FCC Part 15 Subpart C Test Report

Product Name : PIQS Virtual Touch Projector
Model Name : TT

Prepared for:

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Report Number	:	UL71220170302FCC/IC002-1
Date of Report	:	04-19-2017
Date of Test	:	03-03-2017~04-16-2017

Notes：

The test results only relate to these samples which have been tested.
Partly using this report will not be admitted unless been allowed by Unilab.
Uniab is only responsible for the complete report with the reported stamp of Unilab.

Applicant:	PIQS Technology(Shenzhen) Limited. West,6F Buiding 1,No.35 CuiJing Road,Pingshan New District,Shenzhen City,Guangdong,China.
Manufacturer:	PIQS Technology(Shenzhen) Limited. West,6F Buiding 1,No.35 CuiJing Road,Pingshan New District,Shenzhen City,Guangdong,China.
Product Name:	PIQS Virtual Touch Projector
Brand Name:	PIQS
Model Name:	TT
FCC ID:	2ALH2-PFAT100
IC	22519-PFAT100
Serial Number:	N/A
EUT Voltage:	MIN: 16V, NOR: 19V, MAX: 23V
Date of Receipt:	03-02-2017
Date of Test:	03-03-2017~04-16-2017
Test Standard:	FCC CFR Tile 47 Part 15 Subpart C ANSI C 63.4: 2014 ANSI C 63.10: 2013 KDB 558074 D01 v03r05 KDB 662911 DO1 V02 KDB 789033 DO2 V01 RSS-GEN Issue 4 RSS-247 Issue 2
Test Result:	PASS

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(Supervisor: Eva Wang)

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1. GENERAL INFORMATION

1.1 EUT DESCRIPTION

Product Name:	PIQS Virtual Touch Projector
Model Name:	TT
Hardware Version:	M3_T826_ARM_V3
Software Version:	TTCN20170224V001
RF Exposure Environment:	Uncontrolled
WIFI 2.4G	
Frequency Range:	2412MHz~2472MHz
Type of Modulation:	DSSS(BPSK/QPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Antenna Type:	Internal
Antenna Peak Gain:	2dBi
WIFI 5G	
Frequency Range:	5150MHz-5250MHz 5725MHz-5825MHz
Type of Modulation:	DSSS(BPSK/QPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Antenna Type:	Internal
Antenna Peak Gain:	2dBi
Component	
AC Adapter:	Input: AC 100-240V 50/60Hz 1.5A
	Output: DC 19V 3.42A

1.2 TEST MODE

Unilab has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
WIFI 2.4G
Mode 1: 802.11b CH1
Mode 2: 802.11b CH6
Mode 3: 802.11b CH11
Mode 4: 802.11g CH1
Mode 5: 802.11g CH6
Mode 6: 802.11g CH11
Mode 7: 802.11n20 CH1
Mode 8: 802.11n20 CH6
Mode 9: 802.11n20 CH11

WIFI 5G
Mode 10: 802.11a CH36
Mode 11: 802.11a CH48
Mode 12: 802.11n20 CH36
Mode 13: 802.11n20 CH48
Mode 14: 802.11n40 CH38
Mode 15: 802.11n40 CH46
Mode 16: 802.11a CH149
Mode 17: 802.11a CH157
Mode 18: 802.11a CH165
Mode 19: 802.11n20 CH149
Mode 20: 802.11n20 CH157
Mode 21: 802.11n20 CH165
Mode 22: 802.11n40 CH151
Mode 23: 802.11n40 CH159
Mode 24: 802.11ac20 CH36
Mode 25: 802.11ac20 CH48
Mode 26: 802.11ac40 CH38
Mode 27: 802.11ac40 CH46
Mode 28: 802.11ac80 CH42
Mode 29: 802.11ac20 CH149
Mode 30: 802.11ac20 CH157
Mode 31: 802.11ac20 CH165
Mode 32: 802.11ac40 CH151
Mode 33: 802.11ac40 CH159
Mode 34: 802.11ac80 CH155

Test Modes Description:
IEEE802.11a with data rate of 6 Mbps using SISO mode.
IEEE802.11b with data rate of 6 Mbps using SISO mode.
IEEE802.11g with data rate of 6 Mbps using SISO mode.
IEEE802.11n20 with data rate of MCS0 and bandwidth of 20MHz using SISO mode.
IEEE802.11n20 with data rate of MCS8 and bandwidth of 20MHz using MIMO mode.
IEEE802.11n40 with data rate of MCS0 and bandwidth of 40MHz using SISO mode.
IEEE802.11n40 with data rate of MCS8 and bandwidth of 40MHz using MIMO mode.
IEEE802.11ac20 with data rate of MCS0 and bandwidth of 20MHz using SISO mode.
IEEE802.11ac20 with data rate of MCS8 and bandwidth of 20MHz using MIMO mode.
IEEE802.11ac40 with data rate of MCS0 and bandwidth of 40MHz using SISO mode.
IEEE802.11ac40 with data rate of MCS8 and bandwidth of 40MHz using MIMO mode.
IEEE802.11ac80 with data rate of MCS0 and bandwidth of 80MHz using SISO mode.
IEEE802.11ac80 with data rate of MCS8 and bandwidth of 80MHz using MIMO mode.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

2.1 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

2.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

2.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2014 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2014.

2.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4

8.37625 - 8.38675 8.41425 - 8.41475 12.29 - 12.293 12.51975 - 12.52025 12.57675 - 12.57725 13.36 - 13.41	156.7 - 156.9 162.0125 - 167.17 167.72 - 173.2 240 - 285 322 - 335.4	2655 - 2900 3260 - 3267 3332 - 3339 3345.8 - 3358 3600 - 4400	22.01 - 23.12 23.6 - 24.0 31.2 - 31.8 36.43 - 36.5 (2)

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

2 Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

2.5 Restricted Frequency Bands of RSS-GEN

Restricted bands, identified in Table 6, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

(a) Fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of Table 6 except for apparatus complying under RSS-287;

(b) Unwanted emissions that fall into restricted bands of Table below shall comply with the limits specified in RSS-Gen; and

(c) Unwanted emissions that do not fall within the restricted frequency bands of Table 6 shall comply either with the limits specified in the applicable RSS or with those specified in this RSS-Gen.

MHz	MHz	MHz	MHz	GHz
0.090-0.110	8.37625-8.38675	74.8-75.2	1718.8-1722.2	9.0-9.2
2.1735-2.1905	8.41425-8.41475	108-138	2200-2300	9.3-9.5
3.020-3.026	12.29-12.293	156.52475-156.52525	2310-2390	10.6-12.7
4.125-4.128	12.51975-12.52025	156.7-156.9	2655-2900	13.25-13.4
4.17725-4.17775	12.57675-12.57725	240-285	3260-3267	14.47-14.5
4.20725-4.20775	13.36-13.41	322-335.4	3332-3339	15.35-16.2
5.677-5.683	16.42-16.423	399.9-410	3345.8-3358	17.7-21.4
6.215-6.218	16.69475-16.69525	608-614	3500-4400	22.01-23.12
6.26775-6.26825	16.80425-16.80475	960-1427	4500-5150	23.6-24.0
6.31175-6.31225	25.5-25.67	1435-1626.5	5350-5460	31.2-31.8
8.291-8.294	37.5-38.25	1645.5-1646.5	7250-7750	36.43-36.5
8.362-8.366	73-74.6	1660-1710	8025-8500	Above 38.6

* Certain frequency bands listed in Table 6 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in the 200- and 300-series of RSSs, such as RSS-210 and RSS-310, which contain the requirements that apply to licence-exempt radio apparatus.

3. TECHNIACL SUMMARY

3.1 SUMMARY OF STANDARDS AND TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Test Item	FCC	IC	Result
Occupied Bandwidth	§15.247 (a)	RSS-247 §5.1	P
6 dB bandwidth	§15.247 (a)	RSS-247 §5.2	P
Power spectral density	§15.247 (e)	RSS-247 §5.2	P
Peak Output Power (Conduction)	§15.247 (b)	RSS-247 §5.4	P
Unwanted Emissions (Conduction)	§15.247 (d)	RSS-247 §5.5	P
Band edge measurement	§15.247 (d)	RSS-247 §5.5	P
Unwanted Emissions (Radiation)	§15.247 (d) §15.35 (b) §15.209 (a)	RSS-247 §5.5	P
AC Power Line Conducted Emissions	§15.207 (a)	RSS-247 §5.5	P
Restricted Bands of operation	§15.205	RSS-Gen §8.10	P

Note: P means pass, F means failure, N/A means not applicable

3.2 TEST UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance	3.4
Radiated disturbance	4.2

3.3 TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	Agilent	N9038A	MY51210142	11/10/2017
Power meter	R&S	NRP2	101607	02/16/2018
Loop Antenna	Schwarzbeck	FMZB1519	1519-020	03/23/2018
LISN	R&S	ENV216	100069	07/26/2017
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	11/26/2017
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	02/25/2018
Power Splitter	Agilent	11667C/ 52401	MY53806148	02/25/2018
Biconilog Antenna	Schwarzbeck	VULB 9160	3316	09/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	942	09/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	943	09/18/2017
Horn Antenna(18-40GHz)	ETS	3116	00070497	07/18/2017

3.4 TEST FACILITY

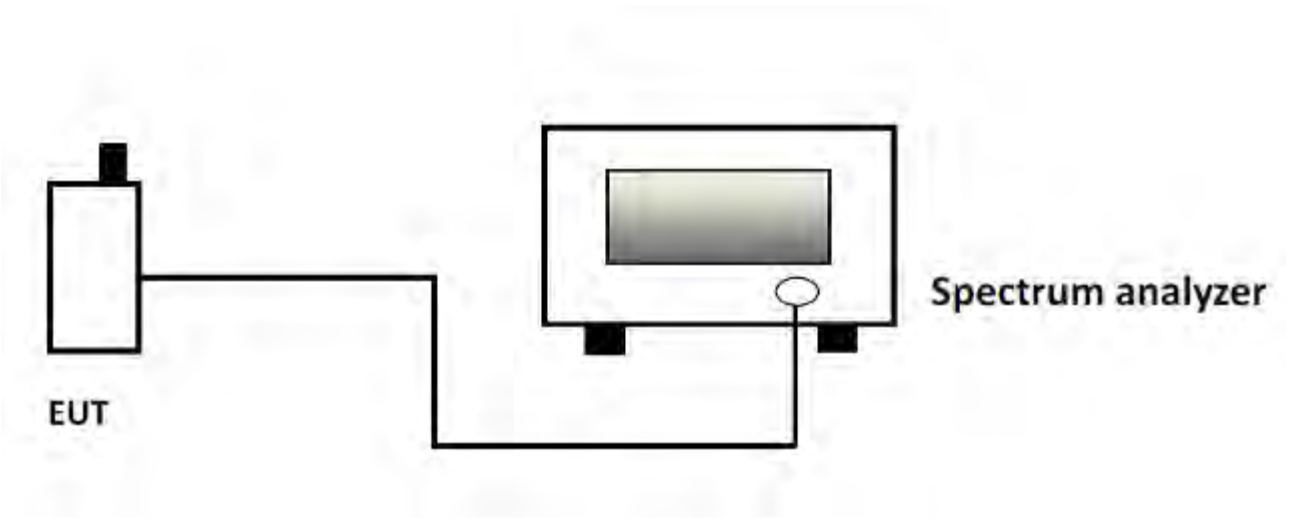
All test facilities used to collect the test data are located at No.1350, Lianxi Rd. Pudong New District, Shanghai, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4: 2014, CISPR 16-1-1 and other equivalent standards. The laboratory is compliance with the requirements of the ISO/IEC/E 17025.

3.5 TEST SETUP CONFIGURATION

The information contained within this report is intended to show verification of compliance of the EUT to the requirements of CFR 47 FCC Part 15.247.
Unilab has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report.

4. OCCUPIED BANDWIDTH

4.1 TEST SETUP



4.2 LIMITS

Limits	≥25 kHz or 2 to 3 times the 20 dB bandwidth

4.3 TEST PROCEDURE

Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
WIFI: Low, Middle and High Channel.
Using occupied BW measurement function of spectrum analyzer and settings are:
XdB = -20dB
RBW = 100kHz
VBW ≥ 3 x RBW
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a channel
Sweep = auto
Detector function = peak
Trace = max hold

4.4 TEST RESULTS

Channel	20dB bandwidth (MHz)	99% bandwidth (MHz)
WIFI 2.4G		
802.11b		
Antenna 1		
802.11b CH1	11.591	13.12
802.11b CH6	11.537	13.12
802.11b CH11	11.401	12.98
Antenna 2		
802.11b CH1	11.700	13.24
802.11b CH6	11.547	13.14
802.11b CH11	11.567	13.08
802.11g		
Antenna 1		
802.11g CH1	16.474	18.52
802.11g CH6	16.506	19.34
802.11g CH11	16.507	18.79
Antenna 2		
802.11g CH1	16.489	18.02
802.11g CH6	16.508	18.73
802.11g CH11	16.470	18.55
802.11n20		
Antenna 1		
802.11n20 CH1	17.645	19.50
802.11n20 CH6	17.711	19.36
802.11n20 CH11	17.701	19.94
Antenna 2		
802.11n20 CH1	17.658	19.44
802.11n20 CH6	17.674	19.30
802.11n20 CH11	17.697	19.42
Mimo		
802.11n20 CH1	17.673	19.42
802.11n20 CH6	17.680	19.73
802.11n20 CH11	17.673	19.45
WIFI 5G(5150MHz-5250MHz)		
802.11a		
Antenna 1		
802.11a CH36	16.536	19.01
802.11a CH48	16.513	18.83
Antenna 2		
802.11a CH36	16.464	18.24
802.11a CH48	16.486	18.37
802.11n20		
Antenna 1		
802.11n20 CH 36	17.716	18.88
802.11n20 CH 48	17.709	19.62
Antenna 2		
802.11n20 CH 36	17.679	19.39

802.11n20 CH 48	17.682	19.49
Mimo		
802.11n20 CH 36	17.673	19.43
802.11n20 CH 48	17.684	19.41
802.11n40		
Antenna 1		
802.11n40 CH 38	36.232	37.54
802.11n40 CH 46	36.197	37.66
Antenna 2		
802.11n40 CH 38	36.147	37.57
802.11n40 CH 46	36.184	37.62
Mimo		
802.11n40 CH 38	36.160	37.55
802.11n40 CH 46	36.219	37.53
WIFI 5G(5725MHz-5850MHz)		
802.11a		
Antenna 1		
802.11a CH149	16.472	18.94
802.11a CH157	16.484	18.60
802.11a CH165	16.473	18.88
Antenna 2		
802.11a CH149	16.455	18.52
802.11a CH157	16.496	18.39
802.11a CH165	16.451	18.24
802.11n20		
Antenna 1		
802.11n20 CH149	17.691	19.40
802.11n20 CH157	17.661	19.58
802.11n20 CH165	17.669	19.70
Antenna 2		
802.11n20 CH149	17.664	19.28
802.11n20 CH157	17.692	19.53
802.11n20 CH165	17.680	19.22
Mimo		
802.11n20 CH149	17.689	18.87
802.11n20 CH157	17.668	19.37
802.11n20 CH165	17.662	19.08
802.11n40		
Antenna 1		
802.11n40 CH151	36.262	37.81
802.11n40 CH159	36.226	37.69
Antenna 2		
802.11n40 CH151	36.283	37.66
802.11n40 CH159	36.237	37.62
Mimo		
802.11n40 CH151	36.234	37.61
802.11n40 CH159	36.265	38.02
802.11ac(5150MHz-5250MHz)		

802.11ac20		
Antenna 1		
802.11ac20 CH36	17.737	19.15
802.11ac20 CH48	17.680	19.61
Antenna 2		
802.11ac20 CH36	17.704	19.88
802.11ac20 CH48	17.656	19.32
Mimo		
802.11ac20 CH36	17.689	19.13
802.11ac20 CH48	17.668	19.38
802.11ac40		
Antenna 1		
802.11ac40 CH38	36.237	37.65
802.11ac40 CH46	36.177	37.66
Antenna 2		
802.11ac40 CH38	36.155	37.67
802.11ac40 CH46	36.201	37.33
Mimo		
802.11ac40 CH38	36.216	37.49
802.11ac40 CH46	36.183	37.70
802.11ac80		
Antenna 1		
802.11ac80 CH42	75.681	77.53
Antenna 2		
802.11ac80 CH42	75.801	77.62
Mimo		
802.11ac80 CH42	75.622	77.38
802.11ac(5725MHz-5850MHz)		
802.11ac20		
Antenna 1		
802.11ac20 CH149	17.669	19.54
802.11ac20 CH157	17.674	19.72
802.11ac20 CH165	17.676	19.48
Antenna 2		
802.11ac20 CH149	17.674	19.36
802.11ac20 CH157	17.675	19.79
802.11ac20 CH165	17.660	19.20
Mimo		
802.11ac20 CH149	17.686	19.45
802.11ac20 CH157	17.678	19.90
802.11ac20 CH165	17.659	19.26
802.11ac40		
Antenna 1		
802.11ac40 CH151	36.223	37.91
802.11ac40 CH159	36.183	37.61
Antenna 2		
802.11ac40 CH151	36.279	37.71
802.11ac40 CH159	36.256	37.72

Mimo		
802.11ac40 CH151	36.269	37.64
802.11ac40 CH159	36.259	37.81
802.11ac80		
Antenna 1		
802.11ac80 CH155	75.751	77.59
Antenna 2		
802.11ac80 CH155	75.738	77.75
Mimo		
802.11ac80 CH155	75.812	77.60

Antenna 1

WIFI 2.4G

802.11b

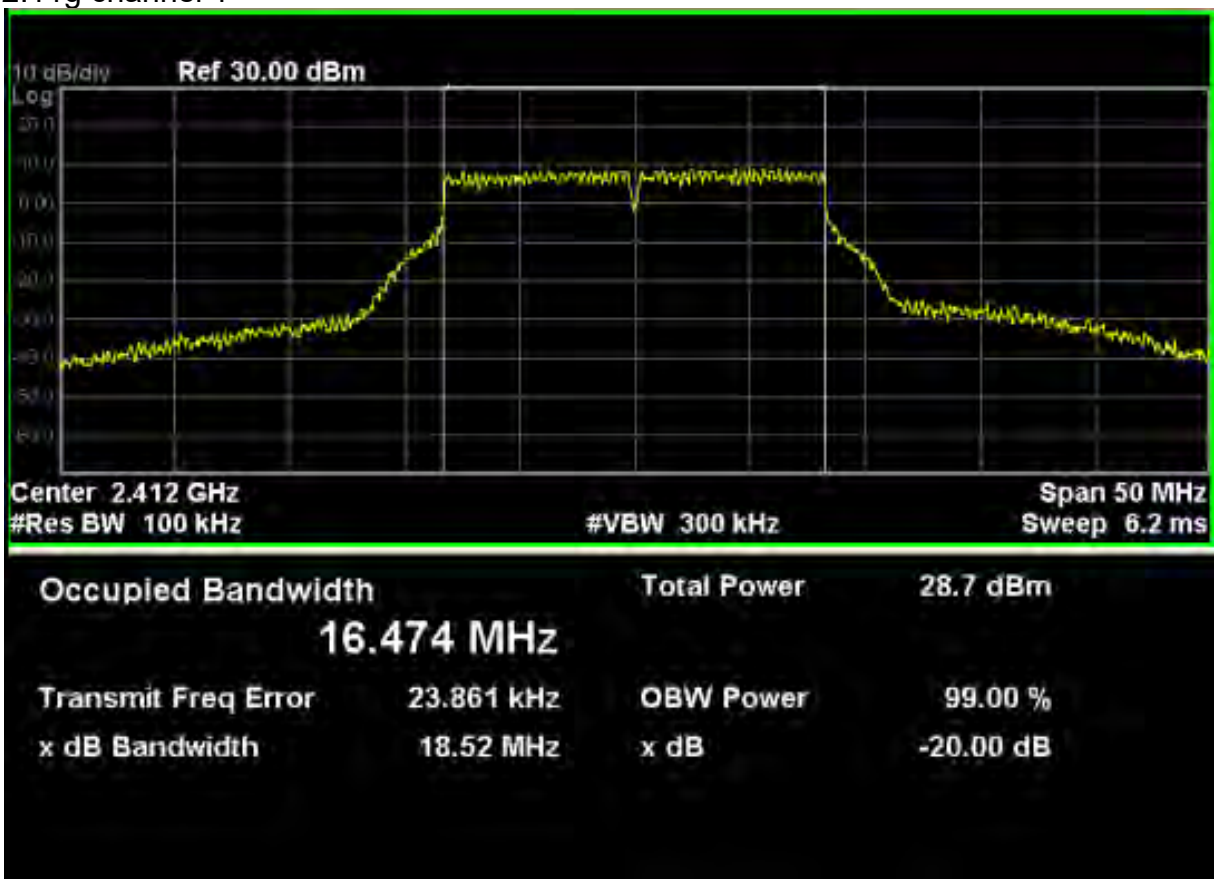
802.11b channel 1

802.11b channel 6

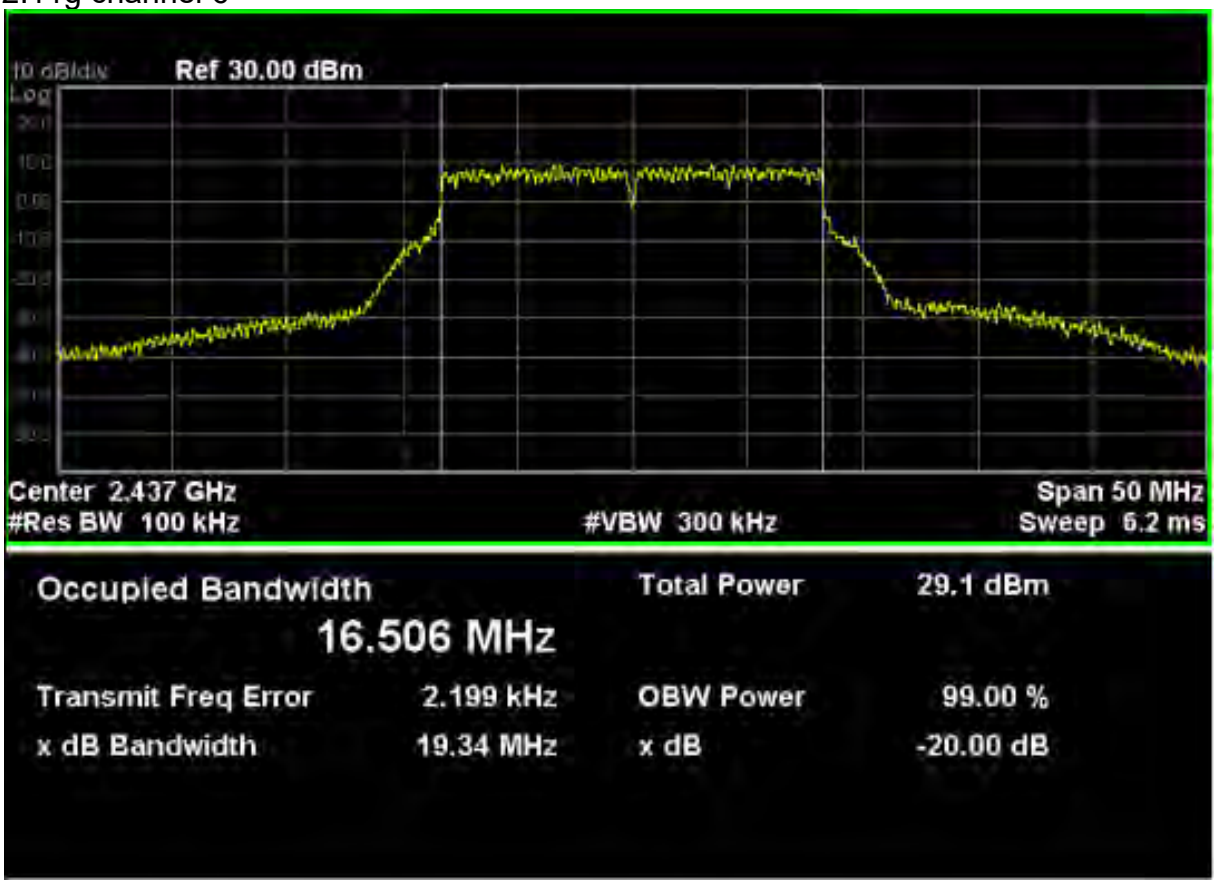
802.11b channel 11

802.11g

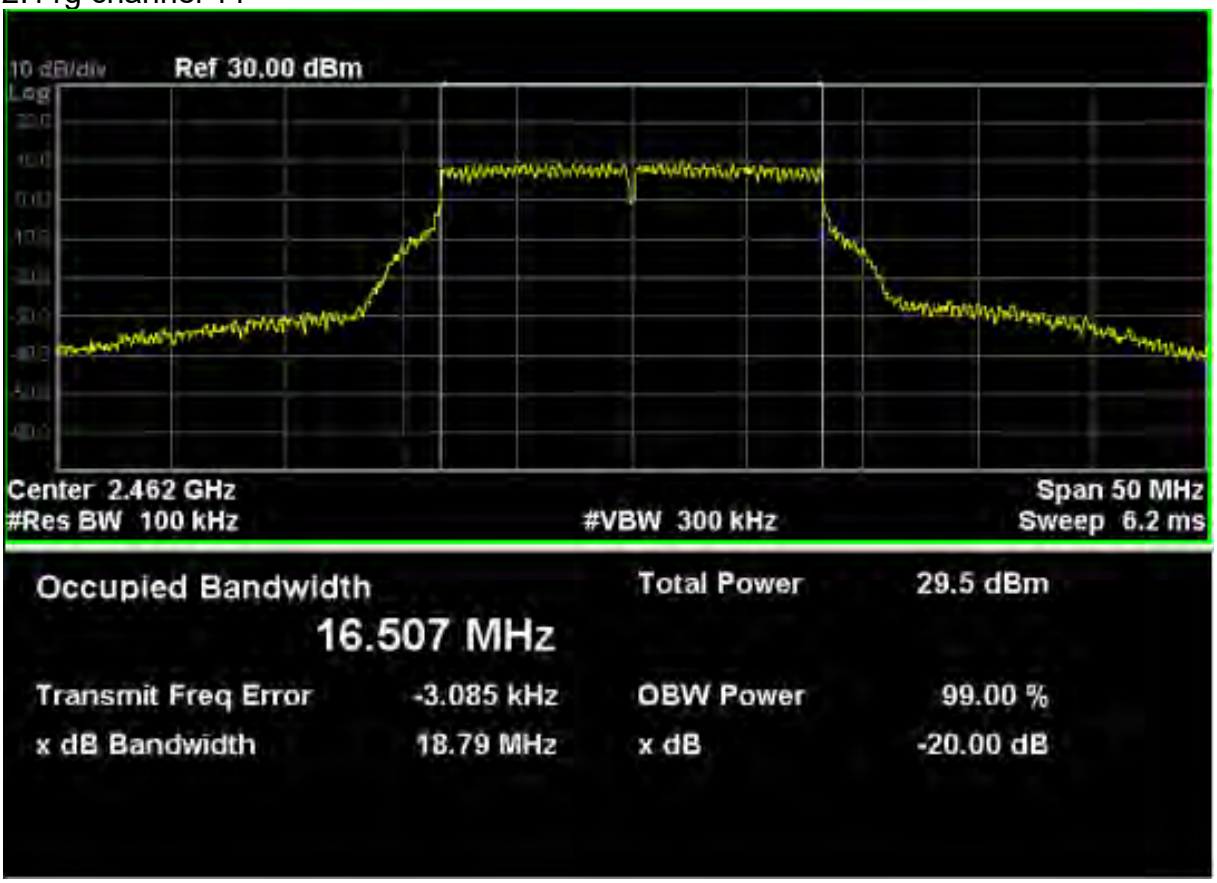
802.11g channel 1



802.11g channel 6

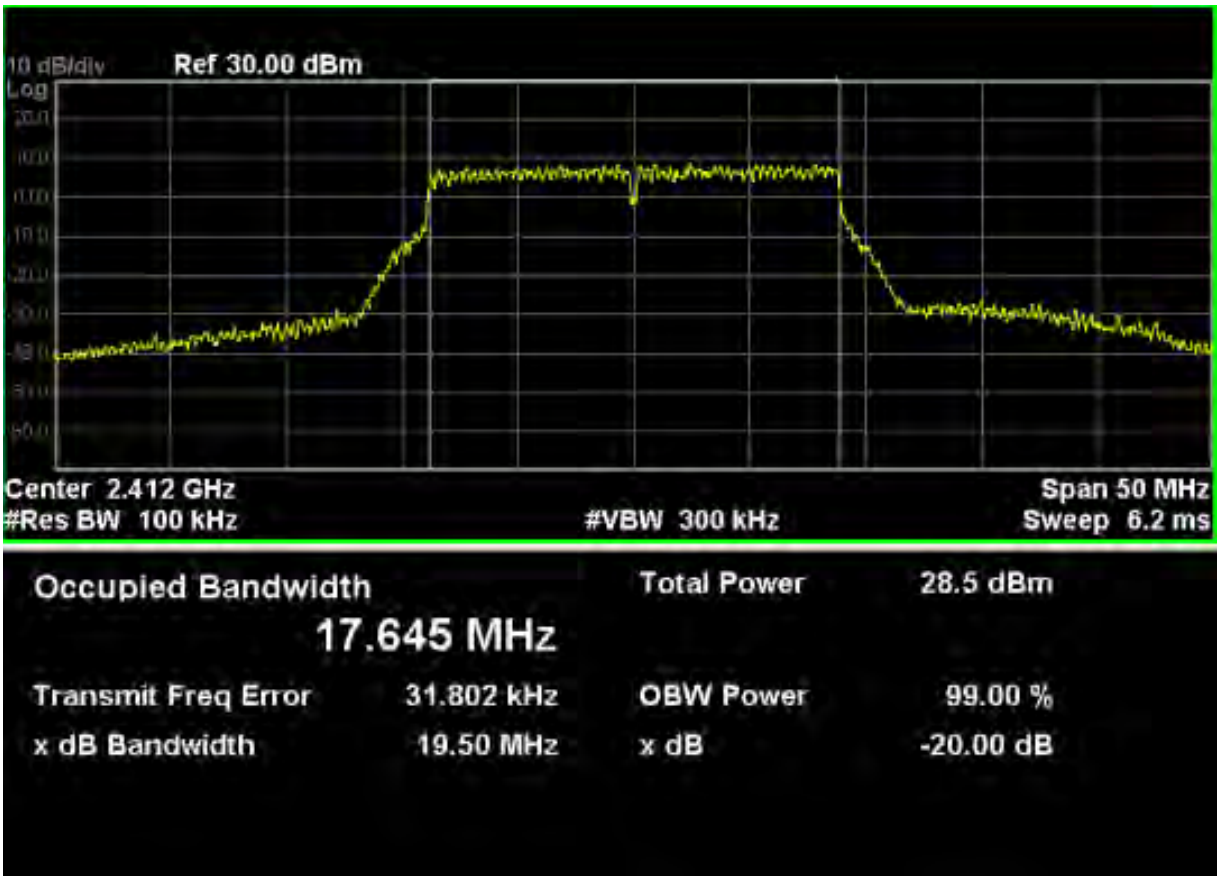


802.11g channel 11

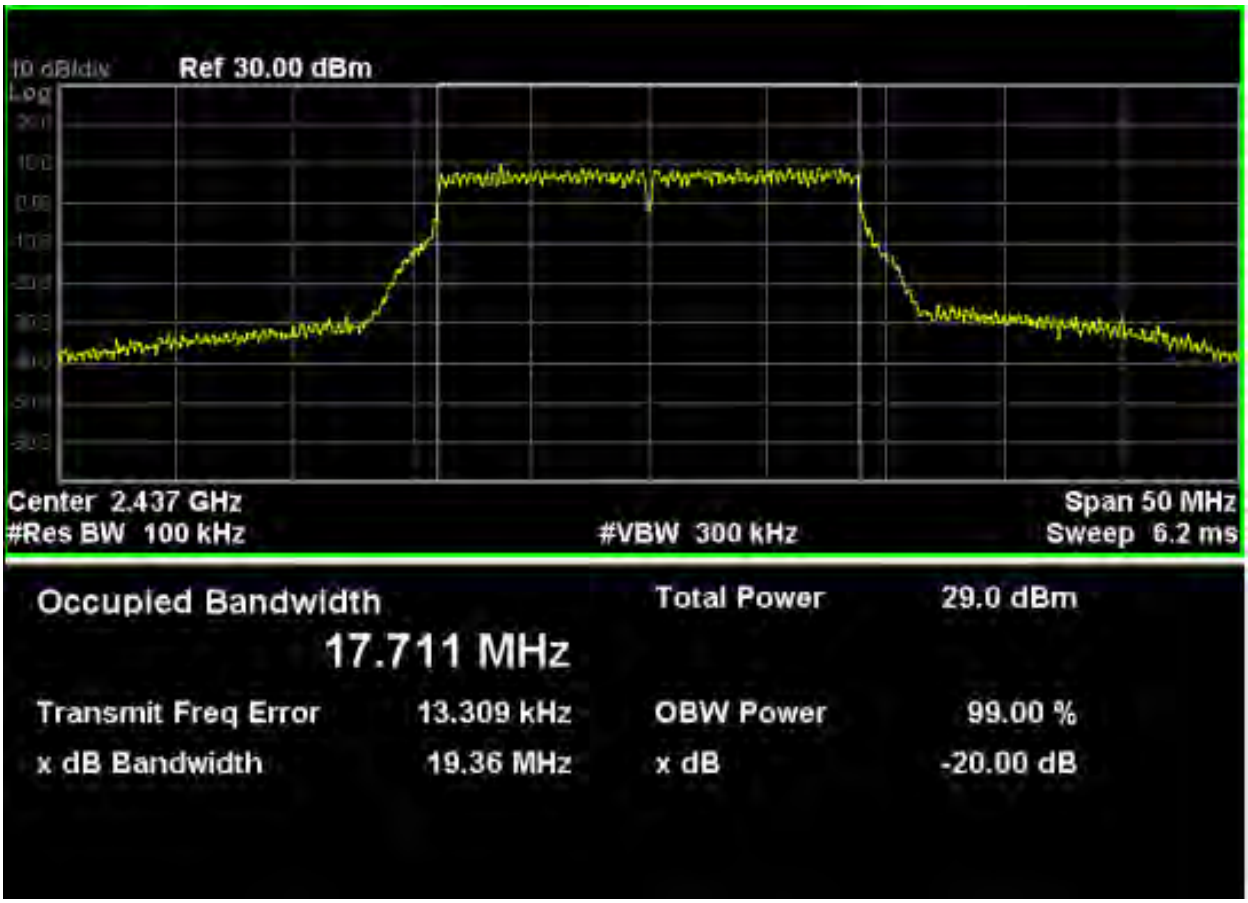


802.11n20

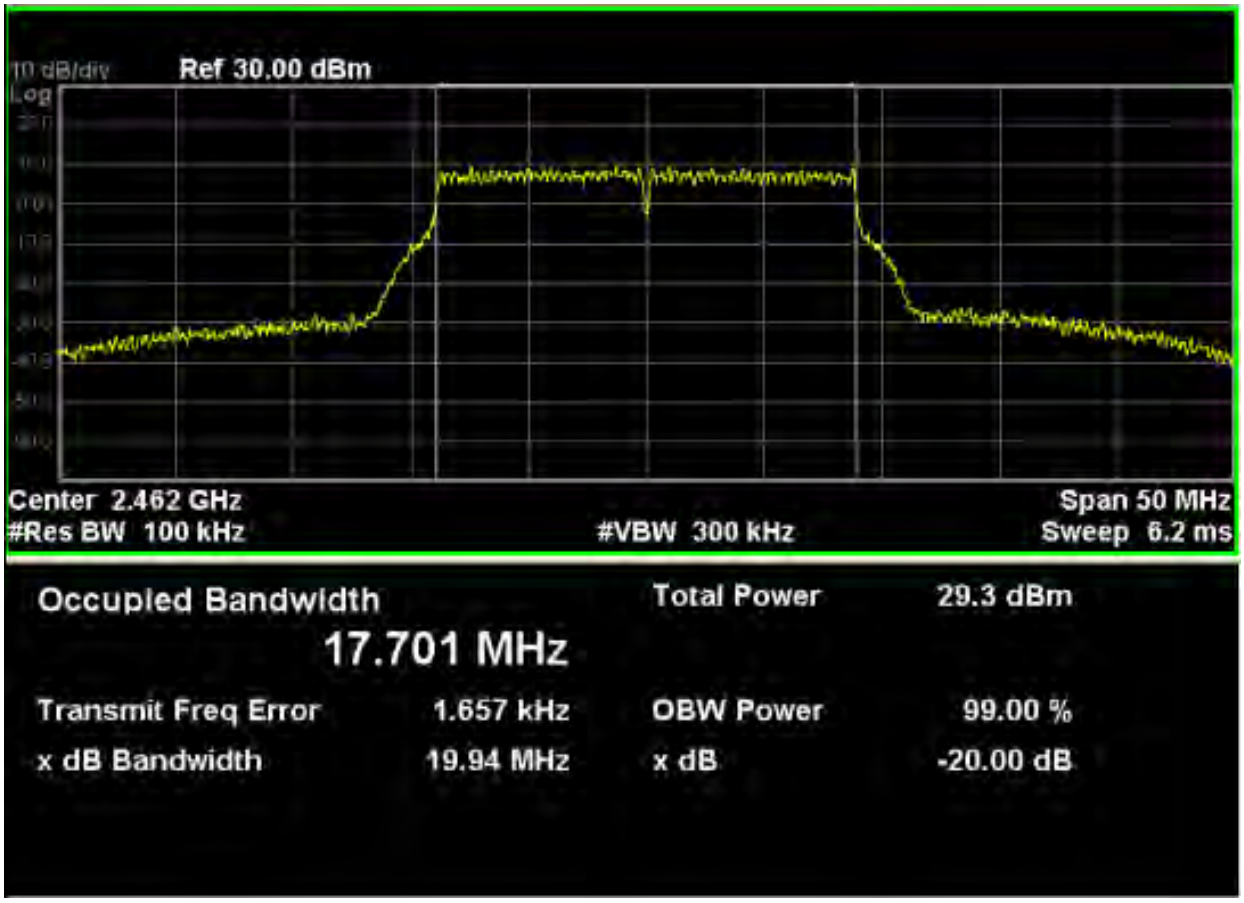
802.11n20 channel 1



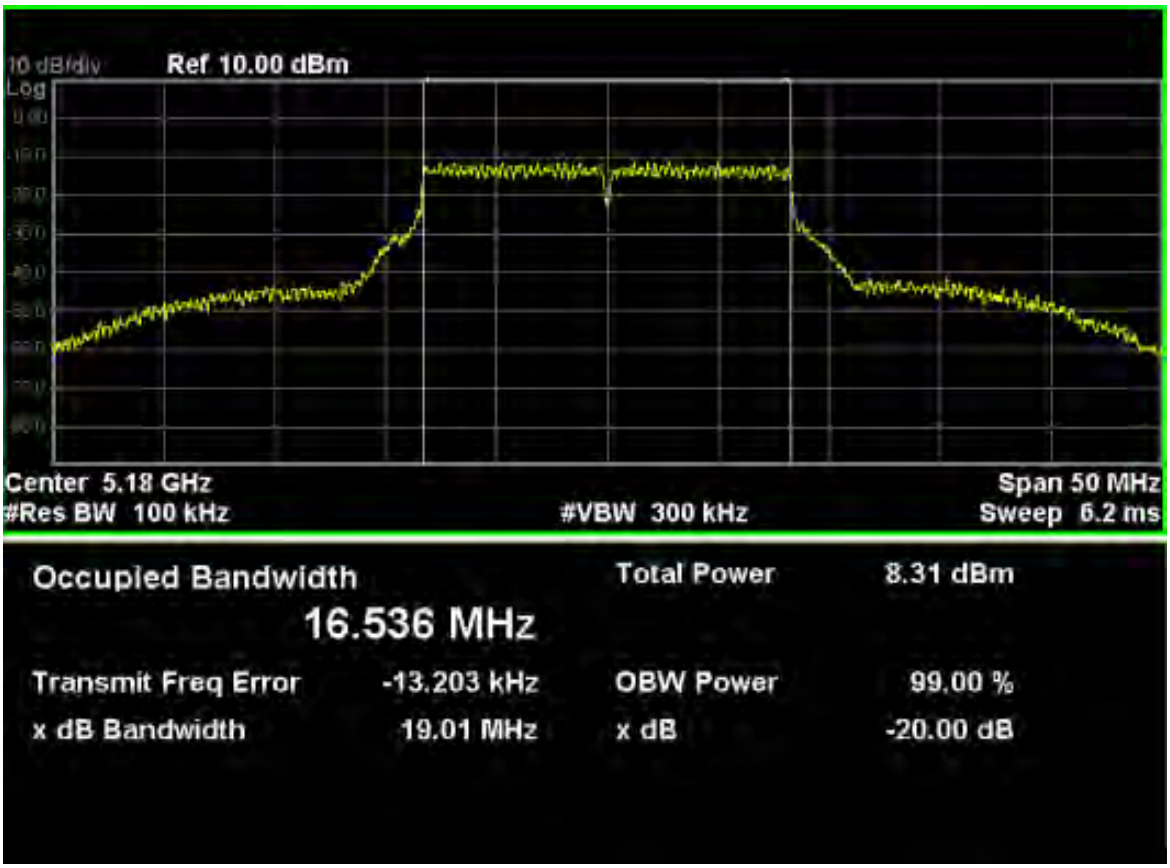
802.11n20 channel 6



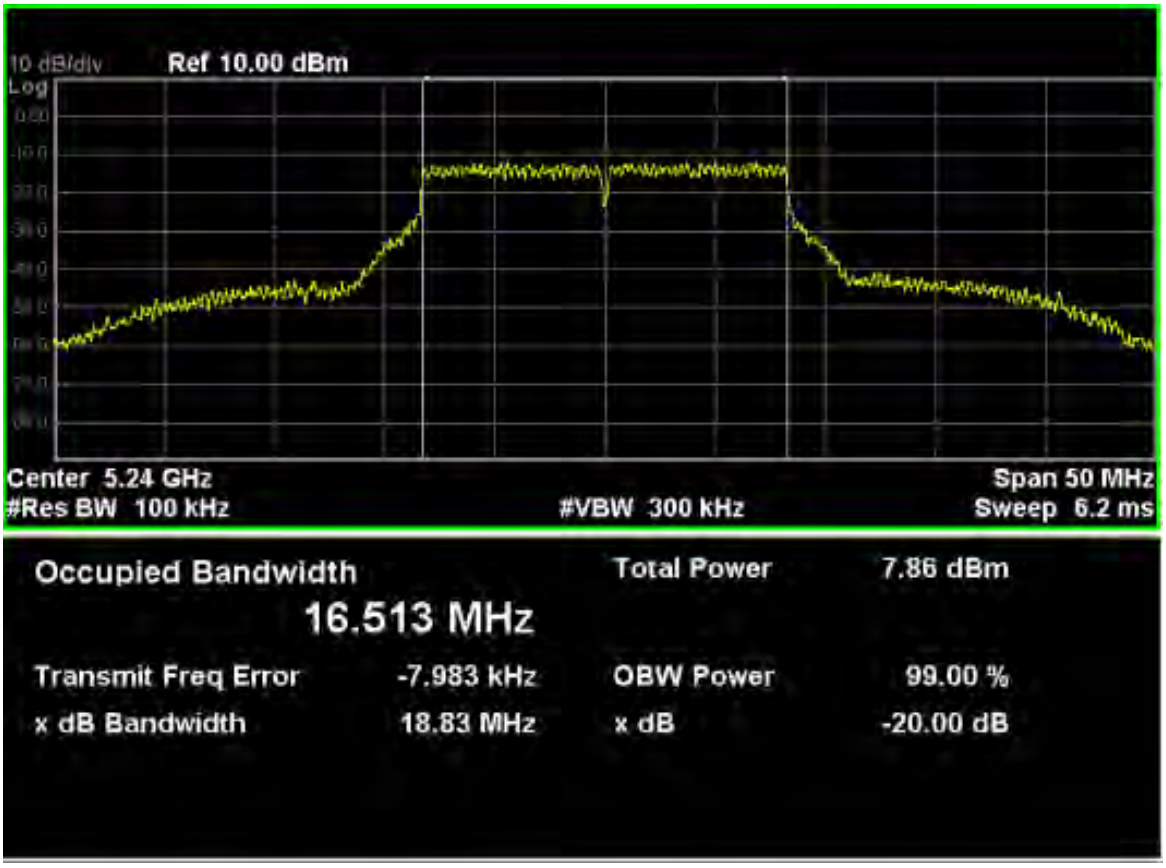
802.11n20 channel 11



WIFI 5G(5150MHz-5250MHz)
802.11a
802.11a channel 36

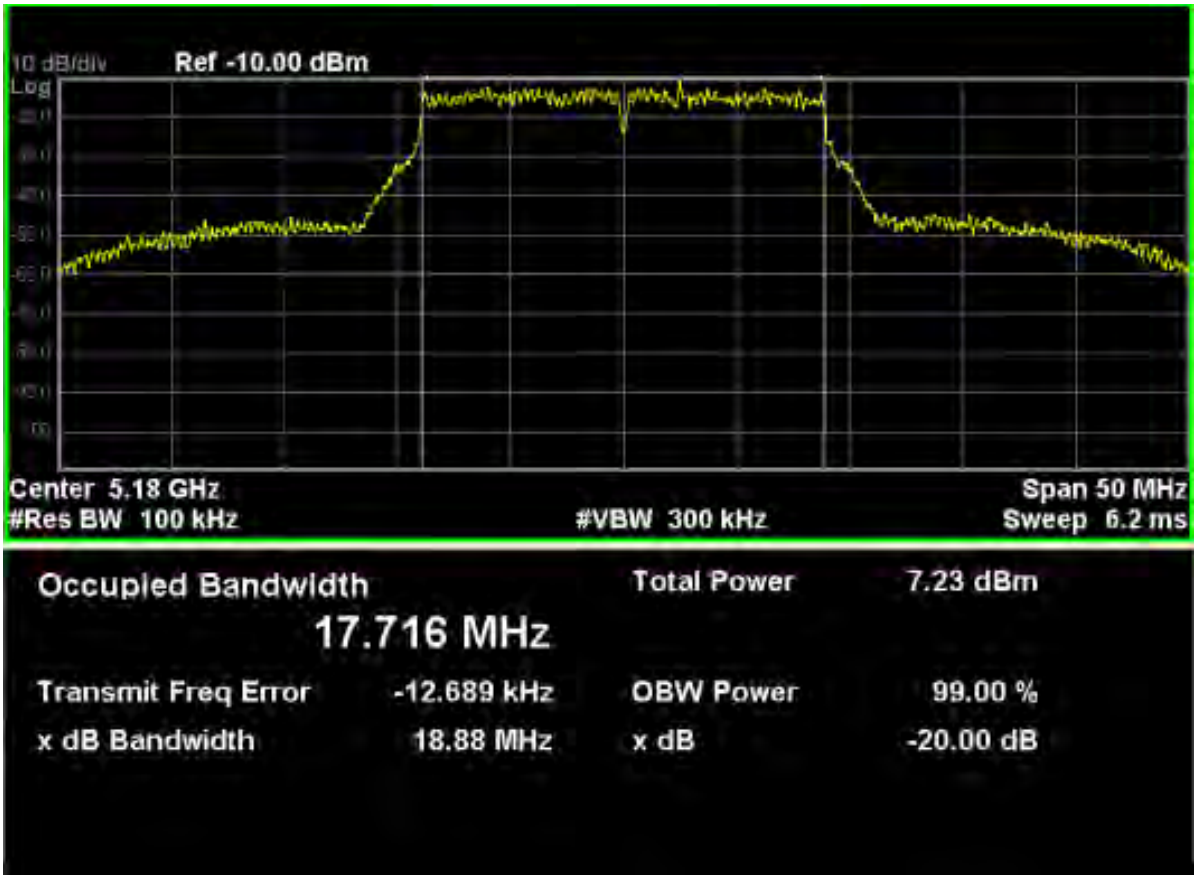


802.11a channel 48

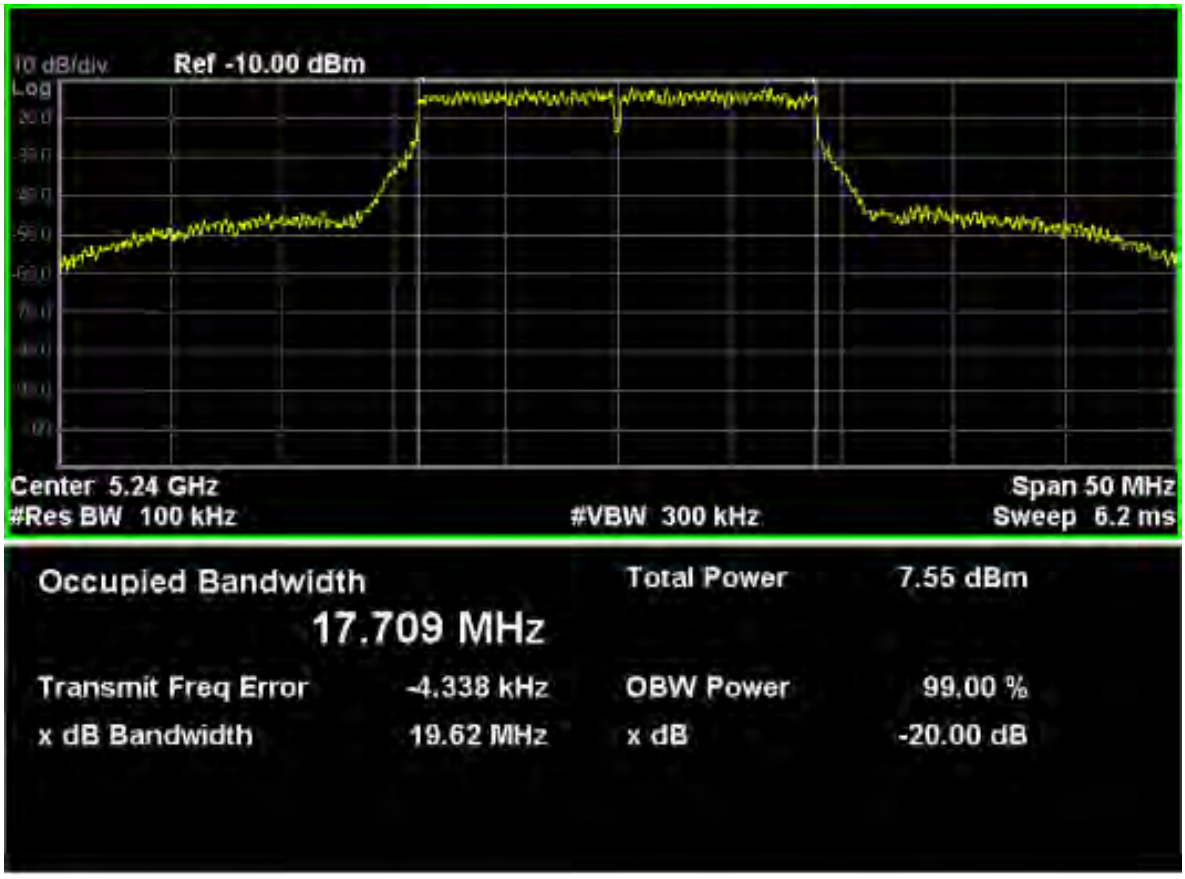


802.11n20

802.11n20 channel 36

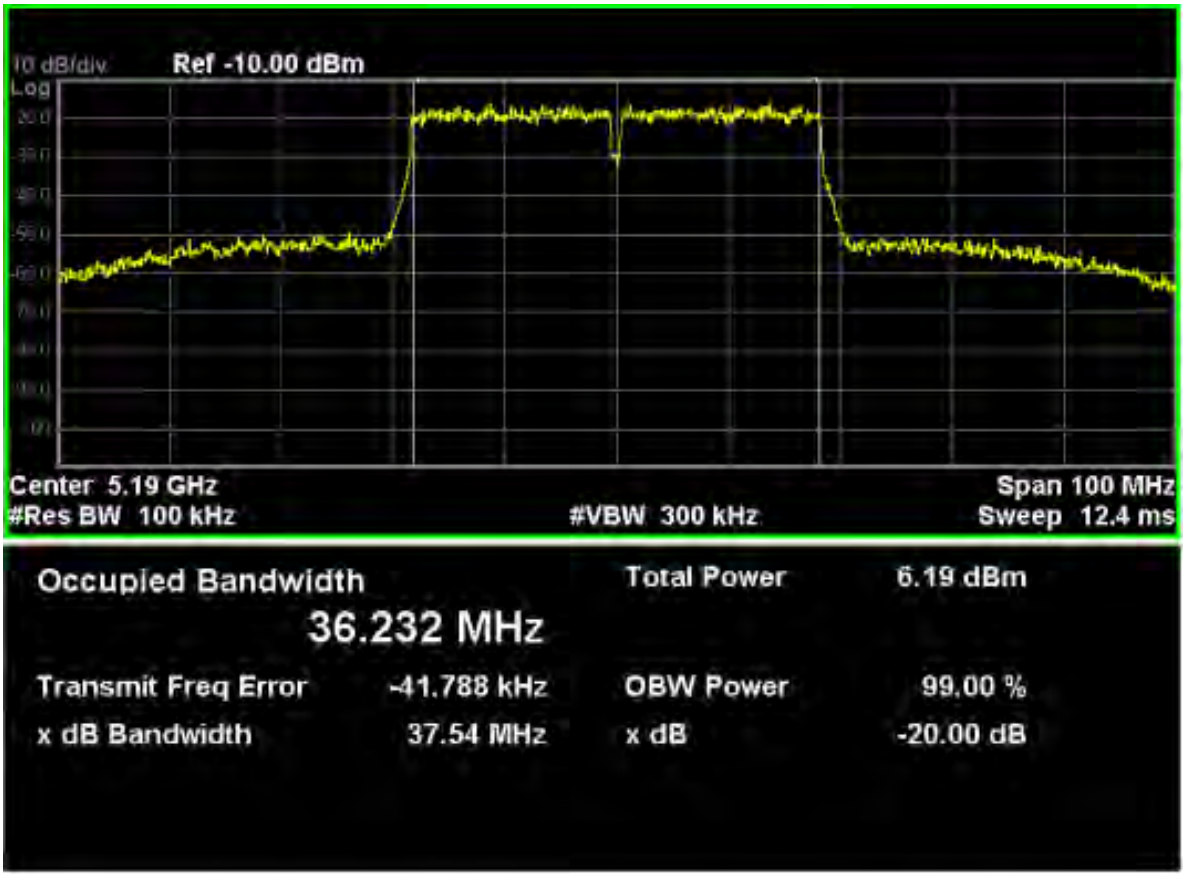


802.11n20 channel 48

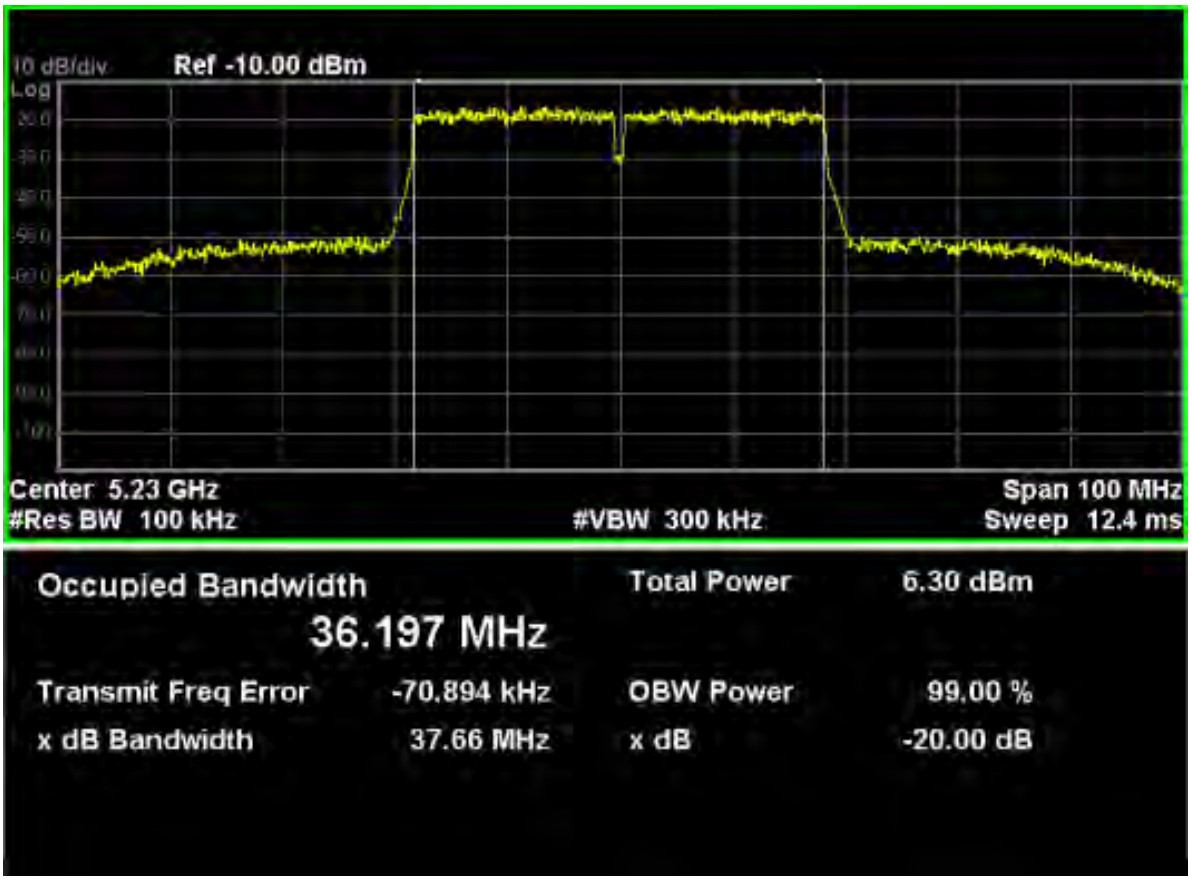


802.11n40

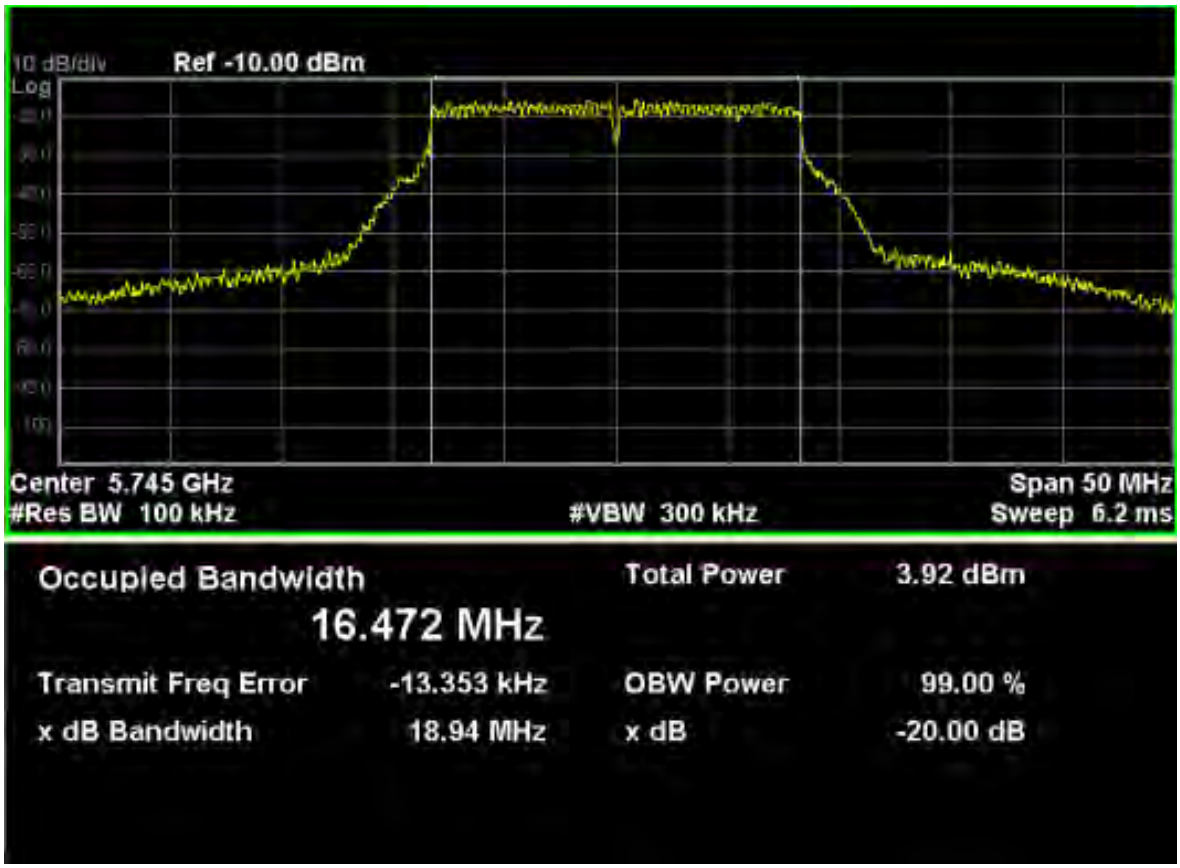
802.11n40 channel 38



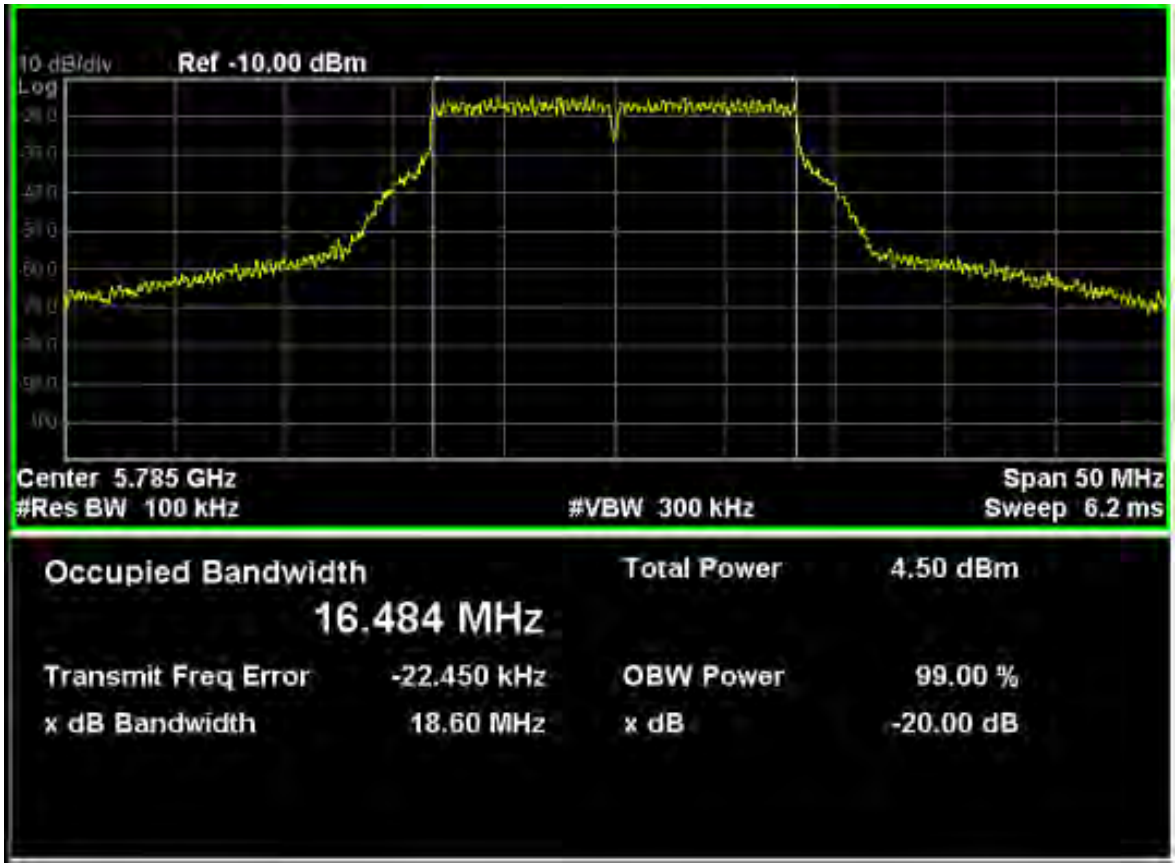
802.11n40 channel 46



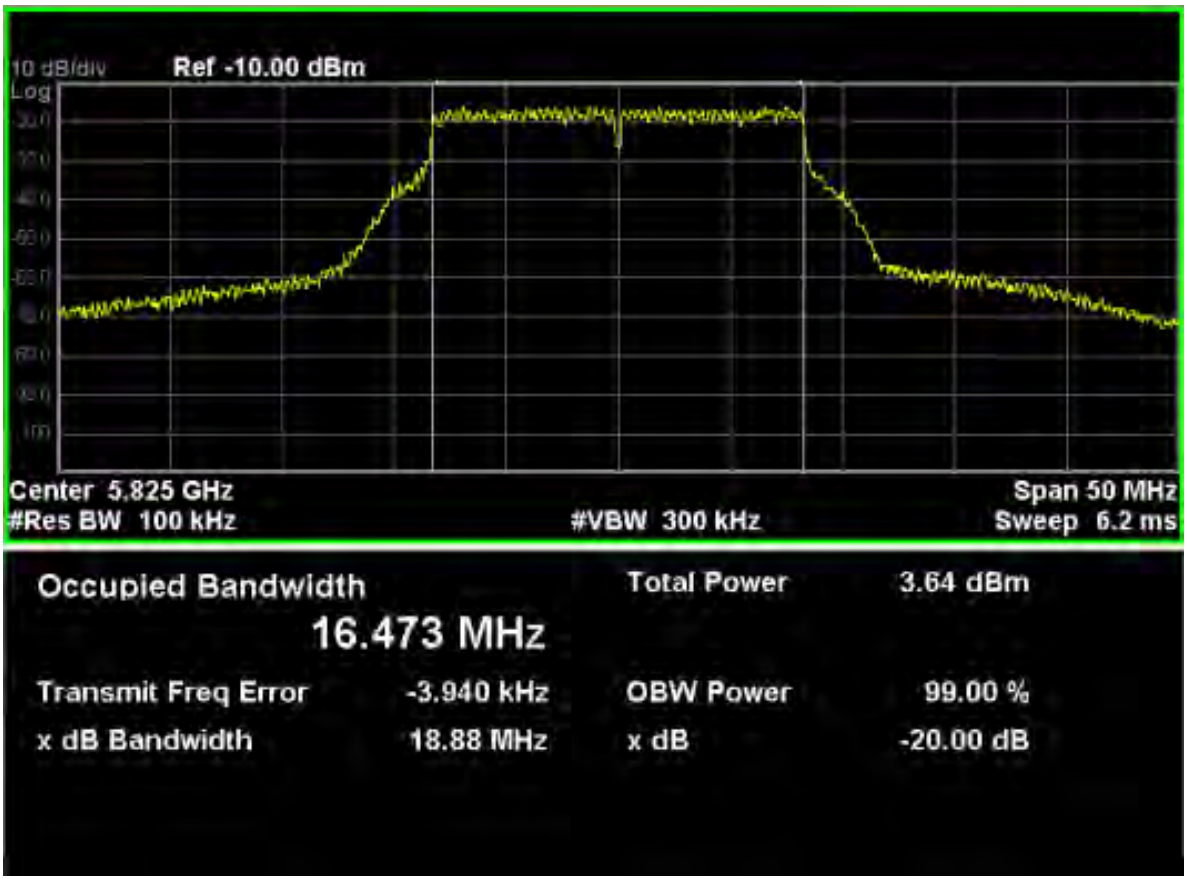
WIFI 5G(5725MHz-5850MHz)
802.11a
802.11a channel 149



802.11a channel 157

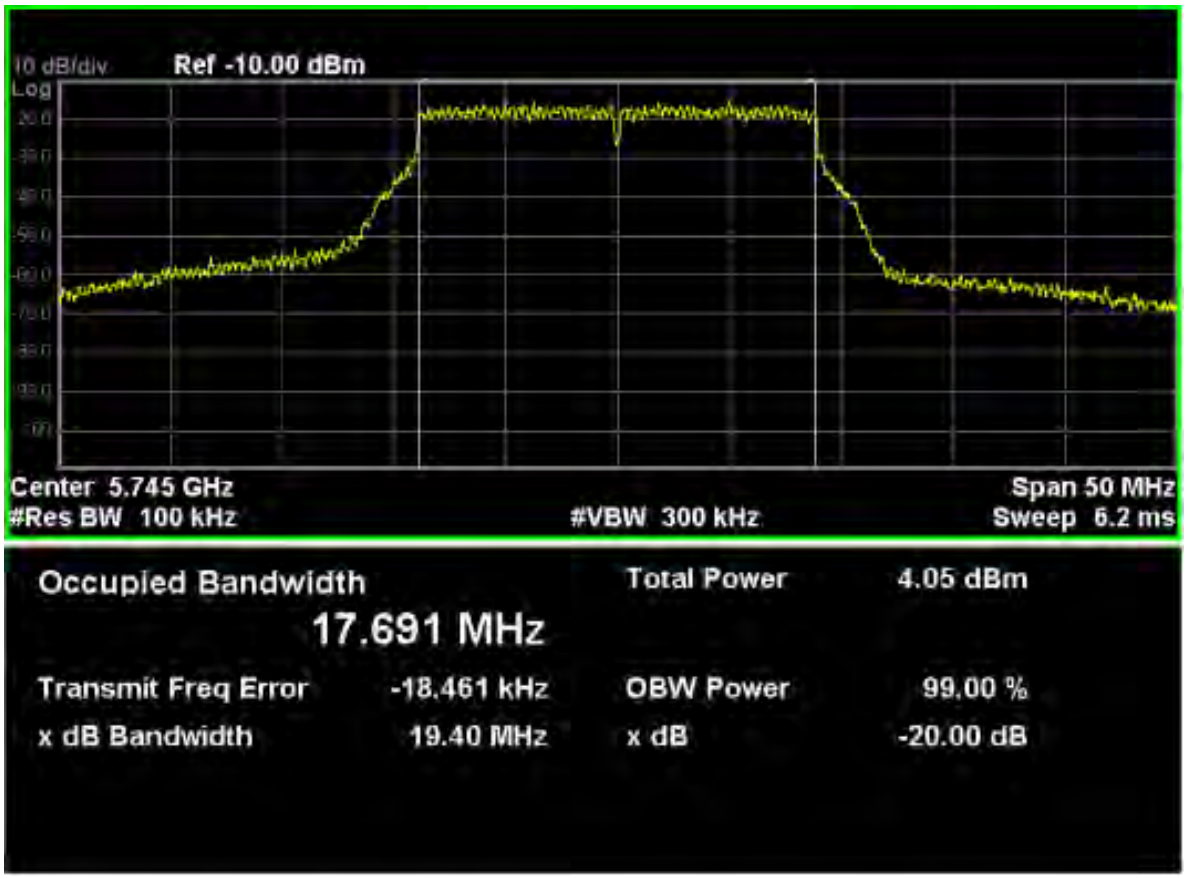


802.11a channel 165

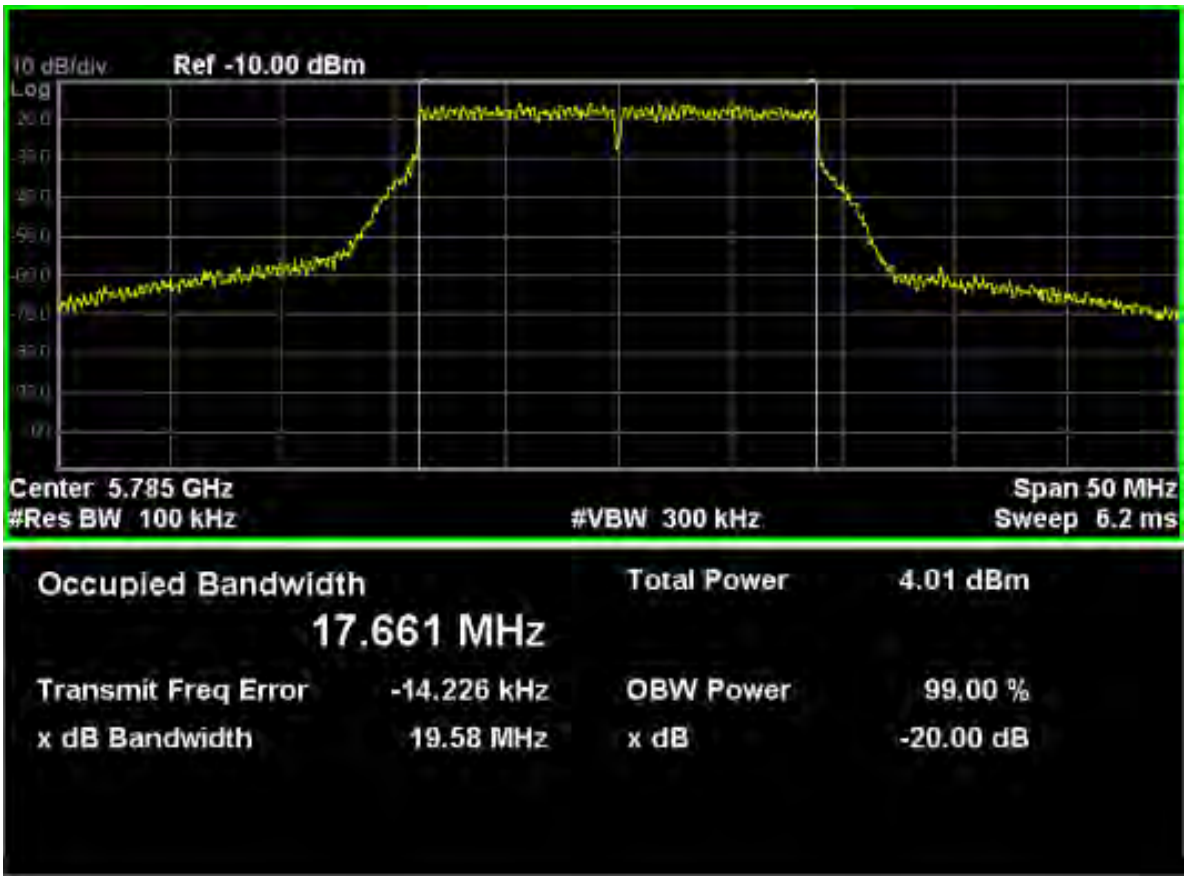


802.11n20

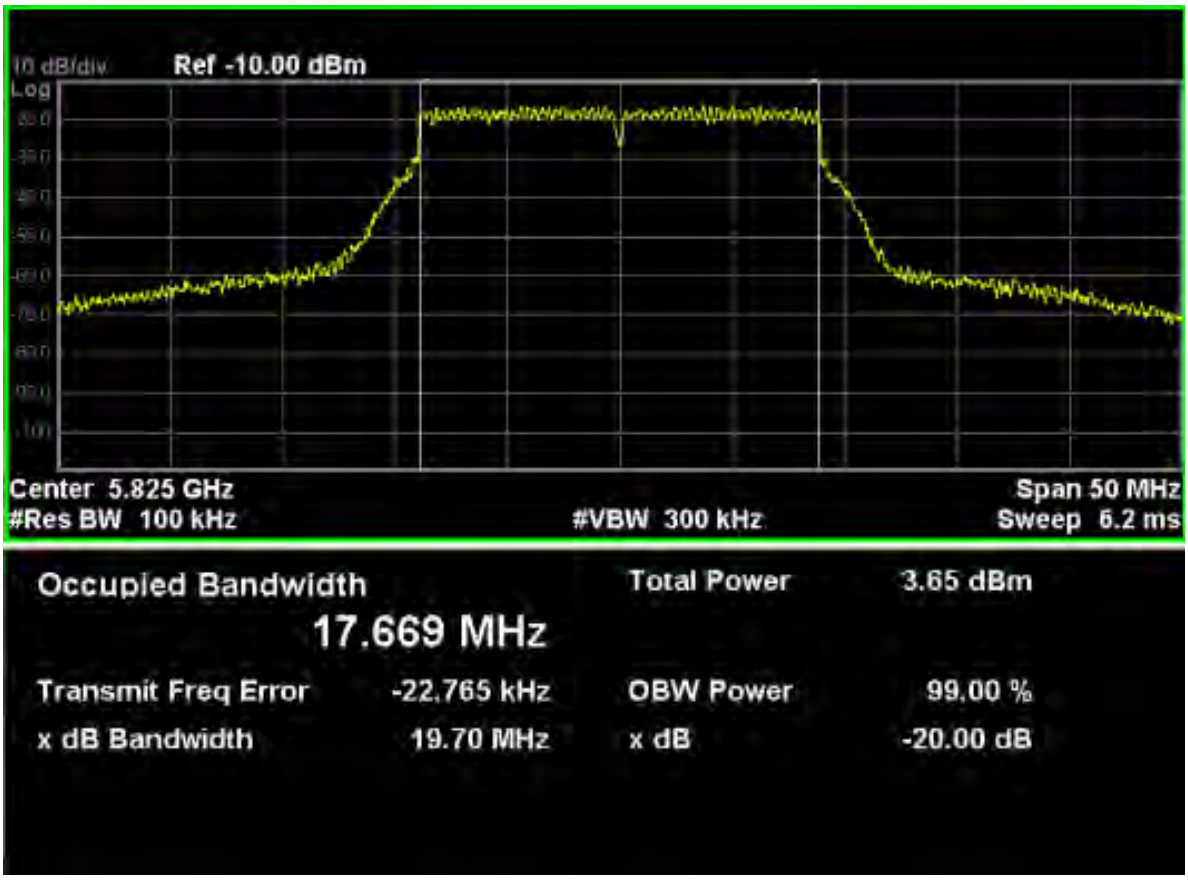
802.11n20 channel 149



802.11n20 channel 157

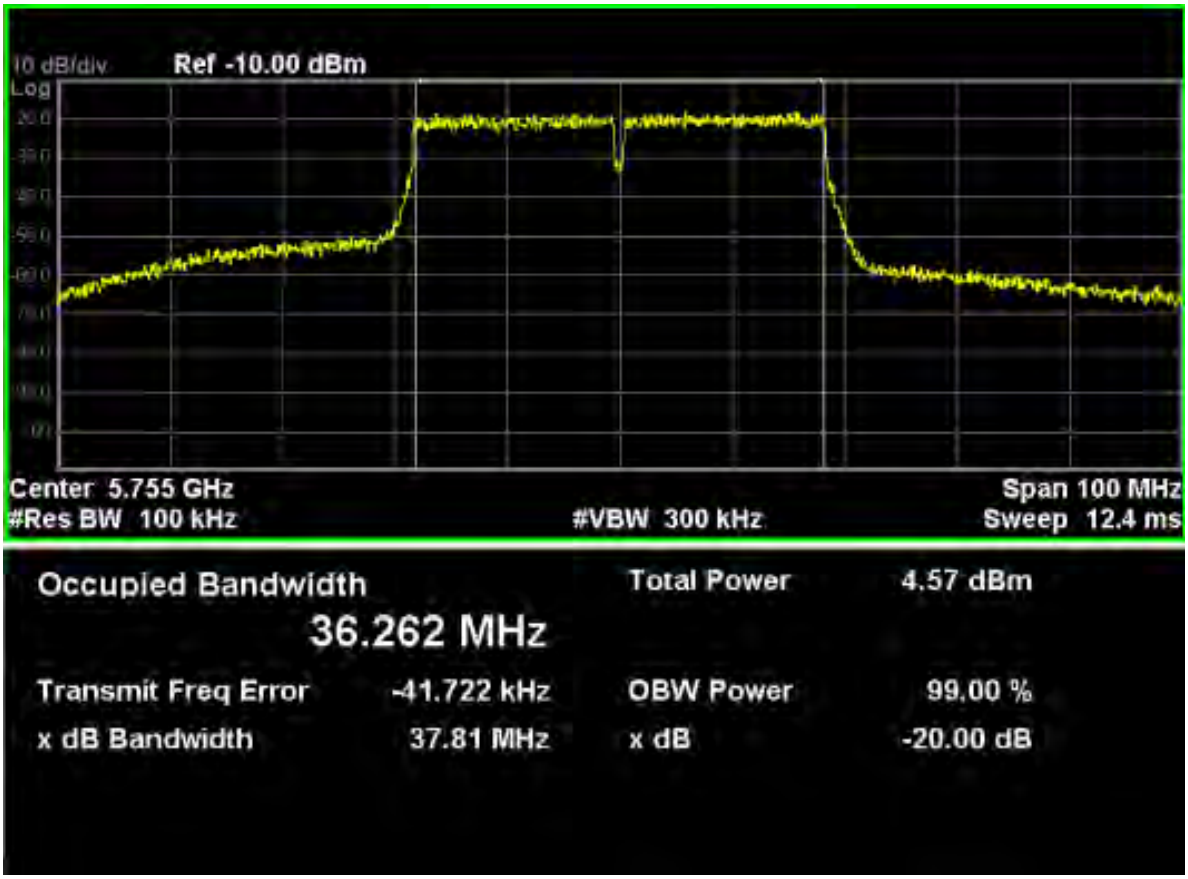


802.11n20 channel 165

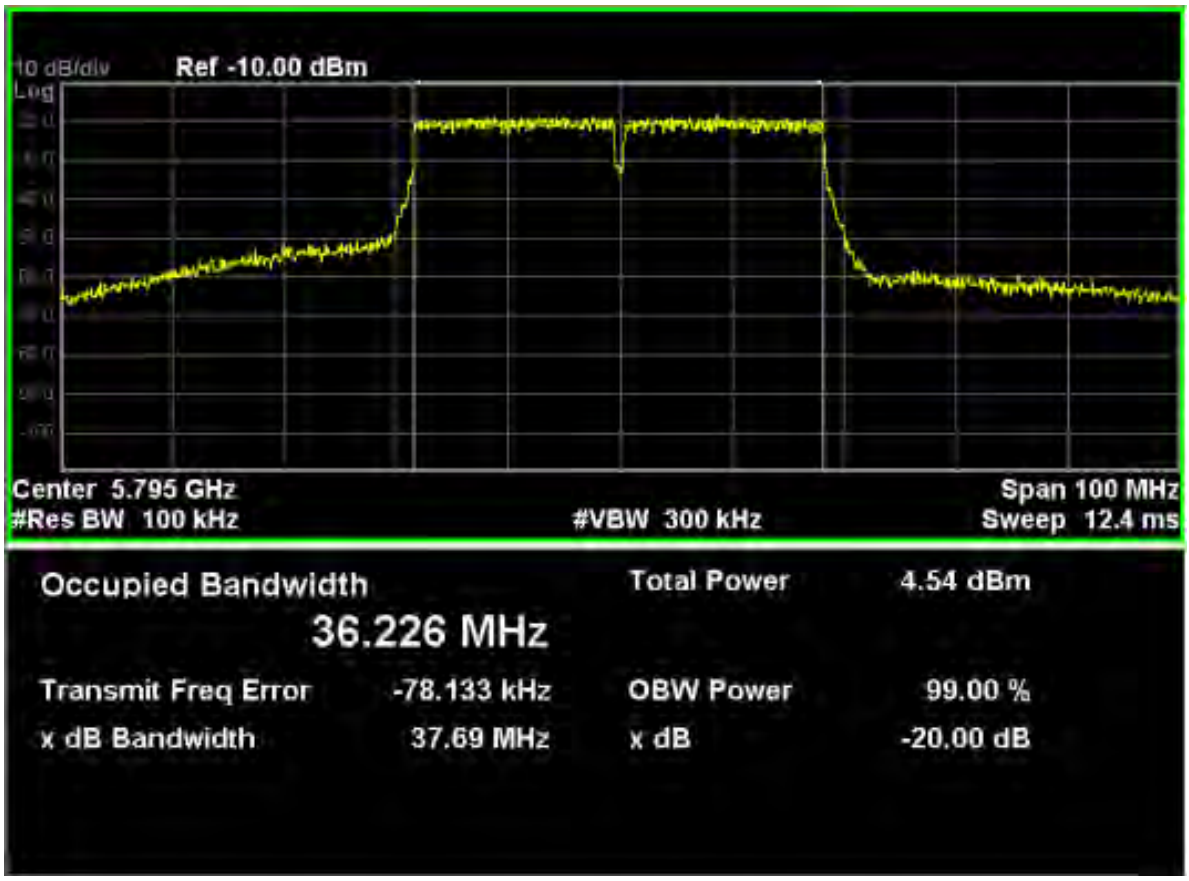


802.11n40

802.11n40 channel 151

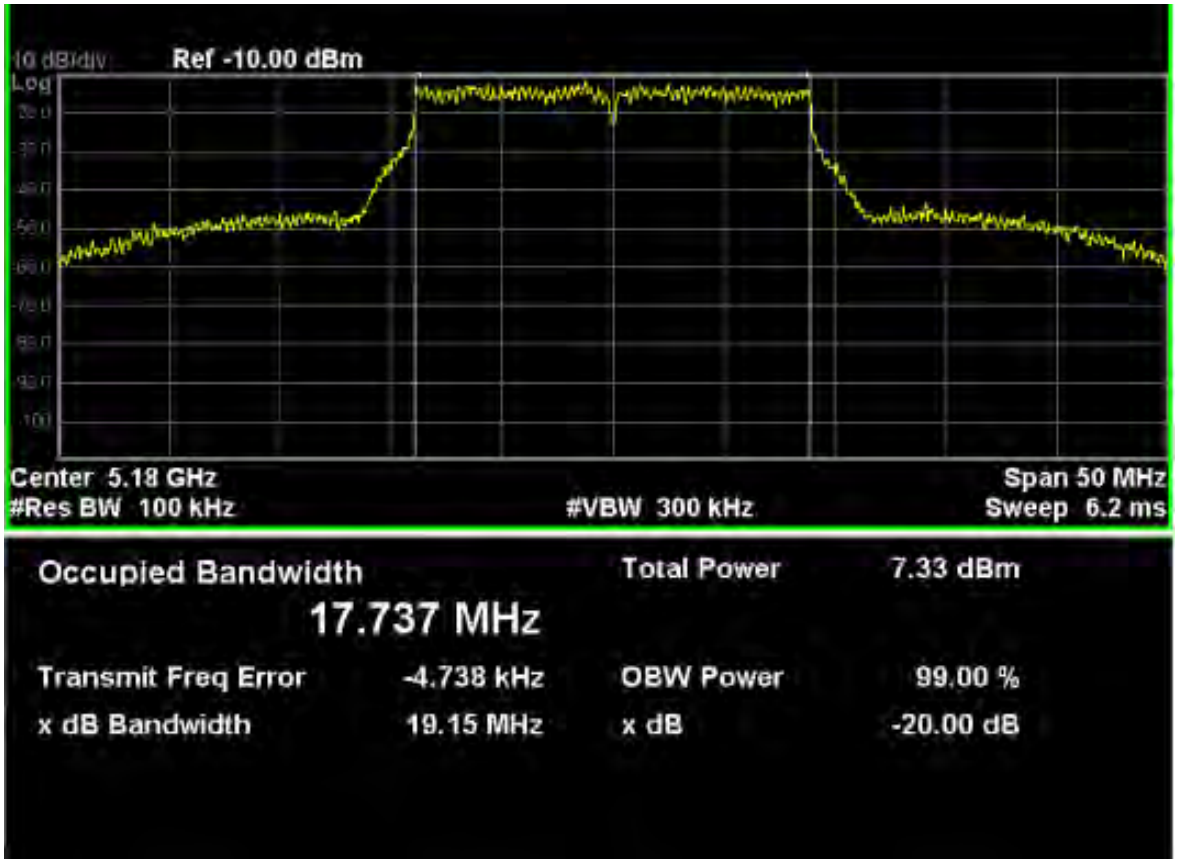


802.11n40 channel 159

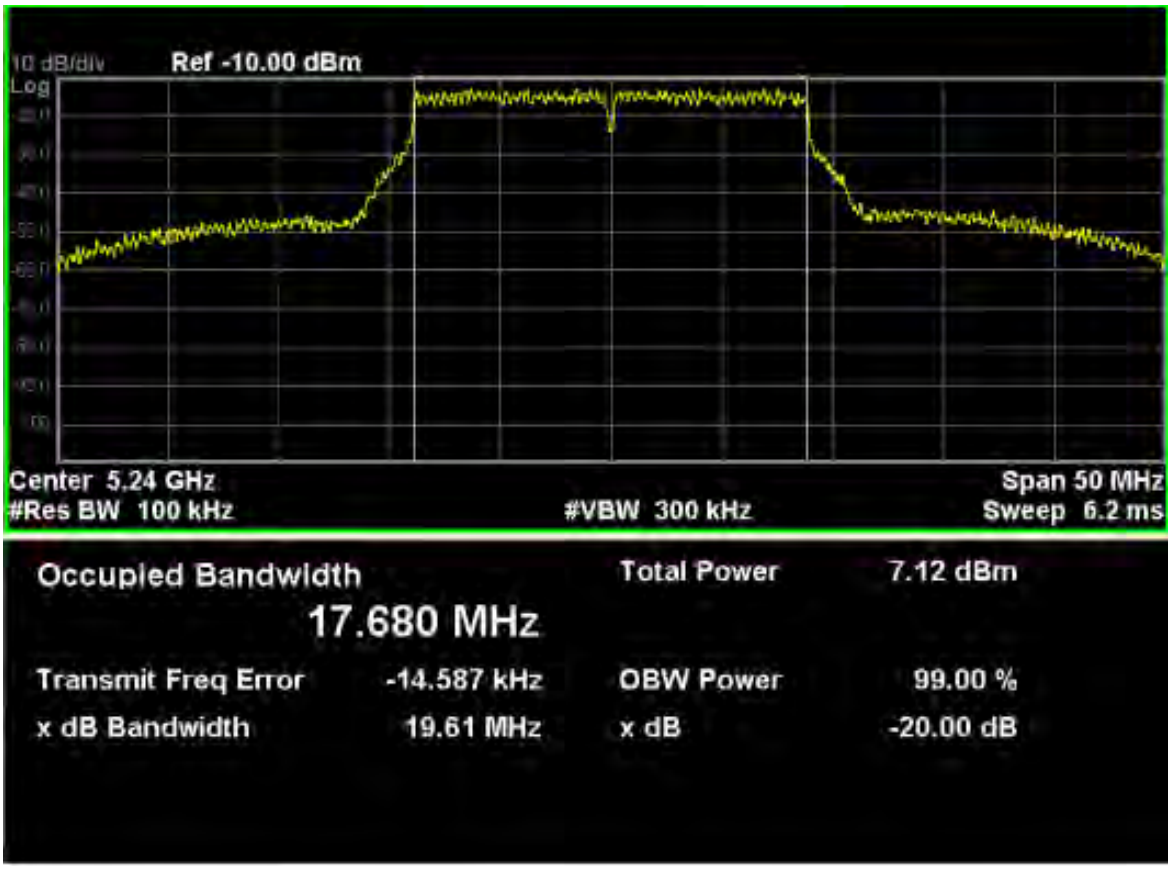


802.11ac (5150MHz-5250MHz)

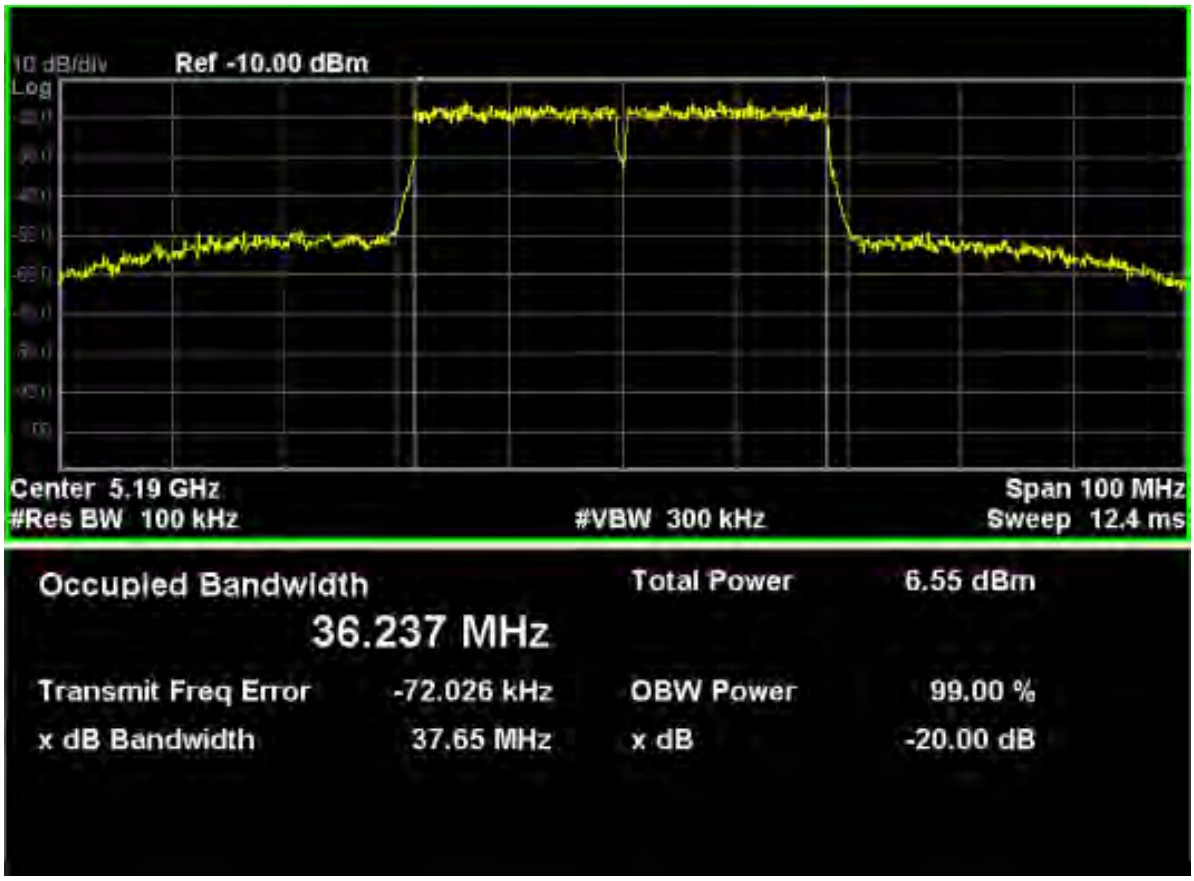
802.11ac20 channel 36



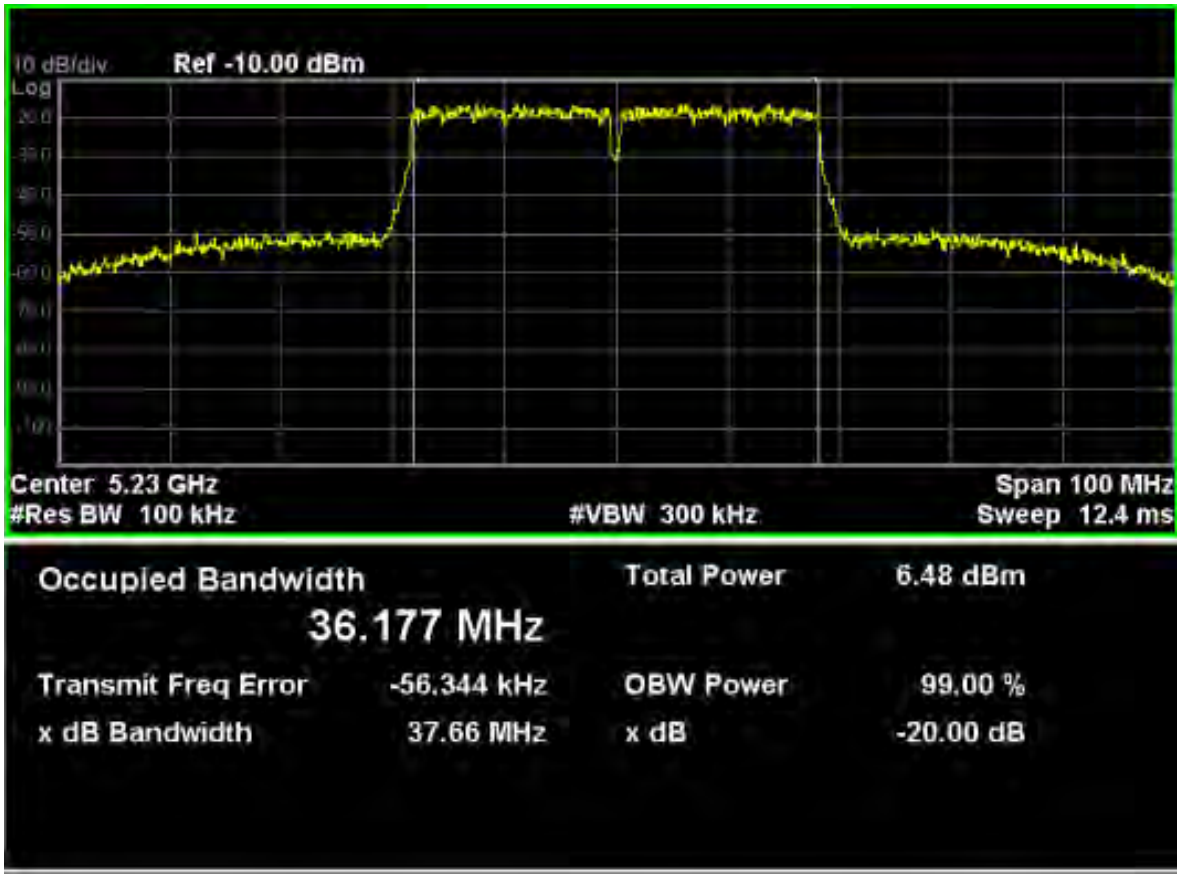
802.11ac20 channel 48



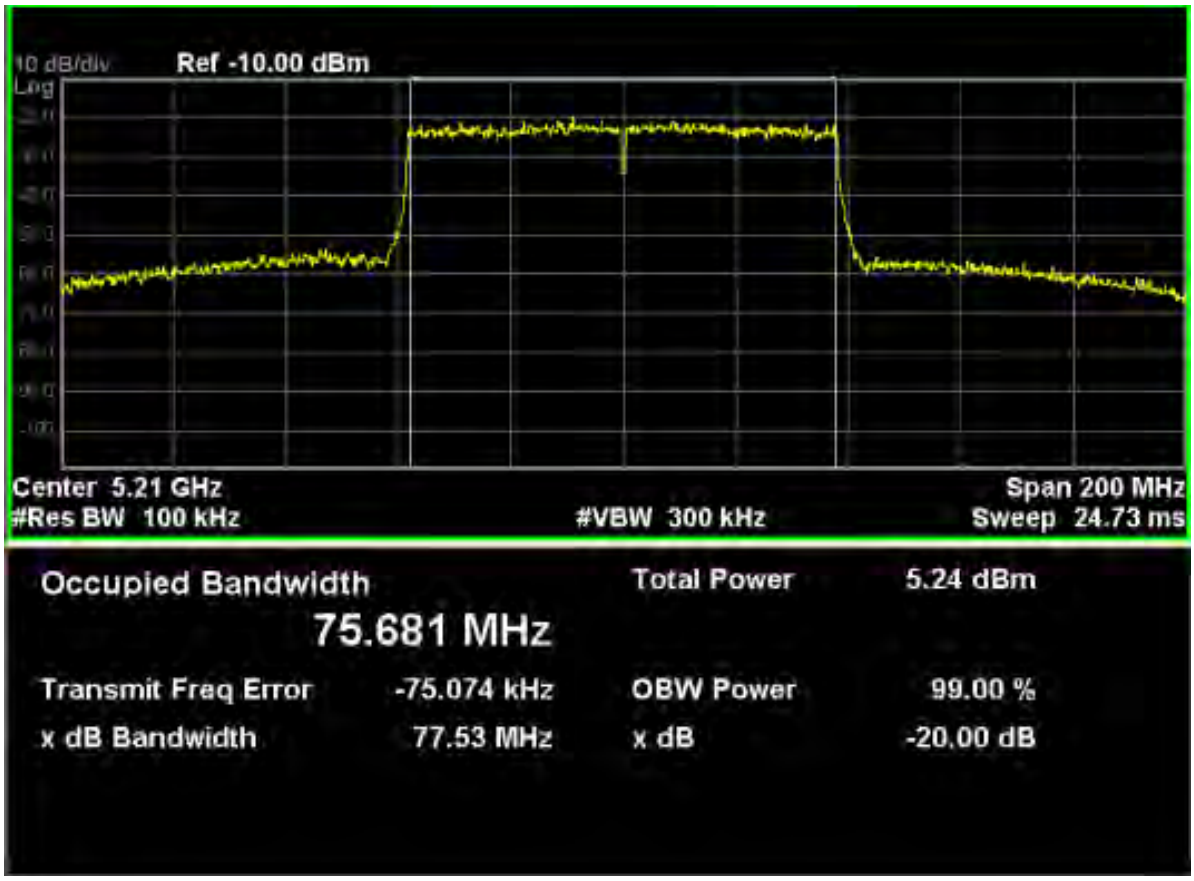
802.11ac40 channel 38



802.11ac40 channel 46

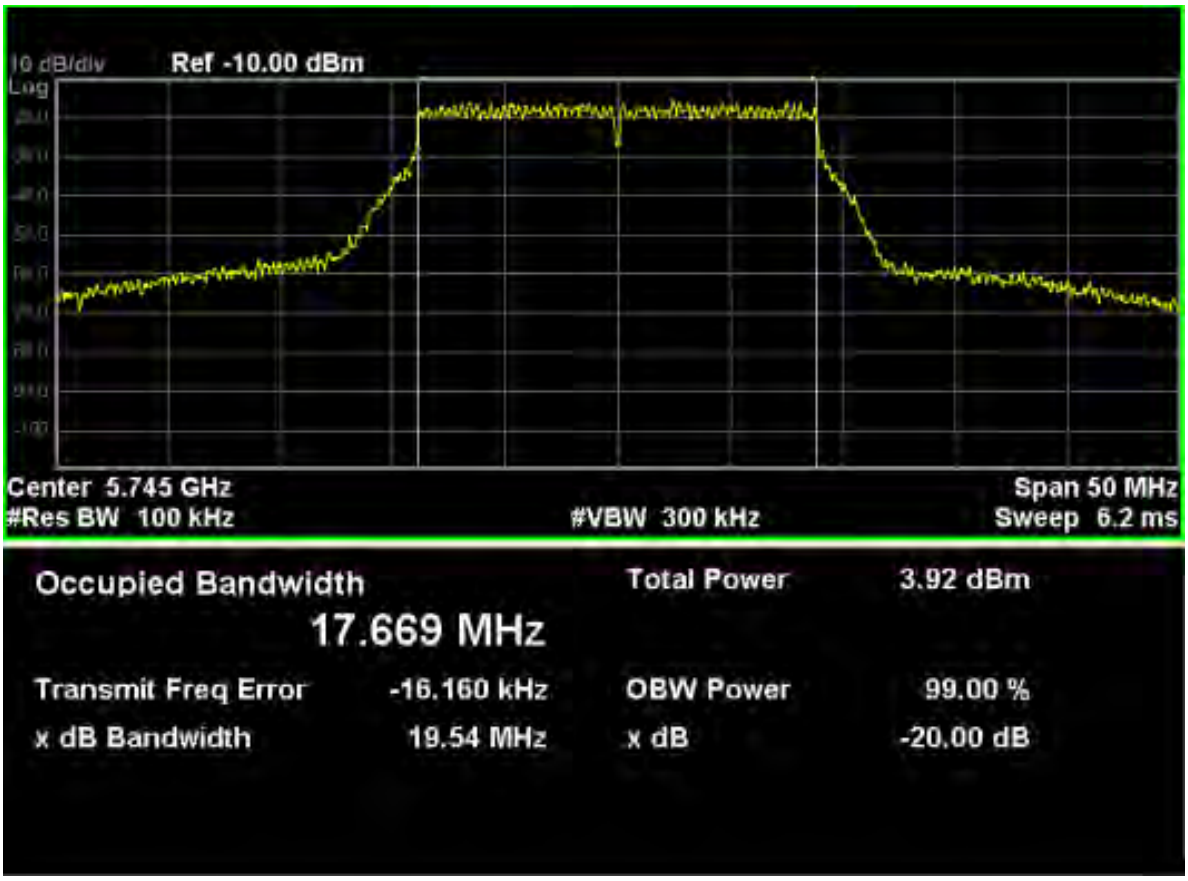


802.11ac80 channel 42

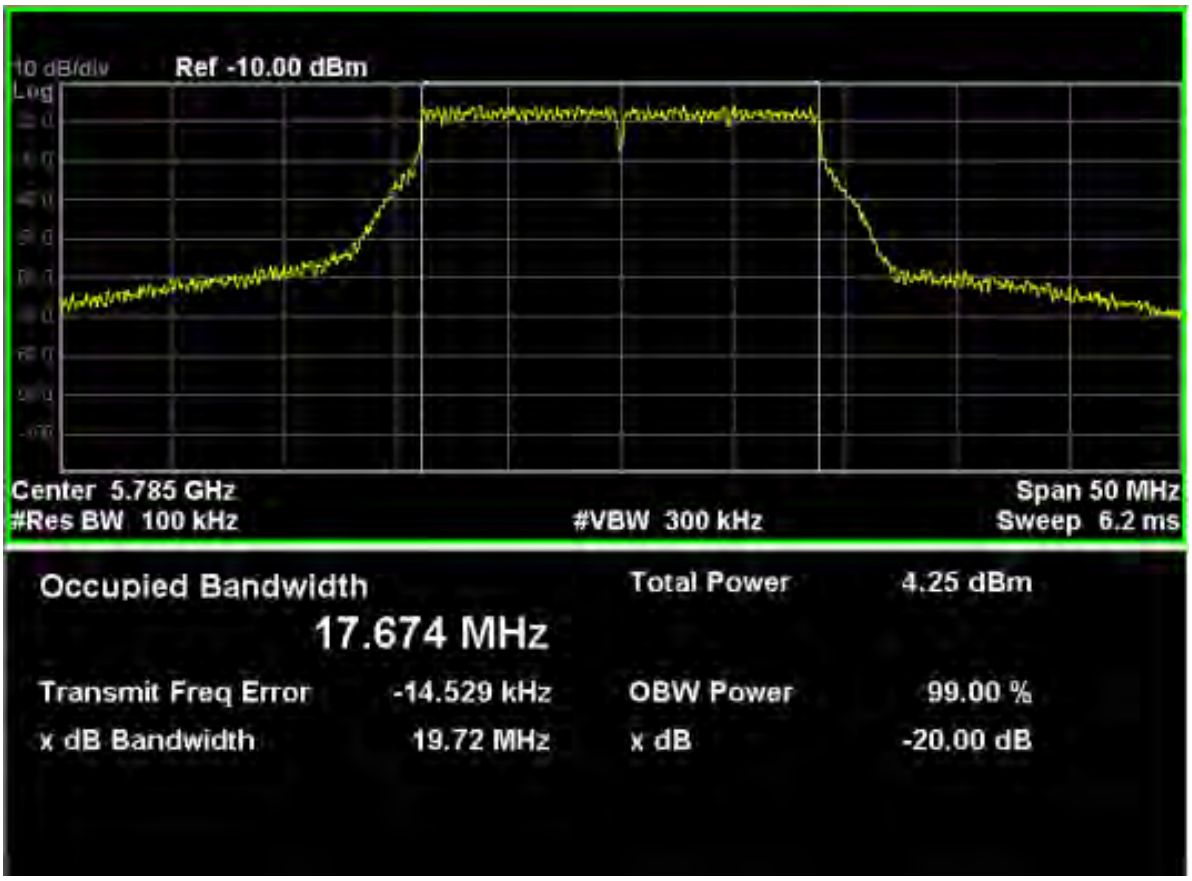


802.11ac (5725MHz-5850MHz)

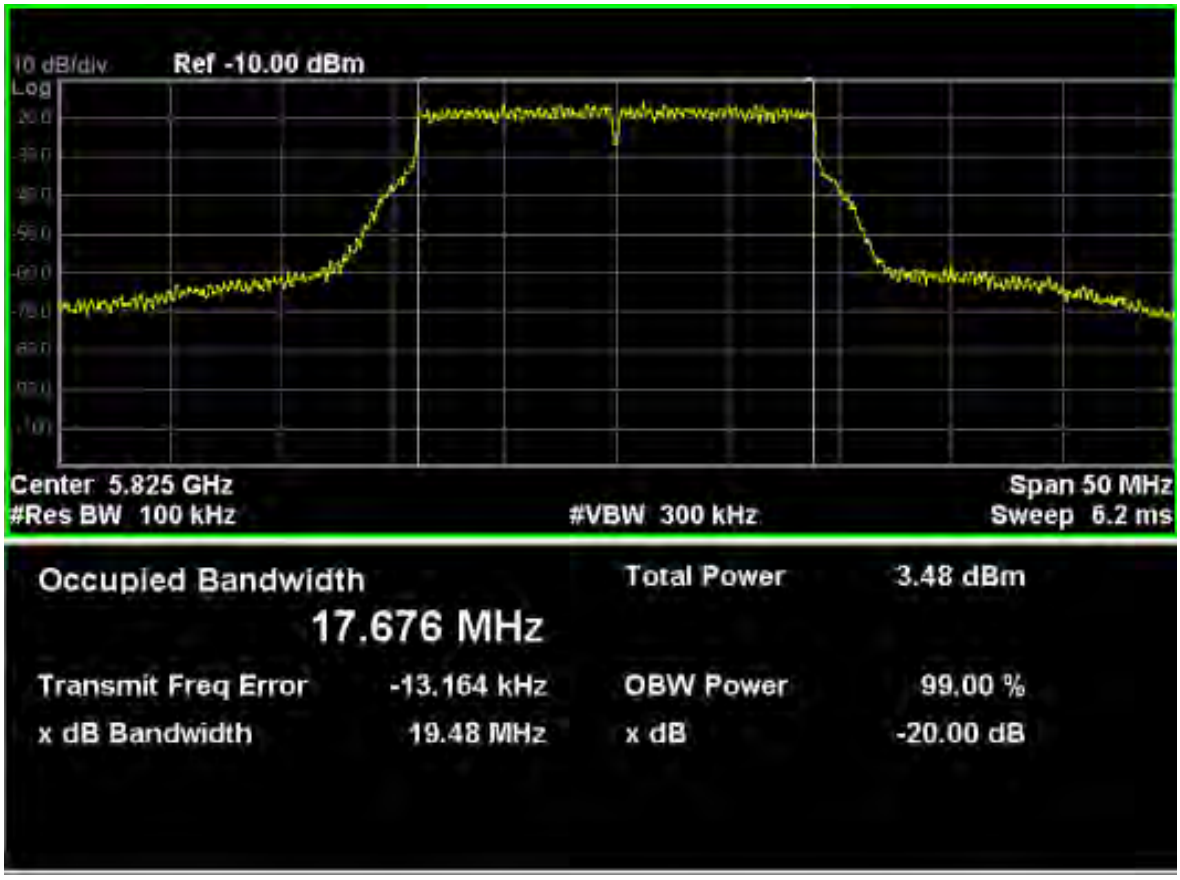
802.11ac20 channel 149



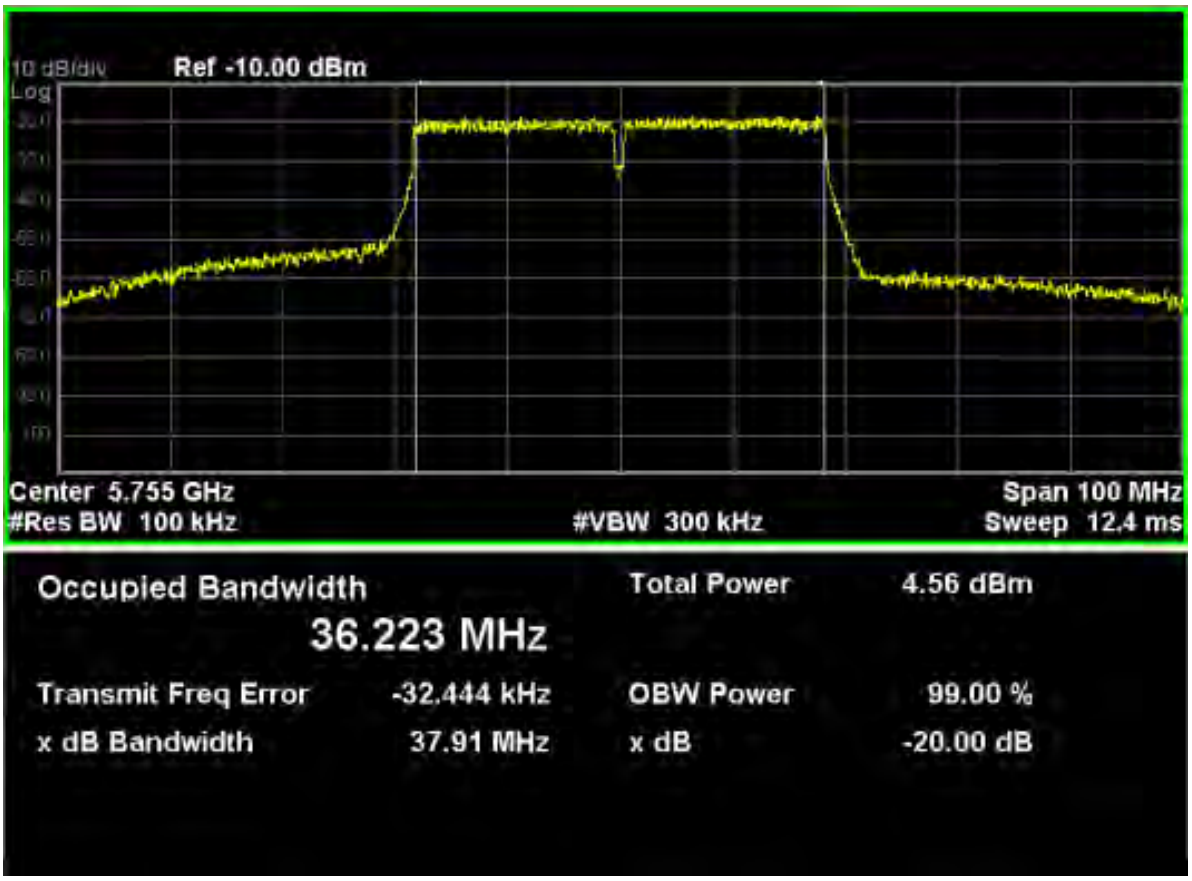
802.11ac20 channel 157



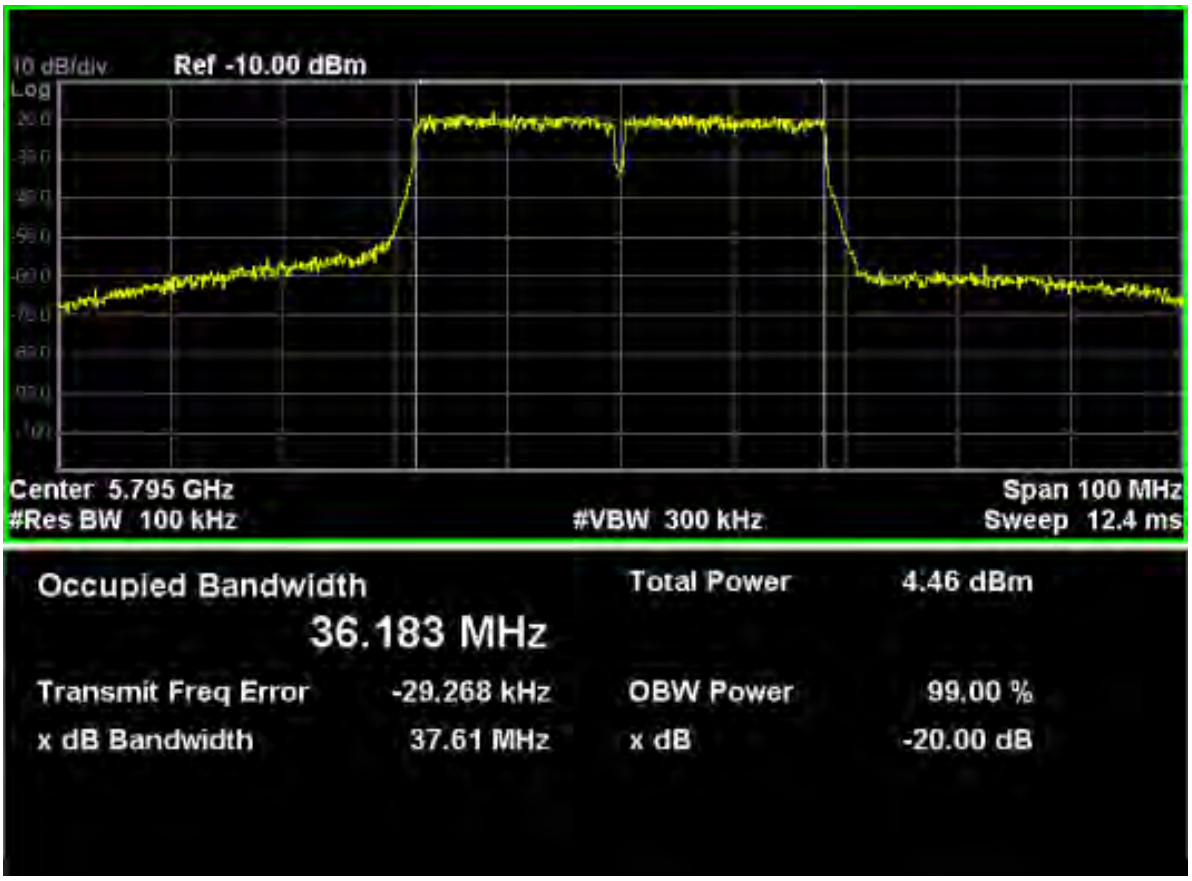
802.11ac20 channel 165



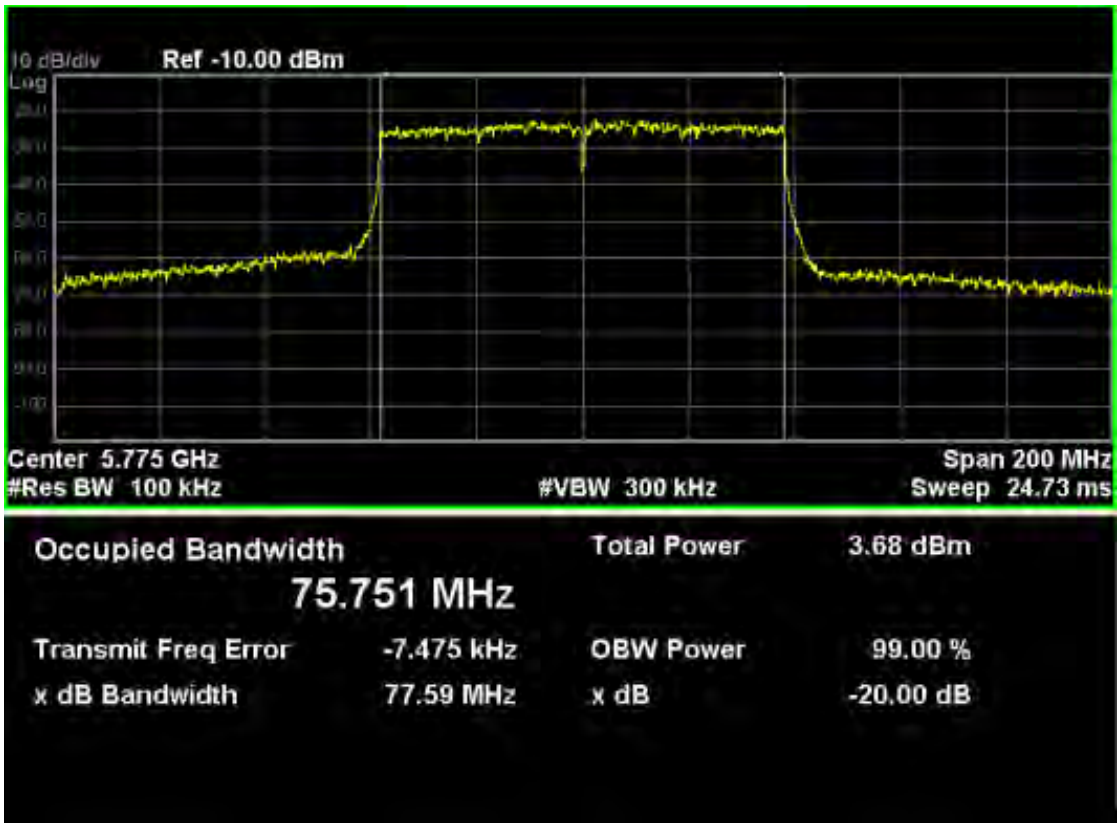
802.11ac40 channel 151



802.11ac40 channel 159



802.11ac80 channel 155

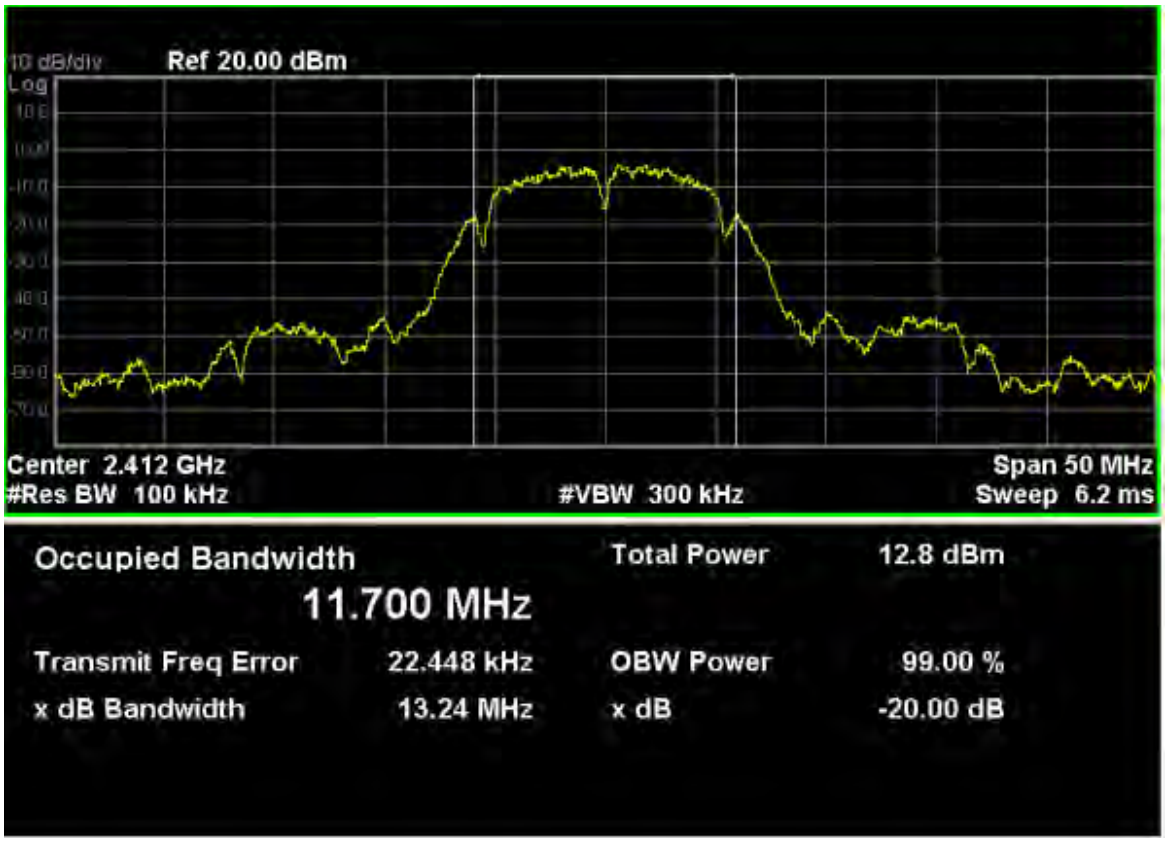


Antenna 2&Mimo

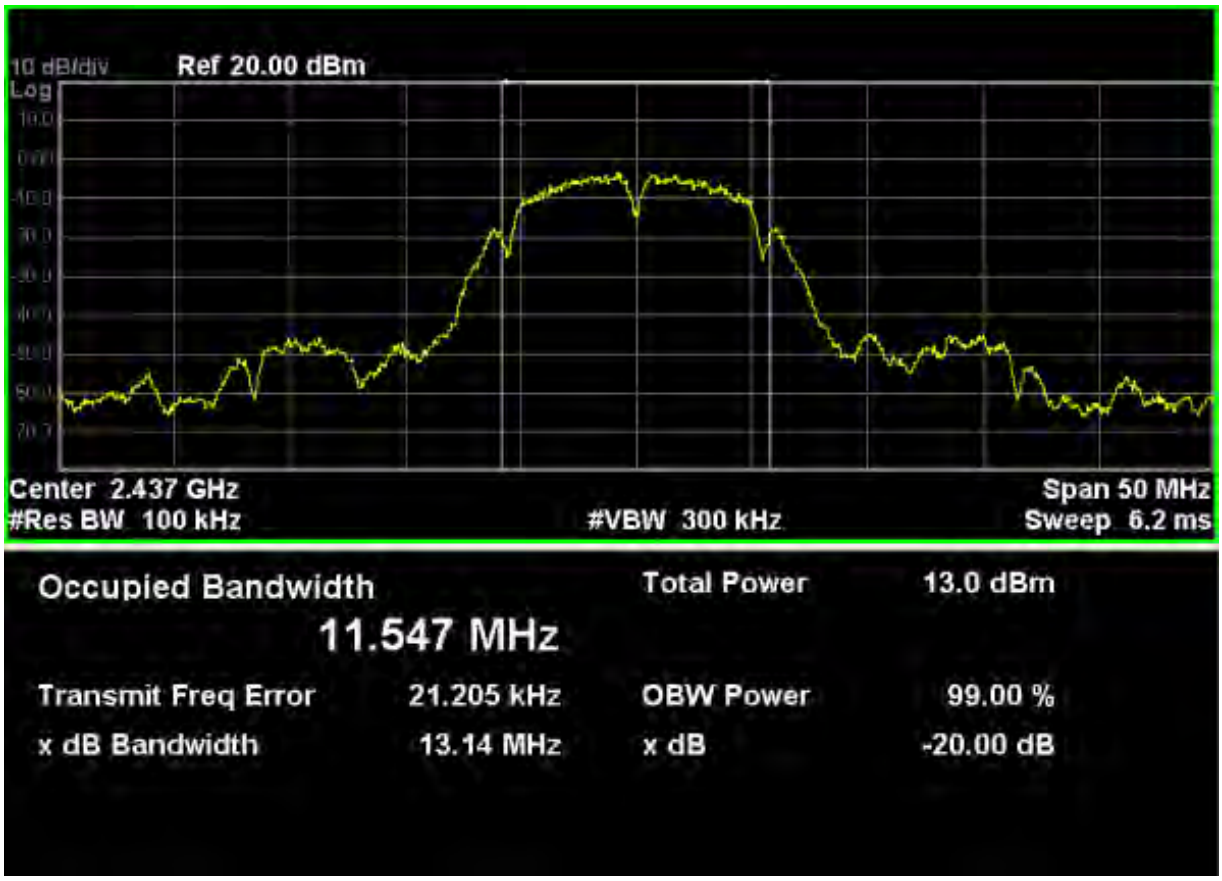
WIFI 2.4G

802.11b

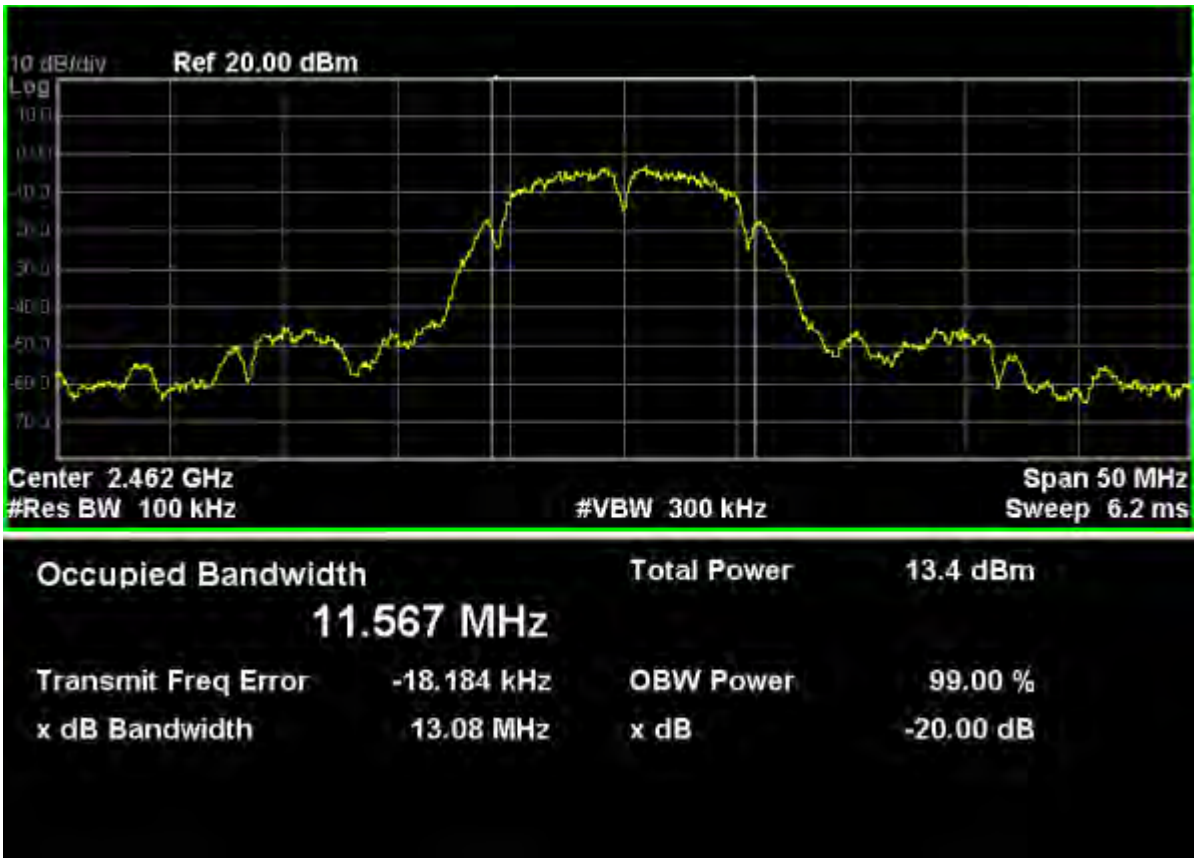
802.11b channel 1



802.11b channel 6

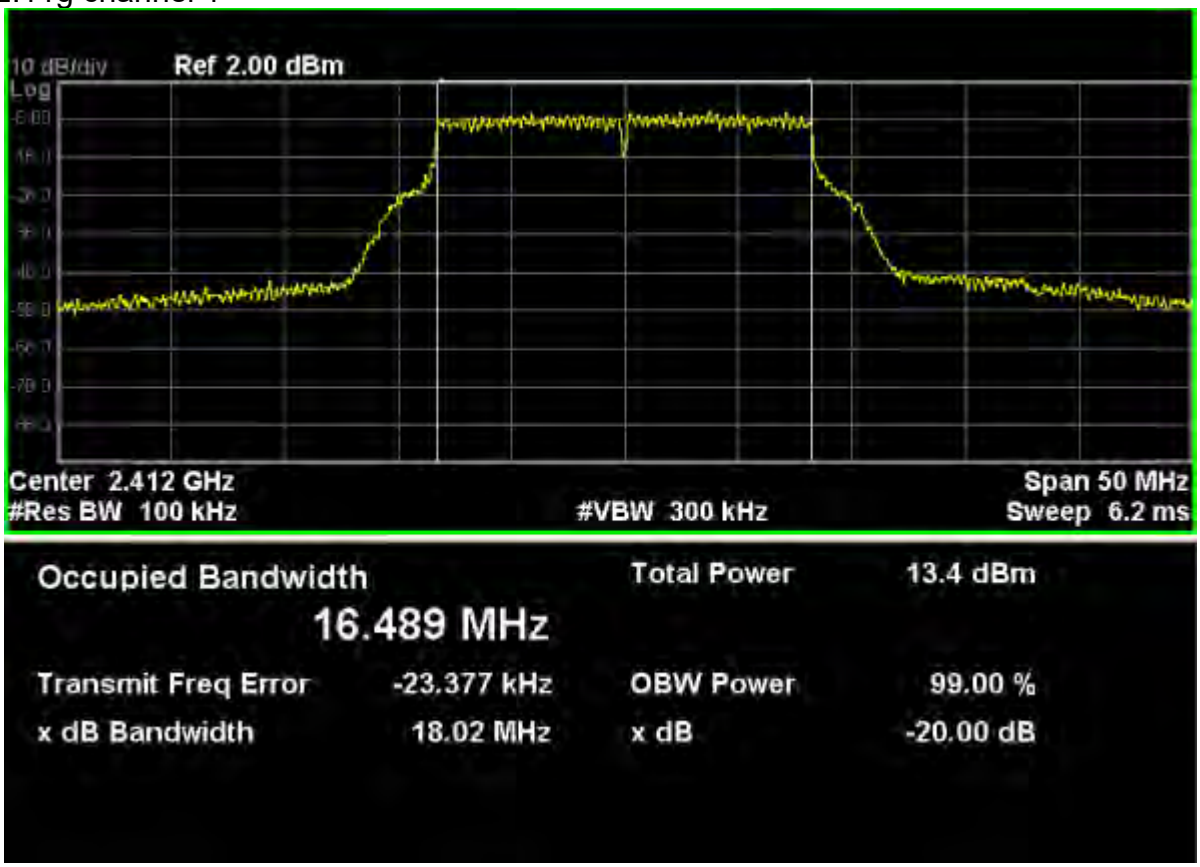


802.11b channel 11

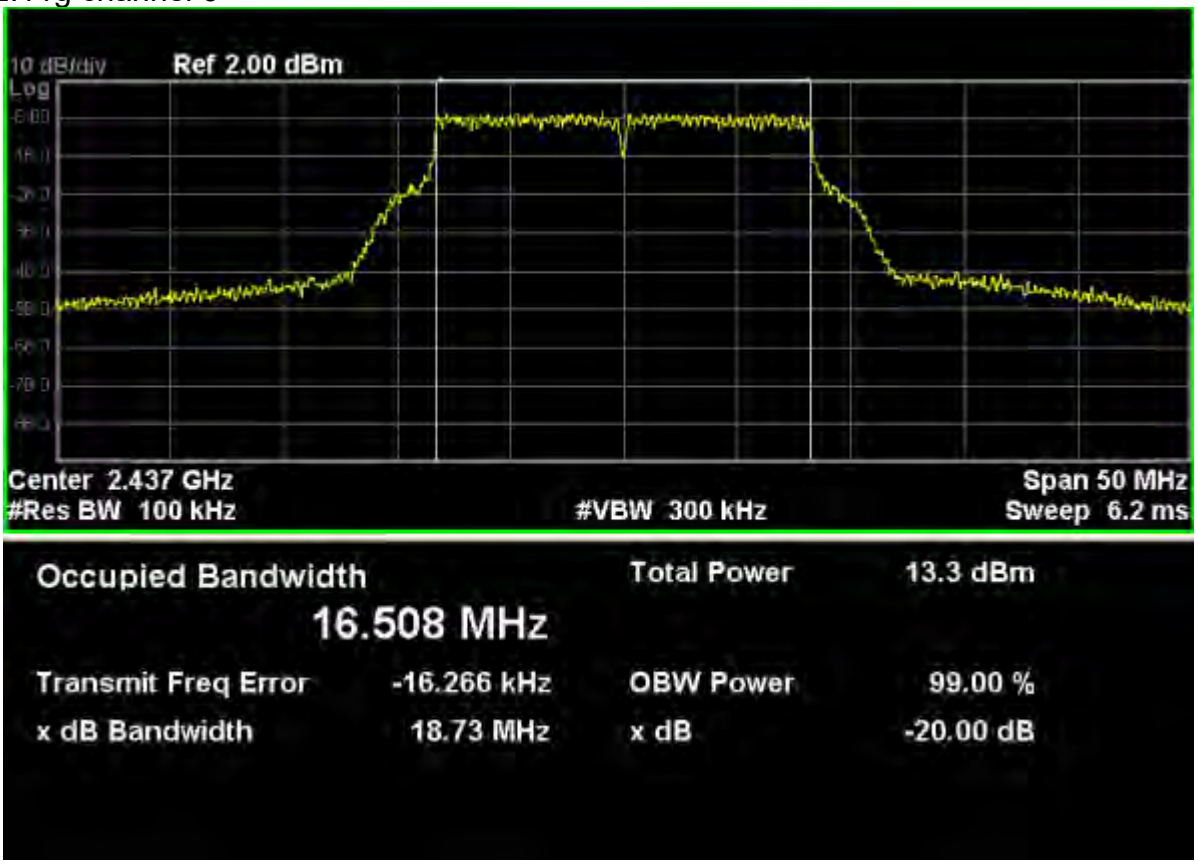


802.11g

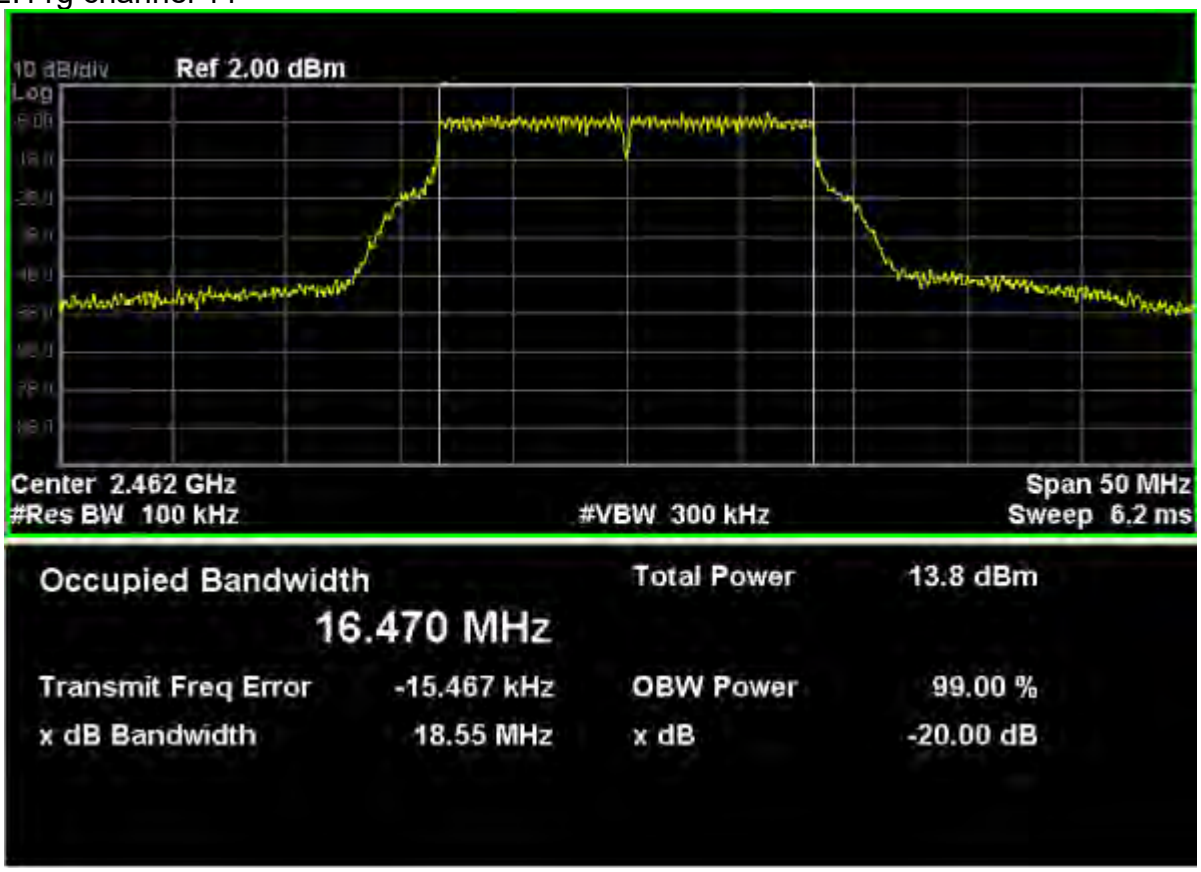
802.11g channel 1



802.11g channel 6

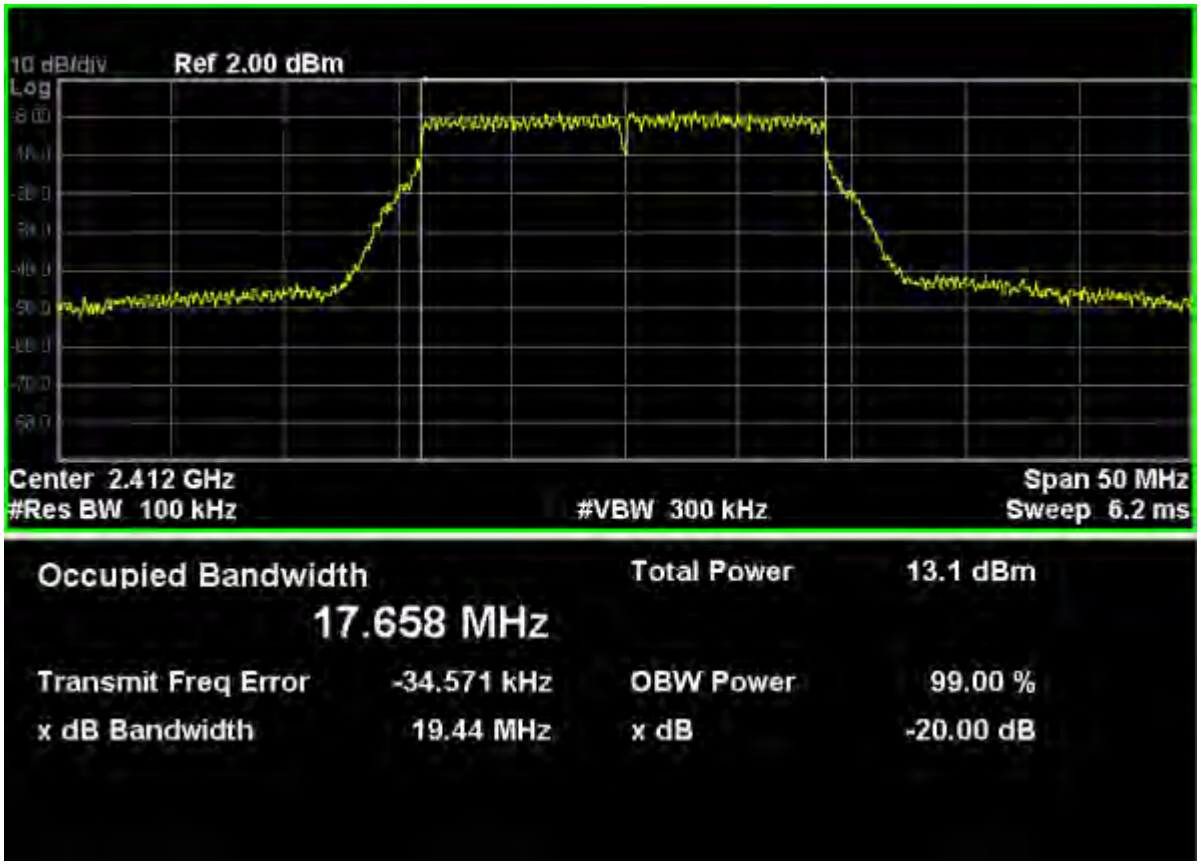


802.11g channel 11

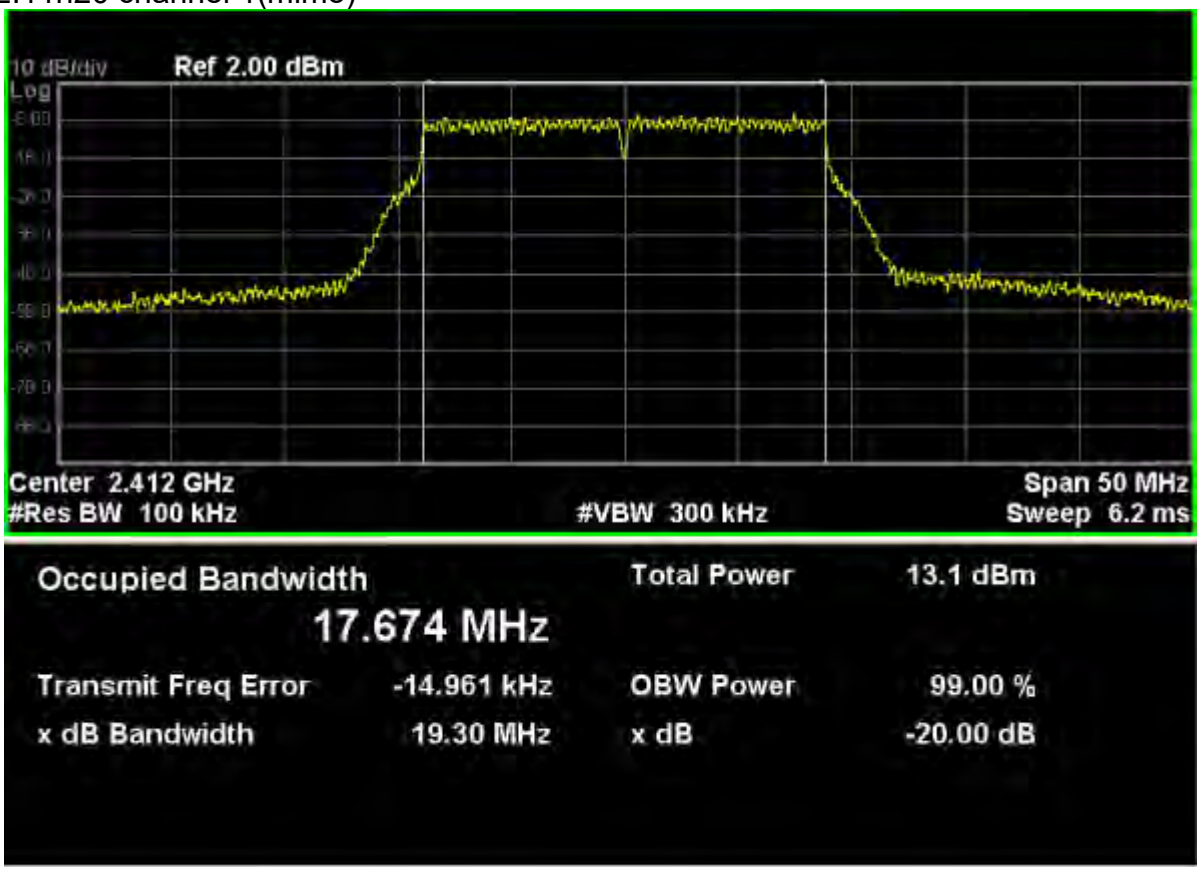


802.11n20

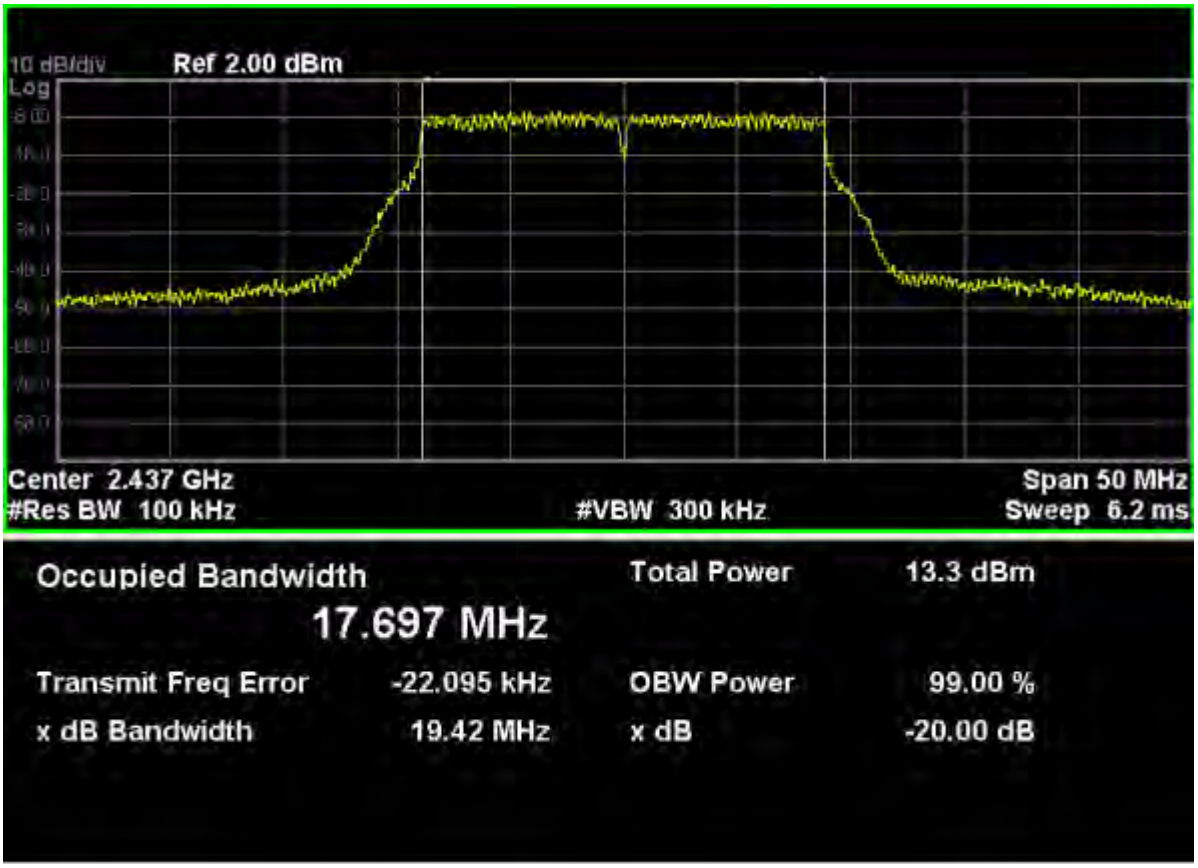
802.11n20 channel 1



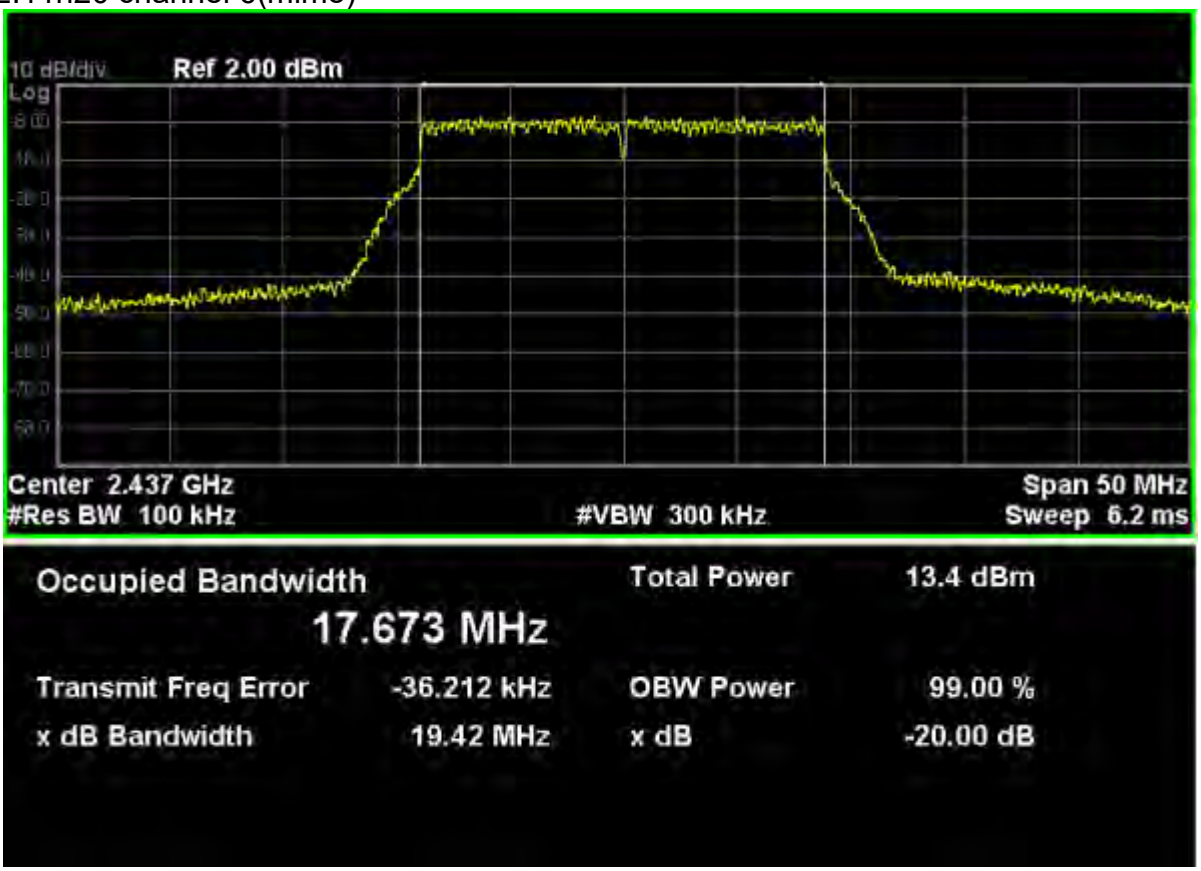
802.11n20 channel 1(mimo)



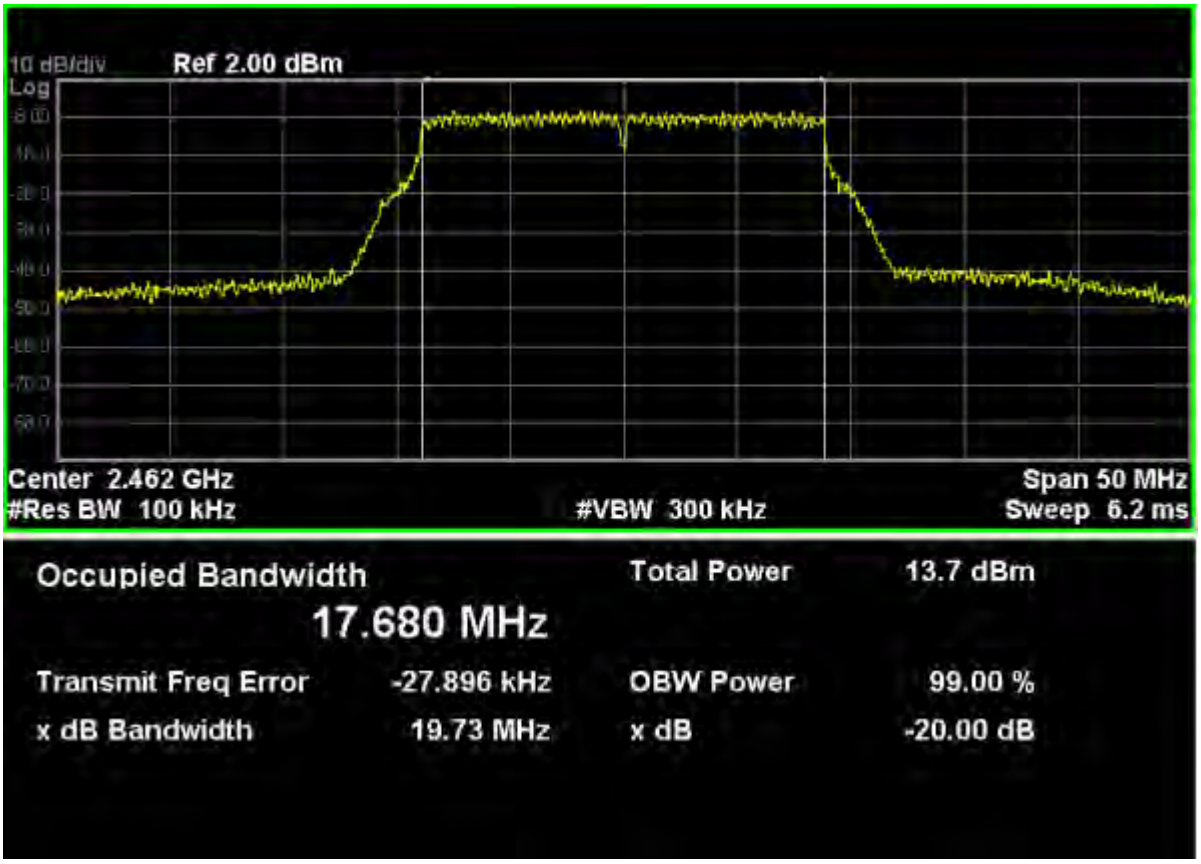
802.11n20 channel 6



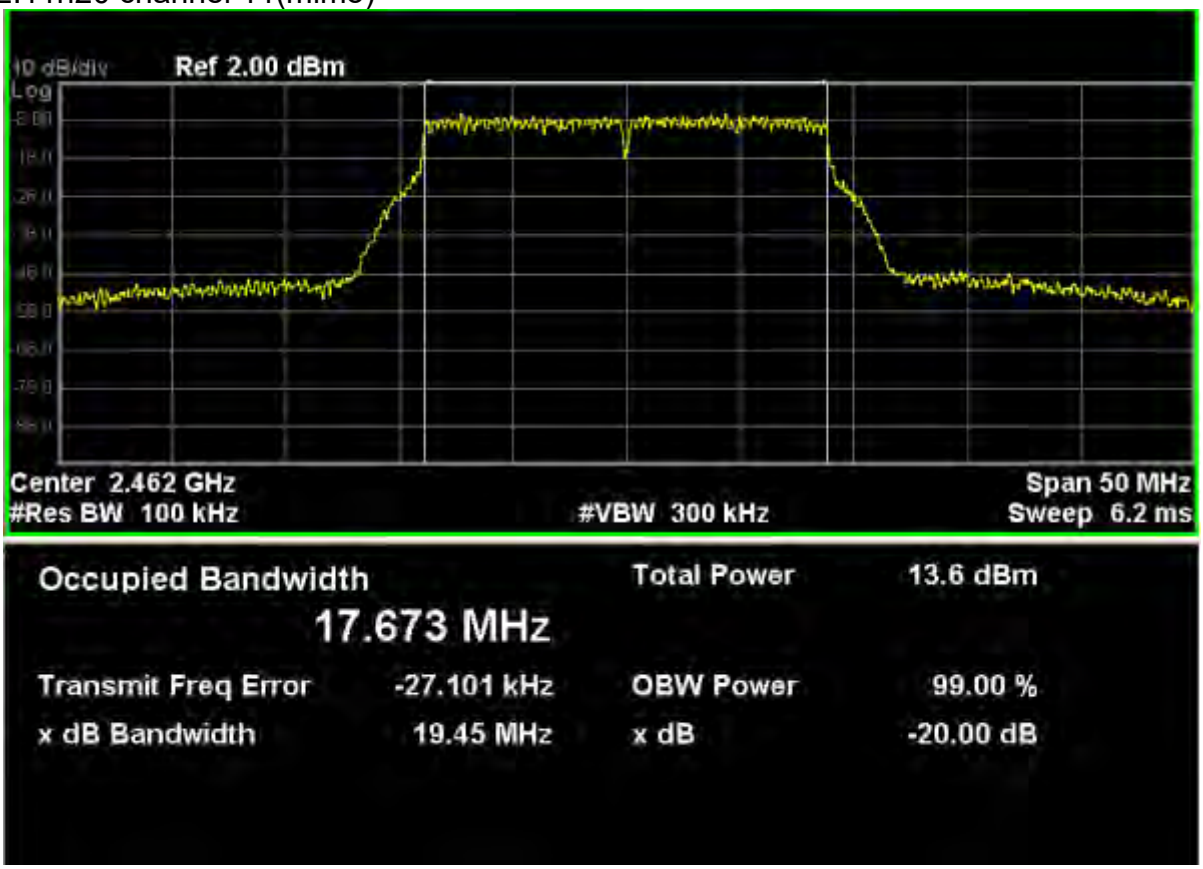
802.11n20 channel 6(mimo)



802.11n20 channel 11



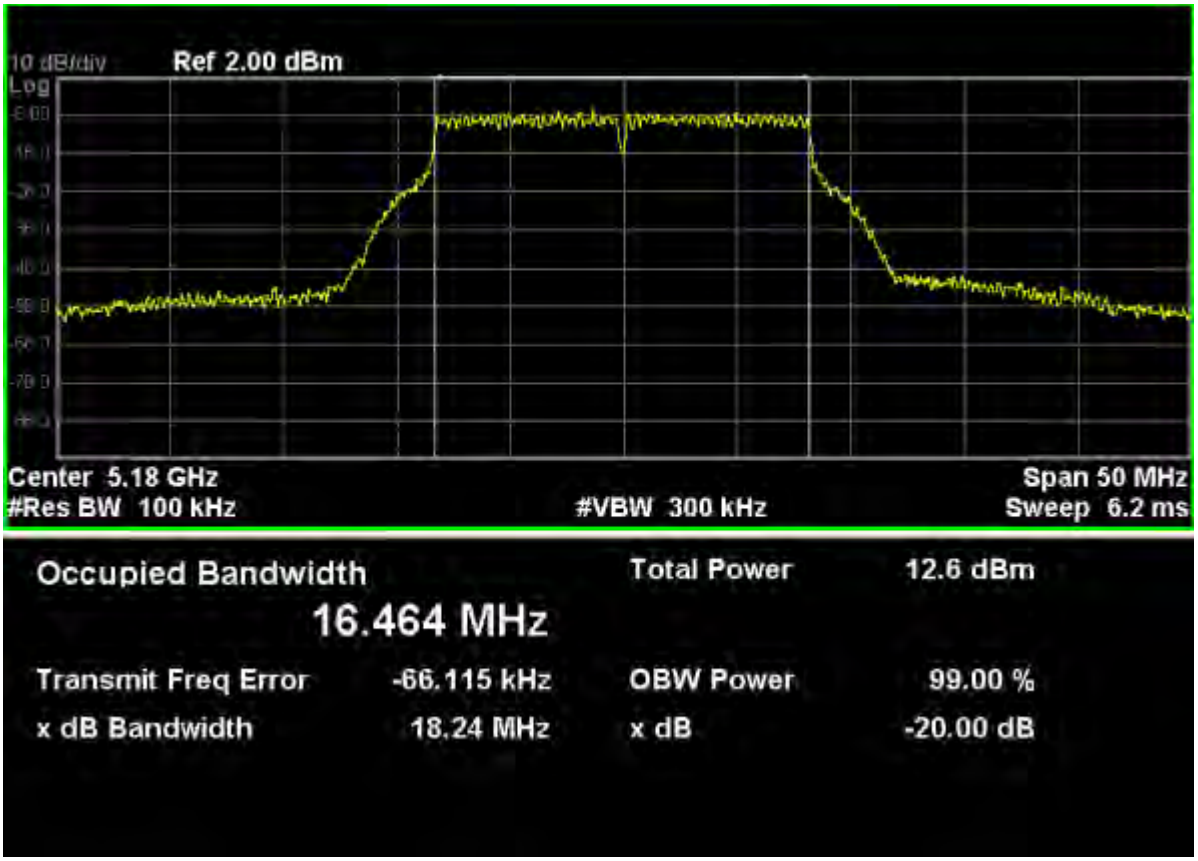
802.11n20 channel 11(mimo)



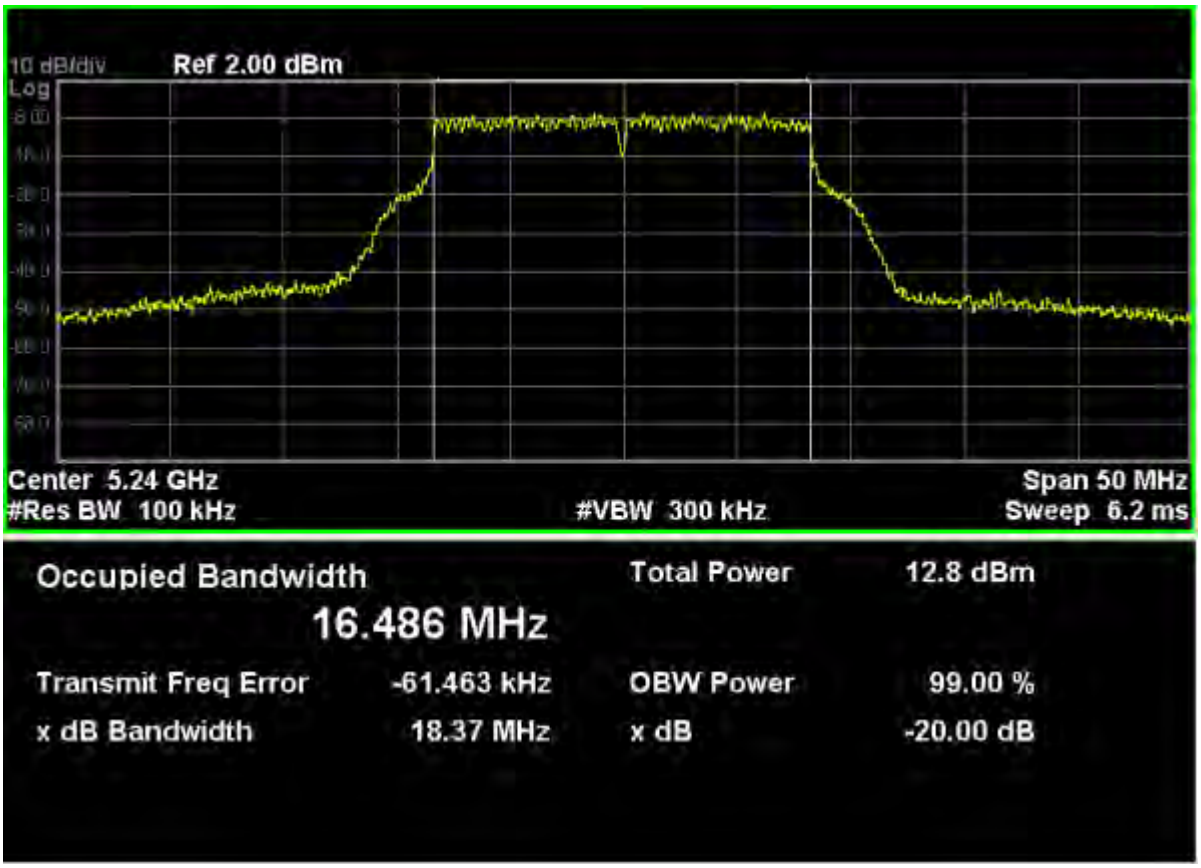
WIFI 5G(5150MHz-5250MHz)

802.11a

802.11a channel 36

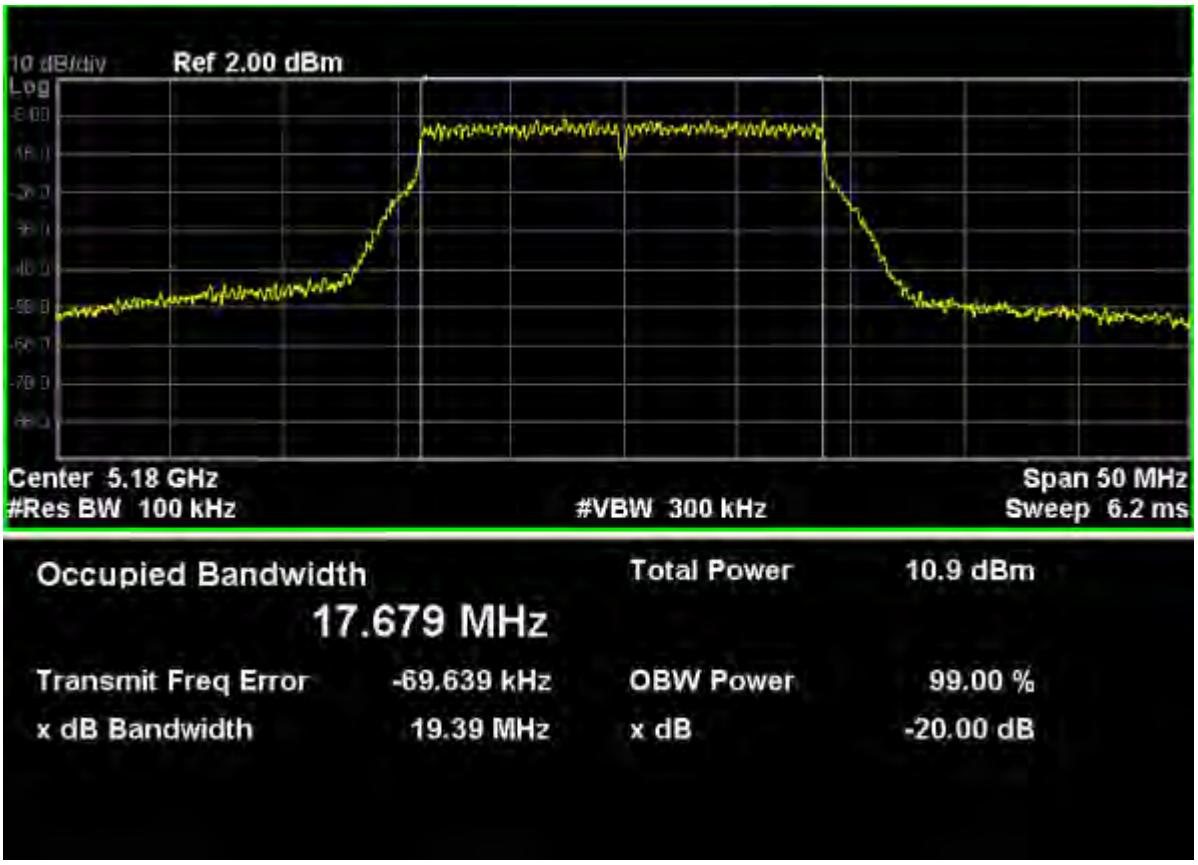


802.11a channel 48

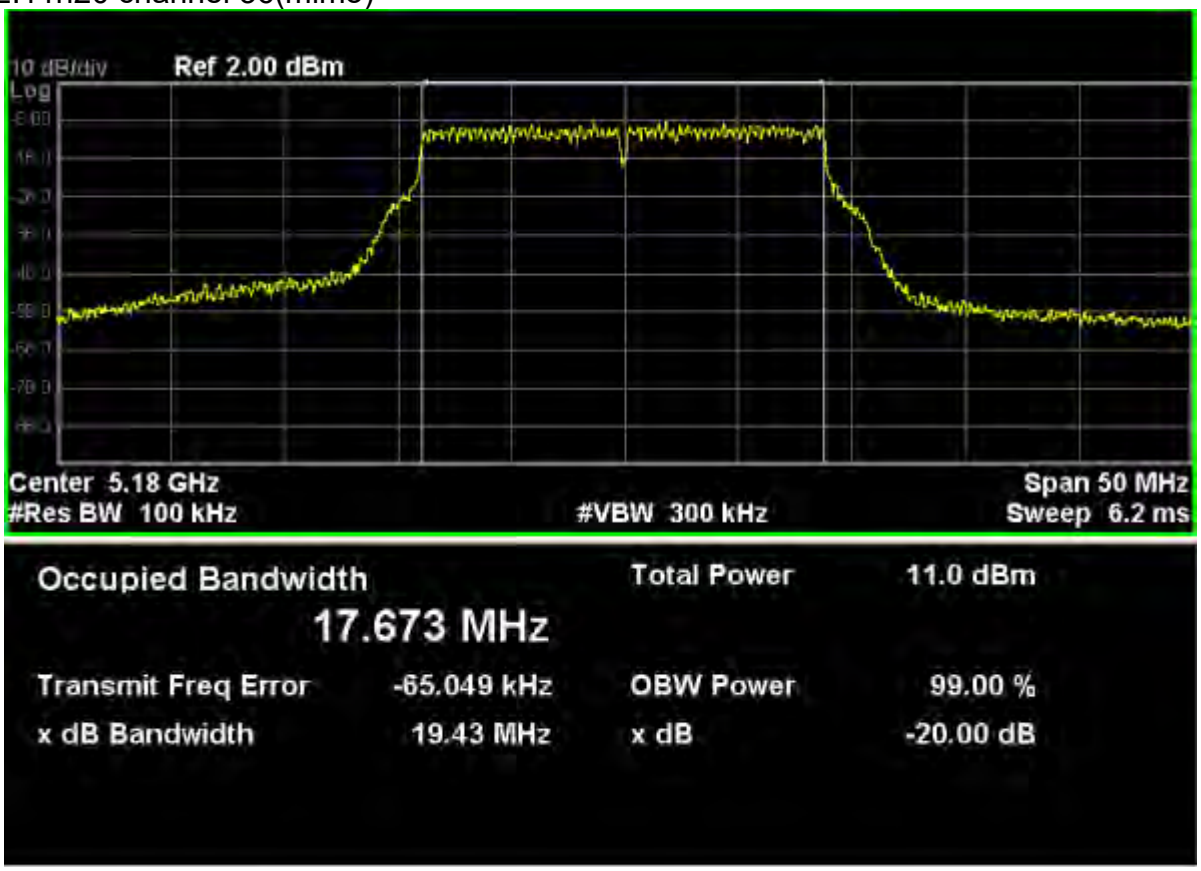


802.11n20

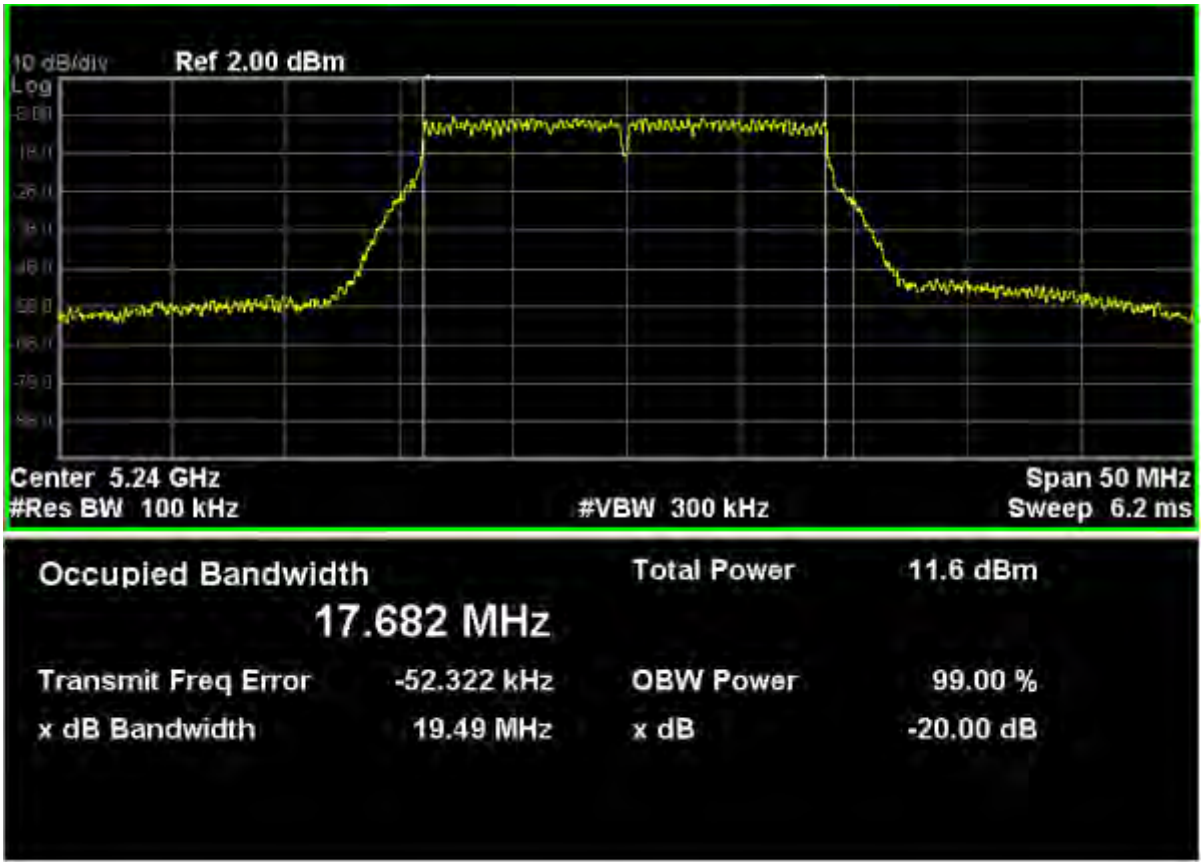
802.11n20 channel 36



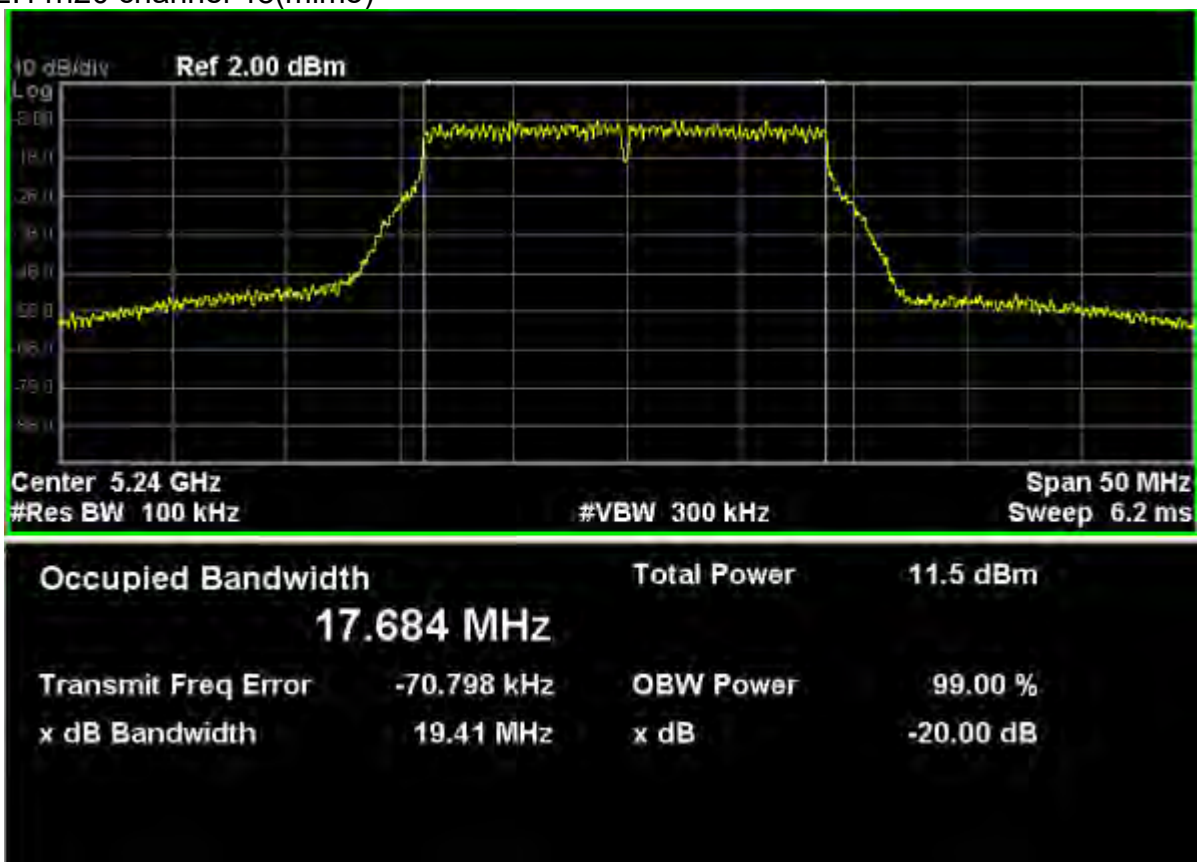
802.11n20 channel 36(mimo)



802.11n20 channel 48

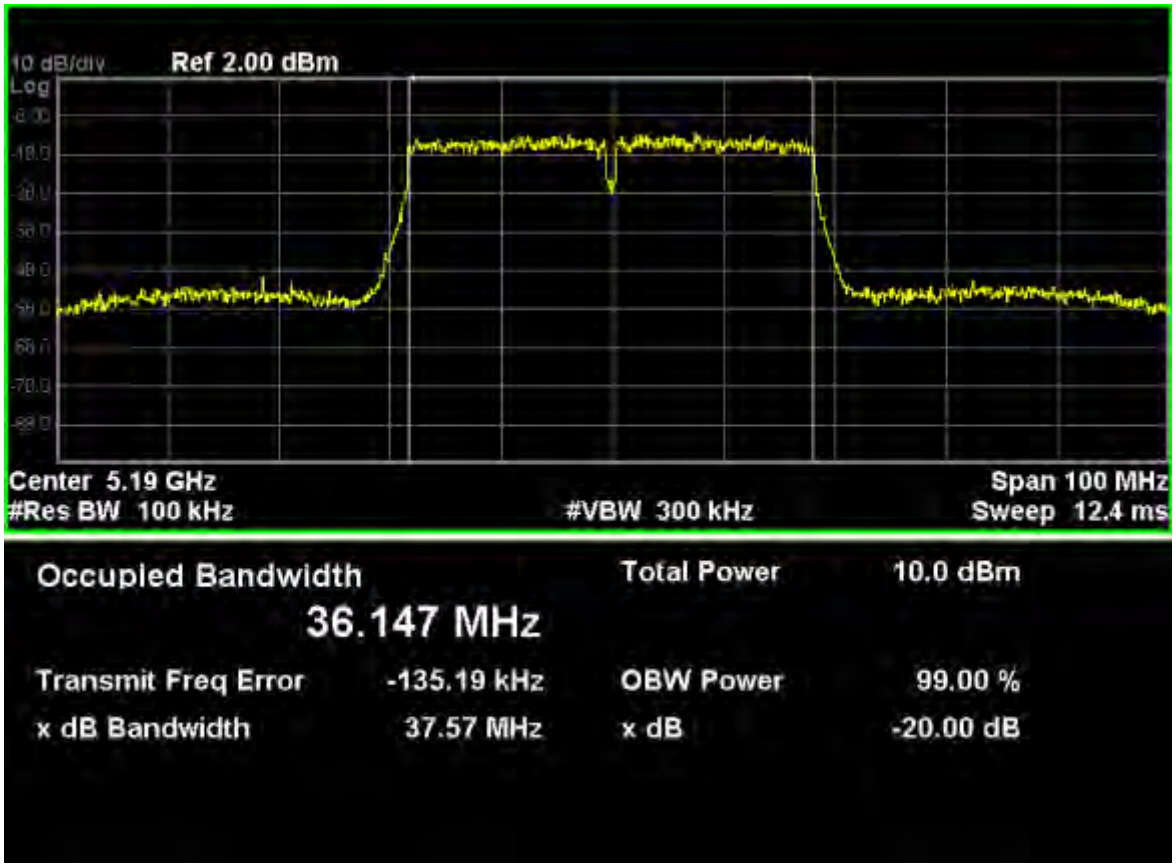


802.11n20 channel 48(mimo)

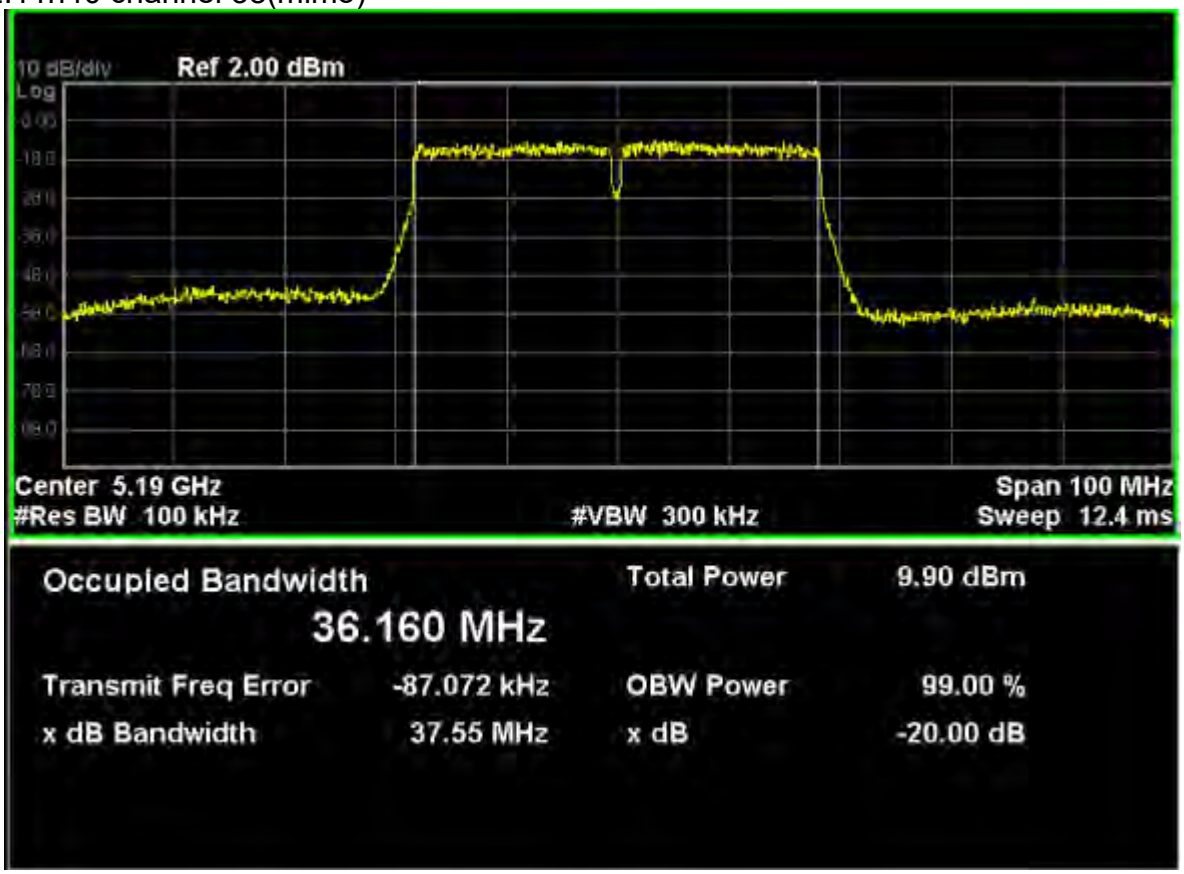


802.11n40

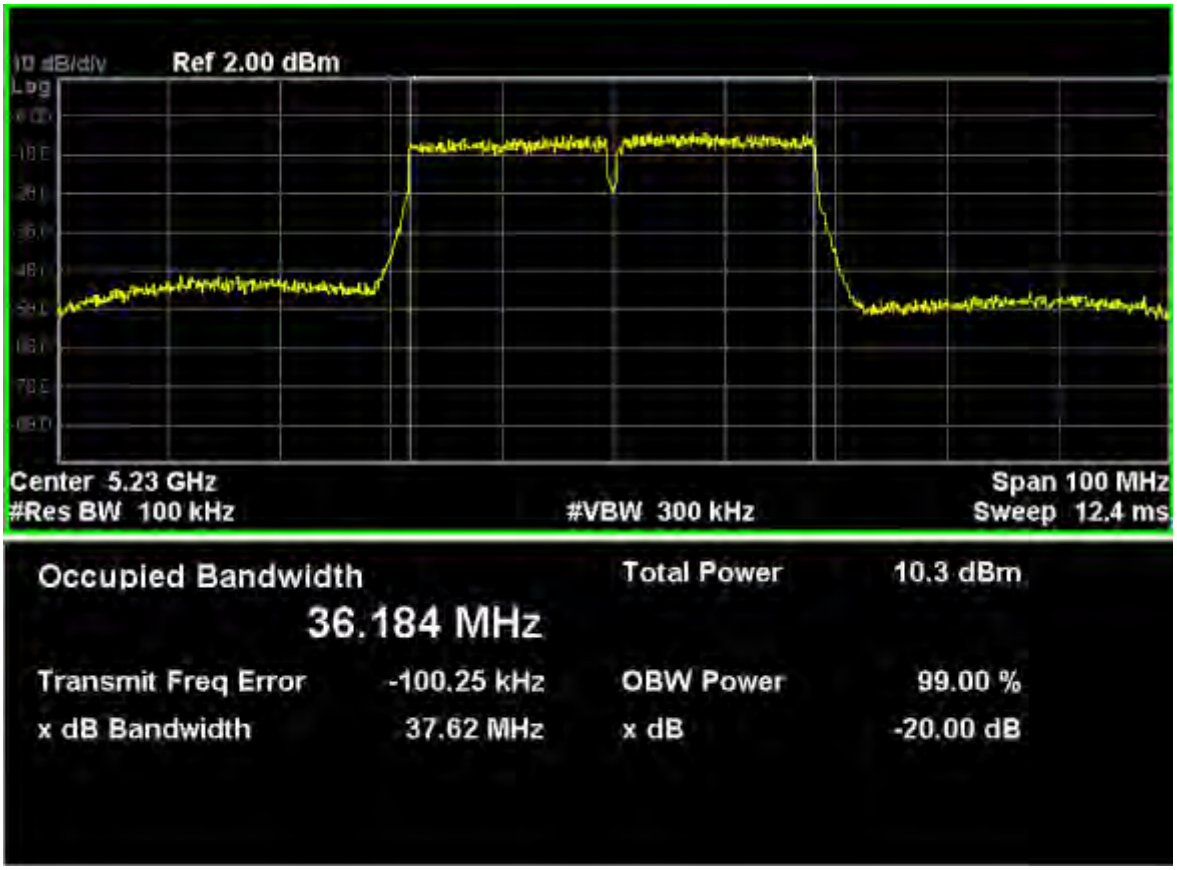
802.11n40 channel 38



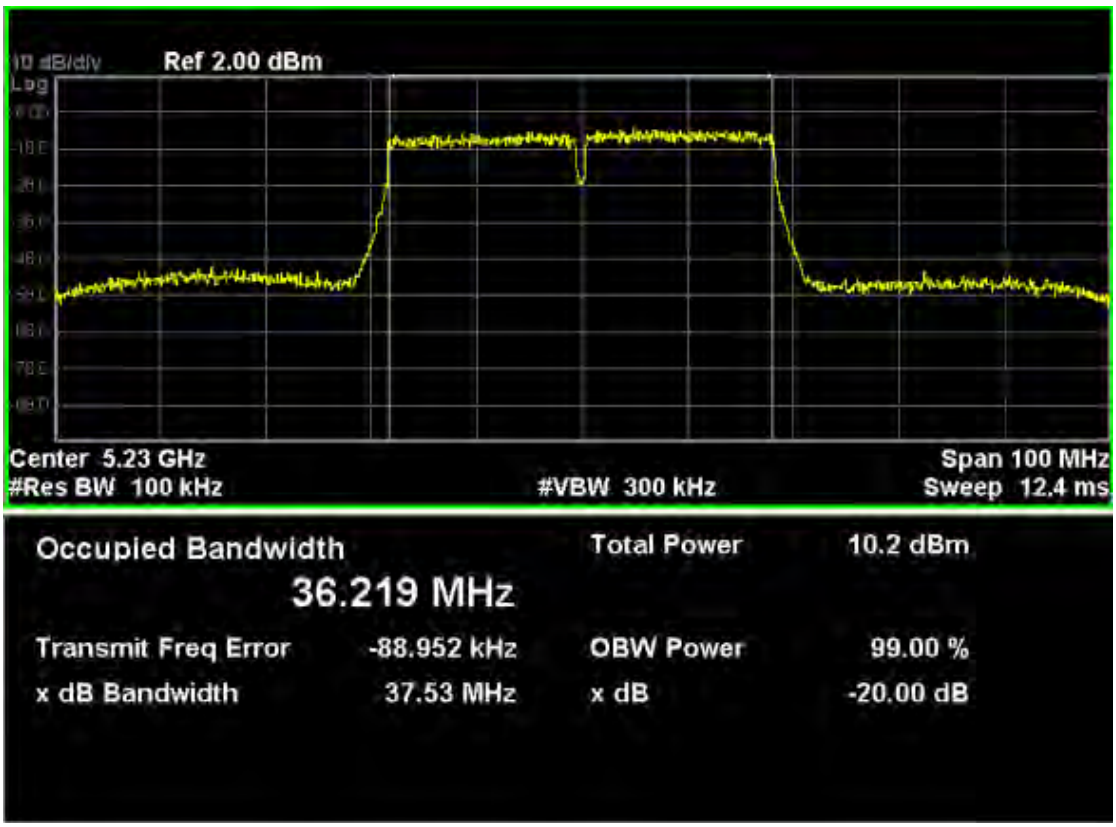
802.11n40 channel 38(mimo)



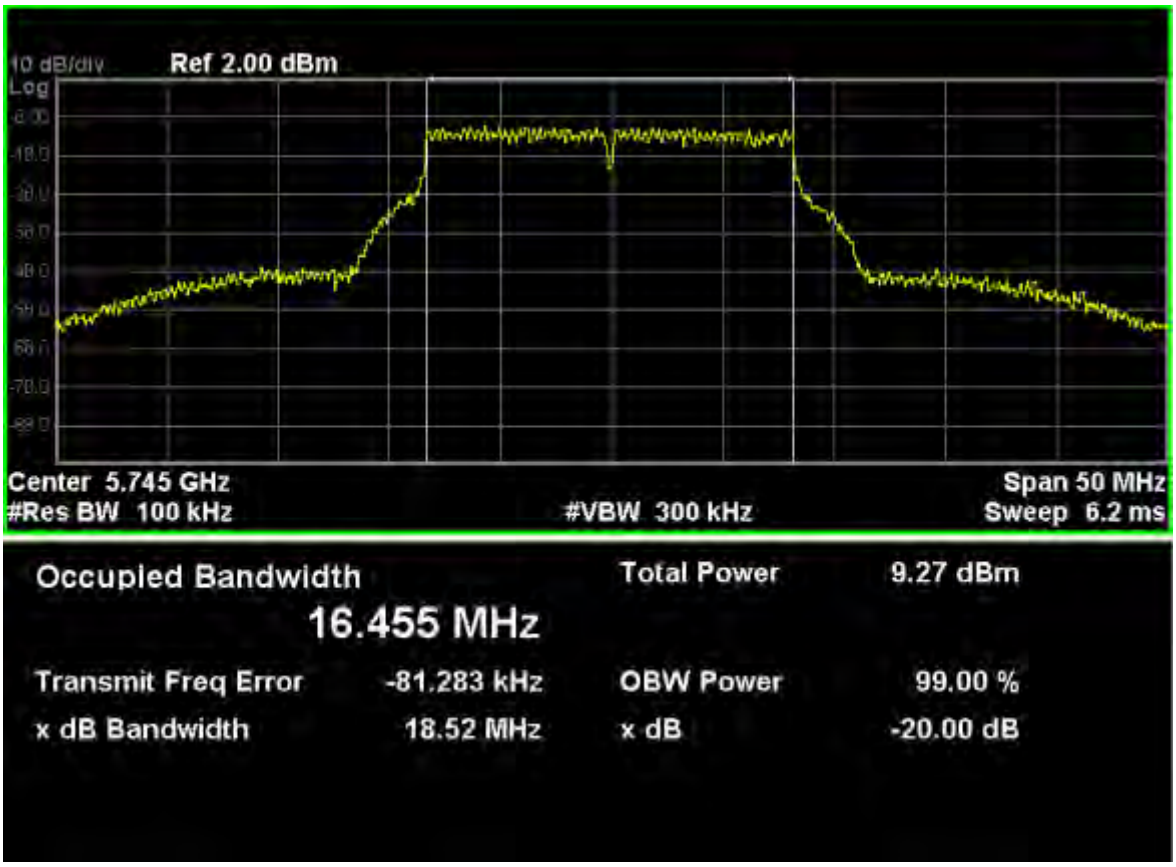
802.11n40 channel 46



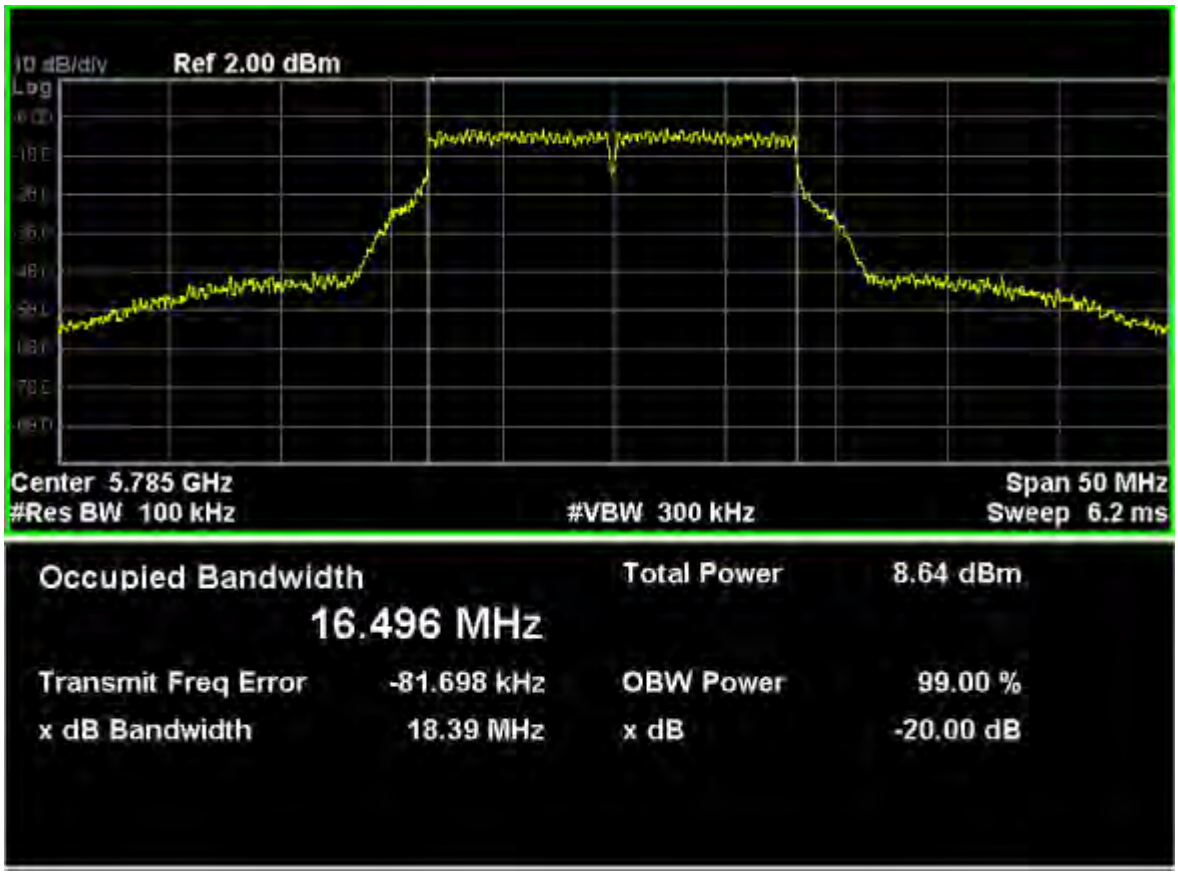
802.11n40 channel 46（mimo）



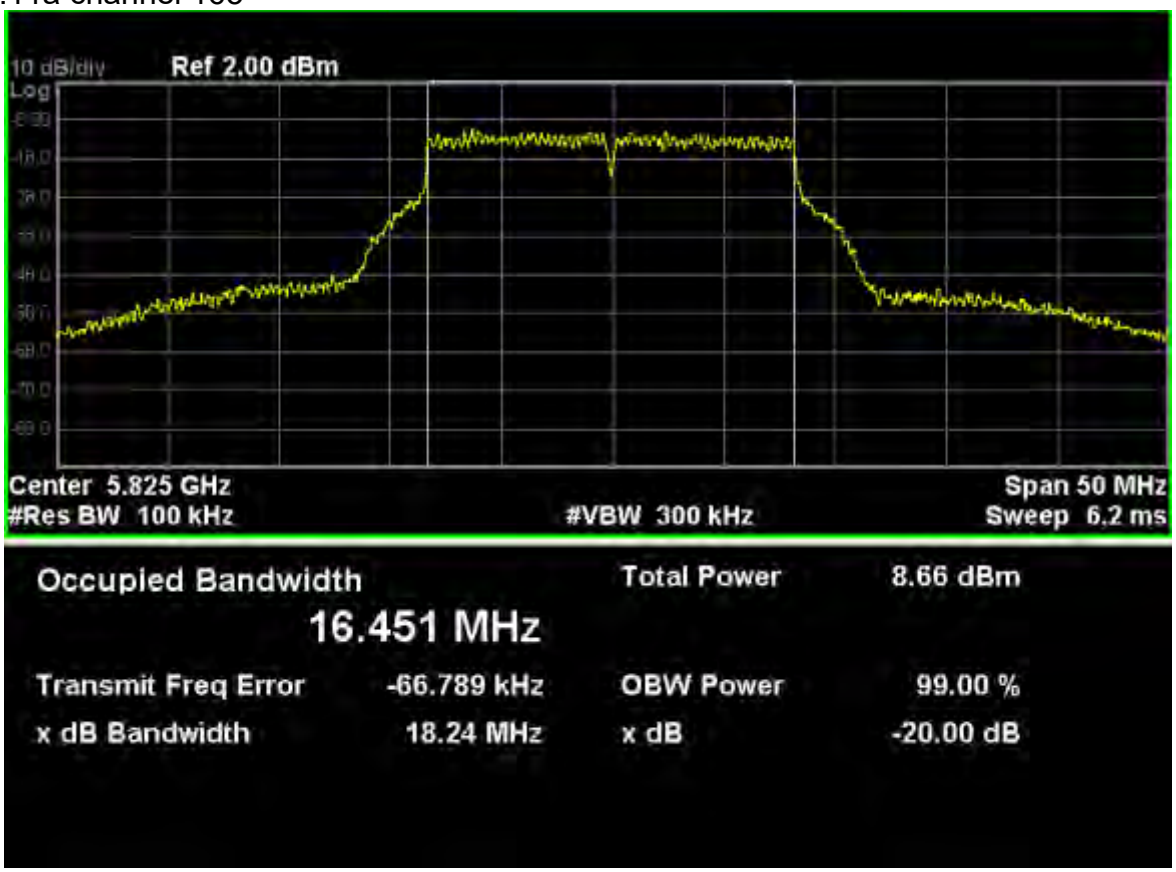
WIFI 5G(5725MHz-5850MHz)
802.11a
802.11a channel 149



802.11a channel 157

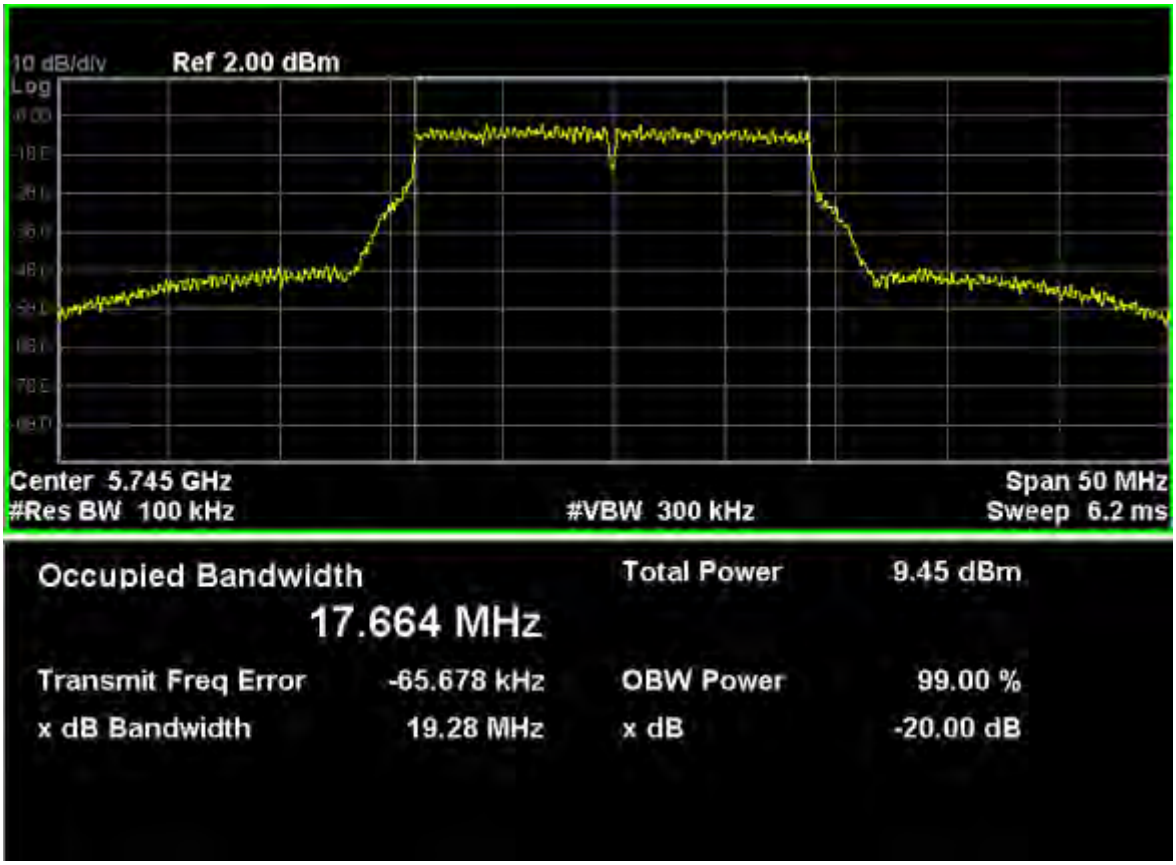


802.11a channel 165

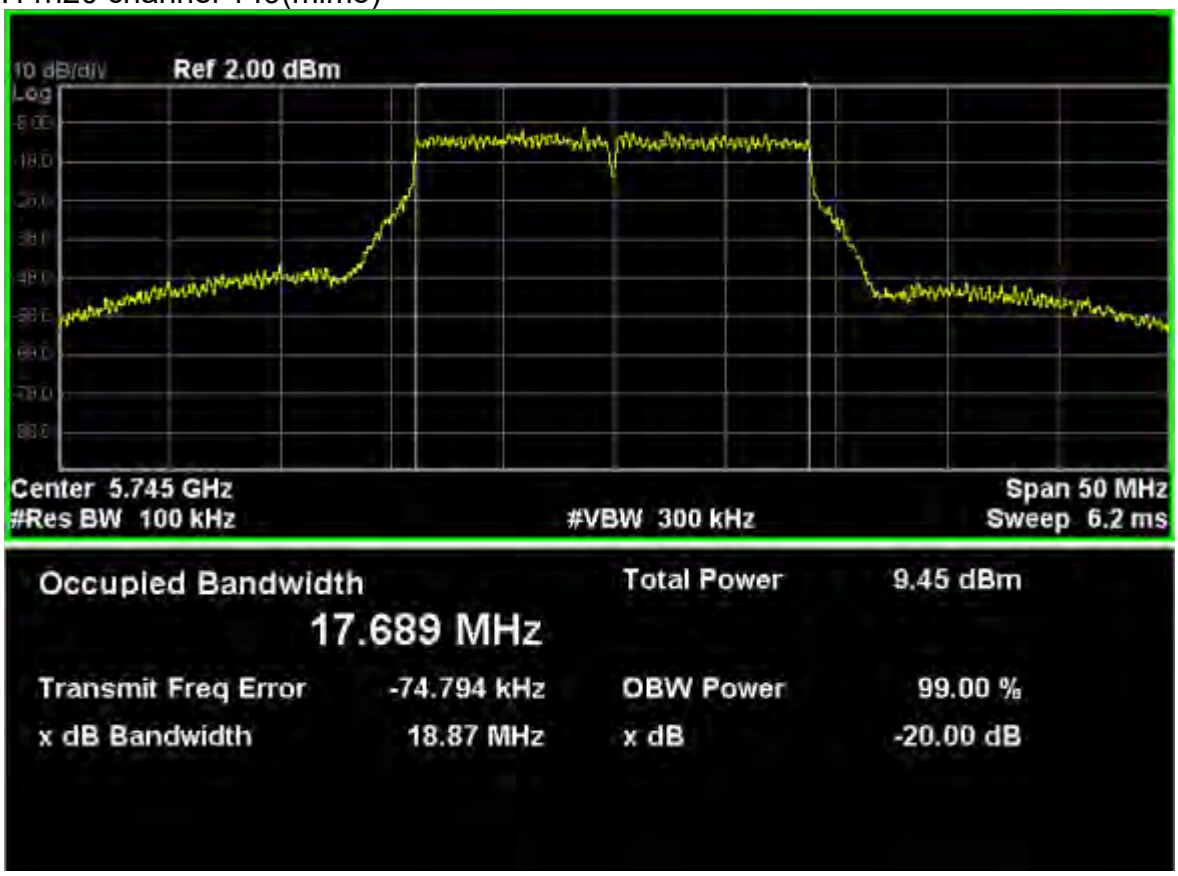


802.11n20

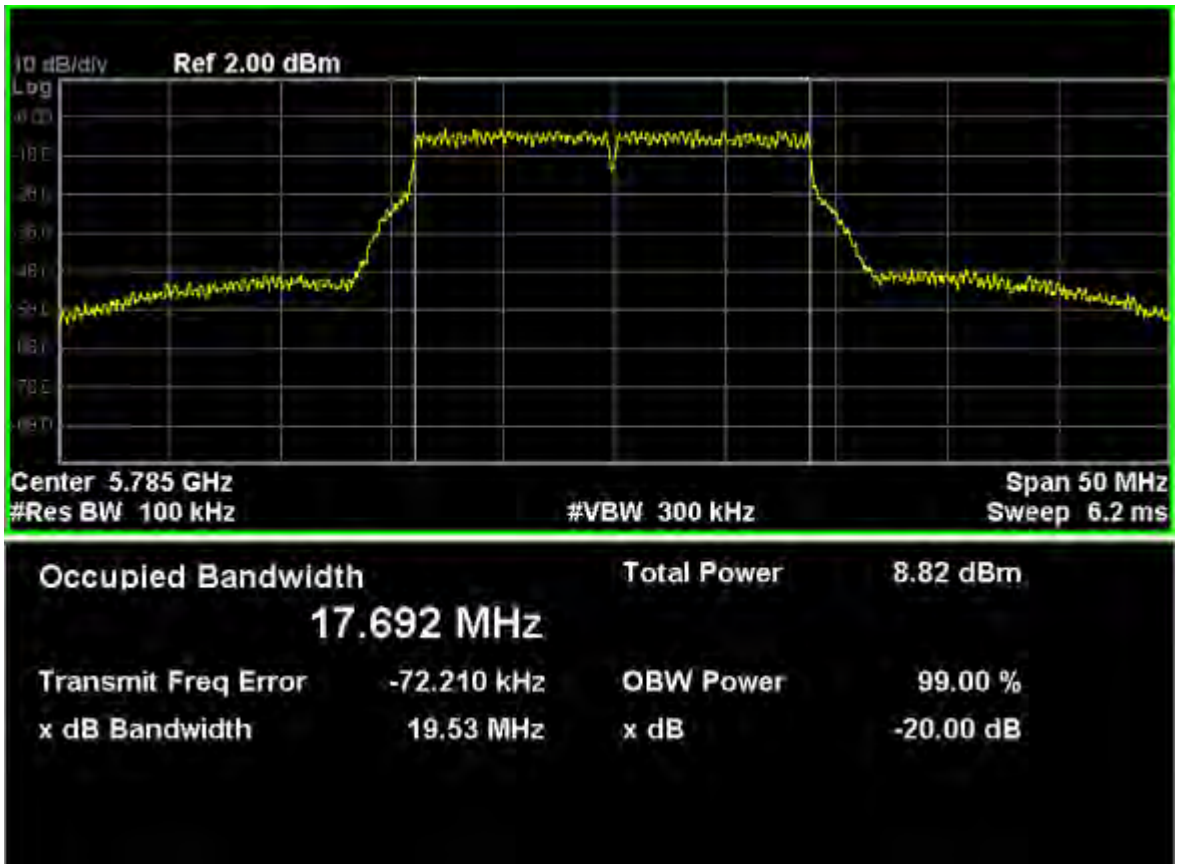
802.11n20 channel 149



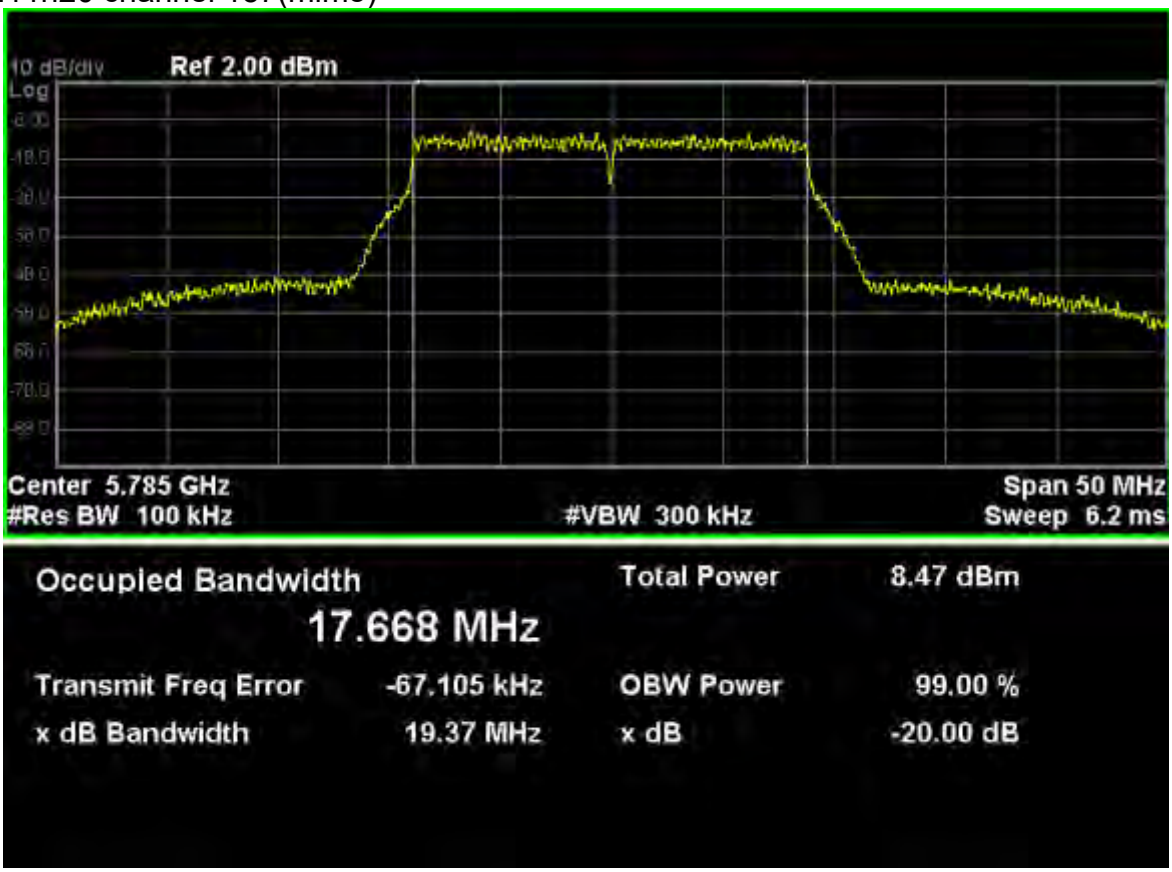
802.11n20 channel 149(mimo)



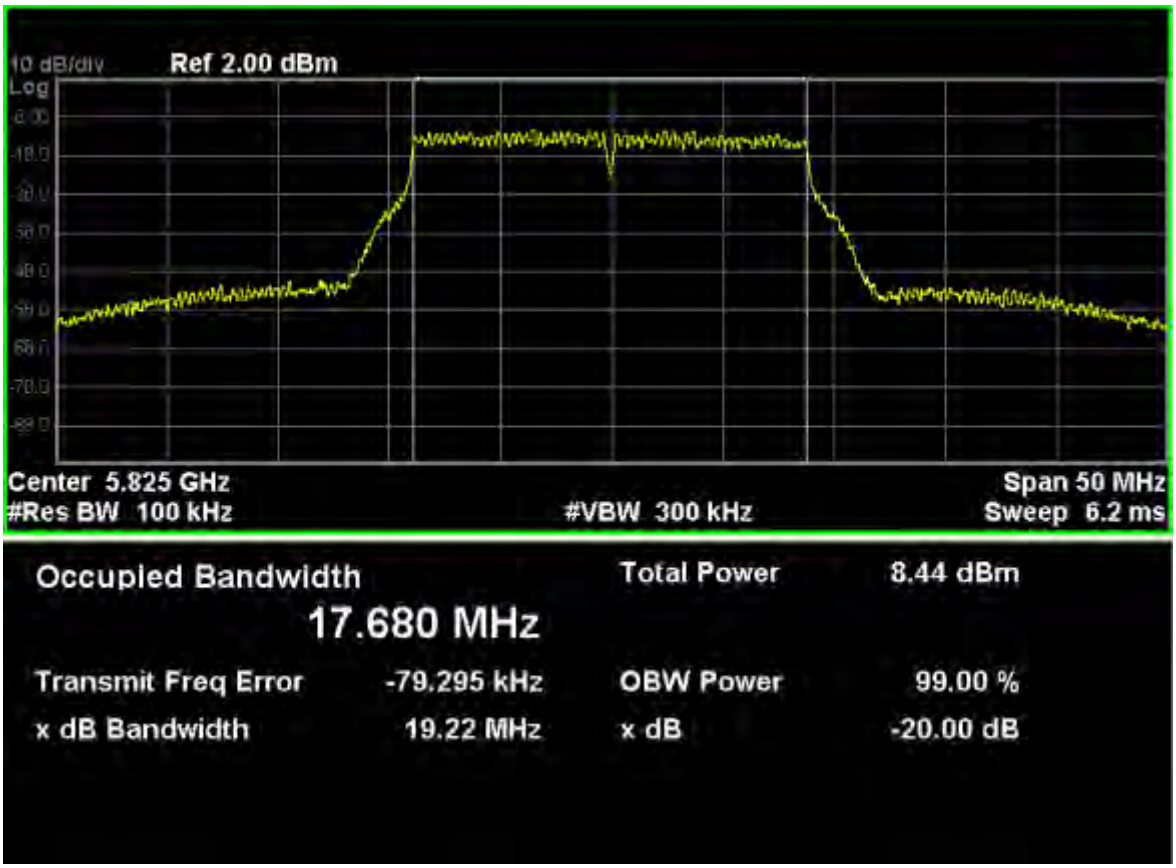
802.11n20 channel 157



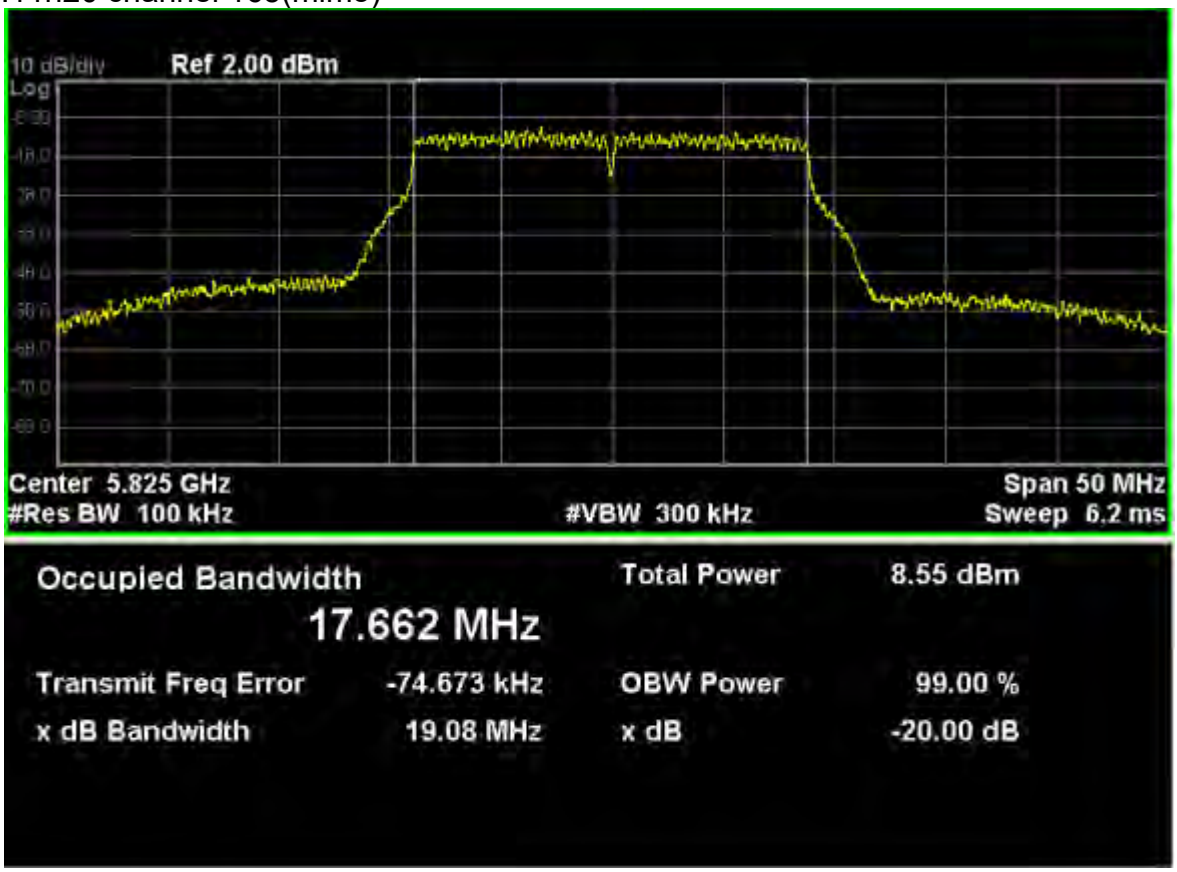
802.11n20 channel 157(mimo)



802.11n20 channel 165

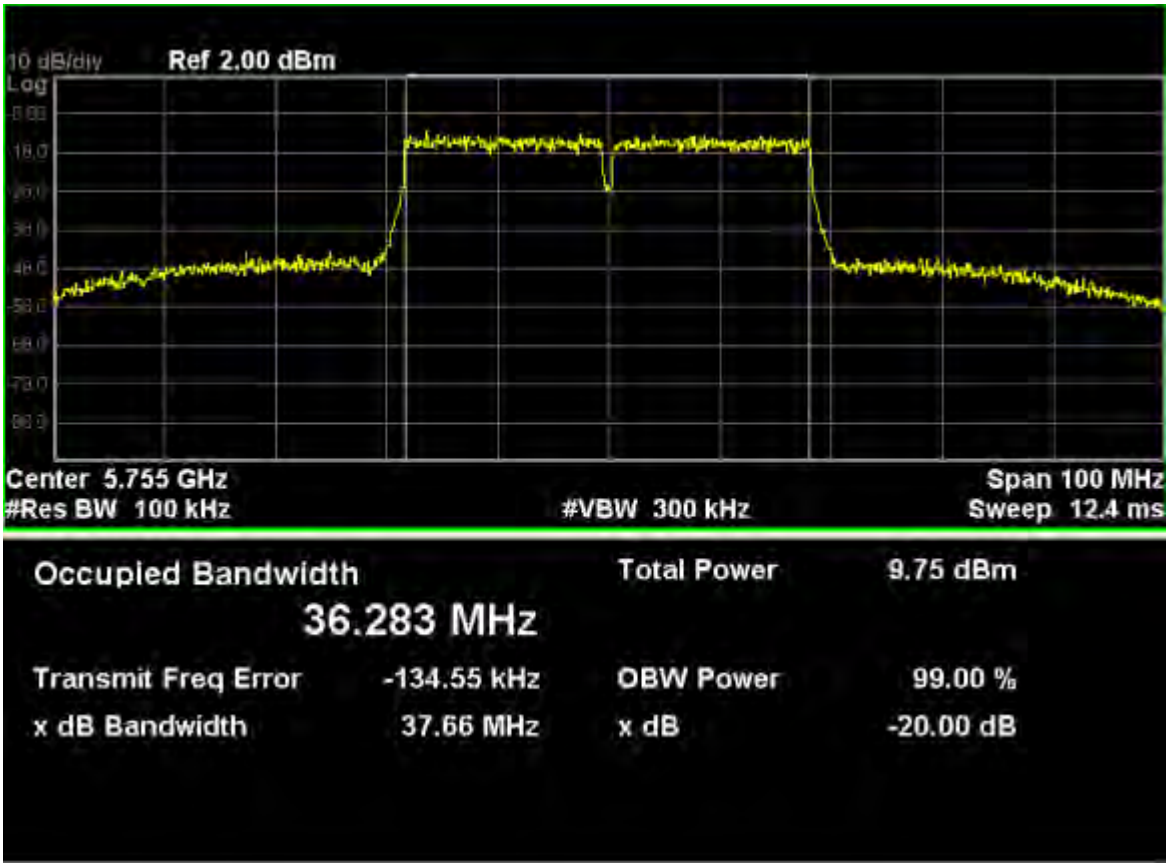


802.11n20 channel 165(mimo)

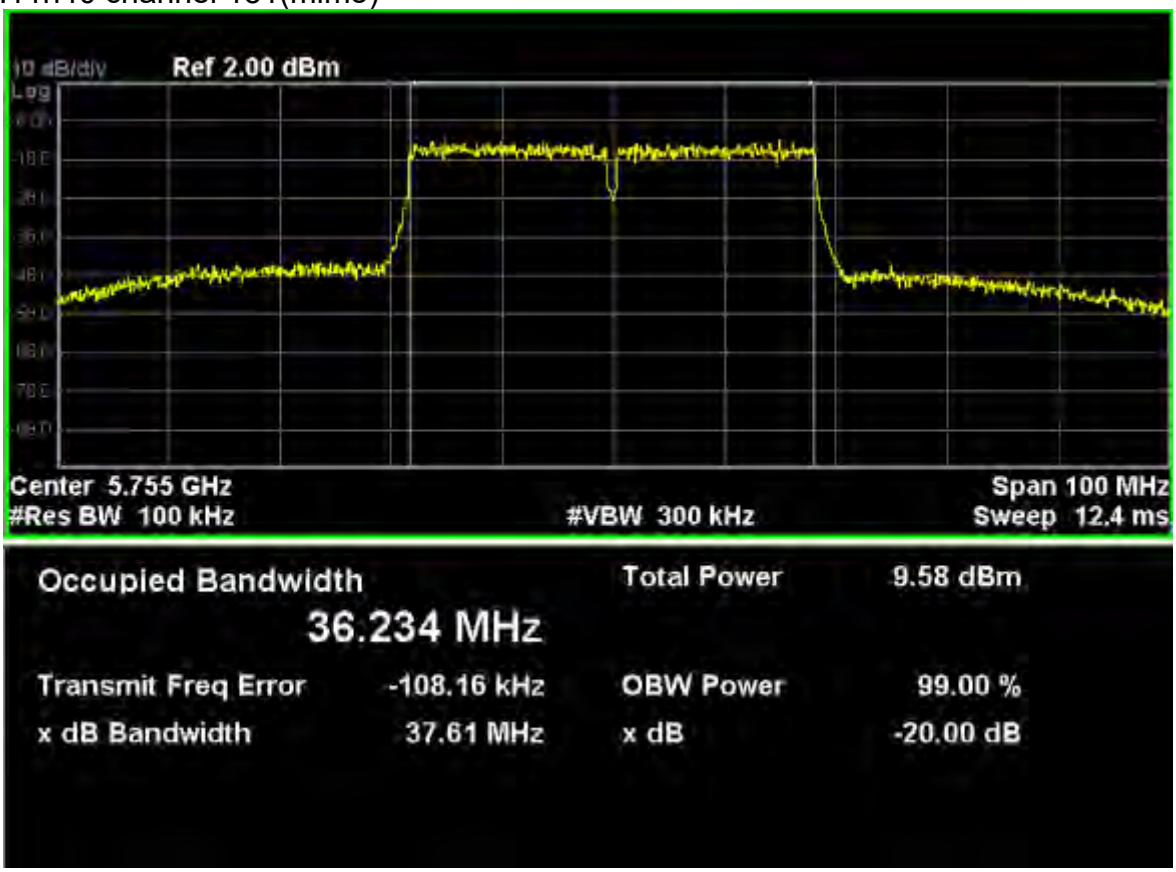


802.11n40

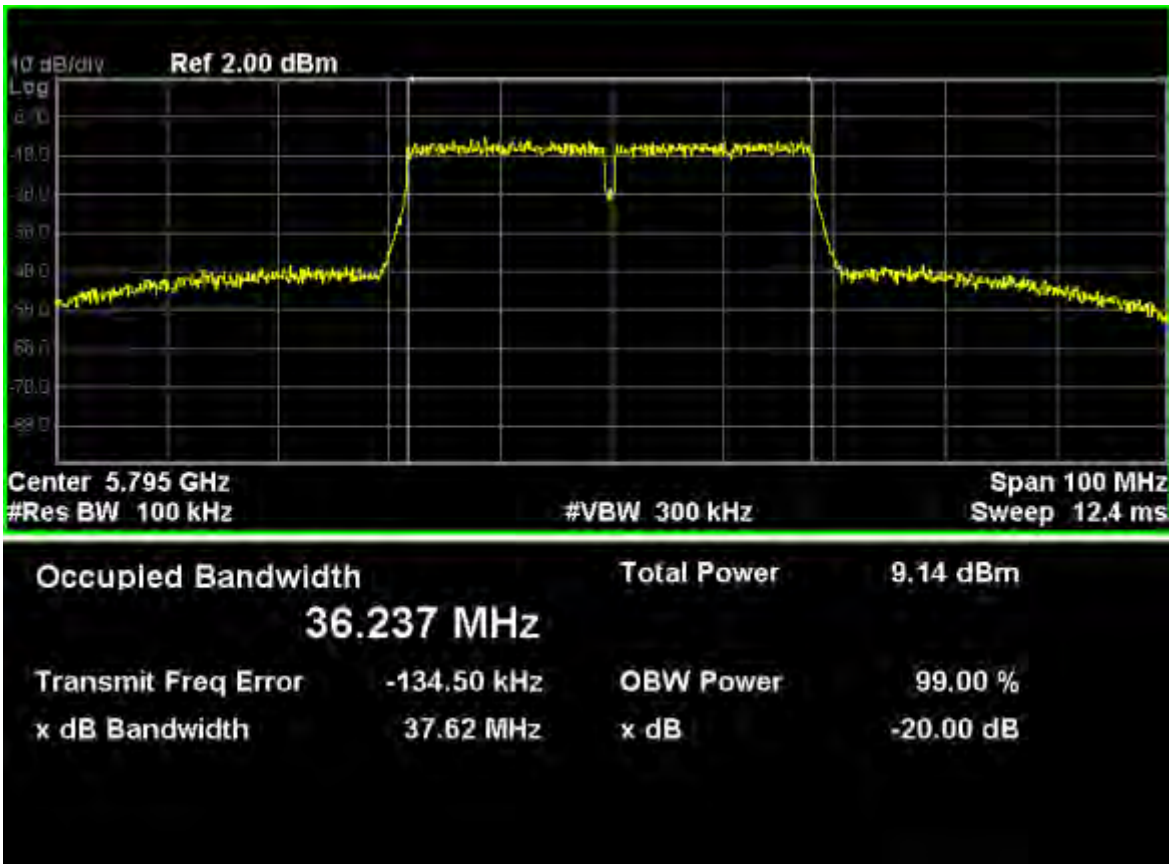
802.11n40 channel 151



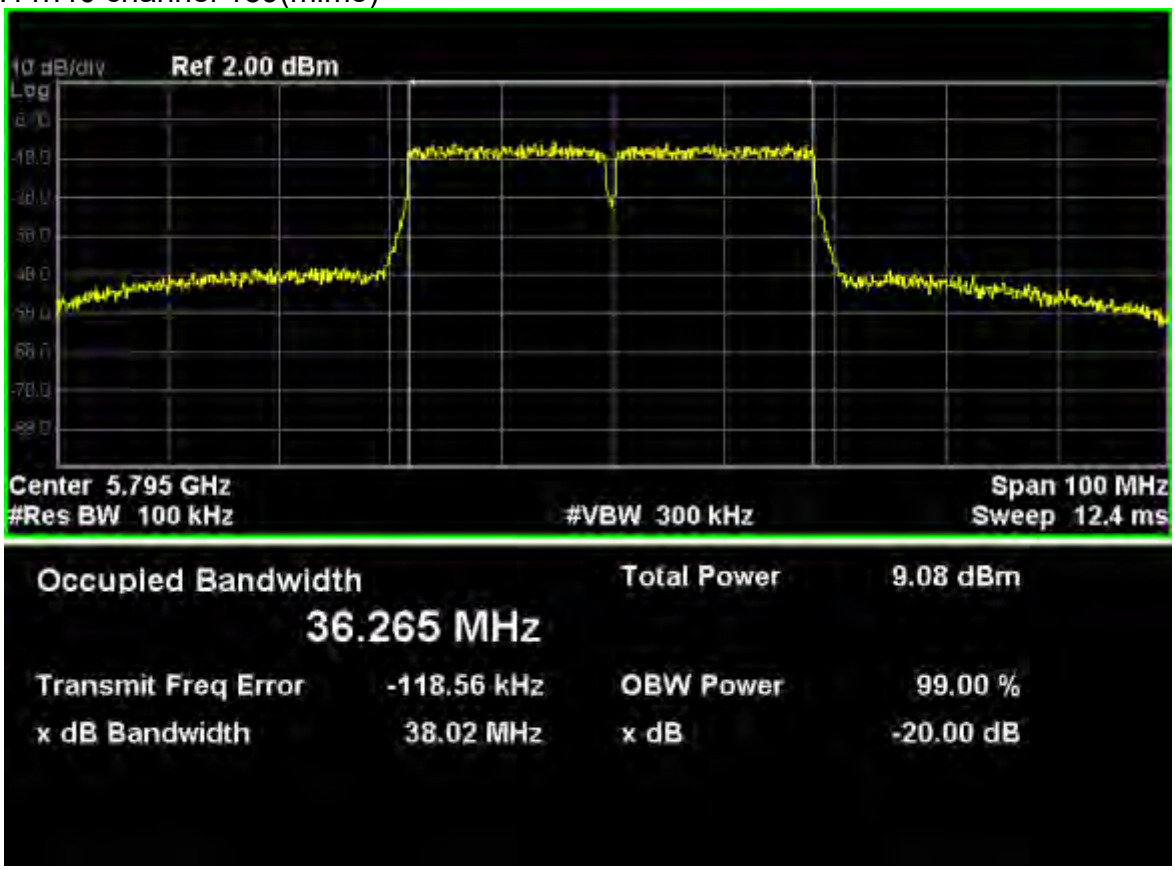
802.11n40 channel 151(mimo)



802.11n40 channel 159

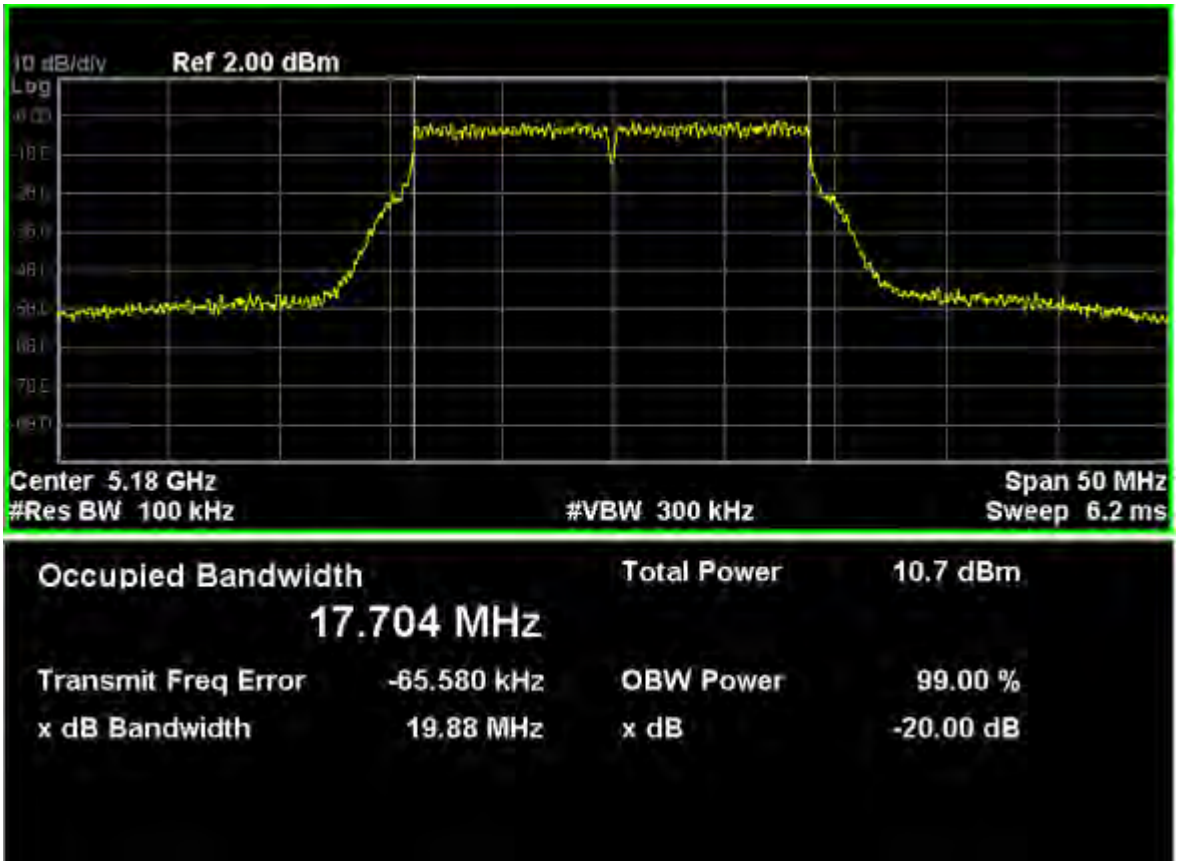


802.11n40 channel 159(mimo)



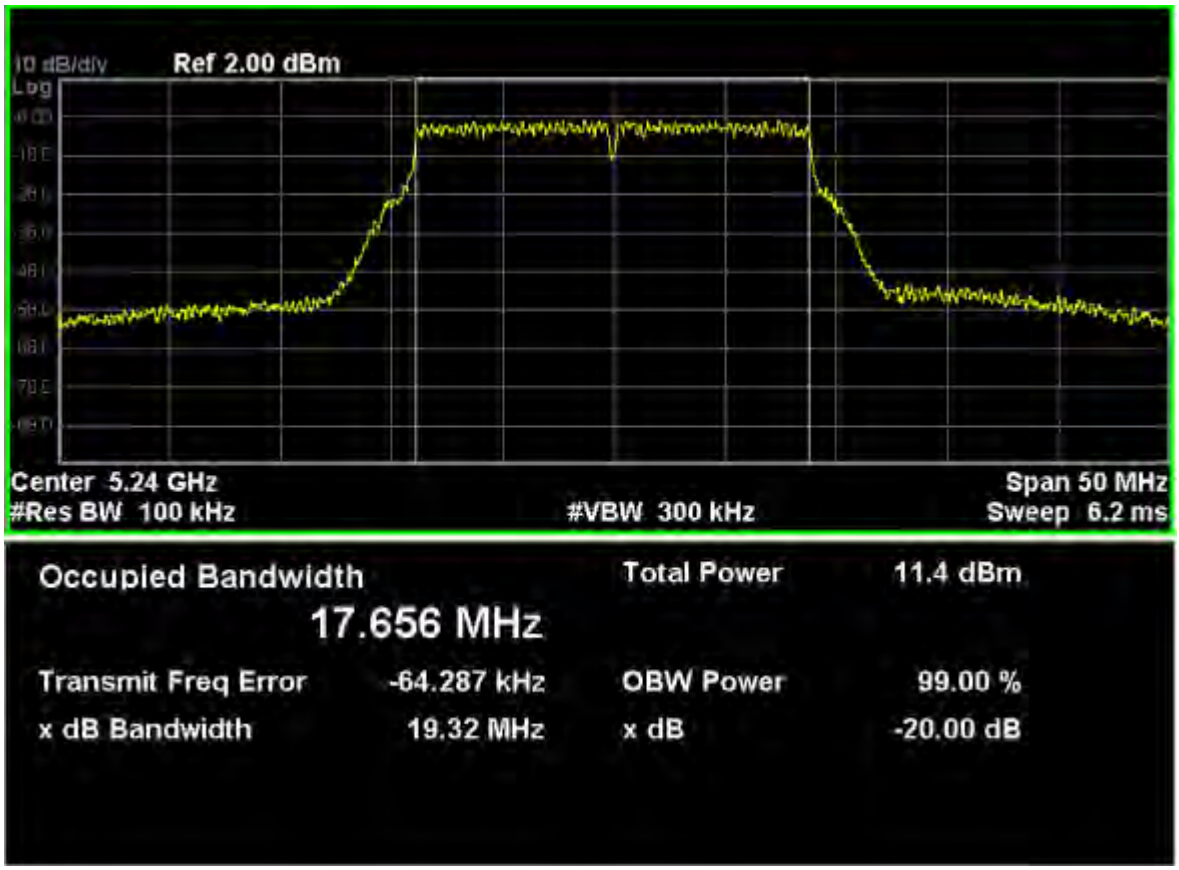
802.11ac (5150MHz-5250MHz)

802.11ac20 channel 36

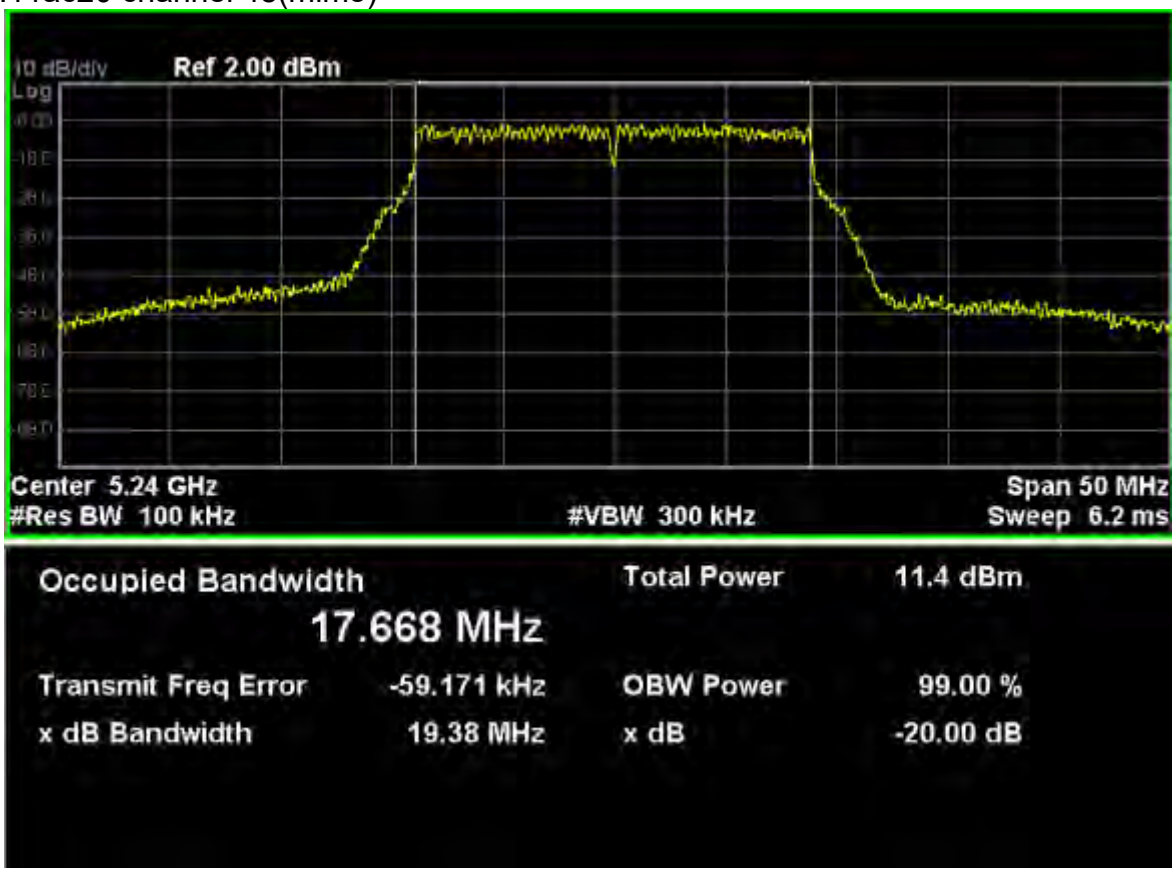


802.11ac20 channel 36(mimo)

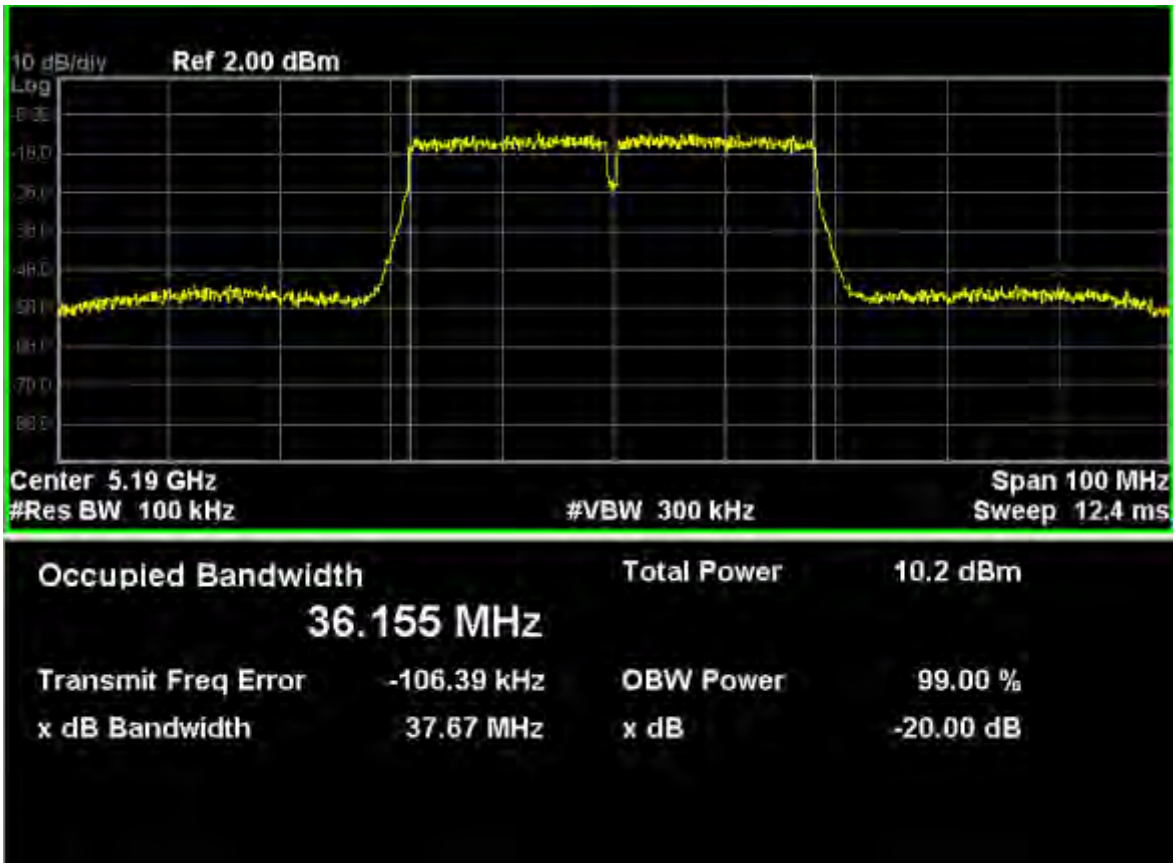
802.11ac20 channel 48



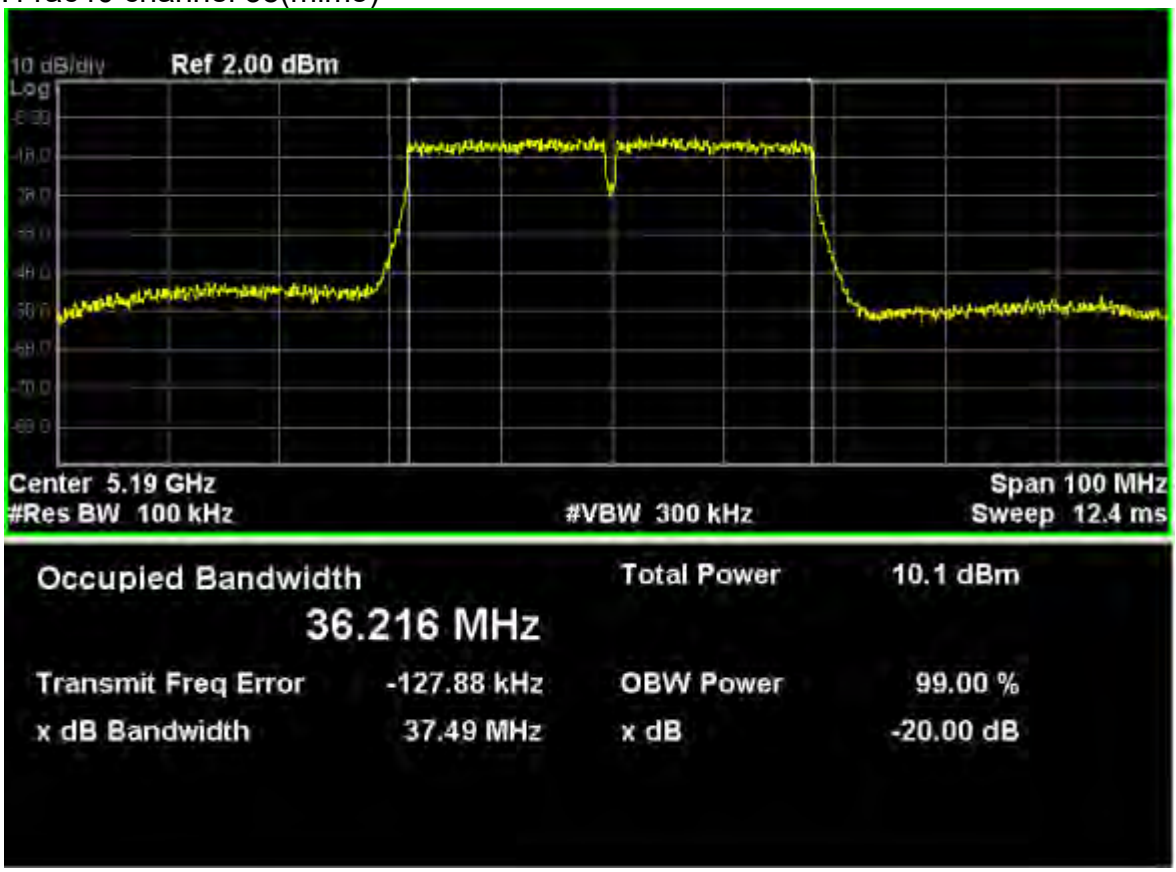
802.11ac20 channel 48(mimo)



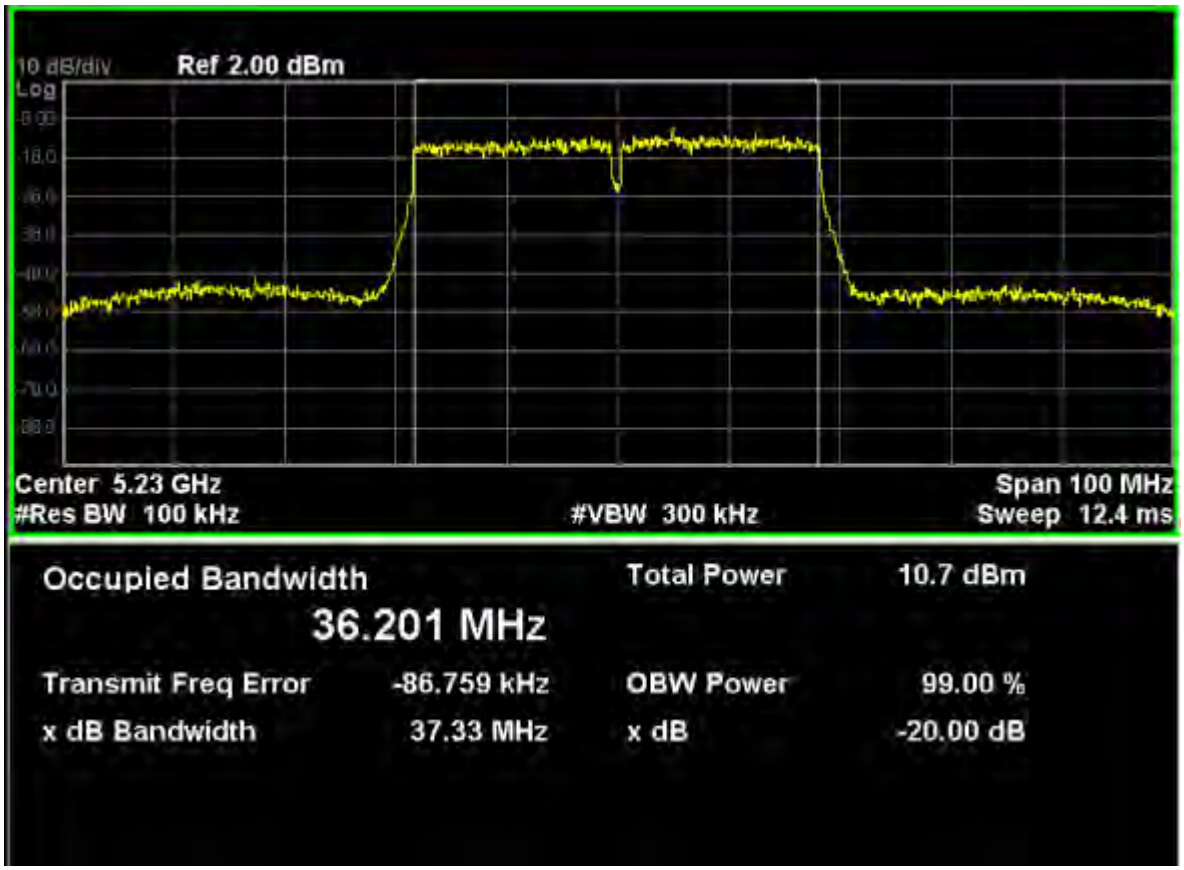
802.11ac40 channel 38



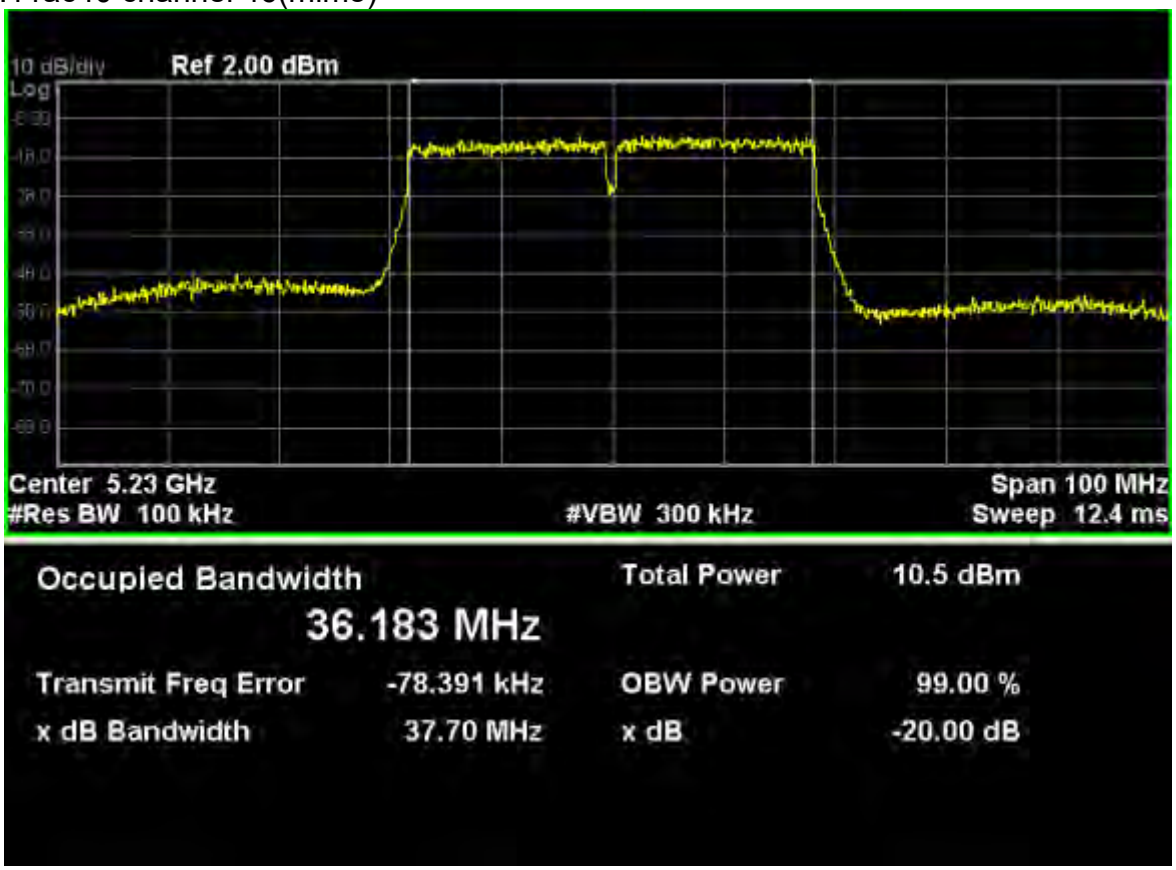
802.11ac40 channel 38(mimo)



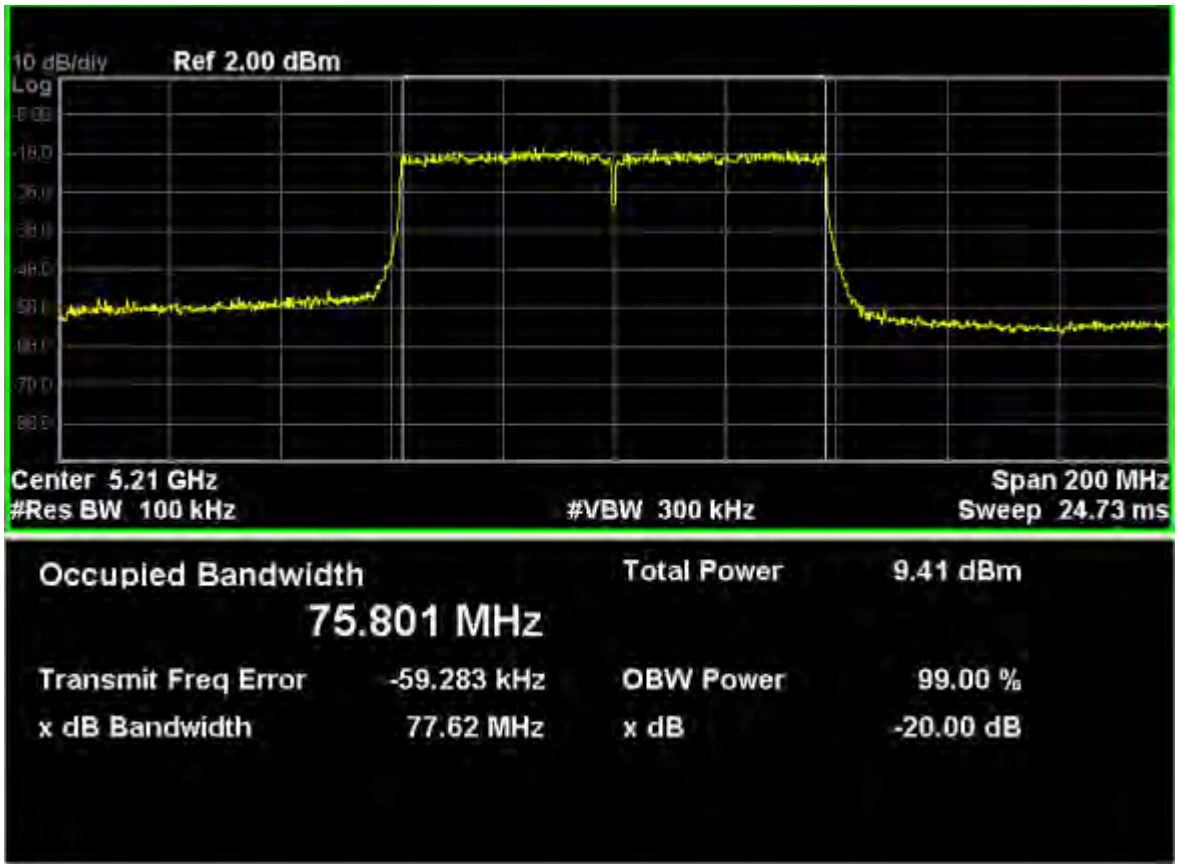
802.11ac40 channel 46



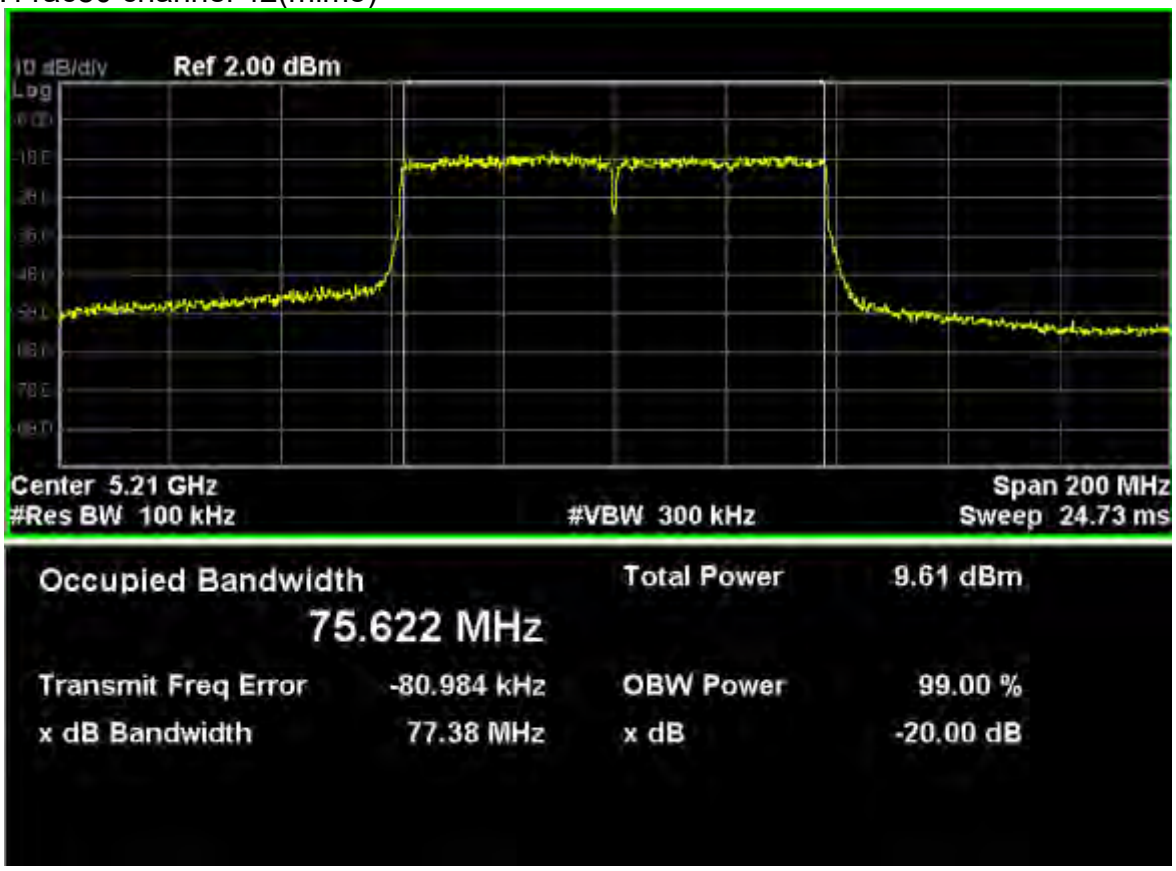
802.11ac40 channel 46(mimo)



802.11ac80 channel 42

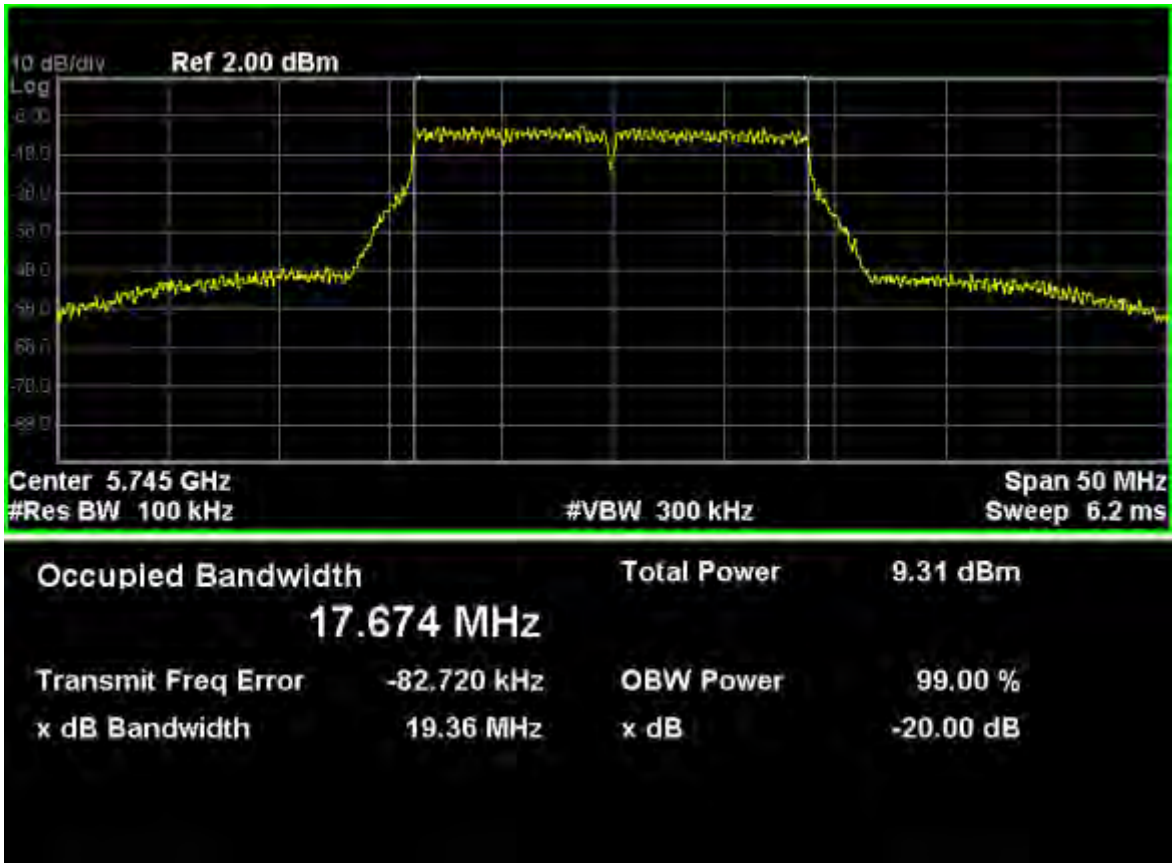


802.11ac80 channel 42(mimo)

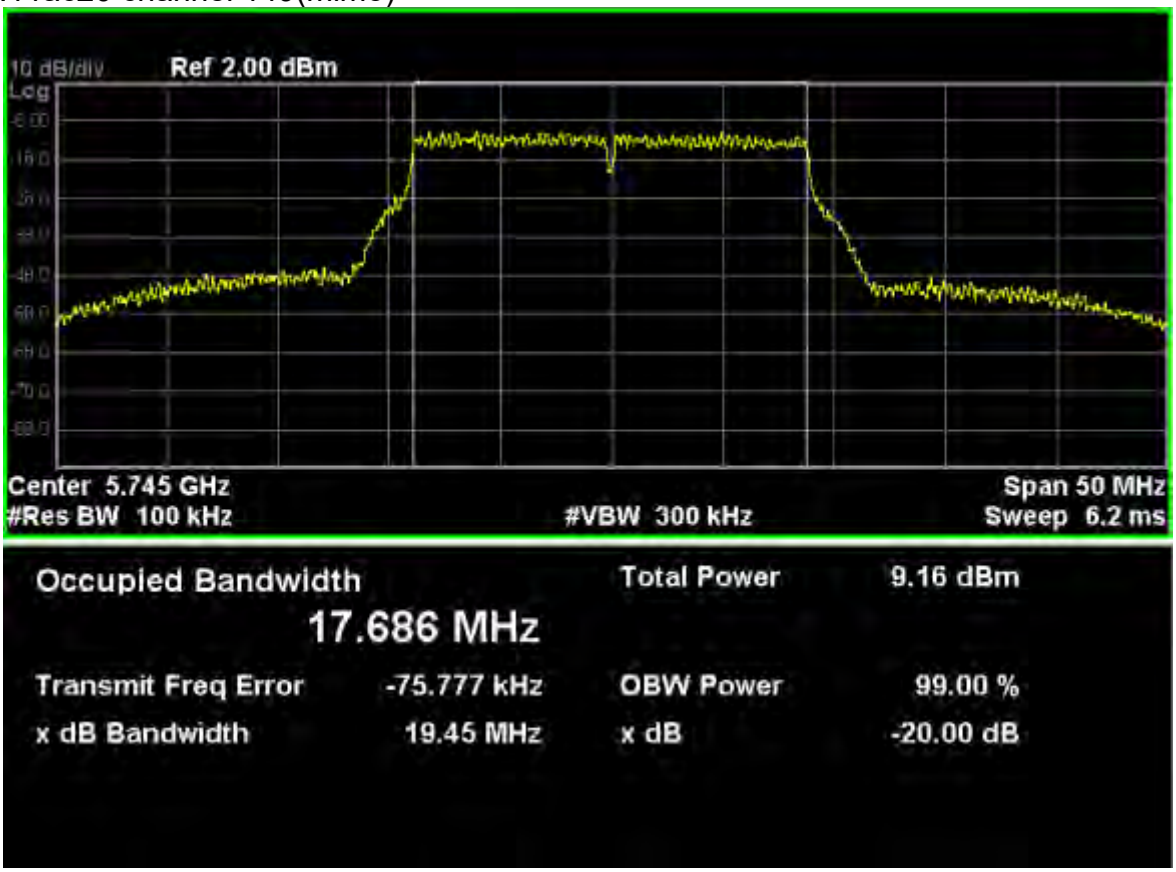


802.11ac (5725MHz-5850MHz)

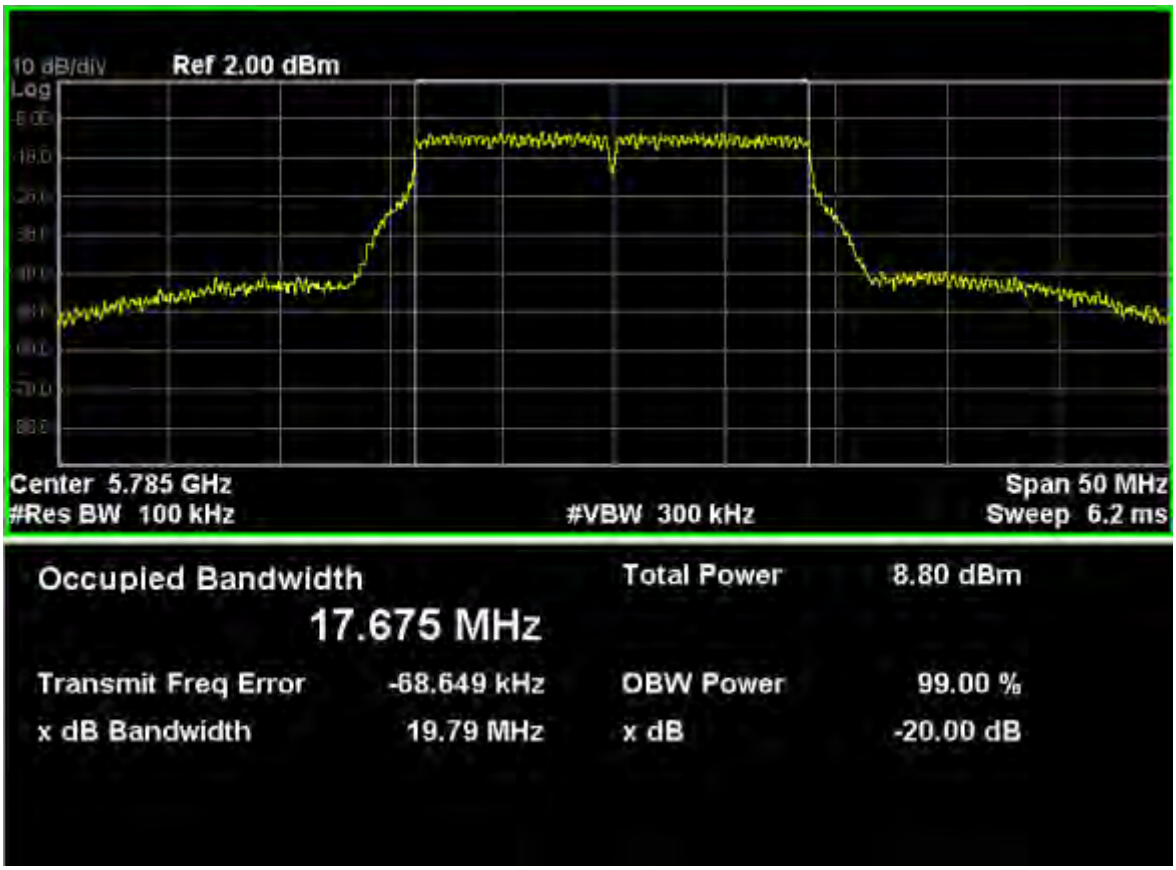
802.11ac20 channel 149



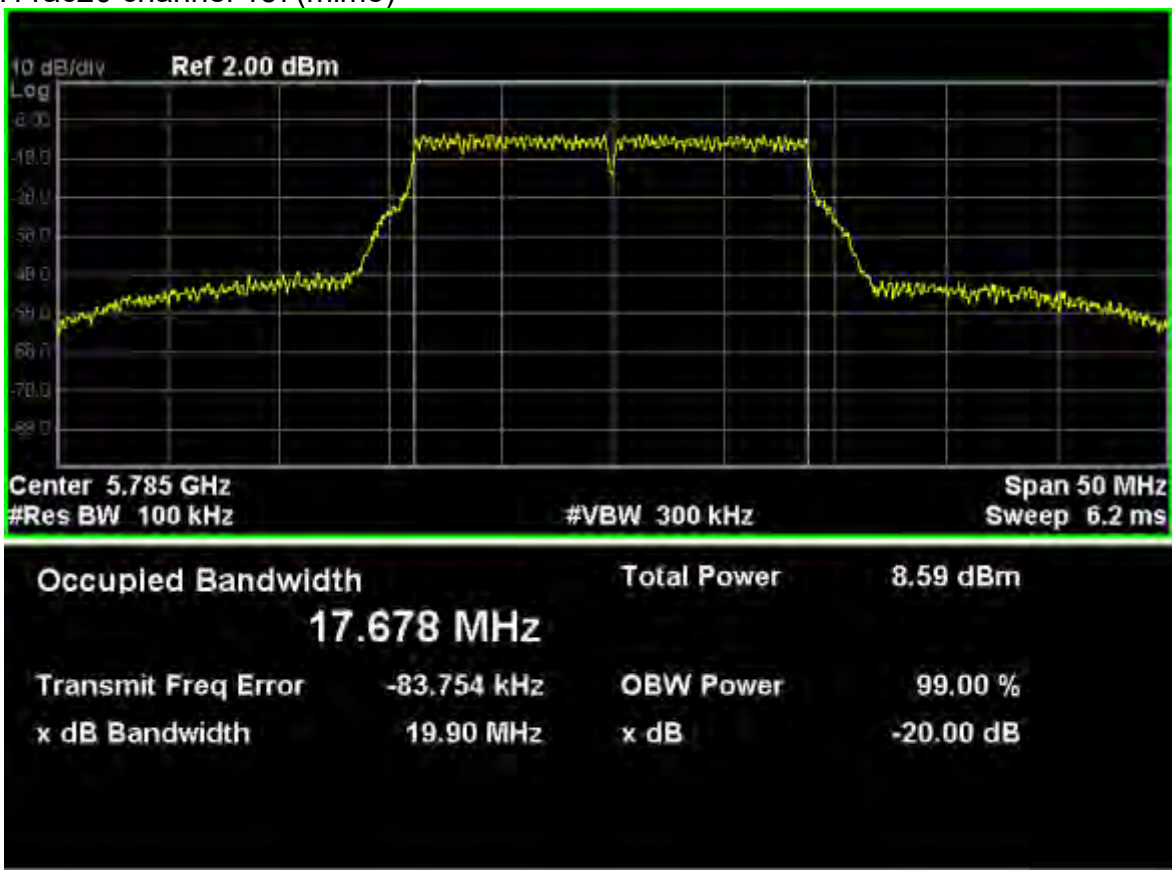
802.11ac20 channel 149(mimo)



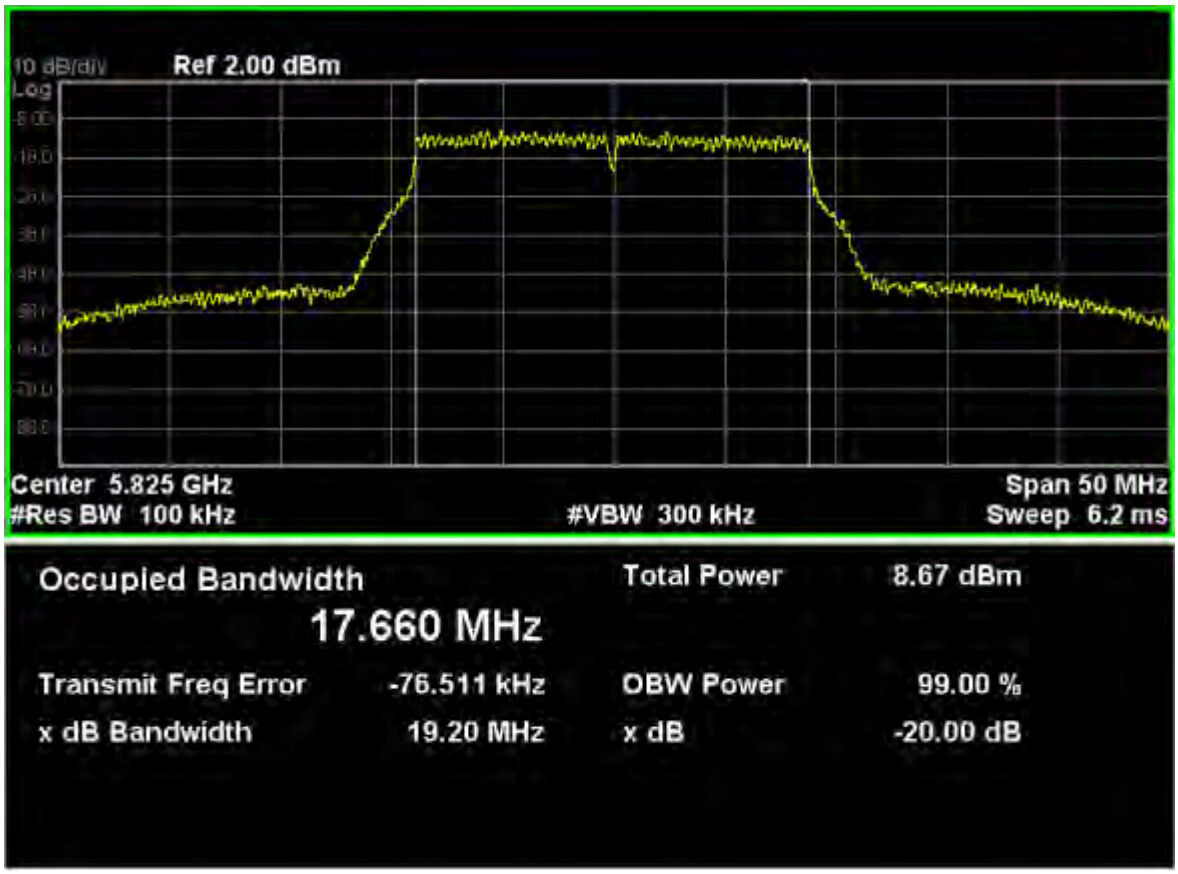
802.11ac20 channel 157



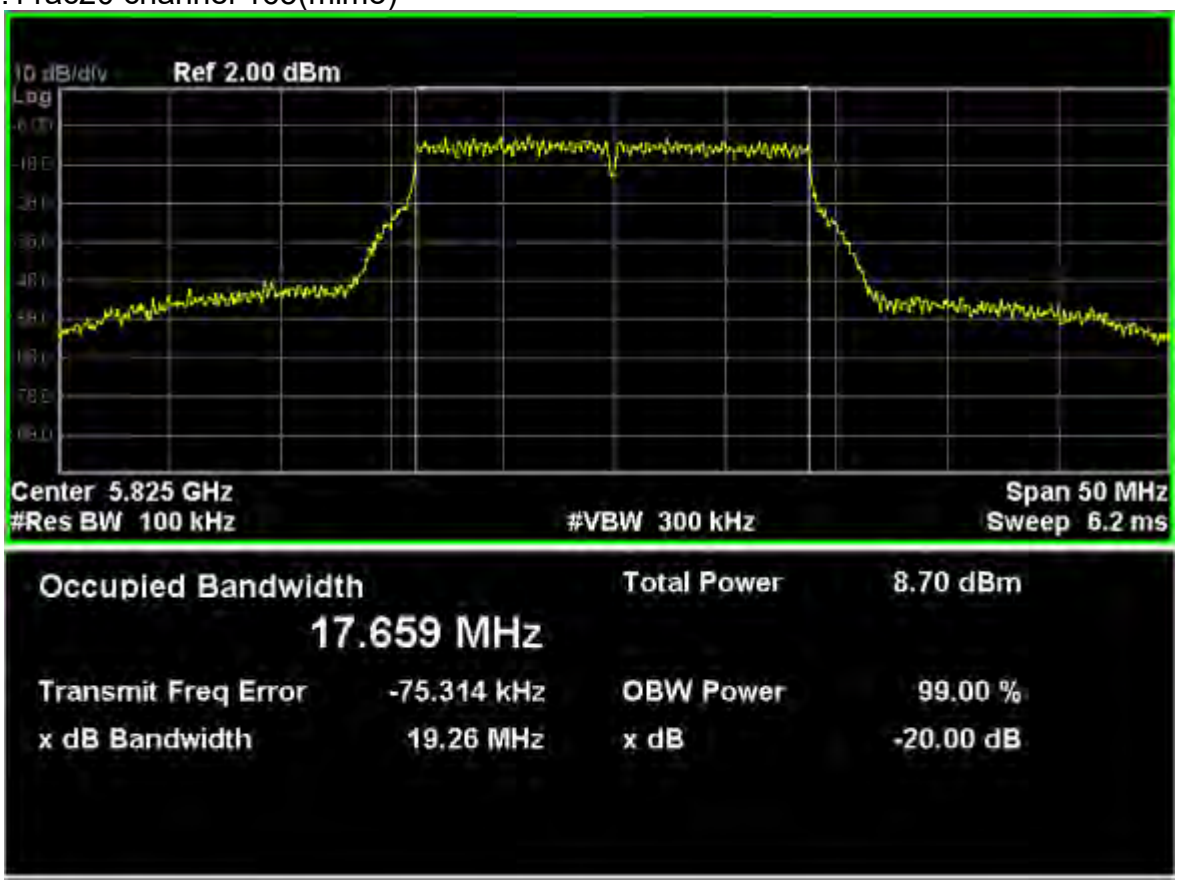
802.11ac20 channel 157(mimo)



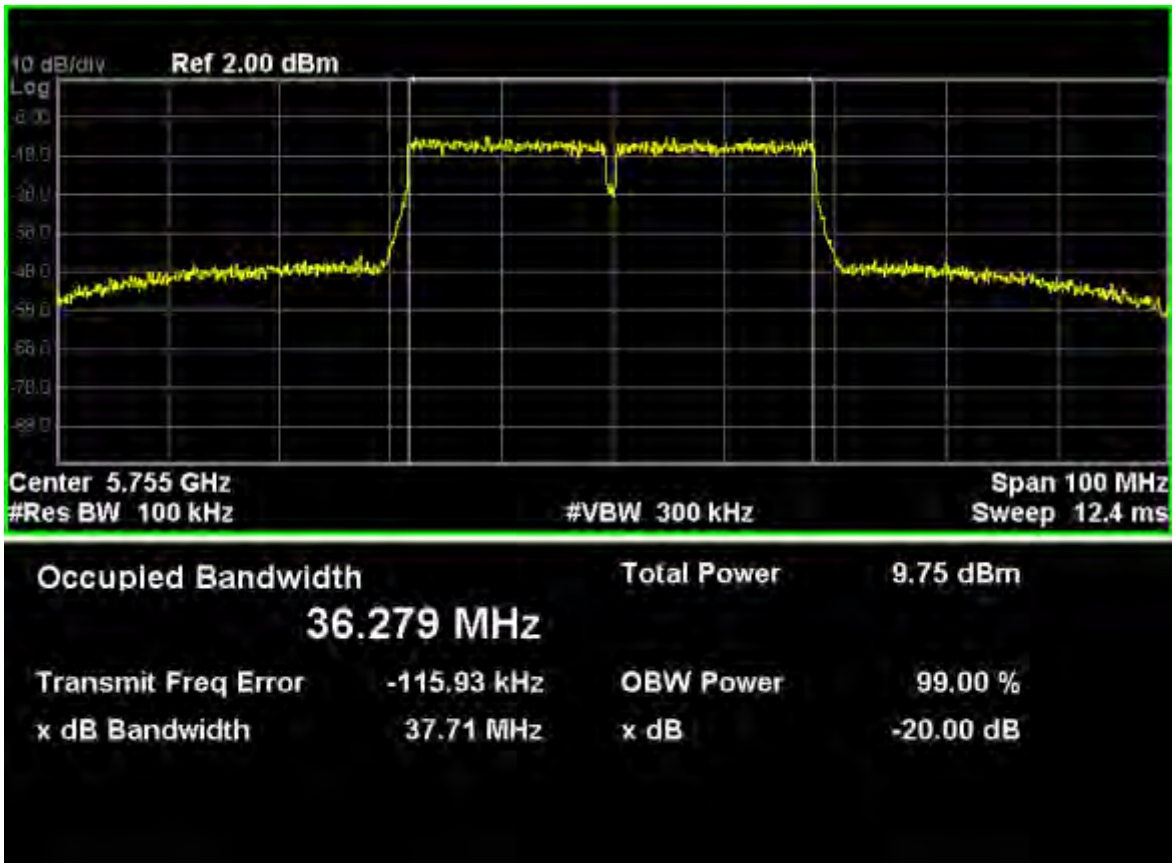
802.11ac20 channel 165



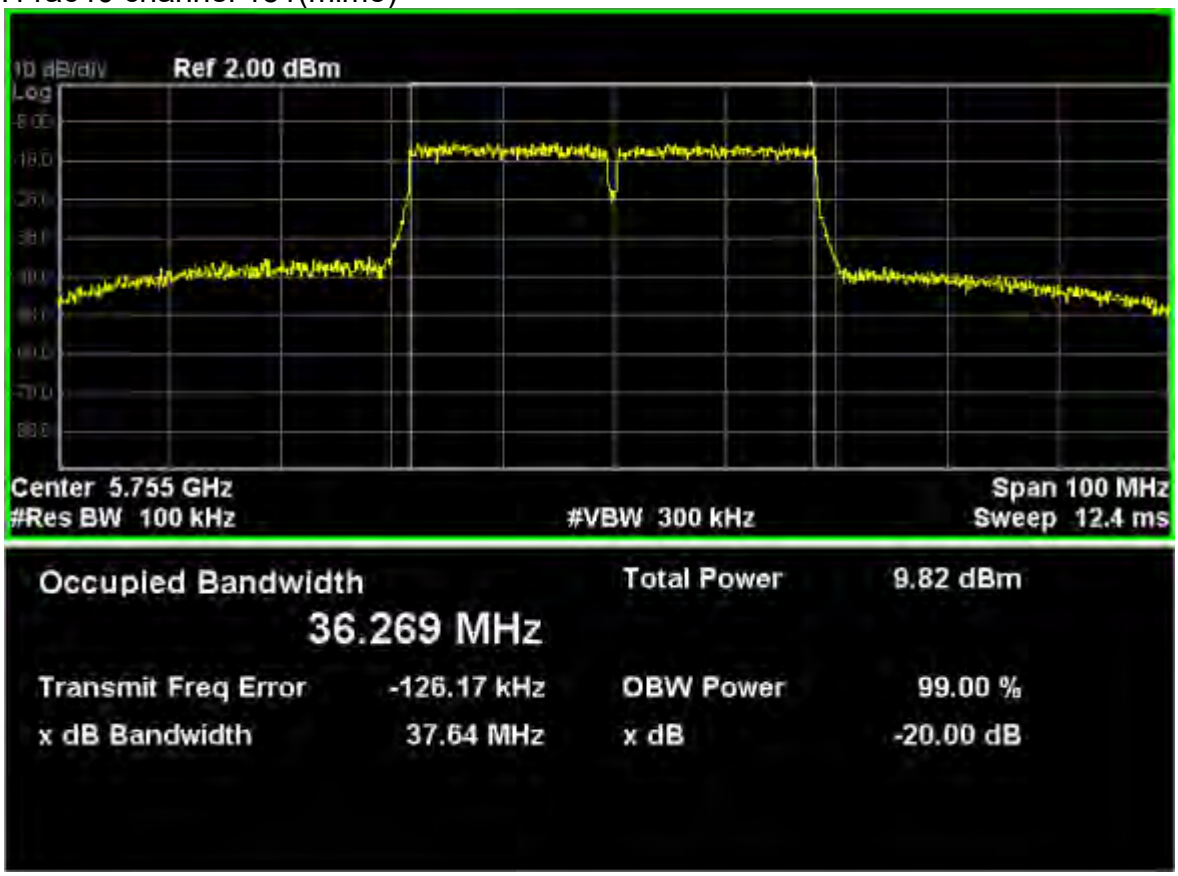
802.11ac20 channel 165(mimo)



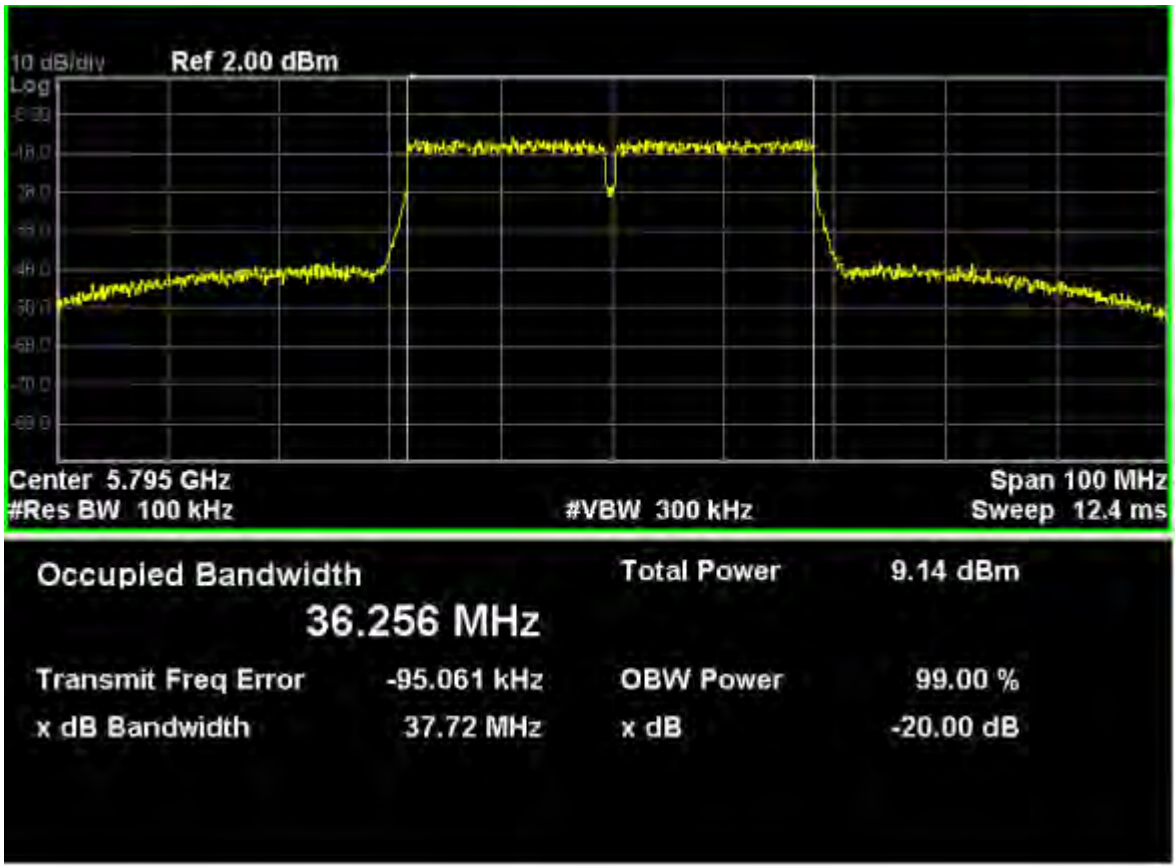
802.11ac40 channel 151



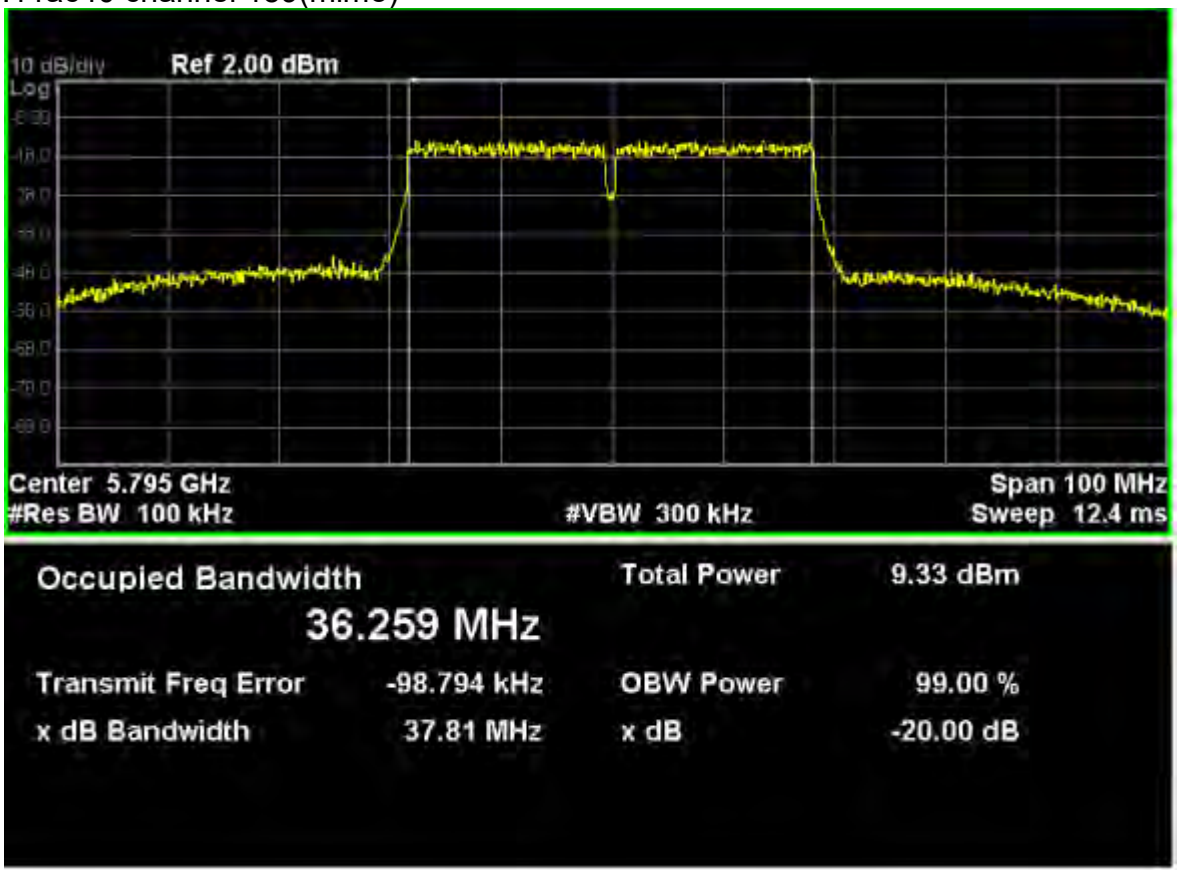
802.11ac40 channel 151(mimo)



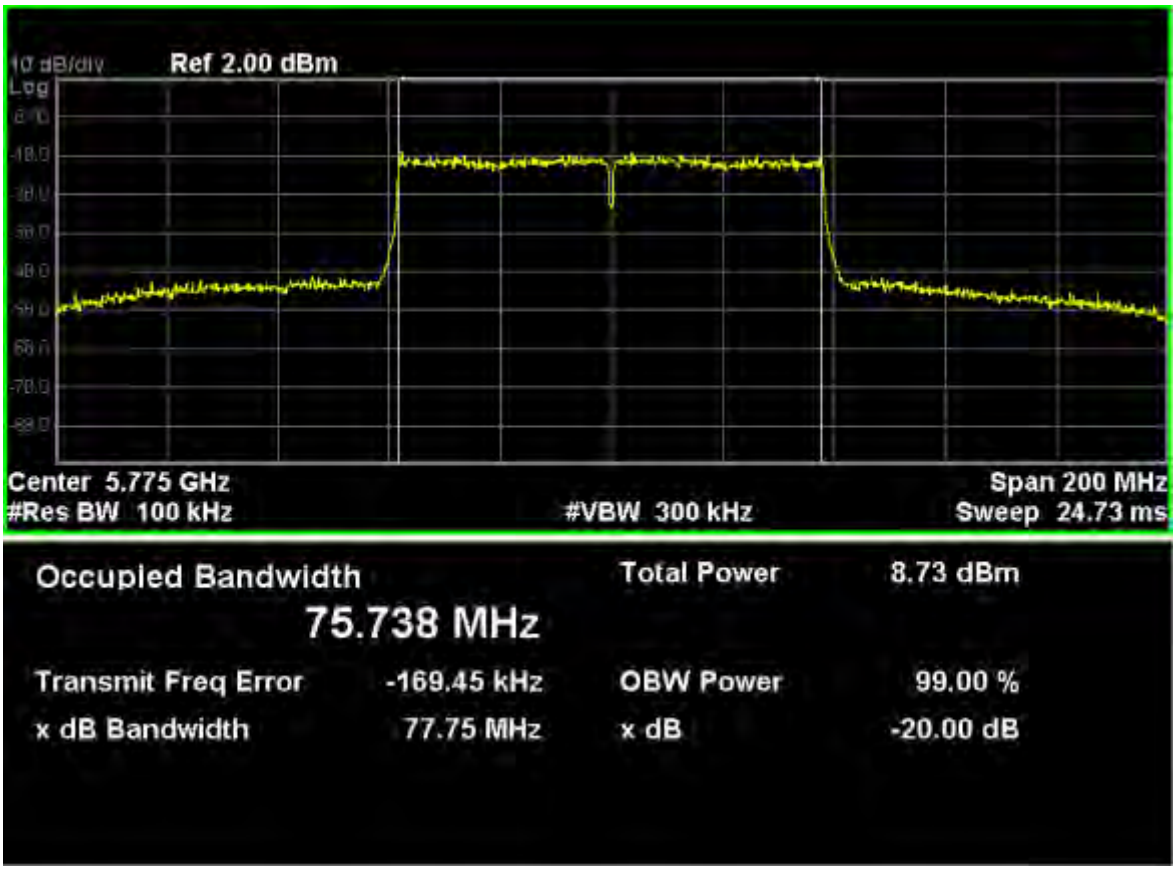
802.11ac40 channel 159



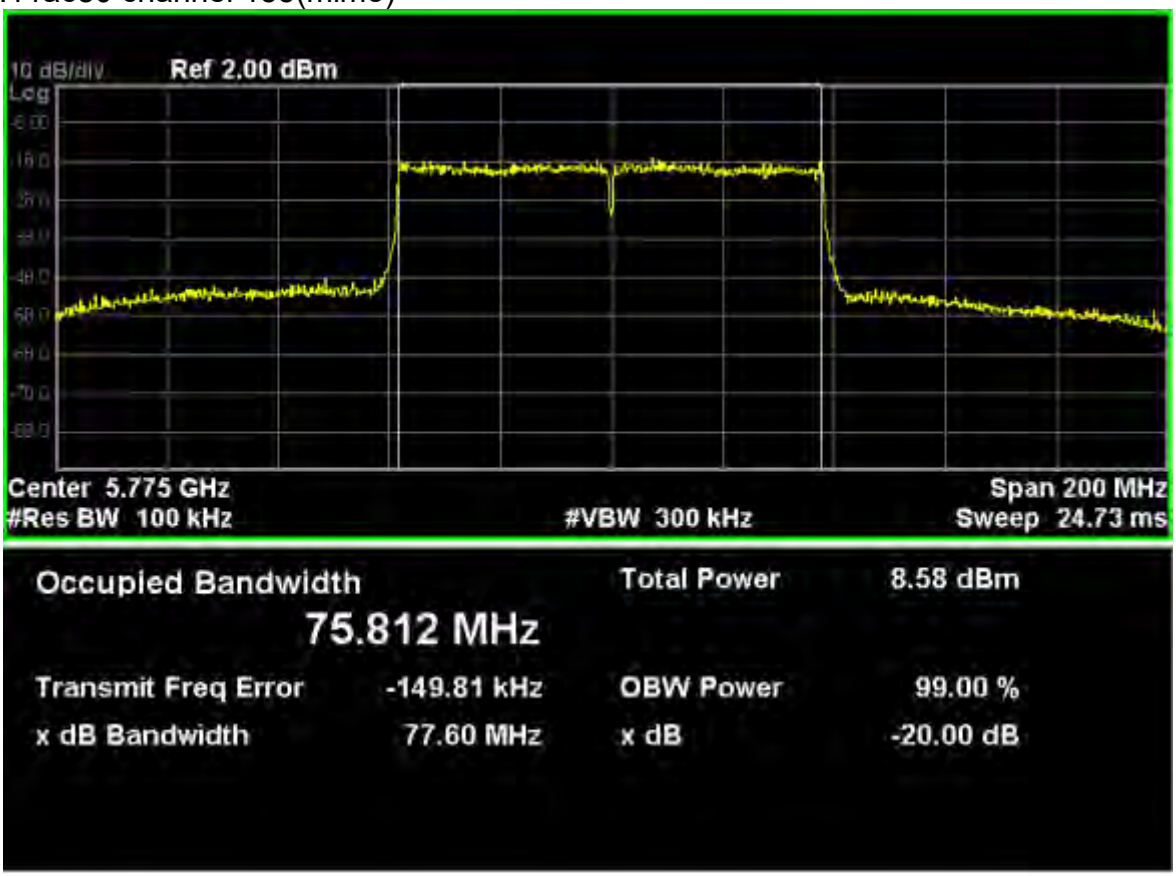
802.11ac40 channel 159(mimo)



802.11ac80 channel 155

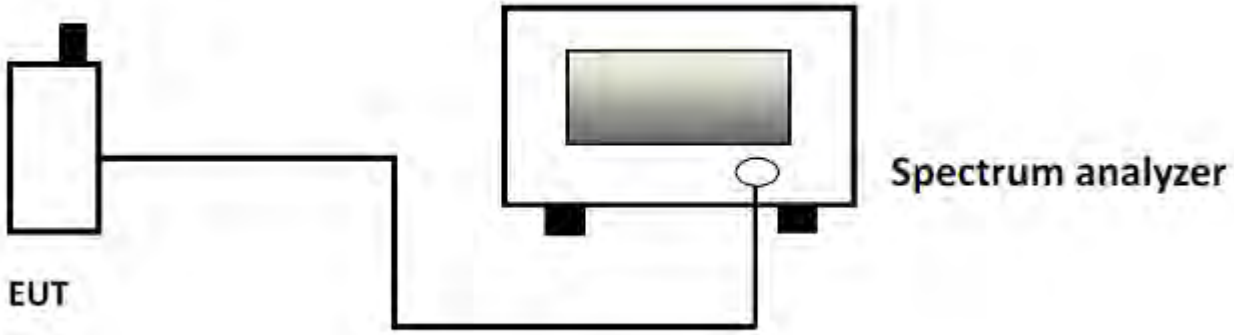


802.11ac80 channel 155(mimo)



5. 6 DB BANDWIDTH

5.1 TEST SETUP



5.2 LIMITS

Limit	≥500 kHz

5.3 TEST PROCEDURE

Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
WIFI: Low, Middle and HighChannel.
Using occupied BW measurement function of spectrum analyzer and settings are:
XdB = -6dB
RBW = 100KHz
VBW ≥ 3 x RBW
Span = approximately 2 to 3 times the 6 dB bandwidth, centered on a channel
Sweep = auto
Detector function = peak
Trace = max hold

5.4 RESULTS & PERFORMANCE

Channel	Measured 6dB bandwidth (MHz)	Limit (MHz)	Result
WIFI 2.4G			
802.11b			
Antenna 1			
802.11b CH1	8.072	≥0.5	PASS
802.11b CH6	8.020	≥0.5	PASS
802.11b CH11	8.546	≥0.5	PASS
Antenna 2			
802.11b CH1	8.953	≥0.5	PASS
802.11b CH6	8.584	≥0.5	PASS
802.11b CH11	9.175	≥0.5	PASS
802.11g			
Antenna 1			
802.11g CH1	16.53	≥0.5	PASS
802.11g CH6	16.53	≥0.5	PASS
802.11g CH11	16.54	≥0.5	PASS
Antenna 2			
802.11g CH1	16.54	≥0.5	PASS
802.11g CH6	16.54	≥0.5	PASS
802.11g CH11	16.55	≥0.5	PASS
802.11n20			
Antenna 1			
802.11n20 CH1	17.78	≥0.5	PASS
802.11n20 CH6	17.78	≥0.5	PASS
802.11n20 CH11	17.77	≥0.5	PASS
Antenna 2			
802.11n20 CH1	17.77	≥0.5	PASS
802.11n20 CH6	17.79	≥0.5	PASS
802.11n20 CH11	17.80	≥0.5	PASS
Mimo			
802.11n20 CH1	17.79	≥0.5	PASS
802.11n20 CH6	17.77	≥0.5	PASS
802.11n20 CH11	17.78	≥0.5	PASS
WIFI 5G(5150MHz-5250MHz)			
802.11a			
Antenna 1			
802.11a CH36	16.58	≥0.5	PASS
802.11a CH48	16.52	≥0.5	PASS
Antenna 2			
802.11a CH36	16.54	≥0.5	PASS
802.11a CH48	16.55	≥0.5	PASS
802.11n20			
Antenna 1			
802.11n20 CH 36	17.78	≥0.5	PASS
802.11n20 CH 48	17.79	≥0.5	PASS
Antenna 2			

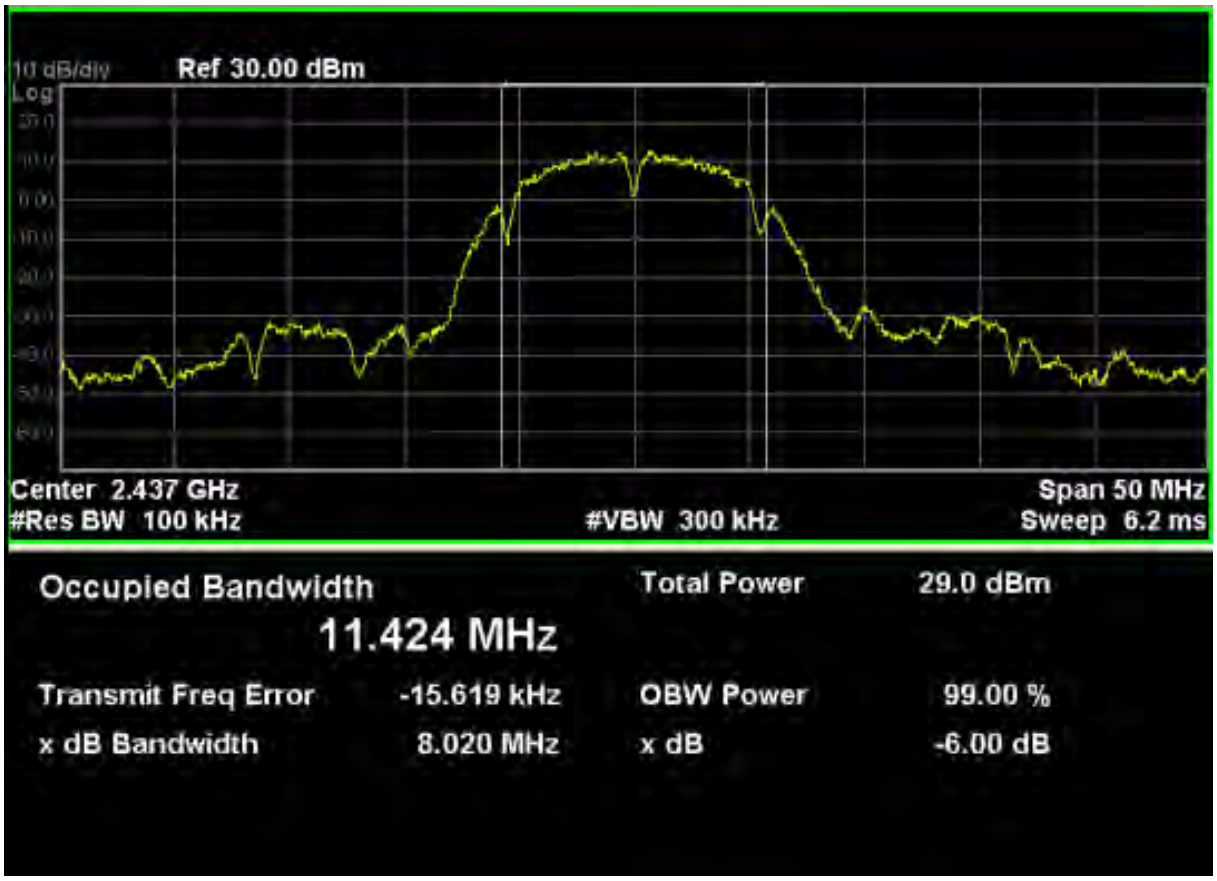
802.11n20 CH 36	17.78	≥0.5	PASS
802.11n20 CH 48	17.78	≥0.5	PASS
Mimo			
802.11n20 CH 36	17.80	≥0.5	PASS
802.11n20 CH 48	17.77	≥0.5	PASS
802.11n40			
Antenna 1			
802.11n40 CH 38	36.52	≥0.5	PASS
802.11n40 CH 46	36.53	≥0.5	PASS
Antenna 2			
802.11n40 CH 38	36.54	≥0.5	PASS
802.11n40 CH 46	36.51	≥0.5	PASS
Mimo			
802.11n40 CH 38	36.49	≥0.5	PASS
802.11n40 CH 46	36.51	≥0.5	PASS
WIFI 5G(5725MHz-5850MHz)			
802.11a			
Antenna 1			
802.11a CH149	16.56	≥0.5	PASS
802.11a CH157	16.52	≥0.5	PASS
802.11a CH165	16.54	≥0.5	PASS
Antenna 2			
802.11a CH149	16.56	≥0.5	PASS
802.11a CH157	16.56	≥0.5	PASS
802.11a CH165	16.52	≥0.5	PASS
802.11n20			
Antenna 1			
802.11n20 CH149	17.80	≥0.5	PASS
802.11n20 CH157	17.77	≥0.5	PASS
802.11n20 CH165	17.77	≥0.5	PASS
Antenna 2			
802.11n20 CH149	17.76	≥0.5	PASS
802.11n20 CH157	17.75	≥0.5	PASS
802.11n20 CH165	17.75	≥0.5	PASS
Mimo			
802.11n20 CH149	17.75	≥0.5	PASS
802.11n20 CH157	17.77	≥0.5	PASS
802.11n20 CH165	17.77	≥0.5	PASS
802.11n40			
Antenna 1			
802.11n40 CH151	36.53	≥0.5	PASS
802.11n40 CH159	36.53	≥0.5	PASS
Antenna 2			
802.11n40 CH151	36.53	≥0.5	PASS
802.11n40 CH159	36.49	≥0.5	PASS
Mimo			
802.11n40 CH151	36.55	≥0.5	PASS
802.11n40 CH159	36.52	≥0.5	PASS

802.11ac(5150MHz-5250MHz)			
802.11ac20			
Antenna 1			
802.11ac20 CH36	17.80	≥0.5	PASS
802.11ac20 CH48	17.80	≥0.5	PASS
Antenna 2			
802.11ac20 CH36	17.80	≥0.5	PASS
802.11ac20 CH48	17.71	≥0.5	PASS
Mimo			
802.11ac20 CH36	17.78	≥0.5	PASS
802.11ac20 CH48	17.75	≥0.5	PASS
802.11ac40			
Antenna 1			
802.11ac40 CH38	36.53	≥0.5	PASS
802.11ac40 CH46	36.49	≥0.5	PASS
Antenna 2			
802.11ac40 CH38	36.49	≥0.5	PASS
802.11ac40 CH46	36.49	≥0.5	PASS
Mimo			
802.11ac40 CH38	36.51	≥0.5	PASS
802.11ac40 CH46	36.49	≥0.5	PASS
802.11ac80			
Antenna 1			
802.11ac80 CH42	76.44	≥0.5	PASS
Antenna 2			
802.11ac80 CH42	76.50	≥0.5	PASS
Mimo			
802.11ac80 CH42	76.49	≥0.5	PASS
802.11ac(5725MHz-5850MHz)			
802.11ac20			
Antenna 1			
802.11ac20 CH149	17.79	≥0.5	PASS
802.11ac20 CH157	17.76	≥0.5	PASS
802.11ac20 CH165	17.75	≥0.5	PASS
Antenna 2			
802.11ac20 CH149	17.79	≥0.5	PASS
802.11ac20 CH157	17.81	≥0.5	PASS
802.11ac20 CH165	17.76	≥0.5	PASS
Mimo			
802.11ac20 CH149	17.76	≥0.5	PASS
802.11ac20 CH157	17.74	≥0.5	PASS
802.11ac20 CH165	17.80	≥0.5	PASS
802.11ac40			
Antenna 1			
802.11ac40 CH151	36.56	≥0.5	PASS
802.11ac40 CH159	36.52	≥0.5	PASS
Antenna 2			
802.11ac40 CH151	36.54	≥0.5	PASS

802.11ac40 CH159	36.56	≥0.5	PASS
Mimo			
802.11ac40 CH151	36.49	≥0.5	PASS
802.11ac40 CH159	36.55	≥0.5	PASS
802.11ac80			
Antenna 1			
802.11ac80 CH155	76.41	≥0.5	PASS
Antenna 2			
802.11ac80 CH155	76.57	≥0.5	PASS
Mimo			
802.11ac80 CH155	76.54	≥0.5	PASS

Antenna 1
WIFI 2.4G
802.11b
802.11b channel 1

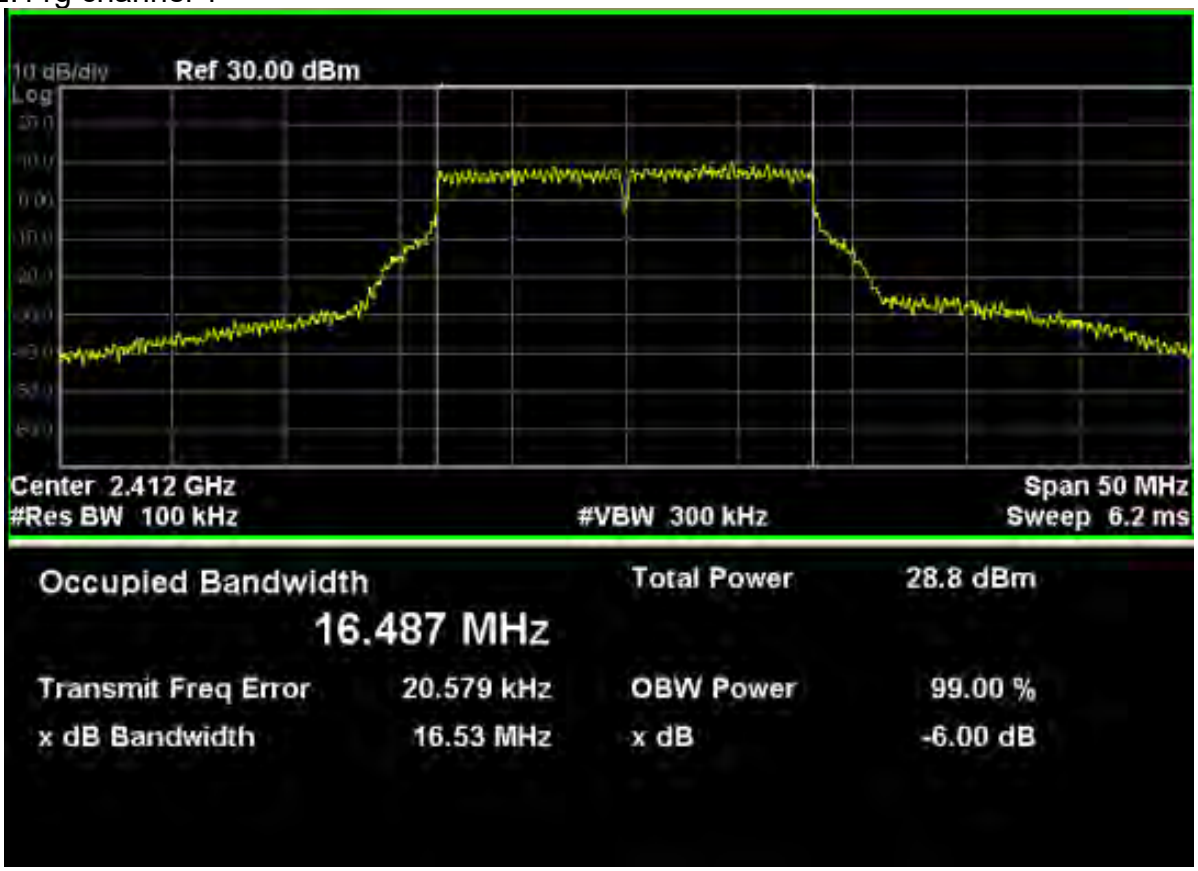
802.11b channel 6



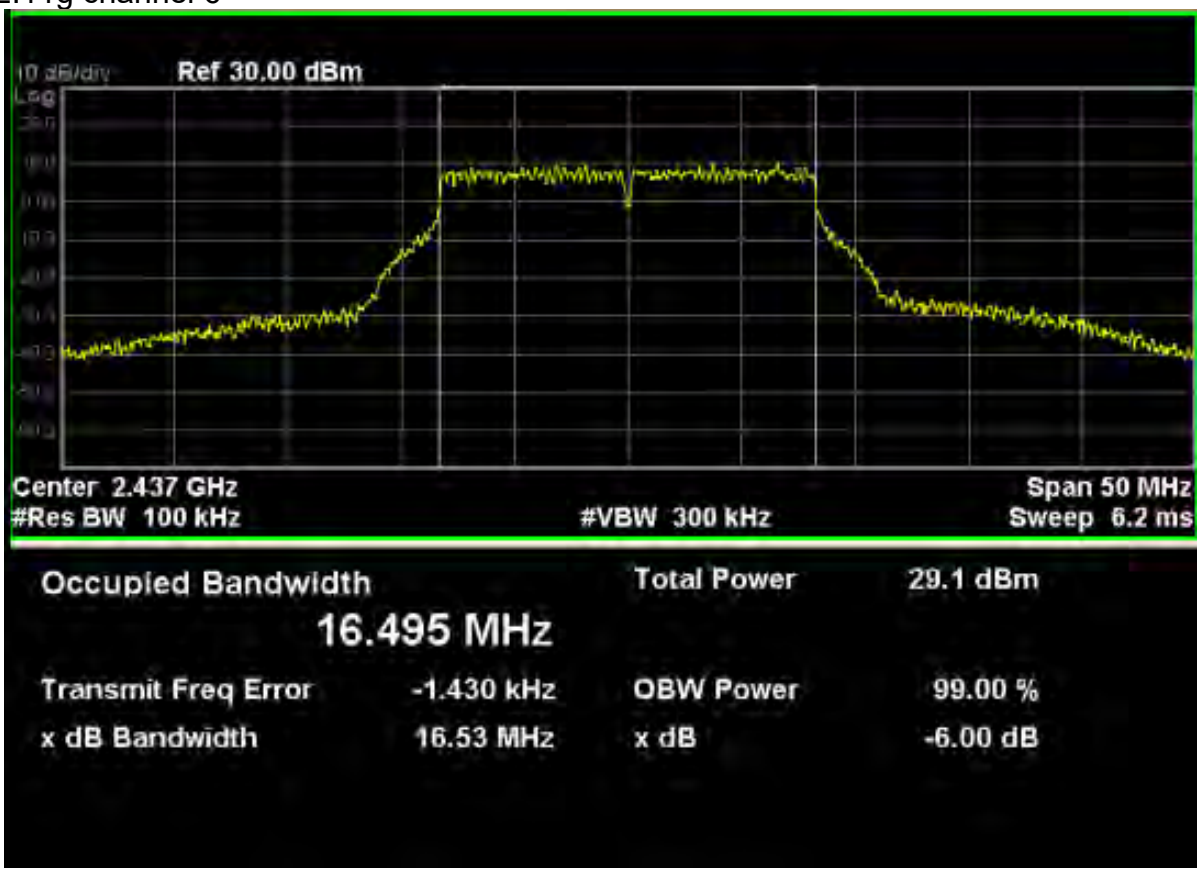
802.11b channel 11

802.11g

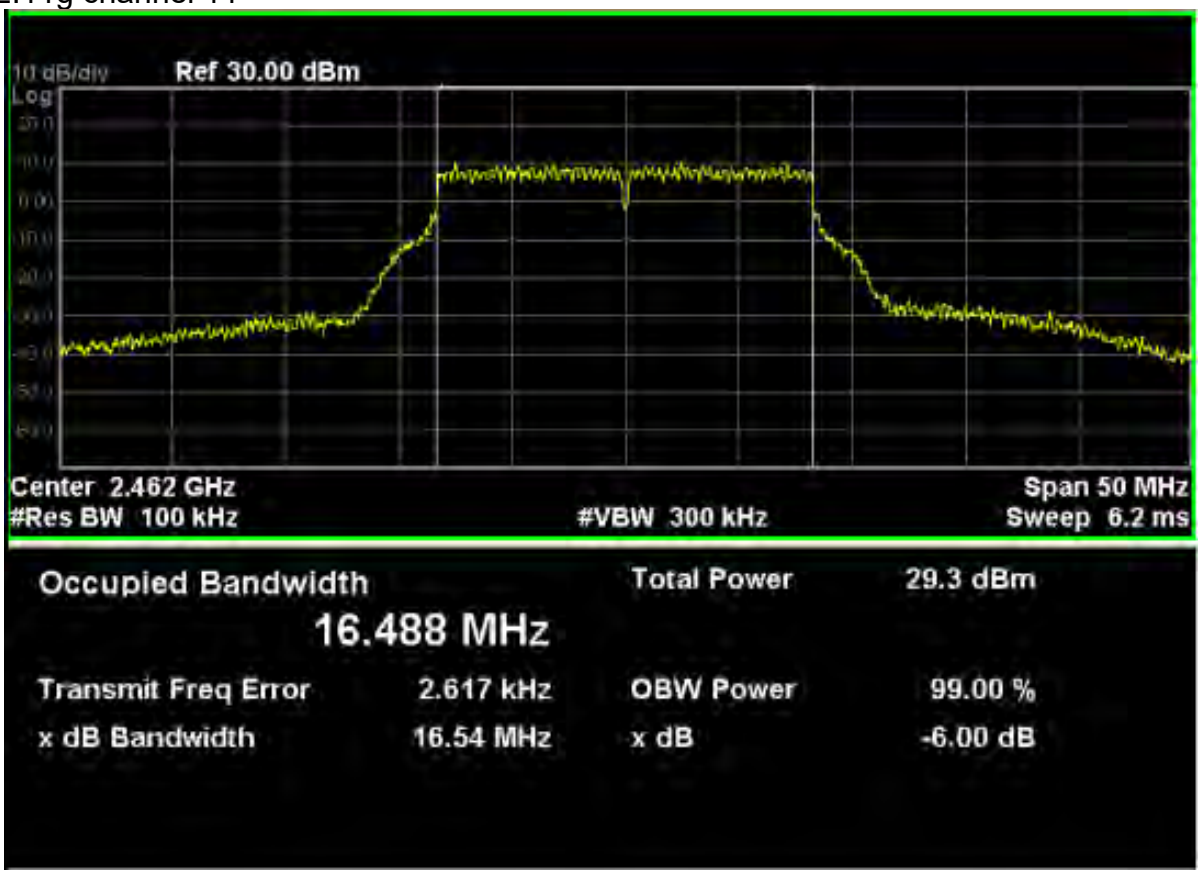
802.11g channel 1



802.11g channel 6

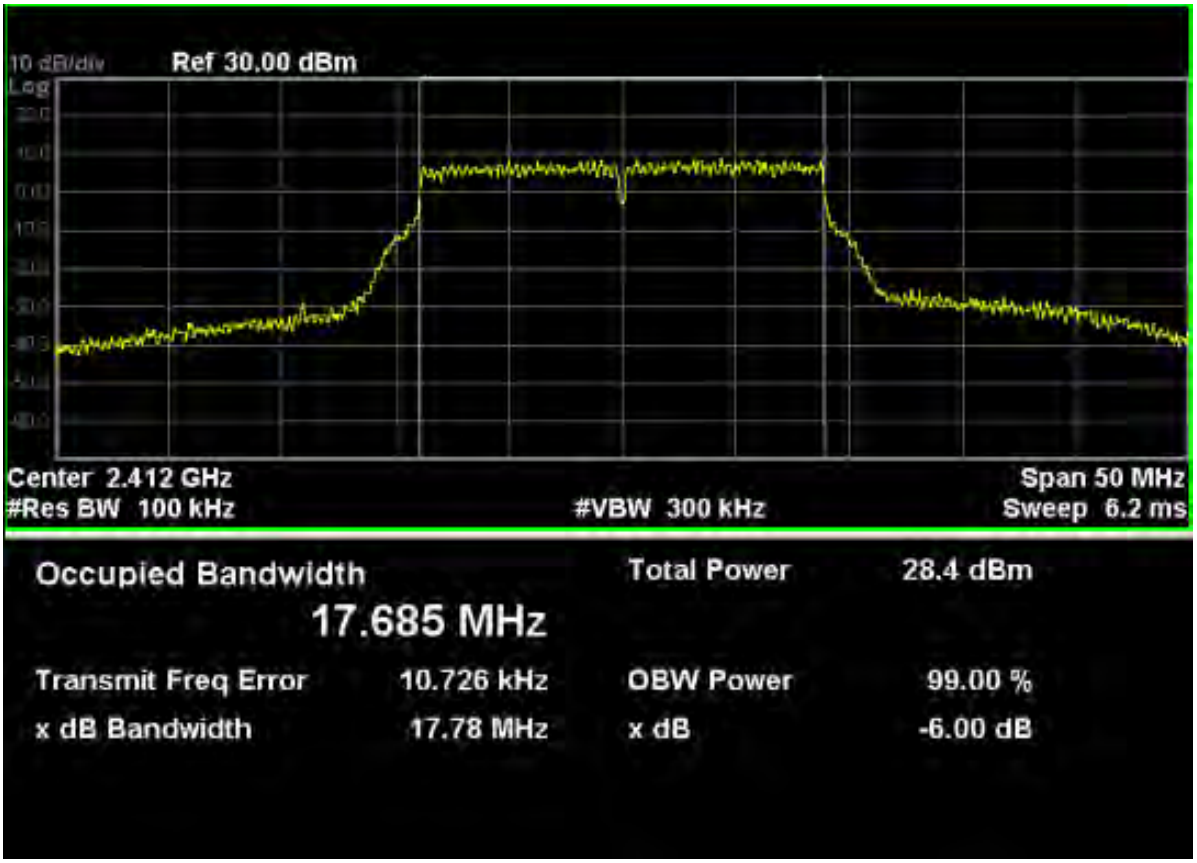


802.11g channel 11

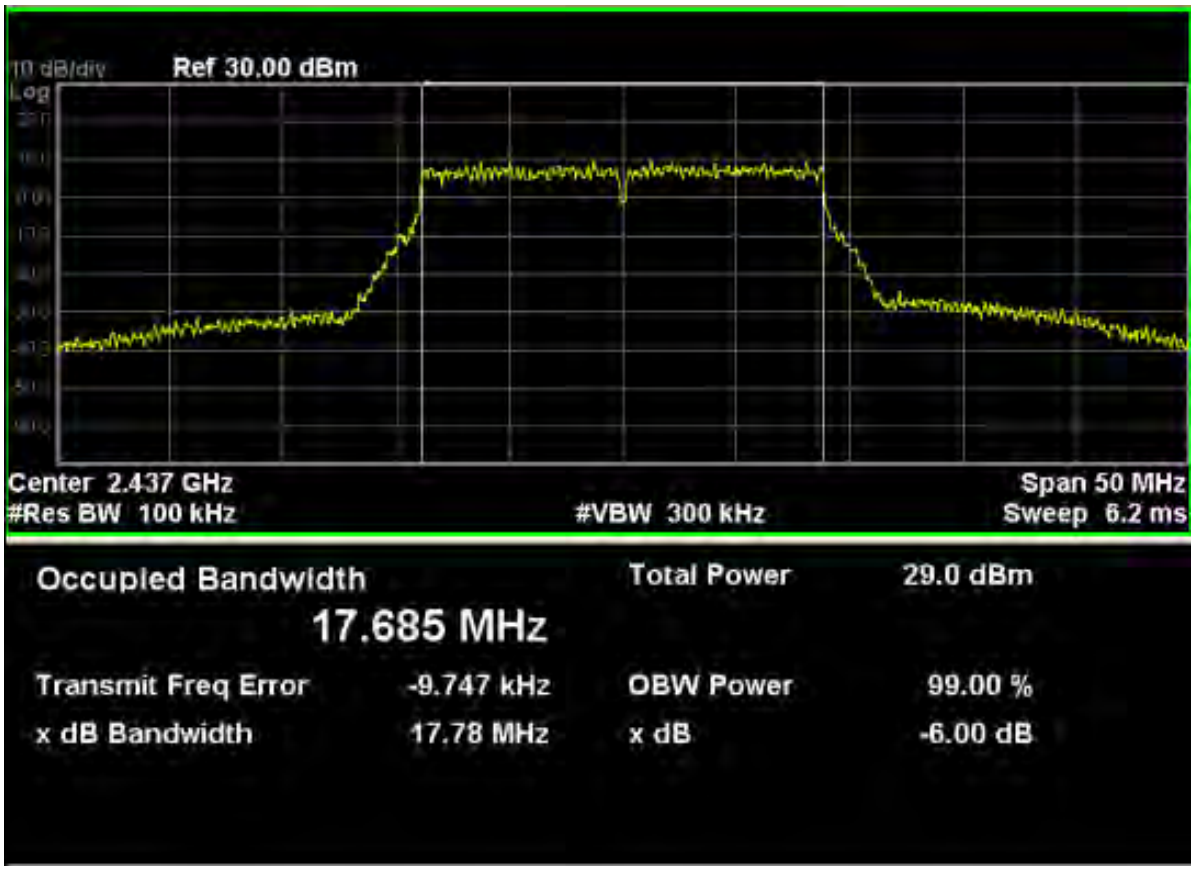


802.11n20

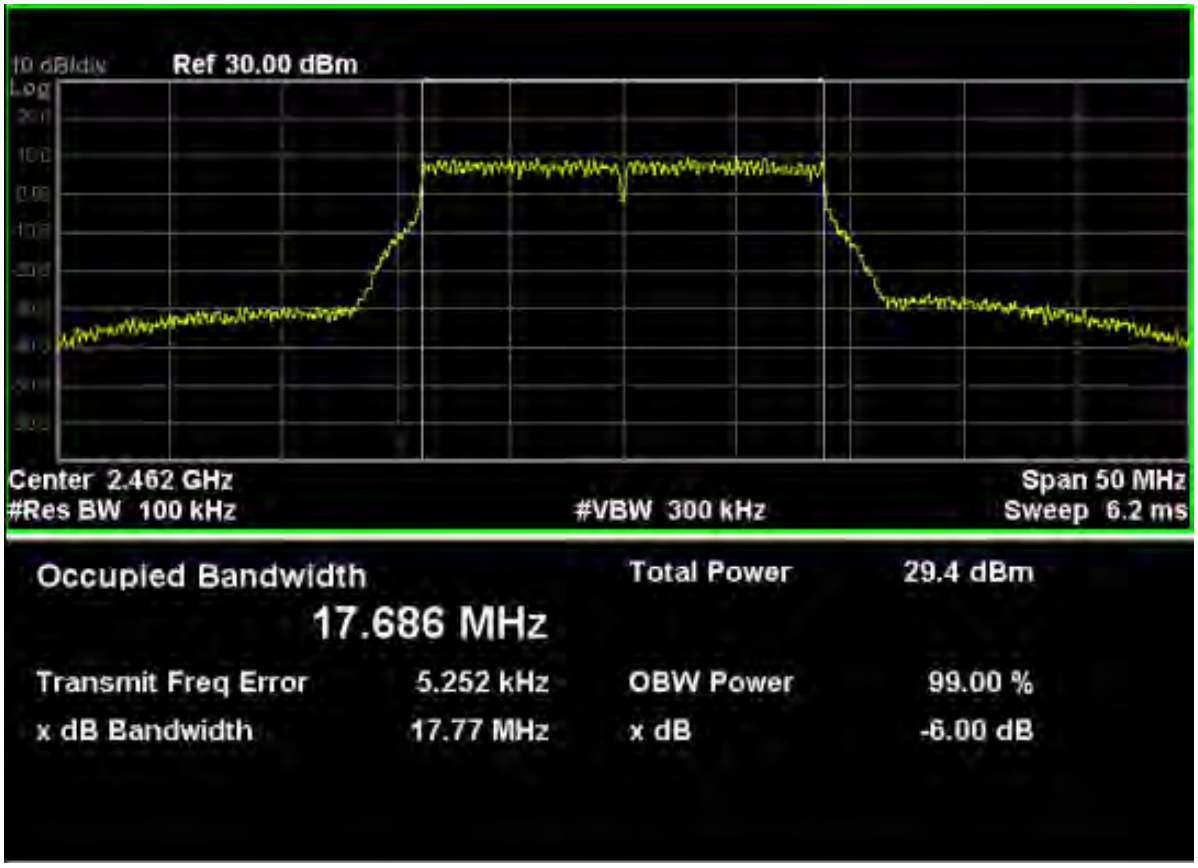
802.11n20 channel 1



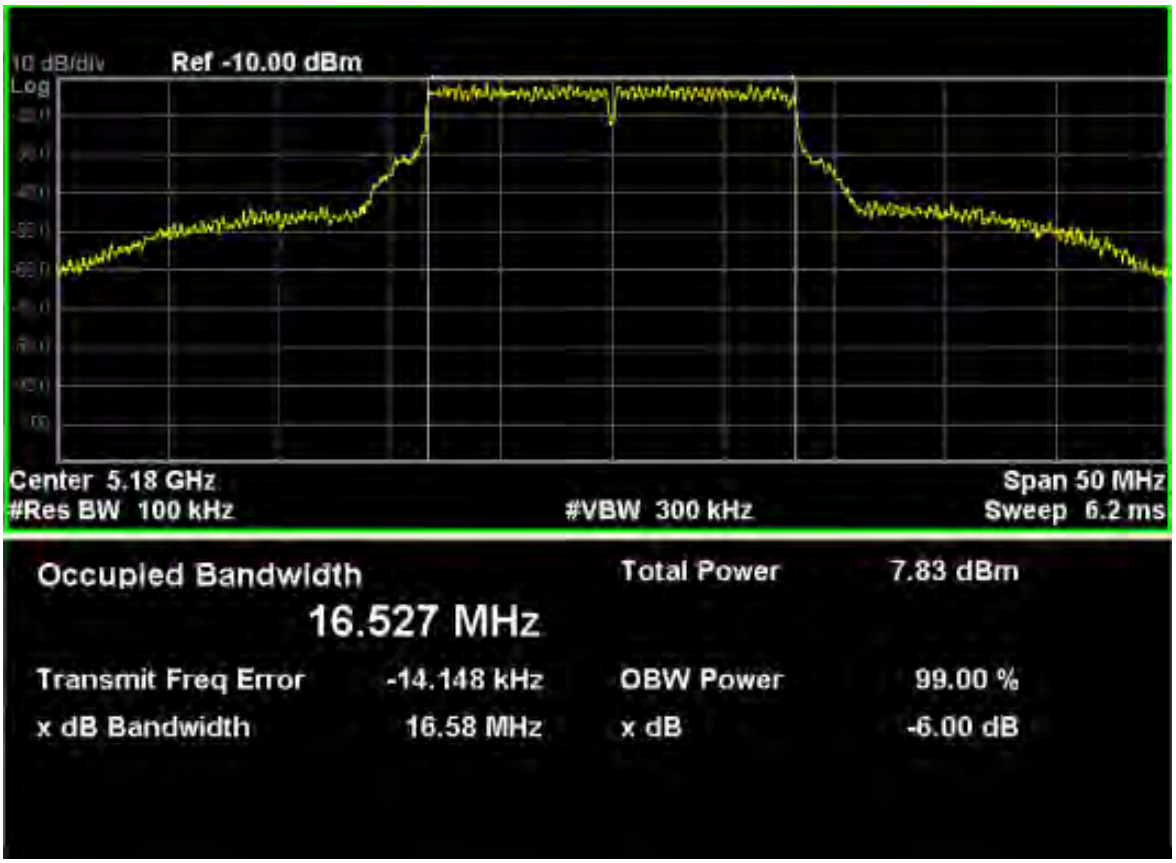
802.11n20 channel 6



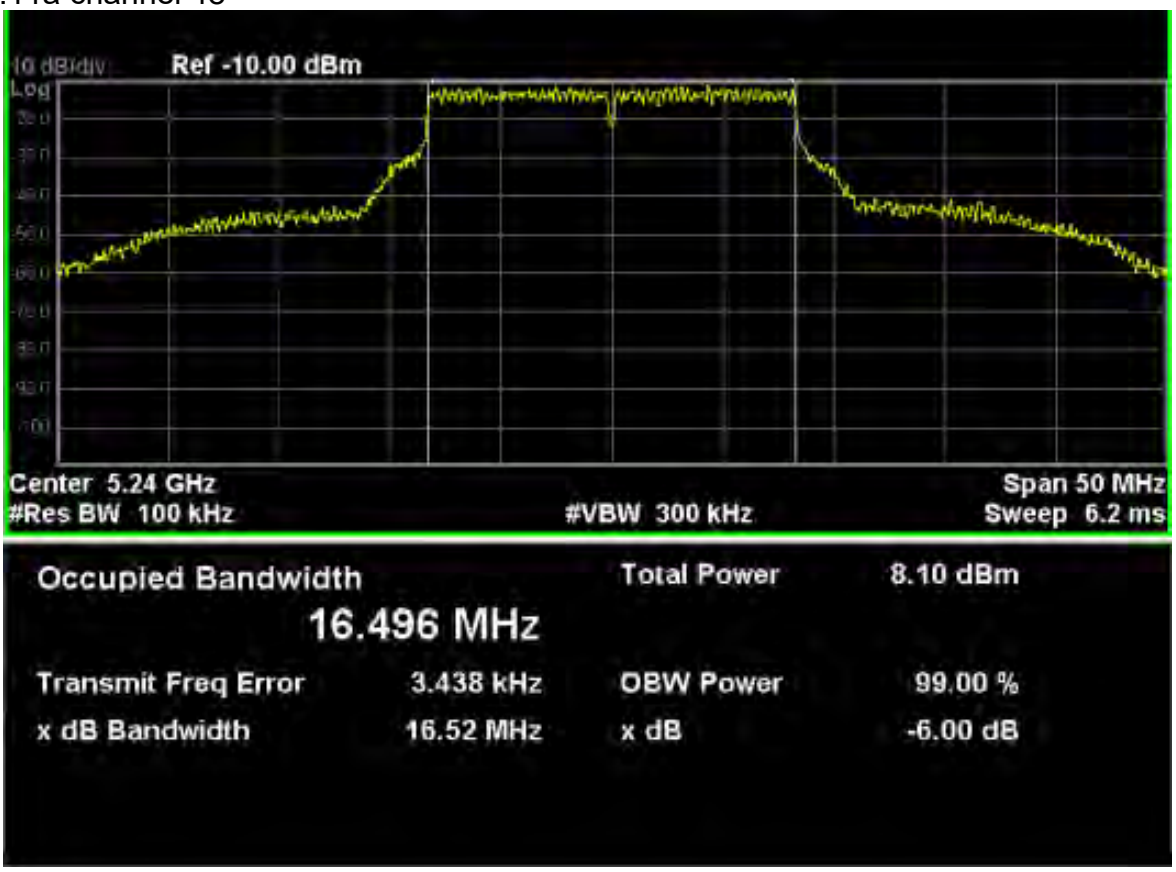
802.11n20 channel 11



WIFI 5G(5150MHz-5250MHz)
802.11a
802.11a channel 36

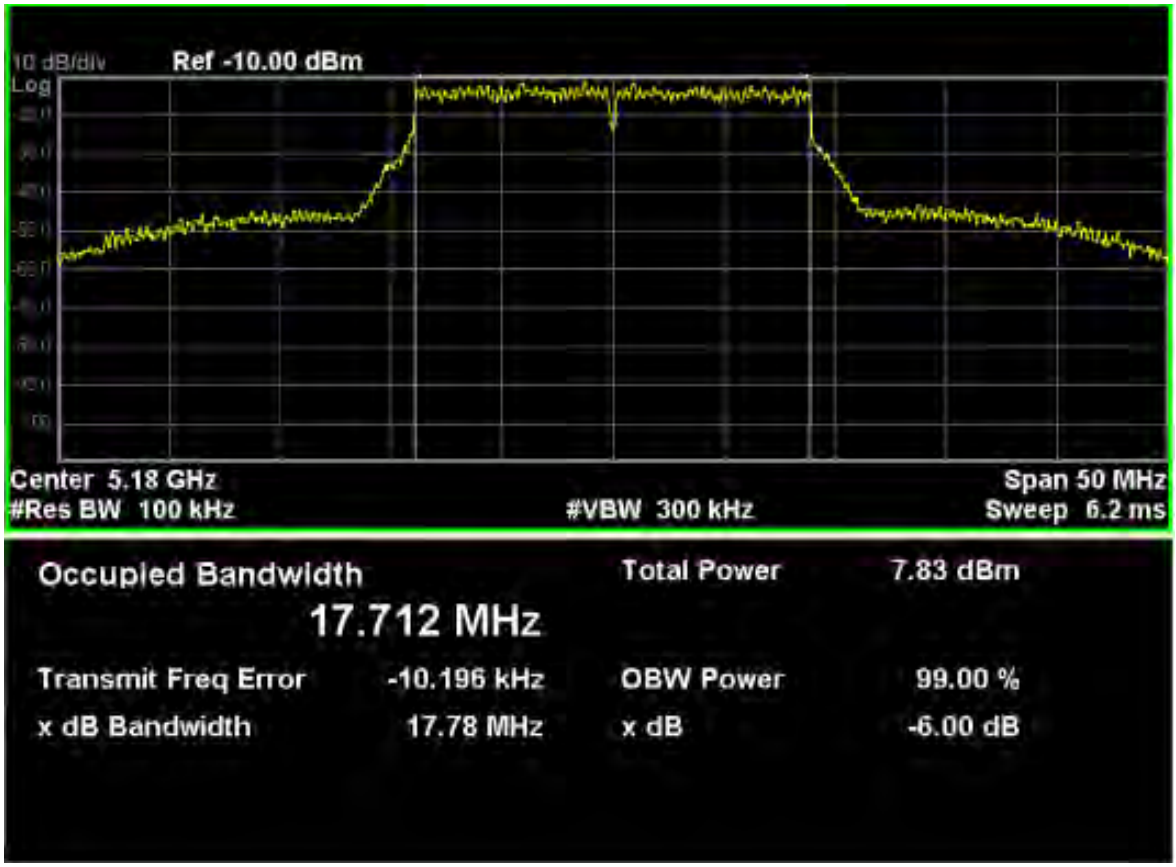


802.11a channel 48

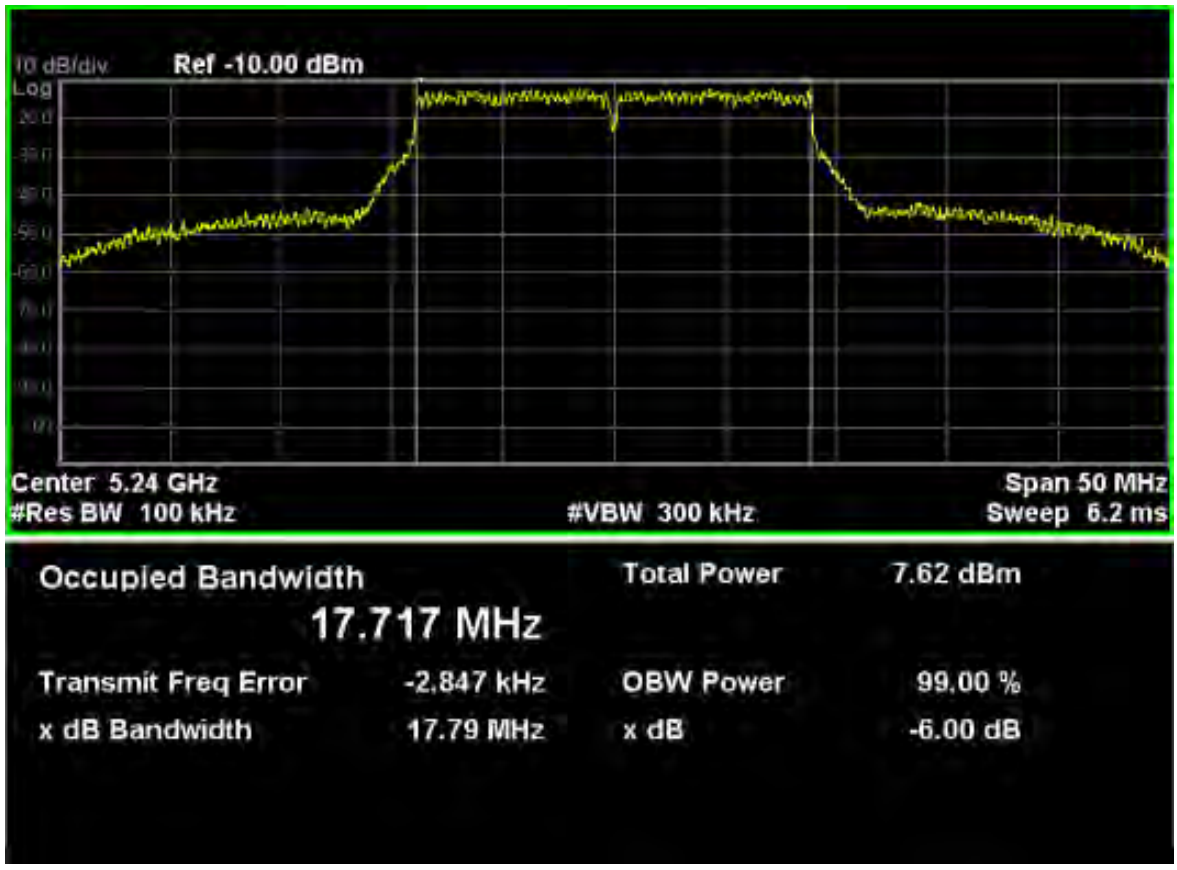


802.11n20

802.11n20 channel 36

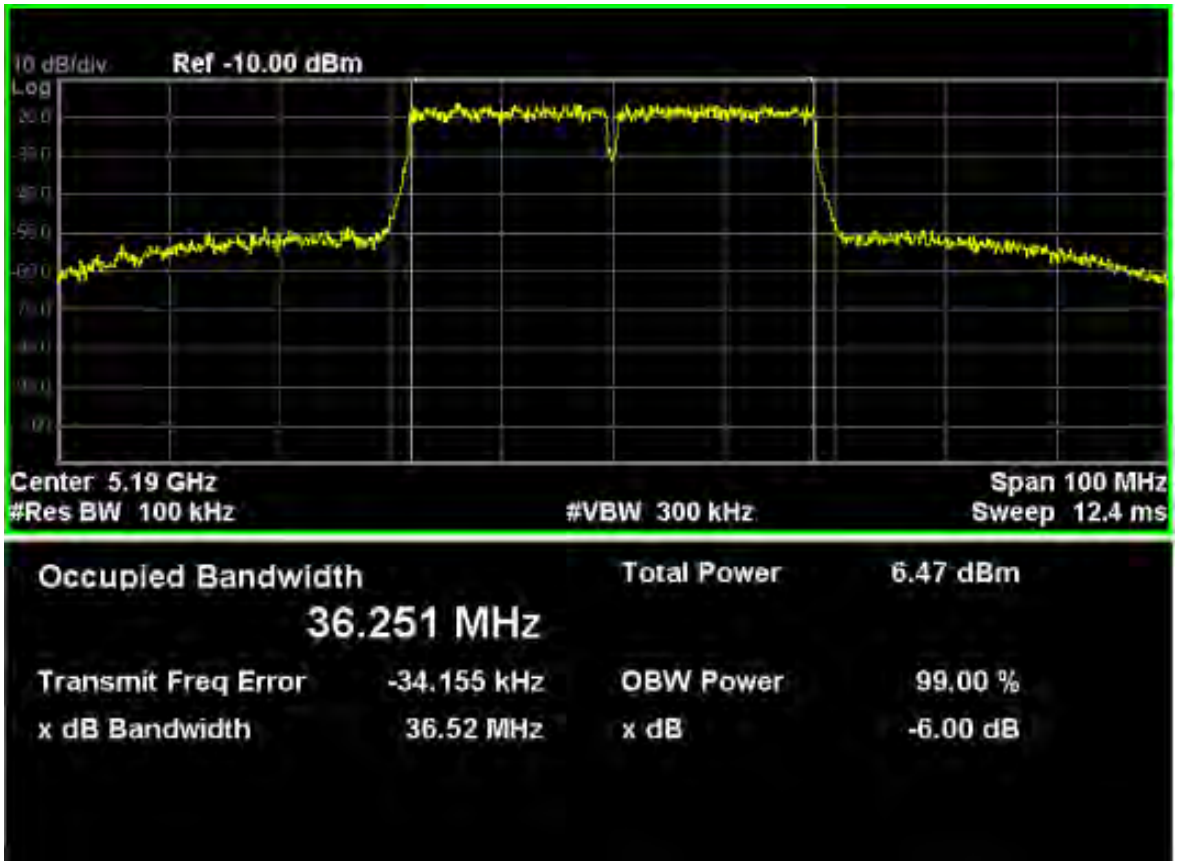


802.11n20 channel 48



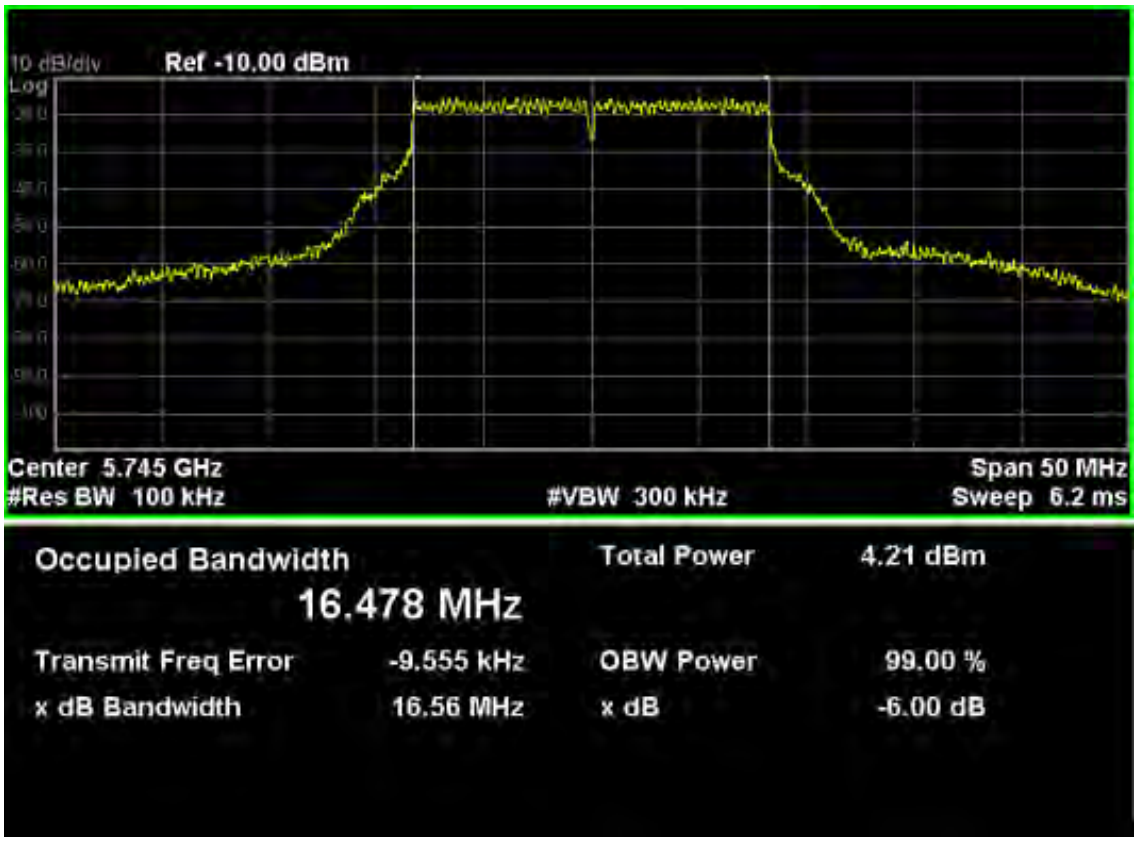
802.11n40

802.11n40 channel 38

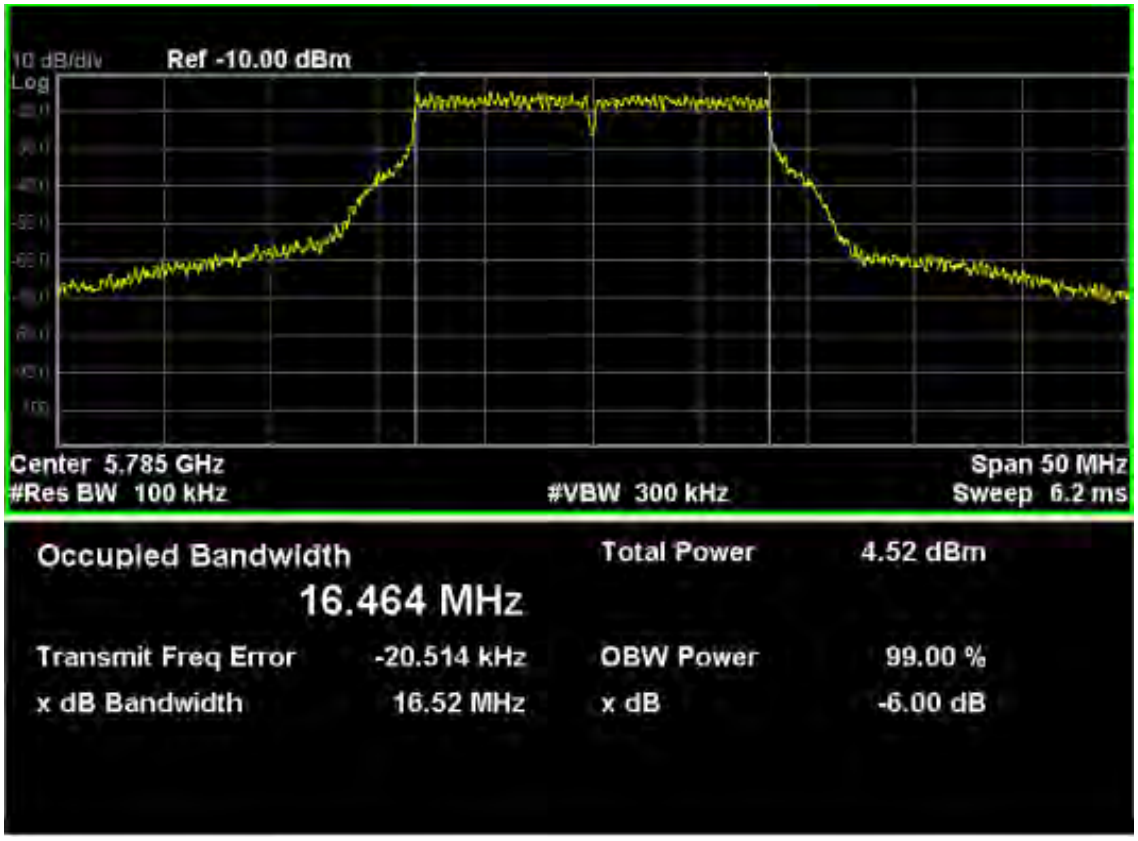


802.11n40 channel 46

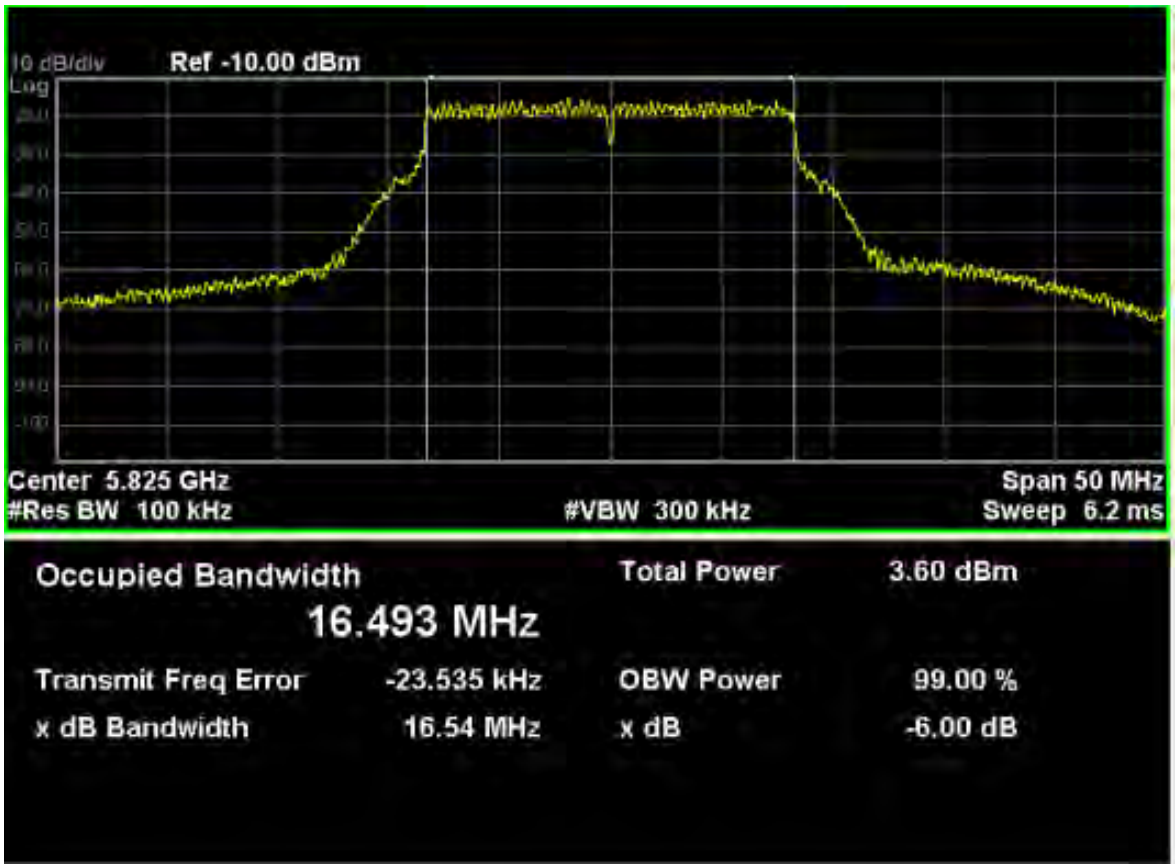
WIFI 5G(5725MHz-5850MHz)
802.11a
802.11a channel 149



802.11a channel 157

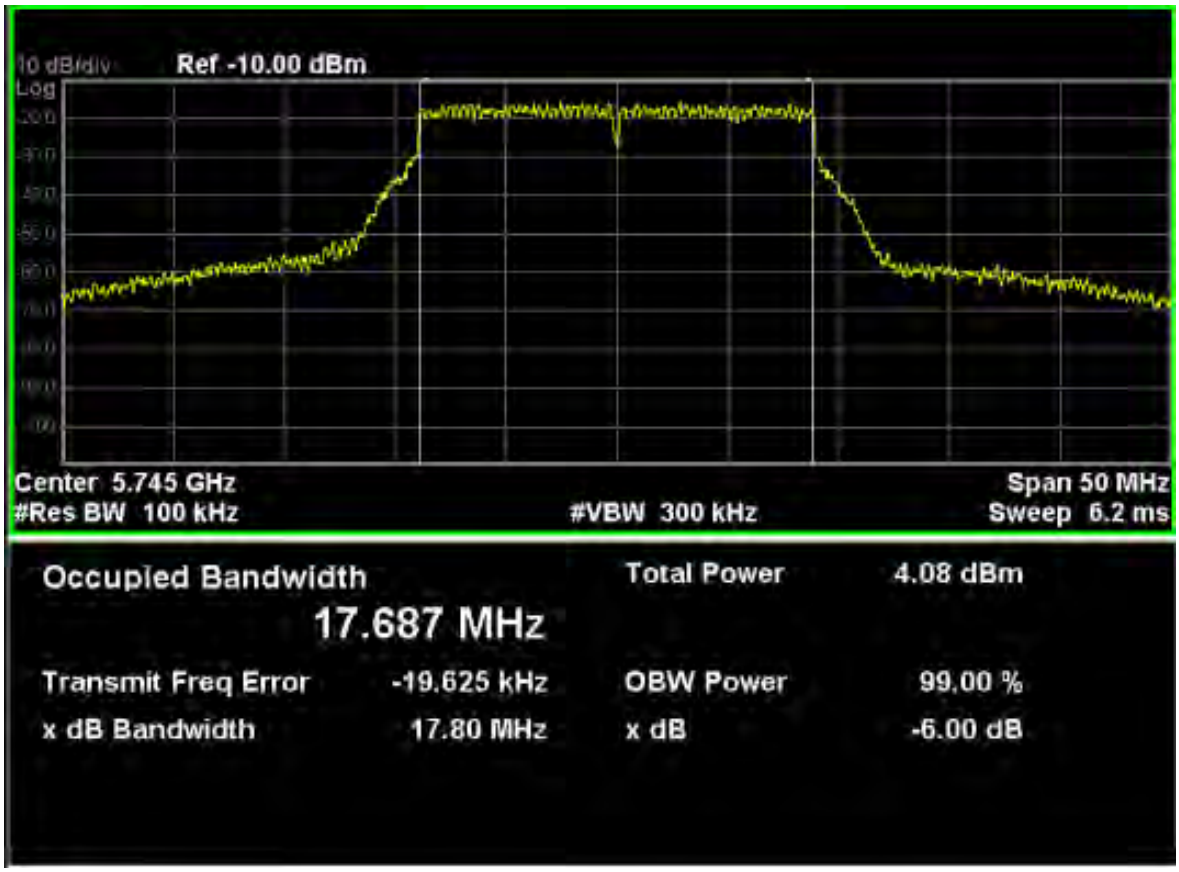


802.11a channel 165



802.11n20

802.11n20 channel 149



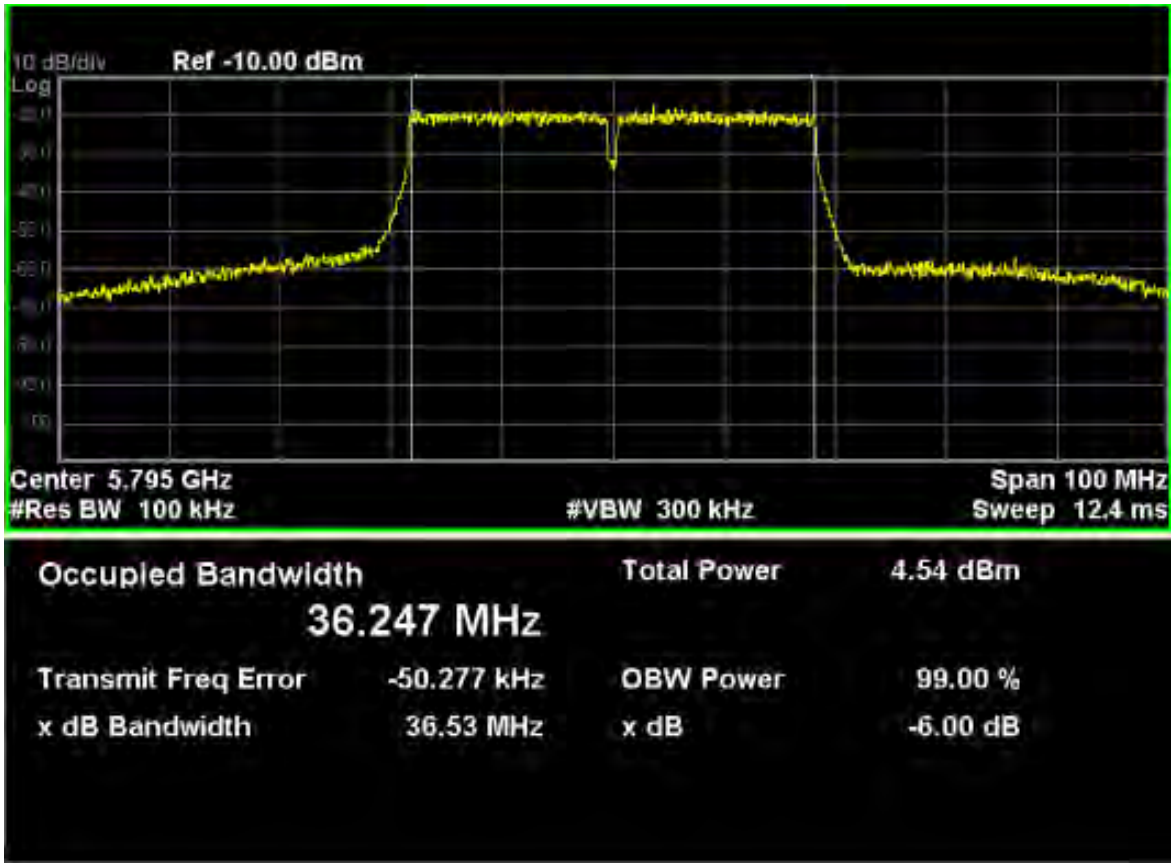
802.11n20 channel 157

802.11n20 channel 165

802.11n40

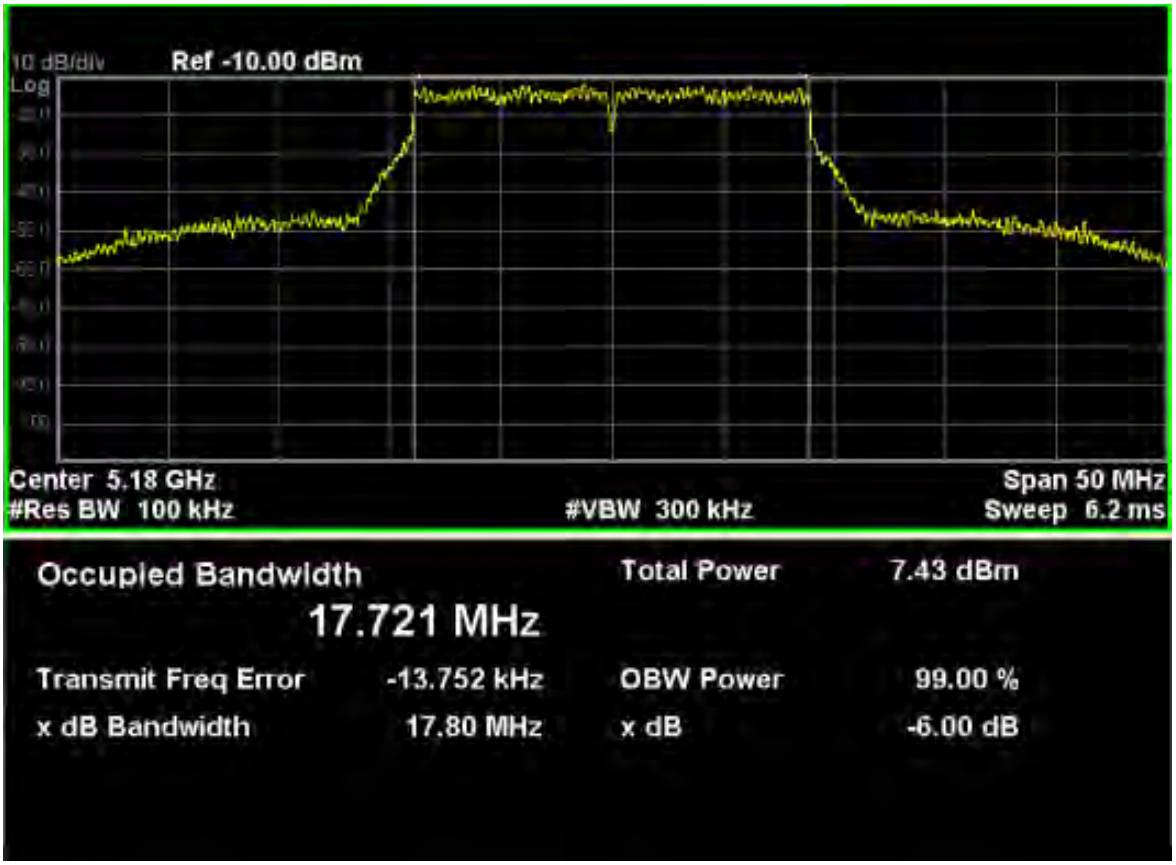
802.11n40 channel 151

802.11n40 channel 159

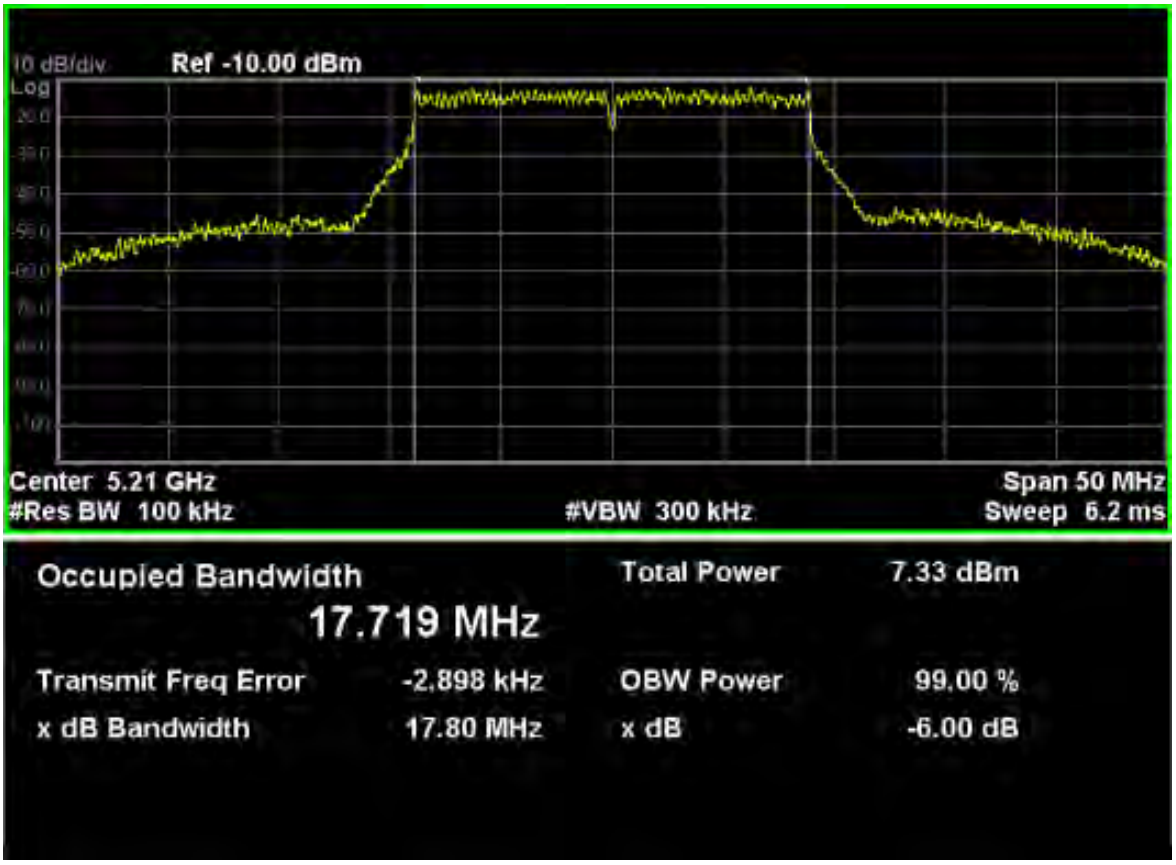


802.11ac (5150MHz-5250MHz)

802.11ac20 channel 36

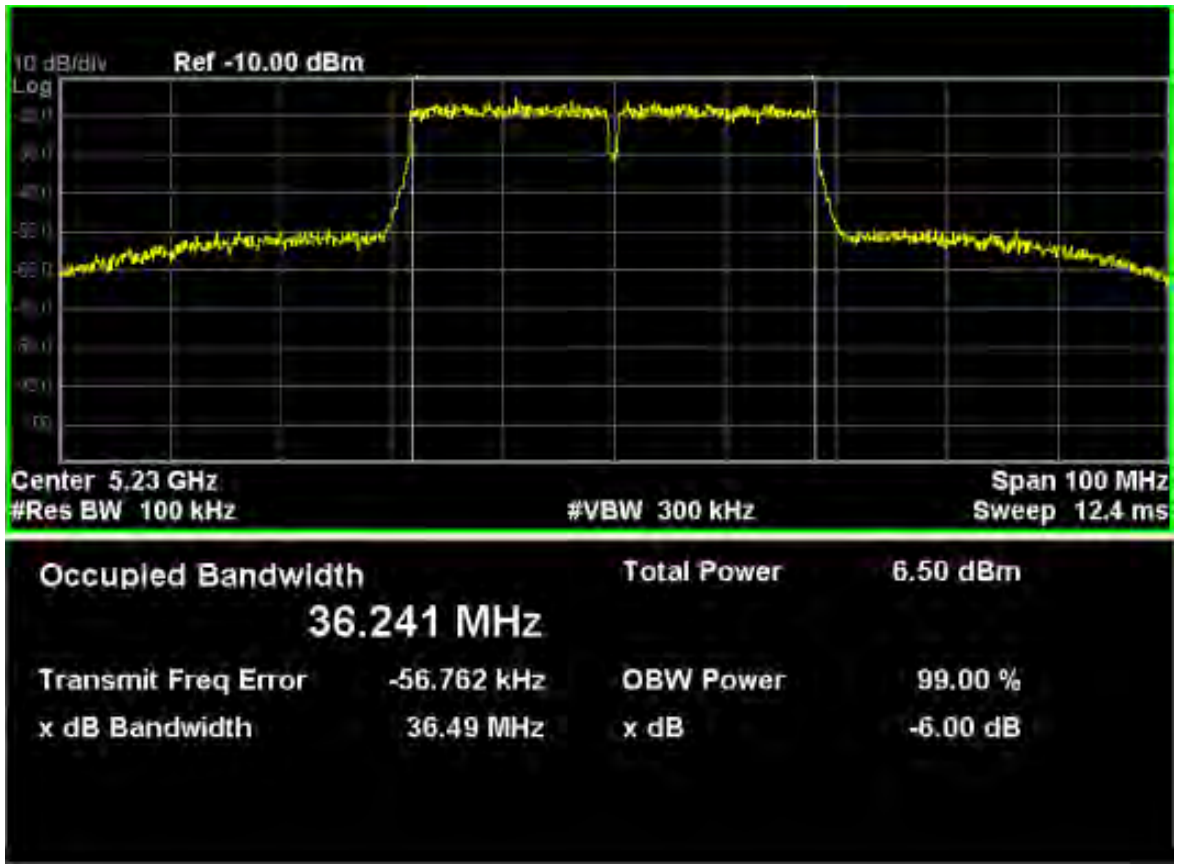


802.11ac20 channel 48

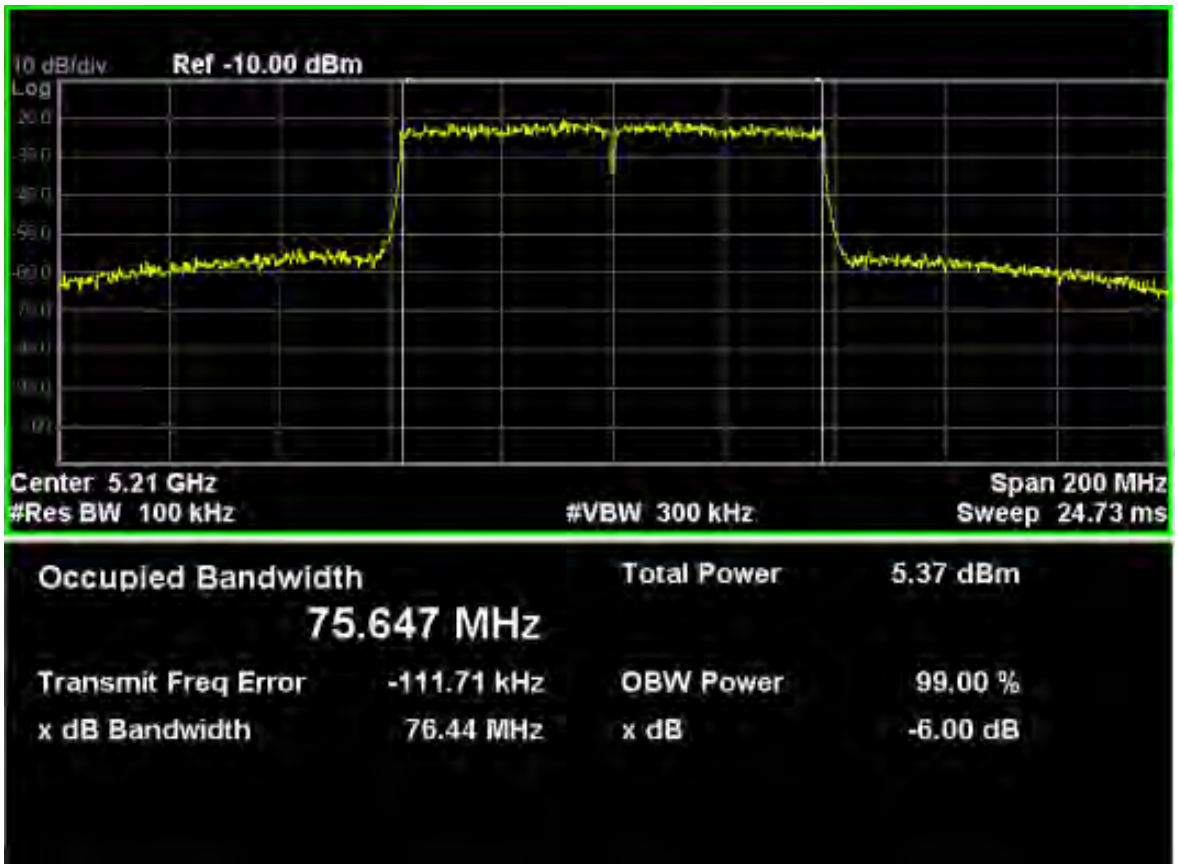


802.11ac40 channel 38

802.11ac40 channel 46

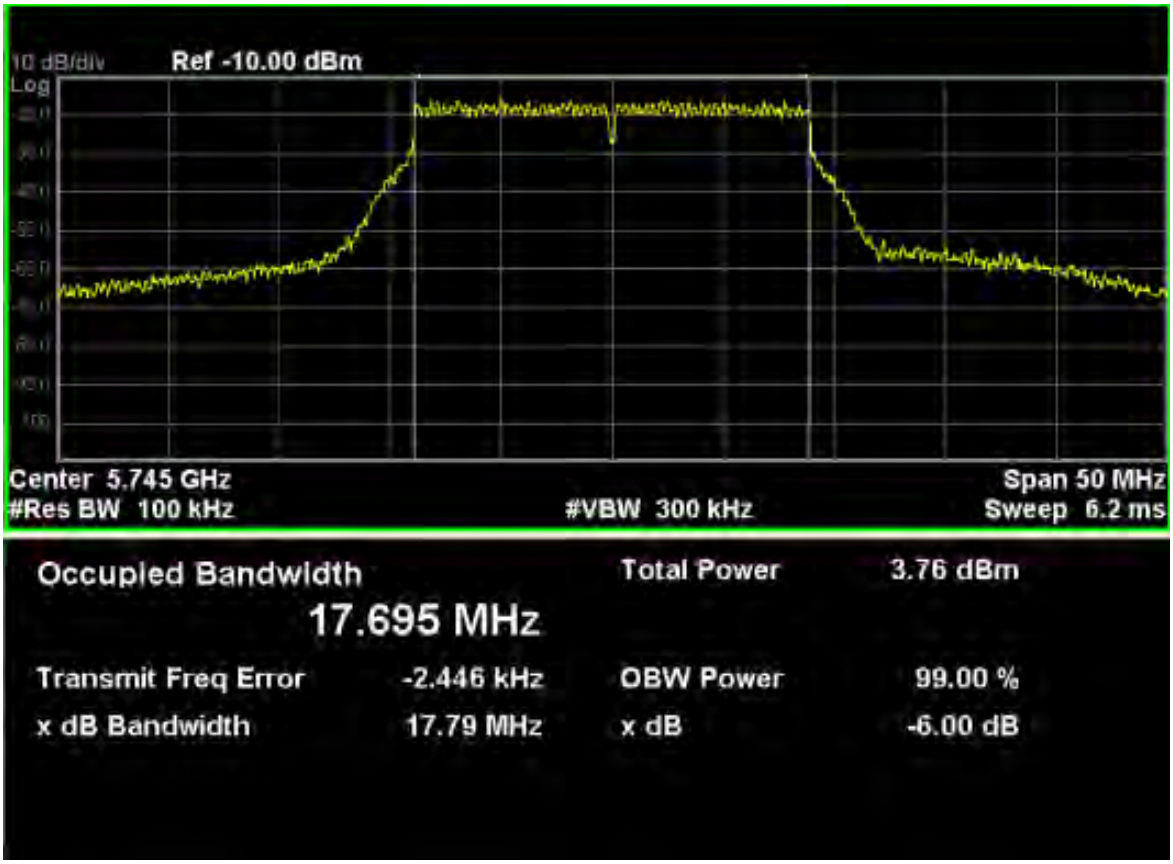


802.11ac80 channel 42

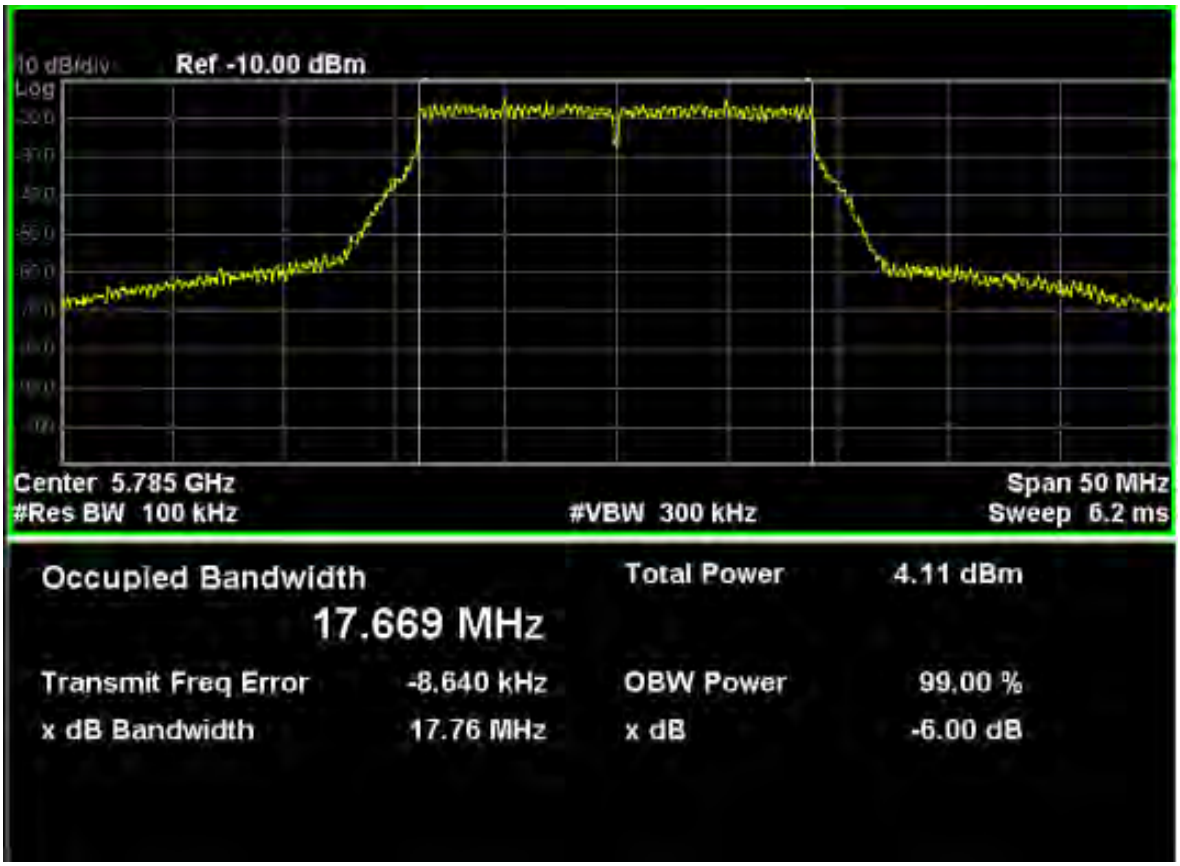


802.11ac (5725MHz-5850MHz)

802.11ac20 channel 149

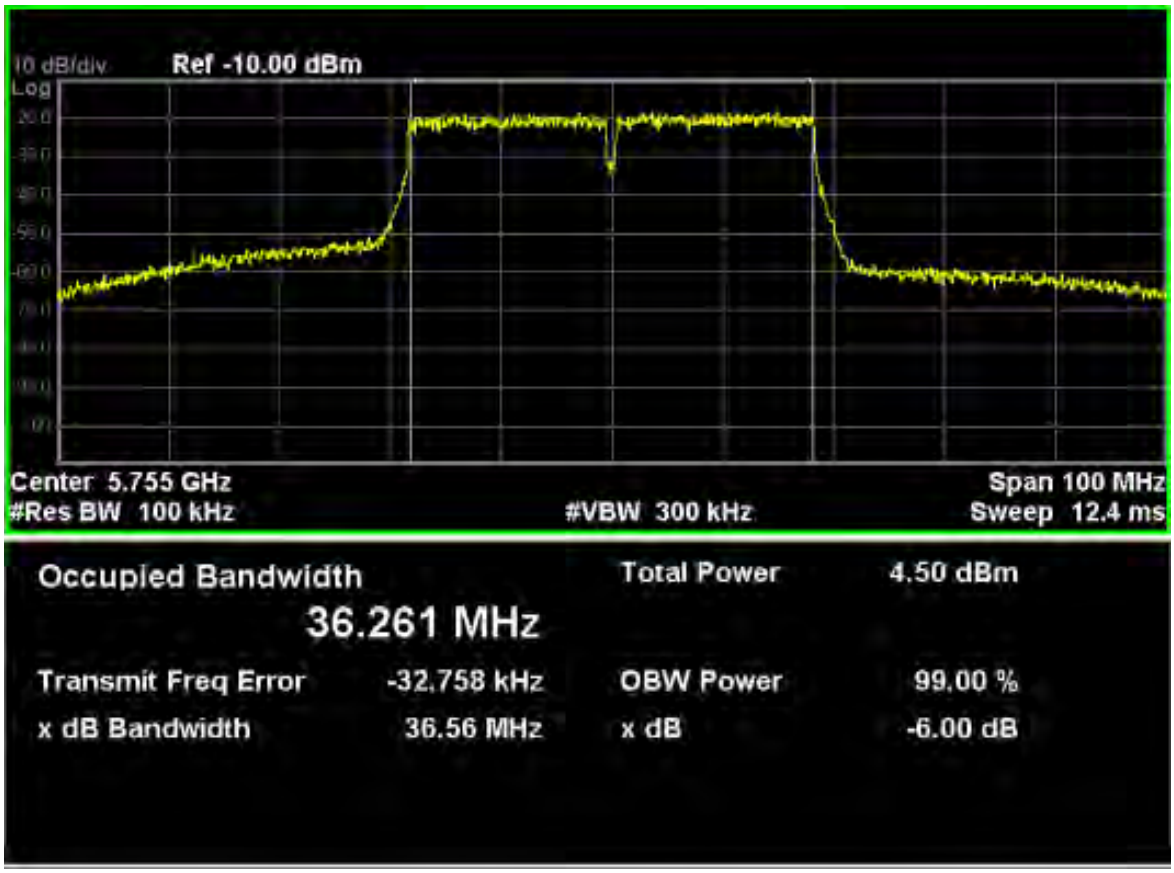


802.11ac20 channel 157

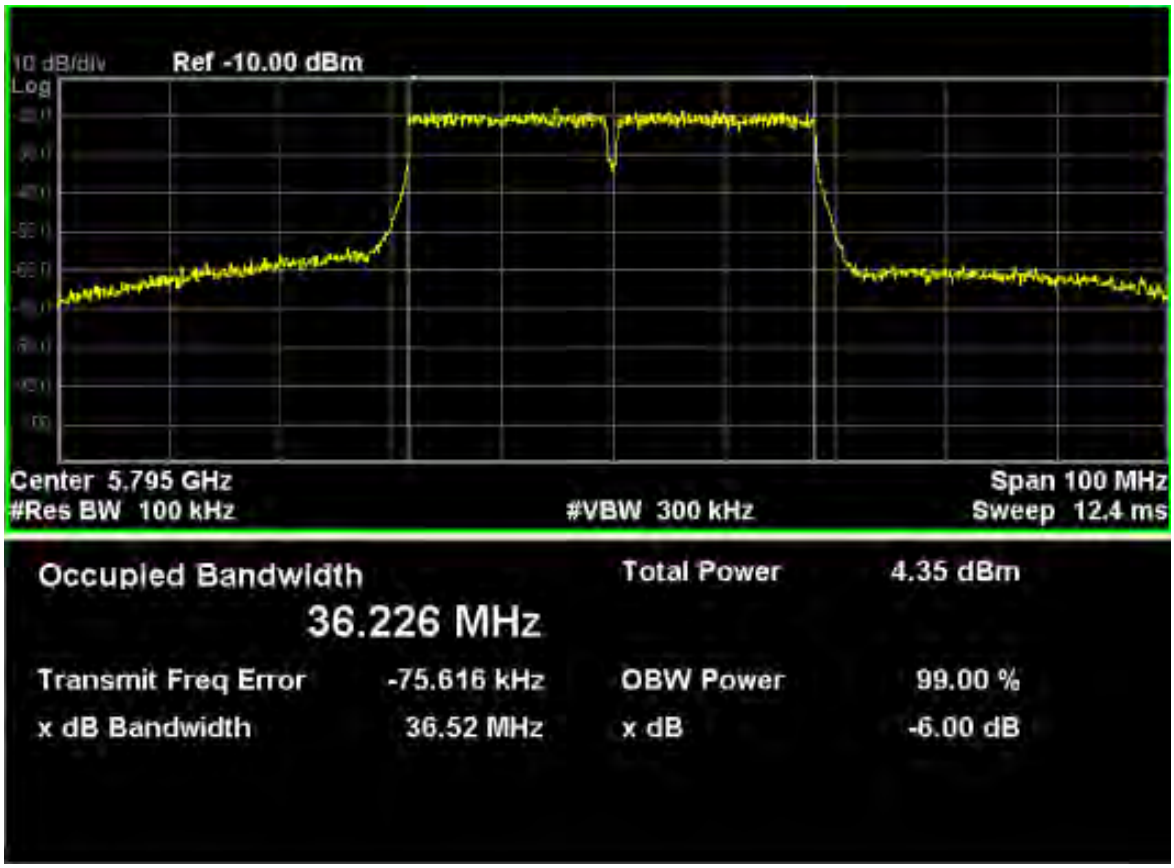


802.11ac20 channel 165

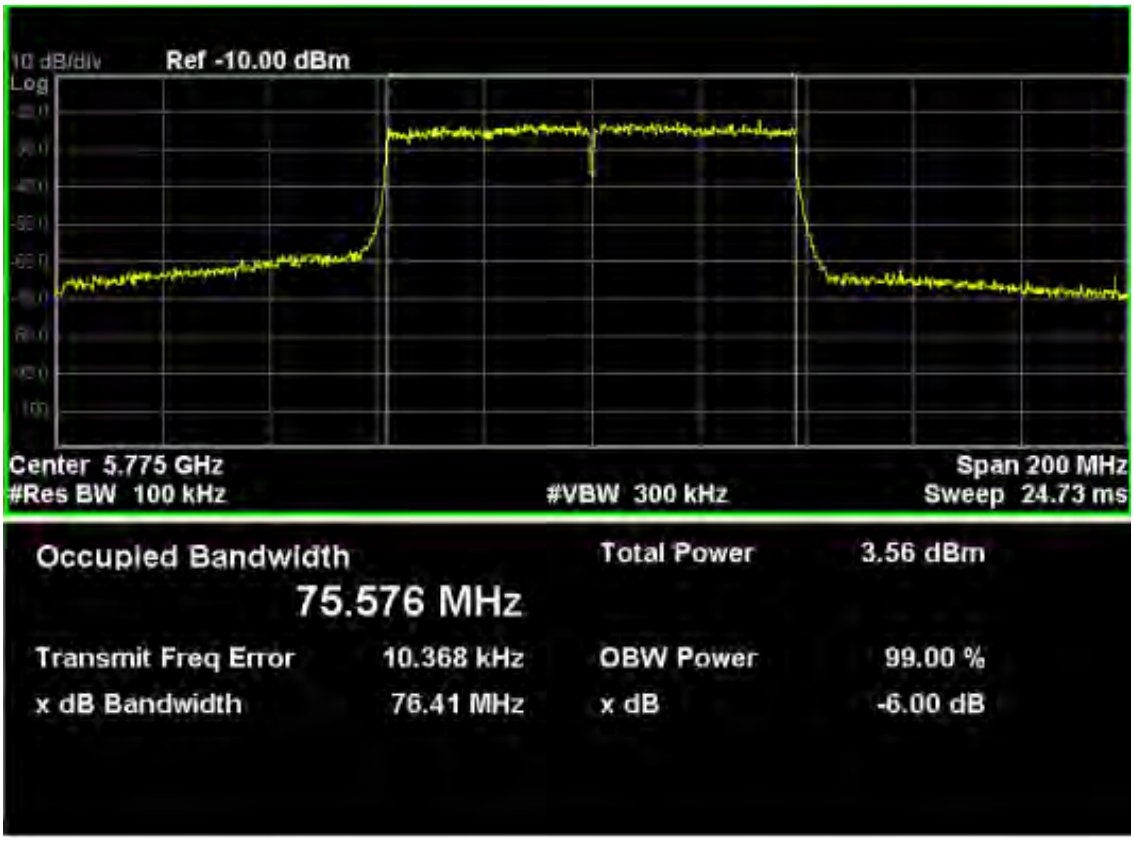
802.11ac40 channel 151



802.11ac40 channel 159

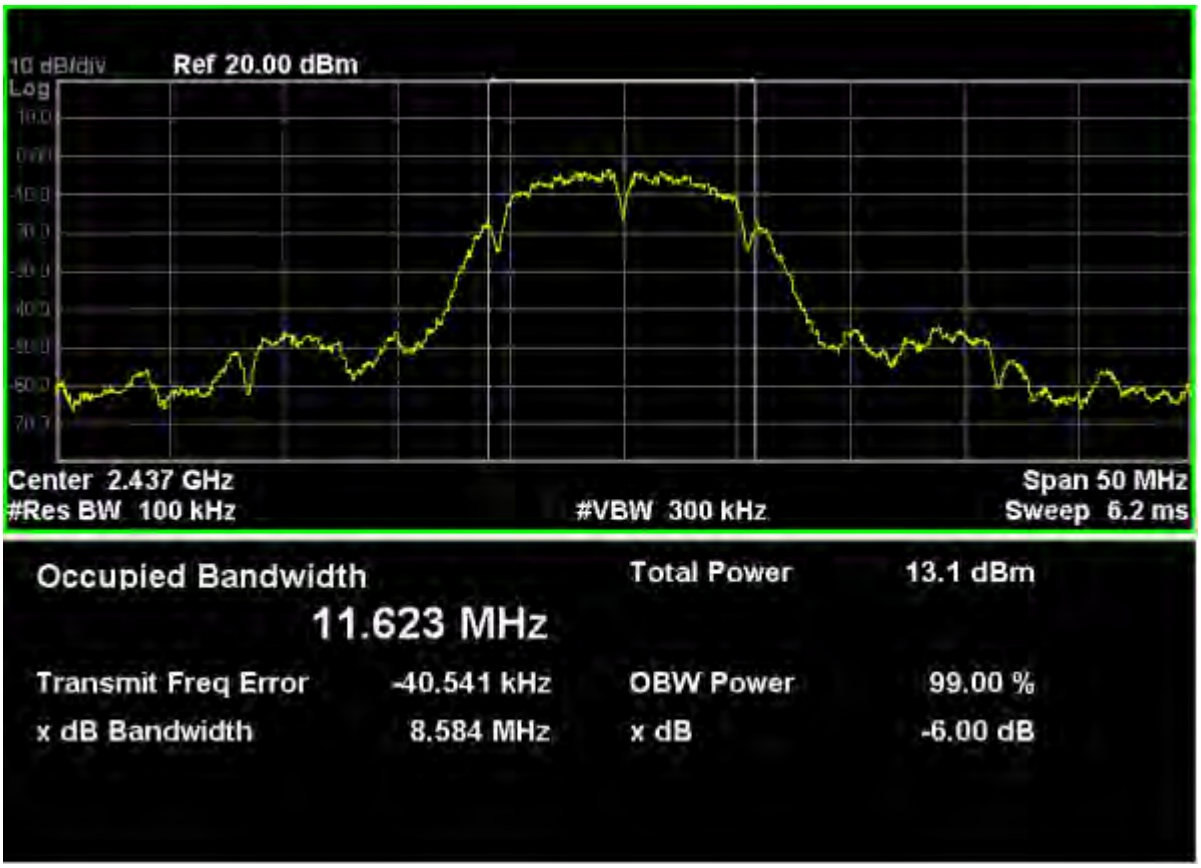


802.11ac80 channel 155

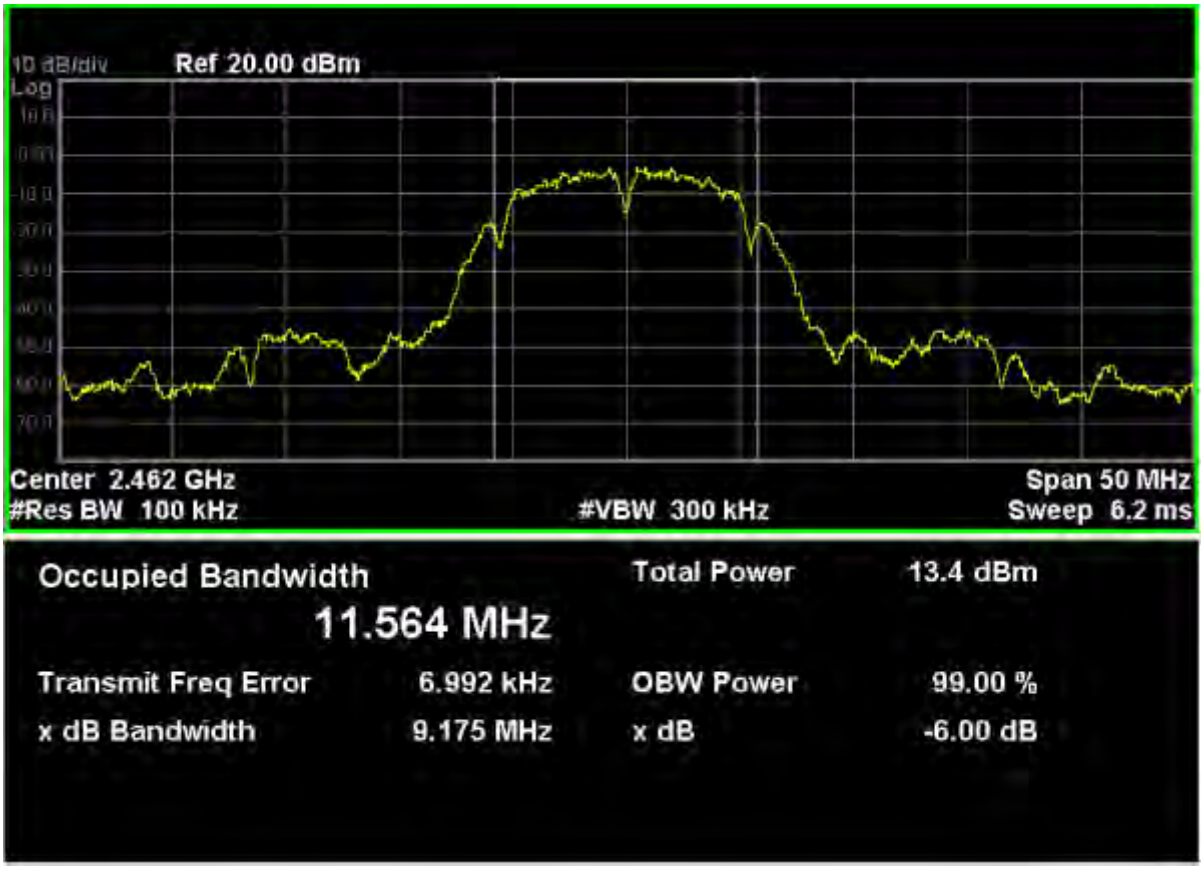


Antenna 2&Mimo
WIFI 2.4G
802.11b
802.11b channel 1

802.11b channel 6

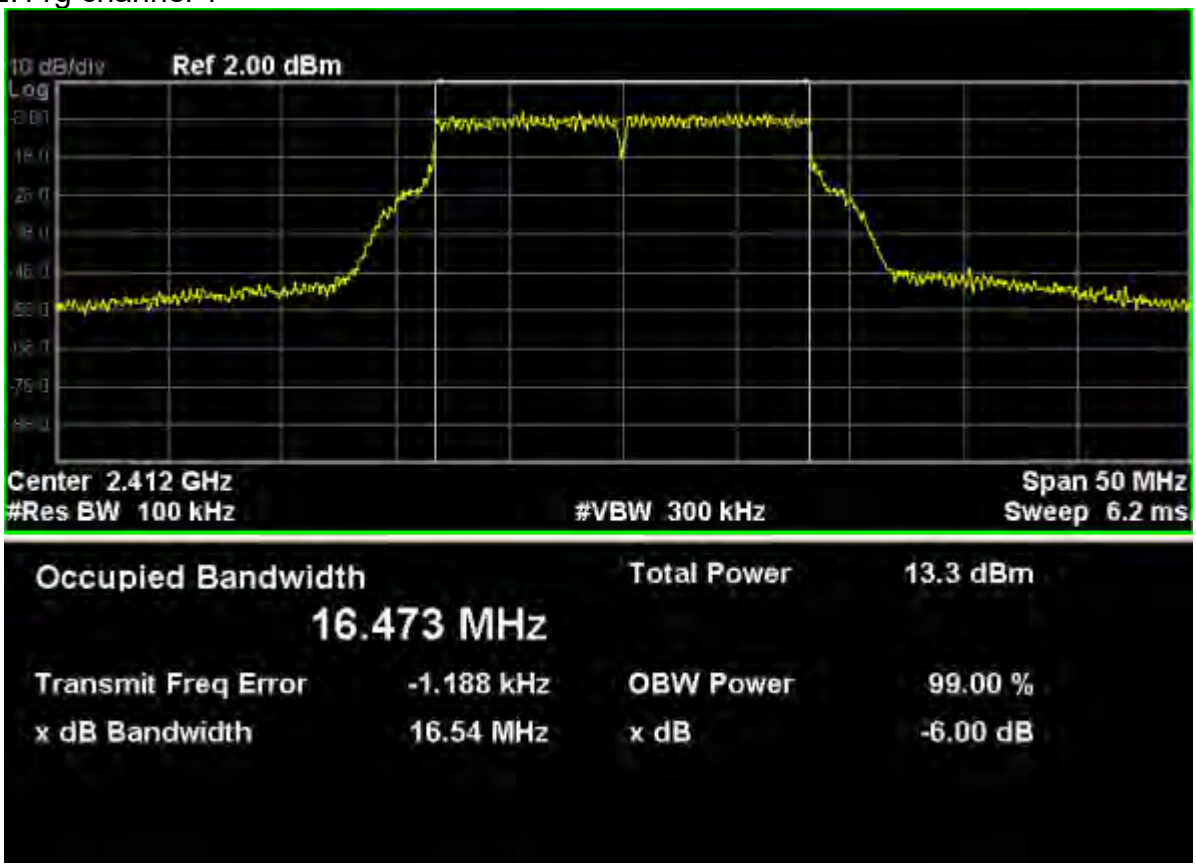


802.11b channel 11

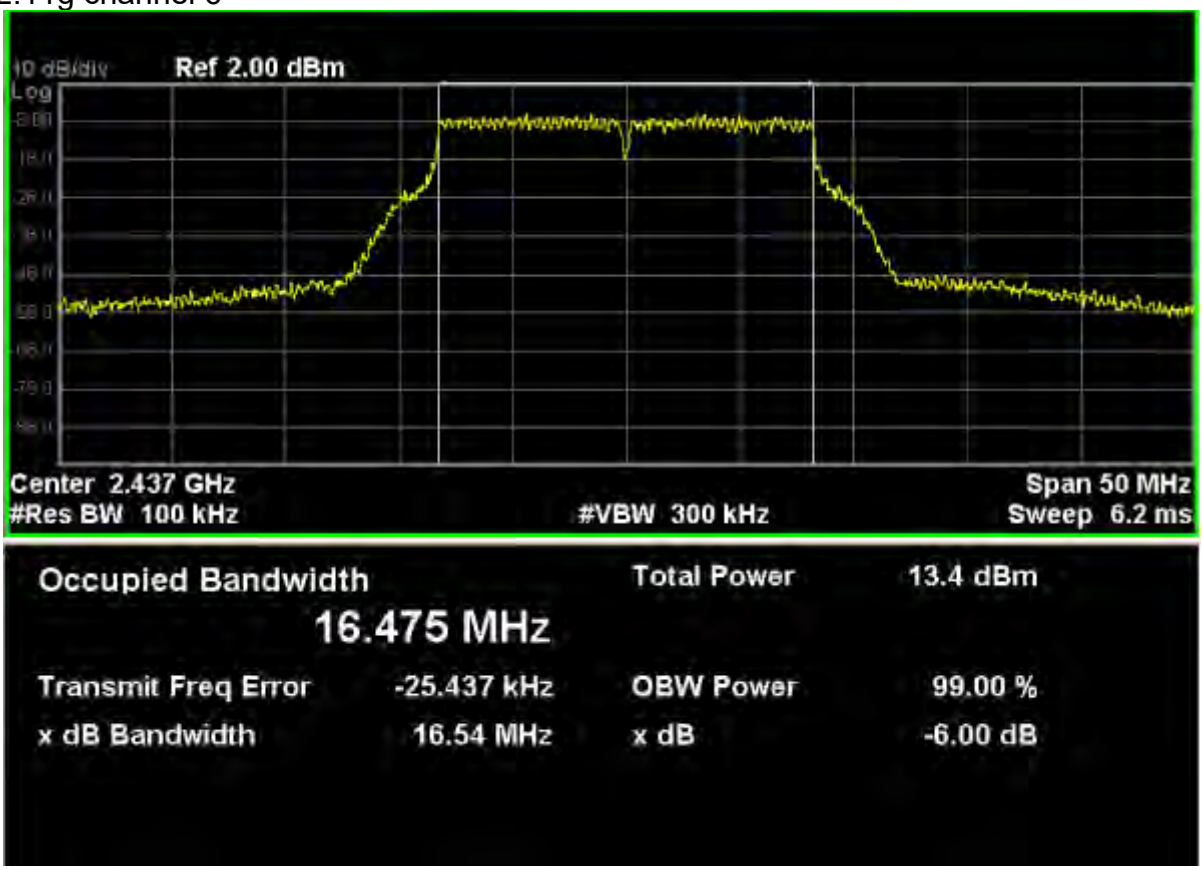


802.11g

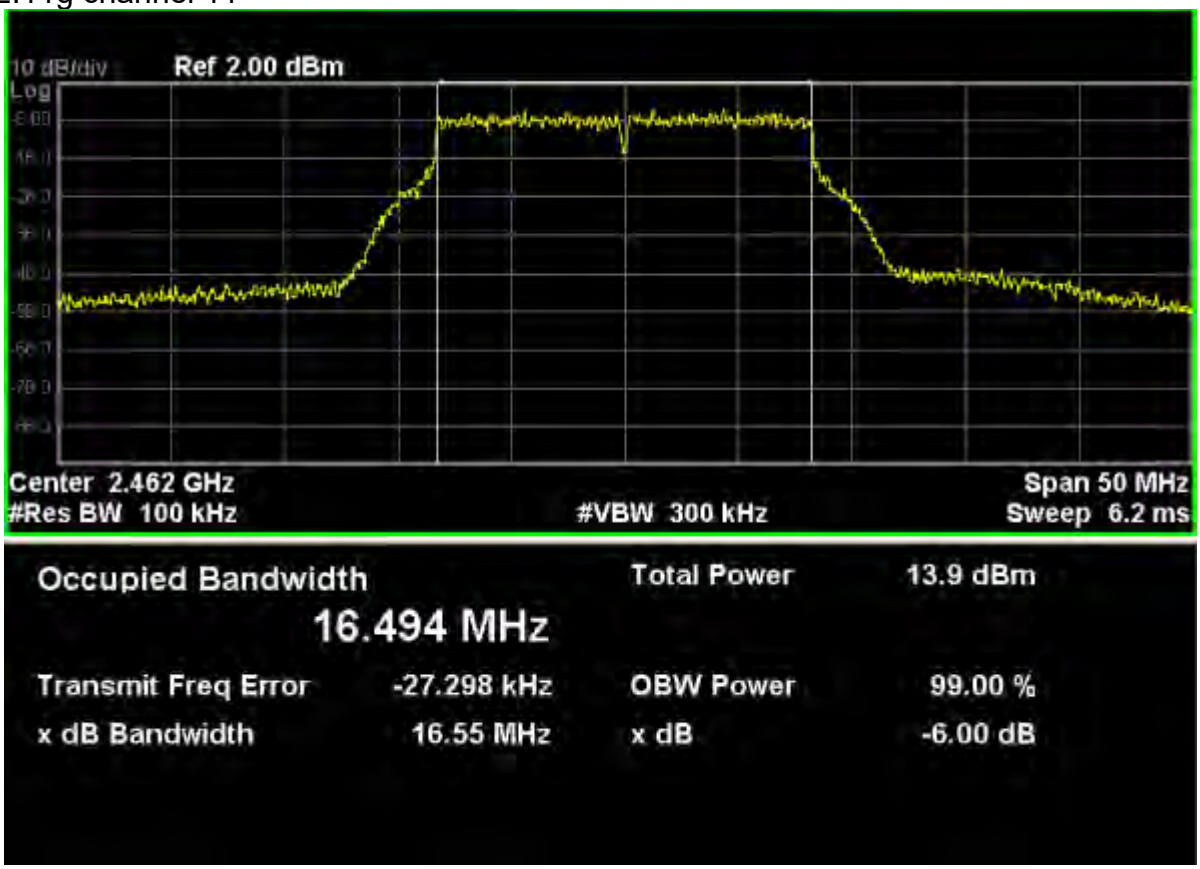
802.11g channel 1



802.11g channel 6

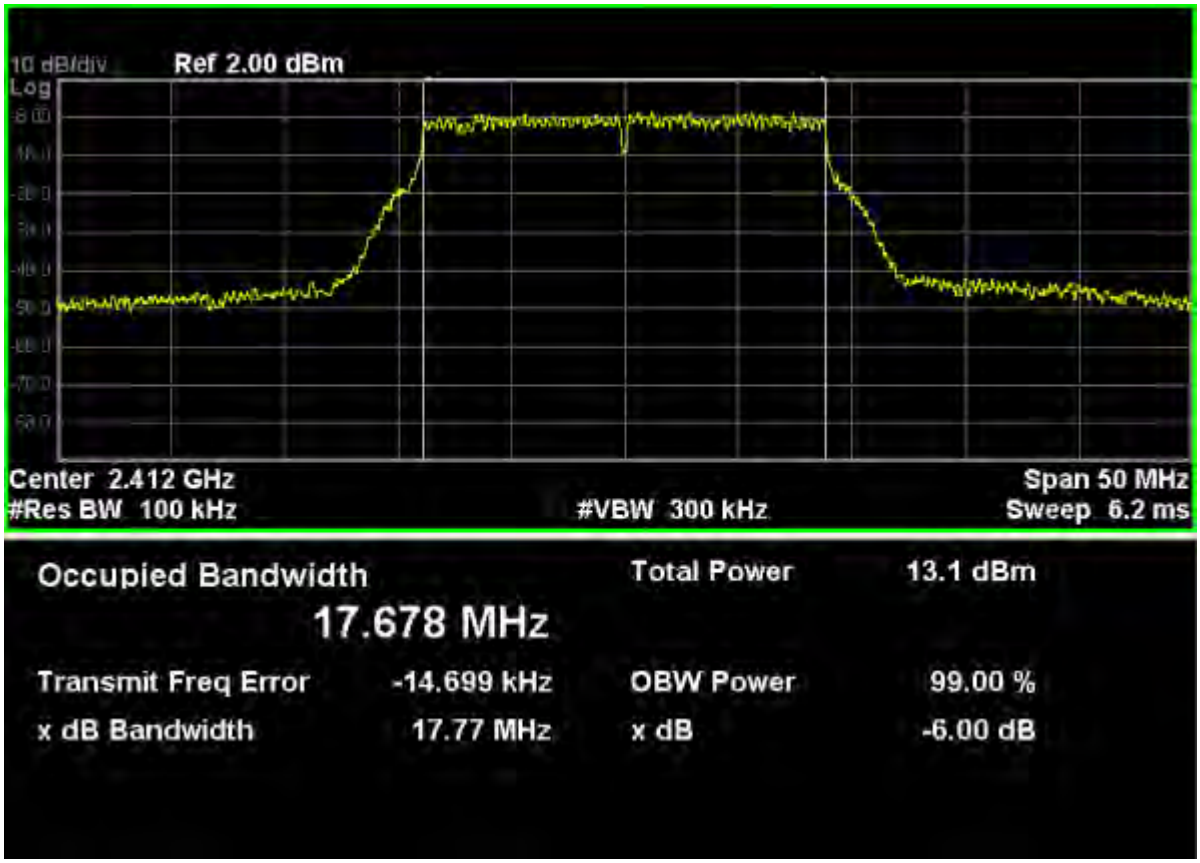


802.11g channel 11

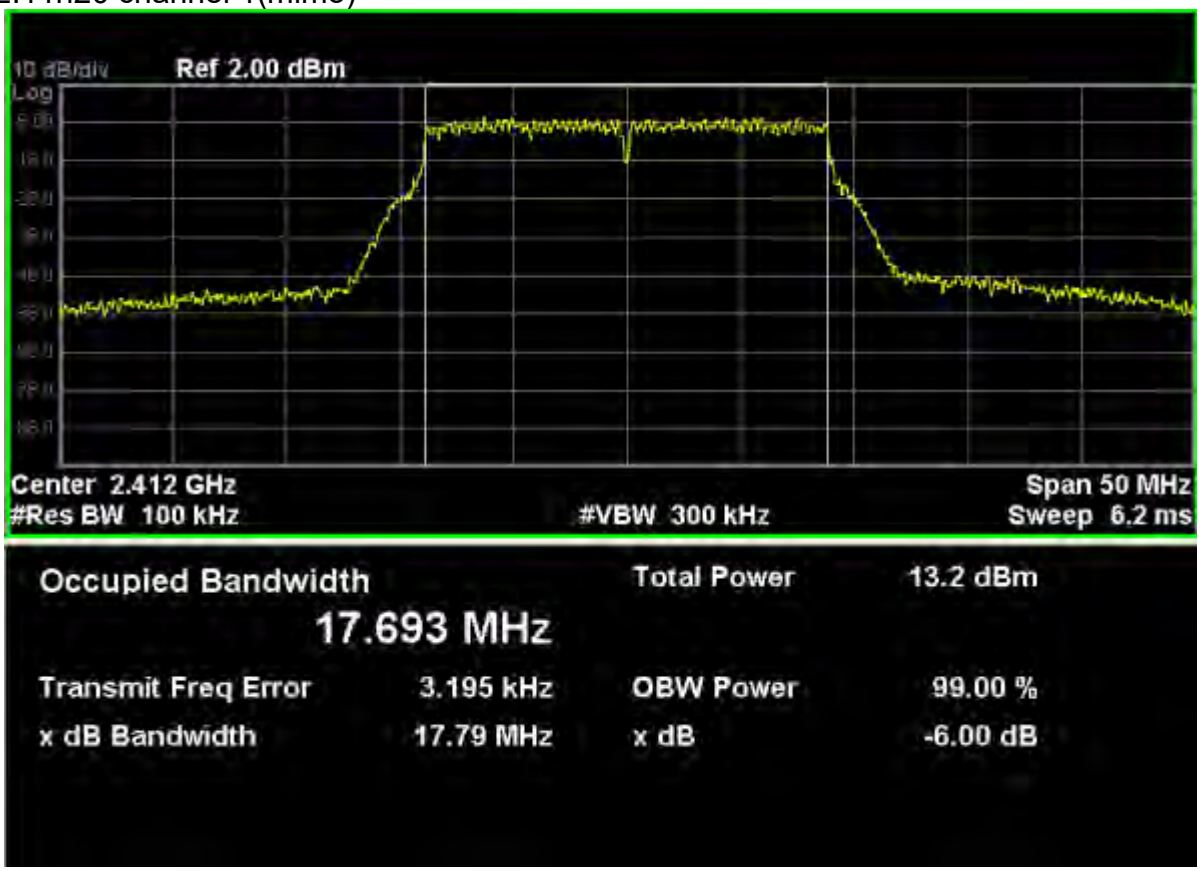


802.11n20

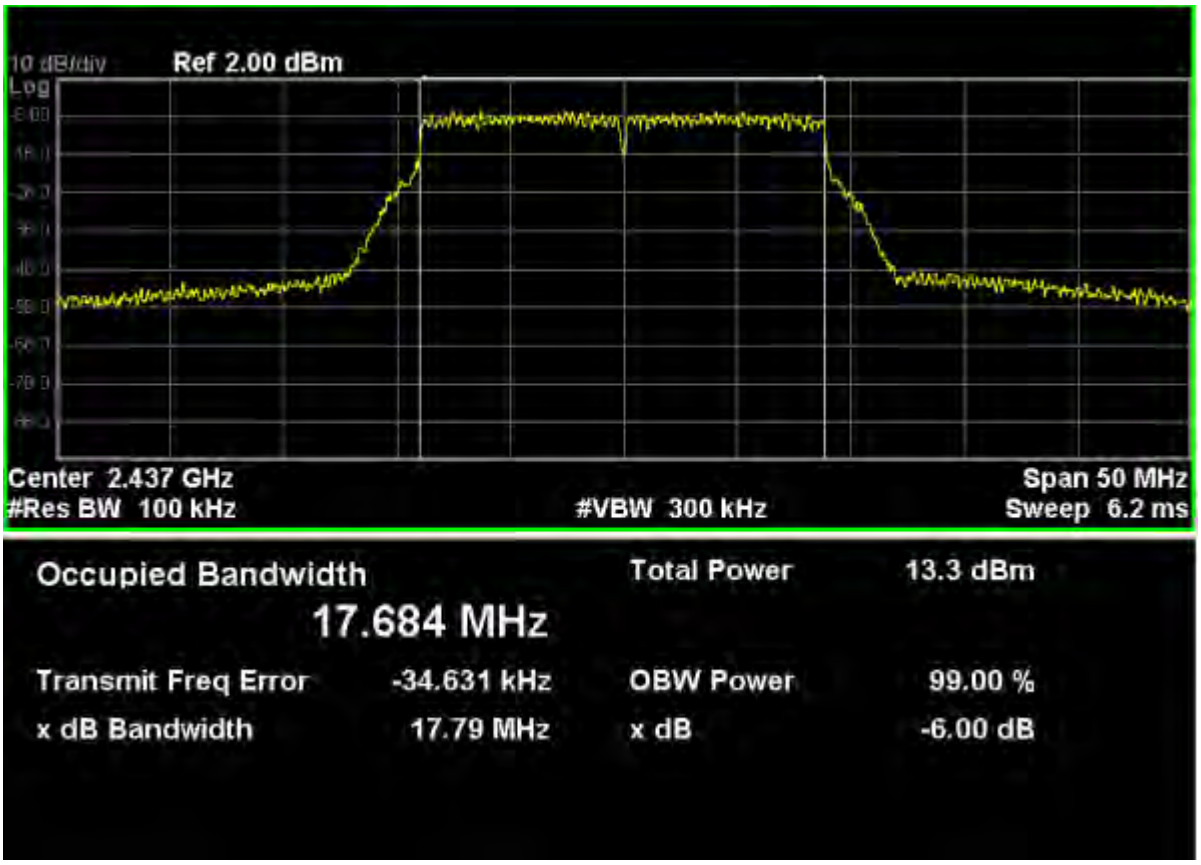
802.11n20 channel 1



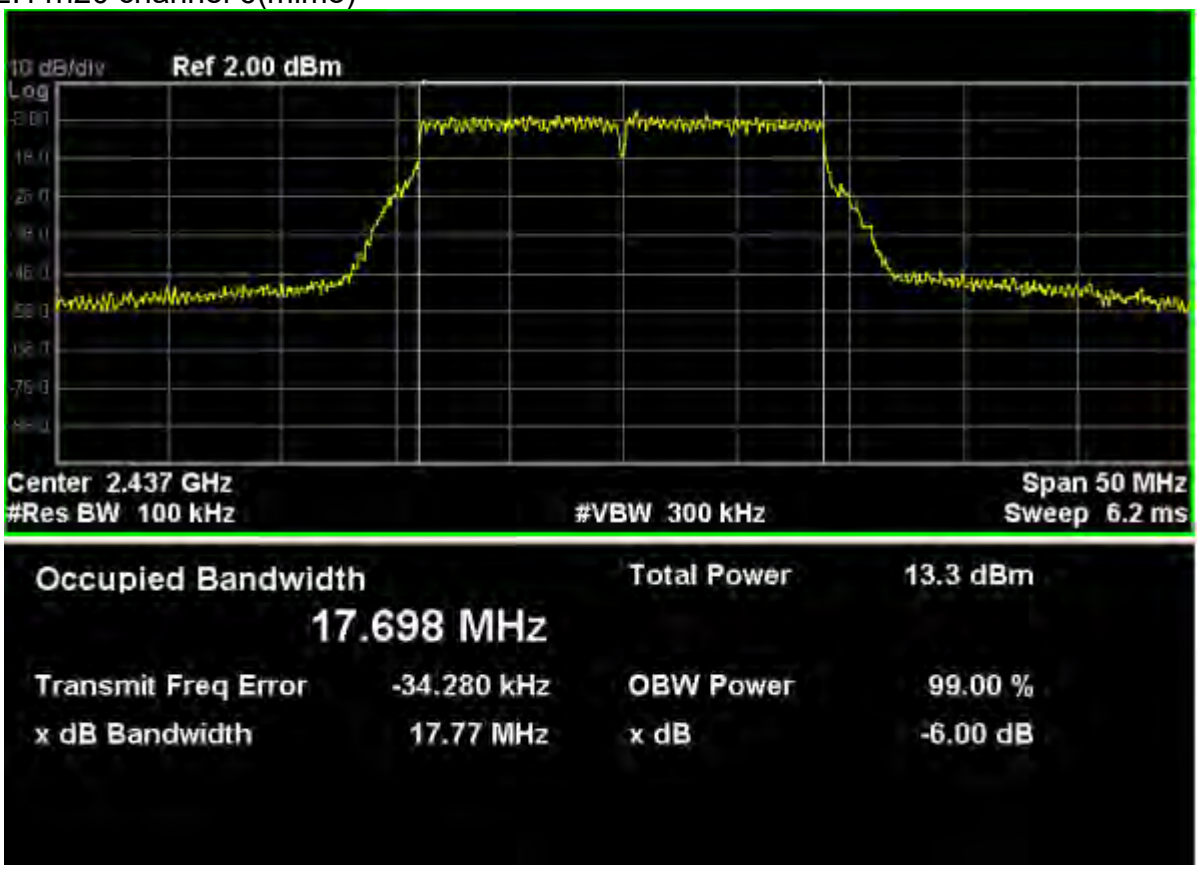
802.11n20 channel 1(mimo)



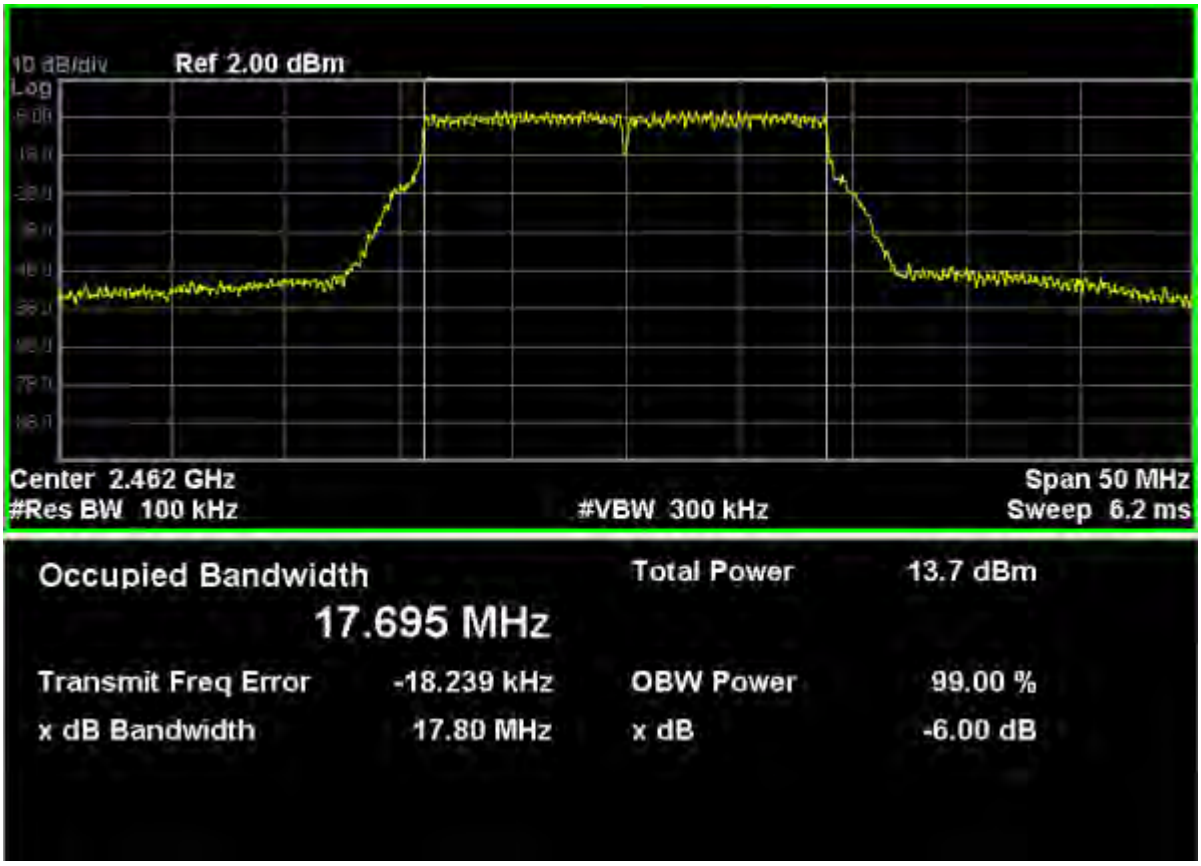
802.11n20 channel 6



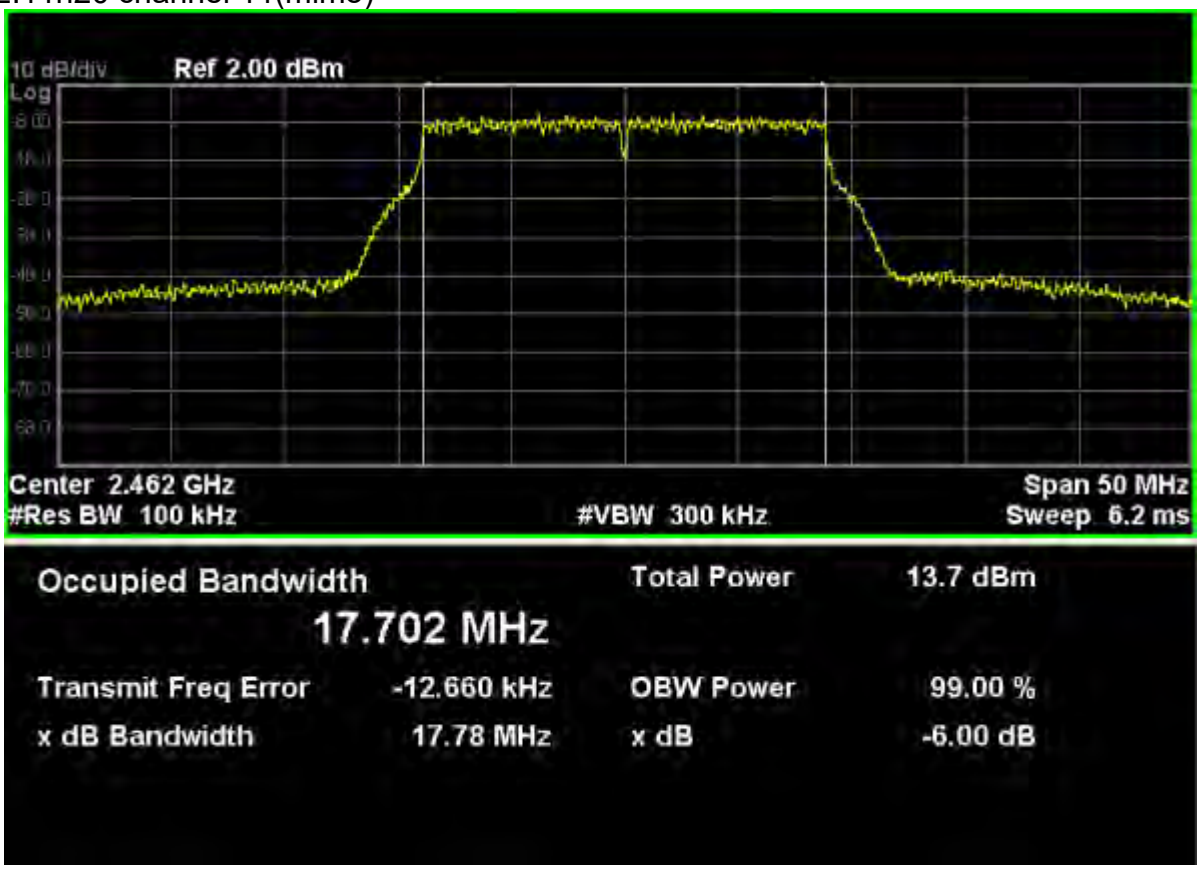
802.11n20 channel 6(mimo)



802.11n20 channel 11



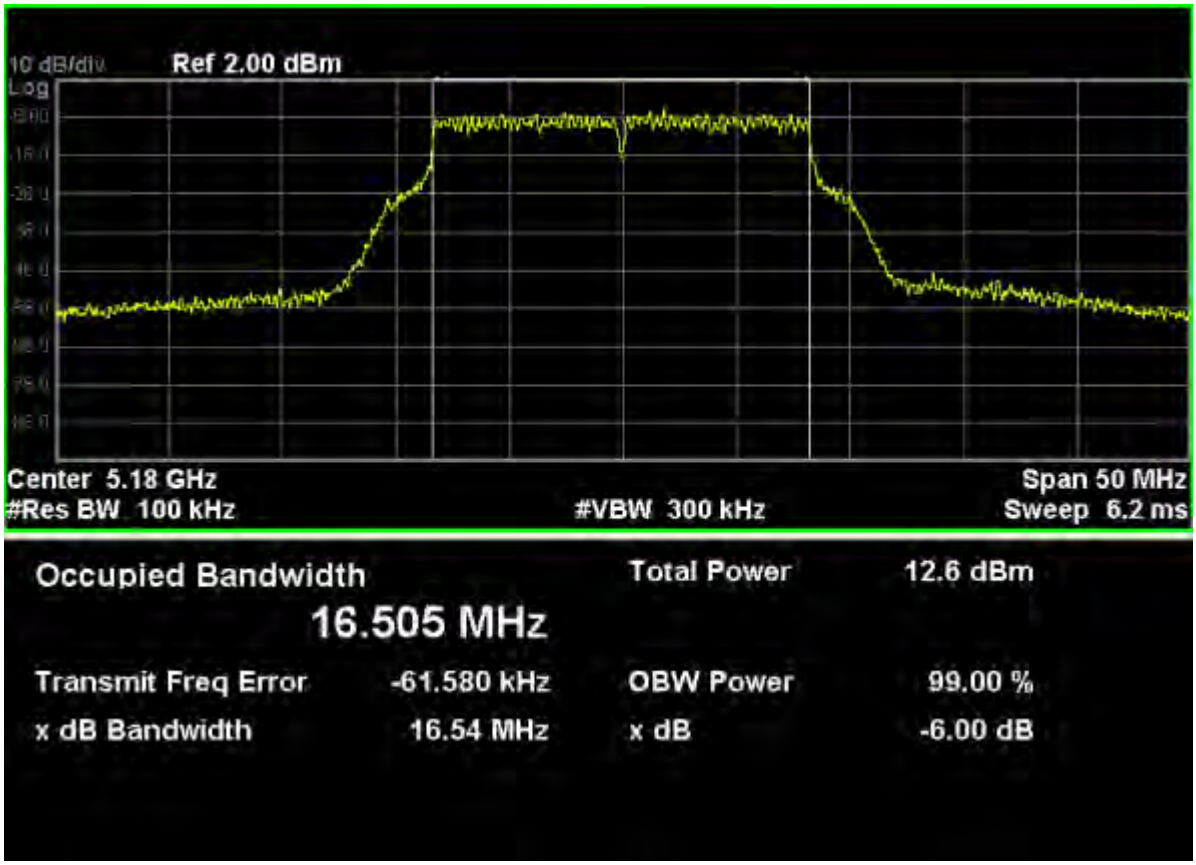
802.11n20 channel 11(mimo)



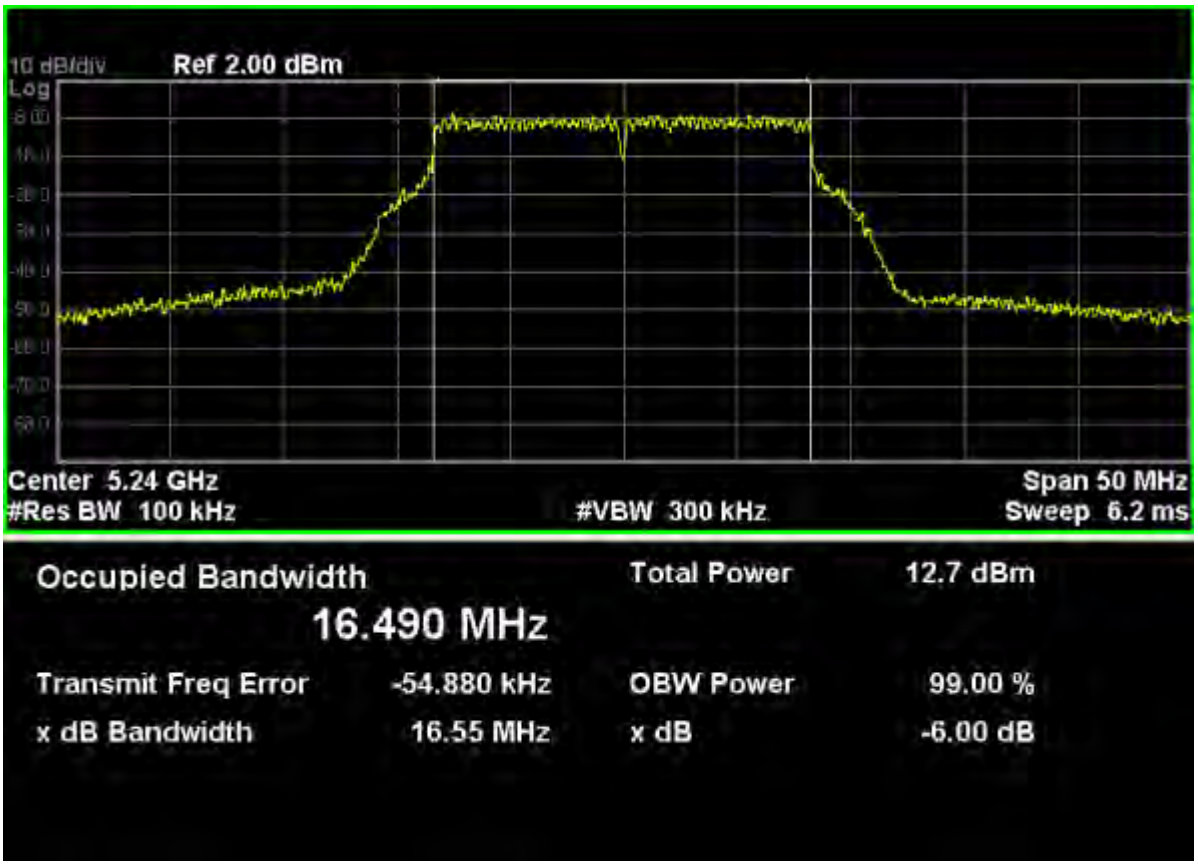
WIFI 5G(5150MHz-5250MHz)

802.11a

802.11a channel 36

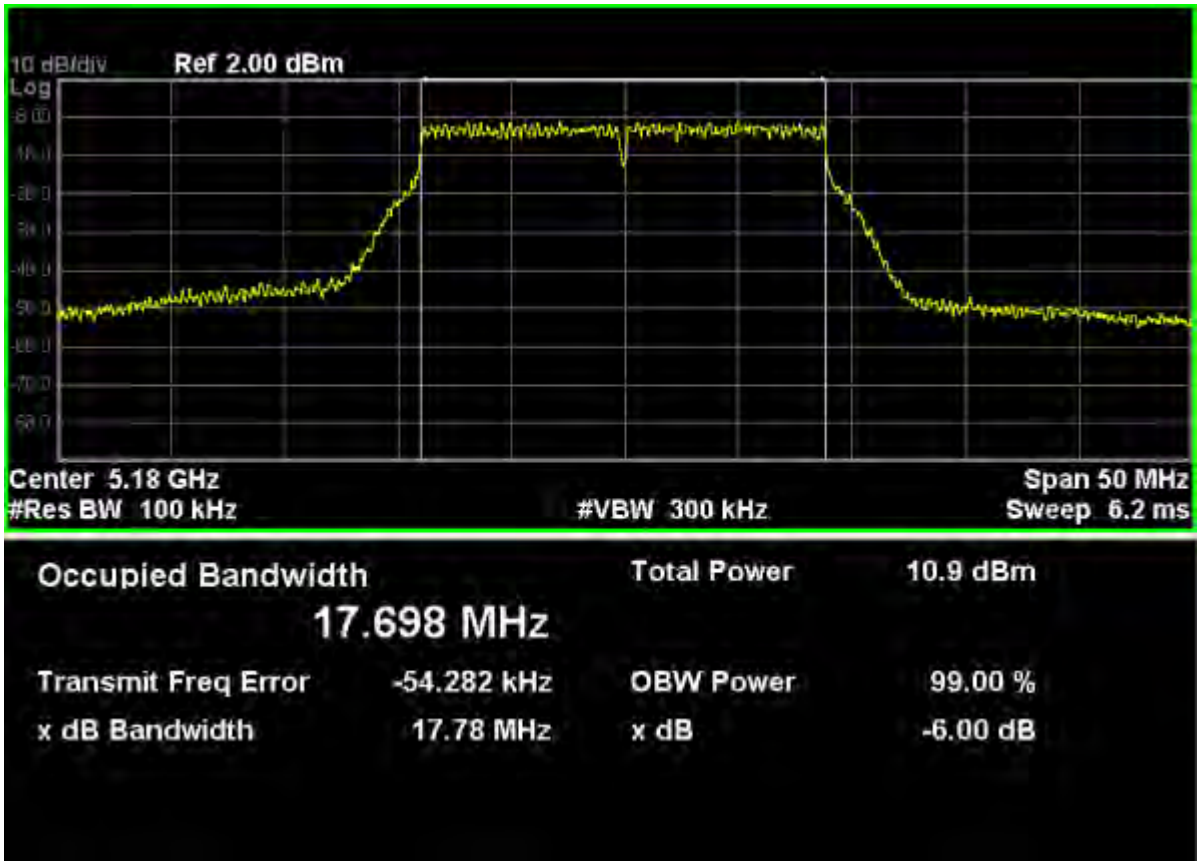


802.11a channel 48

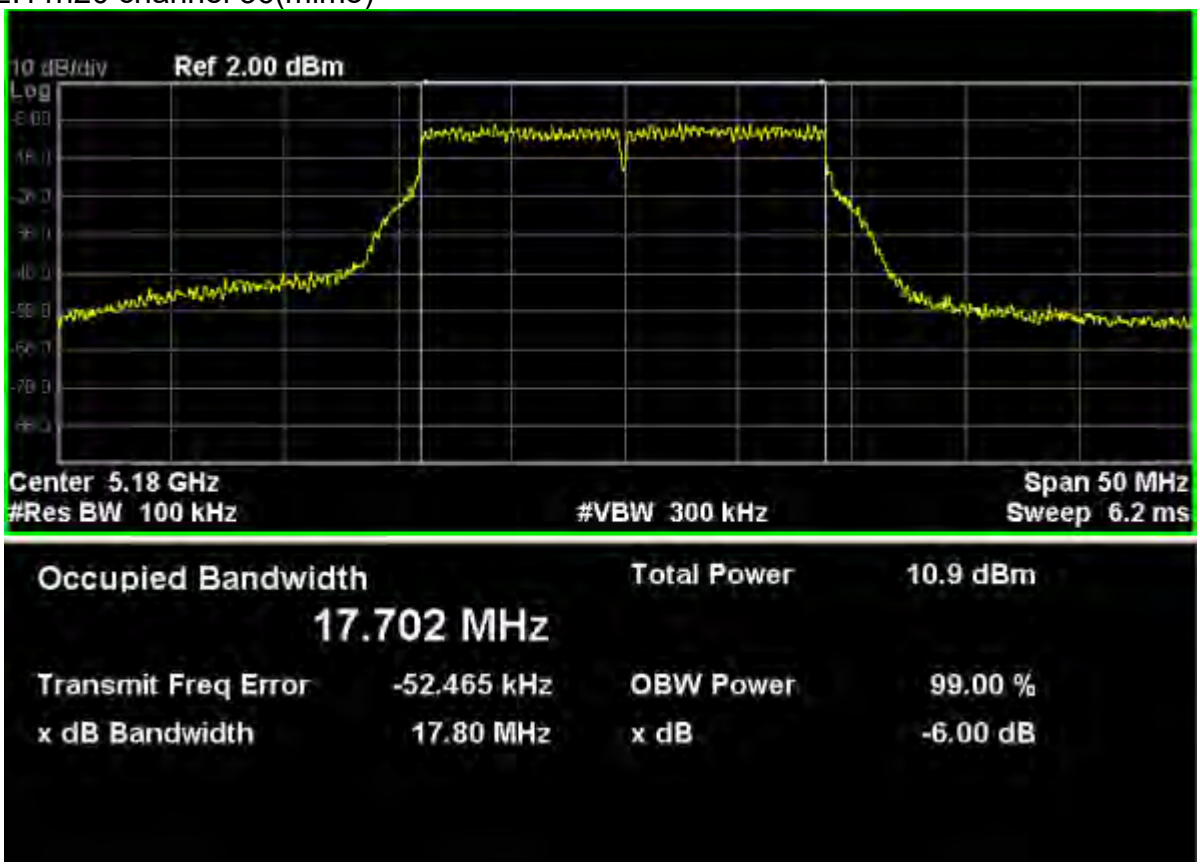


802.11n20

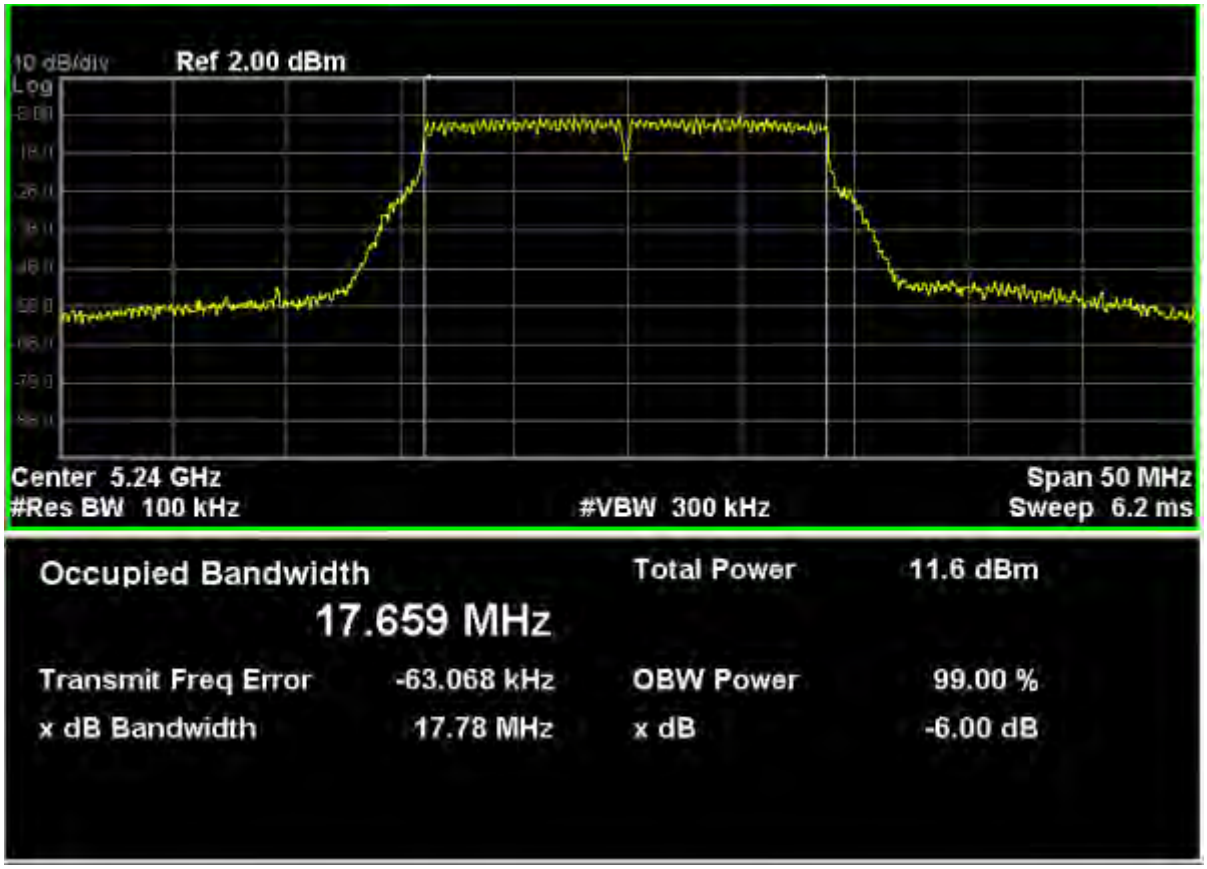
802.11n20 channel 36



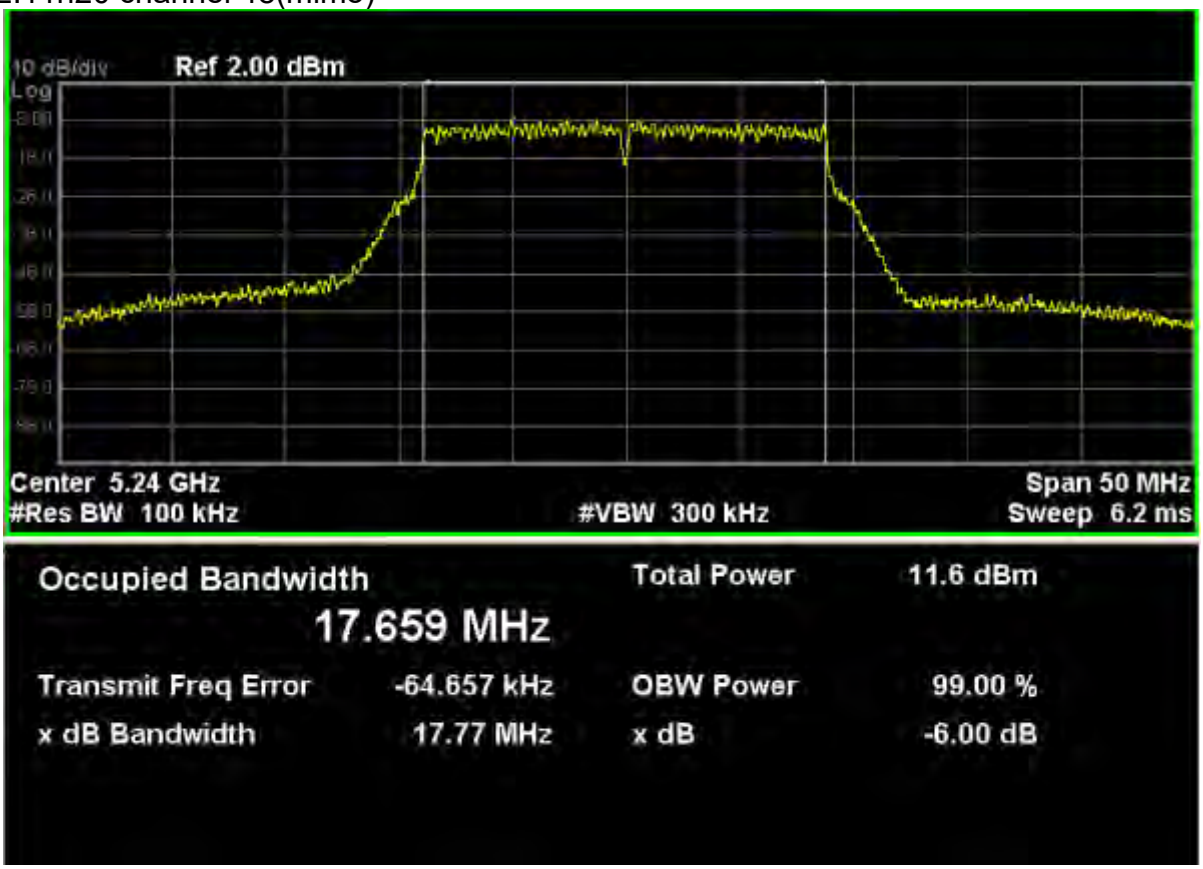
802.11n20 channel 36(mimo)



802.11n20 channel 48

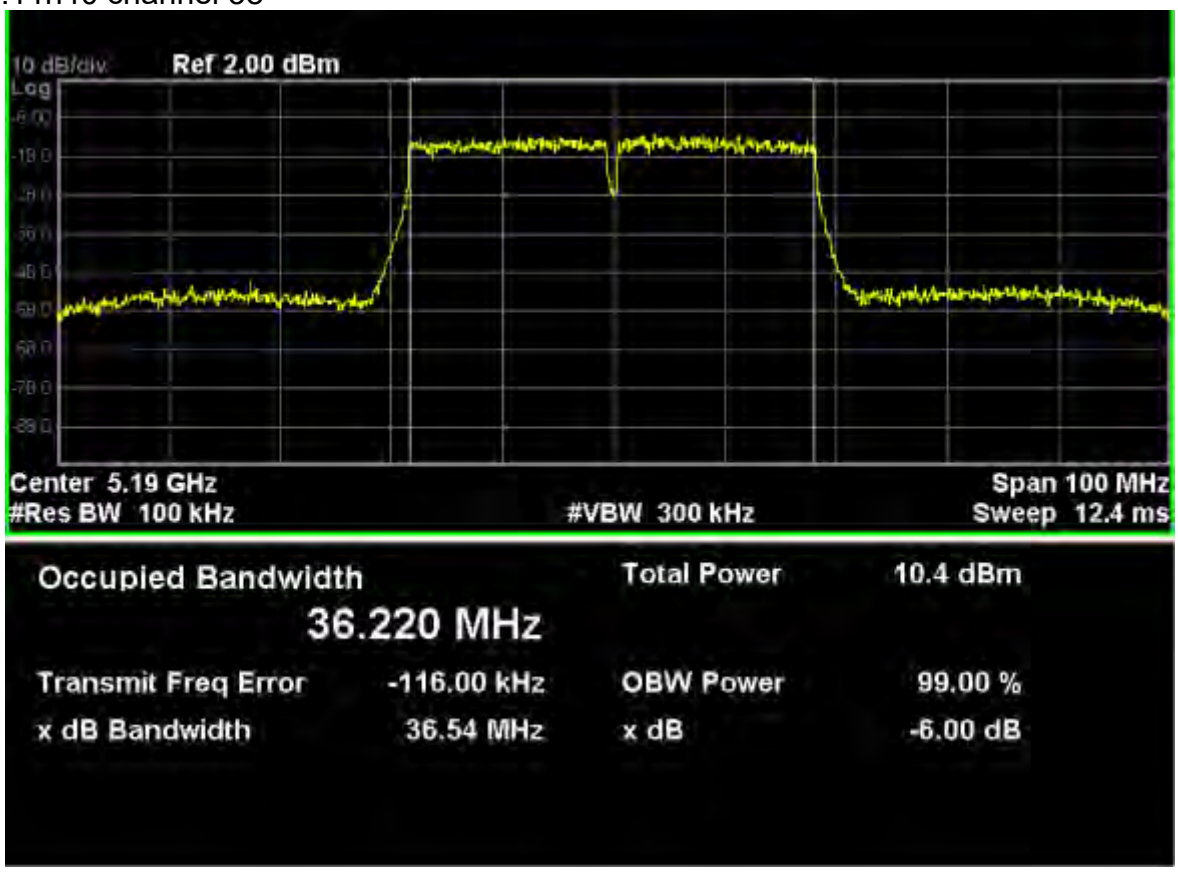


802.11n20 channel 48(mimo)

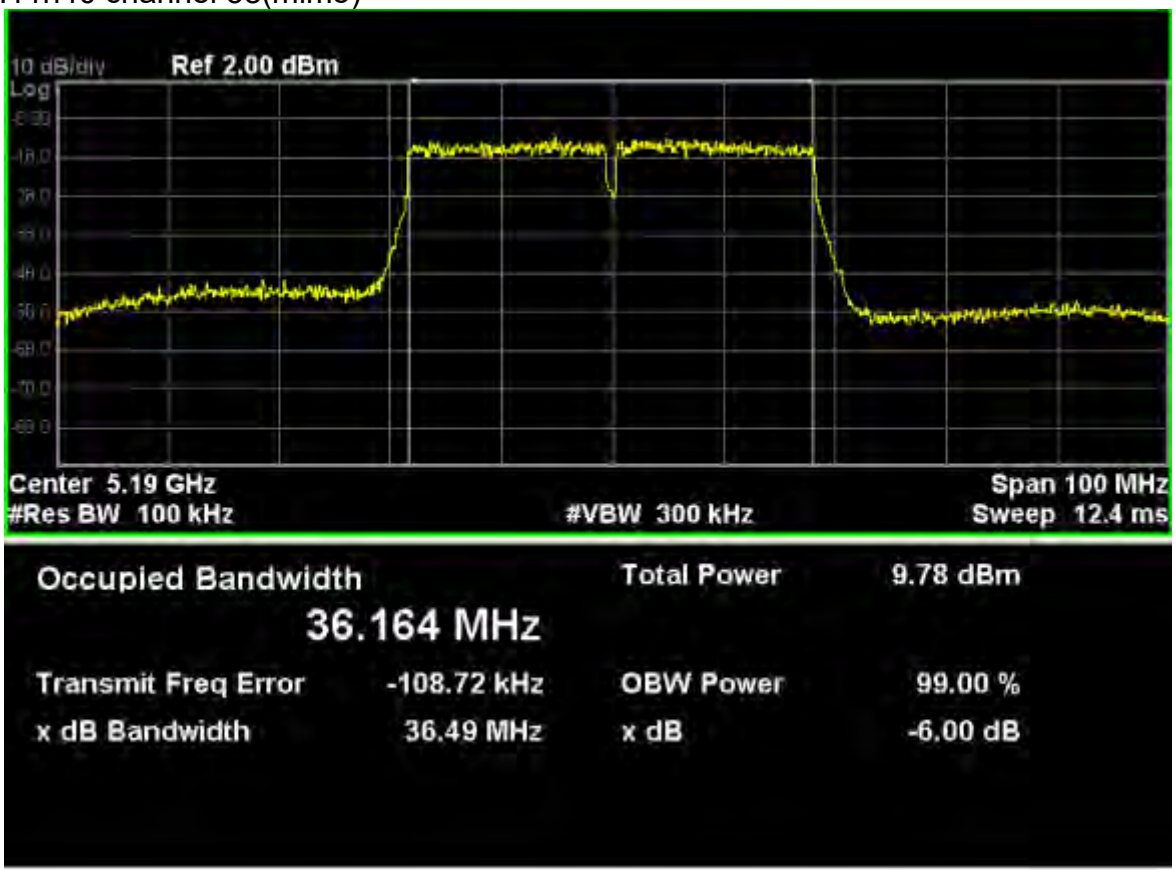


802.11n40

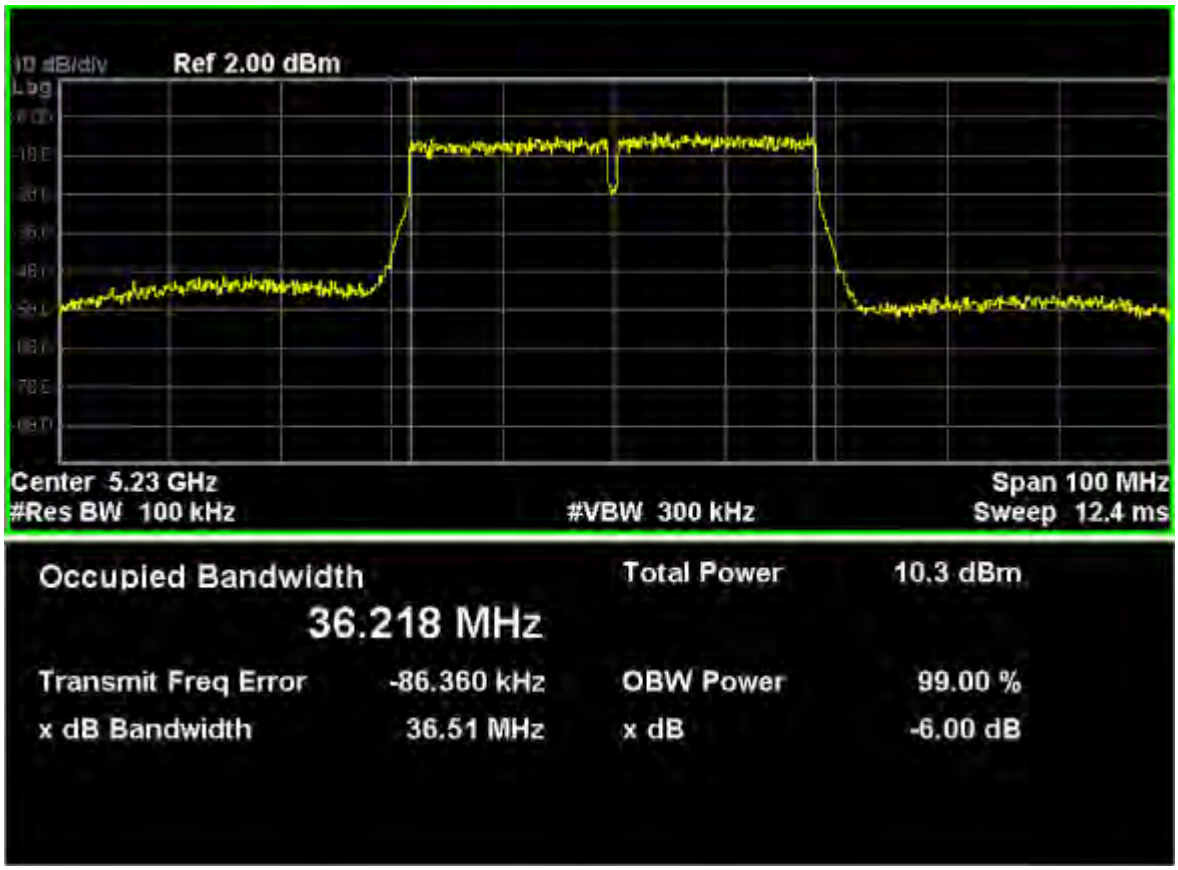
802.11n40 channel 38



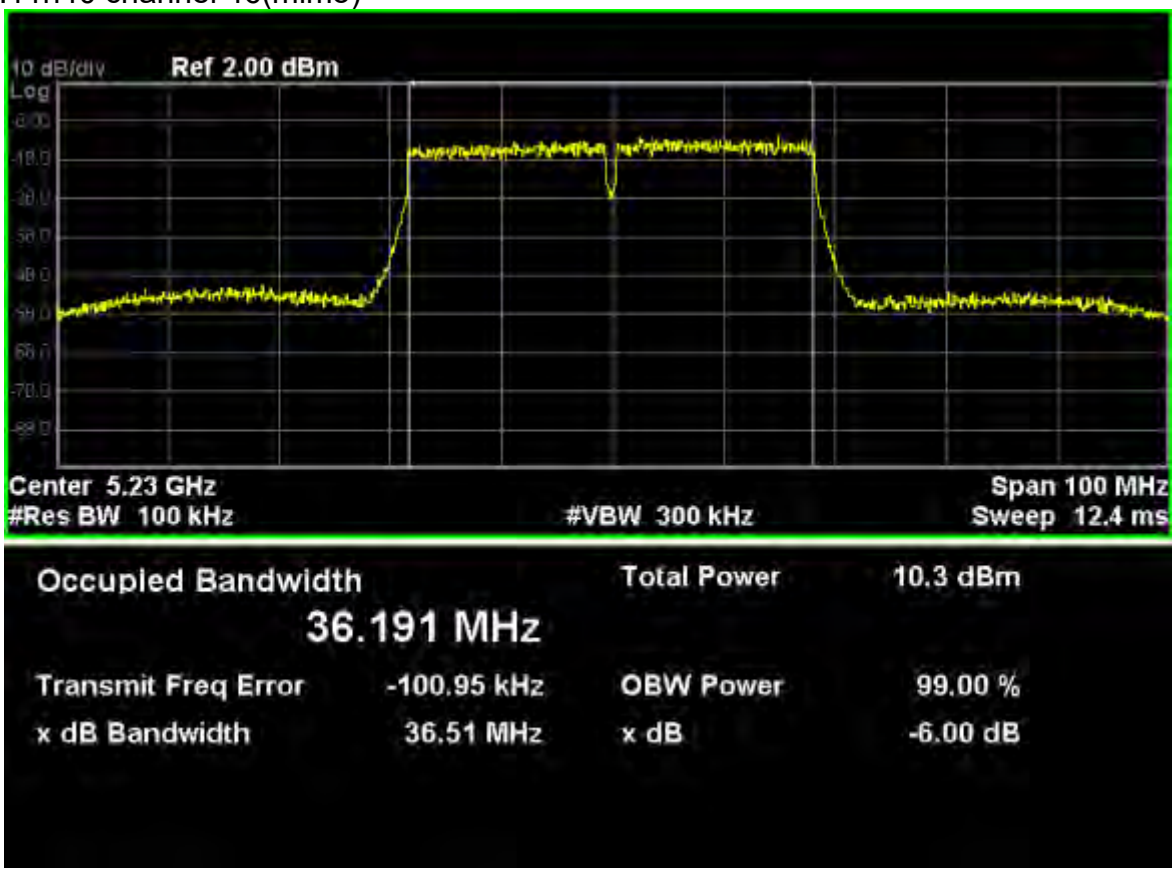
802.11n40 channel 38(mimo)



802.11n40 channel 46



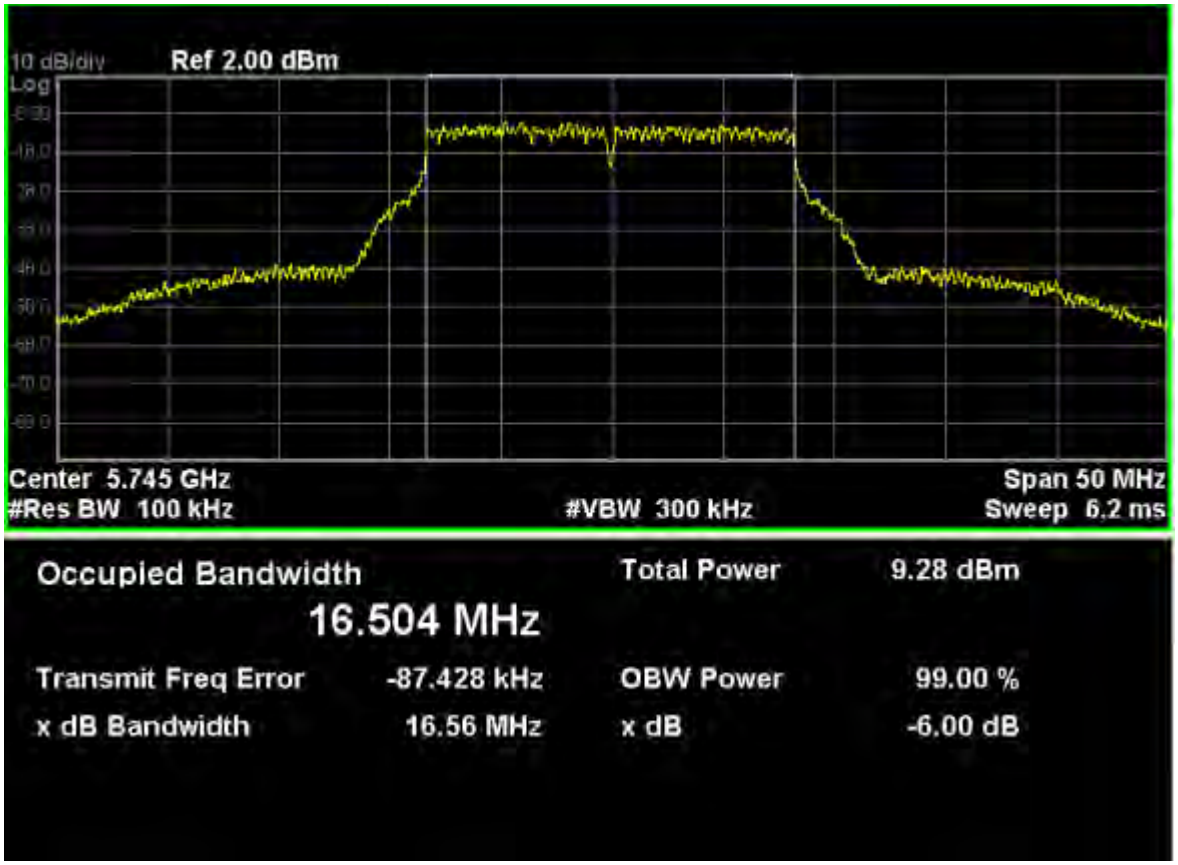
802.11n40 channel 46(mimo)



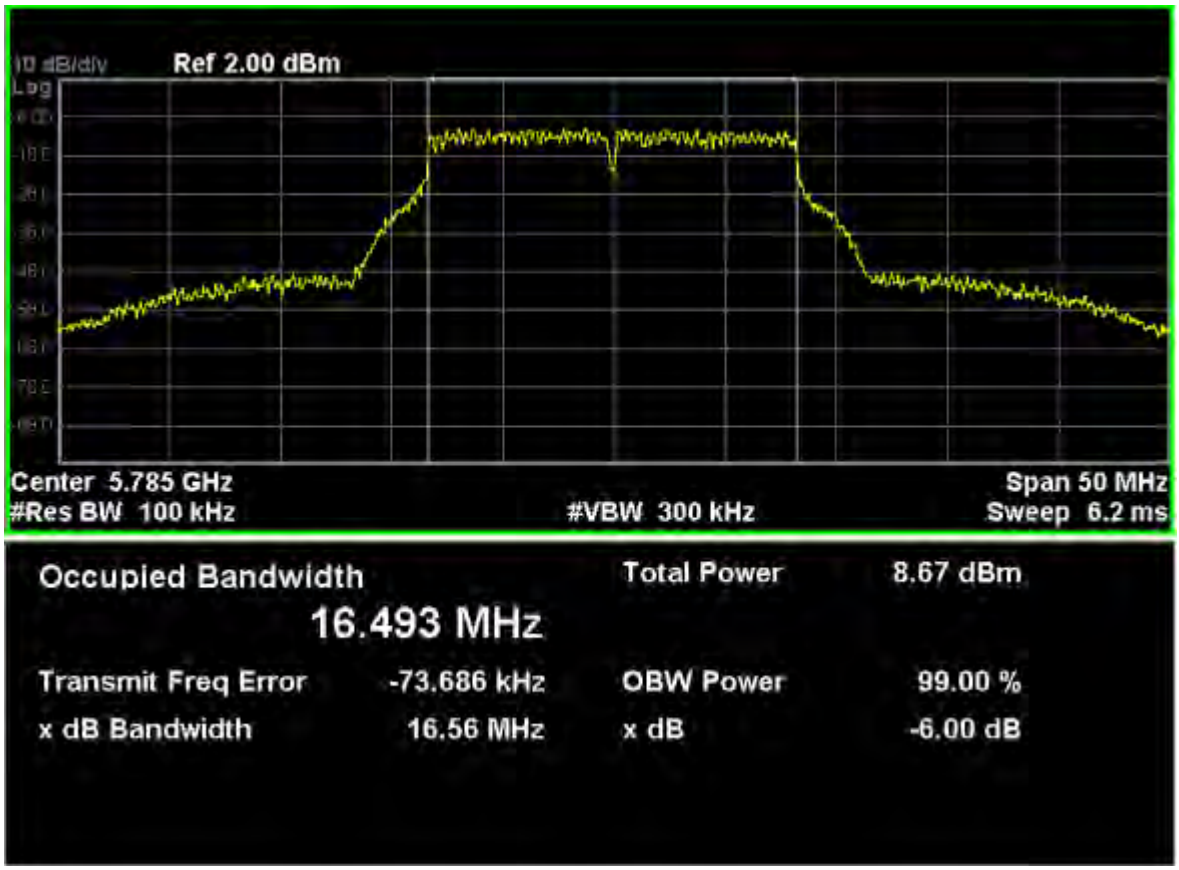
WIFI 5G(5725MHz-5850MHz)

802.11a

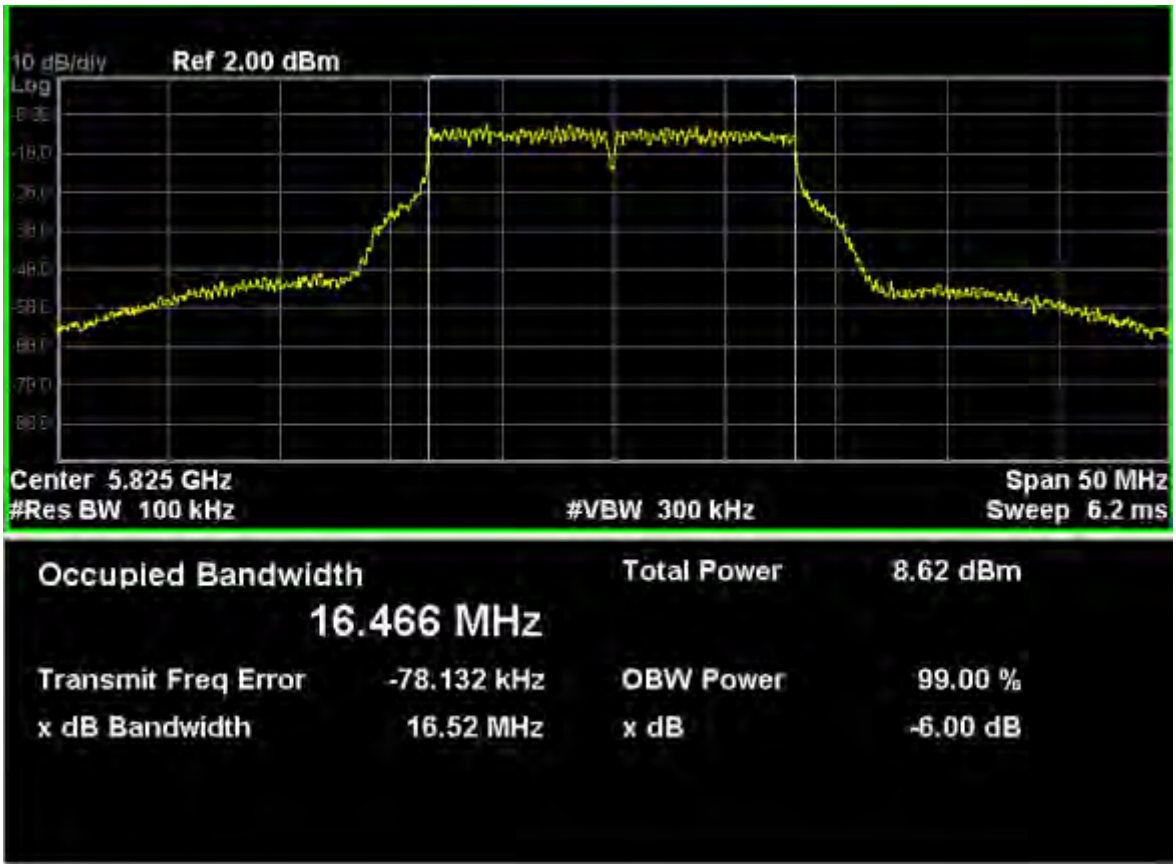
802.11a channel 149



802.11a channel 157

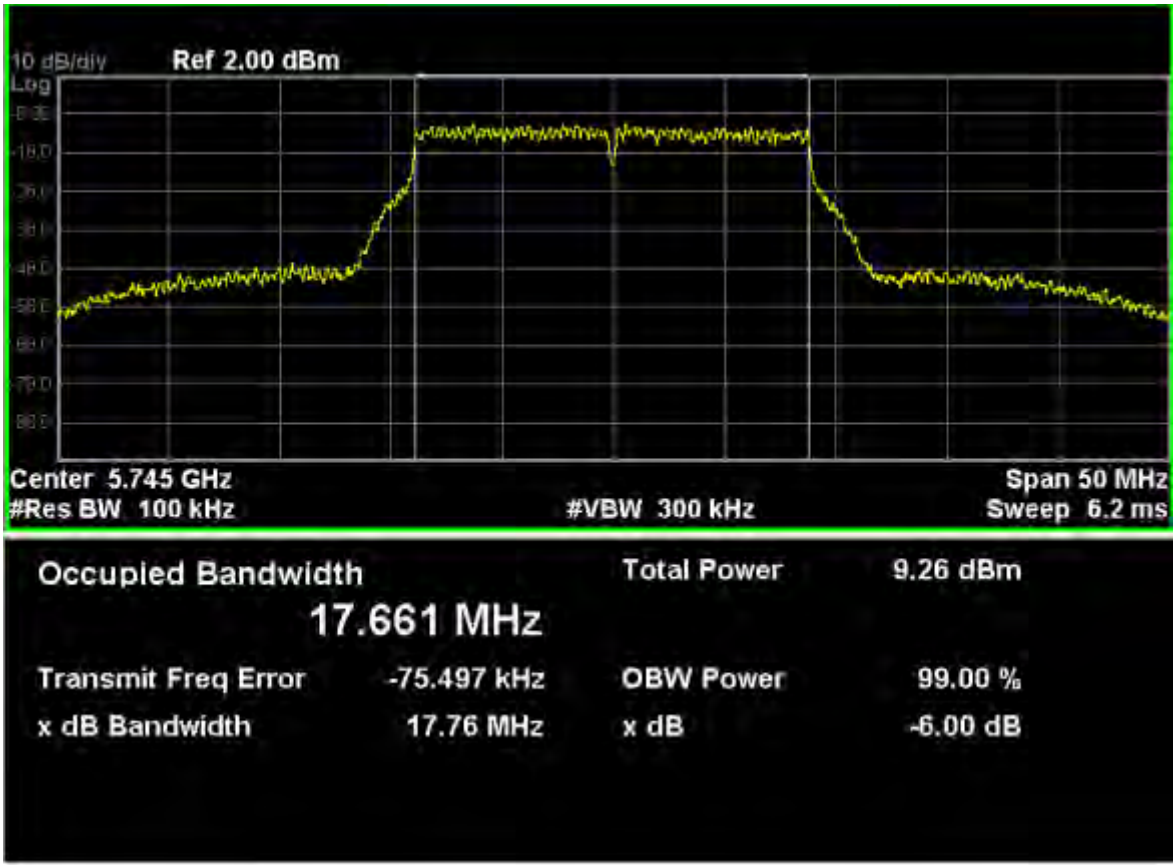


802.11a channel 165

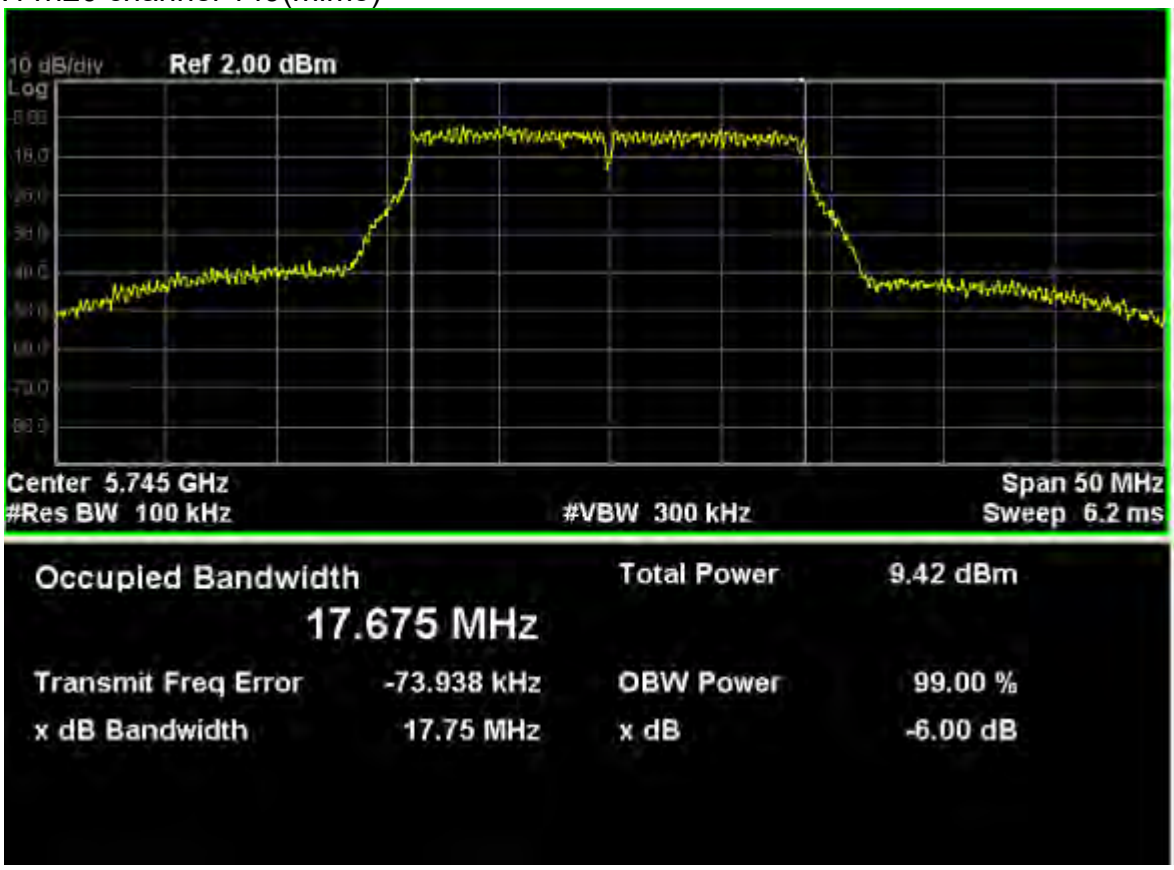


802.11n20

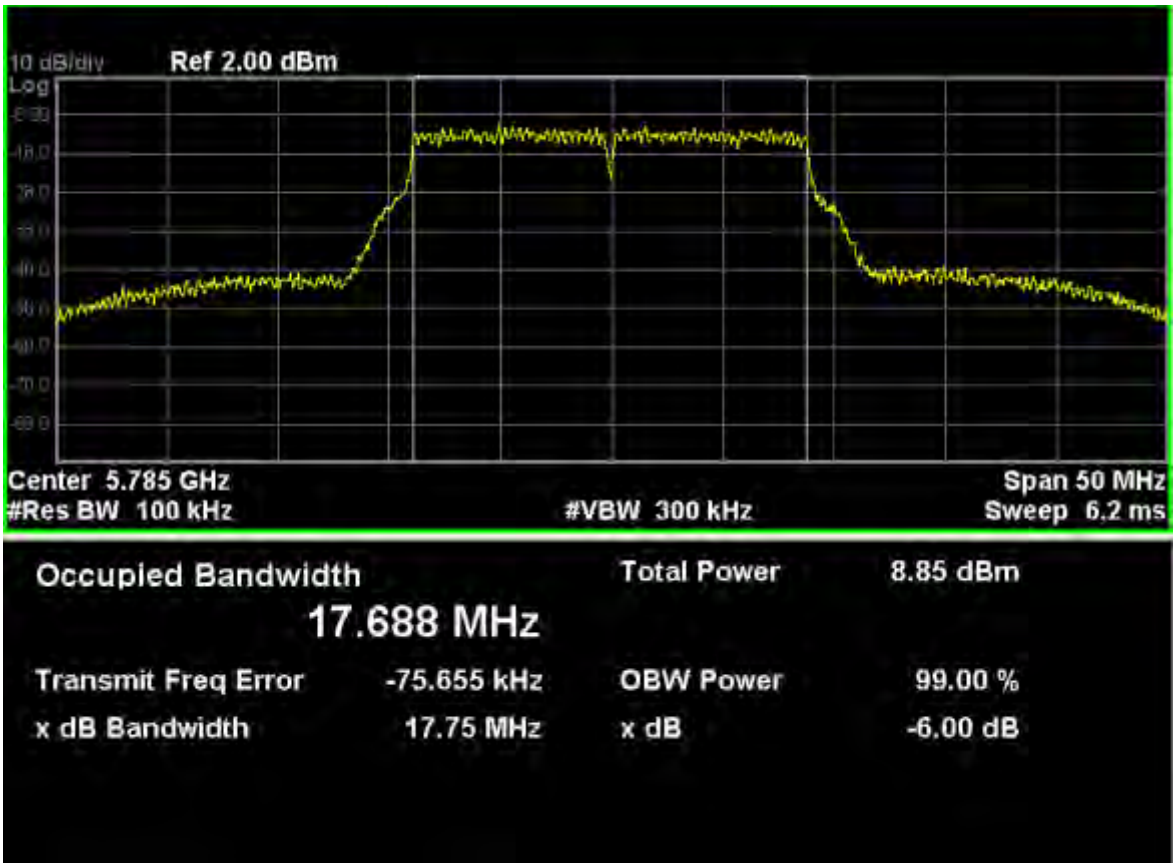
802.11n20 channel 149



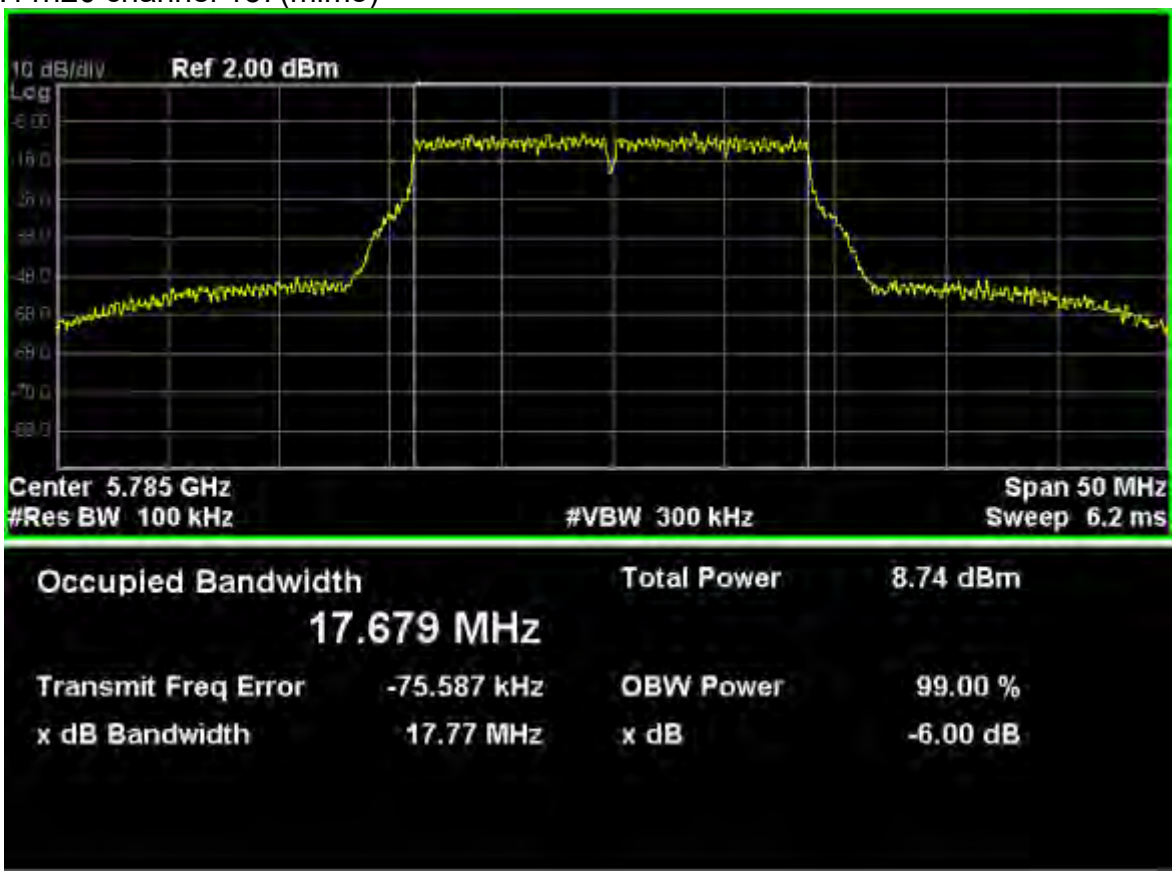
802.11n20 channel 149(mimo)



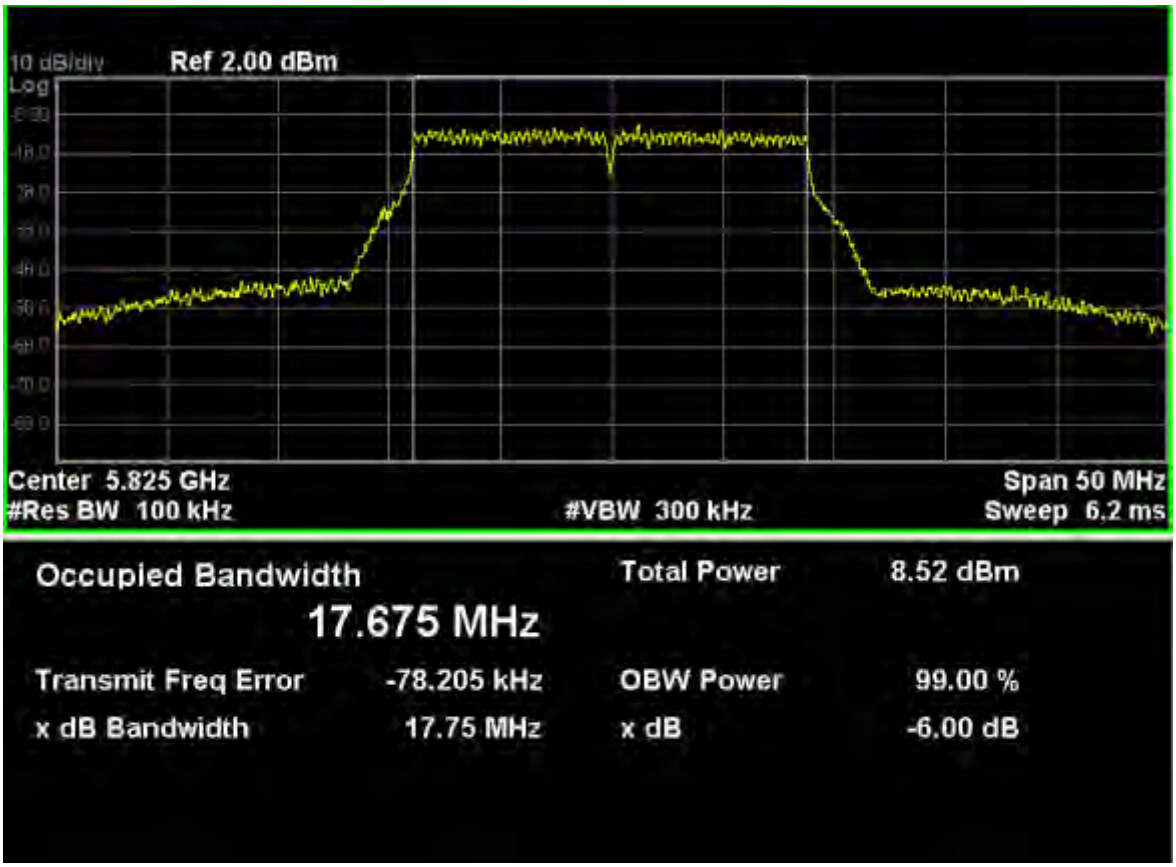
802.11n20 channel 157



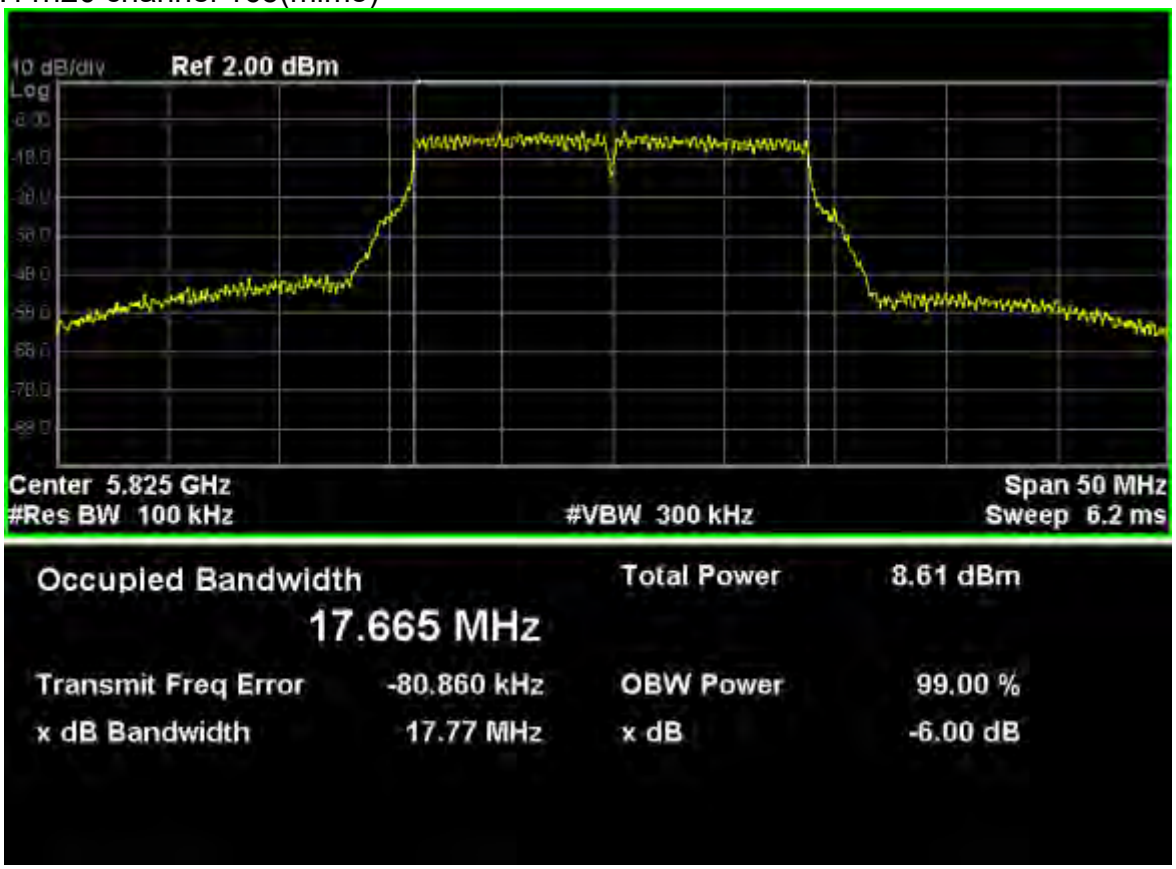
802.11n20 channel 157(mimo)



802.11n20 channel 165

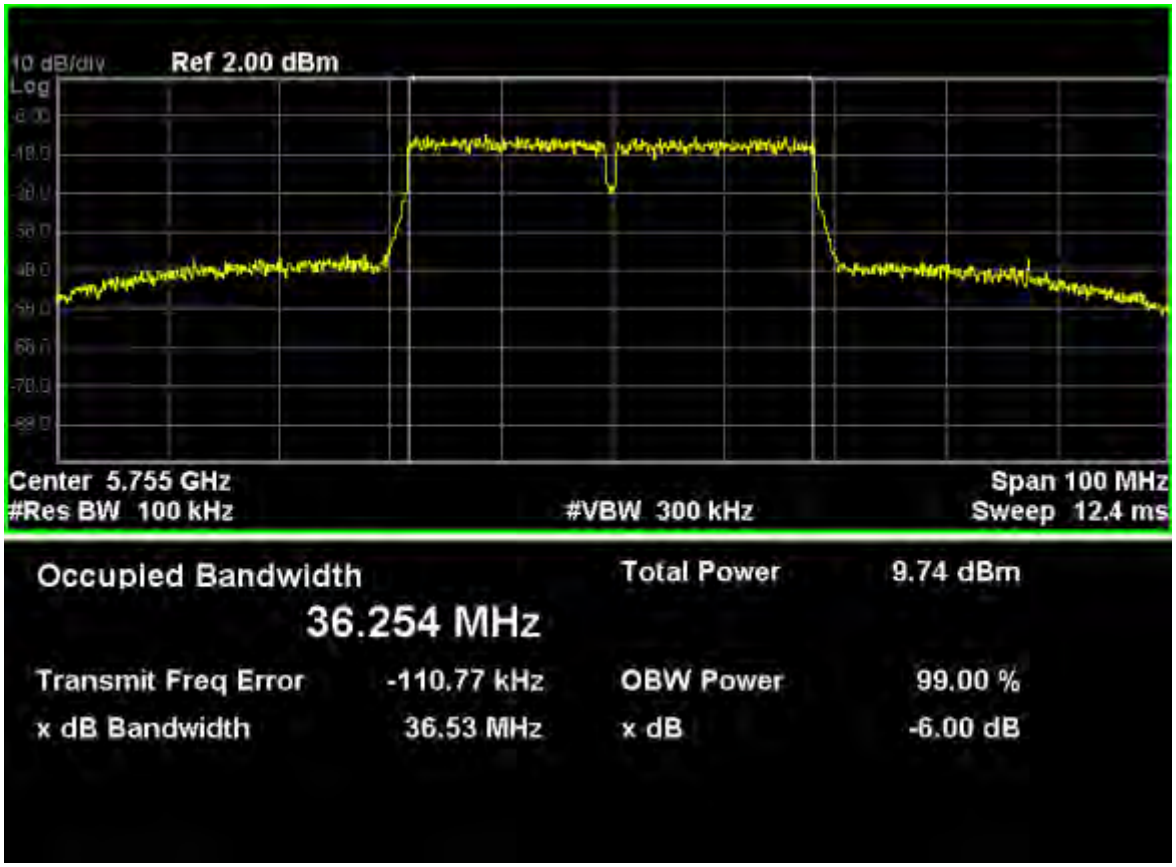


802.11n20 channel 165(mimo)



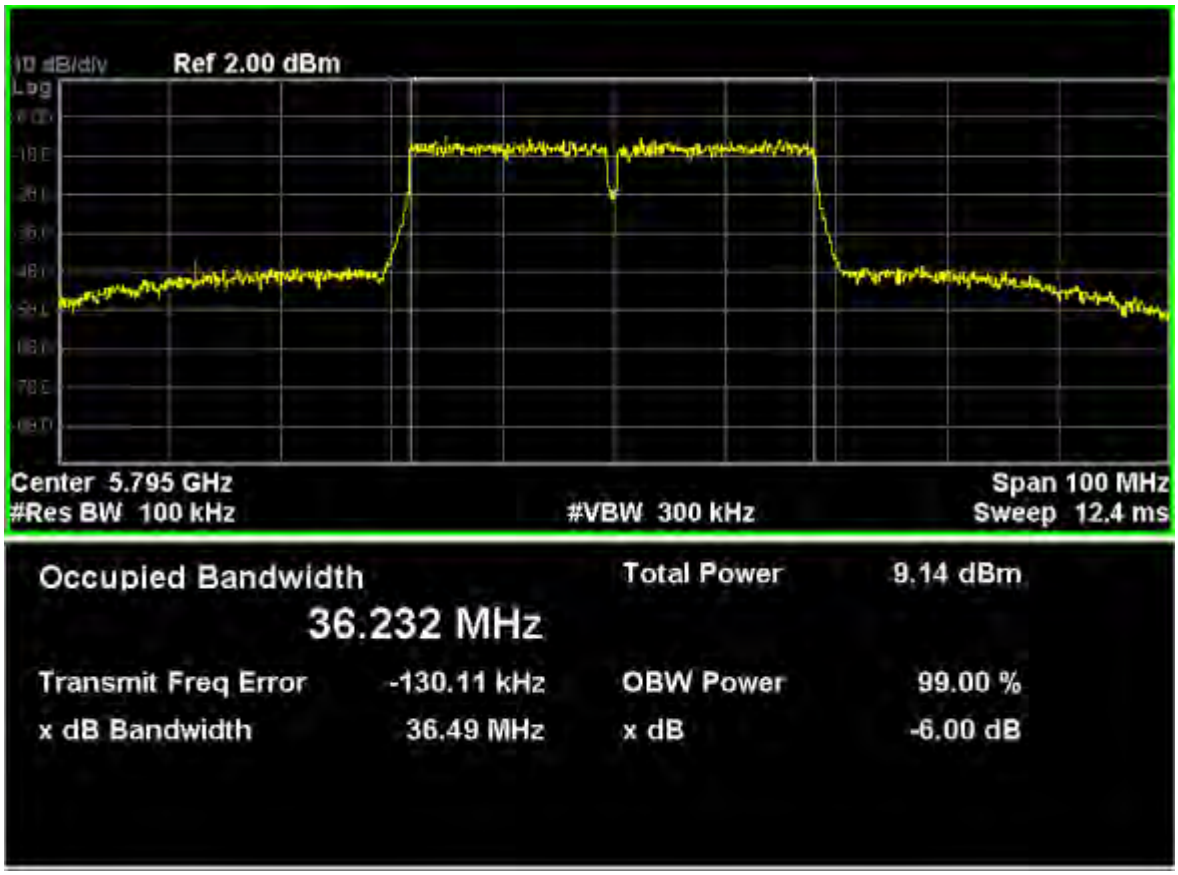
802.11n40

802.11n40 channel 151

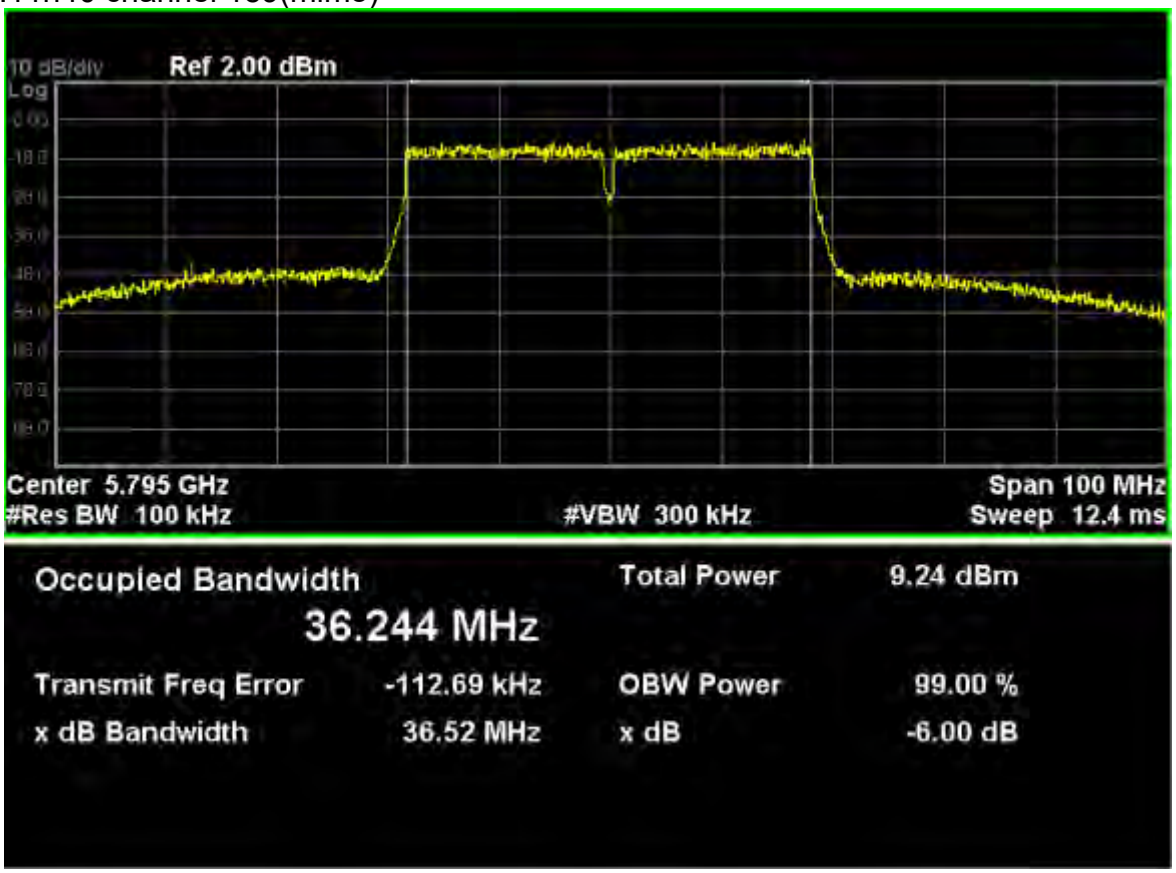


802.11n40 channel 151(mimo)

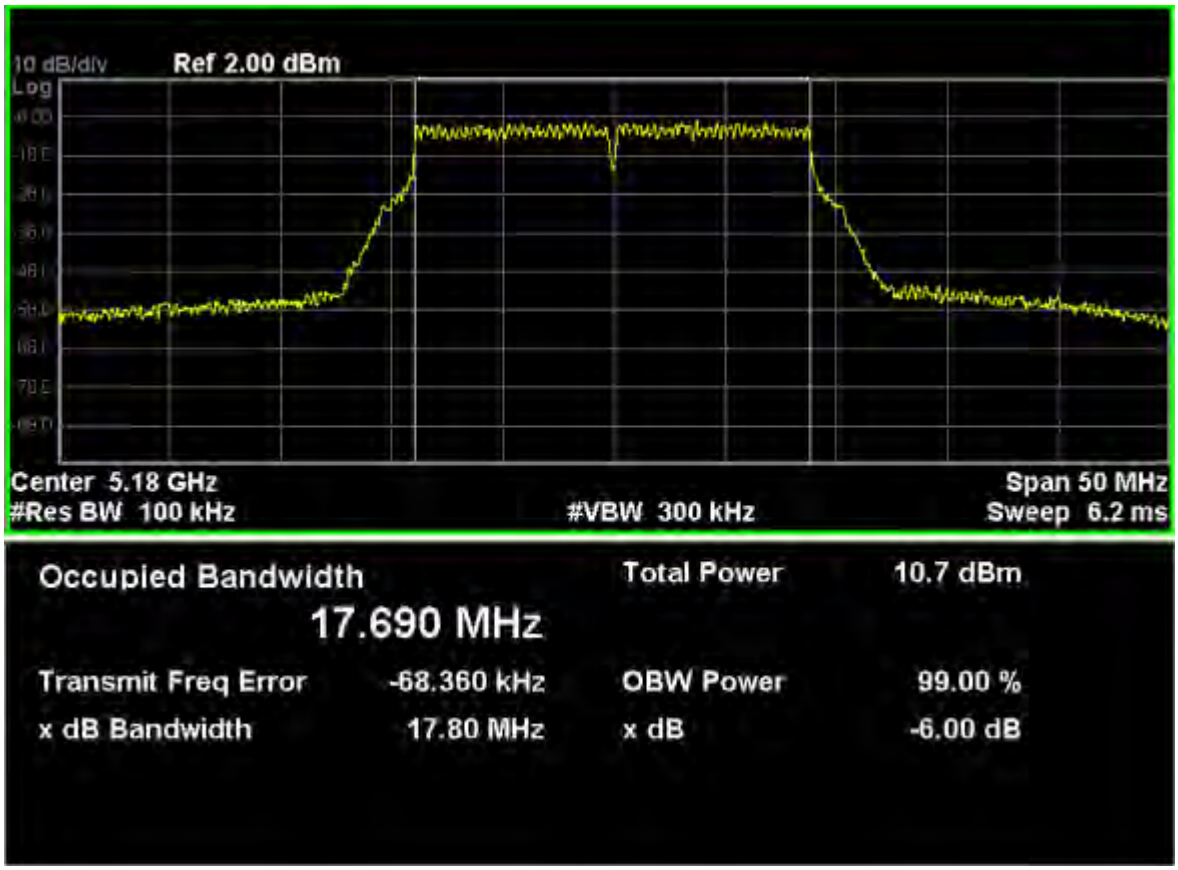
802.11n40 channel 159



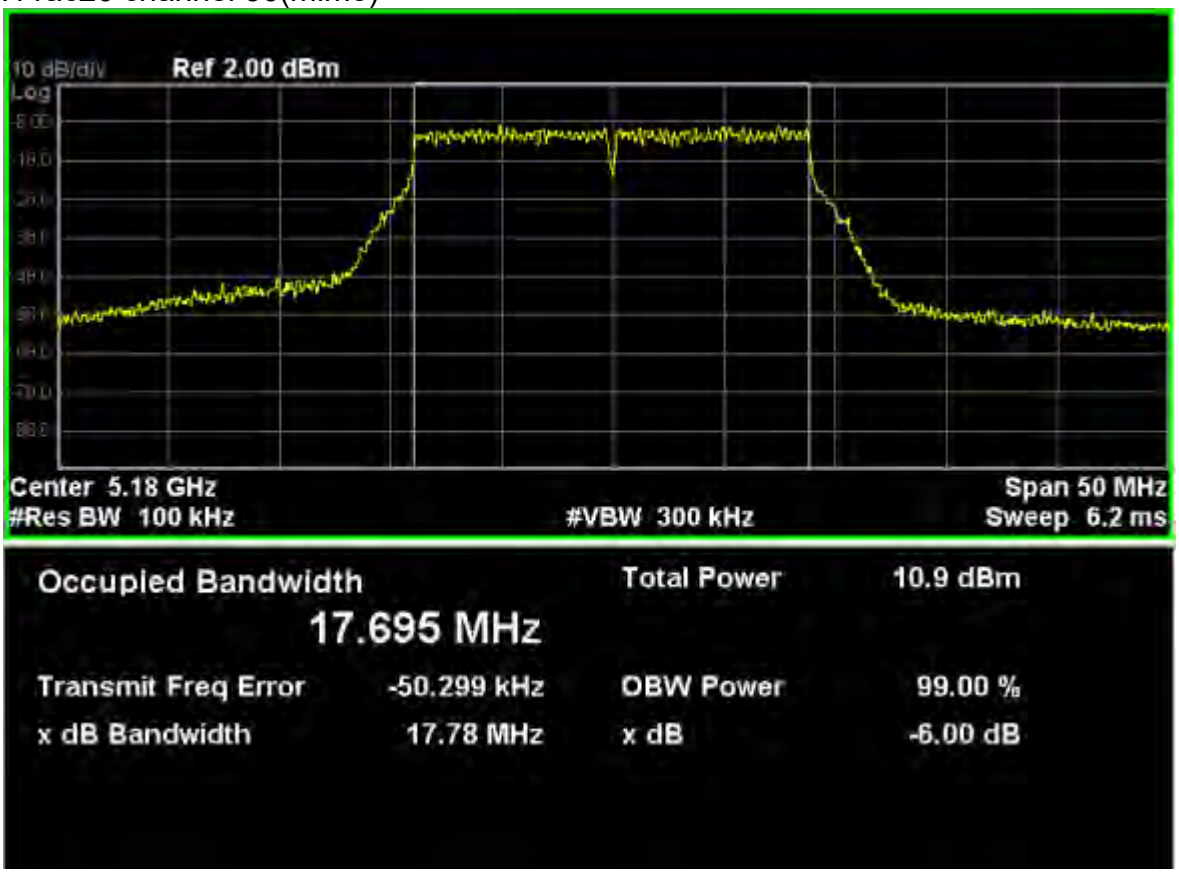
802.11n40 channel 159(mimo)



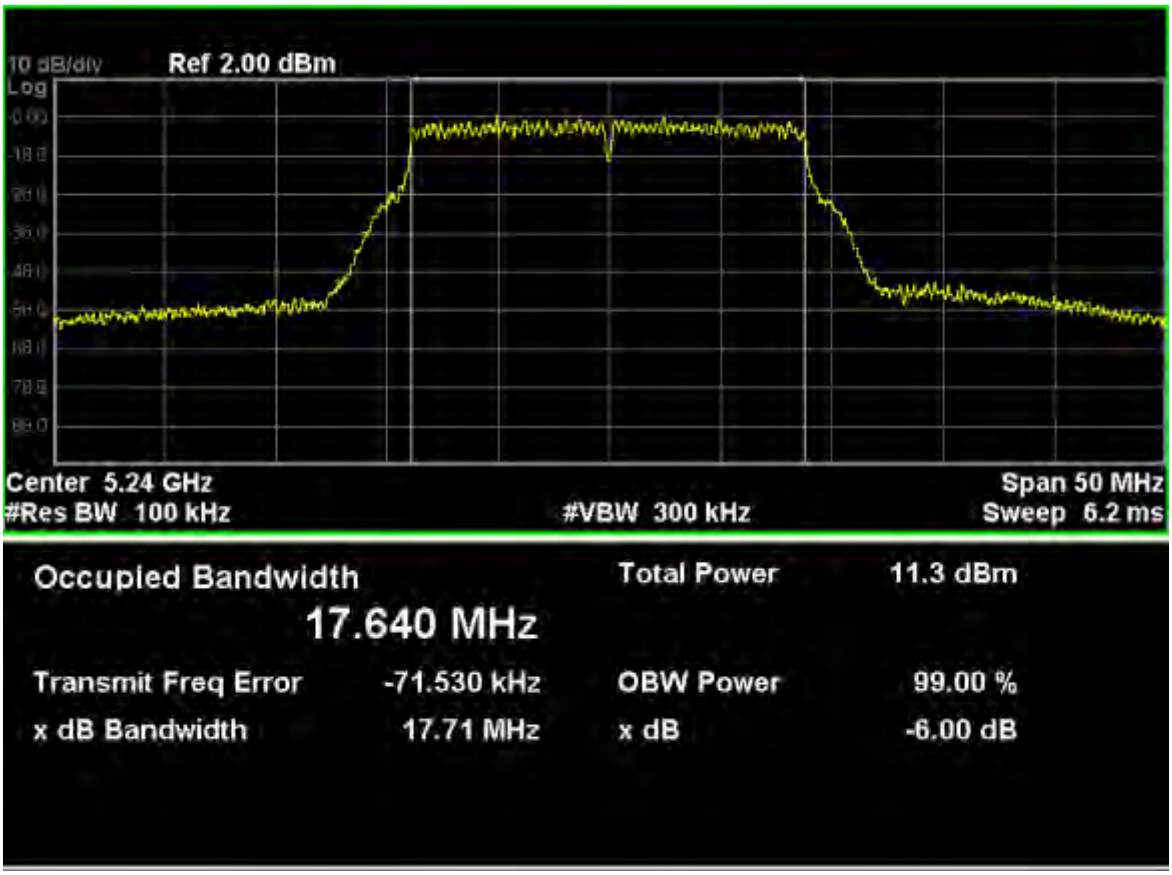
802.11ac(5150MHz-5250MHz)
802.11ac20
802.11ac20 channel 36



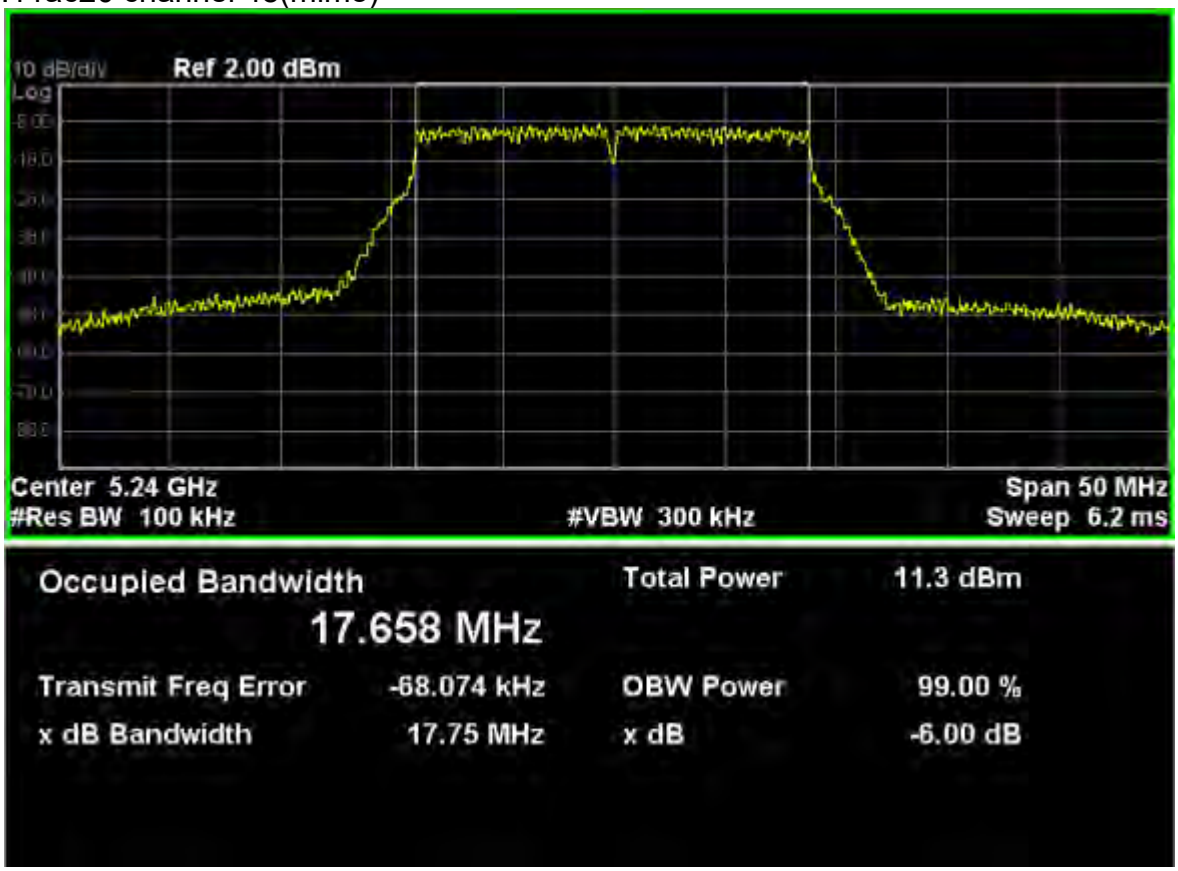
802.11ac20 channel 36(mimo)



802.11ac20 channel 48

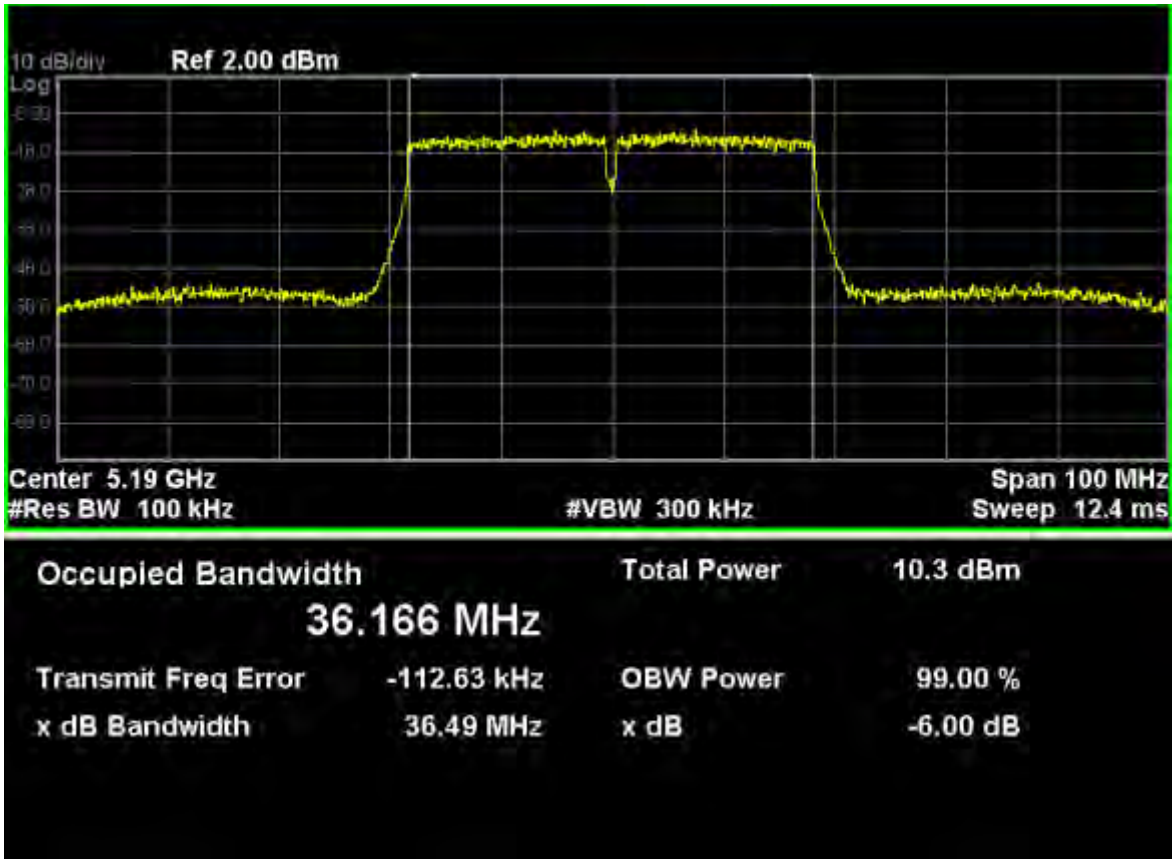


802.11ac20 channel 48(mimo)

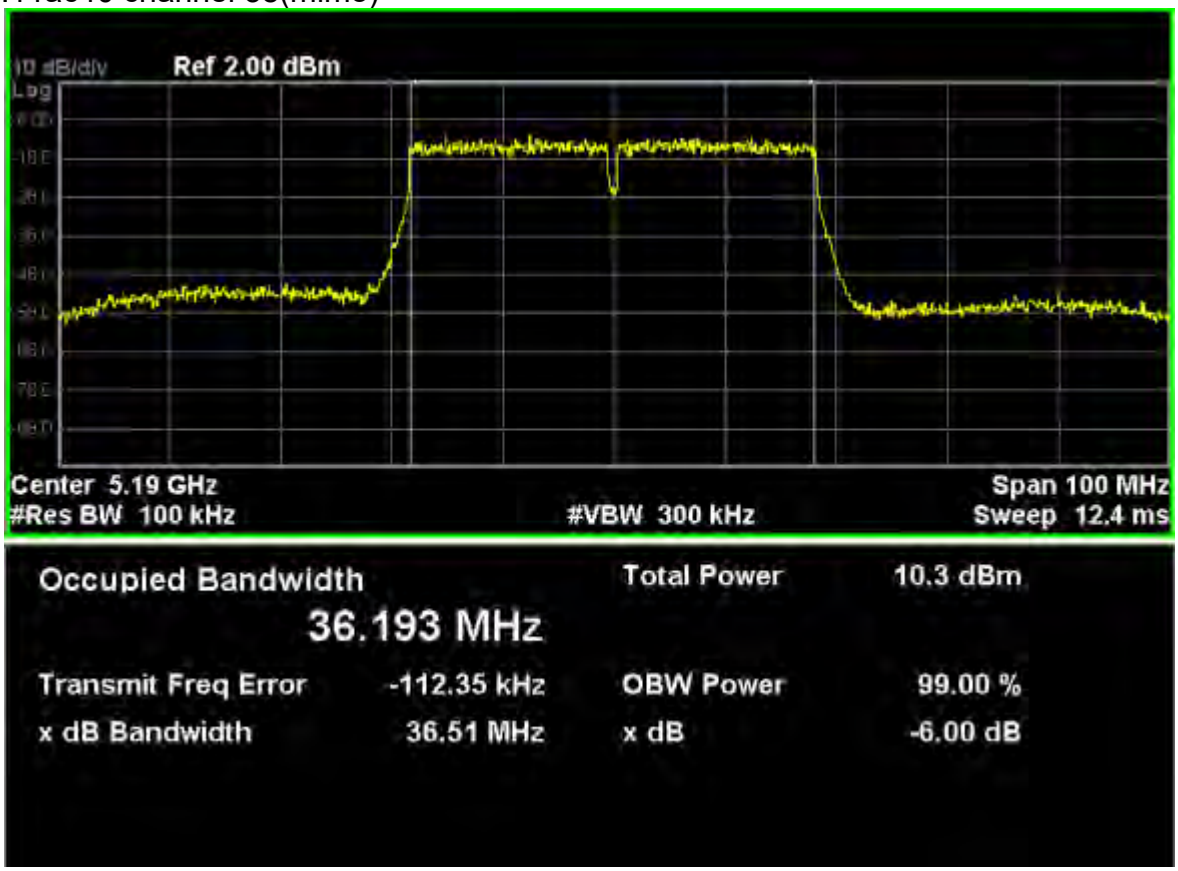


802.11ac40

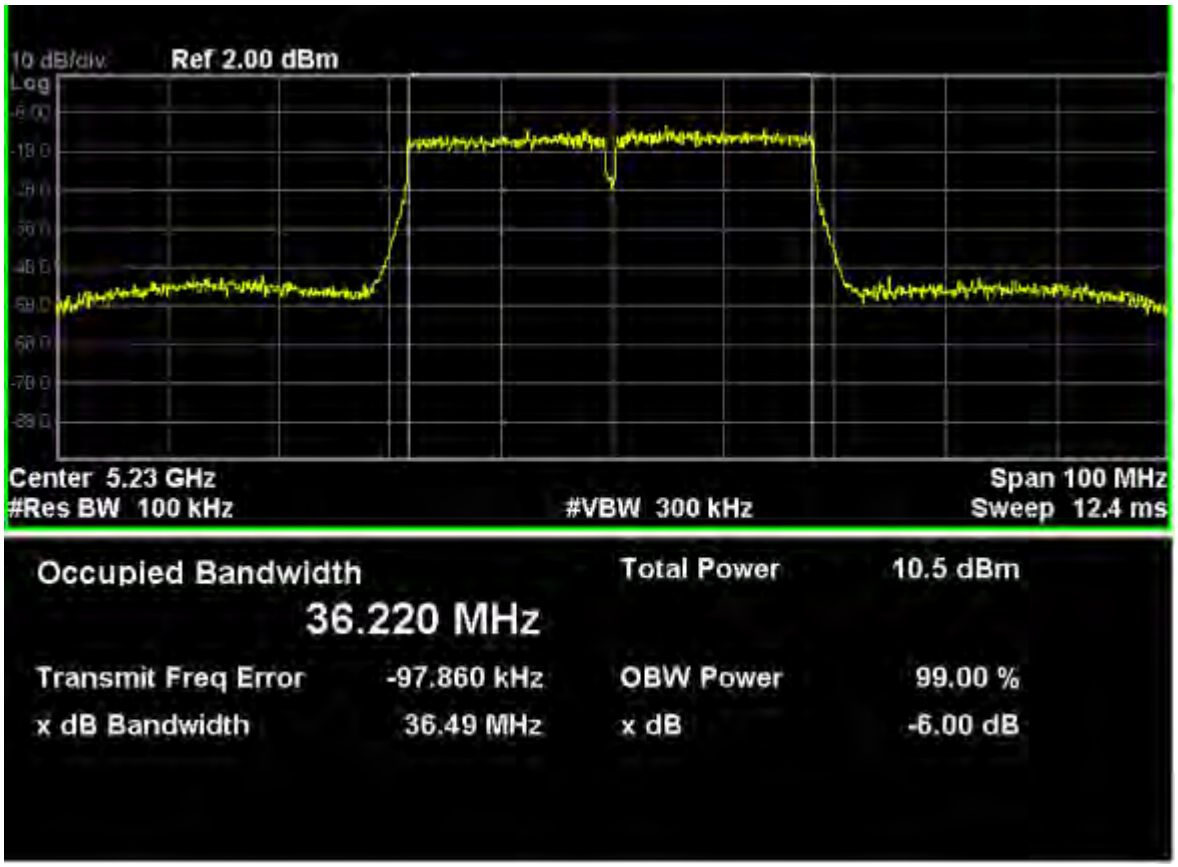
802.11ac40 channel 38



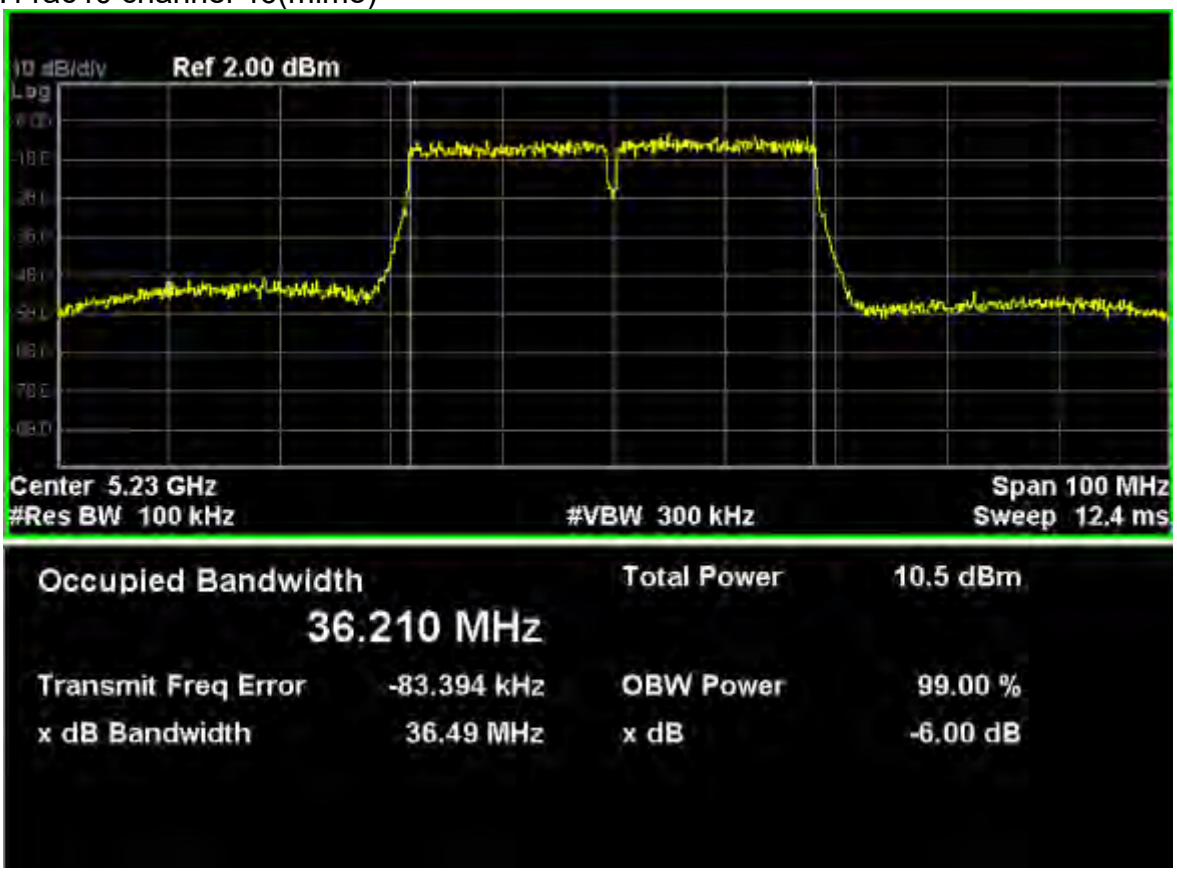
802.11ac40 channel 38(mimo)



802.11ac40 channel 46

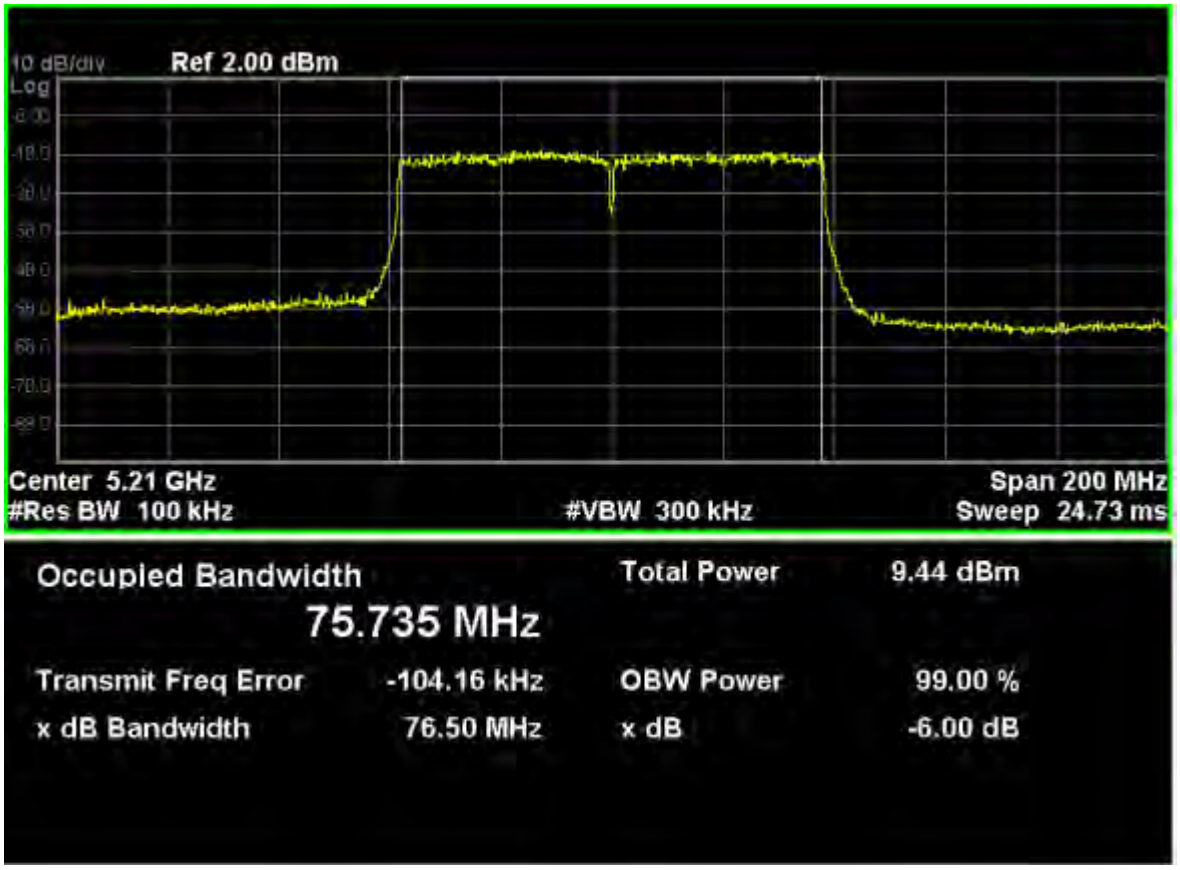


802.11ac40 channel 46(mimo)

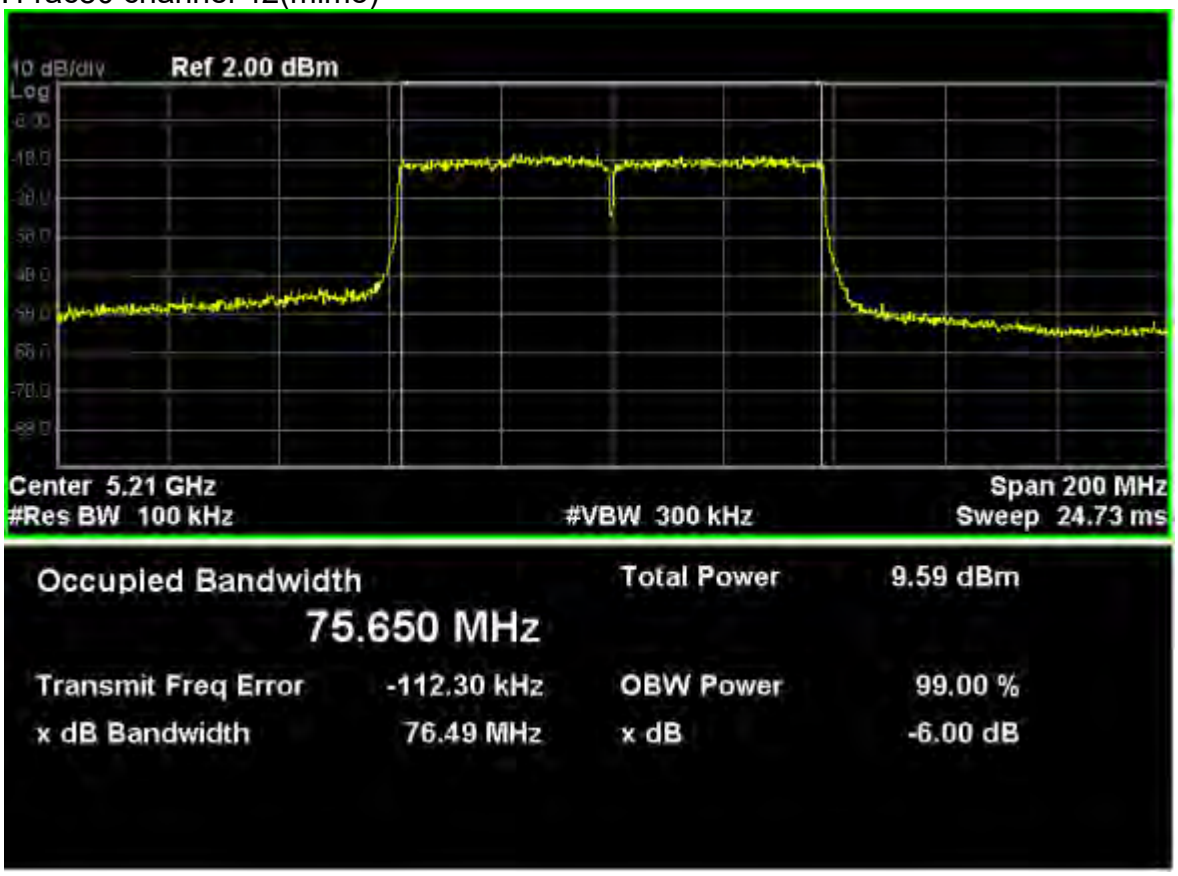


802.11ac80

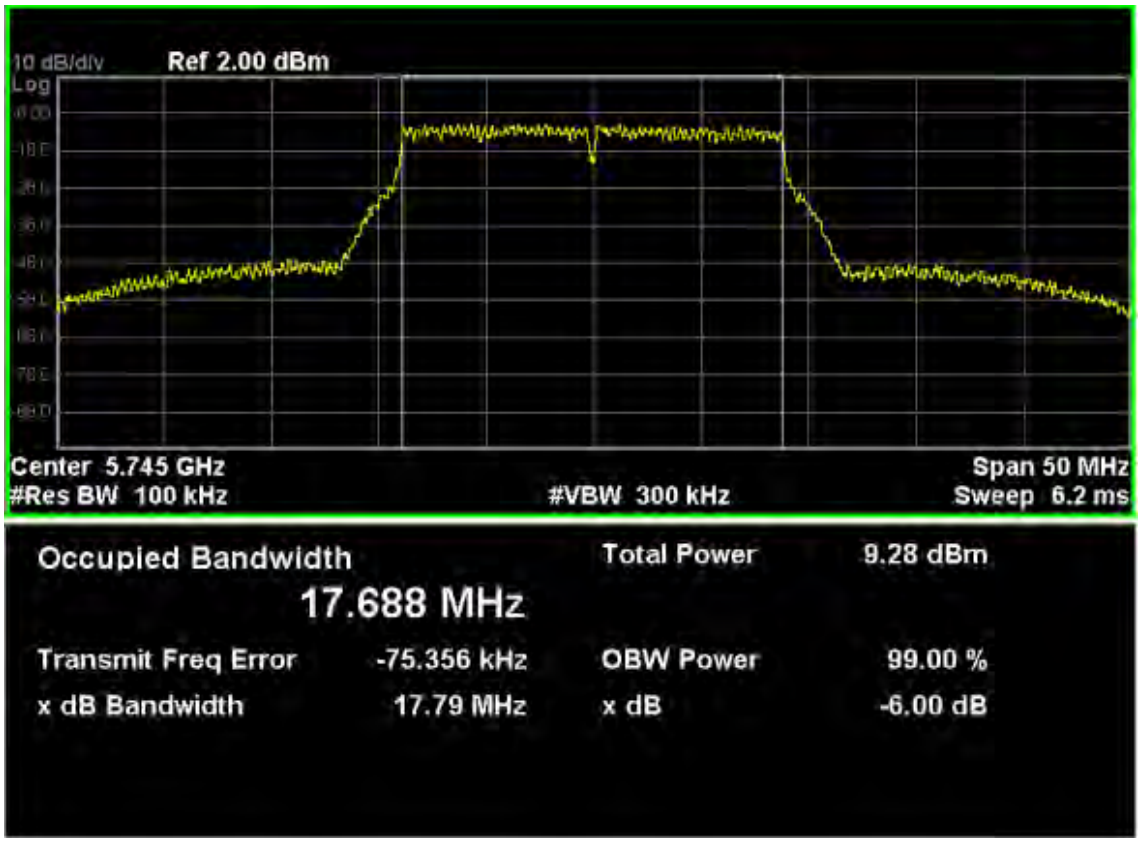
802.11ac80 channel 42



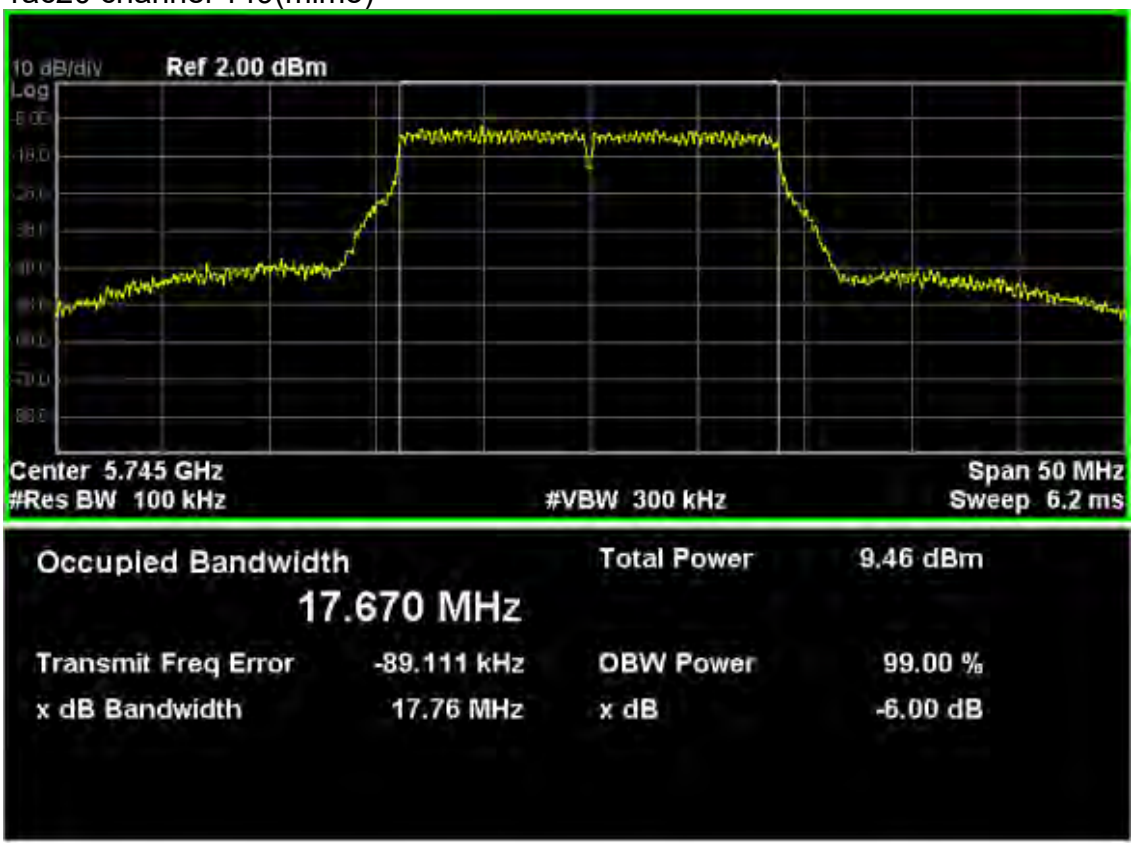
802.11ac80 channel 42(mimo)



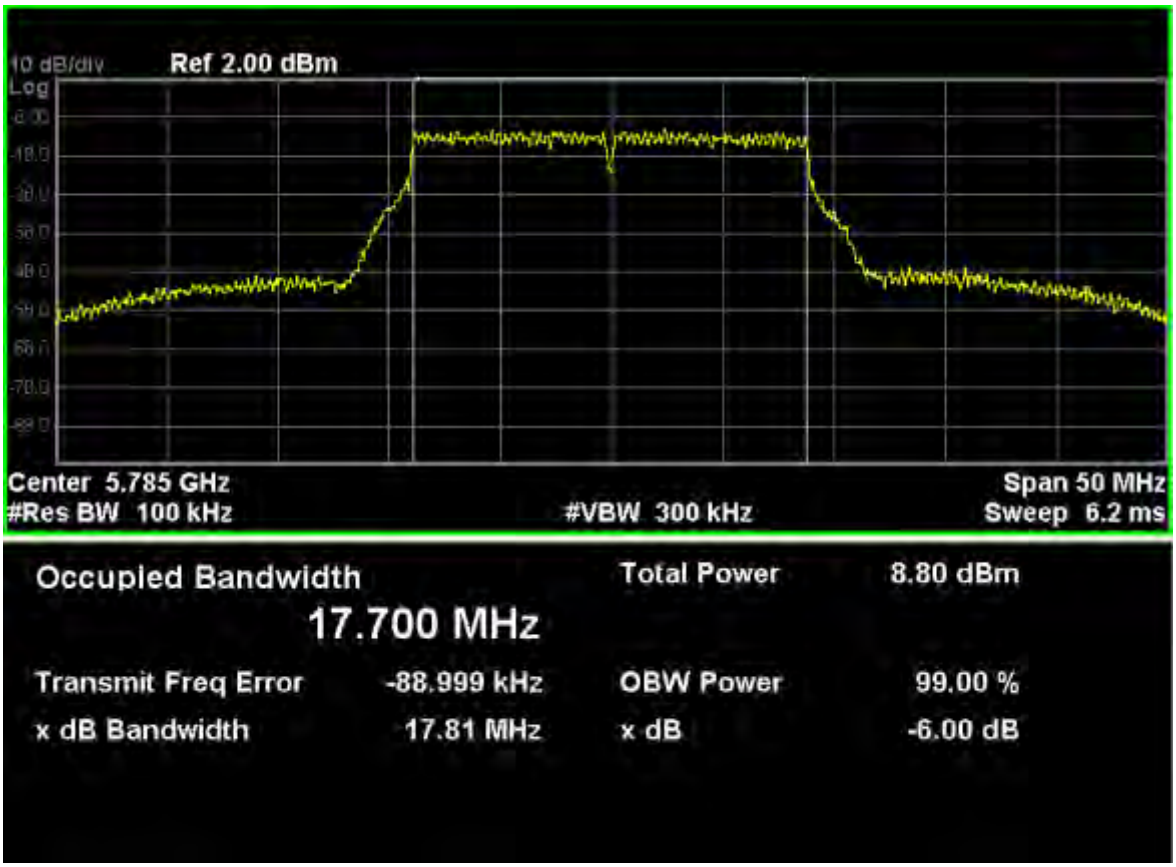
802.11ac(5725MHz-5850MHz)
802.11ac20
802.11ac20 channel 149



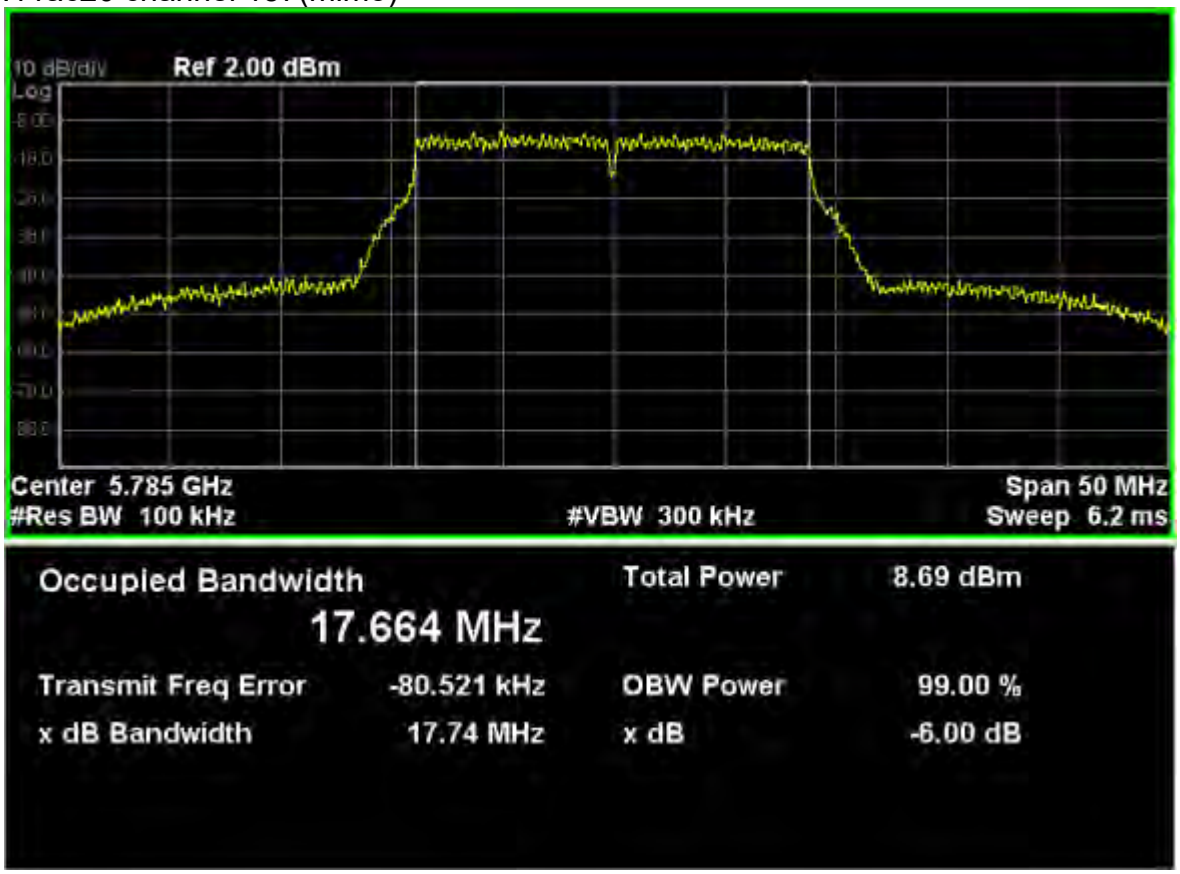
802.11ac20 channel 149(mimo)



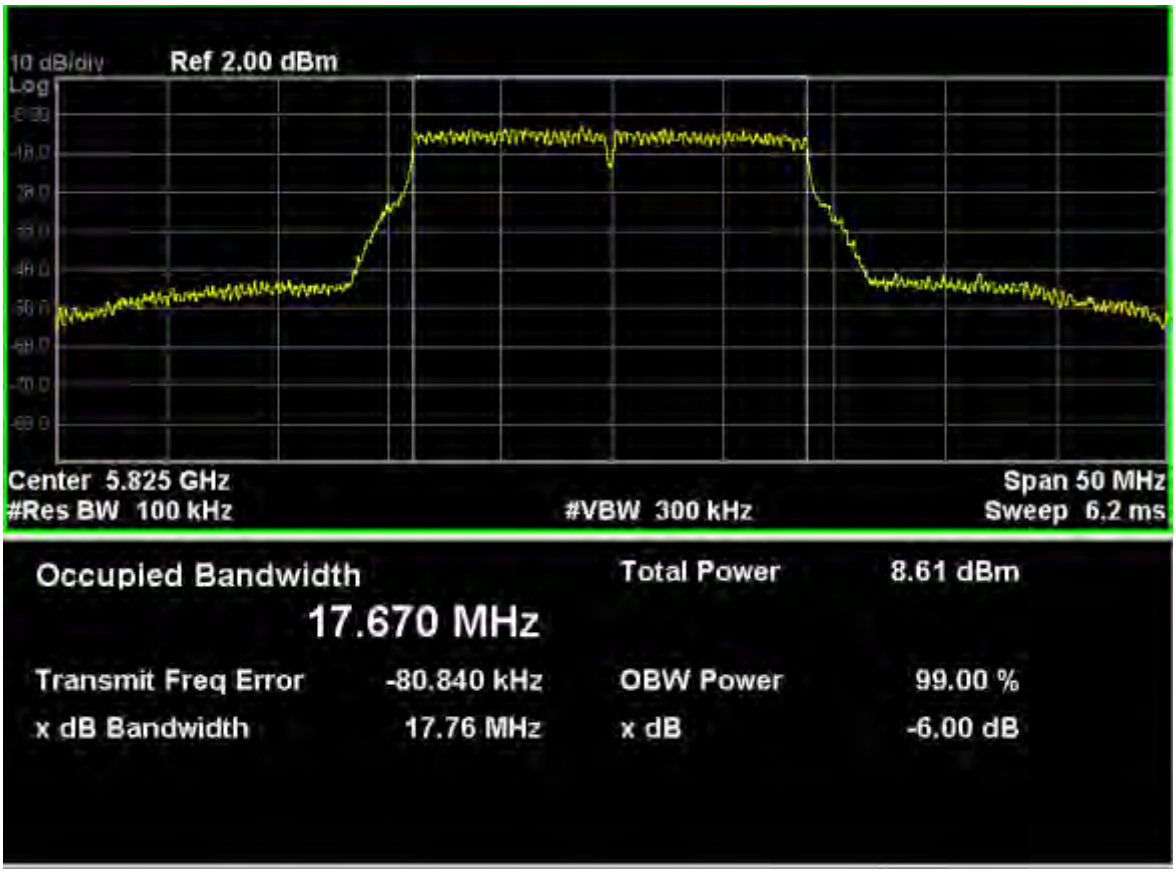
802.11ac20 channel 157



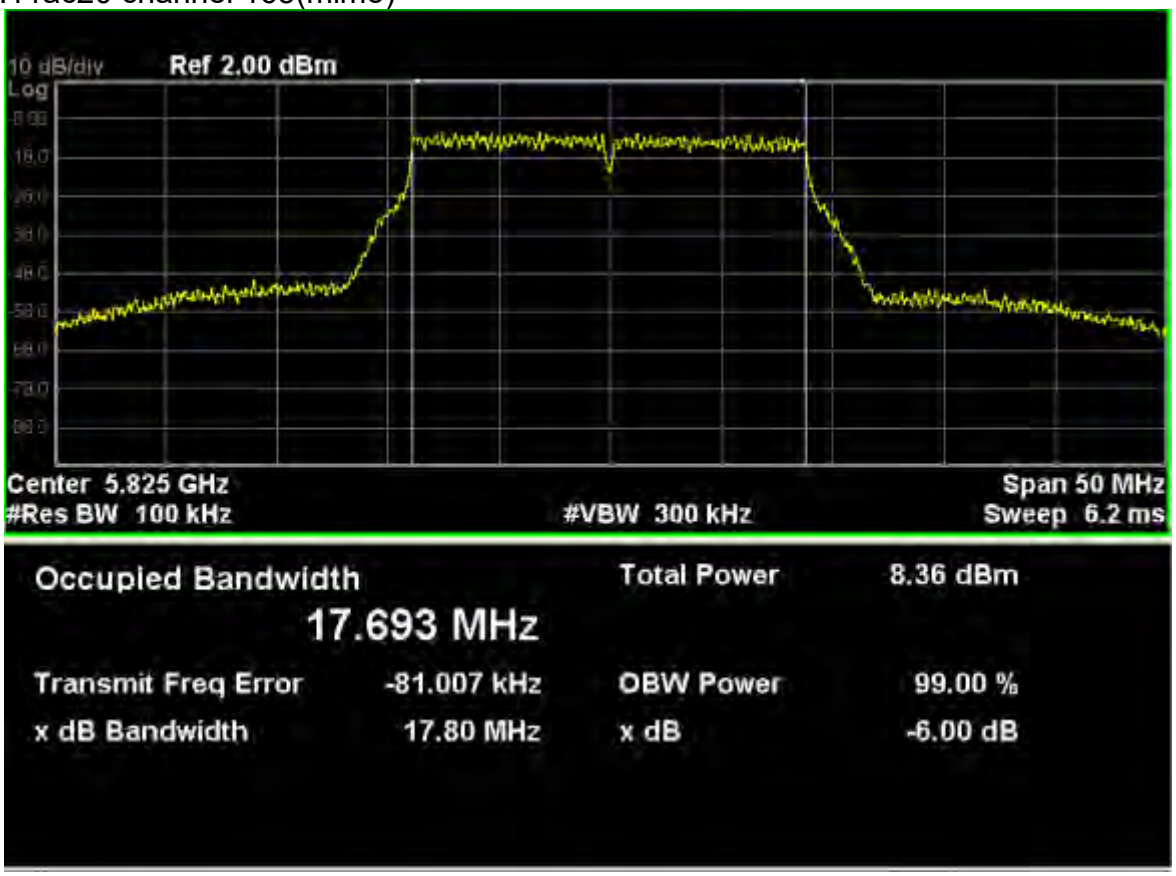
802.11ac20 channel 157(mimo)



802.11ac20 channel 165

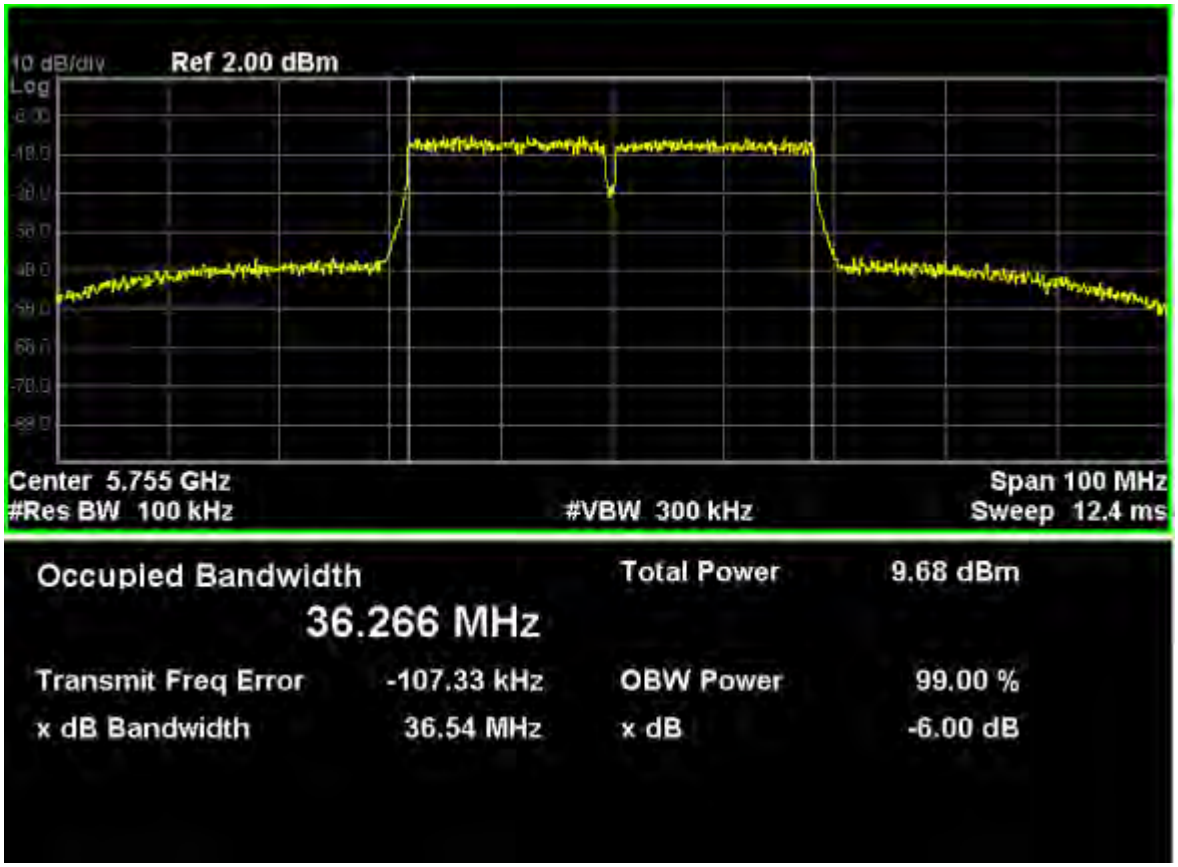


802.11ac20 channel 165(mimo)

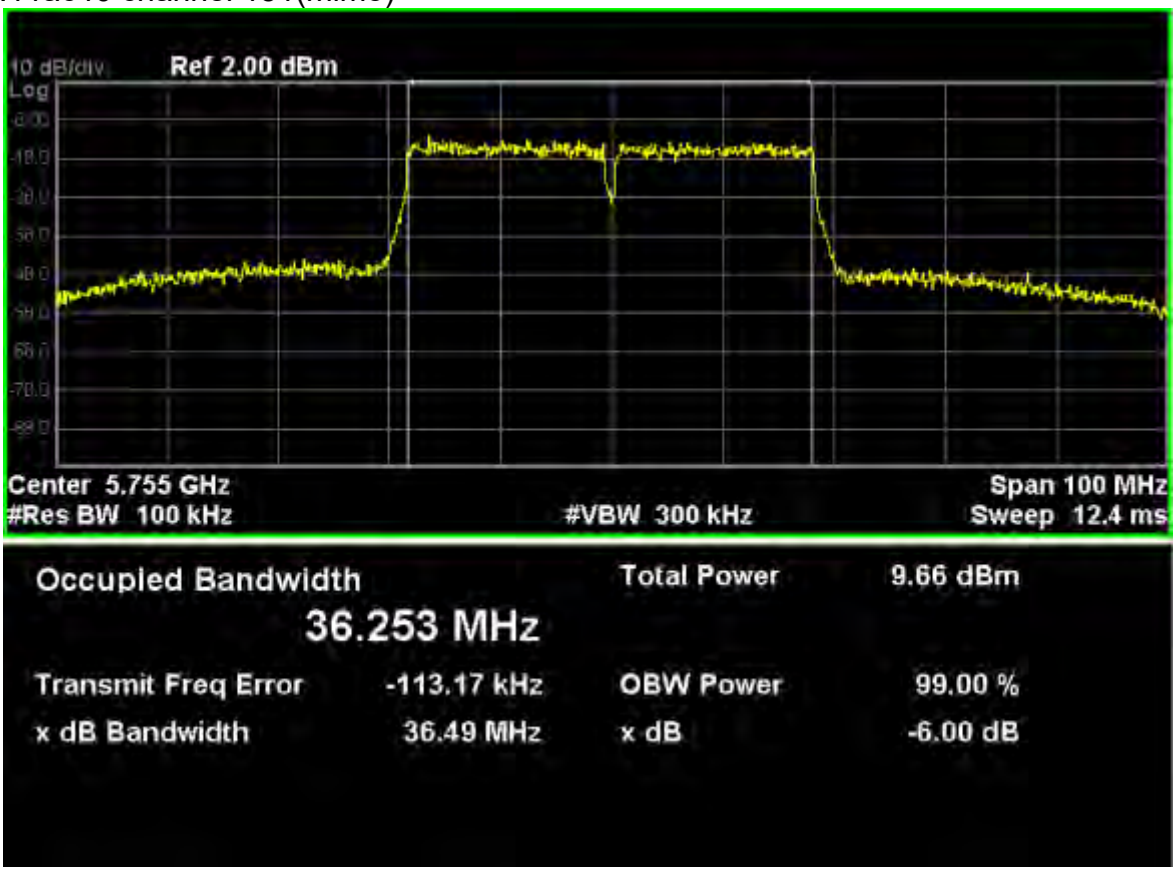


802.11ac40

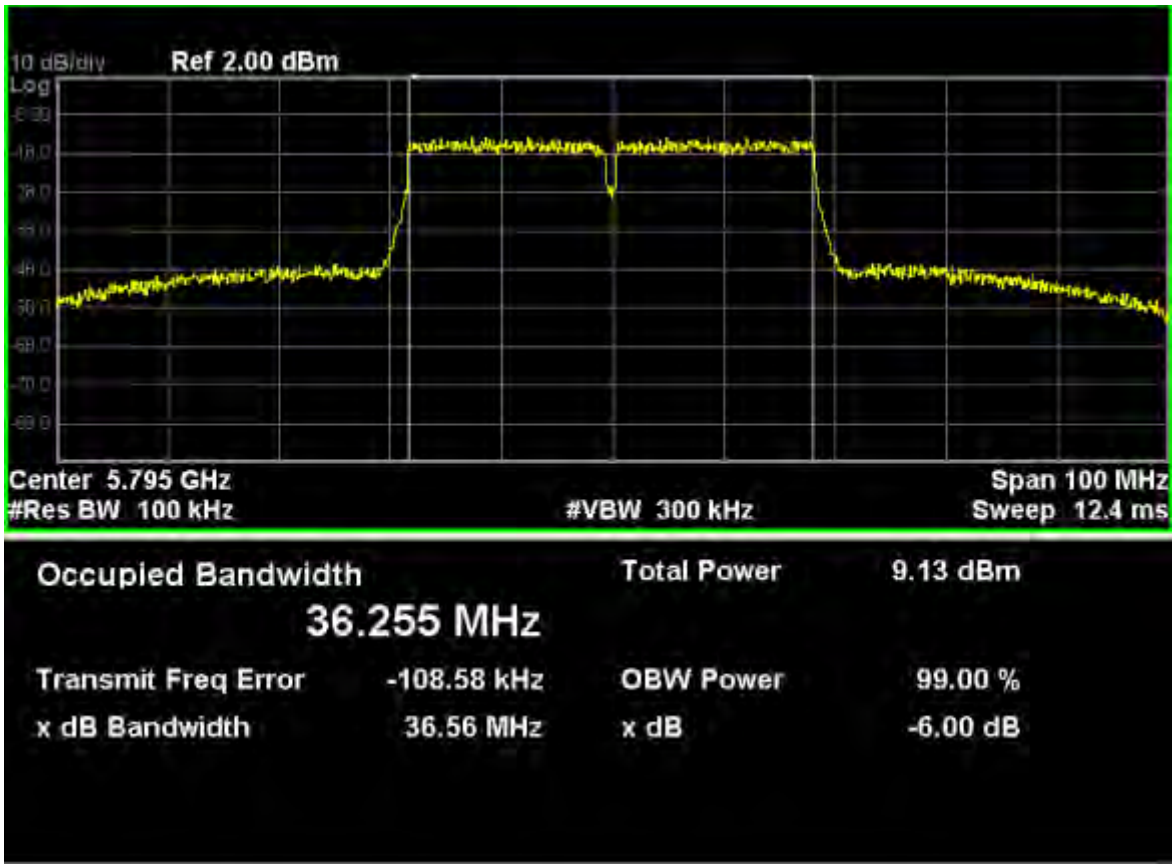
802.11ac40 channel 151



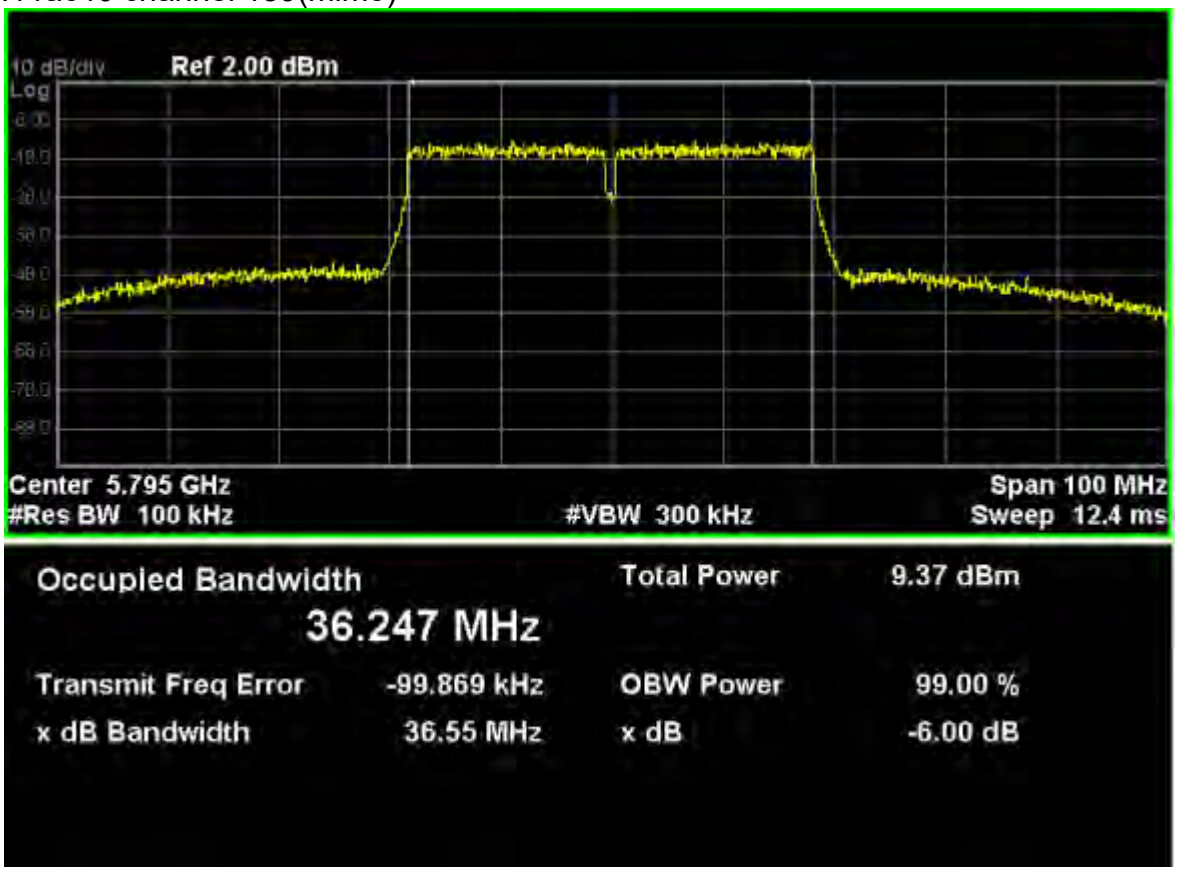
802.11ac40 channel 151(mimo)



802.11ac40 channel 159

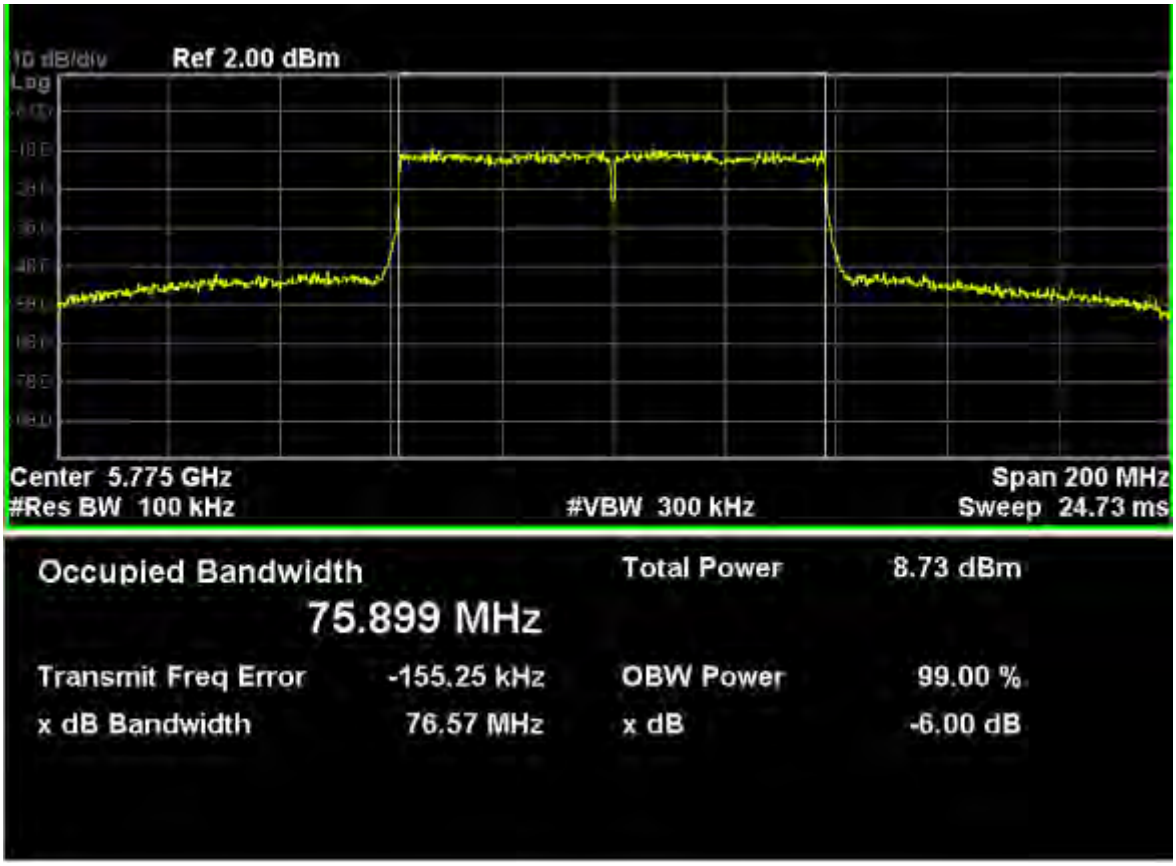


802.11ac40 channel 159(mimo)

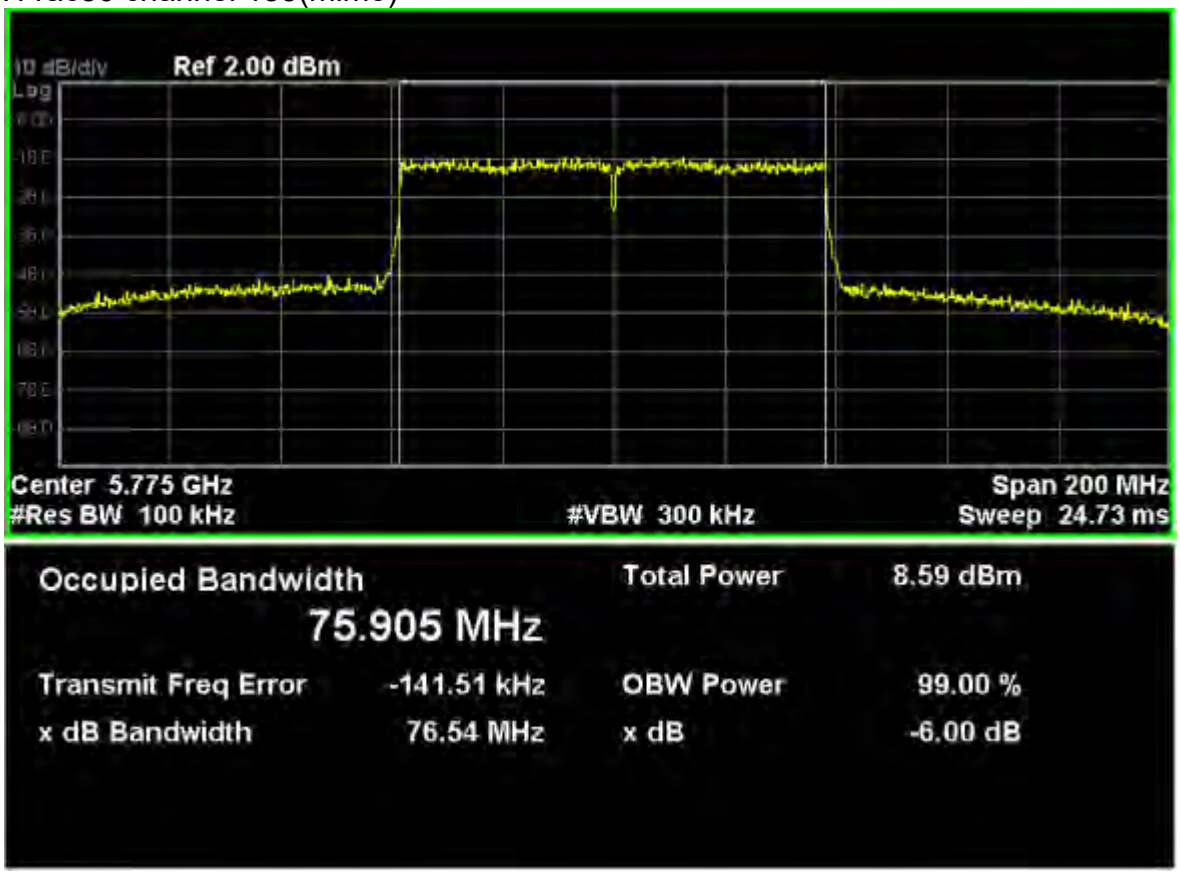


802.11ac80

802.11ac80 channel 155

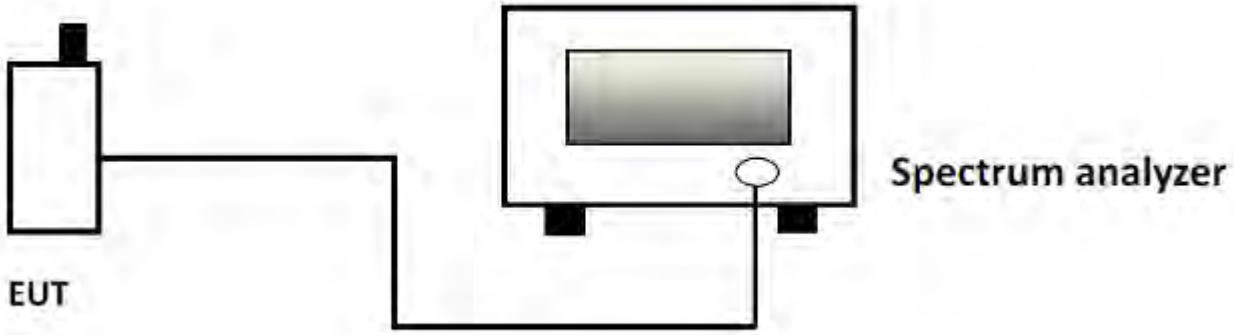


802.11ac80 channel 155(mimo)



6. POWER SPECTRAL DENSITY

6.1 TEST SETUP



6.2 LIMITS

Limits	≤8dBm/3kHz

6.3 TEST PROCEDURE

Set analyzer center frequency to DTS channel center frequency.
Set the span to 1.5 times the DTS bandwidth.
Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
Set the VBW ≥ 3xRBW.
Detector = peak.
Sweep time = auto couple.
Trace mode = max hold.
Allow trace to fully stabilize.
Use the peak marker function to determine the maximum amplitude level within the RBW.
If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.4 RESULTS & PERFORMANCE

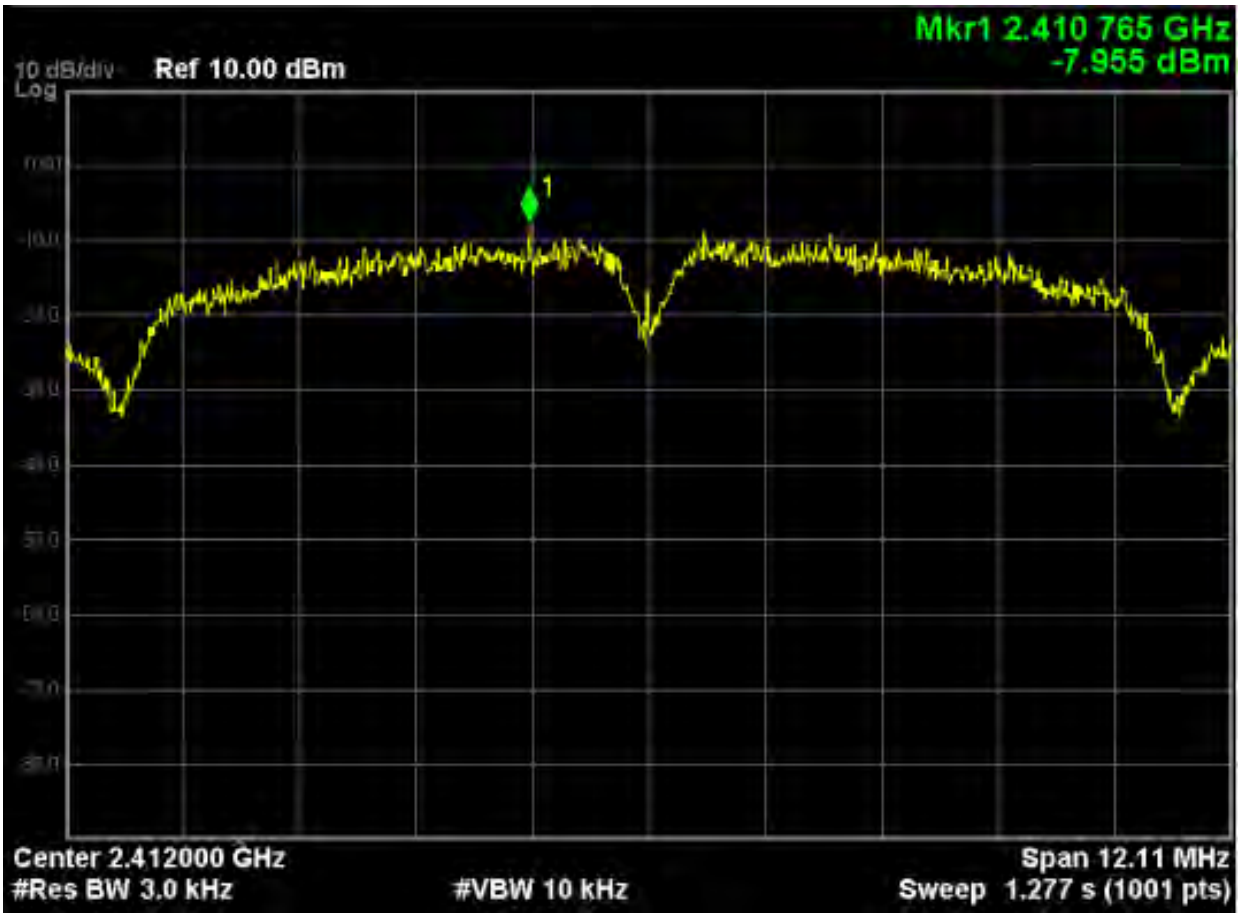
Channel	Measured level (dBm/3KHz)	Limit (dBm/3KHz)	Result
WIFI 2.4G			
802.11b			
Antenna 1			
802.11b CH1	-7.955	≤8.00	PASS
802.11b CH6	-7.282	≤8.00	PASS
802.11b CH11	-7.913	≤8.00	PASS
Antenna 2			
802.11b CH1	-8.146	≤8.00	PASS
802.11b CH6	-8.188	≤8.00	PASS
802.11b CH11	-7.369	≤8.00	PASS
802.11g			
Antenna 1			
802.11g CH1	-12.375	≤8.00	PASS
802.11g CH6	-11.127	≤8.00	PASS
802.11g CH11	-10.353	≤8.00	PASS
Antenna 2			
802.11g CH1	-9.984	≤8.00	PASS
802.11g CH6	-9.382	≤8.00	PASS
802.11g CH11	-8.729	≤8.00	PASS
802.11n20			
Antenna 1			
802.11n20 CH1	-12.165	≤8.00	PASS
802.11n20 CH6	-11.967	≤8.00	PASS
802.11n20 CH11	-11.367	≤8.00	PASS
Antenna 2			
802.11n20 CH1	-11.616	≤8.00	PASS
802.11n20 CH6	-12.033	≤8.00	PASS
802.11n20 CH11	-10.579	≤8.00	PASS
Mimo			
802.11n20 CH1	-11.588	≤8.00	PASS
802.11n20 CH6	-10.813	≤8.00	PASS
802.11n20 CH11	-9.793	≤8.00	PASS
WIFI 5G(5150MHz-5250MHz)			
802.11a			
Antenna 1			
802.11a CH36	-15.697	≤8.00	PASS
802.11a CH48	-17.826	≤8.00	PASS
Antenna 2			
802.11a CH36	-12.253	≤8.00	PASS
802.11a CH48	-12.973	≤8.00	PASS
802.11n20			
Antenna 1			
802.11n20 CH 36	-17.868	≤8.00	PASS
802.11n20 CH 48	-18.753	≤8.00	PASS
Antenna 2			

802.11n20 CH 36	-13.603	≤8.00	PASS
802.11n20 CH 48	-11.870	≤8.00	PASS
Mimo			
802.11n20 CH 36	-12.698	≤8.00	PASS
802.11n20 CH 48	-11.532	≤8.00	PASS
802.11n40			
Antenna 1			
802.11n40 CH 38	-21.661	≤8.00	PASS
802.11n40 CH 46	-21.283	≤8.00	PASS
Antenna 2			
802.11n40 CH 38	-15.566	≤8.00	PASS
802.11n40 CH 46	-15.469	≤8.00	PASS
Mimo			
802.11n40 CH 38	-15.609	≤8.00	PASS
802.11n40 CH 46	-15.356	≤8.00	PASS
WIFI 5G(5725MHz-5850MHz)			
802.11a			
Antenna 1			
802.11a CH149	-20.532	≤8.00	PASS
802.11a CH157	-20.867	≤8.00	PASS
802.11a CH165	-23.003	≤8.00	PASS
Antenna 2			
802.11a CH149	-14.173	≤8.00	PASS
802.11a CH157	-14.171	≤8.00	PASS
802.11a CH165	-14.427	≤8.00	PASS
802.11n20			
Antenna 1			
802.11n20 CH149	-21.466	≤8.00	PASS
802.11n20 CH157	-22.913	≤8.00	PASS
802.11n20 CH165	-20.807	≤8.00	PASS
Antenna 2			
802.11n20 CH149	-14.148	≤8.00	PASS
802.11n20 CH157	-14.026	≤8.00	PASS
802.11n20 CH165	-14.463	≤8.00	PASS
Mimo			
802.11n20 CH149	-14.653	≤8.00	PASS
802.11n20 CH157	-14.985	≤8.00	PASS
802.11n20 CH165	-14.181	≤8.00	PASS
802.11n40			
Antenna 1			
802.11n40 CH151	-23.674	≤8.00	PASS
802.11n40 CH159	-23.123	≤8.00	PASS
Antenna 2			
802.11n40 CH151	-14.520	≤8.00	PASS
802.11n40 CH159	-18.108	≤8.00	PASS
Mimo			
802.11n40 CH151	-15.766	≤8.00	PASS
802.11n40 CH159	-17.696	≤8.00	PASS

802.11ac(5150MHz-5250MHz)			
802.11ac20			
Antenna 1			
802.11ac20 CH36	-19.132	≤8.00	PASS
802.11ac20 CH48	-18.928	≤8.00	PASS
Antenna 2			
802.11ac20 CH36	-12.281	≤8.00	PASS
802.11ac20 CH48	-15.053	≤8.00	PASS
Mimo			
802.11ac20 CH36	-12.216	≤8.00	PASS
802.11ac20 CH48	-14.755	≤8.00	PASS
802.11ac40			
Antenna 1			
802.11ac40 CH38	-21.665	≤8.00	PASS
802.11ac40 CH46	-21.803	≤8.00	PASS
Antenna 2			
802.11ac40 CH38	-18.089	≤8.00	PASS
802.11ac40 CH46	-17.228	≤8.00	PASS
Mimo			
802.11ac40 CH38	-17.415	≤8.00	PASS
802.11ac40 CH46	-17.052	≤8.00	PASS
802.11ac80			
Antenna 1			
802.11ac80 CH42	-25.833	≤8.00	PASS
Antenna 2			
802.11ac80 CH42	-18.279	≤8.00	PASS
Mimo			
802.11ac80 CH42	-21.594	≤8.00	PASS
802.11ac(5725MHz-5850MHz)			
802.11ac20			
Antenna 1			
802.11ac20 CH149	-20.966	≤8.00	PASS
802.11ac20 CH157	-23.128	≤8.00	PASS
802.11ac20 CH165	-22.931	≤8.00	PASS
Antenna 2			
802.11ac20 CH149	-13.930	≤8.00	PASS
802.11ac20 CH157	-13.202	≤8.00	PASS
802.11ac20 CH165	-12.809	≤8.00	PASS
Mimo			
802.11ac20 CH149	-13.420	≤8.00	PASS
802.11ac20 CH157	-12.967	≤8.00	PASS
802.11ac20 CH165	-12.452	≤8.00	PASS
802.11ac40			
Antenna 1			
802.11ac40 CH151	-23.403	≤8.00	PASS
802.11ac40 CH159	-24.354	≤8.00	PASS
Antenna 2			
802.11ac40 CH151	-15.665	≤8.00	PASS

802.11ac40 CH159	-15.229	≤8.00	PASS
Mimo			
802.11ac40 CH151	-16.089	≤8.00	PASS
802.11ac40 CH159	-16.453	≤8.00	PASS
802.11ac80			
Antenna 1			
802.11ac80 CH155	-27.442	≤8.00	PASS
Antenna 2			
802.11ac80 CH155	-17.469	≤8.00	PASS
Mimo			
802.11ac80 CH155	-19.121	≤8.00	PASS

Antenna 1
WIFI 2.4G
802.11b
802.11b channel 1

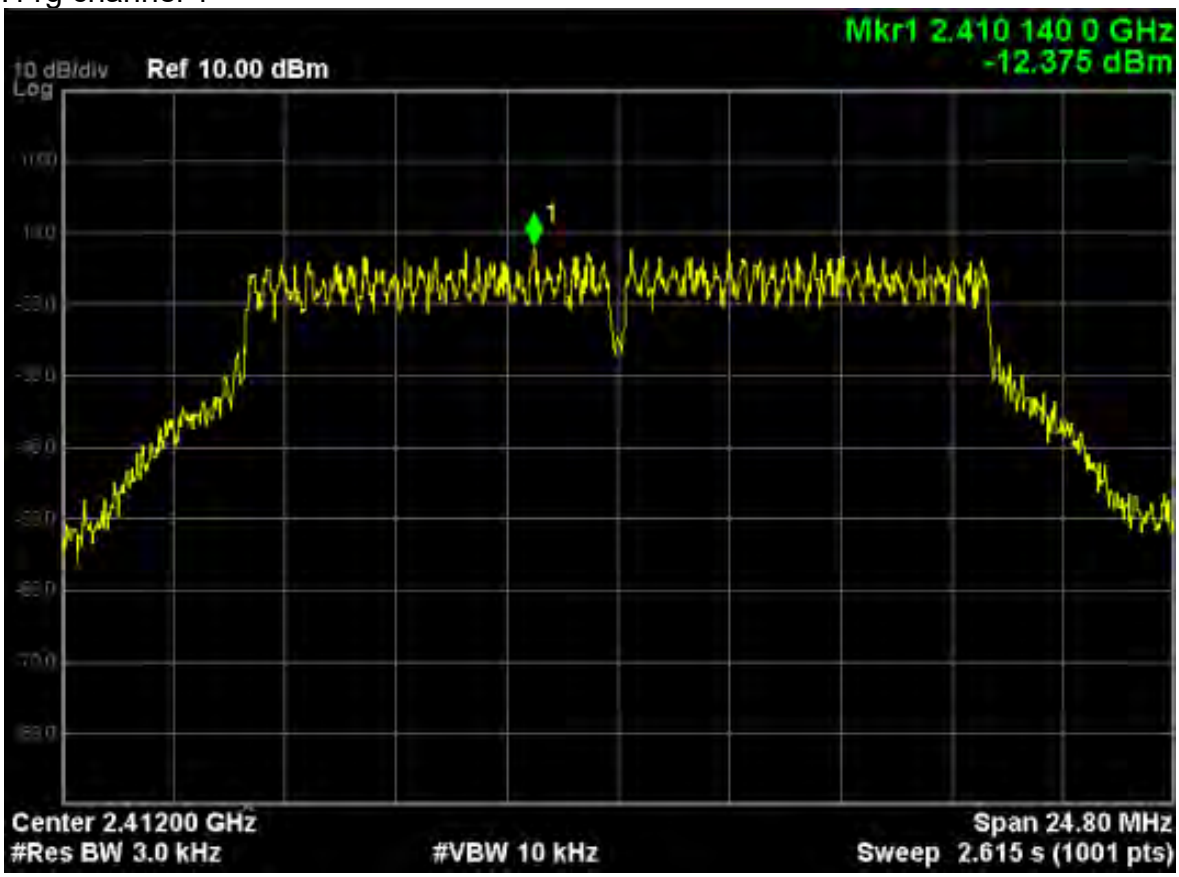


802.11b channel 6

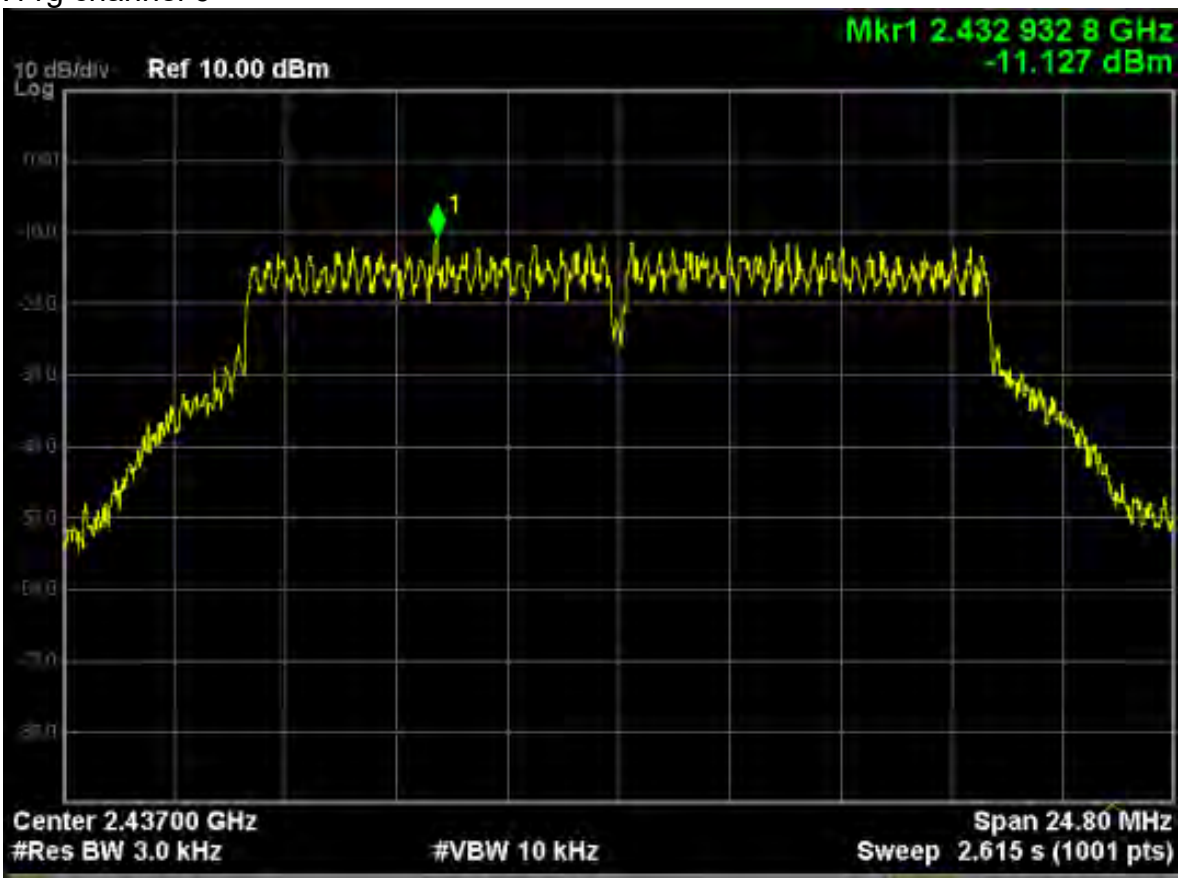
802.11b channel 11

802.11g

802.11g channel 1



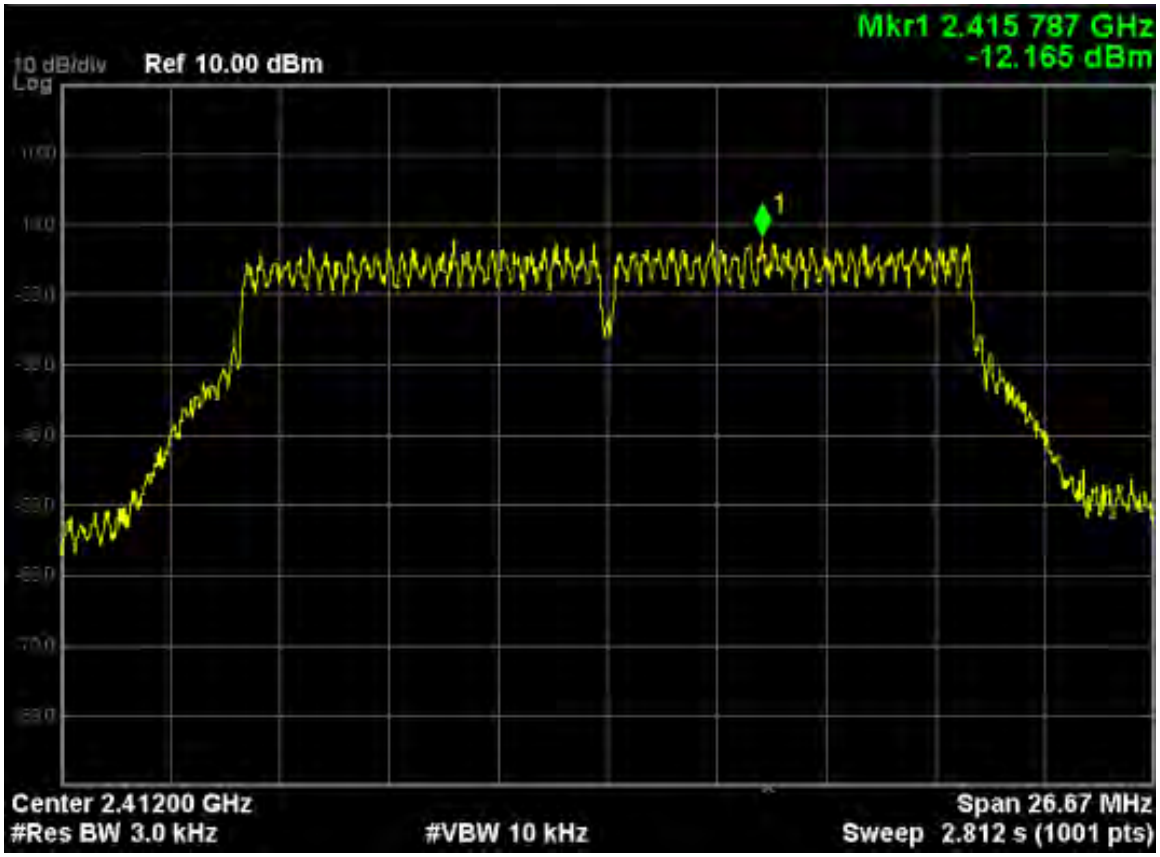
802.11g channel 6



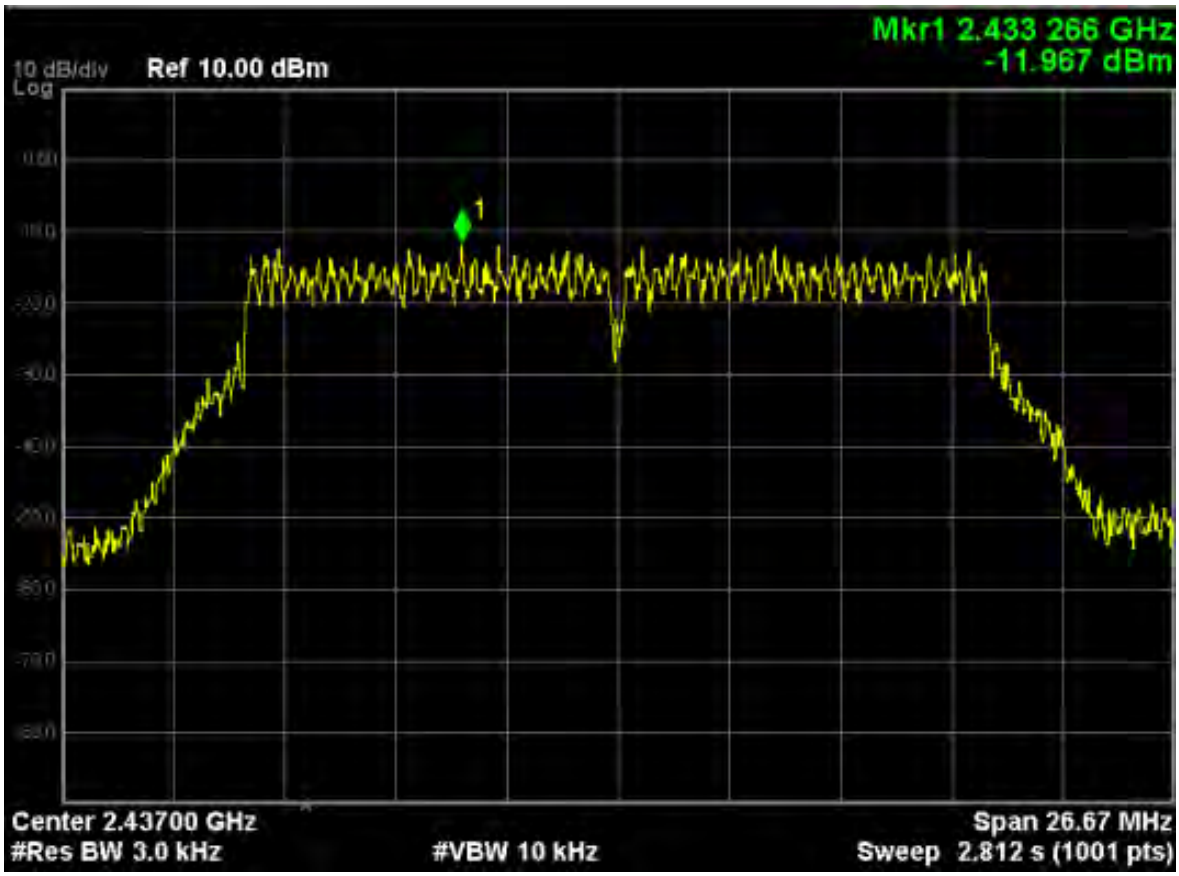
802.11g channel 11

802.11n20

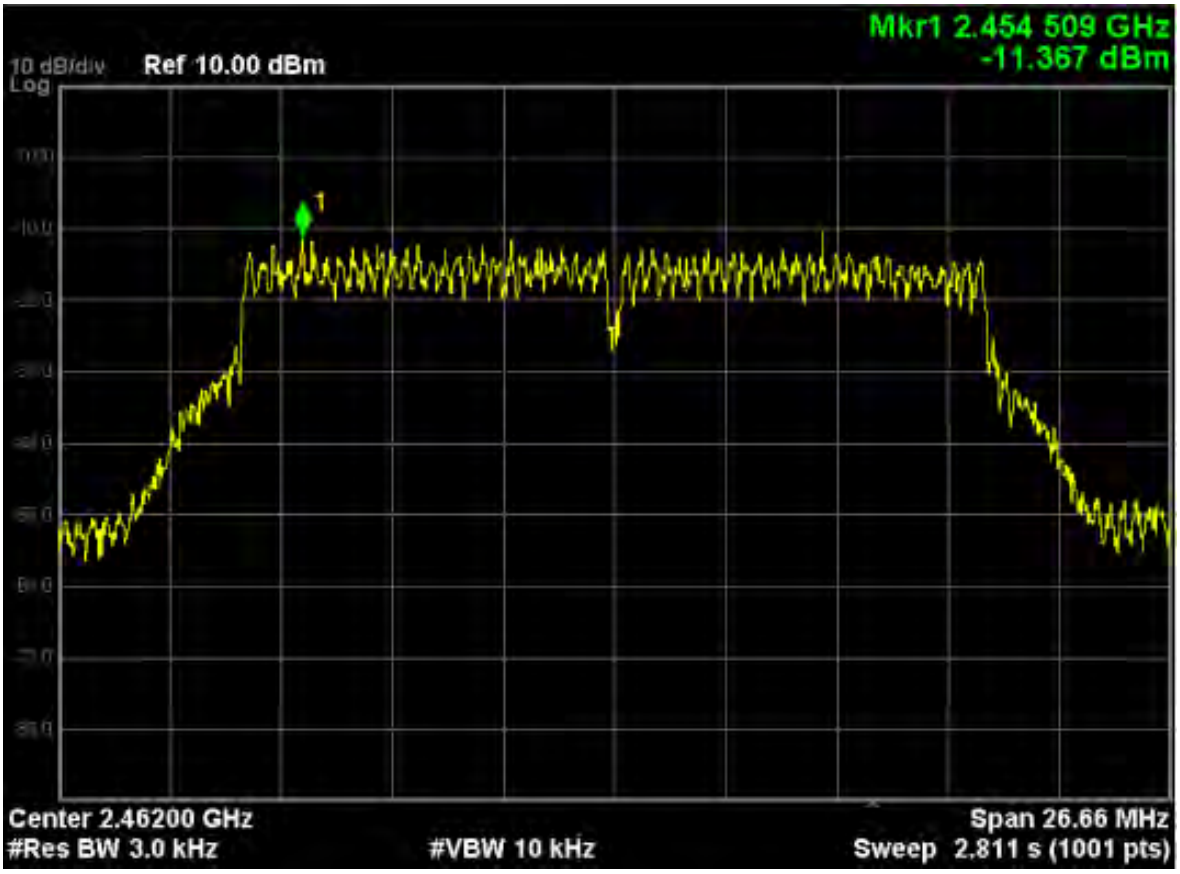
802.11n20 channel 1



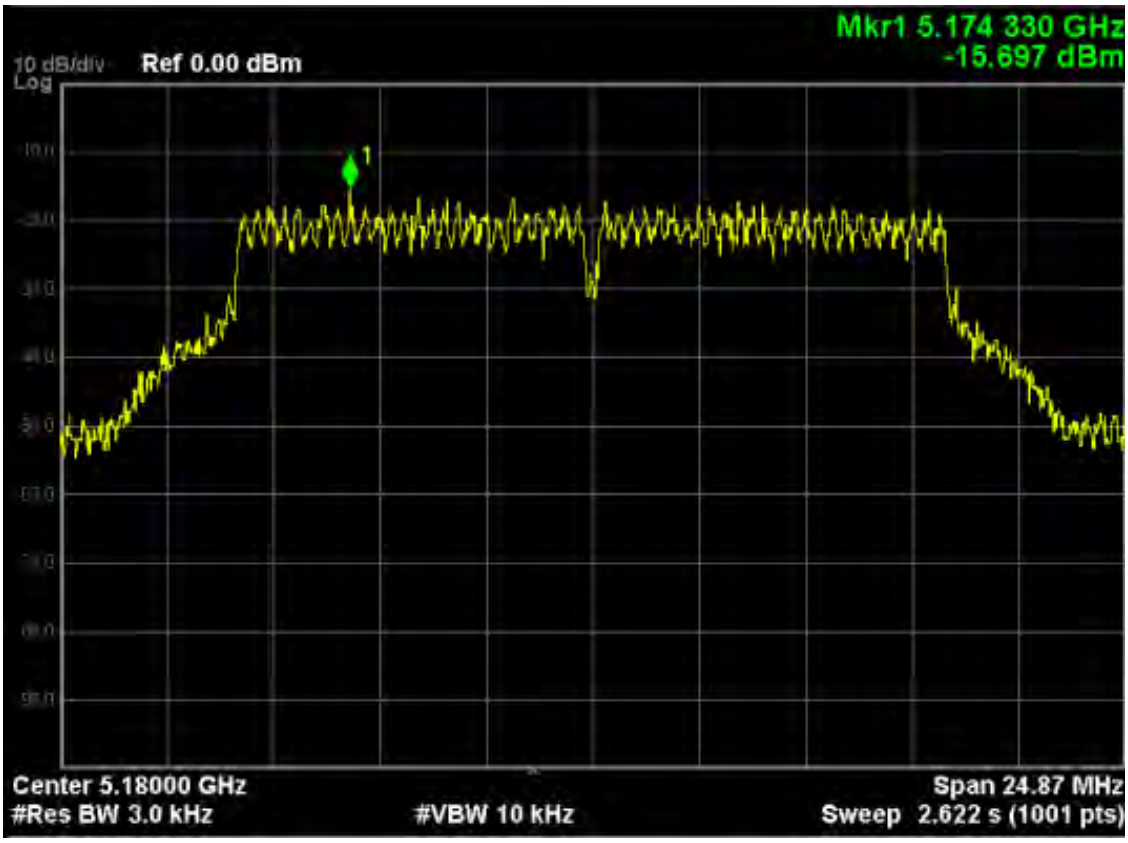
802.11n20 channel 6



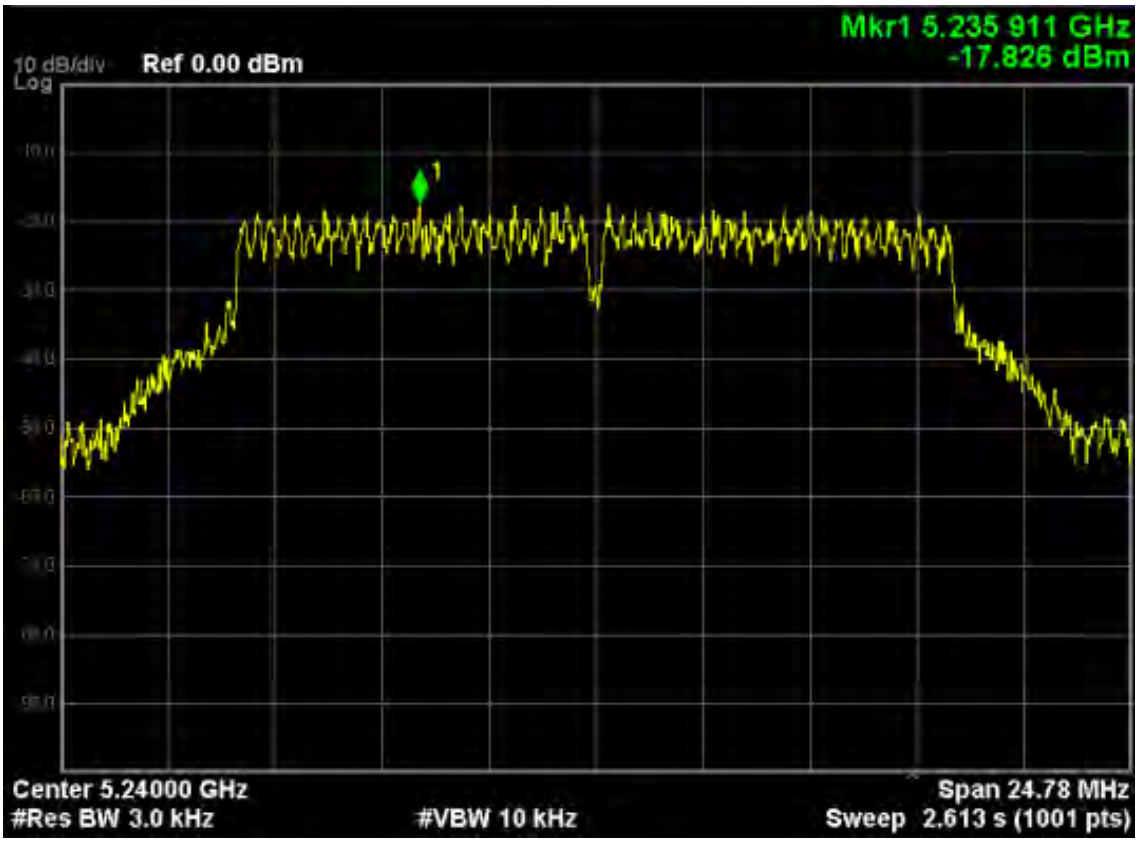
802.11n20 channel 11



WIFI 5G(5150MHz-5250MHz)
802.11a
802.11a channel 36

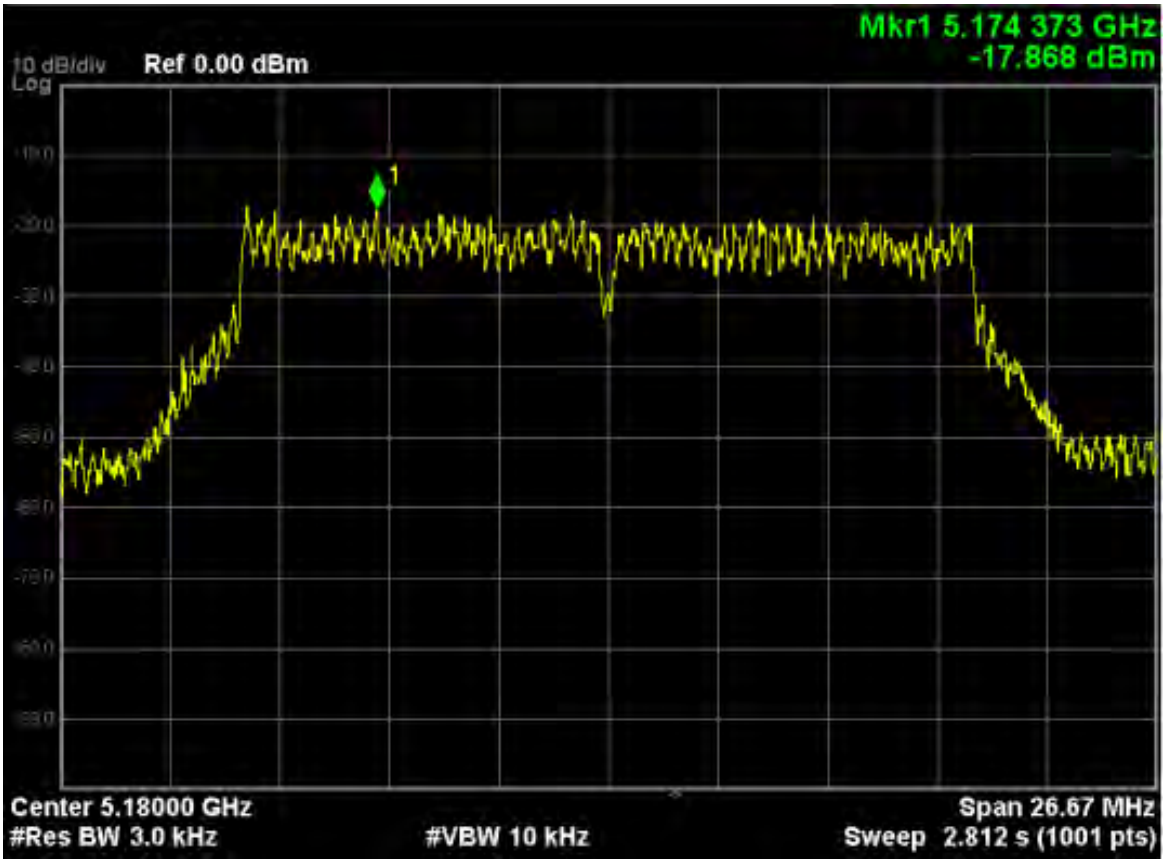


802.11a channel 48

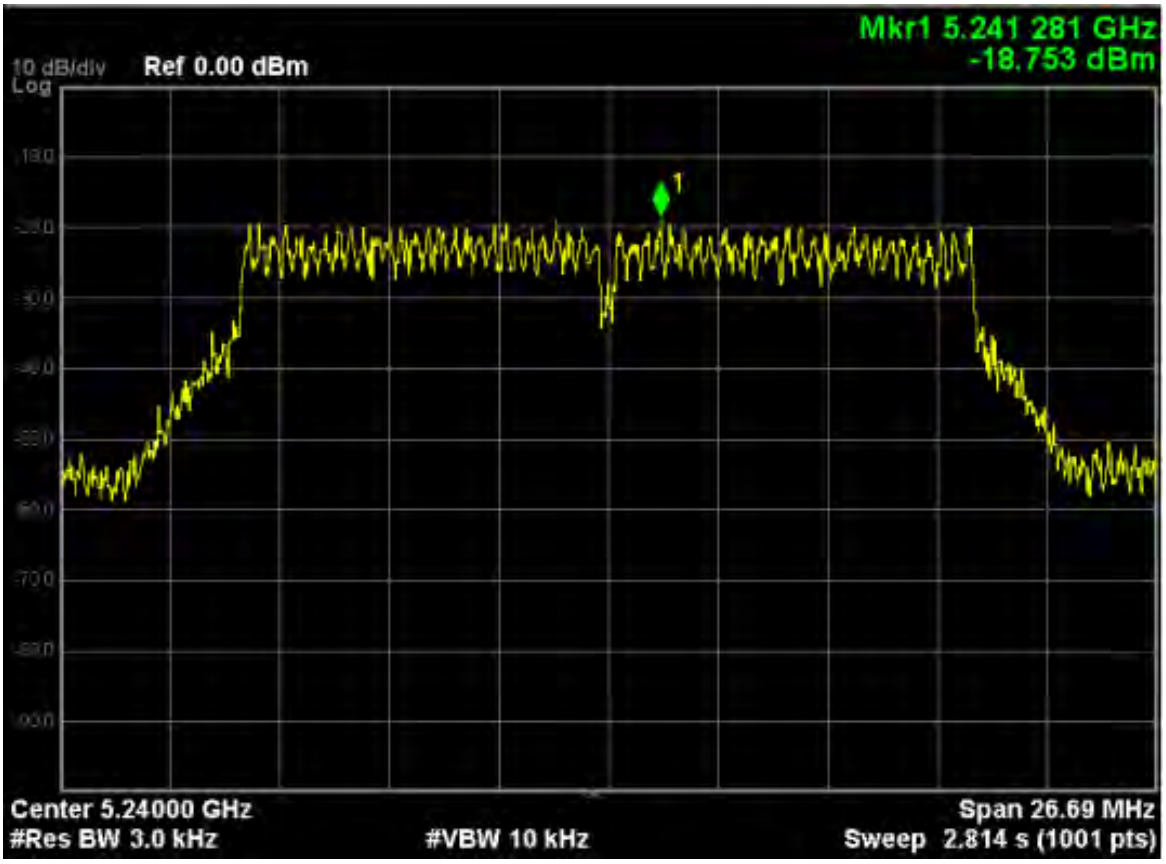


802.11n20

802.11n20 channel 36

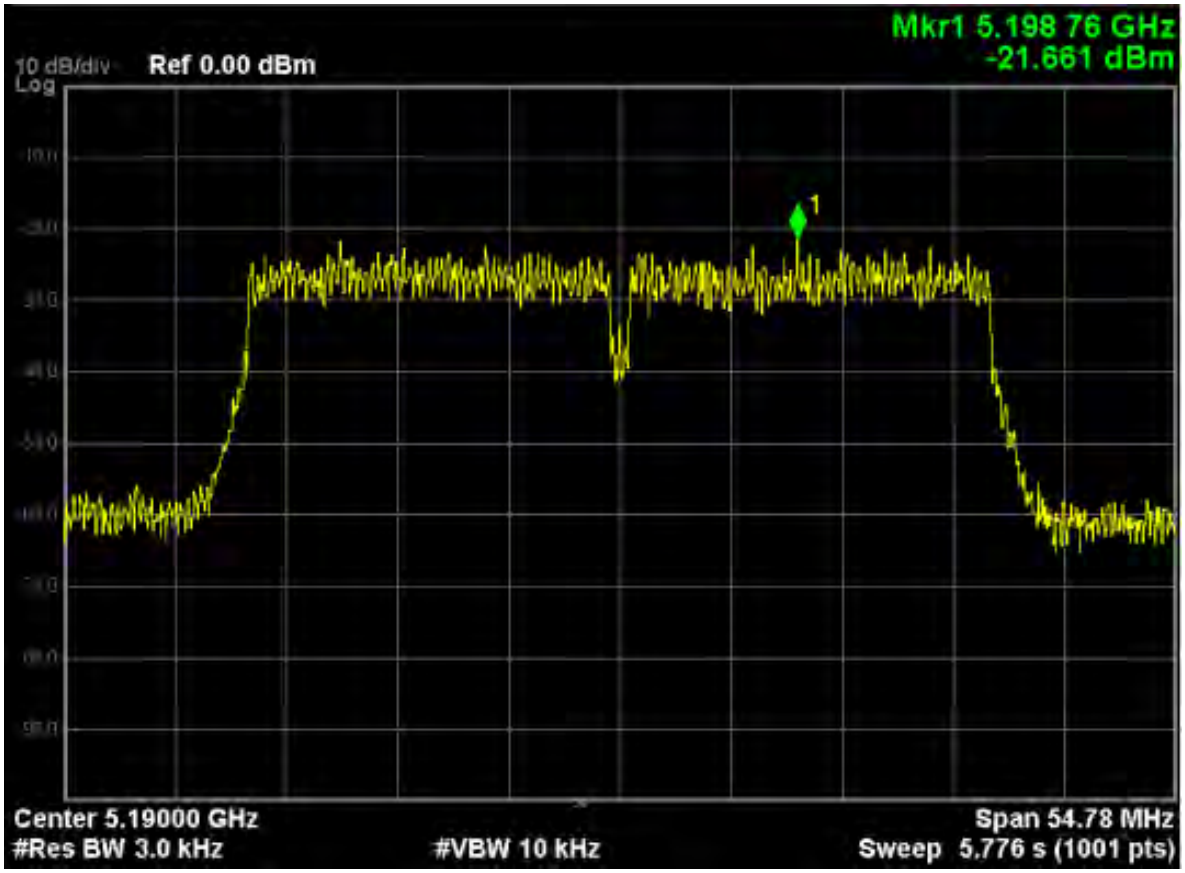


802.11n20 channel 48

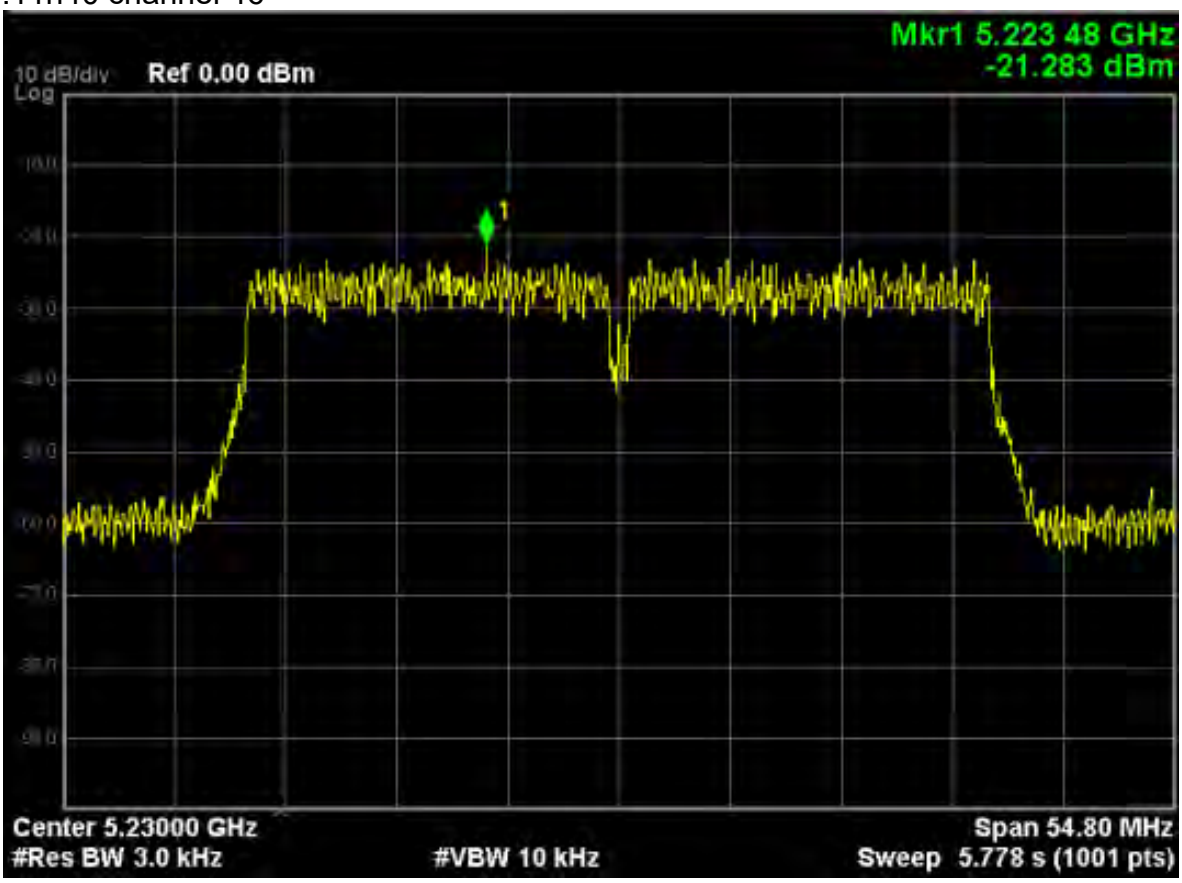


802.11n40

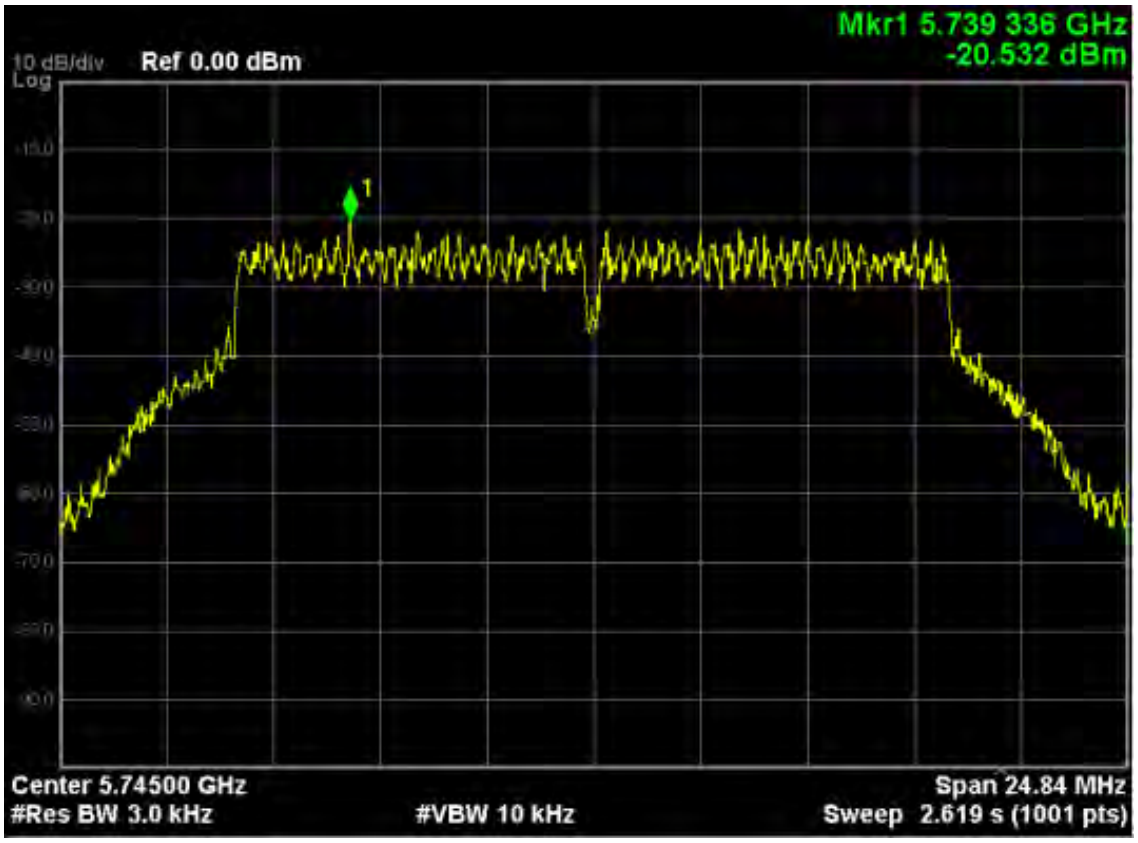
802.11n40 channel 38



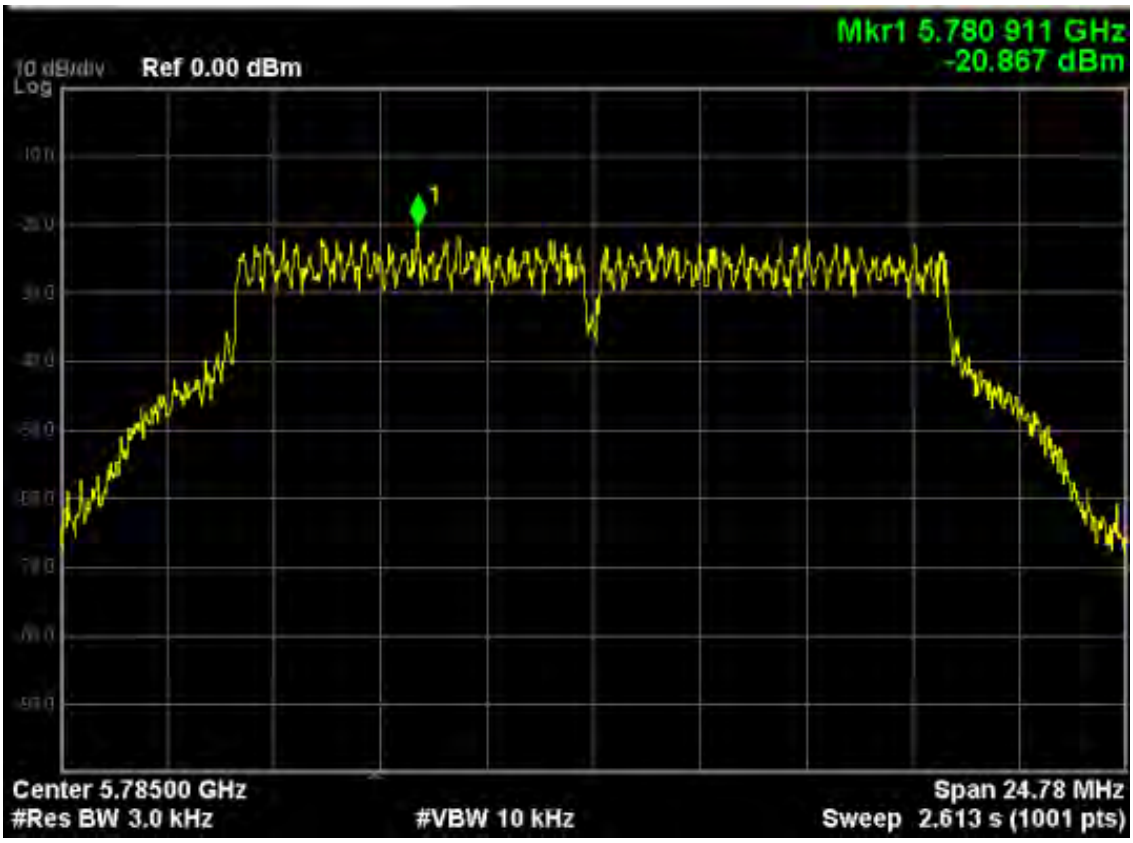
802.11n40 channel 46



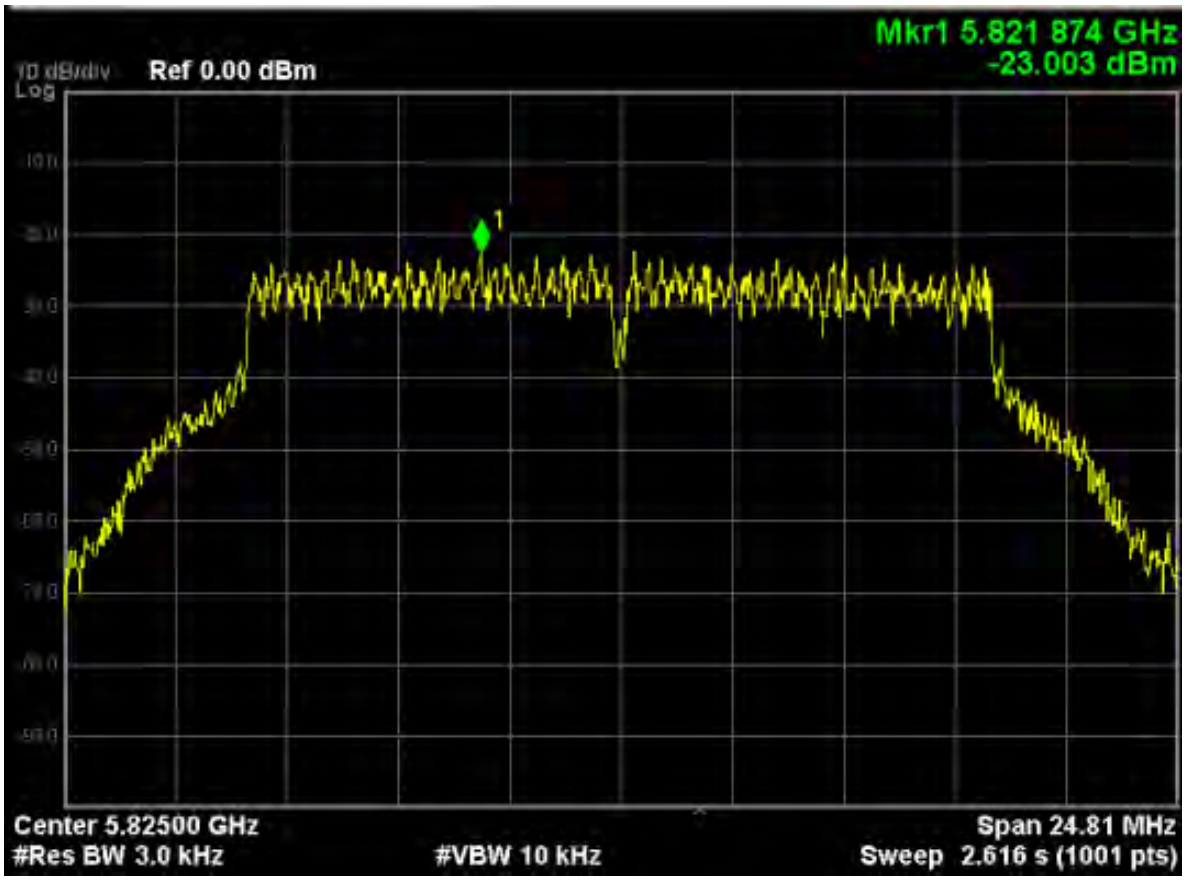
WIFI 5G(5725MHz-5850MHz)
802.11a
802.11a channel 149



802.11a channel 157

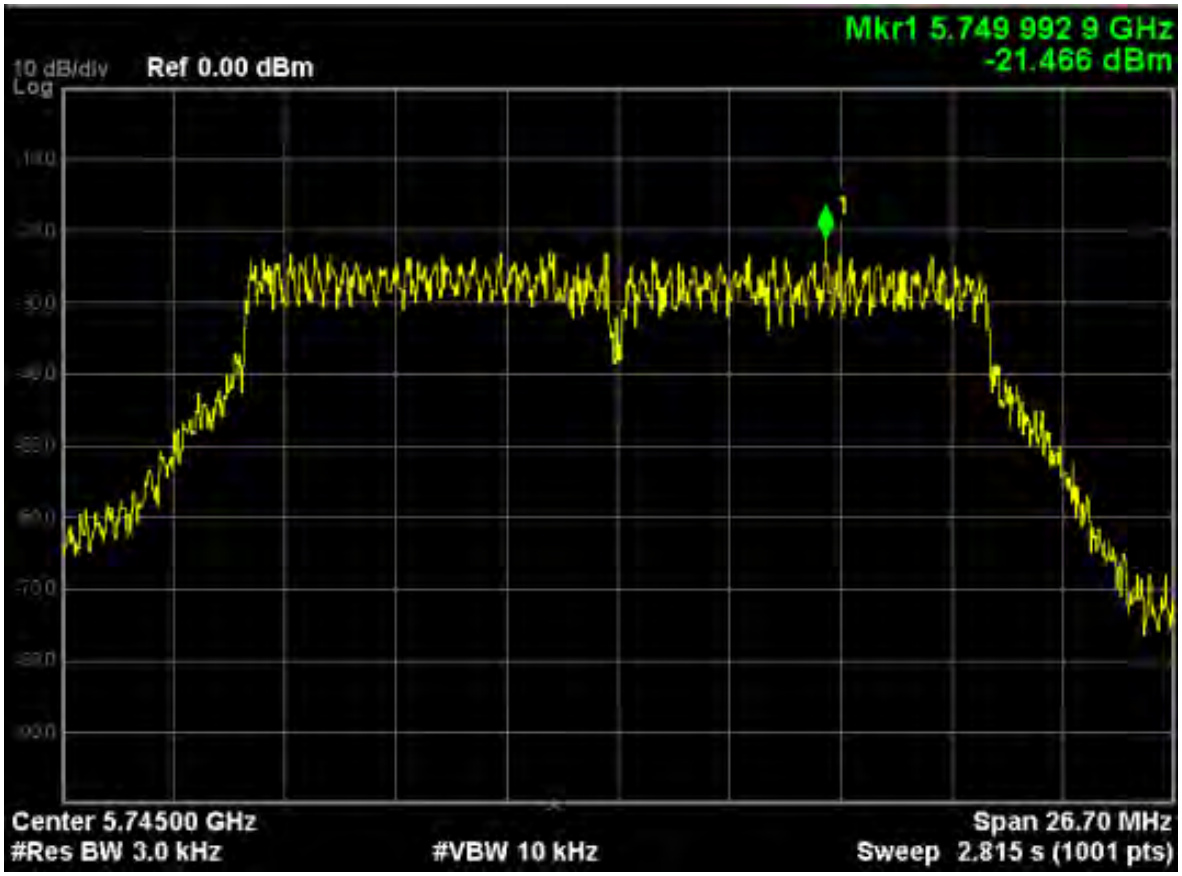


802.11a channel 165

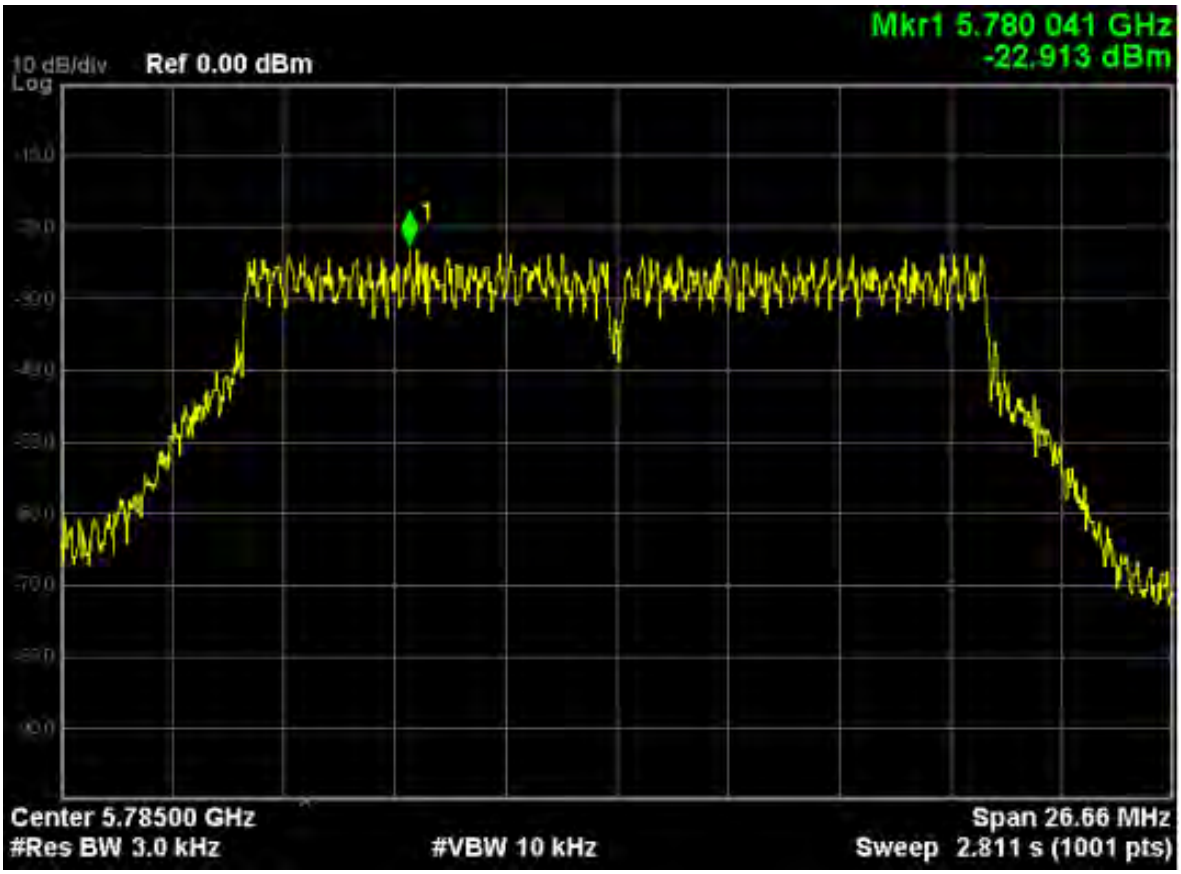


802.11n20

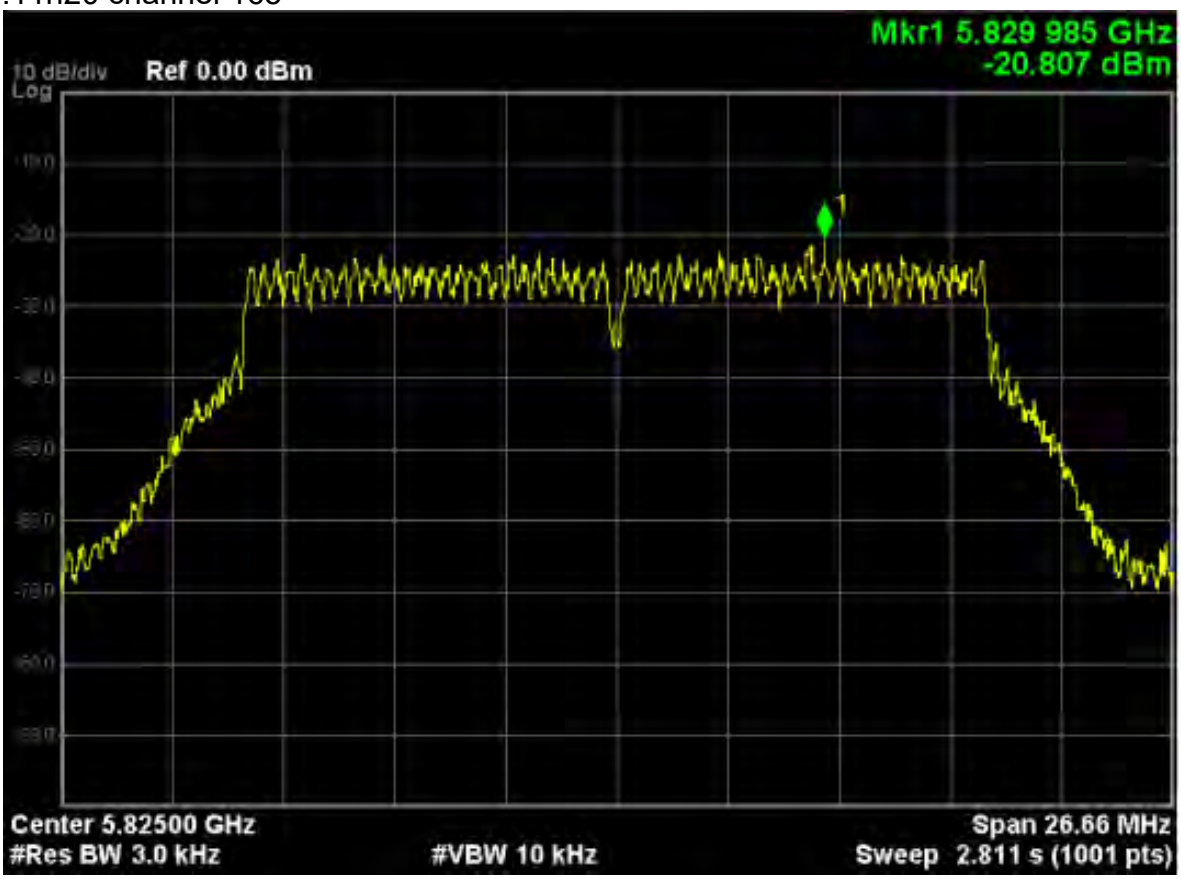
802.11n20 channel 149



802.11n20 channel 157

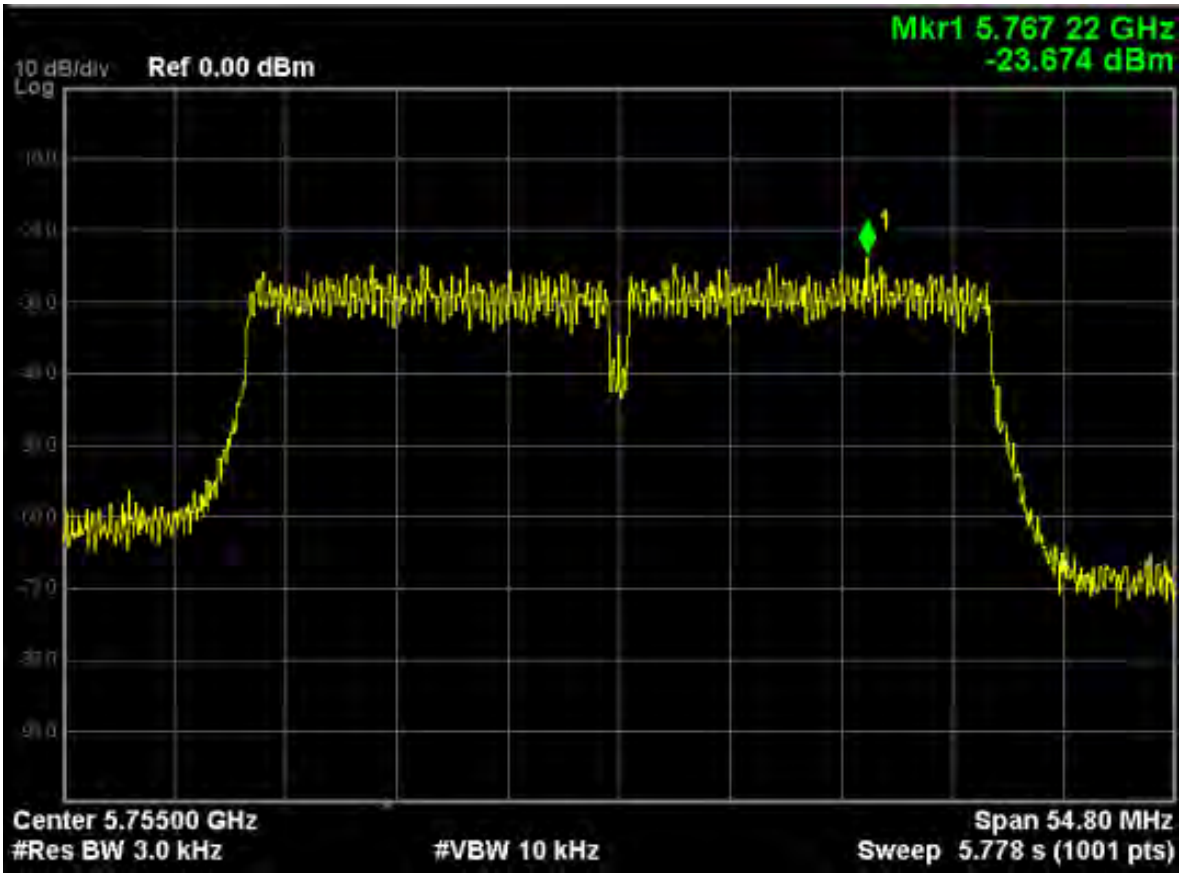


802.11n20 channel 165

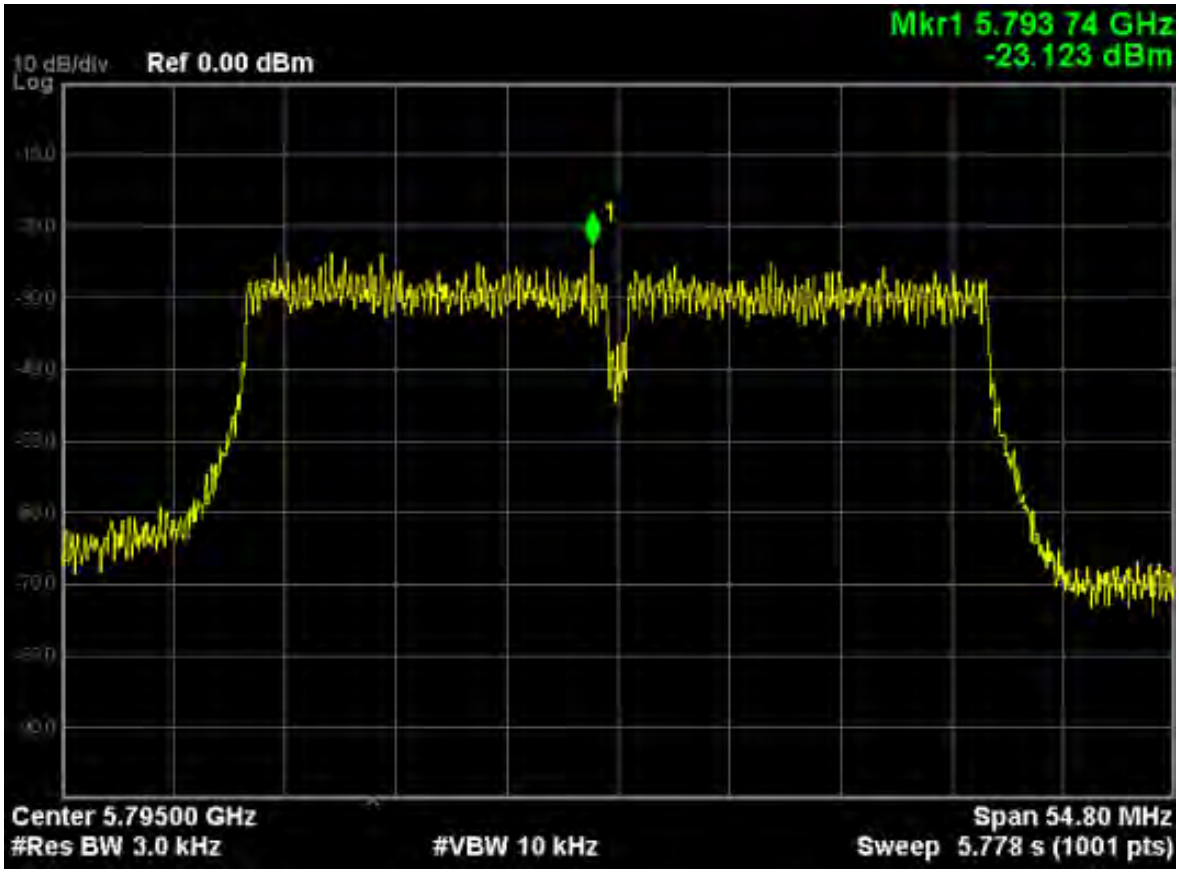


802.11n40

802.11n40 channel 151

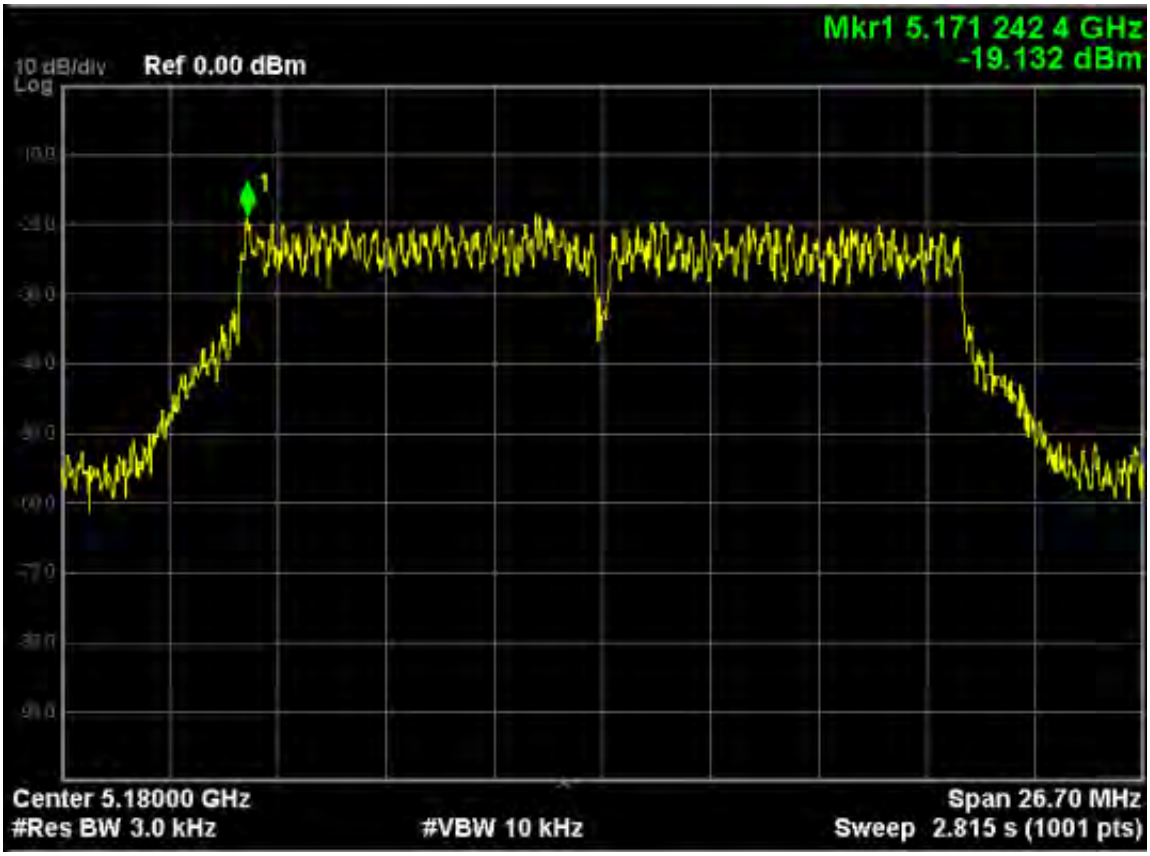


802.11n40 channel 159

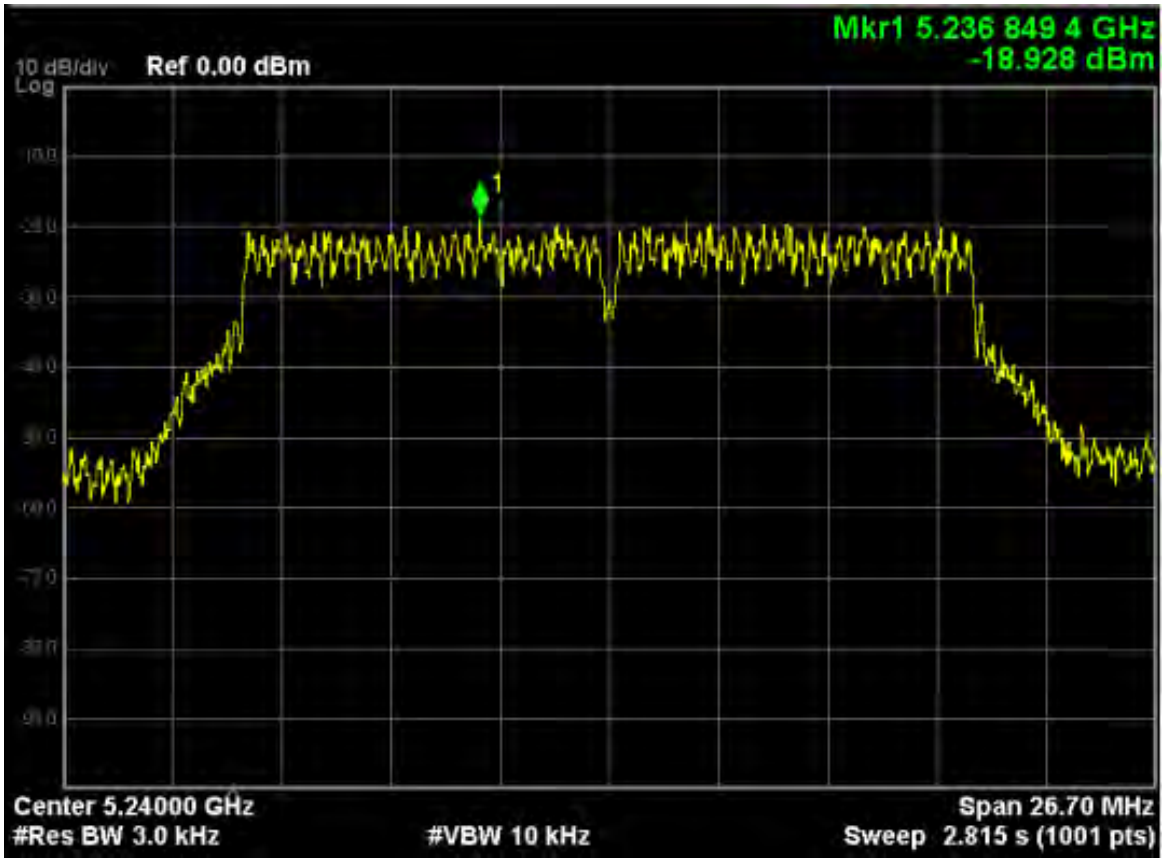


802.11ac (5150MHz-5250MHz)

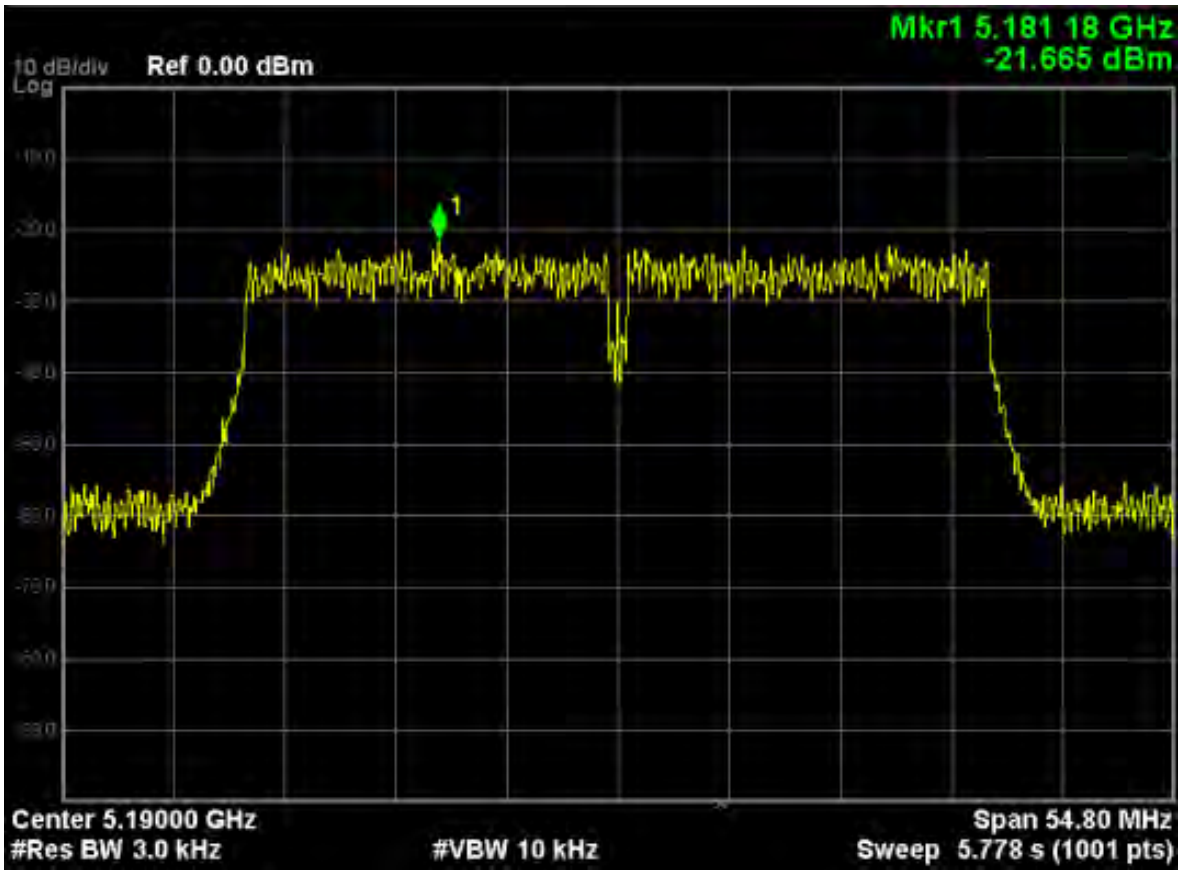
802.11ac20 channel 36



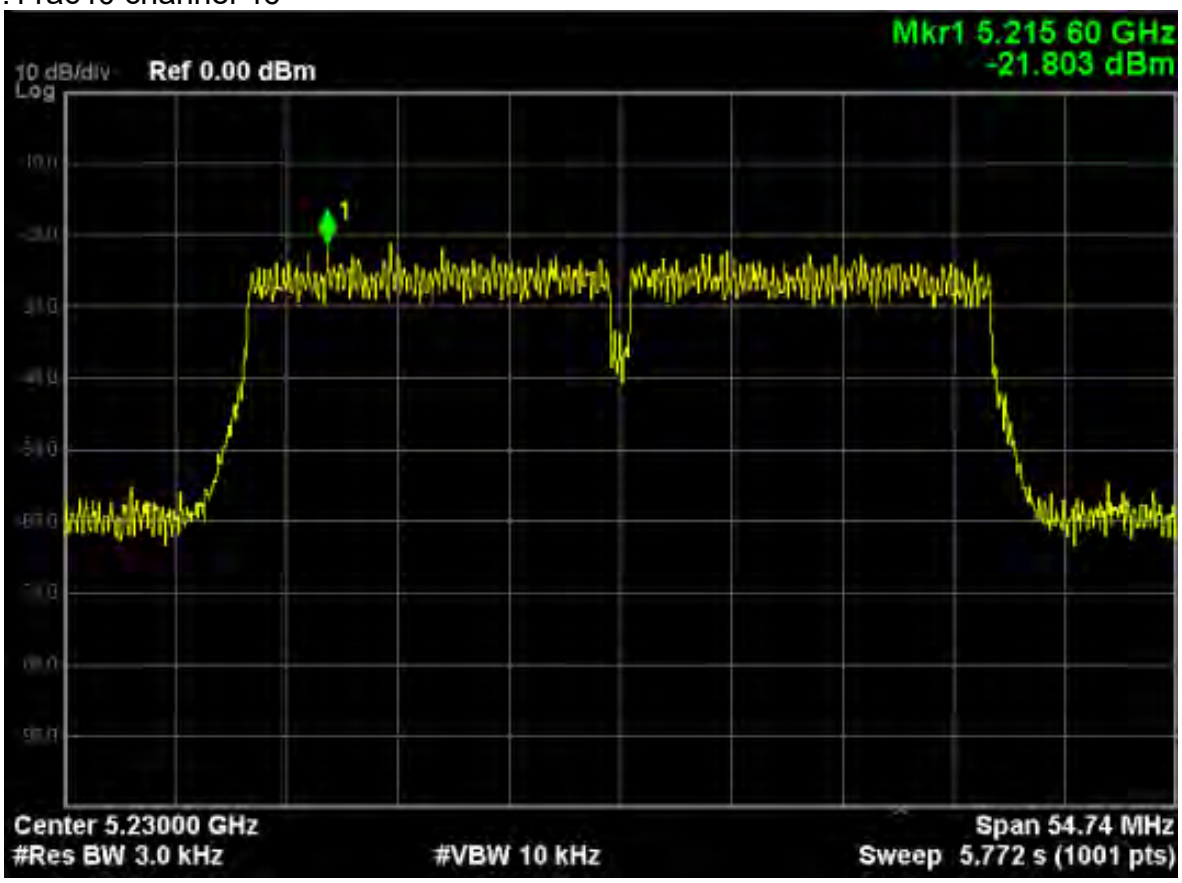
802.11ac20 channel 48



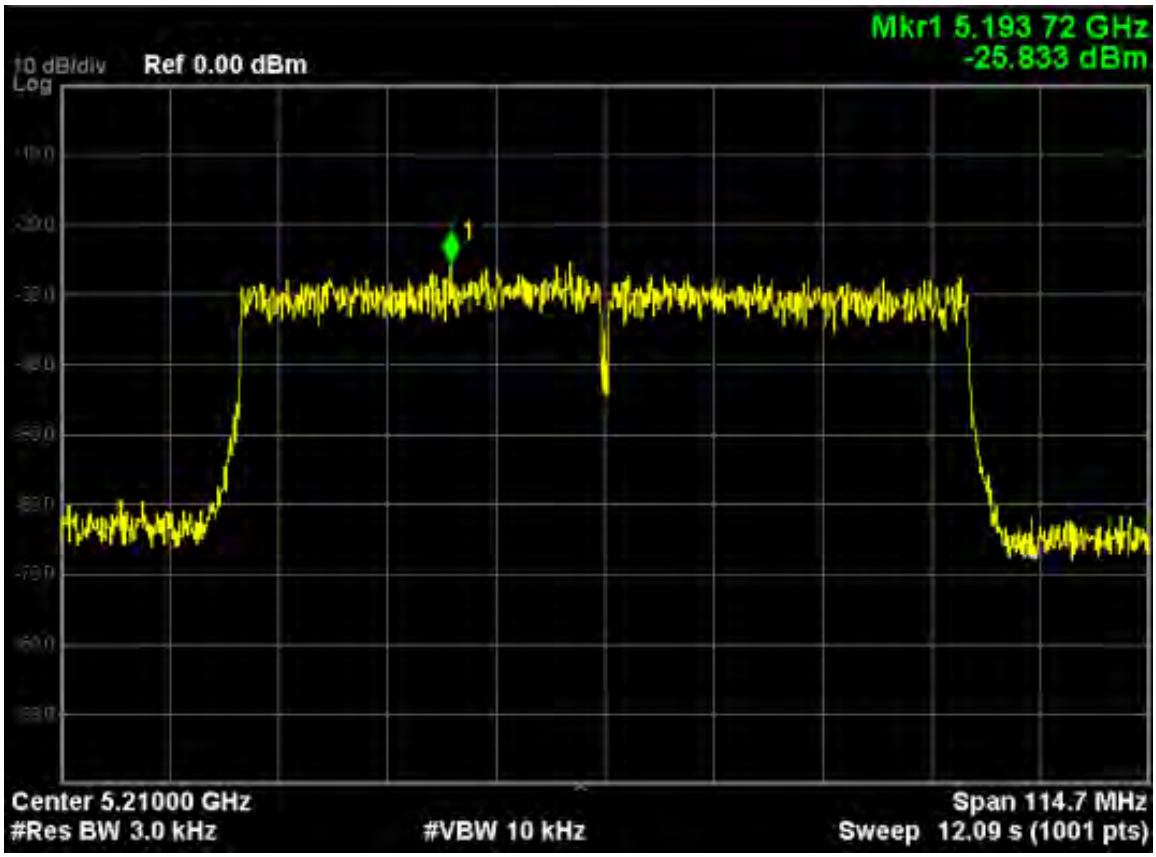
802.11ac40 channel 38



802.11ac40 channel 46

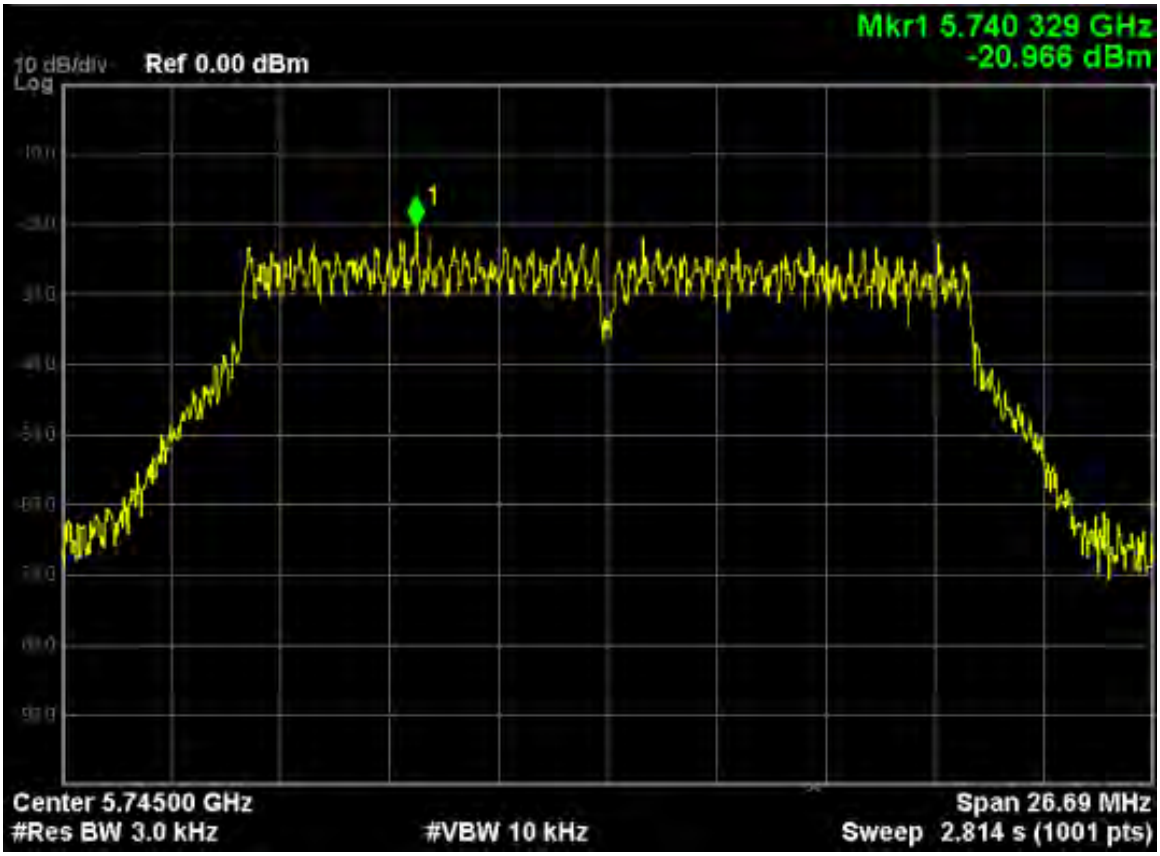


802.11ac80 channel 42

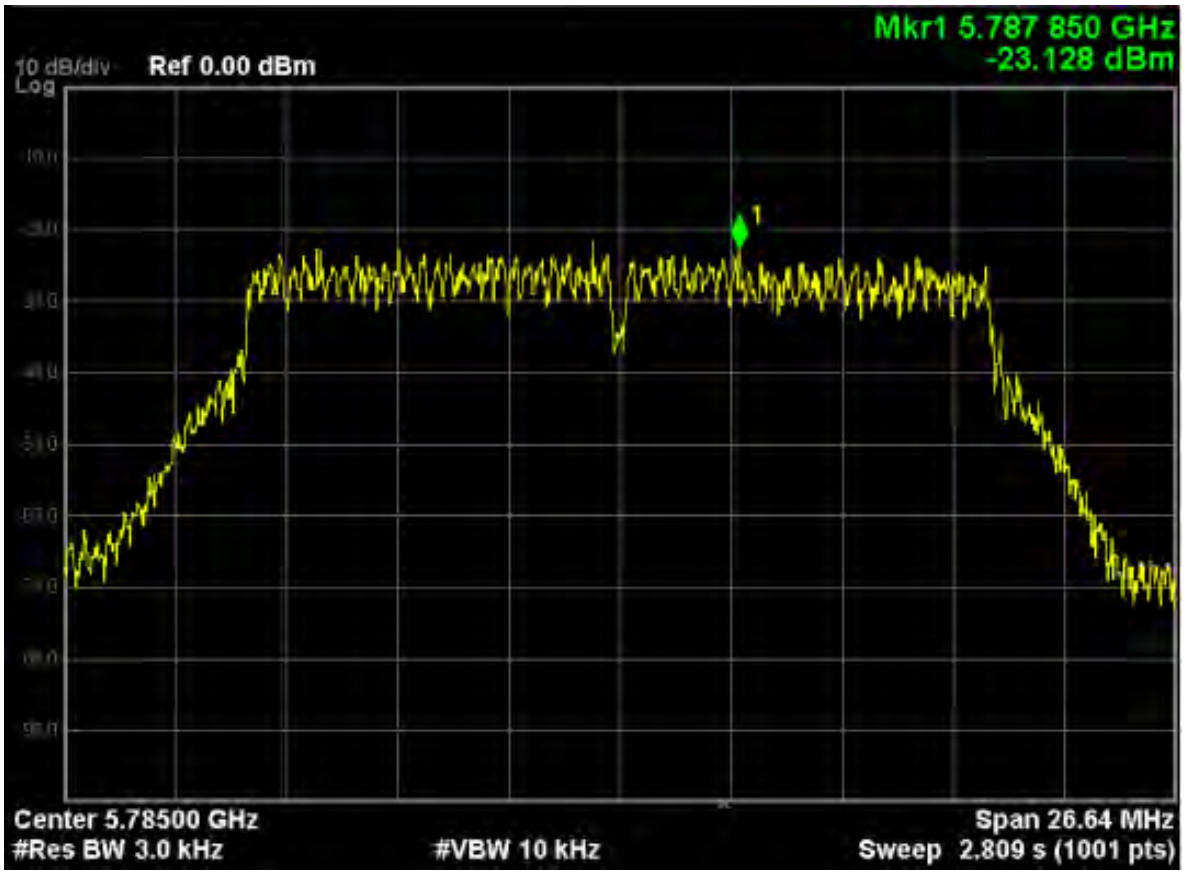


802.11ac (5725MHz-5850MHz)

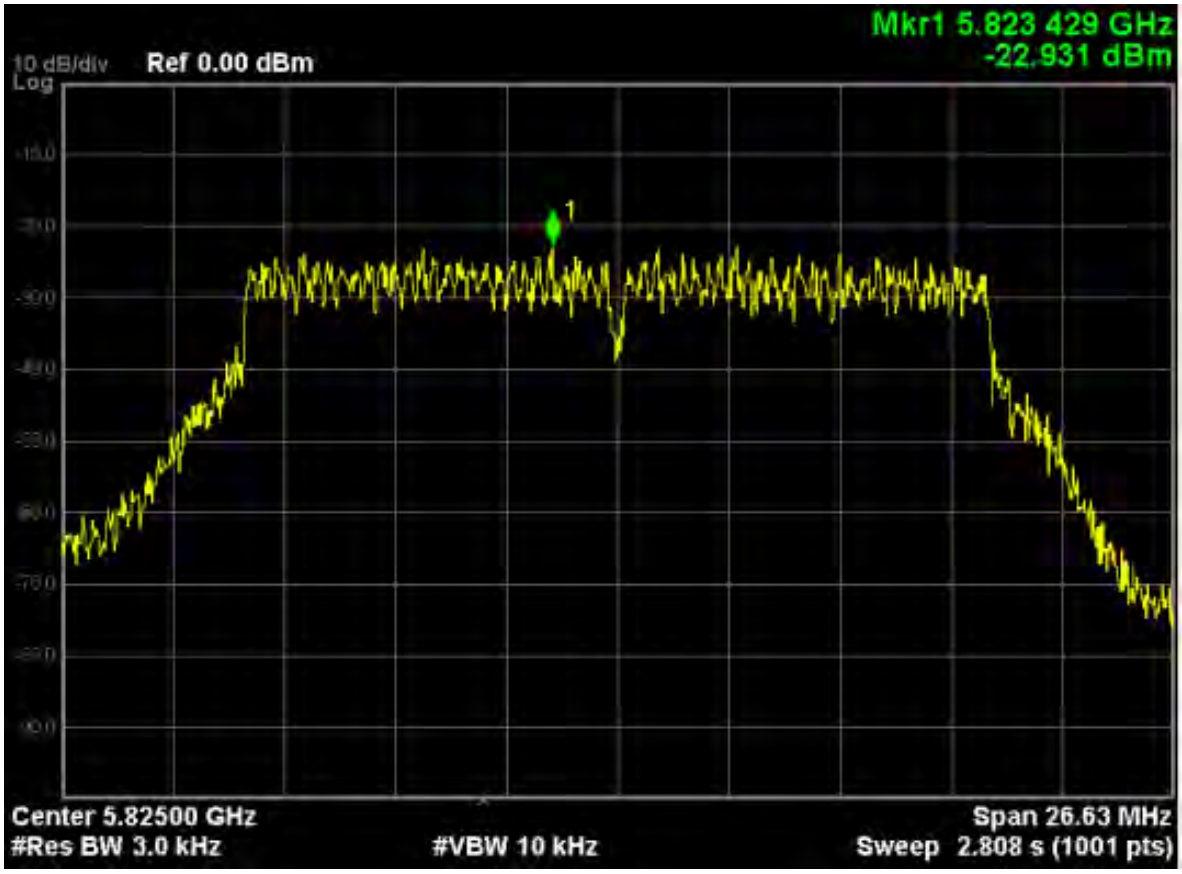
802.11ac20 channel 149



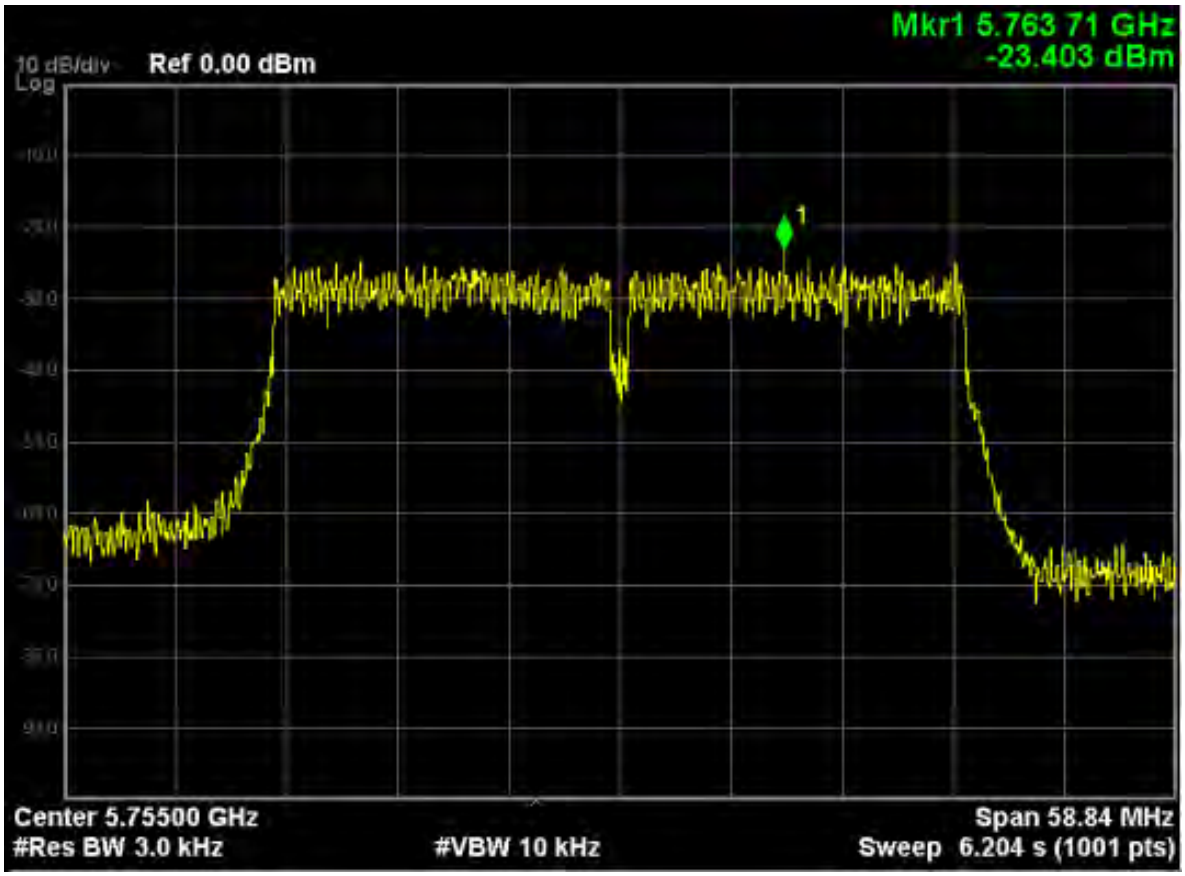
802.11ac20 channel 157



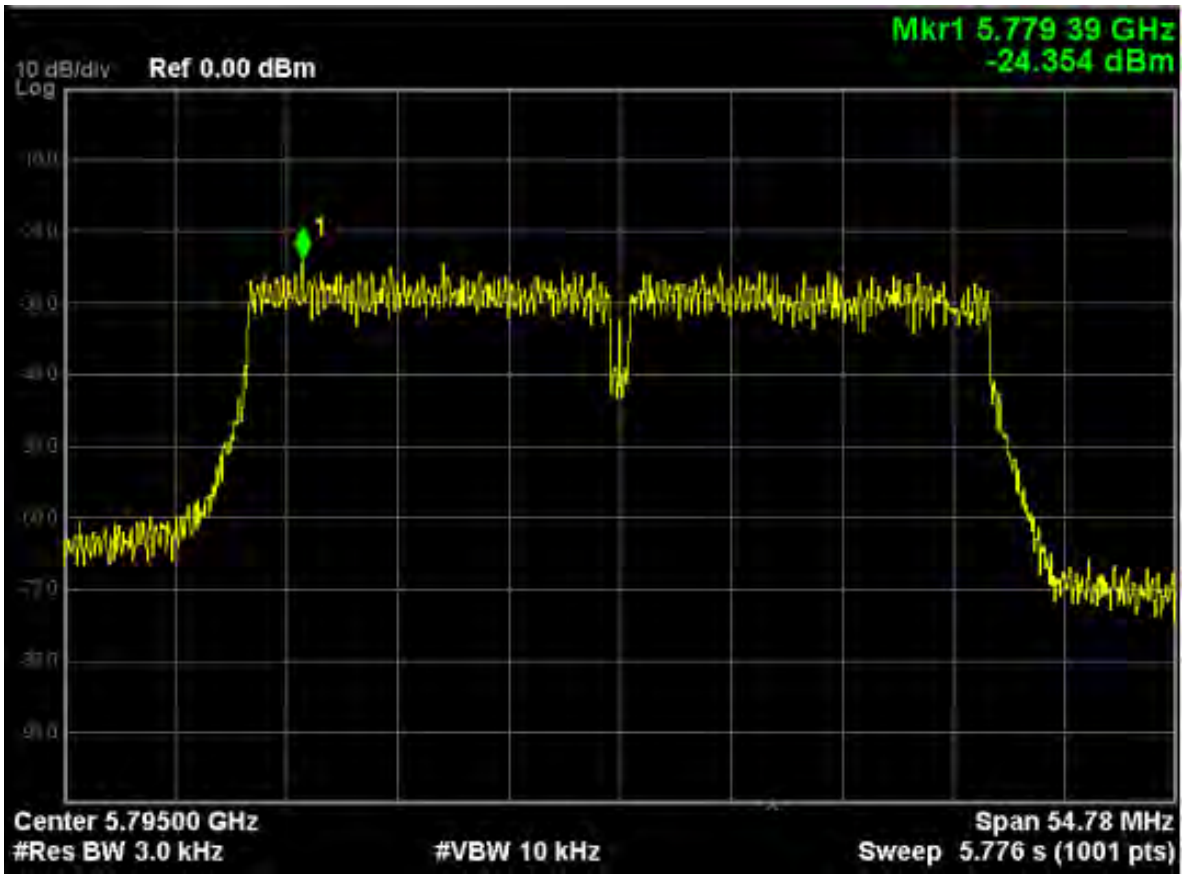
802.11ac20 channel 165



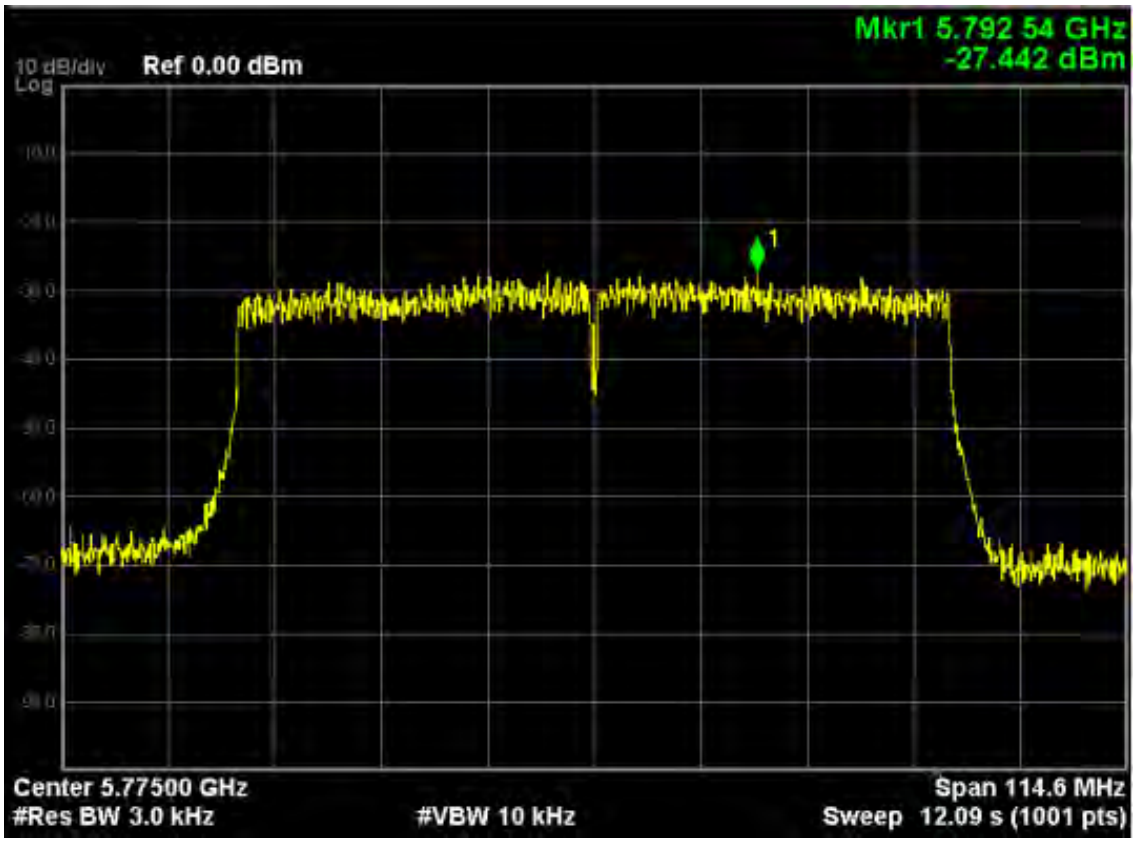
802.11ac40 channel 151



802.11ac40 channel 159



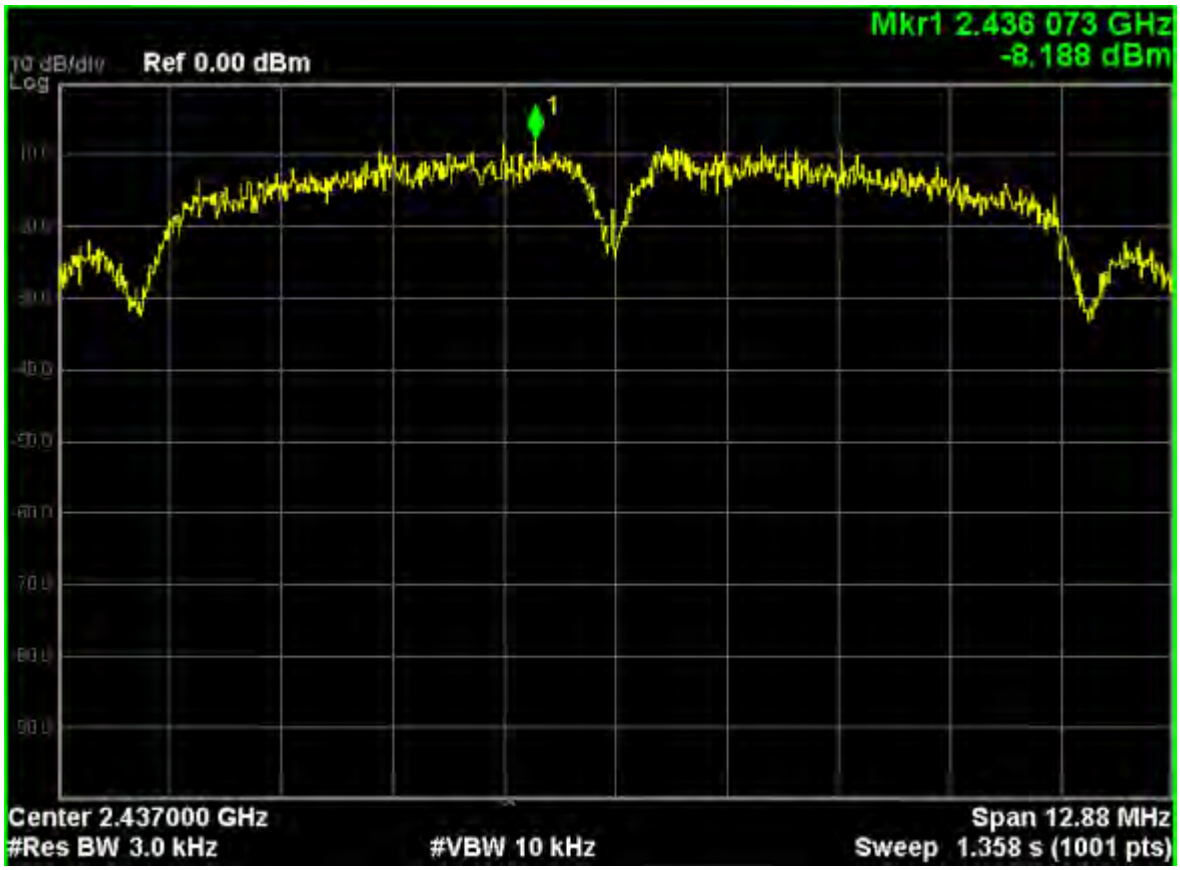
802.11ac80 channel 155



Antenna 2&Mimo
WIFI 2.4G
802.11b

802.11b channel 1

802.11b channel 6

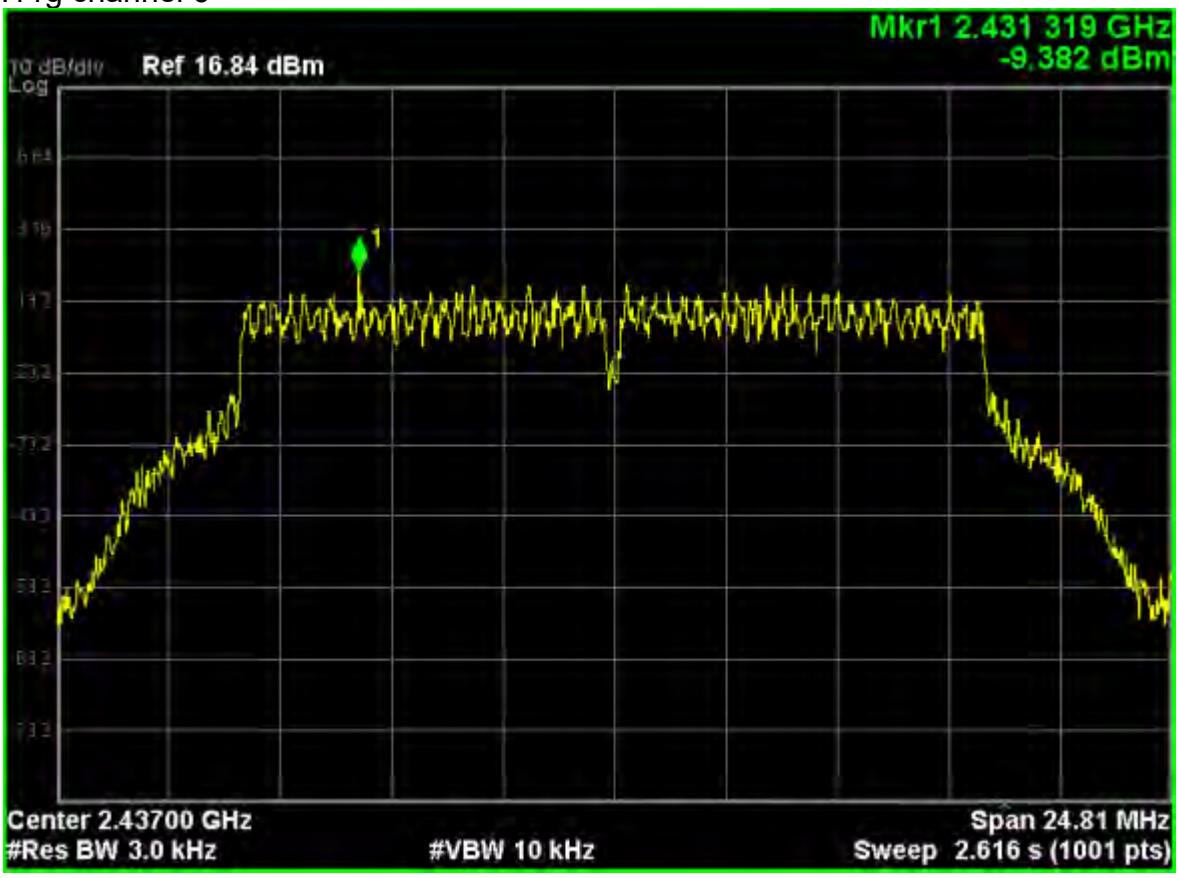


802.11b channel 11

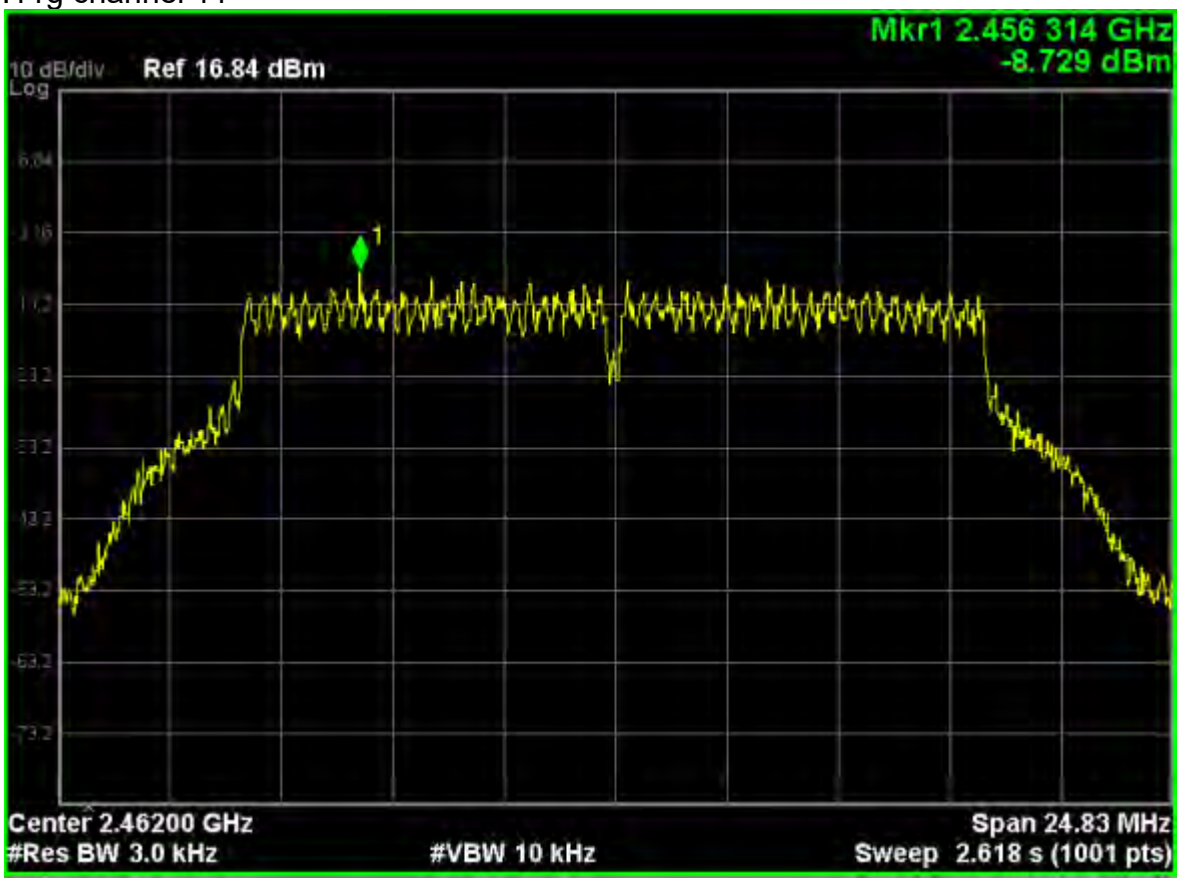
802.11g

802.11g channel 1

802.11g channel 6



802.11g channel 11

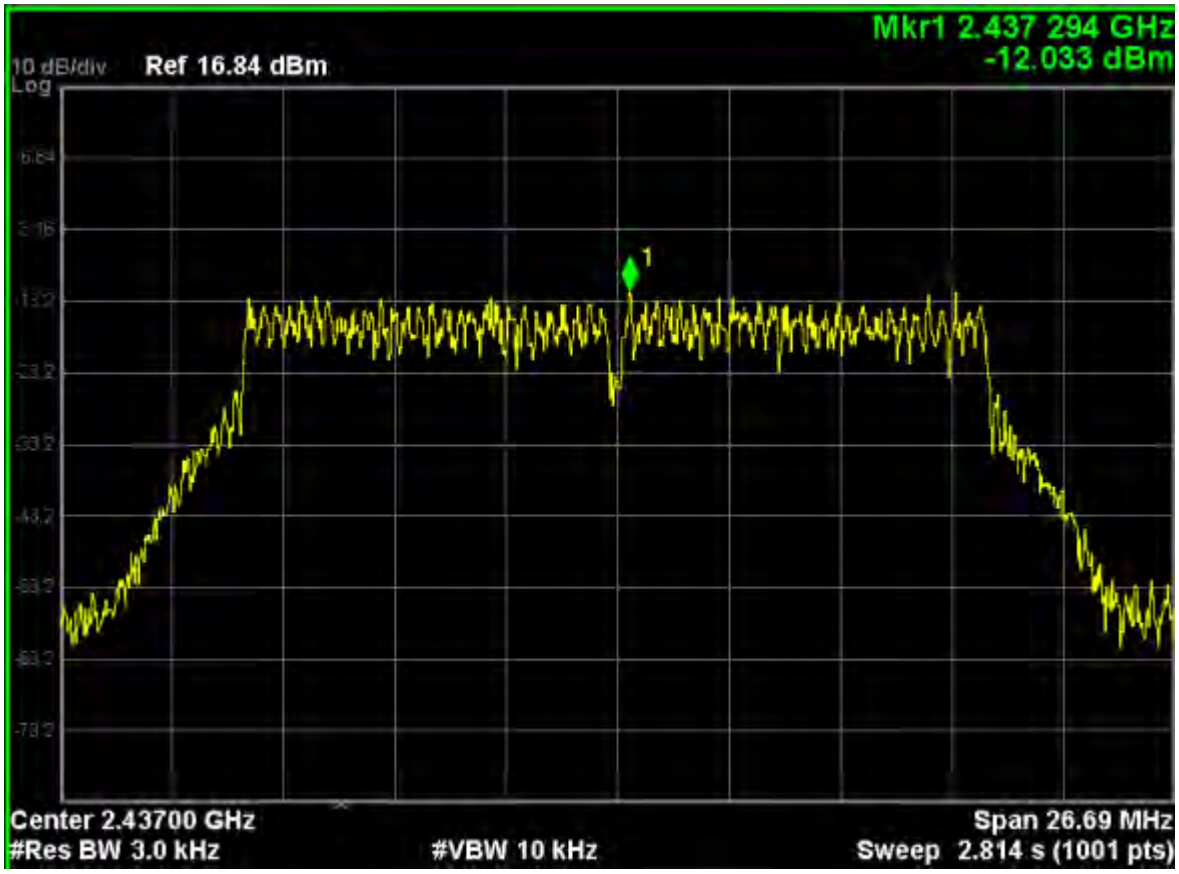


802.11n20

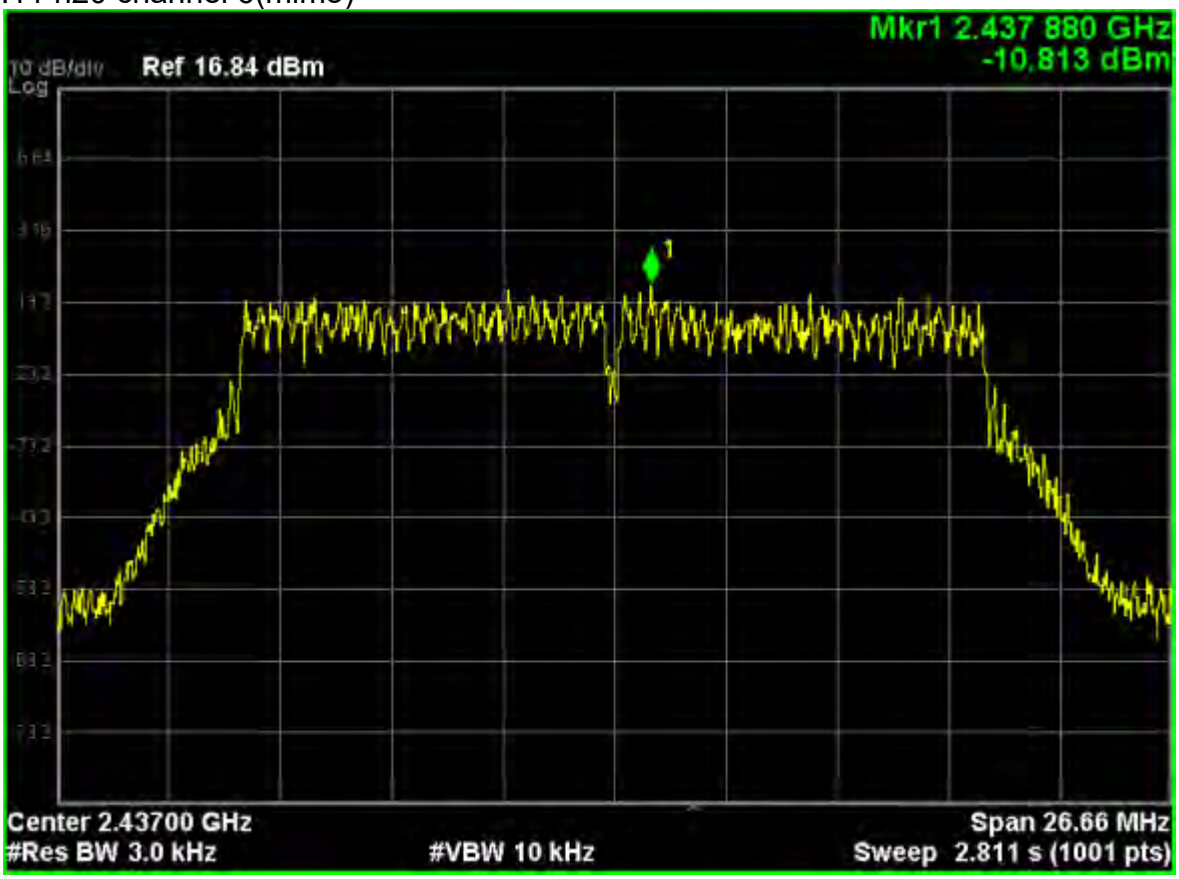
802.11n20 channel 1

802.11n20 channel 1(mimo)

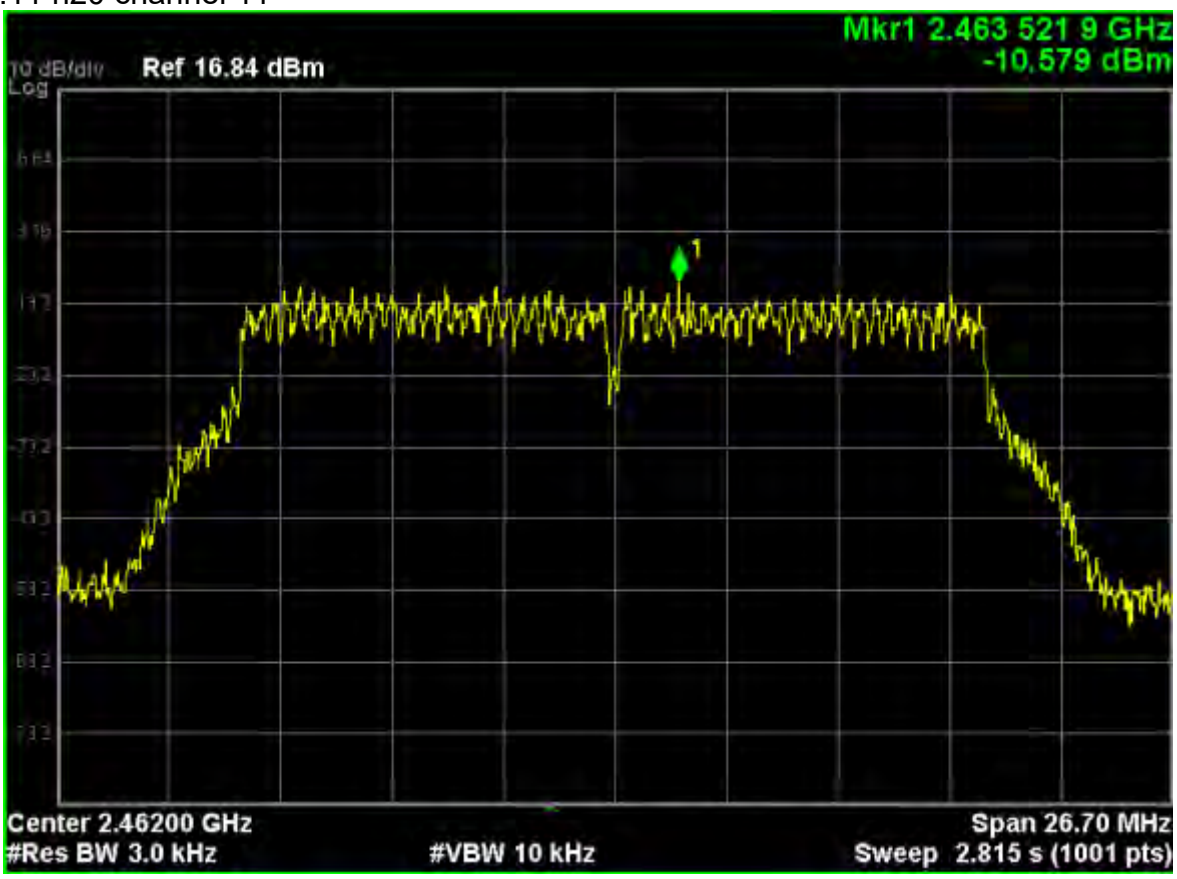
802.11 n20 channel 6



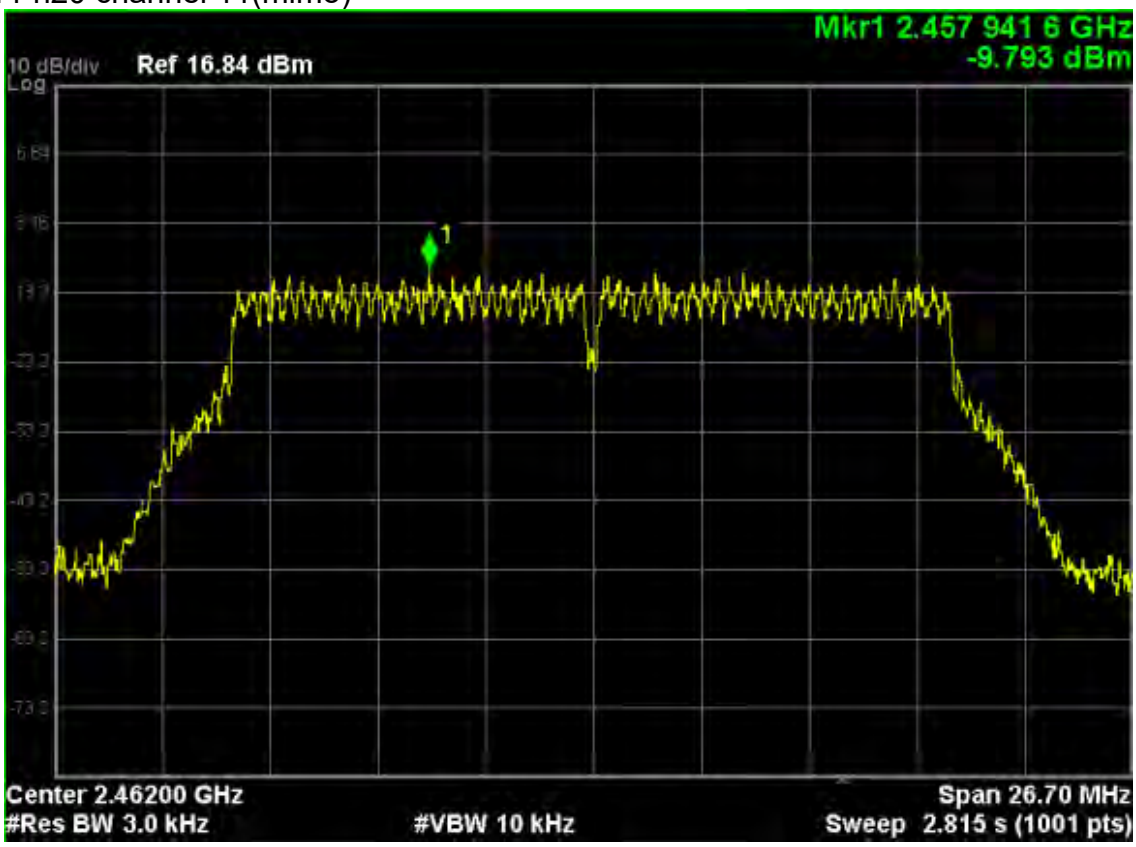
802.11 n20 channel 6(mimo)



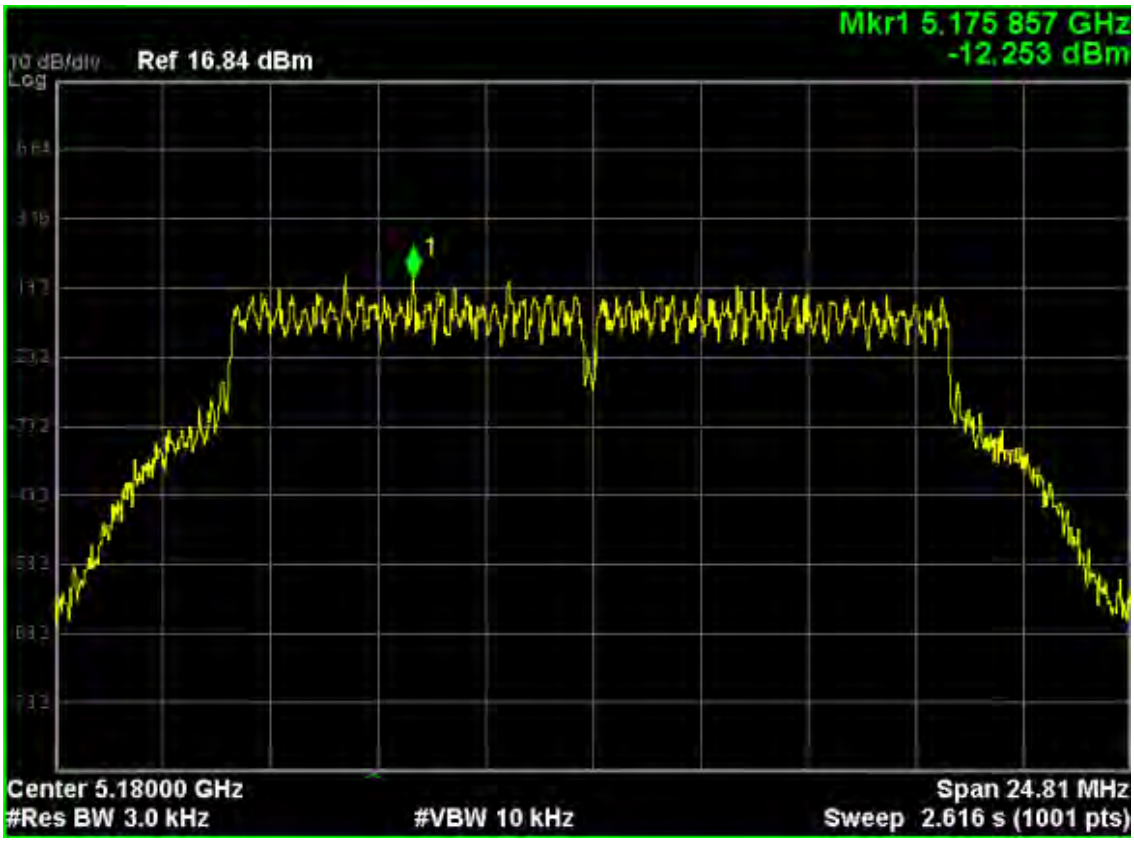
802.11 n20 channel 11



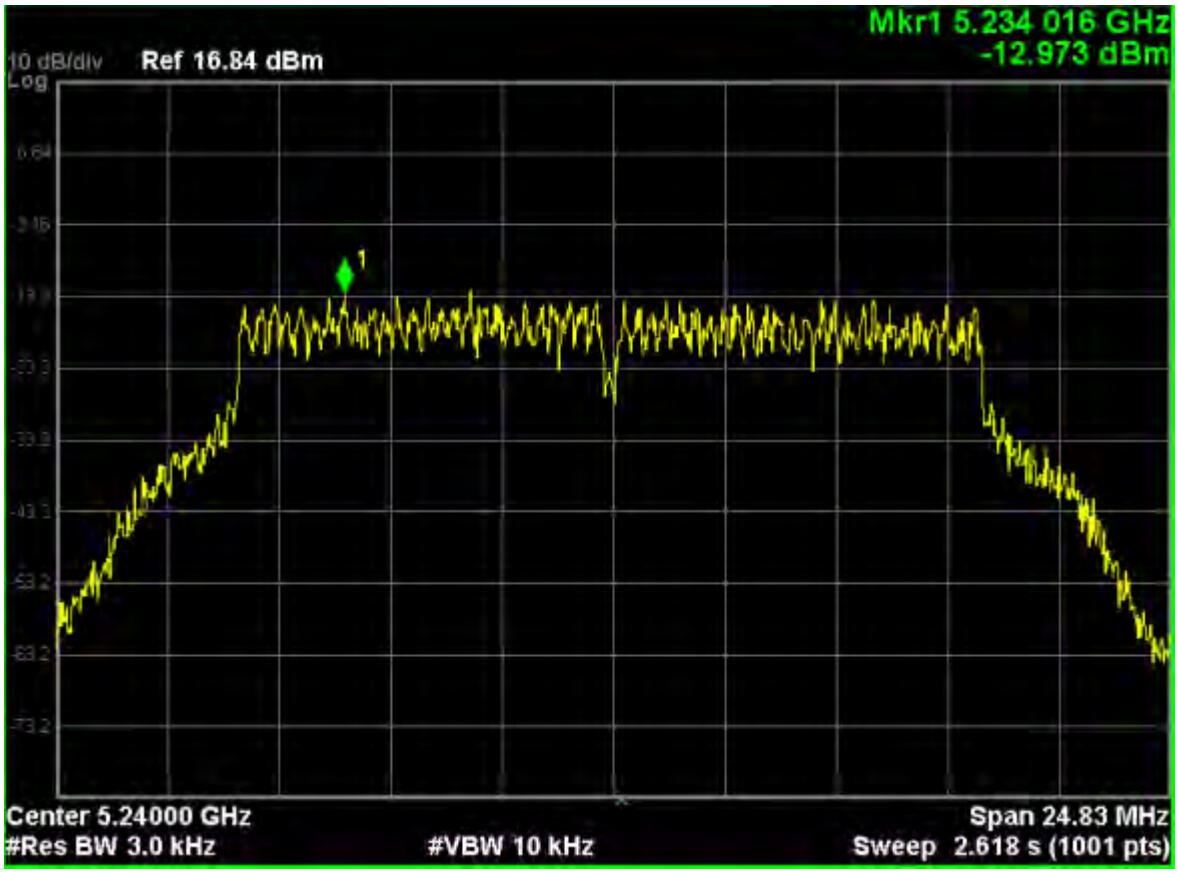
802.11 n20 channel 11(mimo)



WIFI 5G(5150MHz-5250MHz)
802.11a
802.11a channel 36

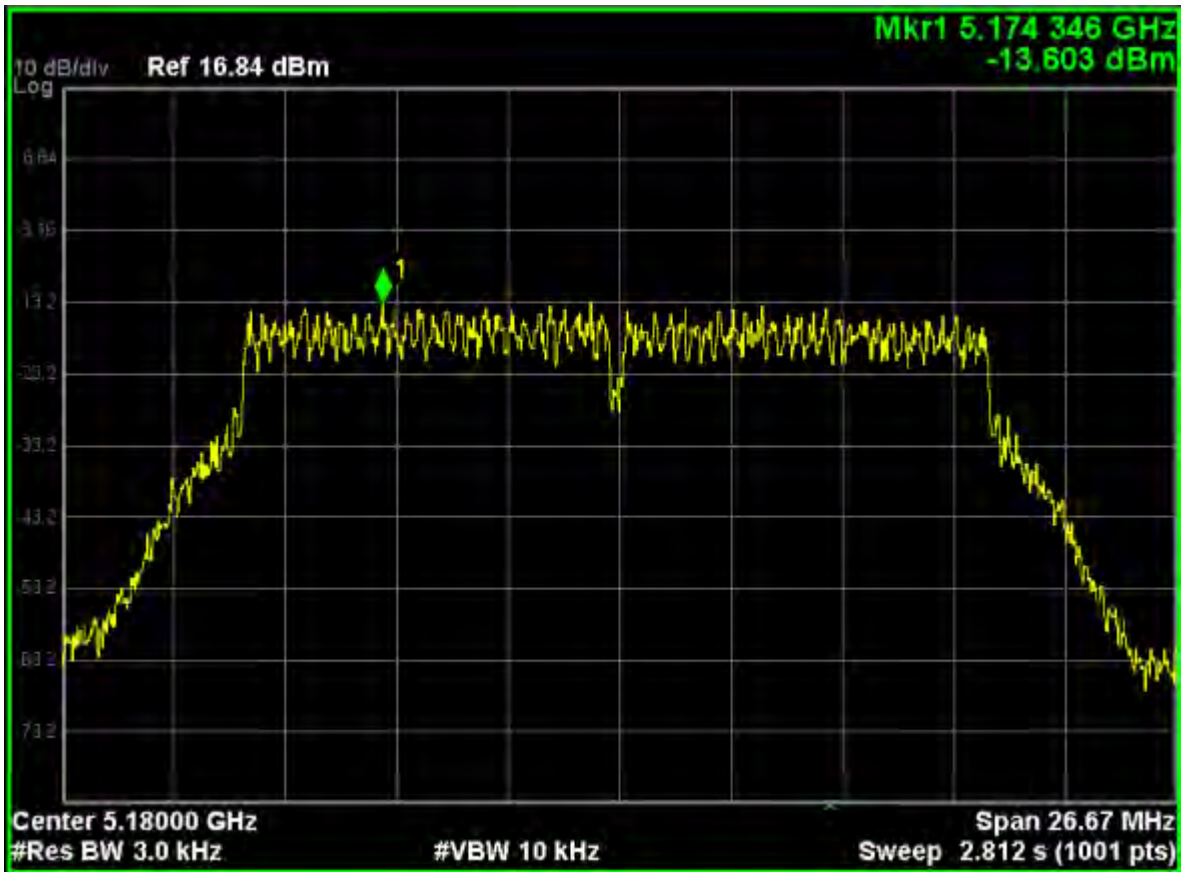


802.11a channel 48

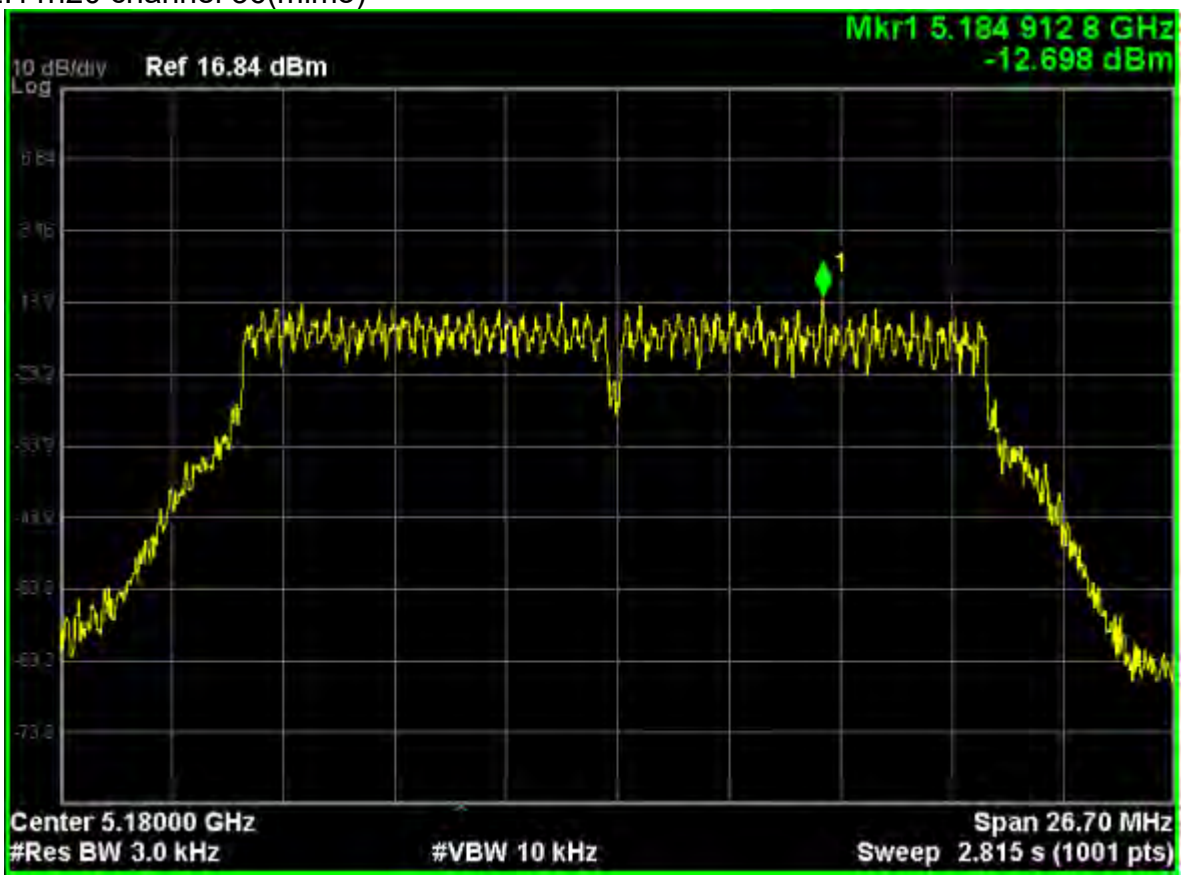


802.11n20

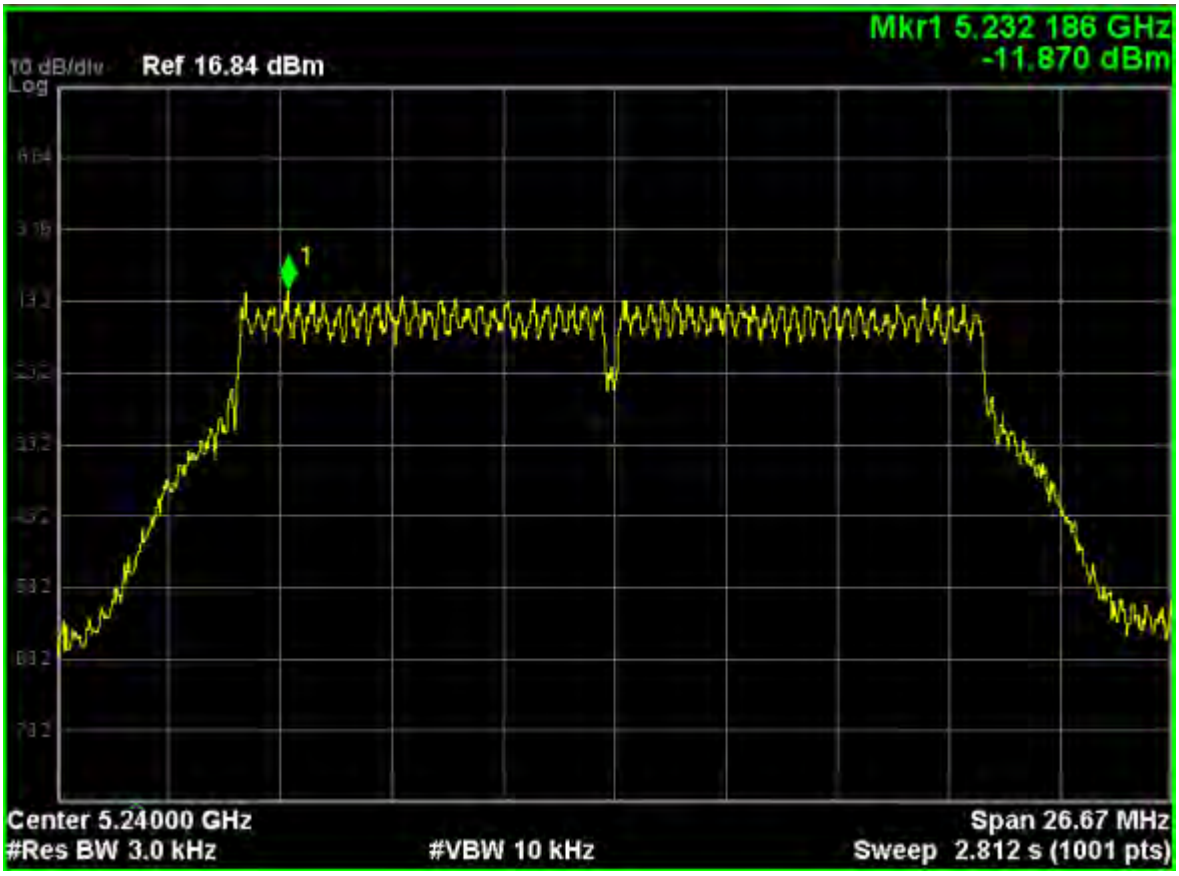
802.11n20 channel 36



802.11n20 channel 36(mimo)



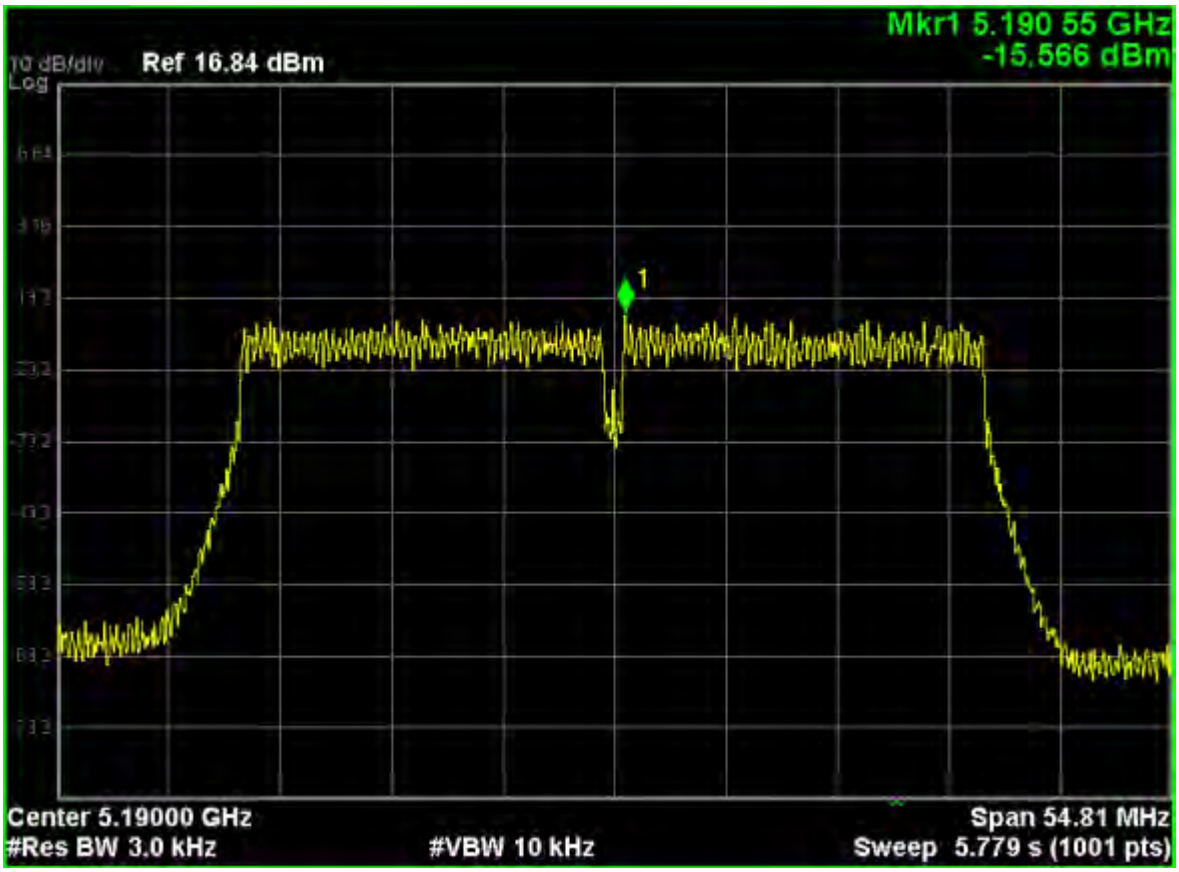
802.11n20 channel 48



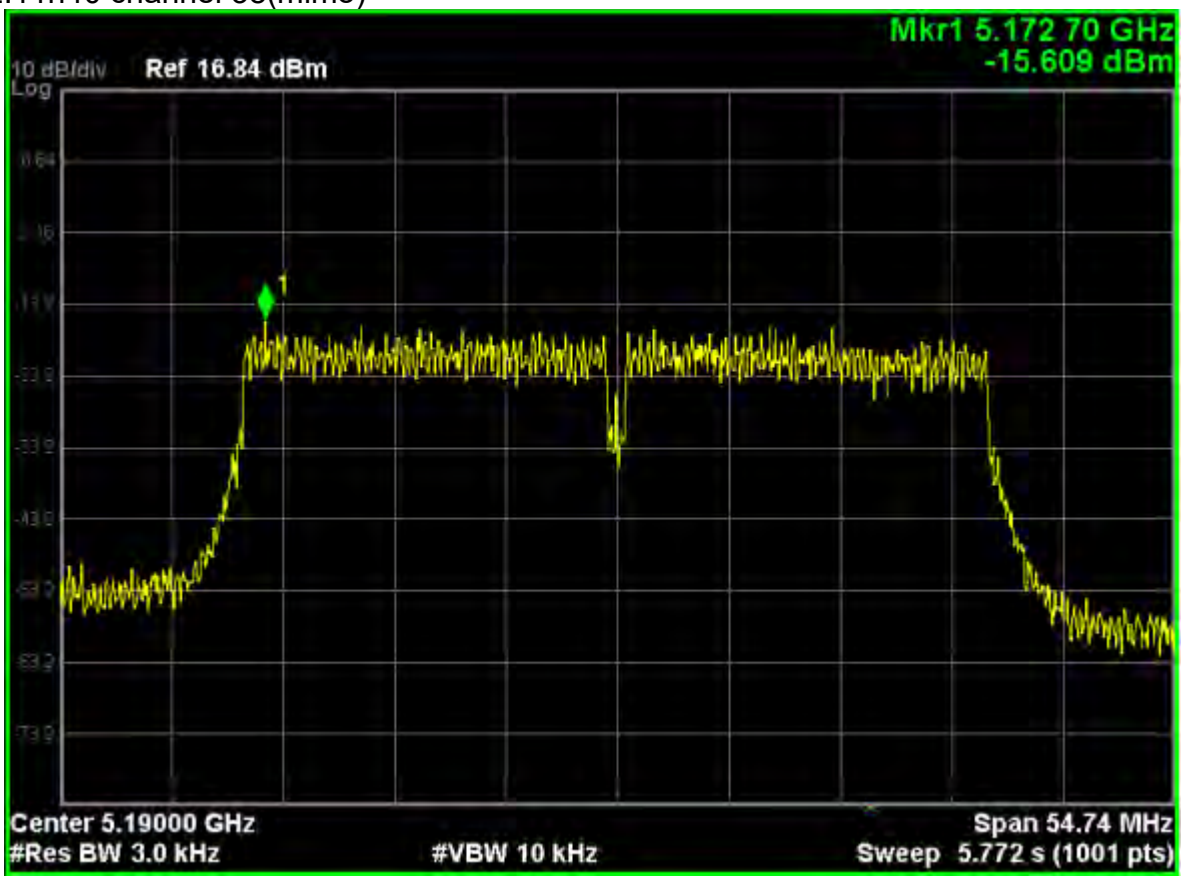
802.11n20 channel 48(mimo)

802.11n40

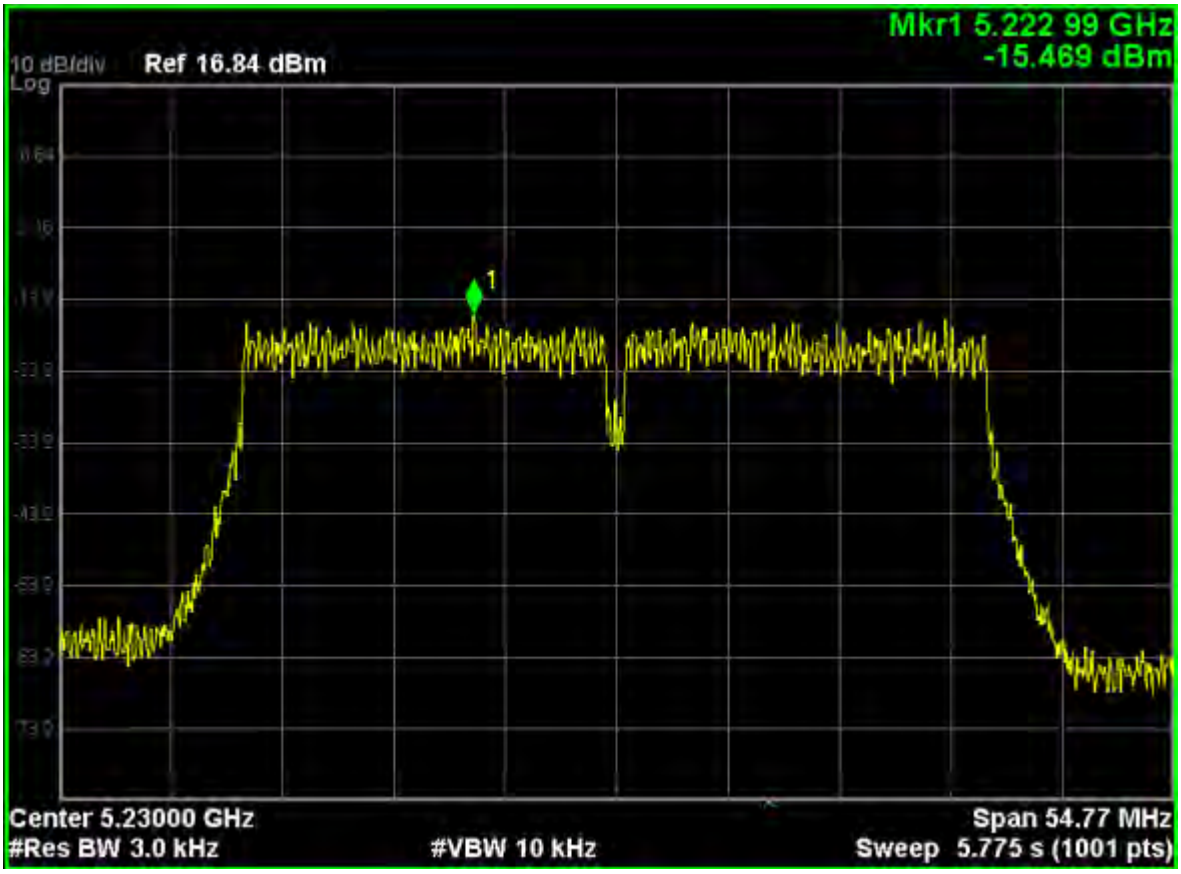
802.11n40 channel 38



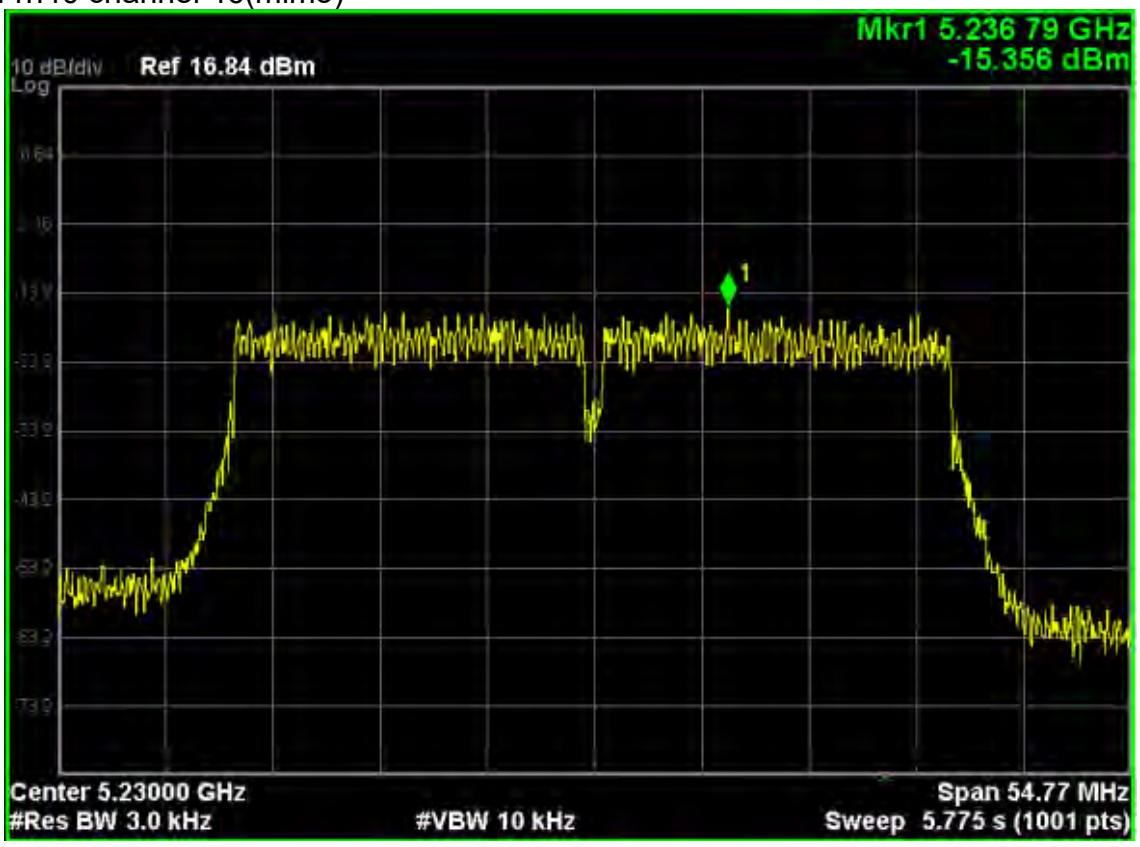
802.11n40 channel 38(mimo)



802.11n40 channel 46



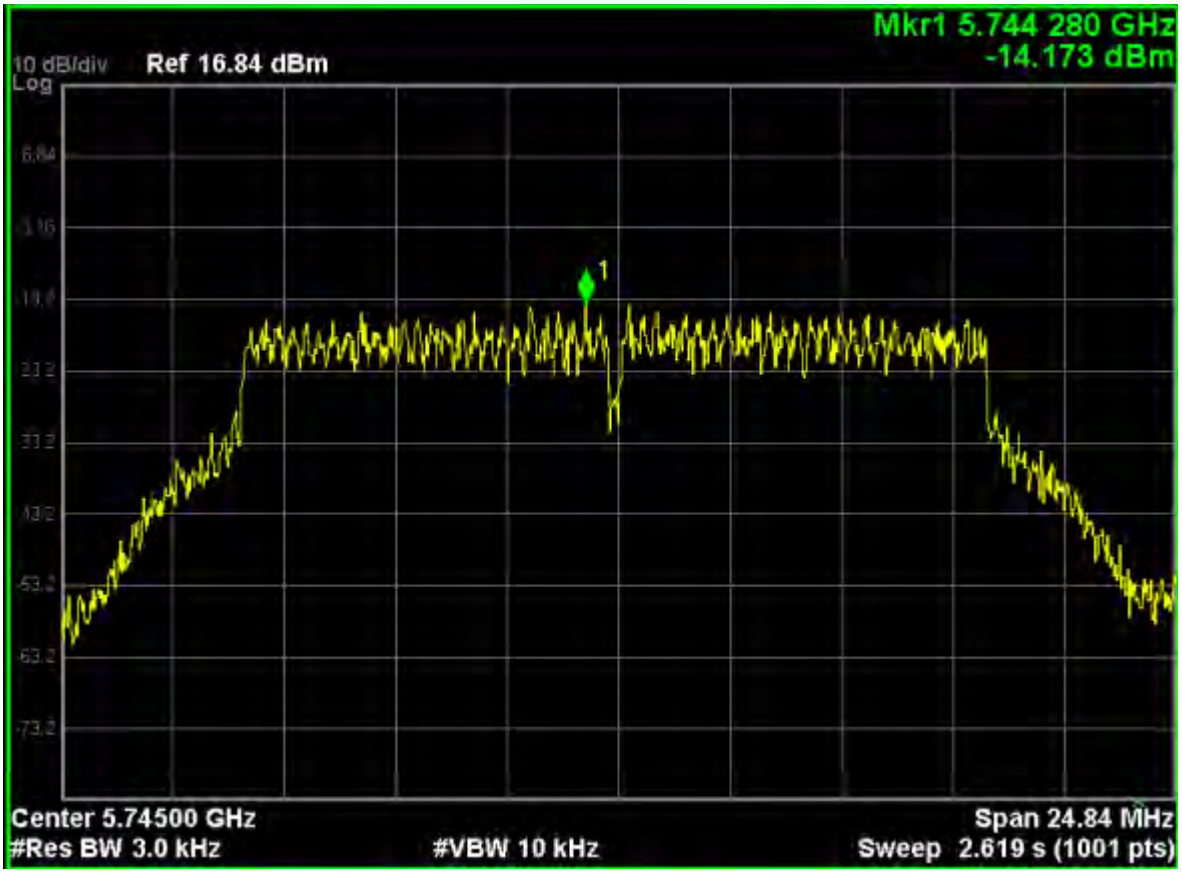
802.11n40 channel 46(mimo)



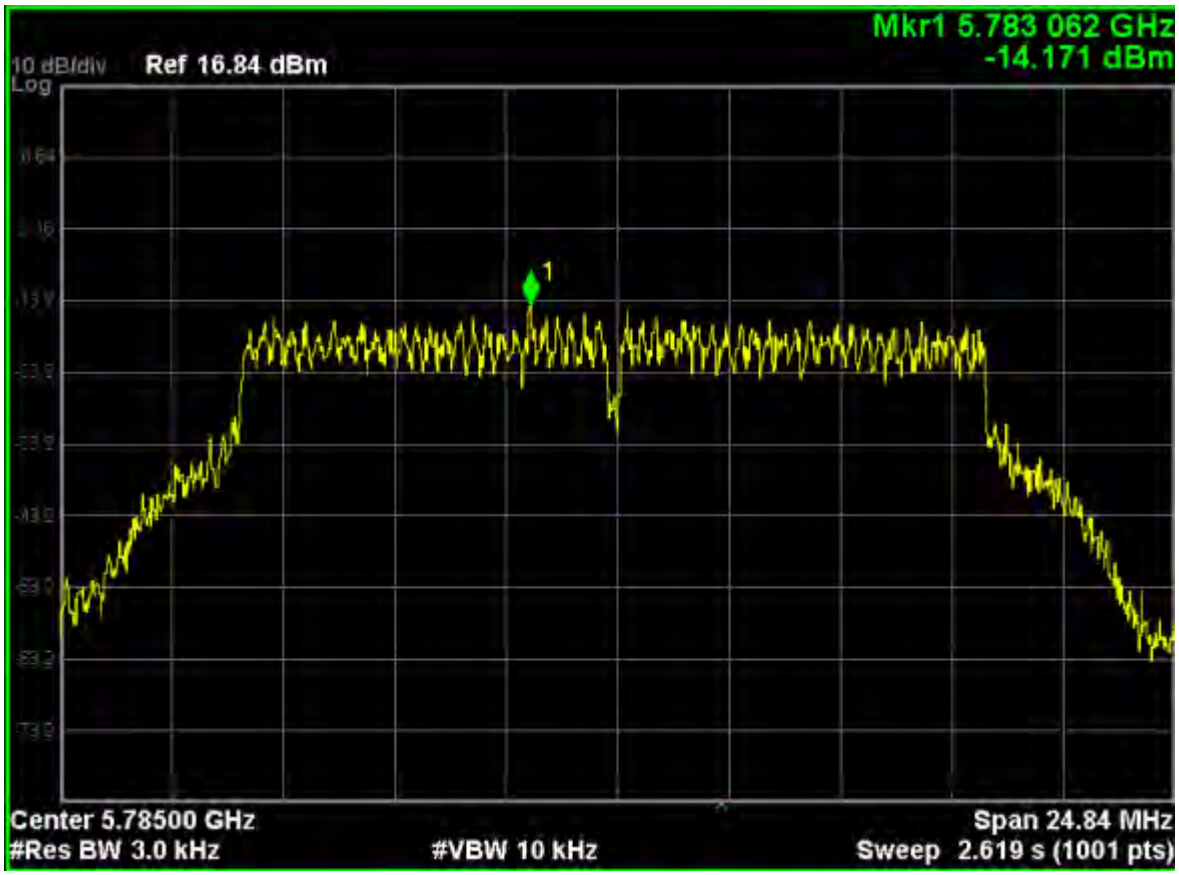
WIFI 5G(5725MHz-5850MHz)

802.11a

802.11a channel 149



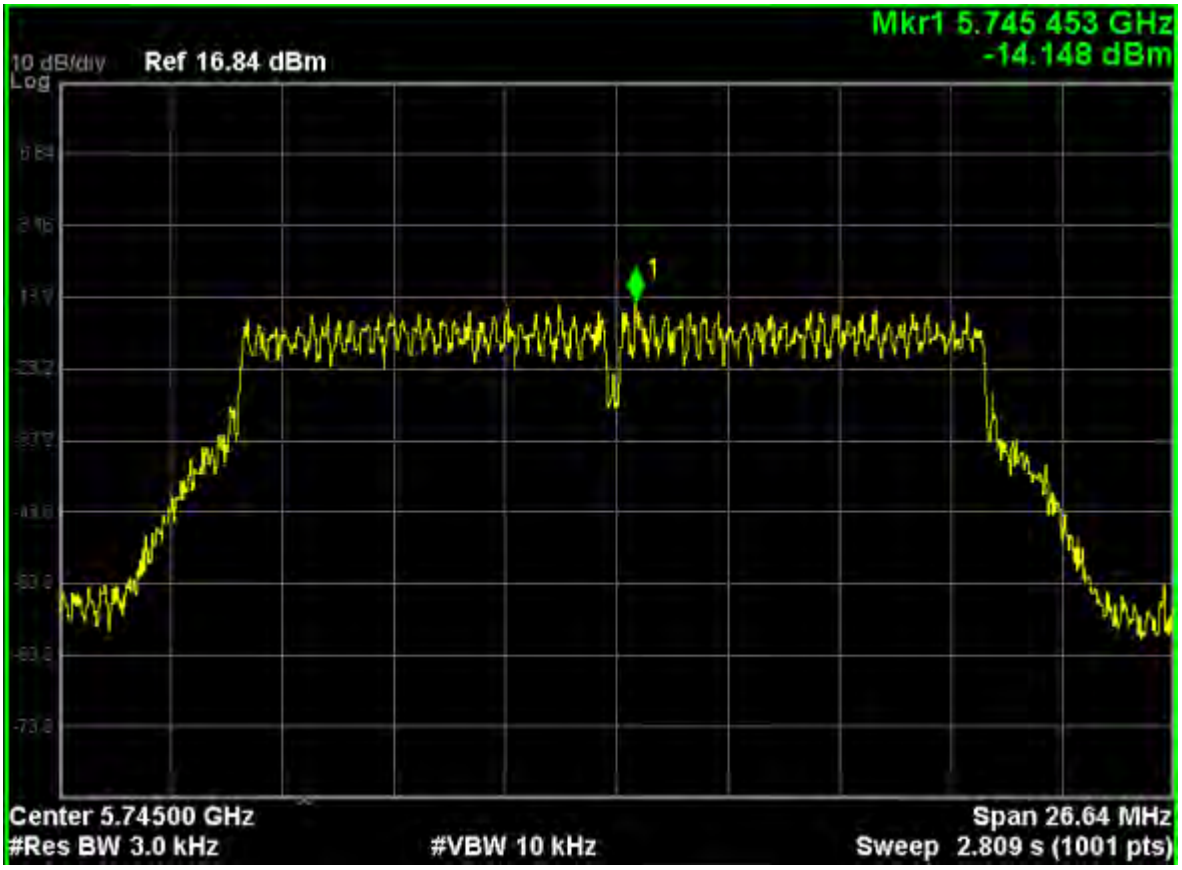
802.11a channel 157



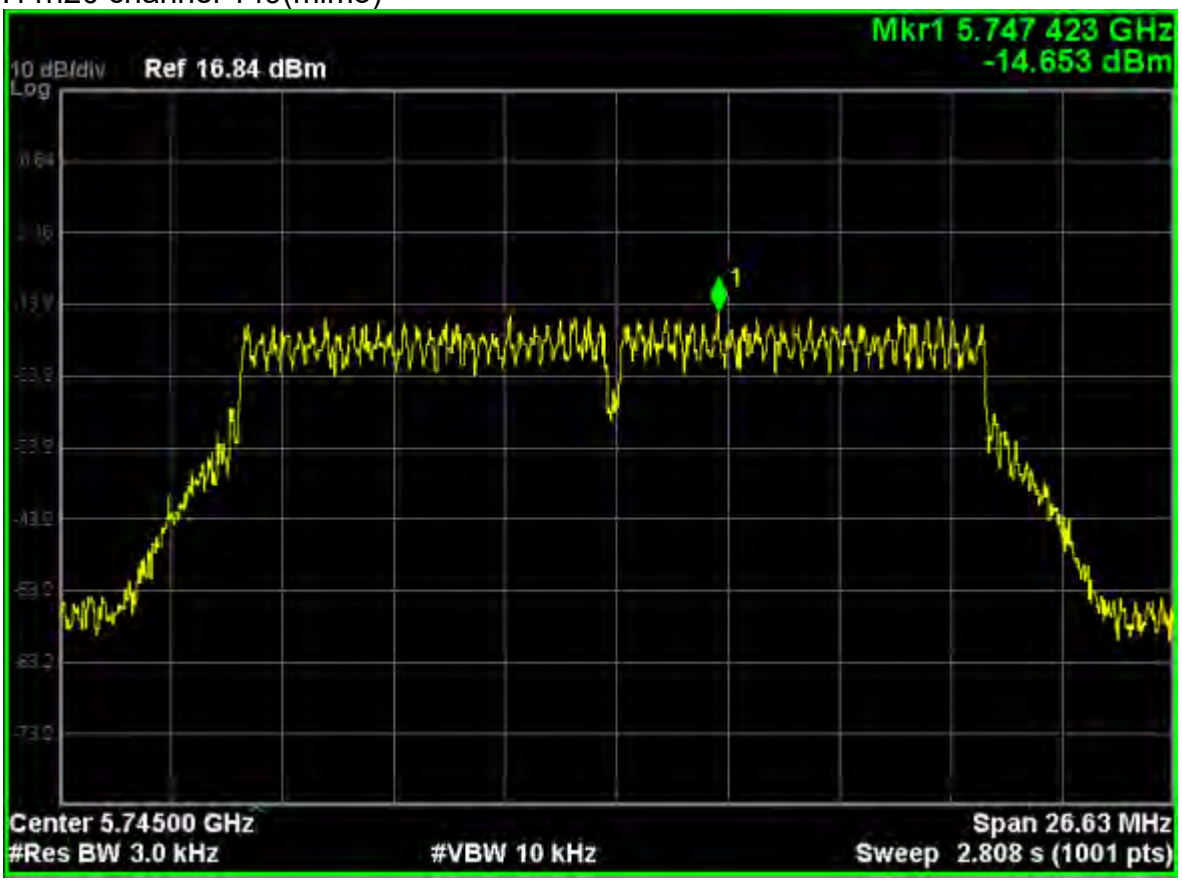
802.11a channel 165

802.11n20

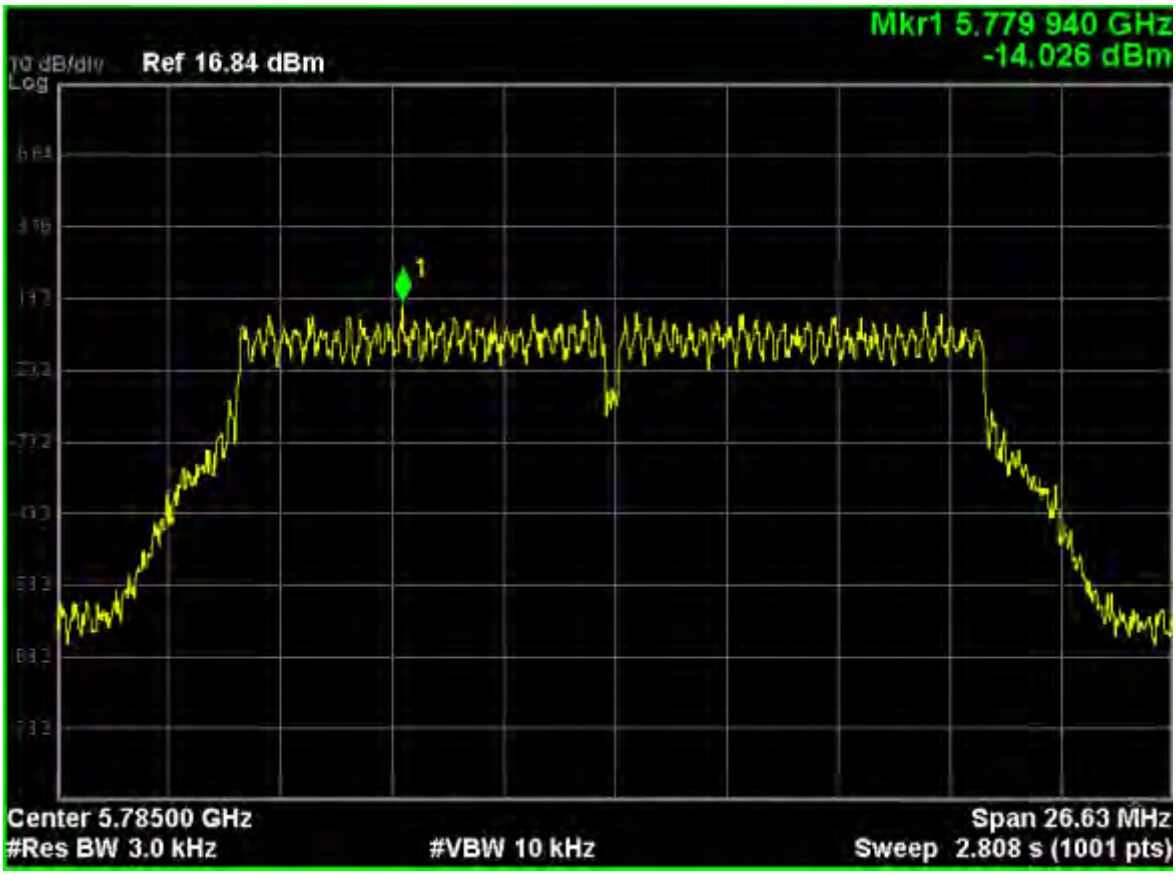
802.11n20 channel 149



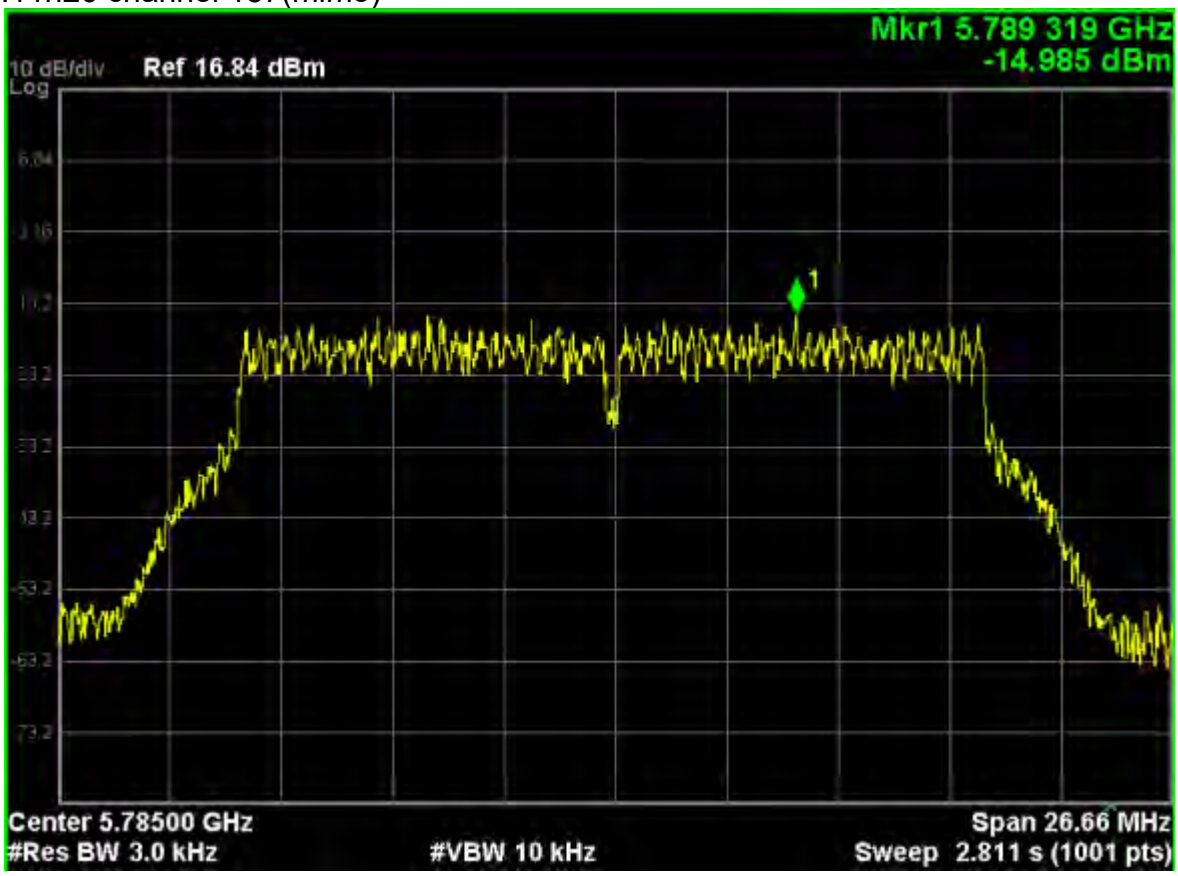
802.11n20 channel 149(mimo)



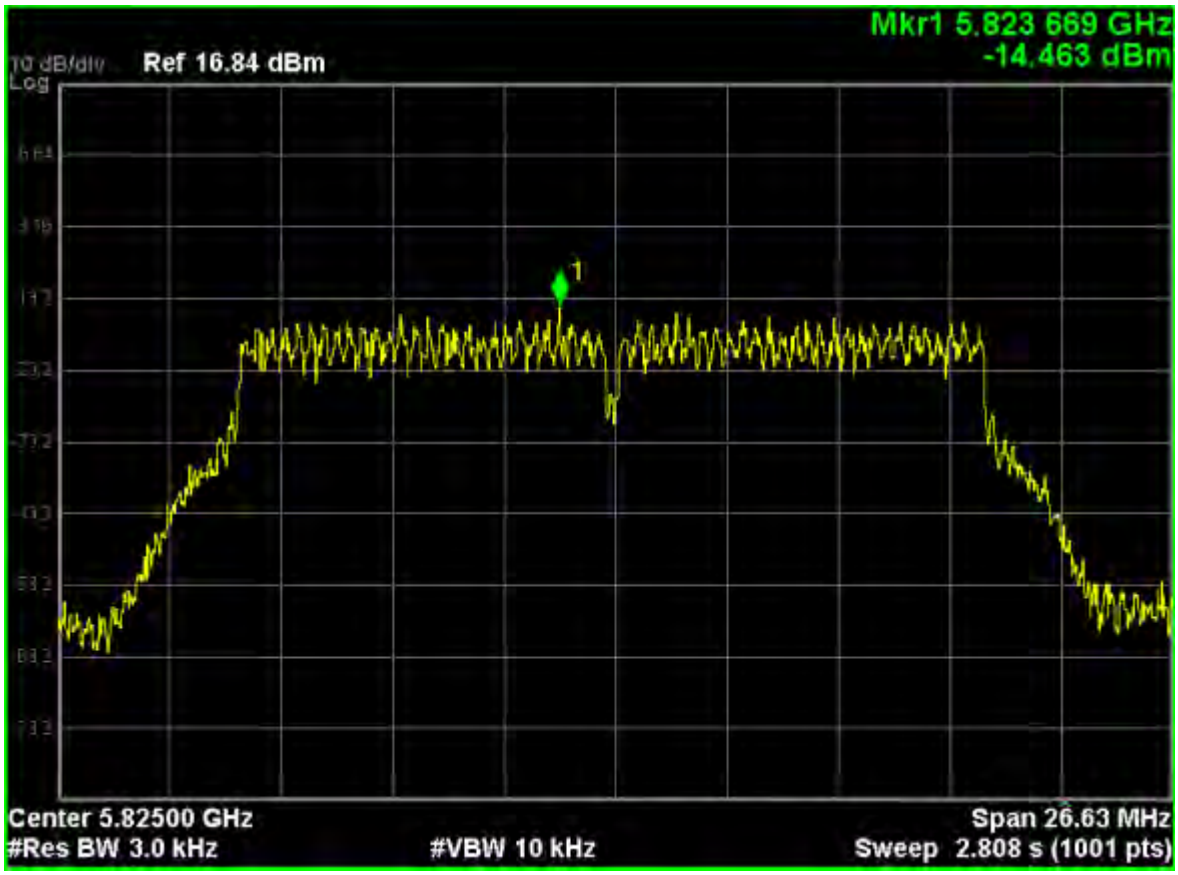
802.11n20 channel 157



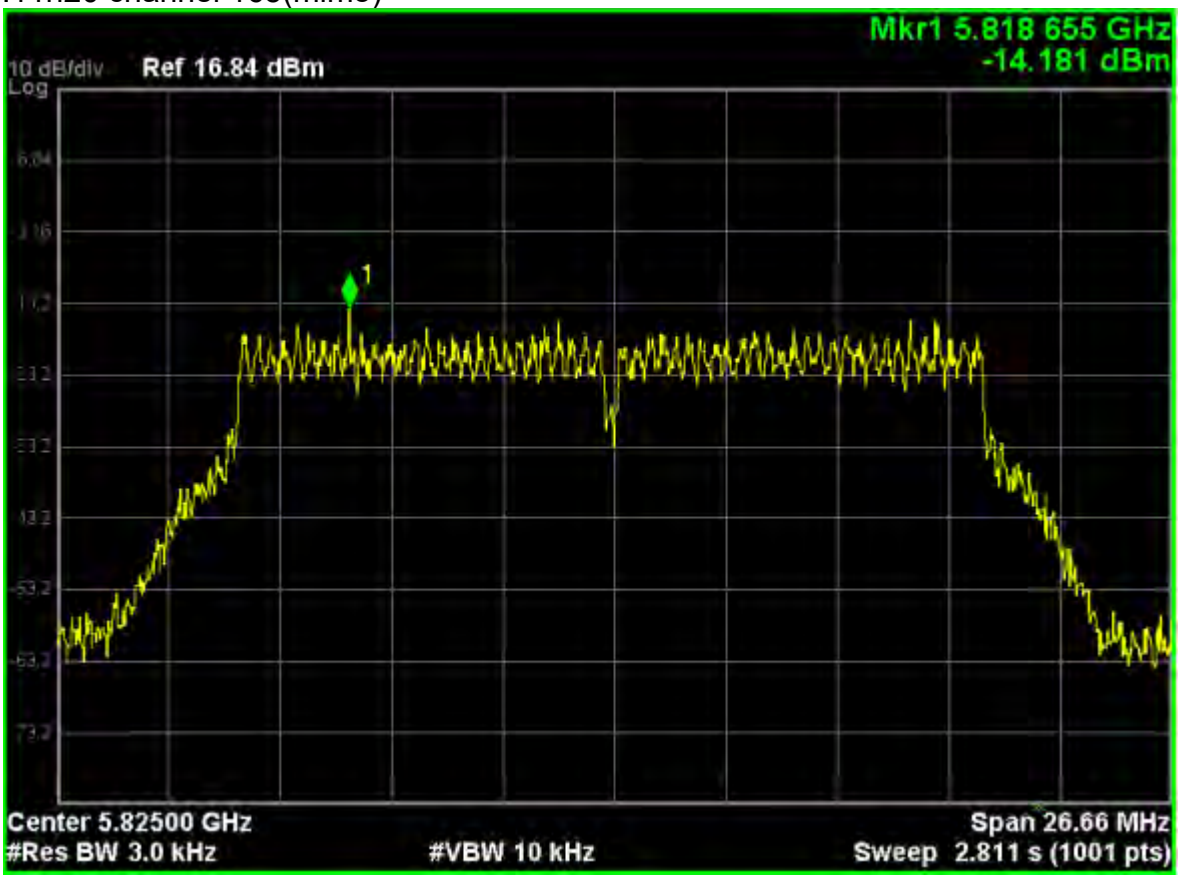
802.11n20 channel 157(mimo)



802.11n20 channel 165

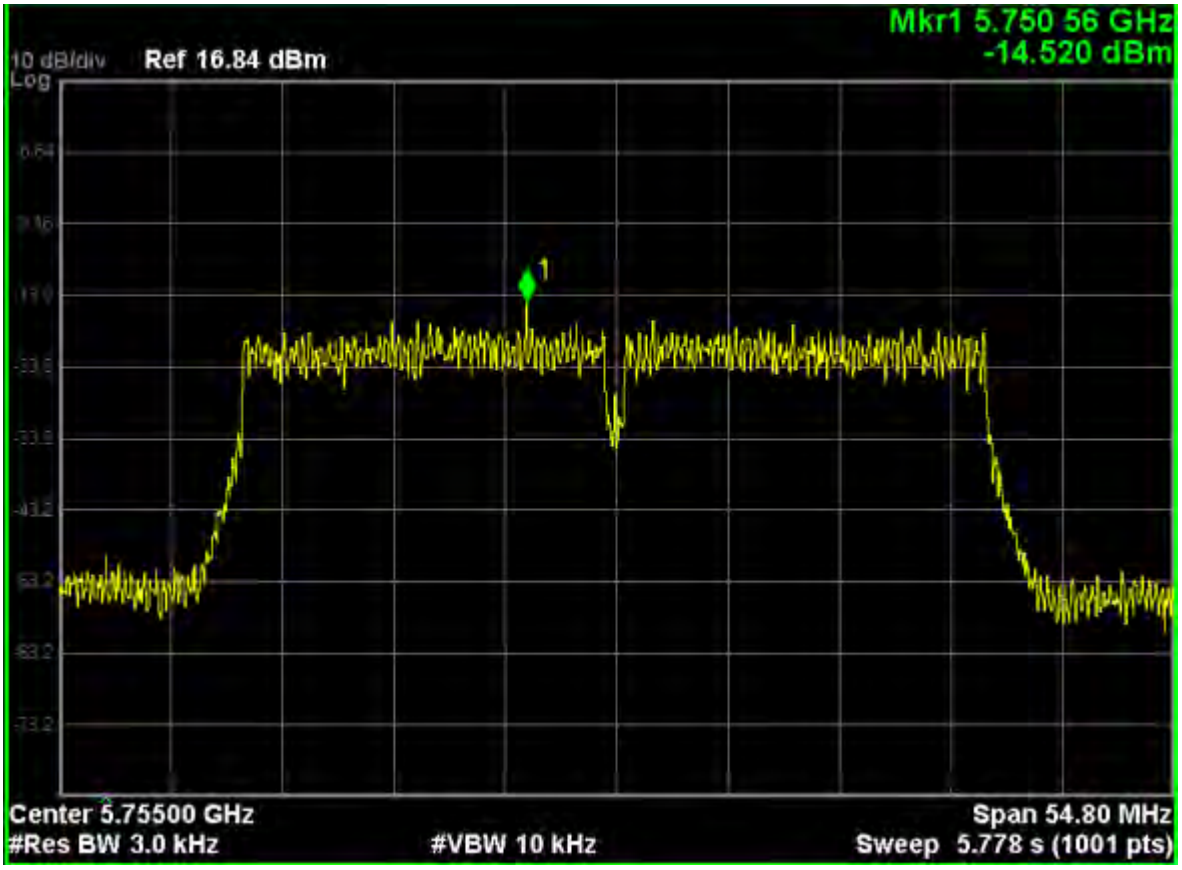


802.11n20 channel 165(mimo)

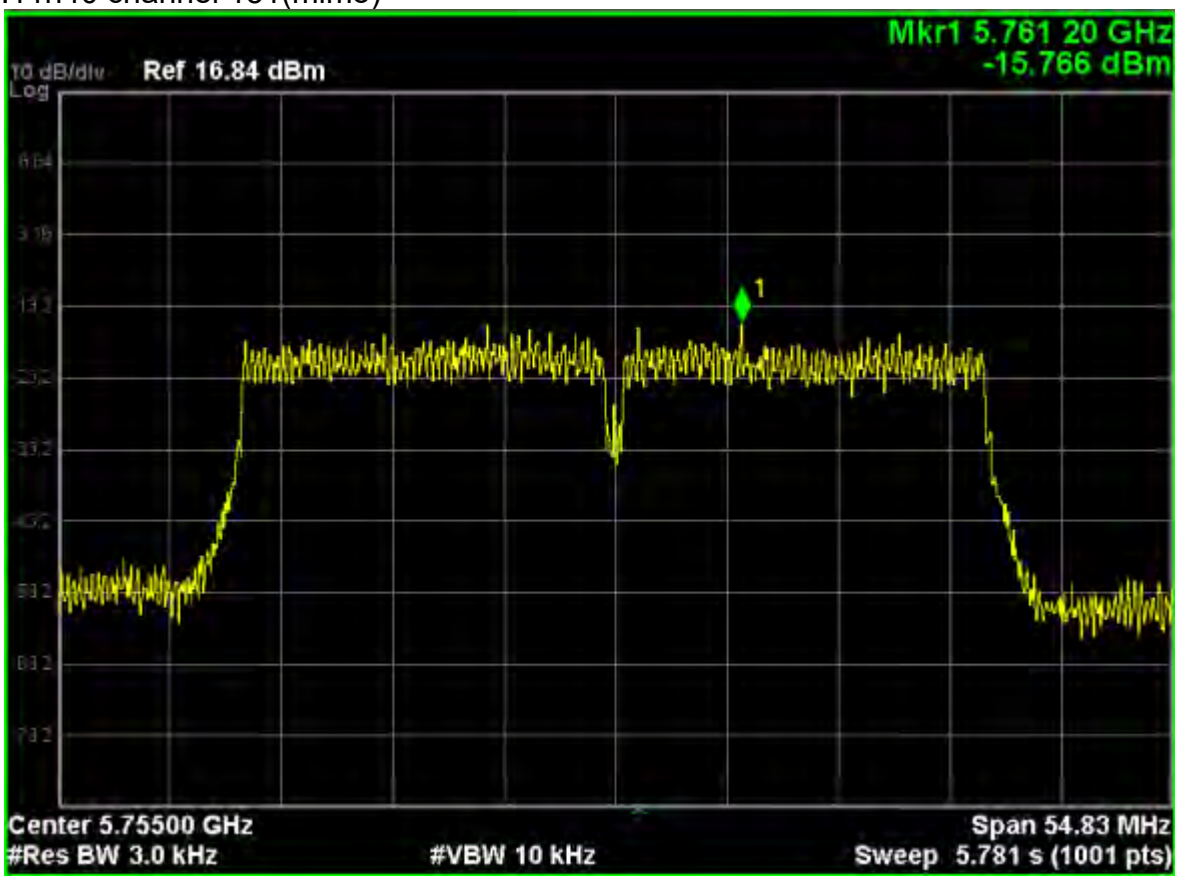


802.11n40

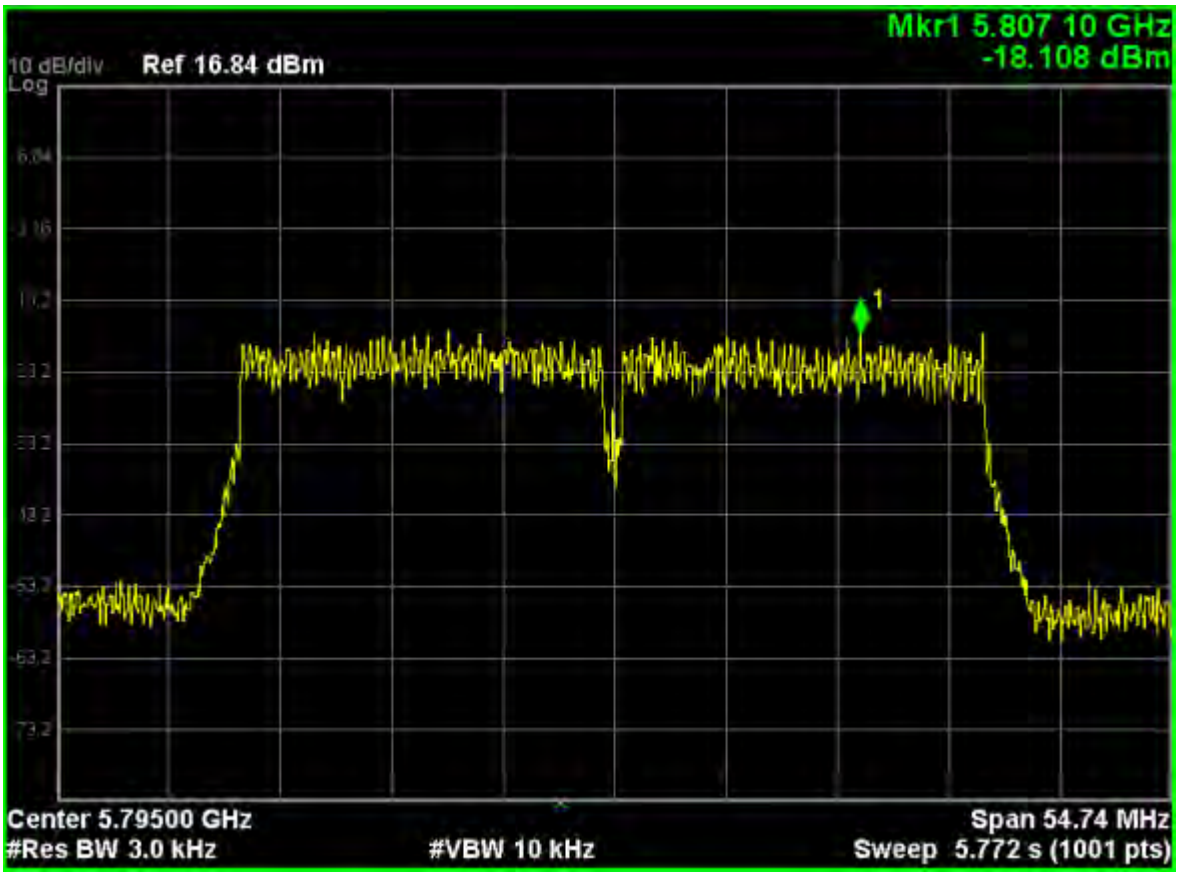
802.11n40 channel 151



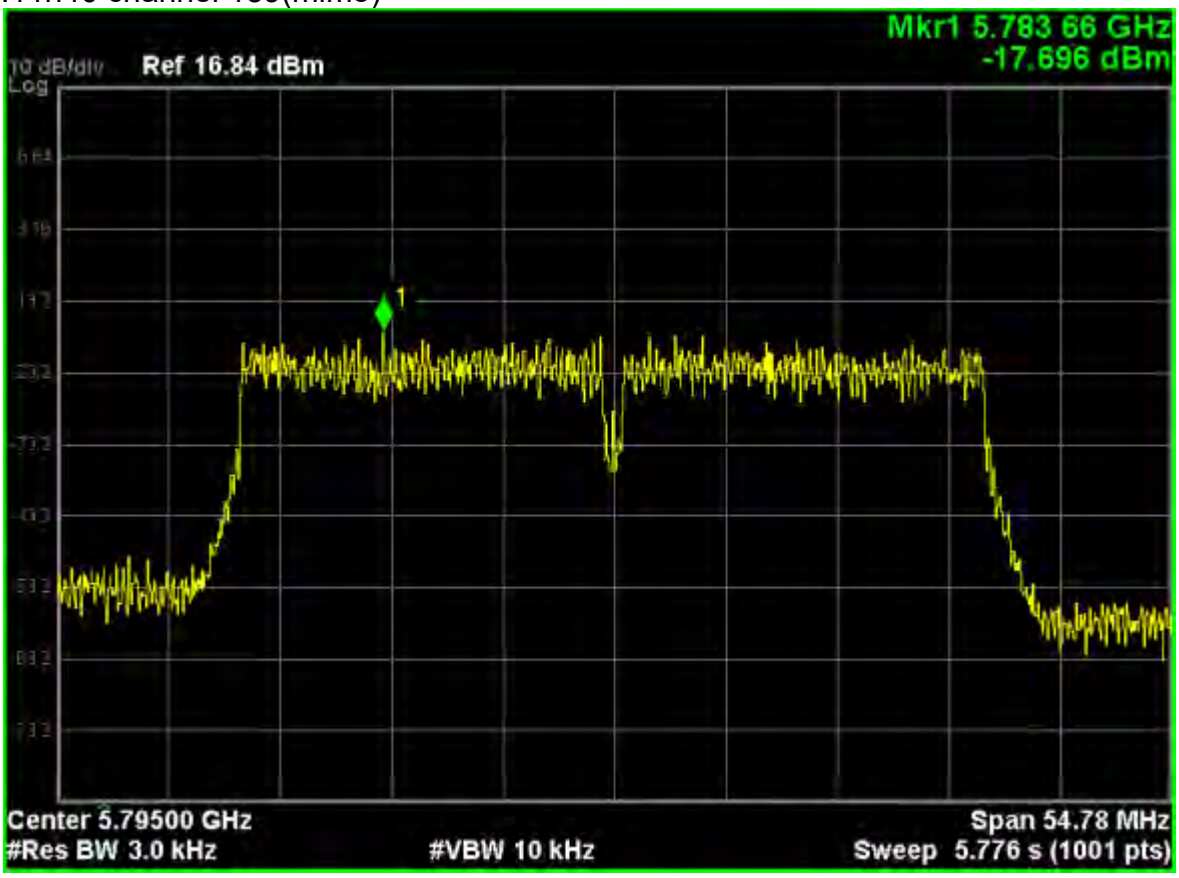
802.11n40 channel 151(mimo)



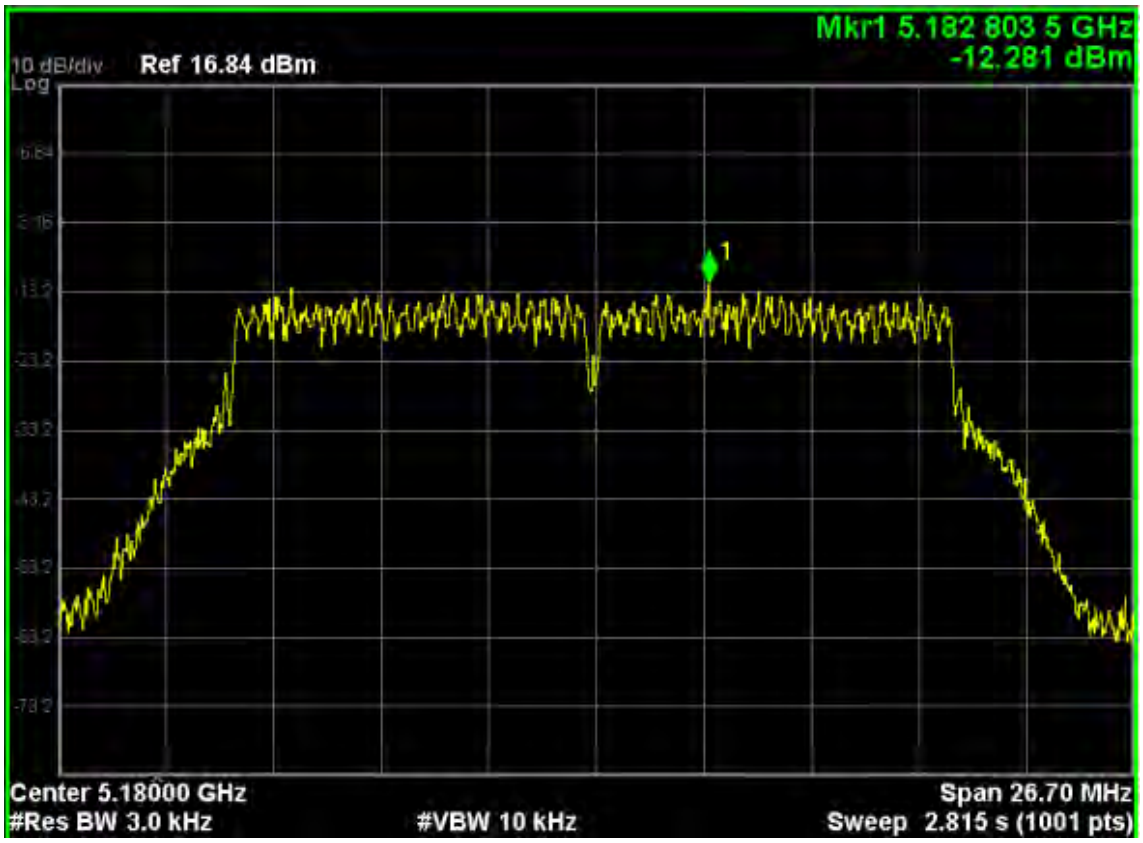
802.11n40 channel 159



802.11n40 channel 159(mimo)



802.11ac(5150MHz-5250MHz)
802.11ac20
802.11ac20 channel 36



802.11ac20 channel 36(mimo)