

# TEST REPORT



**CTK Co., Ltd.**  
(Ho-dong), 113, Yejik-ro, Cheoin-gu,  
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Report No.:  
CTK-2018-02327  
Page (1) / (107) Pages

## 1. Client

- Name : KAONMEDIA Co., Ltd.
- Address : KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
- Date of Receipt : 2018-05-17

## 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: KSTB2020\_NCTC\_STB / KSTB2020



## 5. Date of Test : 2018-06-25 to 2018-07-25

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

## 7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (48 ± 5) % 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
	Bongseok Kim: (Signature) 	Young-taek Lee: (Signature) 

2018-07-31

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



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## REPORT REVISION HISTORY

Date	Revision	Page No
2018-07-31	Issued (CTK-2018-02327)	all

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## 1.0 General Product Description

### 1.1 Client Information

<b>Company</b>	KAONMEDIA Co., Ltd.
<b>Contact Point</b>	KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
<b>Contact Person</b>	Name : Choi Sung Ho E-mail : shchoi@kaonmedia.com Tel : +82-31-724-8861

### 1.2 Product Information

<b>FCC ID</b>	WQTKSTB2020
<b>Product Description</b>	KSTB2020_NCTC_STB
<b>Model name</b>	KSTB2020
<b>Variant Model name</b>	KSTB2076 (Variant model has no difference from basic model, except for model name)
<b>Operating Frequency</b>	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
<b>RF Output Power</b>	UNII 1 802.11a : 13.72 dBm (23.55 mW) 802.11n(HT20) : 16.05 dBm (40.30 mW) 802.11n(HT40) : 11.83 dBm (15.24 mW) 802.11ac(VHT20) : 15.69 dBm (37.06 mW) 802.11ac(VHT40) : 14.62 dBm (28.96 mW) 802.11ac(VHT80) : 11.28 dBm (13.44 mW) UNII 3 802.11a : 13.92 dBm (24.66 mW) 802.11n(HT20) : 15.90 dBm (38.93 mW) 802.11n(HT40) : 11.96 dBm (15.72 mW) 802.11ac(VHT20) : 15.77 dBm (37.80 mW) 802.11ac(VHT40) : 14.44 dBm (27.81 mW) 802.11ac(VHT80) : 11.30 dBm (13.48 mW)
<b>Antenna type</b>	PCB Antenna
<b>Antenna gain</b>	2 dBi (Peak)
<b>Type of Modulation</b>	OFDM
<b>Power Source</b>	DC 12 V (Adapter)

### 1.3 Peripheral Devices





Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R6P
AC/DC Adapter	HP	HSTNN-LA40	7628011101

## 2.0 Facility and Accreditations

### 2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

### 2.2 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Registration Number	Logo
USA	<b>FCC</b>	FCC Part 15 & 18 EMI (Electromagnetic Interference / Emission)	805871	
CANADA	<b>ISED</b>	ISED EMI (3/10m test site)	8737A-2	
JAPAN	<b>VCCI</b>	VCCI V-3 EMI (Electromagnetic Interference / Emission)	C-986 T-1843 R-3627 G-387	
KOREA	<b>NRRA</b>	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.

## 3.0 Test Specifications

### 3.1 Standards

FCC Part Section(s)	Requirement(s)	Status (Note 1)	Test Condition
<b>15.407(e)</b>	6 dB Bandwidth	C	Conducted
<b>15.407</b>	26 dB Bandwidth and 99% Bandwidth	C	
<b>15.407(a)(1)</b>	Conducted Output Power	C	
<b>15.407(a)(1)</b>	Power Spectral Density	C	
<b>15.407(g)</b>	Frequency Stability	C	
<b>15.407 (b)</b>	Undesirable emission	C	Radiated
<b>15.209, 15.407 (b)(5),(6)</b>	Radiated Spurious Emission	C	
<b>15.207</b>	AC Conducted Emissions	C	Line Conducted
<i>Note 1:</i> C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable			
<i>Note 2:</i> The data in this test report are traceable to the national or international standards.			

The sample was tested according to the following specification:  
FCC Part 15.407, ANSI C63.10-2013

The tests were performed according to the method of measurements prescribed in  
KDB No.789033.

### 3.2 Mode of operation during the test

The UUT 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.  
The results are only attached worst cases.

#### Test Frequency

- 802.11a, 802.11n HT20, 802.11ac\_VHT20

Frequency Band	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

Frequency Band	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

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

#### Test antenna

Antenna 1	Antenna 2
ANT 0	ANT 1

#### Duty cycle

Mode	Duty cycle (%)	Mode	Duty cycle (%)
802.11a	81.5	802.11ac(VHT20)	78.0
802.11n(HT20)	85.3	802.11ac(VHT40)	67.1
802.11n(HT40)	77.5	802.11ac(VHT80)	41.6

### 3.3 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	$\pm 1.5$ dB
Power Spectral Density	$\pm 1.5$ dB
Occupied Bandwidth	$\pm 0.1$ MHz
Unwanted Emission(conducted)	$\pm 3.0$ dB
Radiated Emissions ( $f \leq 1$ GHz)	$\pm 4.0$ dB
Radiated Emissions ( $f > 1$ GHz)	$\pm 5.0$ dB

## 4.0 Technical Characteristic Test

### 4.1 26dB 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%.

#### **Limit :**

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NA

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**Test Data:**

**[ANT 0]**

**802.11a**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.36	18.08
	Middle	5 200	22.17	18.12
	High	5 240	22.35	18.14
UNII 3	Low	5 745	21.79	17.47
	Middle	5 785	21.72	17.50
	High	5 825	21.75	17.44

**802.11n(HT20)**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.65	19.06
	Middle	5 200	22.90	19.04
	High	5 240	22.74	19.00
UNII 3	Low	5 745	22.27	18.49
	Middle	5 785	22.39	18.51
	High	5 825	22.12	18.49

**802.11n(HT40)**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 190	40.53	36.91
	High	5 230	40.84	36.83
UNII 3	Low	5 755	39.70	36.44
	High	5 795	39.97	36.45

### 802.11ac(VHT20)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.65	18.96
	Middle	5 200	22.48	18.94
	High	5 240	22.78	18.89
UNII 3	Low	5 745	22.10	18.34
	Middle	5 785	22.38	18.38
	High	5 825	22.03	18.32

### 802.11ac(VHT40)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 190	40.56	36.79
	High	5 230	40.68	36.73
UNII 3	Low	5 755	40.15	36.46
	High	5 795	40.33	36.48

### 802.11ac(VHT80)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 210	81.32	76.04
UNII 3	Low	5 775	80.91	75.81

**[ANT 1]**

**802.11a**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.37	18.12
	Middle	5 200	22.46	18.10
	High	5 240	22.30	18.12
UNII 3	Low	5 745	21.66	17.44
	Middle	5 785	21.63	17.48
	High	5 825	21.66	17.46

**802.11n(HT20)**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.75	19.04
	Middle	5 200	22.55	18.76
	High	5 240	22.45	18.78
UNII 3	Low	5 745	21.92	18.26
	Middle	5 785	21.64	18.20
	High	5 825	21.84	18.24

**802.11n(HT40)**

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 190	40.53	36.80
	High	5 230	40.20	36.77
UNII 3	Low	5 755	39.66	36.45
	High	5 795	39.82	36.48

### 802.11ac(VHT20)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 180	22.68	18.79
	Middle	5 200	22.48	18.79
	High	5 240	22.54	18.75
UNII 3	Low	5 745	21.89	18.23
	Middle	5 785	21.77	18.24
	High	5 825	21.94	18.28

### 802.11ac(VHT40)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
UNII 1	Low	5 190	40.44	36.64
	High	5 230	40.37	36.62
UNII 3	Low	5 755	39.54	36.33
	High	5 795	39.47	36.34

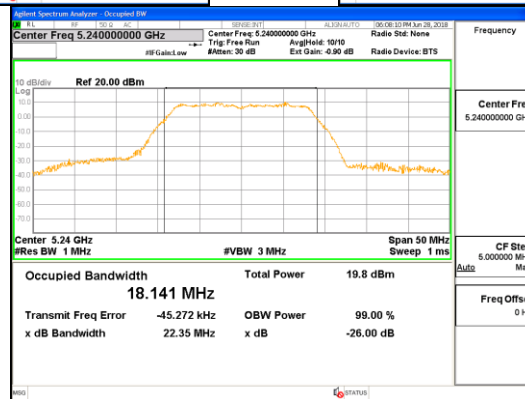
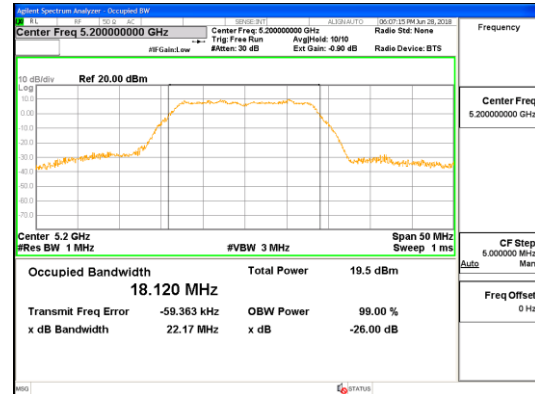
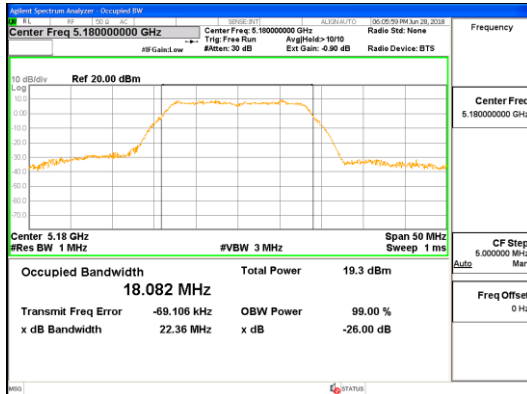
### 802.11ac(VHT80)

Frequency Band	Channel	Frequency [MHz]	26 dB Bandwidth [MHz]	99% Bandwidth [MHz]
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UNII 3	Low	5 775	79.93	75.83

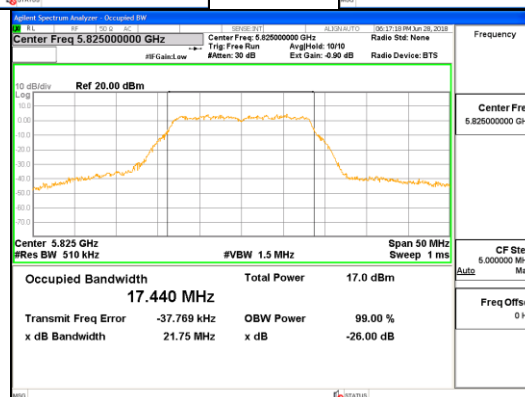
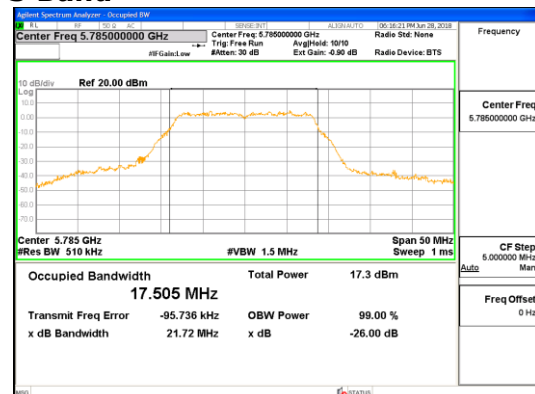
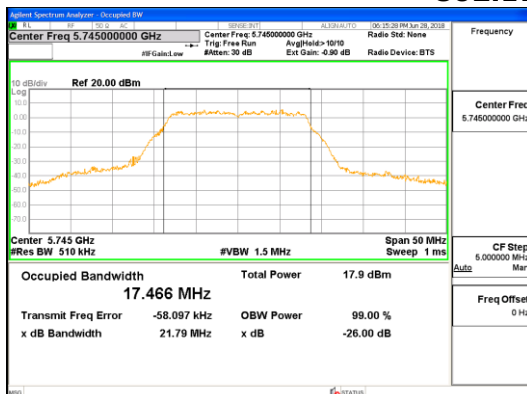
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[ANT 0]

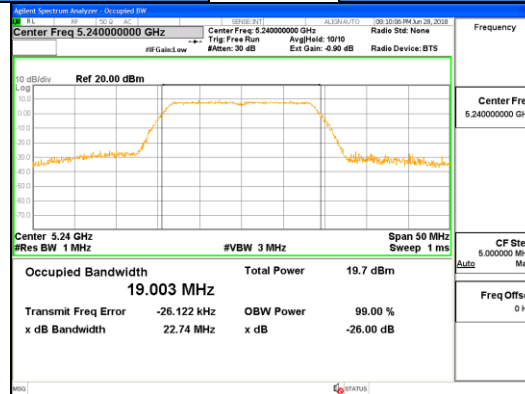
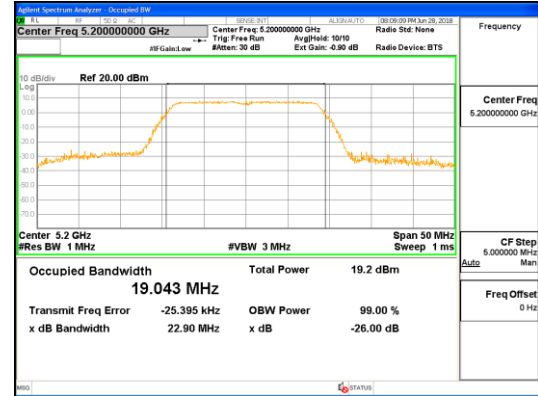
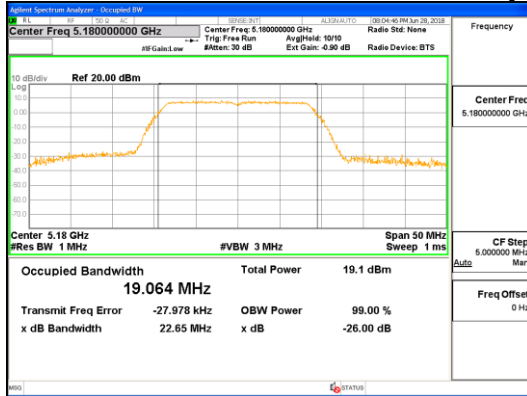
802.11a\_UNII 1 Band



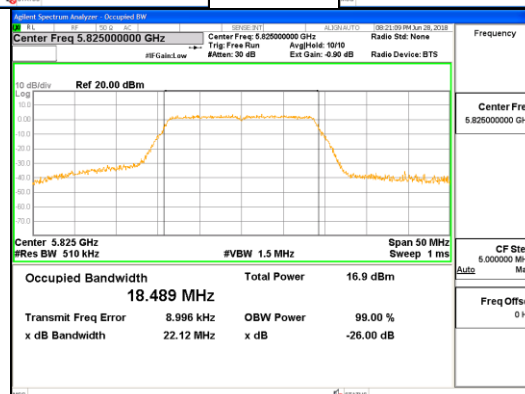
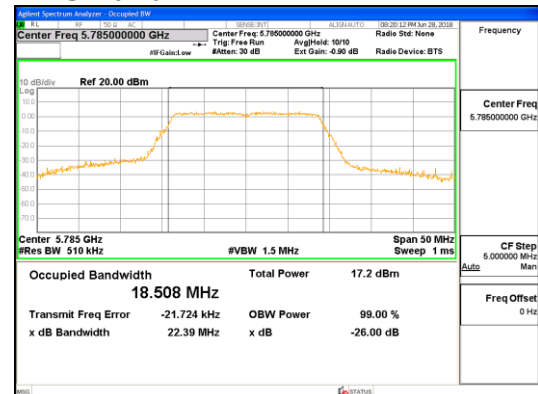
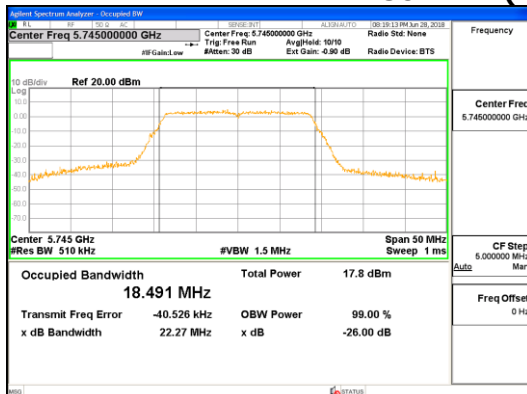
802.11a\_UNII 3 Band



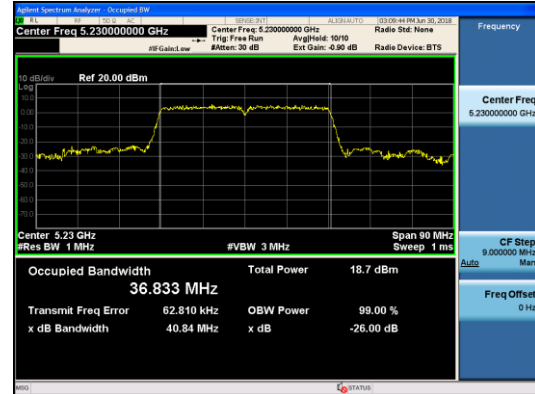
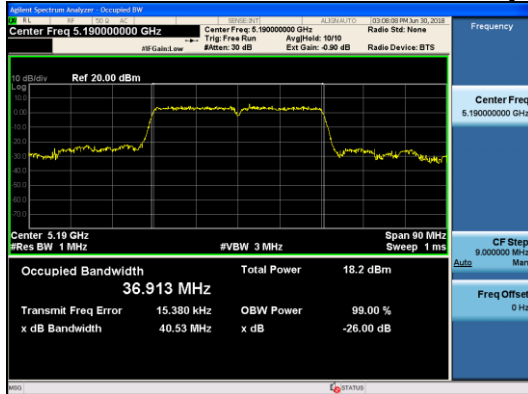
## 802.11n(HT20)\_UNII 1 Band



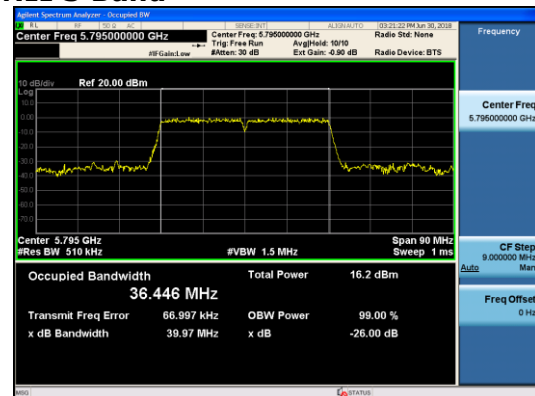
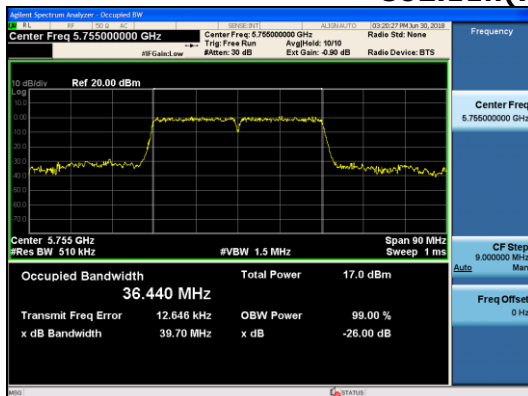
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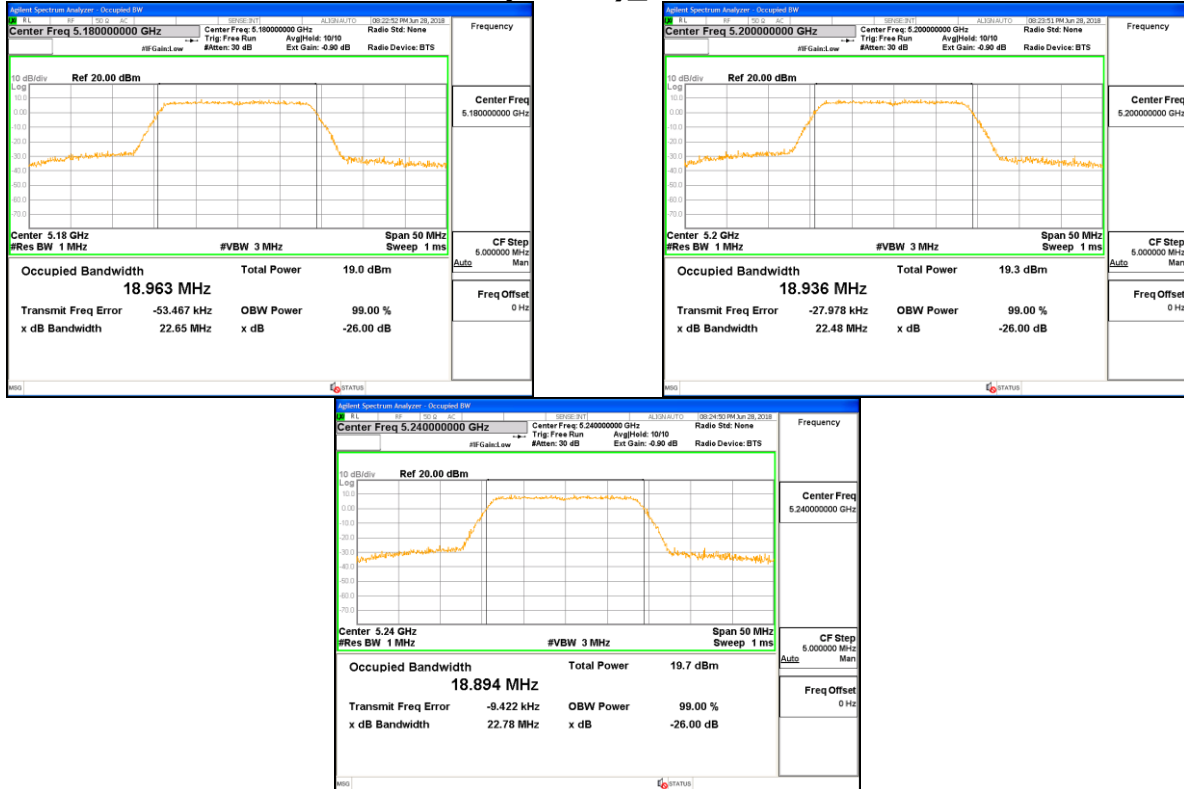
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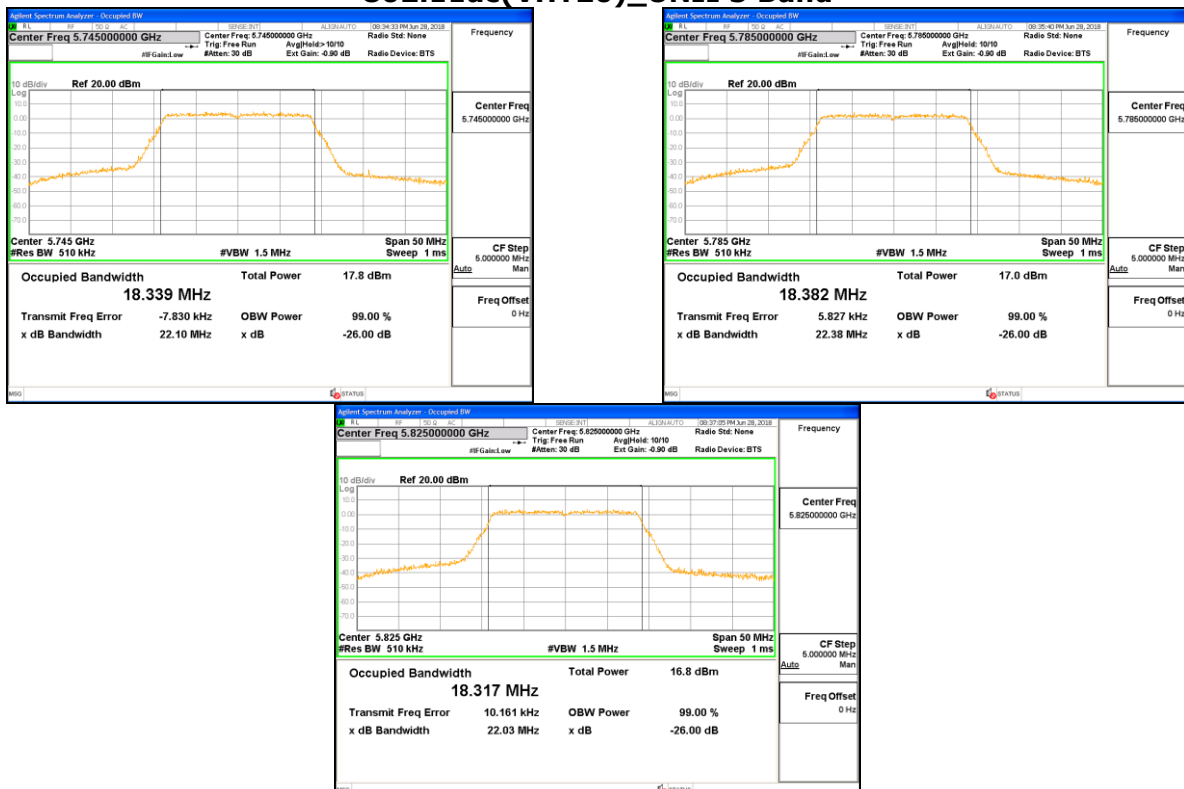
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### 802.11ac(VHT20)\_UNII 1 Band

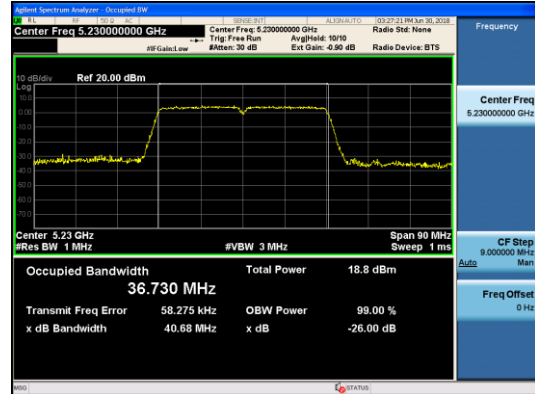
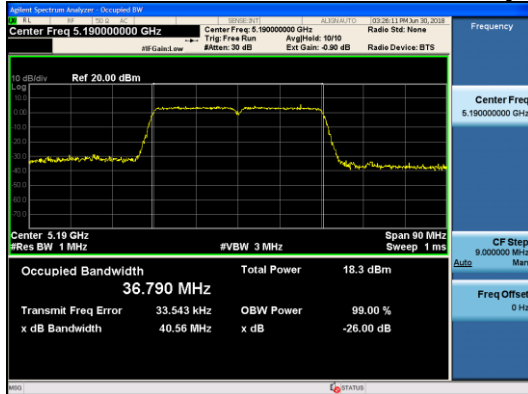


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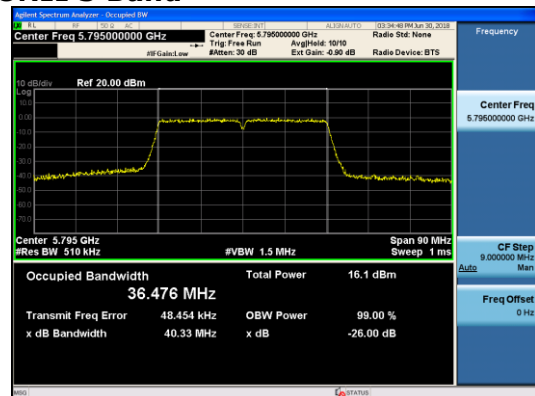
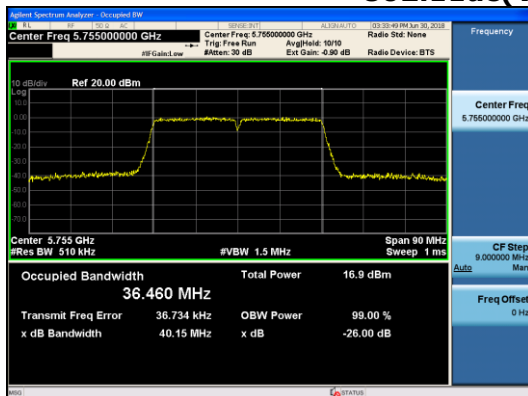




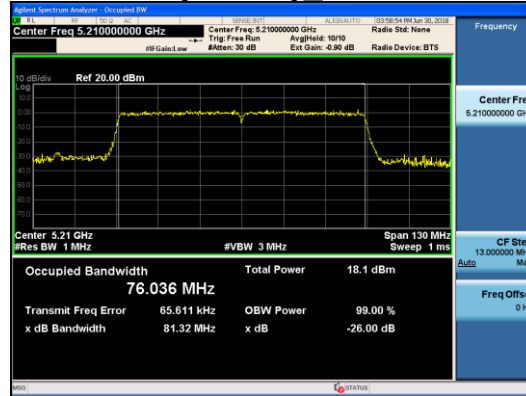
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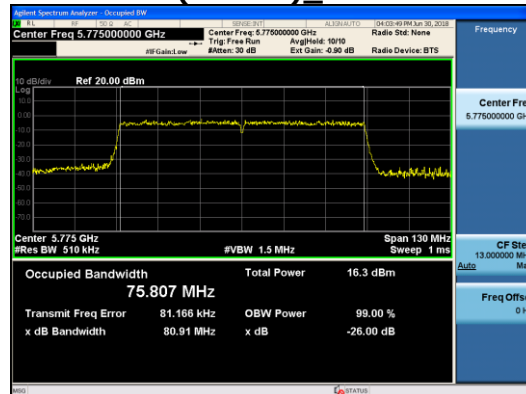
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### 802.11ac(VHT80)\_UNII 1 Band

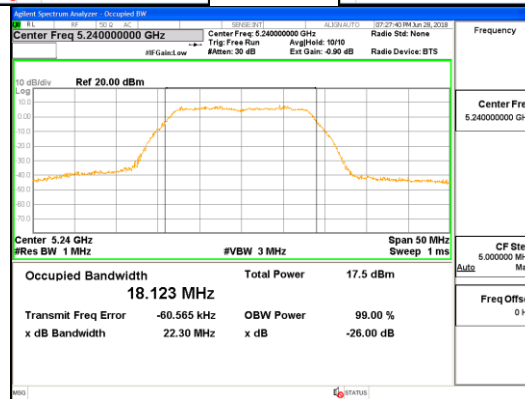
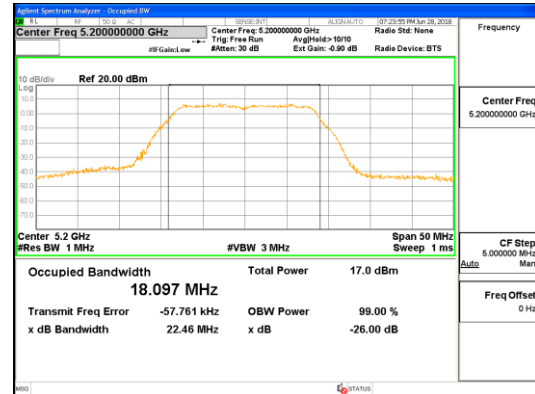
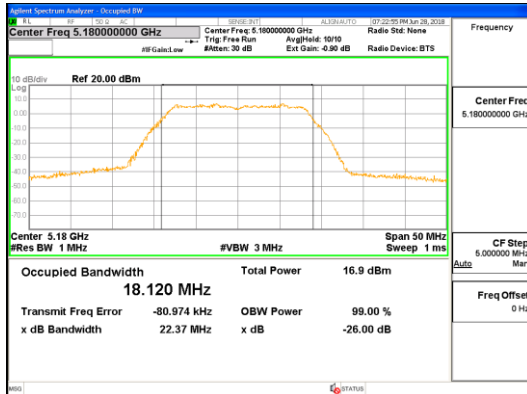


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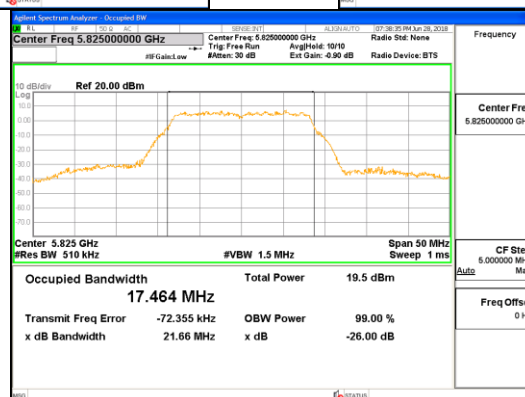
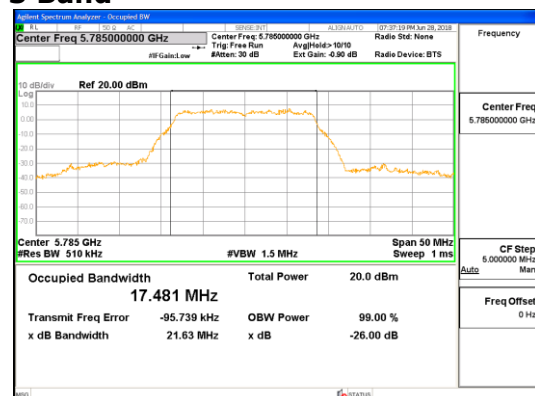
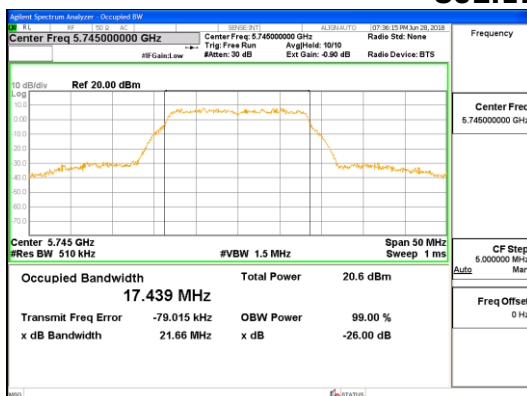


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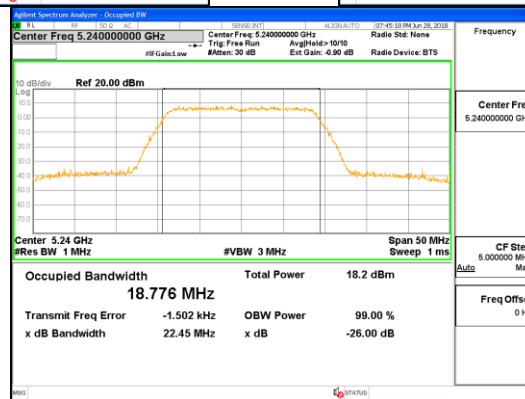
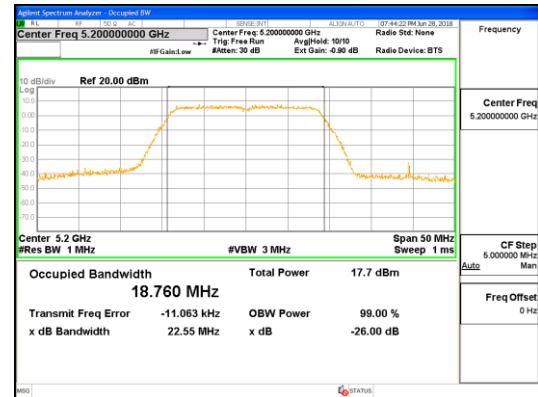
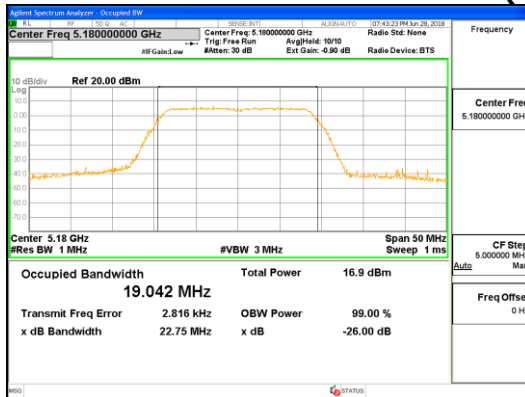
802.11a\_UNII 1 Band



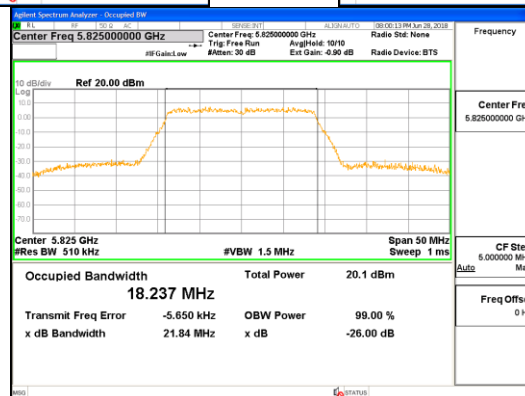
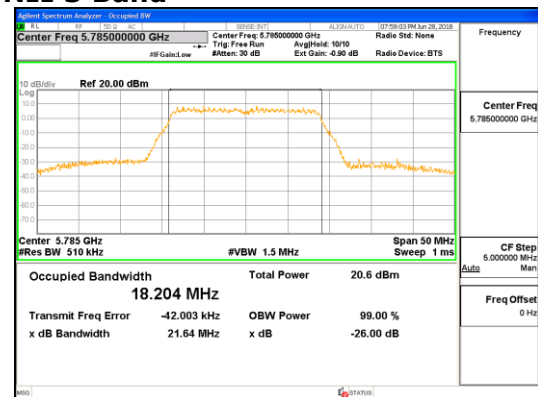
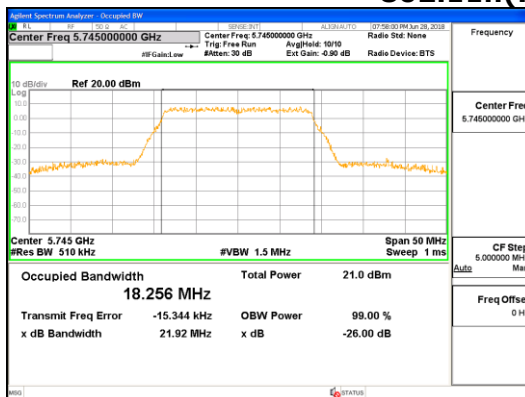
802.11a\_UNII 3 Band



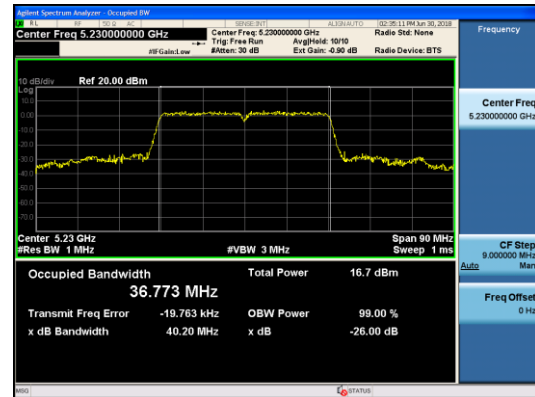
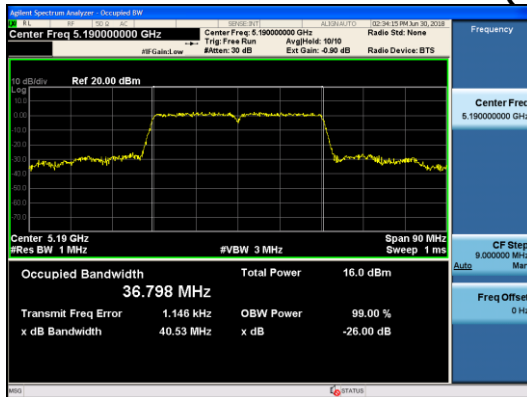
### 802.11n(HT20)\_UNII 1 Band



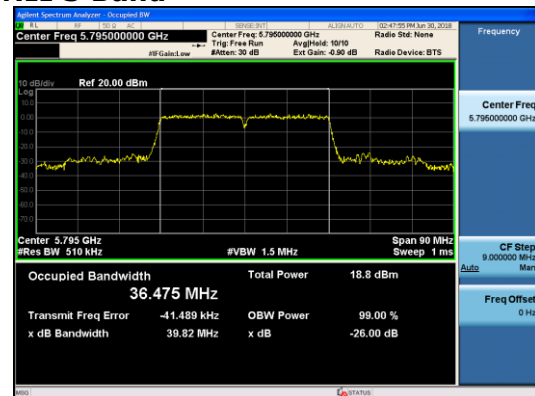
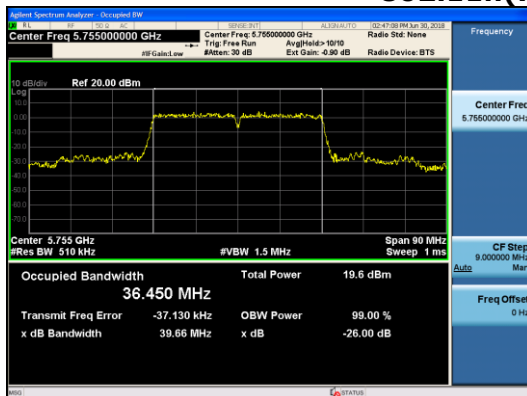
### 802.11n(HT20)\_UNII 3 Band



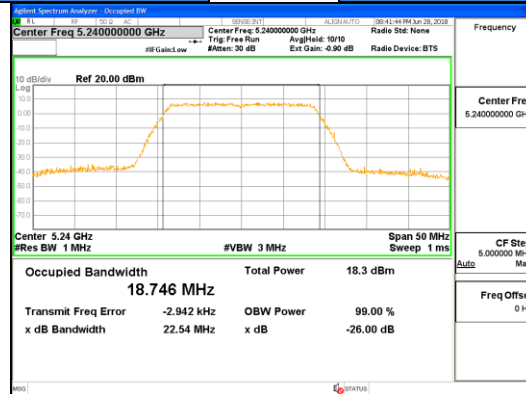
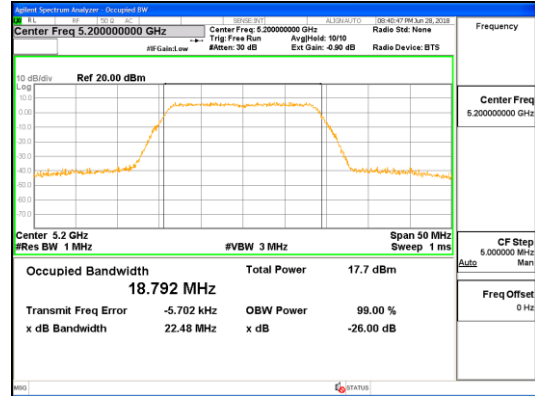
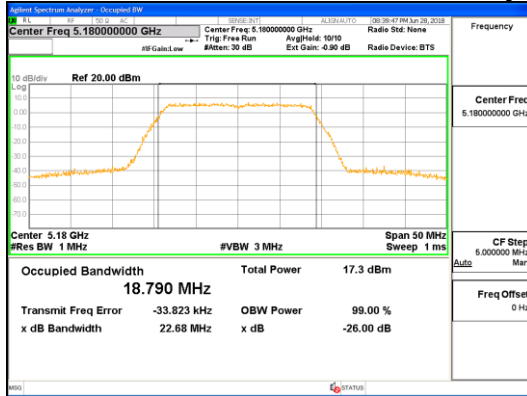
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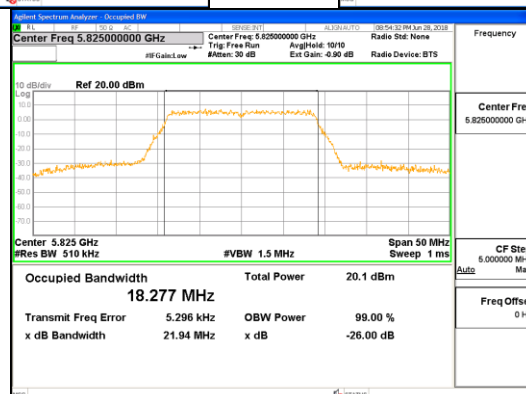
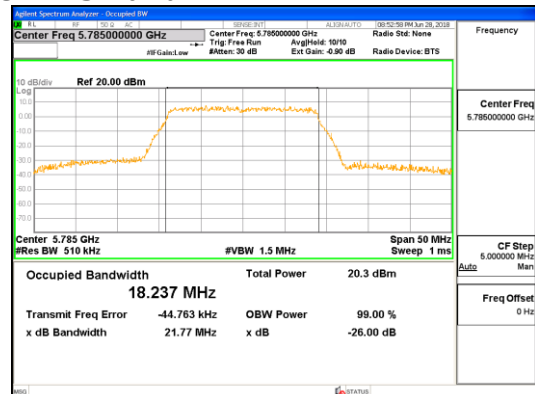
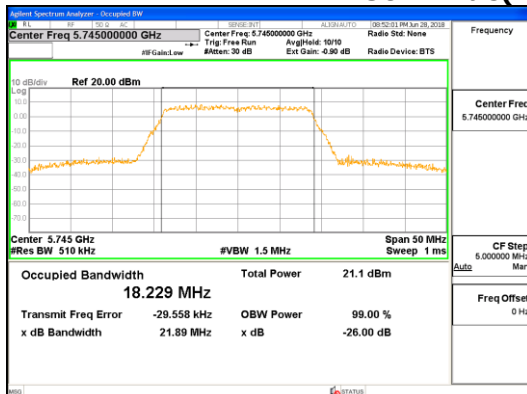
### 802.11n(HT40)\_UNII 3 Band



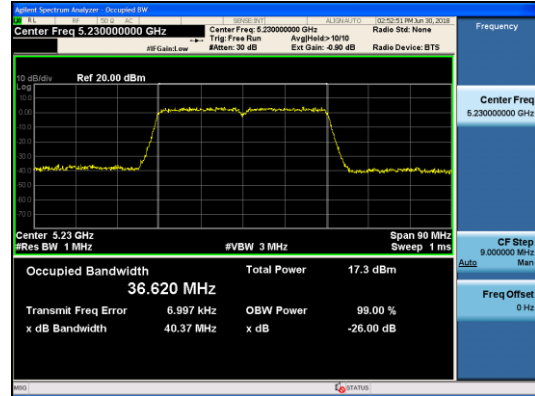
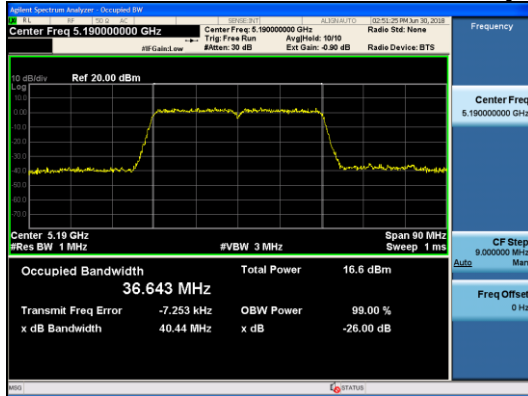
## 802.11ac(VHT20)\_UNII 1 Band



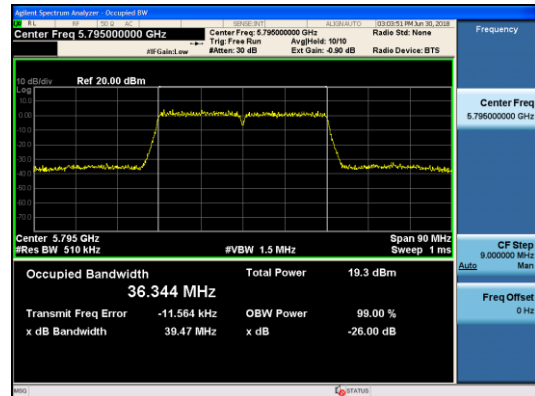
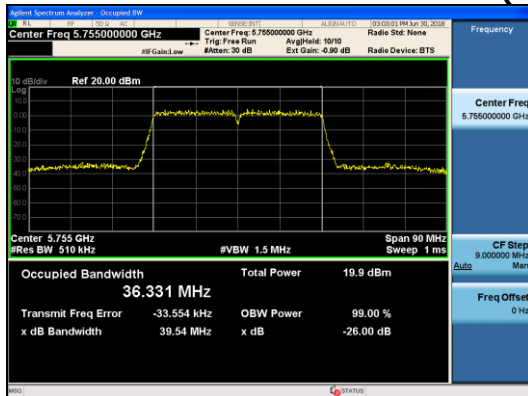
## 802.11ac(VHT20)\_UNII 3 Band



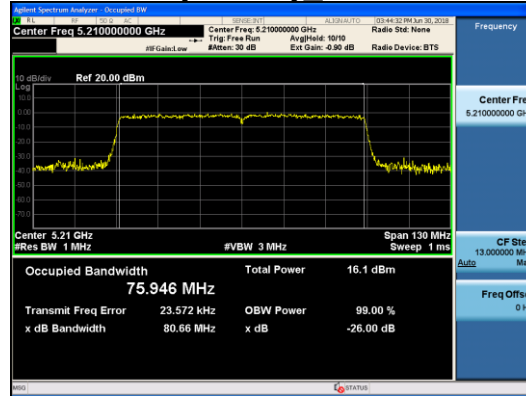
### 802.11ac(VHT40)\_UNII 1 Band



### 802.11ac(VHT40)\_UNII 3 Band



### 802.11ac(VHT80)\_UNII 1 Band



### 802.11ac(VHT80)\_UNII 3 Band

