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FCC / IC UNII REPORT

Certification

Applicant Name:
LG Electronics Inc.

Address:
222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do,451-713, Korea

Date of Issue:
October 12, 2018

Test Site/Location:
HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang-myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Report No.: HCT-RF-1810-FI007

FCC ID:	**BEJIL7SF**
IC:	**2703H-IL7SF**
APPLICANT:	**LG Electronics Inc.**

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : BEJIL7SB / IC: 2703H-IL7SB report.

Model:	IL7SF
EUT Type:	Silverbox RADIO ASM-RECEIVER
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(UNII)
FCC Rule Part(s):	Part 15.407
IC Rule Part(s):	RSS-247 Issue 2 (February 2017), RSS-Gen Issue 5(April 2018)

Band	Mode	Channel Bandwidth (MHz)	Frequency Range (MHz)	Internal Ant Power (dBm)	External Ant Power (dBm)	Internal Ant & External Ant Power (dBm)	Internal Ant Power (W)	External Ant Power (W)
UNII1	802.11a	20	5180 – 5240	7.96	13.00	-	0.0063	0.0200
	802.11n	20	5180 – 5240	7.92	12.88	9.25	0.0062	0.0194
	802.11n	40	5190 - 5230	8.50	12.31	8.48	0.0071	0.0170
	802.11ac	20	5180 – 5240	8.09	12.99	8.53	0.0064	0.0199
	802.11ac	40	5190 - 5230	8.38	12.31	8.47	0.0069	0.0170
	802.11ac	80	5210	8.58	11.89	8.37	0.0072	0.0155
UNII2A	802.11a	20	5260 – 5320	8.25	13.03	-	0.0067	0.0201
	802.11n	20	5260 – 5320	8.22	12.92	9.55	0.0066	0.0196
	802.11n	40	5270 – 5310	8.11	12.18	9.41	0.0065	0.0165
	802.11ac	20	5260 – 5320	8.19	12.87	9.42	0.0066	0.0194
	802.11ac	40	5270 – 5310	8.11	12.18	9.19	0.0065	0.0165
	802.11ac	80	5290	8.19	12.68	8.94	0.0066	0.0185
UNII2C	802.11a	20	5500 – 5720	20.42	18.82	-	0.1102	0.0762
	802.11n	20	5500 – 5720	20.32	18.88	20.17	0.1076	0.0773
	802.11n	40	5510 – 5710	19.63	18.18	21.72	0.0918	0.0658
	802.11ac	20	5500 – 5720	20.35	18.87	20.12	0.1084	0.0771
	802.11ac	40	5510 – 5710	19.62	18.10	21.70	0.0916	0.0646
	802.11ac	80	5530 – 5690	19.32	17.59	21.34	0.0855	0.0574
UNII3	802.11a	20	5745 – 5825	19.96	18.25	-	0.0991	0.0668
	802.11n	20	5745 – 5825	19.79	18.21	22.22	0.0953	0.0662
	802.11n	40	5755 – 5795	19.13	18.02	21.85	0.0818	0.0634
	802.11ac	20	5745 – 5825	19.97	18.27	22.30	0.0993	0.0671
	802.11ac	40	5755 – 5795	18.91	18.09	21.86	0.0778	0.0644
	802.11ac	80	5775	18.59	17.72	21.37	0.0723	0.0592

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from thisequipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC / IC Rules under normal use and maintenance.

Report prepared by : Kwon Jeong
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1810-FI007	October 12, 2018	- First Approval Report

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1. GENERAL INFORMATION

Applicant:	LG Electronics Inc.
Address:	222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do,451-713, Korea
FCC ID:	BEJIL7SF
IC:	2703H-IL7SF
EUT Type:	Silverbox RADIO ASM-RECEIVER
Model:	IL7SF
Date(s) of Tests:	September 10, 2018 ~ October 05, 2018
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

2. EUT DESCRIPTION

Model	IL7SF	
EUT Type	Silverbox RADIO ASM-RECEIVER	
Power Supply	DC 12.0 V	
Frequency Range	20 MHz BW	5180 MHz - 5240 MHz (UNII 1) / 5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5720 MHz (UNII 2C) / 5745 MHz - 5825 MHz (UNII 3)
	40 MHz BW	5190 MHz - 5230 MHz (UNII 1) / 5270 MHz - 5310 MHz (UNII 2A)/ 5510 MHz - 5710 MHz (UNII 2C) / 5755 MHz - 5795 MHz (UNII 3)
	80 MHz BW	5210 MHz (UNII 1) / 5290 MHz (UNII 2A)/ 5530 MHz – 5690 MHz (UNII 2C) / 5775 MHz (UNII 3)
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)	
Antenna Specification	Internal Antenna: Peak Gain : 5.10 dBi (UNII 1) / 5.10 dBi(UNII 2A) / 5.40 dBi(UNII 2C) / 5.40 dBi(UNII 3) External Antenna: Peak Gain : 1.60 dBi (UNII 1) / 1.60 dBi(UNII 2A) / 1.40 dBi(UNII 2C) / 1.60 dBi(UNII 3)	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E / RSS-Gen issue 5, RSS-247 issue 2.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 8 of ANSI C63.10. (Version: 2013)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033 D02 v02r01)

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).
For ISED, test facility was accepted dated July 30, 2018(Registration Number: 5944A-5)

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

* The antennas of this E.U.T are permanently attached.
* The E.U.T Complies with the requirement of §15.203, §15.407 / RSS-Gen

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.71

8. ADDITIONAL INFORMATION

*** Directional Gain Calculation**

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) e) (iii)

Directional gain = $G_{ANT\ MAX}$ + 10 log(N_{ANT}/N_{SS}) dBi

(N_{ANT} = 2, N_{SS} = 2, $G_{ANT\ MAX}$ is.the gain of the antenna having the highest gain)

Sample Calculation = 4.80 + 0 = 4.80 dBi

*** Ant Gain**

Band	Ant Gain (dBi)		N_{ANT}/ Nss	Directional Gain (= $G_{ANT\ MAX}$ + 10 log(N_{ANT}/N_{SS})) (dBi)
UNII 1	Internal	5.10	2 / 2	5.1
	External	1.60		
UNII 2A	Internal	5.10	2 / 2	5.1
	External	1.60		
UNII 2C	Internal	5.40	2 / 2	5.4
	External	1.40		
UNII 3	Internal	5.40	2 / 2	5.4
	External	1.60		

*** Operating mode**

Mode	Operating Mode	Antenna
802.11a/g/n/ac(HT20)	SISO	Internal Antenna
		External Antenna
802.11n(HT20)	MIMO	Internal Antenna + External Antenna
802.11ac(VHT20)		
802.11n(HT40)		
802.11ac(VHT40)		
802.11ac(VHT80)		

*** Power Level Setting(SISO)**

Internal Antenna

Internal Antenna (20M BW)			
Channel	802.11a	802.11n(HT20)	802.11ac(VHT20)
36	6	6	6
40	6	6	6
48	6	6	6
52	6	6	6
60	6	6	6
64	6	6	6
100	13	13	13
116	18	18	18
144	18	18	18
149	18	18	18
157	17	17	17
165	16	16	16

Internal Antenna (40M BW)		
Channel	802.11n(HT40)	802.11ac(VHT40)
38	7	7
46	7	7
54	7	7
62	7	7
102	10	10
110	18	18
142	18	18
151	18	18
159	17	17

Internal Antenna (80M BW)	
Channel	802.11ac(VHT80)
42	7
58	7
106	8
122	18
138	18
155	18

External Antenna

External Antenna (20M BW)			
Channel	802.11a	802.11n(HT20)	802.11ac(VHT20)
36	15	15	15
40	15	15	15
48	14	14	14
52	13	13	13
60	13	13	13
64	12	12	12
100	18	18	18
116	18	18	18
144	18	18	18
149	18	18	18
157	18	18	18
165	18	18	18

External Antenna (40M BW)		
Channel	802.11n(HT40)	802.11ac(VHT40)
38	16	16
46	15	15
54	14	14
62	13	13
102	15	15
110	18	18
142	18	18
151	18	18
159	18	18

External Antenna (80M BW)	
Channel	802.11ac(VHT80)
42	15
58	14
106	13
122	18
138	18
155	18

*** Power Level Setting(MIMO)**

Internal Antenna + External Antenna						
Mod		n20	ac20	n40	ac40	ac80
U-NII-1	Low	5	5	6	6	6
	Mid	5	5	N/A	N/A	
	High	5	5	6	6	
U-NII-2A	Low	5	5	6	6	6
	Mid	5	5	N/A	N/A	
	High	5	5	6	6	
U-NII-2C	Low	13	13	10	10	8
	Mid	16	16	18	18	18
	High	16	16	18	18	18
U-NII-3	Low	18	18	18	18	18
	Mid	18	18	N/A	N/A	
	High	18	18	18	18	

*** Worst case configuration and mode**

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + external accessories
   - Worst case : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge
     Internal Antenna : Z
     External Antenna :X
3. All data rate of operation were investigated and the test results are worst case in lowest datarate of each mode.
   - 802.11a : 6Mbps
   - 802.11n20 : MCS0
   - 802.11n40 : MCS0
   - 802.11ac20 : MCS0
   - 802.11ac40 : MCS0
   - 802.11ac80 : MCS0
4. SISO & MIMO(Multiple spatial streams) were tested and the worst case results are reported.
   (Worst case : SISO(Internal Antenna & External Antenna)

Conducted test

1. The EUT was configured with data rate of highest power.

- Data rate of highest power(SISO, Internal Antenna)

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

- Data rate of highest power(SISO, External Antenna)

802.11a : 12Mbps
802.11n(HT20) : MCS2
MCS7 (Ch. 40)
802.11n(HT40) : MCS3 (Ch. 38, 102, 142, 151, 159)
MCS7 (Ch. 46, 54, 62, 110)
802.11ac(VHT20) : MCS2
802.11ac(VHT40) : MCS3 (Ch. 38, 142, 151)
MCS9 (Ch. 46, 54, 62, 102, 110, 159)
802.11ac(VHT80) : MCS3 (Ch. 58)
MCS9

- Data rate of highest power(MIMO)

802.11n(HT20) : MCS8
802.11n(HT40) : MCS8
802.11ac(VHT20) : MCS9
802.11ac(VHT40) : MCS10
802.11ac(VHT80) : MCS10

2. SISO & MIMO(Multiple spatial streams) were tested and the worst case results are reported.
Worst case : SISO(Internal Antenna & External Antenna)

9. SUMMARY OF TEST RESULTS

9.1 FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)	< 250 mW (5150-5250 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log log $_{10}$ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g)	N/A		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		N/A
Undesirable Emissions	§15.407(b)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 9.8.1 (UNII 3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

Note:

1. This device is installed in a car. Therefore the power source is a battery of car.

9.2 IC Part

Test Description	IC Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth	RSS-GEN, 6.7	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5725 MHz) Whichever power is less		PASS
Power Spectral Density	RSS-247 6.2	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
Frequency Stability	RSS-GEN 8.11	should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.		PASS
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, 8.8	RSS-GEN section 8.8 table 4		N/A
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	cf. Section 9.8.1 (UNII 3)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 5, 6 section 8.10 table 7		PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	RSS-GEN section 7.3 table 3		PASS

Note:

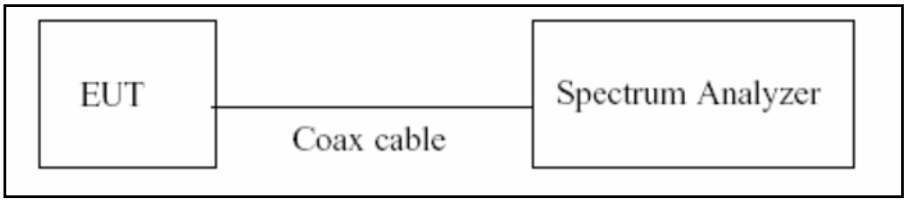
1. This device is installed in a car. Therefore the power source is a battery of car.

10. TEST RESULT

10.1 DUTY CYCLE

The zero-span mode on a spectrum analyzer or EMI receiver ,if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal. Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average. The zero-span measurement method shall not be used unless both RBW and VBW are > 50/*T*, where *T* is defined in section B)1)a), and the number of sweep points across duration *T* exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if *T* ≤ 16.7 microseconds.)

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested according to the zero-span measurement method, (B.2 in KDB 789033 D02 v02r01)
The largest availble value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used becaure all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10*log(1/Duty Cycle)

▣ Duty Cycle Factor

[Internal Ant]

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.067	2.167	0.95399853	0.205
	9	1.382	1.485	0.93050177	0.313
	12	1.043	1.144	0.91228362	0.399
	18	0.704	0.805	0.87431694	0.583
	24	0.532	0.634	0.84027778	0.756
	36	0.364	0.465	0.78212291	1.067
	48	0.276	0.378	0.72935715	1.371
	54	0.248	0.349	0.70967770	1.489
Mode	**MCS INDEX**	**T_{on} (ms)**	**T_{total} (ms)**	**Duty Cycle**	**Duty Cycle Factor (dB)**
802.11n_HT20	0	1.919	2.020	0.95010395	0.222
	1	0.979	1.079	0.90711182	0.423
	2	0.664	0.766	0.86654479	0.622
	3	0.507	0.609	0.83218391	0.798
	4	0.352	0.454	0.77601411	1.101
	5	0.272	0.374	0.72805139	1.378
	6	0.248	0.350	0.70938215	1.491
	7	0.228	0.330	0.69174757	1.601
802.11n_HT40	0	0.943	1.045	0.90238868	0.446
	1	0.492	0.594	0.82824437	0.818
	2	0.340	0.441	0.77120764	1.128
	3	0.264	0.366	0.72210066	1.414
	4	0.188	0.289	0.65096953	1.864
	5	0.152	0.254	0.60038961	2.216
	6	0.140	0.242	0.57873268	2.375
	7	0.128	0.229	0.55818891	2.532

Mode	MCS INDEX	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_VHT20	MCS 0	1.932	2.033	0.95000320	0.223
	MCS 1	0.988	1.089	0.90702395	0.424
	MCS 2	0.674	0.775	0.86933290	0.608
	MCS 3	0.516	0.617	0.83657588	0.775
	MCS 4	0.356	0.458	0.77797203	1.090
	MCS 5	0.280	0.381	0.73529412	1.335
	MCS 6	0.252	0.353	0.71428571	1.461
	MCS 7	0.232	0.334	0.69664508	1.570
	MCS 8	0.200	0.302	0.66441686	1.776
802.11ac_ VHT40	MCS 0	0.952	1.054	0.90322581	0.442
	MCS 1	0.495	0.597	0.82922211	0.813
	MCS 2	0.345	0.445	0.77353615	1.115
	MCS 3	0.268	0.369	0.72633497	1.389
	MCS 4	0.192	0.293	0.65509862	1.837
	MCS 5	0.156	0.258	0.60690884	2.169
	MCS 6	0.144	0.246	0.58793154	2.307
	MCS 7	0.132	0.233	0.56624447	2.470
	MCS 8	0.117	0.218	0.53502094	2.716
	MCS 9	0.112	0.213	0.52684131	2.783
802.11ac_ VHT80	MCS 0	0.460	0.561	0.82020143	0.861
	MCS 1	0.252	0.354	0.71266968	1.471
	MCS 2	0.180	0.282	0.63920455	1.944
	MCS 3	0.148	0.249	0.59325354	2.268
	MCS 4	0.112	0.214	0.52546278	2.795
	MCS 5	0.096	0.197	0.48621637	3.132
	MCS 6	0.088	0.189	0.46515754	3.324
	MCS 7	0.084	0.185	0.45373638	3.432
	MCS 8	0.076	0.177	0.42936711	3.672
	MCS 9	0.072	0.173	0.41634976	3.805

[External Ant]

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.063	2.167	0.95200007	0.214
	9	1.382	1.485	0.93050177	0.313
	12	1.044	1.145	0.91216482	0.399
	18	0.704	0.806	0.87290127	0.590
	24	0.532	0.635	0.83823485	0.766
	36	0.364	0.465	0.78223552	1.067
	48	0.276	0.378	0.73203907	1.355
	54	0.249	0.350	0.71069182	1.483
Mode	**MCS INDEX**	**T_{on} (ms)**	**T_{total} (ms)**	**Duty Cycle**	**Duty Cycle Factor (dB)**
802.11n_HT20	0	1.924	2.021	0.95171018	0.215
	1	0.980	1.081	0.90630696	0.427
	2	0.664	0.764	0.86813187	0.614
	3	0.508	0.609	0.83307710	0.793
	4	0.352	0.454	0.77572090	1.103
	5	0.273	0.373	0.72999976	1.367
	6	0.248	0.350	0.70933429	1.491
	7	0.228	0.329	0.69121642	1.604
802.11n_HT40	0	0.942	1.044	0.90296741	0.443
	1	0.493	0.594	0.82944391	0.812
	2	0.339	0.441	0.76997637	1.135
	3	0.264	0.365	0.72289157	1.409
	4	0.187	0.289	0.64705882	1.891
	5	0.152	0.254	0.59999921	2.218
	6	0.140	0.242	0.58010970	2.365
	7	0.128	0.230	0.55813872	2.533

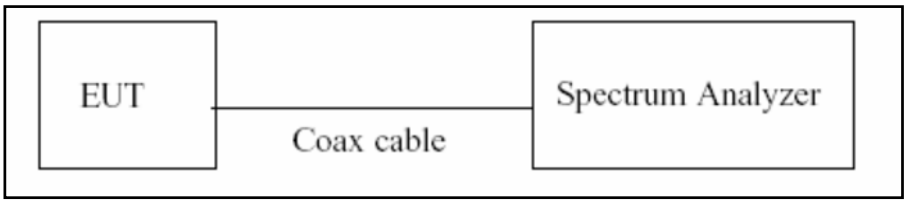
Mode	MCS INDEX	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_VHT20	MCS 0	1.932	2.033	0.95000320	0.223
	MCS 1	0.988	1.089	0.90702395	0.424
	MCS 2	0.672	0.773	0.86898476	0.610
	MCS 3	0.517	0.617	0.83673469	0.774
	MCS 4	0.356	0.457	0.77755159	1.093
	MCS 5	0.281	0.382	0.73447169	1.340
	MCS 6	0.253	0.354	0.71356726	1.466
	MCS 7	0.232	0.334	0.69449402	1.583
	MCS 8	0.200	0.302	0.66208285	1.791
802.11ac_ VHT40	MCS 0	0.953	1.054	0.90392125	0.439
	MCS 1	0.496	0.597	0.83035761	0.807
	MCS 2	0.344	0.445	0.77265222	1.120
	MCS 3	0.268	0.370	0.72619048	1.389
	MCS 4	0.192	0.293	0.65499961	1.838
	MCS 5	0.156	0.257	0.60726591	2.166
	MCS 6	0.144	0.246	0.58695573	2.314
	MCS 7	0.132	0.234	0.56571348	2.474
	MCS 8	0.116	0.216	0.53757407	2.696
	MCS 9	0.112	0.214	0.52499918	2.798
802.11ac_ VHT80	MCS 0	0.460	0.561	0.81996435	0.862
	MCS 1	0.253	0.353	0.71671388	1.447
	MCS 2	0.180	0.281	0.64056940	1.934
	MCS 3	0.148	0.249	0.59437751	2.259
	MCS 4	0.113	0.213	0.53051643	2.753
	MCS 5	0.096	0.194	0.49484536	3.055
	MCS 6	0.088	0.189	0.46560847	3.320
	MCS 7	0.084	0.185	0.45405405	3.429
	MCS 8	0.076	0.178	0.42696629	3.696
	MCS 9	0.071	0.172	0.41279070	3.843

10.2 EMISSION BANDWIDTH AND MINIMUM EMISSION BANDWIDTH MEASUREMENT

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum power control level, as defined in KDB 789033 D02 v02r01, at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

The 26 dB bandwidth is used to determine the conducted power limits.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to(C.1 in KDB 789033 D02 v02r01)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. 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 %.

Note : We tested 26 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 26 dB.

1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.

▣ TEST PROCEDURE (for the band 5.725-5.85 GHz, 6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02 v02r01)

1. RBW = 100 kHz
2. VBW ≥ 3*RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum lever measured in the fundamental emission.

Note : We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

▣ TEST RESULTS for Internal Ant_802.11a

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.14	N/A	Pass
5200	40	21.13	N/A	Pass
5240	48	20.88	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	20.95	N/A	Pass
5300	60	20.91	N/A	Pass
5320	64	20.84	N/A	Pass

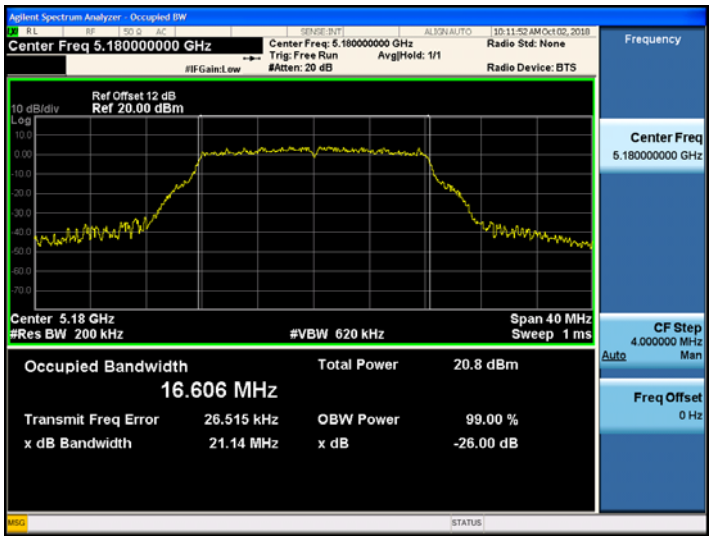
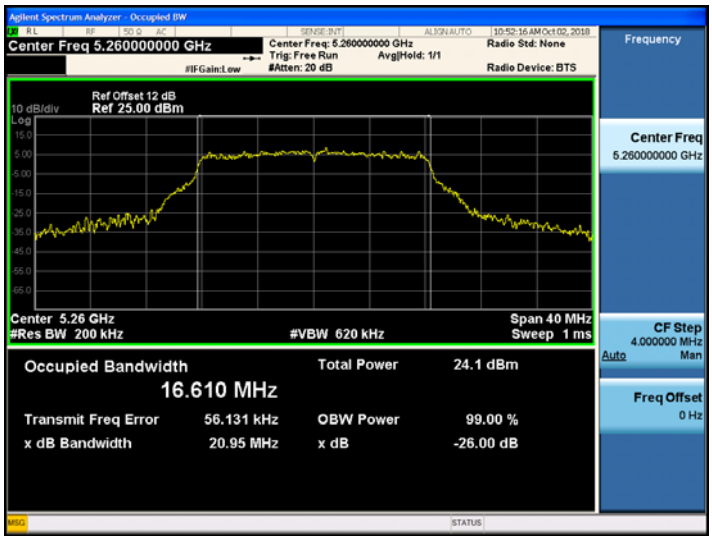
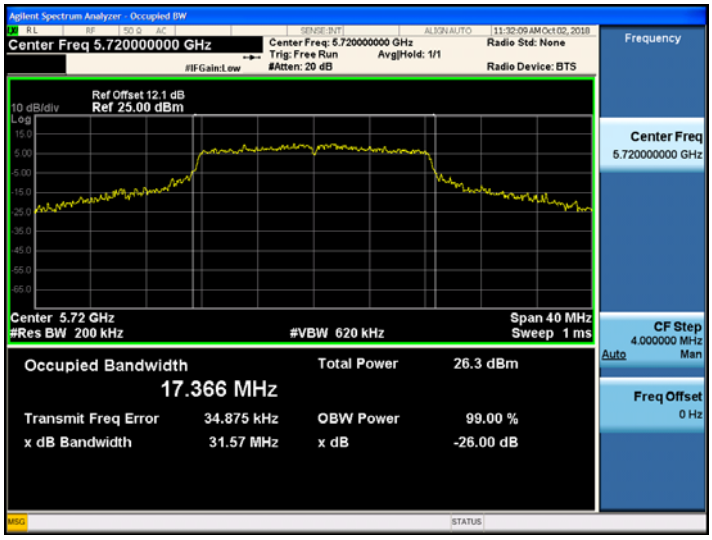
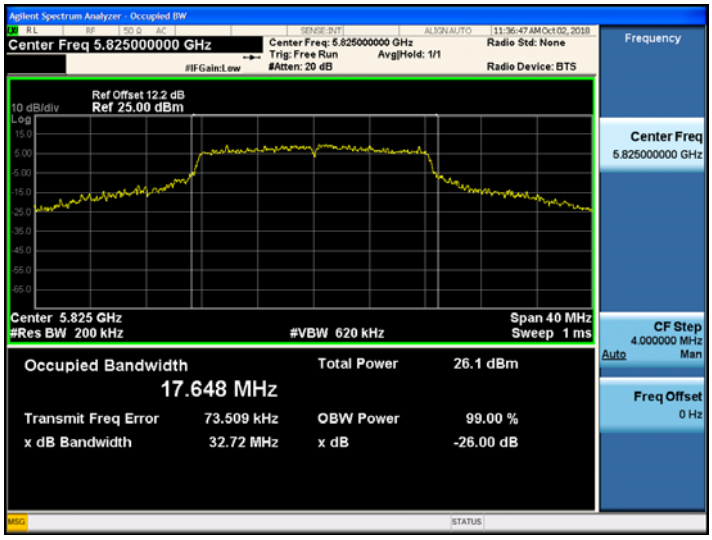
Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	20.92	N/A	Pass
5580	116	24.89	N/A	Pass
5720	144	31.57	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	28.87	N/A	Pass
5785	157	28.68	N/A	Pass
5825	165	32.72	N/A	Pass

▣ TEST Plot for Internal Ant_802.11a

802.11a UNII 1 BAND 26dB Bandwidth (CH 36)	802.11a UNII 2A BAND 26dB Bandwidth (CH 52)
	
802.11a UNII 2C BAND 26dB Bandwidth (CH 144)	**802.11a UNII 3 BAND 26dB Bandwidth (CH 165)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_802.11a

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.50	N/A	Pass
5200	40	21.50	N/A	Pass
5240	48	21.52	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.65	N/A	Pass
5300	60	21.52	N/A	Pass
5320	64	21.11	N/A	Pass

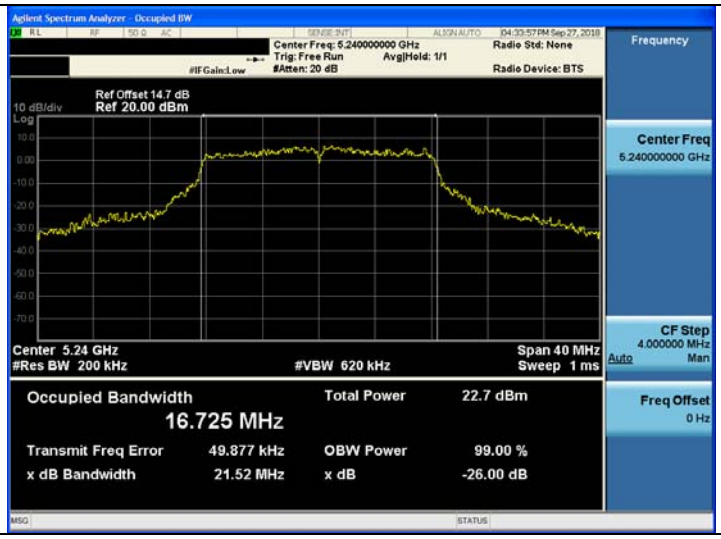
Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.70	N/A	Pass
5580	116	21.65	N/A	Pass
5720	144	21.37	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	26.16	N/A	Pass
5785	157	30.52	N/A	Pass
5825	165	28.85	N/A	Pass

▣ TEST Plot for External Ant_802.11a

802.11a UNII 1 BAND 26dB Bandwidth (CH 48)	802.11a UNII 2A BAND 26dB Bandwidth (CH 52)
	
802.11a UNII 2C BAND 26dB Bandwidth (CH 100)	**802.11a UNII 3 BAND 26dB Bandwidth (CH 157)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Internal Ant_802.11n_HT20

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.32	N/A	Pass
5200	40	21.21	N/A	Pass
5240	48	21.40	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.40	N/A	Pass
5300	60	21.68	N/A	Pass
5320	64	21.53	N/A	Pass

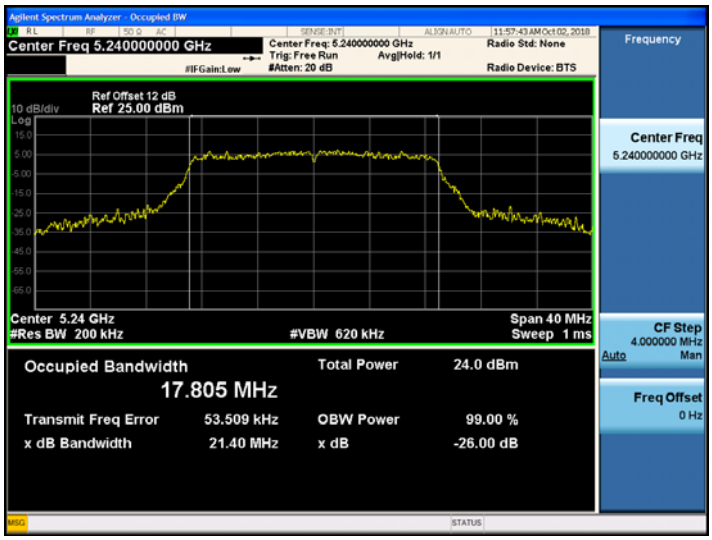
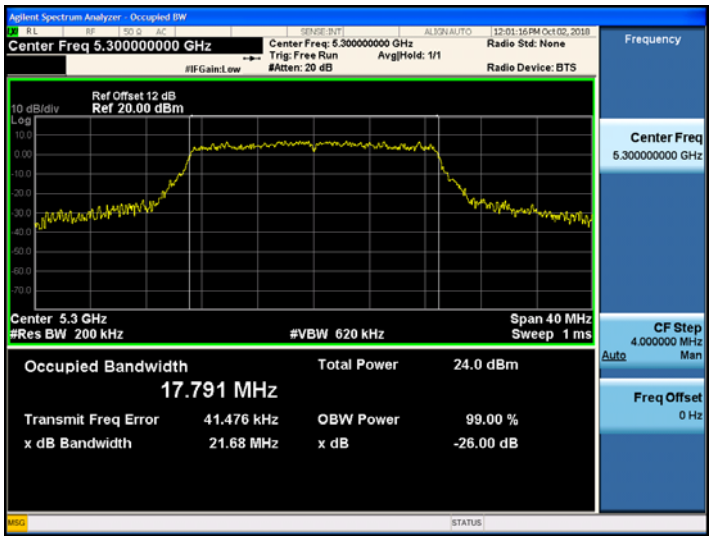
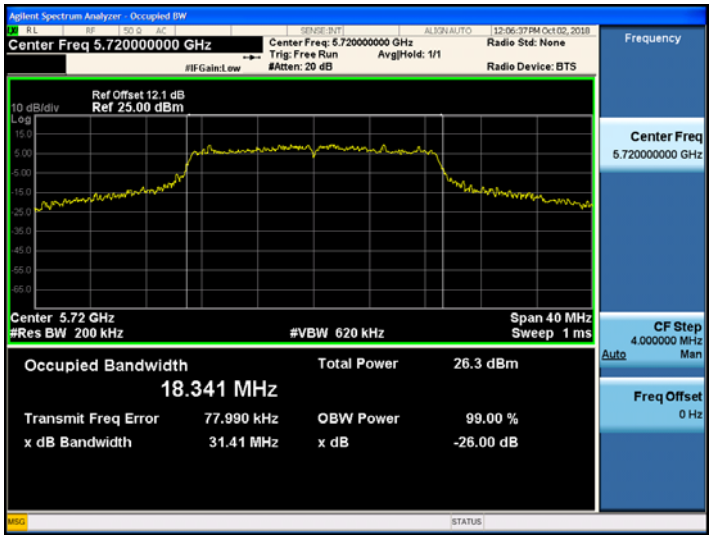
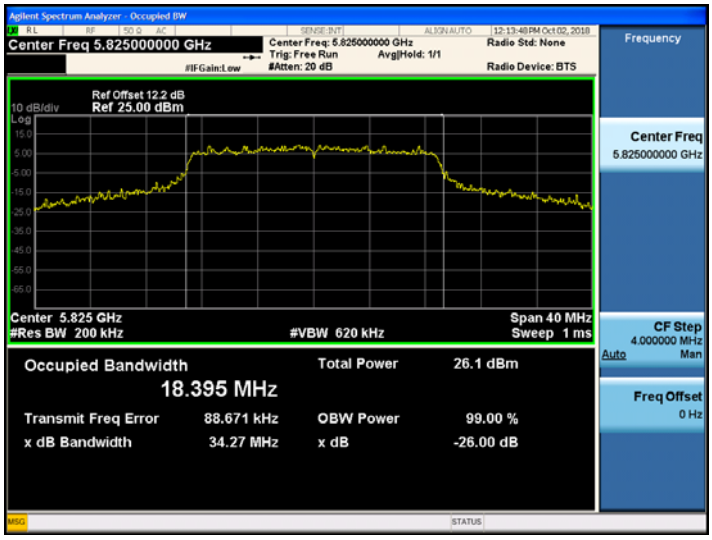
Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.07	N/A	Pass
5580	116	24.89	N/A	Pass
5720	144	31.41	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	30.18	N/A	Pass
5785	157	29.25	N/A	Pass
5825	165	34.27	N/A	Pass

▣ TEST Plot for Internal Ant_802.11n_HT20

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 48)	802.11n_HT20 UNII 2A BAND 26dB Bandwidth(CH 60)
	
802.11n_HT20 UNII 2C BAND 26dB Bandwidth(CH 144)	**802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 165)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_802.11n_HT20

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	24.29	N/A	Pass
5200	40	23.47	N/A	Pass
5240	48	22.34	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	23.12	N/A	Pass
5300	60	23.52	N/A	Pass
5320	64	21.76	N/A	Pass

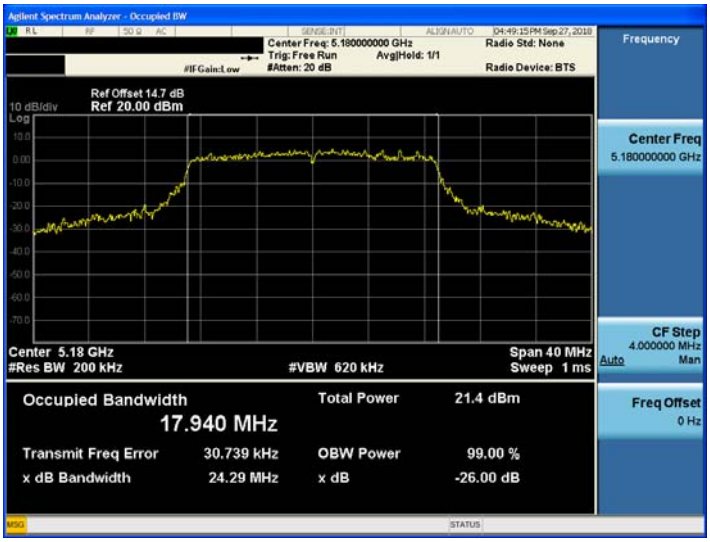
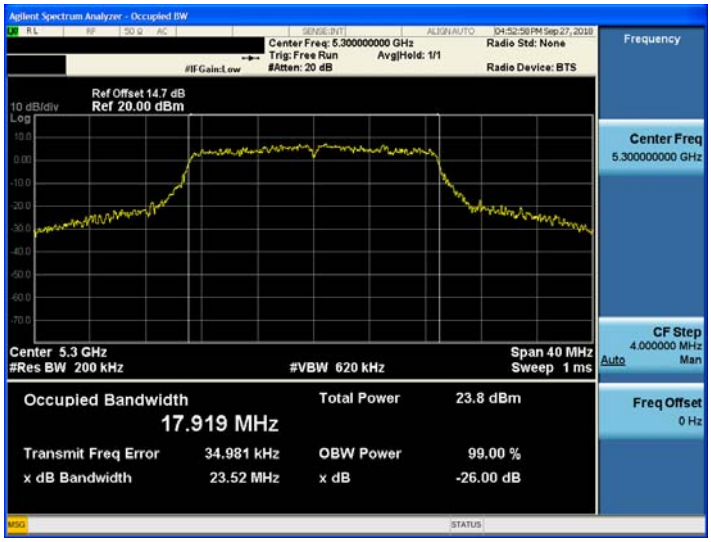
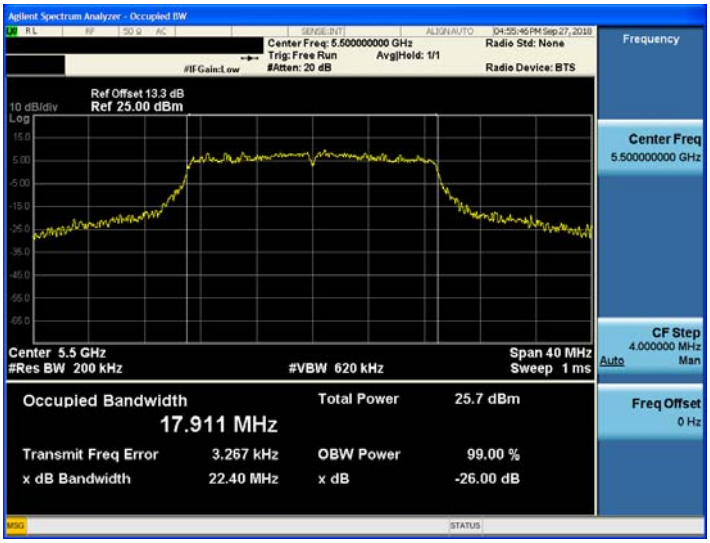
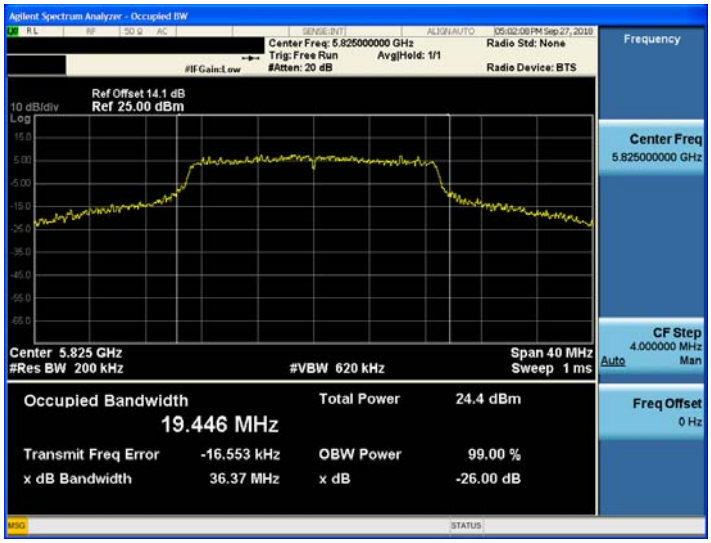
Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	22.40	N/A	Pass
5580	116	21.96	N/A	Pass
5720	144	22.25	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT20

802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	26.87	N/A	Pass
5785	157	32.80	N/A	Pass
5825	165	36.37	N/A	Pass

▣ TEST Plot for External Ant_802.11n_HT20

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 36)	802.11n_HT20 UNII 2A BAND 26dB Bandwidth(CH 60)
	
802.11n_HT20 UNII 2C BAND 26dB Bandwidth(CH 100)	**802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 165)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Internal Ant_ 802.11ac_VHT20

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.68	N/A	Pass
5200	40	21.39	N/A	Pass
5240	48	21.41	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.27	N/A	Pass
5300	60	21.34	N/A	Pass
5320	64	21.30	N/A	Pass

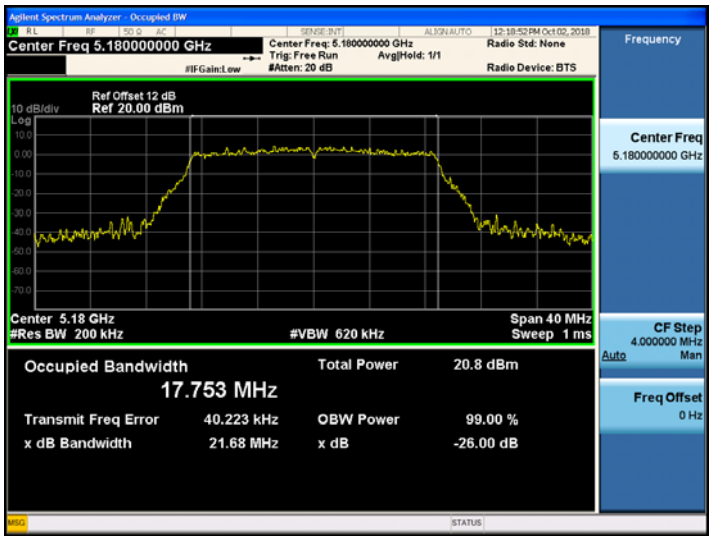
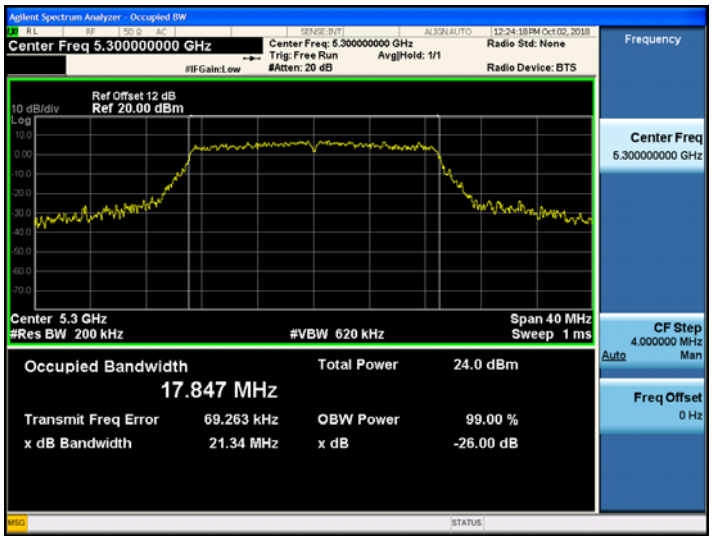
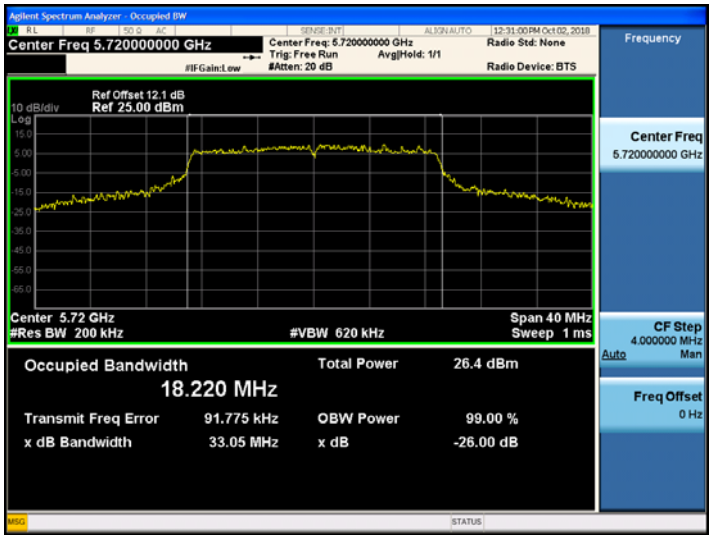
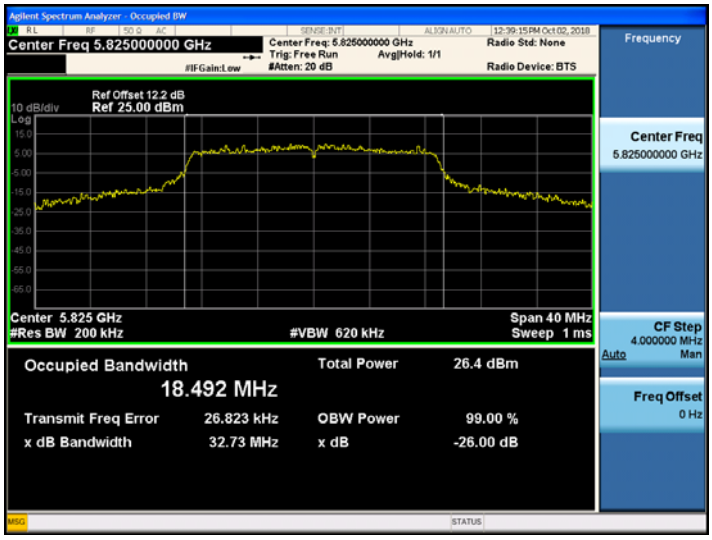
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.30	N/A	Pass
5580	116	25.84	N/A	Pass
5720	144	33.05	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	30.35	N/A	Pass
5785	157	29.15	N/A	Pass
5825	165	32.73	N/A	Pass

▣ TEST Plot for Internal Ant_ 802.11ac_VHT20

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 36)	802.11ac_VHT20 UNII 2A BAND 26dB Bandwidth(CH 60)
	
802.11ac_VHT20 UNII 2C BAND 26dB Bandwidth(CH 144)	**802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 165)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_ 802.11ac_VHT20

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	25.25	N/A	Pass
5200	40	22.91	N/A	Pass
5240	48	21.87	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	22.25	N/A	Pass
5300	60	21.45	N/A	Pass
5320	64	21.81	N/A	Pass

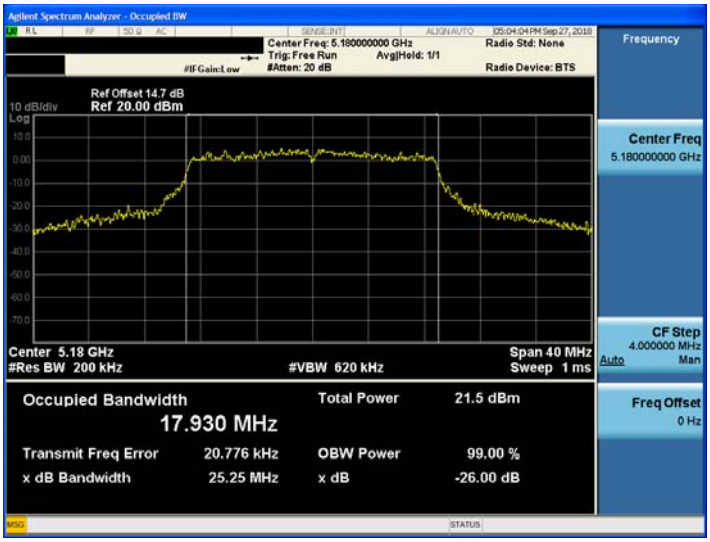
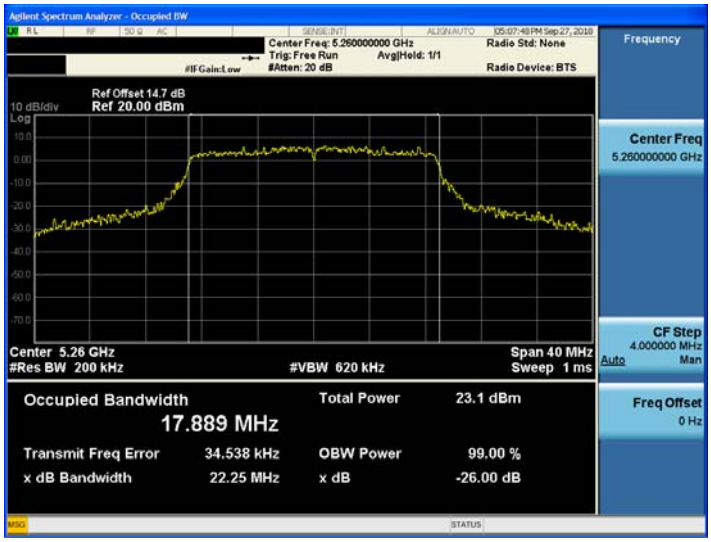
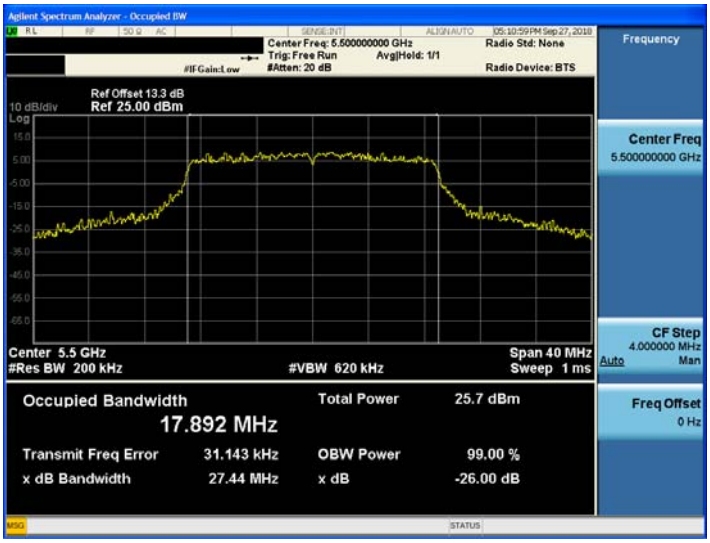
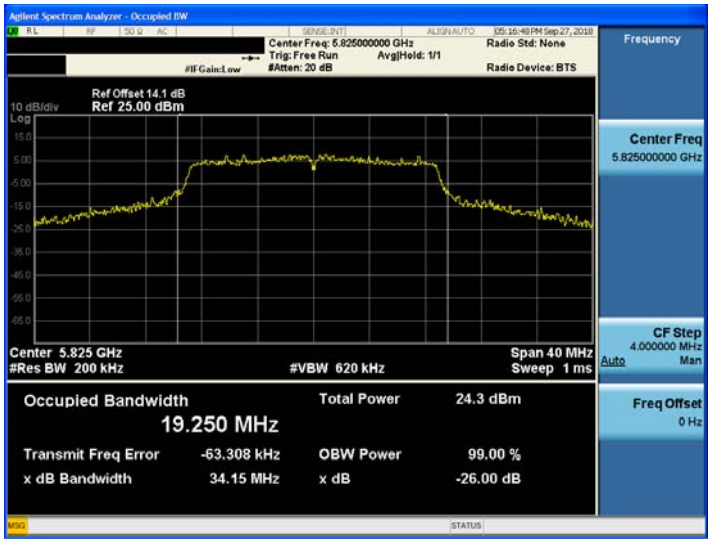
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	27.44	N/A	Pass
5580	116	23.96	N/A	Pass
5720	144	25.18	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT20

802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	26.81	N/A	Pass
5785	157	31.65	N/A	Pass
5825	165	34.15	N/A	Pass

▣ TEST Plot for External Ant_ 802.11ac_VHT20

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 36)	802.11ac_VHT20 UNII 2A BAND 26dB Bandwidth(CH 52)
	
802.11ac_VHT20 UNII 2C BAND 26dB Bandwidth(CH 100)	**802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 165)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Internal Ant_802.11n_HT40

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.52	N/A	Pass
5230	46	39.66	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.14	N/A	Pass
5310	62	39.43	N/A	Pass

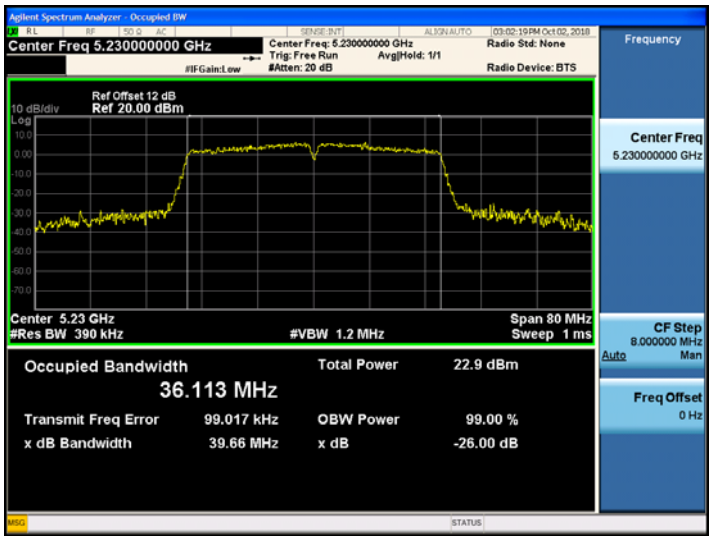
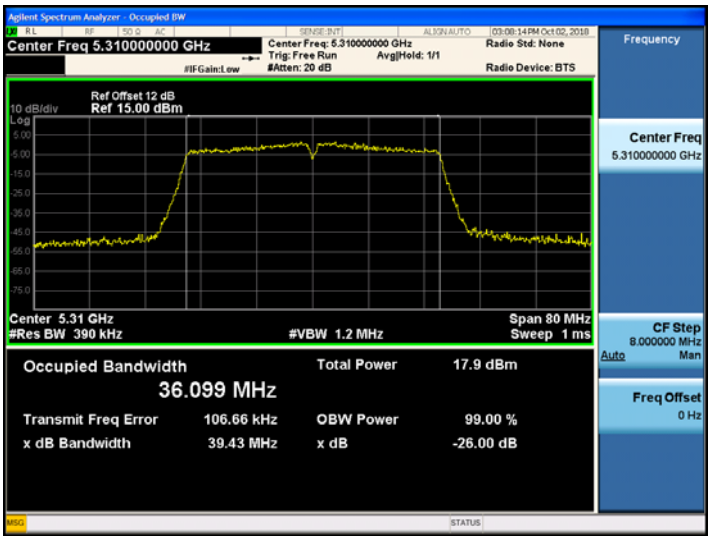
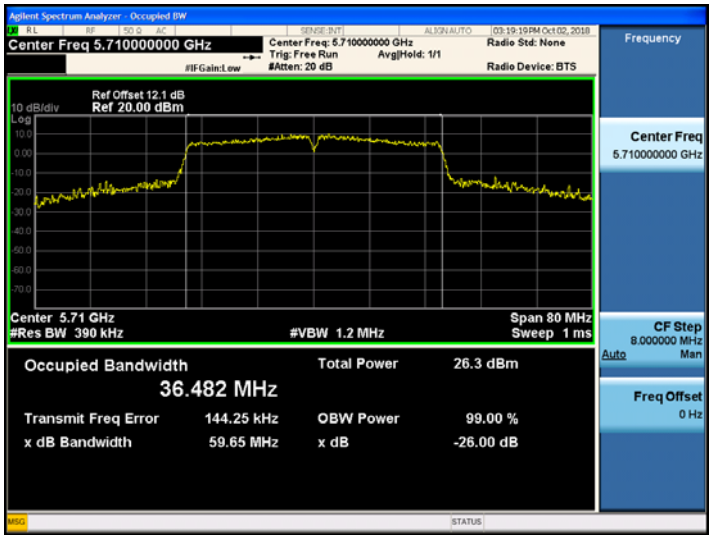
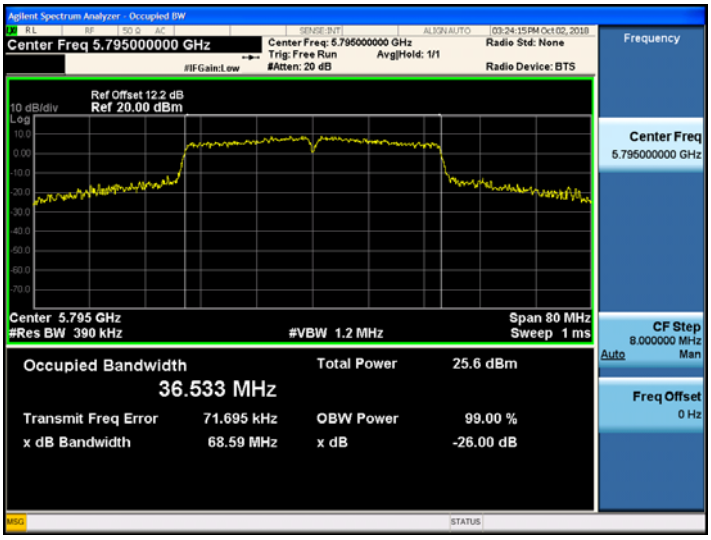
Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.51	N/A	Pass
5550	110	45.88	N/A	Pass
5710	142	59.65	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	58.88	N/A	Pass
5795	159	68.59	N/A	Pass

▣ TEST Plot for Internal Ant_802.11n_HT40

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 2A BAND 26dB Bandwidth (CH 62)
	
802.11n_HT40 UNII 2C BAND 26dB Bandwidth(CH 142)	**802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_802.11n_HT40

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.49	N/A	Pass
5230	46	46.43	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	41.73	N/A	Pass
5310	62	39.70	N/A	Pass

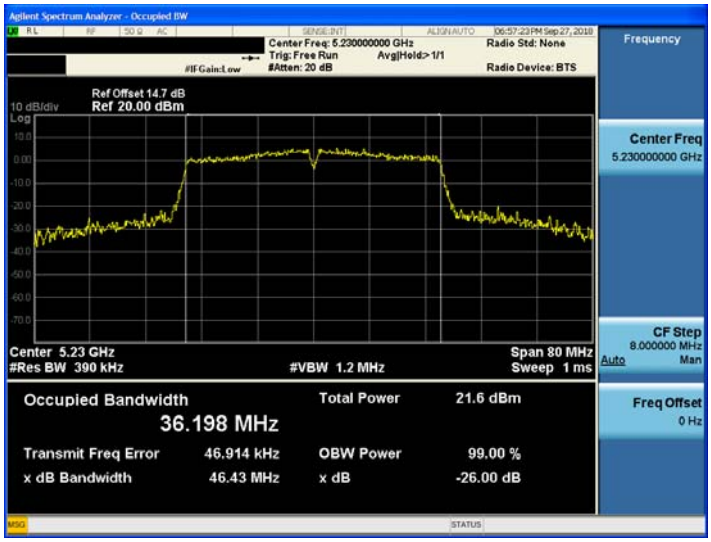
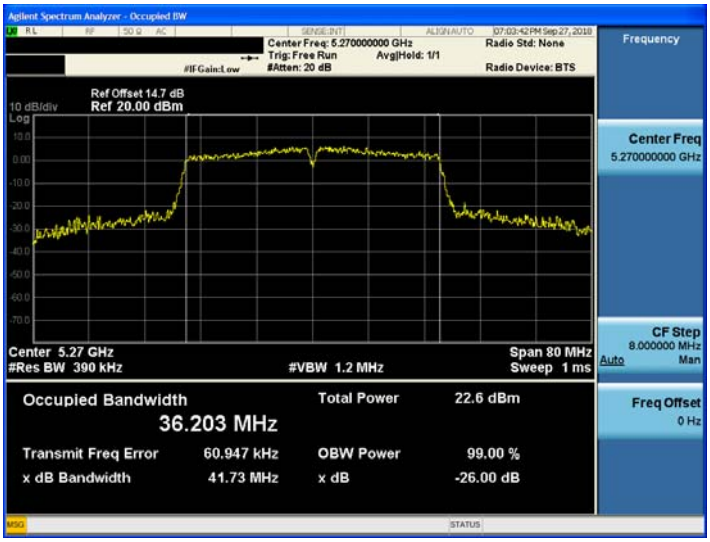
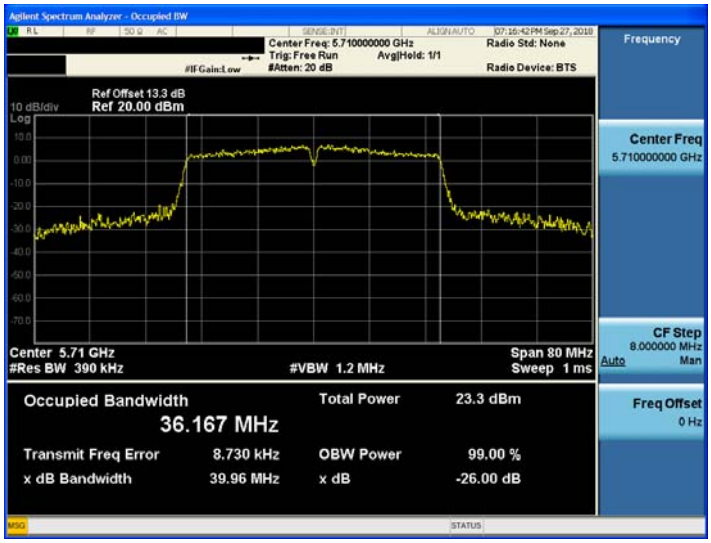
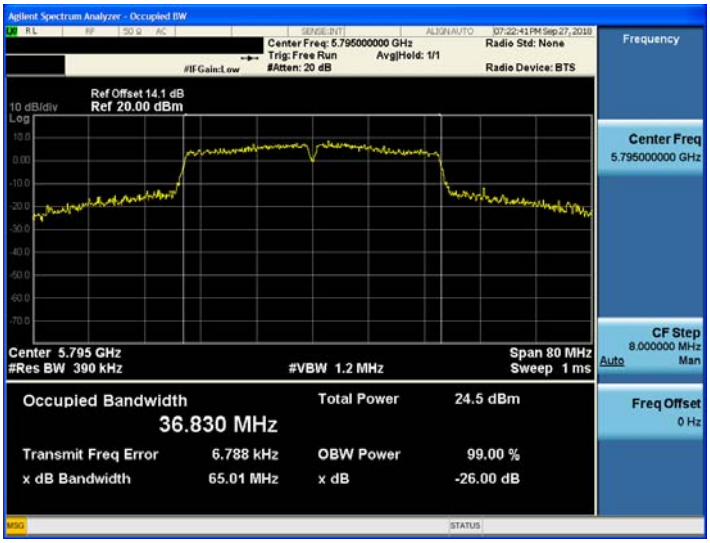
Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.81	N/A	Pass
5550	110	39.43	N/A	Pass
5710	142	39.96	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	57.68	N/A	Pass
5795	159	65.01	N/A	Pass

▣ TEST Plot for External Ant_802.11n_HT40

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 2A BAND 26dB Bandwidth (CH 54)
	
802.11n_HT40 UNII 2C BAND 26dB Bandwidth(CH 142)	**802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Internal Ant_802.11ac_VHT40

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.61	N/A	Pass
5230	46	39.39	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.61	N/A	Pass
5310	62	39.38	N/A	Pass

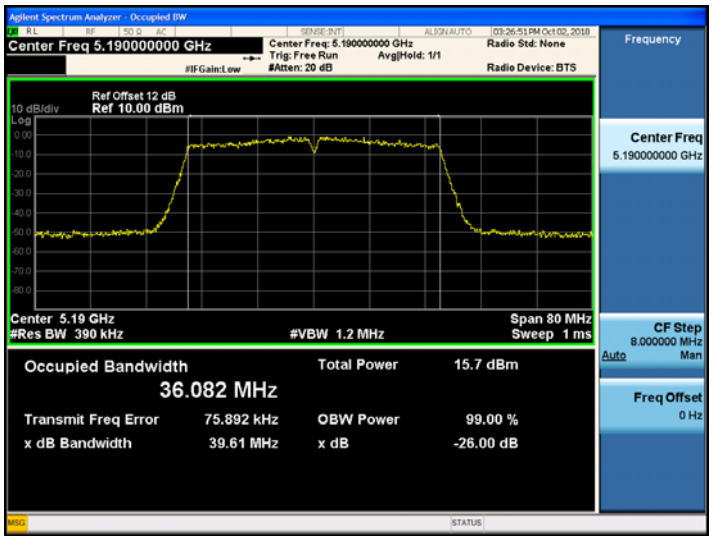
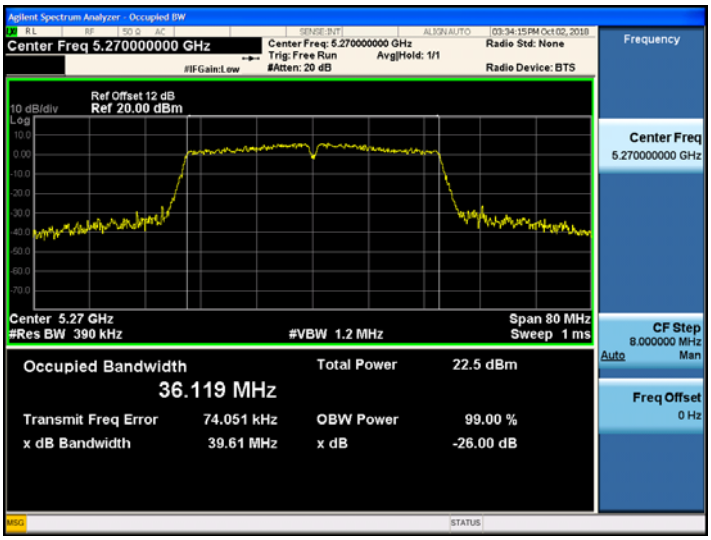
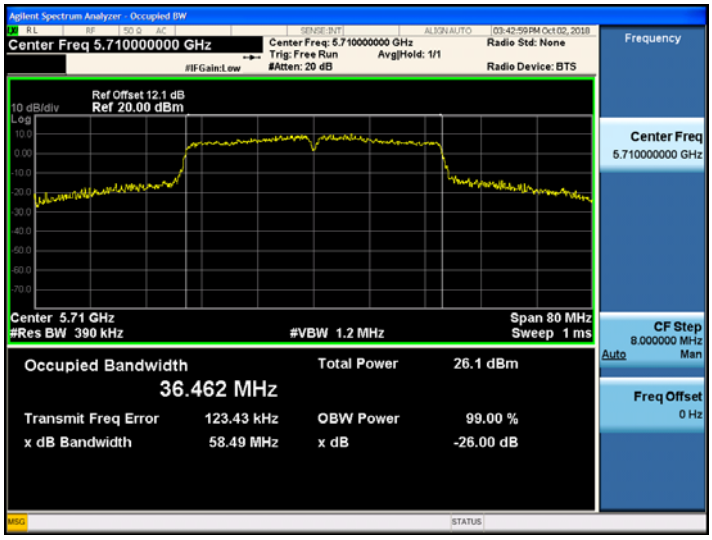
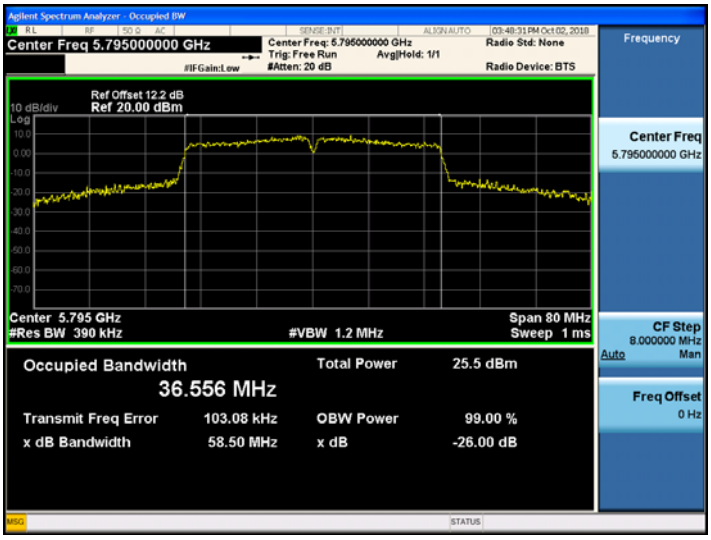
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.52	N/A	Pass
5550	110	45.79	N/A	Pass
5710	142	58.49	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	50.09	N/A	Pass
5795	159	58.50	N/A	Pass

▣ TEST Plot for Internal Ant_802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 2A BAND 26dB Bandwidth (CH 54)
	
802.11ac_VHT40 UNII 2C BAND 26dB Bandwidth(CH 142)	**802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 159)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_802.11ac_VHT40

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.90	N/A	Pass
5230	46	40.05	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.75	N/A	Pass
5310	62	39.57	N/A	Pass

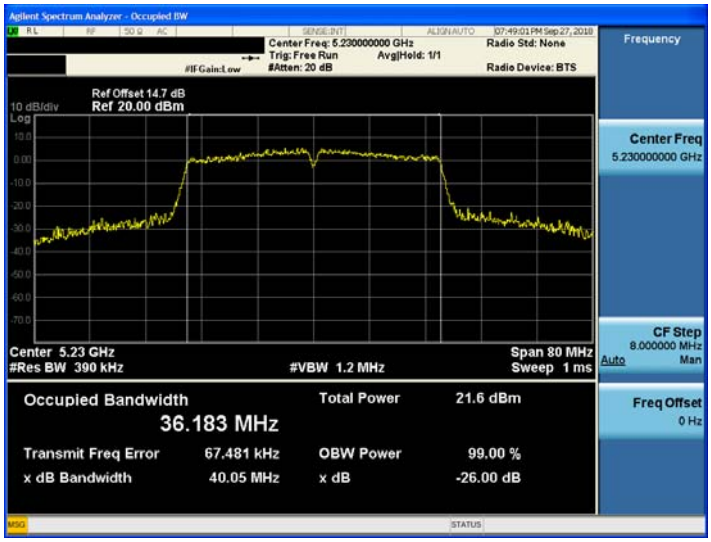
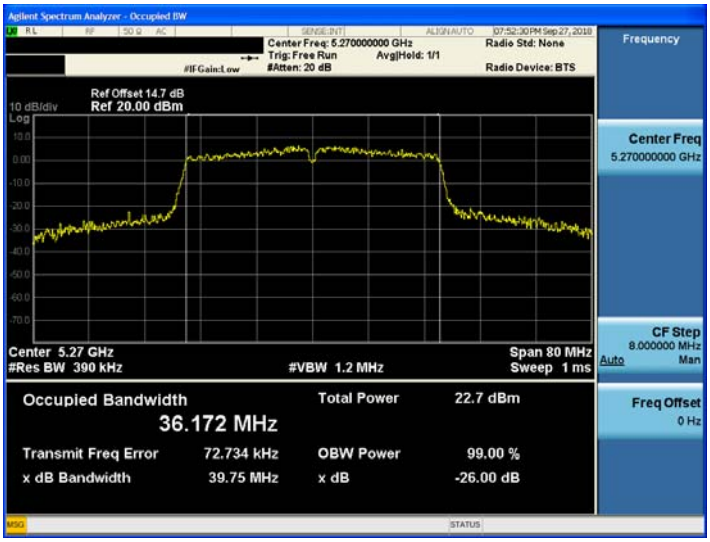
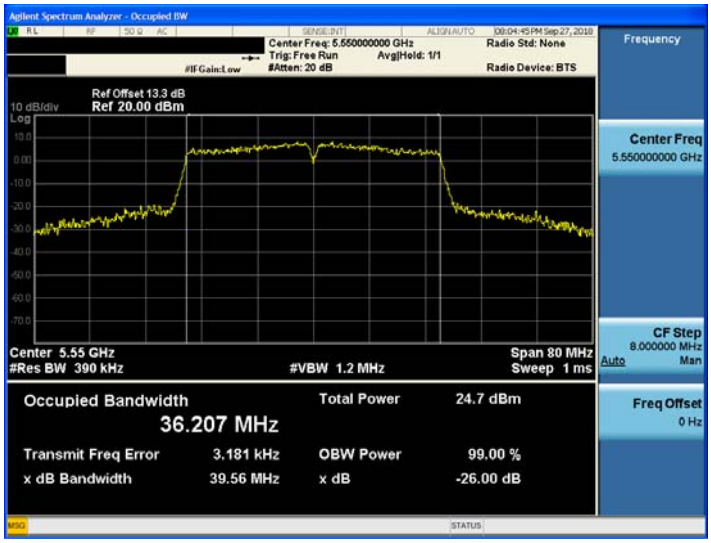
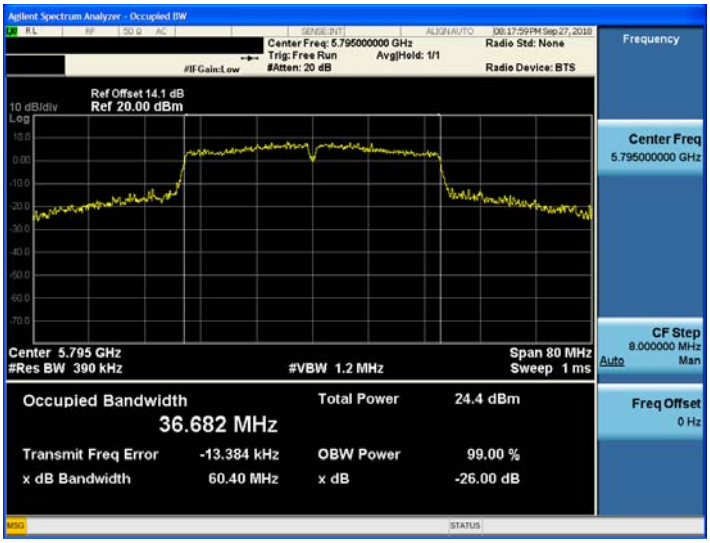
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.46	N/A	Pass
5550	110	39.56	N/A	Pass
5710	142	39.36	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	54.27	N/A	Pass
5795	159	60.40	N/A	Pass

▣ TEST Plot for External Ant_802.11ac_VHT40

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11ac_VHT40 UNII 2A BAND 26dB Bandwidth (CH 54)
	
802.11ac_VHT40 UNII 2C BAND 26dB Bandwidth(CH 110)	**802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 159)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for Internal Ant_802.11ac_VHT80

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	80.86	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	80.93	N/A	Pass

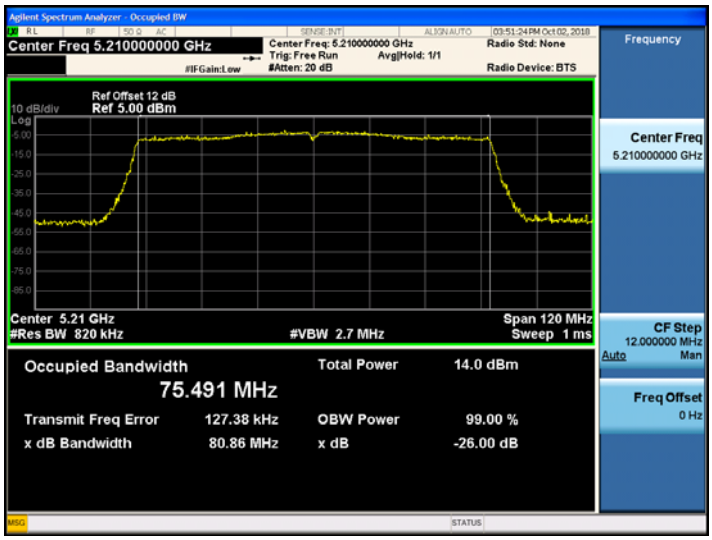
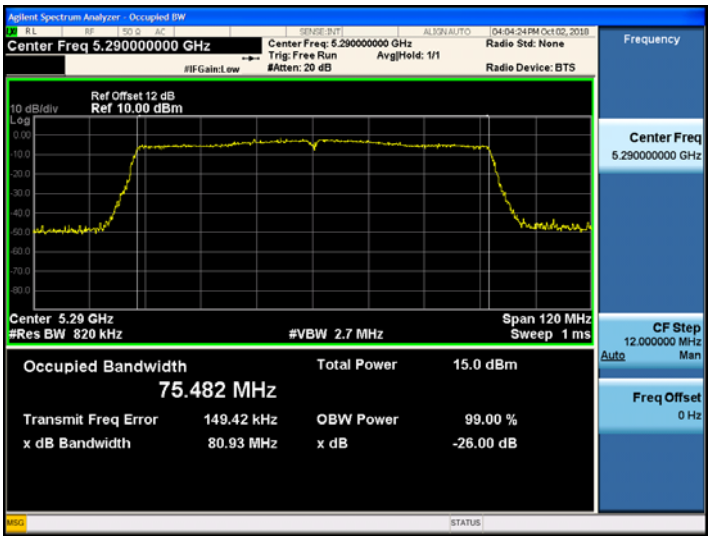
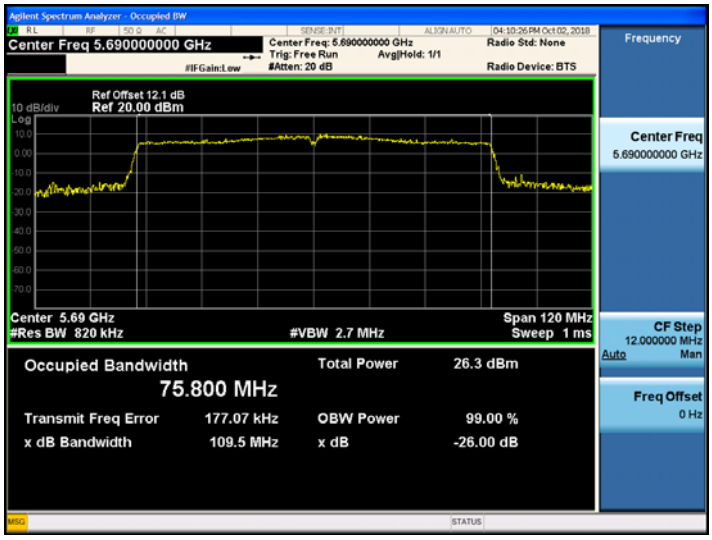
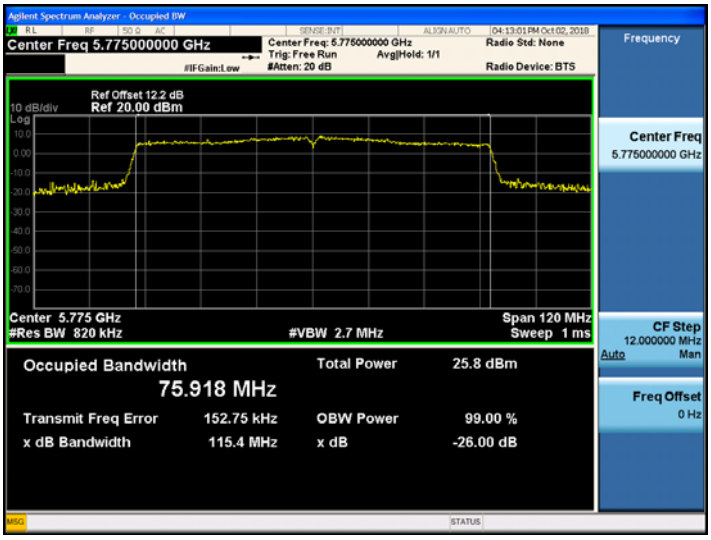
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5530	106	80.84	N/A	Pass
5610	122	101.03	N/A	Pass
5690	138	109.50	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	115.40	N/A	Pass

▣ TEST Plot for Internal Ant_802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 2A BAND 26dB Bandwidth(CH 58)
	
802.11ac_VHT80 UNII 2C BAND 26dB Bandwidth(CH 138)	**802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth(CH 155)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

▣ TEST RESULTS for External Ant_802.11ac_VHT80

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	81.27	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	80.87	N/A	Pass

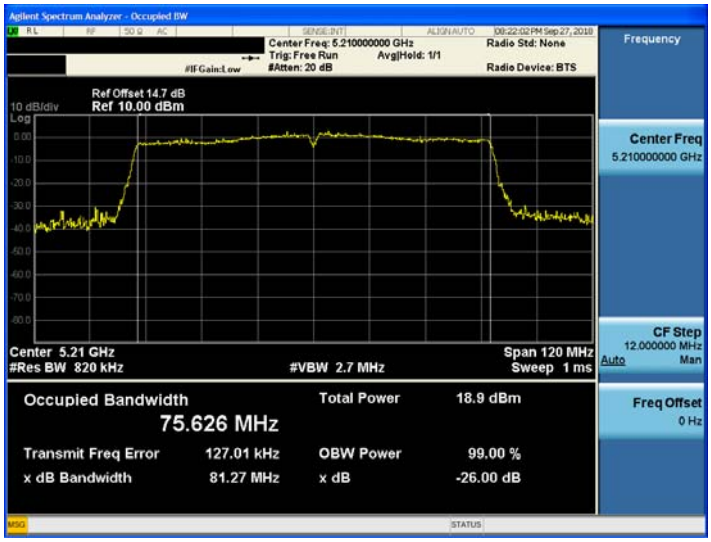
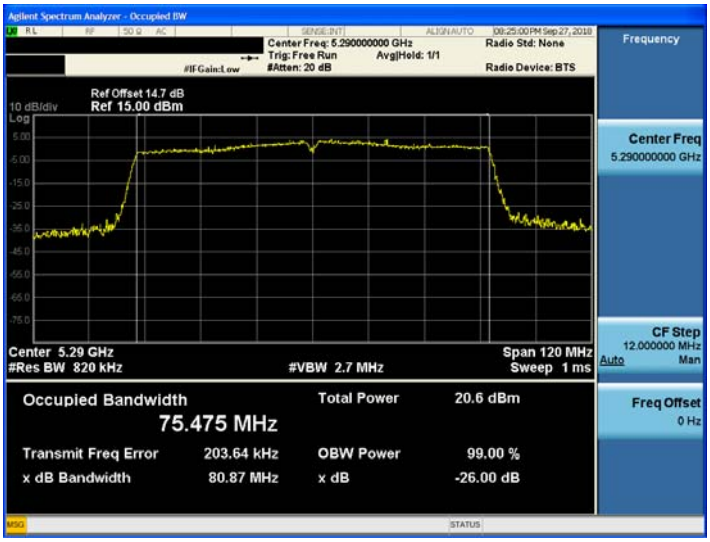
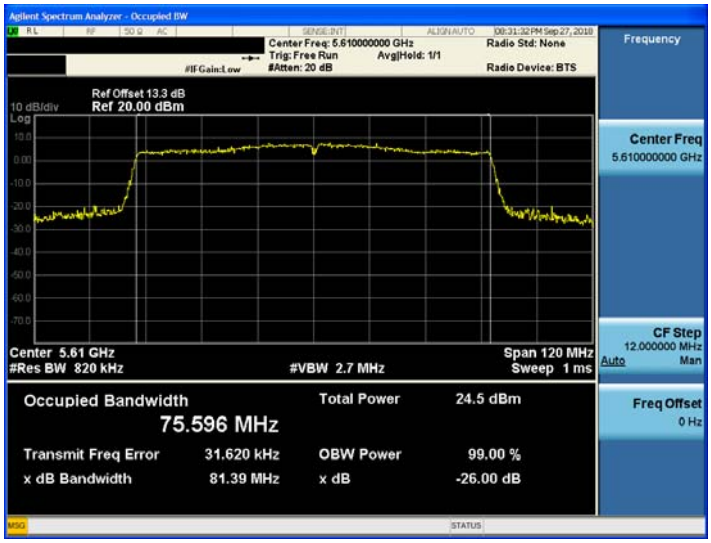
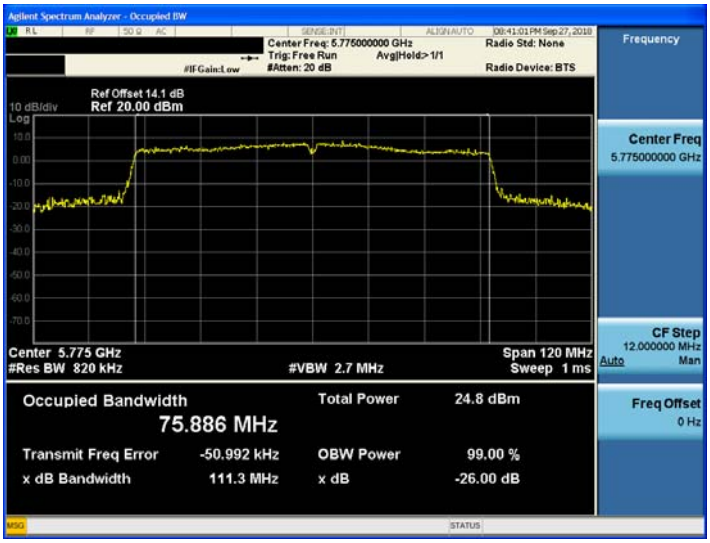
Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5530	106	80.95	N/A	Pass
5610	122	81.39	N/A	Pass
5690	138	81.09	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	111.32	N/A	Pass

▣ TEST Plot for External Ant_802.11ac_VHT80

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 2A BAND 26dB Bandwidth(CH 58)
	
802.11ac_VHT80 UNII 2C BAND 26dB Bandwidth(CH 122)	**802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth(CH 155)**
	

Note : In order to simplify the report, attached plots were only the most wide channel.

Conducted 6 dB Bandwidth

▣ TEST RESULTS for Internal Ant_802.11a/n_HT20/ac_VHT20

Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.34	0.5	Pass
5785	157	16.34	0.5	Pass
5825	165	16.34	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_HT20

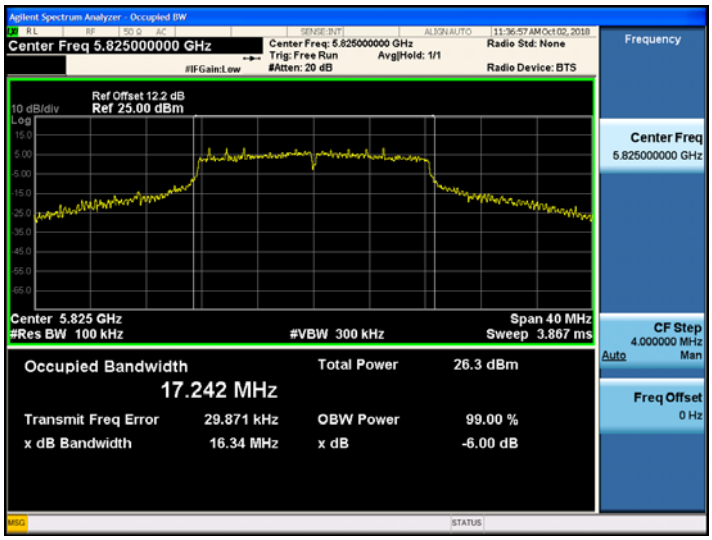
802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.59	0.5	Pass
5785	157	17.06	0.5	Pass
5825	165	17.57	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT20

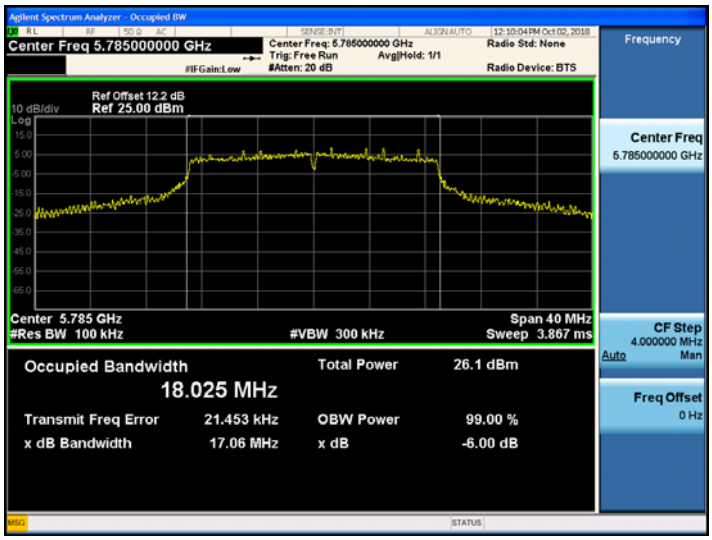
802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.34	0.5	Pass
5785	157	17.36	0.5	Pass
5825	165	17.60	0.5	Pass

▣ TEST PlotS for 802.11a/n_HT20/ac_VHT20

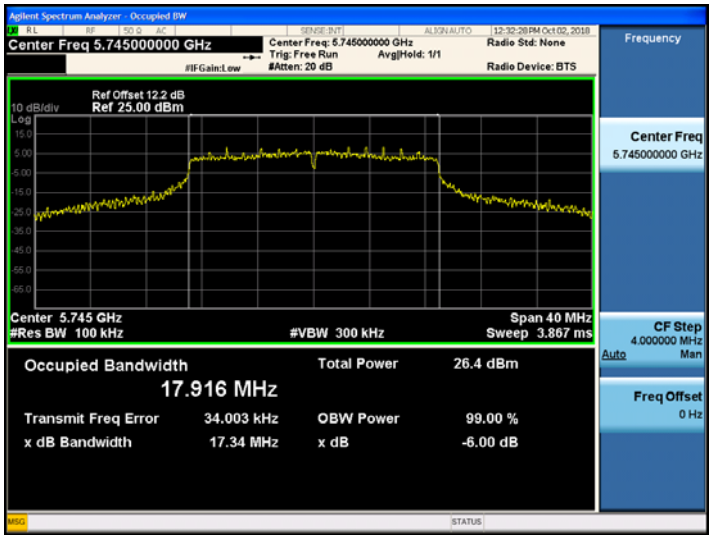
802.11a UNII 3 BAND 6dB Bandwidth (CH.165)



802.11n_HT20 UNII 3 BAND 6dB Bandwidth(CH.157)



802.11ac_VHT20 UNII 3 BAND 6dB Bandwidth(CH.149)



Note : In order to simplify the report, attached plots were only the most narrow channel.

▣ TEST RESULTS for External Ant_802.11a/n_HT20/ac_VHT20

Conducted 6 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.38	0.5	Pass
5785	157	16.34	0.5	Pass
5825	165	16.40	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_HT20

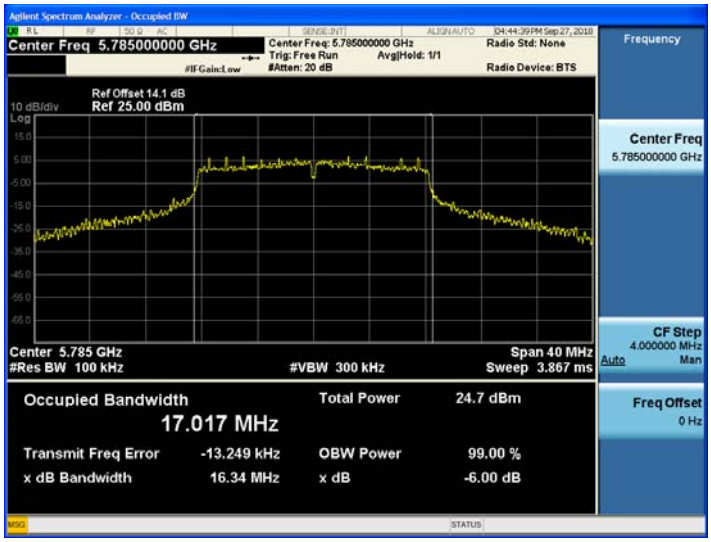
802.11n_HT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.22	0.5	Pass
5785	157	17.60	0.5	Pass
5825	165	17.34	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT20

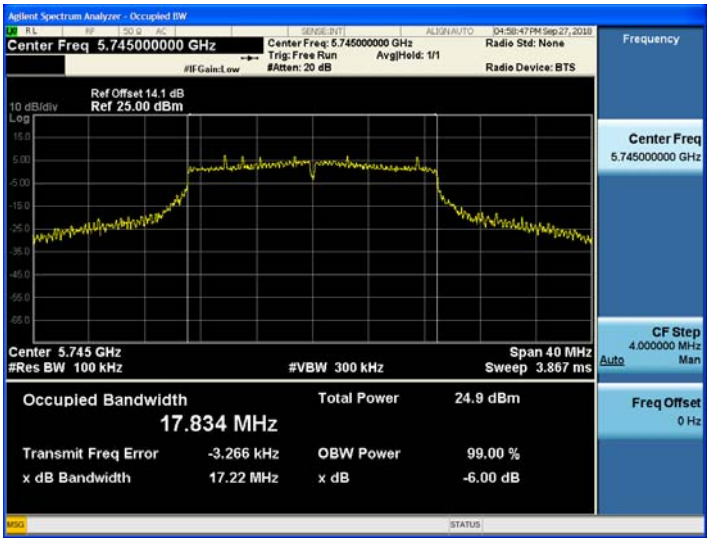
802.11ac_VHT20 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.56	0.5	Pass
5785	157	17.22	0.5	Pass
5825	165	17.60	0.5	Pass

▣ TEST Plots for External Ant_802.11a/n_HT20/ac_VHT20

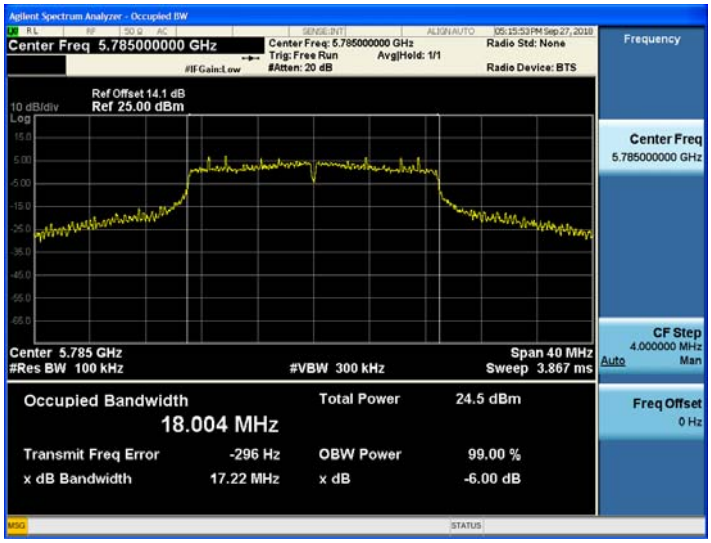
802.11a UNII 3 BAND 6dB Bandwidth (CH.157)



802.11n_HT20 UNII 3 BAND 6dB Bandwidth(CH.149)



802.11ac_VHT20 UNII 3 BAND 6dB Bandwidth(CH.157)



Note : In order to simplify the report, attached plots were only the most narrow channel.

▣ TEST RESULTS for Internal Ant_802.11n_HT40/ac_VHT40

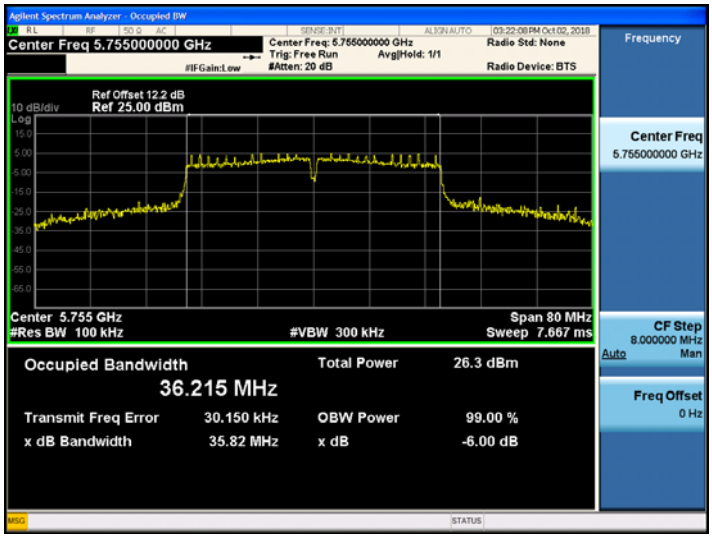
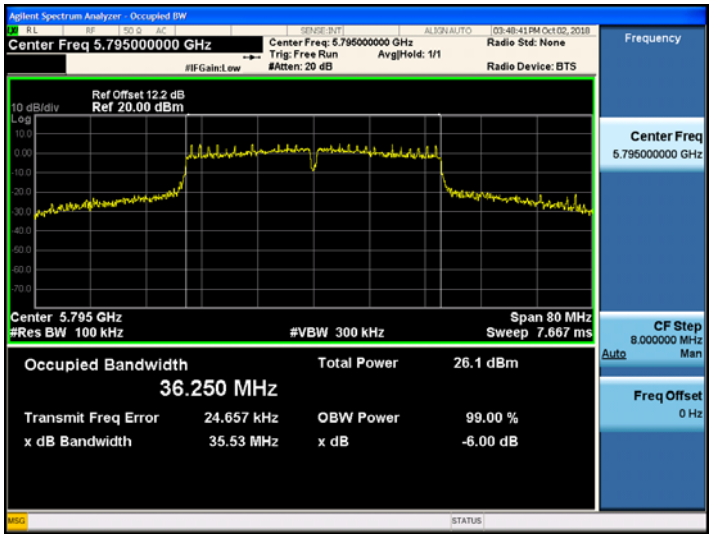
Conducted 6 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.82	0.5	Pass
5795	159	35.87	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.68	0.5	Pass
5795	159	35.53	0.5	Pass

▣ TEST Plots for Internal Ant_802.11n_HT40/ac_VHT40

802.11n_40 MHz UNII 3 BAND 6dB Bandwidth (CH.151)	802.11ac_VHT40 UNII 3 BAND 6dB Bandwidth(CH.159)
	

▣ TEST RESULTS for External Ant_802.11n_HT40/ac_VHT40

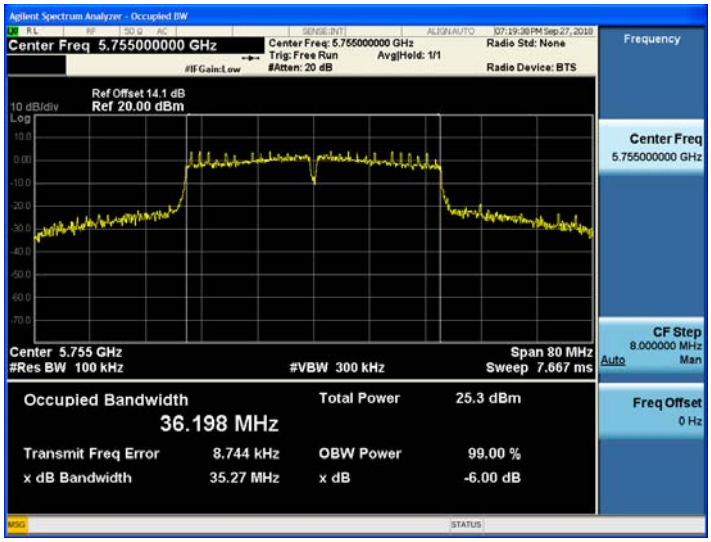
Conducted 6 dB Bandwidth Measurements for 802.11n_HT40

802.11n_HT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.27	0.5	Pass
5795	159	35.61	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT40

802.11ac_VHT40 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.31	0.5	Pass
5795	159	35.51	0.5	Pass

▣ TEST Plots for External Ant_802.11n_HT40/ac_VHT40

802.11n_40 MHz UNII 3 BAND 6dB Bandwidth (CH.151)	802.11ac_VHT40 UNII 3 BAND 6dB Bandwidth(CH.151)
	

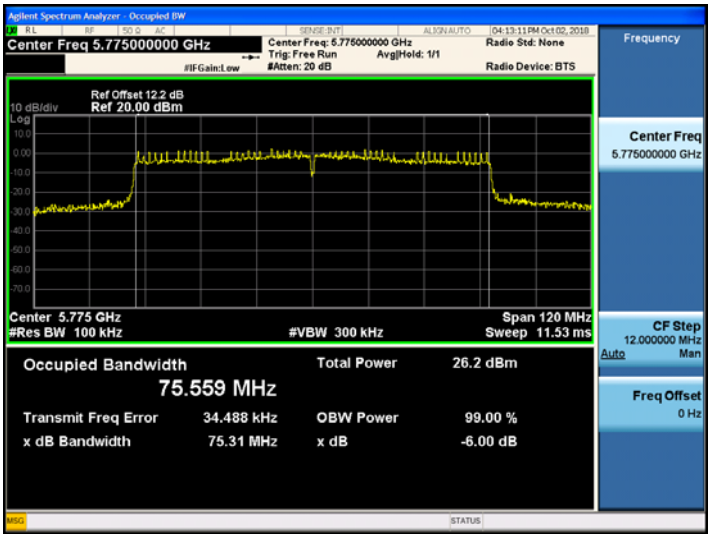
▣ TEST RESULTS Internal Ant_for 802.11ac_VHT80

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.31	0.5	Pass

▣ TEST Plots for Internal Ant_802.11ac_VHT80

802.11ac_VHT80 UNII 3 BAND 6dB Bandwidth(CH.155)



Note : In order to simplify the report, attached plots were only the most narrow channel.

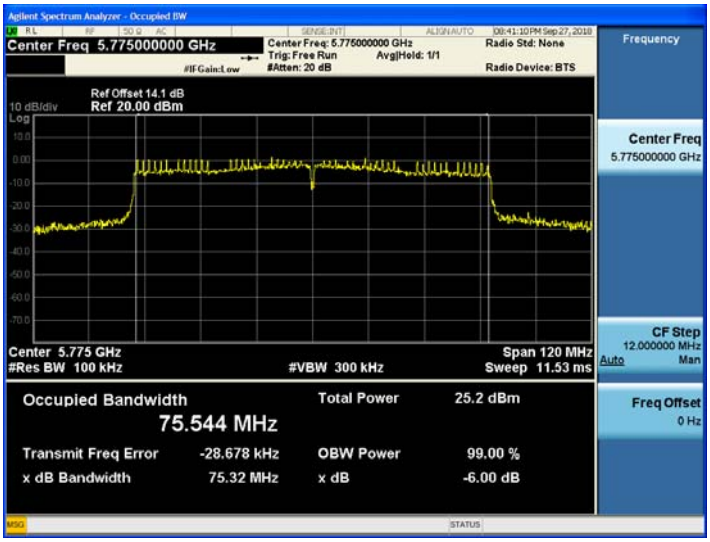
▣ TEST RESULTS External Ant_for 802.11ac_VHT80

Conducted 6 dB Bandwidth Measurements for 802.11ac_VHT80

802.11ac_VHT80 Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.32	0.5	Pass

▣ TEST Plots for External Ant_802.11ac_VHT80

802.11ac_VHT80 UNII 3 BAND 6dB Bandwidth(CH.155)



Note : In order to simplify the report, attached plots were only the most narrow channel.

▣ Straddle channels TEST RESULTS_Internal Ant

Conducted Bandwidth Measurements for 802.11a/n_HT20/ac_VHT20 (UNII 2C Band)

Mode	Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
802.11a	5720	144	16.72	N/A	Pass
802.11n			17.24	N/A	Pass
802.11ac			17.08	N/A	Pass

Conducted Bandwidth Measurements for 802.11a/n_HT20/ac_VHT20 (UNII 3 Band)

Mode	Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
802.11a	5720	144	7.64	N/A	Pass
802.11n			7.68	N/A	Pass
802.11ac			8.52	N/A	Pass

▣ Straddle channels TEST Plot for 802.11a/n_HT20/ac_VHT20_Internal Ant

802.11a CH.144 Bandwidth	802.11n_HT20 CH.144 Bandwidth
	

802.11ac_VHT20 CH.144 Bandwidth


▣ Straddle channels TEST RESULTS_External Ant

Conducted Bandwidth Measurements for 802.11a/n_HT20/ac_VHT20 (UNII 2C Band)

Mode	Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
802.11a	5720	144	15.64	N/A	Pass
802.11n			15.64	N/A	Pass
802.11ac			15.56	N/A	Pass

Conducted Bandwidth Measurements for 802.11a/n_HT20/ac_VHT20 (UNII 3 Band)

Mode	Frequency [MHz]	Channel No.	Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
802.11a	5720	144	5.72	N/A	Pass
802.11n			5.88	N/A	Pass
802.11ac			5.84	N/A	Pass

▣ Straddle channels TEST Plot for 802.11a/n_HT20/ac_VHT20_External Ant

802.11a CH.144 Bandwidth	802.11n_HT20 CH.144 Bandwidth
	

802.11ac_VHT20 CH.144 Bandwidth