RF TEST REPORT

Test item	:	Wi-Fi Transmitter
Model No.	:	WCH730B
Order No.	:	DTNC1410-04550
Date of receipt	:	2014-10-17
Test duration	:	2014-11-22 ~ 2014-12-15
Date of issue	:	2015-01-13
Use of report	:	FCC Original Grant

Applicant : Samsung Electronics Co., Ltd.
19 Chapin Rd., Building D, Pine Brook, New Jersey, United States, 07058

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	FCC Part 15.407 Subpart E
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

Tested by:

Engineer
JongHa Choi

Reviewed by:

Technical Manager
WonJung Lee

Test Report Version

Test Report No.	Date	Description
DRTFCC1501-0005	Jan. 13, 2015	Initial issue

CONTENTS

1. EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Wi-Fi Transmitter
Model Name	WCH730B
Add Model Name	NA
Power Supply	DC 5 V
Frequency Range	**U-NII 1(5150 ~ 5250MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5180 ~ 5240 MHz ▪ 802.11n/ac(HT40, VHT40): 5190 ~ 5230 MHz ▪ 802.11ac(VHT80): 5210 MHz **U-NII 2A(5250 ~ 5350MHz)** ▪ 802.11a/n/ac(HT20, VHT40): 5260 ~ 5320 MHz ▪ 802.11n/ac(HT40, VHT40): 5270 ~ 5310 MHz ▪ 802.11ac(VHT80): 5290 MHz **U-NII 2C(5470 ~ 5725MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5500 ~ 5700 MHz ▪ 802.11n/ac(HT40, VHT40): 5510 ~ 5670 MHz ▪ 802.11ac(VHT80): 5530 MHz **U-NII 3(5725 ~ 5850MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5745 ~ 5825 MHz ▪ 802.11n/ac(HT40, VHT40): 5755 ~ 5795 MHz ▪ 802.11ac(VHT80): 5775 MHz
Modulation type	256QAM, 64QAM, 16QAM, QPSK BPSK for OFDM
Antenna Specification	**Antenna type**: Internal Antenna **Antenna gain** ▪ U-NII 1 band: ANT 1: 2.500 dBi & ANT 2: 2.200 dBi ▪ U-NII 2A band: ANT 1: 2.600 dBi & ANT 2: 2.800 dBi ▪ U-NII 2C band: ANT 1: 2.800 dBi & ANT 2: 2.500 dBi ▪ U-NII 3 band: ANT 1: 2.000 dBi & ANT 2: 2.800 dBi **Antenna Configuration** ▪ 802.11a: Single Transmitting (ANT 1) ▪ 802.11n(MCS0 ~ 7) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11n(MCS8 ~ 15) : Multiple Transmitting (ANT 1 and ANT 2) ▪ 802.11ac(NSS1 MCS0 ~ 9) : Single Transmitting (ANT 1 or ANT 2) ▪ 802.11ac(NSS2 MCS0 ~ 9) : Multiple Transmitting (ANT 1 and ANT 2)

Note: This device does not used TDWR band.

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate	
		Single transmitting	Multiple transmitting
U-NII 1	802.11a	6Mbps	NA
	802.11n(HT20)	MCS 0	MCS 8
	802.11n(HT40)	MCS 0	MCS 8
	802.11ac(VHT20)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT40)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT80)	NSS1 MCS 0	NSS2 MCS 0
U-NII 2A	802.11a	6Mbps	NA
	802.11n(HT20)	MCS 0	MCS 8
	802.11n(HT40)	MCS 0	MCS 8
	802.11ac(VHT20)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT40)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT80)	NSS1 MCS 0	NSS2 MCS 0
U-NII 2C	802.11a	6Mbps	NA
	802.11n(HT20)	MCS 0	MCS 8
	802.11n(HT40)	MCS 0	MCS 8
	802.11ac(VHT20)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT40)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT80)	NSS1 MCS 0	NSS2 MCS 0
U-NII 3	802.11a	6Mbps	NA
	802.11n(HT20)	MCS 0	MCS 8
	802.11n(HT40)	MCS 0	MCS 8
	802.11ac(VHT20)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT40)	NSS1 MCS 0	NSS2 MCS 0
	802.11ac(VHT80)	NSS1 MCS 0	NSS2 MCS 0

The worst case data rate for each modulation is determined as above table. 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]
U-NII 1	36	5180	38	5190	-	-
	40	5200	-	-	42	5210
	48	5240	46	5230	-	-
U-NII 2A	52	5260	54	5270	-	-
	60	5300	-	-	58	5290
	64	5320	62	5310	-	-
U-NII 2C	100	5500	102	5510	-	-
	116	5580	110	5550	106	5530
	140	5700	134	5670	-	-
U-NII 3	149	5745	151	5755	-	-
	157	5785	-	-	155	5775
	165	5825	159	5795	-	-

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Notebook PC	20095	WB06116969	Lenovo	DOC

2.4 Tested environment

Temperature	:	22 °C ~ 24 °C
Relative humidity content	:	42 % ~ 46 % 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)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)				
15.407(a)	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(e)	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz (5725-5850)		C
15.407(a)	Maximum Conducted Output Power	5150 ~ 5250MHz For FCC: < 30 dBm or < 23.97 dBm 5150 ~ 5250MHz For IC: 200mW or <10 + 10log$_{10}$(B) dBm, whichever power is less. 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC 250mW or <11 + 10log$_{10}$(B) dBm, whichever power is less. 5725 ~ 5850MHz For FCC: < 30 dBm		C Note 3
15.407(a)	Peak Power Spectral Density	5150 ~ 5250MHz For FCC: 11dBm/MHz or 17dBm/MHz 5150 ~ 5250MHz For IC: 10dBm/MHz 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC: 11dBm/MHz 5725 ~ 5850MHz For FCC: 30dBm/500kHz		C Note 4
15.407(g)	Frequency Stability	N/A		C
15.407(b)	Undesirable Emissions	5150 ~ 5725MHz: < -27 dBm/MHz EIRP 5725 ~ 5850MHz: < -17 dBm/MHz EIRP or < -27 dBm/MHz EIRP	Radiated	C Note 5, 6
15.205 15.209 15.407(b)	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 6
15.407(h)	Dynamic Frequency Selection	See DFS test report	-	C Note 7
15.207	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	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 D02 V01, KDB662911 D01 v02r01 and ANSI C63.10-2009.

Note 3: (i) For access point operating in the band 5.15-5.25 GHz: < 30 dBm

(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 23.97 dBm

Note 4: (i) For access point operating in the band 5.15-5.25 GHz: < 17 dBm/MHz

(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 11 dBm/MHz

Note 5: For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz

Note 6: These test items were performed in each axis and the worst case data was reported.

Note 7: For DFS testing, please refer to DFS test report.

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB789033 D02 v01. 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 test 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 D02 v01. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2009.

The EUT is placed on the table, 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 D02 v01. 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 C63.10-2009 as stated on KDB789033 D02 v01.

The EUT is placed on a non-conductive 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 42, 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 [8.3]:

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 internal antenna of this E.U.T is permanently attached on the main PCB.(Refer to Internal Photo.)
Therefore this module Complies with the requirement of §15.203

7.2 Directional antenna gain(Worst case):

Bands	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain [dBi]
U-NII 1	2.500	2.200	5.362 Note 1.
U-NII 2A	2.600	2.800	5.711 Note 1.
U-NII 2C	2.800	2.500	5.662 Note 1.
U-NII 3	2.000	2.800	5.420 Note 1.

Note 1. Directional gain(correlated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/20} + 10^{G_2/20} + \ldots + 10^{G_N/20})^2 / N^{ANT}] \text{ dBi}$$

Note 2. Directional gain(completely uncorrelated signal with unequal antenna gain and equal transmit power)

$$10 \log [(10^{G_1/10} + 10^{G_2/10} + \ldots + 10^{G_N/10}) / N^{ANT}] \text{ dBi}$$

Note 3. Directional gain(spatial multiplexing)

$$G_{ANT\,MAX} + 10 \log (N_{ANT} / N_{SS}) \text{ dBi}$$

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 Configuration

Refer to the APPENDIX I.

▣ Test Procedure

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02 V01**.
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**.
   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	U-NII 1	36	5180	21.670	-
		40	5200	21.400	-
		48	5240	21.430	-
	U-NII 2A	52	5260	21.670	-
		60	5300	21.610	-
		64	5320	21.280	-
	U-NII 2C	100	5500	21.320	-
		116	5580	21.440	-
		140	5700	21.630	-
802.11n (HT20)	U-NII 1	36	5180	21.710	21.760
		40	5200	21.920	21.810
		48	5240	21.710	21.790
	U-NII 2A	52	5260	21.580	21.650
		60	5300	21.690	21.800
		64	5320	21.610	21.590
	U-NII 2C	100	5500	21.850	21.640
		116	5580	21.700	21.800
		140	5700	21.650	21.770
802.11n (HT40)	U-NII 1	38	5190	40.100	39.930
		46	5230	40.290	39.870
	U-NII 2A	54	5270	40.020	39.940
		62	5310	39.710	39.950
	U-NII 2C	102	5510	40.010	40.190
		110	5550	39.850	39.930
		134	5670	40.090	40.190
802.11ac (VHT80)	U-NII 1	42	5210	82.240	81.740
	U-NII 2A	58	5290	80.990	81.470
	U-NII 2C	106	5530	81.900	81.710

▣ Result Plots

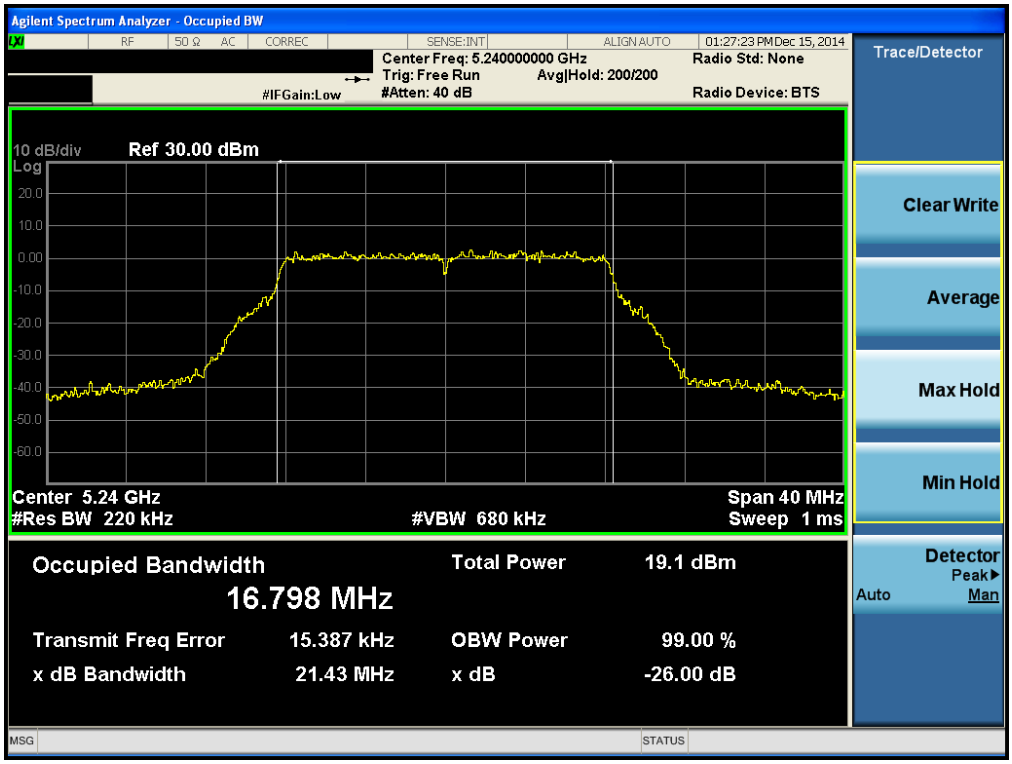
26 dB Bandwidth

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

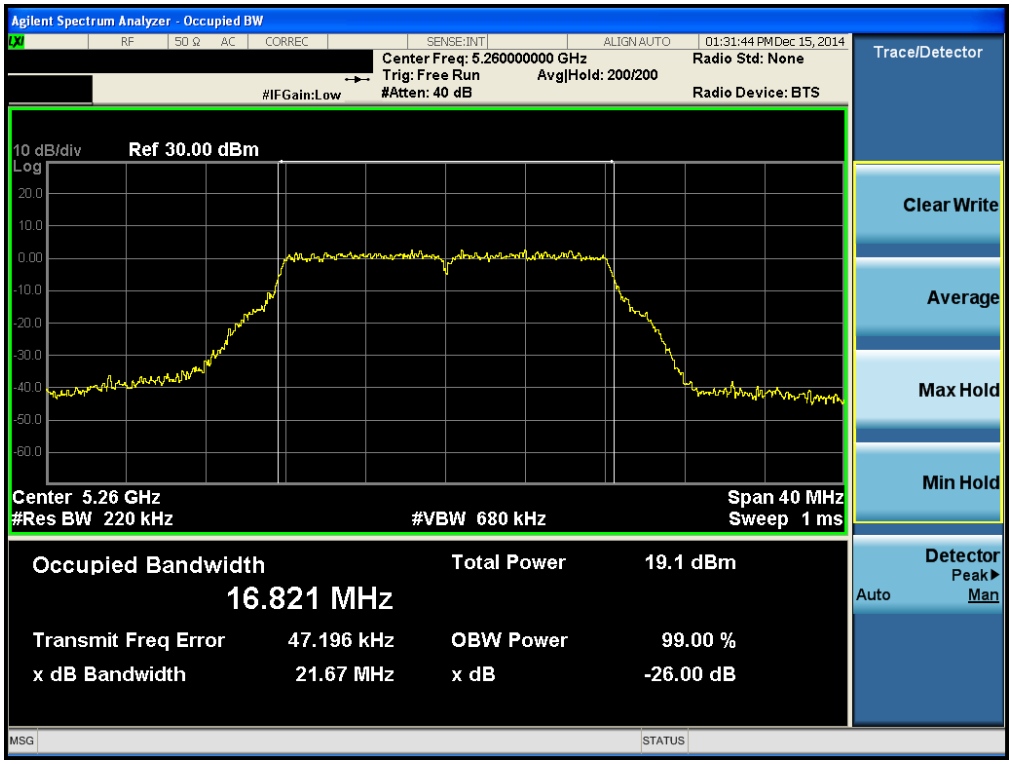
26 dB Bandwidth

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

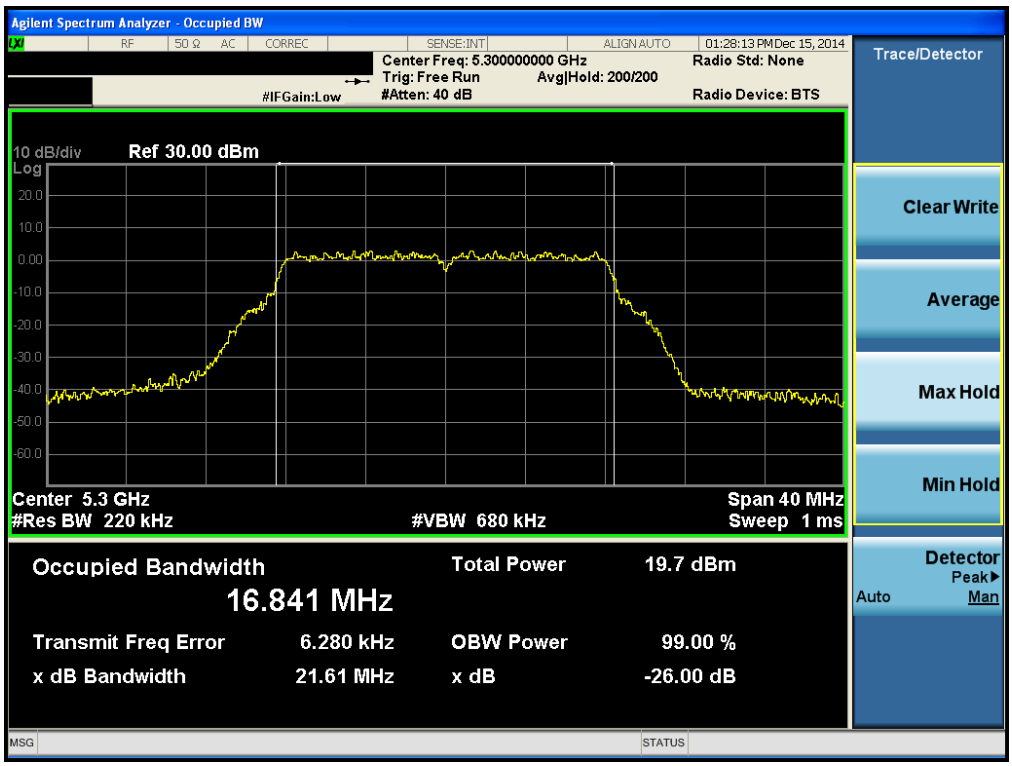
26 dB Bandwidth Test Mode: 802.11a & Ch.48 & ANT 1



26 dB Bandwidth Test Mode: 802.11a & Ch.52 & ANT 1



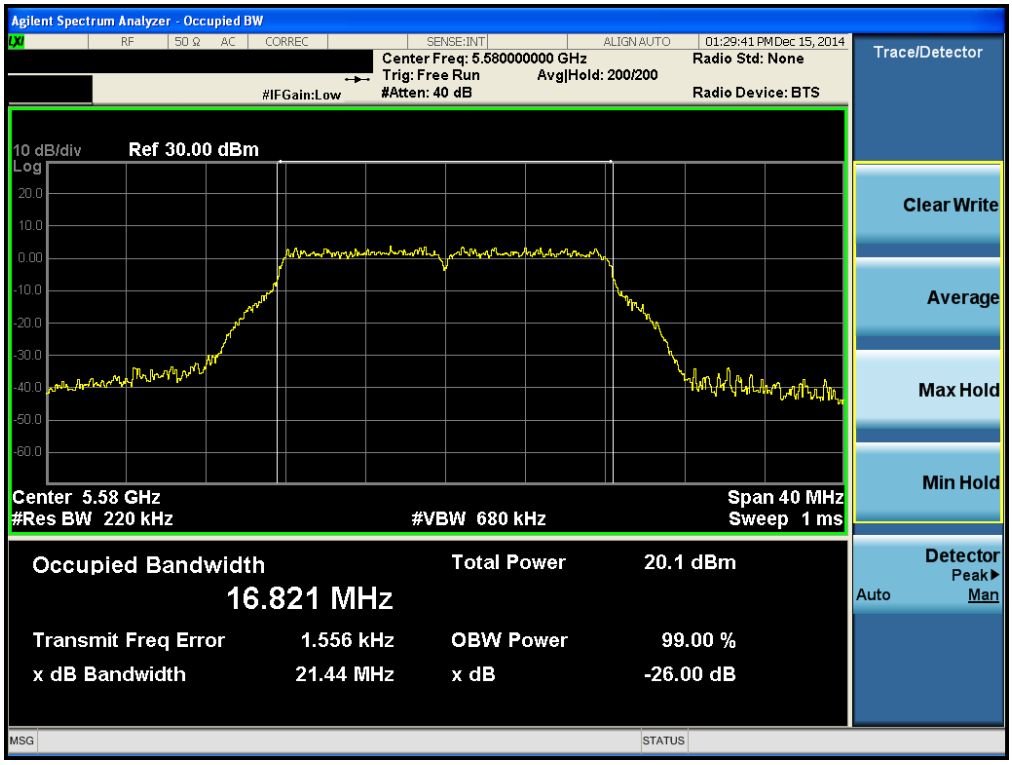
26 dB Bandwidth Test Mode: 802.11a & Ch.60 & ANT 1



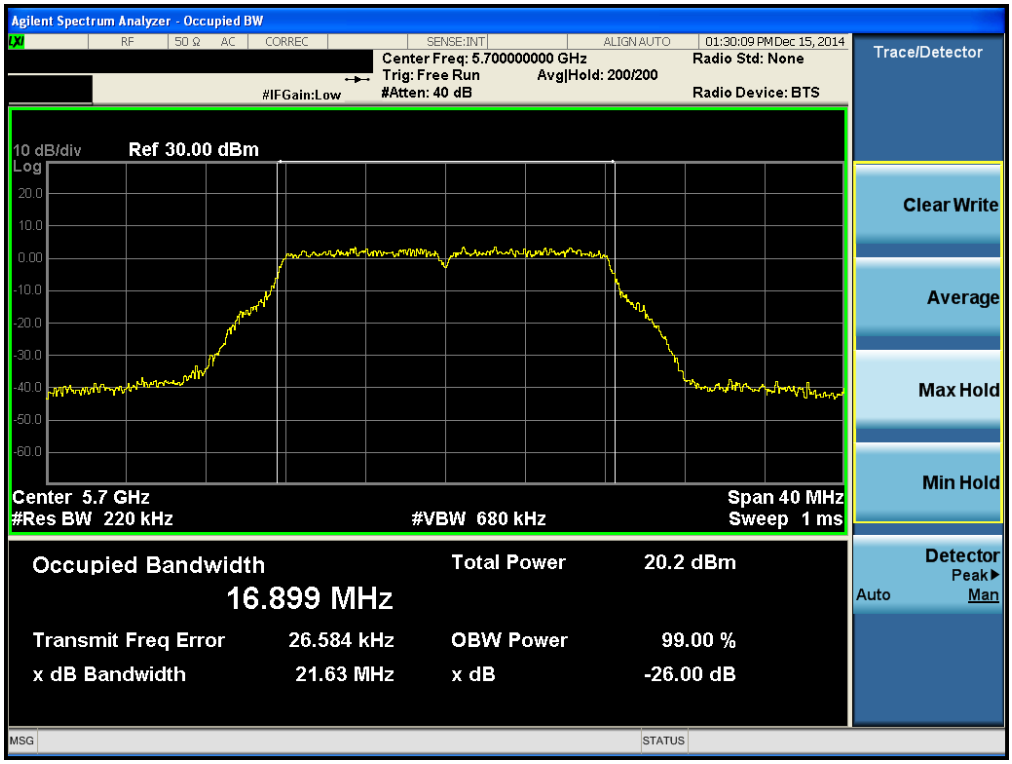
26 dB Bandwidth Test Mode: 802.11a & Ch.64 & ANT 1

26 dB Bandwidth Test Mode: 802.11a & Ch.100 & ANT 1

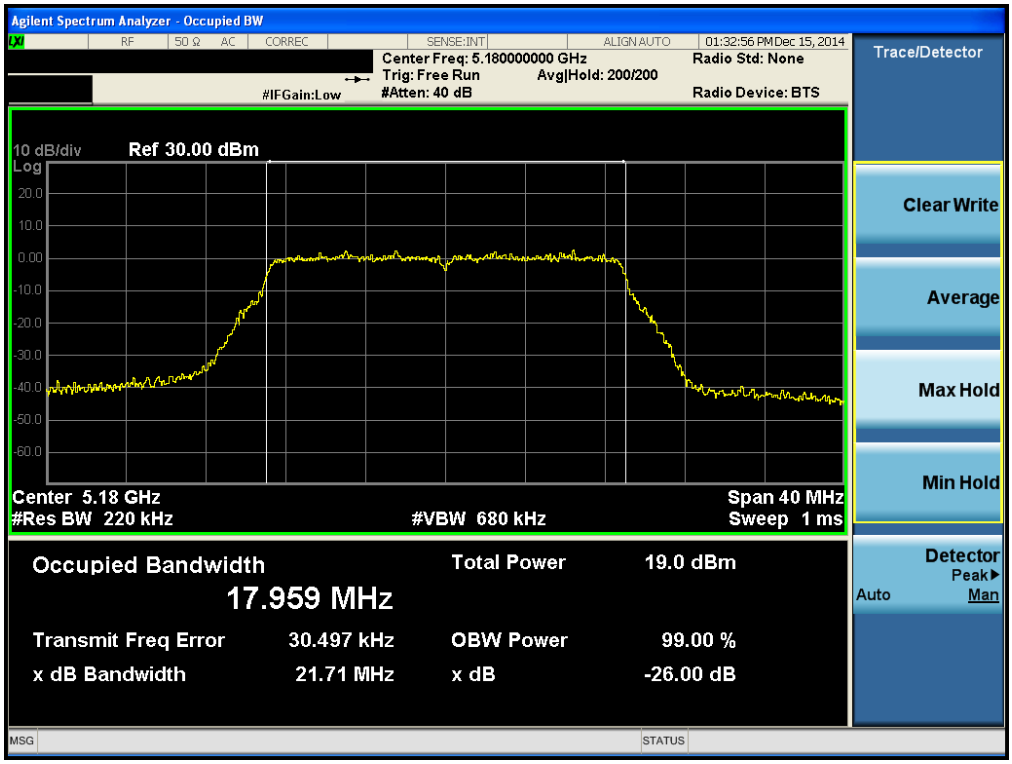
26 dB Bandwidth Test Mode: 802.11a & Ch.116 & ANT 1



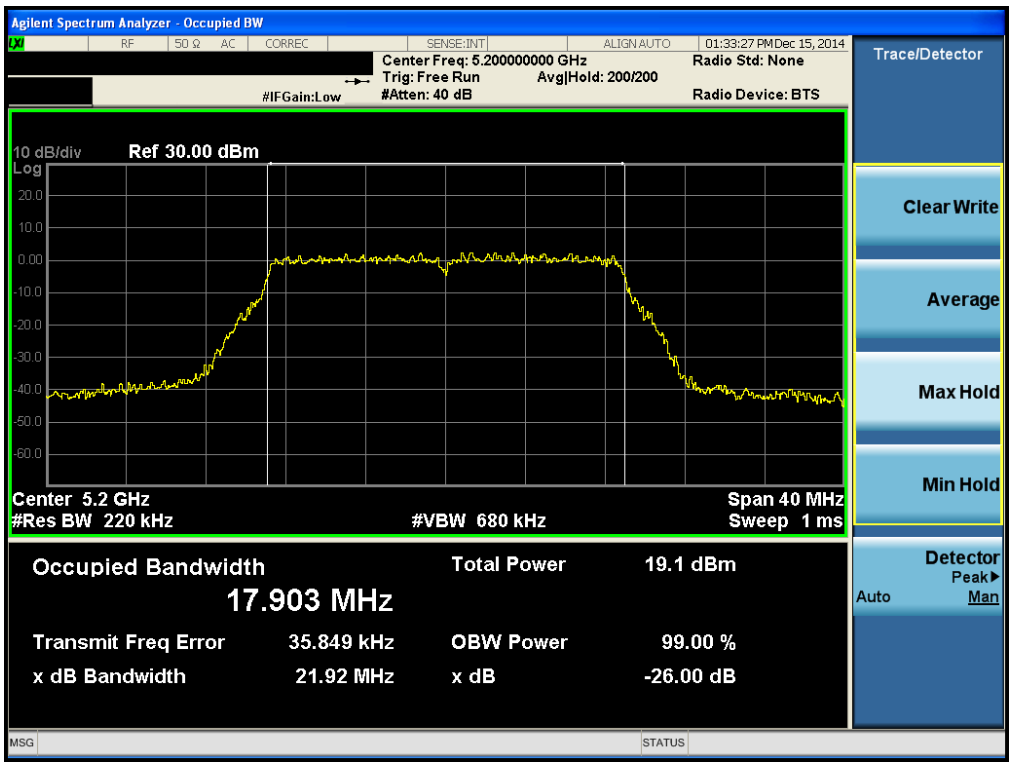
26 dB Bandwidth Test Mode: 802.11a & Ch.140 & ANT 1



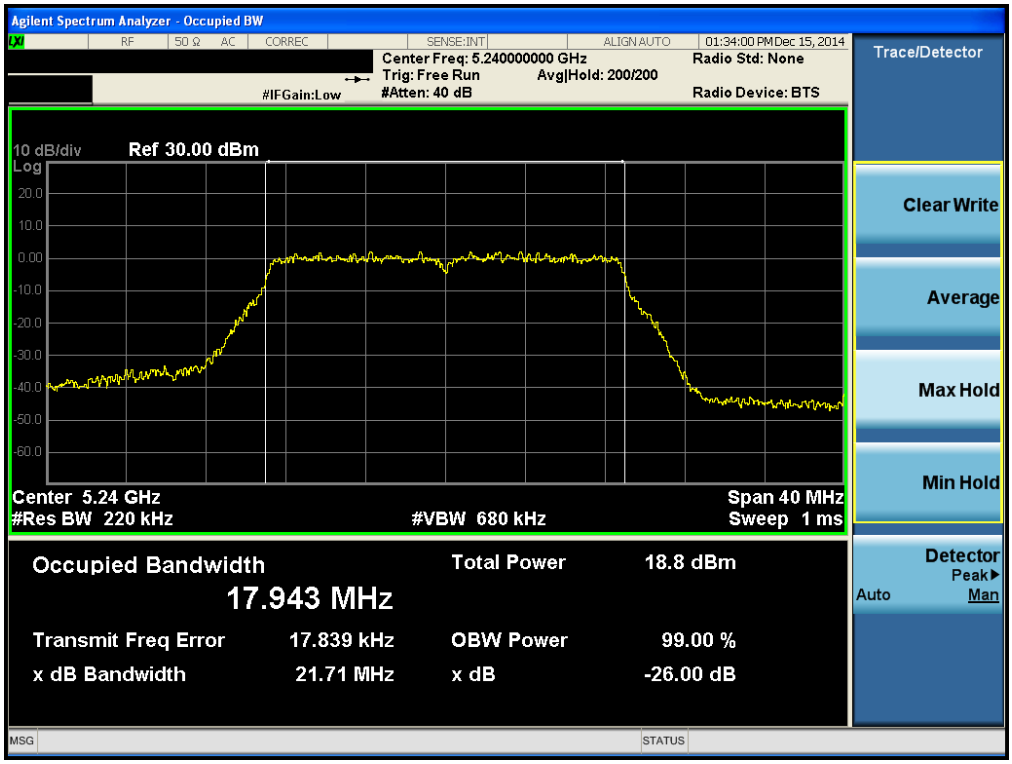
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.36 & ANT 1



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

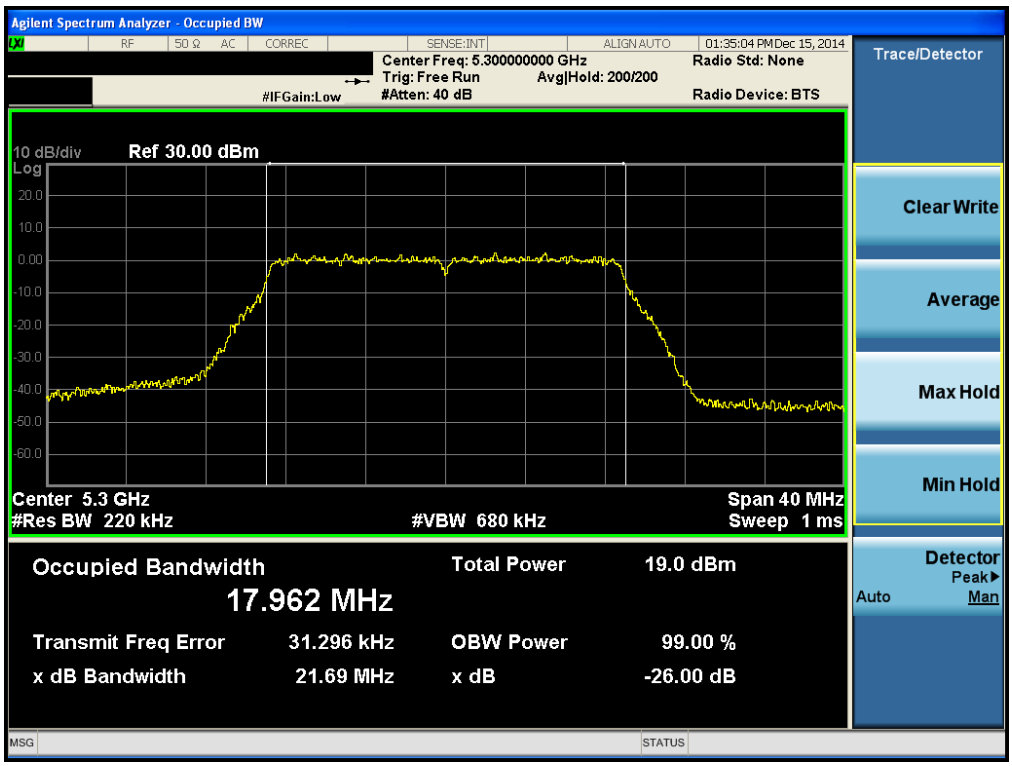


26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.48 & ANT 1

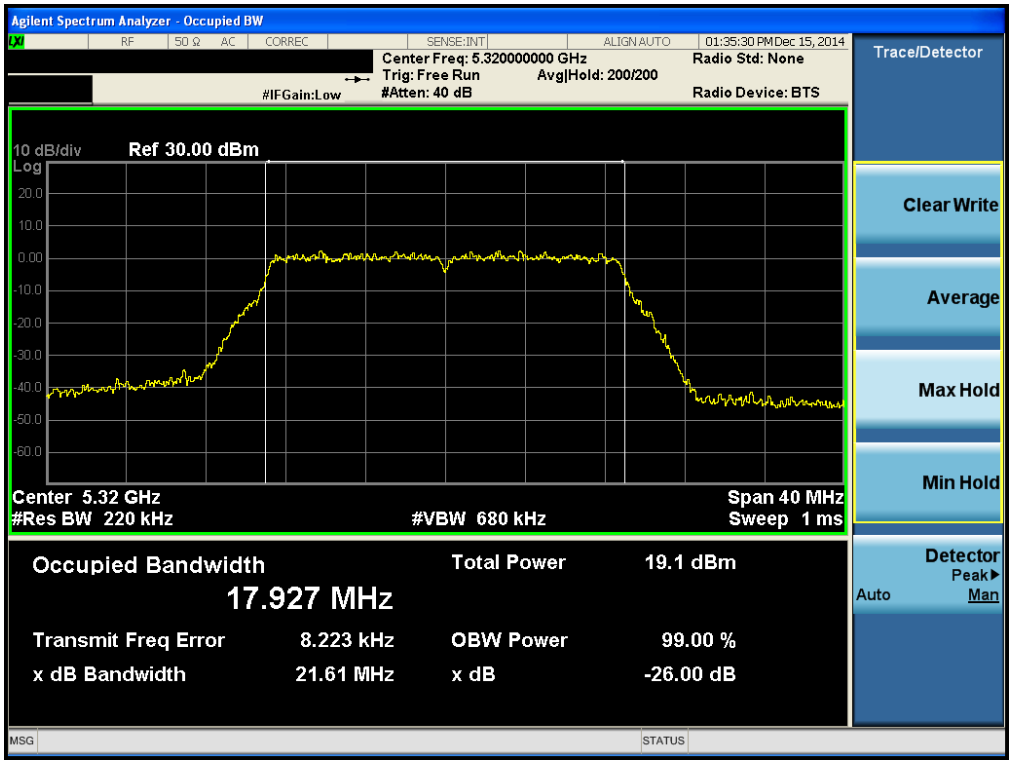


26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.52 & ANT 1

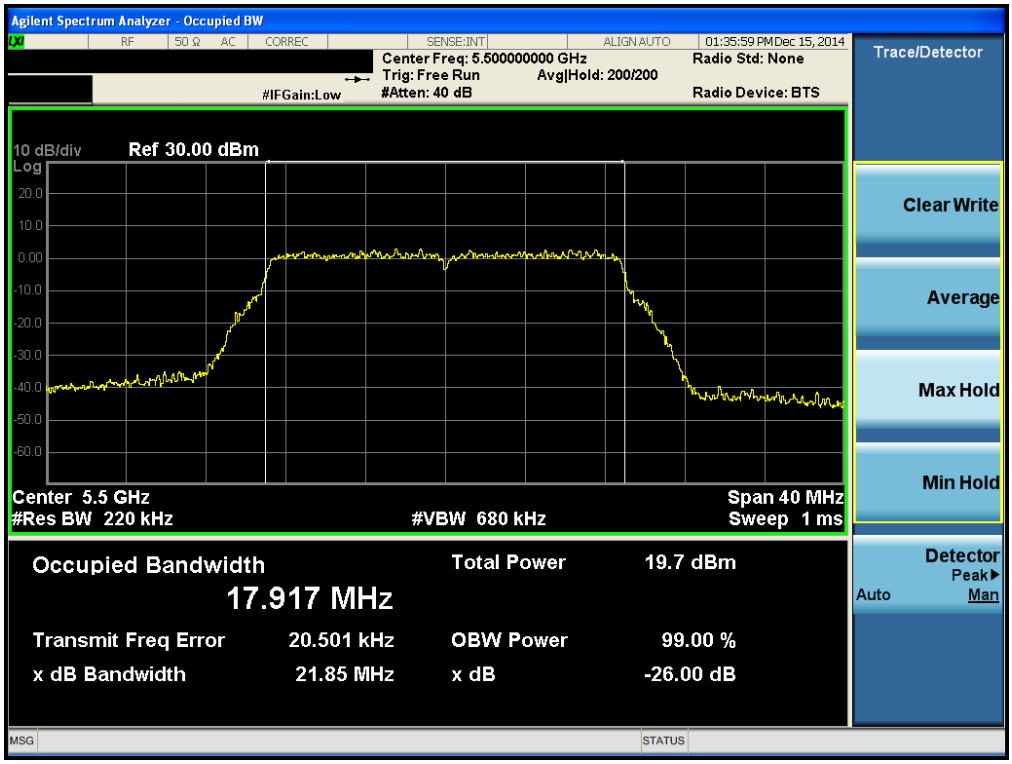
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.60 & ANT 1



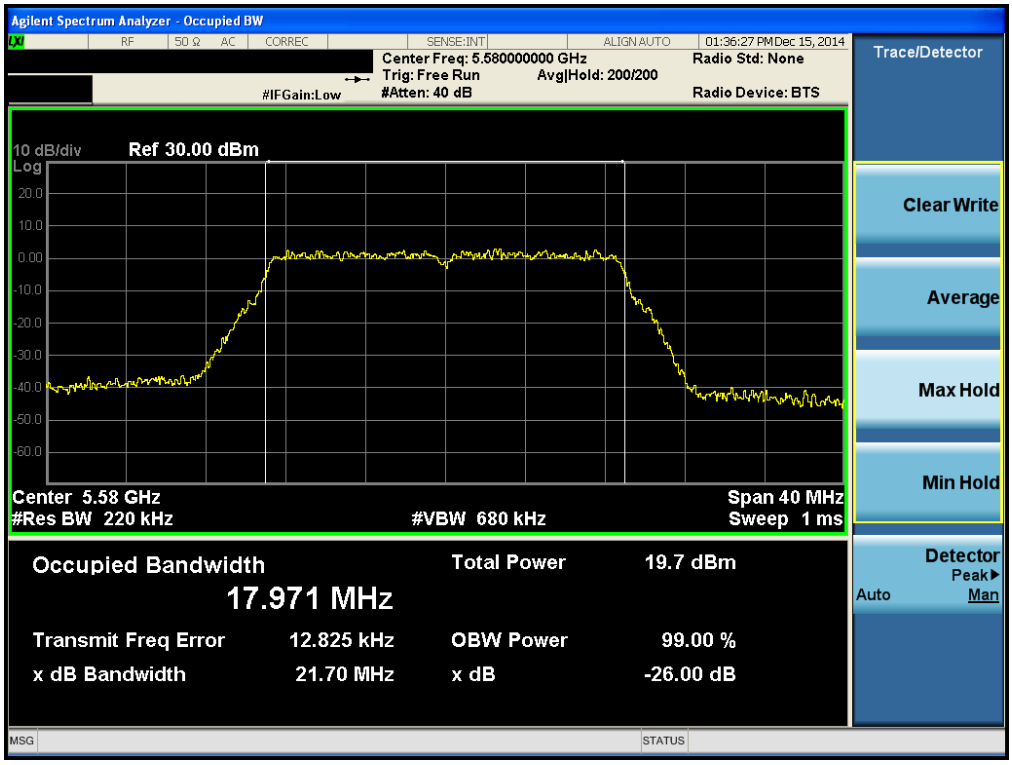
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.64 & ANT 1



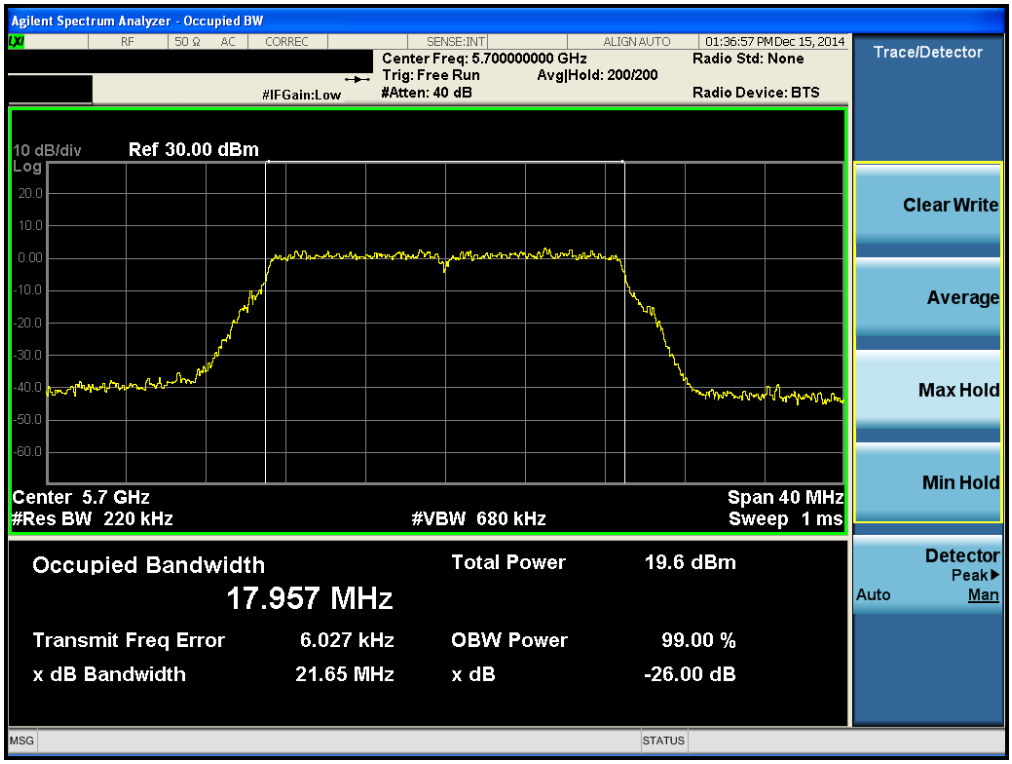
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.100 & ANT 1



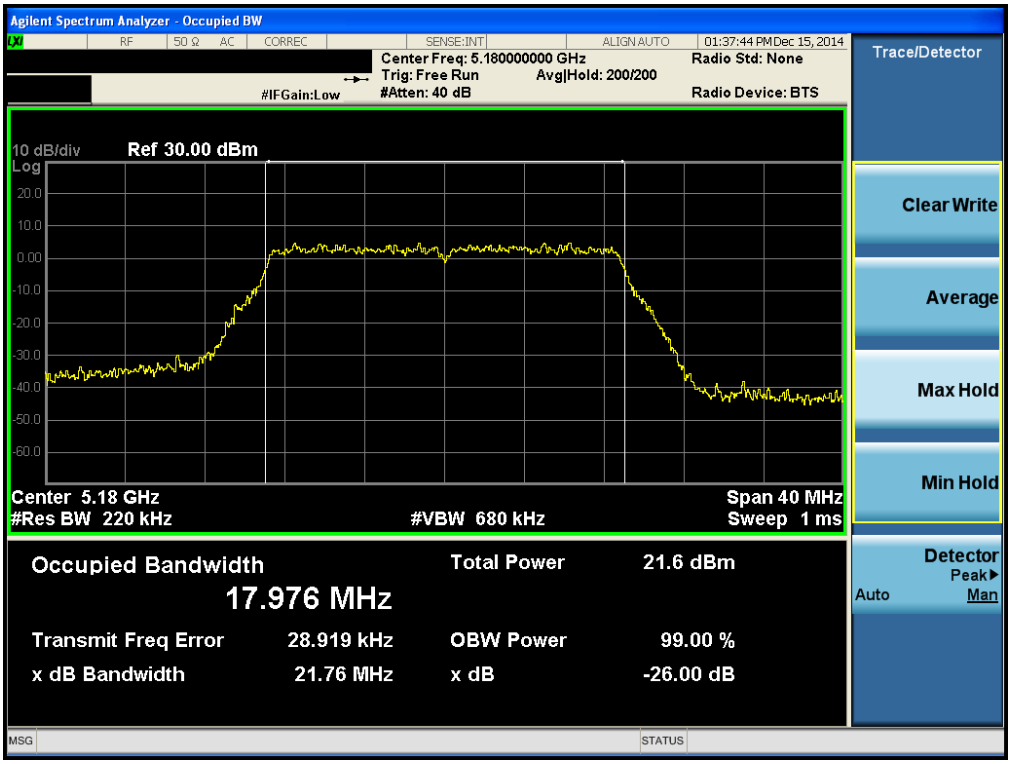
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.116 & ANT 1



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

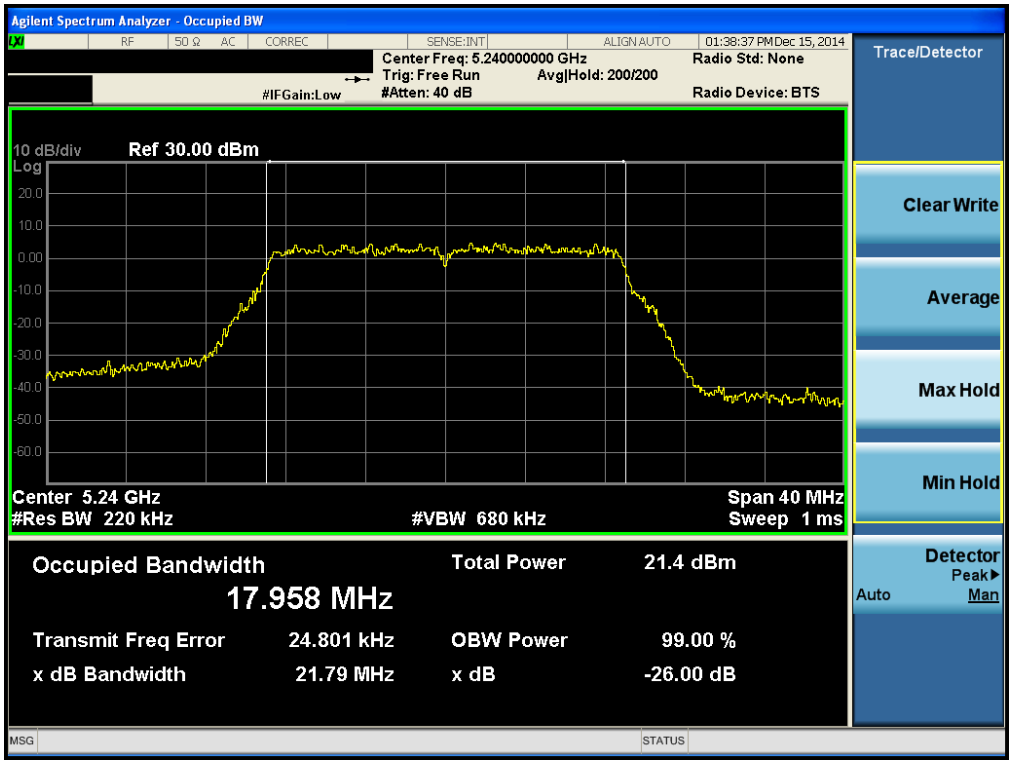


26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.36 & ANT 2



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

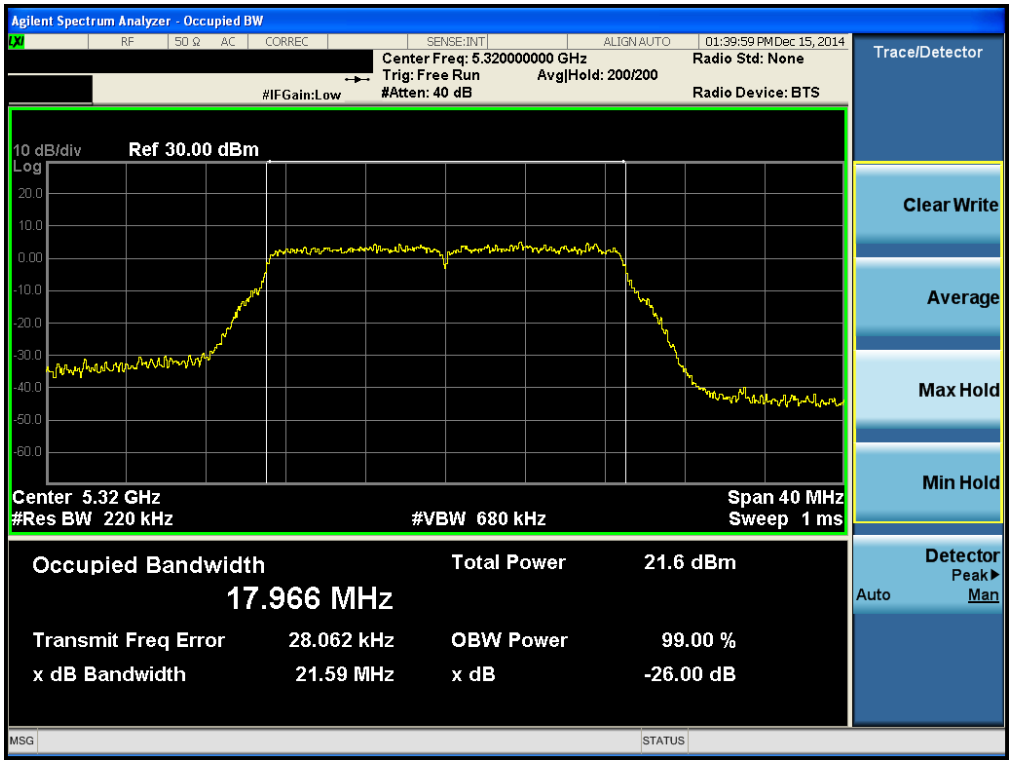
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.48 & ANT 2



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

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

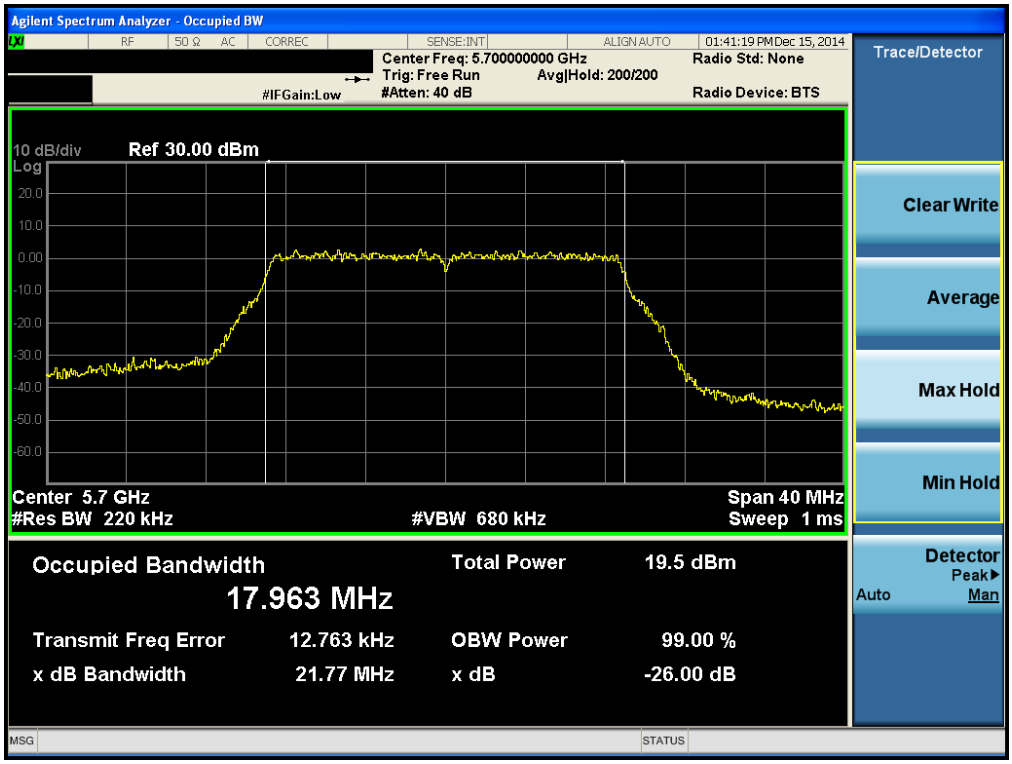
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.64 & ANT 2



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

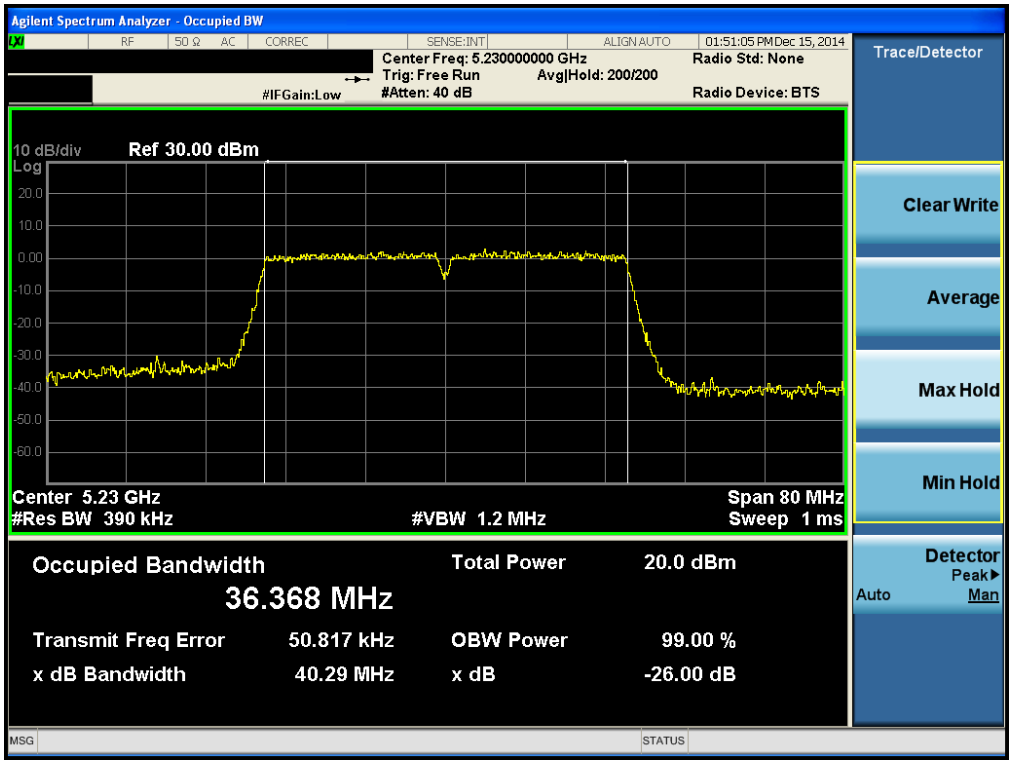
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.116 & ANT 2

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

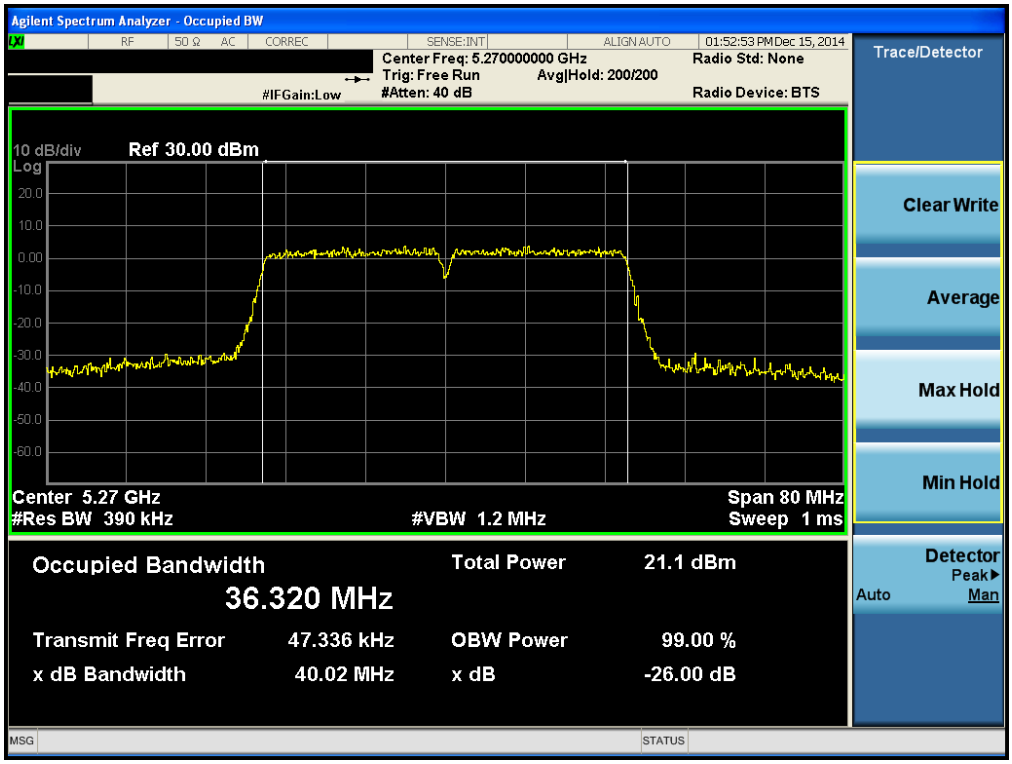


26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.38 & ANT 1

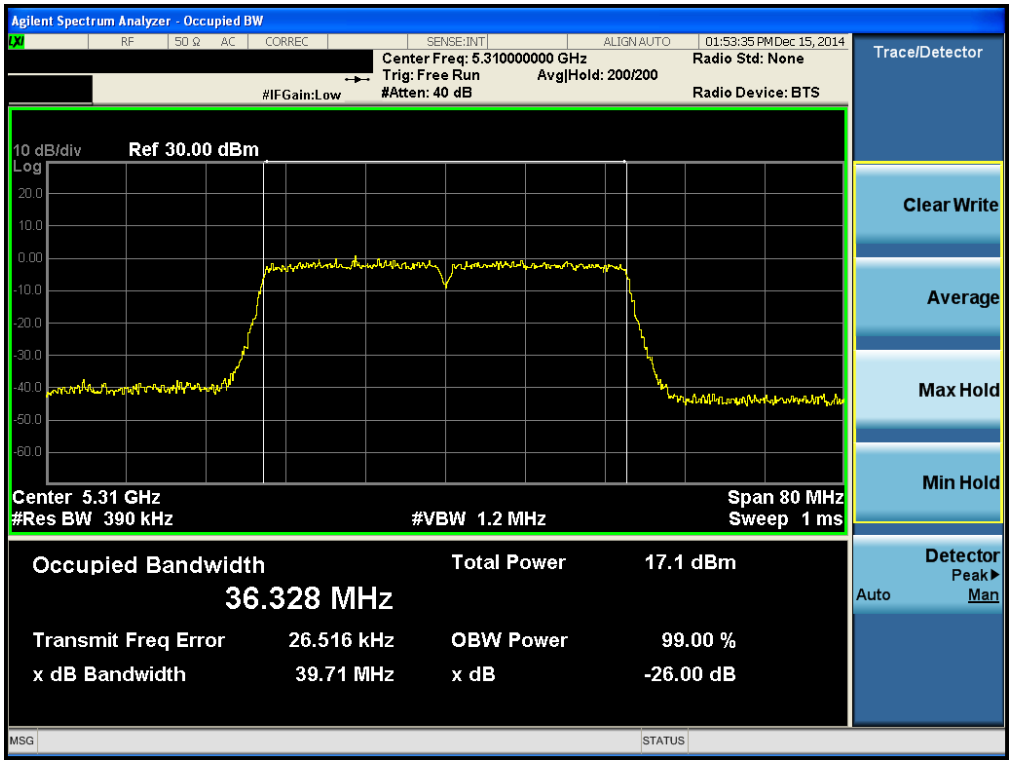
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.46 & ANT 1



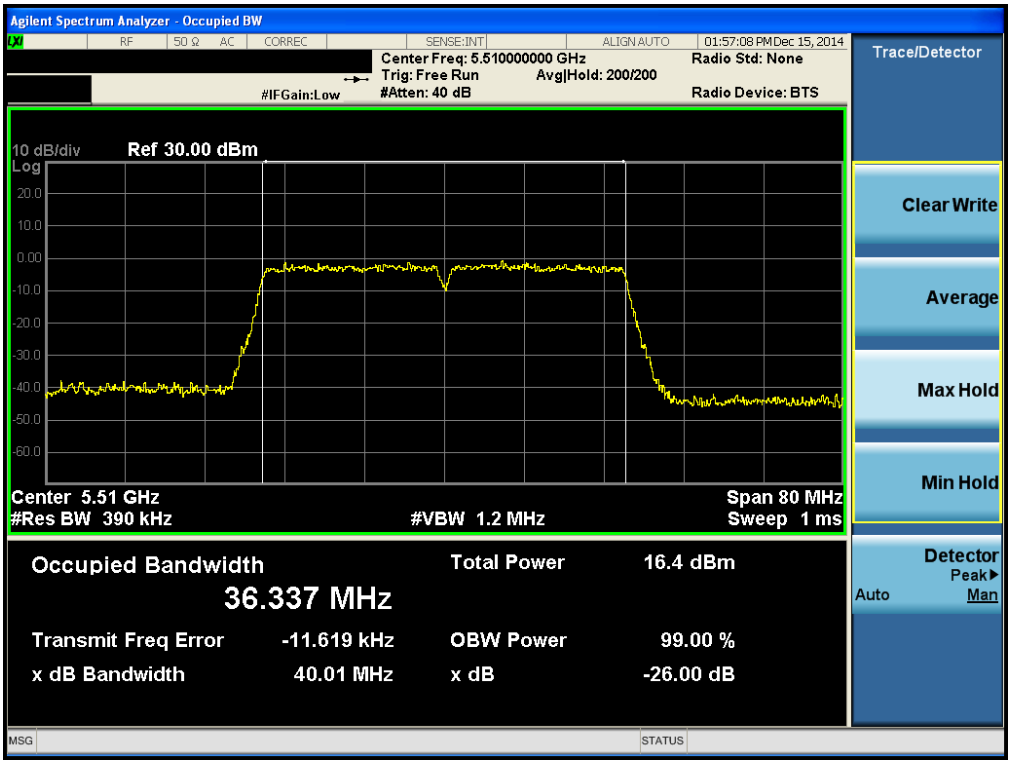
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.54 & ANT 1



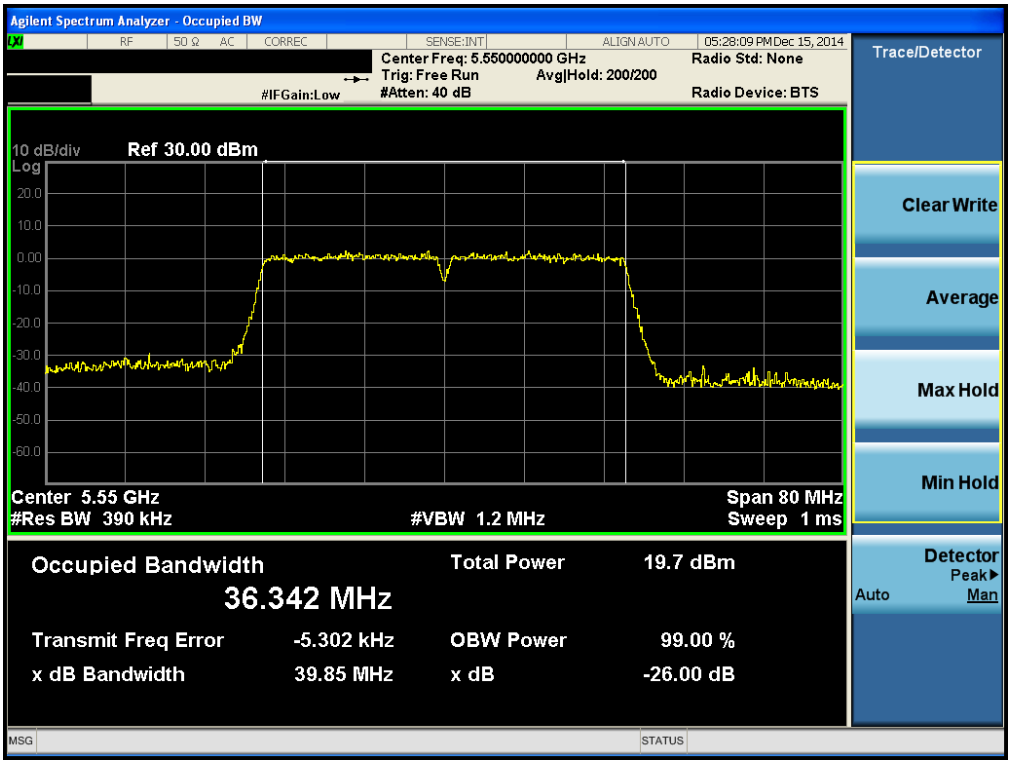
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.62 & ANT 1



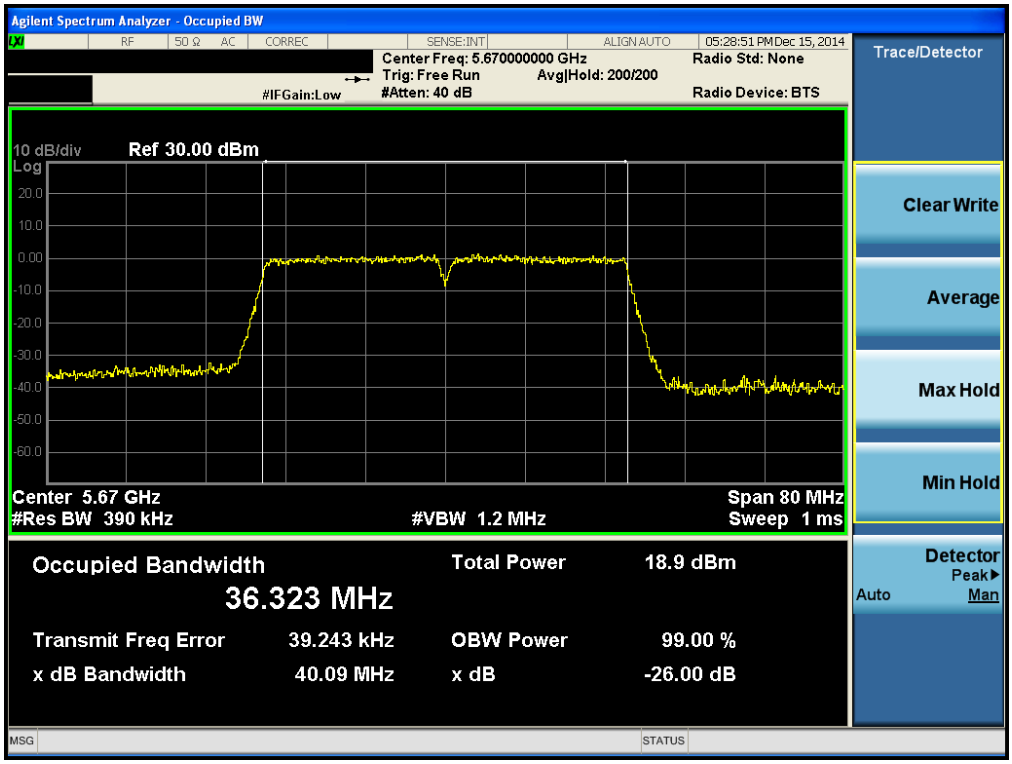
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.102 & ANT 1



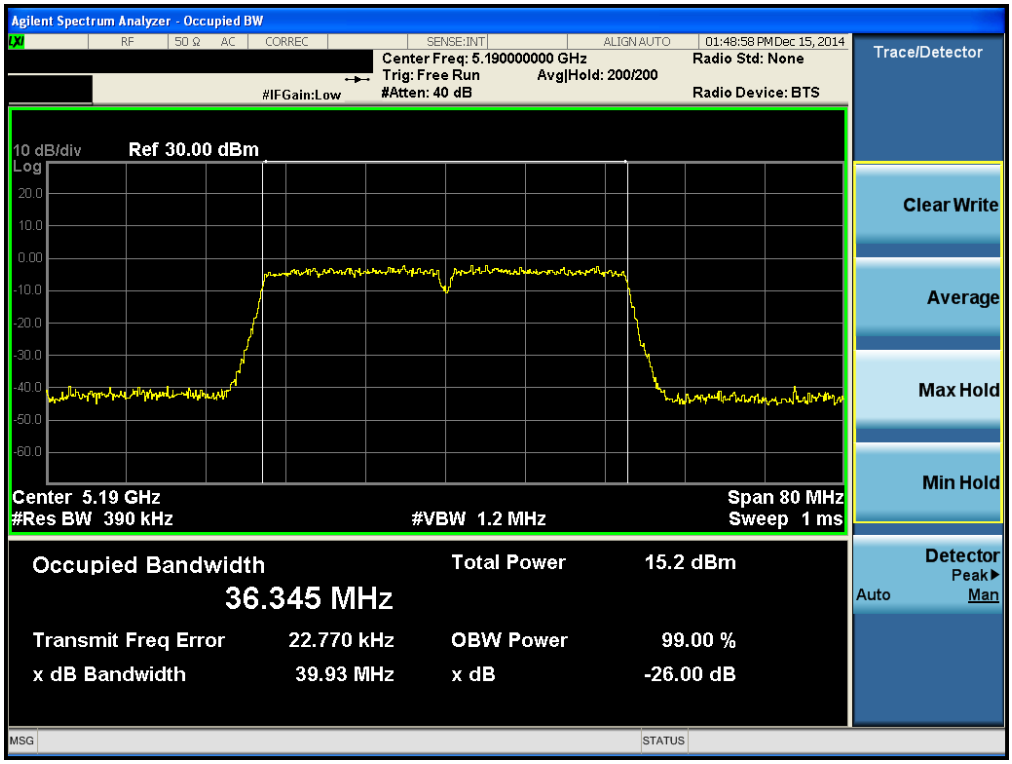
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.110 & ANT 1



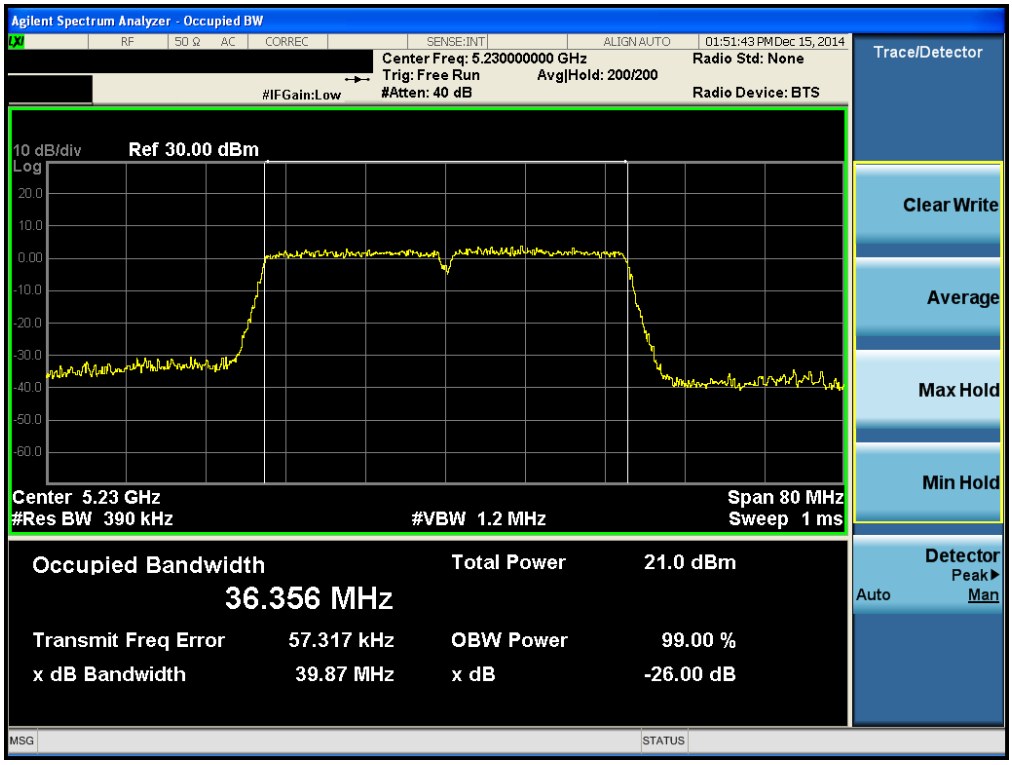
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.134 & ANT 1



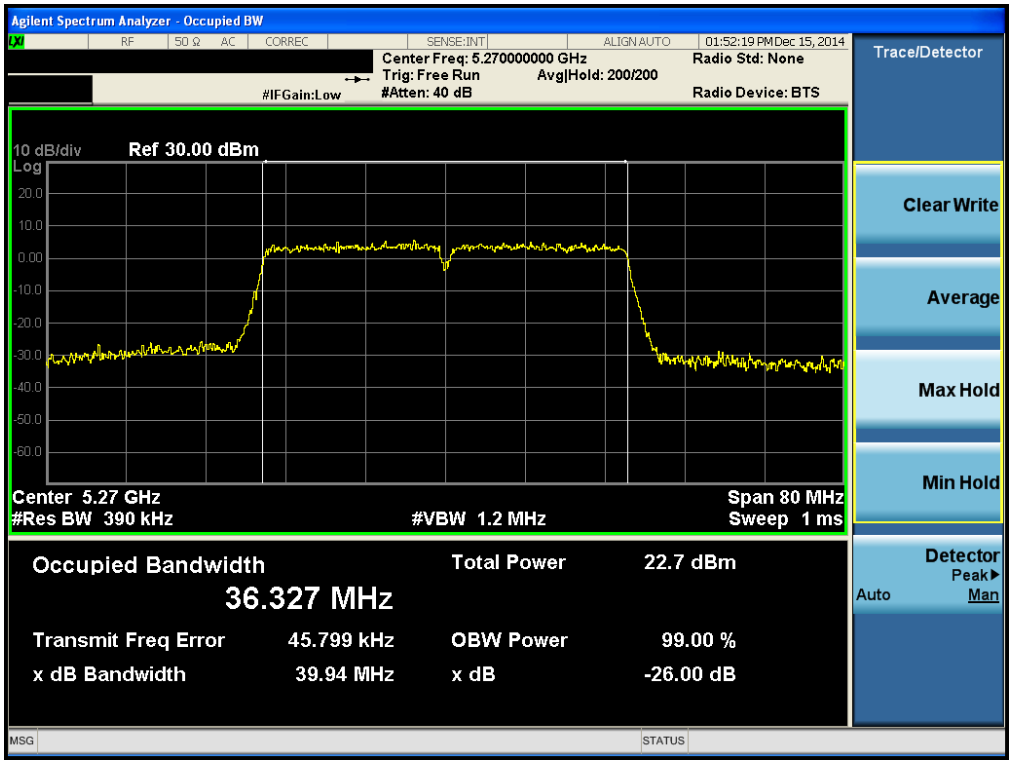
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.38 & ANT 2



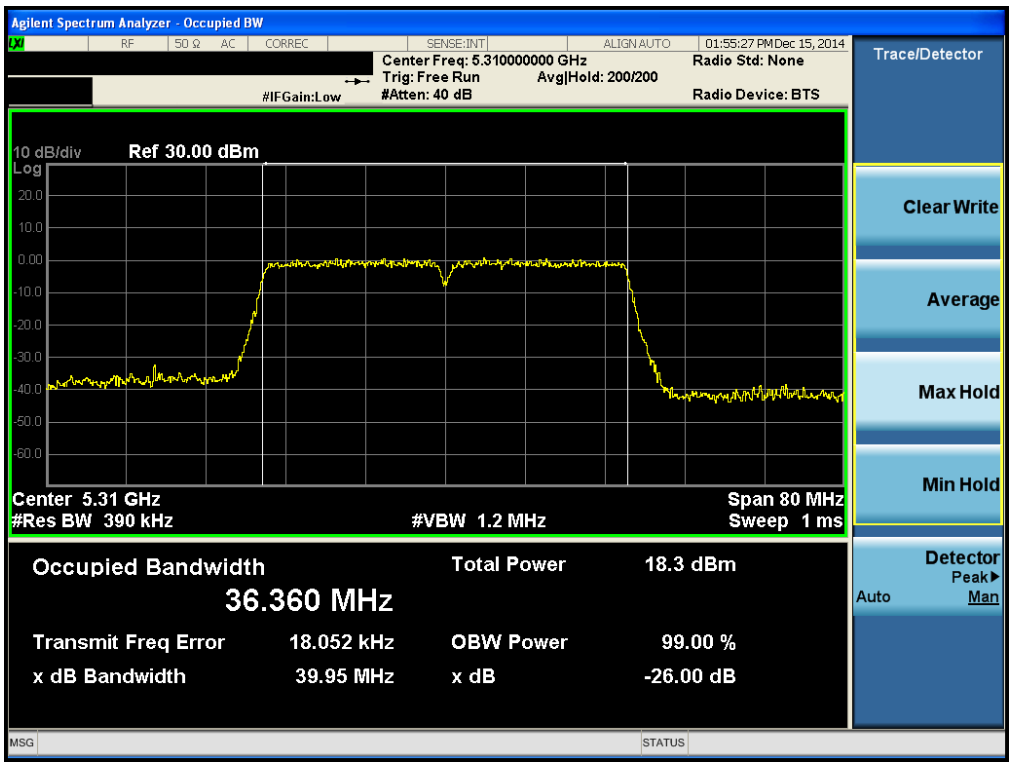
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.46 & ANT 2



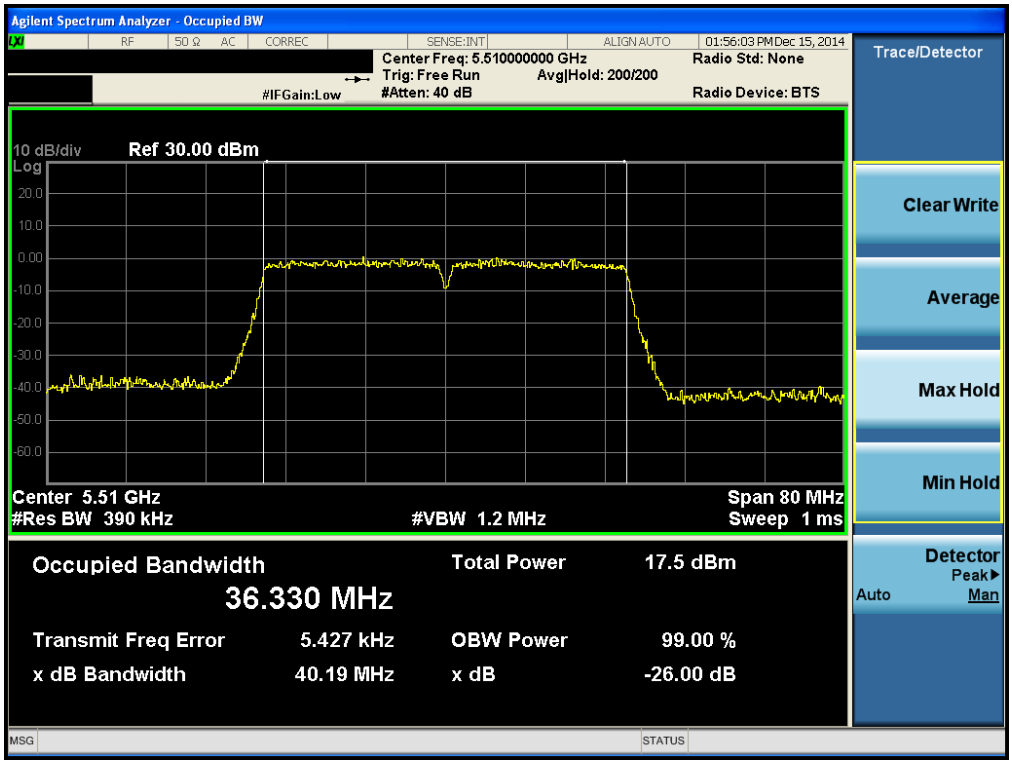
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.54 & ANT 2



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



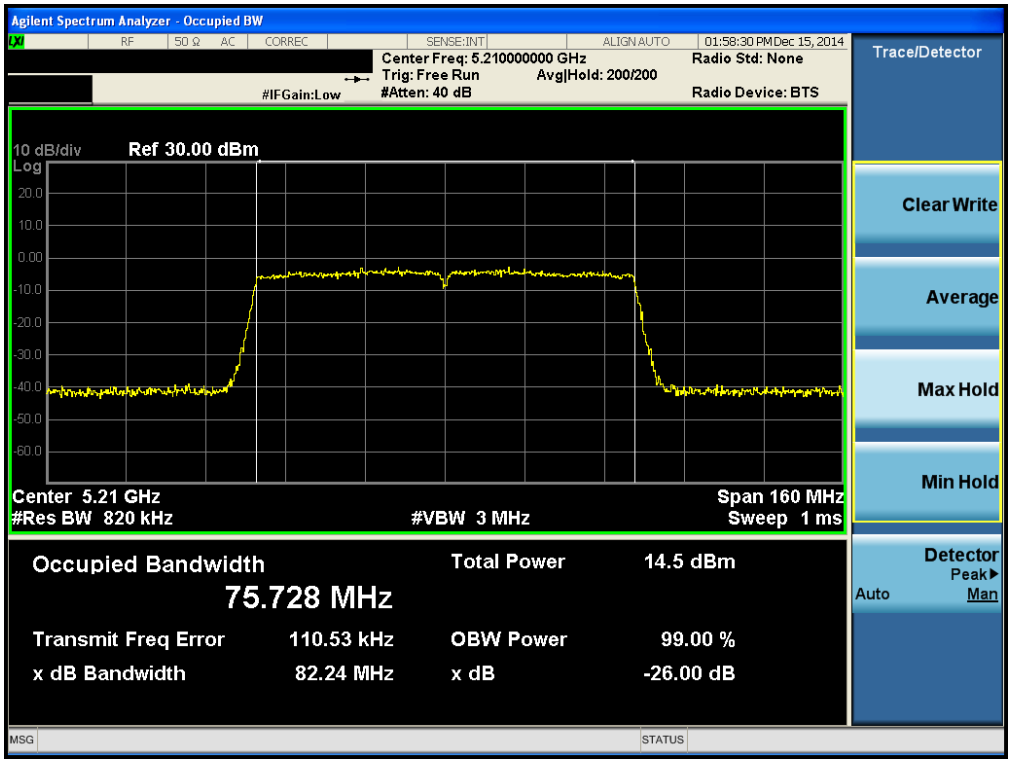
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.102 & ANT 2



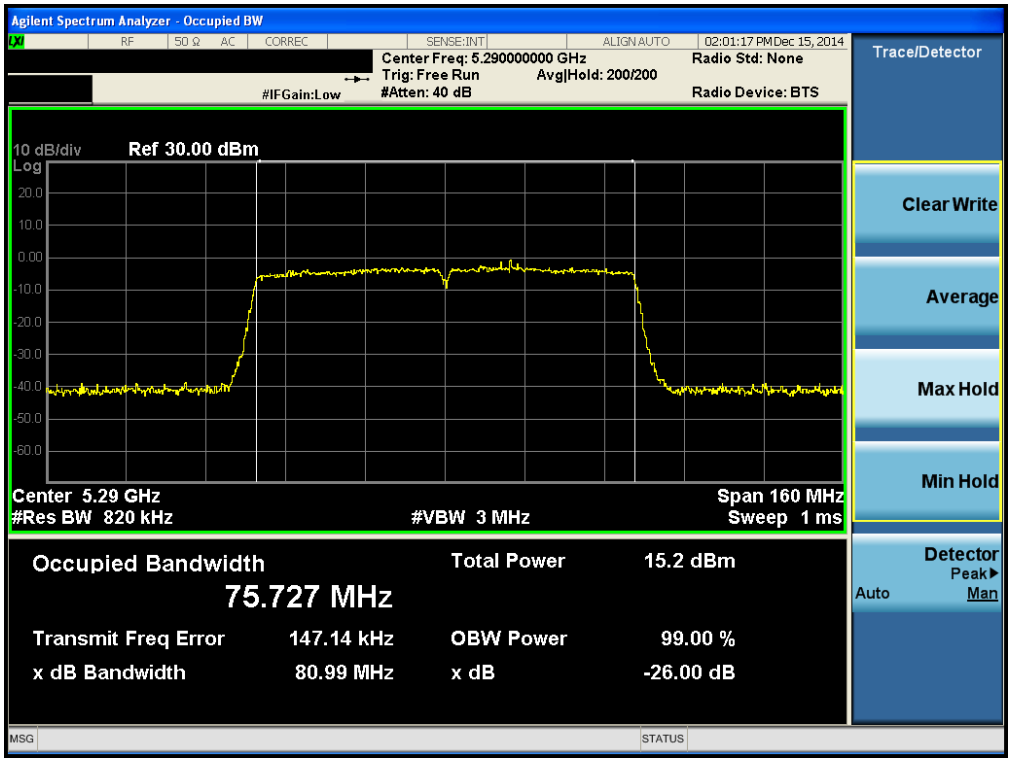
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.110 & ANT 2

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

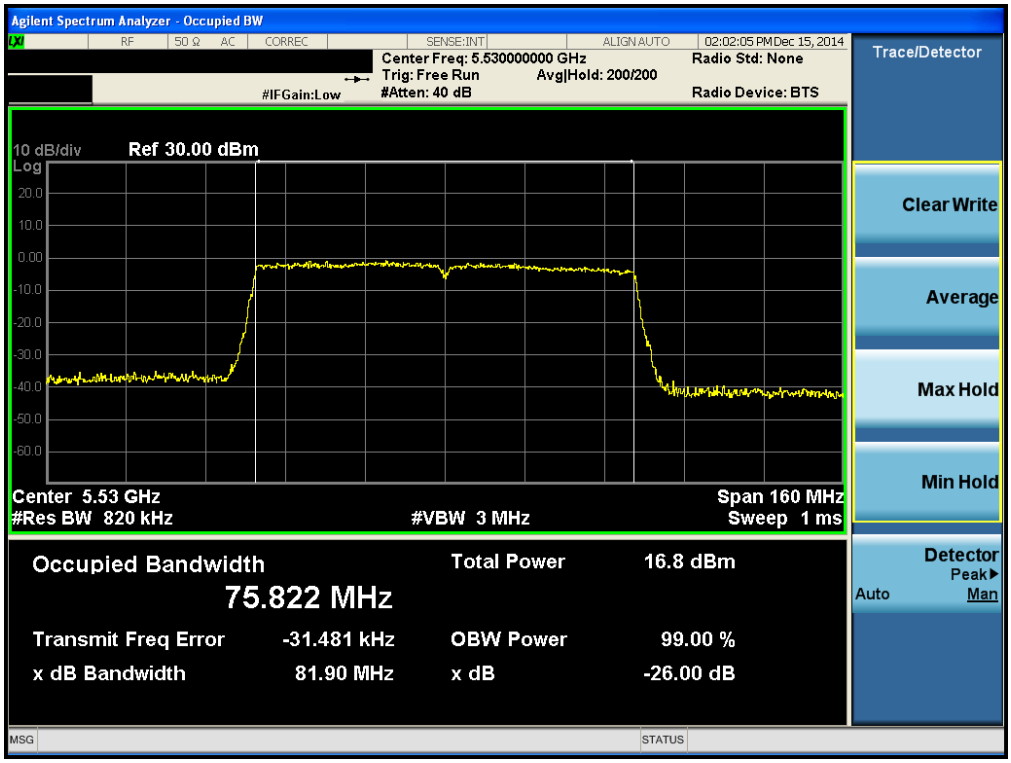
26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.42 & ANT 1



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

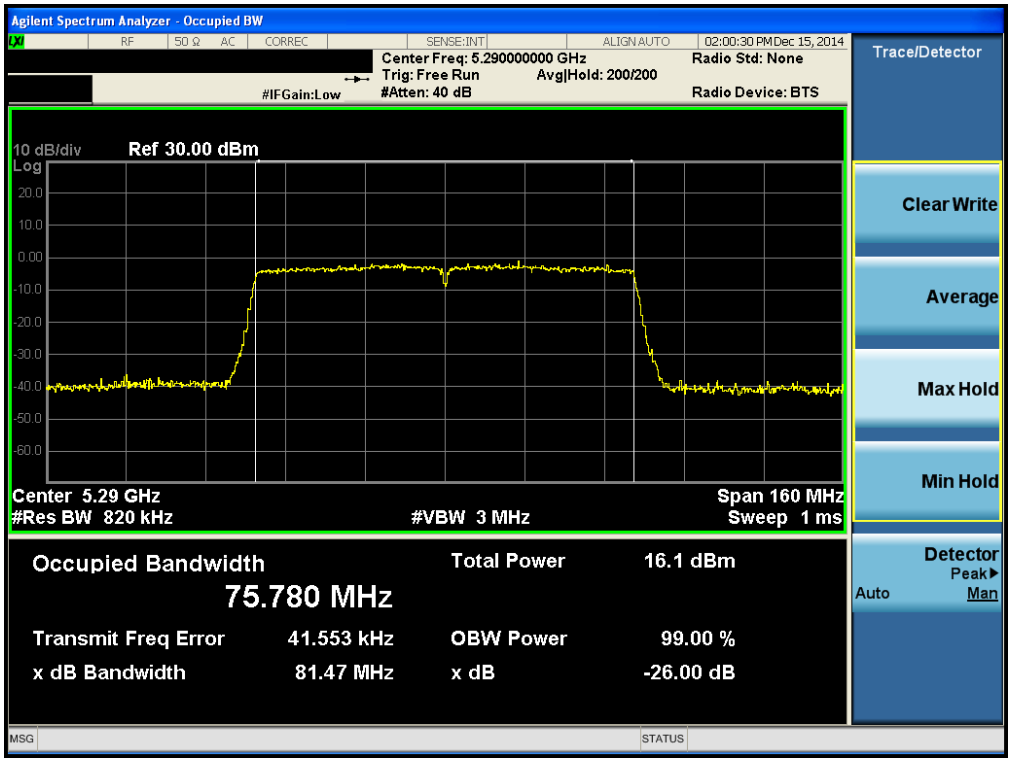


26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.106 & ANT 1



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

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



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

8.2 Minimum Emission Bandwidth (6 dB Bandwidth)

▣ Test Requirements

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz..

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02 V01**.

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth **≥ 3 x RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.
   Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

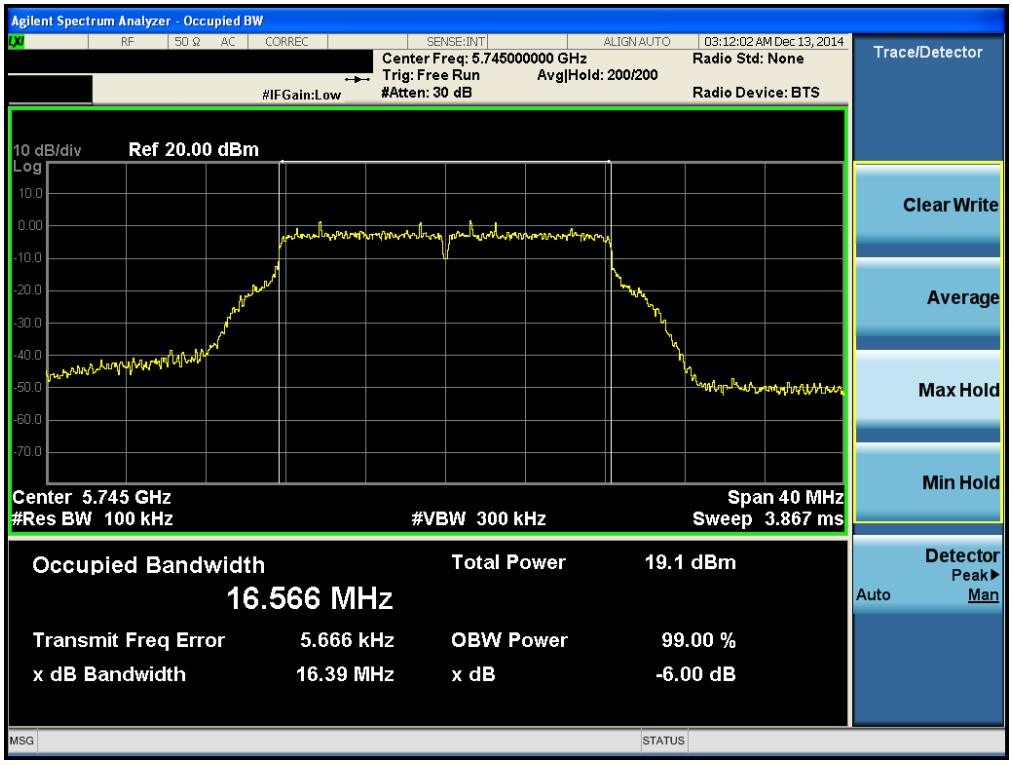
▣ Test Results: Comply

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]	
				ANT 1	ANT 2
802.11a	U-NII 3	149	5745	16.390	-
		157	5785	16.380	-
		165	5825	16.420	-
802.11n (HT20)	U-NII 3	149	5745	17.630	17.650
		157	5785	17.640	17.640
		165	5825	17.640	17.640
802.11n (HT40)	U-NII 3	151	5755	36.390	36.420
		159	5795	36.390	36.340
802.11ac (VHT80)	U-NII 3	155	5775	75.840	76.340

▣ Result Plots

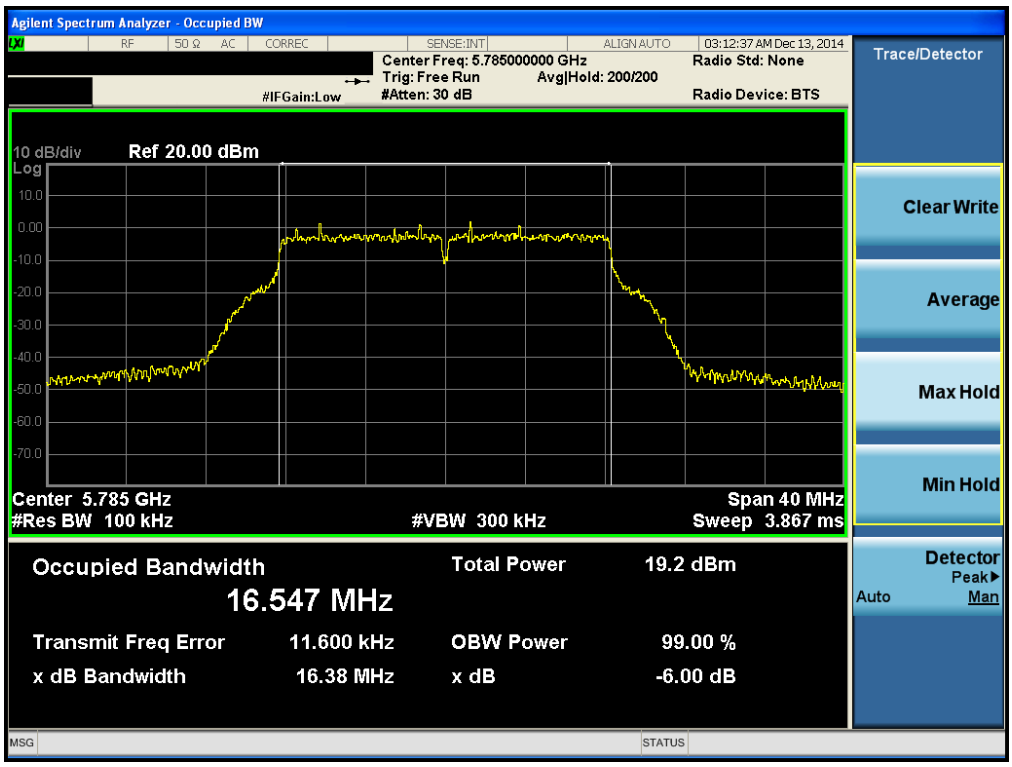
6 dB Bandwidth

Test Mode: 802.11a & Ch.149 & ANT 1

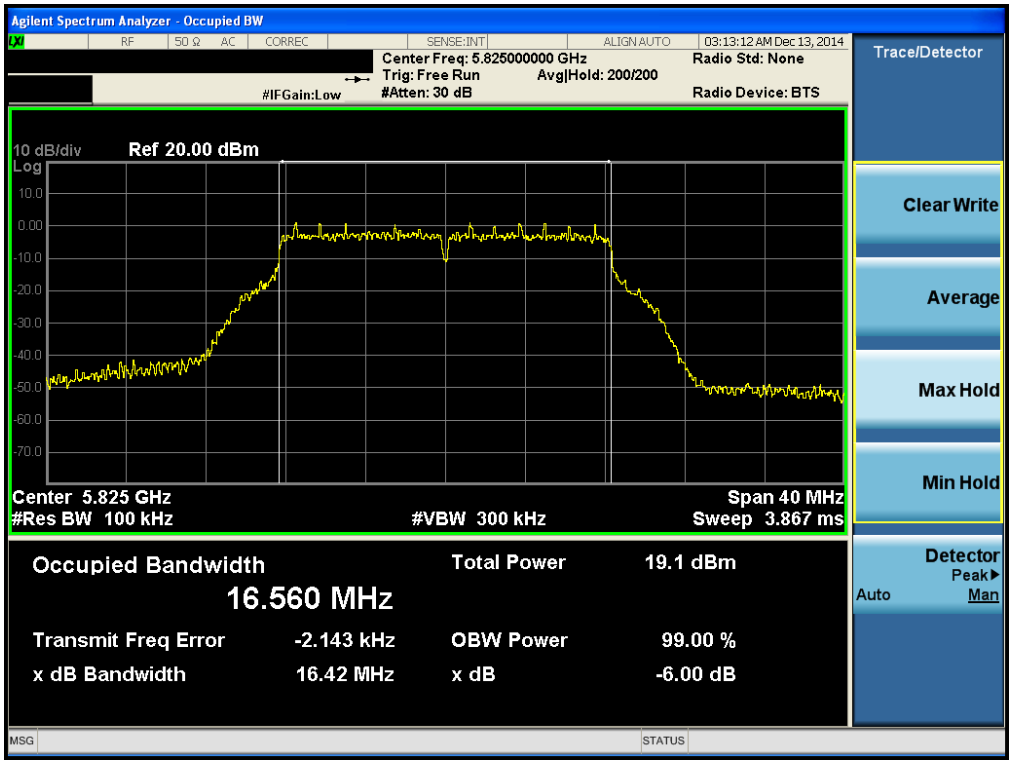


6 dB Bandwidth

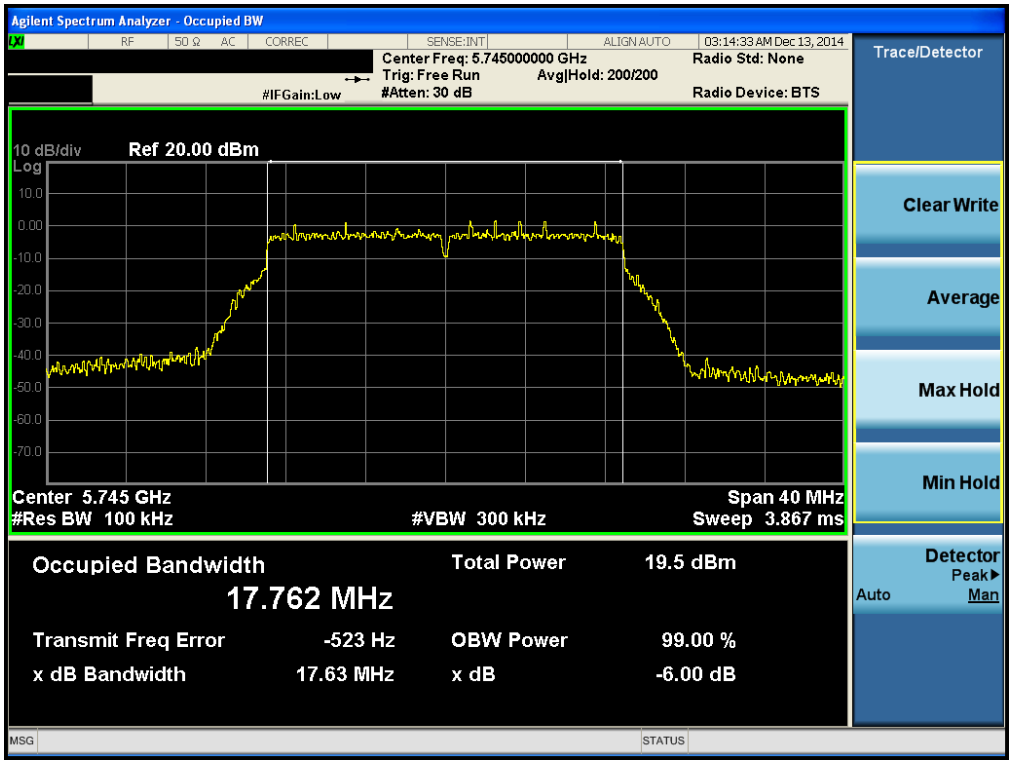
Test Mode: 802.11a & Ch.157 & ANT 1



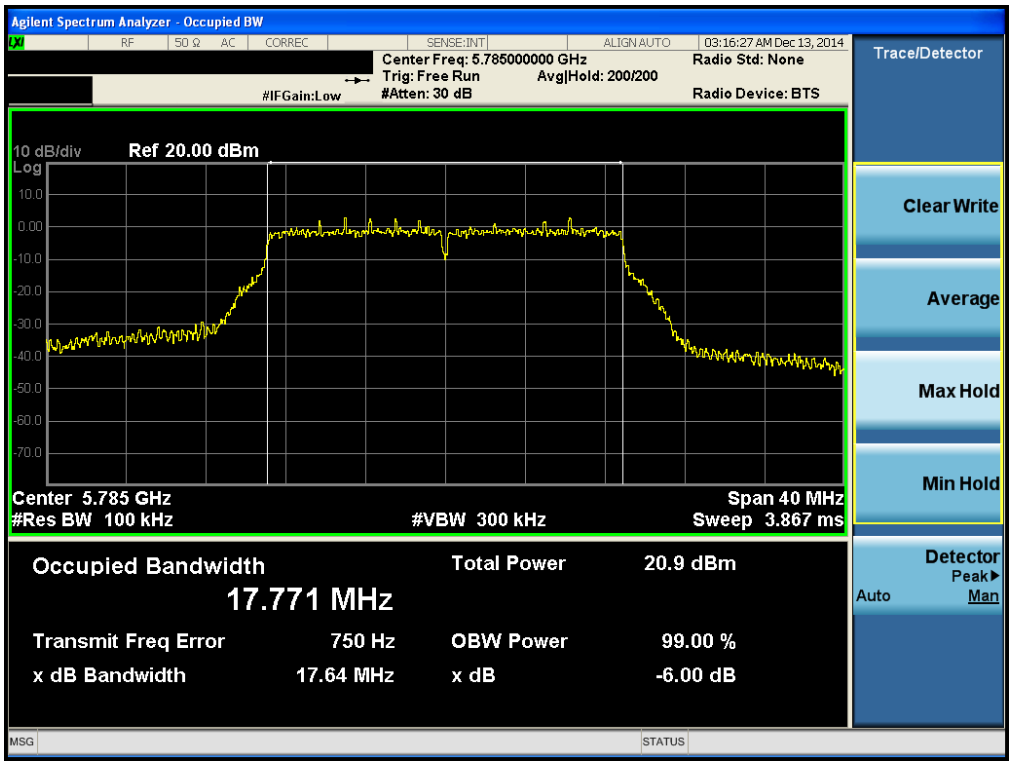
6 dB Bandwidth Test Mode: 802.11a & Ch.165 & ANT 1



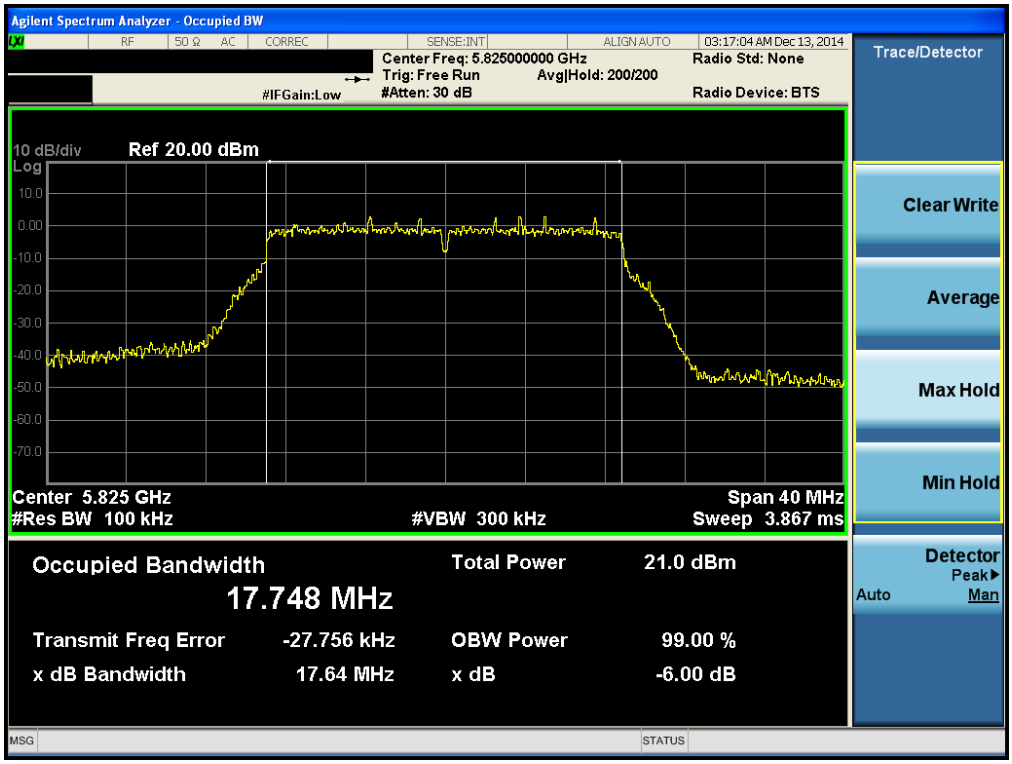
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.149 & ANT 1



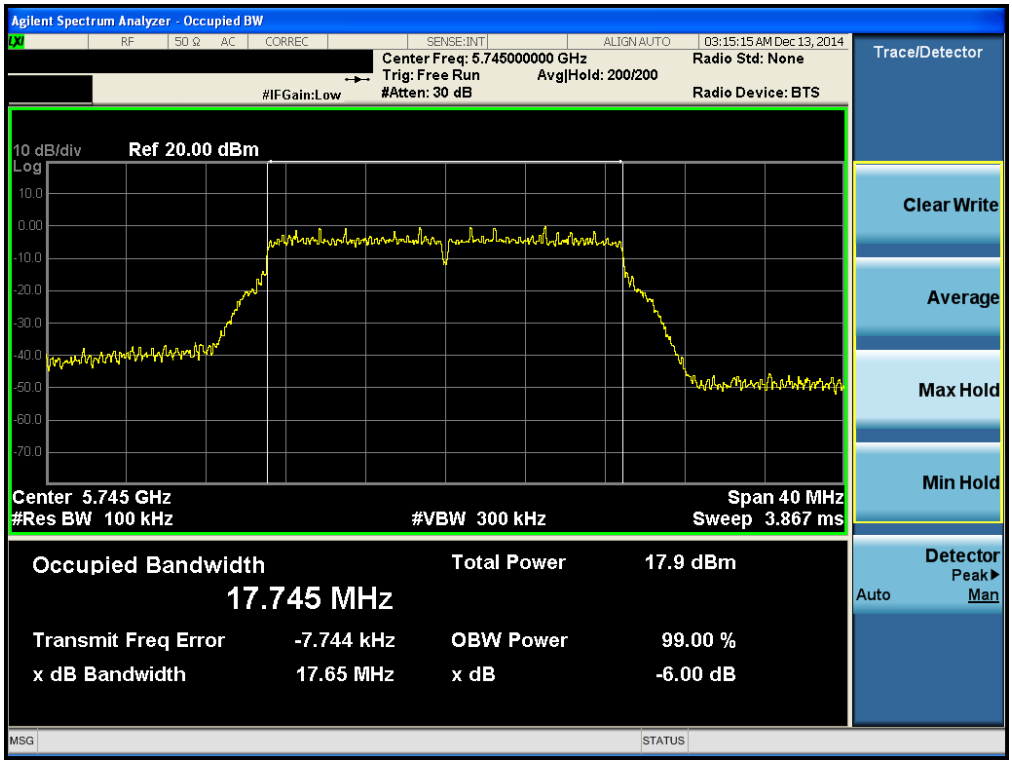
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.157 & ANT 1



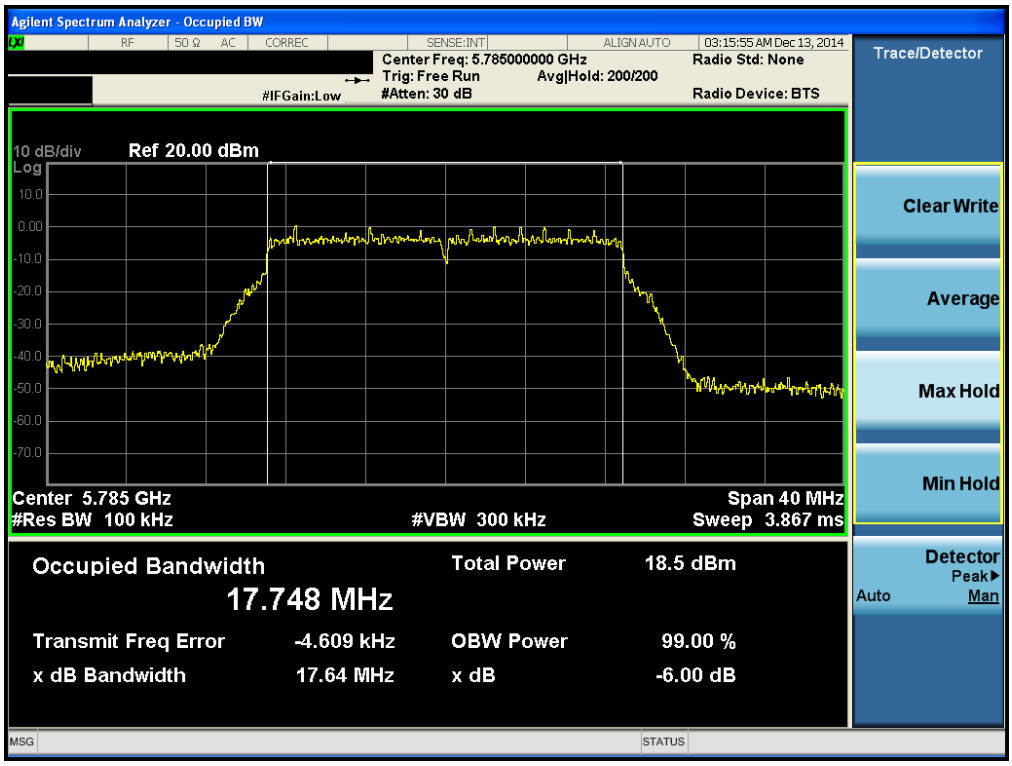
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.165 & ANT 1



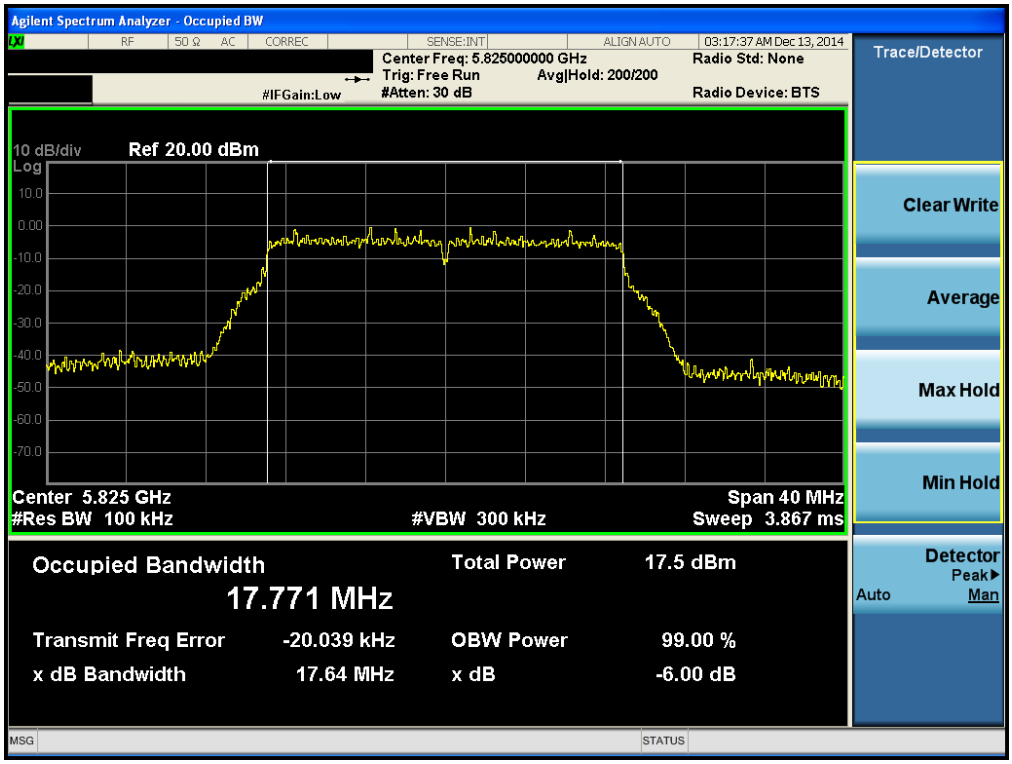
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.149 & ANT 2



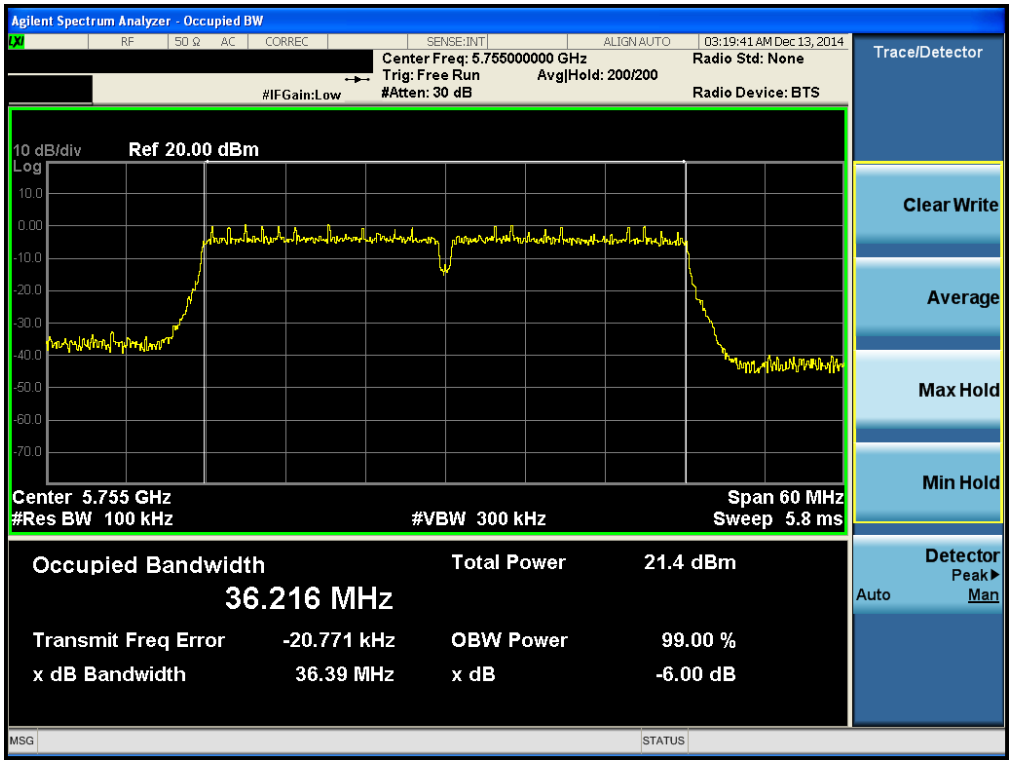
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.157 & ANT 2



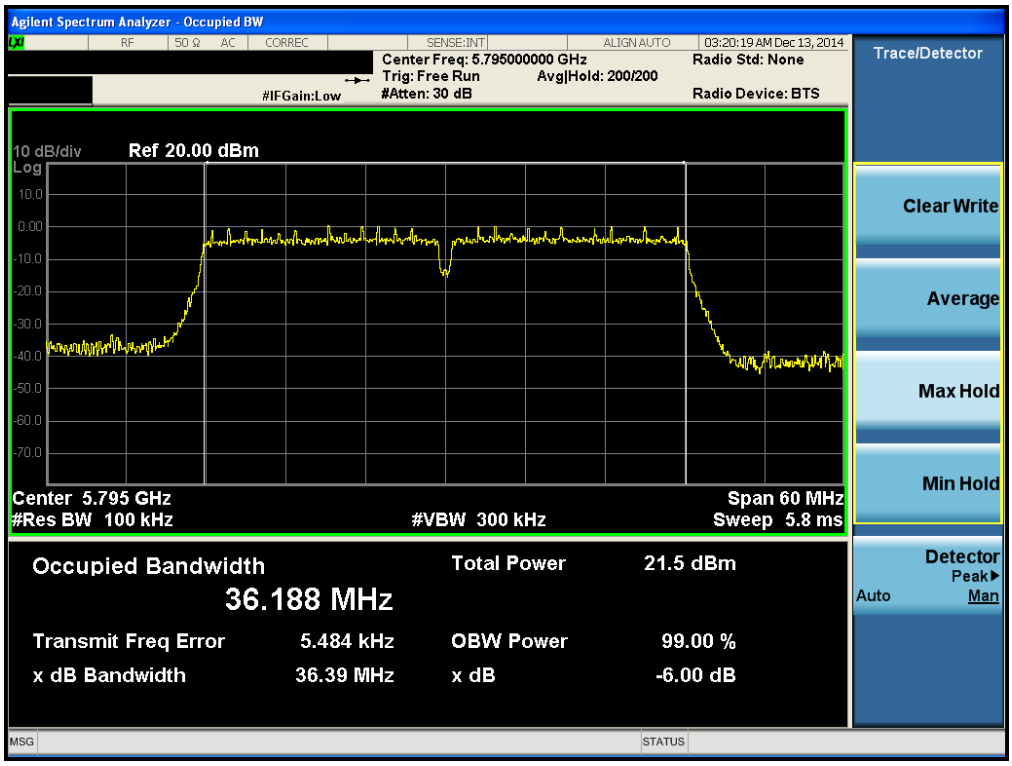
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.165 & ANT 2



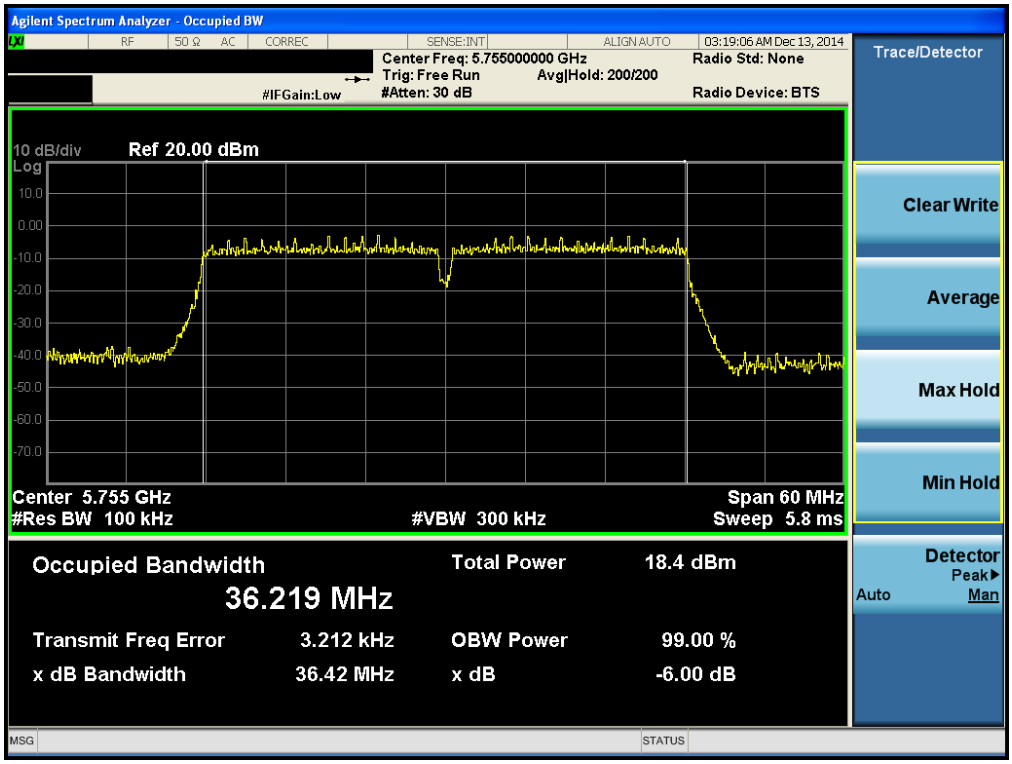
6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.151 & ANT 1



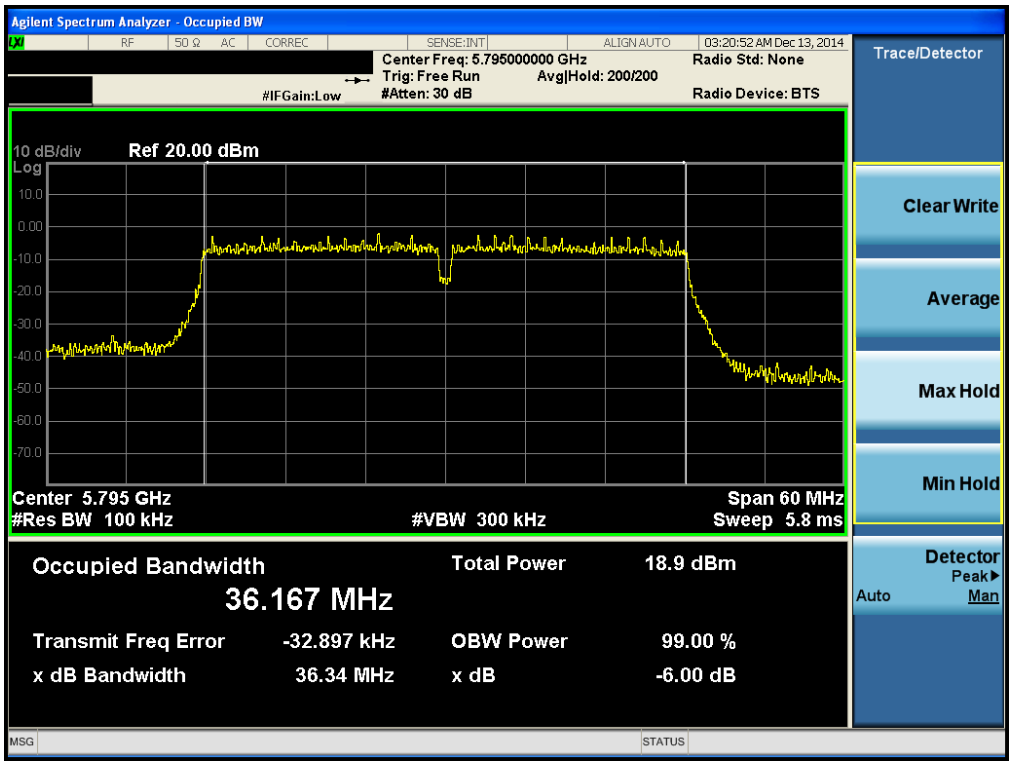
6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.159 & ANT 1



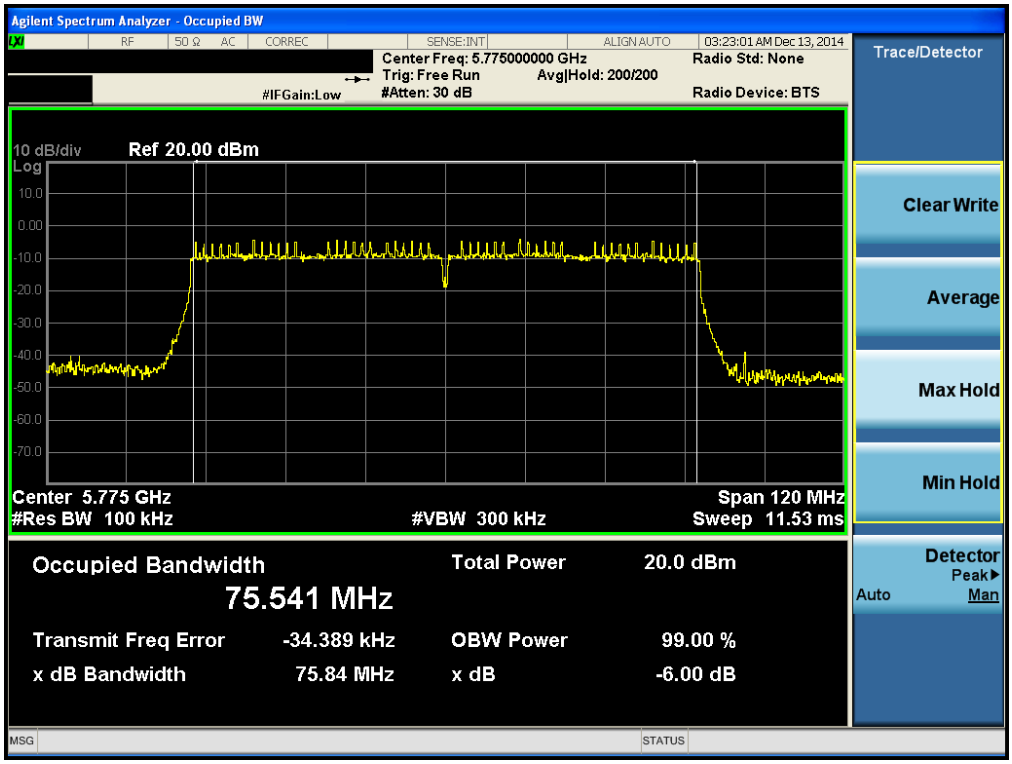
6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.151 & ANT 2



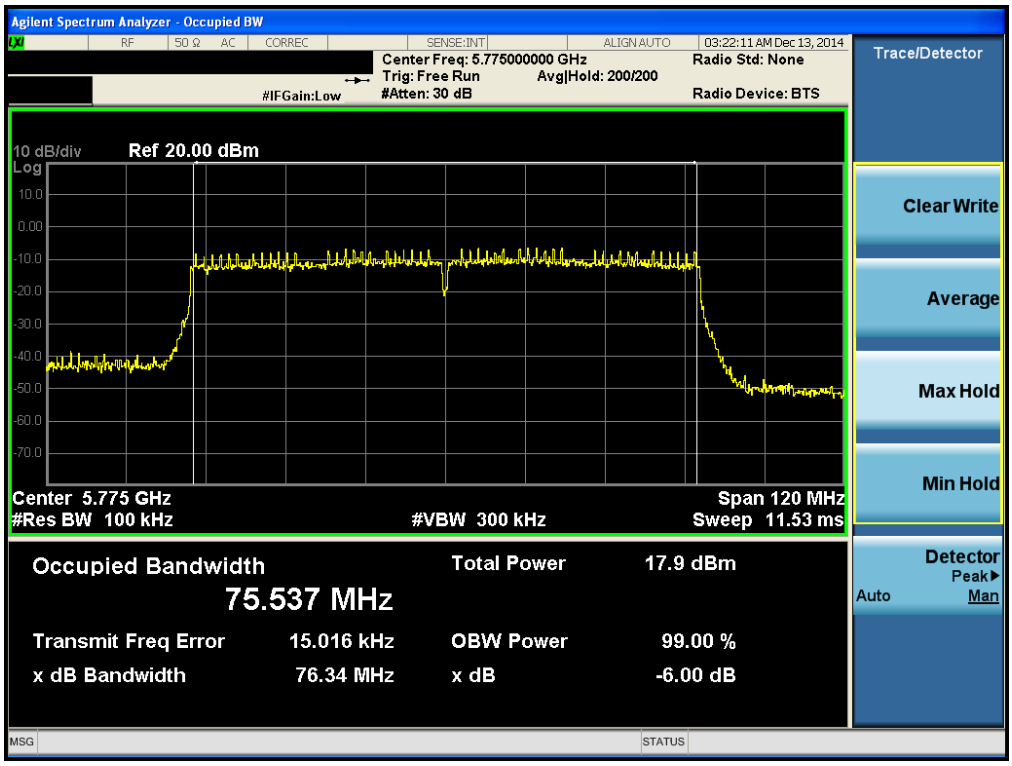
6 dB Bandwidth Test Mode: 802.11n HT40 & Ch.159 & ANT 2



6 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.155 & ANT 1



6 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.155 & ANT 2



8.3 Maximum Conducted Output Power

▣ **Test Requirements**

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum 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 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

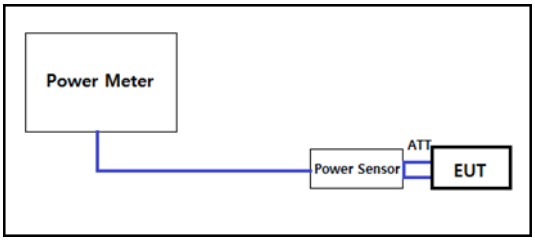
- Output power Limit Calculation

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Directional Gain (Worst case)	Determined Limit [dBm]
U-NII 1	802.11a	250	**23.97**	5.362	**23.97**
	802.11n HT20	250	**23.97**		**23.97**
	802.11n HT40	250	**23.97**		**23.97**
	802.11ac VHT80	250	**23.97**		**23.97**

Bands	Mode	Power Limit [mW] / Least 26dBC BW [MHz]	Calculation Limit [dBm]	ANT Gain	Determined Limit [dBm]
U-NII 2A	802.11a	250	**23.97**	5.711	**23.97**
		21.28	24.27		
	802.11n HT20	250	**23.97**		**23.97**
		21.58	24.34		
	802.11n HT40	250	**23.97**		**23.97**
		39.71	26.98		
	802.11ac VHT80	250	**23.97**		**23.97**
		80.99	30.08		
U-NII 2C	802.11a	250	**23.97**	5.662	**23.97**
		21.32	24.28		
	802.11n HT20	250	**23.97**		**23.97**
		21.64	24.35		
	802.11n HT40	250	**23.97**		**23.97**
		39.85	27.00		
	802.11ac VHT80	250	**23.97**		**23.97**
		81.71	30.12		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	ANT Gain	Determined Limit [dBm]
U-NII 3	802.11a	1000	**30.00**	5.420	**30.00**
	802.11n HT20	1000	**30.00**		**30.00**
	802.11n HT40	1000	**30.00**		**30.00**
	802.11ac VHT80	1000	**30.00**		**30.00**

▣ Test Configuration



▣ Test Procedure

Maximum Conducted Output Power is measured using Measurement Procedure **Method PM-G of KDB789033 D02 V01**

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

▣ Test Results: Comply

Mode	CH	Freq. [MHz]	Test Result [dBm]	
			ANT 1	ANT 2
802.11a (Single Transmit)	36	5180	**14.413**	-
	40	5200	14.262	-
	48	5240	14.296	-
	52	5260	14.072	-
	60	5300	14.025	-
	64	5320	13.302	-
	100	5500	13.684	-
	116	5580	13.717	-
	140	5700	13.514	-
	149	5745	13.418	-
	157	5785	13.554	-
	165	5825	12.541	-

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM(ANT 1 + 2)
802.11n HT20 (Single Transmit)	36	5180	13.455	13.383	-
	40	5200	**14.114**	14.057	-
	48	5240	14.085	14.031	-
	52	5260	14.079	13.992	-
	60	5300	13.118	13.024	-
	64	5320	12.323	12.234	-
	100	5500	12.465	12.404	-
	116	5580	13.549	13.454	-
	140	5700	13.588	13.491	-
	149	5745	13.784	13.699	-
	157	5785	13.790	13.701	-
	165	5825	13.805	13.726	-
802.11n HT20 (Multiple Transmit)	36	5180	9.455	9.396	12.436
	40	5200	10.114	10.017	**13.076**
	48	5240	10.085	9.991	13.049
	52	5260	10.079	10.002	13.051
	60	5300	9.118	9.057	12.098
	64	5320	8.323	8.246	11.295
	100	5500	8.465	8.404	11.445
	116	5580	9.549	9.459	12.515
	140	5700	9.588	9.511	12.560
	149	5745	9.784	9.726	12.765
	157	5785	9.790	9.705	12.758
	165	5825	9.805	9.749	12.787
802.11n HT40 (Single Transmit)	38	5190	8.022	7.941	-
	46	5230	13.315	13.237	-
	54	5270	**14.357**	14.296	-
	62	5310	10.850	10.778	-
	102	5510	10.565	10.491	-
	110	5550	13.859	13.765	-
	134	5670	14.071	13.977	-
	151	5755	13.416	13.345	-
	159	5795	13.426	13.330	-
802.11n HT40 (Multiple Transmit)	38	5190	4.022	3.934	6.989
	46	5230	9.315	9.232	12.284
	54	5270	10.357	10.290	**13.334**
	62	5310	6.850	6.752	9.812
	102	5510	6.565	6.491	9.538
	110	5550	9.859	9.778	12.829
	134	5670	10.071	9.997	13.044
	151	5755	9.416	9.338	12.387
	159	5795	9.426	9.341	12.394

Mode	CH	Freq. [MHz]	Test Result [dBm]		
			ANT 1	ANT 2	SUM(ANT 1 + 2)
802.11ac VHT20 (Single Transmit)	36	5180	13.340	13.275	-
	40	5200	**14.006**	13.896	-
	48	5240	13.968	13.852	-
	52	5260	13.952	13.874	-
	60	5300	12.981	12.917	-
	64	5320	12.220	12.153	-
	100	5500	12.332	12.270	-
	116	5580	13.420	13.332	-
	140	5700	13.440	13.411	-
	149	5745	13.642	13.611	-
	157	5785	13.659	13.594	-
	165	5825	13.678	13.647	-
802.11ac VHT20 (Multiple Transmit)	36	5180	9.355	9.264	12.320
	40	5200	9.980	9.889	12.945
	48	5240	9.973	9.914	12.954
	52	5260	9.977	9.913	**12.955**
	60	5300	8.999	8.906	11.963
	64	5320	8.180	8.087	11.144
	100	5500	8.336	8.275	11.316
	116	5580	9.449	9.386	12.428
	140	5700	9.453	9.400	12.437
	149	5745	9.660	9.626	12.653
	157	5785	9.646	9.576	12.621
	165	5825	9.662	9.605	12.644
802.11ac VHT40 (Single Transmit)	38	5190	7.882	7.799	-
	46	5230	13.203	13.156	-
	54	5270	**14.250**	14.150	-
	62	5310	10.744	10.619	-
	102	5510	10.447	10.400	-
	110	5550	13.728	13.679	-
	134	5670	13.968	13.854	-
	151	5755	13.313	13.221	-
	159	5795	13.305	13.242	-
802.11ac VHT40 (Multiple Transmit)	38	5190	3.873	3.808	6.851
	46	5230	9.190	9.130	12.170
	54	5270	10.213	10.124	**13.179**
	62	5310	6.700	6.602	9.662
	102	5510	6.428	6.328	9.389
	110	5550	9.745	9.678	12.722
	134	5670	9.943	9.845	12.905
	151	5755	9.284	9.252	12.278
	159	5795	9.296	9.247	12.282
802.11ac VHT80 (Single Transmit)	42	5210	8.319	8.231	-
	58	5290	9.913	9.849	-
	106	5530	10.082	10.019	-
	155	5775	**12.425**	12.329	-
802.11ac VHT80 (Multiple Transmit)	42	5210	4.319	4.229	7.285
	58	5290	5.913	5.824	8.879
	106	5530	6.082	6.018	9.060
	155	5775	8.425	8.346	**11.396**

8.4 Maximum Power Spectral Density

▣ **Test requirements**

(1) For the band 5.15-5.25 GHz.

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1MHz band. note1

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1MHz band. note1

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1MHz band. note1

(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 MHz band. note1

(3) For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. note1,note2

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

- Peak Power Spectral Density Limit Calculation

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
U-NII 1	11	2.353	11
U-NII 2A	11	2.701	11
U-NII 2C	11	2.653	11
U-NII 3	30	2.418	30

▣ **Test configuration**

Refer to the APPENDIX I.

▣ **Test procedure**

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02 V01**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: 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 instrument to find the peak of the spectrum and record its value.

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 II.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 Maximum PSD over 1 MHz reference bandwidth.

5) For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.1.a). (Refer to Appendix II)

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW=100 kHz is available on nearly all spectrum analyzers.

▣ **Test results: Comply**

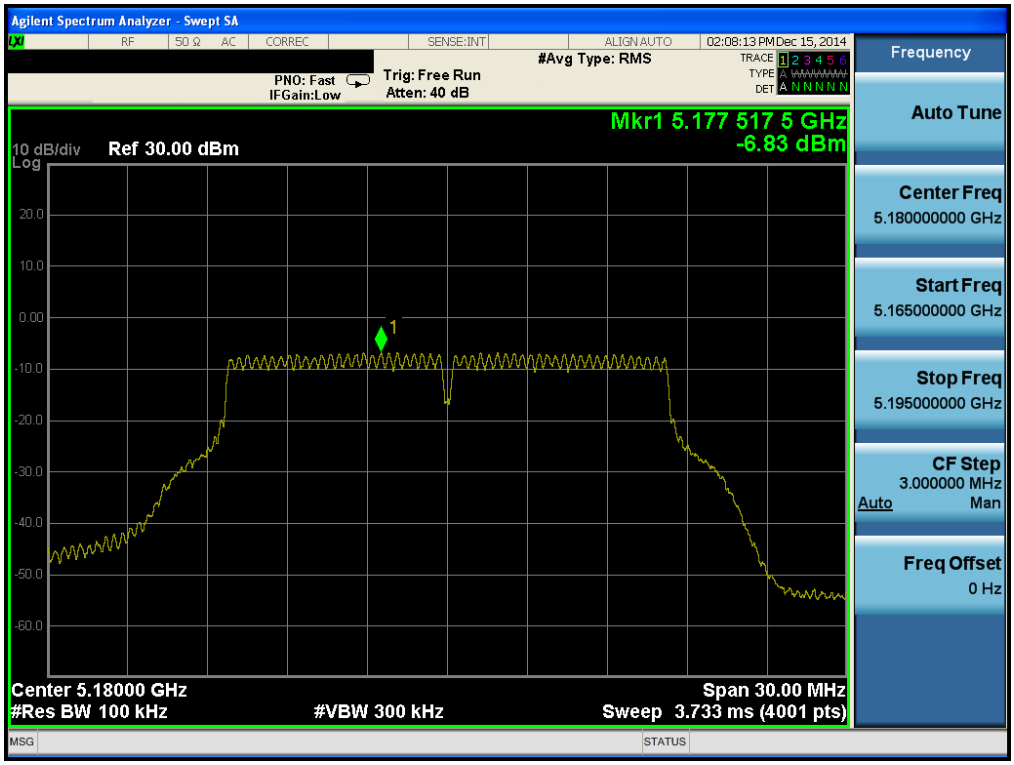
Mode	Channel	Frequency [MHz]	Reading [dBm]		T.F [dB] Note 1	Test Result [dBm] Note 2	
			ANT 1	ANT 2		ANT 1	ANT 2
802.11a	36	5180	-6.830	-	10.230	3.400	-
	40	5200	-6.910	-		3.320	-
	48	5240	-6.950	-		3.280	-
	52	5260	-7.190	-		3.040	-
	60	5300	-6.760	-		3.470	-
	64	5320	-7.340	-		2.890	-
	100	5500	-6.620	-		3.610	-
	116	5580	-6.640	-		3.590	-
	140	5700	-6.820	-		3.410	-
	149	5745	-9.090	-	7.240	-1.850	-
	157	5785	-8.820	-		-1.580	-
	165	5825	-9.190	-		-1.950	-
802.11n HT20	36	5180	-7.030	-7.150	10.230	3.200	3.080
	40	5200	-5.920	-6.210		4.310	4.020
	48	5240	-6.380	-6.580		3.850	3.650
	52	5260	-6.350	-6.490		3.880	3.740
	60	5300	-6.900	-6.970		3.330	3.260
	64	5320	-7.890	-7.930		2.340	2.300
	100	5500	-7.630	-8.260		2.600	1.970
	116	5580	-6.220	-6.980		4.010	3.250
	140	5700	-7.320	-7.790		2.910	2.440
	149	5745	-8.640	-8.850	7.240	-1.400	-1.610
	157	5785	-8.470	-8.480		-1.230	-1.240
	165	5825	-8.230	-8.340		-0.990	-1.100
802.11n HT40	38	5190	-16.090	-16.130	10.440	-5.650	-5.690
	46	5230	-9.620	-9.740		0.820	0.700
	54	5270	-8.180	-8.350		2.260	2.090
	62	5310	-11.930	-11.970		-1.490	-1.530
	102	5510	-12.660	-13.020		-2.220	-2.580
	110	5550	-8.710	-8.730		1.730	1.710
	134	5670	-8.950	-8.990		1.490	1.450
	151	5755	-9.060	-9.930	7.480	-1.580	-2.450
	159	5795	-9.210	-9.560		-1.730	-2.080
802.11ac VHT80	42	5210	-19.150	-19.690	10.370	-8.780	-9.320
	58	5290	-17.350	-18.070		-6.980	-7.700
	106	5530	-16.890	-16.940		-6.520	-6.570
	155	5775	-13.530	-15.790	7.360	-6.170	-8.430

Note 1: T.F = 10log(1MHz/100kHz) + D.C.F. for U-NII 1, 2A and 2C
T.F = 10log(0.5MHz/100kHz) + D.C.F for U-NII 3
For D.C.F., please refer to appendix II.
Note 2: Test Result = Measurement Data + T.F
Note 3: This test item was performed at the worst case mode(Single transmitting mode).

▣ Result Plots – Single Transmit

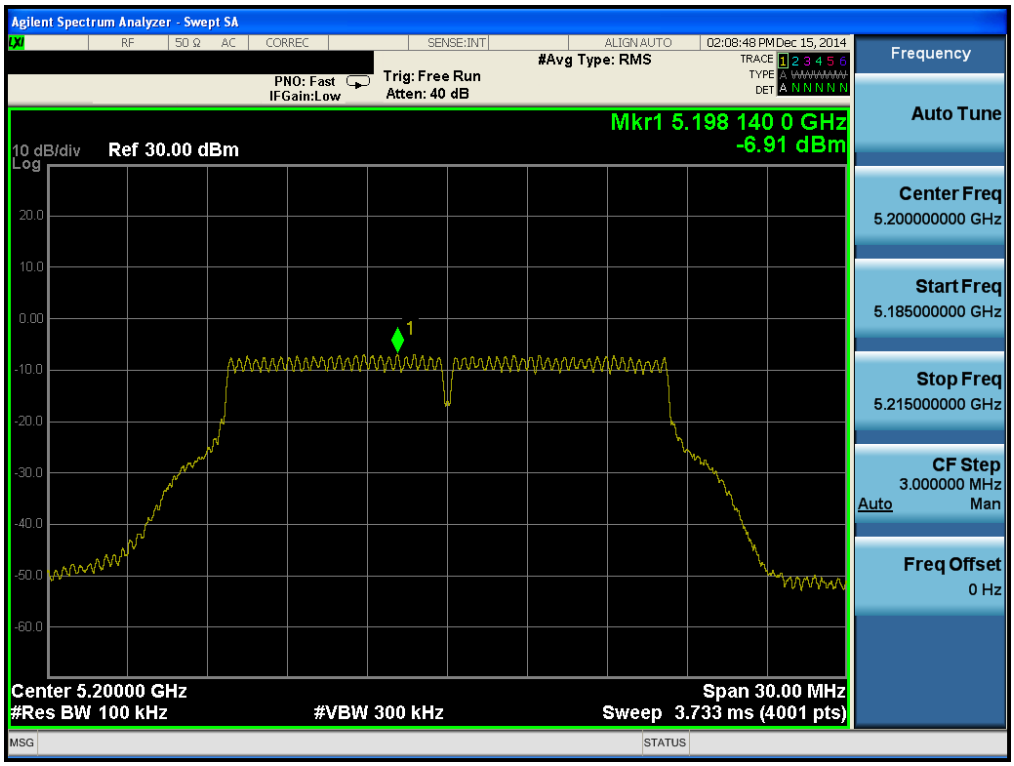
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.36 & ANT 1(SISO)

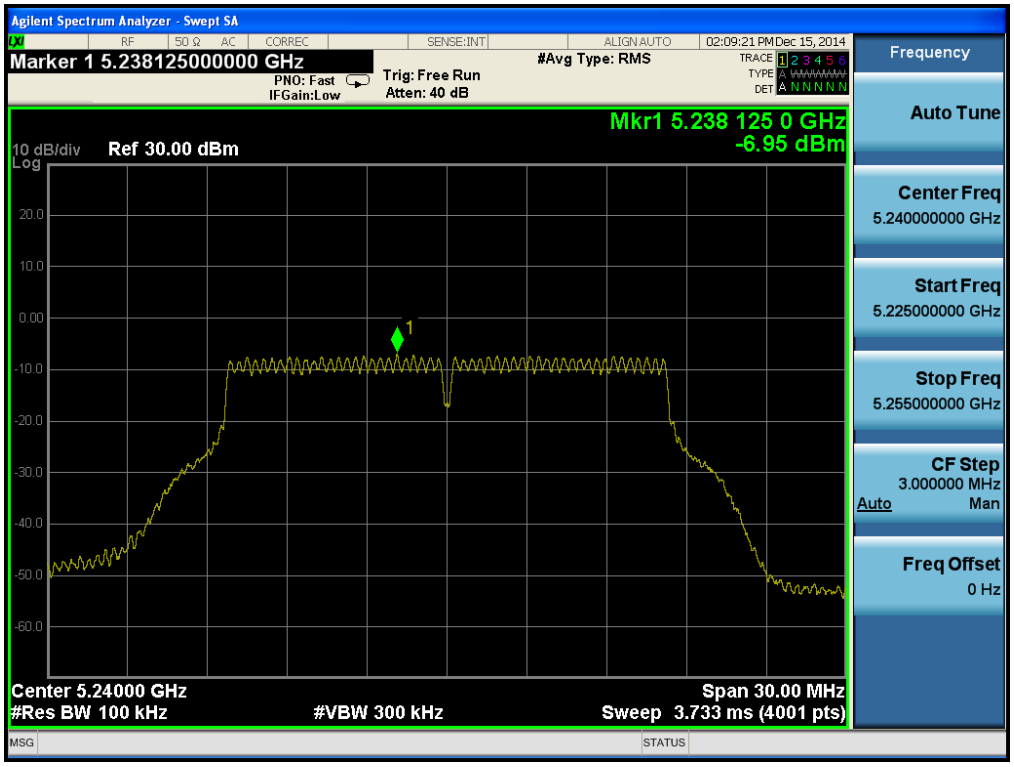


Maximum Power Spectral Density

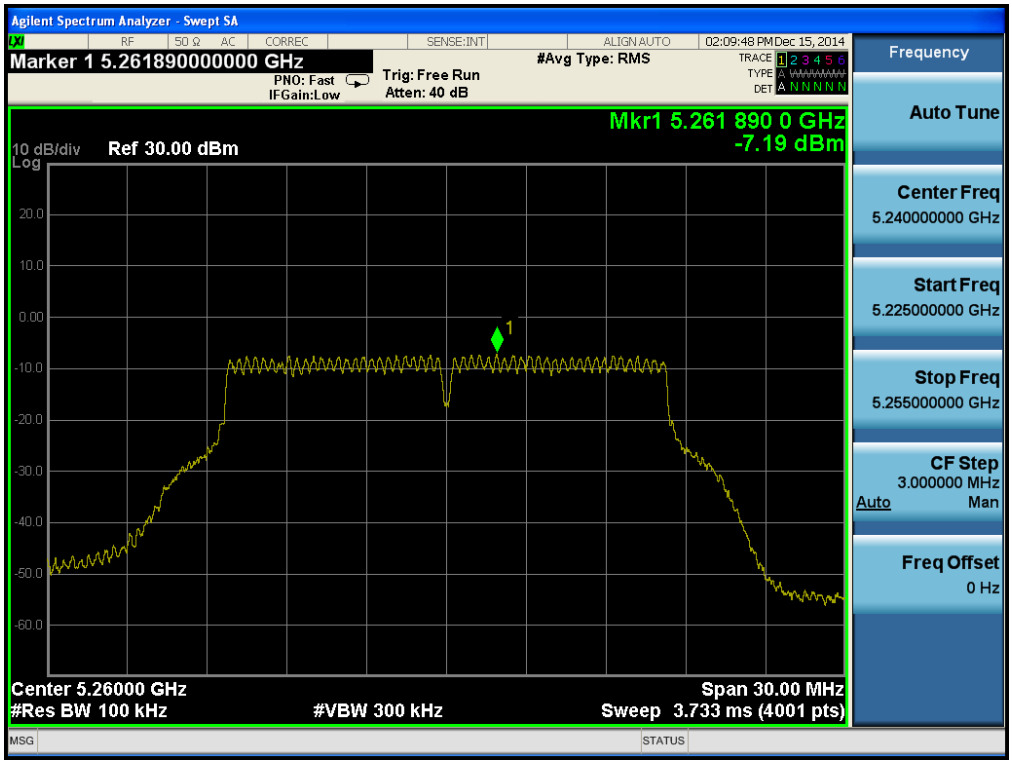
Test Mode: 802.11a & Ch.40 & ANT 1(SISO)



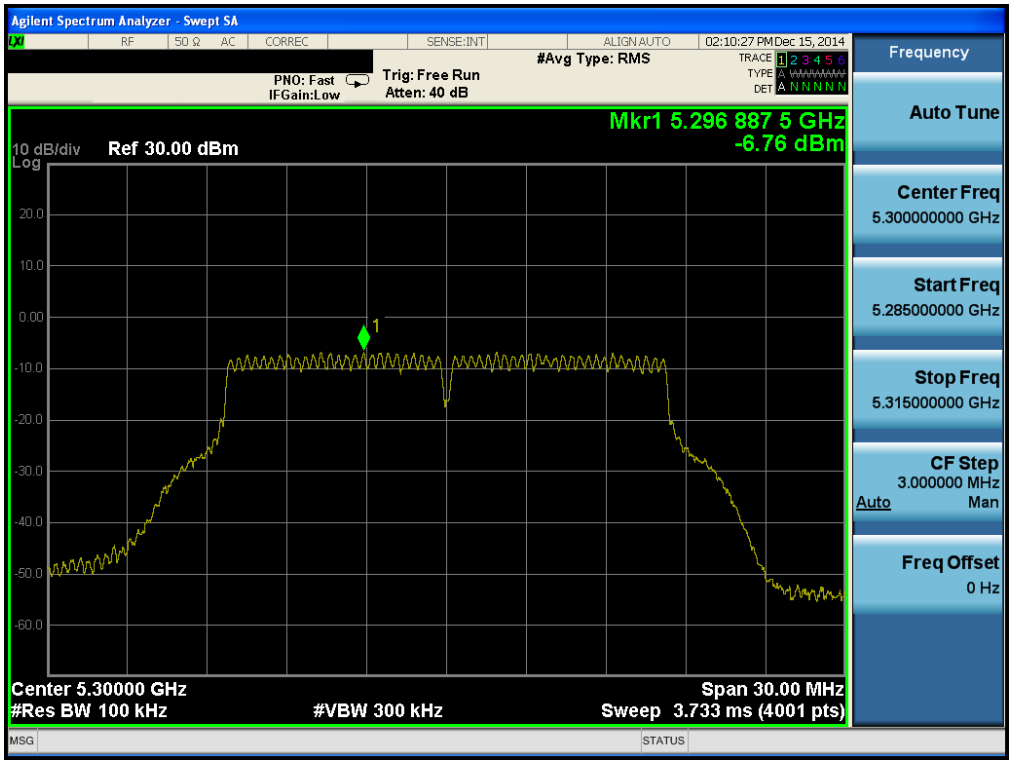
Maximum Power Spectral Density Test Mode: 802.11a & Ch.48 & ANT 1(SISO)



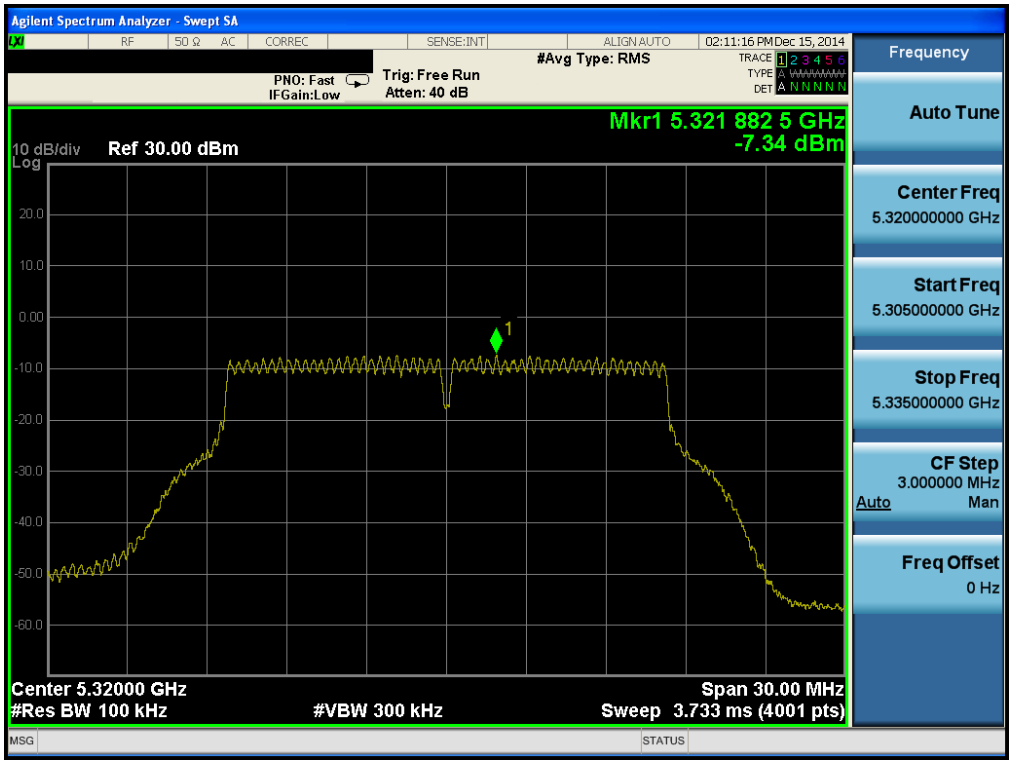
Maximum Power Spectral Density Test Mode: 802.11a & Ch.52 & ANT 1(SISO)



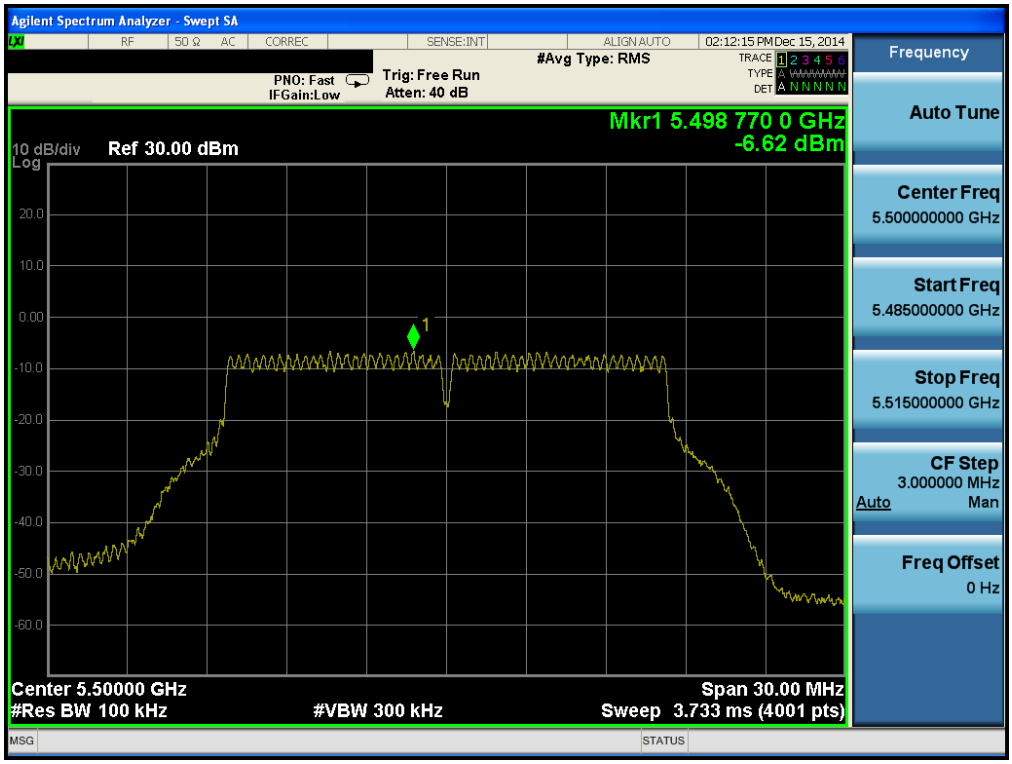
Maximum Power Spectral Density Test Mode: 802.11a & Ch.60 & ANT 1(SISO)



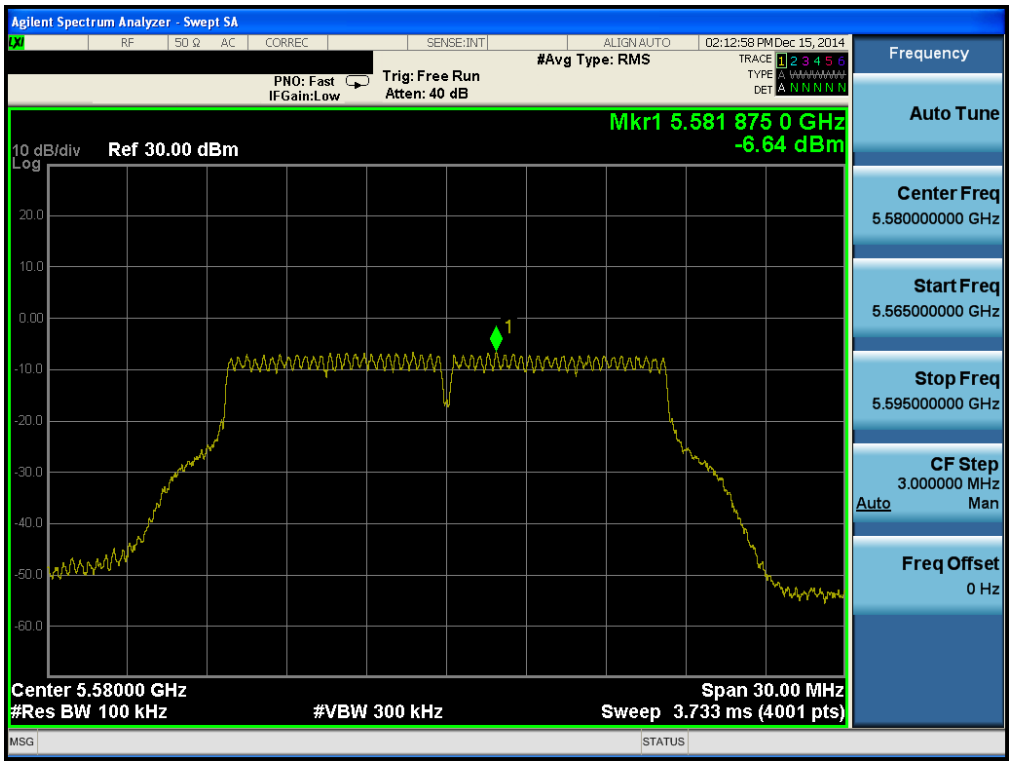
Maximum Power Spectral Density Test Mode: 802.11a & Ch.64 & ANT 1(SISO)



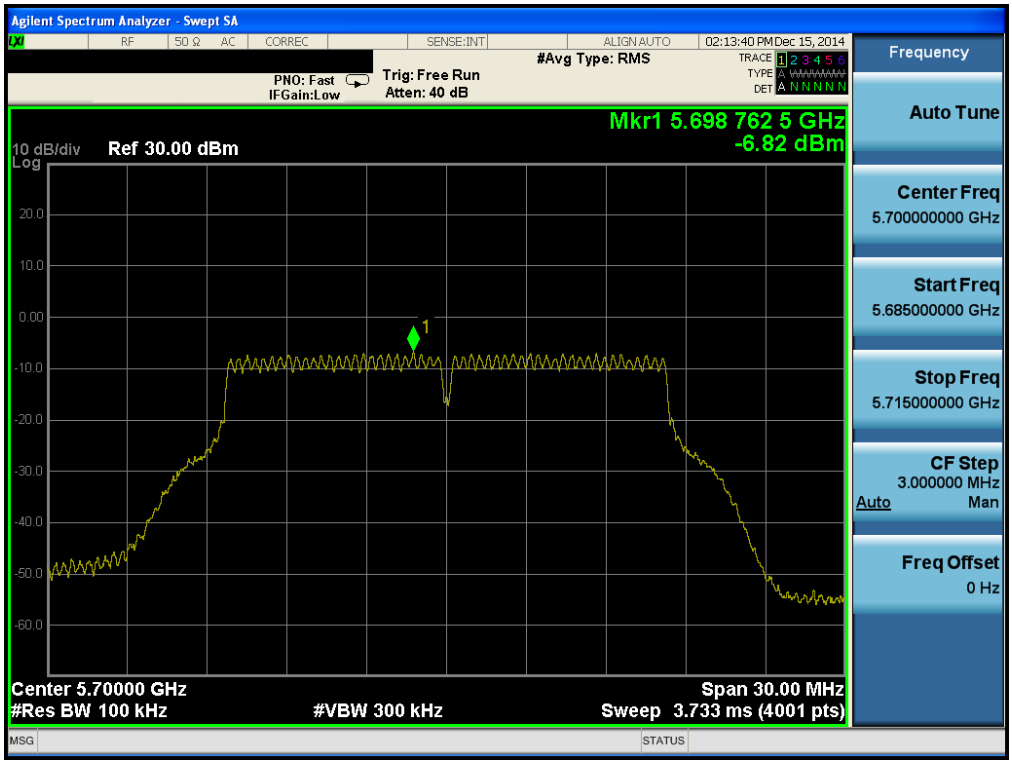
Maximum Power Spectral Density Test Mode: 802.11a & Ch.100 & ANT 1(SISO)



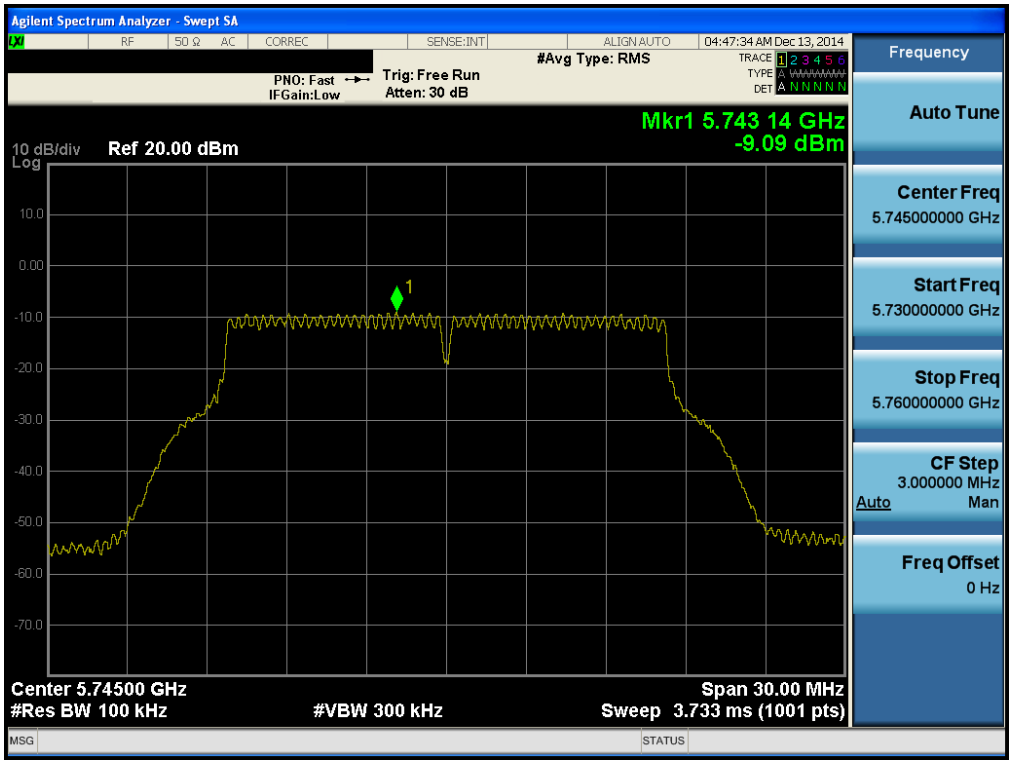
Maximum Power Spectral Density Test Mode: 802.11a & Ch.116 & ANT 1(SISO)



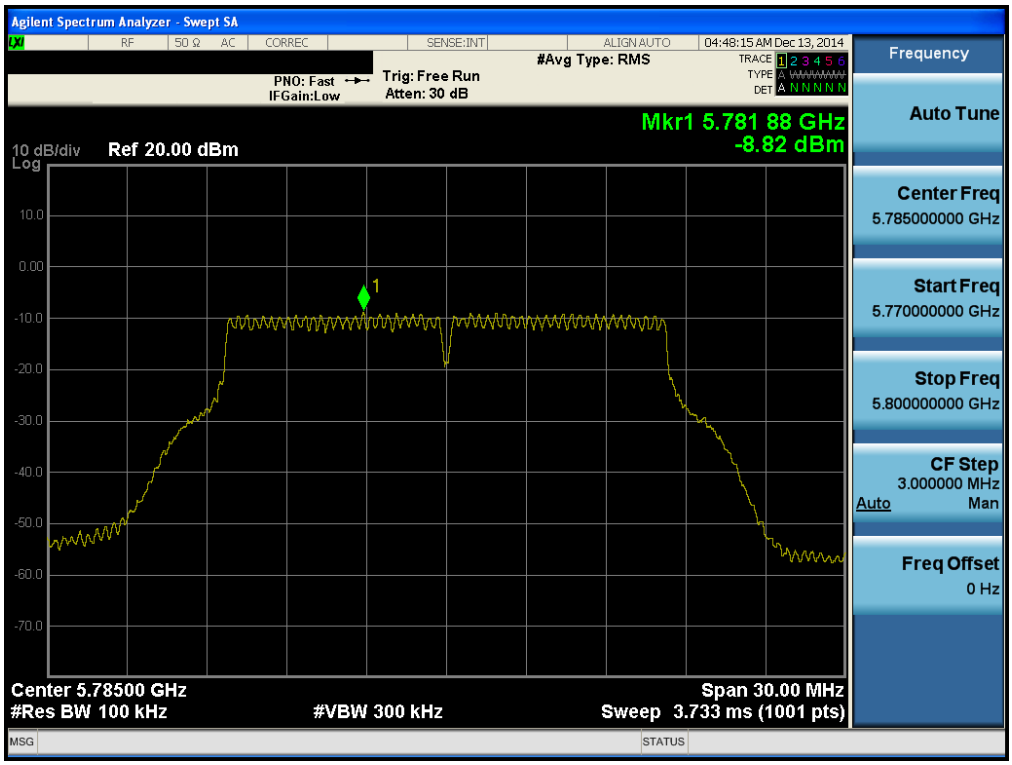
Maximum Power Spectral Density Test Mode: 802.11a & Ch.140 & ANT 1(SISO)



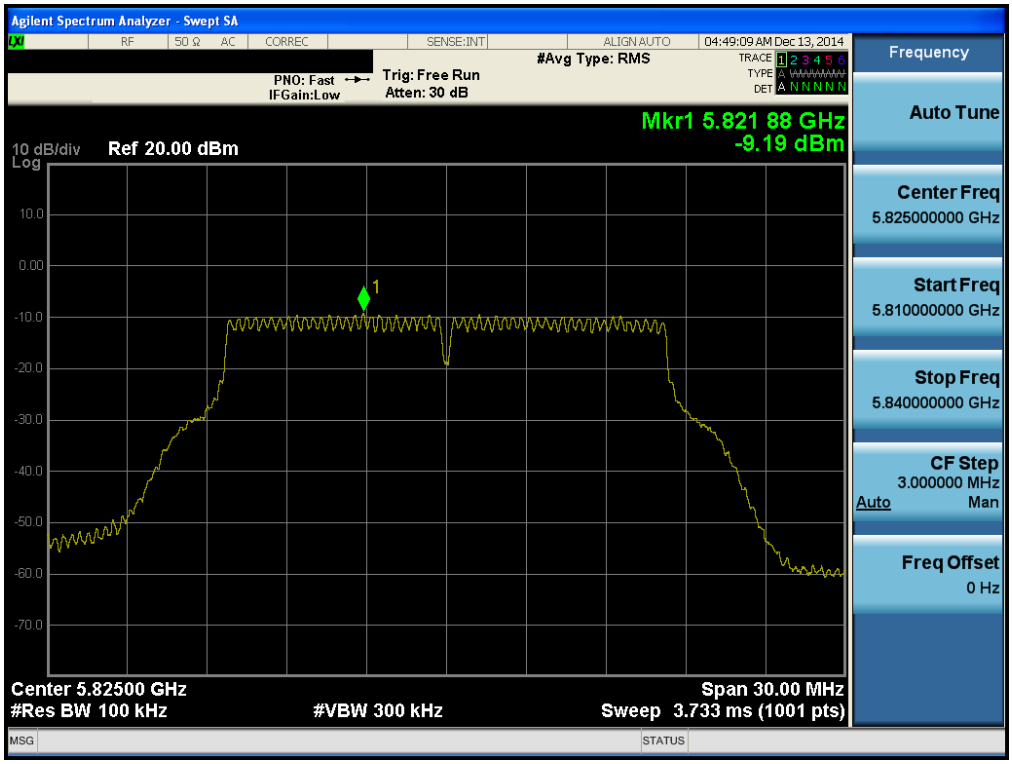
Maximum Power Spectral Density Test Mode: 802.11a & Ch.149 & ANT 1(SISO)



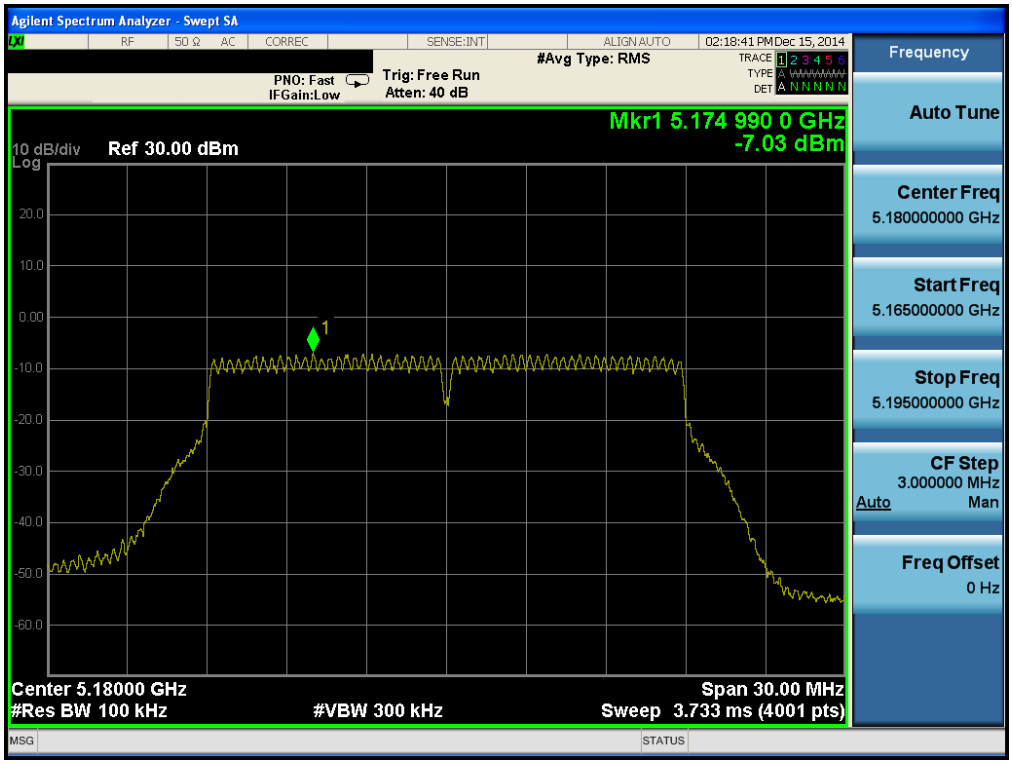
Maximum Power Spectral Density Test Mode: 802.11a & Ch.157 & ANT 1(SISO)



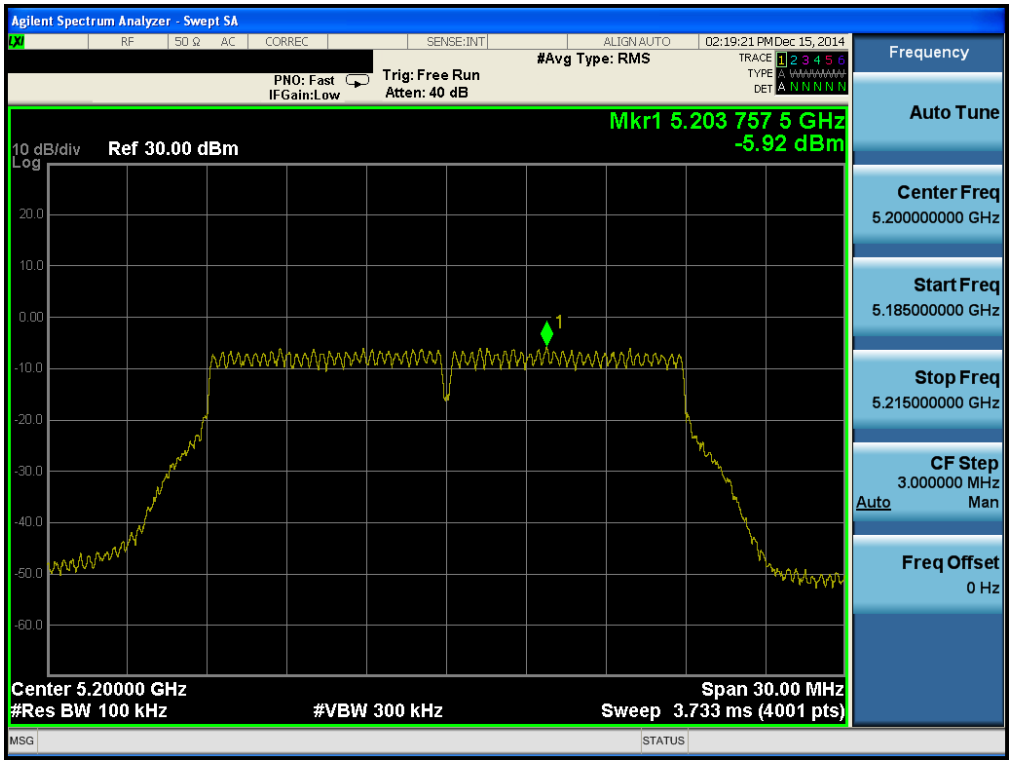
Maximum Power Spectral Density Test Mode: 802.11a & Ch.165 & ANT 1(SISO)



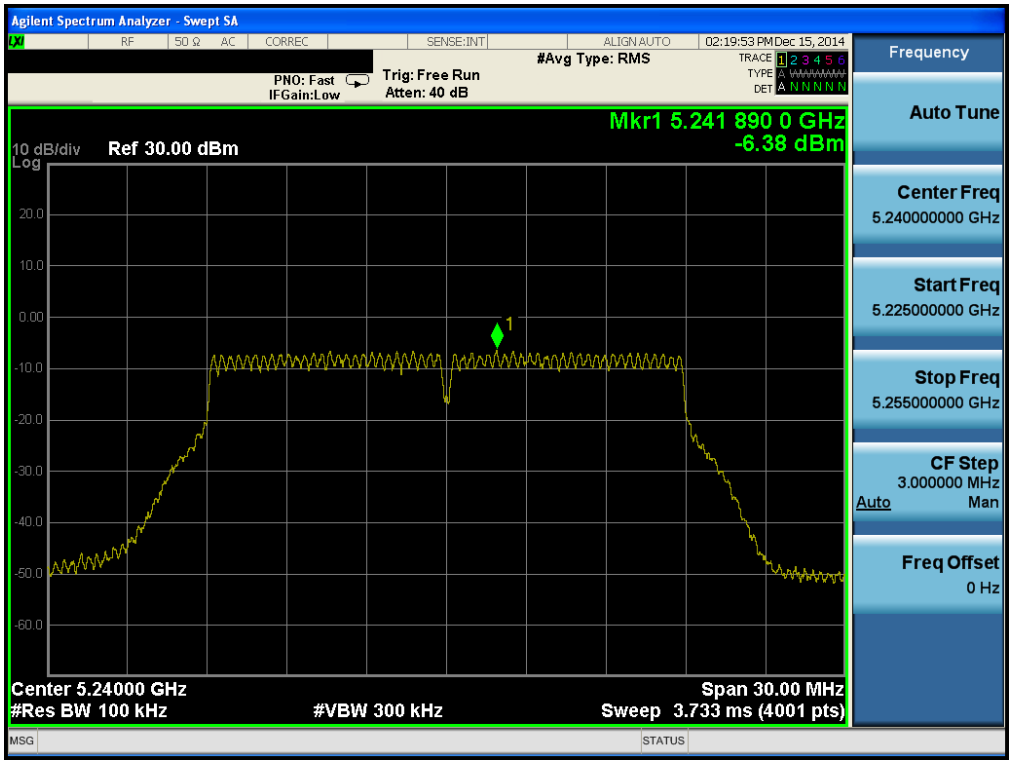
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.36 & ANT 1(SISO)



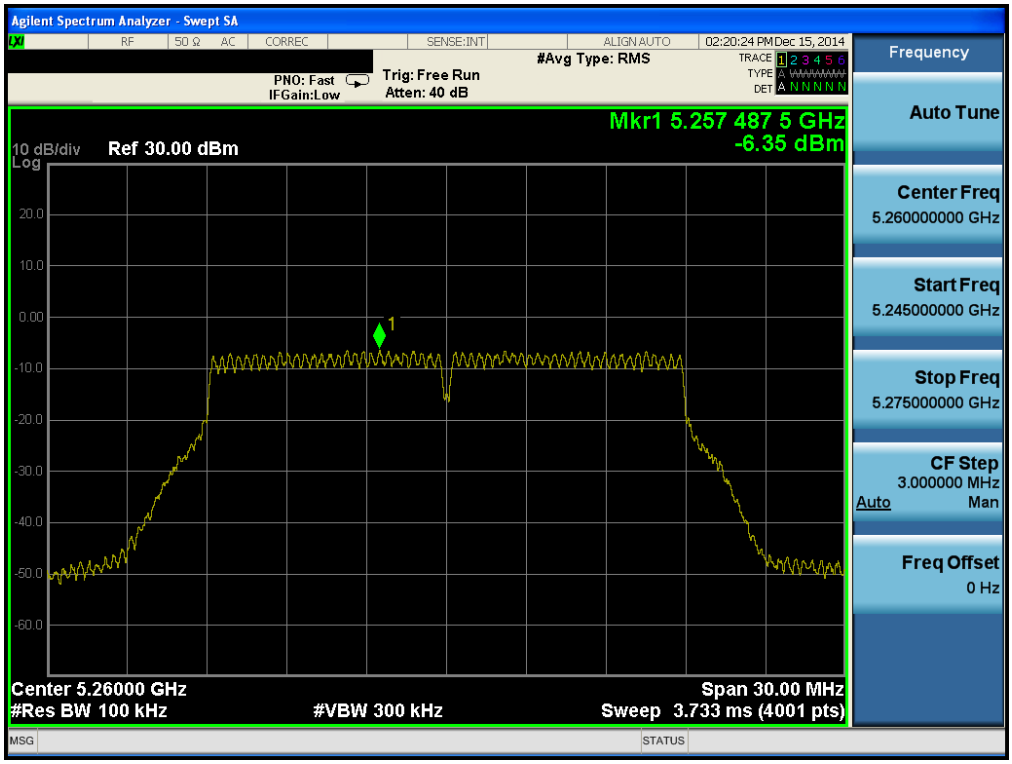
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.40 & ANT 1(SISO)



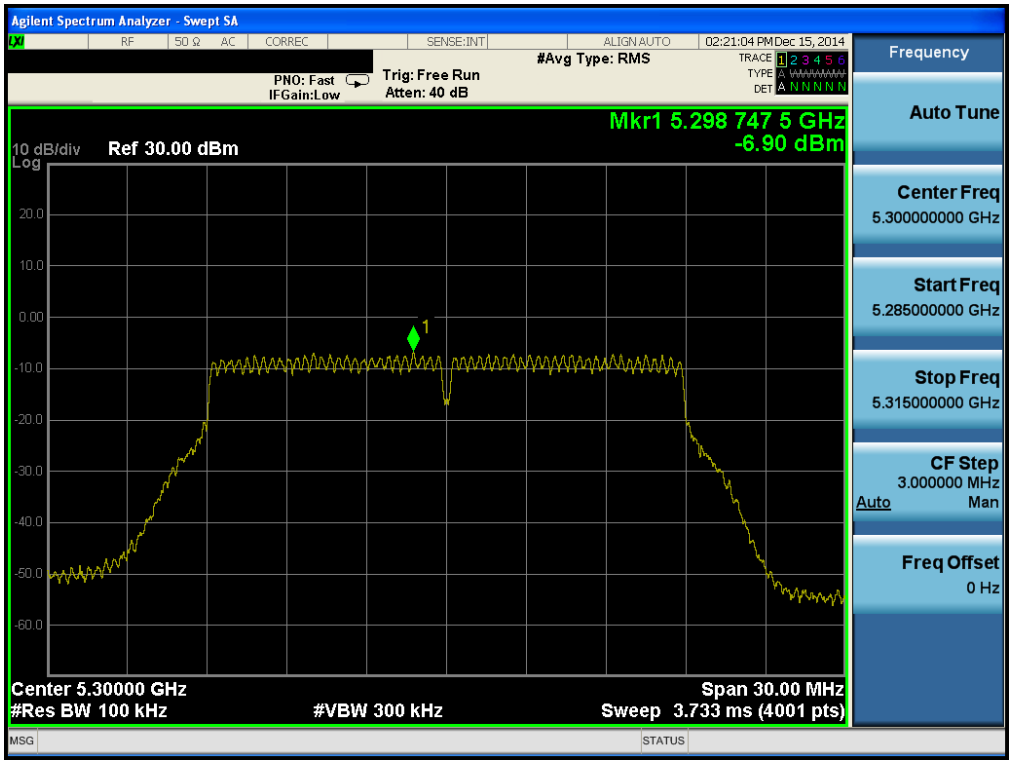
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.48 & ANT 1(SISO)



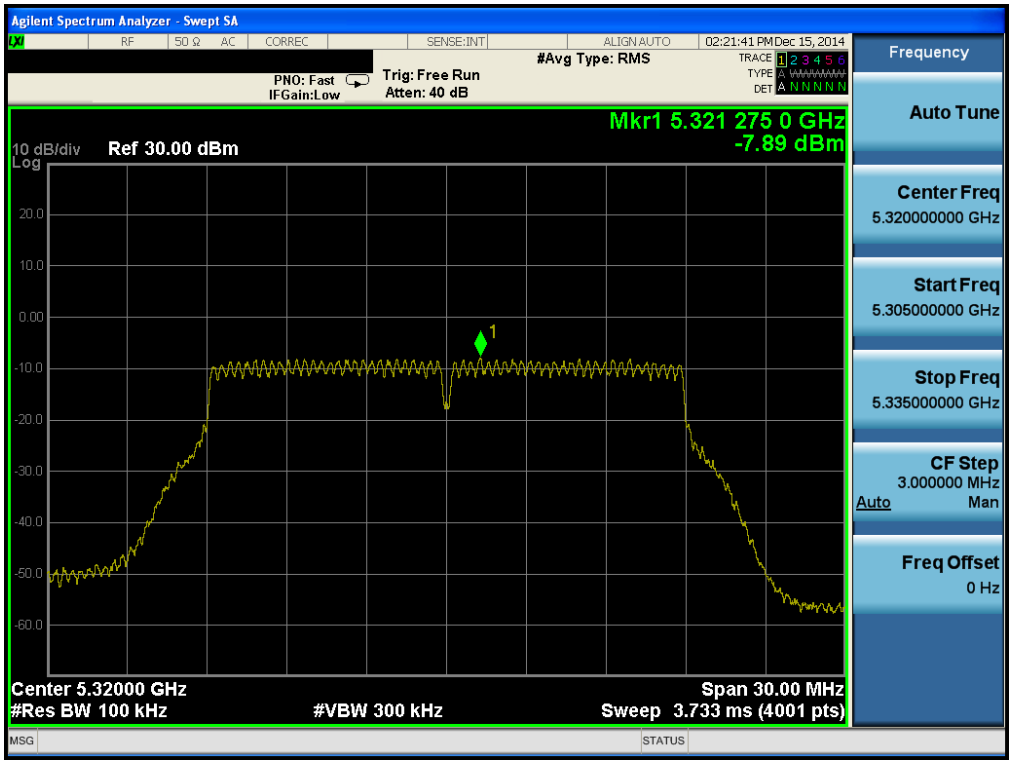
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.52 & ANT 1(SISO)



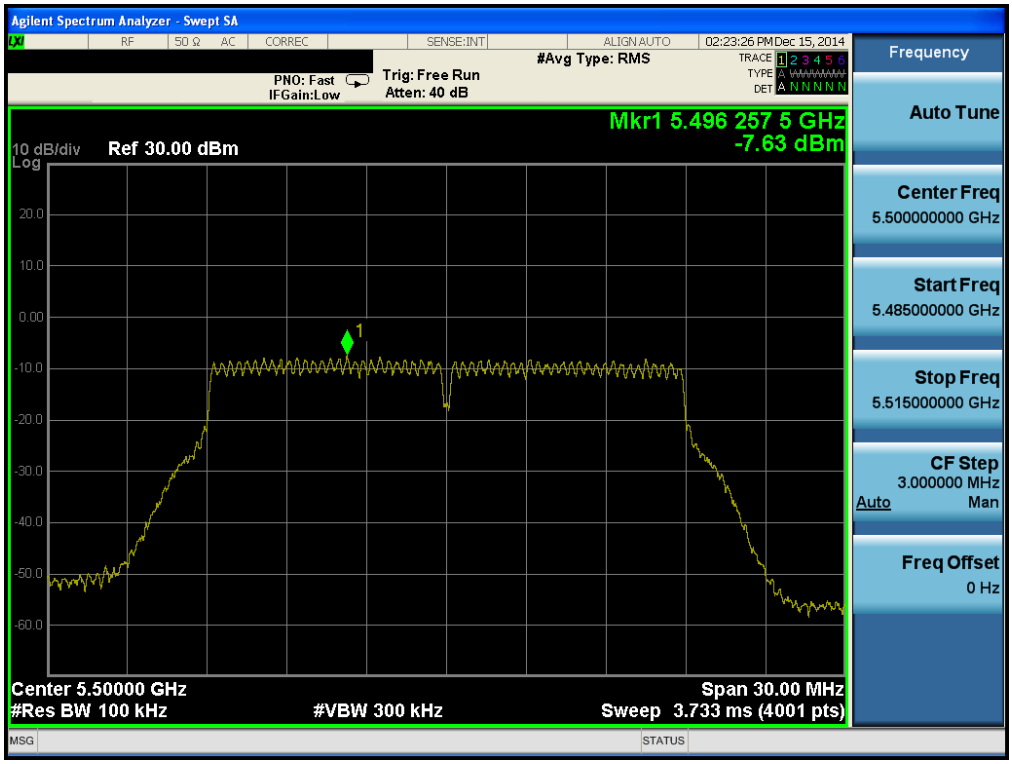
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.60 & ANT 1(SISO)



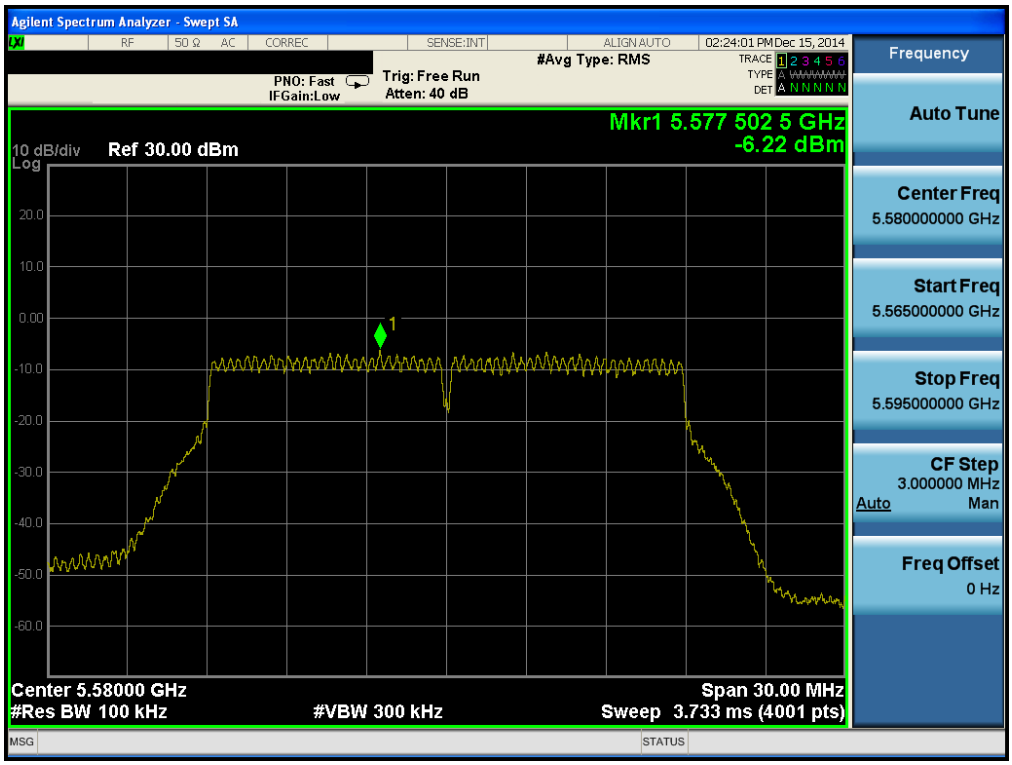
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.64 & ANT 1(SISO)



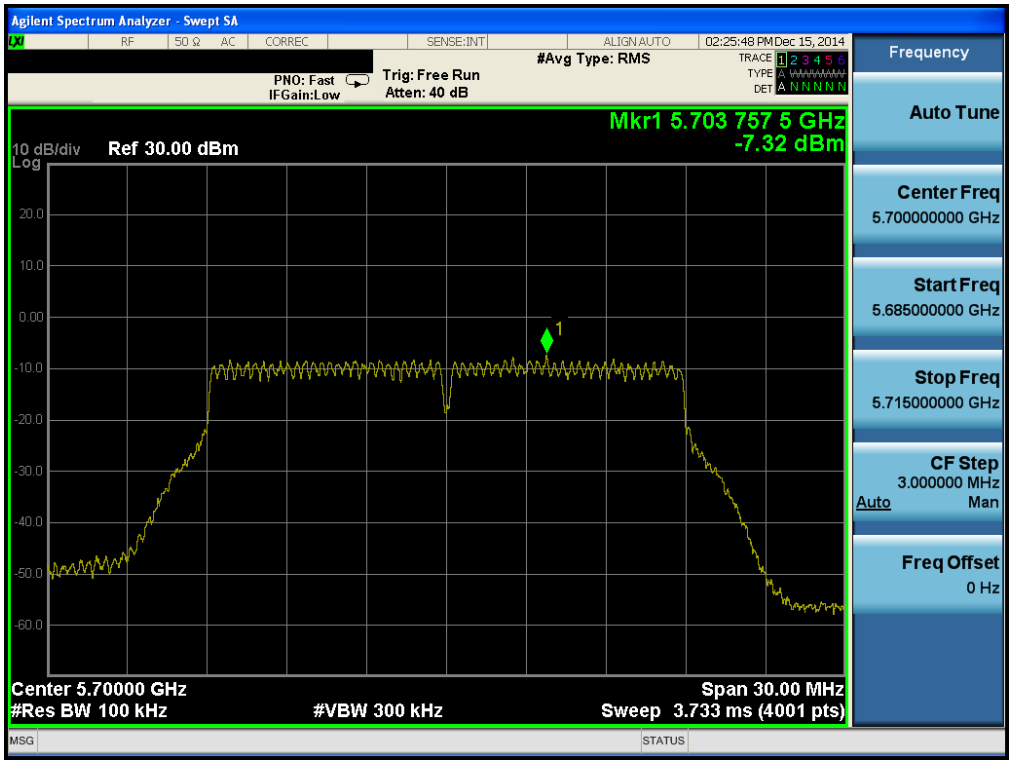
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.100 & ANT 1(SISO)



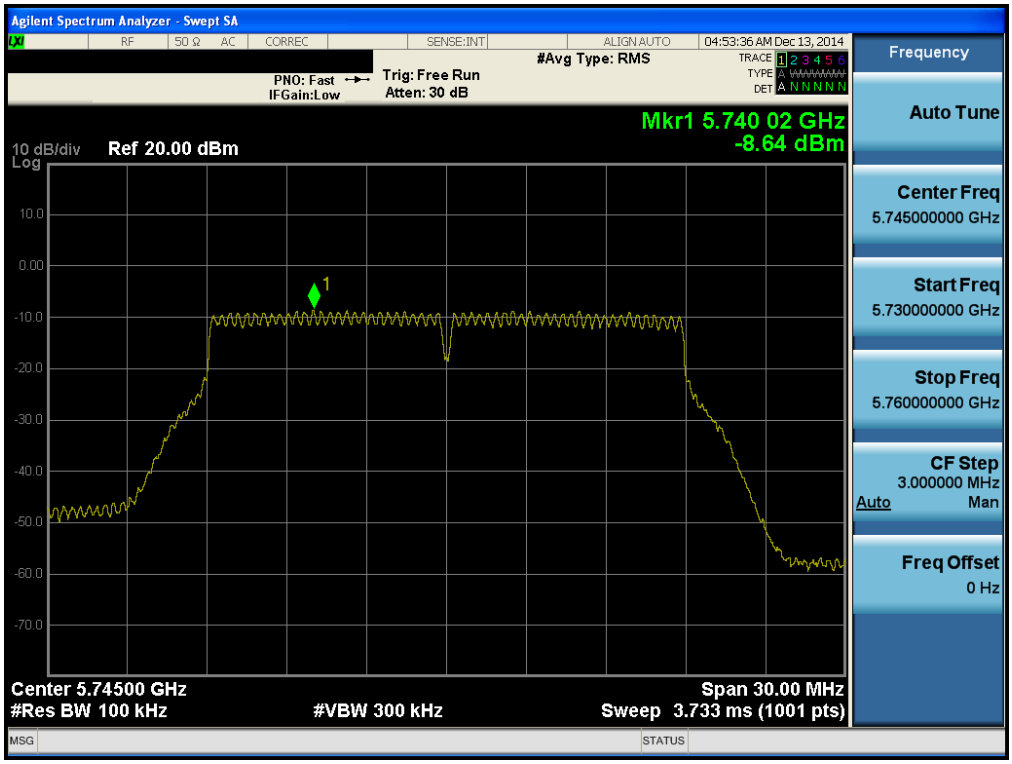
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.116 & ANT 1(SISO)



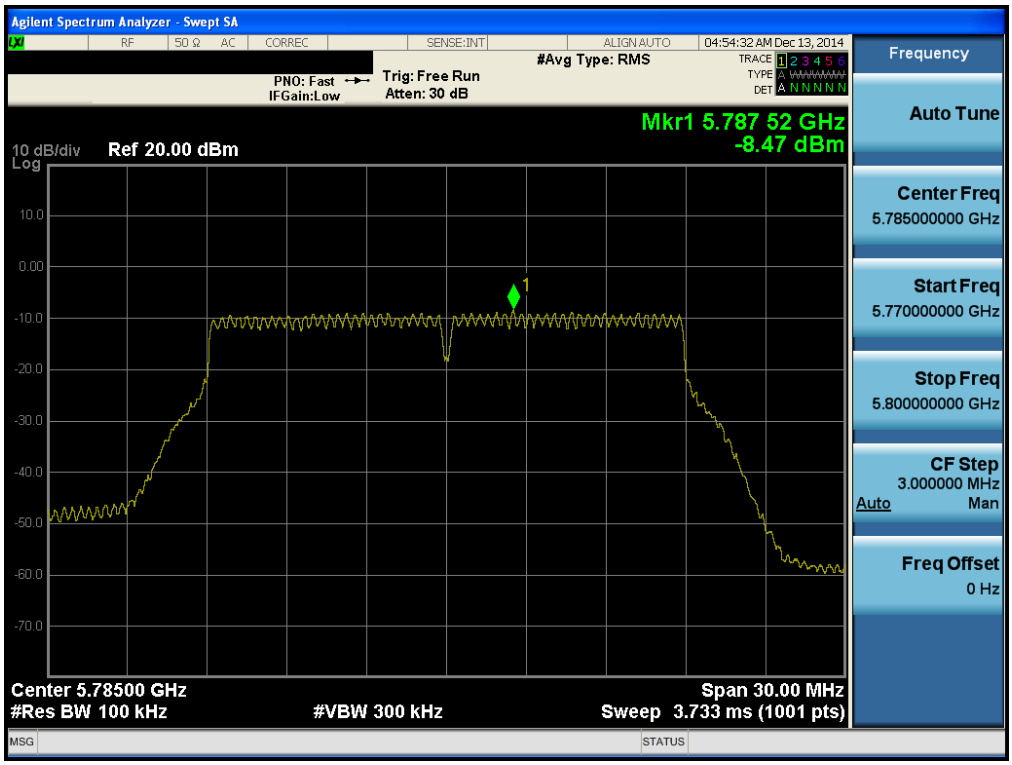
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.140 & ANT 1(SISO)



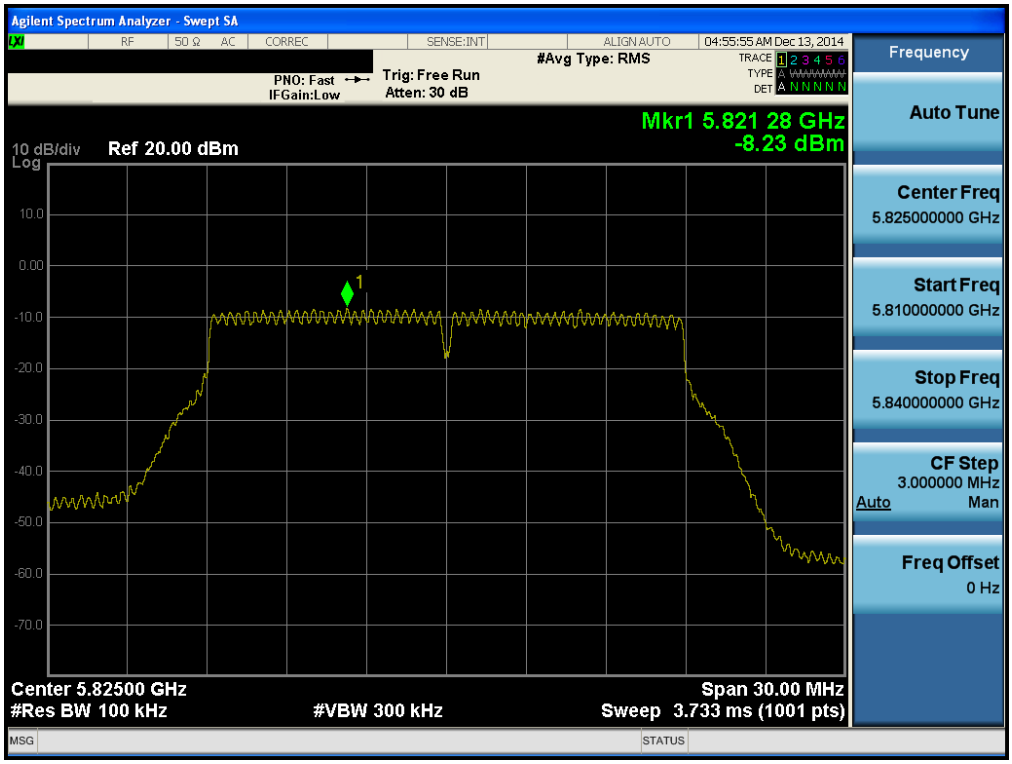
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.149 & ANT 1(SISO)



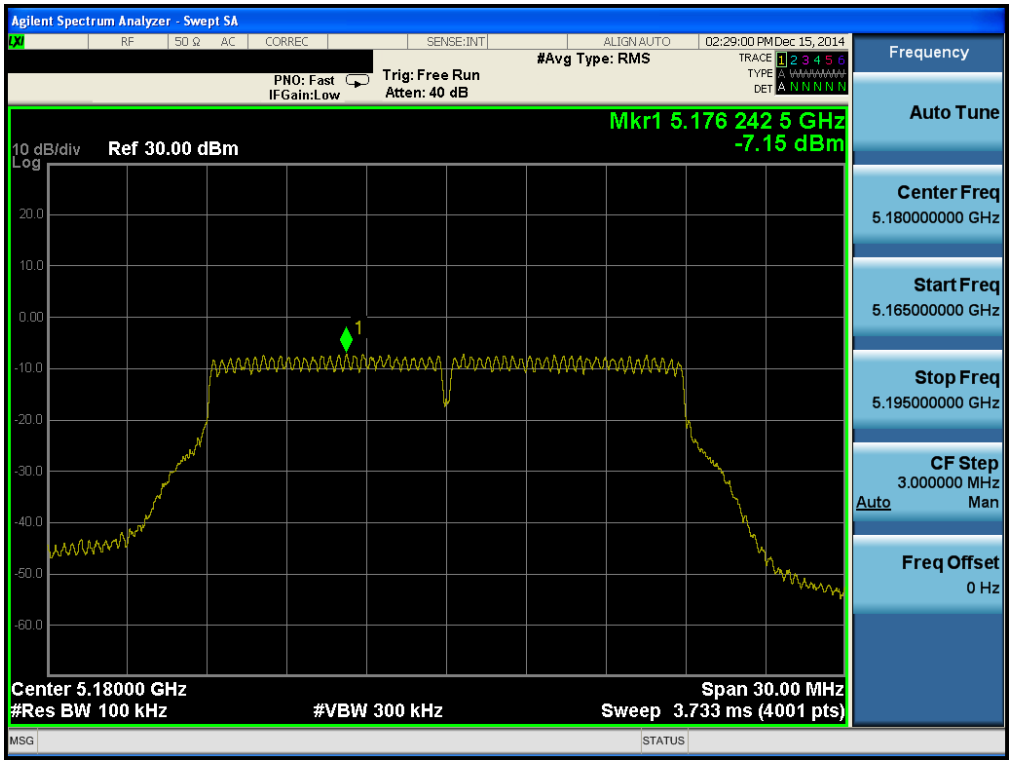
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.157 & ANT 1(SISO)



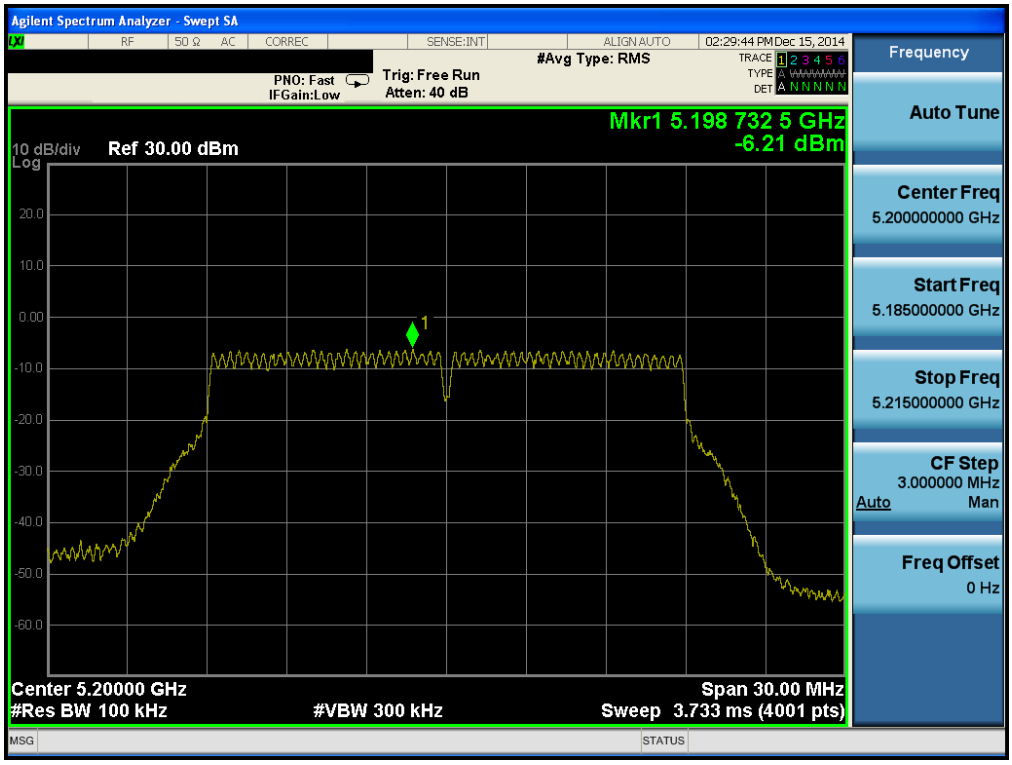
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 1(SISO)



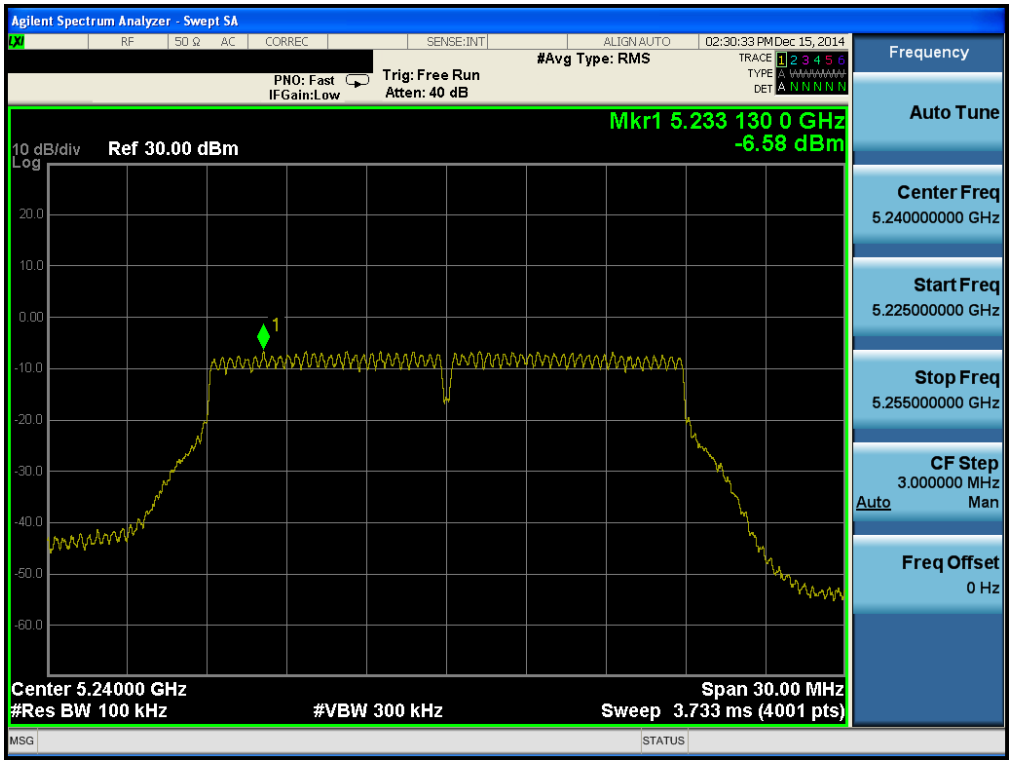
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.36 & ANT 2(SISO)



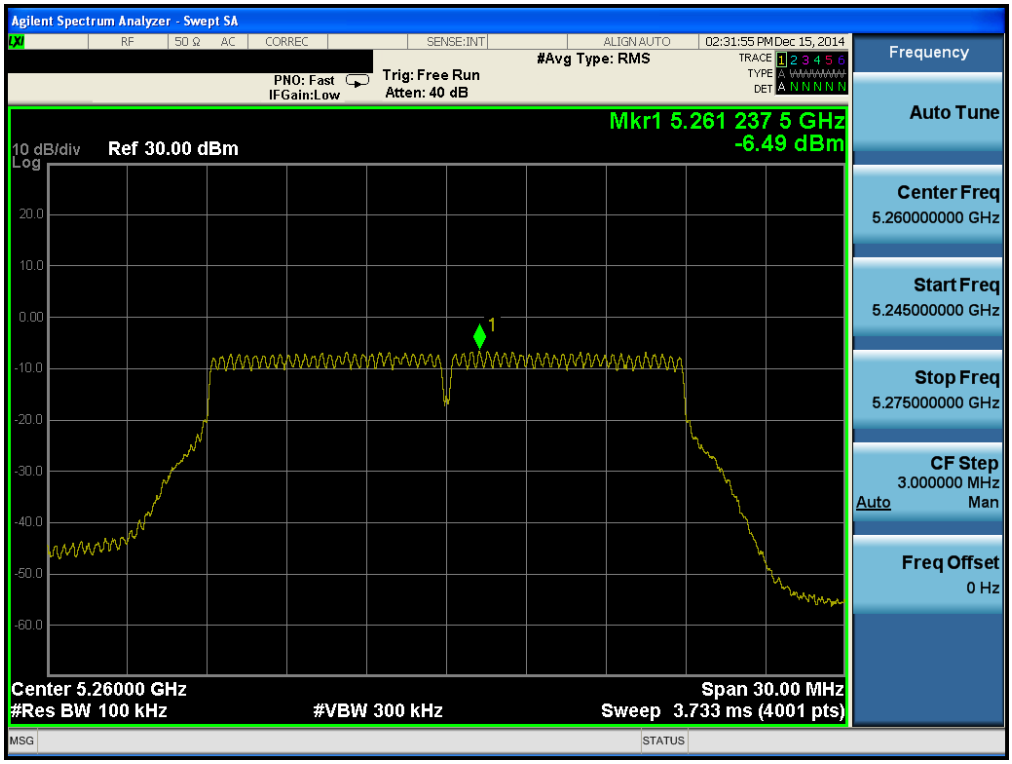
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.40 & ANT 2(SISO)



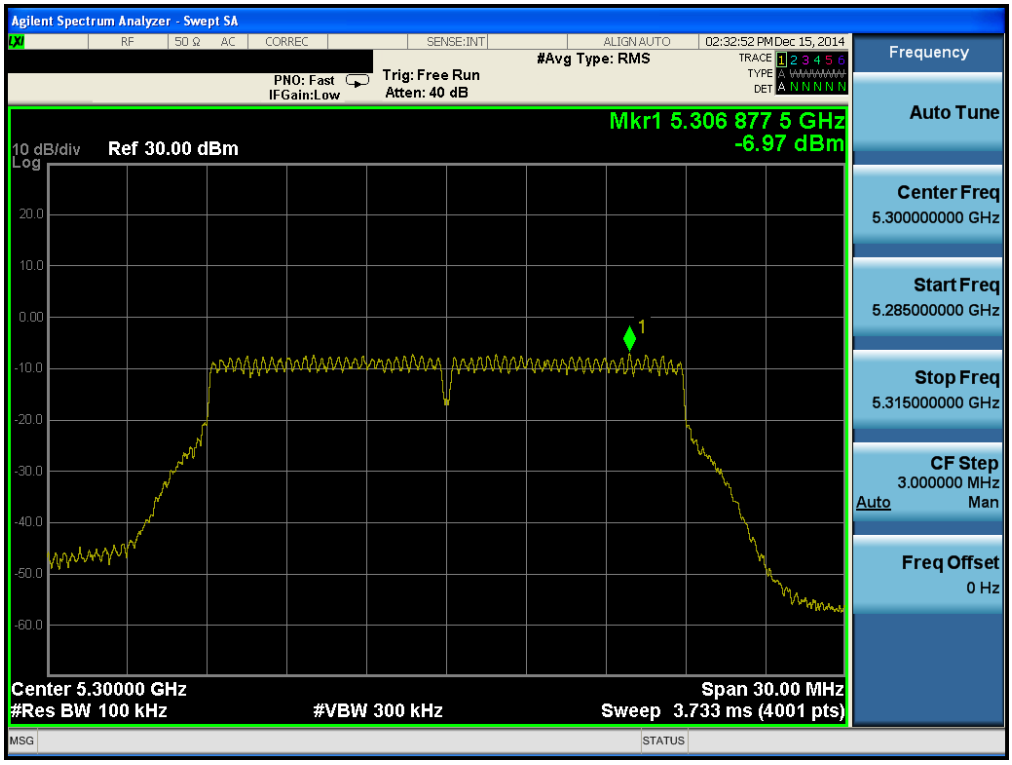
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.48 & ANT 2(SISO)



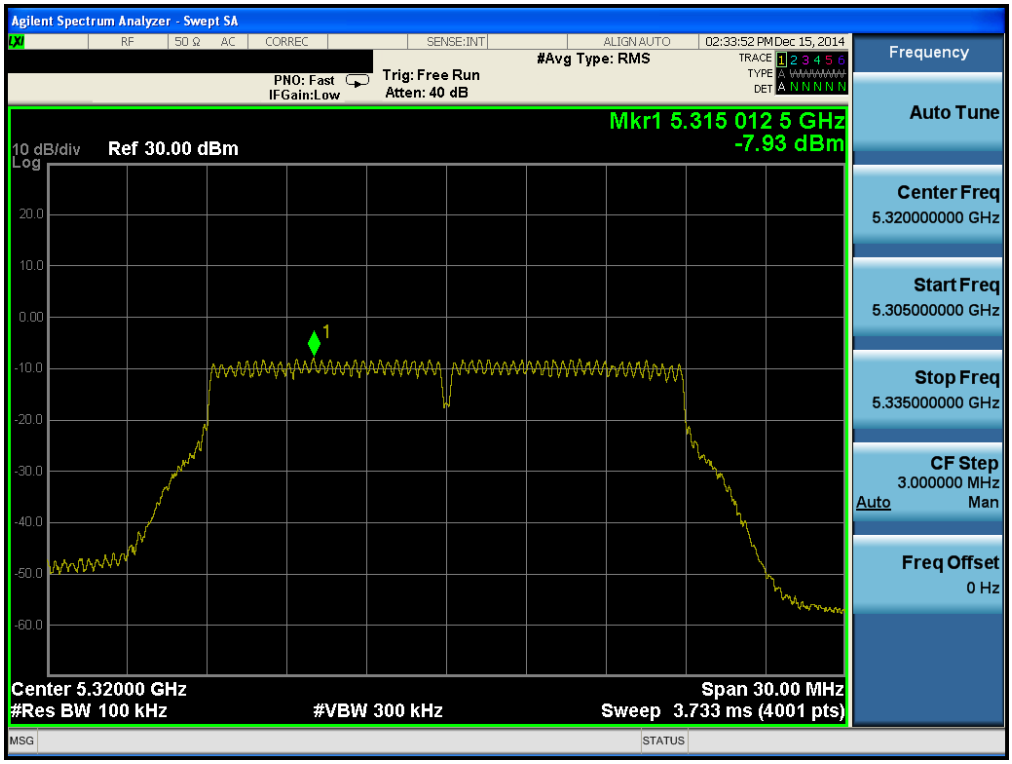
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.52 & ANT 2(SISO)



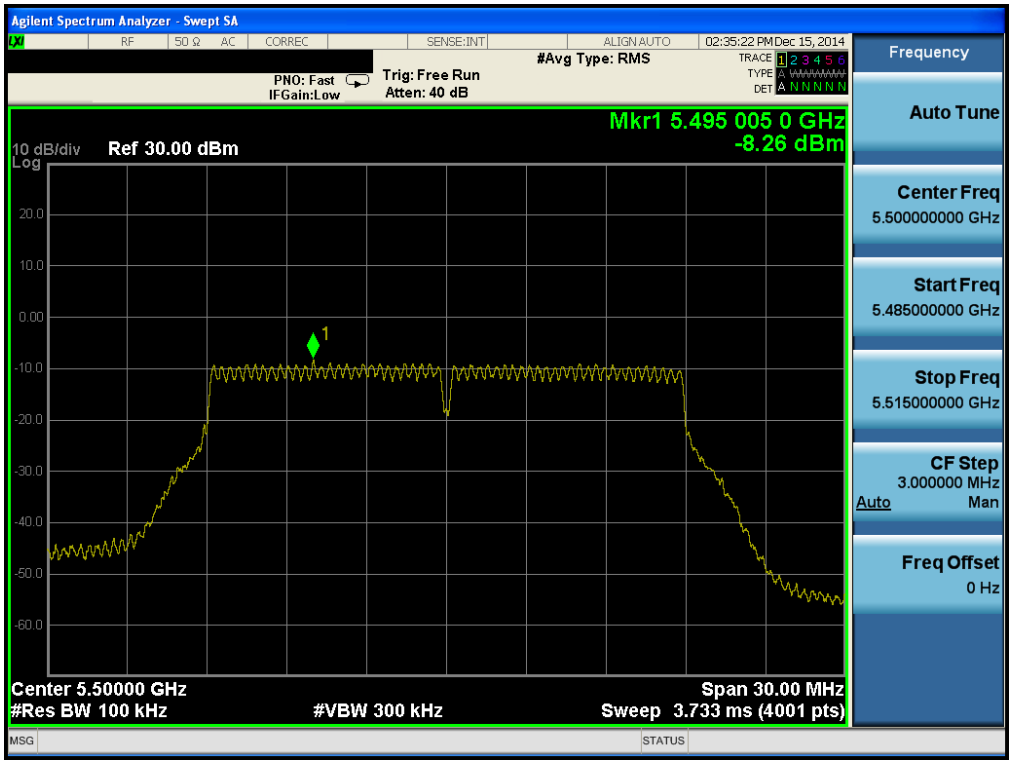
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.60 & ANT 2(SISO)



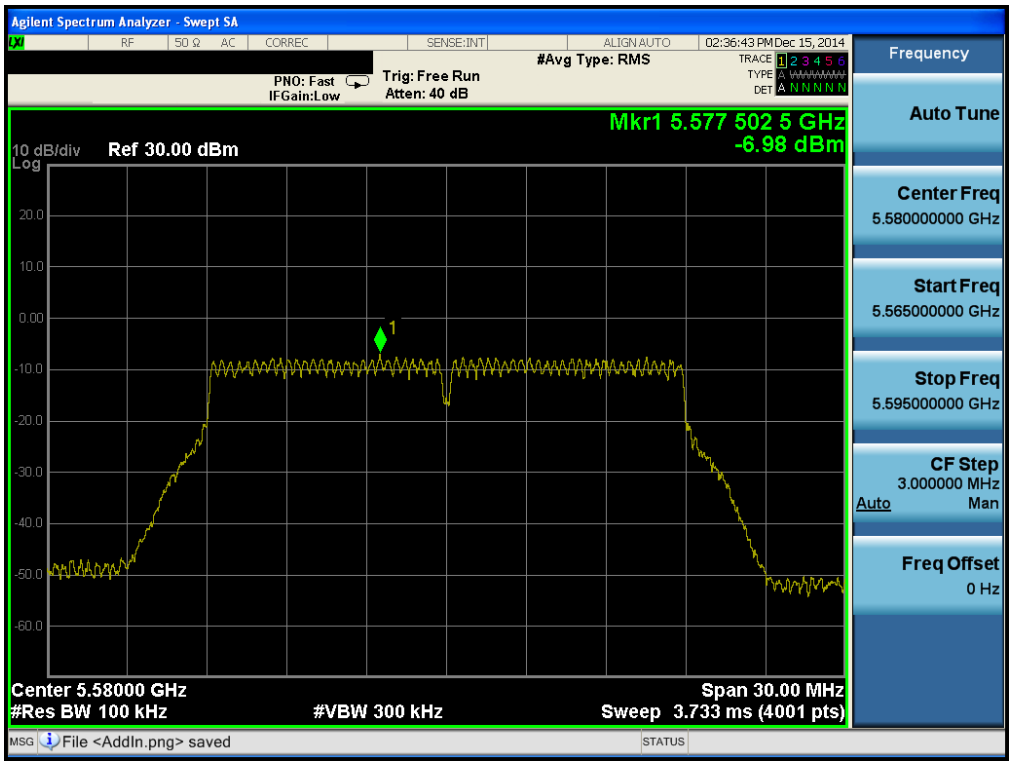
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.64 & ANT 2(SISO)



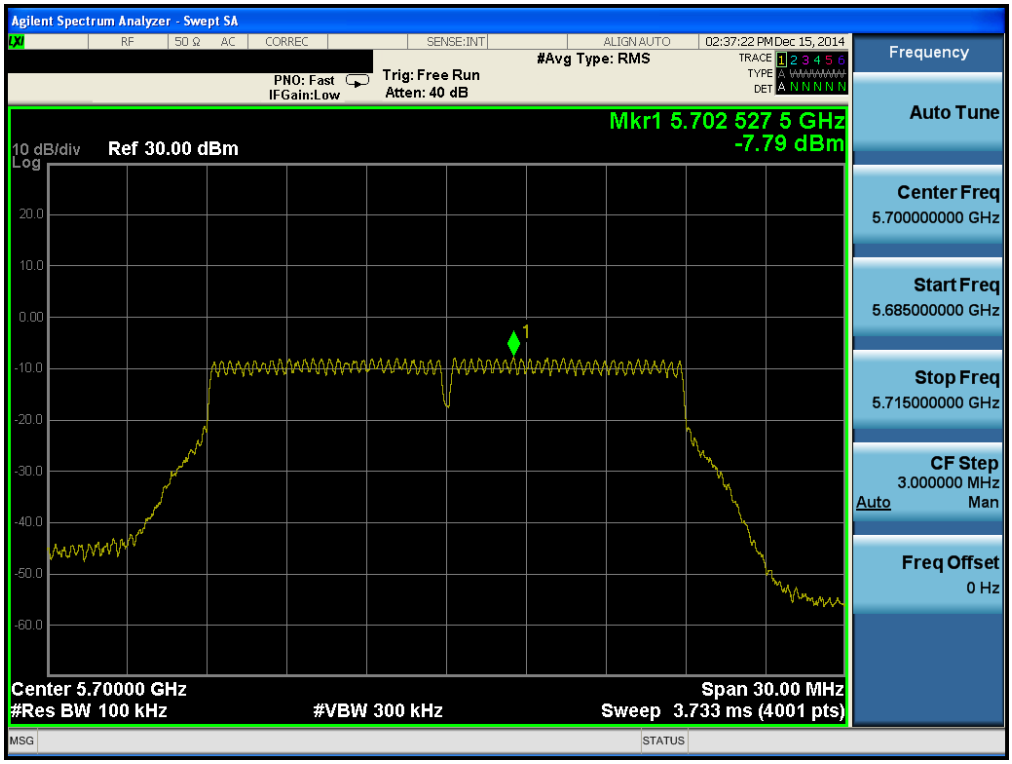
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.100 & ANT 2(SISO)



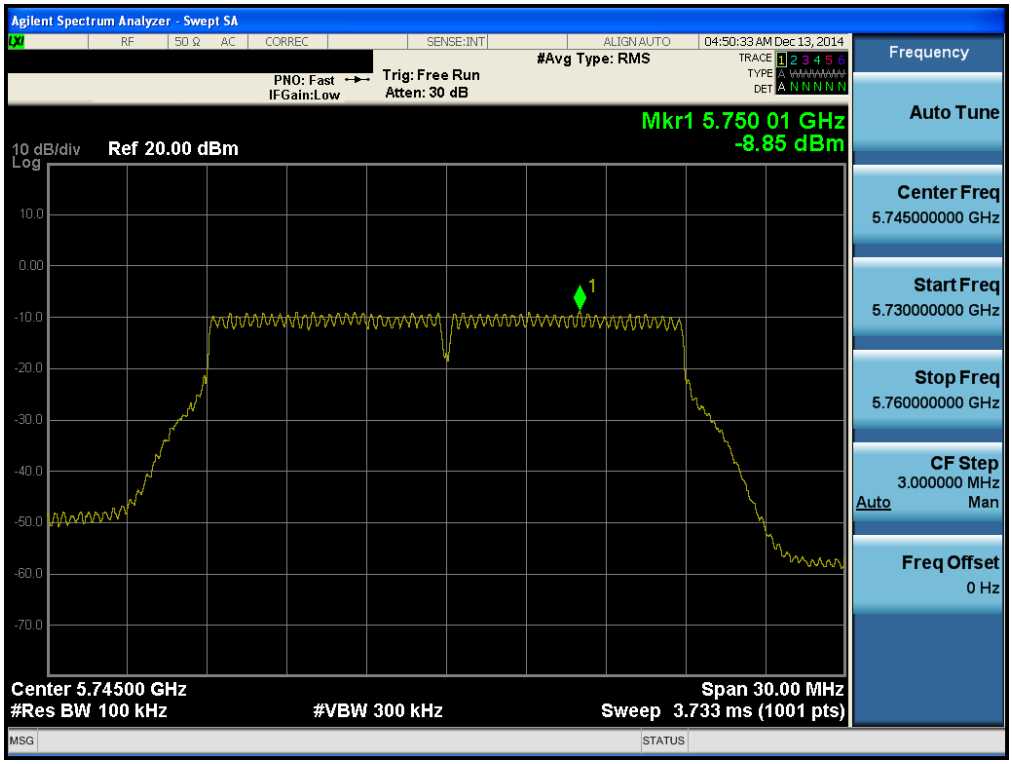
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.116 & ANT 2(SISO)



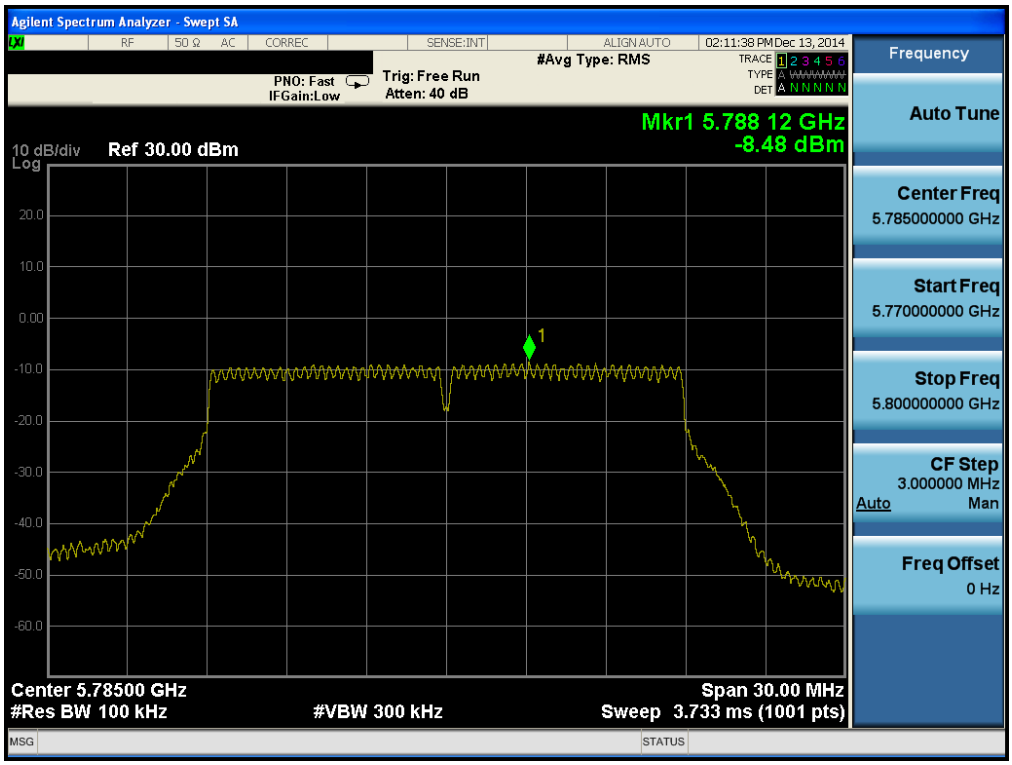
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.140 & ANT 2(SISO)



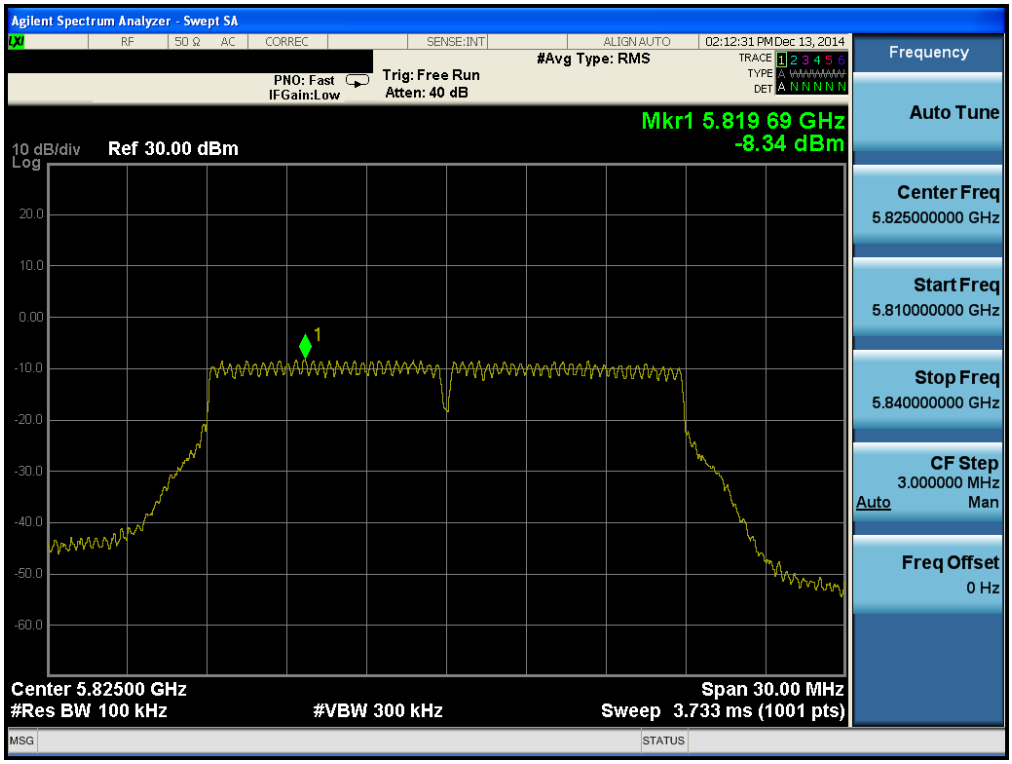
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.149 & ANT 2(SISO)



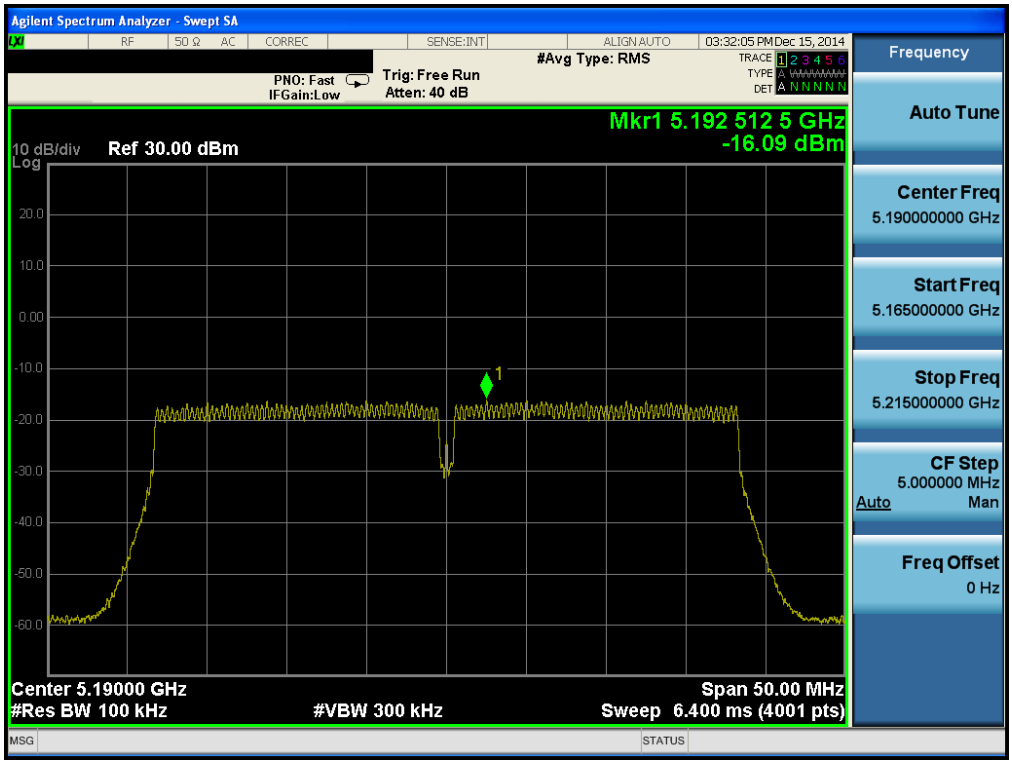
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.157 & ANT 2(SISO)



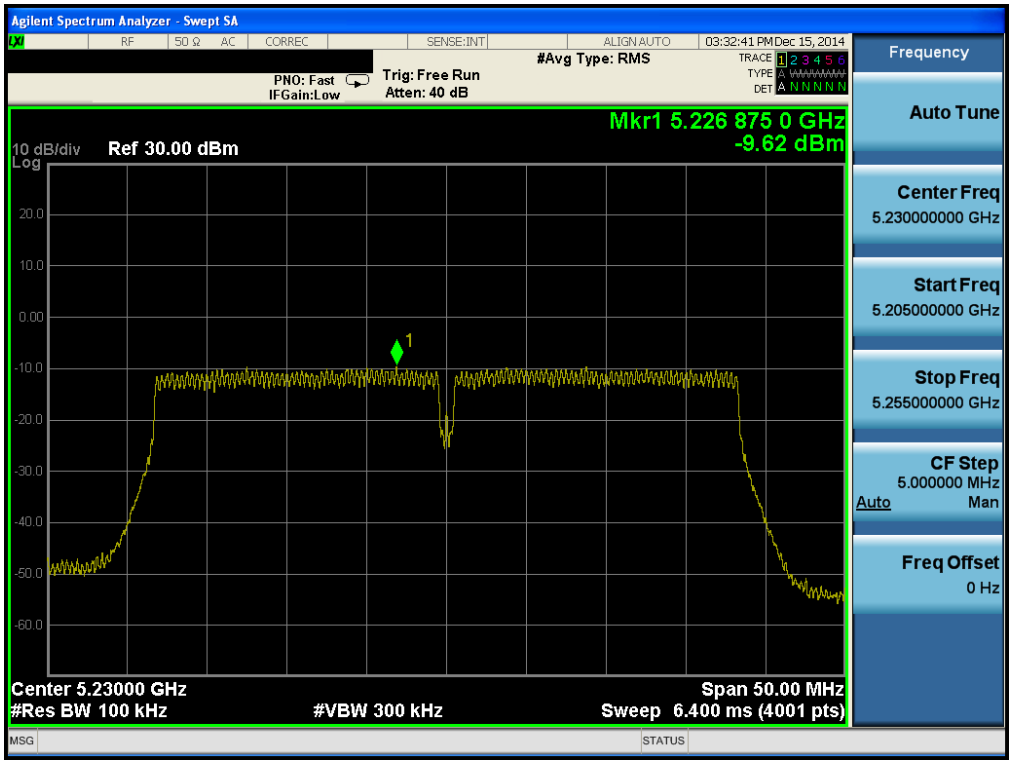
Maximum Power Spectral Density Test Mode: 802.11n HT20 & Ch.165 & ANT 2(SISO)



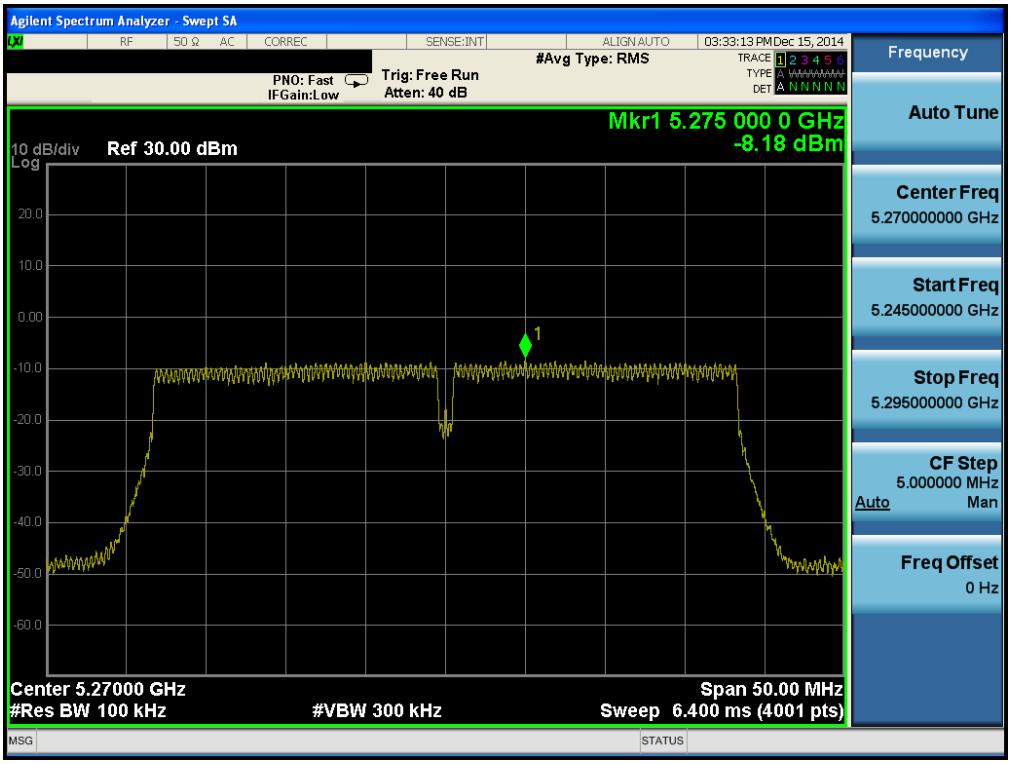
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.38 & ANT 1(SISO)



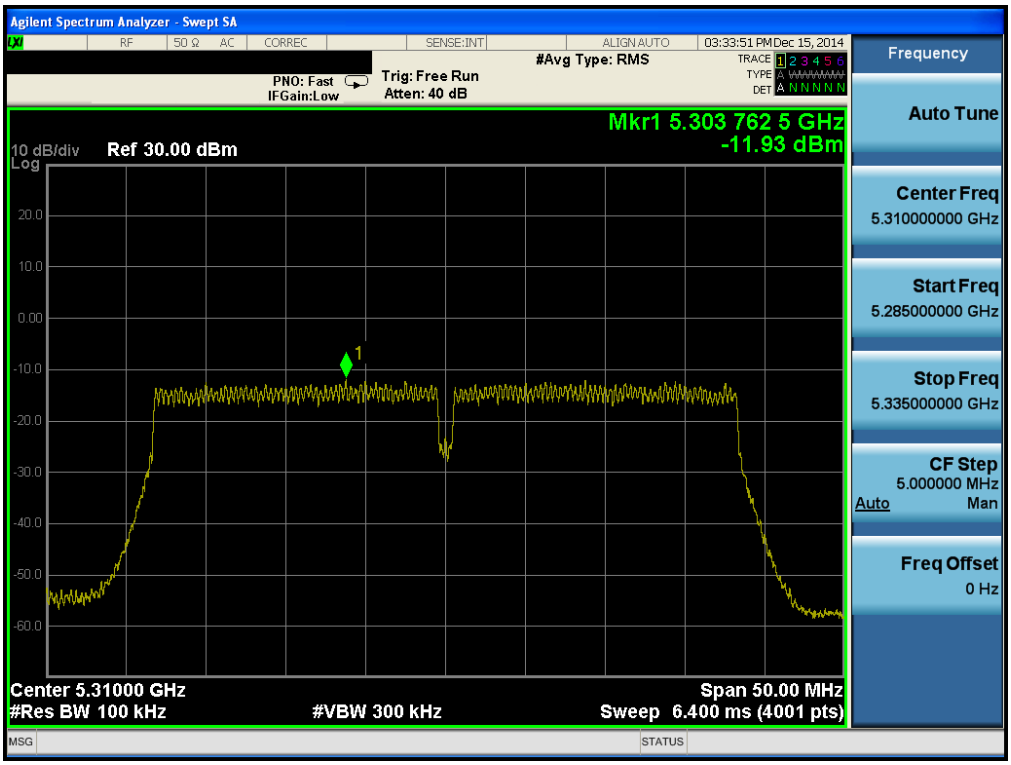
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.46 & ANT 1(SISO)



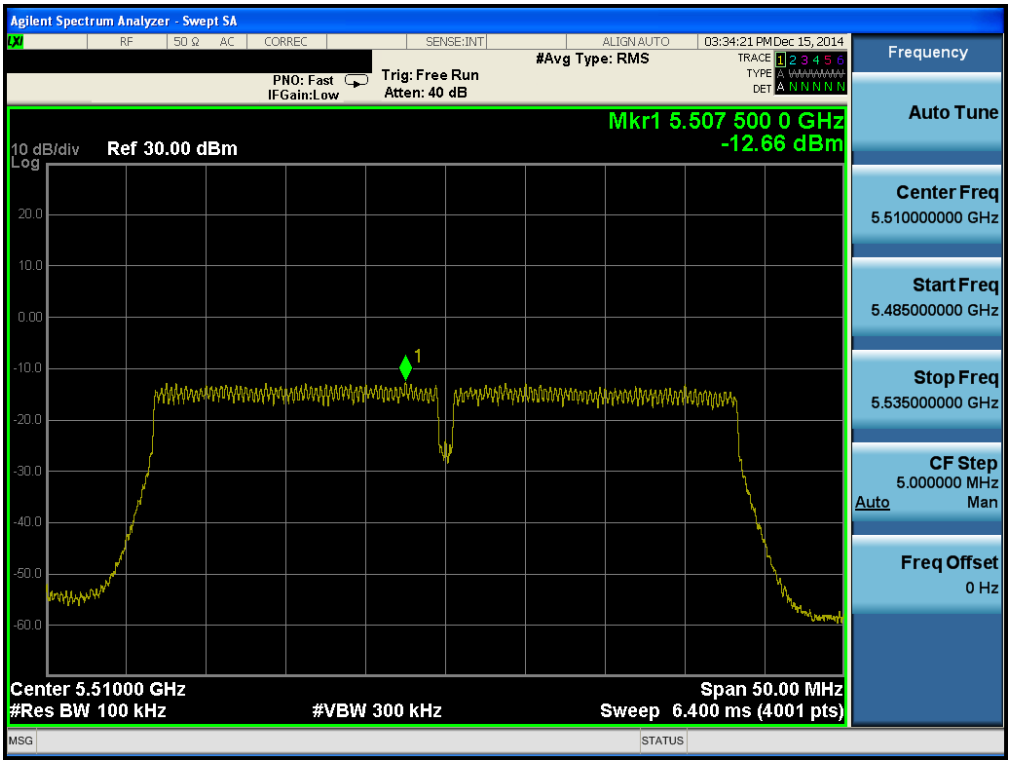
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.54 & ANT 1(SISO)



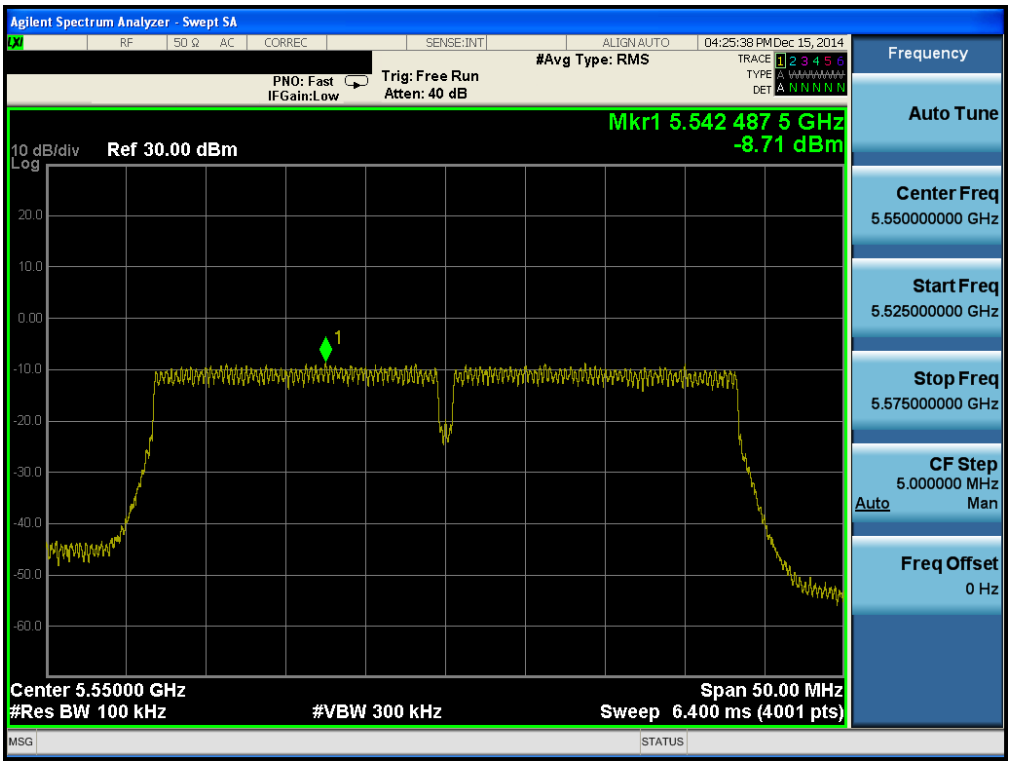
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.62 & ANT 1(SISO)



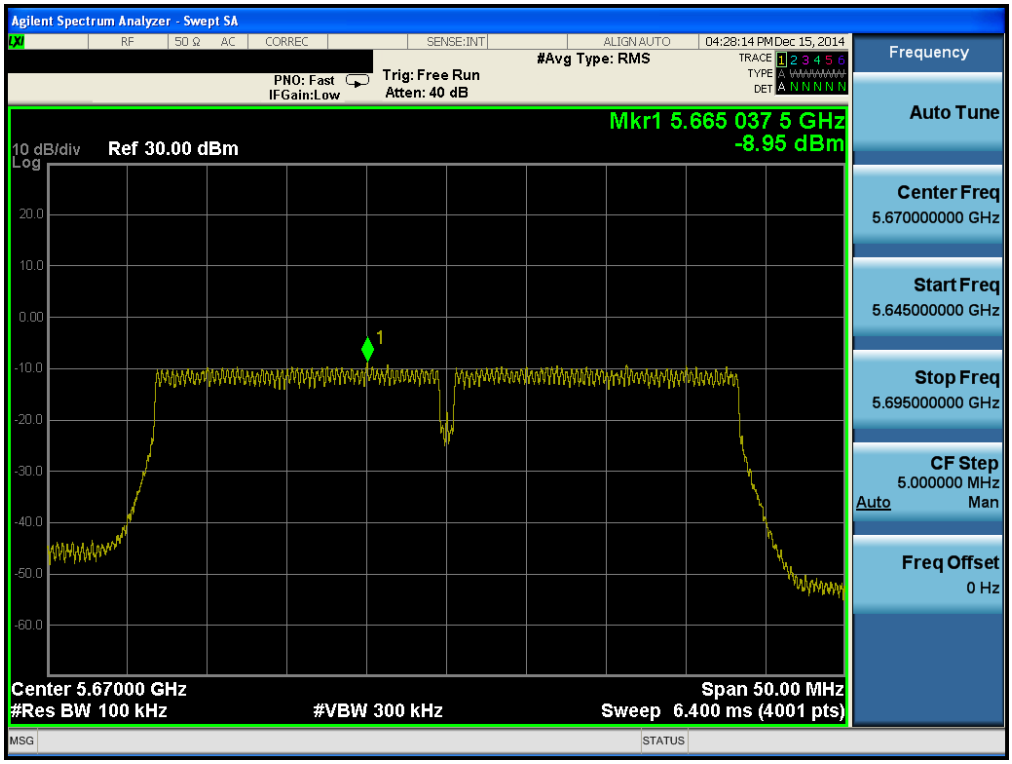
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.102 & ANT 1(SISO)



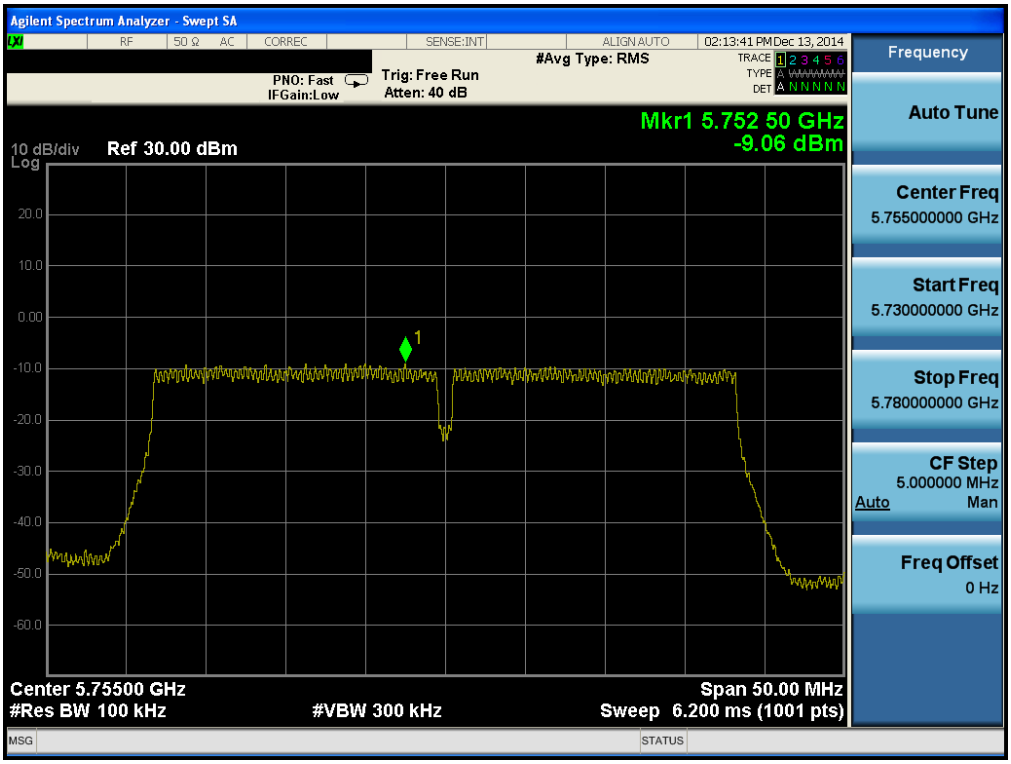
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.110 & ANT 1(SISO)



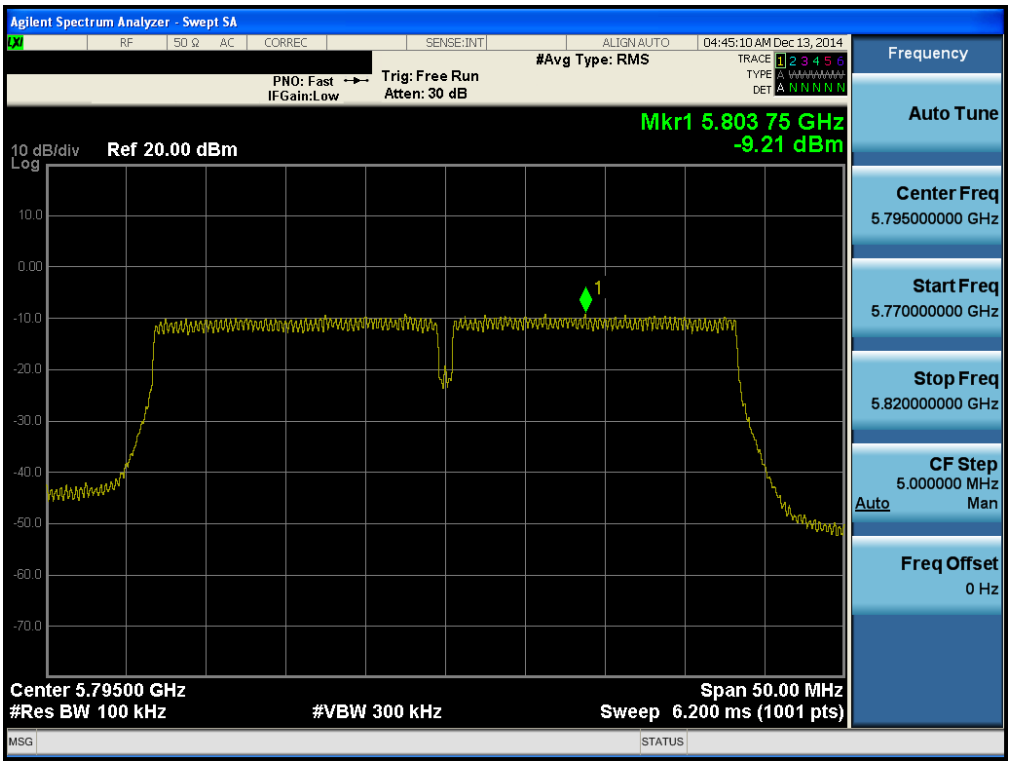
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.134 & ANT 1(SISO)



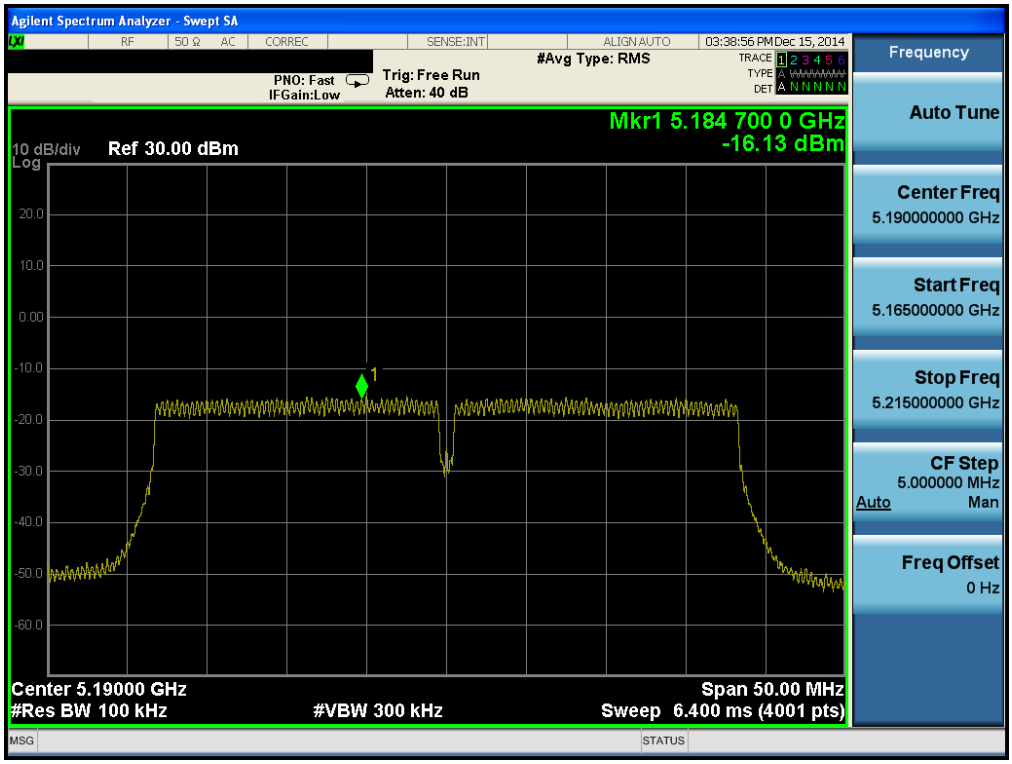
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 1(SISO)



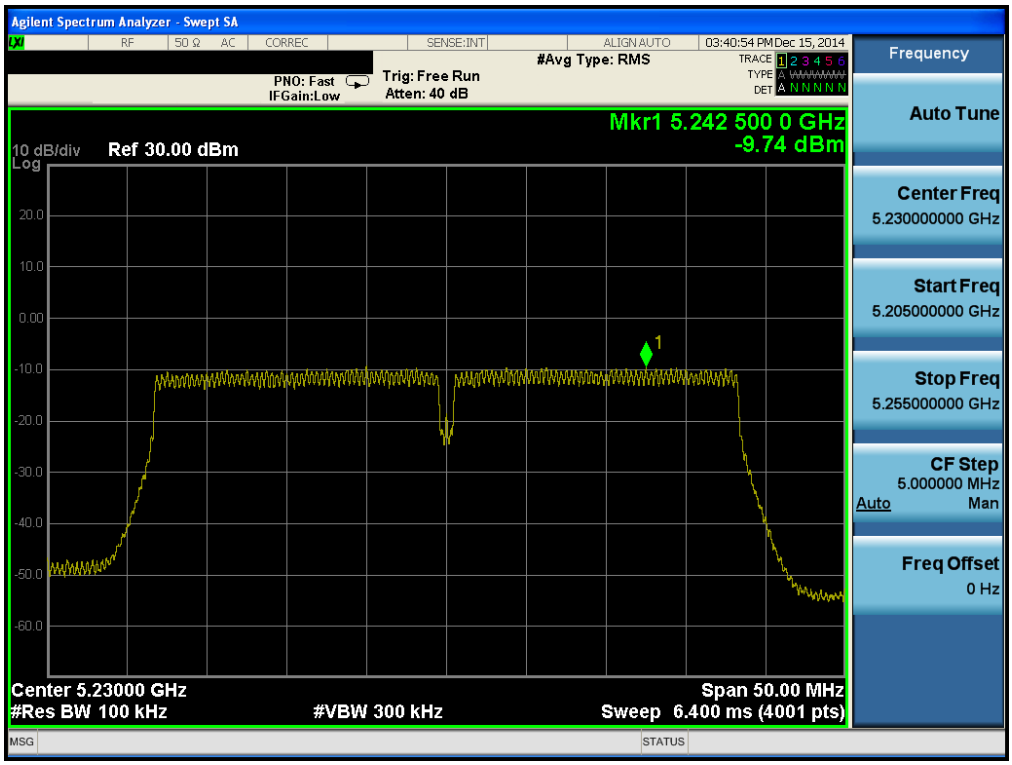
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 1(SISO)



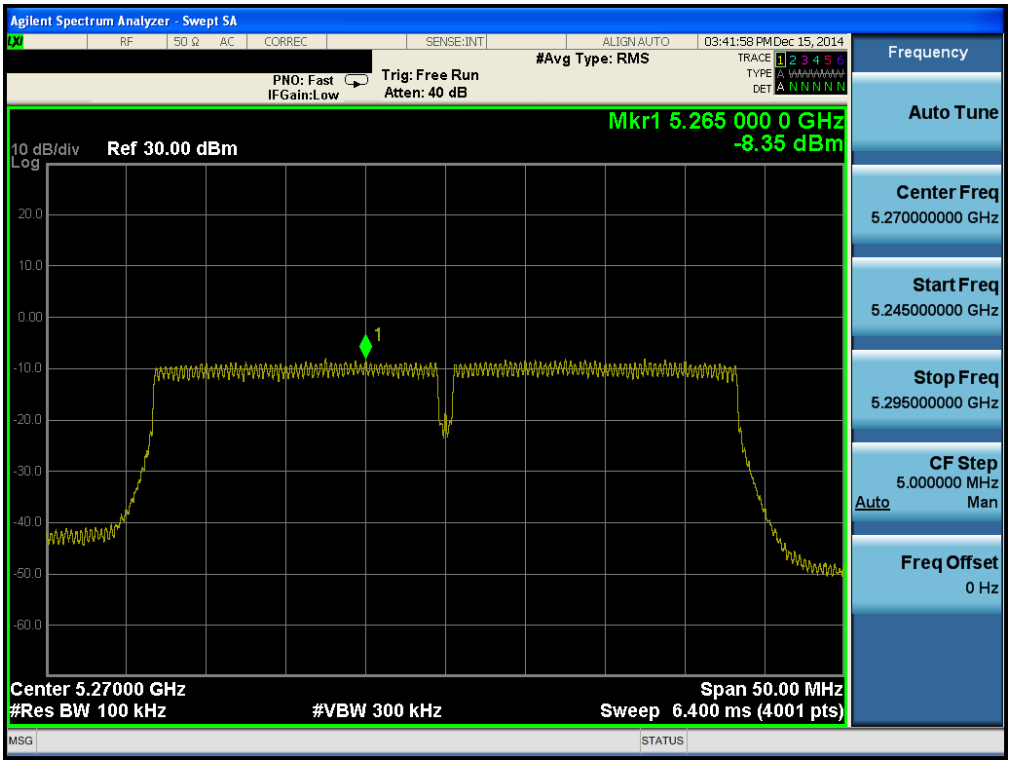
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.38 & ANT 2(SISO)



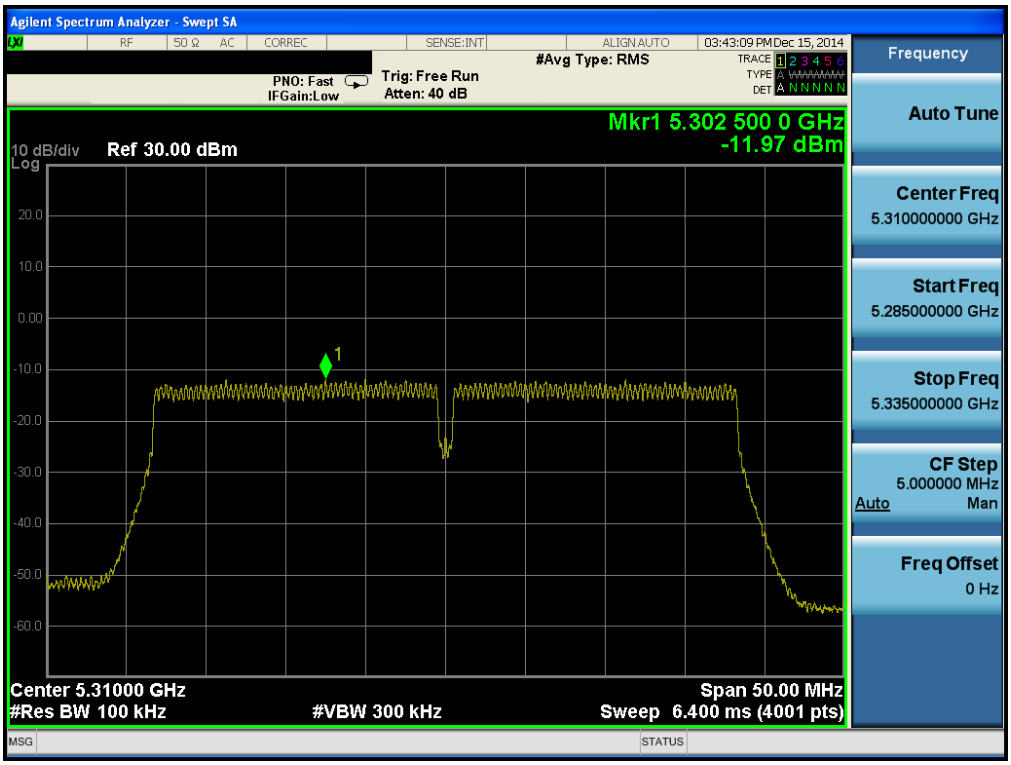
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.46 & ANT 2(SISO)



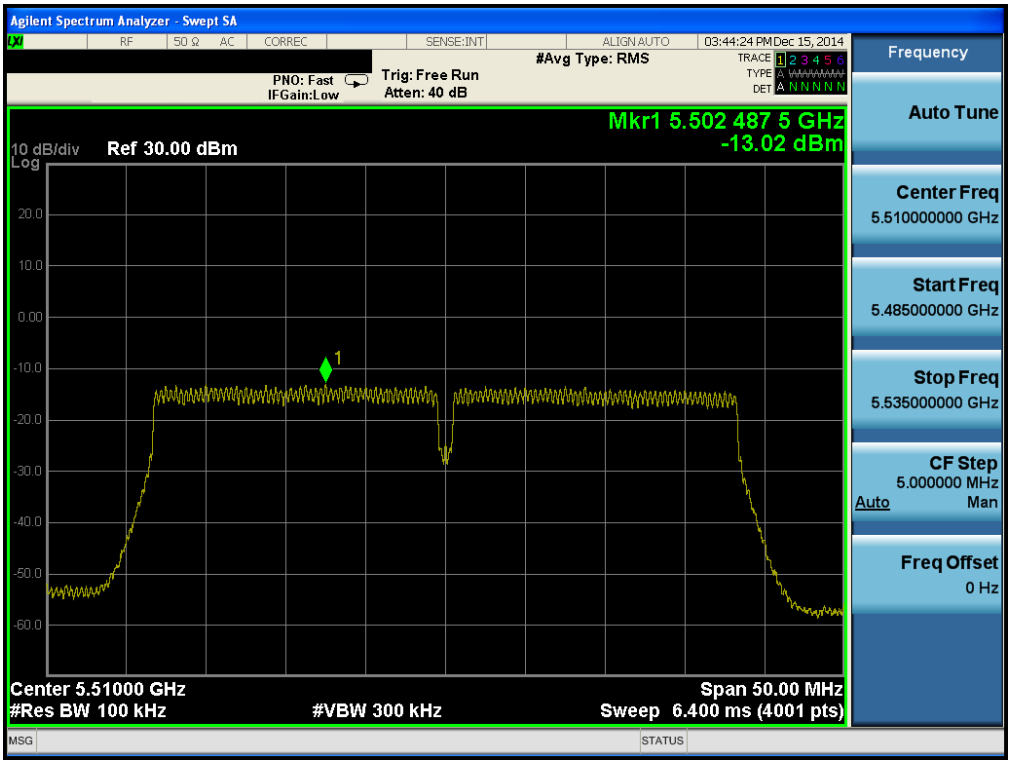
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.54 & ANT 2(SISO)



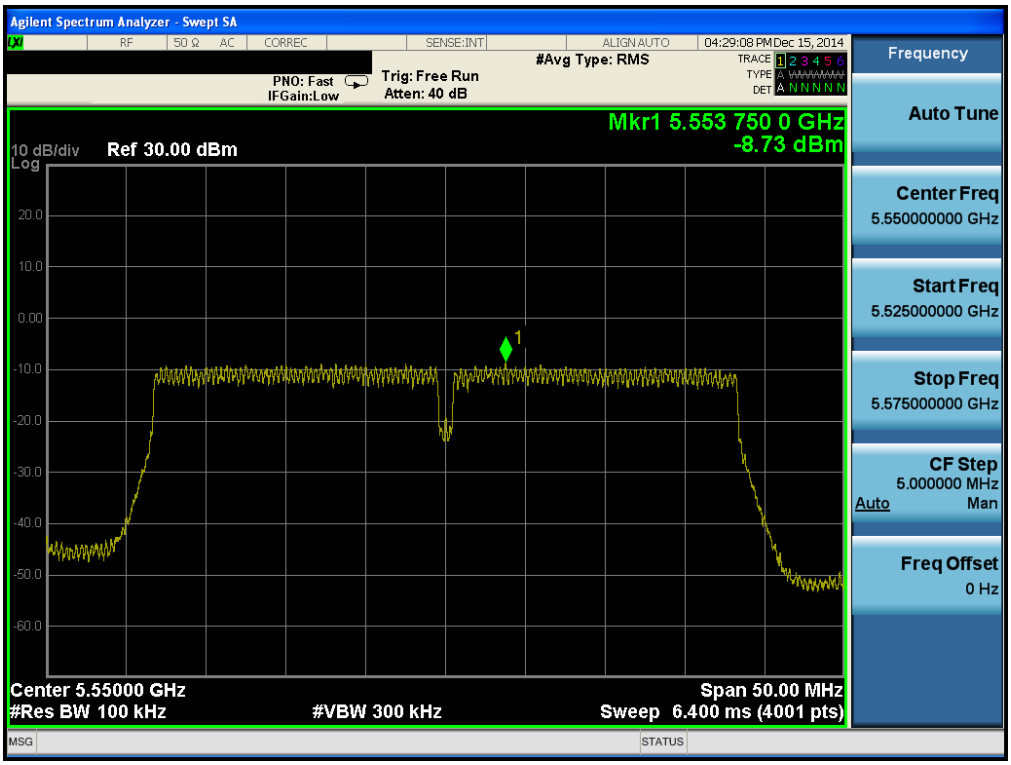
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.62 & ANT 2(SISO)



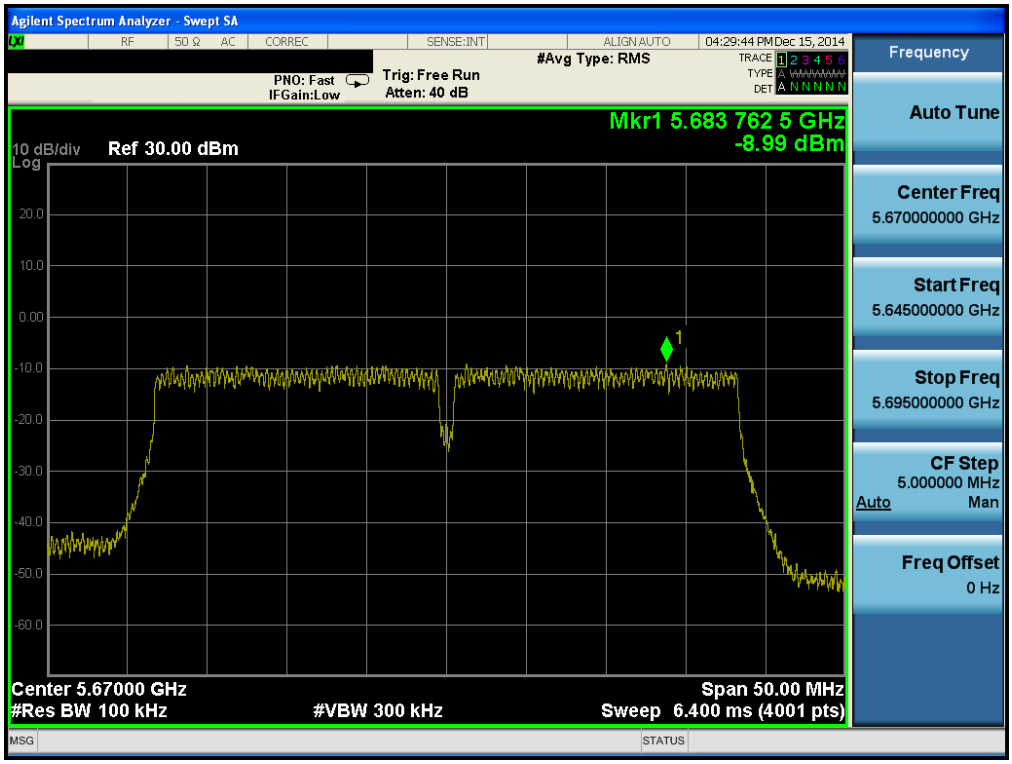
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.102 & ANT 2(SISO)



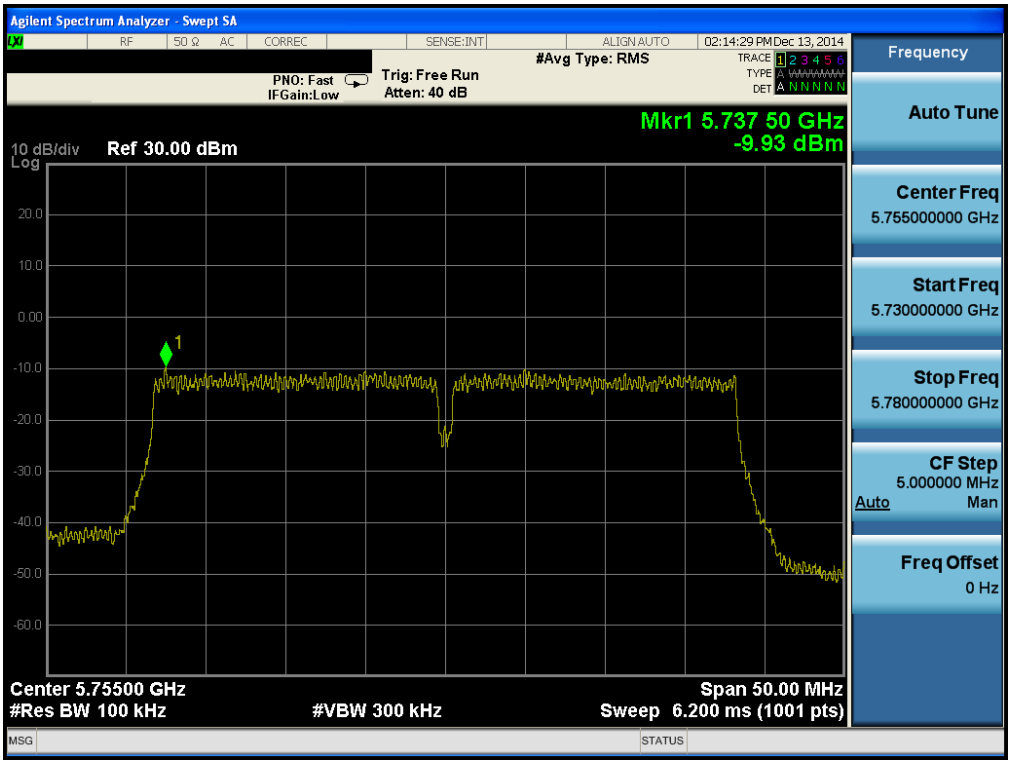
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.110 & ANT 2(SISO)



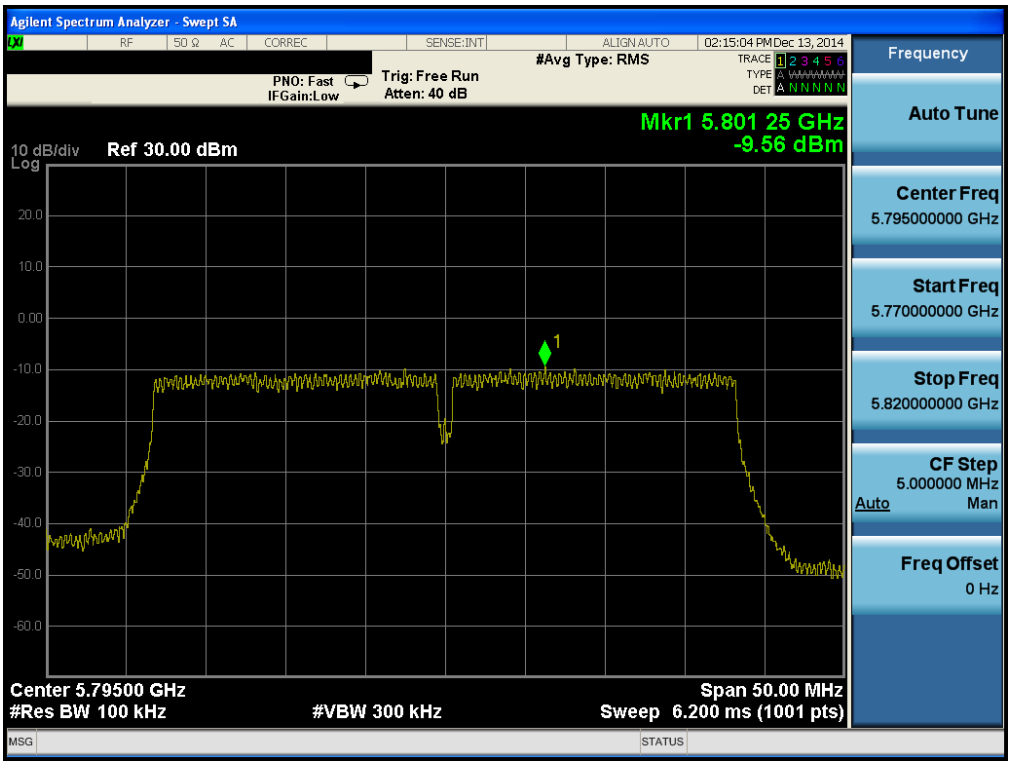
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.134 & ANT 2(SISO)



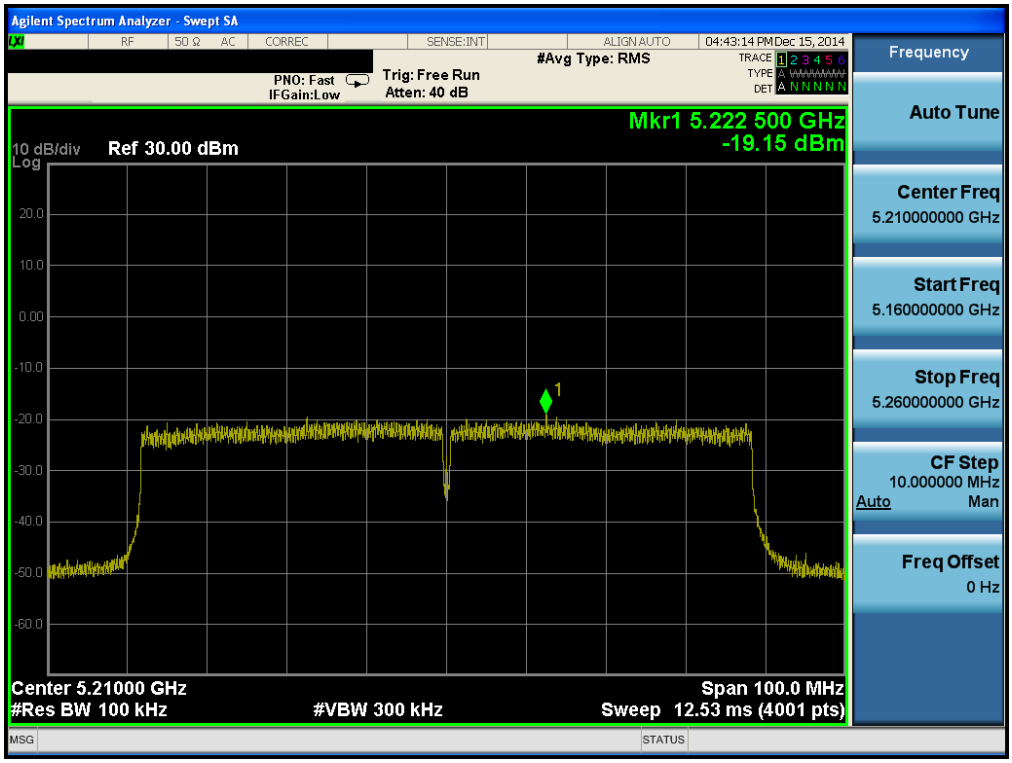
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.151 & ANT 2(SISO)



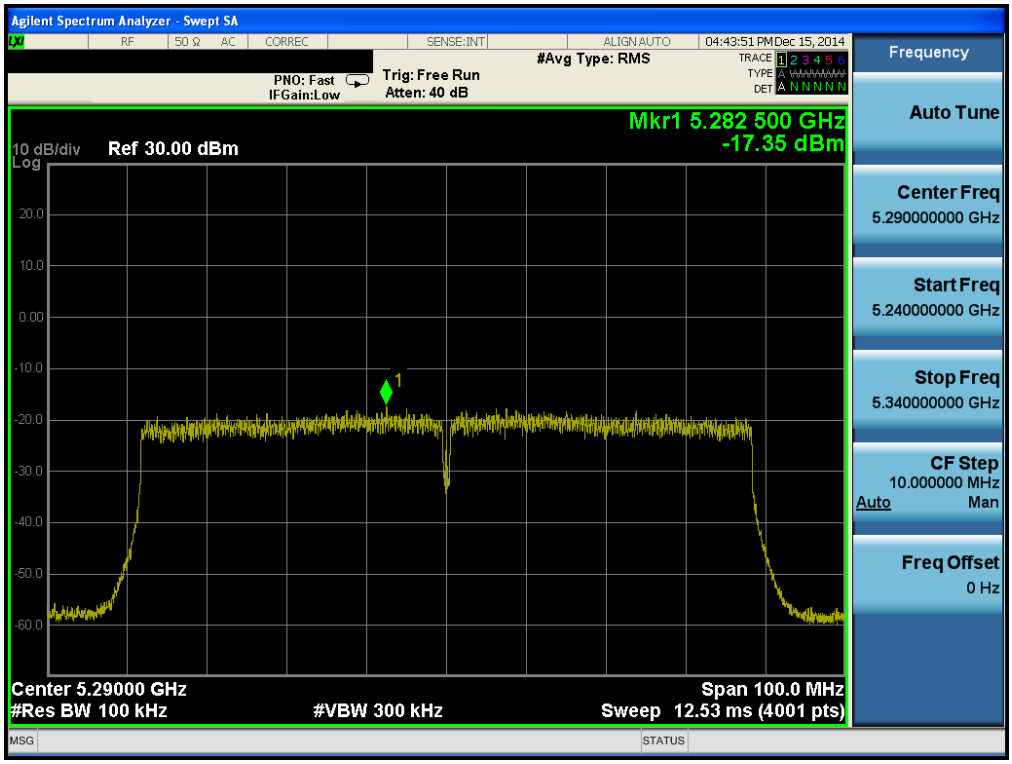
Maximum Power Spectral Density Test Mode: 802.11n HT40 & Ch.159 & ANT 2(SISO)



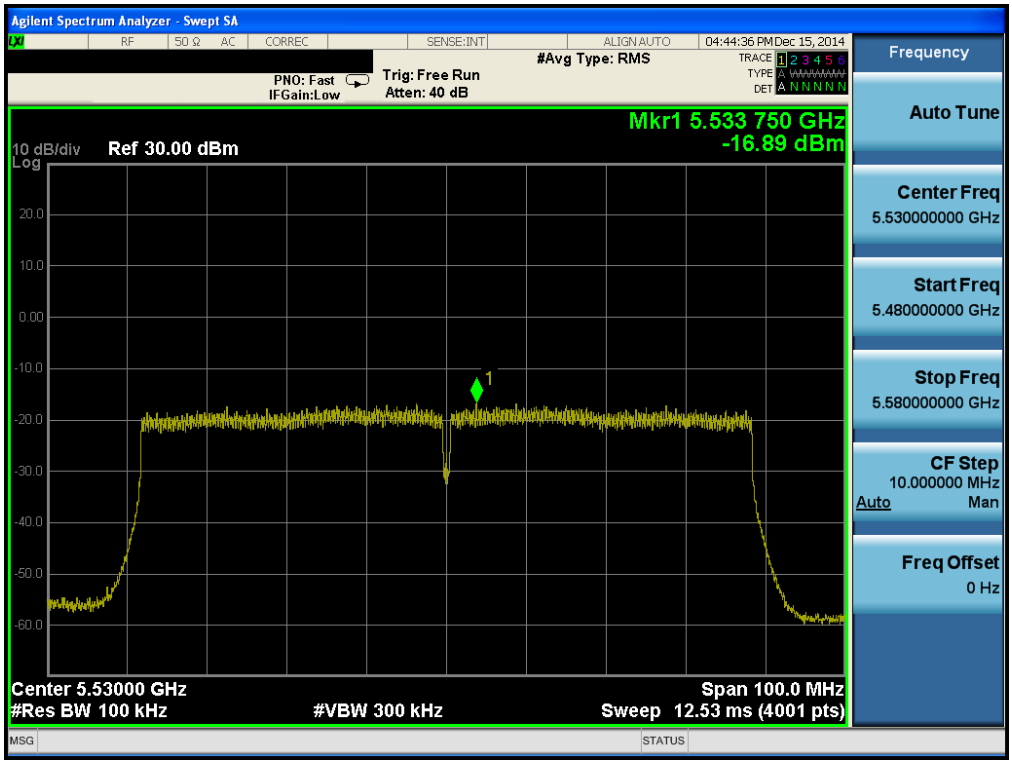
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.42 & ANT 1(SISO)



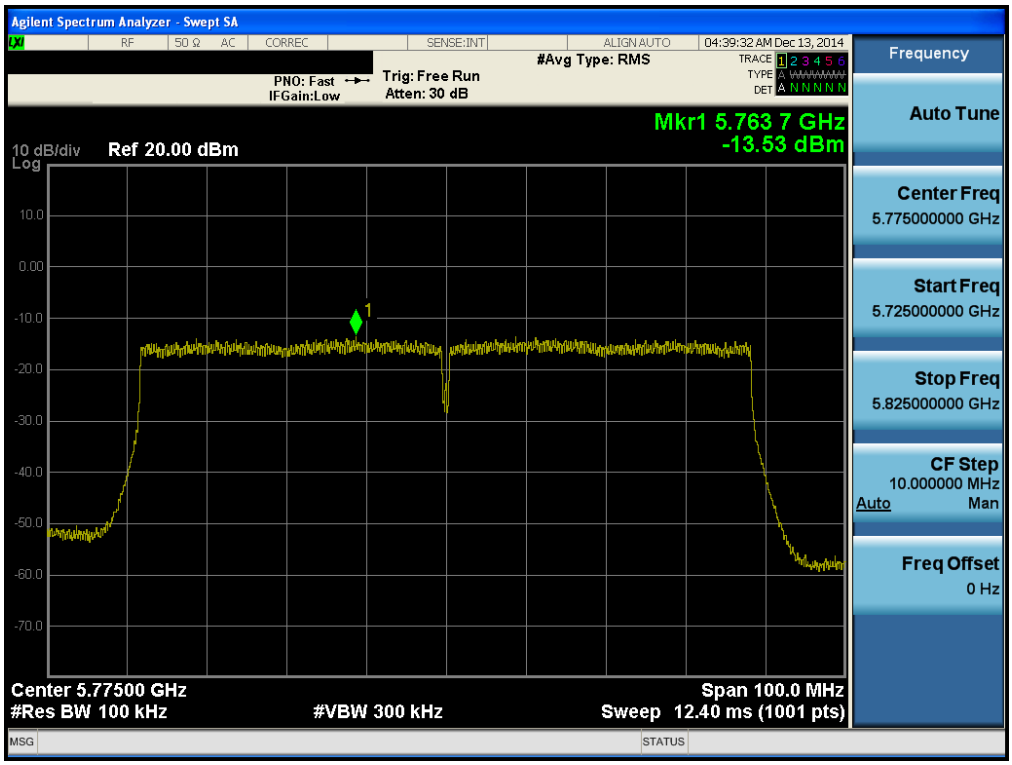
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.58 & ANT 1(SISO)



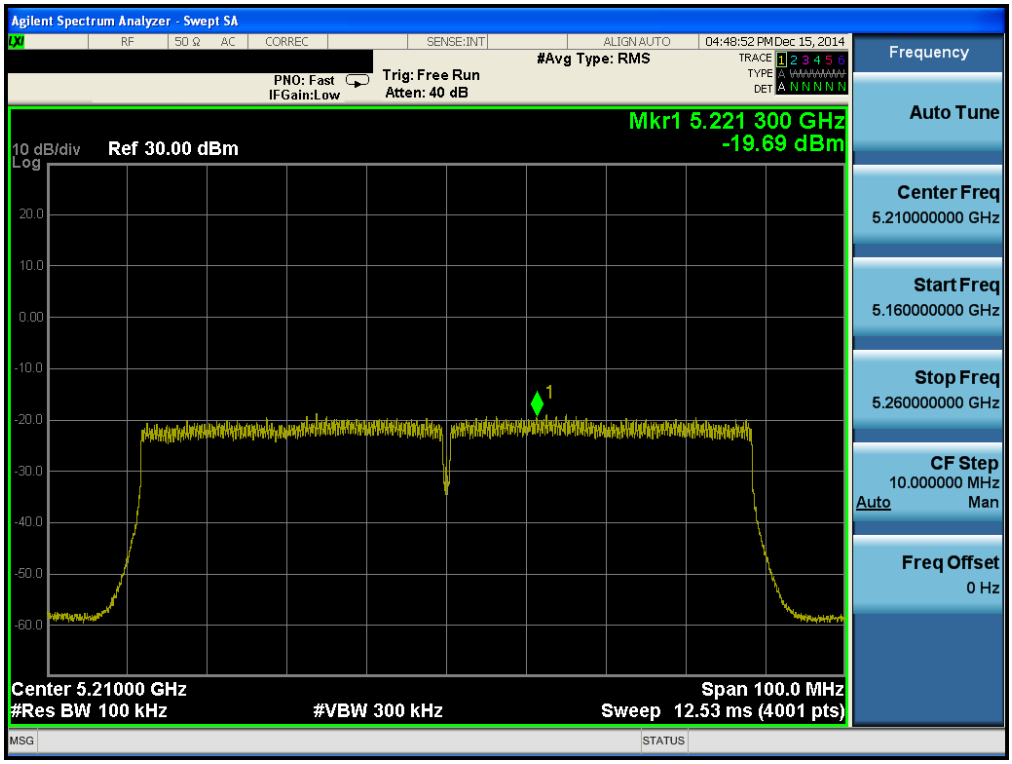
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.106 & ANT 1(SISO)



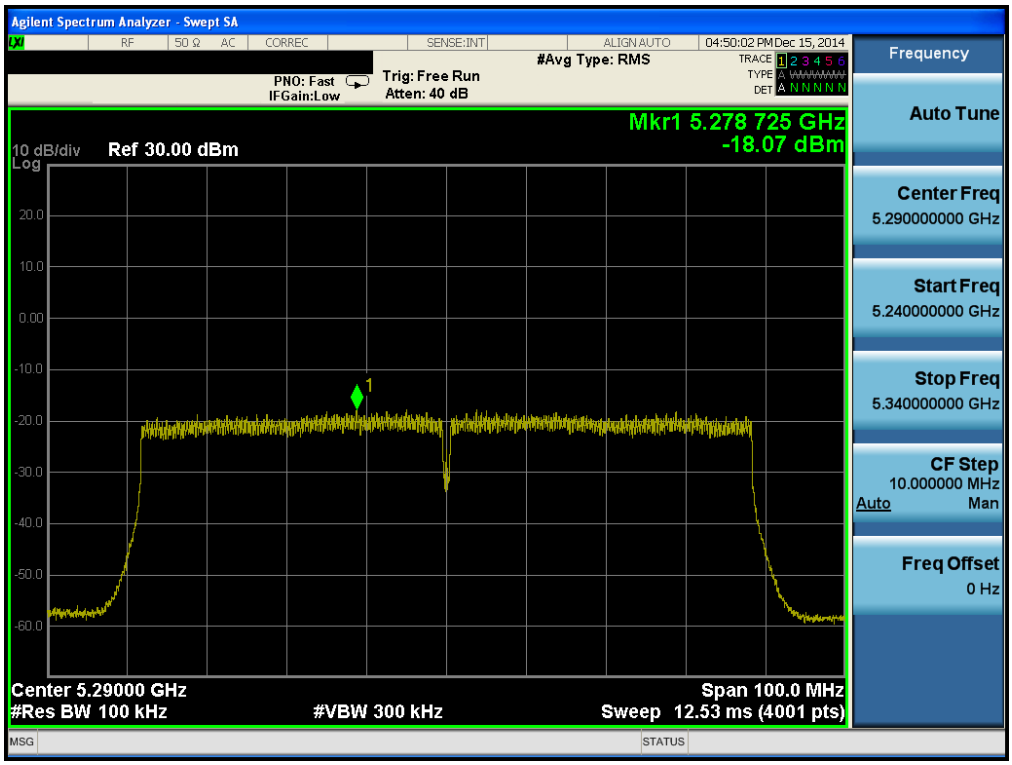
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 1(SISO)



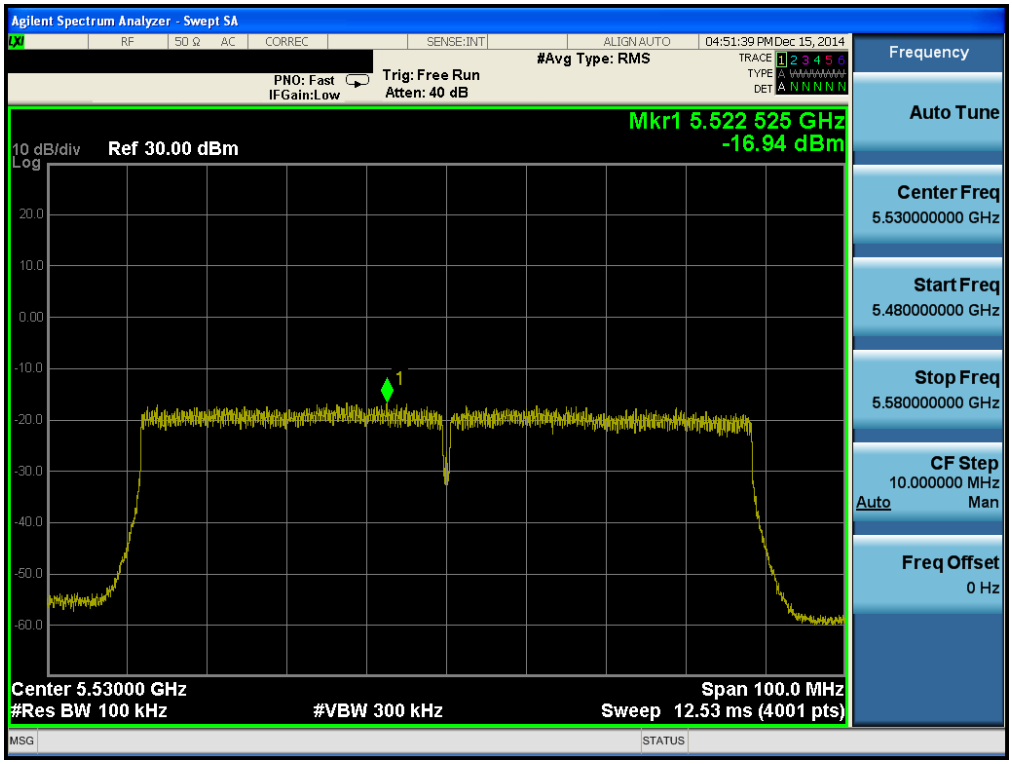
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.42 & ANT 2(SISO)



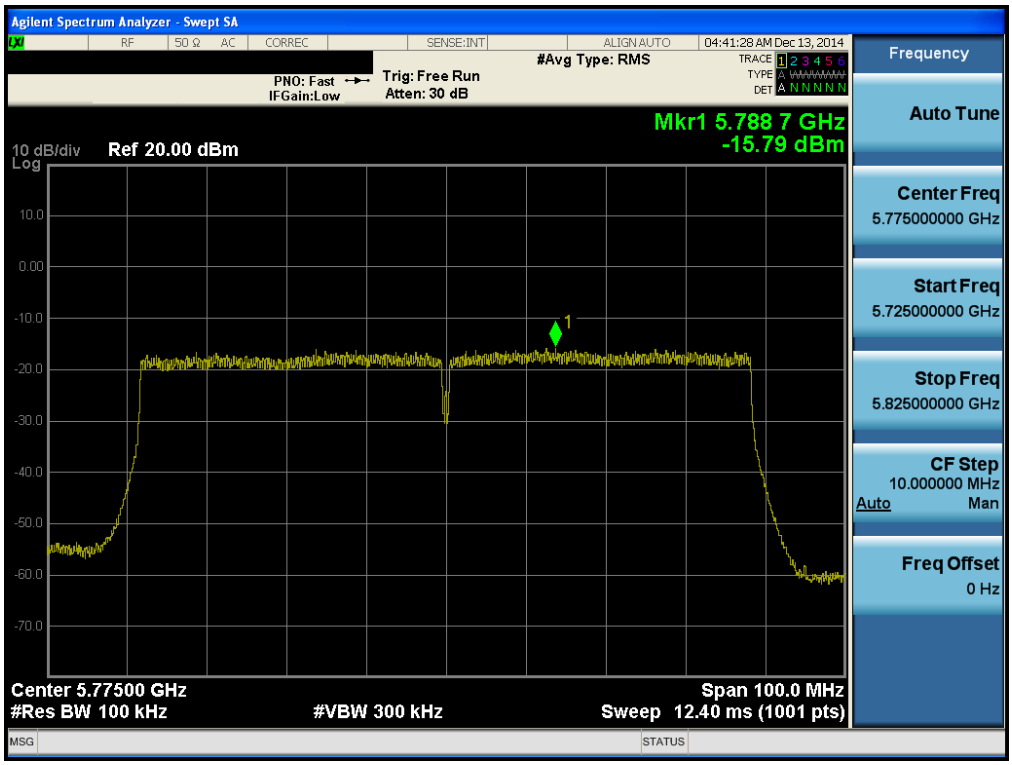
Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.58 & ANT 2(SISO)



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.106 & ANT 2(SISO)



Maximum Power Spectral Density Test Mode: 802.11ac VHT80 & Ch.155 & ANT 2(SISO)



8.5 Frequency Stability

▣ Test requirements

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

▣ Test Procedure

The EUT was placed inside of an environmental chamber as the temperature in the chamber was varied between -30 ℃ and +50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.

▣ Test Results: Comply

Supply Voltage (V DC)	TEMP (℃)	U-NII 1 Operating freq.: 5180MHz		U-NII 2A Operating freq.: 5180MHz		U-NII 2C Operating freq.: 5180MHz		U-NII 3 Operating freq.: 5745MHz	
		Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)	Frequency (Hz)	Deviation (%)
5.00 (100%)	+25	5,180,005,989	0.000116	5,180,004,772	0.000092	5,180,005,118	0.000099	5,745,005,903	0.000103
	+50	5,180,010,194	0.000197	5,180,009,943	0.000192	5,180,010,237	0.000198	5,745,009,910	0.000172
	+40	5,180,015,243	0.000294	5,180,015,012	0.000290	5,180,015,373	0.000297	5,745,014,937	0.000260
	+30	5,180,020,213	0.000390	5,180,020,014	0.000386	5,180,020,505	0.000396	5,745,020,601	0.000359
	+20	5,180,025,221	0.000487	5,180,025,190	0.000486	5,180,025,631	0.000495	5,745,025,518	0.000444
	+10	5,180,030,197	0.000583	5,180,030,250	0.000584	5,180,030,693	0.000593	5,745,030,279	0.000527
	0	5,180,035,300	0.000681	5,180,035,297	0.000681	5,180,035,649	0.000688	5,745,035,117	0.000611
	-10	5,180,040,346	0.000779	5,180,040,393	0.000780	5,180,040,746	0.000787	5,745,039,855	0.000694
	-20	5,180,038,641	0.000746	5,180,038,822	0.000749	5,180,039,011	0.000753	5,745,040,155	0.000699
	-30	5,180,045,291	0.000874	5,180,045,468	0.000878	5,180,045,334	0.000875	5,745,044,832	0.000780
4.25 (85%)	+25	5,180,044,904	0.000867	5,180,045,097	0.000871	5,180,045,006	0.000869	5,745,045,280	0.000788
5.75 (115%)	+25	5,180,010,309	0.000199	5,180,010,459	0.000202	5,180,010,384	0.000200	5,745,010,244	0.000178

8.6 Radiated Spurious Emission Measurements

▣ Test Procedure

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	160.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	160.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	160.7 ~ 160.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240	3600 ~ 4000		
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

▪ **FCC Part 15.407 (b):** Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the **5.15-5.25 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(2) For transmitters operating in the **5.25-5.35 GHz band**: all emissions outside of the **5.15-5.35 GHz band** shall not exceed an **EIRP of -27 dBm/MHz**.
(3) For transmitters operating in the **5.47-5.725 GHz band**: all emissions outside of the **5.47-5.725 GHz band** shall not exceed an **EIRP of -27 dBm/MHz.**
(4) For transmitters operating in the **5.725-5.85 GHz band**: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.
(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
(6) Unwanted emissions **below 1 GHz** must comply with the general field strength limits set forth in **Section 15.209**. Further, any U-NII devices using an **AC power line** are required to comply also with the conducted limits set forth in **Section 15.207**.
(7) The provisions of §15.205 apply to intentional radiators operating under this section
(8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

▣ Test Procedure

The EUT was placed on a 0.8m high non-conductive table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in semi anechoic chamber. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine the worst-case orientation for maximum emissions.

Radiated spurious emission measured using following Measurement Procedure **of KDB789033 D02 V01**

► General Requirements for Unwanted Emissions Measurements

The following requirements apply to all unwanted emissions measurements, both in and outside of the restricted bands:

- EUT Duty Cycle

(1) The EUT shall be configured or modified to **transmit continuously** except as stated in (ii), below. The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle(**to no lower than 98 percent**) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

(2) If **continuous transmission (or at least 98 percent duty cycle) cannot be achieved** due to hardware limitations of the EUT (e.g., overheating), the following additions to the measurement and reporting procedures are required:

- The EUT shall be configured to operate at the maximum achievable duty cycle.
- Measure the duty cycle, x, of the transmitter output signal.
- Adjustments to measurement procedures (e.g., increasing test time and number of traces averaged) shall be performed as described in the procedures below.
- The test report shall include the following additional information:
  - The reason for the duty cycle limitation.
  - The duty cycle achieved for testing and the associated transmit duration and interval between transmissions.
  - The sweep time and the amount of time used for trace stabilization during max-hold measurements for peak emission measurements.

(3) **Reduction of the measured emission amplitude levels to account for operational duty factor is not permitted. Compliance is based on emission levels occurring during transmission - not on an average across on and off times of the transmitter.**

► Measurements below 1000 MHz

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.

b) Compliance shall be demonstrated using **CISPR quasi-peak detection**; however, **peak detection** is permitted as an alternative to quasi-peak detection.

► **Measurements Above 1000MHz(Peak)**

a) Follow the requirements in section II.G.3, “General Requirements for Unwanted Emissions Measurements”.
b) Peak emission levels are measured by setting the analyzer as follows:
(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = Peak.**
(iv) Sweep time = auto.
(v) Trace mode = max hold.
(vi) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle. For example, at 50 percent duty cycle, the measurement time will increase by a factor of two relative to measurement time for continuous transmission.

► **Measurements Above 1000MHz(Method AD)**

(i) **RBW = 1 MHz.**
(ii) **VBW ≥ 3 MHz.**
(iii) **Detector = RMS**, if span/(# of points in sweep) ≤ RBW/2. Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, the detector mode shall be set to peak.
(iv) Averaging type = power (i.e., RMS)
• As an alternative, the detector and averaging type may be set for linear voltage averaging. Some analyzers require linear display mode in order to use linear voltage averaging. Log or dB averaging shall not be used.
(v) Sweep time = auto.
(vi) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, the number of traces shall be increased by a factor of 1/x, where x is the duty cycle. For example, with 50 percent duty cycle, at least 200 traces shall be averaged.
(vii) If tests are performed with the EUT transmitting at a duty cycle less than 98 percent, a correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:

• **If power averaging (RMS) mode was used in step (iv) above, the correction factor is 10 log(1/x), where x is the duty cycle.**
For example, if the transmit duty cycle was 50 percent, then 3 dB must be added to the measured emission levels.
• If linear voltage averaging mode was used in step (iv) above, the correction factor is 20 log(1/x), where x is the duty cycle. For example, if the transmit duty cycle was 50 percent, then 6 dB must be added to the measured emission levels.
• If a specific emission is demonstrated to be continuous (100 percent duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

▣ Measurement Data:

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11a & ANT 1*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180MHz)	5149.88	V	Z	PK	54.58	8.45	N/A	N/A	63.03	74.00	10.97
		5150.00	V	Z	AV	41.30	8.45	0.23	N/A	49.98	54.00	4.02
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5147.81	V	Z	PK	47.35	8.45	N/A	N/A	55.80	74.00	18.20
		5149.70	V	Z	AV	37.45	8.45	0.23	N/A	46.13	54.00	7.87
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	10479.48	H	Z	PK	45.59	9.60	N/A	-9.54	45.65	68.20	22.55
		-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	52 (5260MHz)	10518.15	H	Z	PK	53.02	9.69	N/A	-9.54	53.17	68.20	15.03
		10518.40	V	Z	PK	52.72	9.69	N/A	-9.54	52.87	68.20	15.33
		-	-	-	-	-	-	-	-	-	-	-
	60 (5300MHz)	5354.34	H	Z	PK	50.45	8.81	N/A	N/A	59.26	74.00	14.74
		5350.22	H	Z	AV	40.39	8.81	0.23	N/A	49.43	54.00	4.57
		-	-	-	-	-	-	-	-	-	-	-
	64 (5320MHz)	5351.52	V	Z	PK	51.69	8.81	N/A	N/A	60.50	74.00	13.50
		5350.09	V	Z	AV	40.85	8.81	0.23	N/A	49.89	54.00	4.11
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	100 (5500MHz)	5459.03	V	Z	PK	50.51	9.09	N/A	N/A	59.60	74.00	14.40
		5458.66	V	Z	AV	39.79	9.09	0.23	N/A	49.11	54.00	4.89
		-	-	-	-	-	-	-	-	-	-	-
	116 (5580MHz)	11159.03	V	Z	PK	52.23	11.60	N/A	-9.54	54.29	74.00	19.71
		11159.90	V	Z	AV	40.12	11.60	0.23	-9.54	42.41	54.00	11.59
		-	-	-	-	-	-	-	-	-	-	-
	140 (5700MHz)	11399.22	V	Z	PK	56.45	12.02	N/A	-9.54	58.93	74.00	15.07
		11400.25	V	Z	AV	45.48	12.02	0.23	-9.54	48.19	54.00	5.81
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	149 (5745MHz)	11489.24	H	Y	PK	59.28	12.26	N/A	-9.54	62.00	74.00	12.00
		11489.88	H	Y	AV	47.60	12.26	0.23	-9.54	50.55	54.00	3.45
		-	-	-	-	-	-	-	-	-	-	-
	157 (5785MHz)	11568.95	H	Y	PK	58.94	12.49	N/A	-9.54	61.89	74.00	12.11
		11570.37	H	Y	AV	47.11	12.49	0.23	-9.54	50.29	54.00	3.71
		-	-	-	-	-	-	-	-	-	-	-
	165 (5825MHz)	11649.11	H	Y	PK	58.51	12.72	N/A	-9.54	61.69	74.00	12.31
		11651.51	H	Y	AV	47.20	12.72	0.23	-9.54	50.61	54.00	3.39
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & ANT 1*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180MHz)	5148.23	H	Y	PK	47.27	8.45	N/A	N/A	55.72	74.00	18.28
		5148.74	H	Y	AV	37.52	8.45	0.23	N/A	46.20	54.00	7.80
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5148.23	V	Z	PK	47.49	8.45	N/A	N/A	55.94	74.00	18.06
		5149.13	V	Z	AV	37.02	8.45	0.23	N/A	45.70	54.00	8.30
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	10477.96	V	Z	PK	46.05	9.60	N/A	-9.54	46.11	68.20	22.09
		-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	52 (5260MHz)	10520.14	H	Y	PK	46.43	9.70	N/A	-9.54	46.59	68.20	21.61
		10520.86	V	Z	PK	44.99	9.70	N/A	-9.54	45.15	68.20	23.05
		-	-	-	-	-	-	-	-	-	-	-
	60 (5300MHz)	5351.36	V	Z	PK	47.21	8.81	N/A	N/A	56.02	74.00	17.98
		5352.80	V	Z	AV	36.81	8.81	0.23	N/A	45.85	54.00	8.15
		-	-	-	-	-	-	-	-	-	-	-
	64 (5320MHz)	5350.37	V	Z	PK	47.61	8.81	N/A	N/A	56.42	74.00	17.58
		5350.22	V	Z	AV	37.53	8.81	0.23	N/A	46.57	54.00	7.43
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	100 (5500MHz)	5458.99	V	Z	PK	50.27	9.09	N/A	N/A	59.36	74.00	14.64
		5456.39	V	Z	AV	37.76	9.09	0.23	N/A	47.08	54.00	6.92
		-	-	-	-	-	-	-	-	-	-	-
	116 (5580MHz)	11159.39	H	Y	PK	55.78	11.39	N/A	-9.54	57.63	74.00	16.37
		11161.14	H	Y	AV	45.40	11.39	0.23	-9.54	47.48	54.00	6.52
		-	-	-	-	-	-	-	-	-	-	-
	140 (5700MHz)	11400.07	H	Y	PK	58.65	12.02	N/A	-9.54	61.13	74.00	12.87
		11400.77	H	Y	AV	47.62	12.02	0.23	-9.54	50.33	54.00	3.67
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	149 (5745MHz)	11490.54	H	Y	PK	58.77	12.26	N/A	-9.54	61.49	74.00	12.51
		11490.26	H	Y	AV	47.48	12.26	0.23	-9.54	50.43	54.00	3.57
		-	-	-	-	-	-	-	-	-	-	-
	157 (5785MHz)	11571.05	H	Y	PK	58.95	12.49	N/A	-9.54	61.90	74.00	12.10
		11570.14	H	Y	AV	47.55	12.49	0.23	-9.54	50.73	54.00	3.27
		-	-	-	-	-	-	-	-	-	-	-
	165 (5825MHz)	11649.43	H	Y	PK	57.97	12.72	N/A	-9.54	61.15	74.00	12.85
		11649.70	H	Y	AV	47.00	12.72	0.23	-9.54	50.41	54.00	3.59
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT20) & ANT 2*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	36 (5180MHz)	5145.56	H	Y	PK	54.27	8.45	N/A	N/A	62.72	74.00	11.28
		5149.46	H	Y	AV	42.24	8.45	0.23	N/A	50.92	54.00	3.08
		-	-	-	-	-	-	-	-	-	-	-
	40 (5200MHz)	5147.12	H	Y	PK	53.01	8.45	N/A	N/A	61.46	74.00	12.54
		5149.37	H	Y	AV	42.06	8.45	0.23	N/A	50.74	54.00	3.26
		-	-	-	-	-	-	-	-	-	-	-
	48 (5240MHz)	10479.59	H	Y	PK	54.42	9.60	N/A	-9.54	54.48	68.20	13.72
		10480.36	V	Z	PK	53.68	9.60	N/A	-9.54	53.74	68.20	14.46
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	52 (5260MHz)	10519.73	H	Y	PK	56.20	9.70	N/A	-9.54	56.36	68.20	11.84
		10519.78	V	Z	PK	54.12	9.70	N/A	-9.54	54.28	68.20	13.92
		-	-	-	-	-	-	-	-	-	-	-
	60 (5300MHz)	5350.11	H	Y	PK	50.96	8.81	N/A	N/A	59.77	74.00	14.23
		5350.13	H	Y	AV	40.72	8.81	0.23	N/A	49.76	54.00	4.24
		-	-	-	-	-	-	-	-	-	-	-
	64 (5320MHz)	5350.79	H	Y	PK	50.93	8.81	N/A	N/A	59.74	74.00	14.26
		5351.28	H	Y	AV	40.66	8.81	0.23	N/A	49.70	54.00	4.30
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	100 (5500MHz)	5457.14	V	Z	PK	49.91	9.09	N/A	N/A	59.00	74.00	15.00
		5459.01	V	Z	AV	40.21	9.09	0.23	N/A	49.53	54.00	4.47
		-	-	-	-	-	-	-	-	-	-	-
	116 (5580MHz)	11160.15	H	Y	PK	54.40	11.39	N/A	-9.54	56.25	74.00	17.75
		11160.42	H	Y	AV	43.60	11.39	0.23	-9.54	45.68	54.00	8.32
		-	-	-	-	-	-	-	-	-	-	-
	140 (5700MHz)	11398.99	H	Y	PK	53.02	12.02	N/A	-9.54	55.50	74.00	18.50
		11400.36	H	Y	AV	43.25	12.02	0.23	-9.54	45.96	54.00	8.04
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	149 (5745MHz)	11488.43	H	Z	PK	55.51	12.26	N/A	-9.54	58.23	74.00	15.77
		11491.06	H	Z	AV	44.43	12.26	0.23	-9.54	47.38	54.00	6.62
		-	-	-	-	-	-	-	-	-	-	-
	157 (5785MHz)	11570.82	V	X	PK	55.78	12.49	N/A	-9.54	58.73	74.00	15.27
		11571.88	V	X	AV	45.31	12.49	0.23	-9.54	48.49	54.00	5.51
		-	-	-	-	-	-	-	-	-	-	-
	165 (5825MHz)	11650.09	V	X	PK	56.31	12.72	N/A	-9.54	59.49	74.00	14.51
		11651.46	V	X	AV	45.86	12.72	0.23	-9.54	49.27	54.00	4.73
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & ANT 1*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	38 (5190MHz)	5149.28	H	Y	PK	45.89	8.45	N/A	N/A	54.34	74.00	19.66
		5148.68	H	Y	AV	36.51	8.45	0.44	N/A	45.40	54.00	8.60
		-	-	-	-	-	-	-	-	-	-	-
	46 (5230MHz)	5147.69	V	Y	PK	45.34	8.45	N/A	N/A	53.79	74.00	20.21
		5149.43	V	Y	AV	35.18	8.45	0.44	N/A	44.07	54.00	9.93
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	54 (5270MHz)	10541.49	H	Y	PK	46.89	9.75	N/A	-9.54	47.10	68.20	21.10
		10537.81	V	Y	PK	43.23	9.75	N/A	-9.54	43.44	68.20	24.76
		-	-	-	-	-	-	-	-	-	-	-
	62 (5310MHz)	5350.99	H	Y	PK	48.31	8.81	N/A	N/A	57.12	74.00	16.88
		5351.36	H	Y	AV	37.46	8.81	0.44	N/A	46.71	54.00	7.29
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	102 (5510MHz)	5459.52	V	Y	PK	46.05	9.09	N/A	N/A	55.14	74.00	18.86
		5459.89	V	Y	AV	36.57	9.09	0.44	N/A	46.10	54.00	7.90
		-	-	-	-	-	-	-	-	-	-	-
	110 (5550MHz)	5458.15	V	Y	PK	44.24	9.09	N/A	N/A	53.33	74.00	20.67
		5458.10	V	Y	AV	34.94	9.09	0.44	N/A	44.47	54.00	9.53
		-	-	-	-	-	-	-	-	-	-	-
	134 (5670MHz)	11339.14	H	Y	PK	56.14	11.87	N/A	-9.54	58.47	74.00	15.53
		11340.08	H	Y	AV	45.51	11.87	0.44	-9.54	48.28	54.00	5.72
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	151 (5755MHz)	11508.27	H	Y	PK	58.26	12.31	N/A	-9.54	61.03	74.00	12.97
		11511.49	H	Y	AV	46.84	12.31	0.44	-9.54	50.05	54.00	3.95
		-	-	-	-	-	-	-	-	-	-	-
	159 (5795MHz)	11591.39	H	Y	PK	56.40	12.55	N/A	-9.54	59.41	74.00	14.59
		11591.39	H	Y	AV	46.71	12.55	0.44	-9.54	50.16	54.00	3.84
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11n(HT40) & ANT 2*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	38 (5190MHz)	5148.26	H	Y	PK	51.12	8.45	N/A	N/A	59.57	74.00	14.43
		5149.46	H	Y	AV	42.24	8.45	0.44	N/A	51.13	54.00	2.87
		-	-	-	-	-	-	-	-	-	-	-
	46 (5230MHz)	5148.95	H	Y	PK	51.82	8.45	N/A	N/A	60.27	74.00	13.73
		5150.00	H	Y	AV	41.27	8.45	0.44	N/A	50.16	54.00	3.84
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	54 (5270MHz)	10541.23	H	Y	PK	56.08	9.75	N/A	-9.54	56.29	68.20	11.91
		10538.55	V	Z	PK	50.94	9.75	N/A	-9.54	51.15	68.20	17.05
		-	-	-	-	-	-	-	-	-	-	-
	62 (5310MHz)	5350.24	H	Y	PK	52.34	8.81	N/A	N/A	61.15	74.00	12.85
		5351.81	H	Y	AV	40.99	8.81	0.44	N/A	50.24	54.00	3.76
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	102 (5510MHz)	5459.10	H	Y	PK	53.19	9.09	N/A	N/A	62.28	74.00	11.72
		5459.01	H	Y	AV	41.61	9.09	0.44	N/A	51.14	54.00	2.86
		-	-	-	-	-	-	-	-	-	-	-
	110 (5550MHz)	5459.01	V	Y	PK	45.62	9.09	N/A	N/A	54.71	74.00	19.29
		5458.99	V	Y	AV	36.05	9.09	0.44	N/A	45.58	54.00	8.42
		-	-	-	-	-	-	-	-	-	-	-
	134 (5670MHz)	11339.51	H	Y	PK	56.14	11.87	N/A	-9.54	58.47	74.00	15.53
		11339.94	H	Y	AV	45.51	11.87	0.44	-9.54	48.28	54.00	5.72
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	151 (5755MHz)	11507.85	H	Y	PK	53.96	12.31	N/A	-9.54	56.73	74.00	17.27
		11509.35	H	Y	AV	43.16	12.31	0.44	-9.54	46.37	54.00	7.63
		-	-	-	-	-	-	-	-	-	-	-
	159 (5795MHz)	11592.61	H	Y	PK	53.59	12.55	N/A	-9.54	56.60	74.00	17.40
		11588.79	H	Y	AV	43.37	12.55	0.44	-9.54	46.82	54.00	7.18
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & ANT 1*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	42 (5210MHz)	5141.54	H	Y	PK	46.09	8.45	N/A	N/A	54.54	74.00	19.46
		5146.28	H	Y	AV	36.27	8.45	0.37	N/A	45.09	54.00	8.91
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	58 (5290MHz)	5352.02	H	Y	PK	48.65	8.81	N/A	N/A	57.46	74.00	16.54
		5354.05	H	Y	AV	37.40	8.81	0.37	N/A	46.58	54.00	7.42
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	106 (5530MHz)	5453.00	V	Z	PK	50.25	9.09	N/A	N/A	59.34	74.00	14.66
		5455.67	V	Z	AV	39.58	9.09	0.37	N/A	49.04	54.00	4.96
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	155 (5775MHz)	11550.26	H	Y	PK	52.81	12.43	N/A	-9.54	55.70	74.00	18.30
		11550.10	H	Y	AV	42.32	12.43	0.37	-9.54	45.58	54.00	8.42
		-	-	-	-	-	-	-	-	-	-	-

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & ANT 2*

Band	Tested Channel	Freq. (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCCF (dB)	DCF (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
U-NII 1	42 (5210MHz)	5142.08	V	Z	PK	52.27	8.45	N/A	N/A	60.72	74.00	13.28
		5143.88	V	Z	AV	42.04	8.45	0.37	N/A	50.86	54.00	3.14
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2A	58 (5290MHz)	5352.35	H	Y	PK	49.48	8.81	N/A	N/A	58.29	74.00	15.71
		5351.85	H	Y	AV	40.85	8.81	0.37	N/A	50.03	54.00	3.97
		-	-	-	-	-	-	-	-	-	-	-
U-NII 2C	106 (5530MHz)	5457.03	H	Y	PK	51.21	9.09	N/A	N/A	60.30	74.00	13.70
		5459.52	H	Y	AV	40.97	9.09	0.37	N/A	50.43	54.00	3.57
		-	-	-	-	-	-	-	-	-	-	-
U-NII 3	155 (5775MHz)	11548.70	H	Z	PK	51.27	12.43	N/A	-9.54	54.16	74.00	19.84
		11552.74	H	Z	AV	40.40	12.43	0.37	-9.54	43.66	54.00	10.34
		-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were found greater than listed emissions on above table.
2. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+ DCCF + DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,
   DCCF = Duty Cycle Correction Factor, DCF = Distance Correction Factor
3. Measurement Distance = 3 m for below 10 GHz, Measurement Distance = 1 m for above 10 GHz.
   Therefore Distance Correction Factor(DCF) : - 9.54 dB = 20*log(1m/3m)
4. The limit is converted to field strength.
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -27dBm + 95.2 = 68.2dBuV/m
   E[dBuV/m] = EIRP[dBm] + 95.2 dB = -17dBm + 95.2 = 78.2dBuV/m (within 5715~5725 MHz and 5850~5860 MHz)
5. If peak measurement satisfy the average limit, then average measurement are not required.

8.7 AC Conducted Emissions

▣ **Test Procedure**

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. Emissions closest to the limit are measured in the quasi-peak mode (QP) and average mode (AV) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

▣ **Measurement Data: Comply**

Note 1: See next pages for actual measured spectrum plots and data for worst case result.

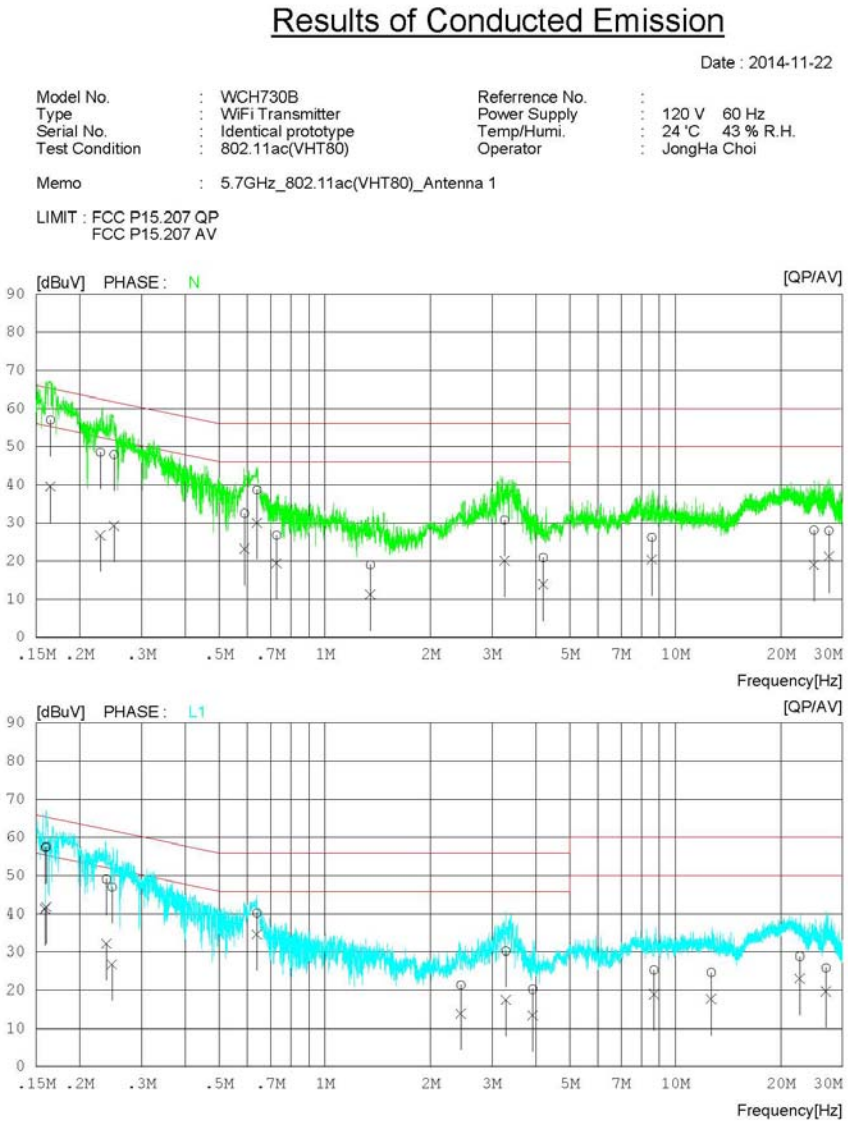
▣ **Minimum Standard: FCC Part 15.207(a)/EN 55022**

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

AC Line Conducted Emissions (Graph)

Test Mode: U-NII 3 & 802.11ac VHT80 & ANT 1



AC Line Conducted Emissions (Data List)

Test Mode: U-NII 3 & 802.11ac VHT80 & ANT 1

Results of Conducted Emission

Date : 2014-11-22

Model No.	:	WCH730B	Referrence No.	:	
Type	:	WiFi Transmitter	Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	24 'C 43 % R.H.
Test Condition	:	802.11ac(VHT80)	Operator	:	JongHa Choi

Memo : 5.7GHz_802.11ac(VHT80)_Antenna 1

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ	READING		C.FACTOR	RESULT		LIMIT		MARGIN		PHASE
		QP	AV		QP	AV	QP	AV	QP	AV	
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16476	47.0	29.7	9.9	56.9	39.6	65.2	55.2	8.3	15.6	N
2	0.22856	38.6	16.8	9.9	48.5	26.7	62.5	52.5	14.0	25.8	N
3	0.25015	38.0	19.4	9.9	47.9	29.3	61.8	51.8	13.9	22.5	N
4	0.58963	22.7	13.3	9.9	32.6	23.2	56.0	46.0	23.4	22.8	N
5	0.64003	28.7	20.1	9.9	38.6	30.0	56.0	46.0	17.4	16.0	N
6	0.72825	16.8	9.5	9.9	26.7	19.4	56.0	46.0	29.3	26.6	N
7	1.34760	9.0	1.3	10.0	19.0	11.3	56.0	46.0	37.0	34.7	N
8	3.25720	20.7	10.0	10.1	30.8	20.1	56.0	46.0	25.2	25.9	N
9	4.19760	10.8	3.8	10.1	20.9	13.9	56.0	46.0	35.1	32.1	N
10	8.56540	16.0	10.2	10.2	26.2	20.4	60.0	50.0	33.8	29.6	N
11	24.85940	17.5	8.3	10.6	28.1	18.9	60.0	50.0	31.9	31.1	N
12	27.43160	17.3	10.6	10.6	27.9	21.2	60.0	50.0	32.1	28.8	N
13	0.15909	47.6	31.4	9.9	57.5	41.3	65.5	55.5	8.0	14.2	L1
14	0.16029	47.7	31.9	9.9	57.6	41.8	65.4	55.4	7.8	13.6	L1
15	0.23792	39.2	22.4	9.9	49.1	32.3	62.2	52.2	13.1	19.9	L1
16	0.24678	37.2	16.9	9.9	47.1	26.8	61.9	51.9	14.8	25.1	L1
17	0.63959	30.3	24.8	9.9	40.2	34.7	56.0	46.0	15.8	11.3	L1
18	2.44200	11.3	3.9	10.0	21.3	13.9	56.0	46.0	34.7	32.1	L1
19	3.28800	20.2	7.5	10.1	30.3	17.6	56.0	46.0	25.7	28.4	L1
20	3.91880	10.2	3.3	10.1	20.3	13.4	56.0	46.0	35.7	32.6	L1
21	8.69640	15.2	8.8	10.2	25.4	19.0	60.0	50.0	34.6	31.0	L1
22	12.65980	14.5	7.6	10.2	24.7	17.8	60.0	50.0	35.3	32.2	L1
23	22.67340	18.3	12.5	10.6	28.9	23.1	60.0	50.0	31.1	26.9	L1
24	26.91760	15.3	9.1	10.6	25.9	19.7	60.0	50.0	34.1	30.3	L1

8.8 Occupied Bandwidth

▣ **Test Requirements**

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured

▣ **Test Configuration**

Refer to the APPENDIX I.

▣ **Test Procedure**

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.
Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual

▣ **Test Results: NA**

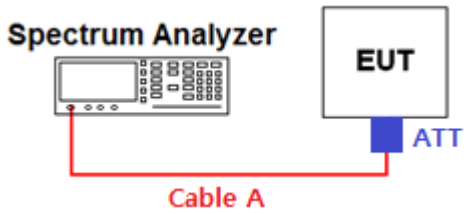
9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
MXA Signal Analyzer	Agilent	N9030A	14/10/21	15/10/21	MY53310140
Digital Multimeter	H.P	34401A	14/02/27	15/02/27	3146A13475
Dynamic Measurement DC Source	Agilent	66332A	14/10/20	15/10/20	MY43000394
Thermohygrometer	BODYCOM	BJ5478	14/05/13	15/05/13	120612-1
Vector Signal Generator	Rohde Schwarz	SMBV100A	14/01/07	15/01/07	255571
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Attenuator	SMAJK	SMAJK-2-3	14/10/21	15/10/21	1
High-pass filter	Wainwright	WHNX8.5	14/09/11	15/09/11	1
High-pass filter	Wainwright	WHKX3.0	14/09/11	15/09/11	9
LOOP Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	14/07/10	16/07/10	3151
Horn Antenna	ETS-LINDGREN	3117	14/05/12	16/05/12	00140394
Horn Antenna	A.H.Systems	SAS-574	13/03/20	15/03/20	154
Amplifier	H.P	8447E	14/01/08	15/01/08	2945A02865
Amplifier	Agilent	8449B	14/02/27	15/02/27	3008A00370
EMI TEST RECEIVER	Rohde Schwarz	ESU	14/01/08	15/01/08	100014
EMI TEST RECEIVER	Rohde Schwarz	ESCI7	14/02/27	15/02/27	100910
Temp & Humi Test Chamber	SJ Science	TEMI850-10	14/02/28	15/02/28	SJ-TH-S50-120203
CVCF	NF	4420	14/05/26	15/05/26	3049354420023
LISN	Schwarzbeck	NNLK8121	14/08/18	15/08/18	NNLK8121-580
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2495A/ MA2490A	14/03/12	15/03/12	1306007 / 1249001

APPENDIX I

Conducted Test set up Diagram

- **Conducted Measurement**



APPENDIX II

Duty Cycle Information

▣ **Test Procedure**

Duty Cycle [X = On Time / (On + Off time)] is measured using Measurement Procedure **of KDB789033 D02 V01**

1. Set the center frequency of the spectrum analyzer to the center frequency of the transmission.
2. Set RBW ≥ EBW if possible; otherwise, set RBW to the largest available value.
3. Set VBW ≥ RBW. Set detector = peak.
4. Note : The zero-span measurement method shall not be used unless both **RBW and VBW are> 50/*T***, where *T* is defined in section II.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.)

   T : The minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
   (***T* = On time** of the above table since the EUT operates with above fixed Duty Cycle and it is the minimum On time)

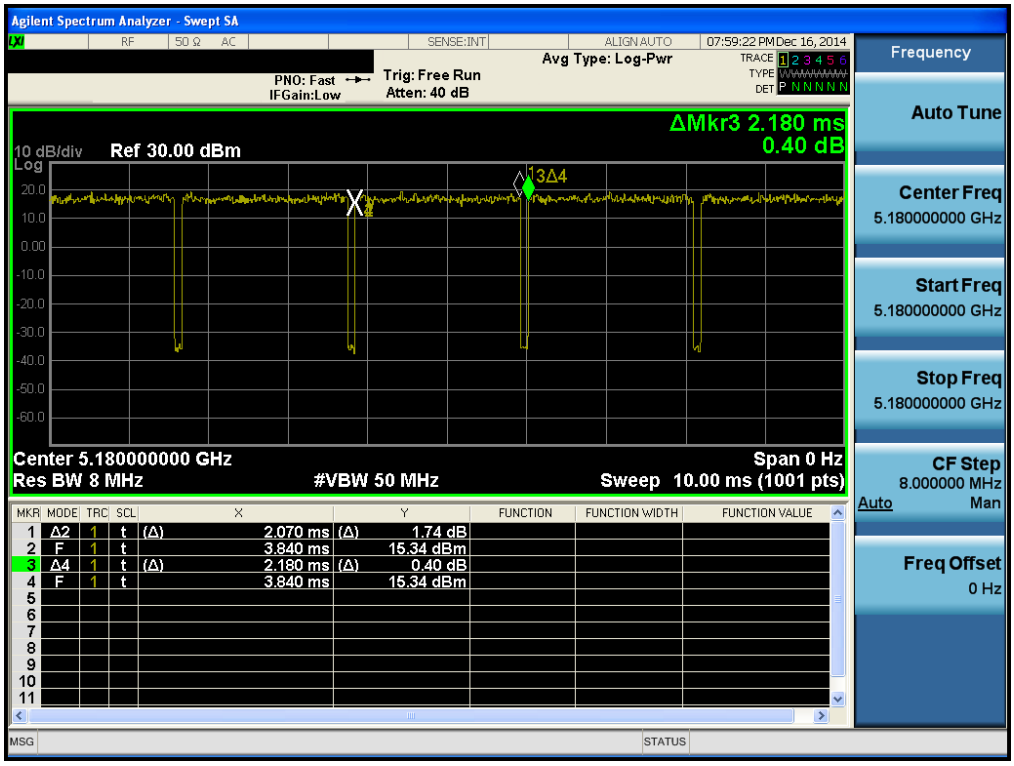
▣ **Test Results:**

Mode	Channel	Tested Frequency [MHz]	Maximum Achievable Duty Cycle (*x*) = On / (On+Off)			Duty Cycle Correction Factor [dB]	1/*T* [Hz]
			On Time [ms]	On+Off Time [ms]	*x*		
802.11a SISO	36	5180	2.07	2.18	0.9495	0.23	483.10
802.11n (HT20) SISO	36	5180	1.92	2.02	0.9505	0.23	520.84
802.11n (HT40) SISO	38	5190	0.94	1.04	0.9038	0.44	1063.83
802.11ac (VHT80) SISO	42	5210	0.45	0.49	0.9184	0.37	2222.23

▣ Result Plots

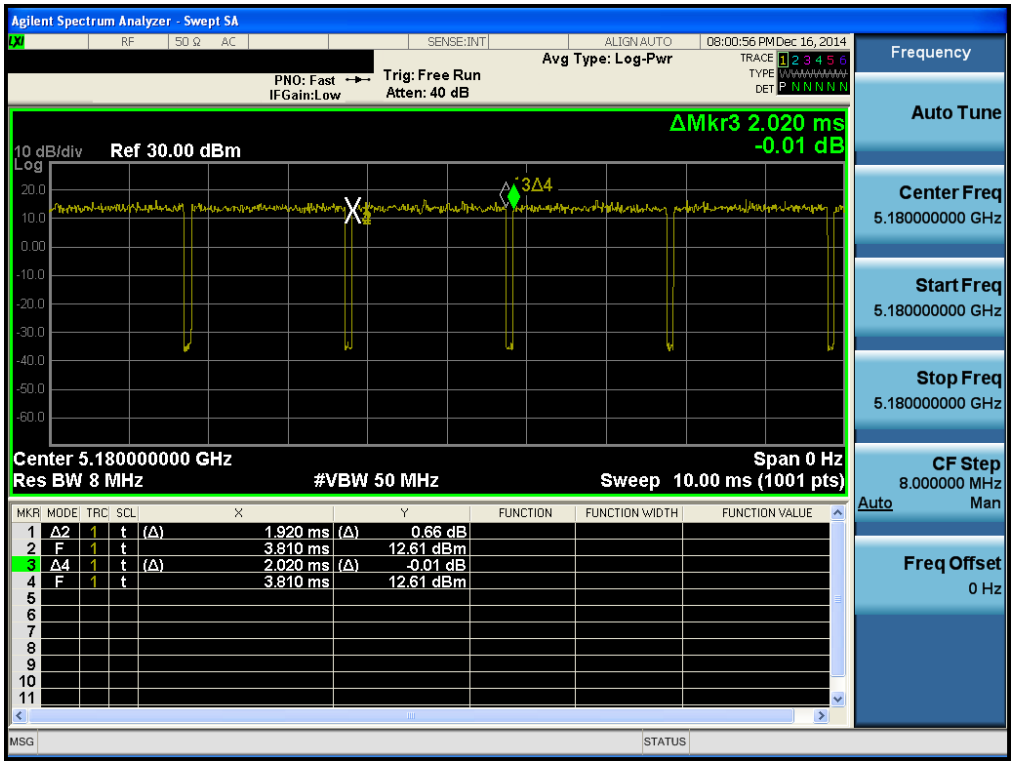
Duty Cycle

Test Mode: 802.11a & Ch.36 & SISO

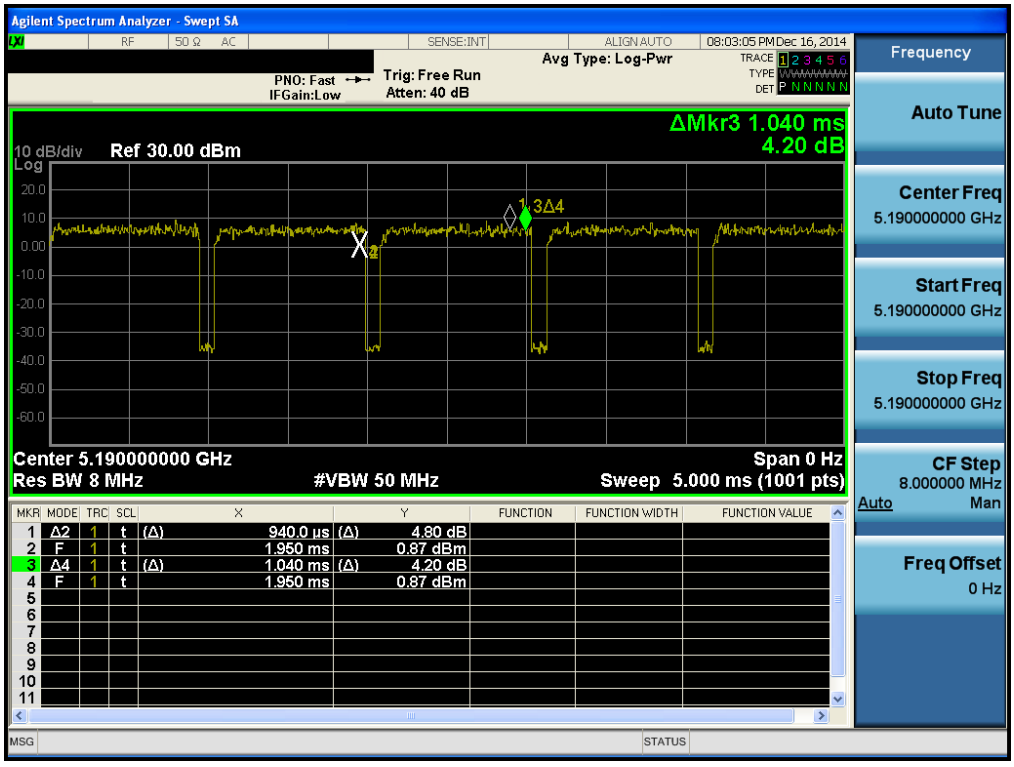


Duty Cycle

Test Mode: 802.11n HT20 & Ch.36 & SISO



Duty Cycle Test Mode: 802.11n HT40 & Ch.38 & SISO



Duty Cycle Test Mode: 802.11ac VHT80 & Ch.42 & SISO