

Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Network audio system(built-in amplifier)

Trade Mark: MA  XIN

Test Model: RAPNAS MF-1

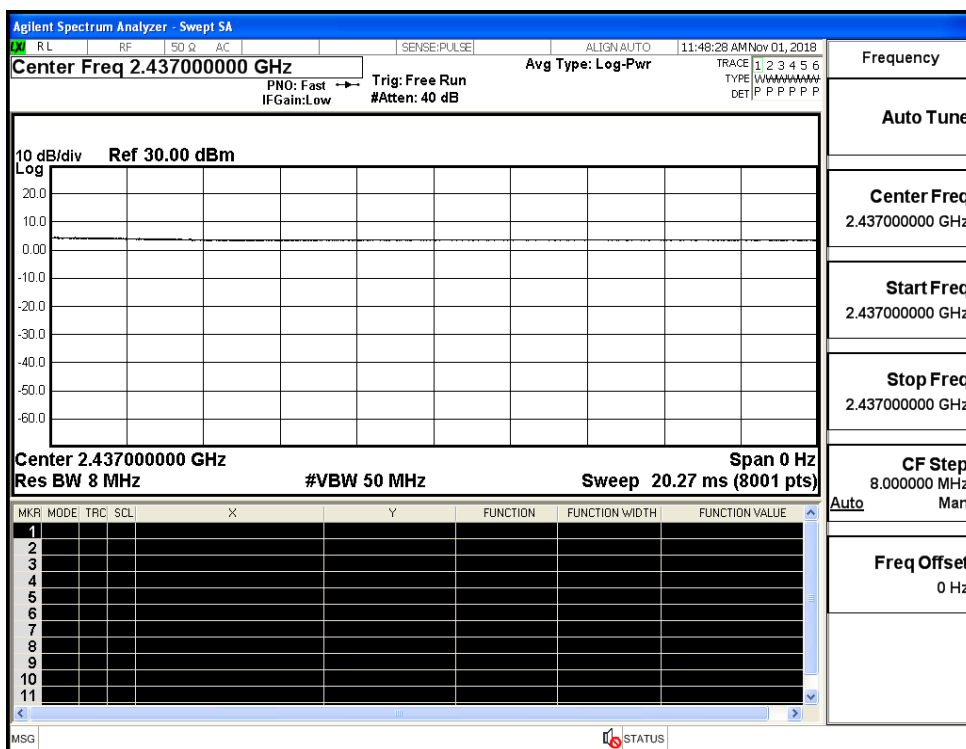
Environmental Conditions

Temperature:	23.5 ° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Tom Liu
Supervised by:	Jayden Zhuo

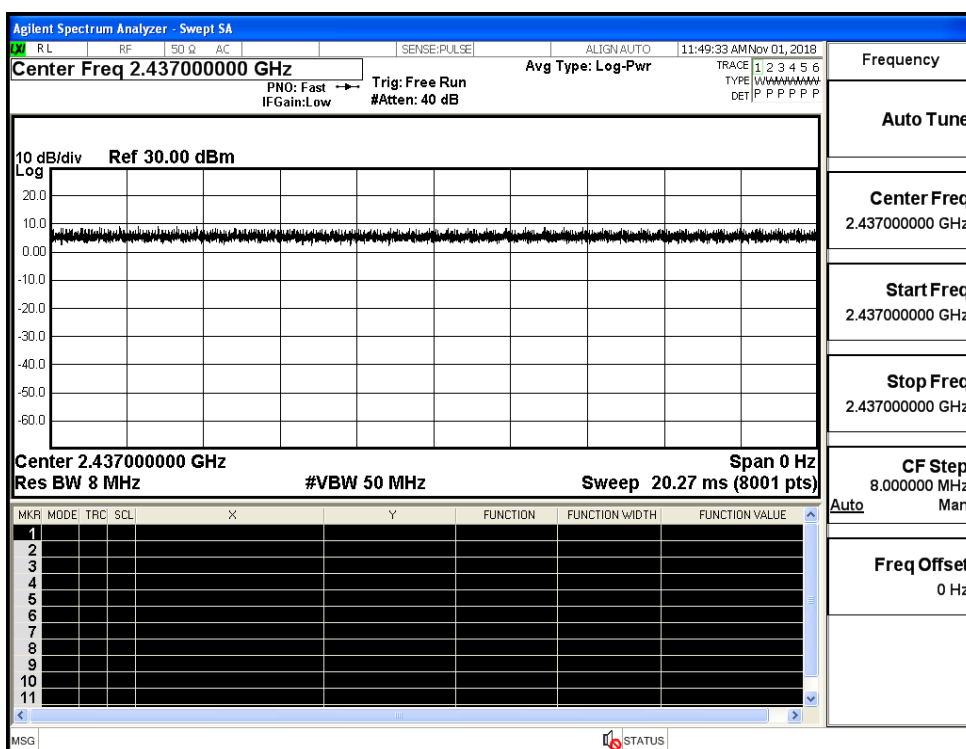
C.1 Duty Cycle

Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
11B	2437	Ant1	100	PASS
11G	2437	Ant1	100	PASS
11N20SISO	2437	Ant1	100	PASS
11N40SISO	2437	Ant1	100	PASS

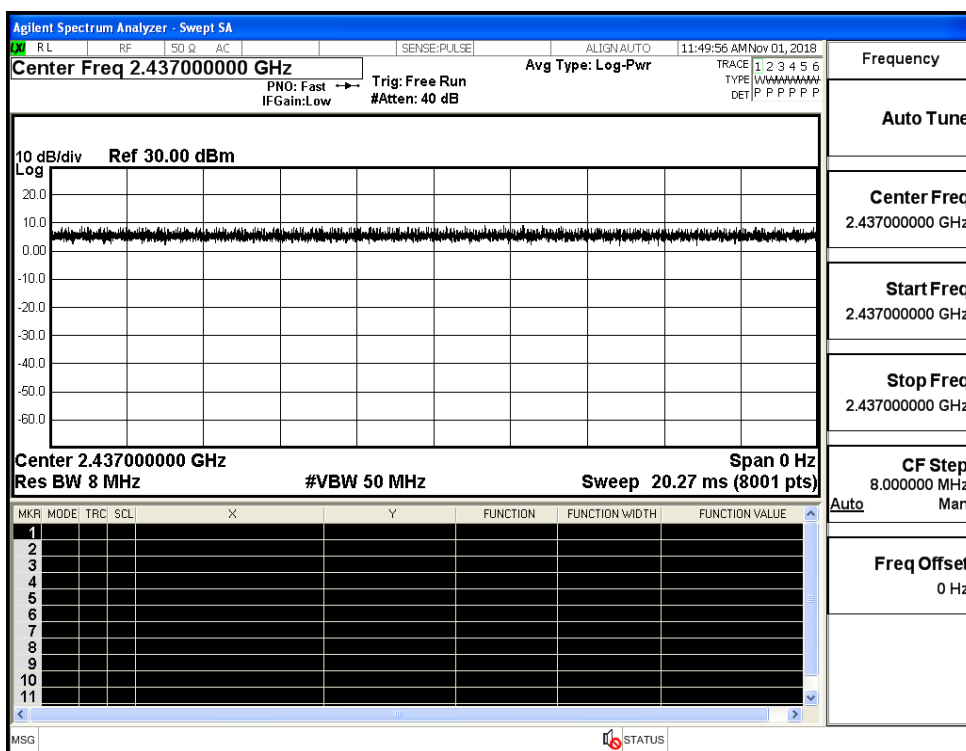
Duty Cycle_11B_2437_Ant1



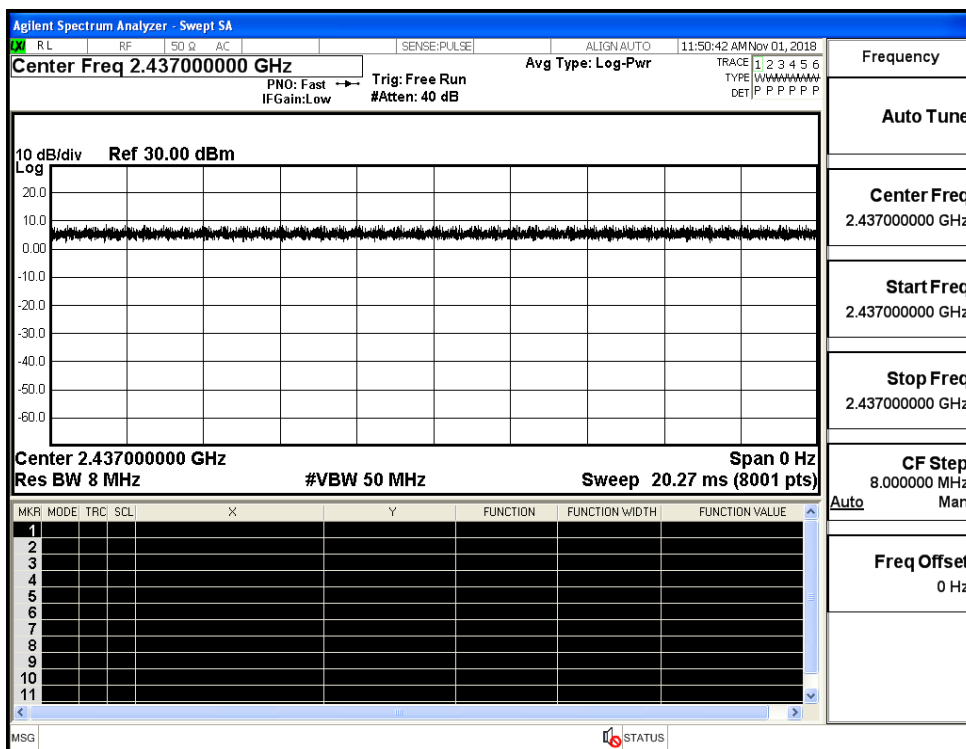
Duty Cycle_11G_2437_Ant1



Duty Cycle_11N20SISO_2437_Ant1



Duty Cycle_11N40SISO_2437_Ant1



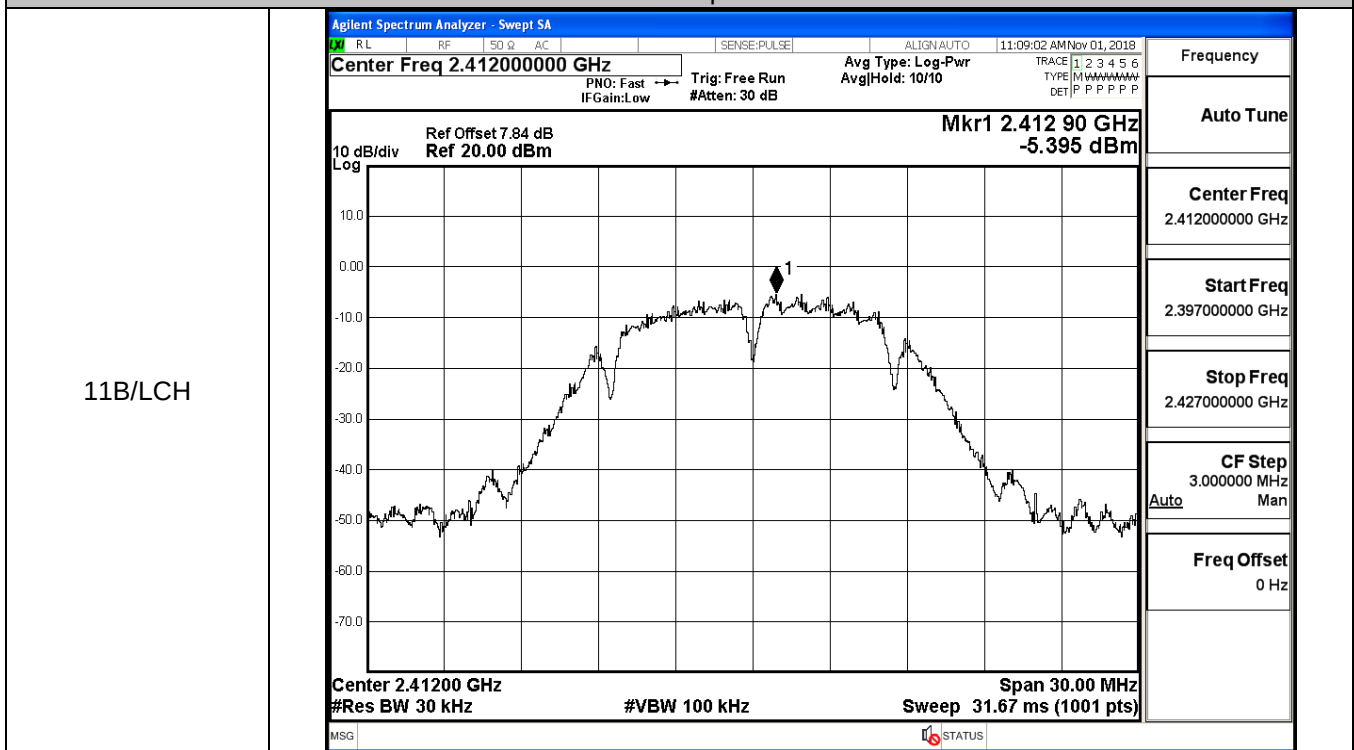
C.2 Maximum Conducted Output Power

Mode	Channel	Meas. Peak Level [dBm]	Limit [dBm]	Verdict
11B	LCH	12.80	30	PASS
	MCH	13.79	30	PASS
	HCH	14.11	30	PASS
11G	LCH	12.73	30	PASS
	MCH	14.63	30	PASS
	HCH	10.70	30	PASS
11N20SISO	LCH	14.24	30	PASS
	MCH	14.92	30	PASS
	HCH	10.60	30	PASS
11N40SISO	LCH	11.39	30	PASS
	MCH	13.65	30	PASS
	HCH	12.43	30	PASS

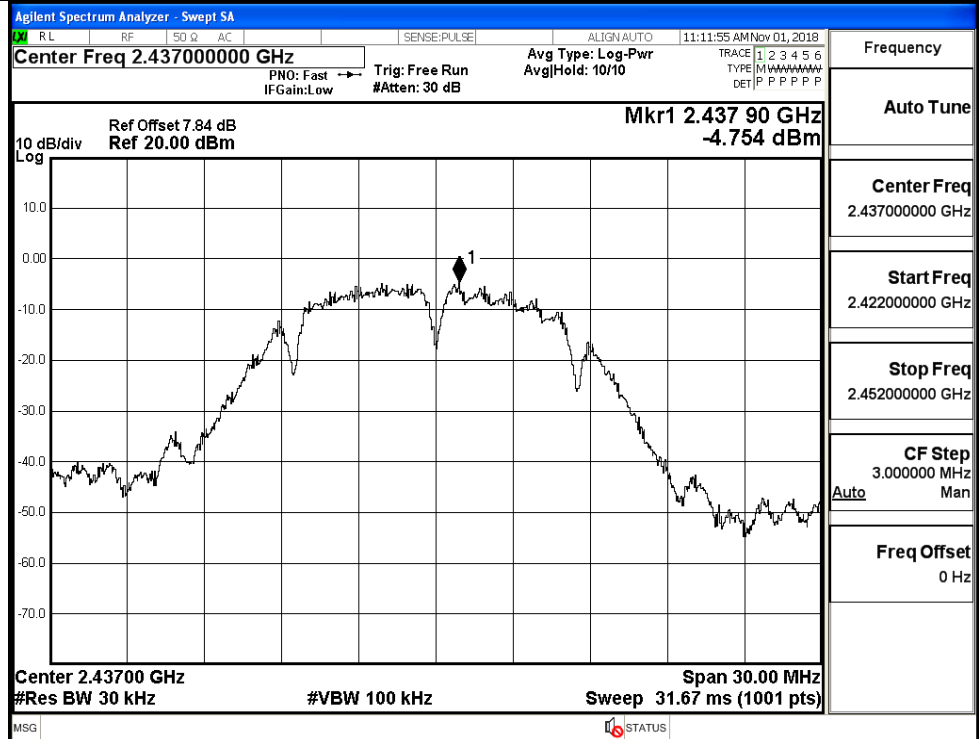
C.3 Maximum Power Spectral Density

Mode	Channel	Meas.Level [dBm/30KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-5.395	8	PASS
	MCH	-4.754	8	PASS
	HCH	-2.560	8	PASS
11G	LCH	-9.712	8	PASS
	MCH	-7.230	8	PASS
	HCH	-10.691	8	PASS
11N20SISO	LCH	-8.716	8	PASS
	MCH	-6.980	8	PASS
	HCH	-10.948	8	PASS
11N40SISO	LCH	-11.052	8	PASS
	MCH	-11.124	8	PASS
	HCH	-10.754	8	PASS

Test Graphs



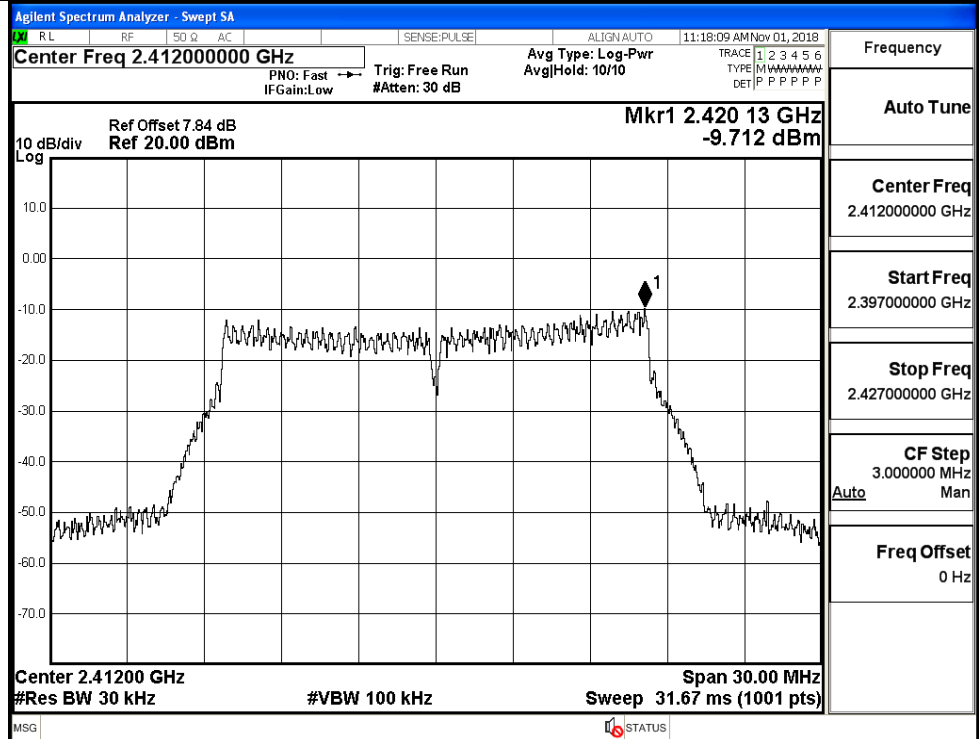
11B/MCH



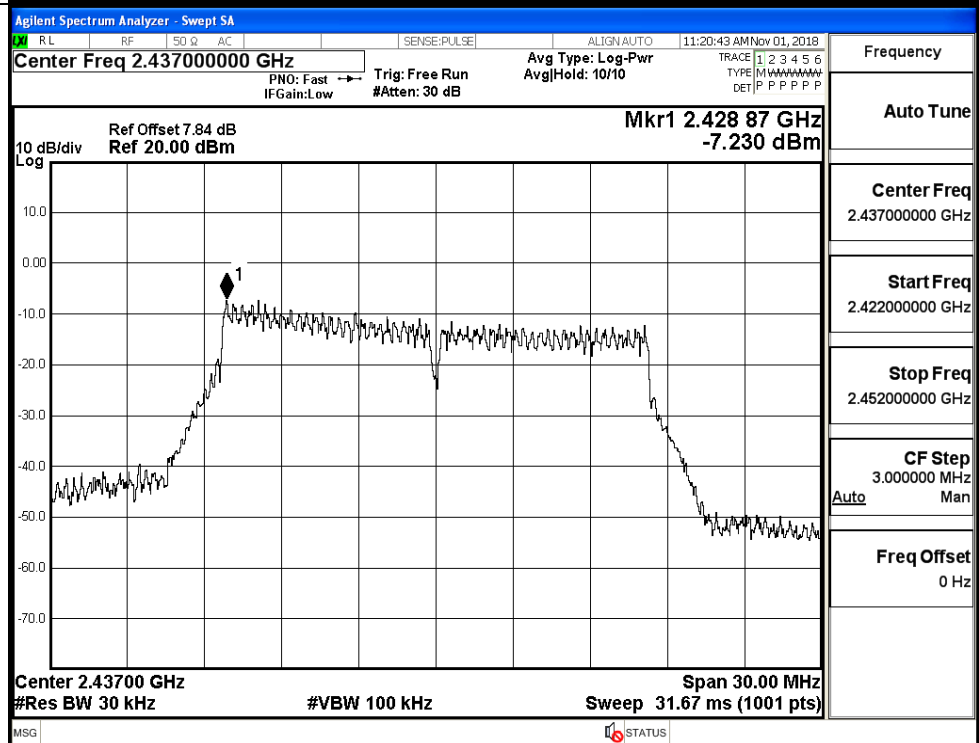
11B/HCH



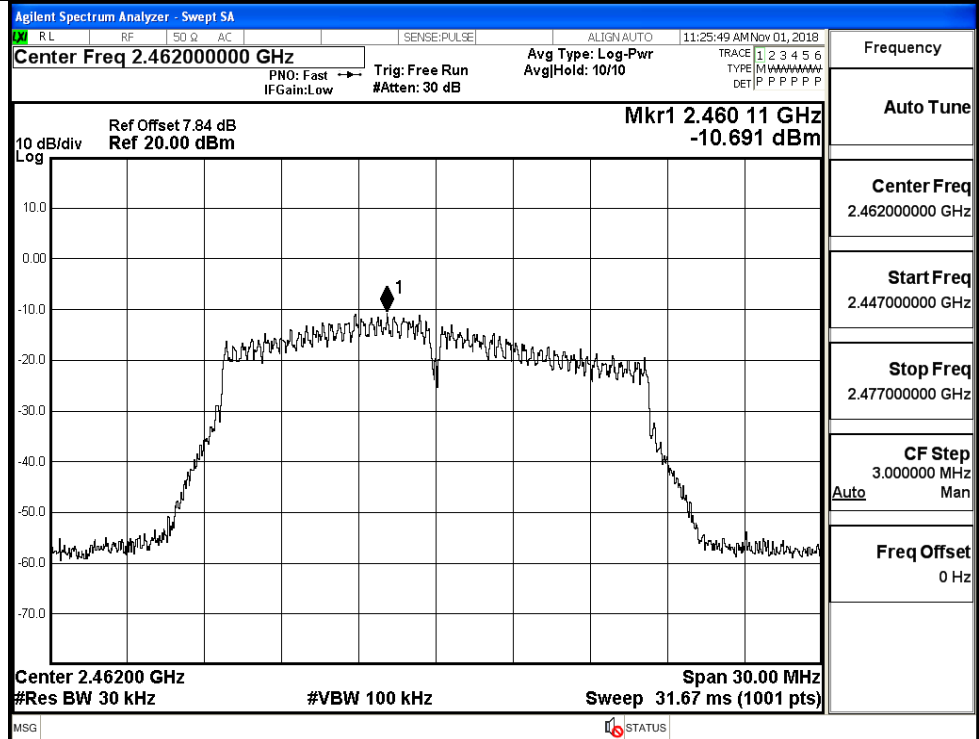
11G/LCH



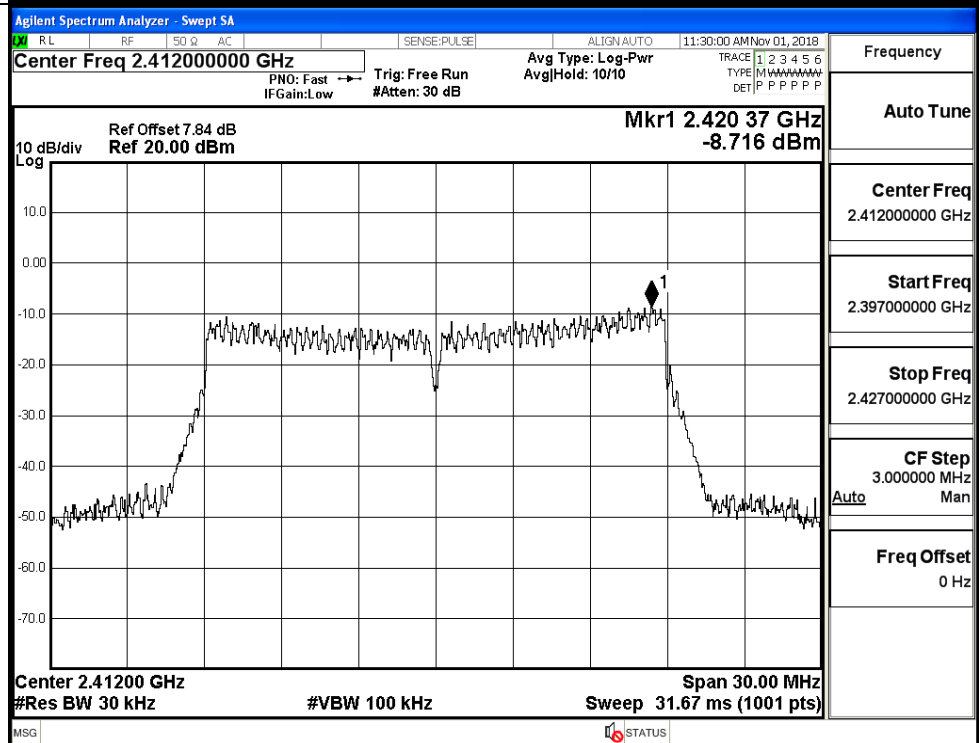
11G/MCH

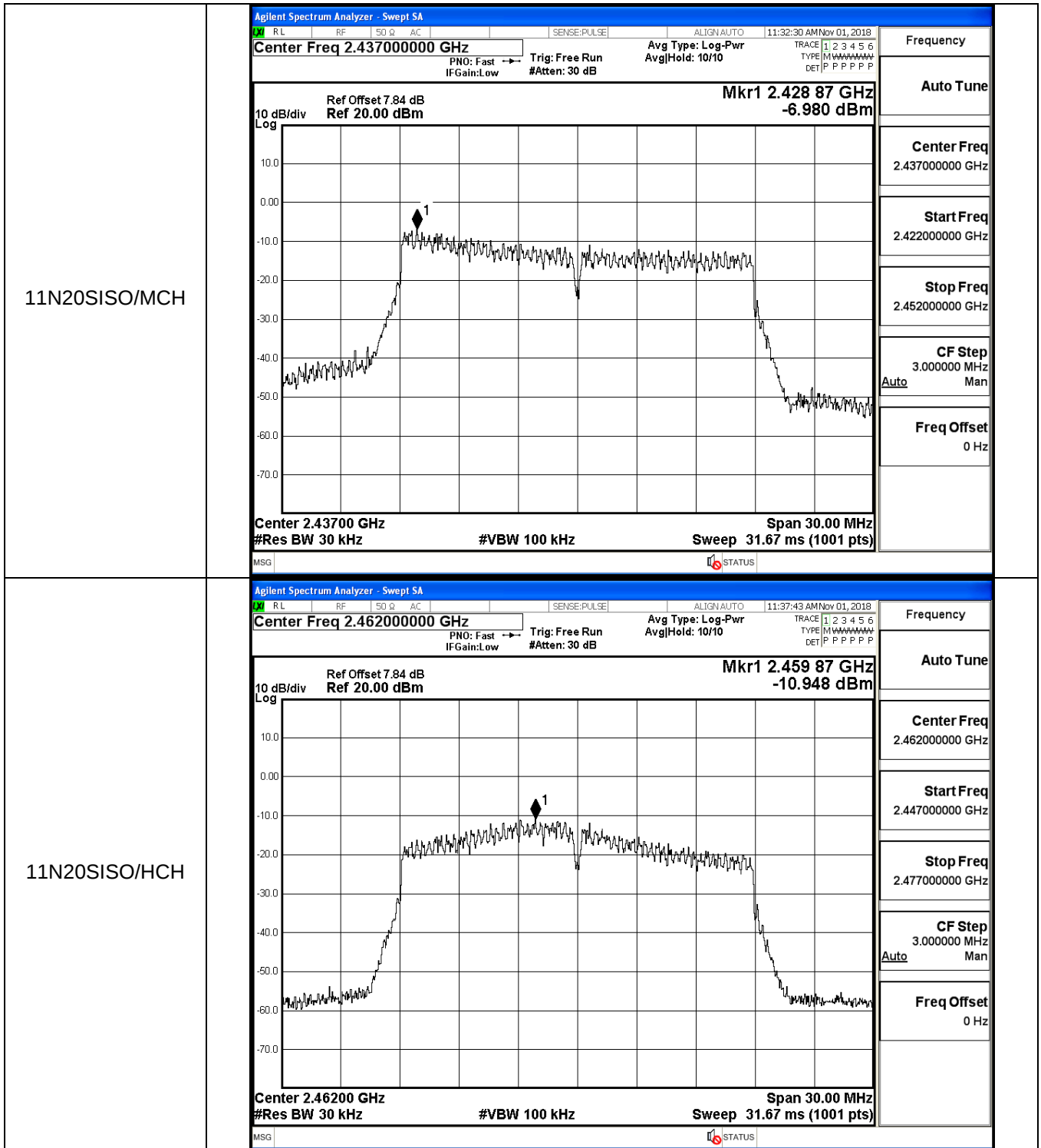


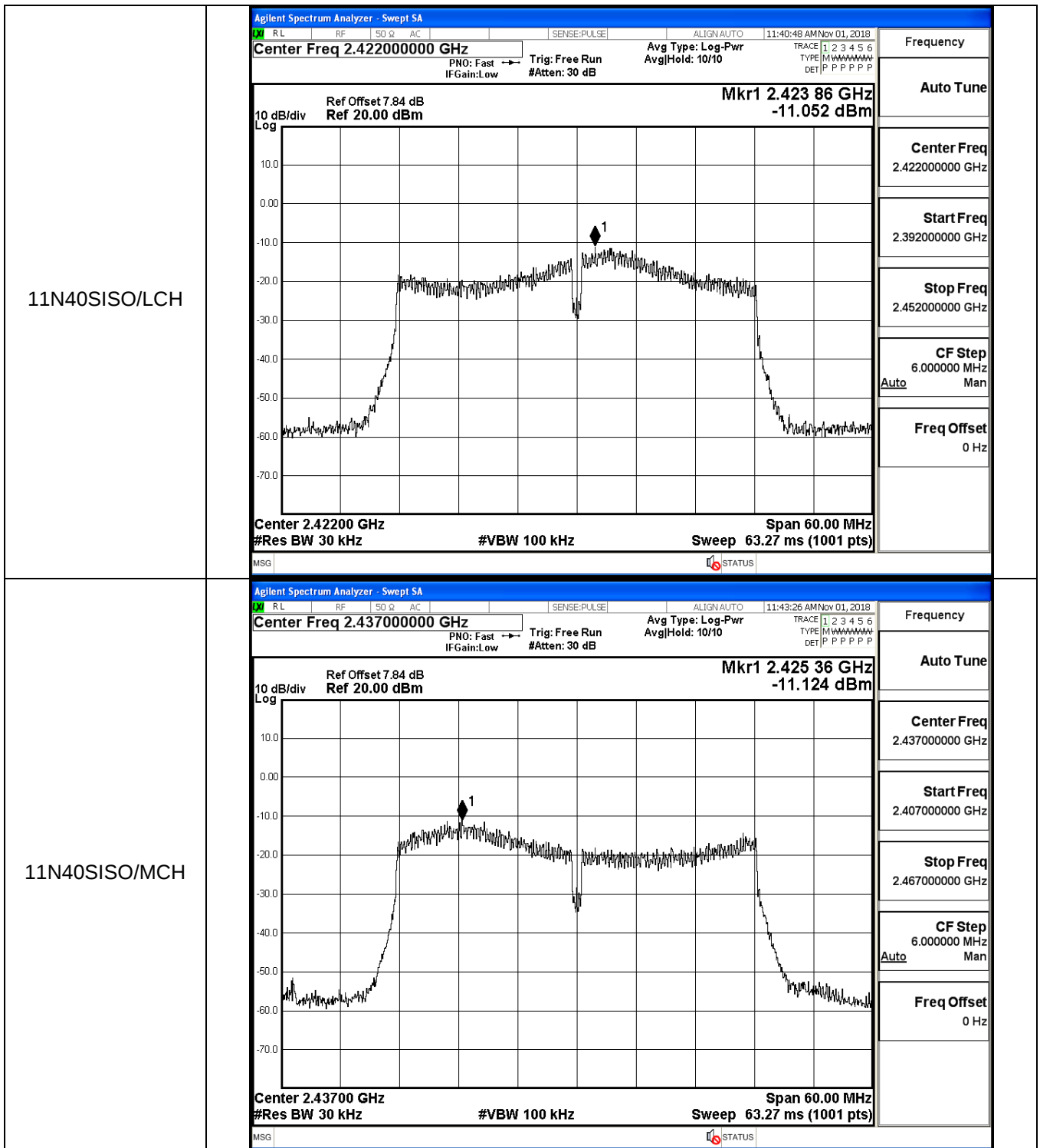
11G/HCH

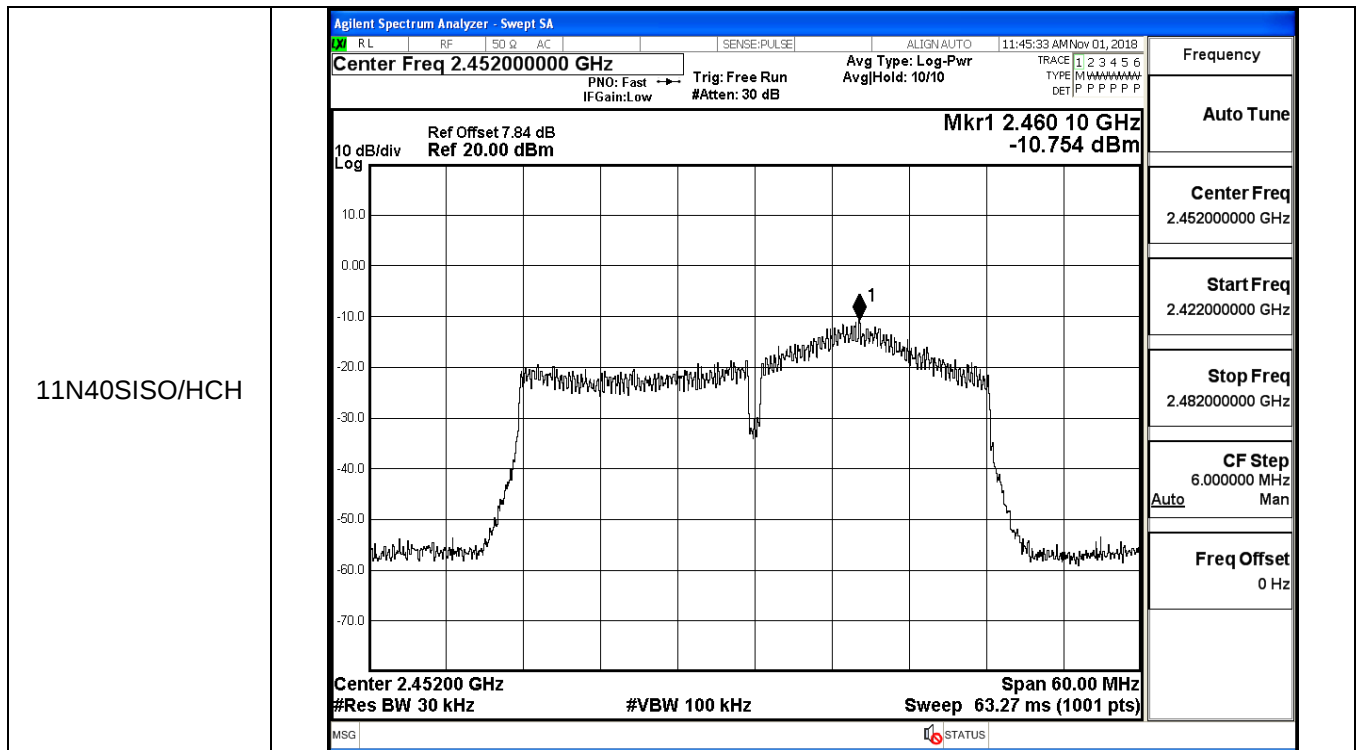


11N20SISO/LCH





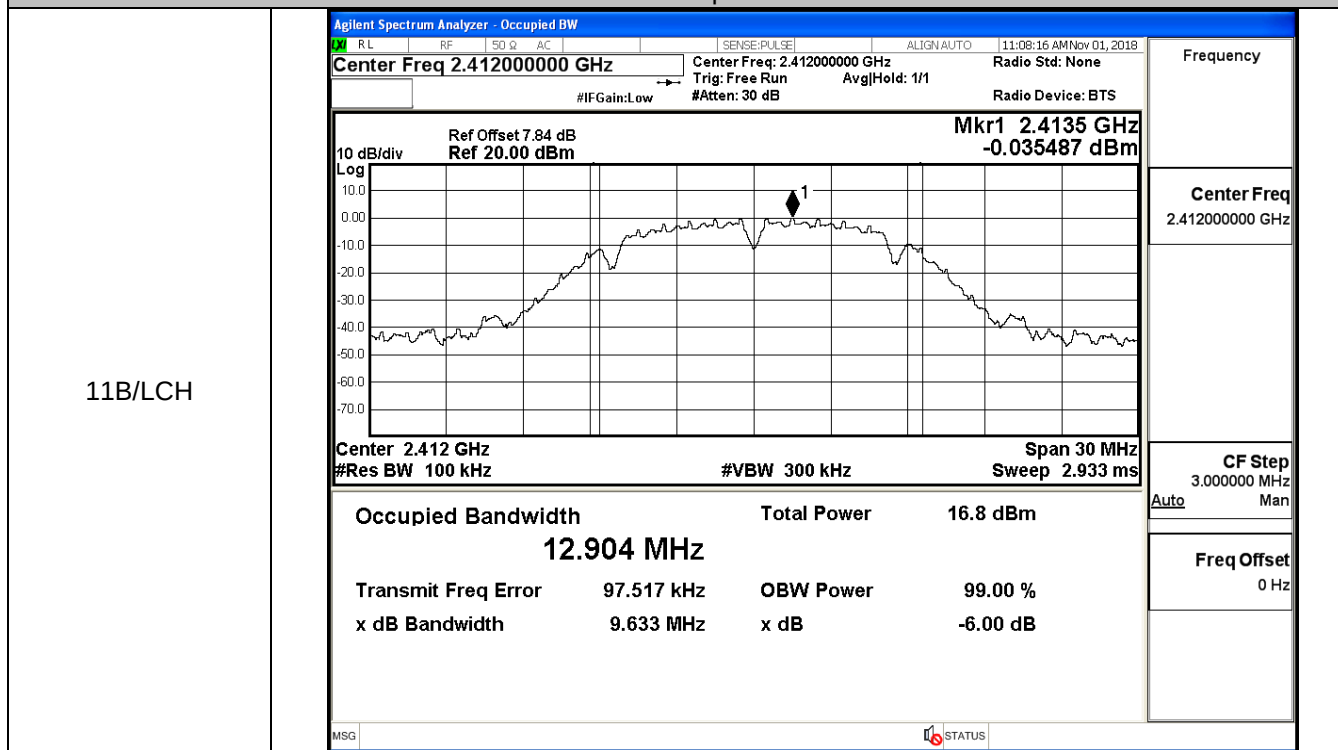




C.4 6dB Bandwidth

Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.633	≥ 0.5	PASS
	MCH	9.602	≥ 0.5	PASS
	HCH	9.551	≥ 0.5	PASS
11G	LCH	16.62	≥ 0.5	PASS
	MCH	16.26	≥ 0.5	PASS
	HCH	16.24	≥ 0.5	PASS
11N20SISO	LCH	17.80	≥ 0.5	PASS
	MCH	17.35	≥ 0.5	PASS
	HCH	17.42	≥ 0.5	PASS
11N40SISO	LCH	35.61	≥ 0.5	PASS
	MCH	36.12	≥ 0.5	PASS
	HCH	35.90	≥ 0.5	PASS

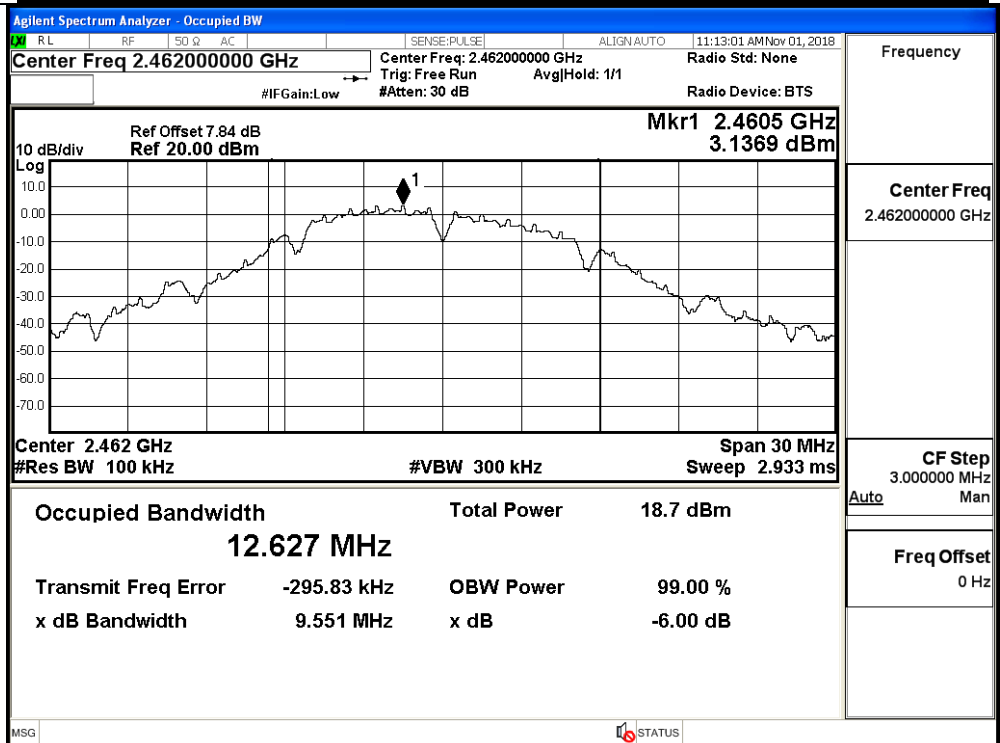
Test Graphs



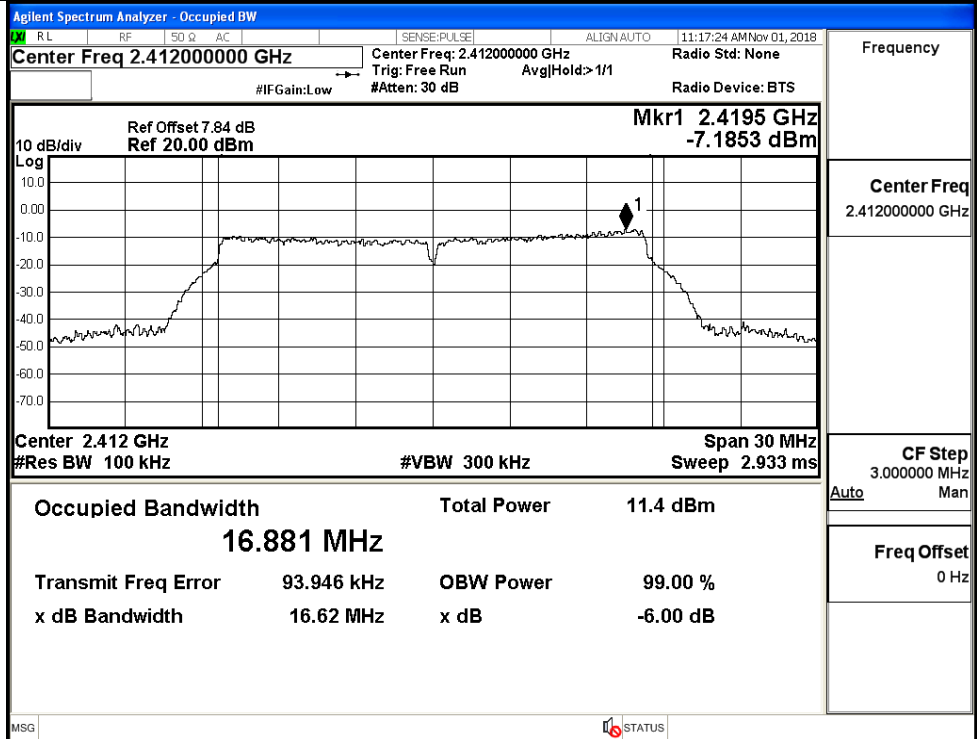
11B/MCH



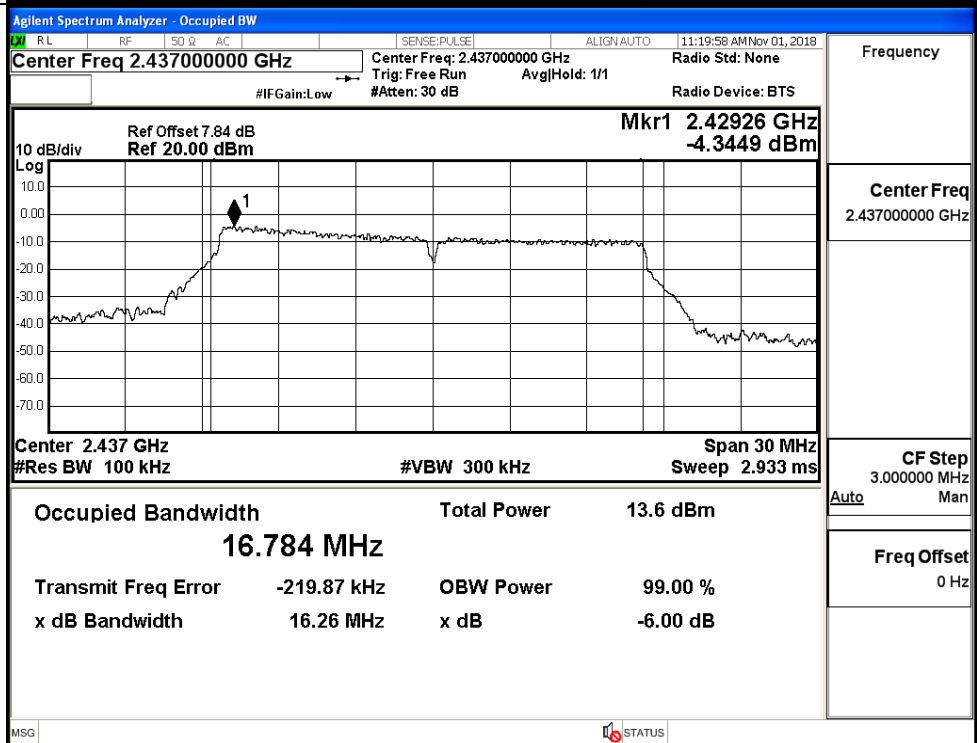
11B/HCH



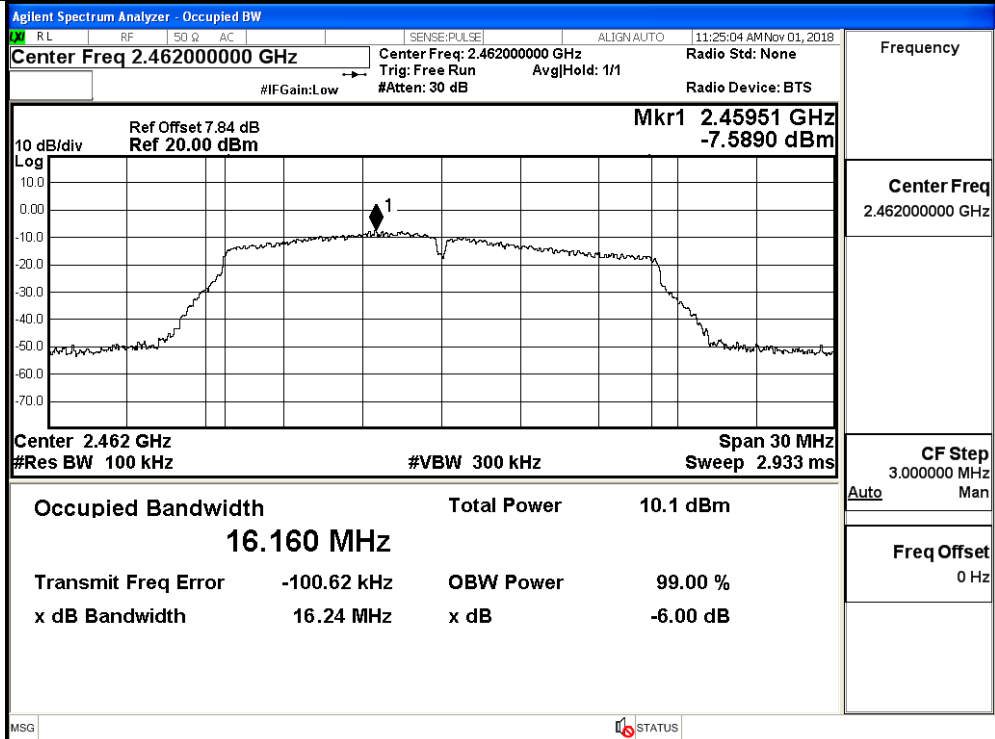
11G/LCH



11G/MCH



11G/HCH



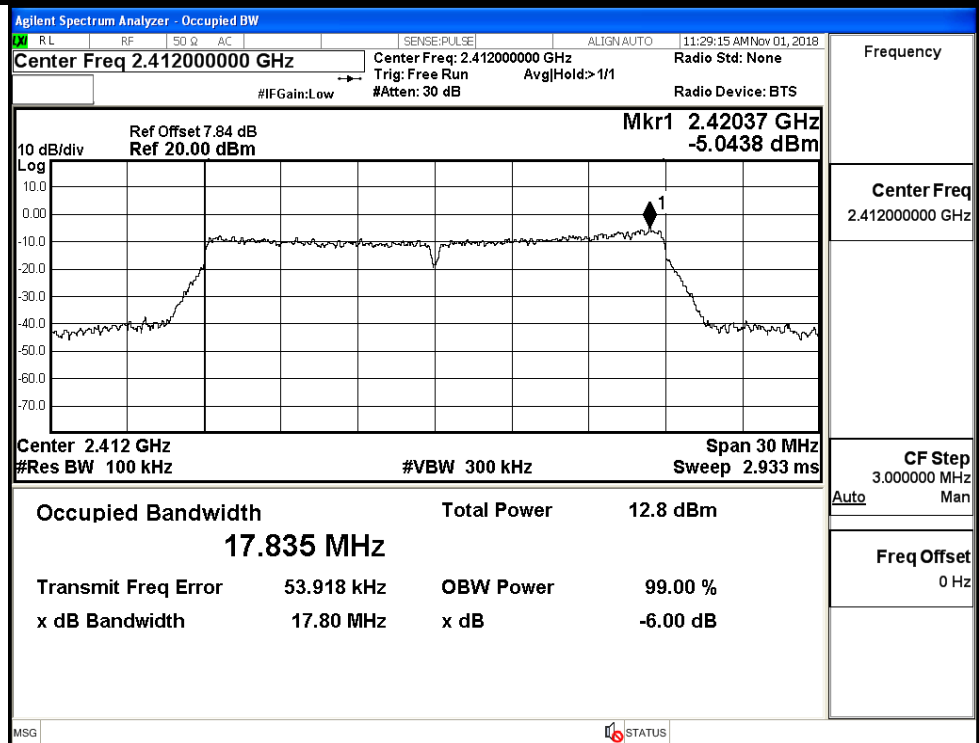
Frequency

Center Freq
2.462000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/LCH



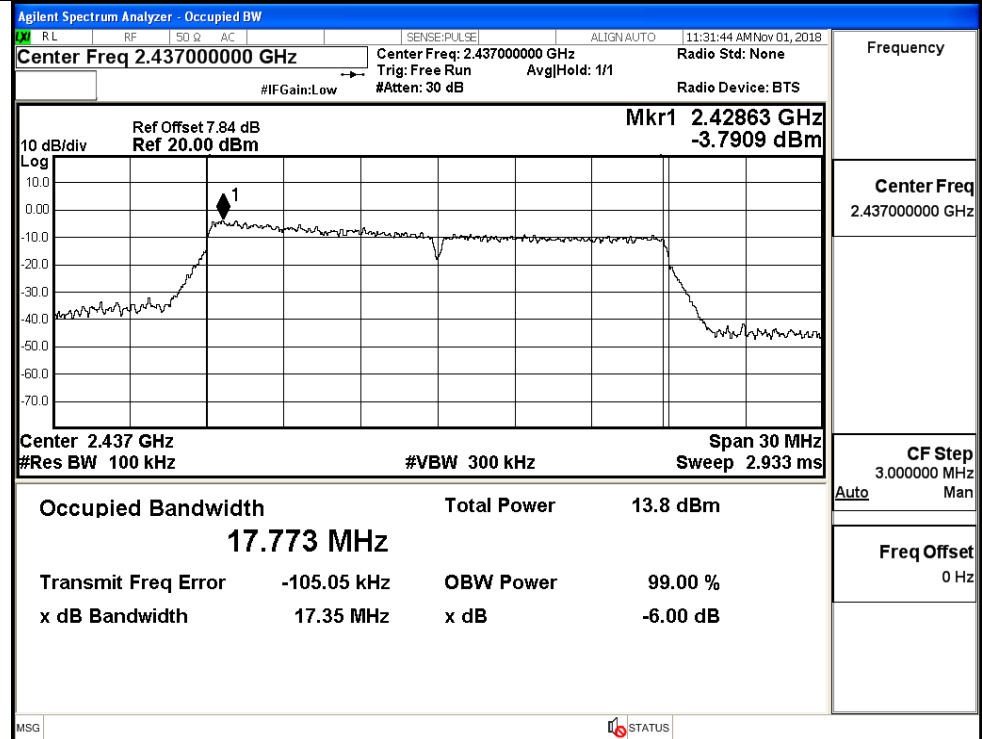
Frequency

Center Freq
2.412000000 GHz

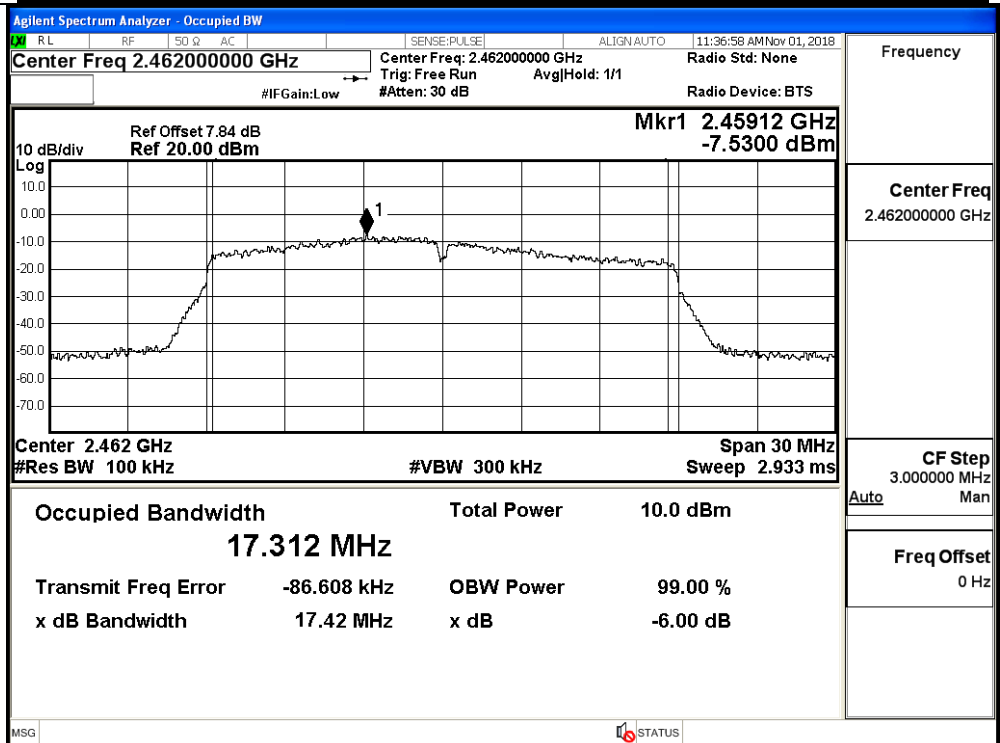
CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

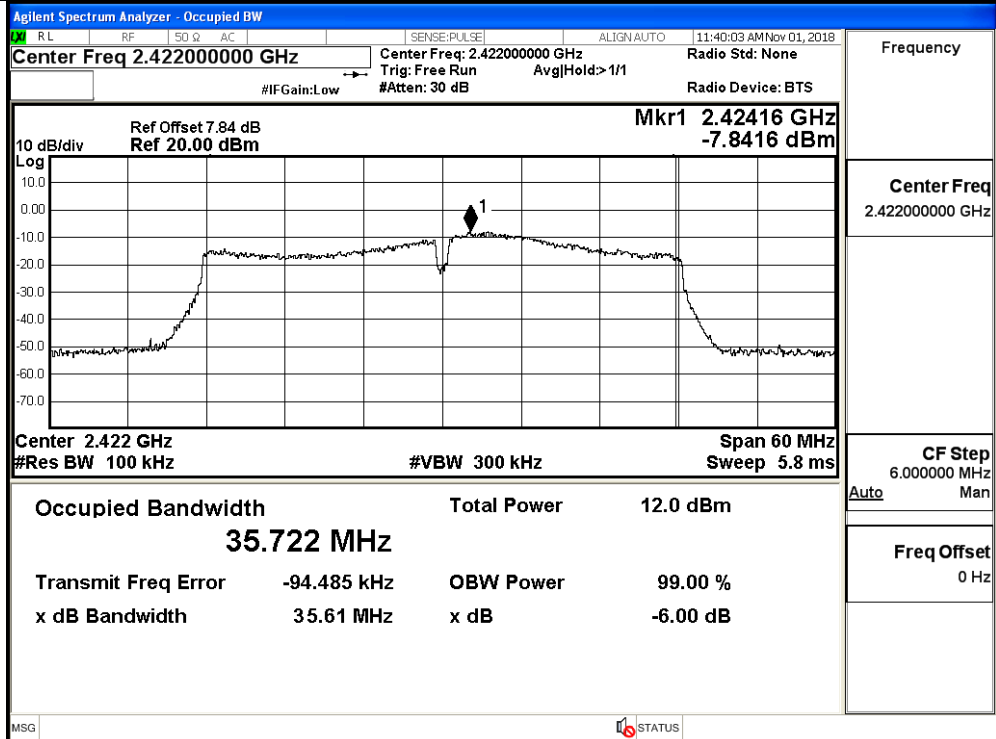
11N20SISO/MCH



11N20SISO/HCH



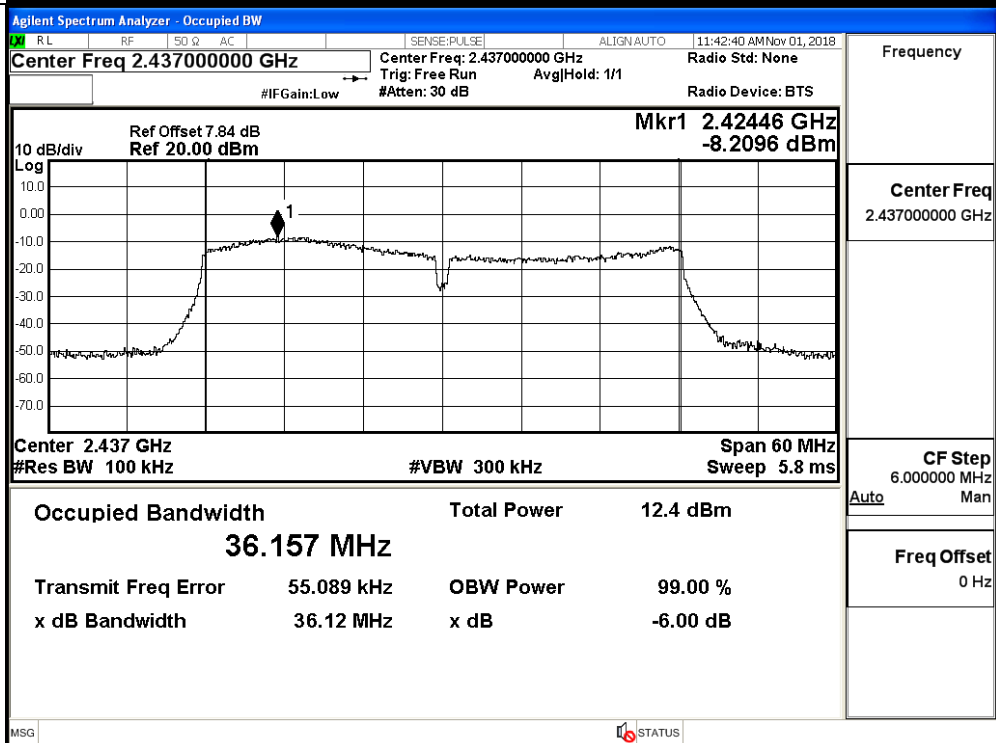
11N40SISO/LCH



Frequency

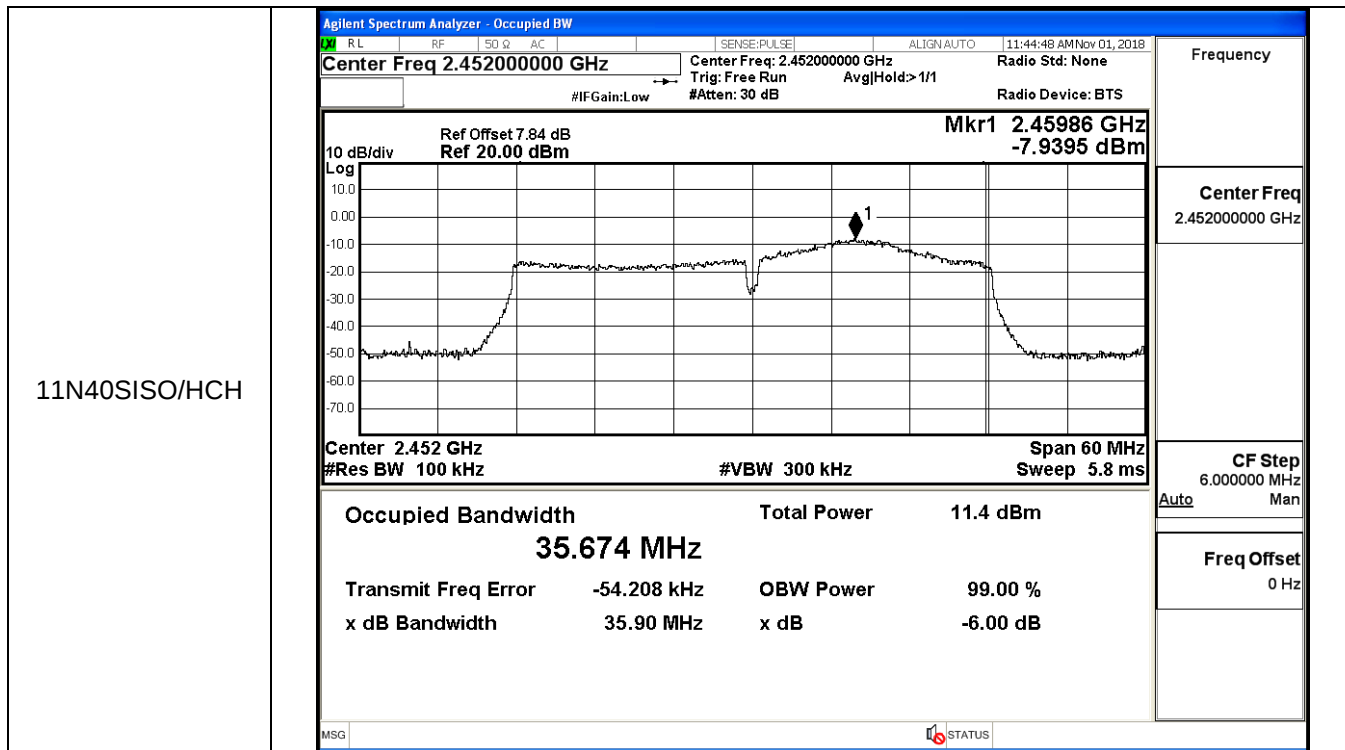
Center Freq
2.422000000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

11N40SISO/MCH



Frequency

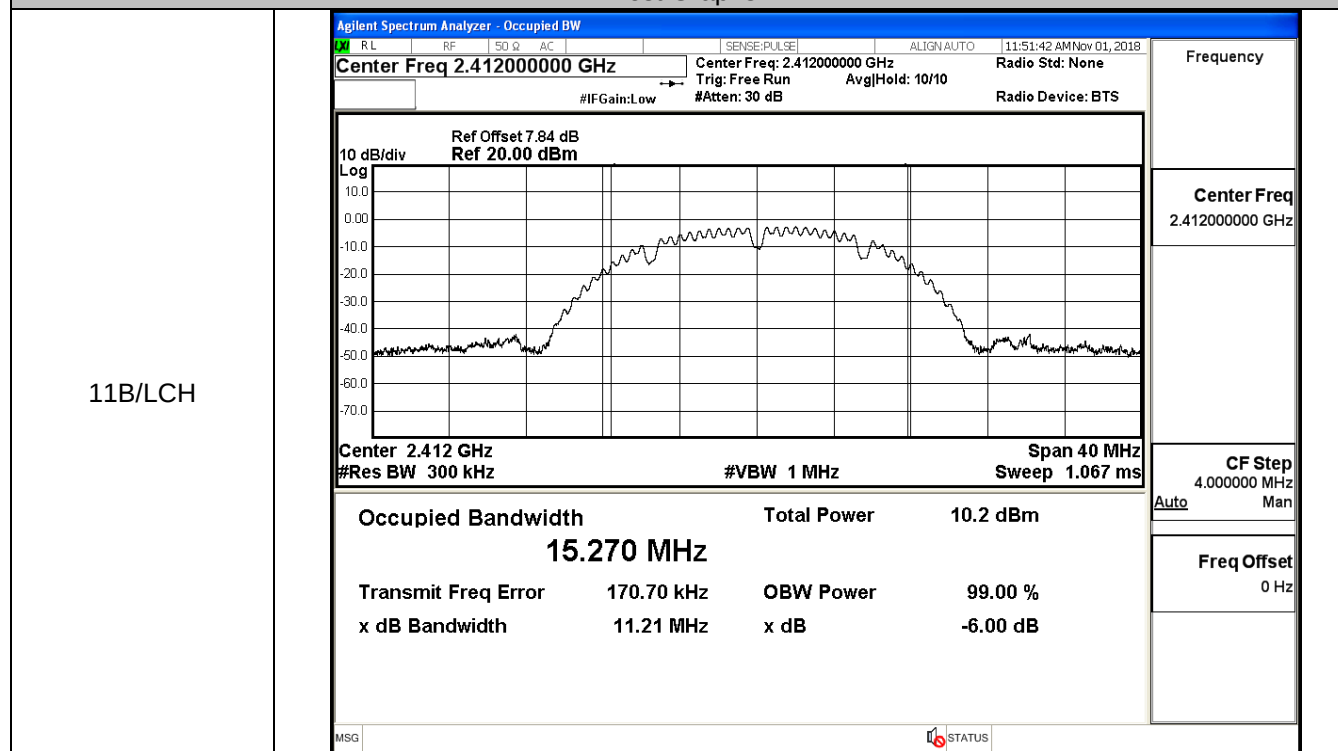
Center Freq
2.437000000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz



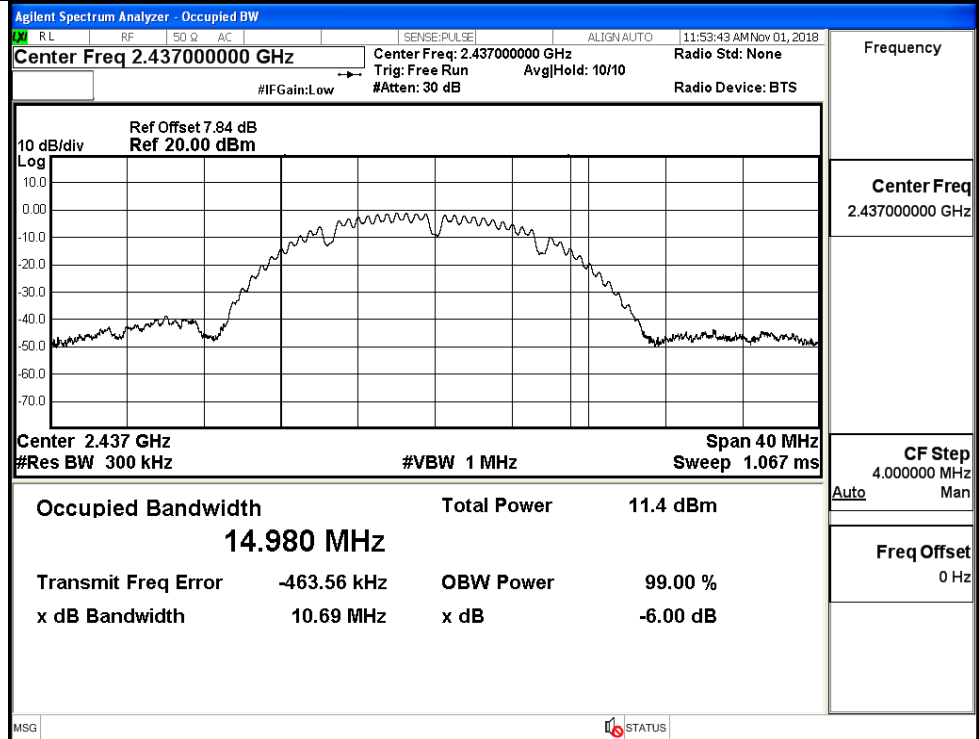
C.5 Occupied Bandwidth

Mode	Channel	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	15.270	No Limit	PASS
	MCH	14.980	No Limit	PASS
	HCH	12.992	No Limit	PASS
11G	LCH	17.405	No Limit	PASS
	MCH	17.380	No Limit	PASS
	HCH	16.826	No Limit	PASS
11N20SISO	LCH	18.096	No Limit	PASS
	MCH	17.955	No Limit	PASS
	HCH	17.818	No Limit	PASS
11N40SISO	LCH	35.351	No Limit	PASS
	MCH	36.083	No Limit	PASS
	HCH	35.302	No Limit	PASS

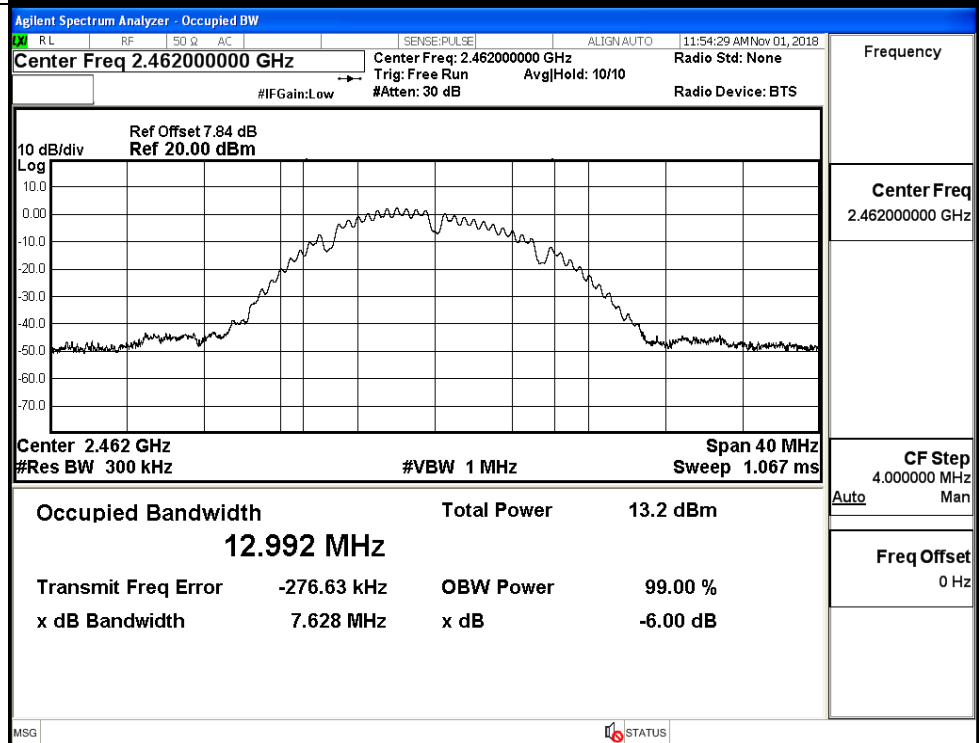
Test Graphs



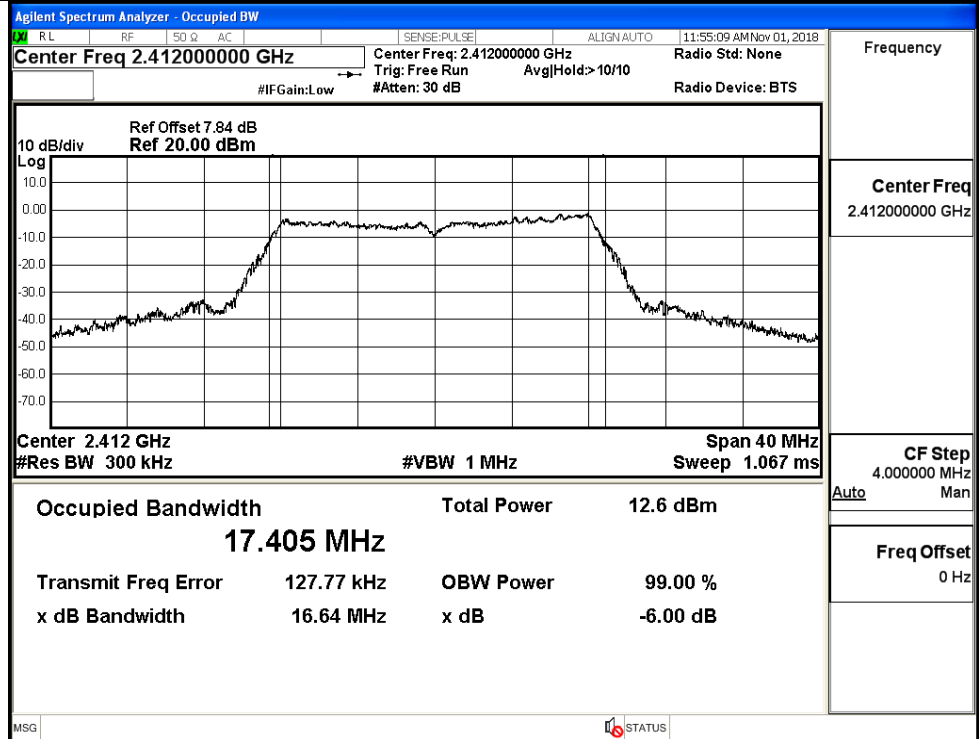
11B/MCH



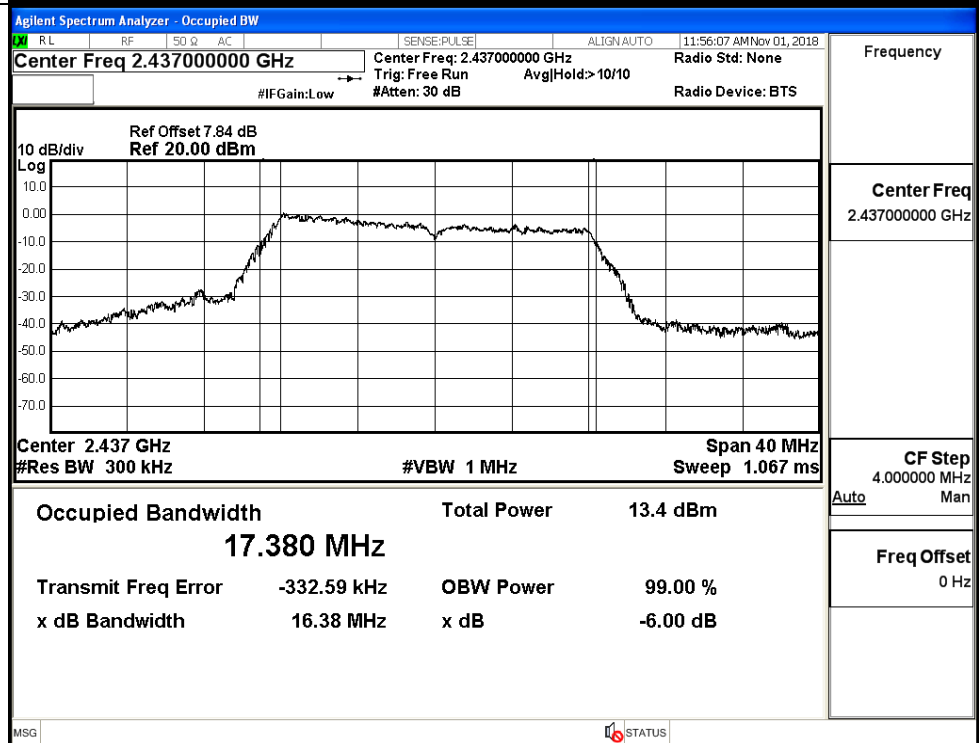
11B/HCH



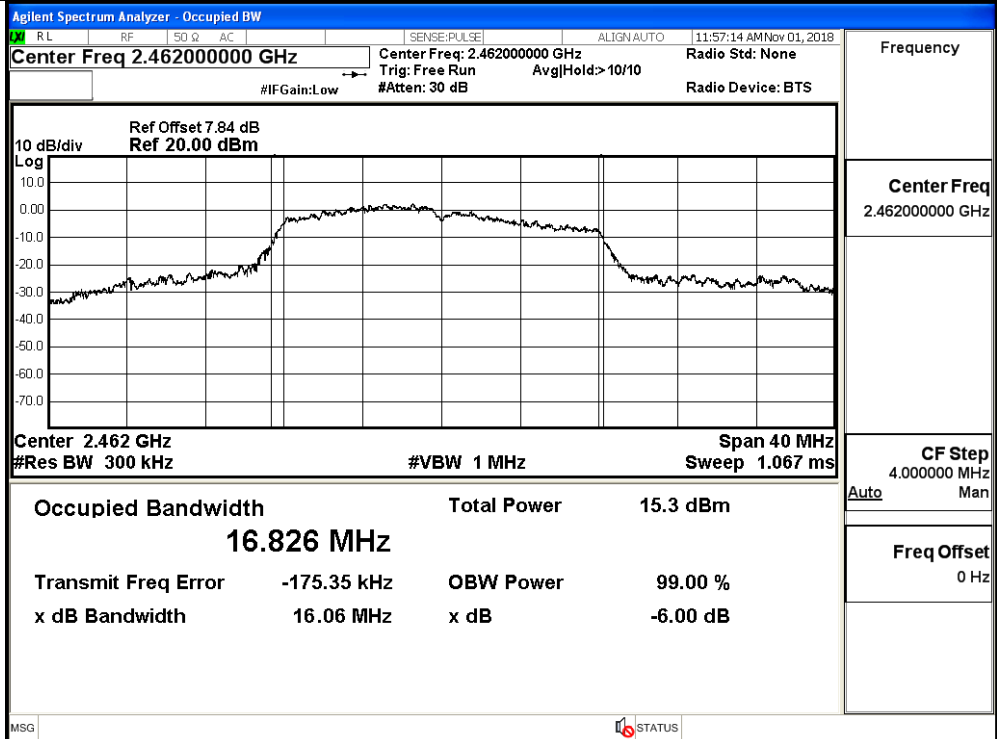
11G/LCH



11G/MCH



11G/HCH



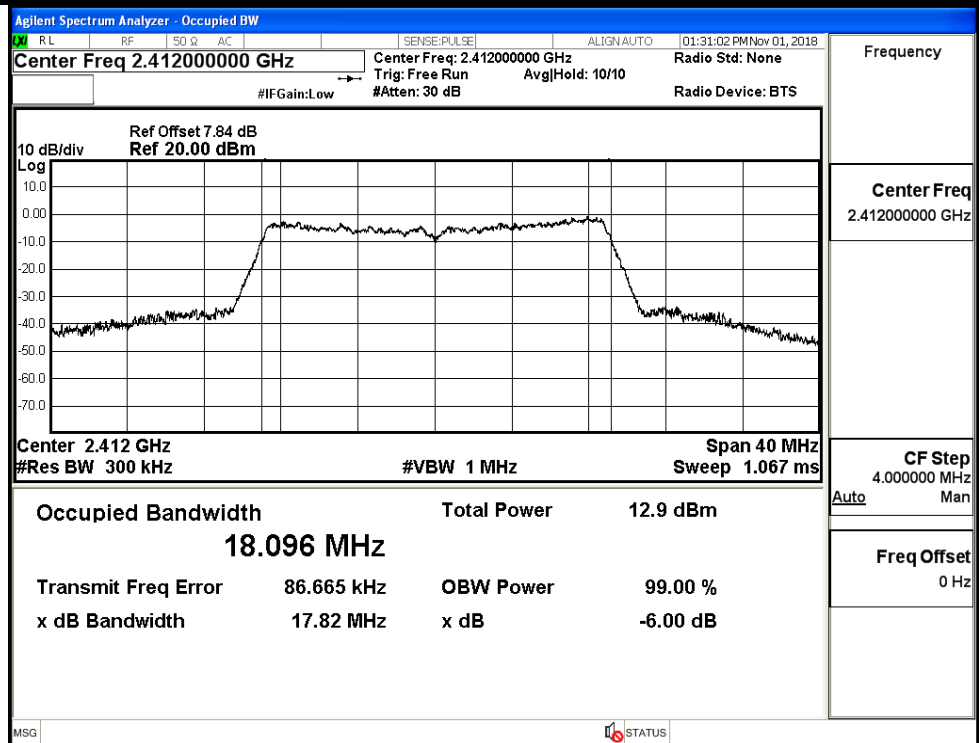
Frequency

Center Freq
2.462000000 GHz

CF Step
4.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/LCH

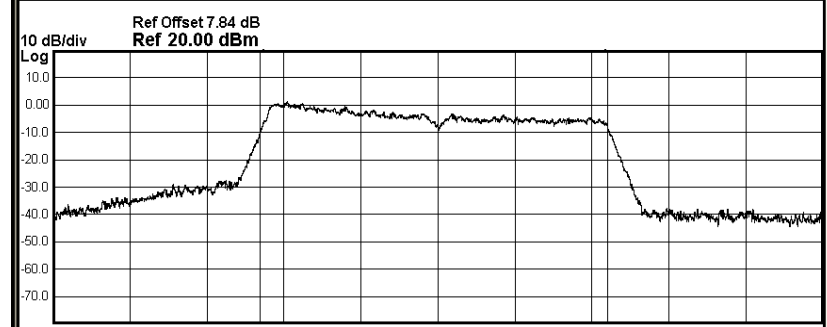
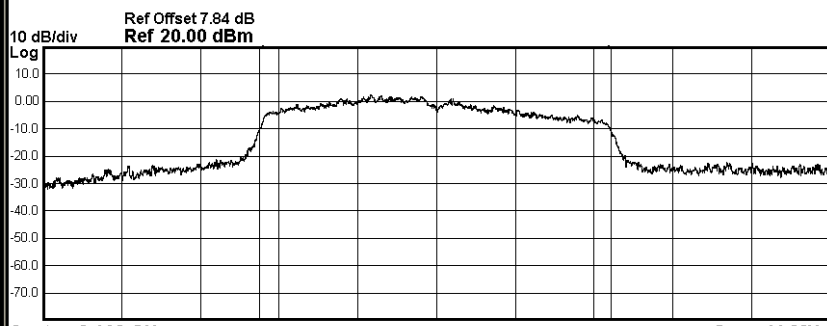


Frequency

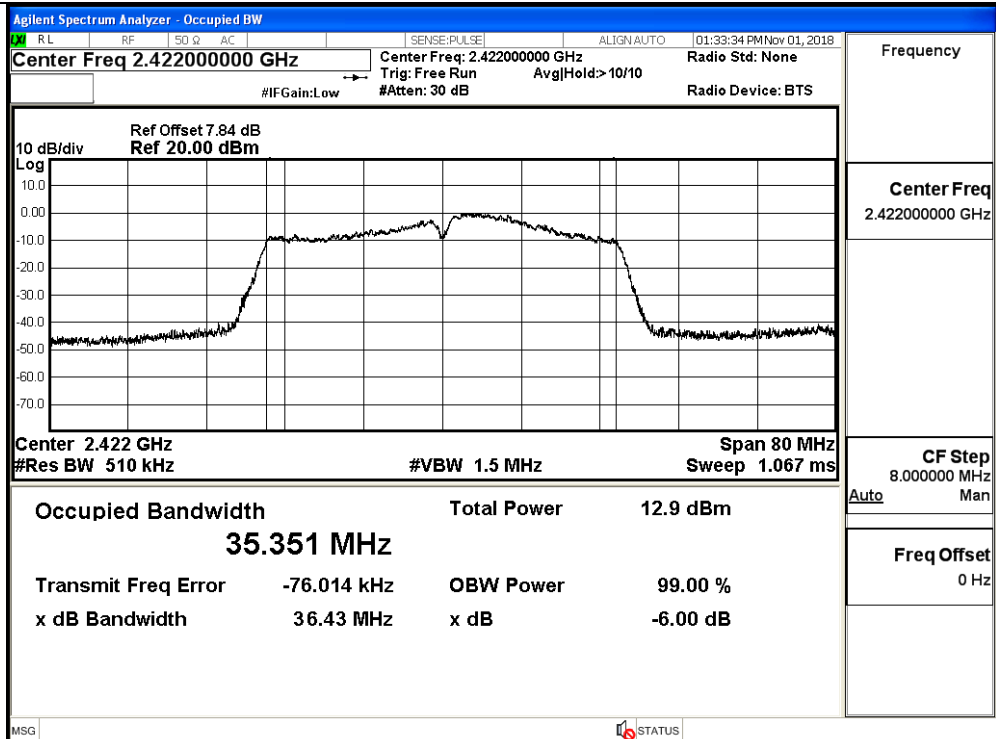
Center Freq
2.412000000 GHz

CF Step
4.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Q AC SENSE:PULSE ALIGN AUTO 01:31:53 PM Nov 01, 2018 Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None Trig: Free Run Avg Hold: 10/10 #IFGain:Low #Atten: 30 dB Radio Device: BTS Ref Offset 7.84 dB Ref 20.00 dBm 10 dB/div Log  Center 2.437 GHz Span 40 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1.067 ms Occupied Bandwidth Total Power 13.9 dBm 17.955 MHz Transmit Freq Error -174.80 kHz OBW Power 99.00 % x dB Bandwidth 16.79 MHz x dB -6.00 dB MSG STATUS Frequency Center Freq 2.437000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/HCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Q AC SENSE:PULSE ALIGN AUTO 01:32:45 PM Nov 01, 2018 Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Radio Std: None Trig: Free Run Avg Hold: 10/10 #IFGain:Low #Atten: 30 dB Radio Device: BTS Ref Offset 7.84 dB Ref 20.00 dBm 10 dB/div Log  Center 2.462 GHz Span 40 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1.067 ms Occupied Bandwidth Total Power 15.5 dBm 17.818 MHz Transmit Freq Error -48.121 kHz OBW Power 99.00 % x dB Bandwidth 17.12 MHz x dB -6.00 dB MSG STATUS Frequency Center Freq 2.462000000 GHz CF Step 4.000000 MHz Auto Man Freq Offset 0 Hz

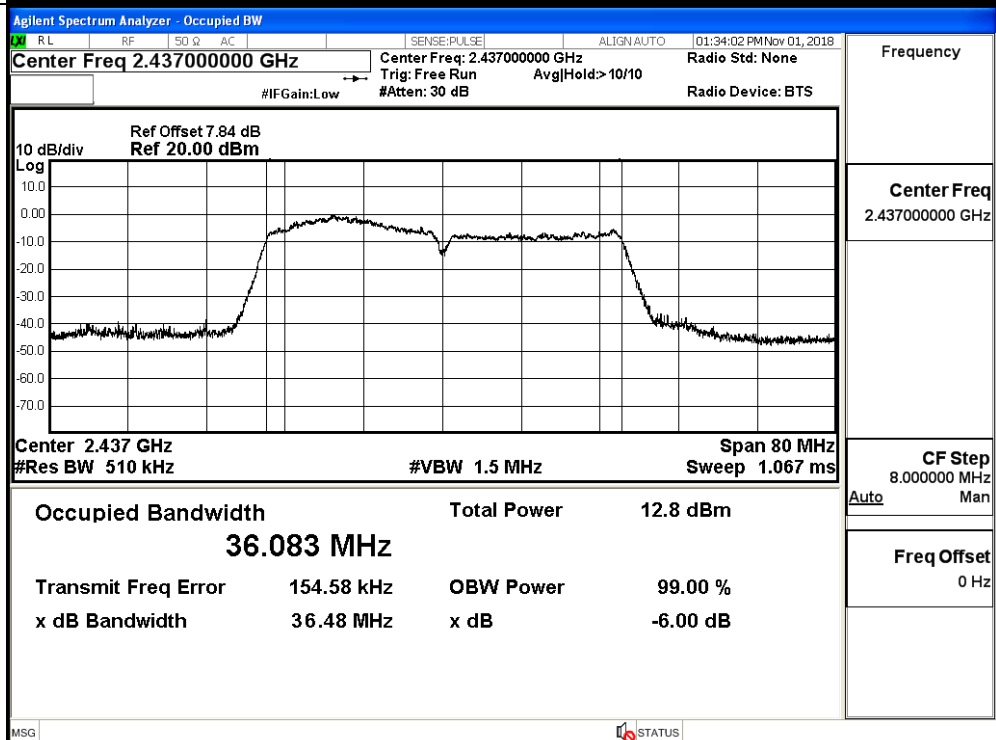
11N40SISO/LCH



Frequency

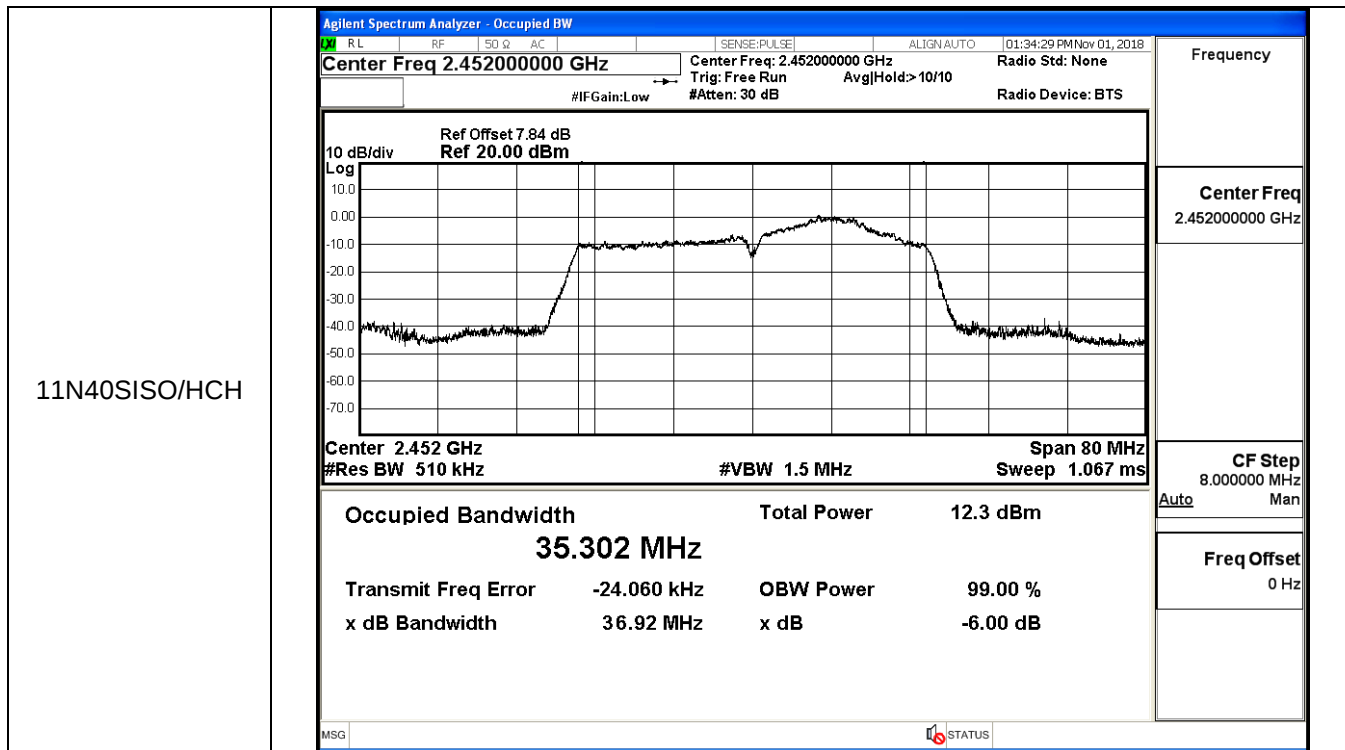
Center Freq
2.422000000 GHzCF Step
8.000000 MHz
Auto ManFreq Offset
0 Hz

11N40SISO/MCH



Frequency

Center Freq
2.437000000 GHzCF Step
8.000000 MHz
Auto ManFreq Offset
0 Hz

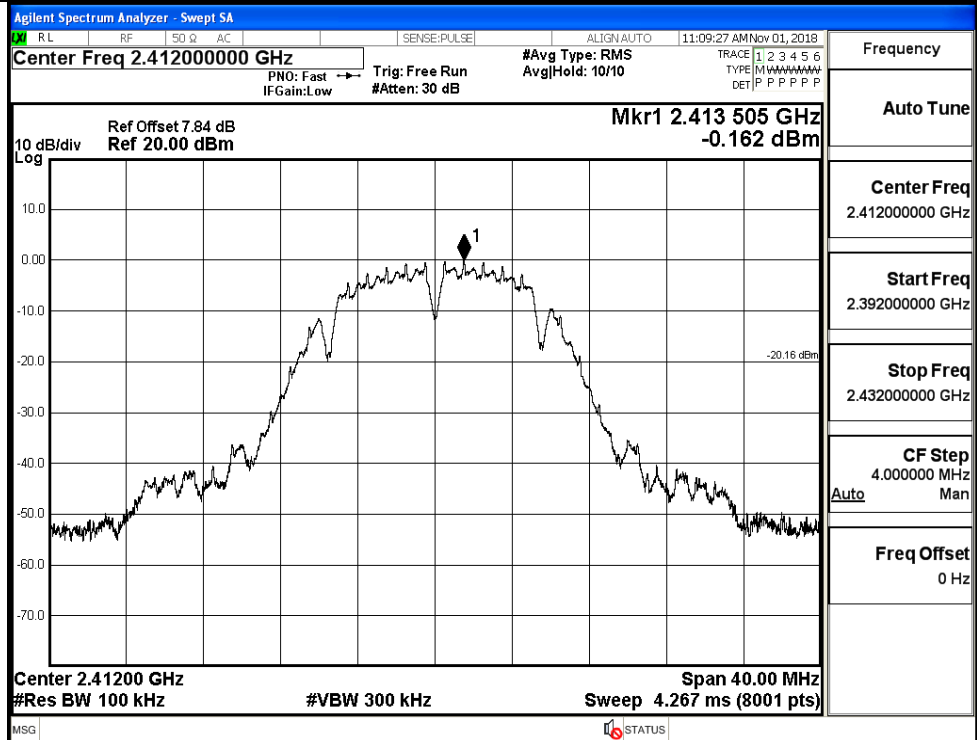


C.6 RF Conducted Spurious Emissions

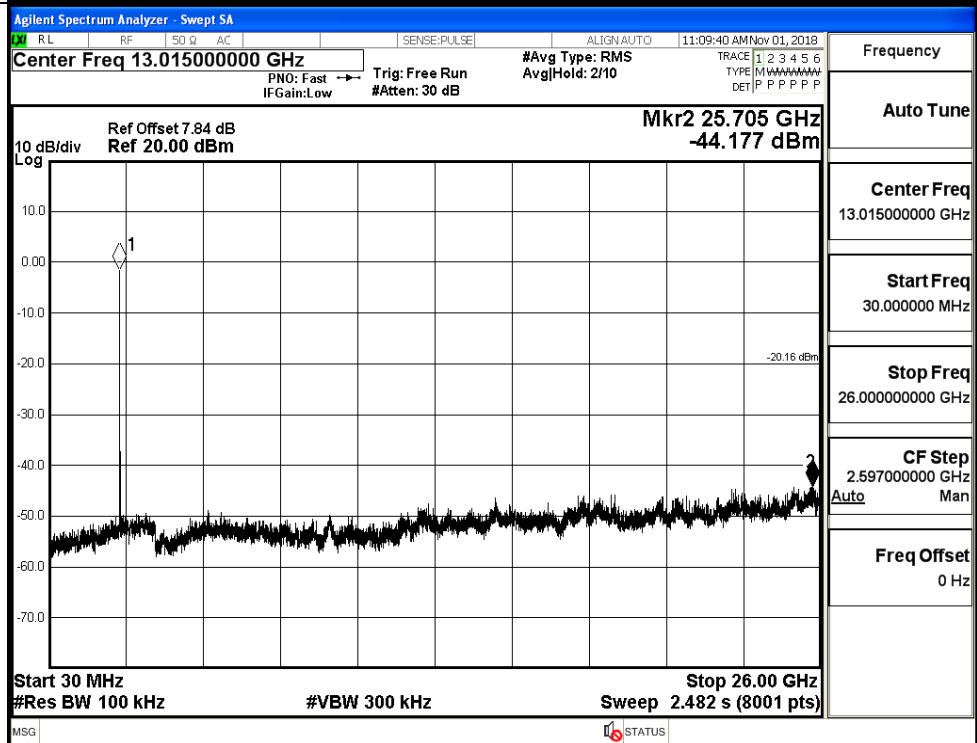
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	-0.162	-44.177	-20.162	PASS
	MCH	1.056	-42.718	-18.944	PASS
	HCH	3.045	-43.983	-16.955	PASS
11G	LCH	-7.167	-43.734	-27.167	PASS
	MCH	-4.588	-44.158	-24.588	PASS
	HCH	-7.946	-44.236	-27.946	PASS
11N20 SISO	LCH	-4.934	-43.934	-24.934	PASS
	MCH	-4.142	-44.420	-24.142	PASS
	HCH	-7.606	-44.553	-27.606	PASS
11N40 SISO	LCH	-7.812	-43.157	-27.812	PASS
	MCH	-8.355	-44.029	-28.355	PASS
	HCH	-8.321	-44.182	-28.321	PASS

11B LCH Graphs

Pref/11B/LCH

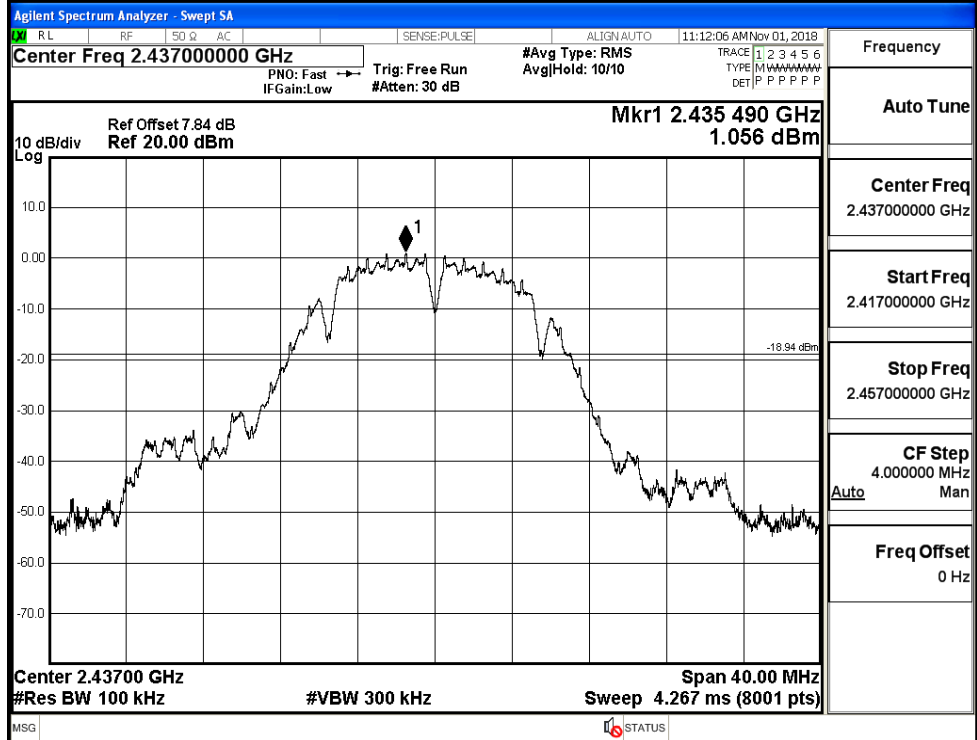


Puw/11B/LCH

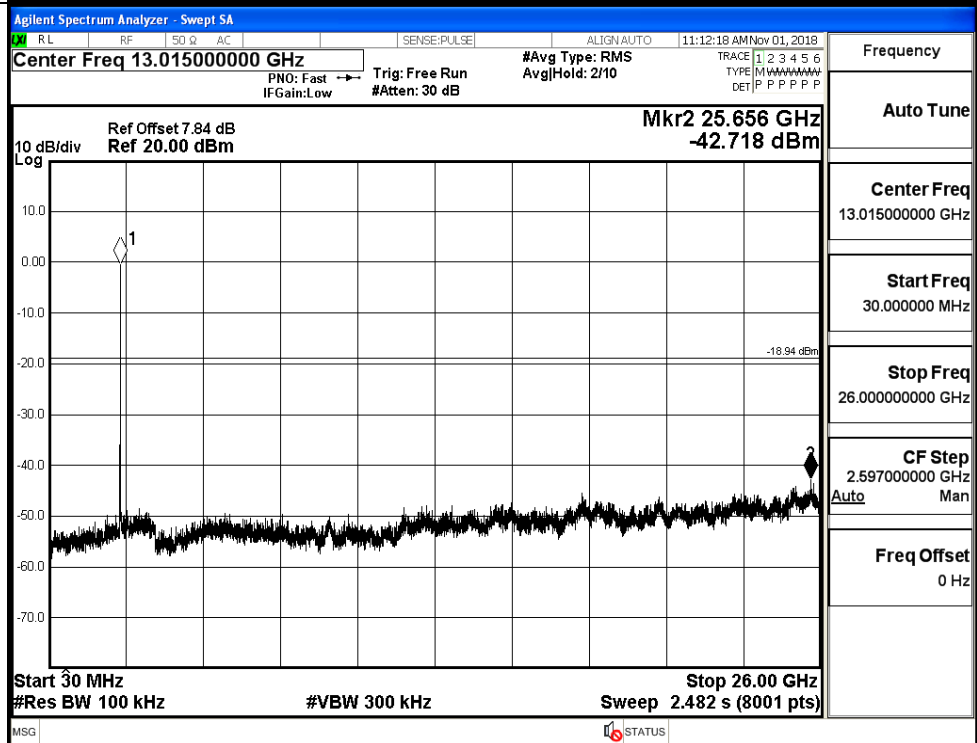


11B MCH Graphs

Pref/11B/MCH

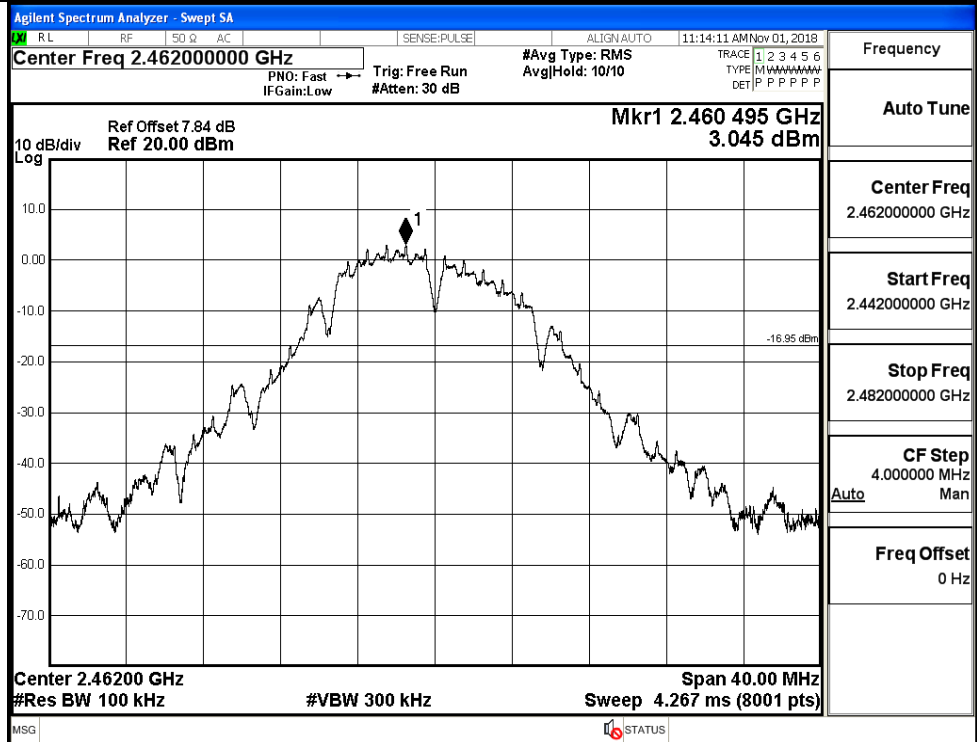


Puw/11B/MCH

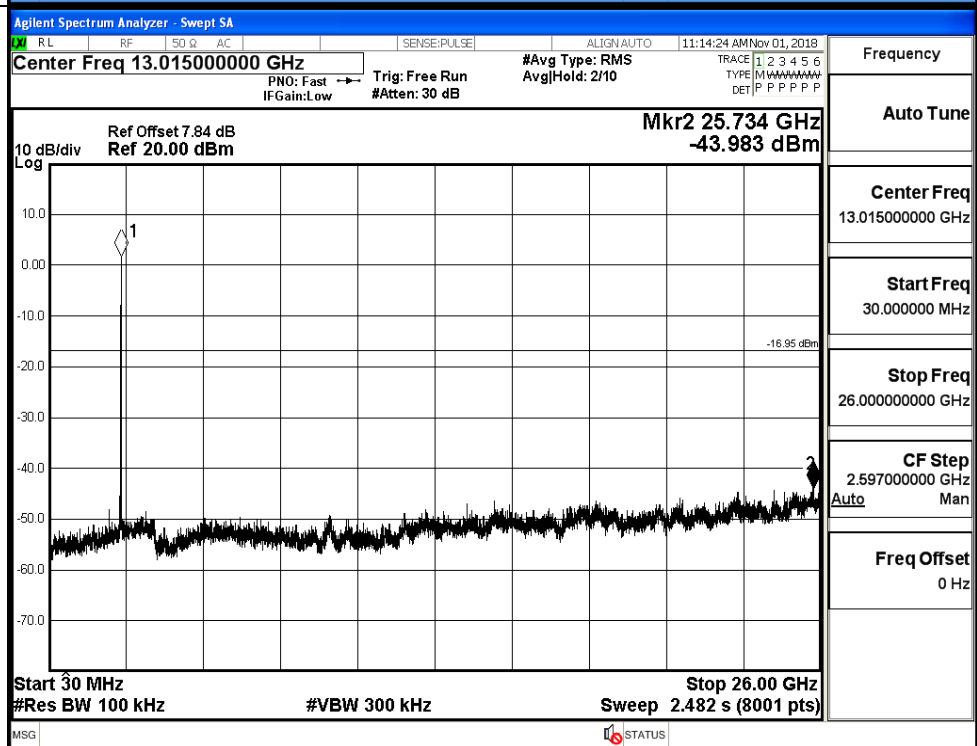


11B HCH Graphs

Pref/11B/HCH

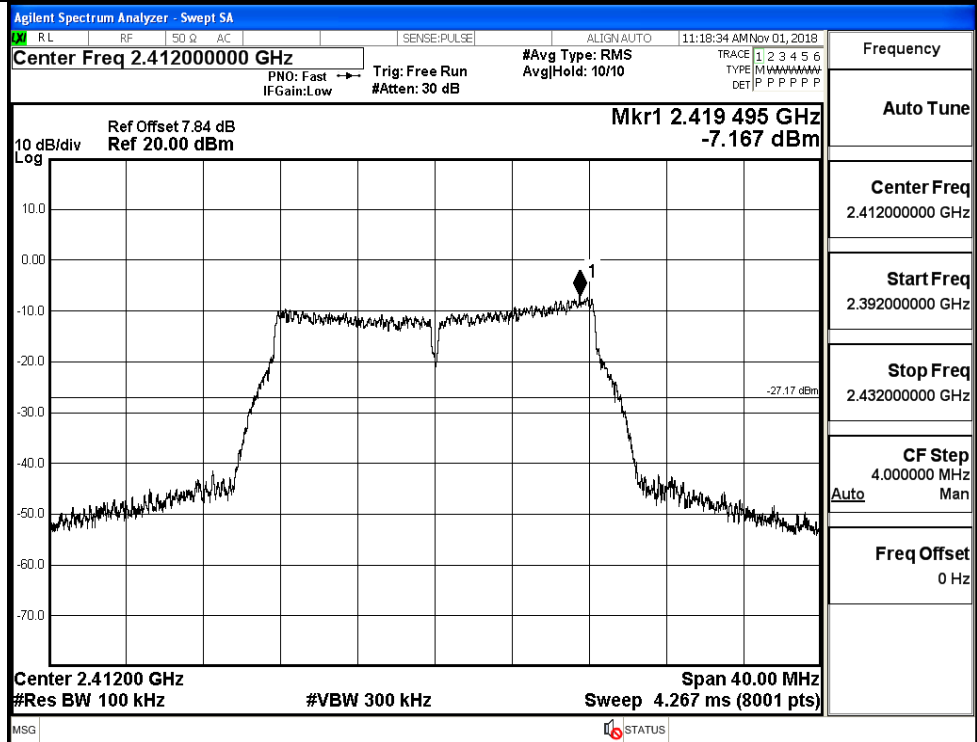


Puw/11B/HCH

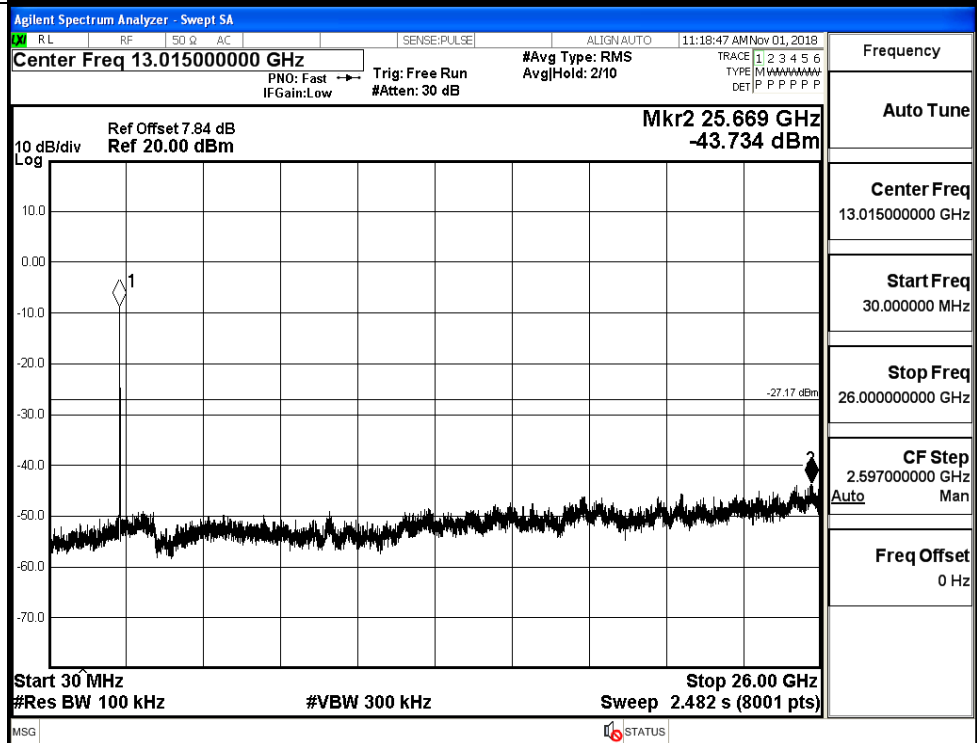


11G LCH Graphs

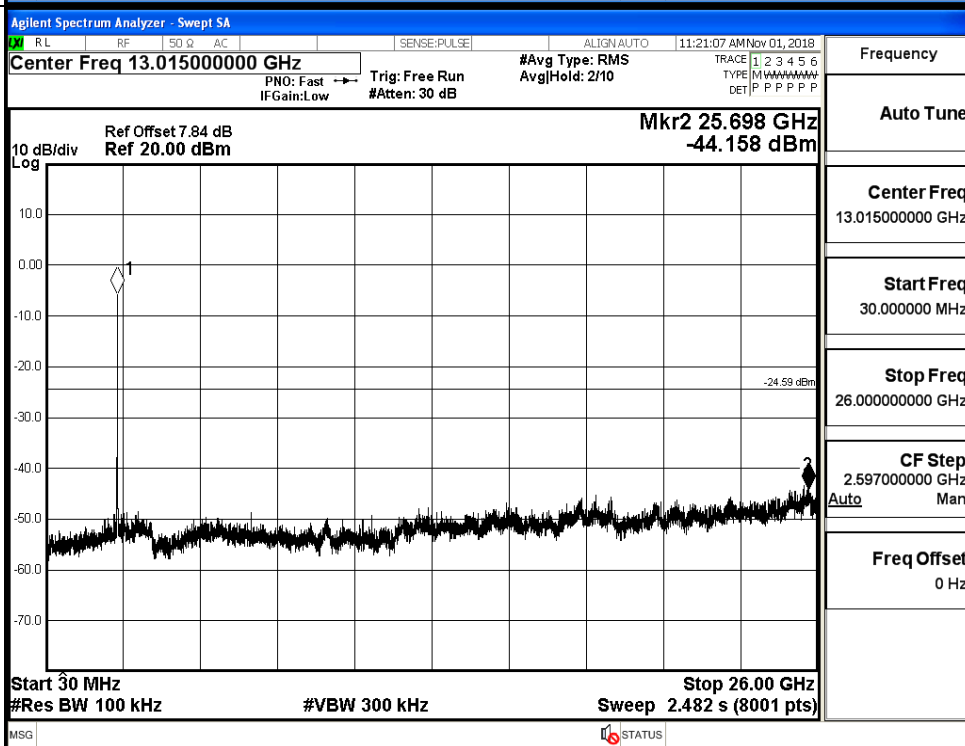
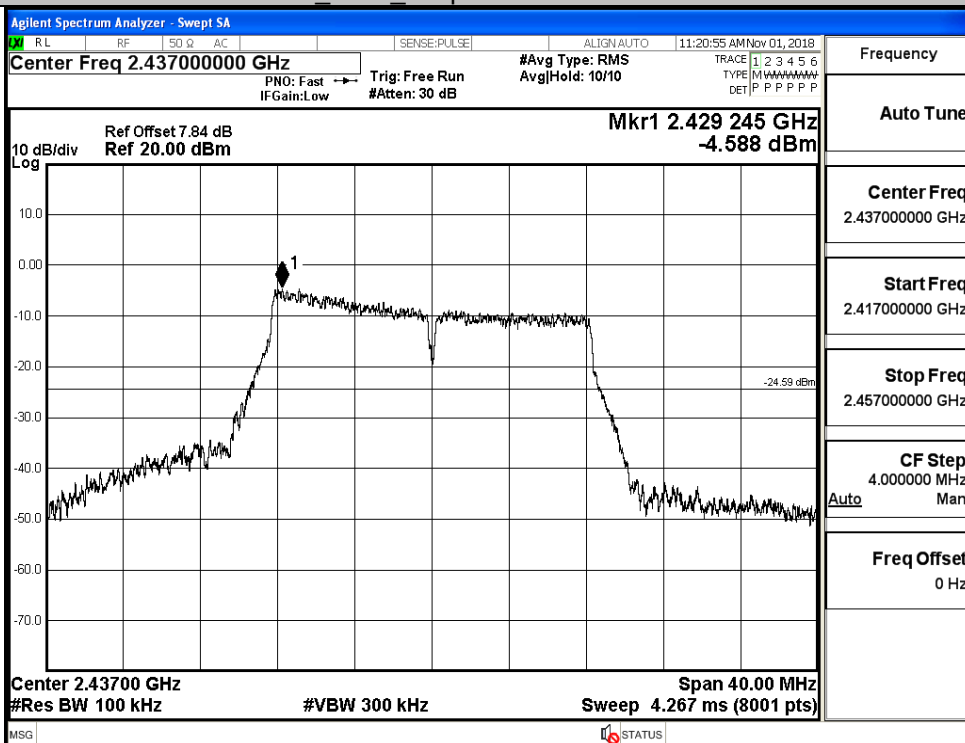
Pref/11G/LCH



Puw/11G/LCH

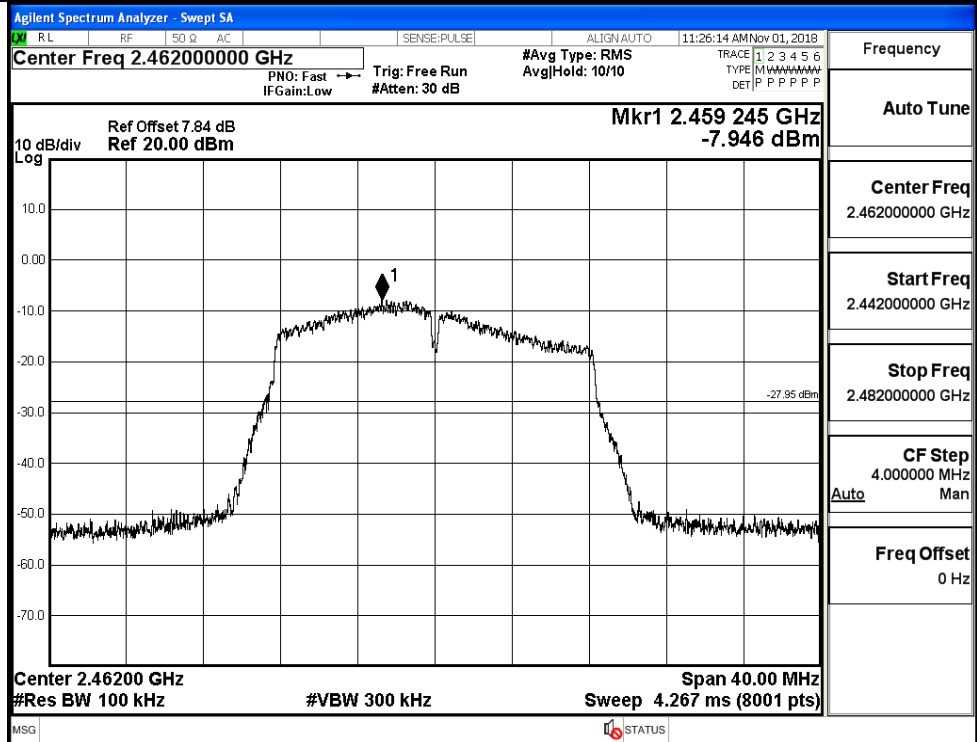


11G_MCH_Graphs

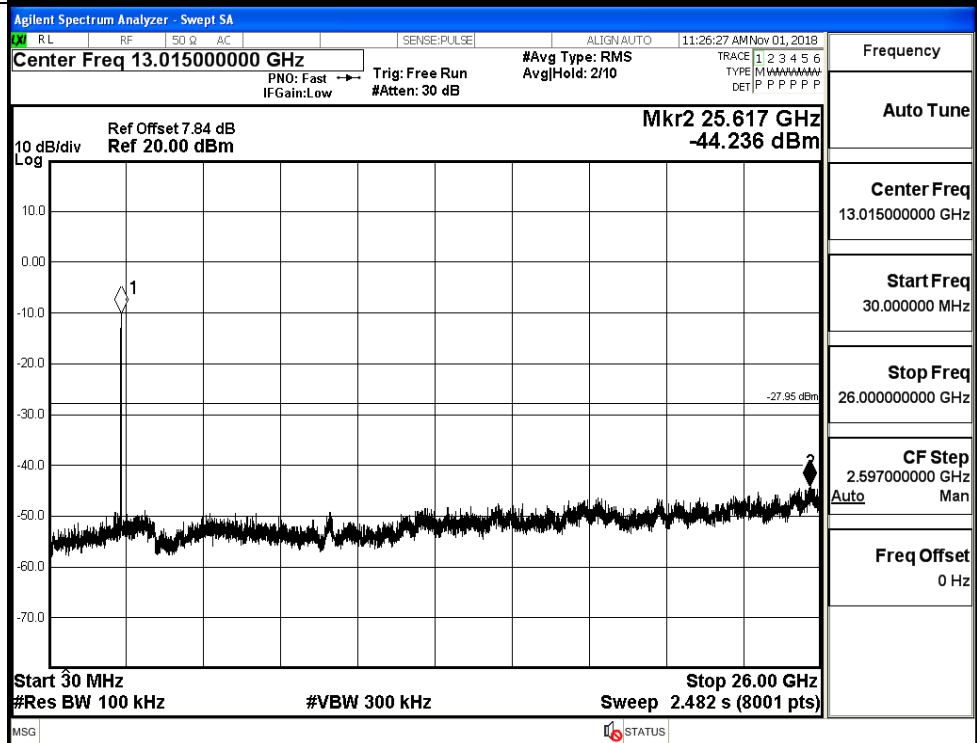


11G HCH Graphs

Pref/11G/HCH

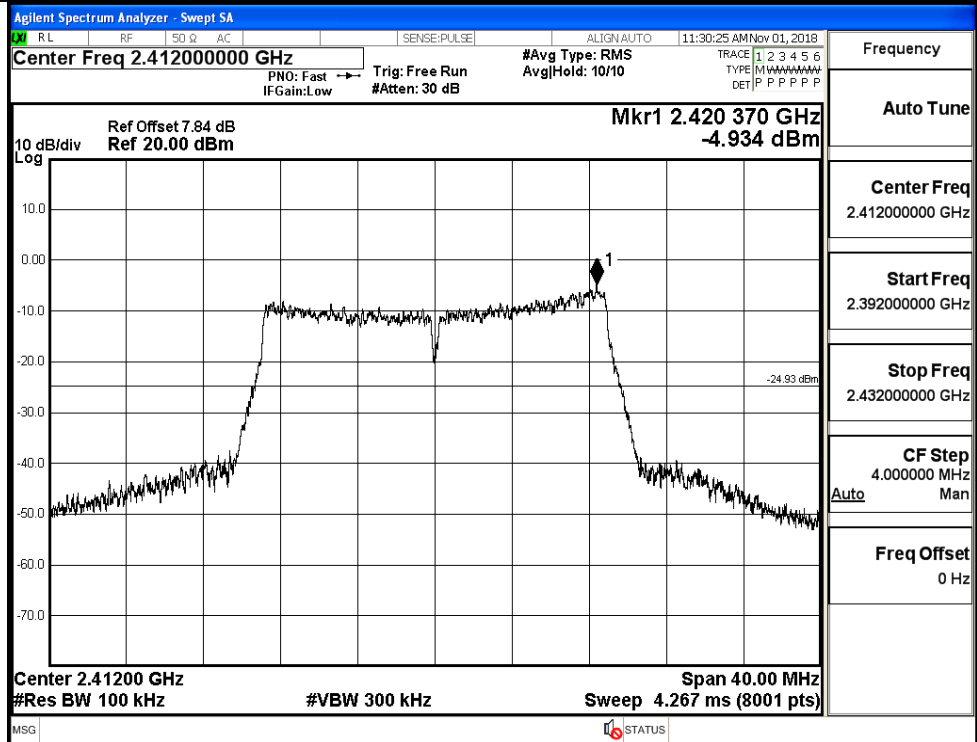


Puw/11G/HCH

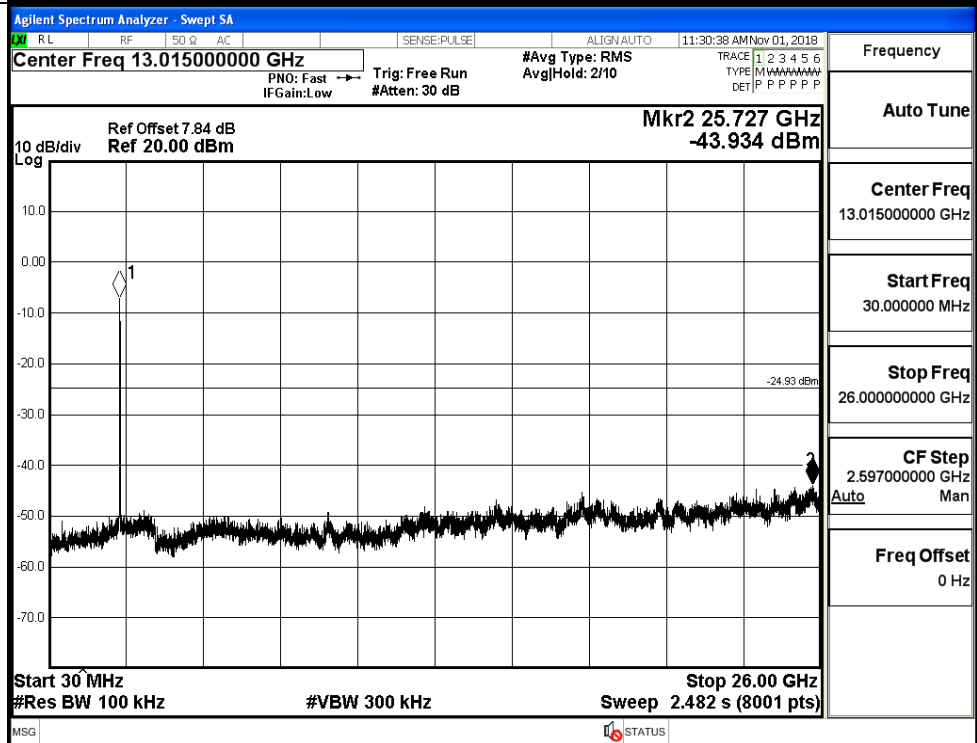


11N20SISO LCH Graphs

Pref/11N20SIS
O/LCH

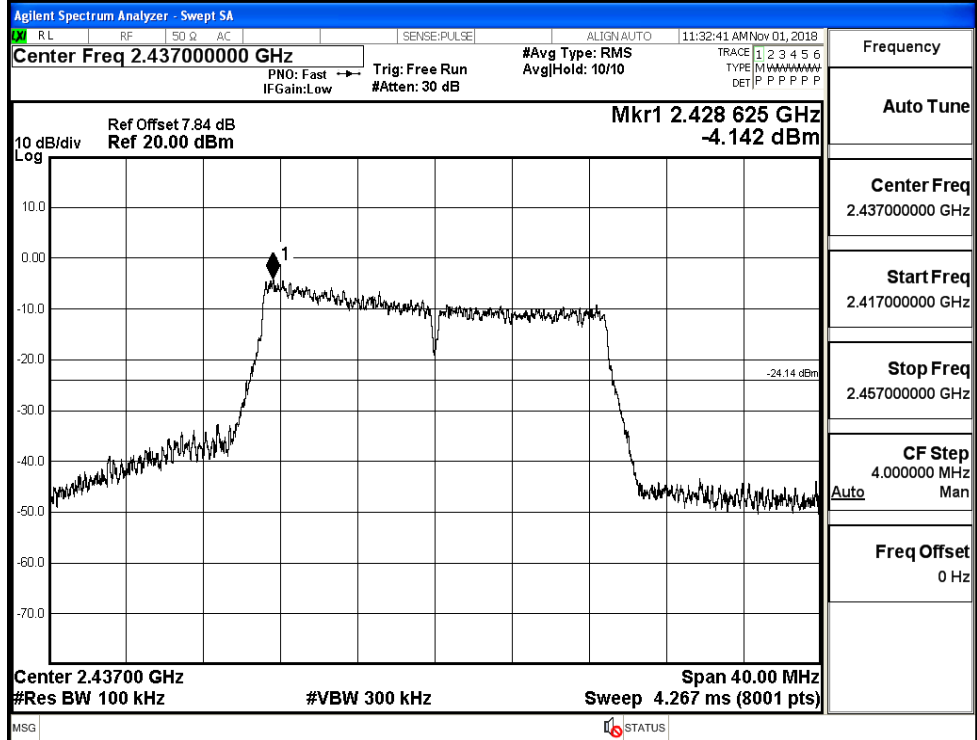


Puw/11N20
SISO/LCH

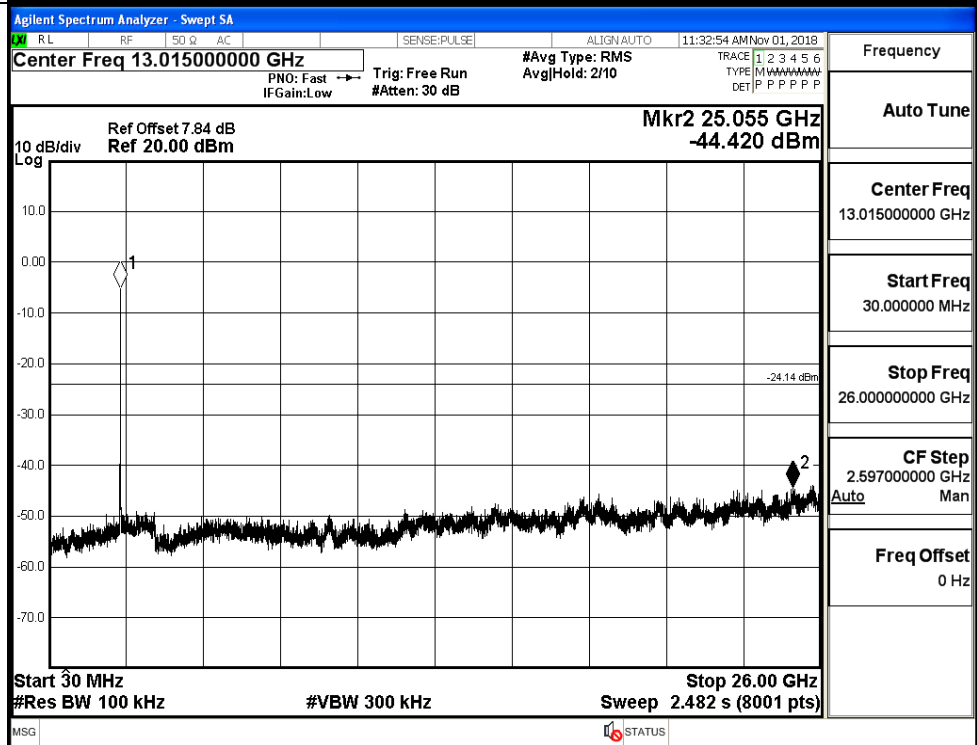


11N20SISO_MCH_Graphs

Pref/11N20
SISO/MCH

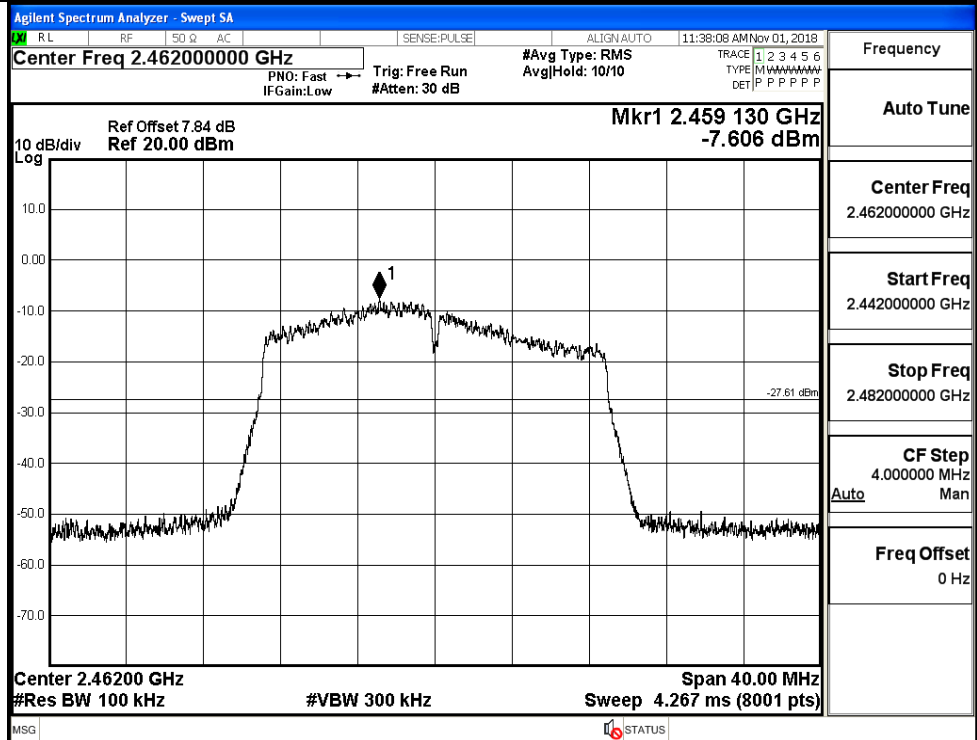


Puw/11N20
SISO/MCH

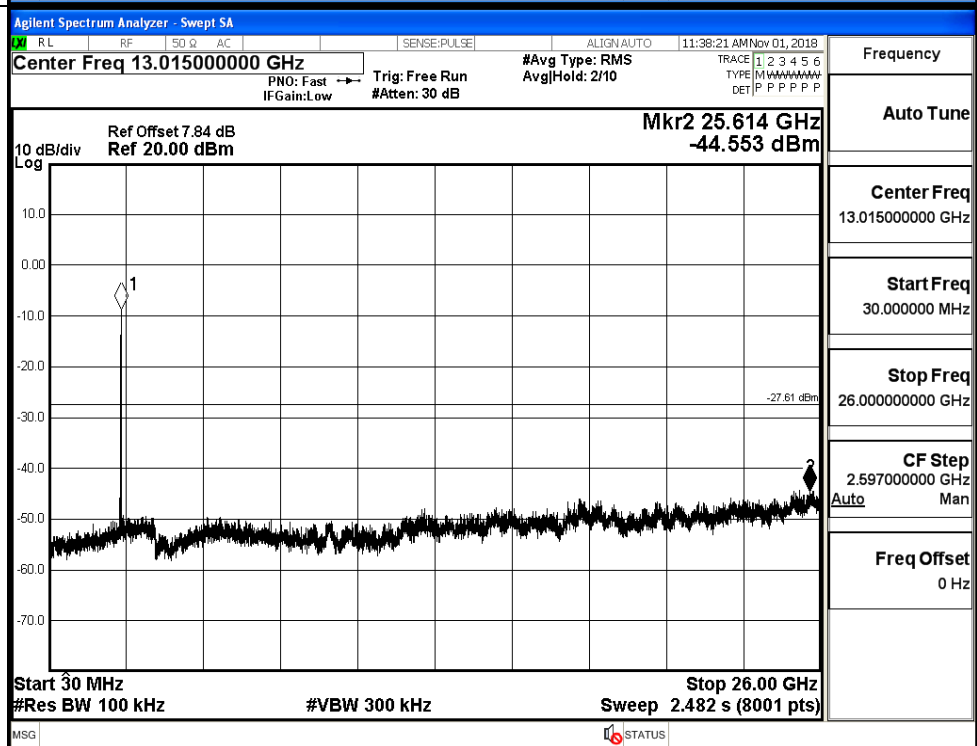


11N20SISO HCH Graphs

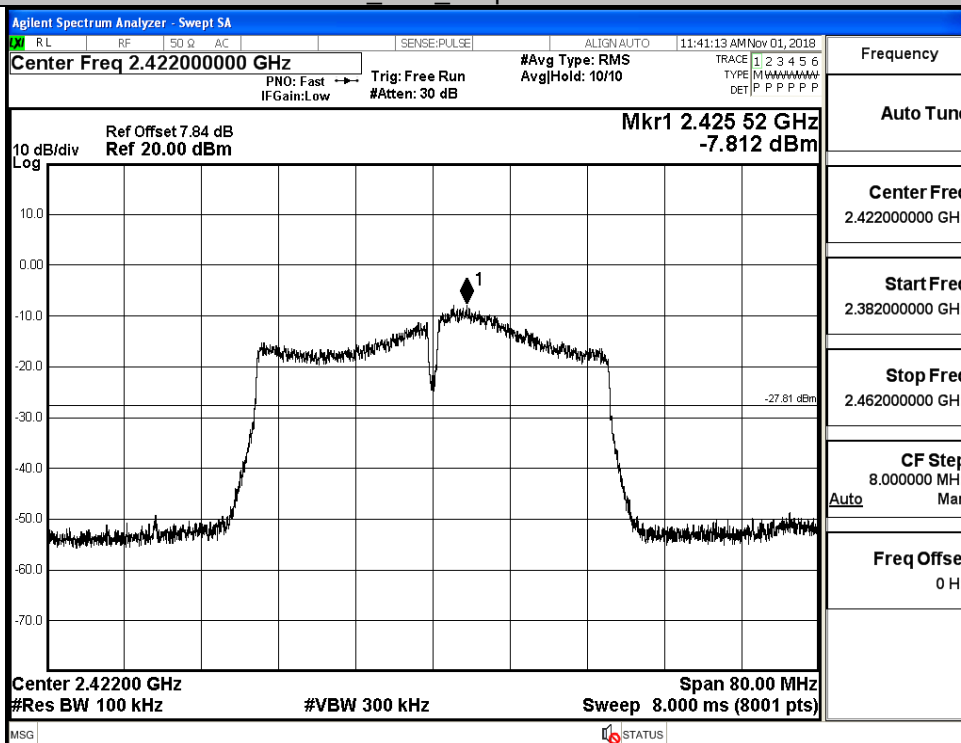
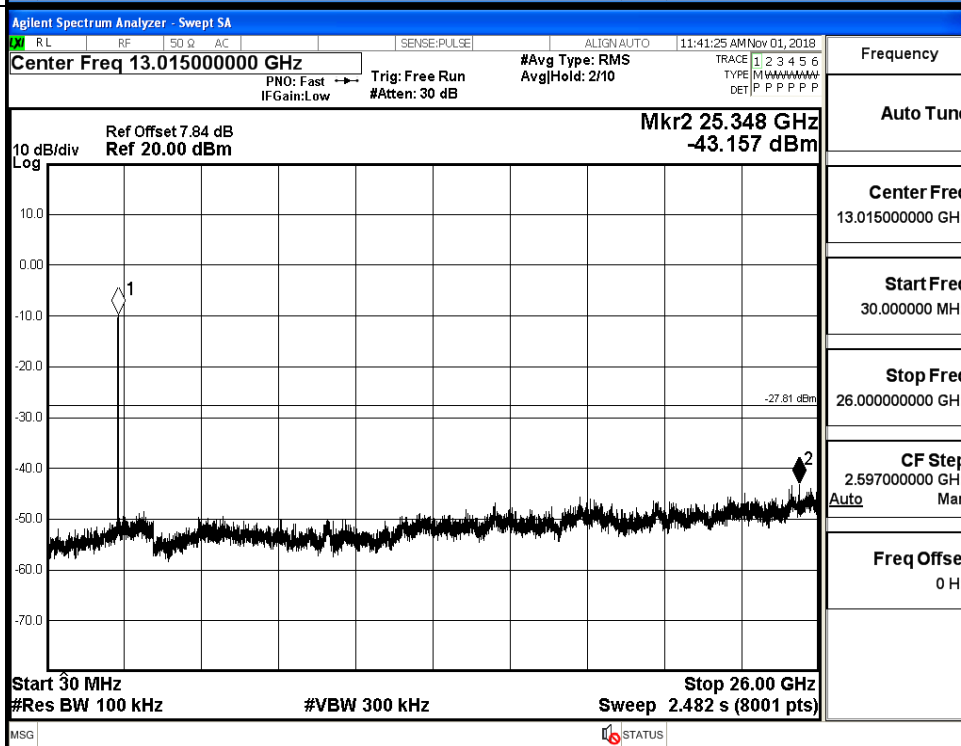
Pref/11N20
SISO/HCH



Puw/11N20
SISO/HCH

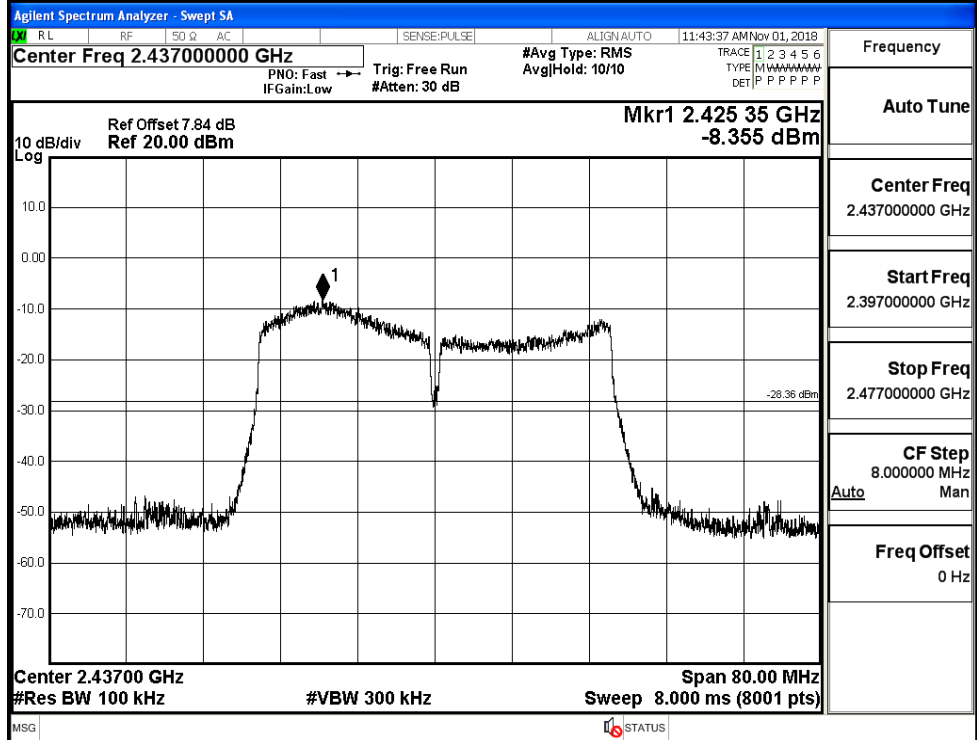


11N40SISO LCH Graphs

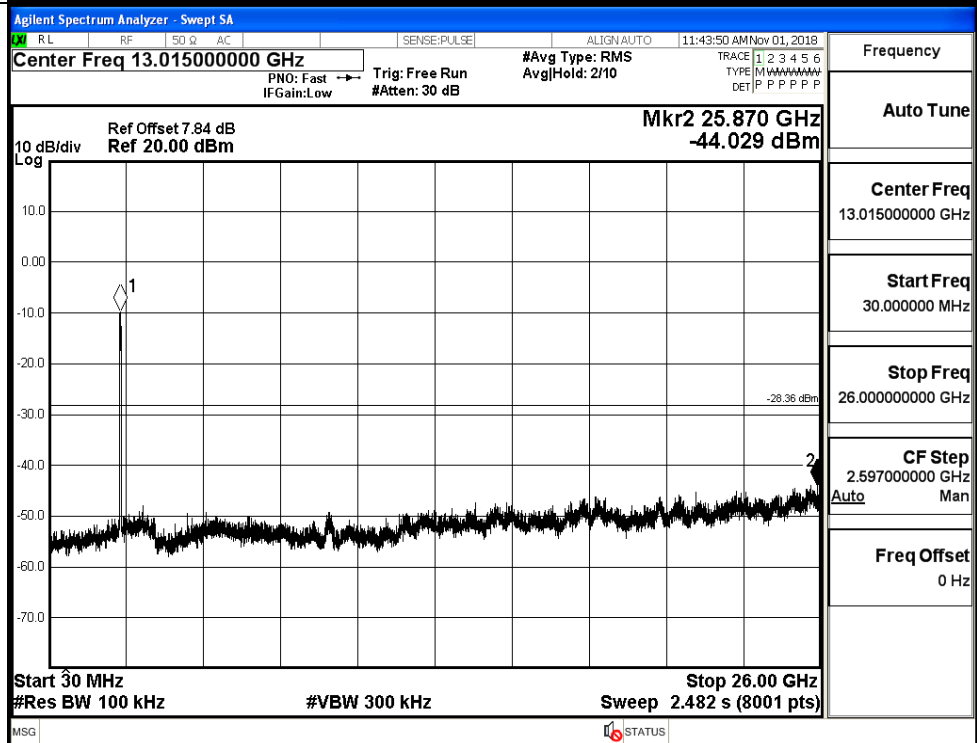
Pref/11N40
SISO/LCHPuw/11N40
SISO/LCH

11N40SISO_MCH_Graphs

Pref/11N40
SISO/MCH

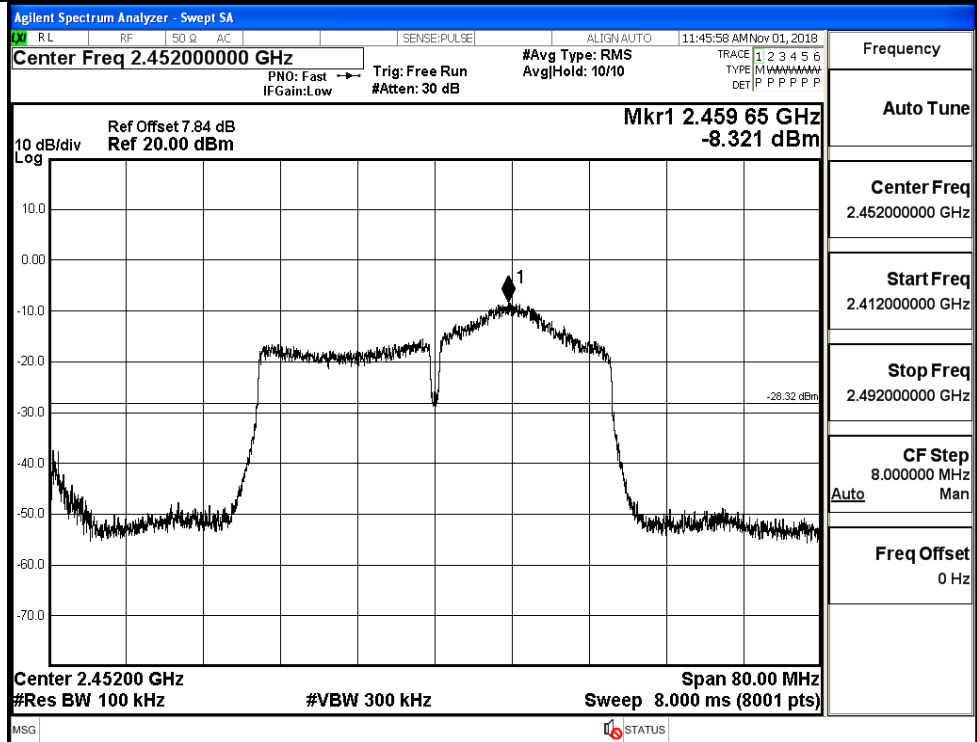


Puw/11N40
SISO/MCH

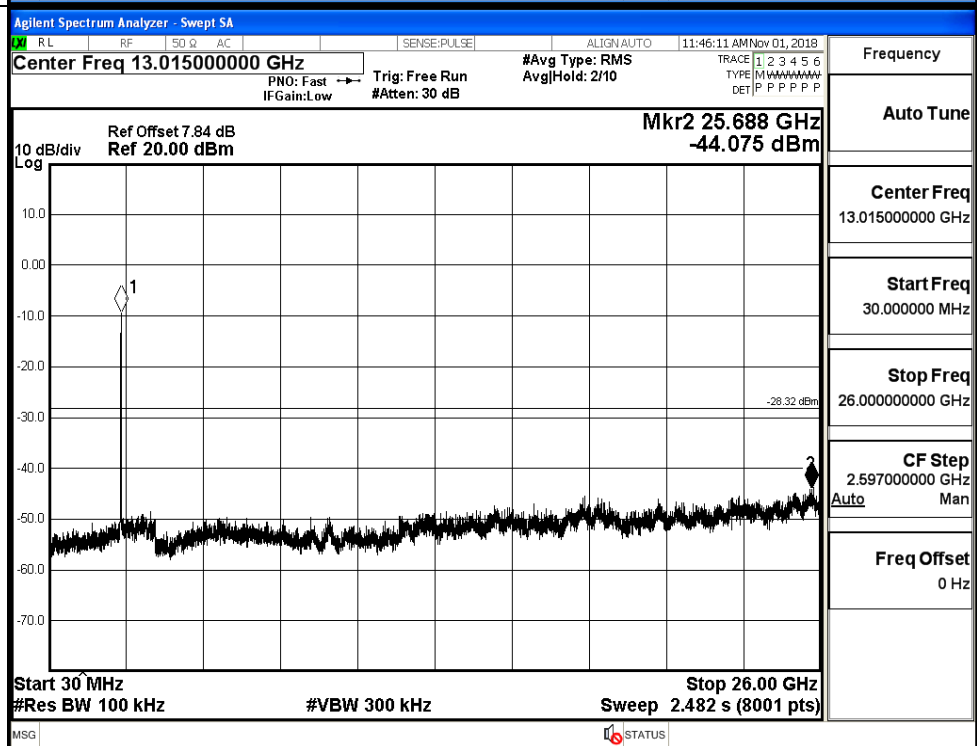


11N40SISO HCH Graphs

Pref/11N40
SISO/HCH



Puw/11N40
SISO/HCH

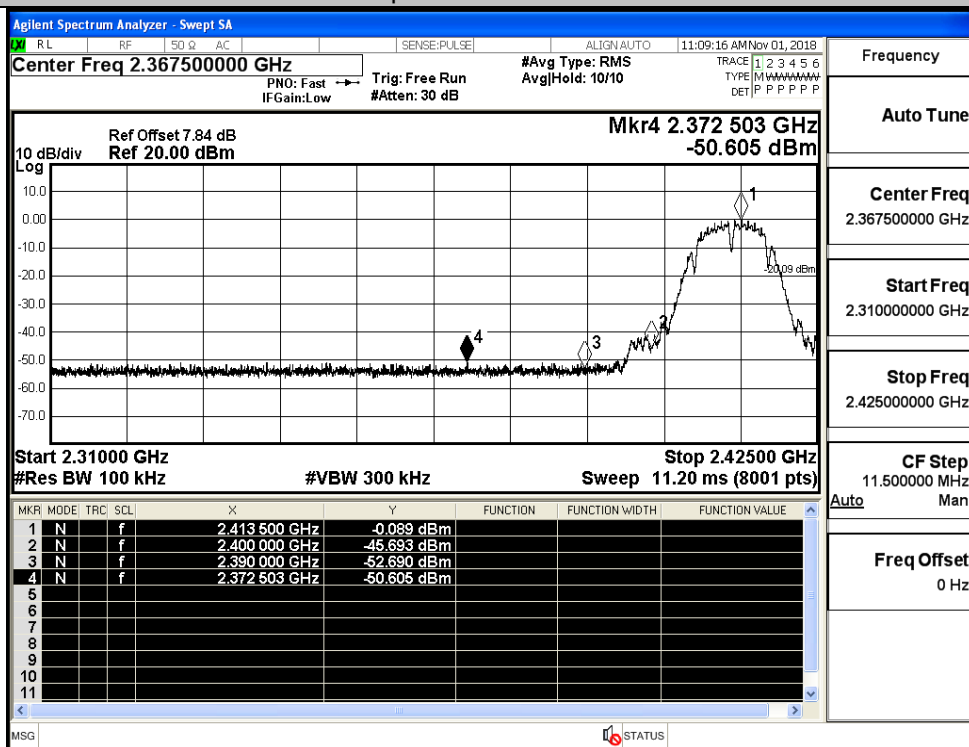


C.7 Band-edge for RF Conducted Emissions

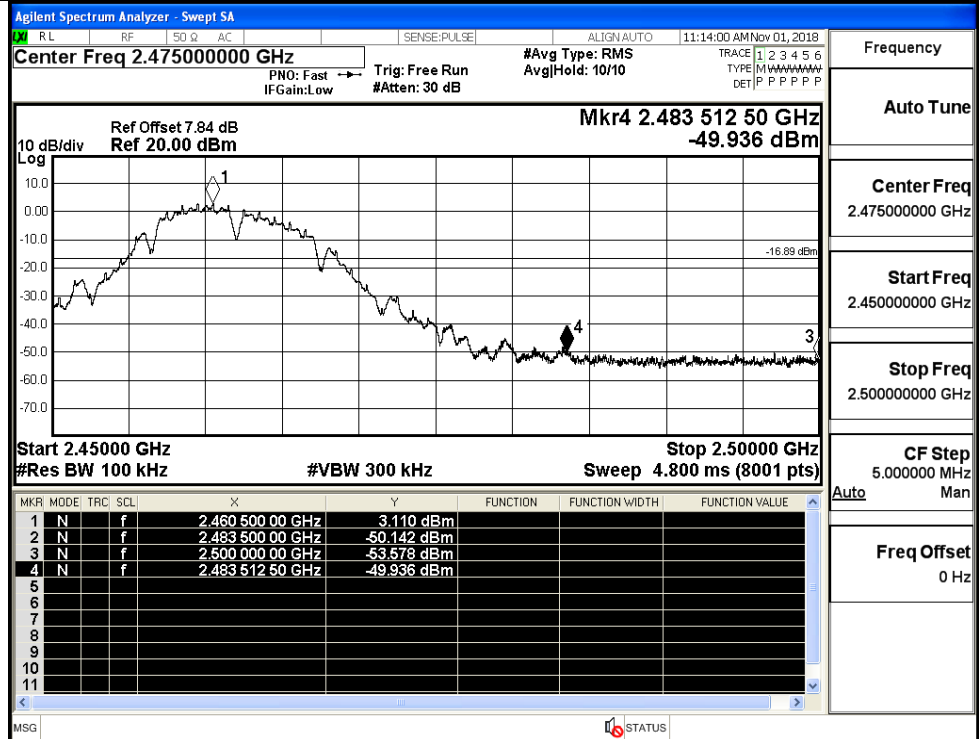
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	-0.089	-50.605	-20.09	PASS
	HCH	3.110	-49.936	-16.89	PASS
11G	LCH	-7.259	-50.179	-27.26	PASS
	HCH	-7.771	-49.581	-27.77	PASS
11N20SISO	LCH	-5.108	-50.157	-25.11	PASS
	HCH	-7.531	-50.320	-27.53	PASS
11N40SISO	LCH	-8.137	-50.499	-28.14	PASS
	HCH	-8.124	-49.019	-28.12	PASS

Test Graphs

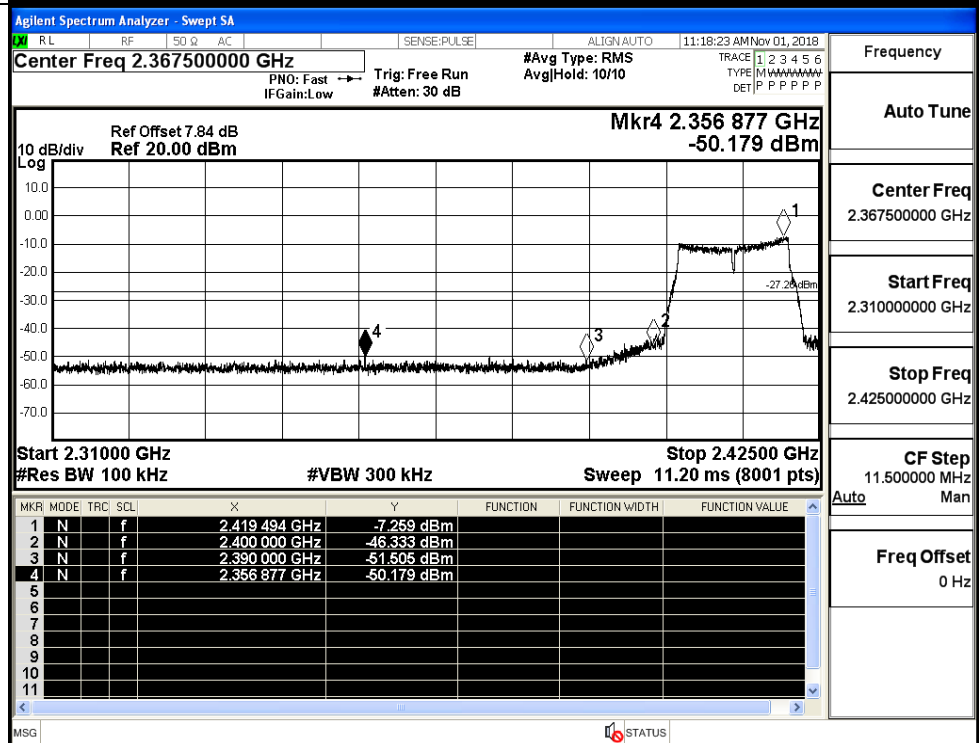
11B/LCH



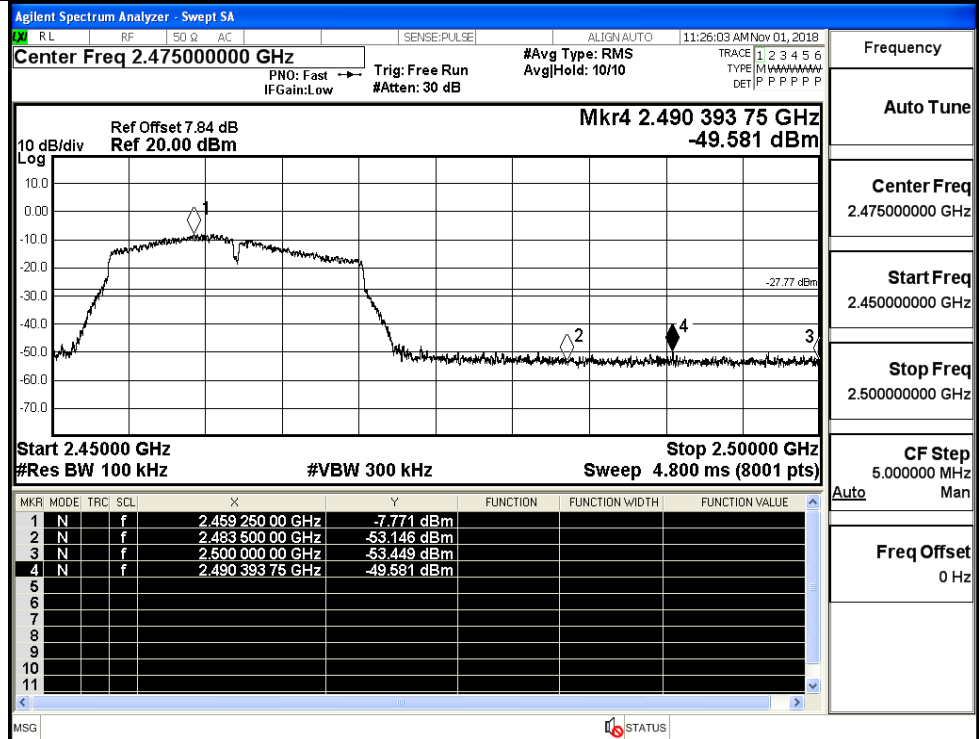
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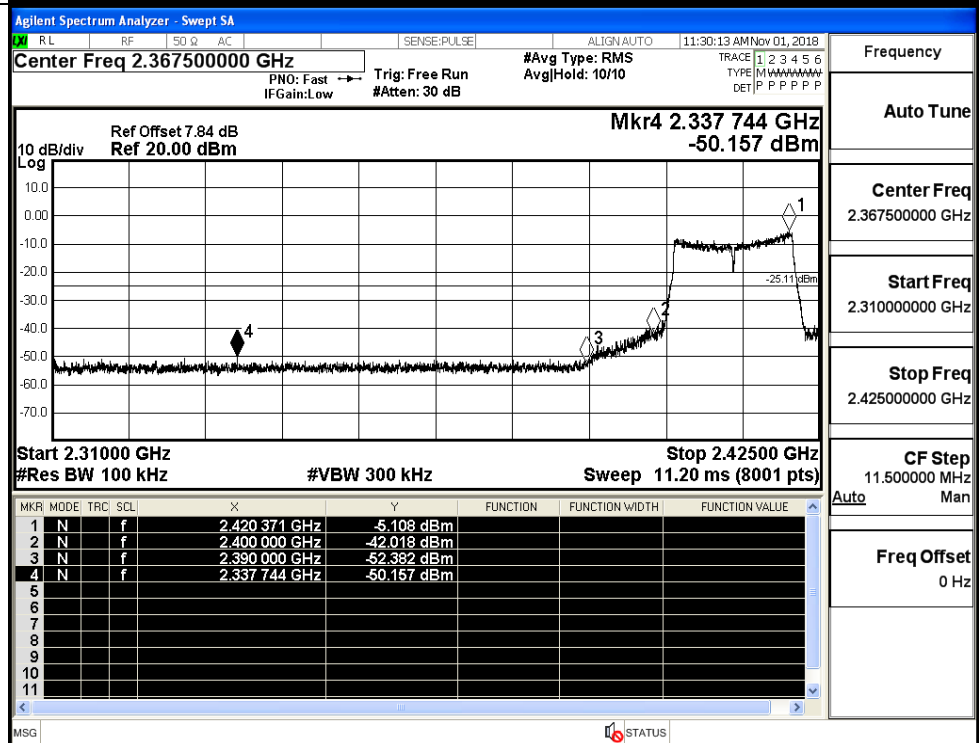
11G/LCH



11G/HCH



11N20SISO/LCH



11N20SISO/HCH

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.475000000 GHz

Ref Offset 7.84 dB
Ref 20.00 dBm

Mkr4 2.488 987 50 GHz
-50.320 dBm

10 dB/div
Log

Start 2.45000 GHz
#Res BW 100 kHz

#VBW 300 kHz

Stop 2.50000 GHz
Sweep 4.800 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.459 125 00 GHz	-7.531 dBm			
2	N		f	2.483 500 00 GHz	-52.018 dBm			
3	N		f	2.500 000 00 GHz	-53.561 dBm			
4	N		f	2.488 987 50 GHz	-50.320 dBm			

MSG STATUS

Frequency

Auto Tune

Center Freq
2.475000000 GHz

Start Freq
2.450000000 GHz

Stop Freq
2.500000000 GHz

CF Step
5.000000 MHz

Auto Man

Freq Offset
0 Hz

11N40SISO/LCH

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.377500000 GHz

Ref Offset 7.84 dB
Ref 20.00 dBm

Mkr4 2.387 051 GHz
-50.499 dBm

10 dB/div
Log

Start 2.31000 GHz
#Res BW 100 kHz

#VBW 300 kHz

Stop 2.44500 GHz
Sweep 13.33 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.424 126 GHz	-8.137 dBm			
2	N		f	2.400 000 GHz	-52.799 dBm			
3	N		f	2.390 000 GHz	-53.519 dBm			
4	N		f	2.387 051 GHz	-50.499 dBm			

MSG STATUS

Frequency

Auto Tune

Center Freq
2.377500000 GHz

Start Freq
2.310000000 GHz

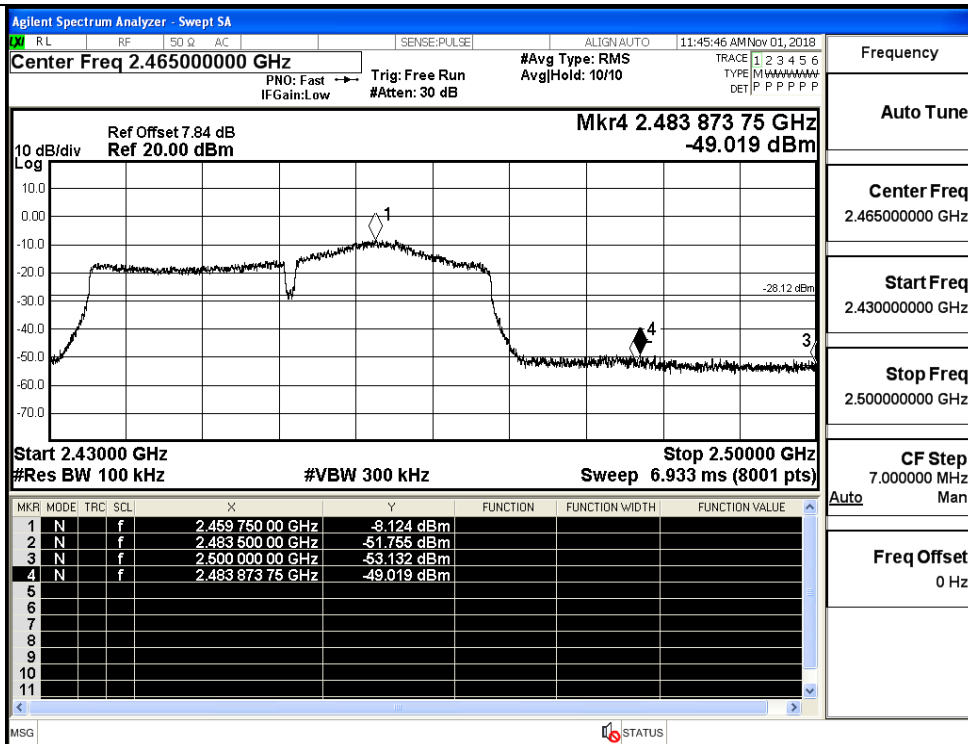
Stop Freq
2.445000000 GHz

CF Step
13.500000 MHz

Auto Man

Freq Offset
0 Hz

11N40SISO/HCH

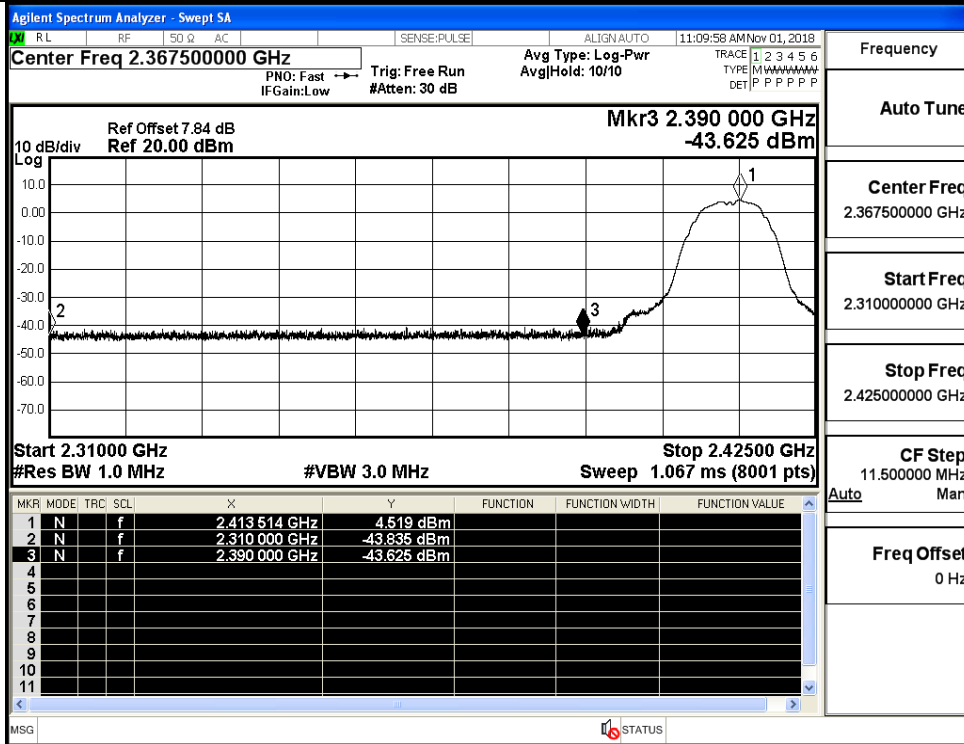


C.8 Restrict-band band-edge measurements

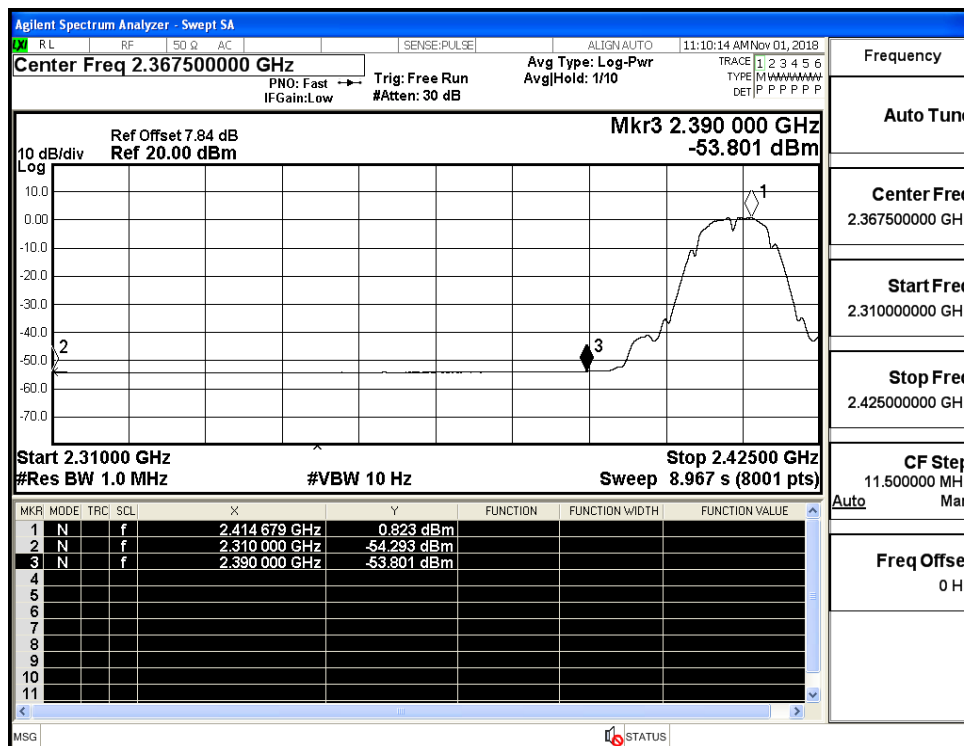
Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
11B	2412	Ant1	2310.0	-43.84	3.5	0	54.92	PEAK	74	PASS
	2412	Ant1	2310.0	-54.29	3.5	0	44.47	AV	54	PASS
	2412	Ant1	2390.0	-43.63	3.5	0	55.13	PEAK	74	PASS
	2412	Ant1	2390.0	-53.80	3.5	0	44.96	AV	54	PASS
	2462	Ant1	2483.5	-41.12	3.5	0	57.64	PEAK	74	PASS
	2462	Ant1	2483.5	-50.72	3.5	0	48.04	AV	54	PASS
	2462	Ant1	2500.0	-43.12	3.5	0	55.64	PEAK	74	PASS
	2462	Ant1	2500.0	-53.64	3.5	0	45.12	AV	54	PASS
11G	2412	Ant1	2310.0	-41.87	3.5	0	56.89	PEAK	74	PASS
	2412	Ant1	2310.0	-54.28	3.5	0	44.48	AV	54	PASS
	2412	Ant1	2390.0	-43.42	3.5	0	55.34	PEAK	74	PASS
	2412	Ant1	2390.0	-53.62	3.5	0	45.14	AV	54	PASS
	2462	Ant1	2483.5	-43.79	3.5	0	54.97	PEAK	74	PASS
	2462	Ant1	2483.5	-53.35	3.5	0	45.41	AV	54	PASS
	2462	Ant1	2500.0	-43.72	3.5	0	55.04	PEAK	74	PASS
	2462	Ant1	2500.0	-53.67	3.5	0	45.09	AV	54	PASS
11N20 SISO	2412	Ant1	2310.0	-44.39	3.5	0	54.37	PEAK	74	PASS
	2412	Ant1	2310.0	-54.29	3.5	0	44.47	AV	54	PASS
	2412	Ant1	2390.0	-41.07	3.5	0	57.69	PEAK	74	PASS
	2412	Ant1	2390.0	-52.88	3.5	0	45.88	AV	54	PASS
	2462	Ant1	2483.5	-42.88	3.5	0	55.88	PEAK	74	PASS
	2462	Ant1	2483.5	-53.30	3.5	0	45.46	AV	54	PASS
	2462	Ant1	2500.0	-42.67	3.5	0	56.09	PEAK	74	PASS
	2462	Ant1	2500.0	-53.65	3.5	0	45.11	AV	54	PASS
11N40 SISO	2422	Ant1	2310.0	-43.01	3.5	0	55.75	PEAK	74	PASS
	2422	Ant1	2310.0	-54.27	3.5	0	44.49	AV	54	PASS

	2422	Ant1	2390.0	-43.64	3.5	0	55.12	PEAK	74	PASS
	2422	Ant1	2390.0	-53.80	3.5	0	44.96	AV	54	PASS
	2452	Ant1	2483.5	-41.79	3.5	0	56.97	PEAK	74	PASS
	2452	Ant1	2483.5	-51.98	3.5	0	46.78	AV	54	PASS
	2452	Ant1	2500.0	-43.62	3.5	0	55.14	PEAK	74	PASS
	2452	Ant1	2500.0	-53.66	3.5	0	45.10	AV	54	PASS

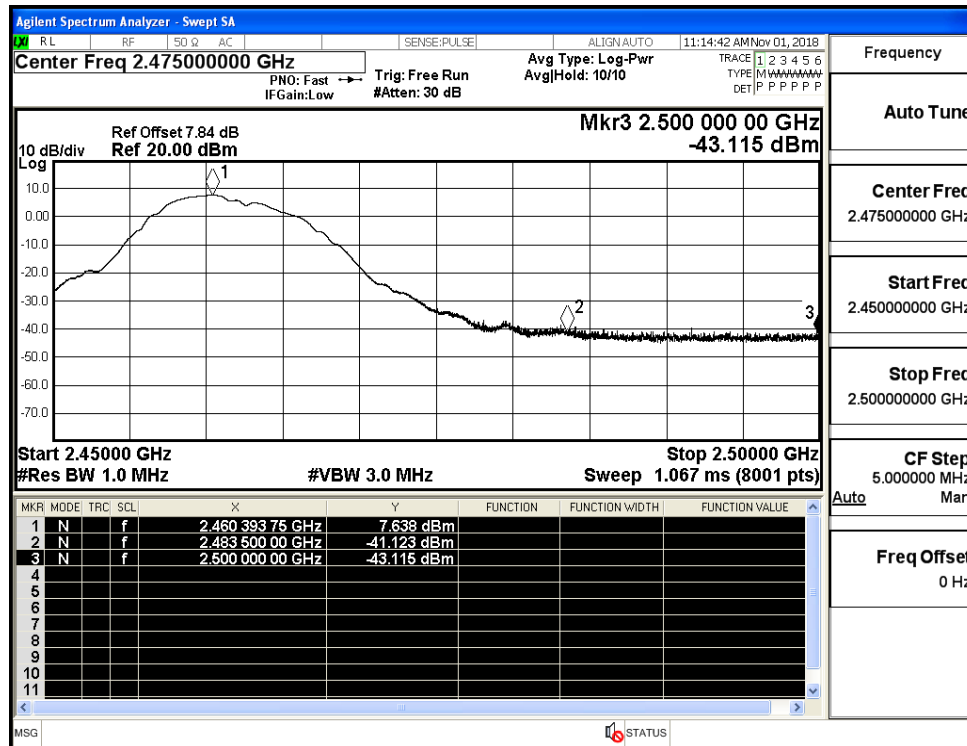
Restrict-band band-edge measurements_11B_2412_Ant1_PEAK



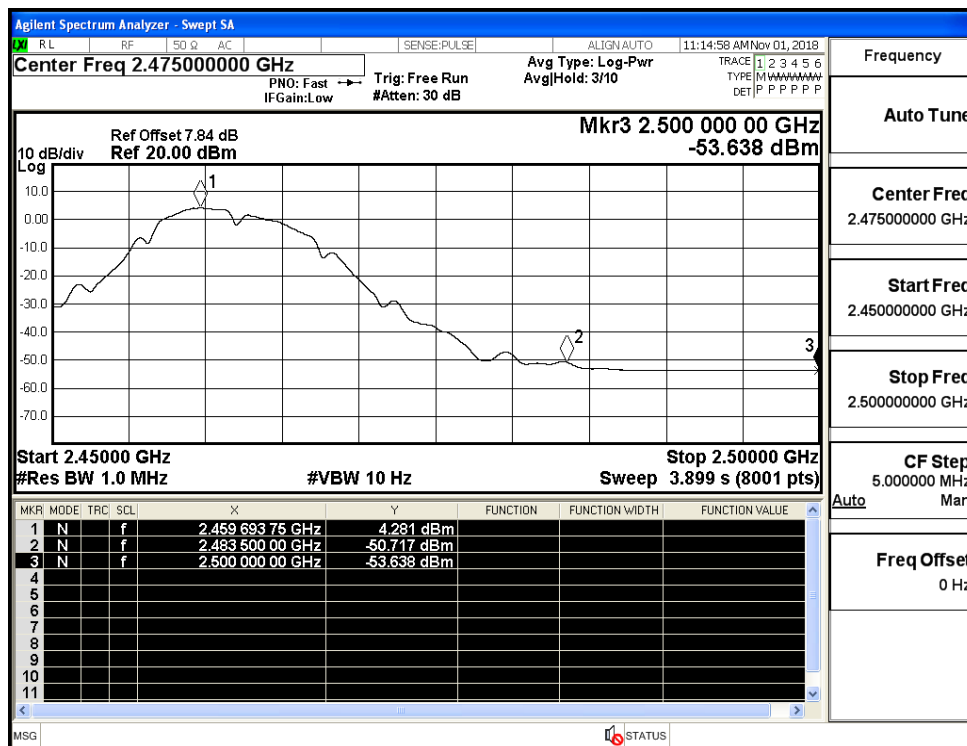
Restrict-band band-edge measurements_11B_2412_Ant1_AV



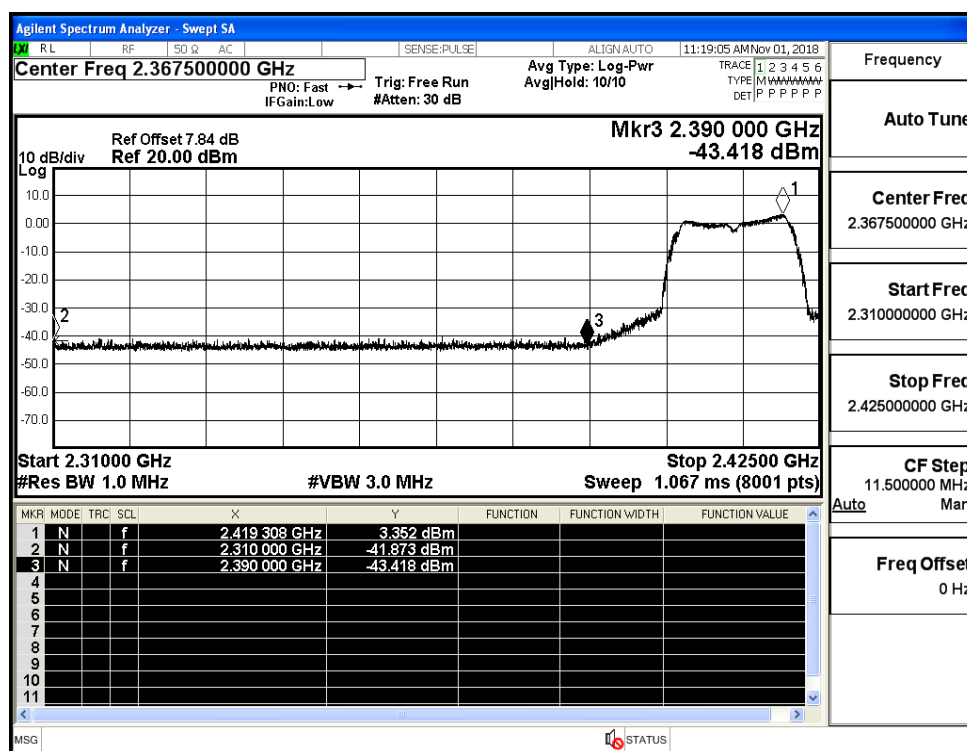
Restrict-band band-edge measurements_11B_2462_Ant1_PEAK



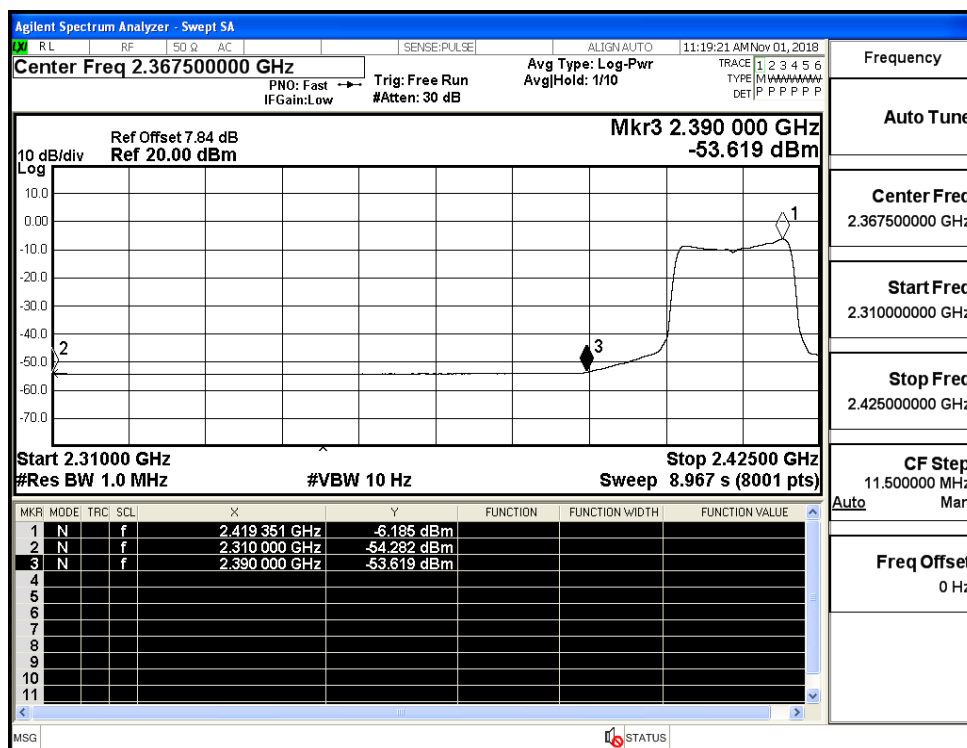
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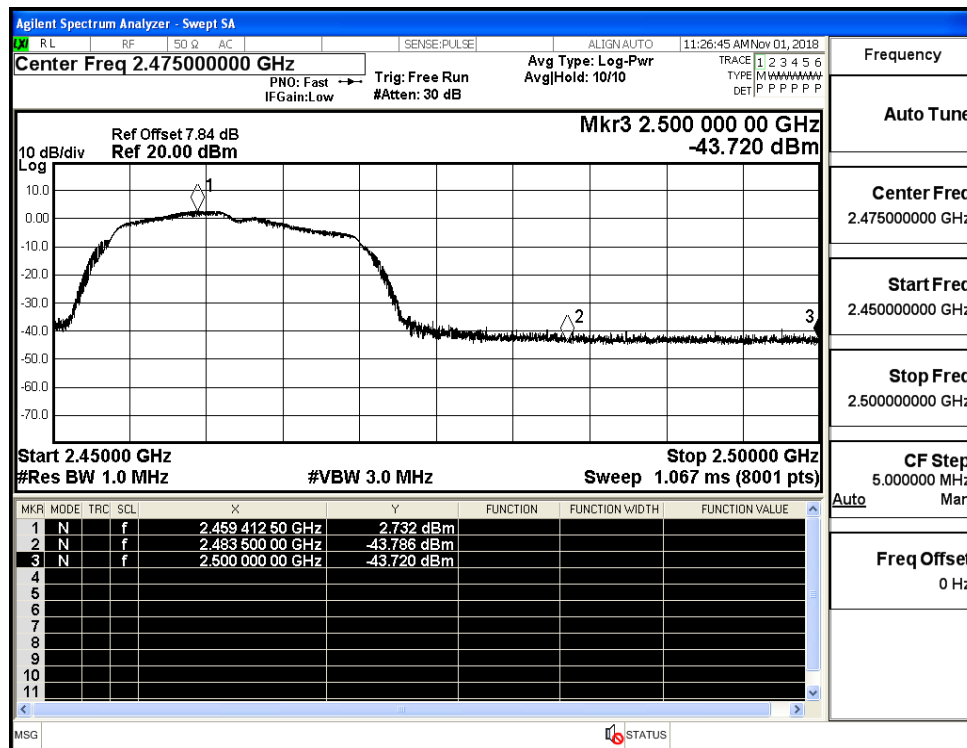
Restrict-band band-edge measurements_11G_2412_Ant1_PEAK



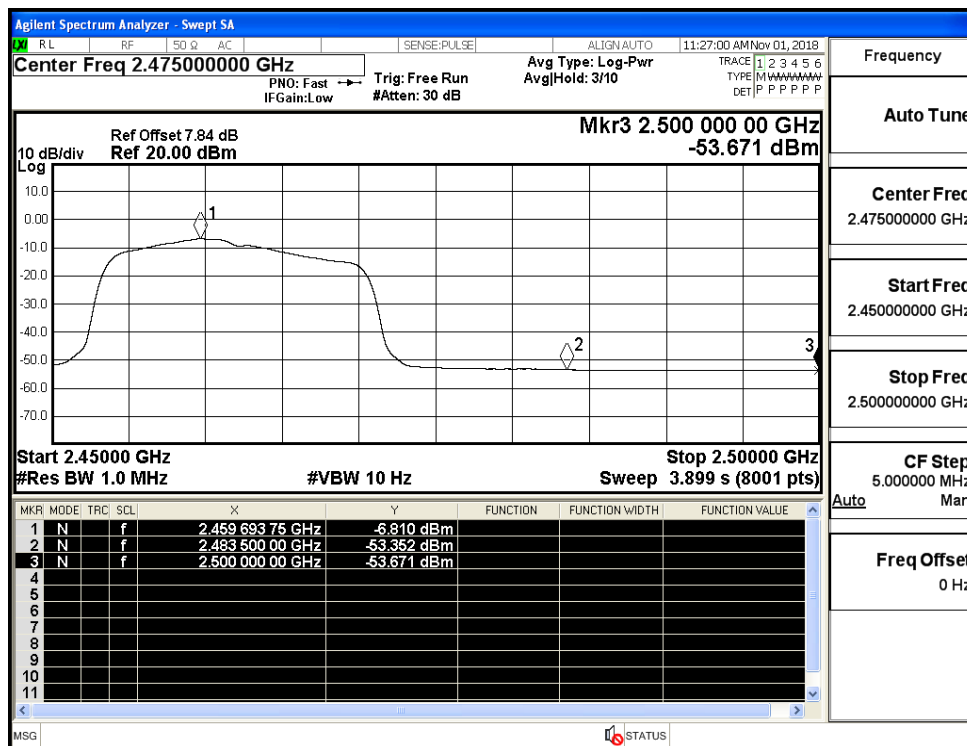
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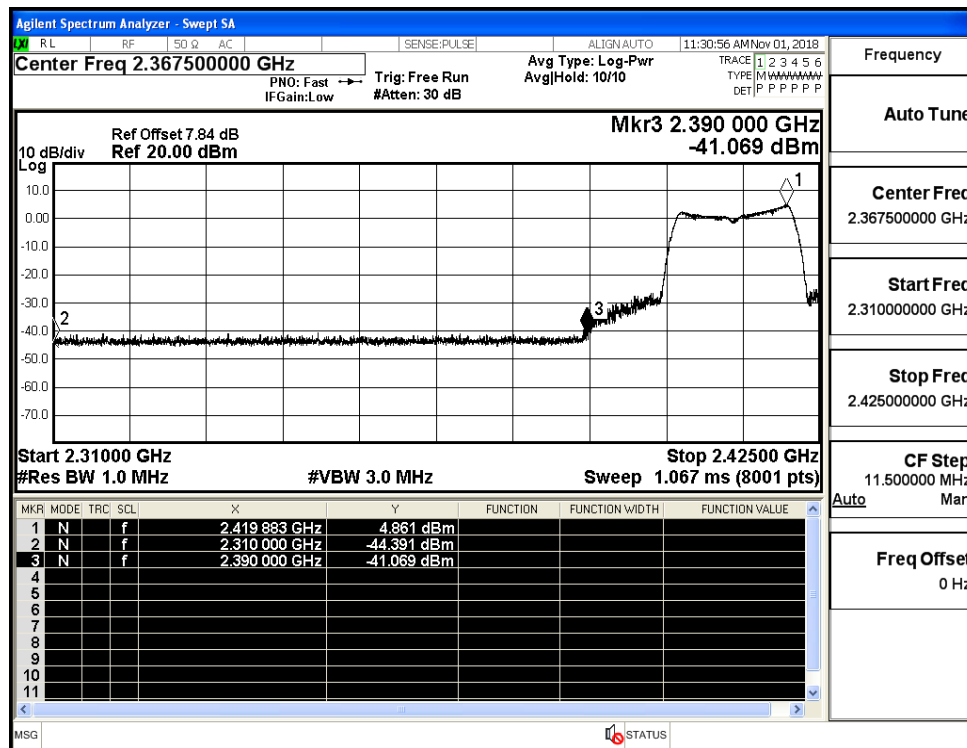
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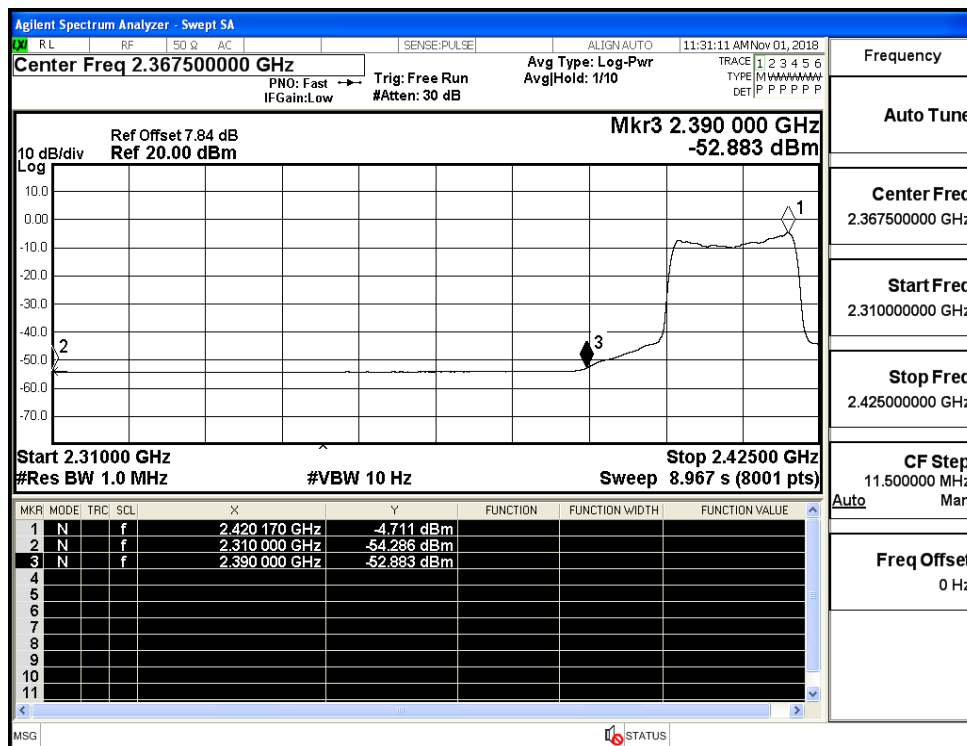
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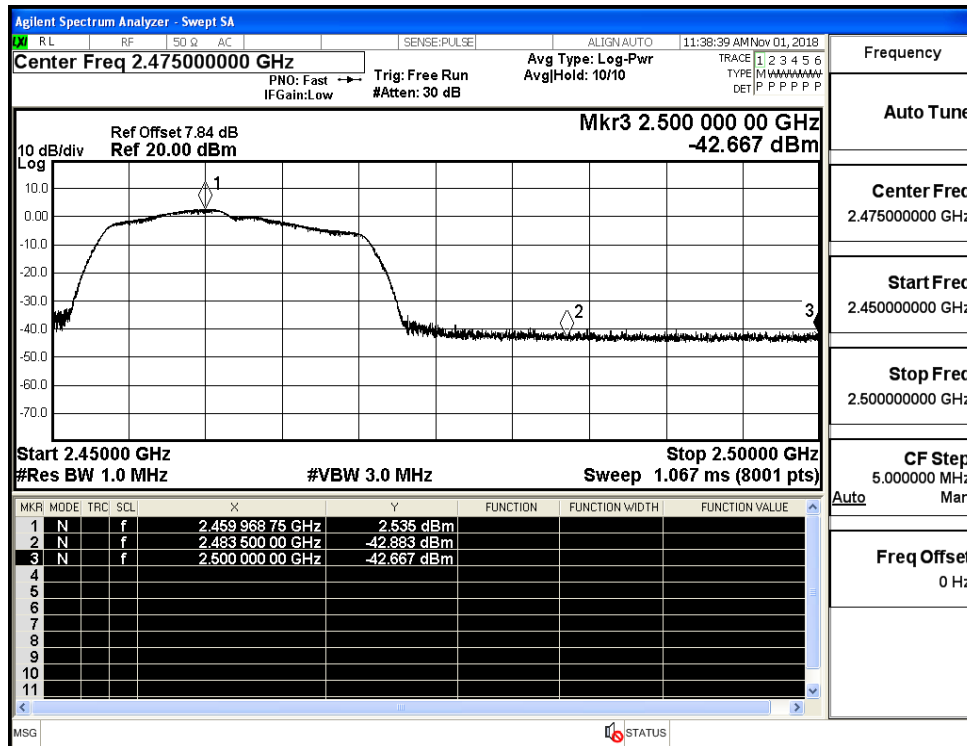
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



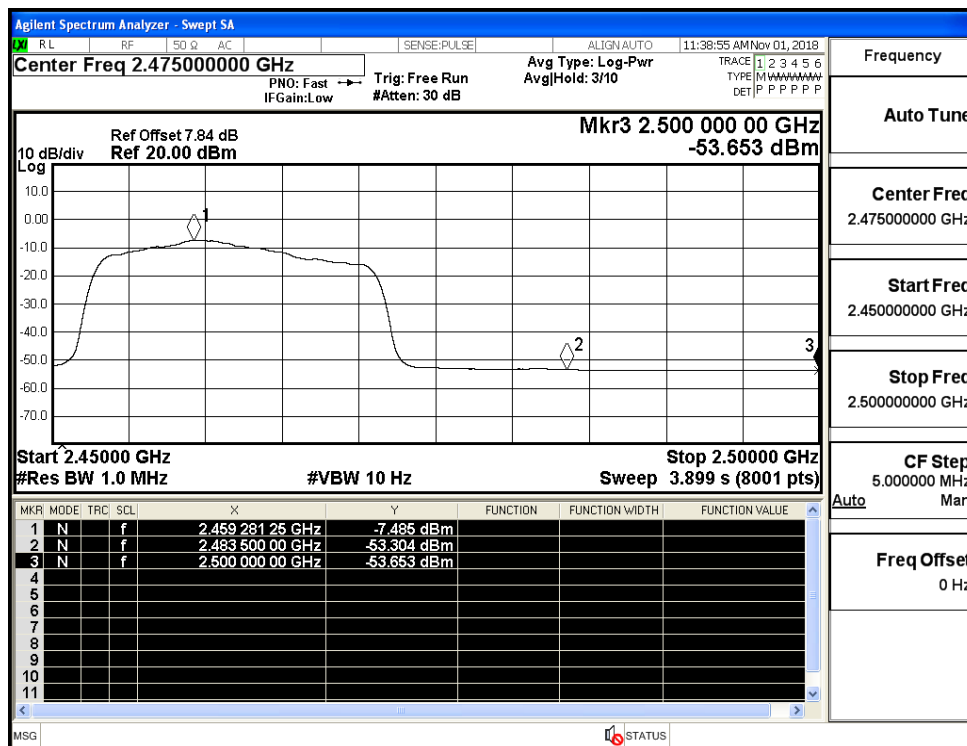
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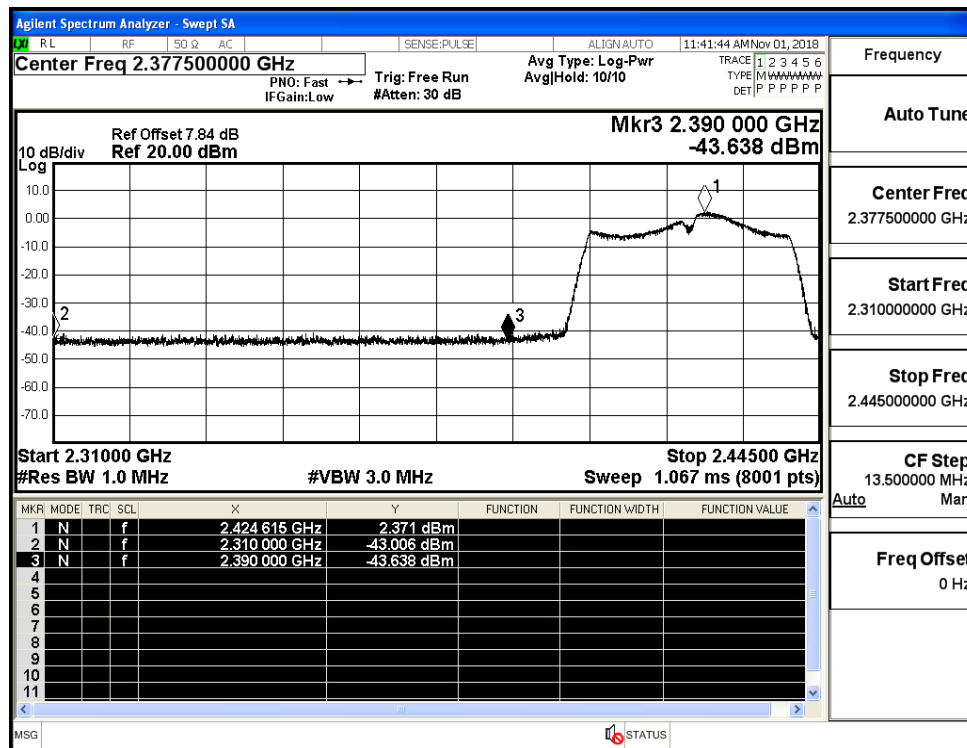
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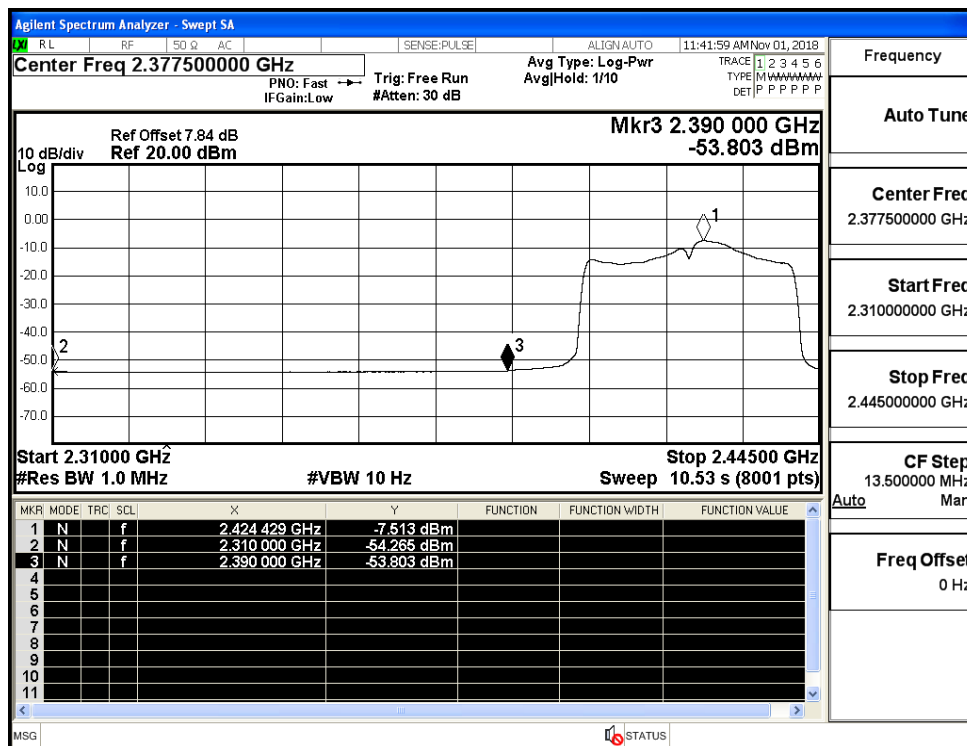
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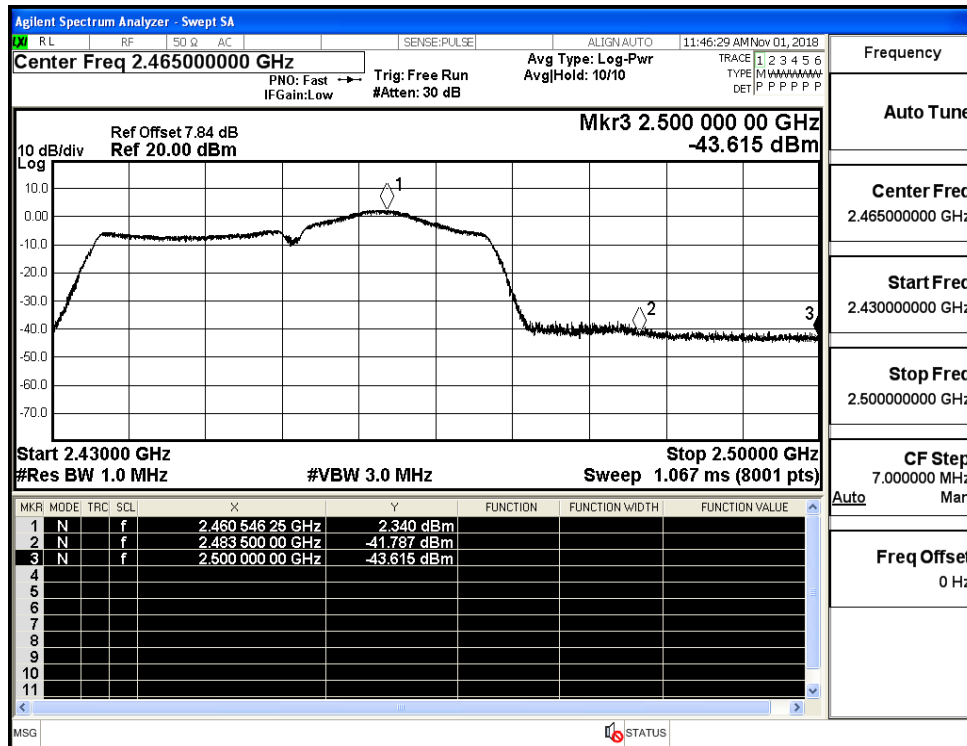
Restrict-band band-edge measurements_11N40SISO_2422_Ant1_PEAK



Restrict-band band-edge measurements_11N40SISO_2422_Ant1_AV



Restrict-band band-edge measurements_11N40SISO_2452_Ant1_PEAK



Restrict-band band-edge measurements_11N40SISO_2452_Ant1_AV

