FCC Part 15 Subpart C Test Report

for DSSS System

Product Name : Android Moblie Data Terminal
Model Name : MX-5050-1D

Prepared for:
Mexxen Technology(ShangHai)INC.
Unit B,12F,Building 11,No. 518,xinzhuan Rd., Songjiang District,Shanghai,China
TEL: +86-21-64955599
FAX: +86-21-64959598

Prepared by:
Unilab (Shanghai) Co., Ltd
FCC 2.948 register number is 714465
No.1350, Lianxi Rd. Pudong New District, Shanghai, China
TEL: +86-21-50275125
FAX: +86-21-50275126

Report Number : UL32220150710FCC009-5
Date of Report : 08-03-2015
Date of Test : 07-17-2015~08-03-2015

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:	Mexxen Technology(ShangHai)INC. Unit B,12F,Building 11,No. 518,xinzhuan Rd., Songjiang District,Shanghai,China
Manufacturer:	Mexxen Technology(ShangHai)INC. Unit B,12F,Building 11,No. 518,xinzhuan Rd., Songjiang District,Shanghai,China
Product Name:	Android Moblie Data Terminal
Brand Name:	MEXXEN
Model Name:	MX-5050-1D
Model Description:	See Part1.1 Note.
FCC ID:	2ADXO-MX-5050
Serial Number:	N/A
EUT Voltage:	AC input: AC 100~240V 50/60Hz 0.4A Output: 5V 2A
Date of Receipt:	07-10-2015
Date of Test:	07-17-2015~08-03-2015
Test Standard:	FCC CFR Tile 47 Part 15 Subpart C ANSI C 63.4: 2009 KDB 558074 D01 v03r02
Test Result:	PASS

Prepared by : Jeffrey.wang
(Technical Engineer: Jeffrey Wang)

Reviewed by : Forest cao
(Senior Engineer: Forest Cao)

Approved by : Eva wang
(Supervisor: Eva Wang)

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 EUT DESCRIPTION

Product Name:	Android Moblie Data Terminal
Model Name:	MX-5050-1D
Hardware Version:	V3.0
Software Version:	GST_A82_M30_3110955E_MUL_V02_20150619
RF Exposure Environment:	Uncontrolled
WIFI	
Frequency Range:	2412MHz~2472MHz
Type of Modulation:	DSSS(BPSK/QPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM) MIMO-OFDM(BPSK/QPSK/16QAM/64QAM)
Channel Number:	11
Antenna Type:	Internal
Antenna Peak Gain:	2.6dBi
Component	
AC Adapter:	Input: AC 100-240V 50/60Hz 0.4A
	Output: DC 5V 2A

Note: We Mexxen Technology(ShangHai)INC.hereby declaration that the Model MX-5050-1D,MX-5050-2D,and Model MX-5050-EX, have the same PCBA design, and same accessories;And no any other difference except for model name.

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
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
Mode 10: 802.11n40 CH3
Mode 11: 802.11n40 CH6
Mode 12: 802.11n40 CH9

The conducted power table is as follows:

Test Mode		Conduct Power(dBm)		
		Channel 1	Channel 6	Channel 11
802.11b	rate 1	15.15	15.18	15.16
	rate 11	**15.13**	**15.29**	**15.17**
802.11g	rate 6	15.04	15.13	14.98
	rate 54	**15.04**	**15.15**	**14.95**
802.11n20	rate MCS 0	15.09	15.21	15.13
	rate MCS 7	**15.06**	**15.25**	**15.13**
Test Mode		Channel 3	Channel 6	Channel 9
802.11n40	rate MCS 0	15.73	15.84	15.64
	rate MCS 7	**15.72**	**15.89**	**15.63**

Note:
1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For the radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.

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: 2009 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: 2009.

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

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 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.
After verification, all tests were carried out with the worst case test modes as shown below

IEEE802.11b mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with 11Mbps data rate were chosen for full testing.

IEEE802.11g mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with 54Mbps data rate were chosen for full testing.

IEEE802.11n20 mode:

Channel Low (2412MHz)

Channel Mid (2437MHz)

Channel High (2462MHz) with 65Mbps data rate were chosen for full testing.

IEEE802.11n40 mode:

Channel Low (2422MHz)

Channel Mid (2437MHz)

Channel High (2452MHz) with 135Mbps data rate were chosen for full testing.

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	Result
Occupied Bandwidth	§15.247 (a)	P
6 dB bandwidth	§15.247 (a)	P
Power spectral density	§15.247 (e)	P
Peak Output Power (Conduction)	§15.247 (b)	P
Spurious Emissions (Conduction)	§15.247 (d)	P
Band edge measurement	§15.247 (d)	P
Spurious Emissions (Radiation)	§15.247 (d) §15.35 (b) §15.209 (a)	P
AC Power Line Conducted Emissions	§15.207 (a)	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	11/11/2015
Power meter	R&S	NRP2	101607	02/18/2016
Loop Antenna	Schwarzbeck	FMZB1519	1519-020	03/25/2016
LISN	R&S	ENV216	100069	07/27/2016
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	11/26/2017
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	02/27/2016
Power Splitter	Agilent	11667C/ 52401	MY53806148	02/27/2016
Biconilog Antenna	Schwarzbeck	VULB 9160	3316	09/19/2016
Horn Antenna	Schwarzbeck	BBHA9120D	942	09/19/2016
Horn Antenna	Schwarzbeck	BBHA9120D	943	09/19/2016

Horn Antenna(18-40GHz)	ETS	3116	00070497	07/18/2016

3.4 TEST FACILITY

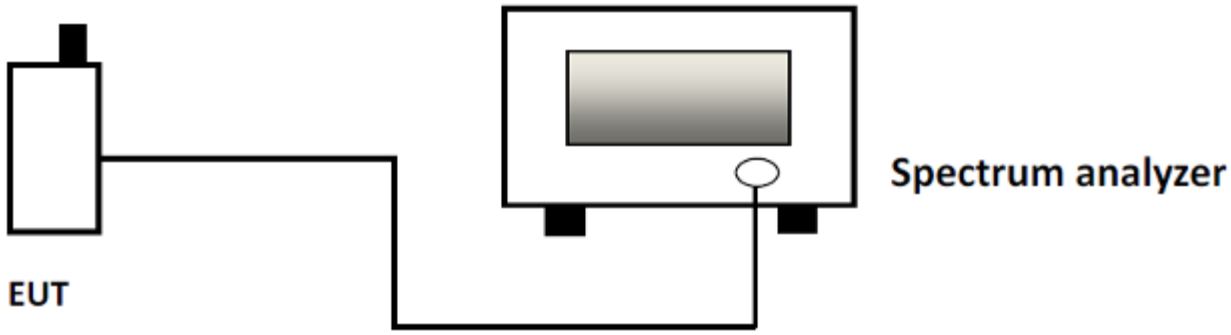
All test facilities used to collect the test data are located at No.1350, Lianxi Rd. Pudong New District, Shanghai, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4: 2009, CISPR 16-1-1 and other equivalent standards. The laboratory is compliance with the 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

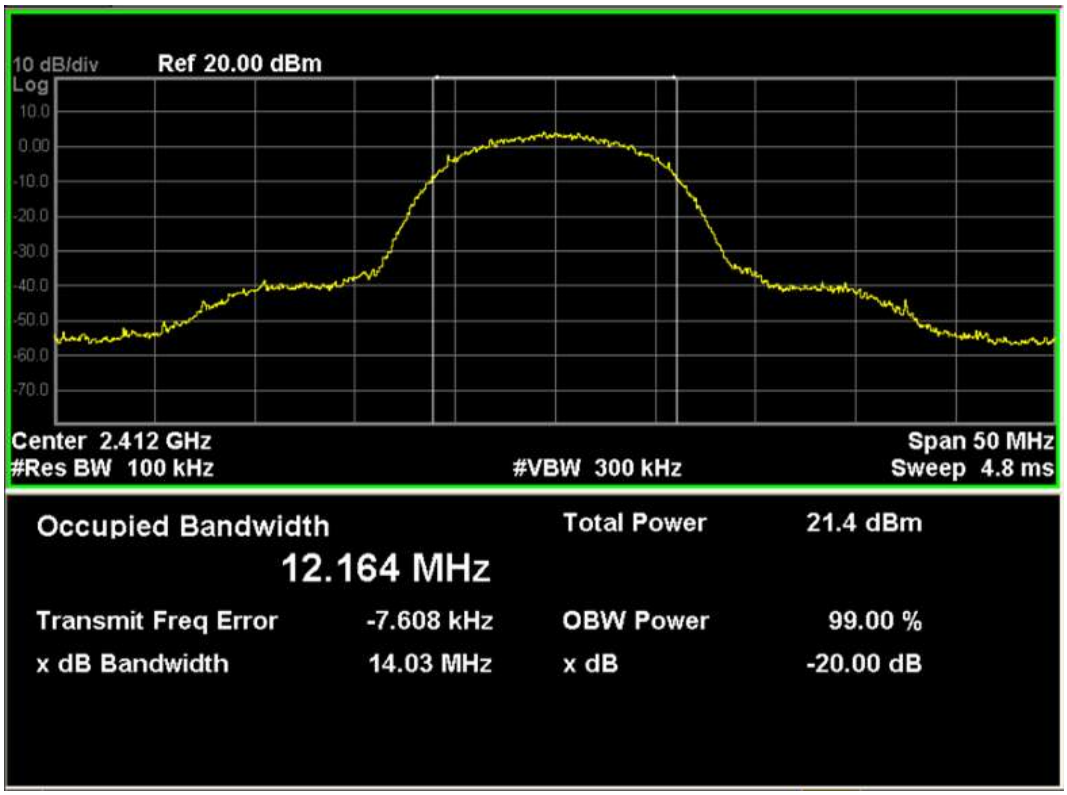
Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
WIFI: Low(1), Middle(6) and High (11).
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

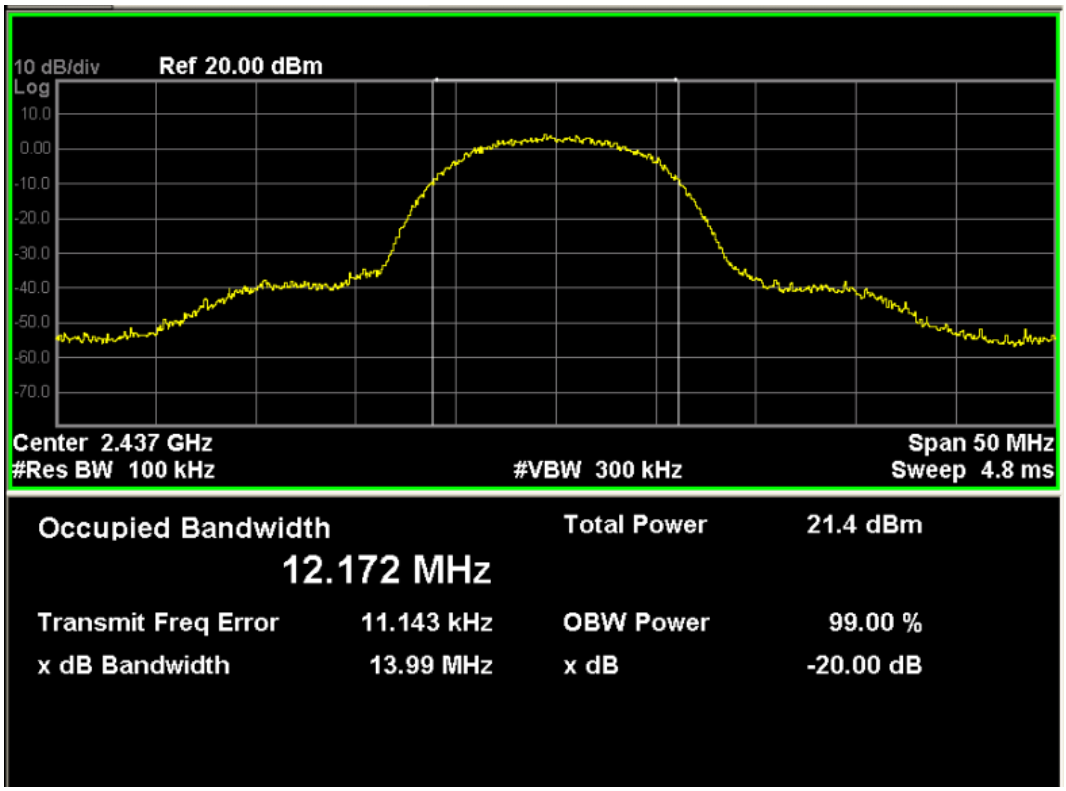
Channel	20dB bandwidth (MHz)	99% bandwidth (MHz)
802.11b		
802.11b CH1	14.03	12.16
802.11b CH6	13.99	12.17
802.11b CH11	14.21	12.20
802.11g		
802.11g CH1	17.47	16.36
802.11g CH6	17.38	16.36
802.11g CH11	17.19	16.33
802.11n20		
802.11n CH1	18.12	17.53
802.11n CH6	18.24	17.53
802.11n CH11	18.16	17.54
802.11n40		
802.11n CH3	37.13	35.99
802.11n CH6	37.03	35.99
802.11n CH9	37.04	35.89

802.11b

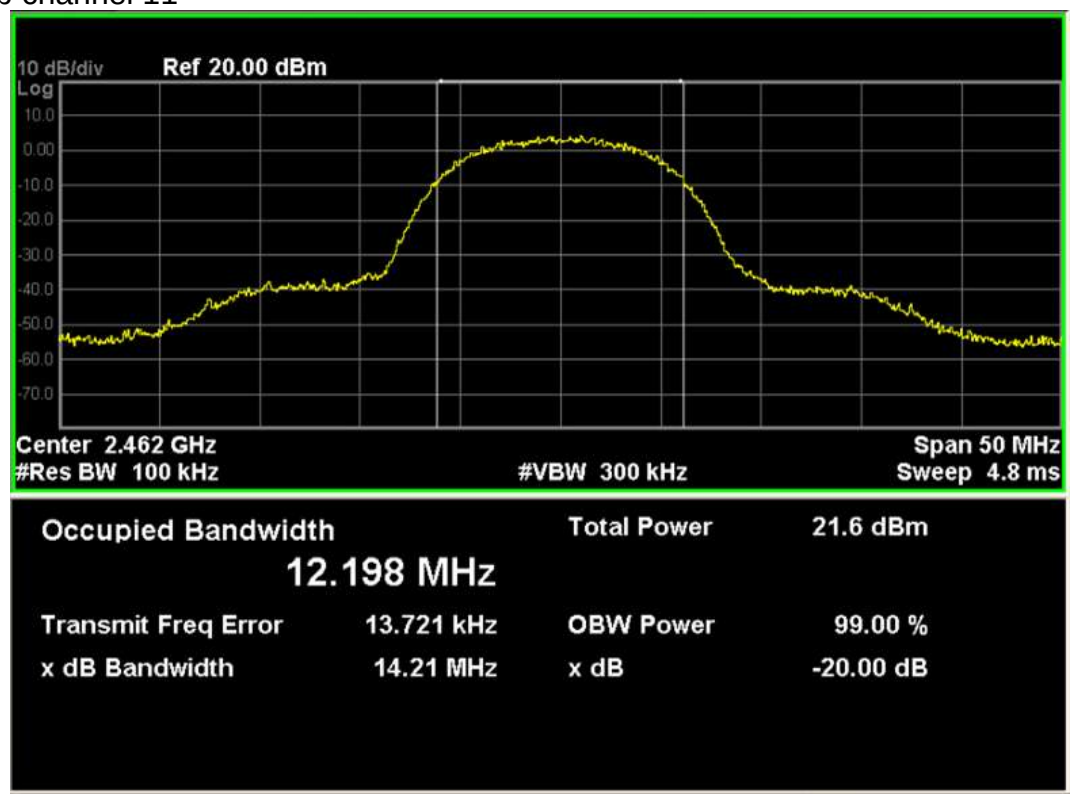
802.11b channel 1



802.11b channel 6

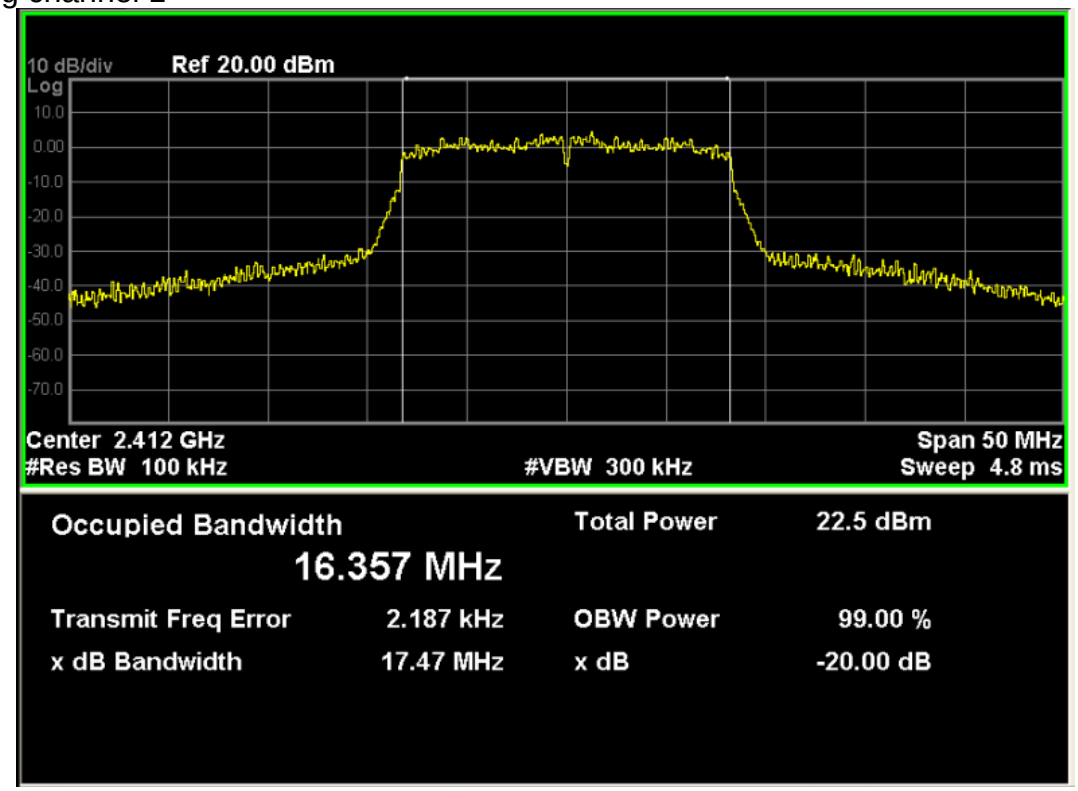


802.11b channel 11

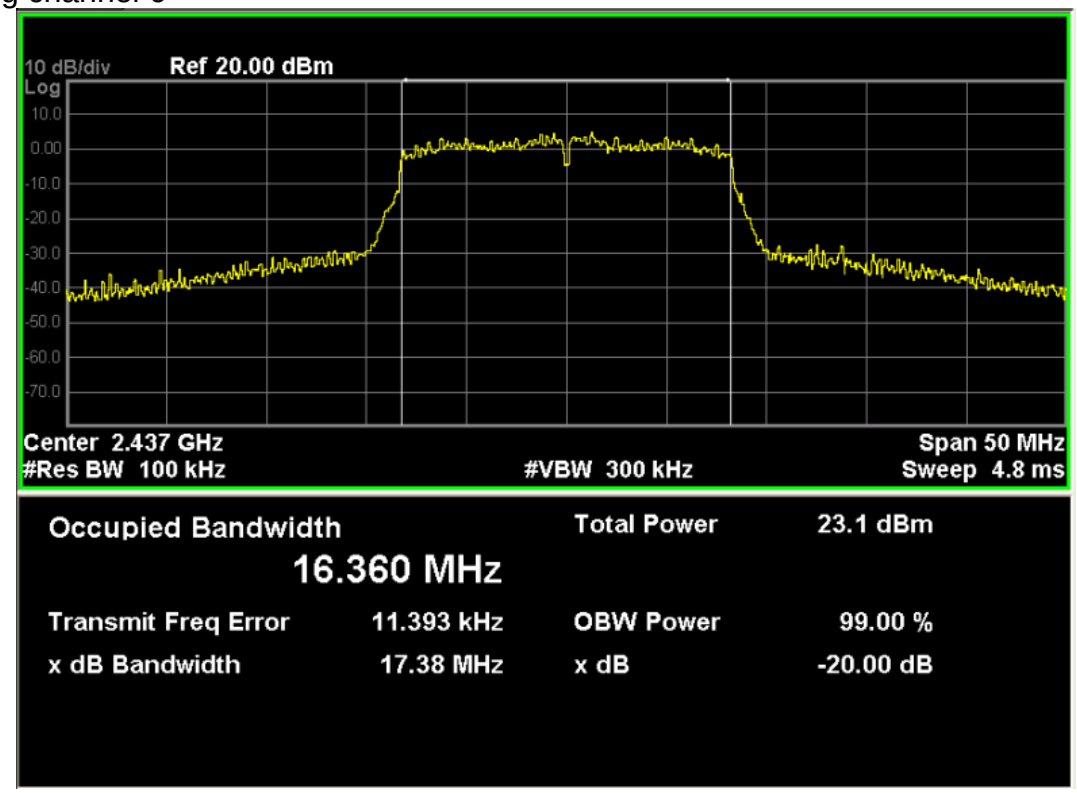


802.11g

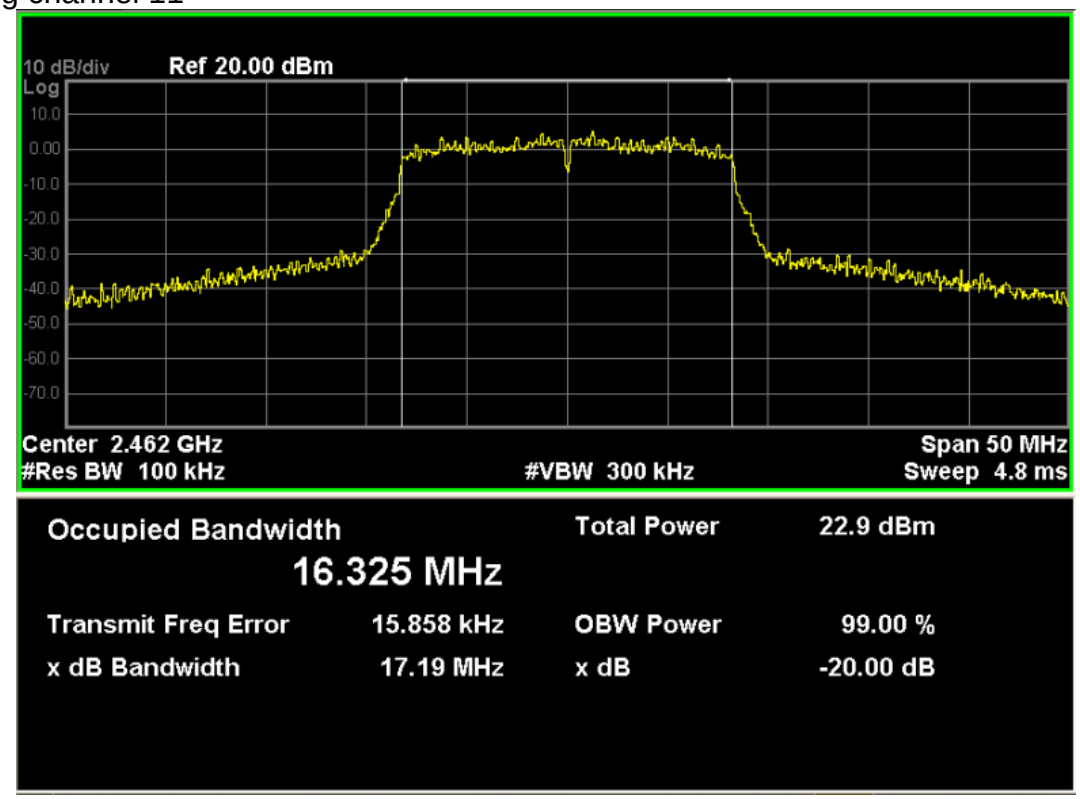
802.11g channel 1



802.11g channel 6

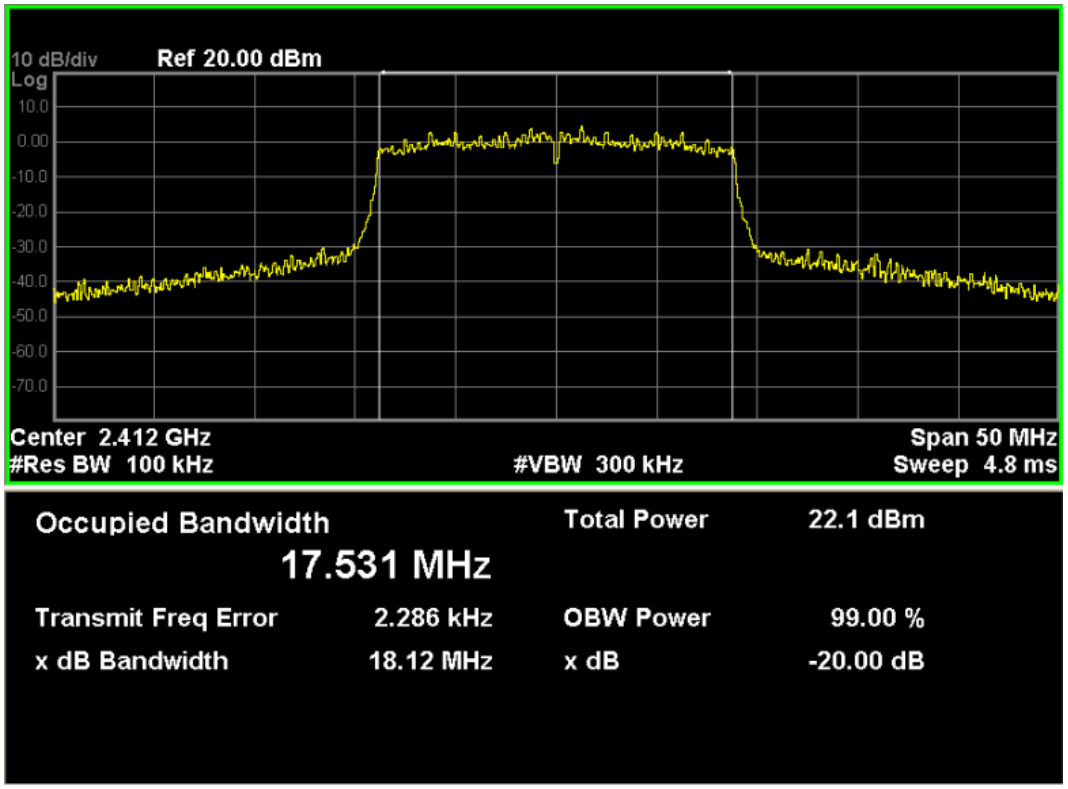


802.11g channel 11

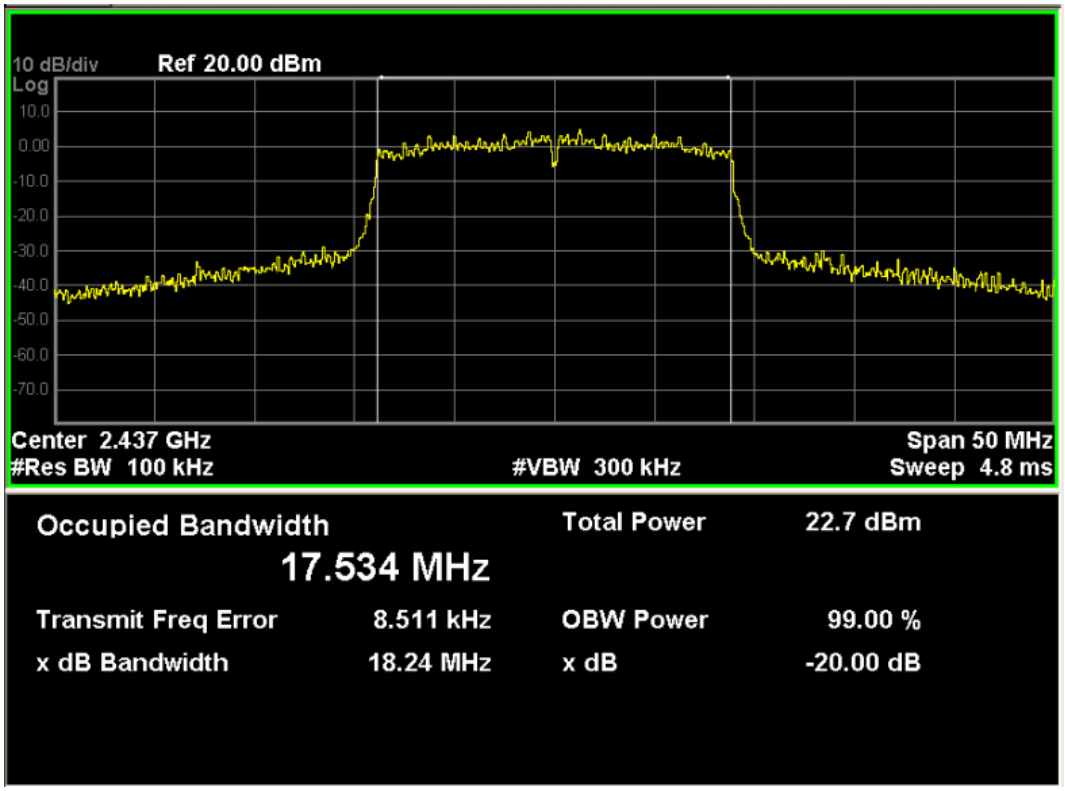


802.11n20

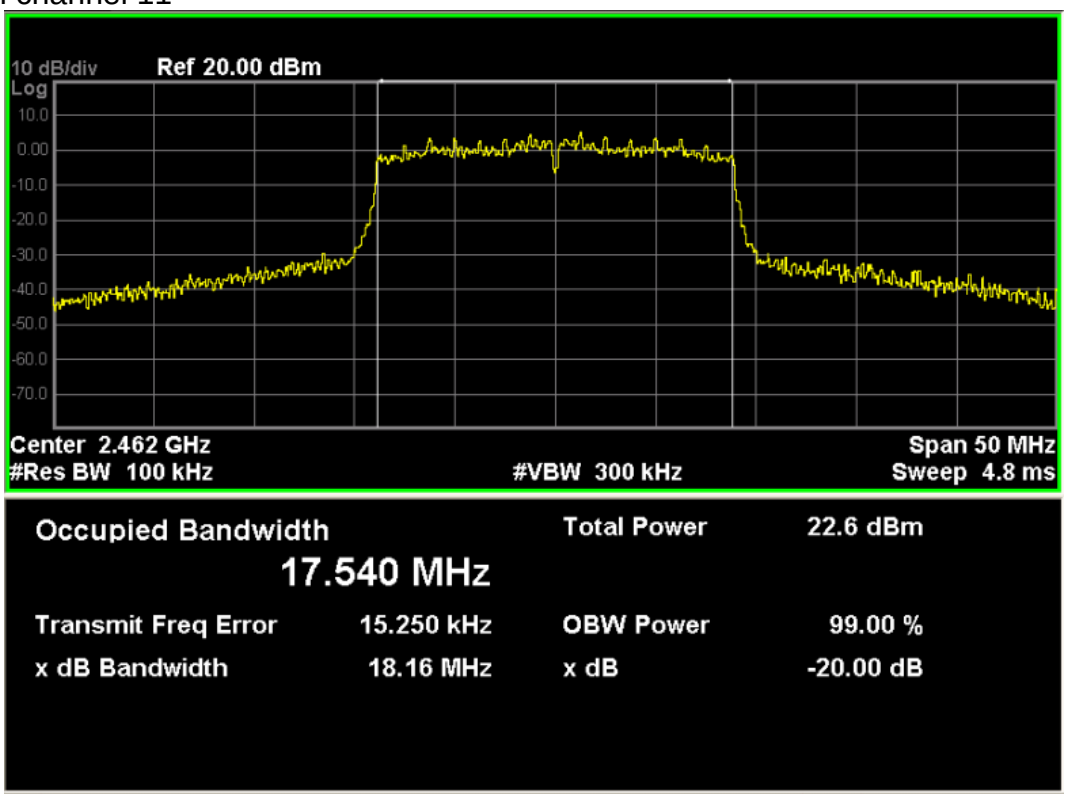
802.11n channel 1



802.11n channel 6

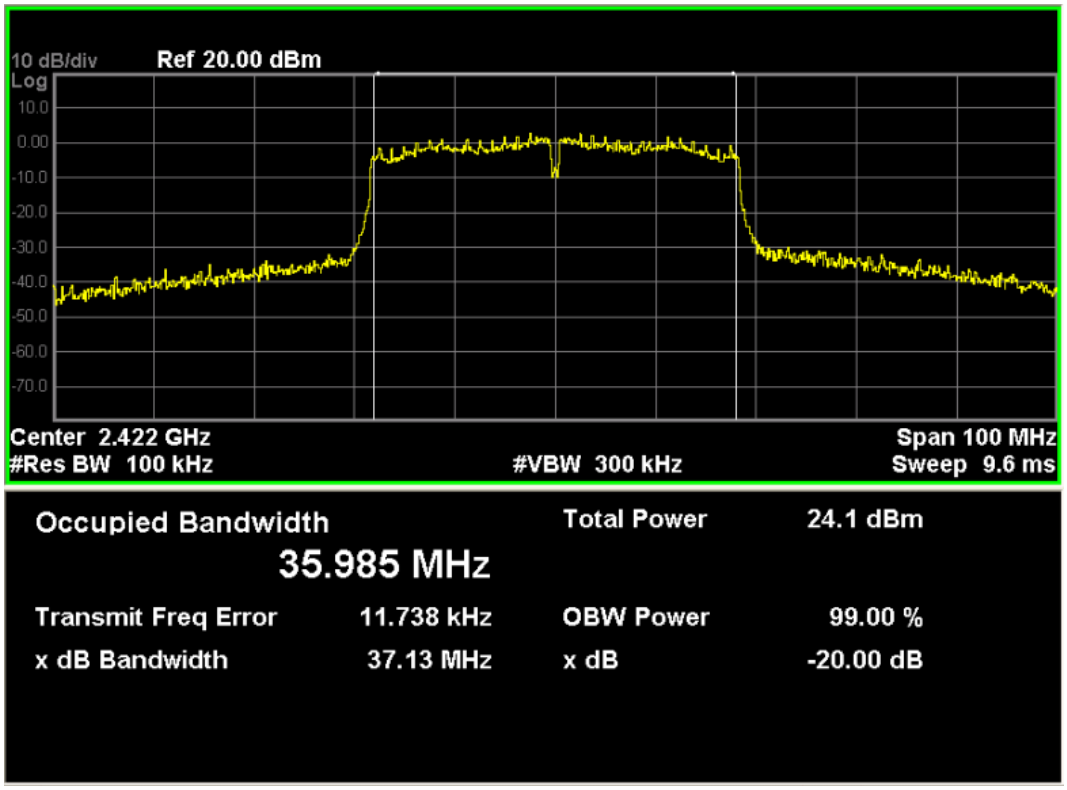


802.11n channel 11

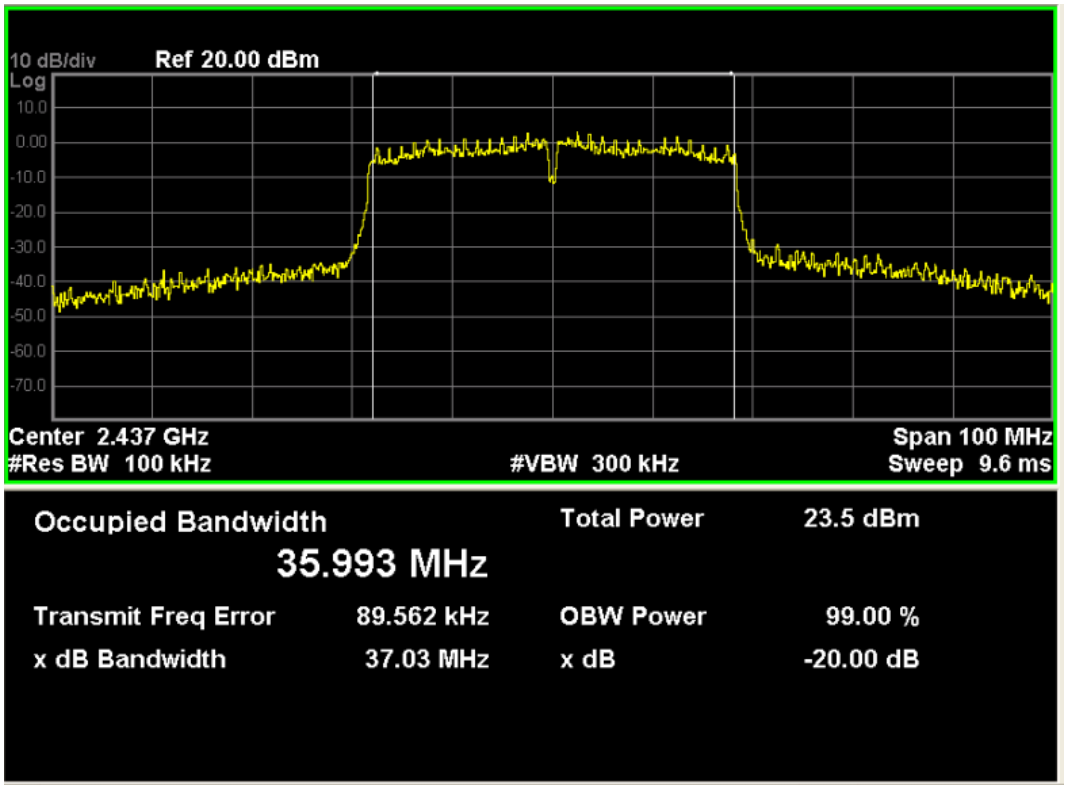


802.11n40

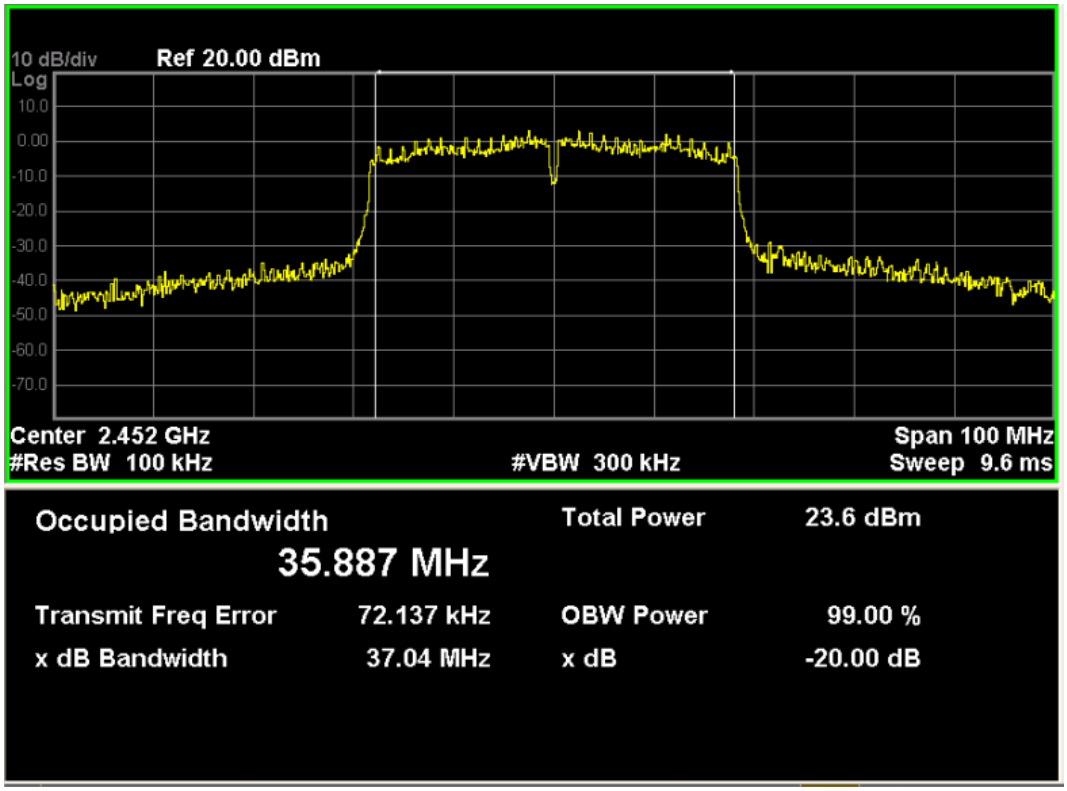
802.11n channel 3



802.11n channel 6

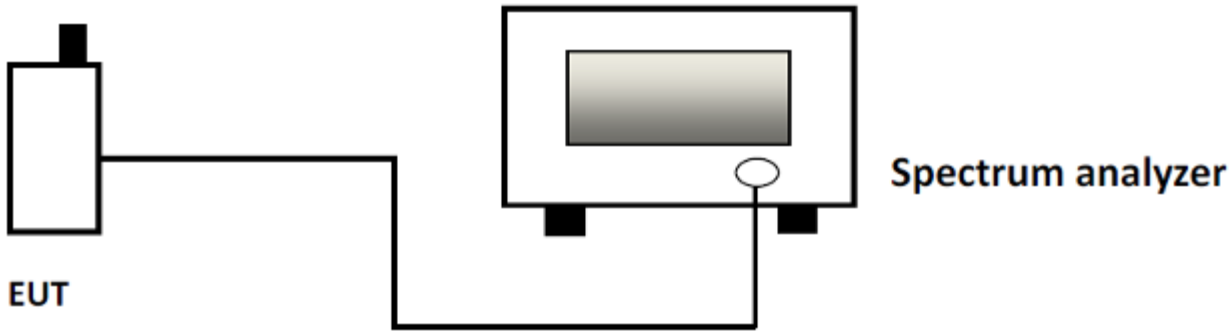


802.11n channel 11



5. 6 DB BANDWIDTH

5.1 TEST SETUP



5.2 LIMITS

Limit	≥500 kHz

5.3 TEST PROCEDURE

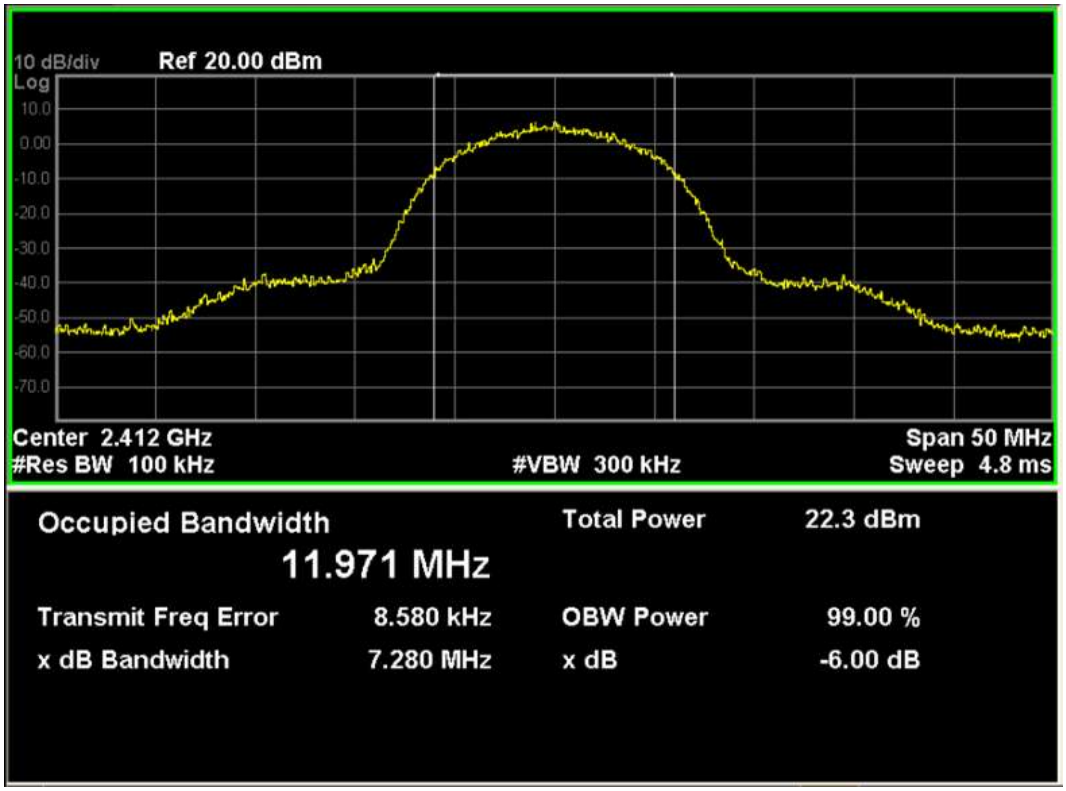
Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
WIFI: Low(1), Middle(6) and High (11).
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

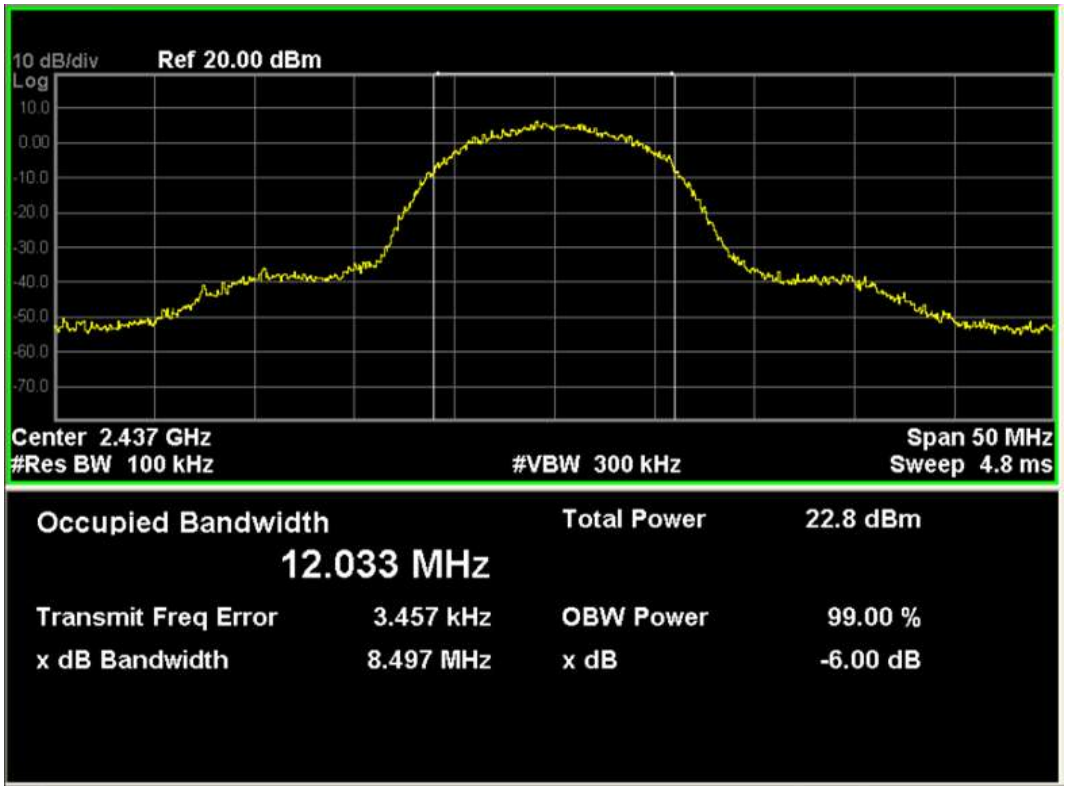
Channel	Measured 6dB bandwidth (MHz)	Limit (MHz)	Result
802.11b			
802.11b CH1	7.28	≥0.5	PASS
802.11b CH6	8.50	≥0.5	PASS
802.11b CH11	7.59	≥0.5	PASS
802.11g			
802.11g CH1	15.45	≥0.5	PASS
802.11g CH6	15.16	≥0.5	PASS
802.11g CH11	15.47	≥0.5	PASS
802.11n20			
802.11n CH1	17.24	≥0.5	PASS
802.11n CH6	17.21	≥0.5	PASS
802.11n CH11	16.57	≥0.5	PASS
802.11n40			
802.11n CH3	33.95	≥0.5	PASS
802.11n CH6	35.21	≥0.5	PASS
802.11n CH9	35.23	≥0.5	PASS

802.11b

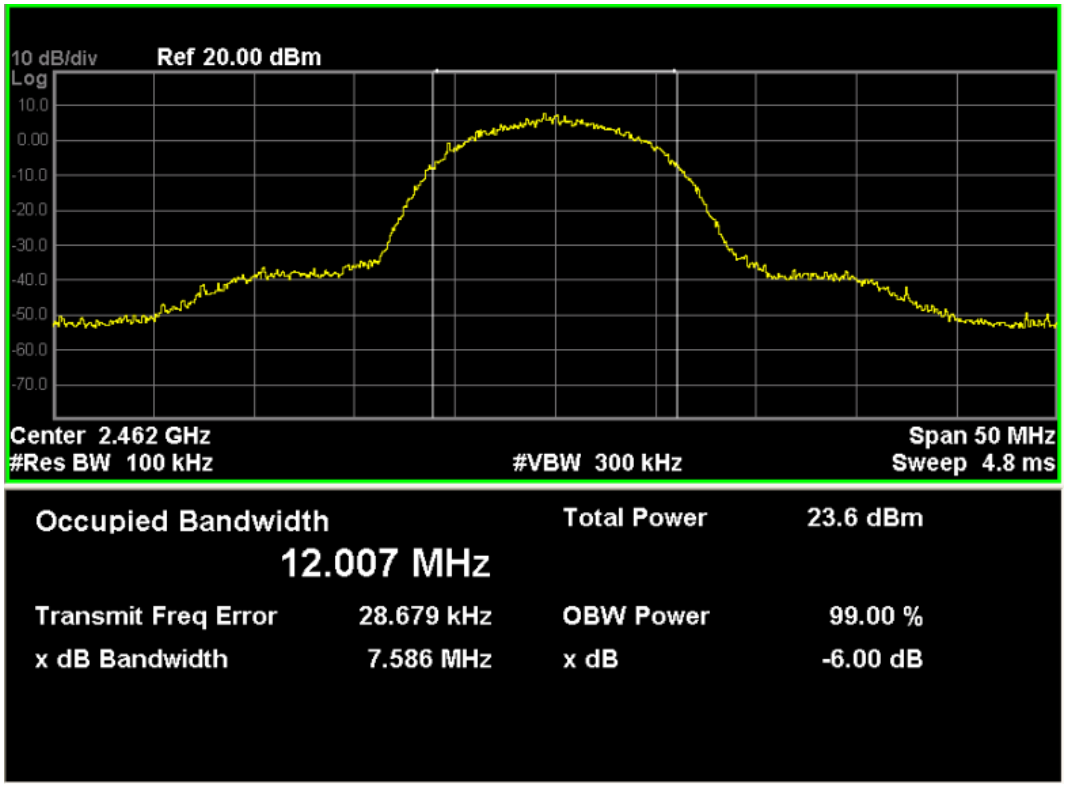
802.11b channel 1



802.11b channel 6

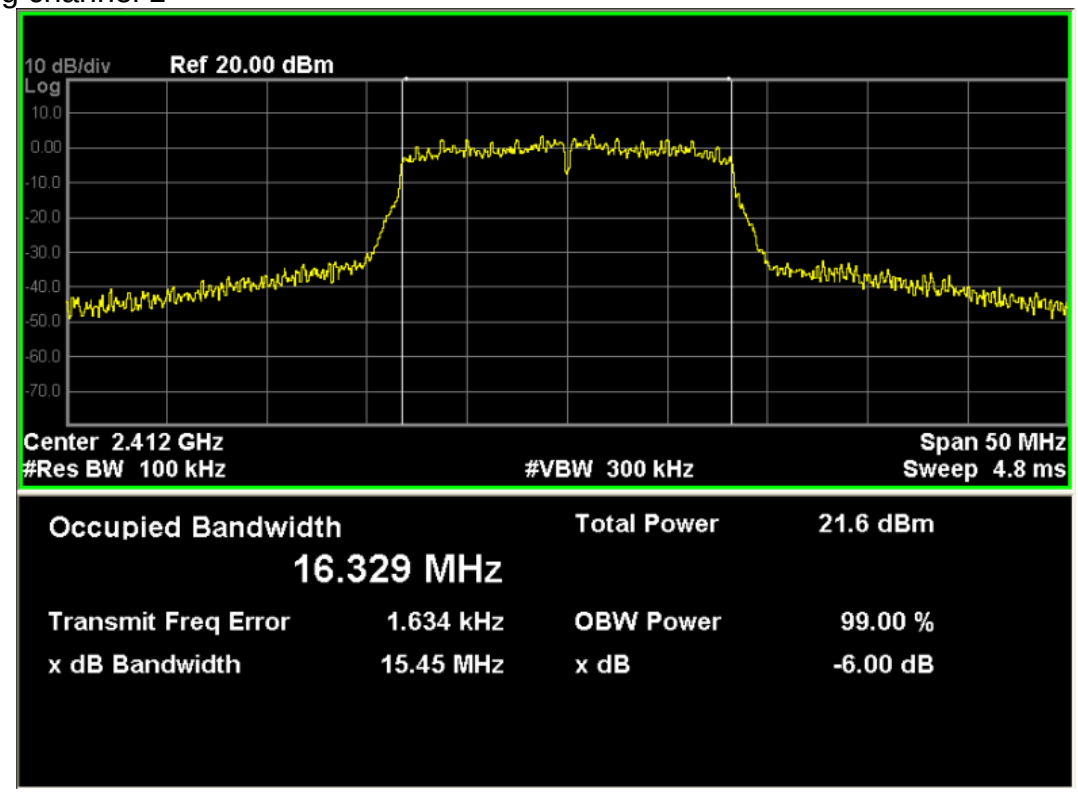


802.11b channel 11

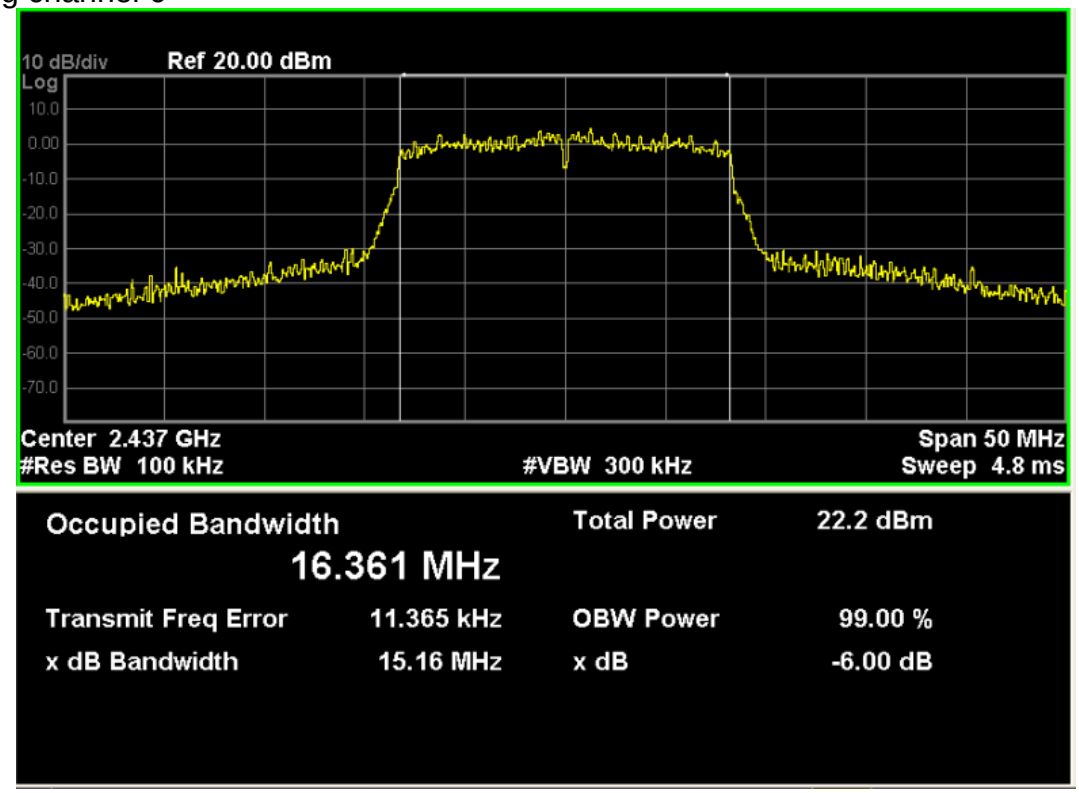


802.11g

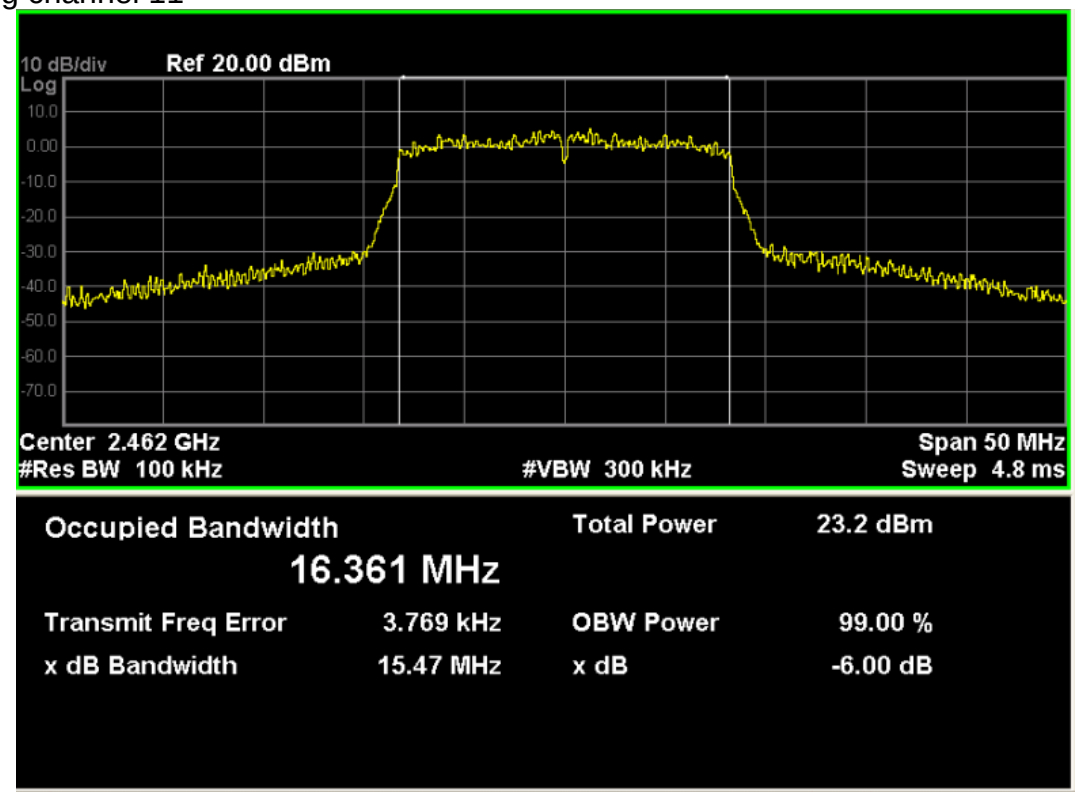
802.11g channel 1



802.11g channel 6

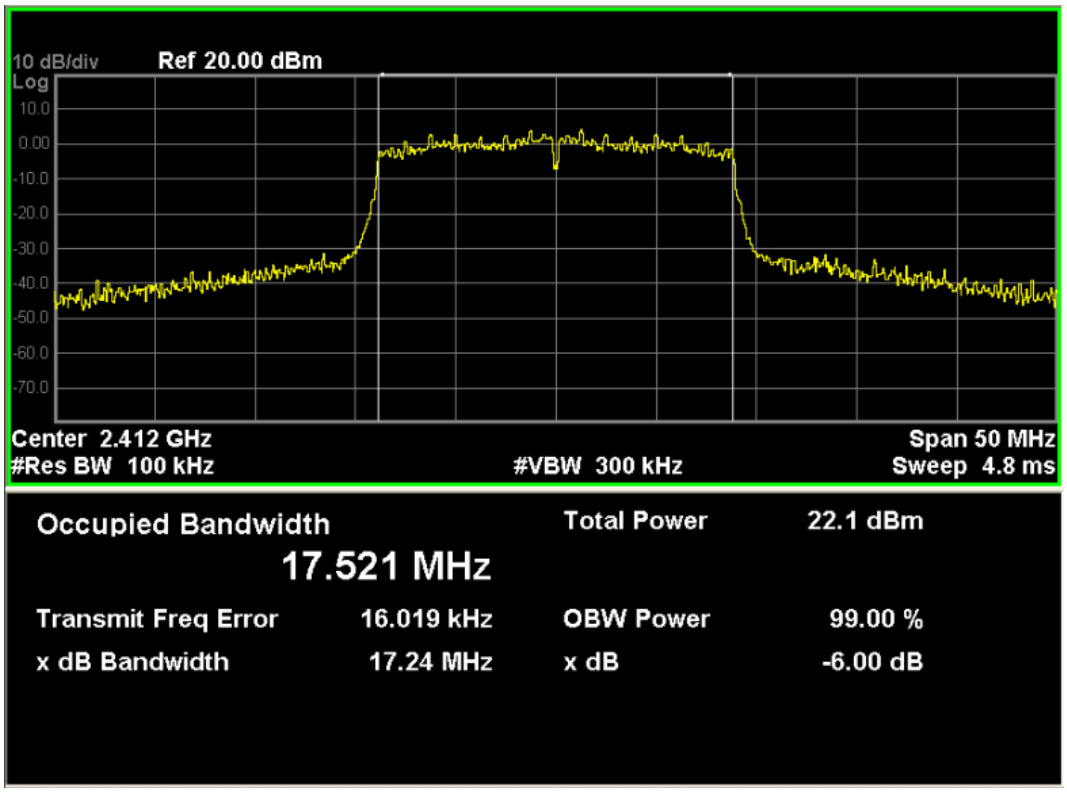


802.11g channel 11

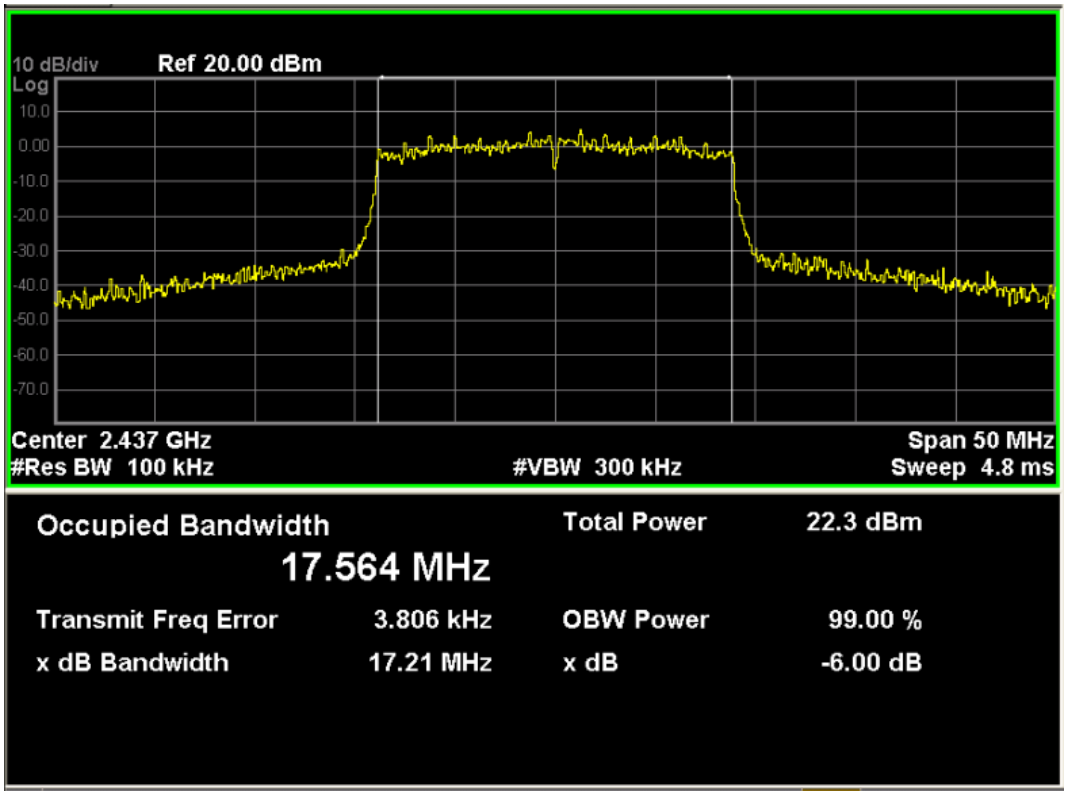


802.11n20

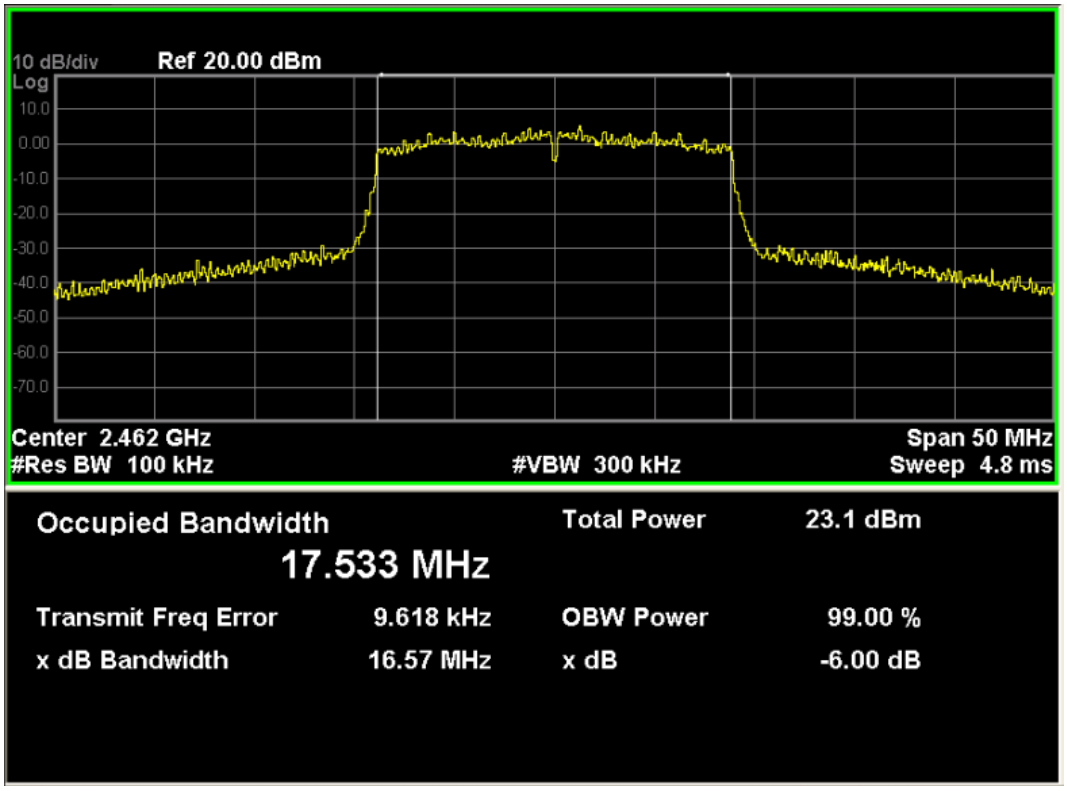
802.11n channel 1



802.11n channel 6

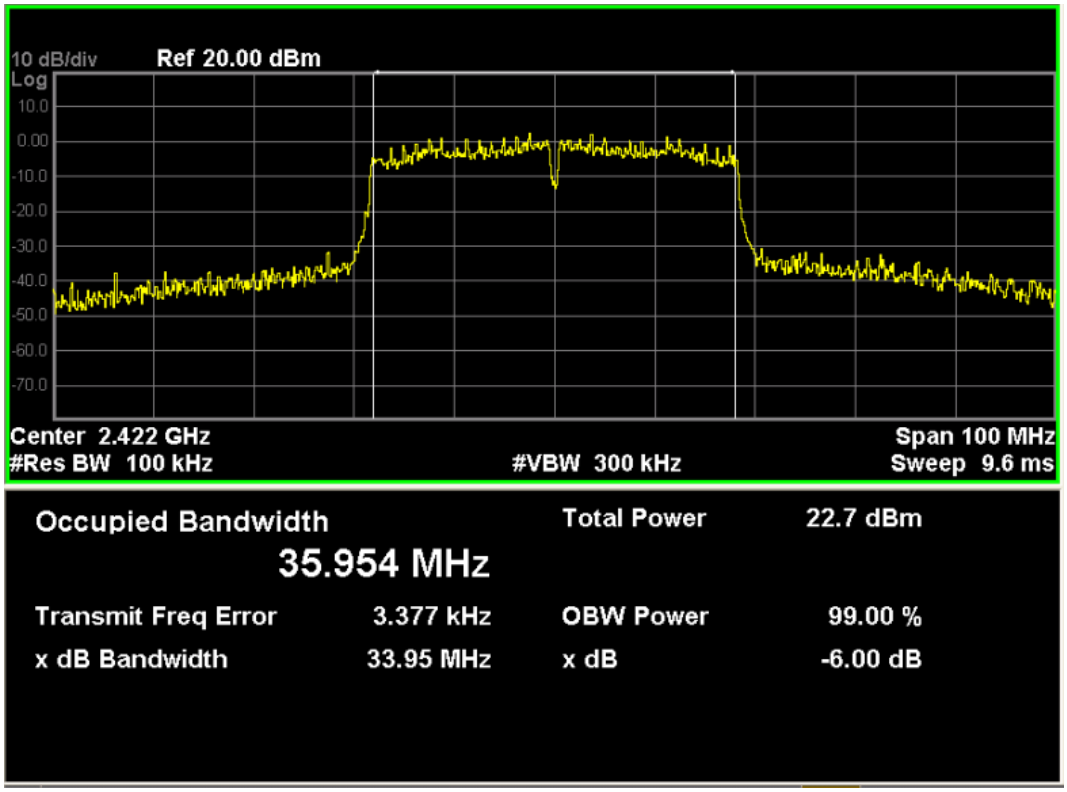


802.11n channel 11

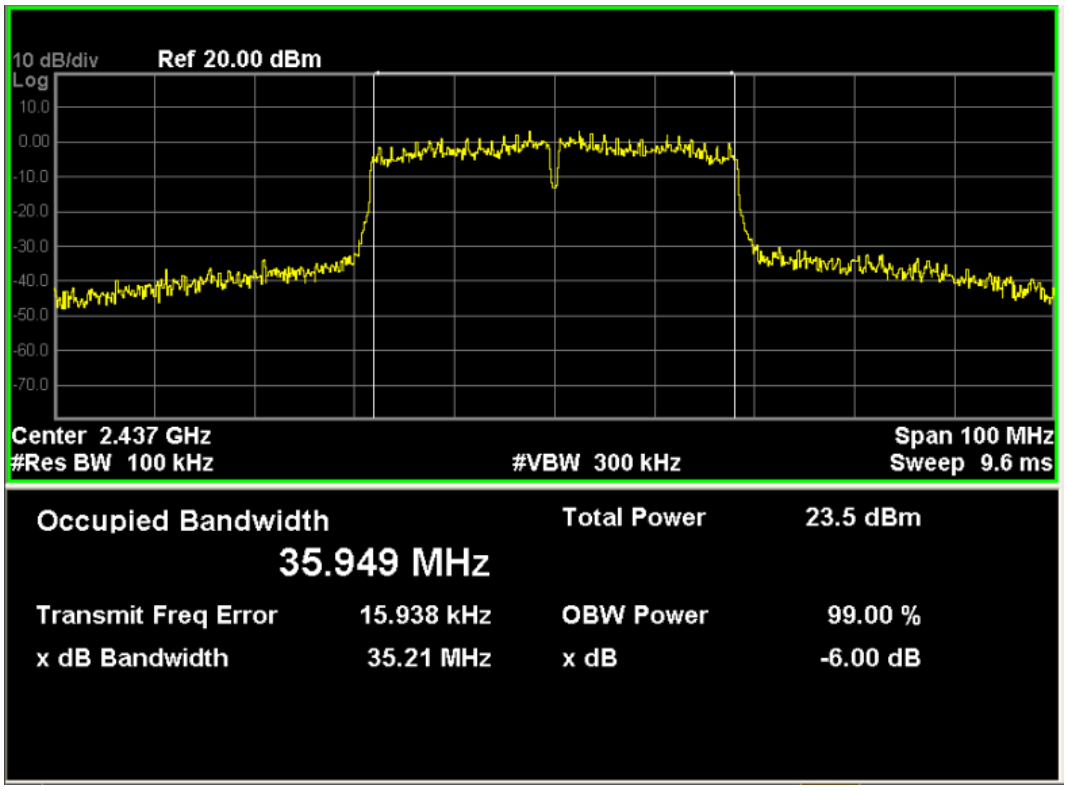


802.11n40

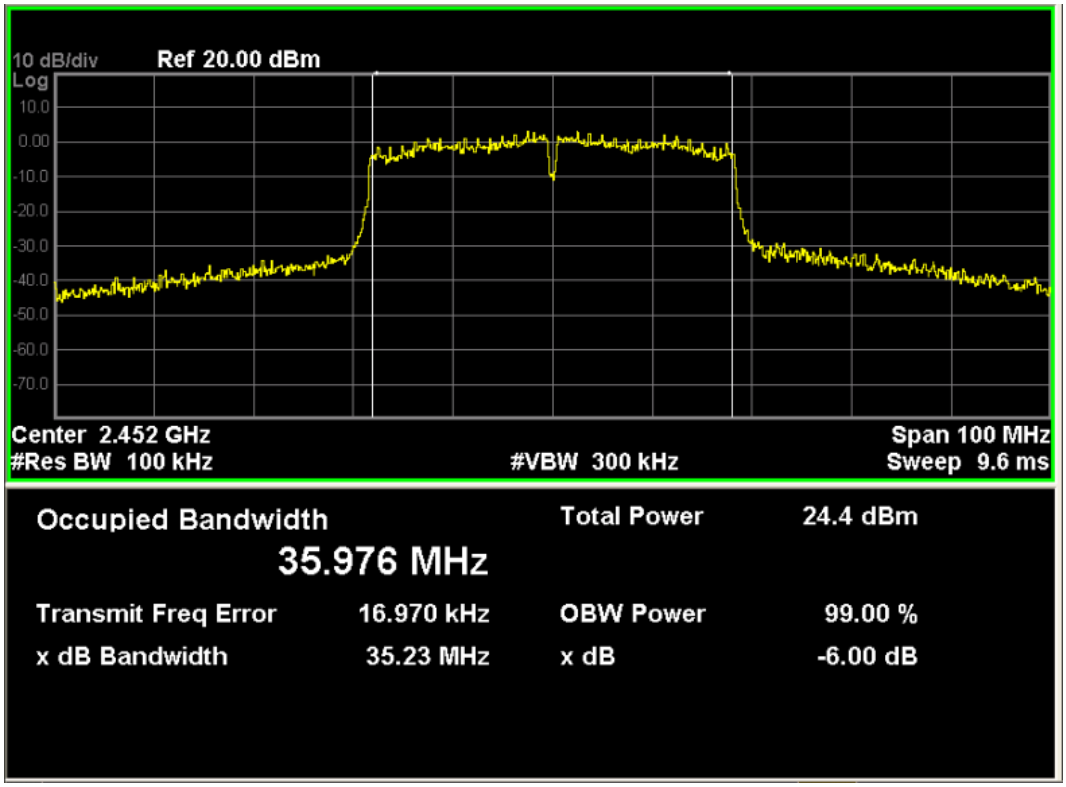
802.11n channel 3



802.11n channel 6

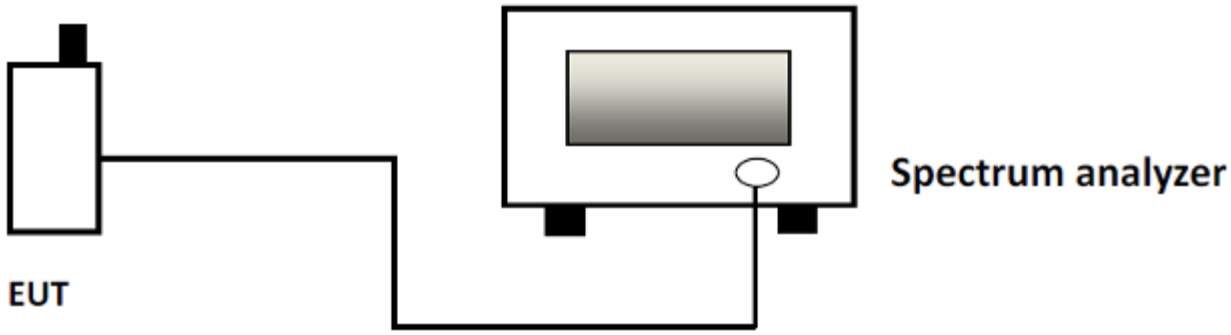


802.11n channel 9



6. POWER SPECTRAL DENSITY

6.1 TEST SETUP



6.2 LIMITS

Limits	≤8dBm/3kHz

6.3 TEST PROCEDURE

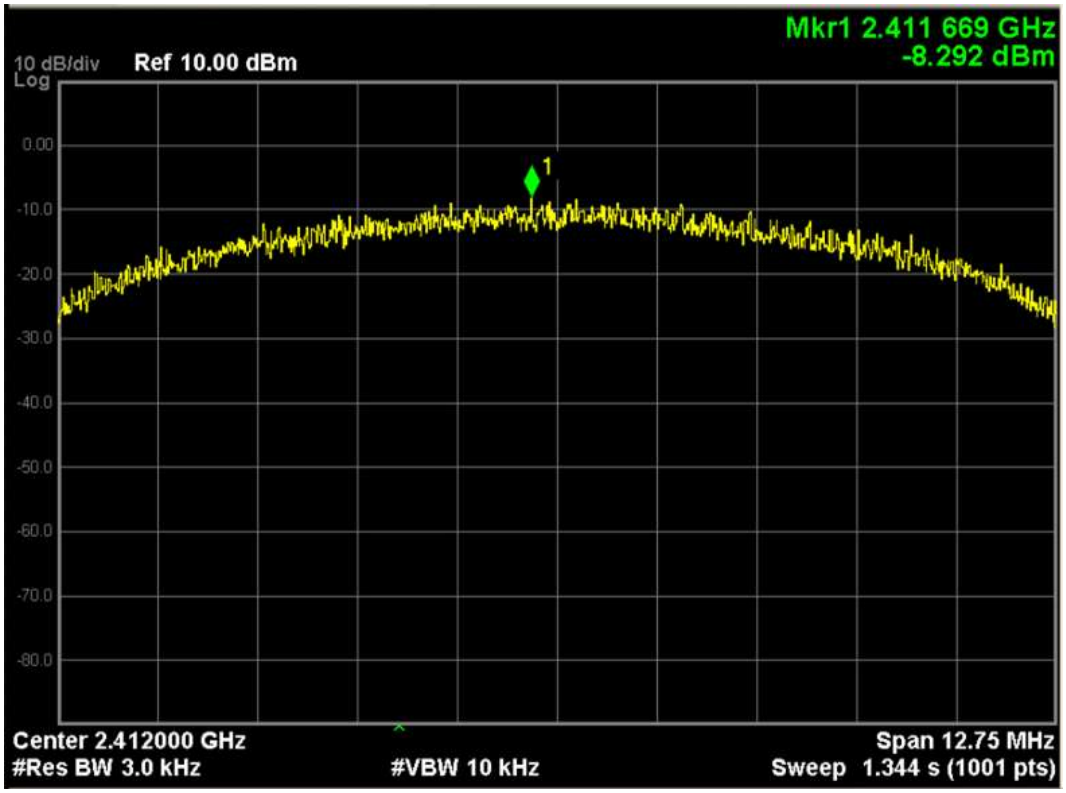
Set analyzer center frequency to DTS channel center frequency.
Set the span to 1.5 times the DTS bandwidth.
Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
Set the VBW ≥ 3xRBW.
Detector = peak.
Sweep time = auto couple.
Trace mode = max hold.
Allow trace to fully stabilize.
Use the peak marker function to determine 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

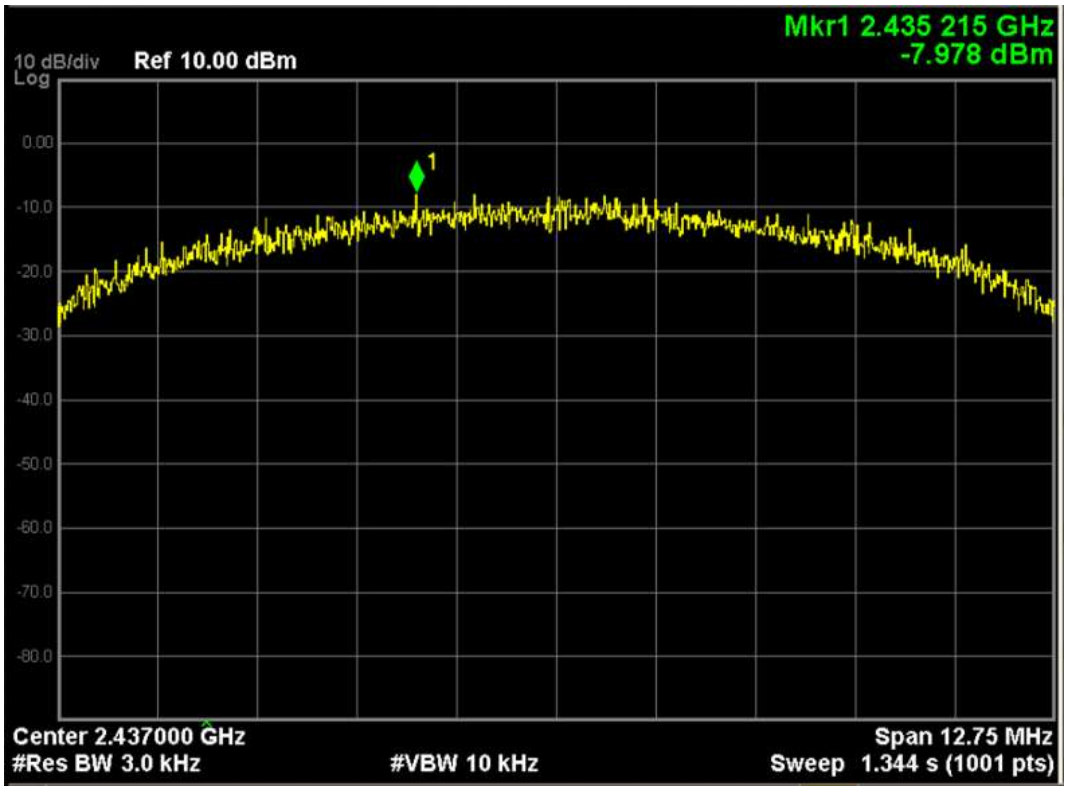
Mode	Channel	Measured level (dBm/3KHz)	Limit (dBm/3KHz)	Result
802.11b	CH1	-8.29	≤8.00	Pass
	CH6	-7.98	≤8.00	Pass
	CH11	-7.13	≤8.00	Pass
802.11g	CH1	-9.86	≤8.00	Pass
	CH6	-9.33	≤8.00	Pass
	CH11	-10.06	≤8.00	Pass
802.11n20	CH1	-10.92	≤8.00	Pass
	CH6	-9.88	≤8.00	Pass
	CH11	-10.12	≤8.00	Pass
802.11n40	CH3	-12.87	≤8.00	Pass
	CH6	-12.76	≤8.00	Pass
	CH9	-12.24	≤8.00	Pass

802.11b

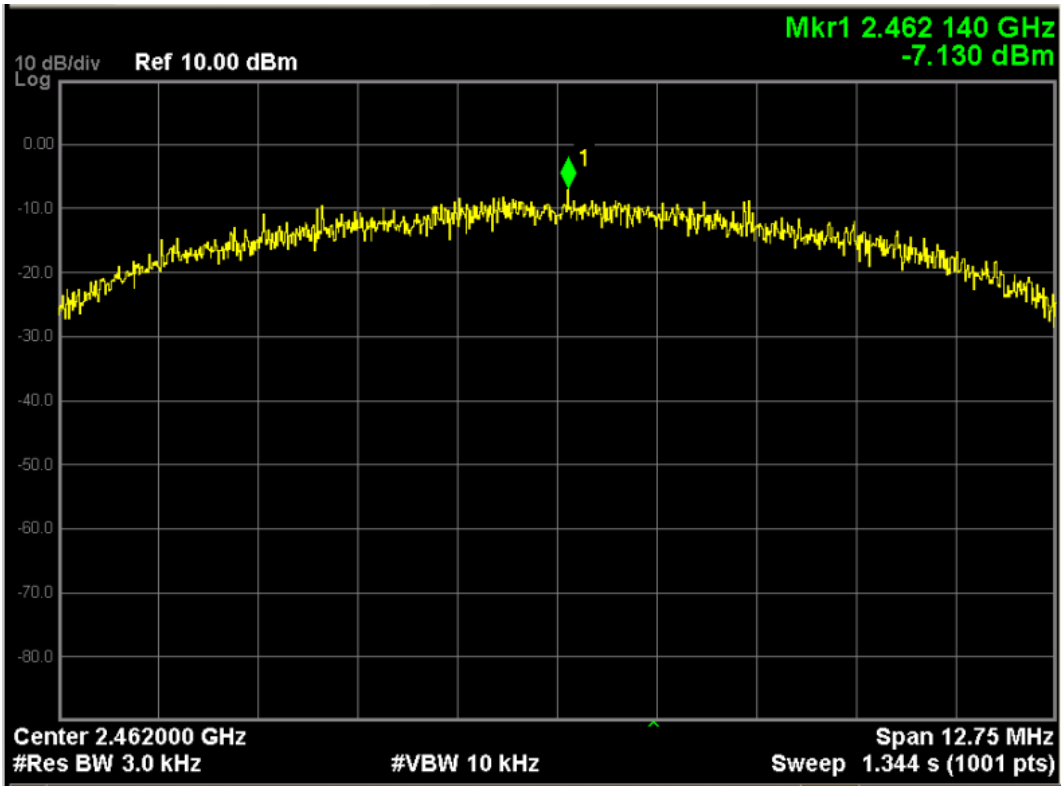
802.11b channel 1



802.11b channel 6

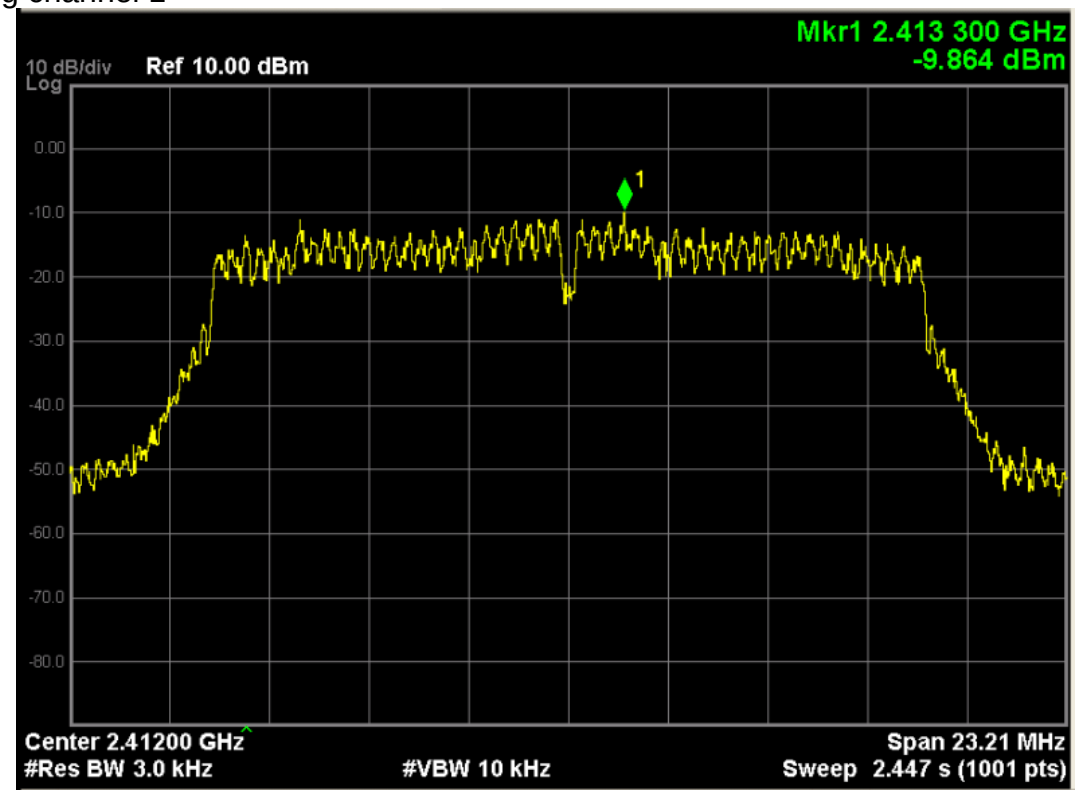


802.11b channel 11

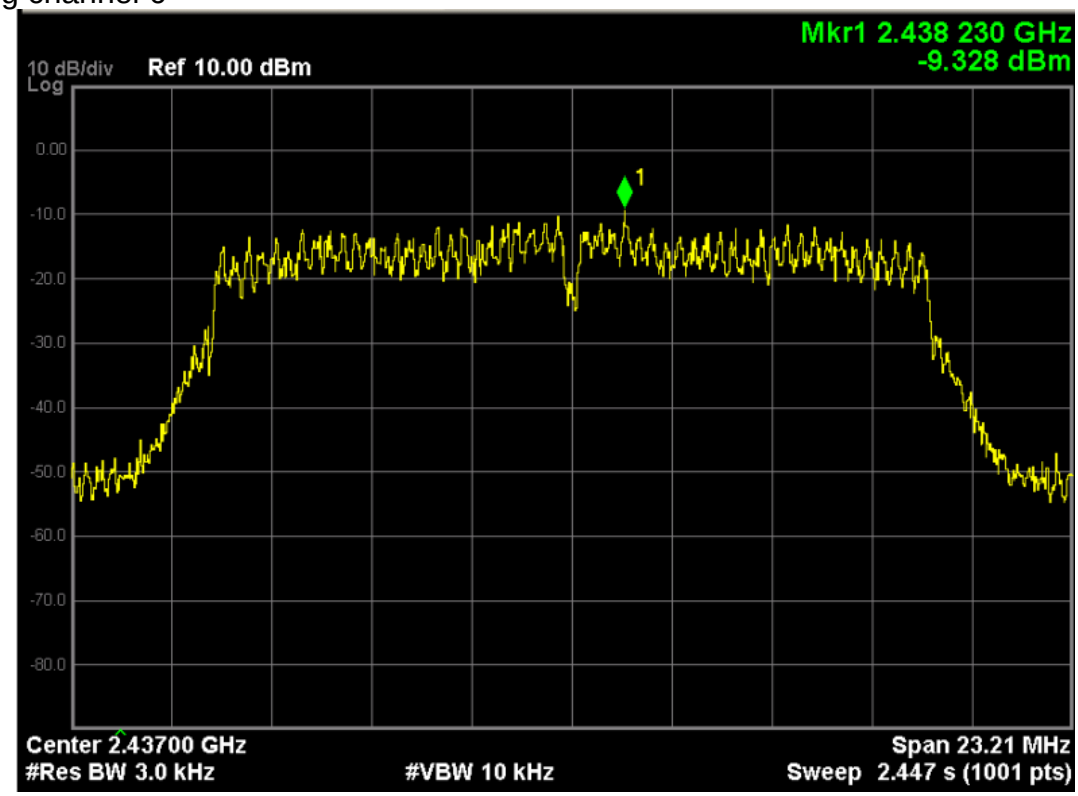


802.11g

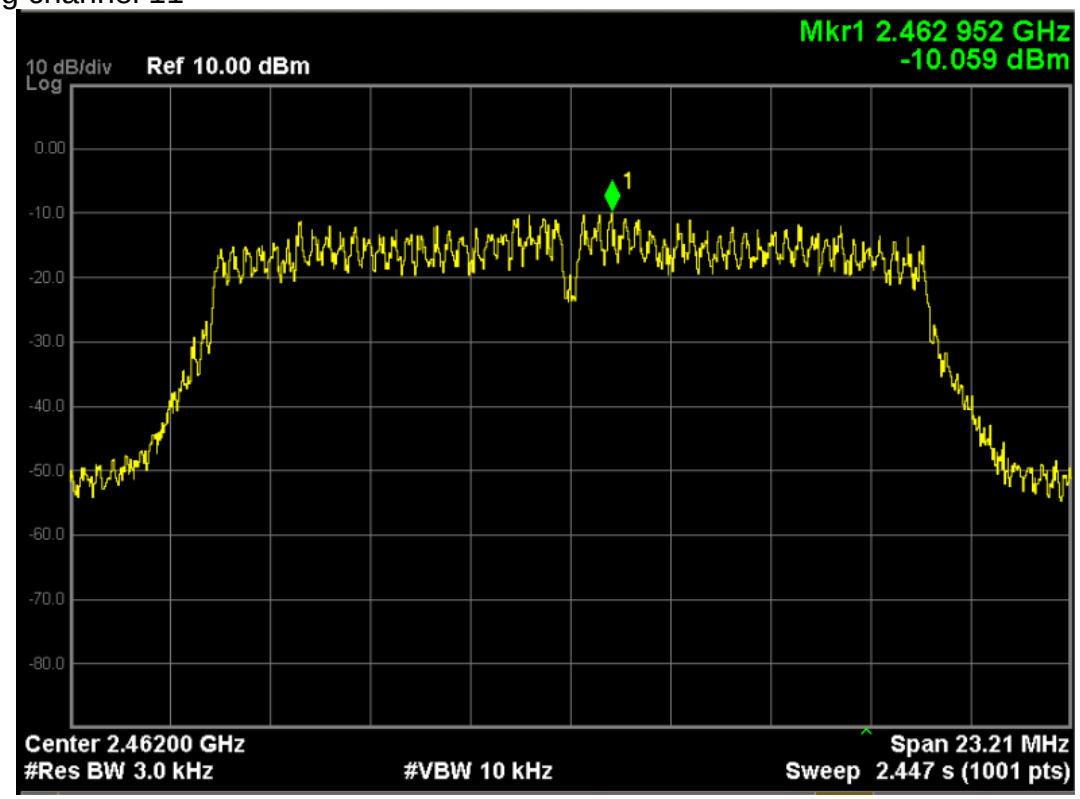
802.11g channel 1



802.11g channel 6

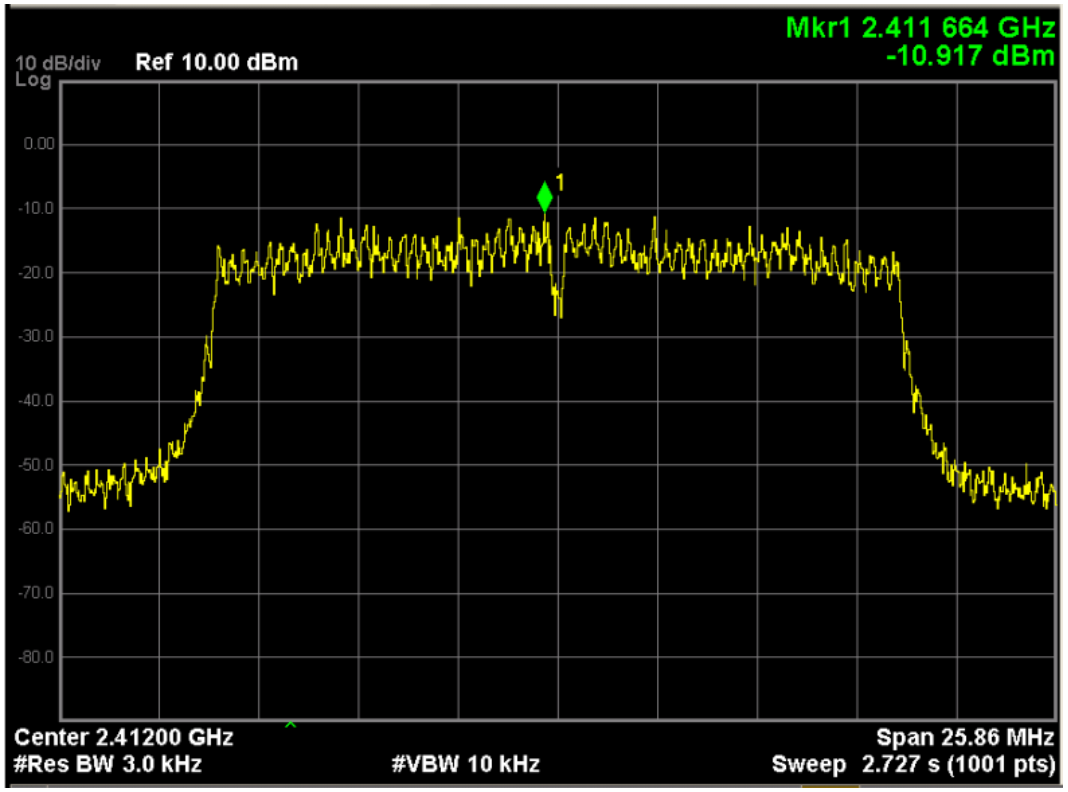


802.11g channel 11

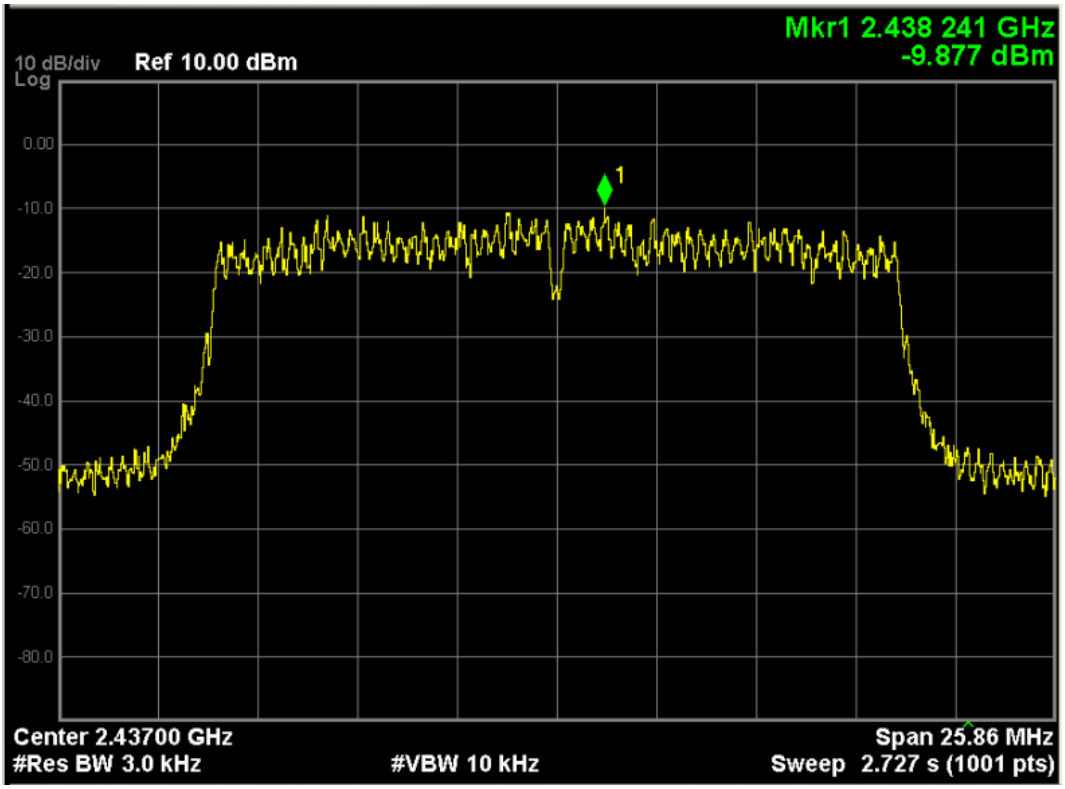


802.11n20

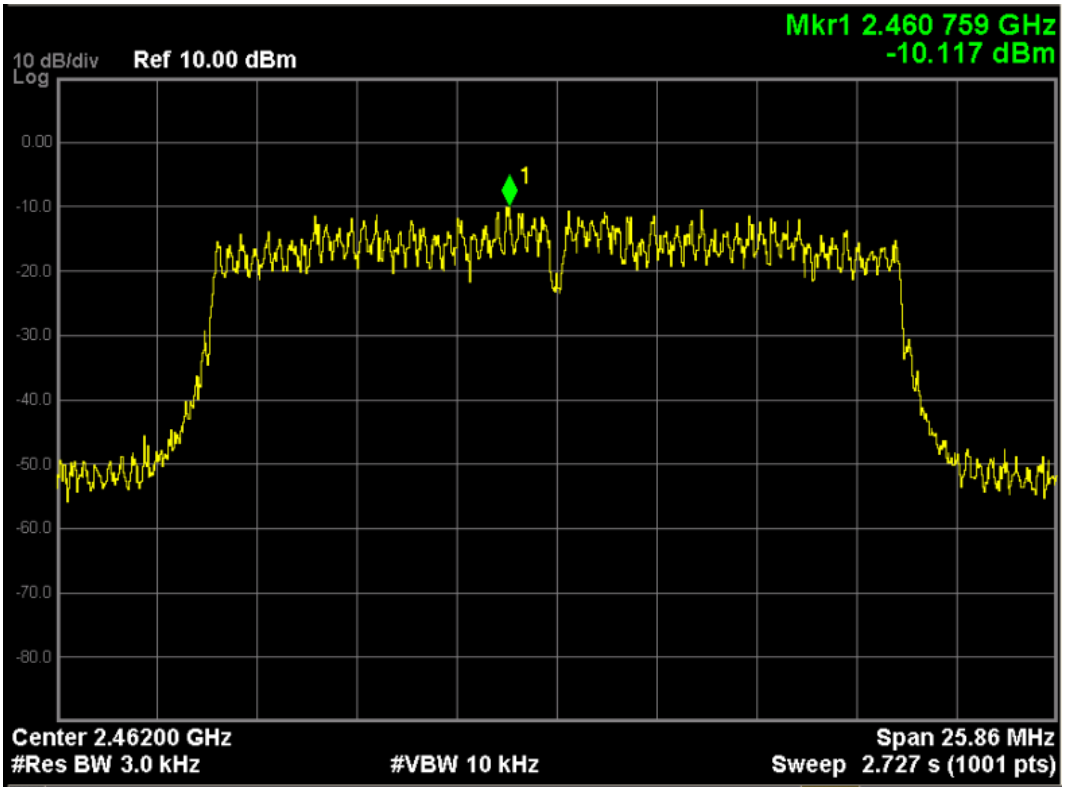
802.11n channel 1



802.11n channel 6

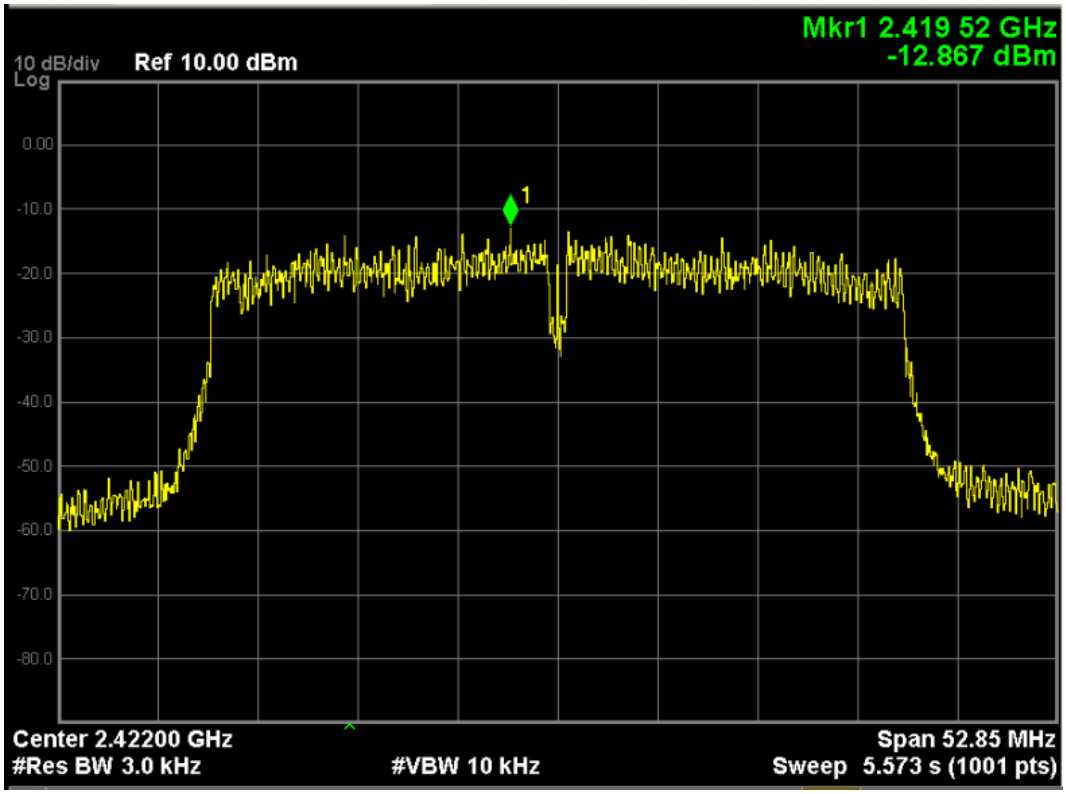


802.11n channel 11

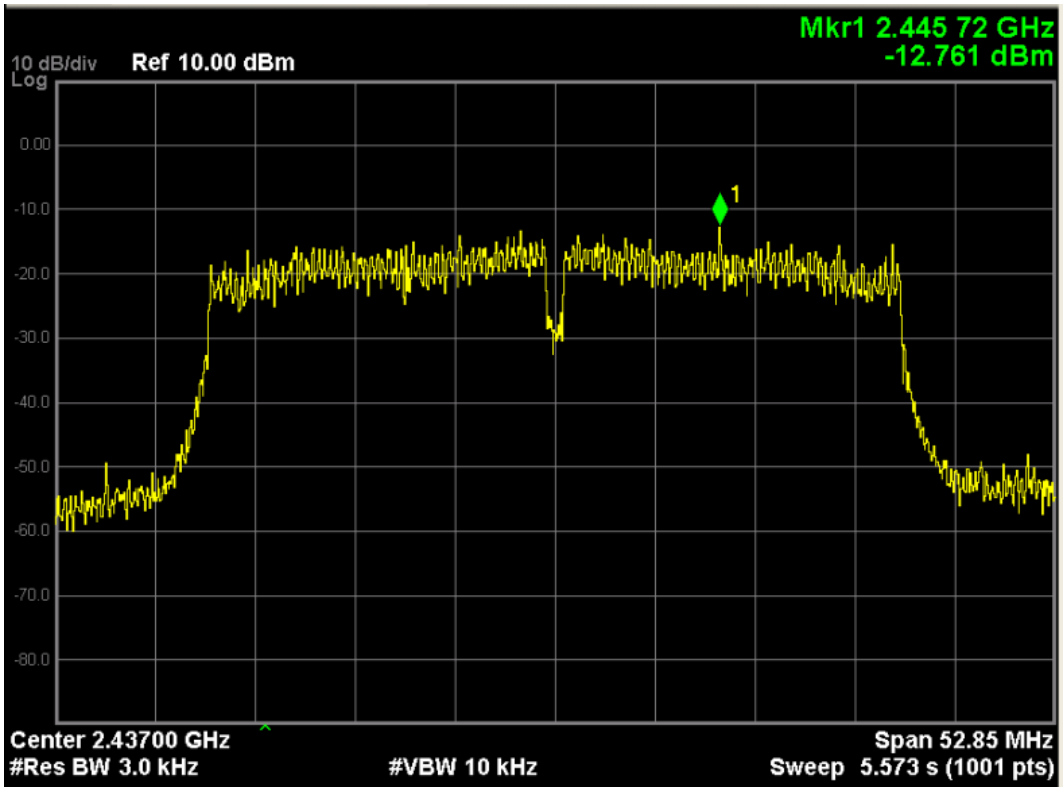


802.11n40

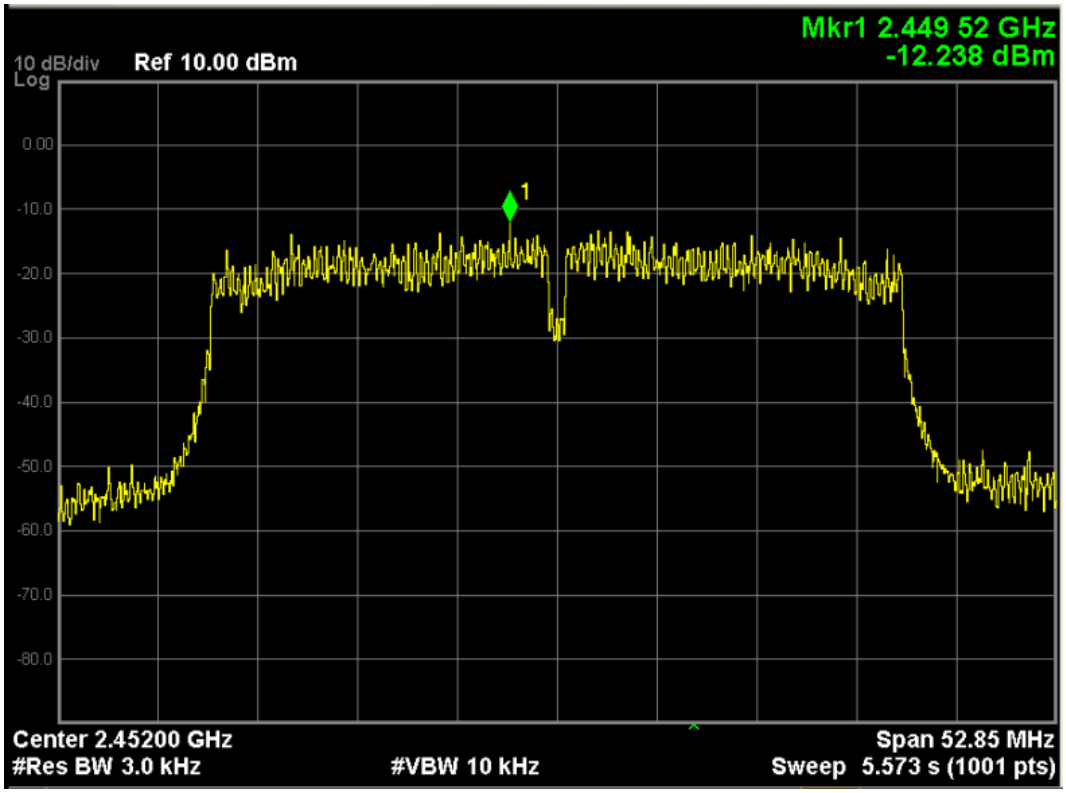
802.11n channel 3



802.11n channel 6

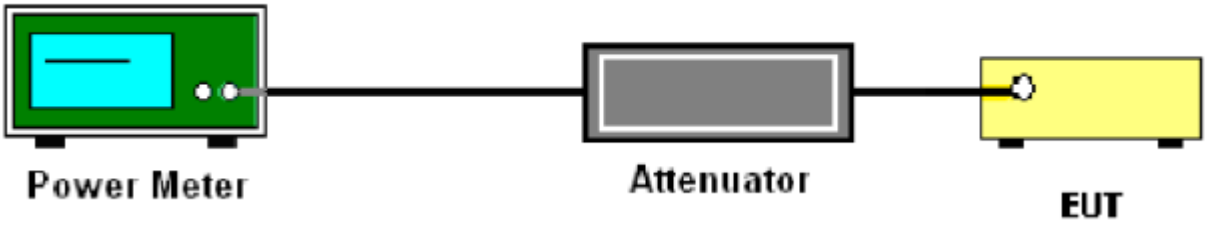


802.11n channel 9



7. PEAK OUTPUT POWER (CONDUCTION)

7.1 TEST SETUP



7.2 LIMITS

Limits	<30dBm

7.3 TEST PROCEDURE

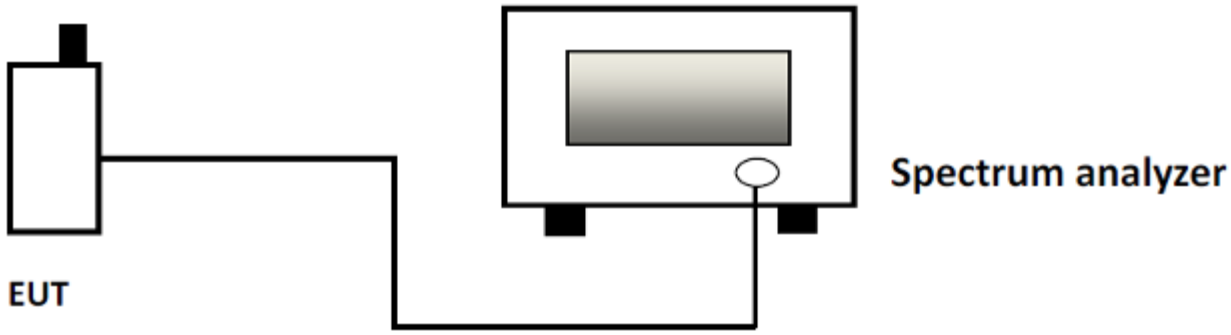
Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum analyzer. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.
The measurement will be conducted at three channels.
WIFI: Low(1), middle(6) and High (11).

7.4 RESULTS & PERFORMANCE

802.11b			
Channel	Peak power (dBm)	Limit (dBm)	Margin (dB)
1 (2412MHz)	15.13	30	14.87
6 (2437MHz)	15.29	30	14.71
11 (2462MHz)	15.17	30	14.83
802.11g			
Channel	Peak power (dBm)	Limit (dBm)	Margin (dB)
1 (2412MHz)	15.04	30	14.96
6 (2437MHz)	15.15	30	14.85
11 (2462MHz)	14.95	30	15.05
802.11n20			
Channel	Peak power (dBm)	Limit (dBm)	Margin (dB)
1 (2412MHz)	15.06	30	14.94
6 (2437MHz)	15.25	30	14.75
11 (2462MHz)	15.13	30	14.87
802.11n40			
Channel	Peak power (dBm)	Limit (dBm)	Margin (dB)
3 (2422MHz)	15.72	30	14.28
6 (2437MHz)	15.89	30	14.11
9 (2452MHz)	15.63	30	14.37

8. SPURIOUS EMISSIONS (CONDUCTION)

8.1 TEST SETUP



8.2 LIMITS

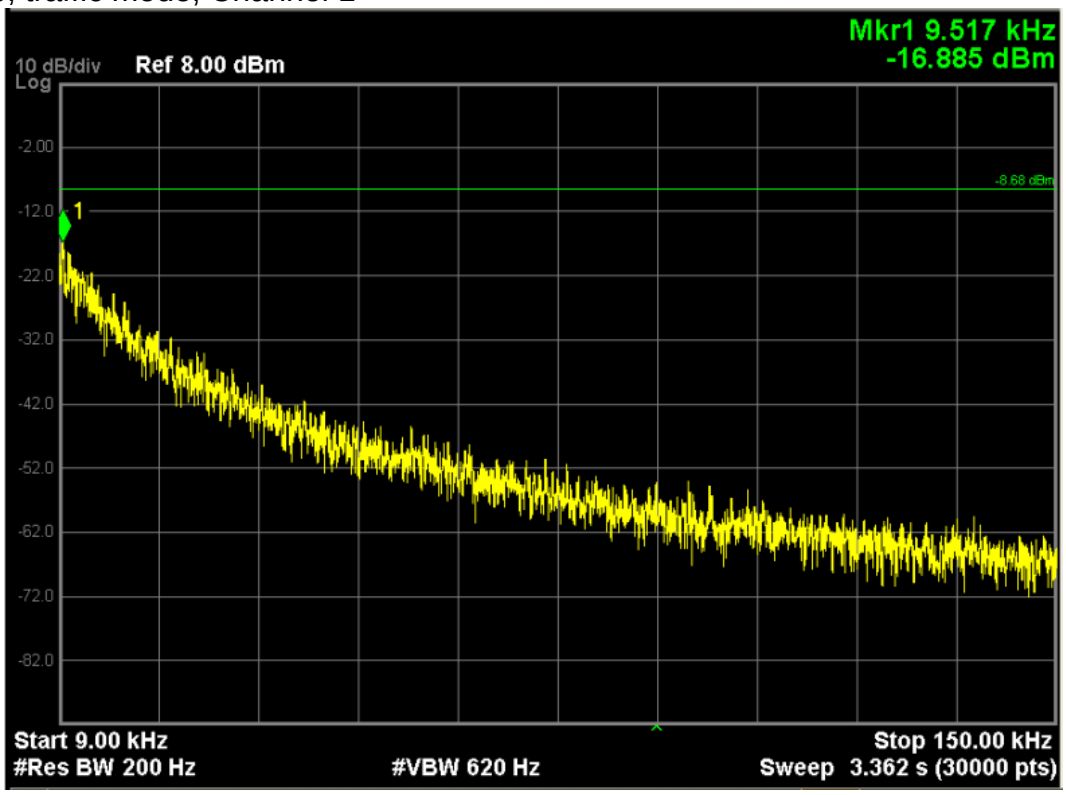
Limit	<(P-20dB)
Note: P is the highest level of the desired power	

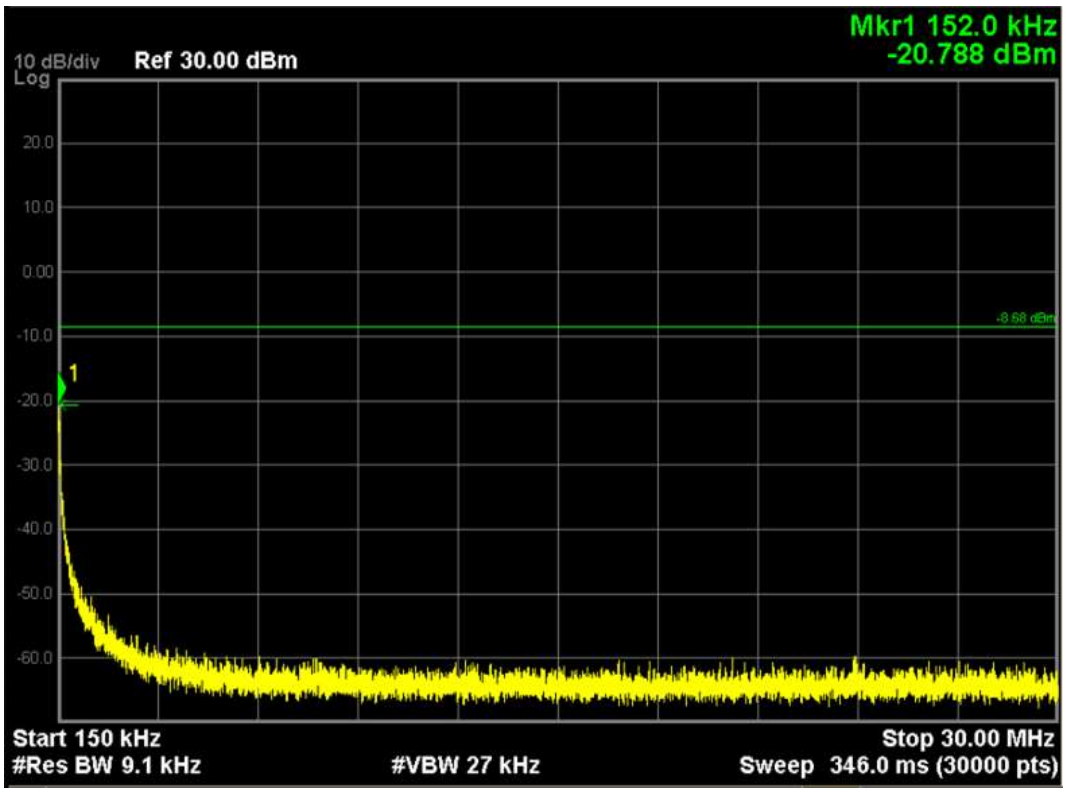
8.3 TEST PROCEDURE

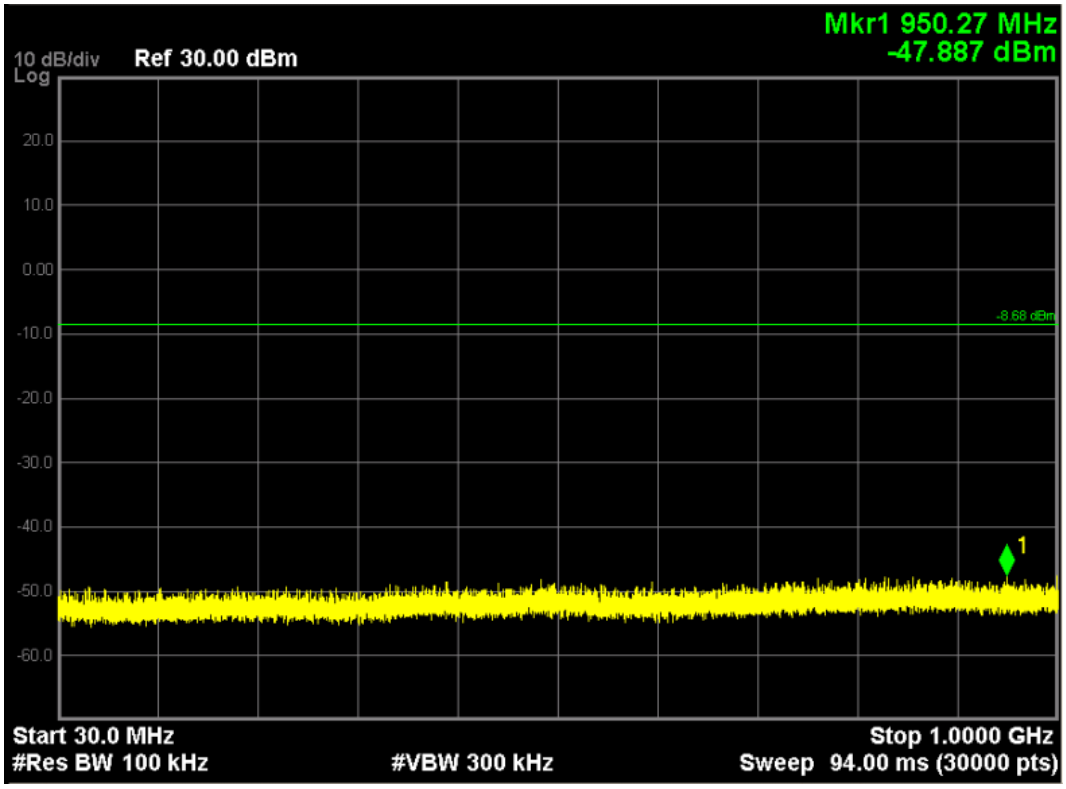
The EUT was connected to Spectrum Analyzer and Base Station via power divider. Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz;VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

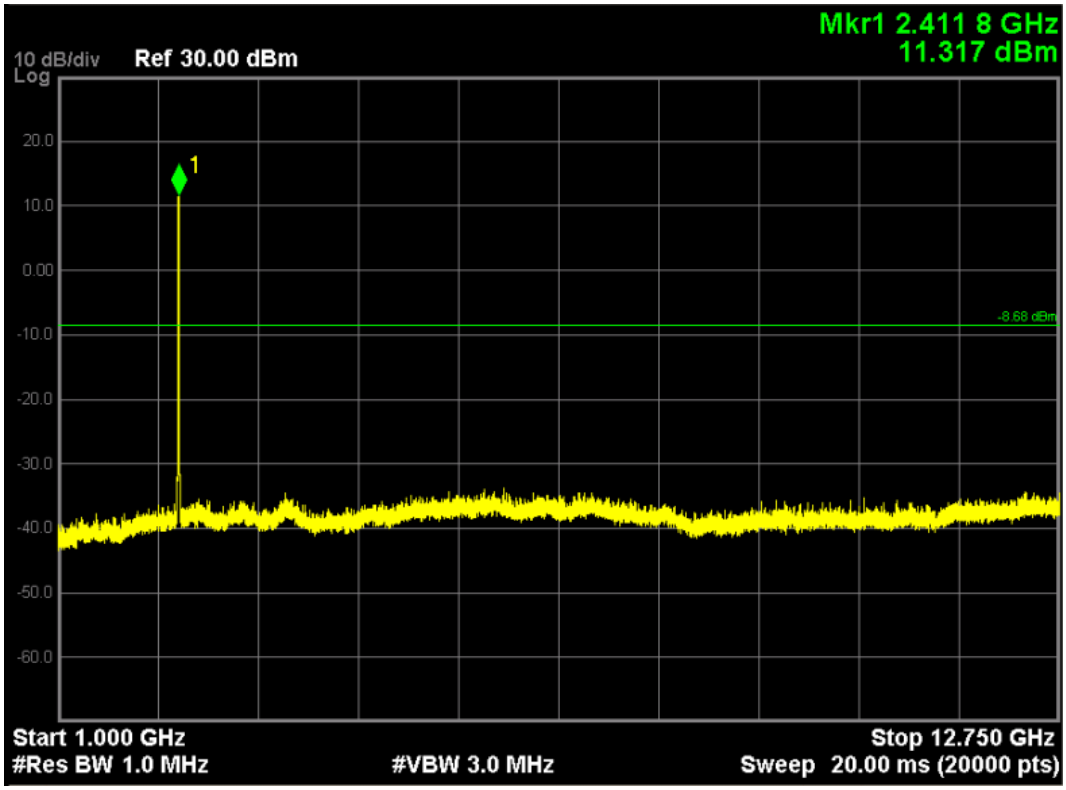
8.4 RESULTS & PERFORMANCE

802.11b, traffic mode; Channel 1

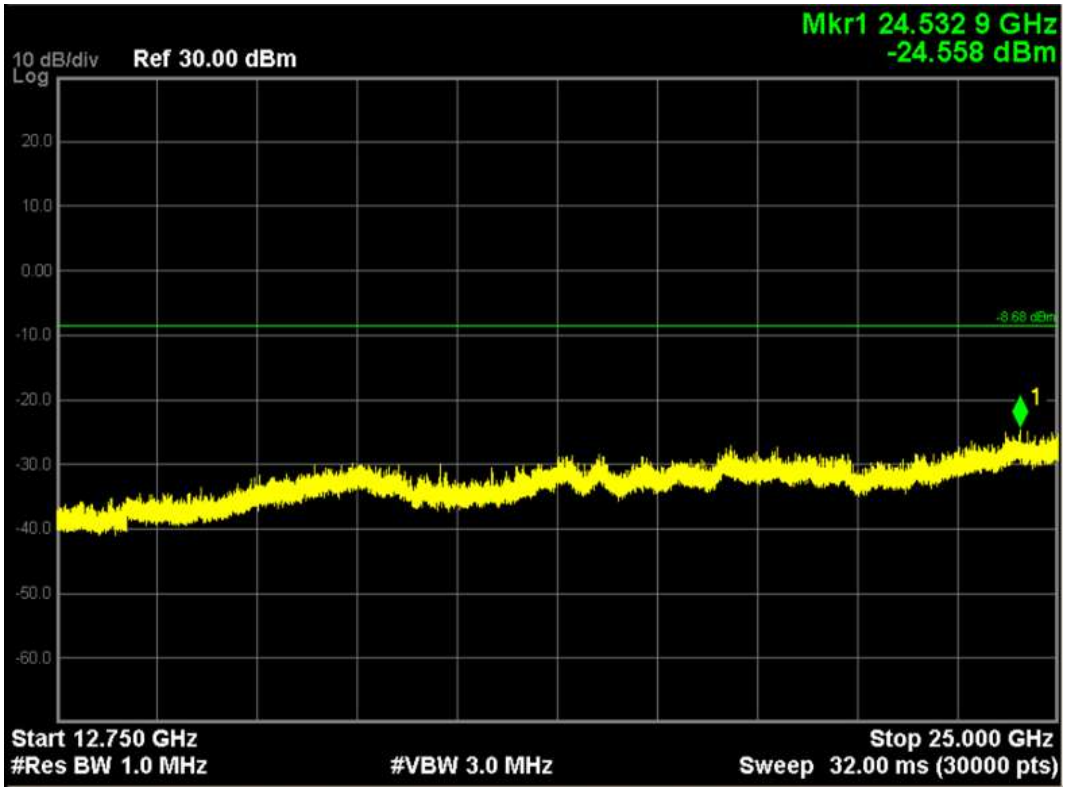




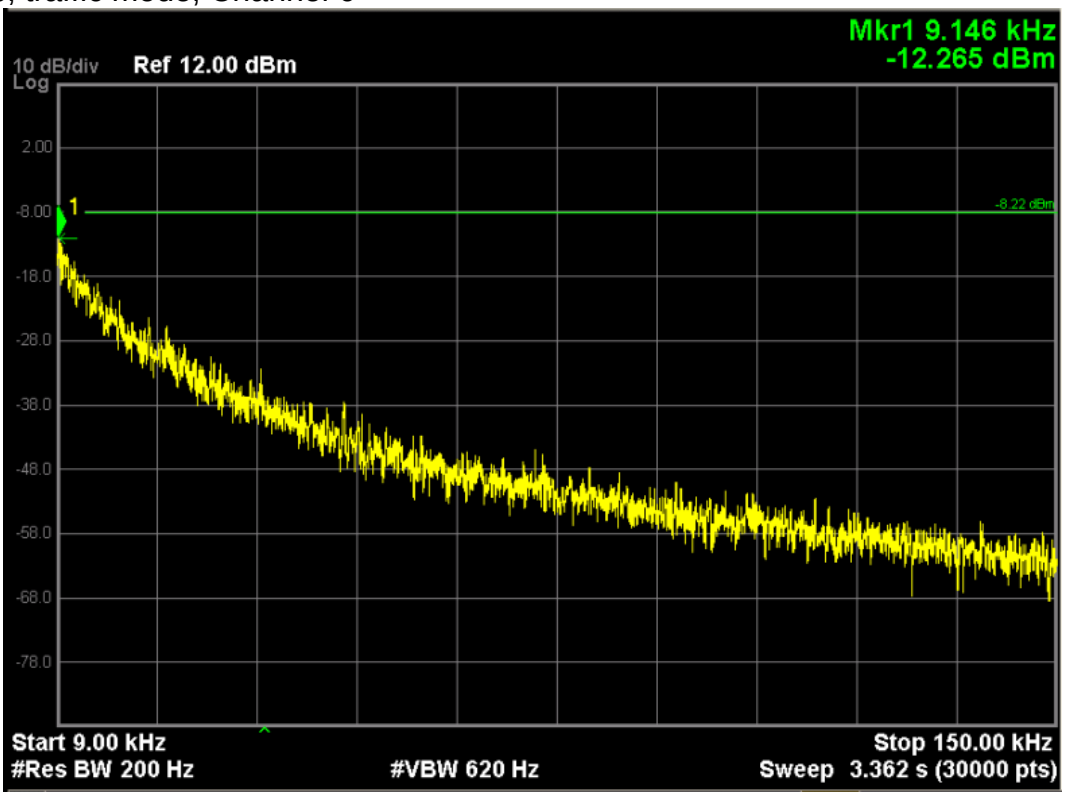


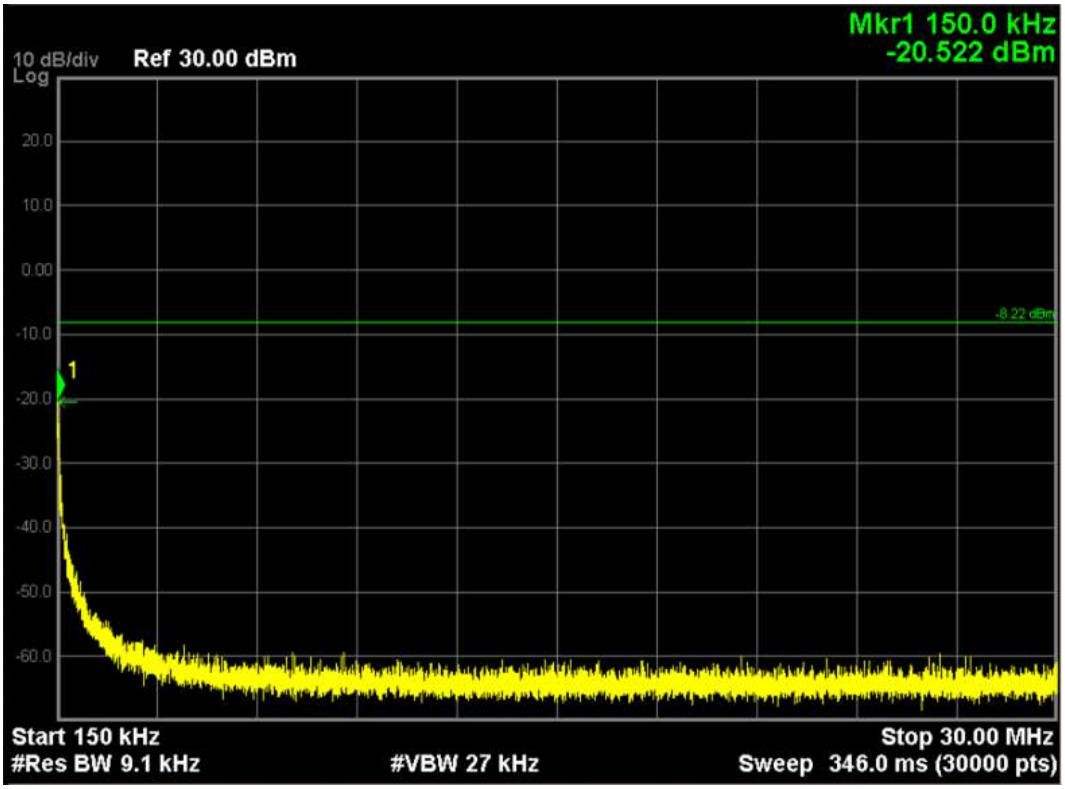


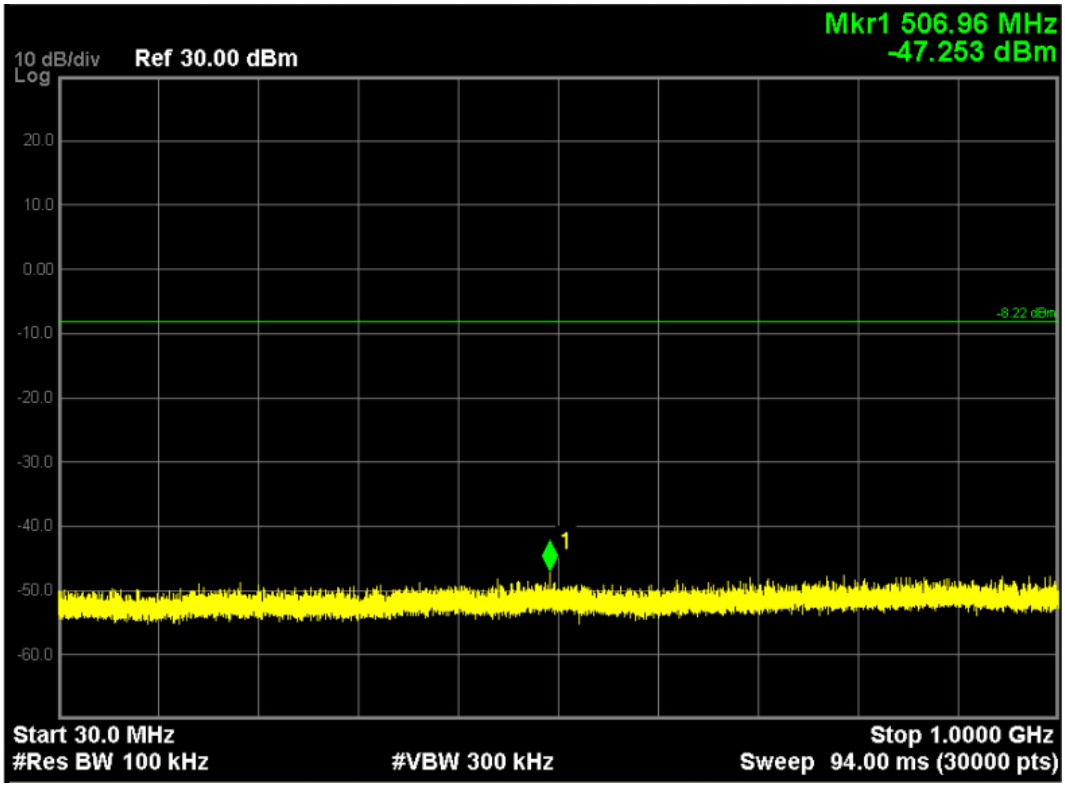
Note: The point mark1 is carrier.

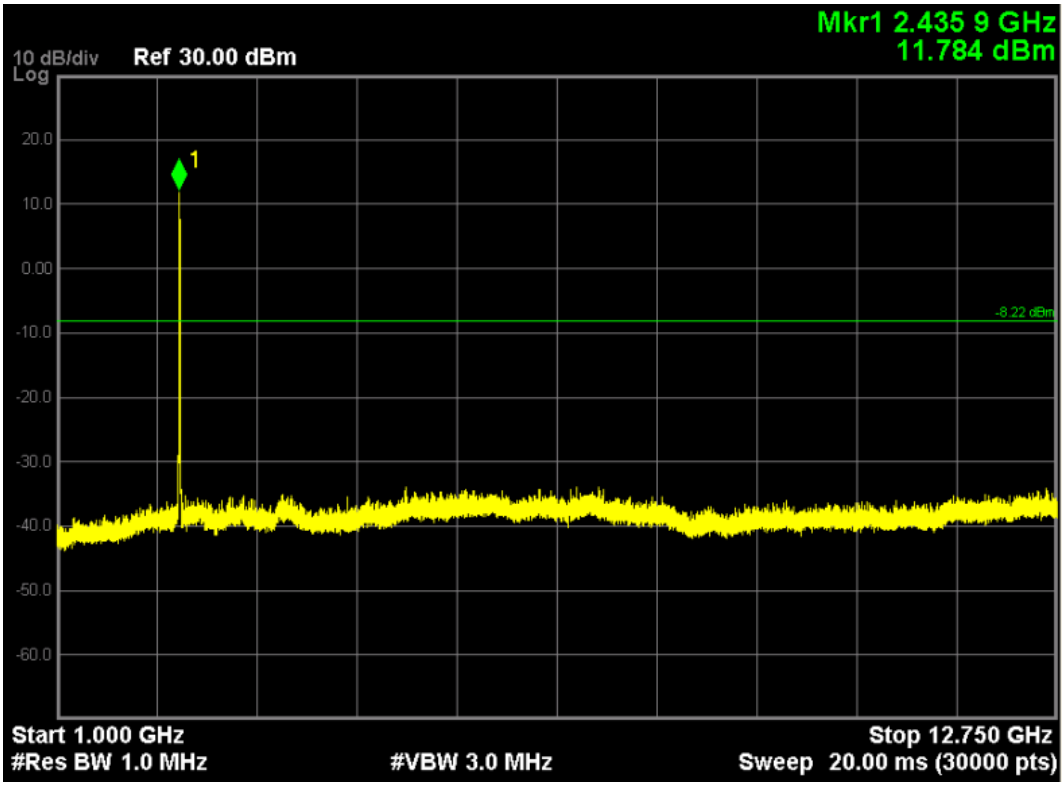


802.11b, traffic mode; Channel 6

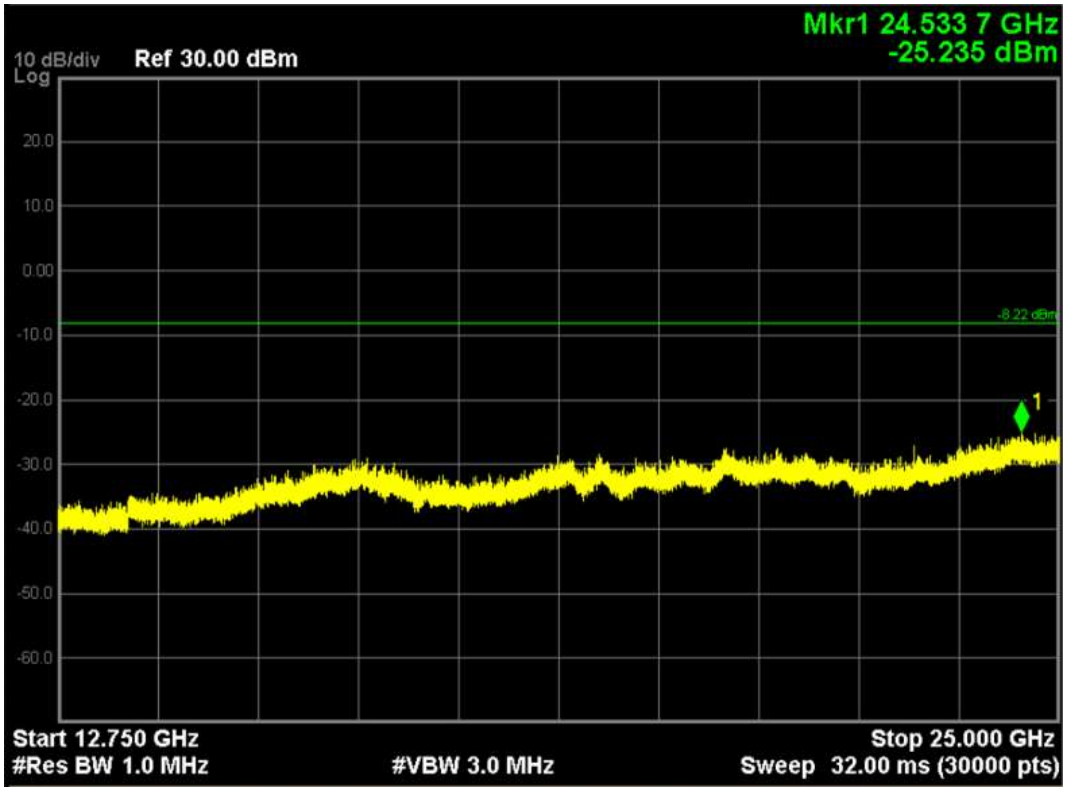



Mkr1 150.0 kHz
-20.522 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-8.22 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

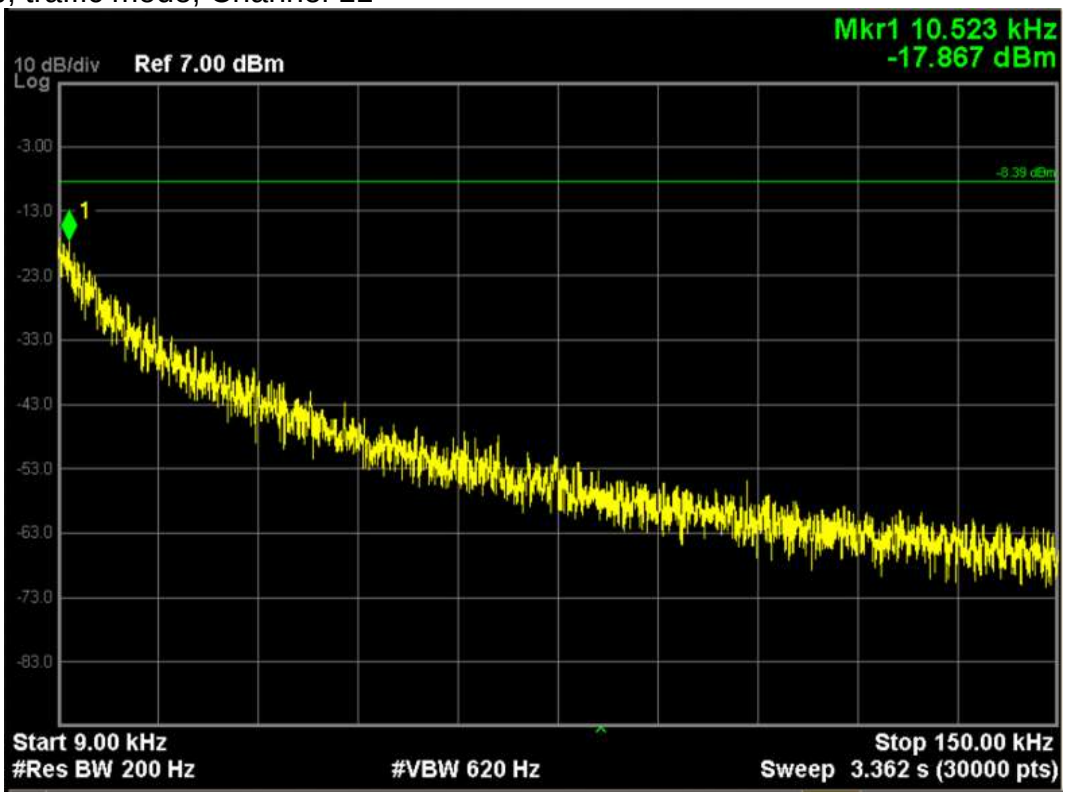

Mkr1 506.96 MHz
-47.253 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-8.22 dBm
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

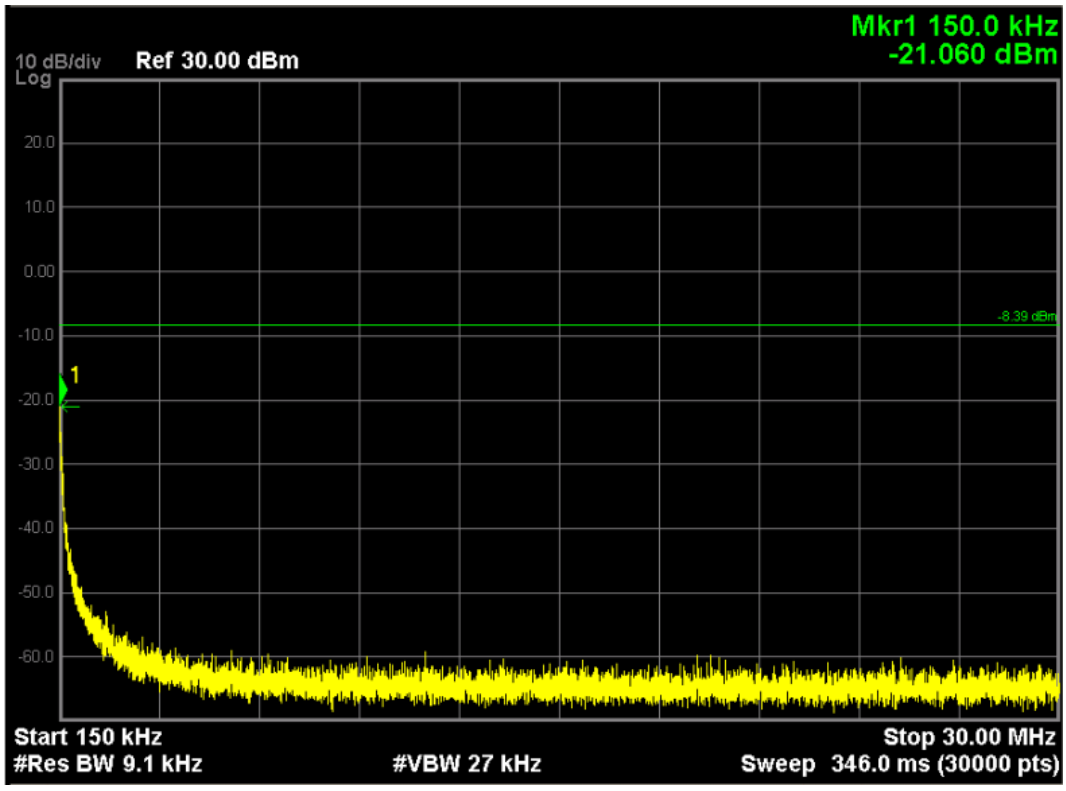


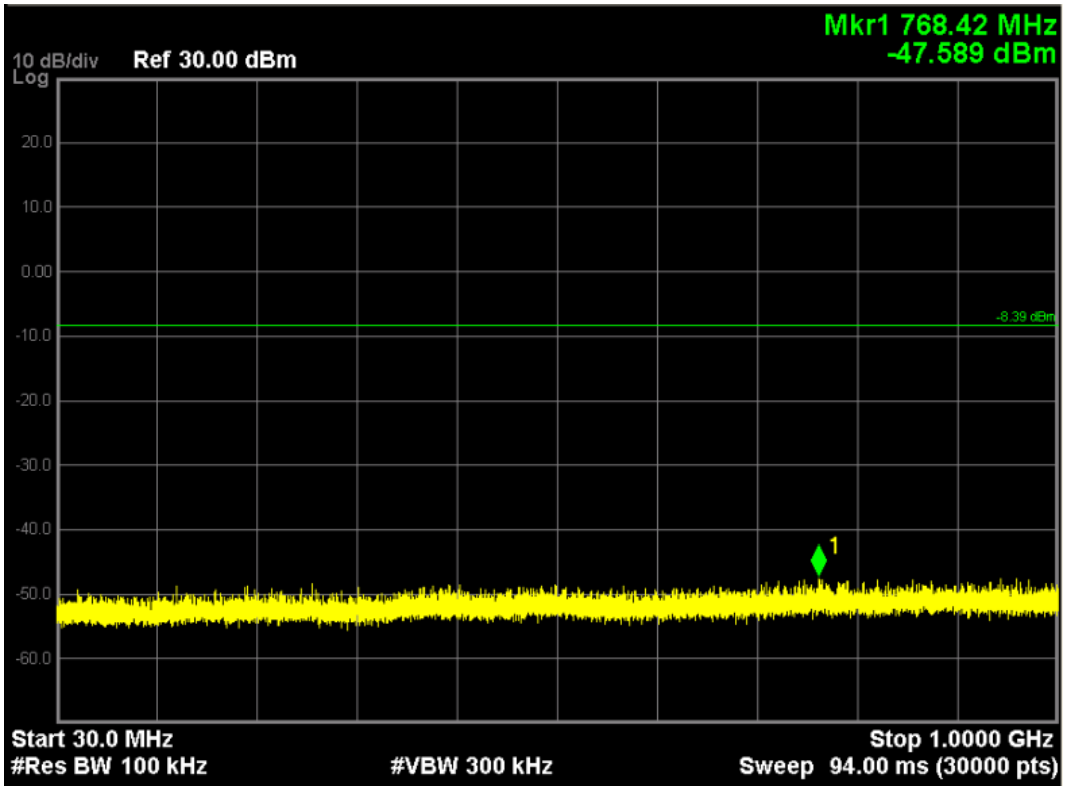
Note: The Mark1 point is carrier.

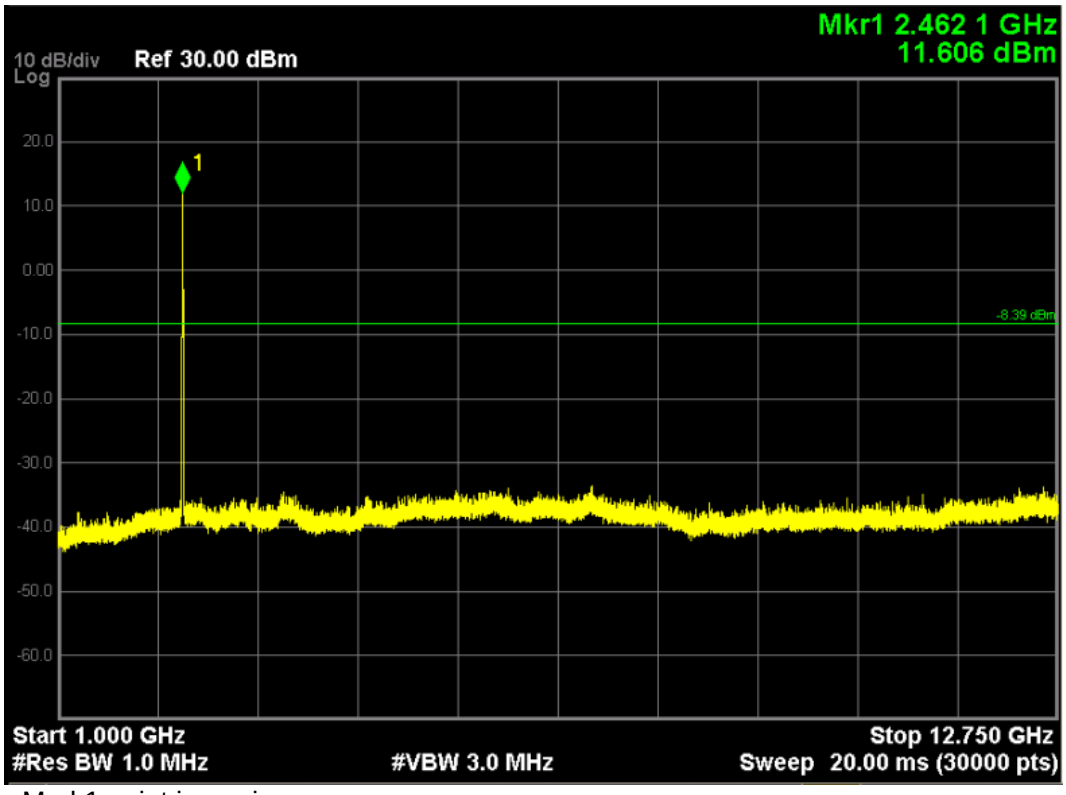


802.11b, traffic mode; Channel 11

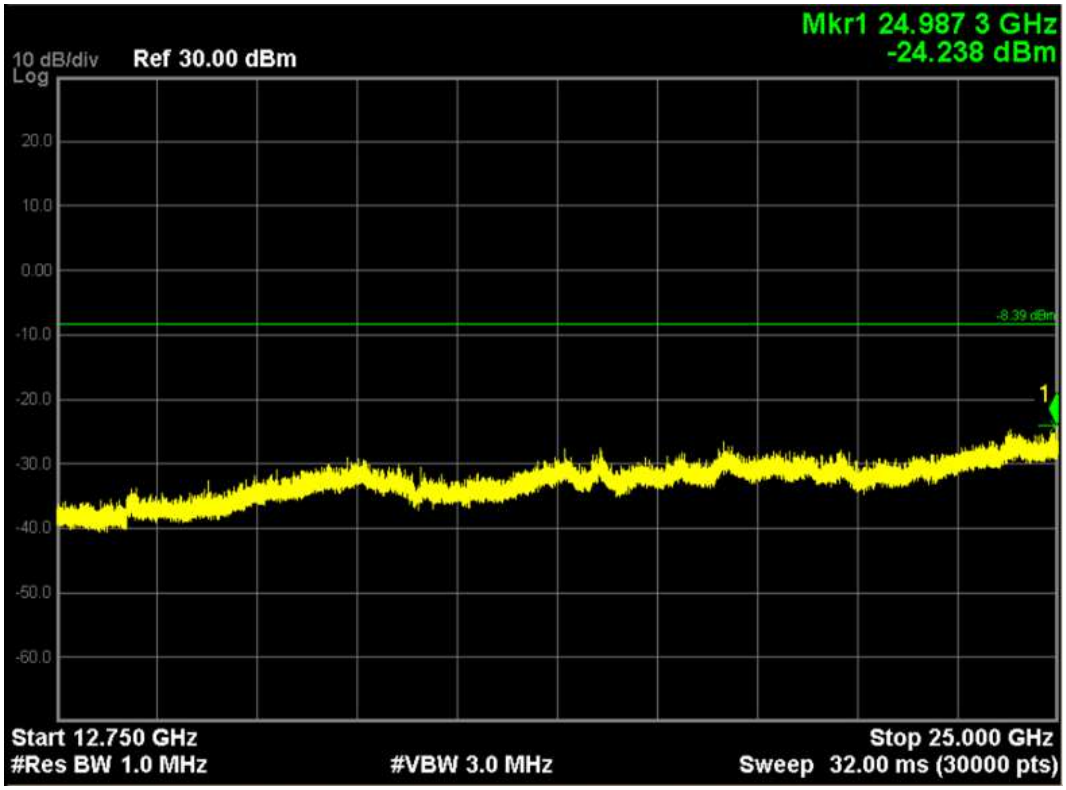




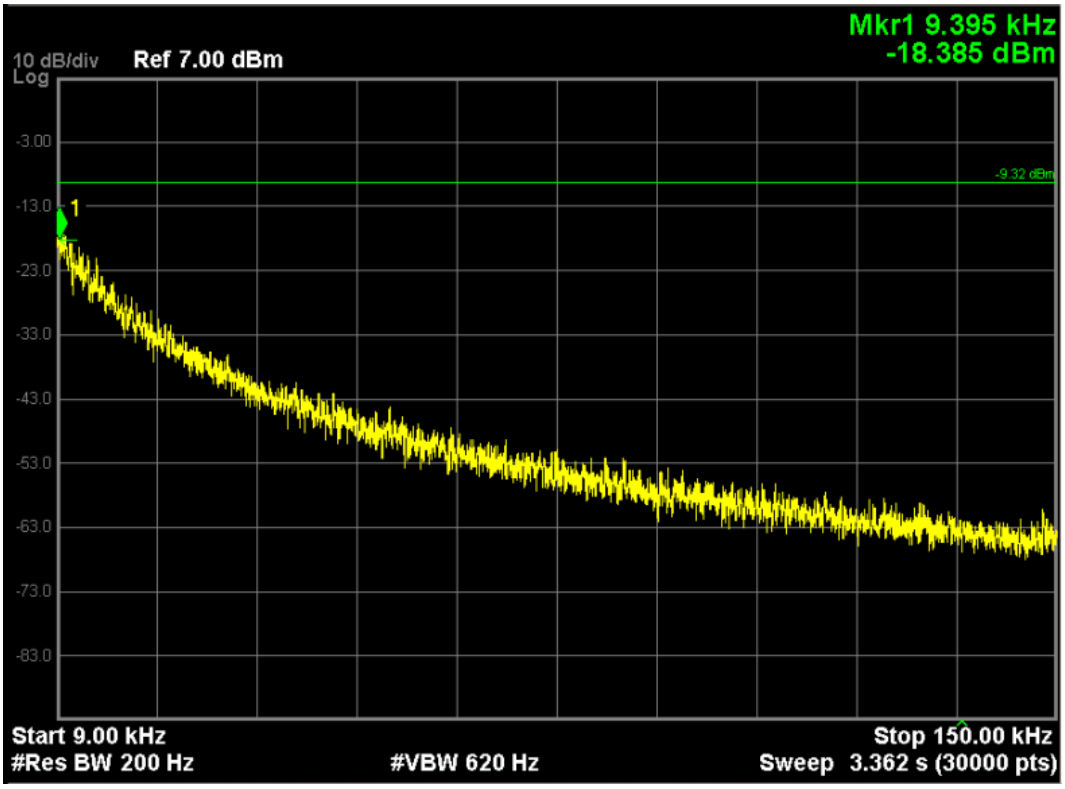


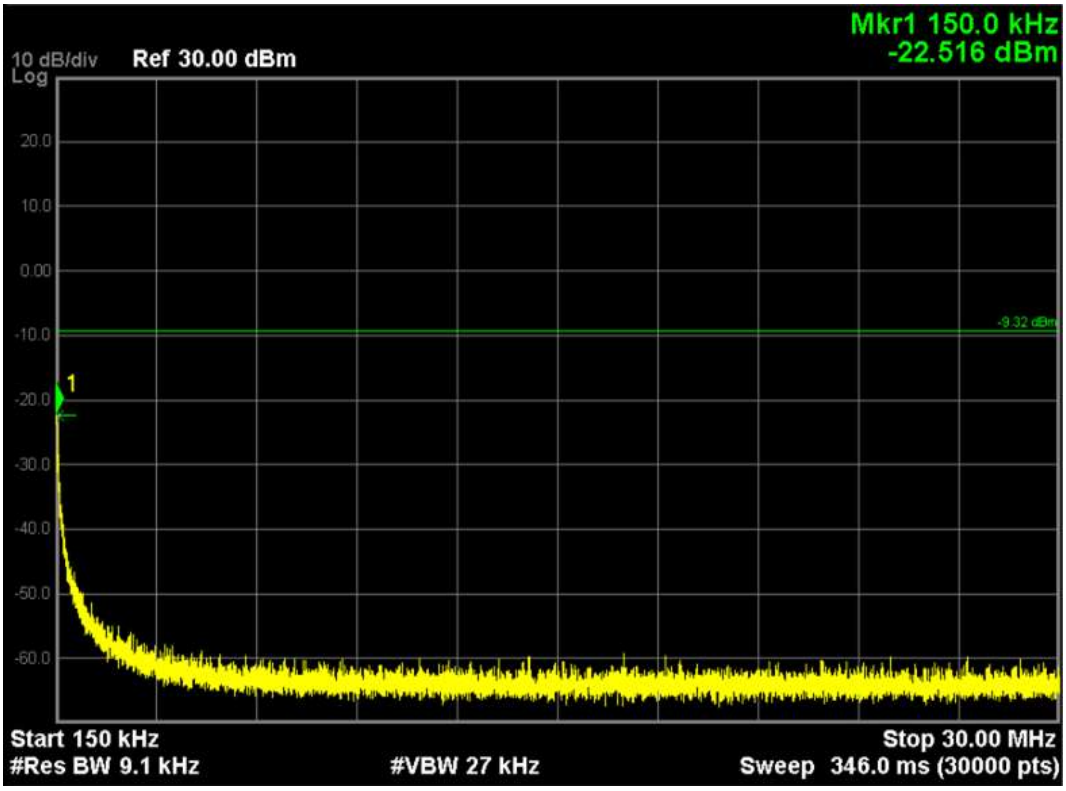


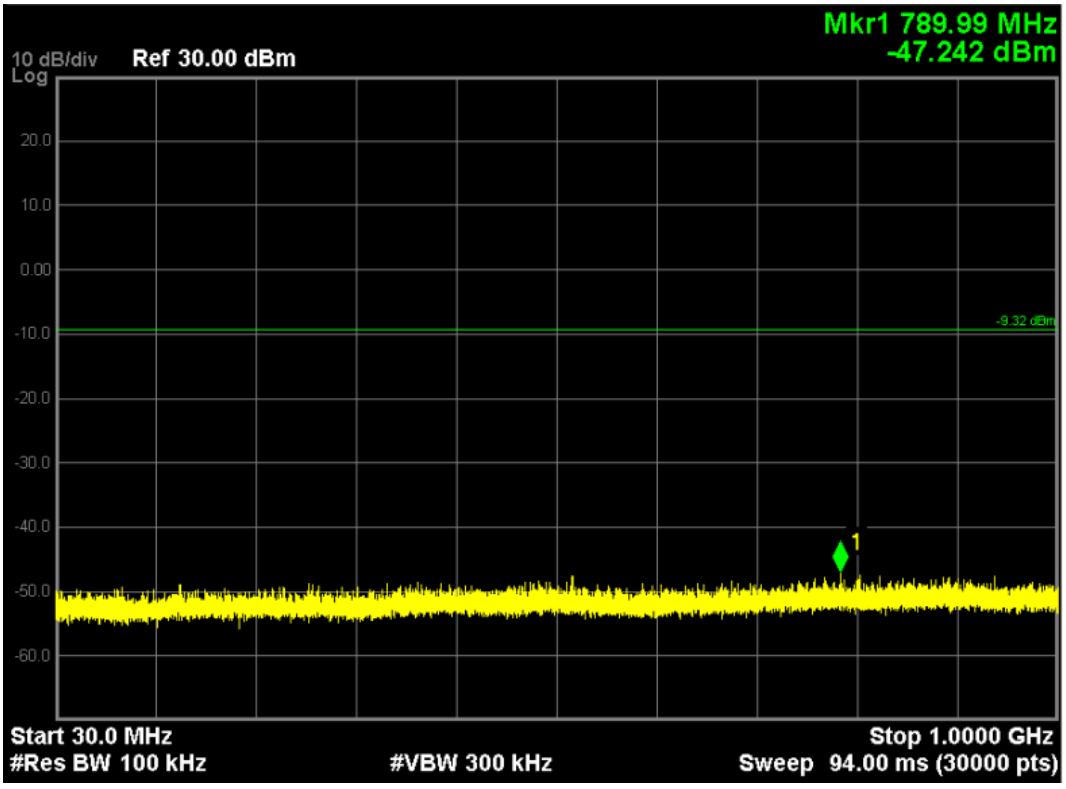
Note: The Mark1 point is carrier.

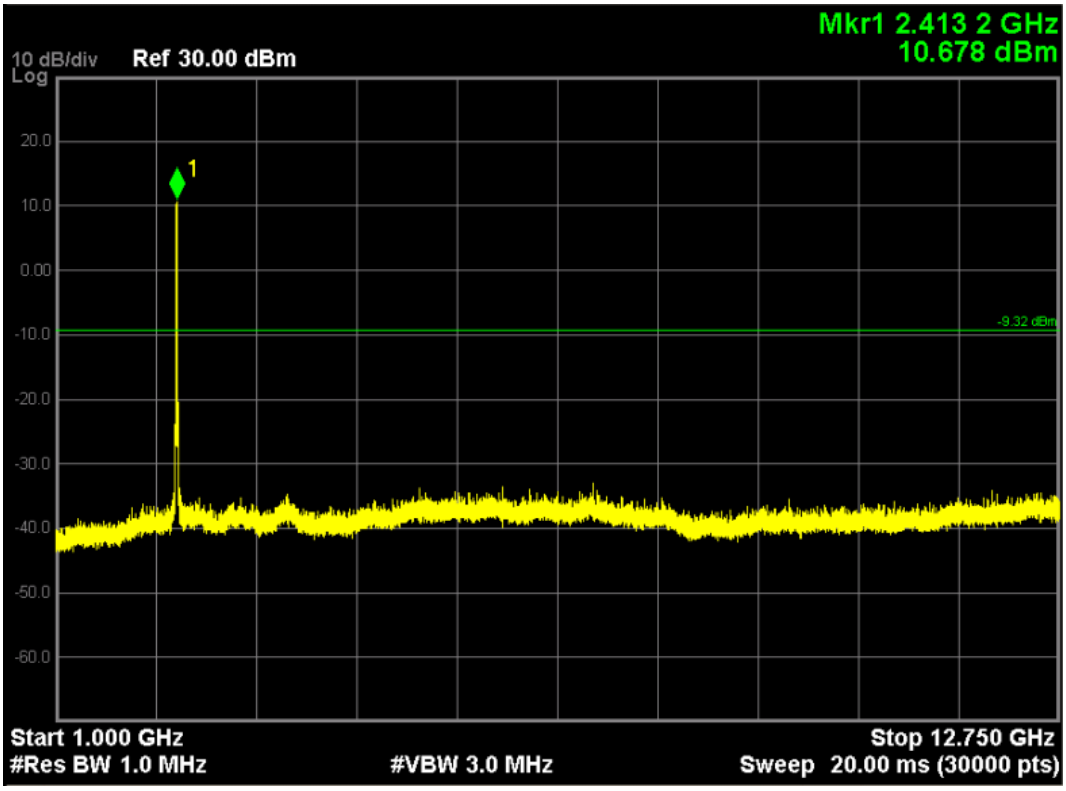


802.11g, traffic mode; Channel 1

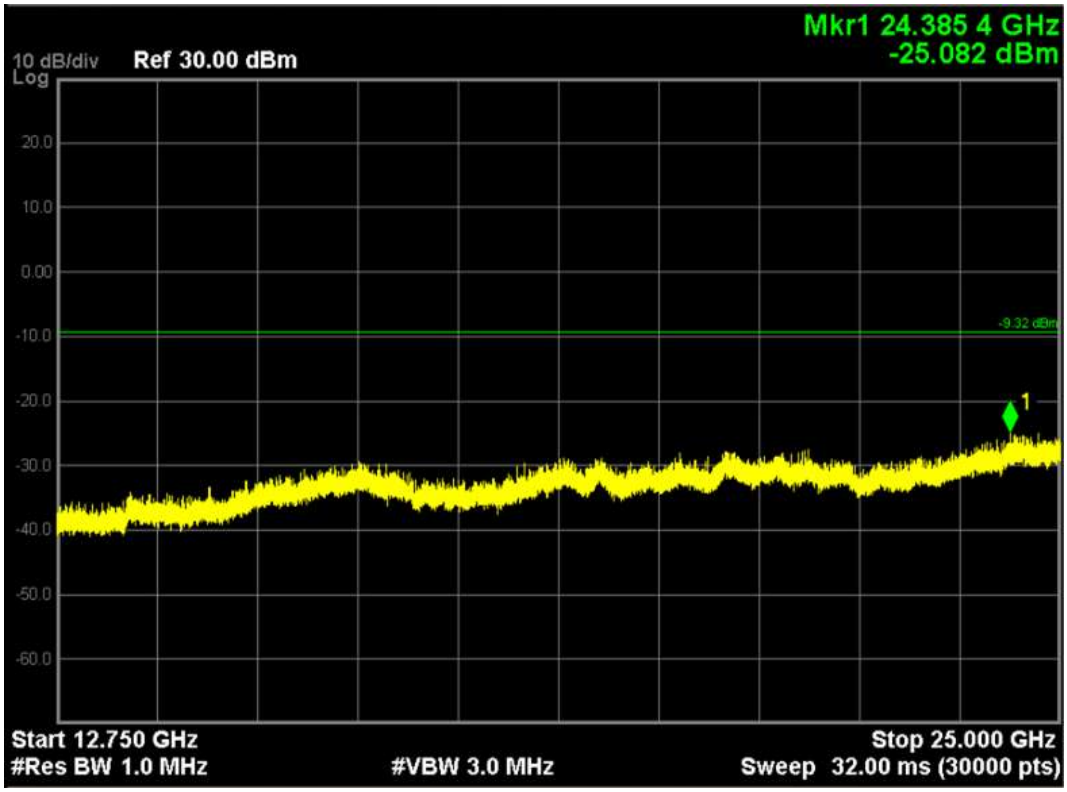



Mkr1 150.0 kHz
-22.516 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.32 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

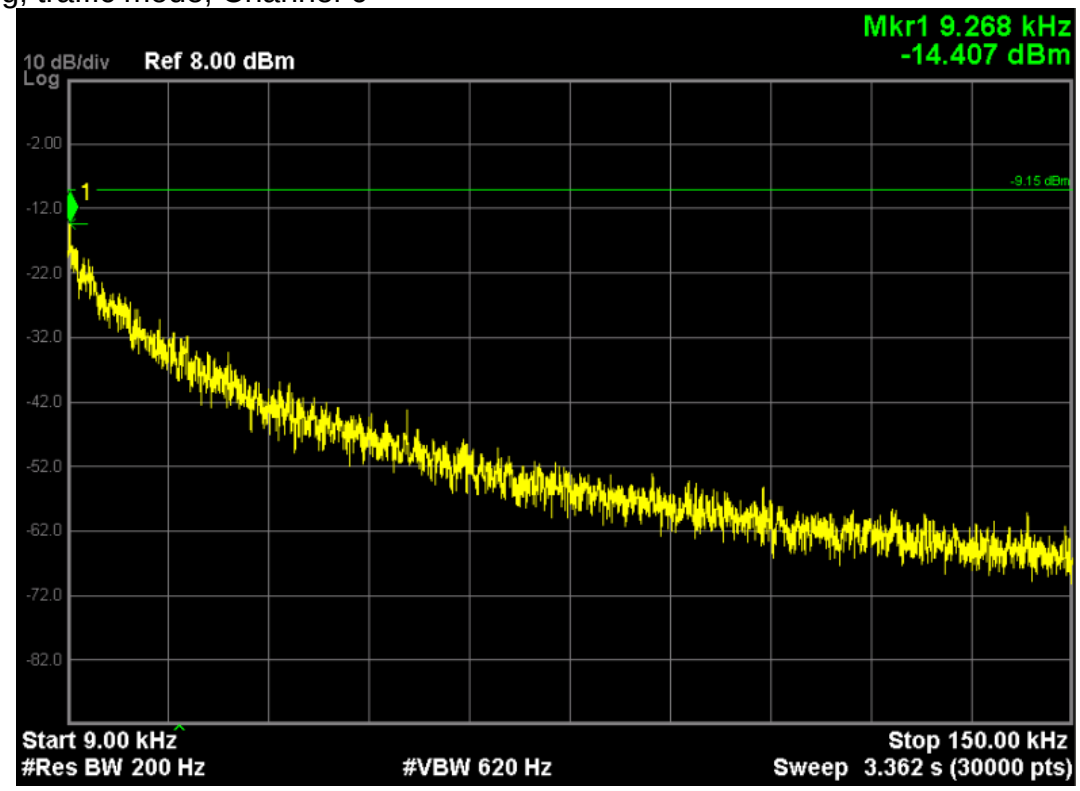

Mkr1 789.99 MHz
-47.242 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.32 dBm
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

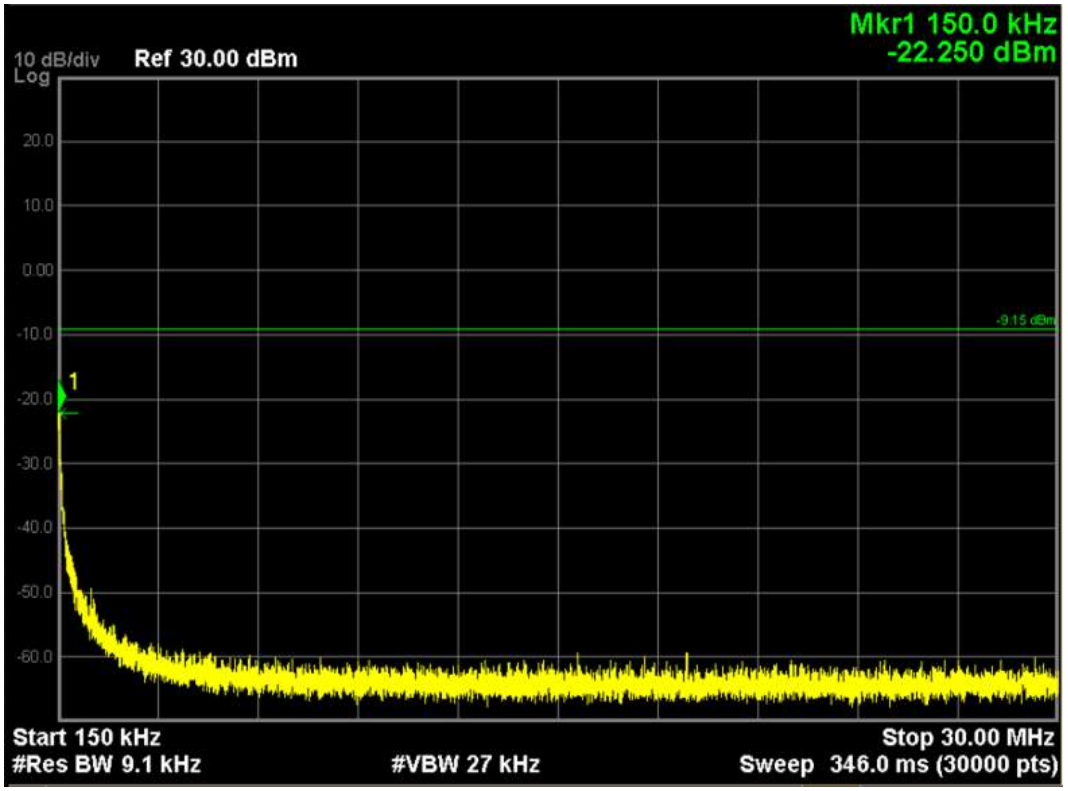


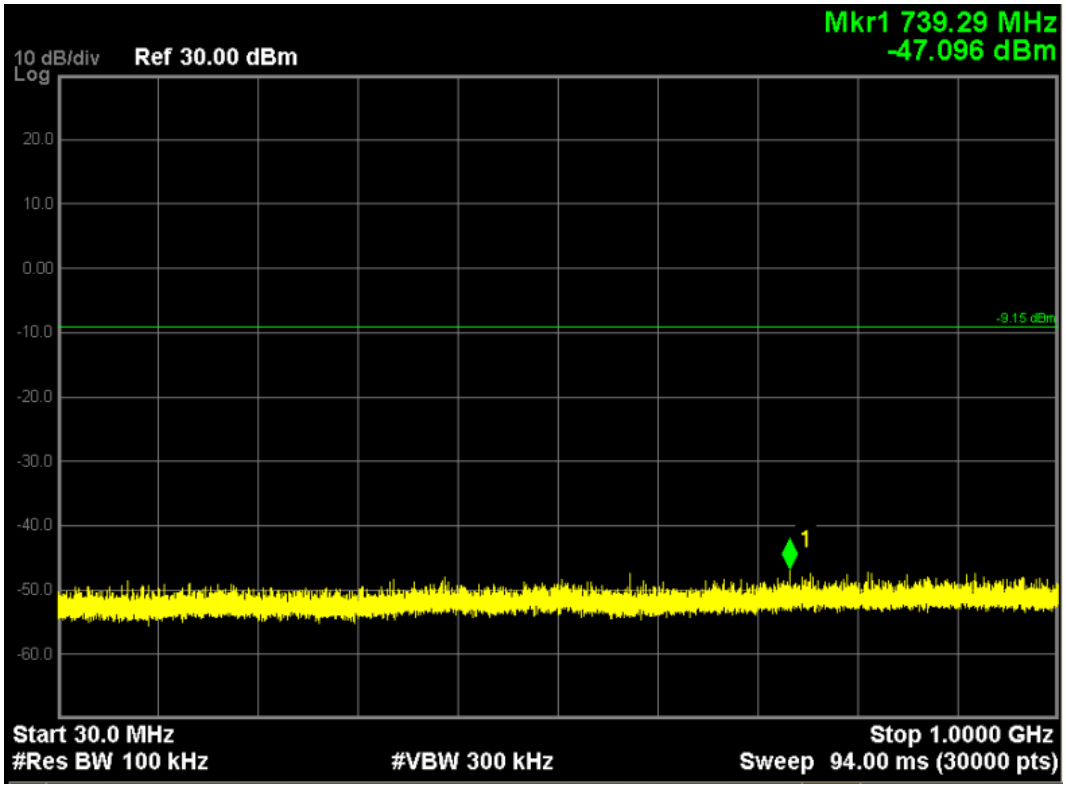
Note: The Mark1 point is carrier.

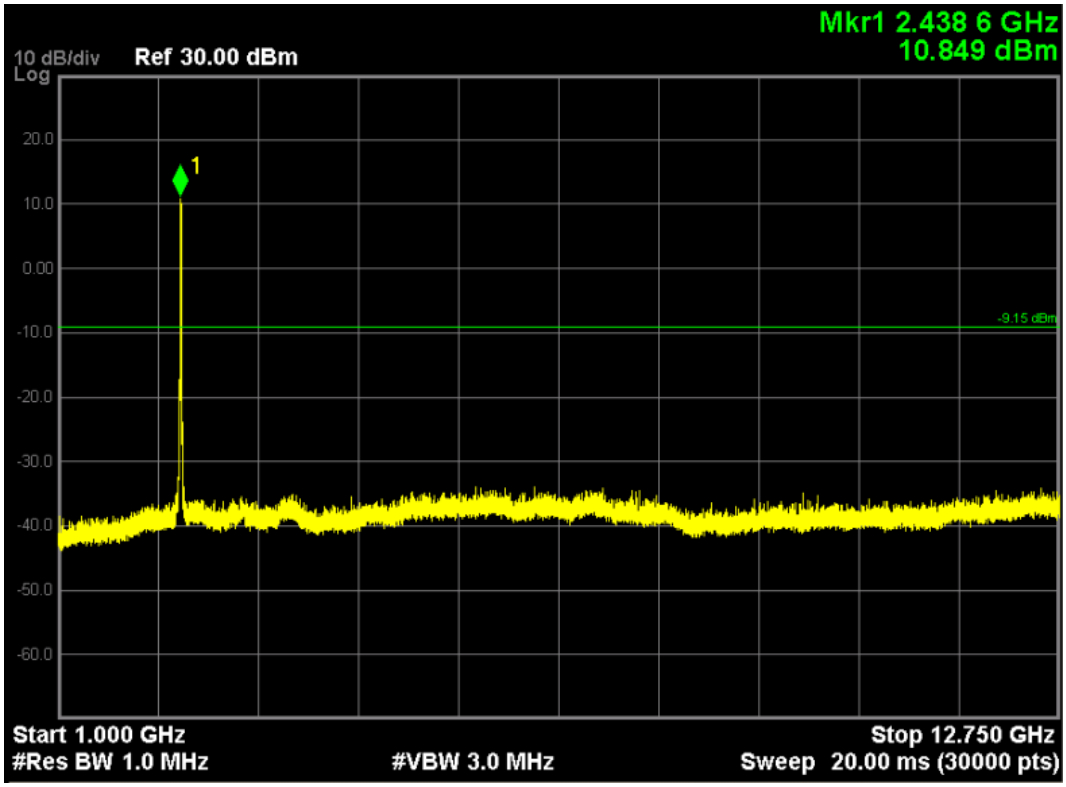


802.11g, traffic mode; Channel 6

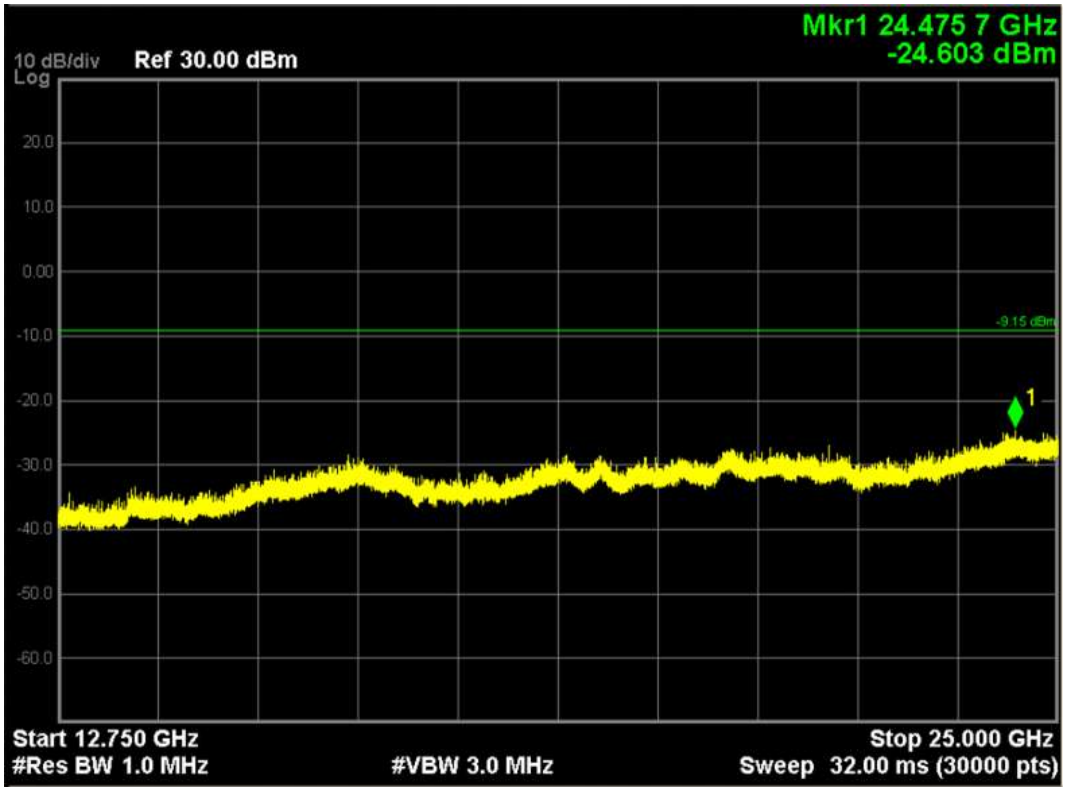




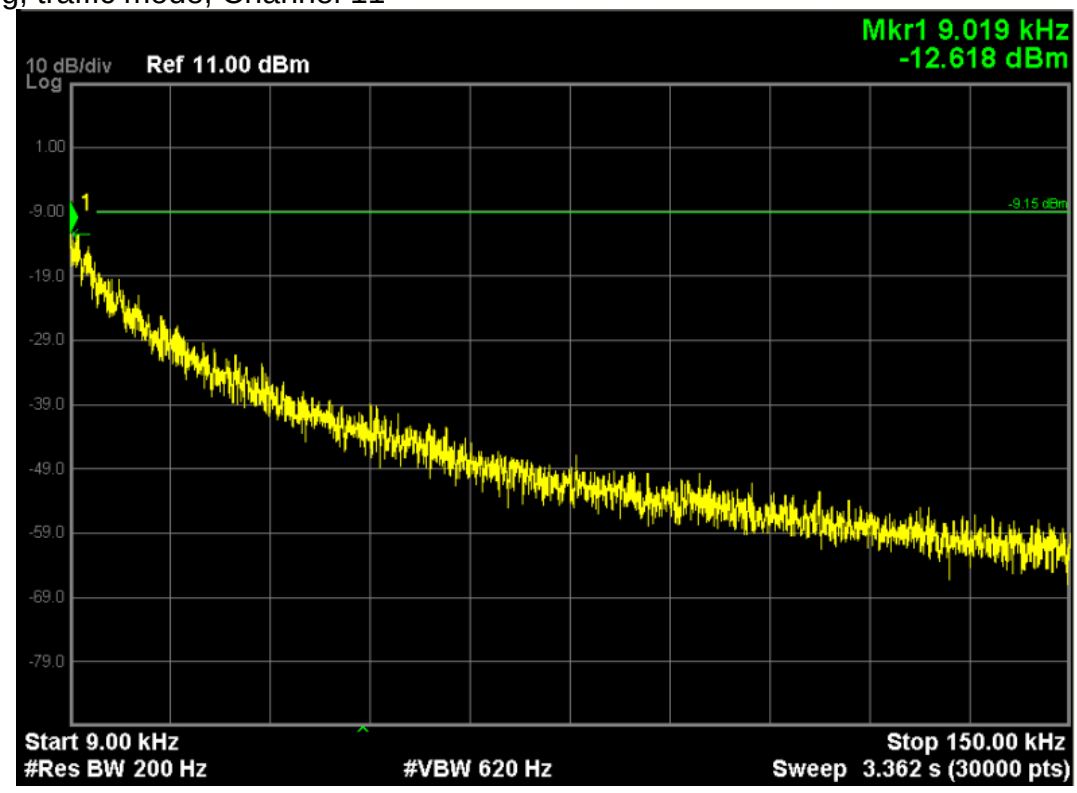


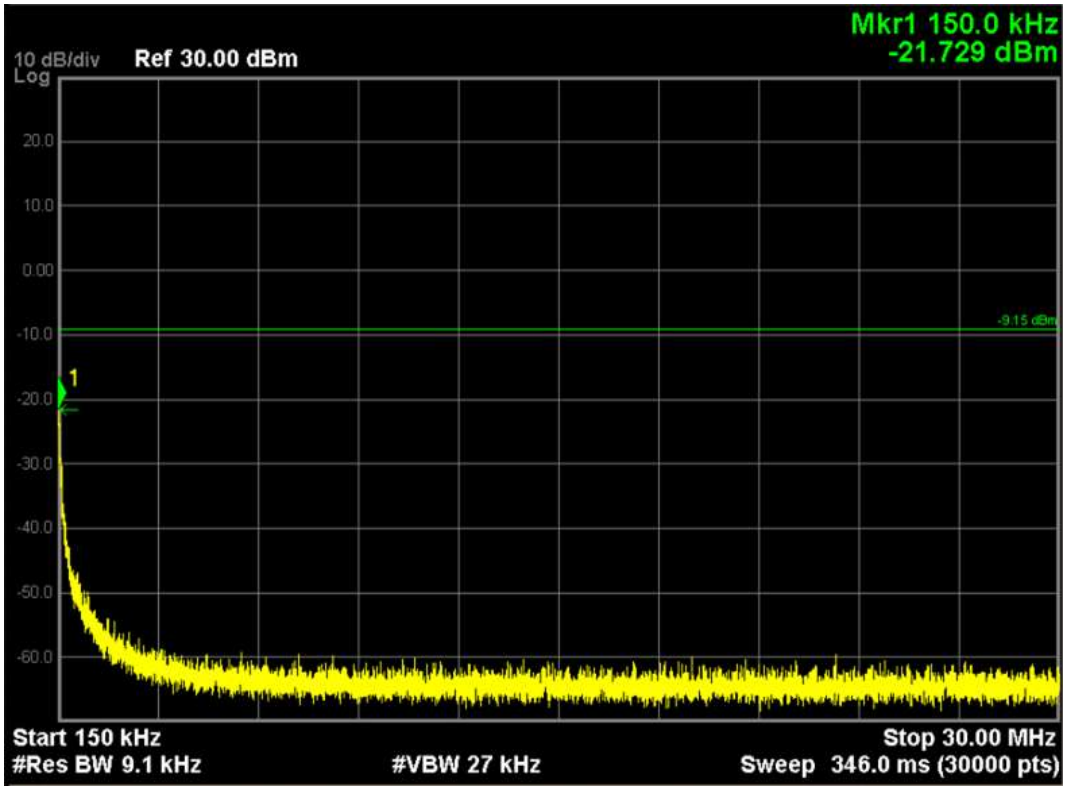


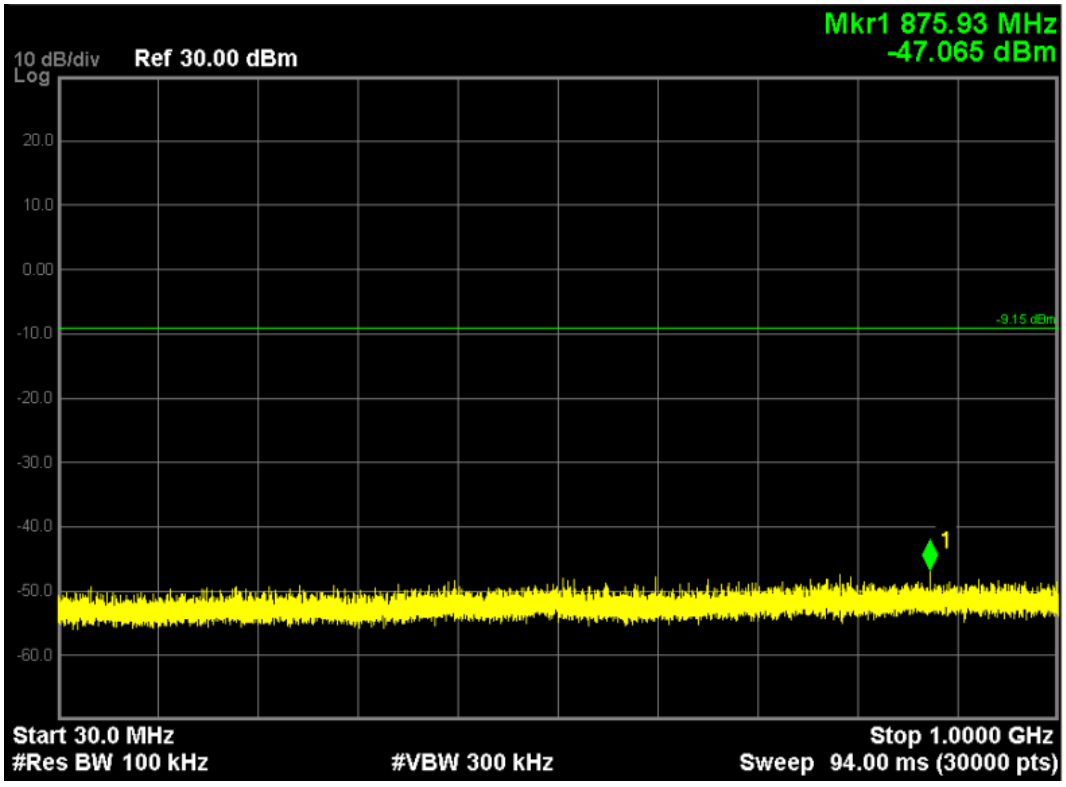
Note: The Mark1 point is carrier.

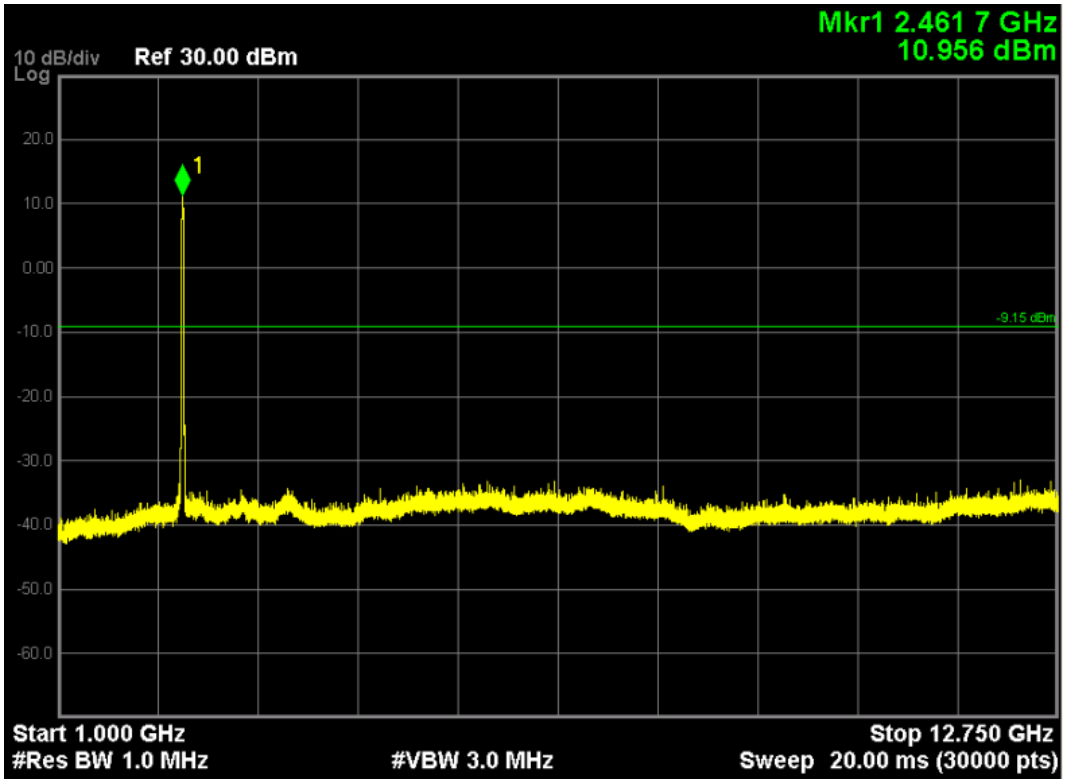


802.11g, traffic mode; Channel 11

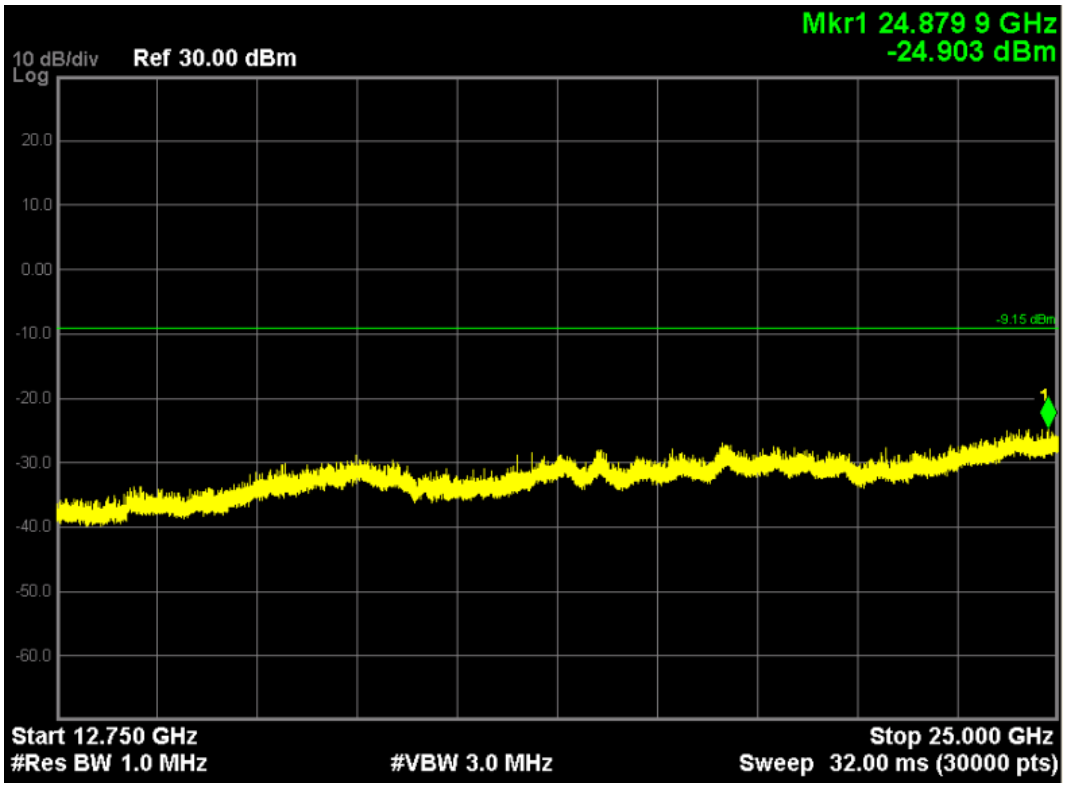



Mkr1 150.0 kHz
-21.729 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.15 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

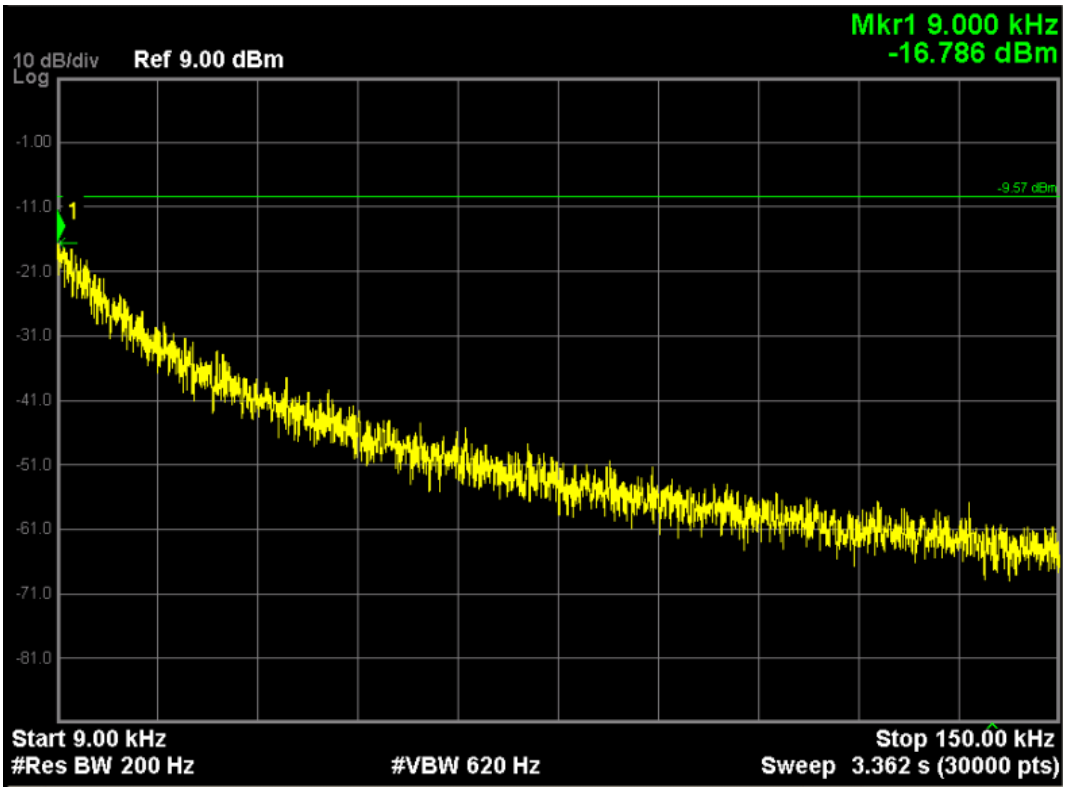

Mkr1 875.93 MHz
-47.065 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.15 dBm
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

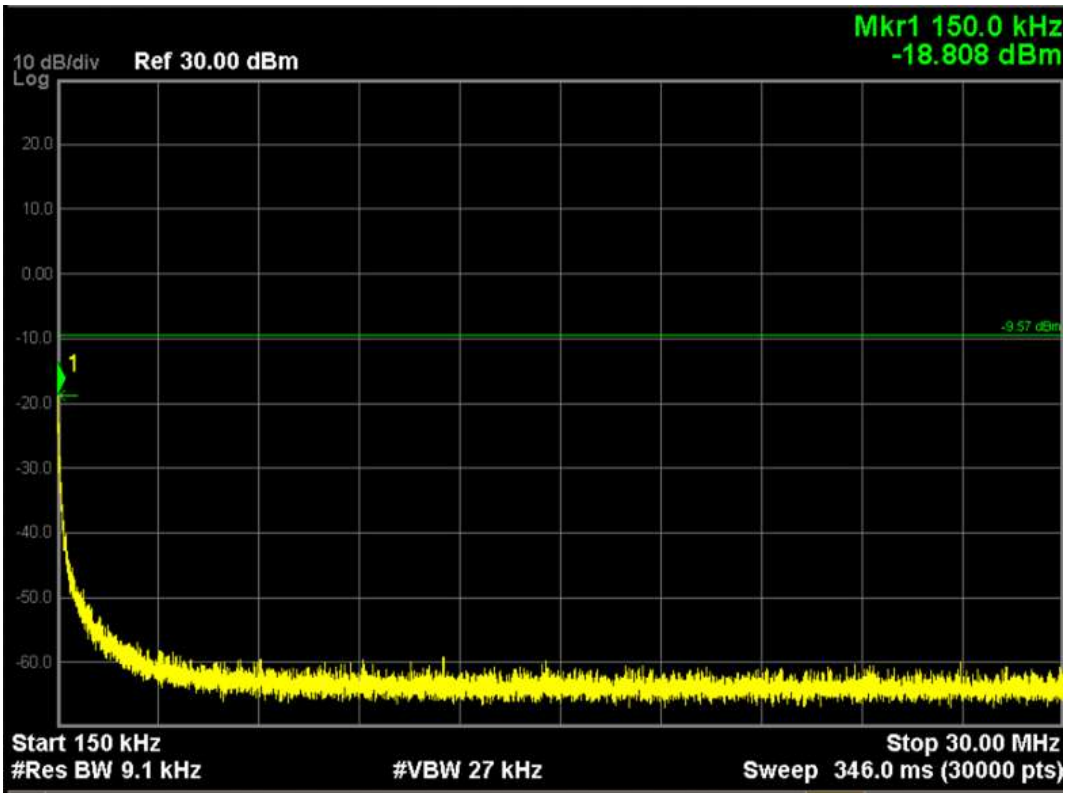


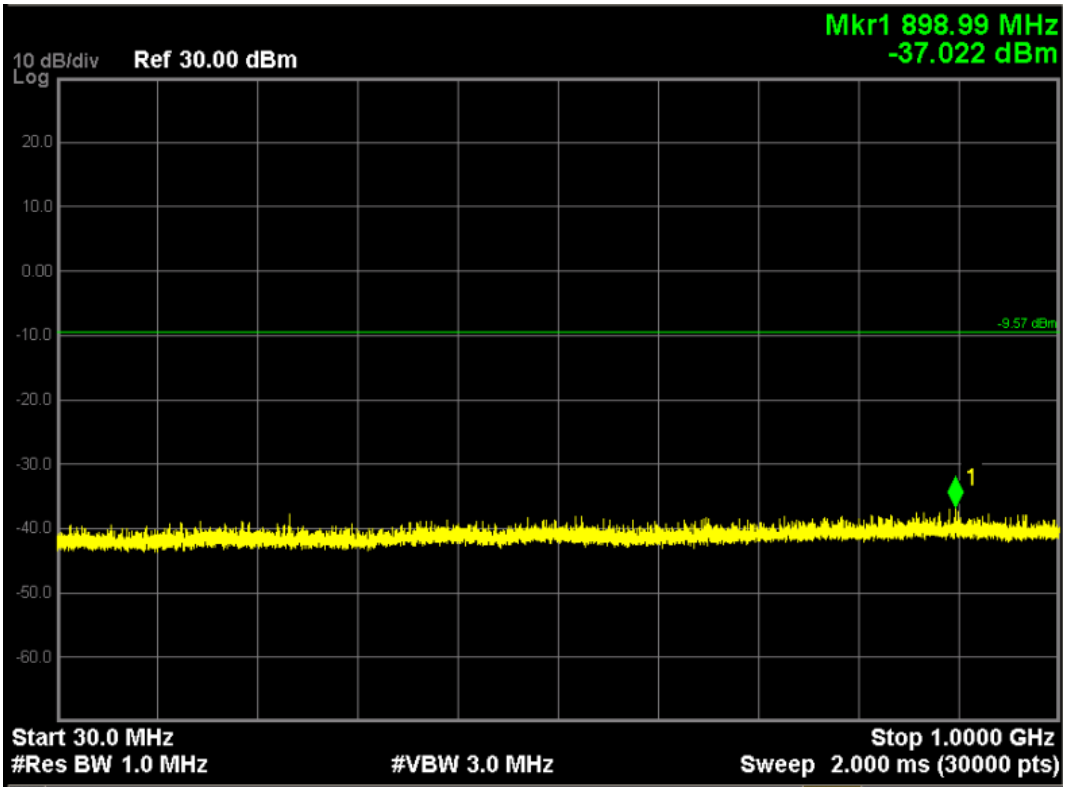
Note: The Mark1 point is carrier

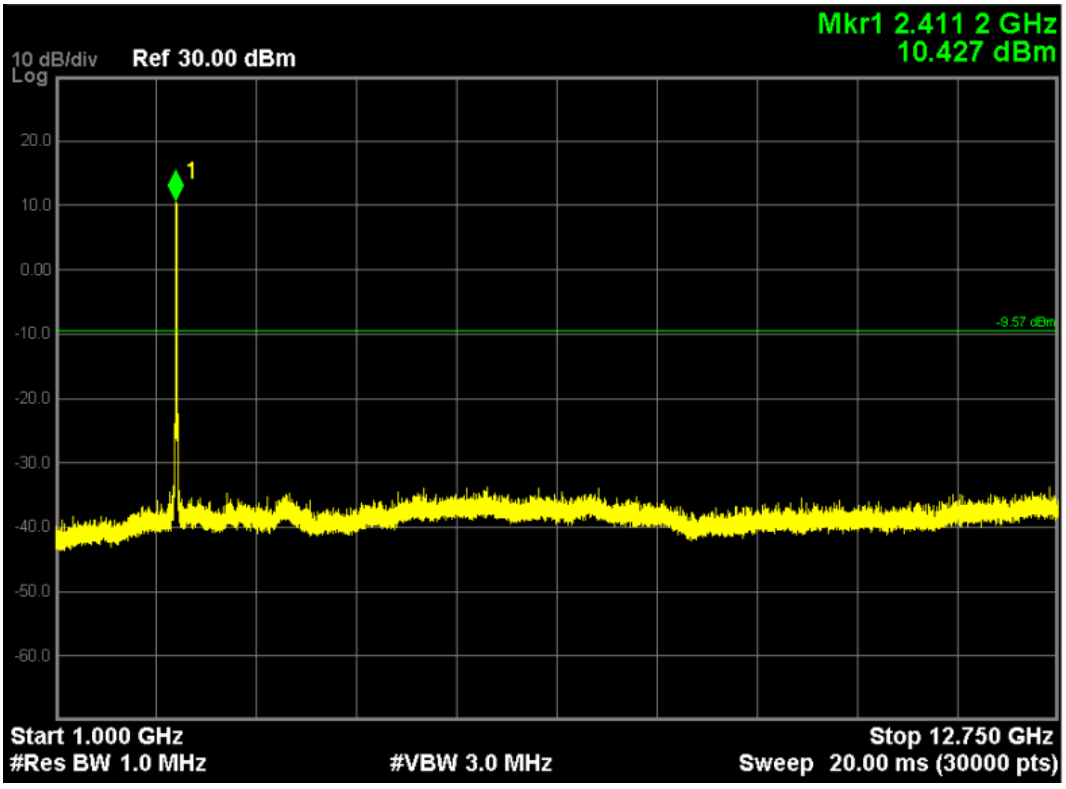


802.11n20, traffic mode; Channel 1;

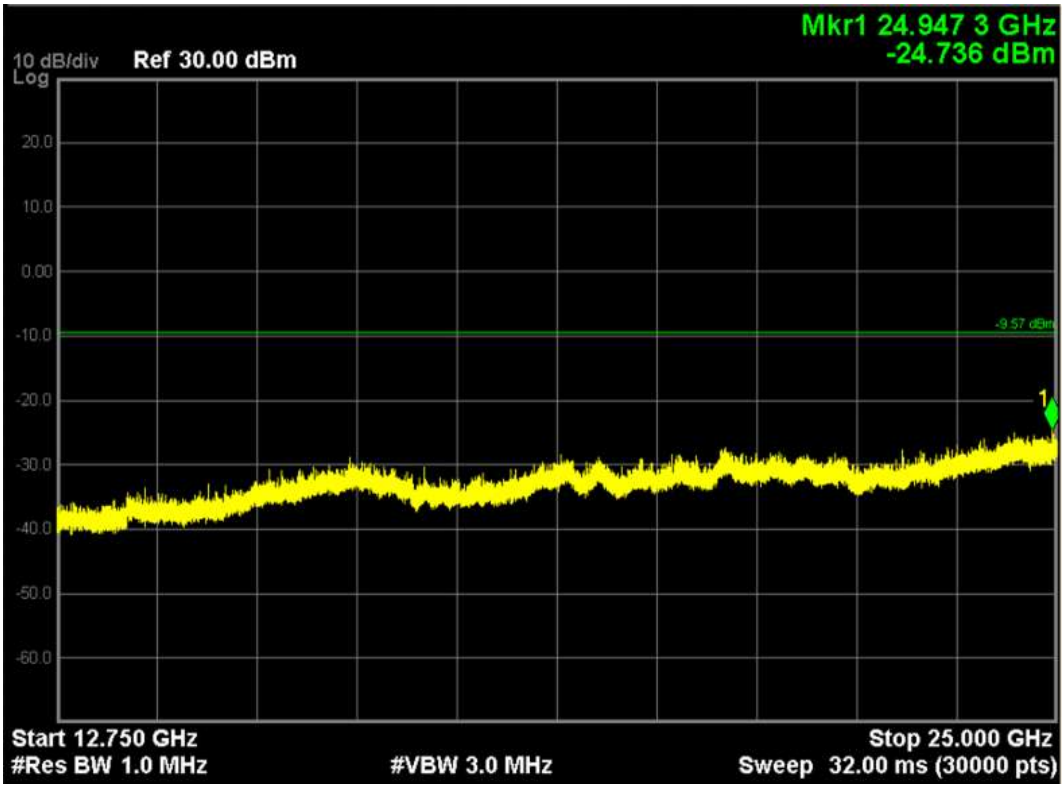




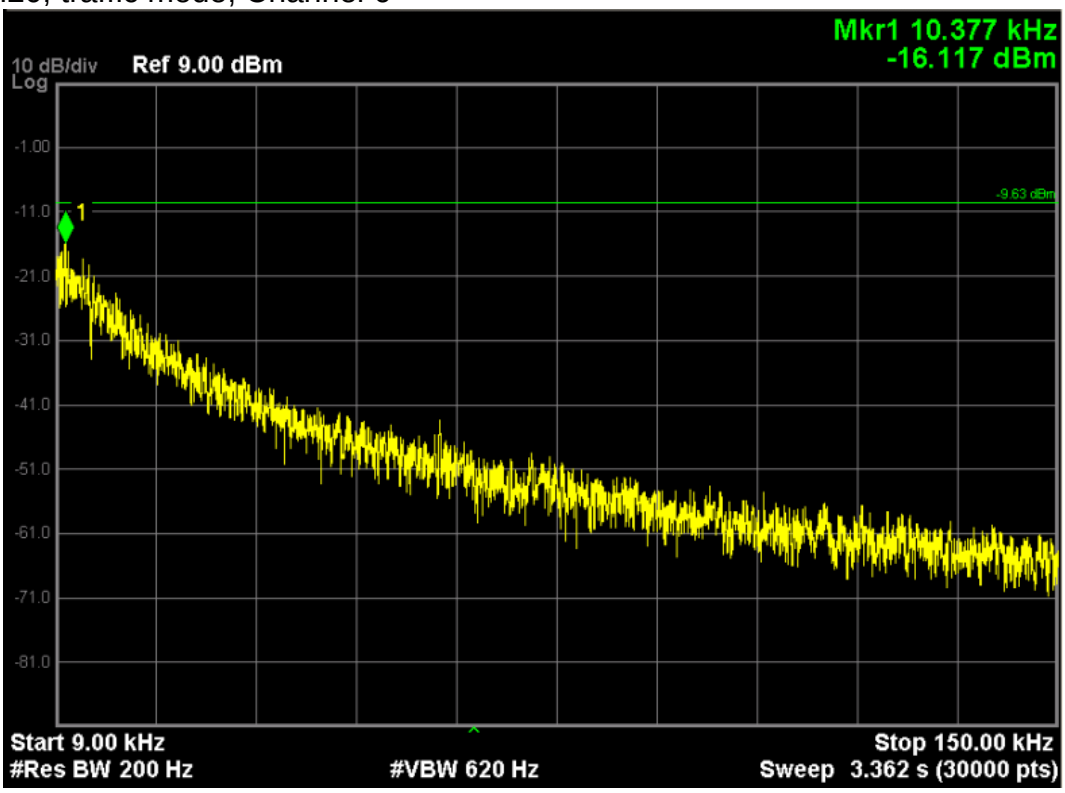


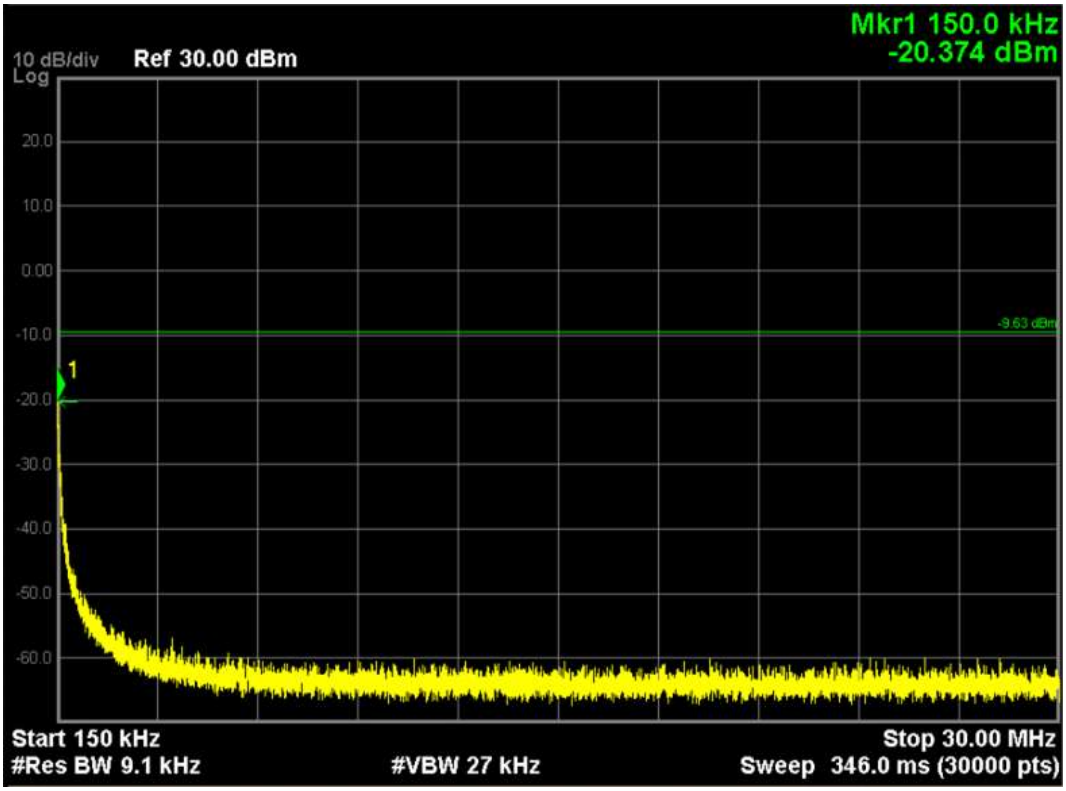


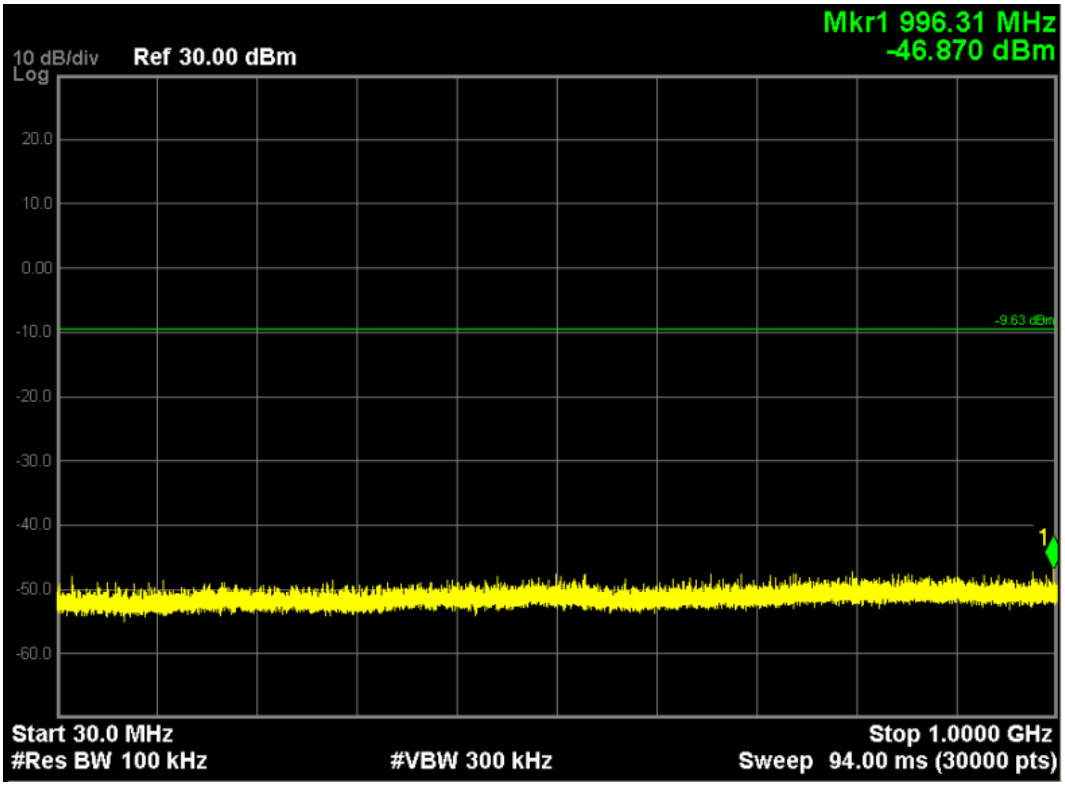
Note: The Mark1 point is carrier.

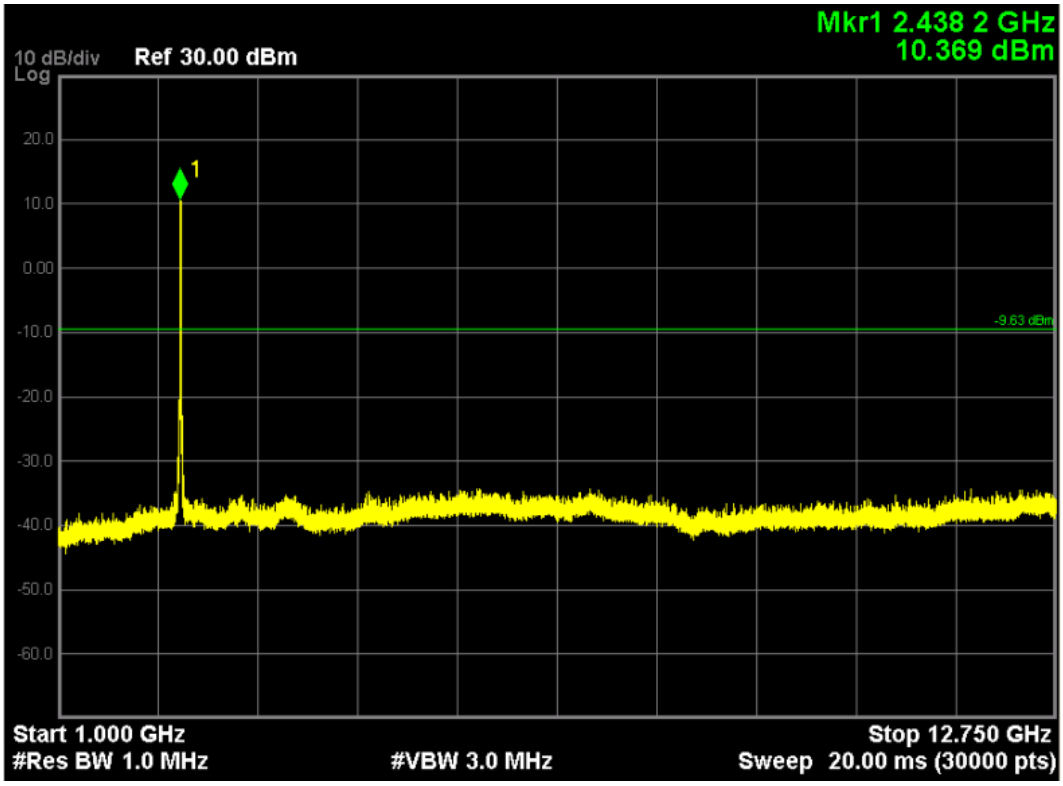


802.11n20, traffic mode; Channel 6

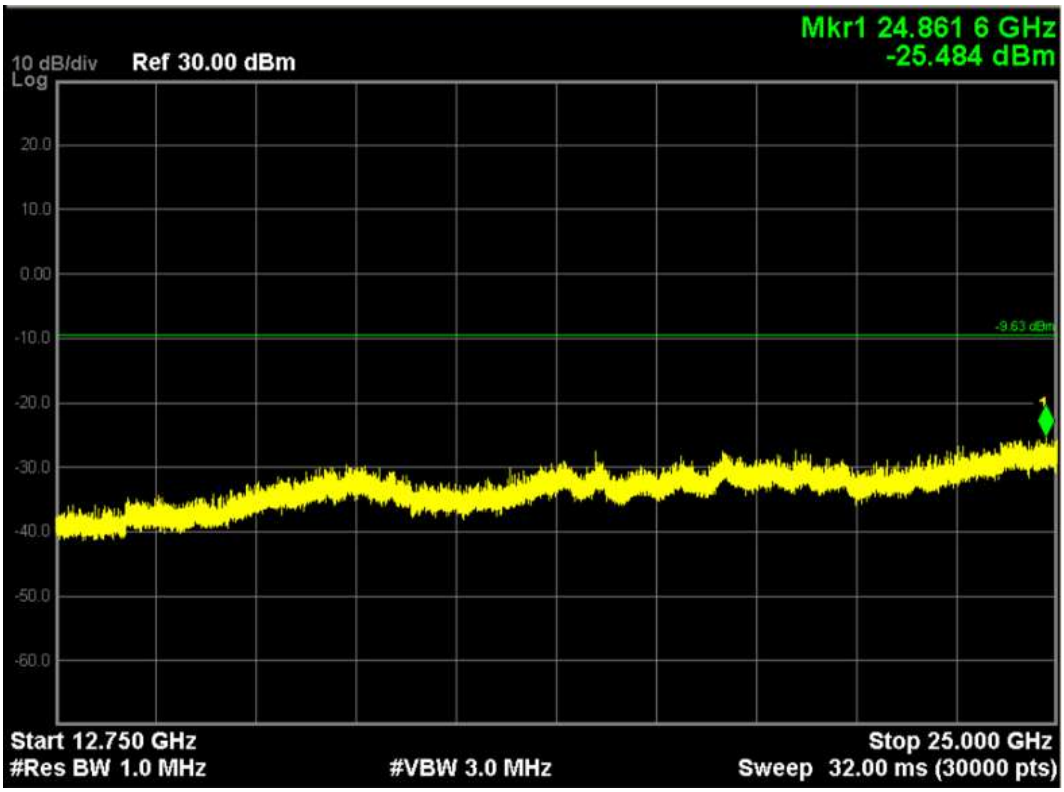



Mkr1 150.0 kHz
-20.374 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.63 dBm
1
Start 150 kHz
#Res BW 9.1 kHz
#VBW 27 kHz
Stop 30.00 MHz
Sweep 346.0 ms (30000 pts)

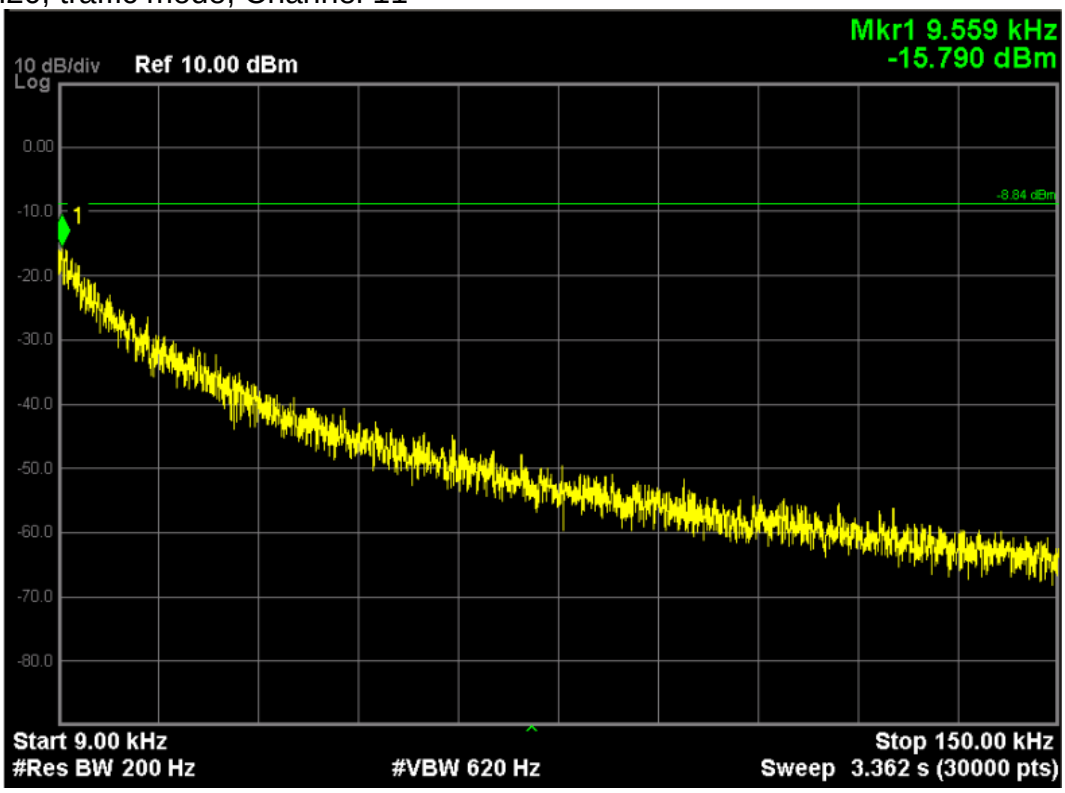

Mkr1 996.31 MHz
-46.870 dBm
10 dB/div
Log
Ref 30.00 dBm
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-9.63 dBm
1
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30000 pts)

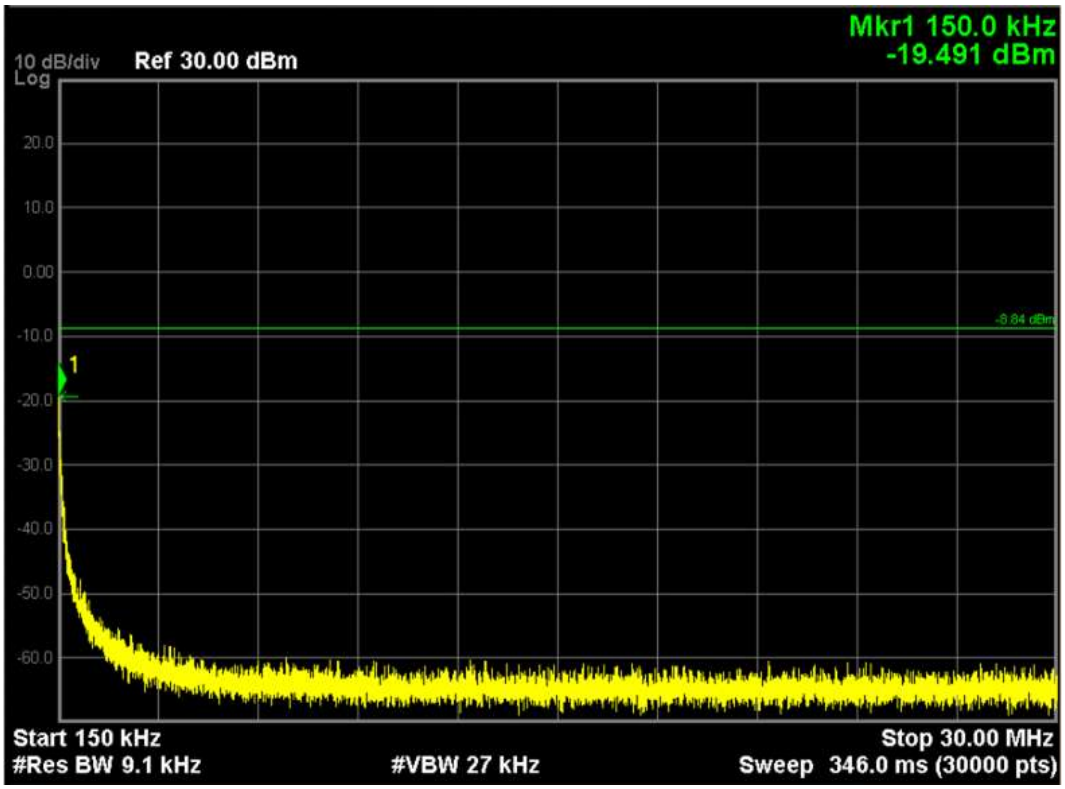


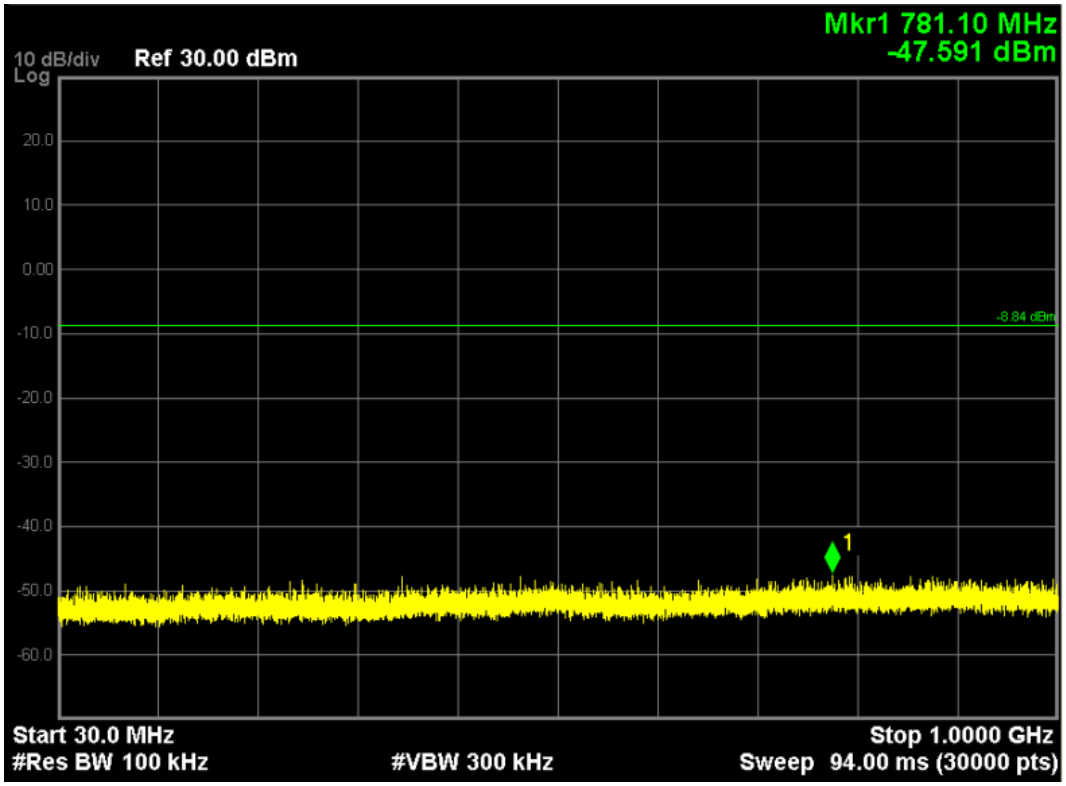
Note: The Mark1 point is carrier.

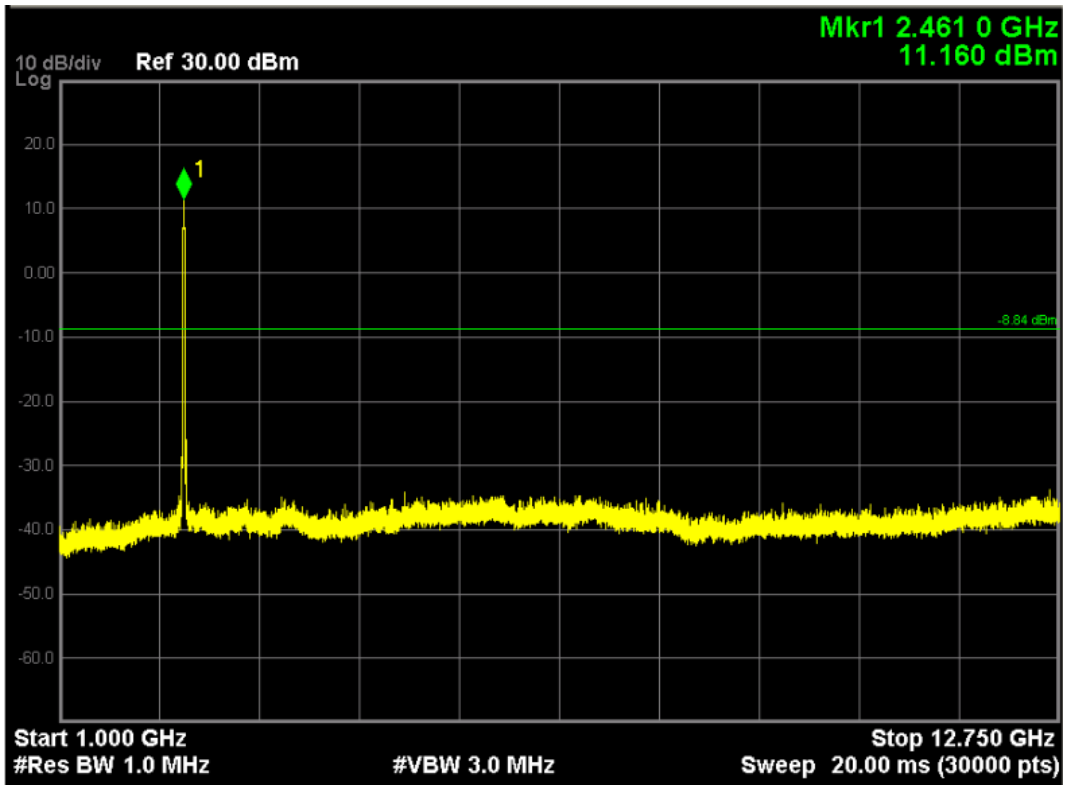


802.11n20, traffic mode; Channel 11

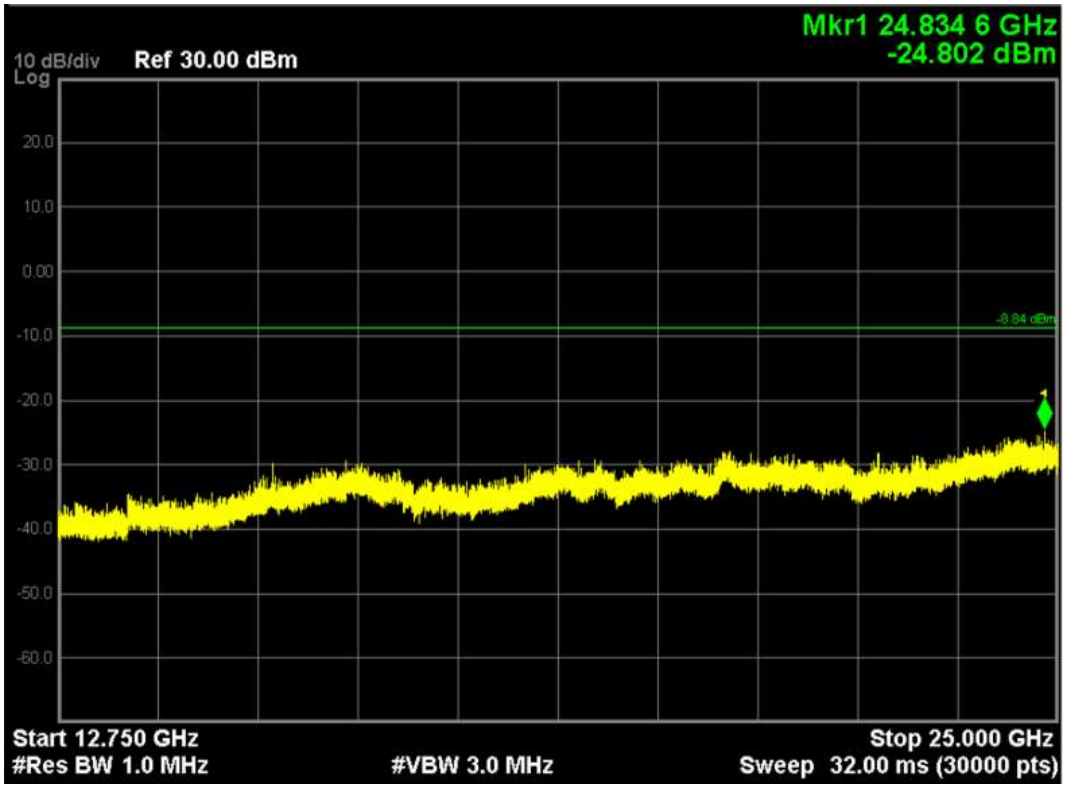








Note: The Mark1 point is carrier.



802.11n40, traffic mode; Channel 3