

Appendix A

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: Smart Plug

Trade Mark: **SIMPNIC**

Test Model: SPG-US-SW

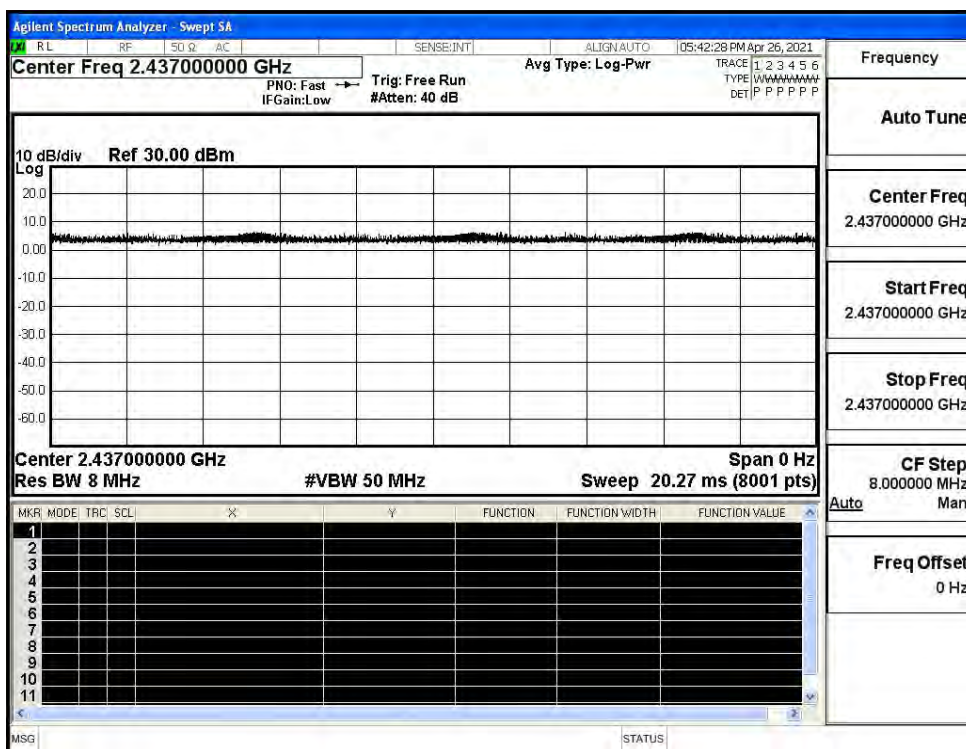
Environmental Conditions

Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Ken He
Supervised by:	Li Huan

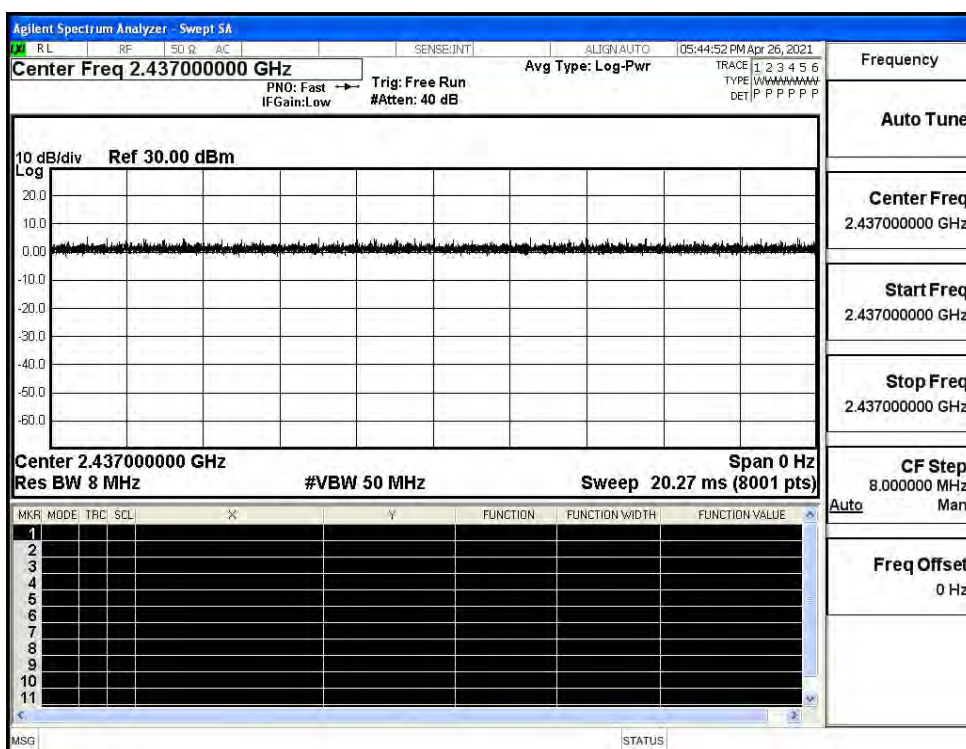
A.1 Duty Cycle

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

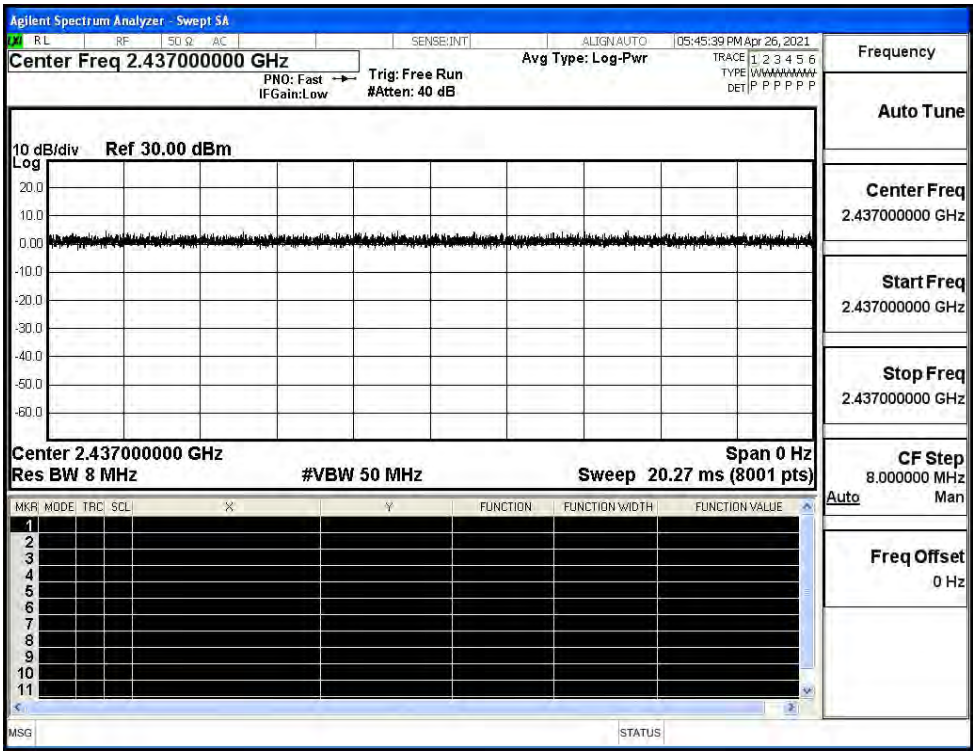
Duty Cycle_11B_2437_Ant1



Duty Cycle_11G_2437_Ant1



Duty Cycle_11N20SISO_2437_Ant1

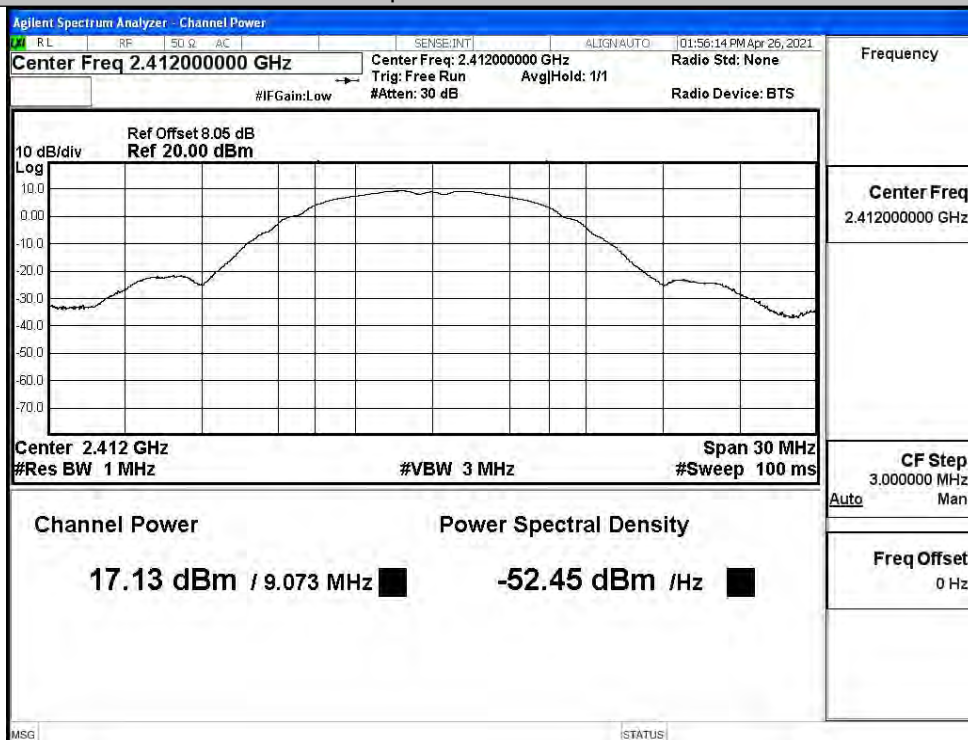


A.2 Maximum Conducted Output Power

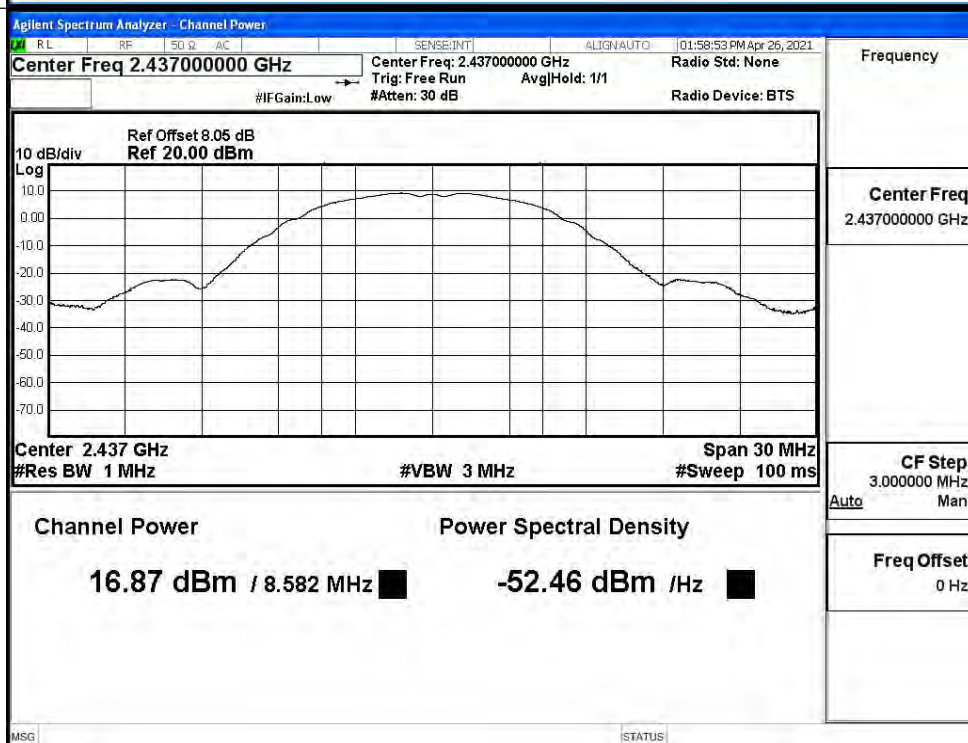
Mode	Channel	Meas.Level [dBm]	Limit [dBm]	Verdict
11B	LCH	17.13	30	PASS
	MCH	16.87	30	PASS
	HCH	15.86	30	PASS
11G	LCH	16.96	30	PASS
	MCH	17.21	30	PASS
	HCH	16.23	30	PASS
11N20SISO	LCH	17.36	30	PASS
	MCH	17.29	30	PASS
	HCH	16.35	30	PASS

Test Graphs

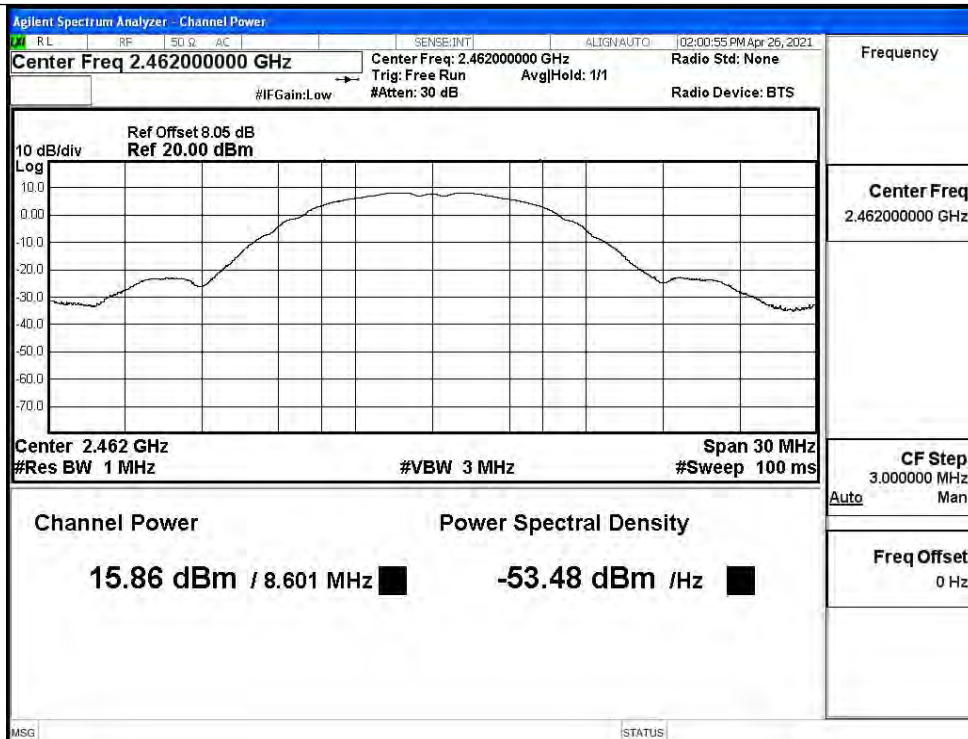
11B/LCH



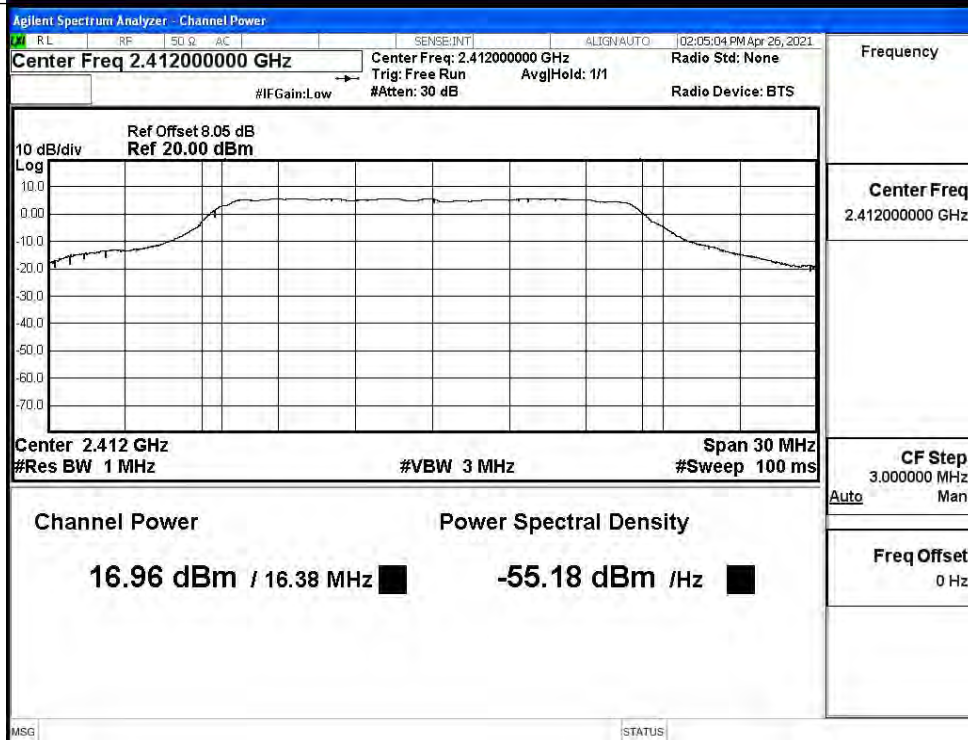
11B/MCH



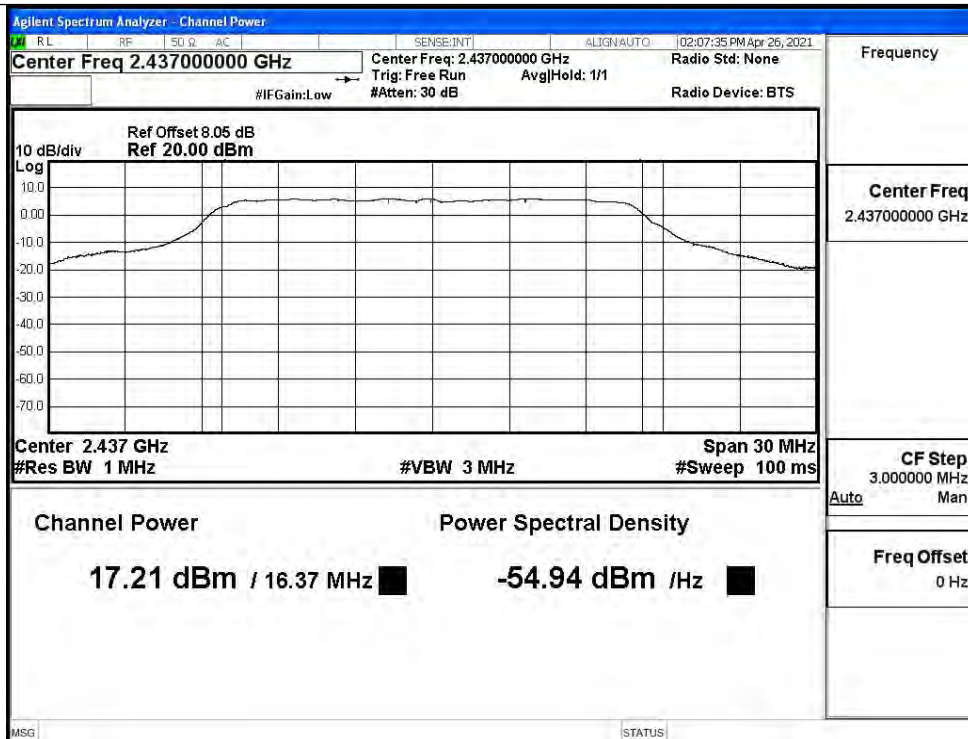
11B/HCH



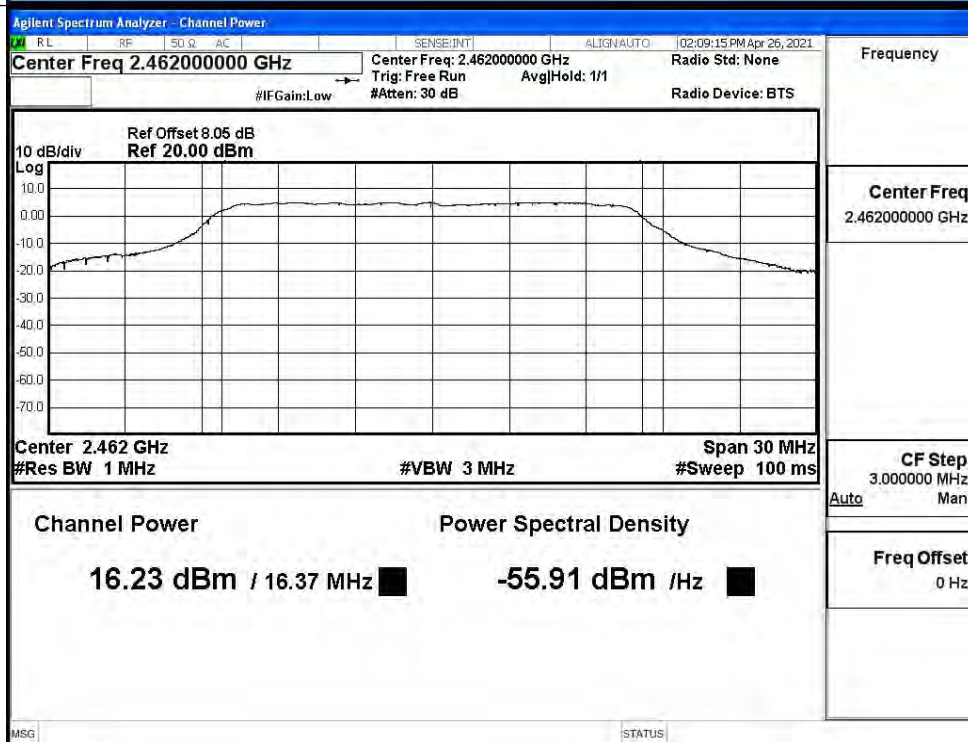
11G/LCH

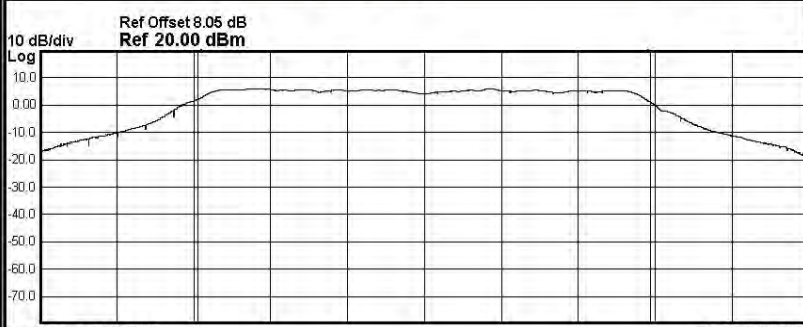
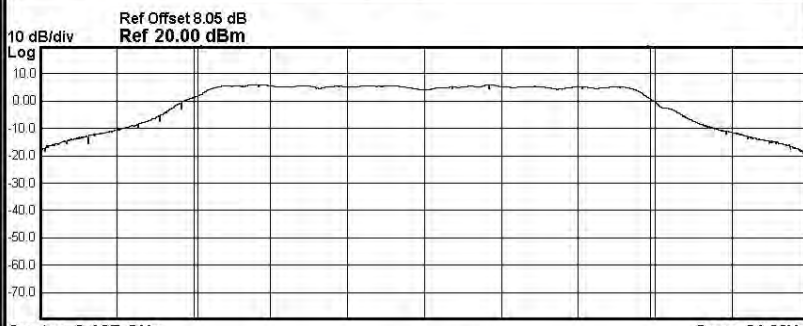


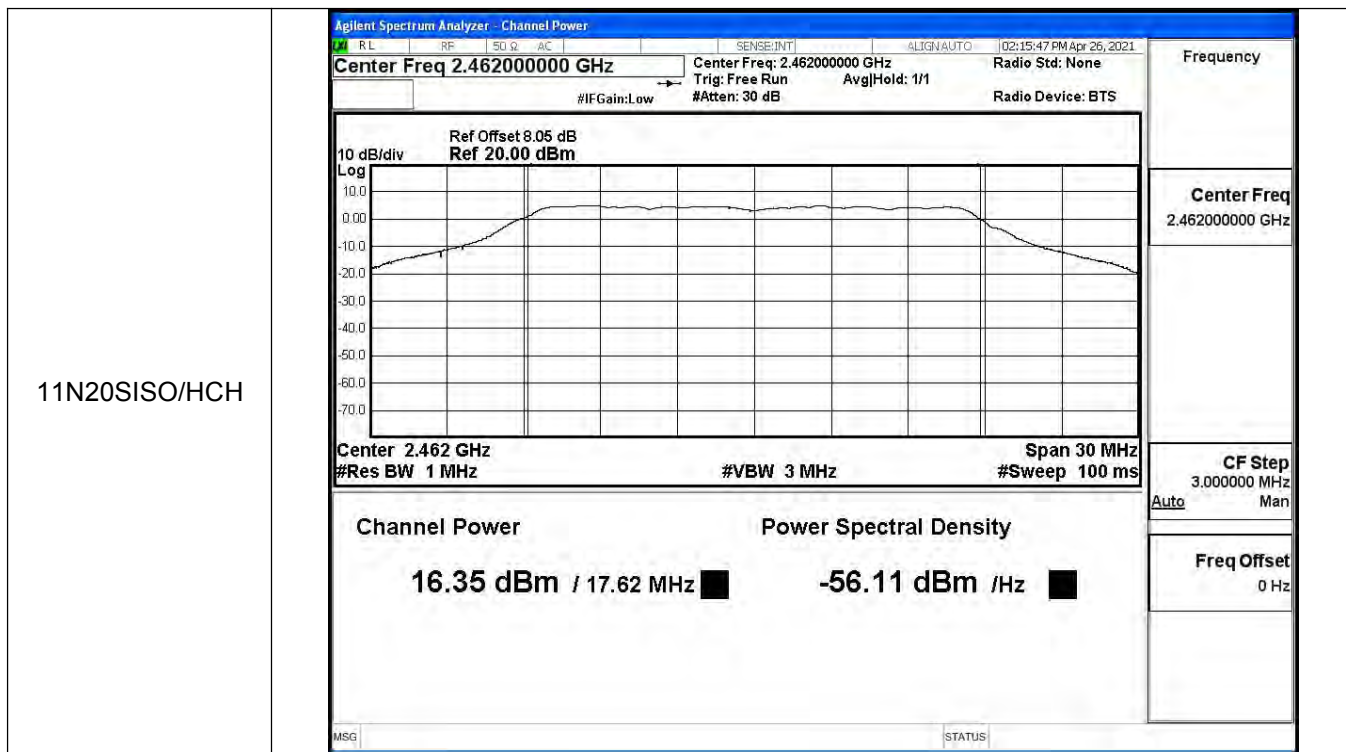
11G/MCH



11G/HCH



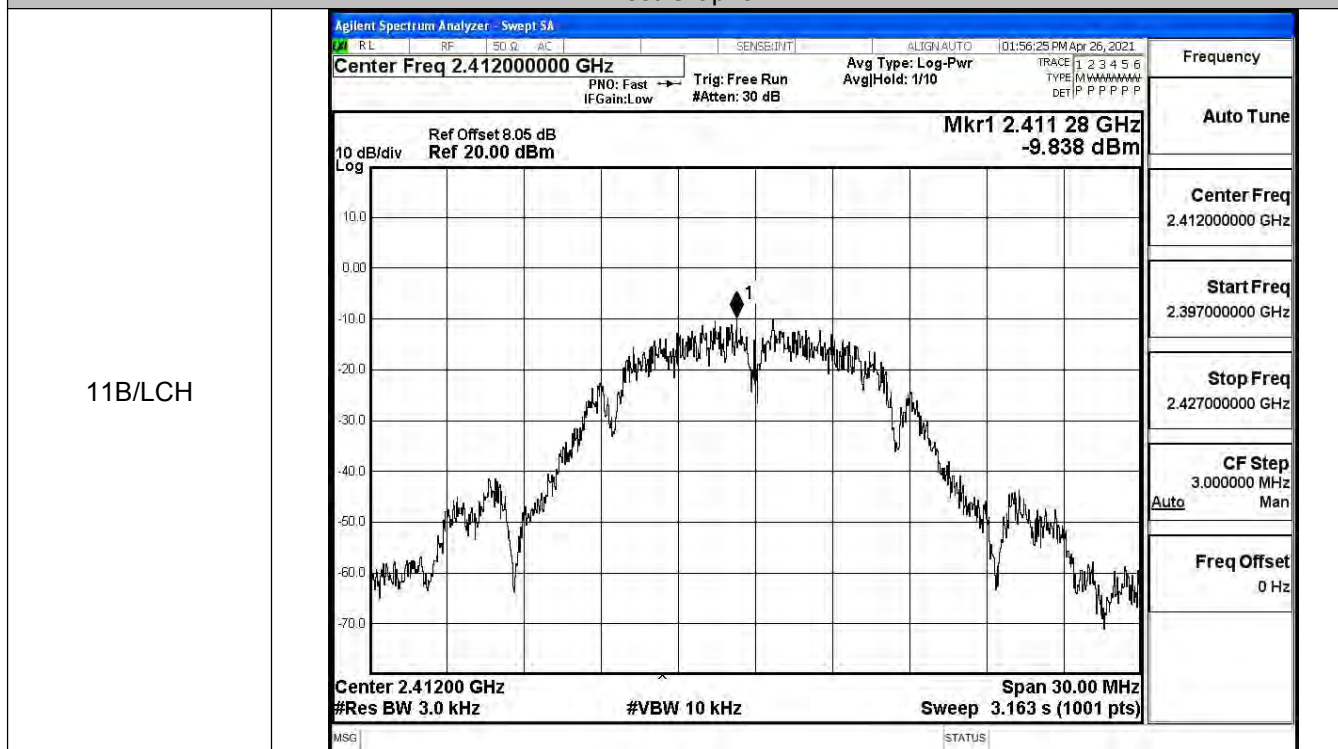
11N20SISO/LCH	Agilent Spectrum Analyzer - Channel Power RL RF 50 Ω AC SENSE:INT ALIGN: AUTO 02:11:43 PM Apr 26, 2021 Center Freq 2.412000000 GHz Center Freq: 2.412000000 GHz Radio Std: None Trig: Free Run Avg Hold: 1/1 #IFGain: Low #Atten: 30 dB Radio Device: BTS Ref Offset 8.05 dB Ref 20.00 dBm  Center 2.412 GHz Span 30 MHz #Res BW 1 MHz #VBW 3 MHz #Sweep 100 ms Channel Power Power Spectral Density 17.36 dBm / 17.63 MHz -55.11 dBm /Hz MSG STATUS	Frequency Center Freq 2.412000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/MCH	Agilent Spectrum Analyzer - Channel Power RL RF 50 Ω AC SENSE:INT ALIGN: AUTO 02:14:08 PM Apr 26, 2021 Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Radio Std: None Trig: Free Run Avg Hold: 1/1 #IFGain: Low #Atten: 30 dB Radio Device: BTS Ref Offset 8.05 dB Ref 20.00 dBm  Center 2.437 GHz Span 30 MHz #Res BW 1 MHz #VBW 3 MHz #Sweep 100 ms Channel Power Power Spectral Density 17.29 dBm / 17.61 MHz -55.16 dBm /Hz MSG STATUS	Frequency Center Freq 2.437000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz



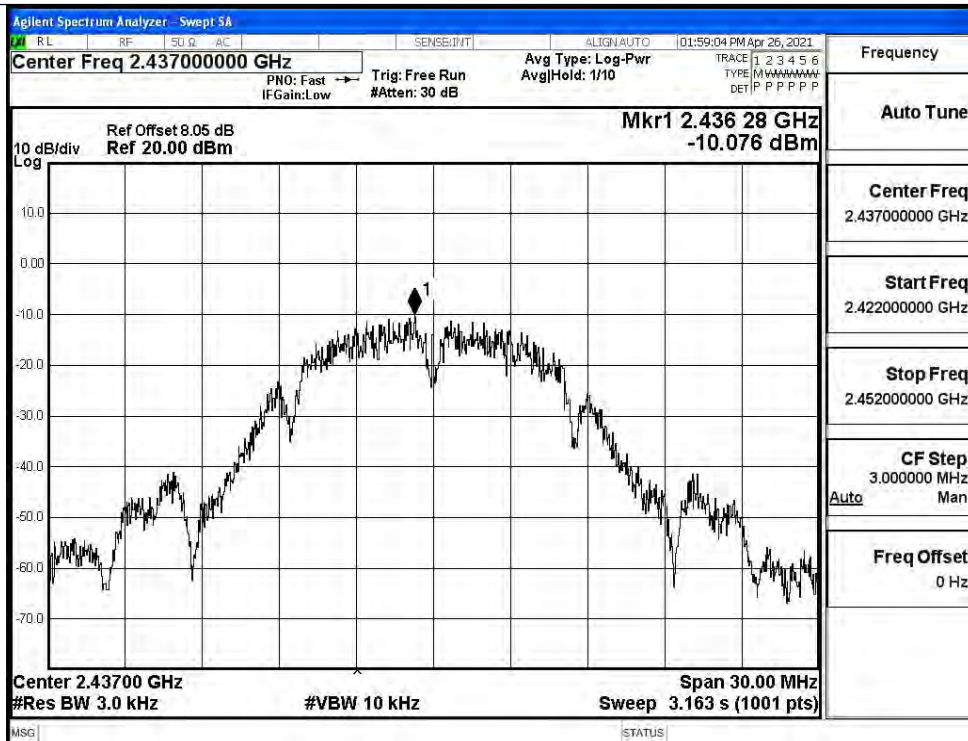
A.3 Maximum Power Spectral Density

Mode	Channel	Meas.Level [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-9.838	8	PASS
	MCH	-10.076	8	PASS
	HCH	-11.135	8	PASS
11G	LCH	-17.100	8	PASS
	MCH	-15.946	8	PASS
	HCH	-17.223	8	PASS
11N20SISO	LCH	-17.436	8	PASS
	MCH	-17.575	8	PASS
	HCH	-17.353	8	PASS

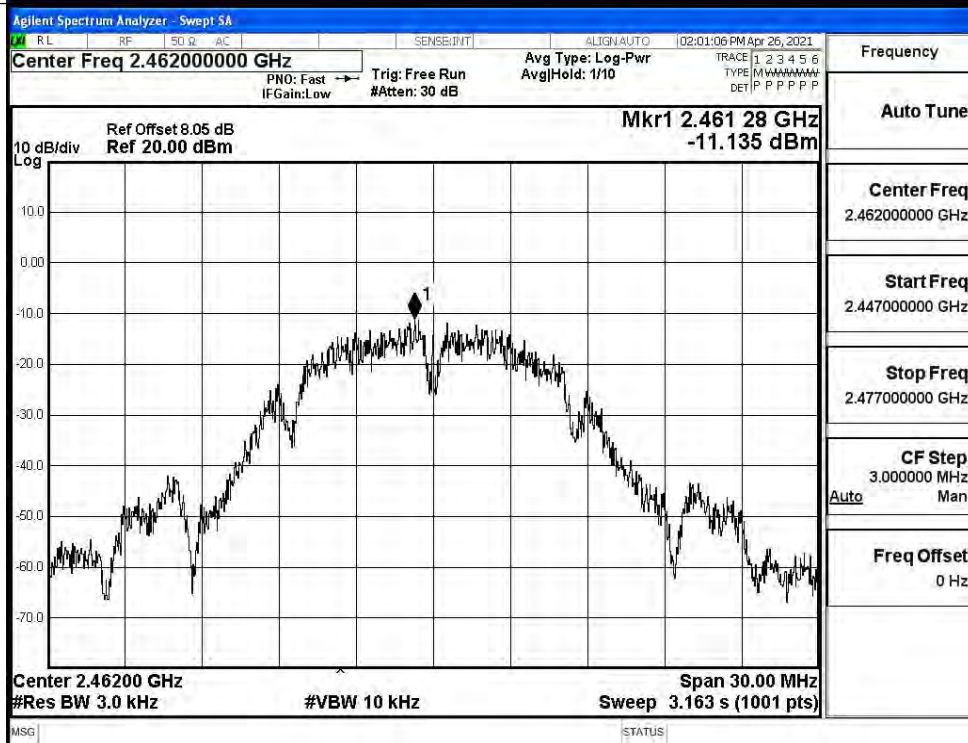
Test Graphs



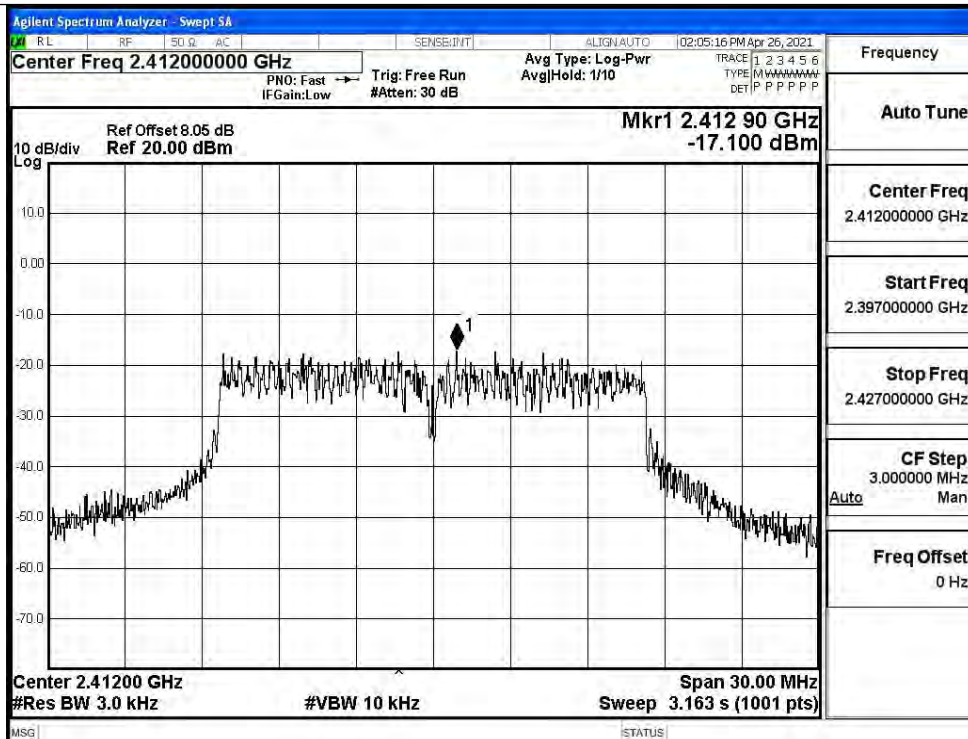
11B/MCH



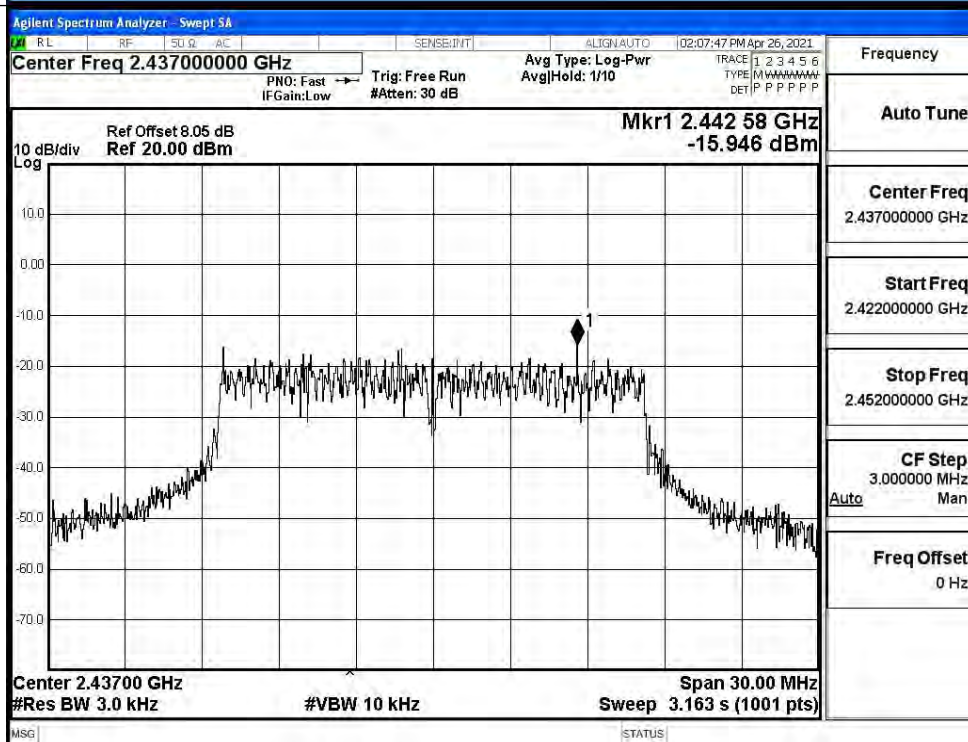
11B/HCH



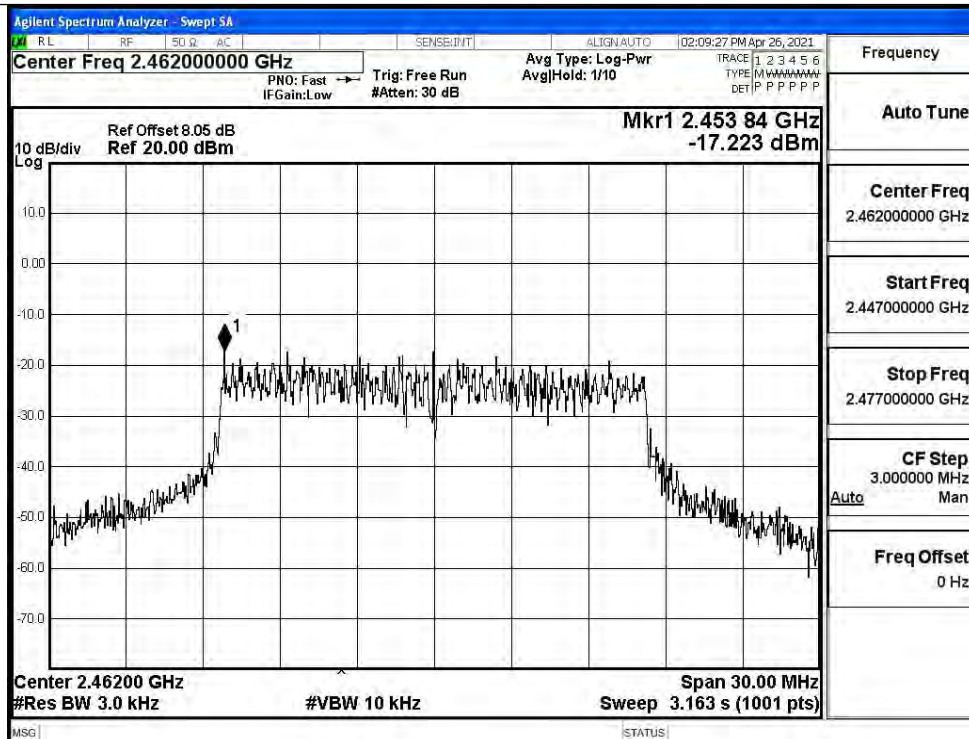
11G/LCH



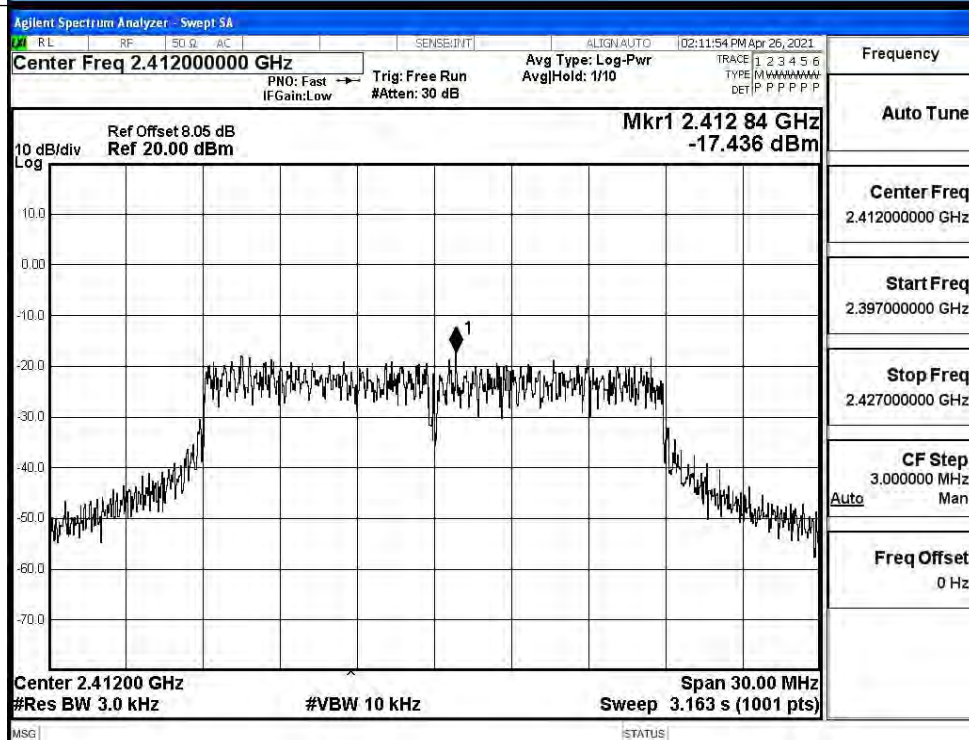
11G/MCH

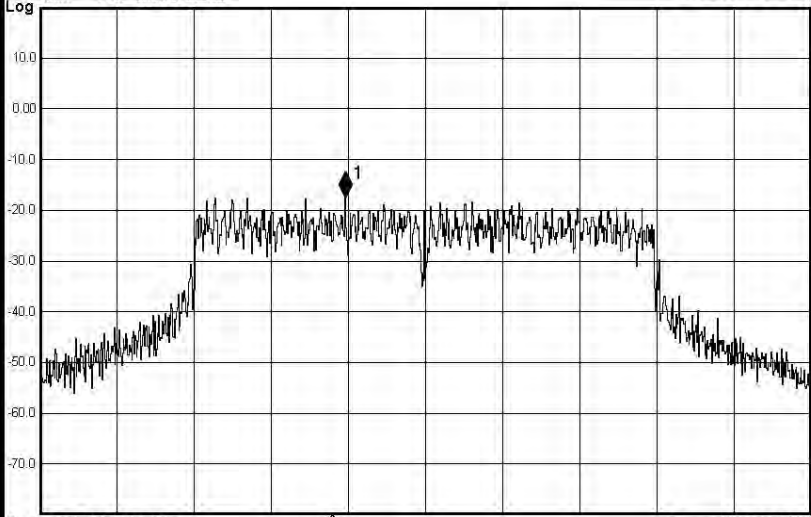
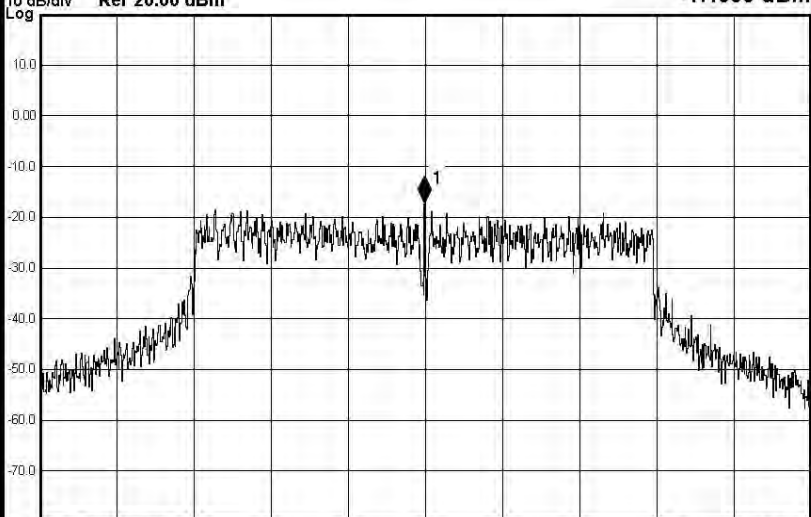


11G/HCH



11N20SISO/LCH



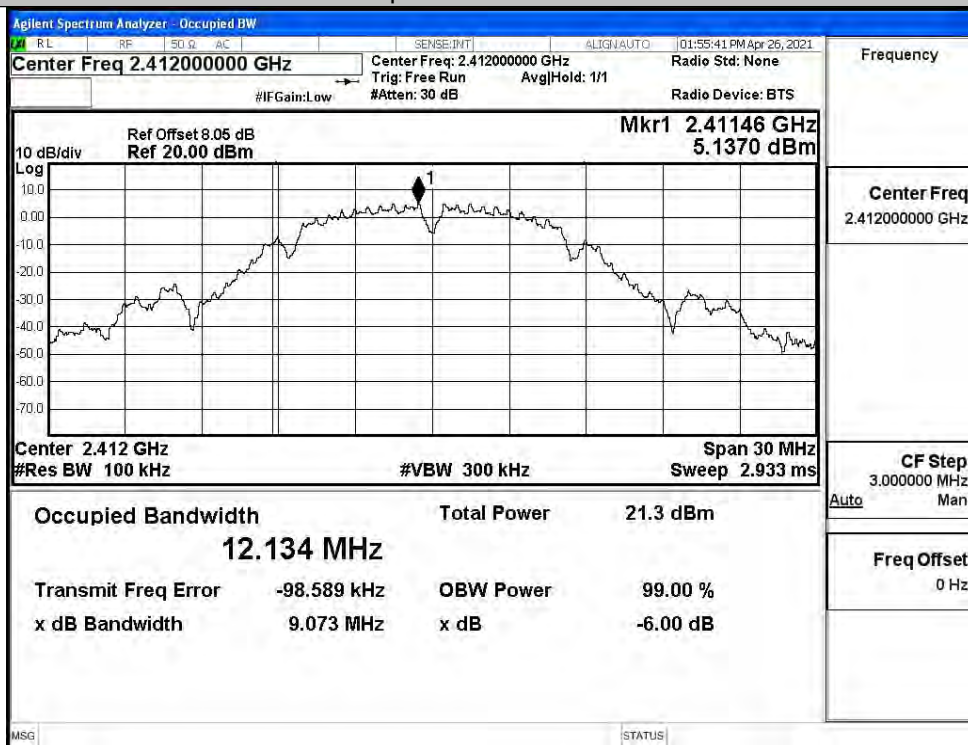
11N20SISO/MCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.437000000 GHz Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.433 88 GHz -17.575 dBm  Center 2.43700 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 3.163 s (1001 pts)	Frequency Auto Tune Center Freq 2.437000000 GHz Start Freq 2.422000000 GHz Stop Freq 2.452000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz
11N20SISO/HCH	Agilent Spectrum Analyzer - Swept SA Center Freq 2.462000000 GHz Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.461 97 GHz -17.353 dBm  Center 2.46200 GHz #Res BW 3.0 kHz #VBW 10 kHz Sweep 3.163 s (1001 pts)	Frequency Auto Tune Center Freq 2.462000000 GHz Start Freq 2.447000000 GHz Stop Freq 2.477000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz

A.4 6dB Bandwidth

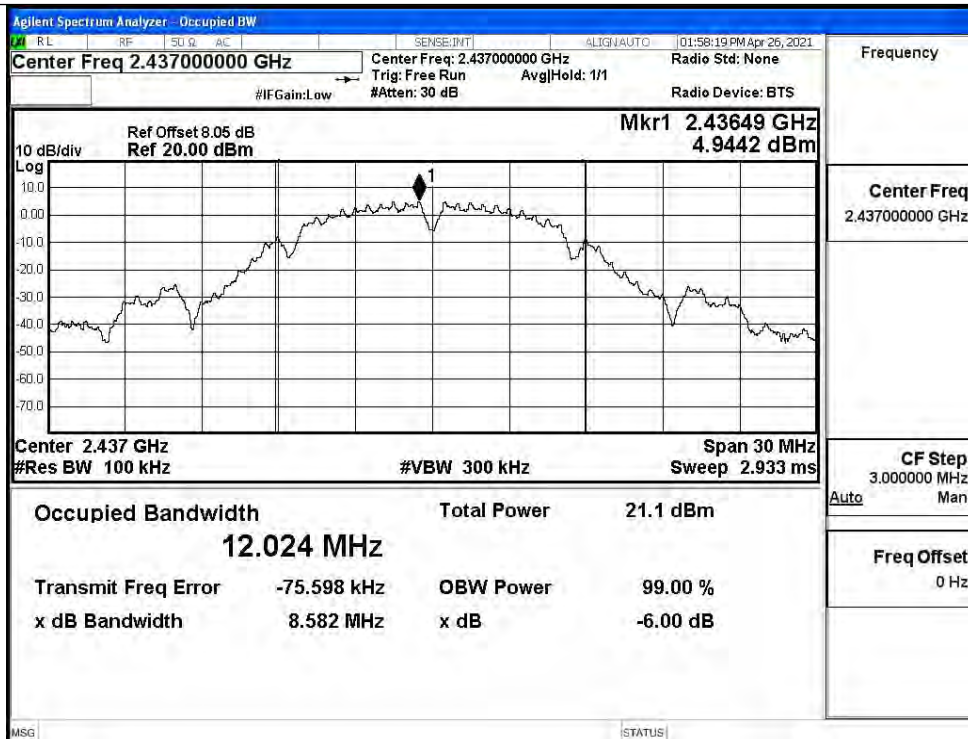
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.073	≥ 0.5	PASS
	MCH	8.582	≥ 0.5	PASS
	HCH	8.601	≥ 0.5	PASS
11G	LCH	16.38	≥ 0.5	PASS
	MCH	16.37	≥ 0.5	PASS
	HCH	16.37	≥ 0.5	PASS
11N20SISO	LCH	17.63	≥ 0.5	PASS
	MCH	17.61	≥ 0.5	PASS
	HCH	17.62	≥ 0.5	PASS

Test Graphs

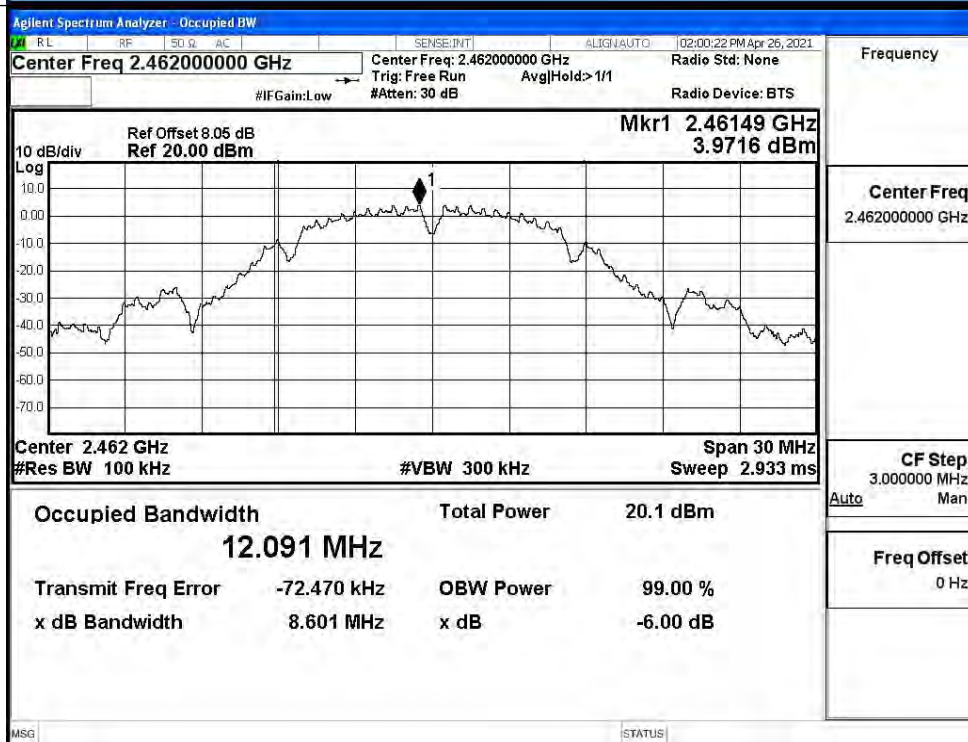
11B/LCH



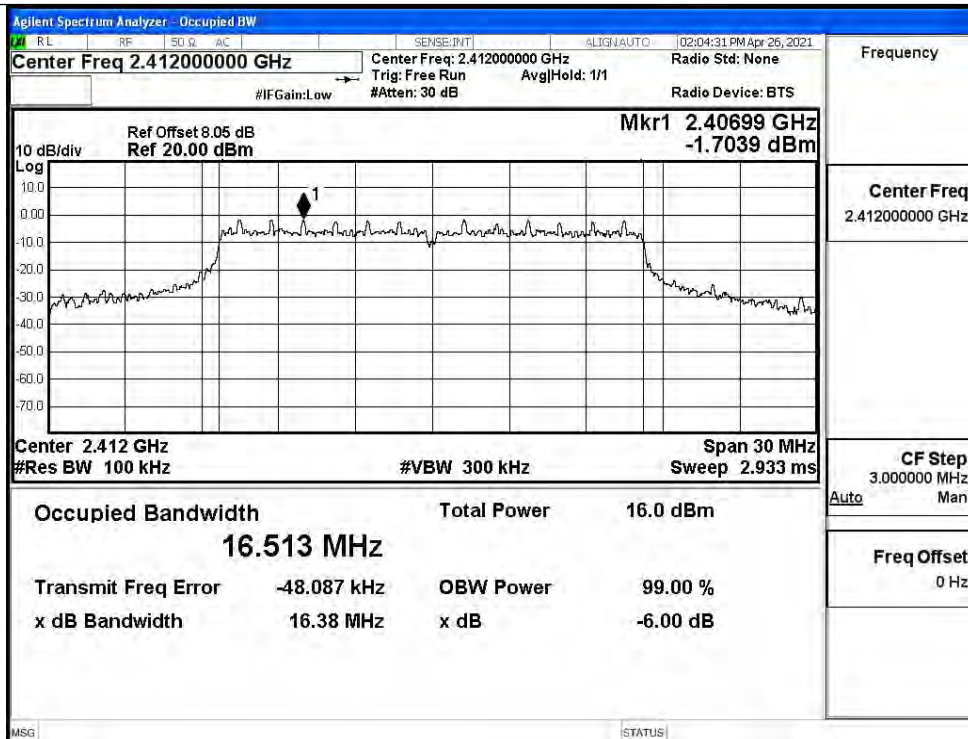
11B/MCH



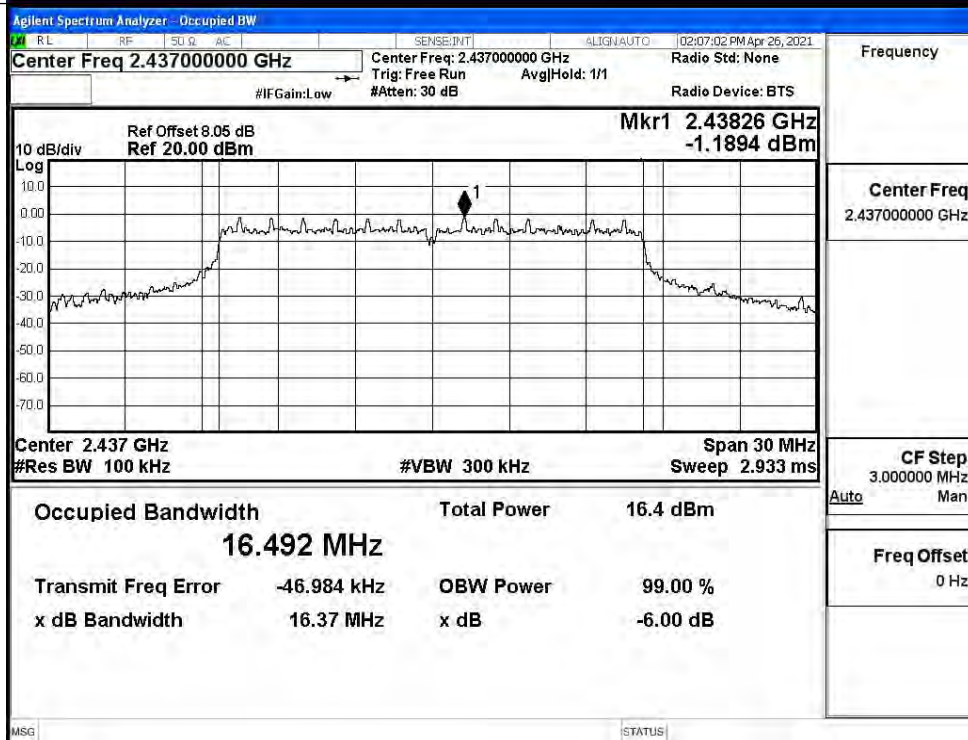
11B/HCH



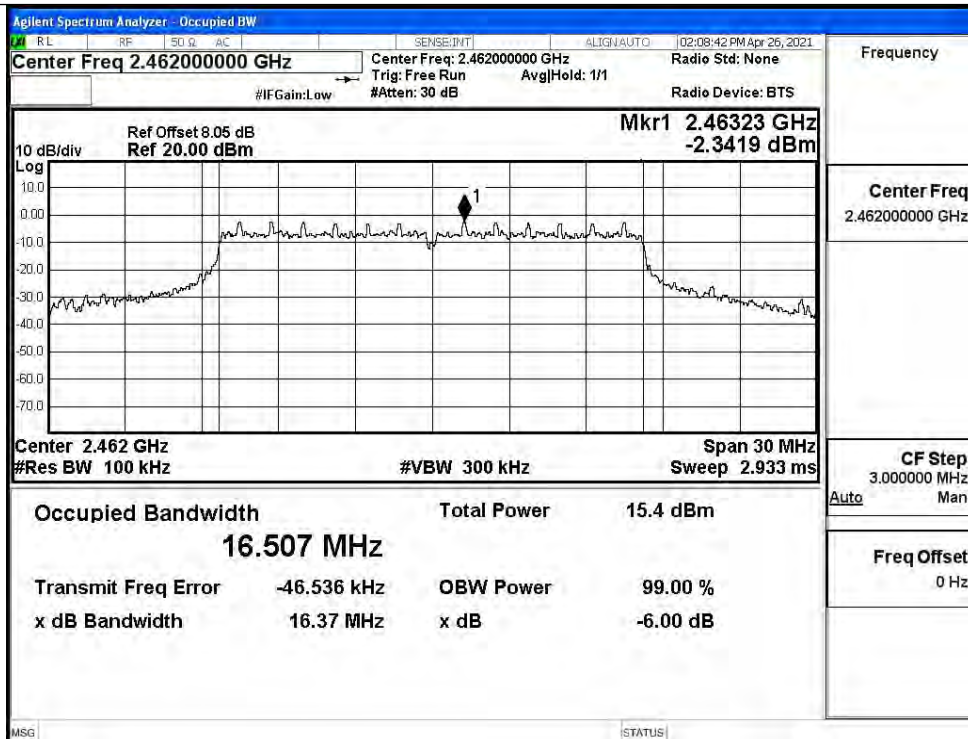
11G/LCH



11G/MCH



11G/HCH



Frequency

Center Freq
2.462000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11N20SISO/LCH

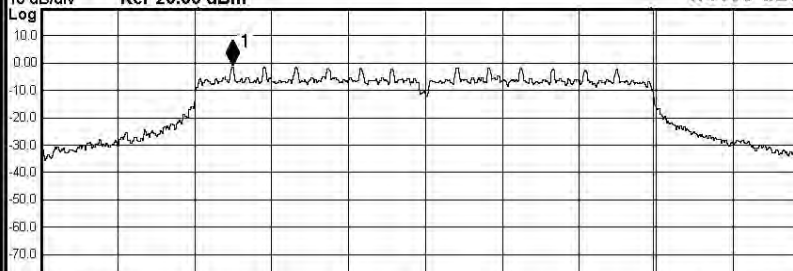
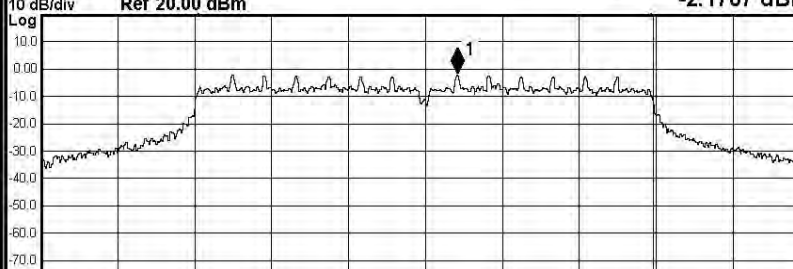


Frequency

Center Freq
2.412000000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

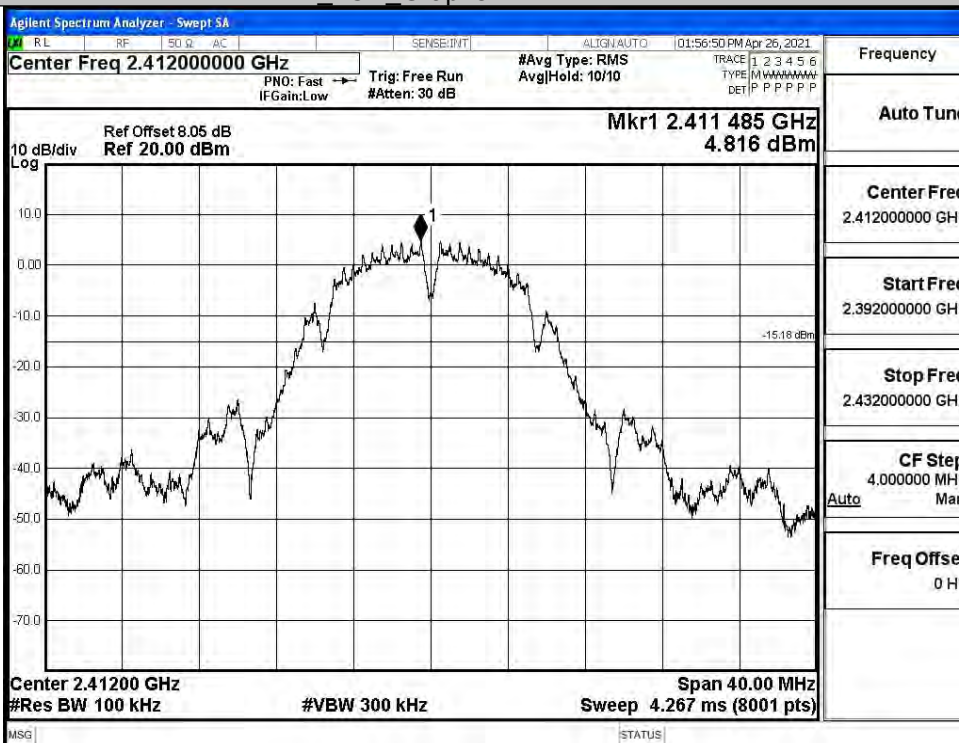
11N20SISO/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF SQ AC SENSE:INT ALIGN:AUTO 02:13:35 PM Apr 26, 2021 Center Freq 2.437000000 GHz Center Freq: 2.437000000 GHz Trig: Free Run Avg/Hold: 1/1 Radio Std: None #IF Gain: Low #Atten: 30 dB Radio Device: BTS 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.4295 GHz -1.4133 dBm  Center 2.437 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.802 MHz Total Power 16.4 dBm Transmit Freq Error -36.453 kHz OBW Power 99.00 % x dB Bandwidth 17.61 MHz x dB -6.00 dB MSG STATUS	Frequency Center Freq 2.437000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz	
	11N20SISO/HCH	Agilent Spectrum Analyzer - Occupied BW RL RF SQ AC SENSE:INT ALIGN:AUTO 02:15:14 PM Apr 26, 2021 Center Freq 2.462000000 GHz Center Freq: 2.462000000 GHz Trig: Free Run Avg/Hold: 1/1 Radio Std: None #IF Gain: Low #Atten: 30 dB Radio Device: BTS 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.46326 GHz -2.1707 dBm  Center 2.462 GHz #Res BW 100 kHz #VBW 300 kHz Span 30 MHz Sweep 2.933 ms Occupied Bandwidth 17.813 MHz Total Power 15.5 dBm Transmit Freq Error -33.494 kHz OBW Power 99.00 % x dB Bandwidth 17.62 MHz x dB -6.00 dB MSG STATUS	Frequency Center Freq 2.462000000 GHz CF Step 3.000000 MHz Auto Man Freq Offset 0 Hz

A.5 RF Conducted Spurious Emissions

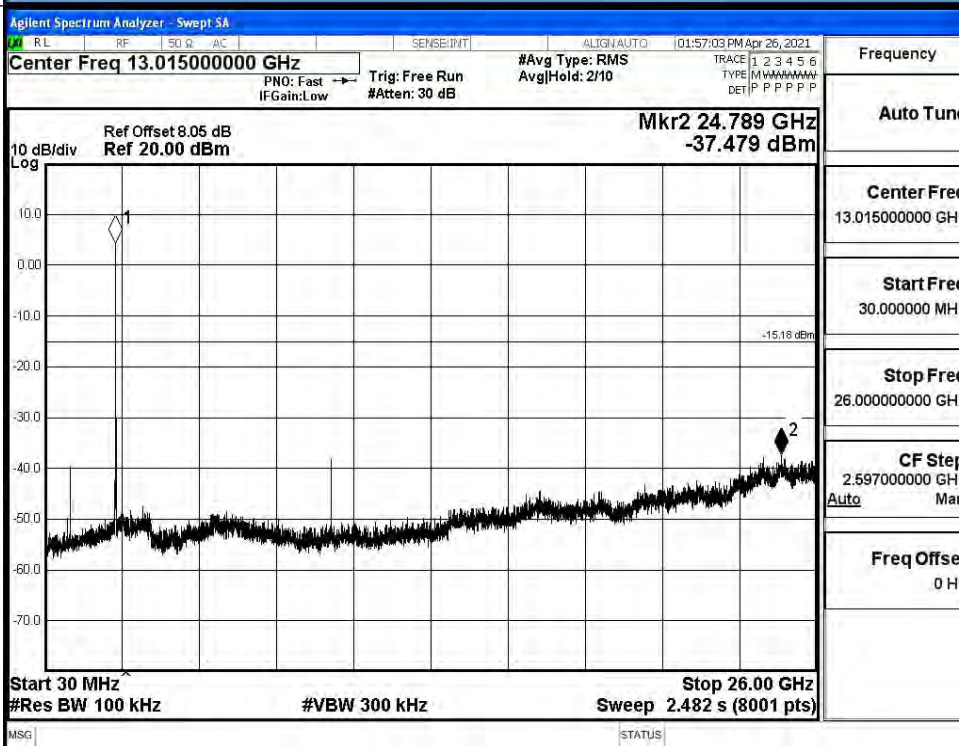
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	4.816	-37.479	-15.184	PASS
	MCH	4.673	-38.260	-15.327	PASS
	HCH	3.653	-36.856	-16.347	PASS
11G	LCH	-1.607	-38.256	-21.607	PASS
	MCH	-1.446	-37.799	-21.446	PASS
	HCH	-2.489	-38.248	-22.489	PASS
11N20 SISO	LCH	-1.444	-38.683	-21.444	PASS
	MCH	-1.383	-37.882	-21.383	PASS
	HCH	-2.512	-37.412	-22.512	PASS

11B LCH Graphs

Pref/11B/LCH

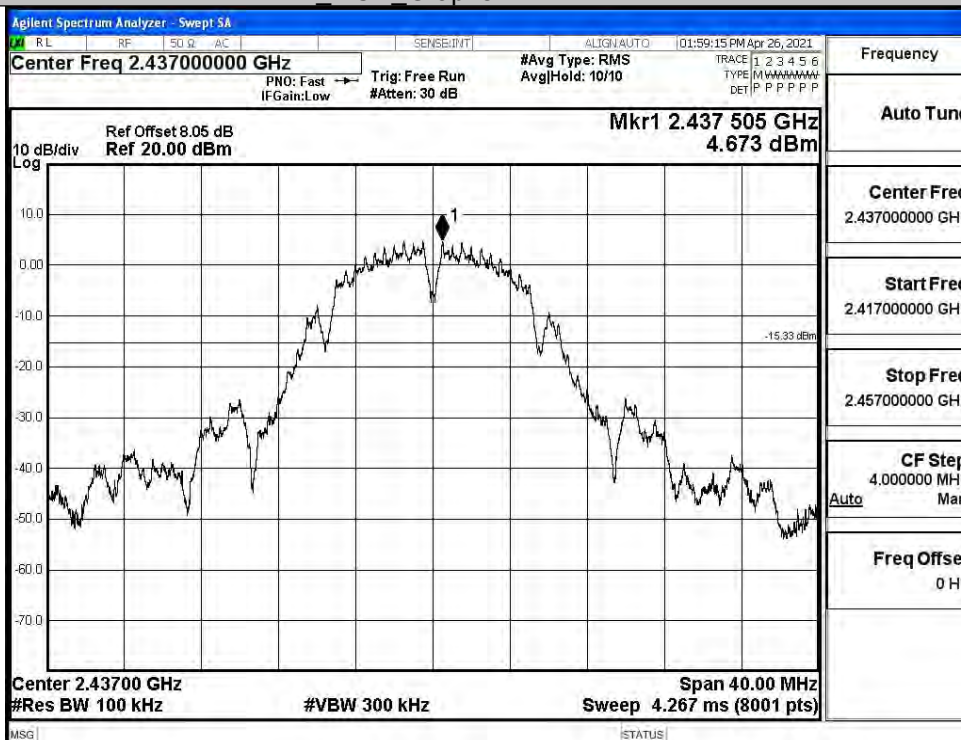


Puw/11B/LCH

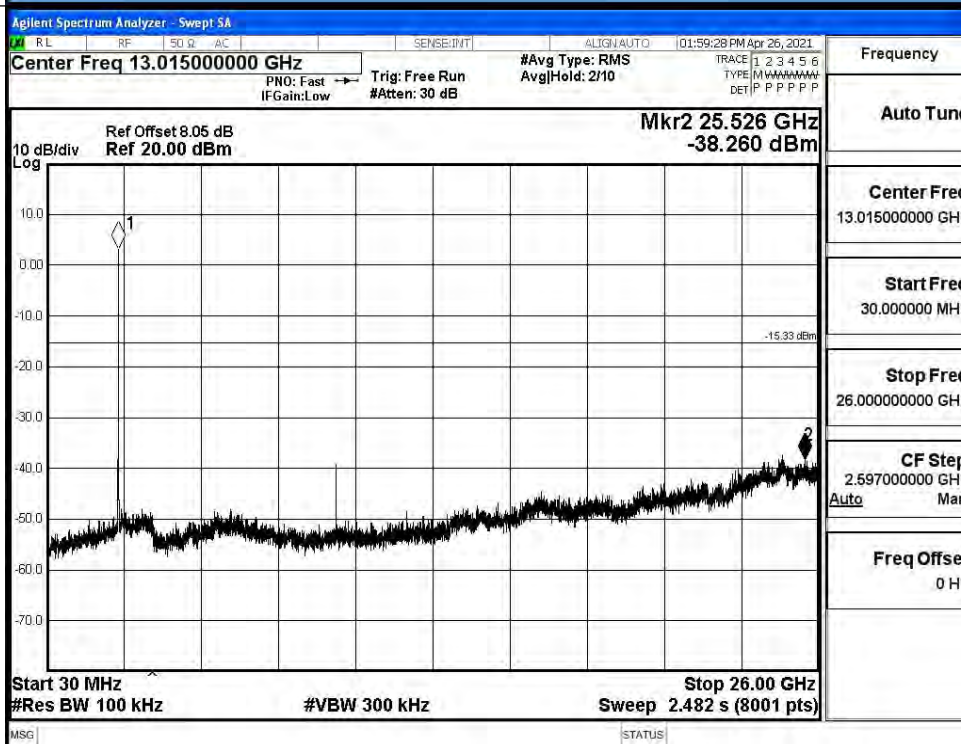


11B MCH Graphs

Pref/11B/MCH

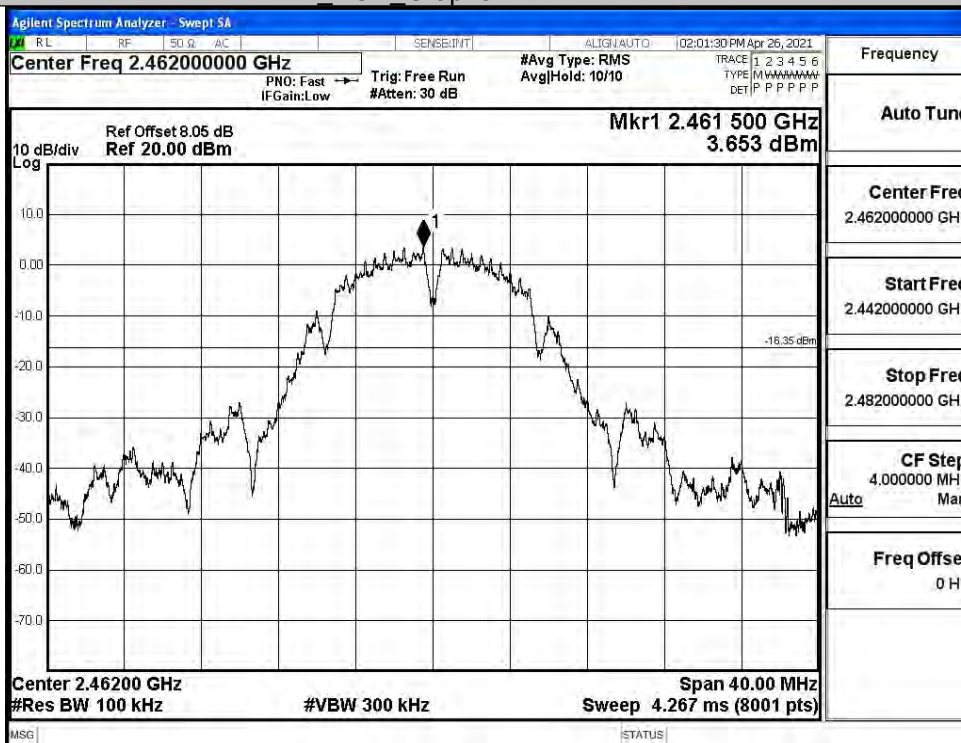


Puw/11B/MCH

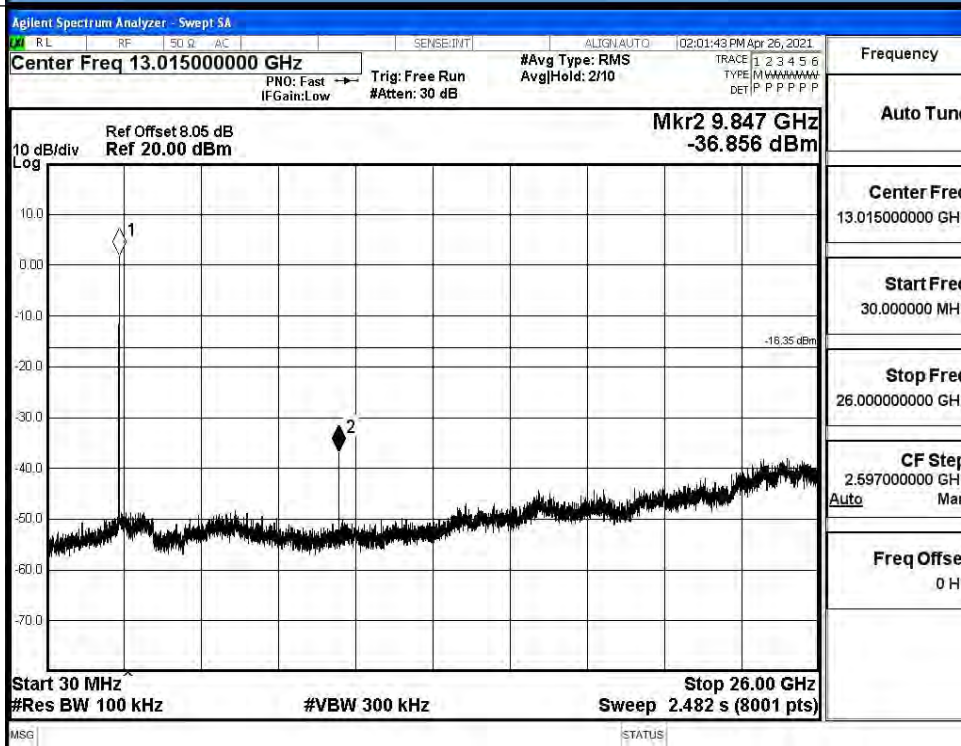


11B HCH Graphs

Pref/11B/HCH

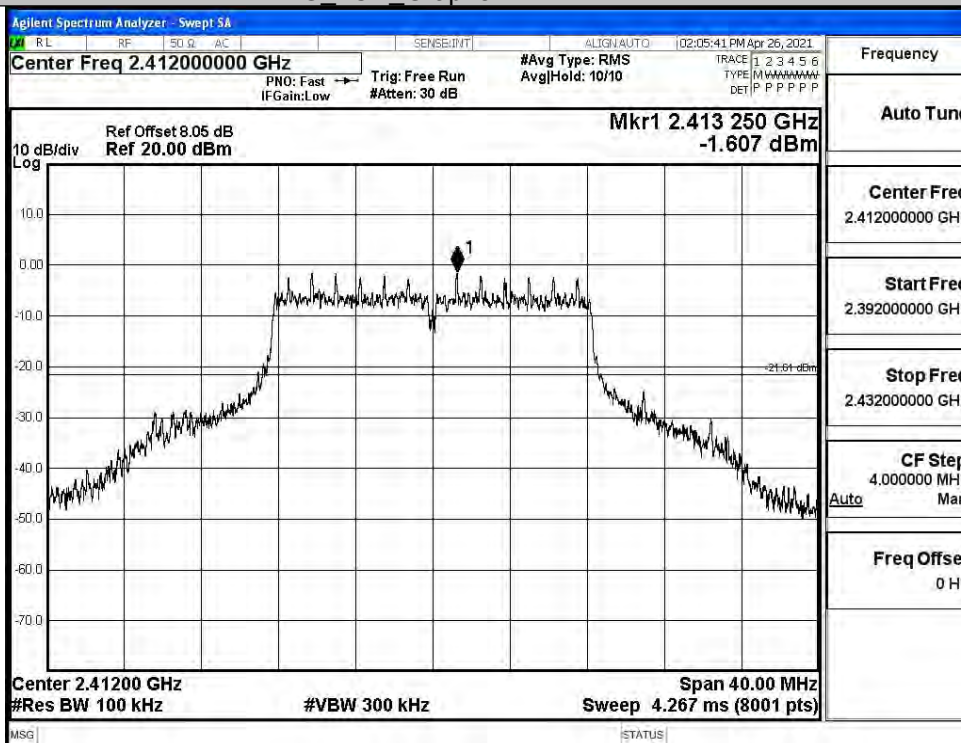


Puw/11B/HCH

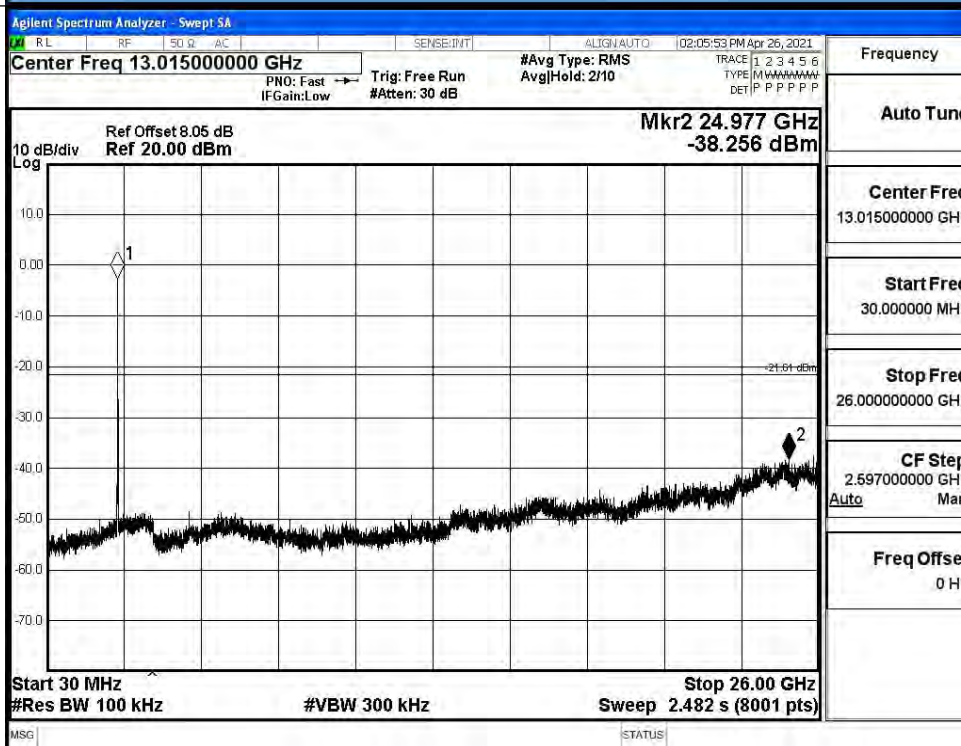


11G LCH Graphs

Pref/11G/LCH

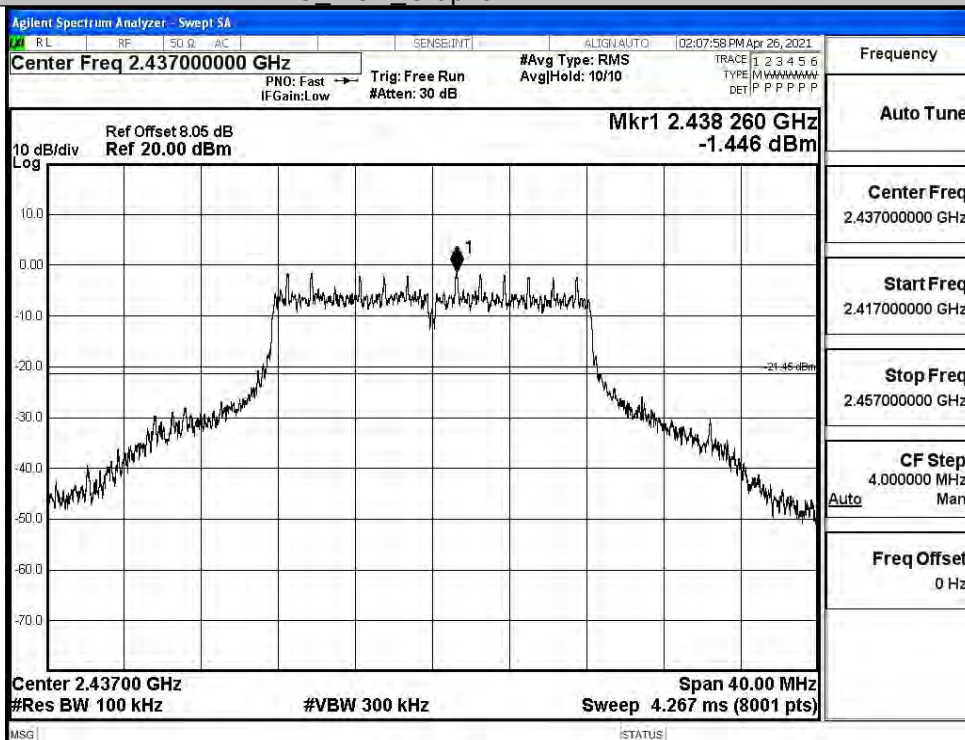


Puw/11G/LCH

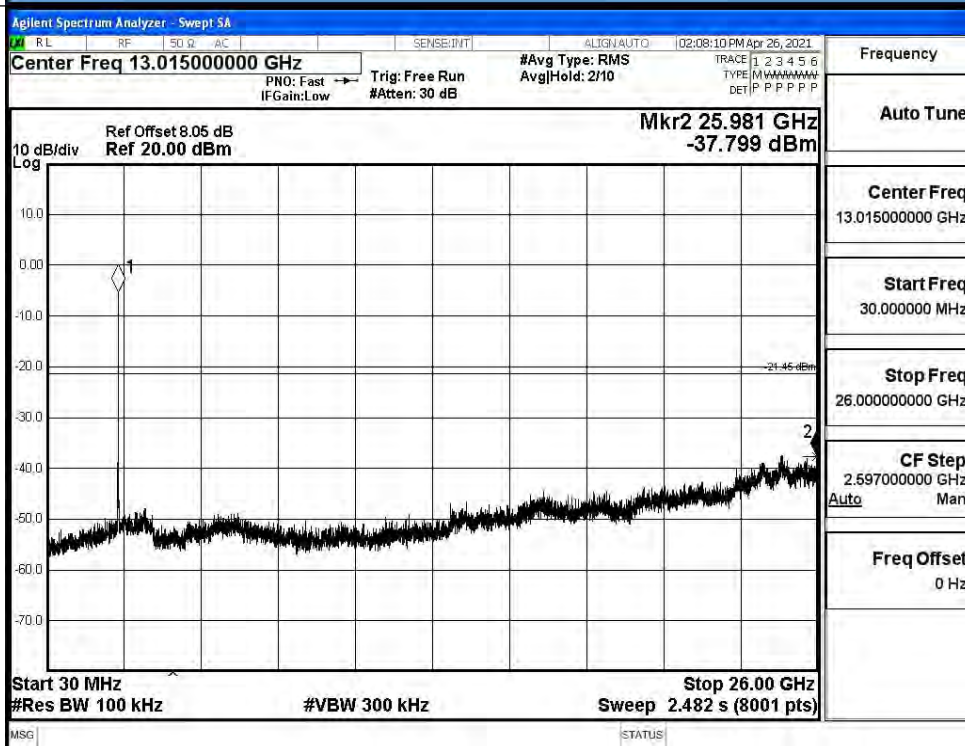


11G MCH Graphs

Pref/11G/MCH

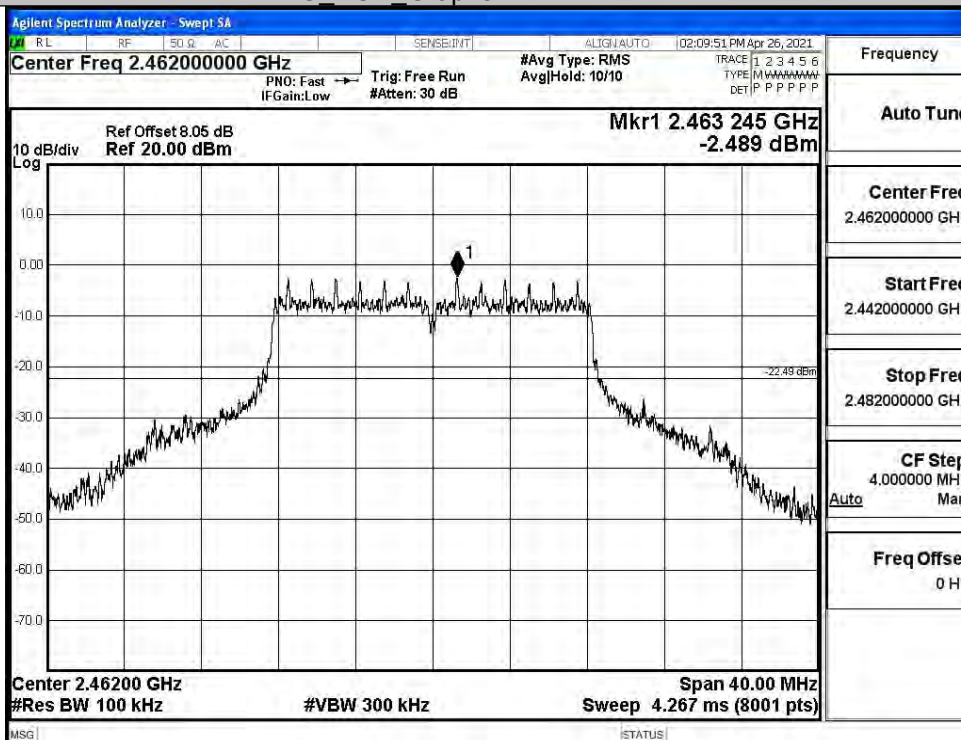


Puw/11G/MCH

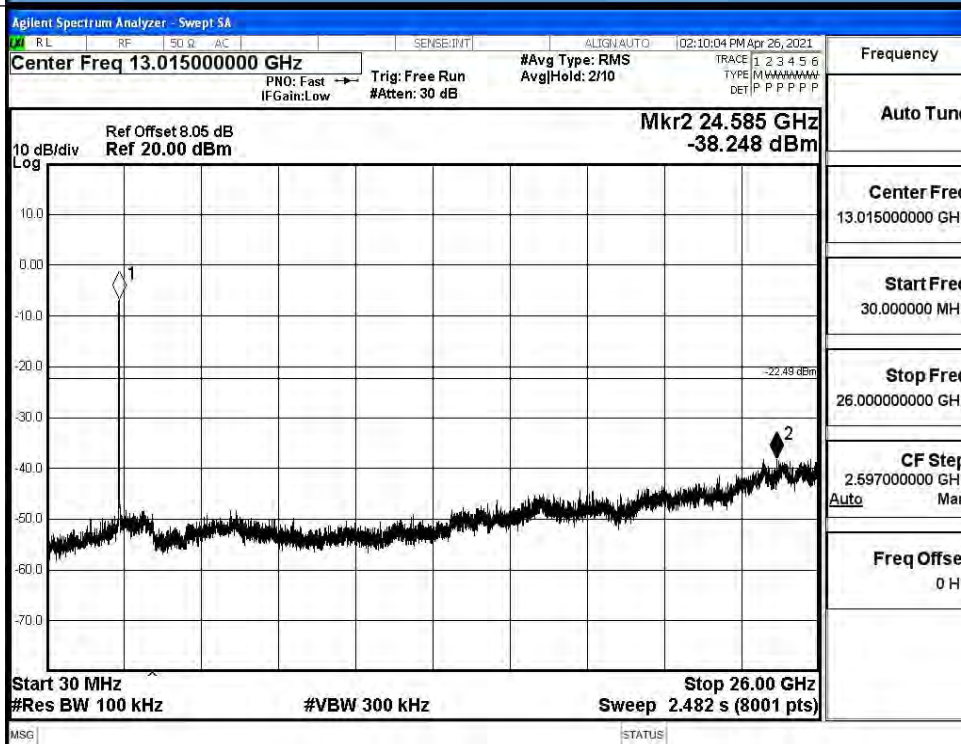


11G HCH Graphs

Pref/11G/HCH



Puw/11G/HCH



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:INT ALLOC: AUTO 02:12:19 PM Apr 26, 2021

Center Freq 2.41200000 GHz PNO: Fast Trg: Free Run #Avg Type: RMS #Atten: 30 dB AvgHld: 10/10

TRACE 1 2 3 4 5 6 TYPE: M M M M M M M M DET: P P P P P P P

Ref Offset 8.05 dB Mkr1 2.413 240 GHz 10 dB/div Ref 20.00 dBm -1.444 dBm

Log

The spectrum analyzer display shows a swept signal. The horizontal axis represents frequency, ranging from 2.392 GHz to 2.432 GHz. The vertical axis represents power in dBm, ranging from -70.0 to 10.0. The signal is a noisy, stepped waveform. A peak is marked with a black dot and labeled '1' at 2.413240 GHz. The peak power is -1.444 dBm. The signal level is approximately -10 dBm across the swept range. The background is a grid.

Center Freq 2.41200000 GHz

Start Freq 2.392000000 GHz

Stop Freq 2.432000000 GHz

CF Step 4.000000 MHz Auto Man

Freq Offset 0 Hz

Center 2.41200 GHz Span 40.00 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 4.267 ms (8001 pts)

MSG STATUS

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:IMT ALIGN:AUTO 02:12:31 PM Apr 26, 2021

Center Freq 13.01500000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg/Hold: 2/10 TRACE 1 2 3 4 5 6 TYPE M W A V I N A V DET P P P P P P

Ref Offset 8.05 dB
Ref 20.00 dBm

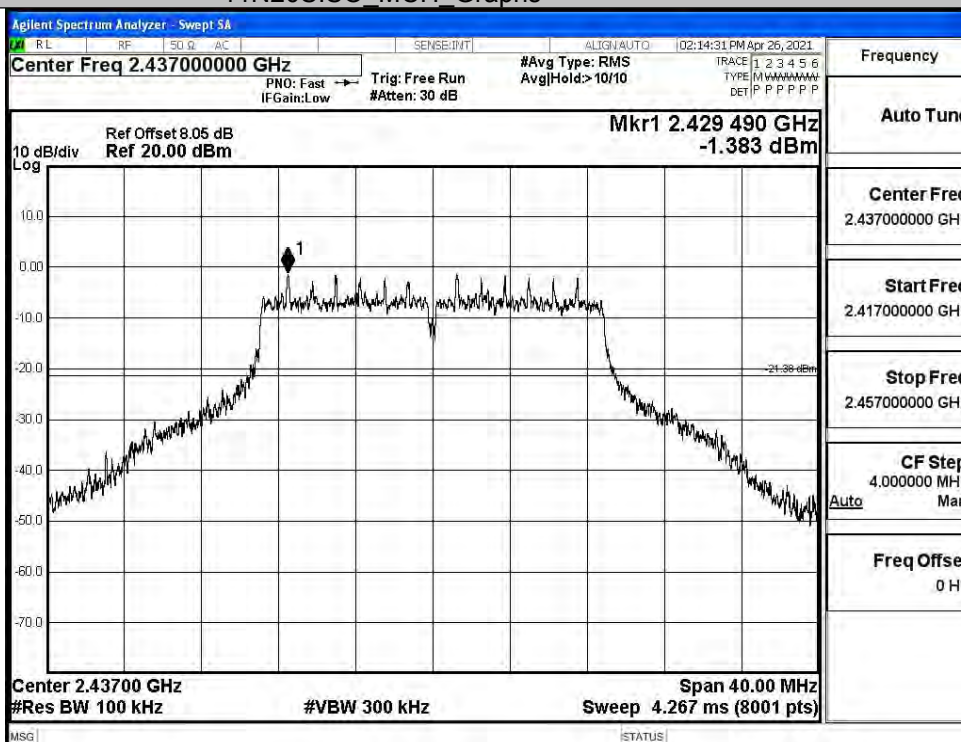
Mkr2 24.789 GHz
-38.683 dBm

The plot shows a spectrum from 30 MHz to 26 GHz. The y-axis ranges from -70 dBm to 10 dBm. A sharp peak is visible at 13.015 GHz, labeled '1'. A second marker is placed at 24.789 GHz, labeled '2', with a value of -38.683 dBm. The baseline noise floor is around -55 dBm.

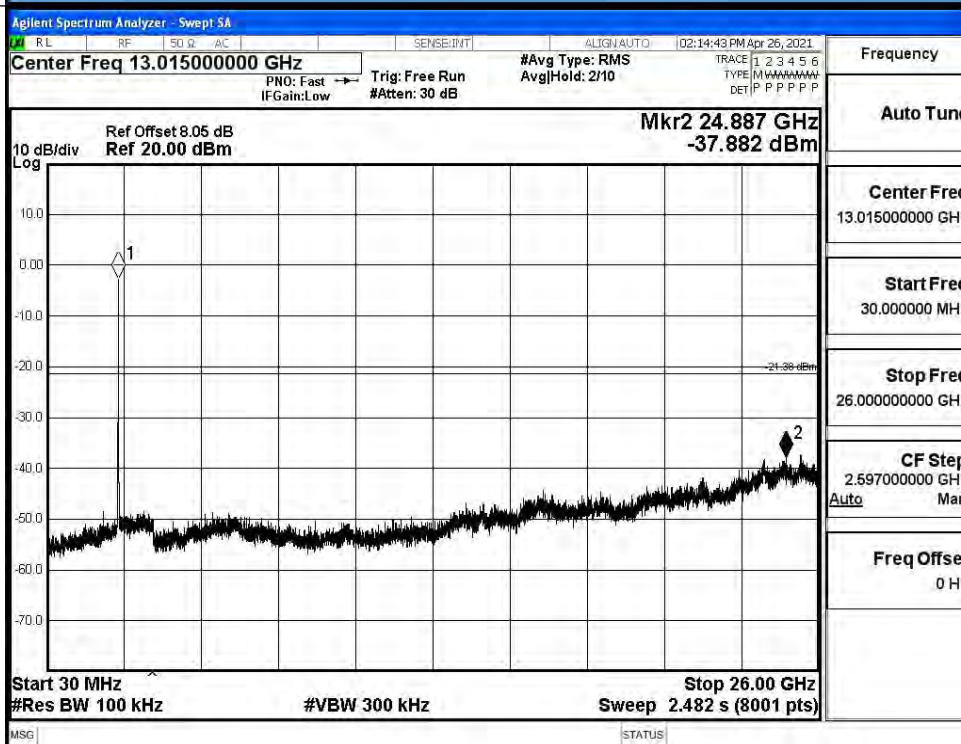
Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.482 s (8001 pts)

Frequency	Auto Tune
Center Freq	13.01500000 GHz
Start Freq	30.000000 MHz
Stop Freq	26.00000000 GHz
CF Step	2.597000000 GHz Man Auto
Freq Offset	0 Hz

Pref/11N20
SISO/MCH

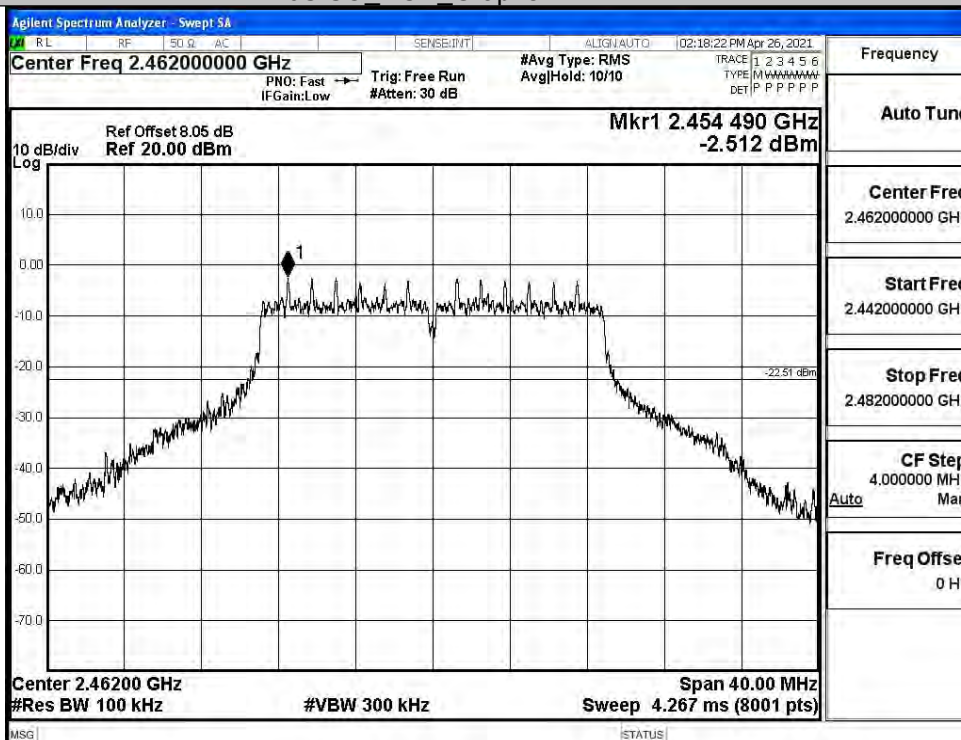


Puw/11N20
SISO/MCH

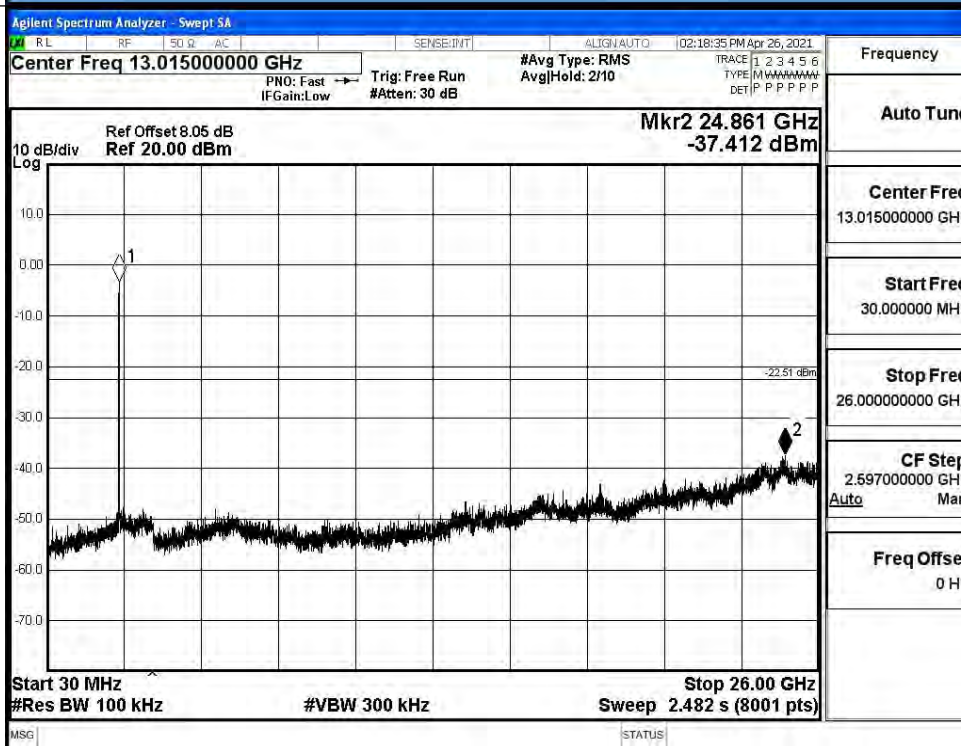


11N20ISO HCH Graphs

Pref/11N20
SISO/HCH

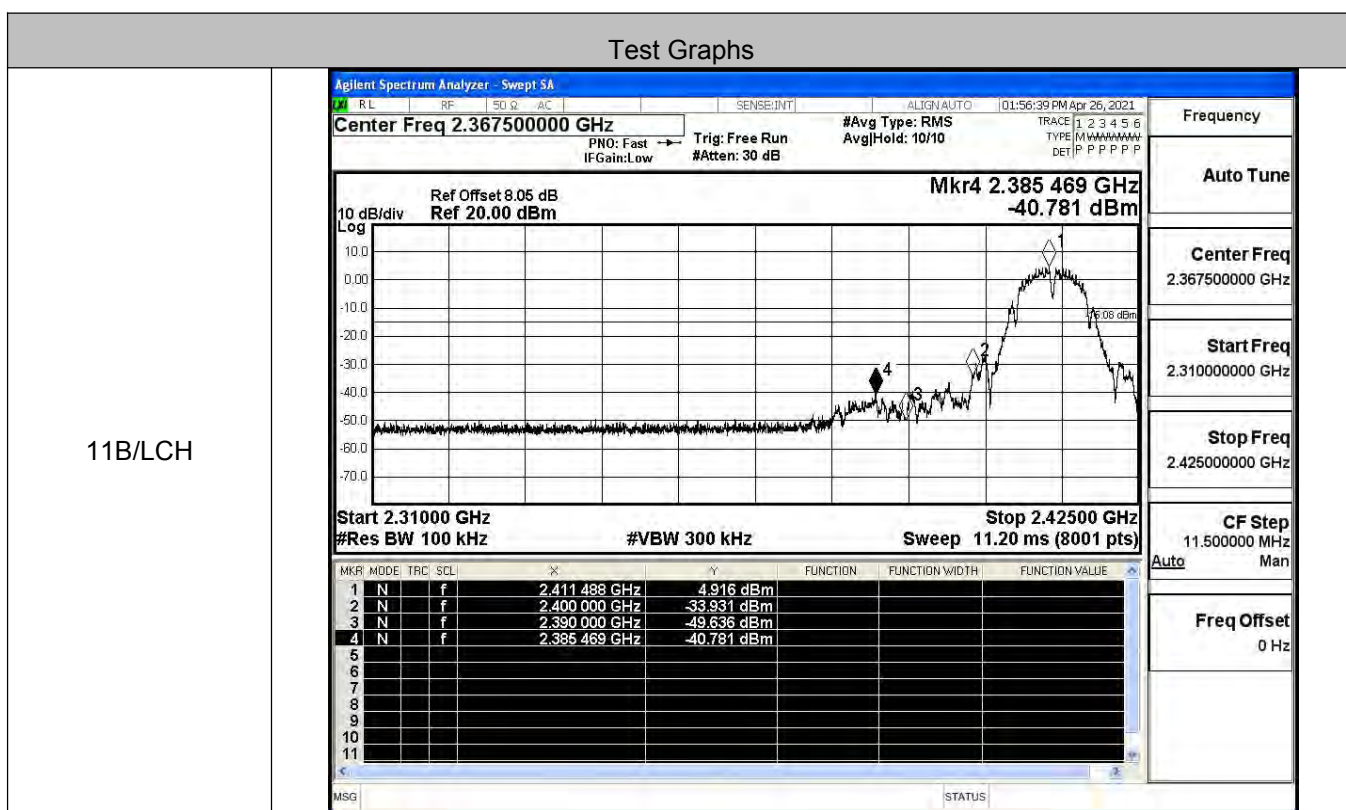


Puw/11N20
SISO/HCH

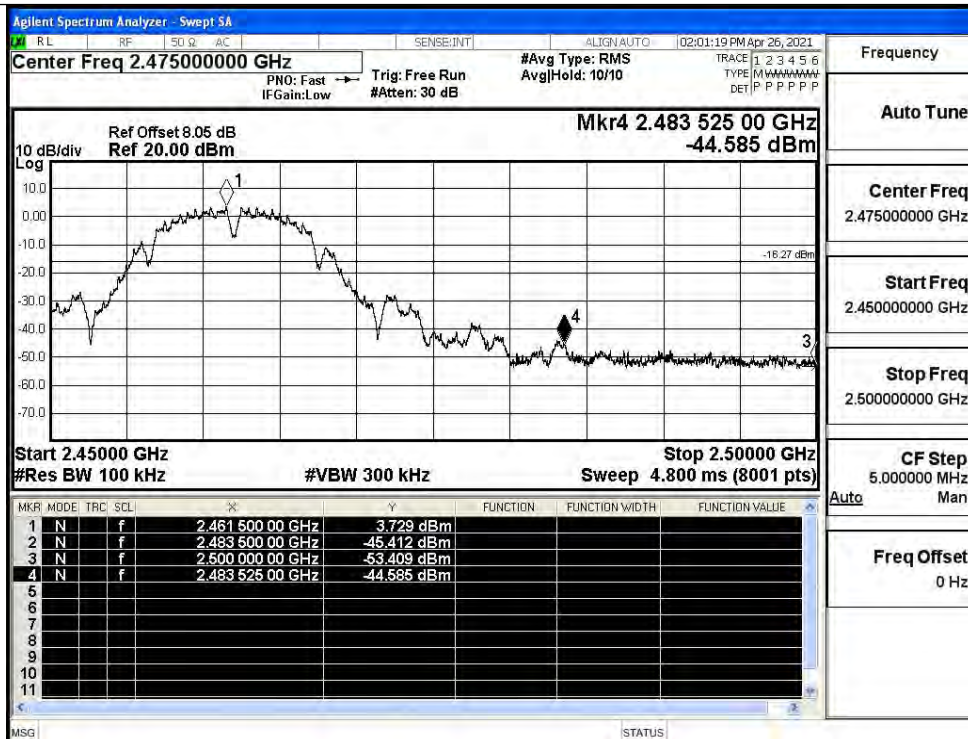


A.6 Band-edge for RF Conducted Emissions

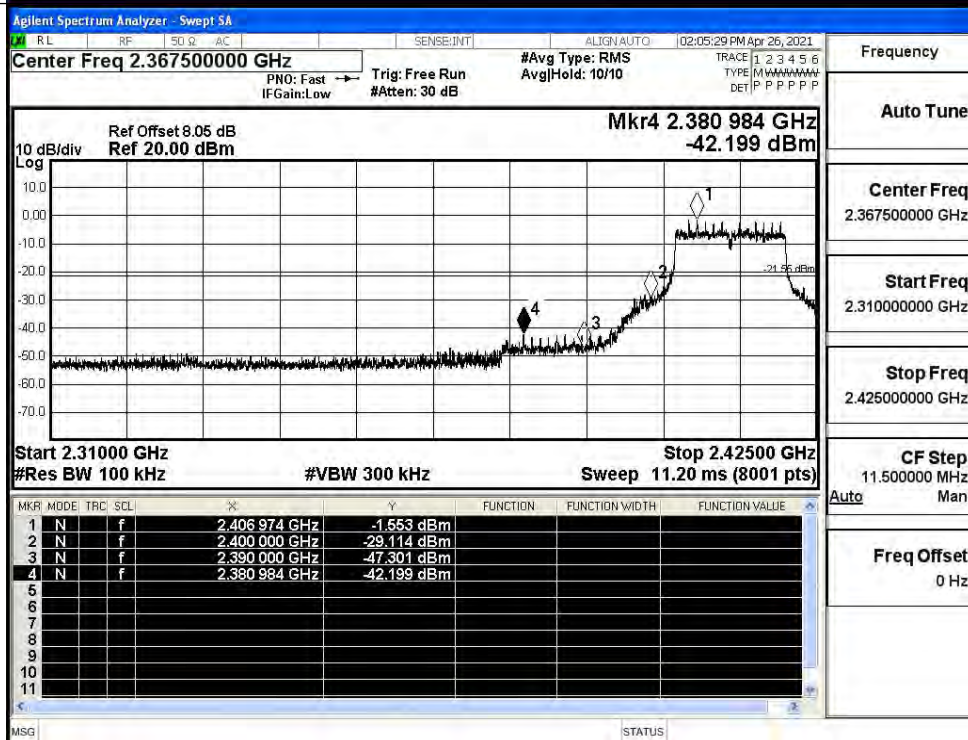
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	4.916	-40.781	-15.08	PASS
	HCH	3.729	-44.585	-16.27	PASS
11G	LCH	-1.553	-42.199	-21.55	PASS
	HCH	-2.531	-46.520	-22.53	PASS
11N20SISO	LCH	-1.449	-41.402	-21.45	PASS
	HCH	-2.385	-46.008	-22.39	PASS



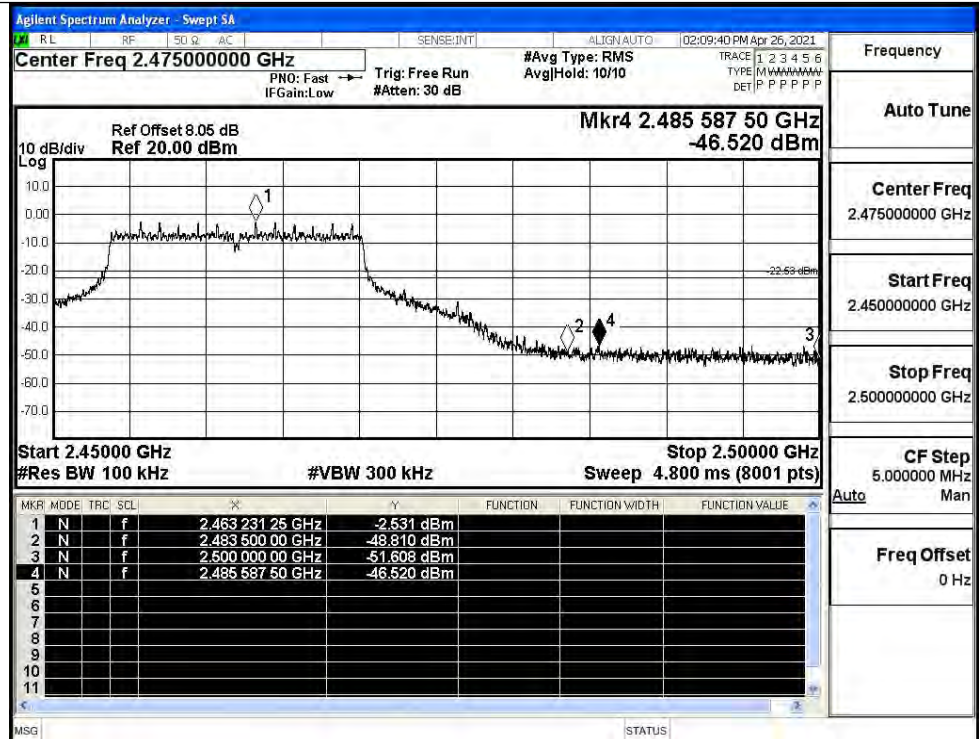
11B/HCH



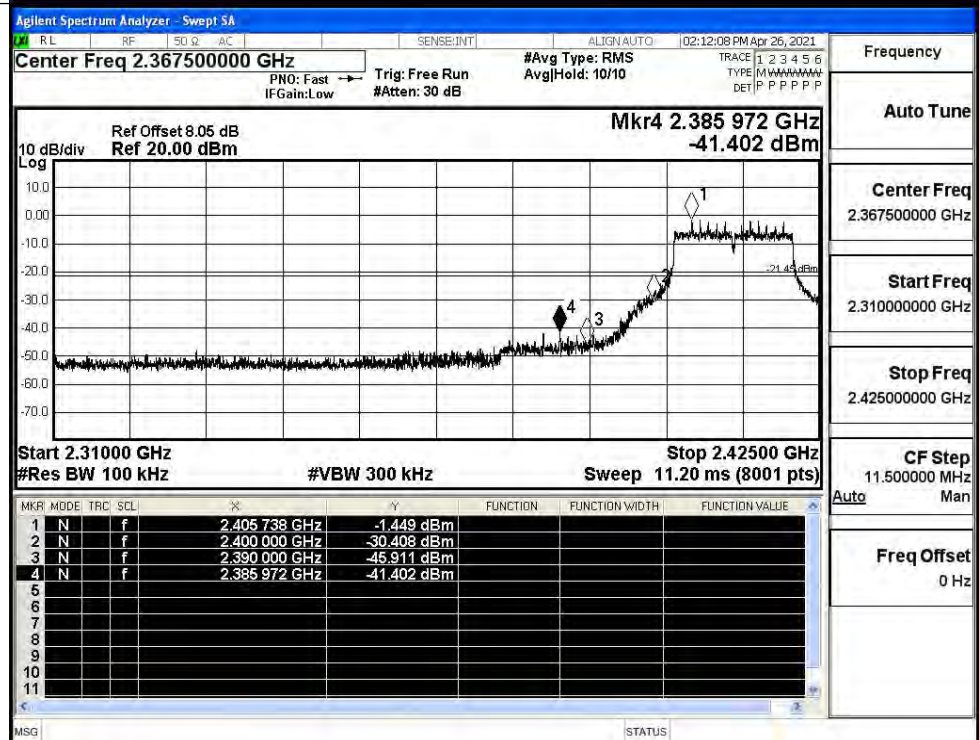
11G/LCH



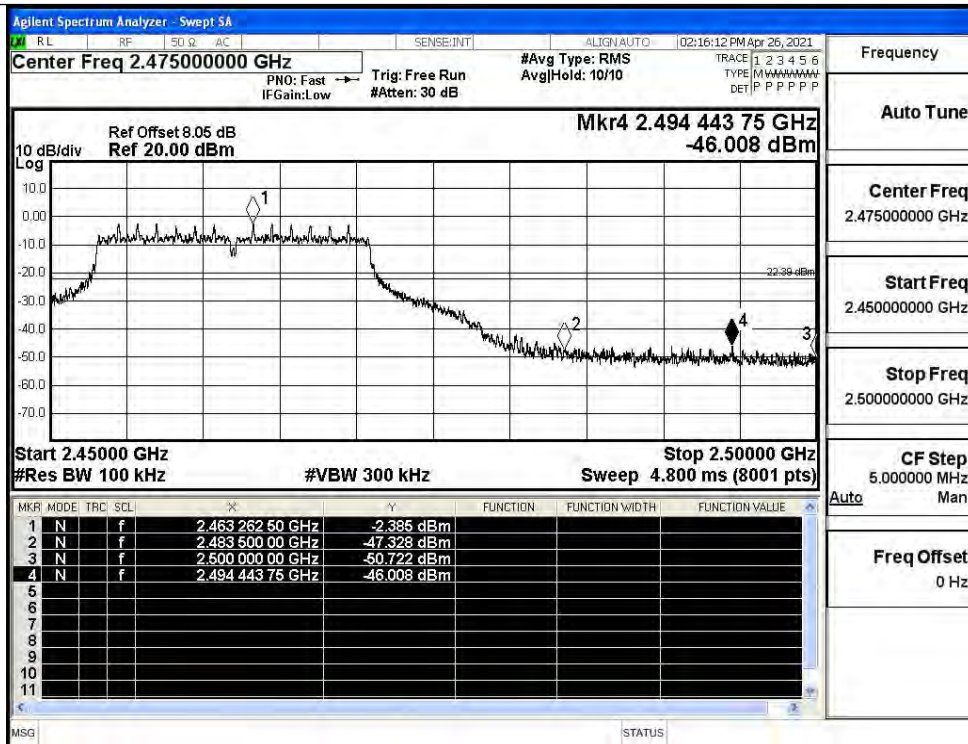
11G/HCH



11N20SISO/LCH



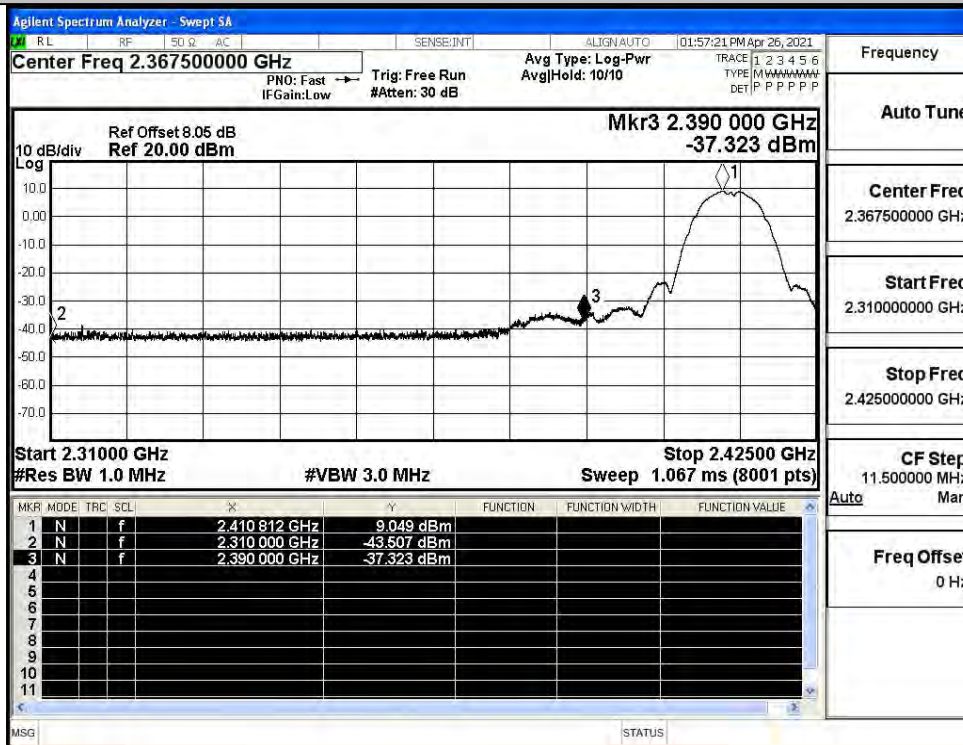
11N20SISO/HCH



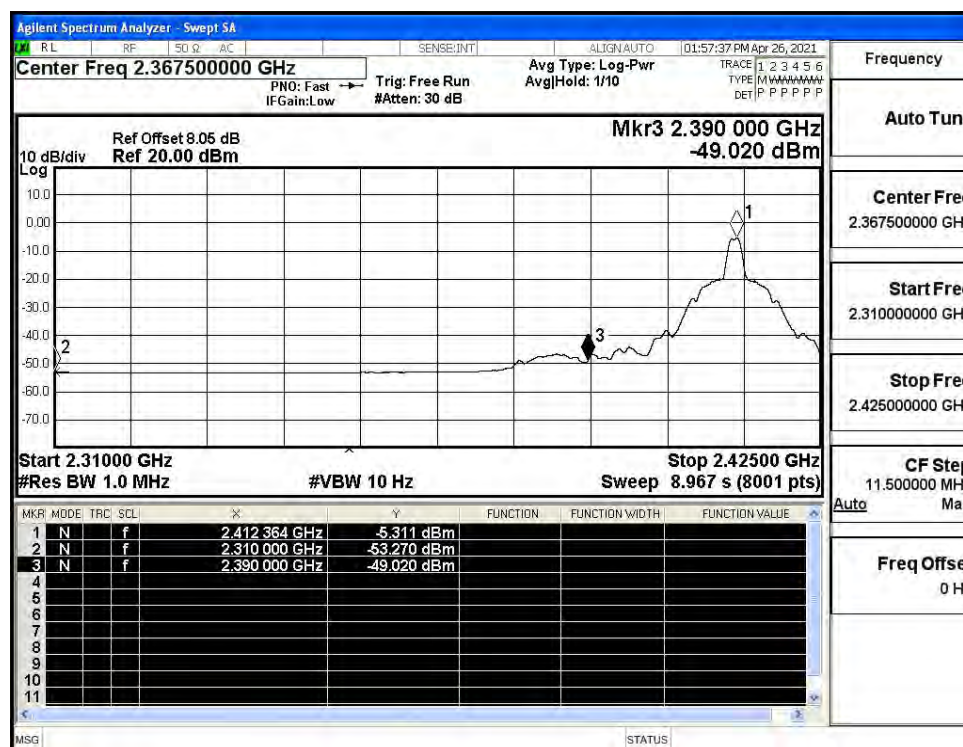
A.7 Restrict-band band-edge measurements

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
11B	2412	Ant1	2310.0	-43.51	2.0	0	53.72	PEAK	74	PASS
	2412	Ant1	2310.0	-53.27	2.0	0	43.96	AV	54	PASS
	2412	Ant1	2390.0	-37.32	2.0	0	59.91	PEAK	74	PASS
	2412	Ant1	2390.0	-49.02	2.0	0	48.21	AV	54	PASS
	2462	Ant1	2483.5	-38.29	2.0	0	58.94	PEAK	74	PASS
	2462	Ant1	2483.5	-48.66	2.0	0	48.57	AV	54	PASS
	2462	Ant1	2500.0	-41.59	2.0	0	55.64	PEAK	74	PASS
	2462	Ant1	2500.0	-52.43	2.0	0	44.80	AV	54	PASS
11G	2412	Ant1	2310.0	-41.58	2.0	0	55.65	PEAK	74	PASS
	2412	Ant1	2310.0	-53.36	2.0	0	43.87	AV	54	PASS
	2412	Ant1	2390.0	-36.72	2.0	0	60.51	PEAK	74	PASS
	2412	Ant1	2390.0	-49.97	2.0	0	47.26	AV	54	PASS
	2462	Ant1	2483.5	-37.11	2.0	0	60.12	PEAK	74	PASS
	2462	Ant1	2483.5	-51.42	2.0	0	45.81	AV	54	PASS
	2462	Ant1	2500.0	-42.40	2.0	0	54.83	PEAK	74	PASS
	2462	Ant1	2500.0	-52.50	2.0	0	44.73	AV	54	PASS
11N20 SISO	2412	Ant1	2310.0	-41.34	2.0	0	55.89	PEAK	74	PASS
	2412	Ant1	2310.0	-53.36	2.0	0	43.87	AV	54	PASS
	2412	Ant1	2390.0	-28.88	2.0	0	68.35	PEAK	74	PASS
	2412	Ant1	2390.0	-49.91	2.0	0	47.32	AV	54	PASS
	2462	Ant1	2483.5	-38.23	2.0	0	59.00	PEAK	74	PASS
	2462	Ant1	2483.5	-51.36	2.0	0	45.87	AV	54	PASS
	2462	Ant1	2500.0	-41.87	2.0	0	55.36	PEAK	74	PASS
	2462	Ant1	2500.0	-52.47	2.0	0	44.76	AV	54	PASS

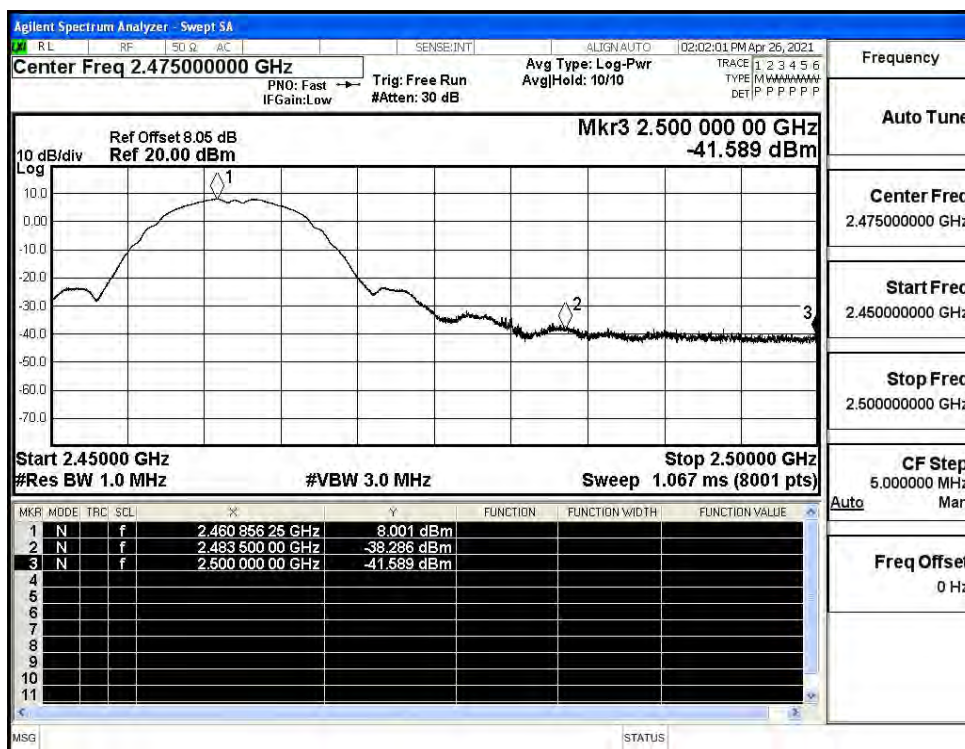
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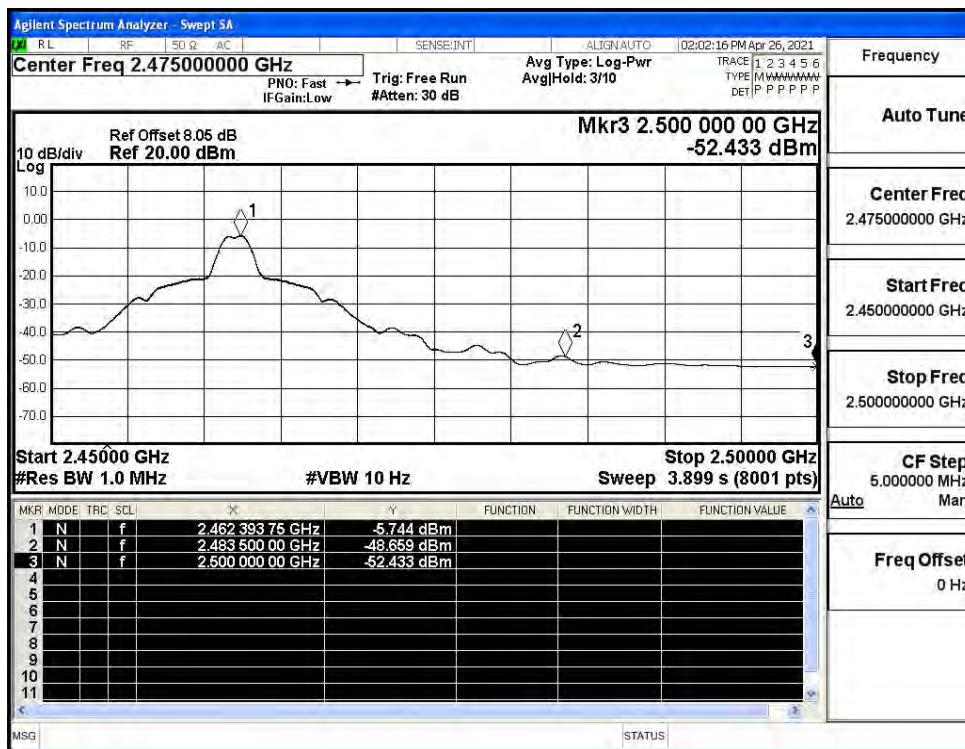
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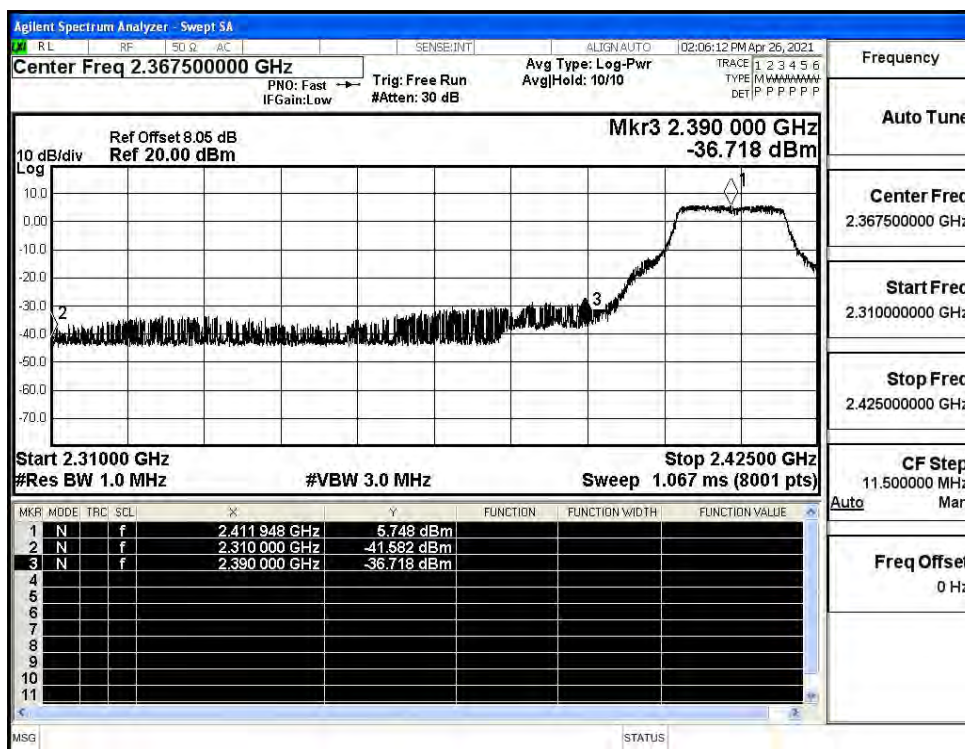
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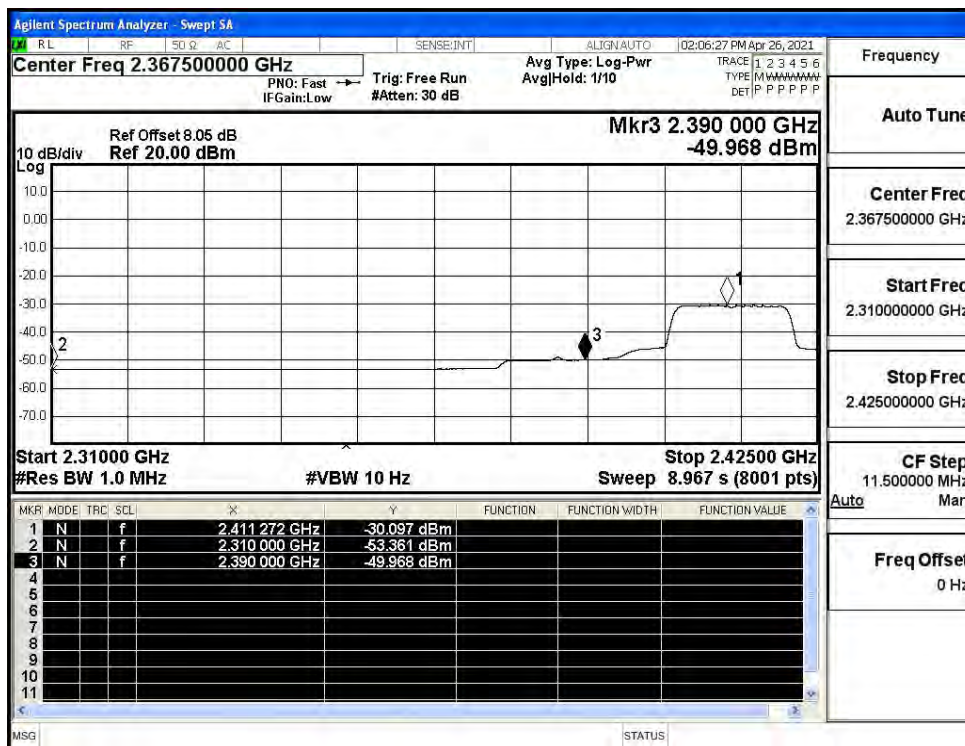
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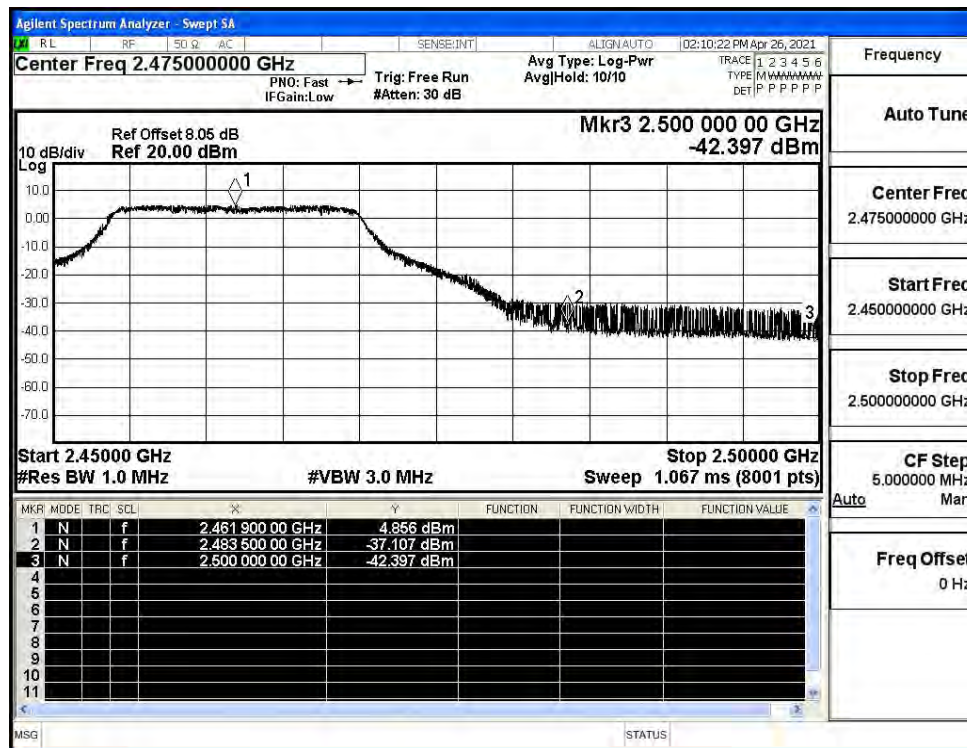
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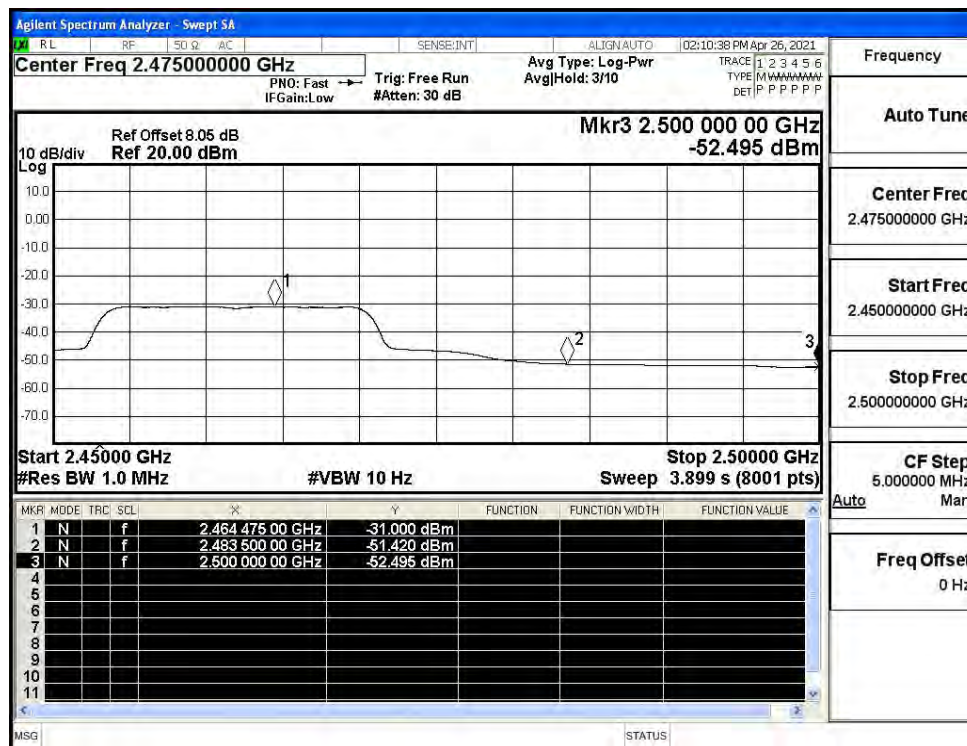
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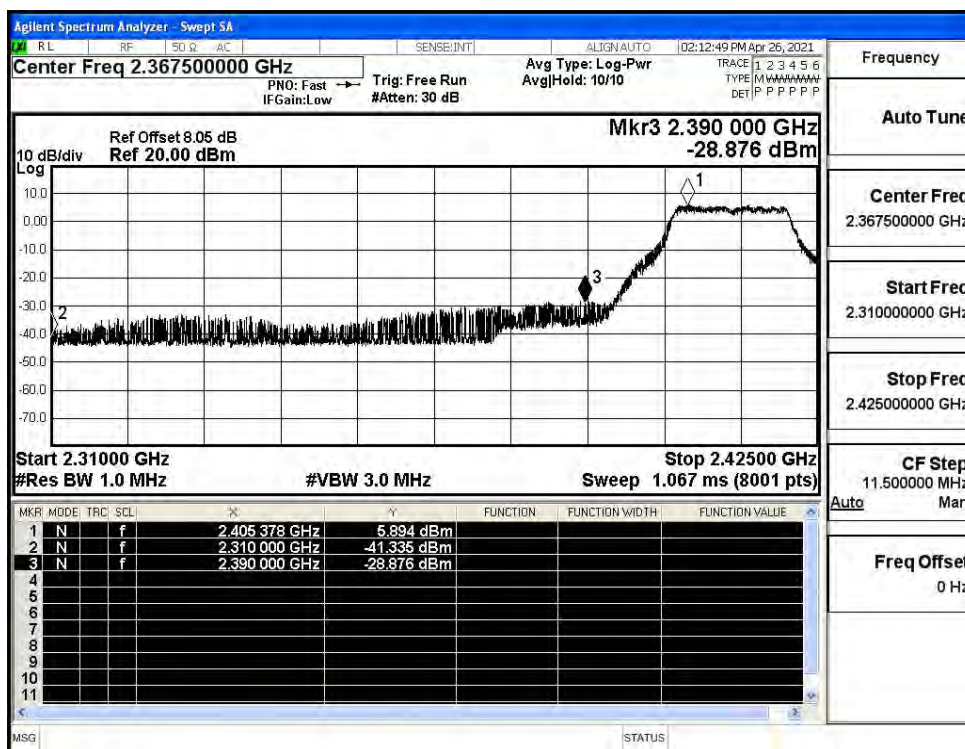
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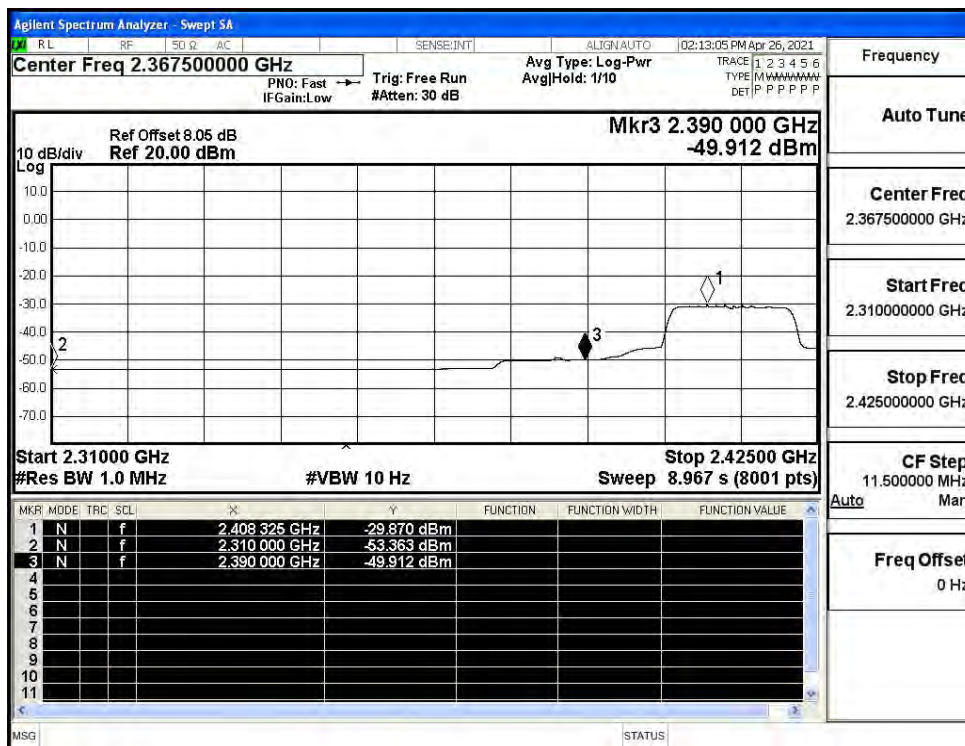
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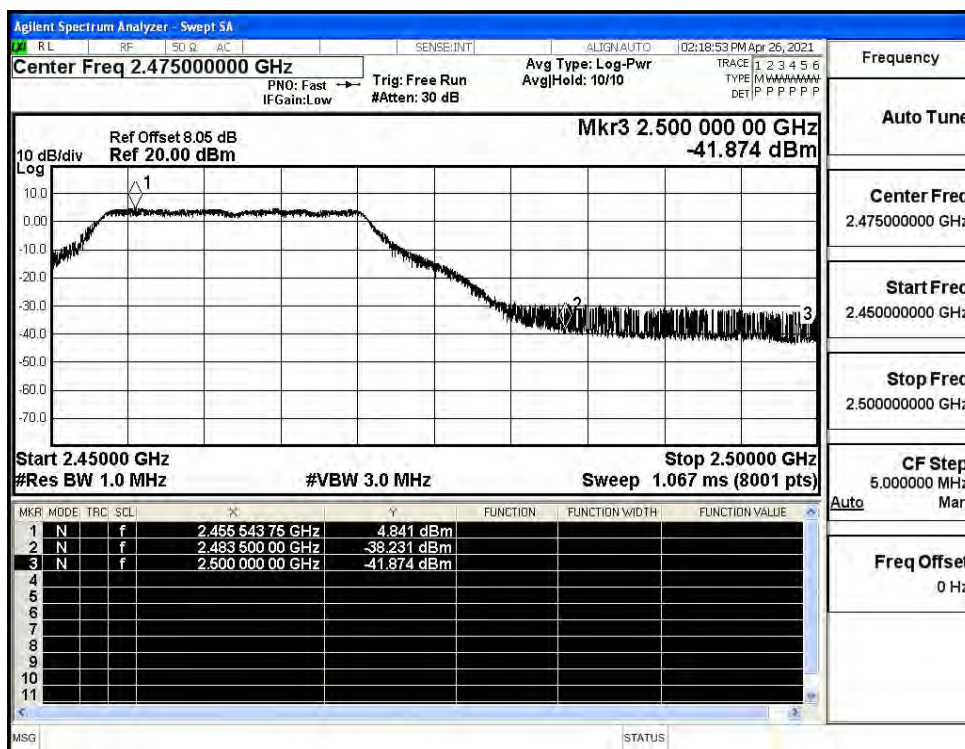
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Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV

