TEST REPORT

DT&C Co., Ltd. 42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea Tel : 031-321-2664, Fax : 031-321-1664	Report No : DRTFCC1601-0017 Pages:(1) / (146) page	Dt&C

1. Customer

   • Name : Hyundai MOBIS Co., Ltd.

   • Address : 203 Teheran-ro, Gangnam-gu, Seoul, Korea, 135-977

2. Use of Report : FCC & IC Original Grant

3. Product Name (FCCID, IC) : DIGITAL CAR AVN SYSTEM (TQ8-ACB40G5AN, 5074A-ACBB0G5KN)

4. Date of Test : 2015-12-07 ~ 2015-12-29

5. Test Method Used : FCC Part 15 Subpart C.407

   RSS-247 Issue 1 (2015-05), RSS-GEN Issue 4 (2014-11)

6. Testing Environment : See appended test report

7. Test Result : ☒ Pass ☐ Fail

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by Name : Jaejin Lee (Signature)	Technical Manager Name : GeunKi Son (Signature)

2016 . 01 . 15 .

DT&C Co., Ltd.

Test Report Version

Test Report No.	Date	Description
DRTFCC1601-0017	Jan. 15, 2016	Initial issue

CONTENTS

1. EUT Description

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	DIGITAL CAR AVN SYSTEM
Model Name(FCC)	ACB40G5AN, ACBB0G5AN
Model Name(IC)	ACBB0G5KN
Hardware version	4.0
Software version	1.0
Power Supply	DC 14.4 V
Frequency Range	**U-NII 1(5150 ~ 5250MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5180 ~ 5240 MHz ▪ 802.11n(HT40)/ac(VHT40): 5190 ~ 5230 MHz ▪ 802.11ac(VHT80): 5210 MHz **U-NII 2A(5250 ~ 5350 MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5260 ~ 5320 MHz ▪ 802.11n(HT40)/ac(VHT40): 5270 ~ 5310 MHz ▪ 802.11ac(VHT80): 5290 MHz **U-NII 2C(5470 ~ 5725 MHz)** ▪ 802.11a/n(HT20)/ac(VHT20): 5500 ~ 5720 MHz ▪ 802.11n(HT40)/ac(VHT40): 5510 ~ 5710 MHz ▪ 802.11ac(VHT80): 5530~5690 MHz **U-NII 3(5725 ~ 5850MHz)** ▪ 802.11a/n(HT20): 5745 ~ 5825 MHz ▪ 802. 11n(HT40)/ac(VHT40): 5755 ~ 5795 MHz ▪ 802.11ac(VHT80): 5775 MHz
Modulation type	OFDM
Antenna Specification	**Antenna type** : Internal Antenna **Antenna gain** ▪ U-NII 1 : 3.00 dBi ▪ U-NII 2C : 3.00 dBi ▪ U-NII 2A : -1.84 dBi ▪ U-NII 3 : -1.03 dBi

2. Information about test items

2.1 Test mode

5GHz Band	Mode	Data Rate
U-NII 1	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 0
U-NII 2A	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 0
U-NII 2C	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 0
U-NII 3	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	NSS1 MCS 0

Note 1: The worst case data rate is determined as above test mode according to the power measurements. And all test items were performed at the worst case data rate.

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	-	-

5GHz Band	802.11a/n(HT20)		802.11n(HT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
U-NII 2C/ U-NII 3 (Band-crossing channels)	144	5720	142	5710	138	5690

Note1: Channels 138, 142, 144 are crosses the boundary between two adjacent U-NII bands. (UNII2C, 3)

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

2.4 Tested environment

Temperature	:	21 ºC ~ 24 ºC
Relative humidity content	:	40 % ~ 42 % R.H.
Details of power supply	:	DC 14.4 V

2.5 EMI Suppression Device(s) / Modifications

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

3. Summary of Tests

FCC Part Section(s)	RSS Std.	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)	RSS-247[6.2.4]	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5725 ~ 5850 MHz		C
-	RSS GEN[6.6]	Occupied Bandwidth (99%)	N/A		
15.407(a)	RSS-247[6.2]	Maximum Conducted Output Power	5150 ~ 5250 MHz : < 30 dBm or < 23.97 dBm (FCC) < 200 mW or 10 + 10log10(B) dBm whichever power is less. (IC) 5250 ~ 5350 & 5470 ~ 5725 MHz : <250 mW or < 11 + 10 log10(B) dBm, whichever power is less. (FCC & IC) 5725 ~ 5850 MHz : < 30 dBm (FCC & IC) Note: B is the 99 % BW(IC) or 26dB BW(FCC).		C Note 3
15.407(a)	RSS-247[6.2]	Peak Power Spectral Density	5150 ~ 5250 MHz : 11 dBm/MHz or 17 dBm/MHz(FCC) 5150 ~ 5250 MHz: < 10 dBm/MHz 5250 ~ 5350 & 5470 ~ 5725 MHz: 11 dBm/MHz (FCC & IC) 5725 ~ 5850 MHz: 30 dBm/500kHz(FCC & IC)		C Note 4
15.407(g)	RSS GEN[6.11]	Frequency Stability	N/A		C
15.407(b)	RSS-247[6.2]	Undesirable Emissions	5150 ~ 5725 MHz: < -27 dBm/MHz EIRP 5725 ~ 5850 MHz: < -17 dBm/MHz EIRP or < -27 dBm/MHz EIRP	Radiated	C Note 5,6
15.205 15.209 15.407(b)	RSS-247[6.2] RSS-GEN[8.9] RSS-GEN[8.10]	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)	RSS-247[6.3]	Dynamic Frequency Selection	FCC 15.407(h)	Conducted	C Note 7
15.207	RSS-GEN[8.8]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	NA Note 8
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, KDB644545 D03 and ANSI C63.10-2013

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: Refer to the DFS test report.

Note 8: This device is installed in a car. Therefore the power source is a battery of car.

4. Test Methodology

Generally the tests were performed according to the KDB789033 D02 v01. And ANSI C63.10-2013 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 C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz 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 C63.10-2013 as stated on KDB789033 D02 v01.

The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm.

For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 or 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 : 165783(FCC) & 5740A-3(IC)

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, loop, 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

According to FCC 47 CFR §15.203:

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

The antenna is permanently attached. (Refer to Internal photo file.)

Therefore this E.U.T Complies with the requirement of §15.203

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 26 dB 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 %.

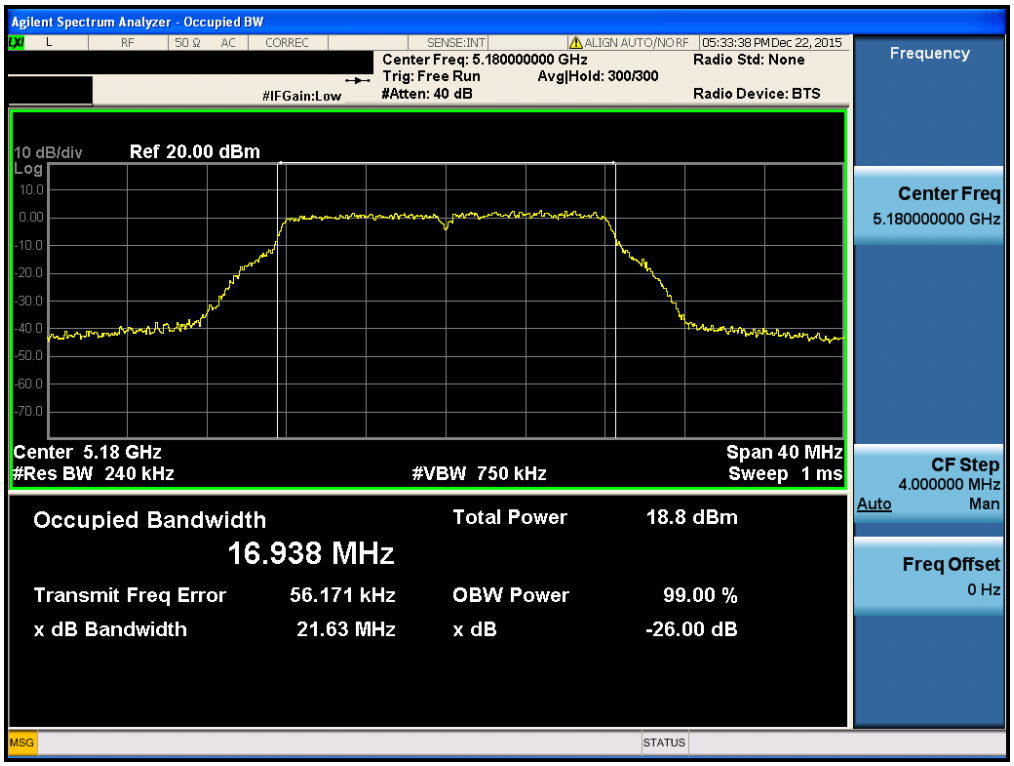
▣ **TEST RESULTS: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	U-NII 1	36	5180	21.63
		40	5200	21.78
		48	5240	21.45
	U-NII 2A	52	5260	21.85
		60	5300	21.70
		64	5320	21.75
	U-NII 2C	100	5500	21.64
		116	5580	21.90
		140	5700	21.87
802.11n (HT20)	U-NII 1	36	5180	21.66
		40	5200	21.90
		48	5240	21.75
	U-NII 2A	52	5260	21.94
		60	5300	21.81
		64	5320	21.80
	U-NII 2C	100	5500	21.85
		116	5580	21.90
		140	5700	21.80
802.11n (HT40)	U-NII 1	38	5190	39.91
		46	5230	40.03
	U-NII 2A	54	5270	40.20
		62	5310	39.96
	U-NII 2C	102	5510	39.92
		110	5550	40.12
		134	5670	40.19
802.11ac (VHT80)	U-NII 1	42	5210	81.86
		-	-	-
	U-NII 2A	58	5290	81.56
		-	-	-
	U-NII 2C	106	5530	81.72
		-	-	-
802.11a	U-NII 2C (Band-crossing channels)	144	5720	15.84
		-	-	-
802.11n (HT20)		144	5720	15.84
		-	-	
802.11n (HT40)		142	5710	35.25
		-	-	-
802.11ac (VHT80)		138	5690	76.14
		-	-	-

▣ Result Plots

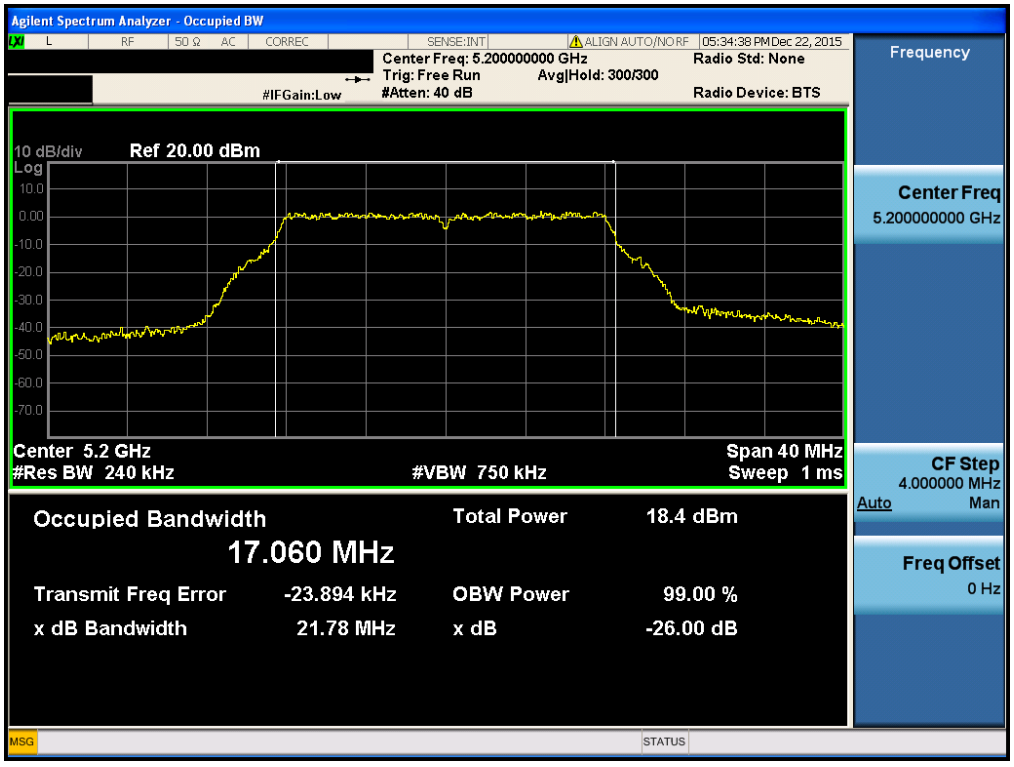
26 dB Bandwidth

Test Mode: 802.11a & Ch.36



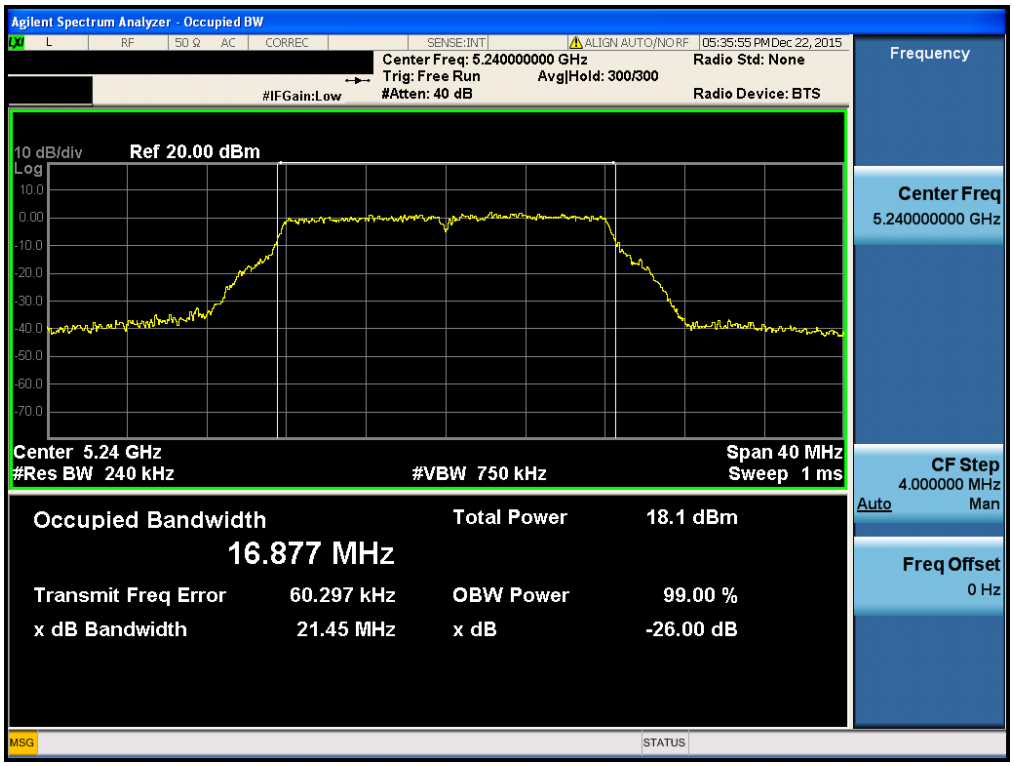
26 dB Bandwidth

Test Mode: 802.11a & Ch.40



26 dB Bandwidth

Test Mode: 802.11a & Ch.48

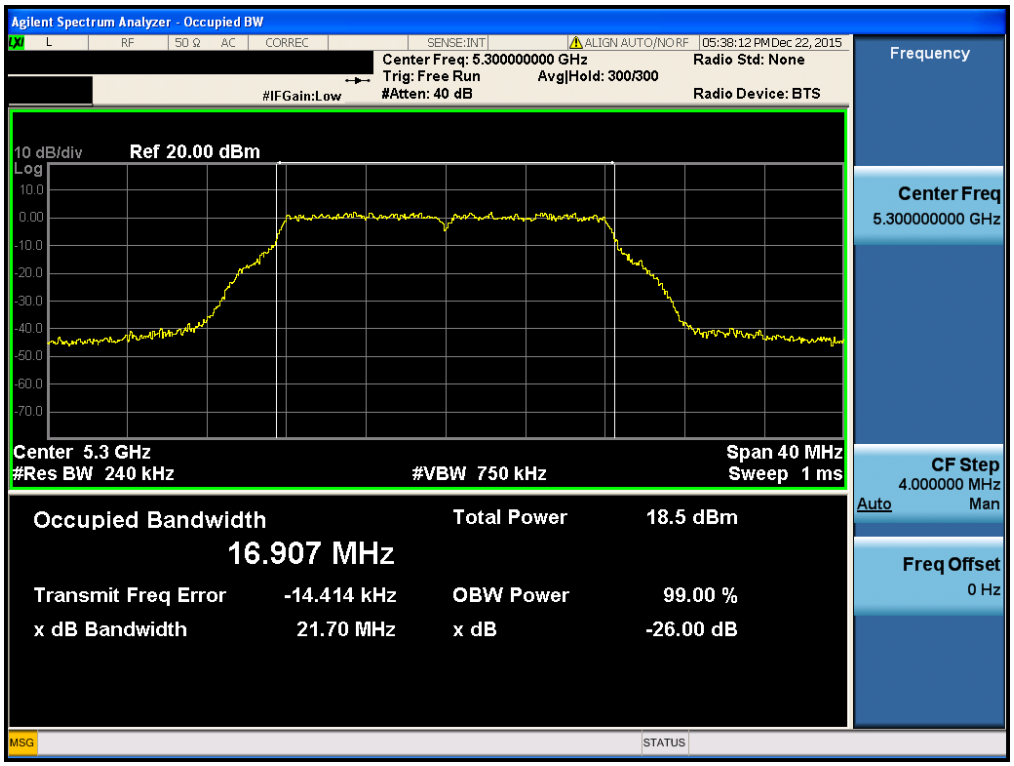


26 dB Bandwidth

Test Mode: 802.11a & Ch.52

26 dB Bandwidth

Test Mode: 802.11a & Ch.60



26 dB Bandwidth

Test Mode: 802.11a & Ch.64

26 dB Bandwidth

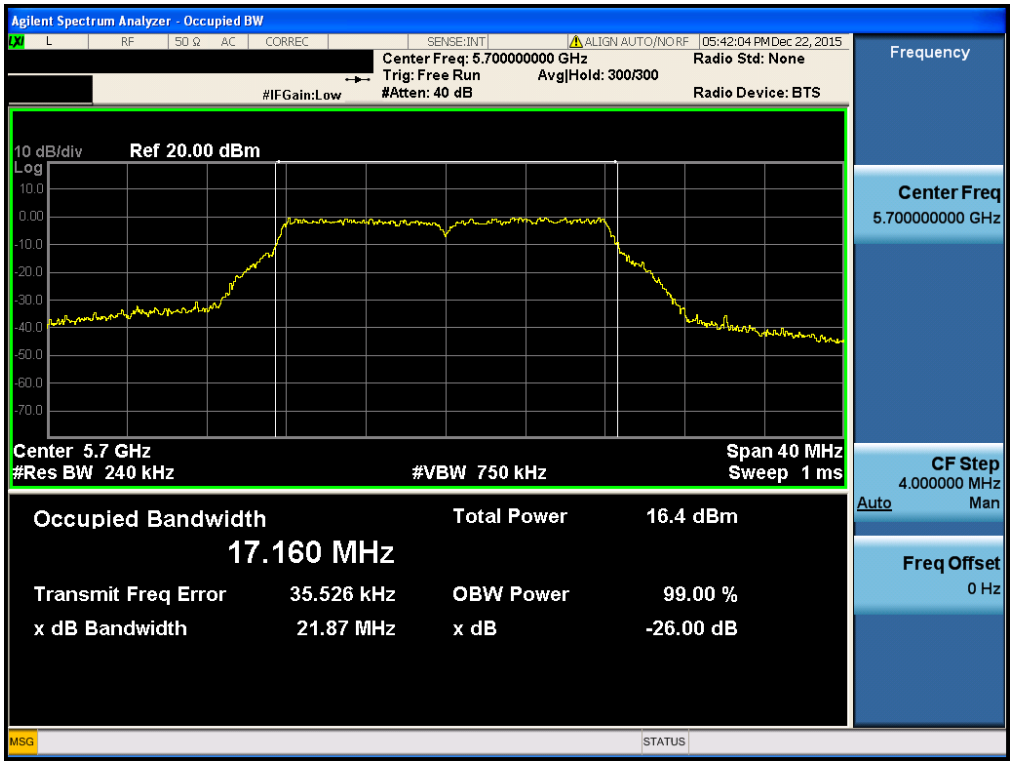
Test Mode: 802.11a & Ch.100

26 dB Bandwidth

Test Mode: 802.11a & Ch.116

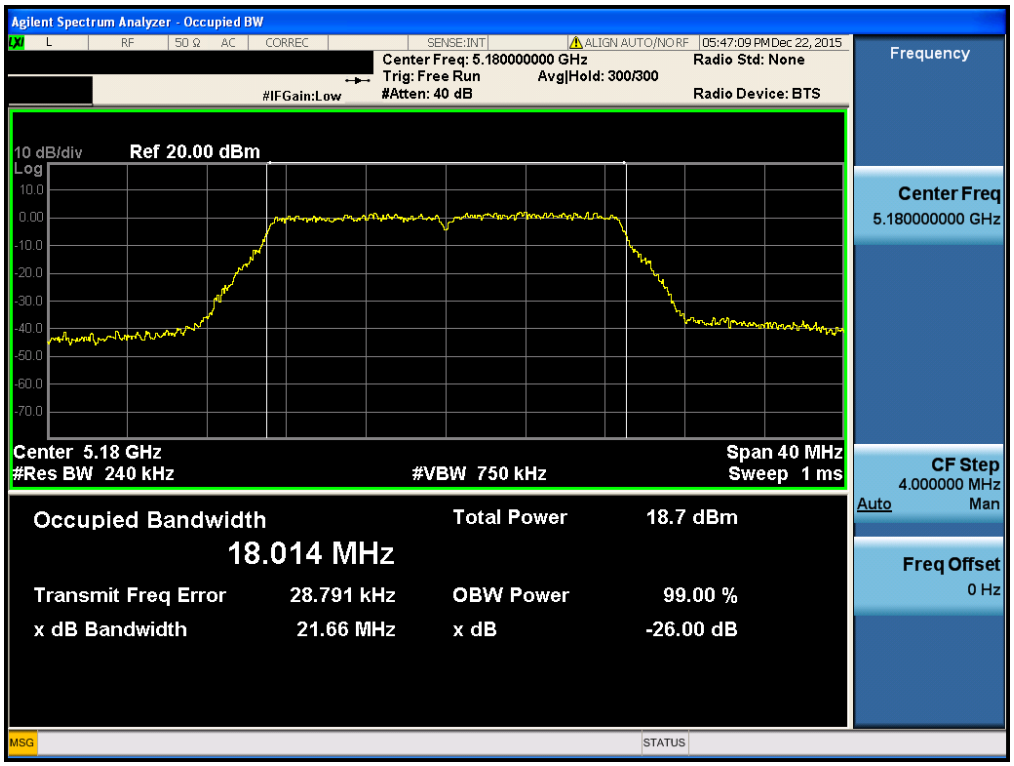
26 dB Bandwidth

Test Mode: 802.11a & Ch.140



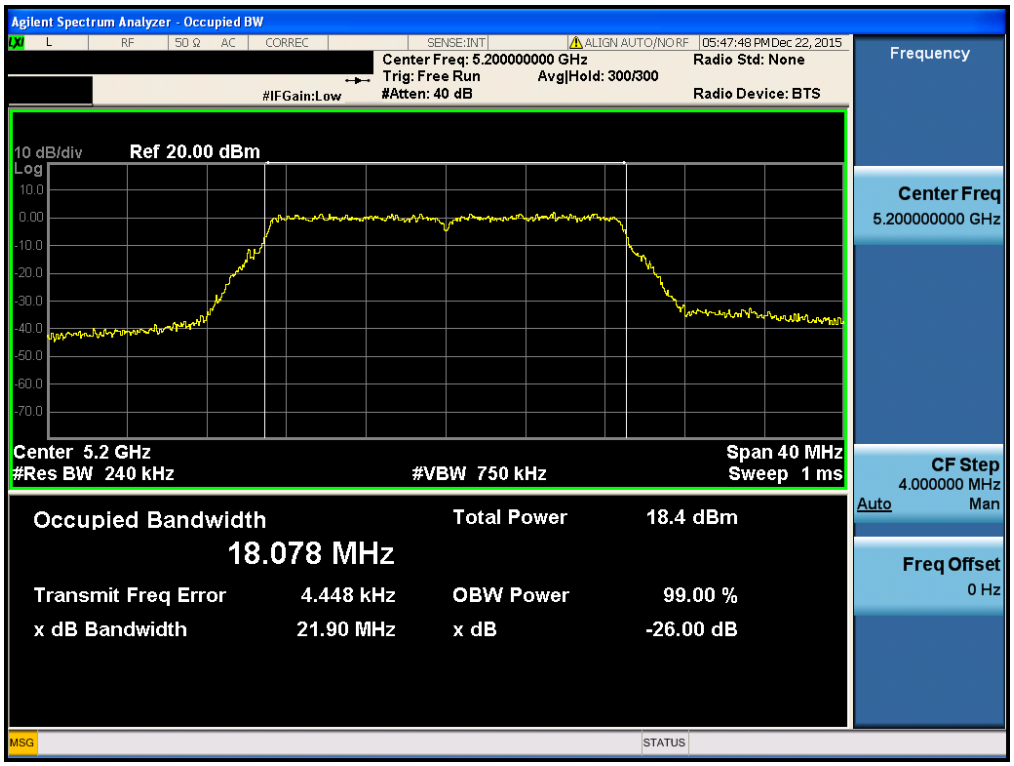
26 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.36



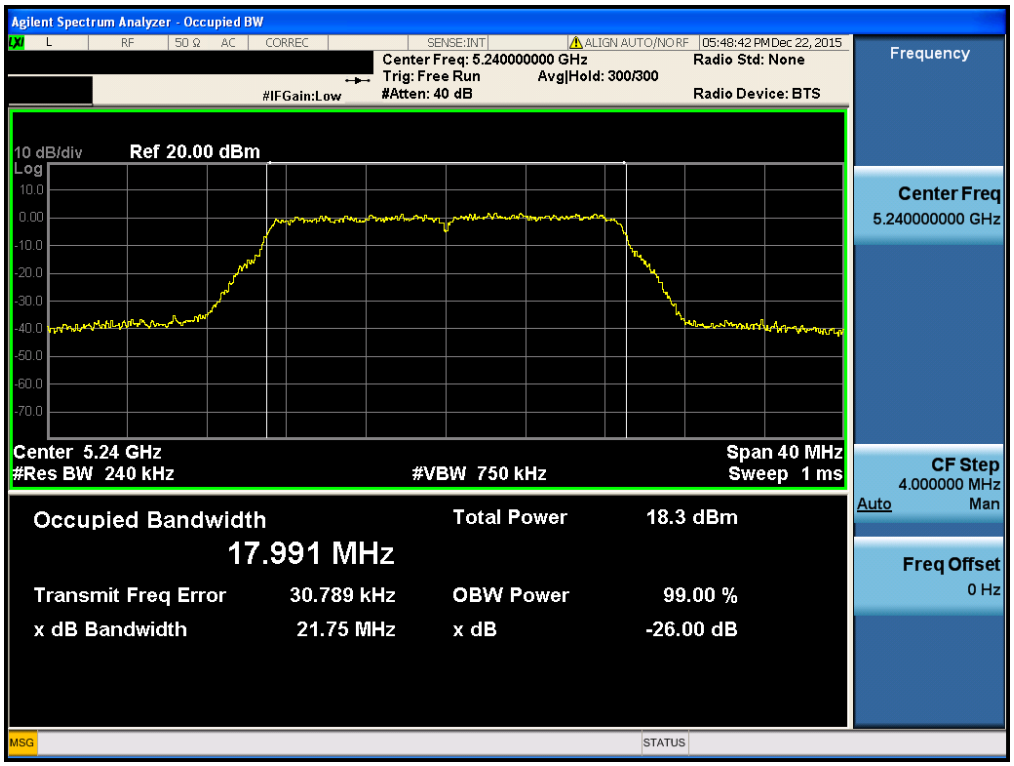
26 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.40



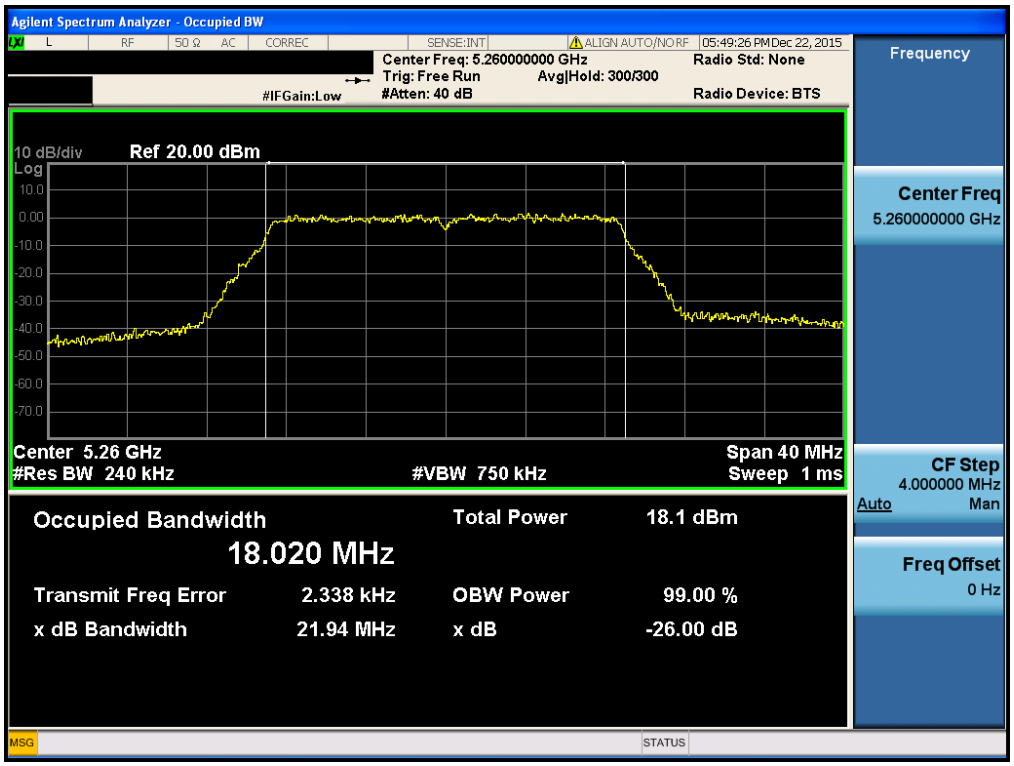
26 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.48



26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.52

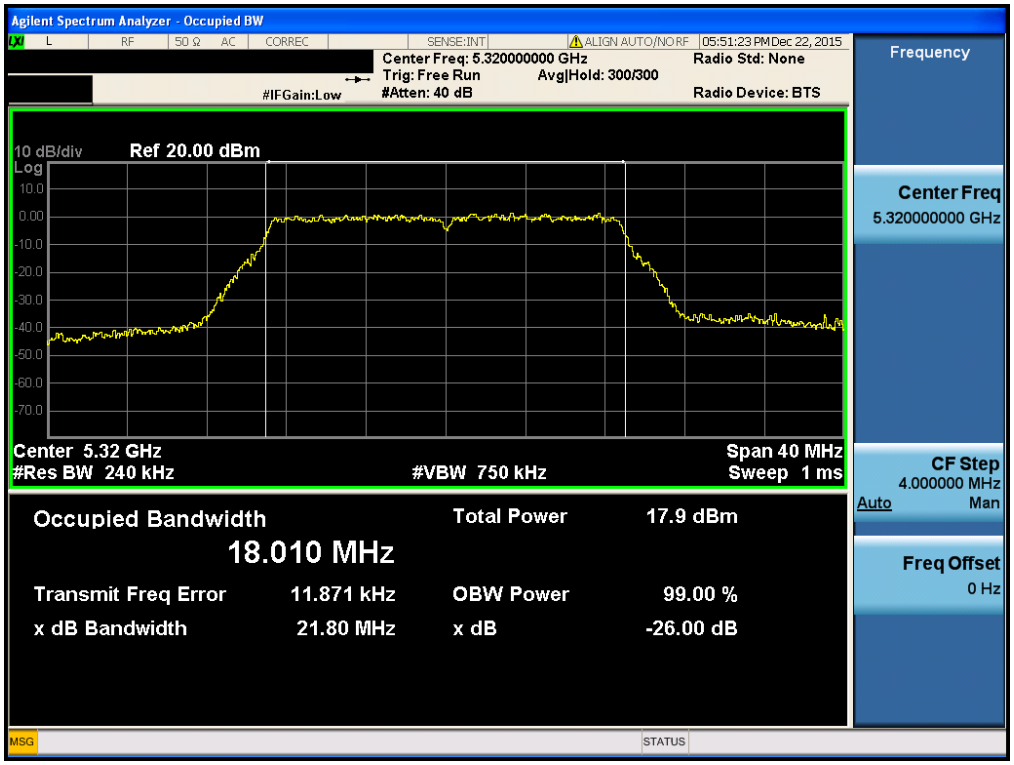


26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.60

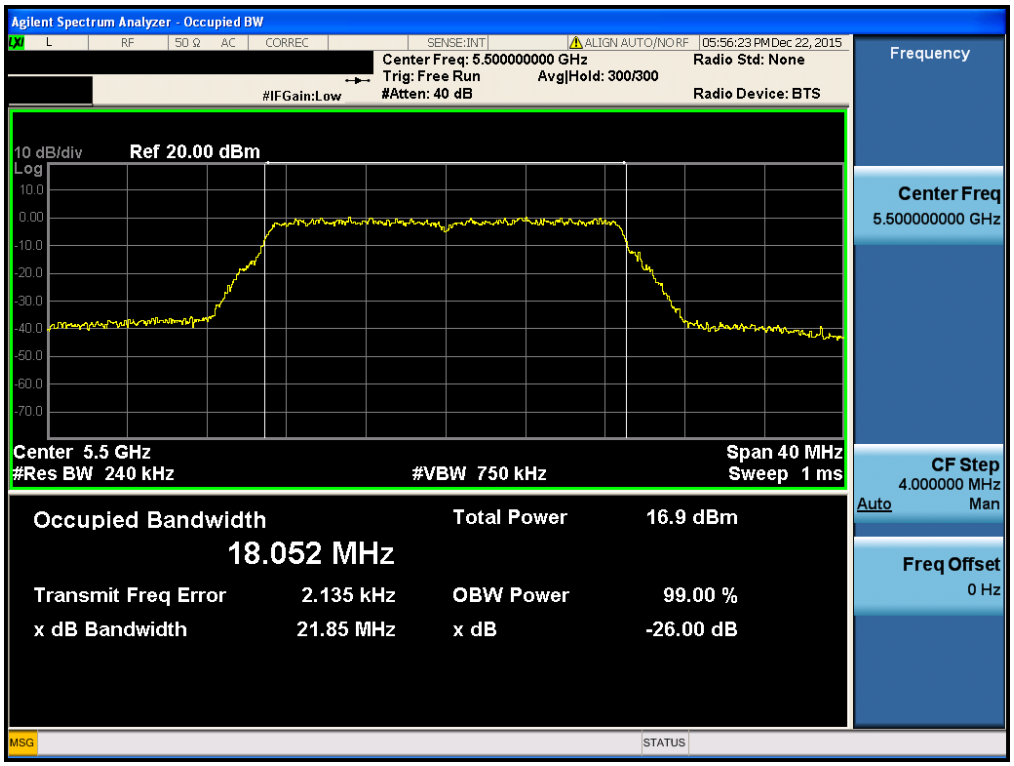
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.64



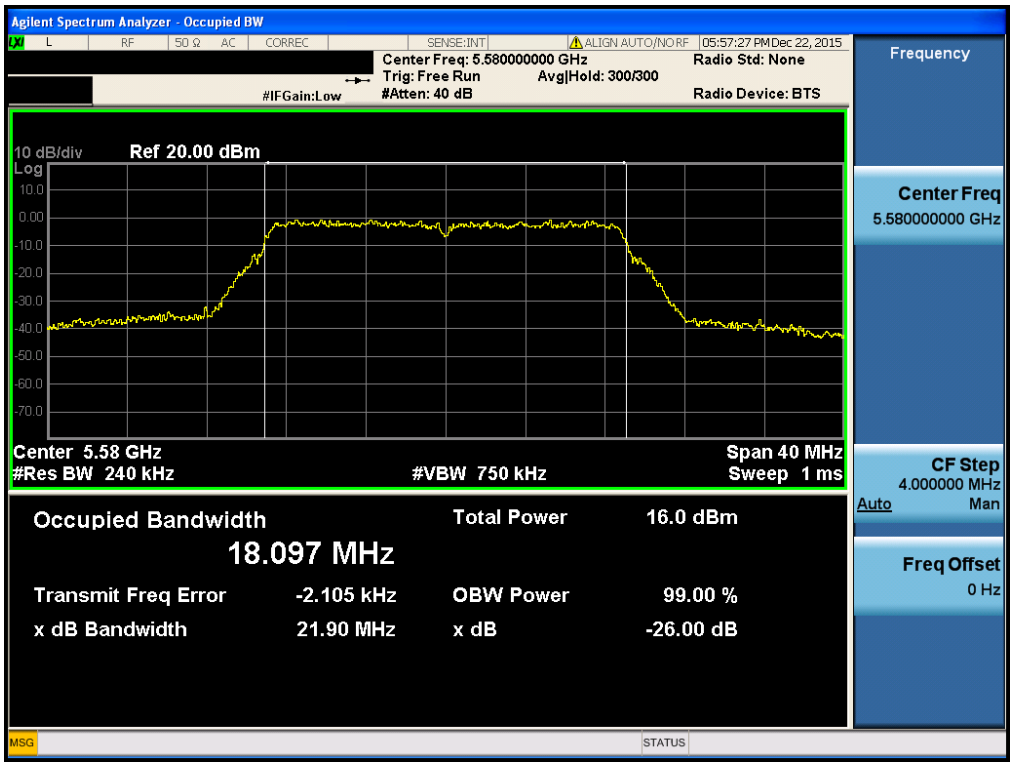
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.100



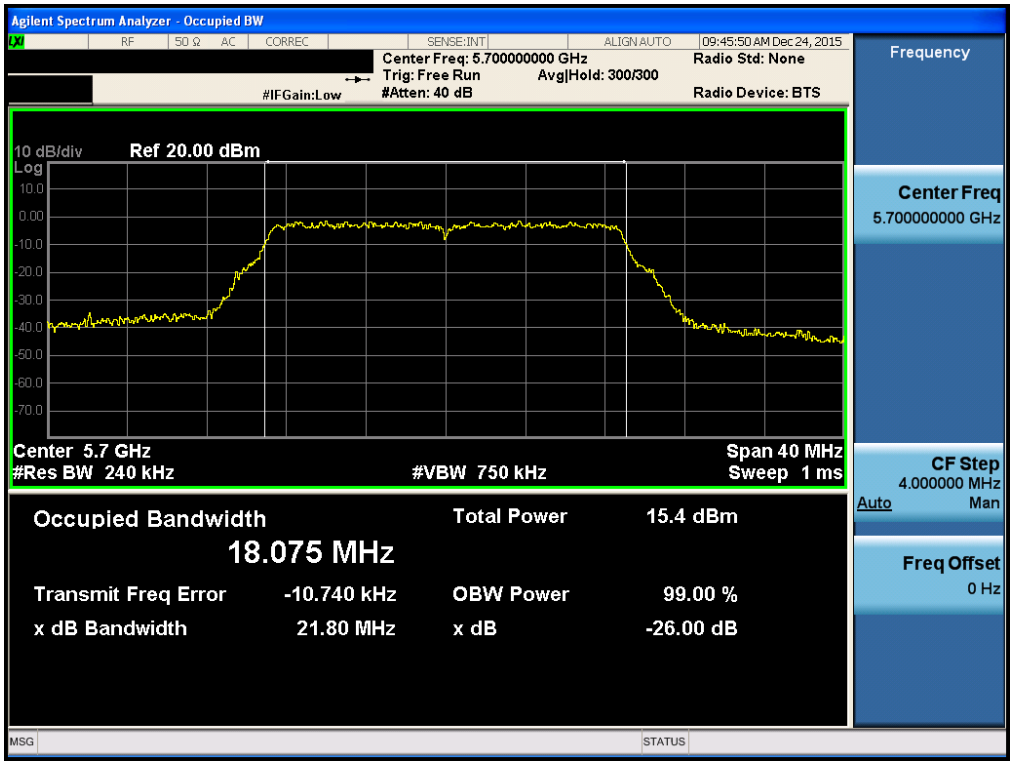
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.116



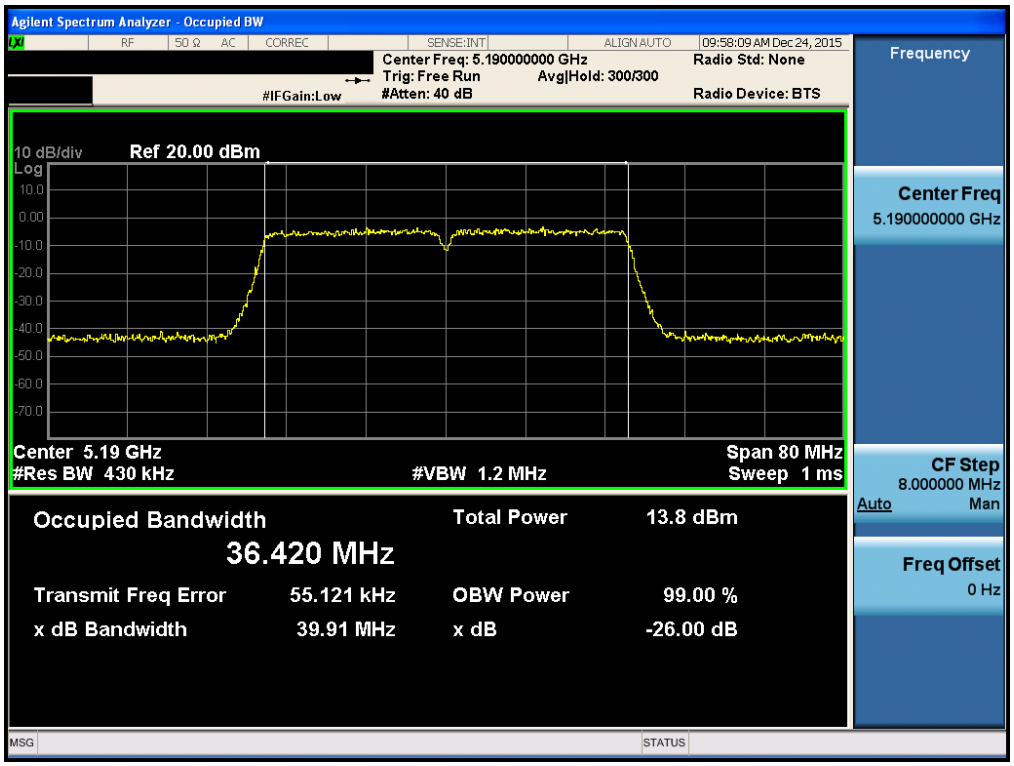
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.140



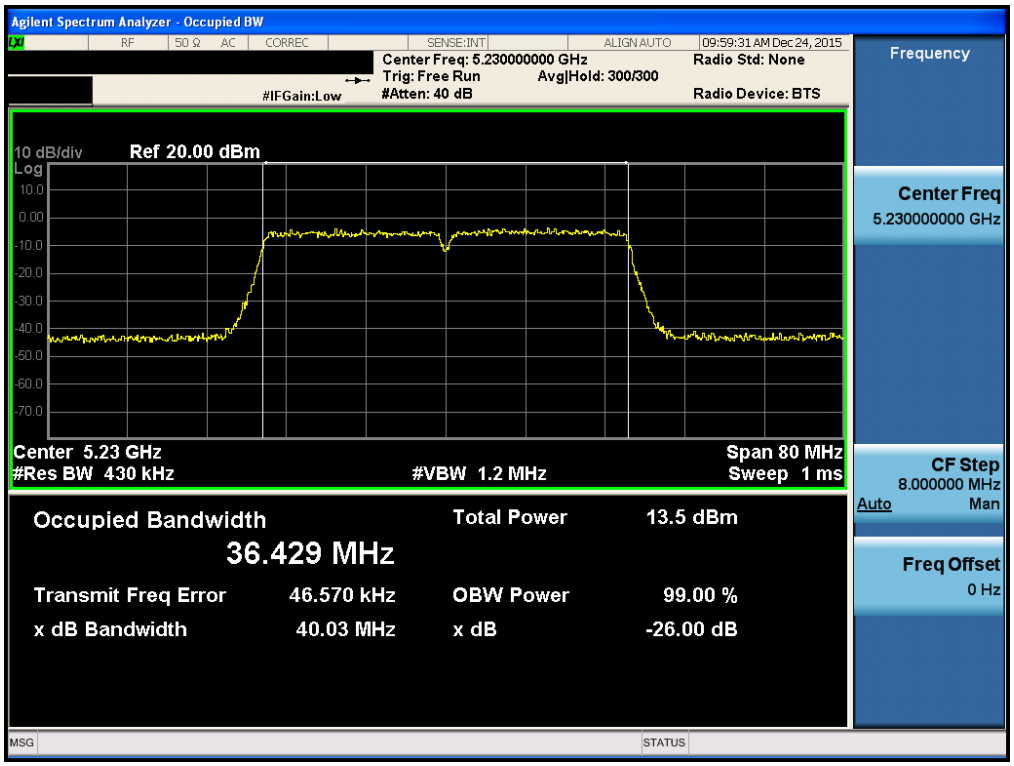
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.38



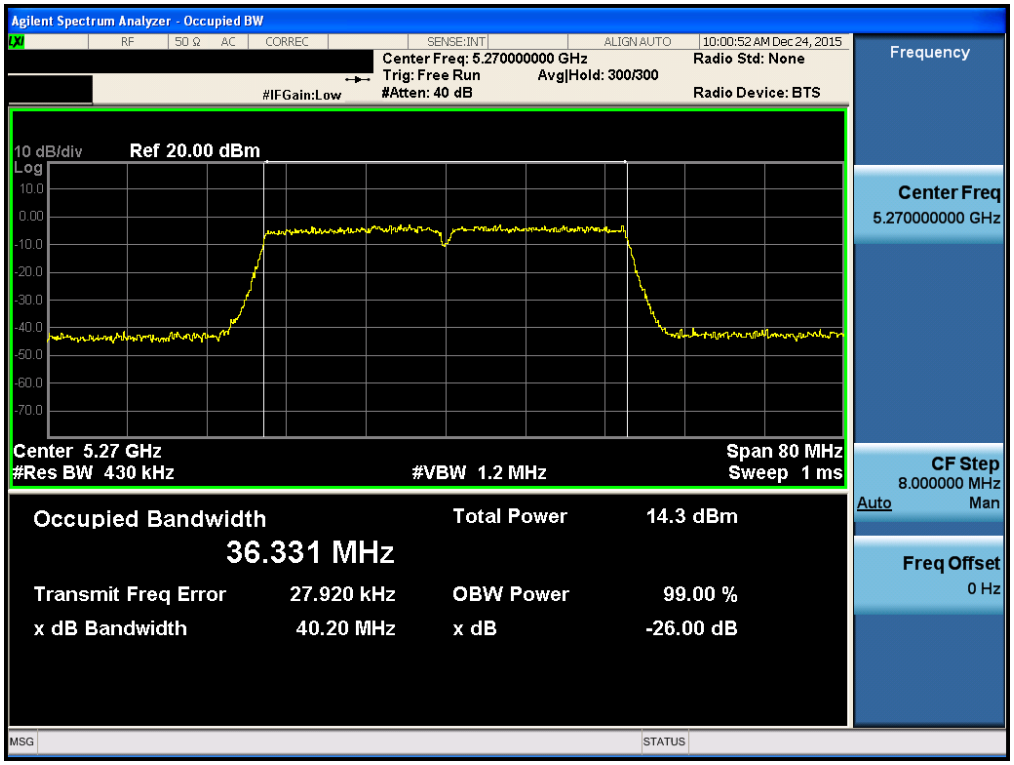
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.46



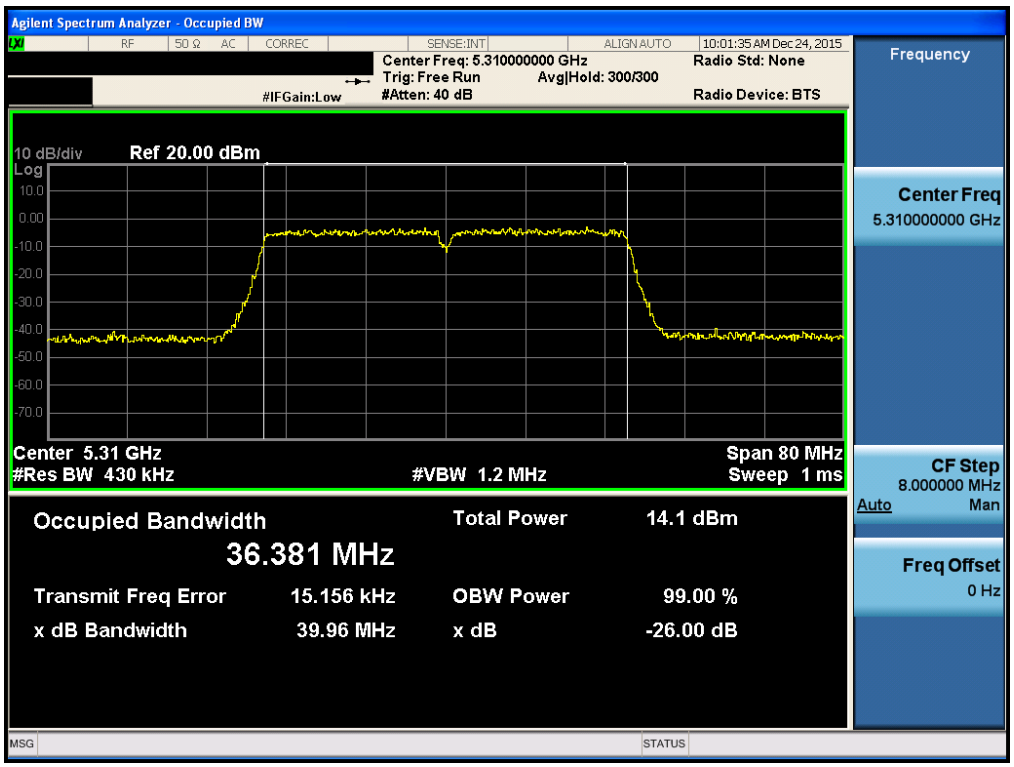
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.54



26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.62

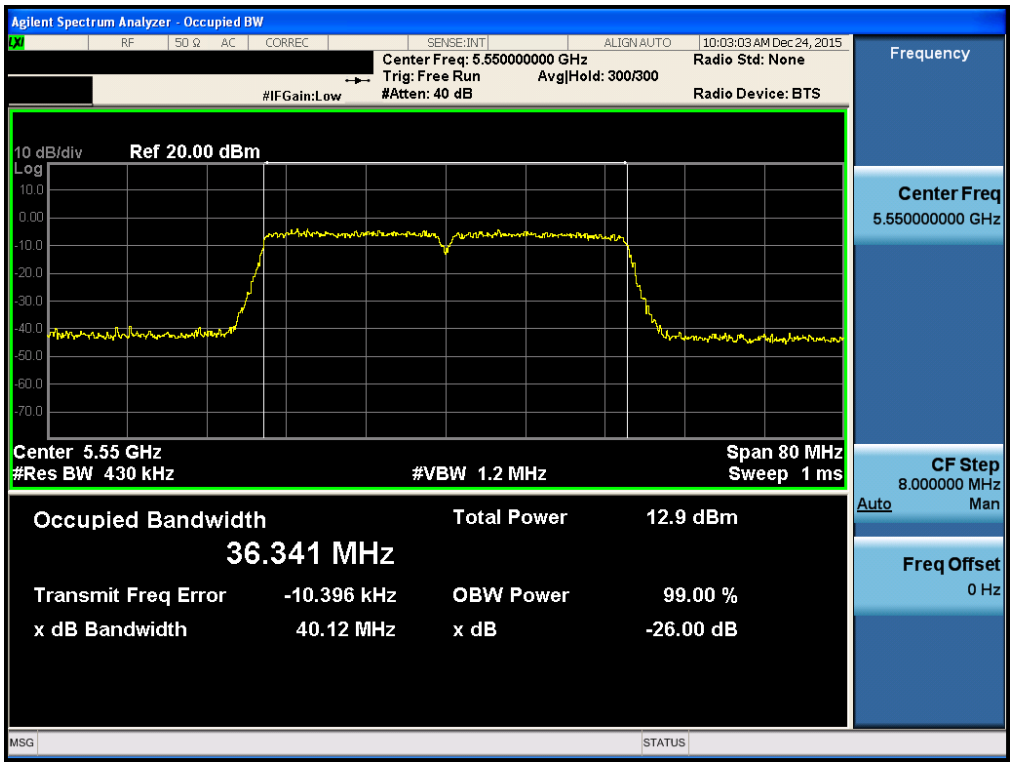


26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.102

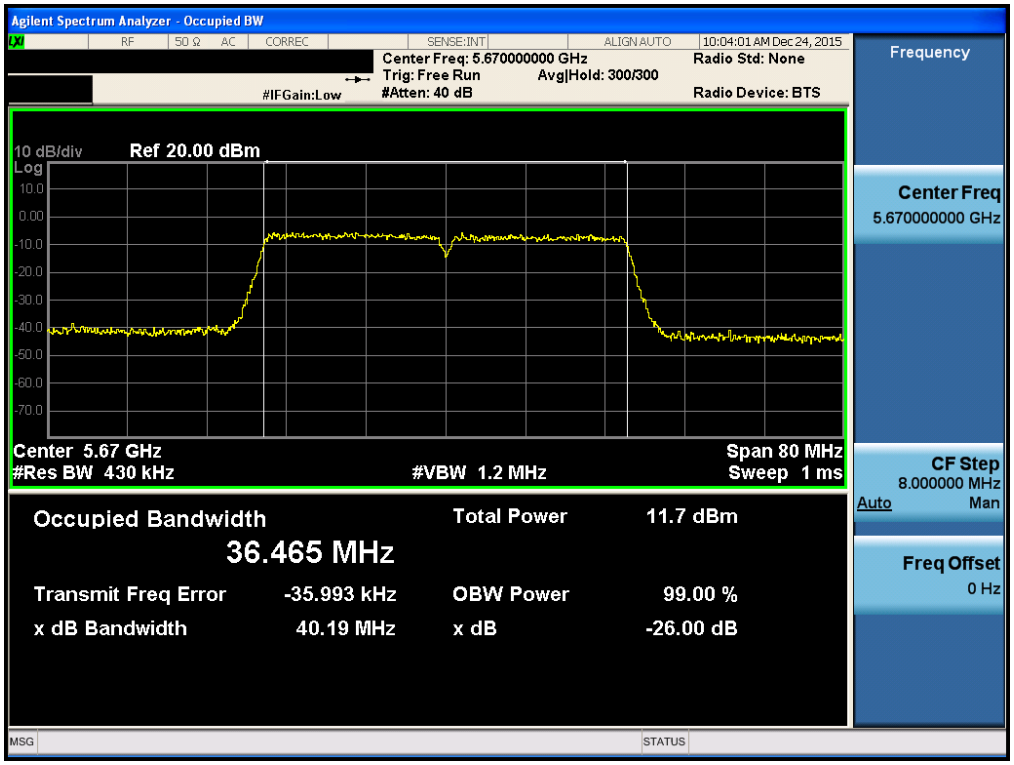
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.110



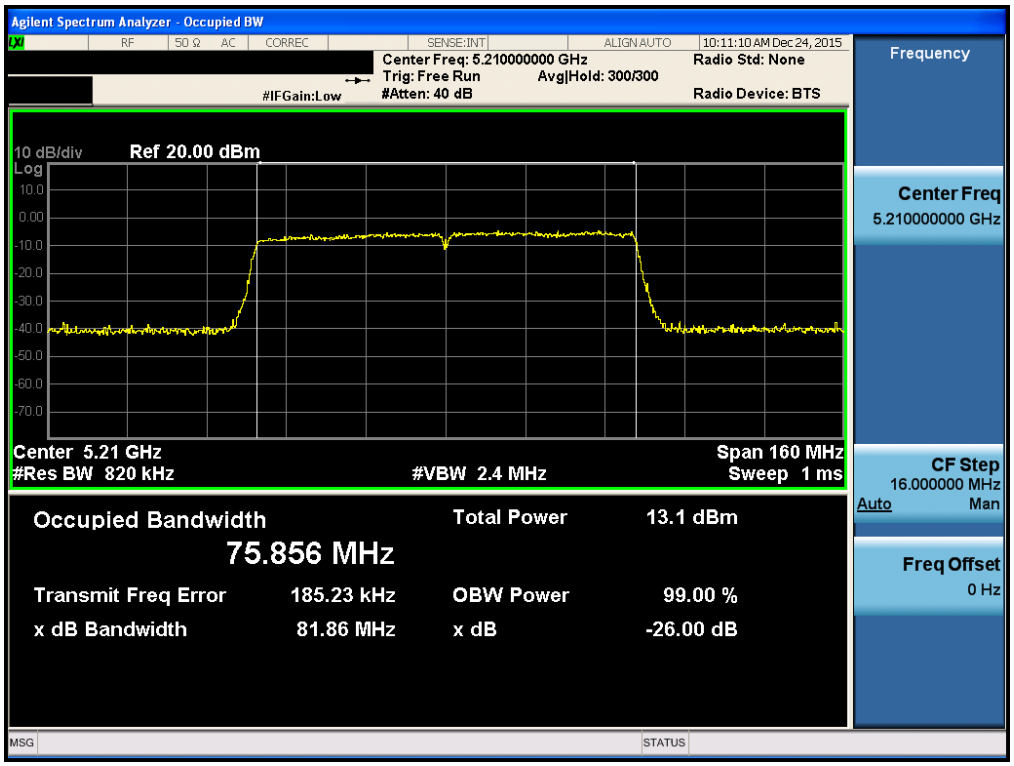
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.134



26 dB Bandwidth

Test Mode: 802.11ac(VHT80) & Ch.42



26 dB Bandwidth

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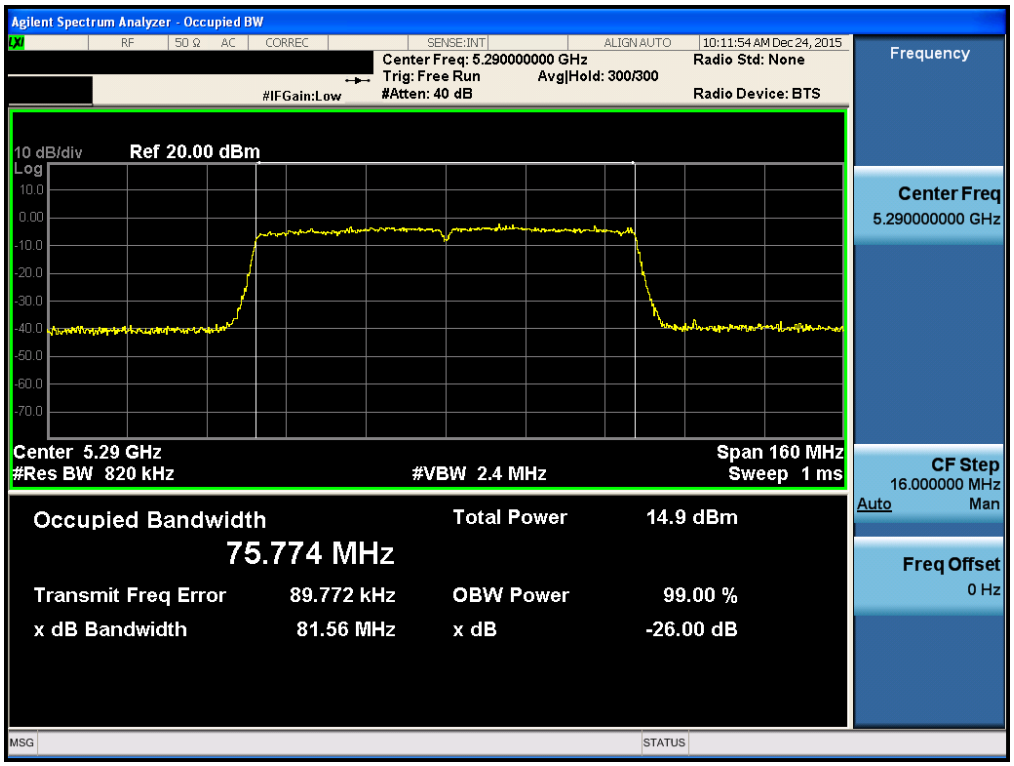
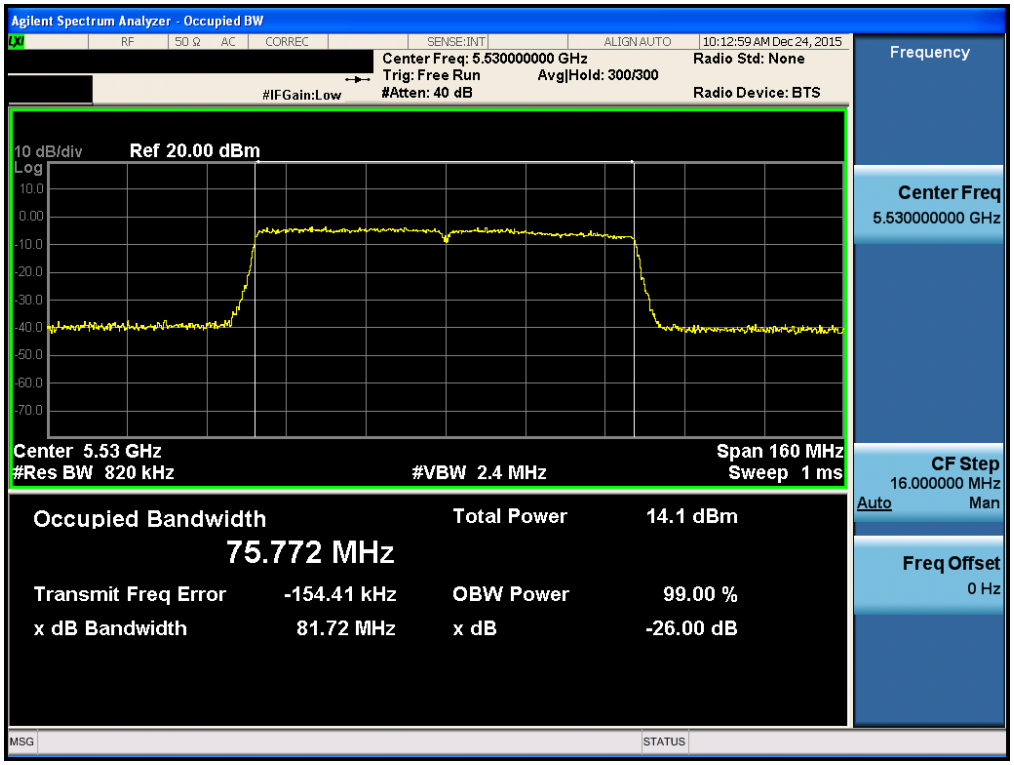


26 dB Bandwidth

Test Mode: 802.11ac(VHT80) & Ch.106



26 dB Bandwidth

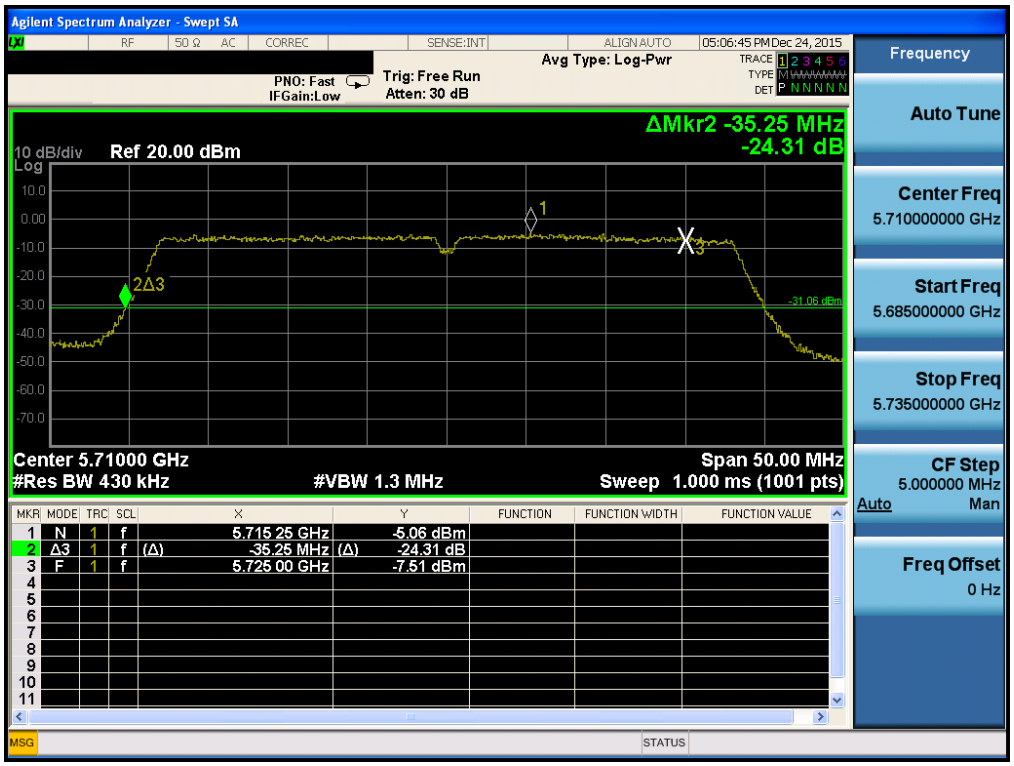
Test Mode: 802.11a & Ch.144

26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.144

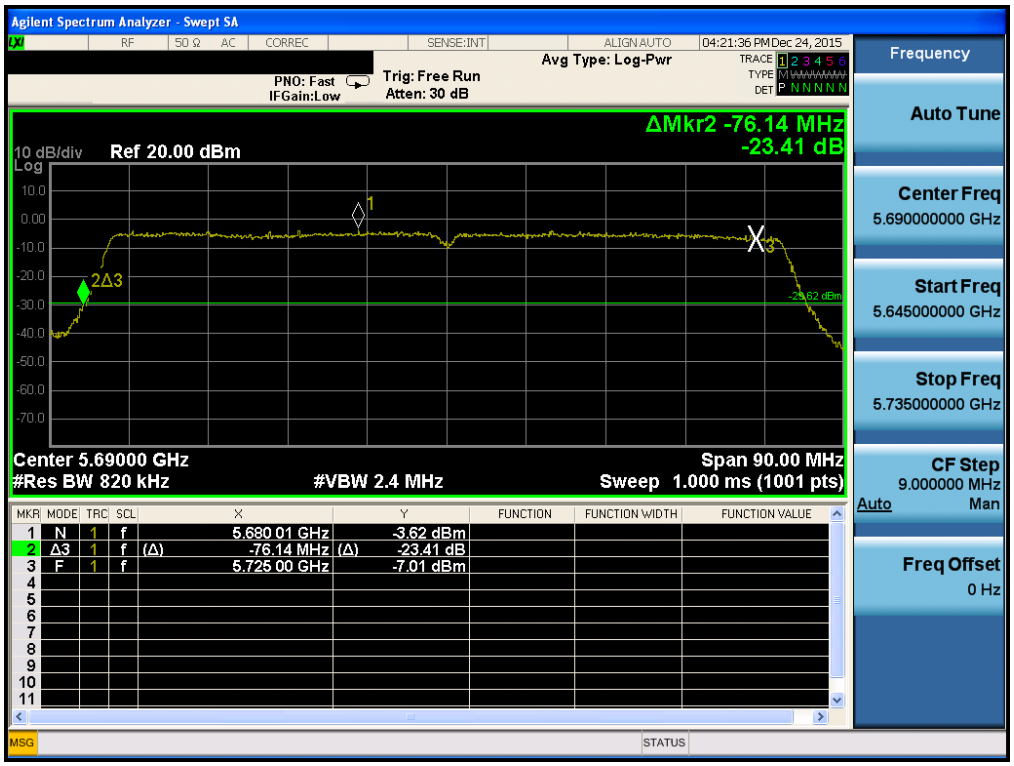
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.142



26 dB Bandwidth

Test Mode: 802.11ac VHT80 & Ch.138



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]
802.11a	U-NII 3	149	5745	16.36
		157	5785	16.41
		165	5825	16.38
802.11n (HT20)		149	5745	17.58
		157	5785	17.66
		165	5825	17.59
802.11n (HT40)		151	5755	36.39
		159	5795	36.39
802.11ac (VHT80)		155	5775	76.07
802.11a	U-NII 3 (Band-crossing channels)	144	5720	3.17
802.11n (HT20)		144	5720	3.80
802.11n (HT40)		142	5710	3.15
802.11ac (VHT80)		138	5690	2.79

▣ RESULT PLOTS

6 dB Bandwidth

Test Mode: 802.11a & Ch.149

6 dB Bandwidth

Test Mode: 802.11a & Ch.157

6 dB Bandwidth

Test Mode: 802.11a & Ch.165

6 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.149

6 dB Bandwidth

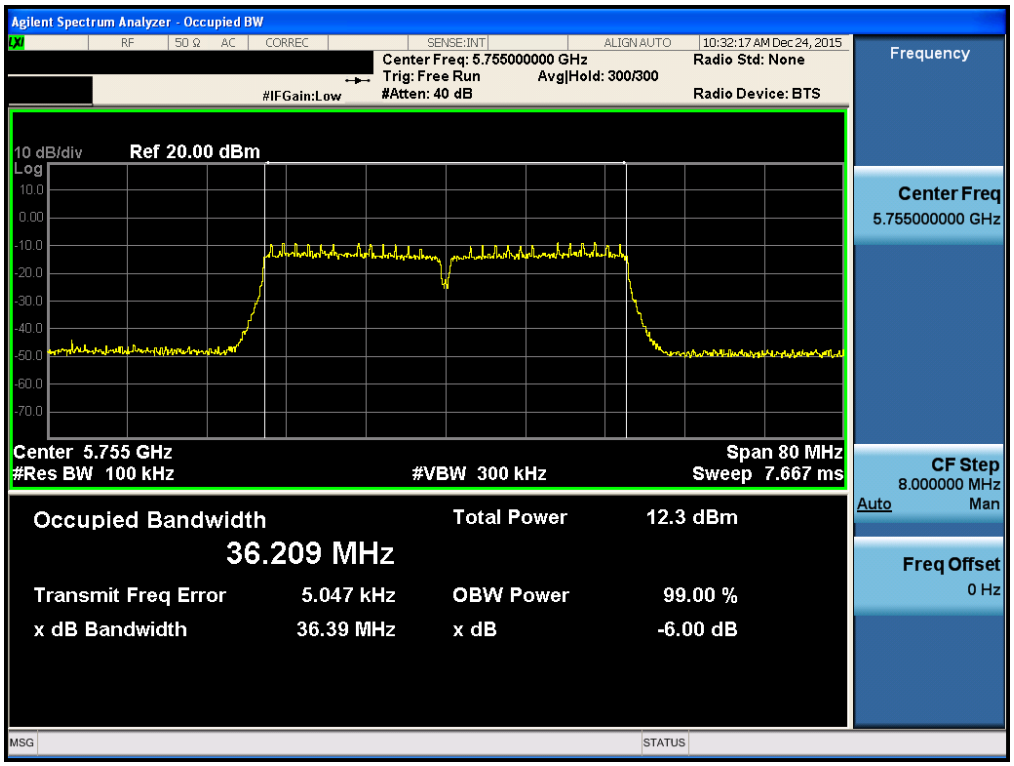
Test Mode: 802.11n(HT20) & Ch.157

6 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.165

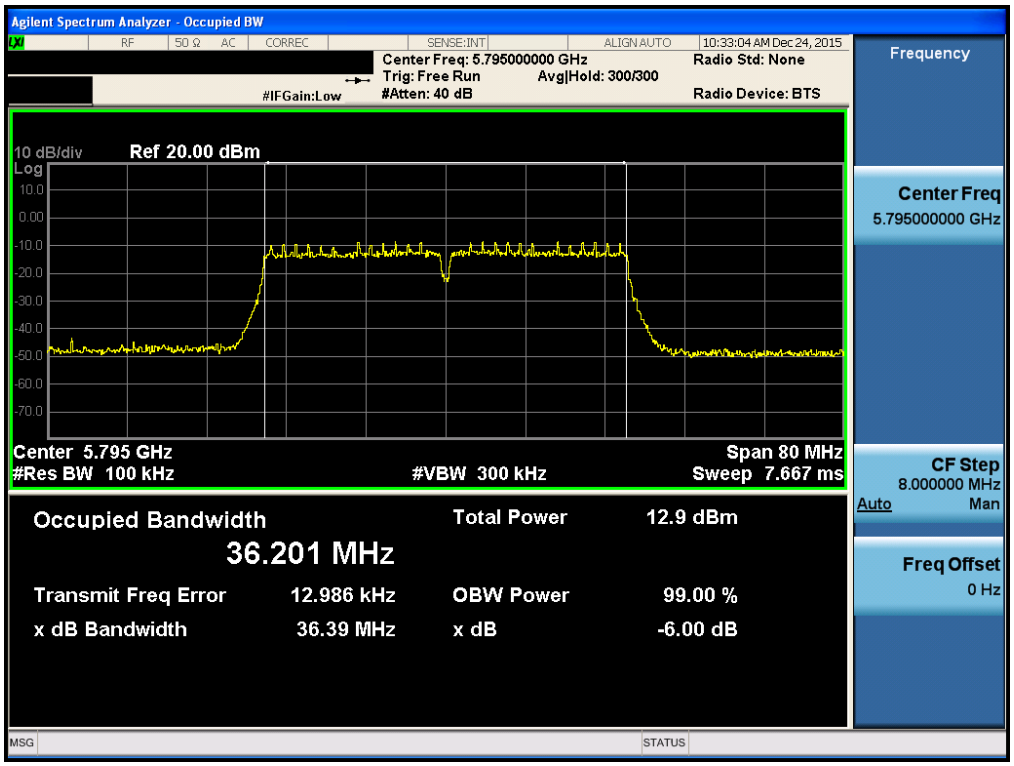
6 dB Bandwidth

Test Mode: 802.11n(HT40) & Ch.151



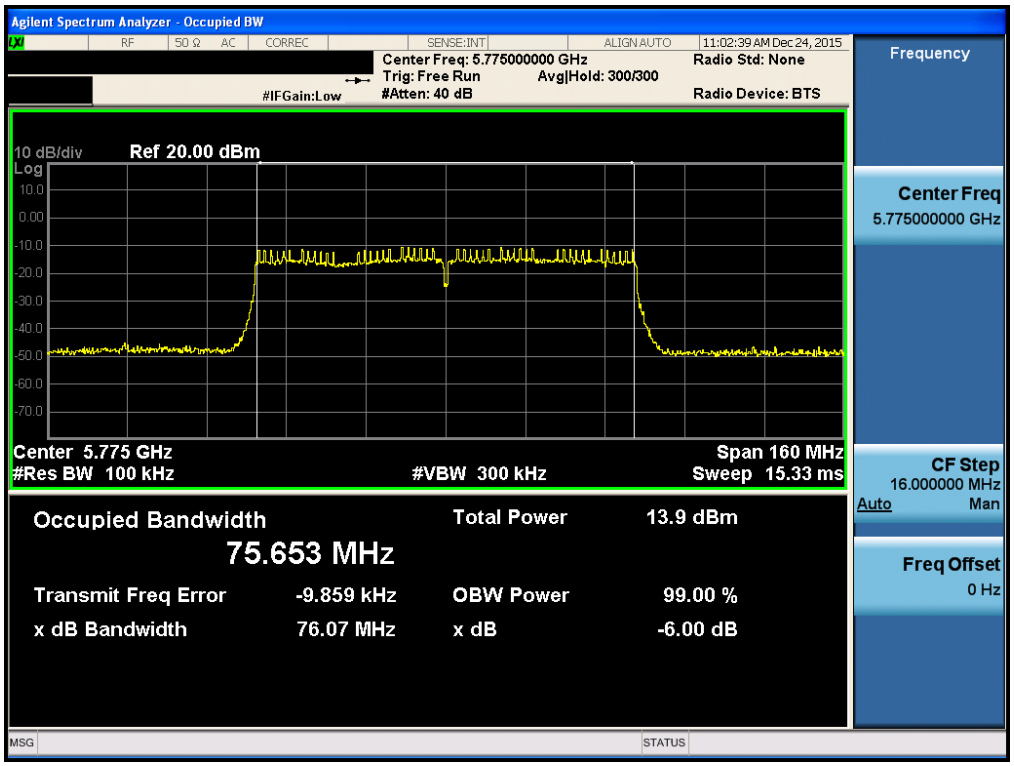
6 dB Bandwidth

Test Mode: 802.11n(HT40) & Ch.159



6 dB Bandwidth

Test Mode: 802.11ac(VHT80) & Ch.155

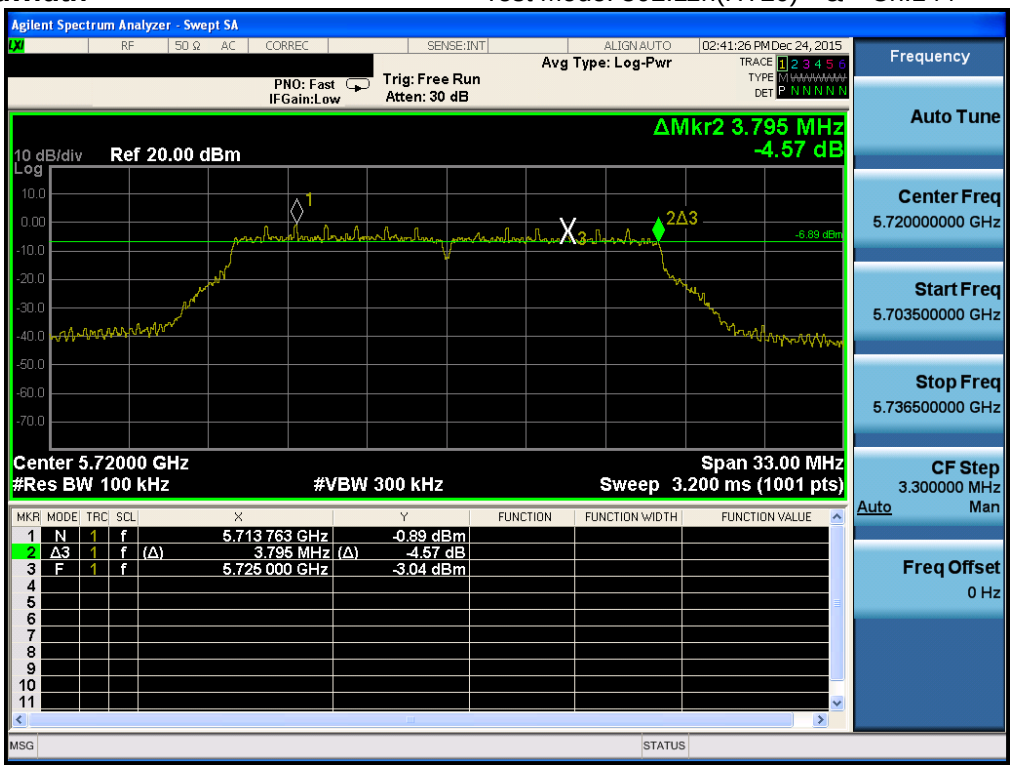


6 dB Bandwidth

Test Mode: 802.11a & Ch.144

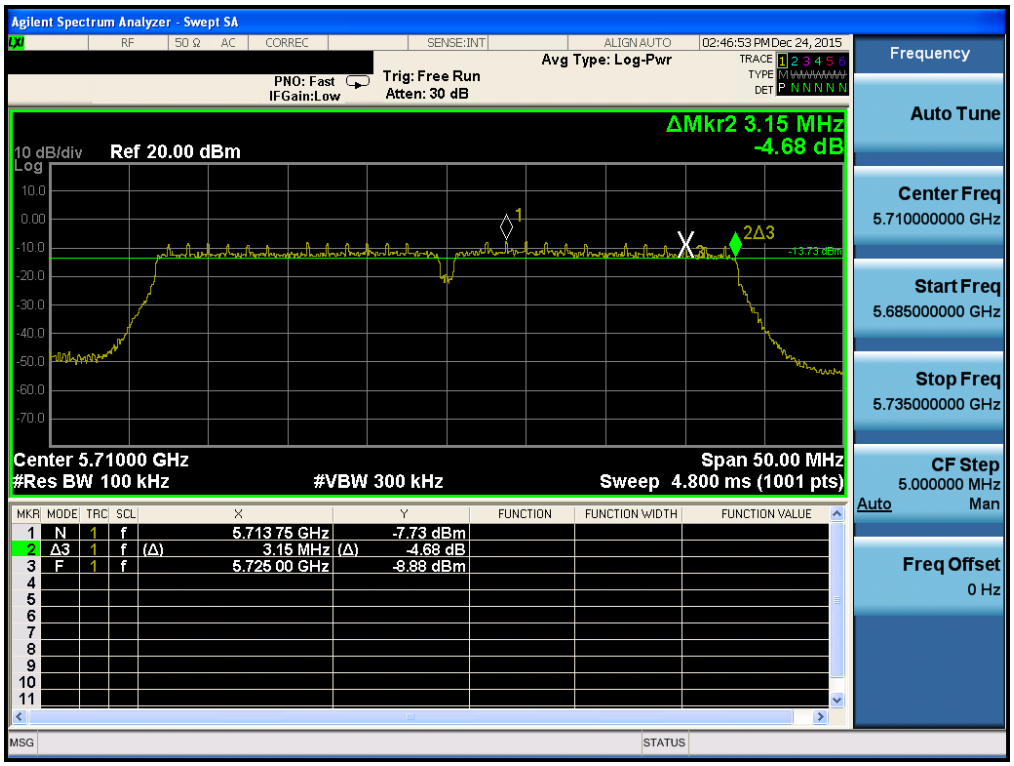
6 dB Bandwidth

Test Mode: 802.11n(HT20) & Ch.144



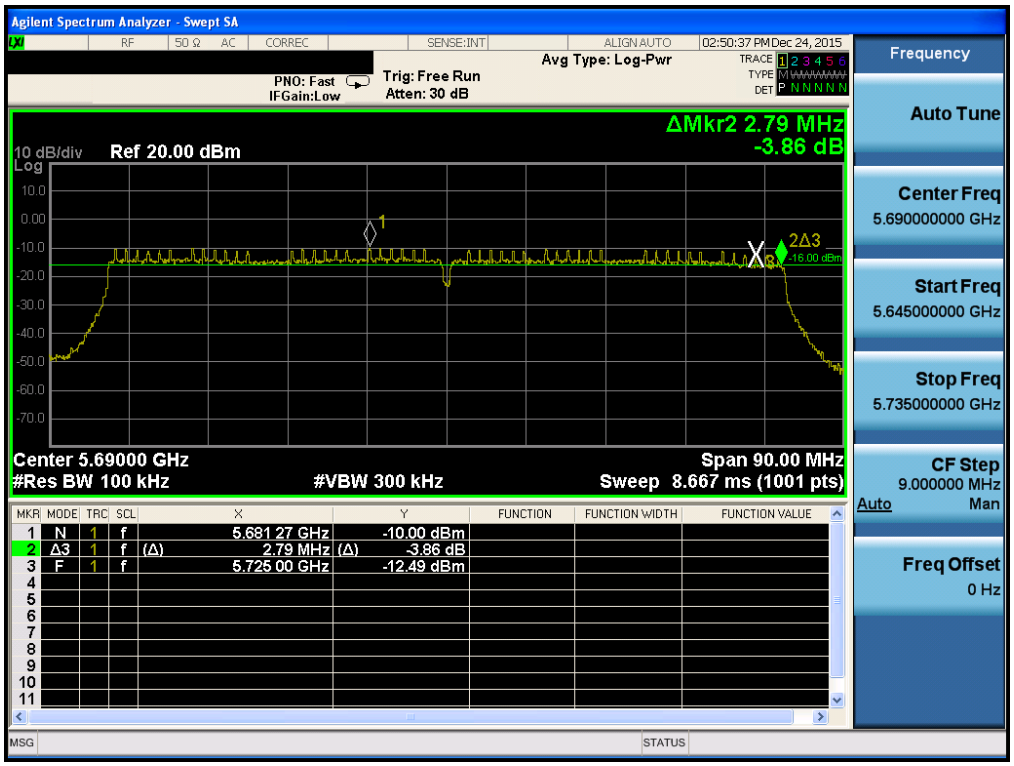
6 dB Bandwidth

Test Mode: 802.11n(HT40) & Ch.142



6 dB Bandwidth

Test Mode: 802.11ac(VHT80) & Ch.138



8.3 Maximum Conducted Output Power

▣ Test Requirements

Part. 15.407(a)

(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, the maximum conducted output power 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, the maximum conducted output power 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. 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 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, the maximum conducted output power 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, the maximum conducted output power 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, the maximum conducted output power 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(FCC)

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 1	802.11a	250	**23.97**	**3.00**	**23.97**
	802.11n(HT20)				
	802.11n(HT40)				
	802.11ac(VHT80)				

Bands	Mode	Power Limit [mW] / Least 26 dBc BW [MHz]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 2A	802.11a	250	**23.97**	**3.00**	**23.97**
		21.70	24.36		
	802.11n(HT20)	250	**23.97**		**23.97**
		21.80	24.38		
	802.11n(HT40)	250	**23.97**		**23.97**
		39.96	27.01		
	802.11ac(VHT80)	250	**23.97**		**23.97**
		81.56	30.11		
U-NII 2C	802.11a	250	**23.97**	**-1.84**	**23.97**
		21.64	24.35		
	802.11n(HT20)	250	**23.97**		**23.97**
		21.80	24.38		
	802.11n(HT40)	250	**23.97**		**23.97**
		39.92	27.01		
	802.11ac(VHT80)	250	**23.97**		**23.97**
		81.72	30.12		
U-NII 2C (band-crossing channels)	802.11a	250	23.97	**-1.84**	**22.99**
		15.84	**22.99**		
	802.11n(HT20)	250	23.97		**22.99**
		15.84	**22.99**		
	802.11n(HT40)	250	**23.97**		**23.97**
		35.25	26.47		
	802.11ac(VHT80)	250	**23.97**		**23.97**
		76.14	29.81		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 3	802.11a	1000	**30.00**	**-1.03**	**30.00**
	802.11n(HT20)				
	802.11n(HT40)				
	802.11ac(VHT80)				

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(1) For band 5150 - 5250 MHz
The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

(2) For band 5250 - 5350 MHz
The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

(3) For band 5470 - 5600 MHz and 5650 - 5725 MHz
The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99 % emission bandwidth in MHz.

(4) For band 5725 - 5850 MHz
The maximum conducted output power shall not exceed 1 W.

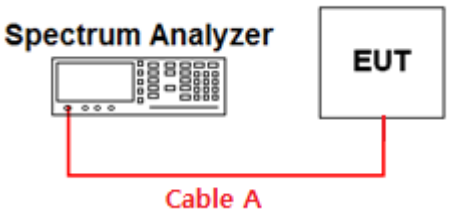
- Output power Limit Calculation(IC)

Bands	Mode	Power Limit [mW] / Least 99% BW [MHz]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
1	802.11a	200	23.01	3.00	22.29
		16.96	**22.29**		
	802.11n(HT20)	200	23.01		22.56
		18.03	**22.56**		
	802.11n(HT40)	200	**23.01**		23.01
		36.35	25.61		
	802.11ac(VHT80)	200	**23.01**		23.01
		75.76	28.79		
2	802.11a	250	23.97	3.00	23.30
		16.99	**23.30**		
	802.11n(HT20)	250	23.97		23.56
		18.05	**23.56**		
	802.11n(HT40)	250	**23.97**		23.97
		36.39	26.61		
	802.11ac(VHT80)	250	**23.97**		23.97
		75.75	29.79		
3	802.11a	250	23.97	-1.84	23.31
		17.03	**23.31**		
	802.11n(HT20)	250	23.97		23.57
		18.07	**23.57**		
	802.11n(HT40)	250	**23.97**		23.97
		36.35	26.61		
	802.11ac(VHT80)	250	**23.97**		23.97
		75.79	29.80		

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
4	802.11a	1000	**30.00**	**-1.03**	30.00
	802.11n(HT20)				
	802.11n(HT40)				
	802.11ac(VHT80)				

▣ Test Configuration

For band-crossing channels (CH 144, 142, 138)



Method SA-2

For other channels

Method PM-G

▣ Test Procedure

Method PM-G of KDB789033 D02 V01

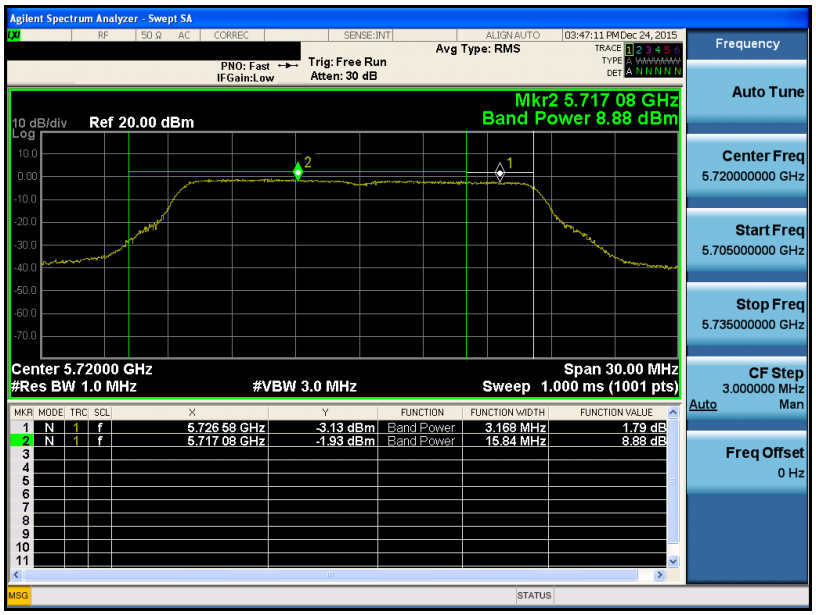
Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle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

Method SA-2 of KDB789033 D02 V01

1. Set span to encompass the emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set the VBW ≥ 3 x RBW.
4. Number of points in sweep ≥ 2 x Span / RBW.
5. Sweep time = auto.
6. Detector = RMS.
7. Trace average at least 100 traces in power averaging mode
8. Compute power by integrating the spectrum across the EBW of the signal.
9. Duty factor need added to measured value (duty cycle < 98 percent).

Note: The measure-and-sum technique is used for test mode with multiple transmitting.

▣ Description of test plot (U-NII 2C, 3 & Band-Crossing Channels)



Maker 2 Function Width (U-NII 2C Band): 26 dB BW (15.84 MHz)
Maker 2 Function Value (U-NII 2C Band): Output power (8.88 dBm)
Maker 1 Function Width (U-NII 3 Band): 6 dB BW (3.17 MHz)
Maker 1 Function Value (U-NII 3 Band): Output power (1.79 dBm)

▣ Test Results: Comply

Mode	Bands	Channel	Frequency [MHz]	Test Result [dBm]
802.11a	U-NII 1	36	5180	12.43
		40	5200	12.44
		48	5240	12.32
	U-NII 2A	52	5260	12.00
		60	5300	11.92
		64	5320	11.51
	U-NII 2C	100	5500	10.29
		116	5580	10.27
		140	5700	10.77
	U-NII 3	149	5745	10.24
		157	5785	10.28
		165	5825	10.93
802.11n (HT20)	U-NII 1	36	5180	12.40
		40	5200	12.44
		48	5240	12.51
	U-NII 2A	52	5260	12.29
		60	5300	12.08
		64	5320	11.85
	U-NII 2C	100	5500	10.21
		116	5580	10.21
		140	5700	10.85
	U-NII 3	149	5745	9.86
		157	5785	10.14
		165	5825	10.69
802.11n (HT40)	U-NII 1	38	5190	7.92
		46	5230	7.88
	U-NII 2A	54	5270	8.93
		62	5310	8.89
	U-NII 2C	102	5510	6.60
		110	5550	6.66
		134	5670	7.06
	U-NII 3	151	5755	6.32
		159	5795	7.00
802.11ac (VHT80)	U-NII 1	42	5210	7.65
	U-NII 2A	58	5290	8.93
	U-NII 2C	106	5530	7.06
	U-NII 3	155	5755	6.96

Band-Crossing Channels

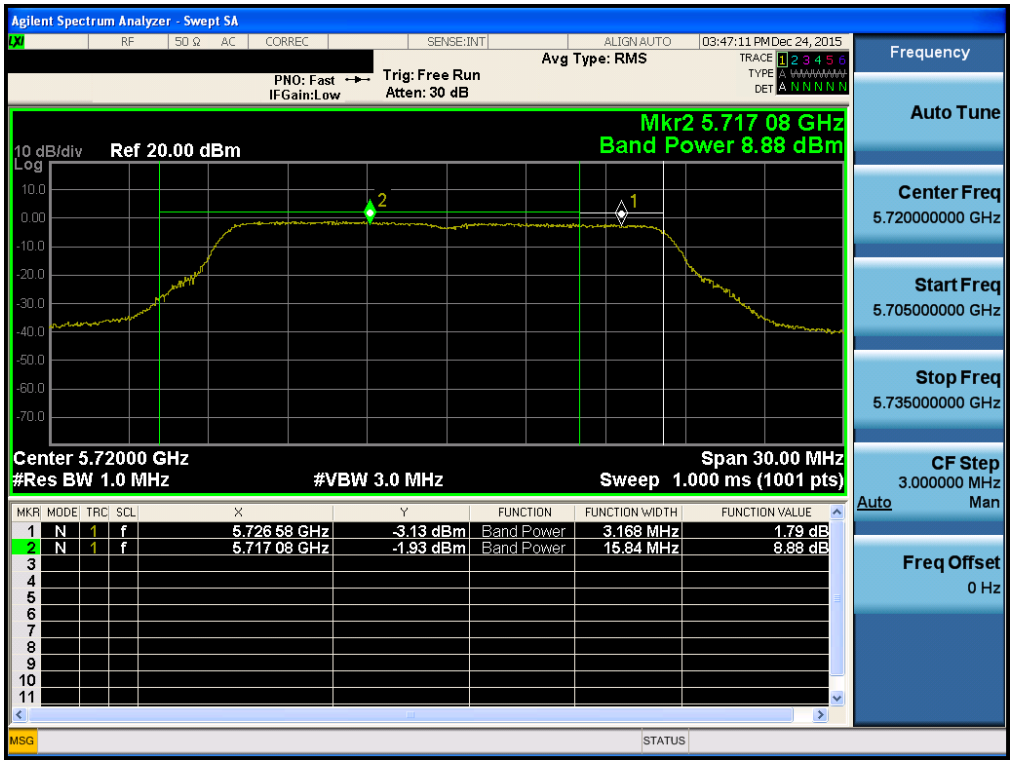
Mode		Channel	Frequency [MHz]	Reading [dBm]	D.C.F [dB] Note 1	Test Result [dBm]
802.11a	U-NII 2C	144	5720	8.88	0.32	9.20
	U-NII 3	144	5720	1.79		2.11
802.11n (HT20)	U-NII 2C	144	5720	8.54	0.32	8.86
	U-NII 3	144	5720	2.00		2.32
802.11n (HT40)	U-NII 2C	142	5710	4.47	0.66	5.13
	U-NII 3	142	5710	-6.78		-6.12
802.11ac (VHT80)	U-NII 2C	138	5690	5.05	1.20	6.25
	U-NII 3	138	5690	-10.87		-9.67

Note 1: D.C.F = 10 log(1/x) where x is the duty cycle.
Note 2: Test Result = Reading + D.C.F

▣ RESULT PLOTS(Band-Crossing Channels)

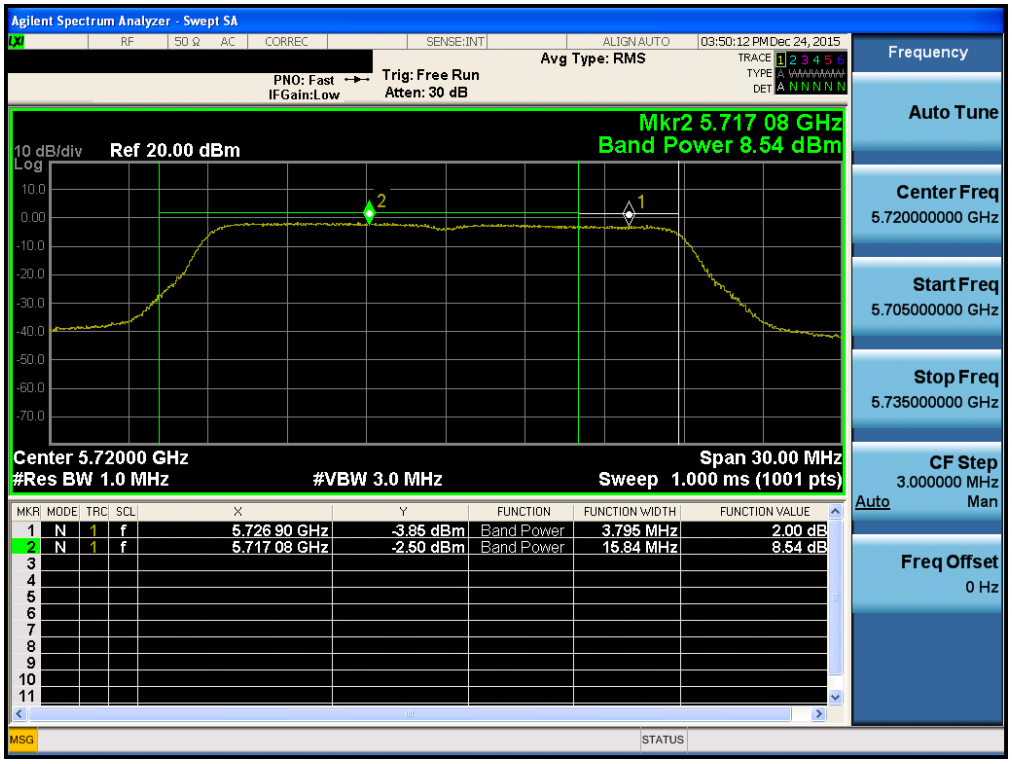
Maximum Output Power

Test Mode: 802.11a & Ch.144

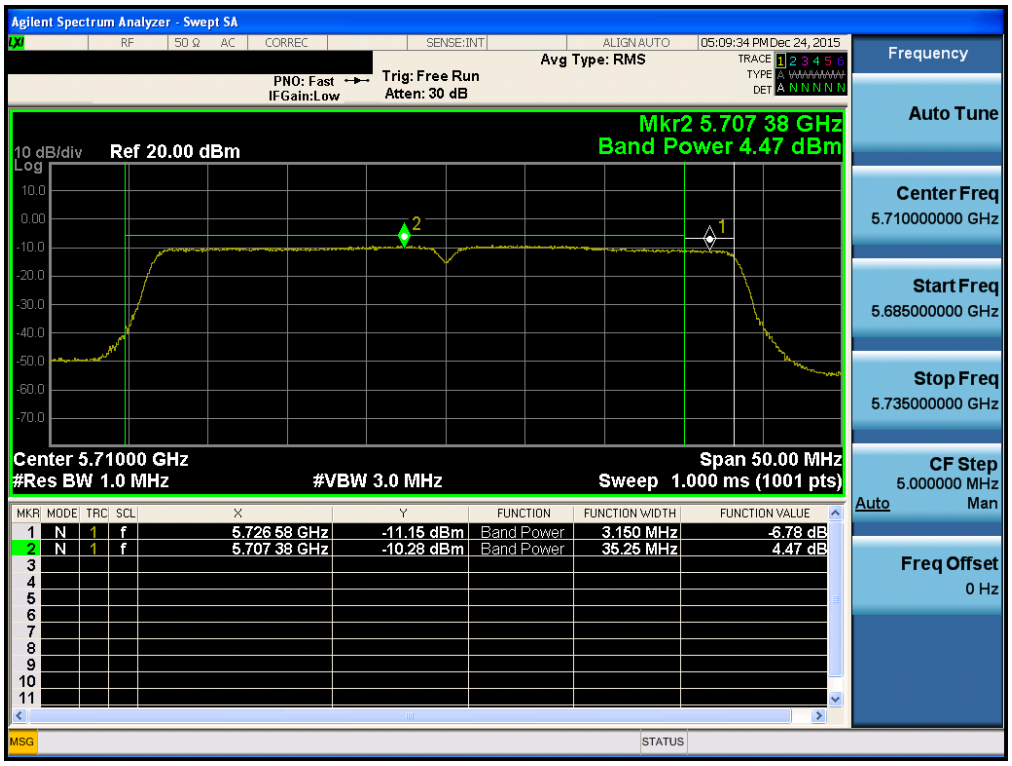


Maximum Output Power

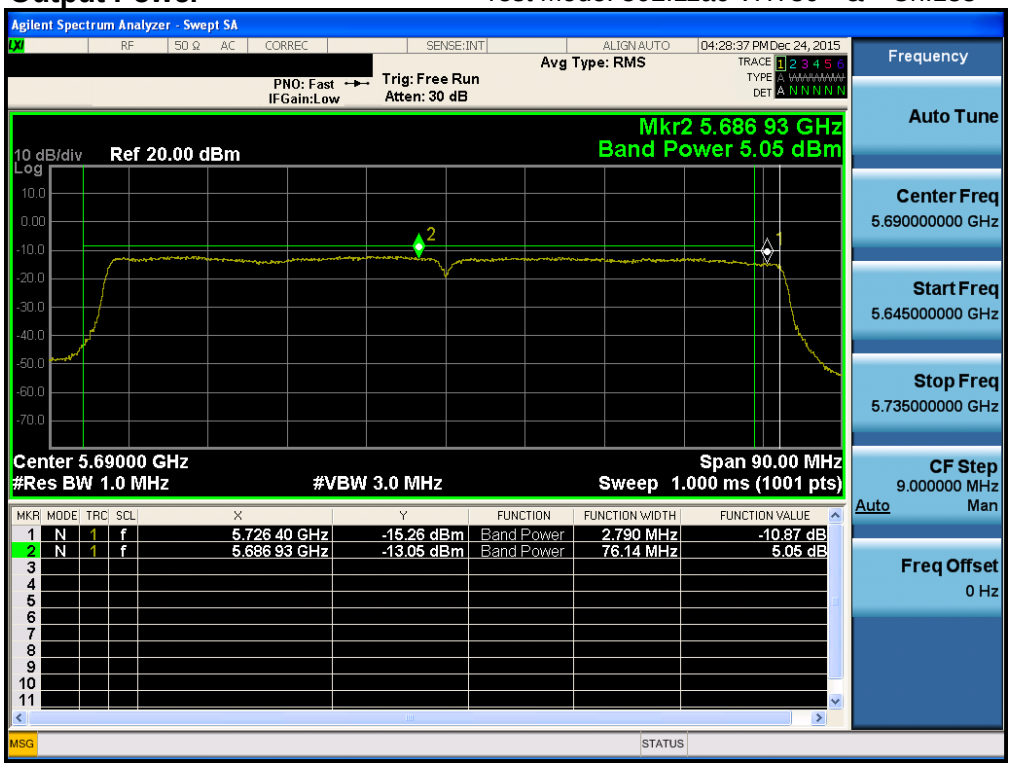
Test Mode: 802.11n HT20 & Ch.144



Maximum Output Power Test Mode: 802.11n HT40 & Ch.142



Maximum Output Power Test Mode: 802.11ac VHT80 & Ch.138



8.4 Maximum Power Spectral Density

▣ **Test requirements**

Part. 15.407(a)

(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 1 MHz 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 1 MHz 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 1 MHz 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(FCC)

Band	Limit [dBm]	Antenna Gain [dBi]	Determined Limit [dBm]
U-NII 1	11	3.00	11
U-NII 2A	11	3.00	11
U-NII 2C	11	-1.84	11
U-NII 3	30	-1.03	30

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(1) For band 5150 - 5250 MHz
The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) For band 5250 - 5350 MHz
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

(3) For band 5470 - 5600 MHz and 5650 - 5725 MHz
The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

(4) For band 5725 - 5850 MHz
The power spectral density shall not exceed 30 dBm in any 500 kHz band.

- Peak Power Spectral Density Limit Calculation(IC)

Band	Limit [dBm]	ANT Gain [dBi]	Determined Limit [dBm]
1	10	3.00	10
2	11	3.00	11
3	11	-1.84	11
4	30	-1.03	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.

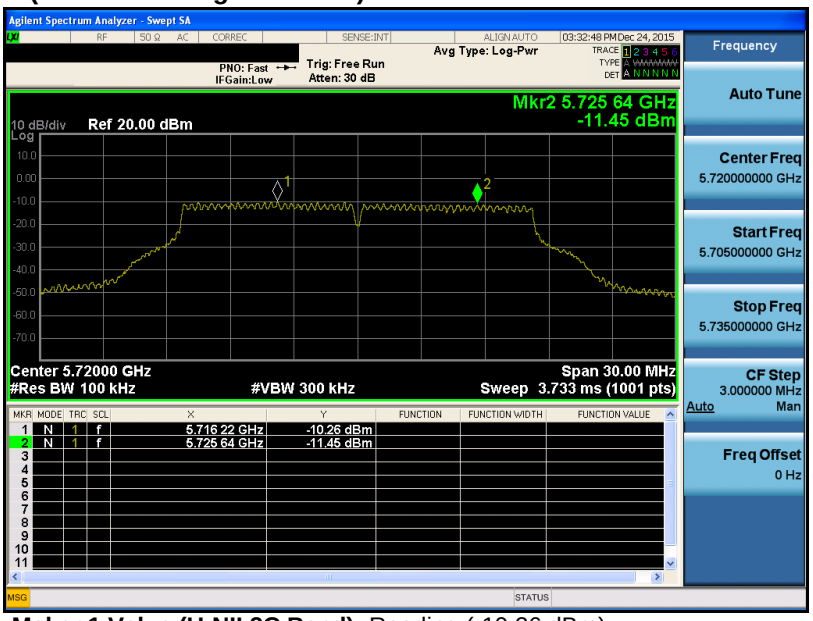
c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log(500 kHz / RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log(1 MHz / 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.

▣ **Description of test plot (Band-Crossing Channels)**



Maker 1 Value (U-NII 2C Band): Reading (-10.26 dBm)
Maker 2 Value (U-NII 3 Band): Reading(-11.45 dBm)

▣ **Test result: Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	T.F [dB] Note 1	Test Result [dBm]
802.11a	36	5180	-0.64	0.32	-0.32
	40	5200	-1.05		-0.73
	48	5240	-1.28		-0.96
	52	5260	-1.52		-1.20
	60	5300	-1.21		-0.89
	64	5320	-1.08		-0.76
	100	5500	-1.48		-1.16
	116	5580	-2.15		-1.83
	140	5700	-2.34		-2.02
	149	5745	-12.94	7.31	-5.63
	157	5785	-12.58		-5.27
	165	5825	-11.50		-4.19
802.11n (HT20)	36	5180	-0.90	0.32	-0.58
	40	5200	-1.48		-1.16
	48	5240	-1.59		-1.27
	52	5260	-1.87		-1.55
	60	5300	-1.62		-1.30
	64	5320	-1.79		-1.47
	100	5500	-1.74		-1.42
	116	5580	-2.54		-2.22
	140	5700	-2.27		-1.95
	149	5745	-13.25	7.31	-5.94
	157	5785	-13.27		-5.96
	165	5825	-12.12		-4.81
802.11n (HT40)	38	5190	-8.89	0.66	-8.23
	46	5230	-8.97		-8.31
	54	5270	-7.84		-7.18
	62	5310	-7.84		-7.18
	102	5510	-8.59		-7.93
	110	5550	-8.90		-8.24
	134	5670	-9.50		-8.84
	151	5755	-19.49	7.65	-11.84
	159	5795	-19.74		-12.09
802.11ac (VHT80)	42	5210	-11.96	1.20	-10.76
	58	5290	-10.91		-9.71
	106	5530	-11.34		-10.14
	155	5775	-21.53	8.19	-13.34

Note 1: "U-NII 1, 2A, 2C [T.F] = 10*LOG(1MHz/1MHz) + D.C.F"
"U-NII 3 [T.F] = 10*LOG(500kHz/100kHz) + D.C.F"
For D.C.F., please refer to appendix II.
Note 2: Test Result = Reading + T.F

Band-Crossing Channels

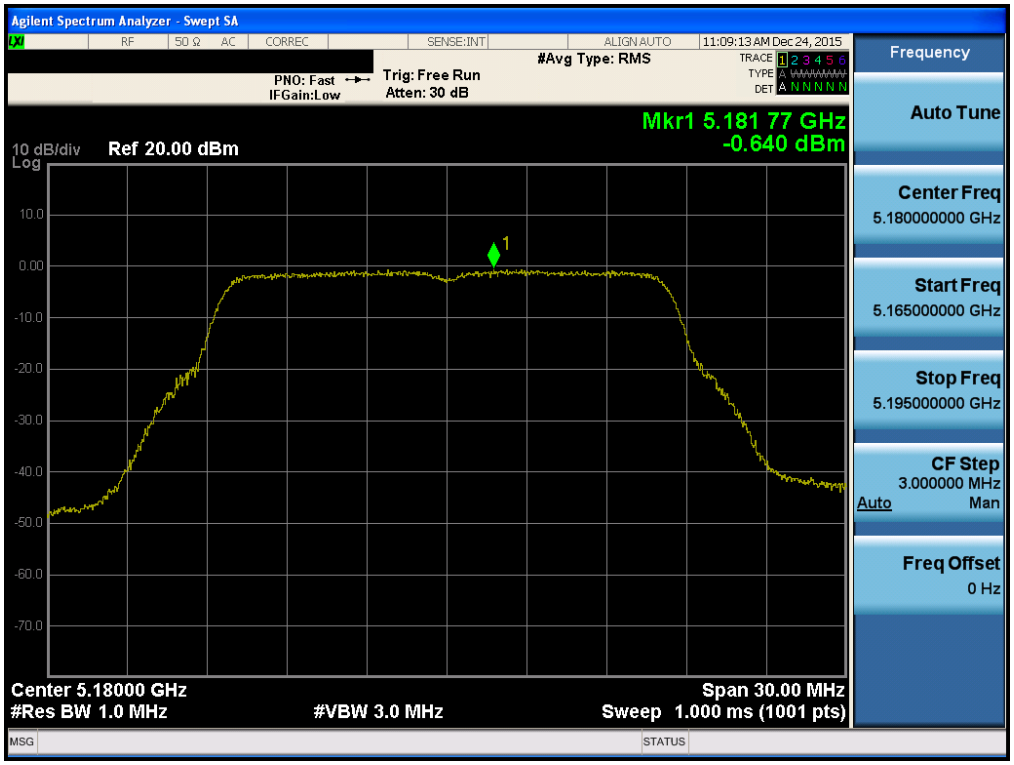
Mode		Channel	Frequency [MHz]	Reading [dBm]	T.F [dB] Note 1	Test Result [dBm]
802.11a	U-NII 2C	144	5720	-10.26	10.32	0.06
	U-NII 3	144	5720	-11.45	7.31	-4.14
802.11n (HT20)	U-NII 2C	144	5720	-10.44	10.32	-0.12
	U-NII 3	144	5720	-11.95	7.31	-4.64
802.11n (HT40)	U-NII 2C	142	5710	-19.45	10.66	-8.79
	U-NII 3	142	5710	-19.60	7.65	-11.95
802.11ac (VHT80)	U-NII 2C	138	5690	-21.59	11.20	-10.39
	U-NII 3	138	5690	-23.96	8.19	-15.77

Note 1: "U-NII 1, 2A, 2C [T.F] = 10*LOG(1MHz/100kHz) + D.C.F"
"U-NII 3 [T.F] = 10*LOG(500kHz/100kHz) + D.C.F"
For D.C.F., please refer to appendix II.
Note 2: Test Result = Reading + T.F

▣ RESULT PLOTS

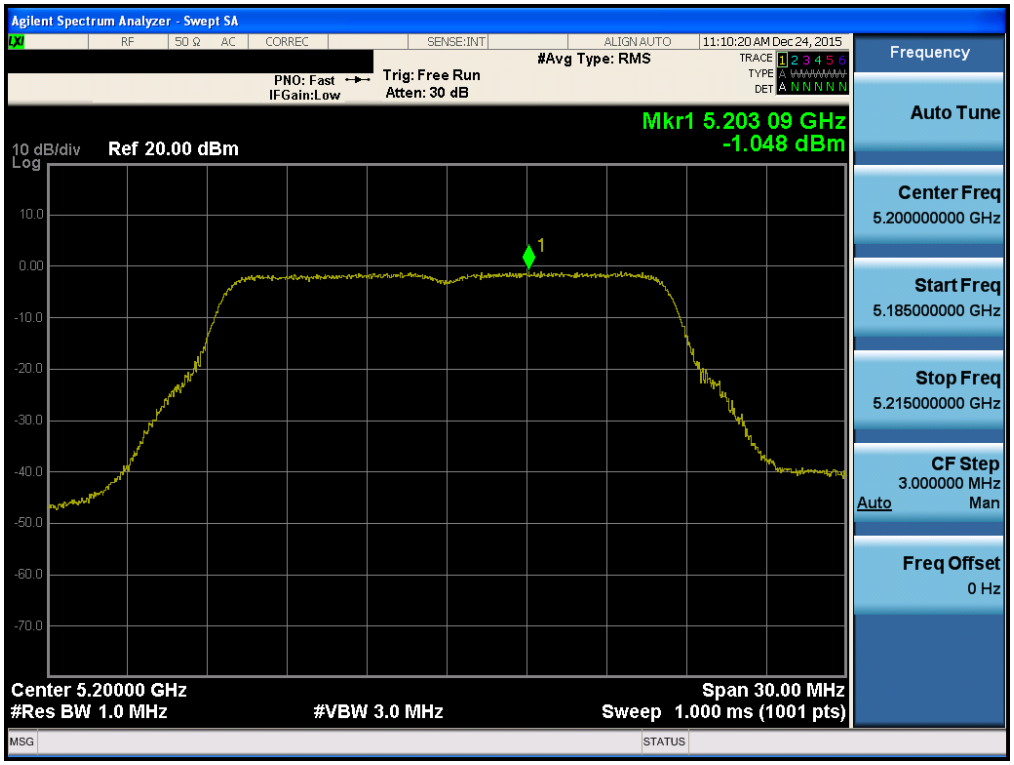
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.36



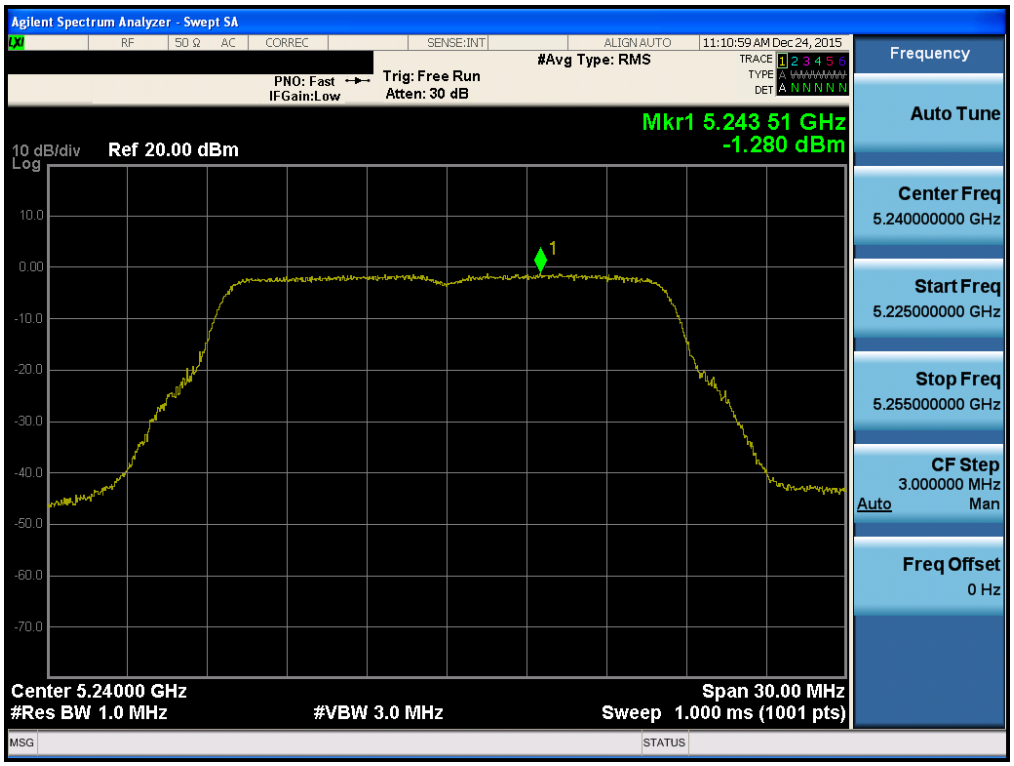
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.40



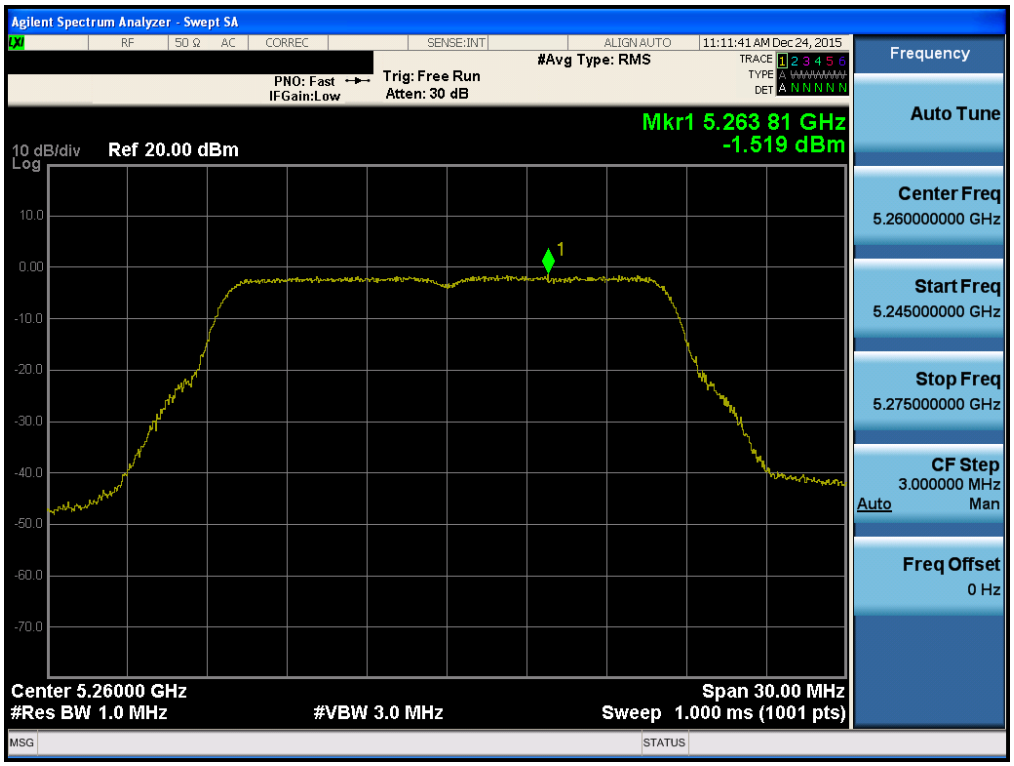
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.48



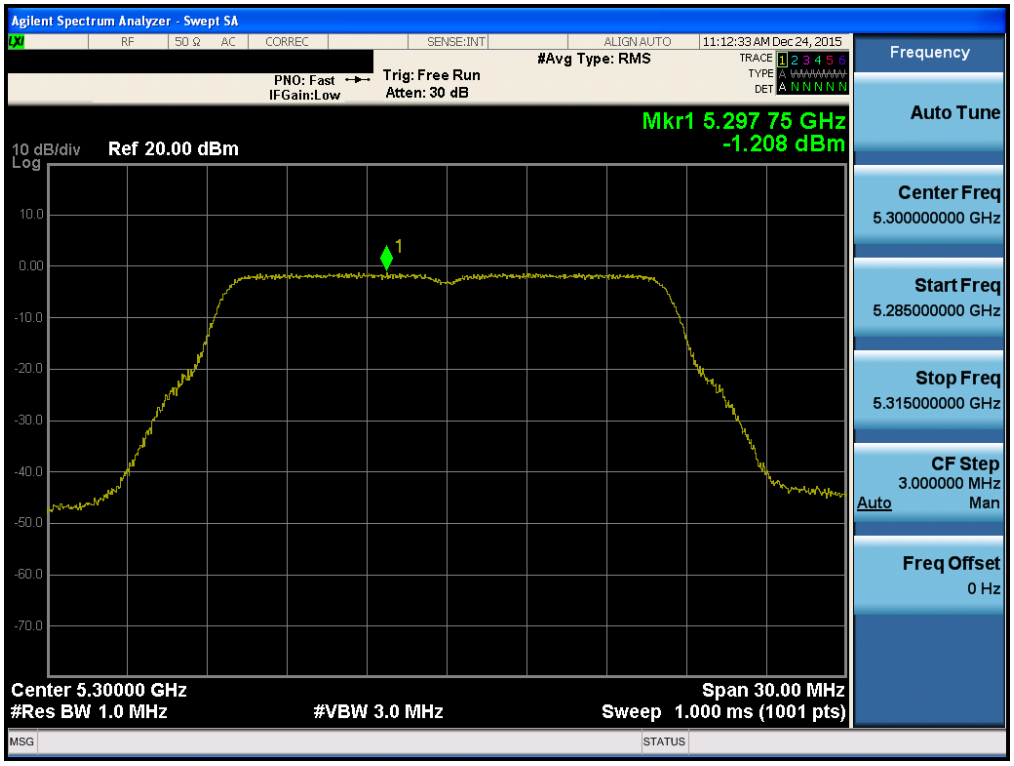
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.52



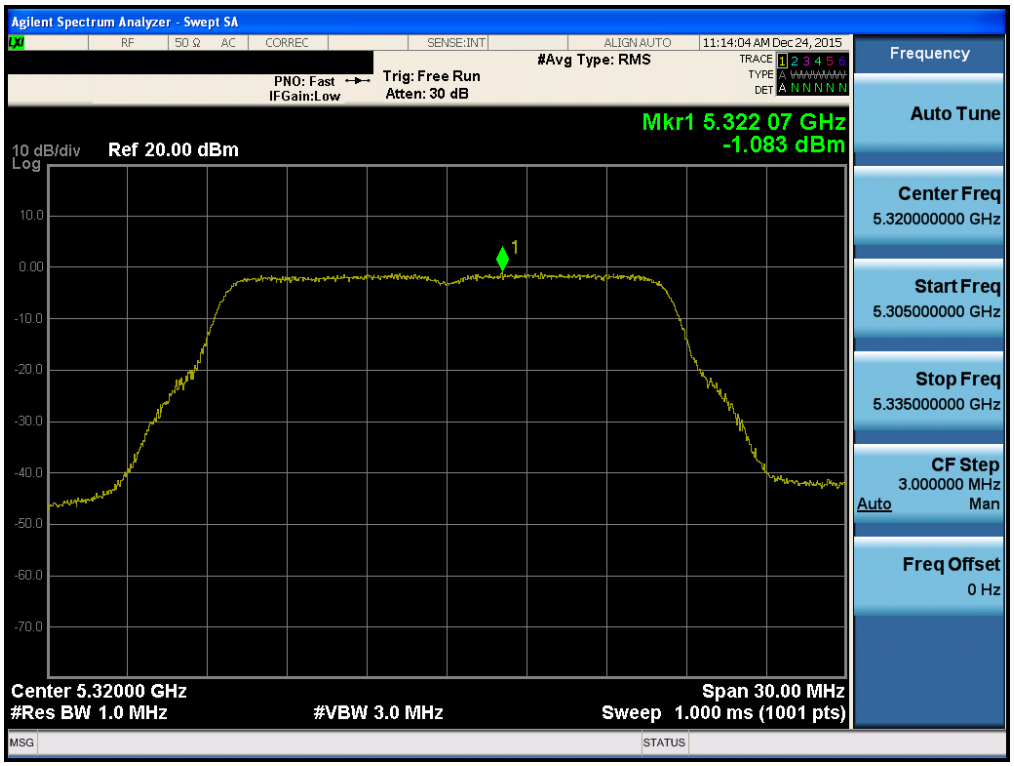
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.60



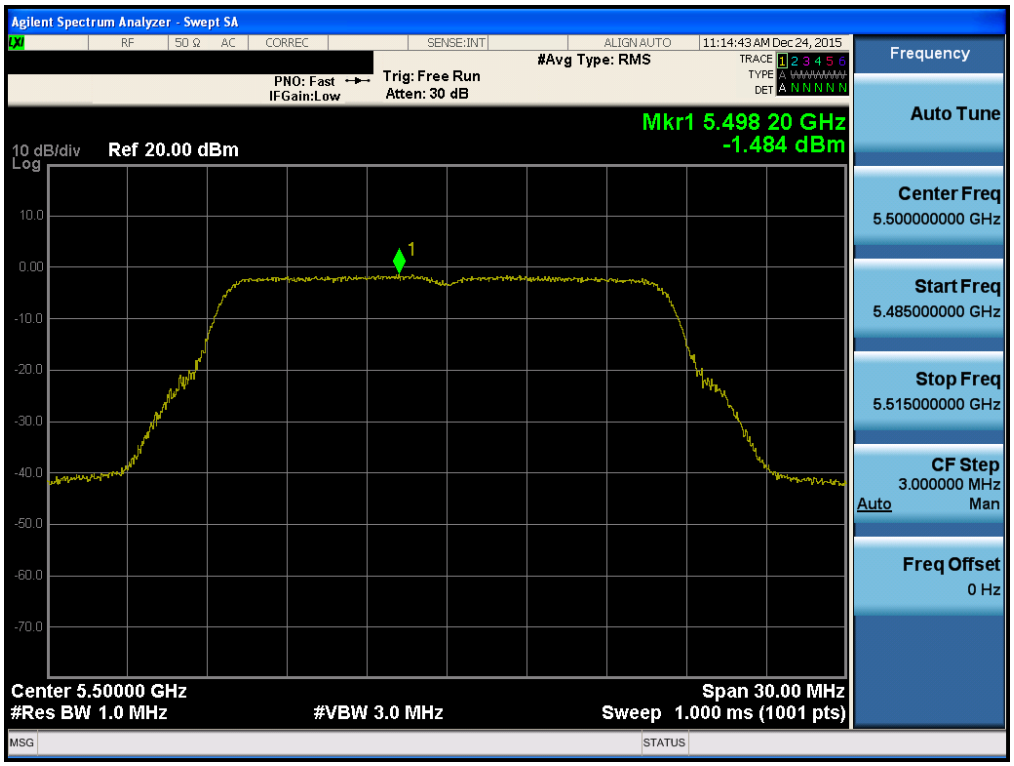
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.64



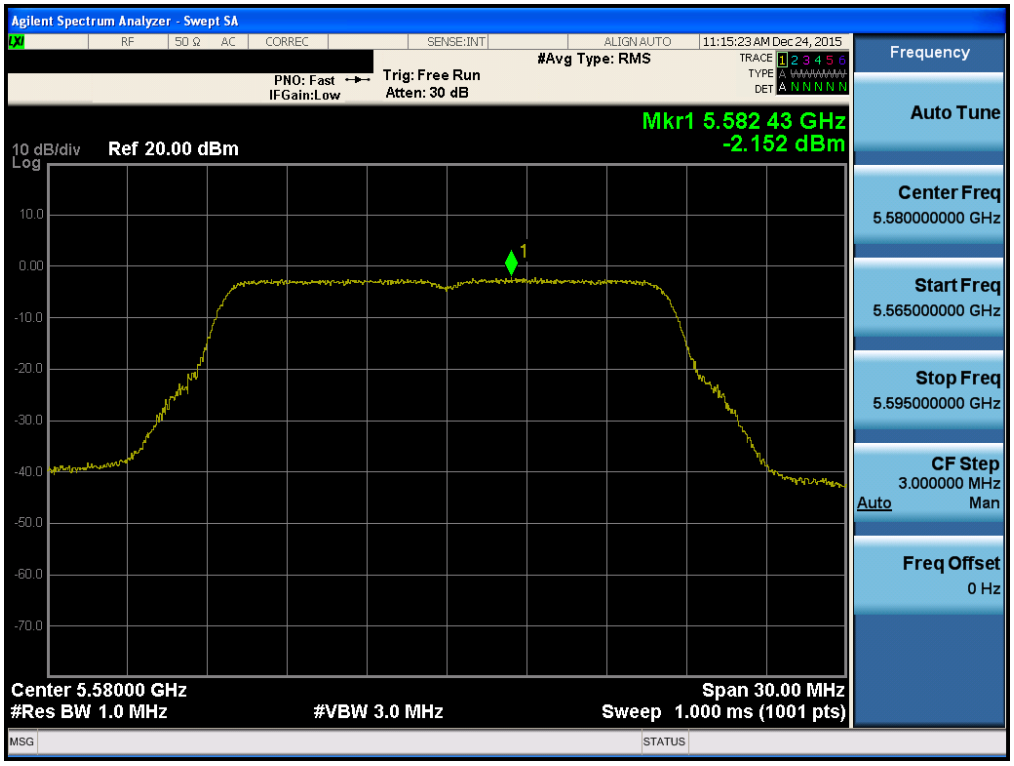
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.100



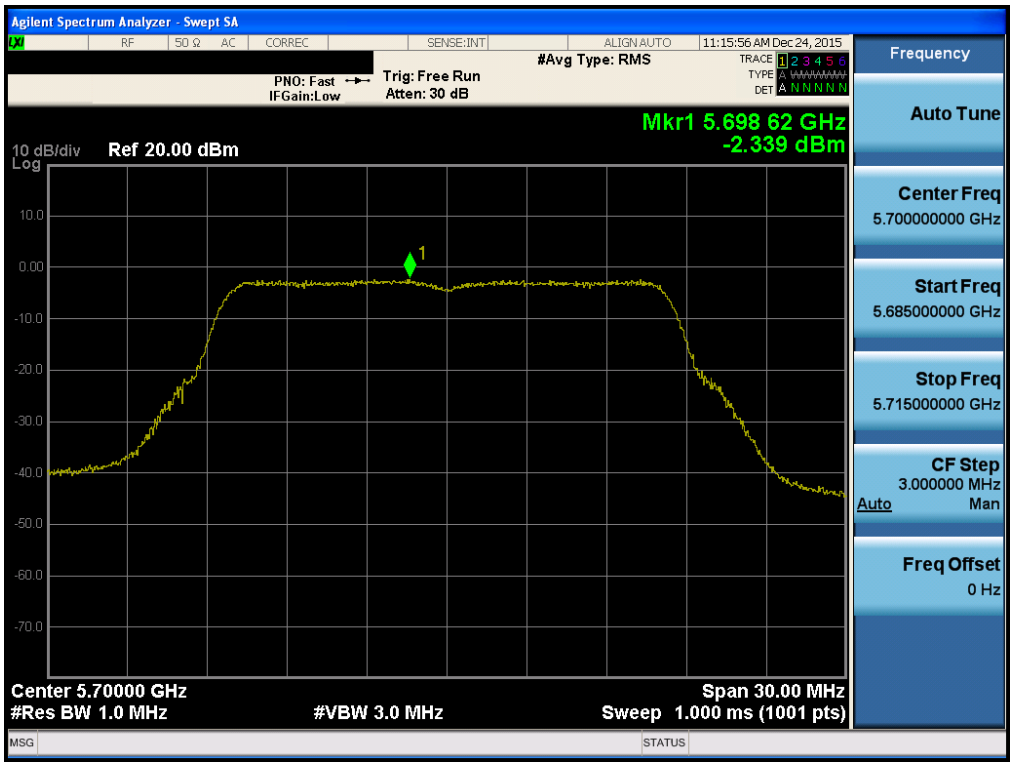
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.116



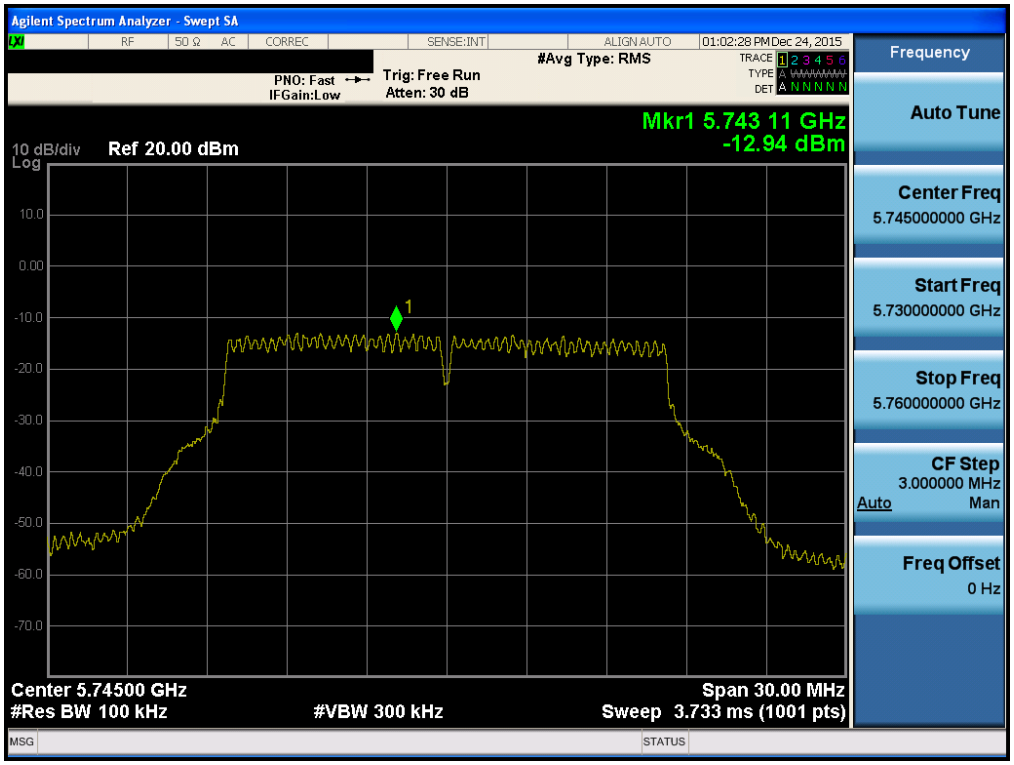
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.140



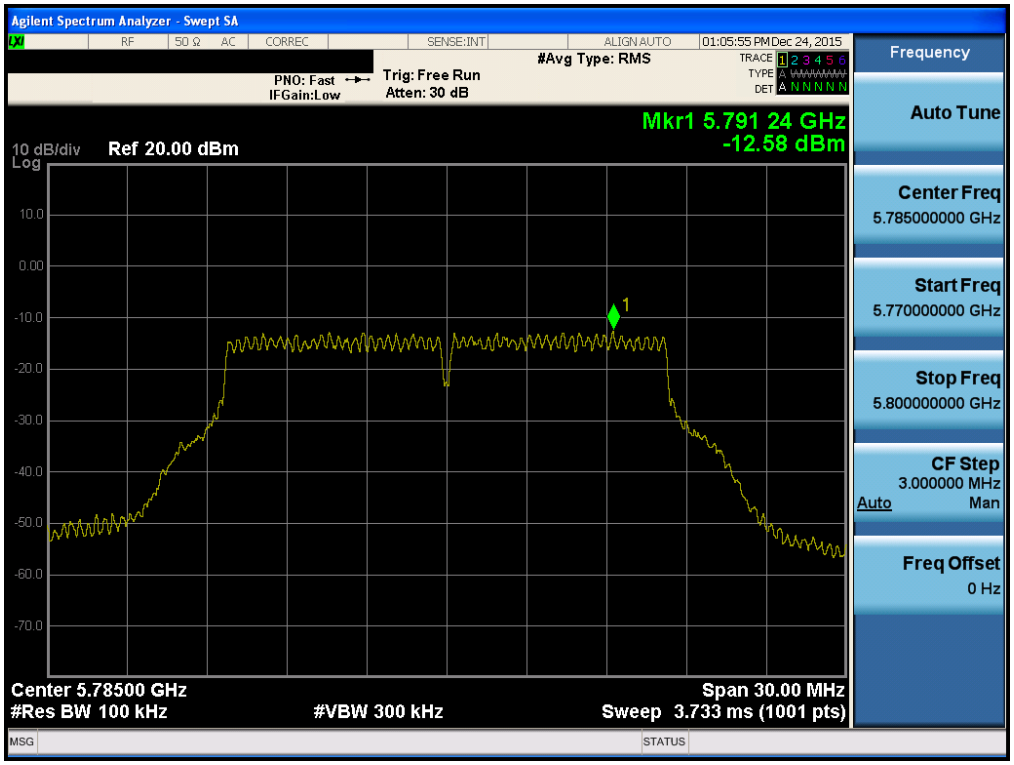
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.149



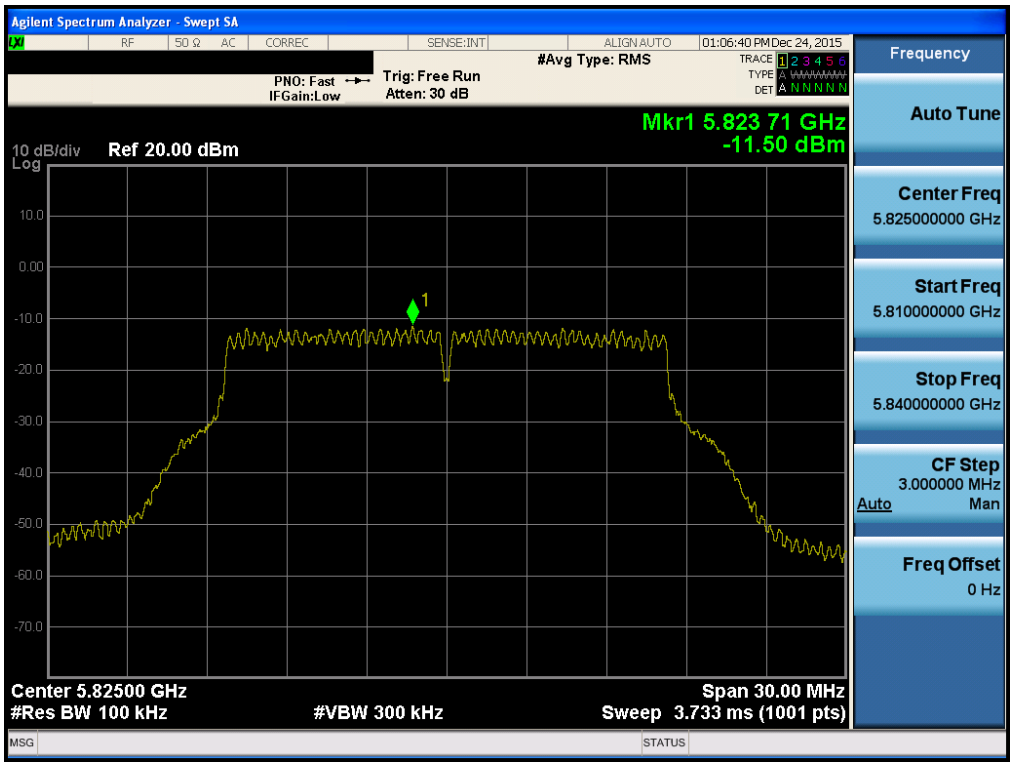
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.157



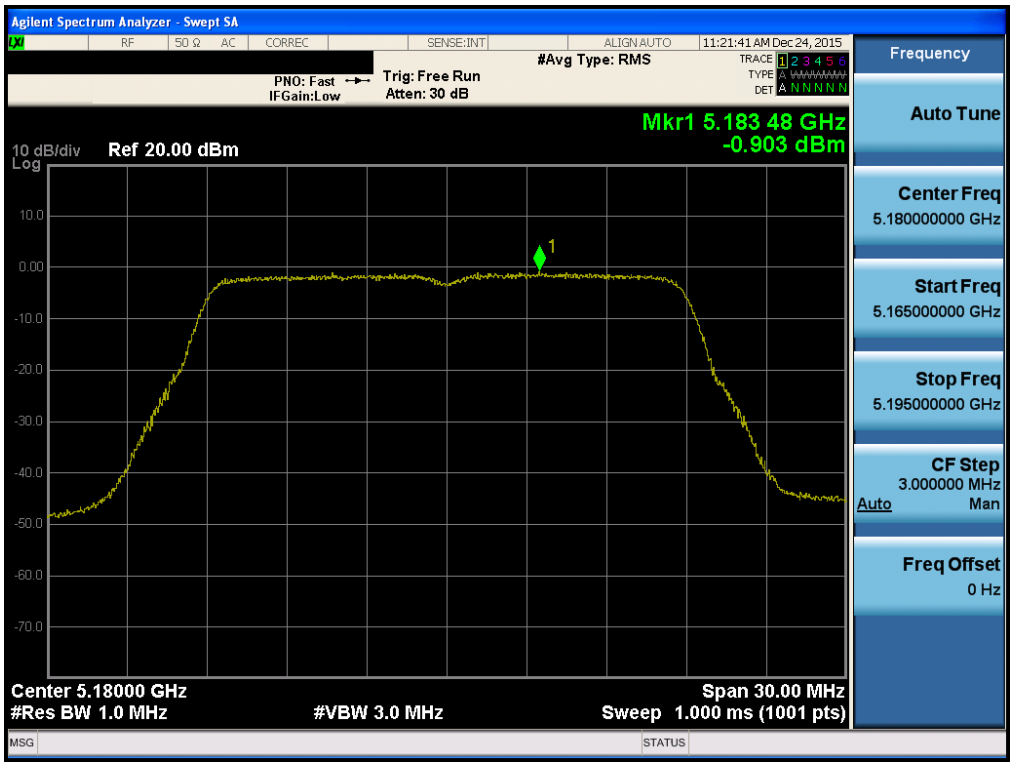
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.165



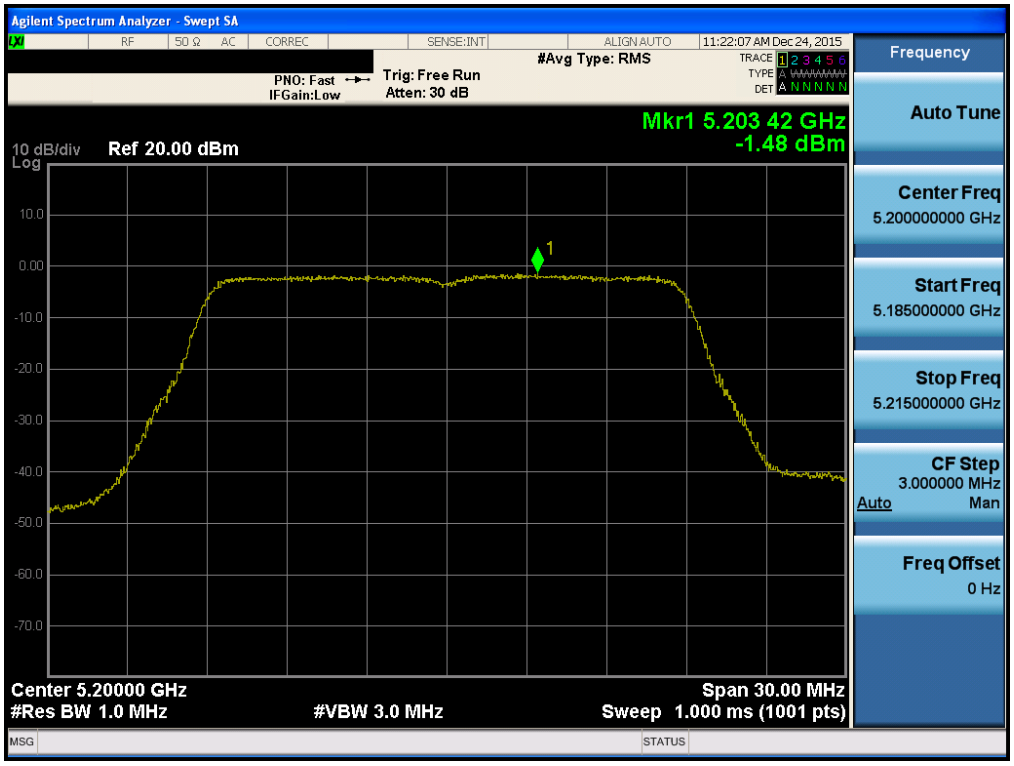
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.36



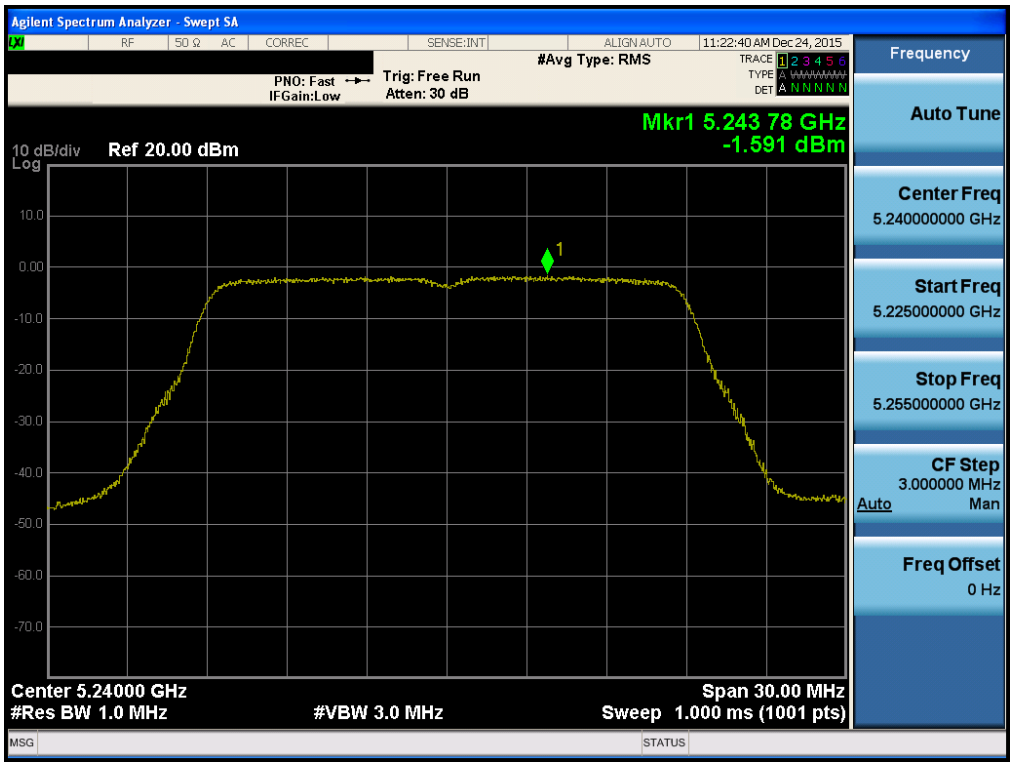
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.40



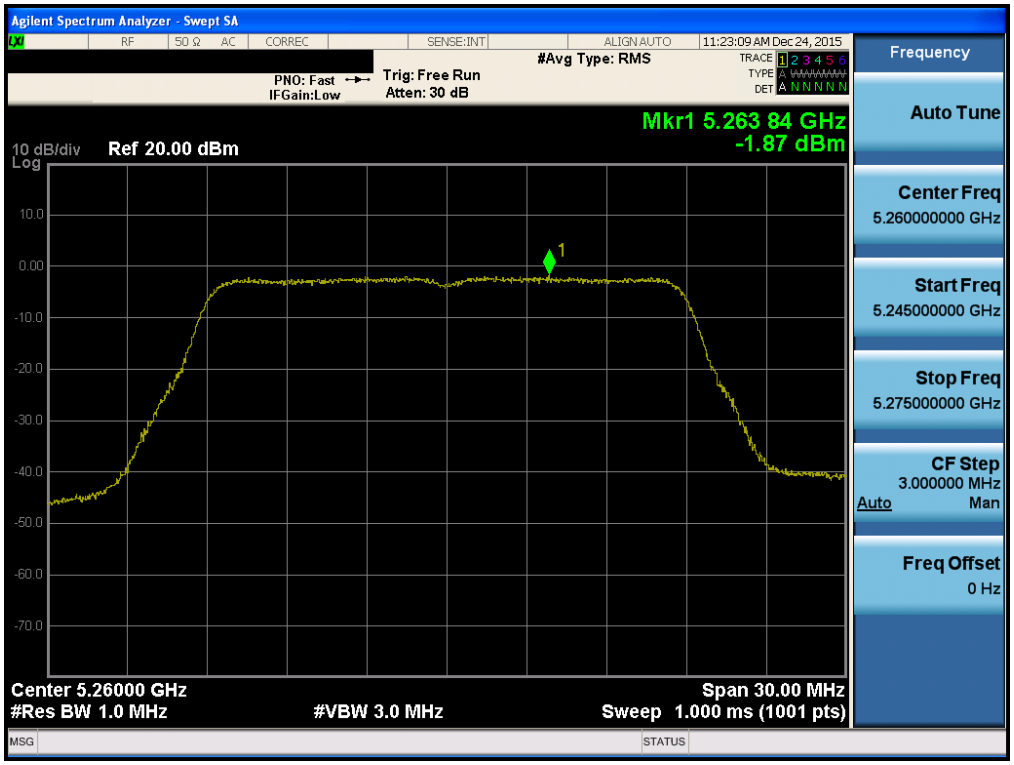
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.48



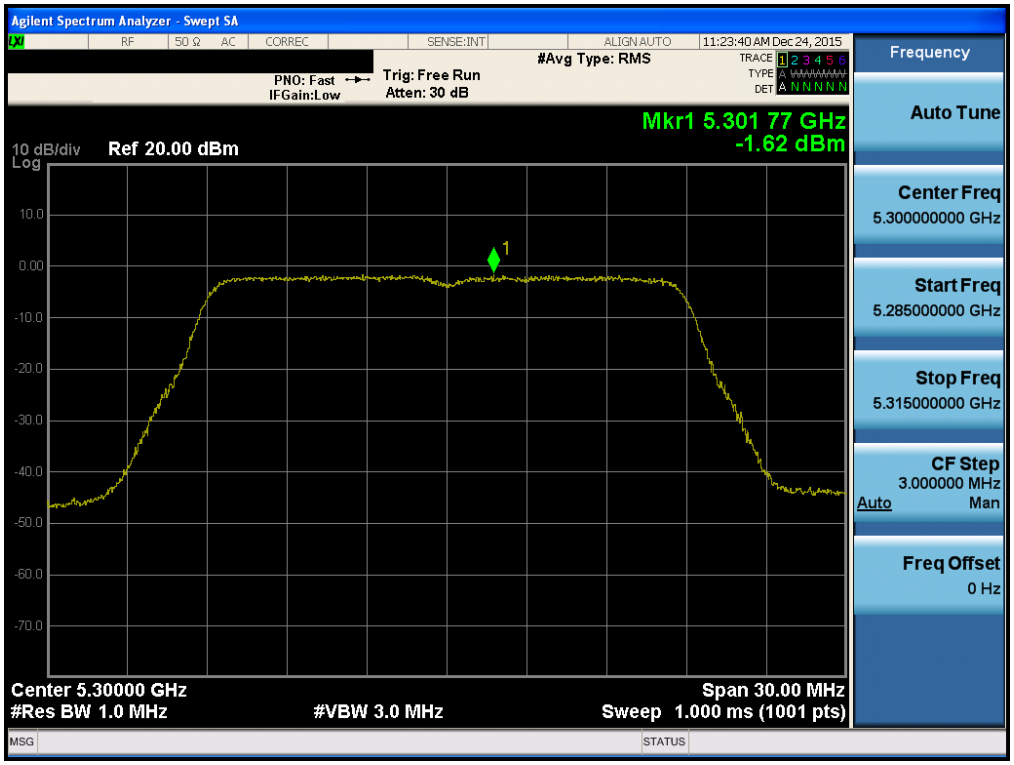
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.52



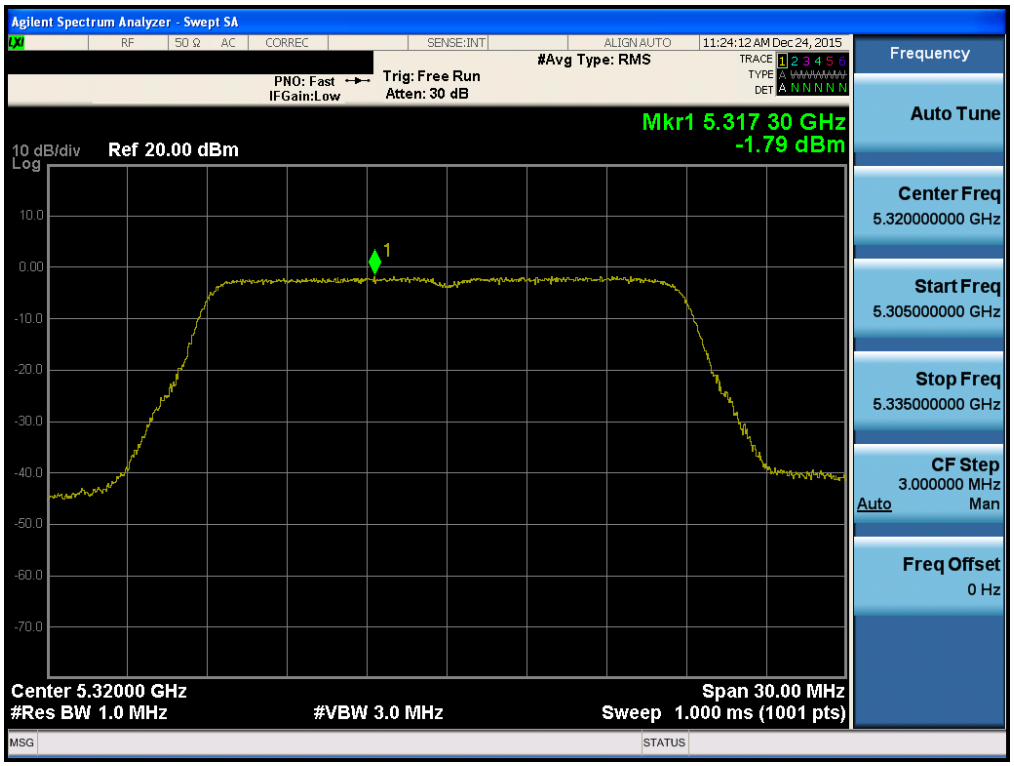
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.60



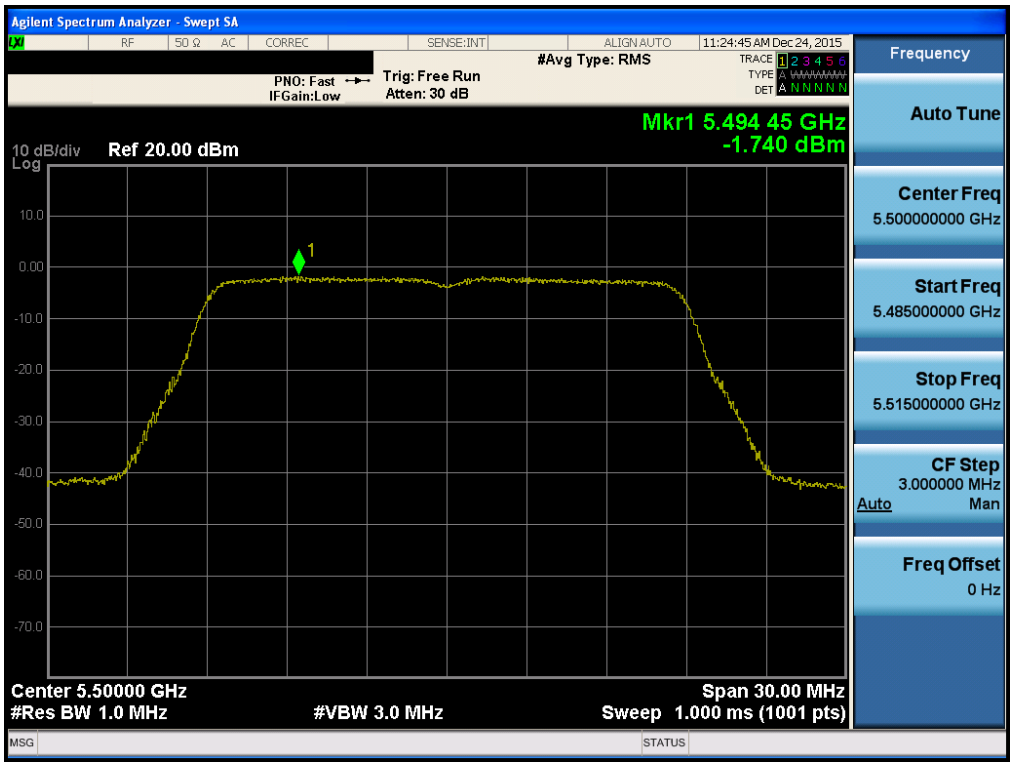
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.64



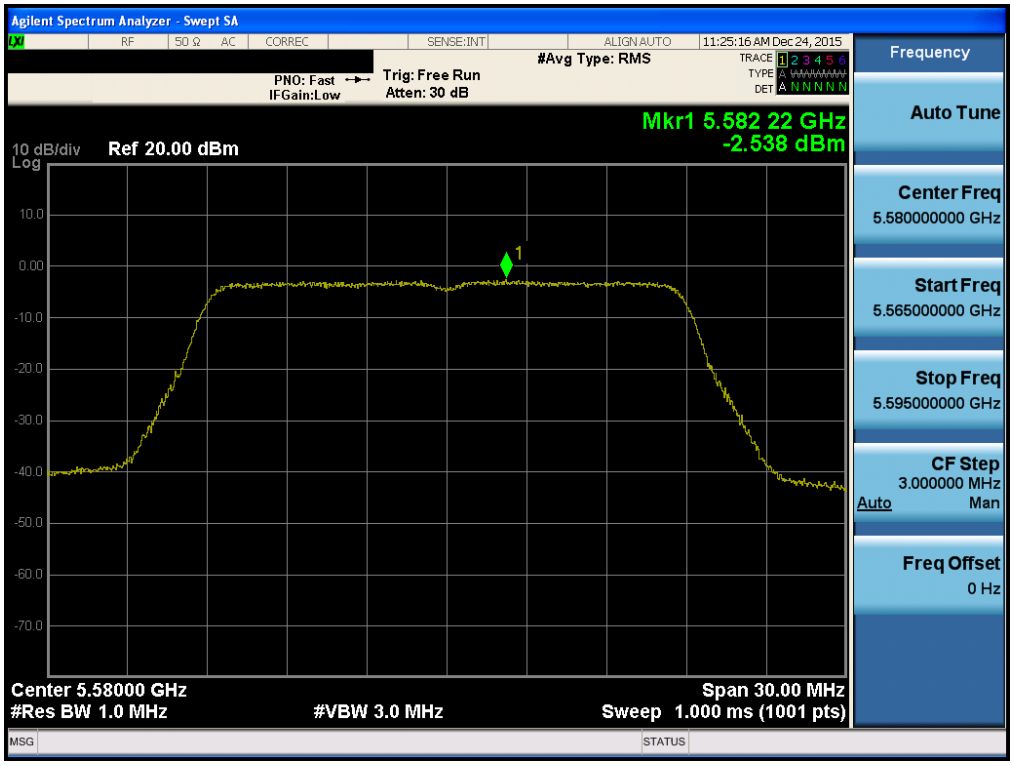
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.100



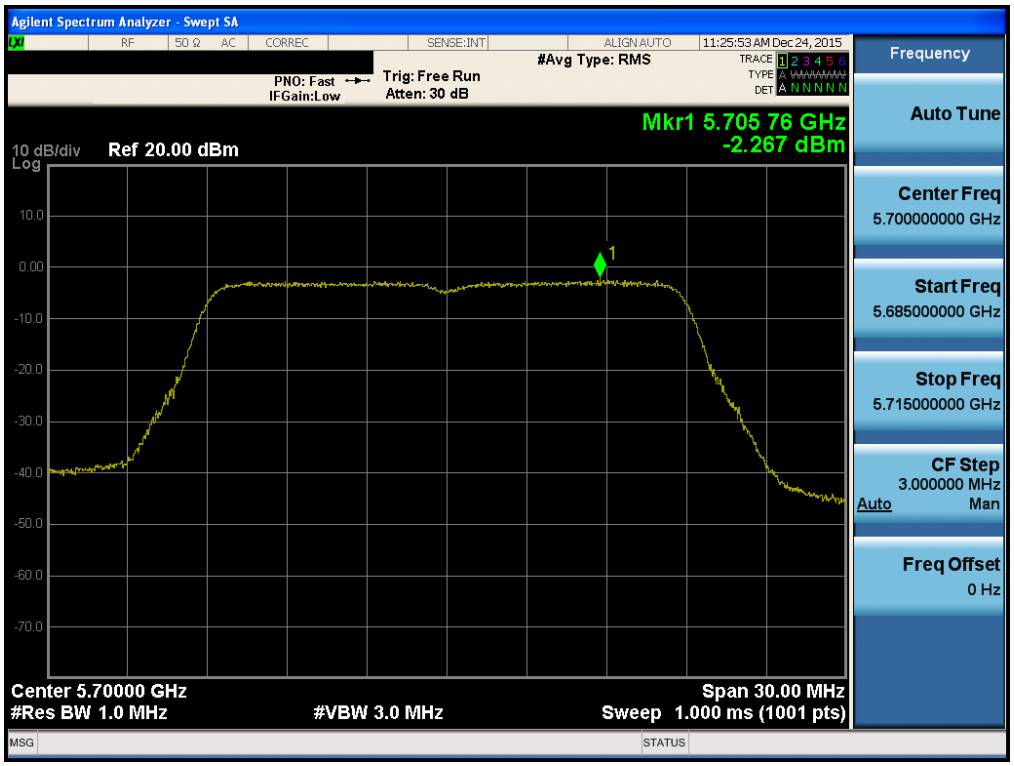
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.116



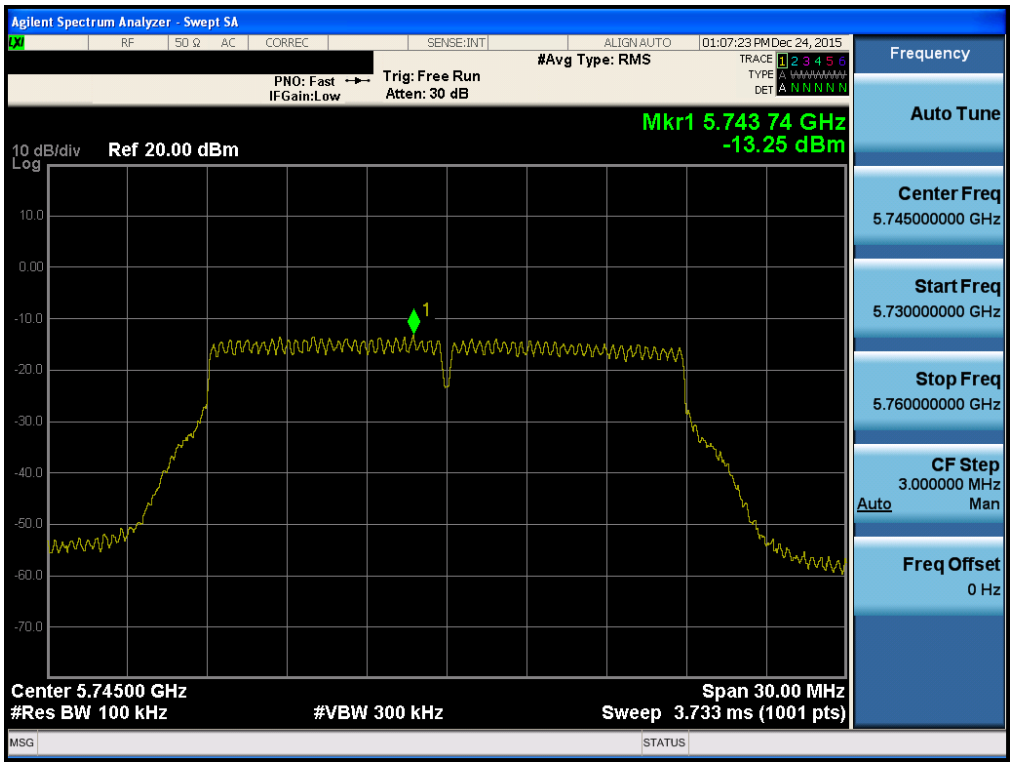
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.140



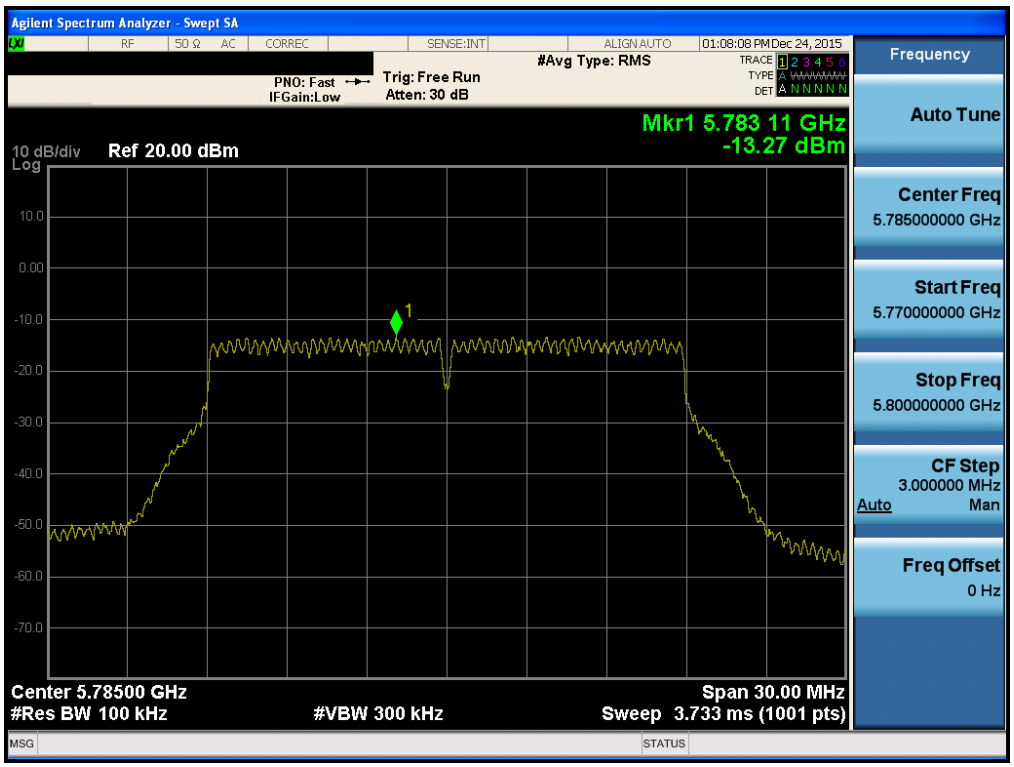
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.149



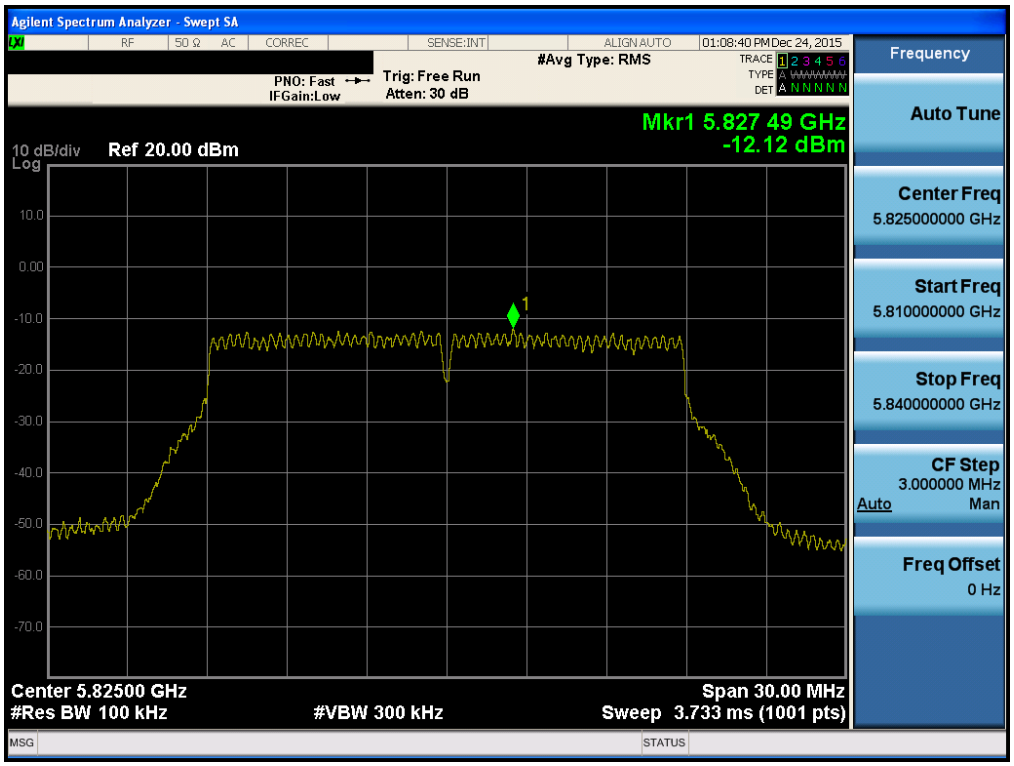
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.157



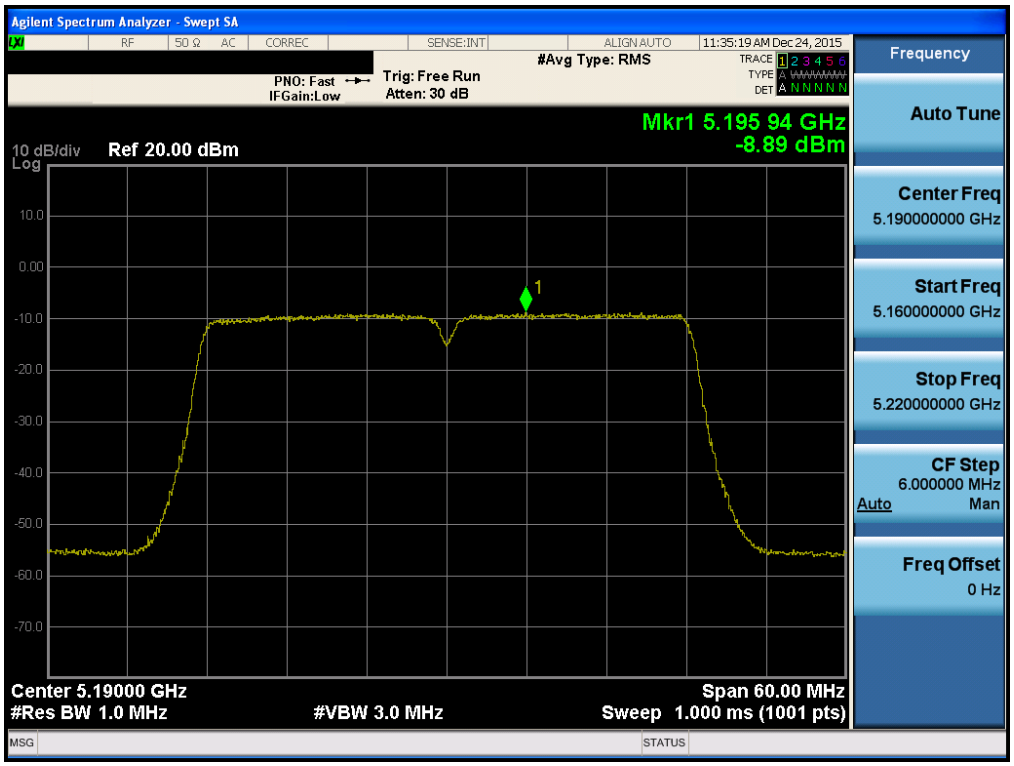
Maximum Power Spectral Density

Test Mode: 802.11n(HT20) & Ch.165



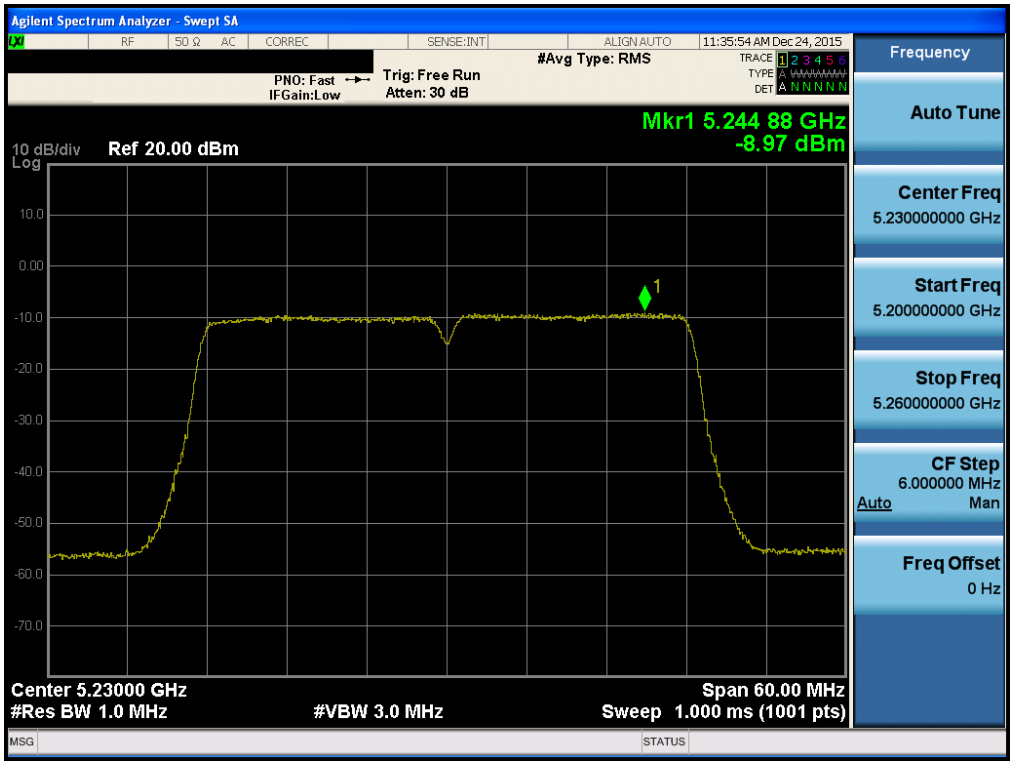
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.38



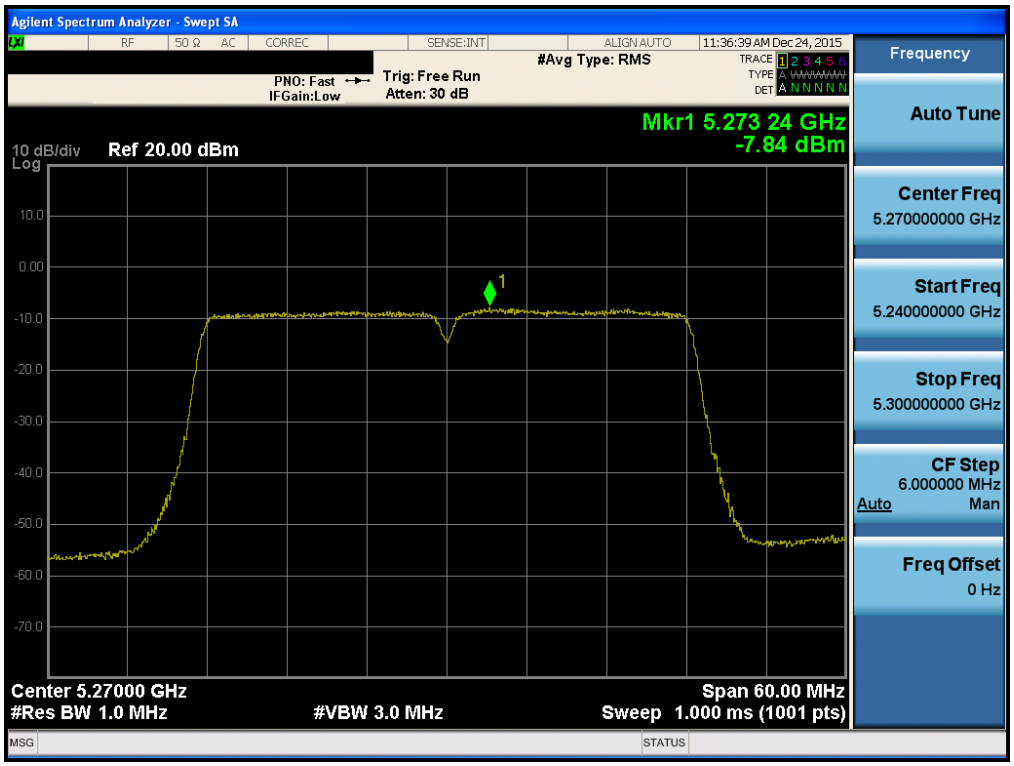
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.46



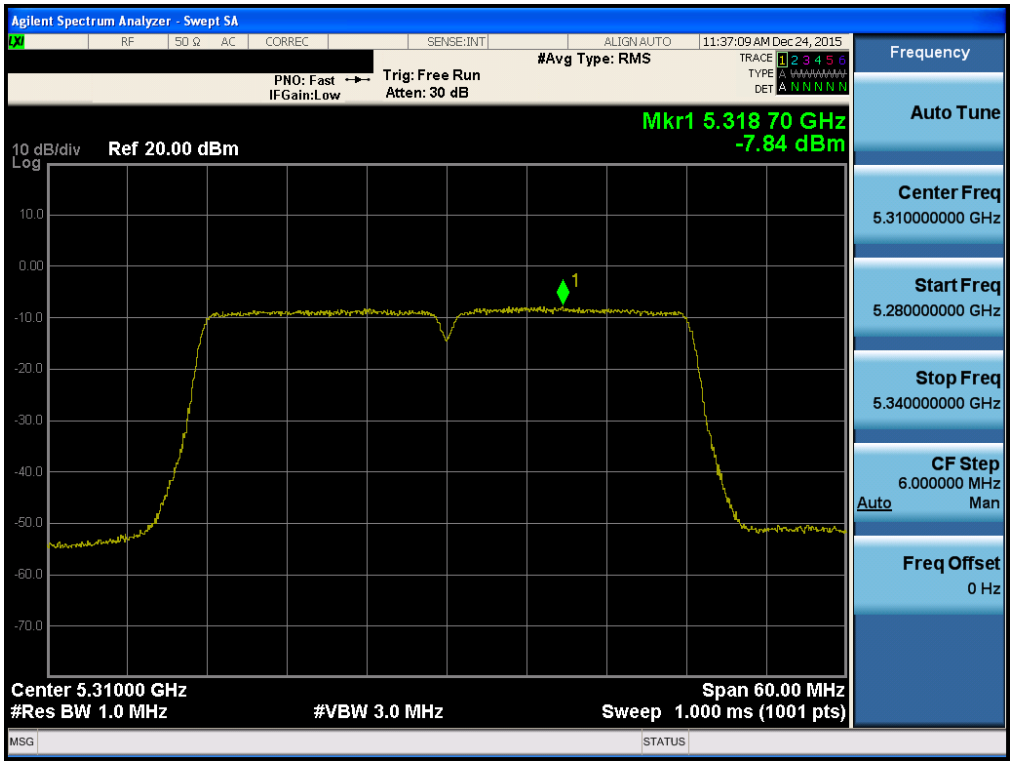
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.54



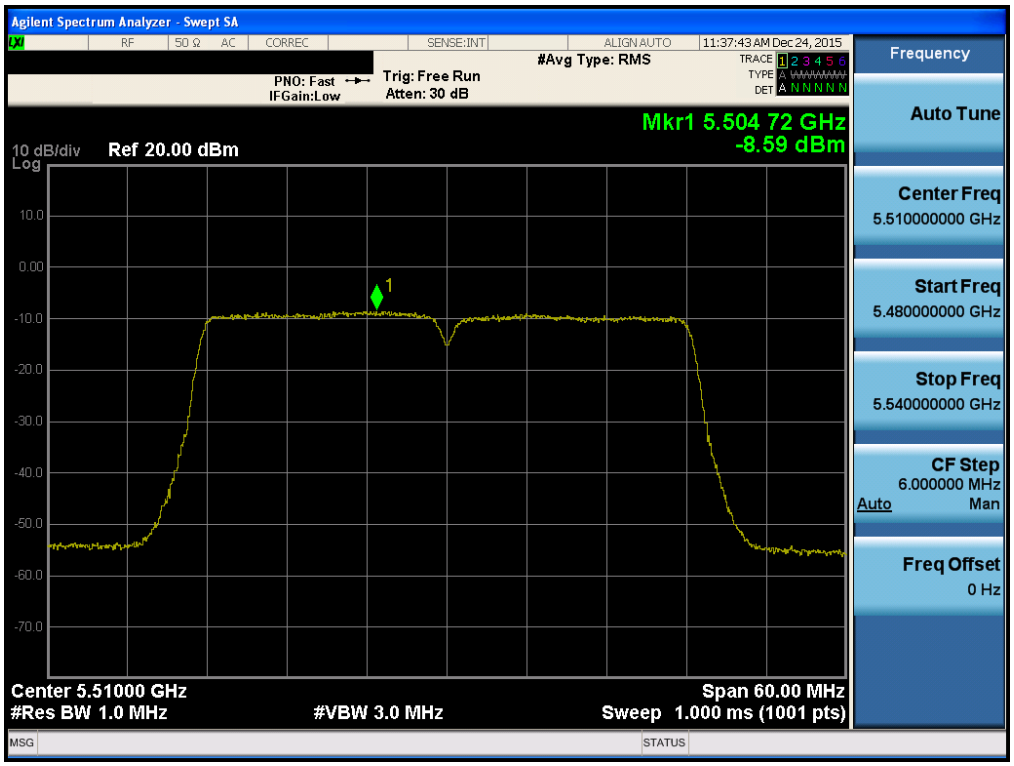
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.62



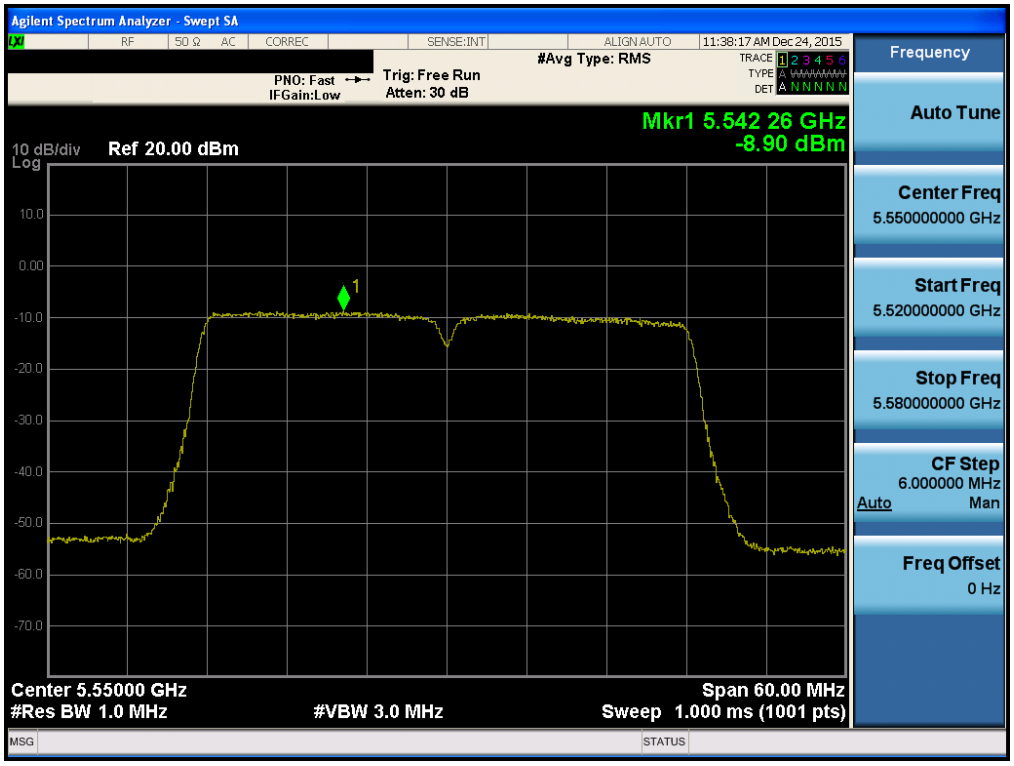
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.102



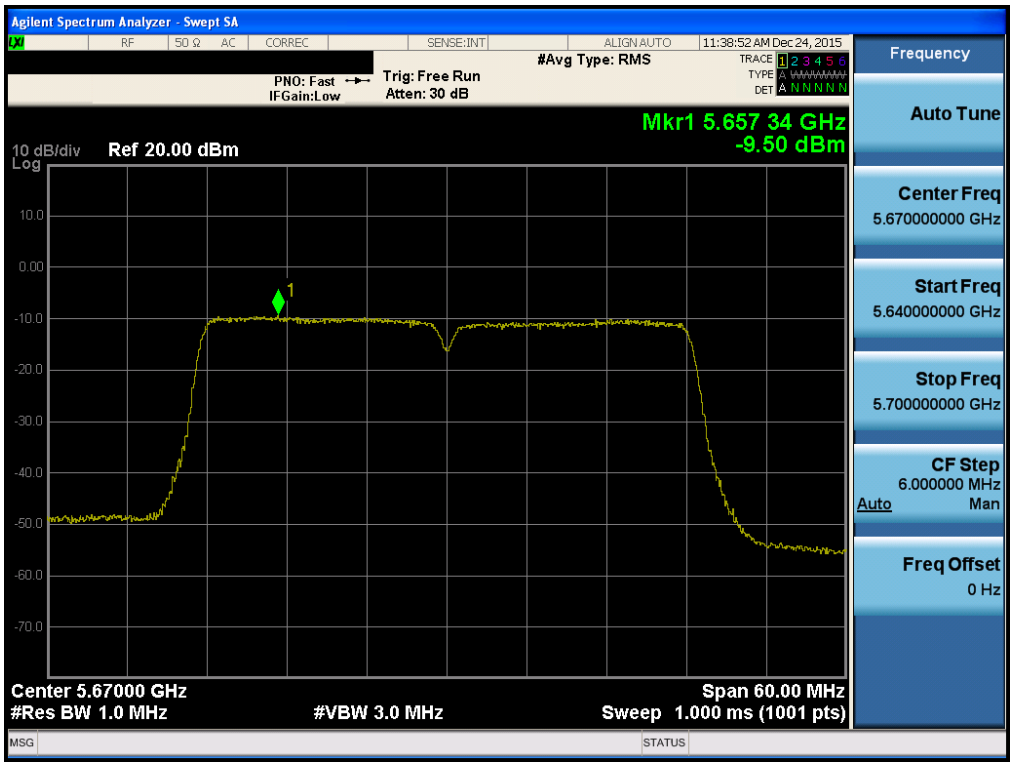
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.110



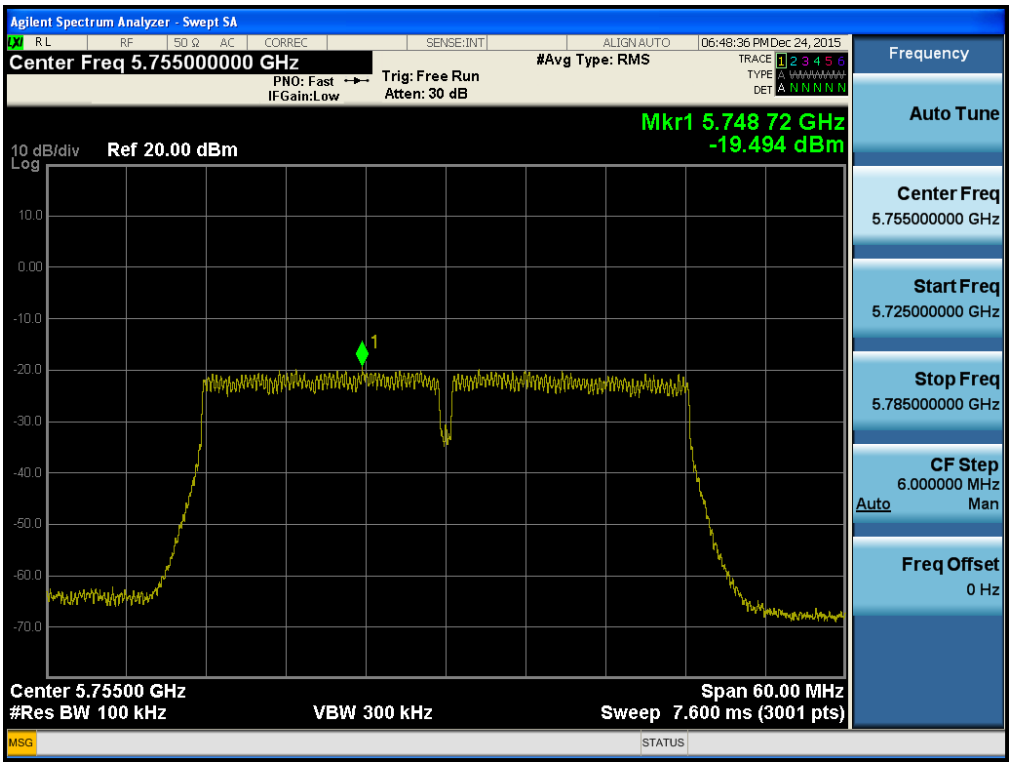
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.134



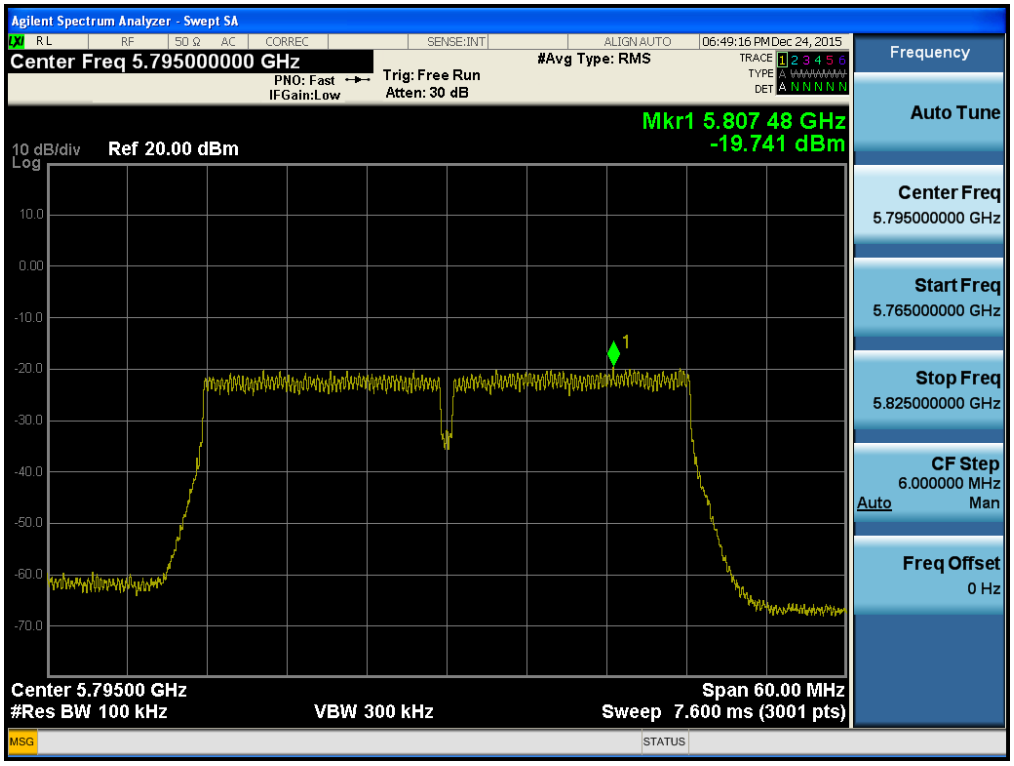
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.151



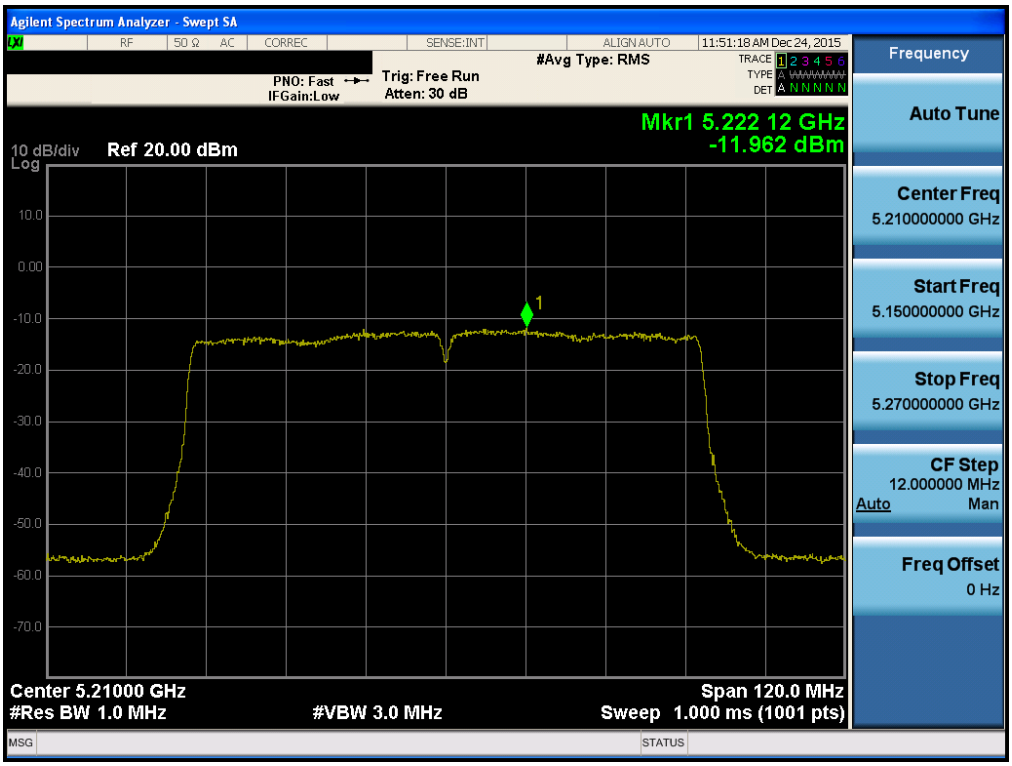
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.159



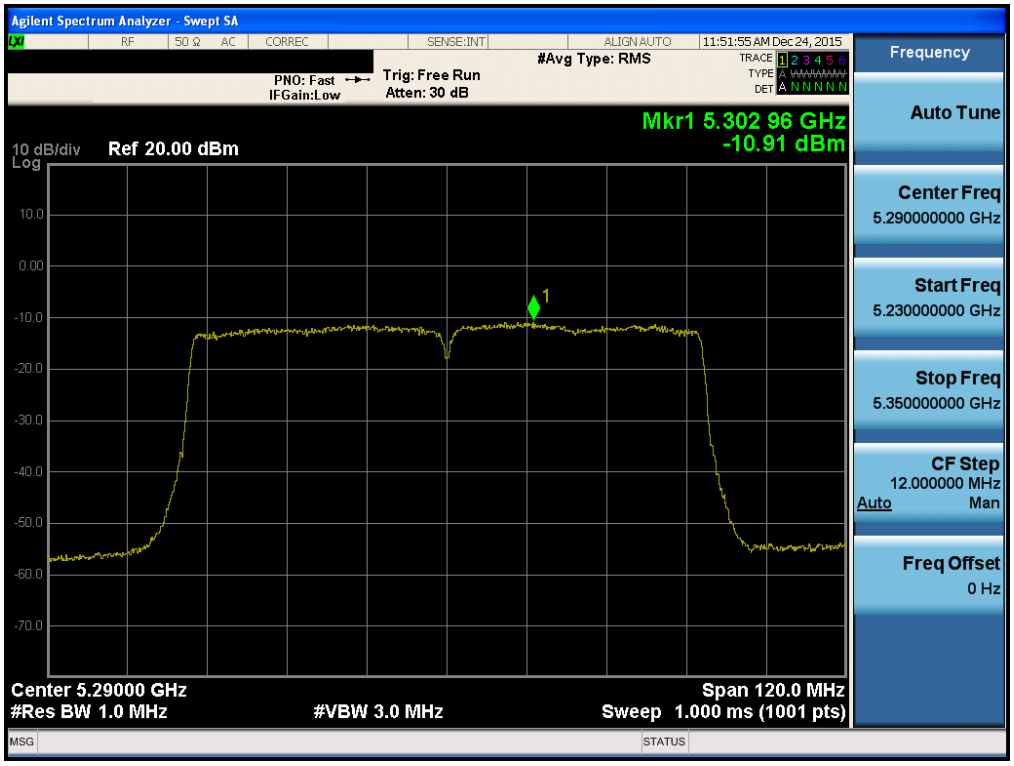
Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.42



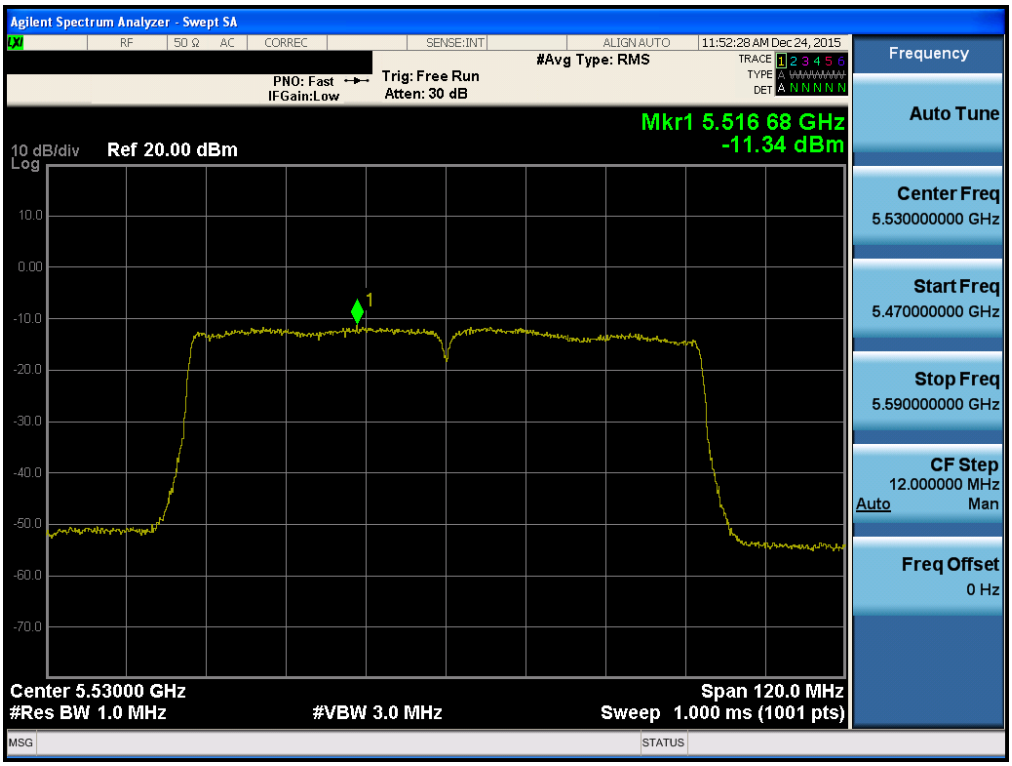
Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.58



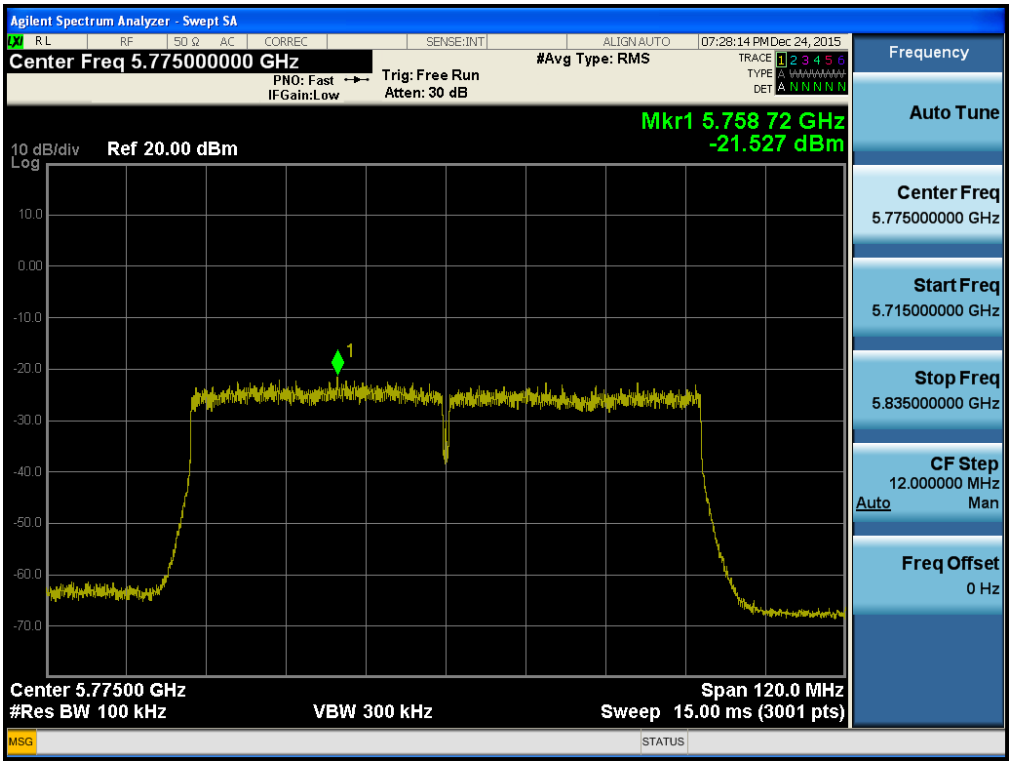
Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.106



Maximum Power Spectral Density

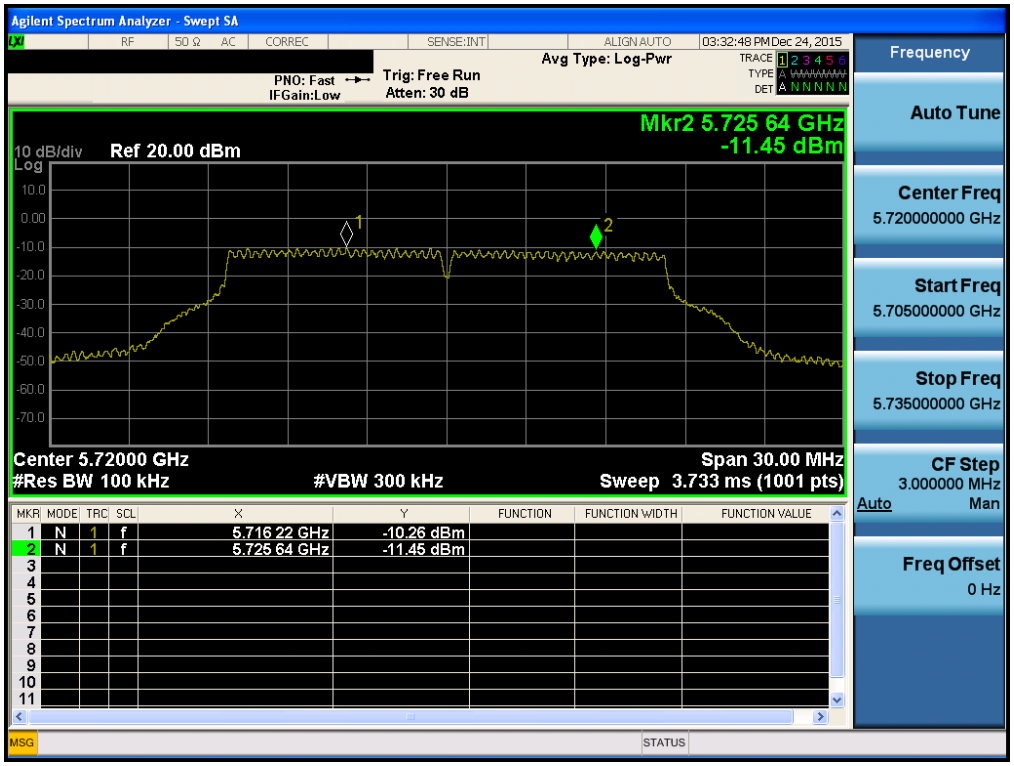
Test Mode: 802.11ac VHT80 & Ch.155



▣ RESULT PLOTS(Band-Crossing Channels)

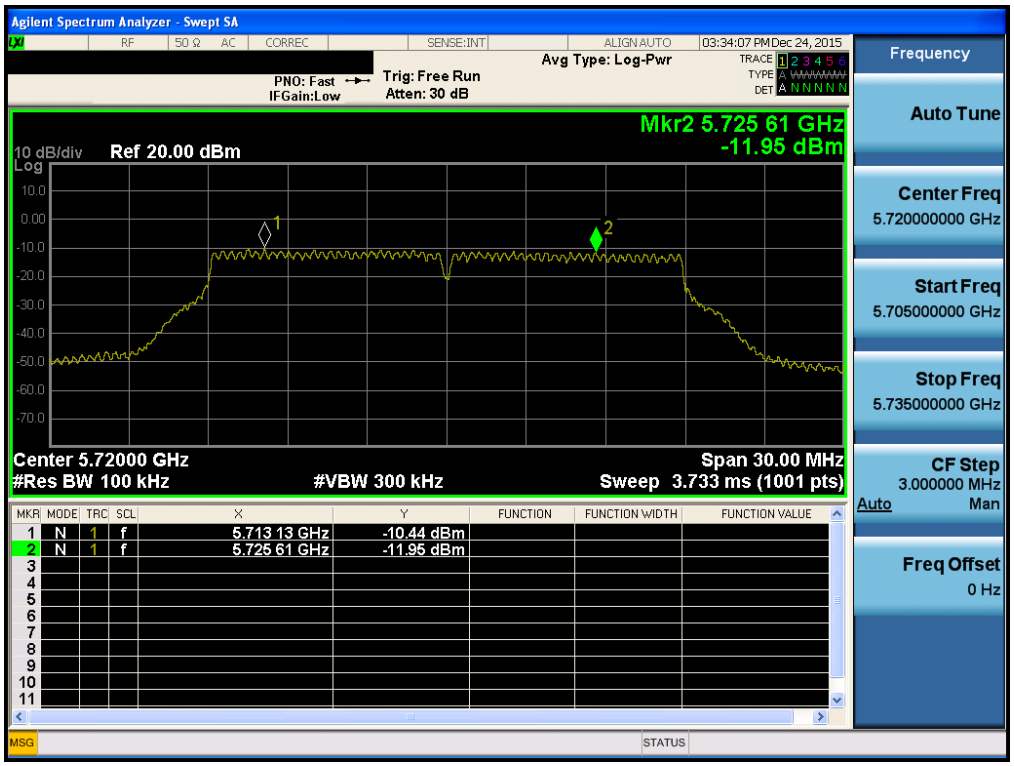
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.144



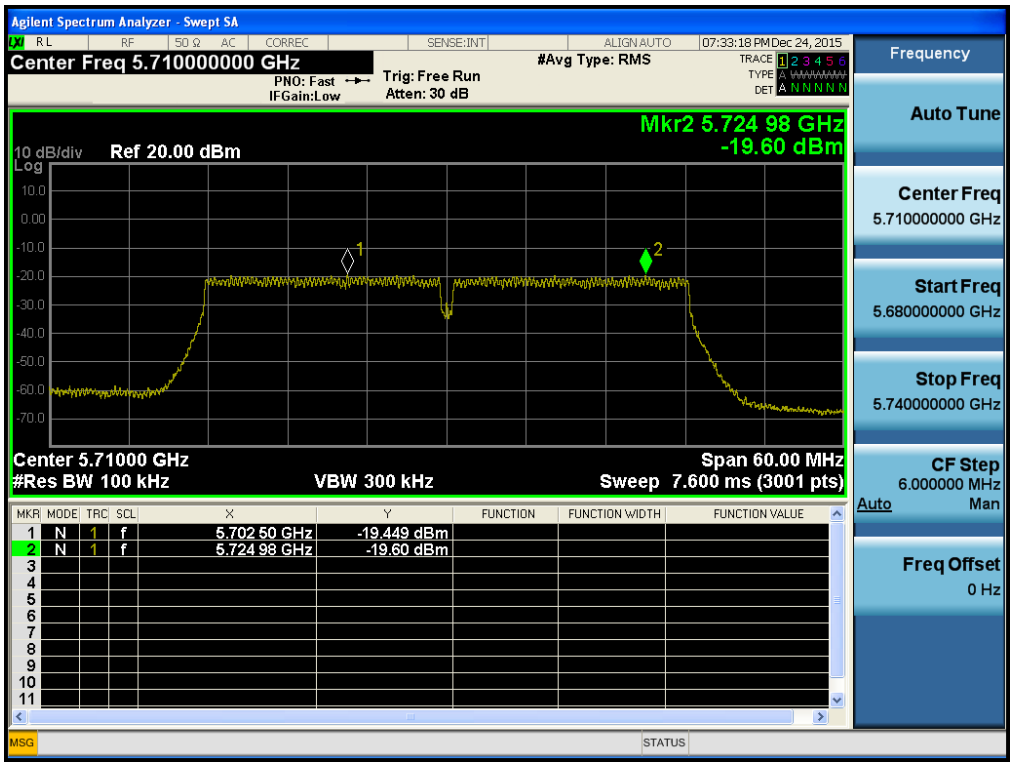
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.144



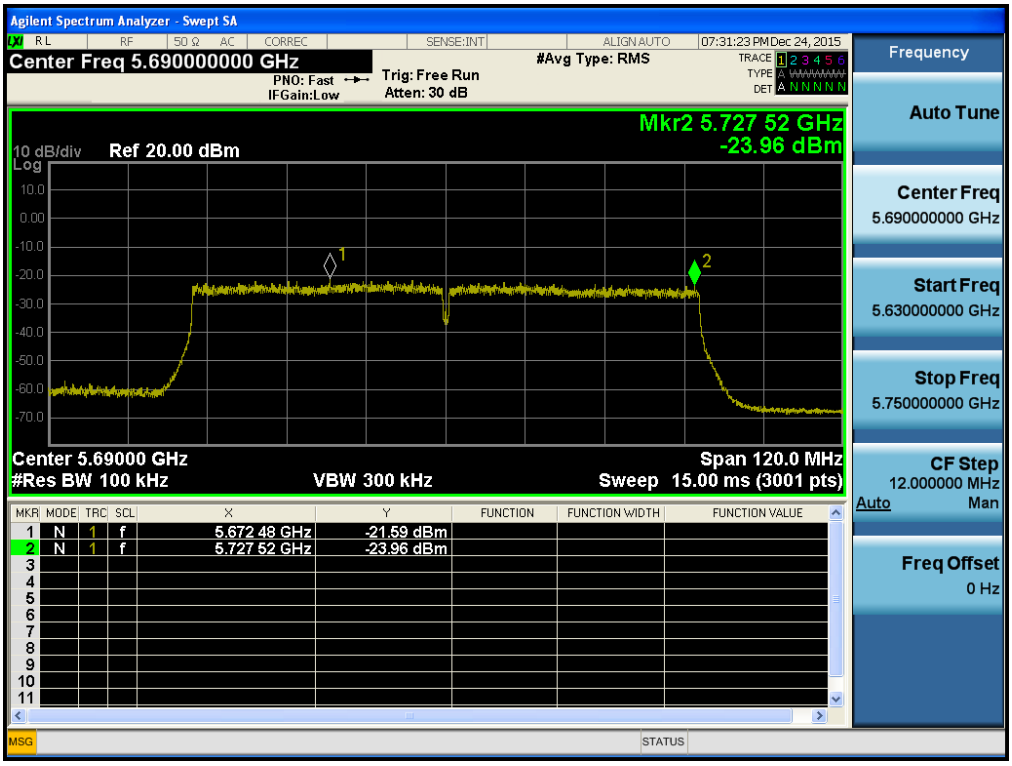
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.142



Maximum Power Spectral Density

Test Mode: 802.11ac VHT80 & Ch.138



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 -20 ℃ and +50 ℃. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each measurement.
Test of frequency stability was performed in modulated carrier.
The edge point of EBW(26dB or 6dB bandwidth) for transmitting channel was evaluated at each temperature and was recorded.

▣ **Test Result : Comply**

U-NII-1 & U-NII-2A : (5150 MHz ~ 5350 MHz)

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5180 MHz	5320 MHz
		26dBc low edge (Hz)	26dBc High edge(Hz)
14.400	+25(Ref)	5,168,954,500	5,330,740,250
	+50	5,169,220,240	5,330,812,600
	+40	5,169,261,200	5,330,814,800
	+30	5,169,240,410	5,330,829,100
	+20	5,169,170,480	5,330,794,500
	+10	5,169,160,520	5,330,786,400
	0	5,169,230,450	5,330,882,400
	-10	5,169,281,300	5,330,865,400
	-20	5,169,143,500	5,330,972,750
12.240	+25	5,168,961,200	5,330,752,300
16.560	+25	5,168,963,600	5,330,753,600

U-NII-2C : (5470 MHz ~ 5725 MHz)

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5500 MHz	5700 MHz
		26dBc low edge (Hz)	26dBc High edge(Hz)
14.400	+25(Ref)	5,489,172,000	5,710,920,250
	+50	5,489,145,000	5,710,909,000
	+40	5,489,184,500	5,710,913,500
	+30	5,489,173,400	5,710,917,400
	+20	5,489,199,400	5,710,914,300
	+10	5,489,214,600	5,710,920,400
	0	5,489,188,400	5,710,916,800
	-10	5,489,167,500	5,710,920,300
	-20	5,489,145,750	5,710,936,000
12.240	+25	5,489,174,900	5,710,921,800
16.560	+25	5,489,175,300	5,710,922,000

U-NII-3 : (5725 MHz ~ 5850 MHz)

Supply Voltage (V DC)	TEMP (℃)	Operating Frequency	
		5745 MHz	5825 MHz
		6dBc low edge (Hz)	6dBc High edge(Hz)
14.400	+25(Ref)	5,736,225,250	5,833,775,750
	+50	5,736,237,750	5,833,791,750
	+40	5,736,235,600	5,833,797,600
	+30	5,736,242,500	5,833,780,500
	+20	5,736,224,800	5,833,791,700
	+10	5,736,218,400	5,833,778,600
	0	5,736,226,400	5,833,781,400
	-10	5,736,237,750	5,833,792,300
	-20	5,736,234,500	5,833,808,250
12.240	+25	5,736,226,800	5,833,772,000
16.560	+25	5,736,223,500	5,833,776,400

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 – 88 MHz, 174 – 216 MHz or 470 – 806 MHz. 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:

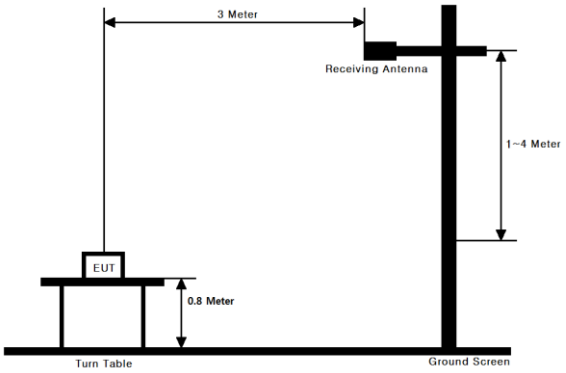
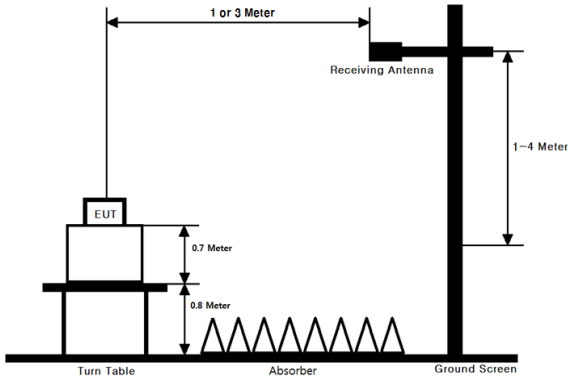
MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725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

▪ **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

Below 1GHz	Above 1GHz
	

▣ Test Procedure

1. The EUT is placed on a non-conductive table. For emission measurements at or below 1 GHz, the table height is 80 cm. For emission measurements above 1 GHz, the table height is 1.5 m.
2. The turn table shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 1 or 3 m away from the receiving antenna, which is varied from 1m to 4 m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

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 1000 MHz (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 1000 MHz (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.

Please refer to Appendix II for the duty correction factor

▣ Measurement Data:

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

Tested Channel	Frequency (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)
36 (5180 MHz)	5149.16	V	X	PK	49.35	10.51	N/A	N/A	59.86	74.00	14.14
	5149.48	V	X	AV	38.14	10.51	0.32	N/A	48.97	54.00	5.03
	10362.25	H	X	PK	43.92	11.34	N/A	-9.54	45.72	68.20	22.48
	-	-	-	-	-	-	-	-	-	-	-
40 (5200 MHz)	10401.70	H	X	PK	43.56	11.41	N/A	-9.54	45.43	68.20	22.77
	-	-	-	-	-	-	-	-	-	-	-
48 (5240 MHz)	10475.98	H	X	PK	43.90	11.55	N/A	-9.54	45.91	68.20	22.29
	-	-	-	-	-	-	-	-	-	-	-

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-2A***

Tested Channel	Frequency (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)
52 (5260 MHz)	10514.10	H	X	PK	43.43	11.59	N/A	-9.54	45.48	68.20	22.72
	-	-	-	-	-	-	-	-	-	-	-
60 (5300 MHz)	10594.65	H	X	PK	42.78	11.76	N/A	-9.54	45.00	68.20	23.20
	-	-	-	-	-	-	-	-	-	-	-
64 (5320 MHz)	5355.04	V	X	PK	49.37	10.77	N/A	N/A	60.14	74.00	13.86
	5353.00	V	X	AV	38.10	10.77	0.32	N/A	49.19	54.00	4.81
	10642.52	H	X	PK	43.43	11.77	N/A	-9.54	45.66	74.00	28.34
	10643.28	H	X	AV	32.50	11.77	0.32	-9.54	35.05	54.00	18.95

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-2C***

Tested Channel	Frequency (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)
100 (5500 MHz)	5451.30	V	X	PK	45.69	10.91	N/A	N/A	56.60	74.00	17.40
	5451.55	V	X	AV	35.74	10.91	0.32	N/A	46.97	54.00	7.03
	5469.50	V	X	PK	46.17	10.93	N/A	N/A	57.10	68.20	11.10
	10996.65	H	X	PK	43.55	12.49	N/A	-9.54	46.50	74.00	27.50
	10997.03	H	X	AV	32.56	12.49	0.32	-9.54	35.83	54.00	18.17
116 (5580 MHz)	11159.63	H	X	PK	43.14	12.79	N/A	-9.54	46.39	74.00	27.61
	11157.00	H	X	AV	32.13	12.79	0.32	-9.54	35.70	54.00	18.30
140 (5700 MHz)	5730.76	V	X	PK	46.48	11.37	N/A	N/A	57.85	68.20	10.35
	11401.30	H	X	PK	42.40	13.24	N/A	-9.54	46.10	74.00	27.90
	11397.55	H	X	AV	32.45	13.24	0.32	-9.54	36.47	54.00	17.53

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11a & U-NII-3***

Tested Channel	Frequency (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)
149 (5745 MHz)	5707.24	V	X	PK	46.59	11.35	N/A	N/A	57.94	68.20	10.26
	5724.88	V	X	PK	53.28	11.37	N/A	N/A	64.65	78.20	13.55
	11484.98	H	X	PK	42.75	13.39	N/A	-9.54	46.60	74.00	27.40
	11483.88	H	X	AV	31.50	13.39	0.32	-9.54	35.67	54.00	18.33
157 (5785 MHz)	11573.15	H	X	PK	42.43	13.57	N/A	-9.54	46.46	74.00	27.54
	11571.78	H	X	AV	31.81	13.57	0.32	-9.54	36.16	54.00	17.84
165 (5825 MHz)	5858.40	V	X	PK	46.03	11.61	N/A	N/A	57.64	78.20	20.56
	5873.05	V	X	PK	45.15	11.63	N/A	N/A	56.78	68.20	11.42
	11653.43	H	X	PK	42.92	13.72	N/A	-9.54	47.10	74.00	26.90
	11653.53	H	X	AV	31.93	13.72	0.32	-9.54	36.43	54.00	17.57

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

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

Tested Channel	Frequency (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)
36 (5180 MHz)	5147.80	V	X	PK	48.94	10.51	N/A	N/A	59.45	74.00	14.55
	5149.88	V	X	AV	38.13	10.51	0.32	N/A	48.96	54.00	5.04
	10363.68	H	X	PK	44.25	11.34	N/A	-9.54	46.05	68.20	22.15
	-	-	-	-	-	-	-	-	-	-	-
40 (5200 MHz)	10399.15	H	X	PK	43.57	11.41	N/A	-9.54	45.44	68.20	22.76
	-	-	-	-	-	-	-	-	-	-	-
48 (5240 MHz)	10476.00	H	X	PK	43.35	11.55	N/A	-9.54	45.36	68.20	22.84
	-	-	-	-	-	-	-	-	-	-	-

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11 n(HT20) & U-NII-2A***

Tested Channel	Frequency (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)
52 (5260 MHz)	10517.30	H	X	PK	42.62	11.59	N/A	-9.54	44.67	68.20	23.53
	-	-	-	-	-	-	-	-	-	-	-
60 (5300 MHz)	10598.33	H	X	PK	42.80	11.76	N/A	-9.54	45.02	68.20	23.18
	-	-	-	-	-	-	-	-	-	-	-
64 (5320 MHz)	5350.60	V	X	PK	48.55	10.77	N/A	N/A	59.32	74.00	14.68
	5351.32	V	X	AV	37.59	10.77	0.32	N/A	48.68	54.00	5.32
	10644.08	H	X	PK	42.90	11.77	N/A	-9.54	45.13	74.00	28.87
	10643.20	H	X	AV	31.86	11.77	0.32	-9.54	34.41	54.00	19.59

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT20) & U-NII-2C***

Tested Channel	Frequency (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)
100 (5500 MHz)	5456.40	V	X	PK	45.99	10.91	N/A	N/A	56.90	74.00	17.10
	5458.75	V	X	AV	35.49	10.91	0.32	N/A	46.72	54.00	7.28
	5463.70	V	X	PK	46.27	10.93	N/A	N/A	57.20	68.20	11.00
	10997.48	H	X	PK	41.98	12.49	N/A	-9.54	44.93	74.00	29.07
	11000.13	H	X	AV	31.12	12.49	0.32	-9.54	34.39	54.00	19.61
116 (5580 MHz)	11163.00	H	X	PK	42.07	12.79	N/A	-9.54	45.32	74.00	28.68
	11160.03	H	X	AV	31.50	12.79	0.32	-9.54	35.07	54.00	18.93
140 (5700 MHz)	5733.00	V	X	PK	46.60	11.37	N/A	N/A	57.97	68.20	10.23
	11393.15	H	X	PK	43.36	13.24	N/A	-9.54	47.06	74.00	26.94
	11396.78	H	X	AV	32.33	13.24	0.32	-9.54	36.35	54.00	17.65

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT20) & U-NII-3***

Tested Channel	Frequency (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)
149 (5745 MHz)	5714.72	V	X	PK	47.09	11.35	N/A	N/A	58.44	68.20	9.76
	5724.32	V	X	PK	55.20	11.37	N/A	N/A	66.57	78.20	11.63
	11493.03	H	X	PK	42.07	13.39	N/A	-9.54	45.92	74.00	28.08
	11489.70	H	X	AV	31.83	13.39	0.32	-9.54	36.00	54.00	18.00
157 (5785 MHz)	11576.08	H	X	PK	41.20	13.57	N/A	-9.54	45.23	74.00	28.77
	11572.05	H	X	AV	30.84	13.57	0.32	-9.54	35.19	54.00	18.81
165 (5825 MHz)	5858.80	V	X	PK	45.48	11.61	N/A	N/A	57.09	78.20	21.11
	5876.15	V	X	PK	45.64	11.63	N/A	N/A	57.27	68.20	10.93
	11653.13	H	X	PK	41.96	13.72	N/A	-9.54	46.14	74.00	27.86
	11656.40	H	X	AV	32.02	13.72	0.32	-9.54	36.52	54.00	17.48

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

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

Tested Channel	Frequency (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)
38 (5190 MHz)	5148.46	V	X	PK	46.49	10.51	N/A	N/A	57.00	74.00	17.00
	5148.10	V	X	AV	35.84	10.51	0.66	N/A	47.01	54.00	6.99
	10386.60	H	X	PK	43.01	11.37	N/A	-9.54	44.84	68.20	23.36
	-	-	-	-	-	-	-	-	-	-	-
46 (5230 MHz)	10457.30	H	X	PK	43.44	11.52	N/A	-9.54	45.42	68.20	22.78
	-	-	-	-	-	-	-	-	-	-	-

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11 n(HT40) & U-NII-2A*

Tested Channel	Frequency (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)
54 (5270 MHz)	10546.38	H	X	PK	42.87	11.66	N/A	-9.54	44.99	74.00	29.01
	-	-	-	-	-	-	-	-	-	-	-
62 (5310 MHz)	5353.96	V	X	PK	49.43	10.77	N/A	N/A	60.20	74.00	13.80
	5352.76	V	X	AV	38.34	10.77	0.66	N/A	49.77	54.00	4.23
	10617.73	H	X	PK	42.89	11.80	N/A	-9.54	45.15	74.00	28.85
	10616.85	H	X	AV	31.81	11.80	0.66	-9.54	34.73	54.00	19.27

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT40) & U-NII-2C***

Tested Channel	Frequency (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)
102 (5510 MHz)	5457.90	V	X	PK	44.49	10.91	N/A	N/A	55.40	74.00	18.60
	5459.56	V	X	AV	34.96	10.91	0.66	N/A	46.53	54.00	7.47
	5469.04	V	X	PK	48.09	10.93	N/A	N/A	59.02	68.20	9.18
	11014.18	H	X	PK	42.16	12.52	N/A	-9.54	45.14	74.00	28.86
	11011.98	H	X	AV	31.71	12.52	0.66	-9.54	35.35	54.00	18.65
110 (5550 MHz)	11098.98	H	X	PK	43.26	12.67	N/A	-9.54	46.39	74.00	27.61
	11100.08	H	X	AV	32.66	12.67	0.66	-9.54	36.45	54.00	17.55
134 (5670 MHz)	5749.23	H	X	PK	44.15	11.41	N/A	N/A	55.56	68.20	12.64
	11335.65	H	X	PK	43.27	13.13	N/A	-9.54	46.86	74.00	27.14
	11338.28	H	X	AV	32.99	13.13	0.66	-9.54	37.24	54.00	16.76

Radiated Spurious Emissions data(9kHz ~ 40GHz) : ***802.11n(HT40) & U-NII-3***

Tested Channel	Frequency (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)
151 (5755 MHz)	5712.90	V	X	PK	50.93	11.35	N/A	N/A	62.28	68.20	5.92
	5722.78	V	X	PK	49.29	11.37	N/A	N/A	60.66	78.20	17.54
	11505.65	H	X	PK	42.69	13.45	N/A	-9.54	46.60	74.00	27.40
	11506.20	H	X	AV	31.86	13.45	0.66	-9.54	36.43	54.00	17.57
159 (5795 MHz)	5855.53	V	X	PK	44.28	11.61	N/A	N/A	55.89	78.20	22.31
	5869.35	V	X	PK	44.55	11.63	N/A	N/A	56.18	68.20	12.02
	11593.63	H	X	PK	42.55	13.60	N/A	-9.54	46.61	74.00	27.39
	11590.50	H	X	AV	31.69	13.60	0.66	-9.54	36.41	54.00	17.59

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

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

Tested Channel	Frequency (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)
42 (5210 MHz)	5144.10	V	X	PK	45.09	10.51	N/A	N/A	55.60	74.00	18.40
	5143.00	V	X	AV	34.63	10.51	1.20	N/A	46.34	54.00	7.66
	10427.53	H	X	PK	43.15	11.44	N/A	-9.54	45.05	74.00	28.95
	10422.08	H	X	AV	32.22	11.44	1.20	-9.54	35.32	54.00	18.68

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-2A*

Tested Channel	Frequency (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)
58 (5290 MHz)	5357.40	V	X	PK	48.58	10.77	N/A	N/A	59.35	74.00	14.65
	5357.30	V	X	AV	38.01	10.77	1.20	N/A	49.98	54.00	4.02
	10586.78	H	X	PK	43.18	11.73	N/A	-9.54	45.37	74.00	28.63
	10582.55	H	X	AV	32.42	11.73	1.20	-9.54	35.81	54.00	18.19

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-2C*

Tested Channel	Frequency (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)
106 (5530 MHz)	5453.90	V	X	PK	50.39	10.91	N/A	N/A	61.30	74.00	12.70
	5454.60	V	X	AV	38.94	10.91	1.20	N/A	51.05	54.00	2.95
	5467.90	V	X	PK	50.87	10.93	N/A	N/A	61.80	68.20	6.40
	11064.55	H	X	PK	42.98	12.60	N/A	-9.54	46.04	74.00	27.96
	11061.50	H	X	AV	31.87	12.60	1.20	-9.54	36.13	54.00	17.87

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *802.11ac(VHT80) & U-NII-3*

Tested Channel	Frequency (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)
155 (5775 MHz)	5684.10	V	X	PK	52.00	11.35	N/A	N/A	63.35	68.20	4.85
	5721.80	V	X	PK	50.84	11.37	N/A	N/A	62.21	78.20	15.99
	5856.96	V	X	PK	43.89	11.61	N/A	N/A	55.50	78.20	22.70
	5879.20	V	X	PK	43.99	11.63	N/A	N/A	55.62	68.20	12.58
	11557.50	H	X	PK	42.25	13.53	N/A	-9.54	46.24	74.00	27.76
	11555.43	H	X	AV	31.09	13.53	1.20	-9.54	36.28	54.00	17.72

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

▣ Measurement Data:

Radiated Spurious Emissions data(9kHz ~ 40GHz) : *Band-Crossing Channels*

Mode	Tested Channel	Frequency (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)
802.11a	144 (5720 MHz)	11440.63	H	X	PK	43.03	13.32	N/A	-9.54	46.81	74.00	27.19
		11438.98	H	X	AV	32.24	13.32	0.32	-9.54	36.34	54.00	17.66
		-	-	-	-	-	-	-	-	-	-	-
802.11n (HT20)	144 (5720 MHz)	11440.93	H	X	PK	42.55	13.32	N/A	-9.54	46.33	74.00	27.67
		11441.98	H	X	AV	31.76	13.32	0.32	-9.54	35.86	54.00	18.14
		-	-	-	-	-	-	-	-	-	-	-
802.11n (HT40)	142 (5710 MHz)	11425.25	H	X	PK	43.79	13.28	N/A	-9.54	47.53	74.00	26.47
		11421.68	H	X	AV	31.79	13.28	0.66	-9.54	36.19	54.00	17.81
		-	-	-	-	-	-	-	-	-	-	-
802.11ac (VHT80)	138 (5690 MHz)	11386.95	H	X	PK	43.07	13.21	N/A	-9.54	46.74	74.00	27.26
		11380.73	H	X	AV	31.72	13.21	1.20	-9.54	36.59	54.00	17.41
		-	-	-	-	-	-	-	-	-	-	-

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 = -27 dBm + 95.2 = 68.2 dBuV/m
   = -17 dBm + 95.2 = 78.2 dBuV/m

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: N/A**

▣ **Minimum Standard: FCC Part 15.207(a)**

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