

TEST REPORT



CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu,
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Report No.:
CTK-2018-02348
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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 / ISED Certification

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


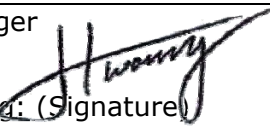
5. Date of Test : 2018-06-07 to 2018-07-27

6. Test Standard(method) used : FCC 47 CFR part 15 subpart E 15.407
ISED RSS-247

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  Ji-Hye Kim: (Signature)	Technical Manager  Won-Jae, Hwang: (Signature)
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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-2018-02348)	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
Certification Number ISED	649E-WEA554
Product Description	WLAN Access Point
Model name	WEA554i
Variant Model name	WEA554d
Operating Frequency	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) 5 250 MHz (160 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) 5 570 MHz (160 MHz_BW)
RF Output Power	802.11a : 12.69 dBm (18.58 mW) 802.11n_HT20 : 13.21 dBm (20.96 mW) 802.11n_HT40 : 14.84 dBm (30.49 mW) 802.11ac_VHT20 : 13.22 dBm (20.99 mW) 802.11ac_VHT40 : 14.84 dBm (30.49 mW) 802.11ac_VHT80 : 15.37 dBm (34.47 mW) 802.11ac_VHT160 : 15.40 dBm (34.67 mW)
Antenna Specification	ANT type : Directional Antenna <ANT 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 3.4 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.

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	-





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2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

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	< 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
15.407(a)(1)	Power Spectral Density	< 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
15.407(g)	Frequency Stability	NA	C	
15.407 (b)	Undesirable emission	< -27 dBm/MHz EIRP (5250 – 5350 MHz, 5470 – 5725 MHz) < -17 dBm/MHz EIRP (5715 – 5725 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.				



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ISED Part Section(s)	Requirement(s)	Limit	Status (Note 1)	Test Condition
RSS-Gen 4.6.1	6 dB Bandwidth	> 500 kHz	C	Conducted
RSS-Gen 4.6.1	26 dB Bandwidth and 99% Bandwidth	NA	C	
RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1	Conducted Output Power	< 250 mW (5 250 – 5 350 MHz, 5 470 – 5 725 MHz)	C	
RSS-247 6.2.1.1, 6.2.2.1, 6.2.3.1	Power Spectral Density	< 11 dBm/MHz (5 250 – 5 350 MHz, 5 470 – 5 725MHz)	C	
RSS-Gen 6.11	Frequency Stability	NA	C	
RSS-247 6.2.1.2, 6.2.2.2, 6.2.3.2	Undesirable emission	< -27 dBm/MHz EIRP (5 250 – 5 350 MHz, 5 470 – 5 725 MHz) < -17 dBm/MHz EIRP (5 715 – 5 725 MHz)	C	Radiated
RSS-Gen 6.13	Radiated Spurious Emission	RSS-247 5.5	C	
RSS-Gen 5	Receiver Spurious Emissions	RSS-Gen 7.1.2	C	
RSS-Gen 8.8	AC Conducted Emissions	RSS-Gen 8.8	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, RSS-247 Issue 2, 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 2A	5 260 MHz	5 300 MHz	5 320 MHz
UNII 2C	5 500 MHz	5 600 MHz	5 720 MHz

- 802.11n_HT40, 802.11ac_VHT40

	Lowest channel	Middle channel	Highest channel
UNII 2A	5 270 MHz	-	5 310 MHz
UNII 2C	5 510 MHz	5 590 MHz	5 710 MHz

- 802.11ac_VHT80

	Lowest channel	Middle channel	Highest channel
UNII 2A	5 290 MHz	-	-
UNII 2C	5 530 MHz	-	5 690 MHz

- 802.11ac_VHT160

	Lowest channel	Middle channel	Highest channel
UNII 2A	5 250 MHz	-	-
UNII 2C	5 570 MHz	-	-

Test mode

Test mode	Modulation	Data rate	Duty Cycle	Duty Cycle Factor
802.11a	OFDM	6 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
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
802.11ac_VHT160	OFDM	MNSS 0	97.5 %	0.11 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



4. Technical Characteristic Test

4.1 26 dB Bandwidth and 99% Bandwidth

Test Procedures

ANSI C63.10-2013 6.9.2
RSS-GEN Issue 4 6.6

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



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%
5 260 MHz	20.71	17.11	21.32	18.16	21.49	18.15
5 300 MHz	20.70	17.12	21.36	18.14	21.07	18.13
5 320 MHz	20.73	17.11	21.37	18.16	21.24	18.15
5 500 MHz	20.78	17.08	21.37	18.16	21.47	18.12
5 600 MHz	20.83	17.14	21.44	18.15	21.34	18.19
5 720 MHz	20.43	17.12	21.62	18.18	21.30	18.16
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 %
5 270 MHz	40.15	36.04	40.15	36.04
5 310 MHz	40.36	36.03	40.33	36.03
5 510 MHz	40.29	36.10	40.34	36.11
5 590 MHz	40.12	36.08	40.39	36.12
5 710 MHz	40.34	36.12	40.47	36.11
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 290 MHz	82.60	75.70
5 530 MHz	82.79	75.84
5 690 MHz	82.92	75.90
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%
5 260 MHz	20.64	17.08	21.23	18.15	21.51	18.15
5 300 MHz	20.39	17.07	21.48	18.13	21.38	18.16
5 320 MHz	20.66	17.07	21.30	18.14	21.21	18.15
5 500 MHz	20.85	17.08	21.31	18.14	21.49	18.14
5 600 MHz	20.89	17.09	21.39	18.16	21.38	18.17
5 720 MHz	20.79	17.13	21.38	18.16	21.60	18.14
Measurement uncertainty	± 0.1 MHz					

26 dB Bandwidth and 99% Bandwidth (MHz)				
Mode	802.11n_HT40		802.11ac_VHT40	
Frequency	26 dB	99 %	26 dB	99 %
5 270 MHz	40.13	36.08	40.18	36.05
5 310 MHz	40.29	36.05	40.25	36.03
5 510 MHz	40.28	36.08	40.38	36.08
5 590 MHz	40.14	36.09	40.22	36.11
5 710 MHz	40.31	36.09	40.23	36.09
Measurement uncertainty	± 0.1 MHz			

26 dB Bandwidth and 99% Bandwidth (MHz)		
Mode	802.11ac_VHT80	
Frequency	26 dB	99 %
5 290 MHz	82.63	75.76
5 530 MHz	82.98	75.84
5 690 MHz	82.76	75.83
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%
5 260 MHz	20.74	17.09	21.19	18.11	21.34	18.16
5 300 MHz	20.74	17.11	21.45	18.14	21.38	18.16
5 320 MHz	20.69	17.11	21.49	18.14	21.33	18.17
5 500 MHz	20.70	17.14	21.34	18.17	21.53	18.16
5 600 MHz	20.64	17.12	21.34	18.17	21.44	18.17
5 720 MHz	20.73	17.13	21.36	18.17	21.36	18.19
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 %
5 270 MHz	40.14	36.06	40.18	36.04
5 310 MHz	40.23	36.06	40.17	36.02
5 510 MHz	40.40	36.10	40.26	36.12
5 590 MHz	40.32	36.07	40.09	36.08
5 710 MHz	40.36	36.08	40.49	36.09
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 290 MHz	82.62	75.77
5 530 MHz	82.78	75.88
5 690 MHz	82.33	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%
5 260 MHz	20.71	17.09	21.45	18.17	21.31	18.13
5 300 MHz	20.57	17.12	21.42	18.15	21.58	18.14
5 320 MHz	20.67	17.10	21.45	18.14	21.25	18.12
5 500 MHz	20.81	17.11	21.23	18.17	21.48	18.17
5 600 MHz	20.71	17.11	21.72	18.17	21.47	18.15
5 720 MHz	20.74	17.12	21.57	18.18	21.52	18.16
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 %
5 270 MHz	40.28	36.06	40.31	36.07
5 310 MHz	40.48	36.09	40.48	36.07
5 510 MHz	40.20	36.06	40.25	36.07
5 590 MHz	40.33	36.10	40.17	36.08
5 710 MHz	40.12	36.10	40.23	36.10
Measurement uncertainty	± 0.1 MHz			

Mode	26 dB Bandwidth and 99% Bandwidth (MHz)	
	802.11ac_VHT80	
	26 dB	99 %
5 290 MHz	82.54	75.73
5 530 MHz	82.59	75.81
5 690 MHz	82.98	75.81
Measurement uncertainty	± 0.1 MHz	



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ANTO + ANT2

	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT160	
Frequency	26 dB	99 %
5 250 MHz	162.40	154.20
5 570 MHz	162.50	154.63
Measurement uncertainty	± 0.1 MHz	

ANT1 + ANT3

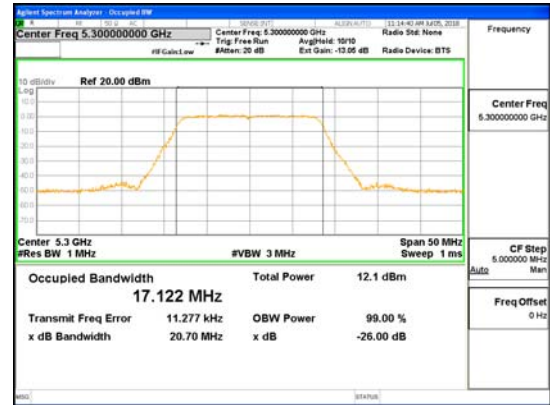
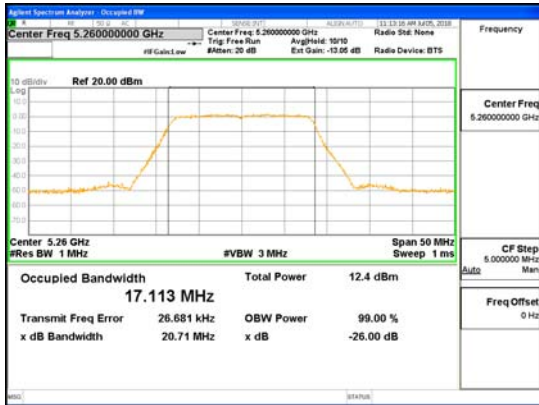
	26 dB Bandwidth and 99% Bandwidth (MHz)	
Mode	802.11ac_VHT160	
Frequency	26 dB	99 %
5 250 MHz	163.10	154.52
5 570 MHz	162.90	154.15
Measurement uncertainty	± 0.1 MHz	

See next pages for actual measured spectrum plots.

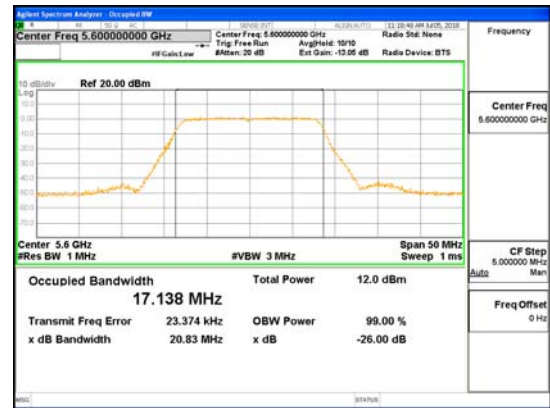
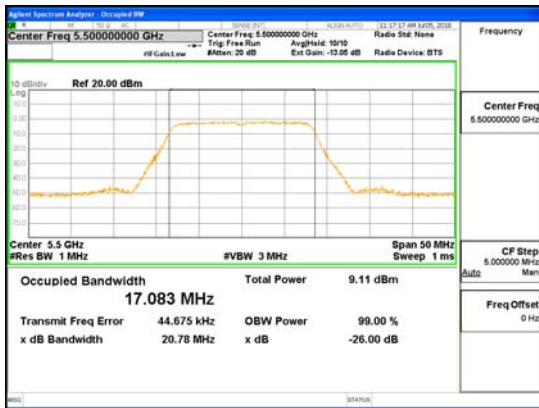


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ANTO_802.11a_UNI I 2A

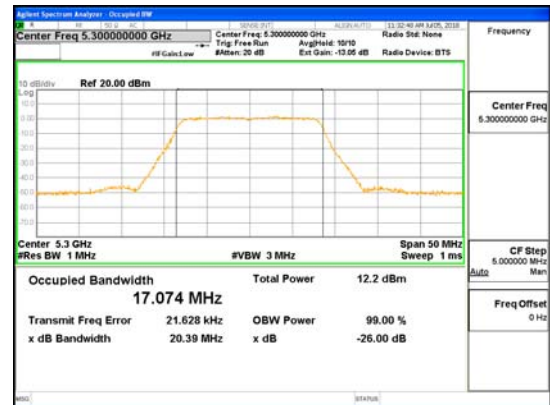


ANTO_802.11a_UNI I 2C

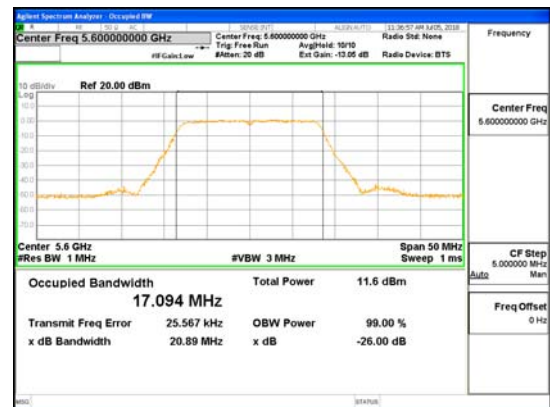


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ANT1_802.11a_UNI1 2A

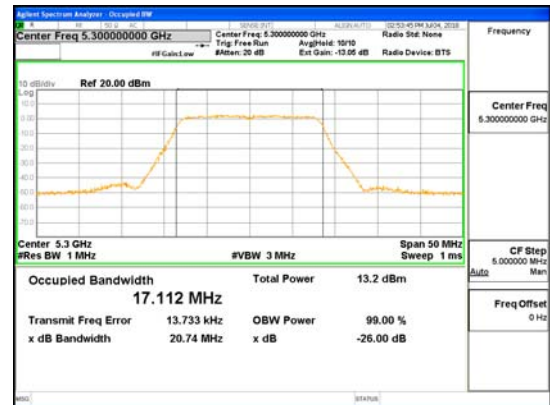
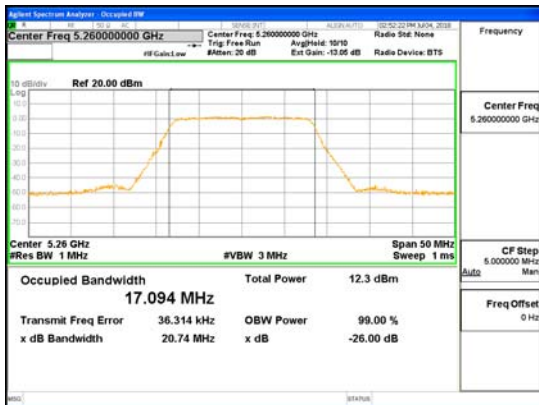


ANT1_802.11a_UNI1 2C

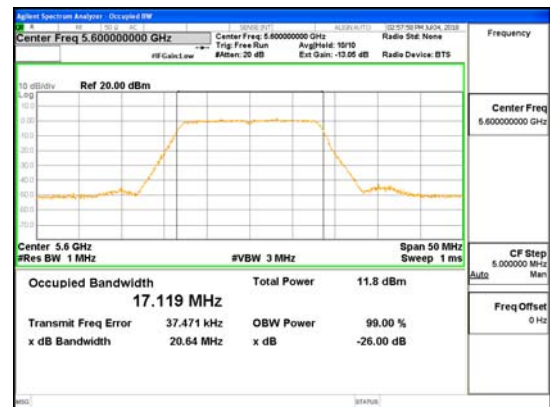
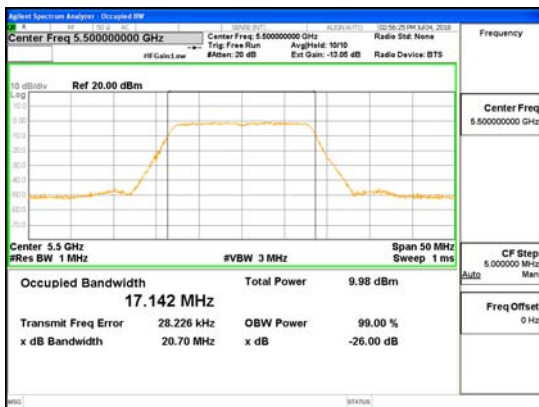


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ANT2_802.11a_UNI I 2A

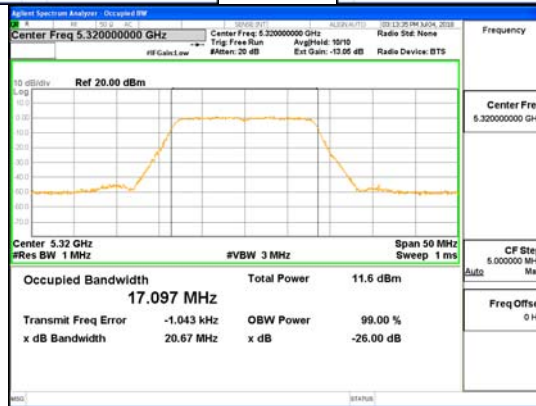
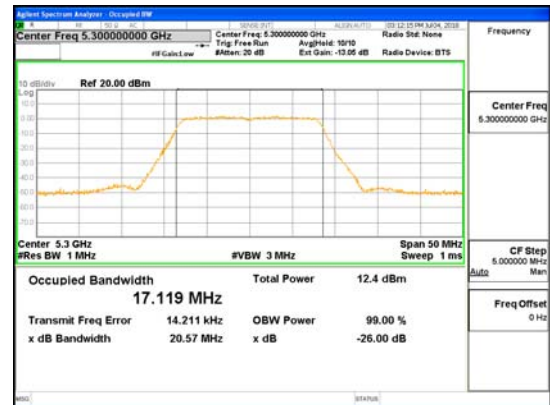


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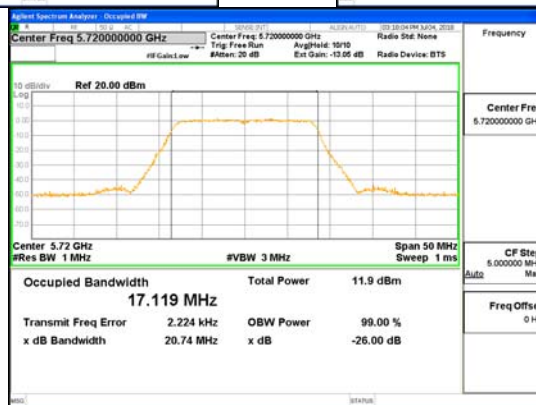
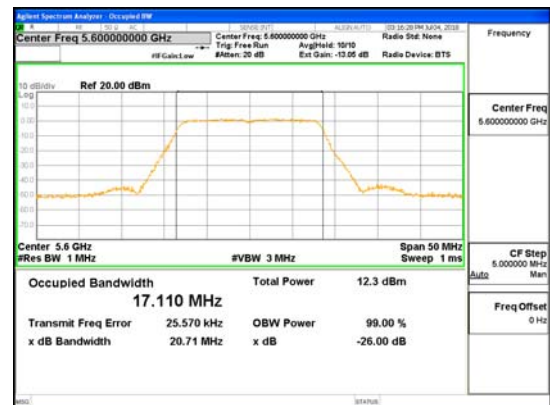
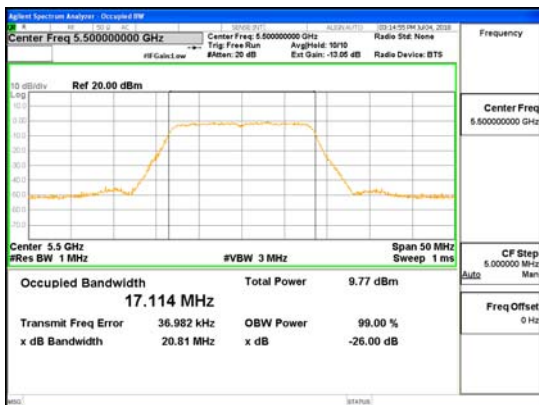


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ANT3_802.11a_UNI1 2A



ANT3_802.11a_UNI1 2C



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ANTO_802.11n_HT20_UNII 2A

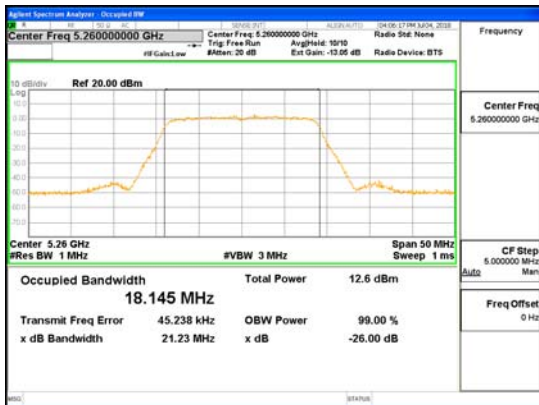


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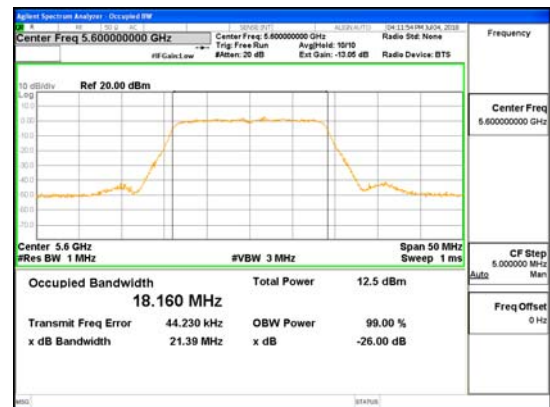
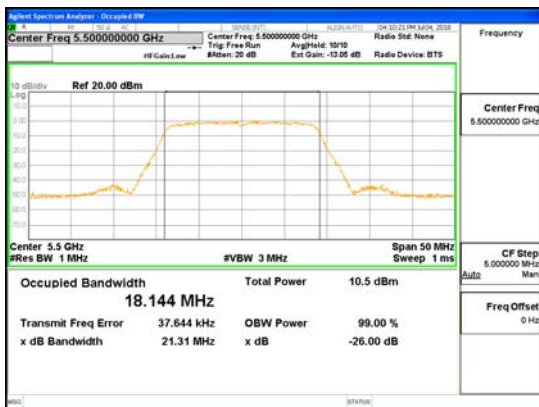


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ANT1_802.11n_HT20_UNII 2A



ANT1_802.11n_HT20_UNII 2C

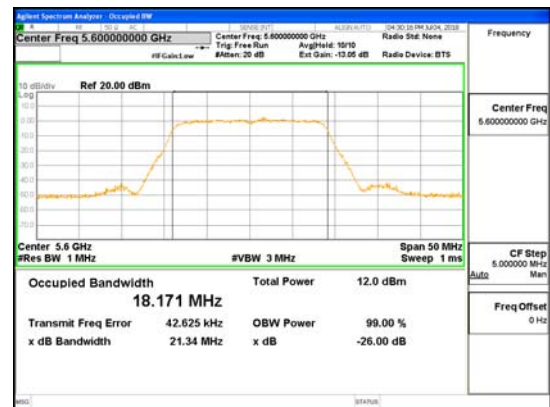
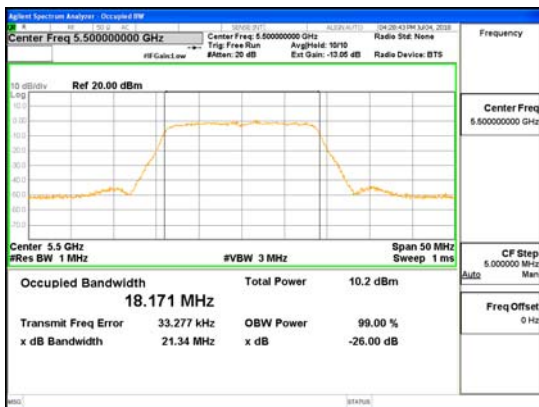


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ANT2_802.11n_HT20_UNI I 2A

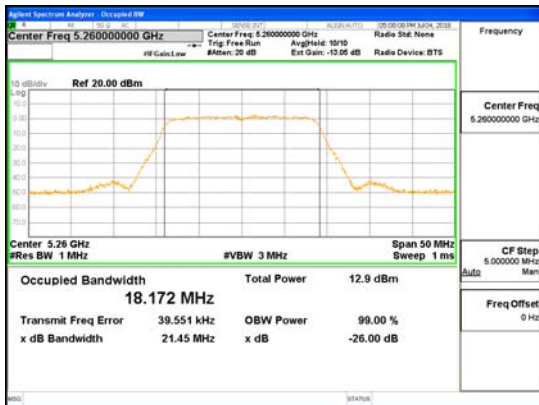


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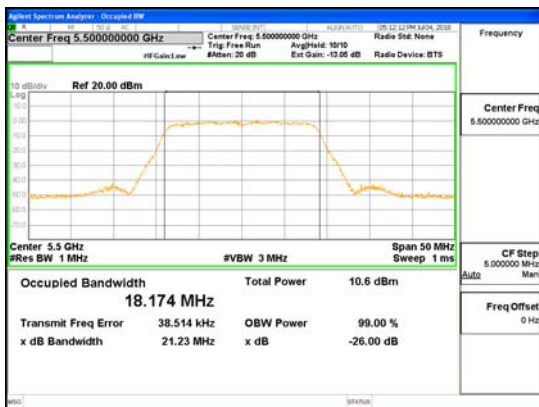


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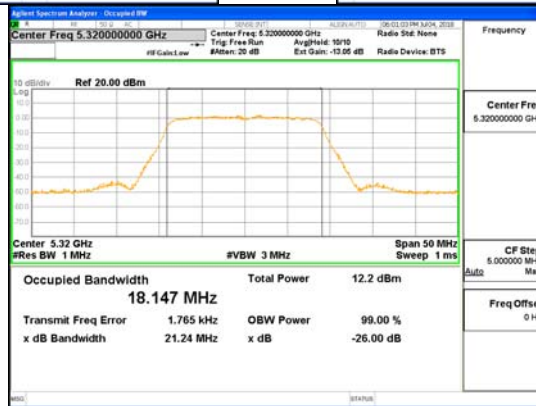
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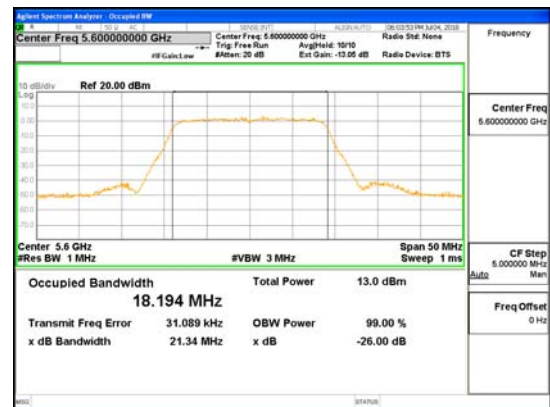
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ANT3_802.11n_HT20_UNII 2C



ANTO_802.11ac_VHT20_UNII 2A

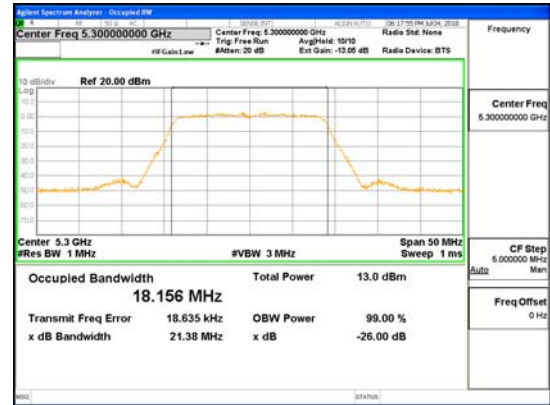
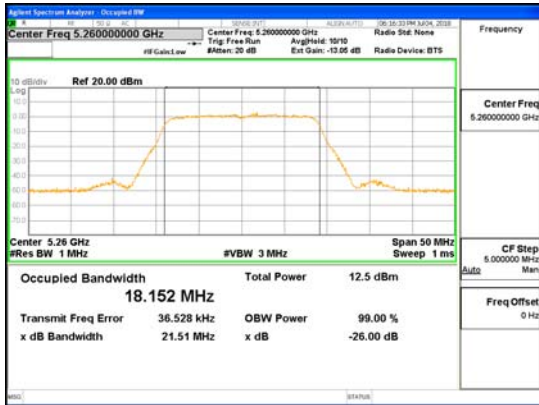


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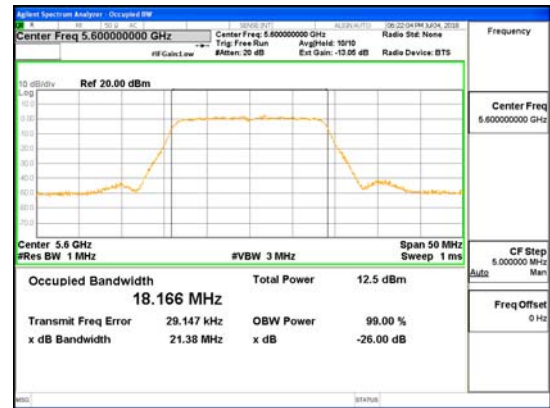


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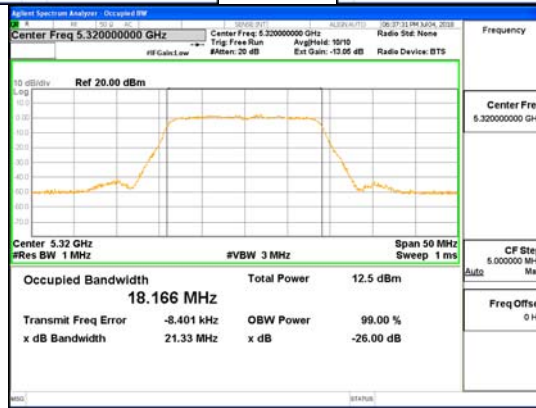
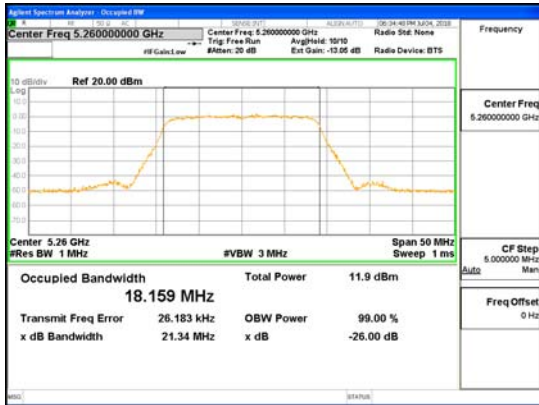
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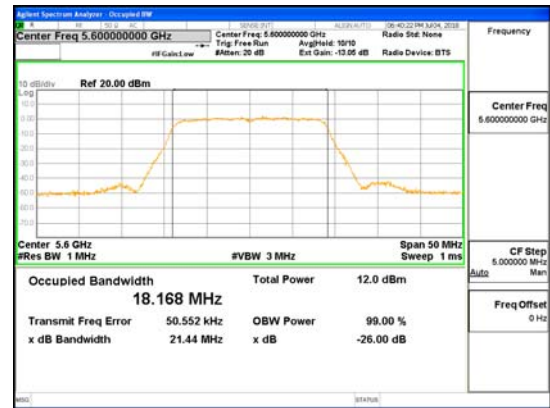
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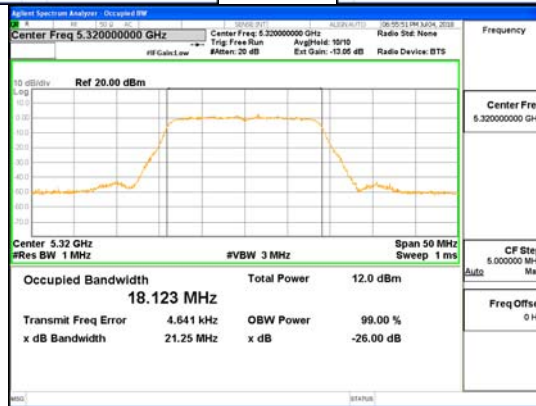
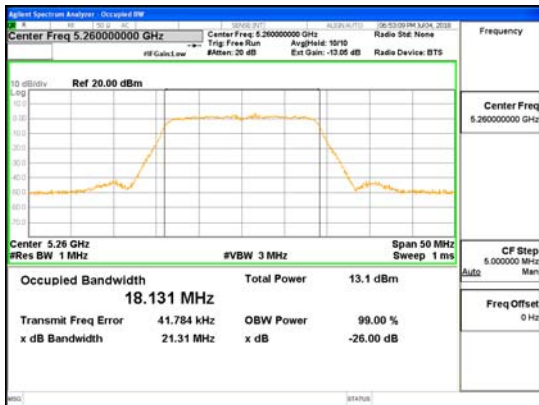
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ANT2_802.11ac_VHT20_UNII 2A



ANT2_802.11ac_VHT20_UNII 2C



ANT3_802.11ac_VHT20_UNII 2A

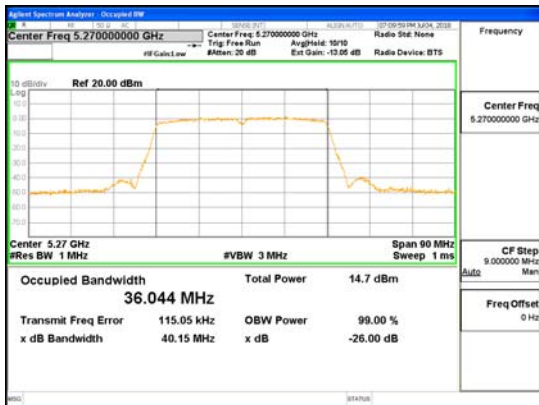


ANT3_802.11ac_VHT20_UNII 2C



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ANTO_802.11n_HT40_UNII 2A



ANTO_802.11n_HT40_UNII 2C



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ANT1_802.11n_HT40_UNII 2A

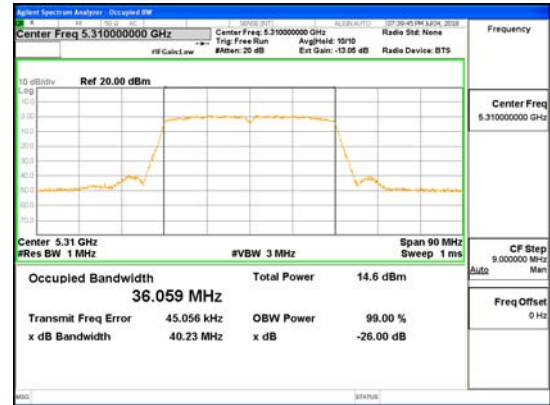
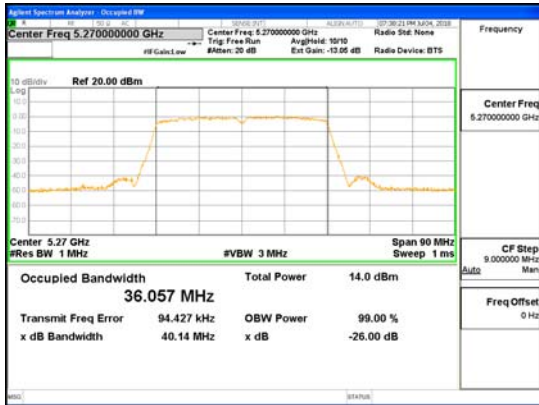


ANT1_802.11n_HT40_UNII 2C



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ANT2_802.11n_HT40_UNII 2A

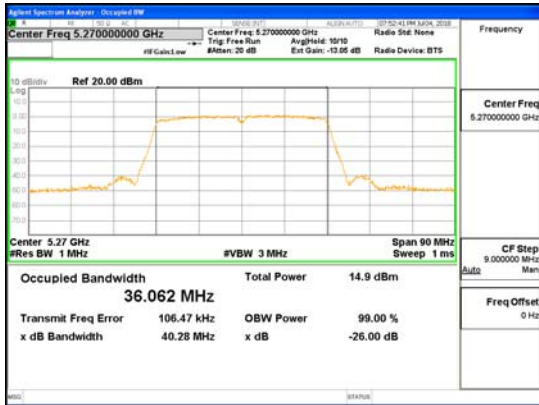


ANT2_802.11n_HT40_UNII 2C



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ANT3_802.11n_HT40_UNII 2A



ANT3_802.11n_HT40_UNII 2C

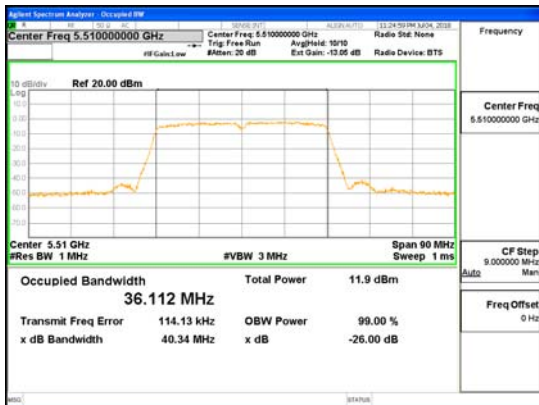


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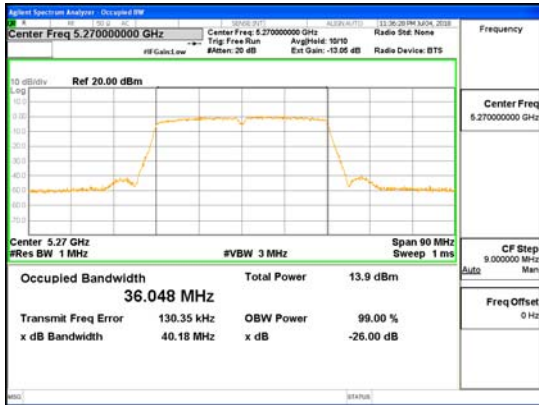


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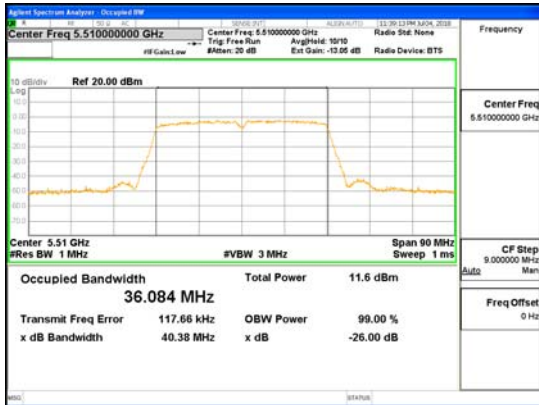


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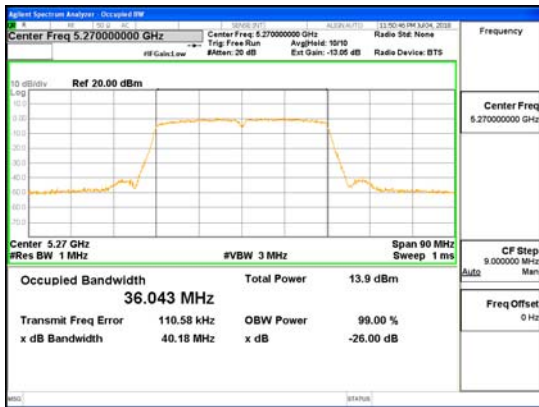


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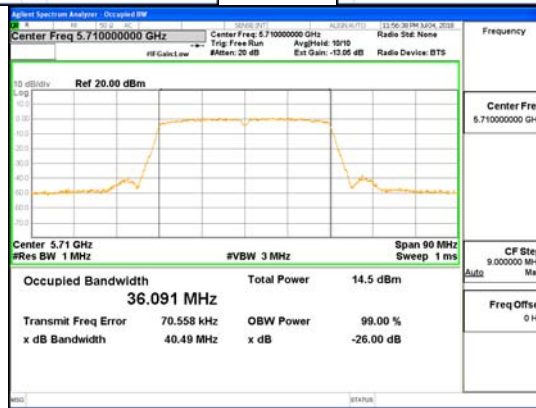
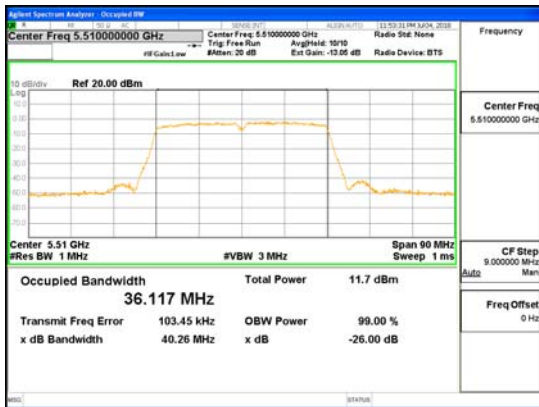


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ANT2_802.11ac_VHT40_UNII 2A



ANT2_802.11ac_VHT40_UNII 2C



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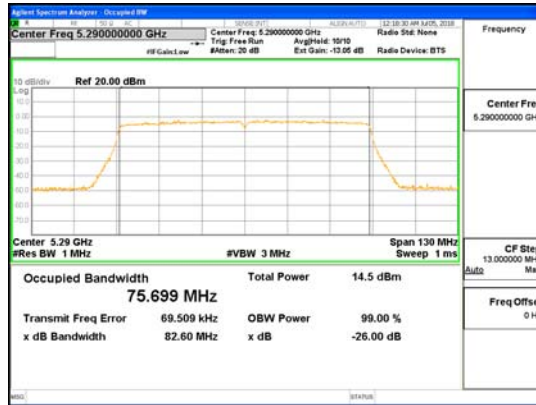
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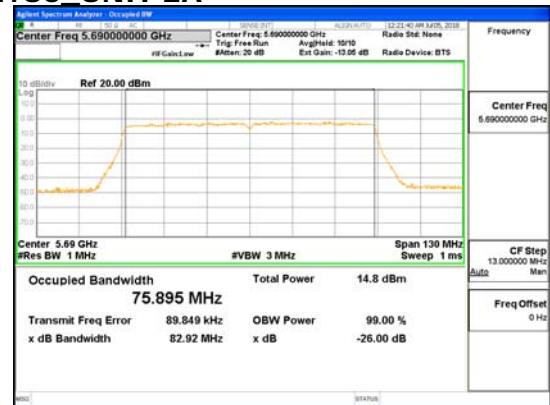
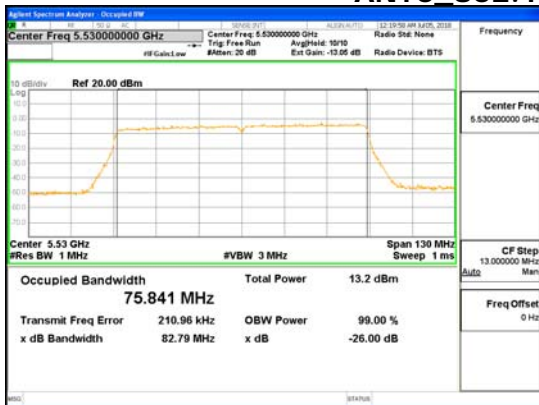
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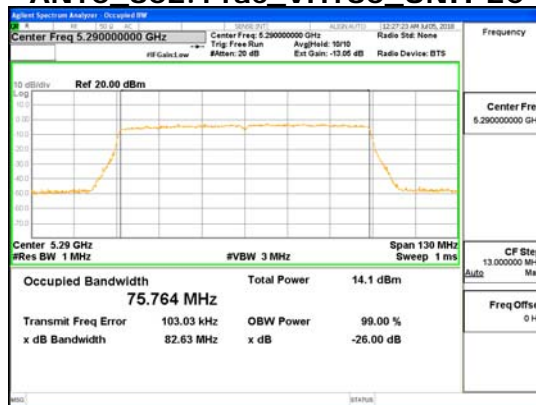
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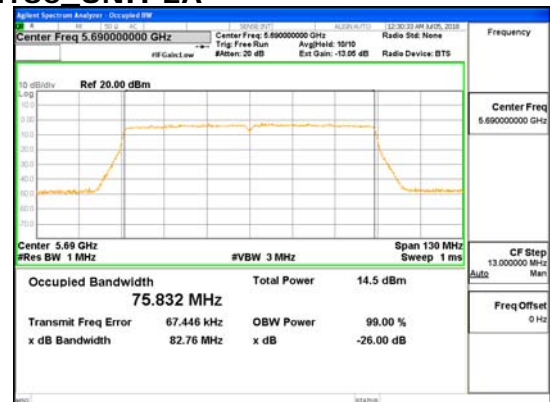
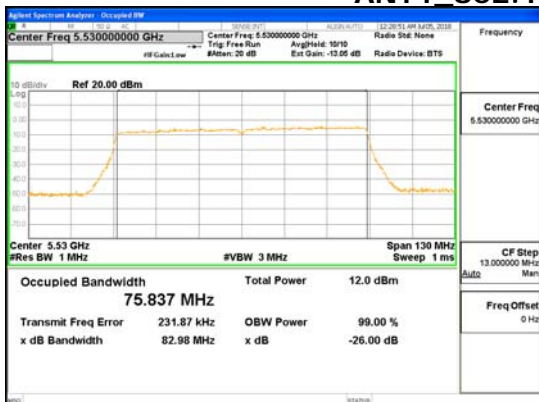
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ANTO_802.11ac_VHT80_UNII_2C



ANT1_802.11ac_VHT80_UNII_2A

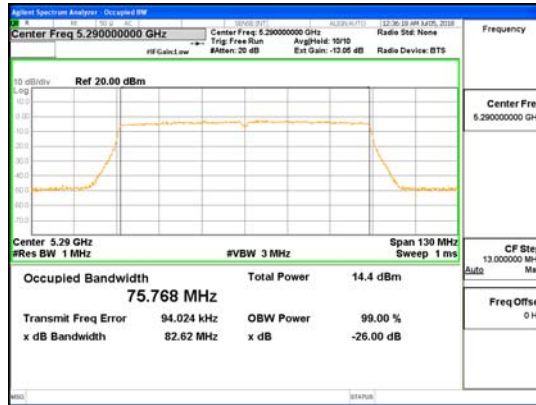


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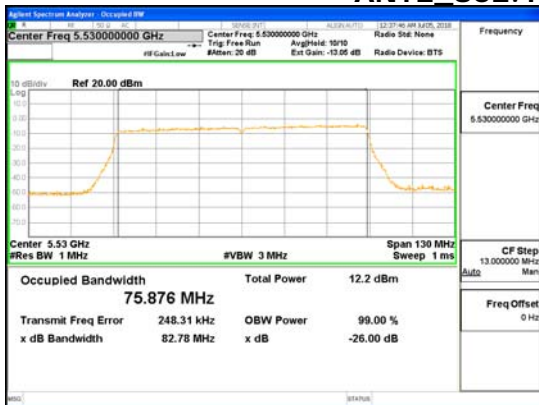


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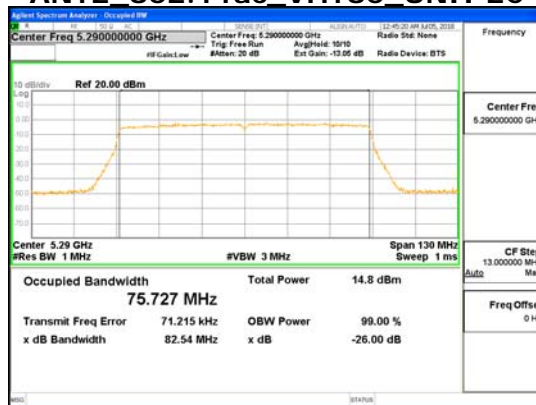
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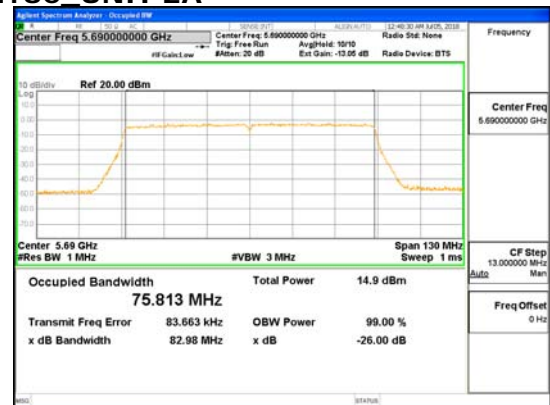
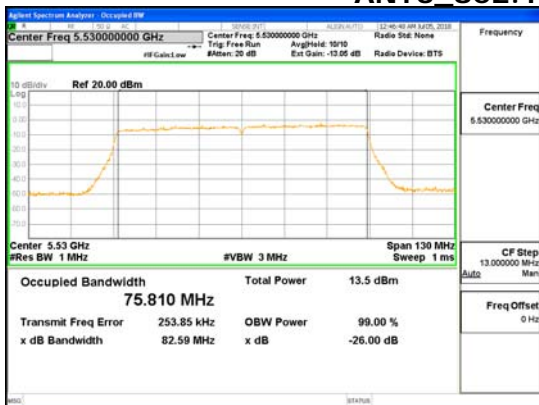
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ANT2_802.11ac_VHT80_UNII 2C



ANT3_802.11ac_VHT80_UNII 2A



ANT3_802.11ac_VHT80_UNII 2C



ANTO + ANT2_802.11ac_VHT160_UNII 2A



ANTO + ANT2_802.11ac_VHT160_UNII 2C



ANT1 + ANT3_802.11ac_VHT160_UNII 2A



ANT1 + ANT3_802.11ac_VHT160_UNII 2C