

FCC/IC UNII REPORT

FCC/IC 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-F014-2

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID	:ZNFH815
IC	:2703C-H815
APPLICANT	:LG Electronics MobileComm U.S.A., Inc.

FCC/IC Model(s): LG-H815

FCC/IC Additional Model(s): LGH815, H815, LG-H815P, LGH815P, H815P, LG-H815p, LGH815p, H815p, LG-H815L, LGH815L, H815L, LG-H815I, LGH815I, H815I, LG-H815AR, LGH815AR, H815AR, LG-H815ar, LGH815ar, H815ar, LG-H815K, LGH815K, H815K, LG-H815k, LGH815k, H815k

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

Max. RF Output Power(Average):

Band	Mode	Channel Bandwidth (MHz)	Frequency Range (MHz)	Power (dBm)
UNII 1	802.11a	20	5180 – 5240	12.53 dBm
	802.11n	20	5180 – 5240	12.52 dBm
	802.11n	40	5190 – 5230	10.49 dBm
	802.11ac	20	5180 – 5240	12.65 dBm
	802.11ac	40	5190 – 5230	10.50 dBm
	802.11ac	80	5210	11.46 dBm
UNII 2A	802.11a	20	5260 – 5320	12.46 dBm
	802.11n	20	5260 – 5320	12.50 dBm
	802.11n	40	5270 – 5310	10.50 dBm
	802.11ac	20	5260 – 5320	12.54 dBm
	802.11ac	40	5270 – 5310	10.50 dBm
	802.11ac	80	5290	12.00 dBm
UNII2C	802.11a	20	5500 – 5720	12.66 dBm
	802.11n	20	5500 – 5720	12.67 dBm
	802.11n	40	5510 – 5710	10.50 dBm
	802.11ac	20	5500 – 5720	12.68 dBm
	802.11ac	40	5510 – 5710	10.41 dBm
	802.11ac	80	5530 – 5690	12.00 dBm
UNII3	802.11a	20	5745 – 5825	12.43 dBm
	802.11n	20	5745 – 5825	12.43 dBm
	802.11n	40	5755 – 5795	10.40 dBm
	802.11ac	20	5745 – 5825	12.30 dBm
	802.11ac	40	5755 – 5795	10.25 dBm
	802.11ac	80	5775	12.00 dBm

Modulation type

OFDM

FCC Classification:

Unlicensed National Information Infrastructure(UNII)

IC Rule Part(s) :

RSS-210 Issue 8(February 2015) , RSS-GEN Issue 4(November 2014)

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

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1504-F014	April 20, 2015	- First Approval Report
HCT-R-1504-F014-1	April 23, 2015	- Revised the Test Mode for Radiated Emissions on and EUT Type
HCT-R-1504-F014-2	April 28, 2015	- Revised the Test Description on page 5 - Revised the Test Mode for Radiated Emissions - Revised Measured Bandwidth on page 26 And Changed the plot on page 27.

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1. GENERAL INFORMATION

Applicant: LG Electronics MobileComm U.S.A., Inc
Address: 1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID: ZNFH815
IC: 2703C-H815
EUT Type: Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/LTE Phone with Bluetooth, WLAN, NFC
FCC/IC Model name(s): LG-H815
FCC/ IC Additional Model name(s): LGH815, H815, LG-H815P, LGH815P, H815P, LG-H815p, LGH815p, H815p, LG-H815L, LGH815L, H815L, LG-H815I, LGH815I, H815I, LG-H815AR, LGH815AR, H815AR, LG-H815ar, LGH815ar, H815ar, LG-H815K, LGH815K, H815K, LG-H815k, LGH815k, H815k
Date(s) of Tests: March 27, 2015 ~ April 06, 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/ IC Model Name	LG-H815	
FCC/IC Additional Model Name	LGH815, H815, LG-H815P, LGH815P, H815P, LG-H815p, LGH815p, H815p, LG-H815L, LGH815L, H815L, LG-H815I, LGH815I, H815I, LG-H815AR, LGH815AR, H815AR, LG-H815ar, LGH815ar, H815ar, LG-H815K, LGH815K, H815K, LG-H815k, LGH815k, H815k	
EUT Type	Cellular/PCS GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/LTE Phone with Bluetooth, WLAN, NFC	
Power Supply	DC 3.8 V	
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: Koma-tech.com Antenna type:FPCB Antenna Peak Gain : -0.55 dBi (5180~5240 UNII1 BAND) / -0.48 dBi (5260~5320 UNII2A BAND) 0.65 dBi (5500~5620 UNII2C BAND) / 0.08 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.

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, §15.407, RSS-GEN 7.1.2

“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 7.1.2

7. SUMMARY OF TEST RESULTS

7.1 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)(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)	N/A		N/A
AC Conducted Emissions 150 kHz-30 MHz	§15.207	<FCC 15.207 limits		N/A
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, 5.407(b)(1), (5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

7.2 IC Part

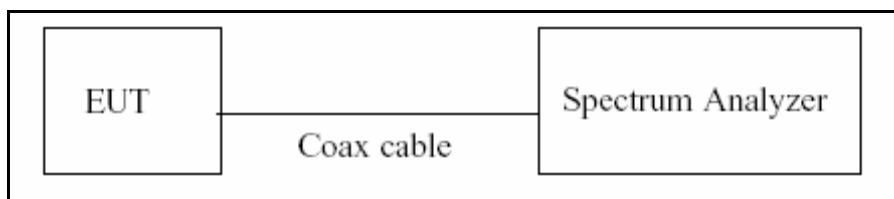
Test Description	IC Part Section(s)	Test Limit	Test Condition	Test Result
99% Bandwidth(IC)	RSS-GEN, 6.6	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-210, A8.2(a)	> 500 kHz		PASS
Maximum Conducted Output Power,	RSS-210, A9.2	< 250 mW or $11+10 \log_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or $11+10 \log_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-210, A8.4(4)	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-210, A9.2	< 200 mW or $10+10 \log_{10}$ (BW) dBm (5150-5250 MHz) < 1 W or $17+10 \log_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or $17+10 \log_{10}$ (BW) dBm (5470-5600 MHz, 5650-5725 MHz) Whichever power is less		
	RSS-210, A8.4(4)	<4 W (5725-5850 MHz)		PASS
Power Spectral Density	RSS-210, A9.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		
	RSS-210, A8.2(b)	<8 dBm/3 kHz(Conducted) (5725-5850 MHz)		
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, 8.8	RSS-GEN section 7.2.4 table 4		NA
Undesirable Emissions	RSS-210, A9.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5600 MHz 5650-5725 MHz)	RADIATED	PASS
	RSS-210, A8.5	>20 dBc(Conducted) (5725-5850 MHz)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-210, 2.2, RSS-GEN, 8.9, 8.10	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS
Receiver Spurious Emissions	RSS-GEN, 7.1.2	cf. Section 8.8.3		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 $RBW \geq EBW$ if possible; otherwise, set RBW to the largest available value. Set $VBW \geq RBW$. 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 $T \leq 16.7$ 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 available value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ microseconds. ($50/6.25 = 8$)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are $> 50/T$.

1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ 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 = $10 \cdot \log(1/\text{Duty Cycle})$

■ Duty Cycle Factor

Mode	Data Rate	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.058	2.167	0.94970005	0.224
	9	1.367	1.483	0.92178018	0.354
	12	1.038	1.146	0.90575916	0.430
	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_HT20	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_HT40	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_VHT20	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
802.11ac_VHT40	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
802.11ac_VHT80	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

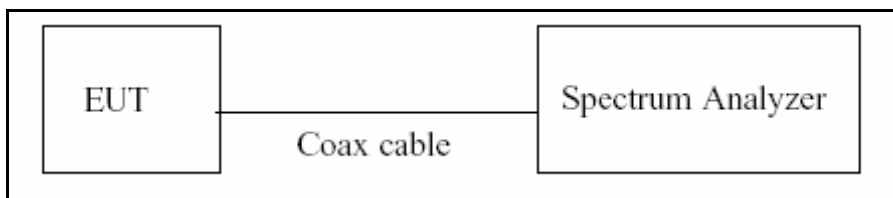
8.2 EMISSION BANDWIDTH AND MINIMUM EMISSION BANDWIDTH MEASUREMENT

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 and 6 dB bandwidth.

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

The 6 dB bandwidth is at least 500 kHz.

■ TEST CONFIGURATION



■ TEST PROCEDURE(26 dB Bandwidth)

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 peak 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 PROCEDURE(6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02, issued 06/06/2014)

1. RBW = 100 kHz
2. VBW $\geq$ 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 level 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.

Conducted 26 dB Bandwidth

■ TEST RESULTS for 802.11a_20MHz 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	21.617	N/A	Pass
5200	40	21.606	N/A	Pass
5240	48	21.505	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	21.583	N/A	Pass
5300	60	21.620	N/A	Pass
5320	64	21.557	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

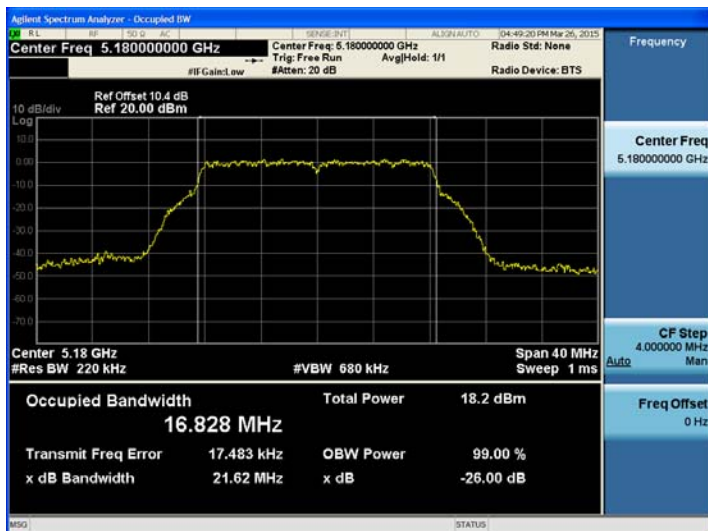
802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.509	N/A	Pass
5580	116	21.572	N/A	Pass
5720	144	21.480	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

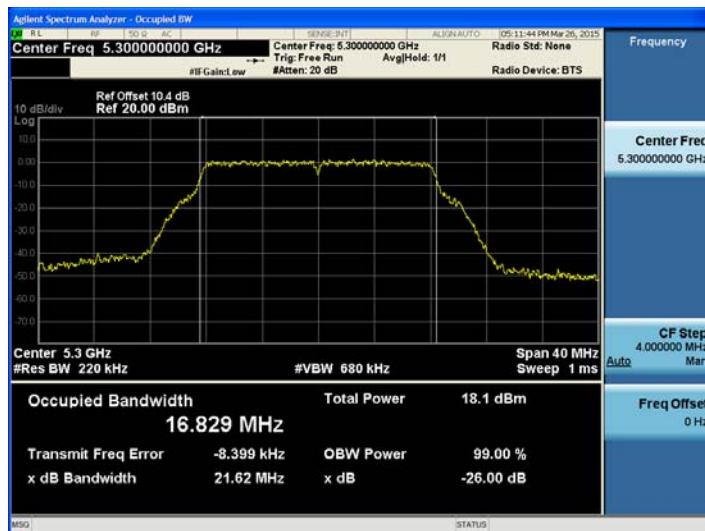
802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.544	N/A	Pass
5785	157	21.445	N/A	Pass
5825	165	21.549	N/A	Pass

TEST Plot for 802.11a _20MHz BW

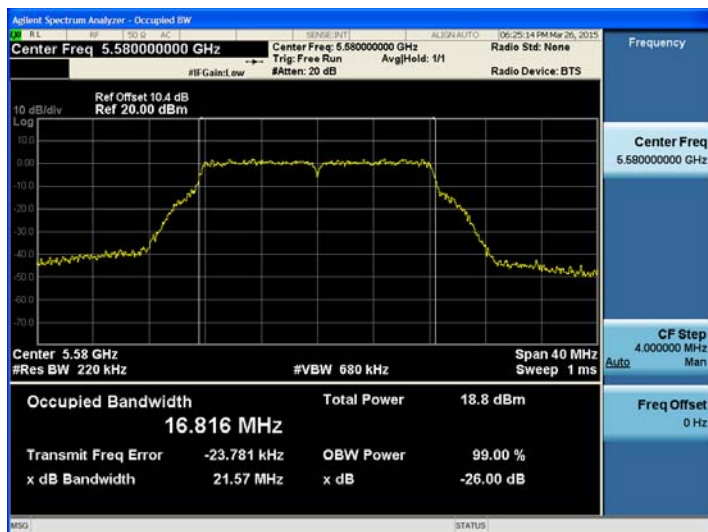
802.11a UNII 1 BAND 26dB Bandwidth



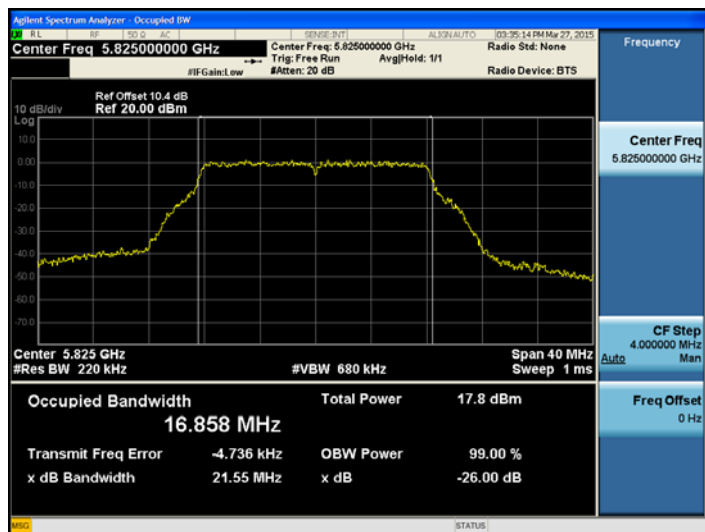
802.11a UNII 2A BAND 26dB Bandwidth



802.11a UNII 2C BAND 26dB Bandwidth



802.11a UNII 3 BAND 26dB Bandwidth



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_20 MHz BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.693	N/A	Pass
5200	40	21.713	N/A	Pass
5240	48	21.900	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.653	N/A	Pass
5300	60	21.666	N/A	Pass
5320	64	21.693	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_20 MHz BW

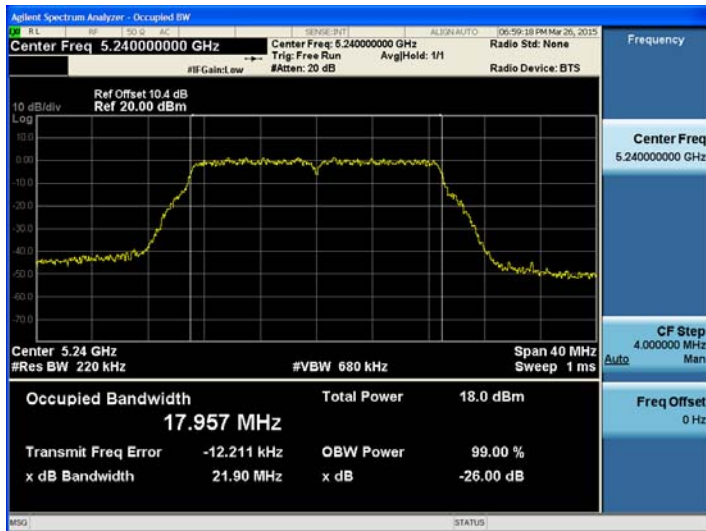
802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.823	N/A	Pass
5580	116	21.853	N/A	Pass
5720	144	21.847	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.804	N/A	Pass
5785	157	21.890	N/A	Pass
5825	165	21.617	N/A	Pass

■ TEST Plot for 802.11n _20MHz BW

802.11n_20 MHz BW UNII 1 BAND 26dB Bandwidth



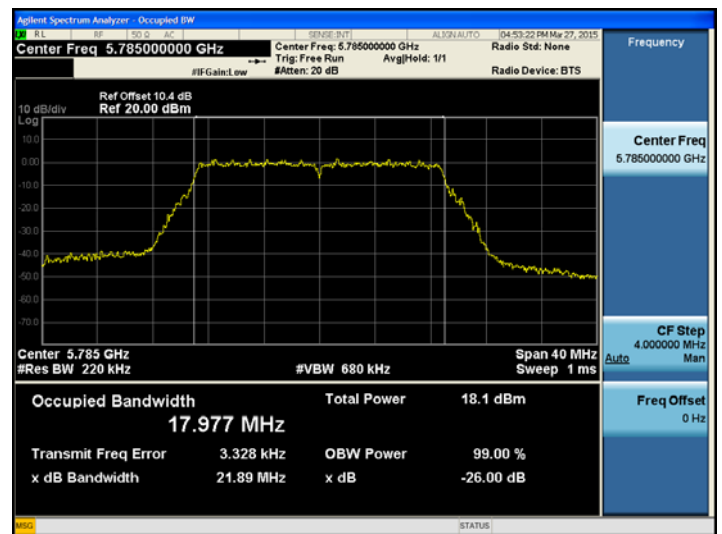
802.11n_20 MHz BW UNII 2A BAND 26dB Bandwidth



802.11n_20 MHz BW UNII 2C BAND 26dB Bandwidth



802.11n_20 MHz BW UNII 3 BAND 26dB Bandwidth



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_20 MHz BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	21.772	N/A	Pass
5200	40	21.845	N/A	Pass
5240	48	21.719	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_20 MHz BW

802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	21.699	N/A	Pass
5300	60	21.625	N/A	Pass
5320	64	21.455	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_20 MHz BW

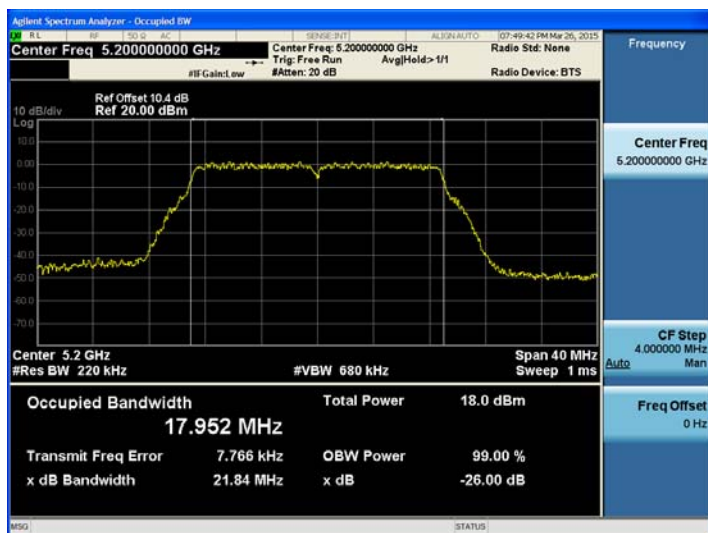
802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.689	N/A	Pass
5580	116	21.694	N/A	Pass
5720	144	21.625	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_20 MHz BW

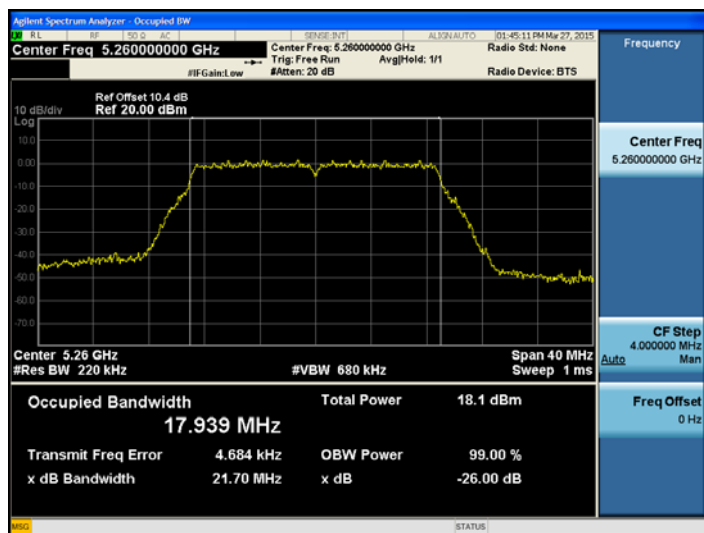
802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.649	N/A	Pass
5785	157	21.906	N/A	Pass
5825	165	21.778	N/A	Pass

TEST Plot for 802.11ac _20MHz BW

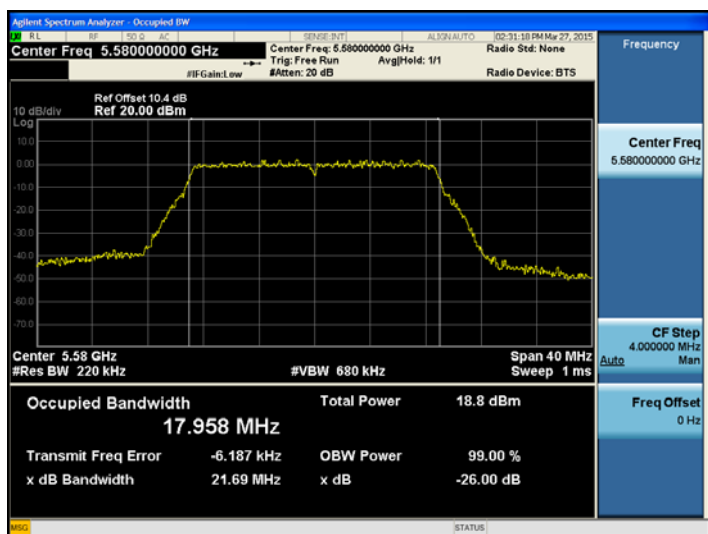
802.11ac_20 MHz BW UNII 1 BAND 26dB Bandwidth



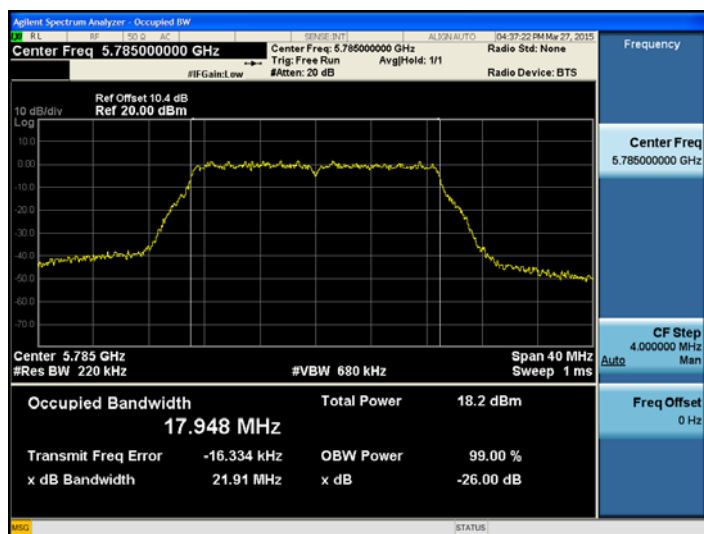
802.11ac_20 MHz BW UNII 2A BAND 26dB Bandwidth



802.11ac_20 MHz BW UNII 2C BAND 26dB Bandwidth



802.11ac_20 MHz BW UNII 3 BAND 26dB Bandwidth



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 MHz BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.899	N/A	Pass
5230	46	40.044	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 MHz BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.986	N/A	Pass
5310	62	39.835	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 MHz BW

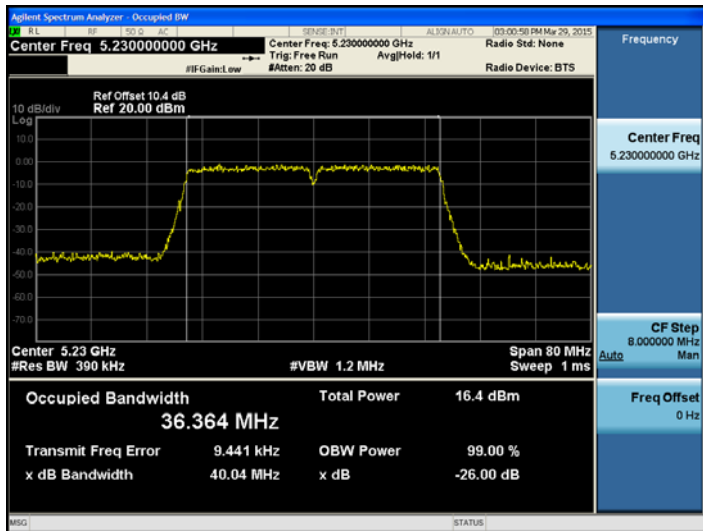
802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.991	N/A	Pass
5590	118	39.758	N/A	Pass
5710	142	39.990	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 MHz BW

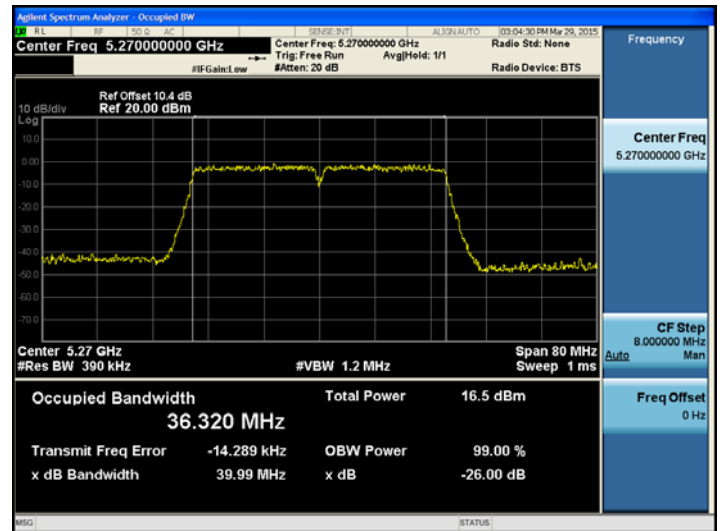
802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	39.870	N/A	Pass
5795	159	39.828	N/A	Pass

TEST Plot for 802.11n_40MHz BW

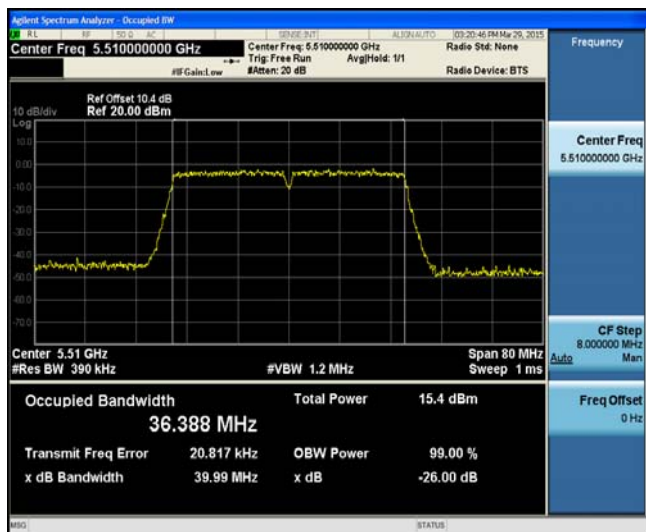
802.11n_40 MHz BW UNII 1 BAND 26dB Bandwidth



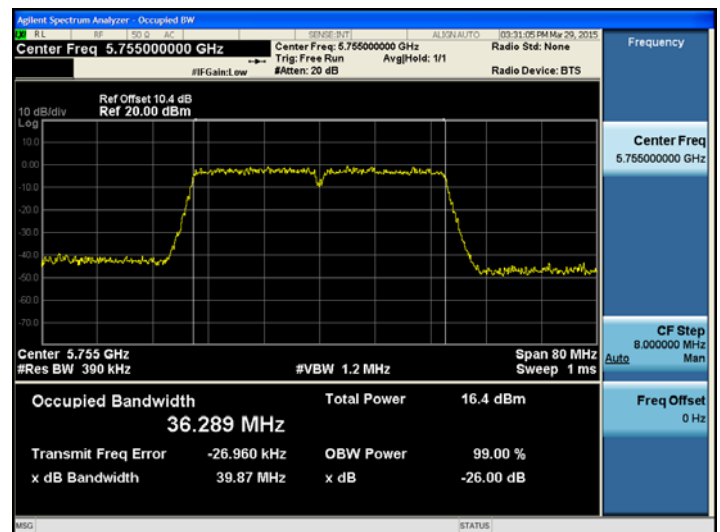
802.11n_40 MHz BW UNII 2A BAND 26dB Bandwidth



802.11n_40 MHz BW UNII 2C BAND 26dB Bandwidth



802.11n_40 MHz BW UNII 3 BAND 26dB Bandwidth



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 MHz BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.982	N/A	Pass
5230	46	39.897	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 MHz BW

802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.817	N/A	Pass
5310	62	40.096	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 MHz BW

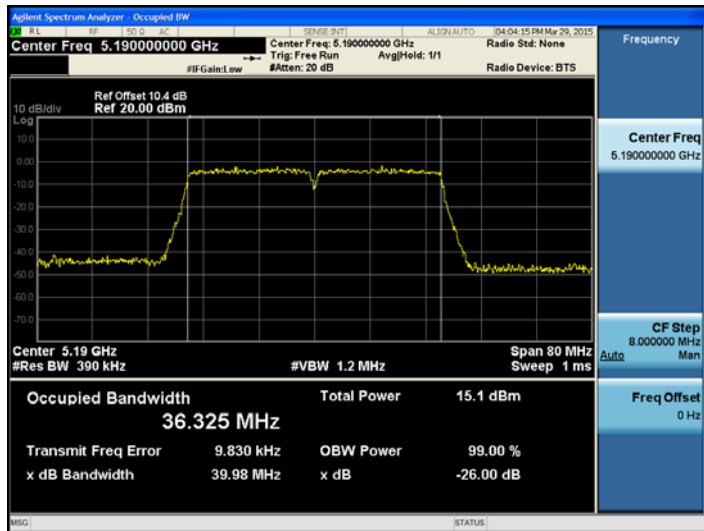
802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.857	N/A	Pass
5590	118	40.070	N/A	Pass
5710	142	39.954	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 MHz BW

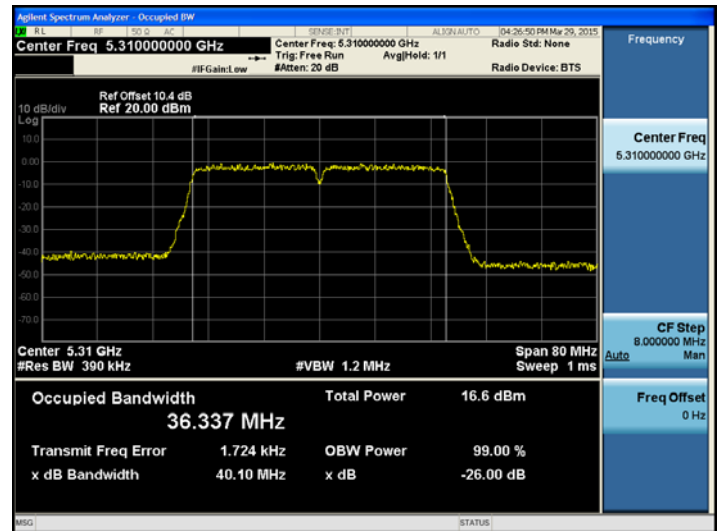
802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	40.102	N/A	Pass
5795	159	39.978	N/A	Pass

TEST Plot for 802.11ac_40MHz BW

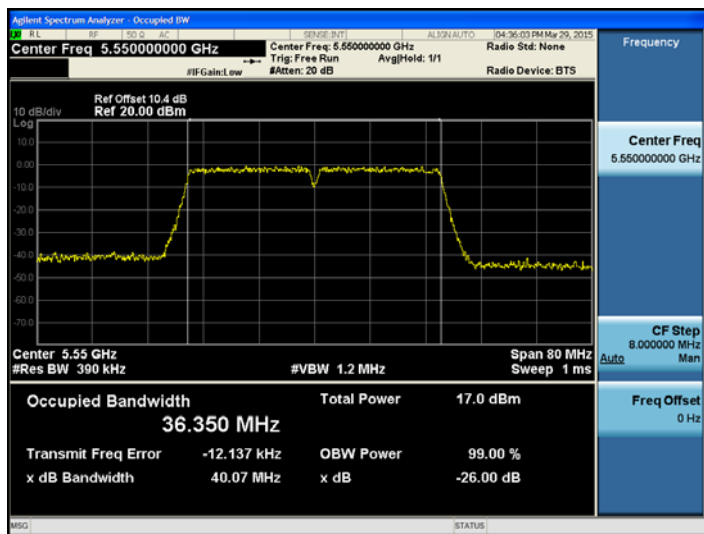
802.11ac_40 MHz BW UNII 1 BAND 26dB Bandwidth



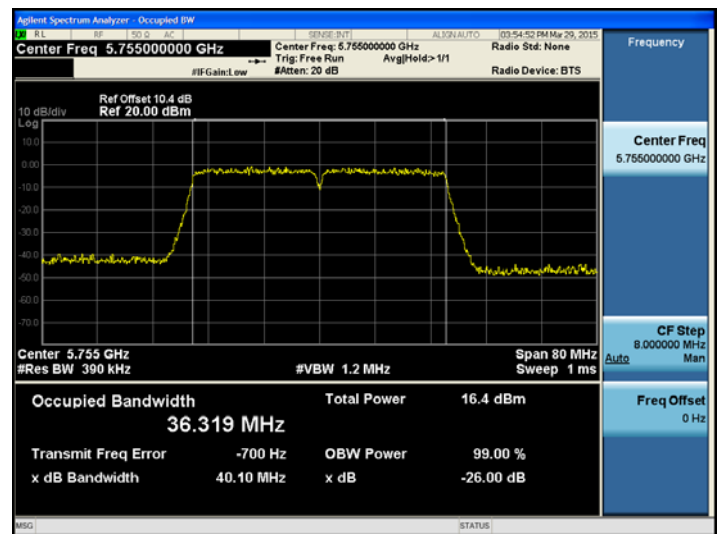
802.11ac_40 MHz BW UNII 2A BAND 26dB Bandwidth



802.11ac_40 MHz BW UNII 2C BAND 26dB Bandwidth



802.11ac_40 MHz BW UNII 3 BAND 26dB Bandwidth



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_80 MHz BW

802.11ac(80MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	80.74	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80 MHz BW

802.11ac(80MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	80.49	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80 MHz BW

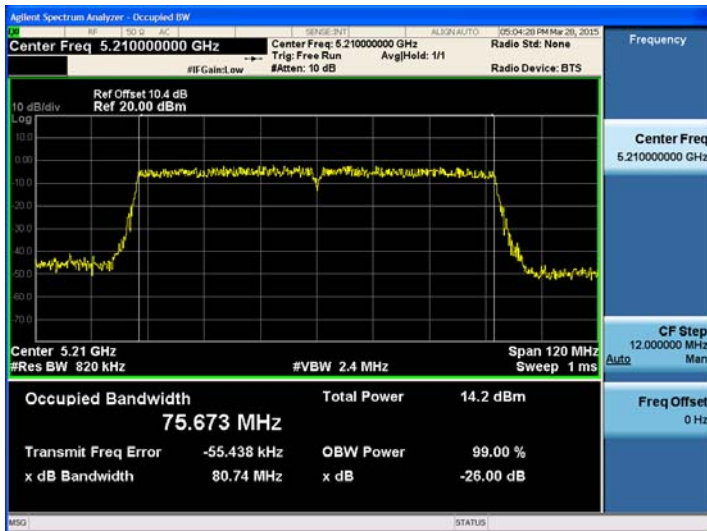
802.11ac(80MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5530	106	80.4	N/A	Pass
5690	138	79.86	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80 MHz BW

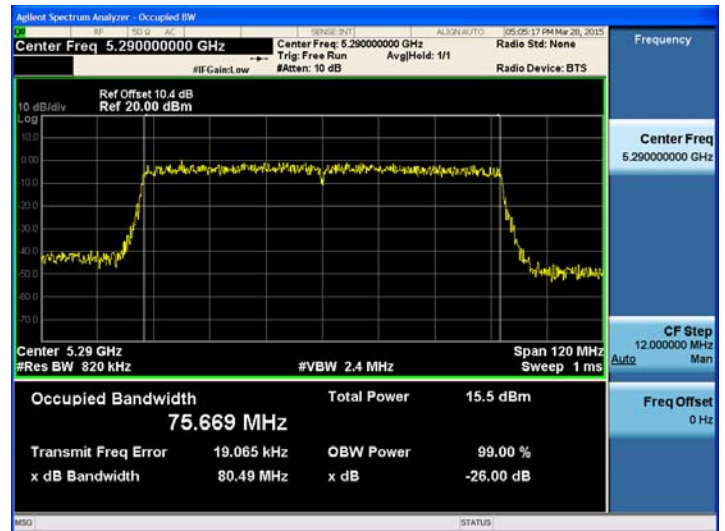
802.11ac(80MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	79.17	N/A	Pass

TEST Plot for 802.11ac_80MHz BW

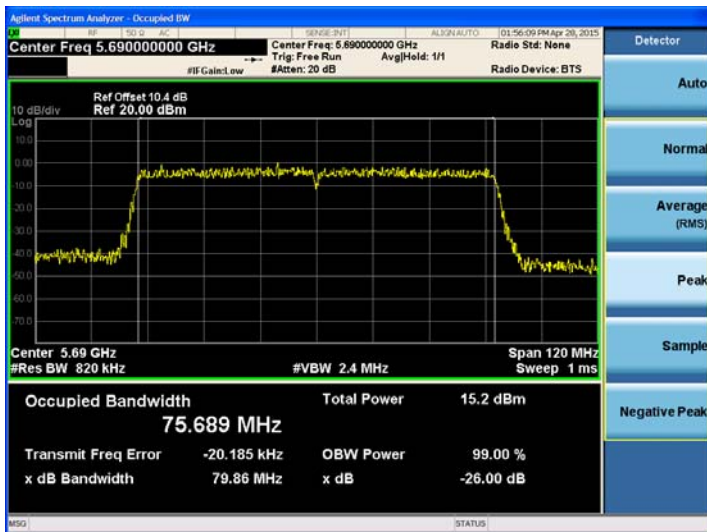
802.11ac_80 MHz BW UNII 1 BAND 26dB Bandwidth



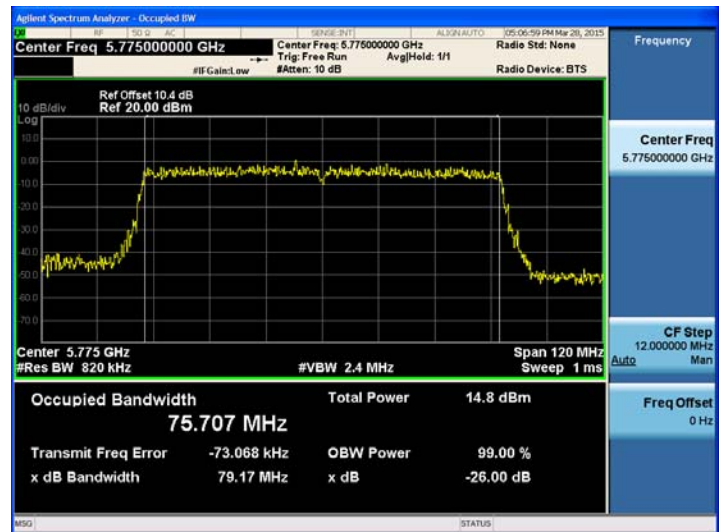
802.11ac_80 MHz BW UNII 2A BAND 26dB Bandwidth



802.11ac_80 MHz BW UNII 2C BAND 26dB Bandwidth



802.11ac_80 MHz BW UNII 3 BAND 26dB Bandwidth



Note :

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

Conducted 6 dB Bandwidth

■ TEST RESULTS for 802.11a/n/ac_20MHz BW

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	16.40	0.5	Pass
5785	157	16.46	0.5	Pass
5825	165	16.47	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11n_20MHz BW

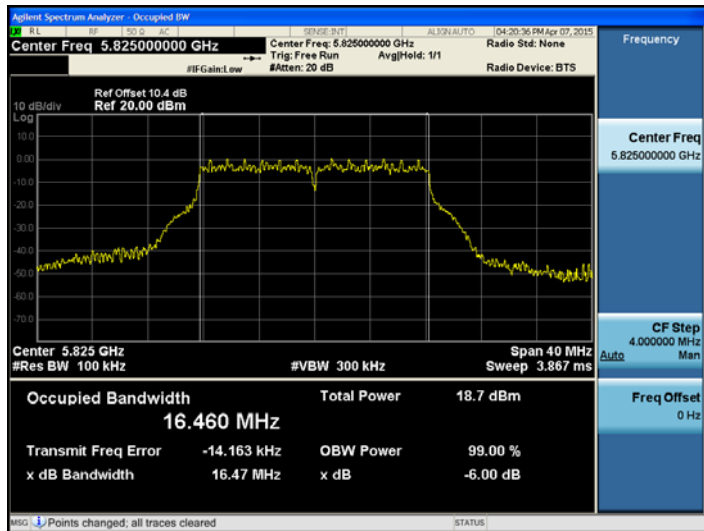
802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.75	0.5	Pass
5785	157	17.73	0.5	Pass
5825	165	17.77	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_20 MHz BW

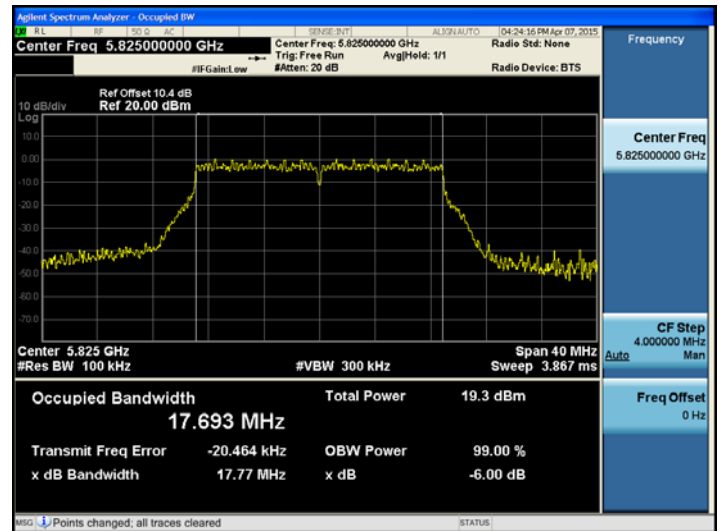
802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.72	0.5	Pass
5785	157	17.73	0.5	Pass
5825	165	17.73	0.5	Pass

TEST Plot for 802.11a/n/ac_20MHz BW

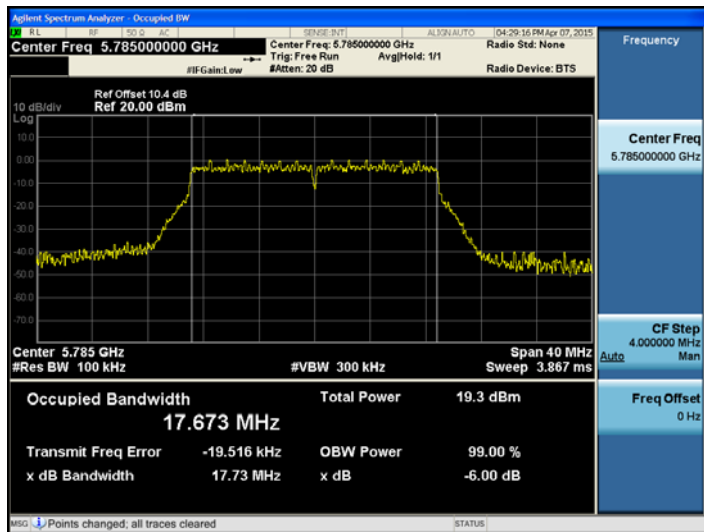
802.11a UNII 3 BAND 6dB Bandwidth



802.11n_20 MHz BW UNII 3 BAND 6dB Bandwidth



802.11ac_20 MHz BW UNII 3 BAND 6dB Bandwidth



Note :

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

TEST RESULTS for 802.11n/ac_40MHz BW

Conducted 6 dB Bandwidth Measurements for 802.11n_40MHz BW

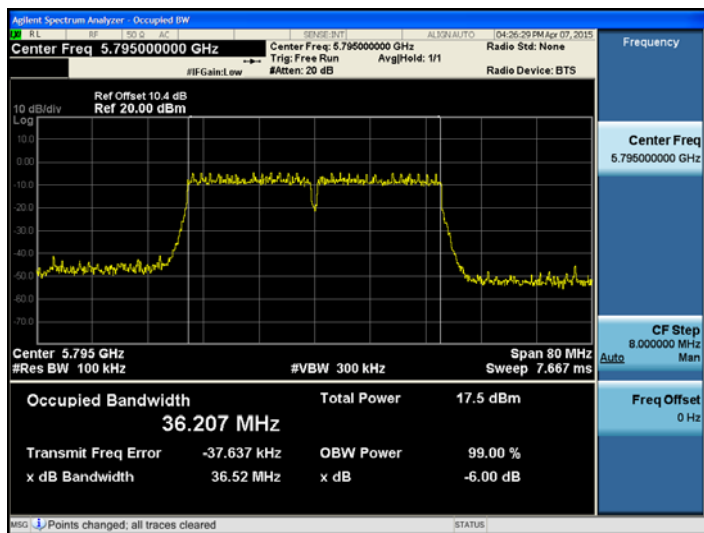
802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.48	0.5	Pass
5795	159	36.52	0.5	Pass

Conducted 6 dB Bandwidth Measurements for 802.11ac_40 MHz BW

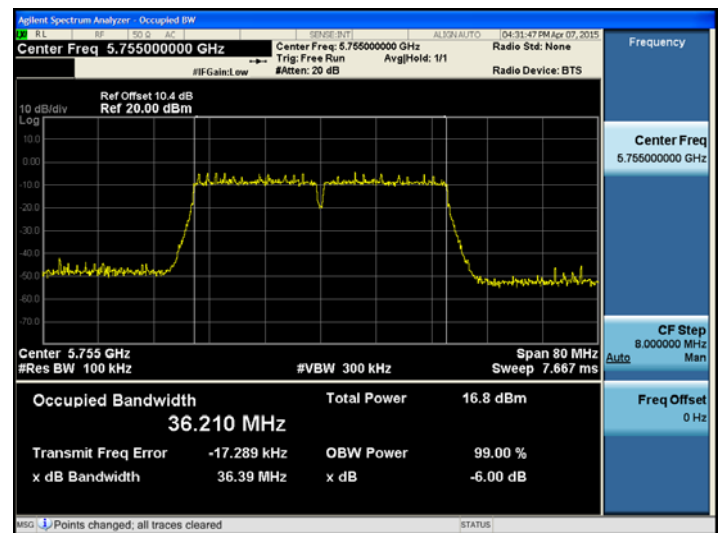
802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.39	0.5	Pass
5795	159	36.38	0.5	Pass

TEST Plot for 802.11n/ac_40MHz BW

802.11n_40 MHz BW UNII 3 BAND 6dB Bandwidth



802.11ac_40 MHz BW UNII 3 BAND 6dB Bandwidth



Note :

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

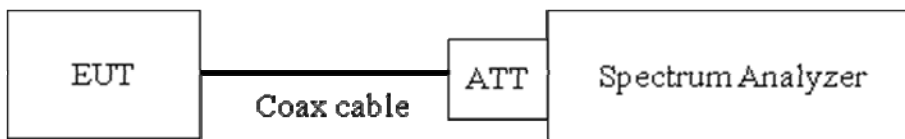
8.3 99% BANDWIDTH MEASUREMENT

limit

None; for IC reporting purposes only

The 99 % bandwidth is used to determine the conducted power limits(for IC).

■ TEST CONFIGURATION



■ TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to as close to 1% of the selected span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RBW = 1% of the total span

VBW $\geq 3 \times$ RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

■ TEST RESULTS for 802.11a_20MHz BW**Conducted 99% Bandwidth Measurements for 802.11a**

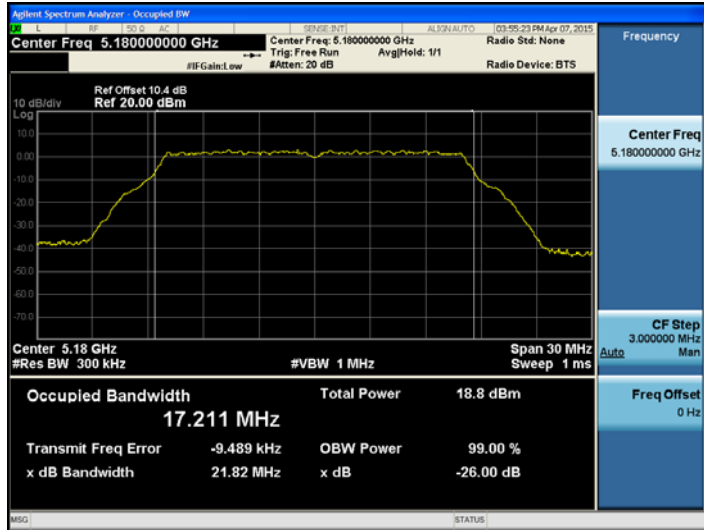
802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.211
5200	40	17.094
5240	48	17.057
5260	52	17.073
5300	60	17.062
5320	64	17.084
5500	100	17.149
5580	116	17.131
5720	144	17.090
5745	149	16.542
5785	157	16.456
5825	165	16.460

Note :

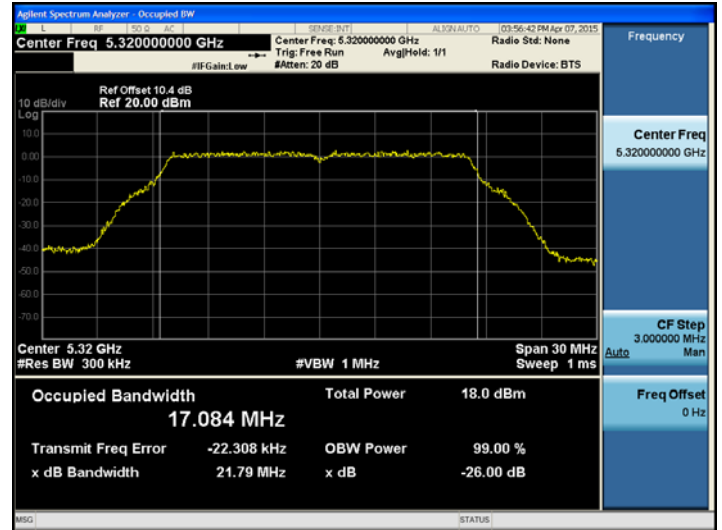
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

TEST Plot for 802.11a _20MHz BW

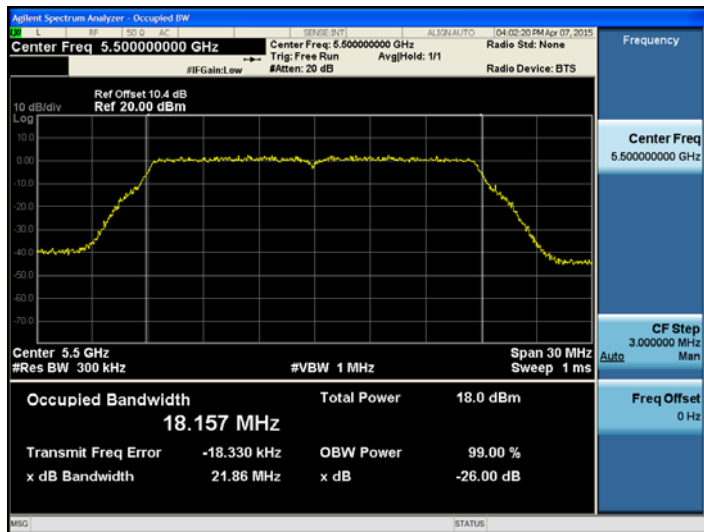
802.11a UNII 1 BAND 99% Bandwidth



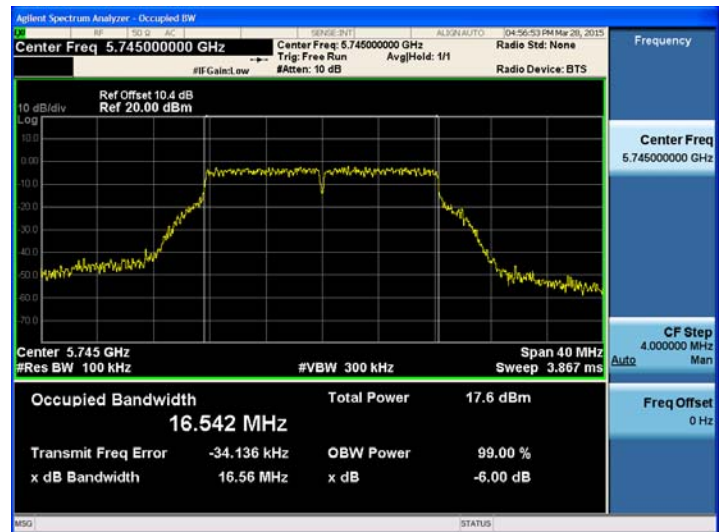
802.11a UNII 2A BAND 99% Bandwidth



802.11a UNII 2C BAND 99% Bandwidth



802.11a UNII 3 BAND 99% Bandwidth



■ TEST Plot for 802.11n _20MHz BW

Conducted 99% Bandwidth Measurements for 802.11n_20 MHz BW

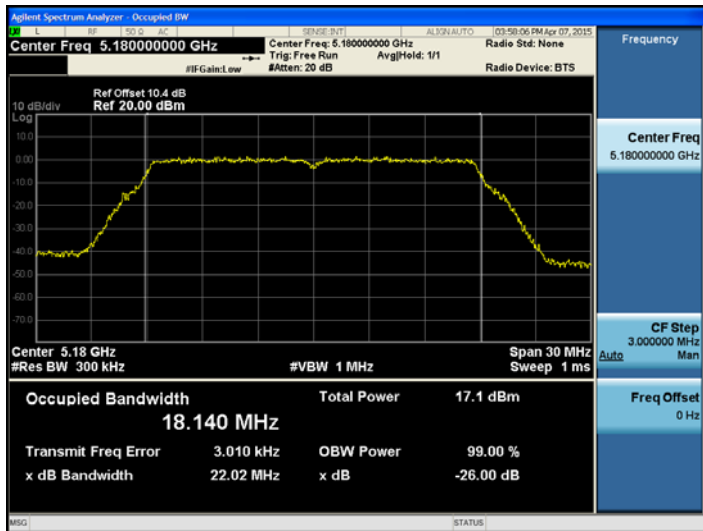
802.11n(20MHz) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.140
5200	40	18.134
5240	48	18.114
5260	52	18.140
5300	60	18.135
5320	64	18.108
5500	100	18.134
5580	116	18.157
5720	144	18.139
5745	149	17.690
5785	157	17.680
5825	165	17.693

Note :

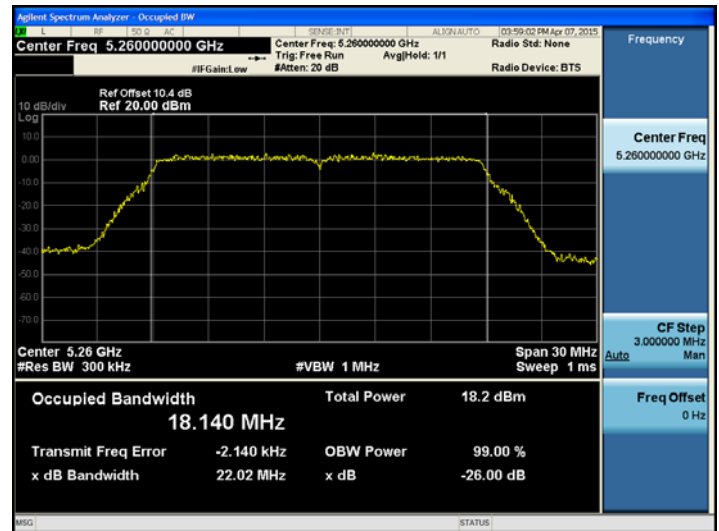
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

TEST Plot for 802.11n _20MHz BW

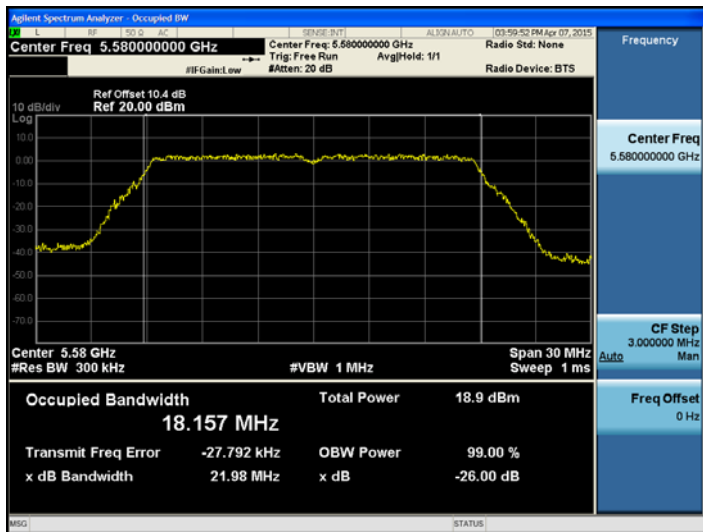
802.11n_20MHz BW UNII 1 BAND 99% Bandwidth



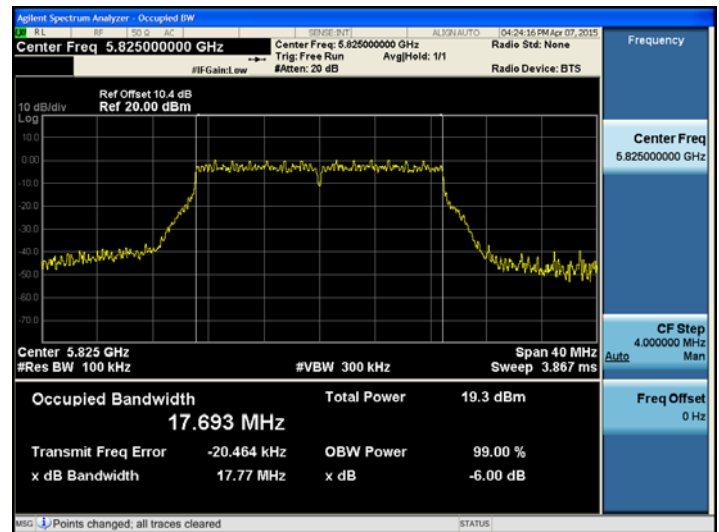
802.11n_20MHz BW UNII 2A BAND 99% Bandwidth



802.11n_20MHz BW UNII 2C BAND 99% Bandwidth



802.11n_20MHz BW UNII 3 BAND 99% Bandwidth



■ **TEST Plot for 802.11ac _20MHz BW**

Conducted 99% Bandwidth Measurements for 802.11ac_20 MHz BW

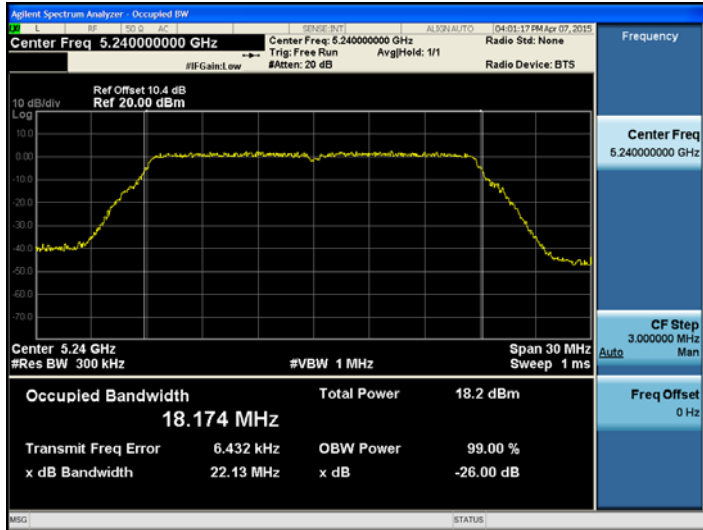
802.11ac(20MHz) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.143
5200	40	18.150
5240	48	18.174
5260	52	18.089
5300	60	18.125
5320	64	18.150
5500	100	18.157
5580	116	18.188
5720	144	18.129
5745	149	17.671
5785	157	17.673
5825	165	17.689

Note :

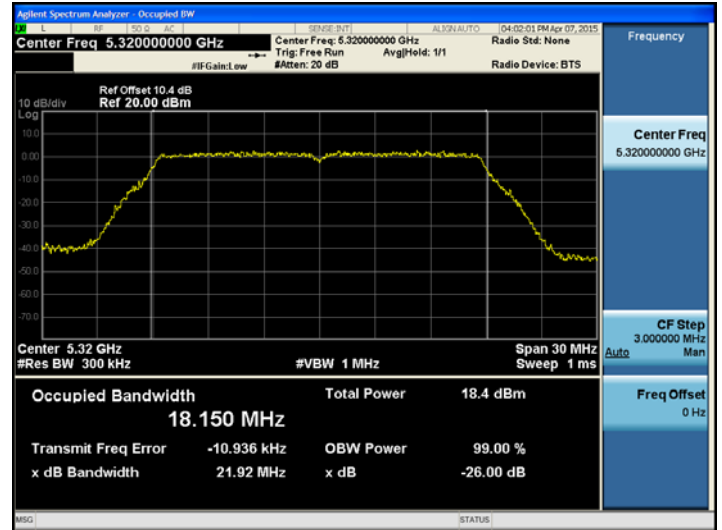
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

TEST Plot for 802.11ac_20MHz BW

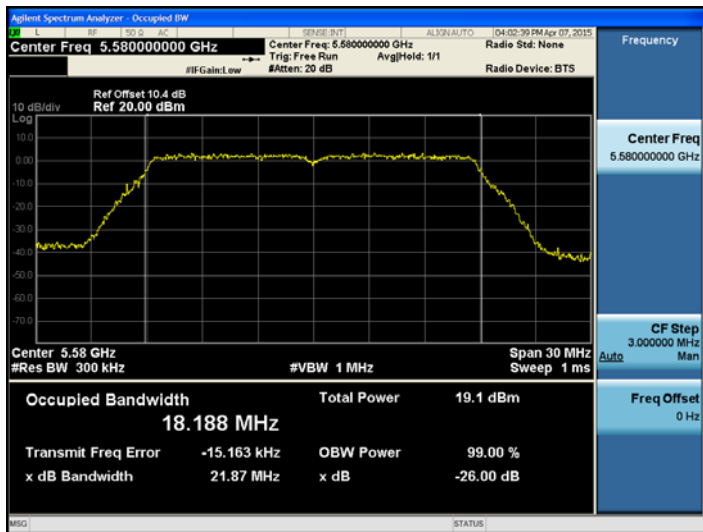
802.11ac_20MHz BW UNII 1 BAND 99% Bandwidth



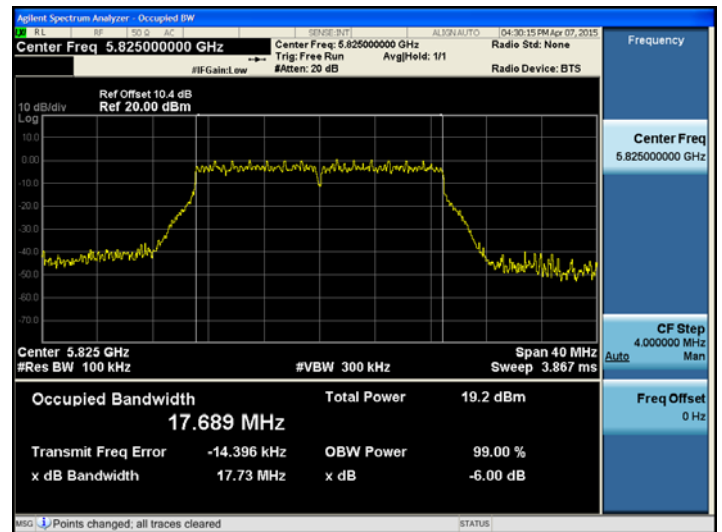
802.11ac_20MHz BW UNII 2A BAND 99% Bandwidth



802.11ac_20MHz BW UNII 2C BAND 99% Bandwidth



802.11ac_20MHz BW UNII 3 BAND 99% Bandwidth



■ **TEST RESULTS for 802.11n_40MHz BW**

Conducted 99% Bandwidth Measurements for 802.11n_40 MHz BW

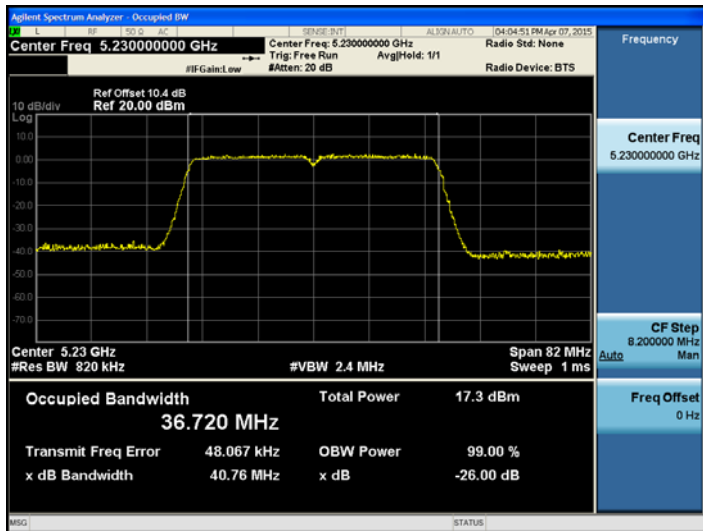
802.11n(40MHz) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.655
5230	46	36.720
5270	54	36.675
5310	62	36.688
5510	102	36.713
5550	110	36.592
5710	142	36.626
5755	151	36.144
5795	159	36.207

Note :

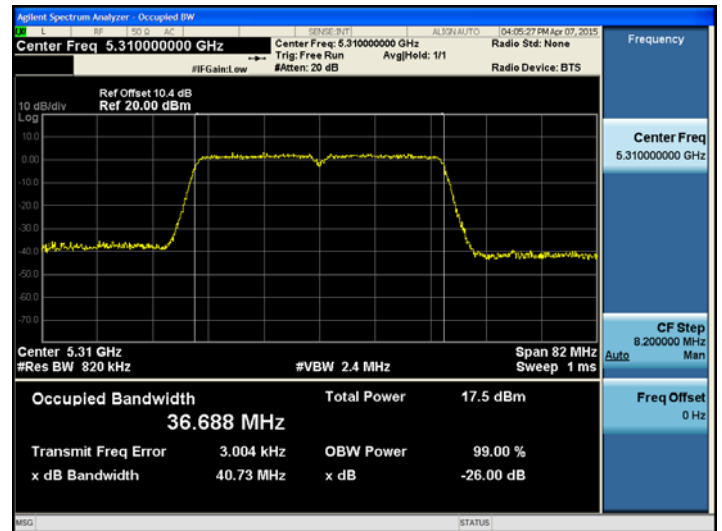
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

■ TEST Plot for 802.11n_40MHz BW

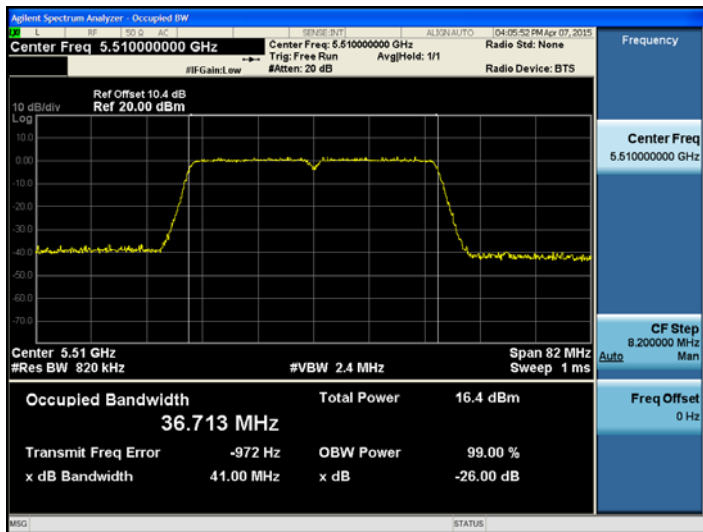
802.11n_40MHz BW UNII 1 BAND 99% Bandwidth



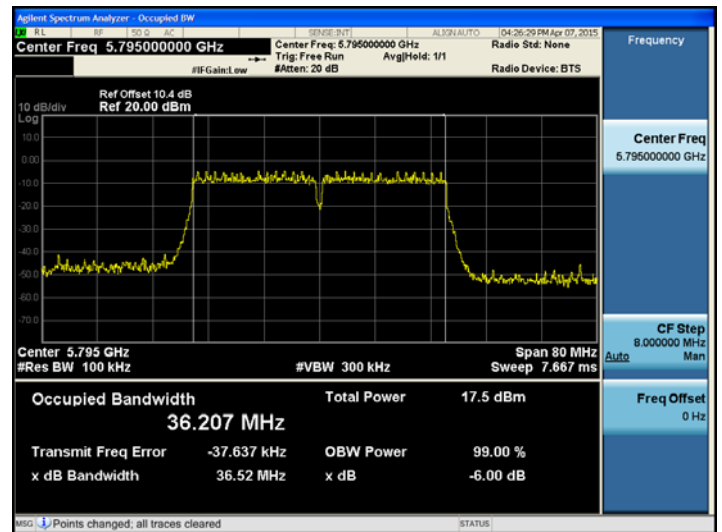
802.11n_40MHz BW UNII 2A BAND 99% Bandwidth



802.11n_40MHz BW UNII 2C BAND 99% Bandwidth



802.11n_40MHz BW UNII 3 BAND 99% Bandwidth



■ **TEST RESULTS for 802.11ac_40MHz BW**

Conducted 99% Bandwidth Measurements for 802.11ac_40 MHz BW

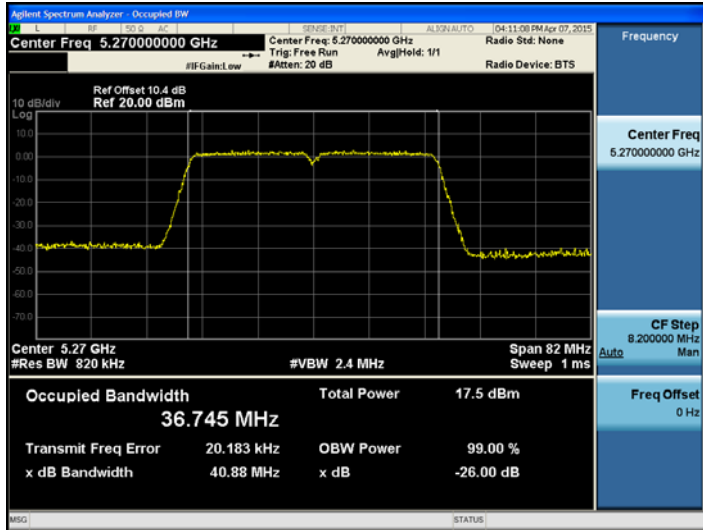
802.11ac(40MHz) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.638
5230	46	36.745
5270	54	36.607
5310	62	36.572
5510	102	36.637
5550	110	36.705
5710	142	36.702
5755	151	36.210
5795	159	36.184

Note :

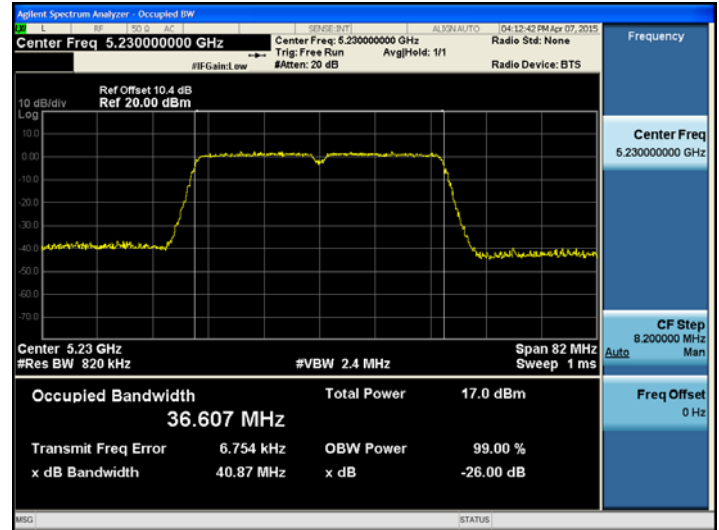
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

TEST Plot for 802.11ac_40MHz BW

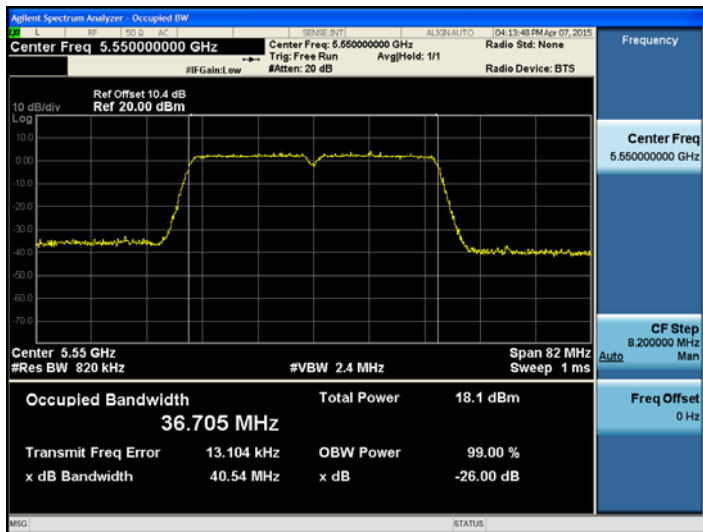
802.11ac_40MHz BW UNII 1 BAND 99% Bandwidth



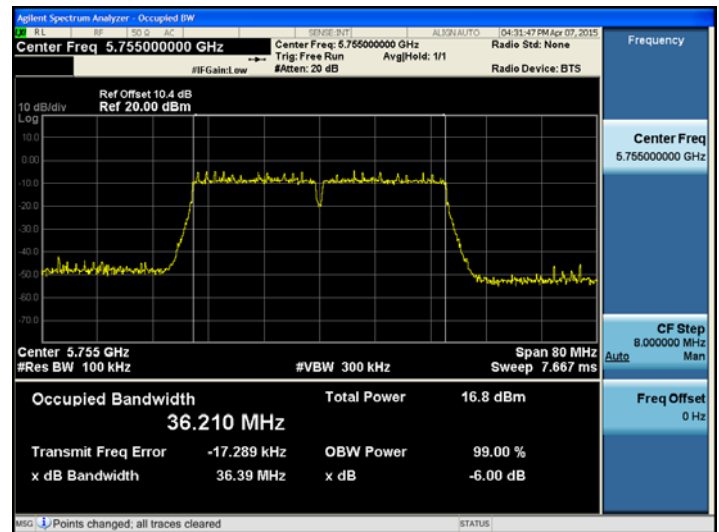
802.11ac_40MHz BW UNII 2A BAND 99% Bandwidth



802.11ac_40MHz BW UNII 2C BAND 99% Bandwidth



802.11ac_40MHz BW UNII 3 BAND 99% Bandwidth



■ TEST RESULTS for 802.11ac_80MHz BW**Conducted 99% Bandwidth Measurements for 802.11ac_80 MHz BW**

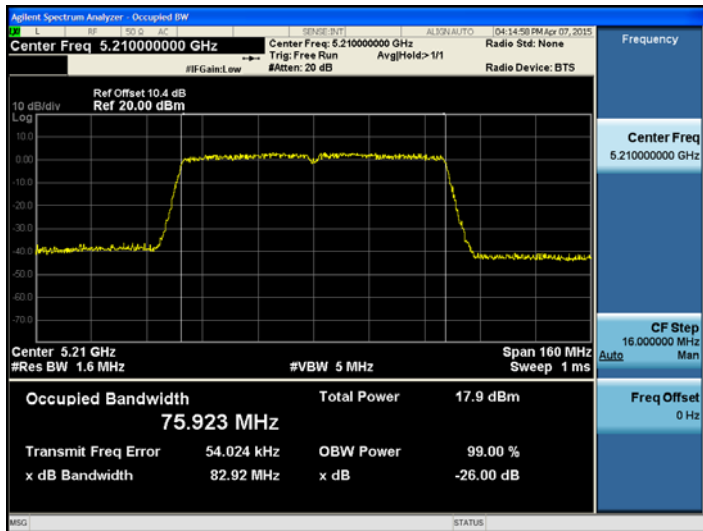
802.11ac(80MHz) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.923
5290	58	75.821
5530	106	75.962
5690	138	75.961
5775	155	75.538

Note :

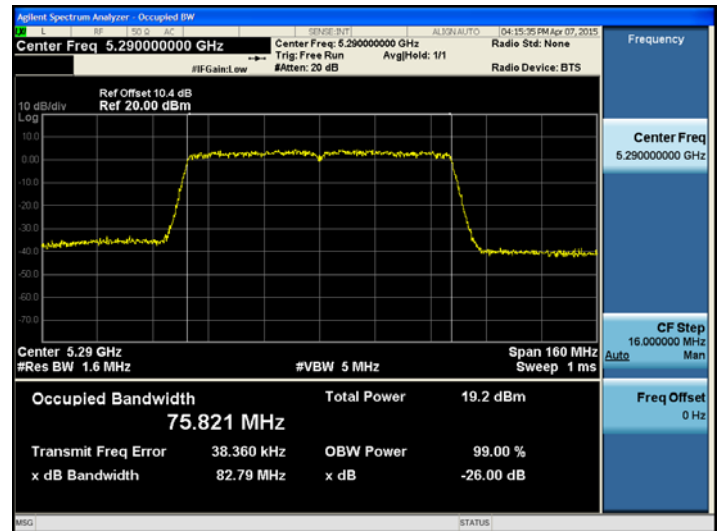
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any UNII1 48 channels for DFS.

■ TEST Plot for 802.11ac_80MHz BW

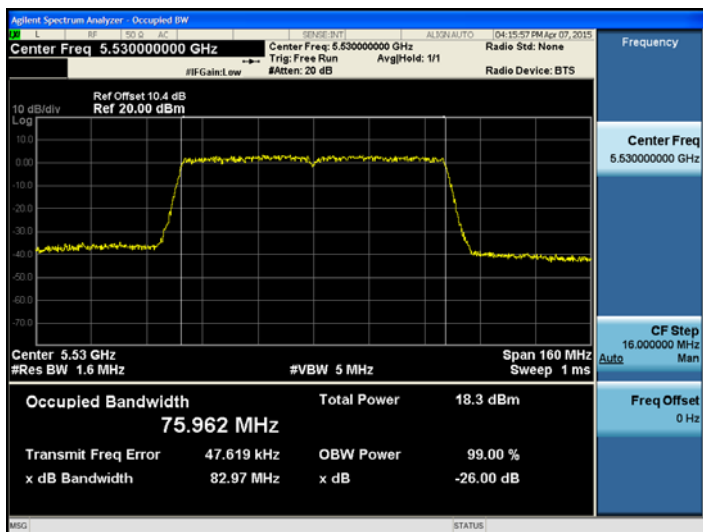
802.11ac_80MHz BW UNII 1 BAND 99% Bandwidth



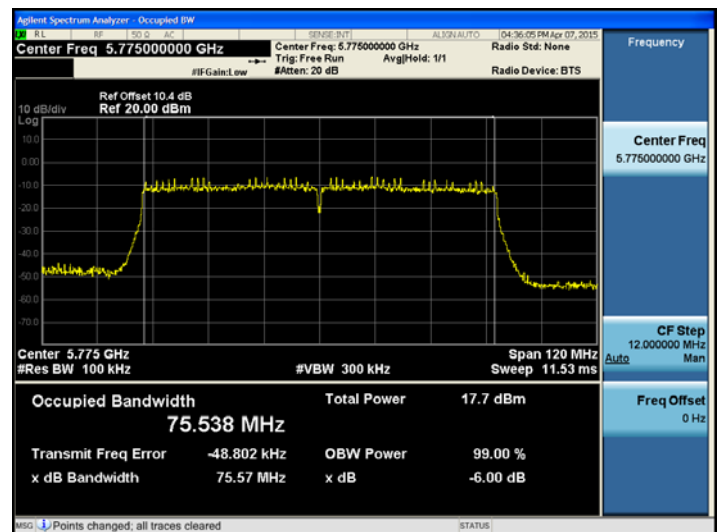
802.11ac_80MHz BW UNII 2A BAND 99% Bandwidth



802.11ac_80MHz BW UNII 2C BAND 99% Bandwidth



802.11ac_80MHz BW UNII 3 BAND 99% Bandwidth



8.4 OUTPUT POWER MEASUREMENT

Test Requirements and limit, §15.407(a)(1) & RSS-210

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(Only FCC)
UNII 2A,2C	802.11a,n,ac	23.98(Only IC)
UNII 3	802.11a,n,ac	30(FCC and IC)

2. Maximum EIRP(for IC) :

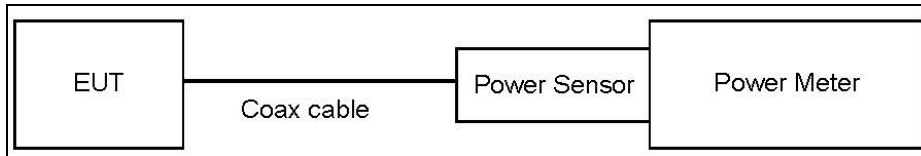
Band	Mode	Limit (dBm)
UNII 1	802.11a,n,ac	23.01
UNII 2A, 2C	802.11a,n,ac	30
UNII 3	802.11a,n,ac	36

Note : 1. In case of UNII 2A, 2C and 3, the gap of Conducted limit and EIRP limit is about 6 dB.

The antenna gain of EUT is not exceed 6 dBi. Therefore, if conducted power is pass, EIRP is also pass. So, we attached only conducted power table.

- Maximum conducted output power of UNII 3 band for IC is average power including duty cycle.(RSS210-i8, Annex 8.4.(4) Alternative peak power measurement)
- Limit of UNII1 for IC is used the conducted level. Limit is 22.09 dBm(EIRP Limit – Antenna Gain = 23.01 dBm-0.92 dBi)

■ 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.

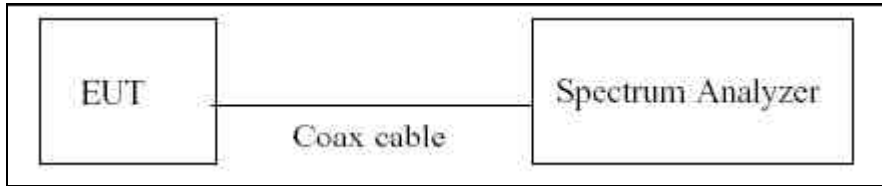
Note :

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)**

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

▪ **Average Power**

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 $10\log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Note :

1. We apply to the offset in the UNII 2A/2C band that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table. We used the particular cable type that is supported by manufacture.

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

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

■ **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

802.11a_20MHz BW (UNII 1)

■ TEST RESULTS

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

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.					
5180	36	6	12.06	0.224	12.28	22.09
		9	11.70	0.354	12.06	22.09
		12	11.67	0.430	12.10	22.09
		18	11.50	0.605	12.11	22.09
		24	11.48	0.788	12.26	22.09
		36	10.82	1.082	11.91	22.09
		48	11.08	1.382	12.46	22.09
		54	10.93	1.526	12.45	22.09
5200	40	6	12.08	0.224	12.30	22.09
		9	11.76	0.354	12.11	22.09
		12	11.75	0.430	12.18	22.09
		18	11.56	0.605	12.17	22.09
		24	11.64	0.788	12.43	22.09
		36	11.27	1.082	12.35	22.09
		48	11.14	1.382	12.53	22.09
		54	10.98	1.526	12.51	22.09
5240	48	6	11.78	0.224	12.01	22.09
		9	11.38	0.354	11.74	22.09
		12	11.65	0.430	12.08	22.09
		18	11.25	0.605	11.86	22.09
		24	11.34	0.788	12.12	22.09
		36	11.02	1.082	12.10	22.09
		48	10.81	1.382	12.19	22.09
		54	10.72	1.526	12.24	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11a _20MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11a 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	12.02	0.224	12.24	23.98
		9	11.75	0.354	12.10	23.98
		12	11.73	0.430	12.16	23.98
		18	10.91	0.605	11.52	23.98
		24	11.59	0.788	12.38	23.98
		36	11.25	1.082	12.33	23.98
		48	10.75	1.382	12.13	23.98
		54	10.82	1.526	12.34	23.98
5300	60	6	12.00	0.224	12.22	23.98
		9	11.71	0.354	12.06	23.98
		12	11.67	0.430	12.10	23.98
		18	11.47	0.605	12.07	23.98
		24	11.56	0.788	12.35	23.98
		36	10.89	1.082	11.98	23.98
		48	11.05	1.382	12.43	23.98
		54	10.93	1.526	12.46	23.98
5320	64	6	11.92	0.224	12.15	23.98
		9	11.75	0.354	12.11	23.98
		12	11.64	0.430	12.07	23.98
		18	11.45	0.605	12.05	23.98
		24	10.85	0.788	11.64	23.98
		36	11.25	1.082	12.33	23.98
		48	10.99	1.382	12.37	23.98
		54	10.63	1.526	12.16	23.98

802.11a _20MHz BW (UNII 2C)

■ TEST RESULTS

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

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	12.02	0.224	12.25	23.98
		9	11.74	0.354	12.09	23.98
		12	11.66	0.430	12.09	23.98
		18	11.52	0.605	12.12	23.98
		24	11.68	0.788	12.46	23.98
		36	11.29	1.082	12.37	23.98
		48	11.11	1.382	12.49	23.98
		54	10.90	1.526	12.43	23.98
5580	116	6	12.04	0.224	12.26	23.98
		9	11.73	0.354	12.08	23.98
		12	11.66	0.430	12.09	23.98
		18	11.53	0.605	12.14	23.98
		24	11.61	0.788	12.39	23.98
		36	11.31	1.082	12.39	23.98
		48	11.10	1.382	12.49	23.98
		54	10.90	1.526	12.43	23.98
5720	144	6	12.20	0.224	12.42	23.98
		9	11.94	0.354	12.29	23.98
		12	11.87	0.430	12.30	23.98
		18	11.71	0.605	12.32	23.98
		24	11.72	0.788	12.51	23.98
		36	11.38	1.082	12.46	23.98
		48	11.28	1.382	12.66	23.98
		54	10.95	1.526	12.47	23.98

802.11a _20MHz BW (UNII 3)

■ TEST RESULTS

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

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.					
5745	149	6	12.03	0.224	12.25	30
		9	11.71	0.354	12.07	30
		12	11.61	0.430	12.04	30
		18	11.36	0.605	11.97	30
		24	11.57	0.788	12.36	30
		36	11.25	1.082	12.33	30
		48	11.05	1.382	12.43	30
		54	10.81	1.526	12.33	30
5785	157	6	11.76	0.224	11.99	30
		9	11.63	0.354	11.99	30
		12	11.58	0.430	12.01	30
		18	11.55	0.605	12.16	30
		24	11.32	0.788	12.11	30
		36	11.15	1.082	12.23	30
		48	10.77	1.382	12.16	30
		54	10.65	1.526	12.17	30
5825	165	6	11.88	0.224	12.10	30
		9	11.50	0.354	11.85	30
		12	11.45	0.430	11.88	30
		18	11.26	0.605	11.87	30
		24	11.41	0.788	12.19	30
		36	11.13	1.082	12.21	30
		48	10.94	1.382	12.32	30
		54	10.61	1.526	12.14	30

802.11n_20MHz BW (UNII 1)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_20MHz 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	10.88	0.243	11.12	22.09
		9	10.70	0.467	11.17	22.09
		12	10.37	0.674	11.05	22.09
		18	10.71	0.829	11.54	22.09
		24	10.40	1.136	11.53	22.09
		36	9.98	1.447	11.42	22.09
		48	9.85	1.567	11.41	22.09
		54	9.78	1.644	11.42	22.09
5200	40	6	11.87	0.243	12.12	22.09
		9	11.68	0.467	12.15	22.09
		12	11.45	0.674	12.12	22.09
		18	11.69	0.829	12.51	22.09
		24	11.32	1.136	12.45	22.09
		36	10.85	1.447	12.30	22.09
		48	10.91	1.567	12.48	22.09
		54	10.61	1.644	12.25	22.09
5240	48	6	11.56	0.243	11.81	22.09
		9	11.38	0.467	11.85	22.09
		12	11.26	0.674	11.93	22.09
		18	11.40	0.829	12.23	22.09
		24	11.39	1.136	12.52	22.09
		36	10.81	1.447	12.25	22.09
		48	10.81	1.567	12.38	22.09
		54	10.70	1.644	12.34	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11n_20MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_20MHz 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	11.79	0.243	12.03	23.98
		9	11.61	0.467	12.08	23.98
		12	11.38	0.674	12.05	23.98
		18	11.60	0.829	12.43	23.98
		24	11.26	1.136	12.39	23.98
		36	11.05	1.447	12.50	23.98
		48	10.84	1.567	12.41	23.98
		54	10.70	1.644	12.35	23.98
5300	60	6	11.71	0.243	11.95	23.98
		9	11.62	0.467	12.09	23.98
		12	11.37	0.674	12.05	23.98
		18	11.48	0.829	12.31	23.98
		24	11.14	1.136	12.28	23.98
		36	10.90	1.447	12.35	23.98
		48	10.83	1.567	12.39	23.98
		54	10.71	1.644	12.36	23.98
5320	64	6	11.81	0.243	12.06	23.98
		9	11.61	0.467	12.08	23.98
		12	11.40	0.674	12.07	23.98
		18	11.63	0.829	12.46	23.98
		24	11.32	1.136	12.46	23.98
		36	11.05	1.447	12.50	23.98
		48	10.82	1.567	12.39	23.98
		54	10.70	1.644	12.35	23.98

802.11n_20MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_20MHz 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	10.79	0.243	11.03	23.98
		9	10.67	0.467	11.14	23.98
		12	10.39	0.674	11.06	23.98
		18	10.46	0.829	11.29	23.98
		24	10.22	1.136	11.36	23.98
		36	10.00	1.447	11.44	23.98
		48	9.82	1.567	11.38	23.98
		54	9.77	1.644	11.41	23.98
5580	116	6	11.78	0.243	12.02	23.98
		9	11.70	0.467	12.17	23.98
		12	11.40	0.674	12.08	23.98
		18	11.58	0.829	12.41	23.98
		24	11.22	1.136	12.36	23.98
		36	10.95	1.447	12.40	23.98
		48	10.85	1.567	12.42	23.98
		54	10.80	1.644	12.44	23.98
5720	144	6	11.96	0.243	12.20	23.98
		9	11.79	0.467	12.25	23.98
		12	11.65	0.674	12.32	23.98
		18	11.74	0.829	12.57	23.98
		24	11.49	1.136	12.62	23.98
		36	11.21	1.447	12.66	23.98
		48	11.10	1.567	12.67	23.98
		54	11.02	1.644	12.66	23.98

802.11n_20MHz BW (UNII 3)

■ TEST RESULTS
Conducted Output Power Measurements (802.11n_20MHz 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	11.81	0.243	12.06	30
		9	11.54	0.467	12.01	30
		12	11.39	0.674	12.06	30
		18	11.60	0.829	12.43	30
		24	11.25	1.136	12.39	30
		36	10.91	1.447	12.35	30
		48	10.76	1.567	12.32	30
		54	10.71	1.644	12.35	30
5785	157	6	11.72	0.243	11.96	30
		9	11.56	0.467	12.02	30
		12	11.26	0.674	11.94	30
		18	11.52	0.829	12.35	30
		24	11.21	1.136	12.35	30
		36	10.84	1.447	12.28	30
		48	10.64	1.567	12.20	30
		54	10.55	1.644	12.20	30
5825	165	6	11.59	0.243	11.83	30
		9	11.44	0.467	11.91	30
		12	11.24	0.674	11.91	30
		18	11.30	0.829	12.13	30
		24	11.13	1.136	12.27	30
		36	10.75	1.447	12.20	30
		48	10.69	1.567	12.25	30
		54	10.55	1.644	12.20	30

802.11ac _20MHz BW (UNII 1)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20MHz 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	10.90	0.248	11.15	22.09
		13	10.58	0.443	11.03	22.09
		19.5	10.54	0.640	11.18	22.09
		26	10.67	0.817	11.49	22.09
		39	10.40	1.119	11.51	22.09
		52	10.10	1.380	11.48	22.09
		58.5	9.89	1.511	11.40	22.09
		65	9.78	1.658	11.44	22.09
		78	9.61	1.833	11.44	22.09
5200	40	6.5	11.73	0.248	11.98	22.09
		13	11.58	0.443	12.03	22.09
		19.5	11.35	0.640	11.99	22.09
		26	11.57	0.817	12.38	22.09
		39	11.26	1.119	12.38	22.09
		52	10.99	1.380	12.37	22.09
		58.5	11.03	1.511	12.54	22.09
		65	10.86	1.658	12.52	22.09
		78	10.82	1.833	12.65	22.09
5240	48	6.5	11.71	0.248	11.96	22.09
		13	11.35	0.443	11.80	22.09
		19.5	11.42	0.640	12.06	22.09
		26	11.41	0.817	12.22	22.09
		39	11.09	1.119	12.21	22.09
		52	10.85	1.380	12.23	22.09
		58.5	10.71	1.511	12.22	22.09
		65	10.65	1.658	12.31	22.09
		78	10.49	1.833	12.33	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11ac_20MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20MHz 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	11.81	0.248	12.06	23.98
		13	11.63	0.443	12.08	23.98
		19.5	11.48	0.640	12.12	23.98
		26	11.60	0.817	12.42	23.98
		39	11.35	1.119	12.47	23.98
		52	11.10	1.380	12.48	23.98
		58.5	10.84	1.511	12.36	23.98
		65	10.81	1.658	12.47	23.98
		78	10.52	1.833	12.36	23.98
5300	60	6.5	11.82	0.248	12.07	23.98
		13	11.63	0.443	12.07	23.98
		19.5	11.44	0.640	12.08	23.98
		26	11.46	0.817	12.27	23.98
		39	11.25	1.119	12.37	23.98
		52	11.16	1.380	12.54	23.98
		58.5	10.86	1.511	12.37	23.98
		65	10.70	1.658	12.36	23.98
		78	10.53	1.833	12.36	23.98
5320	64	6.5	11.76	0.248	12.01	23.98
		13	11.56	0.443	12.01	23.98
		19.5	11.41	0.640	12.05	23.98
		26	11.63	0.817	12.45	23.98
		39	11.31	1.119	12.43	23.98
		52	10.89	1.380	12.27	23.98
		58.5	10.97	1.511	12.48	23.98
		65	10.81	1.658	12.47	23.98
		78	10.61	1.833	12.44	23.98

802.11ac _20MHz BW (UNII 2C)

■ TEST RESULTS
Conducted Output Power Measurements (802.11ac_20MHz BW Mode: 5500~5700)

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	10.81	0.248	11.05	23.98
		13	10.65	0.443	11.10	23.98
		19.5	10.45	0.640	11.09	23.98
		26	10.59	0.817	11.40	23.98
		39	10.28	1.119	11.40	23.98
		52	10.08	1.380	11.46	23.98
		58.5	9.97	1.511	11.48	23.98
		65	9.86	1.658	11.52	23.98
		78	9.69	1.833	11.53	23.98
5580	116	6.5	11.78	0.248	12.03	23.98
		13	11.69	0.443	12.13	23.98
		19.5	11.51	0.640	12.15	23.98
		26	11.58	0.817	12.40	23.98
		39	11.29	1.119	12.41	23.98
		52	11.11	1.380	12.49	23.98
		58.5	10.98	1.511	12.49	23.98
		65	10.92	1.658	12.58	23.98
		78	10.79	1.833	12.62	23.98
5720	144	6.5	12.09	0.248	12.34	23.98
		13	11.79	0.443	12.24	23.98
		19.5	11.68	0.640	12.32	23.98
		26	11.81	0.817	12.63	23.98
		39	11.50	1.119	12.62	23.98
		52	11.23	1.380	12.61	23.98
		58.5	11.17	1.511	12.68	23.98
		65	10.97	1.658	12.63	23.98
		78	10.74	1.833	12.58	23.98

802.11ac _20MHz BW (UNII 3)

■ TEST RESULTS
Conducted Output Power Measurements (802.11ac_20MHz 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	11.62	0.248	11.86	30
		13	11.44	0.443	11.89	30
		19.5	11.31	0.640	11.95	30
		26	11.42	0.817	12.24	30
		39	11.14	1.119	12.26	30
		52	10.89	1.380	12.27	30
		58.5	10.79	1.511	12.30	30
		65	10.61	1.658	12.27	30
		78	10.44	1.833	12.28	30
5785	157	6.5	11.55	0.248	11.80	30
		13	11.41	0.443	11.86	30
		19.5	11.06	0.640	11.70	30
		26	11.39	0.817	12.20	30
		39	11.03	1.119	12.14	30
		52	10.85	1.380	12.23	30
		58.5	10.70	1.511	12.21	30
		65	10.62	1.658	12.28	30
		78	10.34	1.833	12.17	30
5825	165	6.5	11.52	0.248	11.77	30
		13	11.27	0.443	11.71	30
		19.5	11.22	0.640	11.86	30
		26	11.39	0.817	12.21	30
		39	11.00	1.119	12.11	30
		52	10.81	1.380	12.19	30
		58.5	10.60	1.511	12.11	30
		65	10.56	1.658	12.21	30
		78	10.38	1.833	12.21	30

802.11n_40 MHz BW

802.11n_40MHz BW (UNII 1)

TEST RESULTS

Conducted Output Power Measurements (802.11n_40MHz 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	9.16	0.455	9.61	22.09
		27	8.53	0.821	9.35	22.09
		40.5	8.13	1.165	9.30	22.09
		54	8.20	1.452	9.65	22.09
		81	7.75	1.929	9.68	22.09
		108	7.44	2.241	9.68	22.09
		121.5	7.21	2.372	9.58	22.09
		135	7.13	2.541	9.67	22.09
5230	46	13.5	9.79	0.455	10.24	22.09
		27	9.39	0.821	10.22	22.09
		40.5	9.17	1.165	10.33	22.09
		54	8.97	1.452	10.43	22.09
		81	8.53	1.929	10.46	22.09
		108	8.25	2.241	10.49	22.09
		121.5	7.88	2.372	10.25	22.09
		135	7.90	2.541	10.44	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11n _40MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_40MHz 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	9.78	0.455	10.23	23.98
		27	9.40	0.821	10.22	23.98
		40.5	9.14	1.165	10.30	23.98
		54	9.05	1.452	10.50	23.98
		81	8.53	1.929	10.46	23.98
		108	8.23	2.241	10.47	23.98
		121.5	8.09	2.372	10.46	23.98
		135	7.91	2.541	10.45	23.98
5310	62	13.5	9.65	0.455	10.10	23.98
		27	9.51	0.821	10.33	23.98
		40.5	8.95	1.165	10.11	23.98
		54	8.99	1.452	10.44	23.98
		81	8.54	1.929	10.47	23.98
		108	8.05	2.241	10.29	23.98
		121.5	7.96	2.372	10.34	23.98
		135	7.82	2.541	10.36	23.98

802.11n_40MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_40MHz 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	8.34	0.455	8.80	23.98
		27	7.95	0.821	8.77	23.98
		40.5	7.34	1.165	8.50	23.98
		54	7.21	1.452	8.67	23.98
		81	6.83	1.929	8.76	23.98
		108	6.54	2.241	8.78	23.98
		121.5	6.44	2.372	8.81	23.98
		135	6.33	2.541	8.87	23.98
5550	110	13.5	9.91	0.455	10.37	23.98
		27	9.51	0.821	10.33	23.98
		40.5	9.08	1.165	10.25	23.98
		54	8.91	1.452	10.36	23.98
		81	8.50	1.929	10.43	23.98
		108	8.14	2.241	10.38	23.98
		121.5	8.06	2.372	10.43	23.98
		135	7.89	2.541	10.44	23.98
5710	142	13.5	9.82	0.455	10.28	23.98
		27	9.16	0.821	9.98	23.98
		40.5	8.92	1.165	10.08	23.98
		54	8.83	1.452	10.28	23.98
		81	8.57	1.929	10.50	23.98
		108	8.04	2.241	10.28	23.98
		121.5	7.84	2.372	10.21	23.98
		135	7.55	2.541	10.09	23.98

802.11n_40MHz BW (UNII 3)

■ TEST RESULTS

Conducted Output Power Measurements (802.11n_40MHz 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	9.68	0.455	10.14	30
		27	9.26	0.821	10.08	30
		40.5	8.93	1.165	10.09	30
		54	8.95	1.452	10.40	30
		81	8.25	1.929	10.18	30
		108	7.85	2.241	10.09	30
		121.5	7.77	2.372	10.14	30
		135	7.63	2.541	10.17	30
5795	159	13.5	9.40	0.455	9.86	30
		27	8.77	0.821	9.59	30
		40.5	8.55	1.165	9.72	30
		54	8.33	1.452	9.78	30
		81	8.02	1.929	9.95	30
		108	7.66	2.241	9.90	30
		121.5	7.59	2.372	9.97	30
		135	7.40	2.541	9.94	30

□ TEST Plot for 802.11n_40MHz BW

802.11n_40 MHz BW UNII 1 BAND Average Power



802.11n_40 MHz BW UNII 2A BAND Average Power



802.11n_40 MHz BW UNII 2C BAND Average Power



802.11n_40 MHz BW UNII 3 BAND Average Power



802.11ac_40 MHz BW (UNII 1)

40MHz BW

TEST RESULTS

Conducted Output Power Measurements (802.11ac_40MHz 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	9.00	0.451	9.45	22.09
		27	8.63	0.830	9.46	22.09
		40.5	8.34	1.159	9.50	22.09
		54	8.21	1.433	9.64	22.09
		81	7.78	1.881	9.66	22.09
		108	7.43	2.207	9.64	22.09
		121.5	7.29	2.369	9.66	22.09
		135	7.07	2.501	9.57	22.09
		162	6.78	2.758	9.54	22.09
		180	6.86	2.831	9.69	22.09
5230	46	13.5	9.89	0.451	10.34	22.09
		27	9.44	0.830	10.27	22.09
		40.5	9.16	1.159	10.32	22.09
		54	9.03	1.433	10.46	22.09
		81	8.52	1.881	10.40	22.09
		108	8.18	2.207	10.38	22.09
		121.5	8.10	2.369	10.47	22.09
		135	7.72	2.501	10.22	22.09
		162	7.74	2.758	10.50	22.09
		180	7.58	2.831	10.42	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11ac _40MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_40MHz 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	9.78	0.451	10.23	23.98
		27	9.42	0.830	10.25	23.98
		40.5	9.25	1.159	10.41	23.98
		54	8.99	1.433	10.42	23.98
		81	8.57	1.881	10.46	23.98
		108	8.23	2.207	10.44	23.98
		121.5	8.13	2.369	10.50	23.98
		135	7.78	2.501	10.28	23.98
		162	7.64	2.758	10.40	23.98
		180	7.65	2.831	10.48	23.98
5310	62	13.5	9.84	0.451	10.29	23.98
		27	9.34	0.830	10.17	23.98
		40.5	9.20	1.159	10.36	23.98
		54	9.03	1.433	10.47	23.98
		81	8.47	1.881	10.35	23.98
		108	8.12	2.207	10.33	23.98
		121.5	7.97	2.369	10.34	23.98
		135	7.82	2.501	10.32	23.98
		162	7.58	2.758	10.34	23.98
		180	7.51	2.831	10.34	23.98

802.11ac _40MHz BW (UNII 2C)

■ TEST RESULTS
Conducted Output Power Measurements (802.11ac_40MHz Mode: 5510~5670)

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	8.12	0.451	8.57	23.98
		27	7.67	0.830	8.50	23.98
		40.5	7.37	1.159	8.53	23.98
		54	7.14	1.433	8.57	23.98
		81	6.73	1.881	8.61	23.98
		108	6.38	2.207	8.59	23.98
		121.5	6.19	2.369	8.55	23.98
		135	6.12	2.501	8.62	23.98
		162	5.80	2.758	8.56	23.98
		180	5.75	2.831	8.58	23.98
5550	110	13.5	9.87	0.451	10.32	23.98
		27	9.34	0.830	10.17	23.98
		40.5	8.98	1.159	10.14	23.98
		54	8.97	1.433	10.40	23.98
		81	8.42	1.881	10.30	23.98
		108	8.10	2.207	10.31	23.98
		121.5	7.99	2.369	10.36	23.98
		135	7.84	2.501	10.34	23.98
		162	7.62	2.758	10.38	23.98
		180	7.58	2.831	10.41	23.98
5710	142	13.5	9.62	0.451	10.08	23.98
		27	9.28	0.830	10.11	23.98
		40.5	9.13	1.159	10.29	23.98
		54	8.97	1.433	10.40	23.98
		81	8.50	1.881	10.38	23.98
		108	7.95	2.207	10.16	23.98
		121.5	7.78	2.369	10.15	23.98
		135	7.60	2.501	10.10	23.98
		162	7.38	2.758	10.13	23.98
		180	7.36	2.831	10.19	23.98

802.11ac _40MHz BW (UNII 3)

■ TEST RESULTS
Conducted Output Power Measurements (802.11ac_40MHz 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	9.56	0.451	10.02	30
		27	9.27	0.830	10.10	30
		40.5	8.90	1.159	10.06	30
		54	8.77	1.433	10.20	30
		81	8.37	1.881	10.25	30
		108	7.85	2.207	10.06	30
		121.5	7.77	2.369	10.14	30
		135	7.55	2.501	10.05	30
		162	7.37	2.758	10.13	30
		180	7.27	2.831	10.10	30
5795	159	13.5	9.35	0.451	9.80	30
		27	8.73	0.830	9.56	30
		40.5	8.39	1.159	9.55	30
		54	8.37	1.433	9.80	30
		81	8.03	1.881	9.91	30
		108	7.71	2.207	9.92	30
		121.5	7.59	2.369	9.96	30
		135	7.40	2.501	9.90	30
		162	7.18	2.758	9.94	30
		180	7.14	2.831	9.97	30

TEST Plot for 802.11ac_40MHz BW

802.11ac_40 MHz BW UNII 1 BAND Average Power



802.11ac_40 MHz BW UNII 2A BAND Average Power



802.11ac_40 MHz BW UNII 2C BAND Average Power



802.11ac_40 MHz BW UNII 3 BAND Average Power



■ 802.11ac_80 MHz BW

80MHz BW(UNII 1)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80MHz 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	9.26	0.881	10.14	22.09
		58.5	8.98	1.481	10.46	22.09
		87.8	8.72	1.959	10.68	22.09
		117	8.93	2.318	11.25	22.09
		175.5	8.31	2.831	11.14	22.09
		234	8.15	3.167	11.32	22.09
		263.3	8.08	3.369	11.45	22.09
		292.5	7.83	3.457	11.29	22.09
		351	7.67	3.729	11.40	22.09
		390	7.59	3.868	11.46	22.09

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

802.11ac_80MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80MHz 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	9.96	0.881	10.84	23.98
		58.5	9.61	1.481	11.09	23.98
		87.8	9.21	1.959	11.17	23.98
		117	9.46	2.318	11.78	23.98
		175.5	9.17	2.831	12.00	23.98
		234	8.70	3.167	11.87	23.98
		263.3	8.41	3.369	11.78	23.98
		292.5	8.43	3.457	11.89	23.98
		351	8.03	3.729	11.76	23.98
		390	7.98	3.868	11.85	23.98

802.11ac_80MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80MHz Mode: 5530 ~ 5690 MHz)

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	9.12	0.881	10.00	23.98
		58.5	8.83	1.481	10.31	23.98
		87.8	8.50	1.959	10.46	23.98
		117	8.75	2.318	11.07	23.98
		175.5	8.29	2.831	11.12	23.98
		234	7.84	3.167	11.01	23.98
		263.3	7.88	3.369	11.25	23.98
		292.5	7.80	3.457	11.26	23.98
		351	7.32	3.729	11.05	23.98
		390	7.21	3.868	11.08	23.98
5690	138	29.3	9.89	0.881	10.77	23.98
		58.5	9.48	1.481	10.96	23.98
		87.8	9.26	1.959	11.22	23.98
		117	9.51	2.318	11.83	23.98
		175.5	9.17	2.831	12.00	23.98
		234	8.66	3.167	11.83	23.98
		263.3	8.50	3.369	11.87	23.98
		292.5	8.37	3.457	11.82	23.98
		351	8.14	3.729	11.87	23.98
		390	7.98	3.868	11.85	23.98

802.11ac_80MHz BW (UNII 3)

■ **TEST RESULTS**

Conducted Output Power Measurements (802.11ac_80MHz Mode: 5775 MHz)

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	9.94	0.881	10.83	30
		58.5	9.67	1.481	11.15	30
		87.8	9.44	1.959	11.40	30
		117	9.39	2.318	11.70	30
		175.5	9.06	2.831	11.89	30
		234	8.74	3.167	11.91	30
		263.3	8.62	3.369	11.99	30
		292.5	8.54	3.457	12.00	30
		351	8.15	3.729	11.88	30
		390	8.12	3.868	11.99	30

■ TEST Plot for 802.11ac_80MHz BW

802.11ac_80 MHz BW UNII 1 BAND Average Power



802.11ac_80 MHz BW UNII 2A BAND Average Power



802.11ac_80 MHz BW UNII 2C BAND Average Power



802.11ac_80 MHz BW UNII 3 BAND Average Power



8.5 POWER SPECTRAL DENSITY

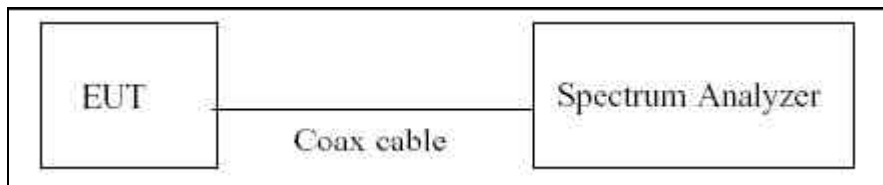
The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

■ Limit

Band	Mode	Limit(For FCC)	Limit(For IC)
UNII 1	802.11a,n,ac	11 dBm/MHz	10 dBm/MHz(e.i.r.p.)
UNII 2A	802.11a,n,ac	11 dBm/MHz	11 dBm/MHz
UNII 2C	802.11a,n,ac	11 dBm/MHz	11 dBm/MHz
UNII 3	802.11a,n,ac	30 dBm/500 kHz	8 dBm/3 kHz

Note : Limit of UNII1 for IC is used the conducted level. Limit is 9.08 dBm(EIRP Limit – Antenna Gain = 10 dBm-0.92 dBi)

■ 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.
3. VBW $\geq$ 3 MHz.
4. Number of points in sweep $\geq$ 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.

■ TEST PROCEDURE(Additional Test for UNII3 of IC)

We tested according to Procedure 10.2 in KDB 558074, issued 06/05/2014

The spectrum analyzer is set to :

Set analyzer center frequency to DTS channel center frequency.

Span = 1.5 times the DTS channel bandwidth.

RBW = 3 kHz ≤ RBW ≤ 100 kHz.

VBW ≥ 3 x RBW.

Sweep = auto couple

Detector = peak

Trace Mode = max hold

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

■ Sample Calculation (Conducted)

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

■ Sample Calculation (EIRP)

EIRP Spectral Density = Reading Value + ATT loss + Cable loss(1 ea) + Duty Cycle Factor + Ant gain

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. 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

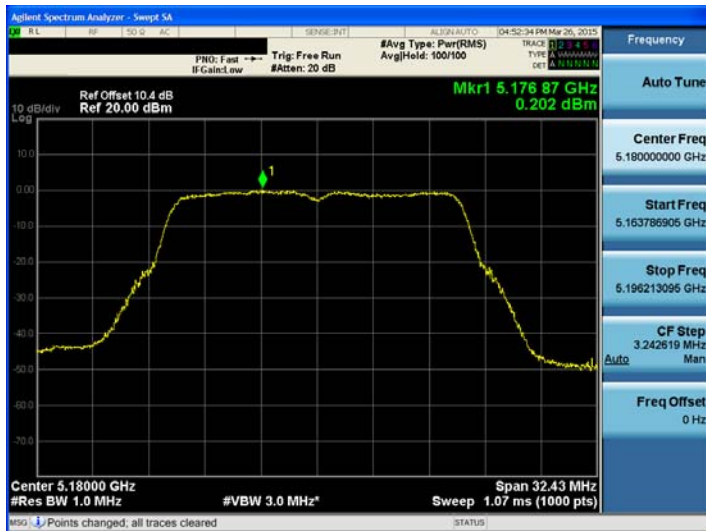
Conducted Power Density Measurements

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	0.202	1.382	1.584	9.08	Pass
5200	40		0.074	1.382	1.456		Pass
5240	48		-0.001	1.526	1.525		Pass
5260	52		-0.161	0.788	0.627	11	Pass
5300	60		-0.227	1.526	1.299		Pass
5320	64		0.214	1.382	1.596		Pass
5500	100		0.798	1.382	2.180	11	Pass
5580	116		0.424	1.382	1.806		Pass
5720	144		-1.584	0.30123	-1.283		Pass
5745	149		6.208	1.382	7.590	30	Pass
5785	157		5.930	1.082	7.012		Pass
5825	165		6.101	1.382	7.483		Pass

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

■ TEST Plot for 802.11a 20MHz BW

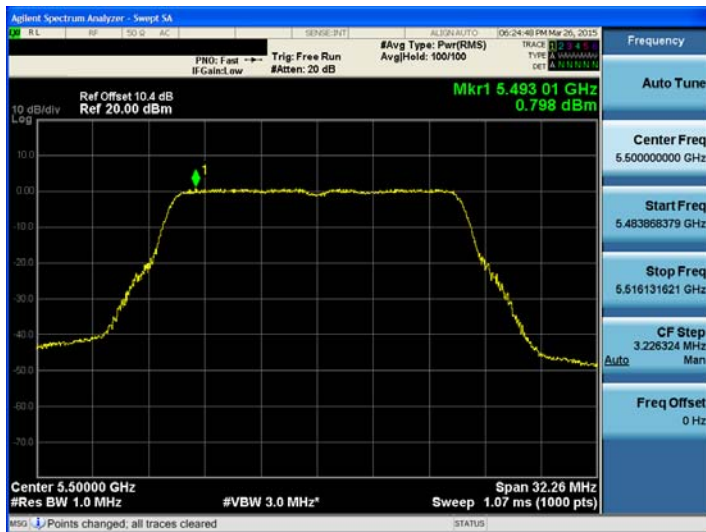
802.11a_20MHz BW UNII 1 BAND PSD



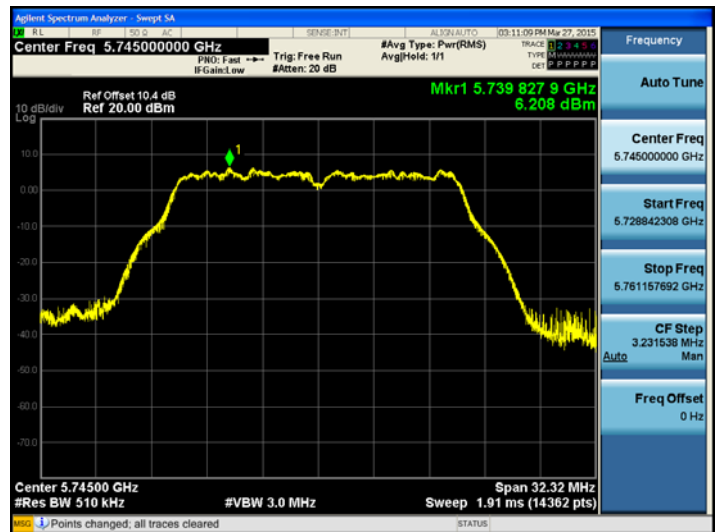
802.11a_20MHz BW UNII 2A BAND PSD



802.11a_20MHz BW UNII 2C BAND PSD



802.11a_20MHz BW UNII 3 BAND PSD



■ 802.11n_20MHz BW

■ TEST RESULTS

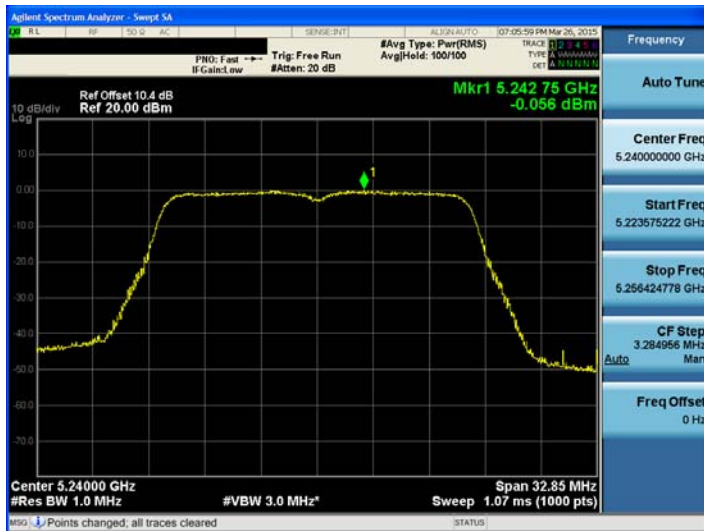
Conducted Power Density Measurements

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 _20MHz BW	-1.906	0.829	-1.077	9.08	Pass
5200	40		-0.394	0.829	0.435		Pass
5240	48		-0.056	1.136	1.080		Pass
5260	52		-0.697	1.447	0.750	11	Pass
5300	60		-0.406	1.567	1.161		Pass
5320	64		-0.118	1.447	1.329		Pass
5500	100		-1.254	1.447	0.193	11	Pass
5580	116		0.163	1.644	1.807		Pass
5720	144		-0.072	1.567	1.495		Pass
5745	149		7.093	0.829	7.922	30	Pass
5785	157		6.777	1.136	7.913		Pass
5825	165		6.892	1.136	8.028		Pass

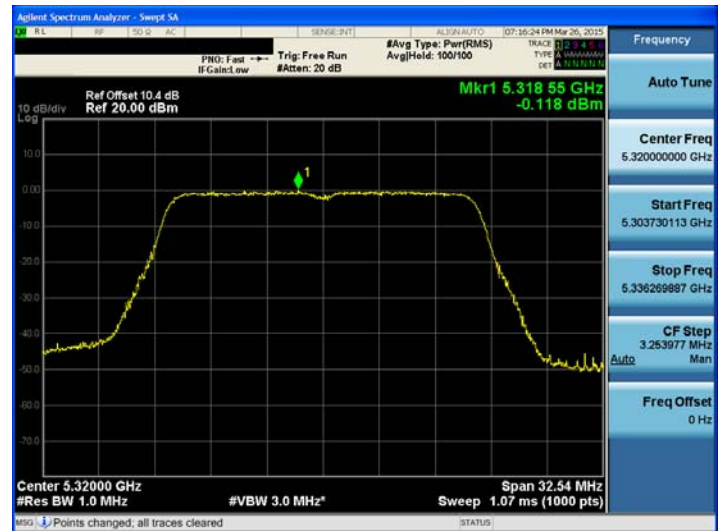
Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.

■ TEST Plot for 802.11n 20MHz BW

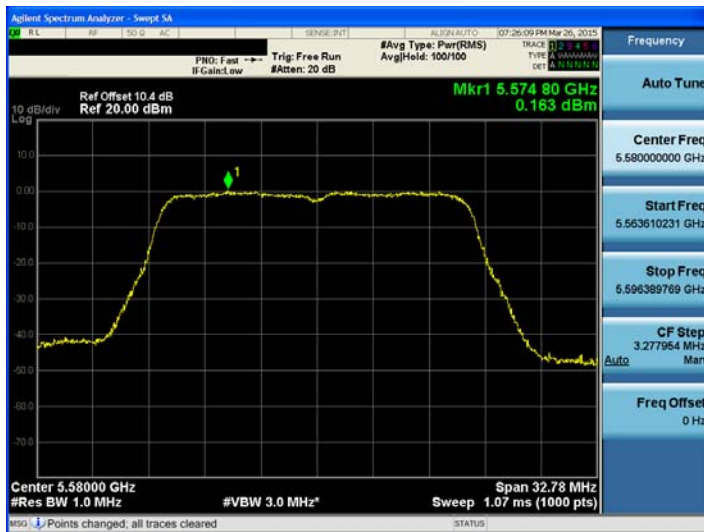
802.11n_20MHz BW UNII 1 BAND PSD



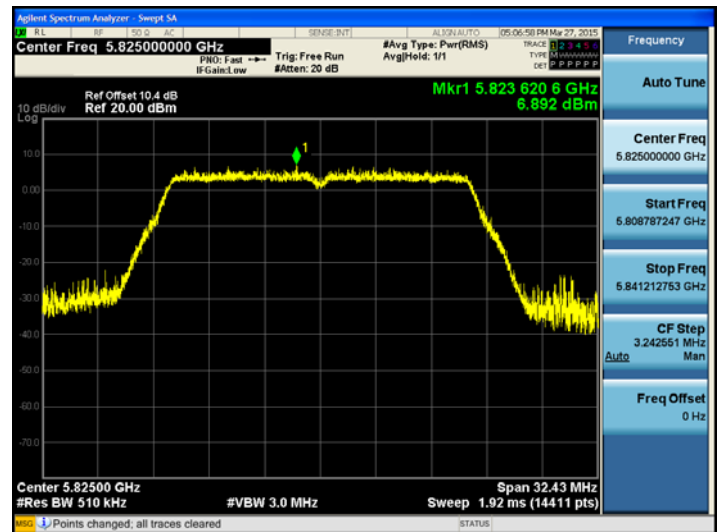
802.11n_20MHz BW UNII 2A BAND PSD



802.11n_20MHz BW UNII 2C BAND PSD



802.11n_20MHz BW UNII 3 BAND PSD



■ 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	-2.096	1.119	-0.977	9.08	Pass
5200	40		-0.882	1.833	0.951		Pass
5240	48		-1.179	1.833	0.654		Pass
5260	52		0.009	1.38	1.389	11	Pass
5300	60		-1.075	1.38	0.305		Pass
5320	64		-0.821	1.511	0.690		Pass
5500	100		-0.942	1.833	0.891	11	Pass
5580	116		-0.068	1.833	1.765		Pass
5720	144		-0.405	1.511	1.106		Pass
5745	149		7.495	1.511	9.006	30	Pass
5785	157		6.751	1.658	8.409		Pass
5825	165		6.393	1.658	8.051		Pass

Note : In case of UNII 1 band, we applied IC limit instead of FCC limit because IC limit is worst case.