

FCC UNII REPORT

FCC Certification

Applicant Name:

LG Electronics MobileComm U.S.A., Inc.

Date of Issue:

March 16, 2016

Test Site/Location:

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

Address:

1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Report No.: HCT-R-1603-F037-1

HCT FRN: 0005866421

IC Recognition No.: 5944A-5

FCC ID : ZNFH840

APPLICANT : LG Electronics MobileComm U.S.A., Inc.

Model(s): LG-H840

Additional Model(s): LGH840, H840, LG-H845, LGH845, H845, LG-H840AR, LGH840AR, H840AR

EUT Type: GSM/WCDMA/LTE 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	13.29	0.0213
	802.11n	20	5180 – 5240	12.58	0.0181
	802.11n	40	5190 - 5230	13.02	0.0200
	802.11ac	20	5180 – 5240	11.31	0.0135
	802.11ac	40	5190 - 5230	12.47	0.0177
UNII2A	802.11a	80	5210	12.01	0.0159
	802.11a	20	5260 – 5320	13.38	0.0218
	802.11n	20	5260 – 5320	12.69	0.0186
	802.11n	40	5270 – 5310	13.14	0.0201
	802.11ac	20	5260 – 5320	11.44	0.0139
UNII2C	802.11ac	40	5270 – 5310	12.46	0.0176
	802.11ac	80	5290	11.96	0.0157
	802.11a	20	5500 – 5700	13.46	0.0222
	802.11n	20	5500 – 5700	12.76	0.0189
	802.11n	40	5510 – 5670	12.94	0.0197
UNII3	802.11ac	20	5500 – 5700	11.60	0.0145
	802.11ac	40	5510 – 5670	12.25	0.0168
	802.11ac	80	5530	11.86	0.0153
	802.11a	20	5745 – 5825	12.89	0.0195
	802.11n	20	5745 – 5825	12.09	0.0162
UNII3	802.11n	40	5755 – 5795	12.35	0.0172
	802.11ac	20	5745 – 5825	10.93	0.0124
	802.11ac	40	5755 – 5795	11.82	0.0152
	802.11ac	80	5775	11.35	0.0136

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
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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-1603-F037	March 08, 2016	- First Approval Report
HCT-R-1603-F037-1	March 16, 2016	- Revised output power limit on page 54. - Revised Measured Bandwidth and plot on page 24-25

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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: ZNFH840
EUT Type: GSM/WCDMA/LTE Phone with Bluetooth, WLAN, NFC
Model name(s): LG-H840
Additional Model name(s): LGH840, H840, LG-H845, LGH845, H845, LG-H840AR, LGH840AR, H840AR
Date(s) of Tests: January 15, 2016 ~ February 28, 2016
Place of Tests: HCT Co., Ltd.
 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
 (IC Recognition No. : 5944A-5)

2. EUT DESCRIPTION

Model Name	LG-H840	
Additional Model name(s):	LGH840, H840, LG-H845, LGH845, H845, LG-H840AR, LGH840AR, H840AR	
EUT Type	GSM/WCDMA/LTE Phone with Bluetooth, WLAN, NFC	
Power Supply	DC 3.85 V	
Battery Infomation	Model: BL-43D1F Type: Li-ion Battery	
Frequency Range	TX_20 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2A)/ 5500 MHz - 5700 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 - 5670 MHz (UNII 2C) / 5755 MHz - 5795 MHz (UNII 3)
	80 MHz BW:	5210 MHz(UNII 1)/ 5290 MHz(UNII 2A)/ 5530 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 - 5700 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 - 5670 MHz (UNII 2C) / 5755 MHz - 5795 MHz (UNII 3)
	80 MHz BW:	5210 MHz(UNII 1)/ 5290 MHz(UNII 2A)/ 5530 MHz (UNII 2C)/ 5775 MHz (UNII 3)
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)	
Antenna Specification	Manufacturer: IM-TECH Antenna type: INTERNAL ANTENNA Peak Gain : -1.95 dBi (5180~5240 UNII1 BAND) / -0.82 dBi (5260~5320 UNII2A BAND) -1.99 dBi (5500~5700 UNII2C BAND) / -3.98 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 January 08, 2016 entitled “ Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) 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 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

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

Conducted Antenna Terminal

See Section from 8.1 to 8.4.(KDB 789033)

3.4 DESCRIPTION OF TEST MODES

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

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

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (latest edition).

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 :2014) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 07, 2015 (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

"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

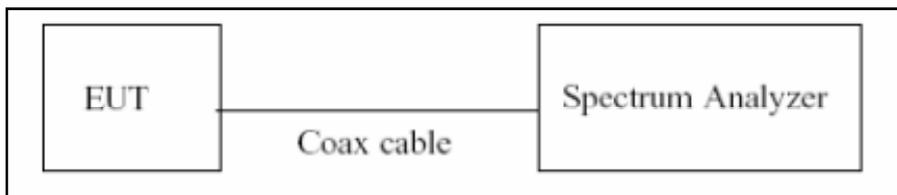
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	CONDUCTED	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 250 mW (5150-5250 MHz) < 250 mW or 11+10 log log ₁₀ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10 log log ₁₀ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(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)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) <-17 dBm/MHz EIRP within 5715-5725 MHz and 5850-5860 MHz (UNII3) <-27 dBm/MHz EIRP outside 5715-5860 MHz (UNII 3)		RADIATED
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209	PASS	

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 01/08/2016)

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 (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11a	6	2.030	2.130	0.95305164	0.209
	9	1.360	1.460	0.93150685	0.308
	12	1.025	1.125	0.91111111	0.404
	18	0.690	0.790	0.87341772	0.588
	24	0.525	0.625	0.84000000	0.757
	36	0.360	0.455	0.79120879	1.017
	48	0.272	0.370	0.73513514	1.336
	54	0.244	0.342	0.71345029	1.466
802.11n_20 MHz BW	MCS 0	1.880	1.980	0.94949495	0.225
	MCS 1	0.955	1.050	0.90952381	0.412
	MCS 2	0.645	0.740	0.87162162	0.597
	MCS 3	0.485	0.585	0.82905983	0.814
	MCS 4	0.335	0.435	0.77011494	1.134
	MCS 5	0.258	0.357	0.72268908	1.410
	MCS 6	0.231	0.330	0.70000000	1.549
	MCS 7	0.213	0.309	0.68932039	1.616
802.11n_40 MHz BW	MCS 0	0.920	1.020	0.90196078	0.448
	MCS 1	0.472	0.572	0.82517483	0.835
	MCS 2	0.324	0.424	0.76415094	1.168
	MCS 3	0.248	0.348	0.71264368	1.471
	MCS 4	0.176	0.274	0.64233577	1.922
	MCS 5	0.136	0.236	0.57627119	2.394
	MCS 6	0.124	0.223	0.55605381	2.549
	MCS 7	0.116	0.215	0.53953488	2.680

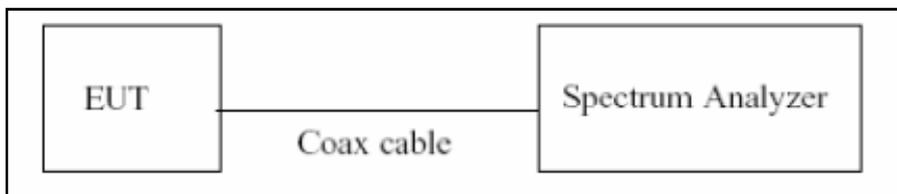
Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_20 MHz BW	MCS 0	0.975	1.074	0.90782123	0.420
	MCS 1	0.507	0.606	0.83663366	0.775
	MCS 2	0.351	0.450	0.78000000	1.079
	MCS 3	0.276	0.375	0.73600000	1.331
	MCS 4	0.195	0.294	0.66326531	1.783
	MCS 5	0.159	0.257	0.61867704	2.085
	MCS 6	0.144	0.242	0.59504132	2.255
	MCS 7	0.136	0.234	0.58119658	2.357
	MCS 8	0.119	0.217	0.54838710	2.609
5.8 GHz Band 802.11ac_40 MHz BW	MCS 0	0.492	0.591	0.83248731	0.796
	MCS 1	0.268	0.367	0.73024523	1.365
	MCS 2	0.192	0.291	0.65979381	1.806
	MCS 3	0.156	0.255	0.61176471	2.134
	MCS 4	0.117	0.216	0.54166667	2.663
	MCS 5	0.100	0.199	0.50251256	2.989
	MCS 6	0.092	0.191	0.48167539	3.172
	MCS 7	0.088	0.188	0.46808511	3.297
	MCS 8	0.080	0.179	0.44692737	3.498
	MCS 9	0.076	0.175	0.43428571	3.622
5.8 GHz Band 802.11ac_80 MHz BW	MCS 0	0.249	0.288	0.86458333	0.632
	MCS 1	0.144	0.184	0.78260870	1.065
	MCS 2	0.112	0.152	0.73684211	1.326
	MCS 3	0.092	0.132	0.69696970	1.568
	MCS 4	0.077	0.116	0.66379310	1.780
	MCS 5	0.068	0.108	0.62962963	2.009
	MCS 6	0.064	0.103	0.62135922	2.067
	MCS 7	0.064	0.104	0.61538462	2.109
	MCS 8	0.060	0.100	0.60000000	2.218
	MCS 9	0.057	0.096	0.59375000	2.264

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 01/08/2016), at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

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

■ TEST CONFIGURATION



■ TEST PROCEDURE (26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.1 in KDB 789033 D02, issued 01/08/2016)

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

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

1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.
3. In case of UNII channels 142 and 144, this device is satisfied with KDB644545 D03.

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

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(C.2 in KDB 789033 D02, issued 01/08/2016)

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.

■ TEST RESULTS for 802.11a_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	21.586	N/A	Pass
5200	40	21.980	N/A	Pass
5240	48	21.310	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	21.689	N/A	Pass
5300	60	21.990	N/A	Pass
5320	64	21.759	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

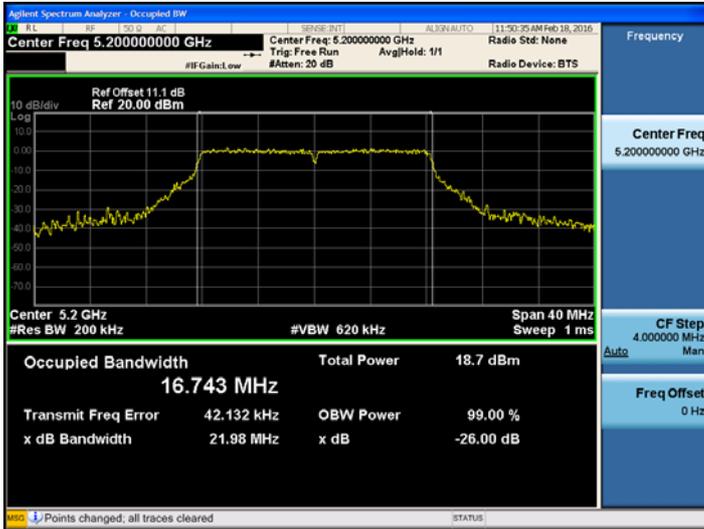
802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.251	N/A	Pass
5580	116	21.395	N/A	Pass
5700	140	21.590	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

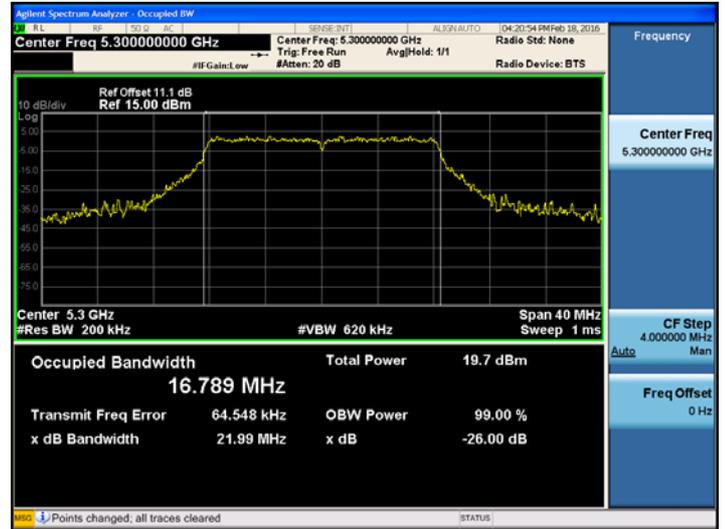
802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	21.261	N/A	Pass
5785	157	21.481	N/A	Pass
5825	165	21.940	N/A	Pass

TEST Plot for 802.11a_20MHz BW

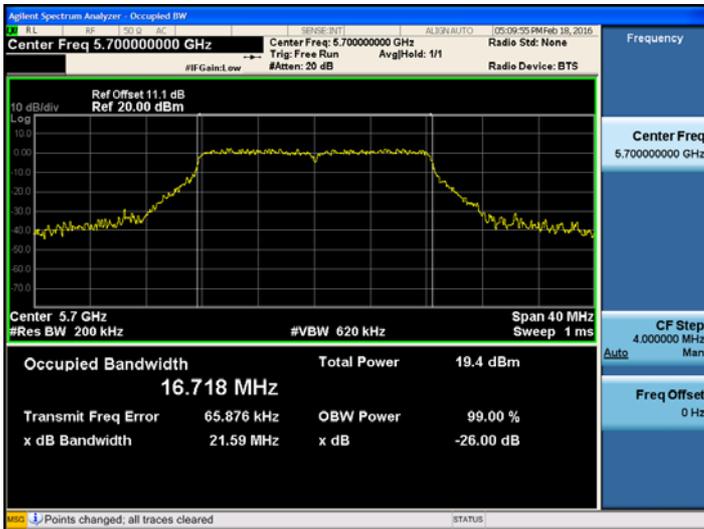
802.11a UNII 1 BAND 26dB Bandwidth (CH40)



802.11a UNII 2A BAND 26dB Bandwidth (CH 60)



802.11a UNII 2C BAND 26dB Bandwidth (CH140)



802.11a UNII 3 BAND 26dB Bandwidth (CH 165)



Note :

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

■ TEST RESULTS for 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	21.940	N/A	Pass
5200	40	21.611	N/A	Pass
5240	48	21.711	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	21.796	N/A	Pass
5300	60	21.984	N/A	Pass
5320	64	22.000	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n 20M BW

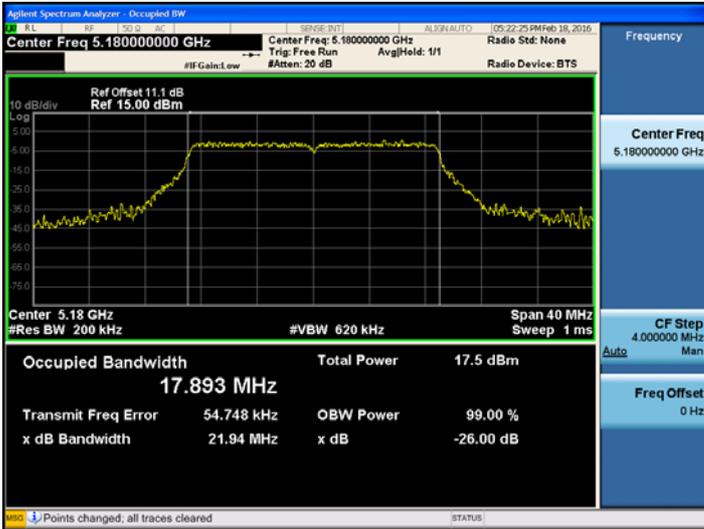
802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	22.480	N/A	Pass
5580	116	21.841	N/A	Pass
5700	140	22.030	N/A	Pass

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	21.773	N/A	Pass
5785	157	22.029	N/A	Pass
5825	165	22.110	N/A	Pass

TEST Plot for 802.11n _20MHz BW

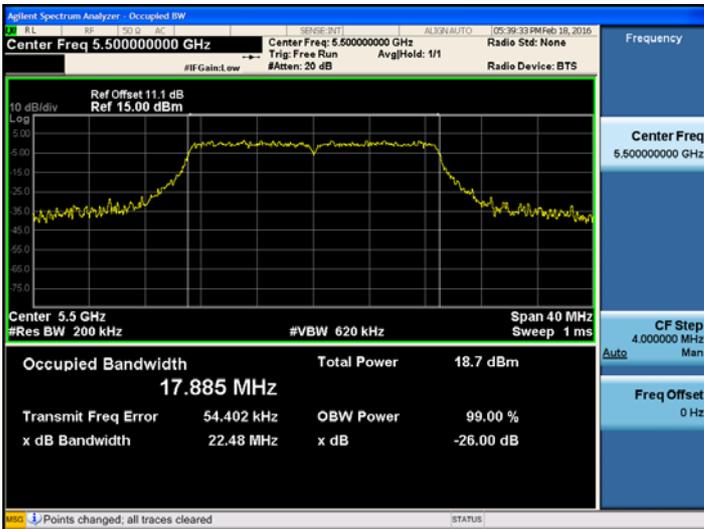
802.11n_20 MHz BW UNII 1 BAND 26dB Bandwidth(CH 36)



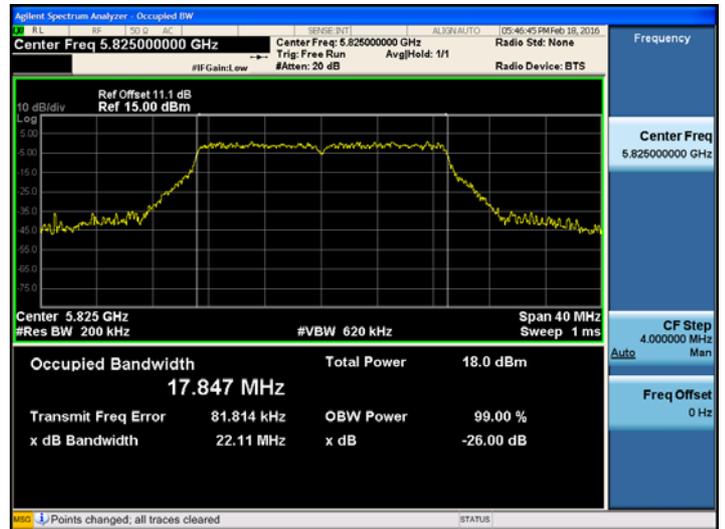
802.11n_20 MHz BW UNII 2A BAND 26dB Bandwidth(CH 64)



802.11n_20 MHz BW UNII 2C BAND 26dB Bandwidth(CH 100)



802.11n_20 MHz BW UNII 3 BAND 26dB Bandwidth(CH 165)



Note :

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

■ TEST RESULTS for 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	21.849	N/A	Pass
5200	40	21.890	N/A	Pass
5240	48	21.735	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	22.020	N/A	Pass
5300	60	21.792	N/A	Pass
5320	64	21.813	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac 20M BW

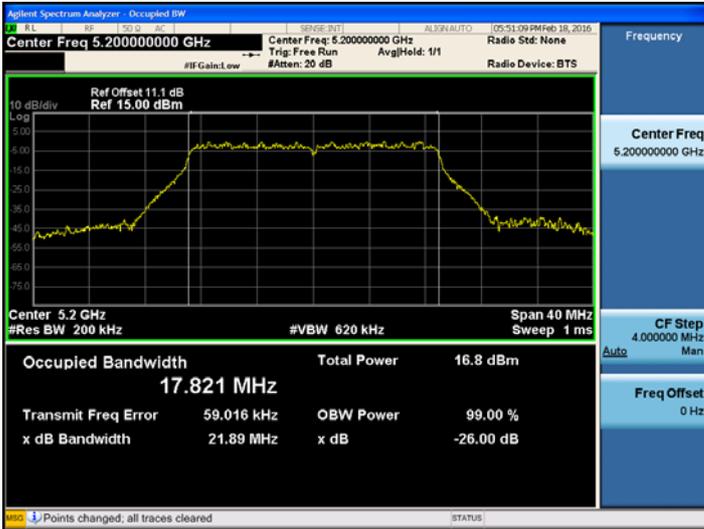
802.11ac(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	21.860	N/A	Pass
5580	116	21.622	N/A	Pass
5700	140	21.789	N/A	Pass

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	21.641	N/A	Pass
5785	157	21.682	N/A	Pass
5825	165	21.780	N/A	Pass

■ TEST Plot for 802.11ac _20MHz BW

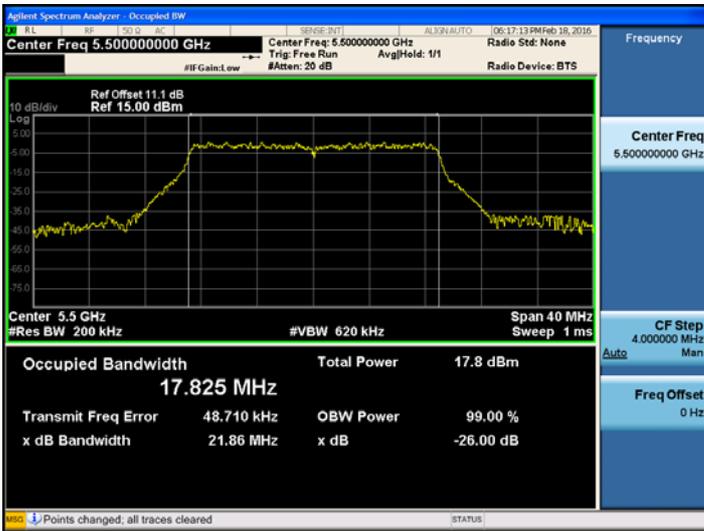
802.11ac_20 MHz BW UNII 1 BAND 26dB Bandwidth(CH 40)



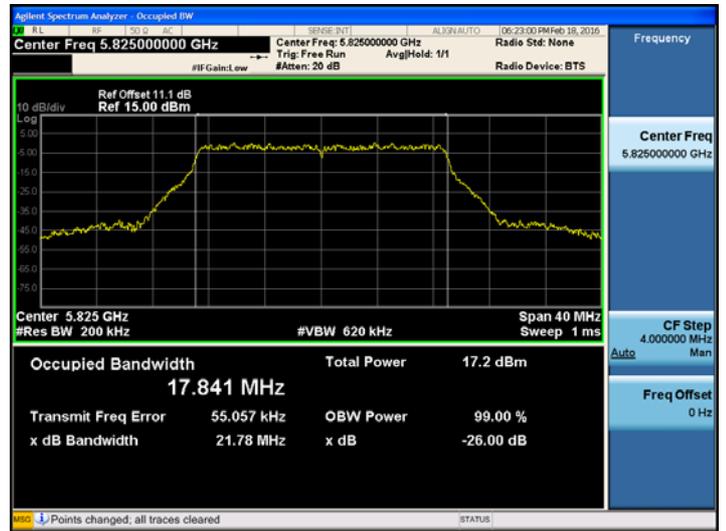
802.11ac_20 MHz BW UNII 2A BAND 26dB Bandwidth(CH 52)



802.11ac_20 MHz BW UNII 2C BAND 26dB Bandwidth(CH 100)



802.11ac_20 MHz BW UNII 3 BAND 26dB Bandwidth(CH 165)



Note :

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

■ TEST RESULTS for 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	42.858	N/A	Pass
5230	46	42.910	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	43.330	N/A	Pass
5310	62	43.077	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

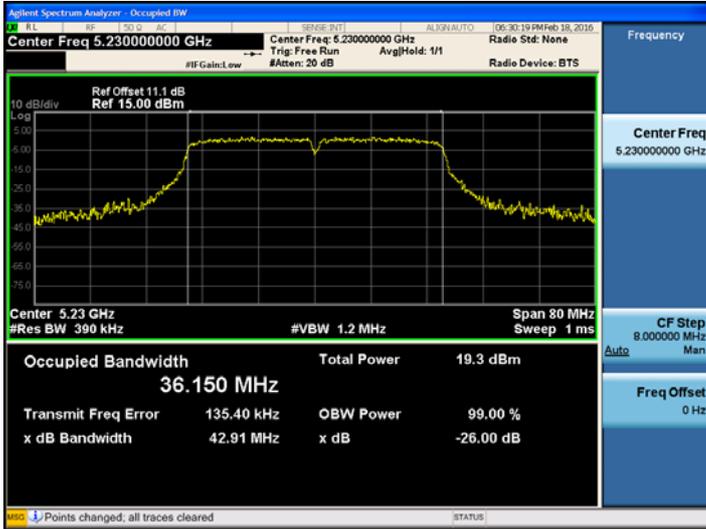
802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	42.907	N/A	Pass
5550	110	42.640	N/A	Pass
5670	134	43.020	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n_40 M BW

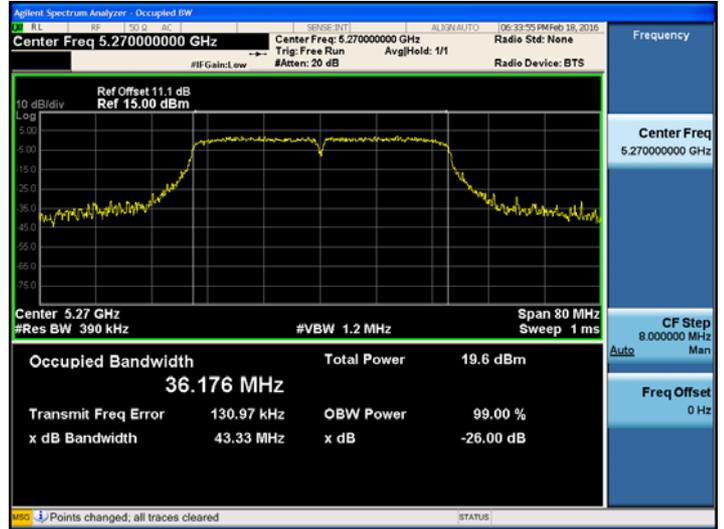
802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	41.999	N/A	Pass
5795	159	43.480	N/A	Pass

TEST Plot for 802.11n_40MHz BW

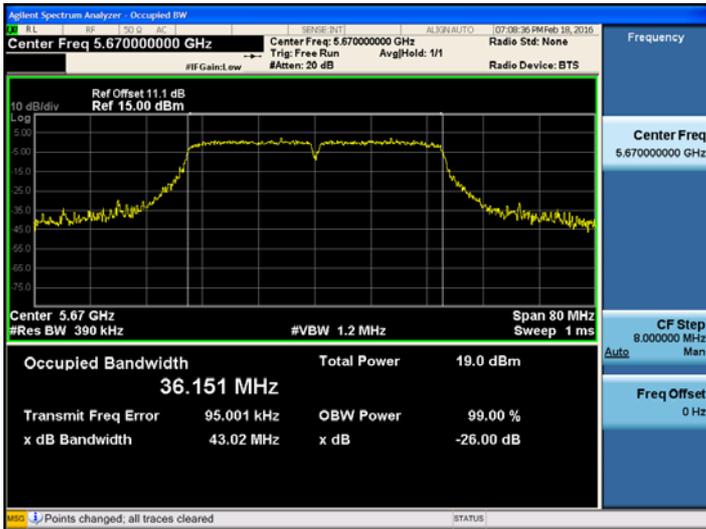
802.11n_40 MHz BW UNII 1 BAND 26dB Bandwidth(CH 46)



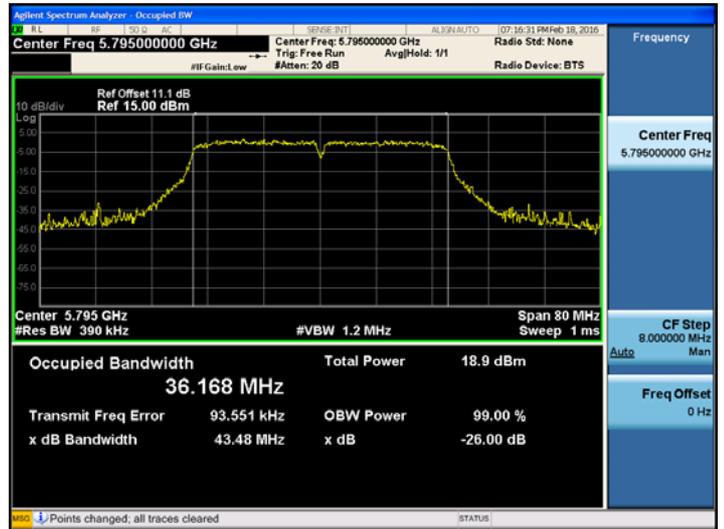
802.11n_40 MHz BW UNII 2A BAND 26dB Bandwidth (CH 54)



802.11n_40 MHz BW UNII 2C BAND 26dB Bandwidth(CH 134)



802.11n_40 MHz BW UNII 3 BAND 26dB Bandwidth (CH 159)



Note :

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

■ TEST RESULTS for 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	42.032	N/A	Pass
5230	46	42.750	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	42.560	N/A	Pass
5310	62	42.153	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_40 M BW

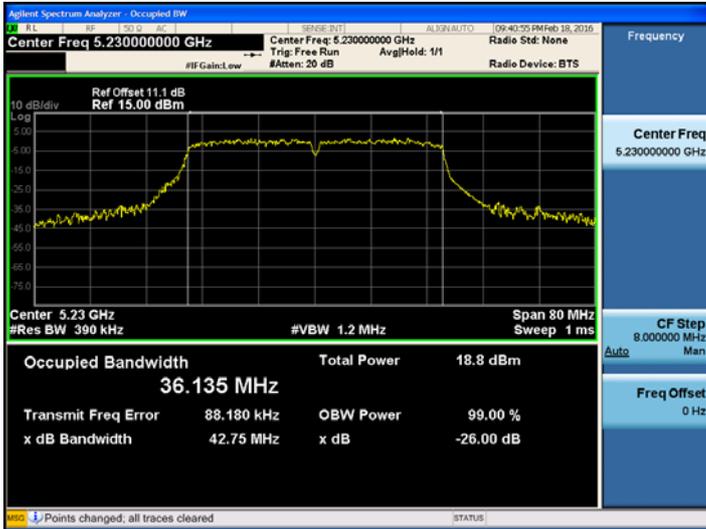
802.11ac(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	41.993	N/A	Pass
5550	110	42.520	N/A	Pass
5670	134	42.362	N/A	Pass

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	42.700	N/A	Pass
5795	159	42.274	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 54)



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	83.670	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	83.500	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	83.550	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac_80M BW

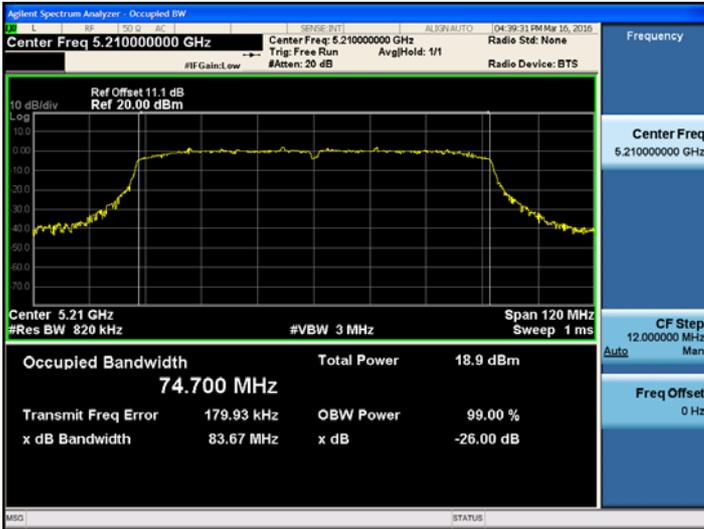
802.11ac(80M) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	83.370	N/A	Pass

Note :

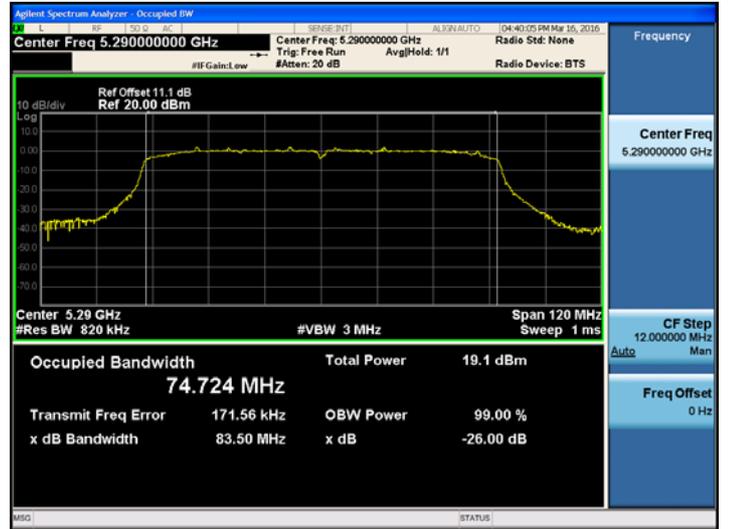
1. In order to simplify the report, attached plots were only the most wide channel.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.

TEST Plot for 802.11ac_80MHz BW

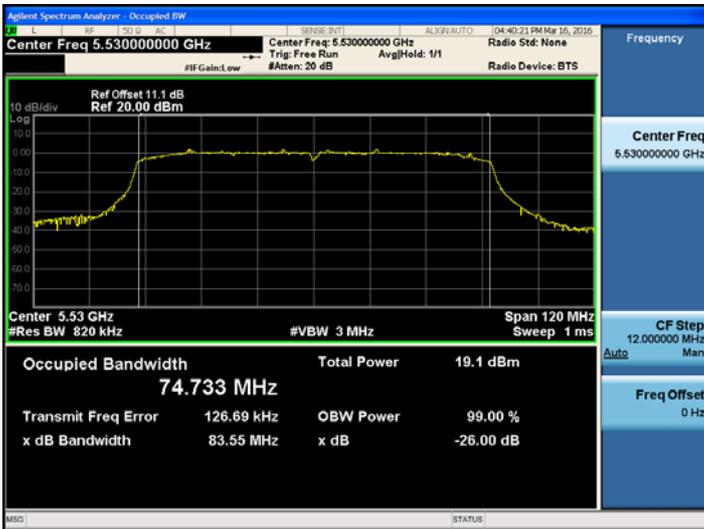
802.11ac_80 MHz BW UNII 1 BAND 26dB Bandwidth(CH 42)



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.

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	16.410	0.5	Pass
5785	157	16.405	0.5	Pass
5825	165	16.420	0.5	Pass

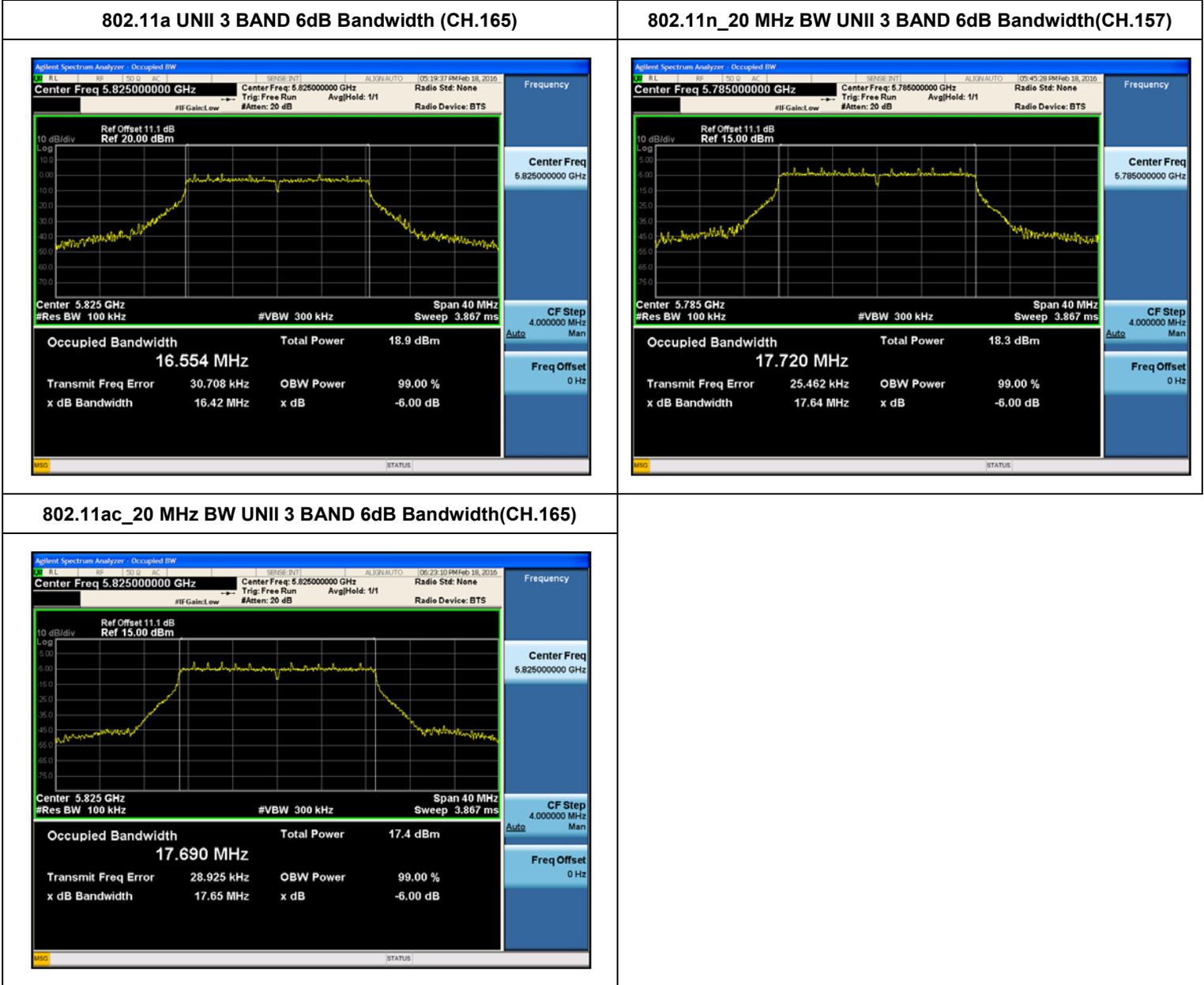
Conducted 6 dB Bandwidth Measurements for 802.11n_20MHz BW

802.11n(20MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.610	0.5	Pass
5785	157	17.640	0.5	Pass
5825	165	17.615	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	17.628	0.5	Pass
5785	157	17.632	0.5	Pass
5825	165	17.650	0.5	Pass

TEST Plot for 802.11a/n/ac_20MHz BW



Note :

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

■ TEST RESULTS for 802.11n/ac_40MHz BW

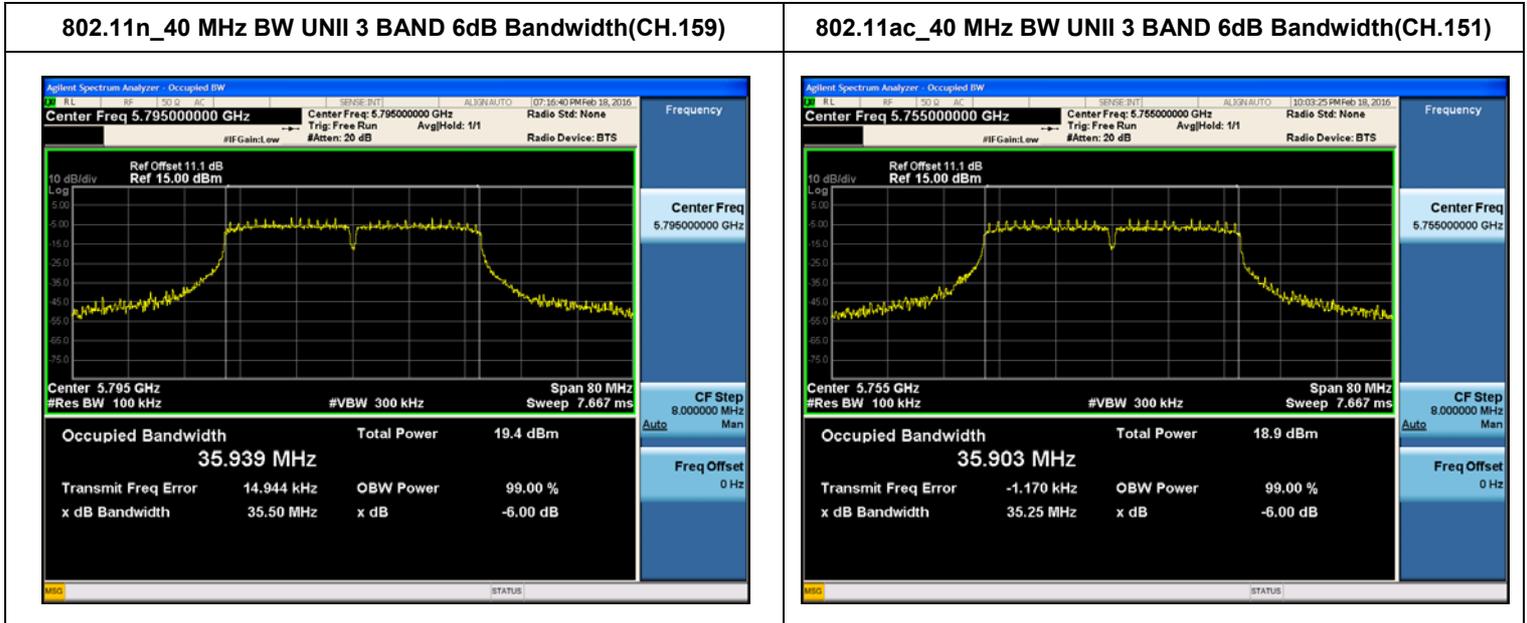
Conducted 6 dB Bandwidth Measurements for 802.11n_40MHz BW

802.11n(40MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.239	0.5	Pass
5795	159	35.500	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	35.250	0.5	Pass
5795	159	35.216	0.5	Pass

■ TEST Plot for 802.11n/ac_40MHz BW



Note :

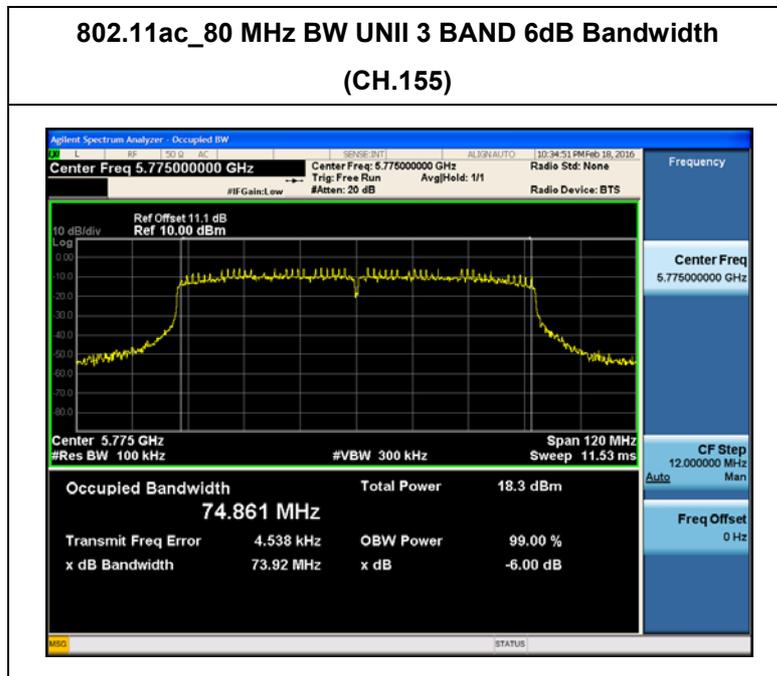
1. In order to simplify the report, attached plots were only the most wide channel.

■ **TEST RESULTS for 802.11ac_80MHz BW**

Conducted 6 dB Bandwidth Measurements for 802.11ac_80MHz BW

802.11ac(80MHz) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	73.920	0.5	Pass

■ **TEST Plot for 802.11ac_80MHz BW**



Note :

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

8.3 OUTPUT POWER MEASUREMENT

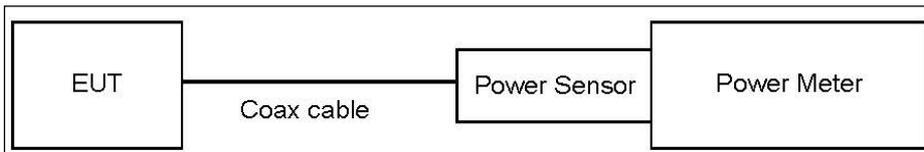
Test Requirements and limit, §15.407(a)(1)

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

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 01/08/2016).
 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.

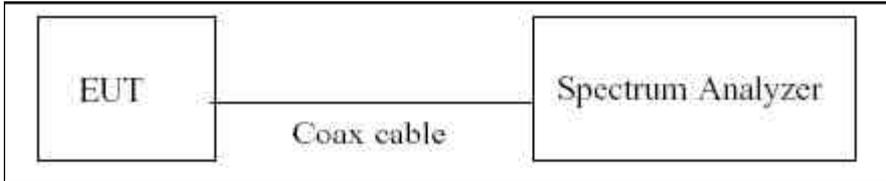
Note :

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

Band	Loss(dB)
UNII 1, 2A, 2C, 3	11.1

(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 01/08/2016).

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	11.1

(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	12.99	0.21	13.20	23.98
		9	12.88	0.31	13.19	23.98
		12	12.77	0.40	13.17	23.98
		18	12.59	0.59	13.18	23.98
		24	12.46	0.76	13.22	23.98
		36	12.05	1.02	13.07	23.98
		48	11.71	1.34	13.05	23.98
		54	11.59	1.47	13.06	23.98
5200	40	6	13.05	0.21	13.26	23.98
		9	12.94	0.31	13.25	23.98
		12	12.85	0.40	13.25	23.98
		18	12.68	0.59	13.27	23.98
		24	12.47	0.76	13.23	23.98
		36	12.21	1.02	13.23	23.98
		48	11.79	1.34	13.13	23.98
		54	11.65	1.47	13.12	23.98
5240	48	6	12.99	0.21	13.20	23.98
		9	12.94	0.31	13.25	23.98
		12	12.87	0.40	13.27	23.98
		18	12.66	0.59	13.25	23.98
		24	12.53	0.76	13.29	23.98
		36	12.08	1.02	13.10	23.98
		48	11.81	1.34	13.15	23.98
		54	11.67	1.47	13.14	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	13.01	0.21	13.22	23.98
		9	12.92	0.31	13.23	23.98
		12	12.88	0.40	13.28	23.98
		18	12.61	0.59	13.20	23.98
		24	12.50	0.76	13.26	23.98
		36	12.12	1.02	13.14	23.98
		48	11.82	1.34	13.16	23.98
		54	11.67	1.47	13.14	23.98
5300	60	6	13.11	0.21	13.32	23.98
		9	13.01	0.31	13.32	23.98
		12	12.94	0.40	13.34	23.98
		18	12.63	0.59	13.22	23.98
		24	12.49	0.76	13.25	23.98
		36	12.22	1.02	13.24	23.98
		48	11.82	1.34	13.16	23.98
		54	11.66	1.47	13.13	23.98
5320	64	6	13.16	0.21	13.37	23.98
		9	13.03	0.31	13.34	23.98
		12	12.88	0.40	13.28	23.98
		18	12.79	0.59	13.38	23.98
		24	12.54	0.76	13.30	23.98
		36	12.19	1.02	13.21	23.98
		48	11.86	1.34	13.20	23.98
		54	11.81	1.47	13.28	23.98

802.11a _20MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11a_20M 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	13.24	0.21	13.45	23.98
		9	13.14	0.31	13.45	23.98
		12	13.00	0.40	13.40	23.98
		18	12.87	0.59	13.46	23.98
		24	12.66	0.76	13.42	23.98
		36	12.22	1.02	13.24	23.98
		48	11.96	1.34	13.30	23.98
		54	11.86	1.47	13.33	23.98
5580	116	6	13.02	0.21	13.23	23.98
		9	12.85	0.31	13.16	23.98
		12	12.82	0.40	13.22	23.98
		18	12.61	0.59	13.20	23.98
		24	12.42	0.76	13.18	23.98
		36	12.16	1.02	13.18	23.98
		48	11.82	1.34	13.16	23.98
		54	11.68	1.47	13.15	23.98
5700	140	6	12.68	0.21	12.89	23.98
		9	12.60	0.31	12.91	23.98
		12	12.49	0.40	12.89	23.98
		18	12.37	0.59	12.96	23.98
		24	12.19	0.76	12.95	23.98
		36	11.85	1.02	12.87	23.98
		48	11.45	1.34	12.79	23.98
		54	11.37	1.47	12.84	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	12.58	0.21	12.79	30
		9	12.51	0.31	12.82	30
		12	12.40	0.40	12.80	30
		18	12.27	0.59	12.86	30
		24	11.95	0.76	12.71	30
		36	11.66	1.02	12.68	30
		48	11.39	1.34	12.73	30
		54	11.28	1.47	12.75	30
5785	157	6	12.59	0.21	12.80	30
		9	12.58	0.31	12.89	30
		12	12.48	0.40	12.88	30
		18	12.21	0.59	12.80	30
		24	11.99	0.76	12.75	30
		36	11.71	1.02	12.73	30
		48	11.46	1.34	12.80	30
		54	11.27	1.47	12.74	30
5825	165	6	12.61	0.21	12.82	30
		9	12.45	0.31	12.76	30
		12	12.35	0.40	12.75	30
		18	12.13	0.59	12.72	30
		24	11.95	0.76	12.71	30
		36	11.65	1.02	12.67	30
		48	11.33	1.34	12.67	30
		54	11.23	1.47	12.70	30

802.11n _20MHz BW (UNII 1)

■ TEST RESULTS

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

802.11n(20MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	0	12.32	0.23	12.55	23.98
		1	12.10	0.41	12.51	23.98
		2	11.94	0.60	12.54	23.98
		3	11.59	0.81	12.40	23.98
		4	11.30	1.13	12.43	23.98
		5	10.96	1.41	12.37	23.98
		6	10.85	1.55	12.40	23.98
		7	10.72	1.62	12.34	23.98
5200	40	0	12.35	0.23	12.58	23.98
		1	12.11	0.41	12.52	23.98
		2	11.89	0.60	12.49	23.98
		3	11.69	0.81	12.50	23.98
		4	11.31	1.13	12.44	23.98
		5	10.97	1.41	12.38	23.98
		6	10.88	1.55	12.43	23.98
		7	10.71	1.62	12.33	23.98
5240	48	0	12.34	0.23	12.57	23.98
		1	12.12	0.41	12.53	23.98
		2	11.92	0.60	12.52	23.98
		3	11.65	0.81	12.46	23.98
		4	11.37	1.13	12.50	23.98
		5	11.04	1.41	12.45	23.98
		6	10.91	1.55	12.46	23.98
		7	10.78	1.62	12.40	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		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	0	12.38	0.23	12.61	23.98
		1	12.17	0.41	12.58	23.98
		2	11.94	0.60	12.54	23.98
		3	11.71	0.81	12.52	23.98
		4	11.40	1.13	12.53	23.98
		5	11.02	1.41	12.43	23.98
		6	10.94	1.55	12.49	23.98
		7	10.81	1.62	12.43	23.98
5300	60	0	12.46	0.23	12.69	23.98
		1	12.19	0.41	12.60	23.98
		2	12.04	0.60	12.64	23.98
		3	11.72	0.81	12.53	23.98
		4	11.43	1.13	12.56	23.98
		5	11.12	1.41	12.53	23.98
		6	10.97	1.55	12.52	23.98
		7	10.91	1.62	12.53	23.98
5320	64	0	12.37	0.23	12.60	23.98
		1	12.22	0.41	12.63	23.98
		2	12.06	0.60	12.66	23.98
		3	11.84	0.81	12.65	23.98
		4	11.40	1.13	12.53	23.98
		5	11.09	1.41	12.50	23.98
		6	10.99	1.55	12.54	23.98
		7	10.86	1.62	12.48	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		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	0	12.52	0.23	12.75	23.98
		1	12.32	0.41	12.73	23.98
		2	12.16	0.60	12.76	23.98
		3	11.89	0.81	12.70	23.98
		4	11.58	1.13	12.71	23.98
		5	11.17	1.41	12.58	23.98
		6	11.10	1.55	12.65	23.98
		7	11.00	1.62	12.62	23.98
5580	116	0	12.26	0.23	12.49	23.98
		1	12.07	0.41	12.48	23.98
		2	11.85	0.60	12.45	23.98
		3	11.66	0.81	12.47	23.98
		4	11.36	1.13	12.49	23.98
		5	10.98	1.41	12.39	23.98
		6	10.86	1.55	12.41	23.98
		7	10.75	1.62	12.37	23.98
5700	140	0	12.01	0.23	12.24	23.98
		1	11.68	0.41	12.09	23.98
		2	11.55	0.60	12.15	23.98
		3	11.34	0.81	12.15	23.98
		4	11.00	1.13	12.13	23.98
		5	10.73	1.41	12.14	23.98
		6	10.46	1.55	12.01	23.98
		7	10.39	1.62	12.01	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		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5745	149	0	11.76	0.23	11.99	30
		1	11.62	0.41	12.03	30
		2	11.46	0.60	12.06	30
		3	11.28	0.81	12.09	30
		4	10.95	1.13	12.08	30
		5	10.52	1.41	11.93	30
		6	10.45	1.55	12.00	30
		7	10.32	1.62	11.94	30
5785	157	0	11.86	0.23	12.09	30
		1	11.62	0.41	12.03	30
		2	11.47	0.60	12.07	30
		3	11.20	0.81	12.01	30
		4	10.92	1.13	12.05	30
		5	10.61	1.41	12.02	30
		6	10.45	1.55	12.00	30
		7	10.31	1.62	11.93	30
5825	165	0	11.83	0.23	12.06	30
		1	11.60	0.41	12.01	30
		2	11.36	0.60	11.96	30
		3	11.16	0.81	11.97	30
		4	10.88	1.13	12.01	30
		5	10.48	1.41	11.89	30
		6	10.32	1.55	11.87	30
		7	10.16	1.62	11.78	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	10.85	0.42	11.27	23.98
		13	10.47	0.77	11.24	23.98
		19.5	10.11	1.08	11.19	23.98
		26	9.84	1.33	11.17	23.98
		39	9.36	1.78	11.14	23.98
		52	9.13	2.09	11.22	23.98
		58.5	8.91	2.25	11.16	23.98
		65	8.71	2.36	11.07	23.98
		78	8.45	2.61	11.06	23.98
5200	40	6.5	10.86	0.42	11.28	23.98
		13	10.49	0.77	11.26	23.98
		19.5	10.18	1.08	11.26	23.98
		26	9.88	1.33	11.21	23.98
		39	9.38	1.78	11.16	23.98
		52	9.17	2.09	11.26	23.98
		58.5	8.94	2.25	11.19	23.98
		65	8.75	2.36	11.11	23.98
		78	8.46	2.61	11.07	23.98
5240	48	6.5	10.89	0.42	11.31	23.98
		13	10.52	0.77	11.29	23.98
		19.5	10.23	1.08	11.31	23.98
		26	9.90	1.33	11.23	23.98
		39	9.39	1.78	11.17	23.98
		52	9.10	2.09	11.19	23.98
		58.5	8.96	2.25	11.21	23.98
		65	8.72	2.36	11.08	23.98
		78	8.48	2.61	11.09	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	10.94	0.42	11.36	23.98
		13	10.59	0.77	11.36	23.98
		19.5	10.25	1.08	11.33	23.98
		26	9.97	1.33	11.30	23.98
		39	9.43	1.78	11.21	23.98
		52	9.14	2.09	11.23	23.98
		58.5	9.00	2.25	11.25	23.98
		65	8.82	2.36	11.18	23.98
		78	8.45	2.61	11.06	23.98
5300	60	6.5	10.96	0.42	11.38	23.98
		13	10.65	0.77	11.42	23.98
		19.5	10.30	1.08	11.38	23.98
		26	9.99	1.33	11.32	23.98
		39	9.54	1.78	11.32	23.98
		52	9.18	2.09	11.27	23.98
		58.5	8.99	2.25	11.24	23.98
		65	8.86	2.36	11.22	23.98
		78	8.55	2.61	11.16	23.98
5320	64	6.5	10.99	0.42	11.41	23.98
		13	10.67	0.77	11.44	23.98
		19.5	10.32	1.08	11.40	23.98
		26	9.96	1.33	11.29	23.98
		39	9.51	1.78	11.29	23.98
		52	9.26	2.09	11.35	23.98
		58.5	8.97	2.25	11.22	23.98
		65	8.87	2.36	11.23	23.98
		78	8.58	2.61	11.19	23.98

802.11ac _20MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_20M 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	11.09	0.42	11.51	23.98
		13	10.83	0.77	11.60	23.98
		19.5	10.50	1.08	11.58	23.98
		26	10.14	1.33	11.47	23.98
		39	9.66	1.78	11.44	23.98
		52	9.44	2.09	11.53	23.98
		58.5	9.24	2.25	11.49	23.98
		65	9.13	2.36	11.49	23.98
		78	8.78	2.61	11.39	23.98
5580	116	6.5	10.86	0.42	11.28	23.98
		13	10.53	0.77	11.30	23.98
		19.5	10.24	1.08	11.32	23.98
		26	9.86	1.33	11.19	23.98
		39	9.36	1.78	11.14	23.98
		52	9.13	2.09	11.22	23.98
		58.5	8.90	2.25	11.15	23.98
		65	8.76	2.36	11.12	23.98
		78	8.45	2.61	11.06	23.98
5700	140	6.5	10.62	0.42	11.04	23.98
		13	10.19	0.77	10.96	23.98
		19.5	9.96	1.08	11.04	23.98
		26	9.63	1.33	10.96	23.98
		39	9.05	1.78	10.83	23.98
		52	8.85	2.09	10.94	23.98
		58.5	8.62	2.25	10.87	23.98
		65	8.53	2.36	10.89	23.98
		78	8.20	2.61	10.81	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	10.46	0.42	10.88	30
		13	10.16	0.77	10.93	30
		19.5	9.85	1.08	10.93	30
		26	9.49	1.33	10.82	30
		39	8.99	1.78	10.77	30
		52	8.71	2.09	10.80	30
		58.5	8.56	2.25	10.81	30
		65	8.42	2.36	10.78	30
		78	8.02	2.61	10.63	30
5785	157	6.5	10.46	0.42	10.88	30
		13	10.08	0.77	10.85	30
		19.5	9.76	1.08	10.84	30
		26	9.47	1.33	10.80	30
		39	8.98	1.78	10.76	30
		52	8.69	2.09	10.78	30
		58.5	8.47	2.25	10.72	30
		65	8.36	2.36	10.72	30
		78	8.04	2.61	10.65	30
5825	165	6.5	10.31	0.42	10.73	30
		13	9.99	0.77	10.76	30
		19.5	9.55	1.08	10.63	30
		26	9.26	1.33	10.59	30
		39	8.84	1.78	10.62	30
		52	8.60	2.09	10.69	30
		58.5	8.35	2.25	10.60	30
		65	8.19	2.36	10.55	30
		78	7.87	2.61	10.48	30

802.11n_40MHz BW (UNII 1)

■ TEST RESULTS

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

802.11n(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	0	12.56	0.45	13.00	23.98
		1	11.91	0.83	12.75	23.98
		2	11.31	1.17	12.47	23.98
		3	10.92	1.47	12.39	23.98
		4	10.31	1.92	12.24	23.98
		5	9.83	2.39	12.22	23.98
		6	9.64	2.55	12.19	23.98
		7	9.47	2.68	12.15	23.98
5230	46	0	12.29	0.45	12.74	23.98
		1	11.86	0.83	12.70	23.98
		2	11.83	1.17	13.00	23.98
		3	11.54	1.47	13.02	23.98
		4	11.01	1.92	12.93	23.98
		5	10.54	2.39	12.94	23.98
		6	10.32	2.55	12.87	23.98
		7	10.22	2.68	12.90	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		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	0	12.58	0.45	13.03	23.98
		1	12.31	0.83	13.14	23.98
		2	11.86	1.17	13.03	23.98
		3	11.53	1.47	13.00	23.98
		4	11.05	1.92	12.97	23.98
		5	10.47	2.39	12.86	23.98
		6	10.26	2.55	12.81	23.98
		7	10.12	2.68	12.80	23.98
5310	62	0	12.64	0.45	13.09	23.98
		1	12.16	0.83	12.99	23.98
		2	11.87	1.17	13.03	23.98
		3	11.37	1.47	12.84	23.98
		4	10.93	1.92	12.86	23.98
		5	10.43	2.39	12.82	23.98
		6	10.18	2.55	12.73	23.98
		7	10.15	2.68	12.83	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		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	0	12.49	0.45	12.94	23.98
		1	12.06	0.83	12.89	23.98
		2	11.72	1.17	12.89	23.98
		3	11.38	1.47	12.85	23.98
		4	10.71	1.92	12.63	23.98
		5	10.35	2.39	12.74	23.98
		6	10.20	2.55	12.75	23.98
		7	10.13	2.68	12.81	23.98
5550	110	0	12.47	0.45	12.92	23.98
		1	12.05	0.83	12.88	23.98
		2	11.74	1.17	12.91	23.98
		3	11.36	1.47	12.83	23.98
		4	10.79	1.92	12.71	23.98
		5	10.35	2.39	12.74	23.98
		6	10.02	2.55	12.57	23.98
		7	9.96	2.68	12.64	23.98
5670	134	0	12.03	0.45	12.48	23.98
		1	11.66	0.83	12.50	23.98
		2	11.69	1.17	12.86	23.98
		3	10.93	1.47	12.40	23.98
		4	10.41	1.92	12.33	23.98
		5	9.93	2.39	12.32	23.98
		6	9.72	2.55	12.27	23.98
		7	9.58	2.68	12.26	23.98

802.11n_40MHz BW (UNII 3)

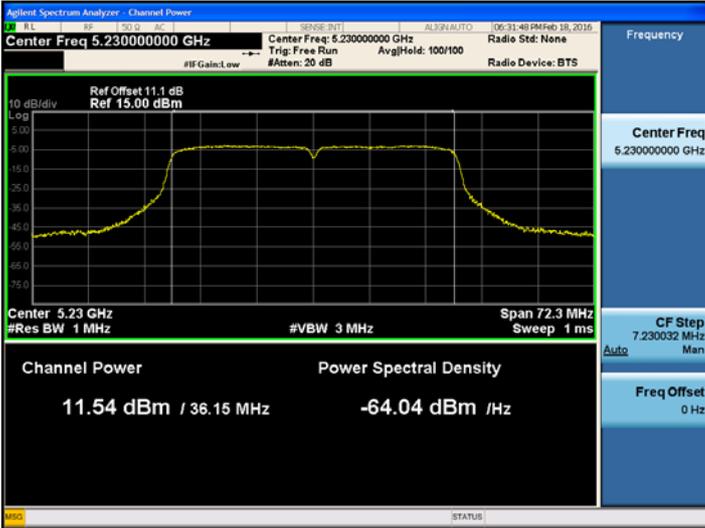
■ TEST RESULTS

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

802.11n(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	0	11.86	0.45	12.31	30
		1	11.52	0.83	12.35	30
		2	11.16	1.17	12.33	30
		3	10.63	1.47	12.10	30
		4	10.20	1.92	12.12	30
		5	9.72	2.39	12.12	30
		6	9.57	2.55	12.12	30
		7	9.38	2.68	12.06	30
5795	159	0	11.81	0.45	12.25	30
		1	11.34	0.83	12.17	30
		2	11.04	1.17	12.21	30
		3	10.79	1.47	12.26	30
		4	10.10	1.92	12.02	30
		5	9.78	2.39	12.17	30
		6	9.62	2.55	12.17	30
		7	9.42	2.68	12.10	30

■ TEST Plot for Ant.0_802.11n_40MHz BW

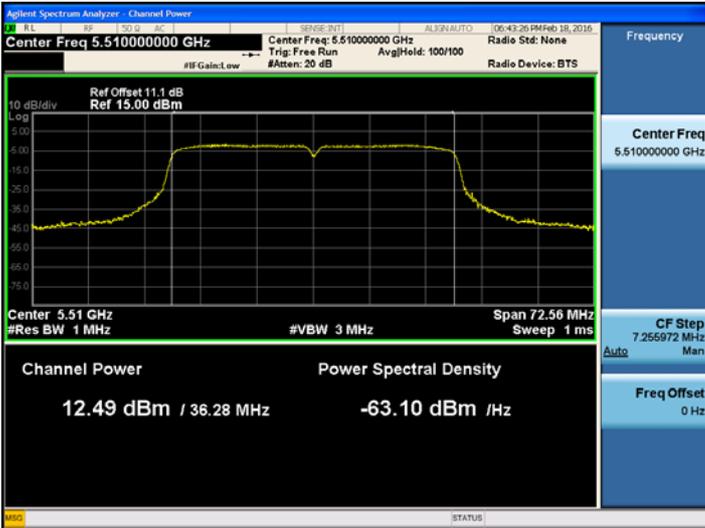
**802.11n_40 MHz BW UNII 1 BAND Average Power
(5190 MHz ~5230 MHz) CH 46 MCS3**



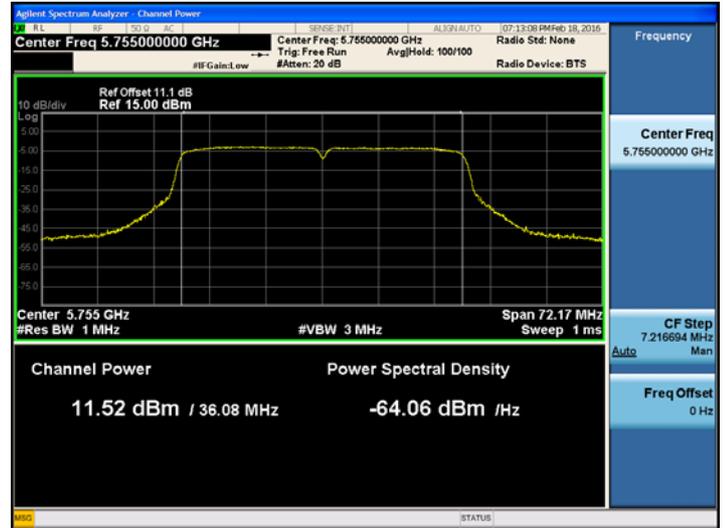
**802.11n_40 MHz BW UNII 2A BAND Average Power
(5270 MHz ~5310 MHz) CH 54 MCS1**



**802.11n_40 MHz BW UNII 2C BAND Average Power
(5510 MHz ~5670 MHz) CH 102 MCS0**



**802.11n_40 MHz BW UNII 3 BAND Average Power
(5755 MHz ~5795 MHz) CH 151 MCS1**



802.11ac_40 MHz BW (UNII 1)

■ TEST RESULTS

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

802.11ac(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	0	11.47	0.80	12.26	23.98
		1	10.89	1.37	12.26	23.98
		2	10.41	1.81	12.22	23.98
		3	10.03	2.13	12.16	23.98
		4	9.45	2.66	12.11	23.98
		5	9.16	2.99	12.15	23.98
		6	9.03	3.17	12.20	23.98
		7	8.88	3.30	12.17	23.98
		8	8.67	3.50	12.17	23.98
		9	8.63	3.62	12.25	23.98
5230	46	0	11.57	0.80	12.37	23.98
		1	11.10	1.37	12.47	23.98
		2	10.59	1.81	12.40	23.98
		3	10.10	2.13	12.23	23.98
		4	9.59	2.66	12.25	23.98
		5	9.20	2.99	12.19	23.98
		6	9.11	3.17	12.28	23.98
		7	9.00	3.30	12.30	23.98
		8	8.73	3.50	12.23	23.98
		9	8.76	3.62	12.38	23.98

802.11ac _40MHz BW (UNII 2A)

■ TEST RESULTS

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

802.11ac(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	0	11.66	0.80	12.46	23.98
		1	11.04	1.37	12.40	23.98
		2	10.48	1.81	12.29	23.98
		3	10.07	2.13	12.20	23.98
		4	9.61	2.66	12.28	23.98
		5	9.25	2.99	12.24	23.98
		6	9.13	3.17	12.30	23.98
		7	8.94	3.30	12.24	23.98
		8	8.71	3.50	12.20	23.98
		9	8.65	3.62	12.27	23.98
5310	62	0	11.63	0.80	12.43	23.98
		1	11.07	1.37	12.43	23.98
		2	10.62	1.81	12.43	23.98
		3	10.20	2.13	12.33	23.98
		4	9.65	2.66	12.31	23.98
		5	9.30	2.99	12.28	23.98
		6	9.10	3.17	12.27	23.98
		7	9.07	3.30	12.37	23.98
		8	8.81	3.50	12.31	23.98
		9	8.76	3.62	12.38	23.98

802.11ac_40MHz BW (UNII 2C)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_40M BW Mode: 5510~5670)

802.11ac(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	0	11.32	0.80	12.12	23.98
		1	10.88	1.37	12.25	23.98
		2	10.36	1.81	12.17	23.98
		3	9.88	2.13	12.01	23.98
		4	9.44	2.66	12.10	23.98
		5	9.03	2.99	12.02	23.98
		6	8.99	3.17	12.16	23.98
		7	8.80	3.30	12.09	23.98
		8	8.69	3.50	12.19	23.98
		9	8.58	3.62	12.21	23.98
5590	118	0	11.42	0.80	12.21	23.98
		1	10.86	1.37	12.22	23.98
		2	10.33	1.81	12.13	23.98
		3	9.92	2.13	12.05	23.98
		4	9.43	2.66	12.09	23.98
		5	9.01	2.99	12.00	23.98
		6	8.89	3.17	12.06	23.98
		7	8.81	3.30	12.11	23.98
		8	8.60	3.50	12.10	23.98
		9	8.60	3.62	12.22	23.98
5670	134	0	11.00	0.80	11.80	23.98
		1	10.55	1.37	11.92	23.98
		2	10.12	1.81	11.92	23.98
		3	9.60	2.13	11.74	23.98
		4	9.14	2.66	11.81	23.98
		5	8.74	2.99	11.73	23.98
		6	8.65	3.17	11.82	23.98
		7	8.46	3.30	11.75	23.98
		8	8.26	3.50	11.76	23.98

		9	8.25	3.62	11.87	23.98
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802.11ac _40MHz BW (UNII 3)

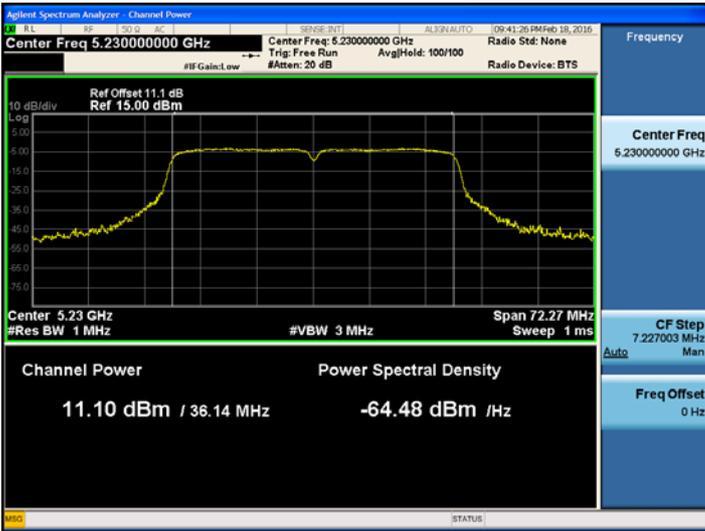
■ TEST RESULTS

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

802.11ac(40MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5755	151	0	11.02	0.80	11.82	30
		1	10.44	1.37	11.81	30
		2	9.97	1.81	11.78	30
		3	9.47	2.13	11.61	30
		4	8.95	2.66	11.61	30
		5	8.58	2.99	11.57	30
		6	8.52	3.17	11.69	30
		7	8.36	3.30	11.65	30
		8	8.20	3.50	11.70	30
		9	8.10	3.62	11.72	30
5795	159	0	10.95	0.80	11.74	30
		1	10.46	1.37	11.82	30
		2	9.98	1.81	11.79	30
		3	9.49	2.13	11.63	30
		4	8.99	2.66	11.66	30
		5	8.70	2.99	11.69	30
		6	8.56	3.17	11.73	30
		7	8.40	3.30	11.69	30
		8	8.18	3.50	11.67	30
		9	8.13	3.62	11.76	30

■ TEST Plot for 802.11ac_40MHz BW

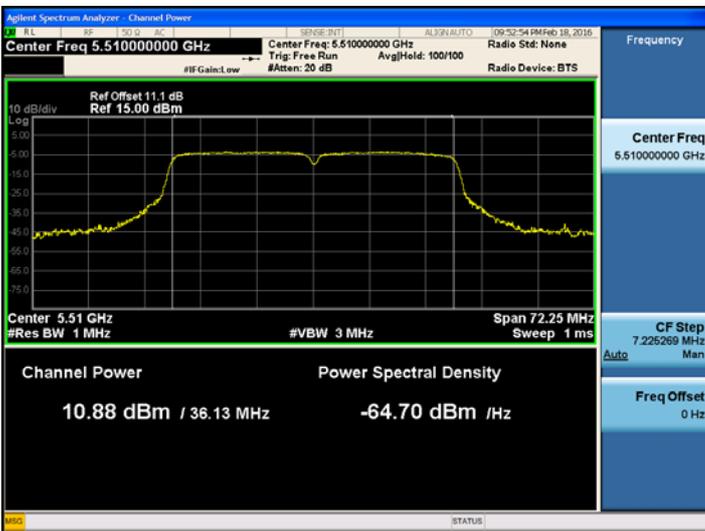
**802.11ac_40 MHz BW UNII 1 BAND Average Power
(5190 ~ 5230 MHz) CH 46 MCS1**



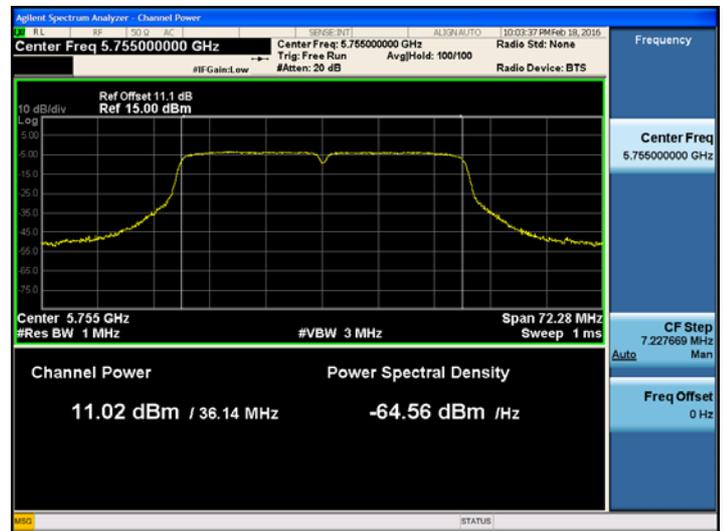
**802.11ac_40 MHz BW UNII 2A BAND Average Power
(5270 ~ 5310 MHz) CH 54 MCS0**



**802.11ac_40 MHz BW UNII 2C BAND Average Power
(5510 ~ 5710 MHz) CH 102 MCS1**



**802.11ac_40 MHz BW UNII 3 BAND Average Power
(5755 ~ 5795 MHz) CH 151 MCS0**



802.11ac_80 MHz BW (UNII 1)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80MHz Mode: 5210)

802.11ac(80MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	0	11.35	0.63	11.98	23.98
		1	10.94	1.06	12.01	23.98
		2	10.50	1.33	11.82	23.98
		3	10.25	1.57	11.82	23.98
		4	10.01	1.78	11.79	23.98
		5	9.93	2.01	11.94	23.98
		6	9.81	2.07	11.87	23.98
		7	9.61	2.11	11.72	23.98
		8	9.57	2.22	11.78	23.98
		9	9.43	2.26	11.70	23.98

802.11ac_80MHz BW (UNII 2A)

■ TEST RESULTS

Conducted Output Power Measurements (802.11ac_80MHz Mode: 5290 MHz)

802.11ac(80MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5290	58	0	11.32	0.63	11.96	23.98
		1	10.72	1.06	11.78	23.98
		2	10.49	1.33	11.81	23.98
		3	10.32	1.57	11.89	23.98
		4	9.96	1.78	11.74	23.98
		5	9.76	2.01	11.76	23.98
		6	9.56	2.07	11.63	23.98
		7	9.58	2.11	11.69	23.98
		8	9.47	2.22	11.69	23.98
		9	9.40	2.26	11.66	23.98

802.11ac_80MHz BW (UNII 2C)

■ TEST RESULTS

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

802.11ac(80MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5530	106	0	11.23	0.63	11.86	23.98
		1	10.67	1.06	11.73	23.98
		2	10.43	1.33	11.76	23.98
		3	10.23	1.57	11.80	23.98
		4	9.84	1.78	11.62	23.98
		5	9.64	2.01	11.65	23.98
		6	9.56	2.07	11.63	23.98
		7	9.56	2.11	11.67	23.98
		8	9.44	2.22	11.66	23.98
		9	9.37	2.26	11.64	23.98

802.11ac_80MHz BW (UNII 3)

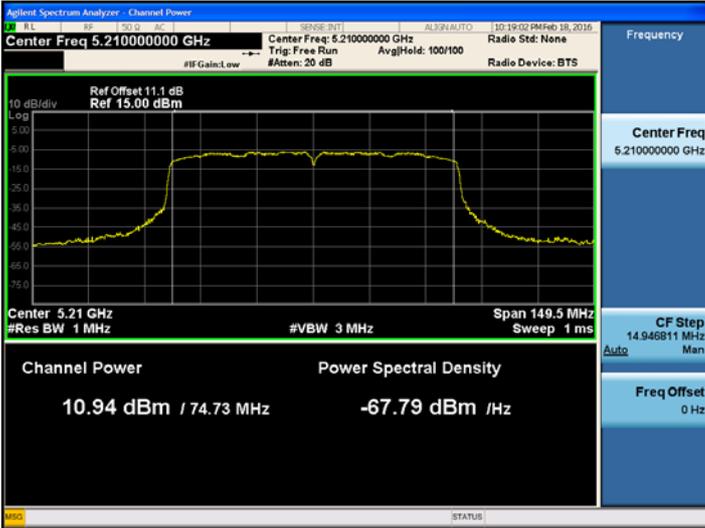
■ TEST RESULTS

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

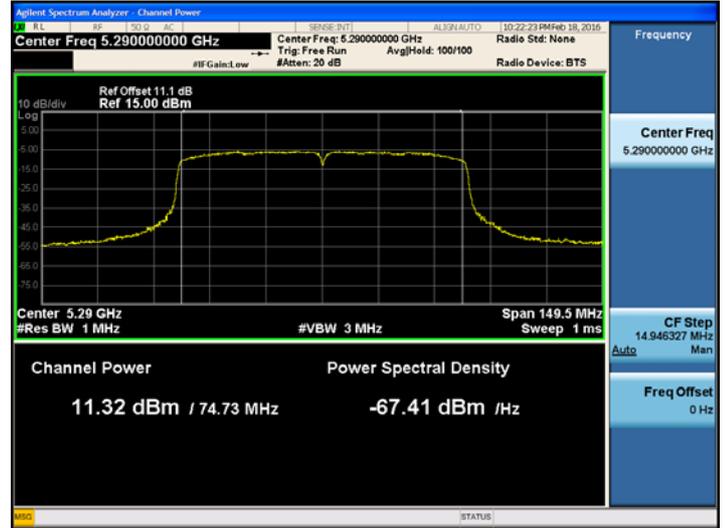
802.11ac(80MHz) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor (dB)	Measured Power(dBm) + Duty Cycle Factor(dB)	Limit (dBm)
Frequency [MHz]	Channel No.					
5775	155	0	10.63	0.63	11.27	30
		1	10.20	1.06	11.26	30
		2	9.98	1.33	11.30	30
		3	9.78	1.57	11.35	30
		4	9.36	1.78	11.14	30
		5	9.22	2.01	11.23	30
		6	9.10	2.07	11.17	30
		7	9.13	2.11	11.24	30
		8	9.03	2.22	11.25	30
		9	8.95	2.26	11.21	30

■ TEST Plot for 802.11ac_80MHz BW

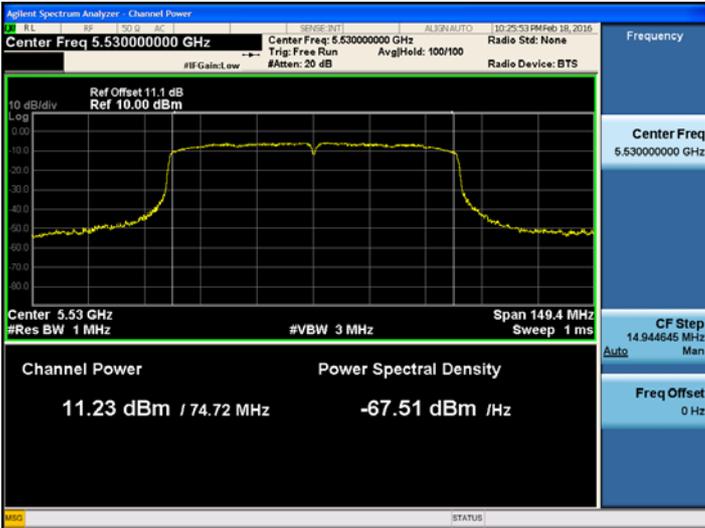
**802.11ac_80 MHz BW UNII 1 BAND Average Power
(5210 MHz) CH 42 MCS1**



**802.11ac_80 MHz BW UNII 2A BAND Average Power
(5290 MHz) CH 58 MCS0**



**802.11ac_80 MHz BW UNII 2C BAND Average Power
(5530 ~ 5690 MHz) CH 106 MCS0**



**802.11ac_80 MHz BW UNII 3 BAND Average Power
(5755 MHz) CH 155 MCS3**

