

Appendix

2.4G WIFI

TABLE OF CONTENTS

1	EQUIPMENT LIST	3
2	MEASUREMENT UNCERTAINTY (95% CONFIDENCE LEVELS, K=2).....	3
3	AC POWER LINE CONDUCTED EMISSIONS	4
4	DUTY CYCLE	6
4.1	<i>Test Results</i>	6
4.2	<i>Test Plots</i>	6
5	CONDUCTED OUTPUT POWER.....	8
5.1	<i>Test Results</i>	8
6	DTS (6 DB) BANDWIDTH & 99% OCCUPIED BANDWIDTH.....	9
6.1	<i>Test Results</i>	9
6.2	<i>Test plots</i>	10
7	POWER SPECTRAL DENSITY	19
7.1	<i>Test Results</i>	19
7.2	<i>Test plots</i>	20
8	BAND-EDGE FOR RF CONDUCTED EMISSIONS	25
8.1	<i>Test plots</i>	25
9	RF CONDUCTED SPURIOUS EMISSIONS.....	29
9.1	<i>Test plots</i>	29

1 Equipment List

Conducted Emission					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
Shielding Room	ZhongYu Electron	GB-88	SEM001-06	2017/5/10	2020/5/9
LISN	Rohde & Schwarz	ENV216	SEM007-01	2019/7/14	2020/7/14
LISN	ETS-LINDGREN	Feb-16	SEM007-02	2019/4/1	2020/3/31
Measurement Software	AUDIX	e3 V5.4.1221d	N/A	N/A	N/A
Coaxial Cable	SGS	N/A	SEM024-01	2019/6/12	2020/6/11
2 Line ISN	Fischer Custom Communications Inc.	FCC-TLISN-T2-02	EMC0122	2019/2/11	2020/2/10
EMI Test Receiver	Rohde & Schwarz	ESCI	SEM004-02	2019/3/2	2020/3/1

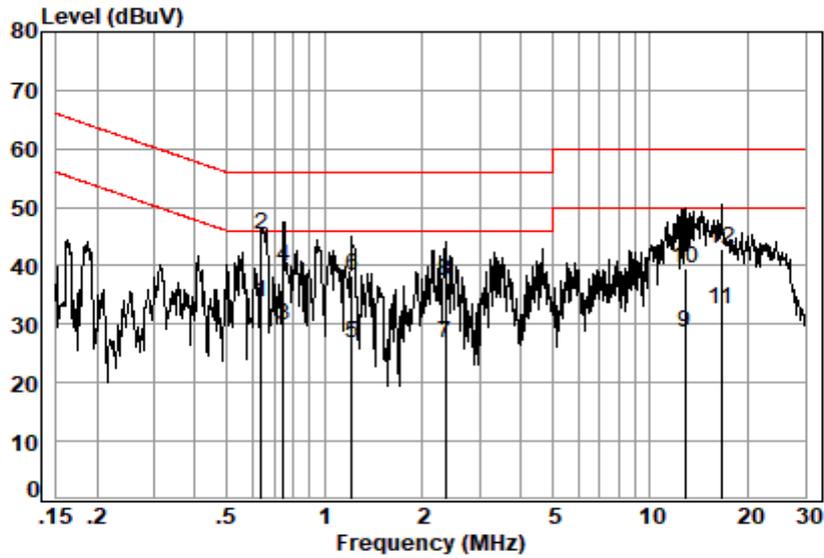
RF conducted test					
Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date	Cal.Duedate
				(yyyy-mm-dd)	(yyyy-mm-dd)
DC Power Supply	Agilent Technologies Inc	66311B	W009-09	2019/7/15	2020/7/15
Signal Analyzer	Rohde & Schwarz	FSV	W025-05	2019/1/13	2020/1/12
Coaxial Cable	SGS	N/A	SEM031-01	2019/6/12	2020/6/11
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Signal Generator	KEYSIGHT	N5173B	SEM006-05	2019/7/14	2020/7/14
Temperature Chamber	GIANT FORCE	ICT-150-40-CP-AR	W027-03	2018/11/27	2019/11/27
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2019/7/14	2020/7/14

2 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Total RF power, conducted	±0.75dB
2	RF power density, conducted	±2.84dB
3	Spurious emissions, conducted	±0.75dB
4	Conduct emission test	±3.12 dB (9KHz- 30MHz)

3 AC Power Line Conducted Emissions

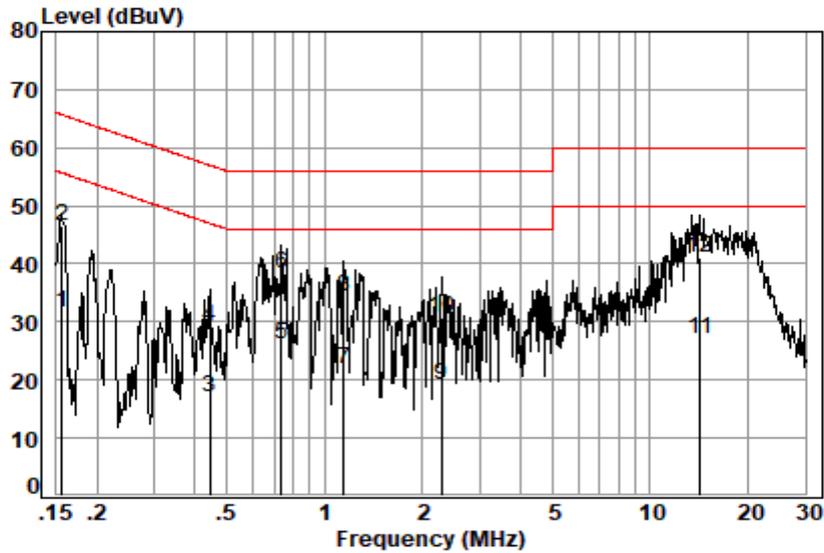
Live Line:



Site : Shielding Room
 Condition: Line
 Job No. : 19419CR
 Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.64	0.07	9.62	24.14	33.83	46.00	-12.17	Average
2	0.64	0.07	9.62	35.71	45.40	56.00	-10.60	QP
3	0.75	0.08	9.63	20.04	29.75	46.00	-16.25	Average
4	0.75	0.08	9.63	30.16	39.87	56.00	-16.13	QP
5	1.21	0.11	9.64	17.03	26.78	46.00	-19.22	Average
6	1.21	0.11	9.64	28.61	38.36	56.00	-17.64	QP
7	2.35	0.16	9.65	16.97	26.78	46.00	-19.22	Average
8	2.35	0.16	9.65	27.53	37.34	56.00	-18.66	QP
9	12.78	0.19	9.87	18.63	28.69	50.00	-21.31	Average
10	12.78	0.19	9.87	29.62	39.68	60.00	-20.32	QP
11	16.57	0.22	10.02	22.18	32.42	50.00	-17.58	Average
12	16.57	0.22	10.02	32.70	42.94	60.00	-17.06	QP

Neutral Line:



Site : Shielding Room
 Condition: Neutral
 Job No. : 19419CR
 Test mode: d

	Freq	Cable Loss	LISN Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dB	dBuV	dBuV	dBuV	dB	
1	0.16	0.01	9.42	22.30	31.73	55.69	-23.96	Average
2	0.16	0.01	9.42	37.02	46.45	65.69	-19.24	QP
3	0.44	0.06	9.56	7.49	17.11	46.98	-29.87	Average
4	0.44	0.06	9.56	19.63	29.25	56.98	-27.73	QP
5	0.74	0.08	9.63	16.52	26.23	46.00	-19.77	Average
6	0.74	0.08	9.63	28.51	38.22	56.00	-17.78	QP
7	1.15	0.10	9.67	12.09	21.86	46.00	-24.14	Average
8	1.15	0.10	9.67	24.54	34.31	56.00	-21.69	QP
9	2.28	0.16	9.70	9.39	19.25	46.00	-26.75	Average
10	2.28	0.16	9.70	20.88	30.74	56.00	-25.26	QP
11	14.21	0.20	10.02	16.79	27.01	50.00	-22.99	Average
12	14.21	0.20	10.02	30.93	41.15	60.00	-18.85	QP

Remarks:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.

5 Conducted Output Power

5.1 Test Results

Measurement Data of Peak Power:

Mode	Test Channel	Peak Output Power (dBm)	Limit (dBm)	Result
802.11B	Lowest	21.03	30.00	Pass
	Middle	21.59	30.00	Pass
	Highest	21.65	30.00	Pass
802.11G	Lowest	21.10	30.00	Pass
	Middle	21.77	30.00	Pass
	Highest	21.59	30.00	Pass
802.11N20	Lowest	19.21	30.00	Pass
	Middle	19.78	30.00	Pass
	Highest	19.62	30.00	Pass

6 DTS (6 dB) Bandwidth & 99% Occupied Bandwidth

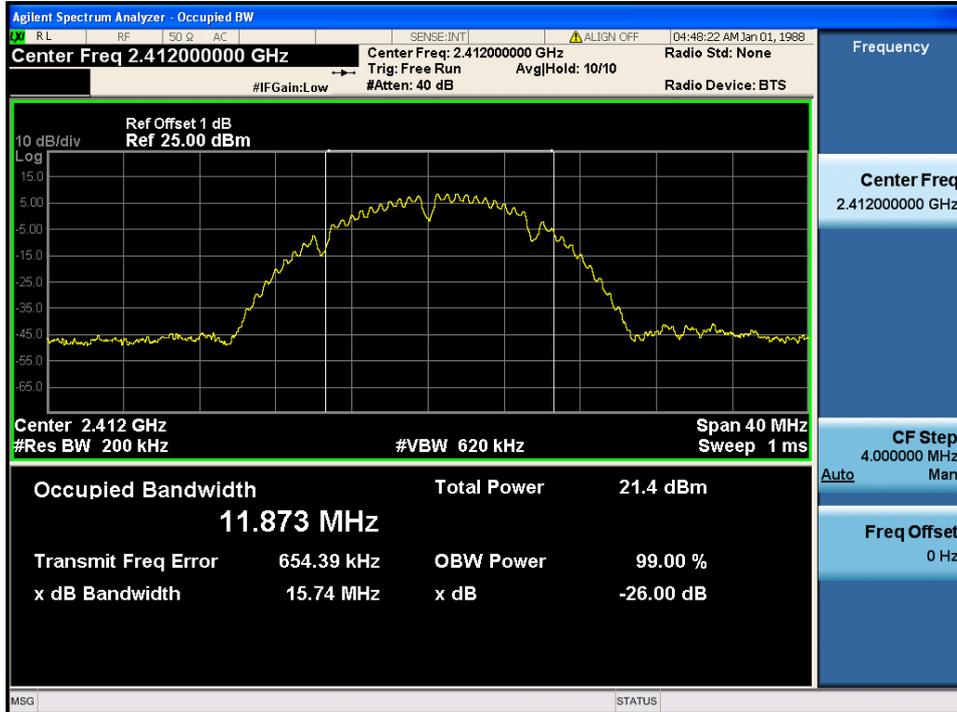
6.1 Test Results

Mode	Test Channel	Occupied Bandwidth (MHz)	6dB Emission Bandwidth (MHz)	Limit (kHz)	Result
802.11B	Lowest	11.87	11.82	≥500	Pass
	Middle	13.08	13.05	≥500	Pass
	Highest	12.35	12.38	≥500	Pass
802.11G	Lowest	16.33	16.28	≥500	Pass
	Middle	16.60	16.45	≥500	Pass
	Highest	16.39	16.33	≥500	Pass
802.11N20	Lowest	17.48	17.42	≥500	Pass
	Middle	17.69	17.62	≥500	Pass
	Highest	17.52	17.50	≥500	Pass

6.2 Test plots

ANT1

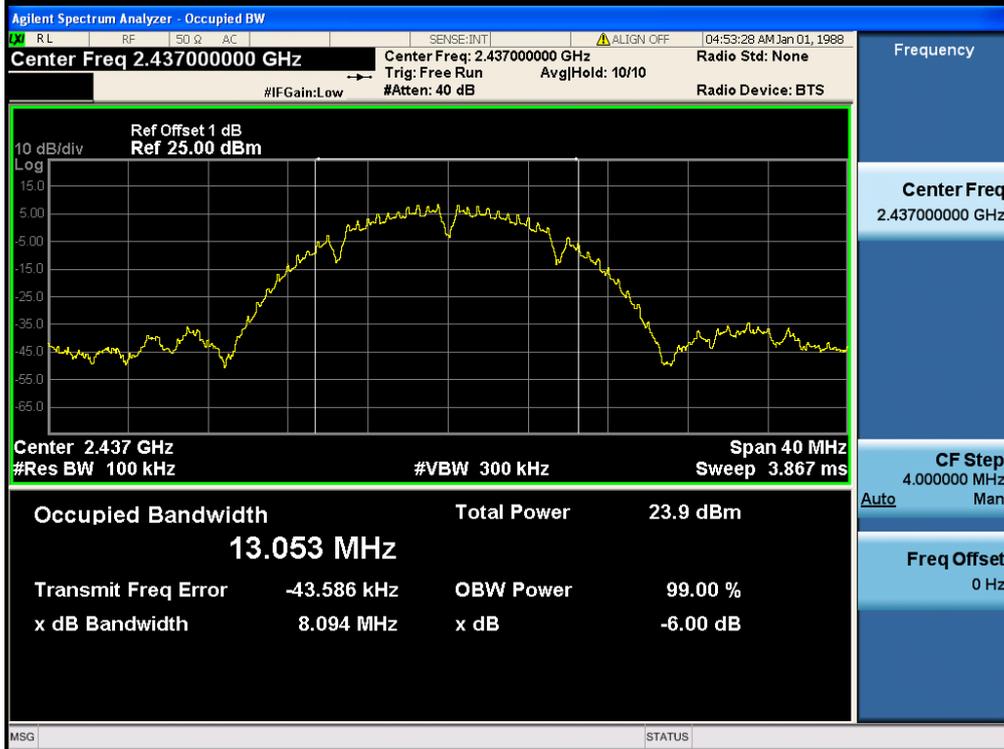
802.11B_Lowest Channel



802.11B Middle Channel

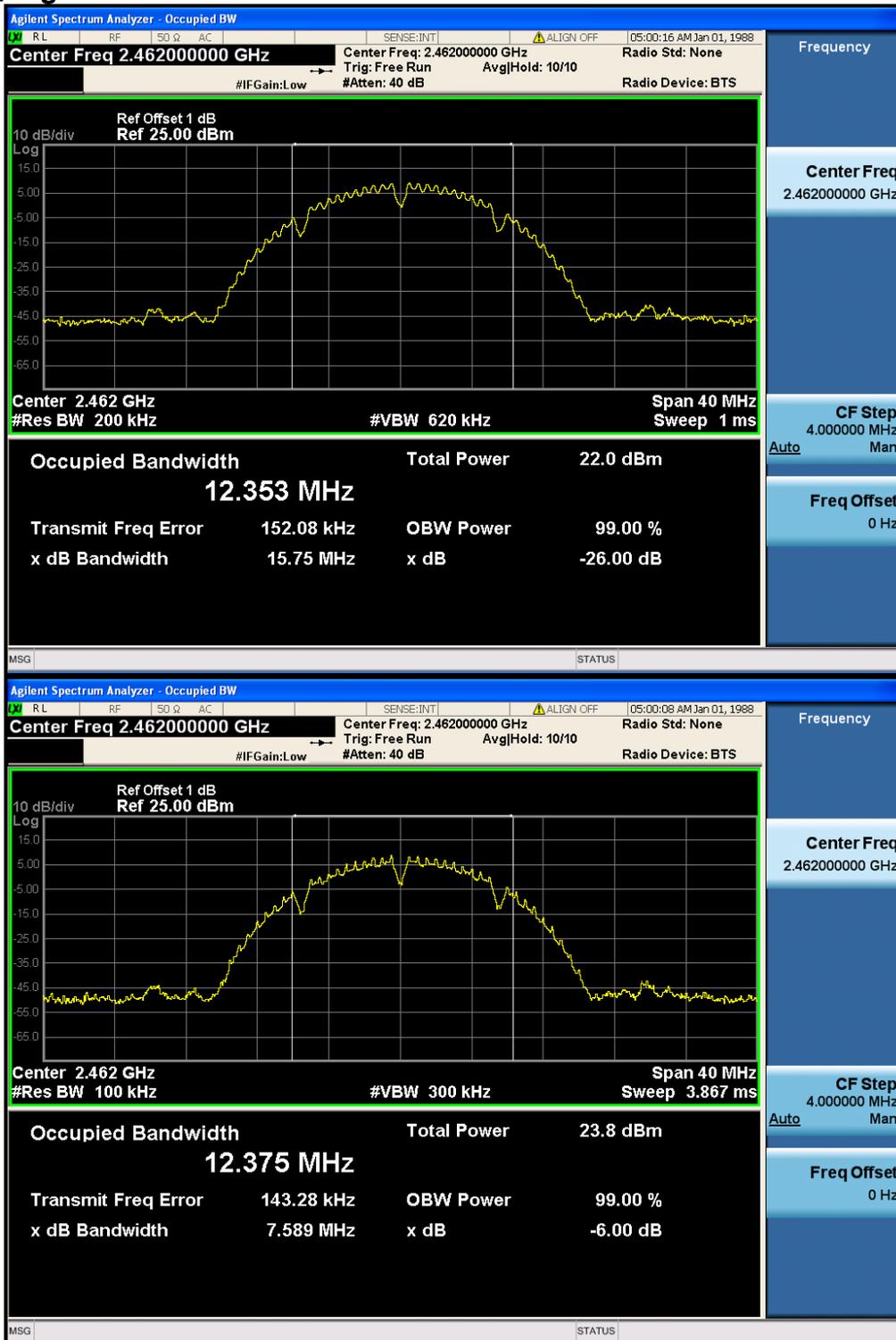


Frequency	Center Freq	2.437000000 GHz
CF Step	4.000000 MHz	Auto Man
Freq Offset	0 Hz	



Frequency	Center Freq	2.437000000 GHz
CF Step	4.000000 MHz	Auto Man
Freq Offset	0 Hz	

802.11B_Highest Channel



802.11G Lowest Channel



802.11G_Middle Channel



802.11G_Highest Channel

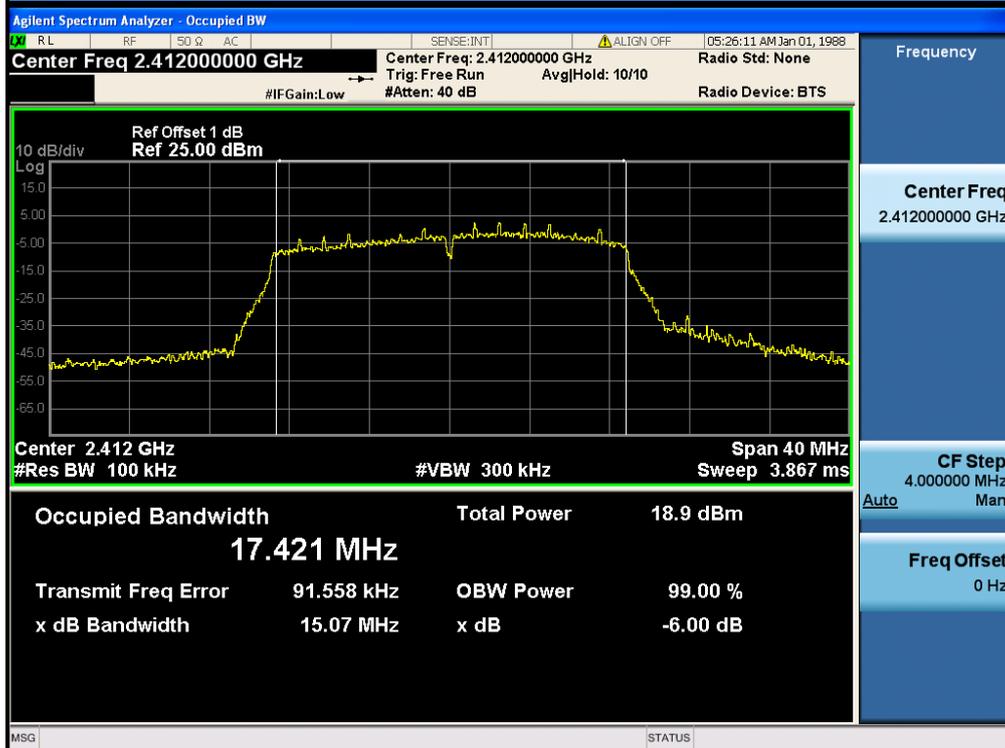


Frequency	Center Freq	2.462000000 GHz
CF Step	4.000000 MHz	Man
Freq Offset	0 Hz	

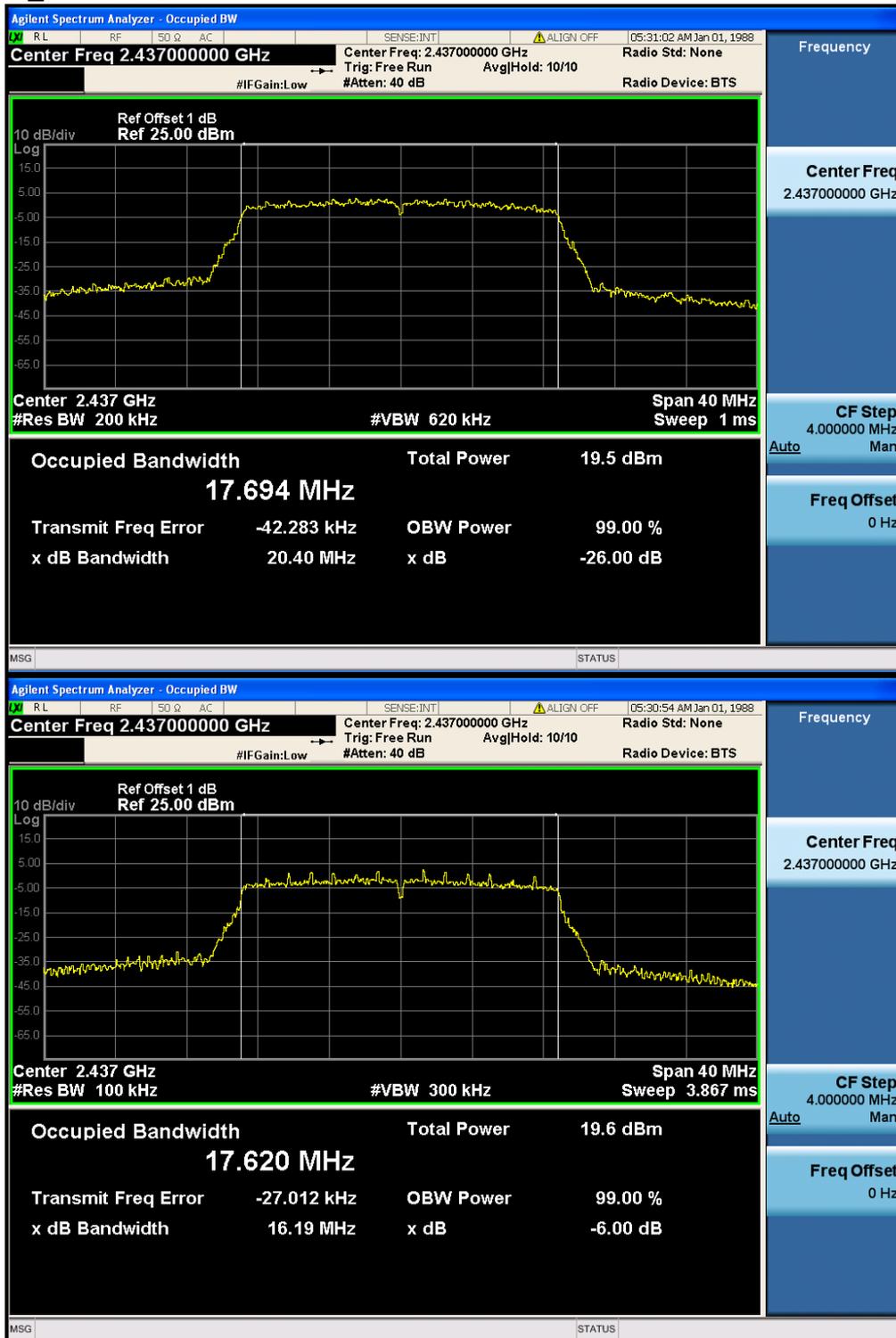


Frequency	Center Freq	2.462000000 GHz
CF Step	4.000000 MHz	Man
Freq Offset	0 Hz	

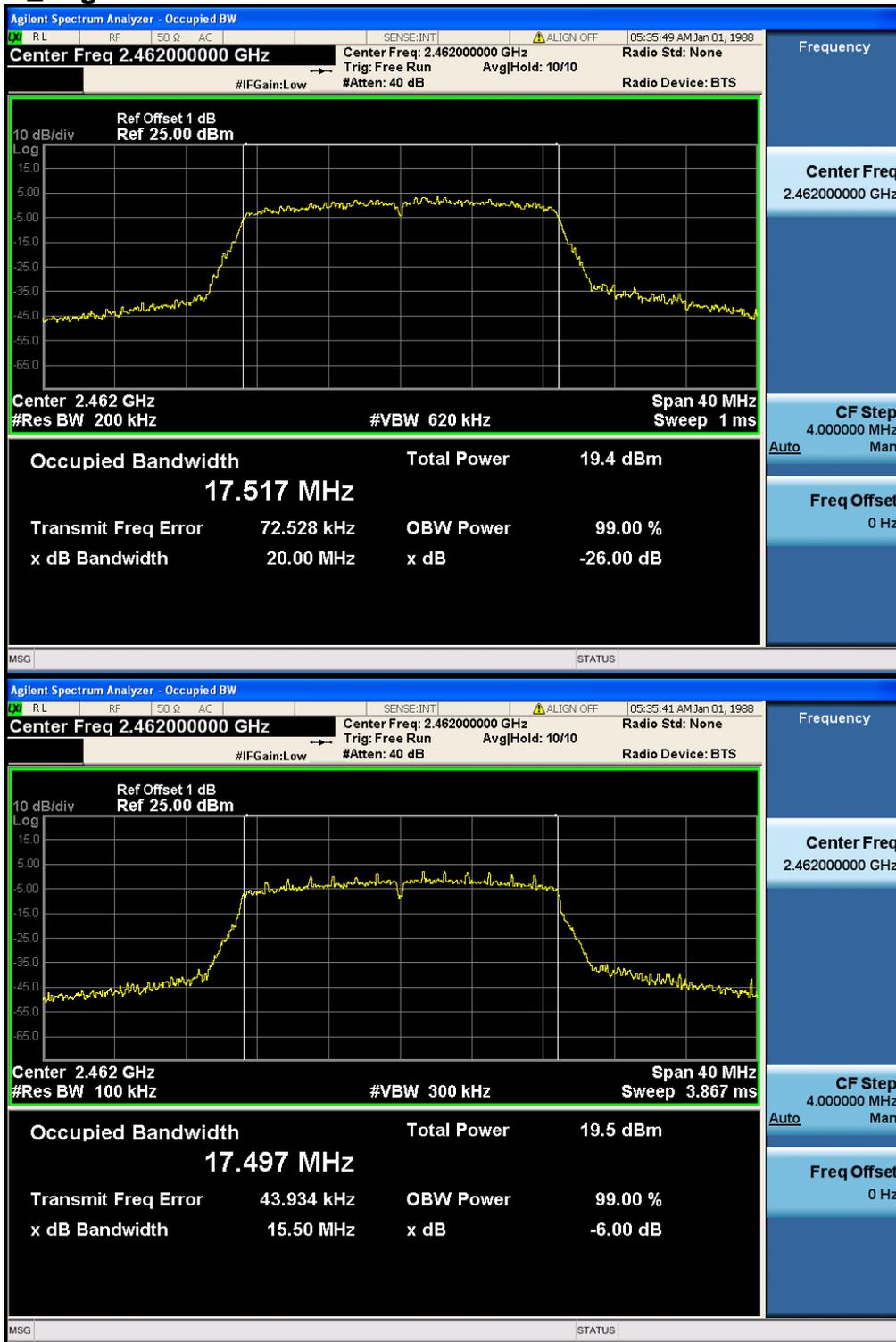
802.11N20_Lowest Channel



802.11 N20 Middle Channel



802.11 N20_Highest Channel



7 Power Spectral Density

7.1 Test Results

Mode	Test Channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11B	Lowest	-5.85	≤8.00	Pass
	Middle	-4.73	≤8.00	Pass
	Highest	-3.57	≤8.00	Pass
802.11G	Lowest	-8.57	≤8.00	Pass
	Middle	-10.37	≤8.00	Pass
	Highest	-10.10	≤8.00	Pass
802.11N20	Lowest	-11.54	≤8.00	Pass
	Middle	-11.97	≤8.00	Pass
	Highest	-11.46	≤8.00	Pass

7.2 Test plots

ANT1

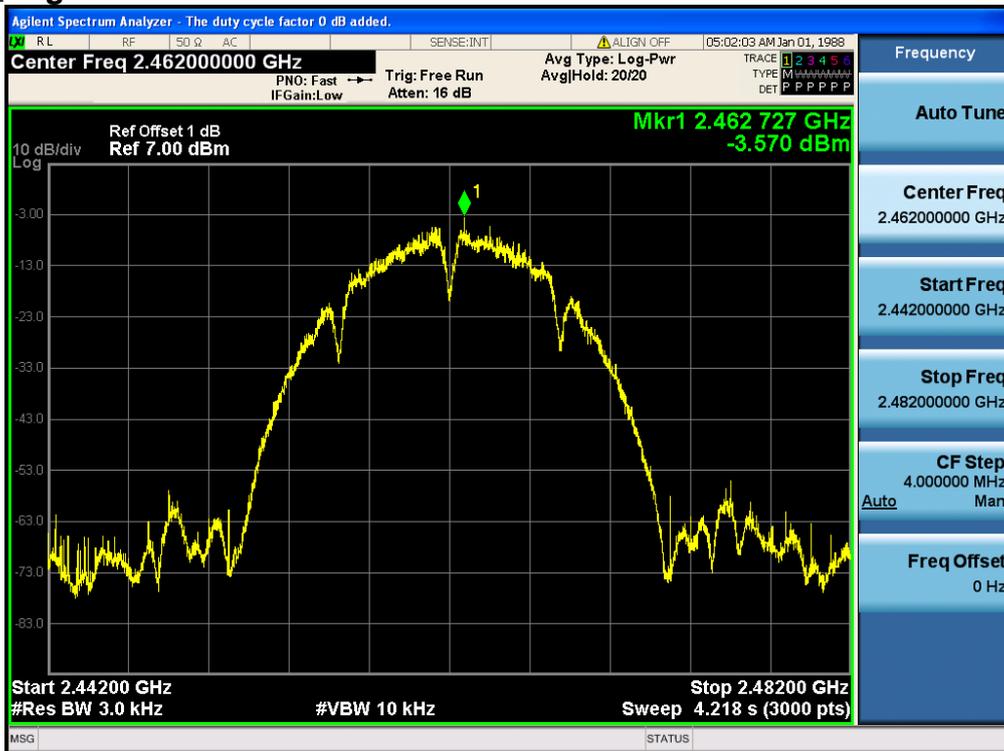
802.11B Lowest Channel



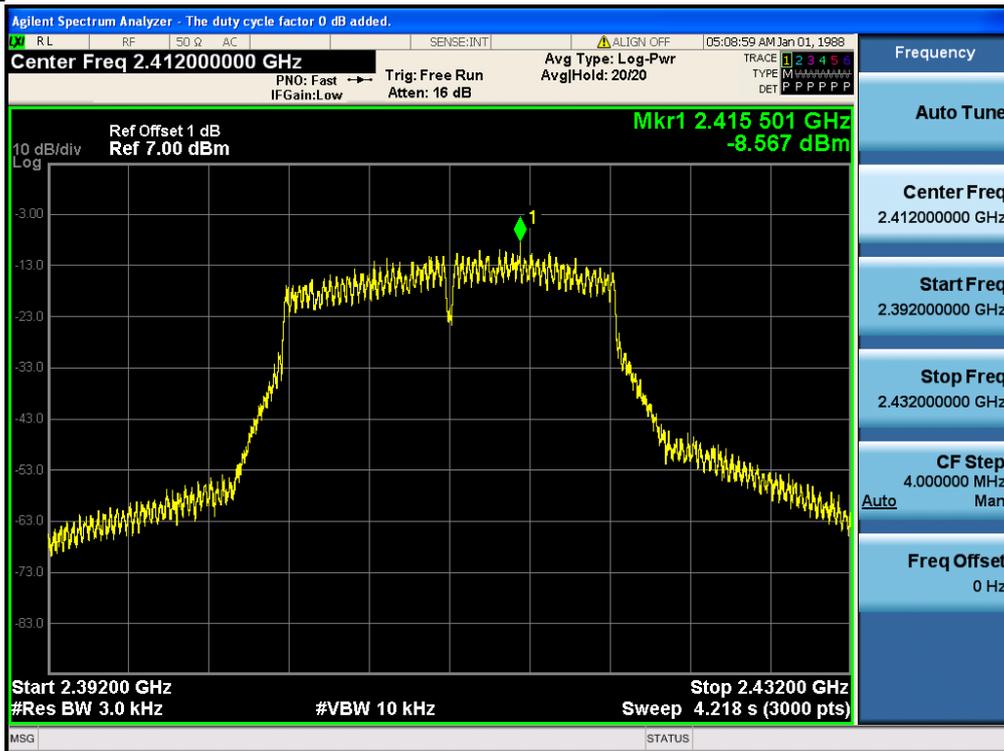
802.11B Middle Channel



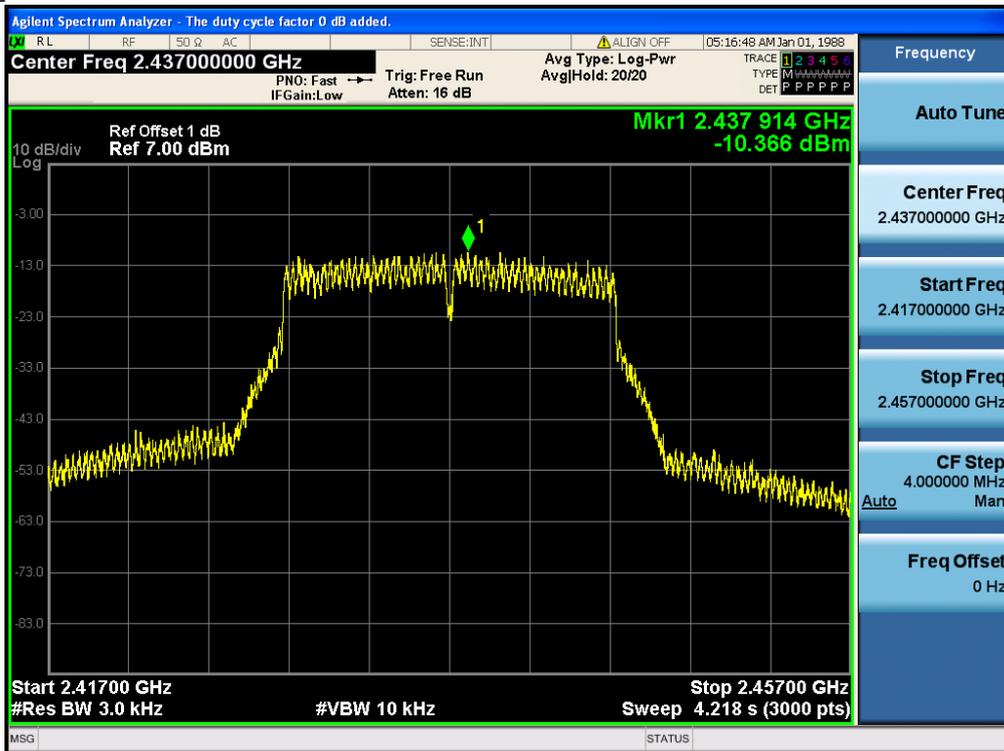
802.11B Highest Channel



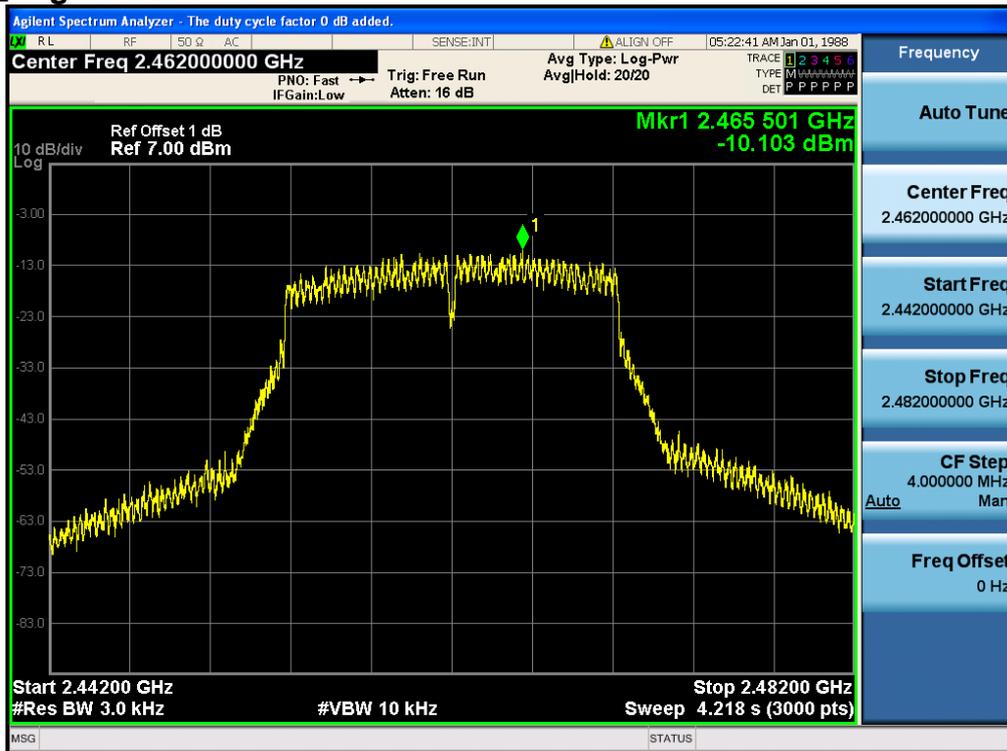
802.11G_Lowest Channel



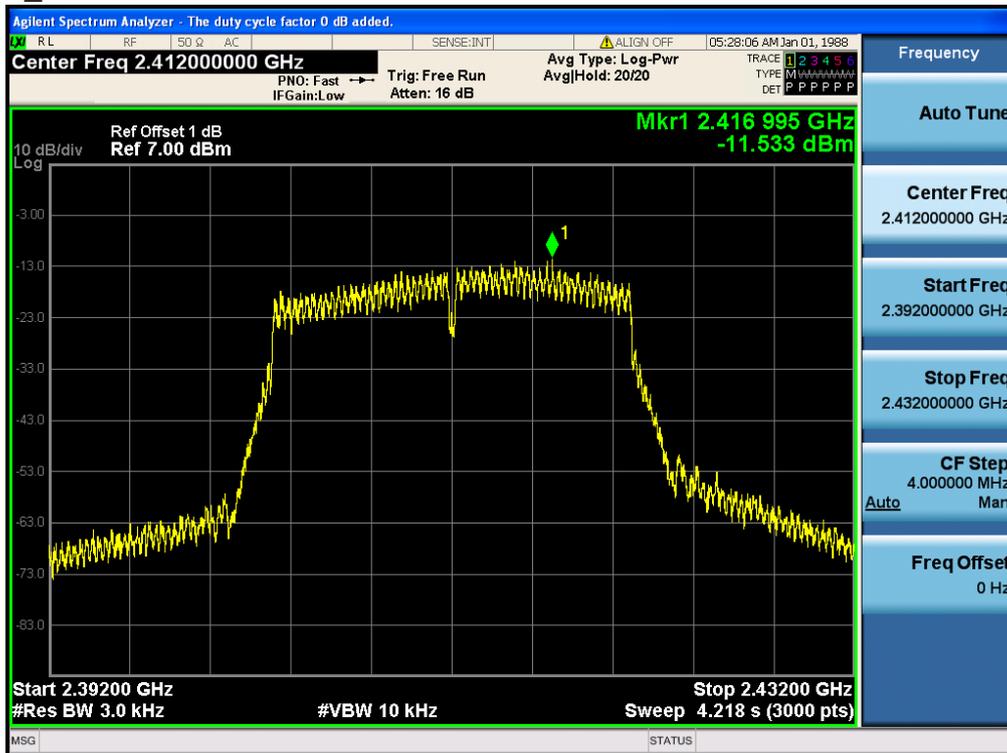
802.11G_Middle Channel



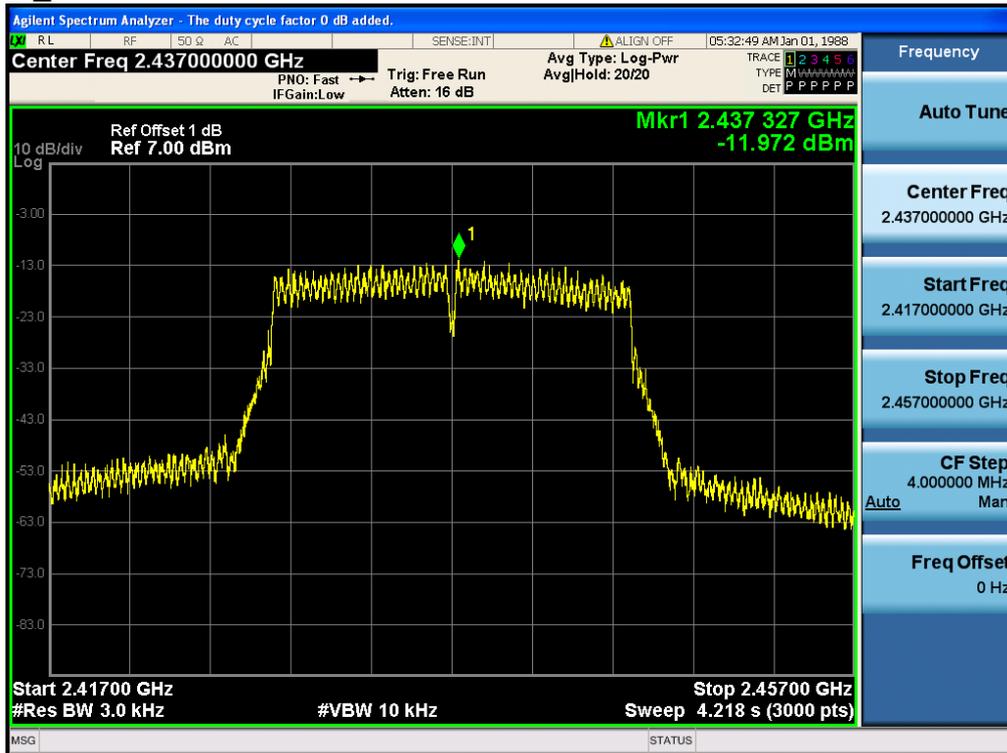
802.11G_Highest Channel



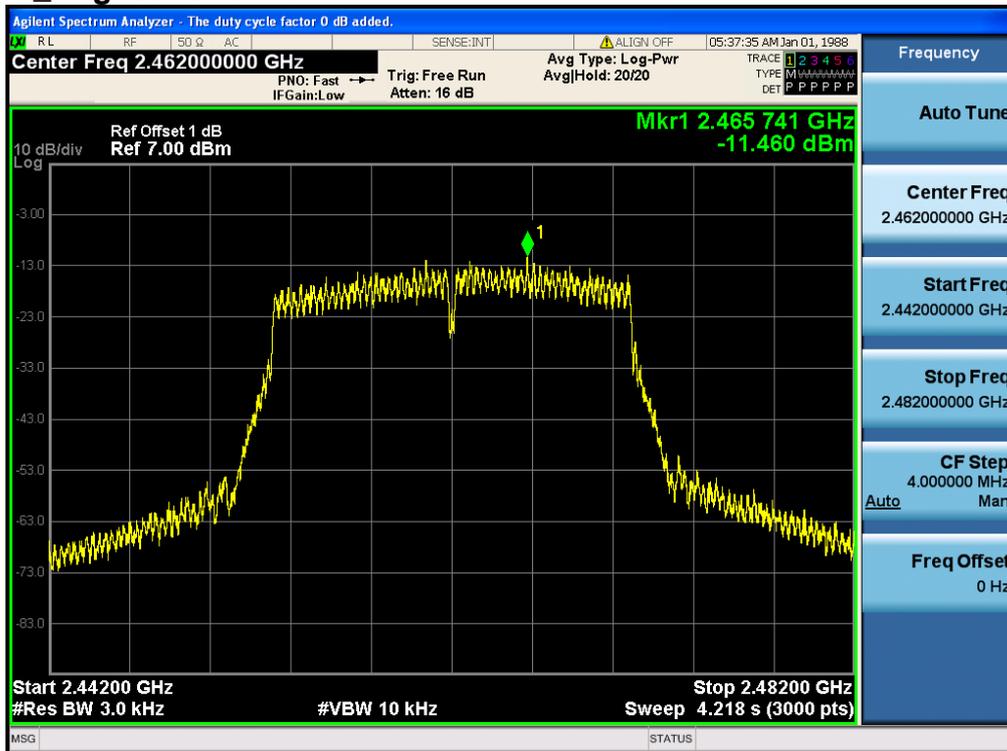
802.11N20_Lowest Channel



802.11 N20 Middle Channel



802.11 N20 Highest Channel



802.11B_Highest Channel



802.11G_Lowest Channel



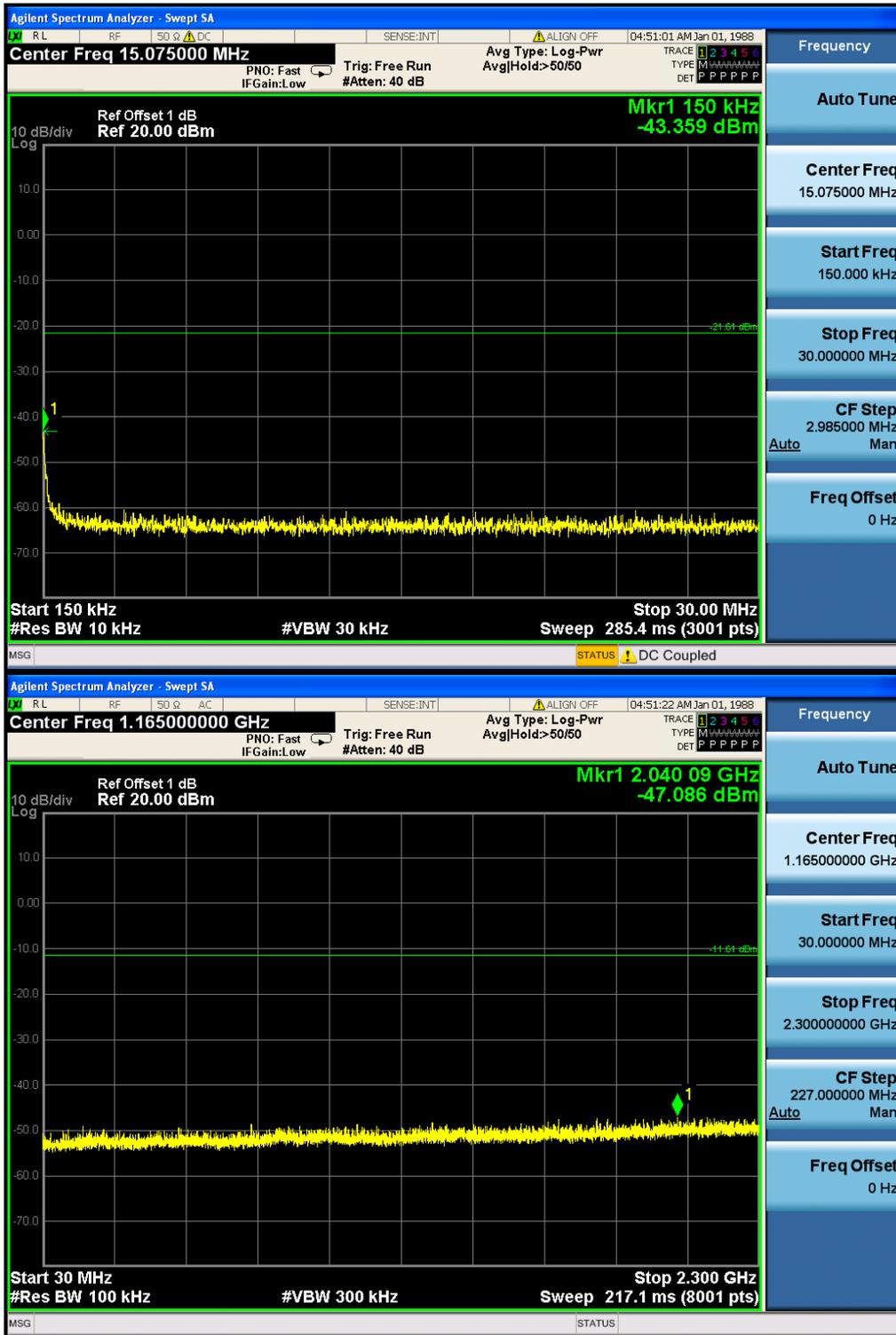
9 RF Conducted Spurious Emissions

9.1 Test plots

ANT1

802.11B Lowest Channel



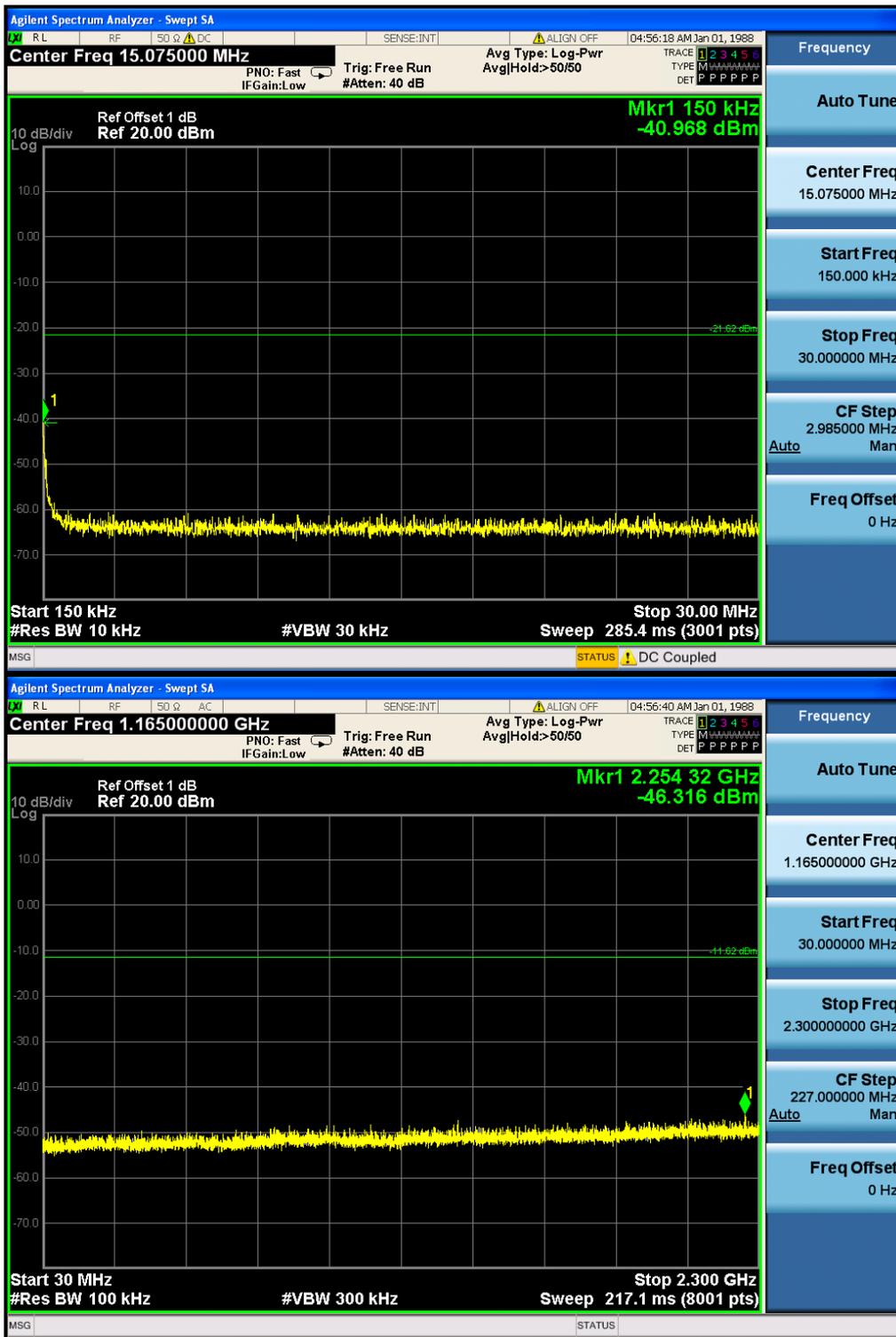






802.11B Middle Channel

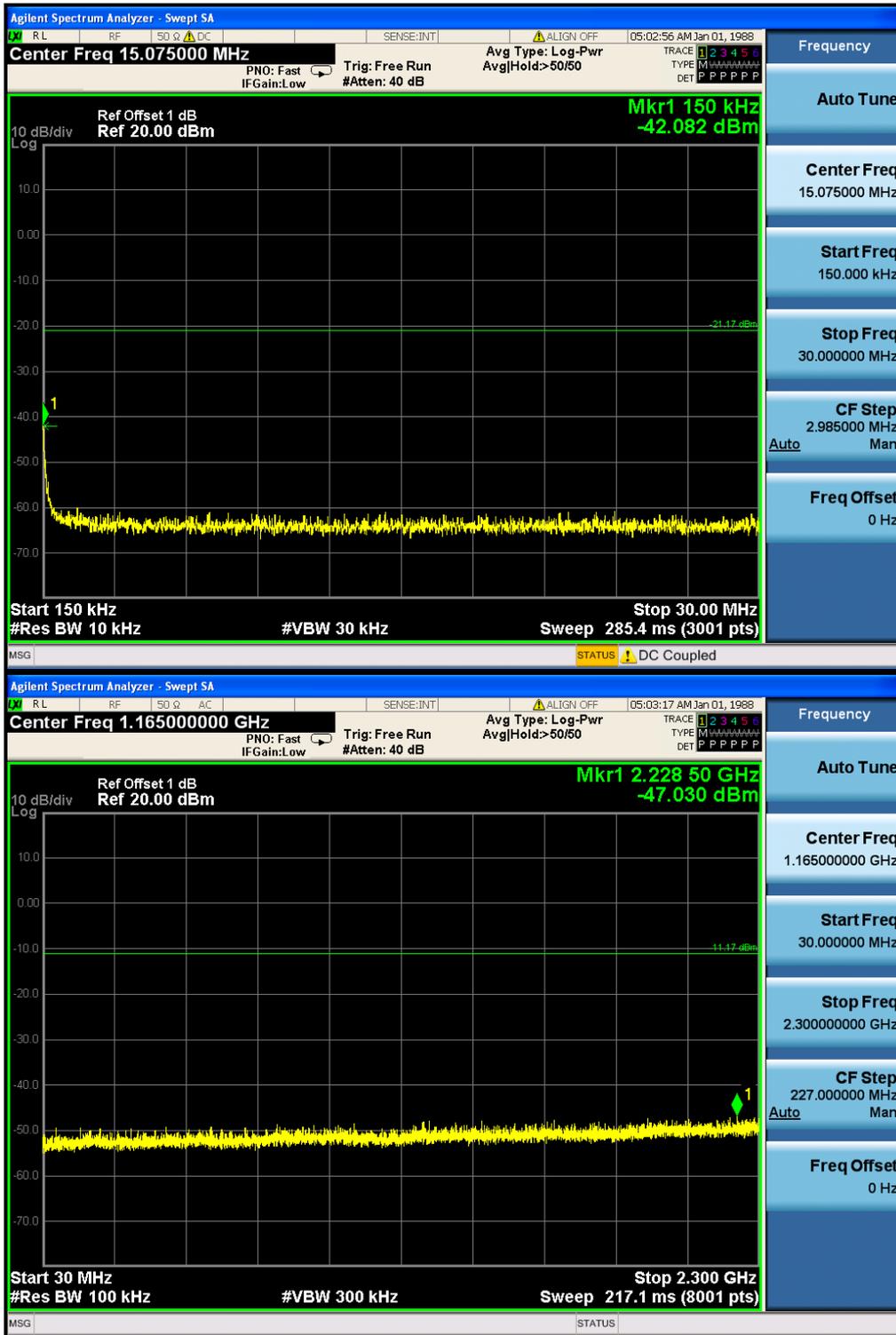






802.11B_Highest Channel



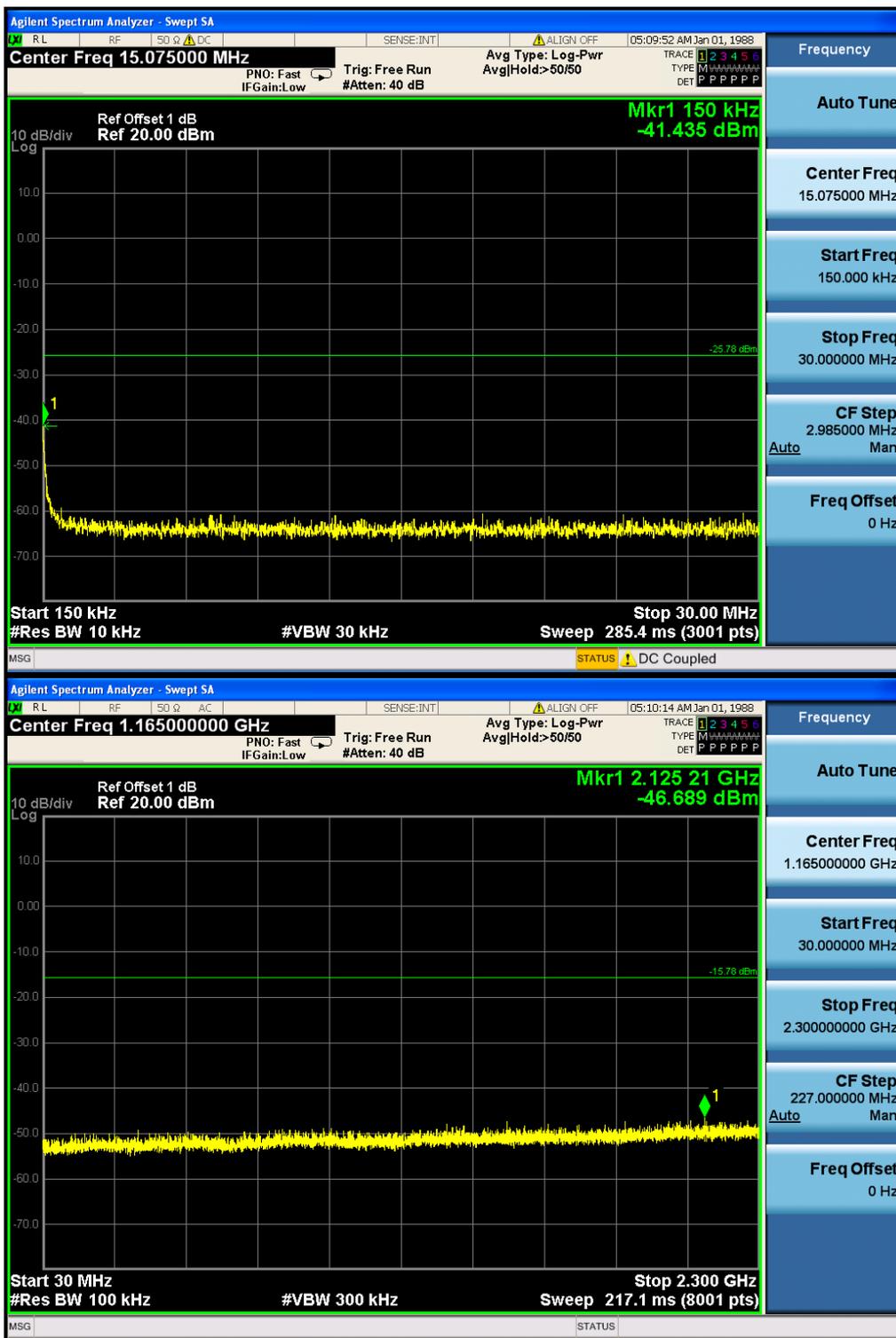


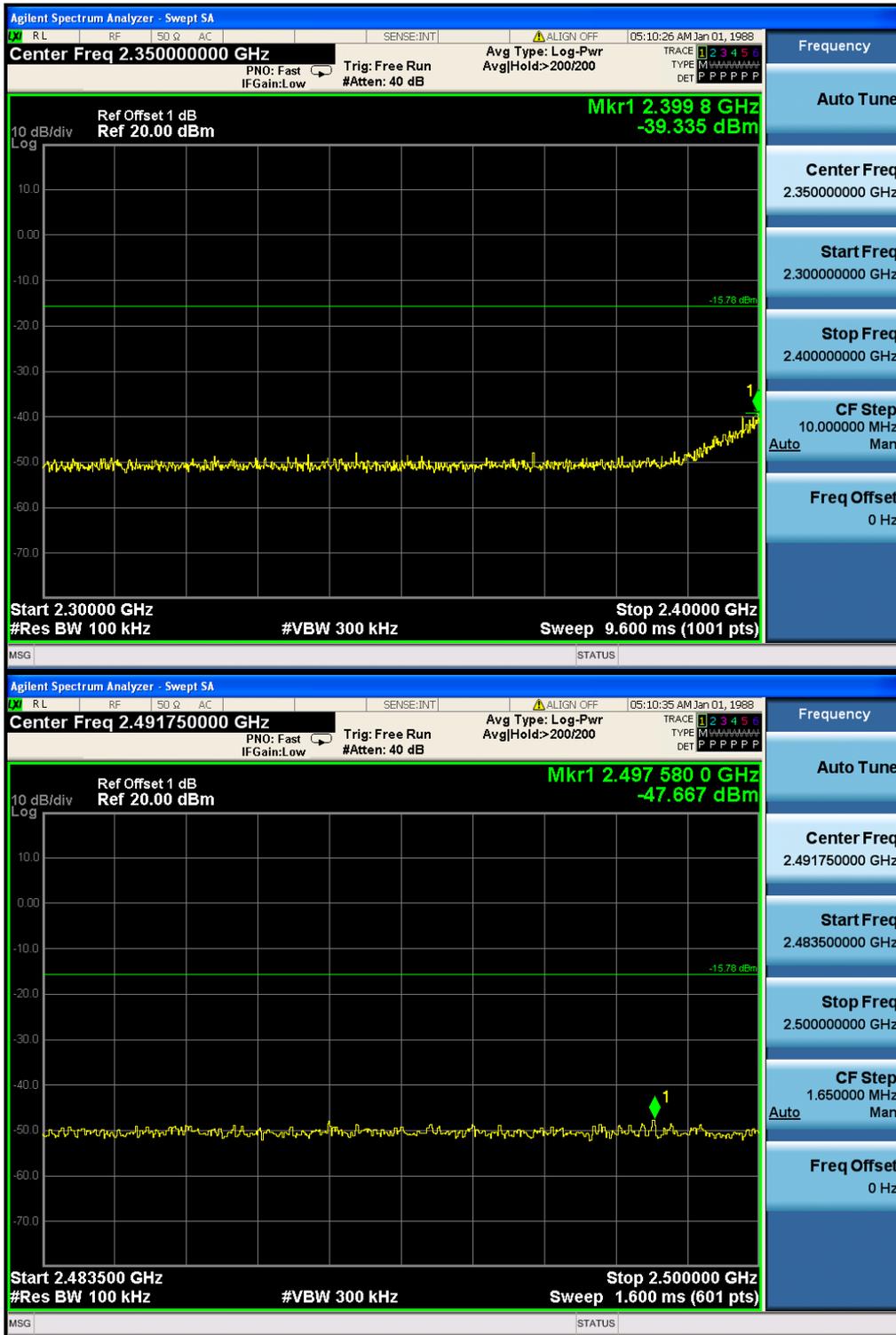


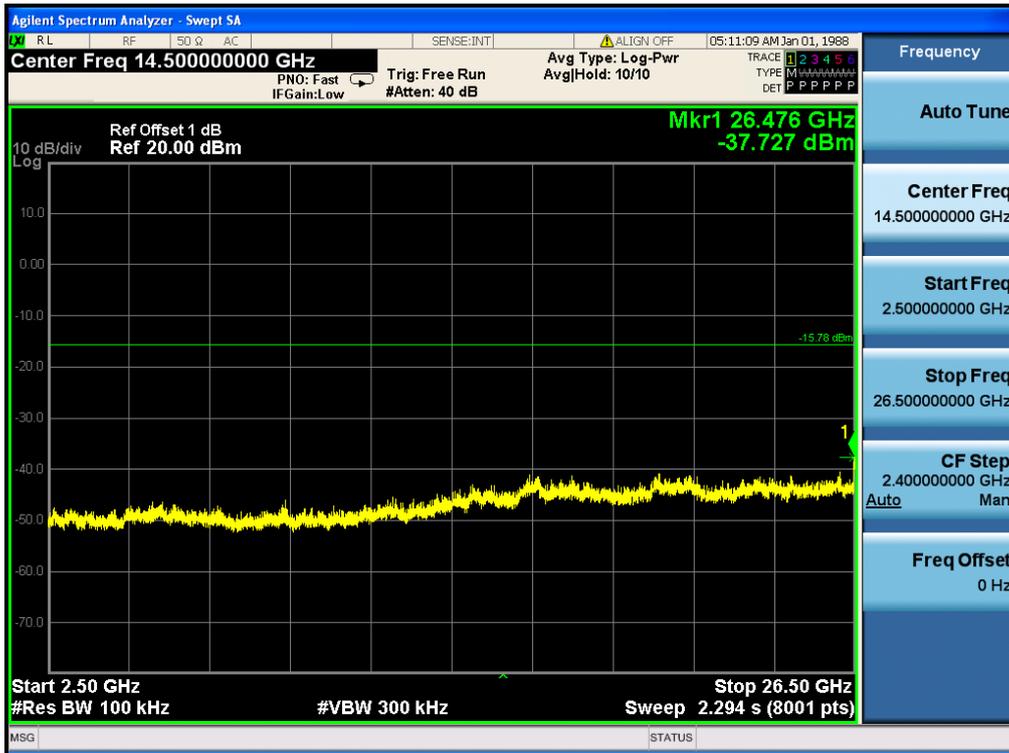


802.11G Lowest Channel

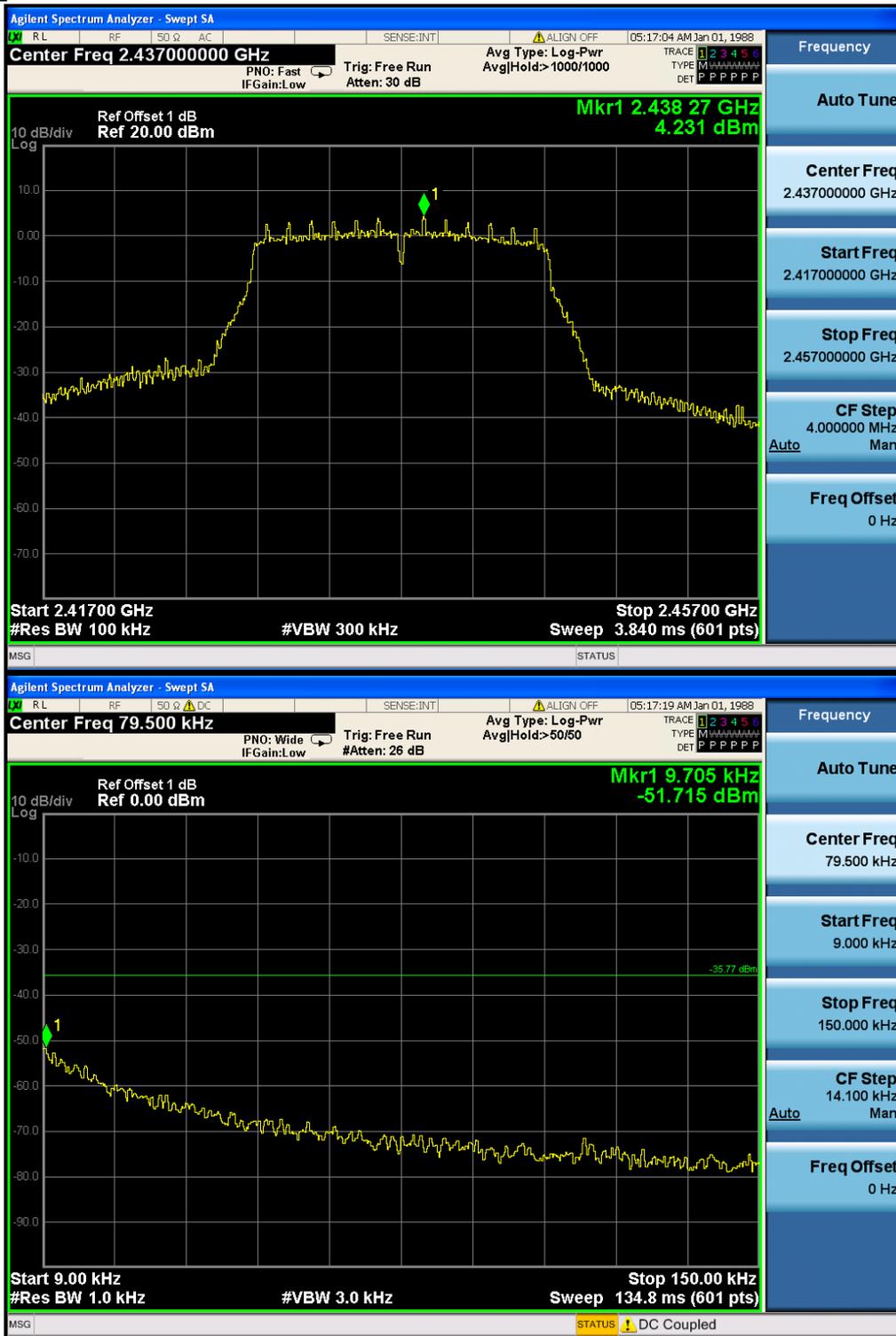


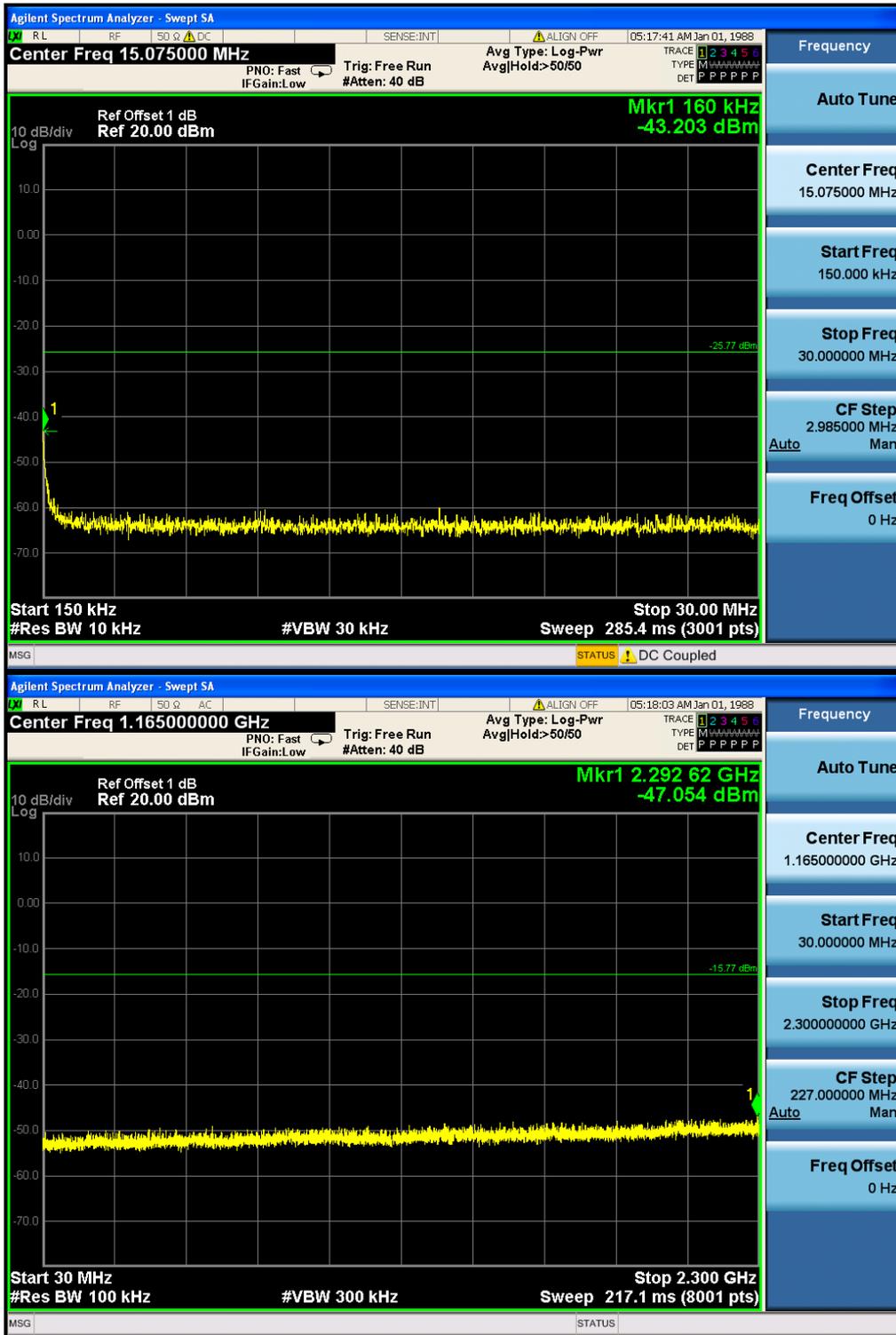




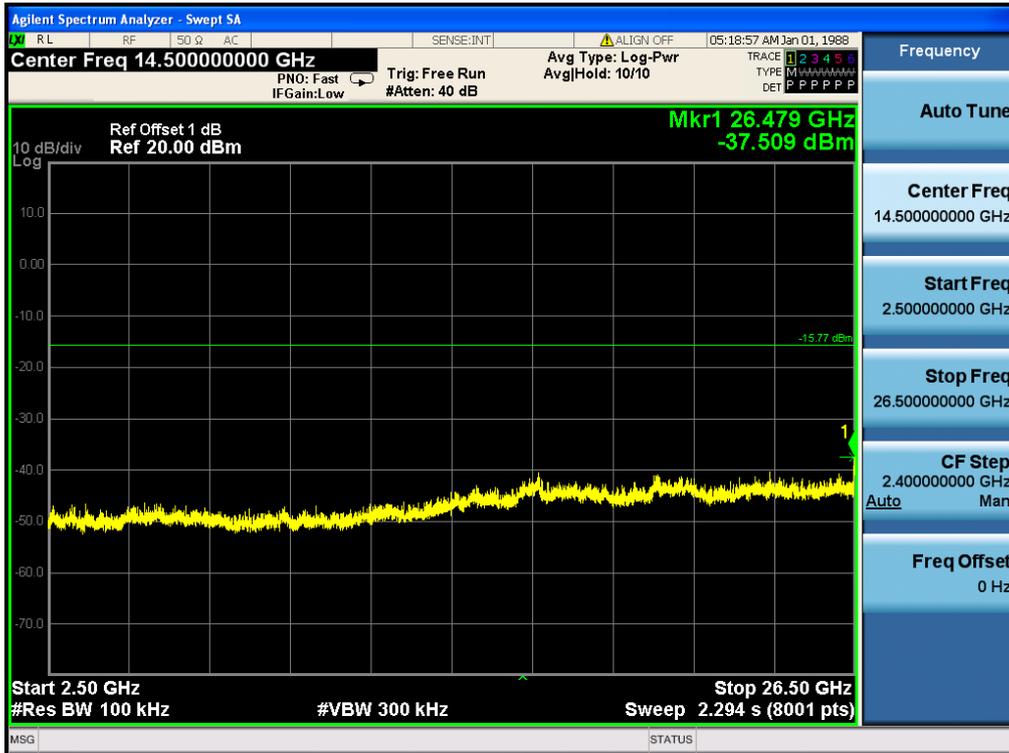


802.11G Middle Channel



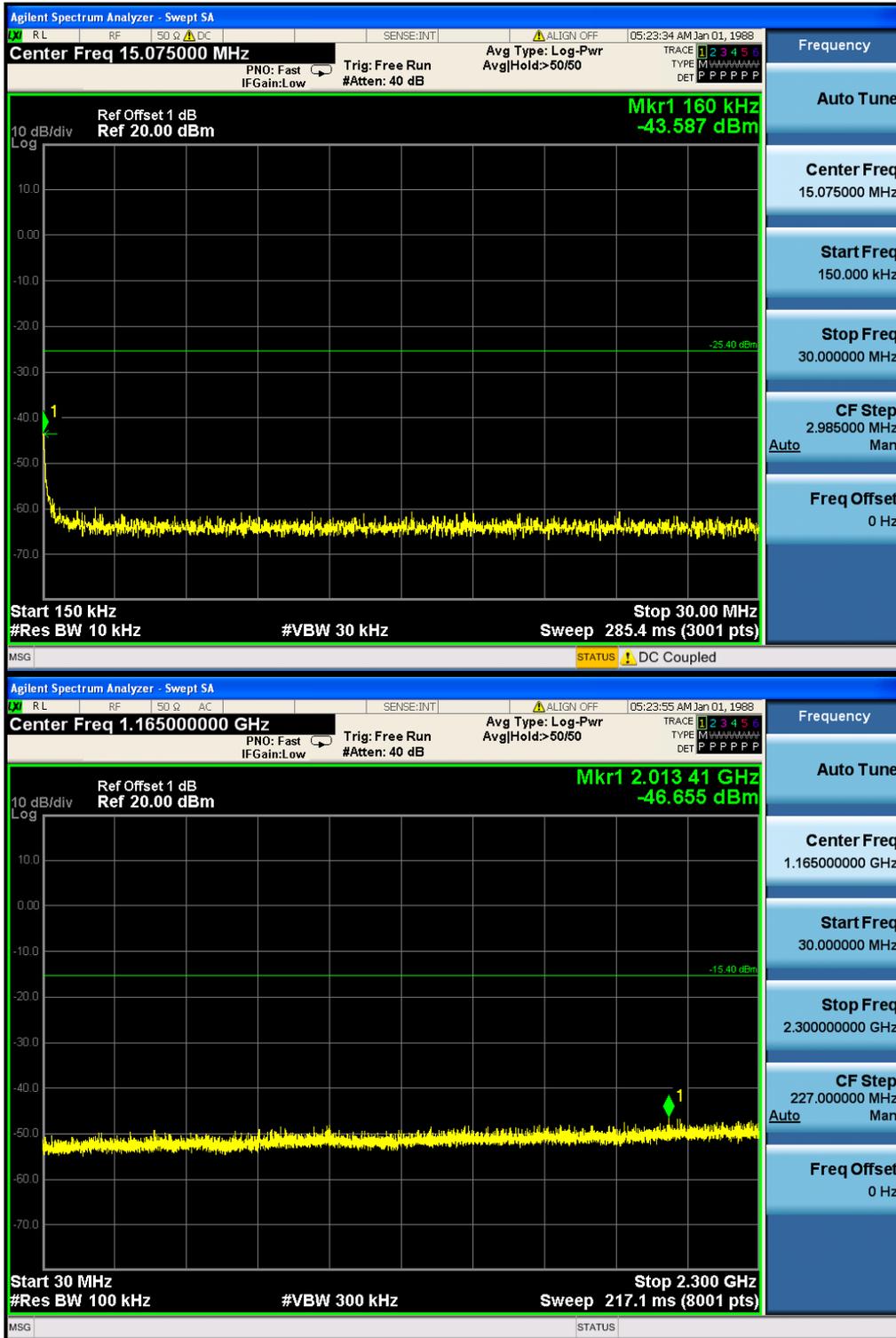




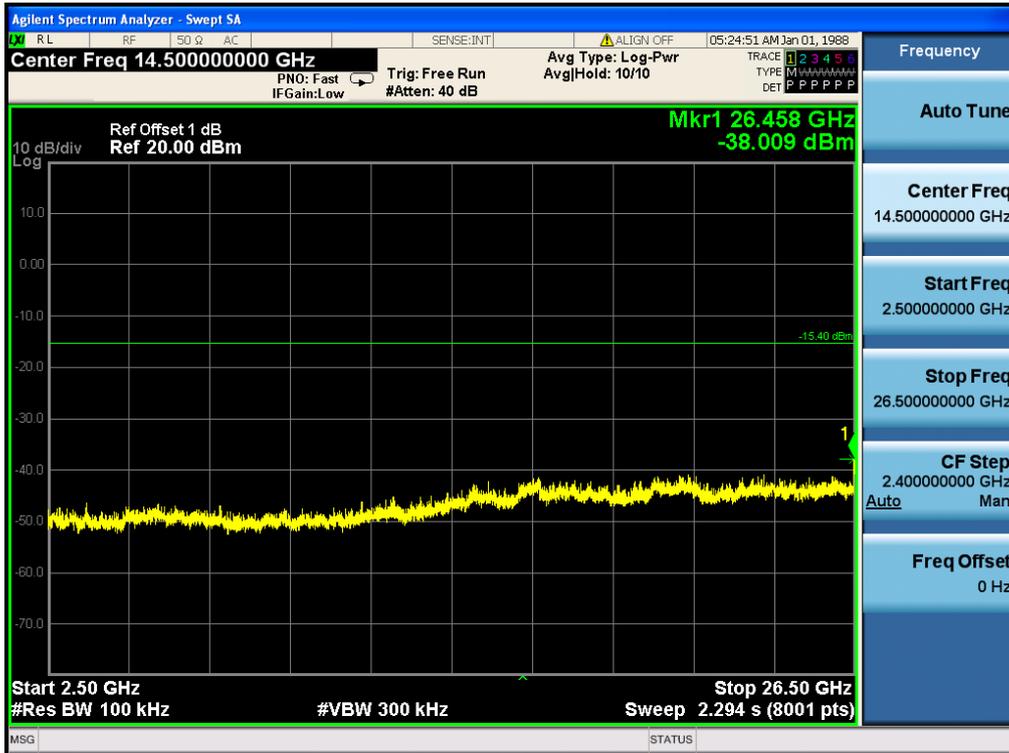


802.11G_Highest Channel



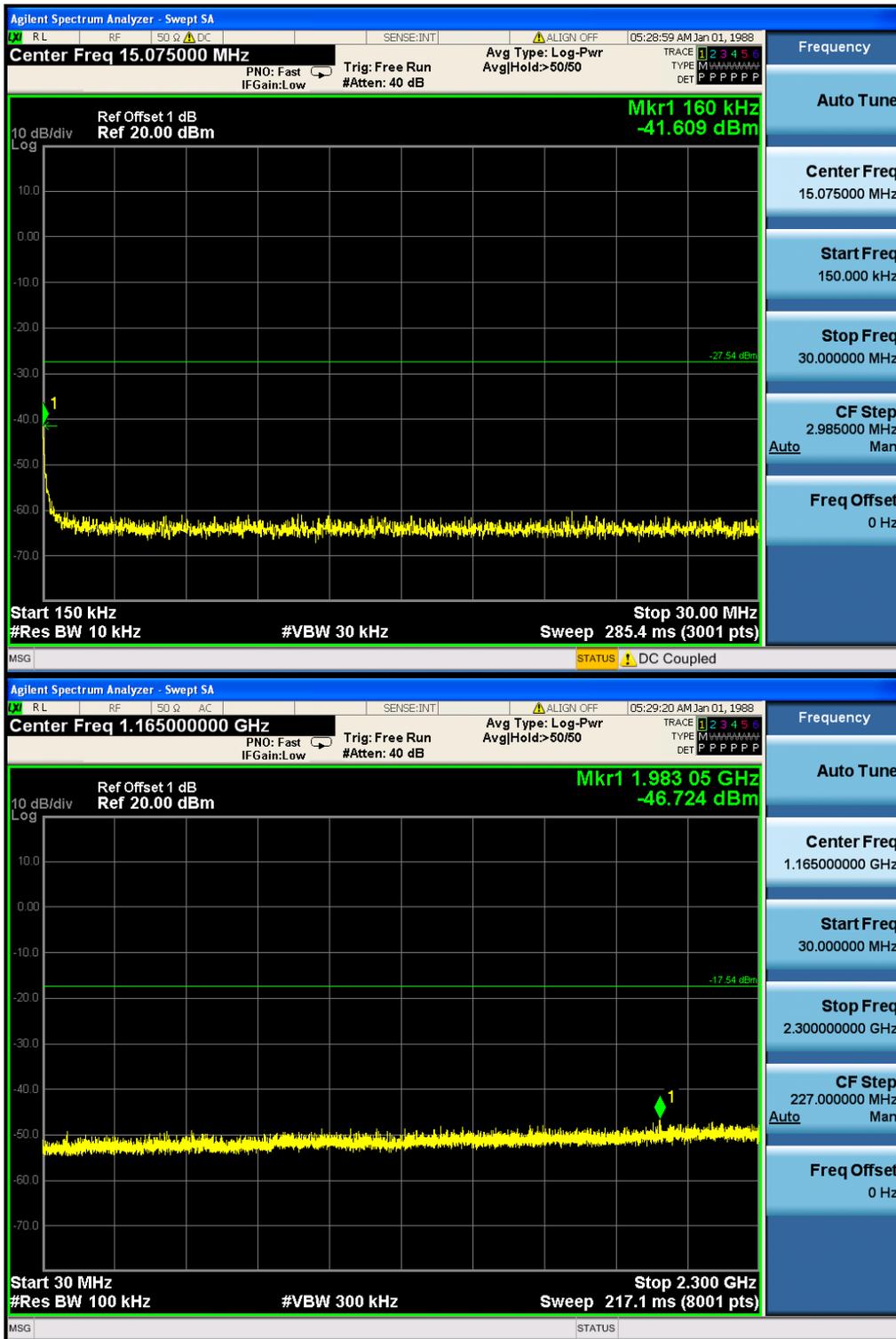




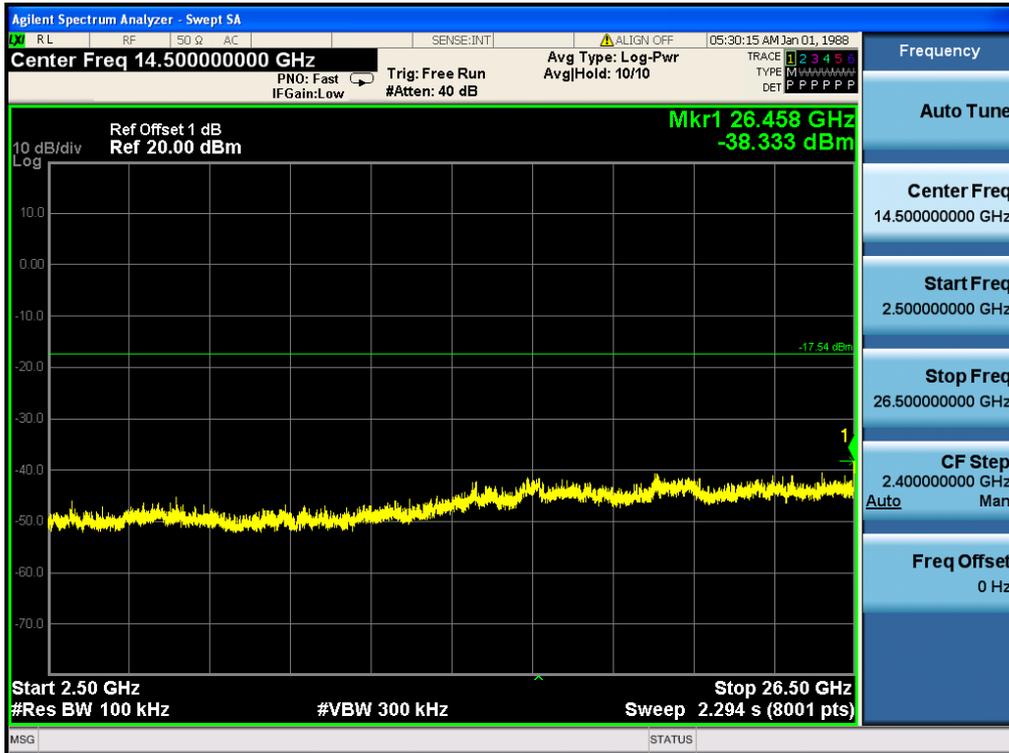


802.11N20 Lowest Channel



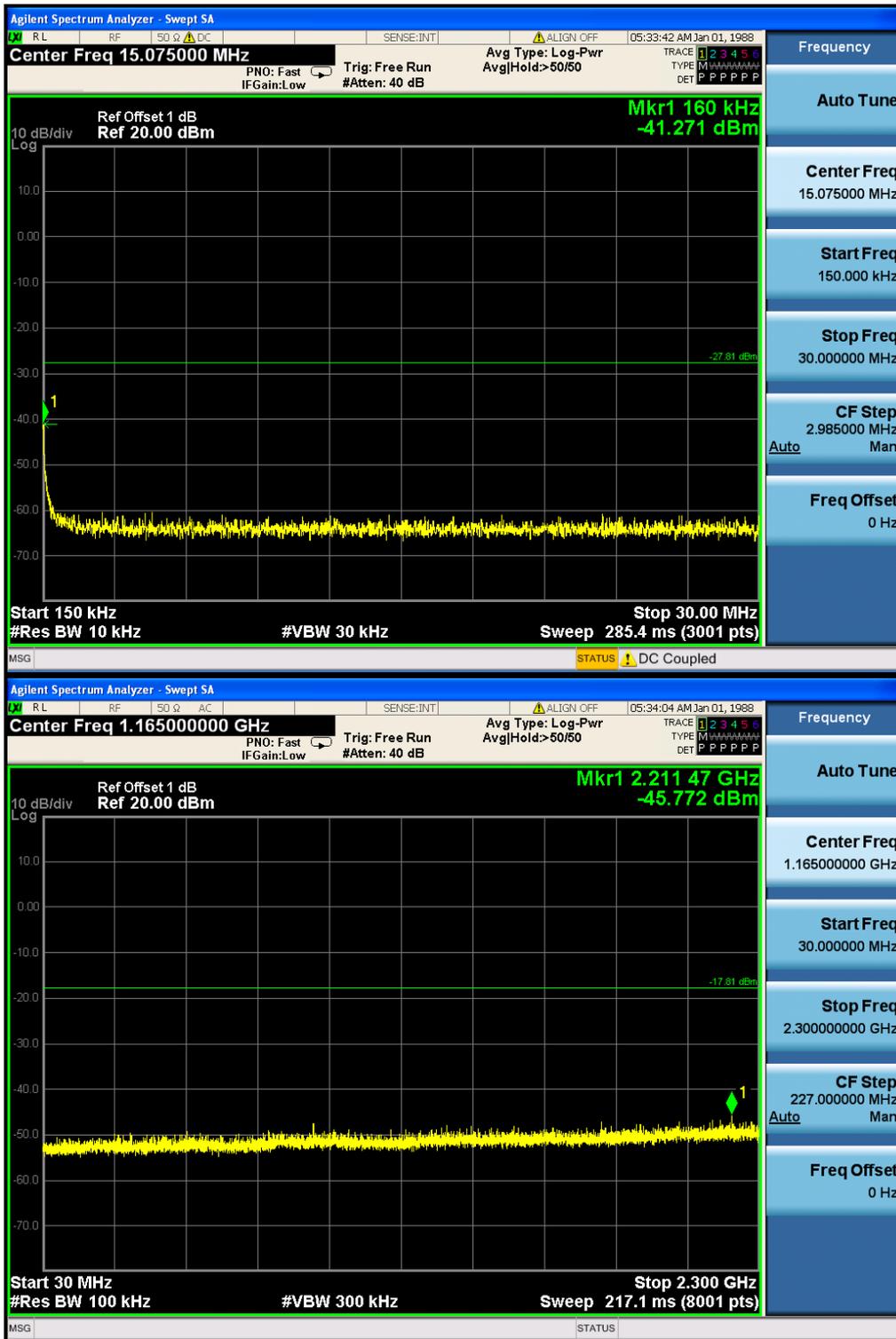




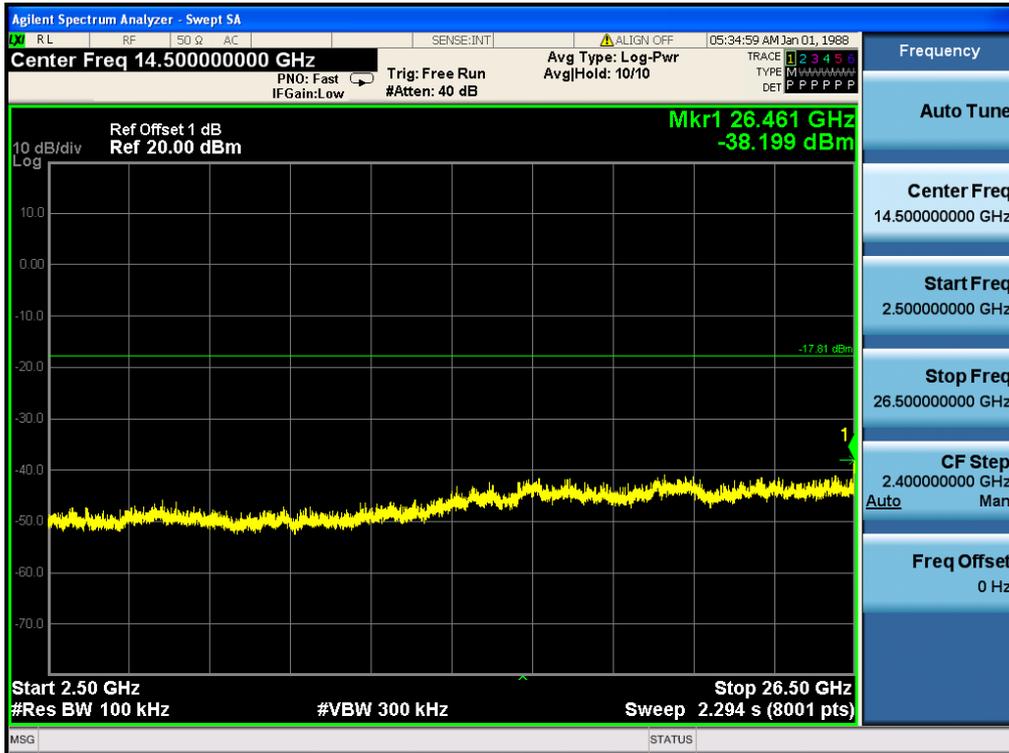


802.11 N20 Middle Channel



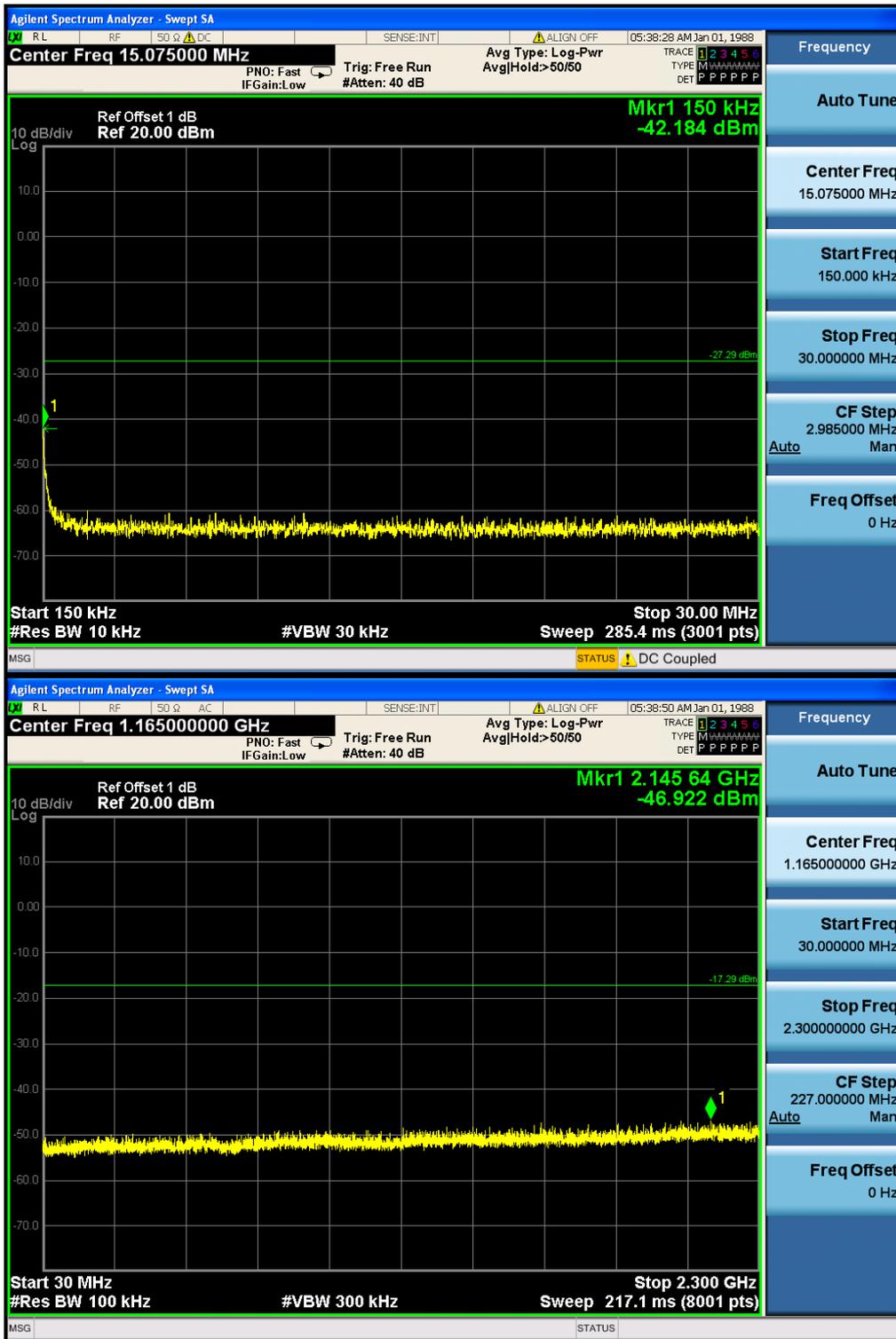




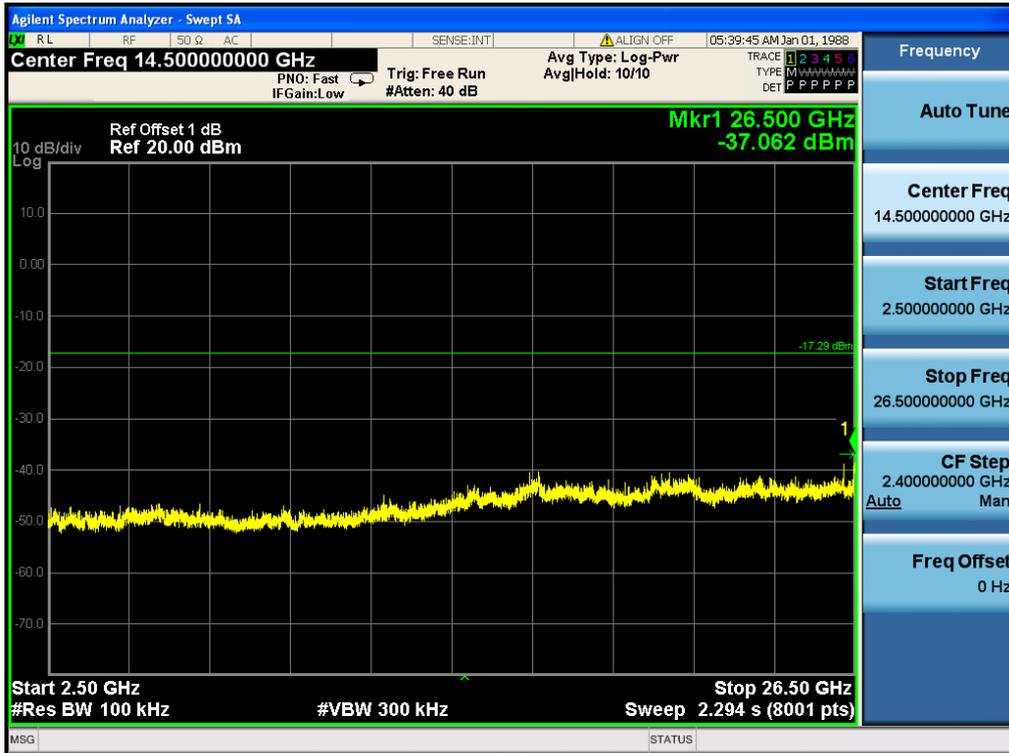


802.11 N20_Highest Channel









Remark:

Scan from 9kHz to 25GHz, the disturbance between 9KHz to 30MHz was very low, and the above harmonics were the highest point could be found when testing, The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.