74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
TEL: +82-31-645-6300 FAX: +82-31-645-6401

FCC UNII REPORT

FCC Certification

Applicant Name:
LG Electronics MobileComm U.S.A., Inc.

Address:
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue:
April 28, 2015

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1504-F027-1

HCT FRN: 0005866421

FCC ID : ZNFH818P
APPLICANT : LG Electronics MobileComm U.S.A., Inc.

FCC Model(s): LG-H818P

Additional Model(s): LGH818P, H818P, LG-H818p, LGH818p, H818p

EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN, NFC

Modulation type OFDM

FCC Classification: Unlicensed National Information Infrastructure(UNII)

FCC Rule Part(s): Part 15.407

Band	Mode	Channel Bandwidth (MHz)	Frequency Range (MHz)	Power (dBm)	Power (W)
UNII1	802.11a	20	5180 – 5240	10.90	0.0123
	802.11n	20	5180 – 5240	11.28	0.0134
	802.11n	40	5190 - 5230	9.39	0.0087
	802.11ac	20	5180 – 5240	10.94	0.0124
	802.11ac	40	5190 - 5230	9.58	0.0091
	802.11ac	80	5210	10.67	0.0117
UNII2A	802.11a	20	5260 – 5320	10.87	0.0122
	802.11n	20	5260 – 5320	11.02	0.0126
	802.11n	40	5270 – 5310	9.68	0.0093
	802.11ac	20	5260 – 5320	11.05	0.0127
	802.11ac	40	5270 – 5310	9.68	0.0093
	802.11ac	80	5290	11.35	0.0136
UNII2C	802.11a	20	5500 – 5720	12.18	0.0165
	802.11n	20	5500 – 5720	12.27	0.0169
	802.11n	40	5510 – 5710	10.52	0.0113
	802.11ac	20	5500 – 5720	12.20	0.0166
	802.11ac	40	5510 – 5710	10.67	0.0117
	802.11ac	80	5530 – 5690	11.45	0.0140
UNII3	802.11a	20	5745 – 5825	11.78	0.0151
	802.11n	20	5745 – 5825	11.84	0.1648
	802.11n	40	5755 – 5795	9.94	0.0986
	802.11ac	20	5745 – 5825	11.80	0.0151
	802.11ac	40	5755 – 5795	9.82	0.0096
	802.11ac	80	5775	11.49	0.0141

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment 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.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by
: Kyung Soo Kang
Test Engineer of RF Team

Approved by
: Sang Jun Lee
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1504-F027	April 23, 2015	- First Approval Report
HCT-R-1504-F027-1	April 28, 2015	- Revised the table on page 101 of the report

Table of Contents

1. GENERAL INFORMATION

Applicant:	LG Electronics MobileComm U.S.A., Inc.
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFH818P
EUT Type:	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN, NFC
Model name(s):	LG-H818P
Additional Model name(s):	LGH818P, H818P, LG-H818p,LGH818p, H818p
Date(s) of Tests:	April 16, 2015 ~ April 21, 2015
Place of Tests:	HCT Co., Ltd. 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

FCC Model Name	LG-H818P	
Additional Name	LGH818P, H818P, LG-H818p,LGH818p,H818p	
EUT Type	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA Phone with Bluetooth, WLAN, NFC	
Power Supply	DC 3.85 V	
Battery type	Li-ion Battery(Standard)	
Frequency Range	TX_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)
	RX_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	Manufacturer: AT&C Co.LTD. Antenna type:INTERNAL Antenna Peak Gain : -1.76 dBi (5180~5240 UNII1 BAND) / -1.21 dBi (5260~5320 UNII2A BAND) 0.80 dBi (5500~5720 UNII2C BAND) / -0.12 dBi (5745~5825 UNII3 BAND)	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v01 dated June 06, 2014 entitled " Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E" and the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) were used in the measurement. For 802.11ac, KDB644545 D03 v01 dated August 14, 2014

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.

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 13.1.4.1 of ANSI C63.4. (Version :2003) 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. 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 13.1.4.1 of ANSI C63.4. (Version: 2003)

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033)

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

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, Korea The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated February 28, 2014 (Registration Number: 90661)

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:

“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,

7. SUMMARY OF TEST RESULTS

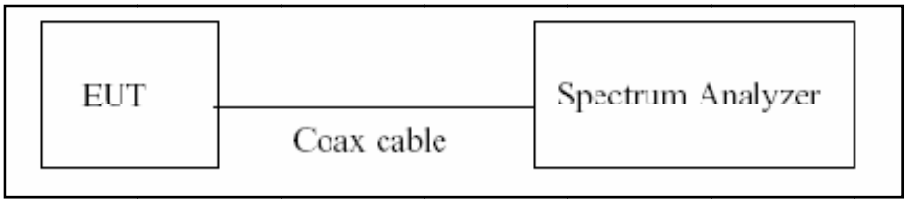
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		
Maximum Conducted Output Power	§15.407(a)(1)	< 250 mW (5150-5250 MHz) < 250 mW (5250-5350 MHz) < 250 mW (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1), (5)	<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)	NA		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)(1), (2), (3)	<-27 dBm/ MHz EIRP (UNII1, 2A, 2C) <-17 dBm/MHz EIRP within 5715-5725 MHz and 5850-5860 MHz, <-27 dBm/MHz EIRP outside 5715-5850 MHz(UNII3)	RADIATED	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(1), (5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

8. TEST RESULT

8.1 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, issued 06/06/2014)
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

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.065	2.167	0.95293032	0.209
	9	1.385	1.490	0.92953020	0.317
	12	1.045	1.146	0.91186736	0.401
	18	0.702	0.807	0.86988848	0.605
	24	0.528	0.633	0.83412322	0.788
	36	0.364	0.467	0.77944325	1.082
	48	0.275	0.378	0.72751323	1.382
	54	0.247	0.351	0.70370370	1.526
802.11n_20 MHz BW	6.5	1.910	2.020	0.94554455	0.243
	13	0.970	1.080	0.89814815	0.467
	19.5	0.655	0.765	0.85620915	0.674
	26	0.504	0.610	0.82622951	0.829
	39	0.348	0.452	0.76991150	1.136
	52	0.268	0.374	0.71657754	1.447
	58.5	0.244	0.350	0.69714286	1.567
	65	0.226	0.330	0.68484848	1.644
802.11n_40 MHz BW	13.5	0.942	1.046	0.90057361	0.455
	27	0.490	0.592	0.82770270	0.821
	40.5	0.338	0.442	0.76470588	1.165
	54	0.262	0.366	0.71584699	1.452
	81	0.186	0.290	0.64137931	1.929
	108	0.151	0.253	0.59683794	2.241
	121.5	0.139	0.240	0.57916667	2.372
	135	0.127	0.228	0.55701754	2.541

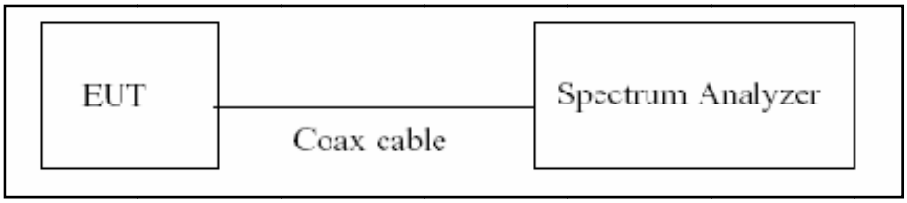
Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_20 MHz BW	6.5	1.921	2.034	0.94444444	0.248
	13	0.986	1.092	0.90293040	0.443
	19.5	0.668	0.774	0.86304910	0.640
	26	0.512	0.618	0.82847896	0.817
	39	0.354	0.458	0.77292576	1.119
	52	0.278	0.382	0.72774869	1.380
	58.5	0.250	0.354	0.70621469	1.511
	65	0.228	0.334	0.68263473	1.658
	78	0.198	0.302	0.65562914	1.833
5.8 GHz Band 802.11ac_40 MHz BW	13.5	0.950	1.054	0.90132827	0.451
	27	0.494	0.598	0.82608696	0.830
	40.5	0.340	0.444	0.76576577	1.159
	54	0.266	0.370	0.71891892	1.433
	81	0.190	0.293	0.64846416	1.881
	108	0.154	0.256	0.60156250	2.207
	121.5	0.142	0.245	0.57959184	2.369
	135	0.131	0.233	0.56223176	2.501
	162	0.115	0.217	0.52995392	2.758
	180	0.111	0.213	0.52112676	2.831
5.8 GHz Band 802.11ac_80 MHz BW	29.3	0.458	0.561	0.81639929	0.881
	58.5	0.251	0.353	0.71104816	1.481
	87.8	0.179	0.281	0.63701068	1.959
	117	0.146	0.249	0.58634538	2.318
	175.5	0.111	0.213	0.52112676	2.831
	234	0.095	0.197	0.48223350	3.167
	263.3	0.087	0.189	0.46031746	3.369
	292.5	0.083	0.184	0.45108696	3.457
	351	0.075	0.177	0.42372881	3.729
	390	0.071	0.173	0.41040462	3.868

8.2 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(issued 06/06/2014), 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

The transmitter output is connected to the Spectrum Analyzer.
The Spectrum Analyzer is set to(C.1 in KDB 789033 D02, issued 06/06/2014)

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.

▣ TEST RESULTS

20 MHz BW

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	21.630	N/A	Pass
5200	40	21.480	N/A	Pass
5240	48	21.620	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	21.480	N/A	Pass
5300	60	21.560	N/A	Pass
5320	64	21.610	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

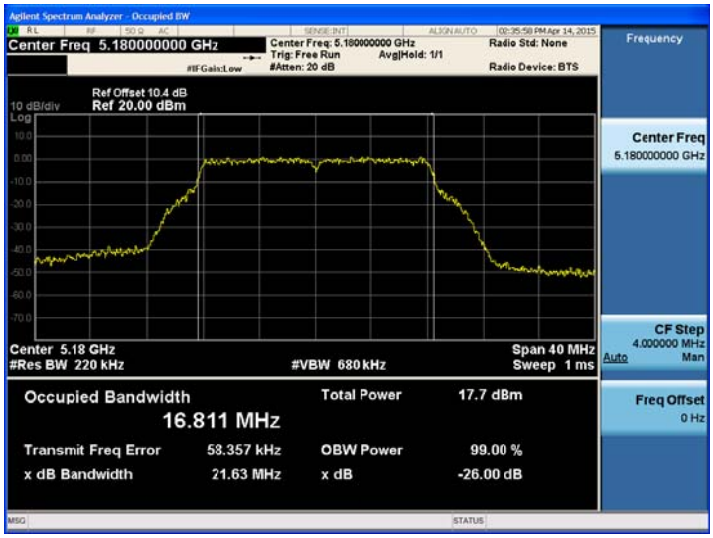
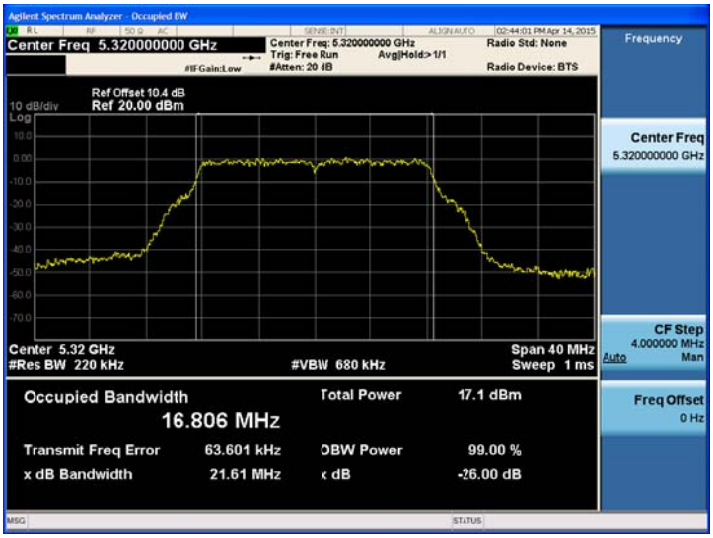
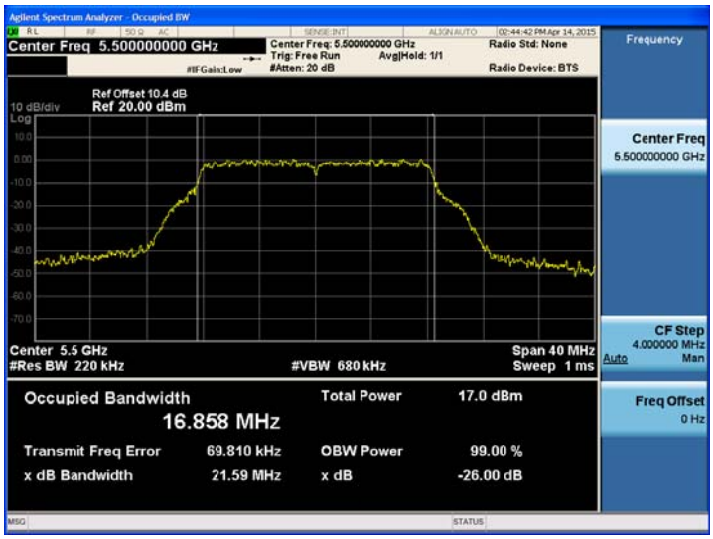
802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.590	N/A	Pass
5580	116	21.450	N/A	Pass
5720	144	21.301	N/A	Pass

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	21.580	N/A	Pass
5785	157	21.700	N/A	Pass
5825	165	21.500	N/A	Pass

▣ TEST Plot for 802.11a _20MHz BW

20 MHz BW

802.11a UNII 1 BAND 26dB Bandwidth (CH 36)	802.11a UNII 2A BAND 26dB Bandwidth (CH 64)
	
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 802.11n _20MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n 20M BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.802	N/A	Pass
5200	40	21.791	N/A	Pass
5240	48	21.554	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n 20M BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.738	N/A	Pass
5300	60	21.831	N/A	Pass
5320	64	21.772	N/A	Pass

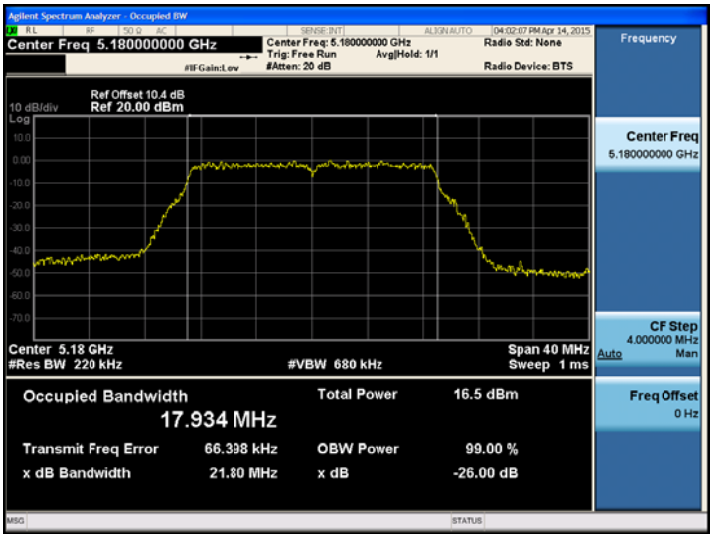
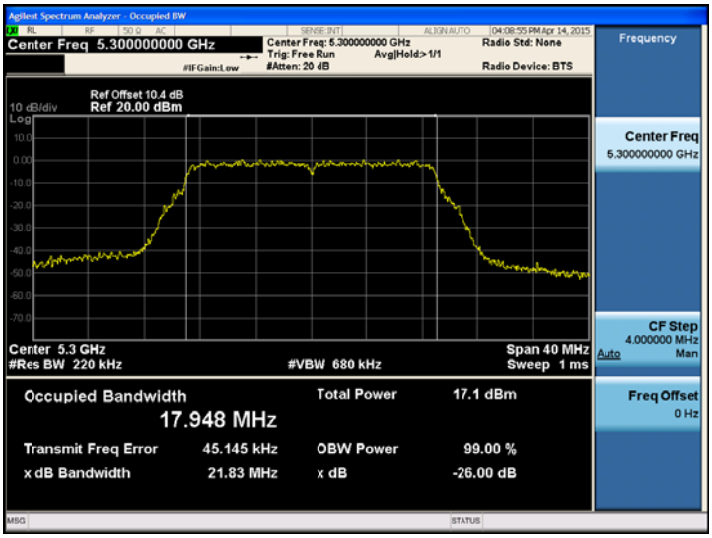
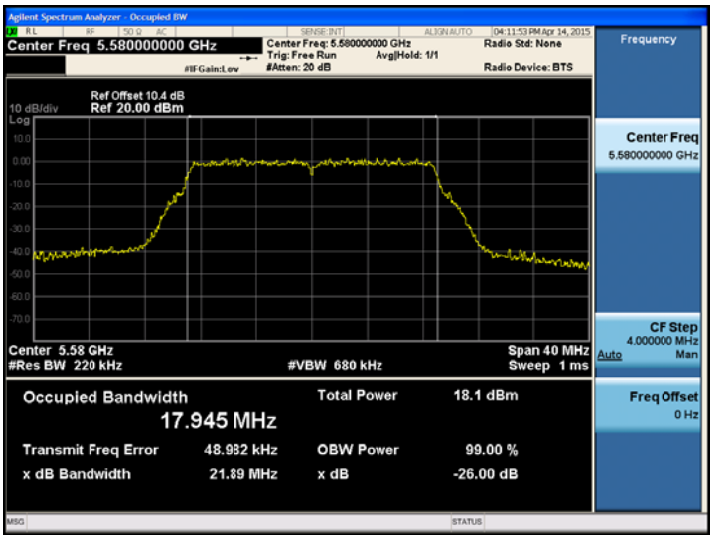
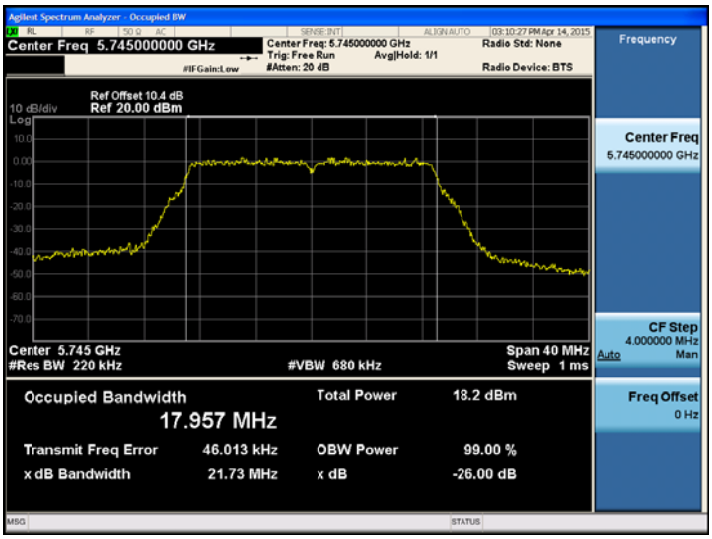
Conducted 26 dB Bandwidth Measurements for 802.11n 20M BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.761	N/A	Pass
5580	116	21.888	N/A	Pass
5720	144	21.811	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n 20M BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.730	N/A	Pass
5785	157	21.630	N/A	Pass
5825	165	21.700	N/A	Pass

▣ TEST Plot for 802.11n _20MHz BW

802.11n_20 MHz BW UNII 1 BAND 26dB Bandwidth(CH 36)	802.11n_20 MHz BW UNII 2A BAND 26dB Bandwidth(CH 60)
	
802.11n_20 MHz BW UNII 2C BAND 26dB Bandwidth(CH 118)	**802.11n_20 MHz BW UNII 3 BAND 26dB Bandwidth(CH 149)**
	

Note :

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

▣ TEST RESULTS for 802.11ac _20MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac 20M BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.580	N/A	Pass
5200	40	21.630	N/A	Pass
5240	48	21.510	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac 20M BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.710	N/A	Pass
5300	60	21.670	N/A	Pass
5320	64	21.860	N/A	Pass

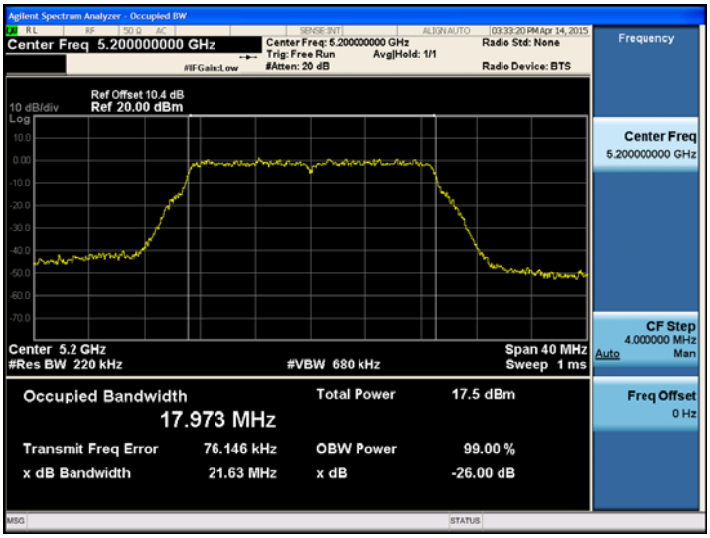
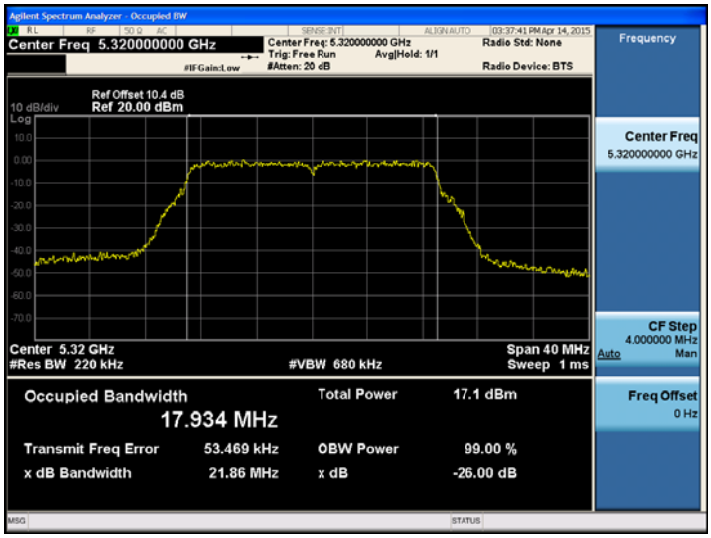
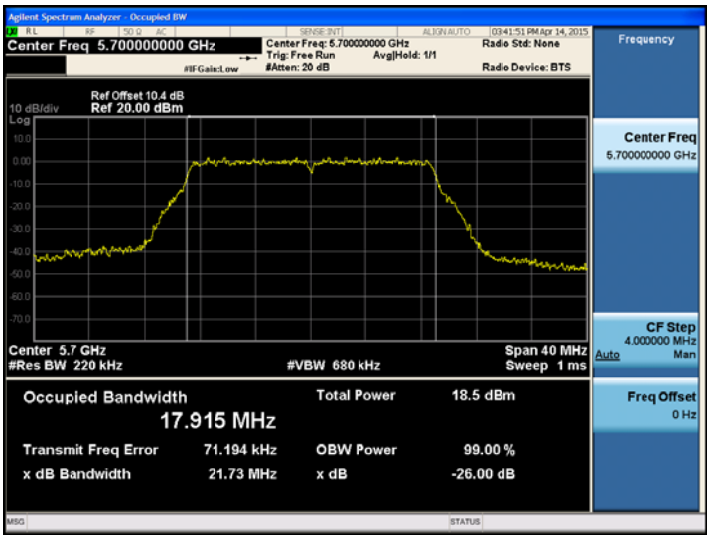
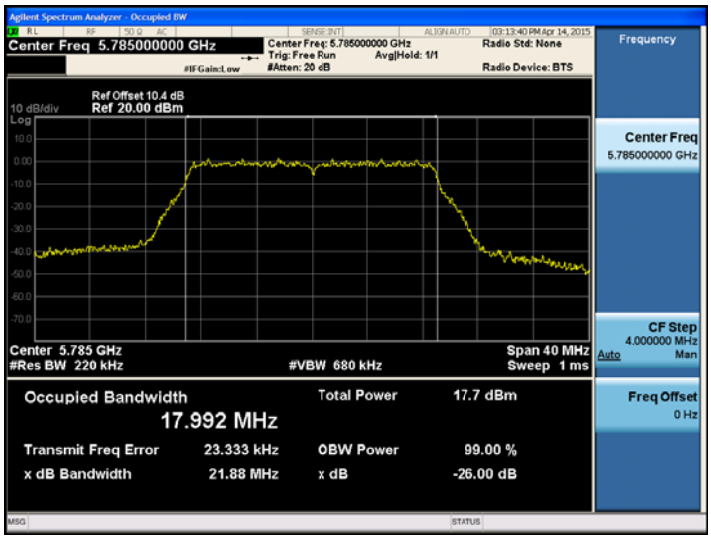
Conducted 26 dB Bandwidth Measurements for 802.11ac 20M BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.700	N/A	Pass
5580	116	21.620	N/A	Pass
5720	144	21.914	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac 20M BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.790	N/A	Pass
5785	157	21.880	N/A	Pass
5825	165	21.670	N/A	Pass

▣ TEST Plot for 802.11ac _20MHz BW

802.11ac_20 MHz BW UNII 1 BAND 26dB Bandwidth(CH 40)	802.11ac_20 MHz BW UNII 2A BAND 26dB Bandwidth (CH 64)
	
802.11ac_20 MHz BW UNII 2C BAND 26dB Bandwidth (CH 144)	**802.11ac_20 MHz BW 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 802.11n_40MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	40.191	N/A	Pass
5230	46	40.288	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	40.312	N/A	Pass
5310	62	39.967	N/A	Pass

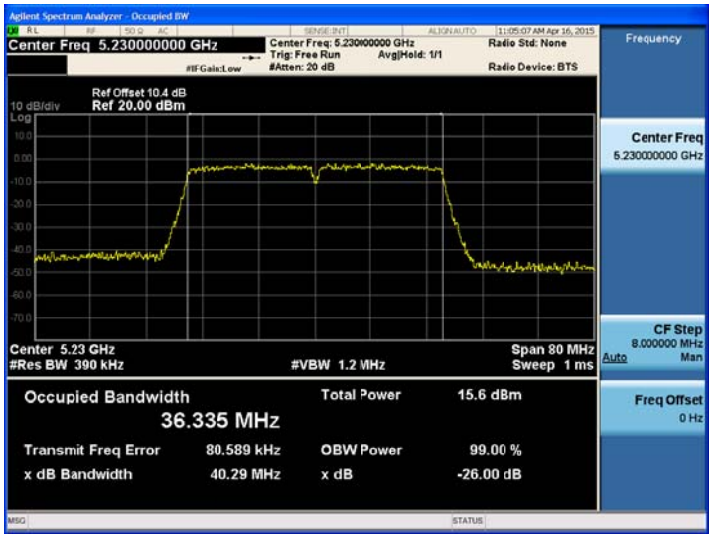
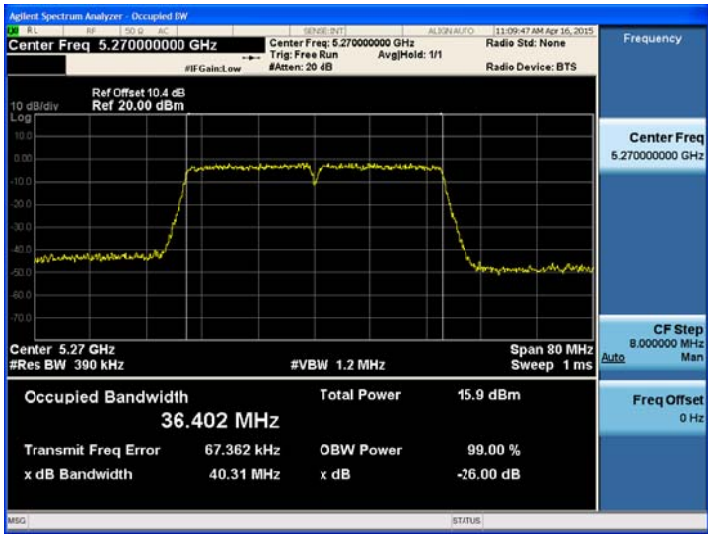
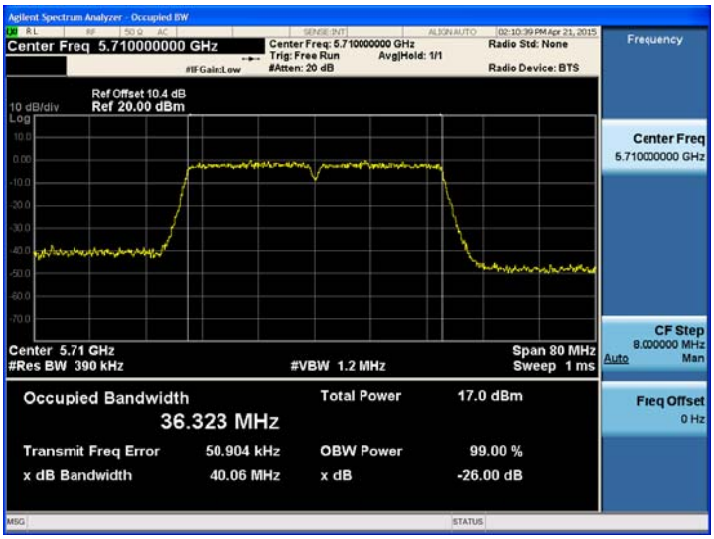
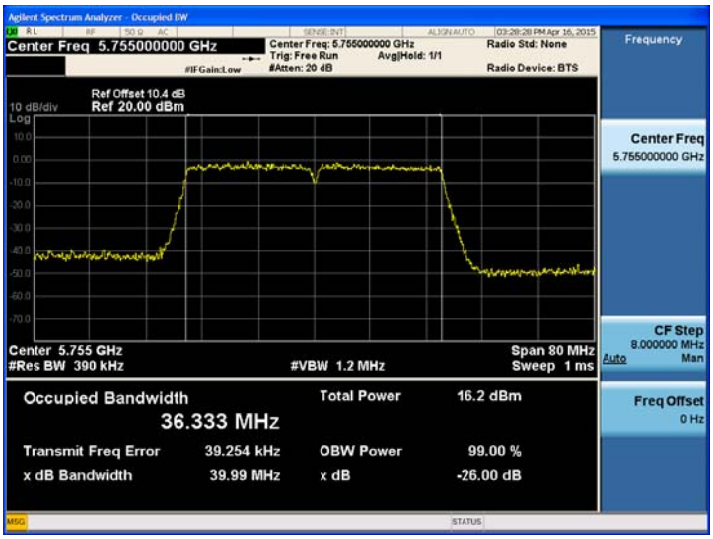
Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	40.038	N/A	Pass
5550	110	39.970	N/A	Pass
5710	142	40.064	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.992	N/A	Pass
5795	159	39.980	N/A	Pass

▣ TEST Plot for 802.11n_40MHz BW

802.11n_40 MHz BW UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_40 MHz BW UNII 2A BAND 26dB Bandwidth (CH 54)
	
802.11n_40 MHz BW UNII 2C BAND 26dB Bandwidth(CH 142)	**802.11n_40 MHz BW UNII 3 BAND 26dB Bandwidth (CH 151)**
	

Note :

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

▣ TEST RESULTS for 802.11ac_40MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 M BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.851	N/A	Pass
5230	46	40.057	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 M BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.972	N/A	Pass
5310	62	39.996	N/A	Pass

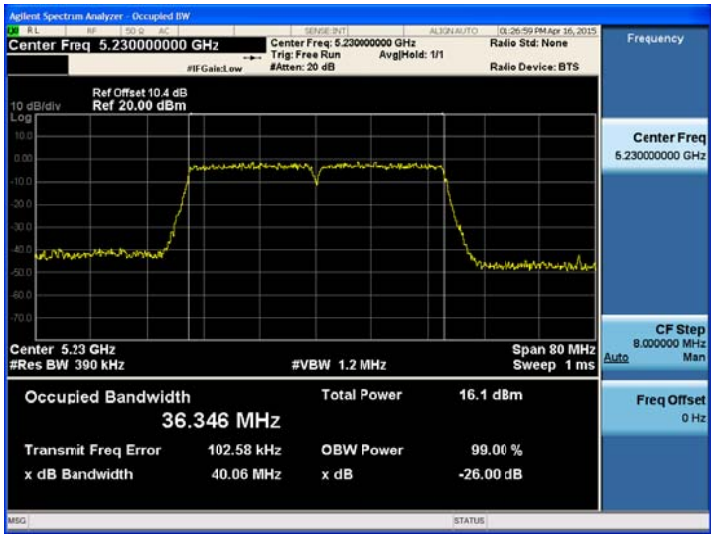
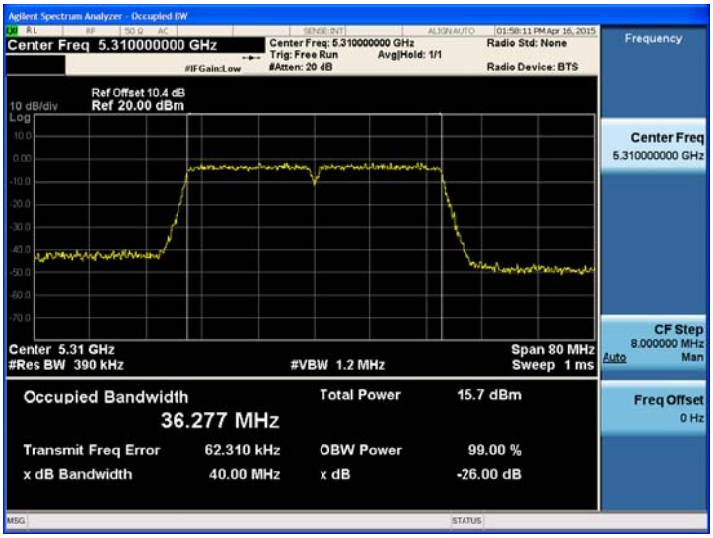
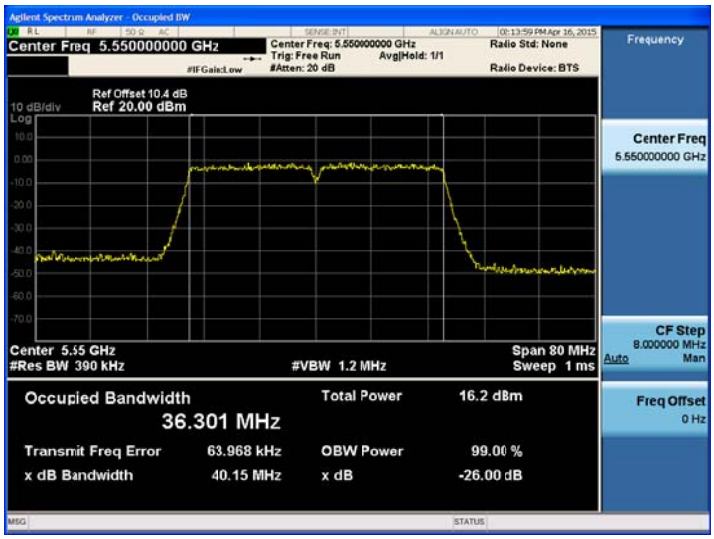
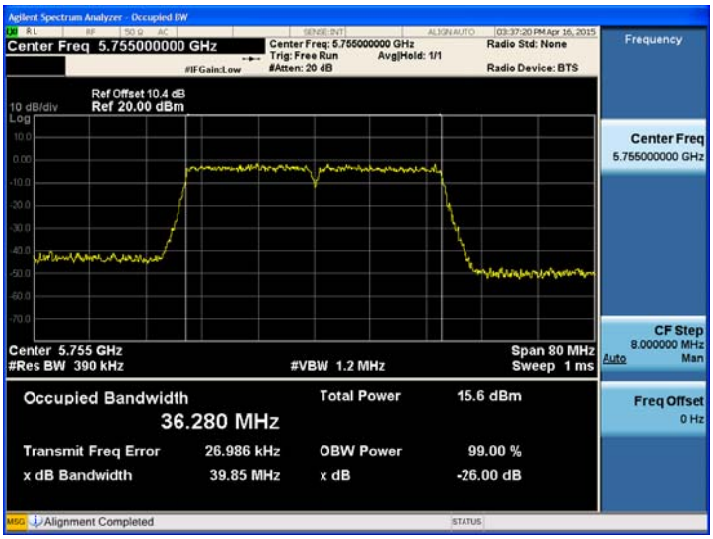
Conducted 26 dB Bandwidth Measurements for 802.11ac_40 M BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.797	N/A	Pass
5550	110	40.149	N/A	Pass
5710	142	39.810	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 M BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.847	N/A	Pass
5795	159	39.751	N/A	Pass

▣ TEST Plot for 802.11ac_40MHz BW

802.11ac_40 MHz BW UNII 1 BAND 26dB Bandwidth(CH 46)	802.11ac_40 MHz BW UNII 2A BAND 26dB Bandwidth(CH 62)
	
802.11ac_40 MHz BW UNII 2C BAND 26dB Bandwidth(CH 110)	**802.11ac_40 MHz BW UNII 3 BAND 26dB Bandwidth(CH 151)**
	

Note :

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

▣ TEST RESULTS for 802.11ac_80MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac_80M BW

802.11ac(80M) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	81.631	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80M BW

802.11ac(80M) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	81.817	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80M BW

802.11ac(80M) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5530	106	82.385	N/A	Pass
5690	138	81.622	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80M BW

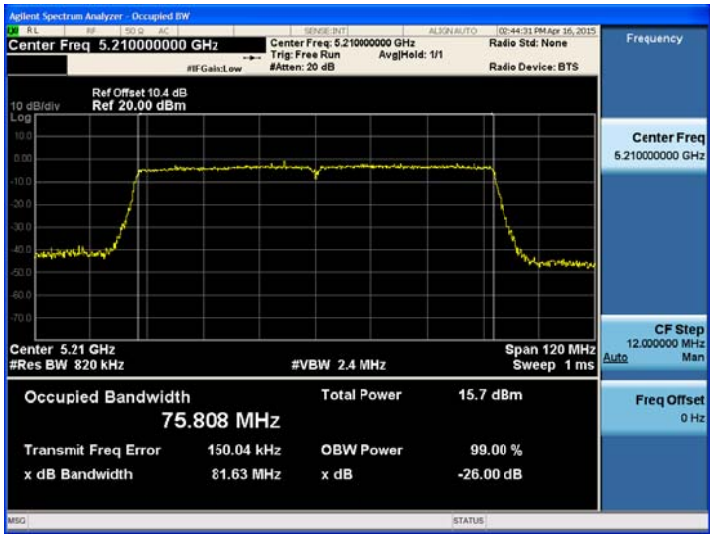
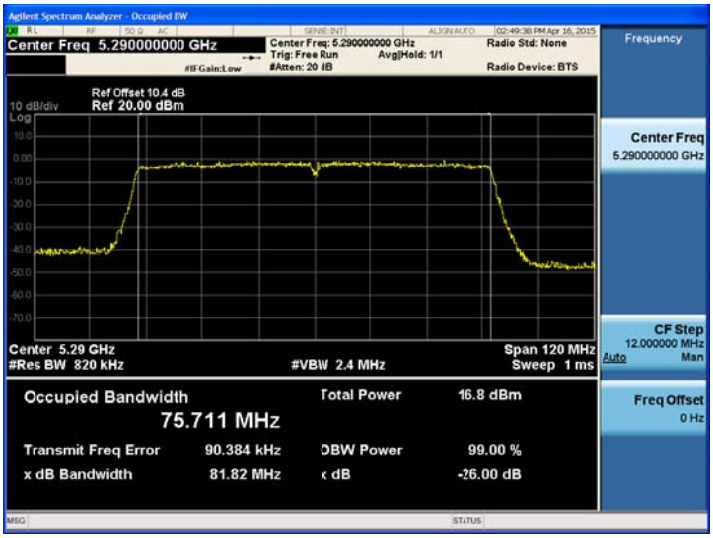
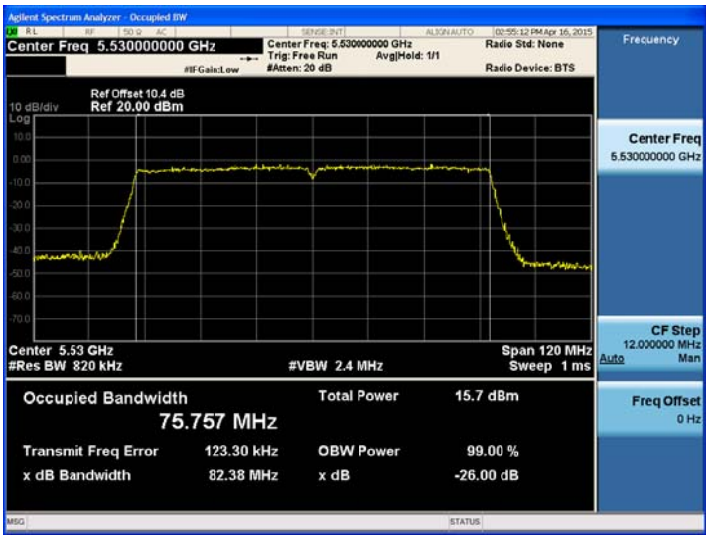
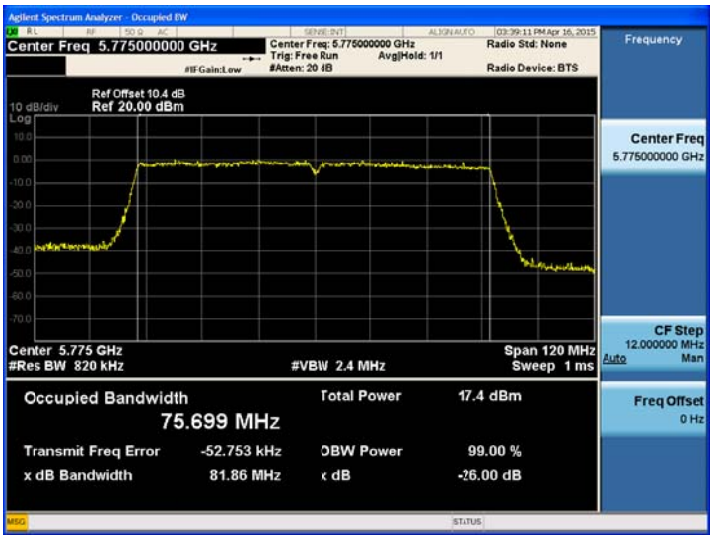
802.11ac(80M) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	81.864	N/A	Pass

Note :

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 Plot for 802.11ac _80MHz BW

802.11ac_80 MHz BW UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_80 MHz BW UNII 2A BAND 26dB Bandwidth(CH 58)
	
802.11ac_80 MHz BW UNII 2C BAND 26dB Bandwidth(CH 106)	**802.11ac_80 MHz BW UNII 3 BAND 26dB Bandwidth(CH 155)**
	

Note :

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

8.3 OUTPUT POWER MEASUREMENT

Test Requirements and limit, §15.407(a)(1)

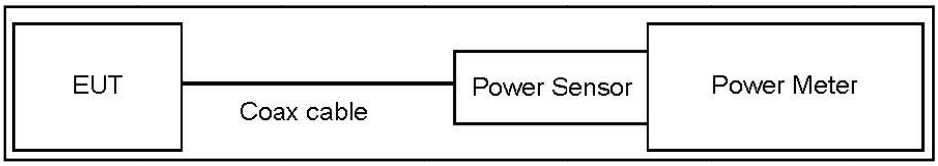
A transmitter antenna terminal of EUT is connected to the input of a Power meter or Spectrum Analyzer .Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

▣ Limit

1. Maximum Conducted Output Power :

Band	Mode	Limit (dBm)
UNII 1, 2A, 2C	802.11a,n,ac	23.98
UNII 3	802.11a,n,ac	30.00

▣ TEST CONFIGURATION(20 MHz BW)



▣ TEST PROCEDURE(20 MHz BW)

▪ Average Power (Procedure E.3.a in KDB 789033, issued 06/06/2014).

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

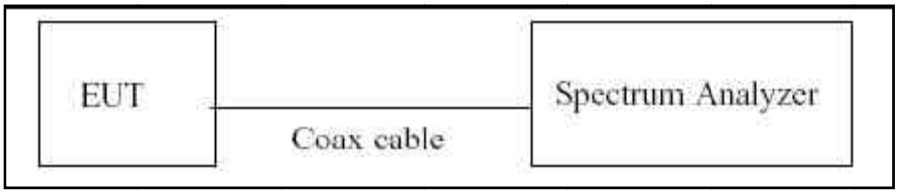
Note :

1. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 2A, 2C, 3	10.4

(Actual value of loss for the attenuator and cable combination)

▣ TEST CONFIGURATION(40 MHz BW & 80 MHz BW)



▣ TEST PROCEDURE(40 MHz BW & 80 MHz BW)

▪ Average Power

The transmitter output is connected to the Spectrum Analyzer. We use the spectrum analyzer's integrated band power measurement function. We tested according to Method SA-2 in KDB 789033(issued 06/06/2014).

The Spectrum Analyzer is set to

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2*span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

▣ Sample Calculation (Conducted)

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

▣ Sample Calculation (EIRP)

Output Power = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor + Ant gain

Note :

1. Spectrum reading values are not plot data. The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 2A, 2C, 3	10.4

(Actual value of loss for the attenuator and cable combination)

802.11a_20MHz BW (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a_20M BW Mode: 5180~5240)

802.11a(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	10.45	0.209	10.66	23.98
		9	10.15	0.317	10.47	23.98
		12	10.12	0.401	10.52	23.98
		18	9.97	0.605	10.58	23.98
		24	10.05	0.788	10.84	23.98
		36	9.73	1.082	10.81	23.98
		48	9.51	1.382	10.90	23.98
		54	9.38	1.526	10.90	23.98
5200	40	6	10.34	0.209	10.55	23.98
		9	9.98	0.317	10.30	23.98
		12	9.89	0.401	10.29	23.98
		18	9.96	0.605	10.56	23.98
		24	9.81	0.788	10.59	23.98
		36	9.53	1.082	10.61	23.98
		48	9.41	1.382	10.79	23.98
		54	9.18	1.526	10.70	23.98
5240	48	6	10.42	0.209	10.63	23.98
		9	10.03	0.317	10.35	23.98
		12	10.11	0.401	10.51	23.98
		18	9.94	0.605	10.55	23.98
		24	10.02	0.788	10.81	23.98
		36	9.78	1.082	10.86	23.98
		48	9.49	1.382	10.87	23.98
		54	9.33	1.526	10.86	23.98

802.11a _20MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a_20M Mode: 5260~5320)

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6	10.42	0.209	10.63	23.98
		9	10.17	0.317	10.49	23.98
		12	10.17	0.401	10.57	23.98
		18	9.99	0.605	10.60	23.98
		24	9.97	0.788	10.76	23.98
		36	9.76	1.082	10.84	23.98
		48	9.49	1.382	10.87	23.98
		54	9.28	1.526	10.81	23.98
5300	60	6	10.43	0.209	10.64	23.98
		9	10.25	0.317	10.57	23.98
		12	10.16	0.401	10.56	23.98
		18	10.04	0.605	10.65	23.98
		24	10.02	0.788	10.80	23.98
		36	9.74	1.082	10.82	23.98
		48	9.48	1.382	10.86	23.98
		54	9.28	1.526	10.81	23.98
5320	64	6	10.38	0.209	10.59	23.98
		9	10.47	0.317	10.79	23.98
		12	10.15	0.401	10.55	23.98
		18	10.14	0.605	10.75	23.98
		24	10.00	0.788	10.79	23.98
		36	9.69	1.082	10.77	23.98
		48	9.43	1.382	10.82	23.98
		54	9.28	1.526	10.81	23.98

802.11a _20MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a_20M Mode: 5500~5720)

802.11a Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6	11.26	0.209	11.47	23.98
		9	10.96	0.317	11.28	23.98
		12	10.82	0.401	11.22	23.98
		18	10.70	0.605	11.31	23.98
		24	10.81	0.788	11.60	23.98
		36	10.52	1.082	11.60	23.98
		48	10.29	1.382	11.67	23.98
		54	10.06	1.526	11.58	23.98
5580	116	6	11.36	0.209	11.57	23.98
		9	11.19	0.317	11.51	23.98
		12	11.08	0.401	11.48	23.98
		18	11.08	0.605	11.68	23.98
		24	10.99	0.788	11.78	23.98
		36	10.73	1.082	11.81	23.98
		48	10.43	1.382	11.81	23.98
		54	10.29	1.526	11.81	23.98
5700	140	6	11.54	0.209	11.75	23.98
		9	11.37	0.317	11.69	23.98
		12	11.29	0.401	11.69	23.98
		18	11.12	0.605	11.72	23.98
		24	11.20	0.788	11.99	23.98
		36	10.88	1.082	11.96	23.98
		48	10.61	1.382	11.99	23.98
		54	10.42	1.526	11.95	23.98

802.11a _20MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11a_20M BW Mode: 5745~5825)

802.11a (20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6	11.33	0.209	11.54	30
		9	11.13	0.317	11.45	30
		12	11.11	0.401	11.51	30
		18	10.91	0.605	11.52	30
		24	10.98	0.788	11.76	30
		36	10.70	1.082	11.78	30
		48	10.36	1.382	11.75	30
		54	10.15	1.526	11.67	30
5785	157	6	11.28	0.209	11.49	30
		9	11.11	0.317	11.43	30
		12	11.04	0.401	11.44	30
		18	10.92	0.605	11.52	30
		24	10.94	0.788	11.73	30
		36	10.52	1.082	11.60	30
		48	10.34	1.382	11.73	30
		54	10.14	1.526	11.67	30
5825	165	6	11.28	0.209	11.49	30
		9	11.10	0.317	11.42	30
		12	10.96	0.401	11.37	30
		18	10.79	0.605	11.40	30
		24	10.82	0.788	11.61	30
		36	10.50	1.082	11.59	30
		48	10.35	1.382	11.73	30
		54	10.07	1.526	11.60	30

802.11n _20MHz BW (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_20M BW Mode: 5180~5240)

802.11n(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	9.79	0.243	10.04	23.98
		13	9.59	0.467	10.05	23.98
		19.5	9.41	0.674	10.08	23.98
		26	9.62	0.829	10.45	23.98
		39	9.26	1.136	10.40	23.98
		52	8.92	1.447	10.36	23.98
		58.5	8.82	1.567	10.39	23.98
		65	8.73	1.644	10.37	23.98
5200	40	6.5	10.23	0.243	10.47	23.98
		13	9.88	0.467	10.35	23.98
		19.5	9.77	0.674	10.45	23.98
		26	9.99	0.829	10.82	23.98
		39	9.77	1.136	10.90	23.98
		52	9.45	1.447	10.90	23.98
		58.5	9.37	1.567	10.94	23.98
		65	9.29	1.644	10.94	23.98
5240	48	6.5	10.18	0.243	10.43	23.98
		13	10.02	0.467	10.48	23.98
		19.5	9.87	0.674	10.55	23.98
		26	10.04	0.829	10.87	23.98
		39	9.78	1.136	10.92	23.98
		52	9.70	1.447	11.15	23.98
		58.5	9.45	1.567	11.02	23.98
		65	9.63	1.644	11.28	23.98

802.11n _20MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_20M BW Mode: 5260~5320)

802.11n(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6.5	10.33	0.243	10.57	23.98
		13	10.13	0.467	10.60	23.98
		19.5	10.03	0.674	10.70	23.98
		26	10.18	0.829	11.01	23.98
		39	9.79	1.136	10.93	23.98
		52	9.57	1.447	11.02	23.98
		58.5	9.46	1.567	11.02	23.98
		65	9.31	1.644	10.96	23.98
5300	60	6.5	10.26	0.243	10.51	23.98
		13	10.04	0.467	10.50	23.98
		19.5	9.86	0.674	10.54	23.98
		26	10.07	0.829	10.90	23.98
		39	9.79	1.136	10.92	23.98
		52	9.55	1.447	10.99	23.98
		58.5	9.40	1.567	10.97	23.98
		65	9.32	1.644	10.97	23.98
5320	64	6.5	10.15	0.243	10.39	23.98
		13	10.00	0.467	10.46	23.98
		19.5	9.77	0.674	10.44	23.98
		26	9.98	0.829	10.81	23.98
		39	9.62	1.136	10.75	23.98
		52	9.40	1.447	10.85	23.98
		58.5	9.29	1.567	10.86	23.98
		65	9.25	1.644	10.90	23.98

802.11n _20MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_20M BW Mode: 5500~5700)

802.11n(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6.5	9.89	0.243	10.13	23.98
		13	9.70	0.467	10.16	23.98
		19.5	9.57	0.674	10.24	23.98
		26	9.71	0.829	10.54	23.98
		39	9.47	1.136	10.61	23.98
		52	9.02	1.447	10.46	23.98
		58.5	9.07	1.567	10.63	23.98
		65	8.64	1.644	10.28	23.98
5580	116	6.5	11.13	0.243	11.37	23.98
		13	10.96	0.467	11.43	23.98
		19.5	10.75	0.674	11.42	23.98
		26	10.95	0.829	11.77	23.98
		39	10.65	1.136	11.79	23.98
		52	10.27	1.447	11.72	23.98
		58.5	10.17	1.567	11.74	23.98
		65	10.11	1.644	11.75	23.98
5700	140	6.5	11.26	0.243	11.50	23.98
		13	11.05	0.467	11.52	23.98
		19.5	10.87	0.674	11.54	23.98
		26	11.06	0.829	11.88	23.98
		39	10.85	1.136	11.99	23.98
		52	10.48	1.447	11.93	23.98
		58.5	10.30	1.567	11.86	23.98
		65	10.31	1.644	11.96	23.98

802.11n _20MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_20M BW Mode: 5745~5825)

802.11n(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6.5	11.10	0.243	11.34	30
		13	10.84	0.467	11.30	30
		19.5	10.73	0.674	11.40	30
		26	10.99	0.829	11.82	30
		39	10.52	1.136	11.66	30
		52	10.35	1.447	11.80	30
		58.5	10.16	1.567	11.73	30
		65	10.08	1.644	11.72	30
5785	157	6.5	11.17	0.243	11.41	30
		13	10.92	0.467	11.39	30
		19.5	10.77	0.674	11.44	30
		26	10.91	0.829	11.74	30
		39	10.62	1.136	11.76	30
		52	10.31	1.447	11.76	30
		58.5	10.18	1.567	11.74	30
		65	9.99	1.644	11.63	30
5825	165	6.5	11.17	0.243	11.41	30
		13	10.79	0.467	11.26	30
		19.5	10.70	0.674	11.38	30
		26	10.81	0.829	11.64	30
		39	10.53	1.136	11.67	30
		52	10.39	1.447	11.84	30
		58.5	10.23	1.567	11.79	30
		65	10.18	1.644	11.82	30

802.11ac _20MHz BW (UNII 1)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20M BW Mode: 5180~5240)

802.11ac(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	9.85	0.248	10.09	23.98
		13	9.55	0.443	10.00	23.98
		19.5	9.36	0.640	10.00	23.98
		26	9.48	0.817	10.29	23.98
		39	9.15	1.119	10.27	23.98
		52	8.98	1.380	10.36	23.98
		58.5	8.77	1.511	10.29	23.98
		65	8.67	1.658	10.33	23.98
		78	8.49	1.833	10.32	23.98
5200	40	6.5	10.21	0.248	10.46	23.98
		13	10.02	0.443	10.47	23.98
		19.5	9.82	0.640	10.46	23.98
		26	10.02	0.817	10.84	23.98
		39	9.48	1.119	10.60	23.98
		52	9.47	1.380	10.85	23.98
		58.5	9.38	1.511	10.89	23.98
		65	9.27	1.658	10.93	23.98
		78	9.08	1.833	10.92	23.98
5240	48	6.5	10.21	0.248	10.45	23.98
		13	10.08	0.443	10.52	23.98
		19.5	9.78	0.640	10.42	23.98
		26	10.03	0.817	10.84	23.98
		39	9.72	1.119	10.84	23.98
		52	9.50	1.380	10.88	23.98
		58.5	9.39	1.511	10.90	23.98
		65	9.28	1.658	10.93	23.98
		78	9.11	1.833	10.94	23.98

802.11ac _20MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20M BW Mode: 5260~5320)

802.11ac(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6.5	10.47	0.248	10.72	23.98
		13	10.10	0.443	10.55	23.98
		19.5	10.05	0.640	10.69	23.98
		26	10.23	0.817	11.05	23.98
		39	9.84	1.119	10.96	23.98
		52	9.57	1.380	10.95	23.98
		58.5	9.46	1.511	10.97	23.98
		65	9.33	1.658	10.98	23.98
		78	9.19	1.833	11.02	23.98
5300	60	6.5	10.26	0.248	10.51	23.98
		13	10.07	0.443	10.51	23.98
		19.5	9.92	0.640	10.56	23.98
		26	10.06	0.817	10.88	23.98
		39	9.79	1.119	10.90	23.98
		52	9.53	1.380	10.91	23.98
		58.5	9.43	1.511	10.94	23.98
		65	9.26	1.658	10.92	23.98
		78	9.10	1.833	10.93	23.98
5320	64	6.5	10.13	0.248	10.38	23.98
		13	9.95	0.443	10.40	23.98
		19.5	9.78	0.640	10.42	23.98
		26	10.03	0.817	10.84	23.98
		39	9.66	1.119	10.77	23.98
		52	9.43	1.380	10.81	23.98
		58.5	9.32	1.511	10.83	23.98
		65	9.24	1.658	10.90	23.98
		78	9.01	1.833	10.84	23.98

802.11ac _20MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20M BW Mode: 5500~5720)

802.11ac(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6.5	9.94	0.248	10.18	23.98
		13	9.72	0.443	10.16	23.98
		19.5	9.56	0.640	10.19	23.98
		26	9.72	0.817	10.54	23.98
		39	9.41	1.119	10.53	23.98
		52	8.90	1.380	10.28	23.98
		58.5	9.05	1.511	10.56	23.98
		65	8.82	1.658	10.48	23.98
		78	8.85	1.833	10.68	23.98
5580	116	6.5	11.14	0.248	11.39	23.98
		13	10.95	0.443	11.40	23.98
		19.5	10.80	0.640	11.44	23.98
		26	10.97	0.817	11.79	23.98
		39	10.50	1.119	11.62	23.98
		52	10.33	1.380	11.71	23.98
		58.5	10.18	1.511	11.69	23.98
		65	10.18	1.658	11.84	23.98
		78	9.84	1.833	11.68	23.98
5700	140	6.5	11.29	0.248	11.54	23.98
		13	10.98	0.443	11.42	23.98
		19.5	10.93	0.640	11.57	23.98
		26	11.01	0.817	11.83	23.98
		39	10.69	1.119	11.81	23.98
		52	10.43	1.380	11.81	23.98
		58.5	10.39	1.511	11.90	23.98
		65	10.31	1.658	11.97	23.98
		78	9.97	1.833	11.81	23.98

802.11ac _20MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20M BW Mode: 5745~5825)

802.11ac(20MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	6.5	11.14	0.248	11.39	30
		13	10.84	0.443	11.29	30
		19.5	10.67	0.640	11.31	30
		26	10.95	0.817	11.77	30
		39	10.62	1.119	11.74	30
		52	10.28	1.380	11.66	30
		58.5	10.19	1.511	11.71	30
		65	10.05	1.658	11.71	30
		78	9.87	1.833	11.70	30
5785	157	6.5	11.14	0.248	11.38	30
		13	10.86	0.443	11.31	30
		19.5	10.78	0.640	11.42	30
		26	10.96	0.817	11.78	30
		39	10.61	1.119	11.73	30
		52	10.39	1.380	11.77	30
		58.5	10.16	1.511	11.67	30
		65	10.07	1.658	11.73	30
		78	9.82	1.833	11.65	30
5825	165	6.5	11.15	0.248	11.40	30
		13	10.95	0.443	11.39	30
		19.5	10.72	0.640	11.36	30
		26	10.83	0.817	11.65	30
		39	10.62	1.119	11.74	30
		52	10.31	1.380	11.69	30
		58.5	10.18	1.511	11.69	30
		65	10.14	1.658	11.80	30
		78	9.93	1.833	11.76	30

802.11n _40MHz BW (UNII 1)

▣ TEST RESULTS

40MHz BW

Conducted Output Power Measurements (802.11n_40M BW Mode: 5190~5230)

802.11n(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	7.81	0.455	8.26	23.98
		27	7.19	0.821	8.01	23.98
		40.5	7.14	1.165	8.30	23.98
		54	6.96	1.452	8.41	23.98
		81	6.48	1.929	8.41	23.98
		108	5.83	2.241	8.08	23.98
		121.5	6.06	2.372	8.44	23.98
		135	5.78	2.541	8.32	23.98
5230	46	13.5	8.59	0.455	9.05	23.98
		27	8.20	0.821	9.02	23.98
		40.5	7.86	1.165	9.03	23.98
		54	7.86	1.452	9.31	23.98
		81	7.31	1.929	9.24	23.98
		108	6.98	2.241	9.22	23.98
		121.5	7.02	2.372	9.39	23.98
		135	6.65	2.541	9.19	23.98

802.11n _40MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_40M BW Mode: 5270~5310)

802.11n(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	13.5	8.87	0.455	9.33	23.98
		27	8.51	0.821	9.33	23.98
		40.5	8.25	1.165	9.41	23.98
		54	8.10	1.452	9.56	23.98
		81	7.50	1.929	9.43	23.98
		108	7.37	2.241	9.62	23.98
		121.5	7.00	2.372	9.37	23.98
		135	7.14	2.541	9.68	23.98
5310	62	13.5	8.61	0.455	9.07	23.98
		27	8.18	0.821	9.01	23.98
		40.5	7.98	1.165	9.15	23.98
		54	7.72	1.452	9.17	23.98
		81	7.40	1.929	9.33	23.98
		108	7.01	2.241	9.25	23.98
		121.5	6.93	2.372	9.30	23.98
		135	6.49	2.541	9.03	23.98

802.11n _40MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_40M BW Mode: 5510~5670)

802.11n(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	7.74	0.455	8.20	23.98
		27	7.32	0.821	8.14	23.98
		40.5	6.84	1.165	8.01	23.98
		54	6.85	1.452	8.30	23.98
		81	6.29	1.929	8.22	23.98
		108	6.03	2.241	8.27	23.98
		121.5	5.85	2.372	8.22	23.98
		135	5.70	2.541	8.24	23.98
5550	110	13.5	9.07	0.455	9.52	23.98
		27	8.79	0.821	9.62	23.98
		40.5	8.43	1.165	9.60	23.98
		54	8.36	1.452	9.81	23.98
		81	7.82	1.929	9.75	23.98
		108	7.56	2.241	9.80	23.98
		121.5	7.40	2.372	9.77	23.98
		135	7.21	2.541	9.75	23.98
5670	134	13.5	9.36	0.455	9.81	23.98
		27	8.96	0.821	9.78	23.98
		40.5	8.41	1.165	9.57	23.98
		54	8.52	1.452	9.97	23.98
		81	8.04	1.929	9.97	23.98
		108	7.61	2.241	9.85	23.98
		121.5	7.35	2.372	9.72	23.98
		135	7.19	2.541	9.73	23.98

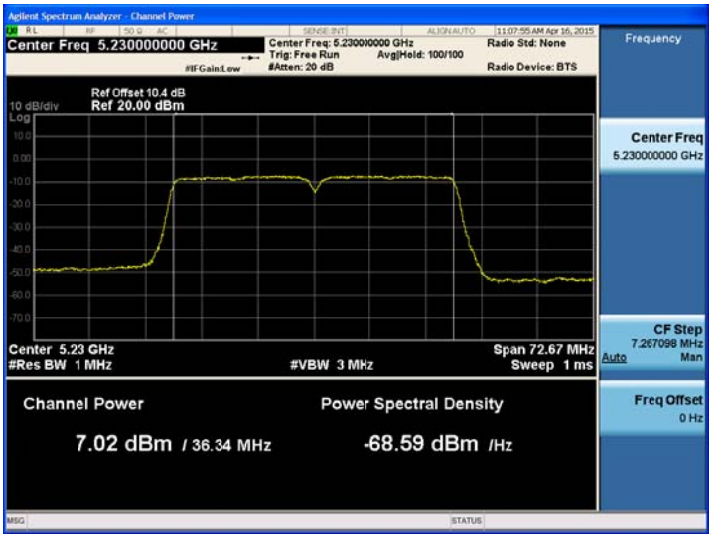
802.11n_40MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11n_40M BW Mode: 5755~5795)

802.11n(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	13.5	9.37	0.881	10.25	30
		27	9.09	1.481	10.57	30
		40.5	8.71	1.959	10.67	30
		54	8.89	2.318	11.20	30
		81	8.65	2.831	11.48	30
		108	8.21	3.167	11.37	30
		121.5	8.11	3.369	11.48	30
		135	7.85	3.457	11.31	30
5795	159	13.5	7.76	3.729	11.49	30
		27	7.50	3.868	11.37	30
		40.5	9.37	0.881	10.25	30
		54	9.09	1.481	10.57	30
		81	8.71	1.959	10.67	30
		108	8.89	2.318	11.20	30
		121.5	8.65	2.831	11.48	30
		135	8.21	3.167	11.37	30

▣ TEST Plot for 802.11n_40MHz BW

802.11n_40 MHz BW UNII 1 BAND Average Power (5190 MHz ~5230 MHz) CH 46 121.5 Mbps	802.11n_40 MHz BW UNII 2A BAND Average Power (5270 MHz ~5310 MHz) CH 54 135 Mbps
	
802.11n_40 MHz BW UNII 2C BAND Average Power (5510 MHz ~5670 MHz) CH 134 54 Mpbs	**802.11n_40 MHz BW UNII 3 BAND Average Power (5755 MHz ~5795 MHz) CH 159 13.5 Mbps**
	

▣ 802.11ac_40 MHz BW (UNII 1)

40MHz BW

Conducted Output Power Measurements (802.11ac_40M BW Mode: 5190~5230)

802.11ac(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	7.80	0.451	8.25	30
		27	7.50	0.830	8.33	30
		40.5	6.89	1.159	8.05	30
		54	7.04	1.433	8.47	30
		81	6.58	1.881	8.46	30
		108	6.24	2.207	8.45	30
		121.5	6.10	2.369	8.46	30
		135	5.86	2.501	8.37	30
		162	5.35	2.758	8.10	30
		180	5.62	2.831	8.45	30
5230	46	13.5	9.03	0.451	9.49	30
		27	8.68	0.830	9.51	30
		40.5	8.12	1.159	9.28	30
		54	8.13	1.433	9.57	30
		81	7.51	1.881	9.39	30
		108	7.37	2.207	9.58	30
		121.5	7.07	2.369	9.44	30
		135	6.83	2.501	9.33	30
		162	6.54	2.758	9.30	30
		180	6.53	2.831	9.36	30

802.11ac _40MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_40M BW Mode: 5270~5310)

802.11ac(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	13.5	9.02	0.451	9.47	30
		27	8.61	0.830	9.44	30
		40.5	8.26	1.159	9.42	30
		54	8.17	1.433	9.60	30
		81	7.71	1.881	9.59	30
		108	7.38	2.207	9.59	30
		121.5	7.23	2.369	9.60	30
		135	7.18	2.501	9.68	30
		162	6.88	2.758	9.64	30
		180	6.84	2.831	9.67	30
5310	62	13.5	8.59	0.451	9.04	30
		27	8.27	0.830	9.10	30
		40.5	7.95	1.159	9.11	30
		54	7.85	1.433	9.28	30
		81	7.40	1.881	9.28	30
		108	7.04	2.207	9.25	30
		121.5	6.79	2.369	9.15	30
		135	6.82	2.501	9.32	30
		162	6.40	2.758	9.16	30
		180	6.52	2.831	9.36	30

802.11ac _40MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_40M BW Mode: 5510~5710)

802.11ac(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	7.66	0.451	8.11	30
		27	7.32	0.830	8.15	30
		40.5	6.92	1.159	8.08	30
		54	6.77	1.433	8.20	30
		81	6.22	1.881	8.10	30
		108	6.06	2.207	8.27	30
		121.5	5.73	2.369	8.10	30
		135	5.50	2.501	8.00	30
		162	5.29	2.758	8.04	30
		180	5.29	2.831	8.12	30
5550	110	13.5	9.14	0.451	9.59	30
		27	8.69	0.830	9.52	30
		40.5	8.45	1.159	9.61	30
		54	8.49	1.433	9.92	30
		81	7.89	1.881	9.77	30
		108	7.43	2.207	9.64	30
		121.5	7.42	2.369	9.79	30
		135	7.22	2.501	9.72	30
		162	6.77	2.758	9.53	30
		180	6.91	2.831	9.74	30
5670	134	13.5	9.28	0.451	9.73	30
		27	8.99	0.830	9.82	30
		40.5	8.63	1.159	9.78	30
		54	8.54	1.433	9.98	30
		81	8.00	1.881	9.88	30
		108	7.63	2.207	9.83	30
		121.5	7.42	2.369	9.79	30
		135	7.28	2.501	9.79	30
		162	7.05	2.758	9.81	30
		180	6.85	2.831	9.68	30

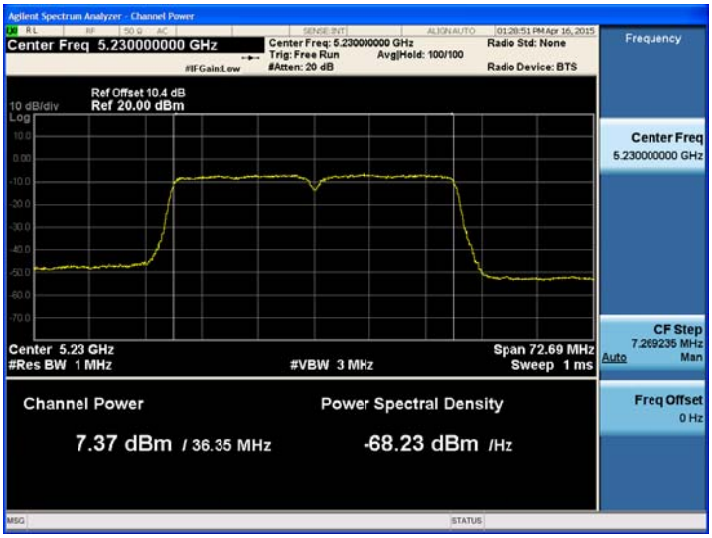
802.11ac _40MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_40M BW Mode: 5755~5795)

802.11ac(40MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	13.5	9.15	0.451	9.60	30
		27	8.78	0.830	9.61	30
		40.5	8.57	1.159	9.72	30
		54	8.39	1.433	9.82	30
		81	7.90	1.881	9.79	30
		108	7.44	2.207	9.65	30
		121.5	7.32	2.369	9.69	30
		135	7.15	2.501	9.65	30
		162	6.92	2.758	9.68	30
		180	6.92	2.831	9.75	30
5795	159	13.5	8.85	0.451	9.30	30
		27	8.24	0.830	9.07	30
		40.5	7.94	1.159	9.10	30
		54	7.97	1.433	9.40	30
		81	7.57	1.881	9.45	30
		108	7.17	2.207	9.38	30
		121.5	7.01	2.369	9.37	30
		135	6.89	2.501	9.39	30
		162	6.62	2.758	9.38	30
		180	6.61	2.831	9.44	30

▣ TEST Plot for 802.11ac_40MHz BW

802.11ac_40 MHz BW UNII 1 BAND Average Power (5190 ~ 5230 MHz) CH 46 108 Mpbs	802.11ac_40 MHz BW UNII 2A BAND Average Power (5270 ~ 5310 MHz) CH 54 135 Mbps
	
802.11ac_40 MHz BW UNII 2C BAND Average Power (5510 ~ 5710 MHz) CH 134 54 Mpbs	**802.11ac_40 MHz BW UNII 3 BAND Average Power (5755 ~ 5795 MHz) CH 151 54 Mpbs**
	

▣ 802.11ac_80 MHz BW

80MHz BW(UNII 1)

Conducted Output Power Measurements (802.11ac_80M BW Mode: 5210)

802.11ac(80MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	29.3	8.63	0.881	9.51	23.98
		58.5	8.17	1.481	9.65	23.98
		87.8	7.95	1.959	9.91	23.98
		117	8.08	2.318	10.40	23.98
		175.5	7.49	2.831	10.32	23.98
		234	7.30	3.167	10.46	23.98
		263.3	7.30	3.369	10.67	23.98
		292.5	6.98	3.457	10.44	23.98
		351	6.76	3.729	10.49	23.98
		390	6.56	3.868	10.43	23.98

802.11ac_80MHz BW (UNII 2A)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80M BW Mode: 5290)

802.11ac (80MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5290	58	29.3	9.15	0.881	10.03	23.98
		58.5	8.90	1.481	10.38	23.98
		87.8	8.59	1.959	10.55	23.98
		117	8.82	2.318	11.14	23.98
		175.5	8.37	2.831	11.20	23.98
		234	8.19	3.167	11.35	23.98
		263.3	7.94	3.369	11.31	23.98
		292.5	7.81	3.457	11.27	23.98
		351	7.61	3.729	11.34	23.98
		390	7.48	3.868	11.35	23.98

802.11ac _80MHz BW (UNII 2C)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80M BW Mode: 5530~5690)

802.11ac(80MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5530	106	29.3	8.62	0.881	9.50	23.98
		58.5	8.28	1.481	9.76	23.98
		87.8	7.91	1.959	9.87	23.98
		117	8.18	2.318	10.49	23.98
		175.5	7.45	2.831	10.28	23.98
		234	7.36	3.167	10.52	23.98
		263.3	7.08	3.369	10.45	23.98
		292.5	6.94	3.457	10.40	23.98
		351	6.77	3.729	10.50	23.98
		390	6.65	3.868	10.52	23.98
5690	138	29.3	9.34	0.881	10.22	23.98
		58.5	9.11	1.481	10.59	23.98
		87.8	8.80	1.959	10.76	23.98
		117	8.99	2.318	11.31	23.98
		175.5	8.61	2.831	11.44	23.98
		234	8.21	3.167	11.38	23.98
		263.3	8.03	3.369	11.40	23.98
		292.5	7.87	3.457	11.32	23.98
		351	7.63	3.729	11.36	23.98
		390	7.58	3.868	11.45	23.98

802.11ac _80MHz BW (UNII 3)

▣ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80M BW Mode: 5775)

802.11ac(80MHz) Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5775	155	29.3	9.37	0.881	10.25	30
		58.5	9.09	1.481	10.57	30
		87.8	8.71	1.959	10.67	30
		117	8.89	2.318	11.20	30
		175.5	8.65	2.831	11.48	30
		234	8.21	3.167	11.37	30
		263.3	8.11	3.369	11.48	30
		292.5	7.85	3.457	11.31	30
		351	7.76	3.729	11.49	30
		930	7.50	3.868	11.37	30

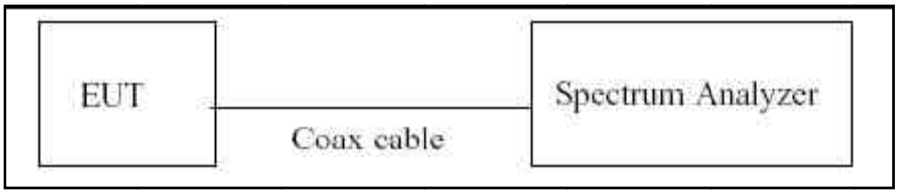
▣ TEST Plot for 802.11ac_80MHz BW

802.11ac_80 MHz BW UNII 1 BAND Average Power (5210 MHz) CH 42 263.3 Mbps	802.11ac_80 MHz BW UNII 2A BAND Average Power (5290 MHz) CH 58 234 Mbps
	
802.11ac_80 MHz BW UNII 2C BAND Average Power (5530 MHz ~ 5690 MHz) CH 138 390 Mbps	**802.11ac_80 MHz BW UNII 3 BAND Average Power (5775 MHz) CH 155 351 Mbps**
	

8.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 11 dBm/ MHz for UNII 1,2A, 2C and 30 dBm/500 kHz for UNII 3.

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033(issued 06/06/2014).

The spectrum analyzer is set to :

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2*span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

▣ Sample Calculation

PSD = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor

Output Power = -5 dBm + 10 dB + 0.8 dB + 0.21 dB = 16.01 dBm

Note :

1. Spectrum reading values are not plot data. The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss + Cable loss
3. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1, 2A , 2C, 3	10.4

(Actual value of loss for the attenuator and cable combination)

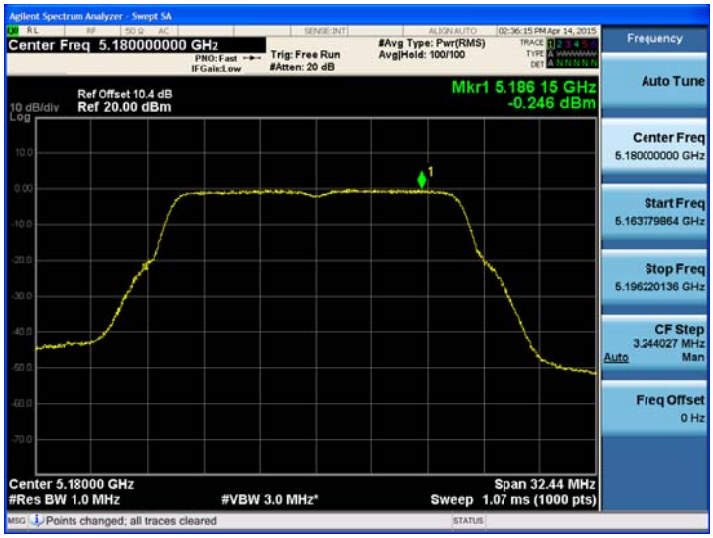
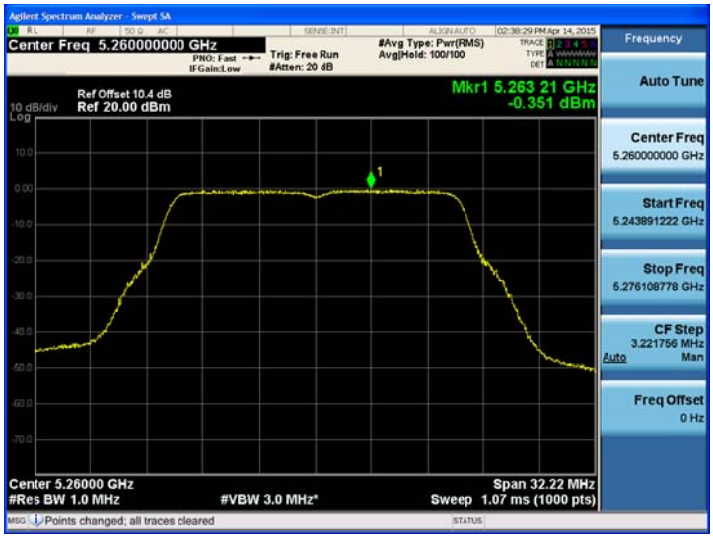
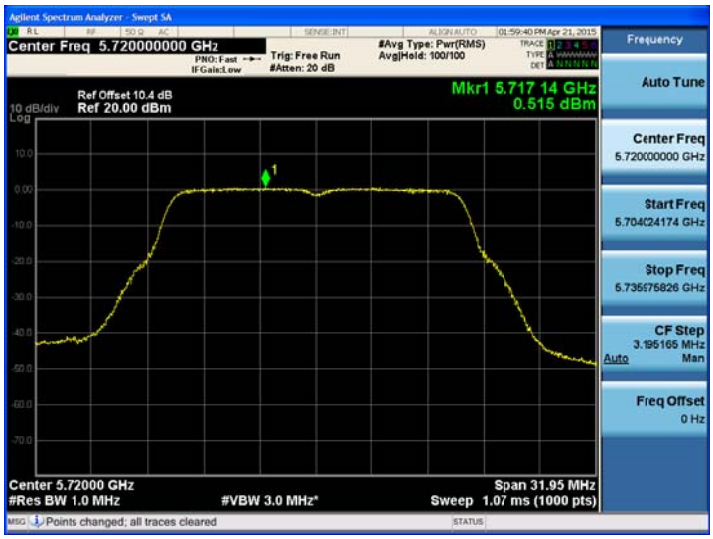
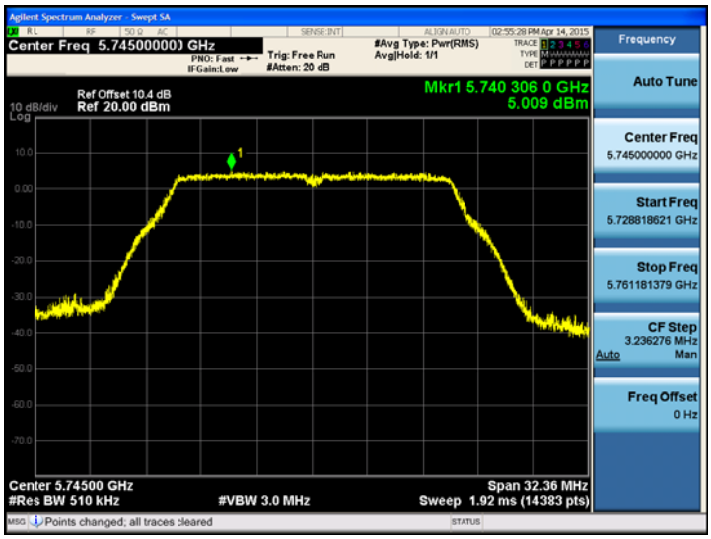
▣ 802.11a_20MHz BW

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11a	-0.246	1.52610	1.280	11	Pass
5200	40		-0.420	1.38159	0.962	11	Pass
5240	48		-0.454	1.38159	0.928	11	Pass
5260	52		-0.351	1.38159	1.031	11	Pass
5300	60		-0.595	1.38159	0.787	11	Pass
5320	64		-0.931	1.38159	0.451	11	Pass
5500	100		-0.948	1.38159	0.434	11	Pass
5580	116		0.303	1.08215	1.385	11	Pass
5720	144		0.515	1.38159	1.897	11	Pass
5745	149		5.009	1.08215	6.091	30	Pass
5785	157		4.442	0.78770	5.230	30	Pass
5825	165		4.153	1.38159	5.535	30	Pass

▣ TEST Plot for 802.11a 20MHz BW

802.11a_20MHz BW UNII 1 BAND PSD CH 36	802.11a_20MHz BW UNII 2A BAND PSD CH 52
	
802.11a_20MHz BW UNII 2C BAND PSD CH 144	**802.11a_20MHz BW UNII 3 BAND PSD CH 149**
	

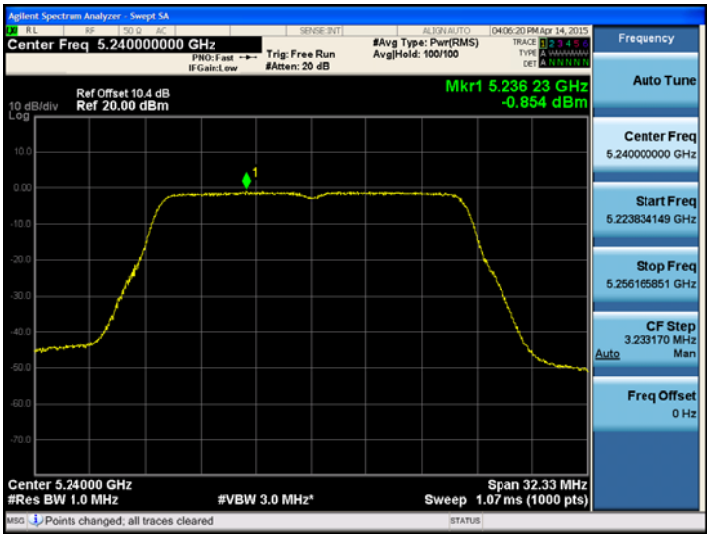
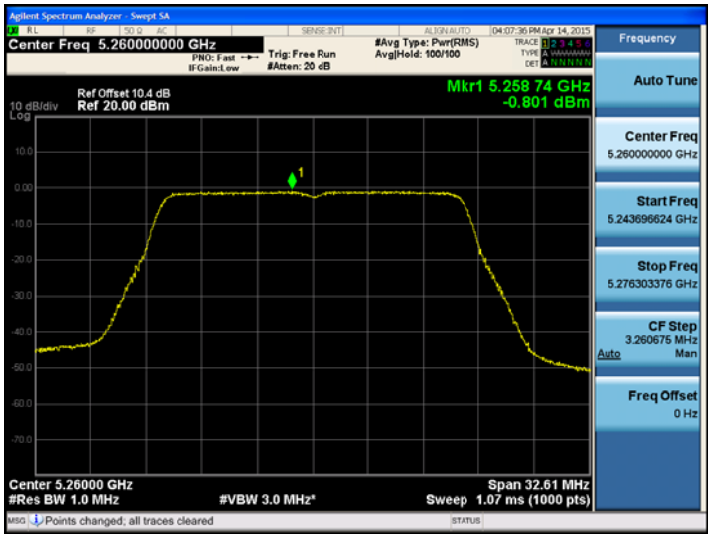
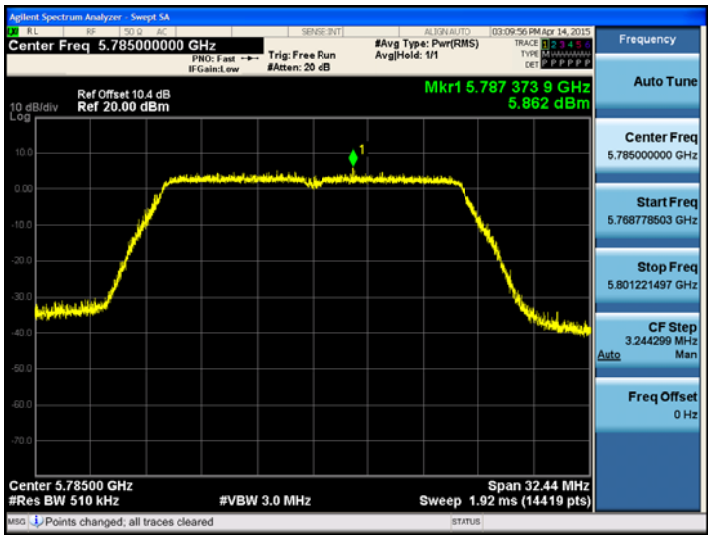
▣ 802.11n_20MHz BW

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11n 20M BW	-1.669	0.82899	-0.840	11	Pass
5200	40		-0.786	1.56678	0.781	11	Pass
5240	48		-0.854	1.64406	0.790	11	Pass
5260	52		-0.801	1.56678	0.766	11	Pass
5300	60		-1.125	1.44737	0.322	11	Pass
5320	64		-1.386	1.64406	0.258	11	Pass
5500	100		-2.341	1.56678	-0.774	11	Pass
5580	116		-0.282	1.13559	0.854	11	Pass
5720	144		0.232	1.44737	1.679	11	Pass
5745	149		5.524	0.82899	6.353	30	Pass
5785	157		5.862	1.44737	7.309	30	Pass
5825	165		5.380	1.44737	6.827	30	Pass

▣ TEST Plot for 802.11n 20MHz BW

802.11n_20MHz BW UNII 1 BAND PSD CH 48	802.11n_20MHz BW UNII 2A BAND PSD CH 52
	
802.11n_20MHz BW UNII 2C BAND PSD CH 144	**802.11n_20MHz BW UNII 3 BAND PSD CH 157**
	

▣ 802.11ac_20MHz BW

▣ TEST RESULTS

Conducted Power Density Measurements

Frequency (MHz)	Channel No.	Mode	Test Result				
			Measured Power Density (dBm)	Duty Cycle Factor (dB)	Measured Power Density(dBm) + Duty Cycle Factor	Limit (dBm)	Pass/Fail
5180	36	802.11ac _20MHz BW	-1.517	1.38019	-0.137	9.08	Pass
5200	40		-0.784	1.65812	0.874		Pass
5240	48		-0.759	1.83342	1.074		Pass
5260	52		-0.892	0.81719	-0.075	11	Pass
5300	60		-1.172	1.51063	0.339		Pass
5320	64		-1.307	1.65812	0.351		Pass
5500	100		-2.142	1.83342	-0.309	11	Pass
5580	116		-0.241	1.65812	1.417		Pass
5720	144		0.317	0.81719	1.134		Pass
5745	149		5.037	0.81719	5.854	30	Pass
5785	157		4.802	0.81719	5.619		Pass
5825	165		4.522	1.65812	6.180		Pass