HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

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

Address:
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Date of Issue:
September 26, 2013

Test Site/Location:
HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea

Report No.: HCTR1309FR13-1

HCT FRN: 0005866421

FCC ID : ZNFLGL22

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

FCC Model(s):	KS1204
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Cellular WCDMA/HSDPA/HSUPA Phone with Bluetooth/WLAN/NFC
Max. RF Output Power:	Wi-Fi 802.11a (5180~5240) (11.97 dBm)/ Wi-Fi 802.11a (5260~5320) (12.00 dBm)/ Wi-Fi 802.11a (5500~5720) (11.90 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (10.95 dBm)/ Wi-Fi 802.11n_20 MHz BW(5260~5320)(11.03 dBm)/ Wi-Fi 802.11n_20 MHz BW(5500~5720)(10.89 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (11.11 dBm)/ Wi-Fi 802.11n_40 MHz BW (5270~5310) (11.27 dBm)/ Wi-Fi 802.11n_40 MHz BW (5510~5710) (10.88 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5180~5240) (9.84 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5260~5320) (10.27 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5500~5720) (10.18 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5190~5230) (10.20 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5270~5310) (10.53 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5510~5710) (10.04 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5210) (9.59 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5290) (9.43 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5530~5690) (9.77 dBm)
Frequency Range:	20 MHz BW: 5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2)/ 5500 MHz - 5720 MHz (UNII 2e)/ 5500 MHz - 5720 MHz (UNII 2e)_802.11ac 40 MHz BW: 5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2)/ 5510 MHz - 5710 MHz (UNII 2e)/ 5510 MHz - 5710 MHz (UNII 2e)_802.11ac 80 MHz BW: 5210 MHz(UNII 1)/ 5290 MHz(UNII 2)/ 5530 MHz - 5690 MHz(UNII 2e)
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(UNII)
FCC Rule Part(s):	Part 15.407

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
: Jong Seok Lee
Test Engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1309FR13	September 16, 2013	- First Approval Report
HCTR1309FR13-1	September 26, 2013	- Revised Conducted Power for 802.11ac_40 MHz BW(5190 MHz ~ 5230 MHz) on Page 1 and 4 - Insert the Unit(dB) for Duty Cycle Factor on Page 9 - Revised the Channel Information in Table on Page 18 - Insert all plots for 26 dB BW and 20 dB BW - Added 802.11a ch144, 802.11n_20MHz BW ch144, 802.11n_40MHz BW ch142

Table of Contents

1. GENERAL INFORMATION

Applicant:	LG Electronics MobileComm U.S.A., Inc.
Address:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID:	ZNFLGL22
EUT Type:	Cellular/PCS GSM/GPRS/EDGE Cellular WCDMA/HSDPA/HSUPA Phone with Bluetooth/WLAN/NFC
Model name(s):	KS1204
Date(s) of Tests:	August 27, 2013 ~ September 26, 2013
Place of Tests:	HCT Co., Ltd. 105-1, Jangam-ri , Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, KOREA. (IC Recognition No. : 5944A-3)

2. EUT DESCRIPTION

EUT Type	Cellular/PCS GSM/GPRS/EDGE Cellular WCDMA/HSDPA/HSUPA Phone with Bluetooth/WLAN/NFC	
FCC Model Name	KS1204	
Power Supply	DC 3.8 V	
Battery Type	Li-ion Battery(Standard)	
Frequency Range	TX_20 MHz BW: 40 MHz BW: 80 MHz BW: RX_20 MHz BW: 40 MHz BW: 80 MHz BW:	5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2)/ 5500 MHz - 5720 MHz (UNII 2e) where) Not supported 5600 MHz – 5640 MHz 5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2)/ 5510 MHz - 5710 MHz (UNII 2e) where) Not supported 5590 MHz – 5630 MHz 5210 MHz(UNII 1)/ 5290 MHz(UNII 2)/ 5530 MHz - 5690 MHz(UNII 2e) where) Not supported 5610 MHz 5180 MHz - 5240 MHz (UNII 1)/ 5260 MHz - 5320 MHz (UNII 2)/ 5500 MHz - 5720 MHz (UNII 2e) where) Not supported 5600 MHz – 5640 MHz 5190 MHz - 5230 MHz (UNII 1)/ 5270 MHz - 5310 MHz (UNII 2)/ 5510 MHz - 5710 MHz (UNII 2e) where) Not supported 5590 MHz – 5630 MHz 5210 MHz(UNII 1)/ 5290 MHz(UNII 2)/ 5530 MHz - 5690 MHz(UNII 2e) Where) Not supported 5610 MHz
Max. RF Output Power:	Wi-Fi 802.11a (5180~5240) (11.97 dBm)/ Wi-Fi 802.11a (5260~5320) (12.00 dBm)/ Wi-Fi 802.11a (5500~5720) (11.90 dBm)/ Wi-Fi 802.11n_20 MHz BW (5180~5240) (10.95 dBm)/ Wi-Fi 802.11n_20 MHz BW(5260~5320)(11.03 dBm)/ Wi-Fi 802.11n_20 MHz BW(5500~5720)(10.89 dBm)/ Wi-Fi 802.11n_40 MHz BW(5190~5230) (11.11 dBm)/ Wi-Fi 802.11n_40 MHz BW (5270~5310) (11.27 dBm)/ Wi-Fi 802.11n_40 MHz BW (5510~5710) (10.88 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5180~5240) (9.84 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5260~5320) (10.27 dBm)/ Wi-Fi 802.11ac_20 MHz BW (5500~5720) (10.18 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5190~5230) (10.20 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5270~5310) (10.53 dBm)/ Wi-Fi 802.11ac_40 MHz BW (5510~5710) (10.04 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5210) (9.59 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5290) (9.43 dBm)/ Wi-Fi 802.11ac_80 MHz BW (5530~5690) (9.77 dBm)	
Modulation Type	OFDM(802.11a, 802.11n, 802.11ac)	
Antenna Specification	Manufacturer: Ace Technology Antenna type: PIFA Antenna Peak Gain : -1.2 dBi	

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D01 General UNII Test Procedures v01r03 dated April 08, 2013 entitled " Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices, the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.4-2003) – Part 15, Subpart E" were used in the measurement.
For 802.11ac, KDB644545 D01 v01r01 dated April 08, 2013.

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 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, 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 June 21, 2011 (Registration Number: 90661)

5.2 EQUIPMENT

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

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

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

* The antennas of this E.U.T are permanently attached.

*The E.U.T Complies with the requirement of §15.203

7. SUMMARY OF TEST RESULTS

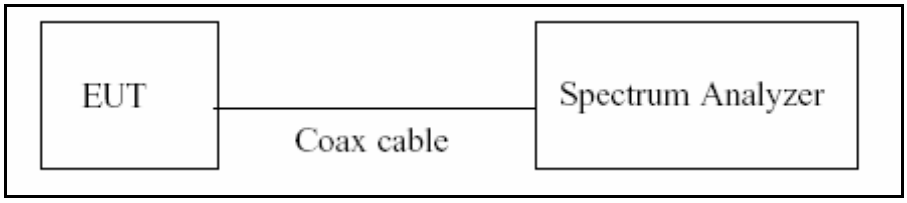
Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
TRANSMITTER MODE(TX)			CONDUCTED	
26dB Bandwidth	NA	NA		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 4+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 11+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 11+10 log $_{10}$ (BW) dBm (5470-5725 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1), (5)	<4 dBm/ MHz (5150-5250) <11 dBm/ MHz (5250-5350) <11 dBm/ MHz (5470-5725)		PASS
Peak Excursion	§15.407(a)(6)	<13 dB/ MHz maximum difference		PASS
Frequency Stability	§15.407(g)	NA		PASS
Undesirable Emissions	§15.407(b)(1), (2), (3)	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	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
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits	LINE CONDUCTED	PASS

8. TEST RESULT

8.1 DUTY CYCLE

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

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. We tested accroding to the zero-span measurement method, B)2) in KDB 789033(issued 04/08/2013)
The largest availble value of RBW is 8 MHz and VBW is 50 MHz. The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)
The zero-span method was used becaure all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/*T*.

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

▣ Duty Cycle Factor

Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	2.064	2.162	0.95467160	0.201
	9	1.380	1.485	0.92929293	0.318
	12	1.044	1.146	0.91099476	0.405
	18	0.705	0.804	0.87686567	0.571
	24	0.531	0.633	0.83886256	0.763
	36	0.363	0.464	0.78318966	1.061
	48	0.276	0.377	0.73209549	1.354
	54	0.248	0.350	0.70857143	1.496
802.11n_20 MHz BW	6.5	1.921	2.019	0.95146112	0.216
	13	0.975	1.080	0.90277778	0.444
	19.5	0.664	0.764	0.86910995	0.609
	26	0.508	0.610	0.83196721	0.799
	39	0.351	0.452	0.77654867	1.098
	52	0.271	0.373	0.72654155	1.387
	58.5	0.248	0.349	0.71060172	1.484
	65	0.227	0.328	0.69207317	1.598
802.11n_40 MHz BW	13.5	0.945	1.045	0.90430622	0.437
	27	0.492	0.593	0.82967960	0.811
	40.5	0.340	0.440	0.77272727	1.120
	54	0.264	0.363	0.72727273	1.383
	81	0.188	0.288	0.65277778	1.852
	108	0.152	0.252	0.60317460	2.196
	121.5	0.140	0.240	0.58333333	2.341
	135	0.128	0.228	0.56140351	2.507

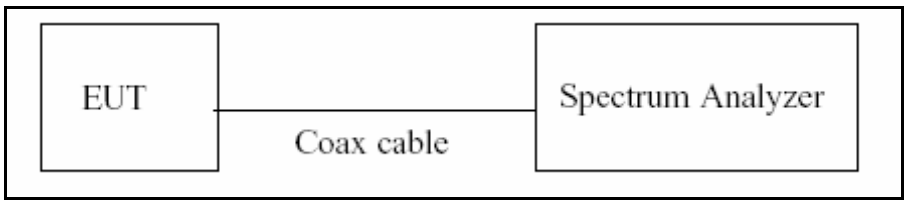
Mode	Data Rate	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11ac_20 MHz BW	6.5	1.935	2.035	0.95085995	0.219
	13	0.987	1.089	0.90633609	0.427
	19.5	0.672	0.772	0.87046632	0.602
	26	0.516	0.616	0.83766234	0.769
	39	0.356	0.457	0.77850733	1.087
	52	0.280	0.382	0.73298429	1.349
	58.5	0.252	0.353	0.71388102	1.464
	65	0.232	0.333	0.69669670	1.570
	78	0.199	0.301	0.66223404	1.790
5.8 GHz Band 802.11ac_40 MHz BW	13.5	0.952	1.052	0.90494297	0.434
	27	0.496	0.596	0.83221477	0.798
	40.5	0.344	0.444	0.77477477	1.108
	54	0.268	0.368	0.72826087	1.377
	81	0.192	0.292	0.65753425	1.821
	108	0.156	0.256	0.60937500	2.151
	121.5	0.144	0.245	0.58895706	2.299
	135	0.132	0.232	0.56896552	2.449
	162	0.116	0.216	0.53703704	2.700
	180	0.112	0.212	0.52830189	2.771
5.8 GHz Band 802.11ac_80 MHz BW	29.3	0.460	0.560	0.82142857	0.854
	58.5	0.252	0.352	0.71590909	1.451
	87.8	0.180	0.280	0.64285714	1.919
	117	0.148	0.248	0.59677419	2.242
	175.5	0.112	0.212	0.52830189	2.771
	234	0.096	0.196	0.48979592	3.100
	263.3	0.088	0.188	0.46808511	3.297
	292.5	0.084	0.184	0.45652174	3.405
	351	0.076	0.176	0.43181818	3.647
	390	0.072	0.172	0.41860465	3.782

8.2 26 dB 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(issued 04/08/2013), at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26 dB bandwidth.

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

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to(Page 3 in KDB 789033, issued 04/08/2013)

9. RBW = approximately 1 % of the emission bandwidth
10. VBW > RBW
11. Detector = Peak
12. Trace mode = max hold
13. 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 %.

▣ TEST RESULTS

20 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	20.39	N/A	Pass
5200	40	20.45	N/A	Pass
5240	48	20.50	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	20.50	N/A	Pass
5300	60	20.25	N/A	Pass
5320	64	20.26	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	20.49	N/A	Pass
5580	116	20.37	N/A	Pass
5700	140	20.51	N/A	Pass
5720	144	20.11	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	20.69	N/A	Pass
5200	40	20.91	N/A	Pass
5240	48	20.62	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	20.74	N/A	Pass
5300	60	20.35	N/A	Pass
5320	64	20.84	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	20.73	N/A	Pass
5580	116	20.70	N/A	Pass
5700	140	20.73	N/A	Pass
5720	144	20.56	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5180	36	20.68	N/A	Pass
5200	40	20.76	N/A	Pass
5240	48	20.65	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	20.77	N/A	Pass
5300	60	20.74	N/A	Pass
5320	64	20.79	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5500	100	20.63	N/A	Pass
5580	116	20.68	N/A	Pass
5720	144	20.64	N/A	Pass

40 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.24	N/A	Pass
5230	46	39.48	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.70	N/A	Pass
5310	62	39.71	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11n

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.69	N/A	Pass
5550	110	39.59	N/A	Pass
5670	134	39.58	N/A	Pass
5710	142	39.29	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5190	38	39.47	N/A	Pass
5230	46	39.30	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	39.68	N/A	Pass
5310	62	39.57	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5510	102	39.74	N/A	Pass
5550	110	39.72	N/A	Pass
5710	142	39.74	N/A	Pass

80 MHz BW

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5210	42	82.11	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	82.30	N/A	Pass

Conducted 26 dB Bandwidth Measurements for 802.11ac

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5530	106	82.18	N/A	Pass
5690	138	83.23	N/A	Pass

Note :

1. **In order to simplify the report, attached plots were only the most wide channel.**
2. **We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.**

▣ 20 dB BW TEST RESULTS(Additional Test)

Conducted 20 dB Bandwidth Measurements for 802.11a

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	19.17	N/A	Pass

Conducted 20 dB Bandwidth Measurements for 802.11n_20 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	19.57	N/A	Pass

Conducted 20 dB Bandwidth Measurements for 802.11ac_20 MHz BW

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5260	52	19.56	N/A	Pass

Conducted 20 dB Bandwidth Measurements for 802.11n_40 MHz BW

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	38.40	N/A	Pass

Conducted 20 dB Bandwidth Measurements for 802.11ac_40 MHz BW

802.11ac Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5270	54	38.27	N/A	Pass

Conducted 20 dB Bandwidth Measurements for 802.11ac_80 MHz BW

802.11a Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5290	58	79.79	N/A	Pass

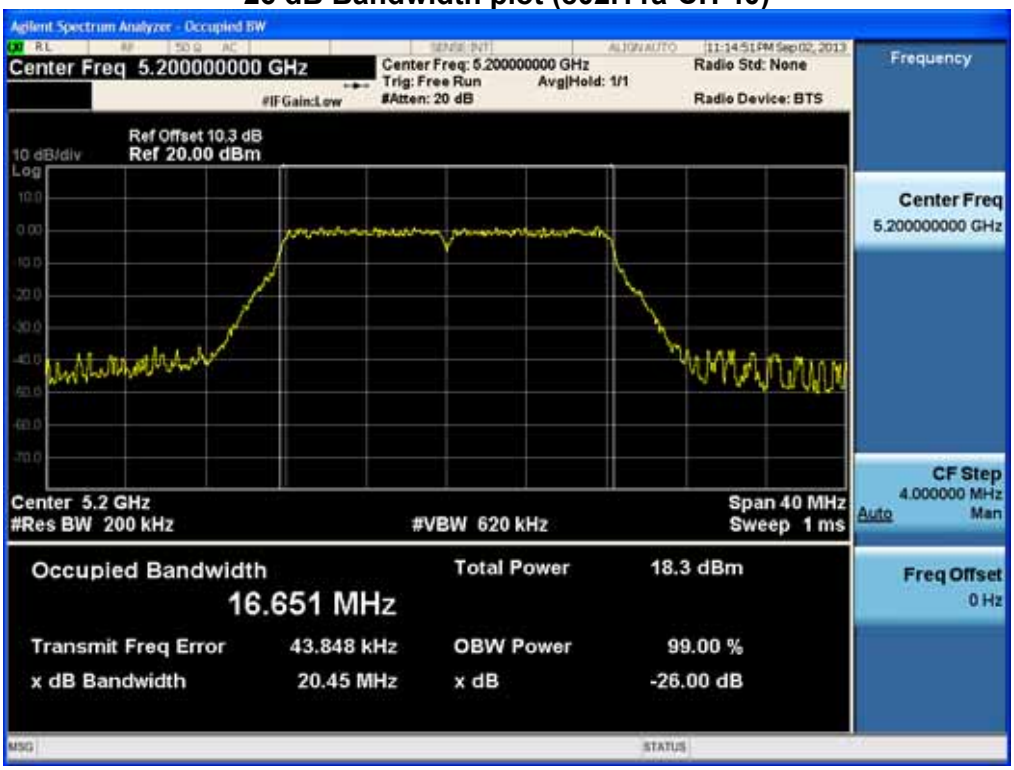
Note : We performed the 20 dB BW test to prove that no part of the fundamental emissions of any UNII2 band signal lies within the UNII band 1.

▣ RESULT PLOTS

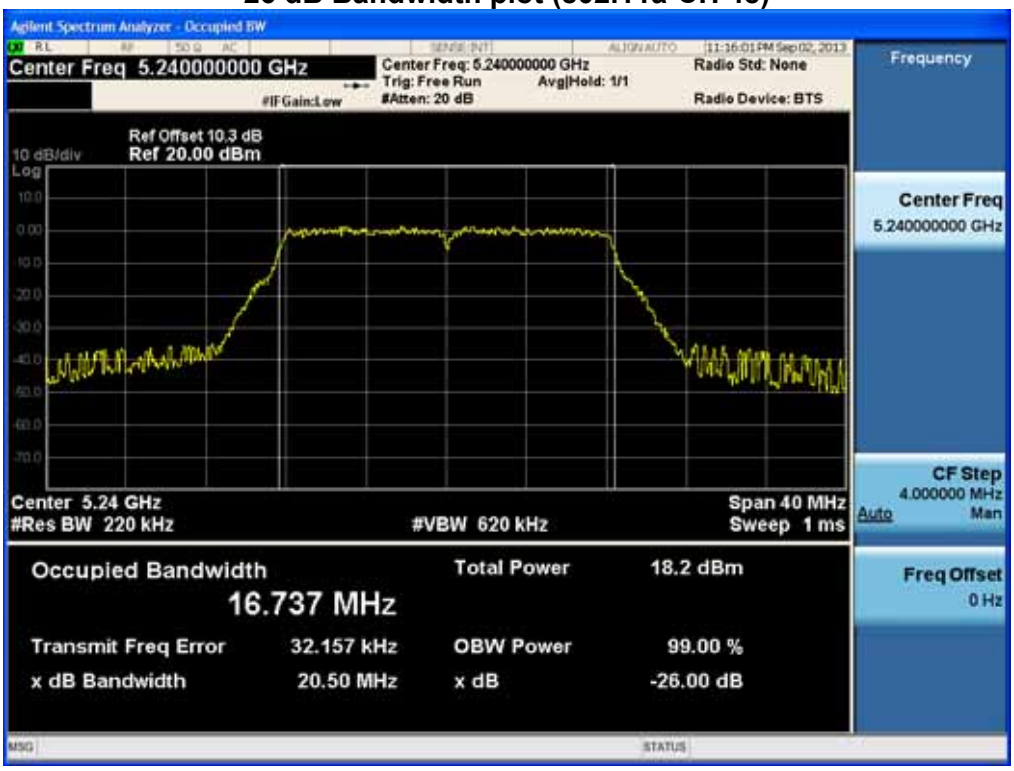
20 MHz BW

26 dB Bandwidth plot (802.11a-CH 36)

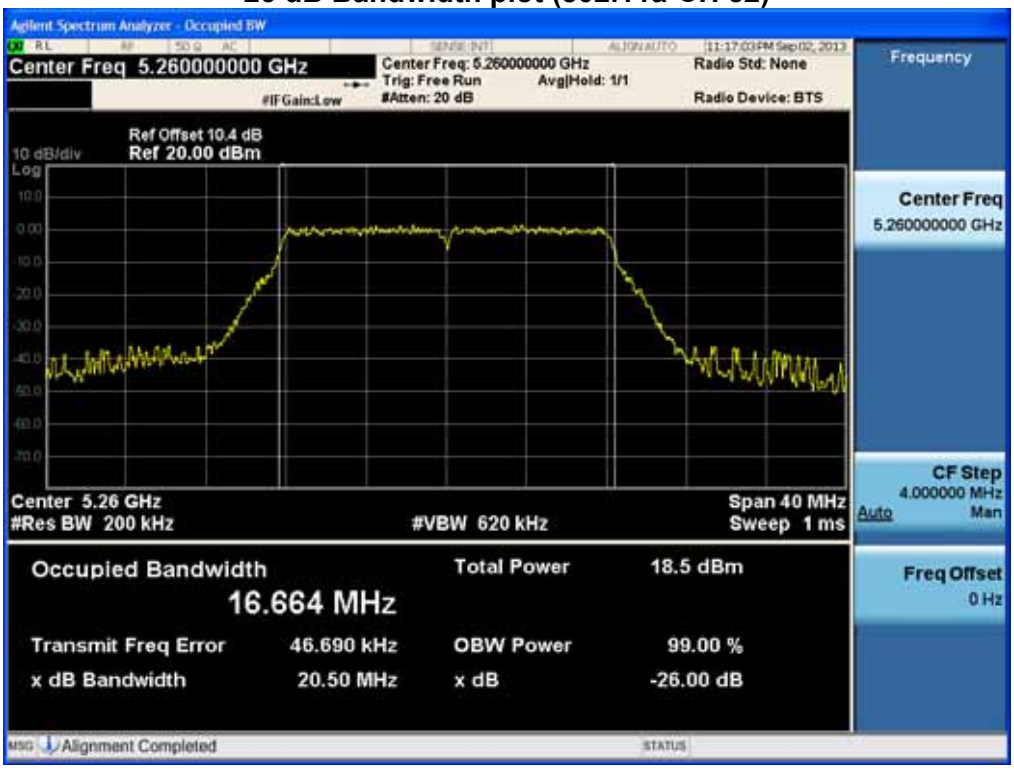
26 dB Bandwidth plot (802.11a-CH 40)



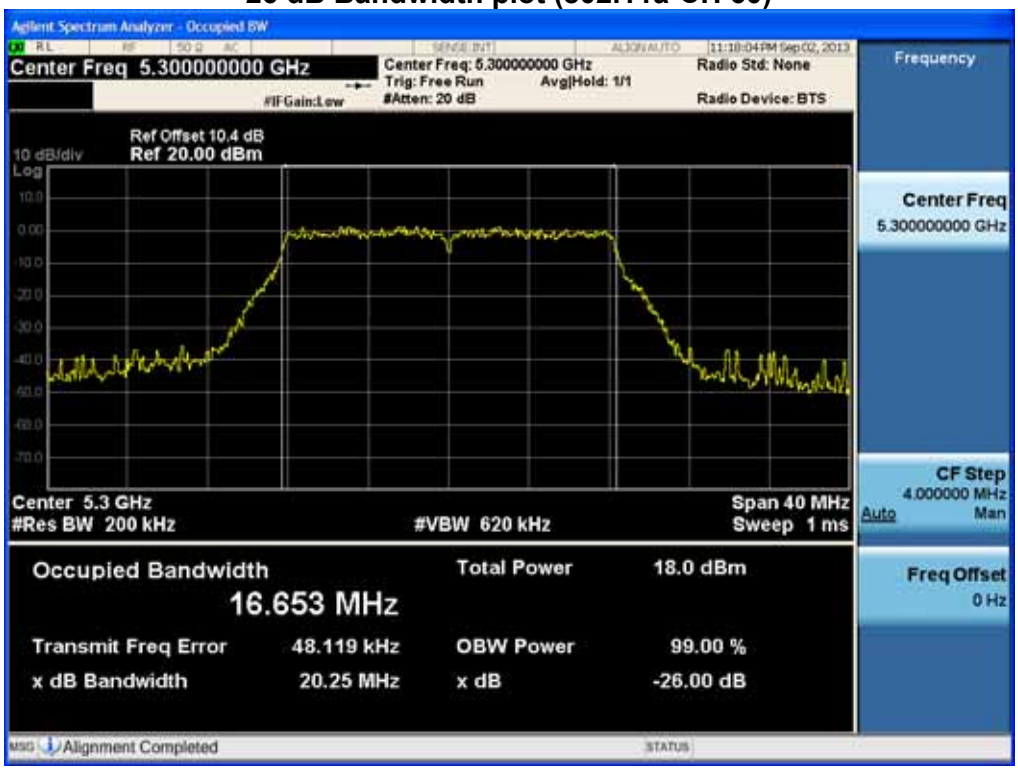
26 dB Bandwidth plot (802.11a-CH 48)



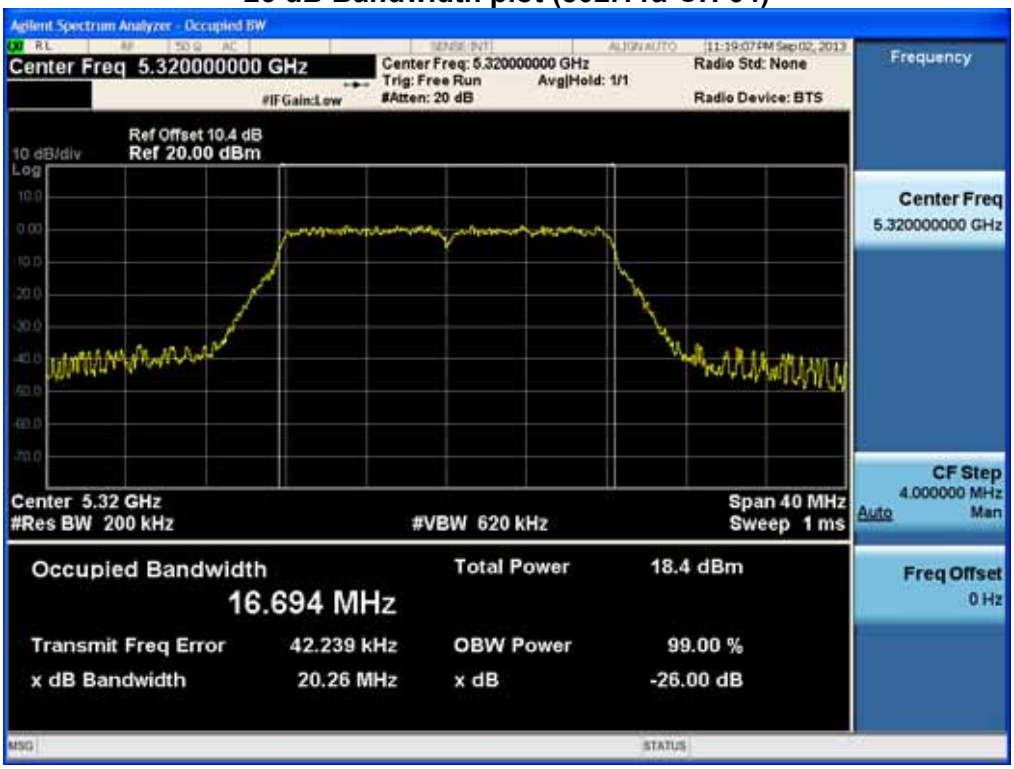
26 dB Bandwidth plot (802.11a-CH 52)



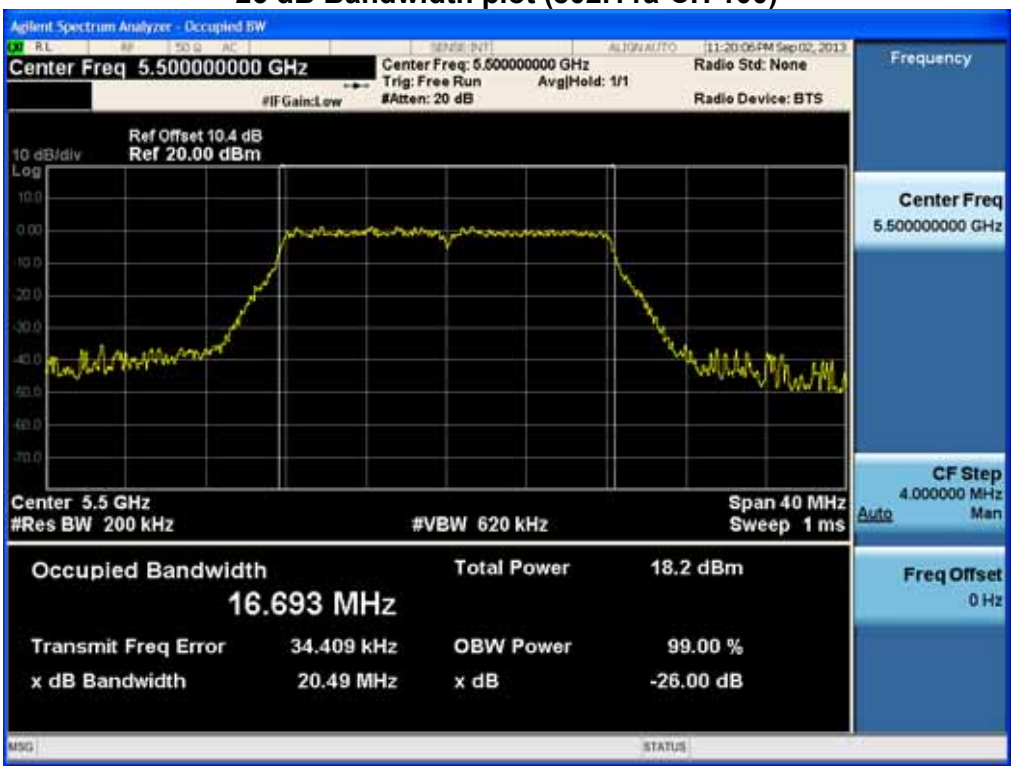
26 dB Bandwidth plot (802.11a-CH 60)



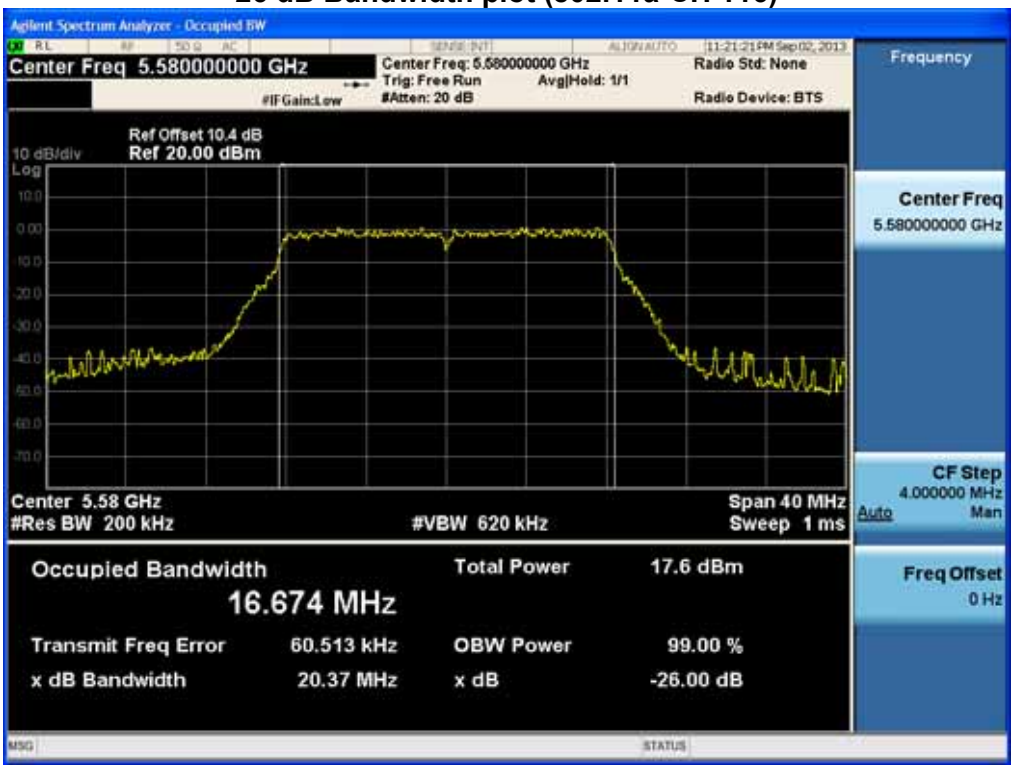
26 dB Bandwidth plot (802.11a-CH 64)



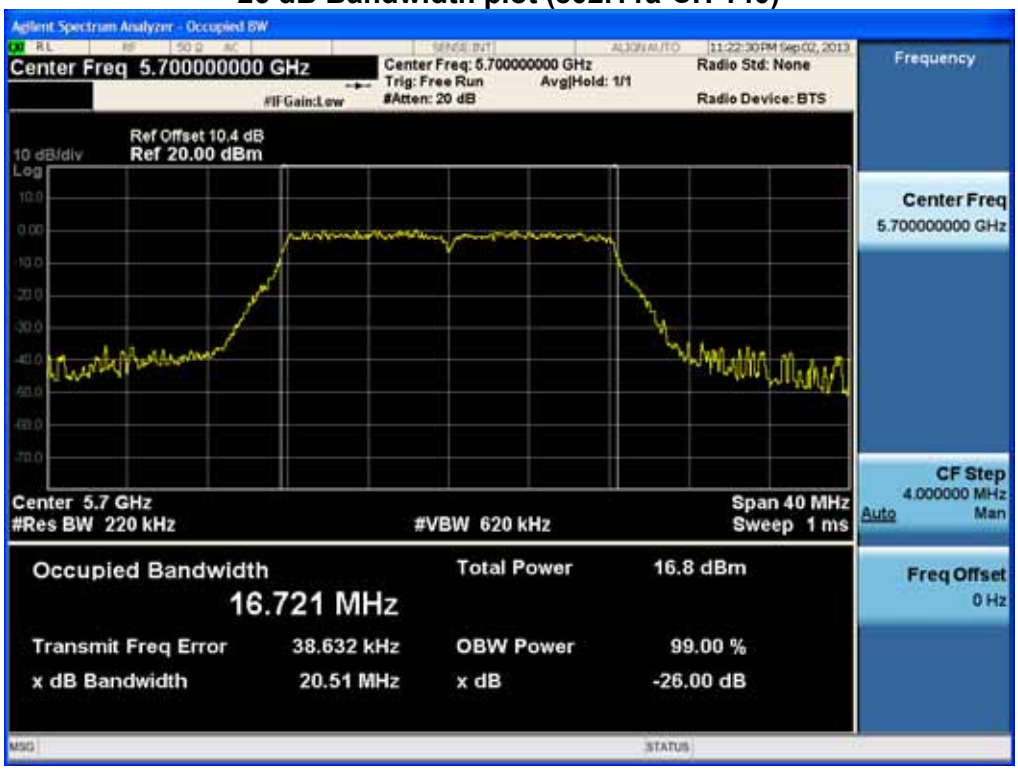
26 dB Bandwidth plot (802.11a-CH 100)



26 dB Bandwidth plot (802.11a-CH 116)

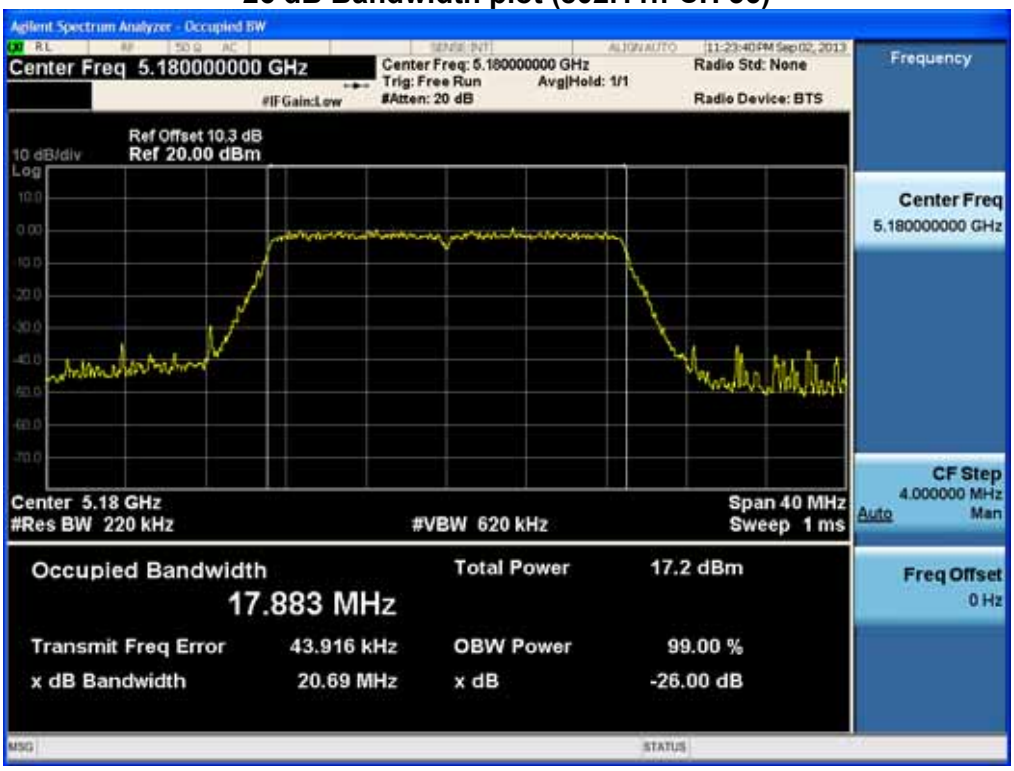


26 dB Bandwidth plot (802.11a-CH 140)

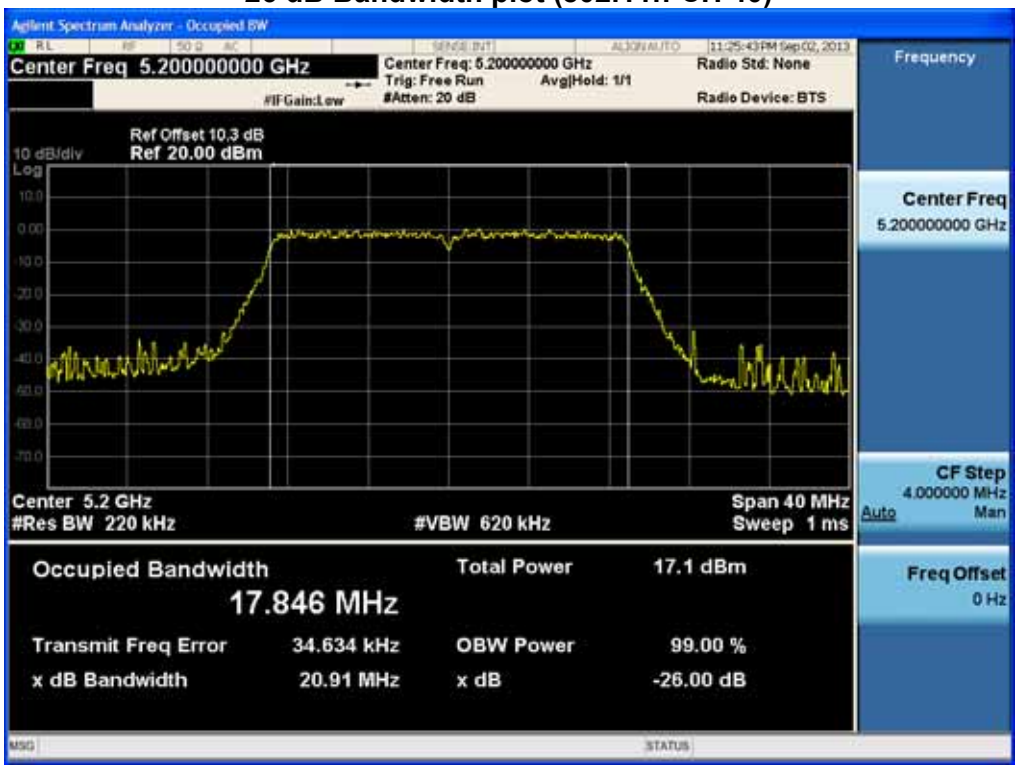


26 dB Bandwidth plot (802.11a-CH 144)

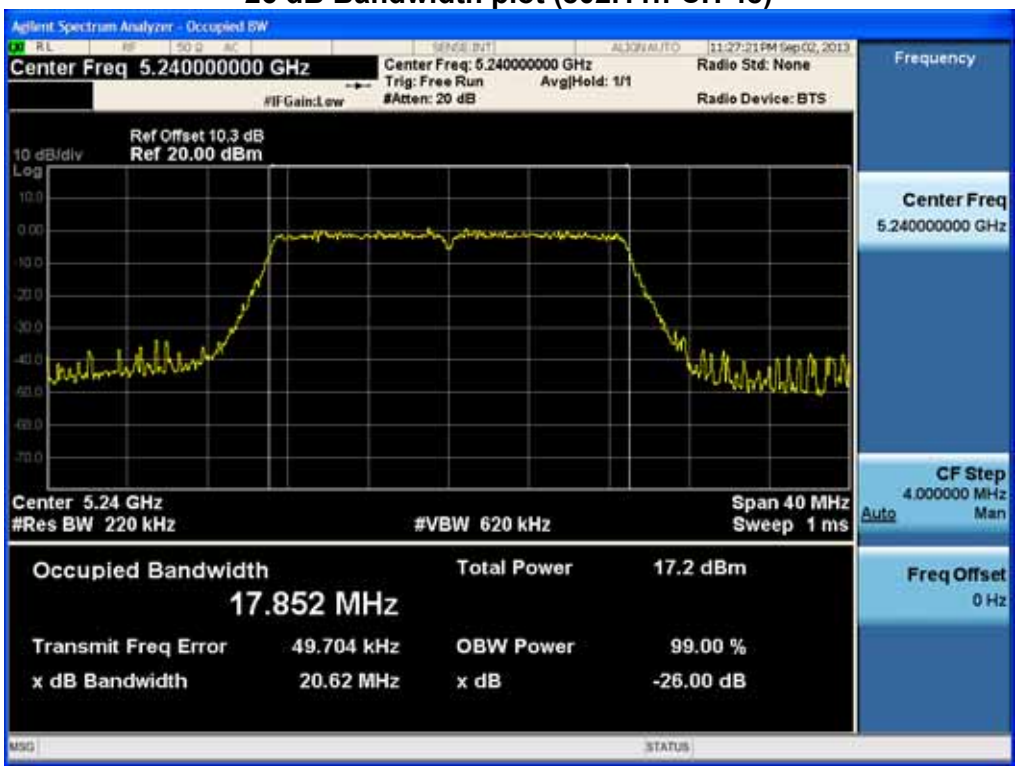
26 dB Bandwidth plot (802.11n-CH 36)



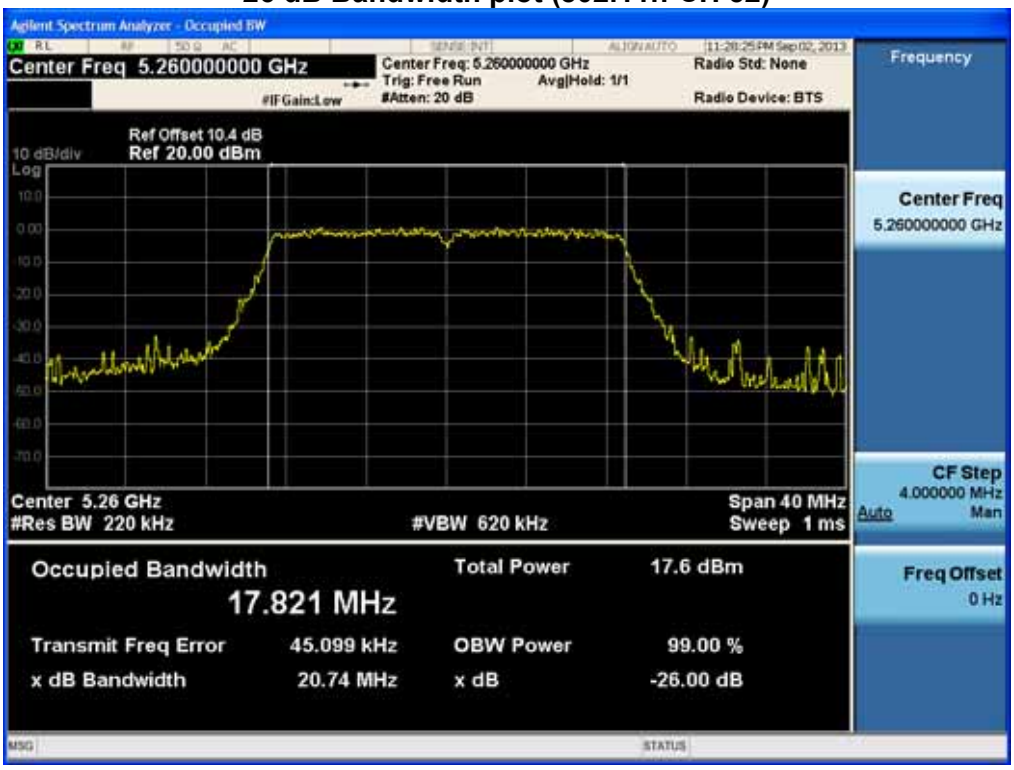
26 dB Bandwidth plot (802.11n-CH 40)



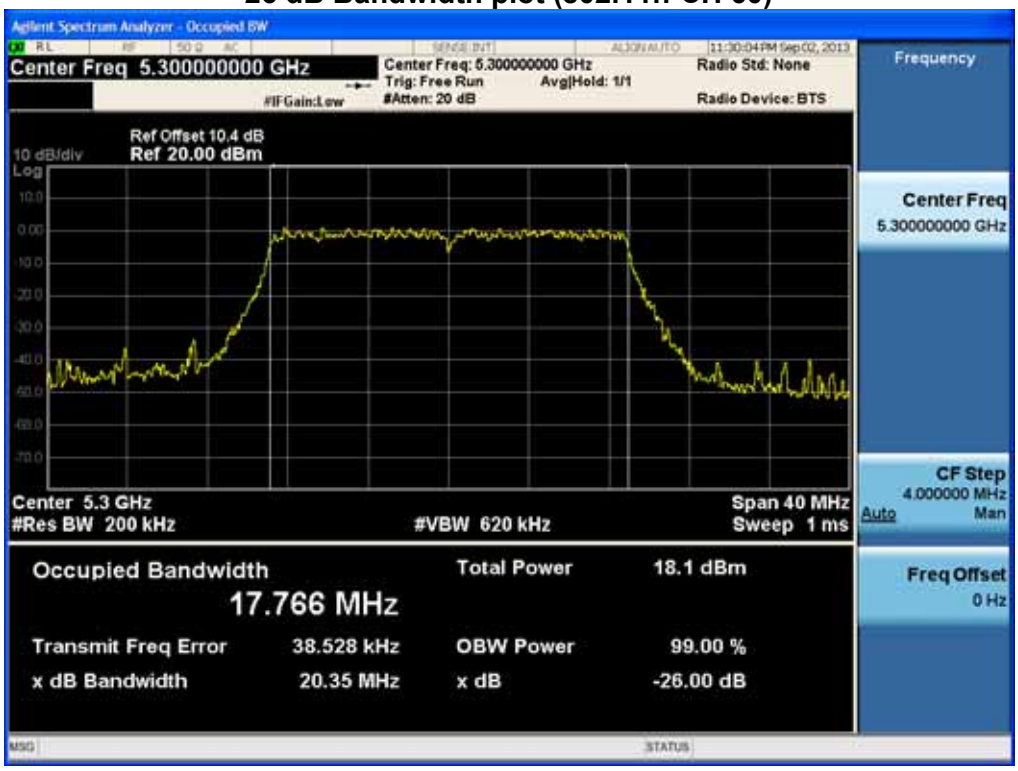
26 dB Bandwidth plot (802.11n-CH 48)



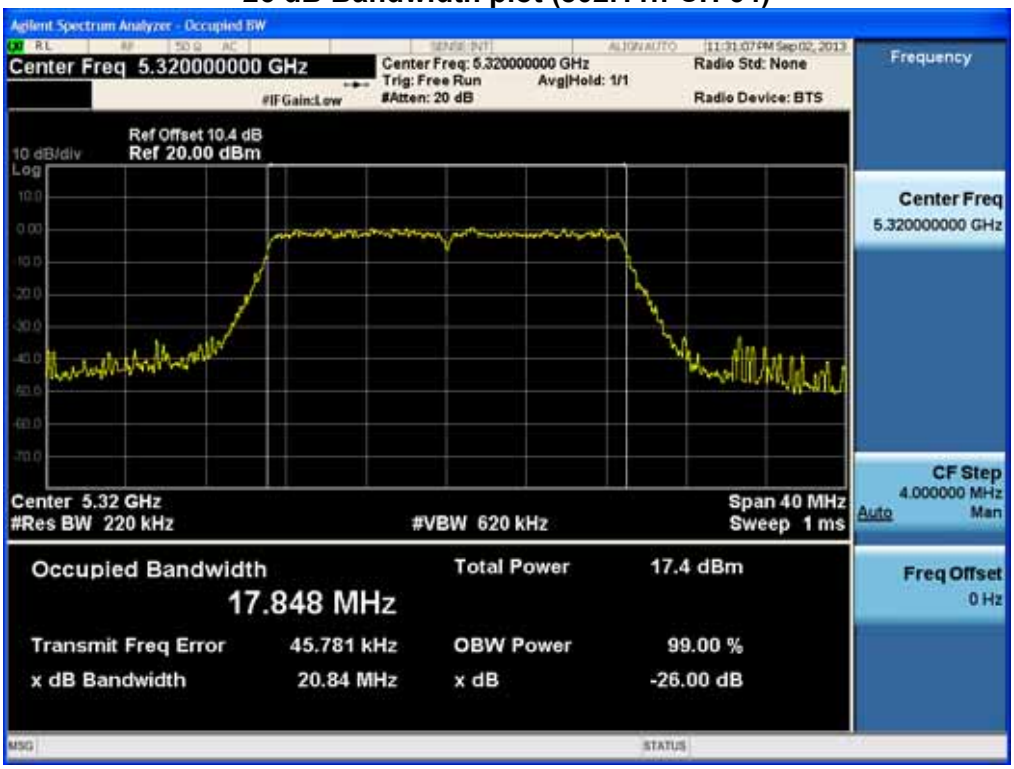
26 dB Bandwidth plot (802.11n-CH 52)



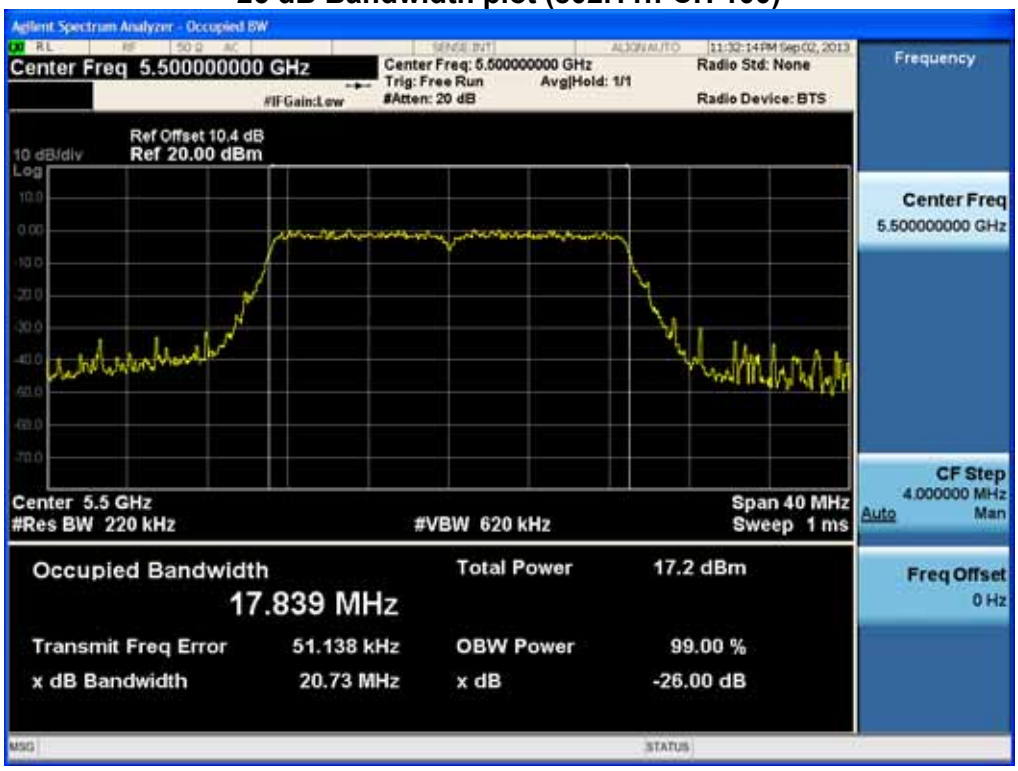
26 dB Bandwidth plot (802.11n-CH 60)



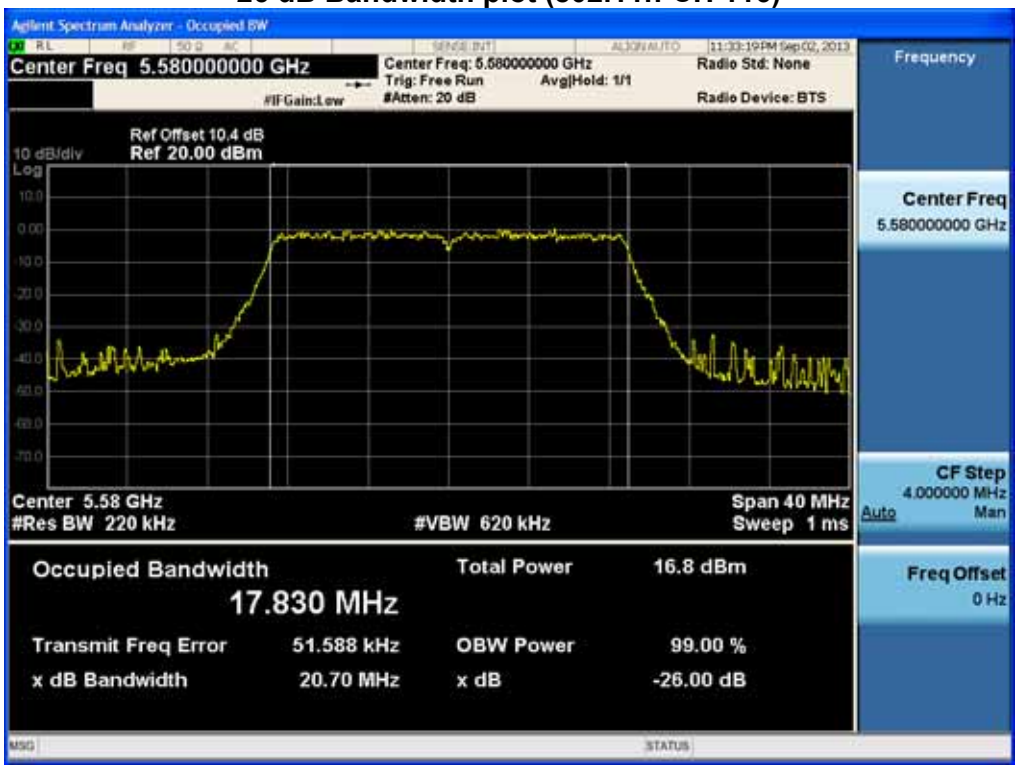
26 dB Bandwidth plot (802.11n-CH 64)



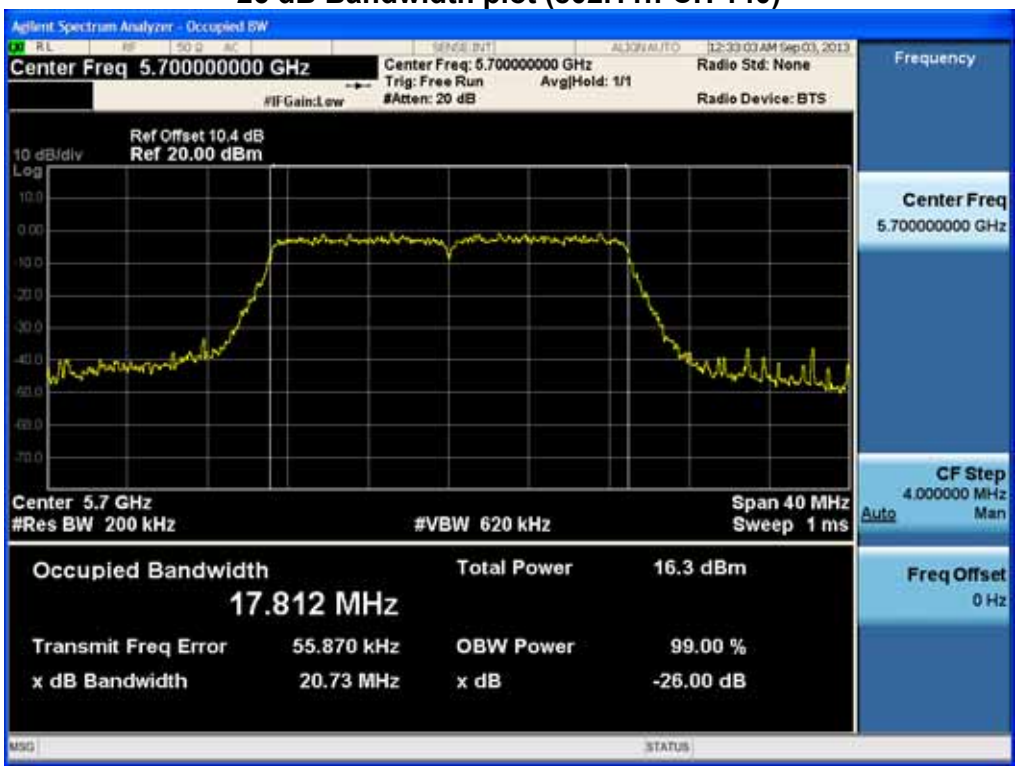
26 dB Bandwidth plot (802.11n-CH 100)



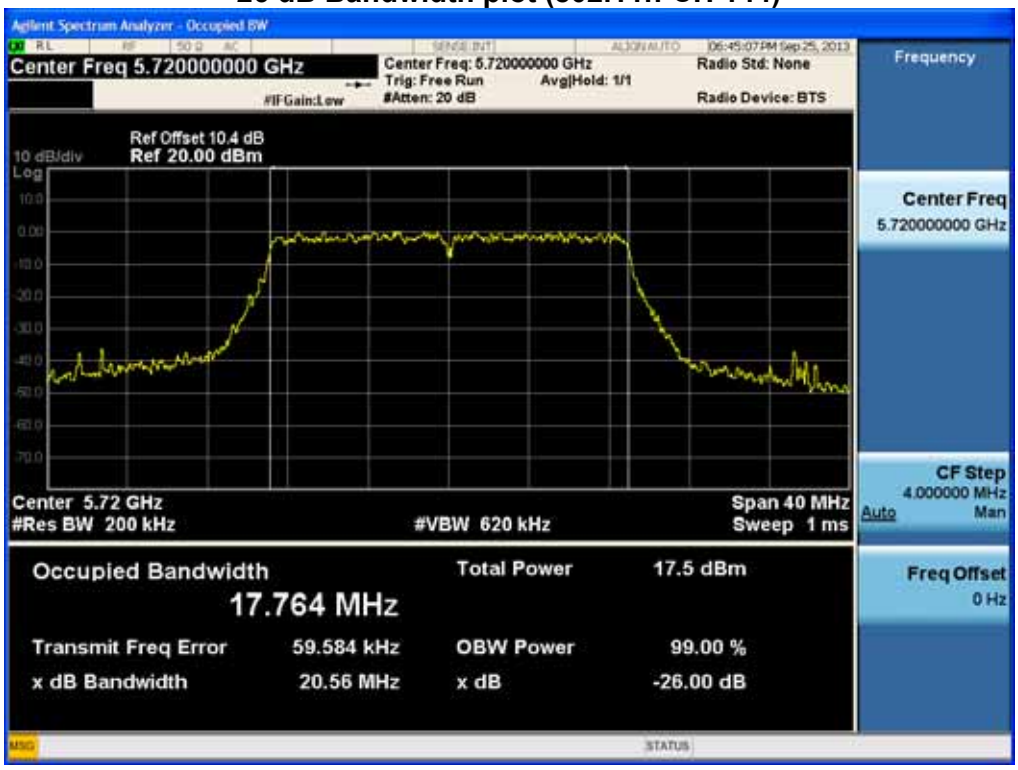
26 dB Bandwidth plot (802.11n-CH 116)



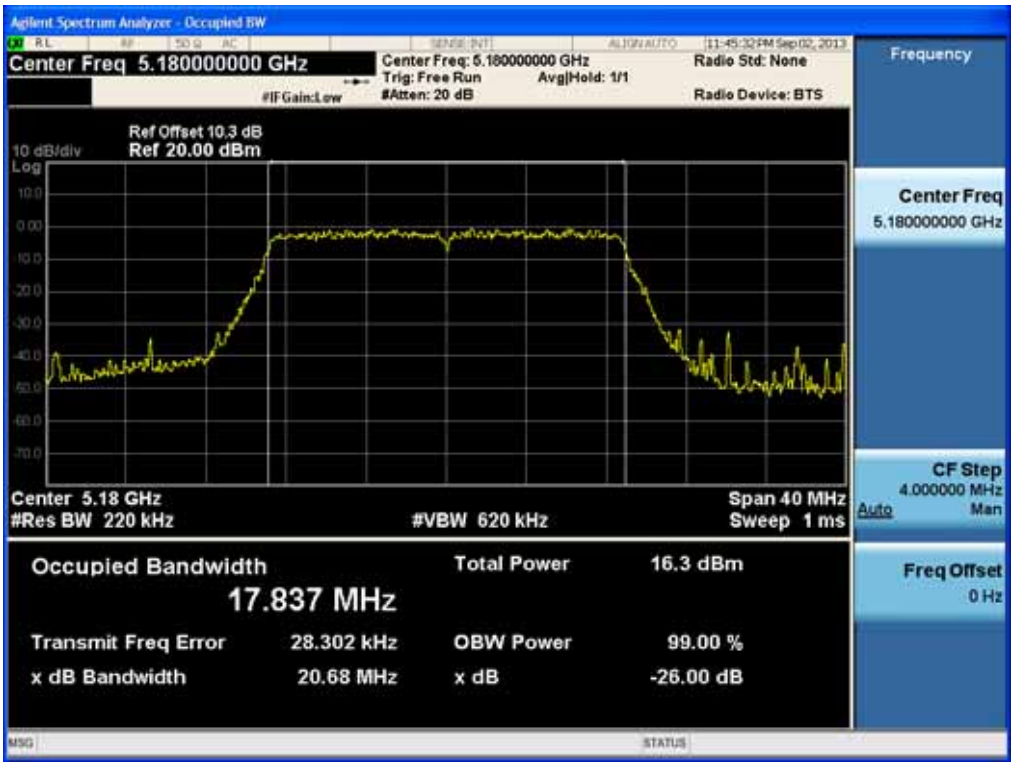
26 dB Bandwidth plot (802.11n-CH 140)



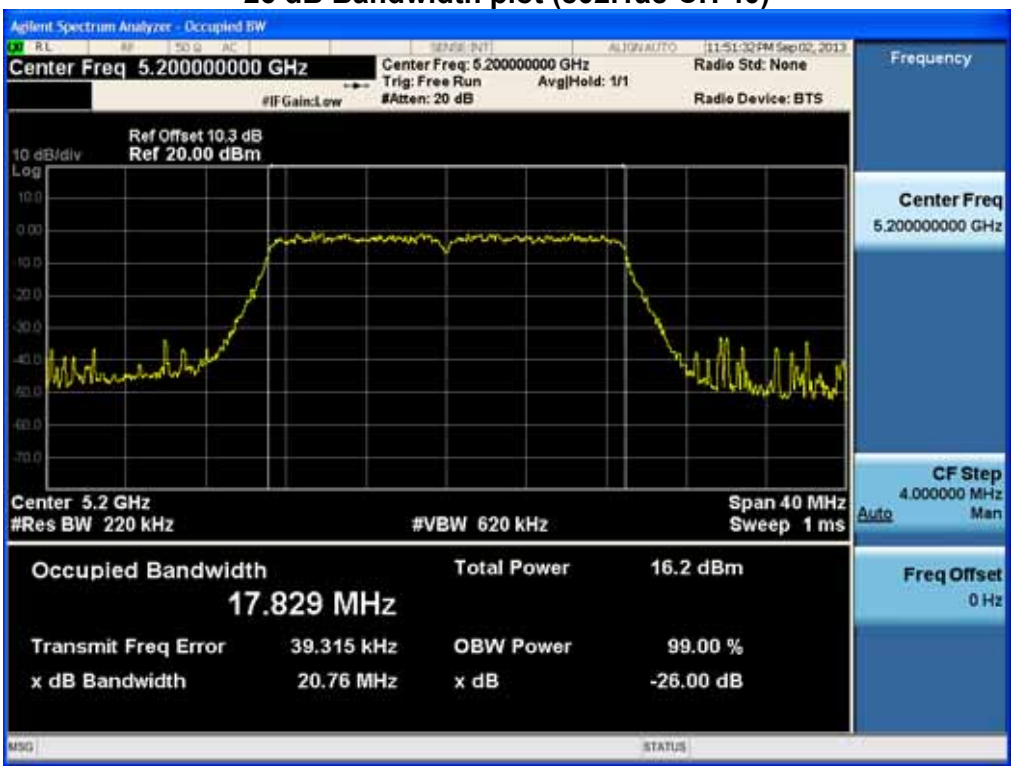
26 dB Bandwidth plot (802.11n-CH 144)



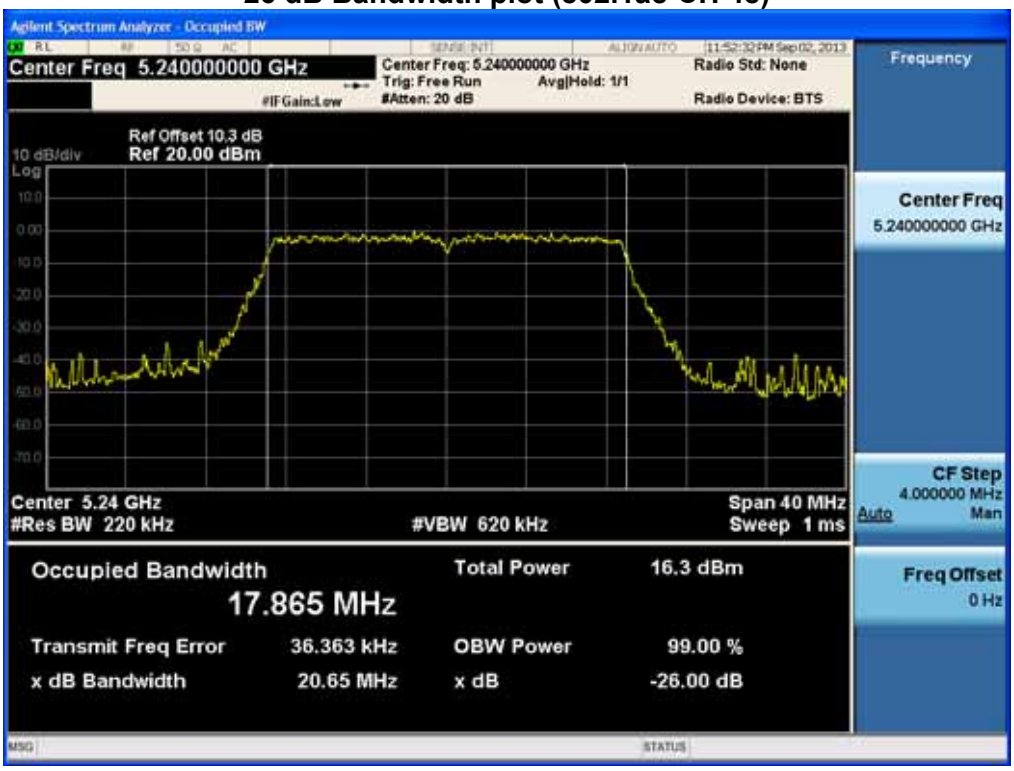
26 dB Bandwidth plot (802.1ac-CH 36)



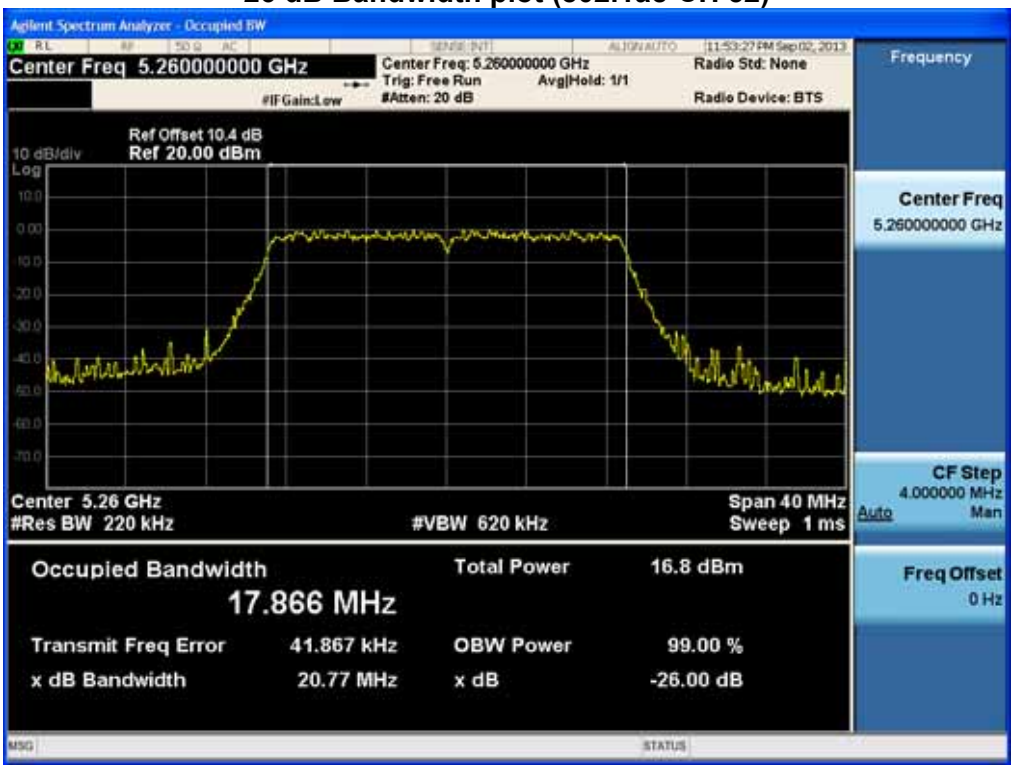
26 dB Bandwidth plot (802.1ac-CH 40)



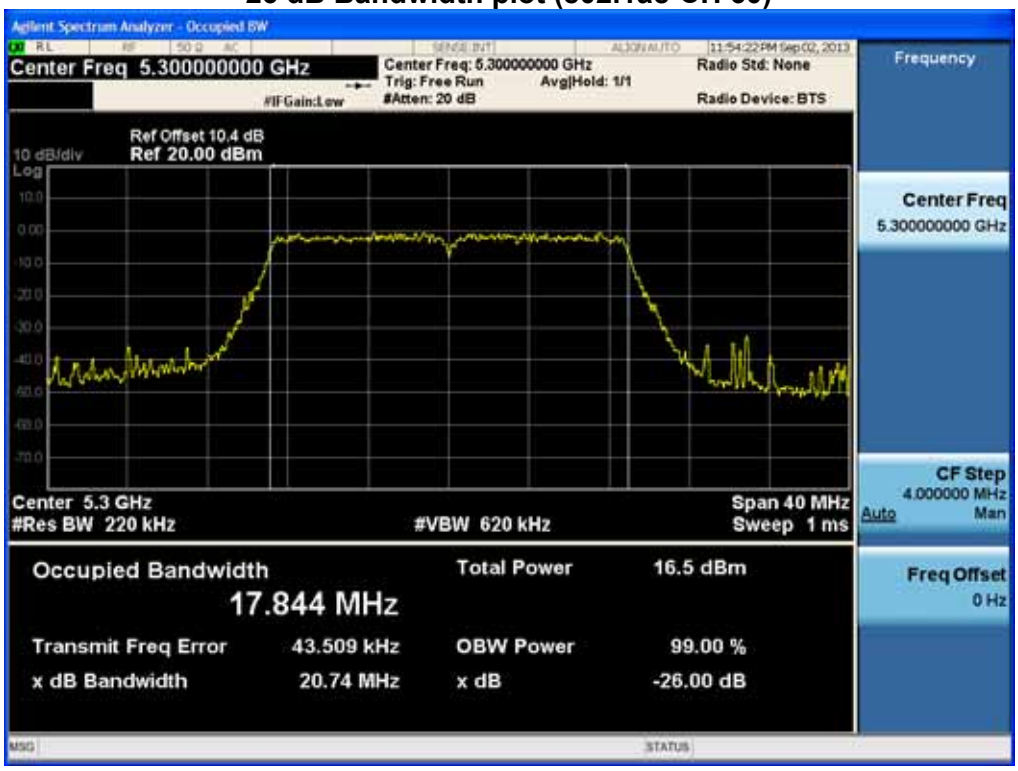
26 dB Bandwidth plot (802.1ac-CH 48)



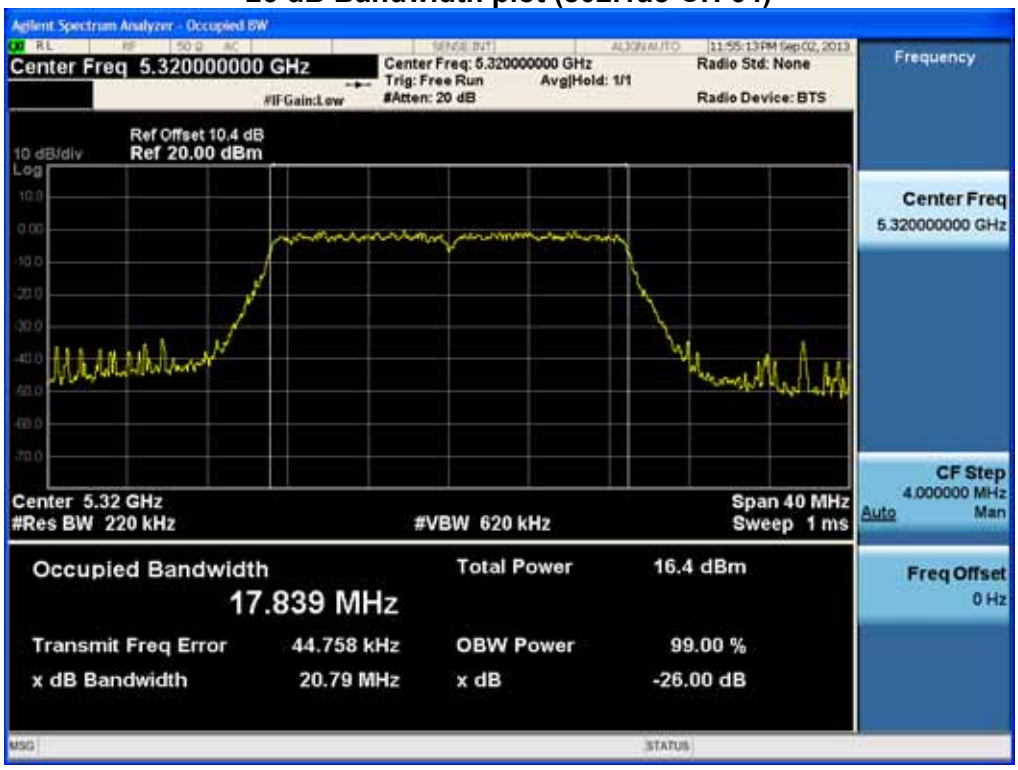
26 dB Bandwidth plot (802.1ac-CH 52)



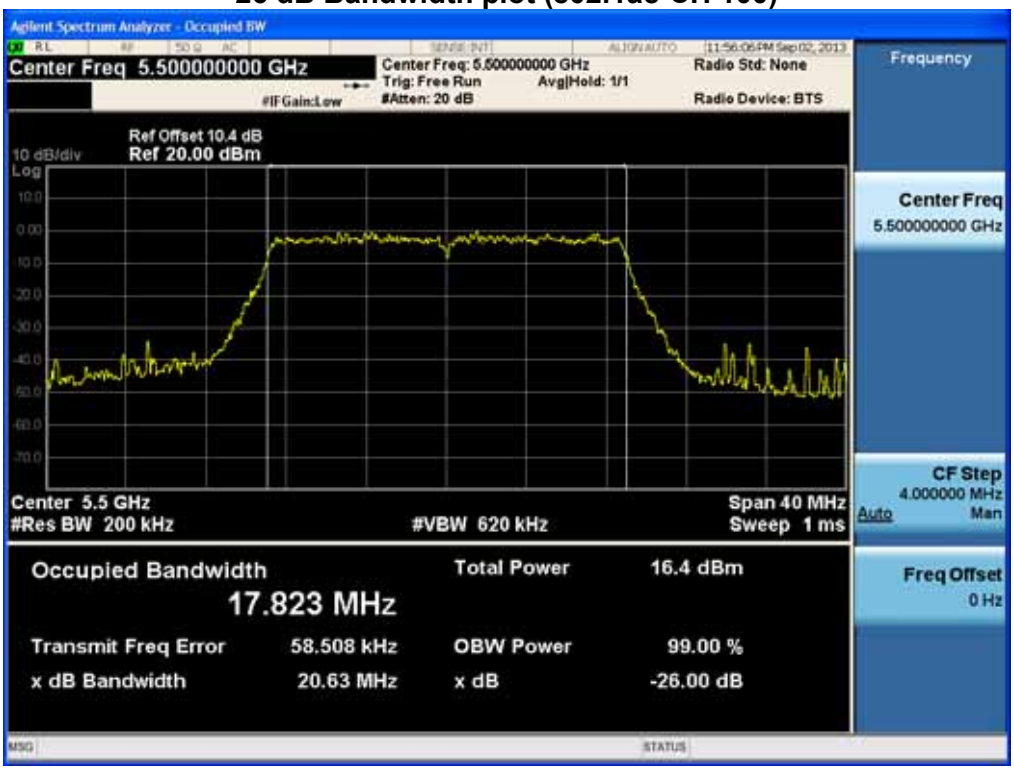
26 dB Bandwidth plot (802.1ac-CH 60)



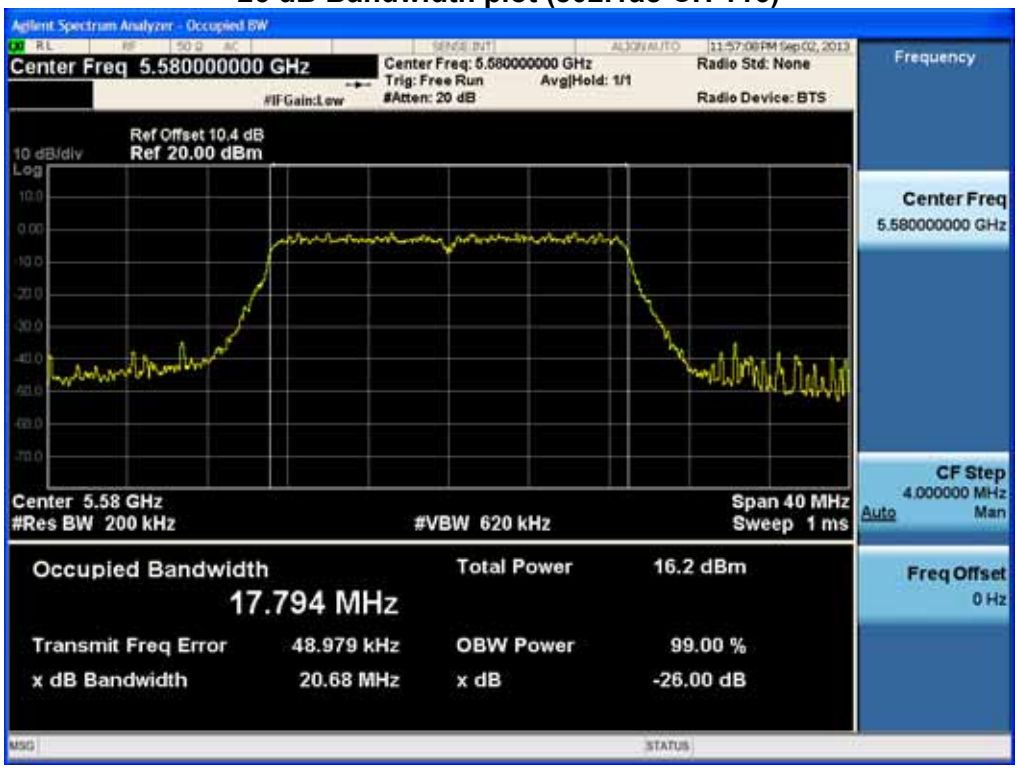
26 dB Bandwidth plot (802.1ac-CH 64)



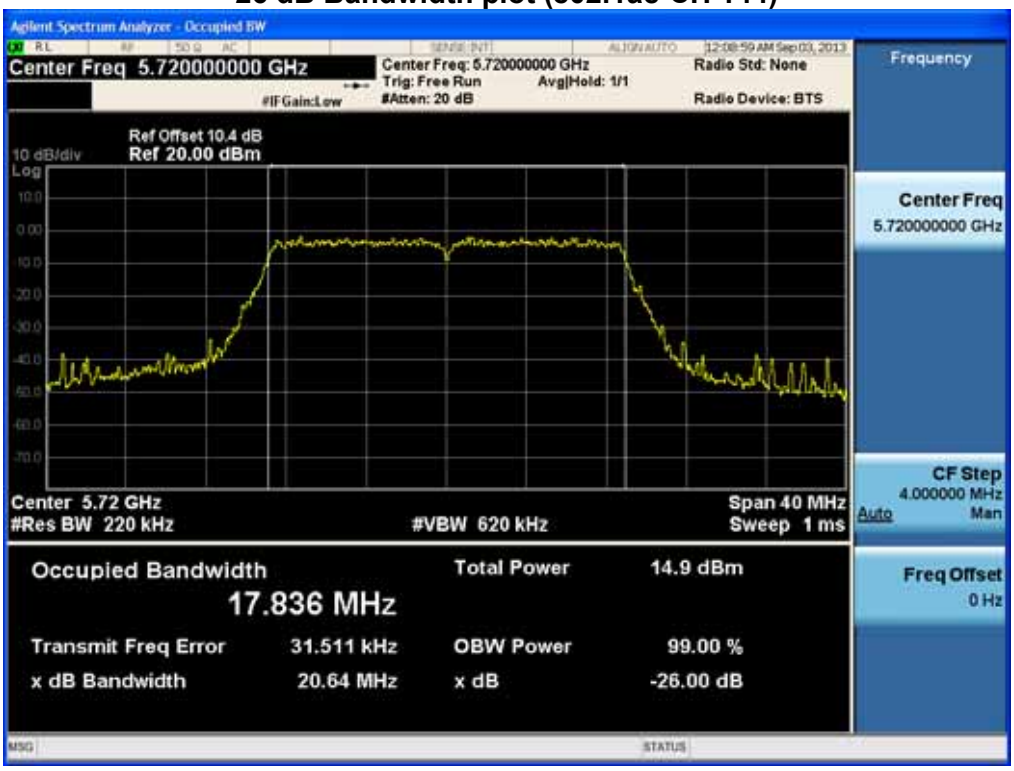
26 dB Bandwidth plot (802.1ac-CH 100)



26 dB Bandwidth plot (802.1ac-CH 116)

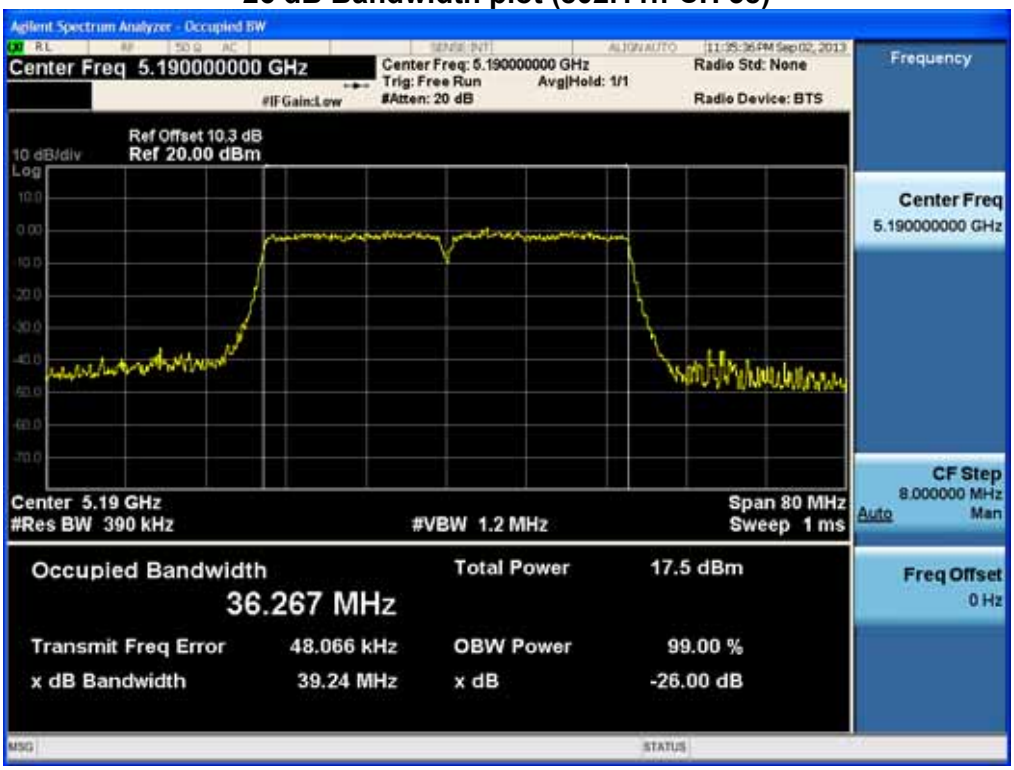


26 dB Bandwidth plot (802.1ac-CH 144)

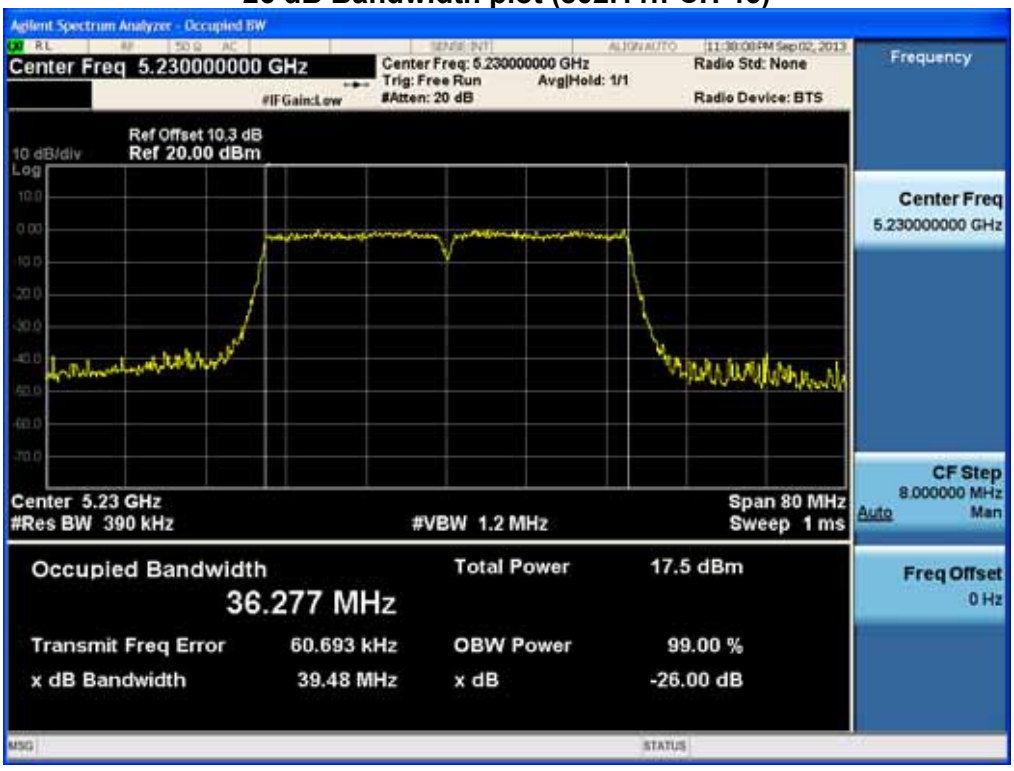


40 MHz BW

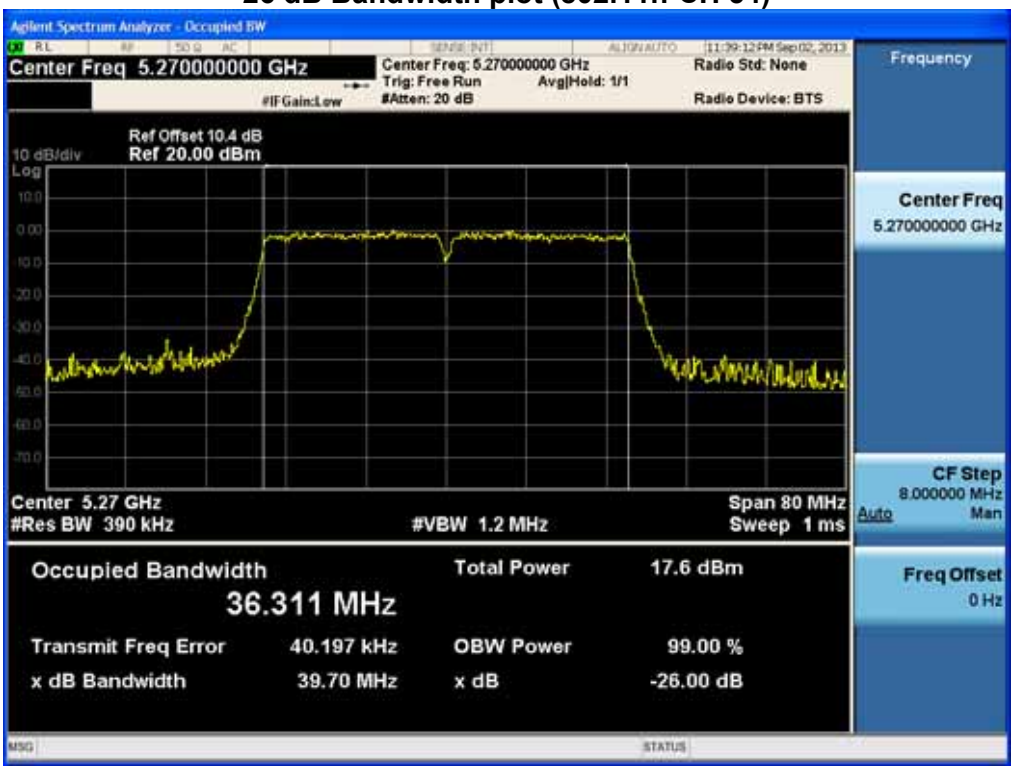
26 dB Bandwidth plot (802.11n-CH 38)



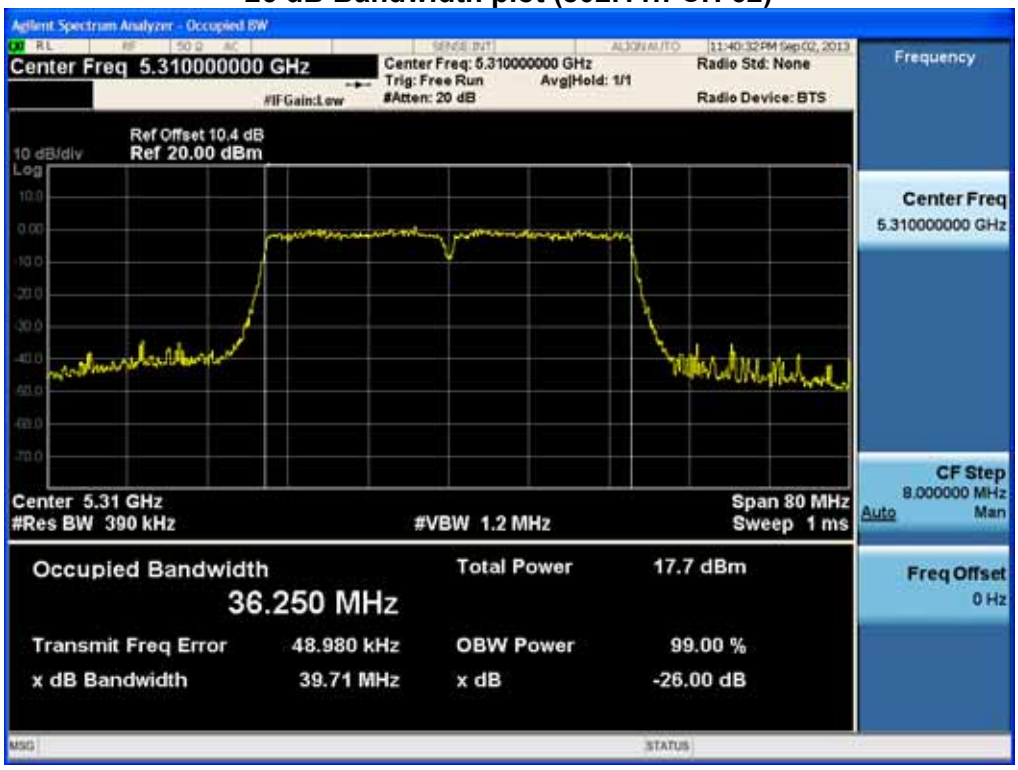
26 dB Bandwidth plot (802.11n-CH 46)



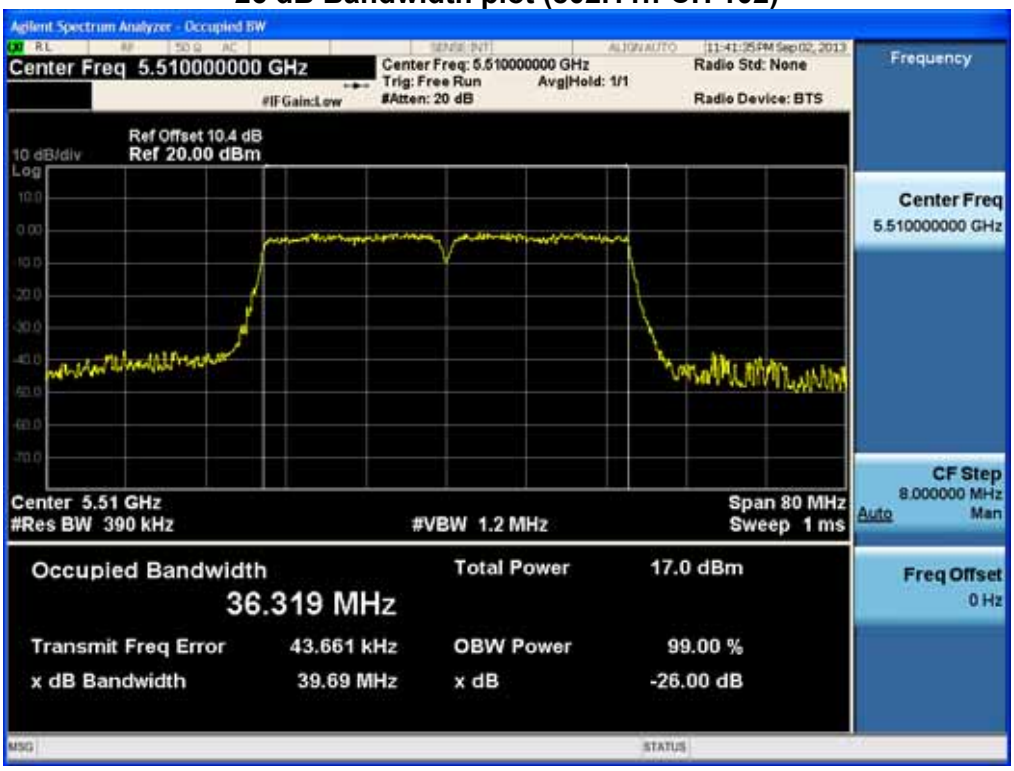
26 dB Bandwidth plot (802.11n-CH 54)



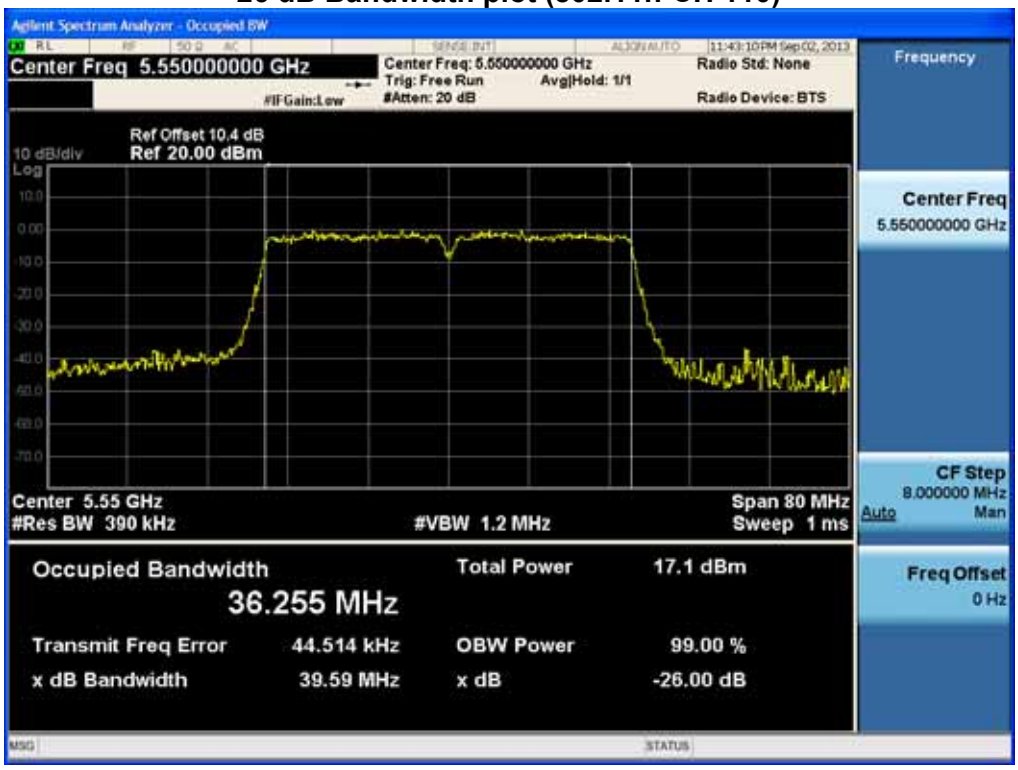
26 dB Bandwidth plot (802.11n-CH 62)



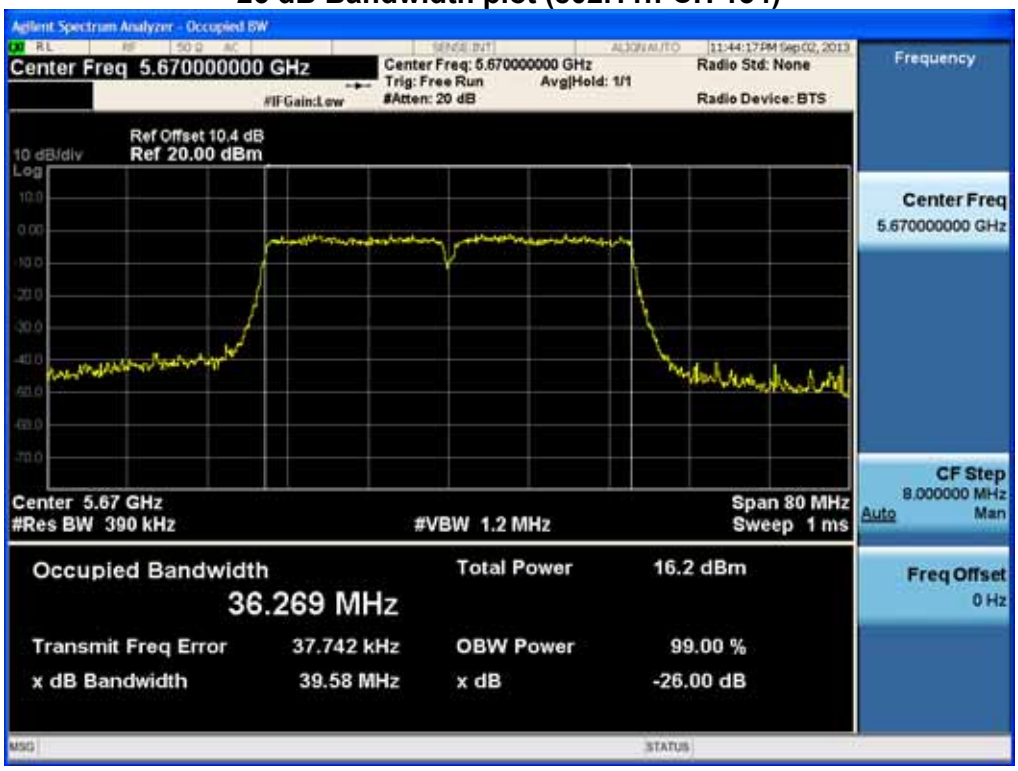
26 dB Bandwidth plot (802.11n-CH 102)



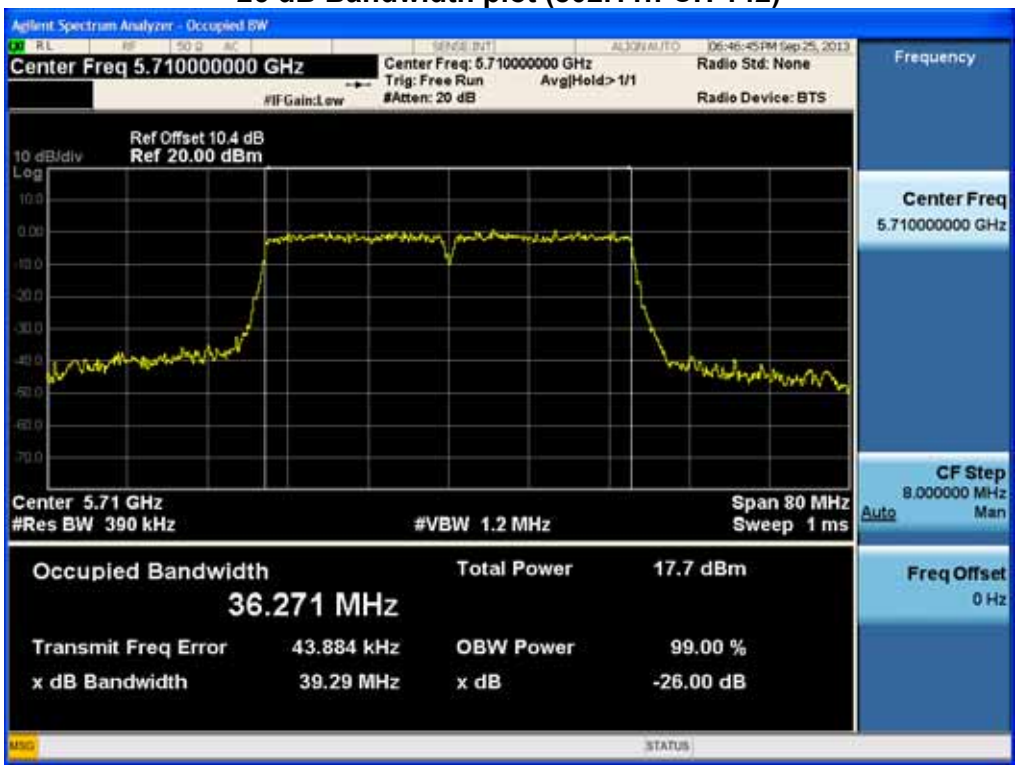
26 dB Bandwidth plot (802.11n-CH 110)



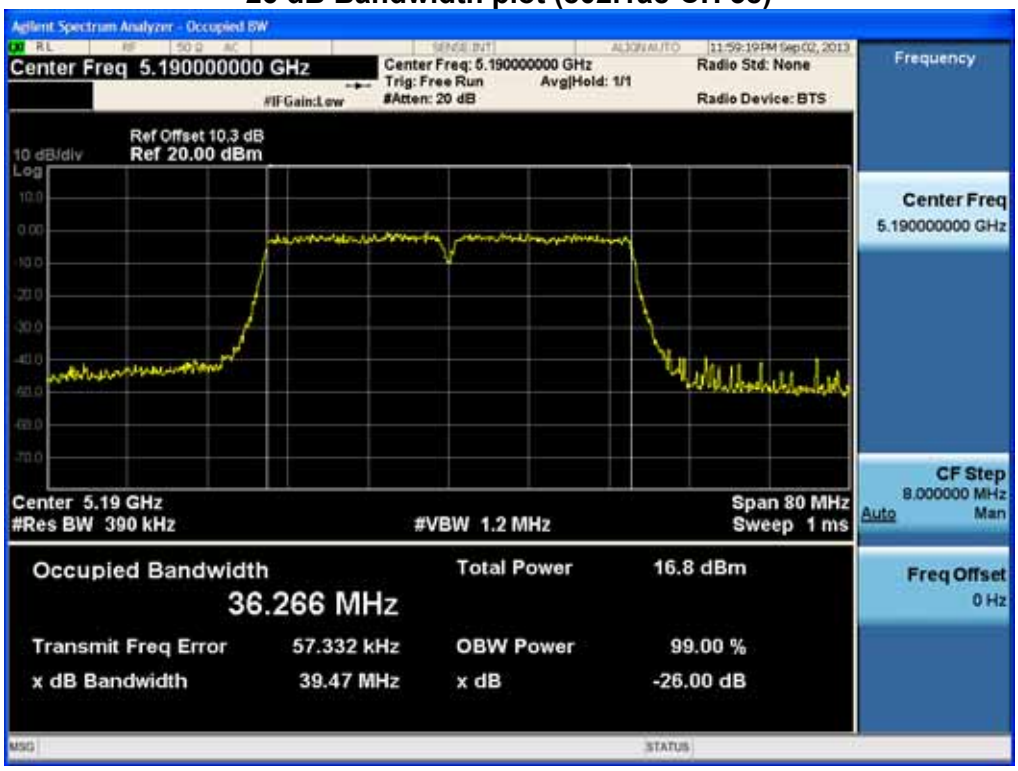
26 dB Bandwidth plot (802.11n-CH 134)



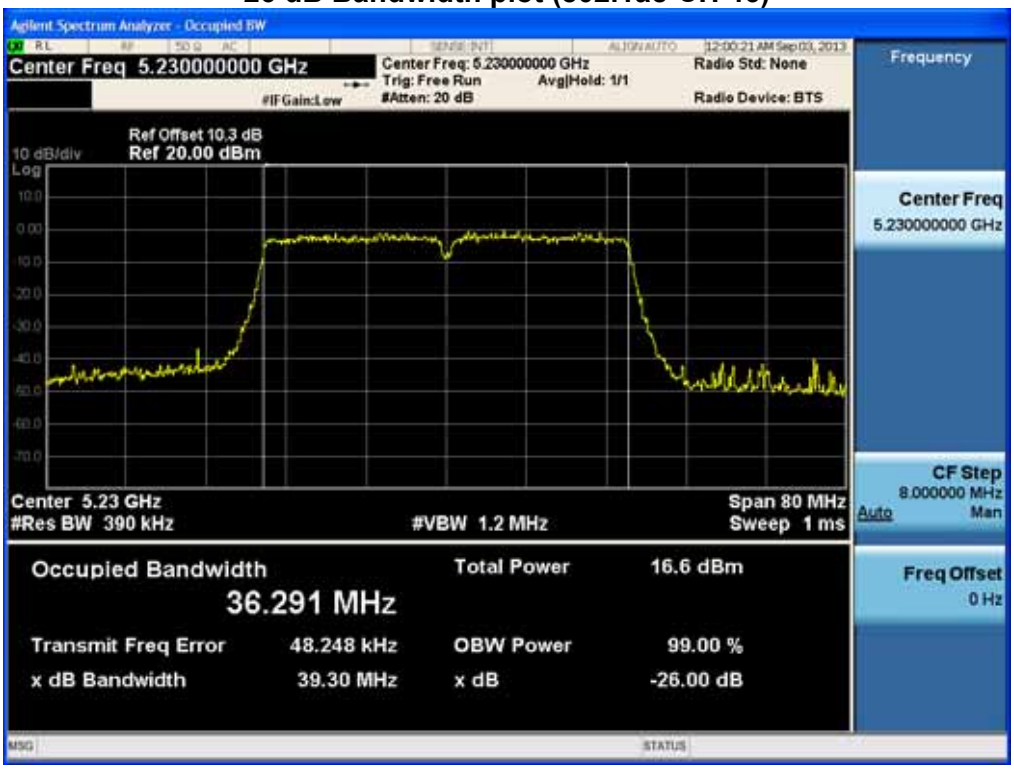
26 dB Bandwidth plot (802.11n-CH 142)



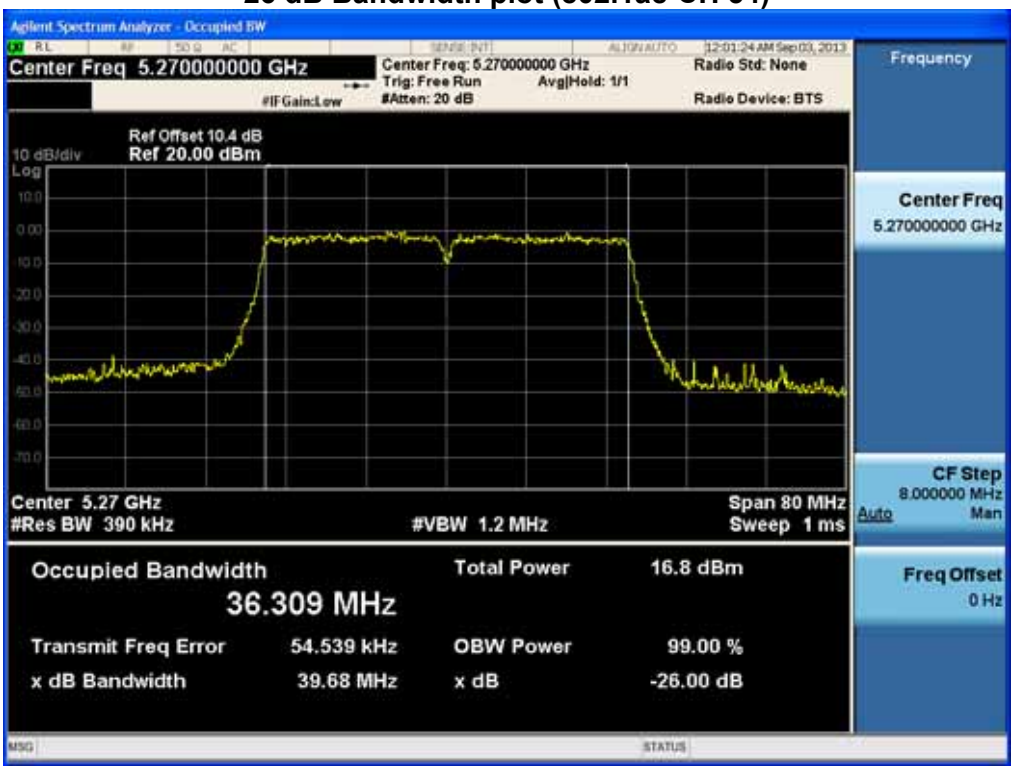
26 dB Bandwidth plot (802.1ac-CH 38)



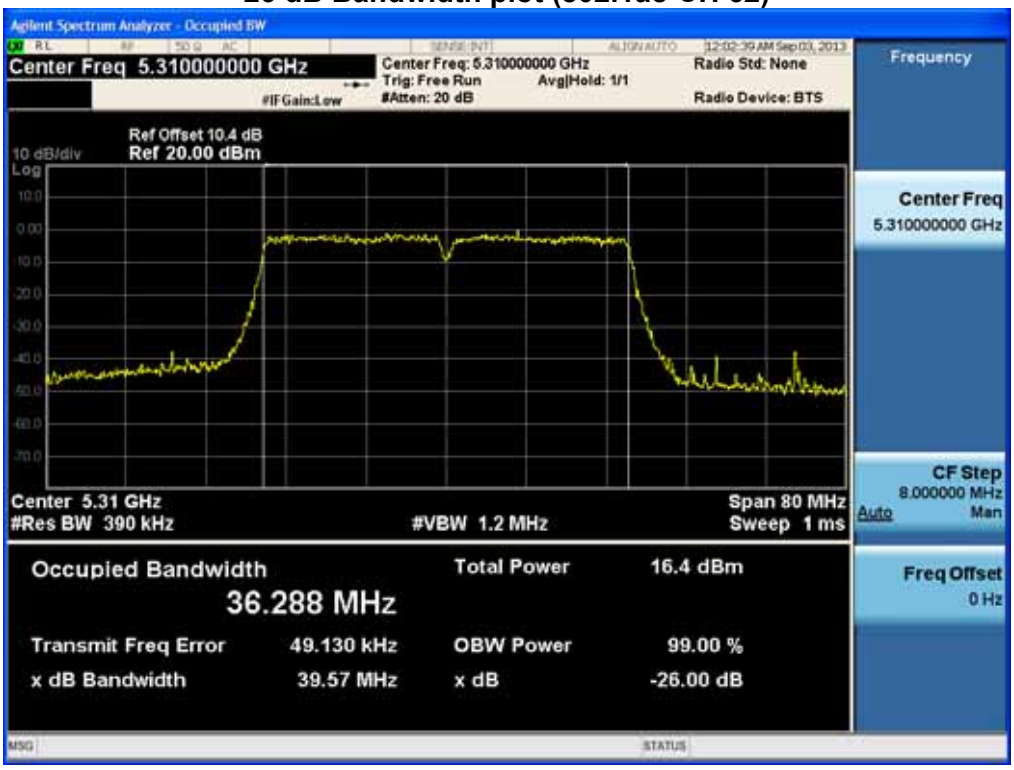
26 dB Bandwidth plot (802.1ac-CH 46)



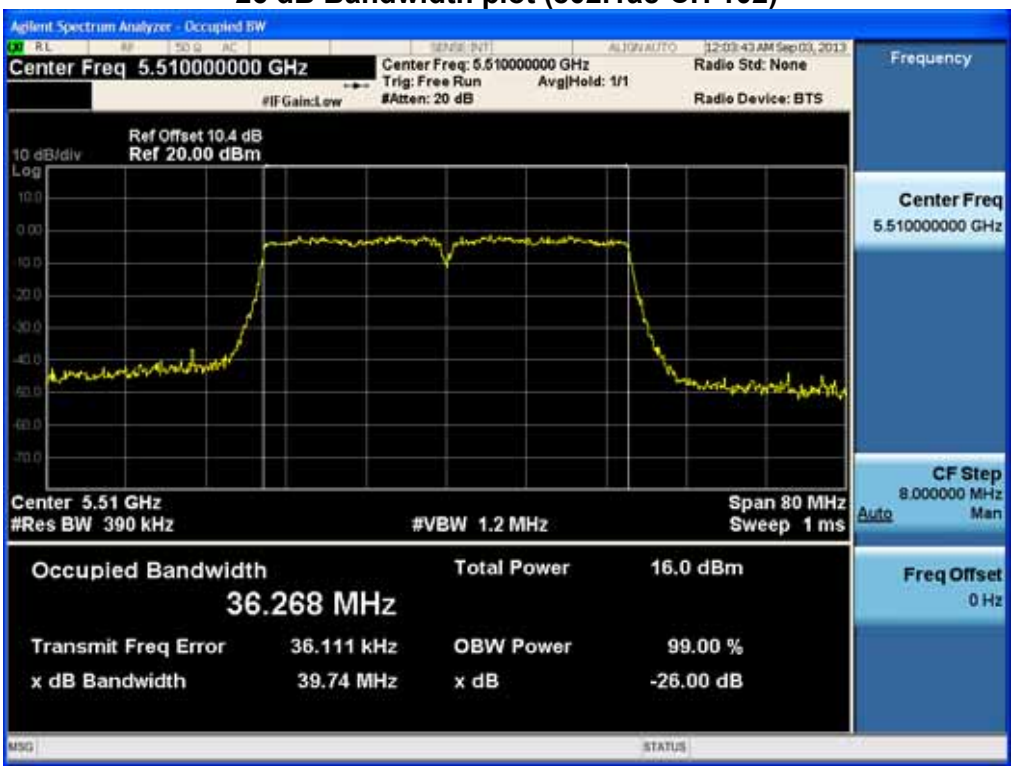
26 dB Bandwidth plot (802.1ac-CH 54)



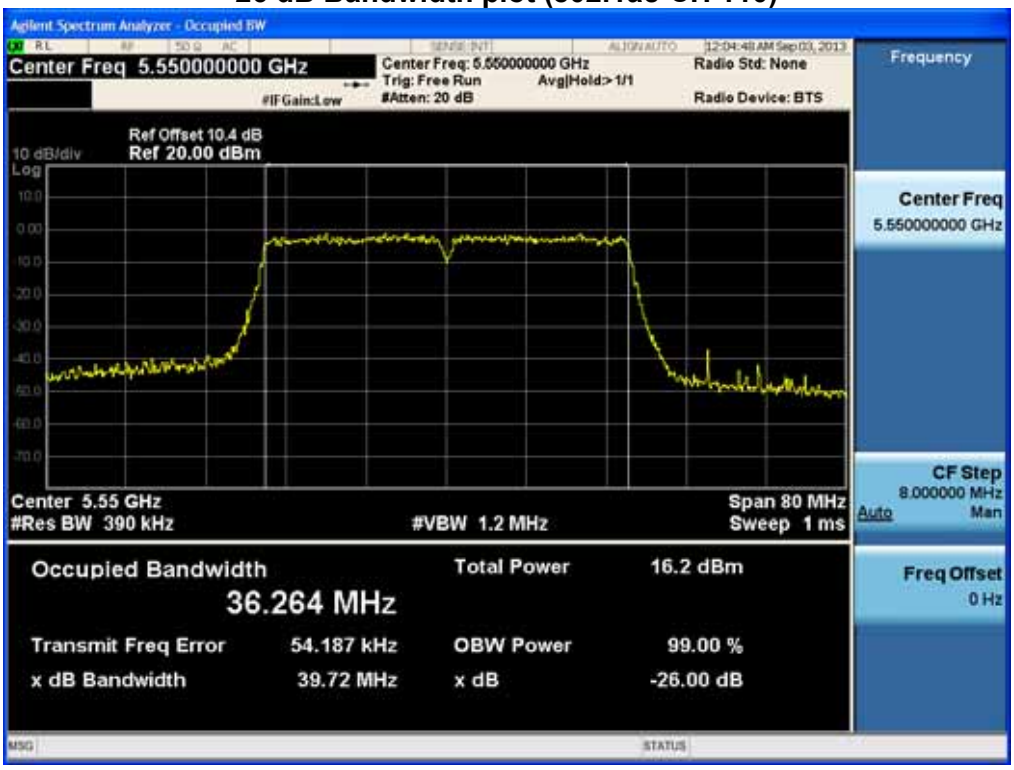
26 dB Bandwidth plot (802.1ac-CH 62)



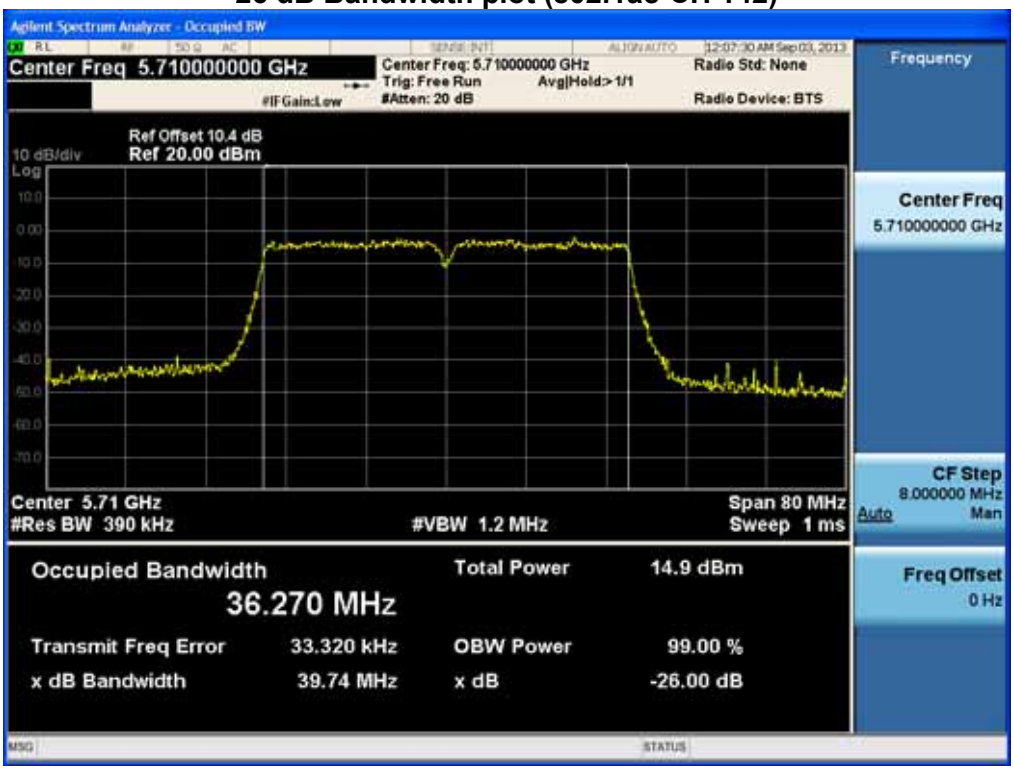
26 dB Bandwidth plot (802.1ac-CH 102)



26 dB Bandwidth plot (802.1ac-CH 110)

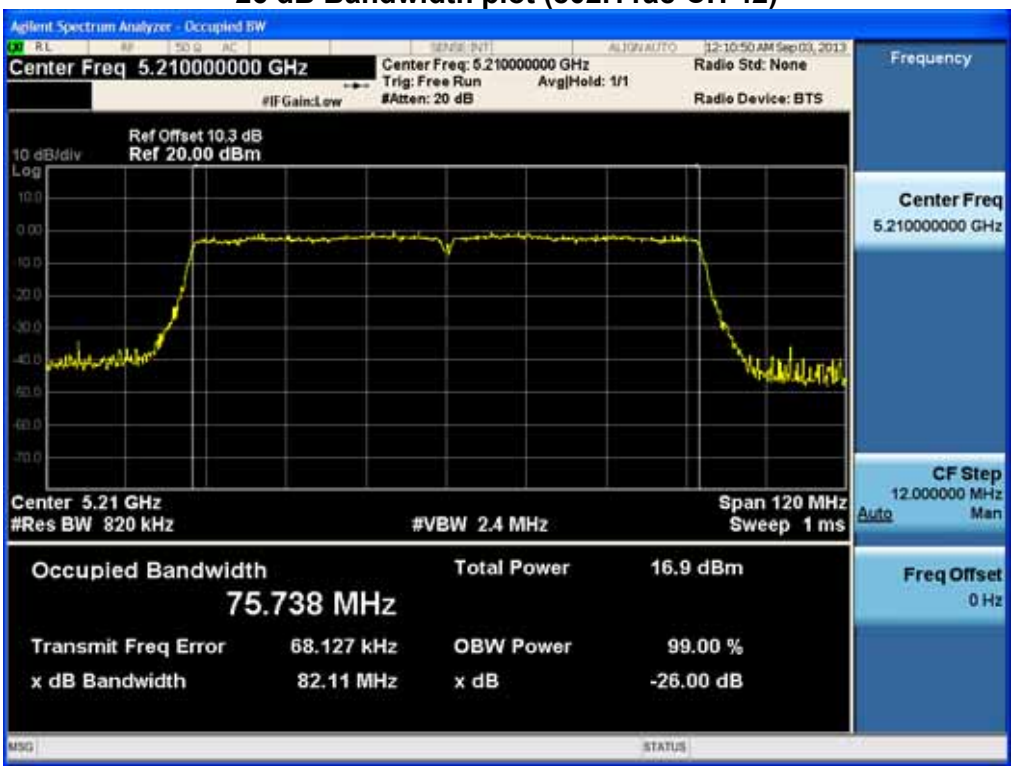


26 dB Bandwidth plot (802.1ac-CH 142)

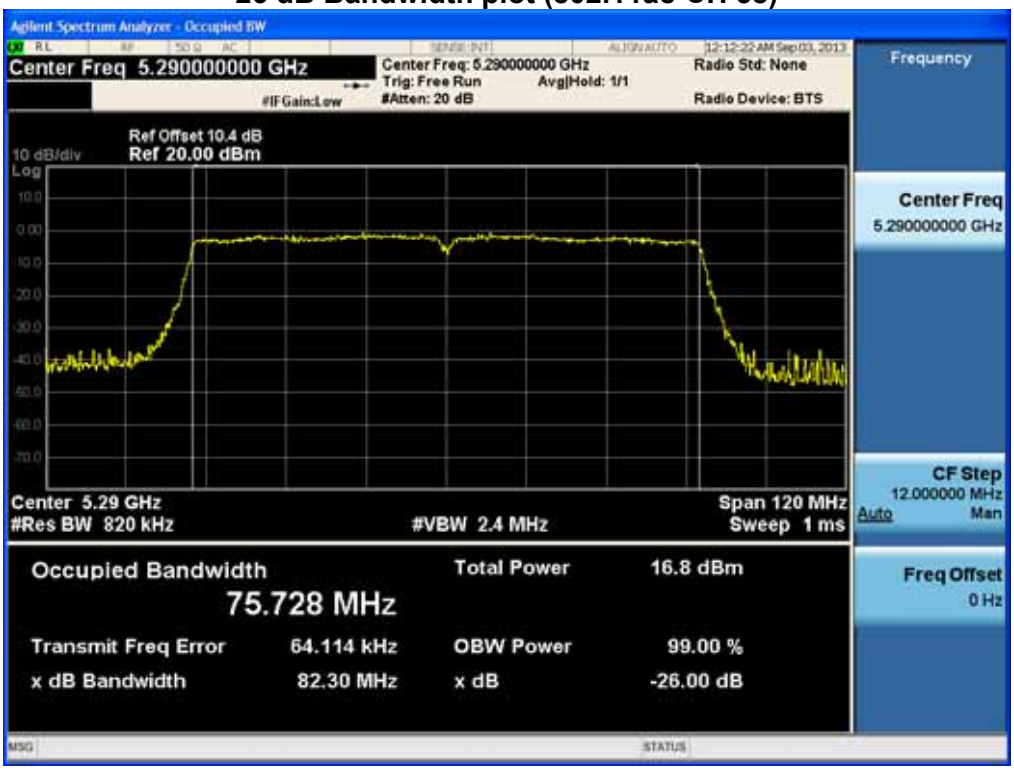


80 MHz BW

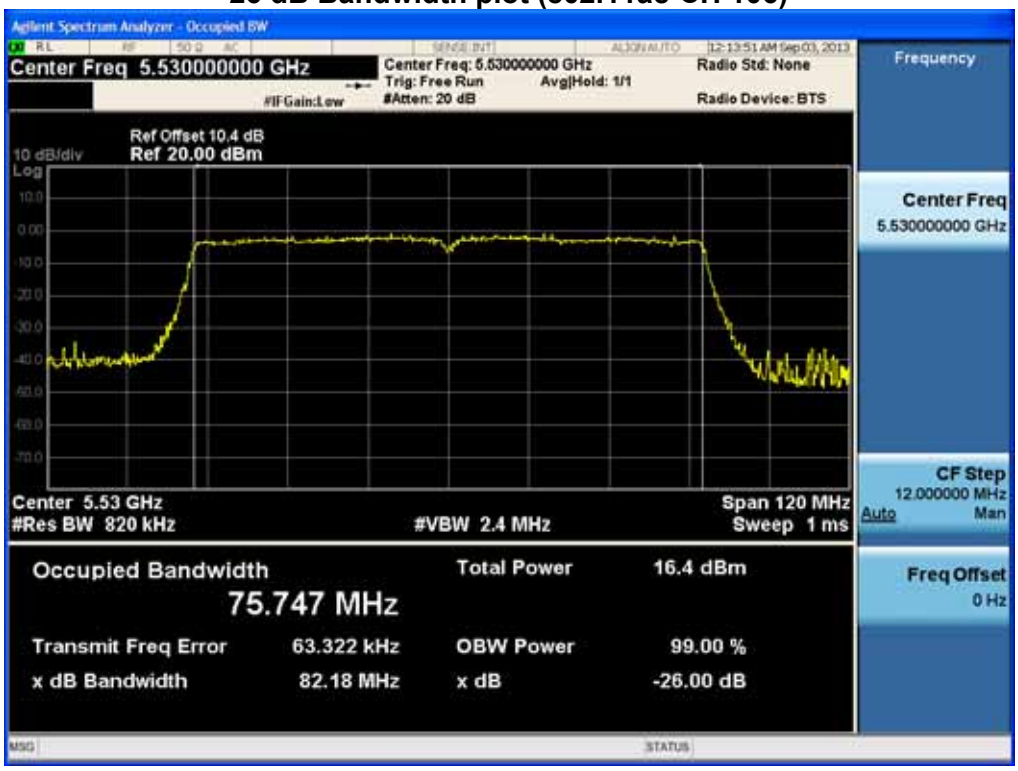
26 dB Bandwidth plot (802.11ac-CH 42)



26 dB Bandwidth plot (802.11ac-CH 58)



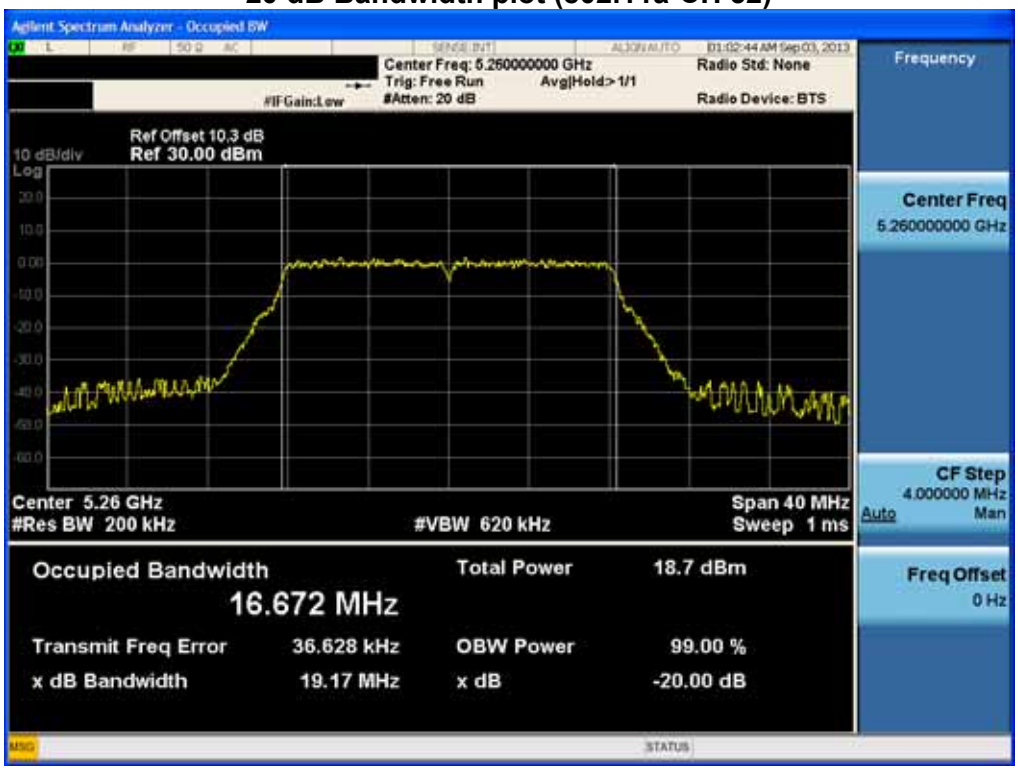
26 dB Bandwidth plot (802.11ac-CH 106)



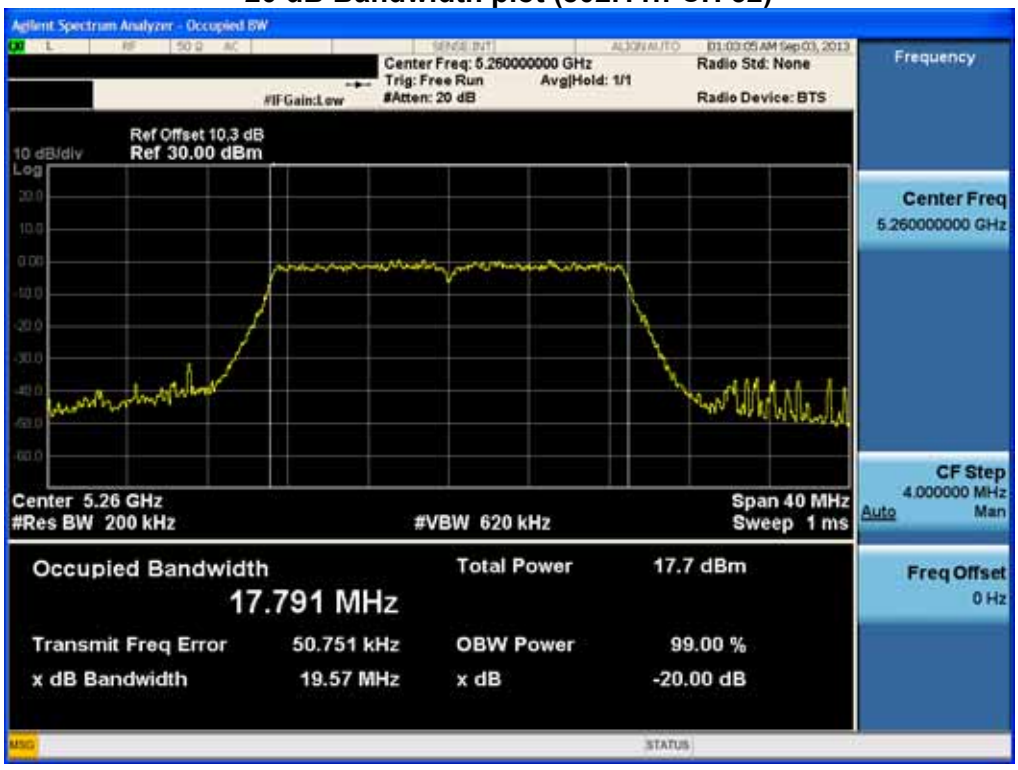
26 dB Bandwidth plot (802.11ac-CH 138)

▣ RESULT PLOTS(20 dB Bandwidth)

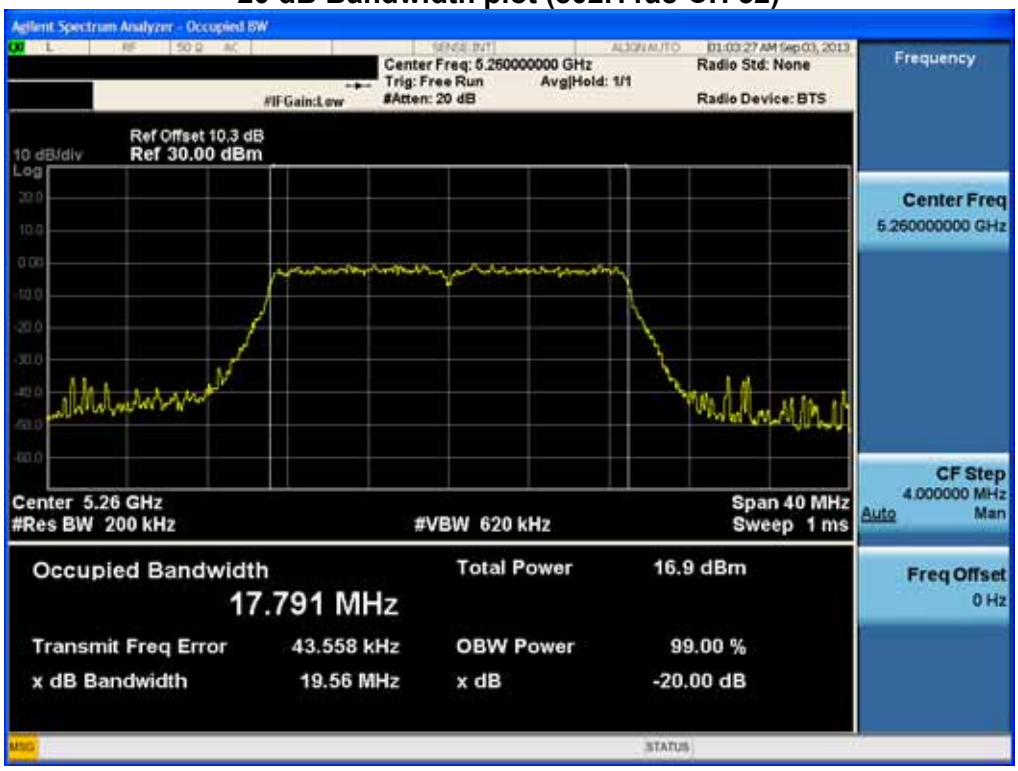
20 dB Bandwidth plot (802.11a-CH 52)



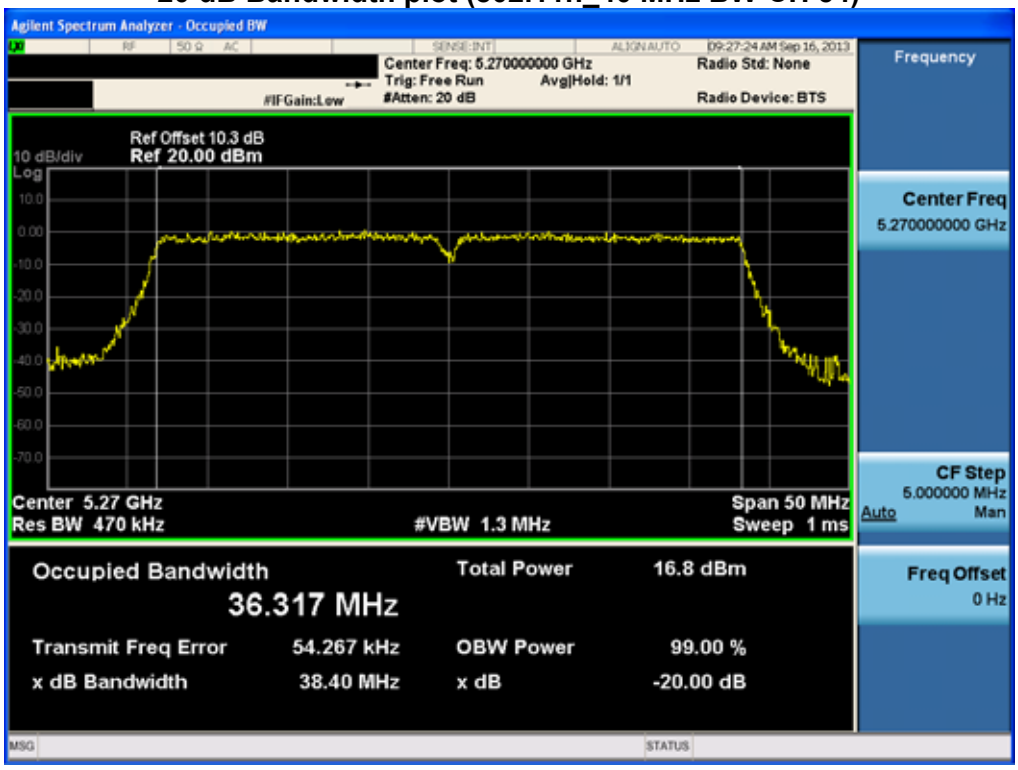
20 dB Bandwidth plot (802.11n-CH 52)



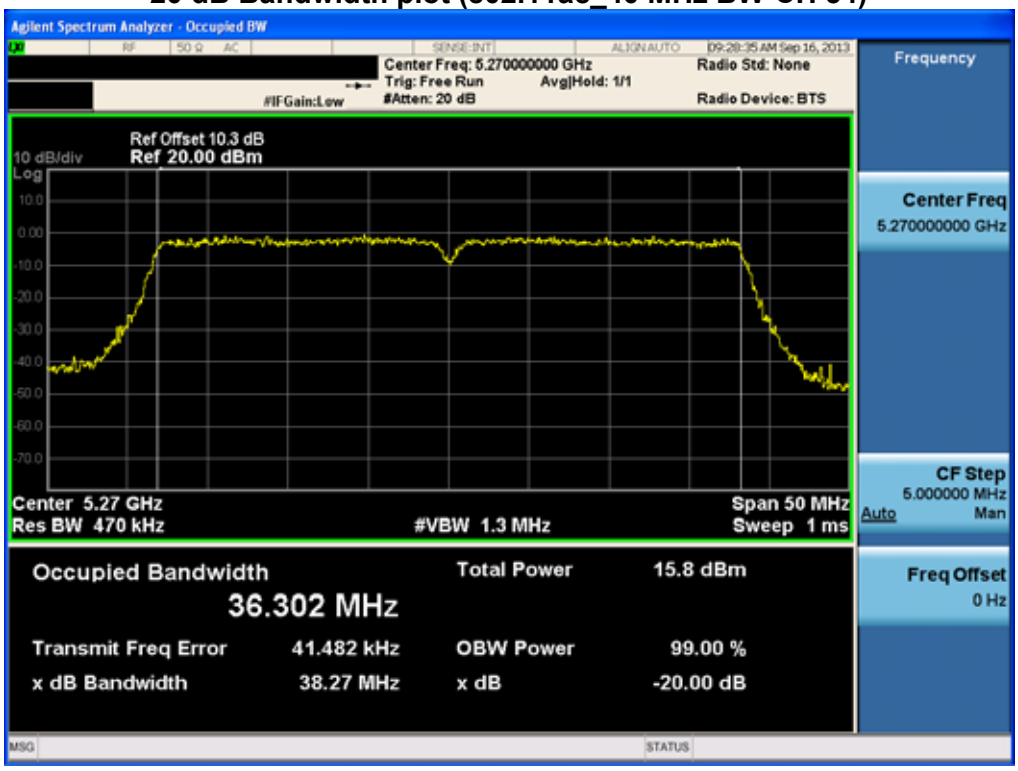
20 dB Bandwidth plot (802.11ac-CH 52)



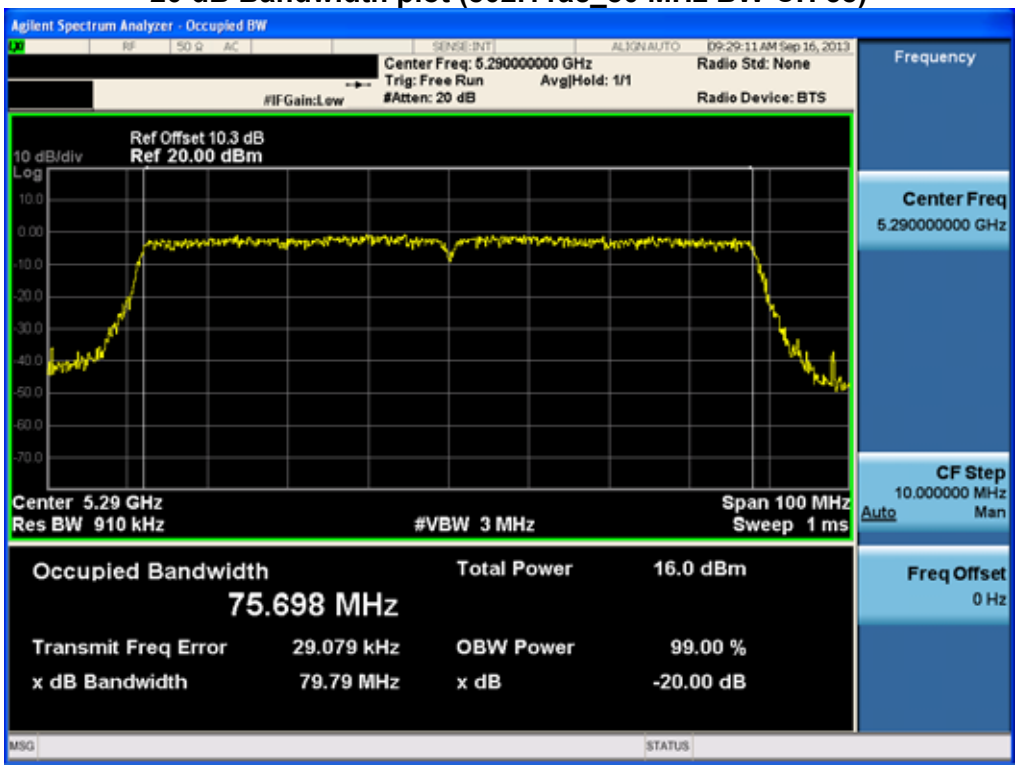
20 dB Bandwidth plot (802.11n_40 MHz BW-CH 54)



20 dB Bandwidth plot (802.11ac_40 MHz BW-CH 54)



20 dB Bandwidth plot (802.11ac_80 MHz BW-CH 58)



8.3 OUTPUT POWER MEASUREMENT

Test Requirements and limit, §15.247(b)(3)

The transmitter output is connected to the input of a RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

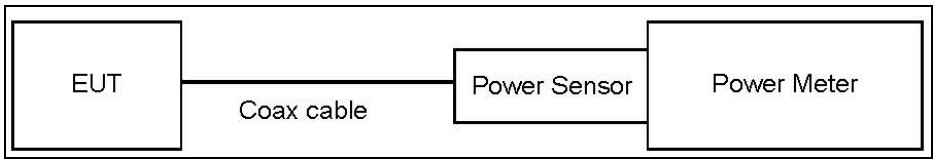
. In the 5.15 – 5.25 GHz band, the maximum permissible conducted output power is the lesser of 50 mW ((16.99 dBm) and 4 dBm + 10 log $_{10}$ (26 dB BW).

In the 5.25 – 5.35 GHz band, the maximum permissible conducted output power is the lesser of 250 mW (23.98 dBm) and 11 dBm + 10 log $_{10}$ (26 dB BW).

In the 5.47 – 5.725 GHz band, the maximum permissible conducted output power is the lesser of 250 mW (23.98 dBm) and 11 dBm + 10 log $_{10}$ (26 dB BW).

Limit : 802.11a_UNII-1 = 16.99 dBm
802.11n_UNII-1_20 MHz BW = 16.99 dBm
802.11n_UNII-1_40 MHz BW = 16.99 dBm
802.11ac_UNII-1_20 MHz BW =16.99 dBm
802.11ac_UNII-1_40 MHz BW =16.99 dBm
802.11ac_UNII-1_80 MHz BW =16.99 dBm
802.11a_UNII-2 = 23.98 dBm
802.11n_UNII-2_20 MHz BW = 23.98dBm
802.11n_UNII-2_40 MHz BW = 23.98 dBm
802.11ac_UNII-2_20 MHz BW =23.98 dBm
802.11ac_UNII-2_40 MHz BW =23.98 dBm
802.11ac_UNII-2_80 MHz BW =23.98 dBm
802.11a_UNII-2e = 23.98dBm
802.11n_UNII-2e_20 MHz BW = 23.98 dBm
802.11n_UNII-2e_40 MHz BW = 23.98 dBm
802.11ac_UNII-2e_20 MHz BW =23.98 dBm
802.11ac_UNII-2e_40 MHz BW =23.98 dBm
802.11ac_UNII-2e_80 MHz BW =23.98 dBm

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method E)3)a) in KDB 789033(issued 04/08/2013).

▪ Average Power

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. We apply to the offset in the 5.2 GHz, 5.3 GHz and 5.6 GHz range that was rounded off to the closest tenth dB. Actual value of loss for the attenuator and cable combination is below table.

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43

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

▣ TEST RESULTS

20 MHz BW

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

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6	11.76	0.201	11.97	16.99
		9	11.53	0.318	11.85	16.99
		12	11.44	0.405	11.84	16.99
		18	11.17	0.571	11.74	16.99
		24	10.96	0.763	11.72	16.99
		36	10.69	1.061	11.75	16.99
		48	10.42	1.354	11.78	16.99
		54	10.21	1.496	11.70	16.99
5200	40	6	11.64	0.201	11.84	16.99
		9	11.41	0.318	11.73	16.99
		12	11.29	0.405	11.70	16.99
		18	11.11	0.571	11.68	16.99
		24	10.90	0.763	11.67	16.99
		36	10.56	1.061	11.62	16.99
		48	10.39	1.354	11.75	16.99
		54	10.18	1.496	11.68	16.99
5240	48	6	11.52	0.201	11.72	16.99
		9	11.31	0.318	11.63	16.99
		12	11.23	0.405	11.63	16.99
		18	11.01	0.571	11.59	16.99
		24	10.83	0.763	11.60	16.99
		36	10.49	1.061	11.55	16.99
		48	10.31	1.354	11.66	16.99
		54	10.10	1.496	11.59	16.99

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

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6	11.80	0.201	12.00	23.98
		9	11.63	0.318	11.95	23.98
		12	11.53	0.405	11.93	23.98
		18	11.35	0.571	11.92	23.98
		24	11.12	0.763	11.88	23.98
		36	10.78	1.061	11.85	23.98
		48	10.60	1.354	11.95	23.98
		54	10.38	1.496	11.87	23.98
5300	60	6	11.72	0.201	11.92	23.98
		9	11.54	0.318	11.85	23.98
		12	11.46	0.405	11.86	23.98
		18	11.22	0.571	11.79	23.98
		24	11.01	0.763	11.77	23.98
		36	10.72	1.061	11.78	23.98
		48	10.54	1.354	11.90	23.98
		54	10.30	1.496	11.79	23.98
5320	64	6	11.66	0.201	11.86	23.98
		9	11.51	0.318	11.83	23.98
		12	11.39	0.405	11.80	23.98
		18	11.24	0.571	11.81	23.98
		24	10.98	0.763	11.74	23.98
		36	10.66	1.061	11.72	23.98
		48	10.48	1.354	11.83	23.98
		54	10.28	1.496	11.77	23.98

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

802.11a Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6	11.56	0.201	11.76	23.98
		9	11.46	0.318	11.78	23.98
		12	11.38	0.405	11.79	23.98
		18	11.24	0.571	11.81	23.98
		24	10.99	0.763	11.76	23.98
		36	10.63	1.061	11.69	23.98
		48	10.54	1.354	11.90	23.98
		54	10.22	1.496	11.71	23.98
5580	116	6	11.21	0.201	11.41	23.98
		9	11.10	0.318	11.42	23.98
		12	11.04	0.405	11.45	23.98
		18	10.91	0.571	11.48	23.98
		24	10.75	0.763	11.51	23.98
		36	10.41	1.061	11.47	23.98
		48	10.23	1.354	11.59	23.98
		54	9.90	1.496	11.39	23.98
5700	140	6	10.78	0.201	10.98	23.98
		9	10.67	0.318	10.99	23.98
		12	10.62	0.405	11.02	23.98
		18	10.44	0.571	11.01	23.98
		24	10.29	0.763	11.06	23.98
		36	10.02	1.061	11.08	23.98
		48	9.75	1.354	11.10	23.98
		54	9.57	1.496	11.07	23.98
5720	144	6	10.18	0.201	10.39	23.98
		9	10.01	0.318	10.33	23.98
		12	9.96	0.405	10.36	23.98
		18	9.85	0.571	10.42	23.98
		24	9.58	0.763	10.35	23.98
		36	9.17	1.061	10.23	23.98
		48	9.11	1.354	10.46	23.98
		54	8.80	1.496	10.30	23.98

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	10.73	0.216	10.95	16.99
		13	10.40	0.444	10.84	16.99
		19.5	10.13	0.609	10.74	16.99
		26	10.01	0.799	10.81	16.99
		39	9.69	1.098	10.79	16.99
		52	9.38	1.387	10.77	16.99
		58.5	9.22	1.484	10.70	16.99
		65	9.16	1.598	10.76	16.99
5200	40	6.5	10.52	0.216	10.74	16.99
		13	10.30	0.444	10.74	16.99
		19.5	10.24	0.609	10.85	16.99
		26	10.06	0.799	10.86	16.99
		39	9.68	1.098	10.78	16.99
		52	9.40	1.387	10.79	16.99
		58.5	9.19	1.484	10.67	16.99
		65	9.04	1.598	10.64	16.99
5240	48	6.5	10.29	0.216	10.51	16.99
		13	10.21	0.444	10.65	16.99
		19.5	10.05	0.609	10.66	16.99
		26	9.91	0.799	10.71	16.99
		39	9.49	1.098	10.59	16.99
		52	9.27	1.387	10.66	16.99
		58.5	9.19	1.484	10.67	16.99
		65	8.99	1.598	10.59	16.99

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6.5	10.63	0.216	10.85	23.98
		13	10.48	0.444	10.92	23.98
		19.5	10.34	0.609	10.95	23.98
		26	10.23	0.799	11.03	23.98
		39	9.90	1.098	11.00	23.98
		52	9.62	1.387	11.01	23.98
		58.5	9.47	1.484	10.95	23.98
		65	9.37	1.598	10.97	23.98
5300	60	6.5	10.52	0.216	10.74	23.98
		13	10.47	0.444	10.91	23.98
		19.5	10.25	0.609	10.86	23.98
		26	10.08	0.799	10.88	23.98
		39	9.79	1.098	10.89	23.98
		52	9.53	1.387	10.92	23.98
		58.5	9.43	1.484	10.91	23.98
		65	9.33	1.598	10.93	23.98
5320	64	6.5	10.54	0.216	10.76	23.98
		13	10.40	0.444	10.84	23.98
		19.5	10.23	0.609	10.84	23.98
		26	10.12	0.799	10.92	23.98
		39	9.68	1.098	10.78	23.98
		52	9.47	1.387	10.86	23.98
		58.5	9.37	1.484	10.85	23.98
		65	9.27	1.598	10.87	23.98

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6.5	10.48	0.216	10.70	23.98
		13	10.39	0.444	10.83	23.98
		19.5	10.19	0.609	10.80	23.98
		26	10.05	0.799	10.85	23.98
		39	9.79	1.098	10.89	23.98
		52	9.44	1.387	10.83	23.98
		58.5	9.36	1.484	10.84	23.98
		65	9.28	1.598	10.88	23.98
5580	116	6.5	10.35	0.216	10.57	23.98
		13	10.12	0.444	10.56	23.98
		19.5	9.96	0.609	10.57	23.98
		26	9.82	0.799	10.62	23.98
		39	9.50	1.098	10.60	23.98
		52	9.17	1.387	10.56	23.98
		58.5	9.11	1.484	10.59	23.98
		65	9.01	1.598	10.61	23.98
5700	140	6.5	9.94	0.216	10.16	23.98
		13	9.69	0.444	10.13	23.98
		19.5	9.54	0.609	10.15	23.98
		26	9.41	0.799	10.21	23.98
		39	9.03	1.098	10.13	23.98
		52	8.81	1.387	10.20	23.98
		58.5	8.75	1.484	10.23	23.98
		65	8.51	1.598	10.11	23.98
5720	144	6.5	9.30	0.216	9.51	23.98
		13	9.09	0.444	9.53	23.98
		19.5	8.95	0.609	9.56	23.98
		26	8.74	0.799	9.54	23.98
		39	8.45	1.098	9.54	23.98
		52	8.21	1.387	9.60	23.98
		58.5	8.09	1.484	9.57	23.98
		65	7.94	1.598	9.54	23.98

40 MHz BW

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	10.62	0.437	11.06	16.99
		27	10.30	0.811	11.11	16.99
		40.5	9.57	1.120	10.69	16.99
		54	9.60	1.383	10.98	16.99
		81	9.22	1.852	11.07	16.99
		108	8.78	2.196	10.98	16.99
		121.5	8.39	2.341	10.73	16.99
		135	8.19	2.507	10.70	16.99
5230	46	13.5	10.32	0.437	10.76	16.99
		27	10.06	0.811	10.87	16.99
		40.5	9.29	1.120	10.41	16.99
		54	9.11	1.383	10.49	16.99
		81	8.66	1.852	10.51	16.99
		108	8.65	2.196	10.85	16.99
		121.5	8.29	2.341	10.63	16.99
		135	8.26	2.507	10.77	16.99

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	13.5	10.59	0.437	11.03	23.98
		27	10.26	0.811	11.07	23.98
		40.5	10.11	1.120	11.23	23.98
		54	9.85	1.383	11.23	23.98
		81	9.42	1.852	11.27	23.98
		108	9.05	2.196	11.25	23.98
		121.5	8.77	2.341	11.11	23.98
		135	8.73	2.507	11.24	23.98
5310	62	13.5	10.72	0.437	11.16	23.98
		27	10.38	0.811	11.19	23.98
		40.5	10.01	1.120	11.13	23.98
		54	9.73	1.383	11.11	23.98
		81	9.37	1.852	11.22	23.98
		108	8.88	2.196	11.08	23.98
		121.5	8.59	2.341	10.93	23.98
		135	8.21	2.507	10.72	23.98

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

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	10.26	0.437	10.70	23.98
		27	9.86	0.811	10.67	23.98
		40.5	9.49	1.120	10.61	23.98
		54	9.35	1.383	10.73	23.98
		81	8.78	1.852	10.63	23.98
		108	8.40	2.196	10.60	23.98
		121.5	8.26	2.341	10.60	23.98
		135	8.19	2.507	10.70	23.98
5550	110	13.5	10.43	0.437	10.87	23.98
		27	9.80	0.811	10.61	23.98
		40.5	9.58	1.120	10.70	23.98
		54	9.41	1.383	10.79	23.98
		81	9.03	1.852	10.88	23.98
		108	8.67	2.196	10.87	23.98
		121.5	8.47	2.341	10.81	23.98
		135	8.15	2.507	10.66	23.98
5670	134	13.5	9.71	0.437	10.15	23.98
		27	9.22	0.811	10.03	23.98
		40.5	9.11	1.120	10.23	23.98
		54	8.73	1.383	10.11	23.98
		81	8.23	1.852	10.08	23.98
		108	7.99	2.196	10.19	23.98
		121.5	7.93	2.341	10.27	23.98
		135	7.58	2.507	10.09	23.98
5710	142	13.5	9.08	0.437	9.51	23.98
		27	8.87	0.811	9.68	23.98
		40.5	8.43	1.120	9.55	23.98
		54	8.08	1.383	9.46	23.98
		81	7.61	1.852	9.47	23.98
		108	7.32	2.196	9.51	23.98
		121.5	7.55	2.341	9.89	23.98
		135	7.49	2.507	10.00	23.98

20 MHz BW

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5180	36	6.5	9.41	0.219	9.63	16.99
		13	9.24	0.427	9.67	16.99
		19.5	9.05	0.602	9.65	16.99
		26	8.88	0.769	9.65	16.99
		39	8.58	1.087	9.67	16.99
		52	8.39	1.349	9.74	16.99
		58.5	8.28	1.464	9.74	16.99
		65	8.16	1.570	9.73	16.99
		78	7.98	1.790	9.77	16.99
5200	40	6.5	9.36	0.219	9.58	16.99
		13	9.18	0.427	9.61	16.99
		19.5	9.03	0.602	9.63	16.99
		26	8.86	0.769	9.63	16.99
		39	8.62	1.087	9.71	16.99
		52	8.37	1.349	9.72	16.99
		58.5	8.30	1.464	9.76	16.99
		65	8.22	1.570	9.79	16.99
		78	8.03	1.790	9.82	16.99
5240	48	6.5	9.62	0.219	9.84	16.99
		13	9.23	0.427	9.66	16.99
		19.5	9.06	0.602	9.66	16.99
		26	8.92	0.769	9.69	16.99
		39	8.65	1.087	9.74	16.99
		52	8.44	1.349	9.79	16.99
		58.5	8.34	1.464	9.80	16.99
		65	7.98	1.570	9.55	16.99
		78	7.79	1.790	9.58	16.99

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5260	52	6.5	10.05	0.219	10.27	23.98
		13	9.55	0.427	9.98	23.98
		19.5	9.46	0.602	10.06	23.98
		26	9.16	0.769	9.93	23.98
		39	8.89	1.087	9.98	23.98
		52	8.64	1.349	9.99	23.98
		58.5	8.56	1.464	10.02	23.98
		65	8.48	1.570	10.05	23.98
		78	8.29	1.790	10.08	23.98
5300	60	6.5	10.05	0.219	10.27	23.98
		13	9.59	0.427	10.02	23.98
		19.5	9.27	0.602	9.87	23.98
		26	9.09	0.769	9.86	23.98
		39	8.84	1.087	9.93	23.98
		52	8.56	1.349	9.91	23.98
		58.5	8.43	1.464	9.89	23.98
		65	8.27	1.570	9.84	23.98
		78	8.10	1.790	9.89	23.98
5320	64	6.5	9.92	0.219	10.14	23.98
		13	9.35	0.427	9.78	23.98
		19.5	9.09	0.602	9.69	23.98
		26	9.04	0.769	9.81	23.98
		39	8.83	1.087	9.92	23.98
		52	8.57	1.349	9.92	23.98
		58.5	8.47	1.464	9.93	23.98
		65	8.32	1.570	9.89	23.98
		78	8.15	1.790	9.94	23.98

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5500	100	6.5	9.96	0.219	10.18	23.98
		13	9.45	0.427	9.88	23.98
		19.5	9.32	0.602	9.92	23.98
		26	9.20	0.769	9.97	23.98
		39	8.86	1.087	9.95	23.98
		52	8.64	1.349	9.99	23.98
		58.5	8.44	1.464	9.90	23.98
		65	8.35	1.570	9.92	23.98
		78	8.15	1.790	9.94	23.98
5580	116	6.5	9.88	0.219	10.10	23.98
		13	9.23	0.427	9.66	23.98
		19.5	9.13	0.602	9.73	23.98
		26	8.88	0.769	9.65	23.98
		39	8.70	1.087	9.79	23.98
		52	8.34	1.349	9.69	23.98
		58.5	8.23	1.464	9.69	23.98
		65	8.12	1.570	9.69	23.98
		78	7.91	1.790	9.70	23.98
5720	144	6.5	9.00	0.219	9.22	23.98
		13	8.79	0.427	9.22	23.98
		19.5	8.66	0.602	9.26	23.98
		26	8.51	0.769	9.28	23.98
		39	8.16	1.087	9.24	23.98
		52	7.94	1.349	9.29	23.98
		58.5	7.80	1.464	9.27	23.98
		65	7.67	1.570	9.24	23.98
		78	7.44	1.790	9.23	23.98

40 MHz BW

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5190	38	13.5	9.70	0.434	10.13	16.99
		27	9.33	0.798	10.13	16.99
		40.5	9.01	1.108	10.12	16.99
		54	8.82	1.377	10.20	16.99
		81	8.38	1.821	10.20	16.99
		108	8.03	2.151	10.18	16.99
		121.5	7.85	2.299	10.15	16.99
		135	7.70	2.449	10.15	16.99
		162	7.35	2.700	10.05	16.99
		180	6.84	2.771	9.61	16.99
5230	46	13.5	9.50	0.434	9.93	16.99
		27	9.22	0.798	10.02	16.99
		40.5	8.92	1.108	10.03	16.99
		54	8.76	1.377	10.14	16.99
		81	8.15	1.821	9.97	16.99
		108	7.57	2.151	9.72	16.99
		121.5	7.31	2.299	9.61	16.99
		135	7.27	2.449	9.72	16.99
		162	7.16	2.700	9.86	16.99
		180	6.88	2.771	9.65	16.99

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5270	54	13.5	9.93	0.434	10.36	23.98
		27	9.73	0.798	10.53	23.98
		40.5	9.10	1.108	10.21	23.98
		54	8.73	1.377	10.11	23.98
		81	8.03	1.821	9.85	23.98
		108	7.90	2.151	10.05	23.98
		121.5	8.10	2.299	10.40	23.98
		135	8.02	2.449	10.47	23.98
		162	7.31	2.700	10.01	23.98
		180	7.71	2.771	10.48	23.98
5310	62	13.5	9.84	0.434	10.27	23.98
		27	9.49	0.798	10.29	23.98
		40.5	9.31	1.108	10.42	23.98
		54	8.98	1.377	10.36	23.98
		81	8.56	1.821	10.38	23.98
		108	8.17	2.151	10.32	23.98
		121.5	7.54	2.299	9.84	23.98
		135	7.36	2.449	9.81	23.98
		162	7.28	2.700	9.98	23.98
		180	7.12	2.771	9.89	23.98

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5510	102	13.5	9.45	0.434	9.88	23.98
		27	9.06	0.798	9.86	23.98
		40.5	8.67	1.108	9.78	23.98
		54	8.32	1.377	9.70	23.98
		81	7.92	1.821	9.74	23.98
		108	7.66	2.151	9.81	23.98
		121.5	7.44	2.299	9.74	23.98
		135	7.37	2.449	9.82	23.98
		162	7.11	2.700	9.81	23.98
		180	7.02	2.771	9.79	23.98
5550	110	13.5	9.60	0.434	10.03	23.98
		27	9.16	0.798	9.96	23.98
		40.5	8.70	1.108	9.81	23.98
		54	8.66	1.377	10.04	23.98
		81	8.09	1.821	9.91	23.98
		108	7.68	2.151	9.83	23.98
		121.5	7.53	2.299	9.83	23.98
		135	7.46	2.449	9.91	23.98
		162	7.18	2.700	9.88	23.98
		180	7.01	2.771	9.78	23.98
5710	142	13.5	9.09	0.434	9.52	23.98
		27	8.40	0.798	9.20	23.98
		40.5	8.60	1.108	9.71	23.98
		54	7.83	1.377	9.21	23.98
		81	7.30	1.821	9.12	23.98
		108	7.01	2.151	9.16	23.98
		121.5	6.88	2.299	9.18	23.98
		135	6.70	2.449	9.15	23.98
		162	6.33	2.700	9.03	23.98
		180	6.35	2.771	9.12	23.98

80 MHz BW

Conducted Output Power Measurements (802.11ac Mode: 5210)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5210	42	29.3	8.64	0.854	9.50	16.99
		58.5	8.06	1.451	9.51	16.99
		87.8	7.53	1.919	9.45	16.99
		117	7.21	2.242	9.45	16.99
		175.5	6.74	2.771	9.51	16.99
		234	6.36	3.100	9.46	16.99
		263.3	6.17	3.297	9.46	16.99
		292.5	6.11	3.405	9.52	16.99
		351	5.84	3.647	9.48	16.99
		390	5.80	3.782	9.59	16.99

Conducted Output Power Measurements (802.11ac Mode: 5290)

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5290	58	29.3	8.56	0.854	9.42	23.98
		58.5	7.96	1.451	9.41	23.98
		87.8	7.48	1.919	9.40	23.98
		117	7.11	2.242	9.36	23.98
		175.5	6.66	2.771	9.43	23.98
		234	6.33	3.100	9.43	23.98
		263.3	6.05	3.297	9.35	23.98
		292.5	5.97	3.405	9.37	23.98
		351	5.74	3.647	9.39	23.98
		390	5.60	3.782	9.38	23.98

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

802.11ac Mode		Rate (Mbps)	Measured Power(dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
5530	106	29.3	8.83	0.854	9.69	23.98
		58.5	8.32	1.451	9.77	23.98
		87.8	7.82	1.919	9.74	23.98
		117	7.43	2.242	9.67	23.98
		175.5	6.96	2.771	9.73	23.98
		234	6.58	3.100	9.68	23.98
		263.3	6.39	3.297	9.68	23.98
		292.5	6.31	3.405	9.72	23.98
		351	6.08	3.647	9.72	23.98
		390	5.95	3.782	9.73	23.98
5690	138	29.3	8.39	0.854	9.24	23.98
		58.5	7.81	1.451	9.26	23.98
		87.8	7.34	1.919	9.26	23.98
		117	6.92	2.242	9.16	23.98
		175.5	6.37	2.771	9.14	23.98
		234	6.01	3.100	9.11	23.98
		263.3	5.80	3.297	9.10	23.98
		292.5	5.71	3.405	9.12	23.98
		351	5.48	3.647	9.13	23.98
		390	5.43	3.782	9.21	23.98

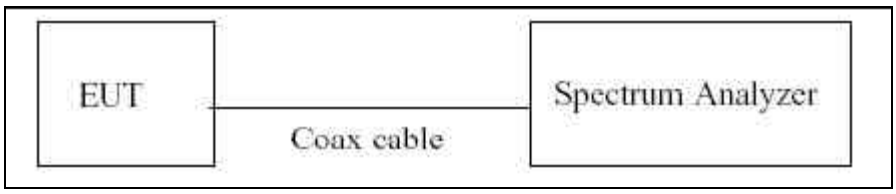
Note :

1. **We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.**

8.4 POWER SPECTRAL DENSITY

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies. The maximum permissible peak power spectral density is 4 dBm/ MHz in the 5.15 GHz – 5.25 GHz band and 11 dBm/ MHz in the 5.25 GHz – 5.35 GHz and 5.47 GHz – 5.725 GHz bands

▣ TEST CONFIGURATION



▣ TEST PROCEDURE

We tested according to Method in KDB 789033(issued 04/08/2013).

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

▣ Sample Calculation

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

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

Note :

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

Band	Frequency(MHz)	Loss(dB)
UNII 1	5180	10.30
	5190	10.29
	5200	10.28
	5230	10.29
	5240	10.34
UNII 2	5260	10.37
	5270	10.38
	5300	10.40
	5310	10.39
	5320	10.39
UNII 2e	5500	10.35
	5510	10.36
	5550	10.41
	5580	10.43
	5670	10.43
	5700	10.30

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

▣ 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	0.437	0.201	0.638	4	Pass
5200	40		0.313	0.201	0.514	4	Pass
5240	48		0.526	0.201	0.727	4	Pass
5260	52	802.11a	0.885	0.201	1.086	11	Pass
5300	60		0.515	0.201	0.716	11	Pass
5320	64		0.539	0.201	0.740	11	Pass
5500	100	802.11a	-0.605	1.354	0.749	11	Pass
5580	116		-0.721	1.354	0.633	11	Pass
5700	140		-1.611	1.354	-0.257	11	Pass
5720	144		-0.750	1.354	0.604	11	Pass

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	-1.038	0.216	-0.822	4	Pass
5200	40		-1.495	0.799	-0.696	4	Pass
5240	48		-1.364	0.799	-0.565	4	Pass
5260	52	802.11n 20MHz BW	-1.163	1.387	0.224	11	Pass
5300	60		-1.466	1.598	0.132	11	Pass
5320	64		-1.352	0.799	-0.553	11	Pass
5500	100	802.11n 20MHz BW	-1.551	1.098	-0.453	11	Pass
5580	116		-1.767	0.799	-0.968	11	Pass
5700	140		-1.767	0.799	-0.968	11	Pass
5720	144		-1.902	1.387	-0.515	11	Pass

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
5190	38	802.11n 40MHz BW	-3.984	0.811	-3.173	4	Pass
5230	46		-4.300	0.811	-3.489	4	Pass
5270	54	802.11n 40MHz BW	-3.816	1.852	-1.964	11	Pass
5310	62		-4.449	1.852	-2.597	11	Pass
5510	102	802.11n 40MHz BW	-5.185	1.383	-3.802	11	Pass
5550	110		-5.017	1.852	-3.165	11	Pass
5670	134		-6.616	2.341	-4.275	11	Pass
5710	142		-5.120	2.507	-2.613	11	Pass

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	-3.267	1.790	-1.477	4	Pass
5200	40		-2.898	1.790	-1.108	4	Pass
5240	48		-1.997	0.219	-1.778	4	Pass
5260	52	802.11ac 20MHz BW	-1.333	0.219	-1.114	11	Pass
5300	60		-1.584	0.219	-1.365	11	Pass
5320	64		-1.824	0.219	-1.605	11	Pass
5500	100	802.11ac 20MHz BW	-1.900	0.219	-1.681	11	Pass
5580	116		-1.975	0.219	-1.756	11	Pass
5720	144		-3.401	1.349	-2.052	11	Pass

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
5190	38	802.11ac 40MHz BW	-5.387	1.377	-4.010	4	Pass
5230	46		-5.856	1.377	-4.479	4	Pass
5270	54	802.11ac 40MHz BW	-4.874	0.798	-4.076	11	Pass
5310	62		-5.288	1.108	-4.180	11	Pass
5510	102	802.11ac 40MHz BW	-5.110	0.434	-4.676	11	Pass
5550	110		-5.689	1.377	-4.312	11	Pass
5710	142		-6.301	0.434	-5.867	11	Pass

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
5210	42	802.11ac 80MHz BW	-10.267	3.782	-6.485	4	Pass
5290	58	802.11ac 80MHz BW	-9.984	3.100	-6.884	11	Pass
5530	106	802.11ac 80MHz BW	-9.167	1.451	-7.716	11	Pass
5690	138		-10.188	1.451	-8.737	11	Pass

Note :

1. **In order to simplify the report, attached plots were only the highest PSD channel.**
2. **We applied the 15.407 for Ch.144, 142 and 138 in 802.11ac according to KDB 644545 D01 v01r01.**