

**FCC 47 CFR PART 15 SUBPART E**

**CERTIFICATION TEST REPORT**

*For*

2 in 1 PC

MODEL No.: M1220KWP

FCC ID: S7JM1220KWP

Trade Mark: N/A

REPORT NO.: ES170217006E4

ISSUE DATE: April 17, 2017

*Prepared for*

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*Prepared by*

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## 1 TEST RESULT CERTIFICATION

Applicant:	SHENZHEN YIFANG DIGITAL TECHNOLOGY CO., LTD. Building NO.22, 23, Fifth Region, Baiwangxin Industrial Park , Songbai Rd. Nanshan, Shenzhen 518108, China
Manufacturer:	SHENZHEN YIFANG DIGITAL TECHNOLOGY CO., LTD. Building NO.22, 23, Fifth Region, Baiwangxin Industrial Park , Songbai Rd. Nanshan, Shenzhen 518108, China
Product Description:	2 in 1 PC
Model Number:	M1220KWP
File Number:	ES170217006E4
Date of Test:	February 17, 2017 to April 17, 2017


Measurement Procedure Used:


APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart E	PASS

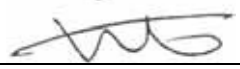
The above equipment was tested by EMTEK(SHENZHEN) CO., LTD.. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.407

The test results of this report relate only to the tested sample identified in this report.

Date of Test : February 17, 2017 to April 17, 2017

Prepared by :   
Yaping Shen/Editor

Reviewer :   
Joe Xia/Supervisor

Approve & Authorized Signer :   
Lisa Wang/Manager

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## 2 EUT TECHNICAL DESCRIPTION

Characteristics	Description			
<b>IEEE 802.11 WLAN Mode Supported</b>	<input checked="" type="checkbox"/> 802.11a(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11b(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11g(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(80MHz channel bandwidth)			
<b>Data Rate</b>	WIFI: 802.11 b:1,2,5.5,11Mbps; 802.11 g/a:6,9,12,18,24,36,48,54Mbps; 802.11n(HT20)/ac(HT20): MCS0-MCS7; 802.11n(HT40): MCS0-MCS7; 802.11ac(HT40):MCS0-MCS8; 802.11ac(VHT80):MCS0-MCS8; Bluetooth DSS: 1Mbps for GFSK modulation 2Mbps for pi/4-DQPSK modulation 3Mbps for 8DPSK modulation Bluetooth DTS: 1Mbps for GFSK modulation			
<b>Modulation</b>	WIFI: OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/g/n; DSSS with DBPSK/DQPSK/CCK for 802.11b; BT DSS: GFSK modulation (1Mbps) pi/4-DQPSK modulation (2Mbps) 8DPSK modulation (3Mbps) BT DTS: GFSK modulation (1Mbps)			
<b>Operating Frequency Range</b>	WIFI 5G Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	802.11a/n(HT20)/ac(VHT20)	5180-5240	4
		802.11n(HT40)/ac(VHT40)	5190-5230	2
		802.11 ac(VHT80)	5210	1
	UNII Band II-A	802.11a/n(HT20)/ac(VHT20)	5260-5320	4
		802.11n(HT40)/ac(VHT40)	5270-5310	2
		802.11 ac(VHT80)	5290	1
	UNII Band II-C	802.11a/n(HT20)/ac(VHT20)	5500-5700	11
		802.11n(HT40)/ac(VHT40)	5510-5670	5
		802.11 ac(VHT80)	5530-5610	2
UNII Band III	802.11a/n(HT20)/ac(VHT20)	5745-5825	5	
	802.11n(HT40)/ac(VHT40)	5755-5795	2	
	802.11 ac(VHT80)	5775	1	

	2.4G WIFI: 2412-2462MHz for 802.11b/g; 2412-2462MHz for 802.11n(HT20); 2422-2452MHz for 802.11n(HT40); Bluetooth: 2402-2480MHz
<b>Transmit Power Max</b>	16.48 dBm for WIFI 2.4G Band; 1.784 dBm for BT DSS; 3.994 dBm for BT DTS; 13.80 dBm for UNII Band I; 13.34 dBm for UNII Band II-A; 14.04 dBm for UNII Band II-C; 12.35 dBm for UNII Band III
<b>Antenna Type</b>	FPC Antenna Two antenna for WIFI A antenna for BT
<b>Smart system</b>	<input checked="" type="checkbox"/> SISO <input type="checkbox"/> MIMO
<b>Antenna Gain</b>	2dBi for WIFI 2.4G Band 2dBi for BT 2dBi for WIFI 5G Band
<b>Power supply</b>	<input checked="" type="checkbox"/> DC supply: DC supply: DC 7.4V by lithium battery or DC 12V by adapter
	<input checked="" type="checkbox"/> Adapter supply: Adapter 1: Model: ADS-25FSG-12 12024EPCU Input: AC 100-240V, 50/60Hz 0.7A Output: DC 12V 2A Adapter 2: Model: KSASB0241200200VU Input: AC 100-240V, 50/60Hz 0.6A Output: DC 12V 2A

**Note:** for more details, please refer to the User's manual of the EUT.

### 3 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.407 (a) 15.407 (e)	99% , 6dB and 26dB Bandwidth	PASS	
15.407 (a)	Maximum Conducted Output Power	PASS	
15.407 (a)	Peak Power Spectral Density	PASS	
15.407 (b)	Radiated Spurious Emission	PASS	
15.407(g)	Frequency Stability	PASS	
15.407 (b)(6) 15.207	Power Line Conducted Emission	PASS	
15.407(a) 15.203	Antenna Application	PASS	
NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 789003 D2 General UNII Test Procedures New Rules v01r02, In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: S7JM1220KWP filing to comply with Section 15.247 of the FCC Part 15, Subpart E Rules.

## 4 TEST METHODOLOGY

### 4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart E

FCC KDB 789003 D2 General UNII Test Procedures New Rules v01r02

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

### 4.2 MEASUREMENT EQUIPMENT USED

#### 4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/28/2016	05/28/2017
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/28/2016	05/28/2017
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	05/28/2017
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100006	05/28/2016	05/28/2017
Voltage Probe	Rohde & Schwarz	TK9416	N/A	05/28/2016	05/28/2017
I.S.N	Rohde & Schwarz	ENY22	1109.9508.02	05/28/2016	05/28/2017

#### 4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/28/2016	05/28/2017
Pre-Amplifier	HP	8447D	2944A07999	05/28/2016	05/28/2017
Bilog Antenna	Schwarzbeck	VULB9163	142	05/28/2016	05/28/2017
Loop Antenna	ARA	PLA-1030/B	1029	05/28/2016	05/28/2017
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/28/2016	05/28/2017
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/28/2016	05/28/2017
Cable	Schwarzbeck	AK9513	ACRX1	05/28/2016	05/28/2017
Cable	Rosenberger	N/A	FP2RX2	05/28/2016	05/28/2017
Cable	Schwarzbeck	AK9513	CRPX1	05/28/2016	05/28/2017
Cable	Schwarzbeck	AK9513	CRRX2	05/28/2016	05/28/2017

#### 4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	05/28/2016	05/28/2017
Power meter	Anritsu	ML2495A	0824006	05/28/2016	05/28/2017
Power sensor	Anritsu	MA2411B	0738172	05/28/2016	05/28/2017
Spectrum Analyzer	Agilent	N9010A	My53470879	05/28/2016	05/28/2017
Spectrum Analyzer	Rohde & Schwarz	FSV40	100967	05/28/2016	05/28/2017

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### 4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11a: 6 Mbps; 802.11n (HT20): MCS0; 802.11n (HT20): MCS15; 802.11n (HT40): MCS0; 802.11n (HT40): MCS15; 802.11ac (HT20): MCS0; 802.11ac (HT20): MCS15; 802.11ac (HT40): MCS0; 802.11ac (HT40): MCS19; 802.11ac (HT80): MCS0; 802.11ac (HT80): MCS19;) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.



Wifi 5G with UNII Band I

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220		
40	5200	48	5240		

Frequency and Channel list for 802.11n(HT40)/ac(VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190				
46	5230				

Frequency and Channel list for 802.11ac(VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210				

**Test** Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	40	5200	48	5240

**Test** Frequency and channel for 802.11n(VHT40)/ac(VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	N/A	N/A	46	5230

**Test** Frequency and channel for 802.11ac(HT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
42	5210	N/A	N/A	N/A	N/A

Wifi 5G with UNII Band II-A

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300		
56	5280	64	5320		

Frequency and Channel list for 802.11n(VHT40)/ac(VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270				
62	5310				

Frequency and Channel list for 802.11ac(VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
58	5290				

**Test** Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	56	5280	64	5320

**Test** Frequency and channel for 802.11n(HT40)/ac(VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	N/A	N/A	62	5310

**Test** Frequency and channel for 802.11ac(VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
58	5290	N/A	N/A	N/A	N/A

Wifi 5G with UNII Band II-C

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	116	5580	132	5660
104	5520	120	5600	136	5680
108	5540	124	5620	140	5700
112	5560	128	5640		

Frequency and Channel list for 802.11n(VHT40)/ac(VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	126	5630		
110	5550	134	5670		
118	5590				

Frequency and Channel list for 802.11ac(VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530				
122	5610				

**Test** Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	120	5600	140	5700

**Test** Frequency and channel for 802.11n(VHT40)/ac(VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	118	5590	134	5670

**Test** Frequency and channel for 802.11ac(VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	N/A	N/A	122	5610

Wifi 5G with UNII Band III

Frequency and Channel list for 802.11a/n(HT20)/ac(VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785	165	5825
153	5765	161	5805		

Frequency and Channel list for 802.11n(HT40)/ac(VHT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755				
159	5795				

Frequency and Channel list for 802.11ac(VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				

**Test** Frequency and Channel for 802.11a/n(HT20)/ac(VHT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785	165	5825

**Test** Frequency and channel for 802.11n(HT40)/ac(VHT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	N/A	N/A	159	5795

**Test** Frequency and channel for 802.11ac(VHT80):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
155	5775				

## 5 FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

### 5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

: Accredited by CNAS,2016.10.24

The certificate is valid until 2022.10.28

The Laboratory has been assessed and proved to be in compliance with CNAS-CL01:2006 (identical to ISO/IEC 17025:2005)

The Certificate Registration Number is L2291.

Accredited by TUV Rheinland Shenzhen 2015.4

The Laboratory has been assessed according to the requirements ISO/IEC 17025.

Accredited by FCC, July 06, 2016

The Certificate Registration Number is 709623.

Accredited by FCC, July 06, 2016

The Certificate Registration Number is 406365.

Accredited by Industry Canada, November 29, 2012

The Certificate Registration Number is 4480A.

Name of Firm

: EMTEK(SHENZHEN) CO., LTD.

Site Location

: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5$

## **7 SETUP OF EQUIPMENT UNDER TEST**

### **7.1 RADIO FREQUENCY TEST SETUP**

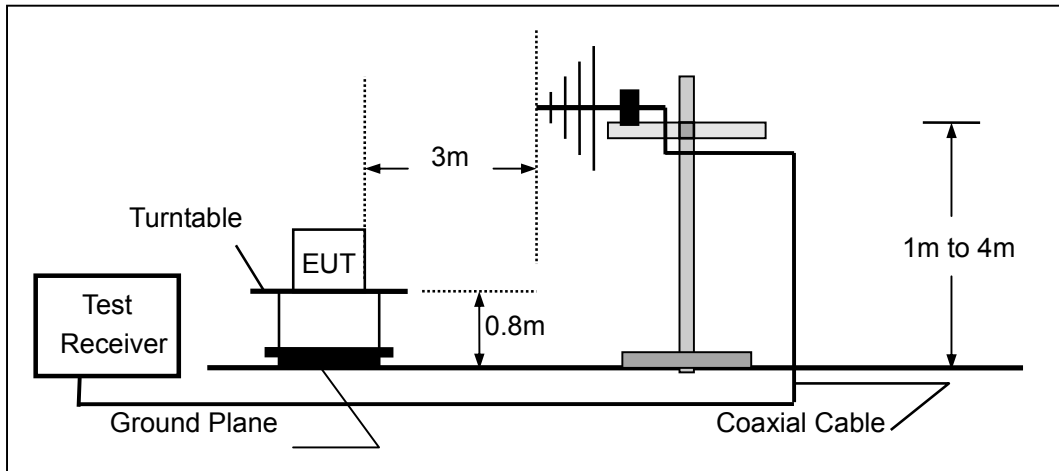
The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.

### **7.2 RADIO FREQUENCY TEST SETUP**

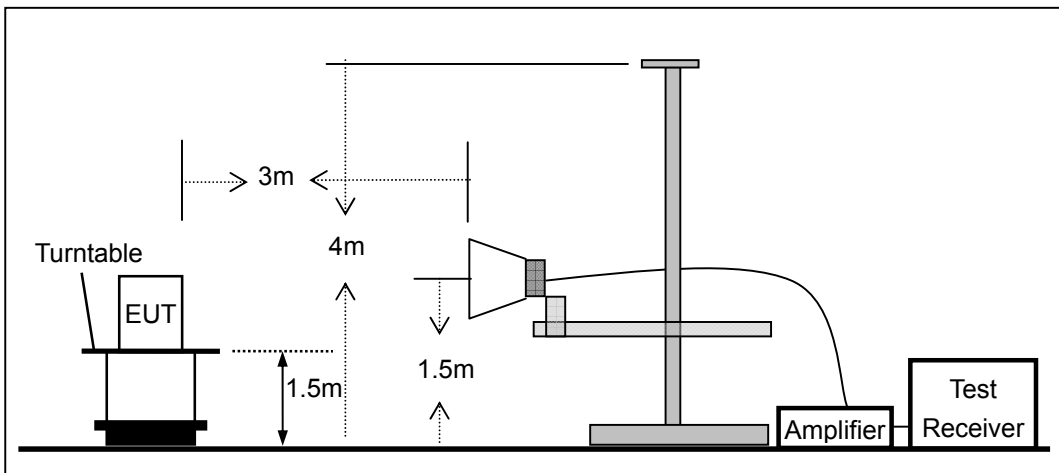
The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz

(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz



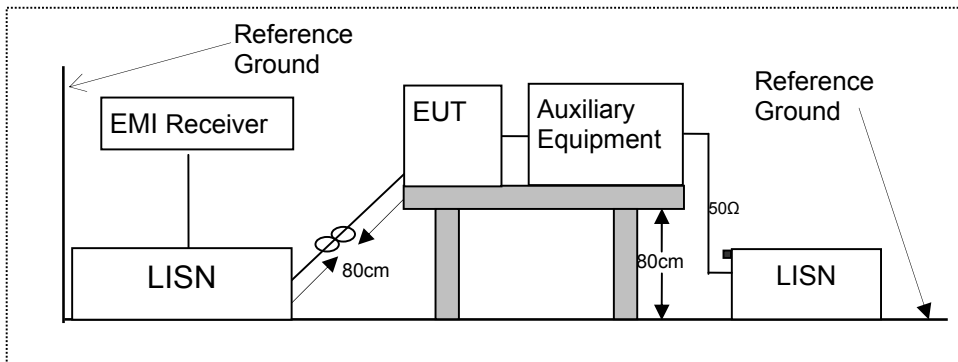


### 7.3 CONDUCTED EMISSION TEST SETUP

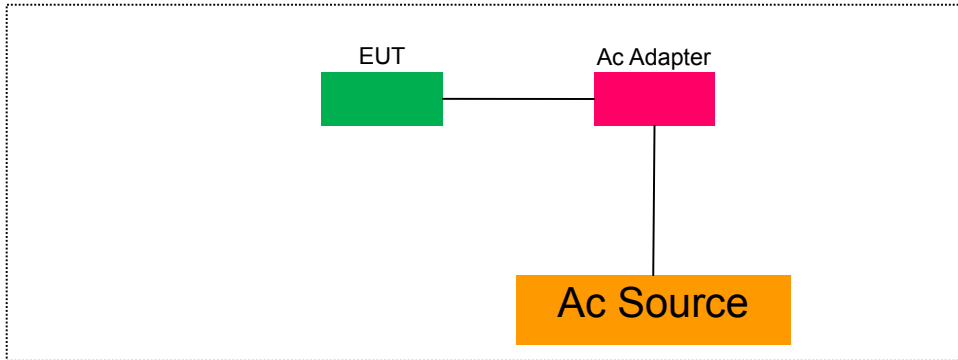
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



#### 7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



#### 7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
N/A	N/A	N/A	N/A	N/A	N/A	N/A

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

## 8 TEST REQUIREMENTS

### 8.1 BANDWIDTH MEASUREMENT

#### 8.1.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I  
According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C  
According to FCC Part 15.407(a)(3) for UNII Band III  
According to FCC Part 15.407(e) for UNII Band III  
According to 789033 D02 Section II(C)  
According to 789033 D02 Section II(D)

#### 8.1.2 Conformance Limit

No limit requirement.  
The minimum 6 dB emission bandwidth of at least 500 KHz for the UNII Band III.

#### 8.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

#### 8.1.4 Test Procedure

Connect the antenna port(s) to the spectrum analyzer input. Using the spectrum analyzer Channel Bandwidth mode, configure the spectrum analyzer as shown below

■ The following procedure shall be used for measuring (26 dB) power bandwidth:

Center Frequency: test Frequency

Set RBW = approximately 1% of the emission bandwidth.

Set the VBW > RBW.

Detector = Peak.

Trace mode = max hold.

X dB Bandwidth: 26 dB

Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.

Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

■ Minimum Emission Bandwidth for the UNII Band III

Center Frequency: test Frequency

Set RBW = 100 kHz

Set VBW  $\geq 3 \cdot$  RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

X dB Bandwidth: 6 dB

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

■ The following procedure shall be used for measuring (99 %) power bandwidth:

Set center frequency to the nominal EUT channel center frequency.

Set span = 1.5 times to 5.0 times the OBW.

Set RBW = 1 % to 5 % of the OBW

Set VBW  $\geq 3 \cdot$  RBW

Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

Use the 99 % power bandwidth function of the instrument (if available).

If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

8.1.5 Test Results

Temperature : 28  802.11a mode

Temperature : 28  802.11ac(VHT20) mode

Temperature : 28  802.11ac(VHT80) mode

Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11a	Frequency(MHz) 5180
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth		UNII Band I	
Test Model	802.11a	Frequency(MHz)	5200
Ant0			



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band I	
Test Model	802.11a	Frequency(MHz)
Ant0		5240



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11a	Frequency(MHz) 5260
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A	
Test Model	802.11a	Frequency(MHz)
Ant0		5280



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A	
Test Model	802.11a	Frequency(MHz)
Ant0		5320



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5500
Ant0	

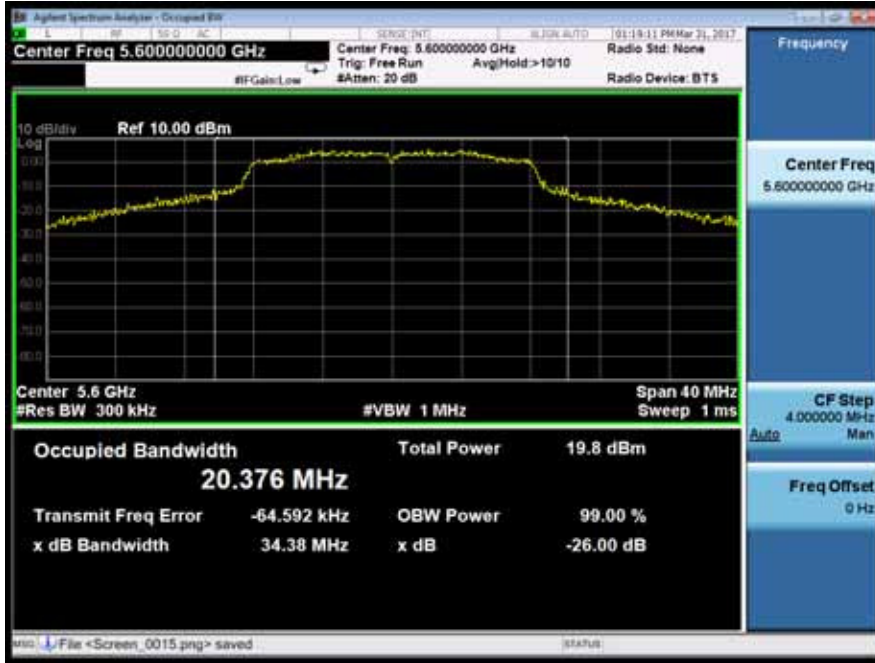


Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5600
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11a	Frequency(MHz) 5700
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth		UNII Band III	
Test Model	802.11a	Frequency(MHz)	5745
Ant0			



Ant1

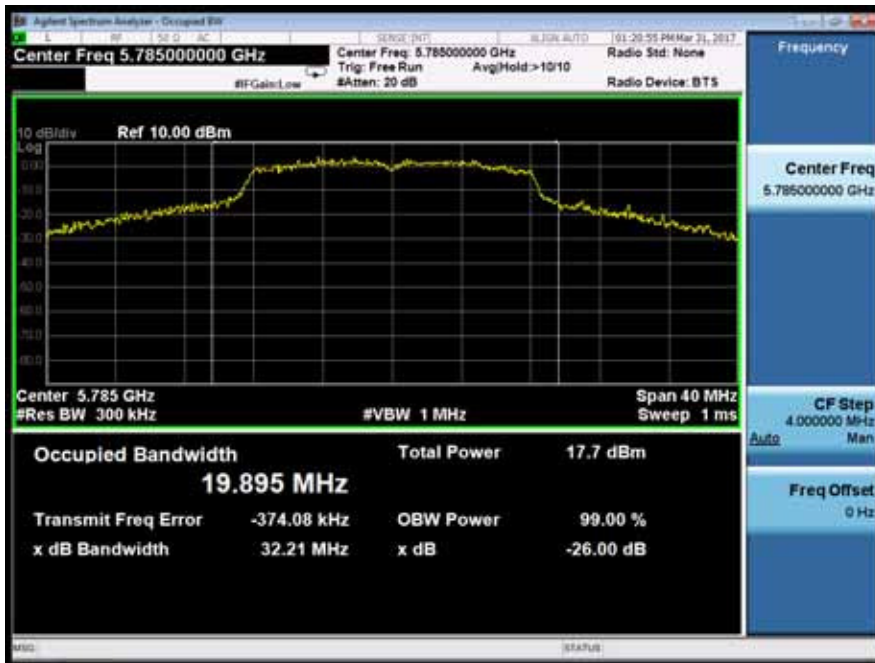




Emission Bandwidth&99% Occupied Bandwidth		UNII Band III	
Test Model	802.11a	Frequency(MHz)	5785
Ant0			



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11a	Frequency(MHz) 5825
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5180
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5200
Ant0	



Ant1







Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A	
Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5260



Ant1

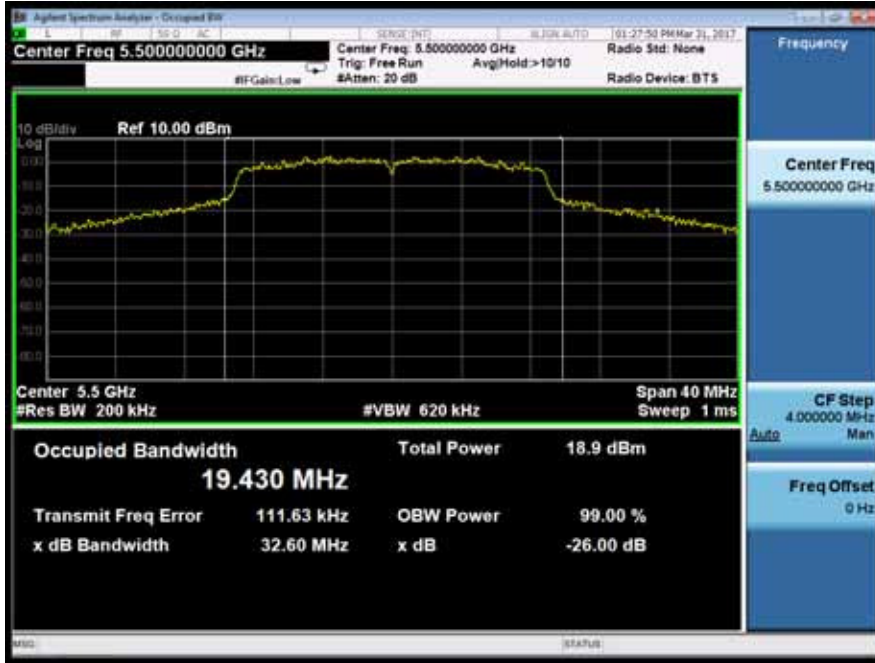




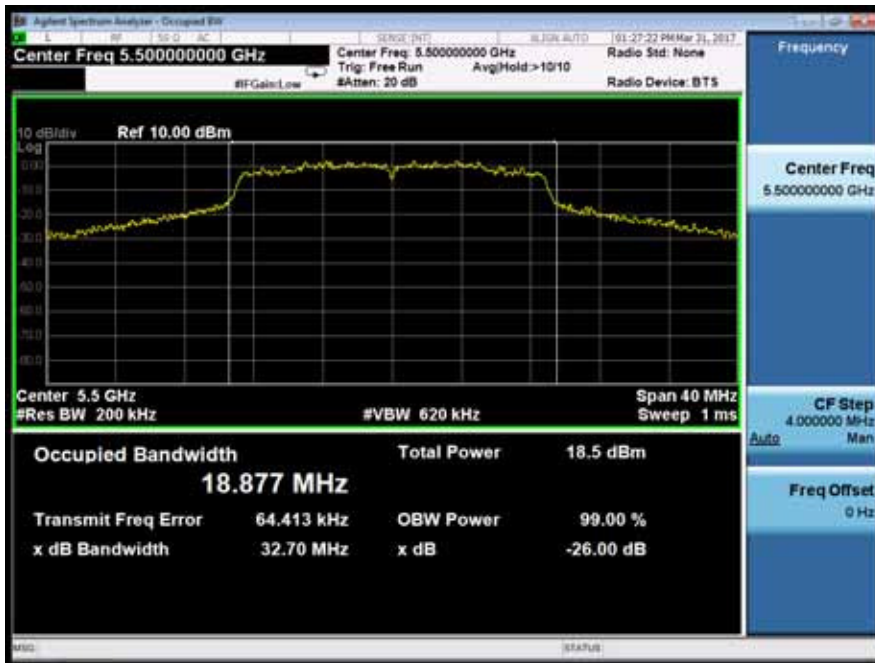




Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5500
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C	
Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5600



Ant1



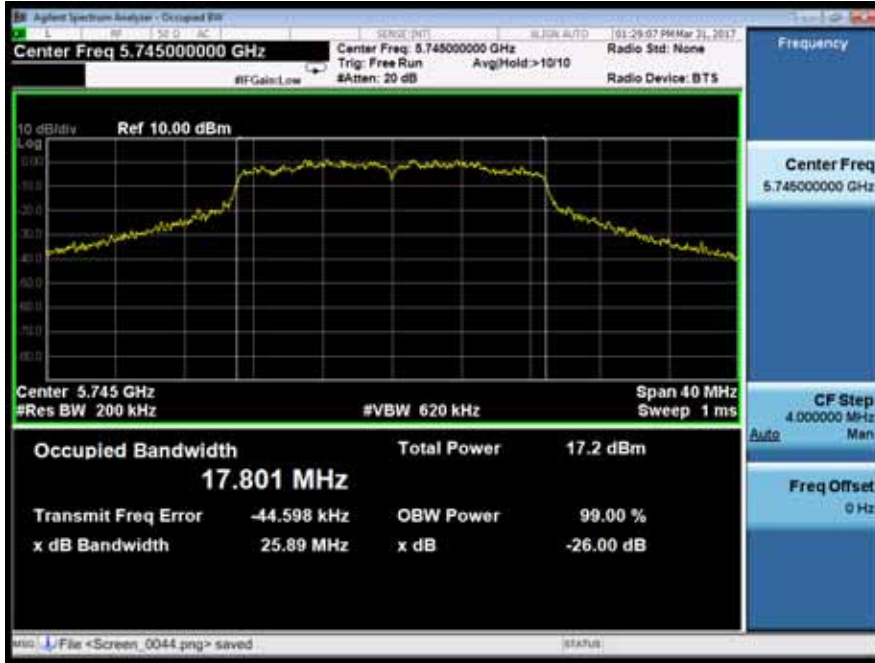
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Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5700



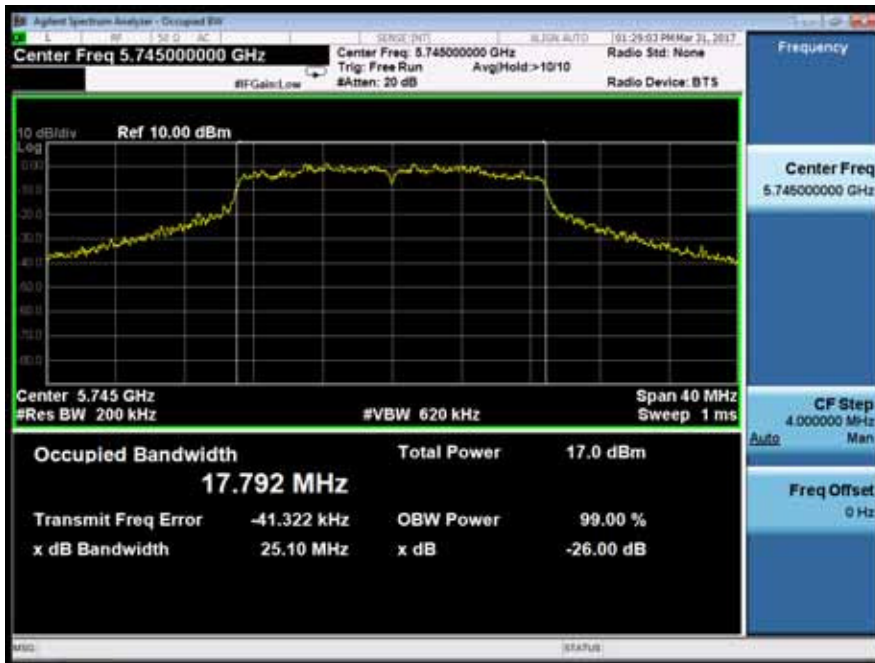
Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5745
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5785
Ant0	



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11n(VHT20) mode	Frequency(MHz) 5825
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5180
Ant0	



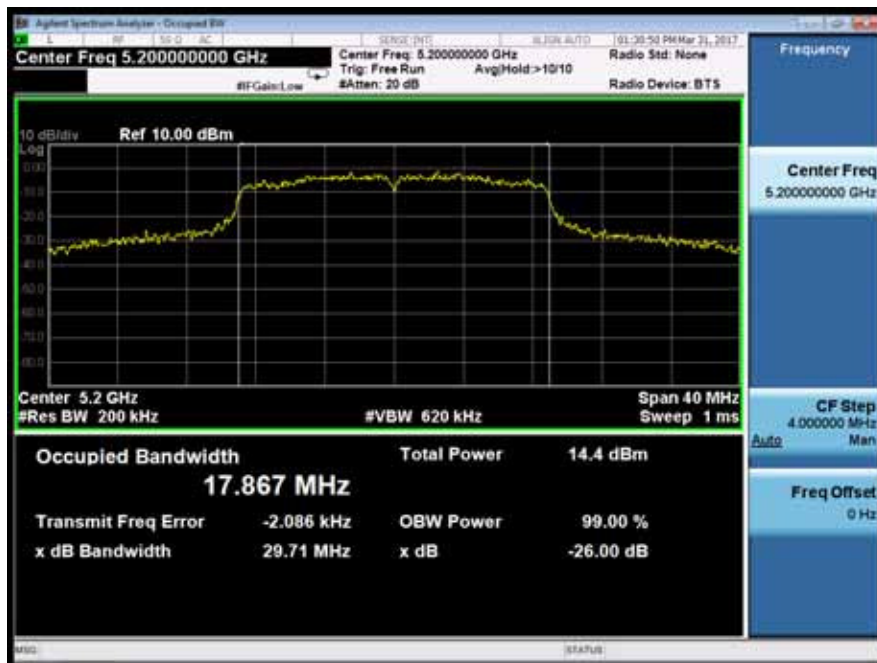
Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5200
Ant0	



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5240
Ant0	



Ant1



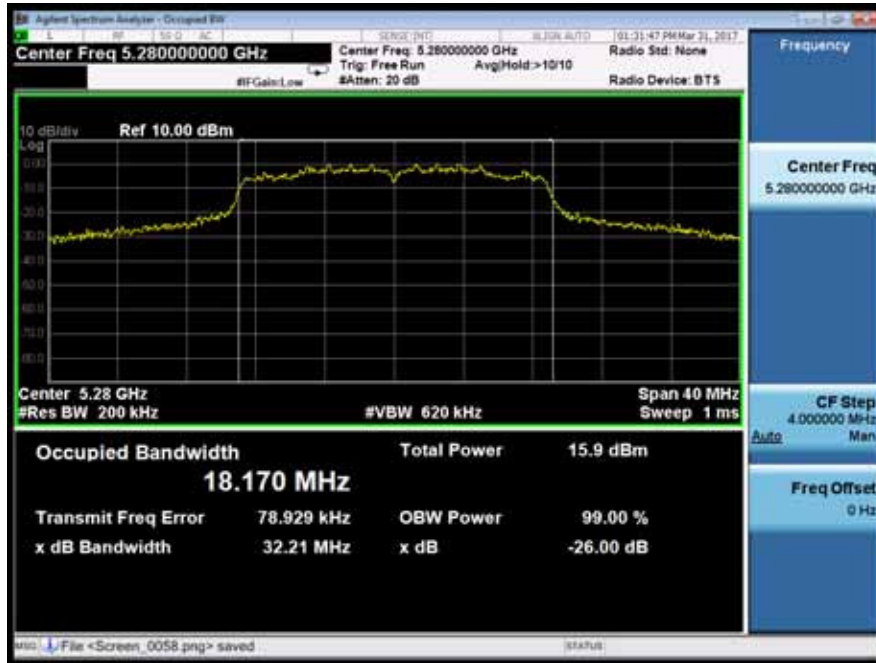
Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5260
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5280
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5320
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5500
Ant0	



Ant1





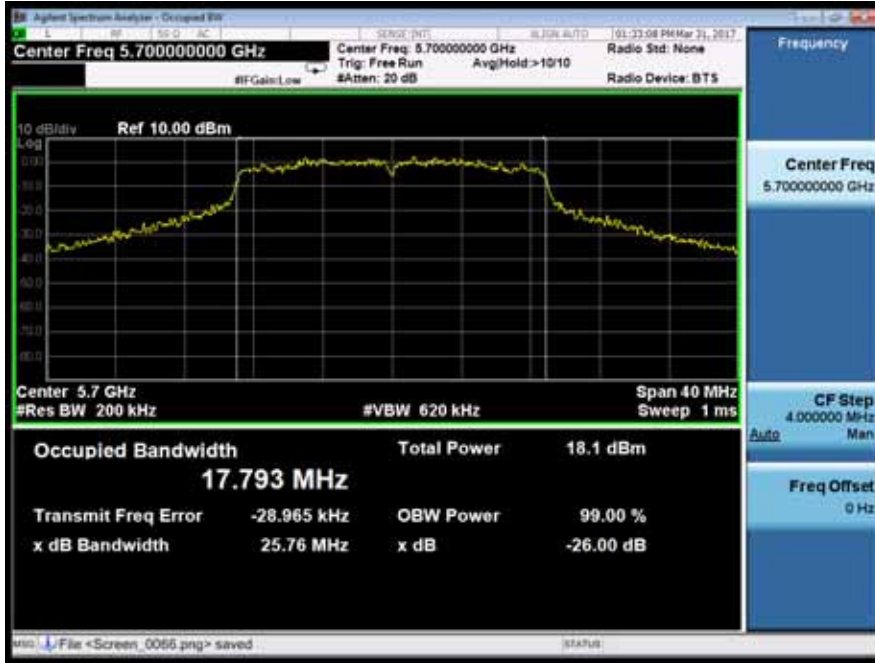
Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5600
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5700
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5745
Ant0	



Ant1

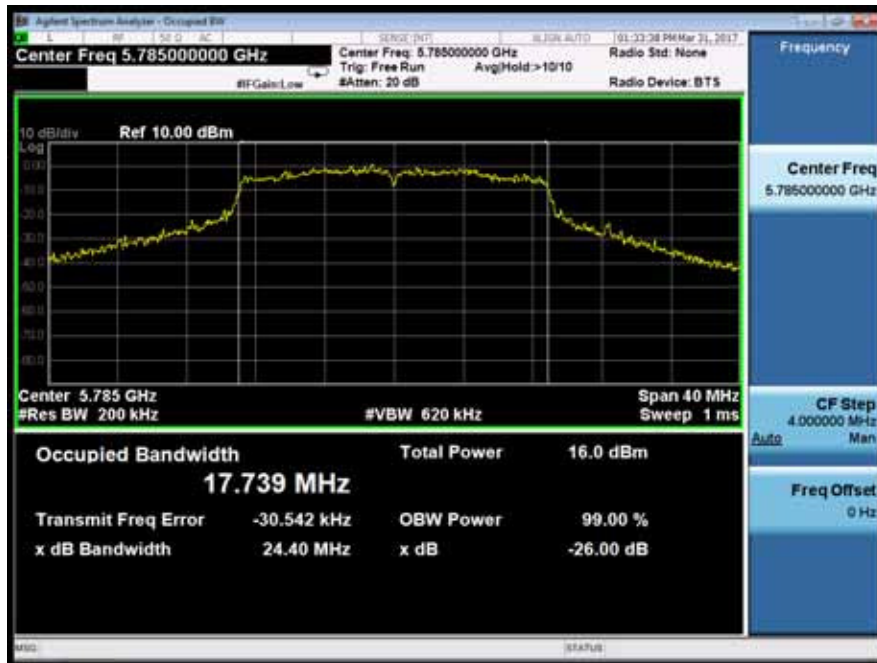




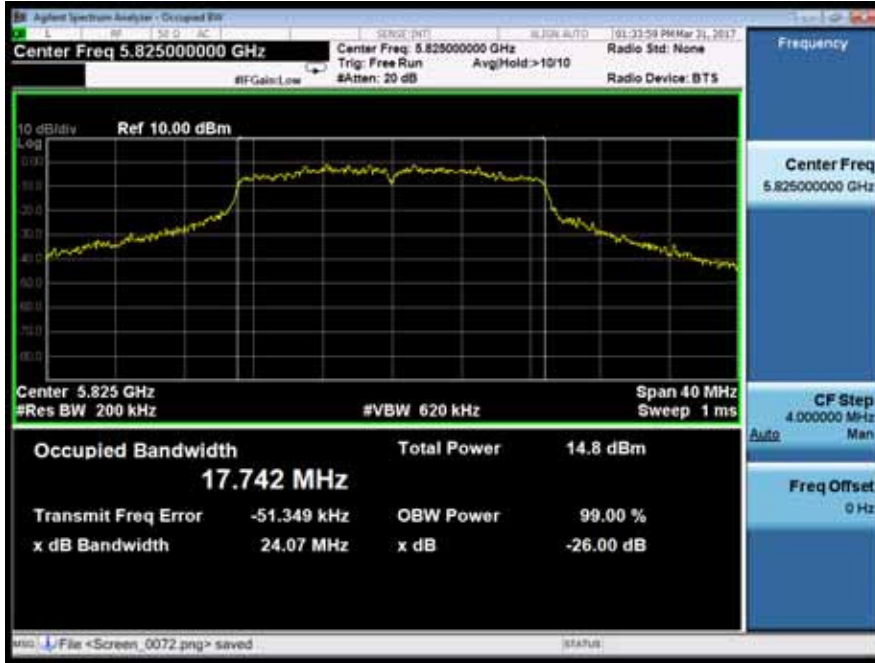
Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5785
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT20) mode	Frequency(MHz) 5825
Ant0	



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5230
Ant0	



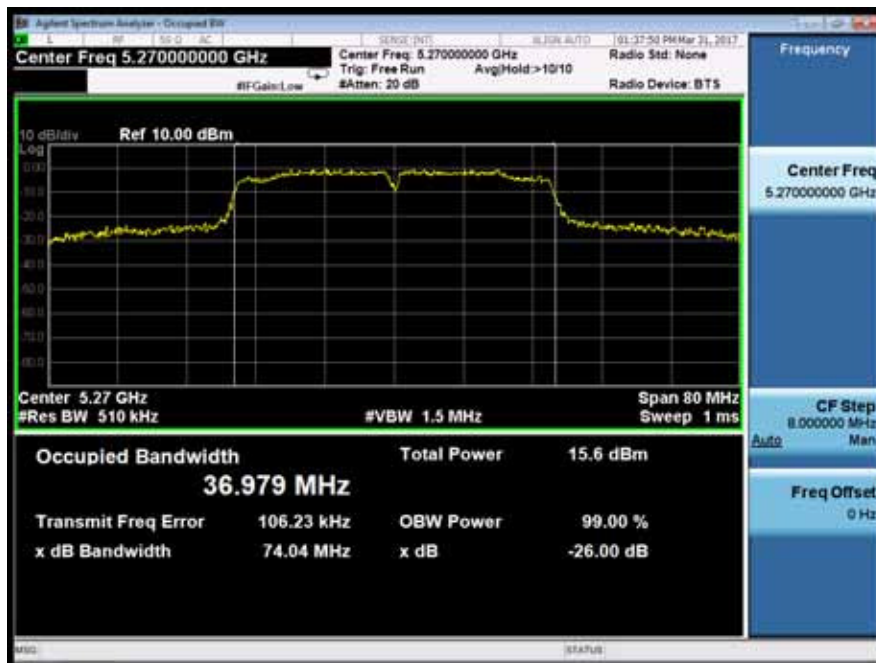
Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5270

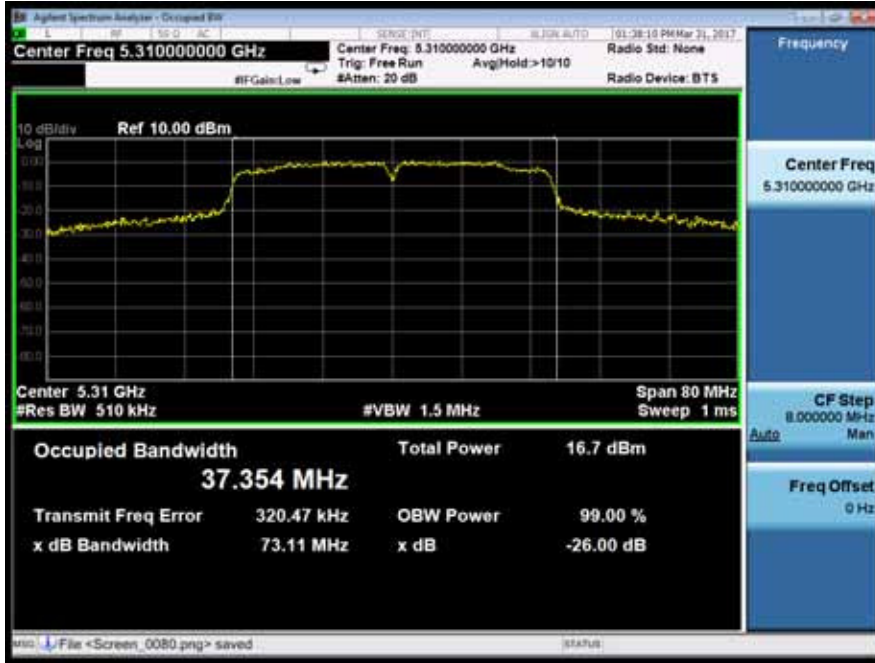


Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5310
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5510
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5590



Ant1





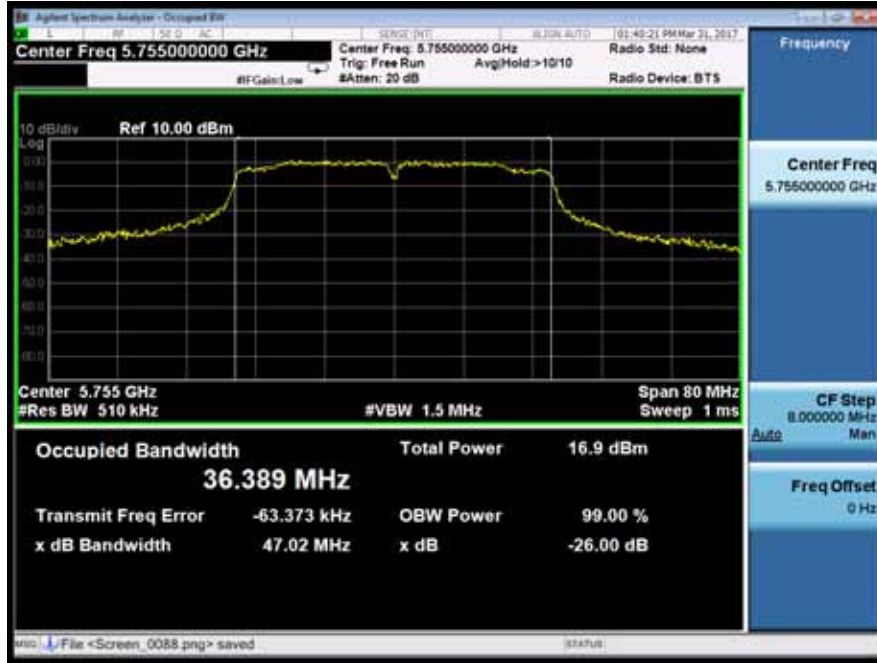
Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5670



Ant1



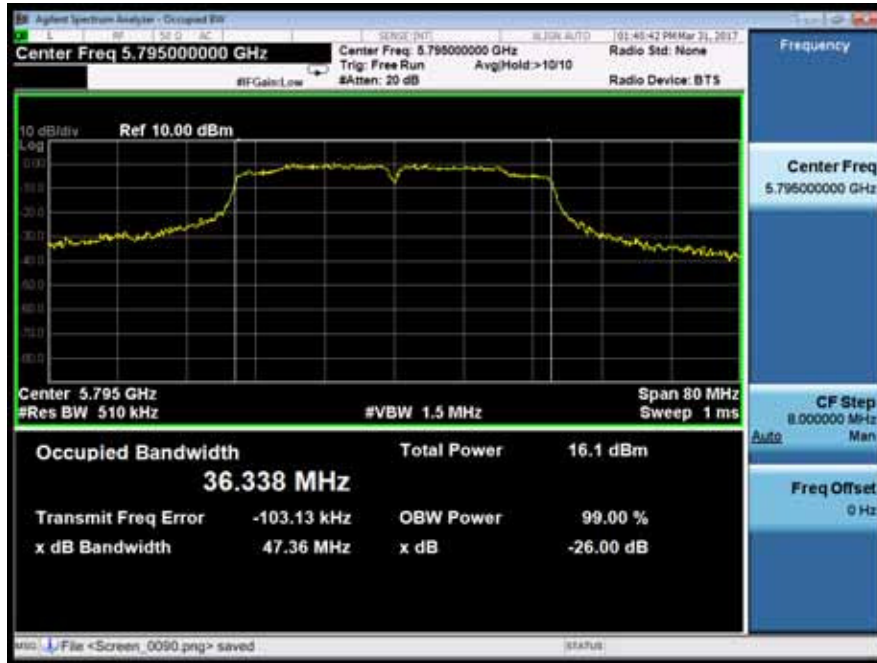
Emission Bandwidth&99% Occupied Bandwidth	UNII Band III	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5755



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11n(VHT40) mode	Frequency(MHz) 5795
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5190
Ant0	



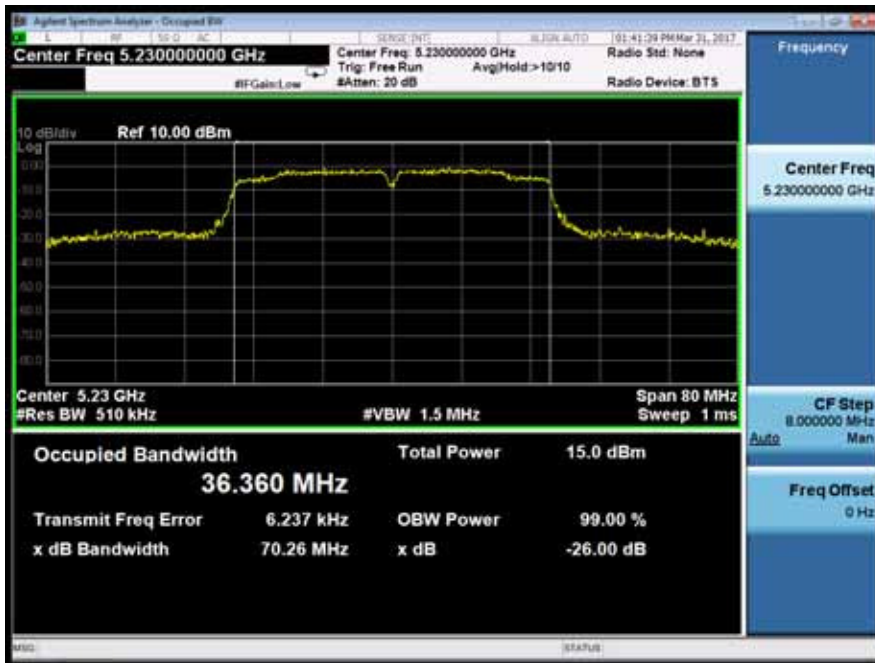
Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5230
Ant0	



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5270
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5310
Ant0	

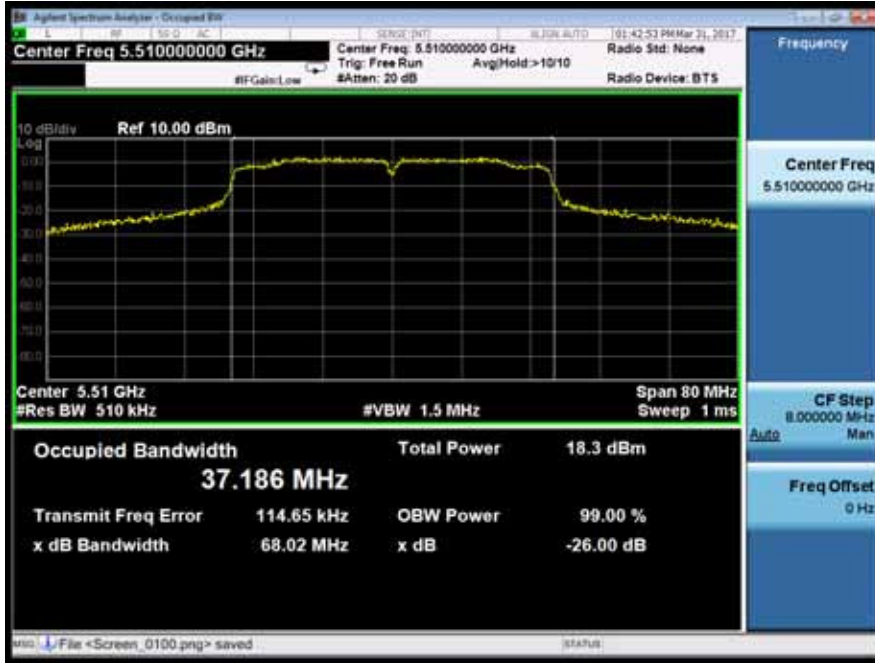


Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5510
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5590
Ant0	



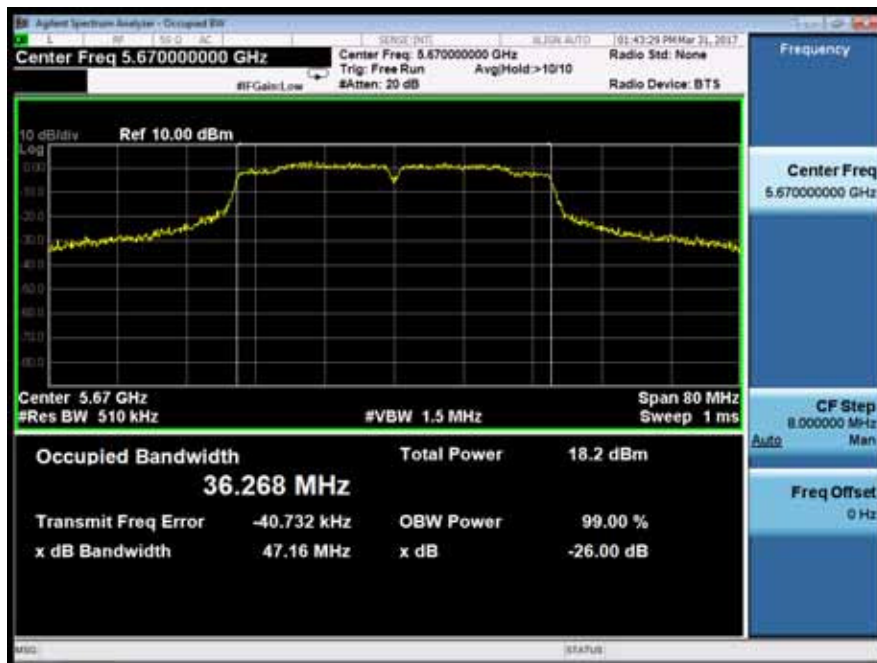
Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5670
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5755
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT40) mode	Frequency(MHz) 5795
Ant0	



Ant1





Emission Bandwidth&99% Occupied Bandwidth	UNII Band I
Test Model 802.11ac(VHT80) mode	Frequency(MHz) 5210
Ant0	



Ant1

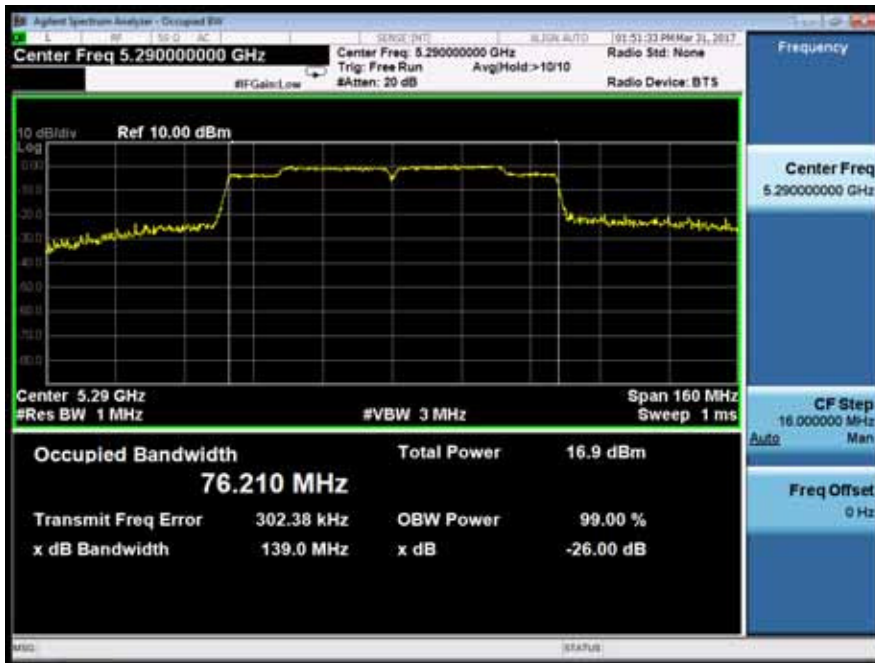




Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-A
Test Model 802.11ac(VHT80) mode	Frequency(MHz) 5290
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT80) mode	Frequency(MHz) 5530
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band II-C
Test Model 802.11ac(VHT80) mode	Frequency(MHz) 5610
Ant0	



Ant1



Emission Bandwidth&99% Occupied Bandwidth	UNII Band III
Test Model 802.11ac(VHT80) mode	Frequency(MHz) 5775
Ant0	



Ant1



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11a mode	Frequency(MHz)
Ant0		5745

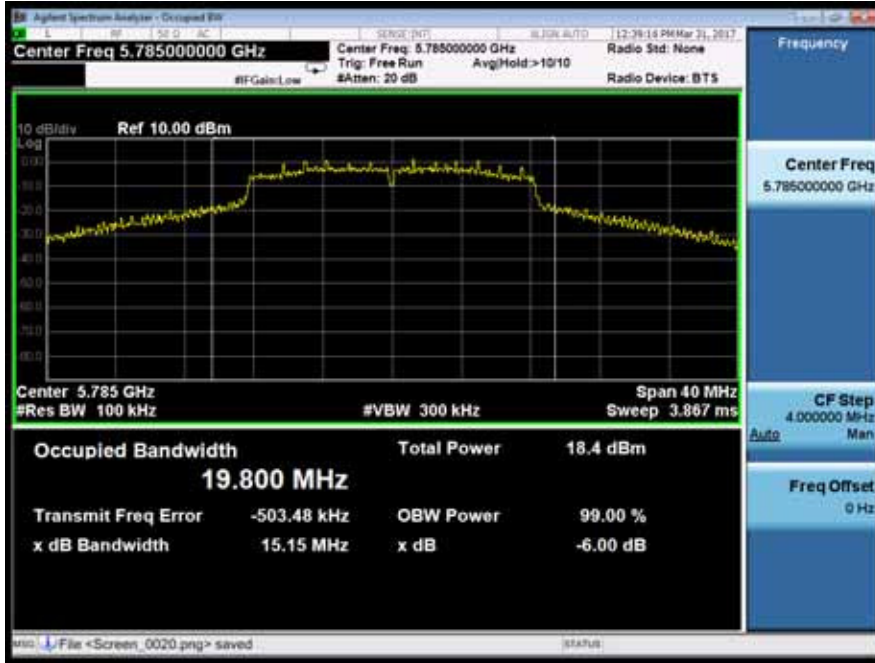


Ant1

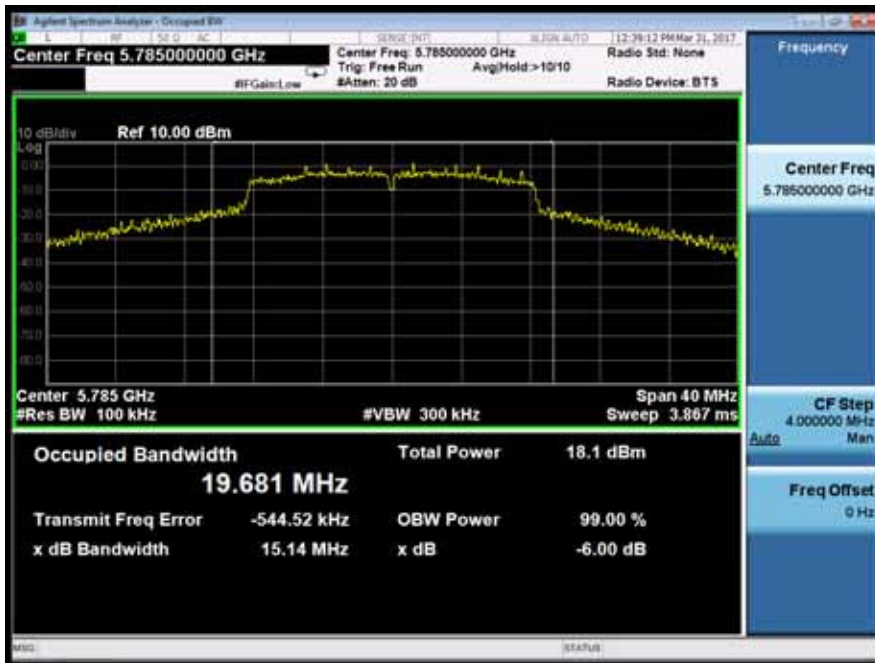




Minimum Emission Bandwidth	UNII Band III
Test Model 802.11a mode	Frequency(MHz) 5785
Ant0	



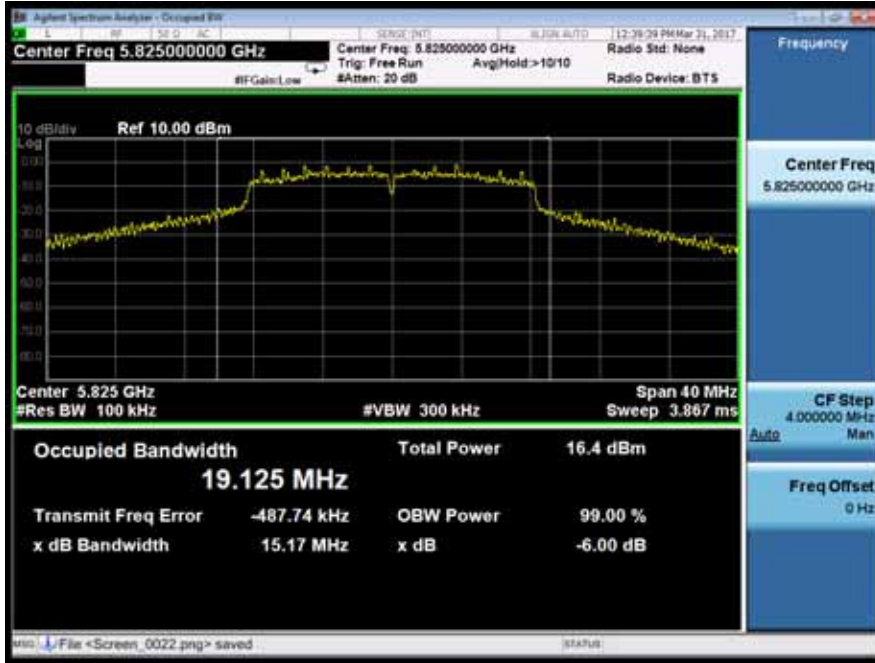
Ant1





Minimum Emission Bandwidth	UNII Band III
Test Model 802.11a mode	Frequency(MHz) 5825

**Ant0**



**Ant1**



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5745



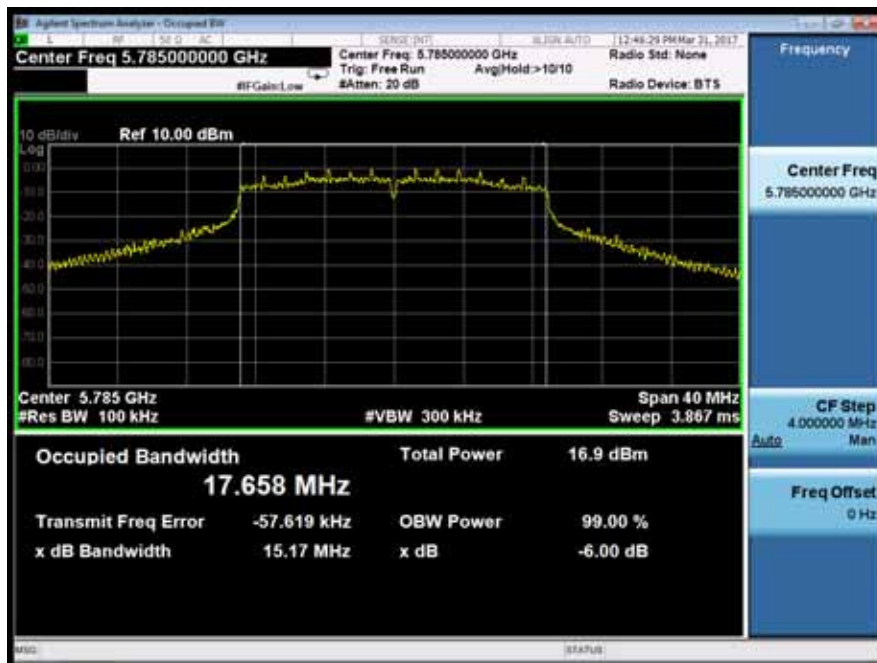
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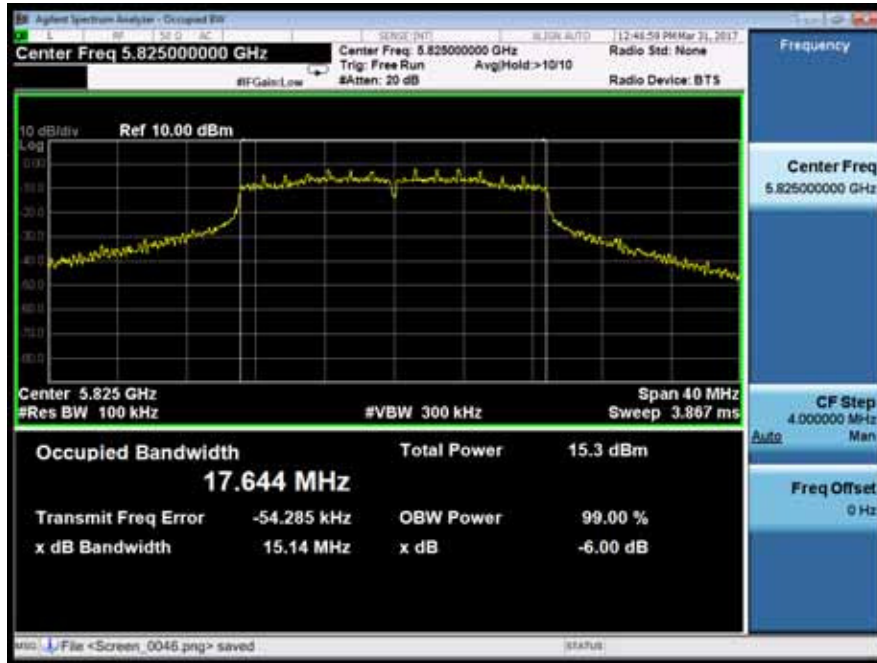
Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5785



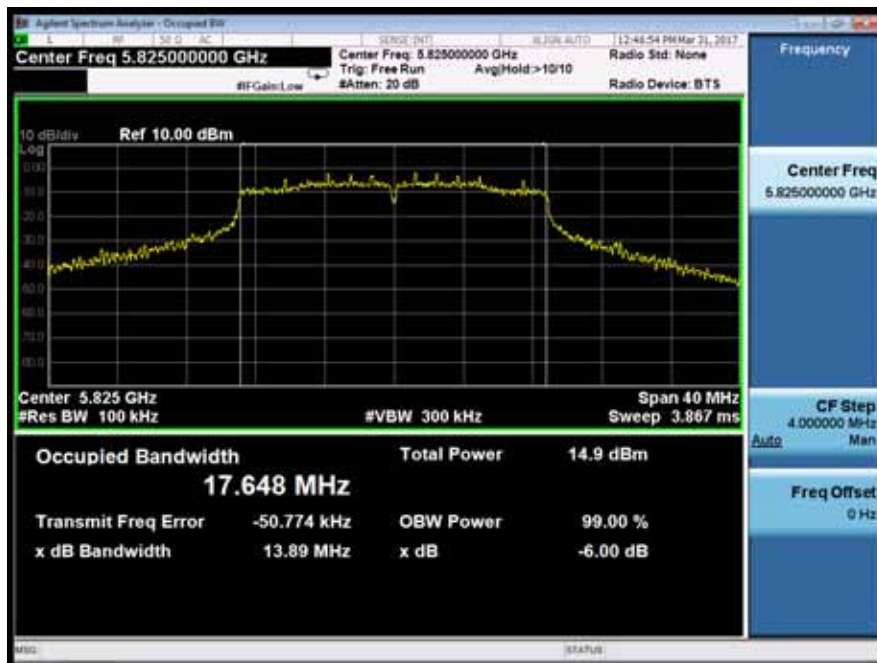
Ant1



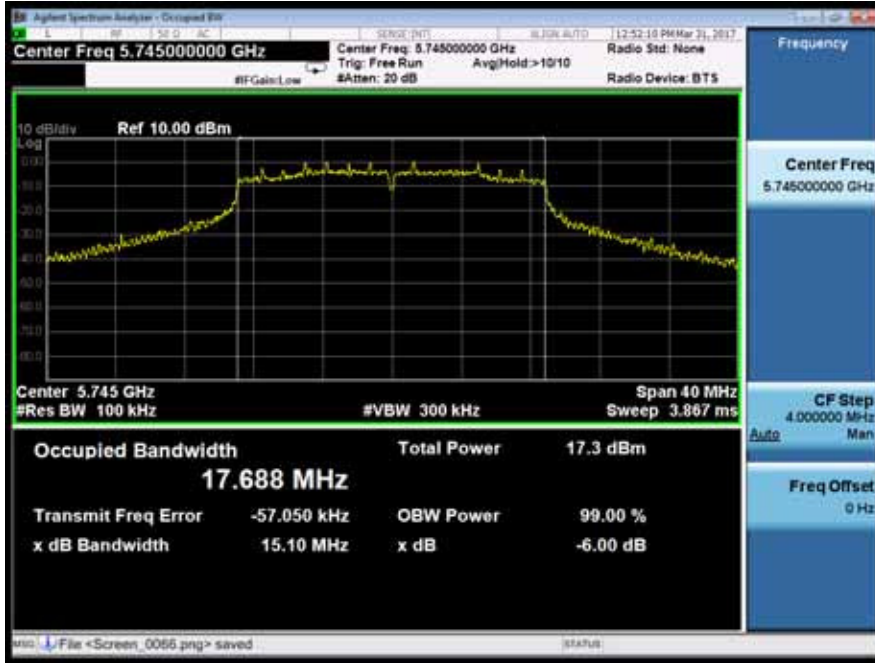
Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11n(VHT20) mode	Frequency(MHz)
Ant0		5825



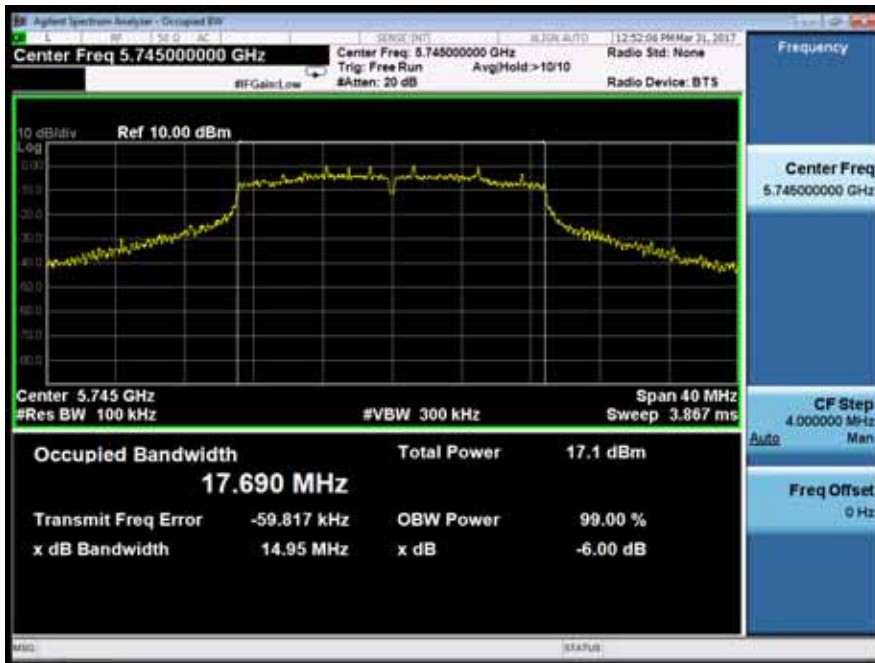
Ant1



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)
Ant0		5745



Ant1

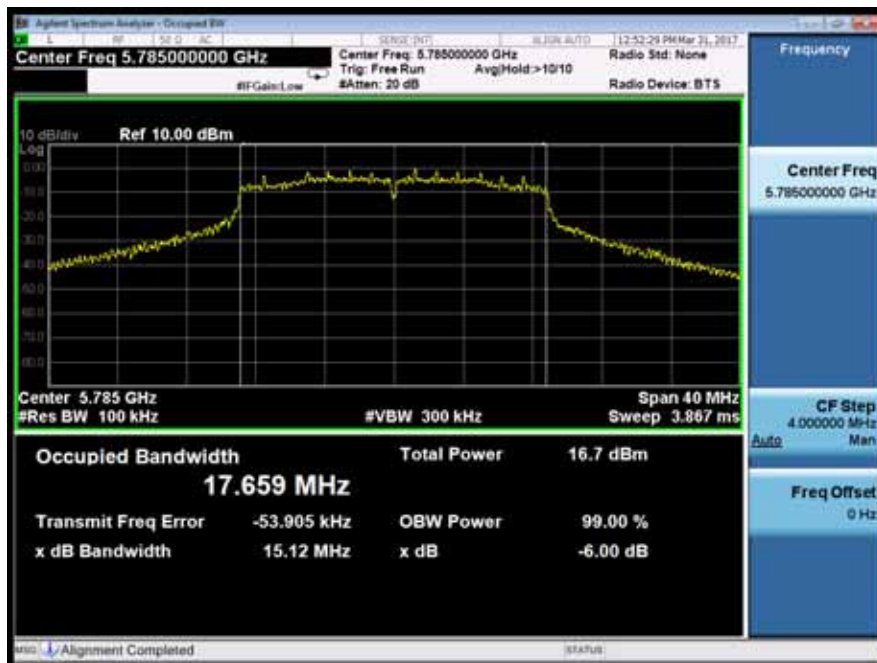




Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)
Ant0		5785

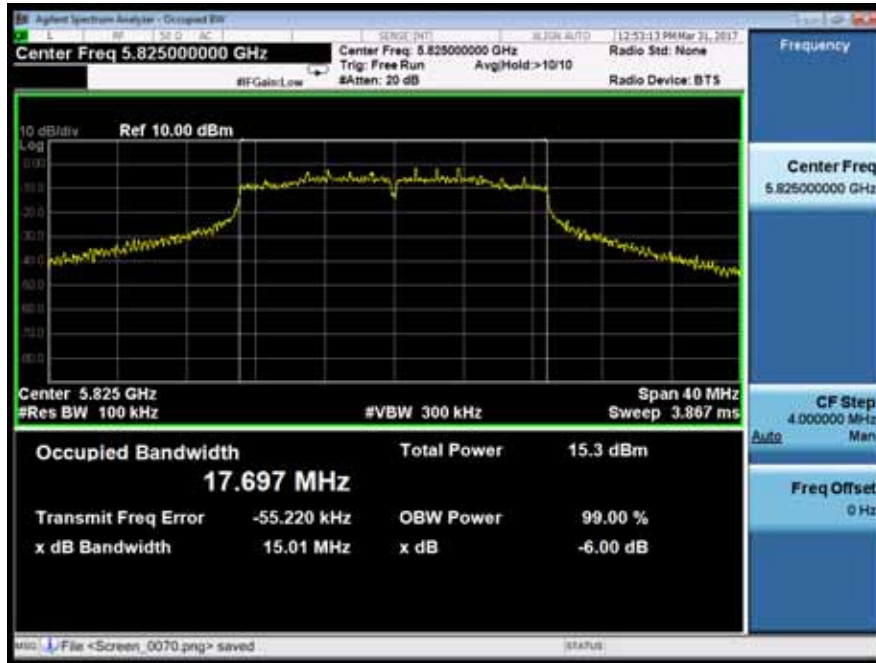


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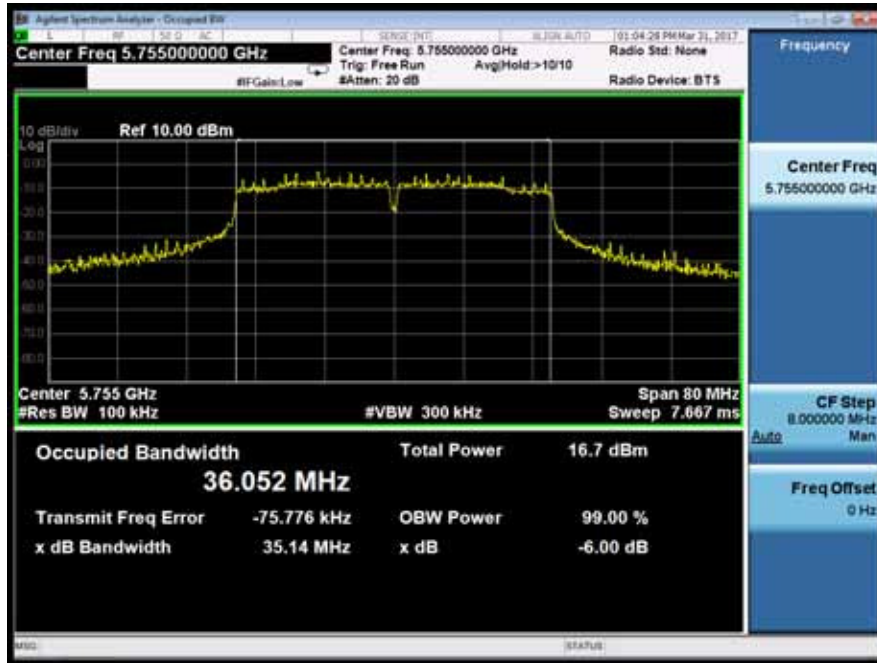
Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT20) mode	Frequency(MHz)
Ant0		5825



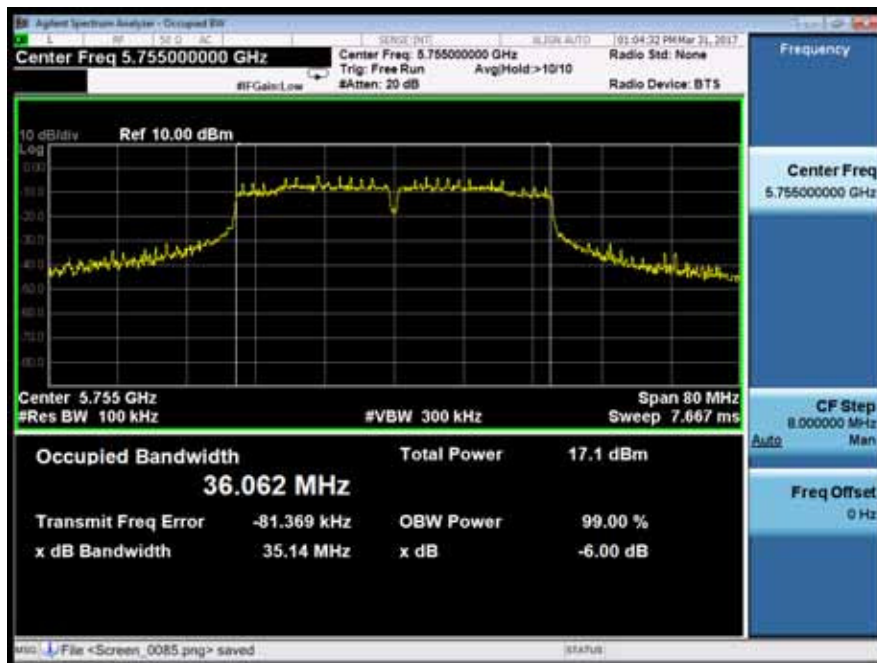
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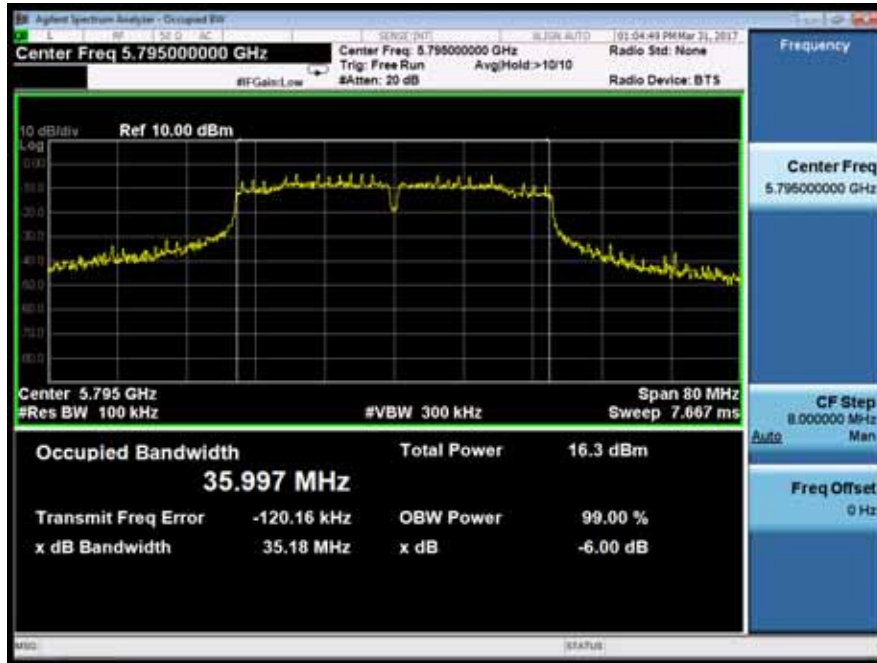
Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5755



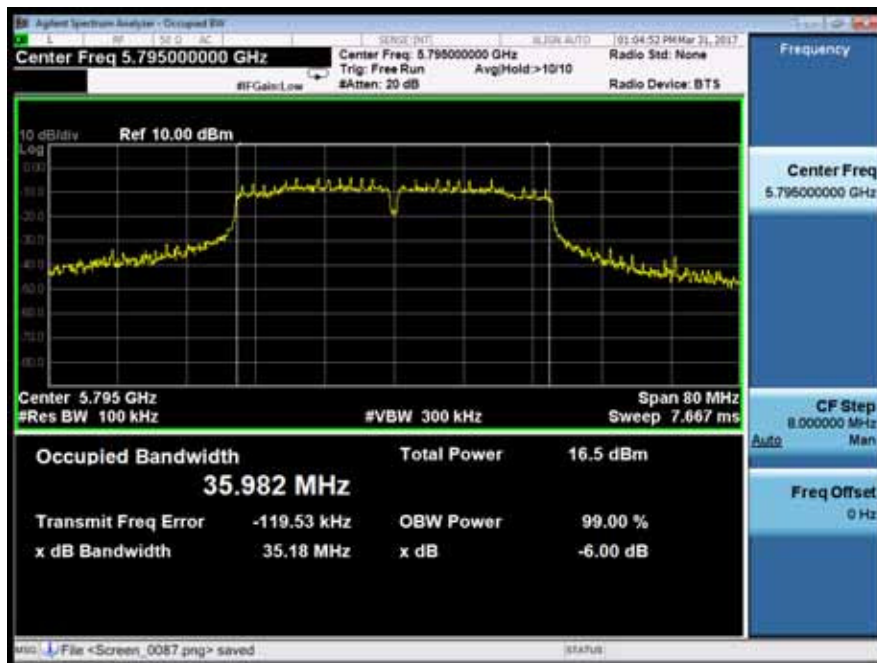
Ant1



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11n(VHT40) mode	Frequency(MHz)
Ant0		5795



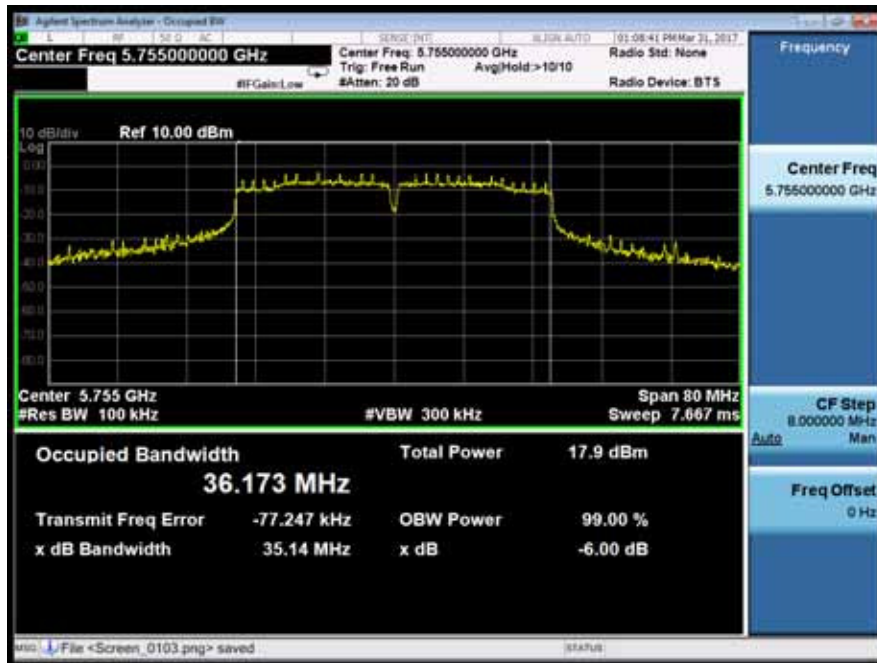
Ant1



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT40) mode	Frequency(MHz)
Ant0		5755



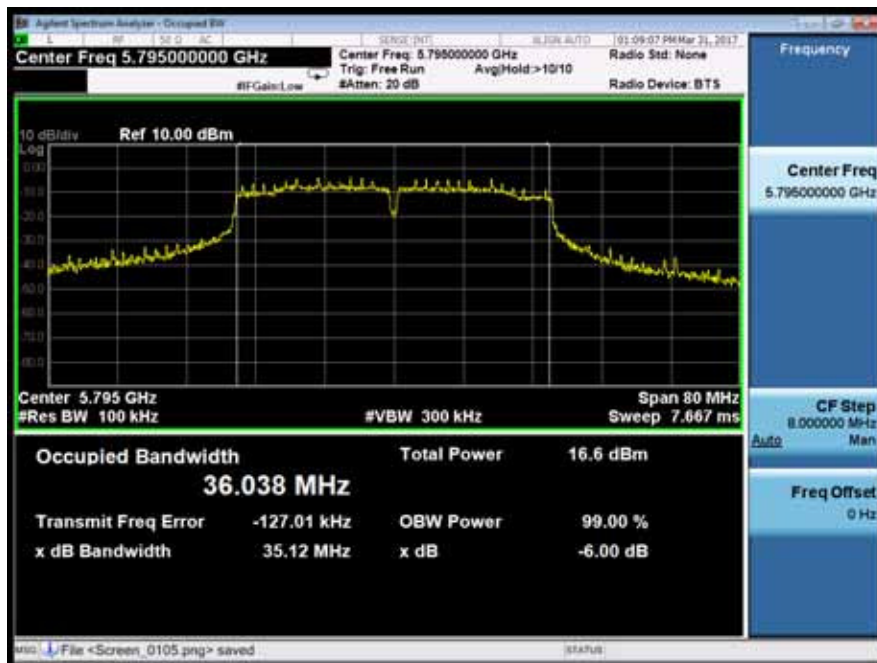
Ant1



Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT40) mode	Frequency(MHz)
Ant0		5795

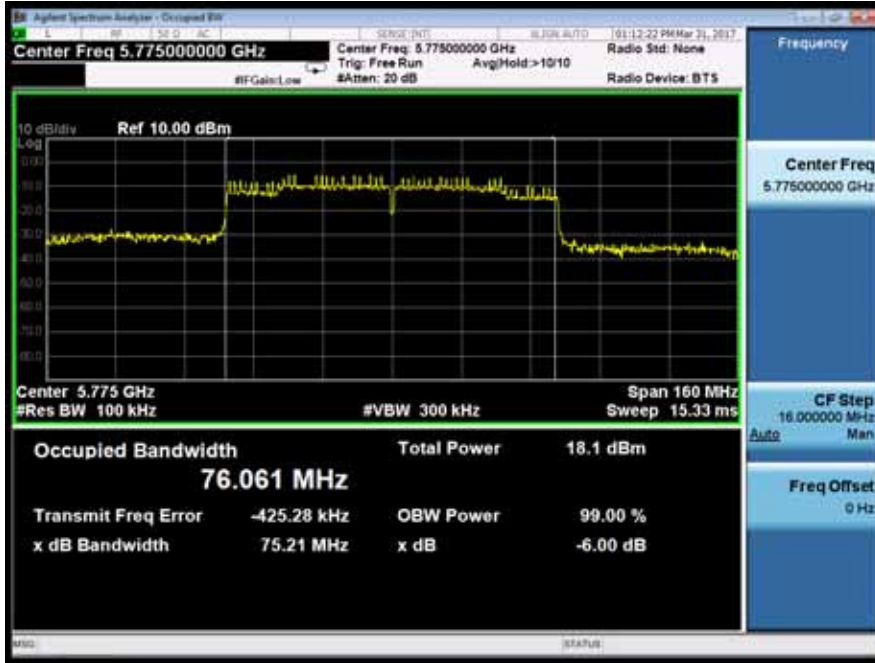


Ant1

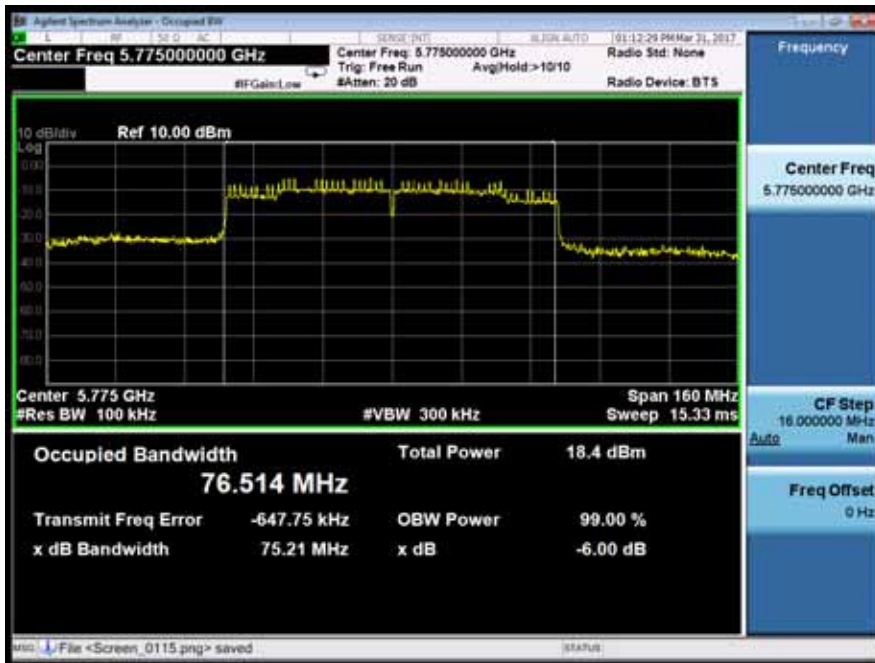




Minimum Emission Bandwidth	UNII Band III	
Test Model	802.11ac(VHT80) mode	Frequency(MHz)
Ant0		5775



Ant1





## 8.2 MAXIMUM CONDUCTED OUTPUT POWER

### 8.2.1 Applicable Standard

According to FCC Part 15.407(a)(1) for UNII Band I

According to FCC Part 15.407(a)(2) for UNII Band II-A and UNII Band II-C

According to FCC Part 15.407(a)(3) for UNII Band III

According to 789033 D02 Section II(E)

### 8.2.2 Conformance Limit

■ For the band 5.15-5.25 GHz,

(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. 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).

(a) (1) (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. 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.

(a) (1) (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.

(a) (1) (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. 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.

■ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands

(a) (2) the maximum conducted output power over the frequency bands 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 megahertz. 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.

■ For the band 5.725-5.85 GHz

(a) (3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz 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.

### 8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

### 8.2.4 Test Procedure

The maximum average conducted output power can be measured using Method PM-G (Measurement using

a gated RF average power meter):

Measurements may be performed 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.

- a. The Transmitter output (antenna port) was connected to the power meter.
- b. Turn on the EUT and power meter and then record the power value.
- c. Repeat above procedures on all channels needed to be tested.

8.2.5 Test Results

Temperature : 28  802.11a mode

Temperature : 28  802.11ac(VHT20) mode

Temperature : 28  802.11ac(VHT80) mode