

RF TEST REPORT

Test item : Wi-Fi Transmitter
Model No. : WEG720B
Order No. : DEMC1311-03573
Date of receipt : 2013-11-21
Test duration : 2014-01-27 ~ 2014-02-18
Date of issue : 2014-02-18
Use of report : FCC& IC Original Grant

Applicant : Samsung Electronics Co Ltd
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Test laboratory : Digital EMC Co., Ltd.
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449-935

Test specification : FCC Part 15.407 Subpart E
RSS-210 Issue 8: 2010

Test environment : See appended test report

Test result : ☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of Digital EMC Co., Ltd.

Tested by:

Witnessed by:

Reviewed by:



Engineer
HyunSuSon

N/A



Deputy General Manager
WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1402-0234	Feb. 18, 2014	Initial issue

CONTENTS

1.EUT DESCRIPTION	4
2. INFORMATION ABOUT TESTING.....	5
2.1 Test mode.....	5
2.2 Tested channel information	5
2.3 Auxiliary equipment	6
2.4 Tested environment	6
2.5 EMI Suppression Device(s) / Modifications.....	6
3. SUMMARY OF TESTS	7
4. TEST METHODOLOGY	8
4.1 EUT configuration.....	8
4.2 EUT exercise	8
4.3 General test procedures.....	8
4.4 Description of test modes.....	8
5. INSTRUMENT CALIBRATION	9
6. FACILITIES AND ACCREDITATIONS	9
6.1 Facilities	9
6.2 Equipment	9
7. ANTENNA REQUIREMENTS	9
8. TEST RESULT	10
8.1 Emission Bandwidth(26 dB Bandwidth)	10
8.2 Maximum Conducted Output Power	48
8.3 Peak Power Spectral Density.....	50
8.4 Peak Excursion Ratio	88
8.5 Frequency Stability.....	107
8.6 Radiated Spurious Emission Measurements	108
8.7 AC Conducted Emissions.....	122
8.8 Occupied Bandwidth	129
9. LIST OF TEST EQUIPMENT.....	166
APPENDIX I.....	167

1.EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Wi-Fi Transmitter
Model Name	WEG720B
Add Model Name	N/A
Power Supply	DC 5 V
Frequency Range	Band I(5150 ~ 5250MHz) 802.11a/n(HT20)/ac(VHT20): 5180 ~ 5240 MHz 802.11n(HT40)/ac(VHT40): 5190 ~ 5230 MHz 802.11ac(VHT80): 5210 MHz Band II(5250 ~ 5350MHz) 802.11a/n(HT20)/ac(VHT20): 5260 ~ 5320 MHz 802.11n(HT40)/ac(VHT40): 5270 ~ 5310 MHz 802.11ac(VHT80): 5290 MHz Band III(5470 ~ 5725MHz) 802.11a/n(HT20)/ac(VHT20): 5500 ~ 5700 MHz 802.11n(HT40)/ac(VHT40): 5510 ~ 5670 MHz 802.11ac(VHT80): 5530 MHz
Modulation type	256QAM, 64QAM, 16QAM, QPSK BPSK for OFDM
Transmissions category	Completely uncorrelated signal
Antenna Specification	Antenna type: Internal Antenna Antenna gain - Band I: ANT 1 : 1.0 dBi & ANT 2 : 2.0 dBi - Band II: ANT 1 : 1.0 dBi & ANT 2 : 2.0 dBi - Band III: ANT 1 : 2.2 dBi & ANT 2 : 0.9 dBi Antenna configuration 802.11a: Single Transmitting (ANT 1 or ANT 2) 802.11n(MCS0 ~ 7) : Single Transmitting (ANT 1 or ANT 2) 802.11n(MCS8 ~ 15): Multiple Transmitting (ANT 1 and ANT 2) 802.11ac(NSS 1): Single Transmitting (ANT 1 or ANT 2) 802.11ac(NSS 2): Multiple Transmitting (ANT 1 and ANT 2)

2. INFORMATION ABOUT TESTING

2.1 Test mode

5GHz Band	Mode	Worst data rate
Band I	802.11a	6 Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 9
Band II	802.11a	6 Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 9
Band III	802.11a	6 Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 9

The worst case data rate for each modulation is determined as above test mode. And all tests conducted in this report were made at the worst case data rate of each modulation.

2.2 Tested channel information

5GHz Band	802.11a/n(HT20)		802.11n(HT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
Band I	36	5180	38	5190	-	-
	40	5200	-	-	42	5210
	48	5240	46	5230	-	-
Band II	52	5260	54	5270	-	-
	60	5300	-	-	58	5290
	64	5320	62	5310	-	-
Band III	100	5500	102	5510	-	-
	116	5580	110	5550	106	5530
	140	5700	134	5670	-	-

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Laptop	Satellite U50D-A	8D031763K	Toshiba	FCC DoC
-	-	-	-	-

2.4 Tested environment

Temperature	: 20 ~ 24°C
Relative humidity content	: 40 ~ 42 % R.H.
Details of power supply	: DC 5 V

2.5 EMI Suppression Device(s) / Modifications

EMI suppression device(s) added and/or modifications made during testing
→ None

3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	N/A	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(a)	RSS-210 [A9.2]	Maximum Conducted Output Power	5150 ~ 5250MHz For FCC 50mW or $< 4 + 10\log_{10}(B)$ dBm, whichever power is less. 5150 ~ 5250MHz For IC 200mW or $< 10 + 10\log_{10}(B)$ dBm, whichever power is less. 5250 ~ 5350MHz For FCC & IC 250mW or $< 11 + 10\log_{10}(B)$ dBm, whichever power is less. 5470 ~ 5725MHz For FCC & IC 250mW or $< 11 + 10\log_{10}(B)$ dBm, whichever power is less.		C
15.407(a)	RSS-210 [A9.2]	Peak Power Spectral Density	5150 ~ 5250MHz For FCC: 4dBm/MHz 5150 ~ 5250MHz For IC: 10dBm/MHz 5250 ~ 5350MHz For FCC & IC: 11dBm/MHz 5470 ~ 5725MHz For FCC & IC: 11dBm/MHz		C
15.407(a)	N/A	Peak Excursion	< 13 dB/MHz maximum difference		C
15.407(g)	N/A	Frequency Stability	N/A		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	N/A		C
15.407(b)	RSS-210 [A9.2]	Undesirable Emissions	< -27 dBm/MHz EIRP	Radiated	C
15.205 15.209 15.407(b)	RSS-Gen [7.2.5]	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C Note.3
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS test report	-	C Note.4
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: The test items were performed according to the KDB789033 and ANSI C63.10.

Note 3: These test items were performed in each axis and the worst case data was reported.

Note 4: For DFS testing, please refer to DFS test report.

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB789033 D01 v01r03. And ANSI C63.10-2009 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing

4.1 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.

4.2 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 C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D01 v01r03. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

The EUT is placed on the turntable, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15MHz and 30MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB789033 D01 v01r03. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10 as stated on KDB789033 D01 v01r03.

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 highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

4.4 Description of test modes

A test program is used to control the EUT for staying in continuous transmitting mode with maximum fixed duty cycle.

5. 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.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 38, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number : 678747

6.2 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 peak, 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."

7. ANTENNA REQUIREMENTS

7.1 According to FCC 47 CFR §15.203& RSS-Gen [7.1.2]:

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

The antenna is installed permanently on this module.(Please refer to the internal photo.)

Therefore this module Complies with the requirement of §15.203

7.2 Directional antenna gain for MIMO :

Bands	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain for uncorrelated signals [dBi]
Band I	1.0	2.0	1.529
Band II	1.0	2.0	1.529
Band III	2.2	0.9	1.598

Directional gain = $10 \log[(10^{G_1/10} + 10^{G_2/10} + \dots + 10^{G_N/10})/N_{ANT}]$ dBi for MIMO uncorrelated signal

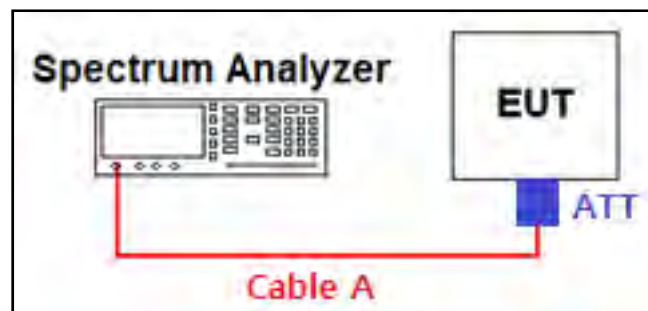
8. TEST RESULT

8.1 Emission Bandwidth(26 dB Bandwidth)

■ Test Requirements

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 in transmission mode at the appropriate frequencies. The 26dB bandwidth is used to determine the conducted output power limit.

■ Test Configurations



■ Test Procedure

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033**.

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

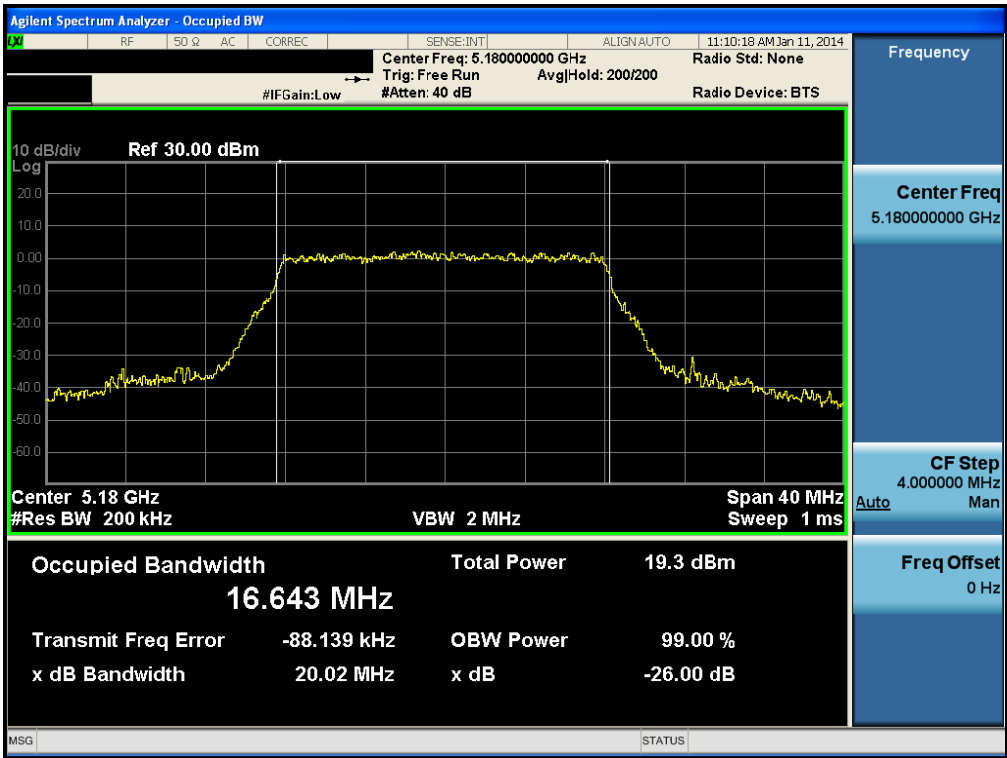
■ **TEST RESULTS: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]	
				ANT 1	ANT 2
802.11a	Band I	36	5180	20.020	20.170
		40	5200	20.000	20.110
		48	5240	20.100	20.060
	Band II	52	5260	20.140	20.200
		60	5300	20.150	20.130
		64	5320	20.140	20.110
	Band III	100	5500	20.060	20.140
		116	5580	20.020	20.070
		140	5700	20.070	20.010
802.11n (HT20)	Band I	36	5180	20.350	20.170
		40	5200	20.430	20.320
		48	5240	20.090	20.230
	Band II	52	5260	20.440	20.330
		60	5300	20.350	20.440
		64	5320	20.360	20.260
	Band III	100	5500	20.350	20.280
		116	5580	20.400	20.260
		140	5700	20.370	20.460
802.11n (HT40)	Band I	38	5190	39.890	39.120
		46	5230	39.510	39.240
	Band II	54	5270	39.440	39.240
		62	5310	39.650	36.160
	Band III	102	5510	39.320	39.290
		110	5550	39.660	38.980
		134	5670	39.610	39.380
802.11ac (VHT80)	Band I	42	5210	81.610	81.100
	Band II	58	5290	82.210	81.810
	Band III	106	5530	81.610	81.650

Result Plots

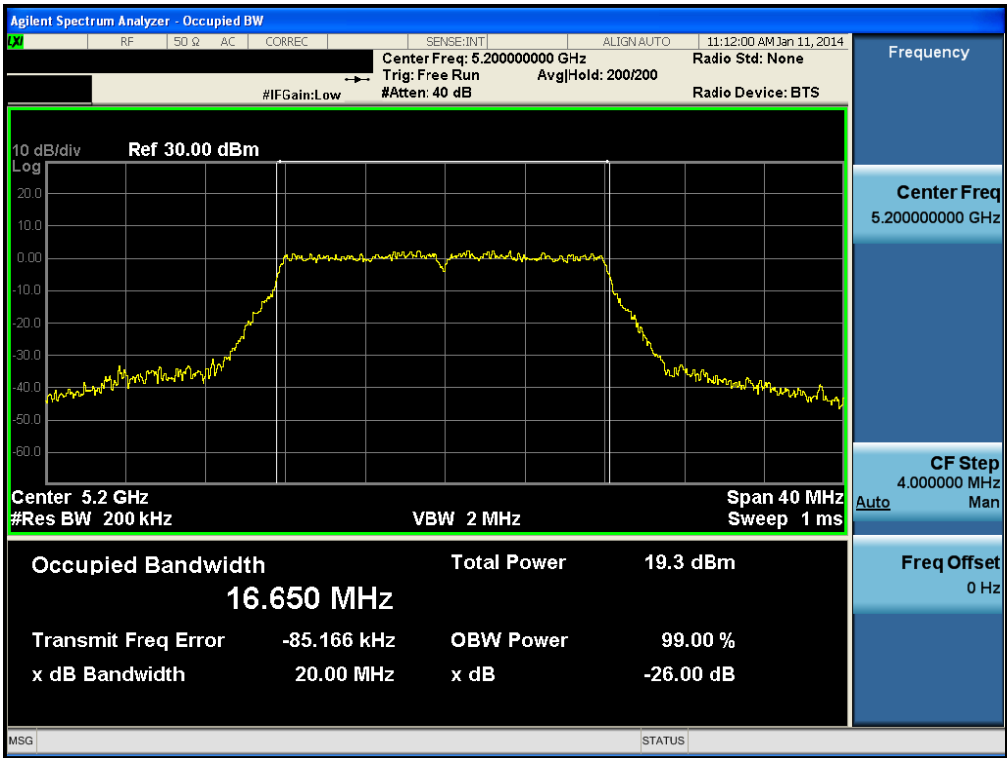
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.36



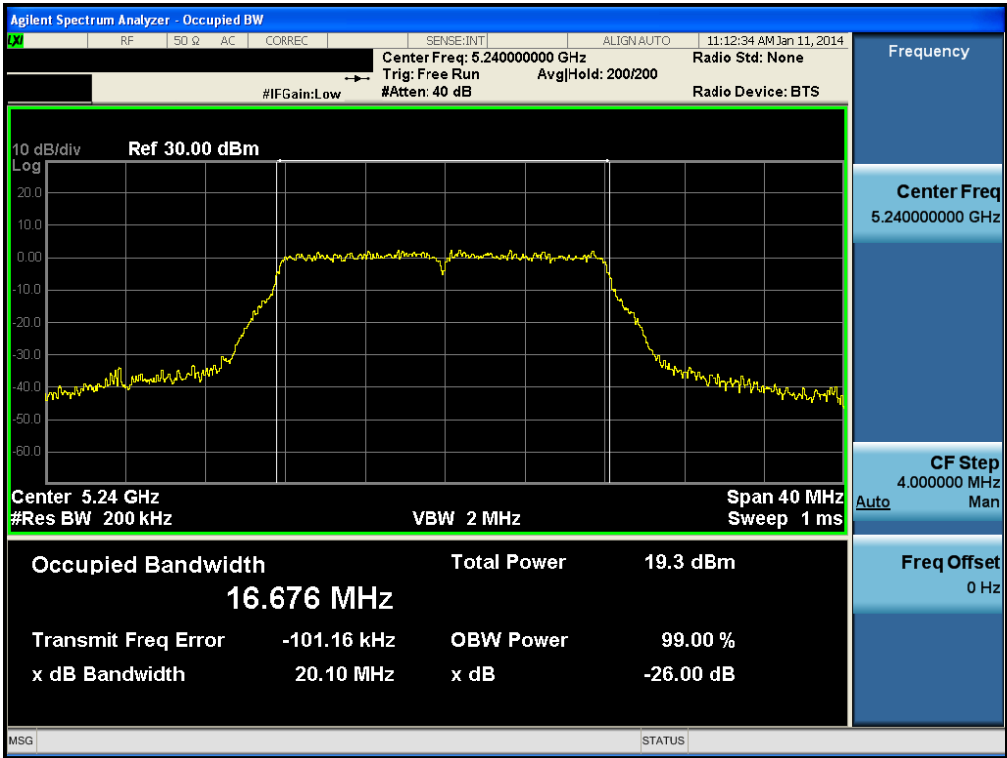
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.40



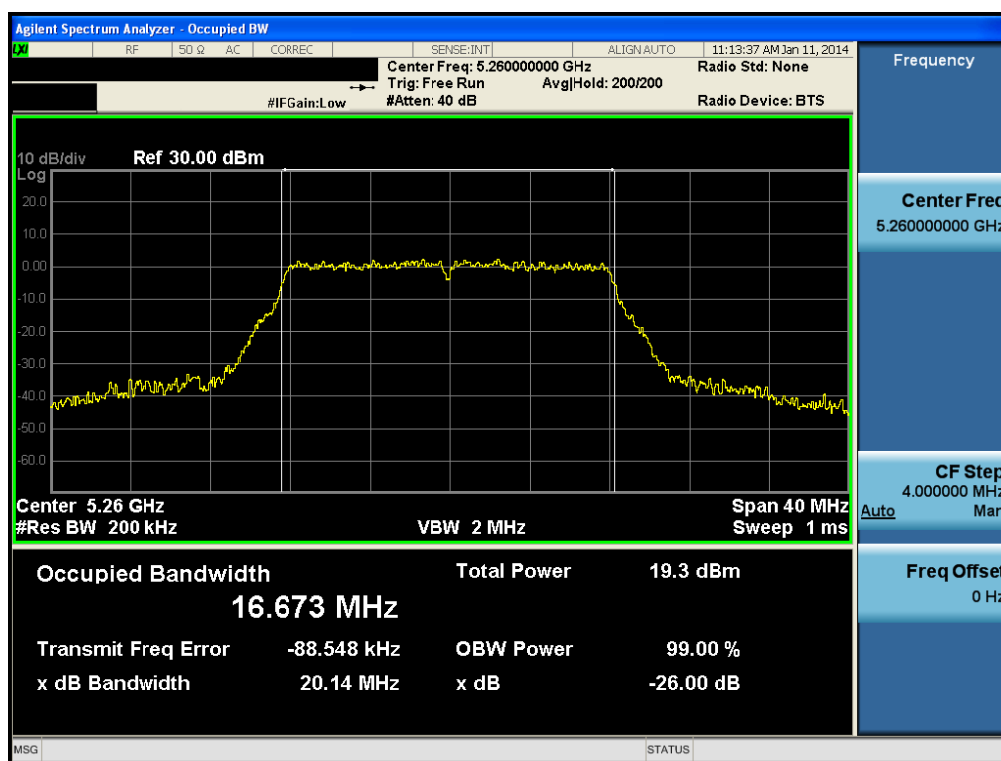
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.48



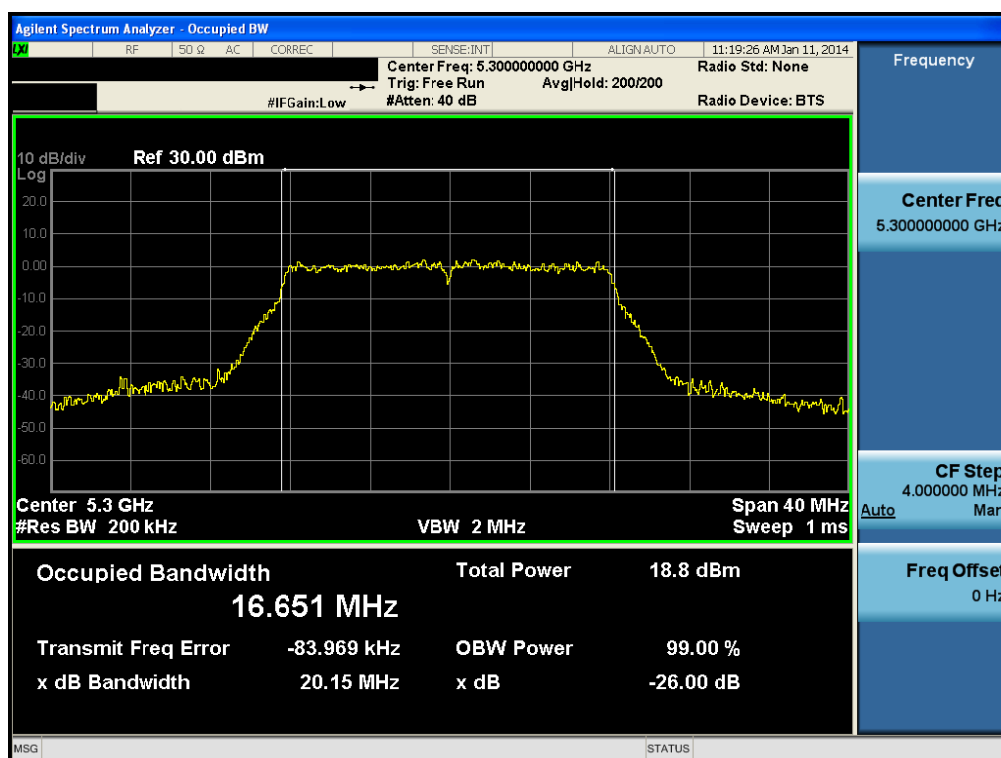
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.52



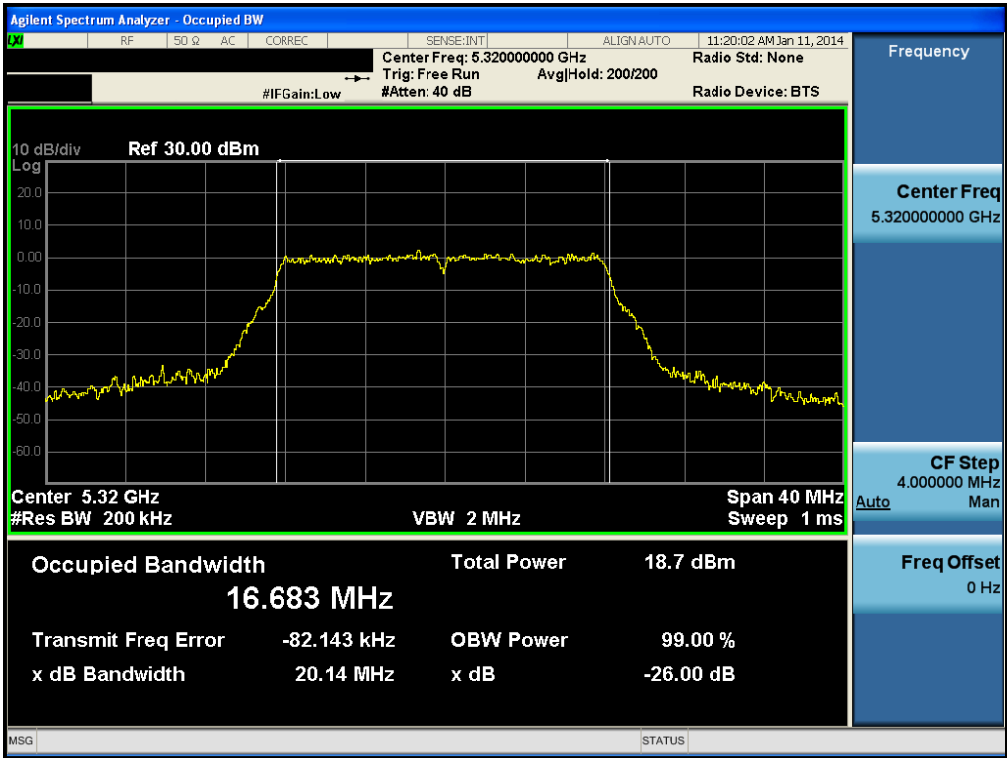
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.60



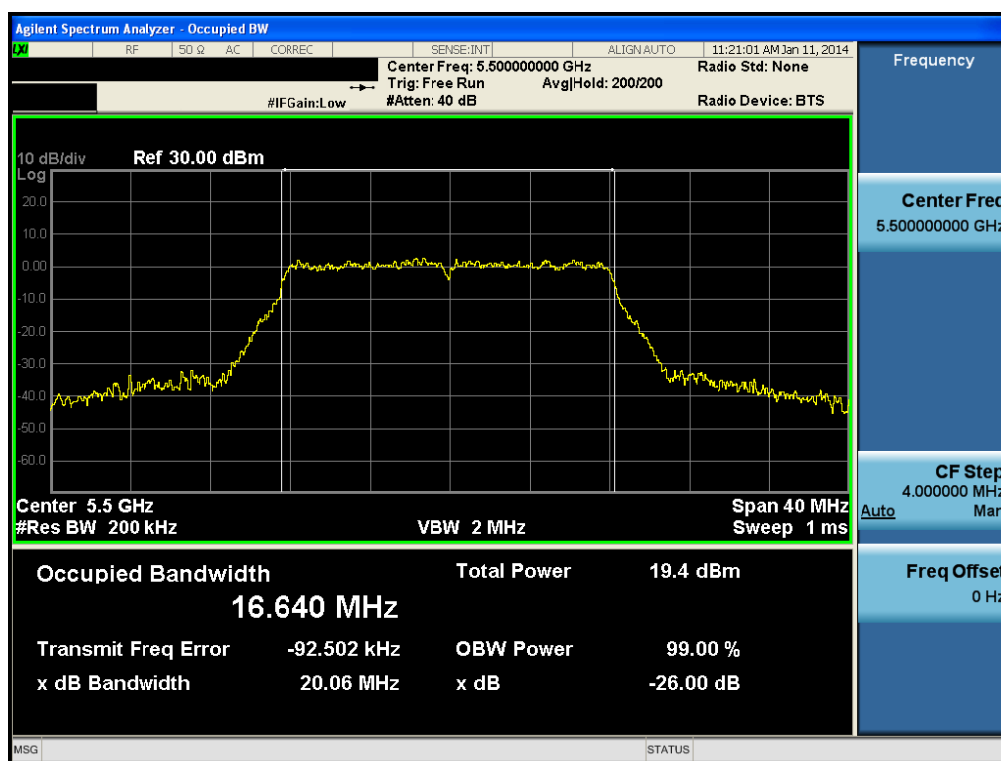
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.64



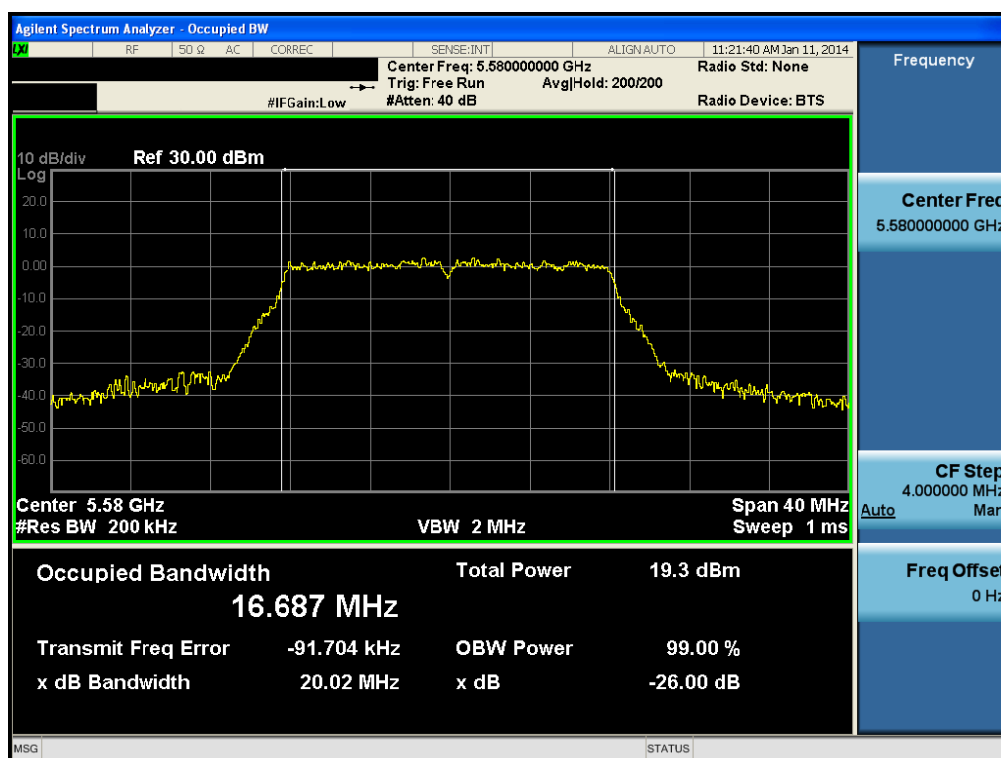
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.100



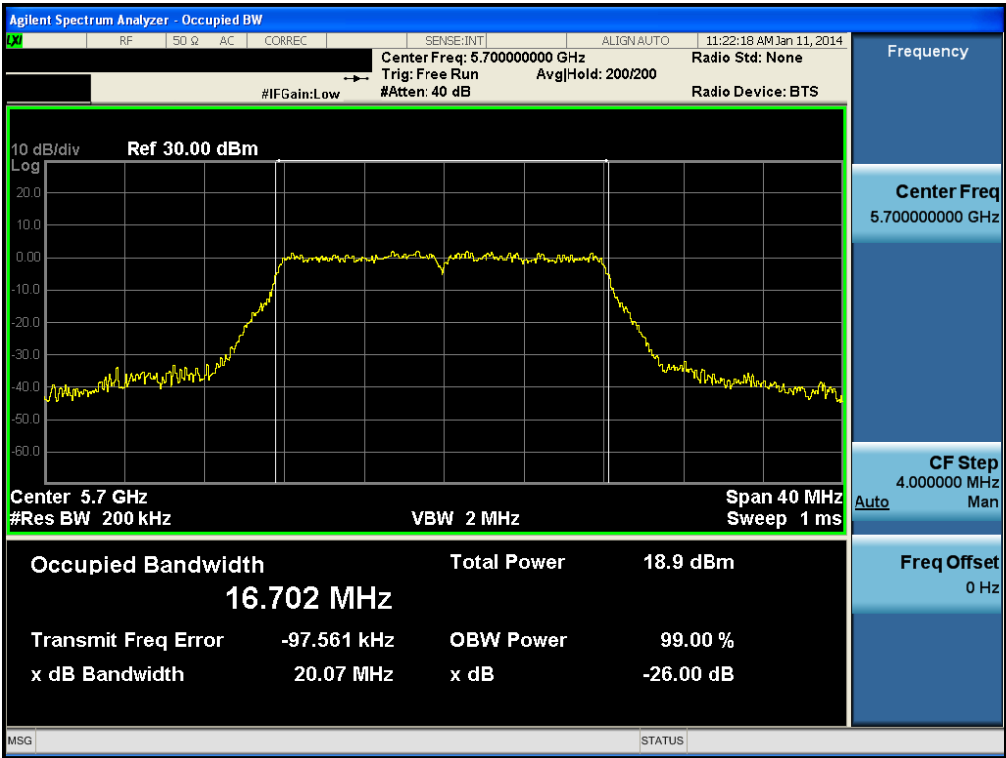
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.116



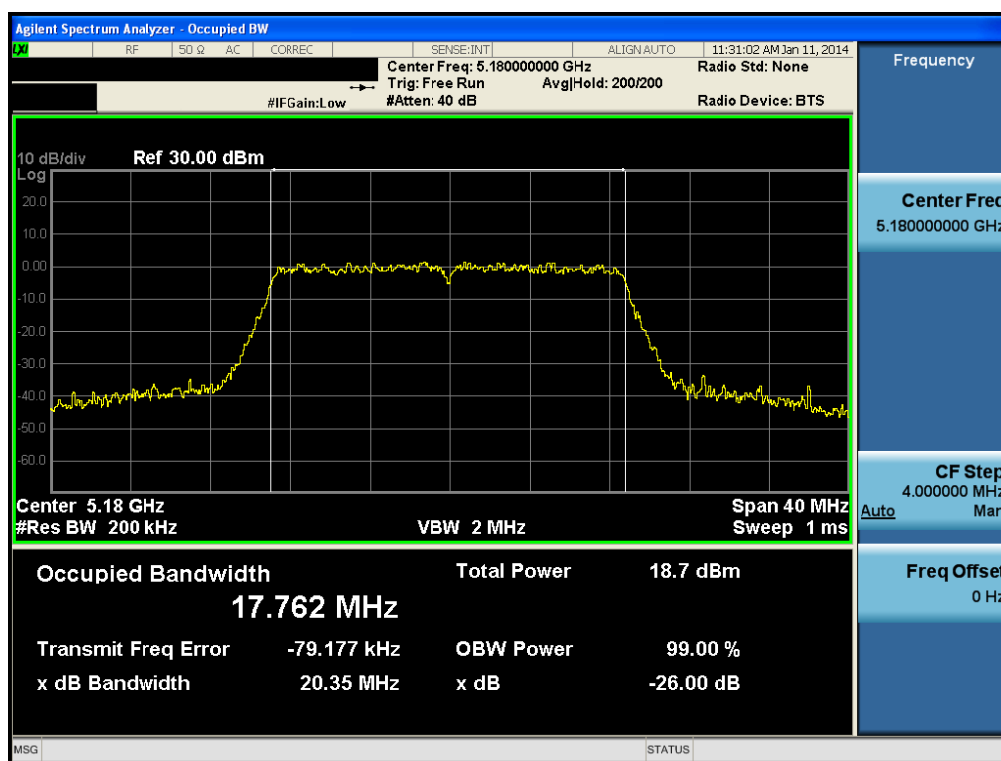
26 dB Bandwidth

Test Mode: ANT 1 & 802.11a & Ch.140



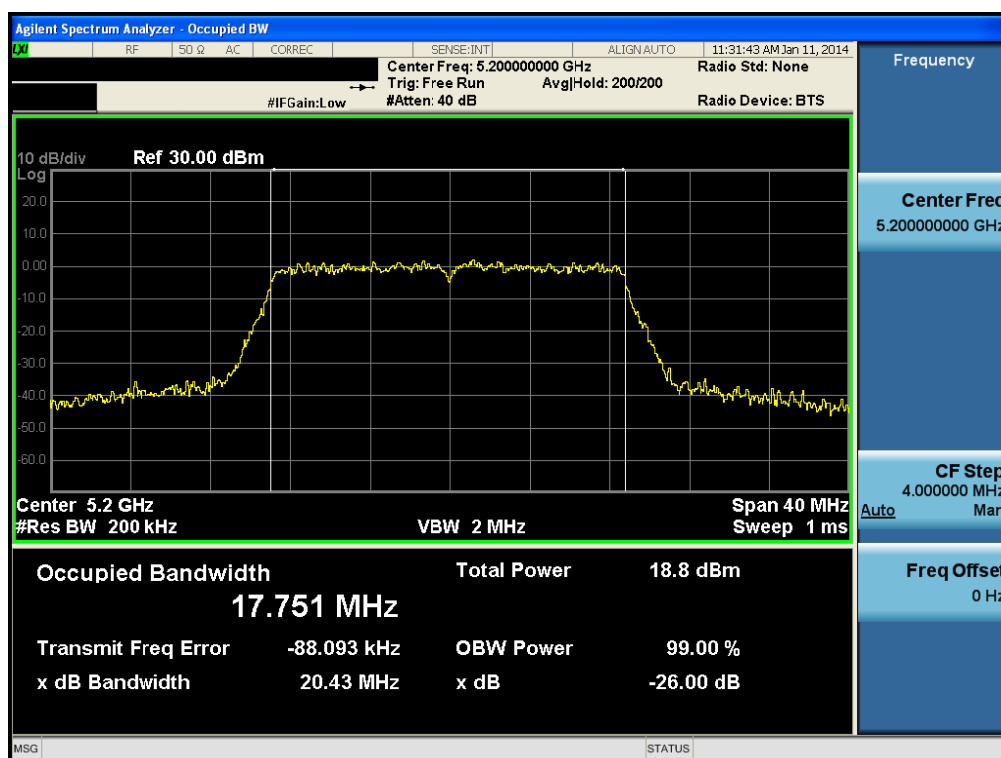
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.36



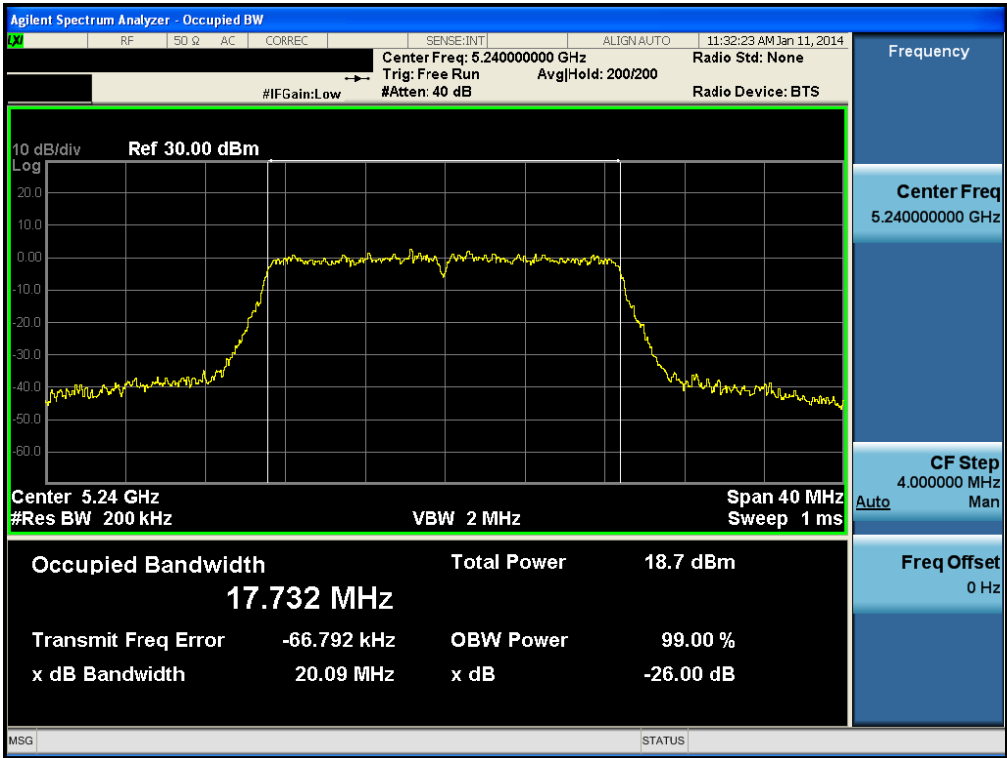
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.40



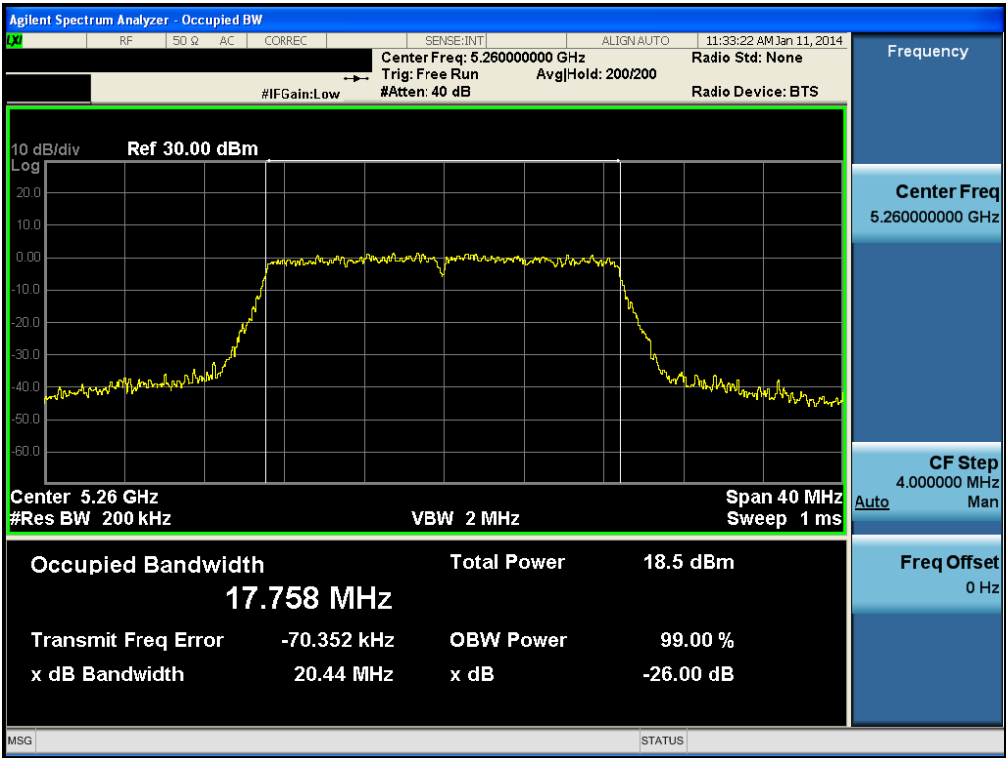
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.48



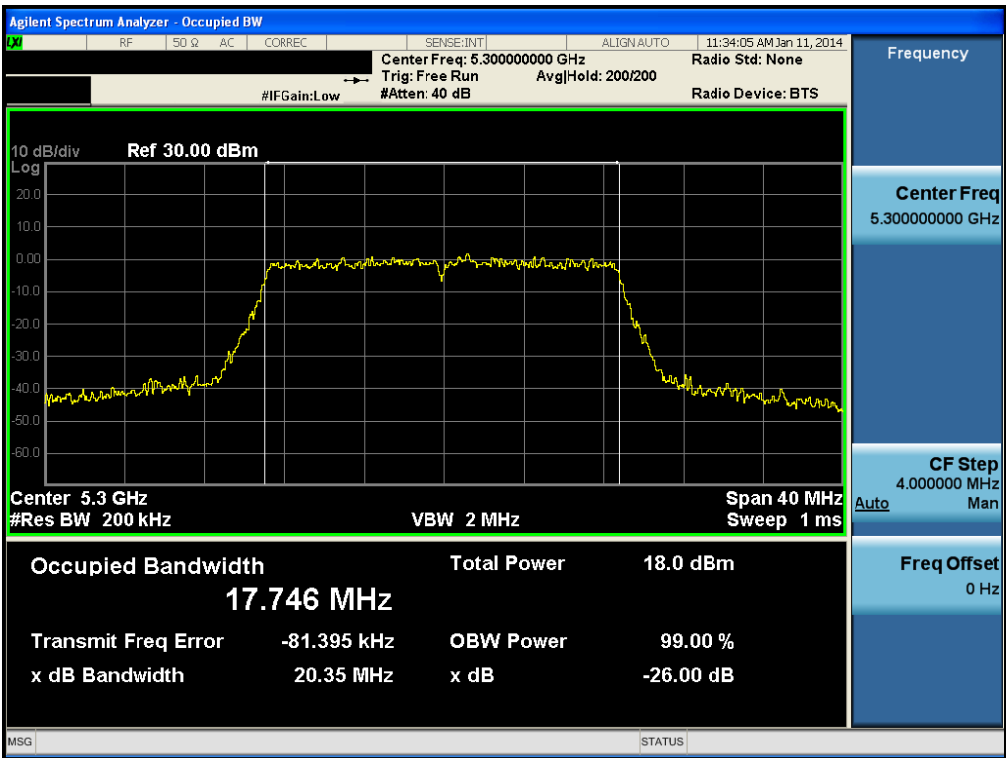
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.52



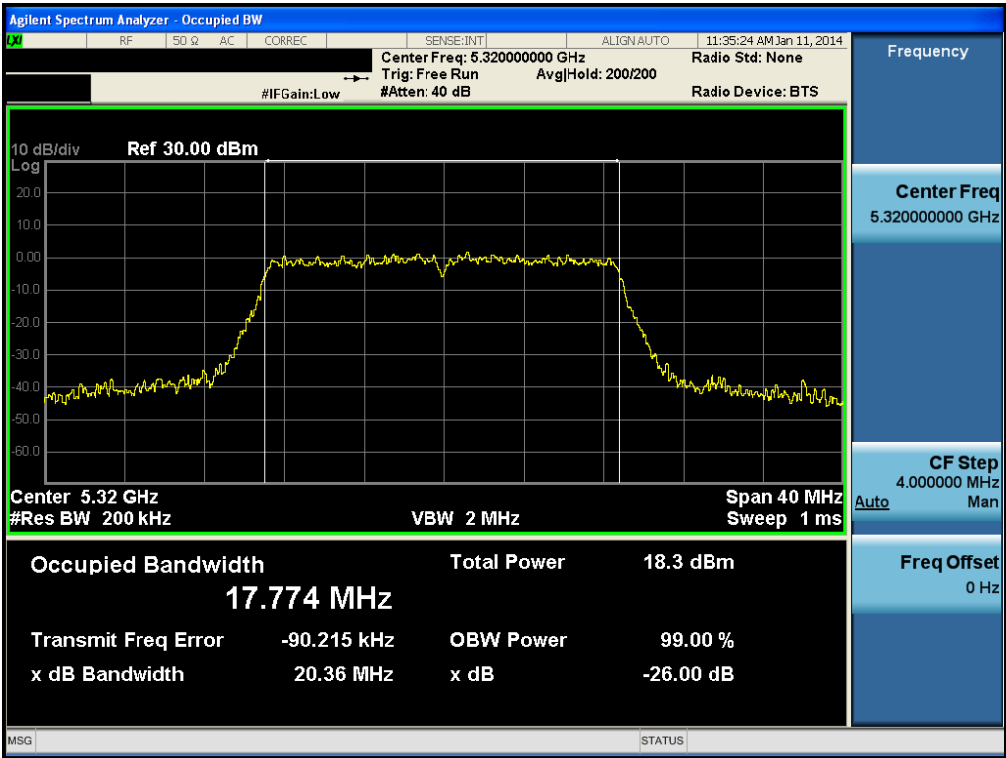
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.60



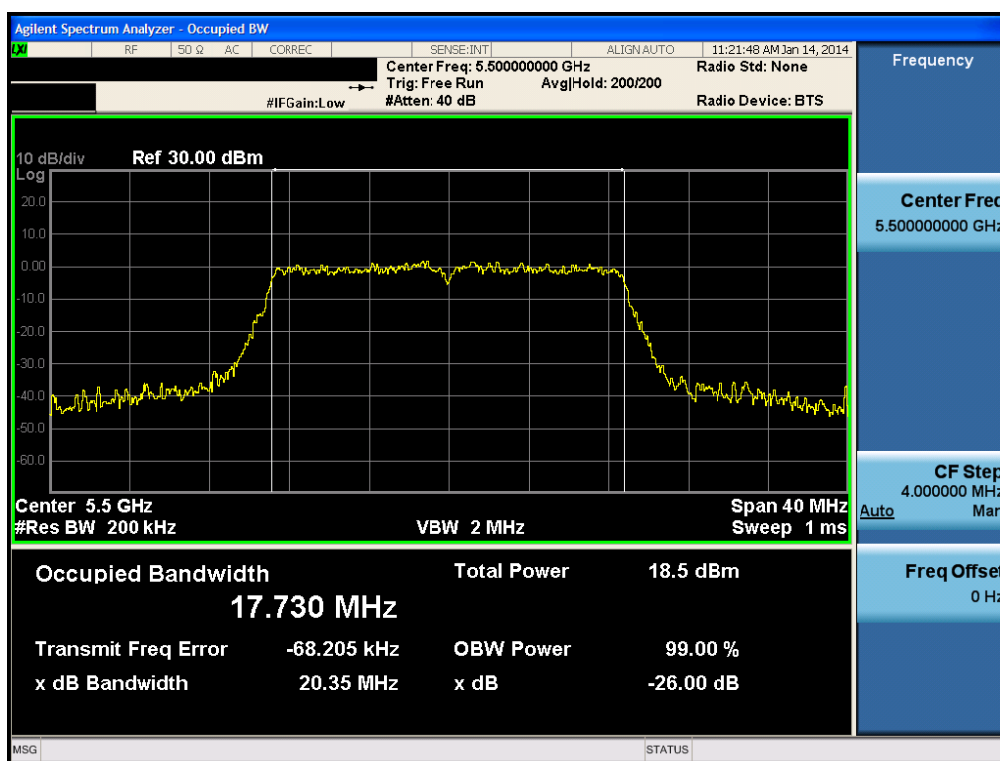
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.64



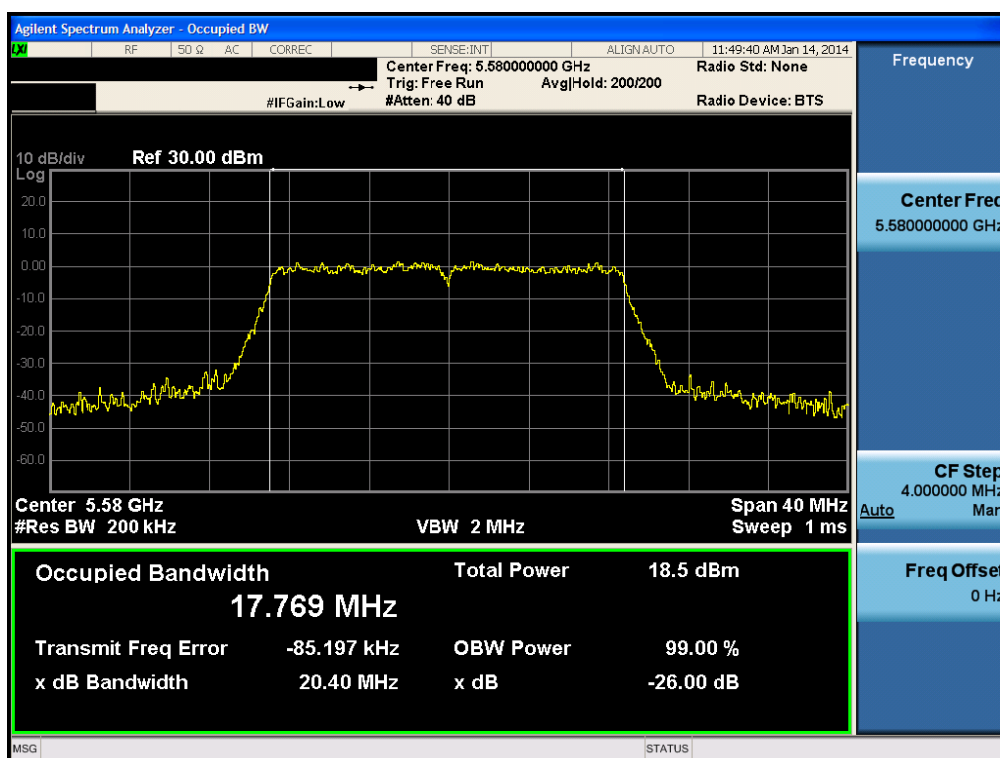
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.100



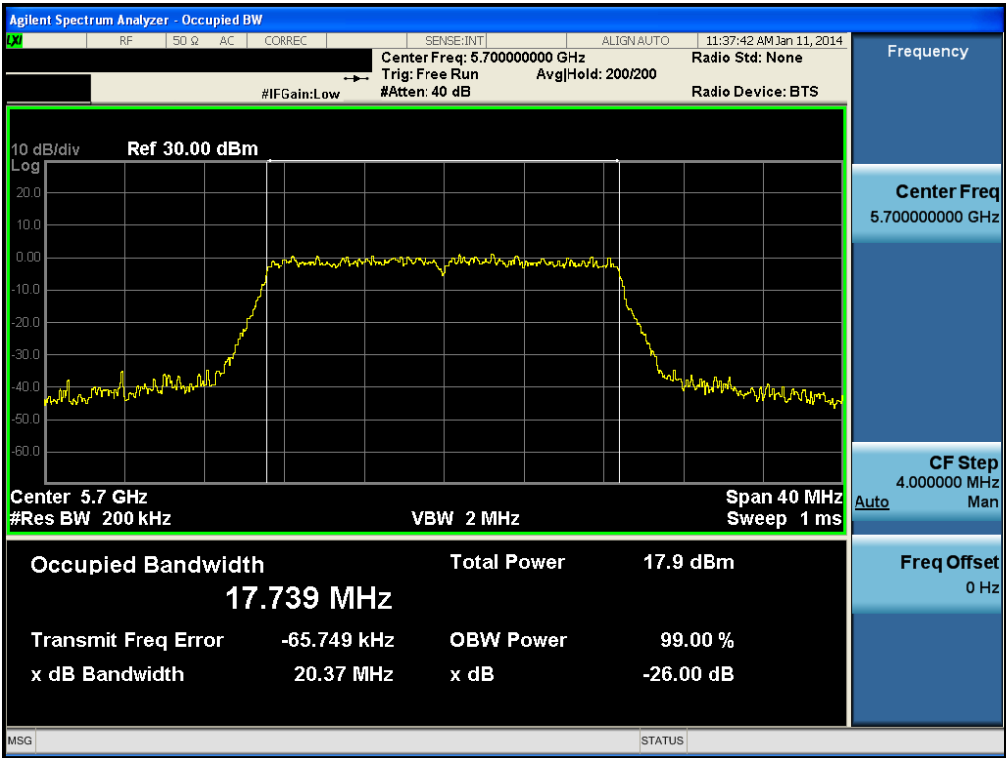
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.116



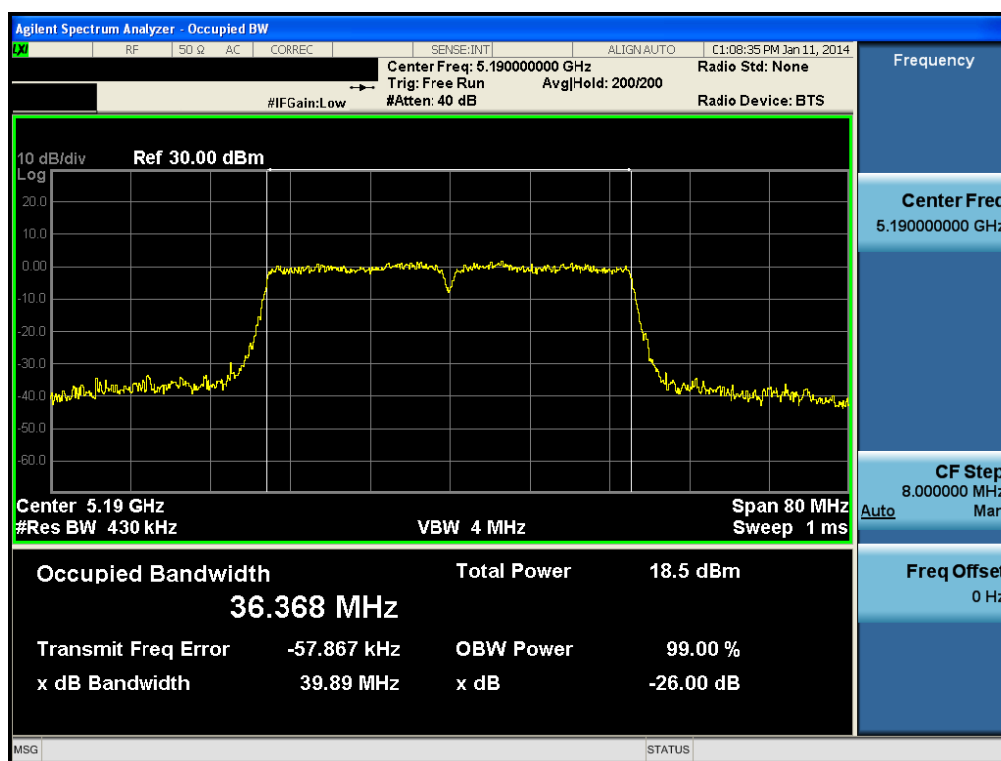
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT20 & Ch.140



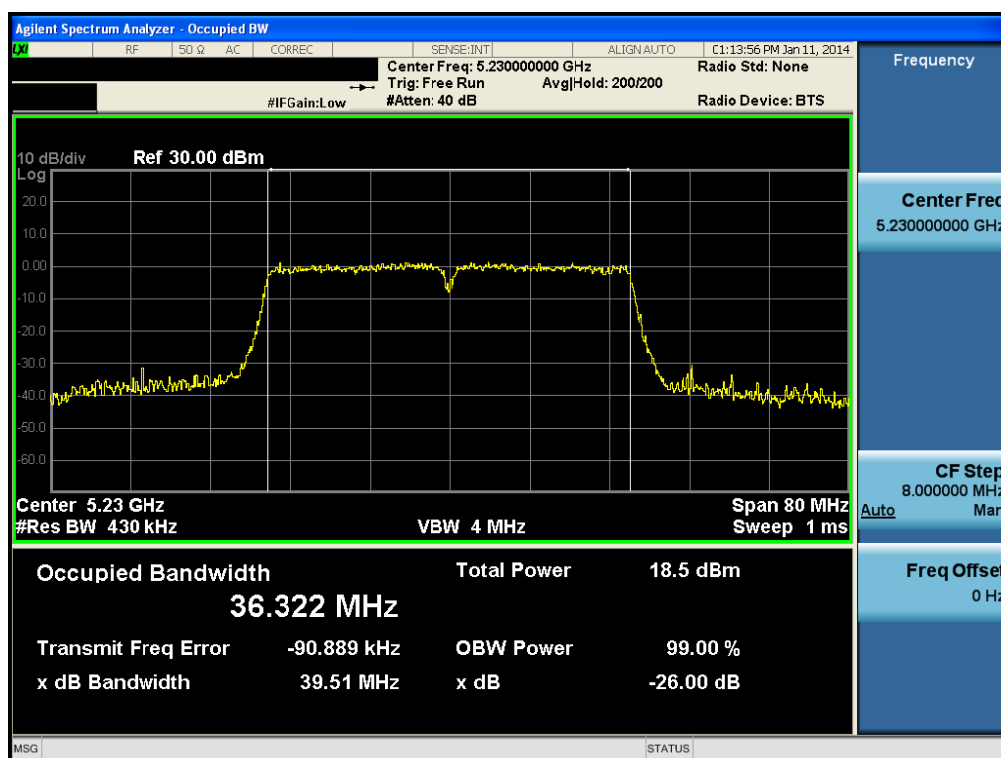
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.38



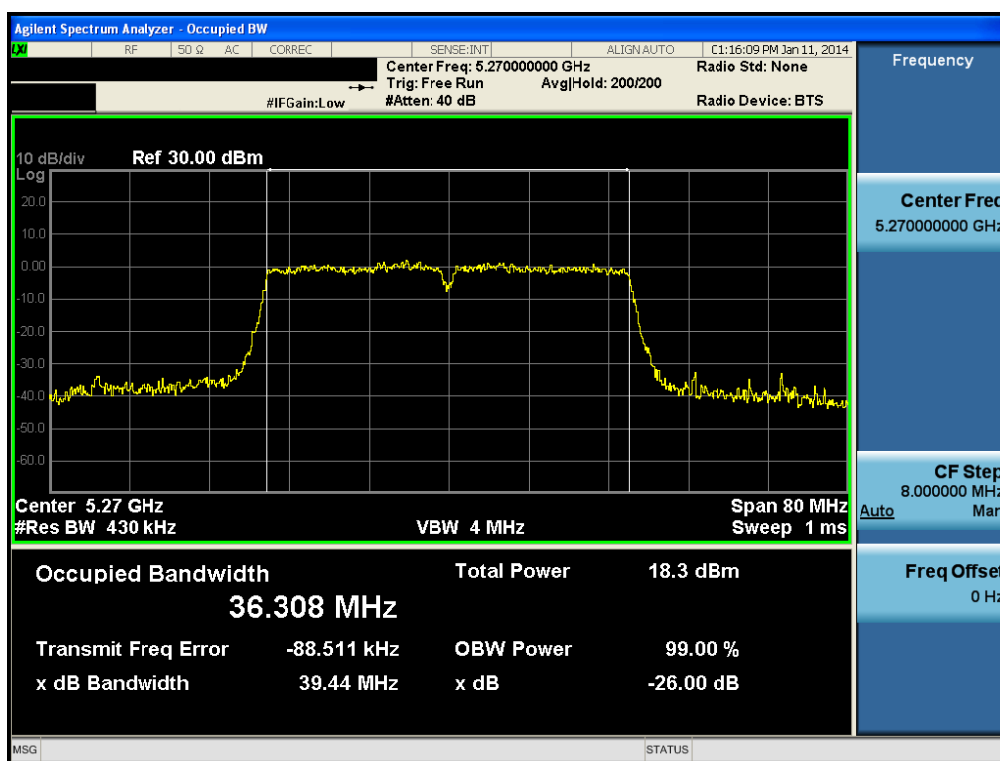
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.46



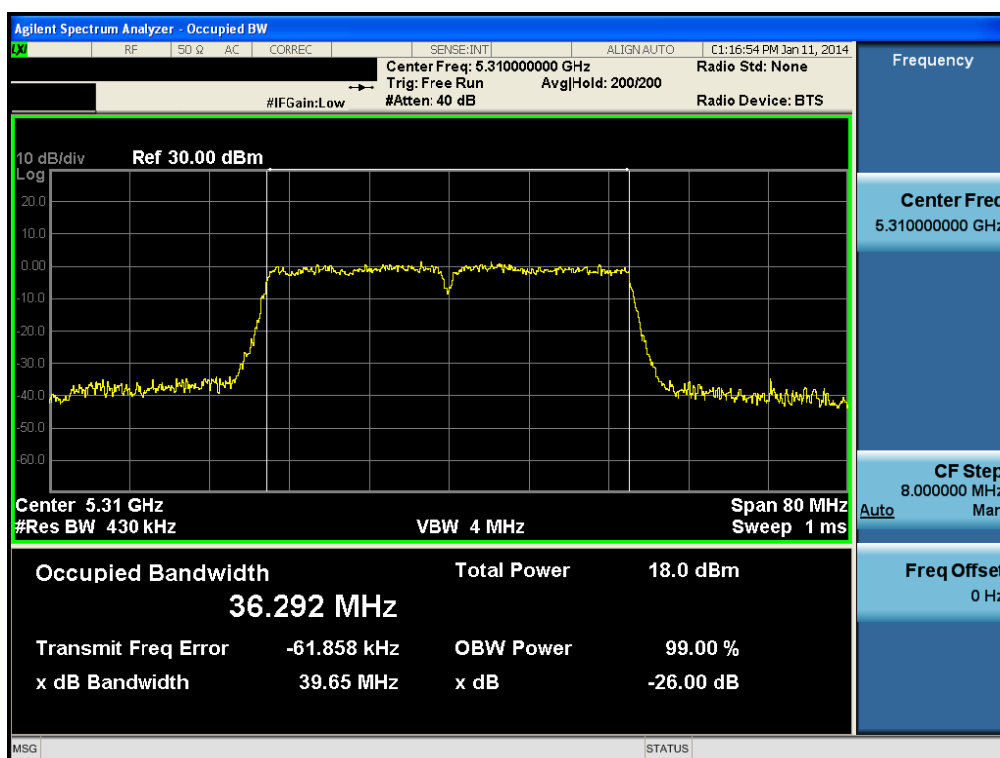
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.54



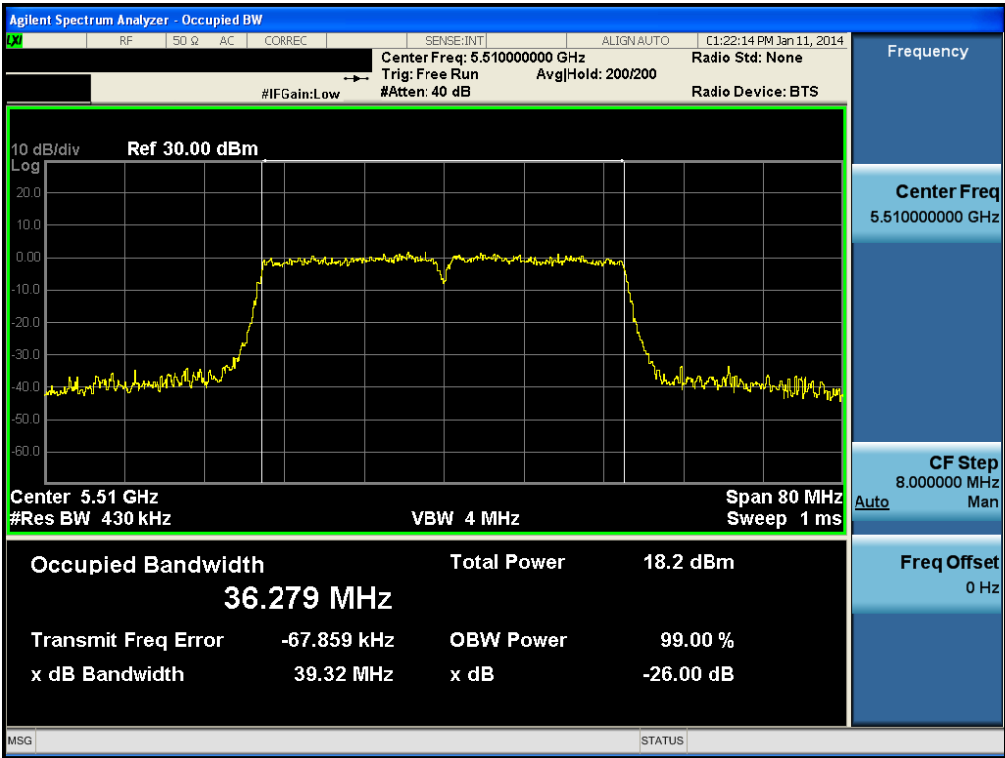
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.62



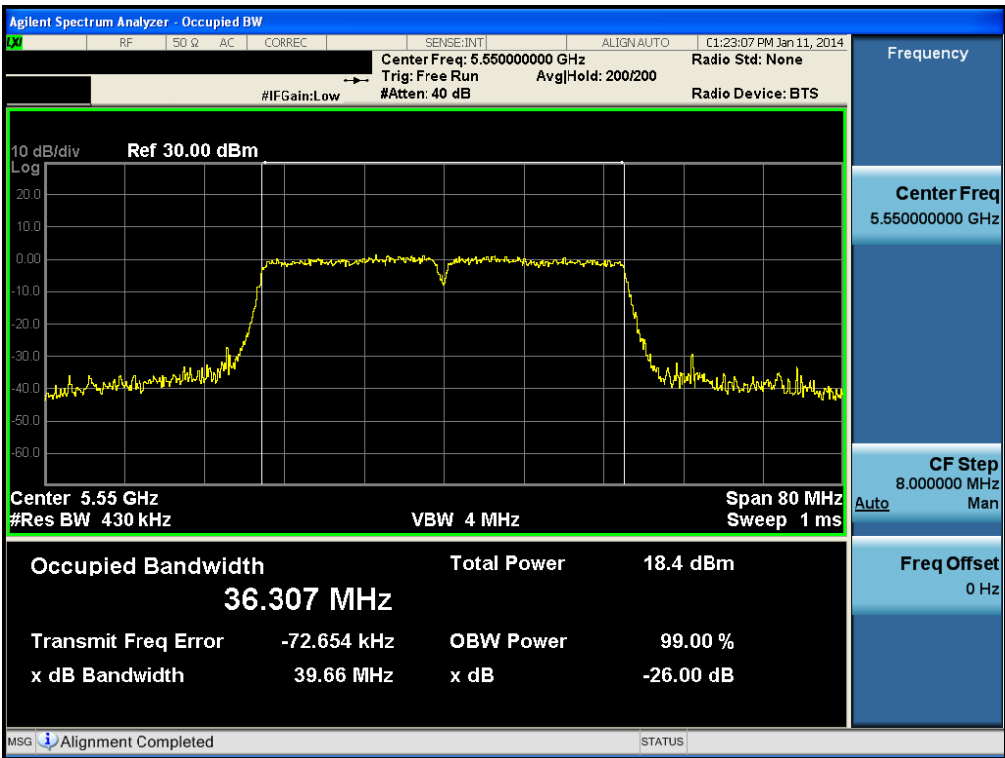
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.102



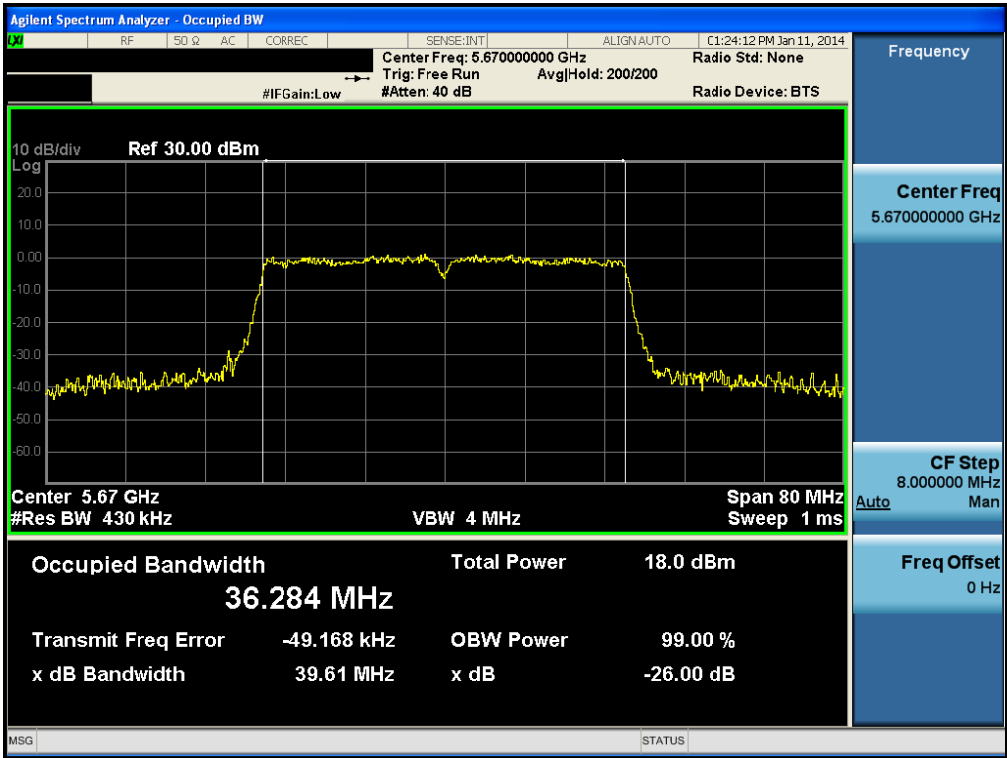
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.110



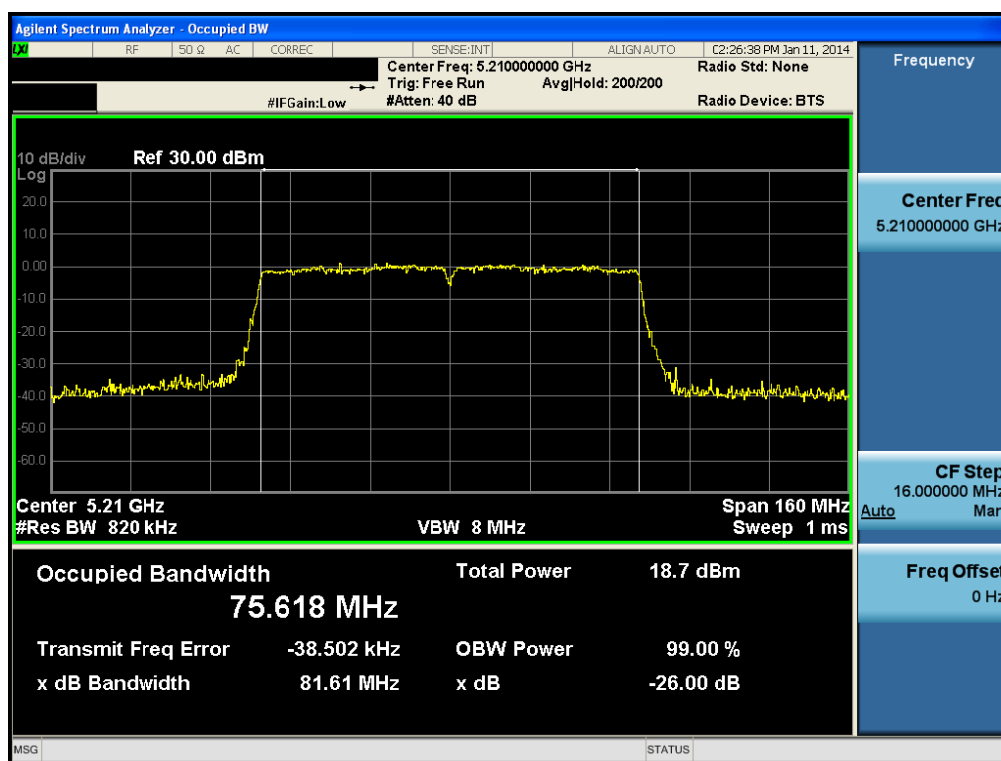
26 dB Bandwidth

Test Mode: ANT 1 & 802.11n HT40 & Ch.134



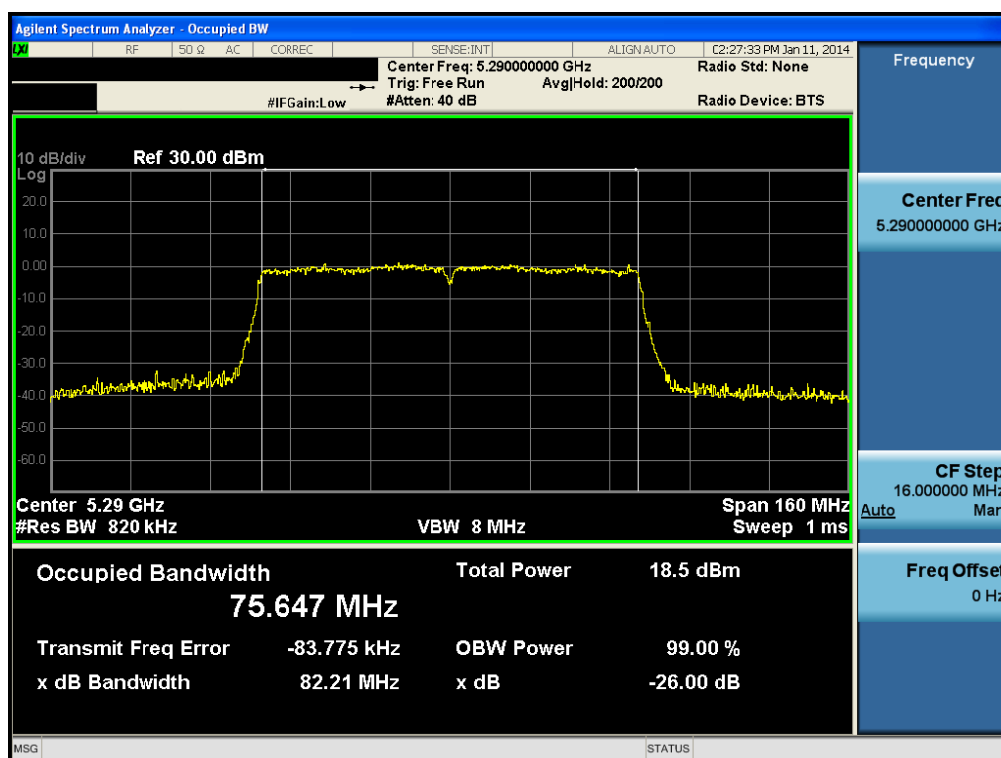
26 dB Bandwidth

Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42



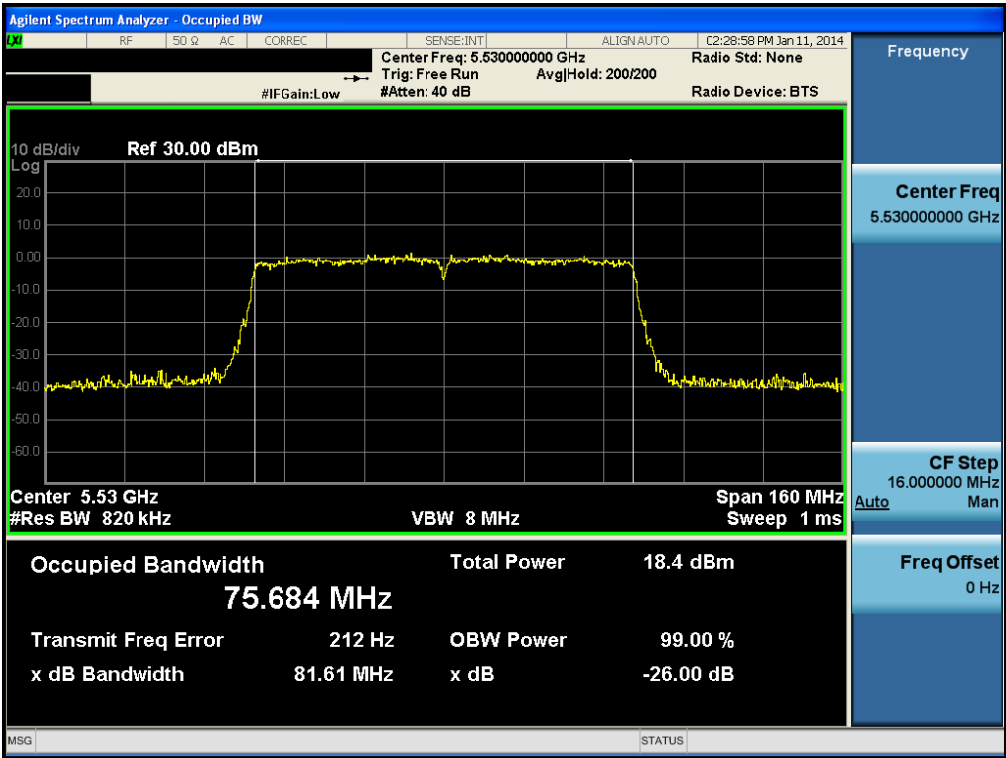
26 dB Bandwidth

Test Mode: ANT 1 & 802.11ac VHT80 & Ch.58



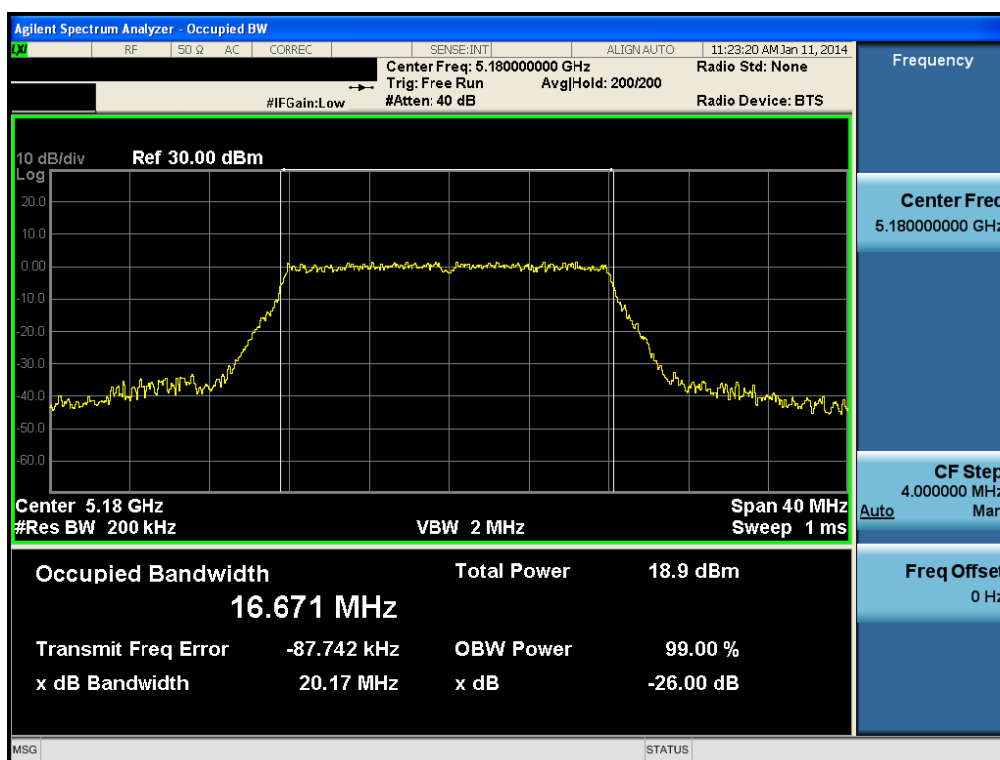
26 dB Bandwidth

Test Mode: ANT 1 & 802.11ac VHT80 & Ch.106



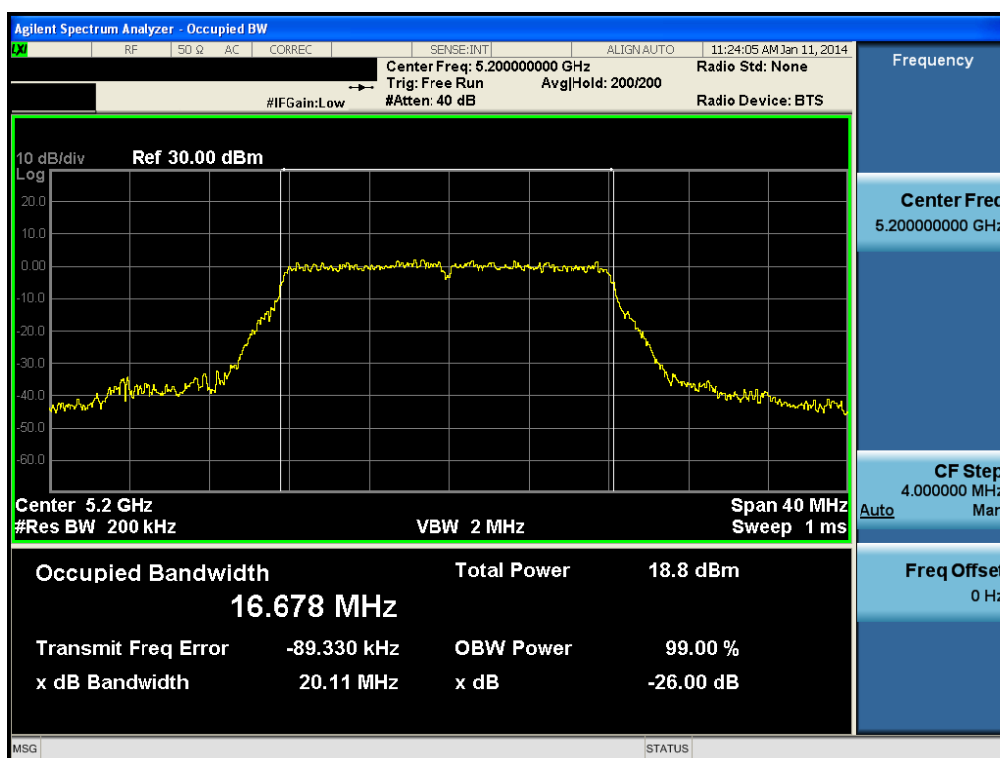
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.36



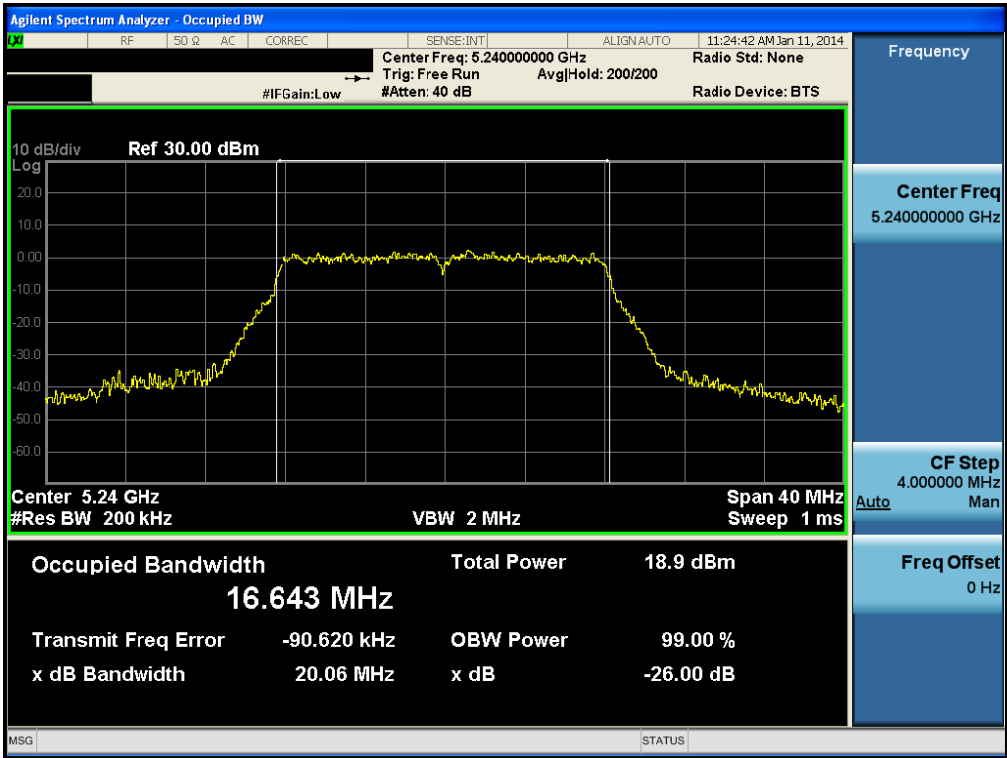
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.40



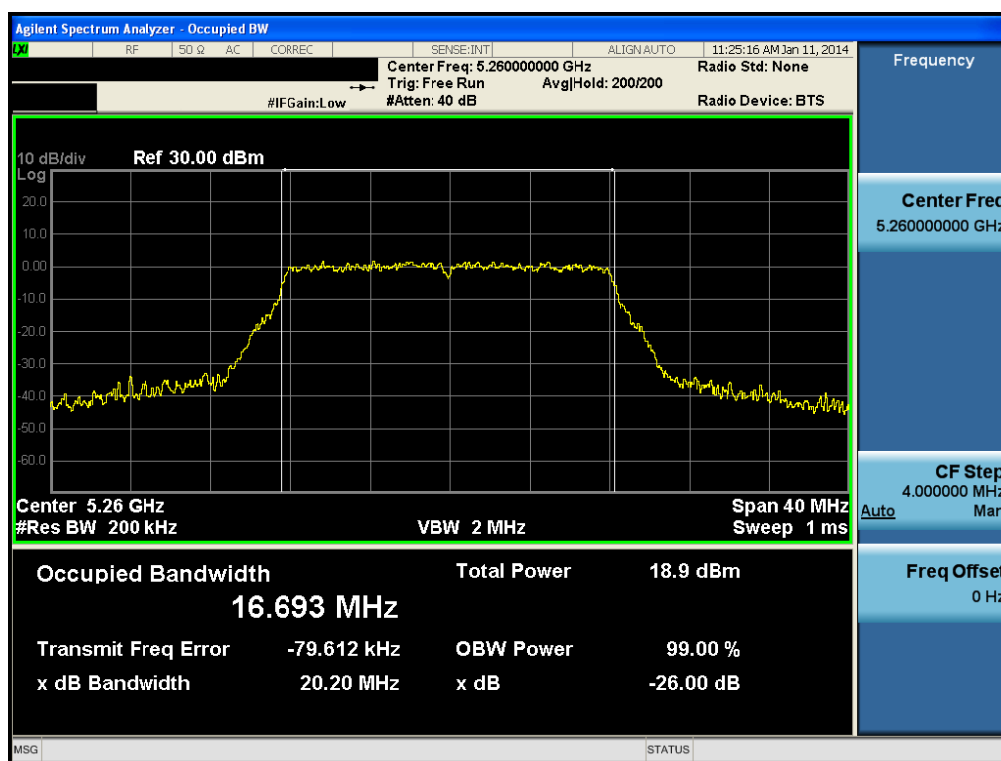
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.48



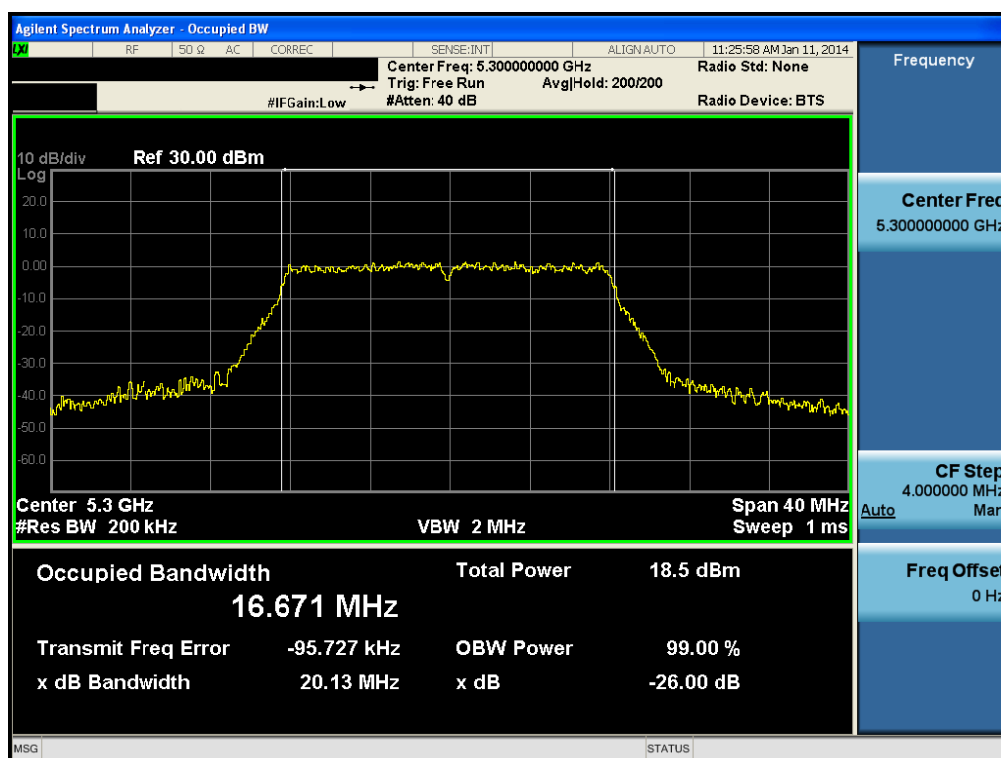
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.52



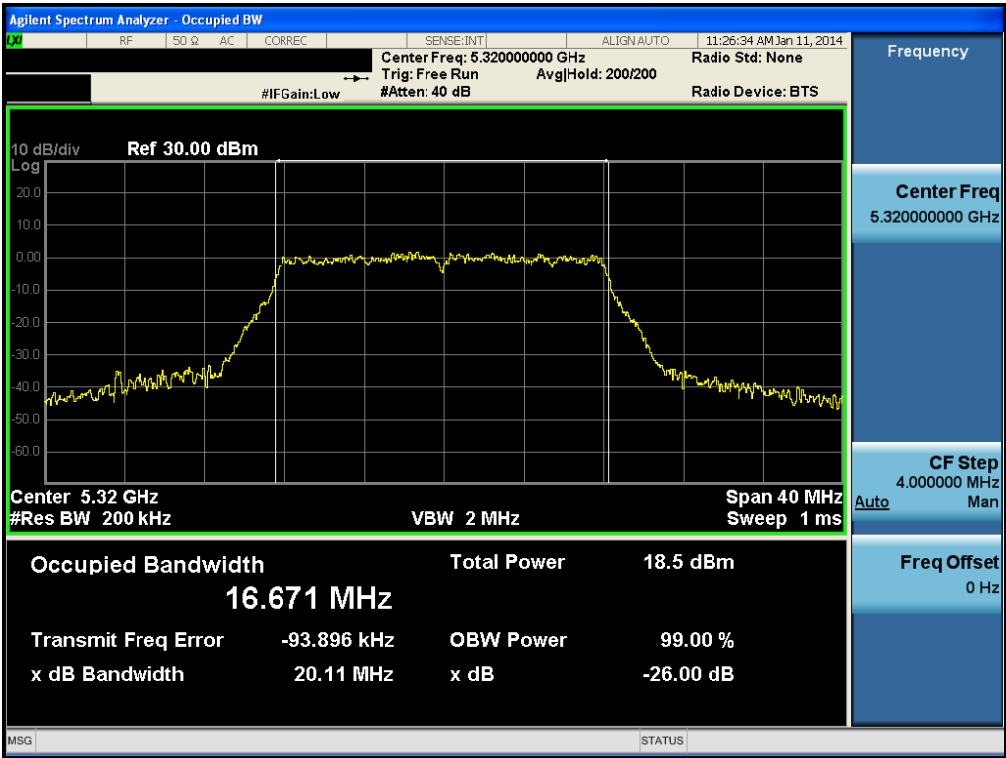
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.60



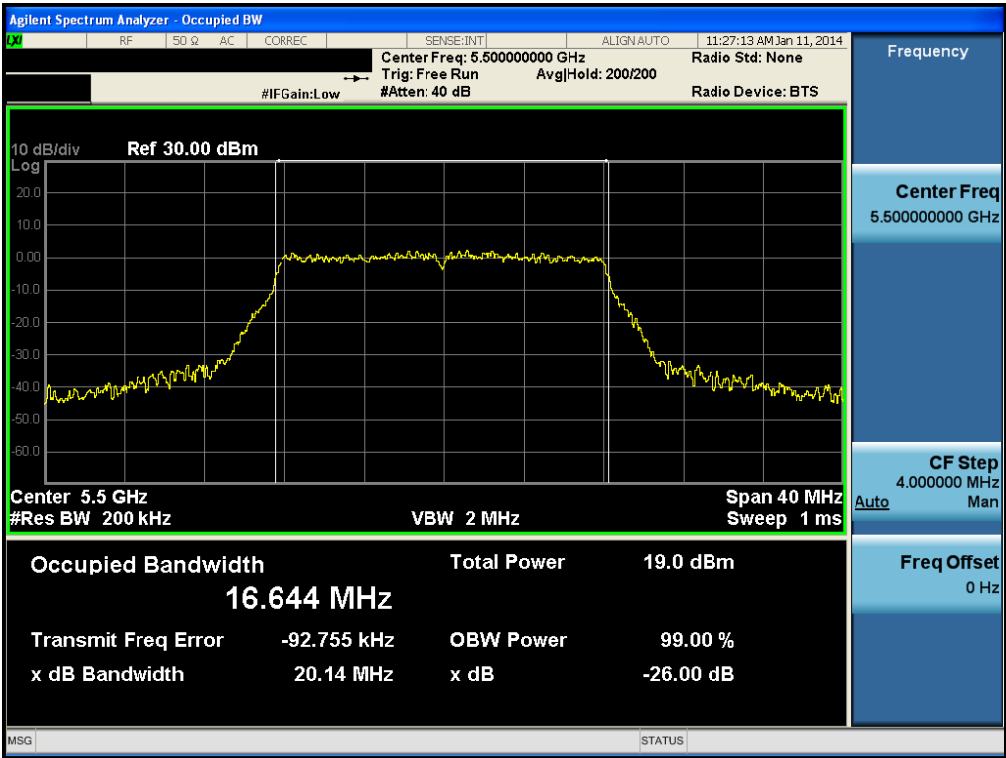
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.64



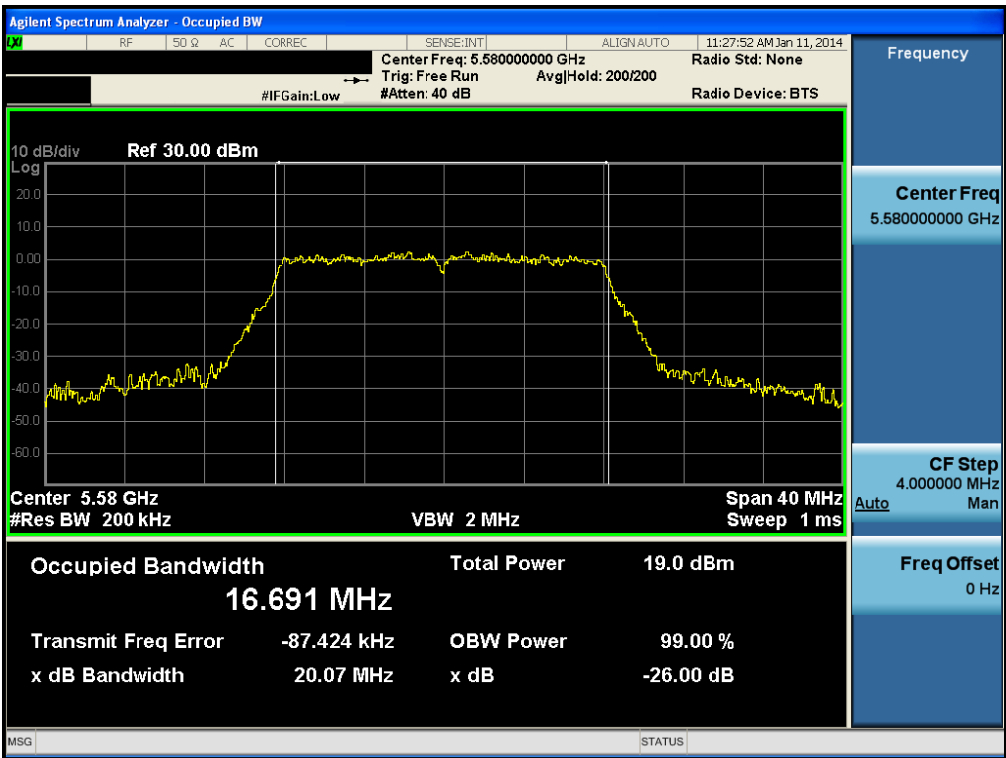
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.100



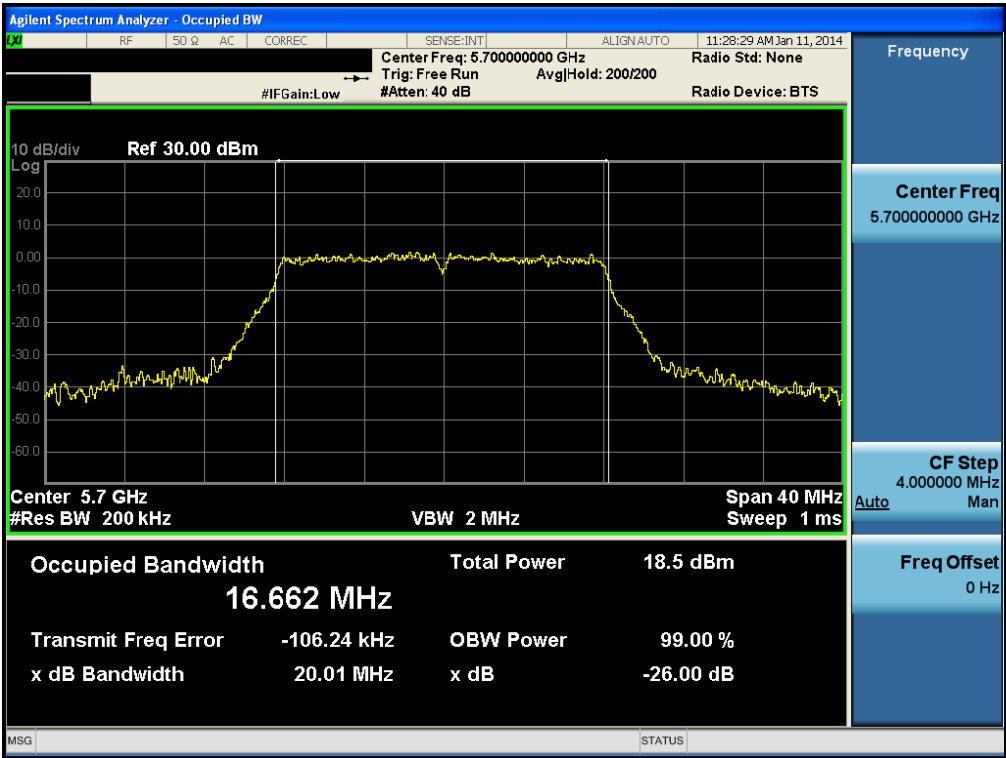
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.116



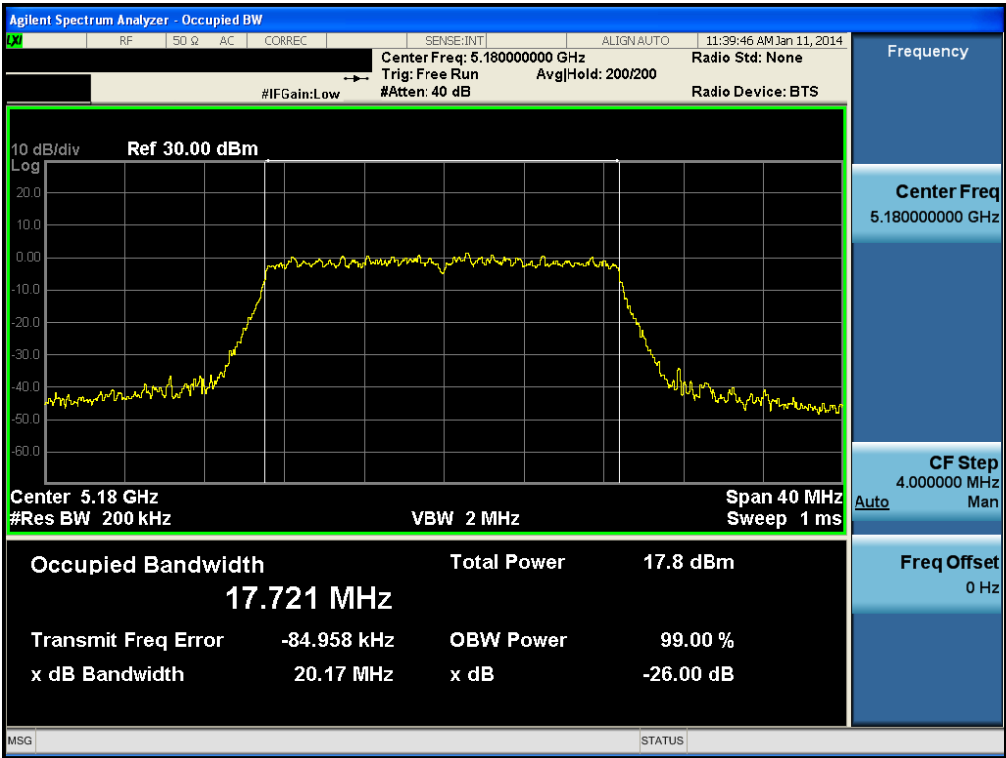
26 dB Bandwidth

Test Mode: ANT 2 & 802.11a & Ch.140



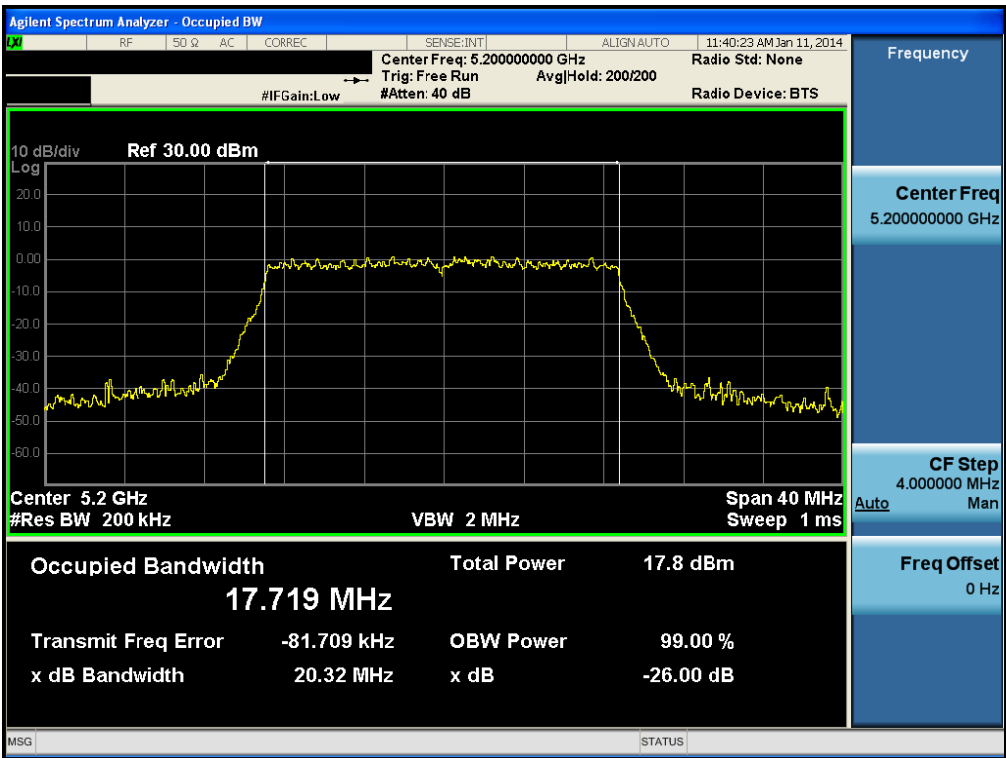
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.36



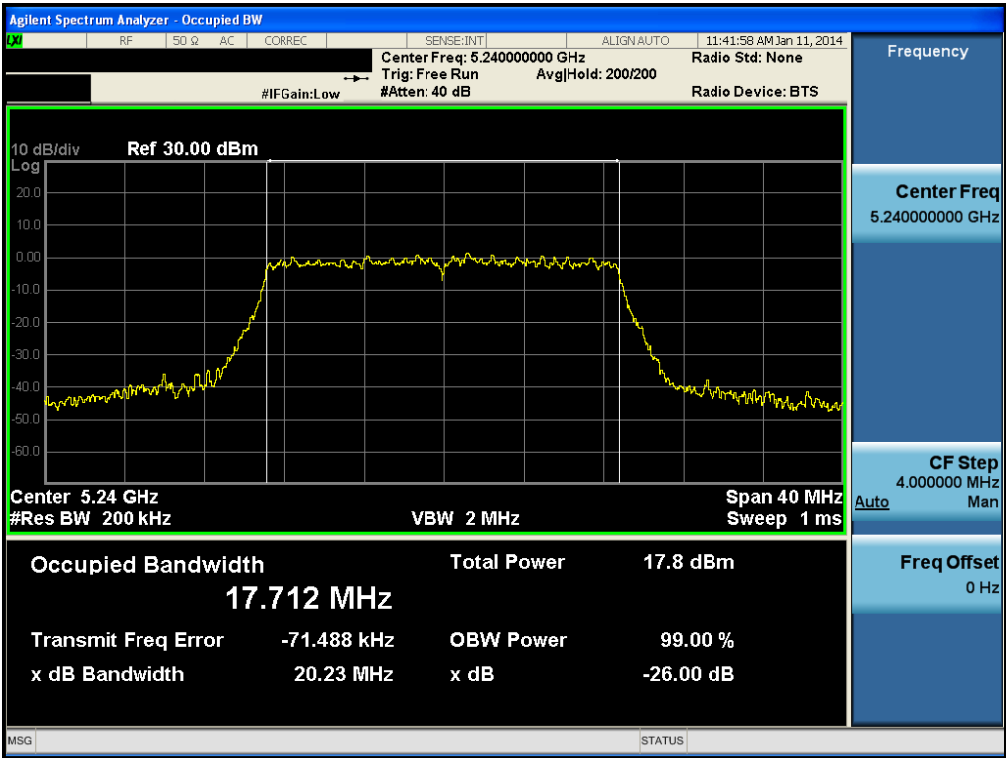
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.40



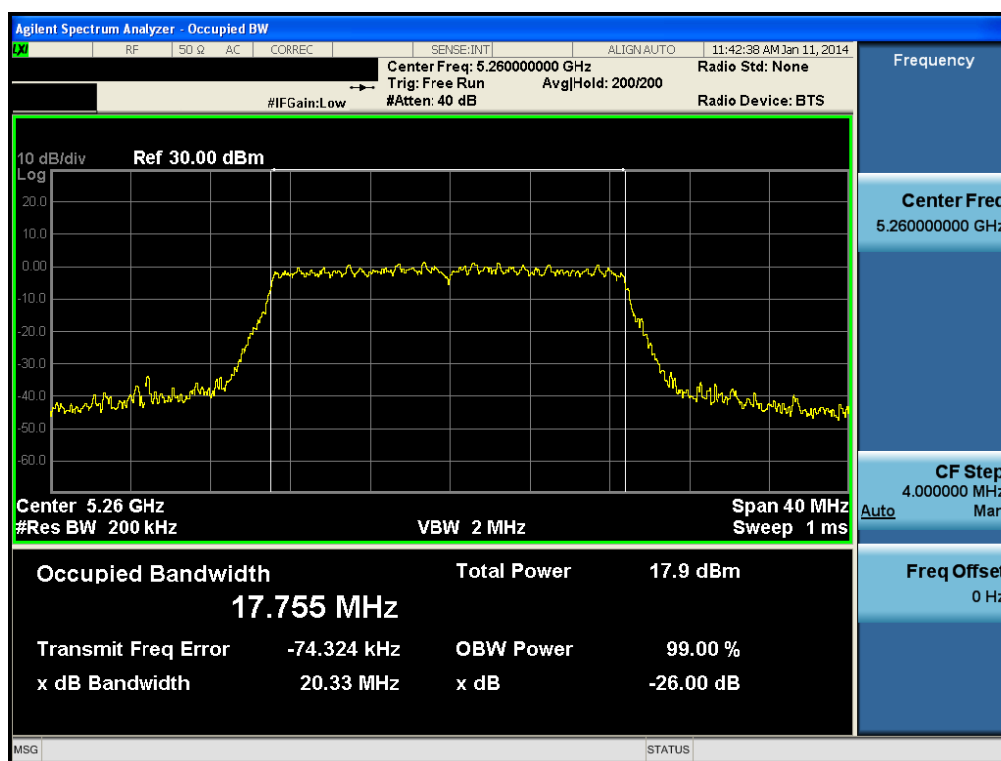
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.48



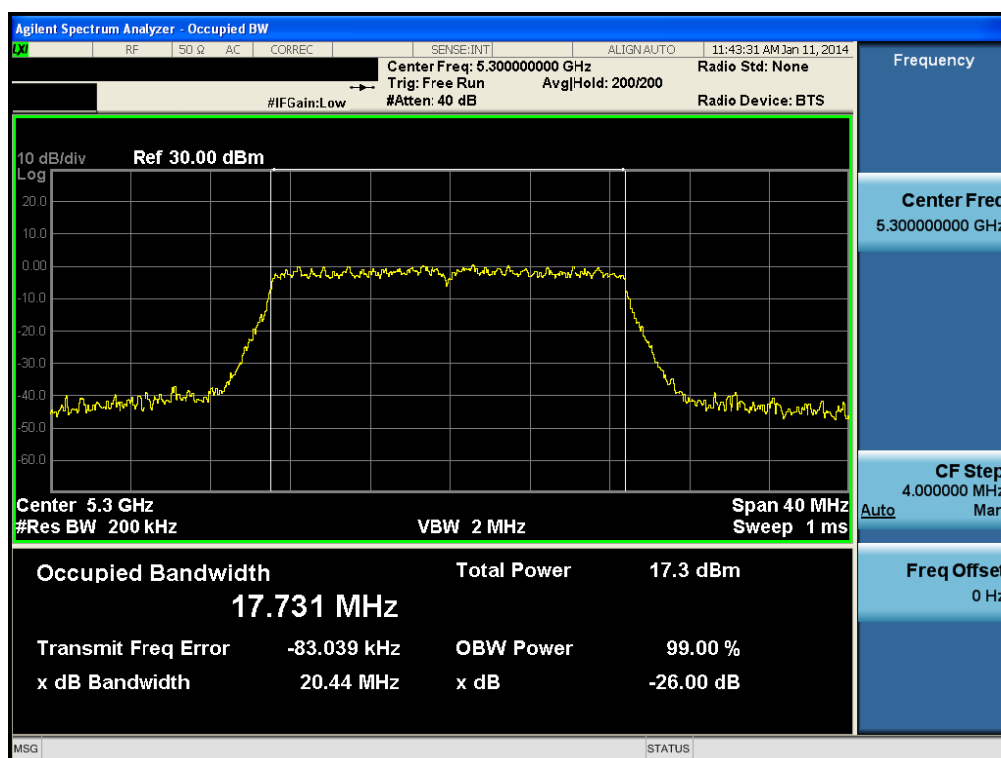
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.52



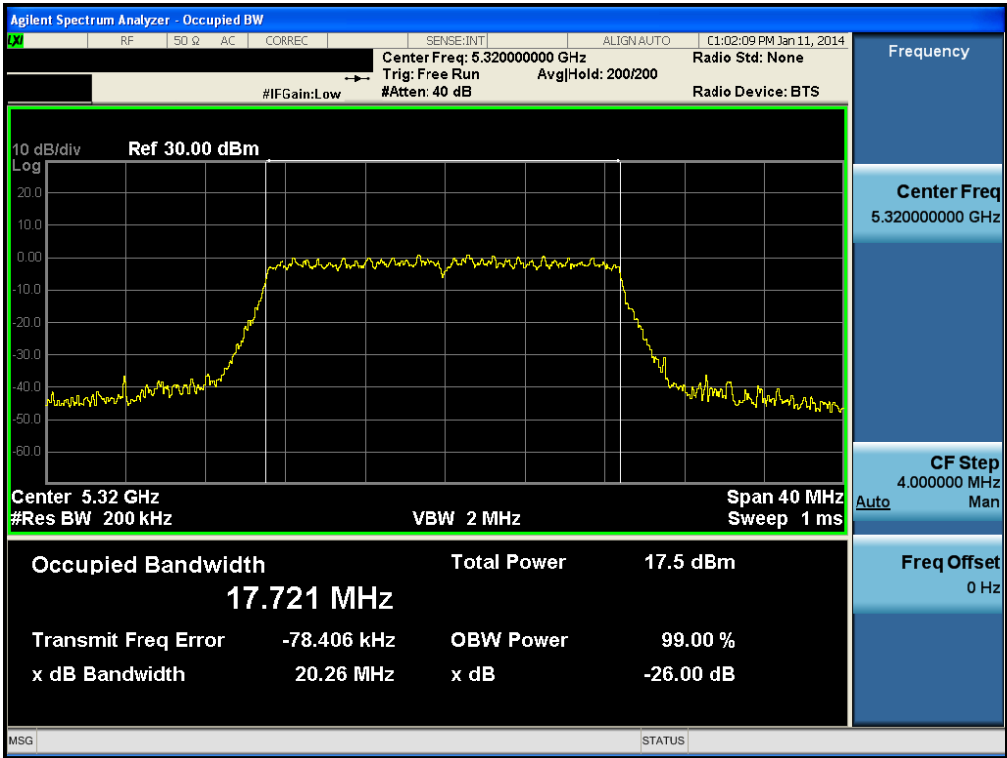
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.60



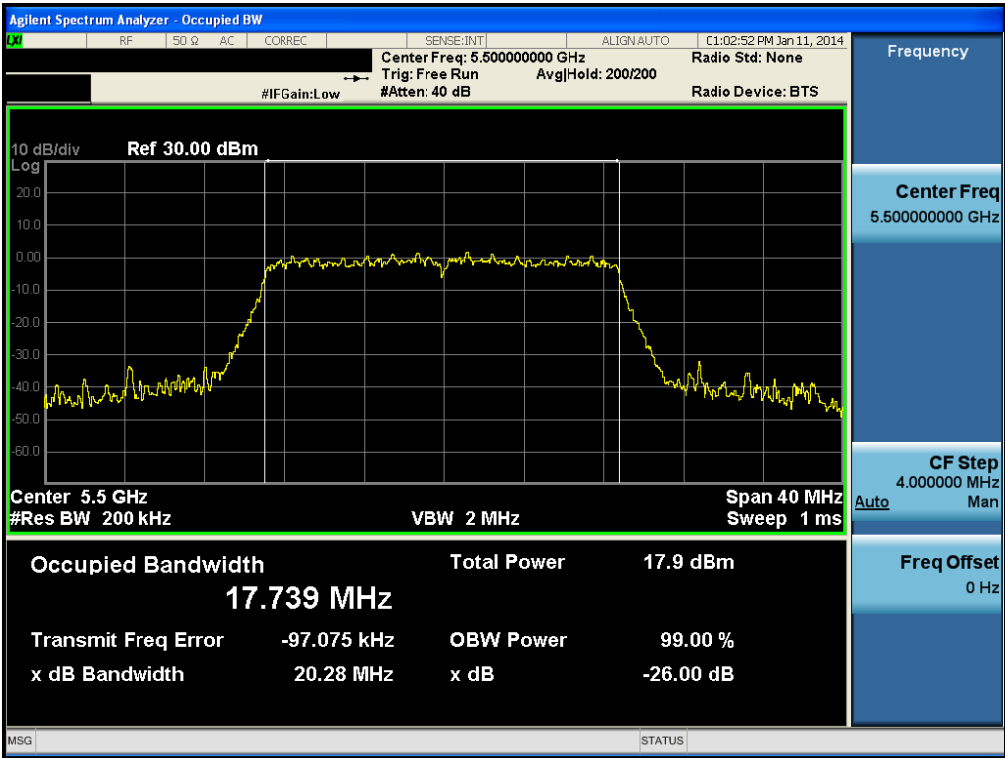
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.64



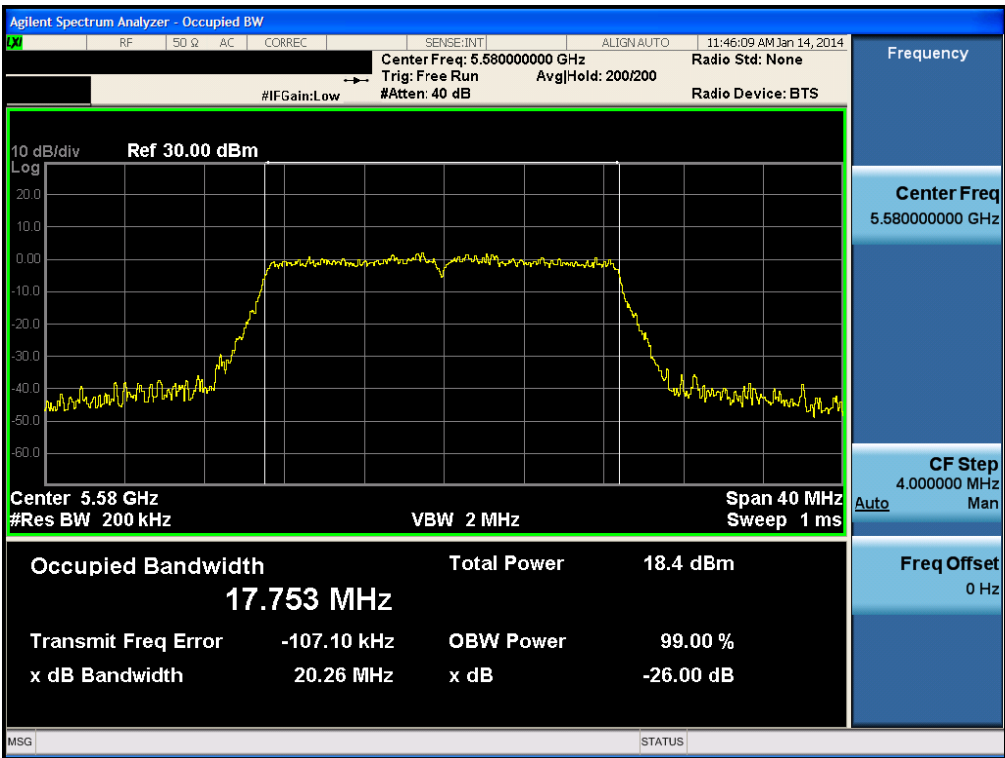
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.100



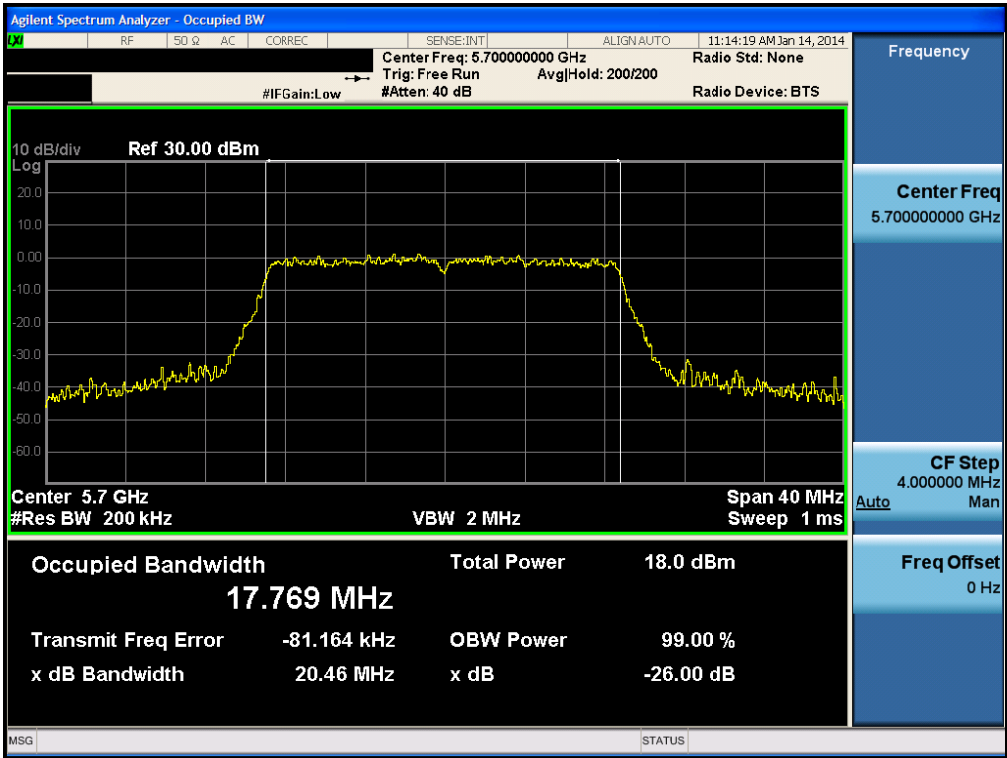
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.116



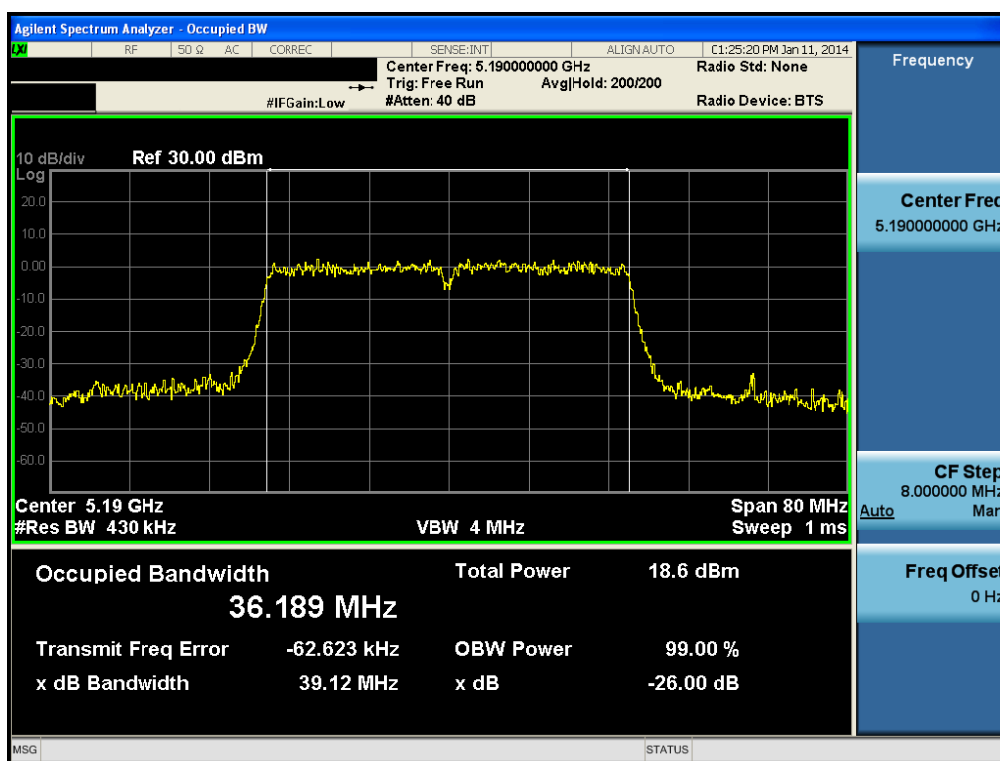
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT20 & Ch.140



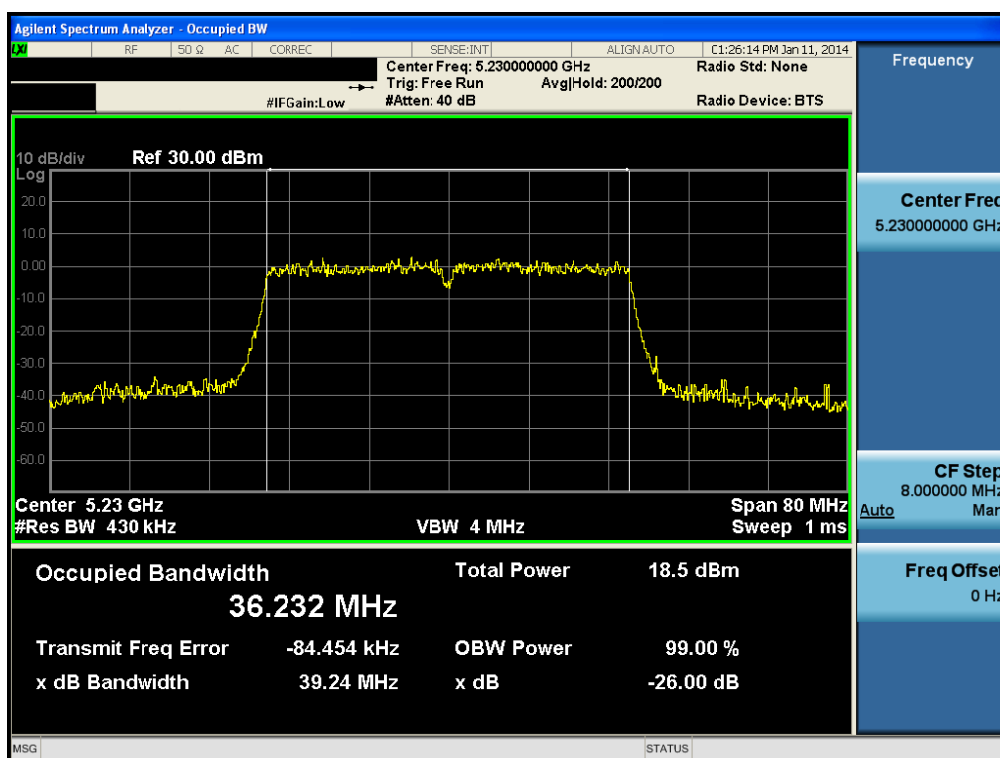
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.38



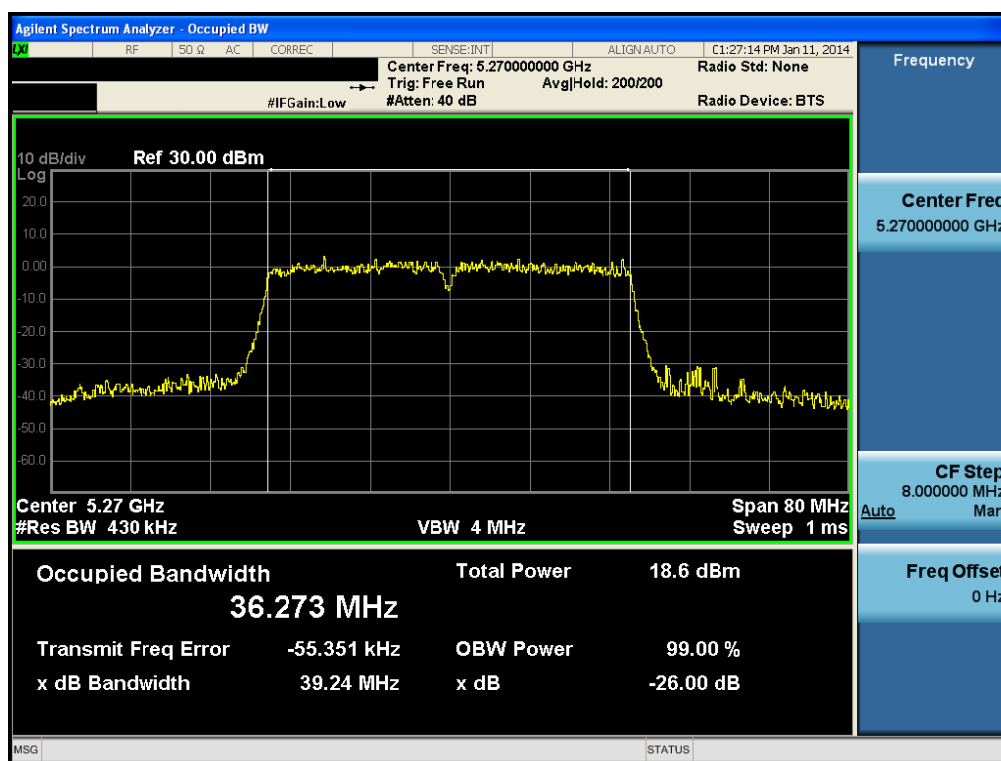
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.46



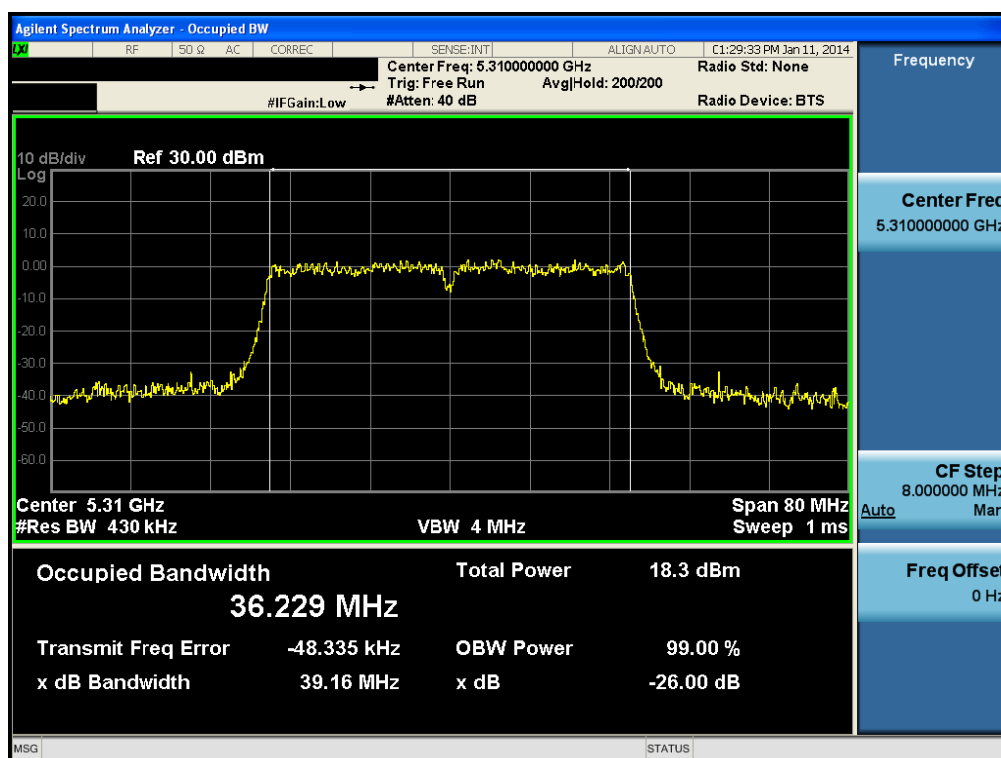
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.54



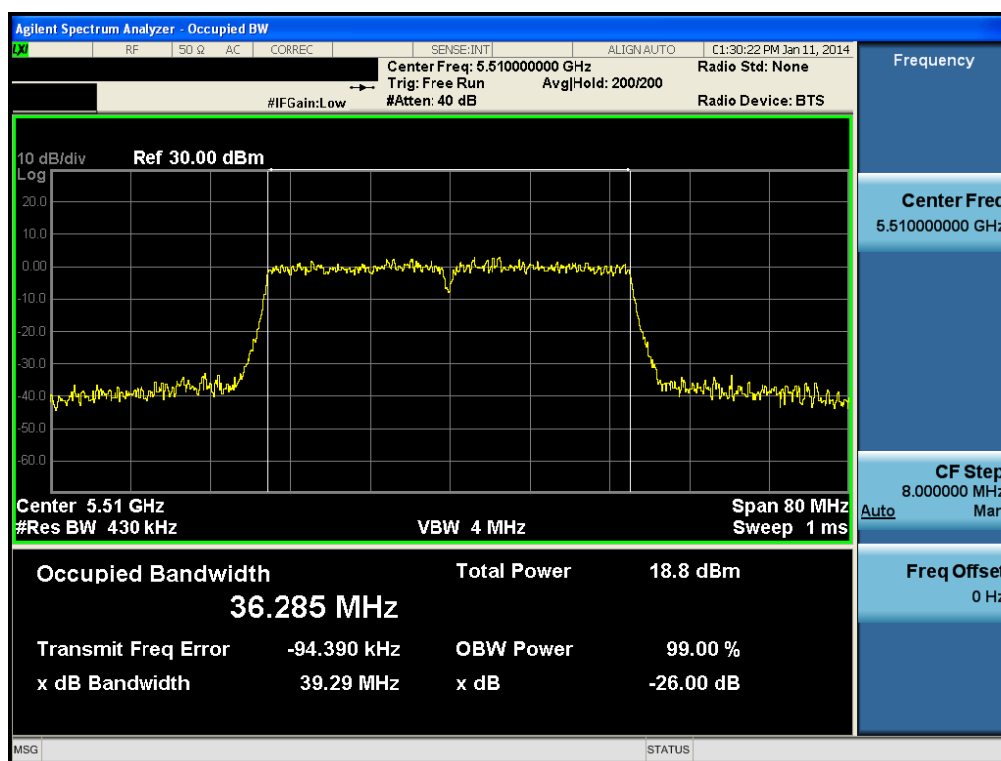
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.62



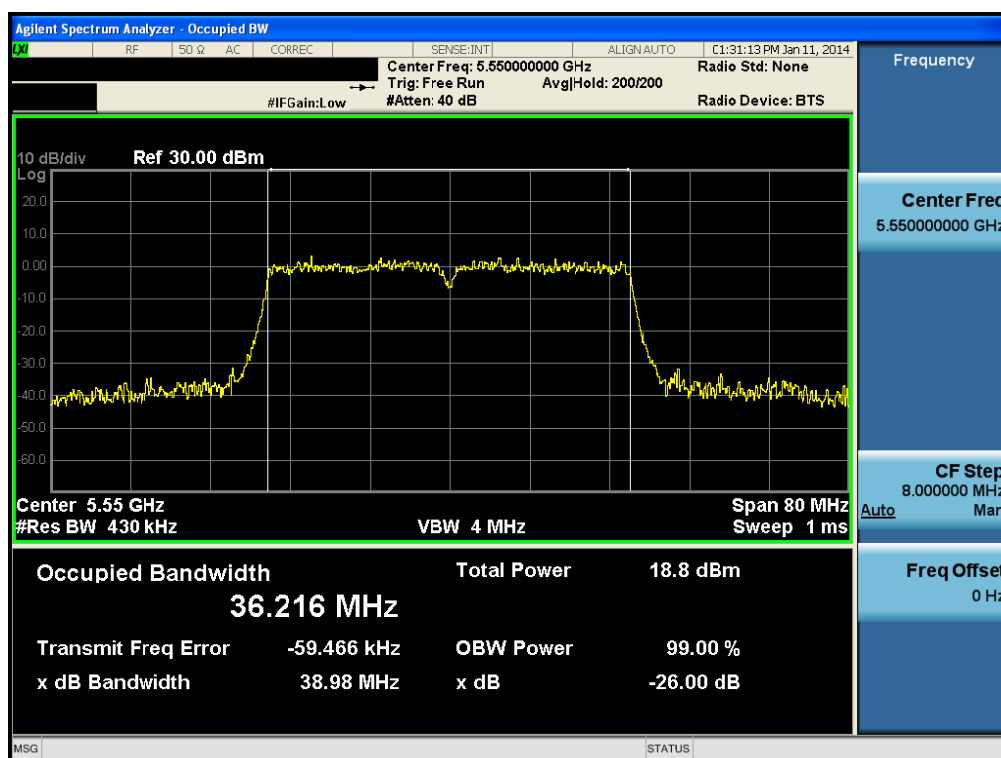
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.102



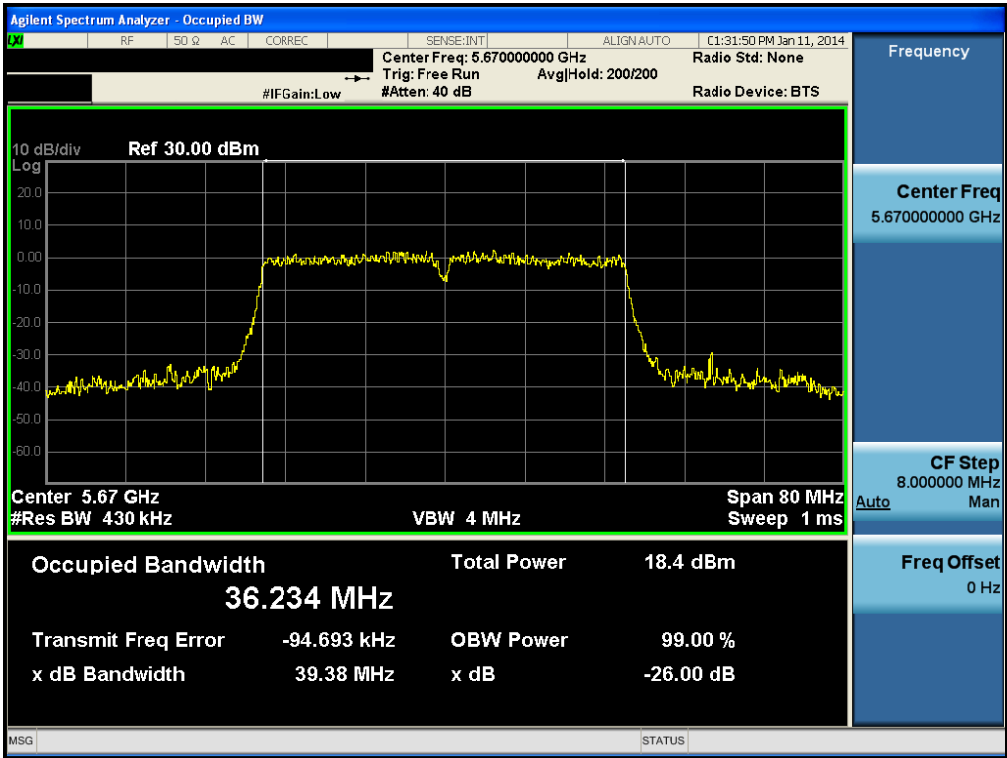
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.110



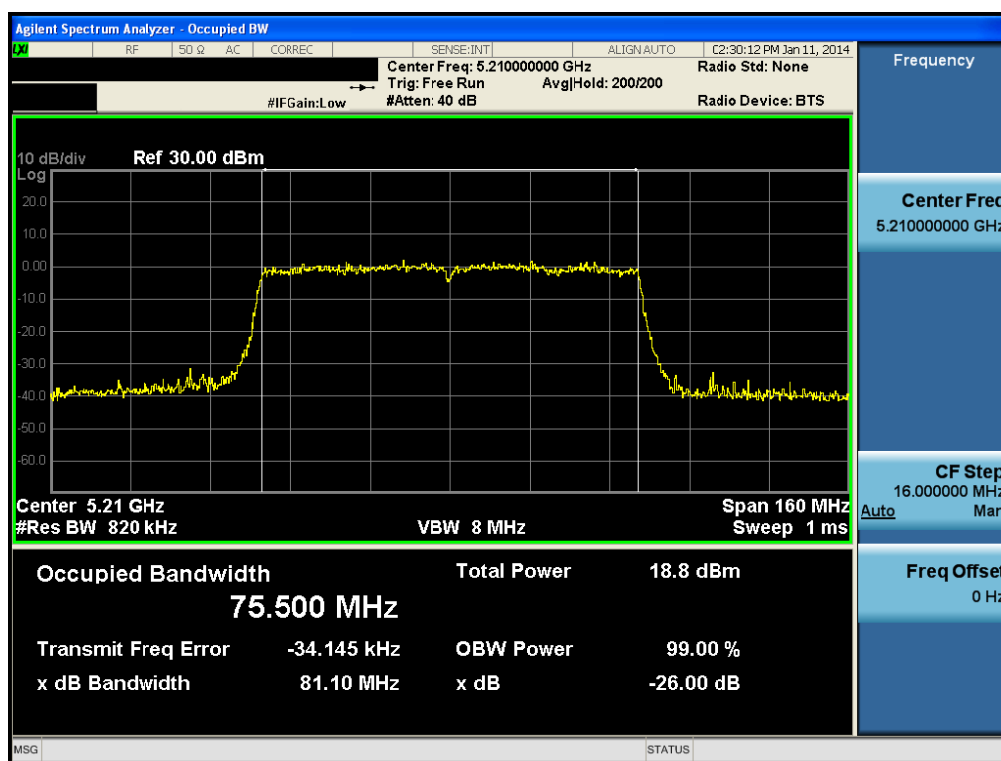
26 dB Bandwidth

Test Mode: ANT 2 & 802.11n HT40 & Ch.134



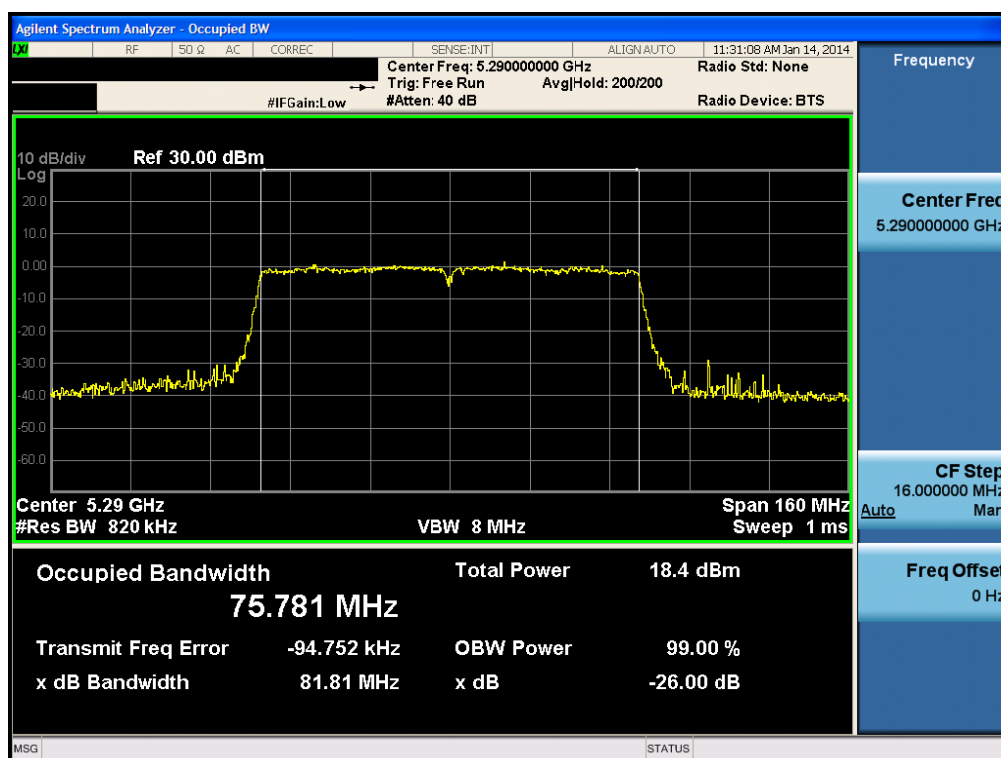
26 dB Bandwidth

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42



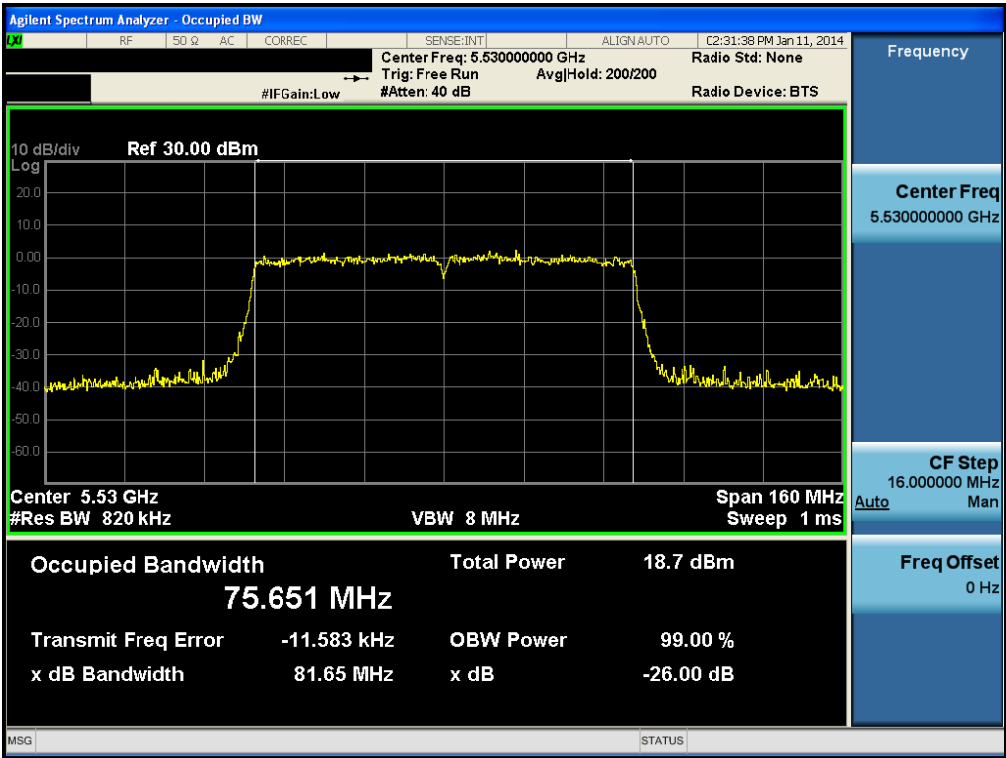
26 dB Bandwidth

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.58



26 dB Bandwidth

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.106



8.2 Maximum Conducted Output Power

■ FCC Requirements

- (1) For the band 5.15~5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (2) For the 5.25~5.35 GHz and 5.47~5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

■ IC Requirements

- (1) For the band 5.15 ~ 5.25 GHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz.
- (2) For the 5.25 ~ 5.35 GHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever power is less.
- (3) For the 5470~5600 MHz and 5650 ~ 5725 MHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10} B$, dBm, whichever power is less.

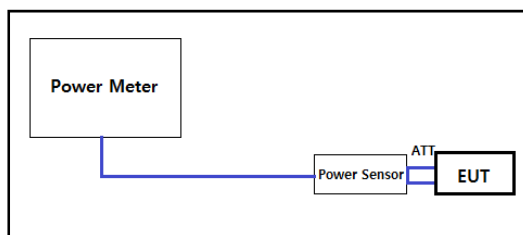
■ Maximum conducted Output power Limit Calculation

Bands	Mode	Power Limit [mW]	Calculation Limit [dBm]	Determined Limit [dBm]
		Least 26dB BW [MHz]		
Band I	802.11a	50	16.98	16.98
		20.000	17.01	
	802.11n HT20	50	16.98	16.98
		20.090	17.02	
	802.11n HT40	50	16.98	16.98
		39.120	19.92	
Band II	802.11a	50	16.98	16.98
		81.100	23.09	
	802.11n HT20	250	23.97	23.97
		20.110	24.03	
	802.11n HT40	250	23.97	23.97
		39.160	26.92	
Band III	802.11a	250	23.97	23.97
		81.810	30.12	
	802.11n HT20	250	23.97	23.97
		20.020	24.01	
	802.11n HT40	250	23.97	23.97
		20.260	24.06	
Band III	802.11n HT40	250	23.97	23.97
		38.980	26.90	
	802.11ac VHT80	250	23.97	23.97
		81.610	30.11	

Note 1: The directional gain does not exceed 6dBi. Please refer to clause 7.2.

Note 2: The FCC limit was used.

Test Configuration



Test Procedure

Maximum Conducted Output Power is measured using Measurement Procedure **Method PM-G of KDB789033**

Test Results : **Comply**

Mode	CH	Freq. [MHz]	Test Result			
			ANT 1		ANT 2	
			[dBm]	[mW]	[dBm]	[mW]
802.11a	36	5180	12.286	16.928	12.070	16.107
	40	5200	12.244	16.765	11.719	14.856
	48	5240	12.241	16.754	11.422	13.874
	52	5260	11.787	15.091	11.711	14.829
	60	5300	11.724	14.874	11.561	14.326
	64	5320	11.715	14.843	11.491	14.097
	100	5500	11.016	12.636	10.628	11.556
	116	5580	11.075	12.809	10.887	12.266
	140	5700	10.536	11.314	10.475	11.156

Mode	CH	Freq. [MHz]	Test Result			
			ANT 1 [dBm]	ANT 2 [dBm]	SUM Power ^{Note1}	
					[dBm]	[mW]
802.11n HT20	36	5180	11.868	11.614	14.754	29.876
	40	5200	11.676	11.345	14.524	28.340
	48	5240	11.596	11.127	14.379	27.404
	52	5260	11.381	10.846	14.133	25.895
	60	5300	11.215	10.906	14.074	25.548
	64	5320	11.266	10.827	14.063	25.483
	100	5500	10.708	10.444	13.589	22.848
	116	5580	11.085	10.905	14.007	25.155
	140	5700	10.439	10.141	13.303	21.394
802.11n HT40	38	5190	11.902	11.510	14.721	29.654
	46	5230	12.157	11.672	14.932	31.132
	54	5270	11.919	11.536	14.743	29.800
	62	5310	11.189	10.814	14.016	25.211
	102	5510	11.488	11.349	14.430	27.730
	110	5550	11.013	11.624	14.340	27.162
	134	5670	10.186	9.715	12.968	19.803
802.11ac VHT80	38	5190	11.126	10.999	14.074	25.547
	54	5270	10.673	10.515	13.606	22.936
	102	5510	10.601	10.211	13.421	21.983

Note 1: SUM power = $10 \log(10^{\frac{\text{ANT 1 Result}}{10}} + 10^{\frac{\text{ANT 2 Result}}{10}})$

8.3 Peak Power Spectral Density

■ FCC Requirements

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1 MHz band.
- (2) For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band.

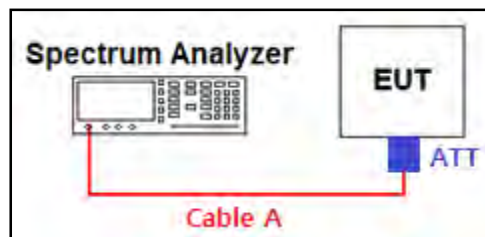
■ IC Requirements

- (1) For the band 5.15~5.25 GHz, the e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
- (2) For the 5.25~5.35 GHz, the power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
- (3) For the 5470~5600 MHz and 5650 ~ 5725 MHz, the power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

■ Peak Power Spectral Density Limit Calculation

Note 1: The directional gain does not exceed 6dBi. Please refer to clause 7.2.

■ Test Configuration



■ Test Procedure

Peak Power Spectral Density is measured using Measurement Procedure of **KDB789033**

- 1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer: select the appropriate test method (SA-1, SA-2, SA-3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power...". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)
- 2) Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
- 3) Make the following adjustments to the peak value of the spectrum, if applicable:
 - a) If Method SA-2 or SA-2 Alternative was used, add $10 \log(1/x)$, where x is the duty cycle, to the peak of the spectrum.
 - b) If Method SA-3 Alternative was used and the linear mode was used in step E)2)g)(viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
- 4) The result is the PPSD.

■TEST RESULTS :Comply

Mode	CH	Freq. [MHz]	Reading		Duty Cycle (x)	DCF [dB]	Test Result	
			ANT 1 [dBm]	ANT 2 [dBm]			ANT 1 [dBm]	ANT 2 [dBm]
802.11a	36	5180	-5.805	-6.164	0.93	0.32	-5.485	-5.844
	40	5200	-5.427	-6.313			-5.107	-5.993
	48	5240	-5.568	-6.173			-5.248	-5.853
	52	5260	-5.117	-6.678			-4.797	-6.358
	60	5300	-5.242	-6.541			-4.922	-6.221
	64	5320	-5.472	-6.583			-5.152	-6.263
	100	5500	-6.809	-6.508			-6.489	-6.188
	116	5580	-6.786	-6.829			-6.466	-6.509
	140	5700	-7.915	-7.994			-7.595	-7.674

Mode	CH	Freq. [MHz]	Reading		Duty Cycle (x)	DCF [dB]	Test Result		
			ANT 1 [dBm]	ANT 2 [dBm]			ANT 1 [dBm]	ANT 2 [dBm]	SUM Power [dBm] ^{Note2}
802.11n HT20	36	5180	-4.701	-5.713	0.85	0.71	-3.991	-5.003	-1.457
	40	5200	-4.909	-5.525			-4.199	-4.815	-1.482
	48	5240	-4.997	-5.568			-4.287	-4.858	-1.550
	52	5260	-4.671	-5.865			-3.961	-5.155	-1.506
	60	5300	-4.666	-5.981			-3.956	-5.271	-1.550
	64	5320	-4.751	-6.034			-4.041	-5.324	-1.625
	100	5500	-6.004	-5.948			-5.294	-5.238	-2.255
	116	5580	-6.498	-6.256			-5.788	-5.546	-2.653
	140	5700	-7.354	-7.617			-6.644	-6.907	-3.758
802.11n HT40	38	5190	-5.474	-6.487	0.77	1.14	-4.334	-5.347	-1.798
	46	5230	-5.307	-6.030			-4.167	-4.890	-1.500
	54	5270	-5.485	-6.093			-4.345	-4.953	-1.625
	62	5310	-5.508	-6.253			-4.368	-5.113	-1.714
	102	5510	-6.442	-6.863			-5.302	-5.723	-2.495
	110	5550	-6.774	-6.852			-5.634	-5.712	-2.661
	134	5670	-7.257	-7.589			-6.117	-6.449	-3.261
802.11ac VHT80	42	5210	-9.850	-10.441	0.36	4.44	-5.410	-6.001	-2.685
	58	5290	-10.265	-10.605			-5.825	-6.165	-2.976
	106	5530	-11.076	-11.327			-6.636	-6.887	-3.747

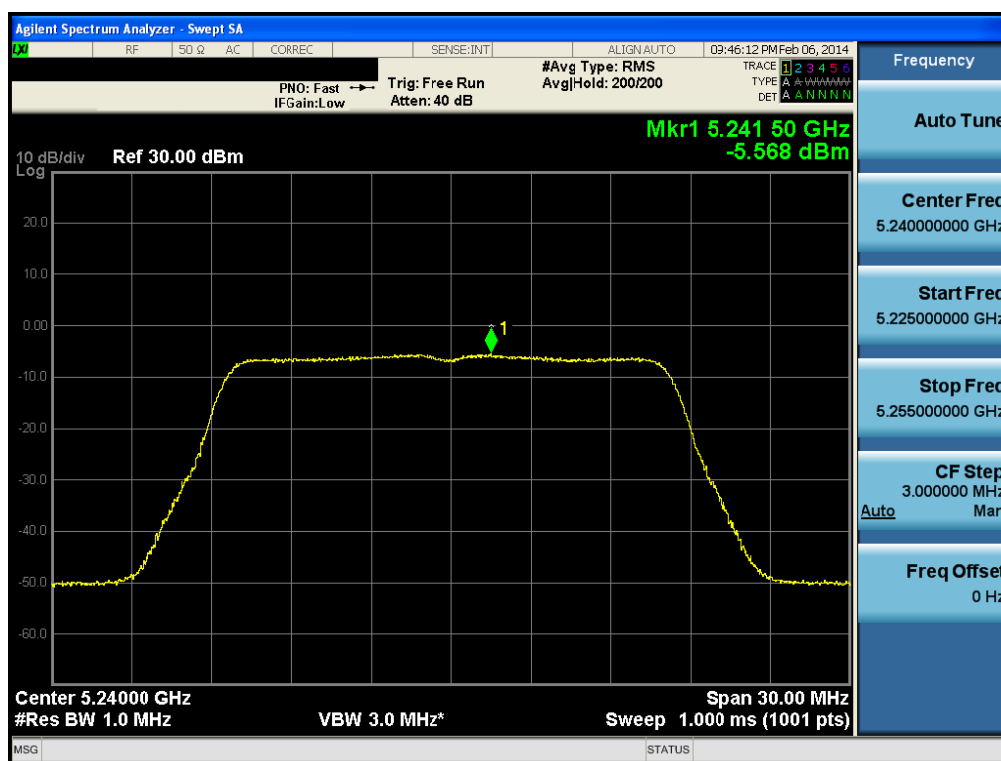
Note 1 :Duty cycle(x) = On time / (On + Off time), For On time and On time information, please refer to APPENDIX II.

DCF = 10 * log (1 / x)

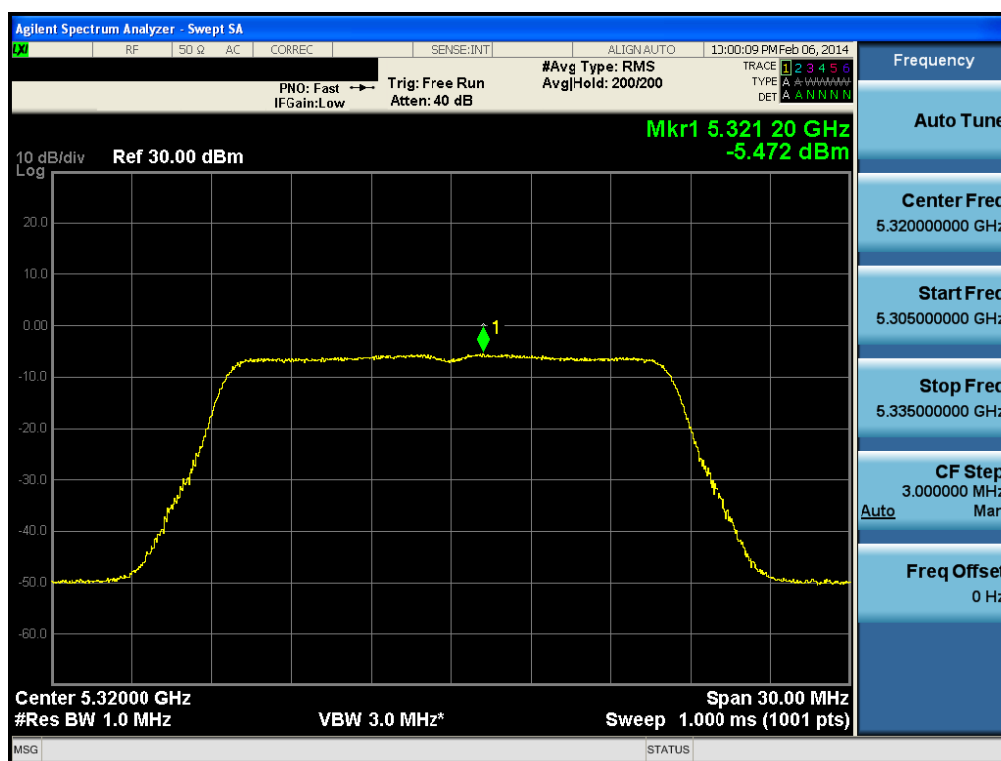
Test Result = Reading Data + DCF

Note 2: SUM power = $10 \log(10^{\frac{ANT\ 1}{10}} + 10^{\frac{ANT\ 2}{10}})$

Test Mode: ANT 1 & 802.11a & Ch.48

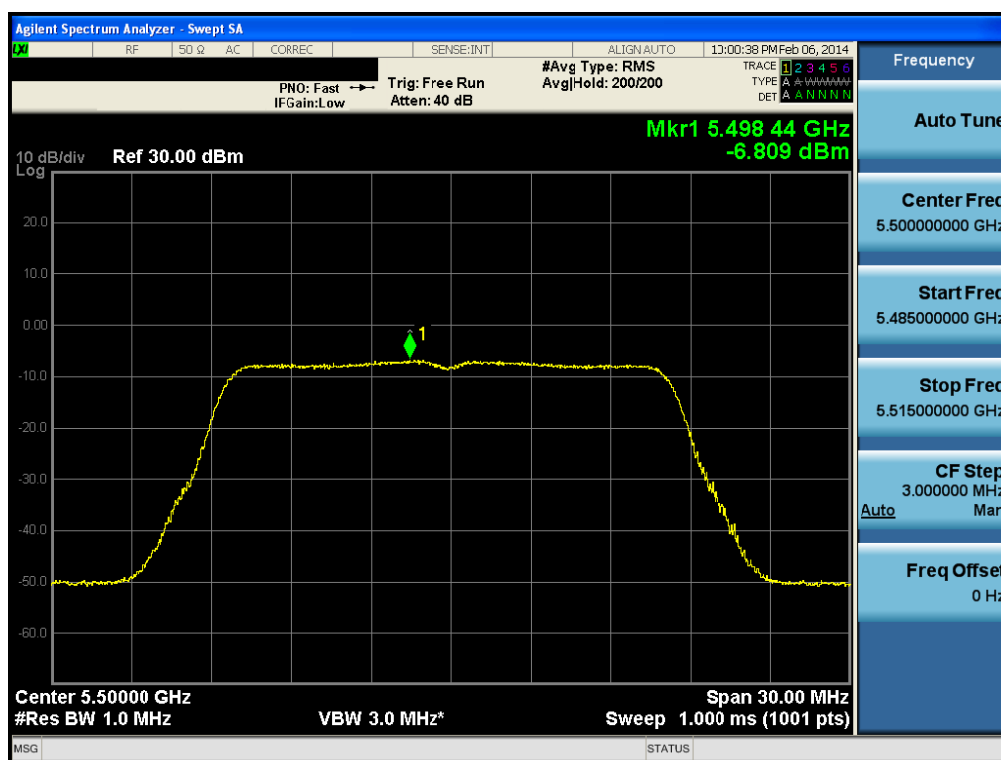


Test Mode: ANT 1 & 802.11a & Ch.64



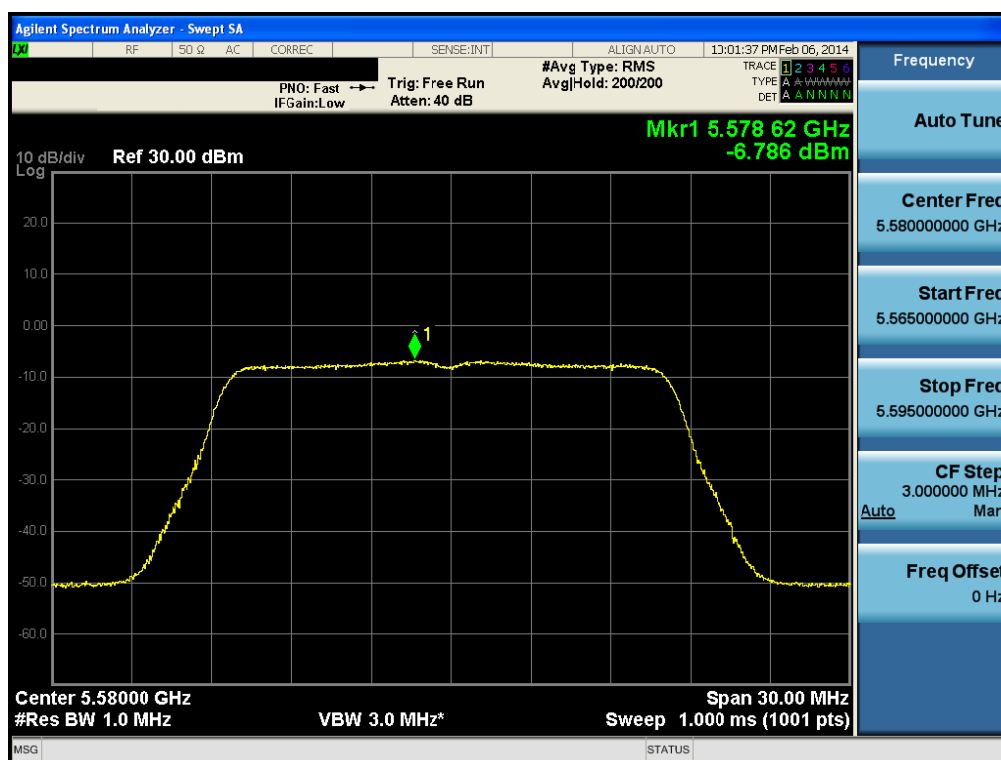
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11a & Ch.100



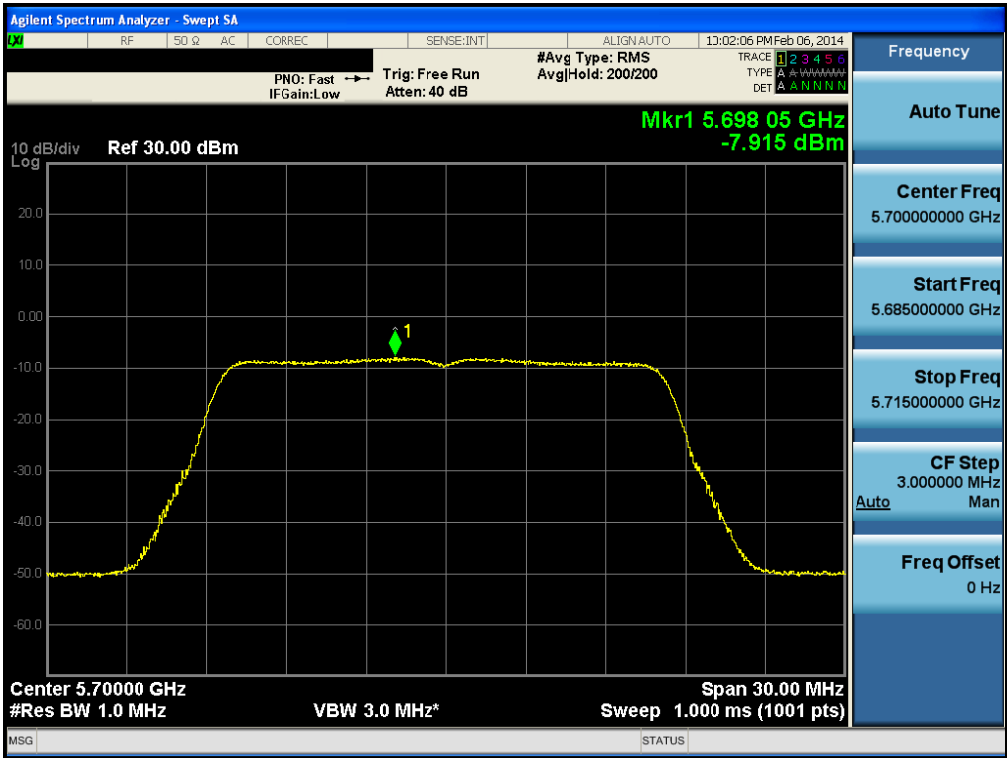
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11a & Ch.116



Peak Power Spectral Density

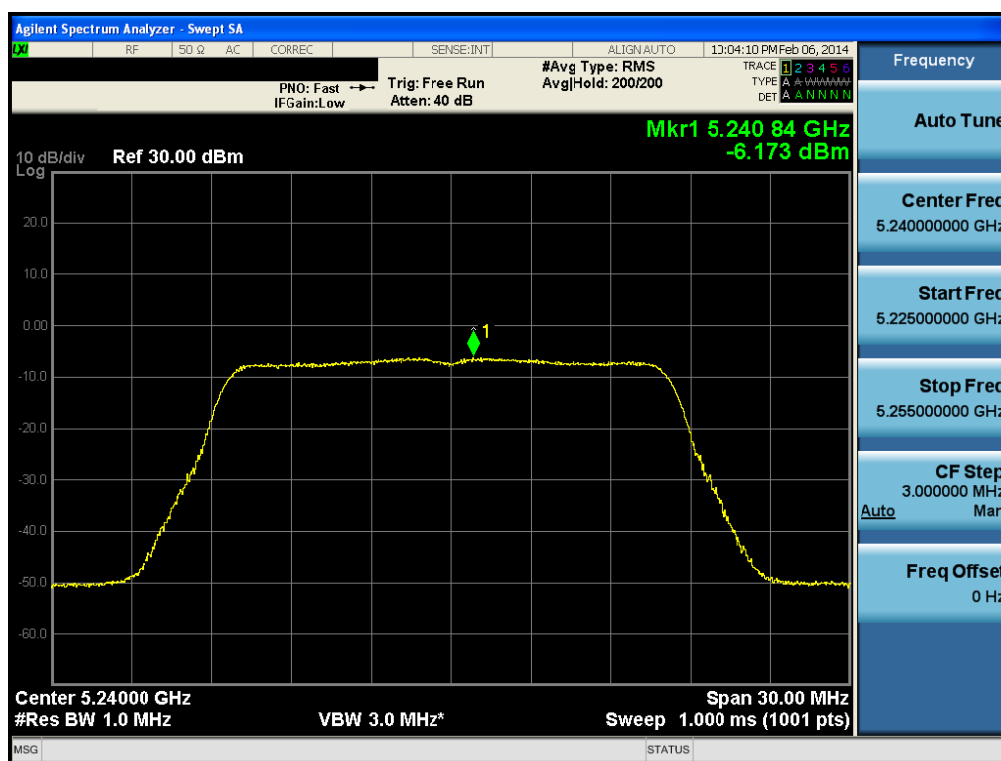
Test Mode: ANT 1 & 802.11a & Ch.140



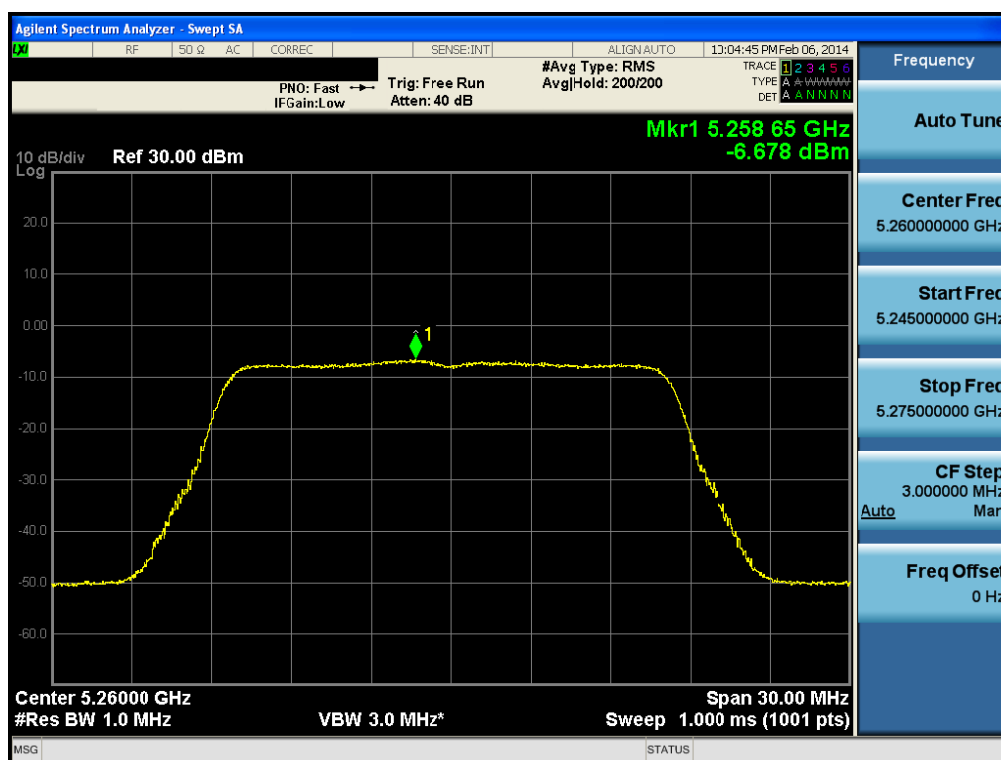
Test Mode: ANT 2 & 802.11a & Ch.36

Test Mode: ANT 2 & 802.11a & Ch.40

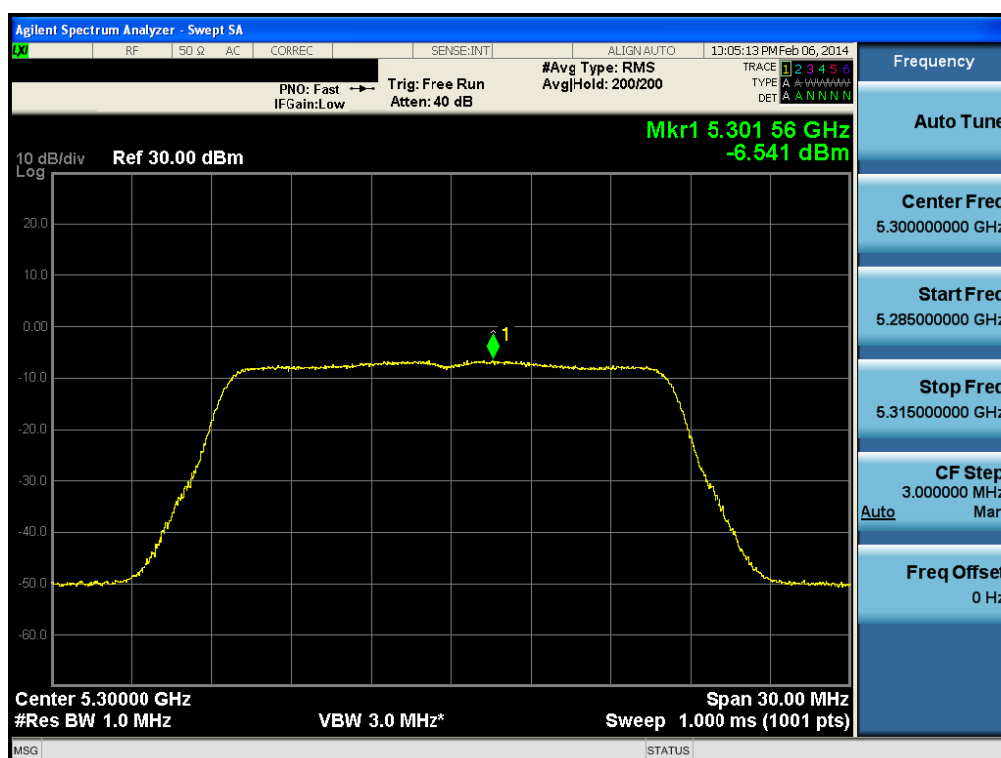
Test Mode: ANT 2 & 802.11a & Ch.48



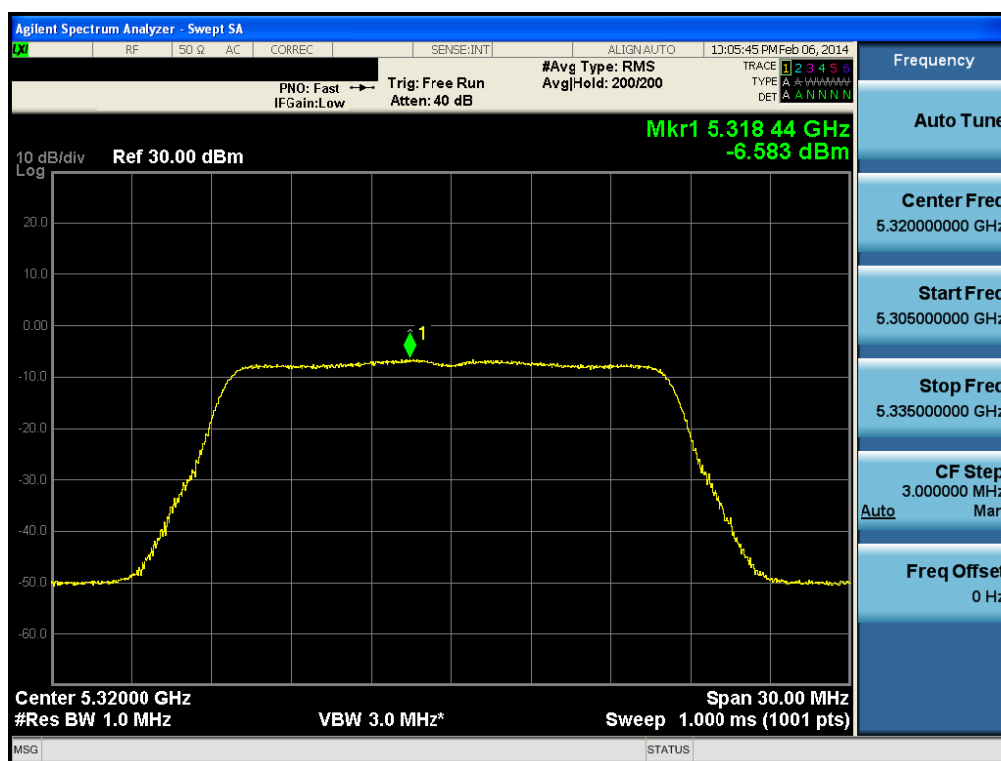
Test Mode: ANT 2 & 802.11a & Ch.52



Test Mode: ANT 2 & 802.11a & Ch.60

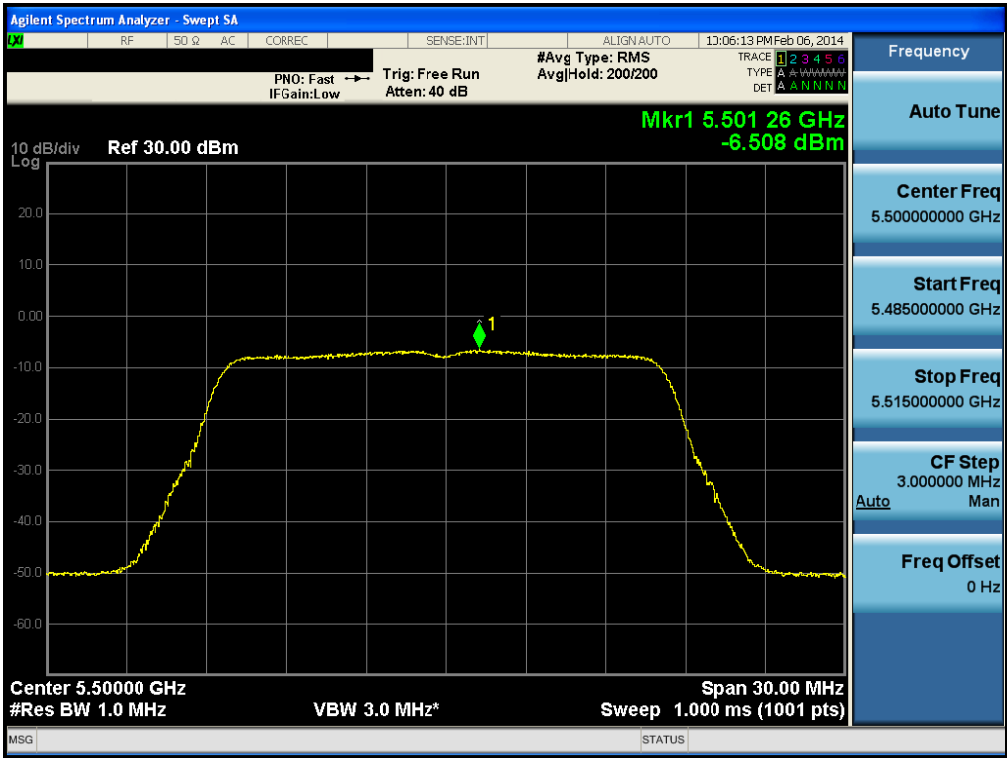


Test Mode: ANT 2 & 802.11a & Ch.64



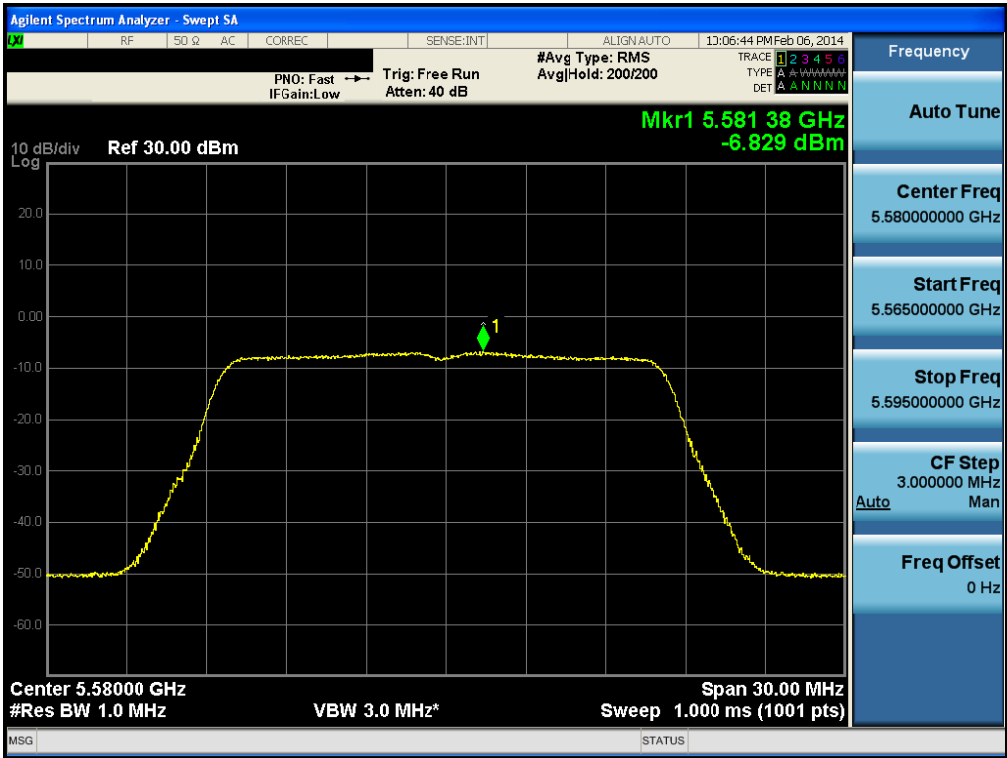
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11a & Ch.100



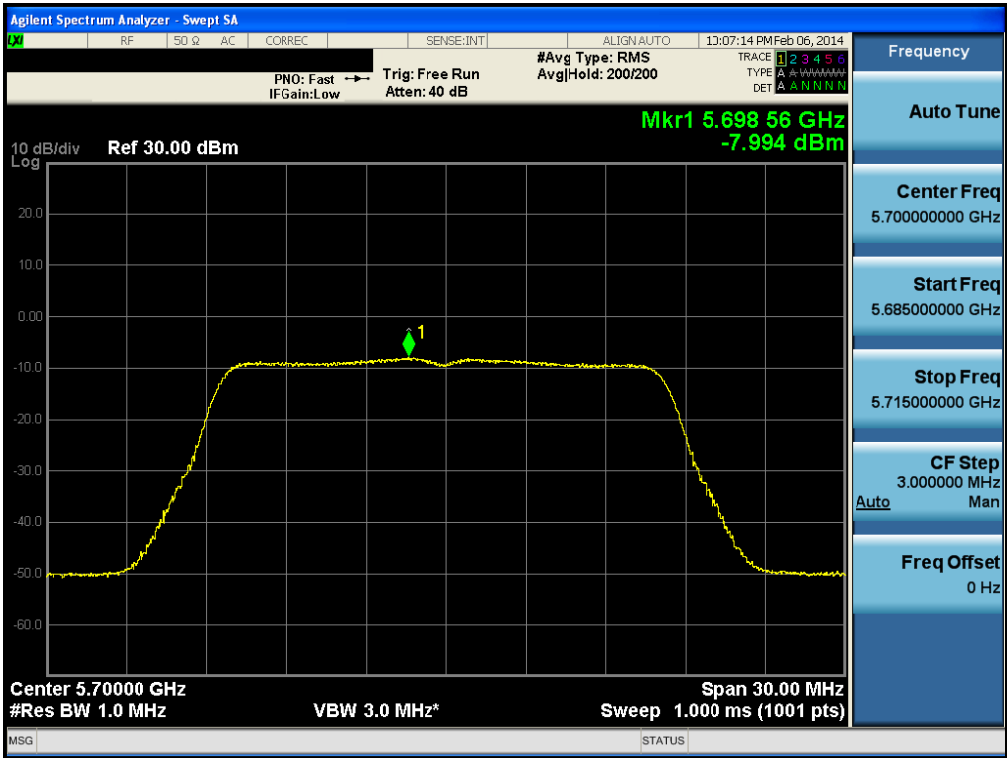
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11a & Ch.116



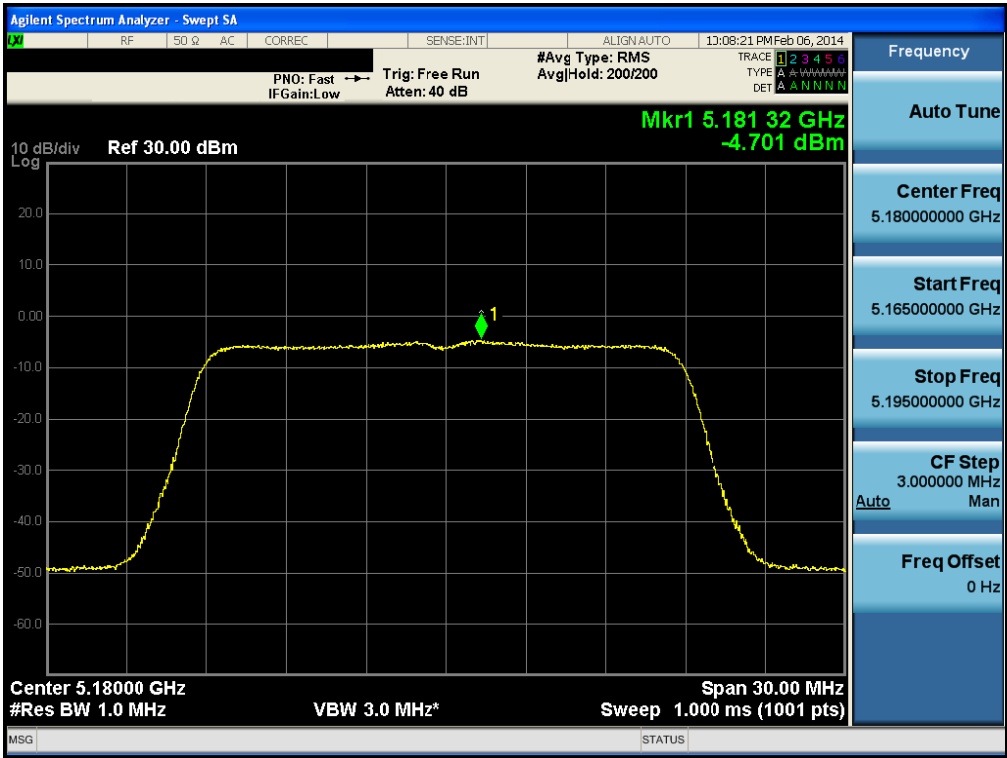
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11a & Ch.140



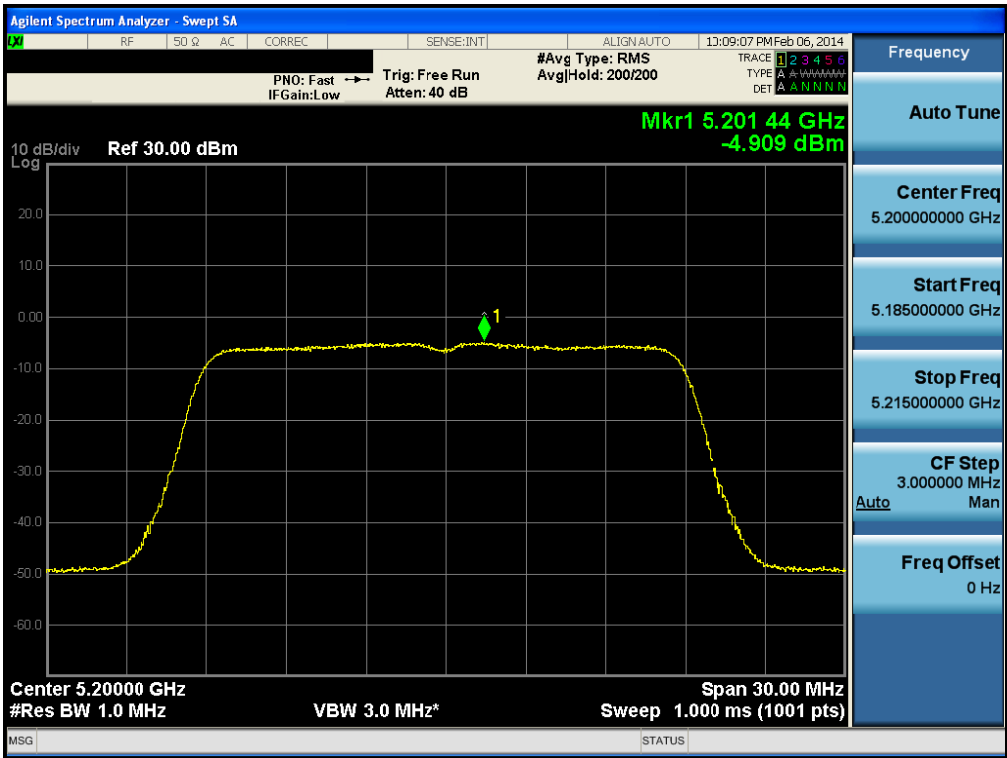
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT20 & Ch.36



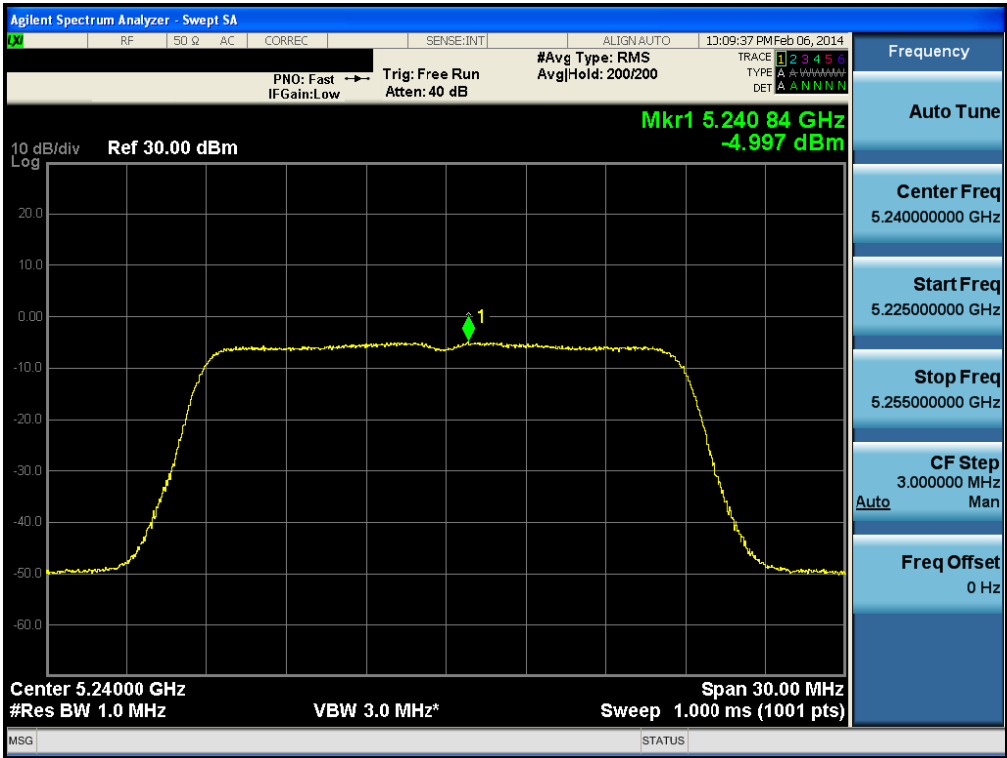
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT20 & Ch.40



Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT20 & Ch.48

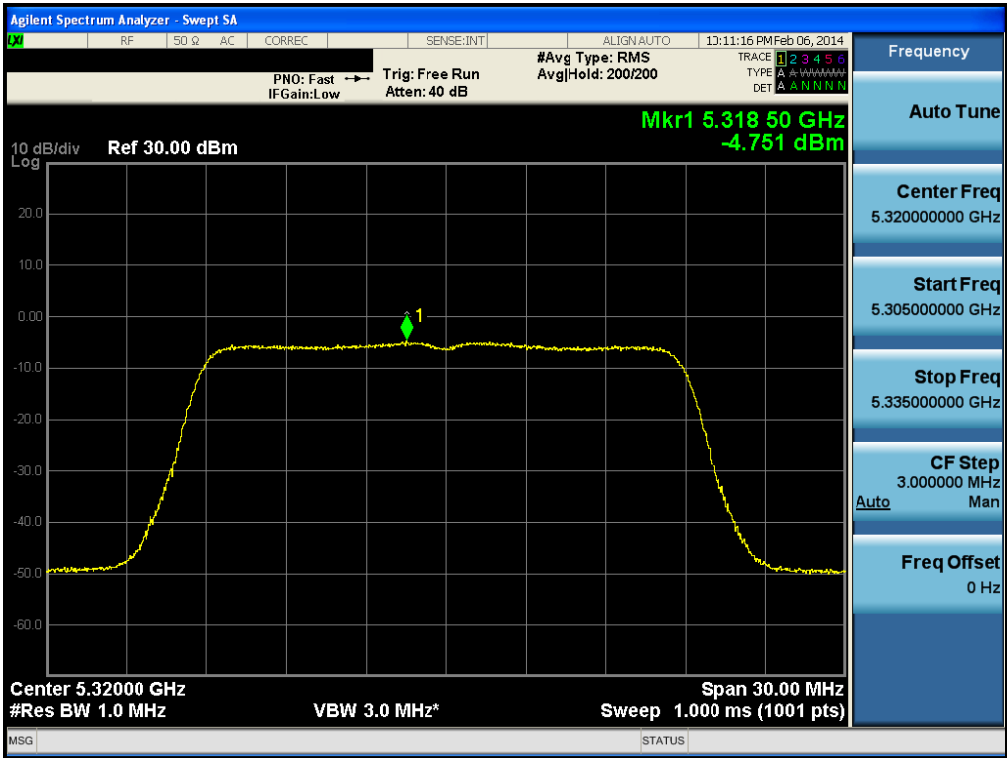


Test Mode: ANT 1 & 802.11n HT20 & Ch.52

Test Mode: ANT 1 & 802.11n HT20 & Ch.60

Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT20 & Ch.64

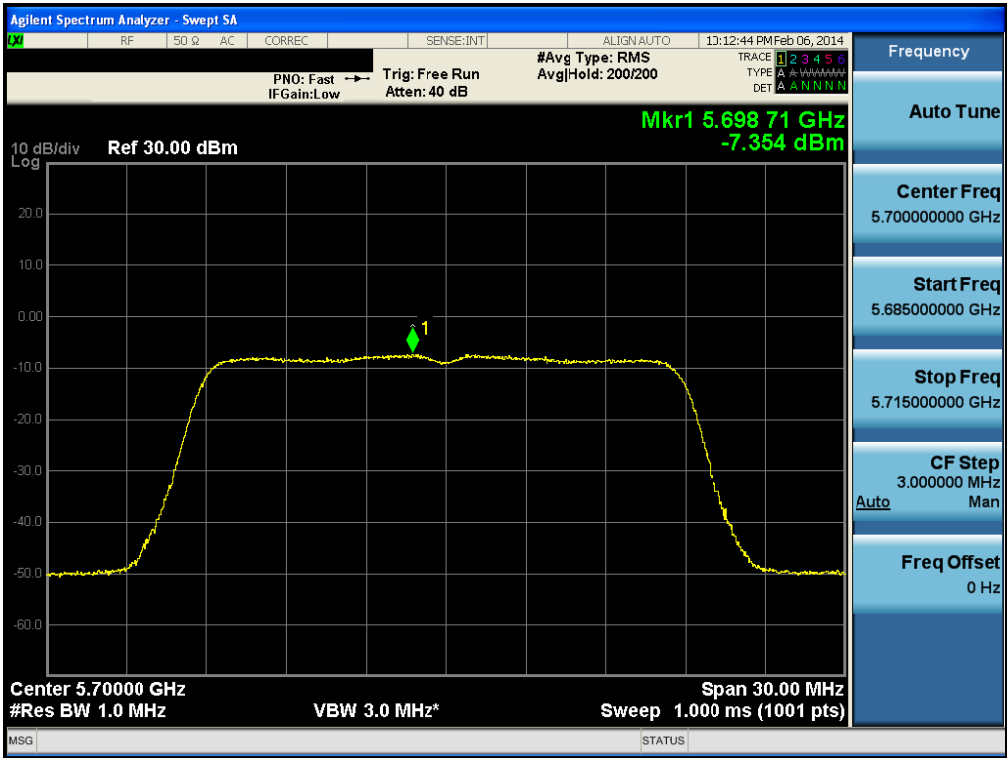


Test Mode: ANT 1 & 802.11n HT20 & Ch.100

Test Mode: ANT 1 & 802.11n HT20 & Ch.116

Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT20 & Ch.140

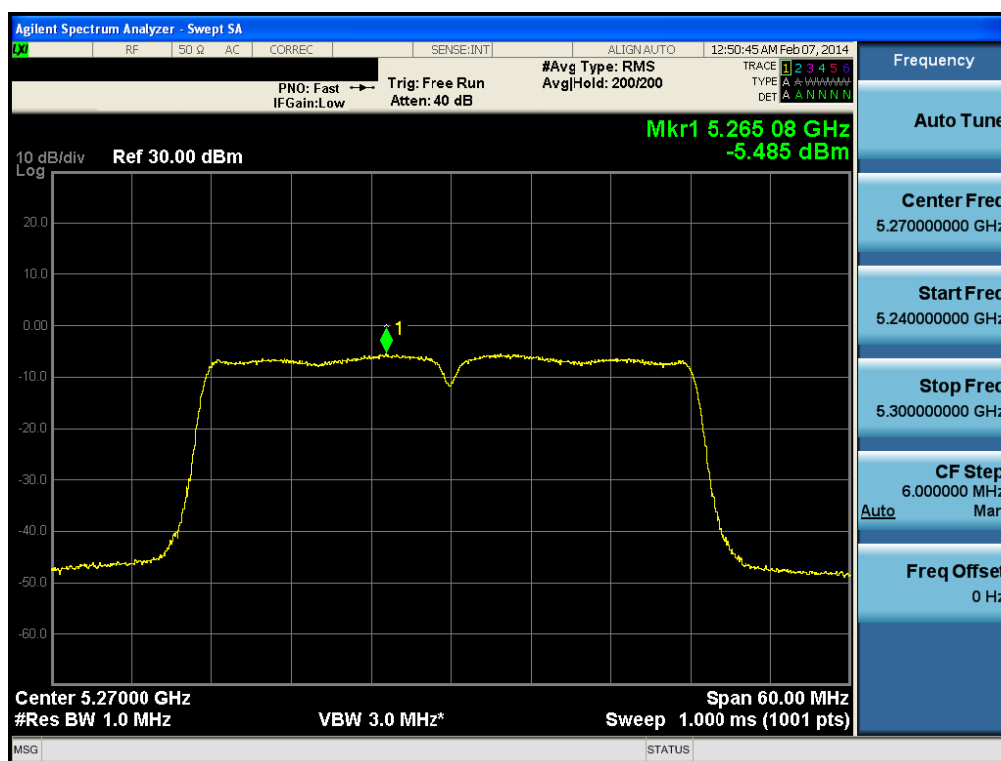


Test Mode: ANT 1 & 802.11n HT40 & Ch.38

Test Mode: ANT 1 & 802.11n HT40 & Ch.46

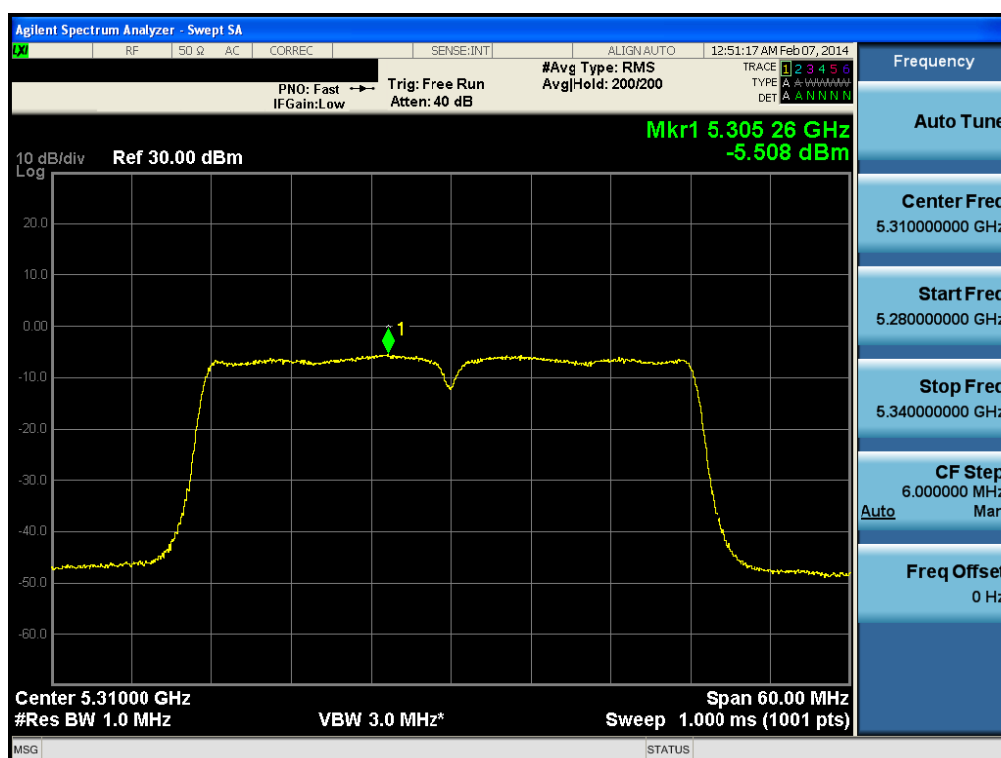
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT40 & Ch.54



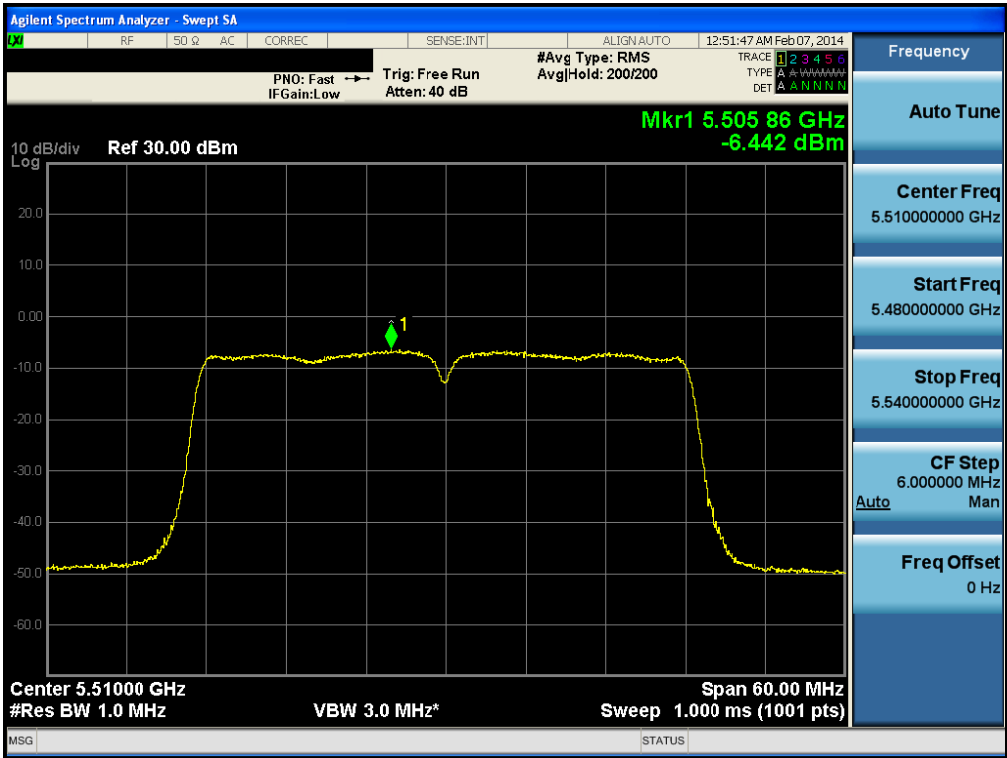
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT40 & Ch.62



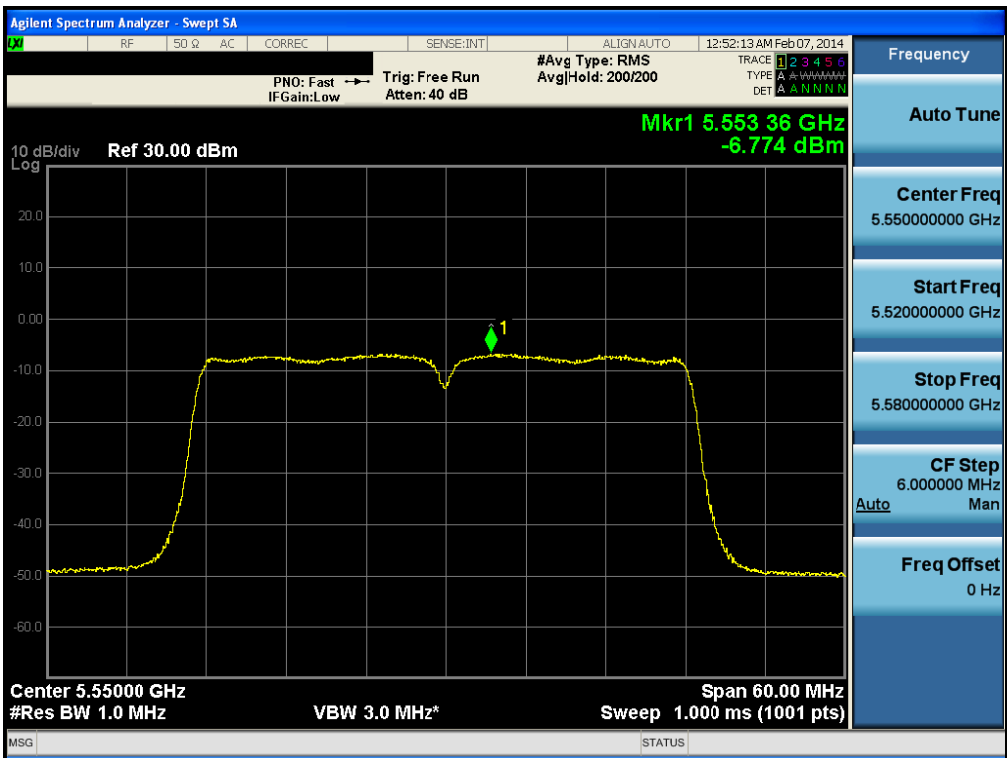
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT40 & Ch.102

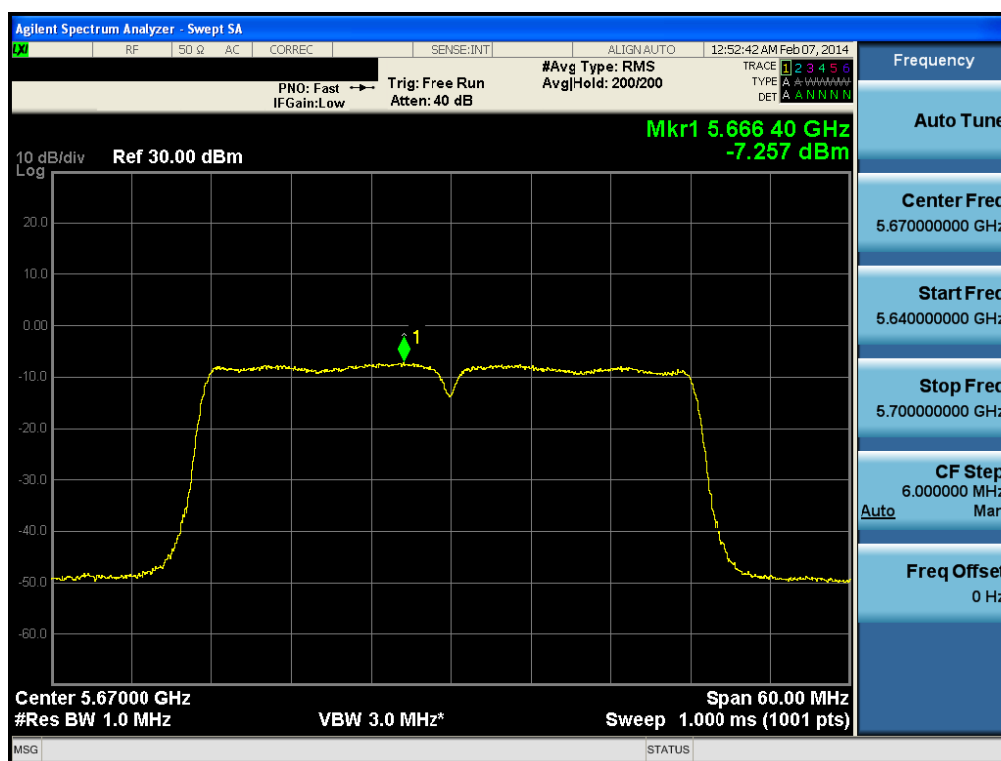


Peak Power Spectral Density

Test Mode: ANT 1 & 802.11n HT40 & Ch.110



Test Mode: ANT 1 & 802.11n HT40 & Ch.134

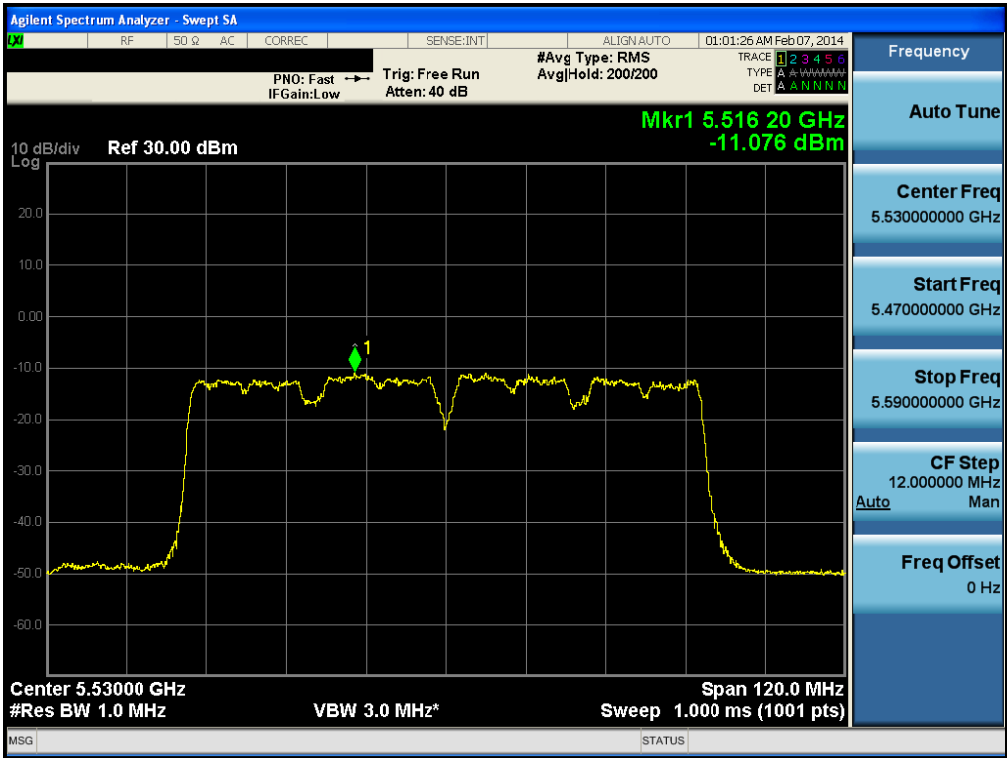


Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42

Test Mode: ANT 1 & 802.11ac VHT80 & Ch.58

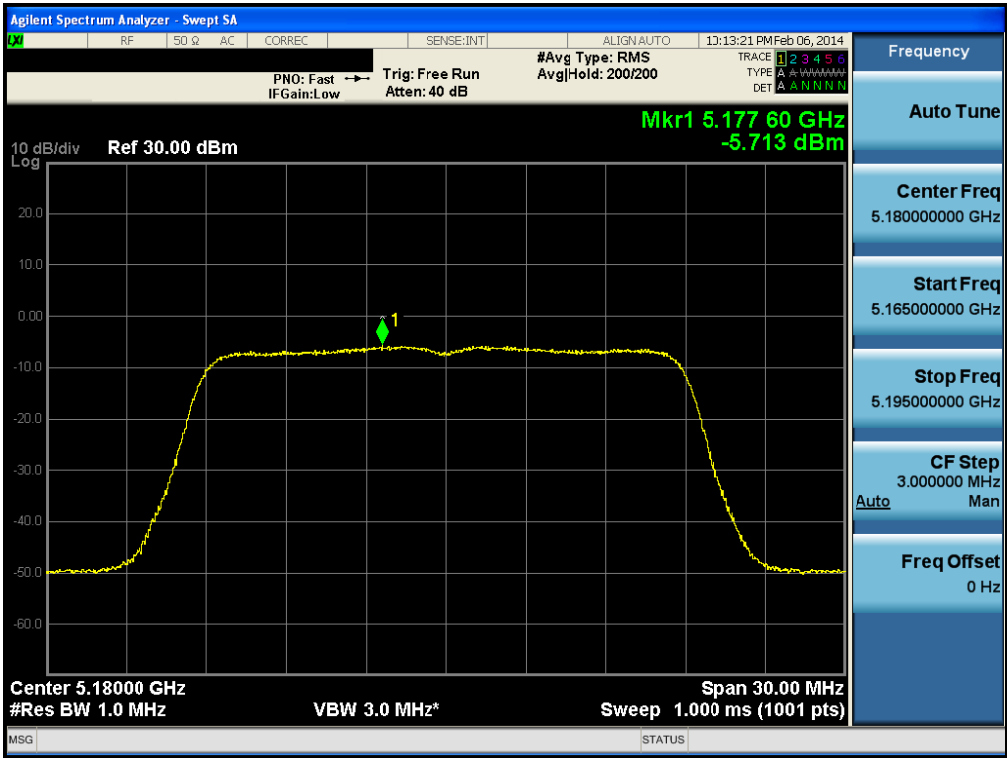
Peak Power Spectral Density

Test Mode: ANT 1 & 802.11ac VHT80 & Ch.106



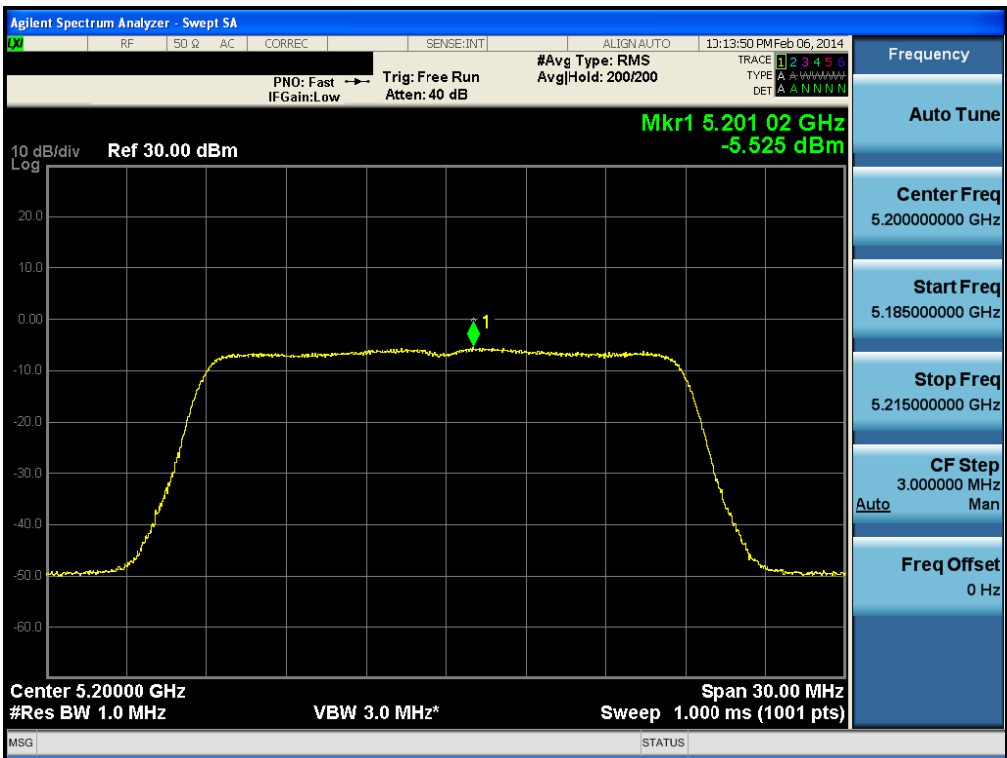
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.36

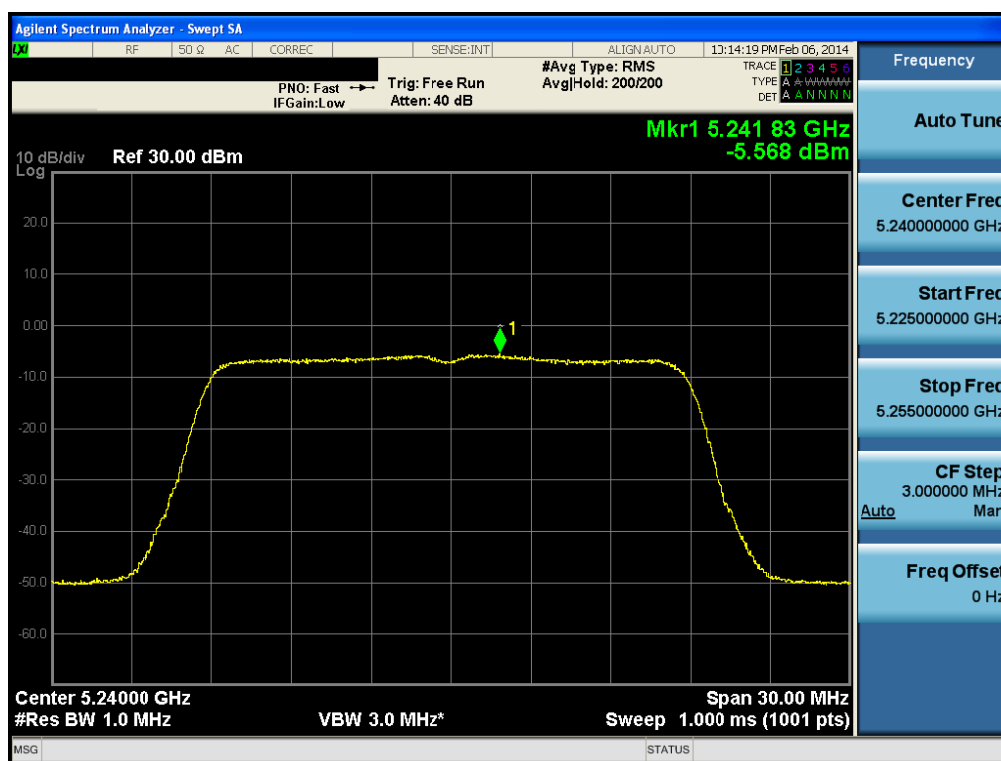


Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.40

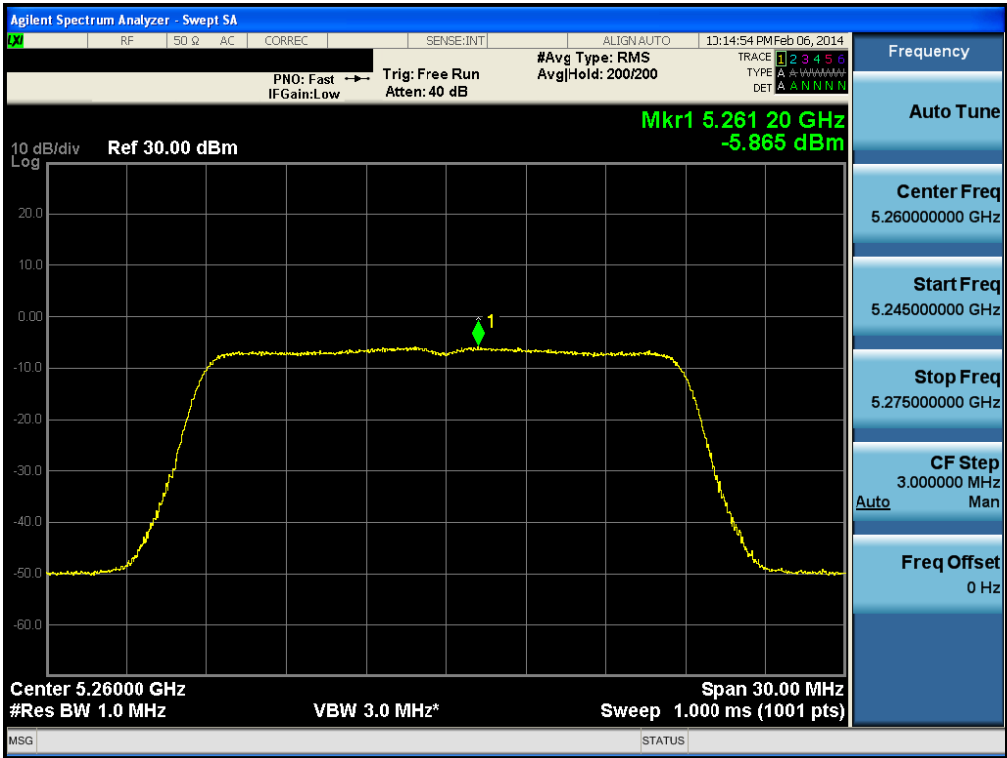


Test Mode: ANT 2 & 802.11n HT20 & Ch.48



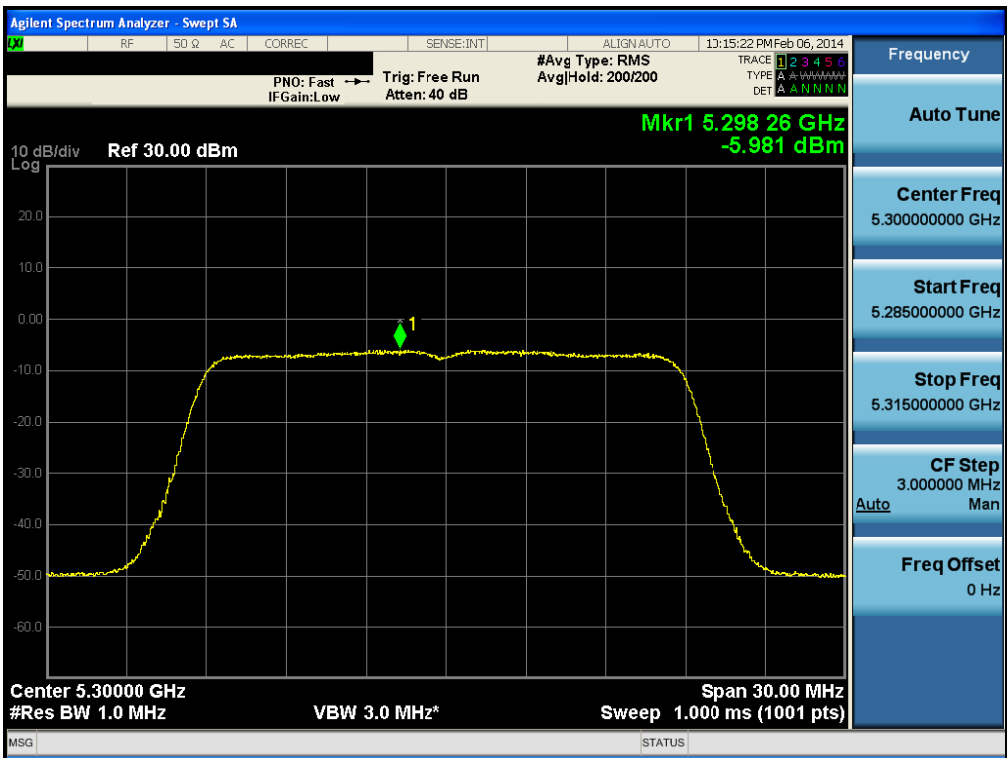
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.52



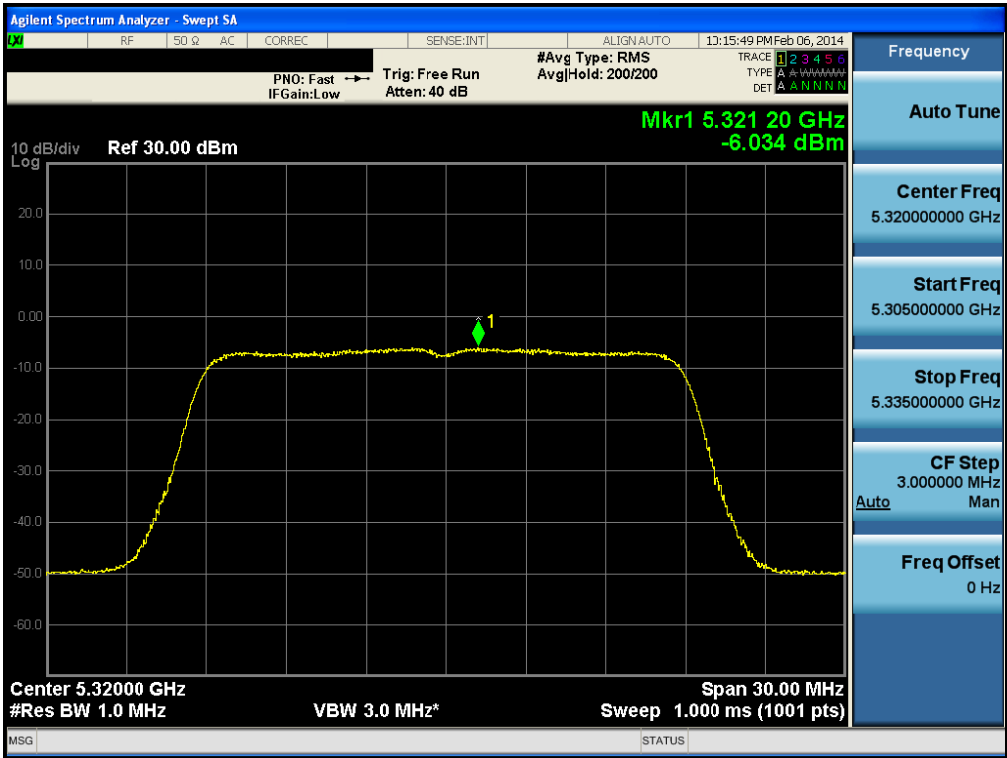
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.60



Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.64

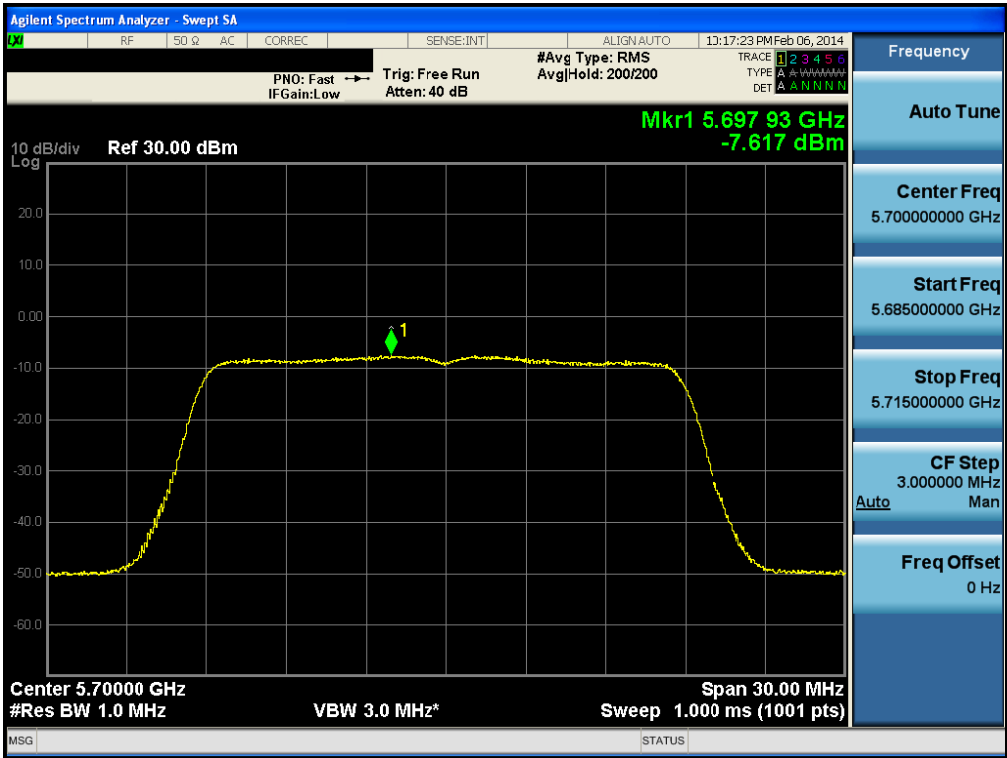


Test Mode: ANT 2 & 802.11n HT20 & Ch.100

Test Mode: ANT 2 & 802.11n HT20 & Ch.116

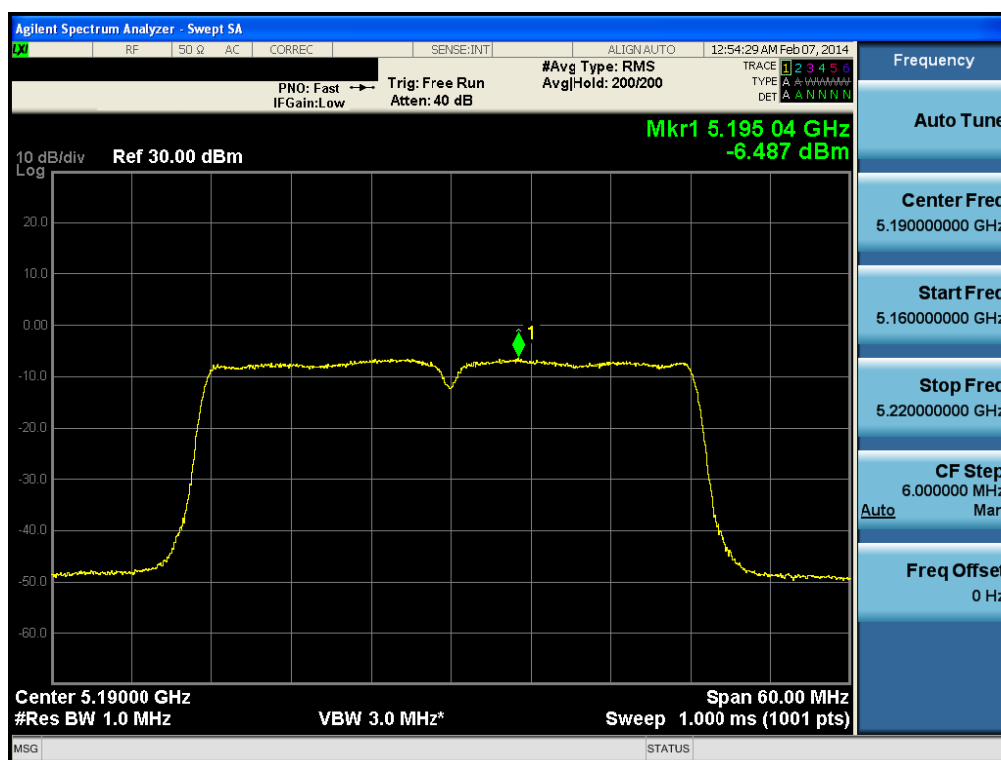
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT20 & Ch.140



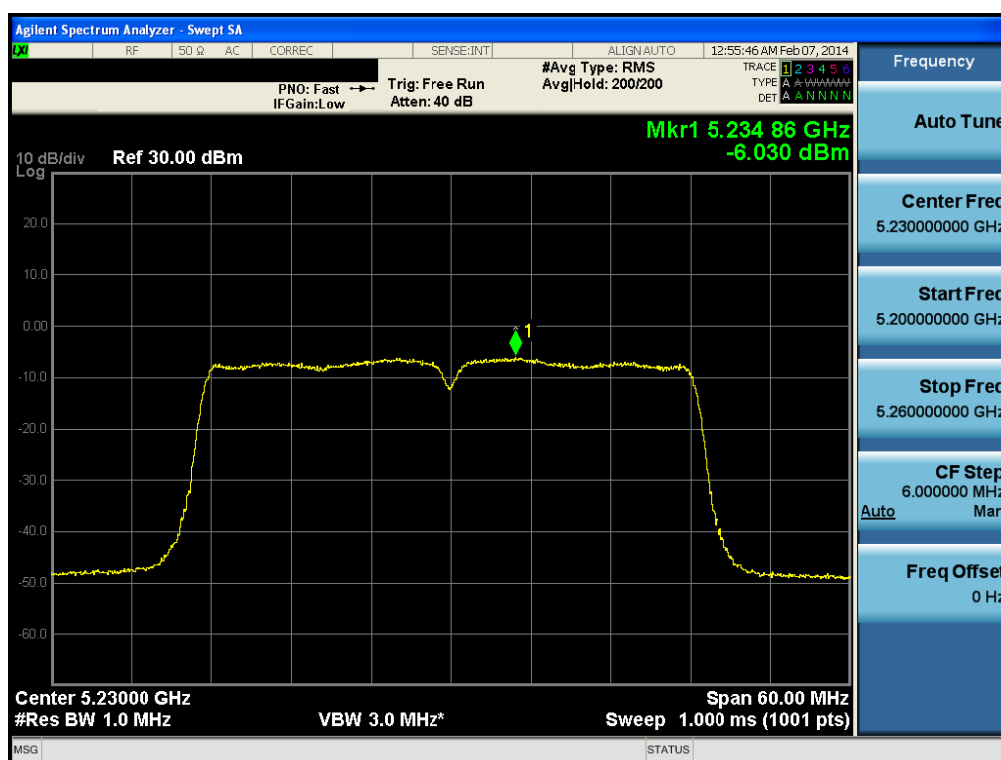
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT40 & Ch.38



Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT40 & Ch.46

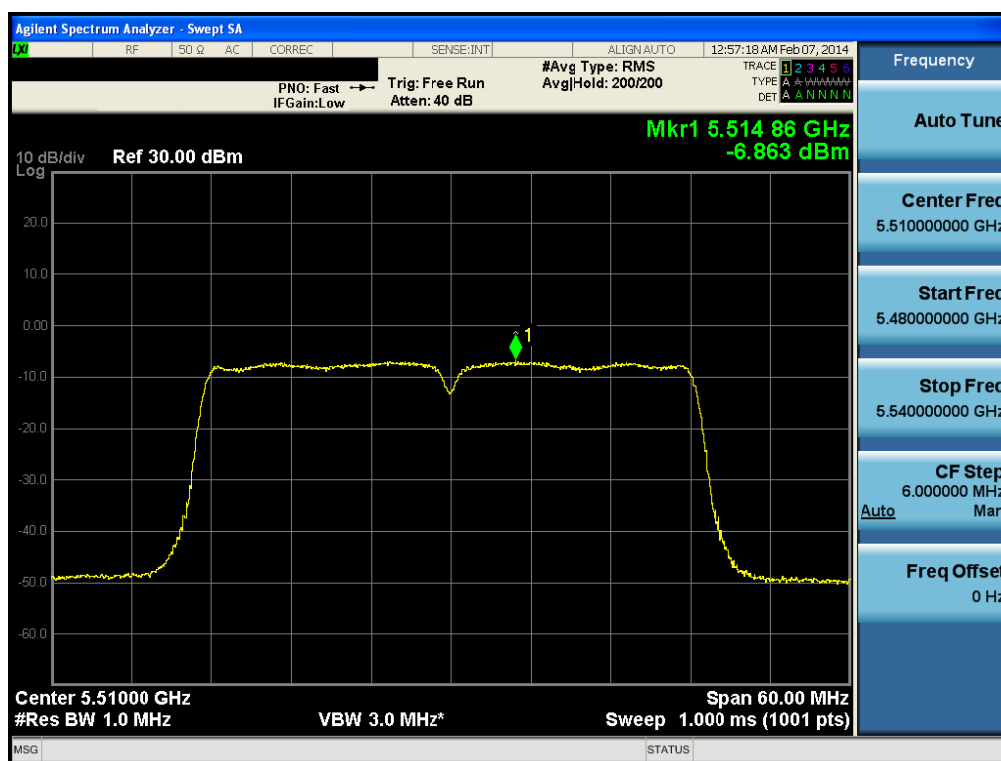


Test Mode: ANT 2 & 802.11n HT40 & Ch.54

Test Mode: ANT 2 & 802.11n HT40 & Ch.62

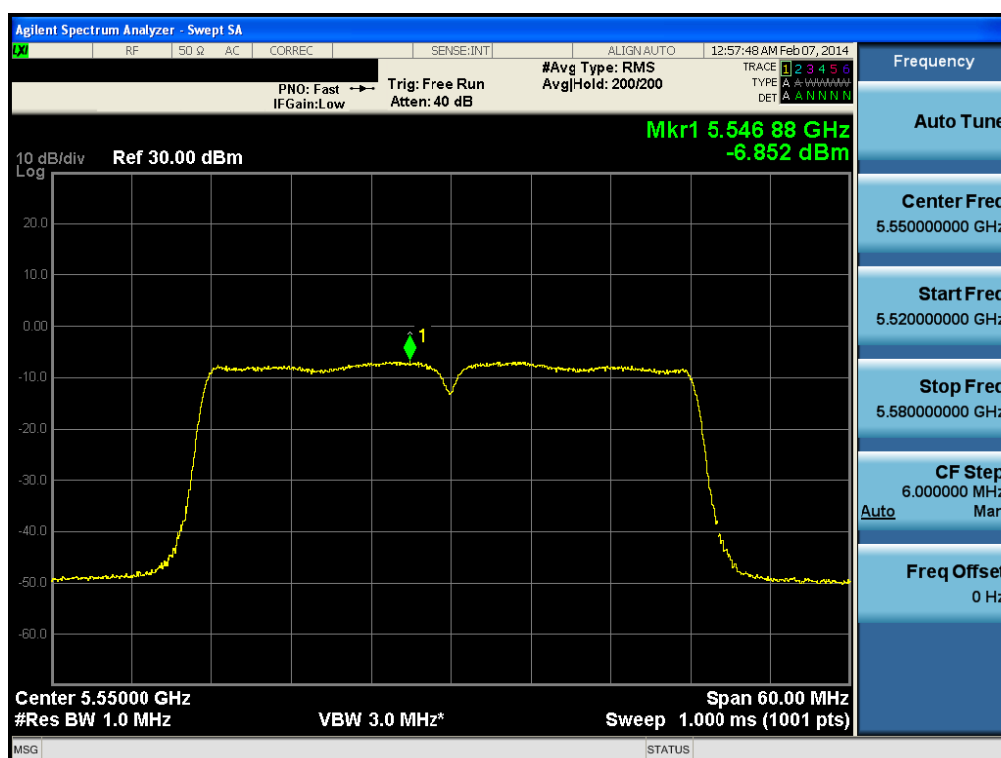
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT40 & Ch.102



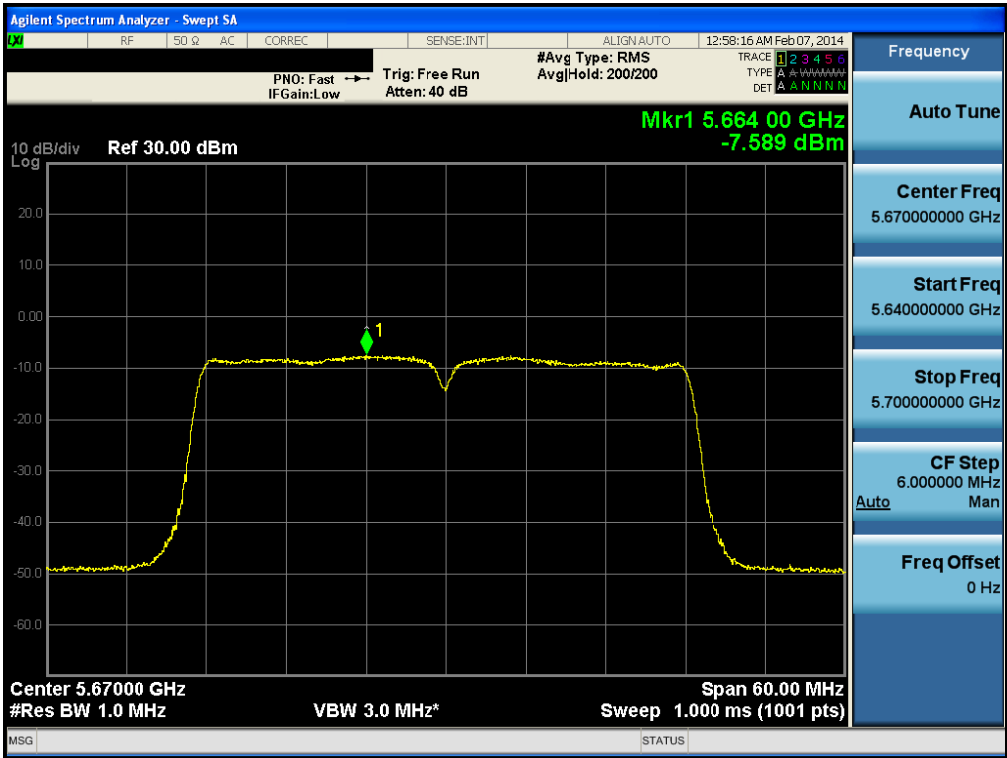
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT40 & Ch.110



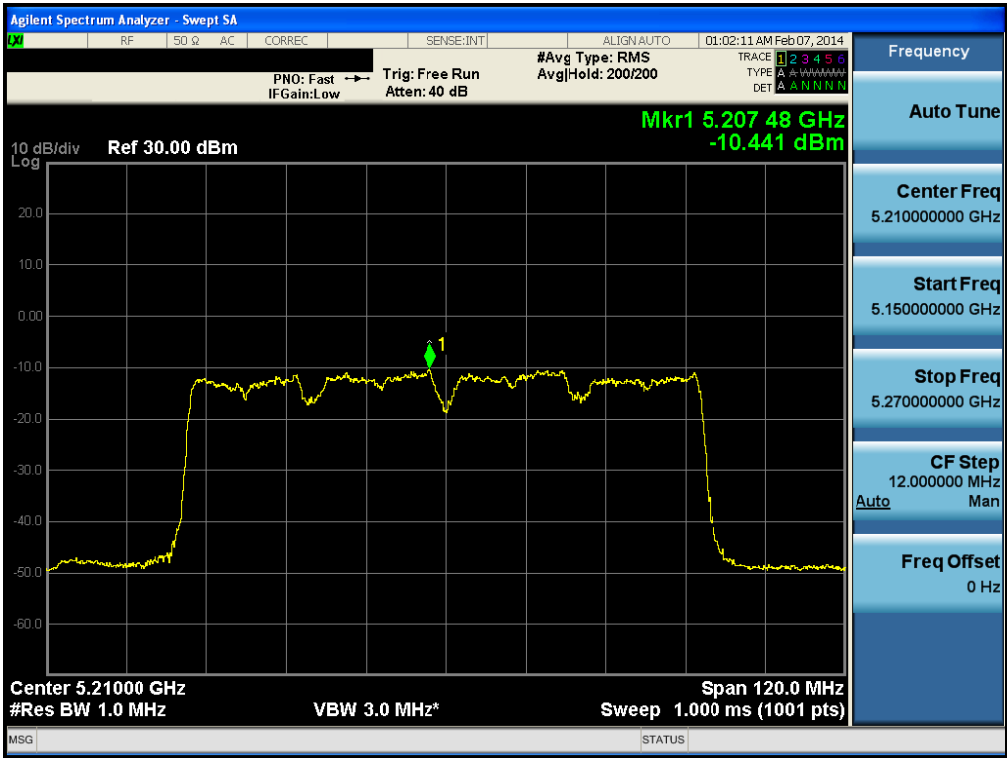
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11n HT40 & Ch.134



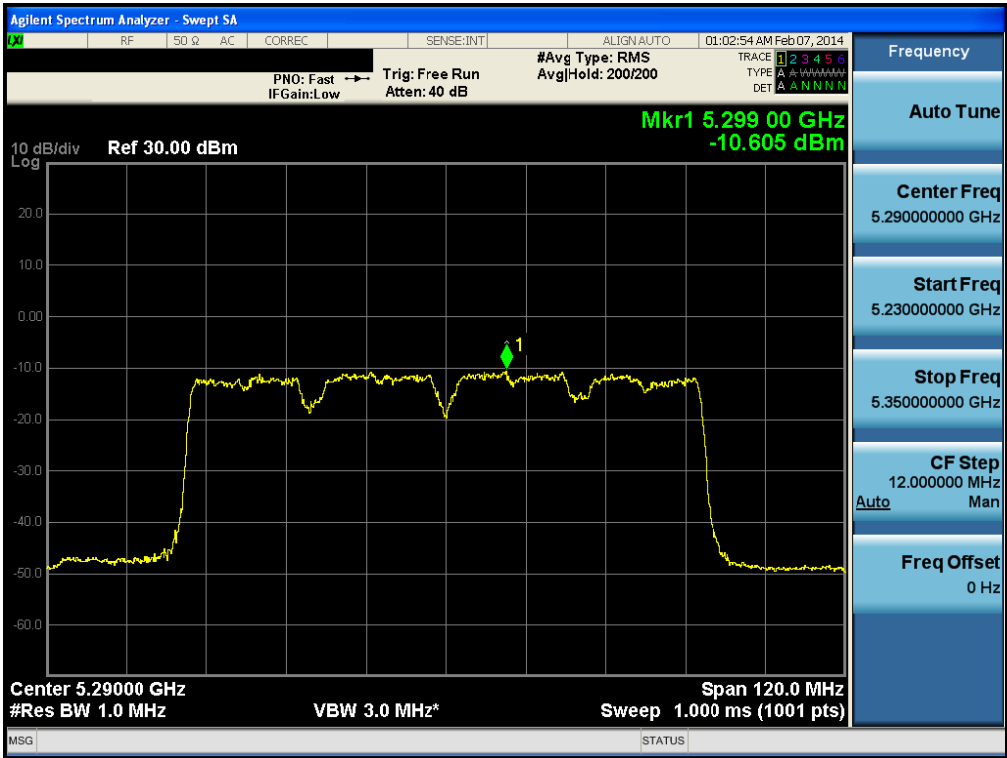
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42



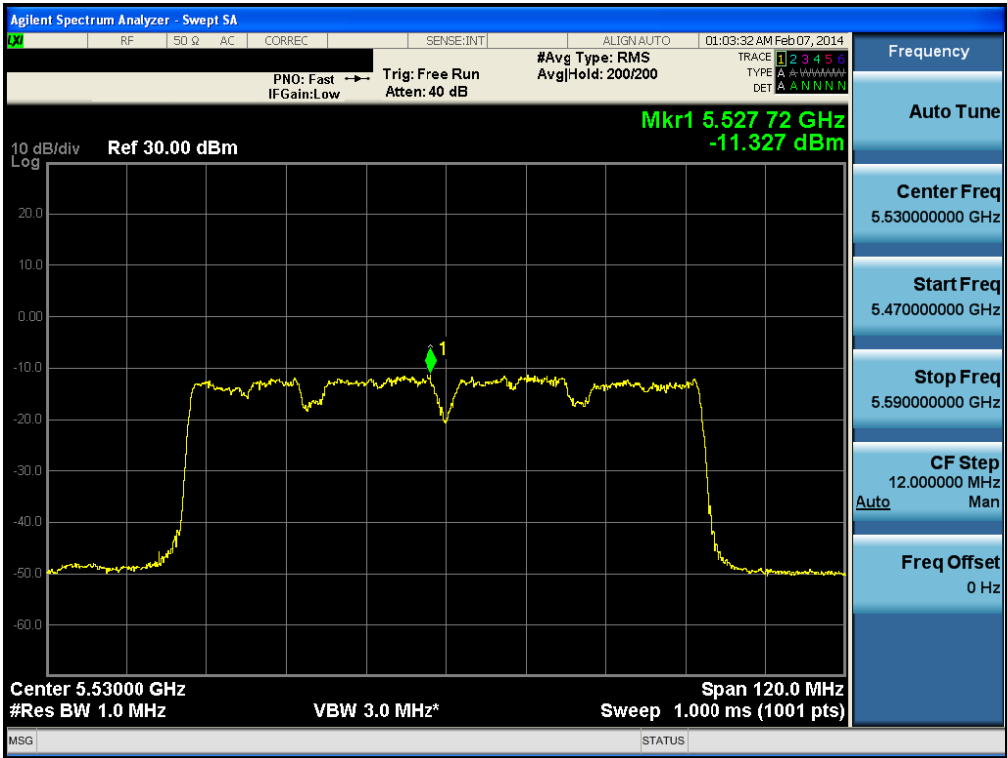
Peak Power Spectral Density

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.58



Peak Power Spectral Density

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.106

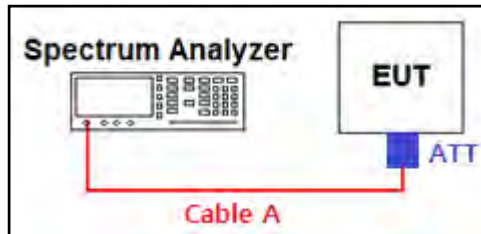


8.4 Peak Excursion Ratio

■ Test requirements

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed **13 dB/MHz**.

■ Test Configuration



■ Test Procedure

Peak Excursion Ratio is measured using Measurement Procedure **of KDB789033**

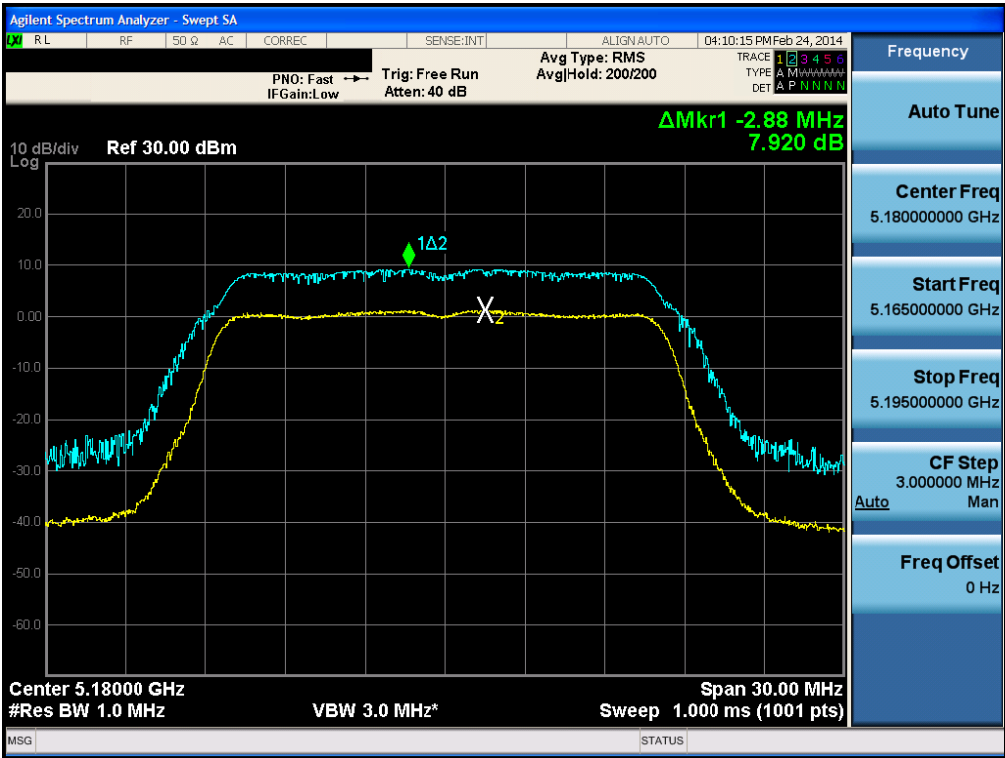
- 1) Compliance with the peak excursion requirement of Section 15.407(a)(6) shall be demonstrated by confirming that the ratio of the maximum of the peak-max-hold spectrum to the maximum of the average spectrum for continuous transmission does not exceed 13 dB. (Earlier procedures that required computing the ratio of the two spectra at each frequency across the emission bandwidth can lead to unintended failures at band edges and will no longer be required.)
- 2) Set the spectrum analyzer span to view the entire emission bandwidth.
- 3) Find the maximum of the peak-max-hold spectrum.
 - a) Set **RBW = 1 MHz & VBW ≥ 3 MHz**.
 - c) **Detector = peak**.
 - d) **Trace mode = max-hold**.
 - e) Allow the sweeps to continue until the trace stabilizes.
 - f) Use the peak search function to find the peak of the spectrum.
- 4) **Use the procedure found under F) to measure the PPSD.**
- 5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

■ Test Result : **Comply**

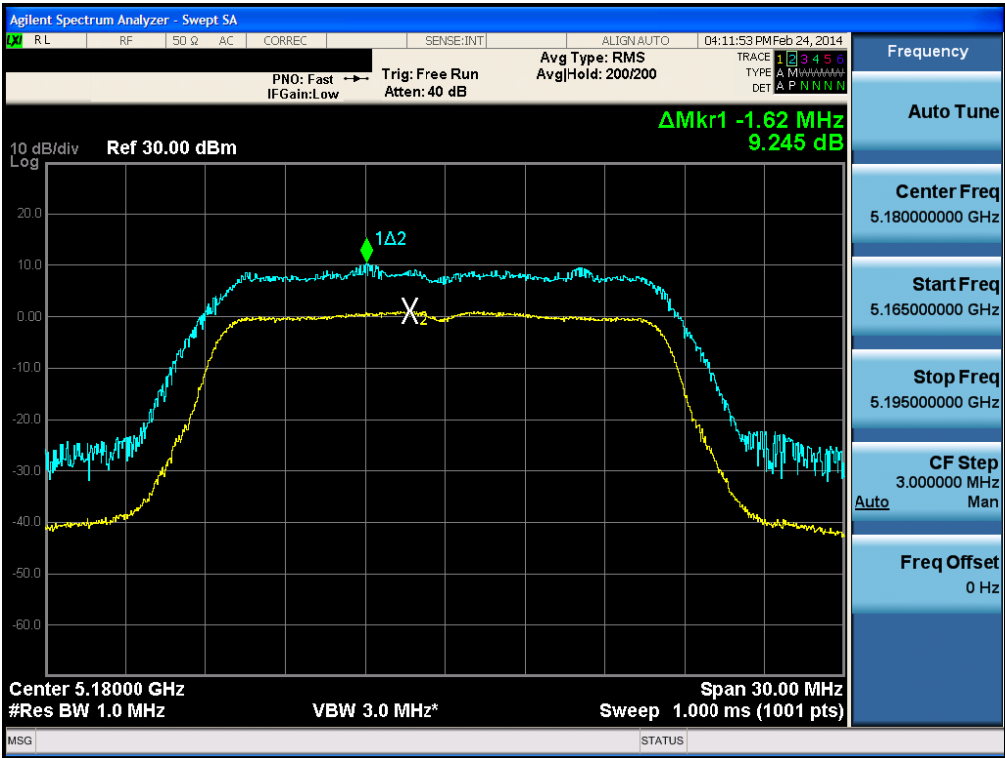
Mode	Band	Channel	Frequency [MHz]	Modulation Type	Test Result [MHz]	
					ANT 1	ANT 2
802.11a	Band I	36	5180	BPSK	7.920	7.942
				QPSK	9.245	9.282
				16QAM	9.918	9.601
				64QAM	9.598	10.013
802.11n (HT20)	Band I	36	5180	BPSK	8.284	8.867
				QPSK	9.337	8.303
				16QAM	9.964	10.236
				64QAM	10.186	10.548
802.11n (HT40)	Band I	46	5230	BPSK	9.539	9.079
				QPSK	10.107	9.890
				16QAM	10.645	10.380
				64QAM	11.138	10.674
802.11ac (VHT80)	Band I	42	5210	BPSK	10.393	10.421
				QPSK	10.620	10.811
				16QAM	11.153	10.568
				64QAM	10.834	11.624
				256QAM	11.537	10.588

Result Plots

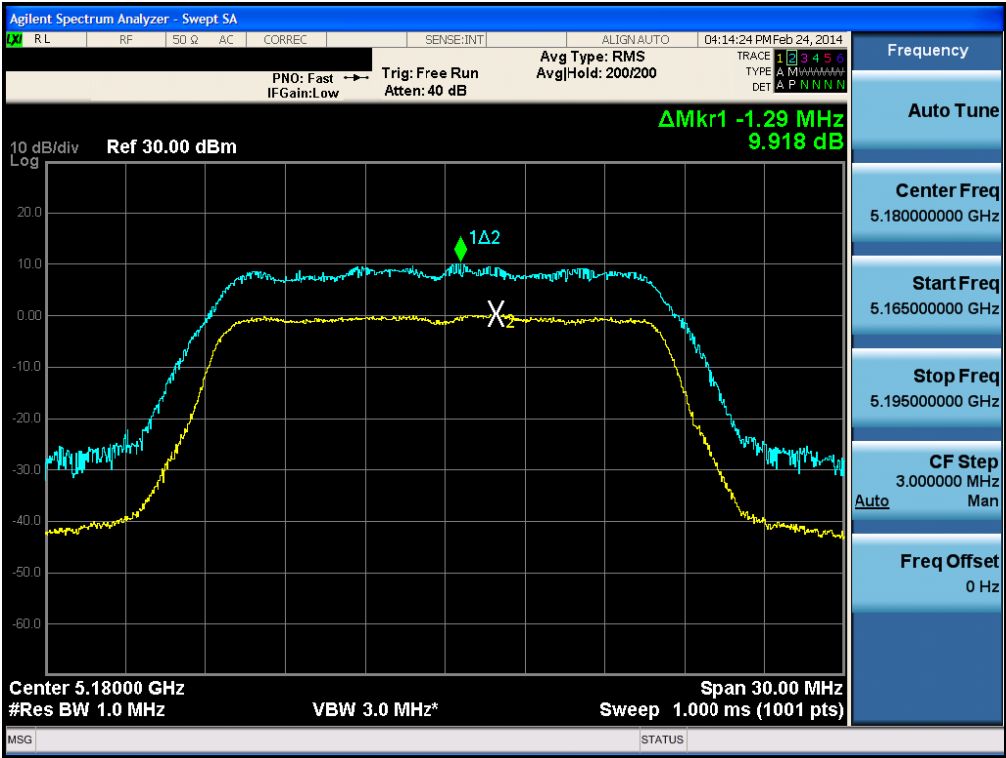
Peak Excursion Ratio Test Mode: ANT 1 & 802.11a & Ch.36 & BPSK



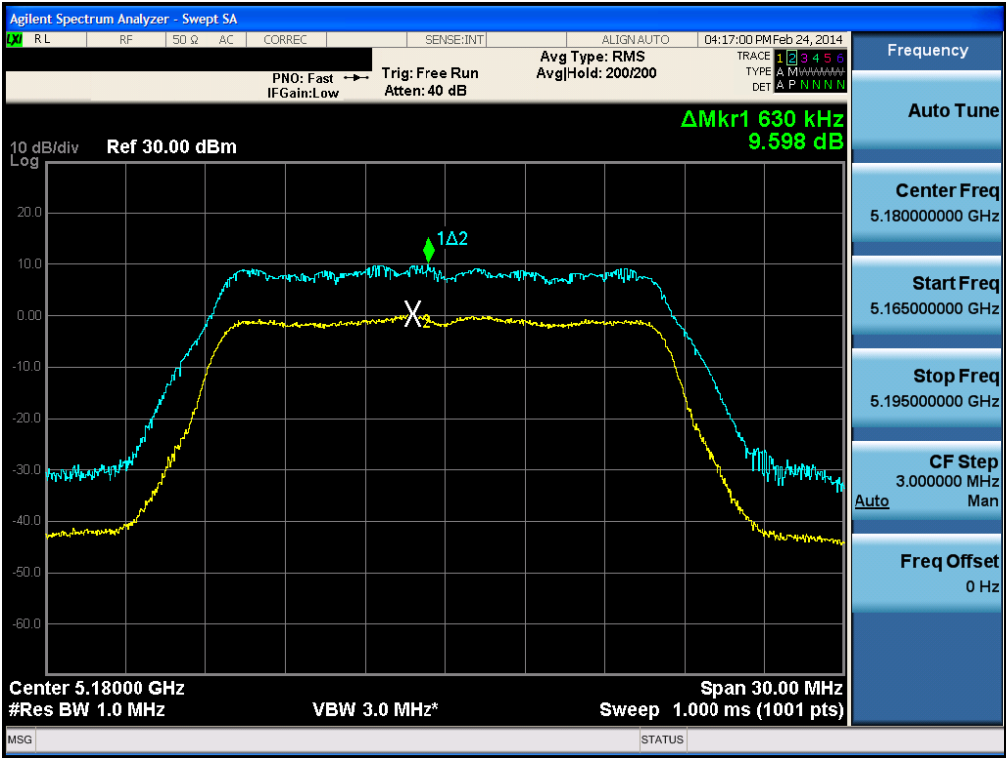
Peak Excursion Ratio Test Mode: ANT 1 & 802.11a & Ch.36 & QPSK



Peak Excursion Ratio Test Mode: ANT 1 & 802.11a & Ch.36 & 16QAM



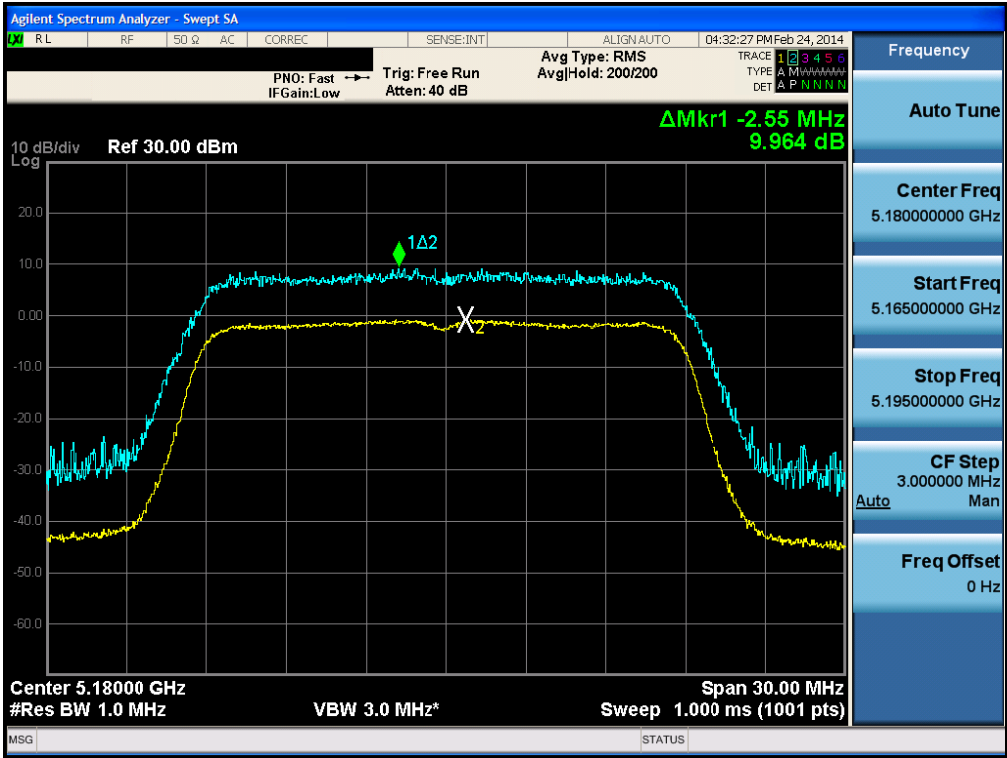
Peak Excursion Ratio Test Mode: ANT 1 & 802.11a & Ch.36 & 64QAM



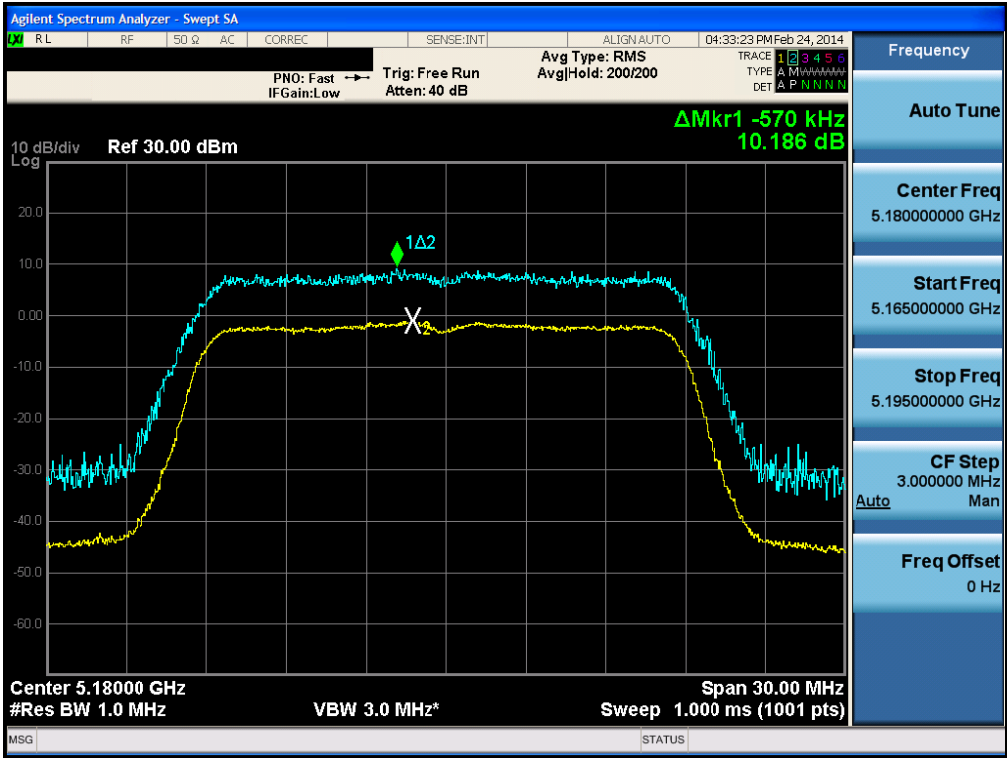
Test Mode: ANT 1 & 802.11n HT20 & Ch.36 & BPSK

Test Mode: ANT 1 & 802.11n HT20 & Ch.36 & QPSK

Peak Excursion Ratio Test Mode: ANT 1 & 802.11n HT20 & Ch.36 & 16QAM

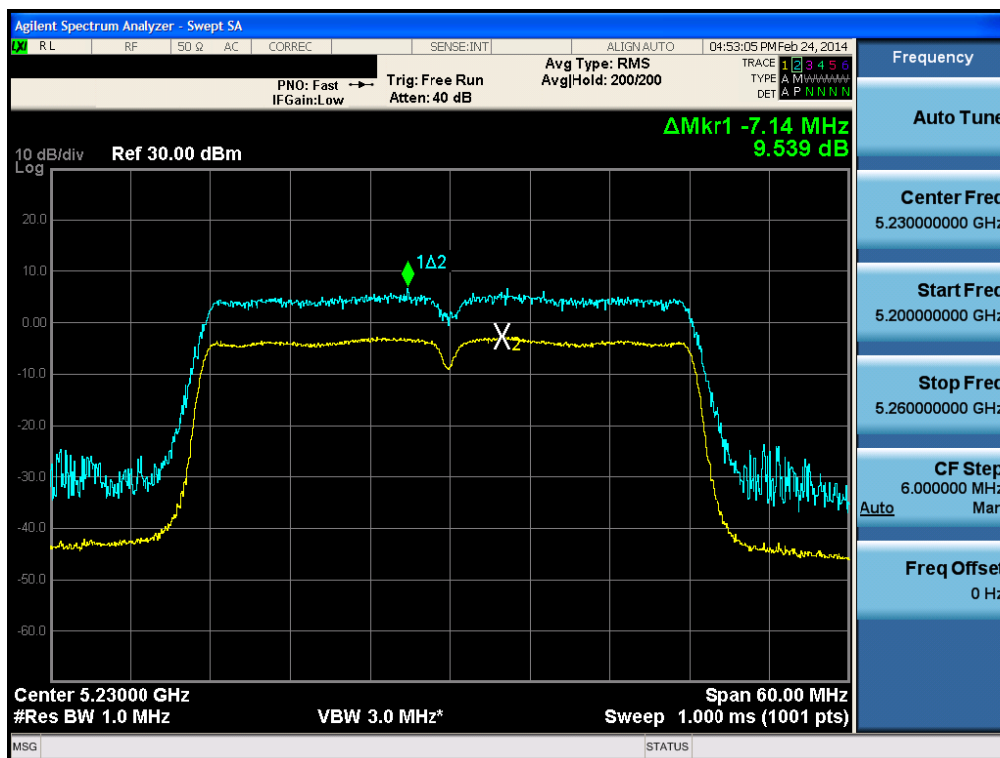


Peak Excursion Ratio Test Mode: ANT 1 & 802.11n HT20 & Ch.36 & 64QAM



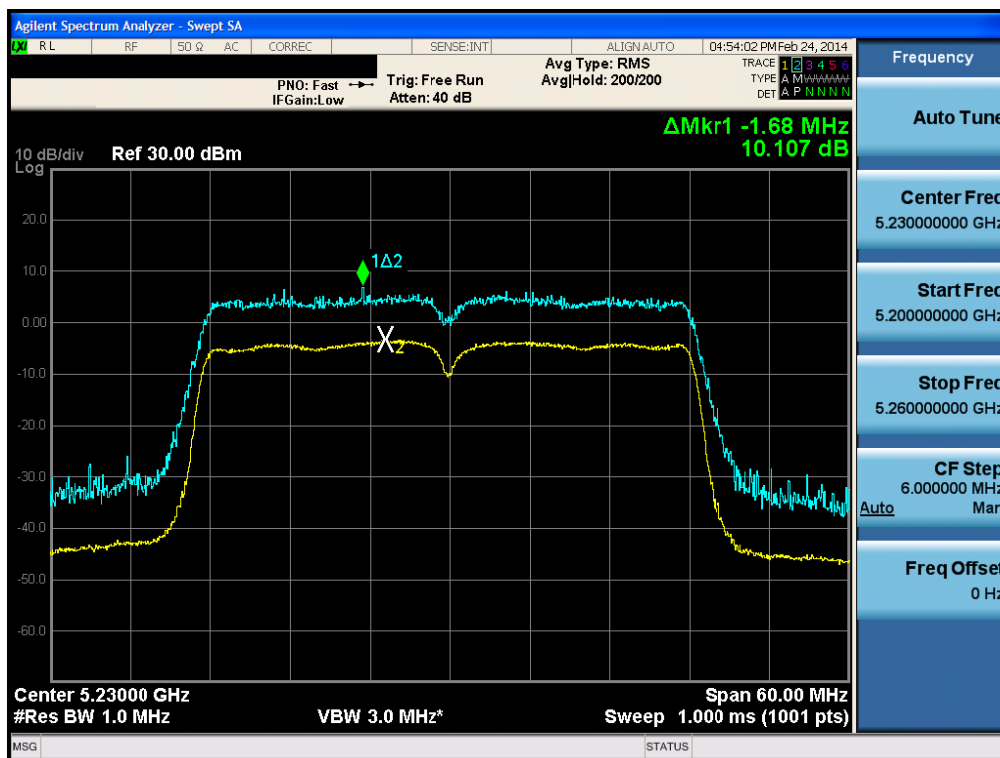
Peak Excursion Ratio

Test Mode: ANT 1 & 802.11n HT40 & Ch.46 & BPSK

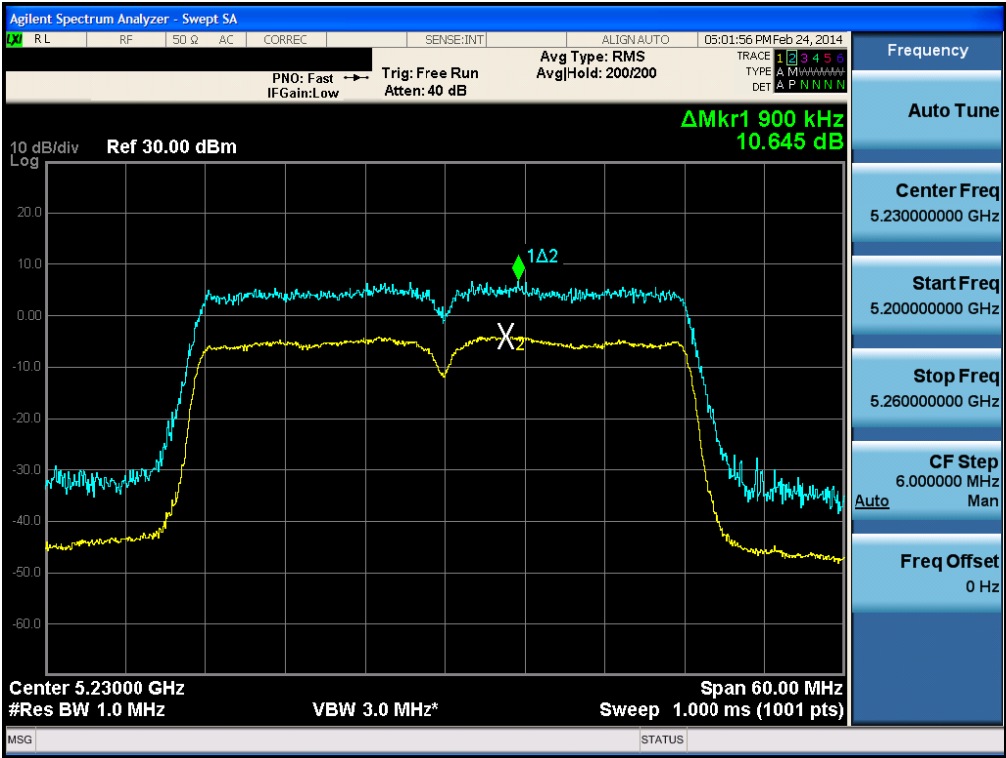


Peak Excursion Ratio

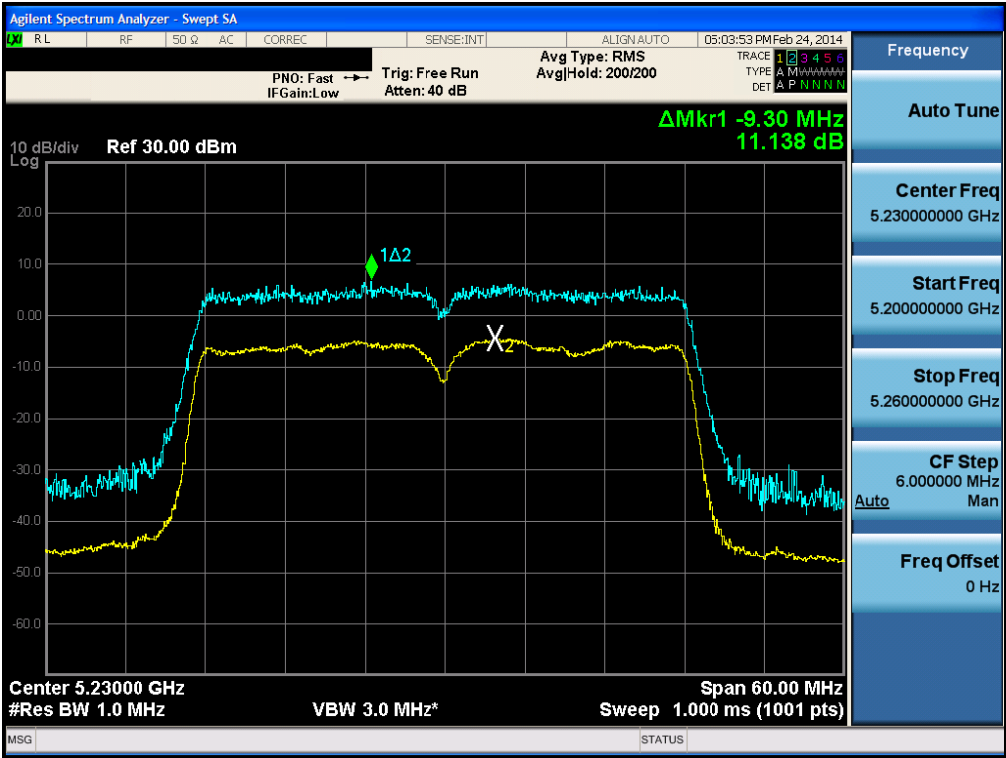
Test Mode: ANT 1 & 802.11n HT40 & Ch.46 & QPSK



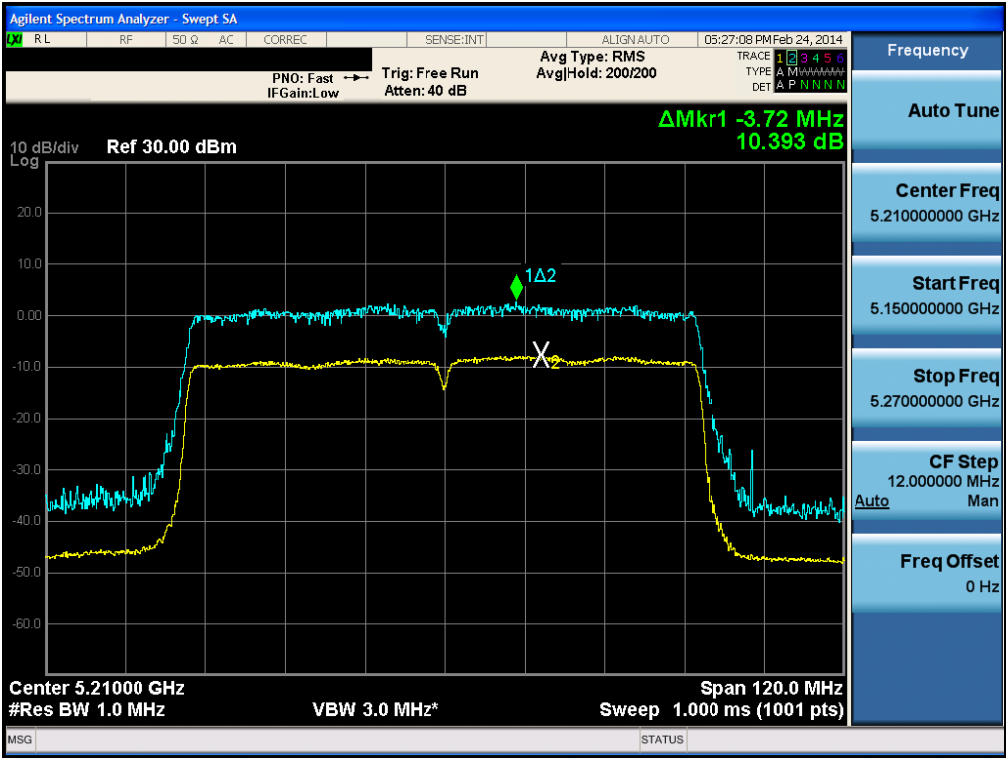
Peak Excursion Ratio Test Mode: ANT 1 & 802.11n HT40 & Ch.46 & 16QAM



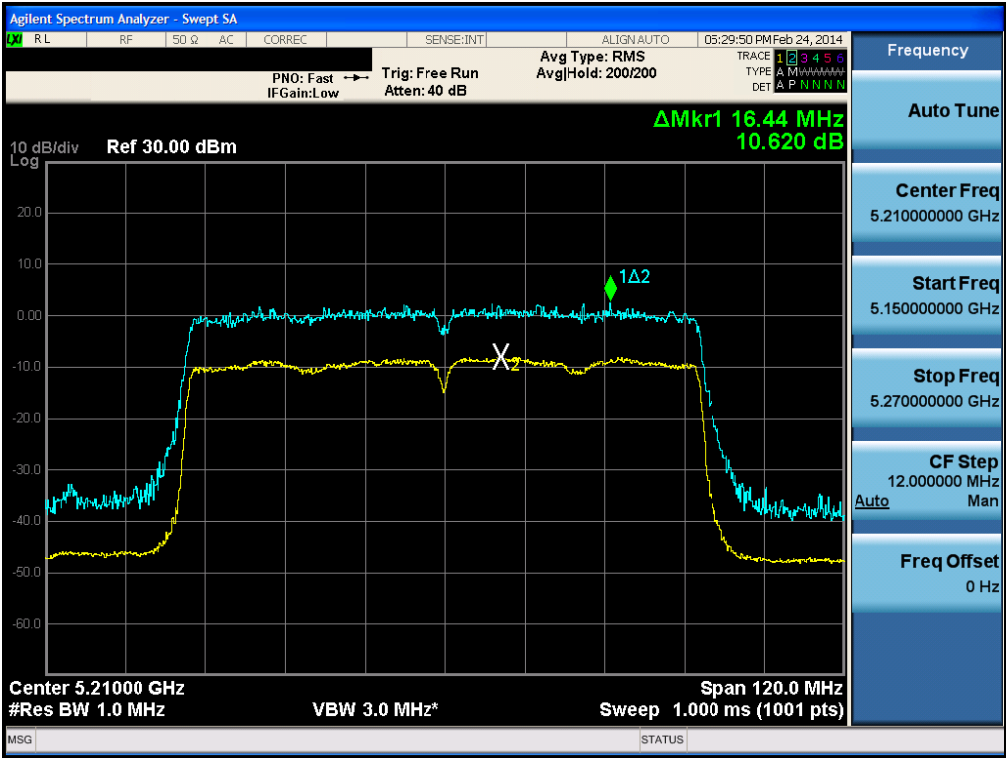
Peak Excursion Ratio Test Mode: ANT 1 & 802.11n HT40 & Ch.46 & 64QAM



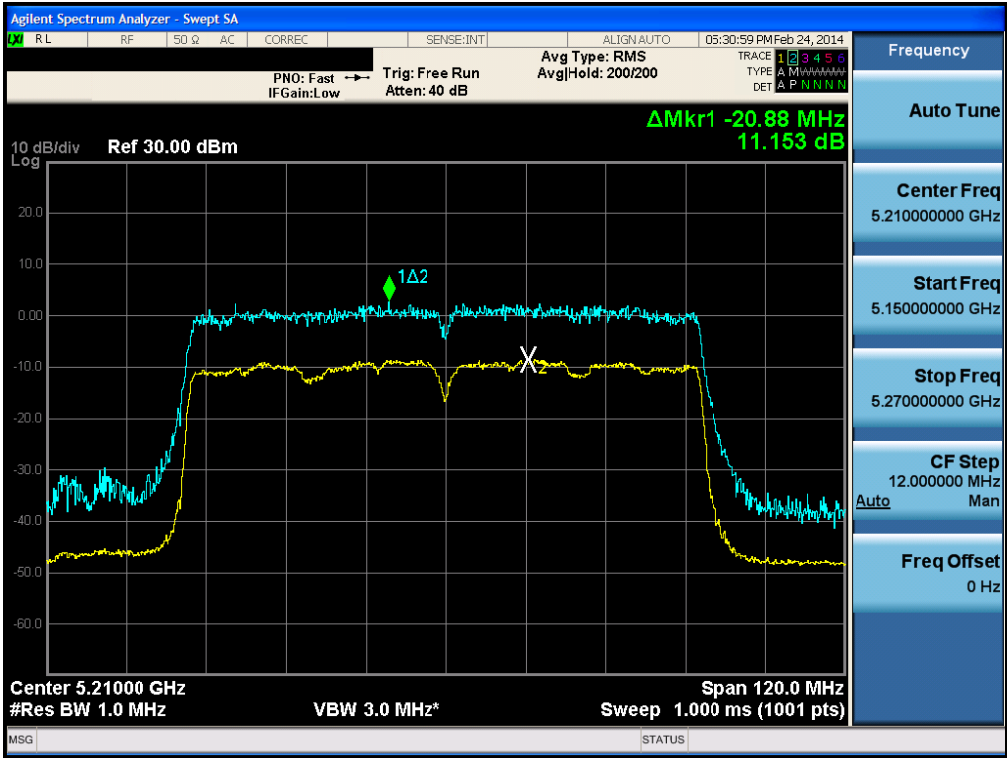
Peak Excursion Ratio Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42 & BPSK



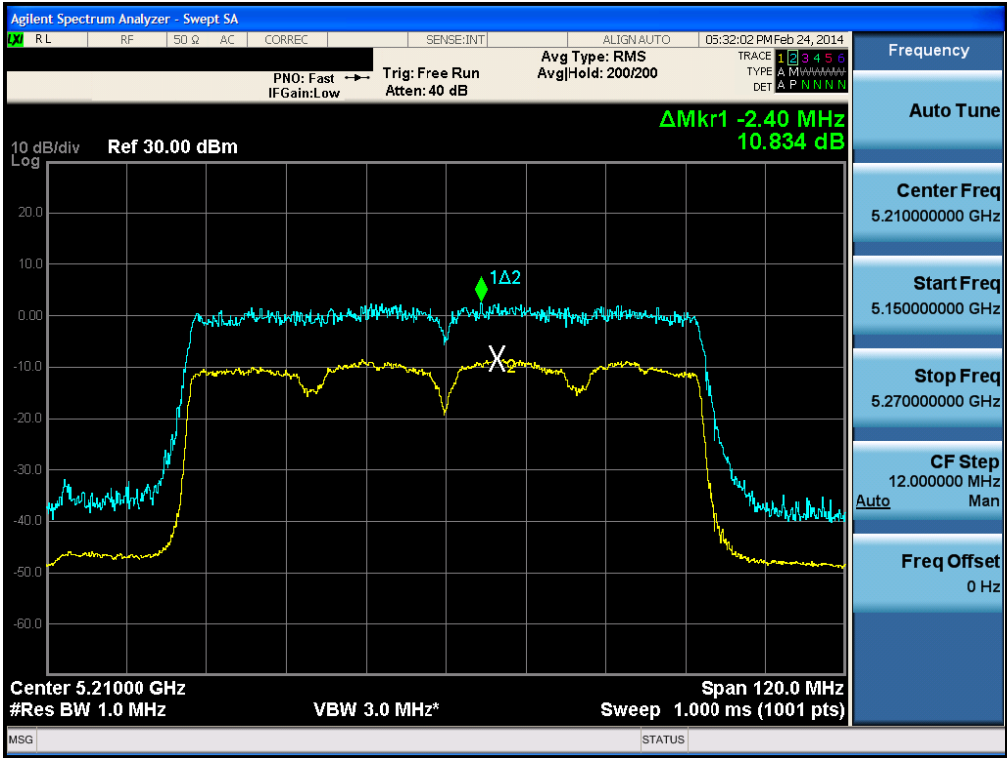
Peak Excursion Ratio Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42 & QPSK



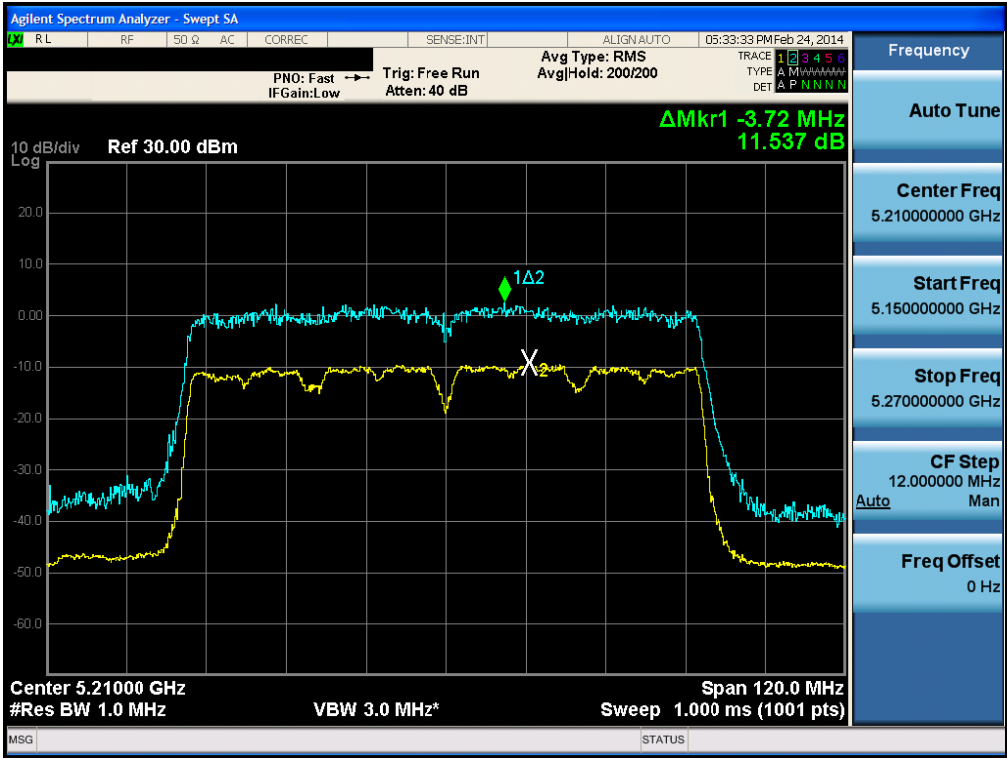
Peak Excursion Ratio Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42 & 16QAM



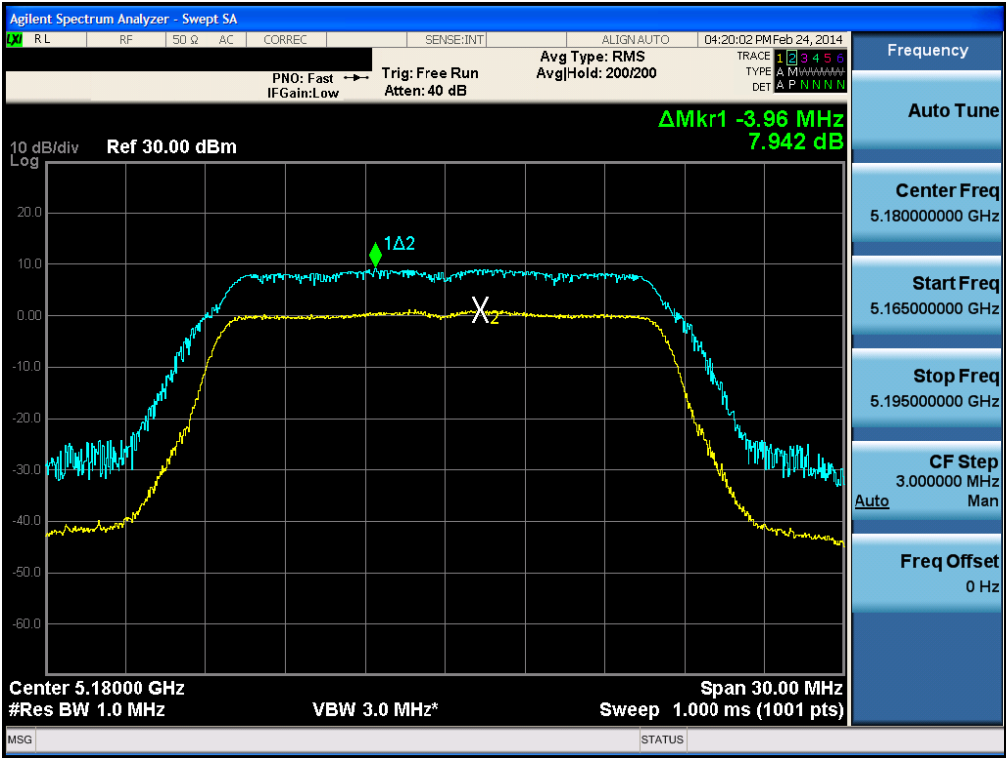
Peak Excursion Ratio Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42 & 64QAM



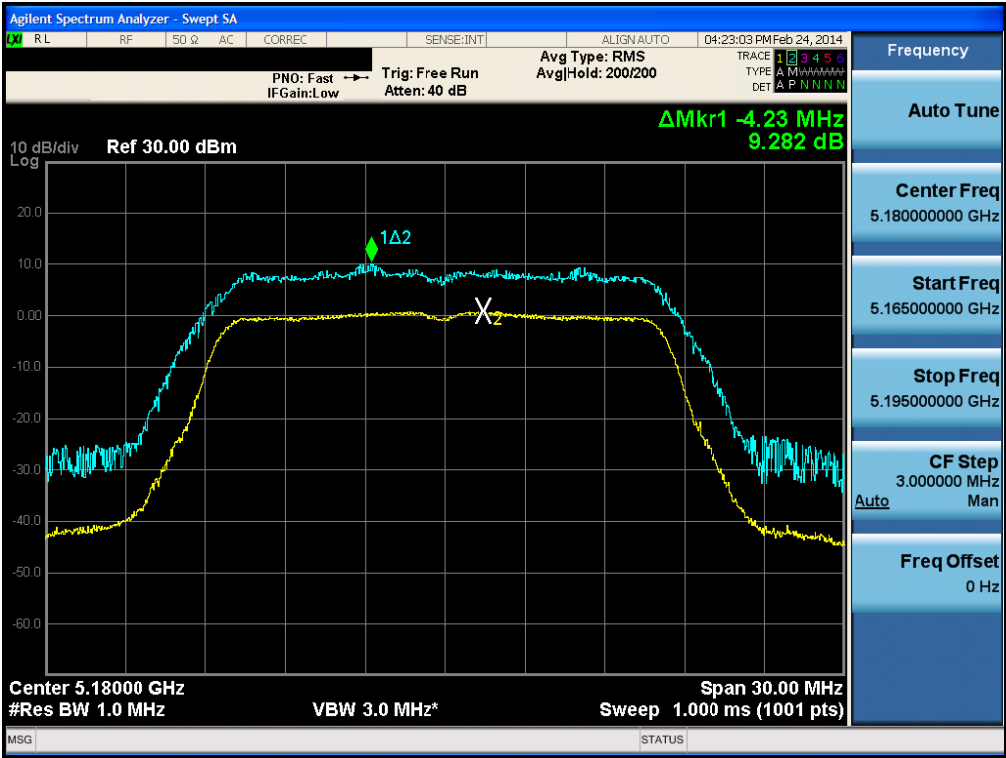
Peak Excursion Ratio Test Mode: ANT 1 & 802.11ac VHT80 & Ch.42 & 256QAM



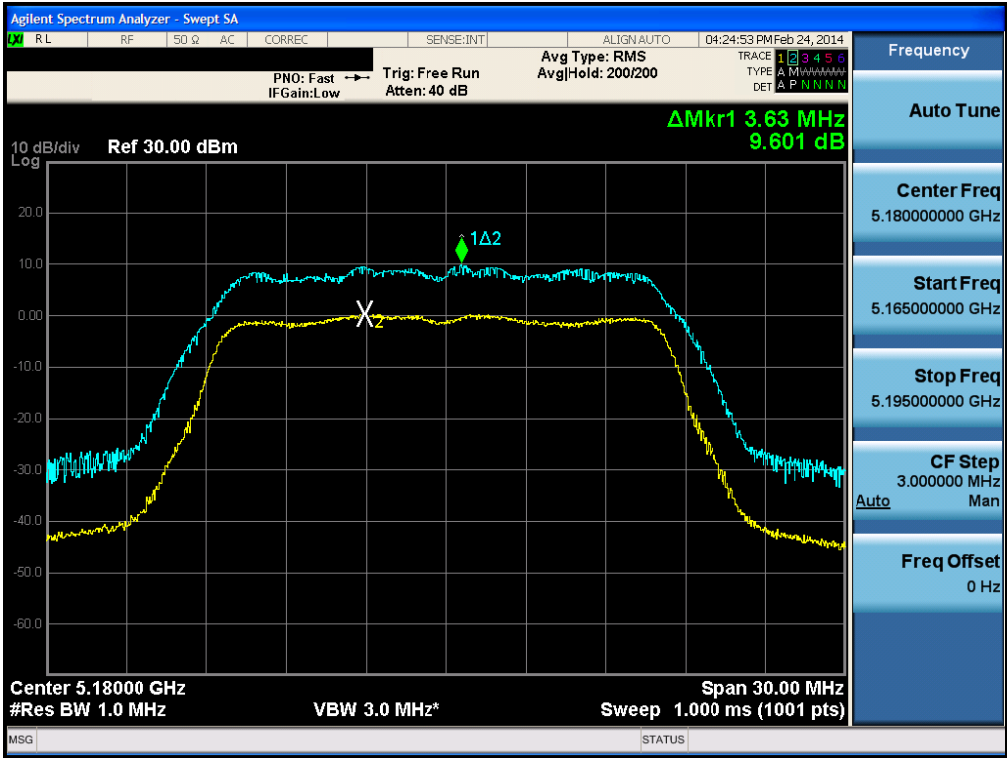
Peak Excursion Ratio Test Mode: ANT 2 & 802.11a & Ch.36 & BPSK



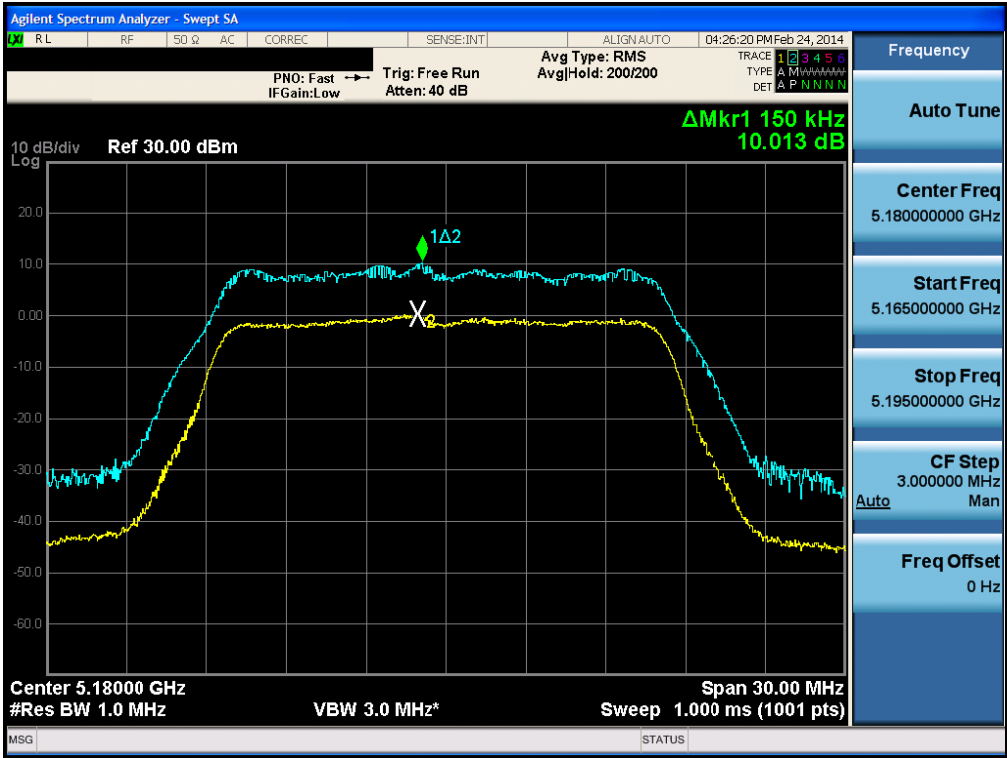
Peak Excursion Ratio Test Mode: ANT 2 & 802.11a & Ch.36 & QPSK



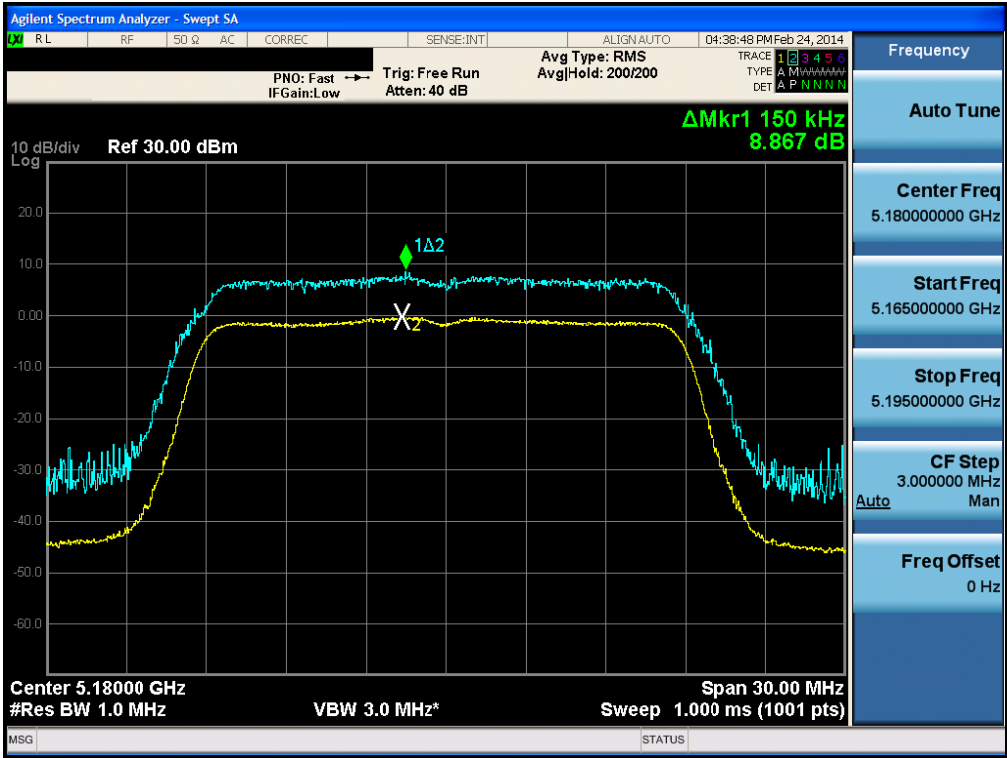
Peak Excursion Ratio Test Mode: ANT 2 & 802.11a & Ch.36 & 16QAM



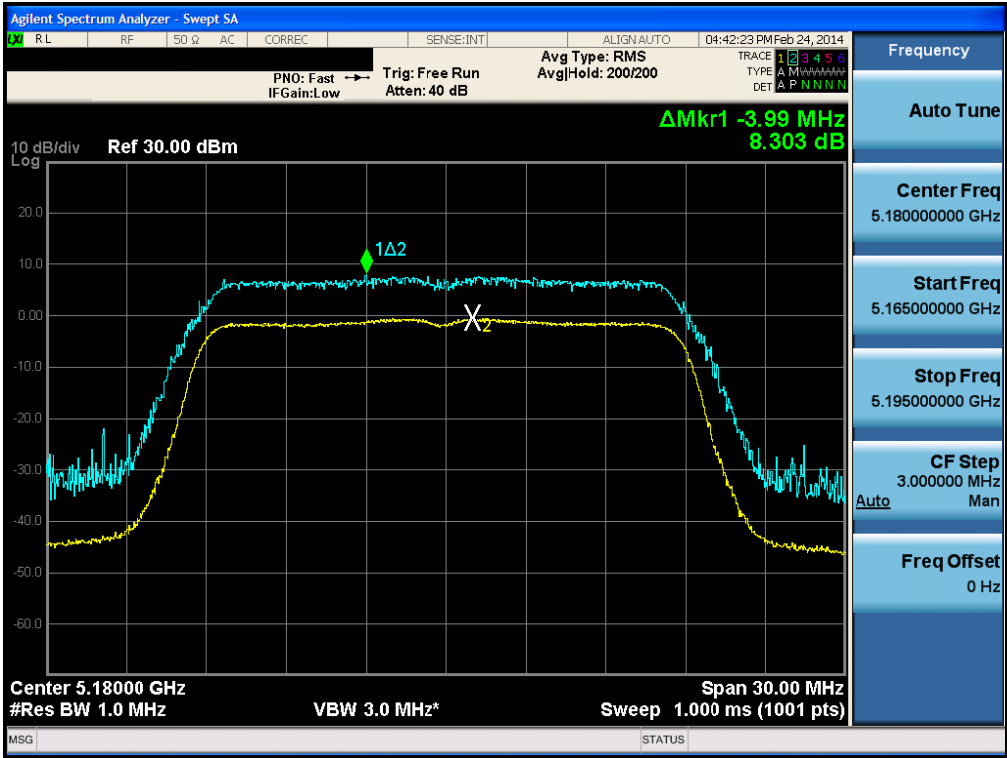
Peak Excursion Ratio Test Mode: ANT 2 & 802.11a & Ch.36 & 64QAM



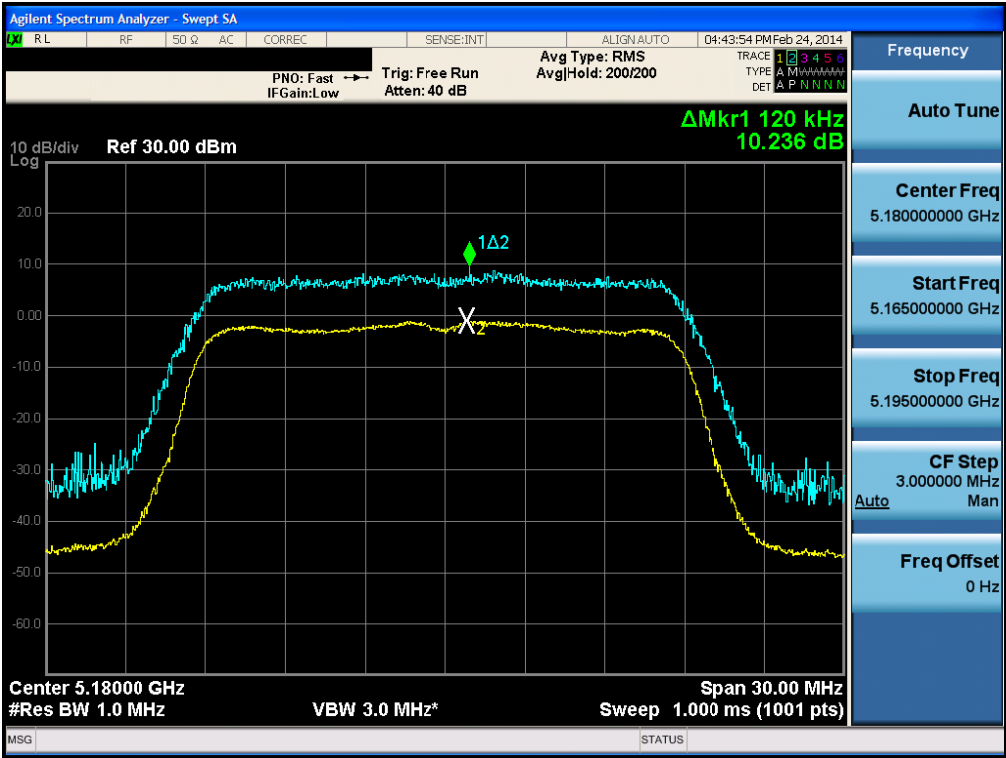
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT20 & Ch.36 & BPSK



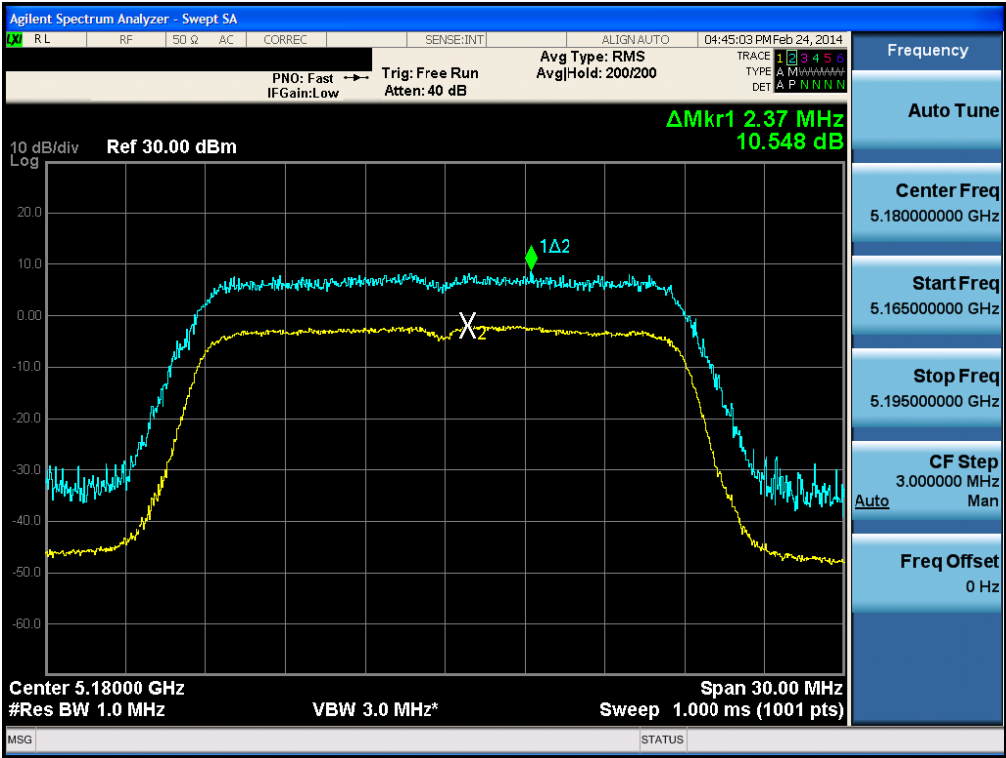
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT20 & Ch.36 & QPSK



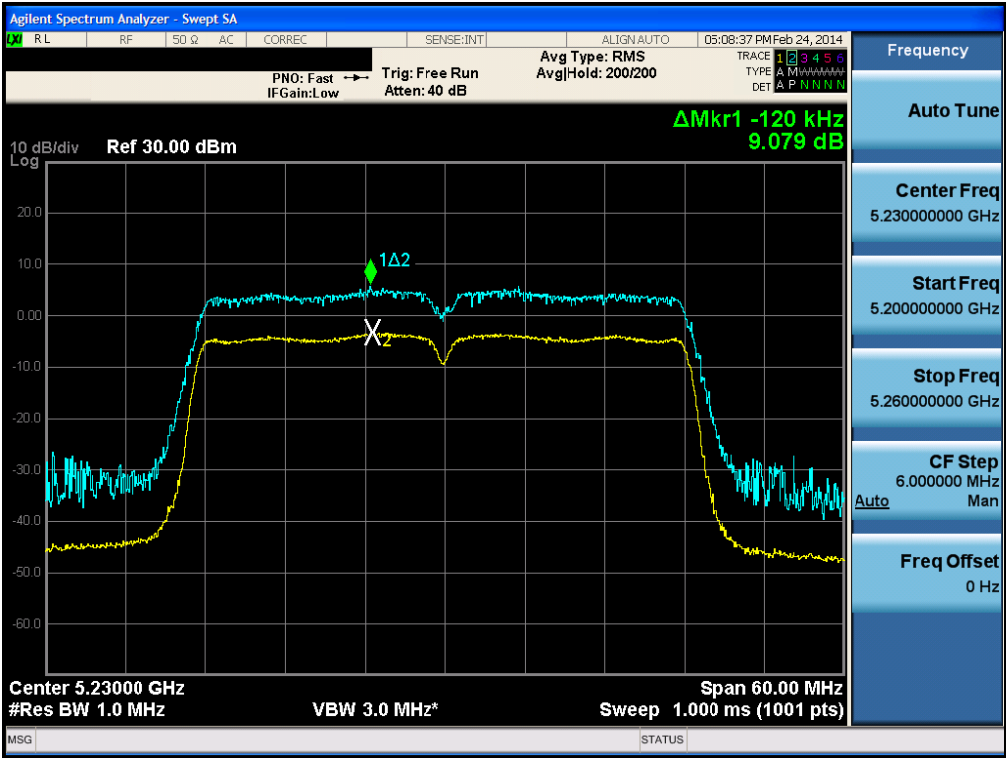
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT20 & Ch.36 & 16QAM



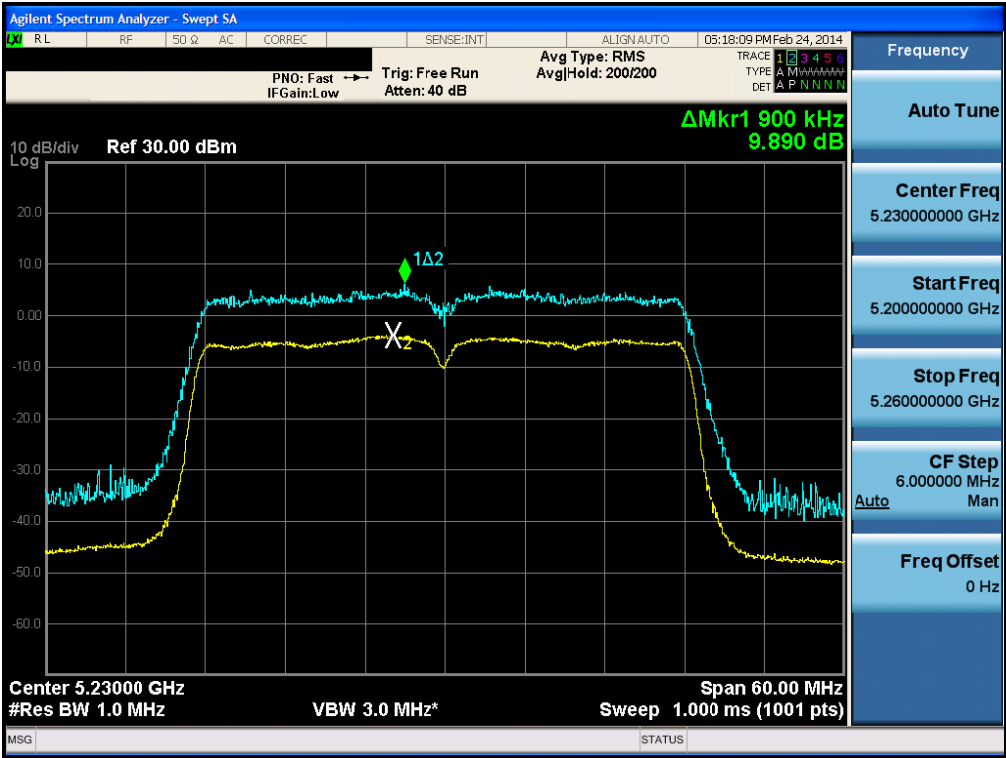
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT20 & Ch.36 & 64QAM



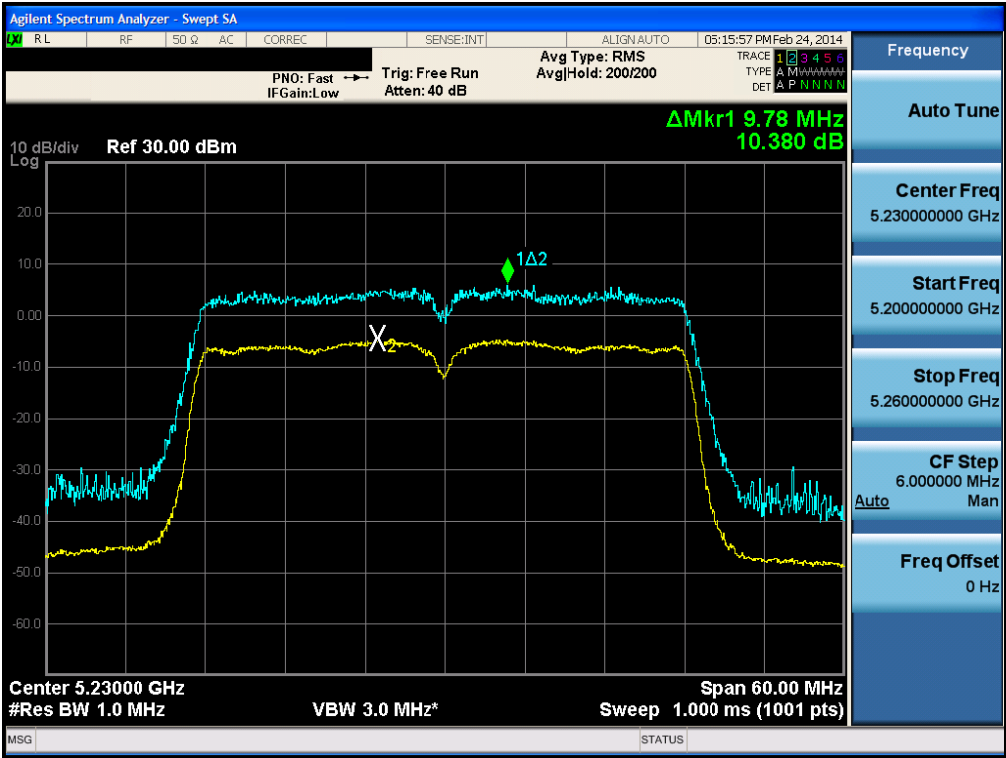
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT40 & Ch.46 & BPSK



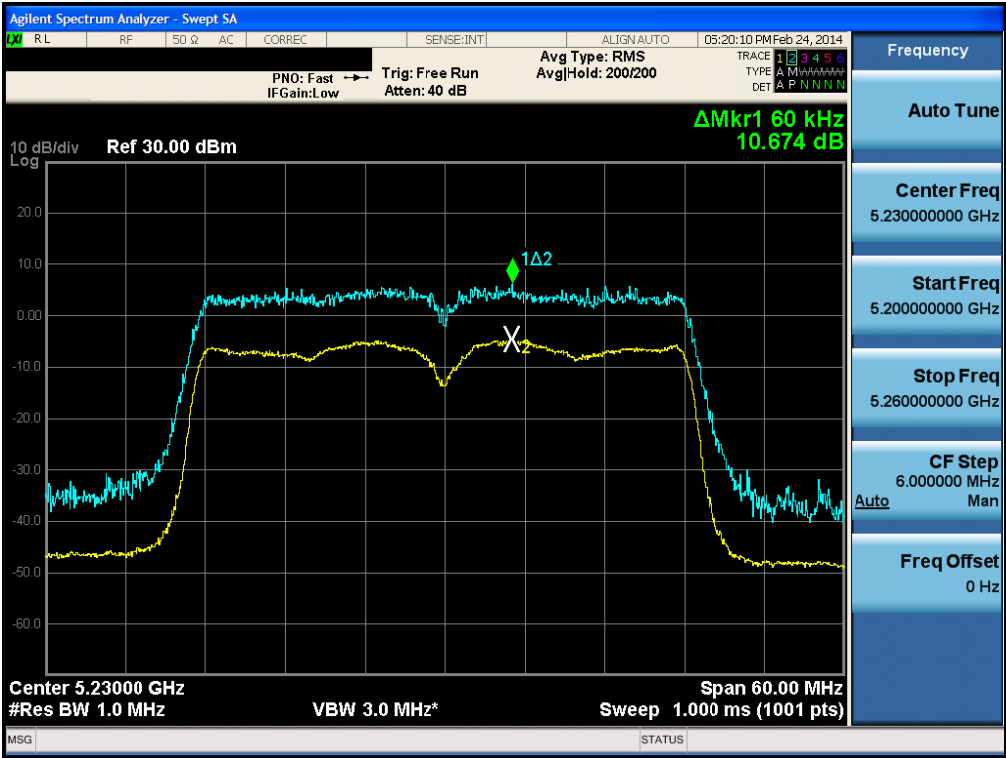
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT40 & Ch.46 & QPSK



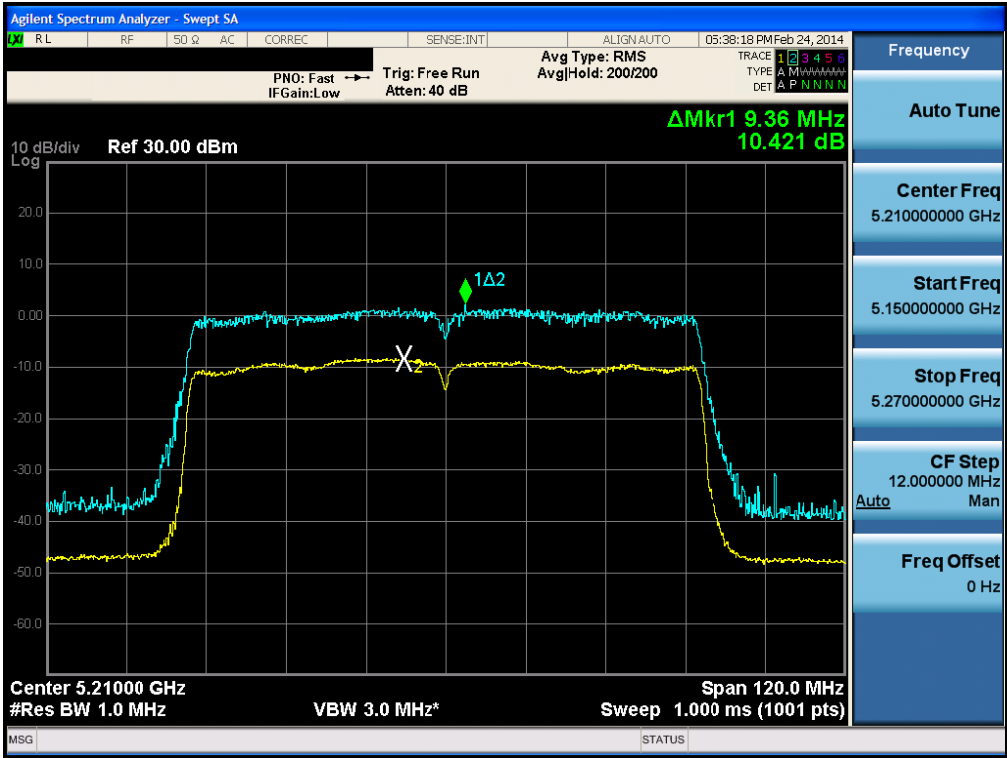
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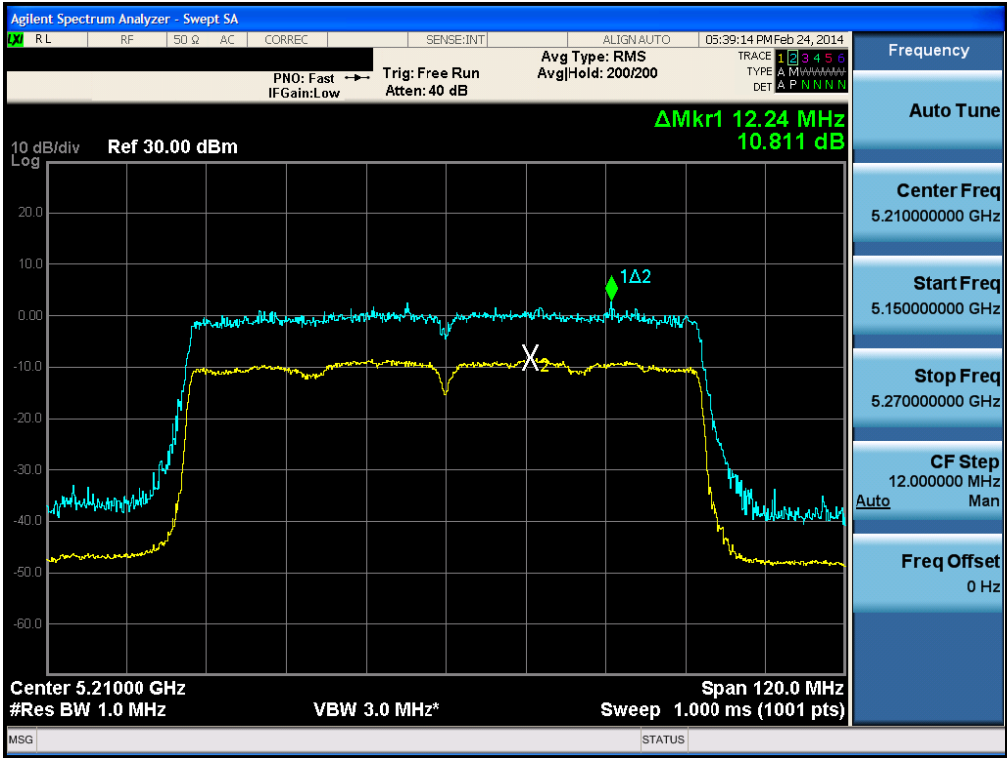
Peak Excursion Ratio Test Mode: ANT 2 & 802.11n HT40 & Ch.46 & 64QAM



Peak Excursion Ratio Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42 & BPSK

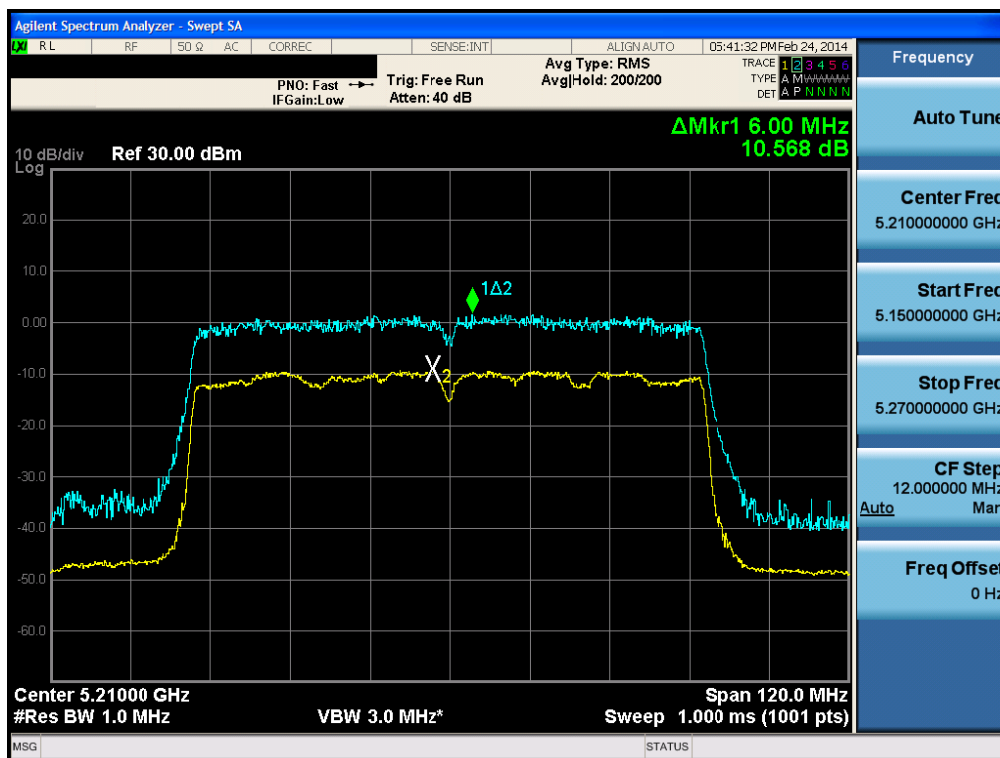


Peak Excursion Ratio Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42 & QPSK



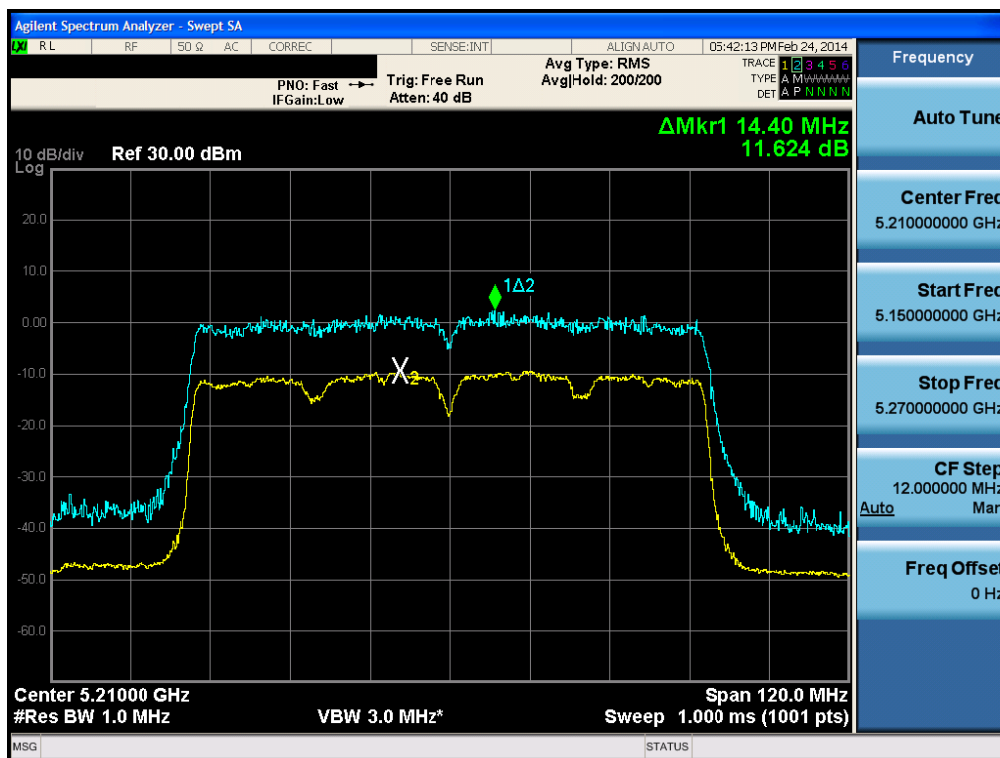
Peak Excursion Ratio

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42 & 16QAM



Peak Excursion Ratio

Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42 & 64QAM



Peak Excursion Ratio Test Mode: ANT 2 & 802.11ac VHT80 & Ch.42 & 256QAM

