



**FCC 47 CFR PART 15 SUBPART E**

**CERTIFICATION TEST REPORT**

**FOR**

**CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS**

**MODEL NUMBERS: A1660, A1780**

**FCC ID: BCG-E3085A**

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** APPLE, INC.  
1 INFINITE LOOP  
CUPERTINO, CA 95014, U.S.A.

**EUT DESCRIPTION:** CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

**MODEL:** A1660, A1780

**SERIAL NUMBER:** C7CRQ02MHCR3 (CONDUCTED)  
C7CQV01GH2FW (RADIATED)

**DATE TESTED:** MARCH 16 TO JULY 27, 2016

APPLICABLE STANDARDS		TEST RESULTS
STANDARD		
CFR 47 Part 15 Subpart E		Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
UL Verification Services Inc. By:



CHIN PANG  
SENIOR ENGINEER  
UL VERIFICATION SERVICES INC.

Prepared By:



ERIC YU  
EMC LAB ENGINEER  
UL VERIFICATION SERVICES INC.

## 2. TEST METHODOLOGY

FCC: The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 14-30, FCC KDB 662911 D01 v02r01, FCC KDB 905462 D02 v01r02/D03 v01r01/D06 v01, FCC KDB 789033 D02 v01r01, FCC KDB 644545 D03 v01, ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
<input type="checkbox"/> Chamber A	<input checked="" type="checkbox"/> Chamber D
<input type="checkbox"/> Chamber B	<input checked="" type="checkbox"/> Chamber E
<input type="checkbox"/> Chamber C	<input checked="" type="checkbox"/> Chamber F
	<input checked="" type="checkbox"/> Chamber G
	<input type="checkbox"/> Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://ts.nist.gov/standards/scopes/2000650.htm>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor} \\ &\quad (\text{dB/m}) + \text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT, Model A1660, A1780 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/WCDMA/HSPA+/DC-HSDPA/LTE radio, IEEE 802.11a/b/g/n/ac, NFC and Bluetooth radio. The rechargeable battery is not user accessible.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

NOTE: Covered modes are test reduction modes. The output powers on the "covered modes" are equal to or less than the mode referenced and use the same modulation.

#### 5.2GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5240	802.11a	Covered by 802.11n HT20 SISO	
	802.11n HT20 SISO	19.00	79.43
	802.11n HT20 2TX CDD	20.00	100.00
	802.11n HT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
	802.11ac VHT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
5190 - 5230	802.11n HT40 SISO	18.95	78.52
	802.11n HT40 2TX CDD	21.99	158.12
	802.11n HT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
	802.11ac VHT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
5210	802.11ac VHT80 SISO	15.46	35.16
	802.11ac VHT80 2TX CDD	17.96	62.52
	802.11ac VHT80 2TX STBC/SDM	Covered by 802.11ac VHT80 CDD 2TX	

#### 5.3GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5260 - 5320	802.11a	Covered by 802.11n HT20 SISO	
	802.11n HT20 SISO	19.00	79.43
	802.11n HT20 2TX CDD	19.98	99.54
	802.11n HT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
	802.11ac VHT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
5270 - 5310	802.11n HT40 SISO	18.94	78.34
	802.11n HT40 2TX CDD	21.82	152.05
	802.11n HT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
	802.11ac VHT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
5290	802.11ac VHT80 SISO	13.98	25.00
	802.11ac VHT80 2TX CDD	15.91	38.99
	802.11ac VHT80 2TX STBC/SDM	Covered by 802.11ac VHT80 CDD 2TX	

## 5.6GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5500 - 5700	802.11a	Covered by 802.11n HT20 SISO	
5500 - 5700	802.11n HT20 SISO	19.00	79.43
5720	802.11ac VHT20 SISO (based on UNII-2C band output power)	18.38	68.87
5500 - 5700	802.11n HT20 2TX CDD	19.20	83.18
5720	802.11ac VHT20 2TX CDD (based on UNII-2C band output power)	19.27	84.53
5500 - 5700	802.11n HT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
5720	802.11ac VHT20 2TX STBC/SDM (based on UNII-2C band output power)	Covered by 802.11n HT20 CDD 2TX	
5510 - 5670	802.11n HT40 SISO	18.77	75.34
5710	802.11ac VHT40 SISO (based on UNII-2C band output power)	19.00	79.43
5510 - 5670	802.11n HT40 2TX CDD	20.50	112.20
5710	802.11ac VHT40 2TX CDD (based on UNII-2C band output power)	20.60	114.82
5510 - 5670	802.11n HT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
5710	802.11ac VHT40 STBC/SDM 2TX (based on UNII-2C band output power)	Covered by 802.11n HT40 CDD 2TX	
5530-5610	802.11ac VHT80 SISO	18.75	74.99
5690	802.11ac VHT80 SISO (based on UNII-2C band output power)	18.80	75.86
5530-5610	802.11ac VHT80 2TX CDD	20.45	110.92
5690	802.11ac VHT80 2TX CDD (based on UNII-2C band output power)	20.57	114.02
5530-5610	802.11ac VHT80 2TX STBC/SDM	Covered by 802.11ac VHT80 CDD 2TX	
5690	802.11ac VHT80 2TX STBC/SDM (based on UNII-2C band output power)	Covered by 802.11ac VHT80 CDD 2TX	

## 5.8GHz Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	Covered by 802.11n HT20 SISO	
5745 - 5825	802.11n HT20 SISO	19.00	79.43
5745 - 5825	802.11a 2TX CDD	Covered by 802.11n HT20 CDD 2TX	
5745 - 5825	802.11n HT20 2TX CDD	21.05	127.35
5745 - 5825	802.11n HT20 2TX STBC/SDM	Covered by 802.11n HT20 CDD 2TX	
5755 - 5795	802.11n HT40 SISO	19.00	79.43
5755 - 5795	802.11n HT40 2TX CDD	21.04	127.06
5755 - 5795	802.11n HT40 2TX STBC/SDM	Covered by 802.11n HT40 CDD 2TX	
5775	802.11ac VHT80 SISO	18.86	76.91
5775	802.11ac VHT80 2TX CDD	20.60	114.82
5775	802.11ac VHT80 2TX STBC/SDM	Covered by 802.11ac VHT80 CDD 2TX	

### 5.3.DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band (GHz)	Antenna Gain (dBi)	
	Chain 0	Chain 1
5.2	-5.02	-6.01
5.3	-5.31	-5.08
5.5	-4.78	-3.10
5.8	-2.73	-5.52

### 5.4.SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Perennial\_9\_44\_11\_27

## 5.5. WORST-CASE CONFIGURATION AND MODE

For radiated harmonics spurious and power line conducted emissions were performed with the EUT set at the CDD mode at highest power setting among the CDD/STBC/SDM/Beamforming modes as worst-case scenario.

The output power for PSD and spurious tests was set higher than maximum for the purposes of testing only

For SISO modes, there are two transmission antennas. The antenna used in any given time can be either Chain 0 or Chain 1. Both antenna ports have the same power; output power and PSD measurement for SISO modes on both antennas are reported. For MIMO modes, both Chain 0 and Chain 1 used at the same time.

The fundamental of the EUT was investigated in three orthogonal orientations X (Flatbed), Y (Landscape), Z (Portrait), it was determined that (see table below) was worst-case orientations. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency Band (GHz)	Mode	Antenna Port	Worst-case Orientation
5.2-5.8	1TX SISO	Chain 0	Z-Portrait
		Chain 1	Z-Portrait
	2TX MIMO	Chain 0 + Chain 1	Y-Landscape

Worst-case data rates as provided by the client were:

802.11a mode: 6 Mbps  
 802.11n HT20 mode: MCS0  
 802.11n HT40 mode: MCS0  
 802.11ac VHT20 mode: MCS0  
 802.11ac VHT40 mode: MCS0  
 802.11ac VHT80 mode: MCS0

802.11ac VHT20 and VHT40 mode are different from 802.11nHT20 and HT40 only in control messages and have the same power settings.

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2. The WiFi/Bluetooth radio modules have the same mechanical outline (e.g., the same package dimension and pin-out layout), use the same on-board antenna matching circuit, have an identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances.

Baseline testing was performed on the two variants to determine the worst case on all conducted power and radiated emissions.

For simultaneous transmission of multiple channels from the same antenna in the 2.4GHz and 5GHz bands, tests were conducted for various configurations having the highest power. No noticeable new emission was found.

The following configurations were investigated on AC line conducted test.

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable
2	EUT powered by host PC via USB cable

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Apple	MacBook Pro	W885200F70K	NA
Laptop Power Supply	Apple	A1343	C0420640G9KDJ92BD	NA

### I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	SMA	Un-Shielded	0.2	To spectrum Analyzer
2	USB	2	USB	Shielded	1	N/A

### I/O CABLES (RADIATED ABOVE 1 GHZ)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
None Used						

### I/O CABLES (BELOW 1 GHZ)

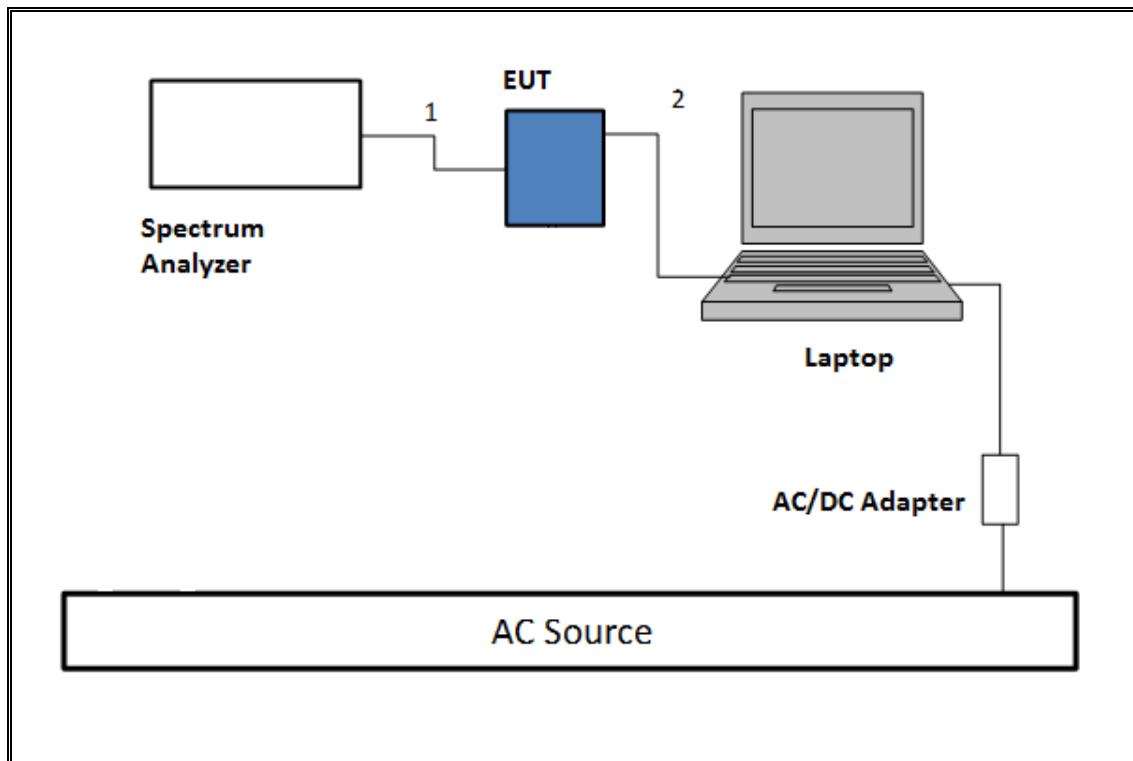
I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	3	N/A

### I/O CABLES (AC LINE CONDUCTED: AC/DC ADAPTER &LAPTOP CONFIGURATION)

I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	1	AC	Un-shielded	3	N/A
2	Power Adapter	1	AC	Un-shielded	3	N/A

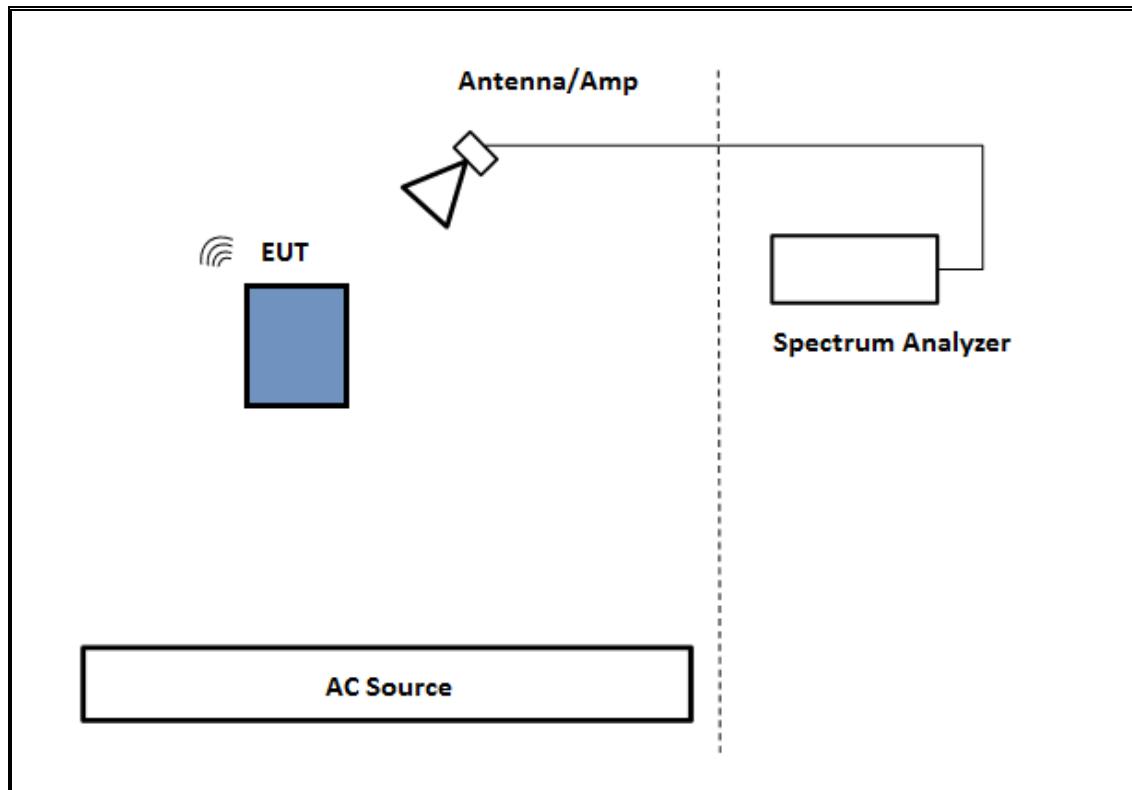
**TEST SETUP**

The EUT was connected to a host Laptop via USB cable and to spectrum analyzer via antenna port. Test software exercised the EUT.

**SETUP DIAGRAM**

**TEST SETUP- RADIATED-ABOVE 1 GHZ**

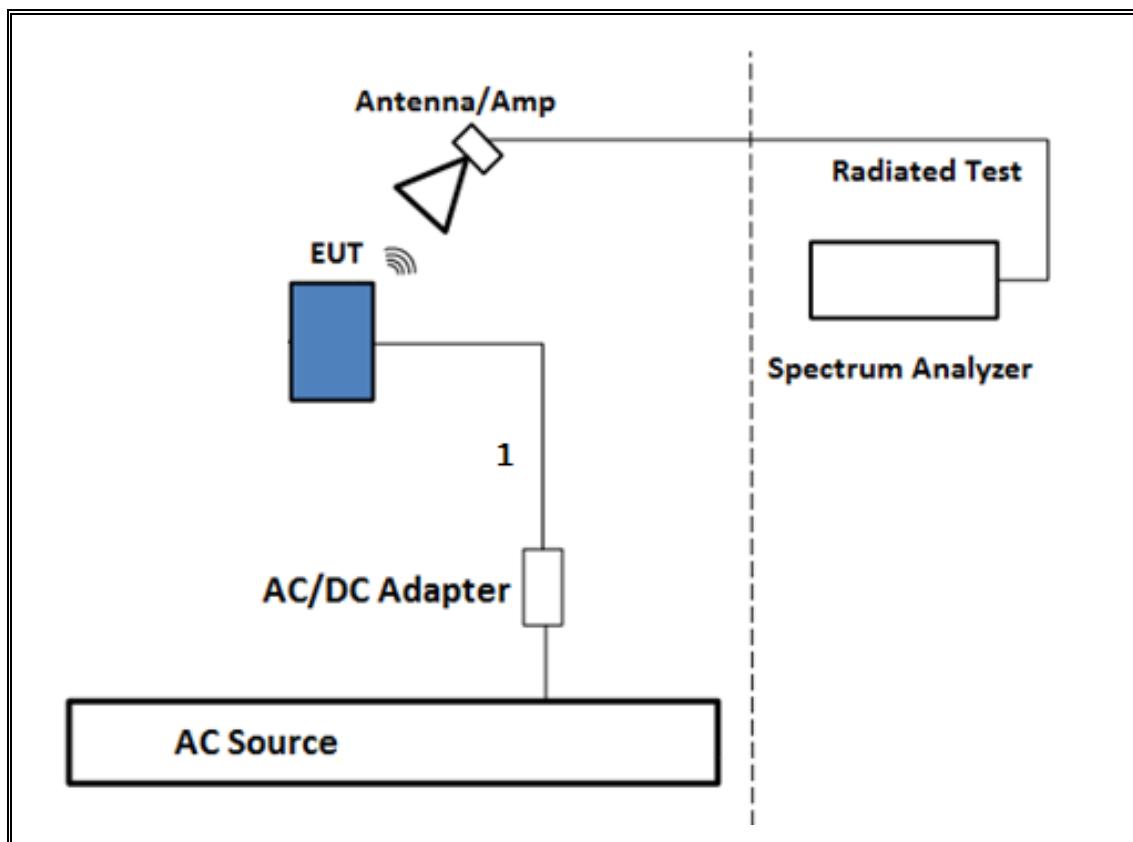
The battery powered EUT was tested as a standalone unit. Test software exercised the EUT.

**SETUP DIAGRAM**

## **TEST SETUP- BELOW 1GHZ**

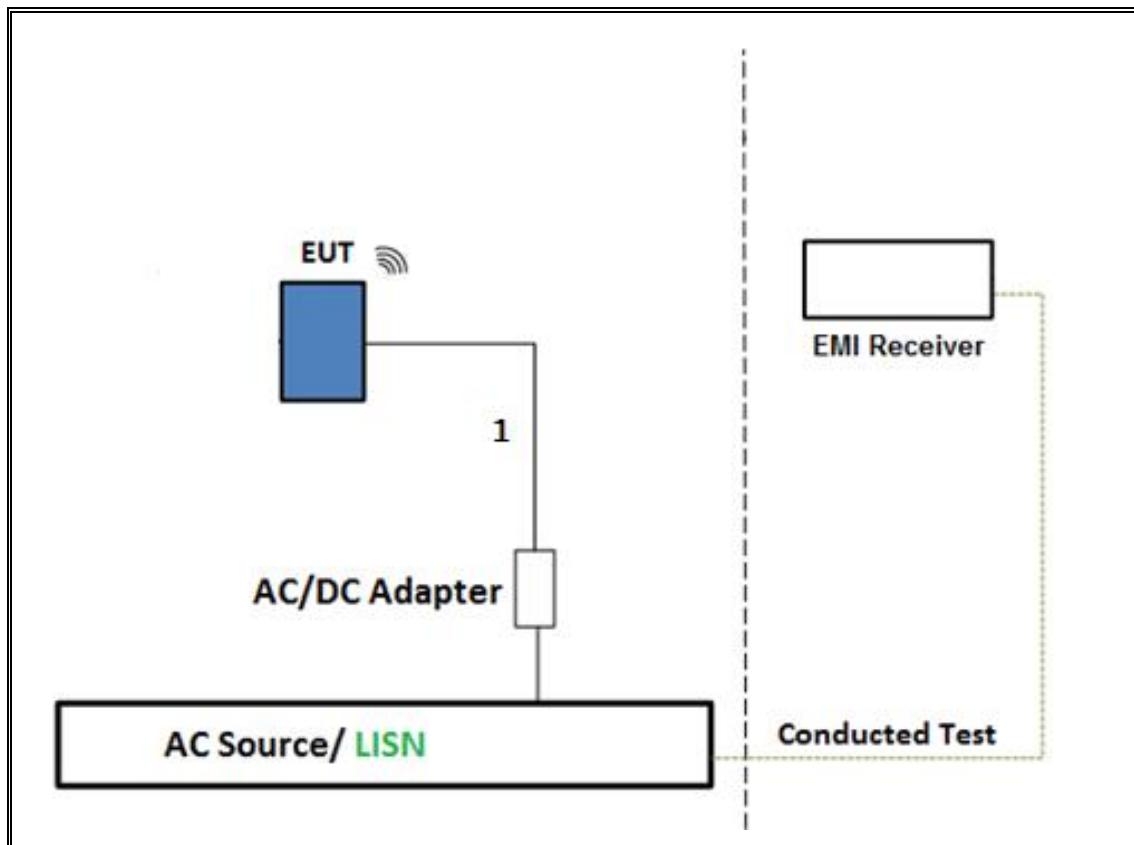
The EUT was tested with powered by AC/DC adapter via USB cable. Test software exercised the EUT.

## **SETUP DIAGRAM**



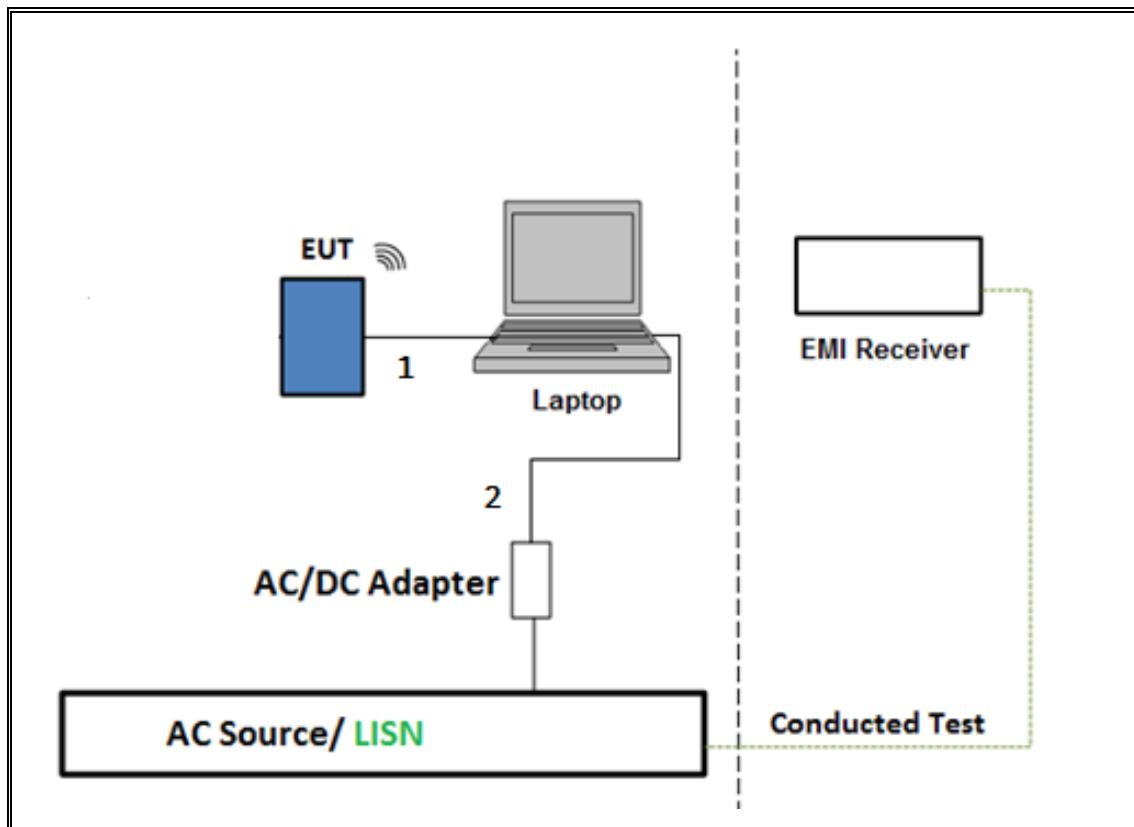
**TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER**

The EUT was tested with powered by AC/DC adapter via USB cable. Test software exercised the EUT.

**SETUP DIAGRAM**

**TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION**

The EUT was tested with powered by host PC via USB cable. Test software exercised the EUT.

**SETUP DIAGRAM**

## 5.7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	3117	00154522	1/12/2017
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	10/28/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	1782158	1/25/2017
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	323562	5/4/2017
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY52350675	11/15/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY51380911	10/15/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	9/25/2016
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	7/8/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	209336	5/26/2017
Spectrum Analyzer, 40 GHz	Agilent	8564E	3943A01643	8/14/2016
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Keysight	8449B	3008A04710	6/29/2016
Antenna, Horn 26.5 to 40GHz	ARA	MWH-2640	209340	5/26/2017
AC Line Conducted				
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/10/2016
LISN for Conducted Emissions CISPR-16	Fischer	50/250-25-2	161124	9/16/2016
Power Cable, Line Conducted Emissions	UL	PG1	N/A	7/28/2016
UL SOFTWARE				
* Radiated Software	UL	UL EMC	Ver 9.5, June 24, 2015	
* Conducted Software	UL	UL EMC	Ver 4.4, March 30, 2016	

Note: \* indicates automation software version used in the compliance certification testing

## 6. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

### 6.1. ON TIME AND DUTY CYCLE

#### LIMITS

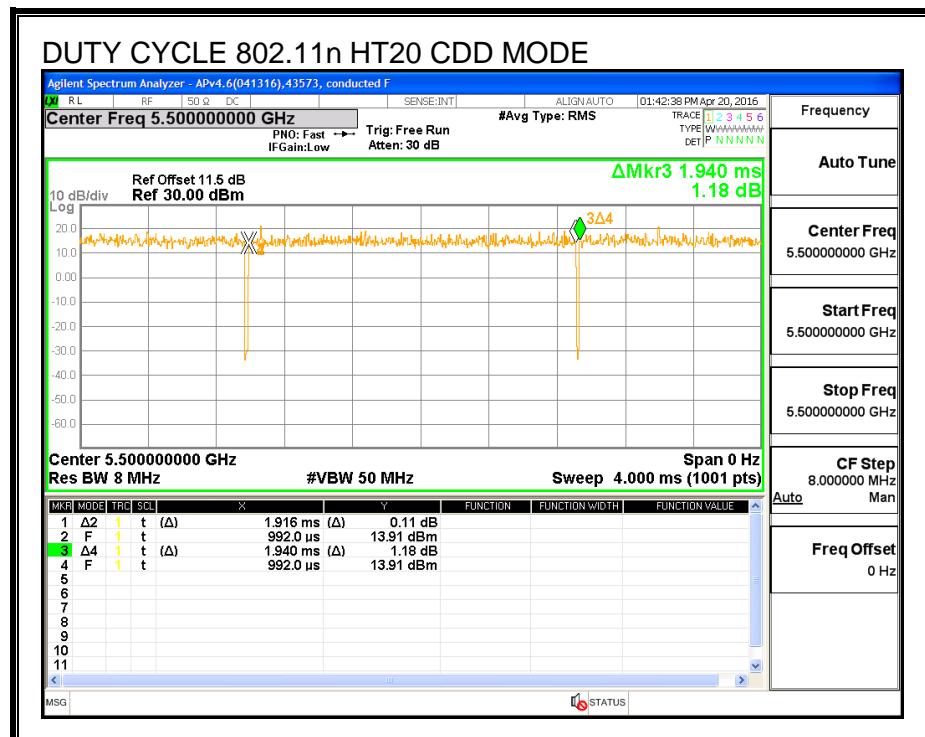
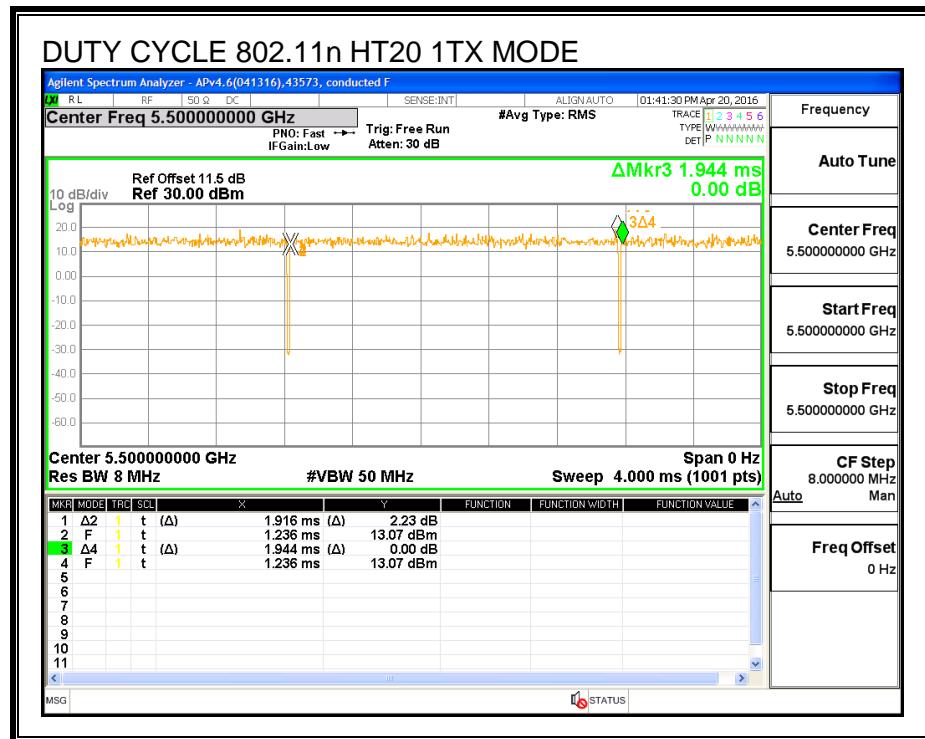
None; for reporting purposes only.

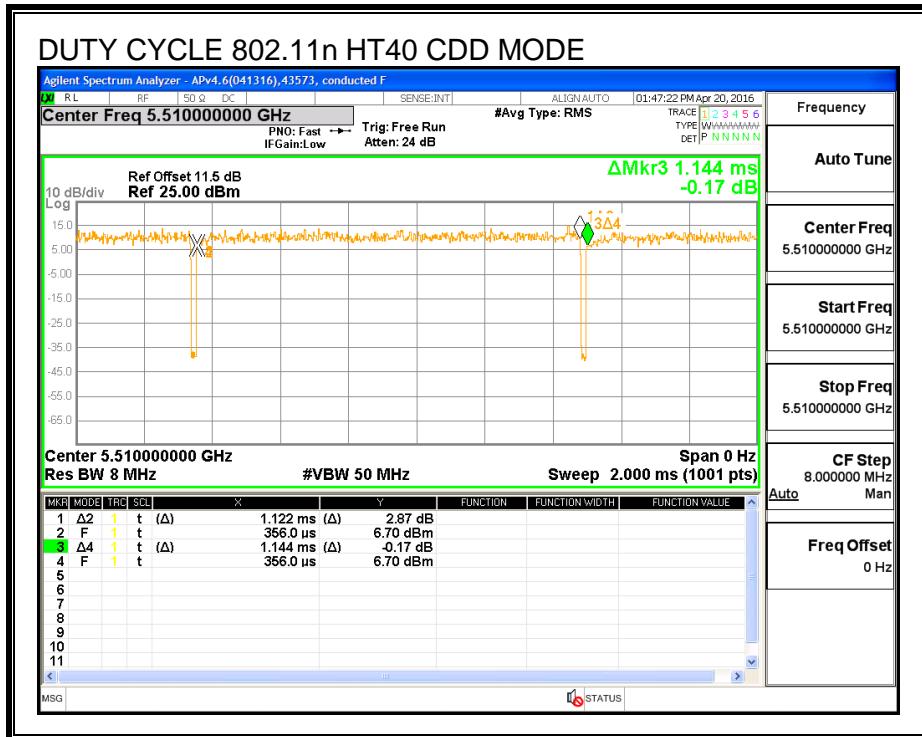
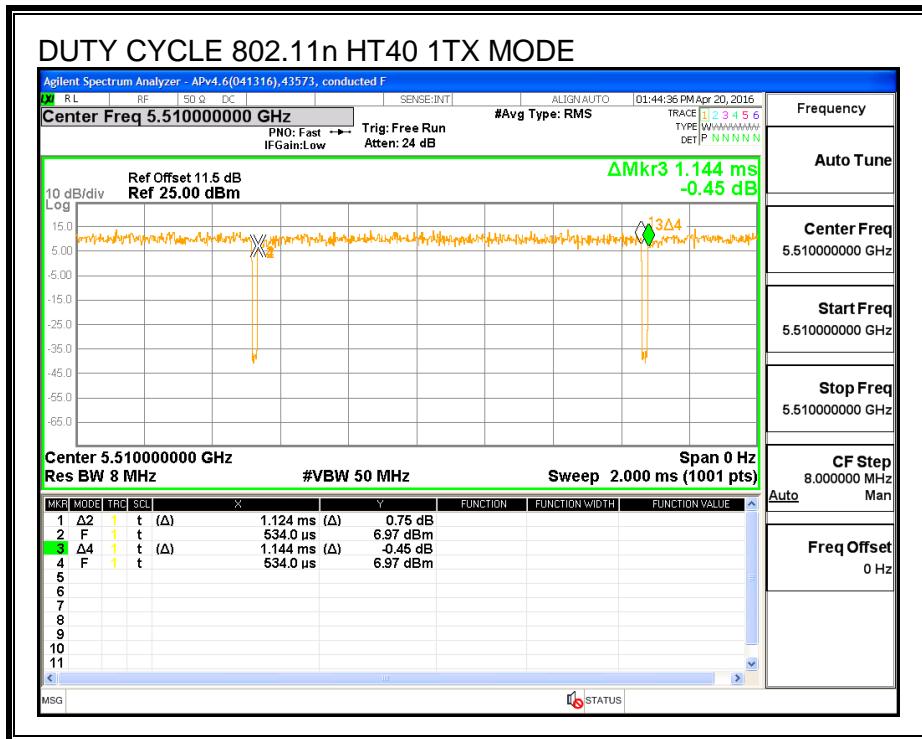
#### PROCEDURE

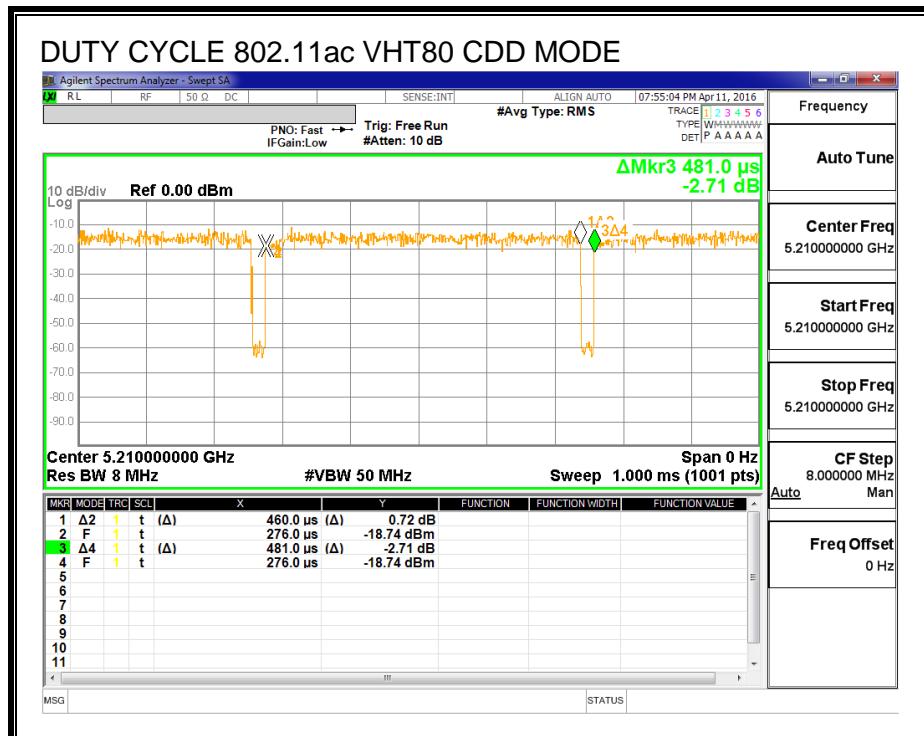
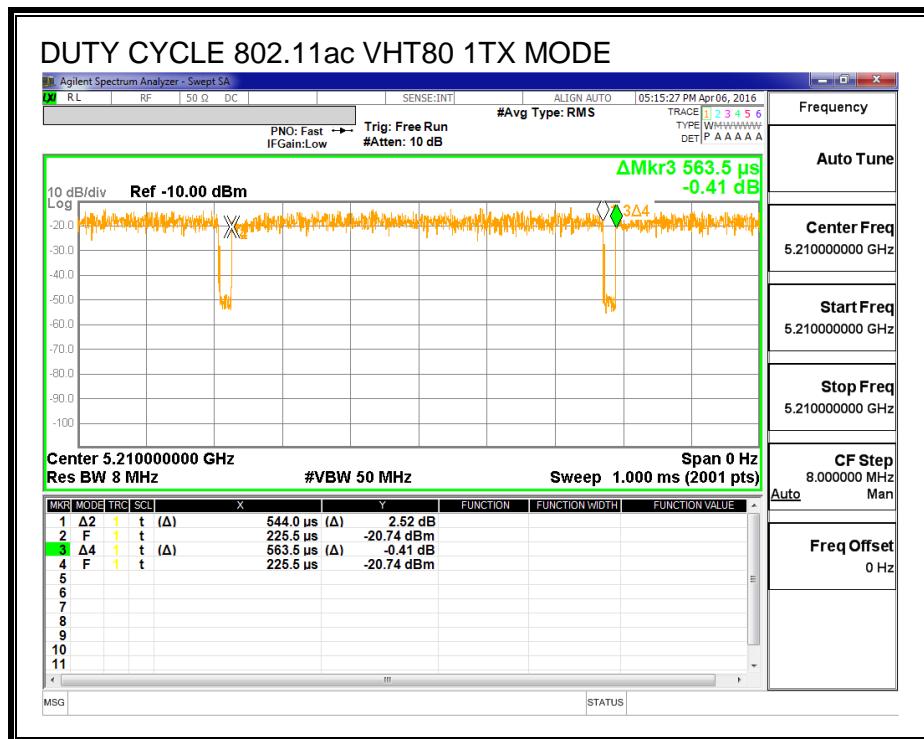
KDB 789033 Zero-Span Spectrum Analyzer Method.

#### RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11n HT20 1TX	1.916	1.944	0.986	98.56%	0.00	0.010
802.11n HT20 CDD	1.916	1.940	0.988	98.76%	0.00	0.010
802.11n HT40 1TX	1.124	1.144	0.983	98.25%	0.00	0.010
802.11n HT40 CDD	1.122	1.144	0.981	98.08%	0.00	0.010
802.11ac VHT80 1TX	0.544	0.564	0.965	96.54%	0.15	1.838
802.11ac VHT80 CDD	0.460	0.481	0.956	95.63%	0.19	2.174

**DUTY CYCLE PLOTS**





## 6.2. MEASUREMENT METHODS

6 dB Emission BW: KDB 789033 D02 v01r02, Section C.

26 dB Emission BW: KDB 789033 D02 v01r02, Section C.

99% Occupied BW: KDB 789033 D02 v01r02, Section D.

Conducted Output Power: KDB 789033 D02 v01r02, Section E.3.b (Method PM-G).

Power Spectral Density: KDB 789033 D02 v01r02, Section F (Method SA-2).

Unwanted emissions in restricted bands: KDB 789033 D02 v01r02, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01r02, Sections G.3, G.4, and G.5.

## 7. ANTENNA PORT TEST RESULTS

### 7.1.802.11n HT20 CHAIN 0 MODE IN THE 5.2 GHz BAND

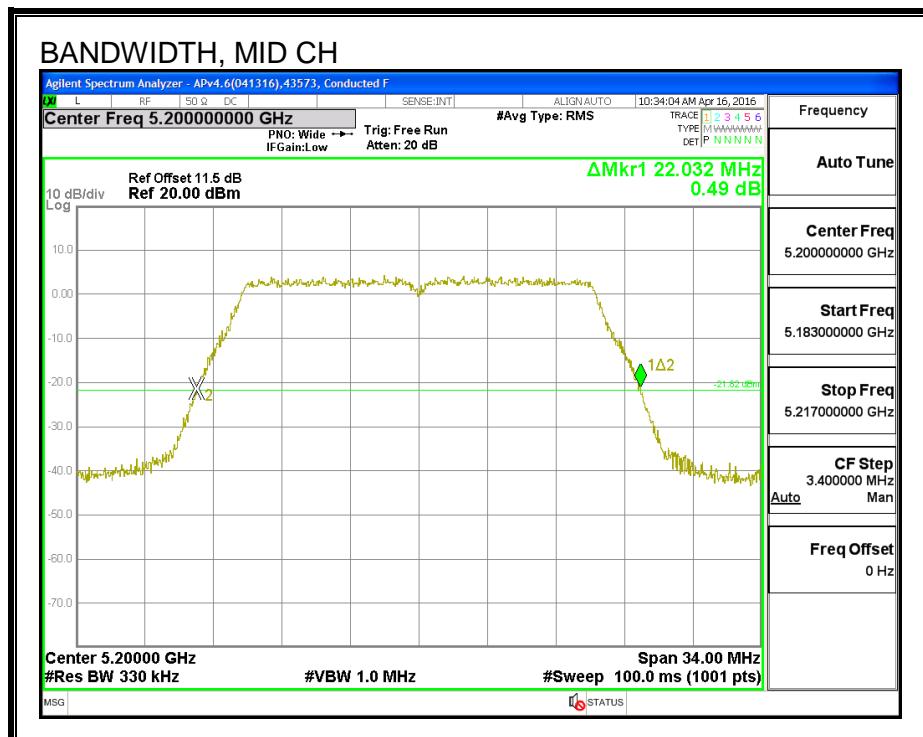
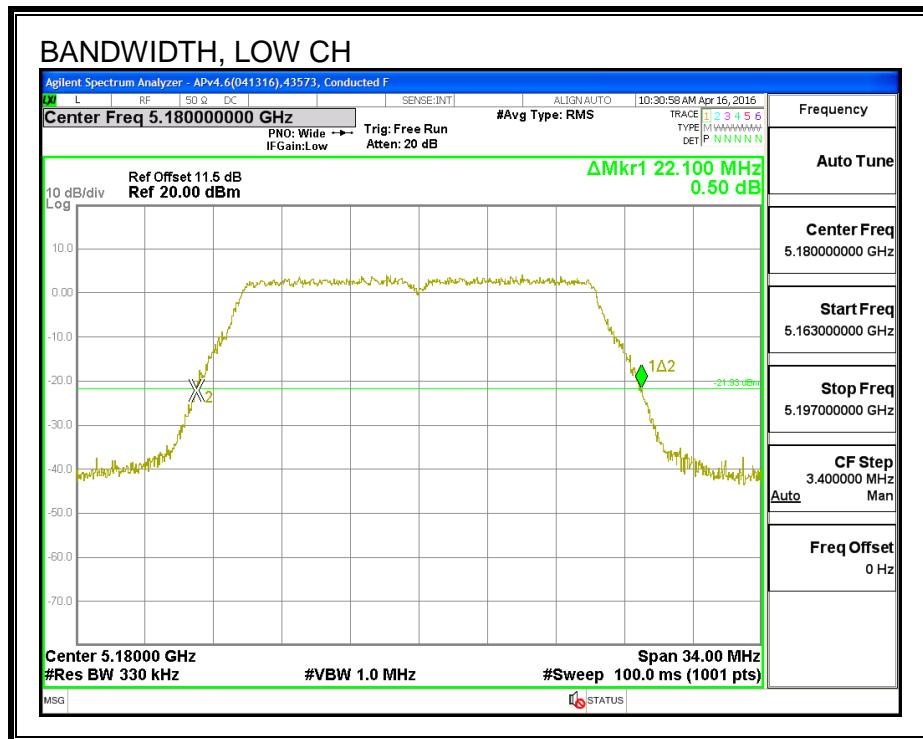
#### 7.1.1. 26 dB BANDWIDTH

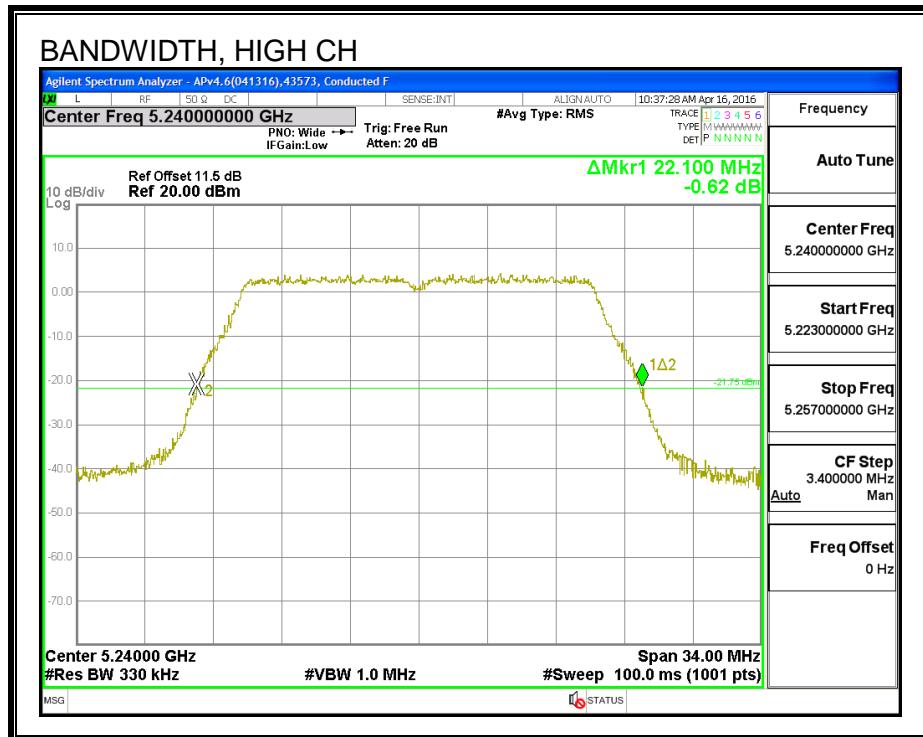
##### LIMITS

None; for reporting purposes only.

##### RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5180	22.10
Mid	5200	22.03
High	5240	22.10

**26 dB BANDWIDTH**



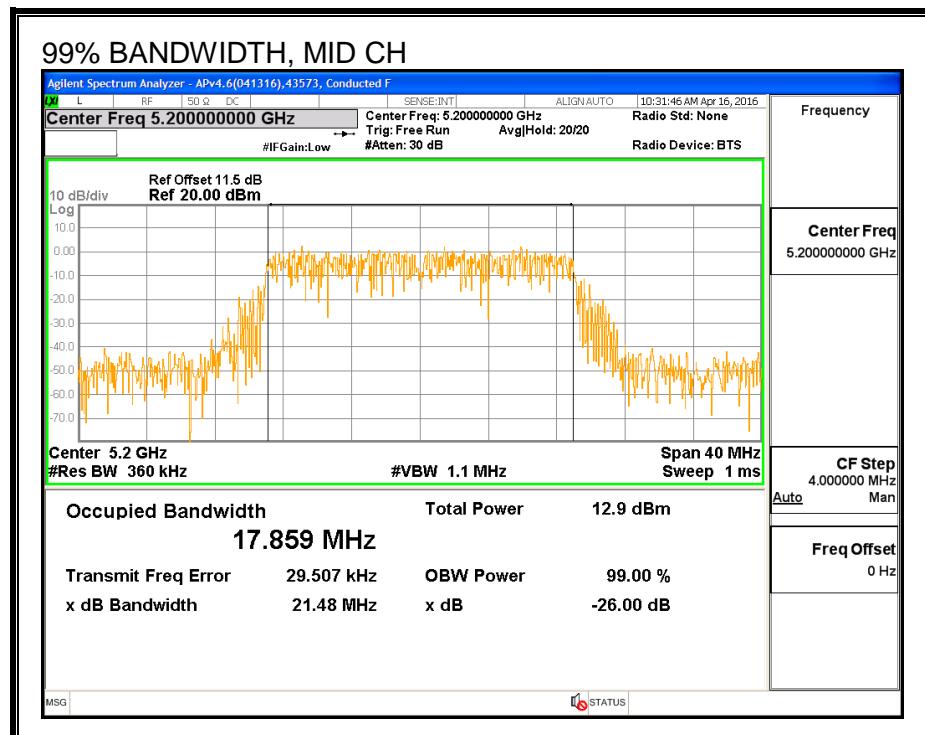
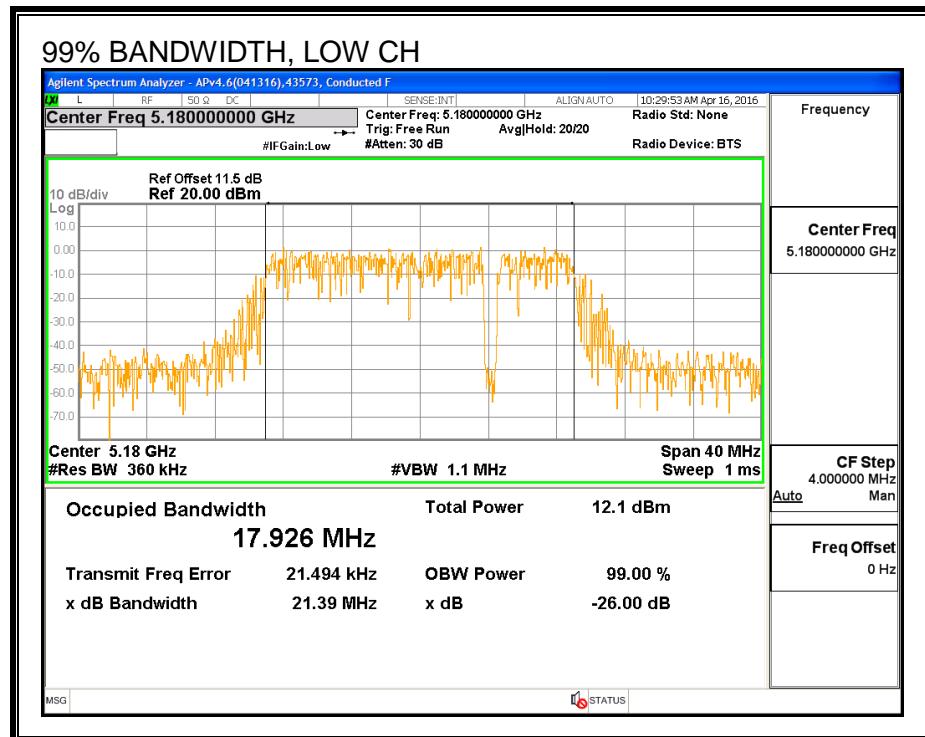
### 7.1.2. 99% BANDWIDTH

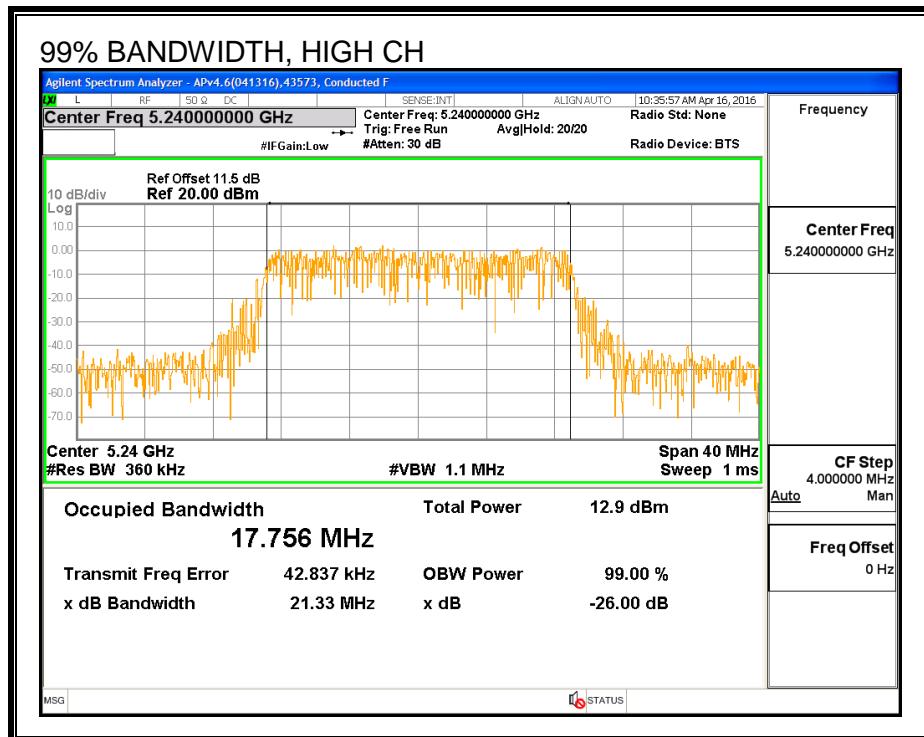
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% BW (MHz)
Low	5180	17.926
Mid	5200	17.859
High	5240	17.756

**99% BANDWIDTH**



### 7.1.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/8/16
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Channel	Frequency (MHz)	Power (dBm)
Low	5180	17.46
Mid	5200	19.00
High	5240	19.00

### 7.1.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/8/16
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### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	-5.02	-5.02	24.00	11.00
Mid	5200	-5.02	-5.02	24.00	11.00
High	5240	-5.02	-5.02	24.00	11.00

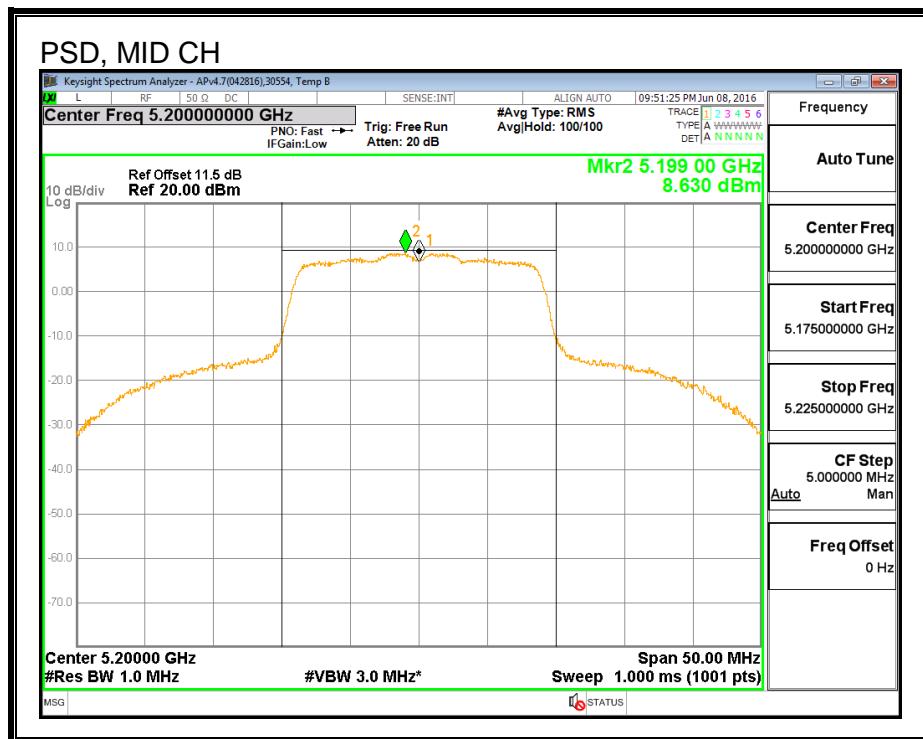
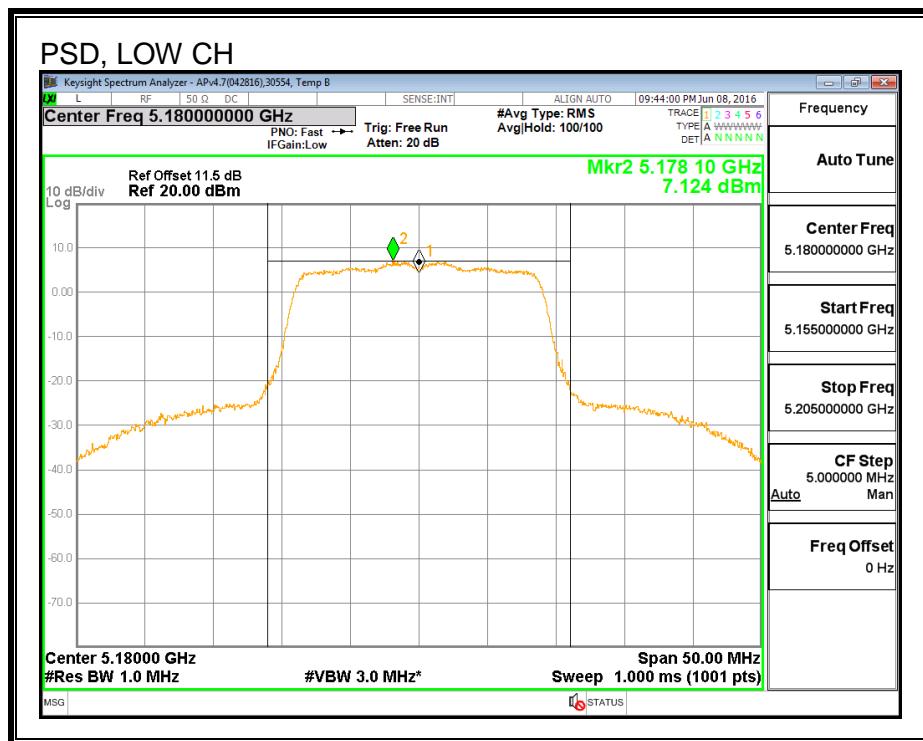
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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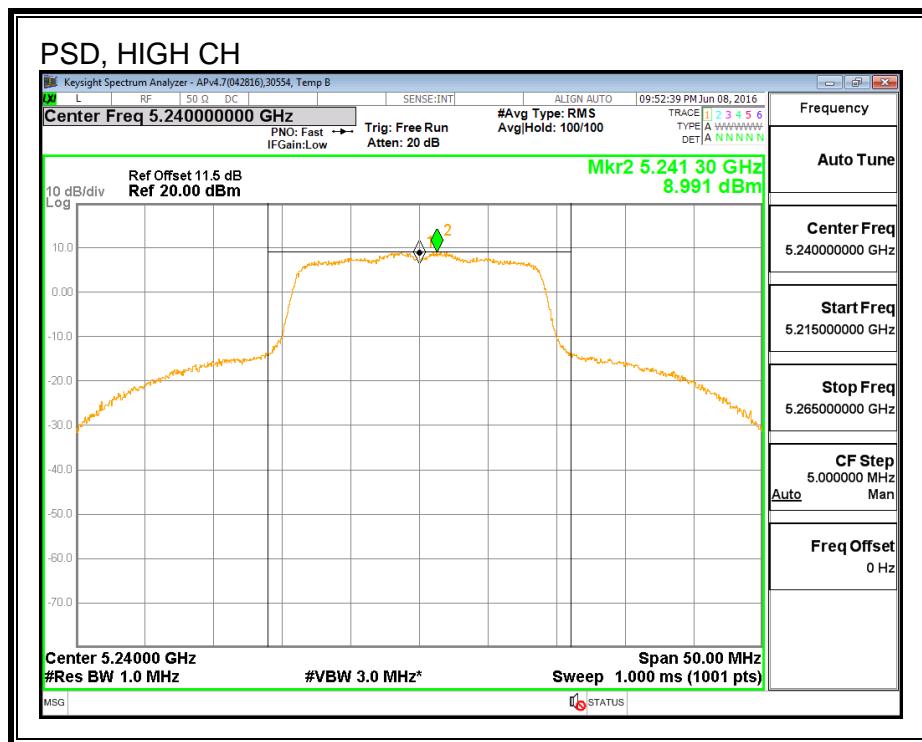
### Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	17.46	17.46	24.00	-6.54
Mid	5200	19.00	19.00	24.00	-5.00
High	5240	19.00	19.00	24.00	-5.00

### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	7.12	7.12	11.00	-3.88
Mid	5200	8.63	8.63	11.00	-2.37
High	5240	8.99	8.99	11.00	-2.01

PSD

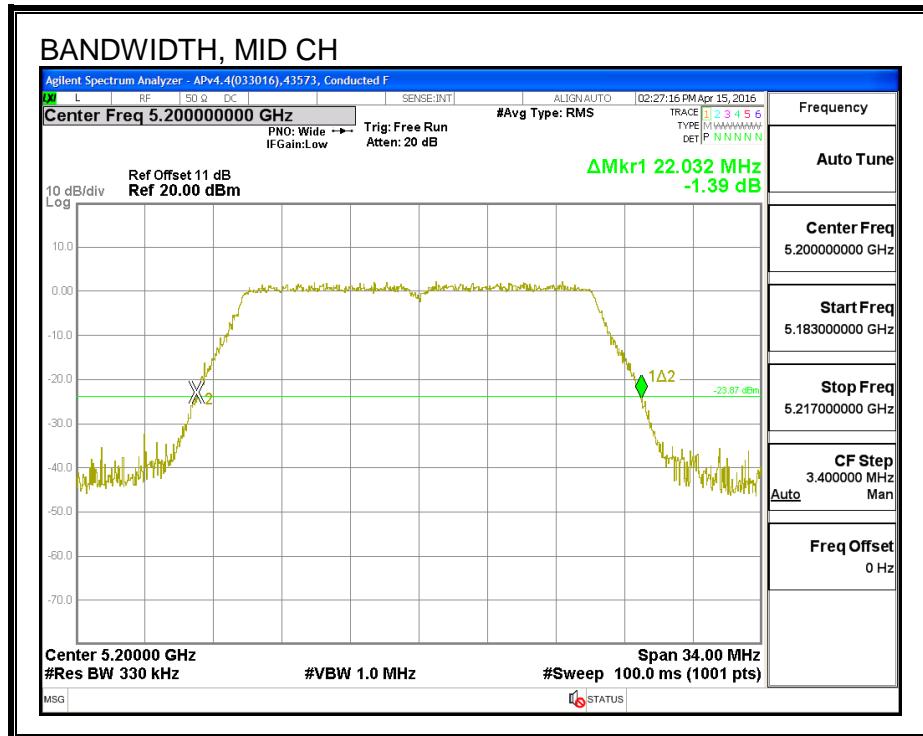
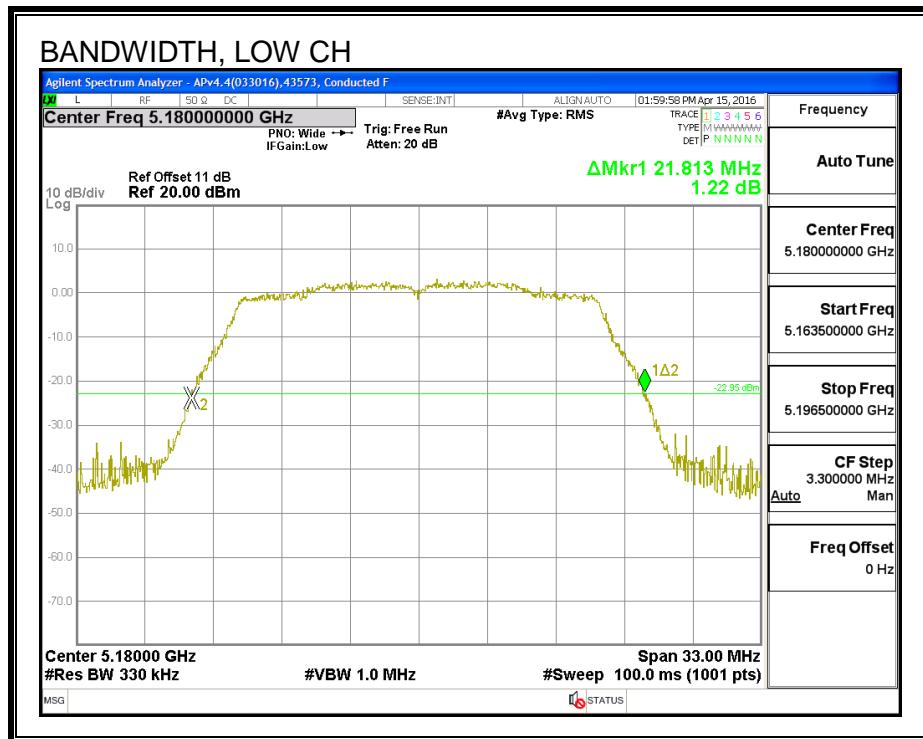


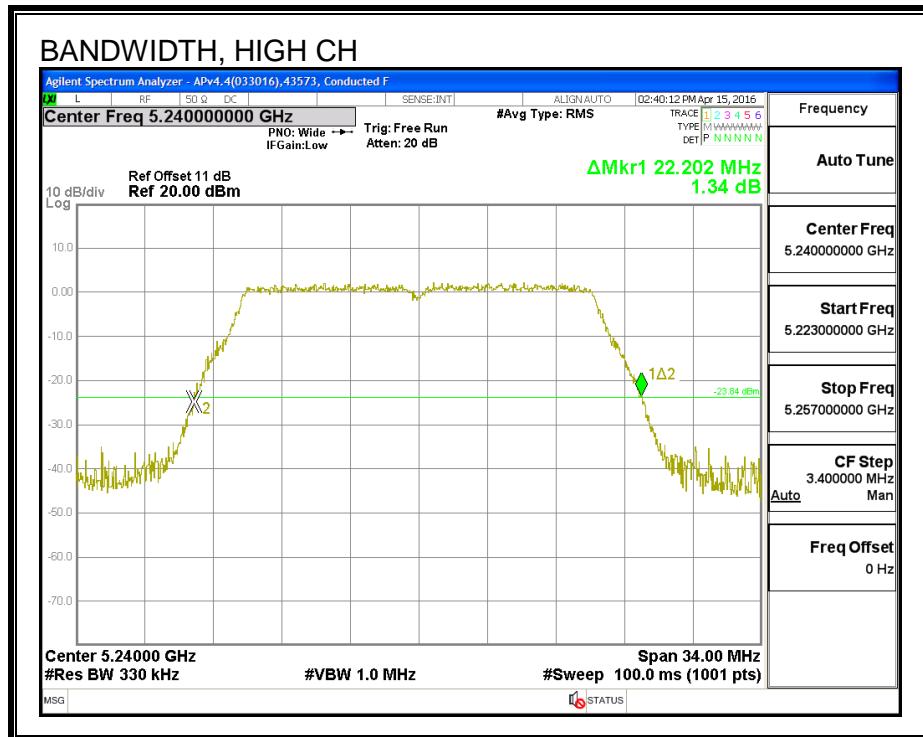
**7.2.802.11n HT20 CHAIN 1 MODE IN THE 5.2 GHz BAND****7.2.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Frequency (MHz)	26 dB Bandwidth (MHz)
5180	21.81
5200	22.03
5240	22.20

**26 dB BANDWIDTH**



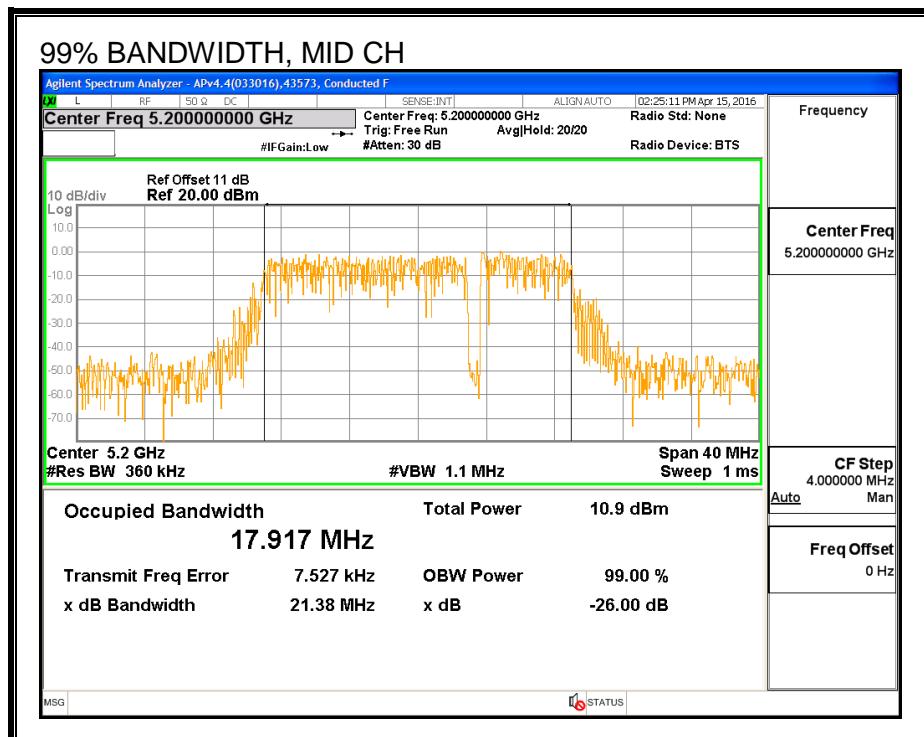
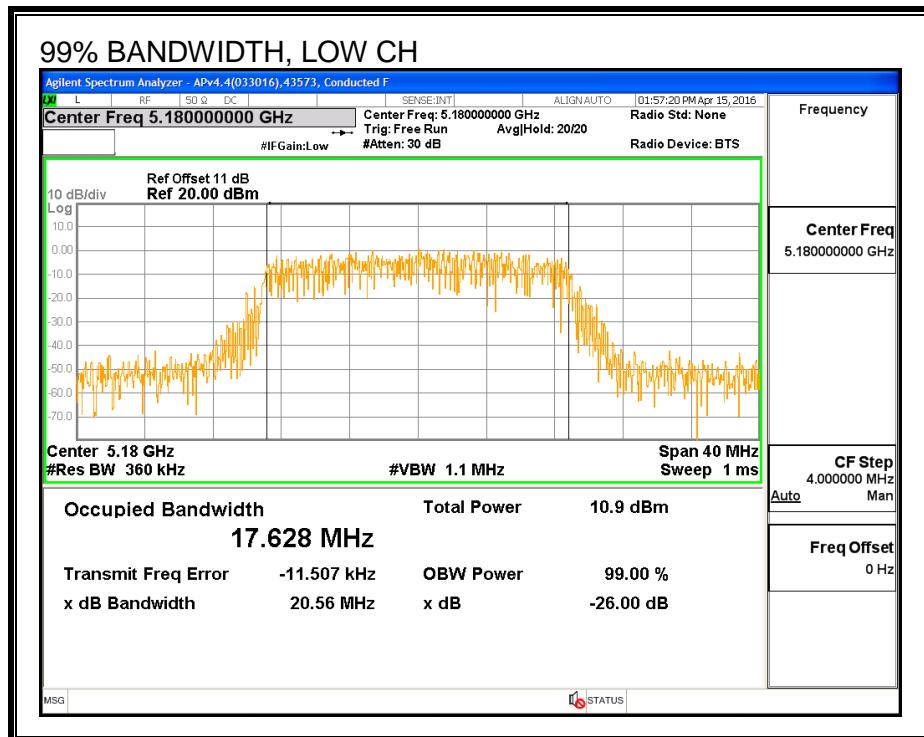
### 7.2.2. 99% BANDWIDTH

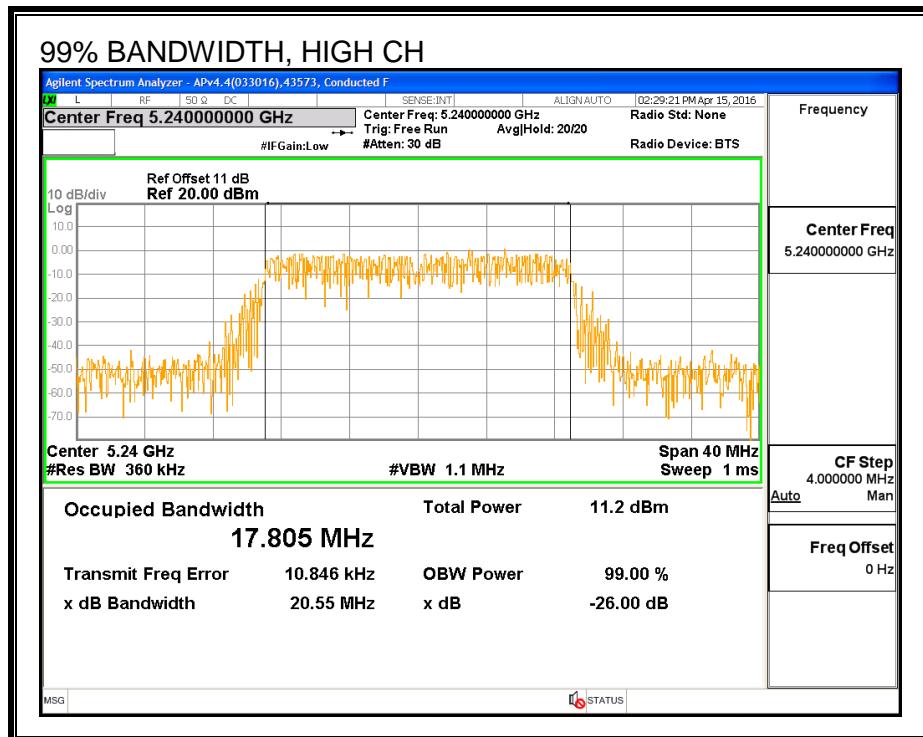
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% BW (MHz)
Low	5180	17.628
Mid	5200	17.917
High	5240	17.805

**99% BANDWIDTH**



### 7.2.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

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Channel	Frequency (MHz)	Power (dBm)
Low	5180	17.48
Mid	5200	19.00
High	5240	19.00

### 7.2.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**TEST PROCEDURE**

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

**DIRECTIONAL ANTENNA GAIN**

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

**RESULTS**

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**Antenna Gain and Limits**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	-6.01	-6.01	24.00	11.00
Mid	5200	-6.01	-6.01	24.00	11.00
High	5240	-6.01	-6.01	24.00	11.00

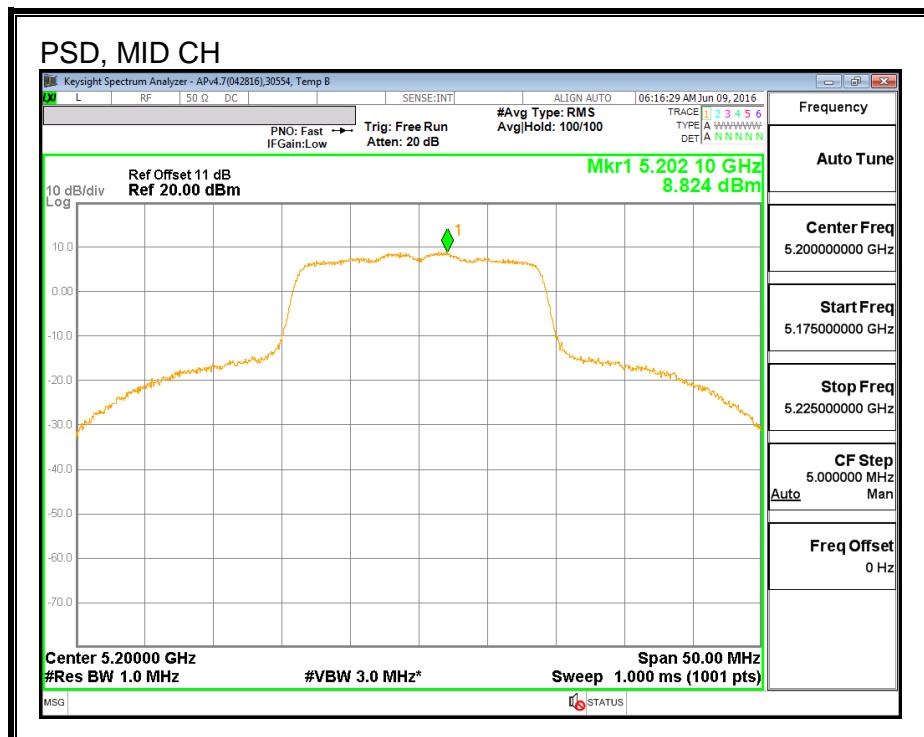
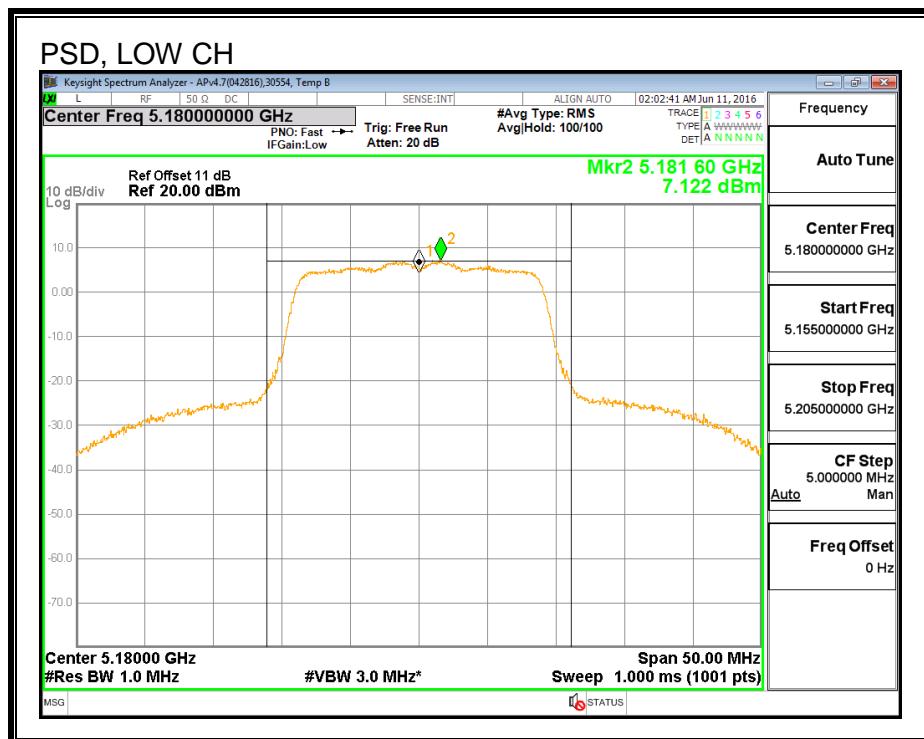
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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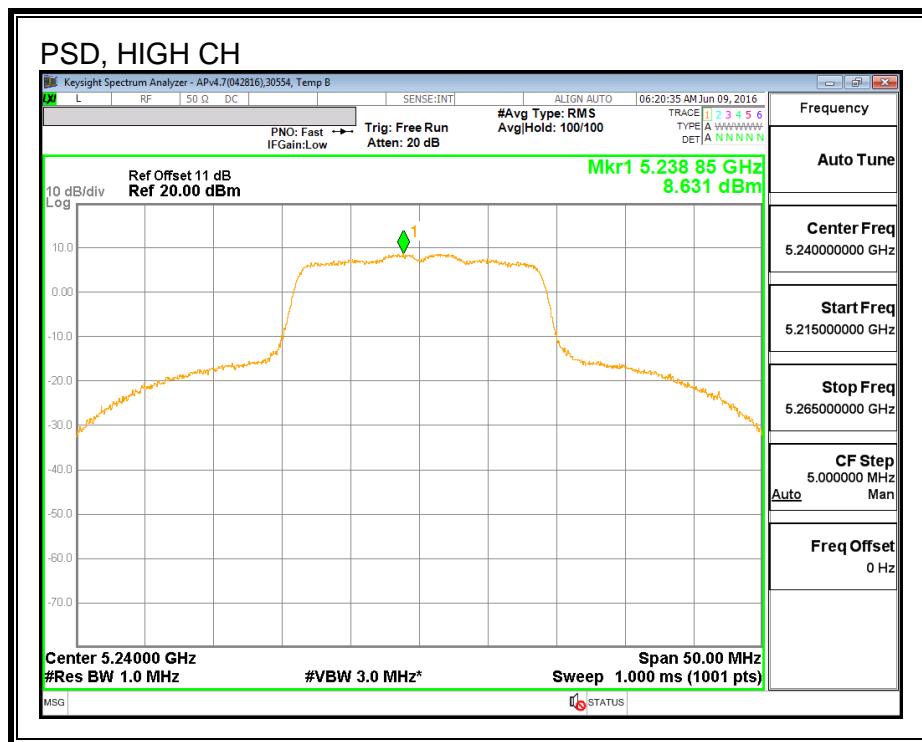
**Output Power Results**

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	17.48	17.48	24.00	-6.52
Mid	5200	19.00	19.00	24.00	-5.00
High	5240	19.00	19.00	24.00	-5.00

**PSD Results**

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	7.12	7.12	11.00	-3.88
Mid	5200	8.82	8.82	11.00	-2.18
High	5240	8.63	8.63	11.00	-2.37

PSD

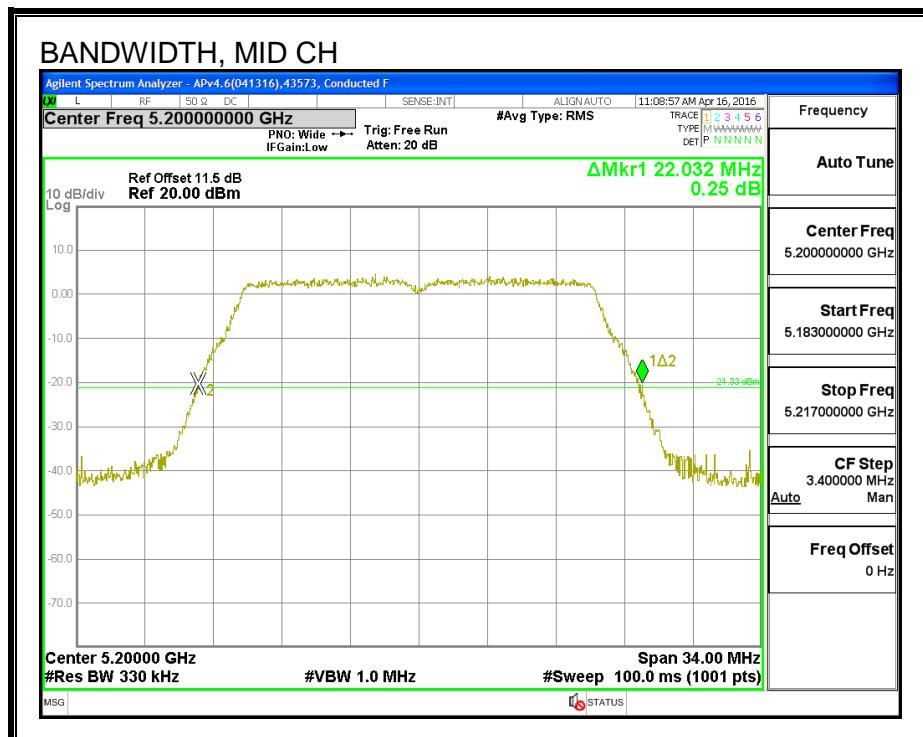
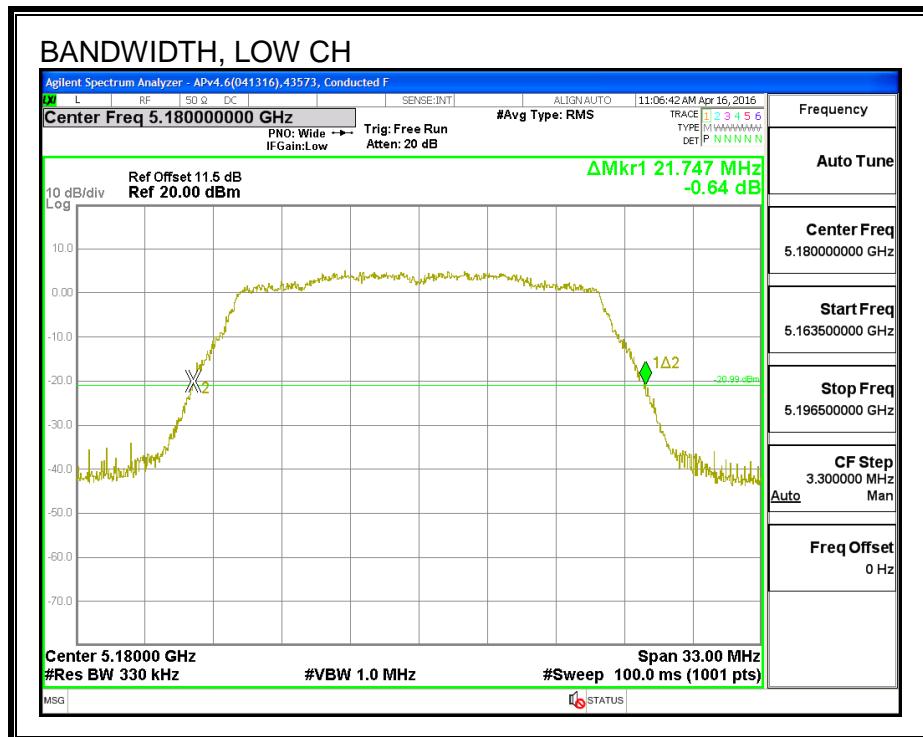


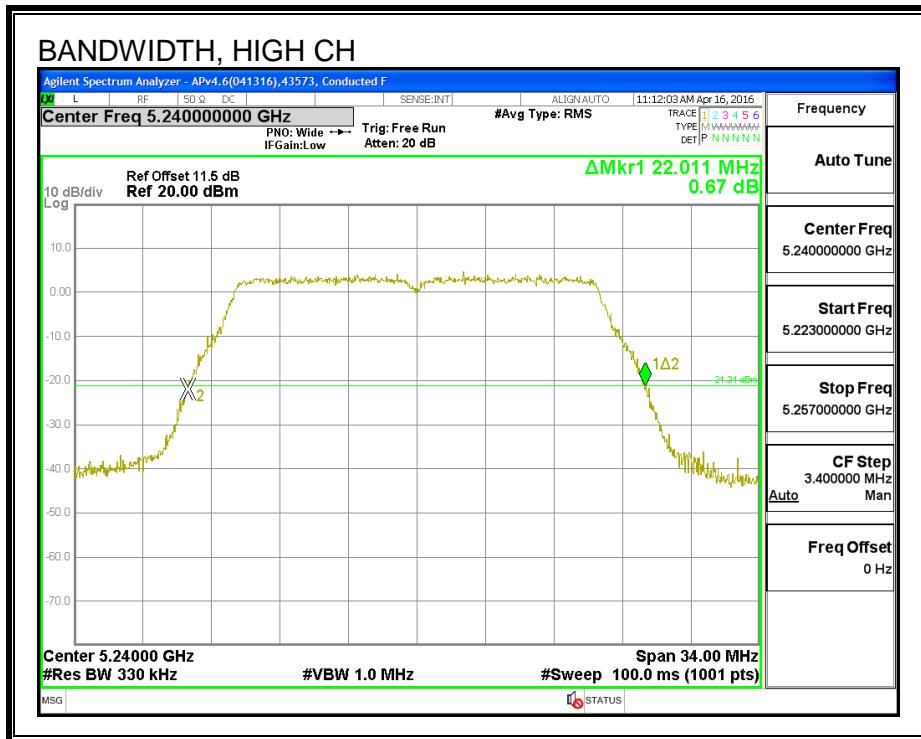
**7.3.802.11n HT20 2Tx CDD MODE IN THE 5.2 GHz BAND****7.3.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

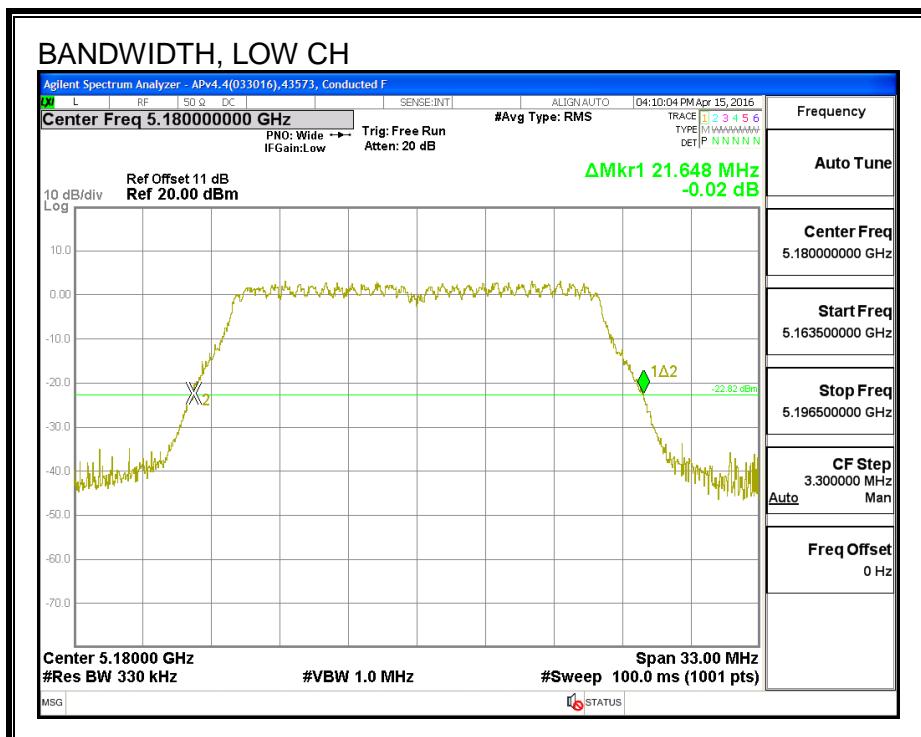
**RESULTS**

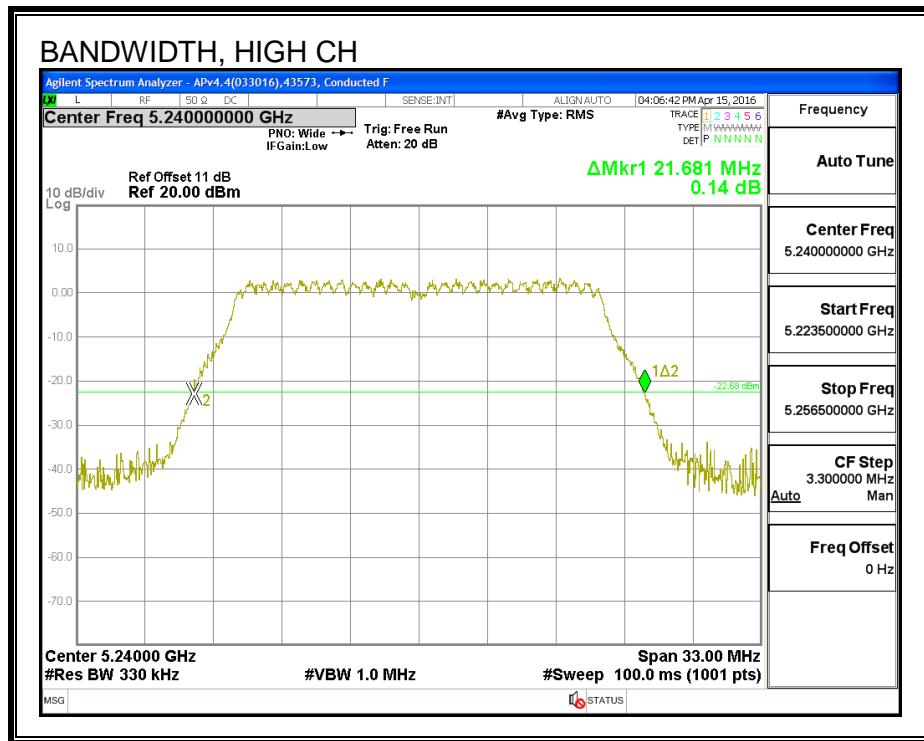
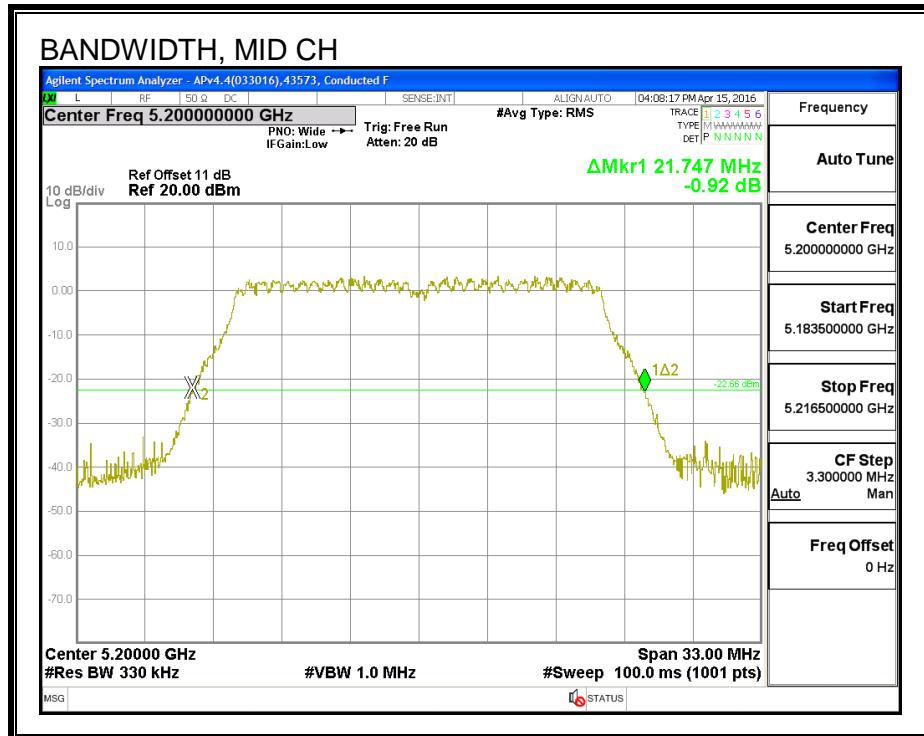
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5180	21.75	21.65
Mid	5200	22.03	21.75
High	5240	22.01	21.68

**26 DB BANDWIDTH, CHAIN 0**



## 26 DB BANDWIDTH, CHAIN 1





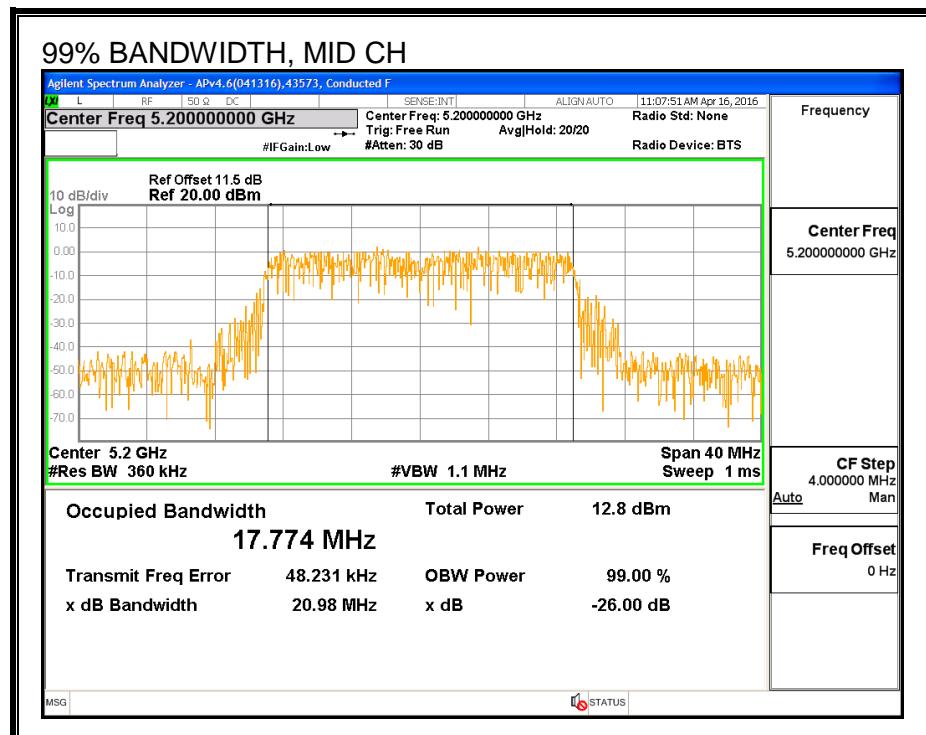
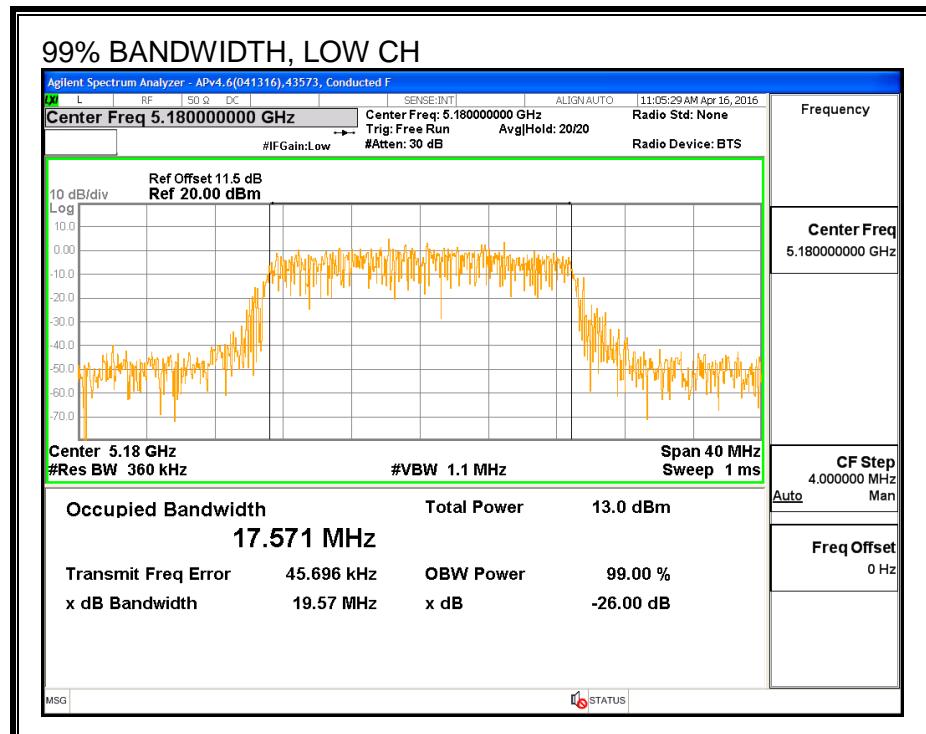
### 7.3.2. 99% BANDWIDTH

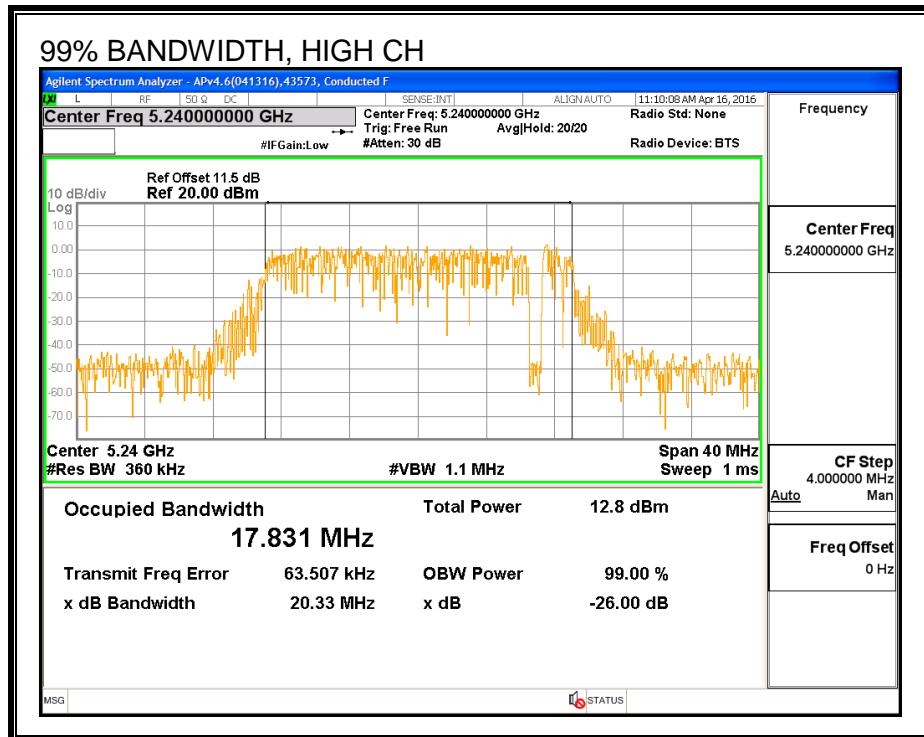
#### LIMITS

None; for reporting purposes only.

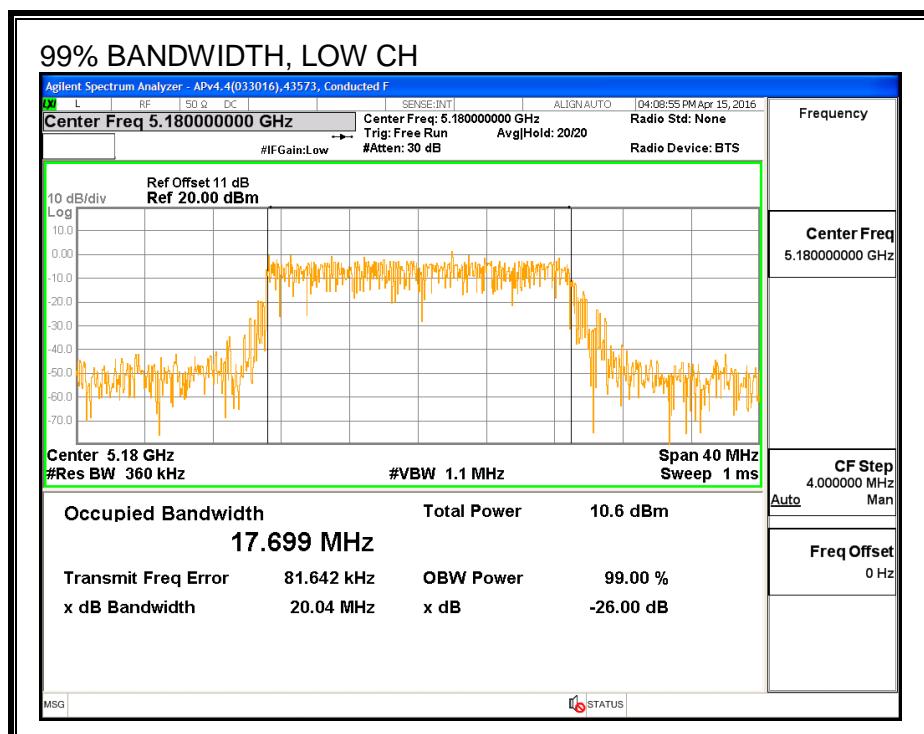
#### RESULTS

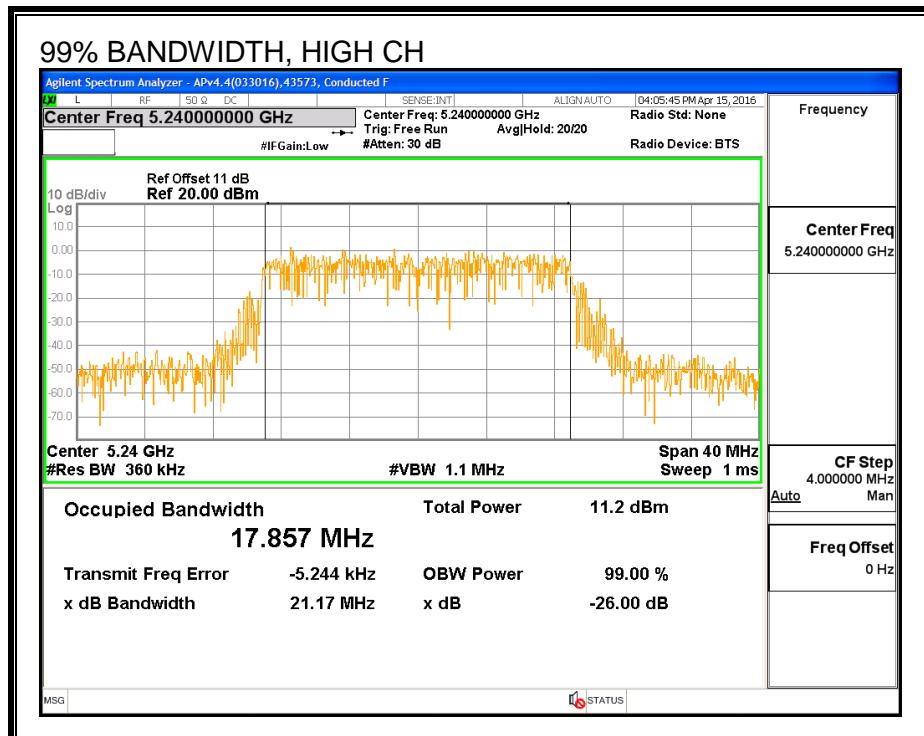
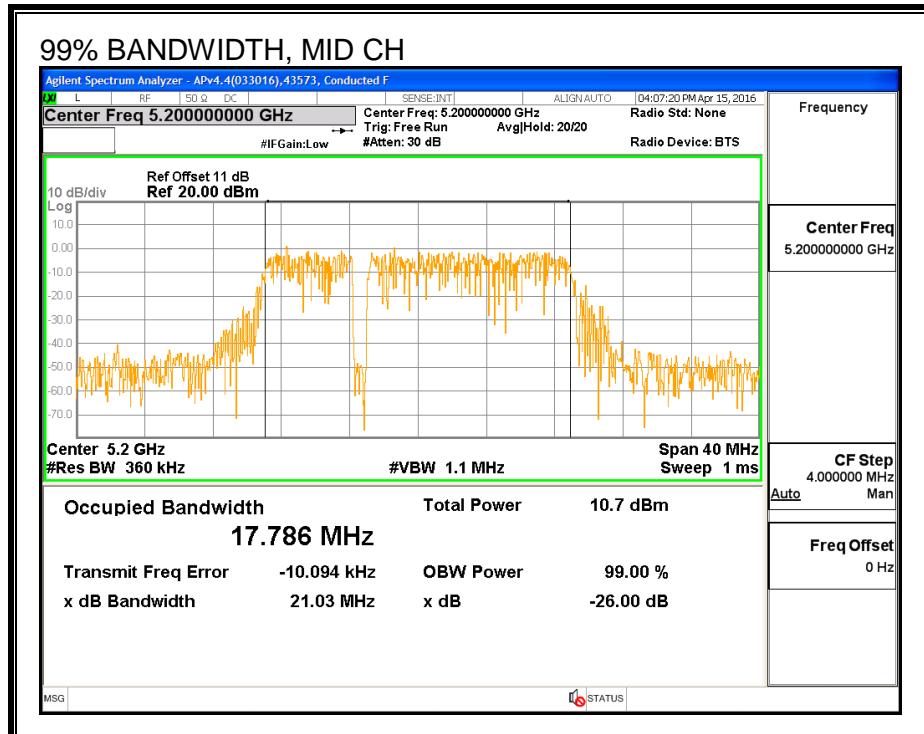
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5180	17.571	17.699
Mid	5200	17.774	17.786
High	5240	17.831	17.857

**99% BANDWIDTH, CHAIN 0**



### 99% BANDWIDTH, CHAIN 1





### 7.3.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

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##### Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5180	16.80	16.83	19.83
Mid	5200	16.95	16.90	19.94
High	5240	16.98	17.00	20.00

### 7.3.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

**DIRECTIONAL ANTENNA GAIN**

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Uncorrelated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-5.49

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Correlated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-2.49

**RESULTS**

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**Antenna Gain and Limits**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5180	-5.49	-2.49	24.00	11.00
Mid	5200	-5.49	-2.49	24.00	11.00
High	5240	-5.49	-2.49	24.00	11.00

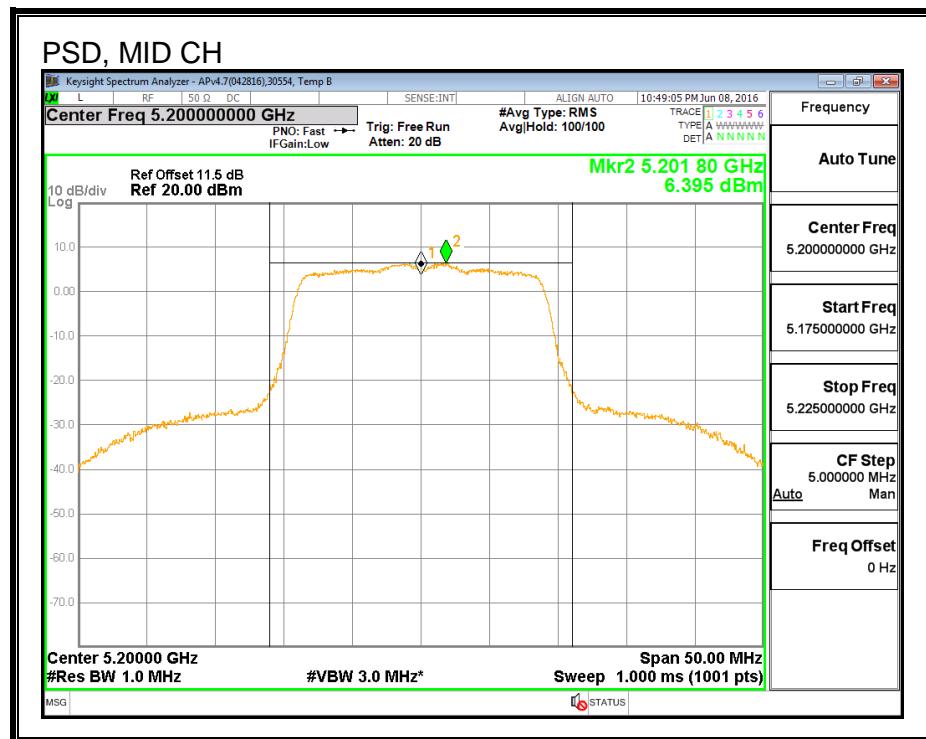
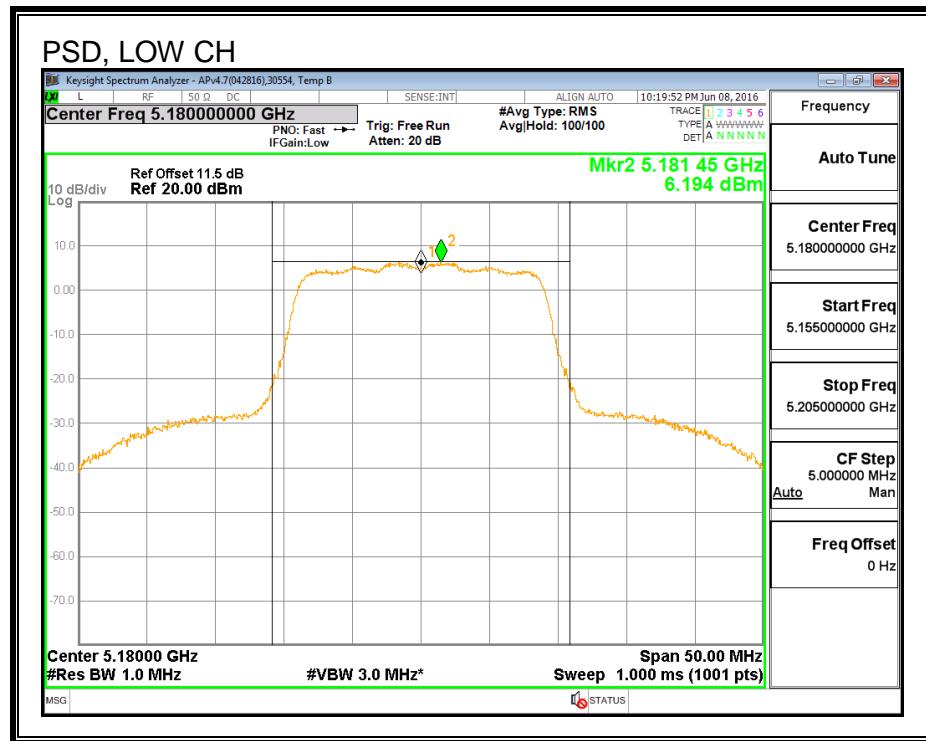
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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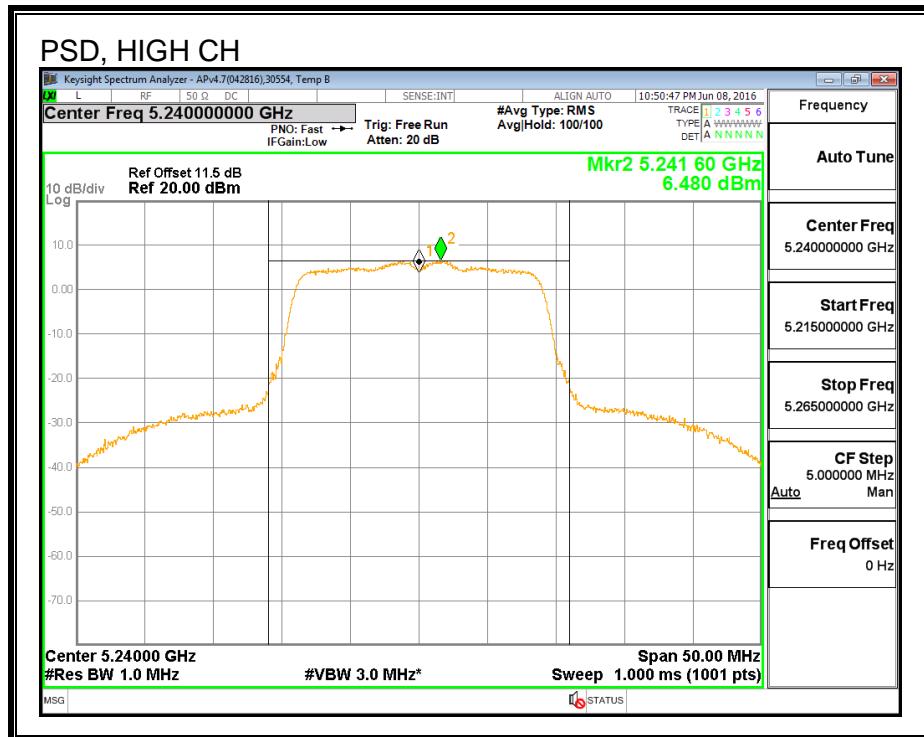
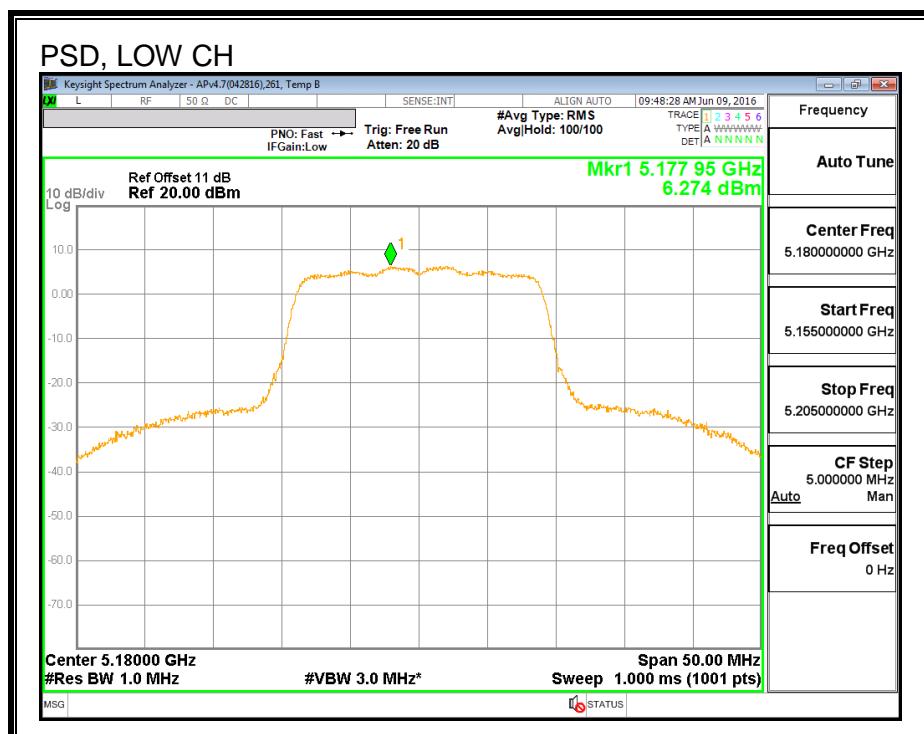
**Output Power Results**

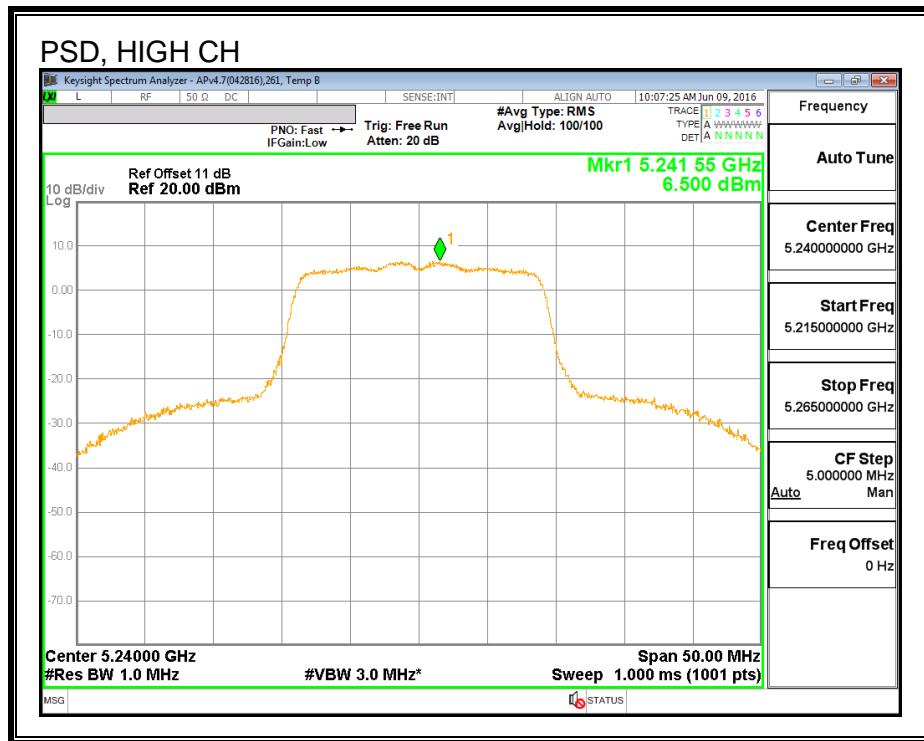
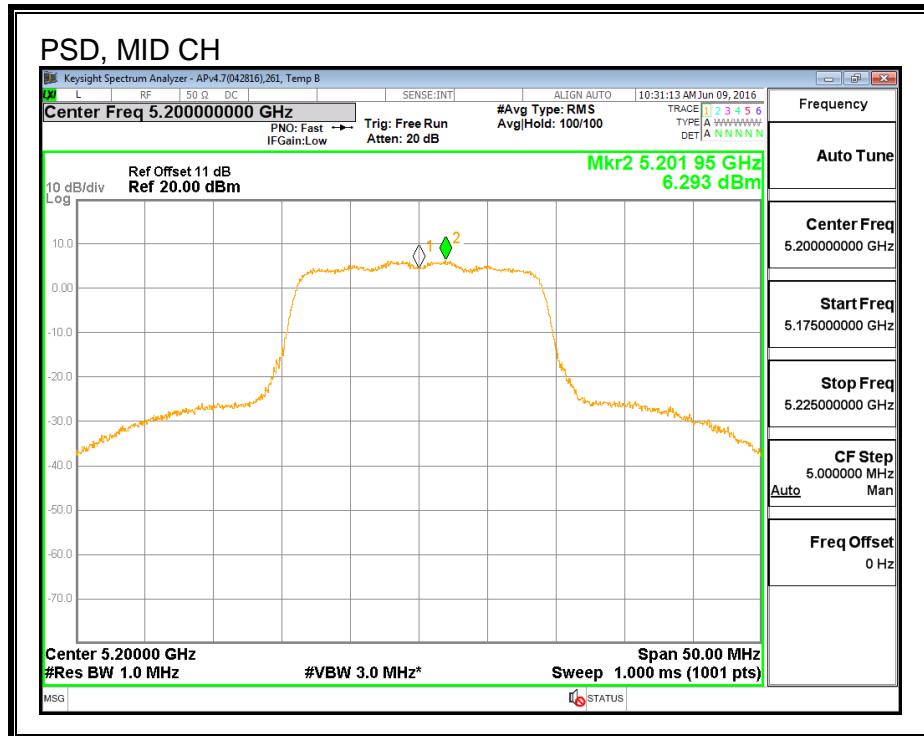
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5180	16.80	16.83	19.83	24.00	-4.17
Mid	5200	16.95	16.90	19.94	24.00	-4.06
High	5240	16.98	17.00	20.00	24.00	-4.00

**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5180	6.194	6.274	9.24	11.00	-1.76
Mid	5200	6.395	6.293	9.35	11.00	-1.65
High	5240	6.48	6.5	9.50	11.00	-1.50

**PSD, CHAIN 0**

**PSD, CHAIN 1**

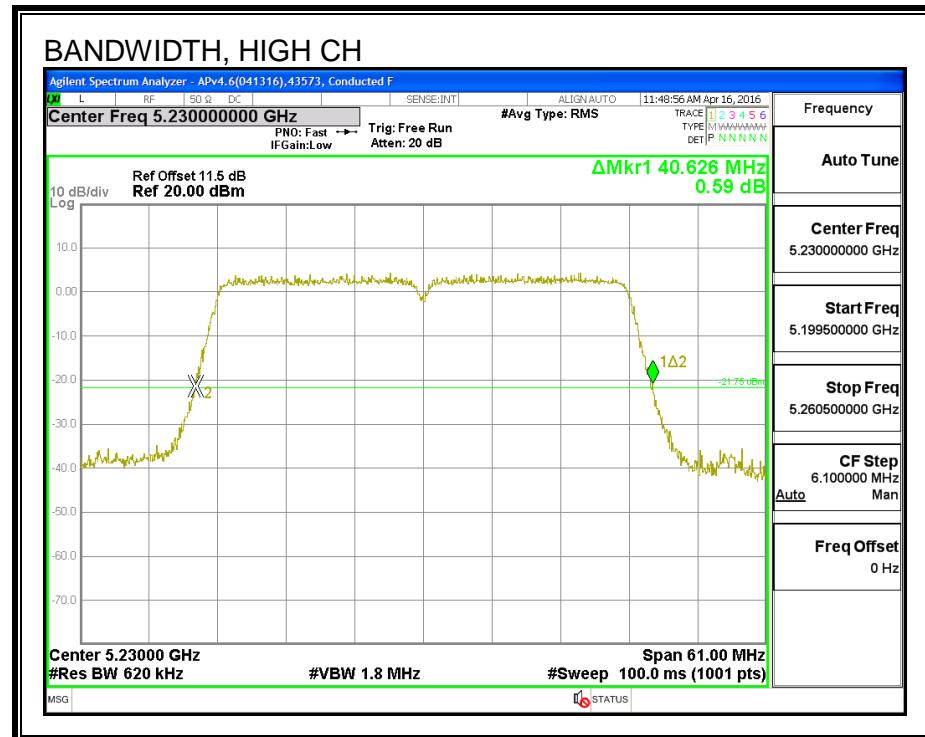
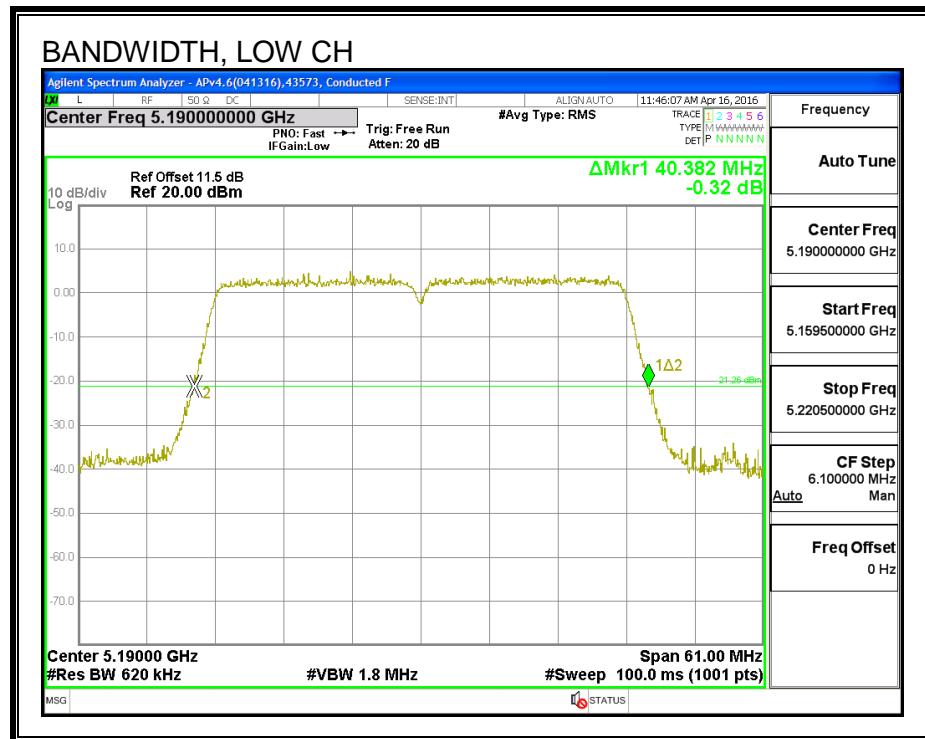


**7.4.802.11n HT40 CHAIN 0 MODE IN THE 5.2 GHz BAND****7.4.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5190	40.38
High	5230	40.63

**26 dB BANDWIDTH**

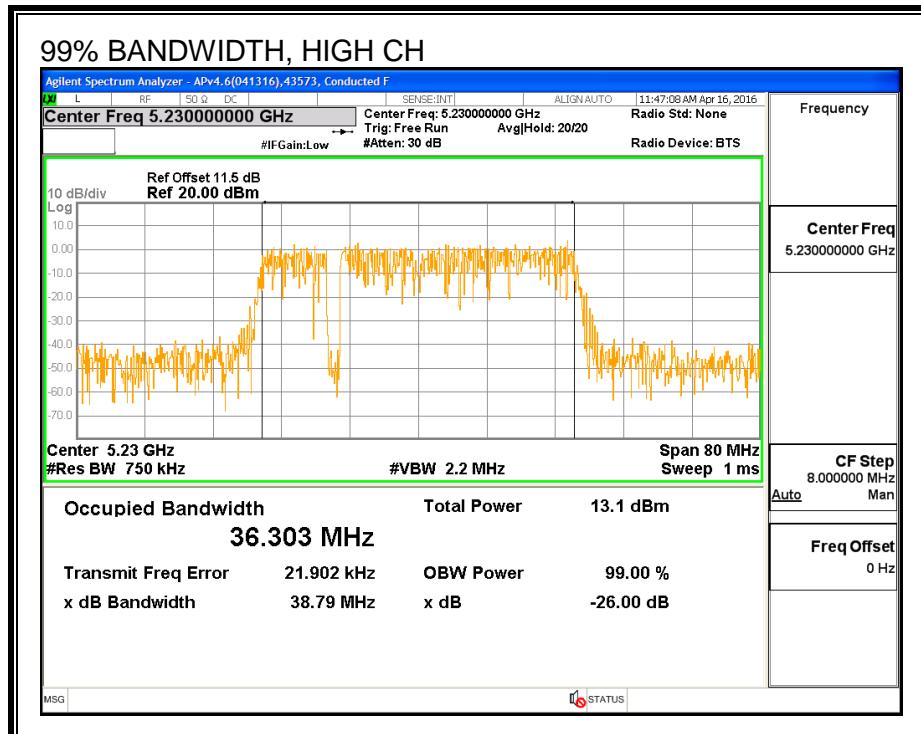
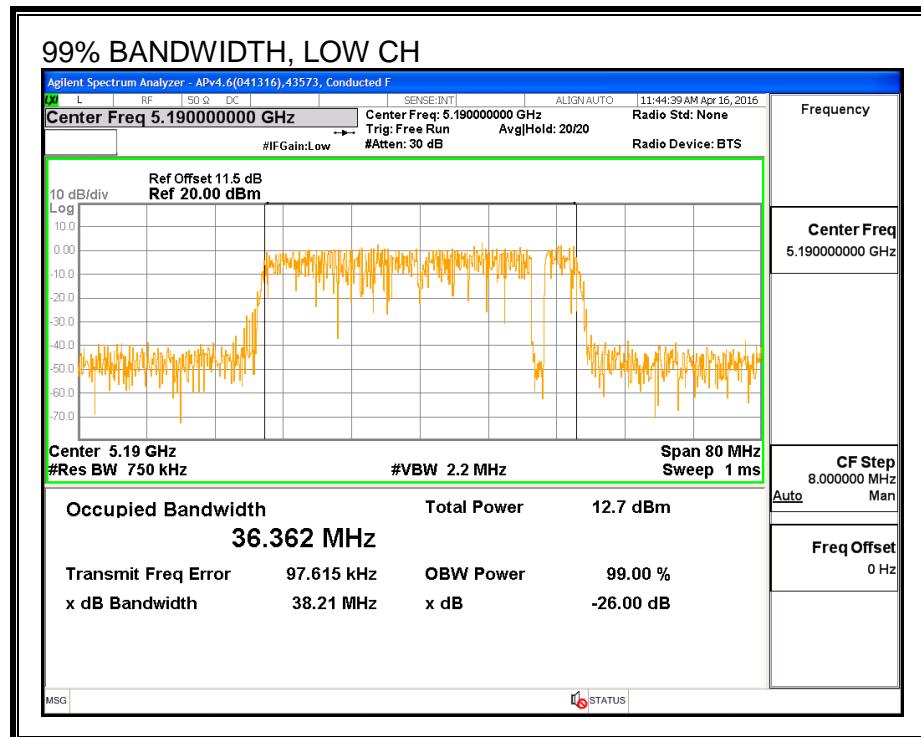
#### 7.4.2. 99% BANDWIDTH

##### LIMITS

None; for reporting purposes only.

##### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.362
High	5230	36.303

**99% BANDWIDTH**

### 7.4.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

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Channel	Frequency (MHz)	Power (dBm)
Low	5190	16.36
High	5230	18.95

#### 7.4.4. OUTPUT POWER AND PSD

##### LIMITS

###### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	-5.02	-5.02	24.00	11.00
High	5230	-5.02	-5.02	24.00	11.00

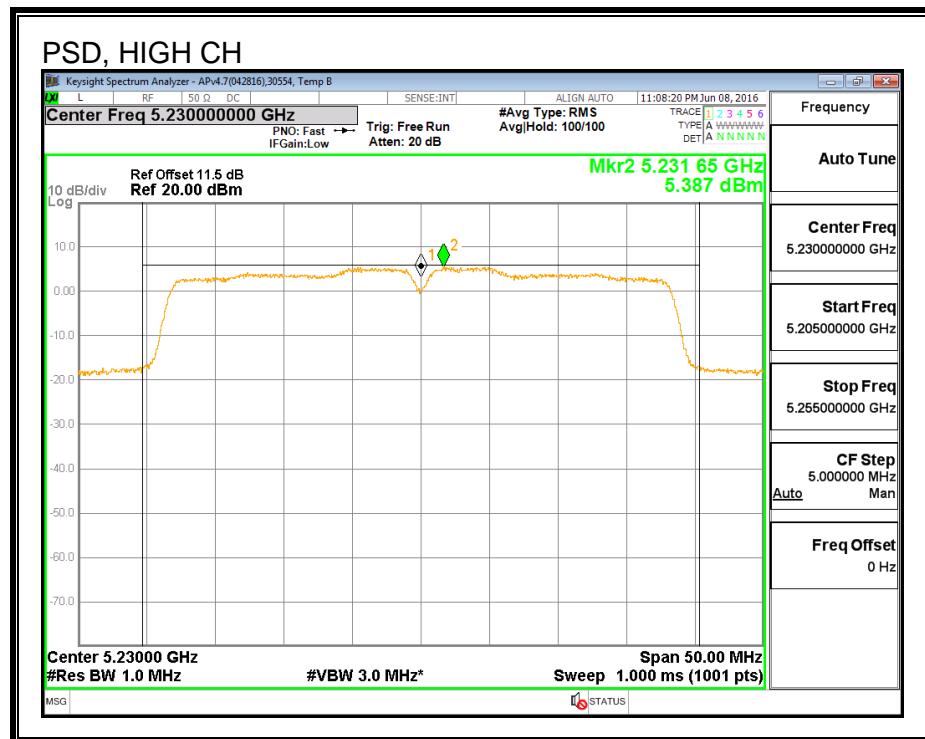
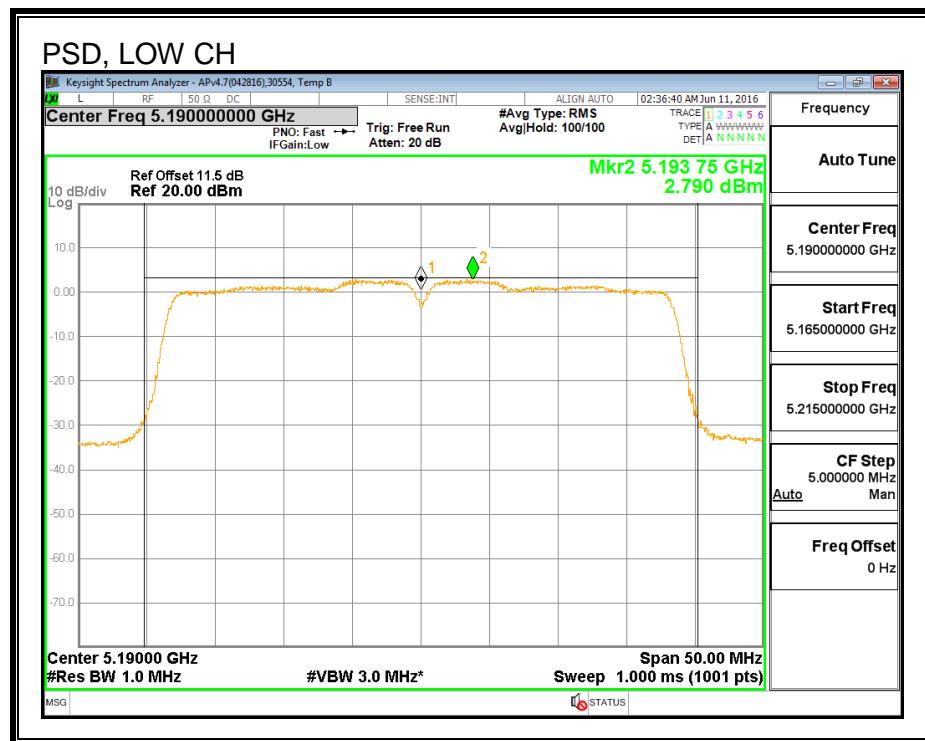
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'PSD</b>
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### Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	16.36	16.36	24.00	-7.64
High	5230	18.95	18.95	24.00	-5.05

### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	2.79	2.79	11.00	-8.21
High	5230	5.39	5.39	11.00	-5.61

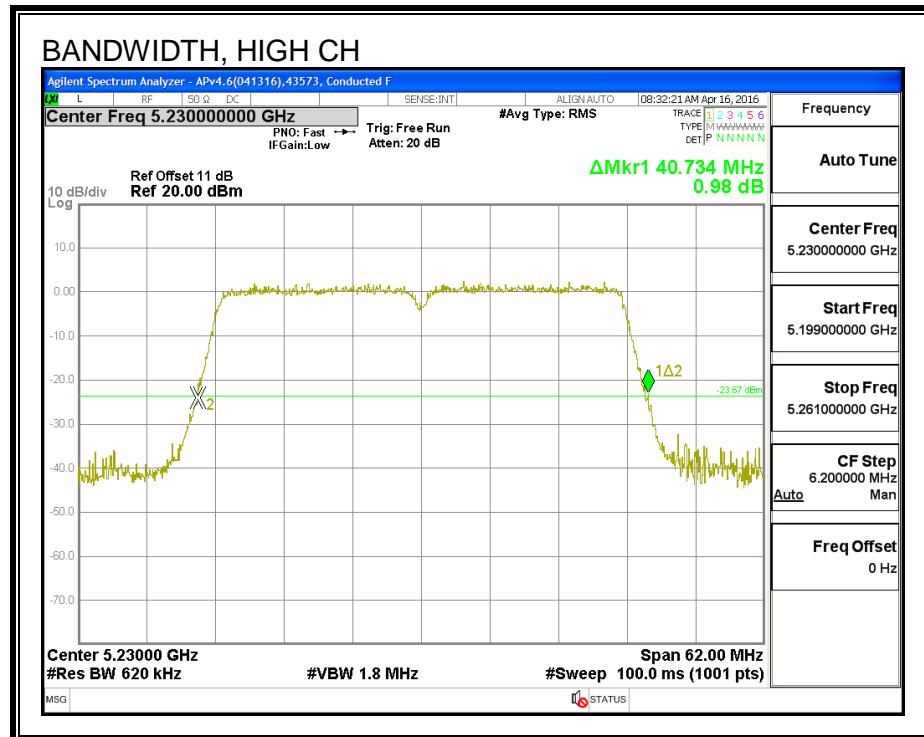
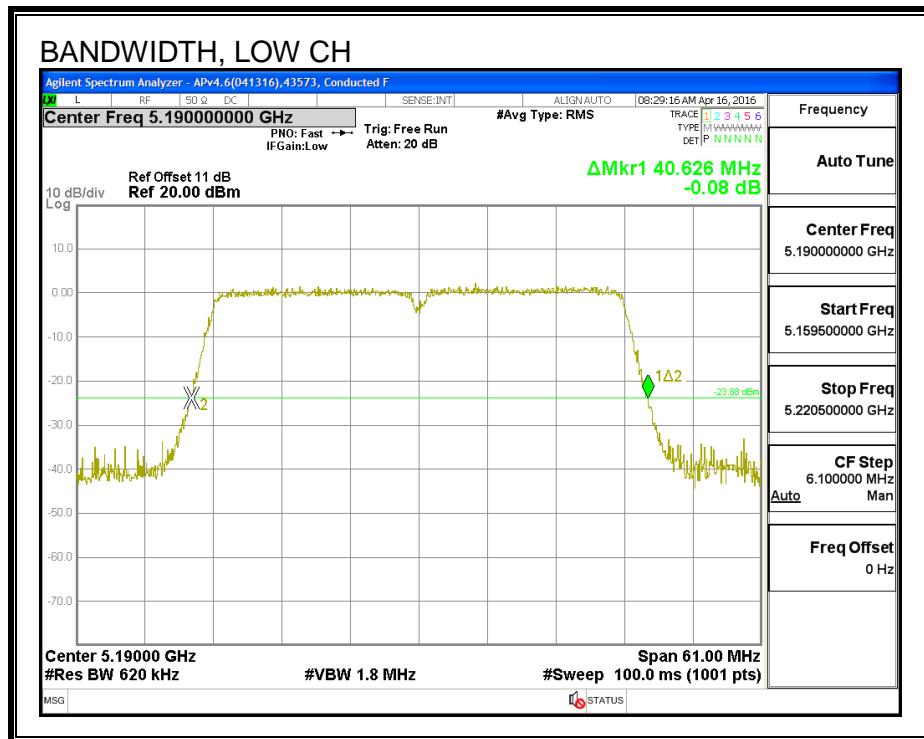
PSD

**7.5.802.11n HT40 CHAIN 1 MODE IN THE 5.2 GHz BAND****7.5.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5190	40.63
High	5230	40.73

**26 dB BANDWIDTH**

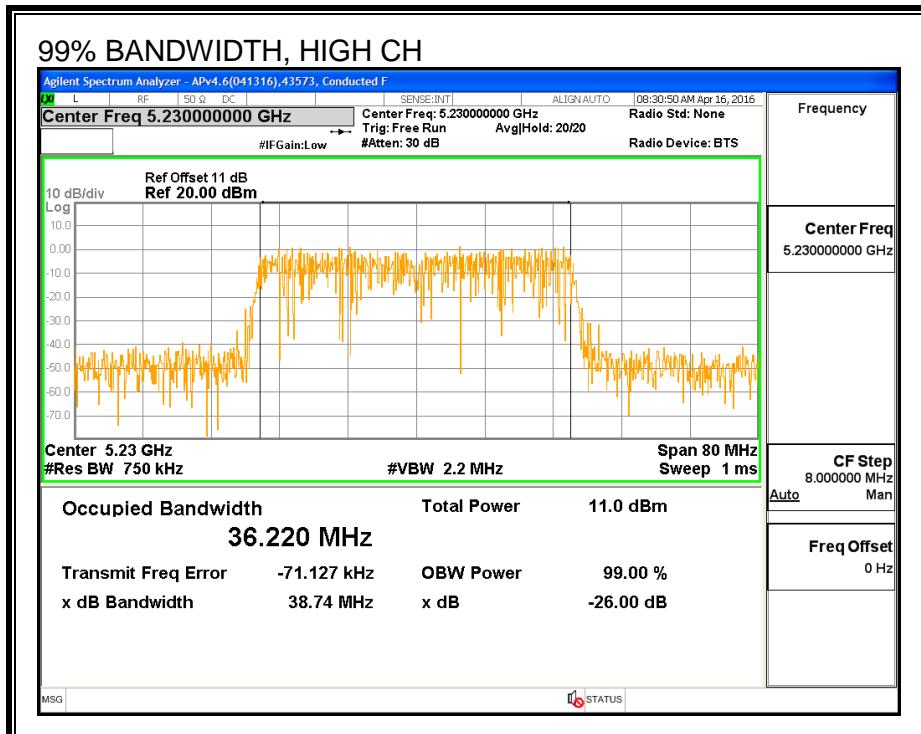
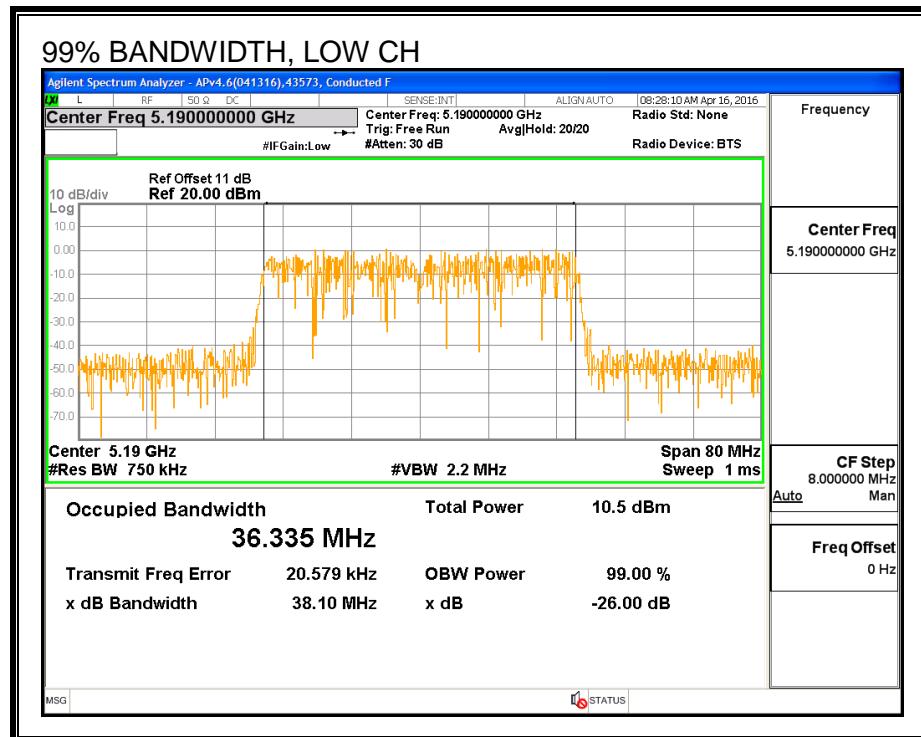
### 7.5.2. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5190	36.335
High	5230	36.220

**99% BANDWIDTH**

### 7.5.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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Channel	Frequency (MHz)	Power (dBm)
Low	5190	16.43
High	5230	18.87

### 7.5.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	-6.01	-6.01	24.00	11.00
High	5230	-6.01	-6.01	24.00	11.00

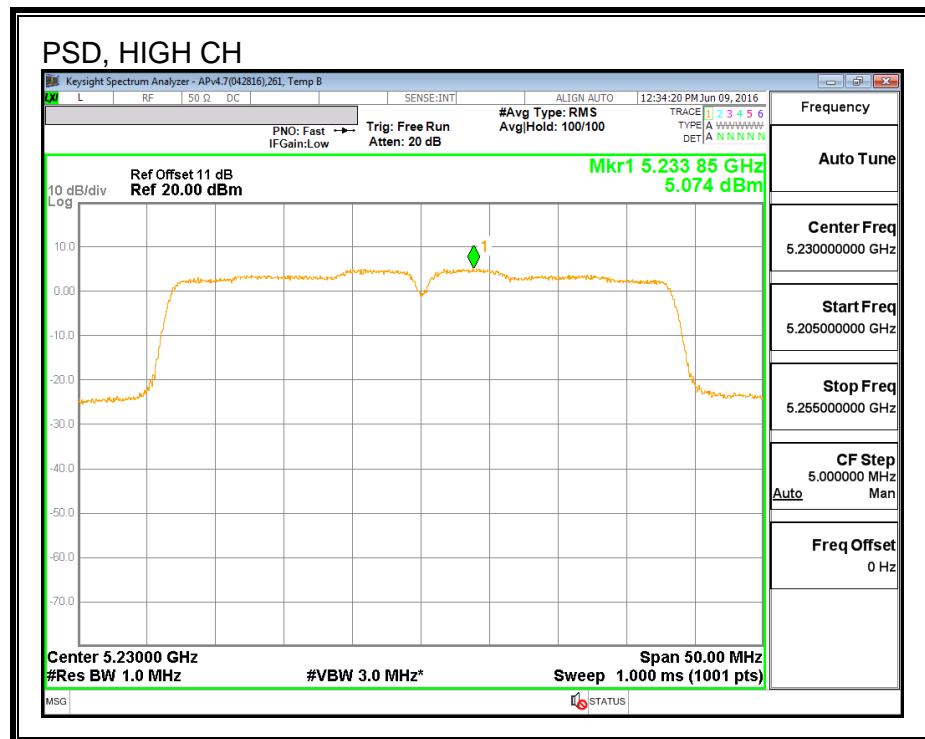
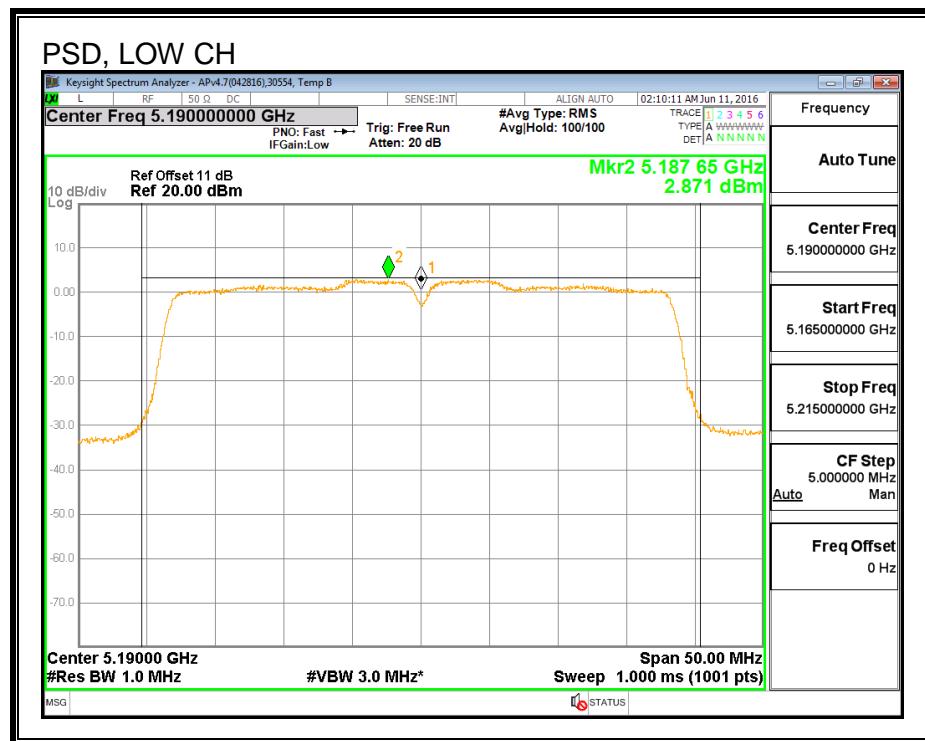
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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### Output Power Results

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	16.43	16.43	24.00	-7.57
High	5230	18.87	18.87	24.00	-5.13

### PSD Results

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	2.871	2.87	11.00	-8.13
High	5230	5.074	5.07	11.00	-5.93

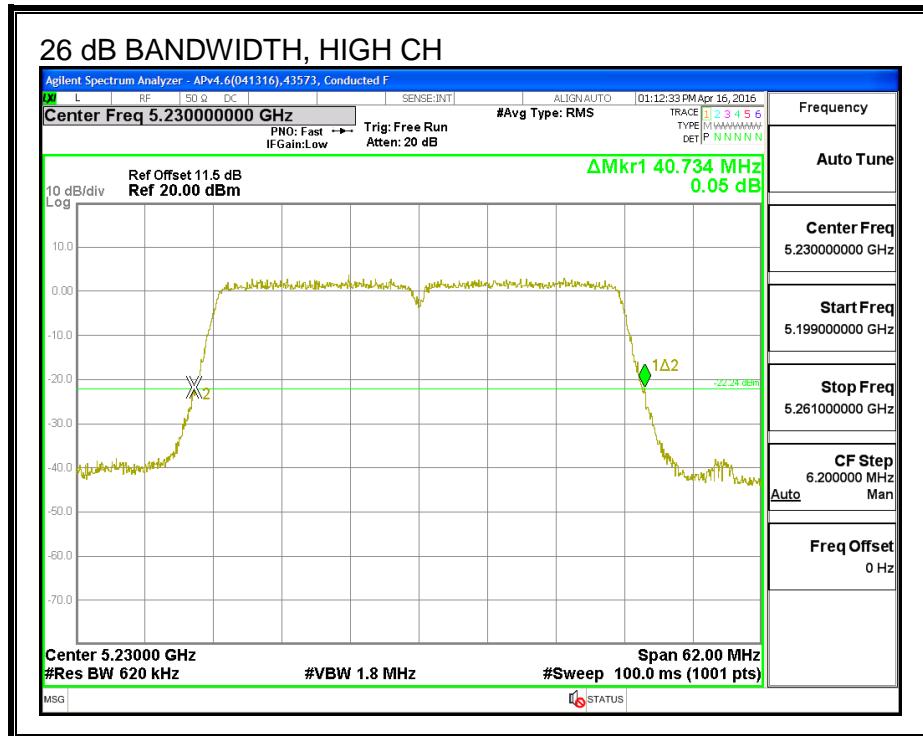
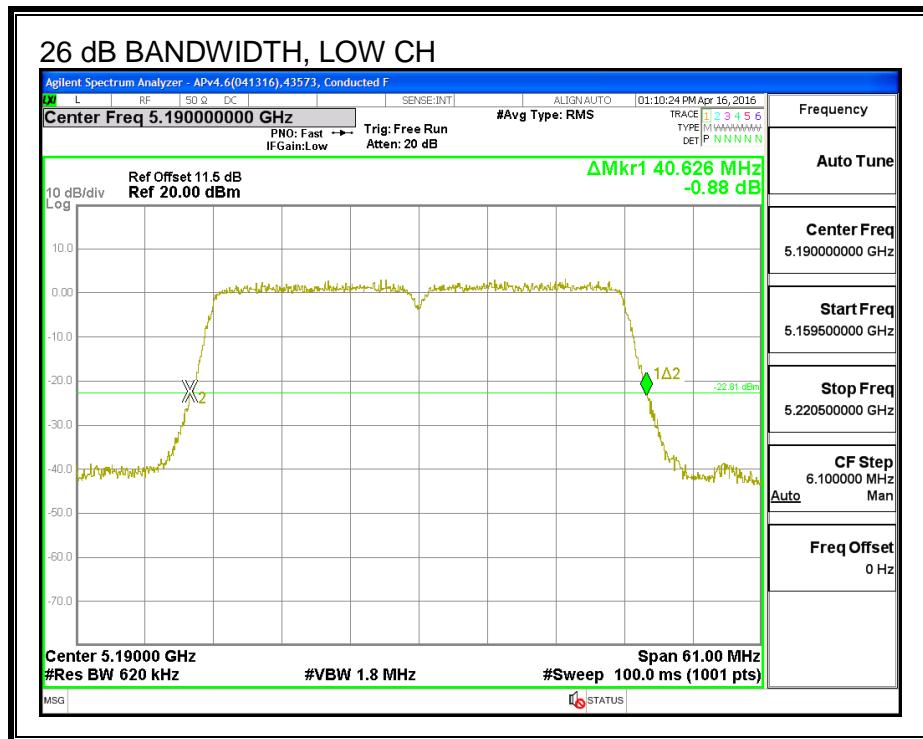
PSD

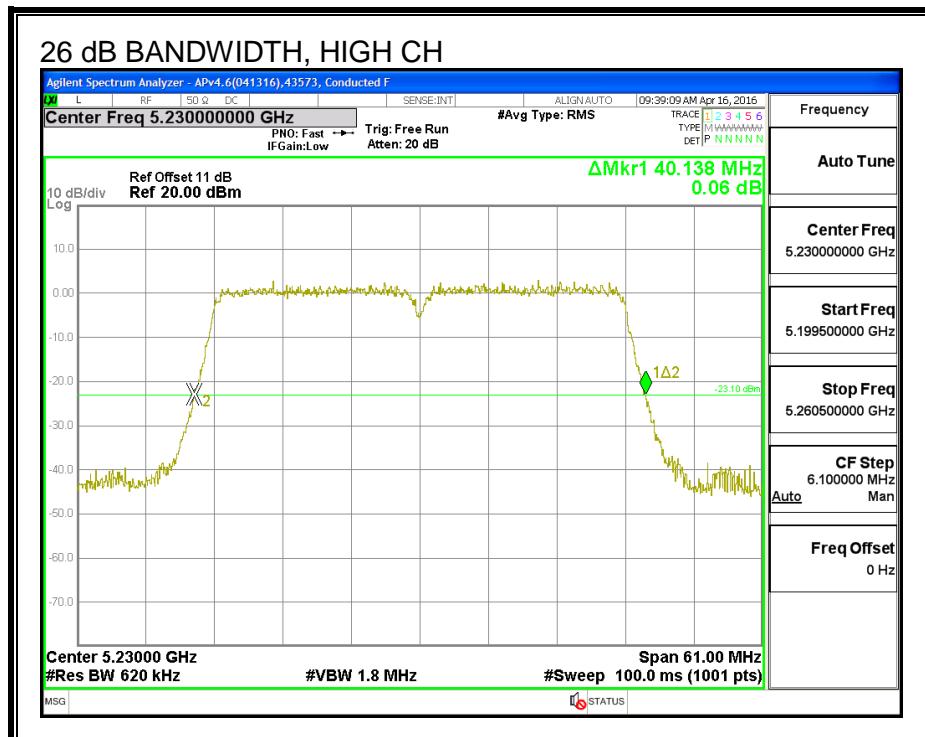
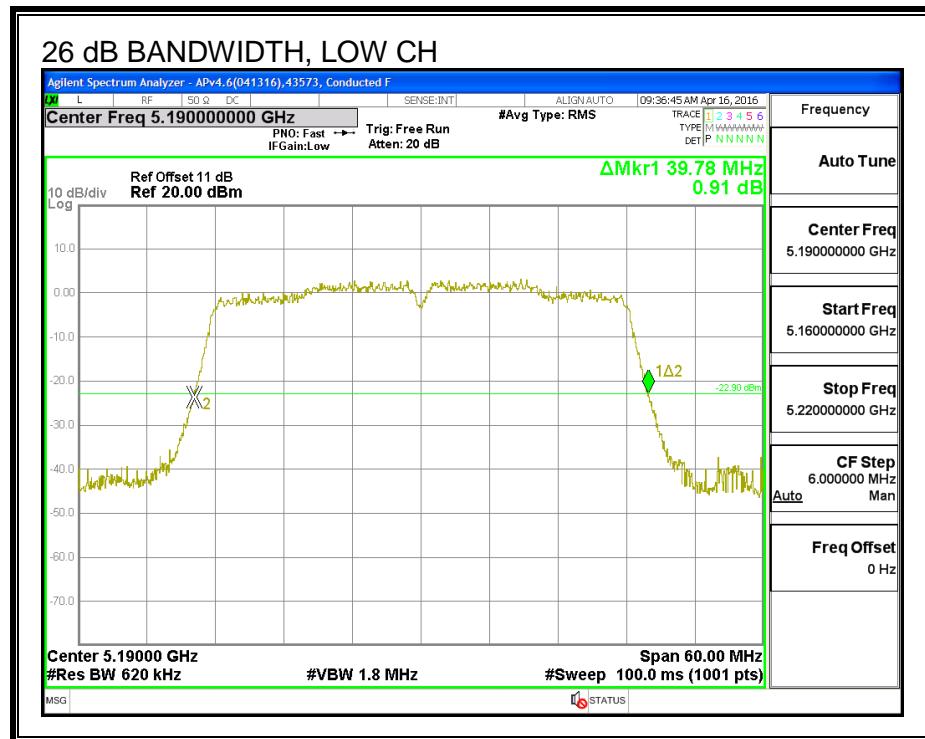
**7.6.802.11n HT40 2Tx CDD MODE IN THE 5.2 GHz BAND****7.6.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5190	40.63	39.78
High	5230	40.73	40.14

**26 DB BANDWIDTH, CHAIN 0**

**26 DB BANDWIDTH, CHAIN 1**

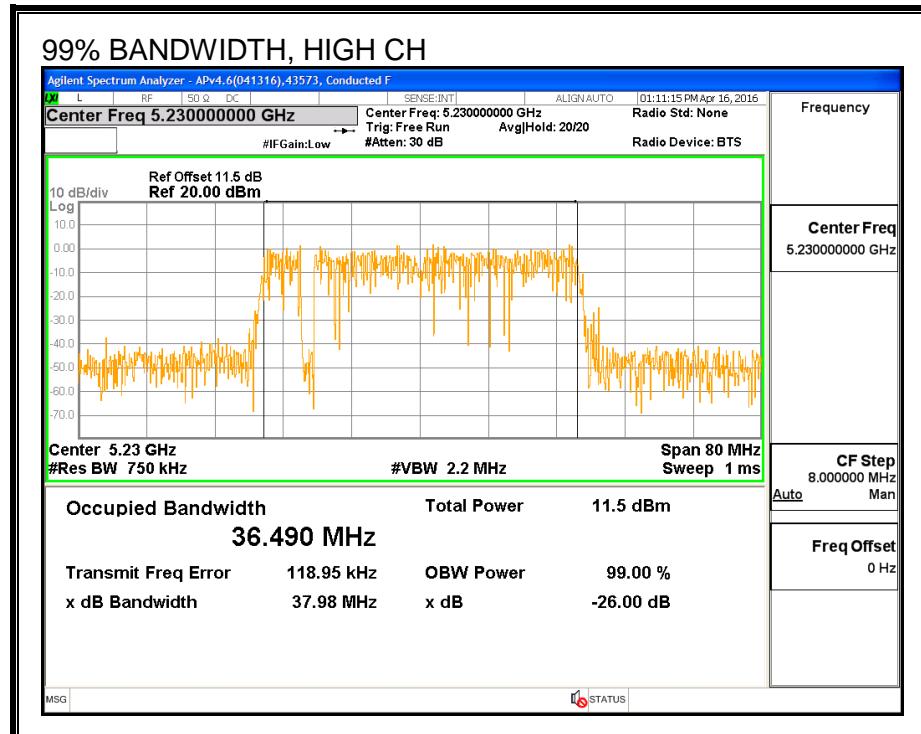
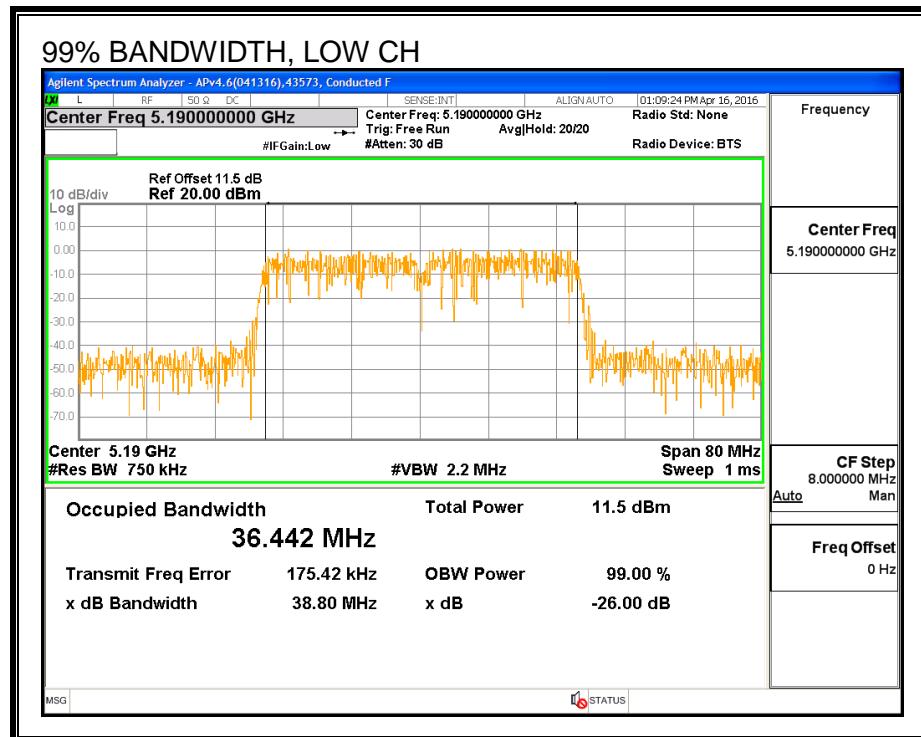
### 7.6.2. 99% BANDWIDTH

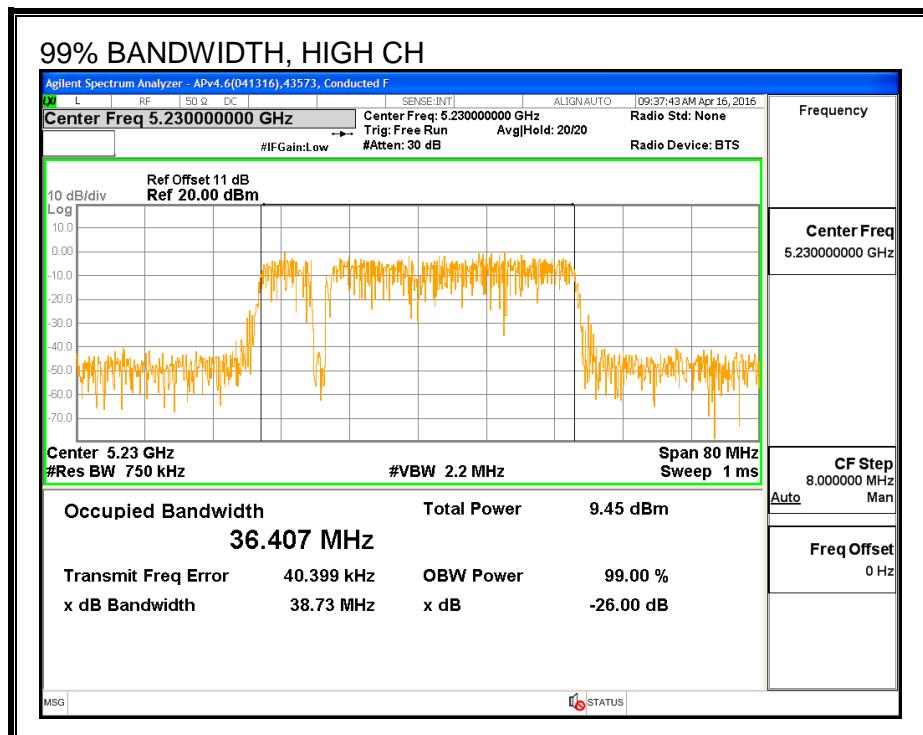
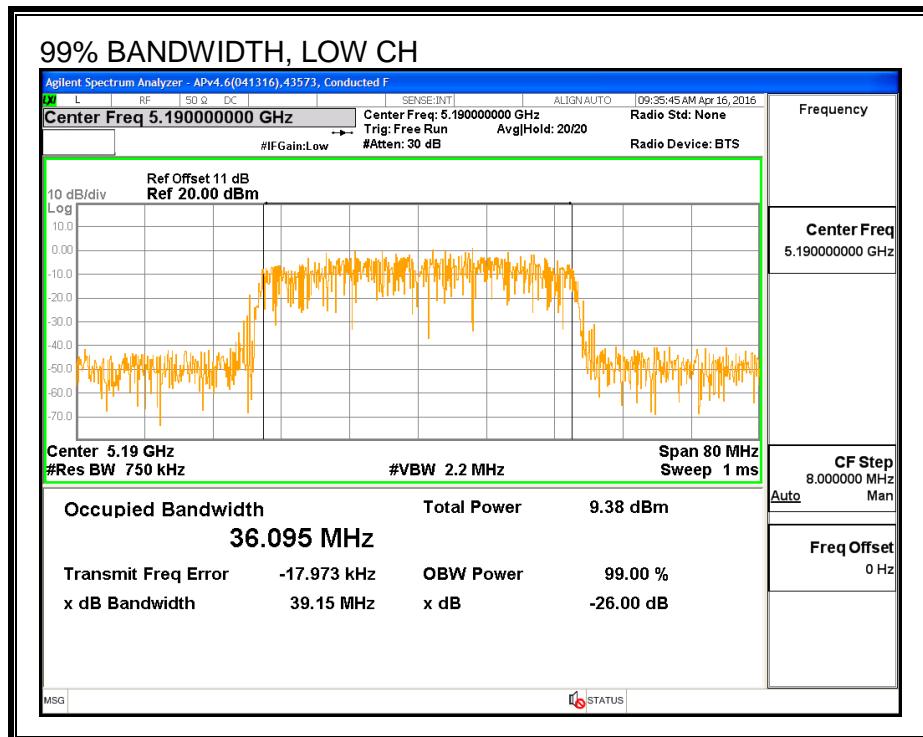
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5190	36.442	36.095
High	5230	36.490	36.407

**99% BANDWIDTH, CHAIN 0**

**99% BANDWIDTH, CHAIN 1**

### 7.6.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

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##### Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5190	14.30	14.34	17.33
High	5230	18.96	19.00	21.99

#### 7.6.4. OUTPUT POWER AND PSD

##### LIMITS

###### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

**DIRECTIONAL ANTENNA GAIN**

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Uncorrelated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-5.49

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Correlated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-2.49

**RESULTS**

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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**Antenna Gain and Limits**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5190	-5.49	-2.49	24.00	11.00
High	5230	-5.49	-2.49	24.00	11.00

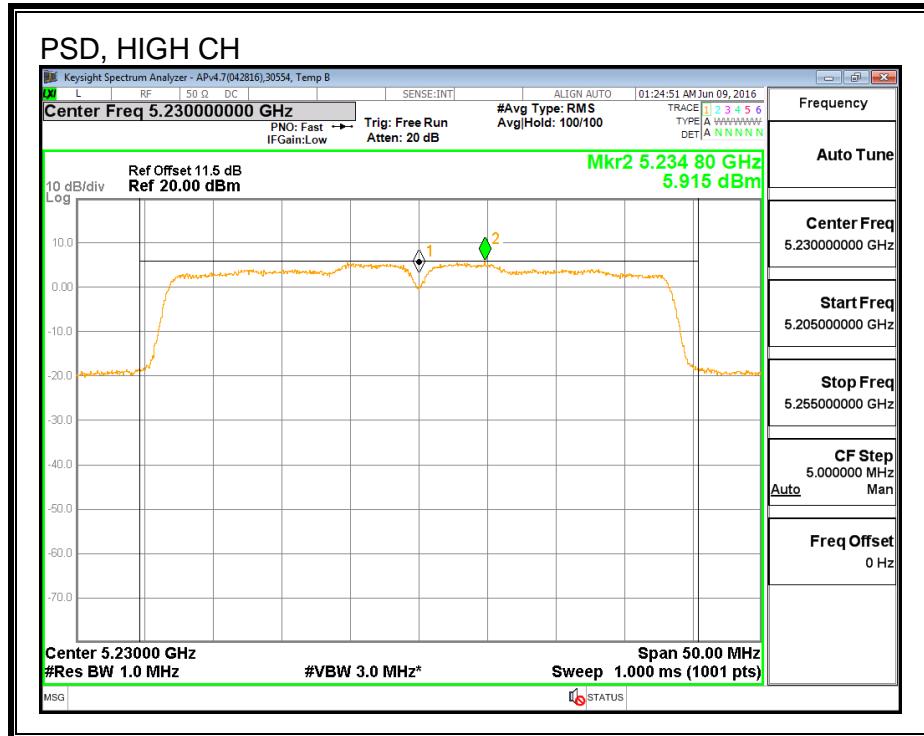
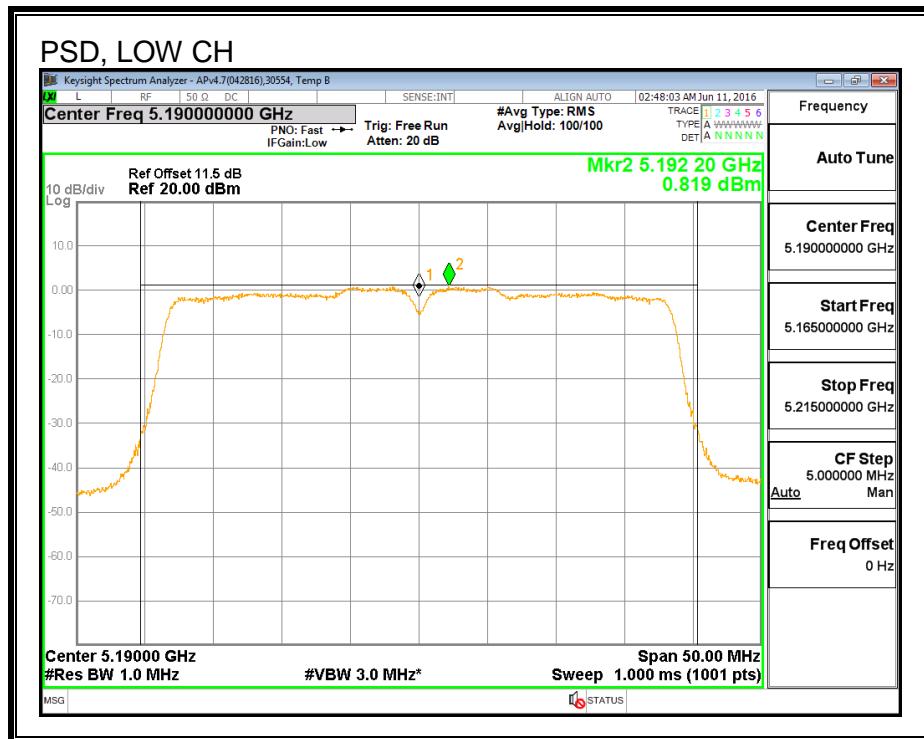
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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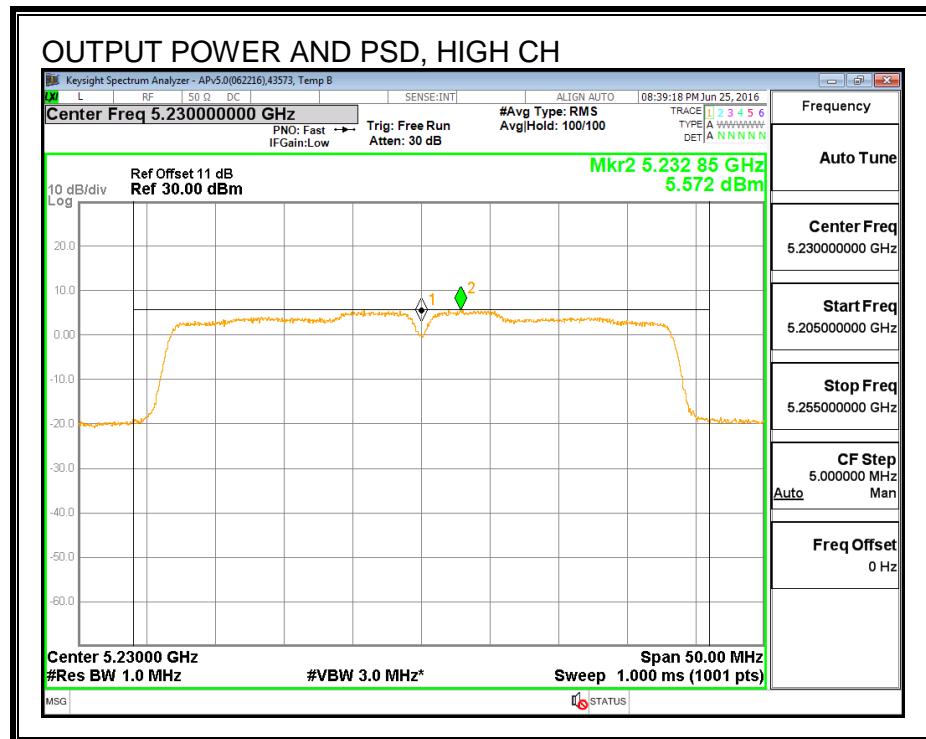
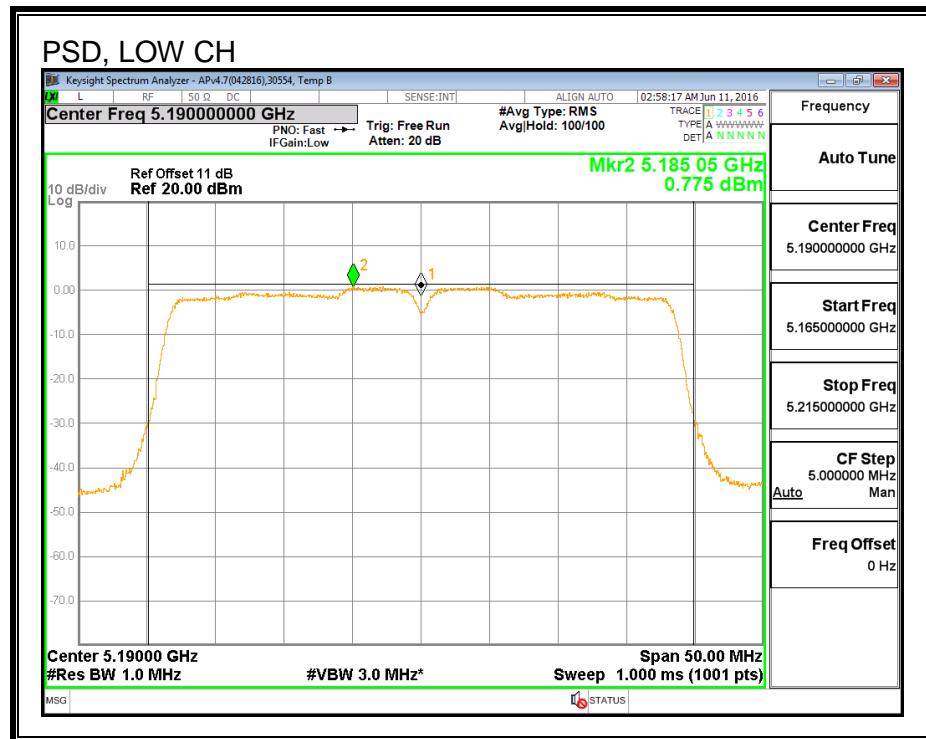
**Output Power Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5190	14.30	14.34	17.33	24.00	-6.67
High	5230	18.96	19.00	21.99	24.00	-2.01

**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5190	0.819	0.775	3.81	11.00	-7.19
High	5230	5.915	5.572	8.76	11.00	-2.24

**PSD, CHAIN 0**

**PSD, CHAIN 1**

## 7.7.802.11ac VHT80 CHAIN 0 MODE IN THE 5.2 GHz BAND

### 7.7.1. 26 dB BANDWIDTH

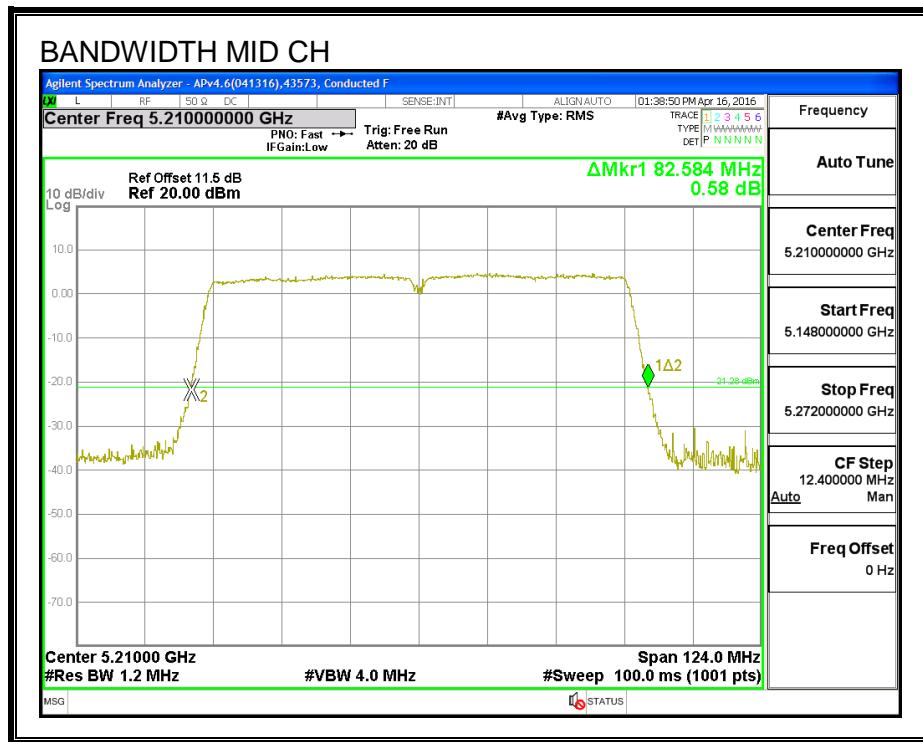
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	82.58

#### 26 dB BANDWIDTH



### 7.7.2. 99% BANDWIDTH

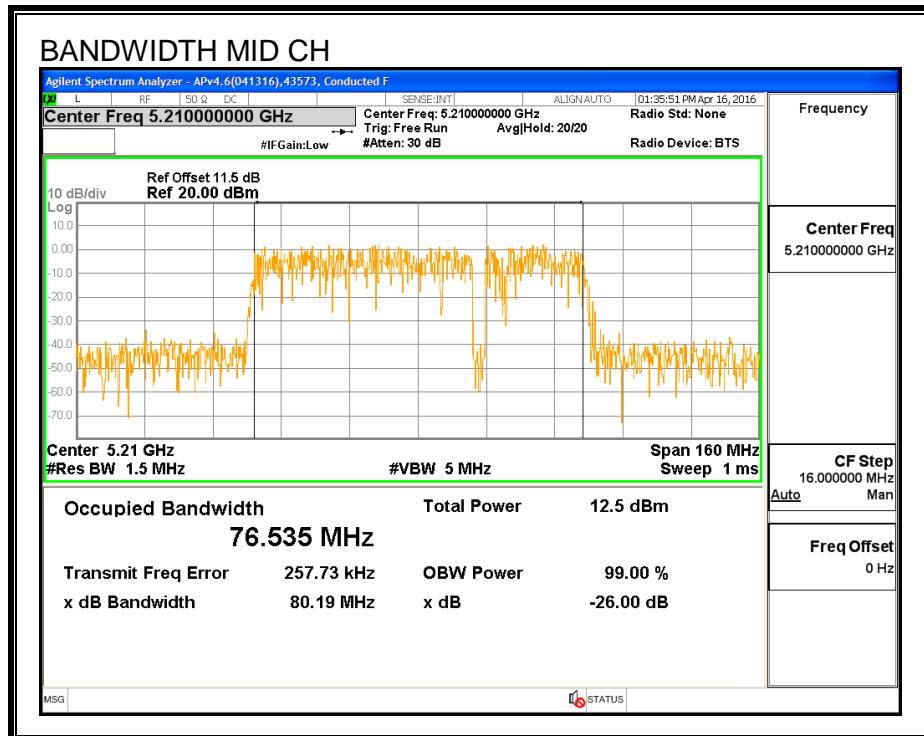
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	76.535

#### 99% BANDWIDTH



### 7.7.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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Channel	Frequency (MHz)	Power (dBm)
Mid	5210	15.26

### 7.7.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

ID:	30554	Date:	6/11/16
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### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	-5.02	-5.02	24.00	11.00

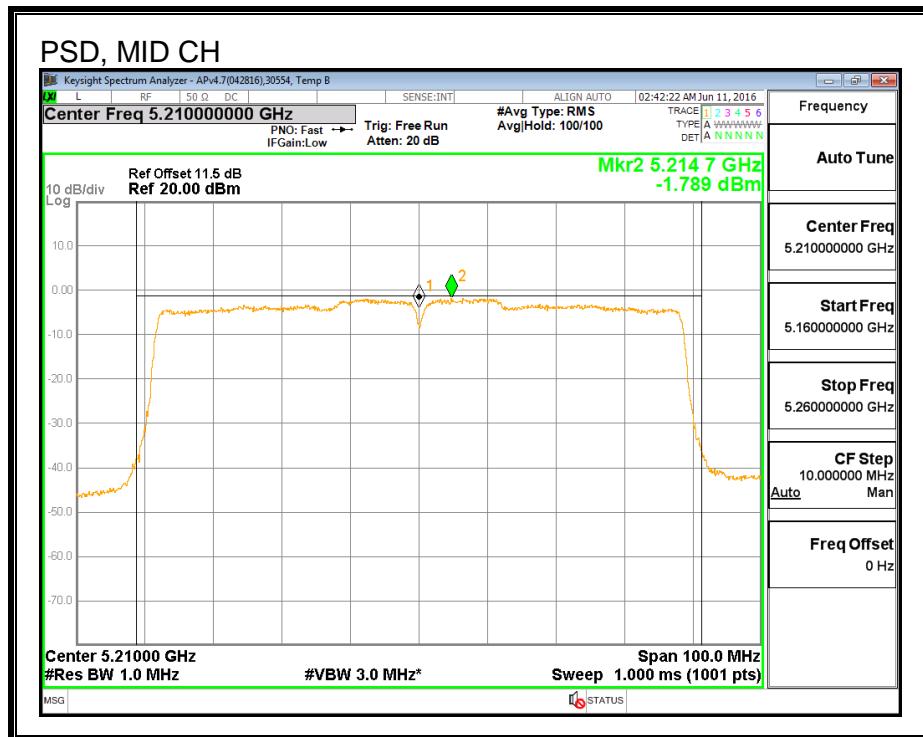
Duty Cycle CF (dB)	0.15	Included in Calculations of Corr'd PSD
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### Output Power Results

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	15.26	15.26	24.00	-8.74

### PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-1.789	-1.64	11.00	-12.64

PSD

## 7.8.802.11ac VHT80 CHAIN 1 MODE IN THE 5.2 GHz BAND

### 7.8.1. 26 dB BANDWIDTH

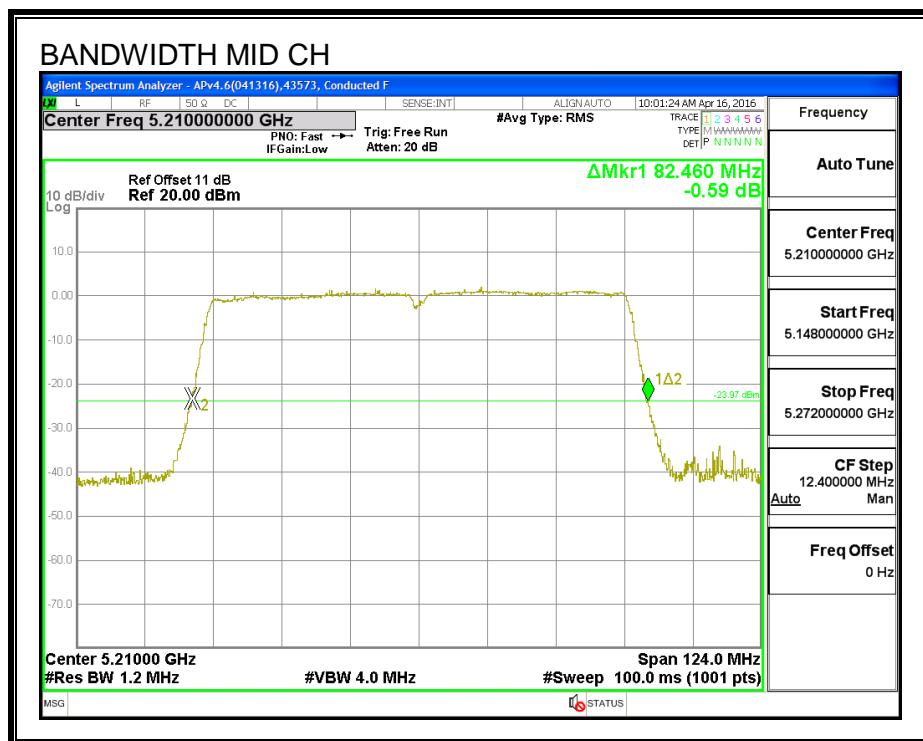
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Mid	5210	82.46

#### 26 dB BANDWIDTH



### 7.8.2. 99% BANDWIDTH

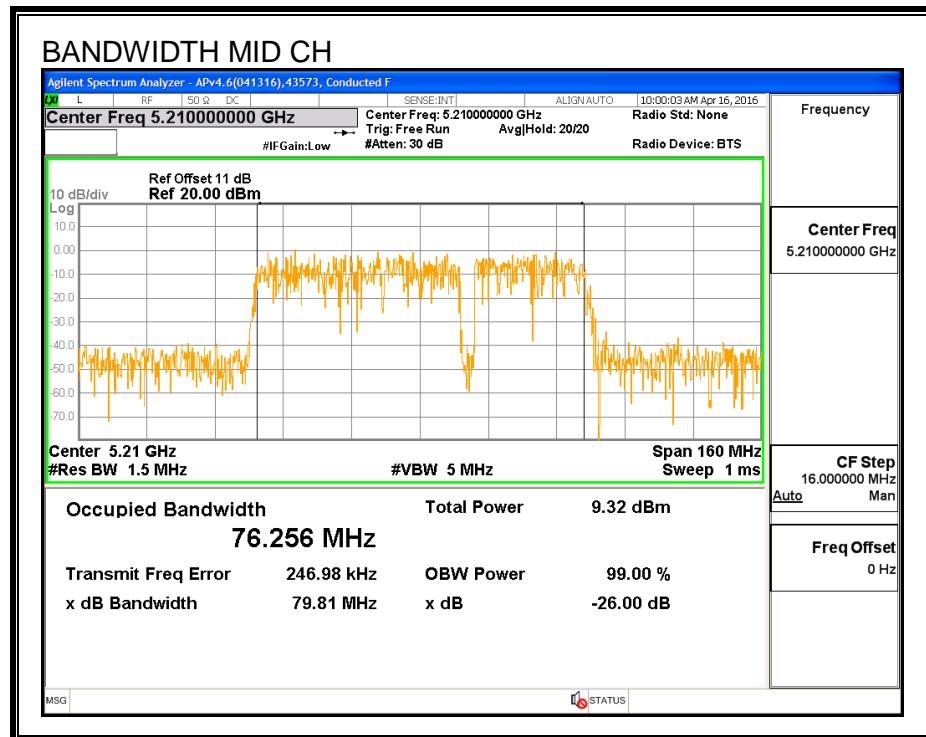
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Mid	5210	76.256

#### 99% BANDWIDTH



### 7.8.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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Channel	Frequency (MHz)	Power (dBm)
Mid	5210	15.46

### 7.8.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

#### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

## RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/11/16
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### Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	-6.01	-6.01	24.00	11.00

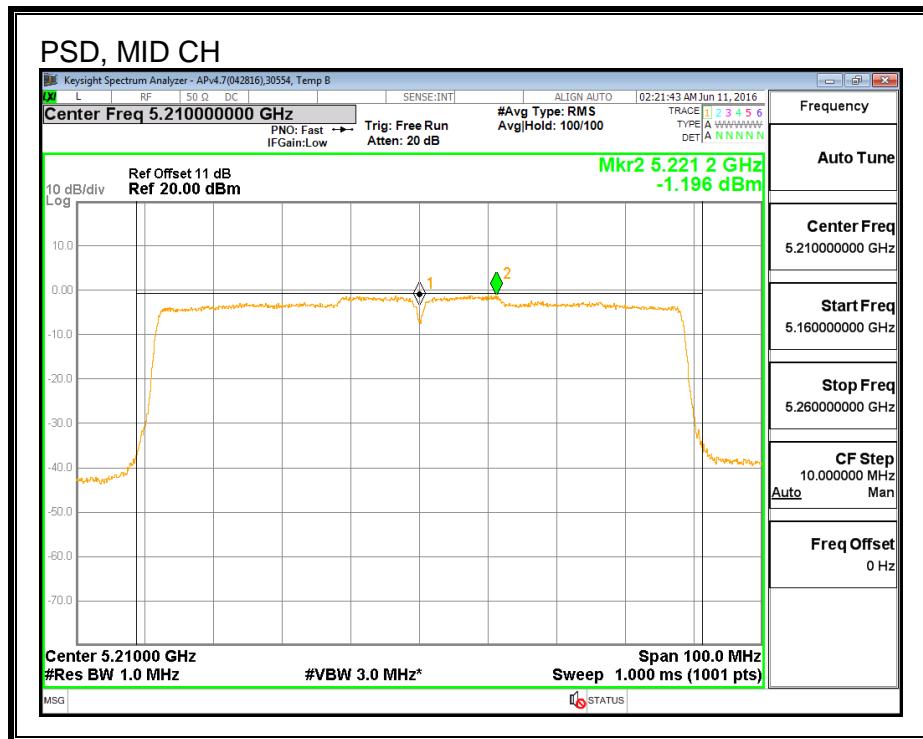
<b>Duty Cycle CF (dB)</b>	0.15	<b>Included in Calculations of Corr'd PSD</b>
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### Output Power Results

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	15.46	15.46	24.00	-8.54

### PSD Results

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-1.196	-1.05	11.00	-12.05

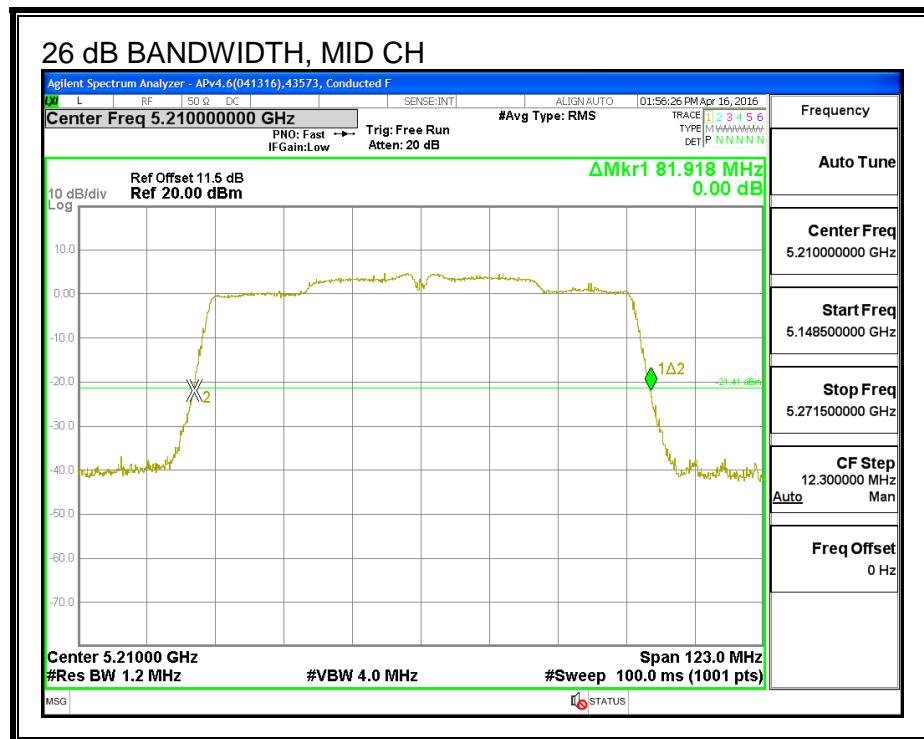
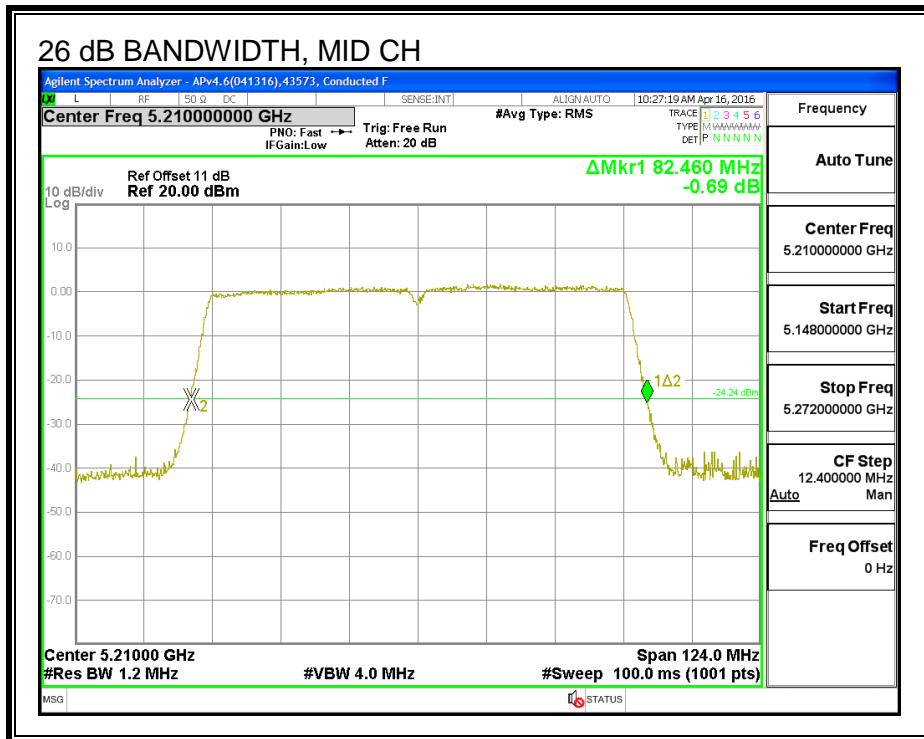
PSD

**7.9.802.11ac VHT80 2Tx CDD MODE IN THE 5.2 GHz BAND****7.9.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Mid	5210	81.92	82.46

**26 DB BANDWIDTH, CHAIN 0****26 DB BANDWIDTH, CHAIN 1**

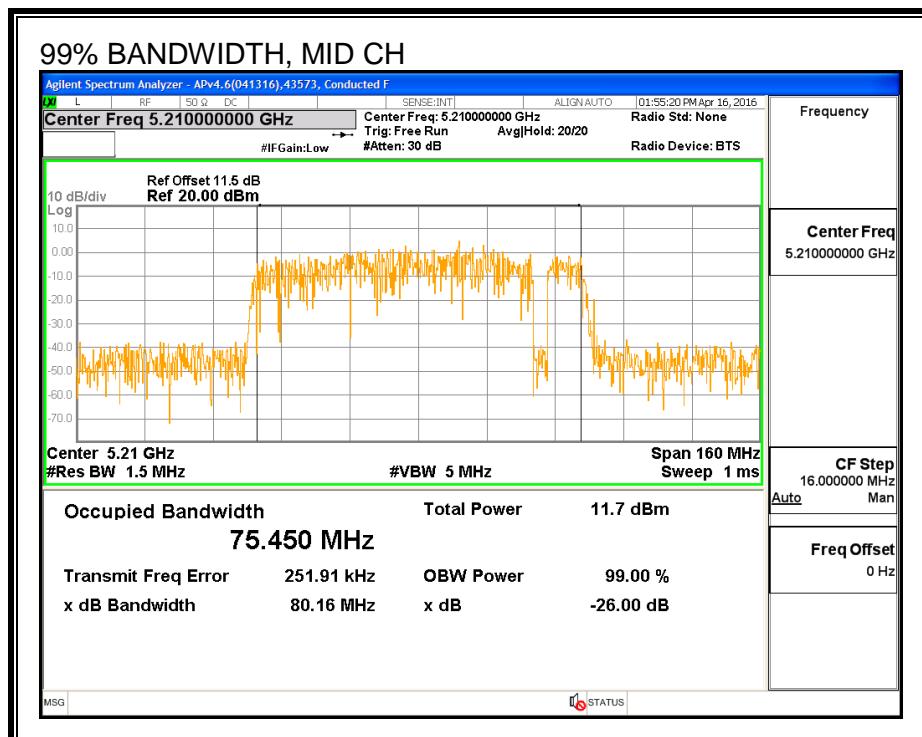
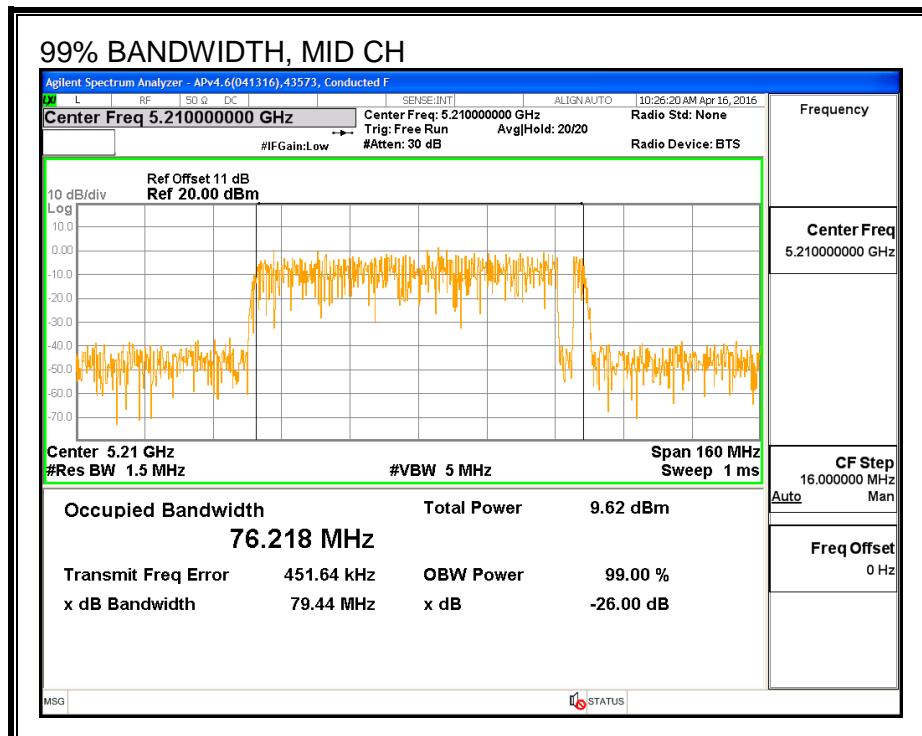
### 7.9.2. 99% BANDWIDTH

#### LIMITS

None; for reporting purposes only.

#### RESULTS

Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
5210	75.450	76.218

**99% BANDWIDTH, CHAIN 0****99% BANDWIDTH, CHAIN 1**

### 7.9.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

<b>ID:</b>	30554	<b>Date:</b>	6/9/16
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##### Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Mid	5210	15.00	14.90	17.96

### 7.9.4. OUTPUT POWER AND PSD

#### LIMITS

##### FCC §15.407 (a) (1)

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

**DIRECTIONAL ANTENNA GAIN**

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Uncorrelated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-5.49

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

<b>Chain 0 Antenna Gain (dBi)</b>	<b>Chain 1 Antenna Gain (dBi)</b>	<b>Correlated Chains Directional Gain (dBi)</b>
-5.02	-6.01	-2.49

**RESULTS**

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**Antenna Gain and Limits**

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Mid	5210	-5.49	-2.49	24.00	11.00

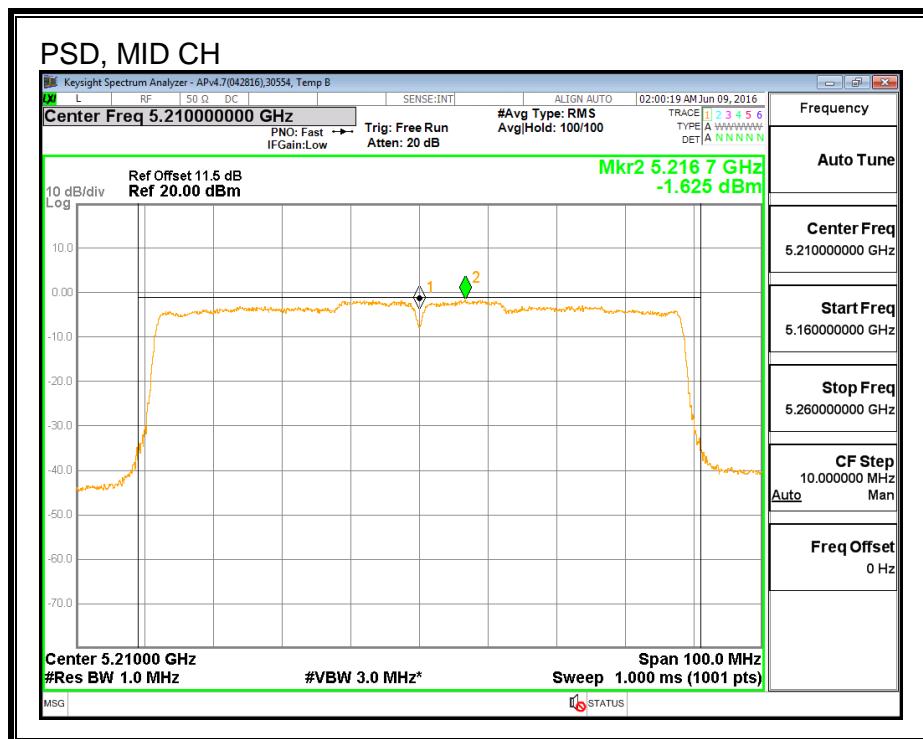
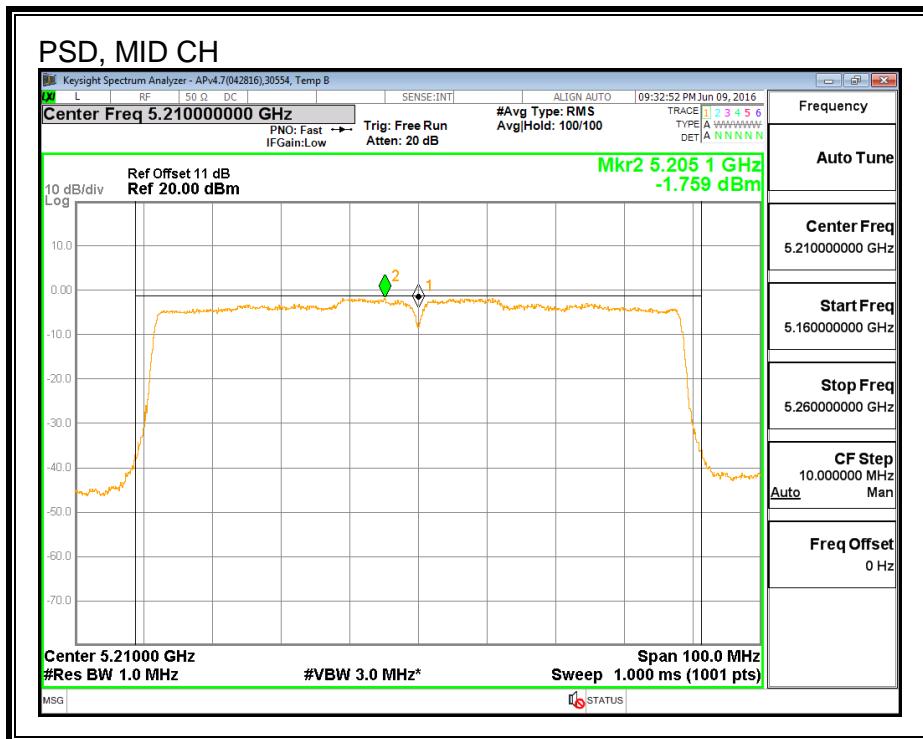
<b>Duty Cycle CF (dB)</b>	0.19	<b>Included in Calculations of Corr'd PSD</b>
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**Output Power Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Mid	5210	15.00	14.90	17.96	24.00	-6.04

**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Mid	5210	-1.625	-1.759	1.51	11.00	-9.49

**PSD, CHAIN 0****PSD, CHAIN 1**

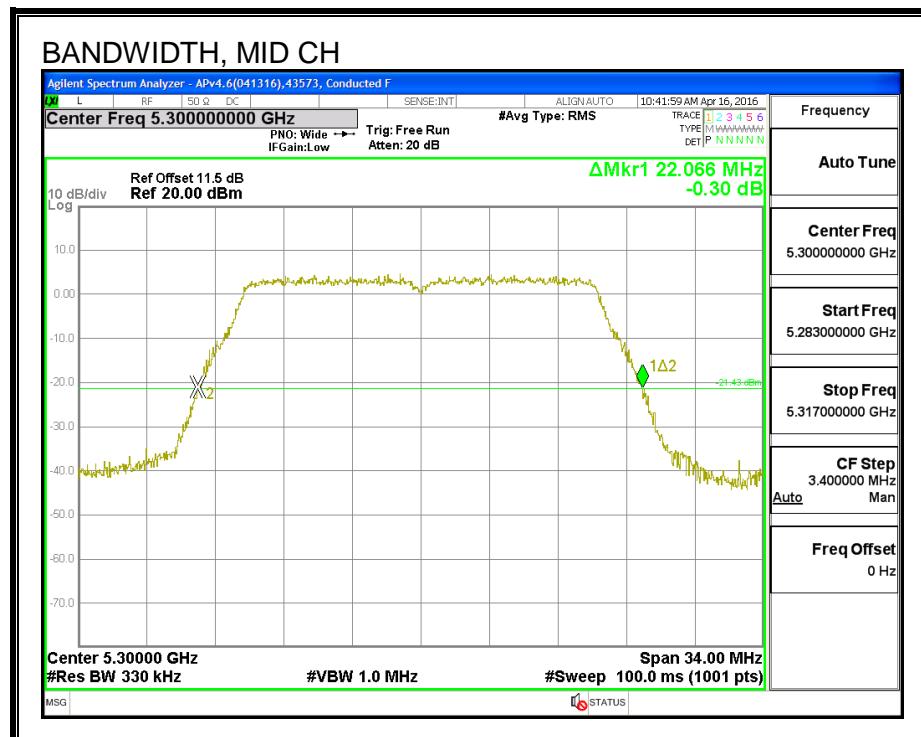
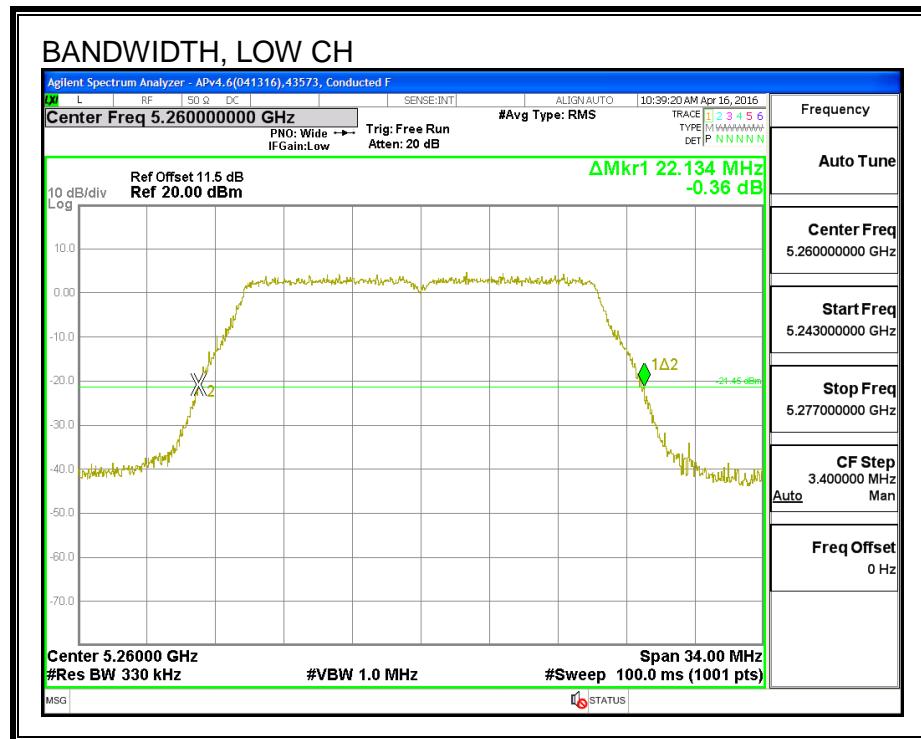
**7.10. 802.11ac VHT80 2Tx STBC MODE IN THE 5.2 GHz BAND****Note:** Covered by 802.11ac VHT80 2Tx CDD MODE

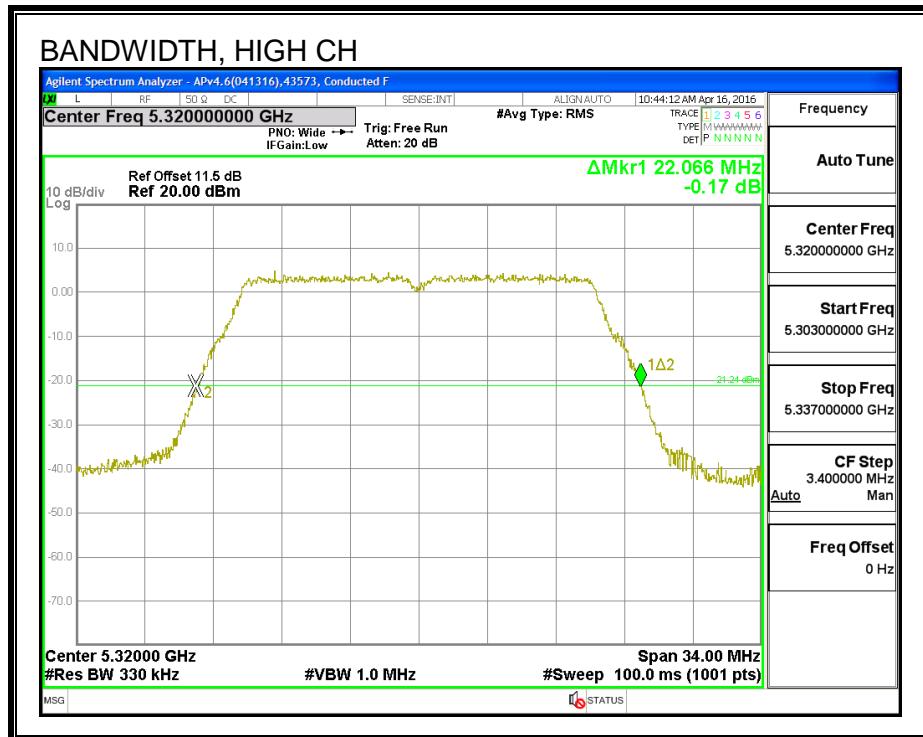
**7.11. 802.11n HT20 CHAIN 0 MODE IN THE 5.3 GHz BAND****7.11.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.13
Mid	5300	22.07
High	5320	22.07

**26 dB BANDWIDTH**



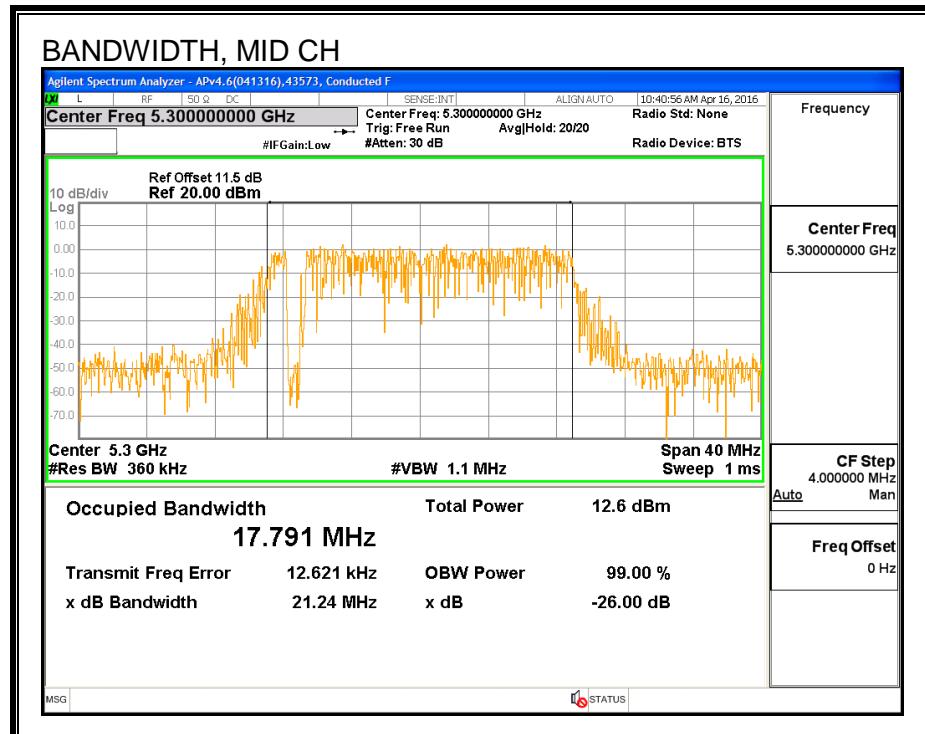
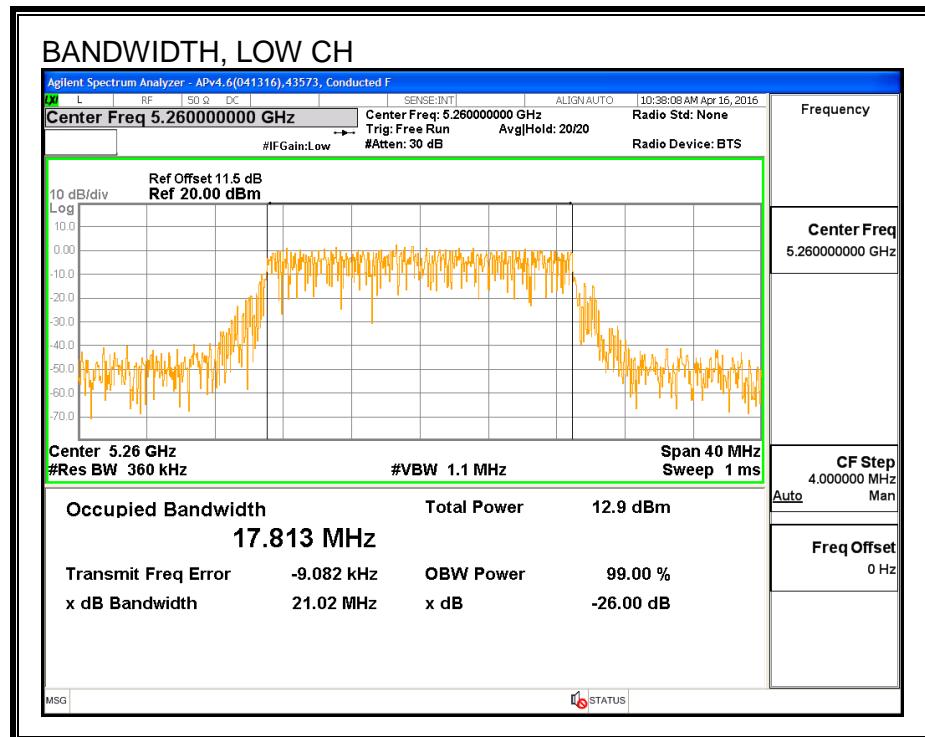
### 7.11.2. 99% BANDWIDTH

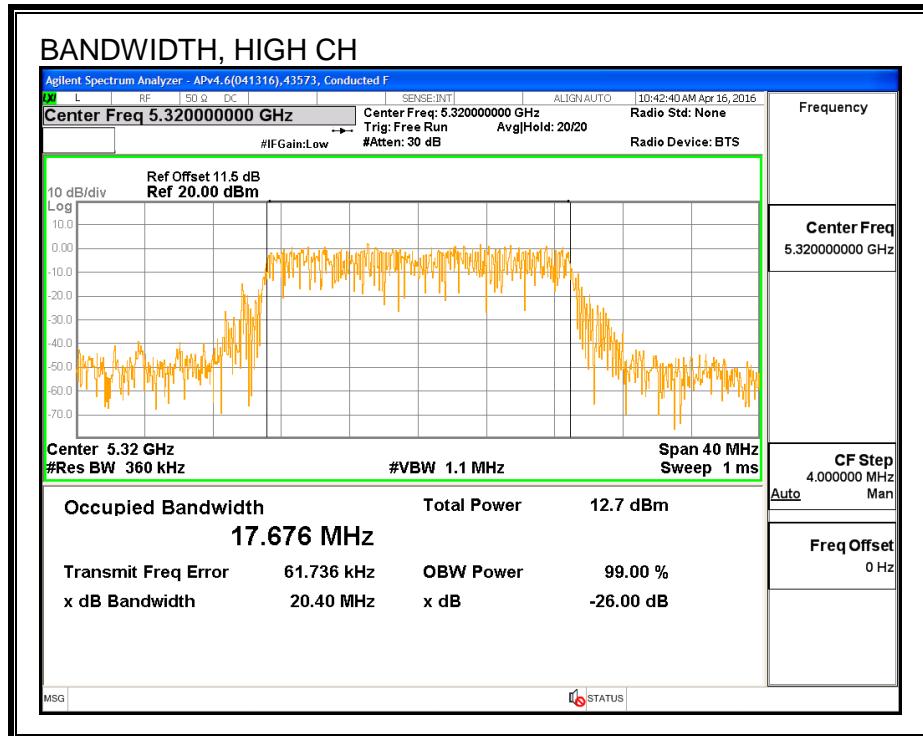
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.813
Mid	5300	17.791
High	5320	17.676

**99% BANDWIDTH**



### 7.11.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

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Channel	Frequency (MHz)	Power (dBm)
Low	5260	18.80
Mid	5300	18.80
High	5320	15.86

#### 7.11.4. OUTPUT POWER AND PSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

**RESULTS**

<b>ID:</b>	30554	<b>Date:</b>	6/8/16
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**Bandwidth, Antenna Gain, and Limits**

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	22.13	17.813	-5.31	23.51	11.00
Mid	5300	22.07	17.791	-5.31	23.50	11.00
High	5320	22.07	17.676	-5.31	23.47	11.00

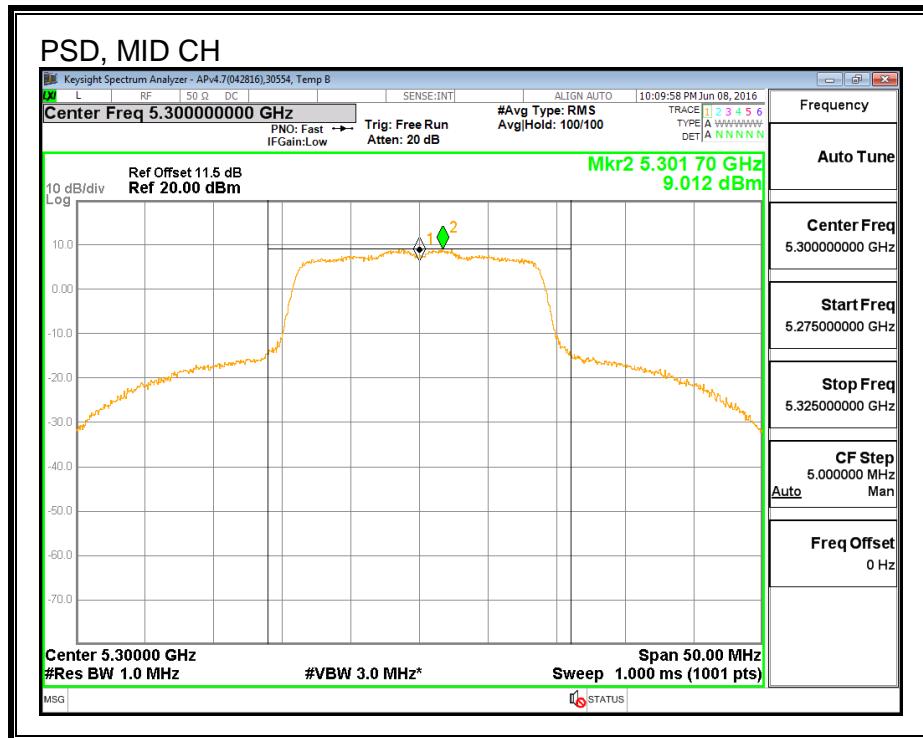
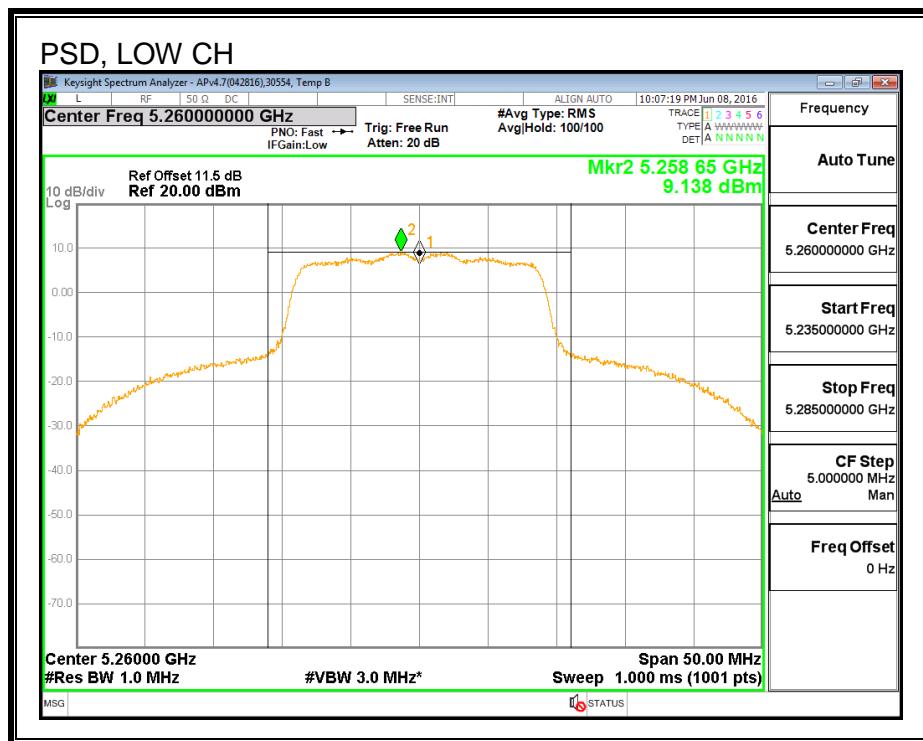
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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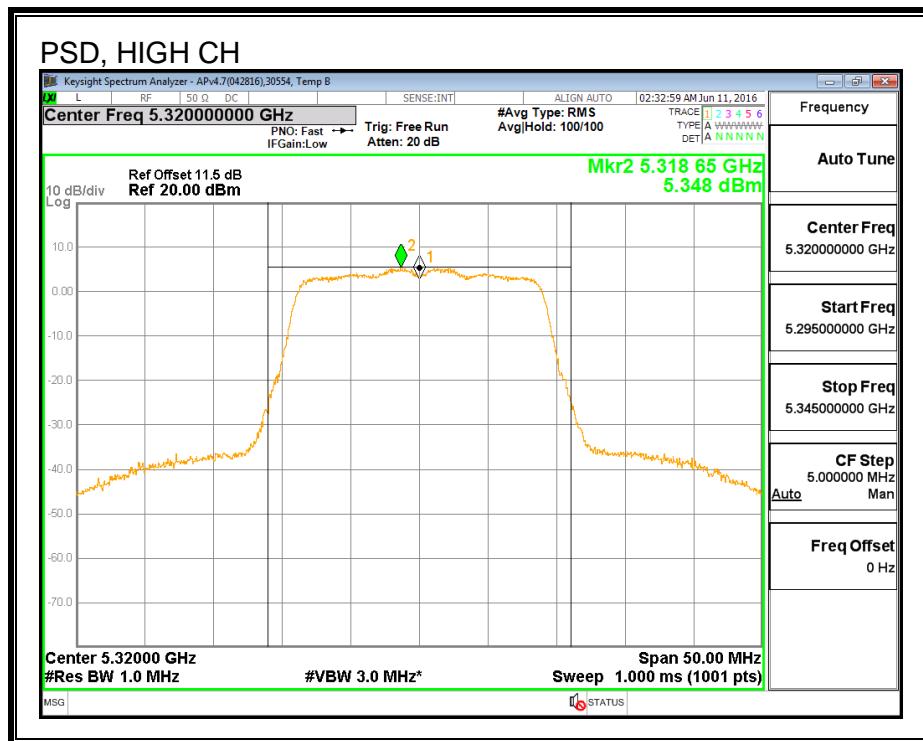
**Output Power Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	18.80	18.80	23.51	-4.71
Mid	5300	18.80	18.80	23.50	-4.70
High	5320	15.86	15.86	23.47	-7.61

**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	9.138	9.14	11.00	-1.86
Mid	5300	9.012	9.01	11.00	-1.99
High	5320	5.348	5.35	11.00	-5.65

PSD

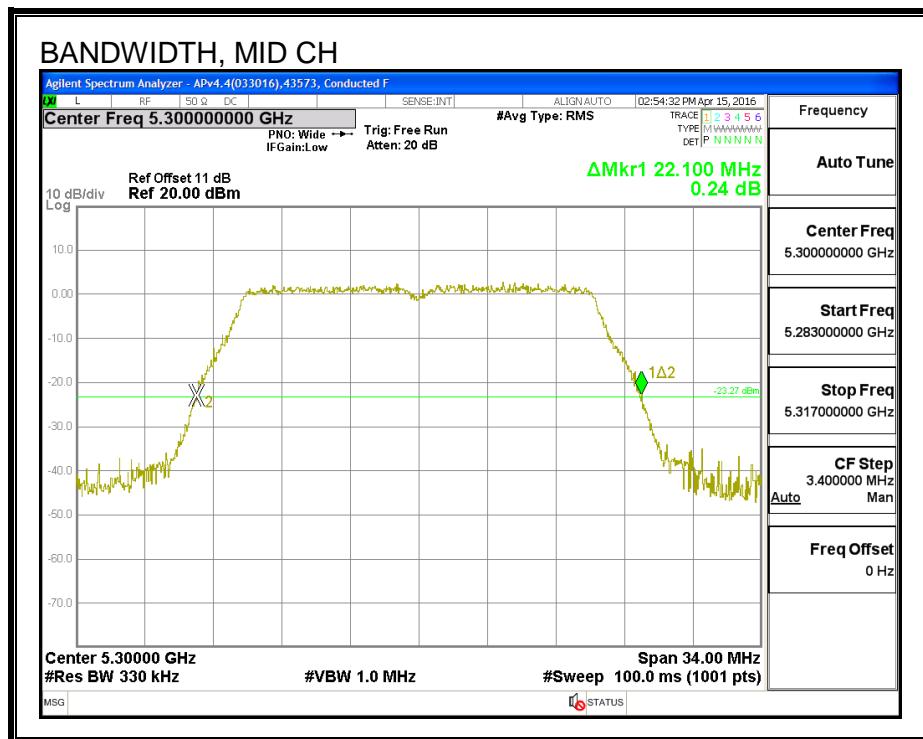
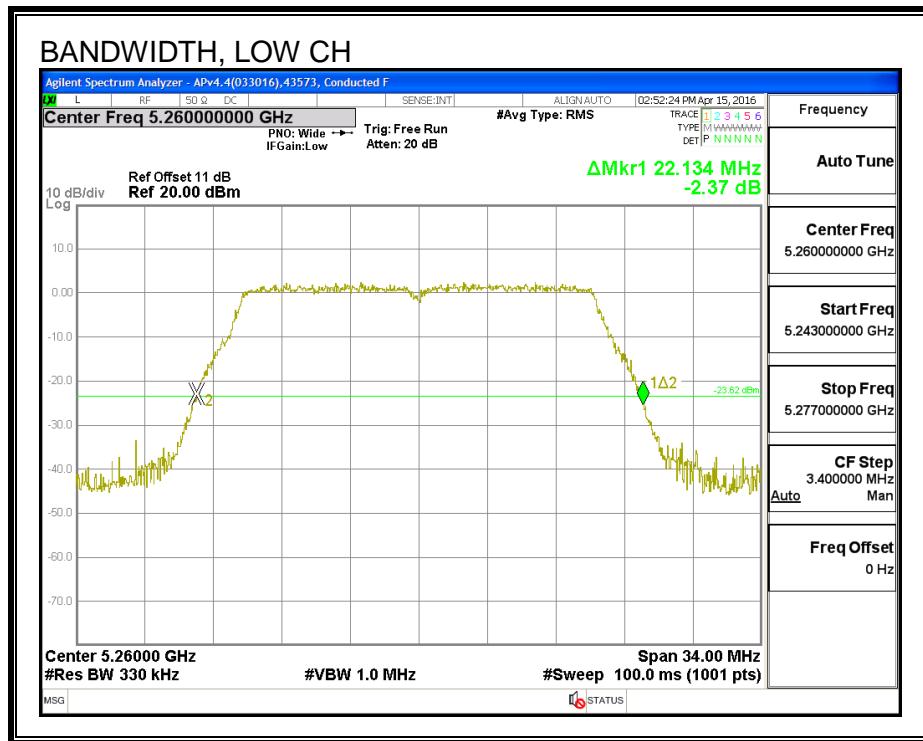


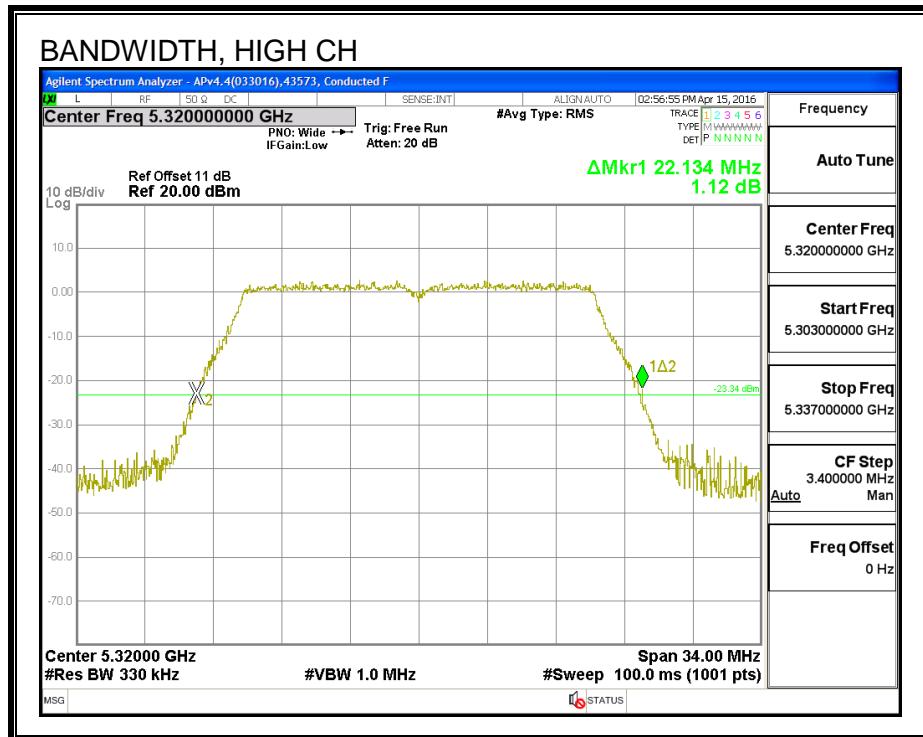
**7.12. 802.11n HT20 CHAIN 1 MODE IN THE 5.3 GHz BAND****7.12.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

**RESULTS**

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)
Low	5260	22.13
Mid	5300	22.10
High	5320	22.13

**26 dB BANDWIDTH**



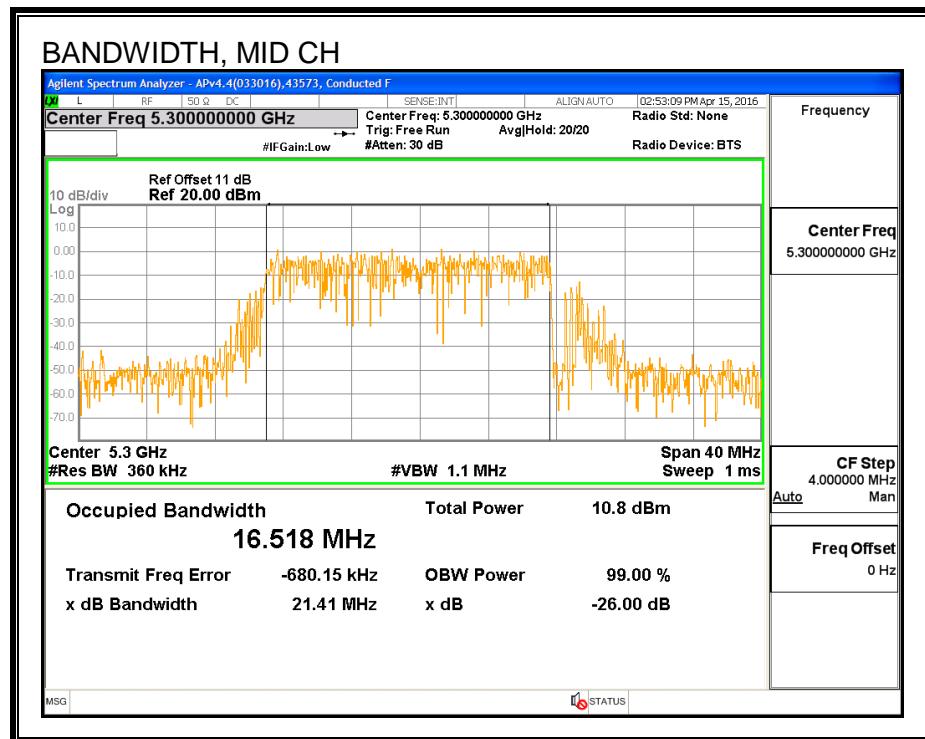
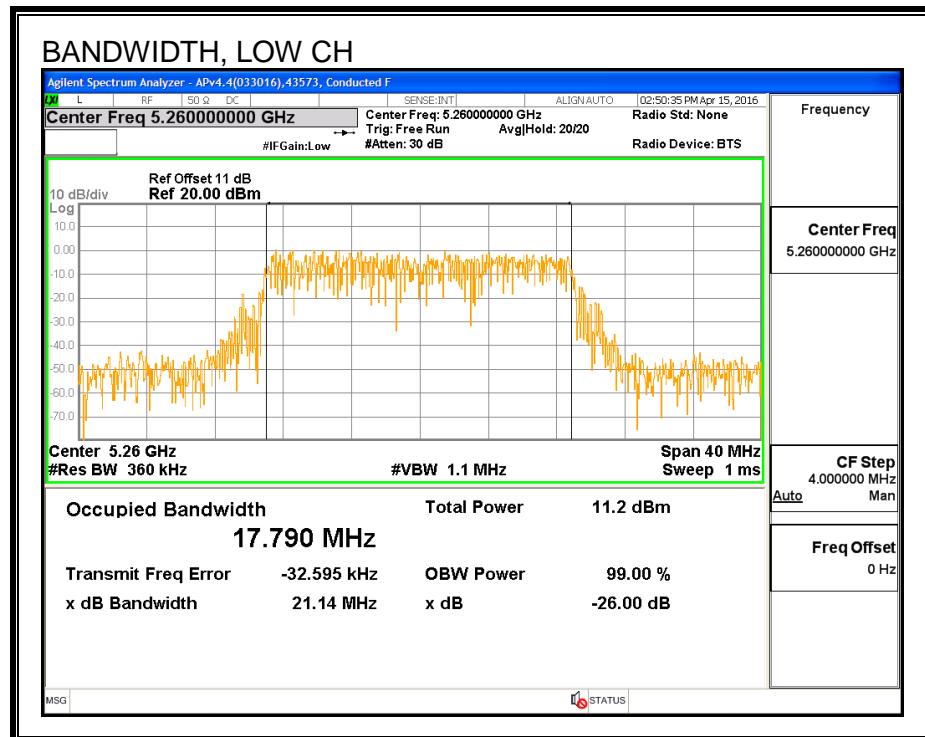
### 7.12.2. 99% BANDWIDTH

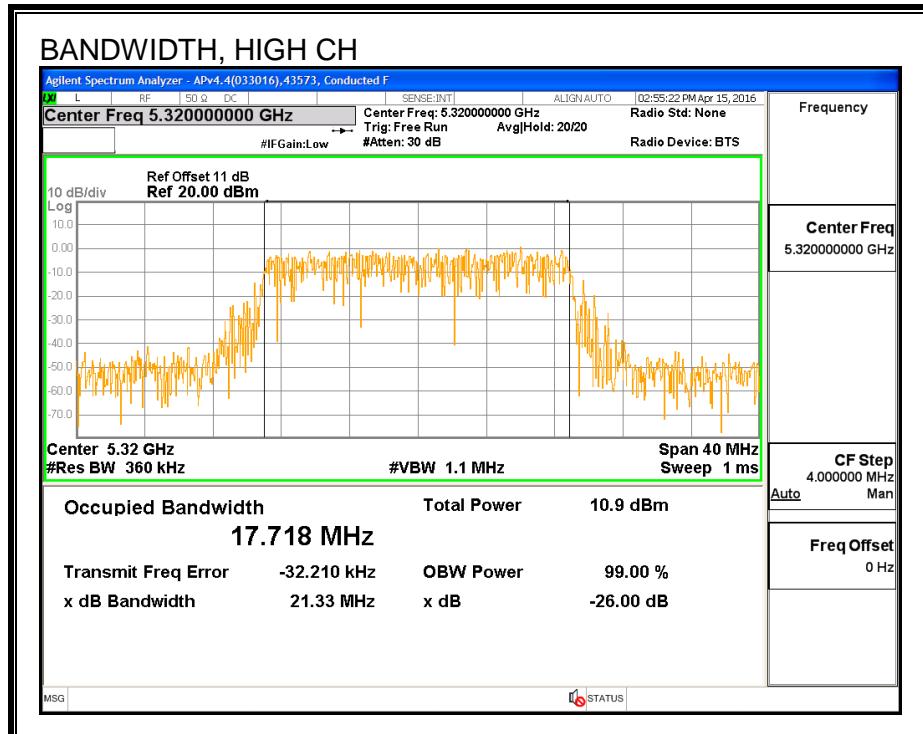
#### LIMITS

None; for reporting purposes only.

#### RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5260	17.790
Mid	5300	16.518
High	5320	17.718

**99% BANDWIDTH**



### 7.12.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

ID:	30554	Date:	6/9/16
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Channel	Frequency (MHz)	Power (dBm)
Low	5260	19.00
Mid	5300	19.00
High	5320	16.00

#### 7.12.4. OUTPUT POWER AND PSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

##### DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

**RESULTS**

<b>ID:</b>	30554	<b>Date:</b>	6/9/16
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**Bandwidth, Antenna Gain, and Limits**

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	22.13	17.790	-5.08	23.50	11.00
Mid	5300	22.10	16.518	-5.08	23.18	11.00
High	5320	22.13	17.718	-5.08	23.48	11.00

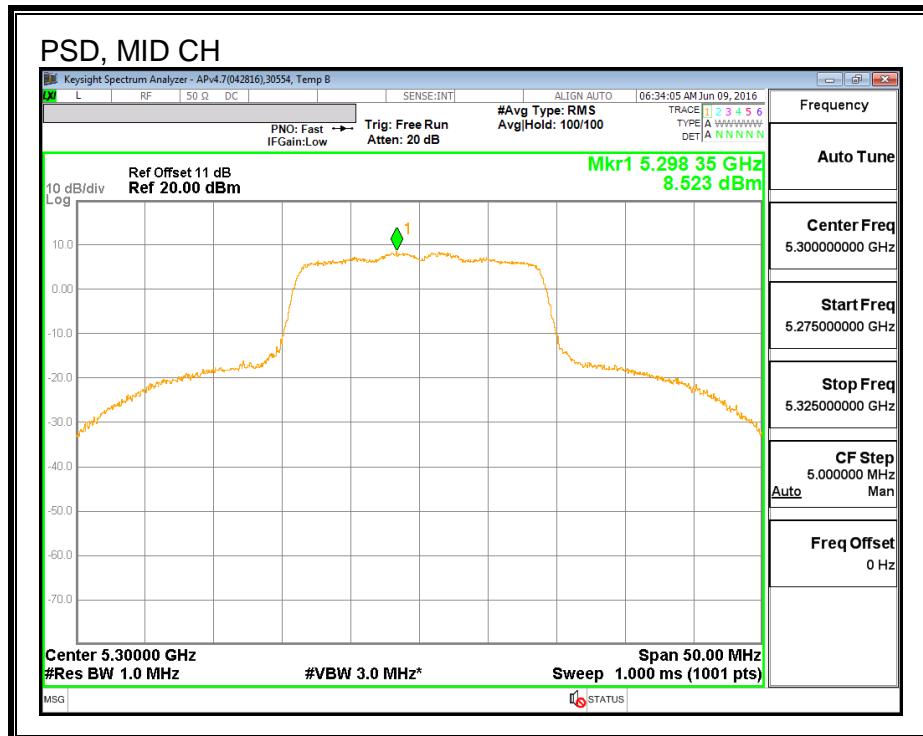
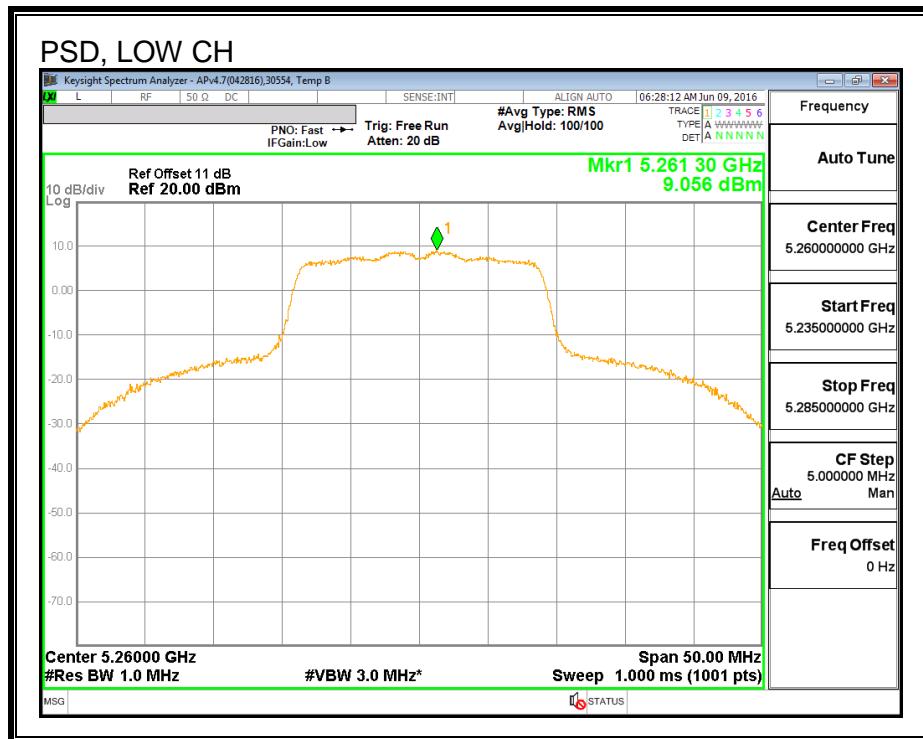
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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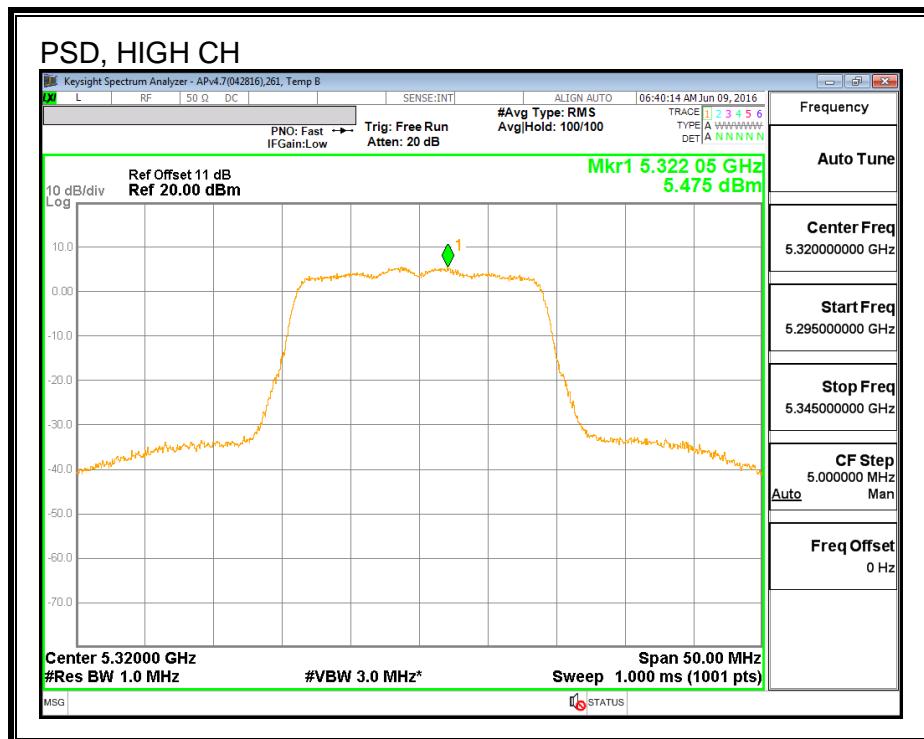
**Output Power Results**

Channel	Frequency (MHz)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	19.00	19.00	23.50	-4.50
Mid	5300	19.00	19.00	23.18	-4.18
High	5320	16.00	16.00	23.48	-7.48

**PSD Results**

Channel	Frequency (MHz)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	9.056	9.06	11.00	-1.94
Mid	5300	8.523	8.52	11.00	-2.48
High	5320	5.475	5.48	11.00	-5.53

PSD

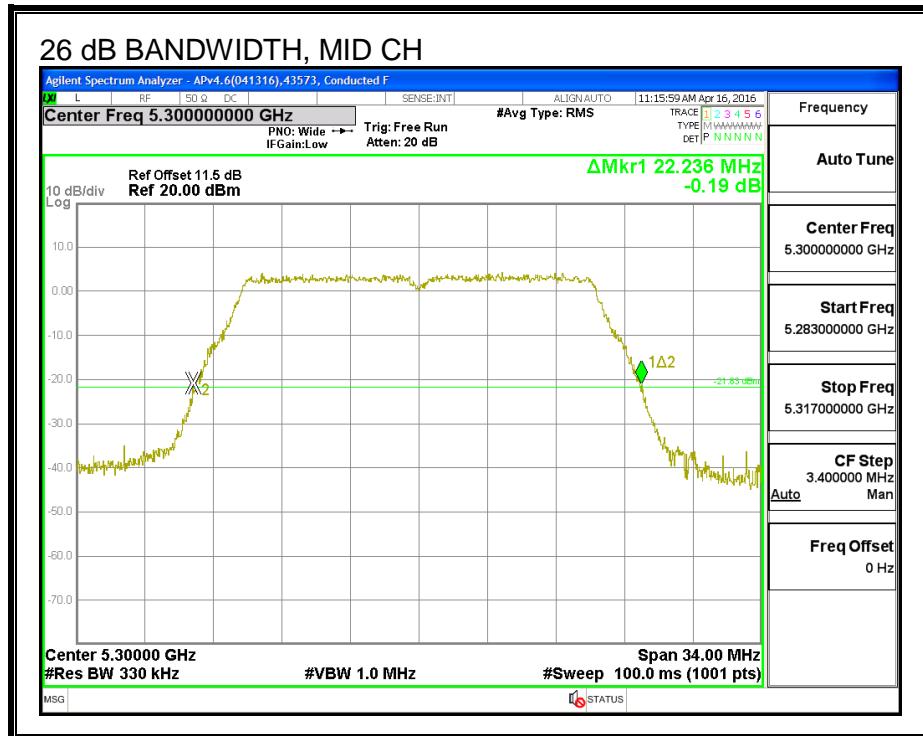
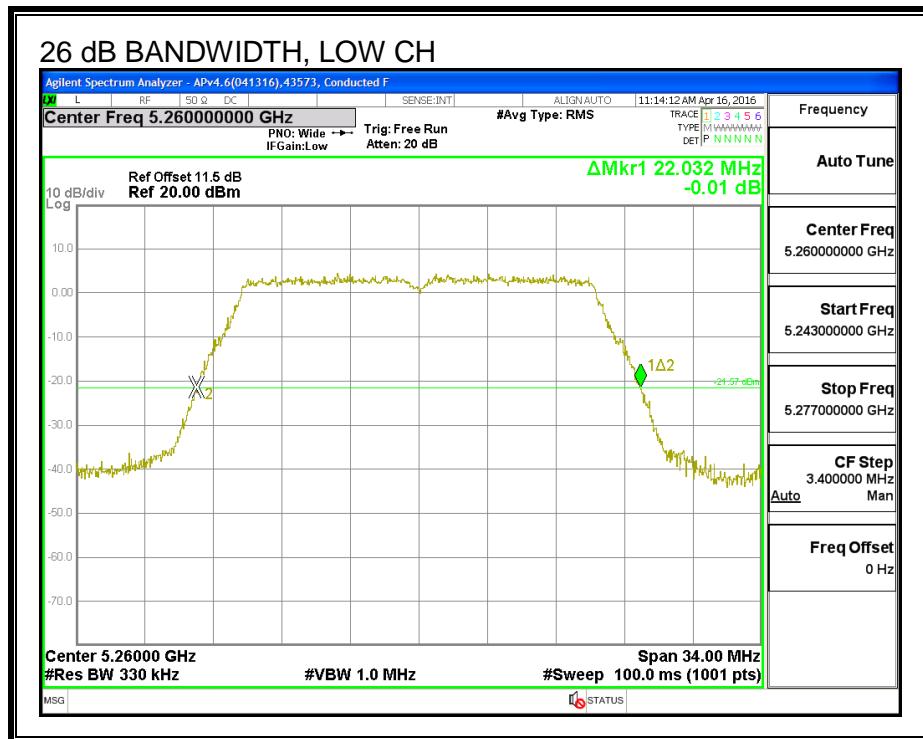


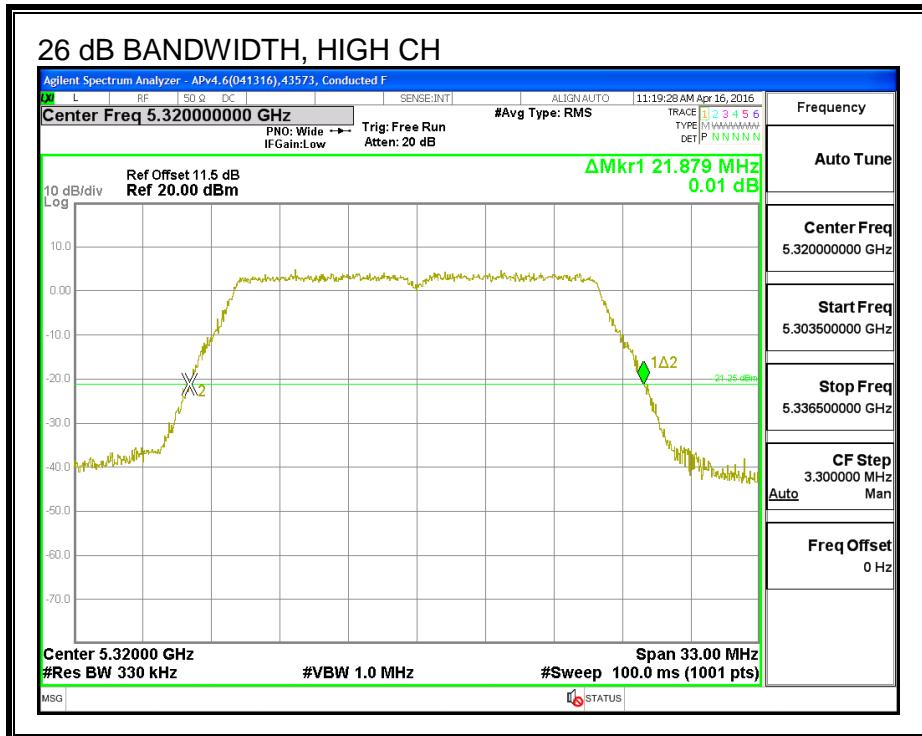
**7.13. 802.11n HT20 2Tx CDD MODE IN THE 5.3 GHz BAND****7.13.1. 26 dB BANDWIDTH****LIMITS**

None; for reporting purposes only.

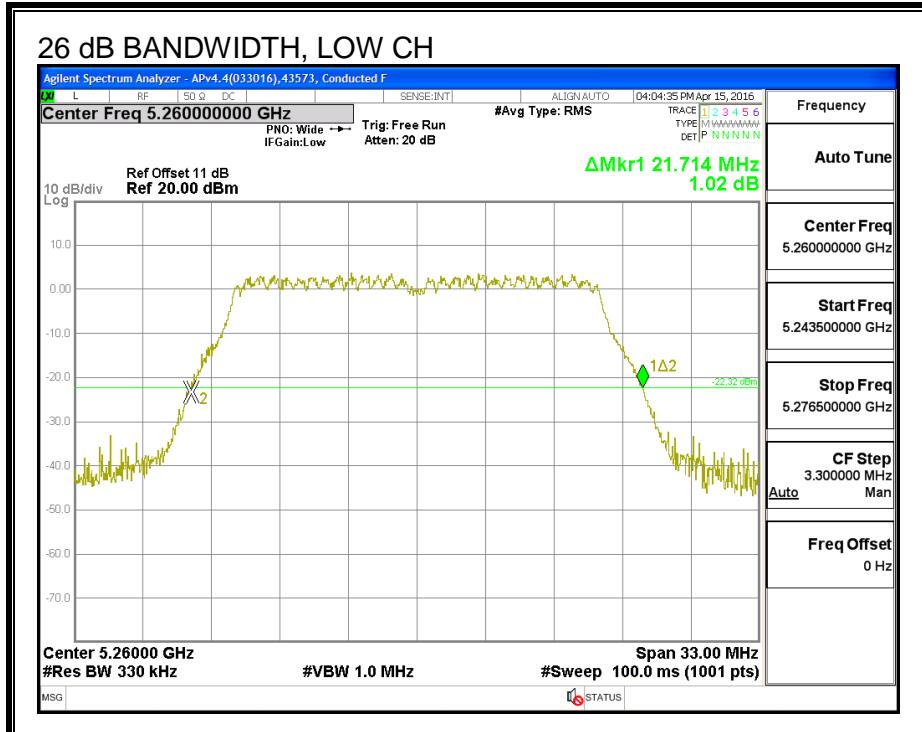
**RESULTS**

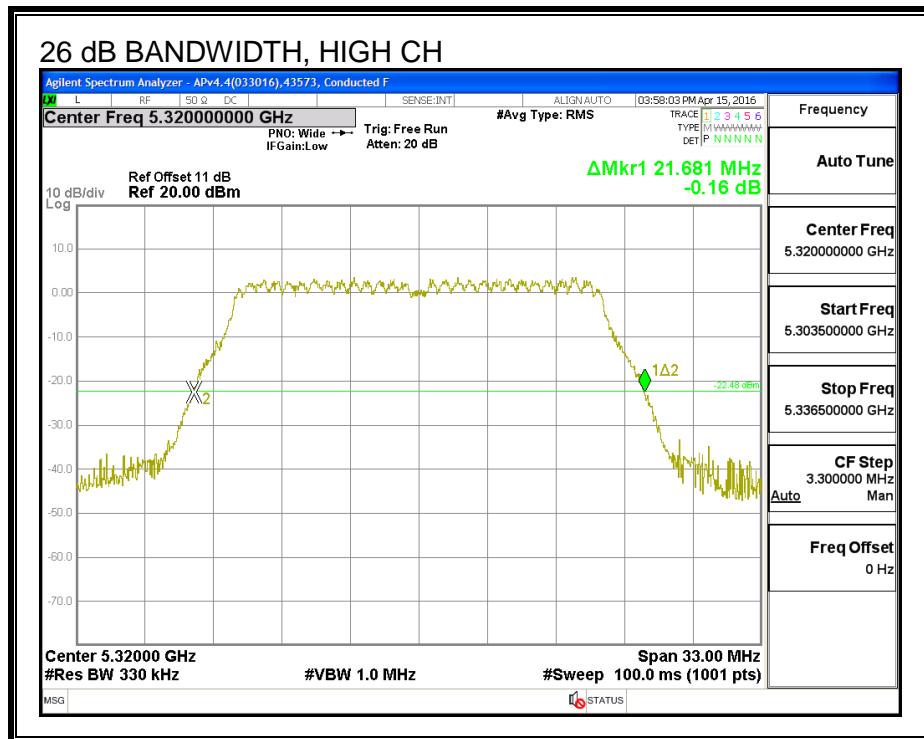
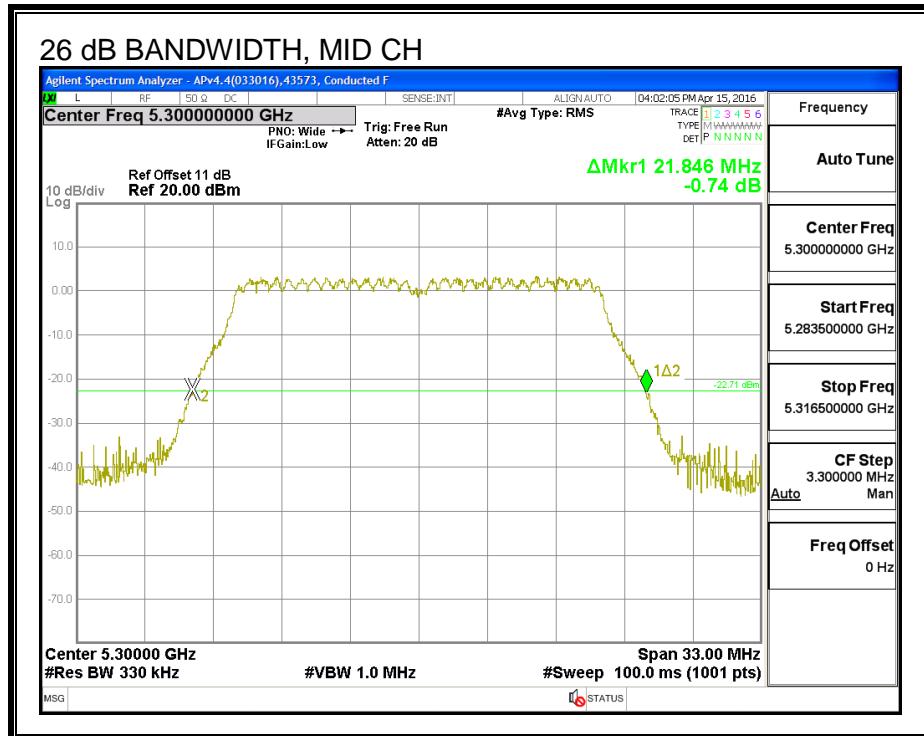
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5260	22.03	21.71
Mid	5300	22.24	21.85
High	5320	21.88	21.68

**26 DB BANDWIDTH, CHAIN 0**



### 26 DB BANDWIDTH, CHAIN 1





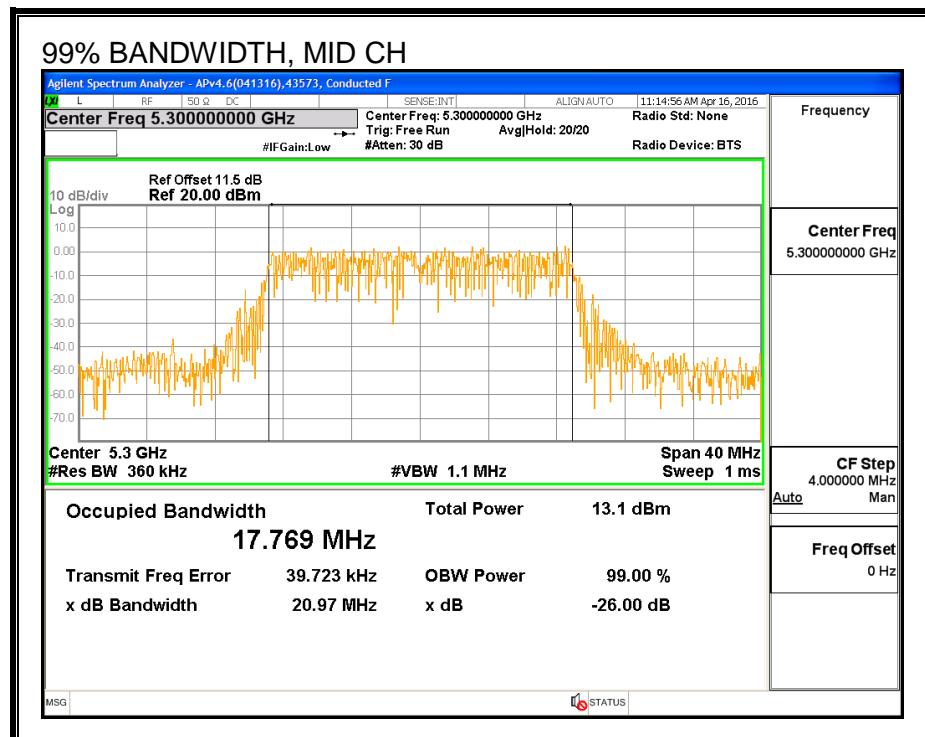
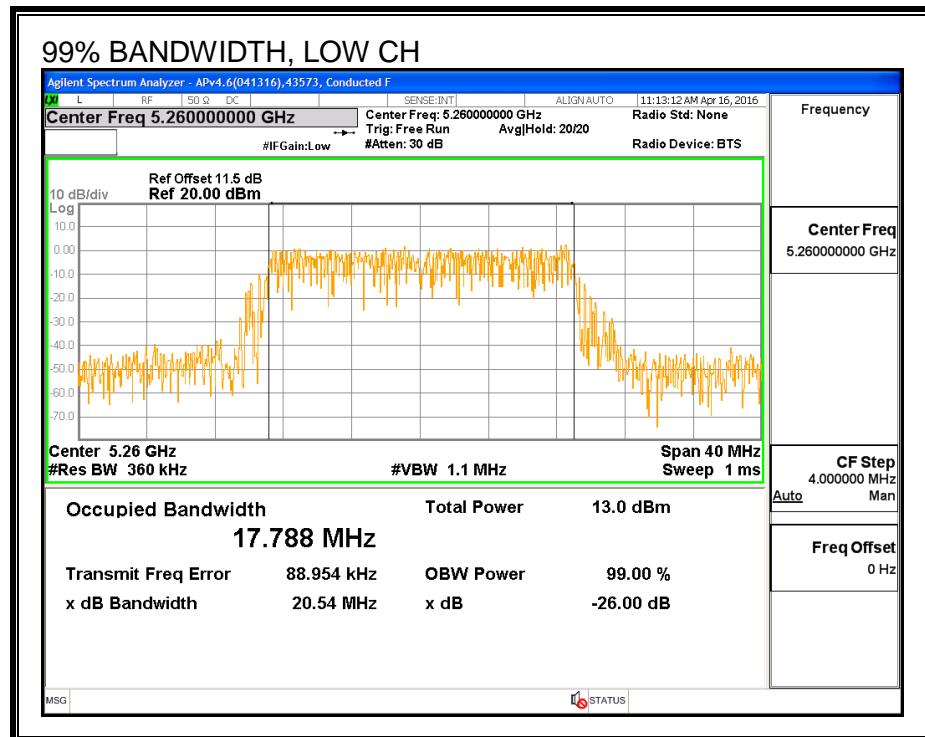
### 7.13.2. 99% BANDWIDTH

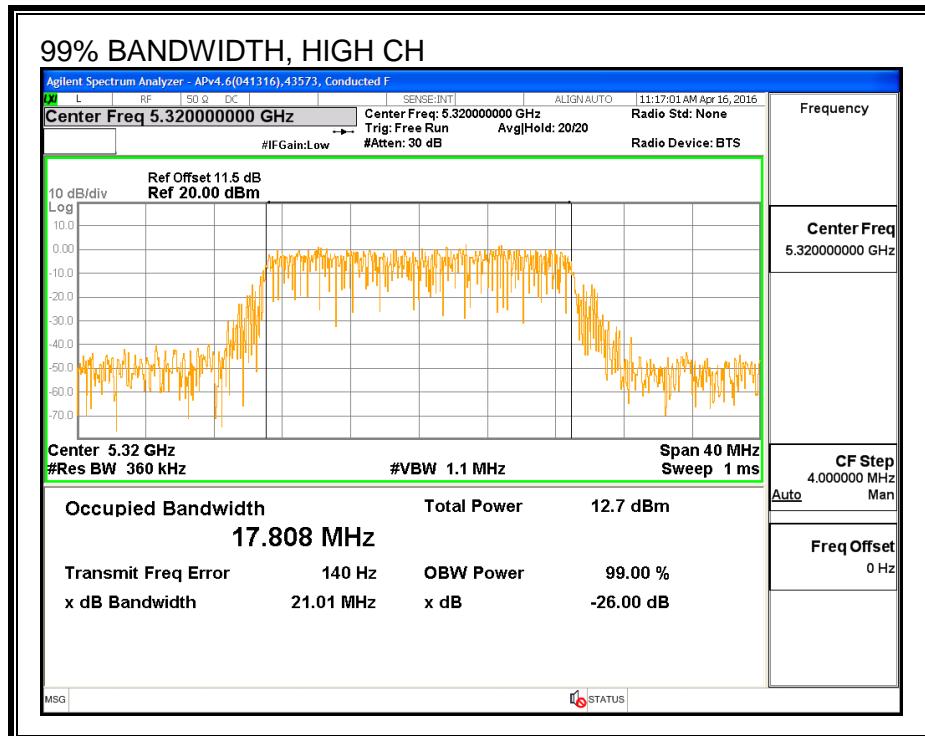
#### LIMITS

None; for reporting purposes only.

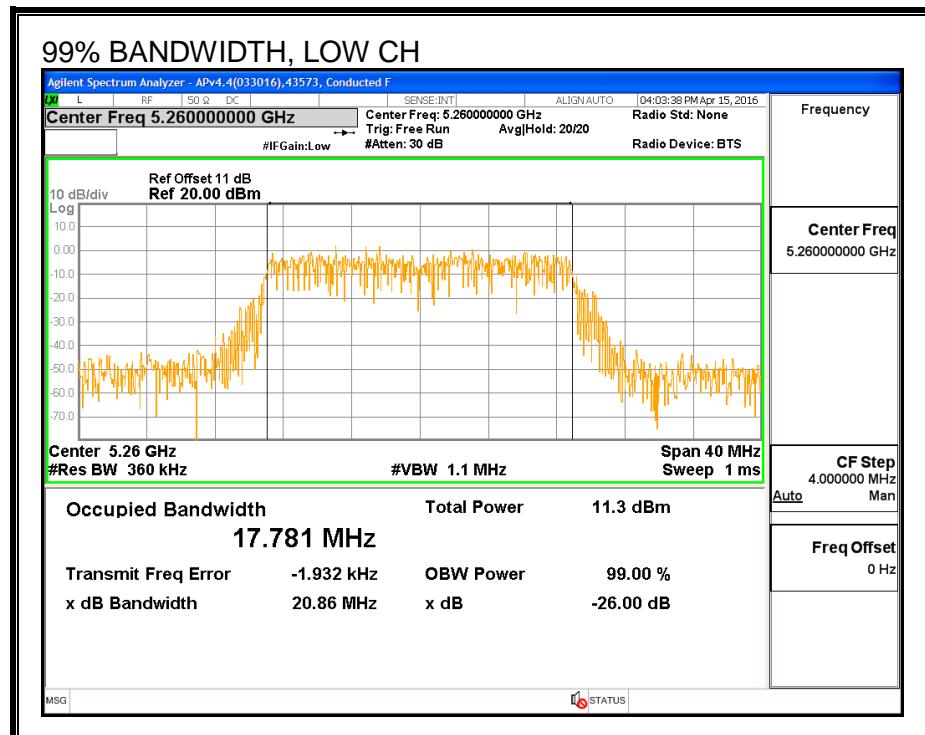
#### RESULTS

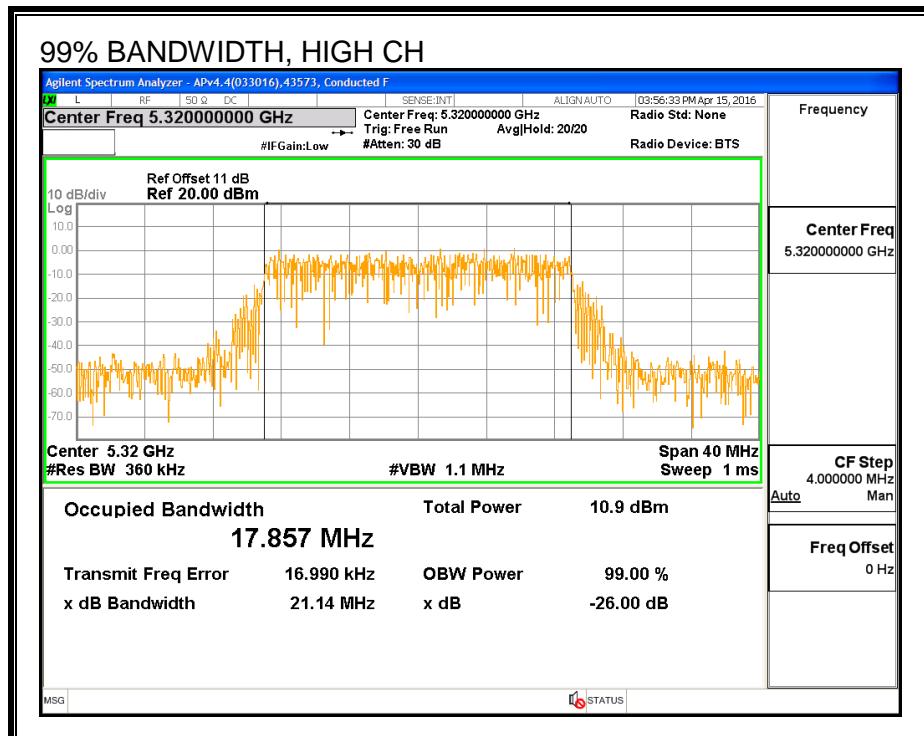
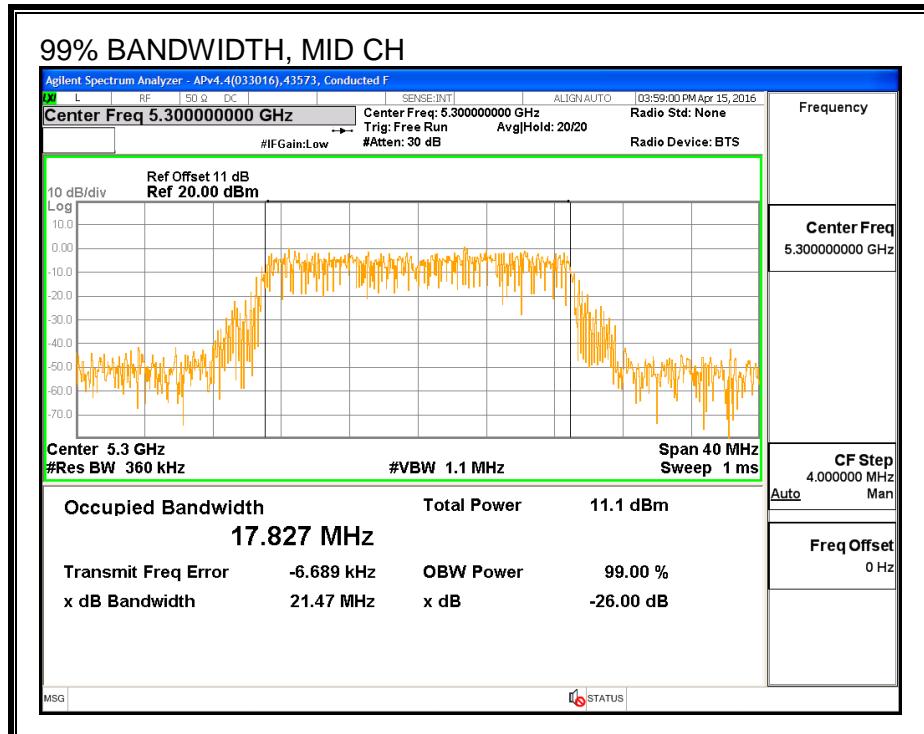
Channel	Frequency (MHz)	99% BW Chain 0 (MHz)	99% BW Chain 1 (MHz)
Low	5260	17.788	17.781
Mid	5300	17.769	17.827
High	5320	17.808	17.857

**99% BANDWIDTH, CHAIN 0**



### 99% BANDWIDTH, CHAIN 1





### 7.13.3. AVERAGE POWER

#### LIMITS

None; for reporting purposes only.

#### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter.

#### RESULTS

ID:	30554	Date:	6/8/16
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##### Average Power Results

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Total Power (dBm)
Low	5260	16.94	17.00	19.98
Mid	5300	16.91	16.95	19.94
High	5320	15.87	15.99	18.94

#### 7.13.4. OUTPUT POWER AND PSD

##### LIMITS

FCC §15.407 (a) (2)

For the band 5.25–5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 26-dB emission bandwidth in MHz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

Measurements perform using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

##### DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
-5.31	-5.08	-5.19

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Correlated Chains Directional Gain (dBi)
-5.31	-5.08	-2.18

**RESULTS**

<b>ID:</b>	30554	<b>Date:</b>	6/8/16
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**Bandwidth, Antenna Gain and Limits**

Channel	Frequency (MHz)	Min 26 dB BW (MHz)	Min 99% BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5260	21.71	17.781	-5.19	-2.18	23.50	11.00
Mid	5300	21.85	17.769	-5.19	-2.18	23.50	11.00
High	5320	21.68	17.808	-5.19	-2.18	23.51	11.00

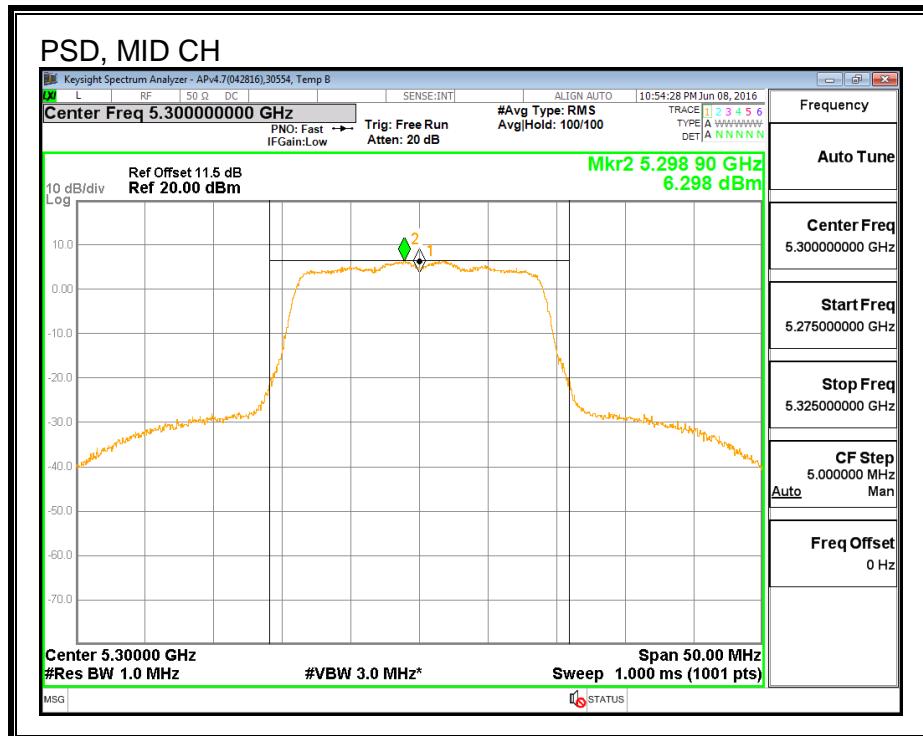
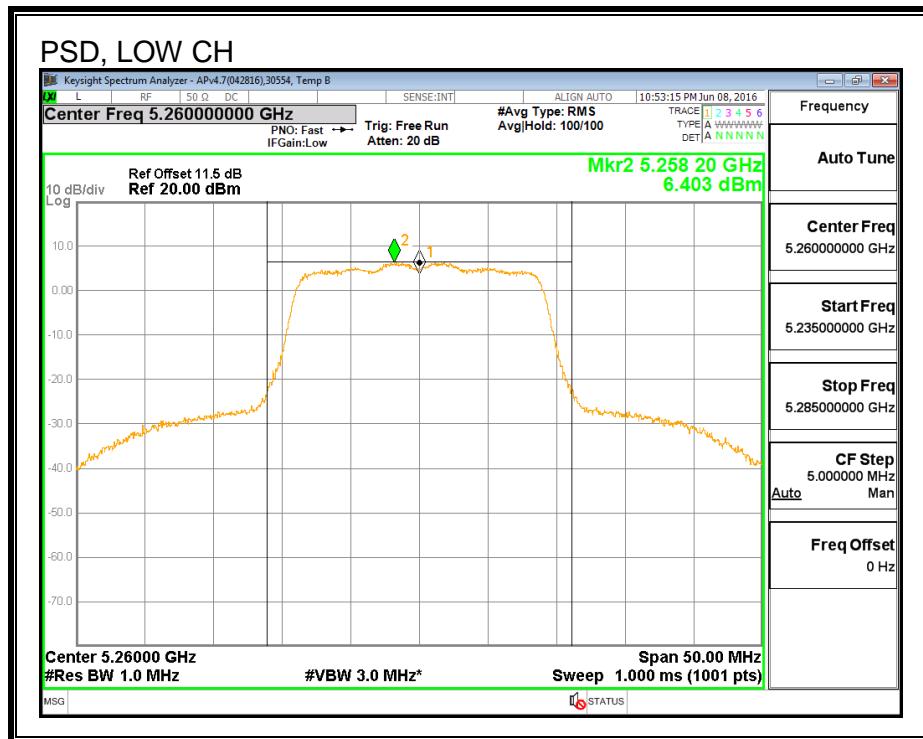
<b>Duty Cycle CF (dB)</b>	0.00	<b>Included in Calculations of Corr'd PSD</b>
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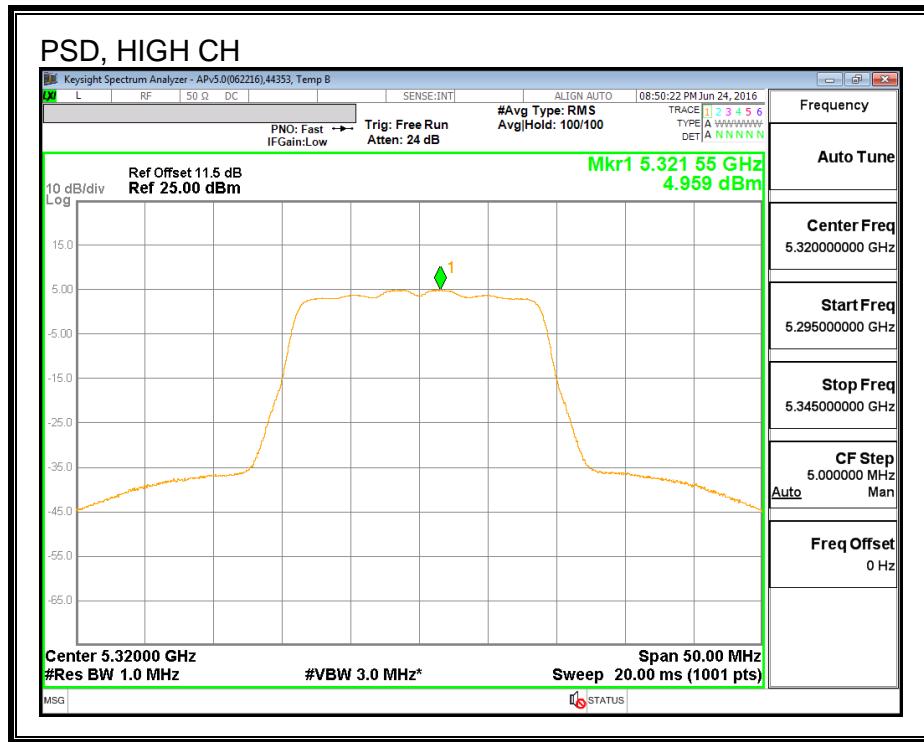
**Output Power Results**

Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5260	16.94	17.00	19.98	23.50	-3.52
Mid	5300	16.91	16.95	19.94	23.50	-3.56
High	5320	15.87	15.99	18.94	23.51	-4.57

**PSD Results**

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5260	6.403	6.516	9.47	11.00	-1.53
Mid	5300	6.298	6.414	9.37	11.00	-1.63
High	5320	4.959	5.071	8.03	11.00	-2.97

**PSD, CHAIN 0**

**PSD, CHAIN 1**