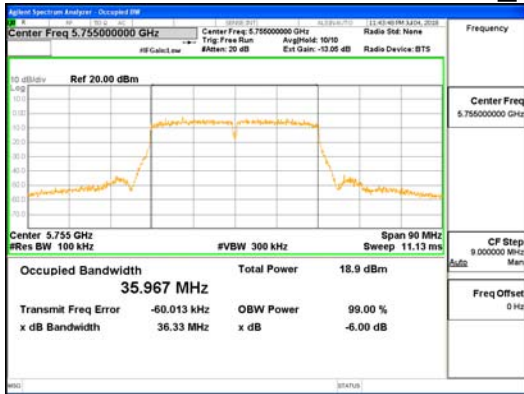


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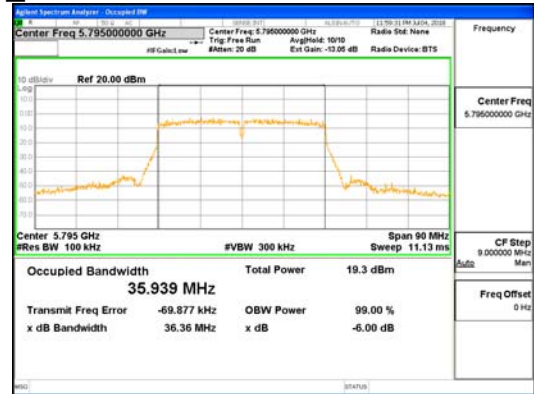
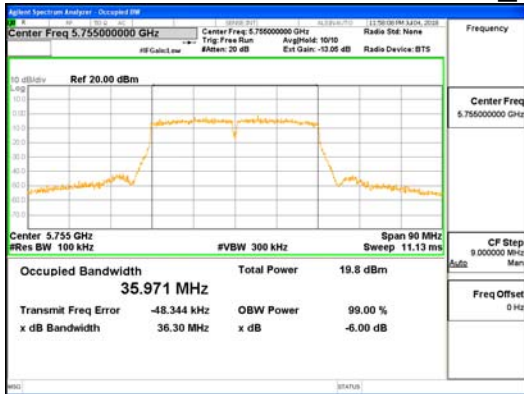
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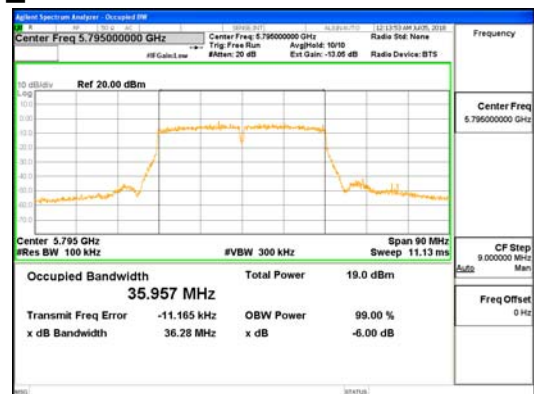
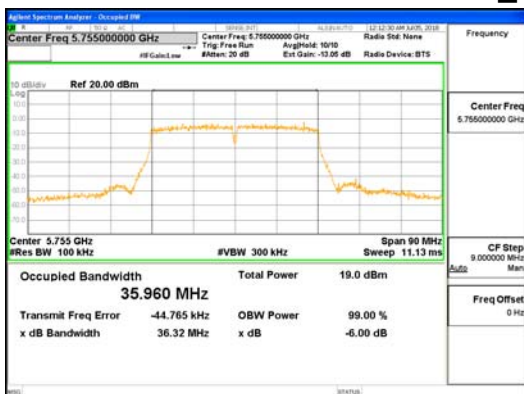
ANTO_802.11ac_VHT40



ANT1_802.11ac_VHT40



ANT2_802.11ac_VHT40



ANT3_802.11ac_VHT40



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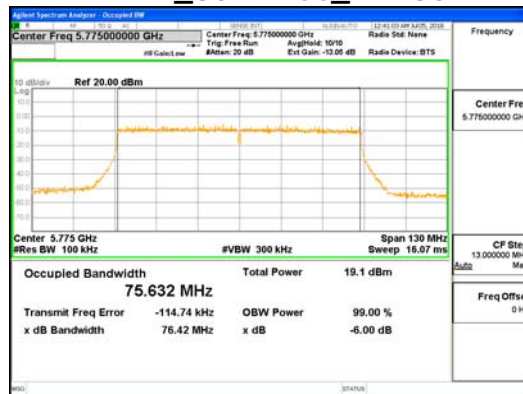
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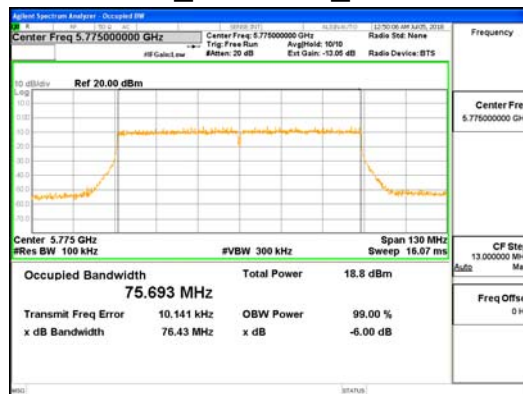
ANTO_802.11ac_VHT80



ANT1_802.11ac_VHT80



ANT2_802.11ac_VHT80



ANT3_802.11ac_VHT80



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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 \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



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Test Data:

ANTO

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	20.22	17.11	21.54	18.15	21.27	18.15
5 200 MHz	20.70	17.09	21.29	18.15	21.52	18.12
5 240 MHz	20.76	17.10	21.44	18.14	21.51	18.16
5 745 MHz	20.16	16.64	21.05	17.76	20.75	17.78
5 785 MHz	20.14	16.67	20.95	17.77	21.01	17.78
5 825 MHz	20.21	16.65	20.91	17.76	20.79	17.78
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	39.98	36.07	40.41	36.06
5 230 MHz	40.06	36.07	40.43	36.06
5 755 MHz	39.59	35.91	39.64	35.95
5 795 MHz	39.65	35.91	39.87	35.88
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	83.03	75.79
5 775 MHz	81.89	75.77
Measurement uncertainty	± 0.1 MHz	



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	20.59	17.07	21.39	18.14	21.37	18.15
5 200 MHz	20.54	17.07	21.48	18.16	21.27	18.16
5 240 MHz	20.90	17.13	21.44	18.16	21.71	18.14
5 745 MHz	20.08	16.66	20.74	17.76	20.92	17.75
5 785 MHz	19.97	16.66	20.83	17.77	20.82	17.77
5 825 MHz	20.13	16.66	20.85	17.77	21.00	17.77
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	40.32	36.08	40.19	36.05
5 230 MHz	40.35	36.09	40.29	36.06
5 755 MHz	39.65	35.89	39.38	35.90
5 795 MHz	39.41	35.91	39.61	35.88
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	83.00	75.90
5 775 MHz	81.92	75.82
Measurement uncertainty	± 0.1 MHz	



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	20.59	17.10	21.54	18.14	21.60	18.16
5 200 MHz	20.66	17.13	21.45	18.15	21.42	18.12
5 240 MHz	20.74	17.11	21.50	18.15	21.23	18.15
5 745 MHz	20.22	16.65	20.78	17.76	21.20	17.76
5 785 MHz	19.98	16.67	20.91	17.78	20.89	17.76
5 825 MHz	20.16	16.67	20.99	17.79	20.90	17.79
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	40.30	36.06	40.08	36.07
5 230 MHz	40.04	36.09	40.25	36.07
5 755 MHz	39.53	35.91	39.69	35.92
5 795 MHz	39.64	35.89	39.65	35.87
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	82.88	75.87
5 775 MHz	81.77	75.75
Measurement uncertainty	± 0.1 MHz	



ANT3

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	20.79	17.11	21.43	18.16	21.47	18.19
5 200 MHz	20.82	17.13	21.29	18.15	21.48	18.20
5 240 MHz	20.64	17.10	21.45	18.13	21.53	18.15
5 745 MHz	20.14	16.63	20.69	17.78	20.83	17.75
5 785 MHz	20.08	16.66	20.92	17.76	20.75	17.77
5 825 MHz	20.18	16.66	20.95	17.78	20.96	17.77
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	40.38	36.09	40.21	36.09
5 230 MHz	40.06	36.07	40.02	36.06
5 755 MHz	39.67	35.88	39.81	35.90
5 795 MHz	39.45	35.90	39.49	35.87
Measurement uncertainty	± 0.1 MHz			

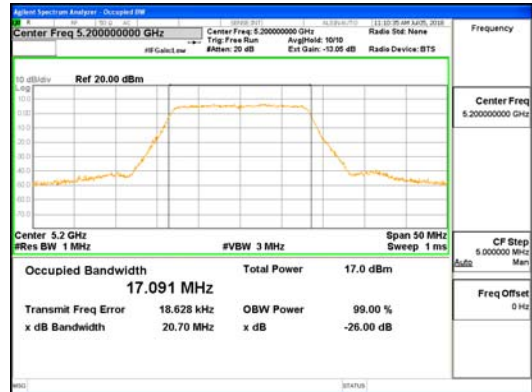
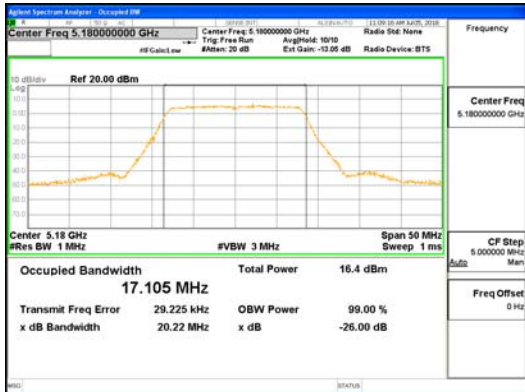
Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 210 MHz	82.85	75.81
5 775 MHz	82.14	75.79
Measurement uncertainty	± 0.1 MHz	

See next pages for actual measured spectrum plots.



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ANTO_802.11a_UNII-3

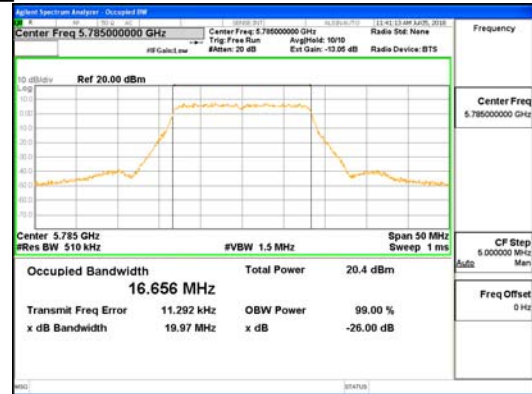


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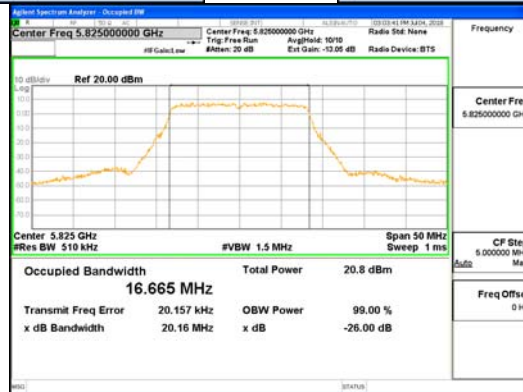


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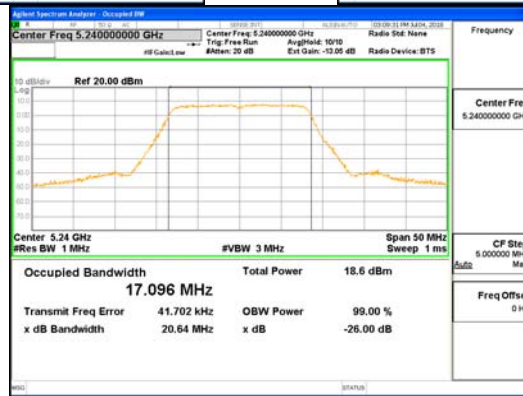
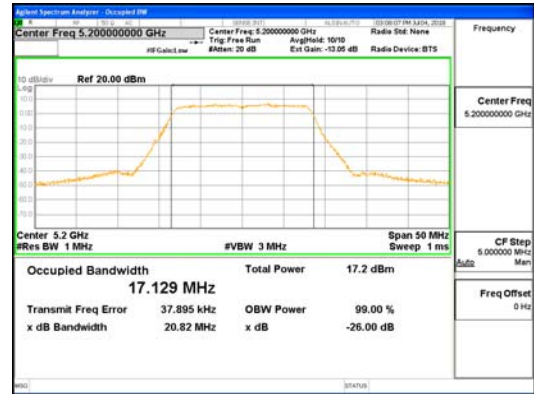
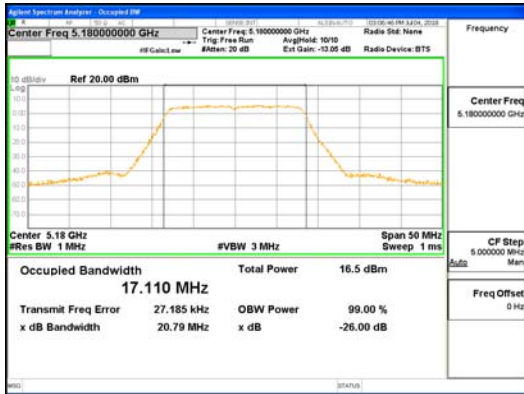


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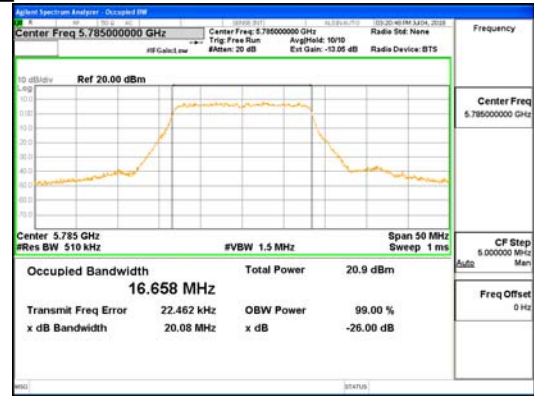
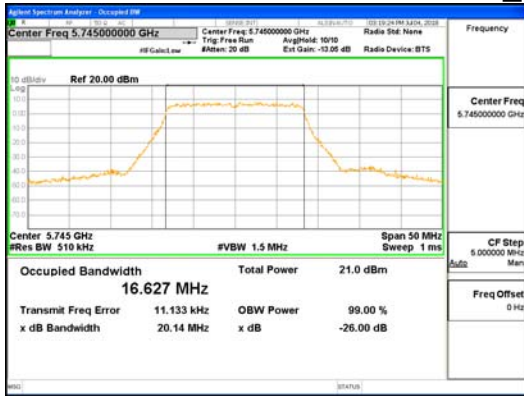


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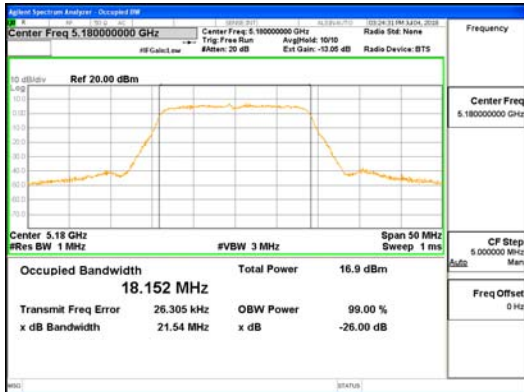


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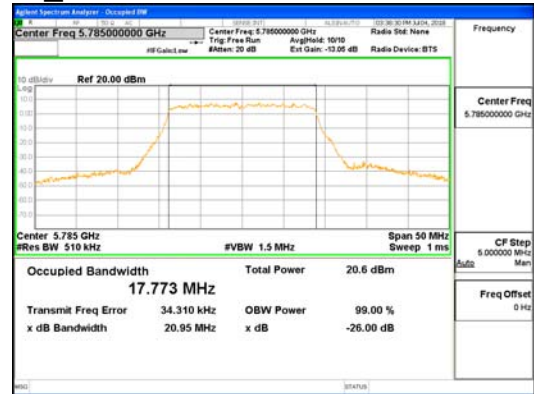


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ANTO_802.11n_HT20_UNII-1

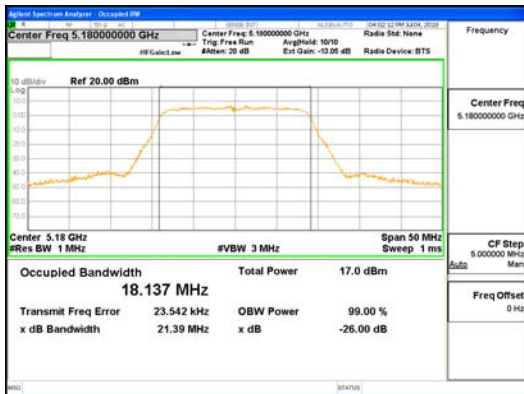


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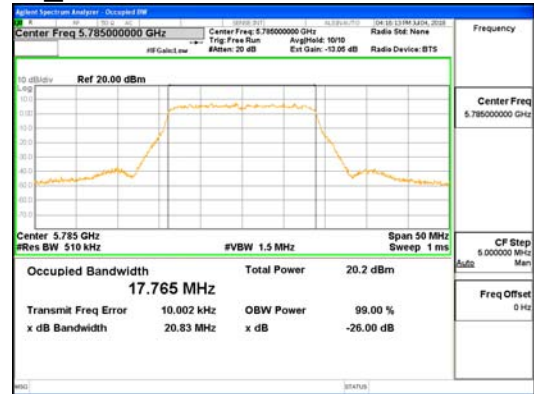


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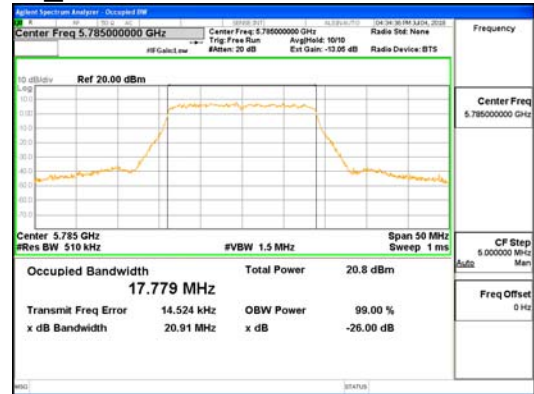


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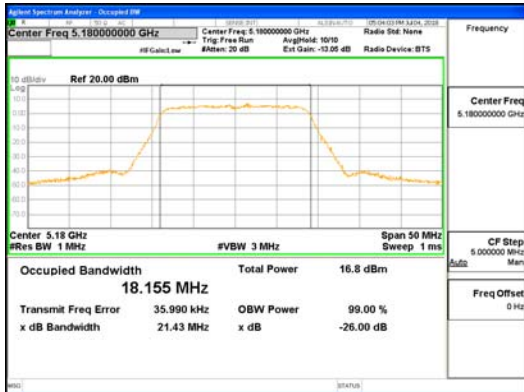


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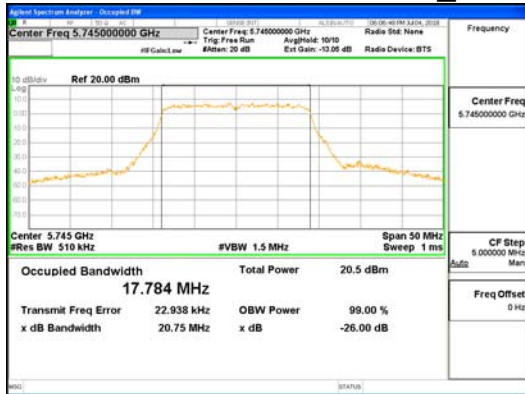


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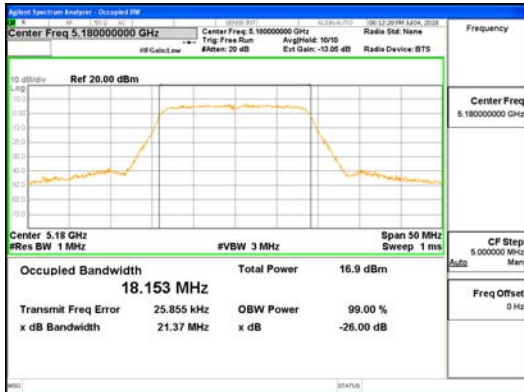


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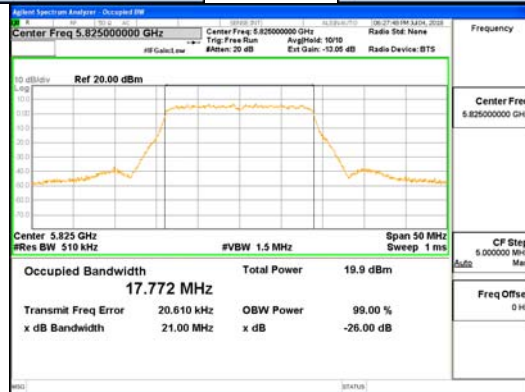


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ANT1_802.11ac_VHT20_UNII-1



ANT1_802.11ac_VHT20_UNII-3



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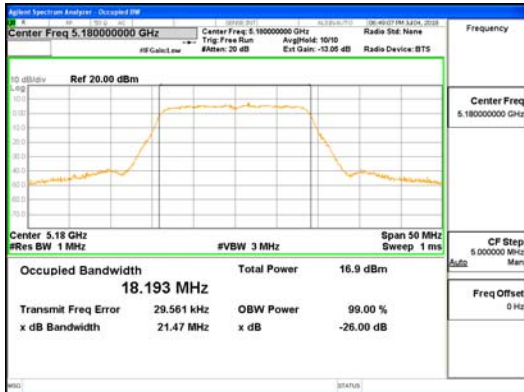


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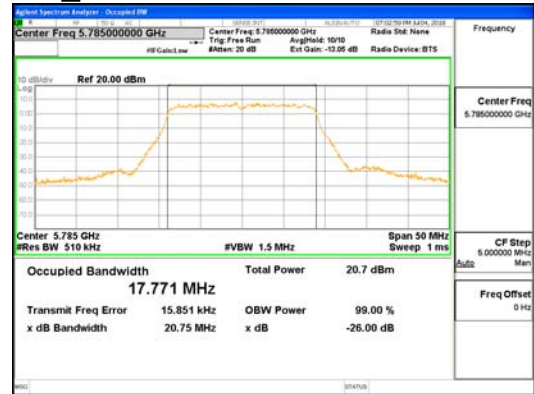
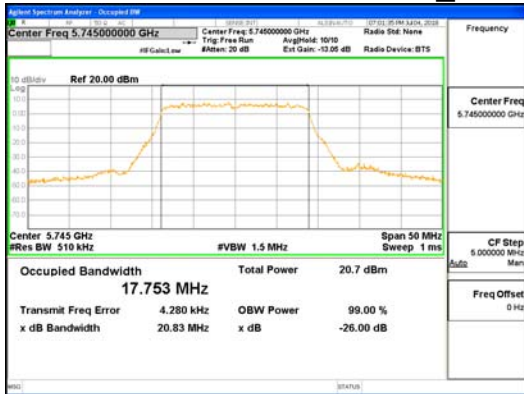


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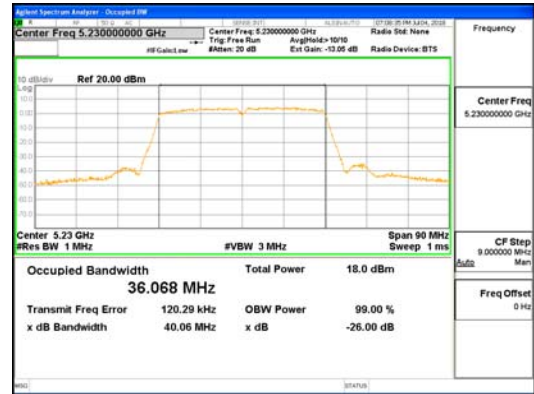
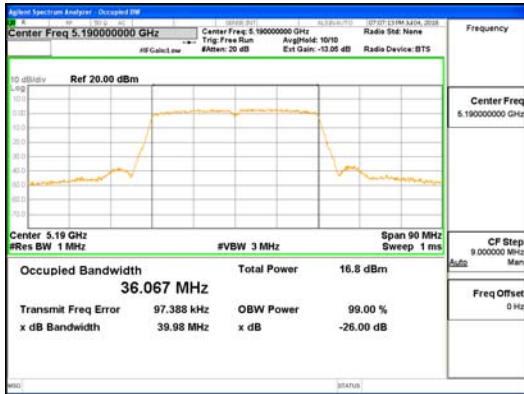
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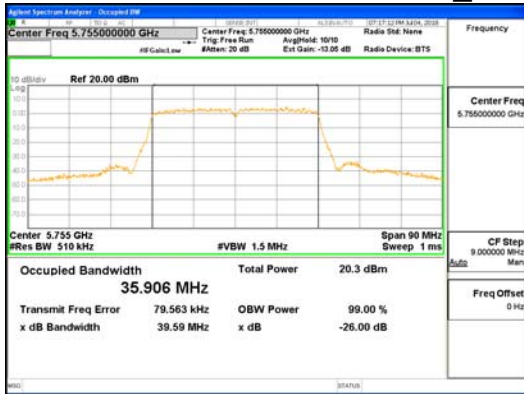
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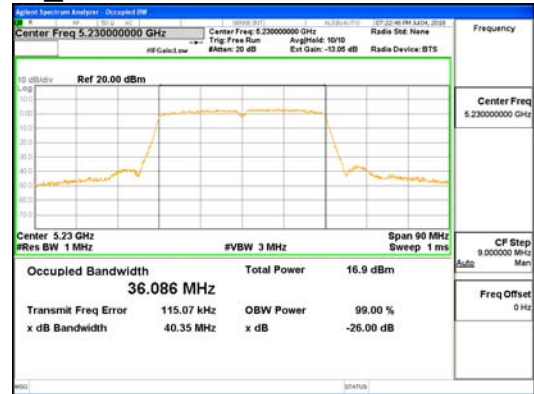
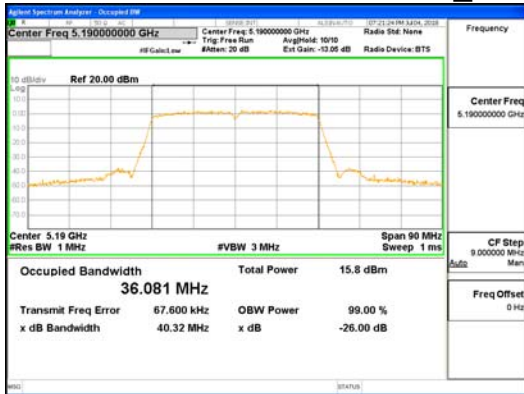
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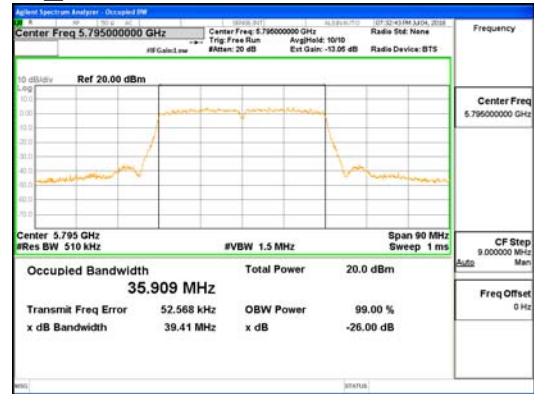
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ANTO_802.11n_HT40_UNII-3



ANT1_802.11n_HT40_UNII-1



ANT1_802.11n_HT40_UNII-3



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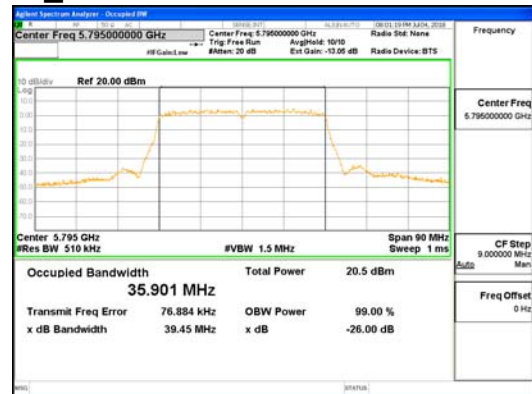
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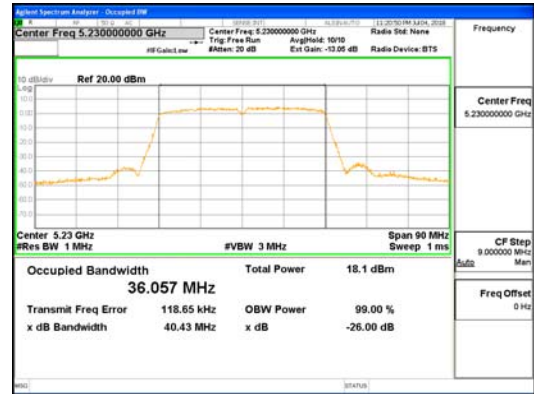
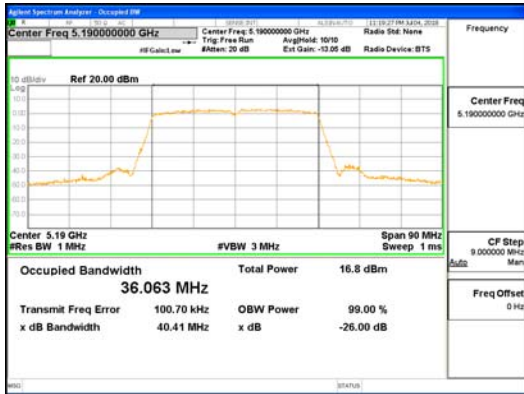
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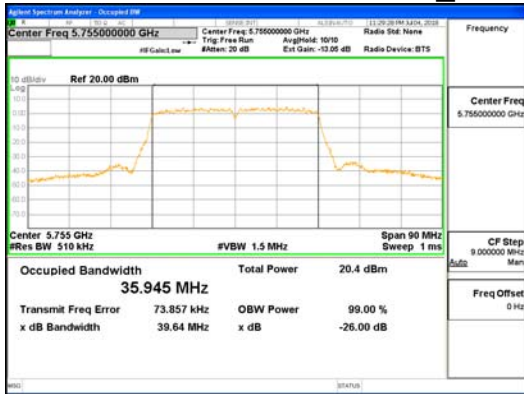
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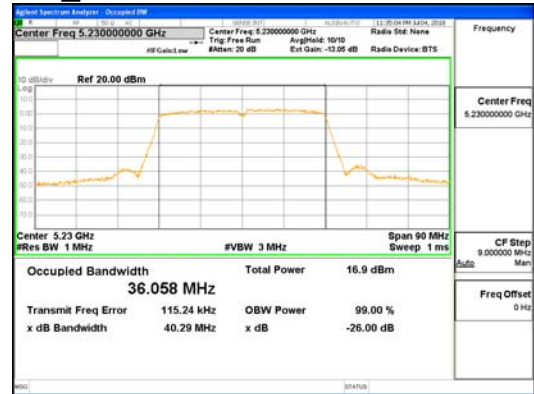
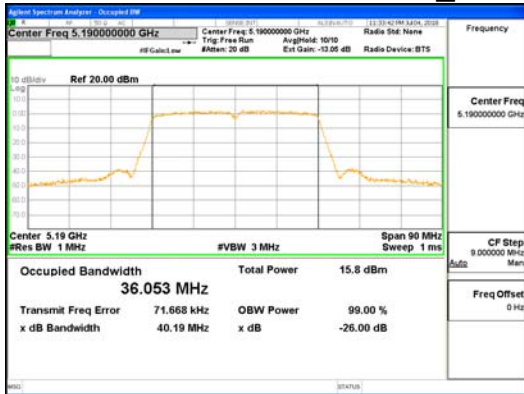
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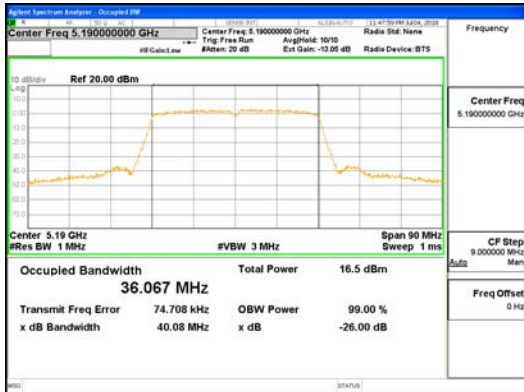


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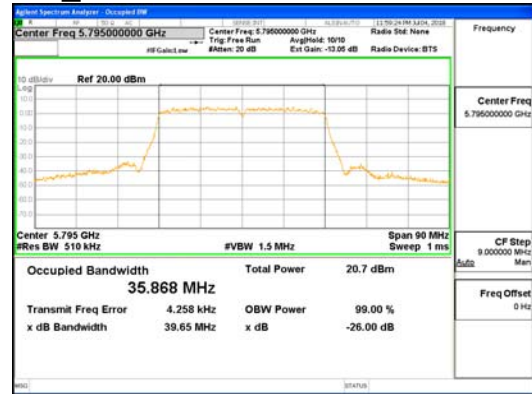
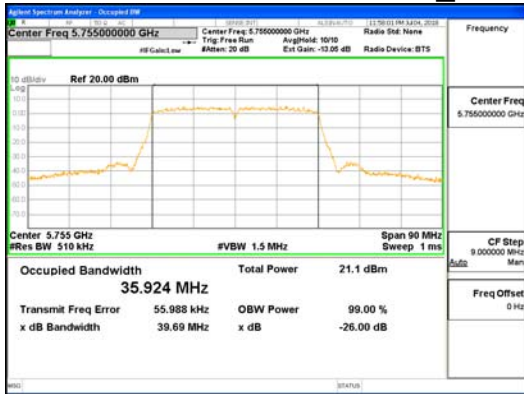


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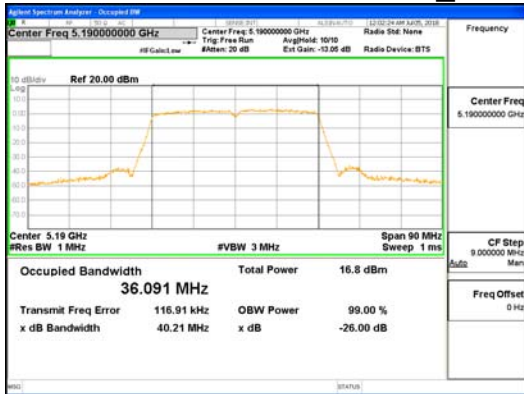
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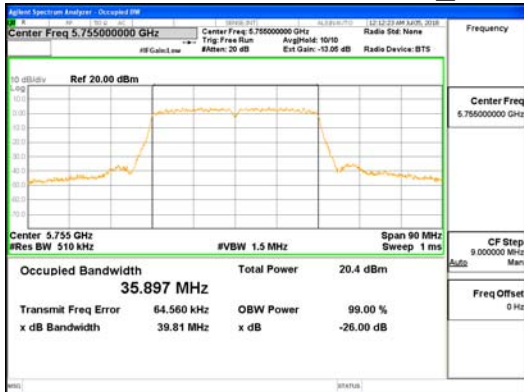
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ANT2_802.11ac_VHT40_UNII-3



ANT3_802.11ac_VHT40_UNII-1



ANT2_802.11ac_VHT40_UNII-3



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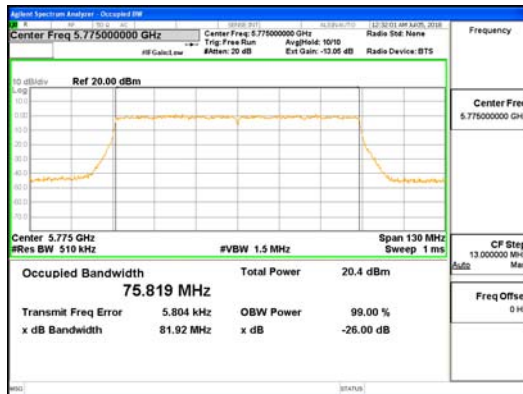
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ANTO_802.11ac_VHT80_UNII-3



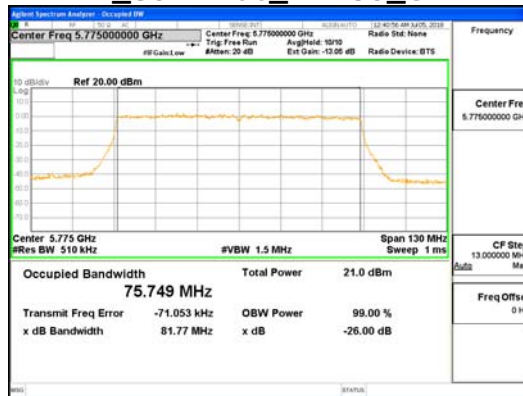
ANT1_802.11ac_VHT80_UNII-1



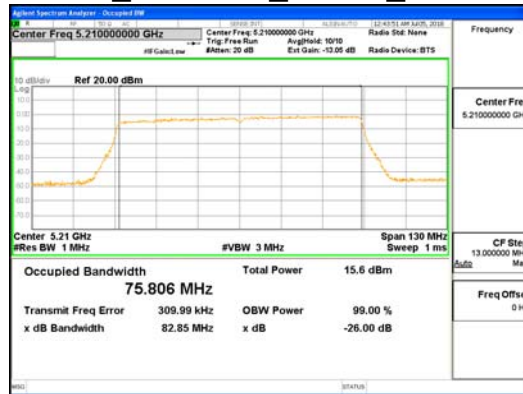
ANT1_802.11ac_VHT80_UNII-3



ANT2_802.11ac_VHT80_UNII-1



ANT2_802.11ac_VHT80_UNII-3



ANT3_802.11ac_VHT80_UNII-1



ANT3_802.11ac_VHT80_UNII-3