

RF TEST REPORT

Test item : Internet Phone
Model No. : SMT-i6021, SMT-i6011
Order No. : DTNC1504-02133, DTNC1504-02134
Date of receipt : 2015-04-29
Test duration : 2015-05-06 ~ 2015-06-10
Date of issue : 2015-06-19
Use of report : FCC & IC Original Grant

Applicant : Samsung Electronics Co., Ltd.
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Test laboratory : DT&C Co., Ltd.
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Test specification : FCC Part 15 Subpart C 247
RSS-247 Issue 1 & RSS-Gen Issue 4

Test environment : See appended test report

Test result : ☒ Pass ☐ Fail

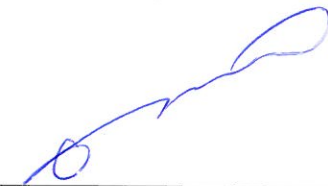
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

Tested by:



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Test Report Version

Test Report No.	Date	Description
DRTFCC1506-0122	Jun. 19, 2015	Initial issue

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1. EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Internet Phone
Model Name	SMT-i6021
Add Model Name	SMT-i6011
Power Supply	DC 12 V(Adaptor), DC 48 V(PoE)
Frequency Range	Band I(5150 ~ 5250MHz) ▪ 802.11a/n(HT20): 5180 ~ 5240 MHz ▪ 802.11n(HT40): 5190 ~ 5230 MHz Band II(5250 ~ 5350MHz) ▪ 802.11a/n(HT20): 5260 ~ 5320 MHz ▪ 802.11n(HT40): 5270 ~ 5310 MHz Band III(5470 ~ 5725MHz) ▪ 802.11a/n(HT20): 5500 ~ 5700 MHz ▪ 802.11n(HT40): 5510 ~ 5670 MHz Band IV(5725 ~ 5850MHz) ▪ 802.11a/n(HT20): 5745 ~ 5825 MHz ▪ 802.11n(HT40): 5755 ~ 5795 MHz
Modulation type	64-QAM, 16QAM, QPSK BPSK for OFDM
Antenna Specification	Antenna type: Internal Antenna Antenna gain ▪ Band I: 3.64 dBi ▪ Band II: 3.64 dBi ▪ Band III: 4.05 dBi ▪ Band IV: 5.02 dBi

Note: The applicant declares that there is some difference between the models.
For detailed information, please refer to the ID letter.

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate
Band I	802.11a	54Mbps
	802.11n(HT20)	MCS 7
	802.11n(HT40)	MCS 7
	802.11ac(VHT80)	-
Band II	802.11a	54Mbps
	802.11n(HT20)	MCS 7
	802.11n(HT40)	MCS 7
	802.11ac(VHT80)	-
Band III	802.11a	54Mbps
	802.11n(HT20)	MCS 7
	802.11n(HT40)	MCS 7
	802.11ac(VHT80)	-
Band IV	802.11a	54Mbps
	802.11n(HT20)	MCS 7
	802.11n(HT40)	MCS 7
	802.11ac(VHT80)	-

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]
Band I	36	5180	38	5190	-	-
	40	5200	-	-	-	-
	48	5240	46	5230	-	-
Band II	52	5260	54	5270	-	-
	60	5300	-	-	-	-
	64	5320	62	5310	-	-
Band III	100	5500	102	5510	-	-
	116	5580	110	5550	-	-
	140	5700	134	5670	-	-
Band IV	149	5745	151	5755	-	-
	157	5785	-	-	-	-
	165	5825	159	5795	-	-

2.3 Auxiliary equipment

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

2.4 Tested environment

Temperature	: 21 °C ~ 25 °C
Relative humidity content	: 40 % ~ 45 % R.H.
Details of power supply	: AC 120V / 60Hz

2.5 EMI Suppression Device(s)/Modifications

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

3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	RSS-247 [6.2]	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(e)	RSS-247 [6.2]	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz		C
15.407(a)	RSS-247 [6.2]	Maximum Conducted Output Power	5150 ~ 5250MHz For FCC: < 23.97 dBm(Client device) 5150 ~ 5250MHz For IC: 200mW or <10 + 10log₁₀(B) dBm, whichever power is less. 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC 250mW or <11 + 10log₁₀(B) dBm, whichever power is less. 5725 ~ 5850MHz For FCC: < 30 dBm		C
15.407(a)	RSS-247 [6.2]	Peak Power Spectral Density	5150 ~ 5250MHz For FCC: 11dBm/MHz(Client device) 5150 ~ 5250MHz For IC: 10dBm/MHz 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC: 11dBm/MHz 5725 ~ 5850MHz For FCC & IC: 30dBm/500kHz		C
15.407(g)	RSS-Gen [6.11]	Frequency Stability	N/A		C
-	RSS-Gen [6.6]	Occupied Bandwidth (99%)	N/A		NA
15.407(b)	RSS-247 [6.2]	Undesirable Emissions	5150 ~ 5725MHz: < -27 dBm/MHz EIRP 5725 ~ 5850MHz: < -17 dBm/MHz EIRP, < -27 dBm/MHz EIRP	Radiated	C Note 3
15.205 15.209 15.407(b)	RSS-Gen [8.9&8.10]	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in FCC 15.209, RSS-Gen [8.9]		C Note 4
15.407(h)	RSS-247 [6.3]	Dynamic Frequency Selection	See DFS test report	-	C Note 5
15.207	RSS-Gen [8.8]	AC Conducted Emissions	FCC 15.207, RSS-Gen [8.8]	AC Line Conducted	C
15.203	RSS-Gen [6.7]	Antenna Requirements	FCC 15.203, RSS-Gen [6.7]	-	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: The test items were performed according to the KDB789033 and ANSI C63.10.(Please refer to the clause 4.) Note 3: 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 4: These test items were performed in each axis and the worst case data was reported. Note 5: For DFS testing, please refer to DFS test report. Note 6: The test items using conducted measurement were performed using only the main model(SMT-i6021) with the adapter. And the radiated measurement was performed using both models with the adaptor and PoE.					

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB789033 D02 v01.

And ANSI C63.10-2013 for IC and ANSI C63.10-2009 for FCC were 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. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10.

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 0.15MHz and 30MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB789033. 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 C63.10as stated on KDB789033.

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 683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Gyeonggi-Do, 449-080, Korea. 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, 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 [6.7]:

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. Please refer to the internal photo.

Therefore this module 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 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%.

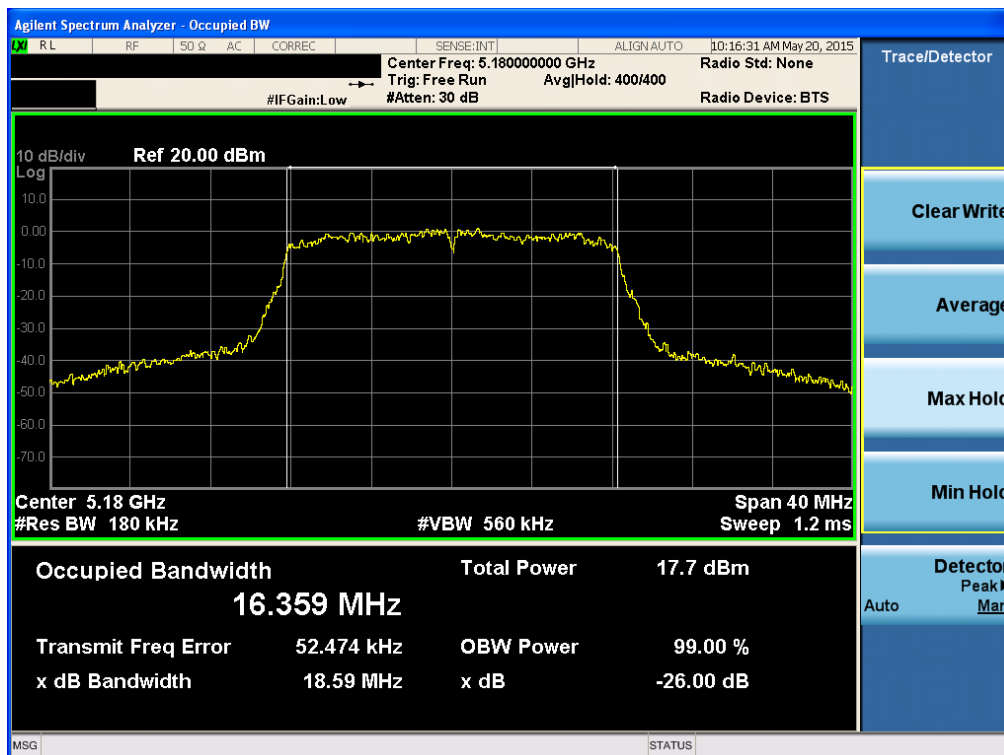
■ **TEST RESULTS: Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band I	36	5180	18.590
		40	5200	18.540
		48	5240	18.570
	Band II	52	5260	18.560
		60	5300	18.670
		64	5320	18.620
	Band III	100	5500	18.520
		116	5580	18.460
		140	5700	18.630
802.11n (HT20)	Band I	36	5180	18.940
		40	5200	18.900
		48	5240	18.870
	Band II	52	5260	18.900
		60	5300	18.840
		64	5320	18.850
	Band III	100	5500	18.980
		116	5580	18.880
		140	5700	18.850
802.11n (HT40)	Band I	38	5190	41.720
		46	5230	42.120
	Band II	54	5270	42.050
		62	5310	41.050
	Band III	102	5510	41.930
		110	5550	42.520
		134	5670	41.510

■ **Result Plots**

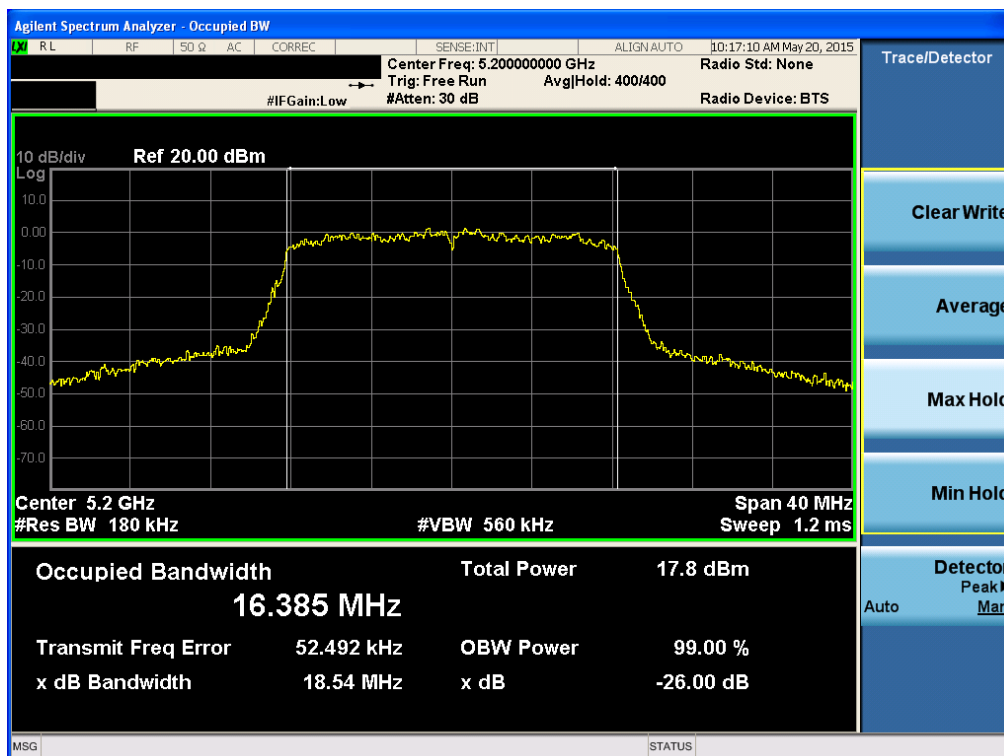
26 dB Bandwidth

Test Mode: 802.11a & Ch.36



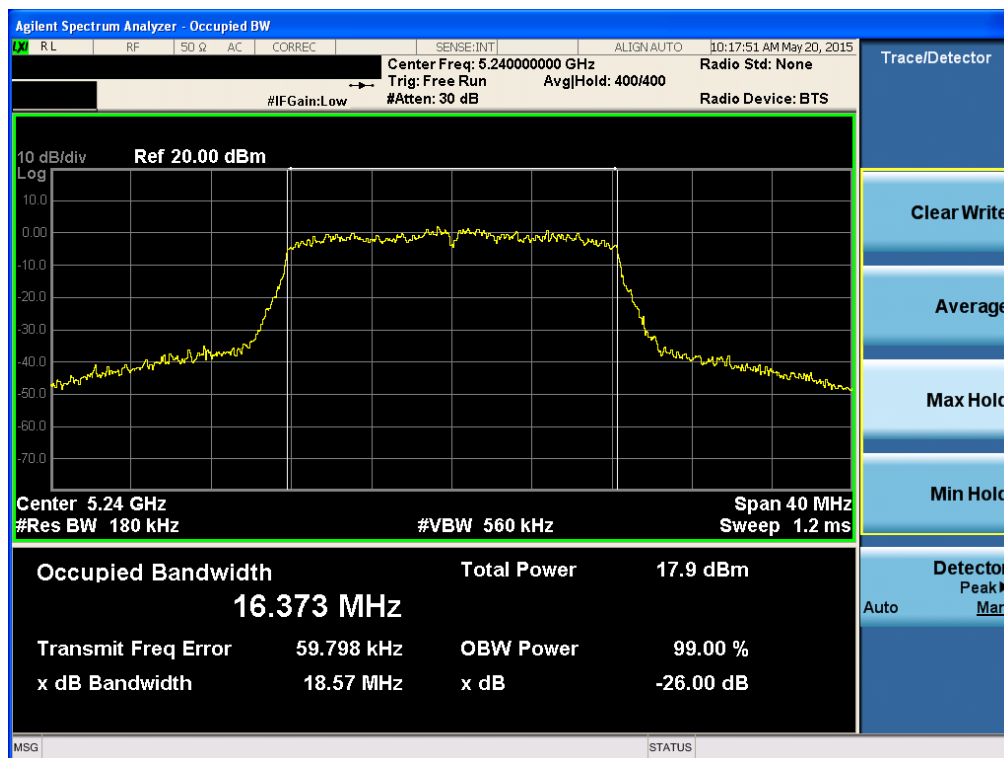
26 dB Bandwidth

Test Mode: 802.11a & Ch.40



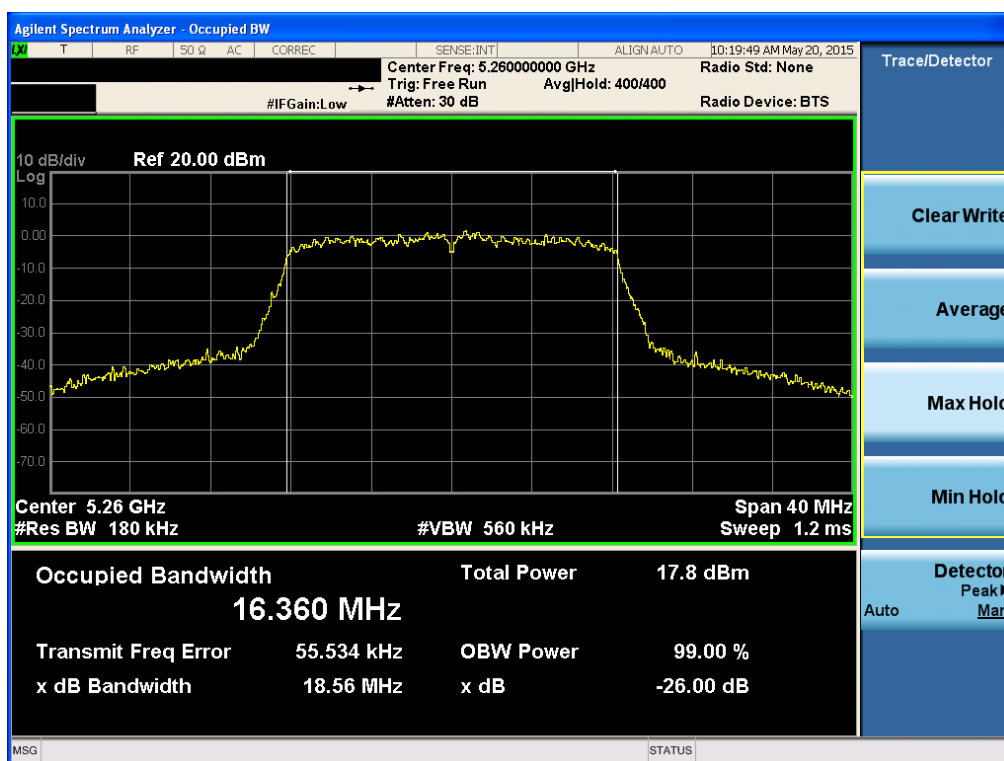
26 dB Bandwidth

Test Mode: 802.11a & Ch.48



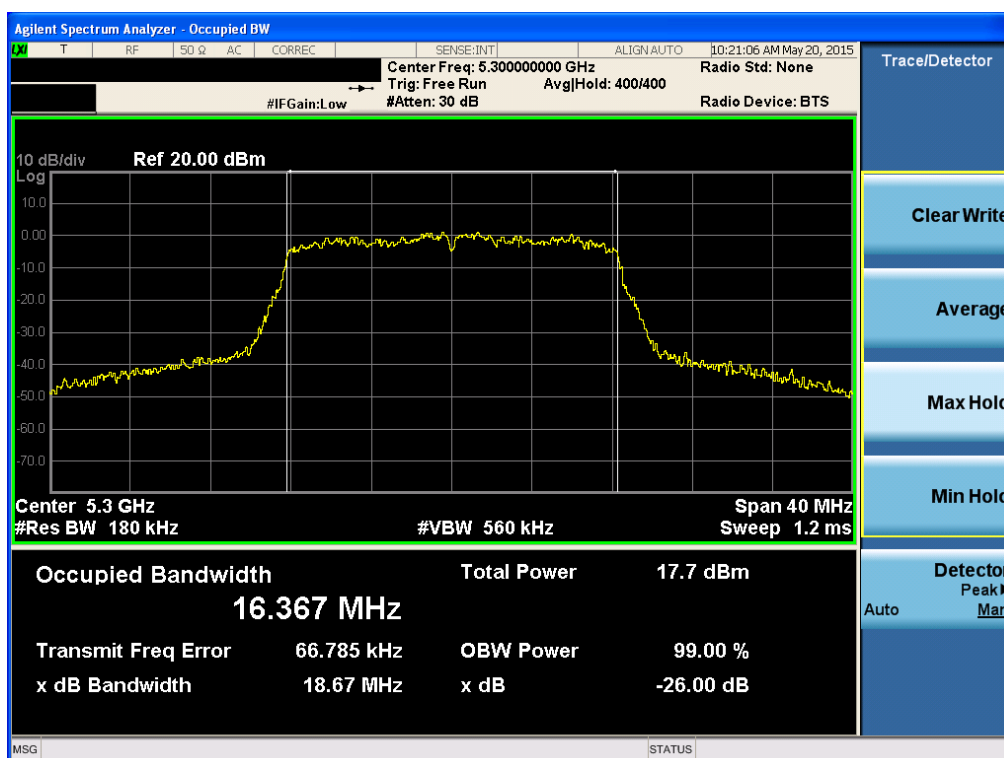
26 dB Bandwidth

Test Mode: 802.11a & Ch.52



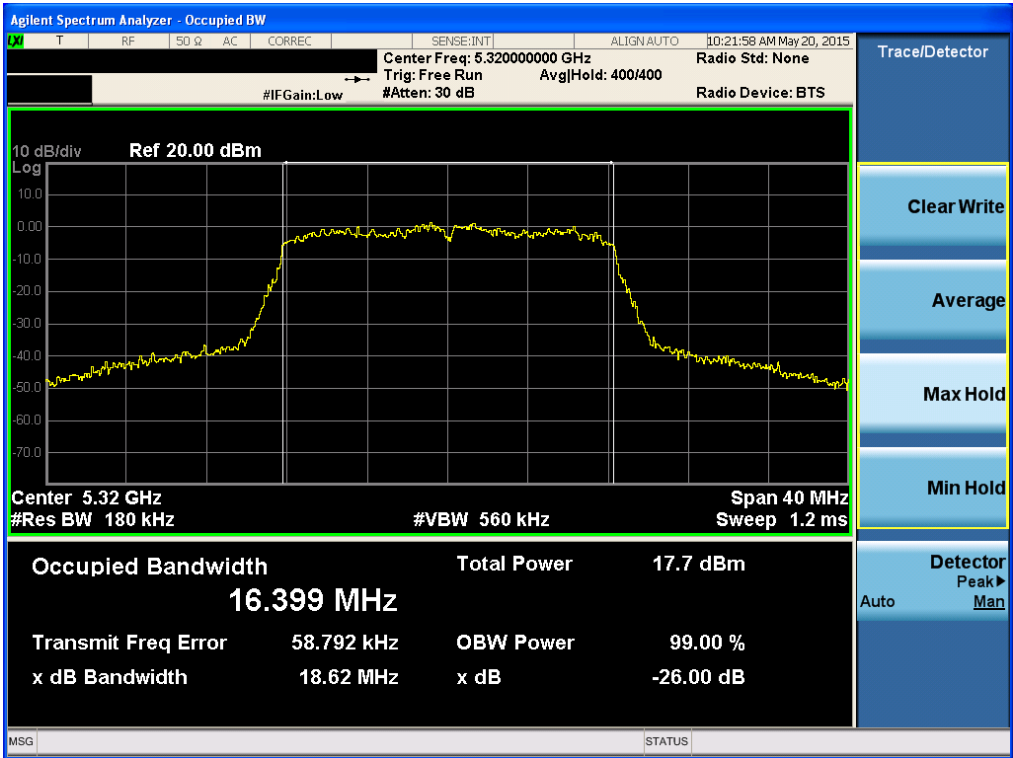
26 dB Bandwidth

Test Mode: 802.11a & Ch.60



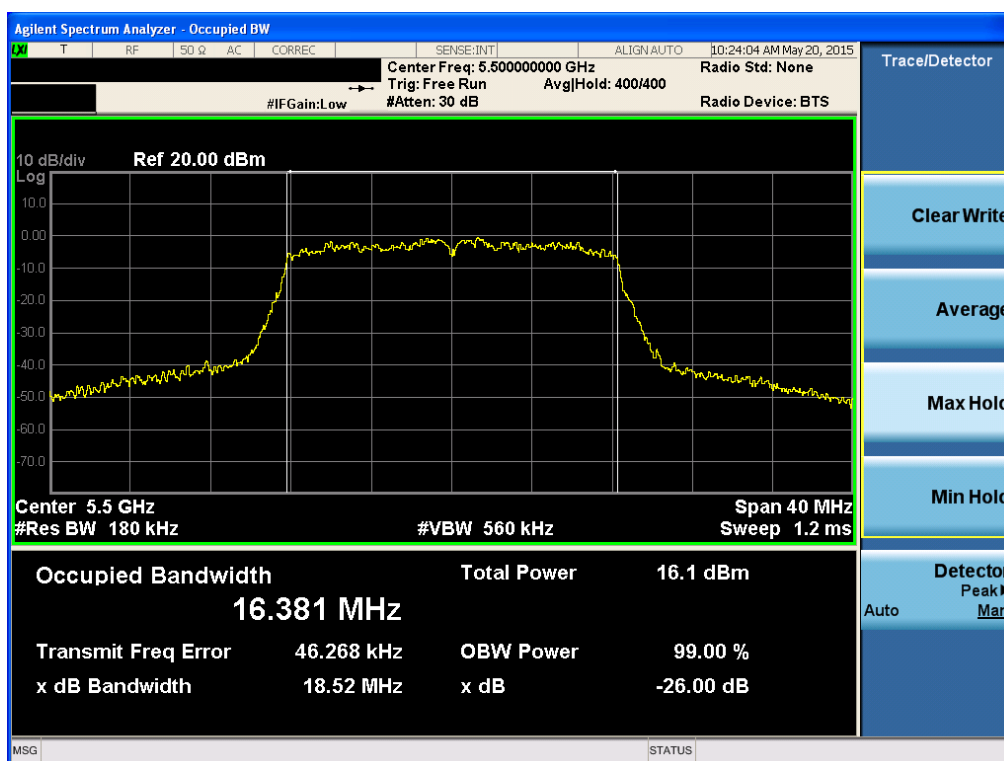
26 dB Bandwidth

Test Mode: 802.11a & Ch.64



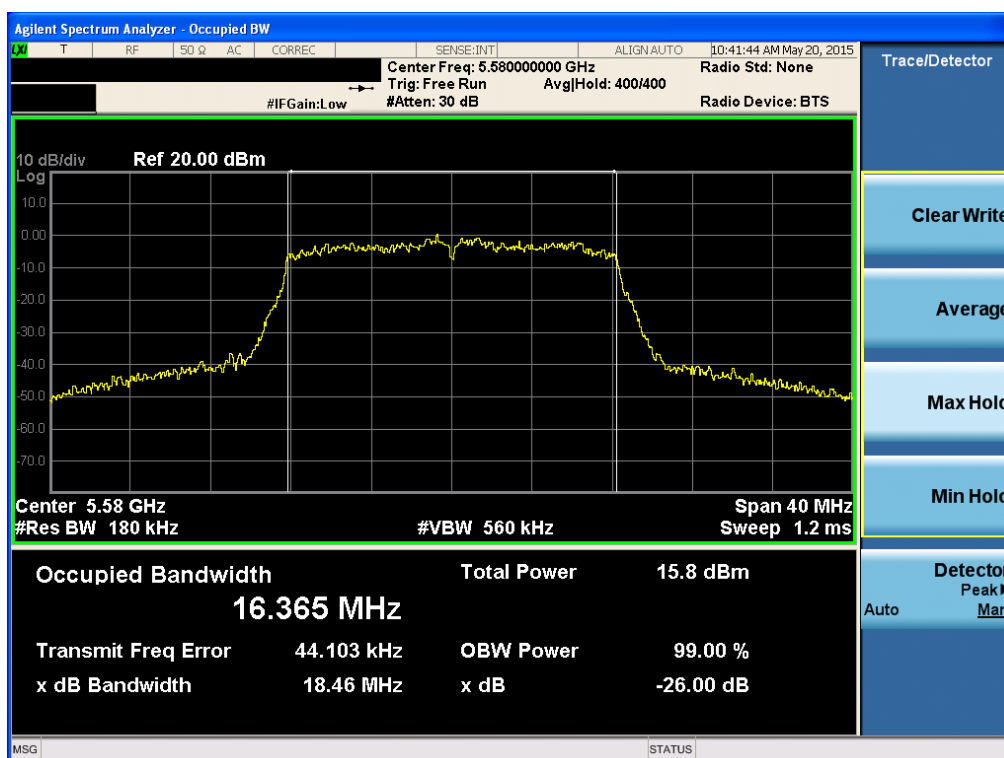
26 dB Bandwidth

Test Mode: 802.11a & Ch.100



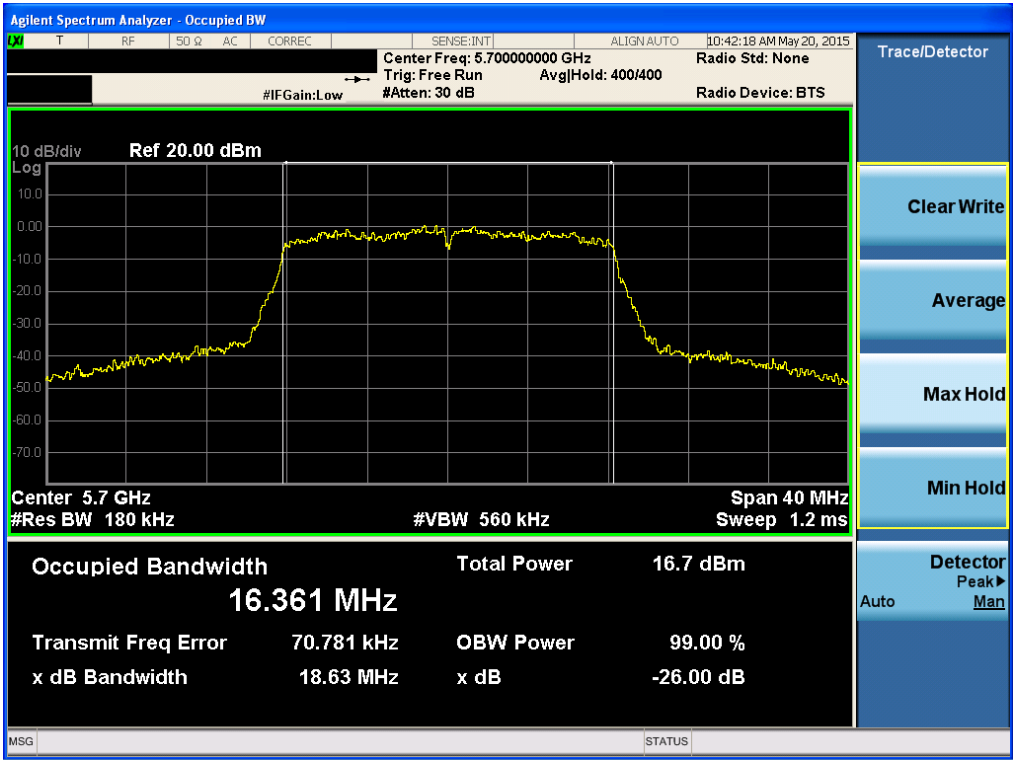
26 dB Bandwidth

Test Mode: 802.11a & Ch.116



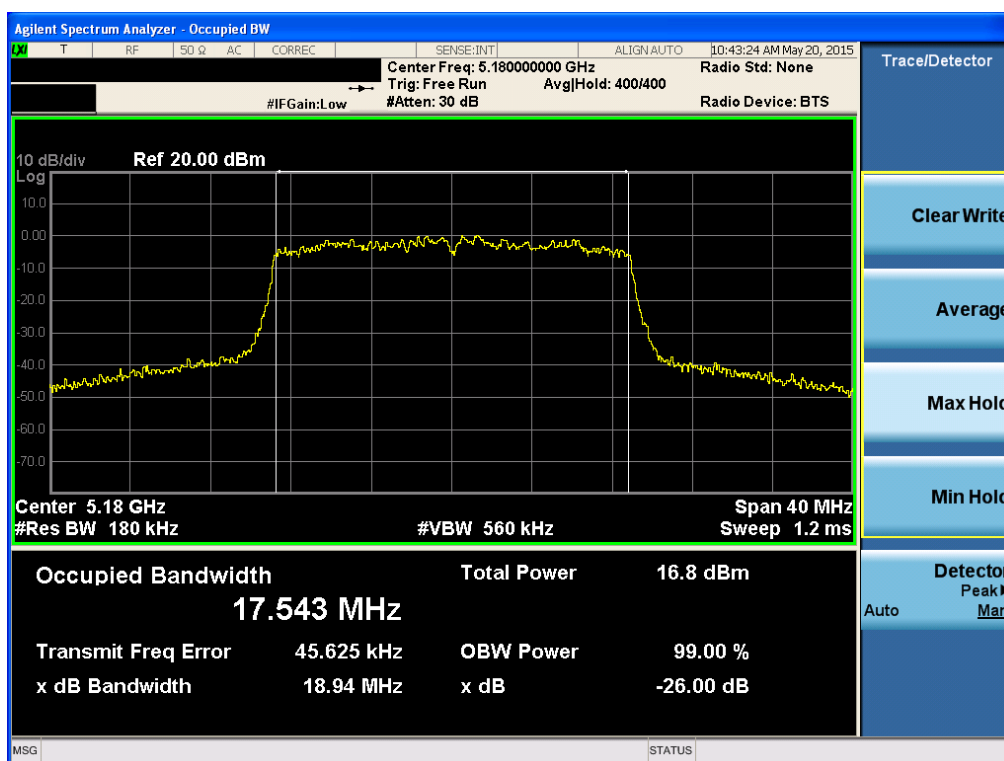
26 dB Bandwidth

Test Mode: 802.11a & Ch.140



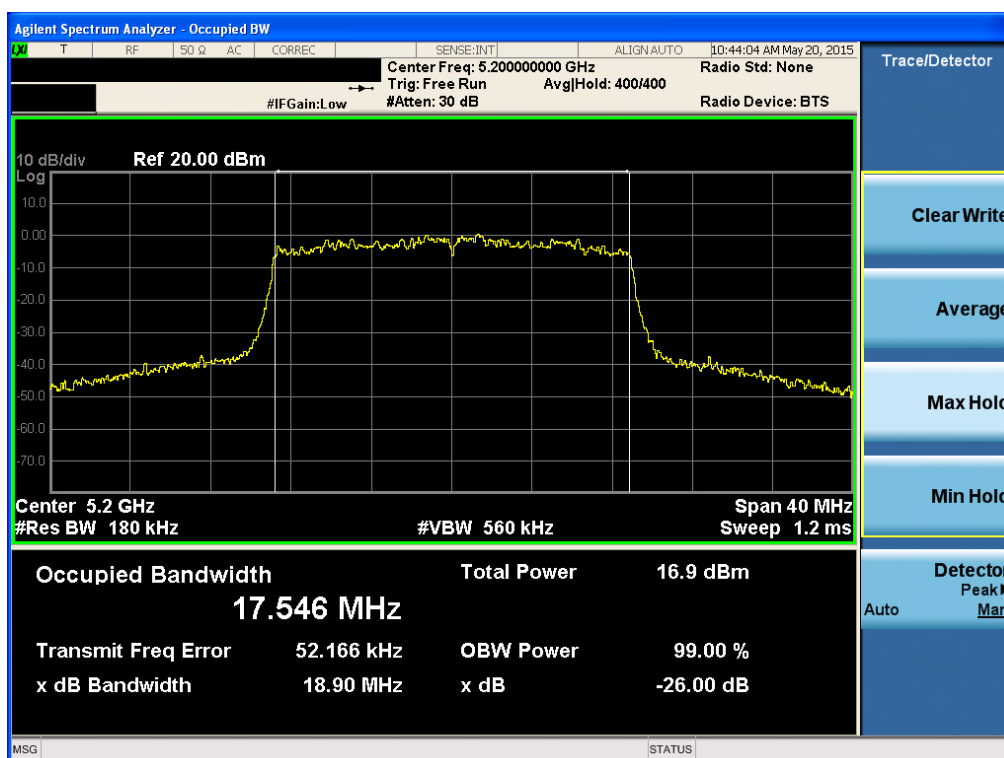
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.36



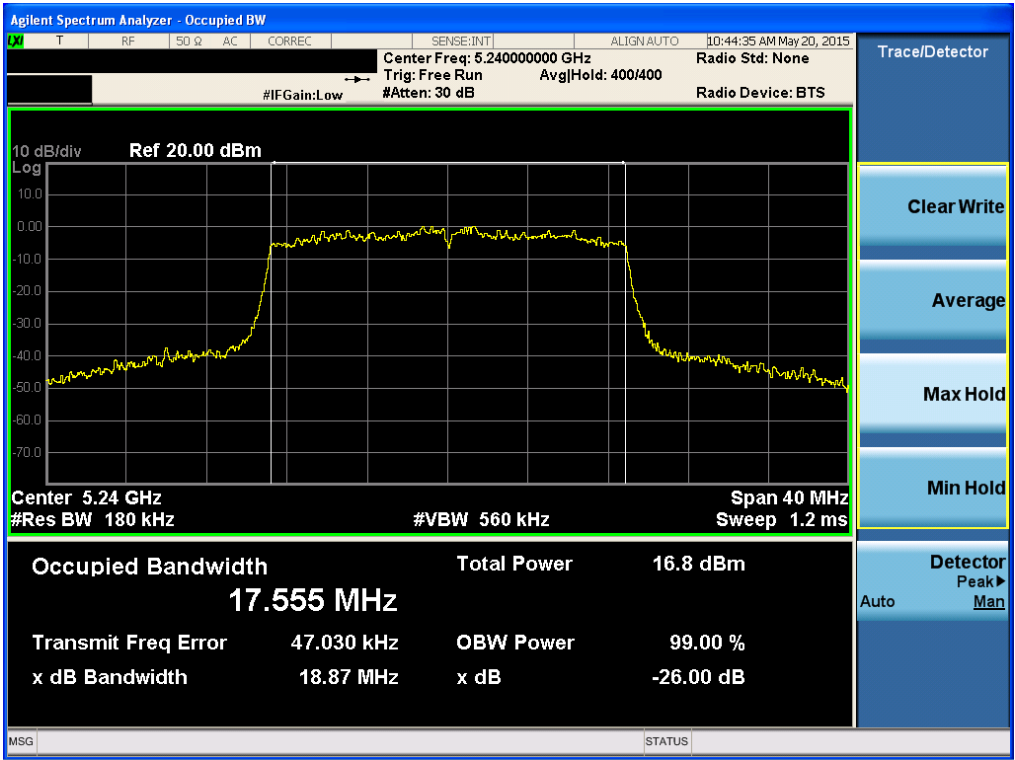
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.40



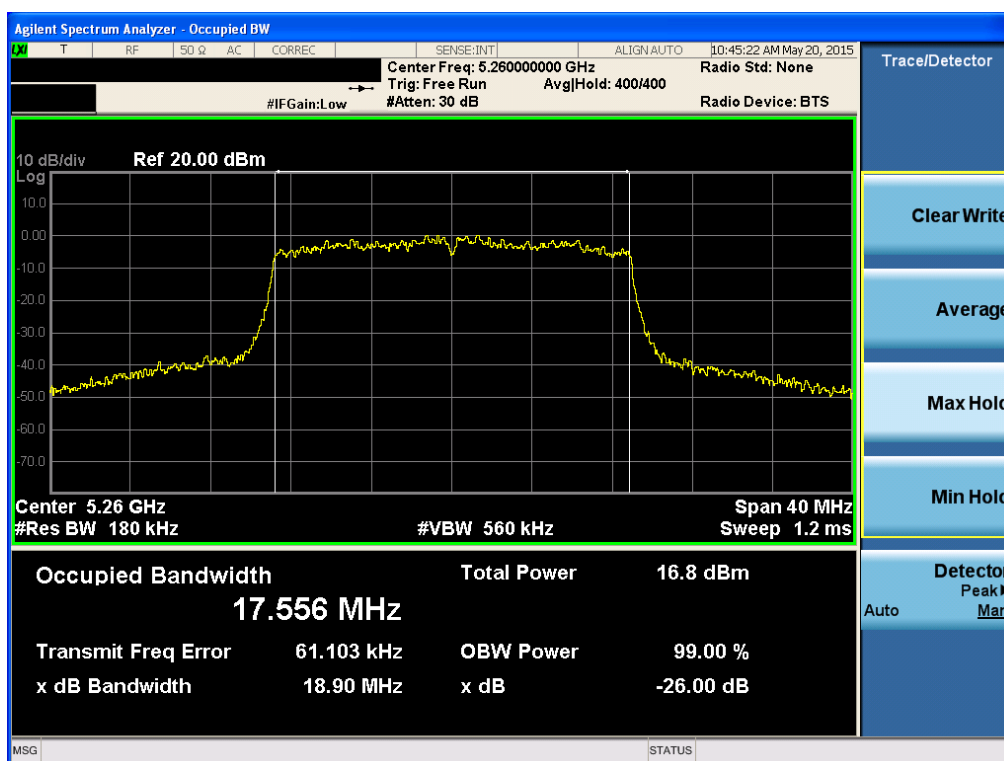
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.48



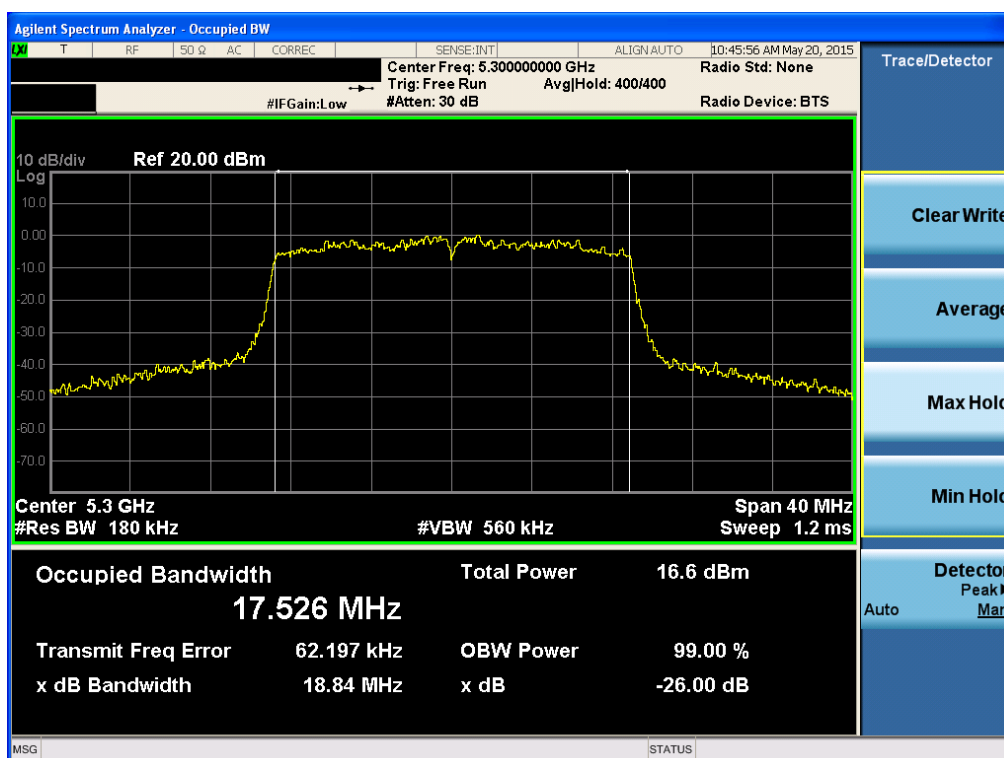
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.52



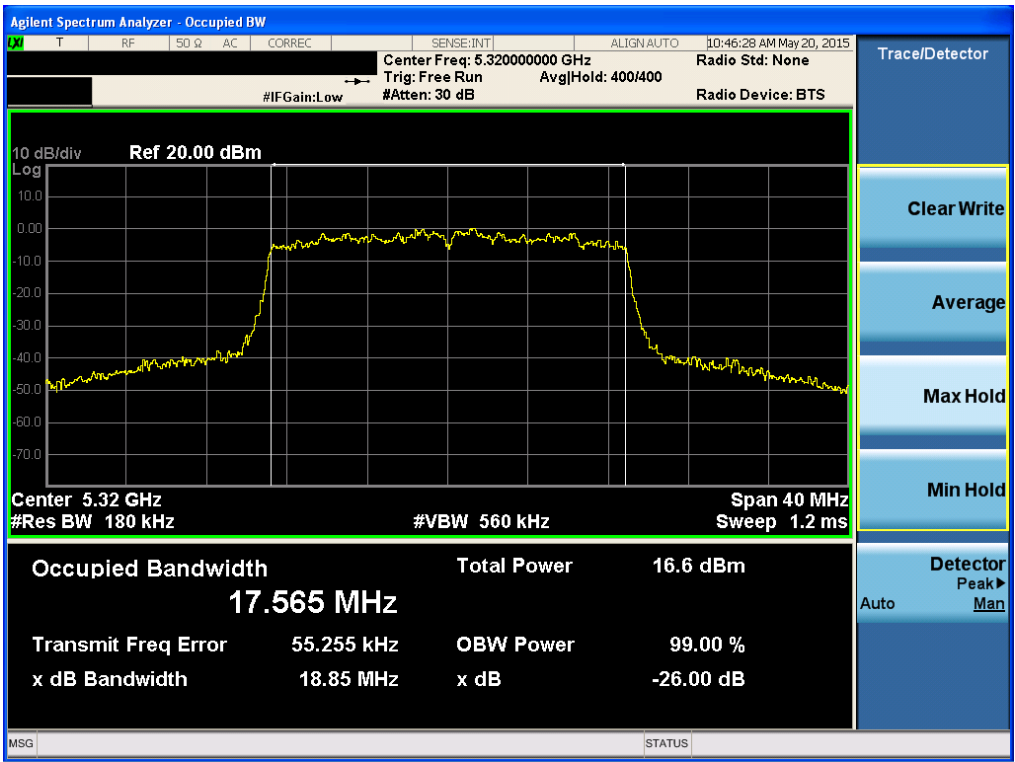
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.60



26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.64

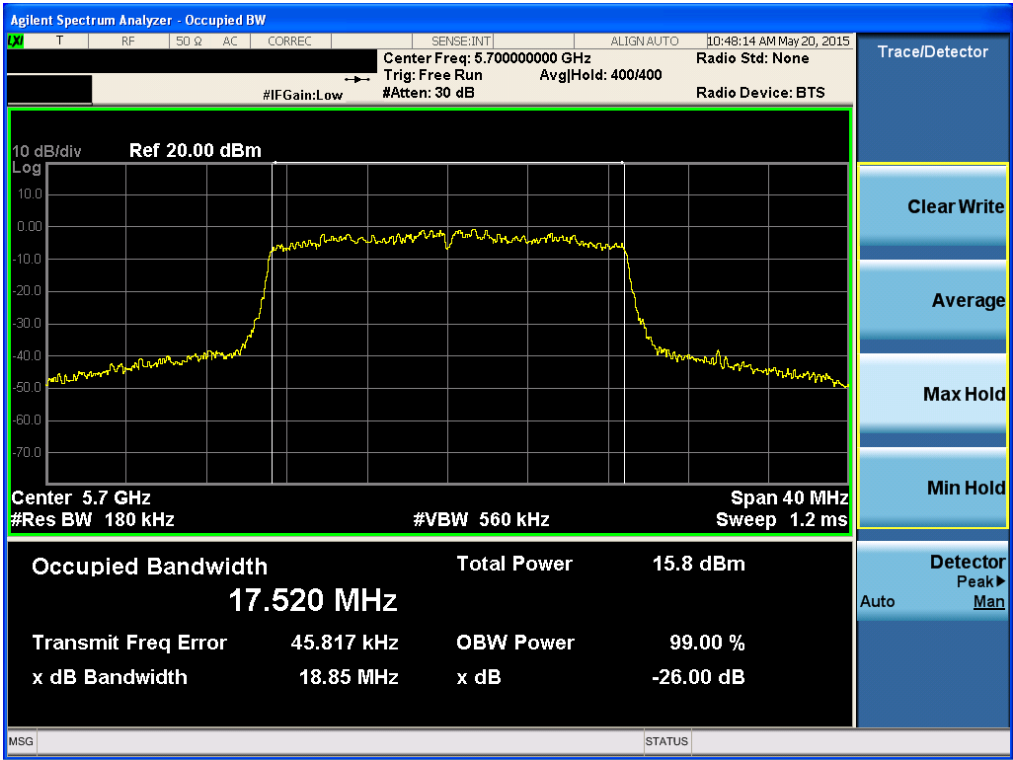


Test Mode: 802.11n HT20 & Ch.100

Test Mode: 802.11n HT20 & Ch.116

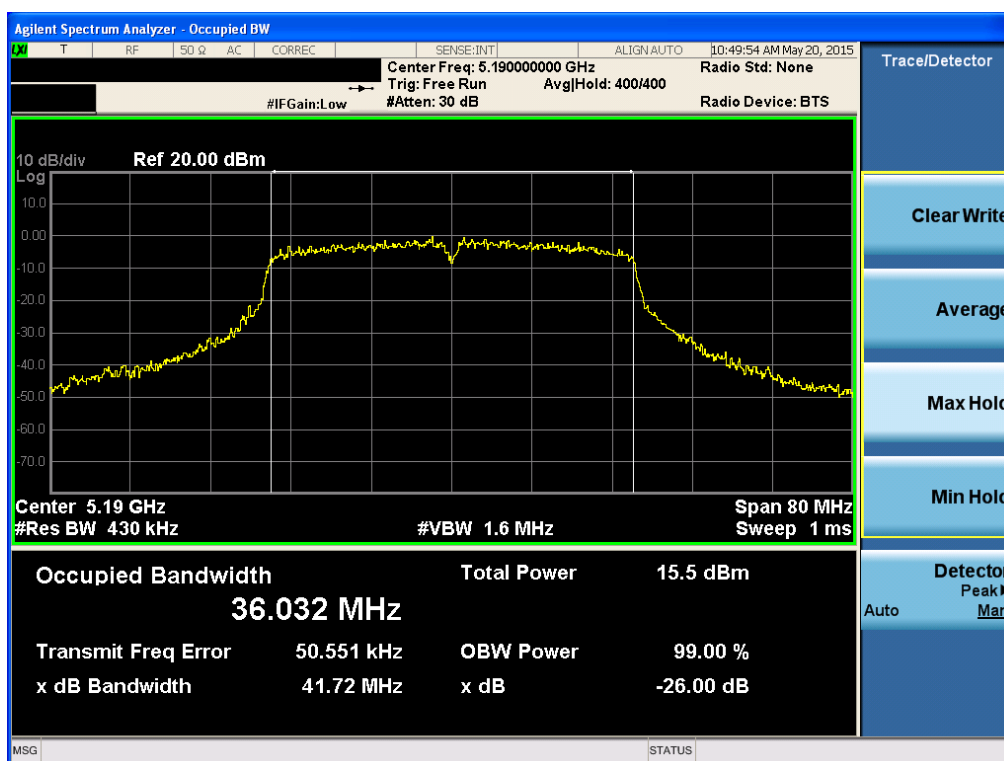
26 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.140



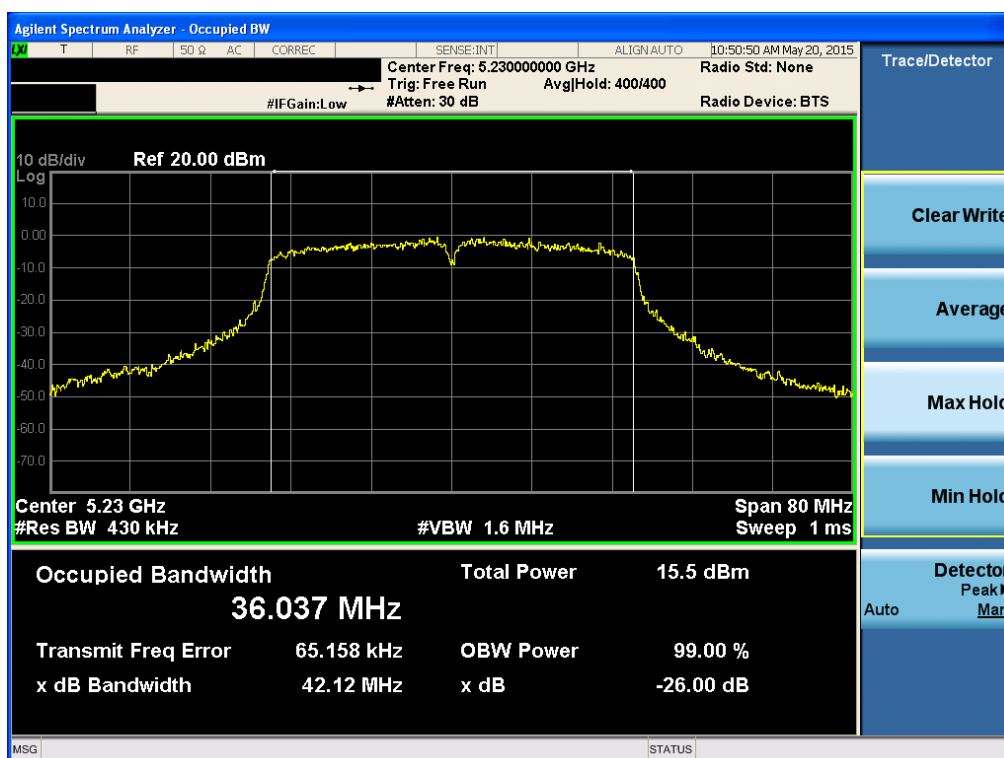
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.38



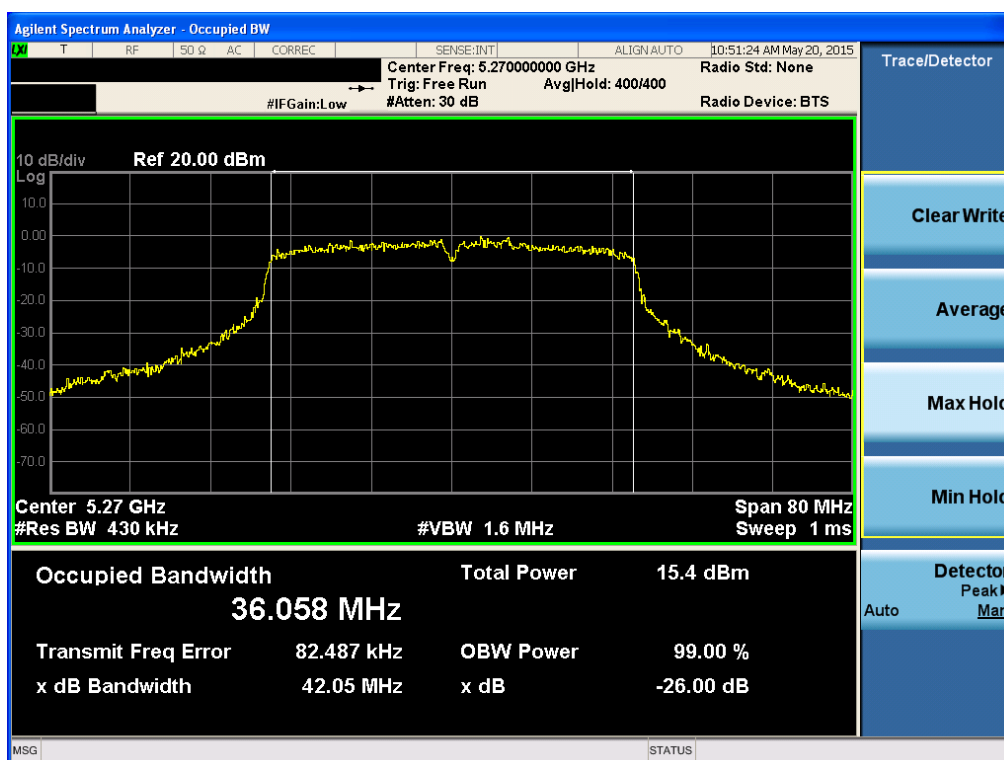
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.46



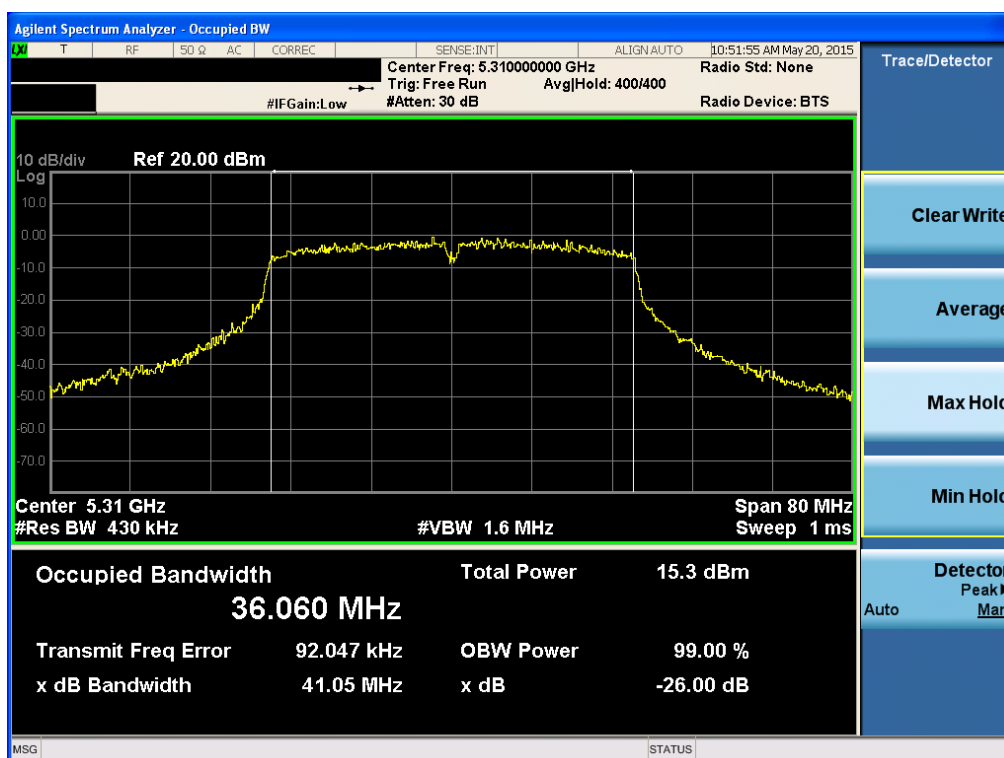
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.54



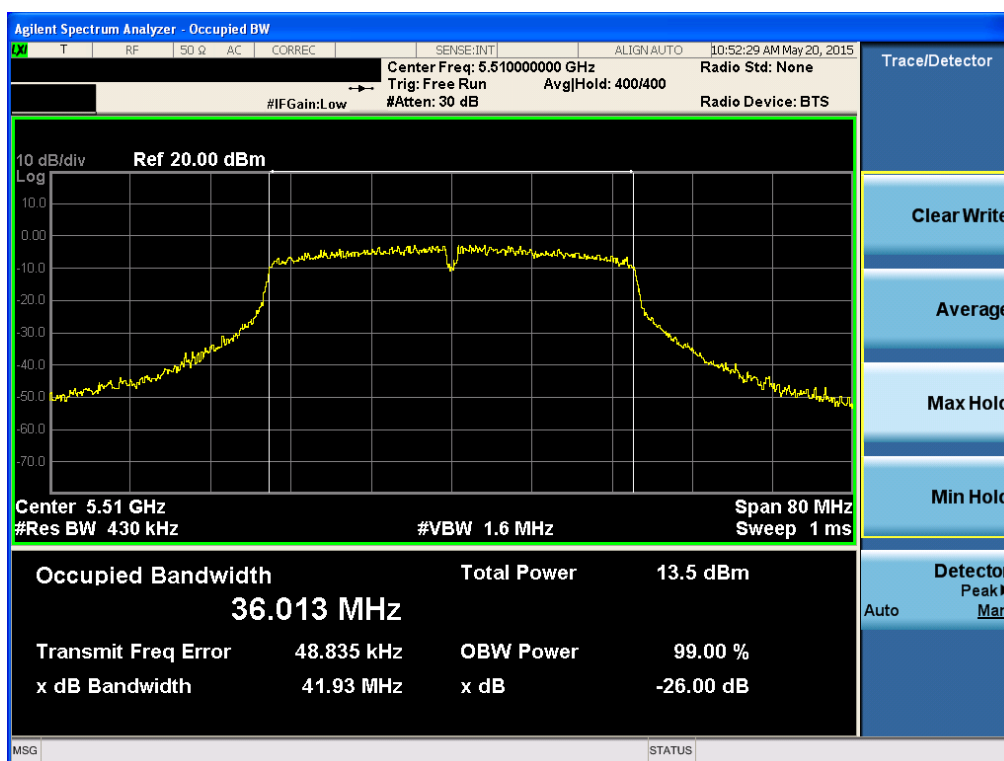
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.62



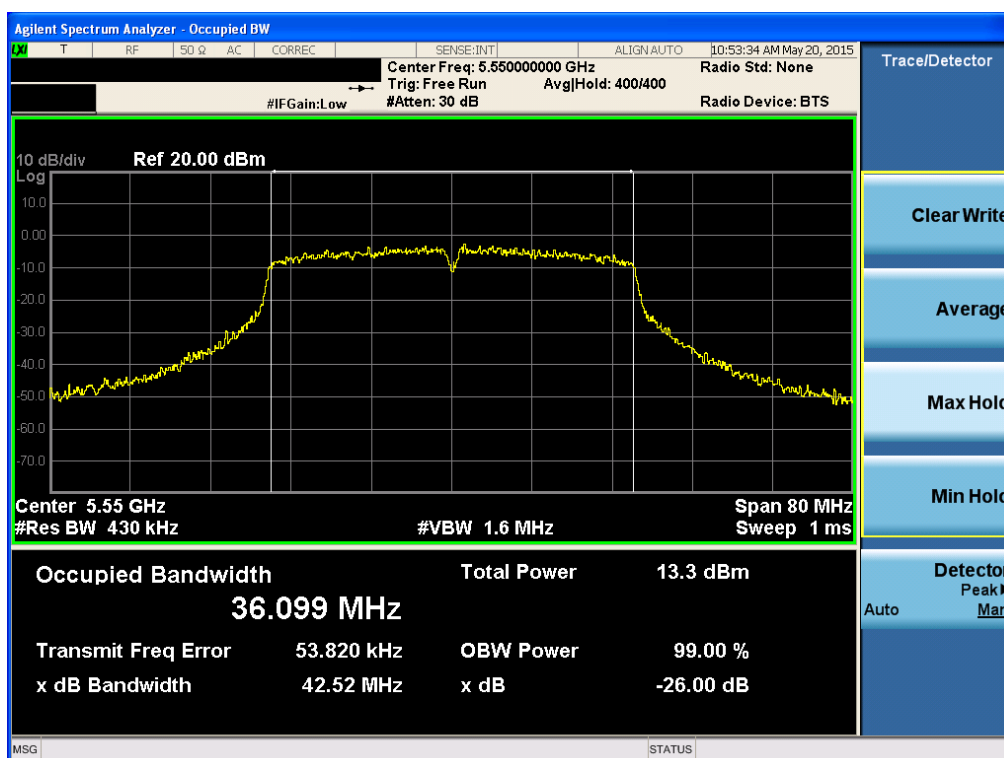
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.102



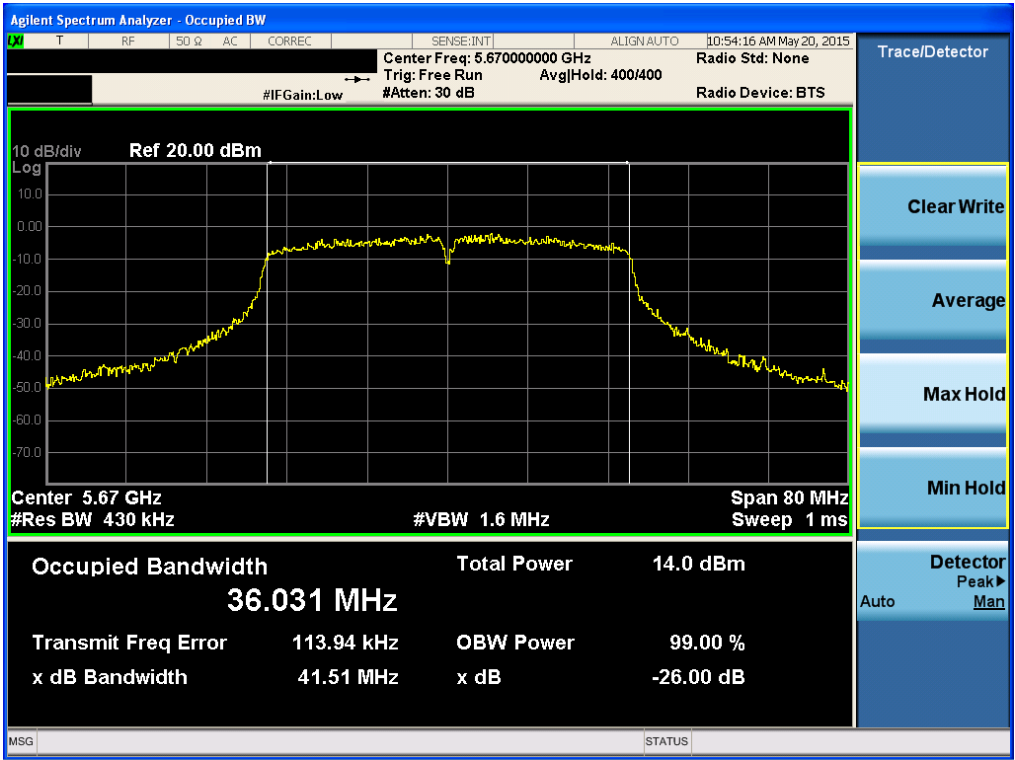
26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.110



26 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.134



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 $\geq 3 \times \text{RBW}$.
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.

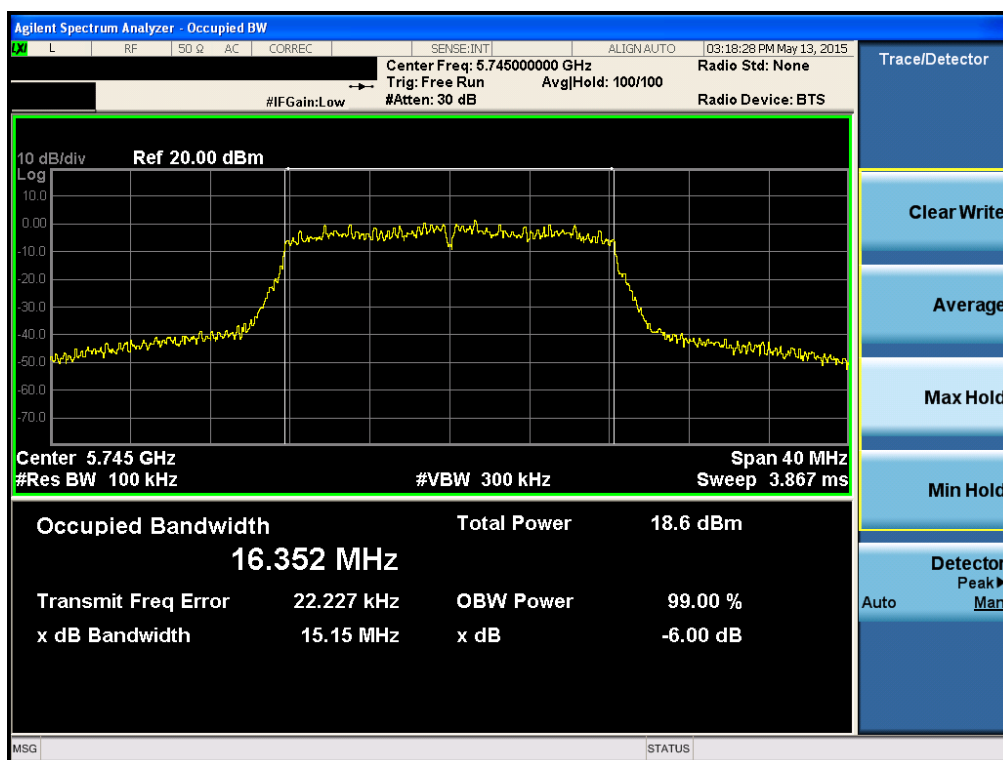
■ TEST RESULTS: **Comply**

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band IV	149	5745	15.15
		157	5785	15.17
		165	5825	16.32
802.11n (HT20)	Band IV	149	5745	16.11
		157	5785	15.44
		165	5825	15.15
802.11n (HT40)	Band IV	151	5755	35.17
		159	5795	35.19

RESULT PLOTS

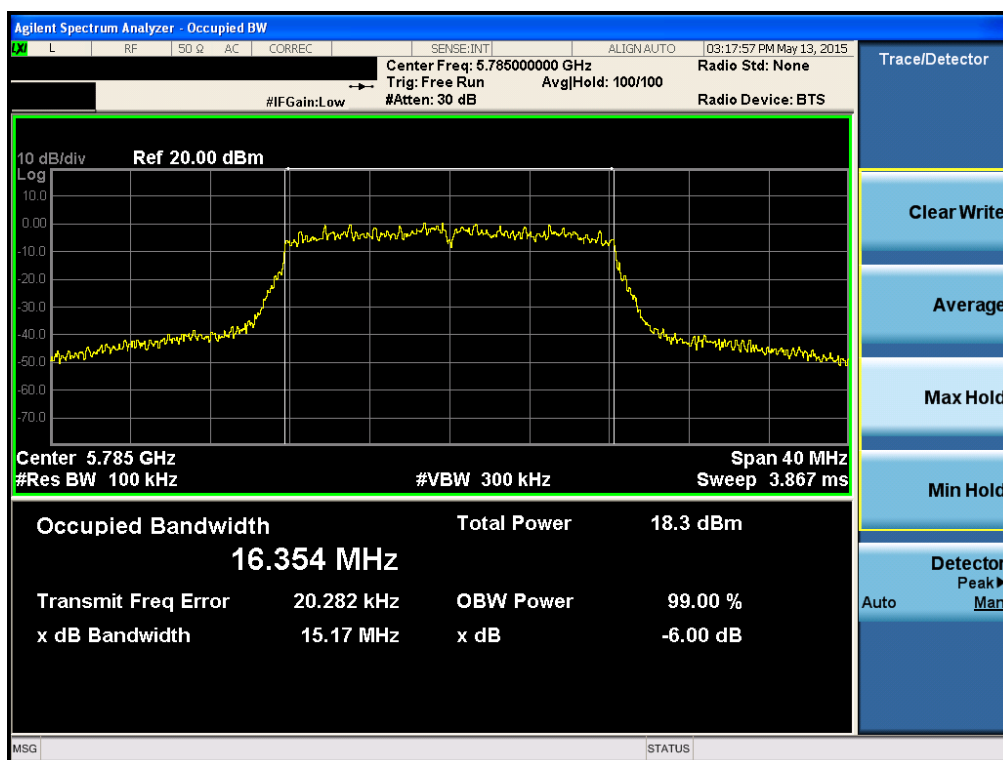
6 dB Bandwidth

Test Mode: 802.11a & Ch.149



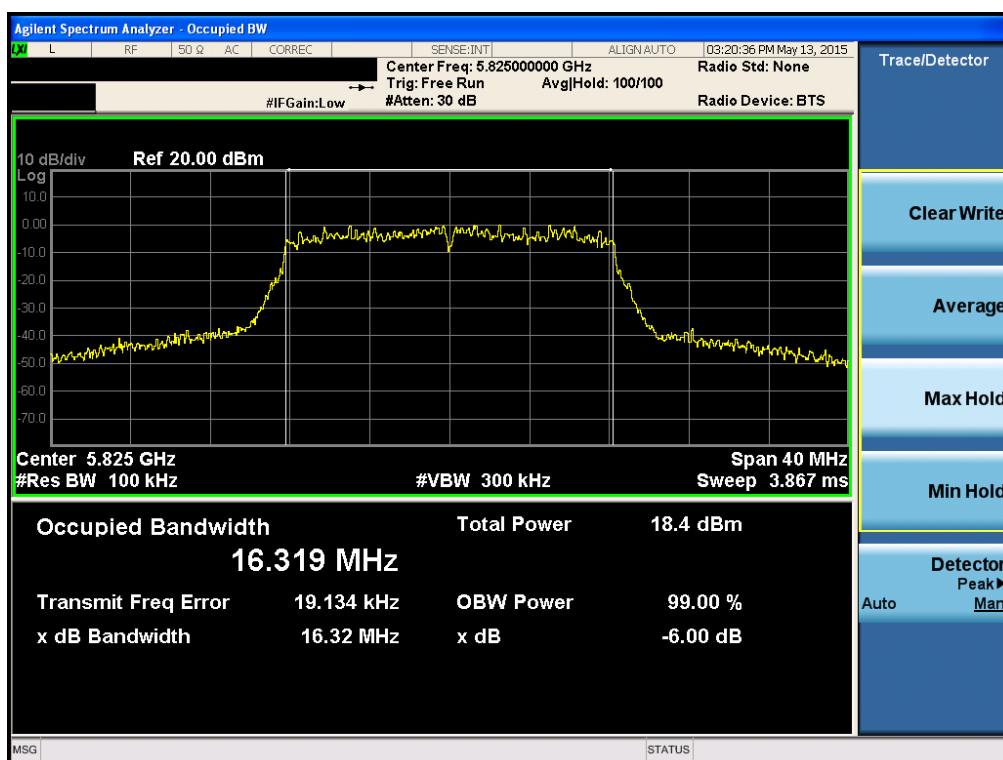
6 dB Bandwidth

Test Mode: 802.11a & Ch.157



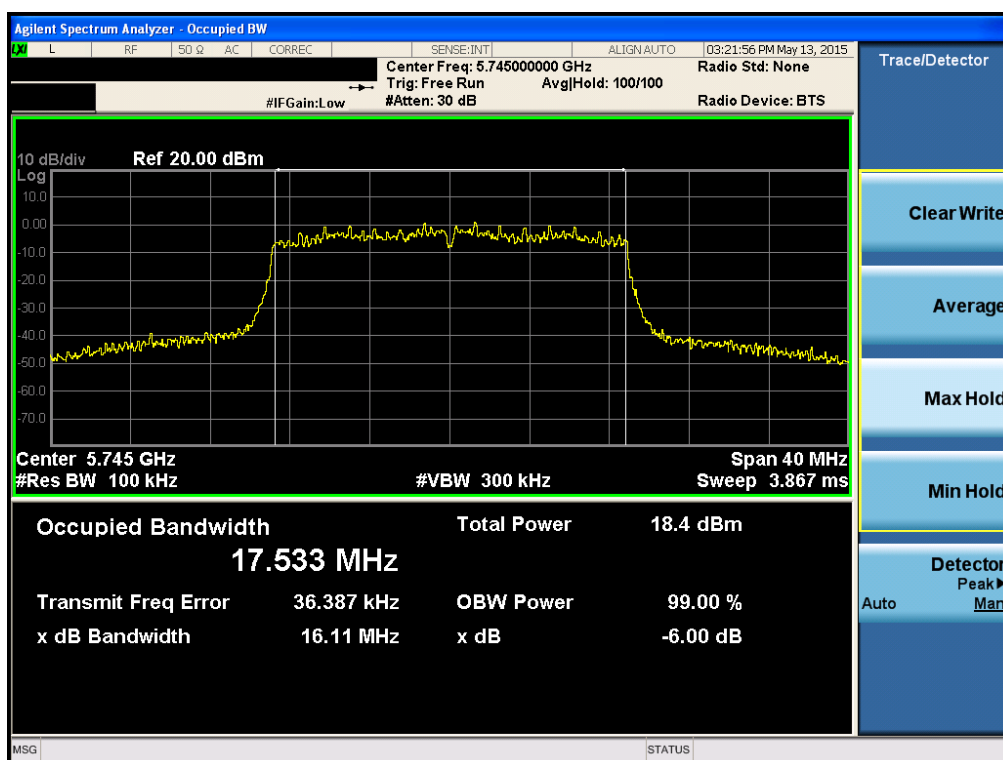
6 dB Bandwidth

Test Mode: 802.11a & Ch.165



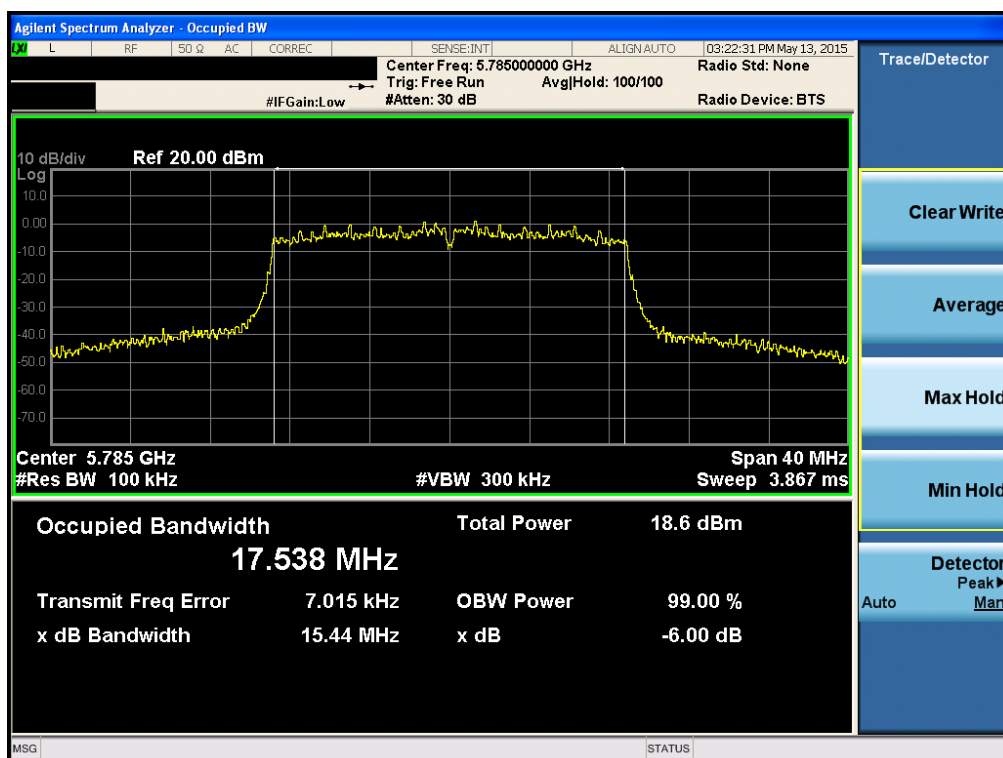
6 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.149



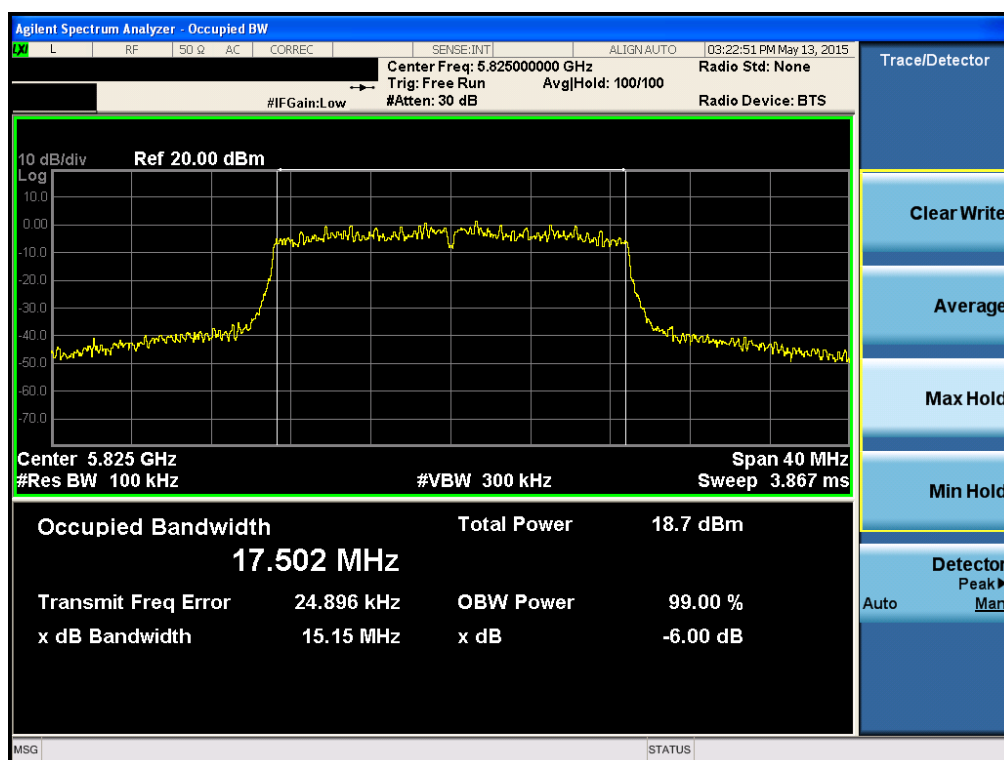
6 dB Bandwidth

Test Mode: 802.11a HT20 & Ch.157



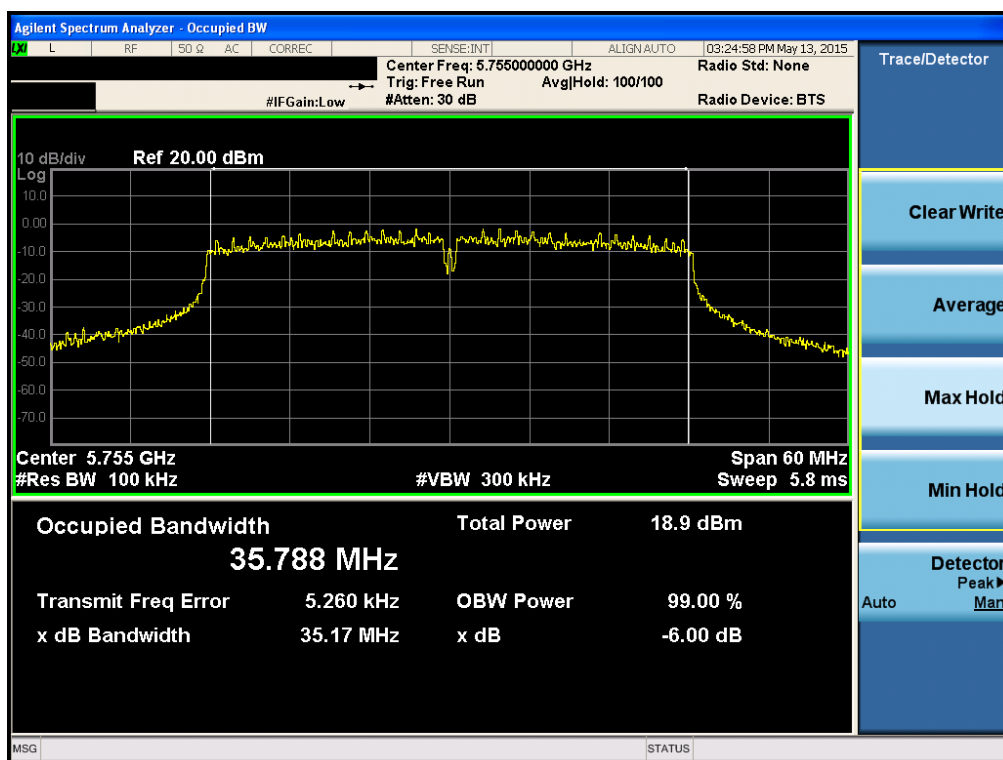
6 dB Bandwidth

Test Mode: 802.11n HT20 & Ch.165



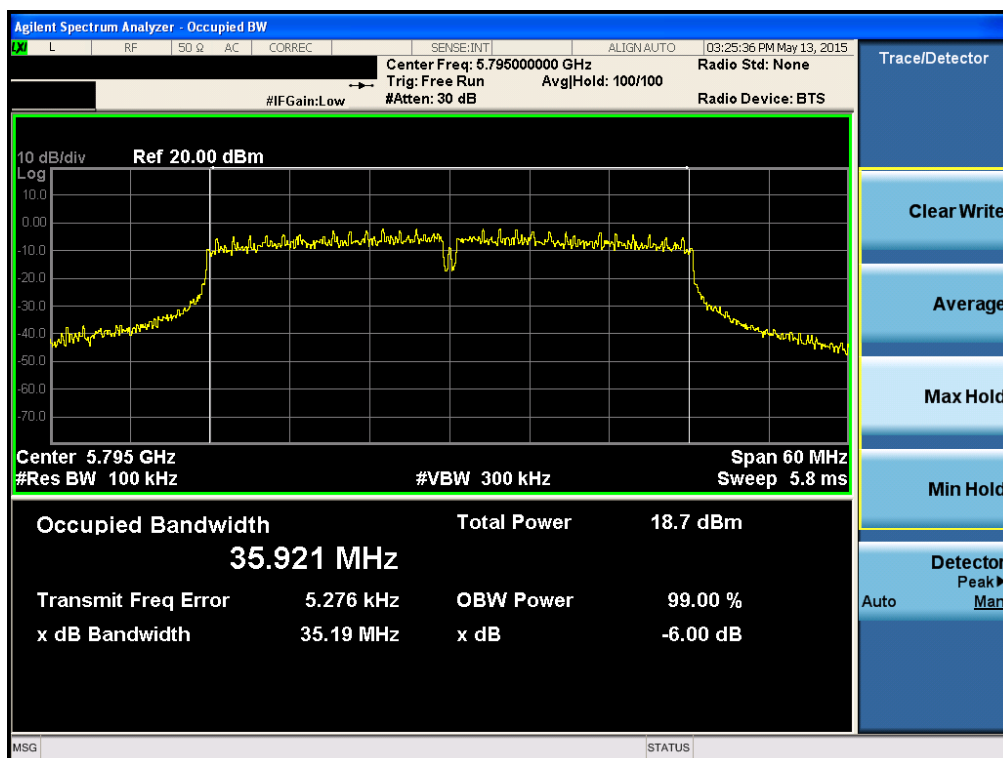
6 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.151



6 dB Bandwidth

Test Mode: 802.11n HT40 & Ch.159



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 $11 \text{ dBm} + 10 \log B$, 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.

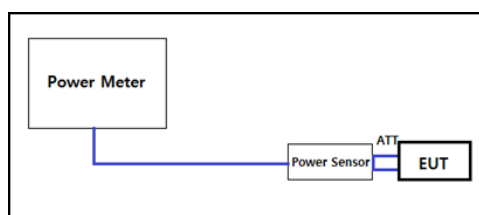
- Output power Limit Calculation

Bands	Mode	Power Limit for FCC [mW]	Calculated Limit [dBm]	Directional Gain (Worst case)	Determined Limit [dBm]	
		Power Limit for IC [mW]				
		At least 99% BW [MHz]			for FCC	for IC
Band I	802.11a	250	23.97	3.64	23.97	22.19
		200	23.01			
		16.572	22.19			
	802.11n HT20	250	23.97		23.97	22.46
		200	23.01			
		17.619	22.46			
	802.11n HT40	250	23.97		23.97	23.01
		200	23.01			
		36.014	25.56			

Bands	Mode	Power Limit [mW]	Calculation Limit [dBm]	ANT Gain	Determined Limit [dBm]	
		At least 26dBC BW [MHz]				
		At least 99% BW [MHz]			for FCC	for IC
Band II	802.11a	250	23.97	3.64	23.68	23.18
		18.560	23.68			
		16.538	23.18			
	802.11n HT20	250	23.97		23.75	23.45
		18.840	23.75			
		17.583	23.45			
	802.11n HT40	250	23.97		23.97	23.97
		41.050	27.13			
		35.998	26.56			
Band III	802.11a	250	23.97	4.05	23.66	23.19
		18.460	23.66			
		16.556	23.19			
	802.11n HT20	250	23.97		23.75	23.46
		18.850	23.75			
		17.603	23.46			
	802.11n HT40	250	23.97		23.97	23.97
		41.510	27.18			
		36.027	26.57			

Bands	Mode	Power Limit [mW]	Calculated Limit [dBm]	ANT Gain	Determined Limit for FCC & IC [dBm]
Band IV	802.11a	1000	30.00	5.02	30.00
	802.11n HT20	1000	30.00		30.00
	802.11n HT40	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	Bands	Channel	Frequency [MHz]	Test Result [dBm]
802.11a	Band I	36	5180	11.566
		40	5200	11.577
		48	5240	11.724
	Band II	52	5260	11.667
		60	5300	11.619
		64	5320	11.484
	Band III	100	5500	9.659
		116	5580	9.527
		140	5700	10.298
	Band IV	149	5745	13.733
		157	5785	14.040
		165	5825	14.034
802.11n HT20	Band I	36	5180	10.311
		40	5200	10.145
		48	5240	10.247
	Band II	52	5260	10.375
		60	5300	10.145
		64	5320	10.044
	Band III	100	5500	7.745
		116	5580	7.824
		140	5700	7.938
	Band IV	149	5745	12.593
		157	5785	12.868
		165	5825	12.979
802.11n HT40	Band I	38	5190	9.154
		46	5230	9.426
	Band II	54	5270	9.254
		62	5310	9.089
	Band III	102	5510	6.841
		110	5550	6.847
		134	5670	7.455
	Band IV	151	5755	11.976
		159	5795	11.604

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]
Band I ^{for FCC}	11	3.64	11
Band I ^{for IC}	10		10
Band II	11	3.64	11
Band III	11	4.05	11
Band IV	30	5.02	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 $RBW \geq 1/T$, where T is defined in section II.B.1.a). (Refer to Appendix II)
 - b) Set $VBW \geq 3 RBW$.
 - c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add $10\log(500\text{kHz}/RBW)$ to the measured result, whereas $RBW (< 500 \text{ kHz})$ 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 $10\log(1\text{MHz}/RBW)$ to the measured result, whereas $RBW (< 1 \text{ MHz})$ 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 $RBW=100 \text{ kHz}$ is available on nearly all spectrum analyzers.

■ Test result: **Comply**

Mode	Channel	Frequency [MHz]	Reading [dBm]	DCF [dB] Note 1	Test Result [dBm]
802.11a	36	5180	-9.260	11.940	2.680
	40	5200	-9.250		2.690
	48	5240	-9.100		2.840
	52	5260	-9.710		2.230
	60	5300	-9.470		2.470
	64	5320	-9.490		2.450
	100	5500	-11.320		0.620
	116	5580	-11.360		0.580
	140	5700	-10.370		1.570
	149	5745	-6.940	8.930	1.990
	157	5785	-7.360		1.570
	165	5825	-7.070		1.860
802.11n HT20	36	5180	-9.370	12.080	2.710
	40	5200	-9.620		2.460
	48	5240	-9.550		2.530
	52	5260	-10.780		1.300
	60	5300	-9.980		2.100
	64	5320	-10.080		2.000
	100	5500	-12.070		0.010
	116	5580	-12.190		-0.110
	140	5700	-11.220		0.860
	149	5745	-7.150	9.070	1.920
	157	5785	-7.350		1.720
	165	5825	-8.010		1.060
802.11n HT40	38	5190	-14.690	13.020	-1.670
	46	5230	-14.370		-1.350
	54	5270	-14.580		-1.560
	62	5310	-14.850		-1.830
	102	5510	-16.740		-3.720
	110	5550	-17.030		-4.010
	134	5670	-16.310		-3.290
	151	5755	-11.850	10.010	-1.840
	159	5795	-12.420		-2.410

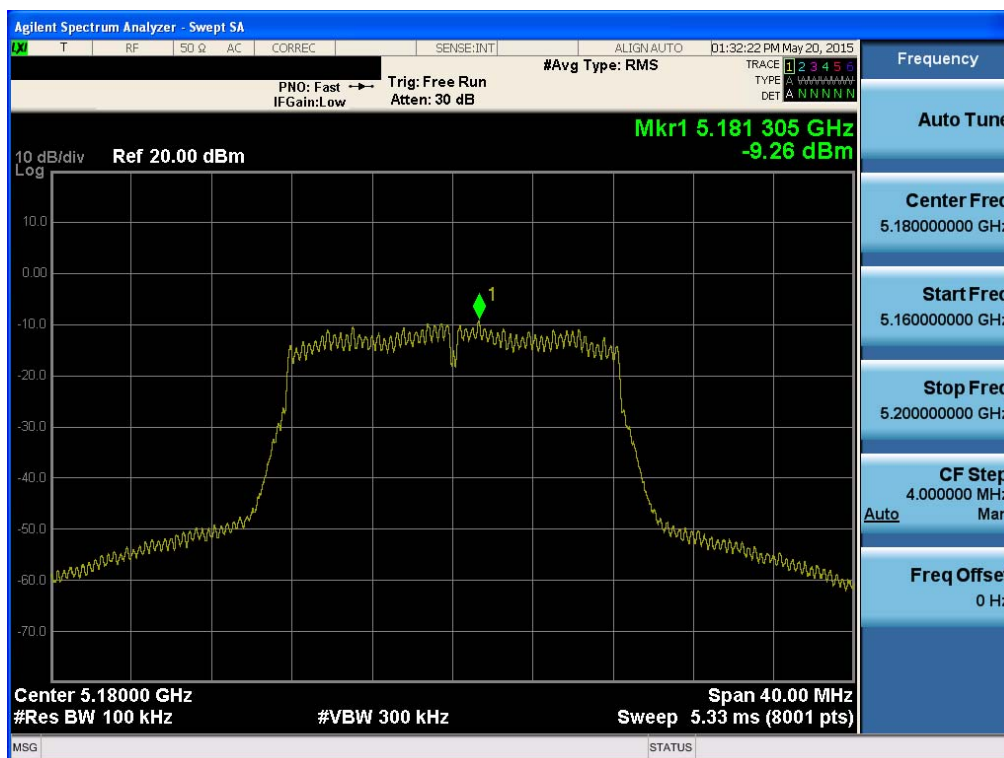
Note 1: **Refer to Appendix II. Only applied when Duty cycle < 0.98**
And correction factor of reduced RBW was included in the DCF.

Note 2: Test Result = Measurement Data + DCF

RESULT PLOTS

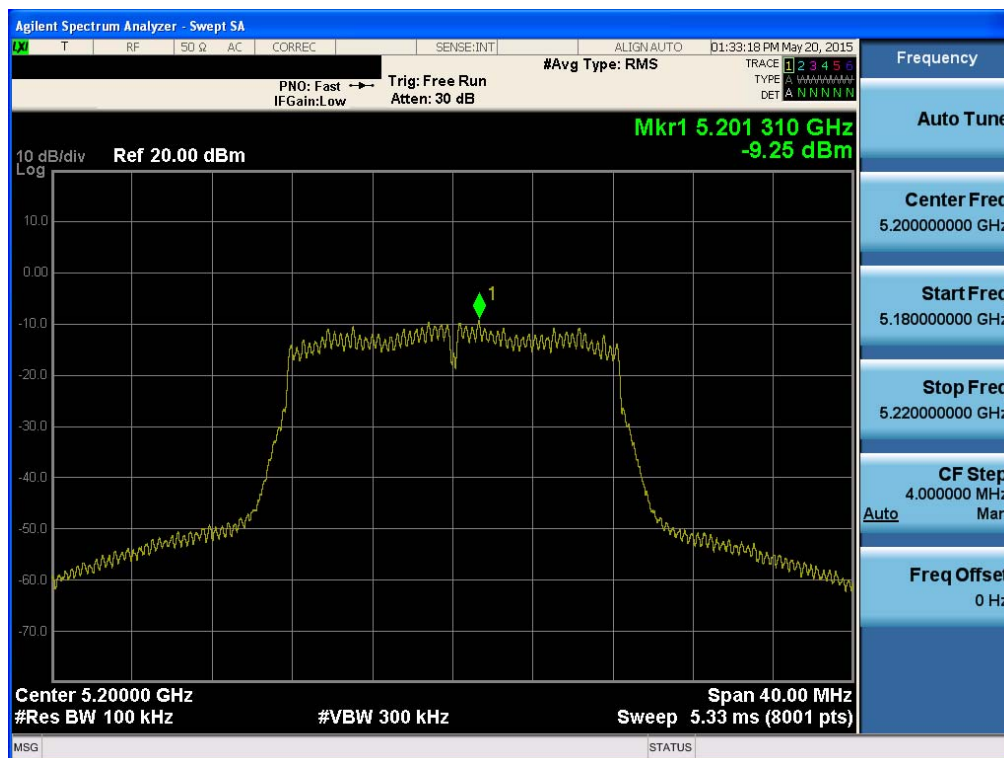
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.36



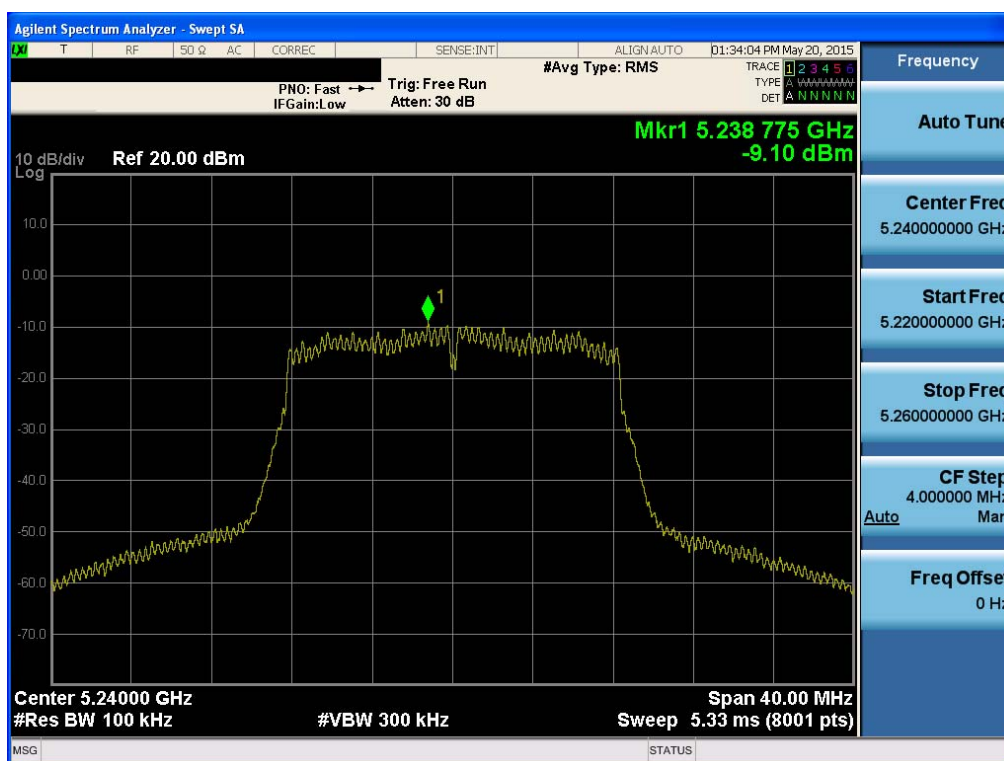
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.40



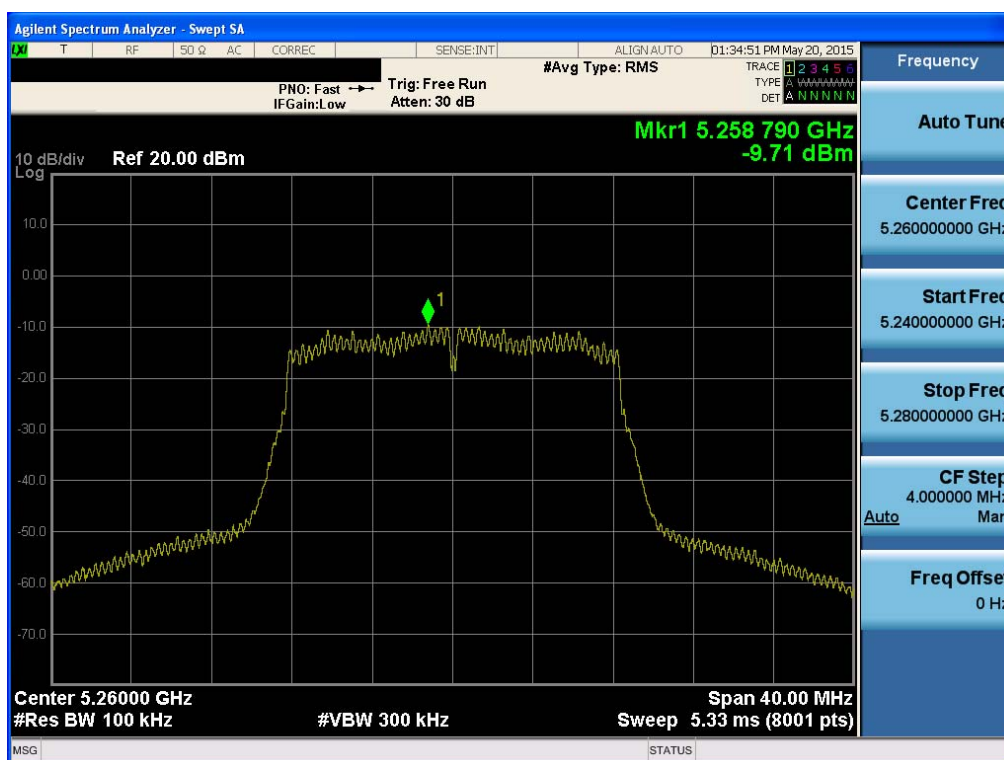
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.48



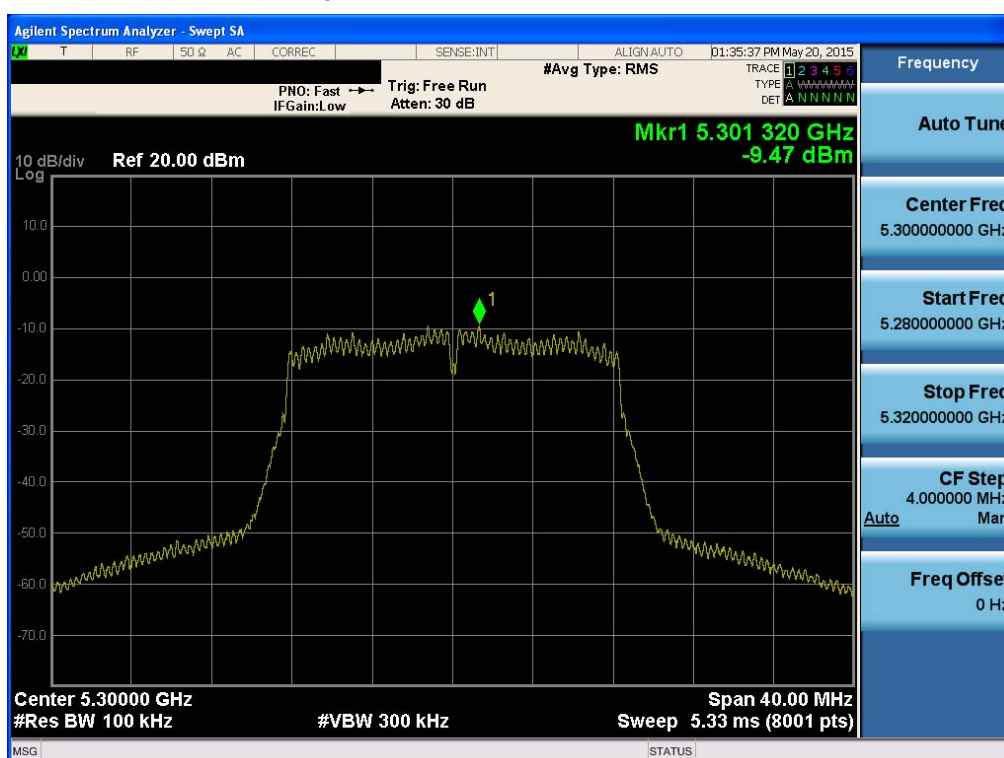
Maximum Power Spectral Density

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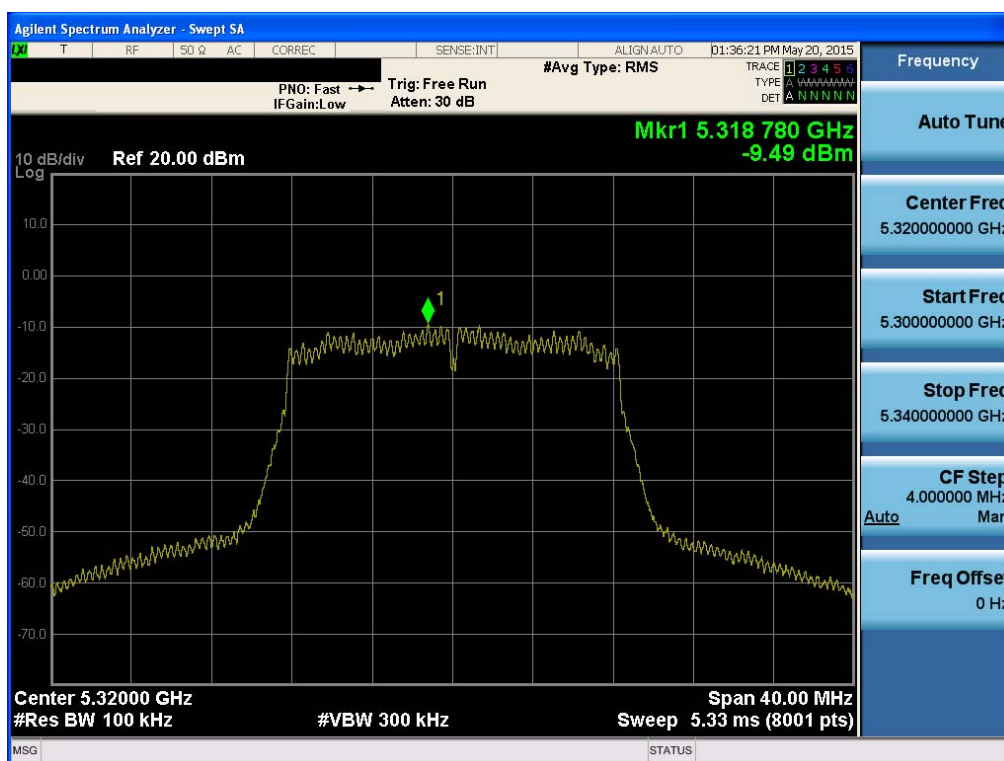
Maximum Power Spectral Density

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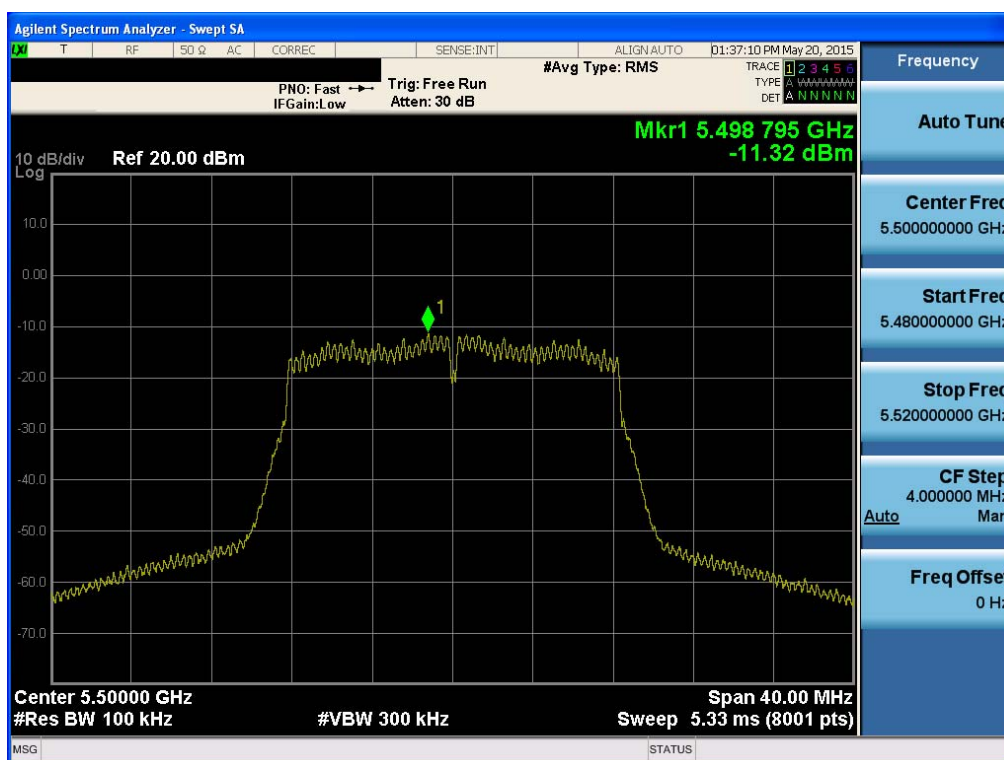
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.64



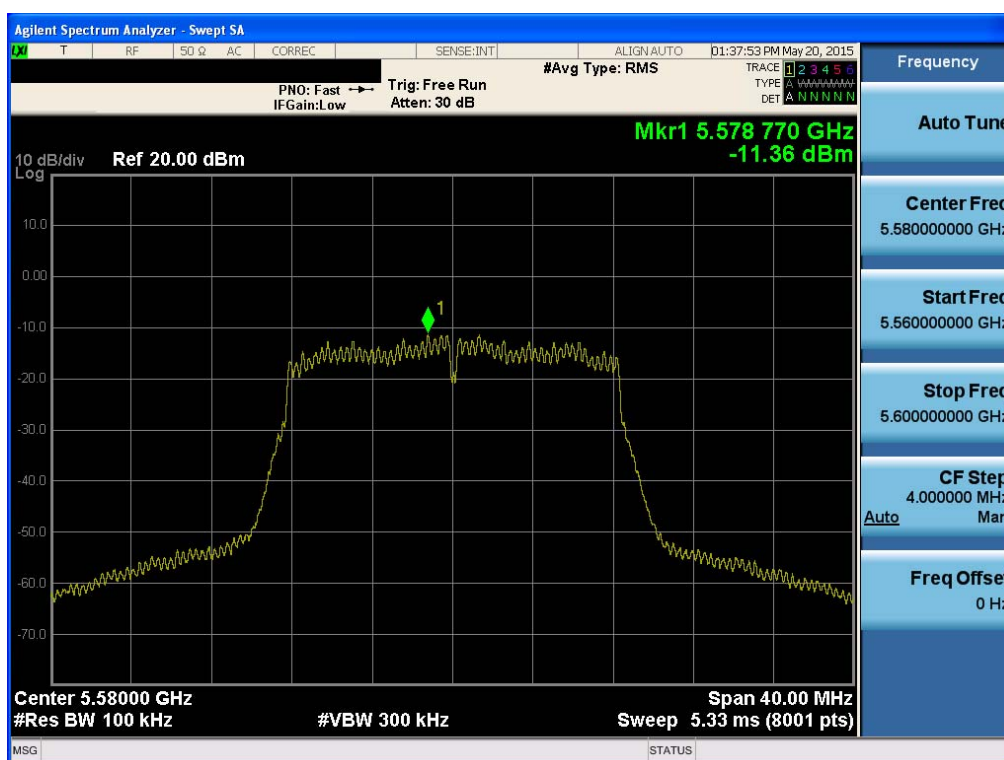
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.100



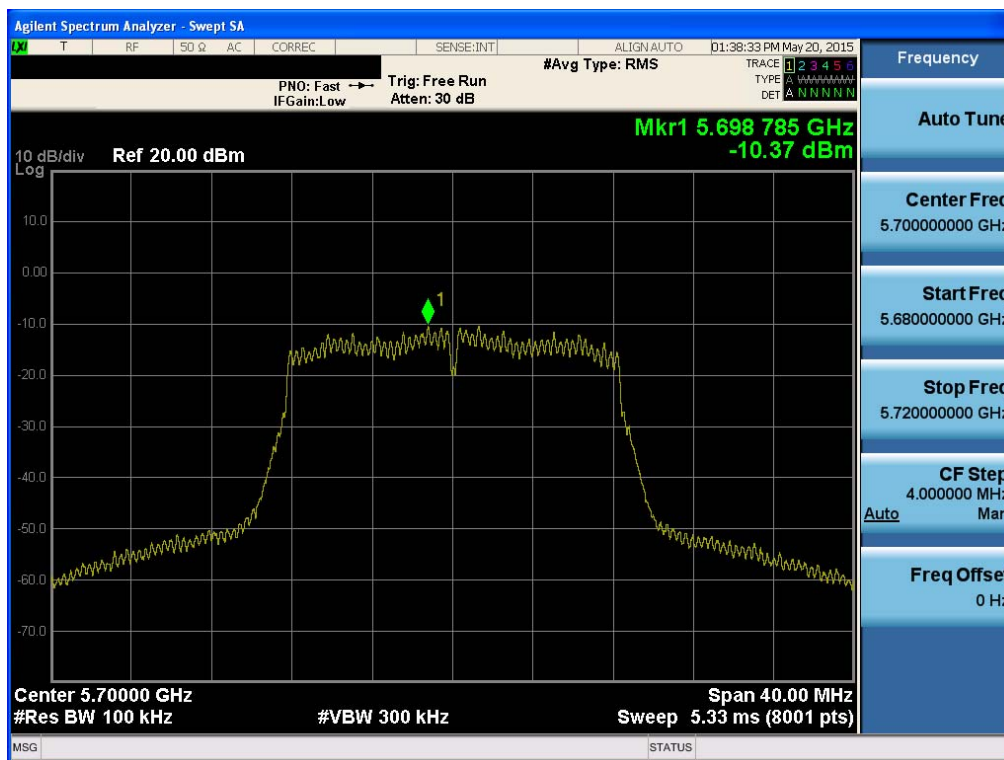
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.116



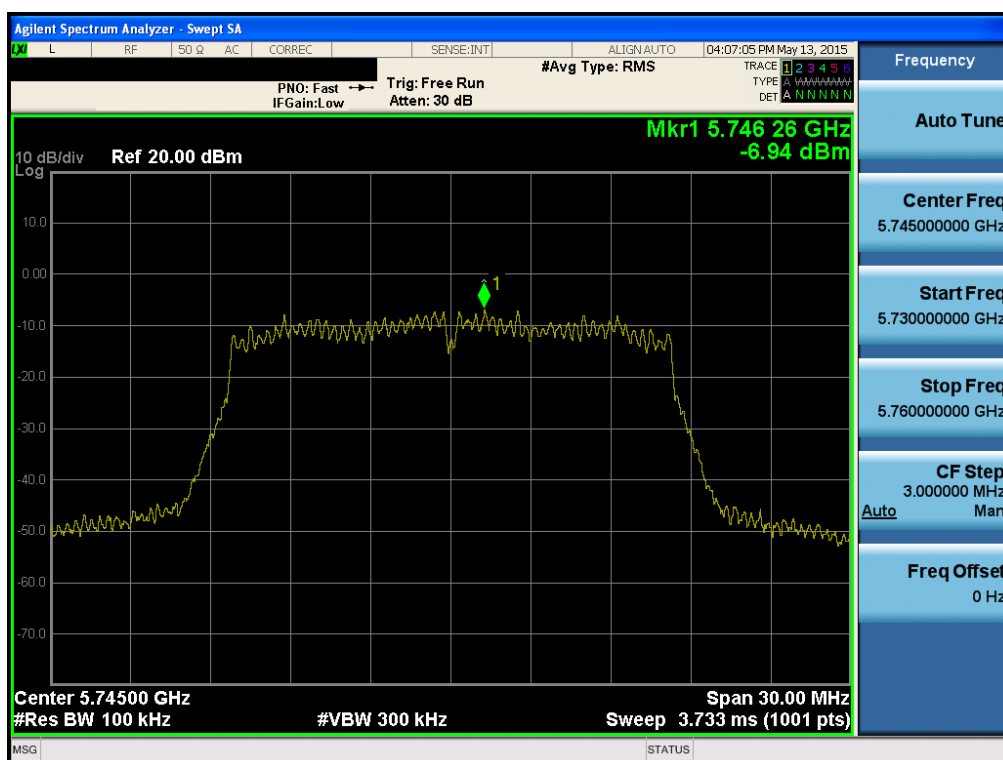
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.140



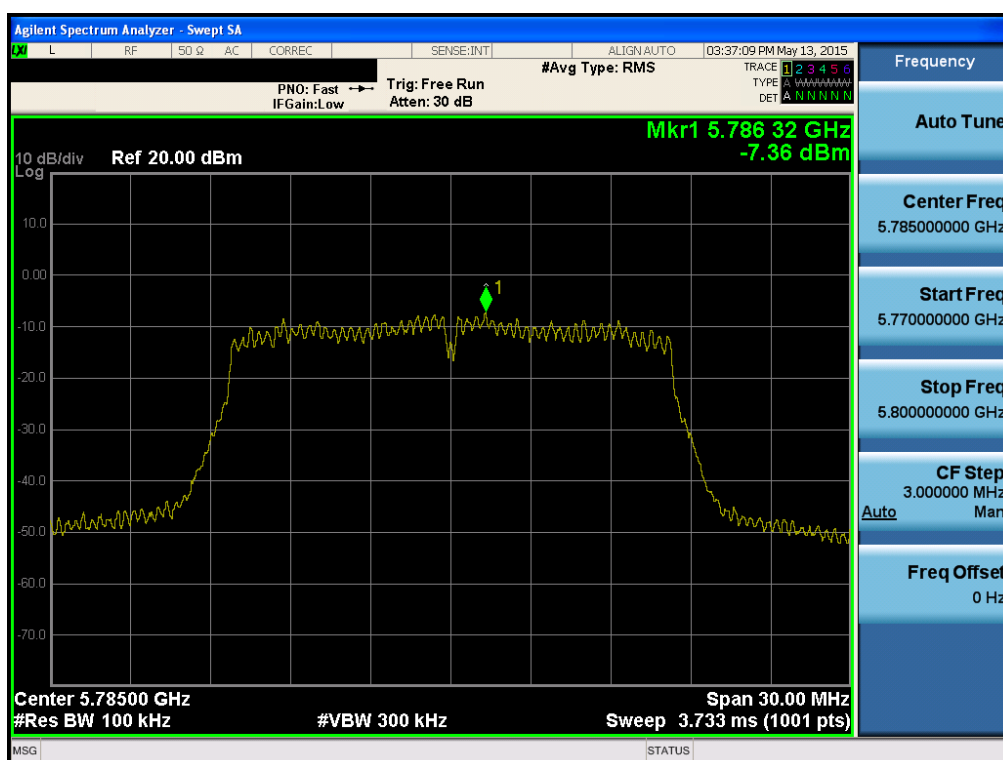
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.149



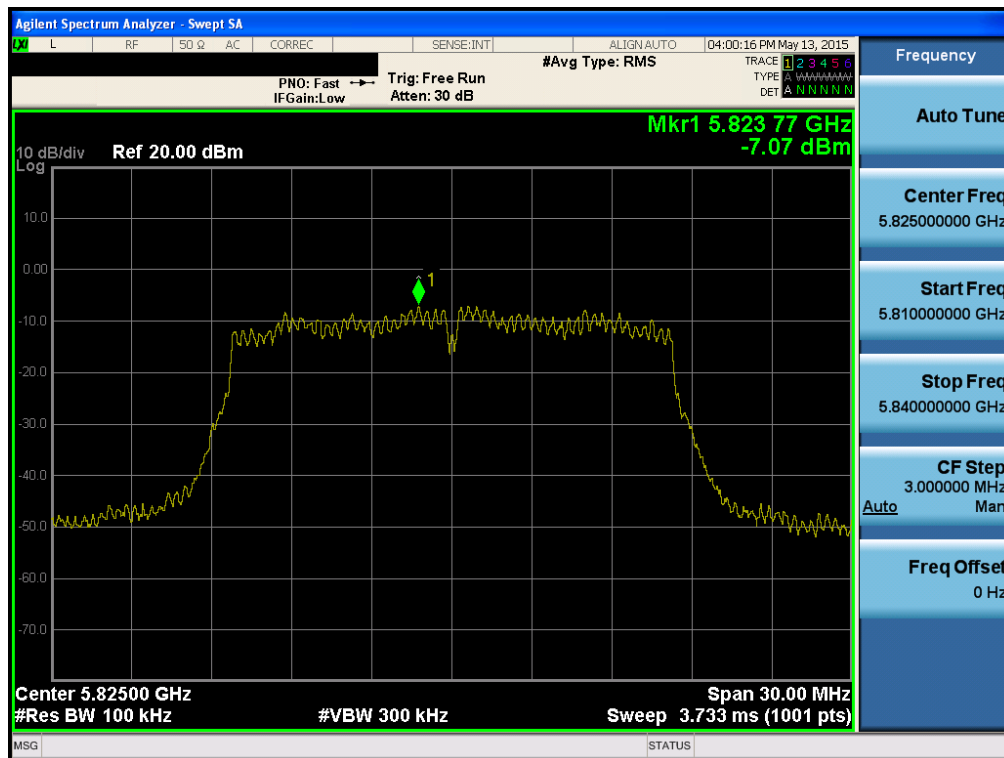
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.157



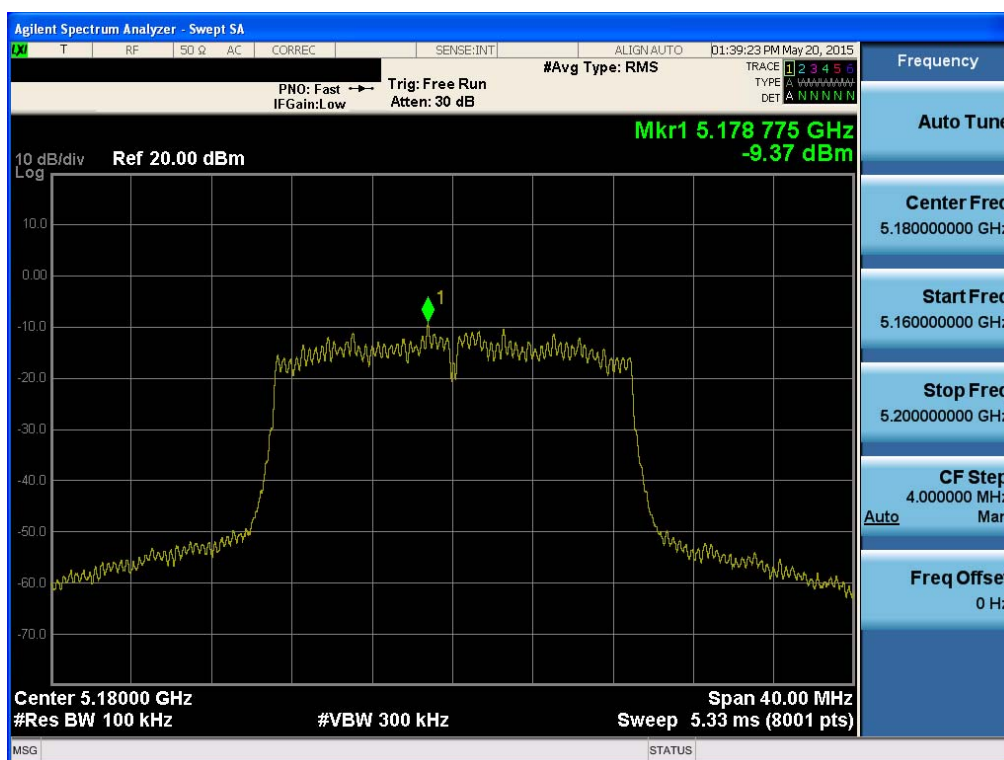
Maximum Power Spectral Density

Test Mode: 802.11a & Ch.165



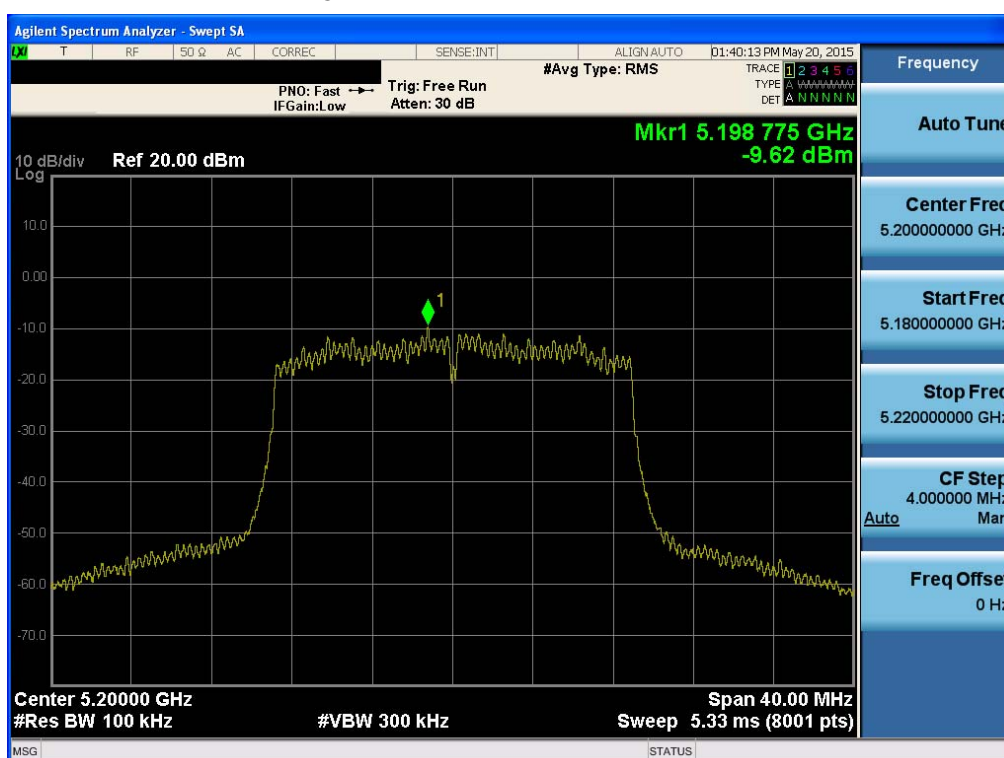
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.36



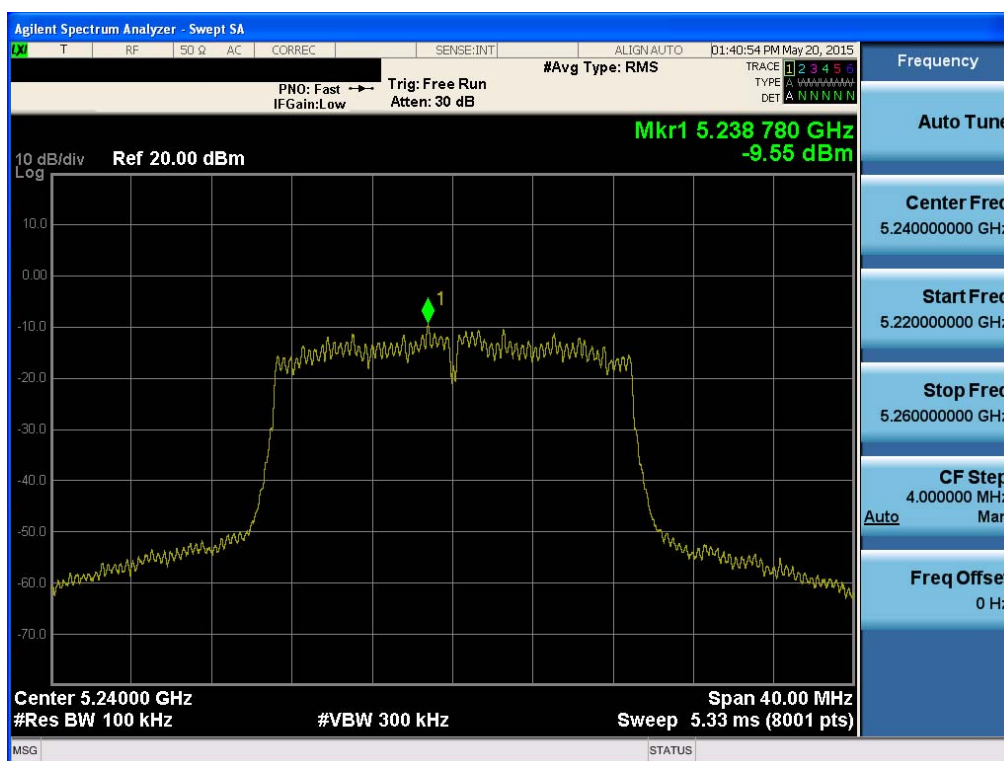
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.40



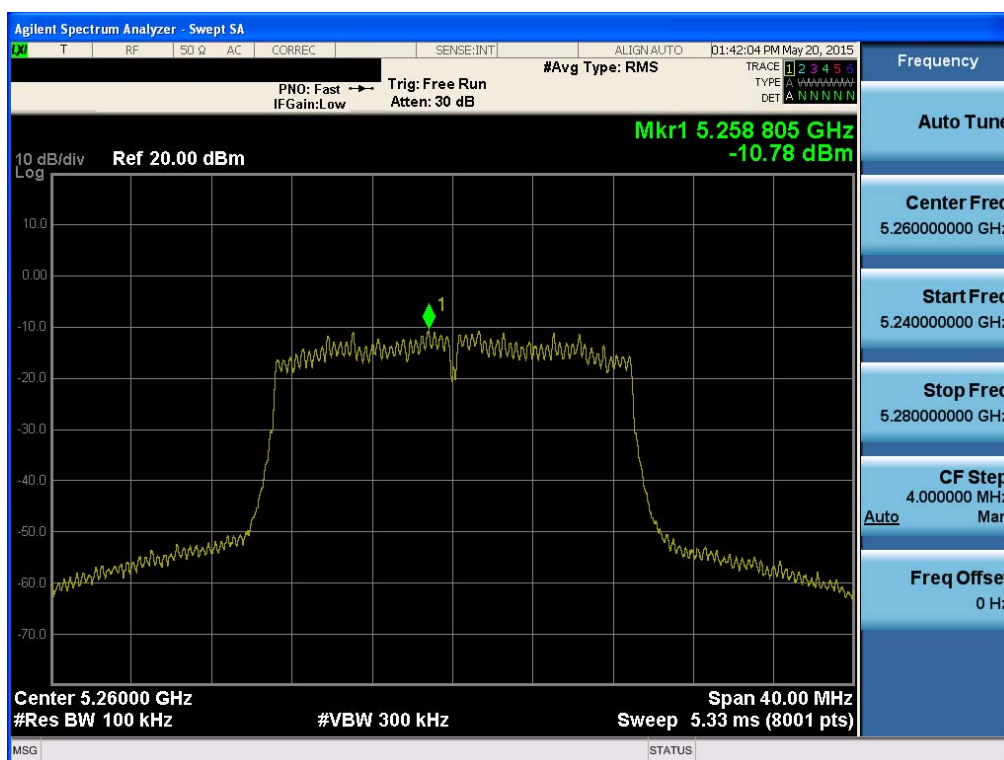
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.48



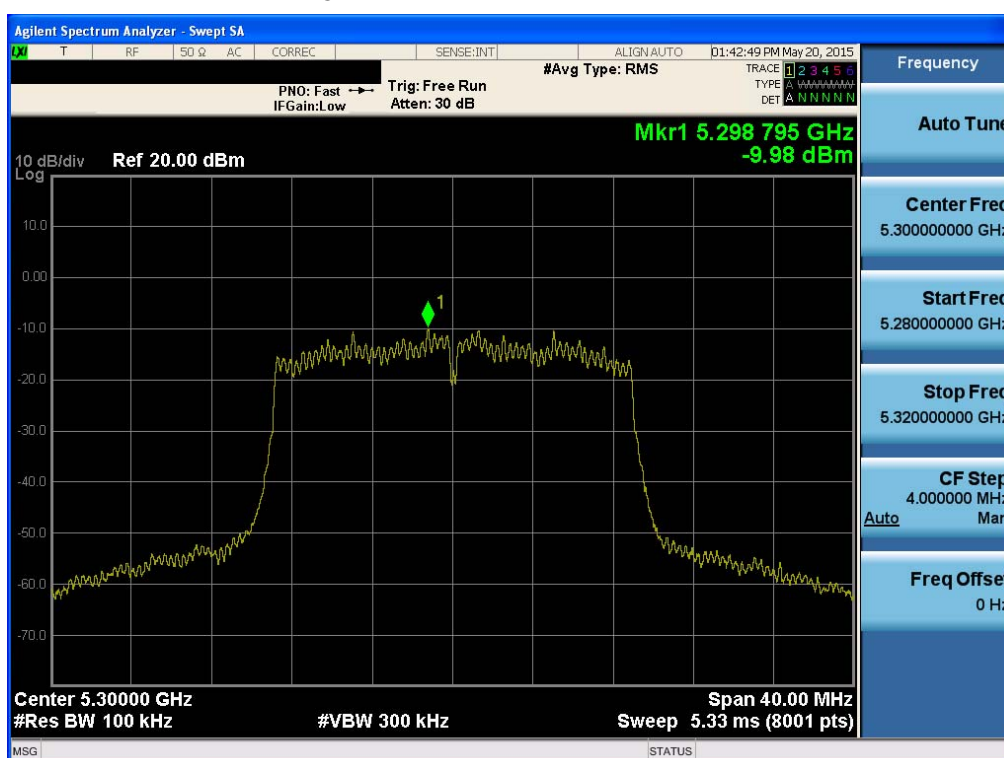
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.52



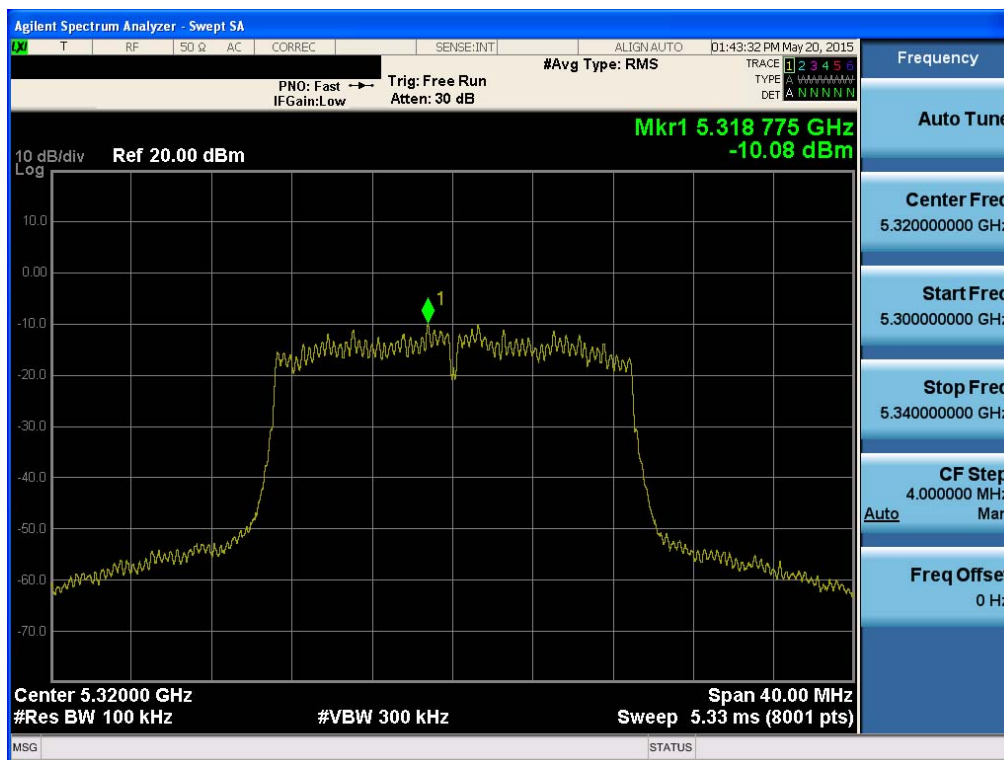
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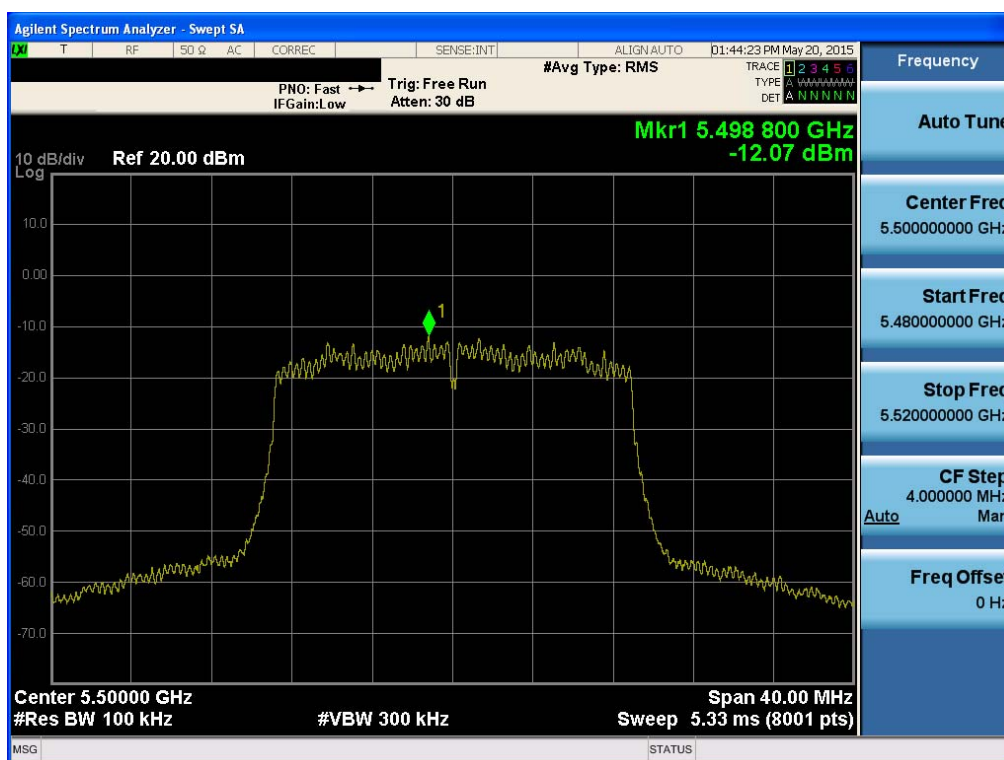
Maximum Power Spectral Density

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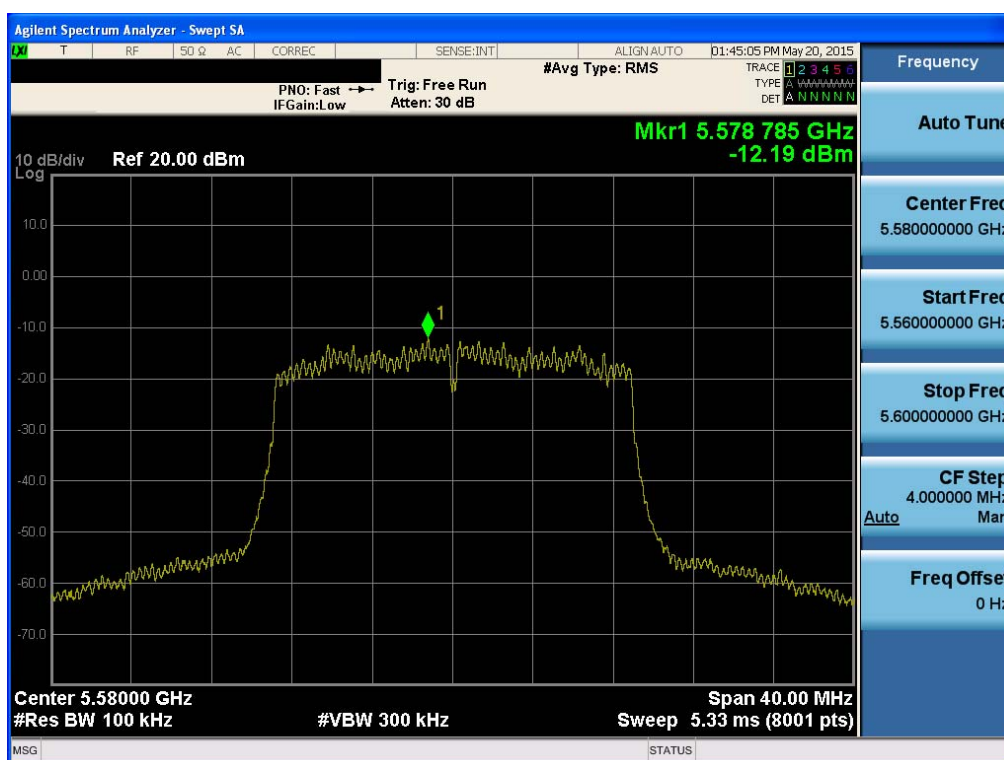
Maximum Power Spectral Density

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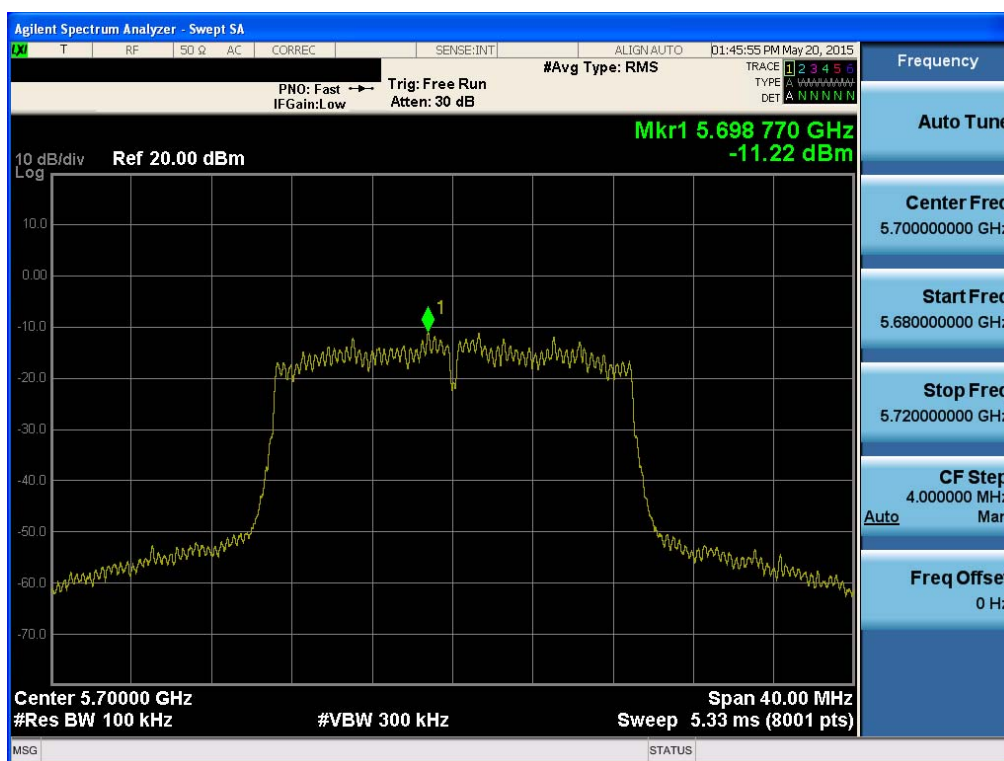
Maximum Power Spectral Density

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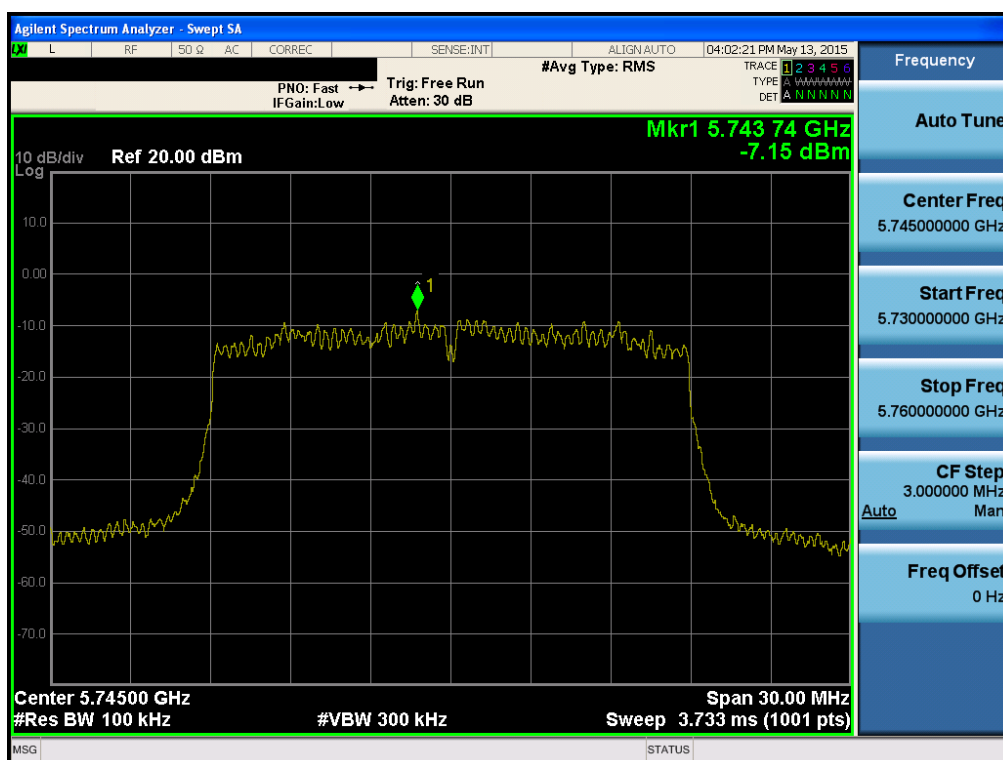
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.140



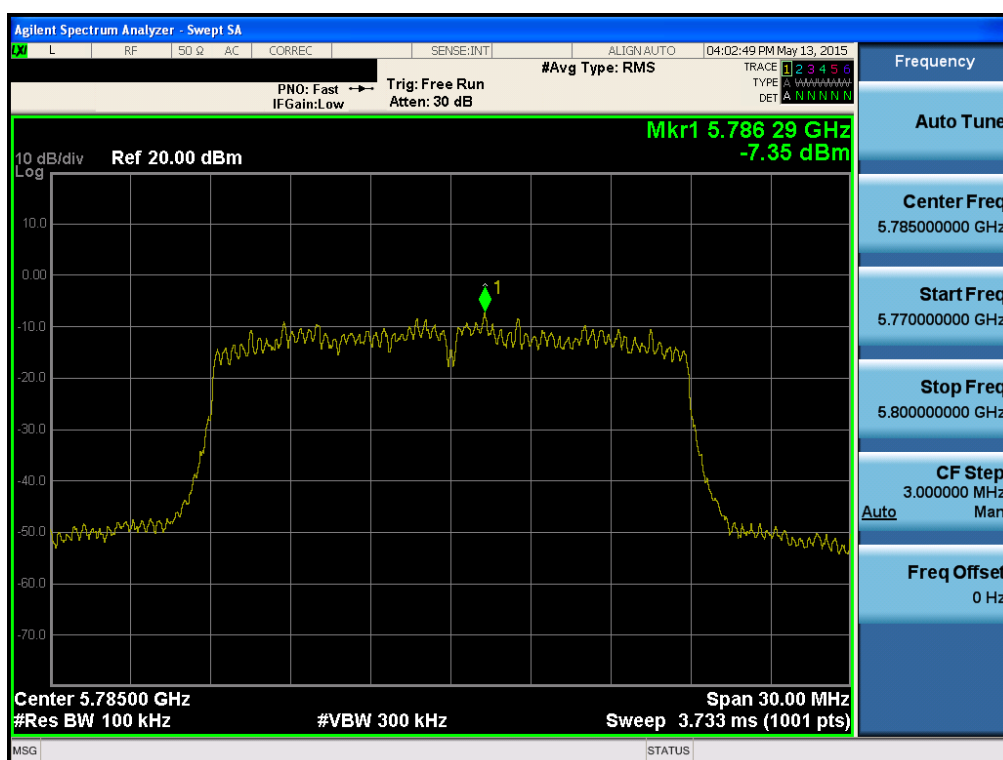
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.149



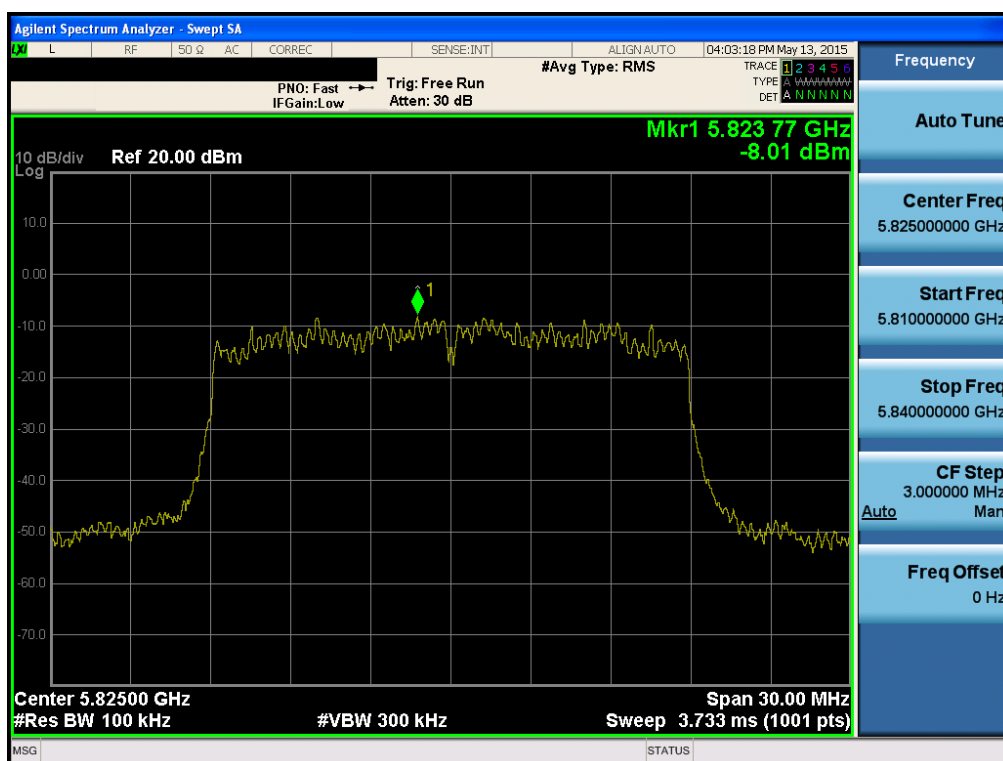
Maximum Power Spectral Density

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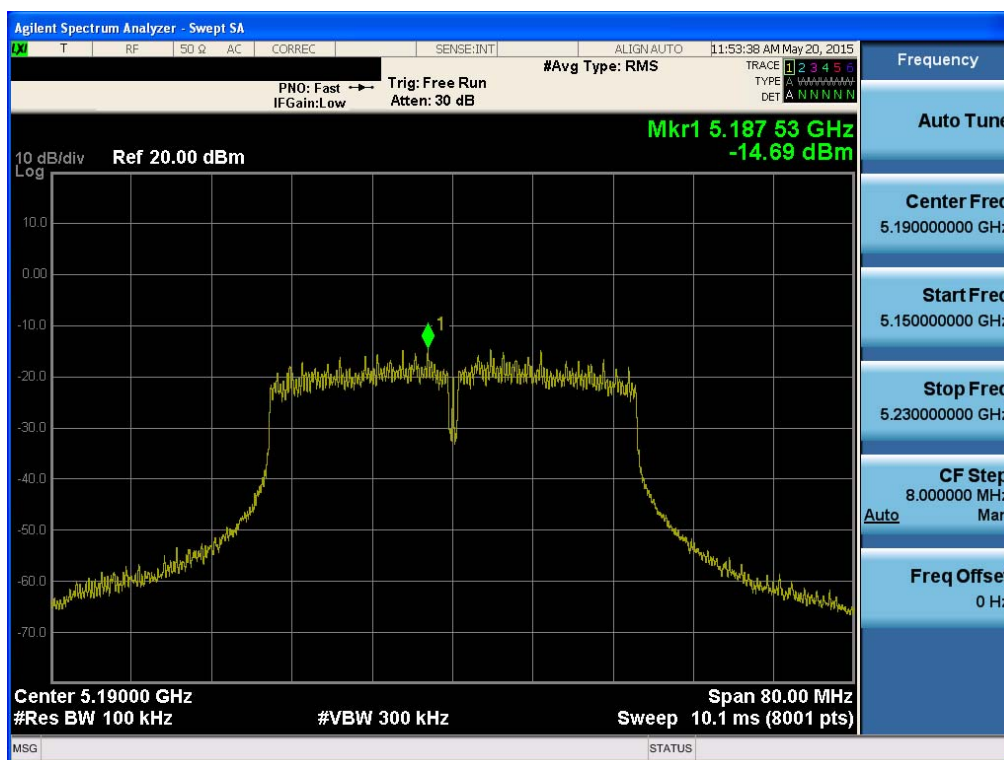
Maximum Power Spectral Density

Test Mode: 802.11n HT20 & Ch.165



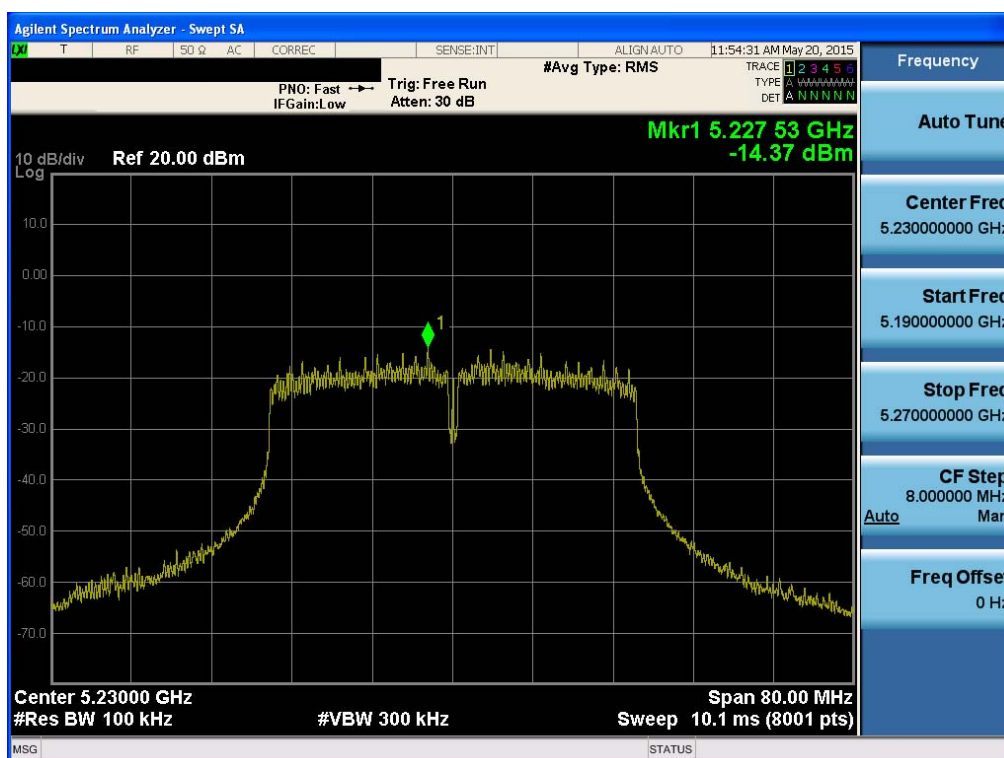
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.38



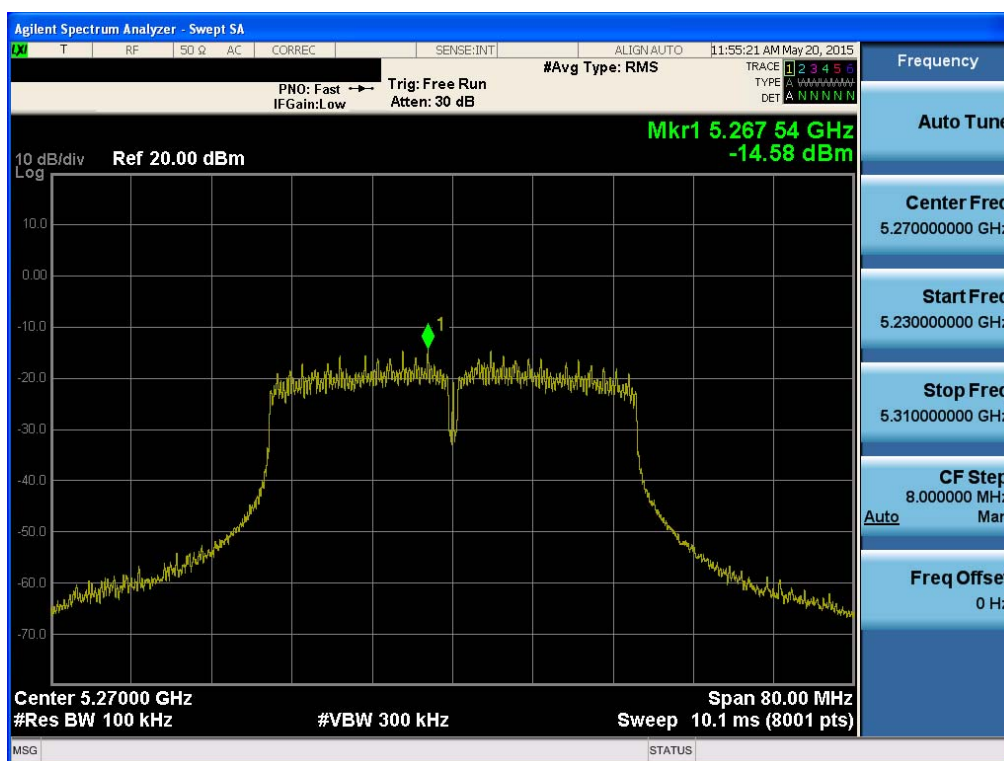
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.46



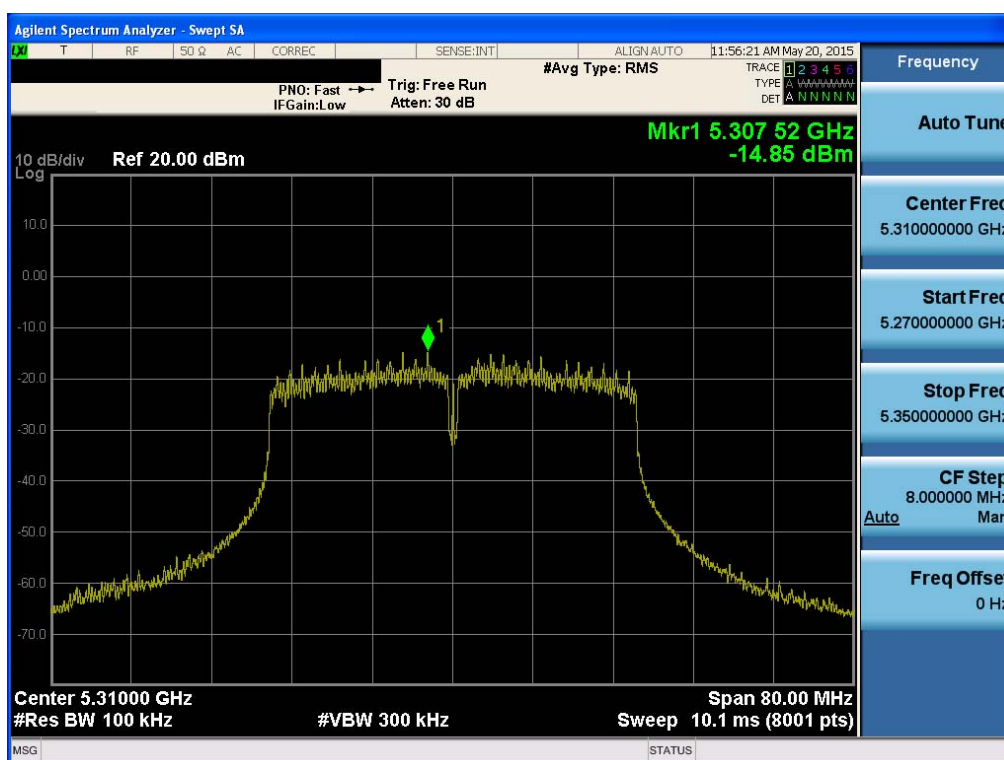
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.54



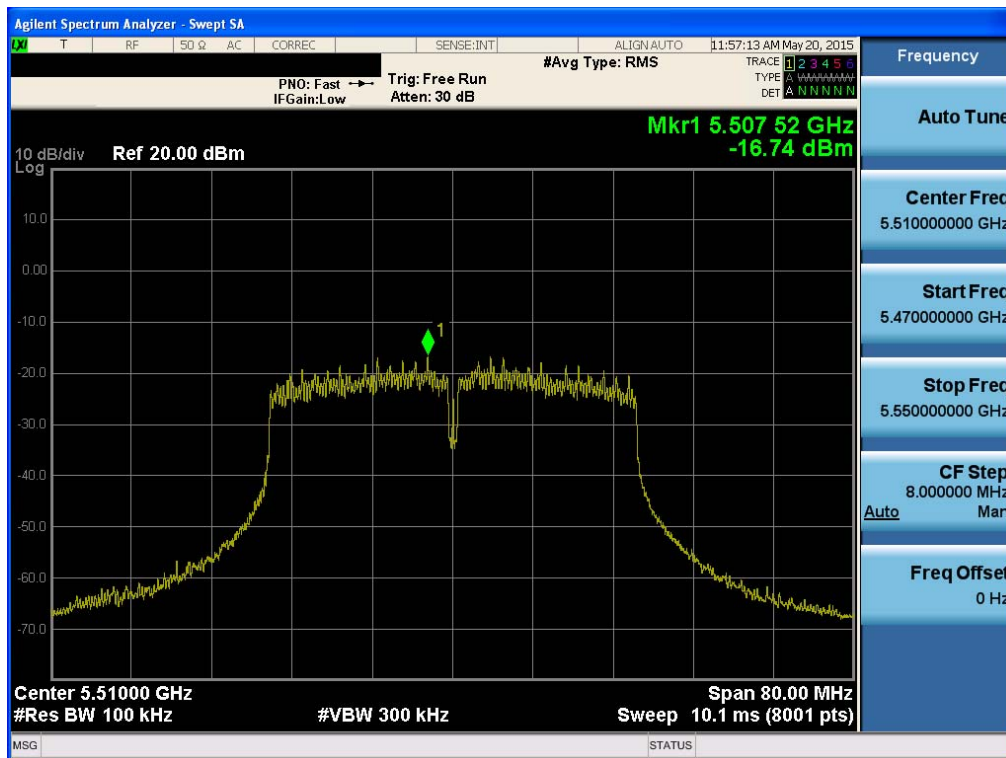
Maximum Power Spectral Density

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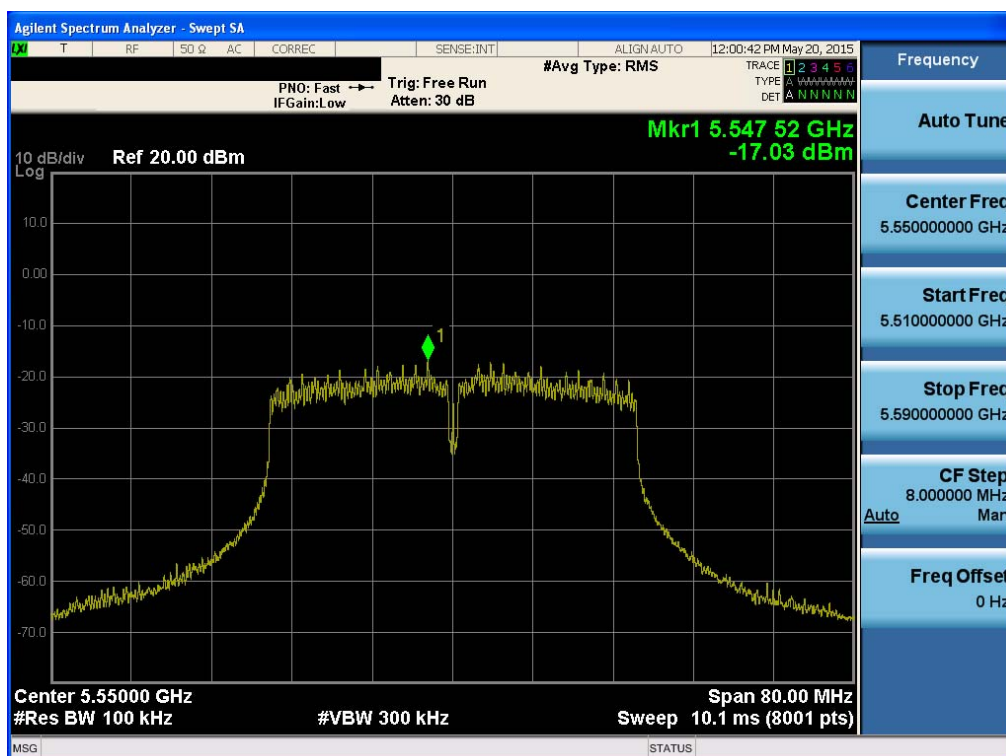
Maximum Power Spectral Density

Test Mode: 802.11n HT40 & Ch.102



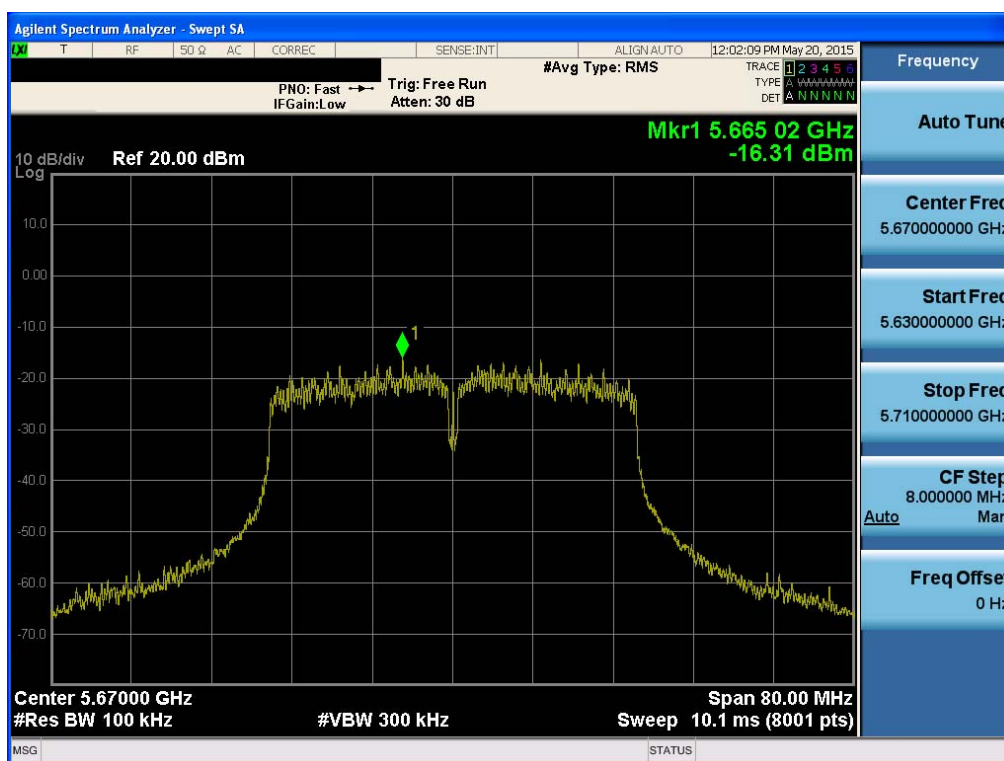
Maximum Power Spectral Density

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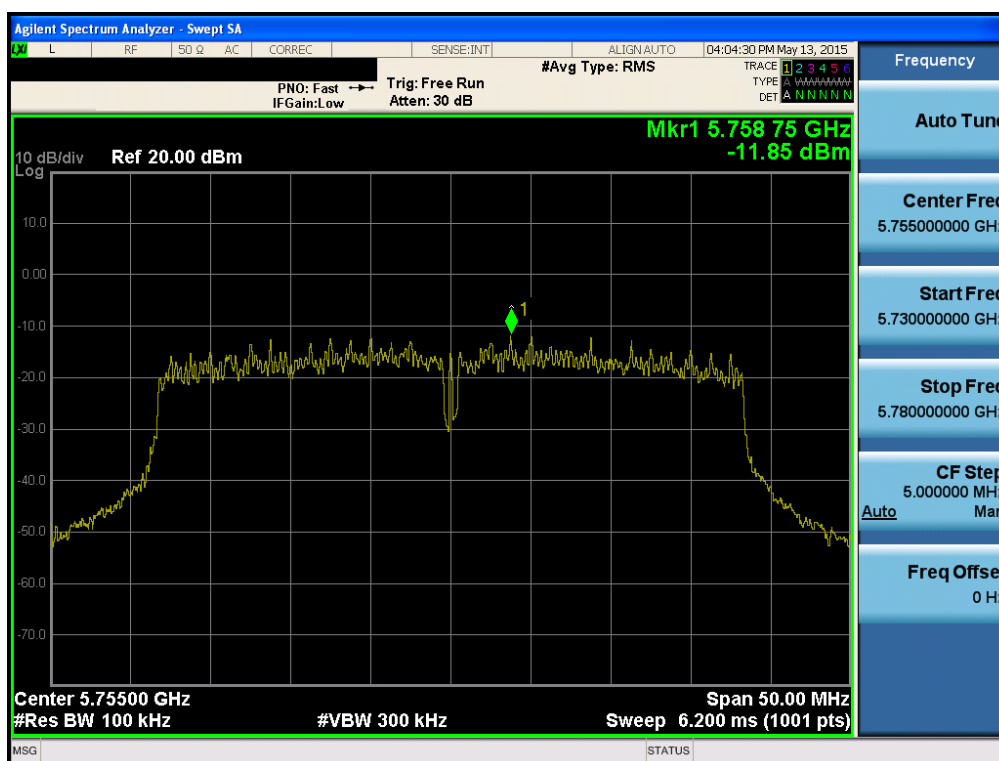
Maximum Power Spectral Density

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

