RF TEST REPORT

Test item	:	Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC
Model No.	:	LG-D855V, LGD855V, D855V, LG-D855v, LGD855v, D855v
Order No.	:	DTNC1411-04837
Date of receipt	:	2014-11-05
Test duration	:	2014-11-07 ~ 2014-11-17
Date of issue	:	2014-11-20
Use of report	:	FCC Original Grant

Applicant : LG Electronics MobileComm U.S.A., Inc.
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

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

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

Tested by:

Engineer
HoonPyo Lee

Reviewed by:

Technical Manager
Geunki Son

Test Report Version

Test Report No.	Date	Description
DRTFCC1411-1479	Nov. 20, 2014	Initial issue

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1. EUT DESCRIPTION

FCC Equipment Class	Unlicensed National Information Infrastructure (UNII)
Product	Multi Band GSM/WCDMA/LTE Phone with Bluetooth, WLAN and NFC
Model Name	LG-D855V
Add Model Name	LGD855V, D855V, LG-D855v, LGD855v, D855v ※ 6 models are same mechanical, electrical and functional. ※ The only difference is the model name, which are changed for marketing purpose.
Power Supply	DC 3.8 V
Frequency Range	**Band I(5150 ~ 5250MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5180 ~ 5240 MHz ▪ 802.11n/ac(HT40, VHT40): 5190 ~ 5230 MHz ▪ 802.11ac(VHT80): 5210 MHz **Band II(5250 ~ 5350MHz)** ▪ 802.11a/n/ac(HT20, VHT40): 5260 ~ 5320 MHz ▪ 802.11n/ac(HT40, VHT40): 5270 ~ 5310 MHz ▪ 802.11ac(VHT80): 5290 MHz **Band III(5470 ~ 5725MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5500 ~ 5700 MHz ▪ 802.11n/ac(HT40, VHT40): 5510 ~ 5670 MHz ▪ 802.11ac(VHT80): 5530 MHz **Band IV(5425 ~ 5850MHz)** ▪ 802.11a/n/ac(HT20, VHT20): 5745 ~ 5825 MHz ▪ 802.11n/ac(HT40, VHT40): 5755 ~ 5795 MHz ▪ 802.11ac(VHT80): 5775 MHz
Modulation type	256QAM, 64QAM, 16QAM, QPSK BPSK for OFDM
Antenna Specification	**Antenna type**: Internal Antenna **Antenna gain** ▪ Band I: -1.580 dBi ▪ Band II: -1.530 dBi ▪ Band III: -0.130 dBi ▪ Band IV: -2.570 dBi

2. Information about test items

2.1 Test mode / Channel Information

5GHz Band	Mode	Data Rate
Band I	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	MCS 0
Band II	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	MCS 0
Band III	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	MCS 0
Band IV	802.11a	6Mbps
	802.11n(HT20)	MCS 0
	802.11n(HT40)	MCS 0
	802.11ac(VHT80)	MCS 0

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

2.2 Tested Channel Information

5GHz Band	802.11a/n(HT20)		802.11n(HT40)		802.11ac(VHT80)	
	Channel	Frequency [MHz]	Channel	Frequency [MHz]	Channel	Frequency [MHz]
Band I	36	5180	38	5190	-	-
	40	5200	-	-	42	5210
	48	5240	46	5230	-	-
Band II	52	5260	54	5270	-	-
	60	5300	-	-	58	5290
	64	5320	62	5310	-	-
Band III	100	5500	102	5510	-	-
	116	5580	110	5550	106	5530
	140	5700	134	5670	-	-
Band IV	149	5745	151	5755	-	-
	157	5785	-	-	155	5775
	165	5825	159	5795	-	-

2.3 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Wireless Charger	WCP-300	N/A	LG	BEJWCP300

Note: The above equipments were supported by manufacturer.

2.4 Tested environment

Temperature	:	22 °C ~ 24 °C
Relative humidity content	:	38 % ~ 50 % R.H.
Details of power supply	:	DC 3.8 V

2.5 EMI Suppression Device(s)/Modifications

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

3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.407(a)	N/A	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(e)	RSS-210 [A8.2]	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz (5725-5850)		C
15.407(a)	RSS-210 [A9.2]	Maximum Conducted Output Power	5150 ~ 5250MHz For FCC: < 30 dBm or < 23.97 dBm 5150 ~ 5250MHz For IC: 200mW or <10 + 10log$_{10}$(B) dBm, whichever power is less. 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC 250mW or <11 + 10log$_{10}$(B) dBm, whichever power is less. 5725 ~ 5850MHz For FCC: < 30 dBm		C Note 3
15.407(a)	RSS-210 [A9.2]	Peak Power Spectral Density	5150 ~ 5250MHz For FCC: 11dBm/MHz or 17dBm/MHz 5150 ~ 5250MHz For IC: 10dBm/MHz 5250 ~ 5350MHz & 5470 ~ 5725MHz For FCC & IC: 11dBm/MHz 5725 ~ 5850MHz For FCC: 30dBm/500kHz		C Note 4
15.407(g)	N/A	Frequency Stability	N/A		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	N/A		NA
15.407(b)	RSS-210 [A9.2]	Undesirable Emissions	5150 ~ 5725MHz: < -27 dBm/MHz EIRP 5725 ~ 5850MHz: < -17 dBm/MHz EIRP or< -27 dBm/MHz EIRP	Radiated	C Note 5, 6, 8
15.205 15.209 15.407(b)	RSS-Gen [7.2.5]	General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		C Note 6, 8
15.407(h)	RSS-210 [A9.3]	Dynamic Frequency Selection	See DFS test report	-	C Note 7
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	FCC 15.207	AC Line Conducted	C
15.203	RSS-Gen [7.1.2]	Antenna Requirements	FCC 15.203	-	C

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

Note 2: The test items were performed according to the KDB789033 D02 V01 and ANSI C63.10-2009, KDB 648474 D03 v01r02

Note 3: (i) For access point operating in the band 5.15-5.25 GHz: < 30 dBm
(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 23.97 dBm

Note 4: (i) For access point operating in the band 5.15-5.25 GHz: < 17 dBm/MHz
(ii) For mobile and portable client devices in the 5.15-5.25 GHz band: < 11 dBm/MHz

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

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

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

Note 8: There is no normal battery cover and there is only one kind of wireless charging battery cover for this handset. So per KDB 648474 D03 v01r02, the spurious emissions were tested with the wireless charging battery cover and with both not charging and charging conditions.
For wireless charging condition, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

4. TEST METHODOLOGY

Generally the tests were performed according to the KDB789033 D02 v01. And ANSI C63.10-2009 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing

4.1 EUT configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart C.

4.3 General test procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02 v01. So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2009.

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

Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02 v01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2009 as stated on KDB789033 D02 v01.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

4.4 Description of test modes

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

5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 Facilities

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number : 678747

6.2 Equipment

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

7. ANTENNA REQUIREMENTS

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

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

The internal antenna is attached on the main PCB using the special spring tension.
(Please refer to the internal photo.)
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 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%.

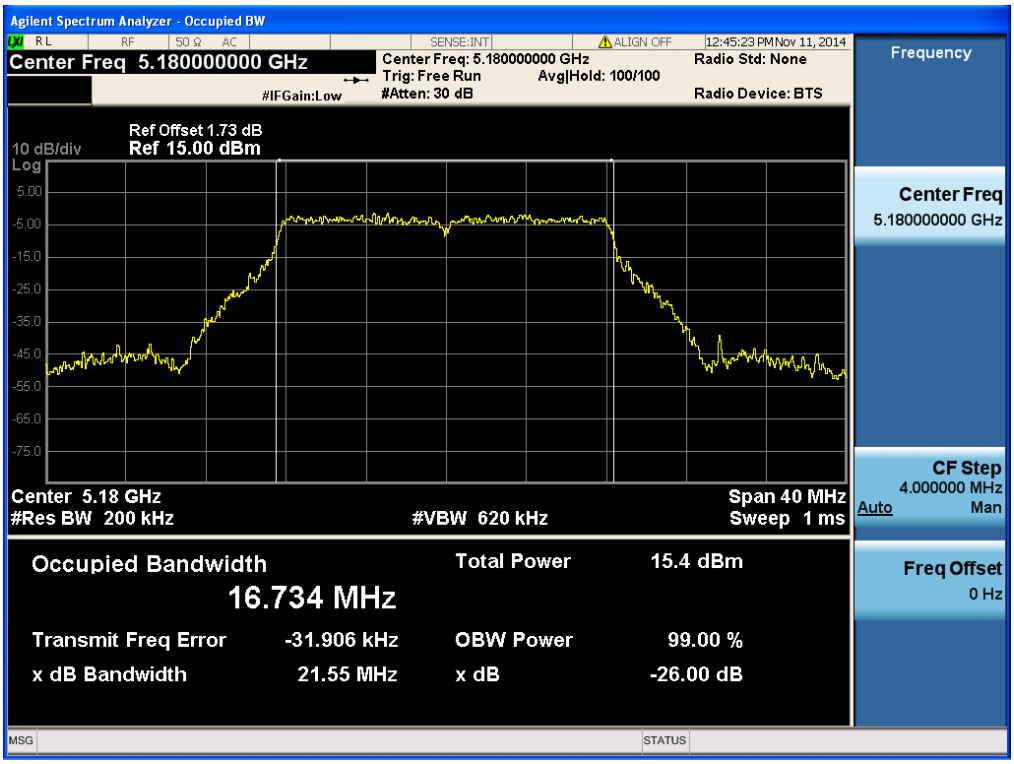
▣ TEST RESULTS: Comply

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band I	36	5180	21.550
		40	5200	21.190
		48	5240	21.530
	Band II	52	5260	21.620
		60	5300	21.110
		64	5320	21.490
	Band III	100	5500	21.660
		116	5580	21.380
		140	5700	21.510
802.11n (HT20)	Band I	36	5180	21.510
		40	5200	21.610
		48	5240	21.590
	Band II	52	5260	21.810
		60	5300	21.660
		64	5320	21.910
	Band III	100	5500	21.300
		116	5580	21.640
		140	5700	21.740
802.11n (HT40)	Band I	38	5190	41.480
		46	5230	42.360
	Band II	54	5270	42.380
		62	5310	42.590
	Band III	102	5510	42.000
		110	5550	42.090
		134	5670	41.980
802.11ac (VHT80)	Band I	42	5210	85.160
	Band II	58	5290	83.130
	Band III	106	5530	83.560

▣ Result Plots

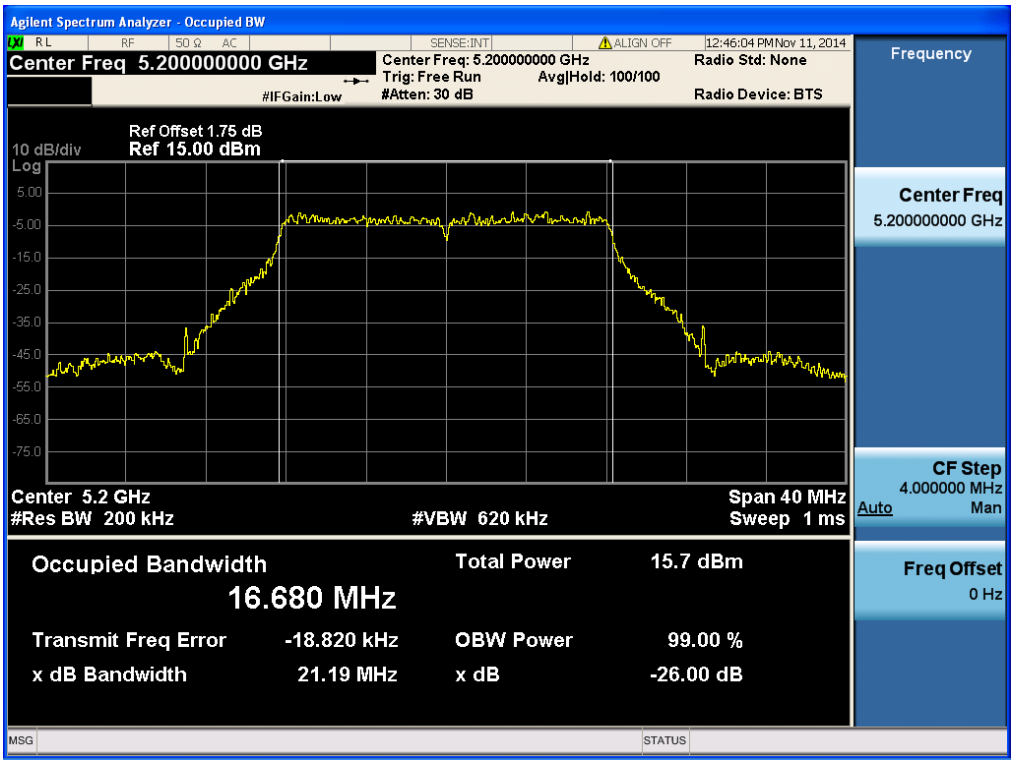
26 dB Bandwidth

Test Mode: 802.11a & Ch.36

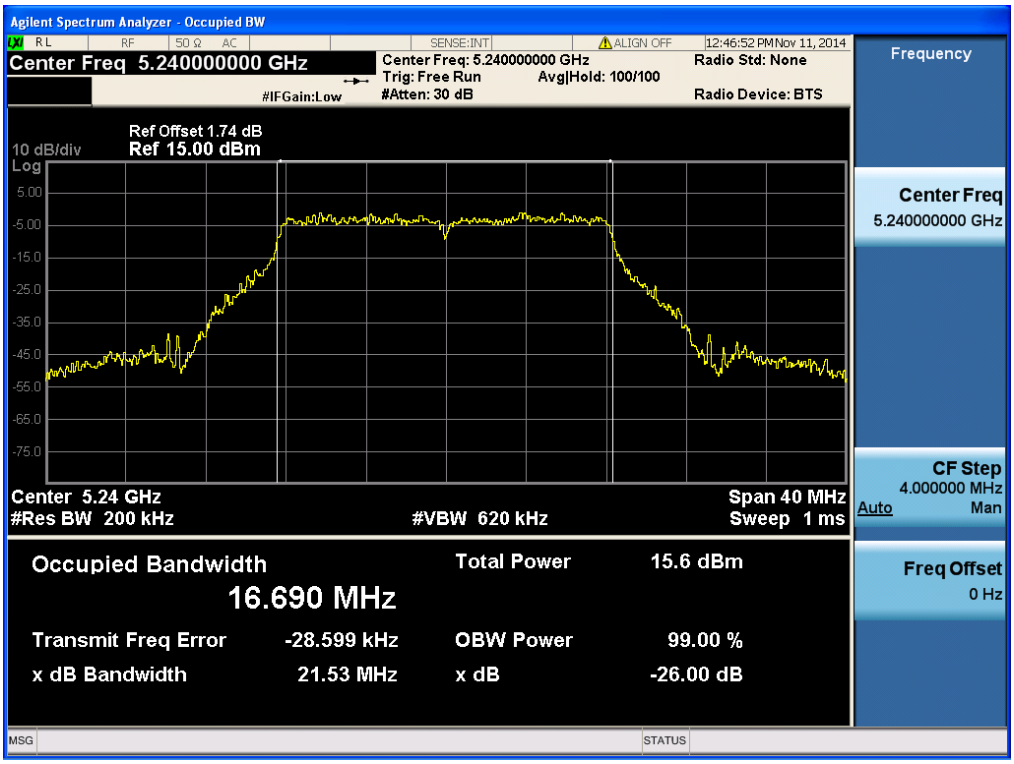


26 dB Bandwidth

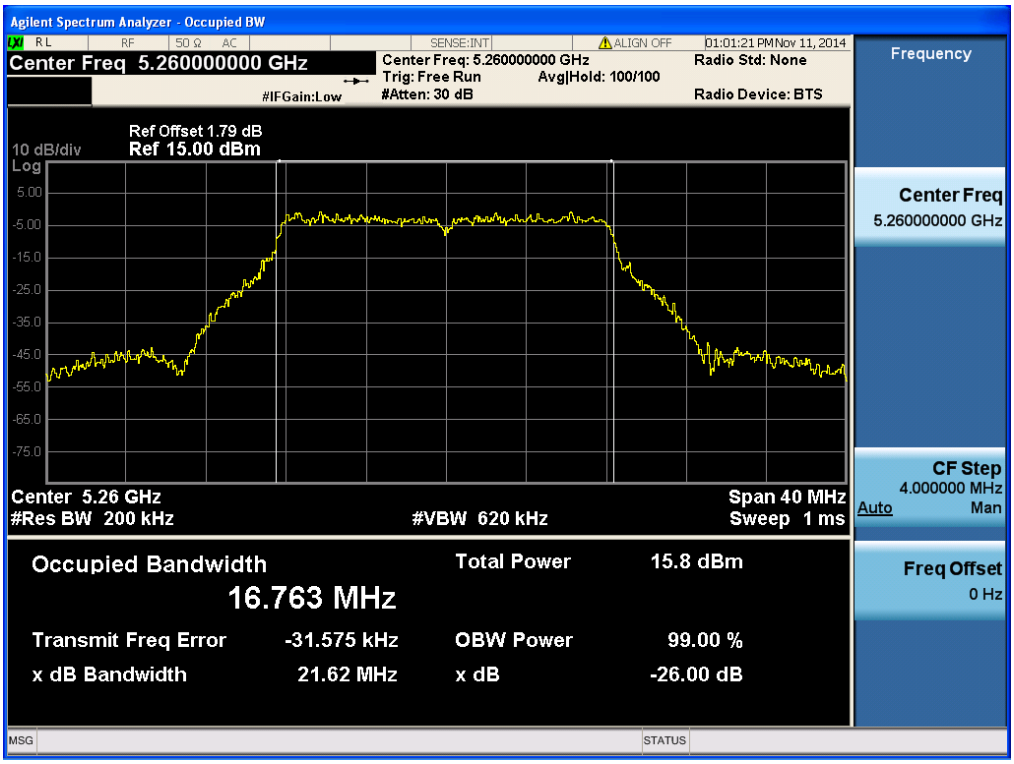
Test Mode: 802.11a & Ch.40



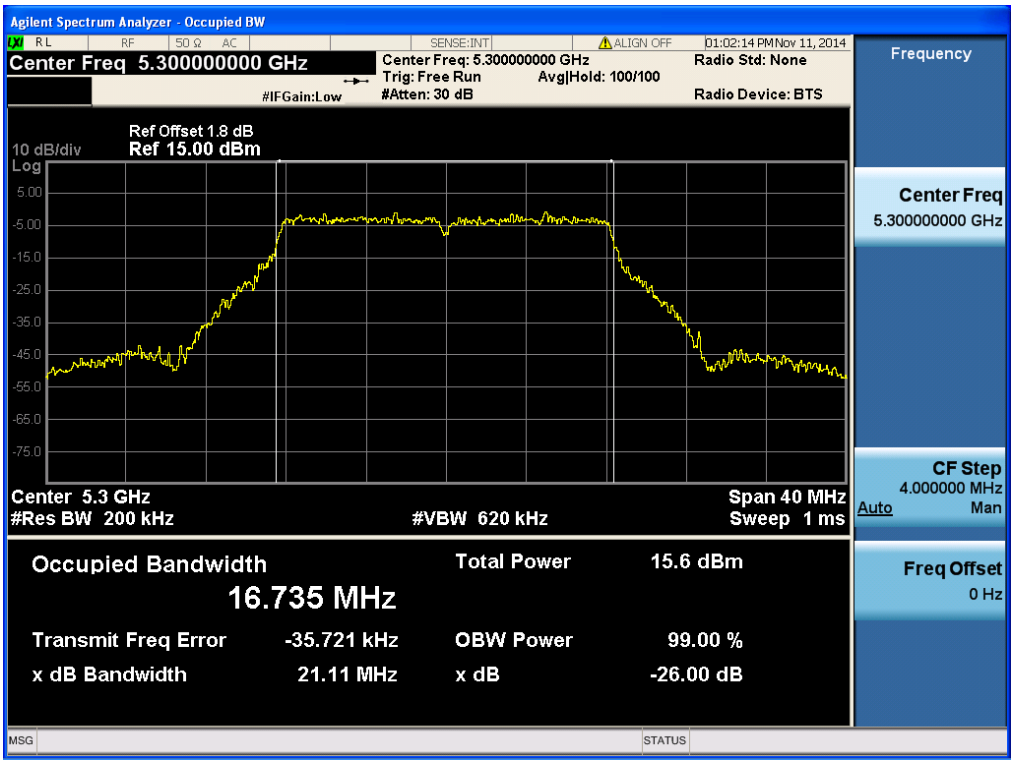
26 dB Bandwidth Test Mode: 802.11a & Ch.48



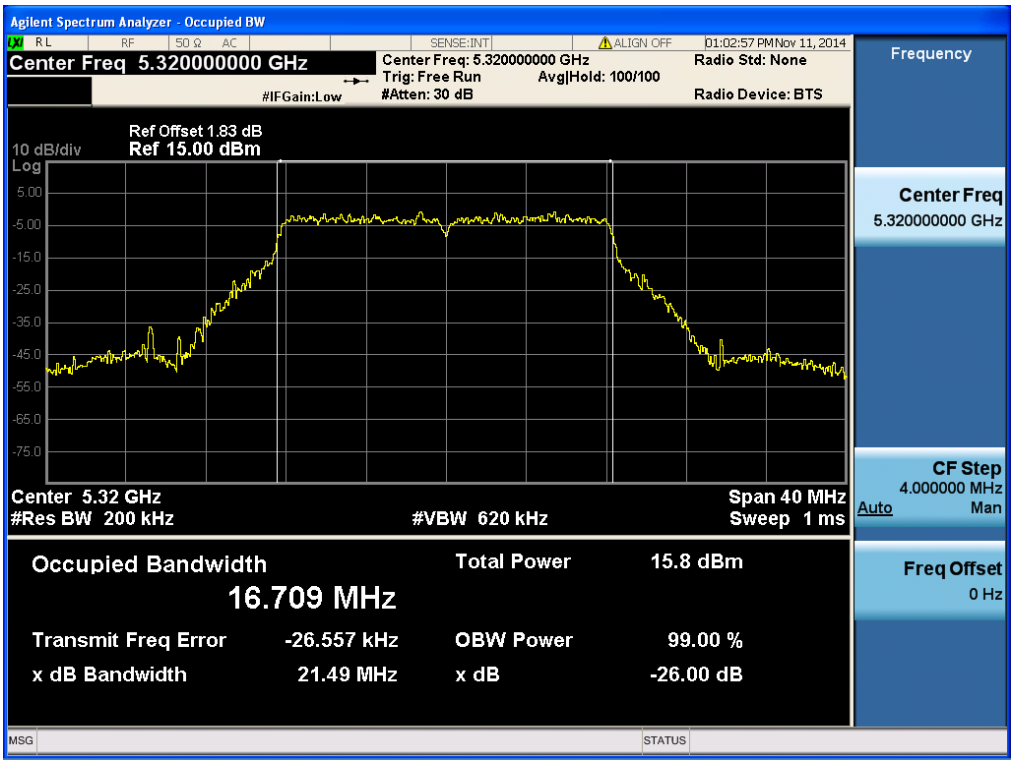
26 dB Bandwidth Test Mode: 802.11a & Ch.52



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

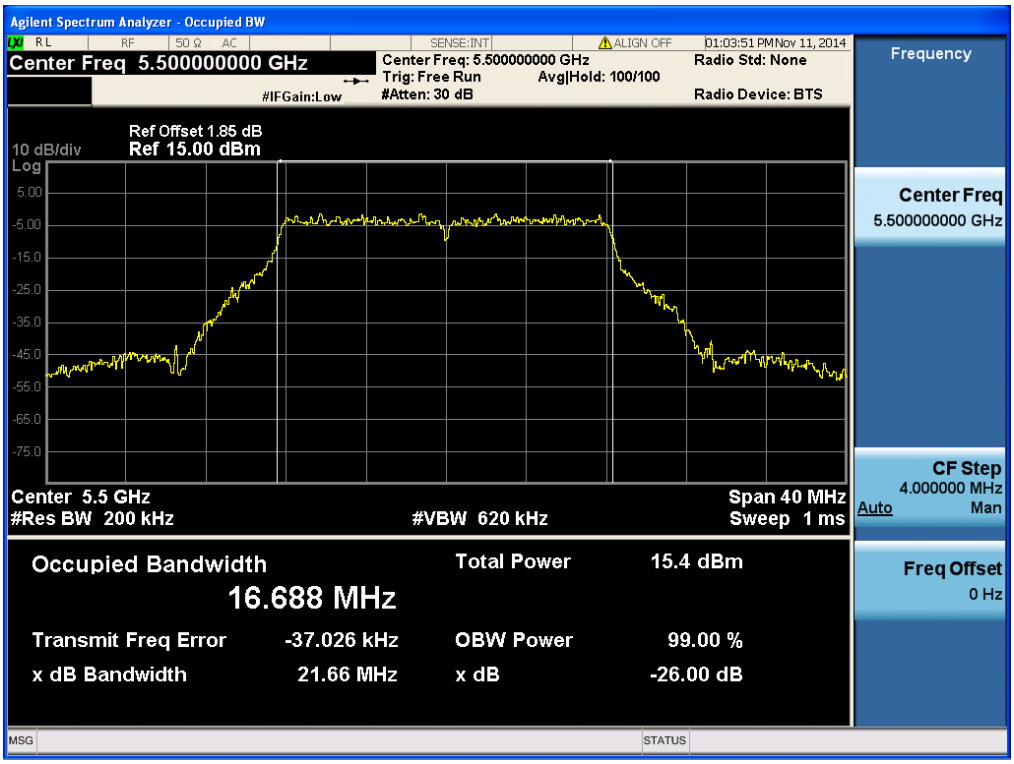


26 dB Bandwidth Test Mode: 802.11a & Ch.64



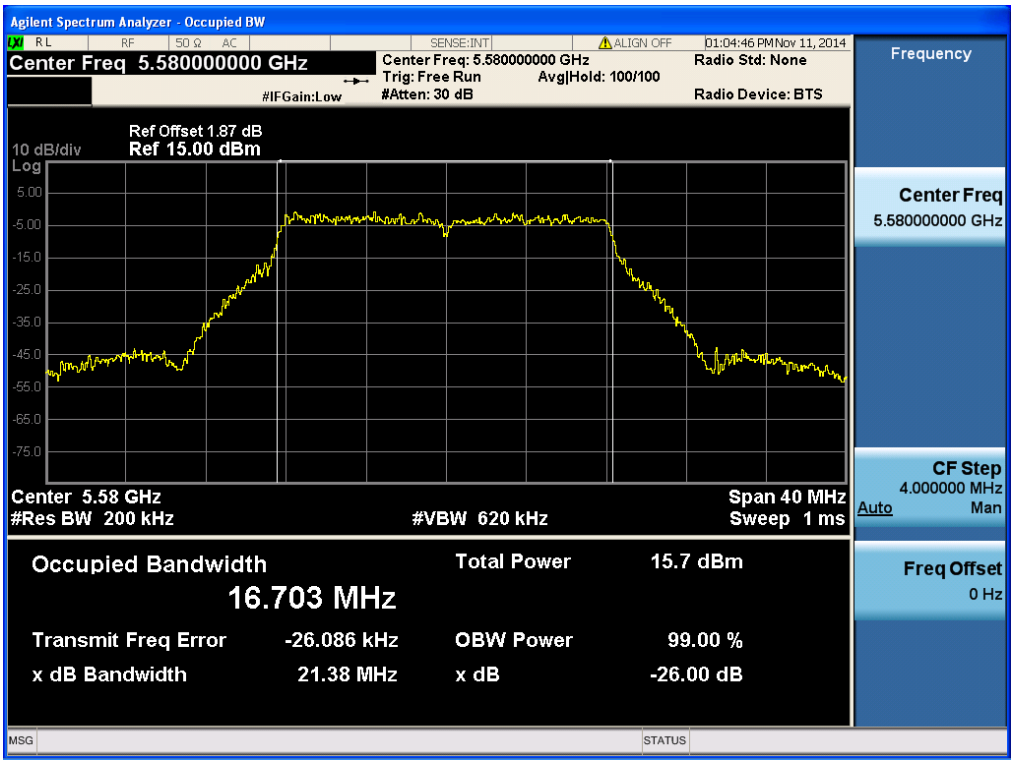
26 dB Bandwidth

Test Mode: 802.11a & Ch.100

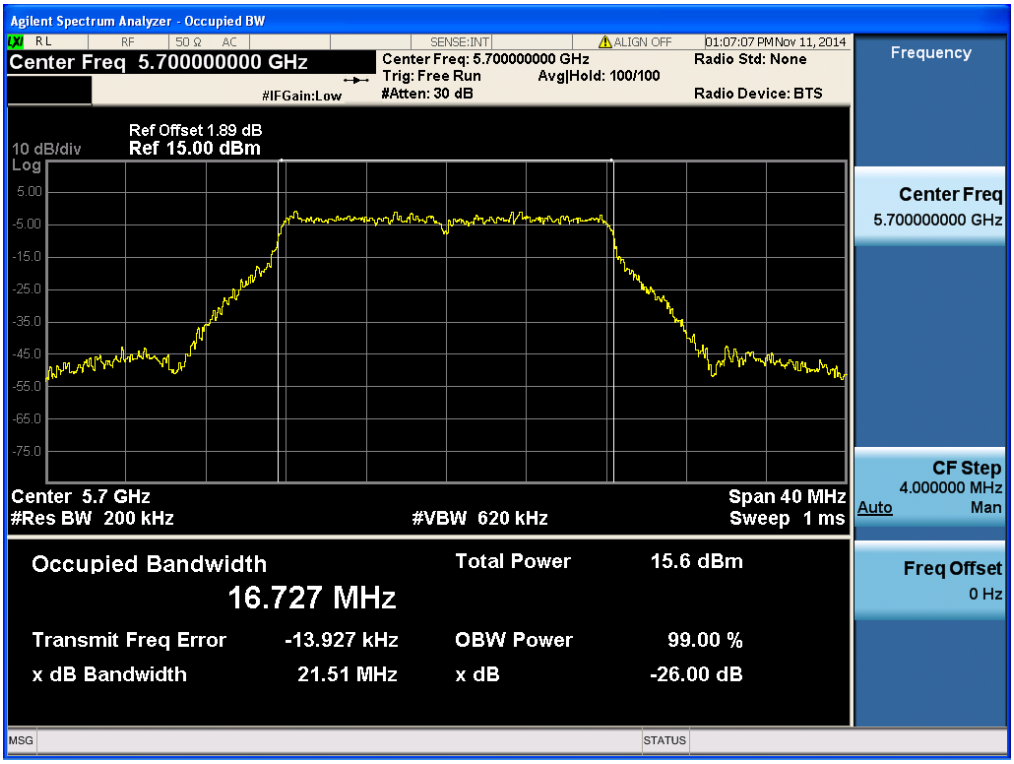


26 dB Bandwidth

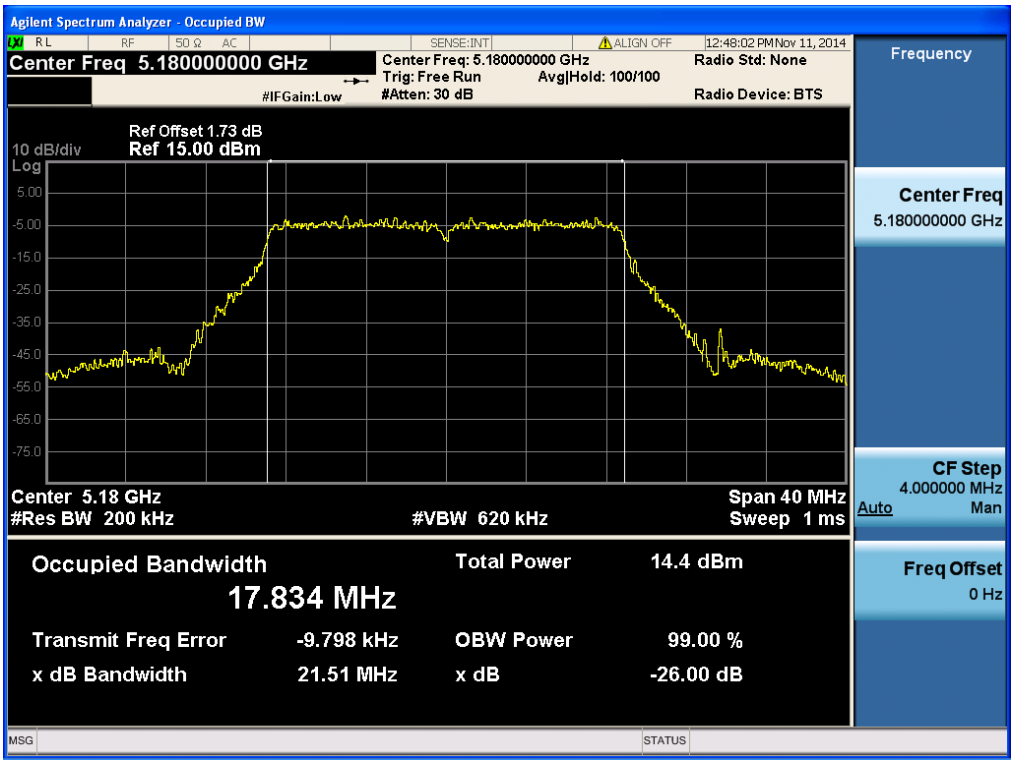
Test Mode: 802.11a & Ch.116



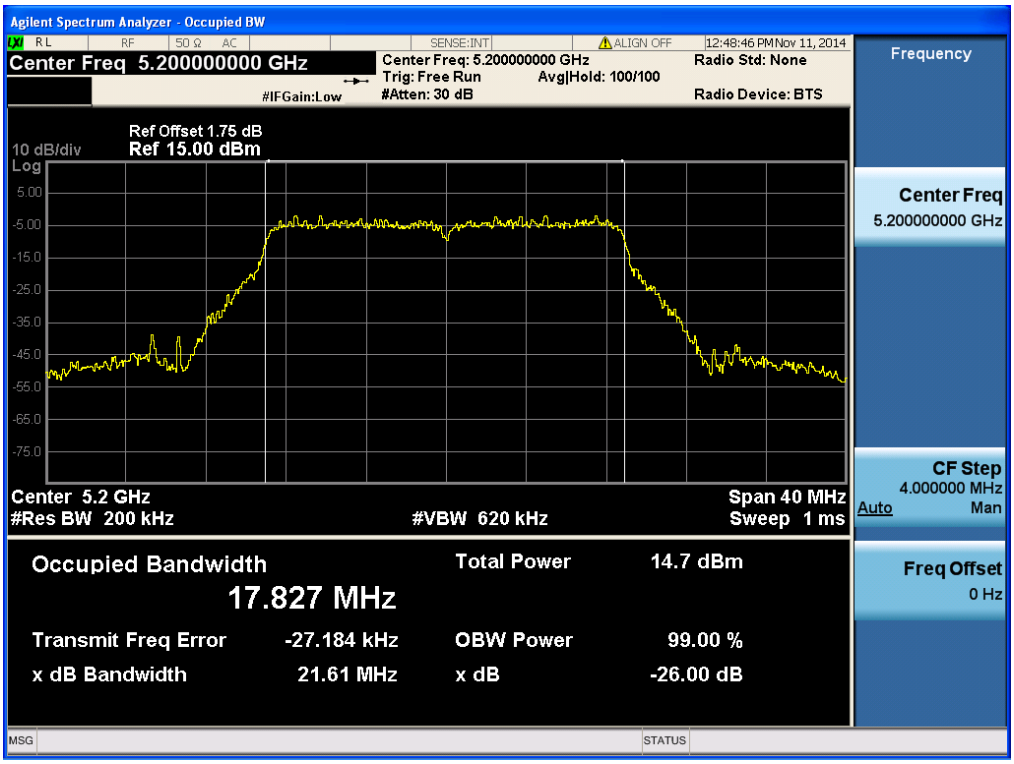
26 dB Bandwidth Test Mode: 802.11a & Ch.140



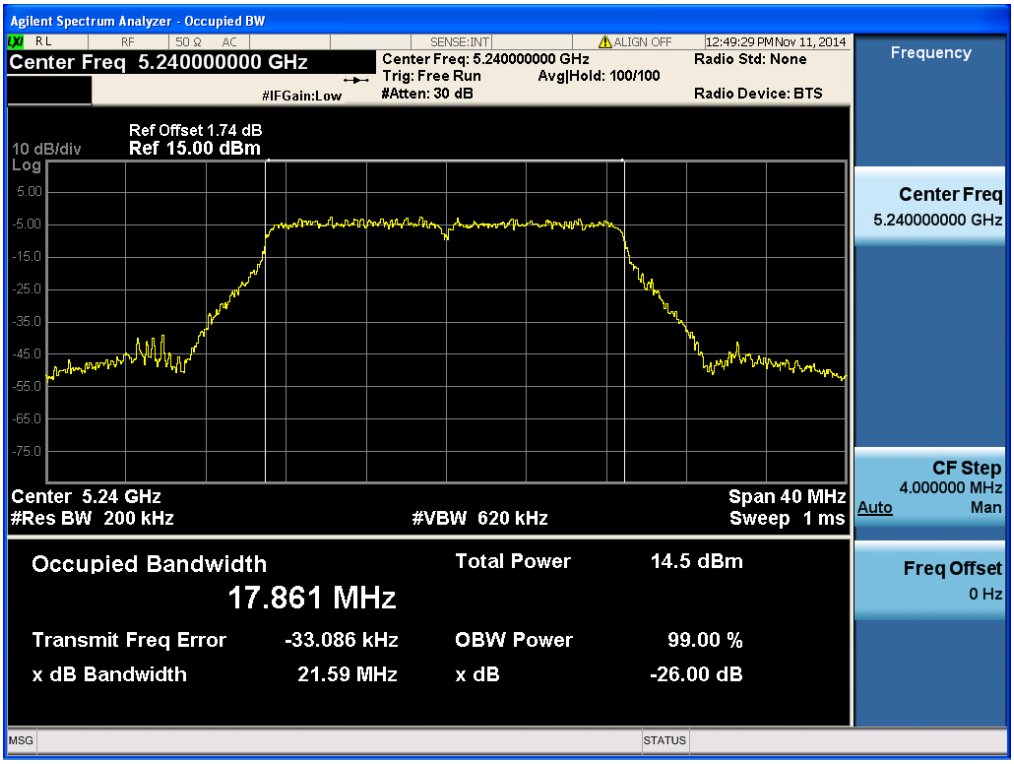
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.36



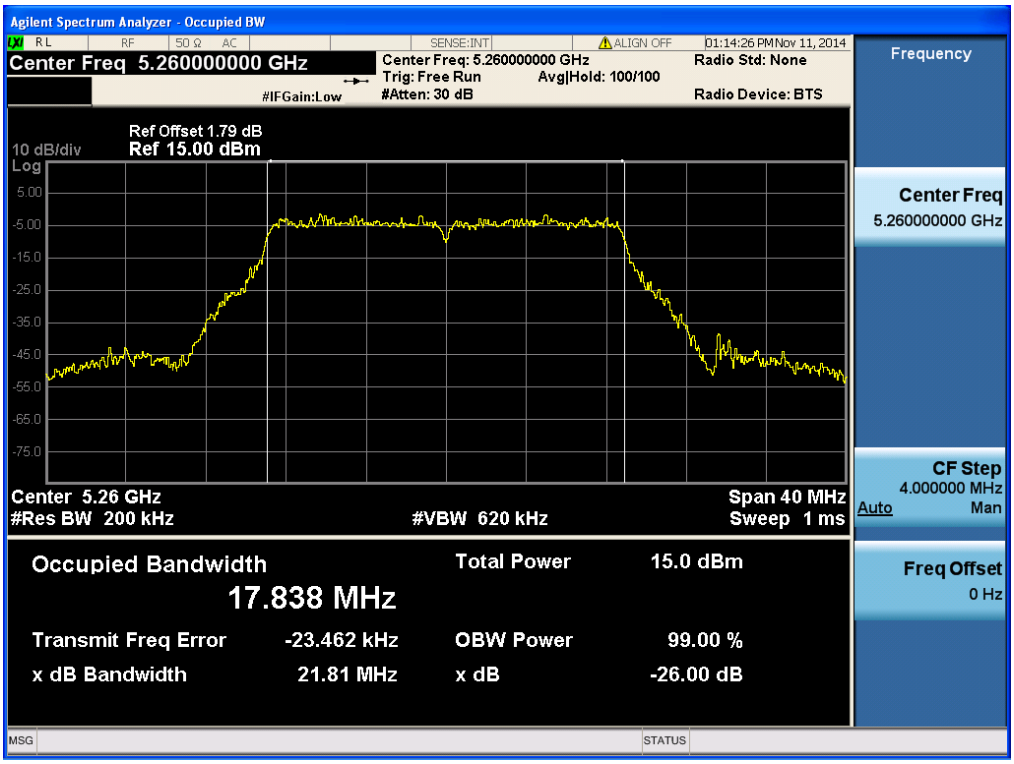
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.40



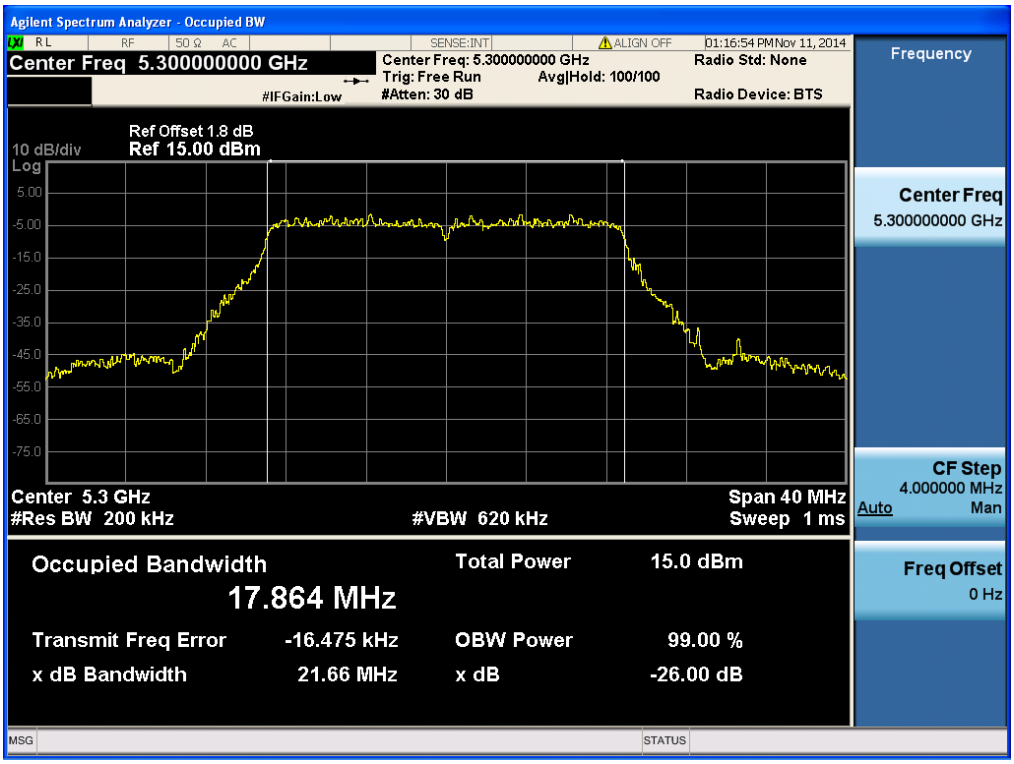
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.48



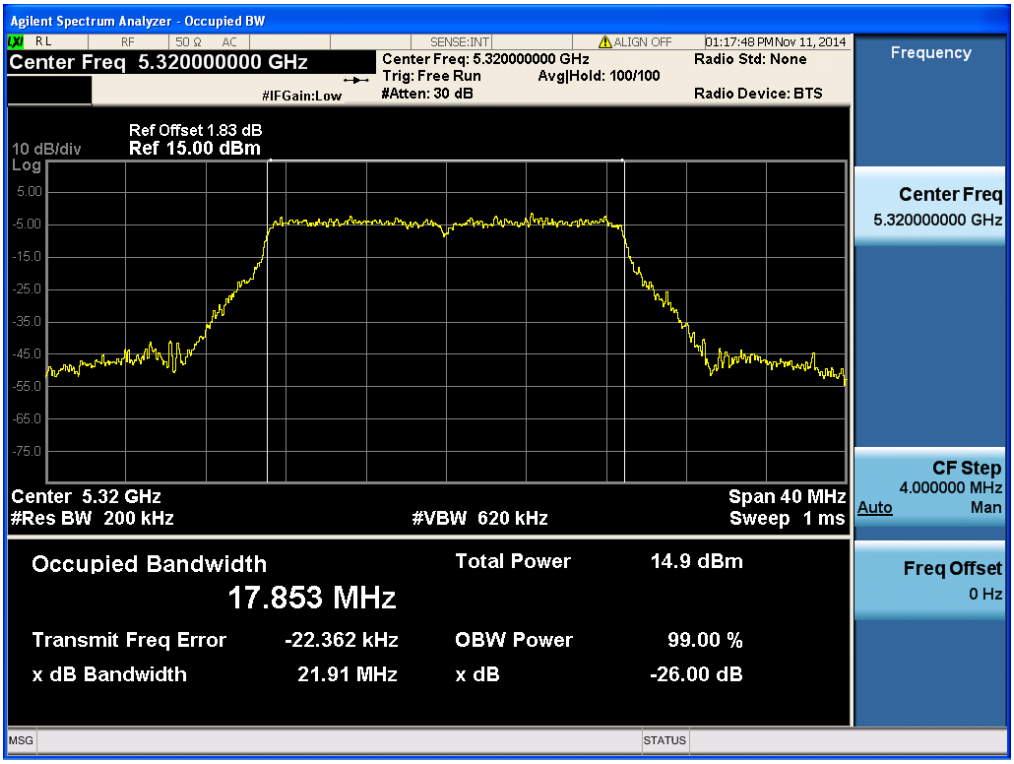
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.52



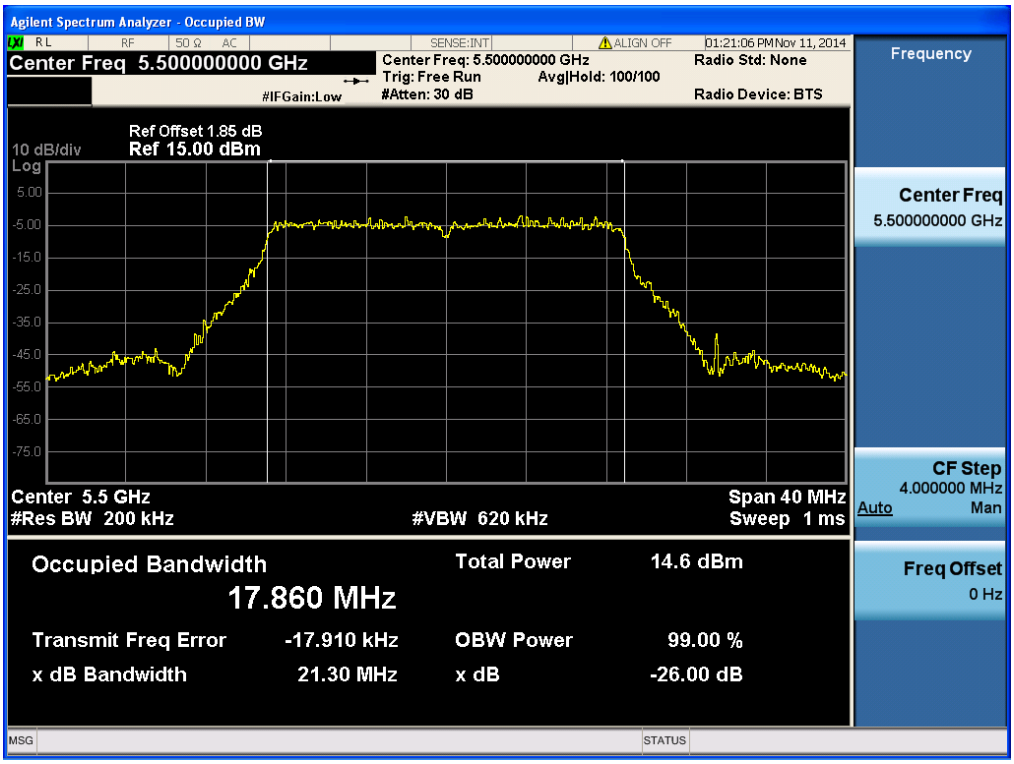
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.60



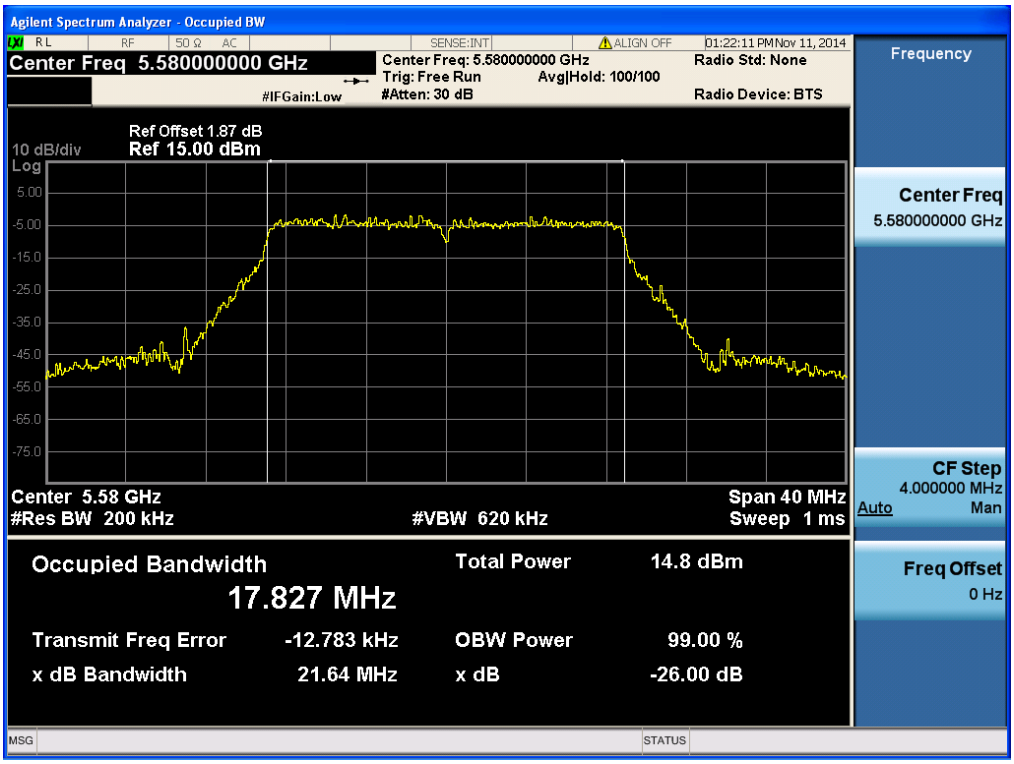
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.64



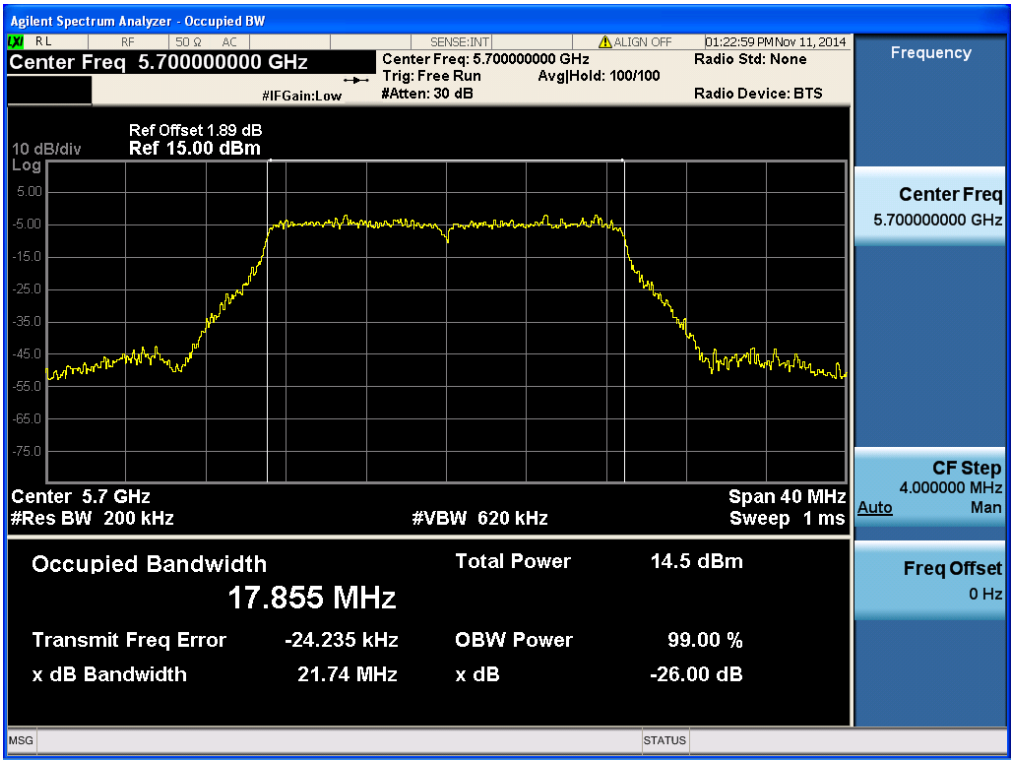
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.100



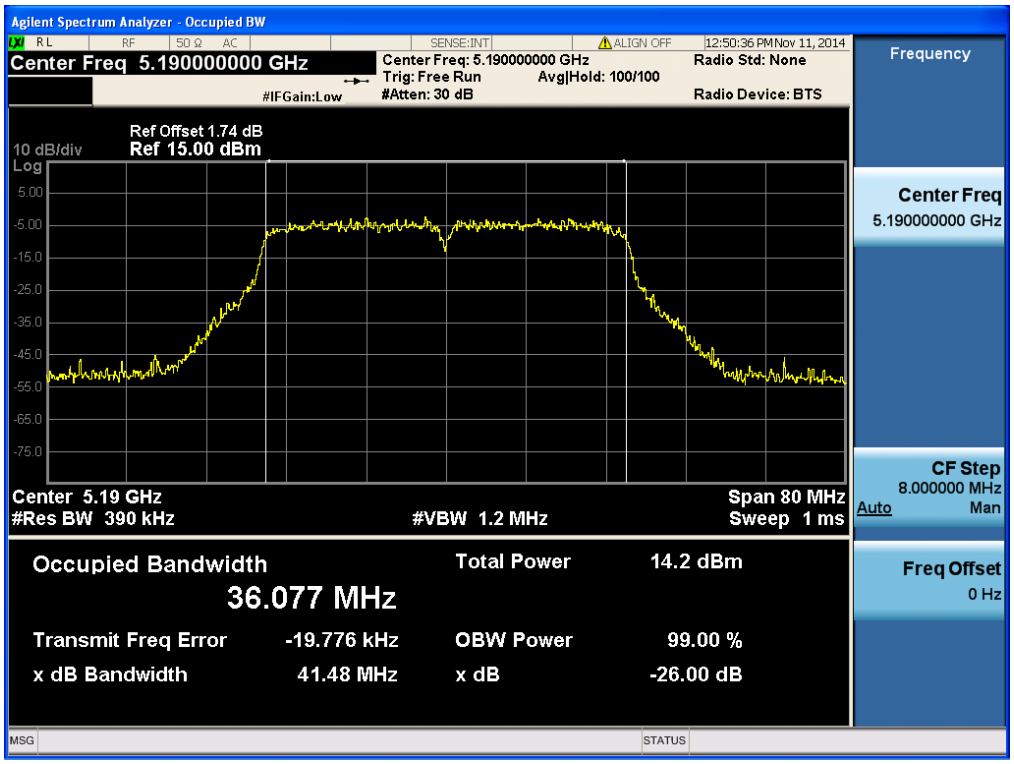
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.116



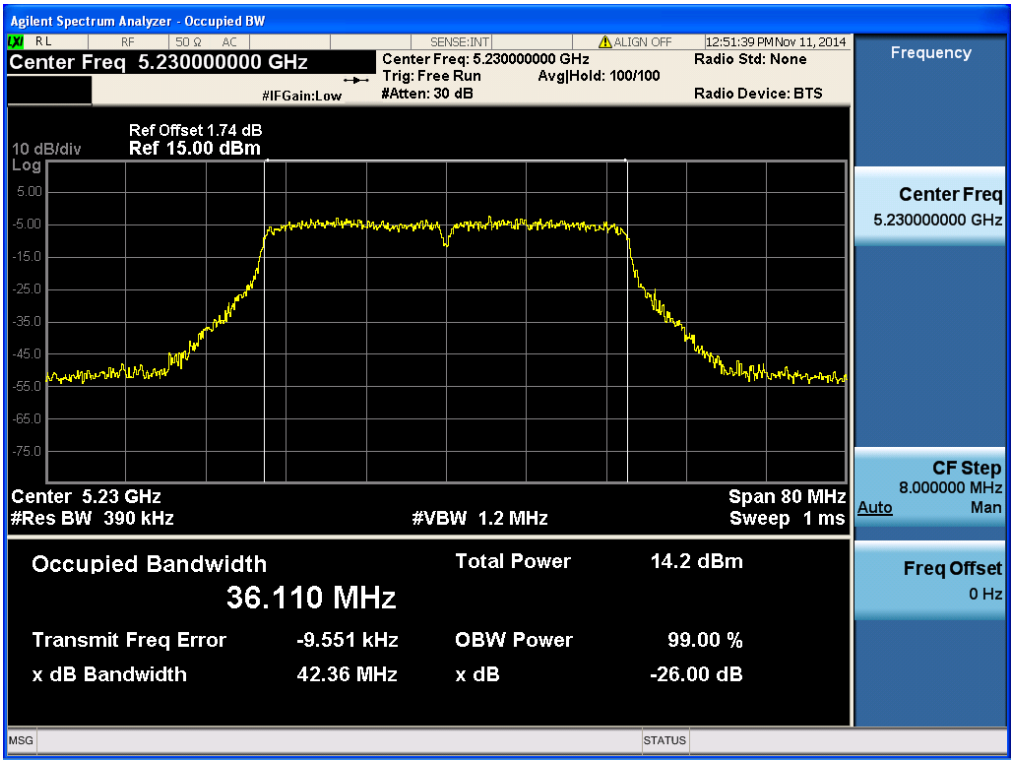
26 dB Bandwidth Test Mode: 802.11n HT20 & Ch.140



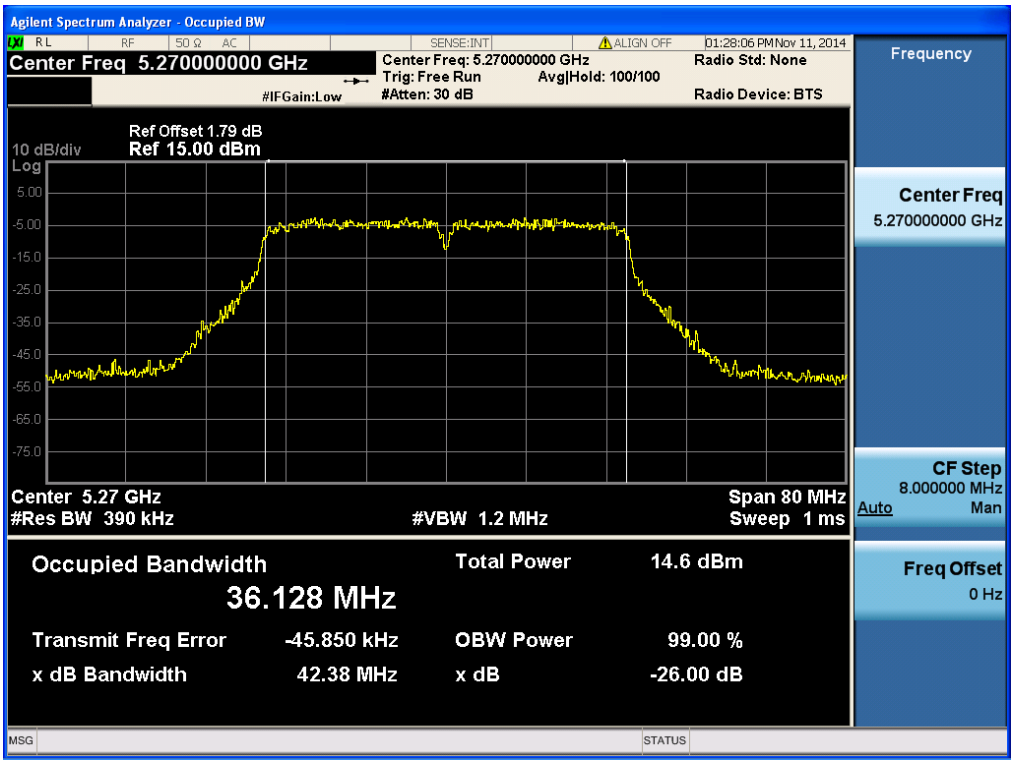
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.38



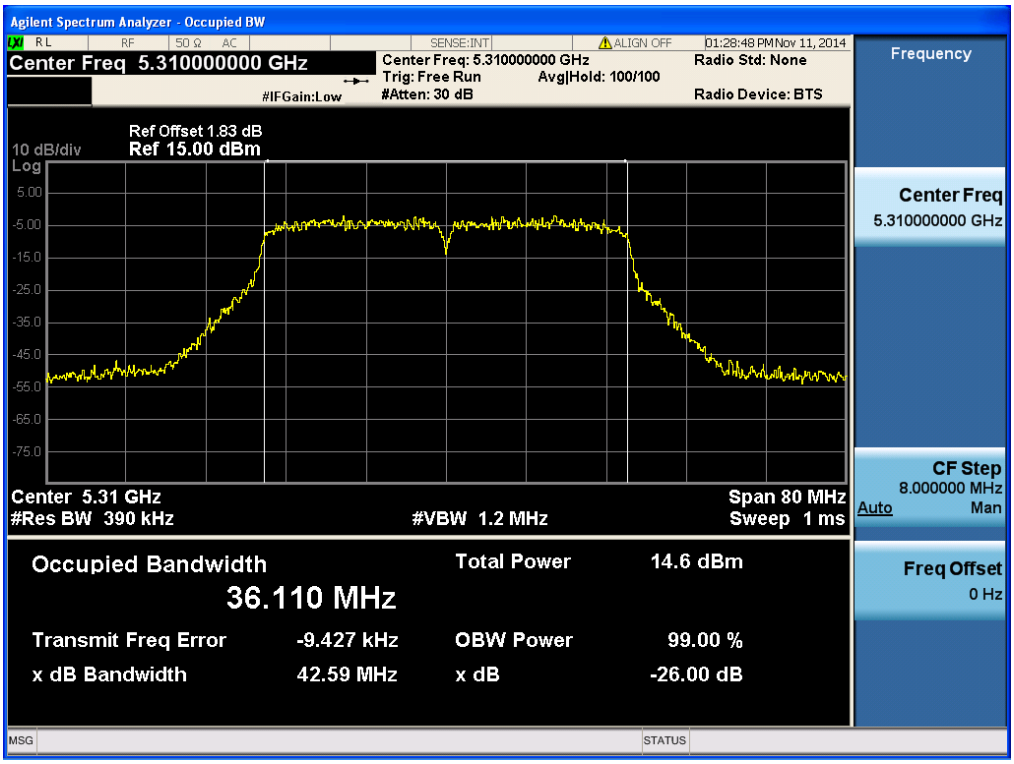
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.46



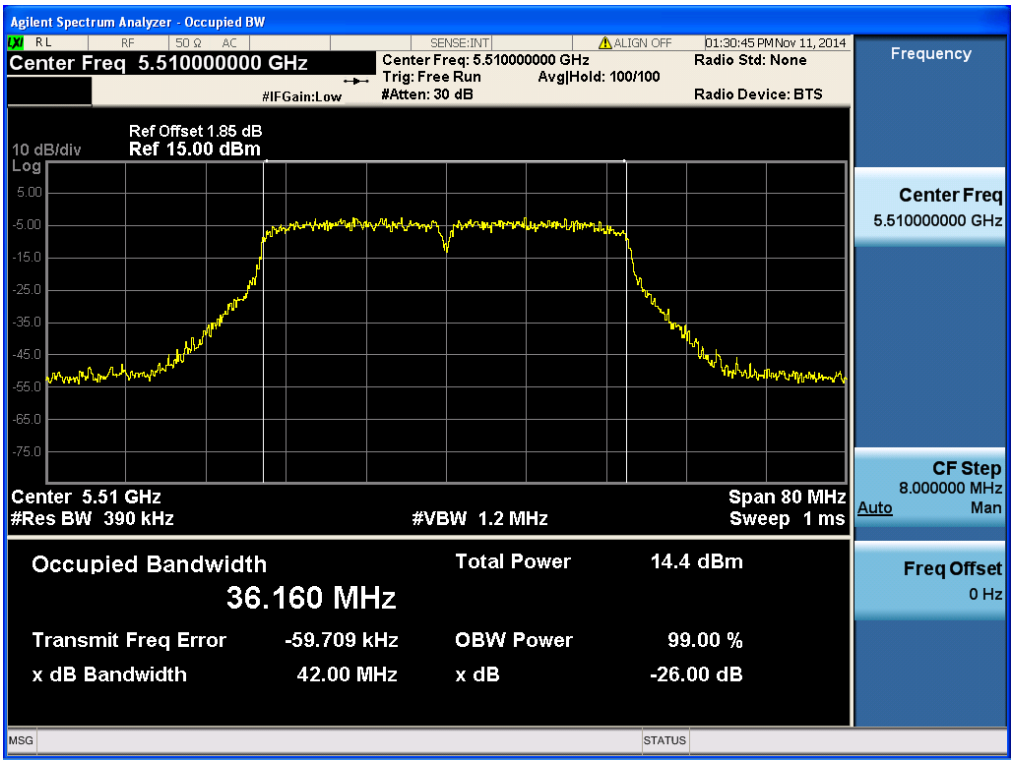
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.54



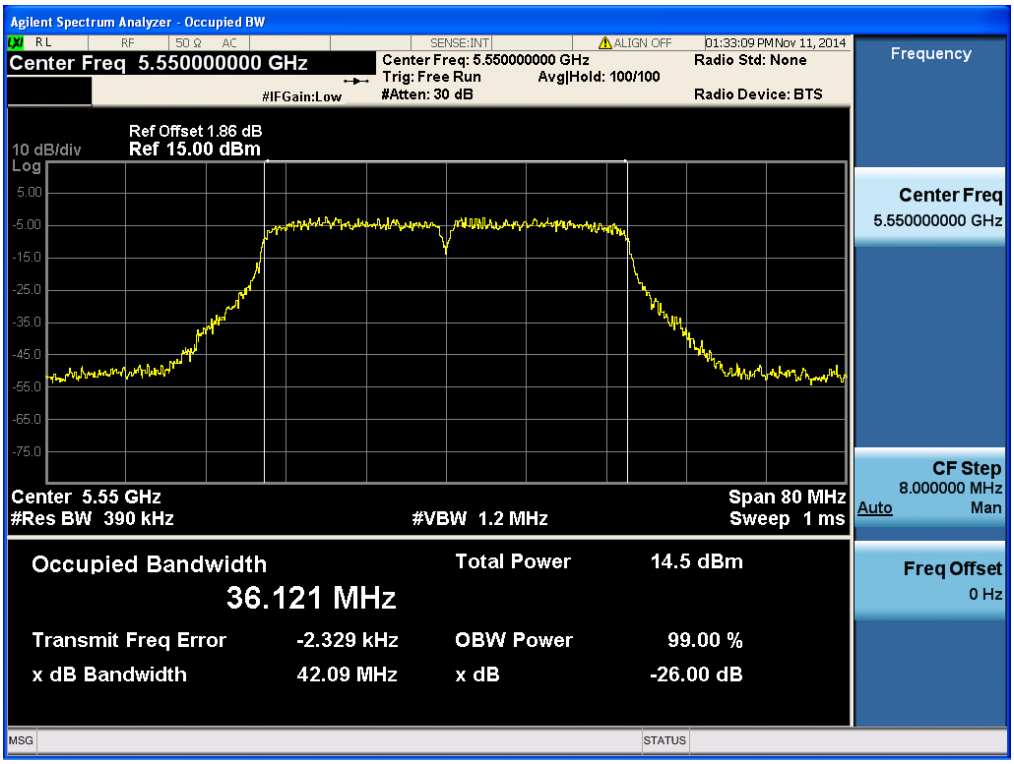
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.62



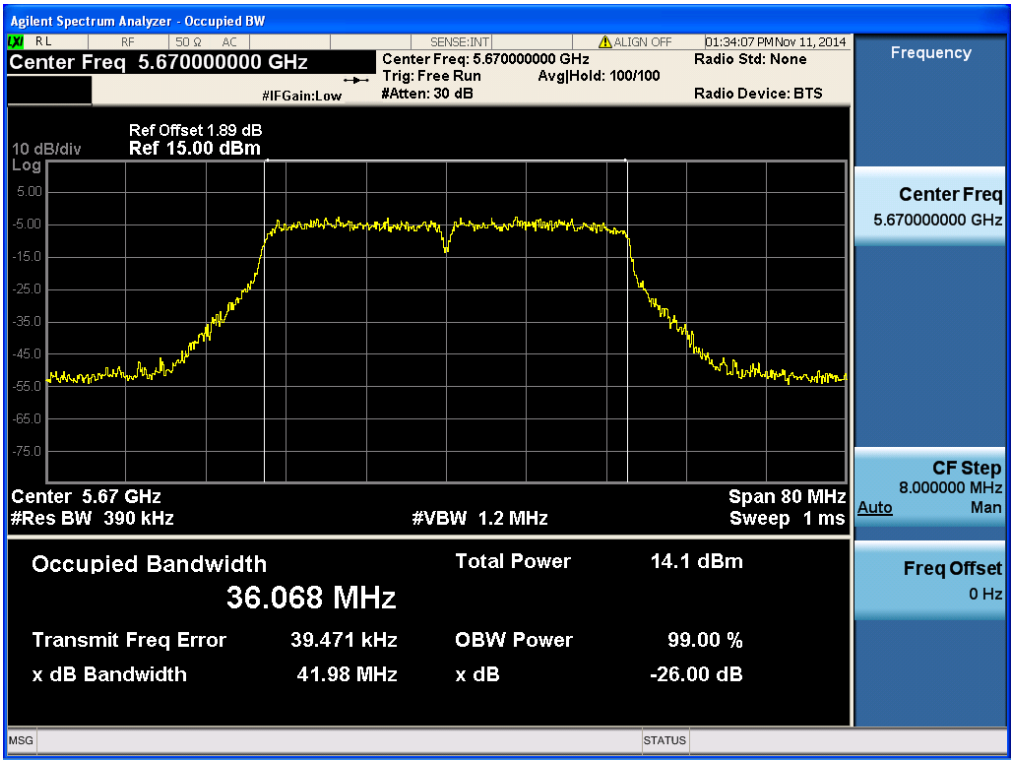
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.102



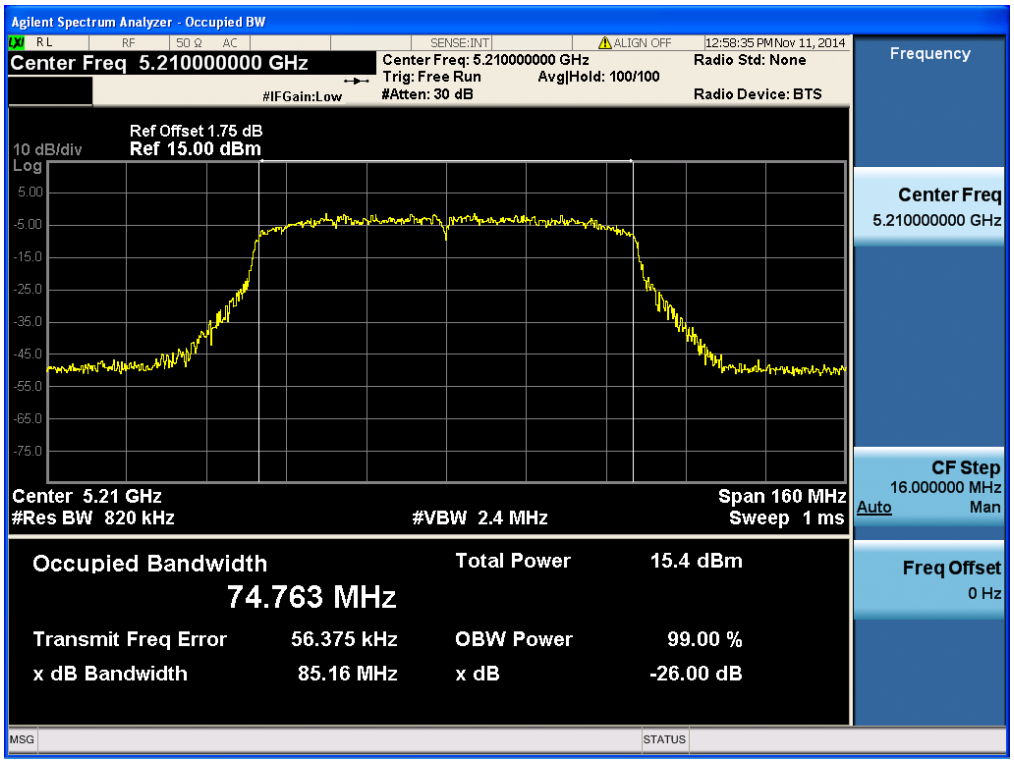
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.110



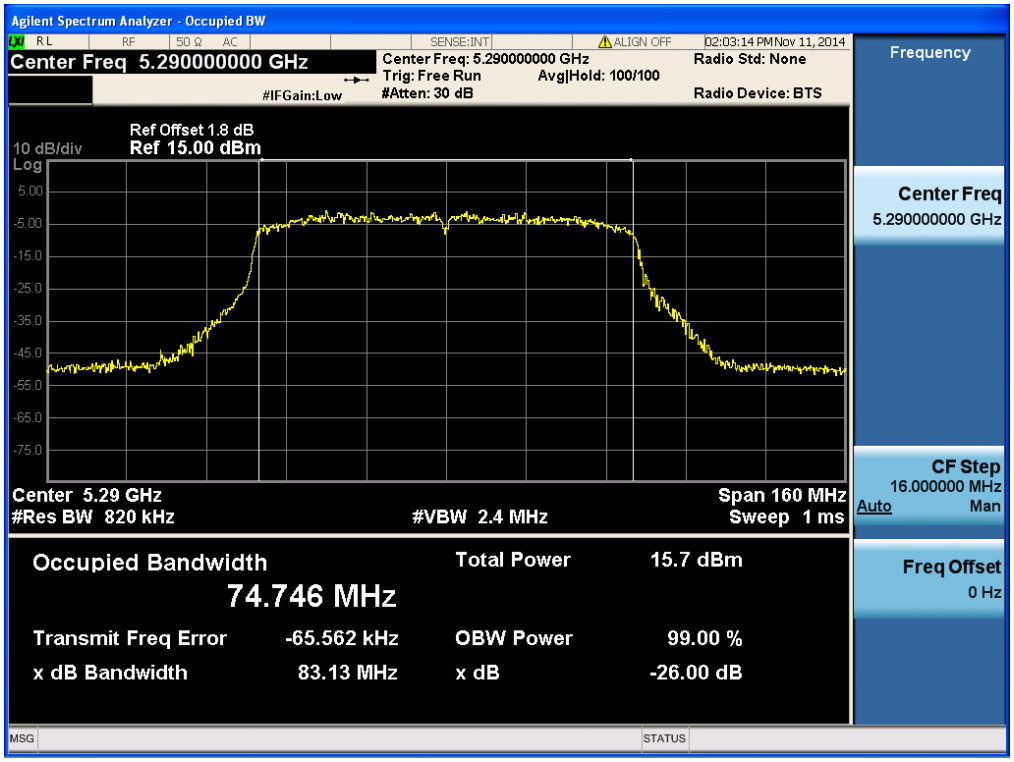
26 dB Bandwidth Test Mode: 802.11n HT40 & Ch.134



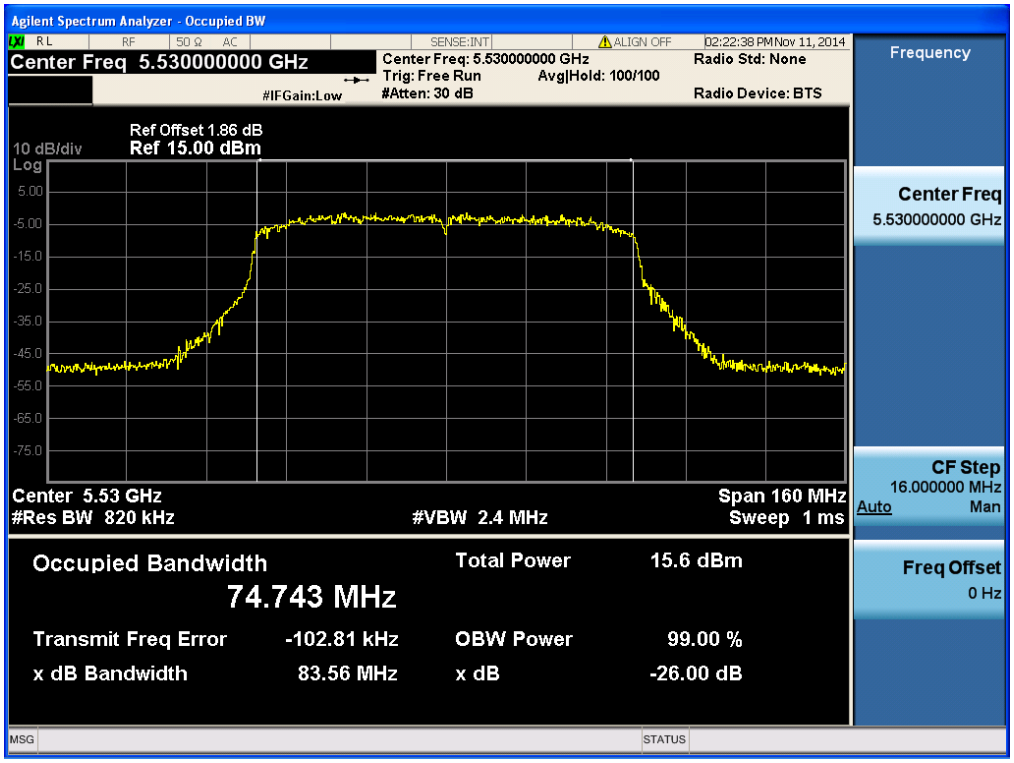
26 dB Bandwidth Test Mode: 802.11ac VHT80 & Ch.42



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



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



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.

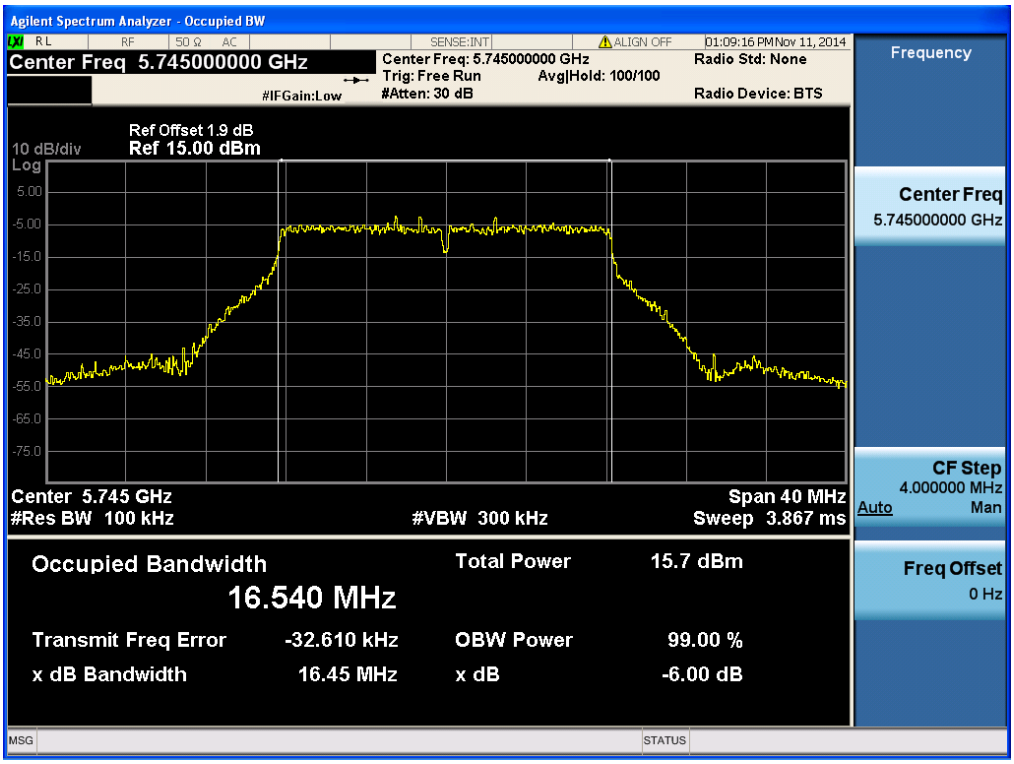
▣ TEST RESULTS: Comply

Mode	Band	Channel	Frequency [MHz]	Test Result [MHz]
802.11a	Band IV	149	5745	16.450
		157	5785	16.410
		165	5825	16.370
802.11n (HT20)	Band IV	149	5745	17.630
		157	5785	17.620
		165	5825	17.600
802.11n (HT40)	Band IV	151	5755	34.440
		159	5795	35.110
802.11ac (VHT80)	Band IV	155	5775	75.190

▣ RESULT PLOTS

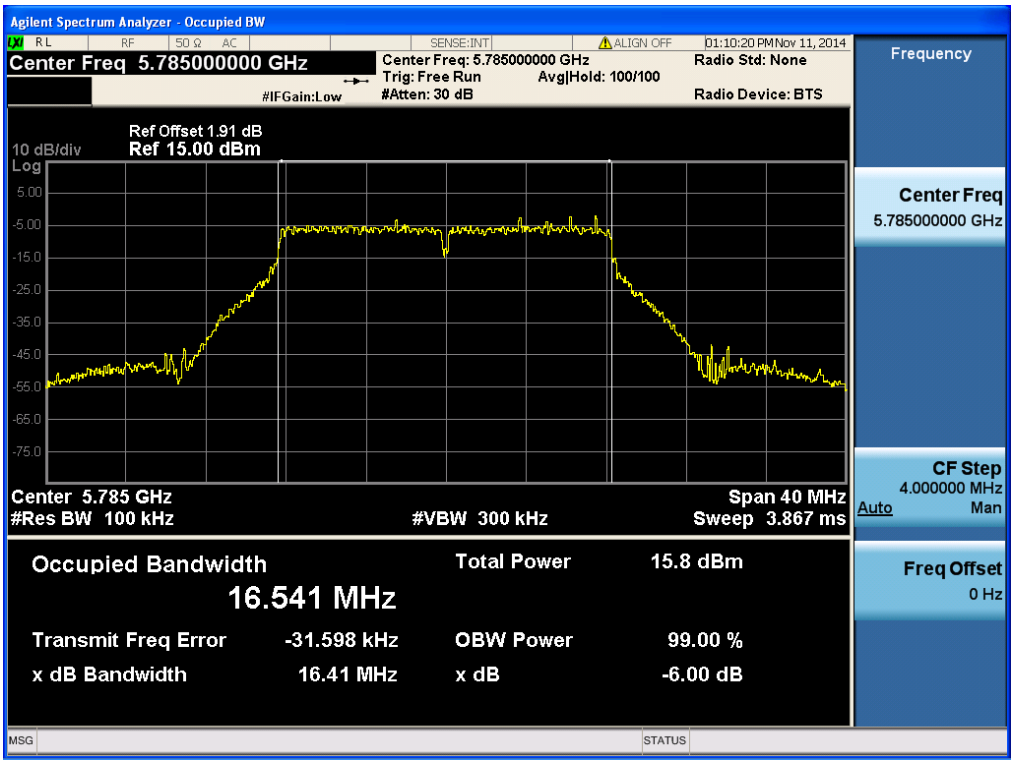
6 dB Bandwidth

Test Mode: 802.11a & Ch.149

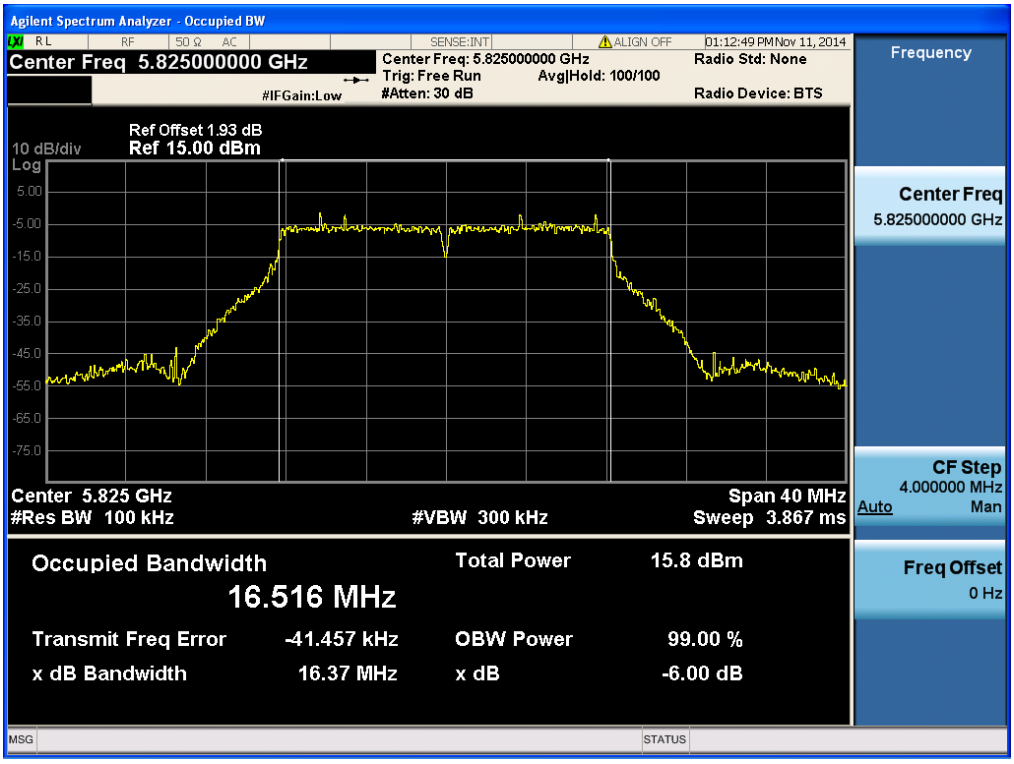


6 dB Bandwidth

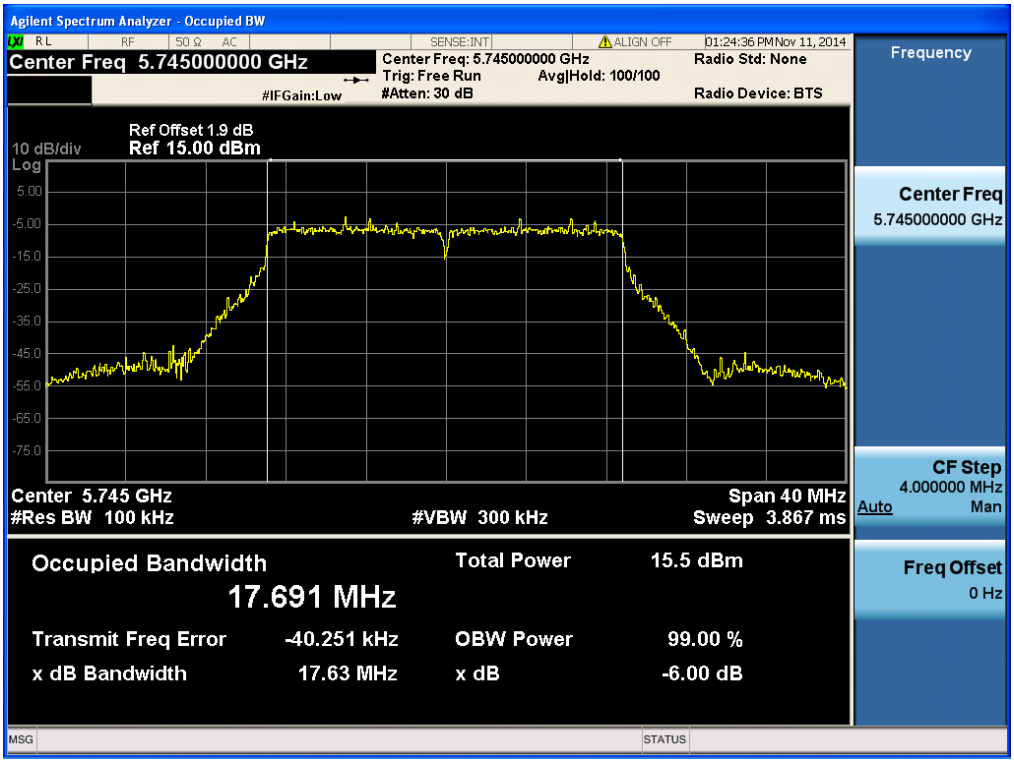
Test Mode: 802.11a & Ch.157



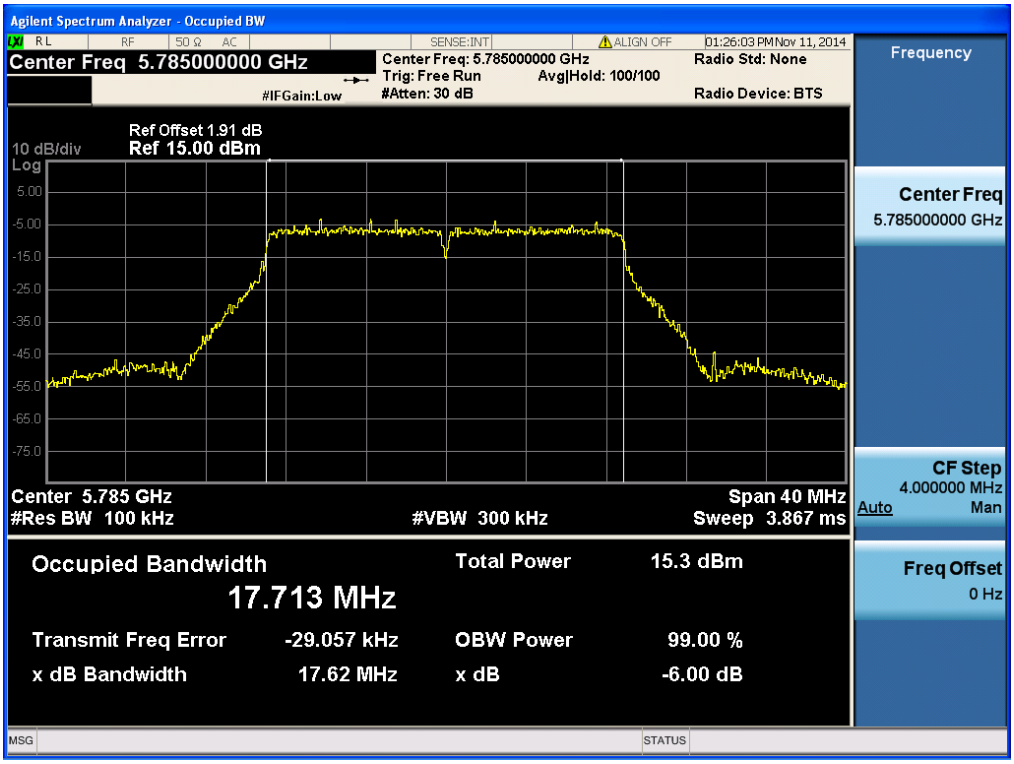
6 dB Bandwidth Test Mode: 802.11a & Ch.165



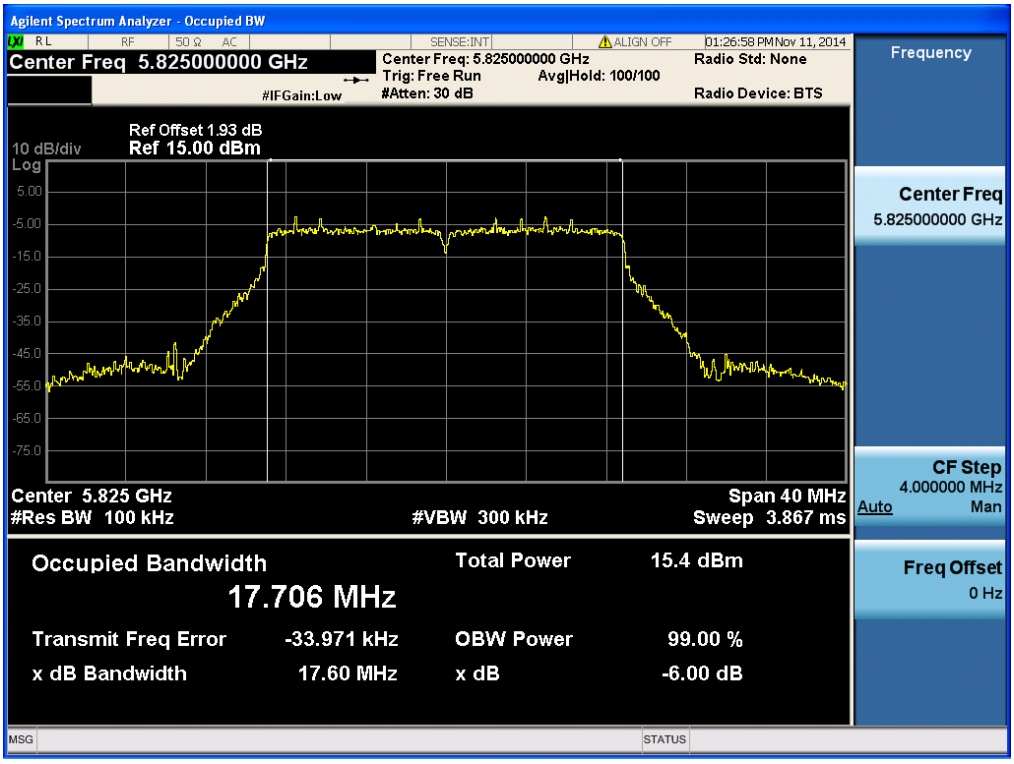
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.149



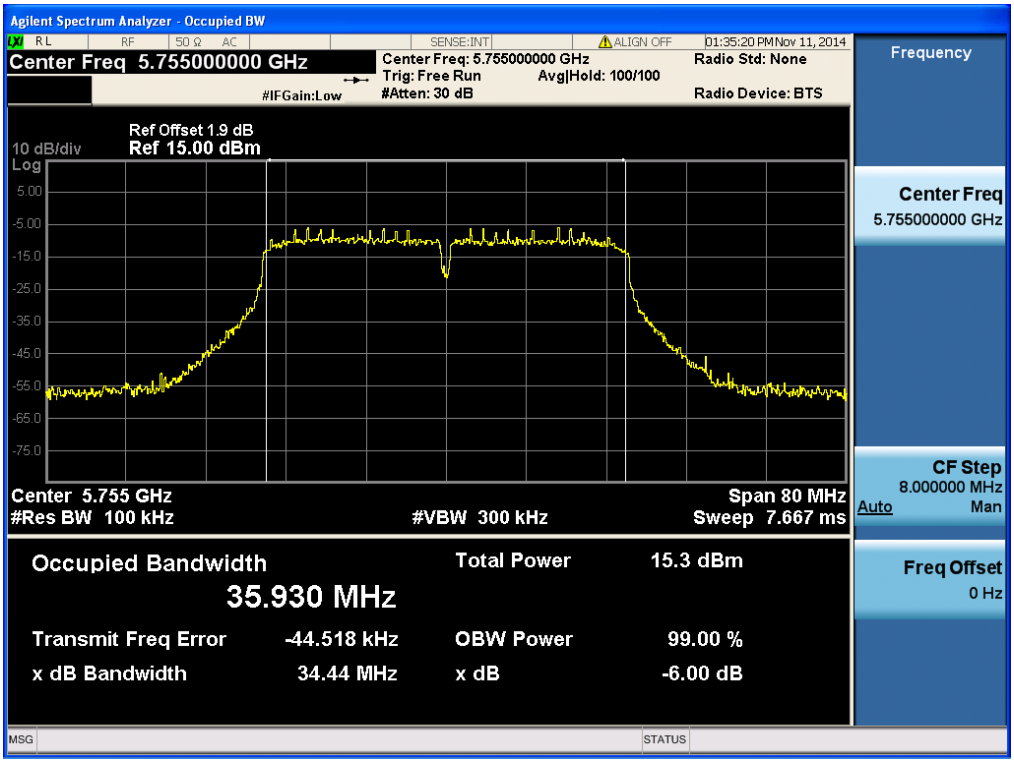
6 dB Bandwidth Test Mode: 802.11a HT20 & Ch.157



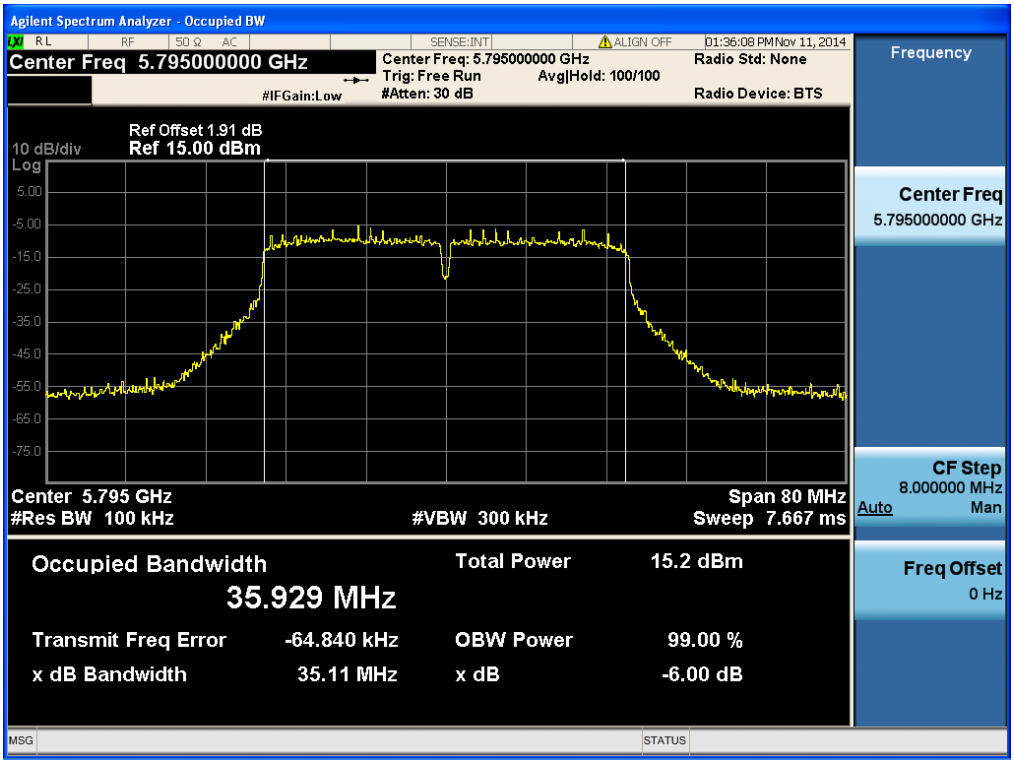
6 dB Bandwidth Test Mode: 802.11n HT20 & Ch.165



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



6 dB Bandwidth Test Mode: 802.11a HT40 & Ch.159



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