

Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)

Product Name: WIFI Module

Trade Mark: N/A

Test Model: ESP-M2

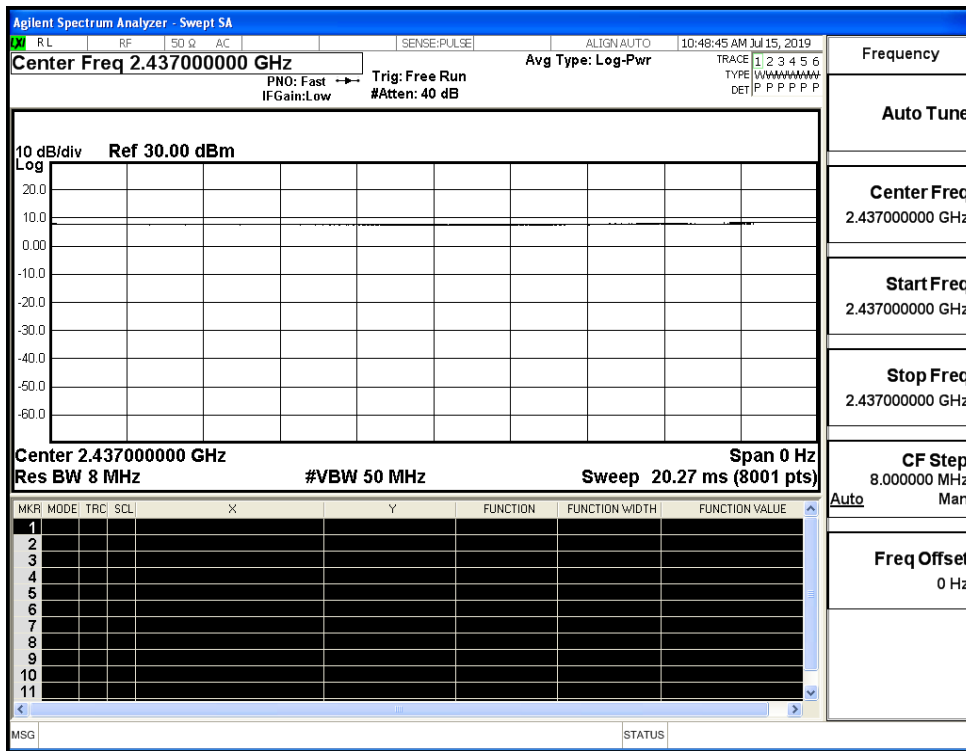
Environmental Conditions

Temperature:	24.1°C
Relative Humidity:	53.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Wang.Chuang

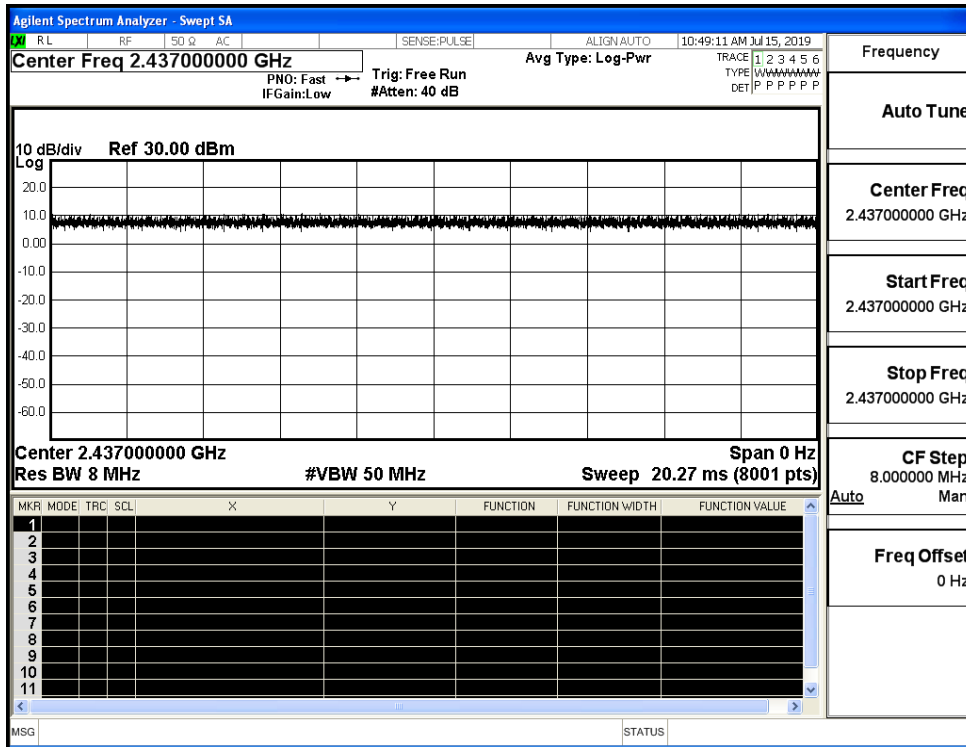
A.1 Duty Cycle

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

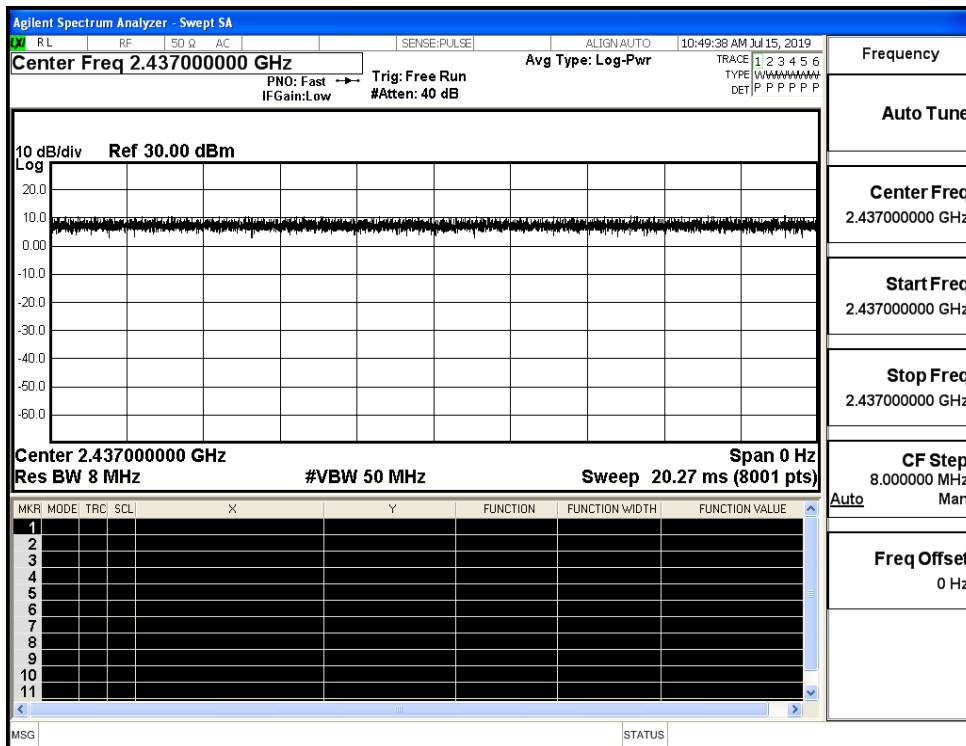
Duty Cycle_11B_2437_Ant1



Duty Cycle_11G_2437_Ant1



Duty Cycle_11N20SISO_2437_Ant1

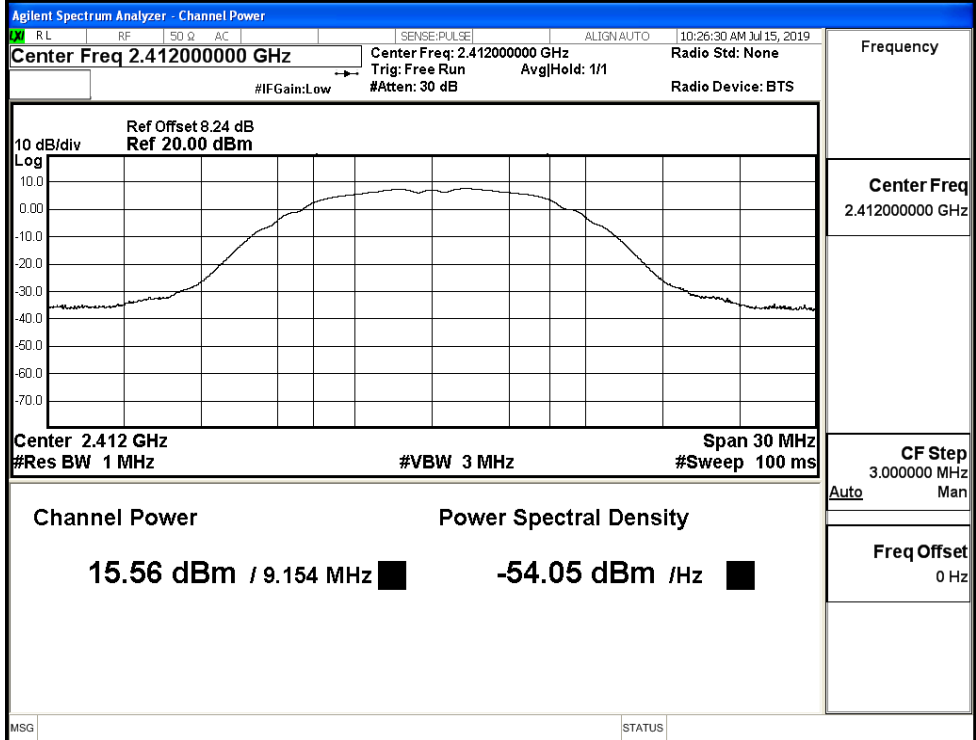


A.2 Maximum Conducted Output Power

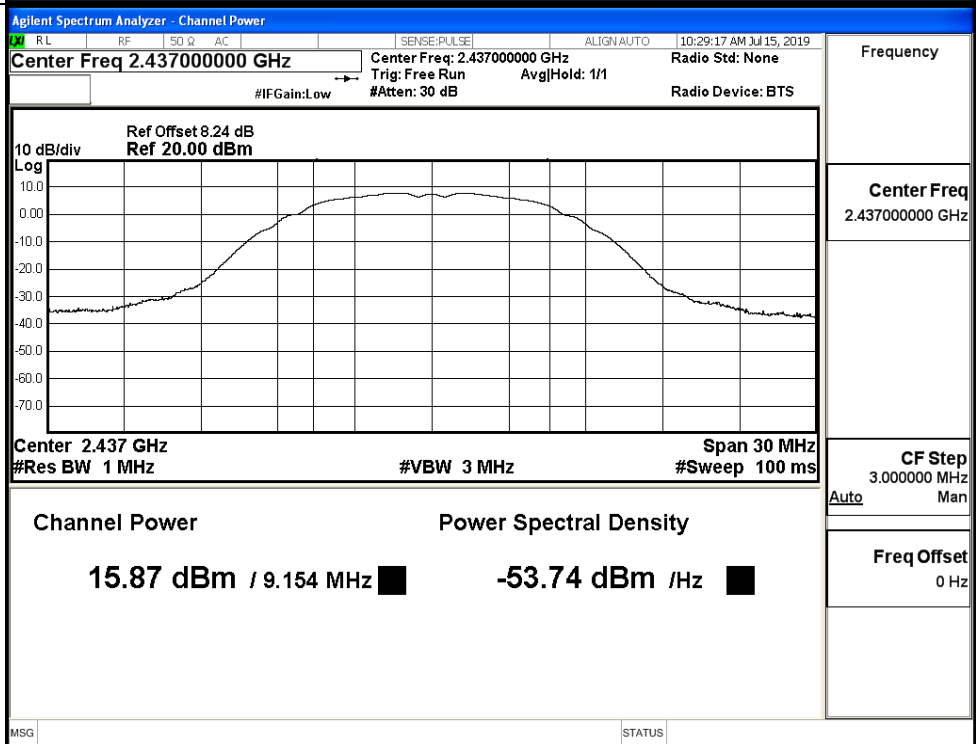
Mode	Channel	Meas.Level [dBm]	Limit [dBm]	Verdict
11B	LCH	15.56	30	PASS
	MCH	15.87	30	PASS
	HCH	15.50	30	PASS
11G	LCH	14.87	30	PASS
	MCH	15.22	30	PASS
	HCH	14.82	30	PASS
11N20SISO	LCH	14.83	30	PASS
	MCH	15.63	30	PASS
	HCH	14.96	30	PASS

Test Graphs

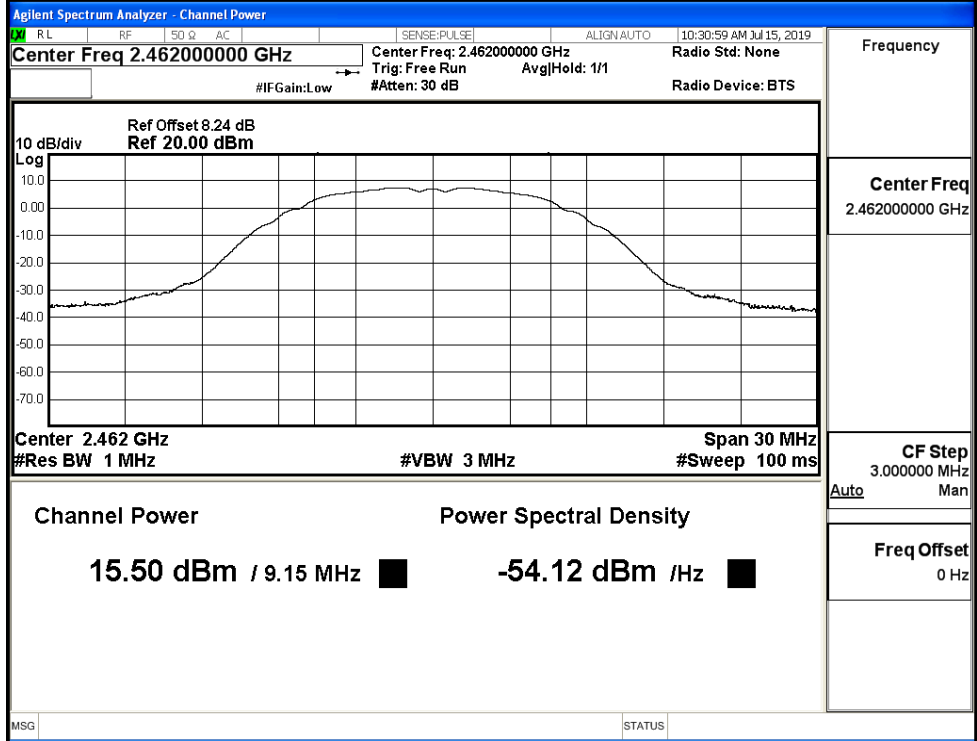
11B/LCH



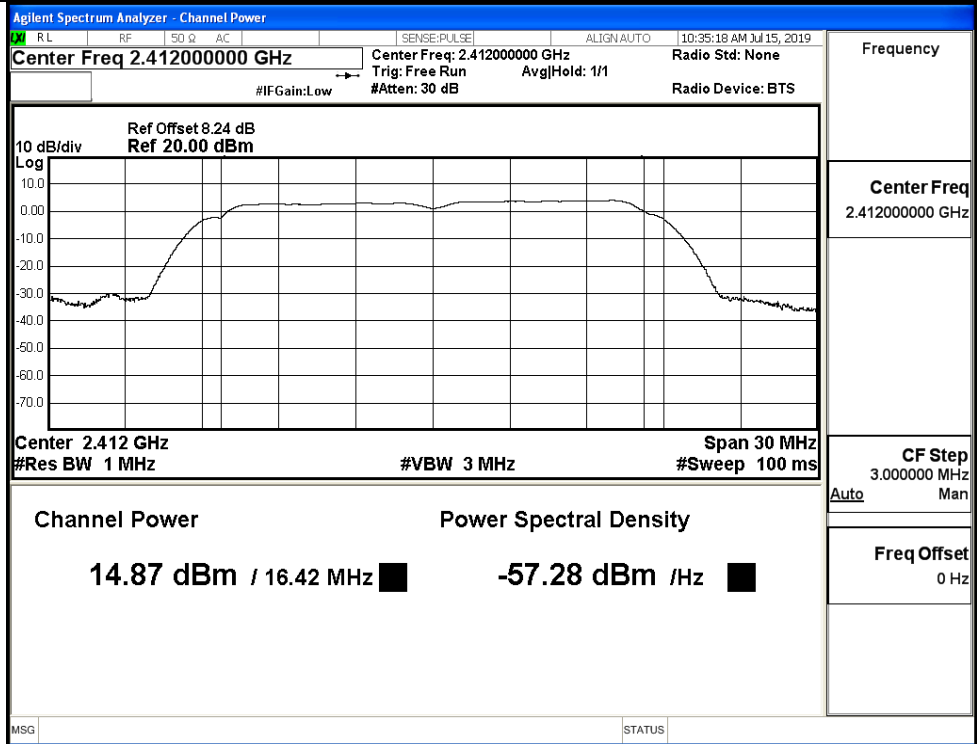
11B/MCH



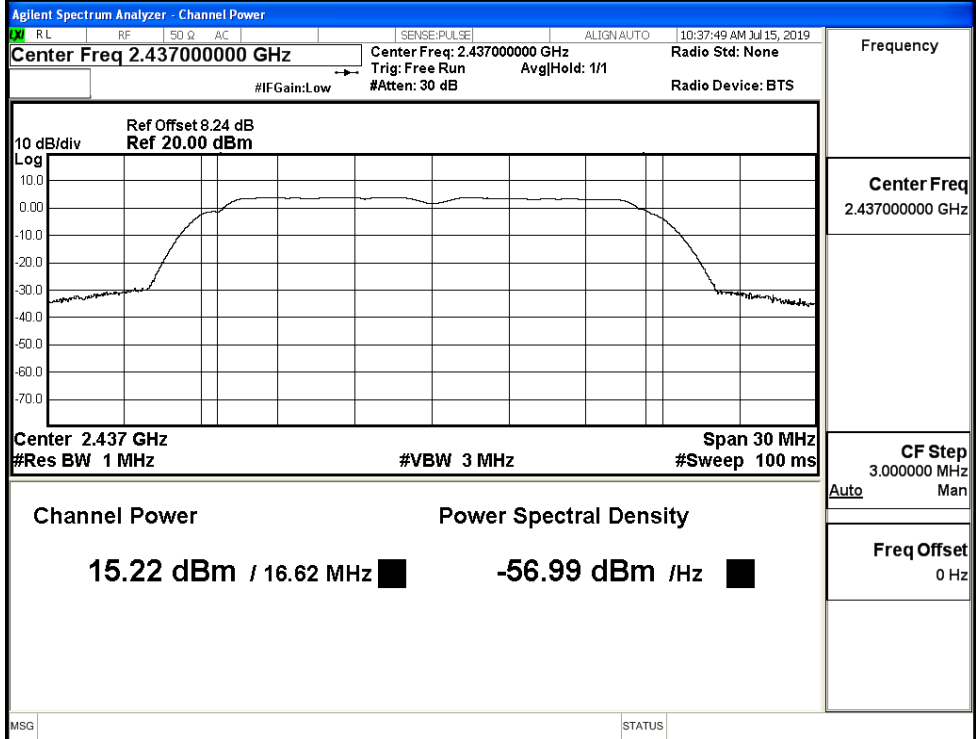
11B/HCH



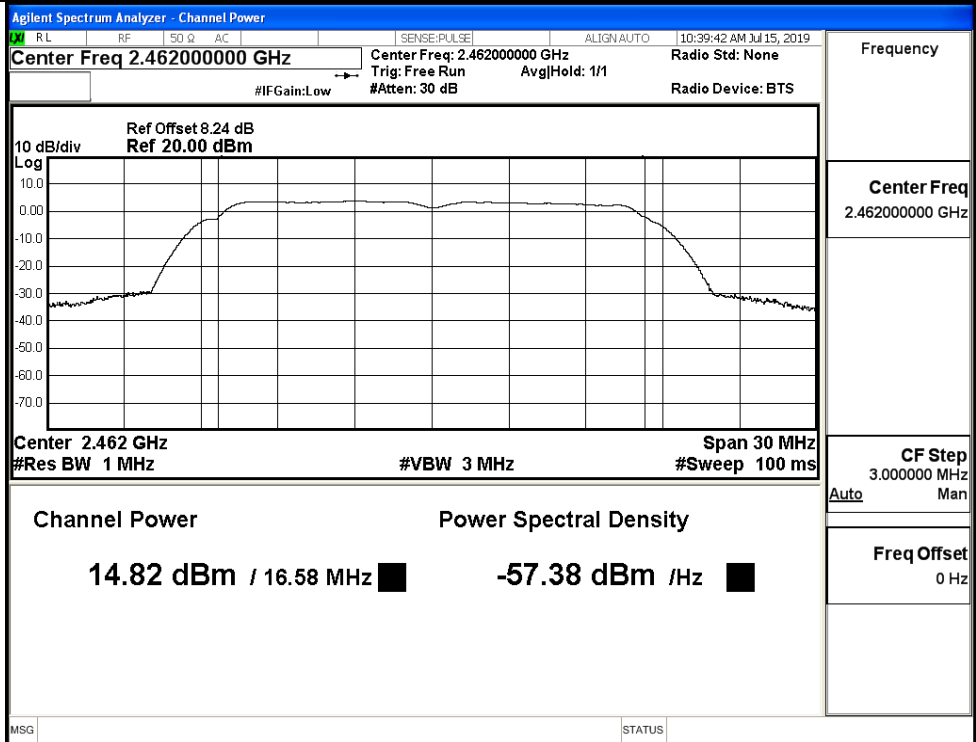
11G/LCH



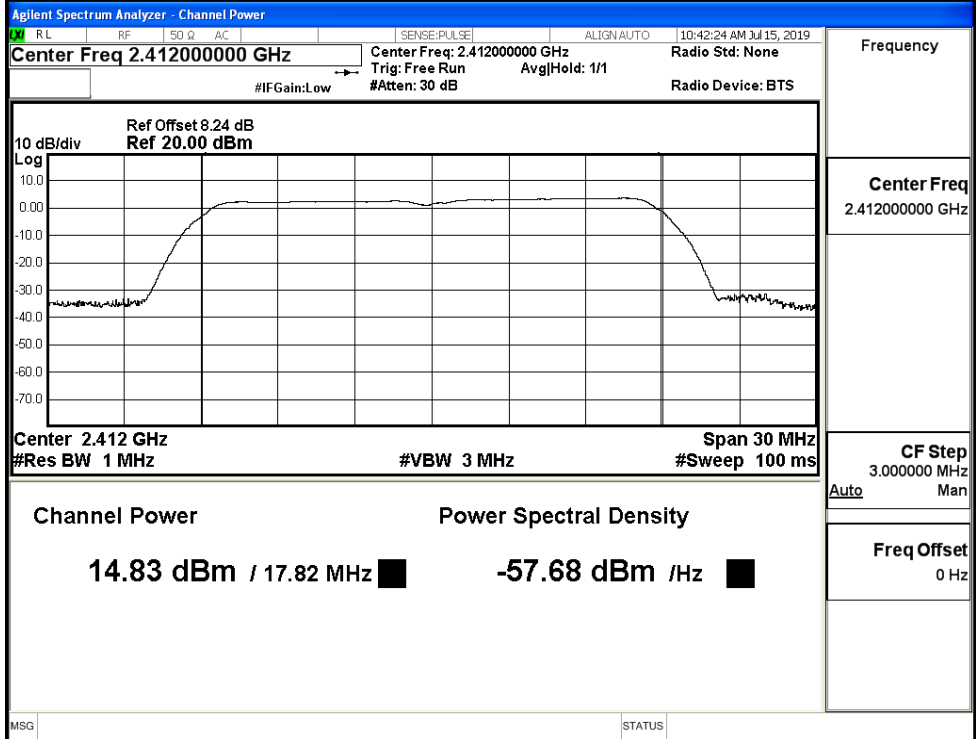
11G/MCH



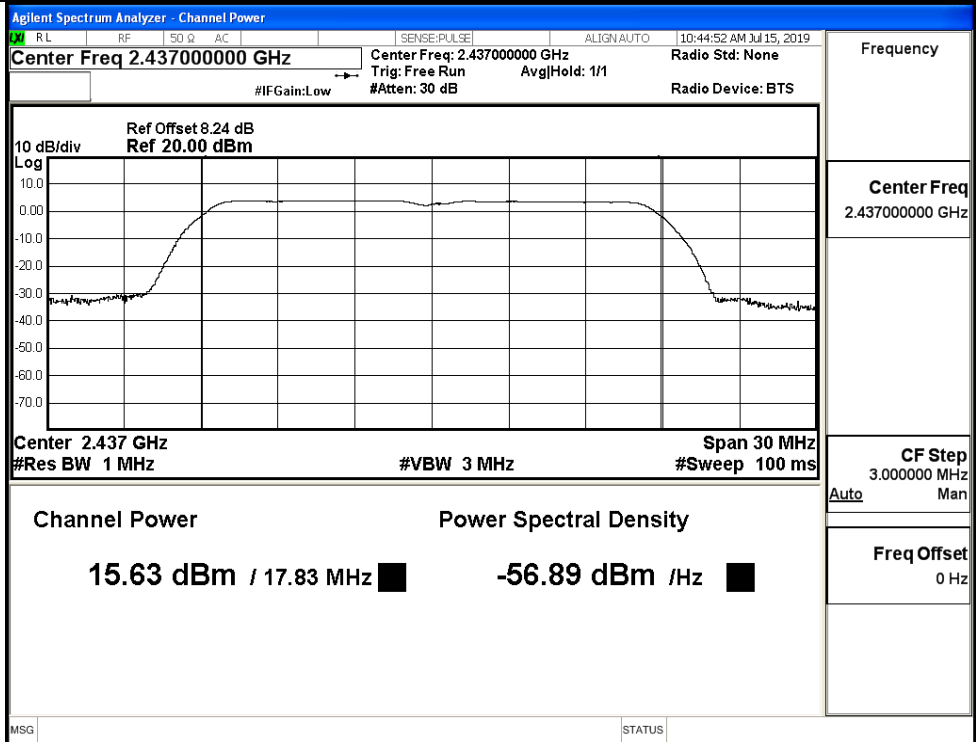
11G/HCH



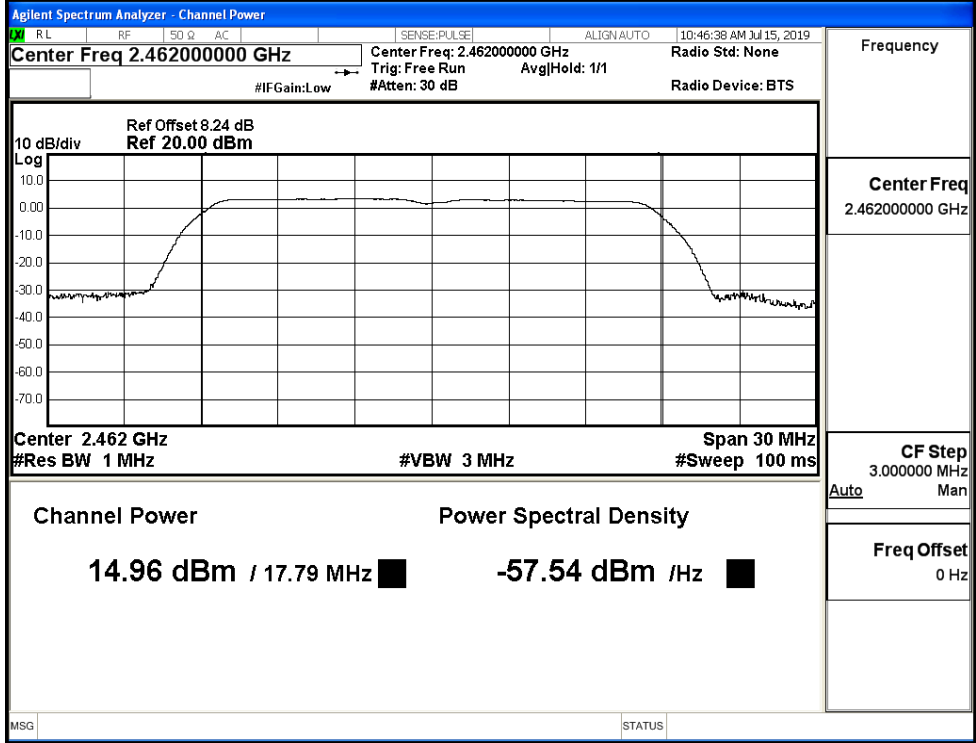
11N20SISO/LCH



11N20SISO/MCH

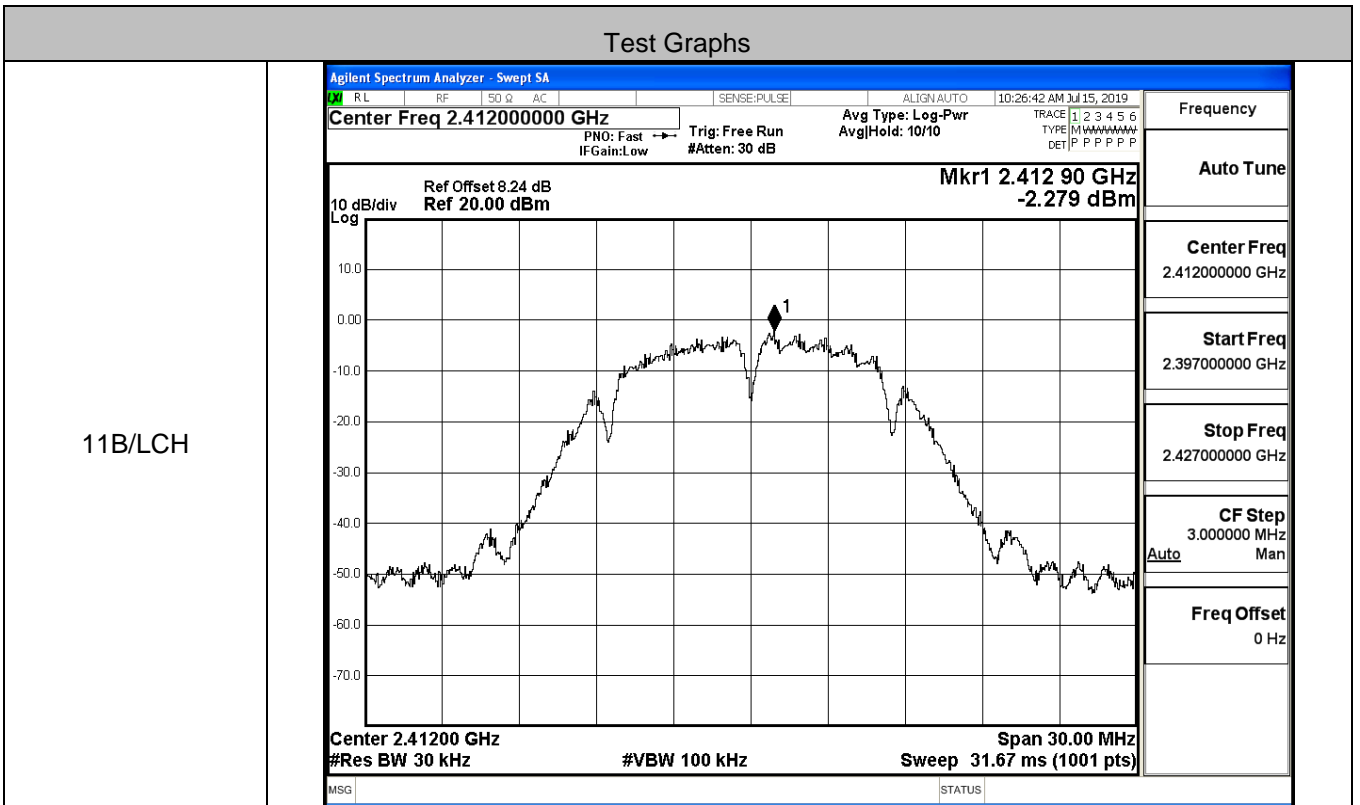


11N20SISO/HCH



A.3 Maximum Power Spectral Density

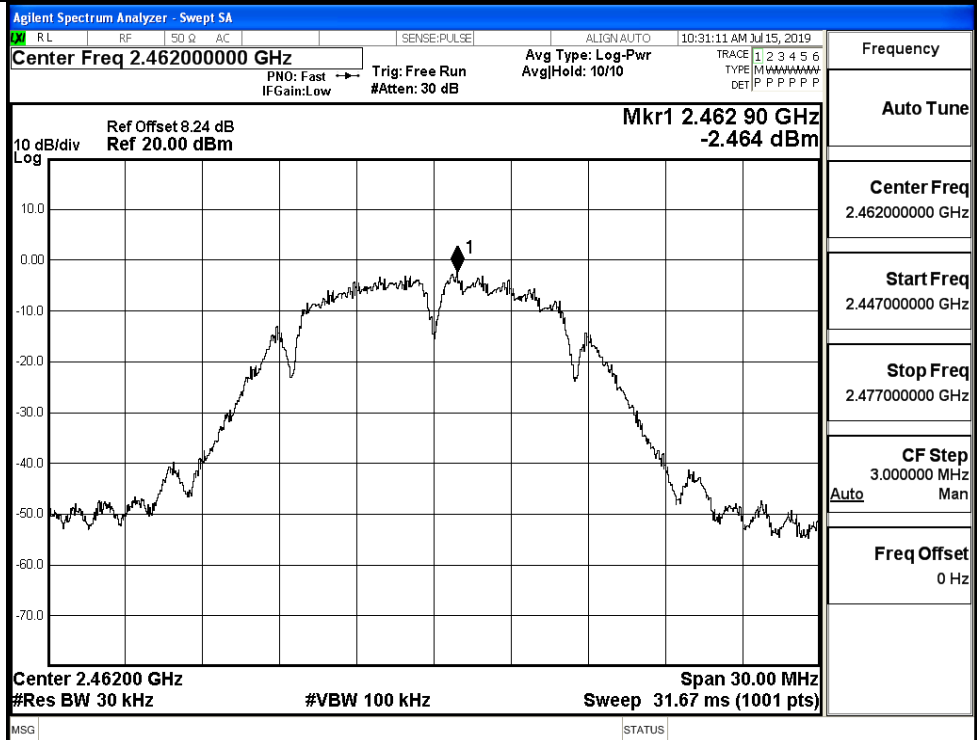
Mode	Channel	Meas.Level [dBm/30KHz]	Meas.Level [dBm/3KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	-2.279	-12.279	8	PASS
	MCH	-2.103	-12.103	8	PASS
	HCH	-2.464	-12.464	8	PASS
11G	LCH	-9.472	-19.472	8	PASS
	MCH	-9.295	-19.295	8	PASS
	HCH	-9.541	-19.541	8	PASS
11N20SISO	LCH	-9.625	-19.625	8	PASS
	MCH	-4.323	-14.323	8	PASS
	HCH	-9.731	-19.731	8	PASS



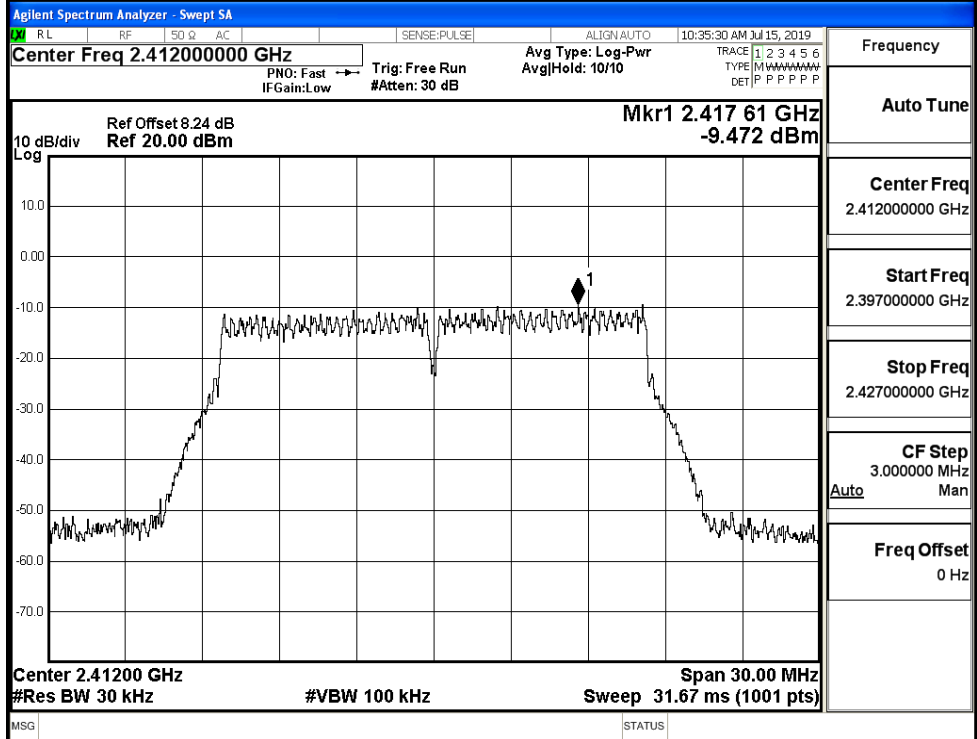
11B/MCH



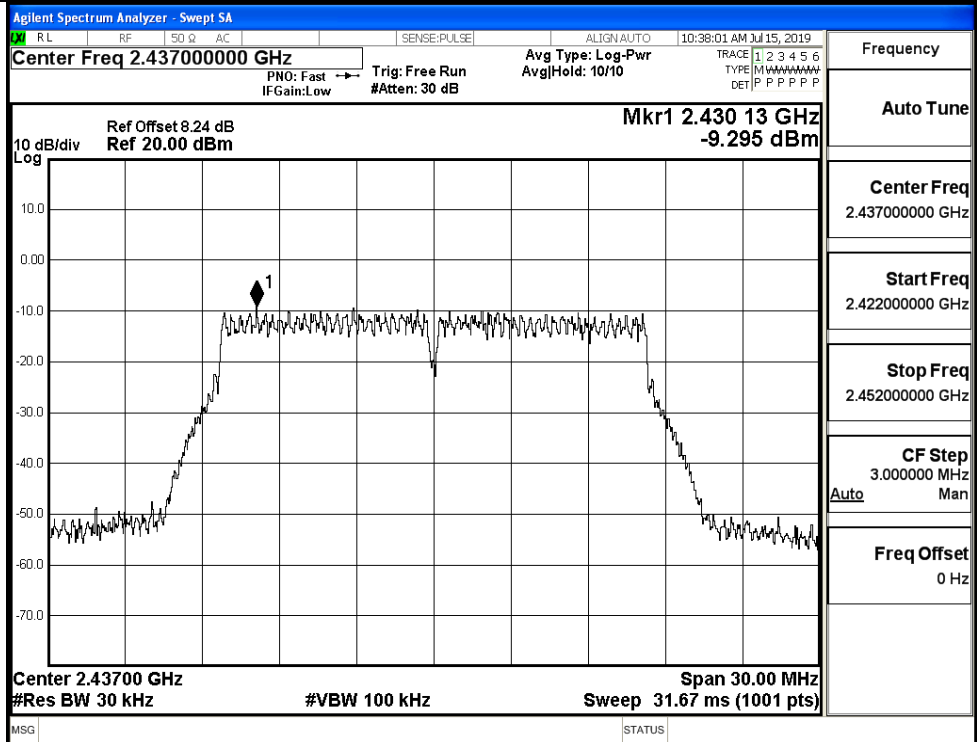
11B/HCH



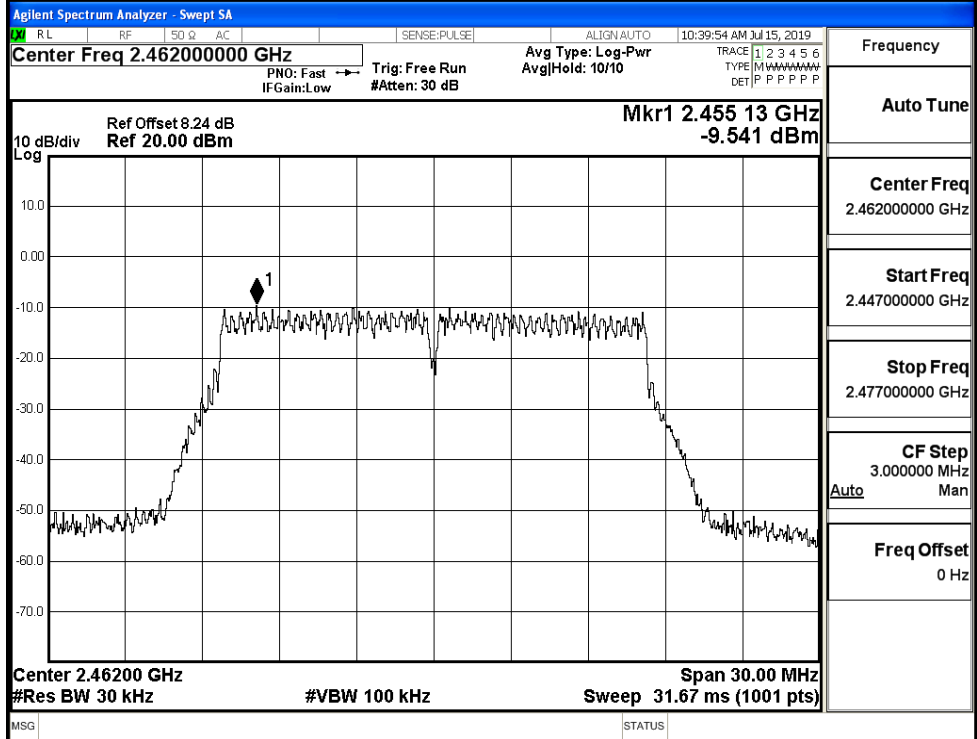
11G/LCH



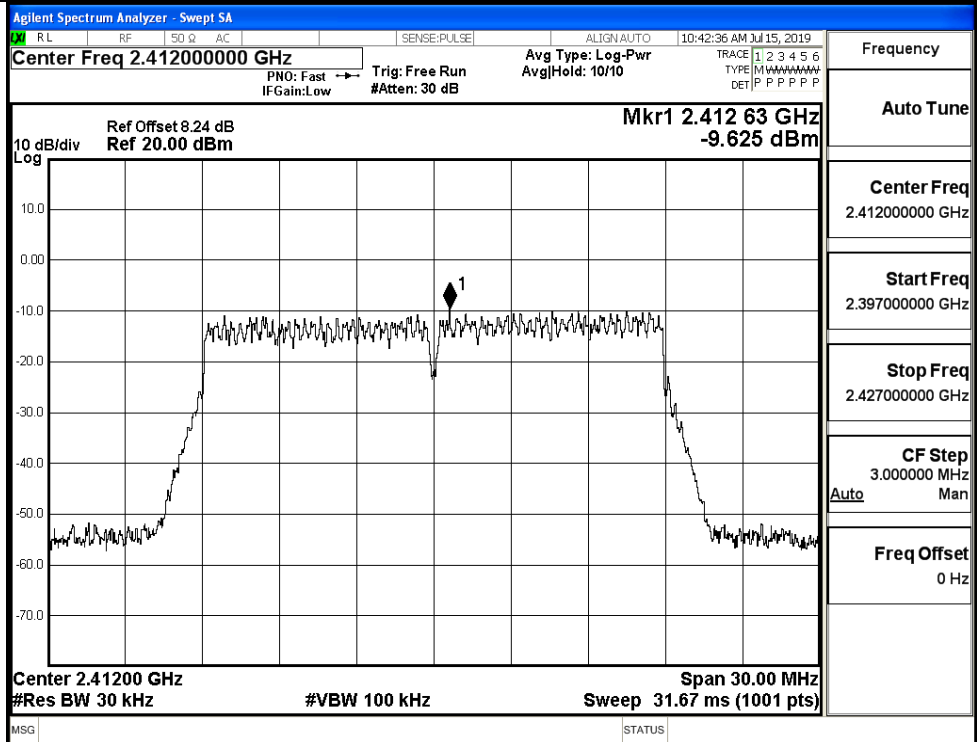
11G/MCH



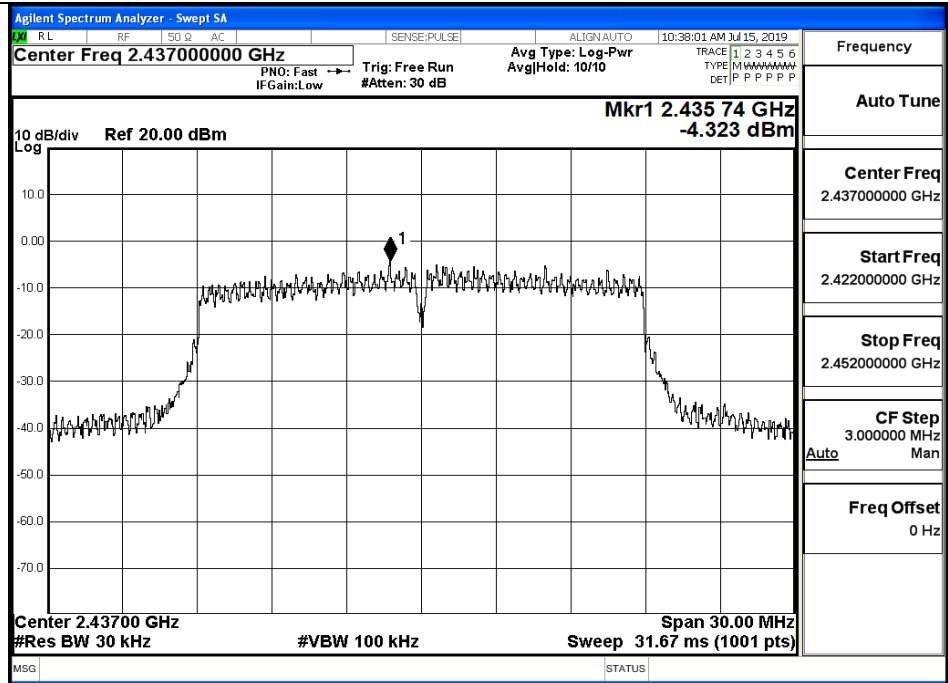
11G/HCH



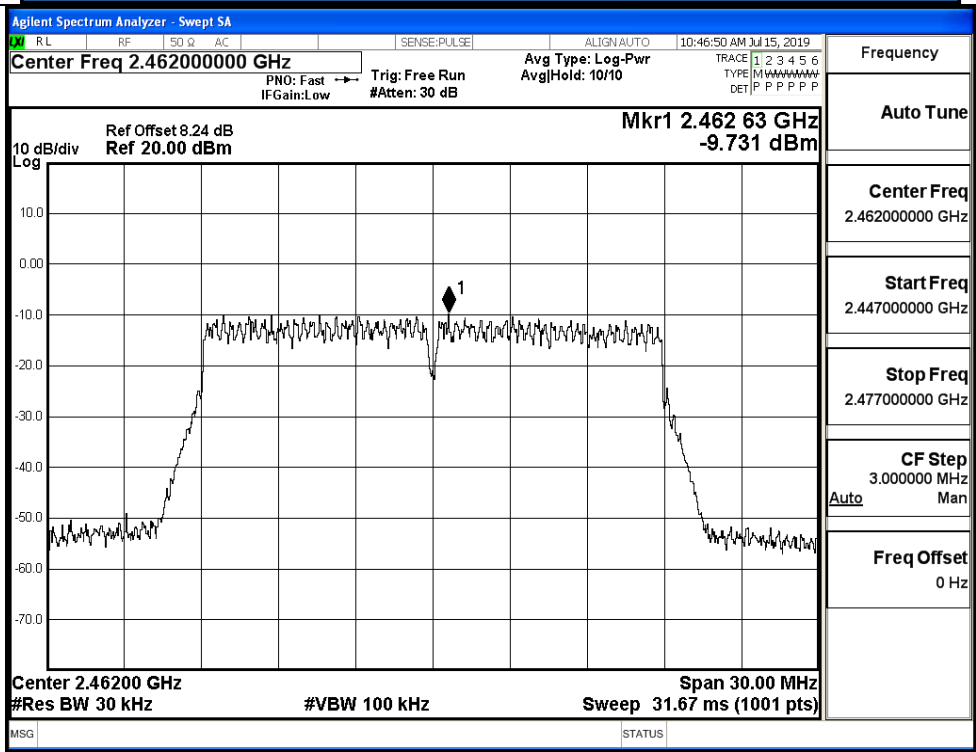
11N20SISO/LCH



11N20SISO/MCH

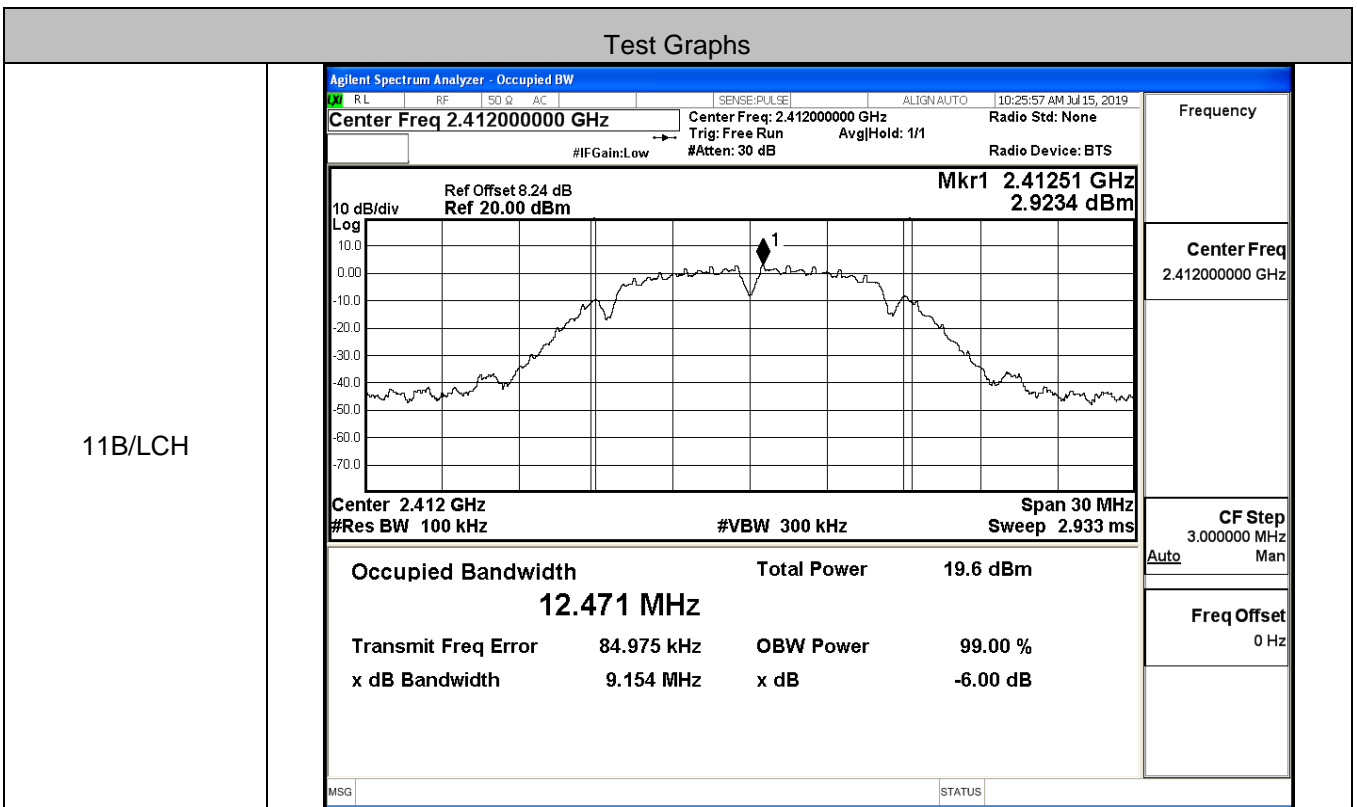


11N20SISO/HCH

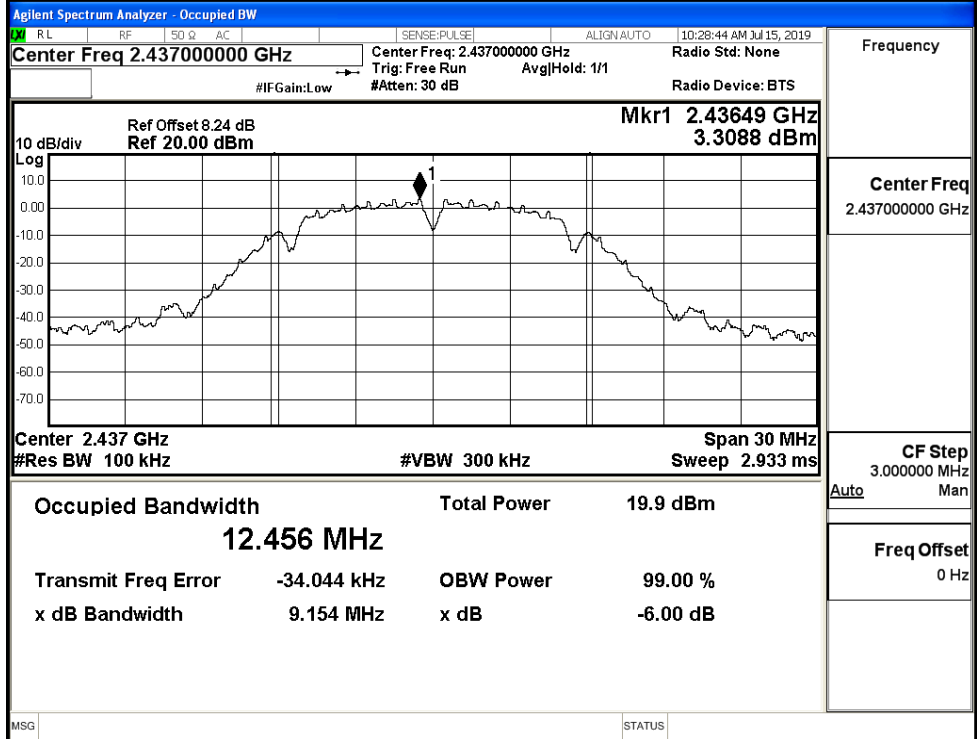


A.4 6dB Bandwidth

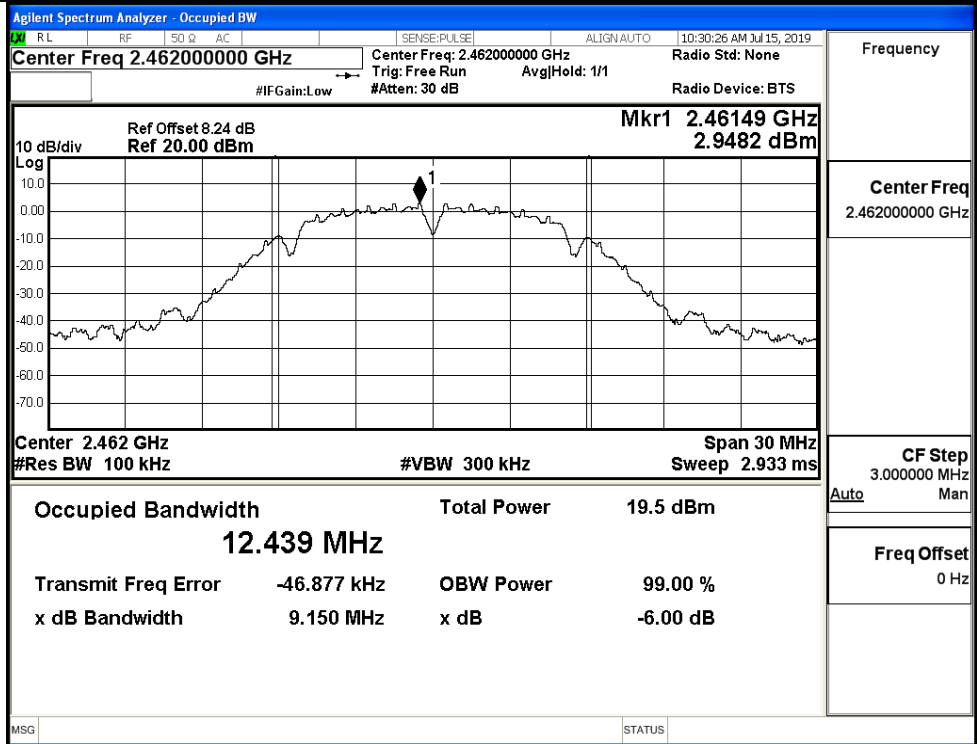
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.154	≥0.5	PASS
	MCH	9.154	≥0.5	PASS
	HCH	9.150	≥0.5	PASS
11G	LCH	16.42	≥0.5	PASS
	MCH	16.62	≥0.5	PASS
	HCH	16.58	≥0.5	PASS
11N20SISO	LCH	17.82	≥0.5	PASS
	MCH	17.83	≥0.5	PASS
	HCH	17.79	≥0.5	PASS



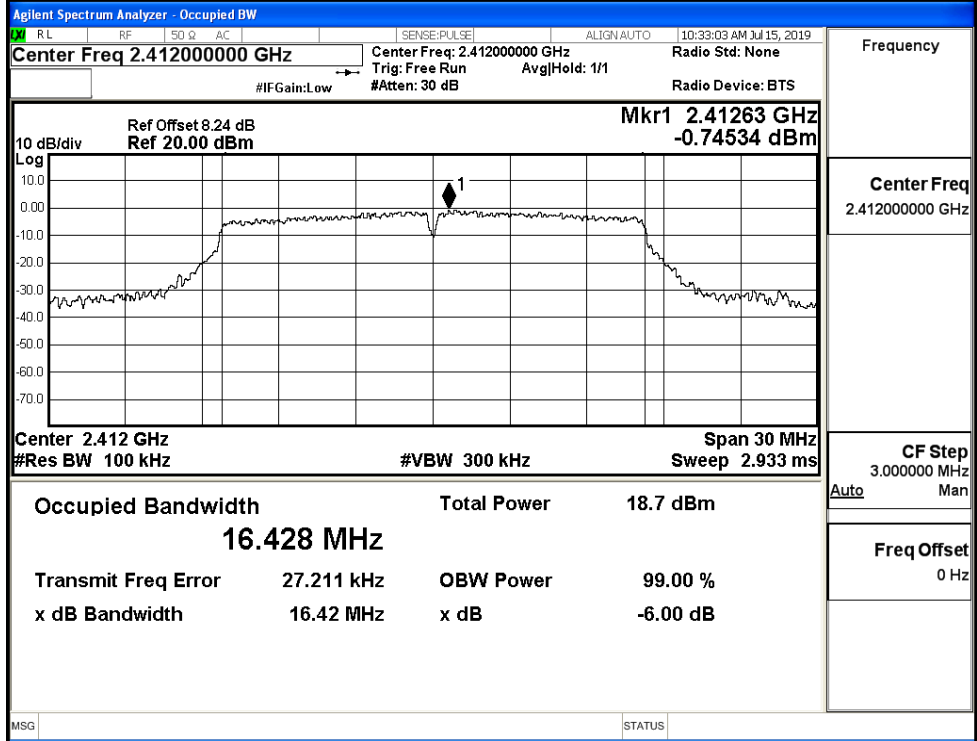
11B/MCH



11B/HCH



11G/LCH



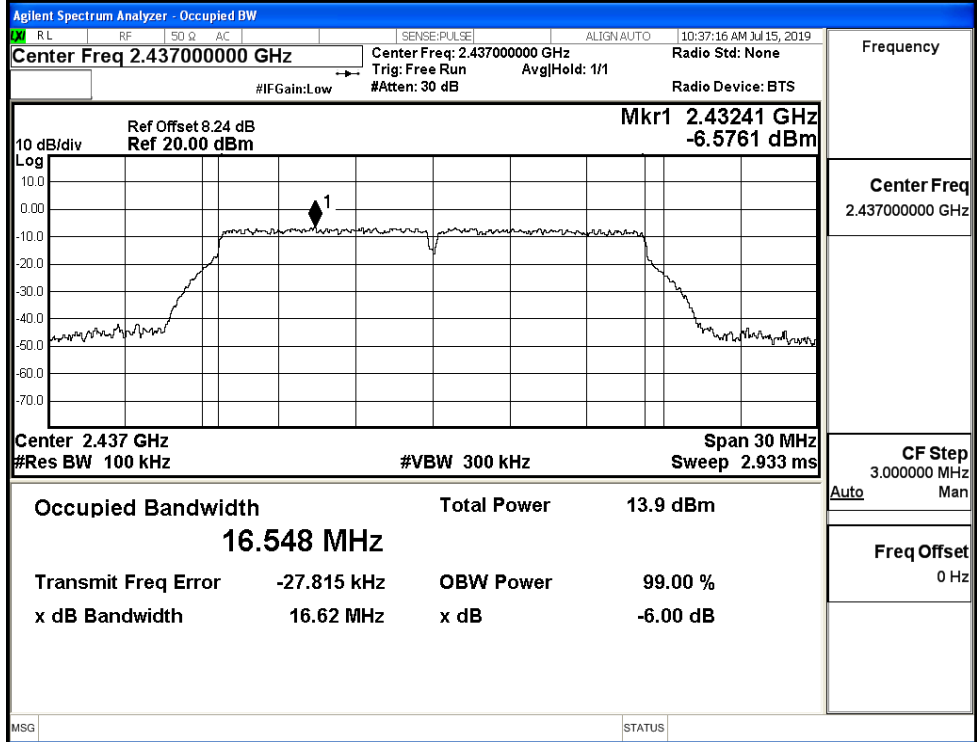
Frequency

Center Freq
2.41200000 GHz

CF Step
3.000000 MHz
Auto Man

Freq Offset
0 Hz

11G/MCH



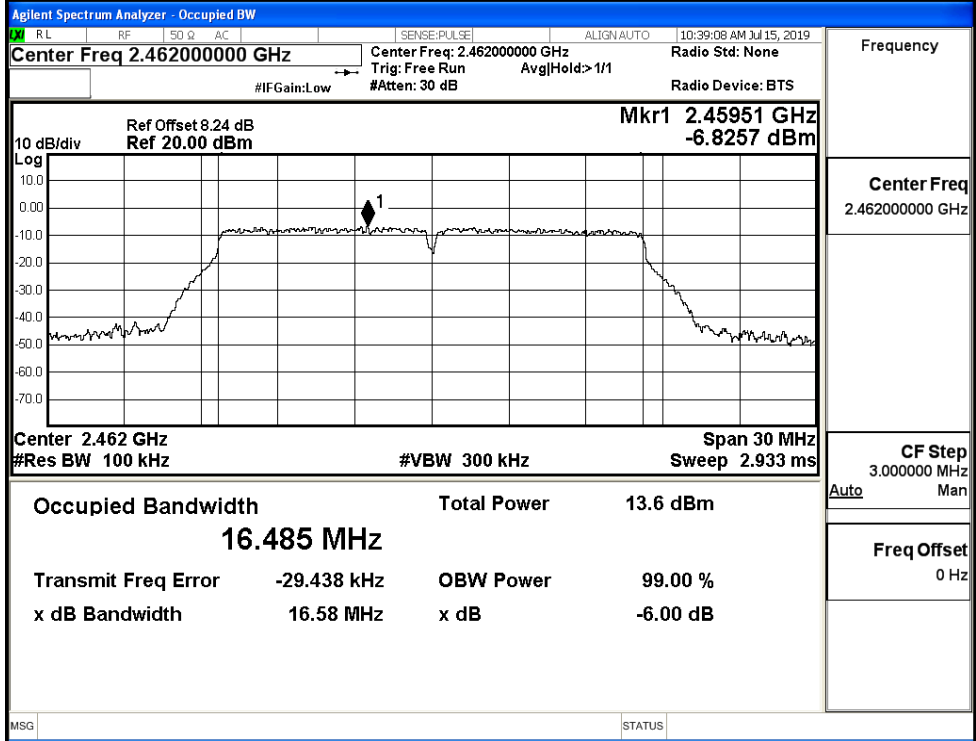
Frequency

Center Freq
2.43700000 GHz

CF Step
3.000000 MHz
Auto Man

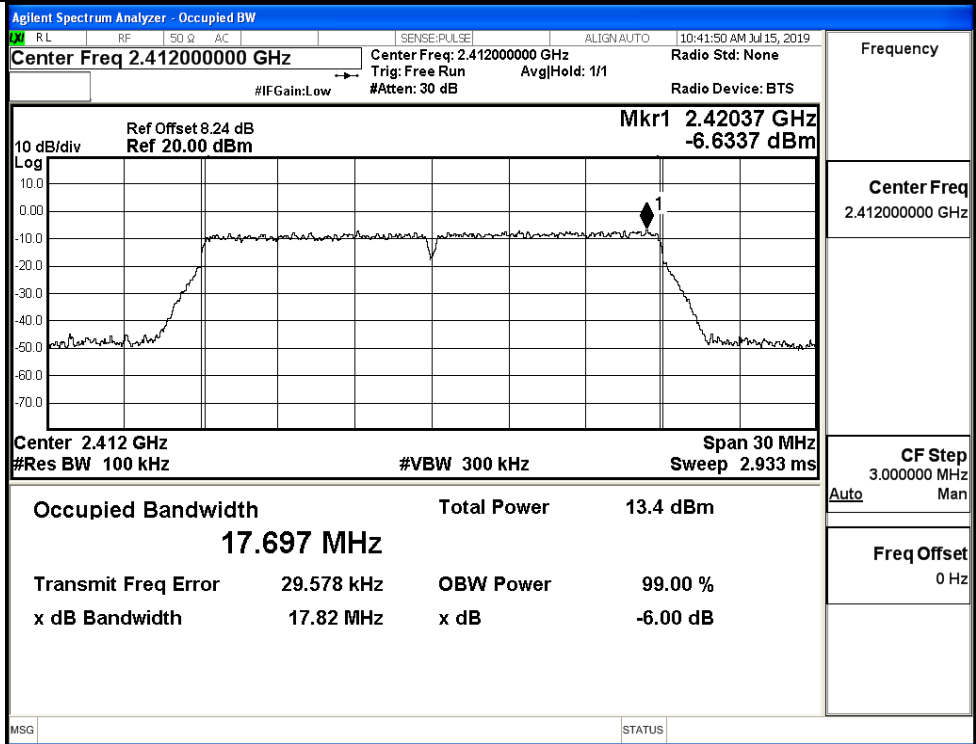
Freq Offset
0 Hz

11G/HCH



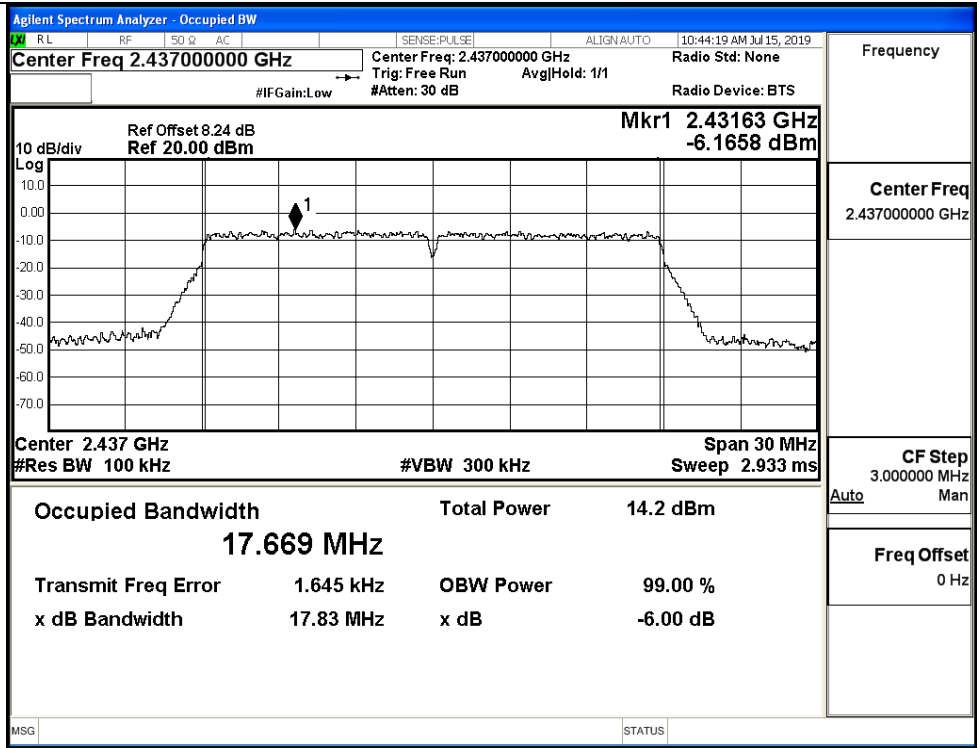
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11N20SISO/LCH

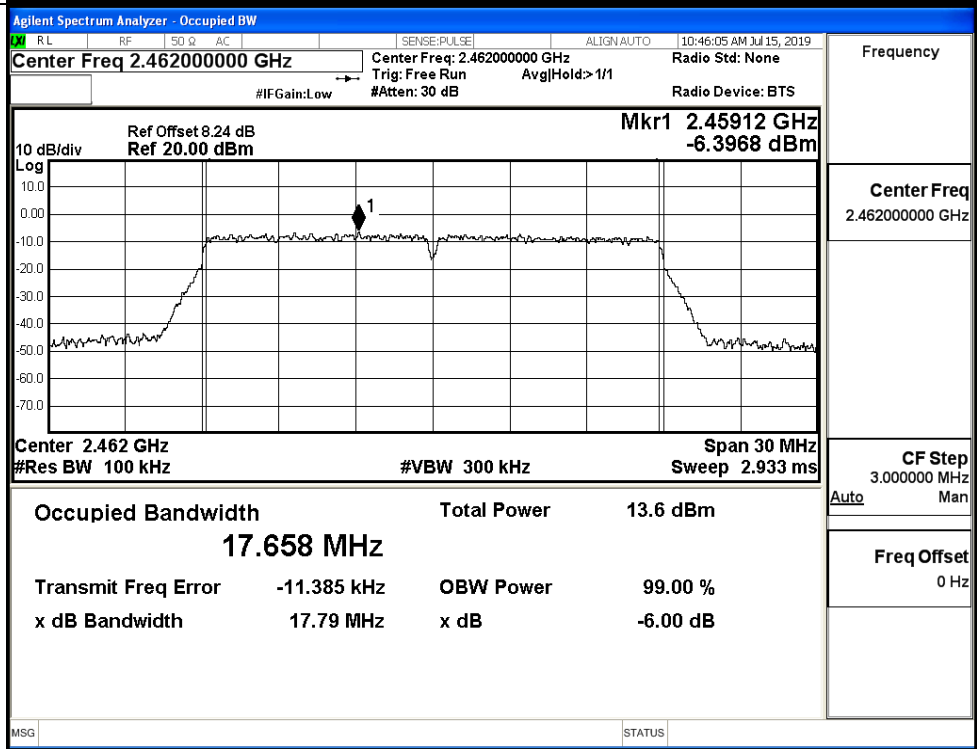


Frequency	2.41200000 GHz
Center Freq	2.41200000 GHz
CF Step	3.000000 MHz
Auto	Man
Freq Offset	0 Hz

11N20SISO/MCH



11N20SISO/HCH



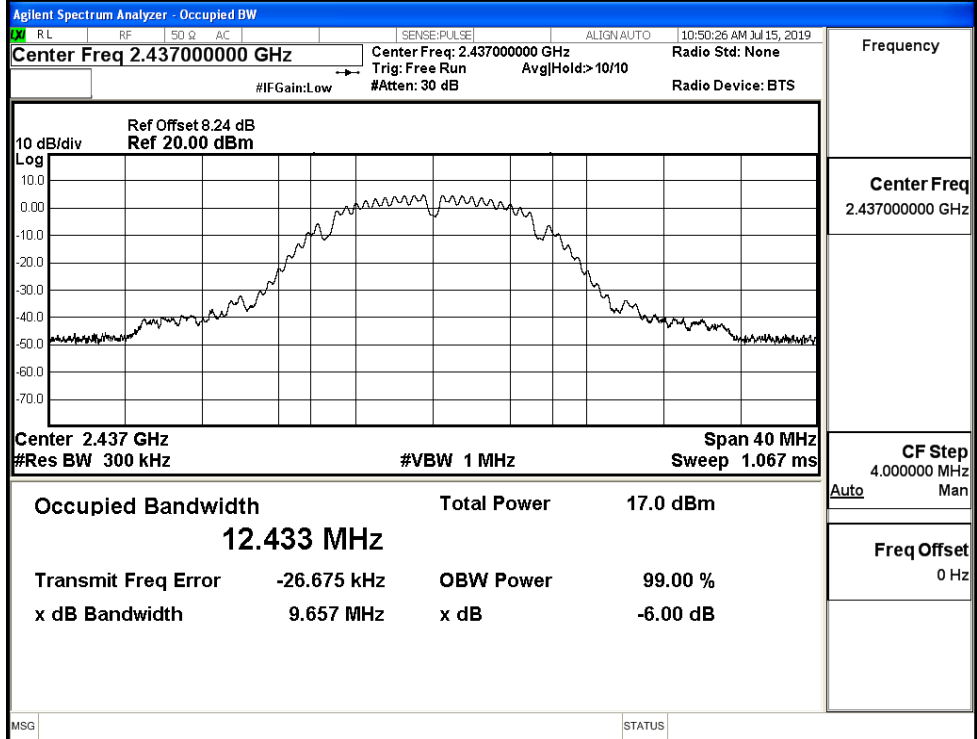
A.5 Occupied Bandwidth

Mode	Channel	Occupied Bandwidth [MHz]	Verdict
11B	LCH	12.476	PASS
	MCH	12.433	PASS
	HCH	12.434	PASS
11G	LCH	16.748	PASS
	MCH	16.690	PASS
	HCH	16.370	PASS
11N20SISO	LCH	17.379	PASS
	MCH	17.600	PASS
	HCH	17.466	PASS

Test Graphs

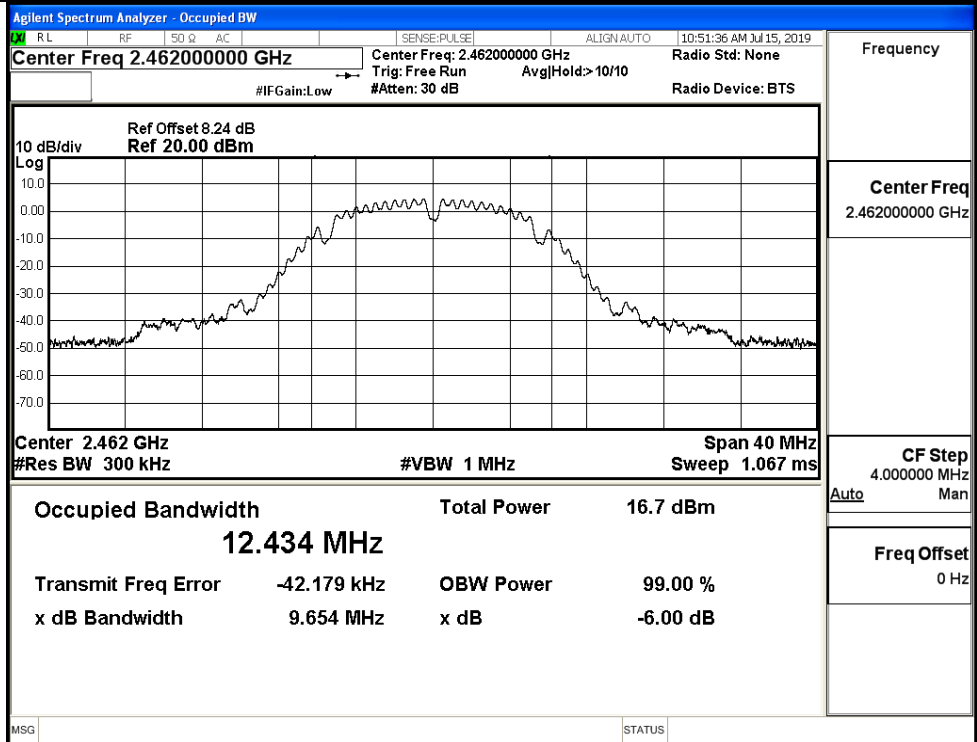
11B/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.41200000 GHz #IFGain:Low #Atten: 30 dB		SENSE:PULSE ALIGN:AUTO 10:50:01 AM Jul 15, 2019 Radio Std: None Radio Device: BTS
	Ref Offset 8.24 dB Ref 20.00 dBm 10 dB/div Log		Frequency Center Freq 2.41200000 GHz
			CF Step 4.000000 MHz Auto Man
	Center 2.412 GHz Span 40 MHz #Res BW 300 kHz #VBW 1 MHz Sweep 1.067 ms		Freq Offset 0 Hz
Occupied Bandwidth 12.476 MHz		Total Power 17.0 dBm	
Transmit Freq Error 110.69 kHz		OBW Power 99.00 %	
x dB Bandwidth 9.689 MHz		x dB -6.00 dB	

11B/MCH



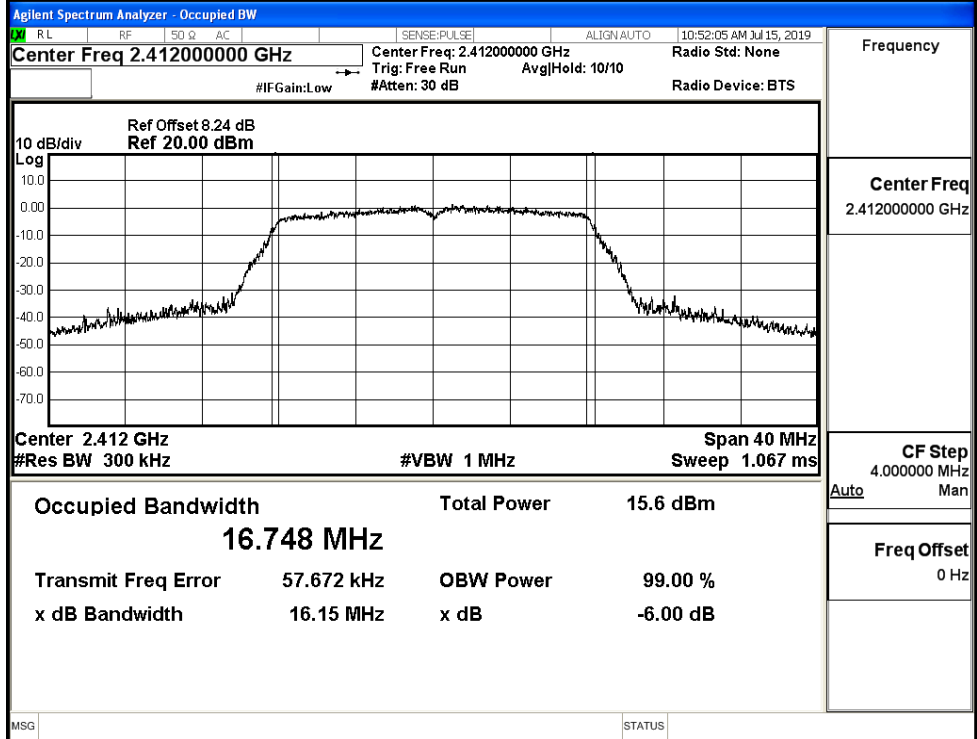
Frequency	2.43700000 GHz
Center Freq	2.43700000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11B/HCH



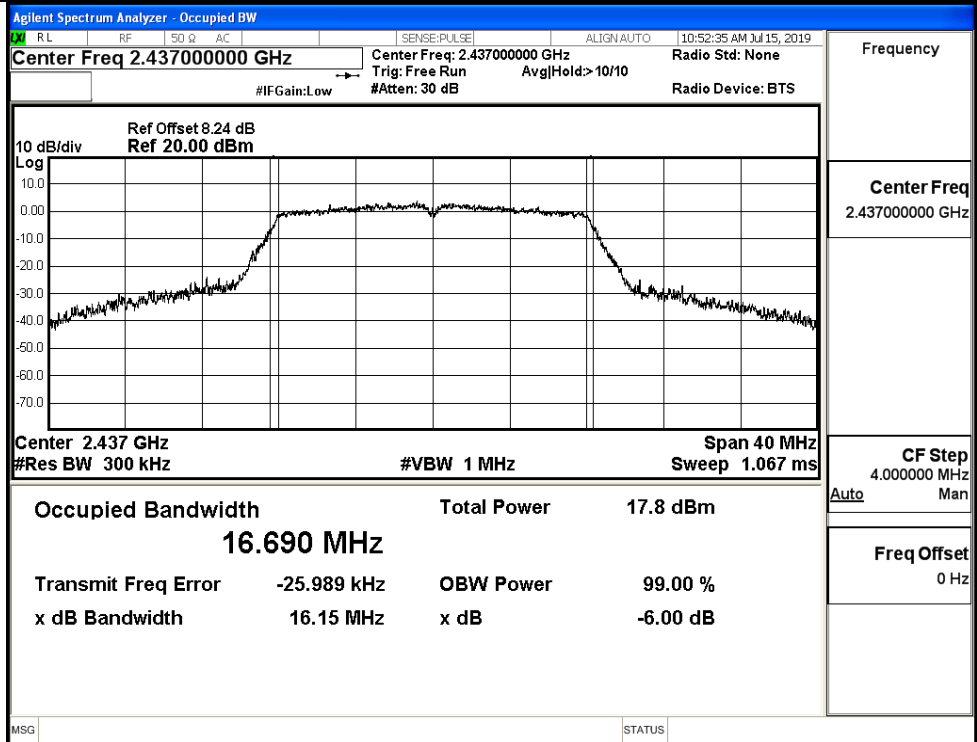
Frequency	2.46200000 GHz
Center Freq	2.46200000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/LCH



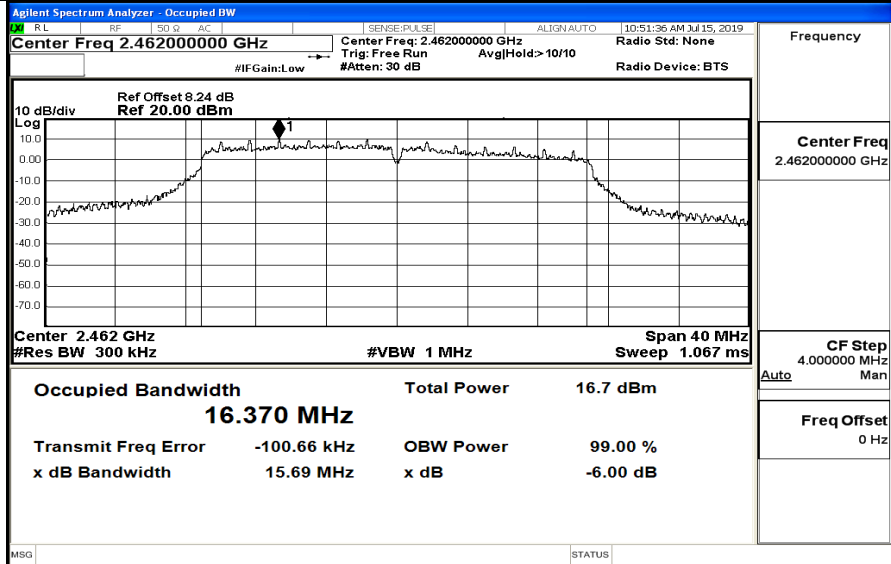
Frequency	2.41200000 GHz
Center Freq	2.41200000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/MCH



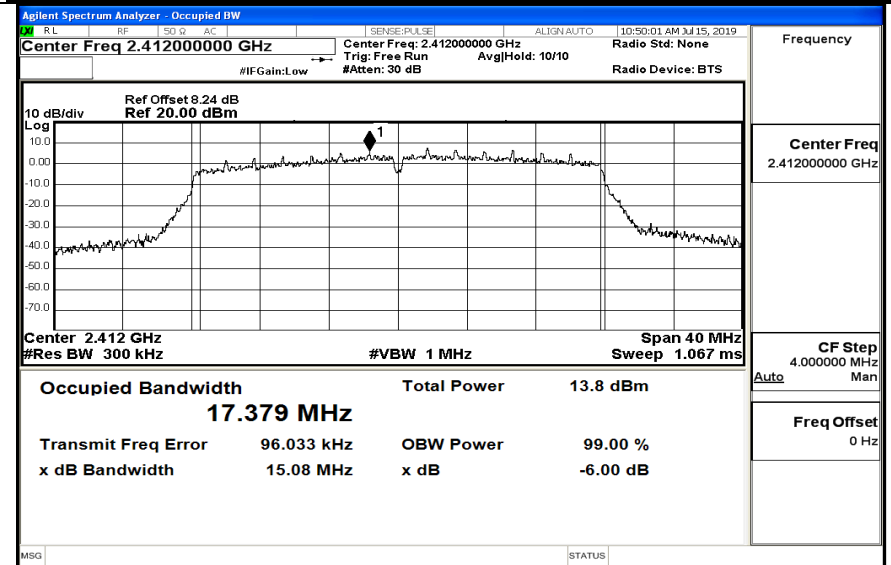
Frequency	2.43700000 GHz
Center Freq	2.43700000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11G/HCH



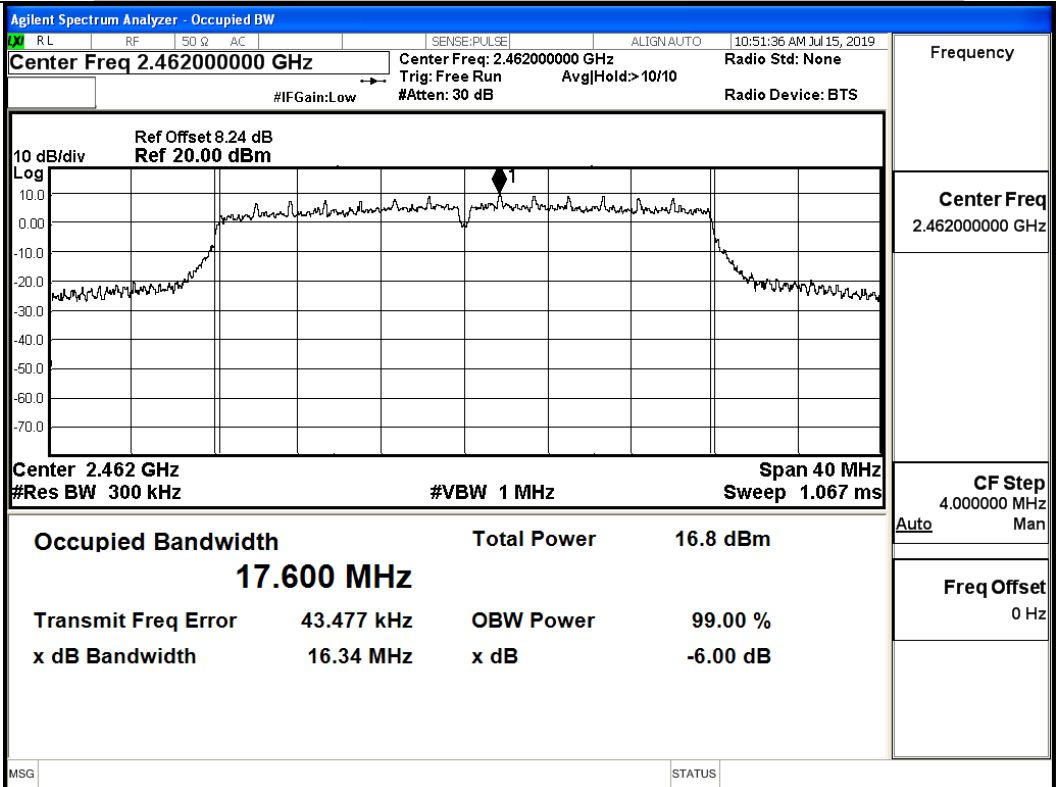
Frequency	
Center Freq	2.46200000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11N20SISO/LCH

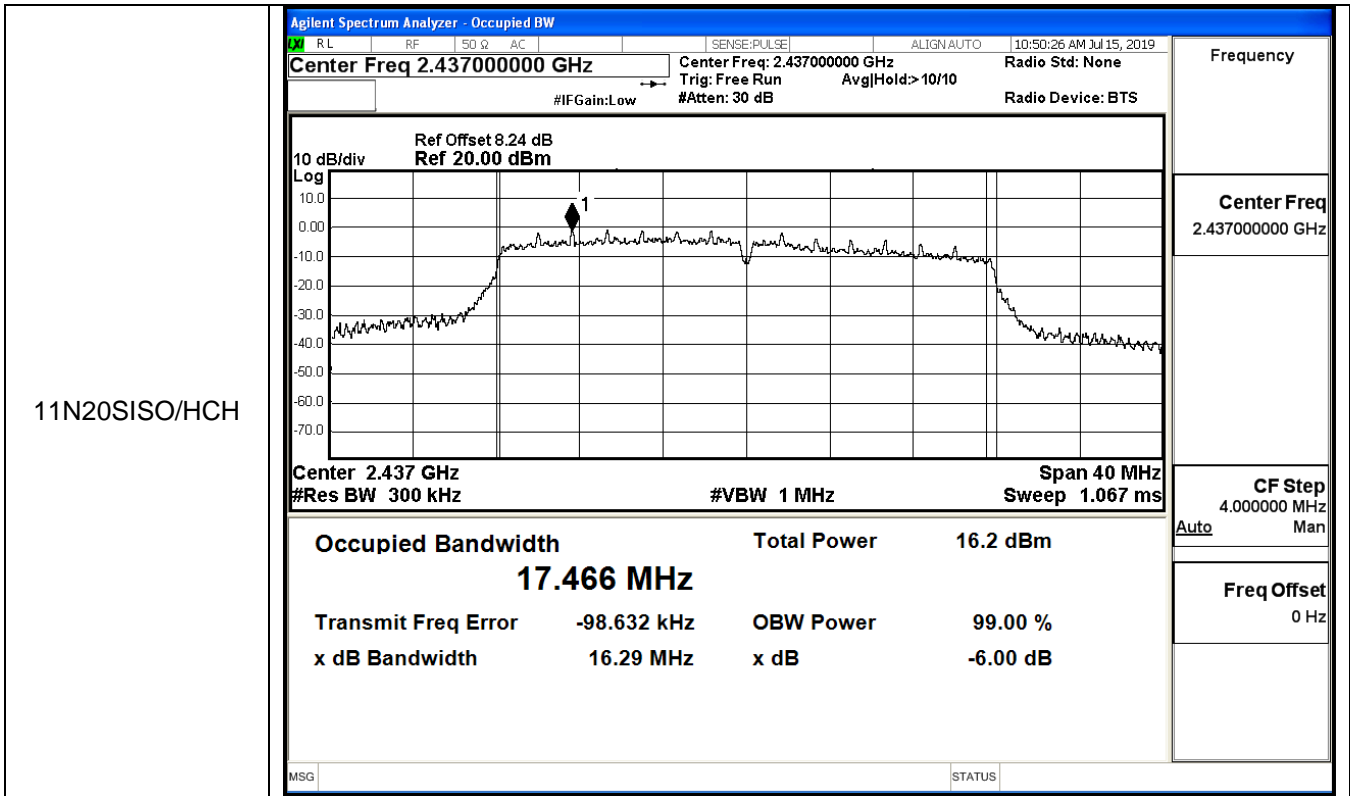


Frequency	
Center Freq	2.41200000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

11N20SISO/MCH



Frequency	
Center Freq	2.46200000 GHz
CF Step	4.000000 MHz
Auto	Man
Freq Offset	0 Hz

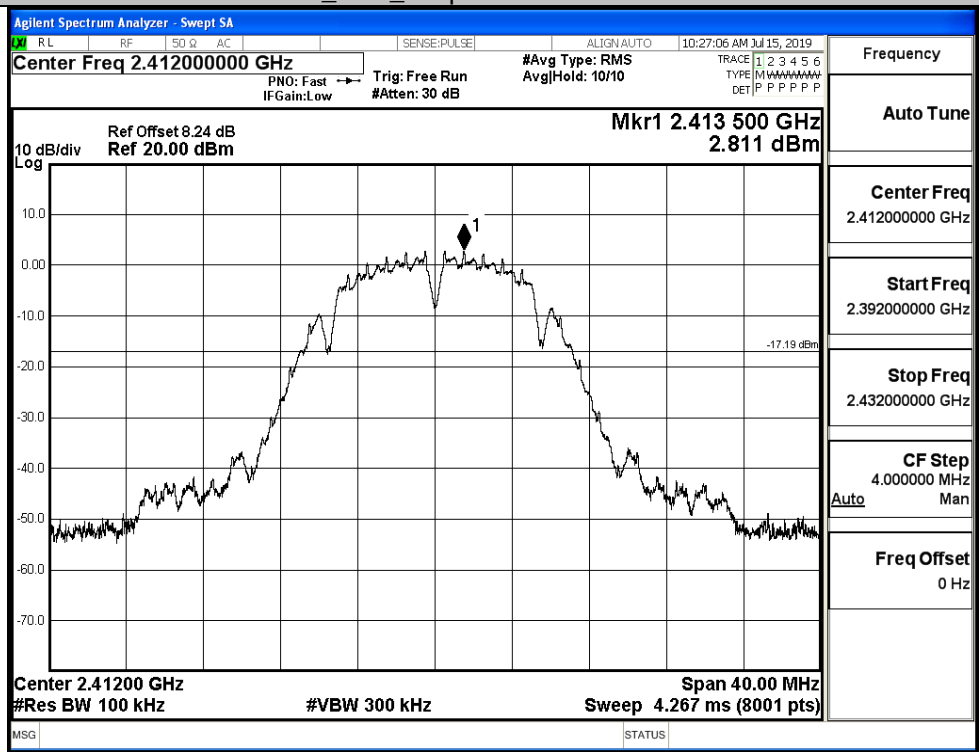


A.6 RF Conducted Spurious Emissions

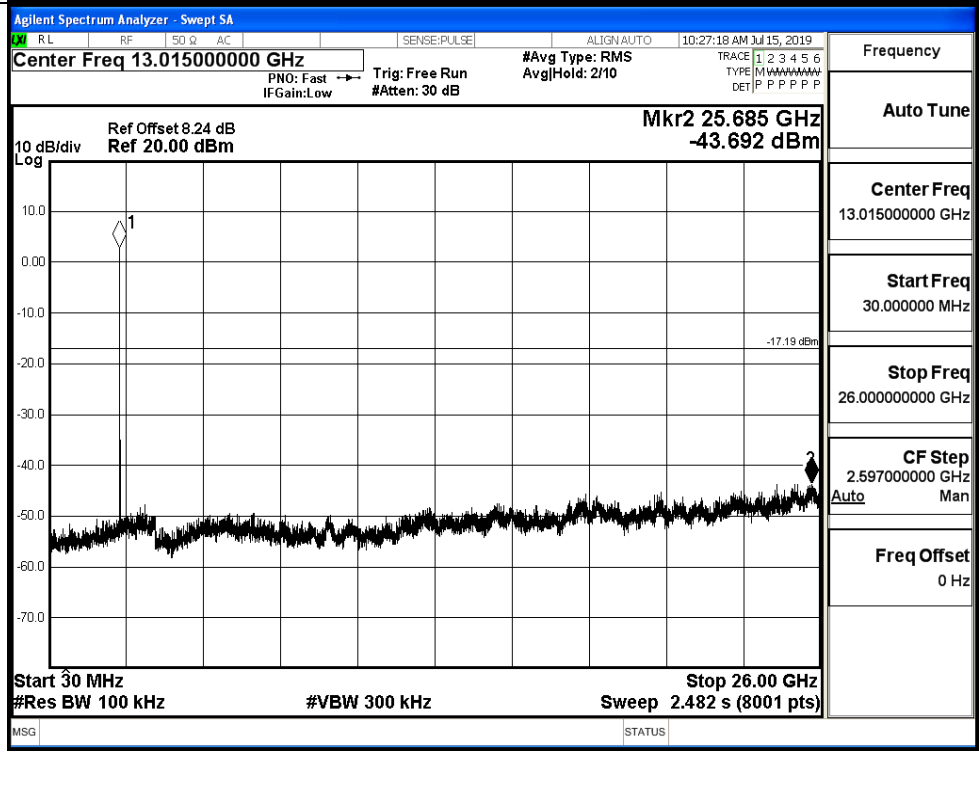
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	2.811	-43.692	-17.189	PASS
	MCH	3.227	-43.218	-16.773	PASS
	HCH	2.877	-43.615	-17.123	PASS
11G	LCH	-6.892	-43.156	-26.892	PASS
	MCH	-6.779	-43.312	-26.779	PASS
	HCH	-6.986	-43.453	-26.986	PASS
11N20 SISO	LCH	-6.723	-42.978	-26.723	PASS
	MCH	-6.364	-43.799	-26.364	PASS
	HCH	-6.870	-43.008	-26.870	PASS

11B_LCH_Graphs

Pref/11B/LCH

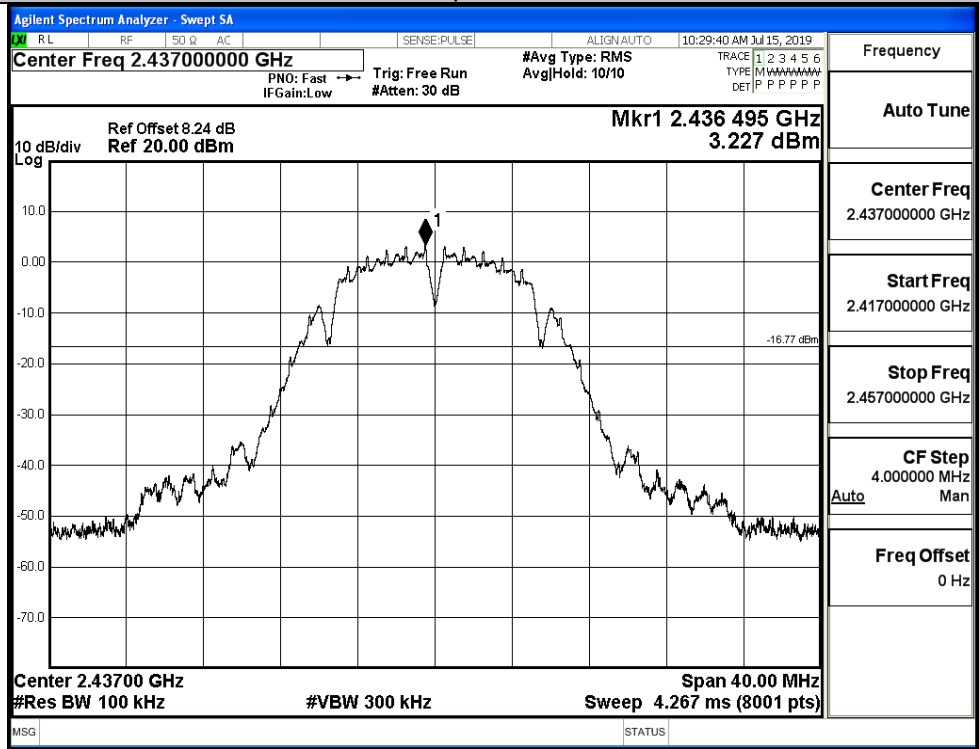


Puw/11B/LCH

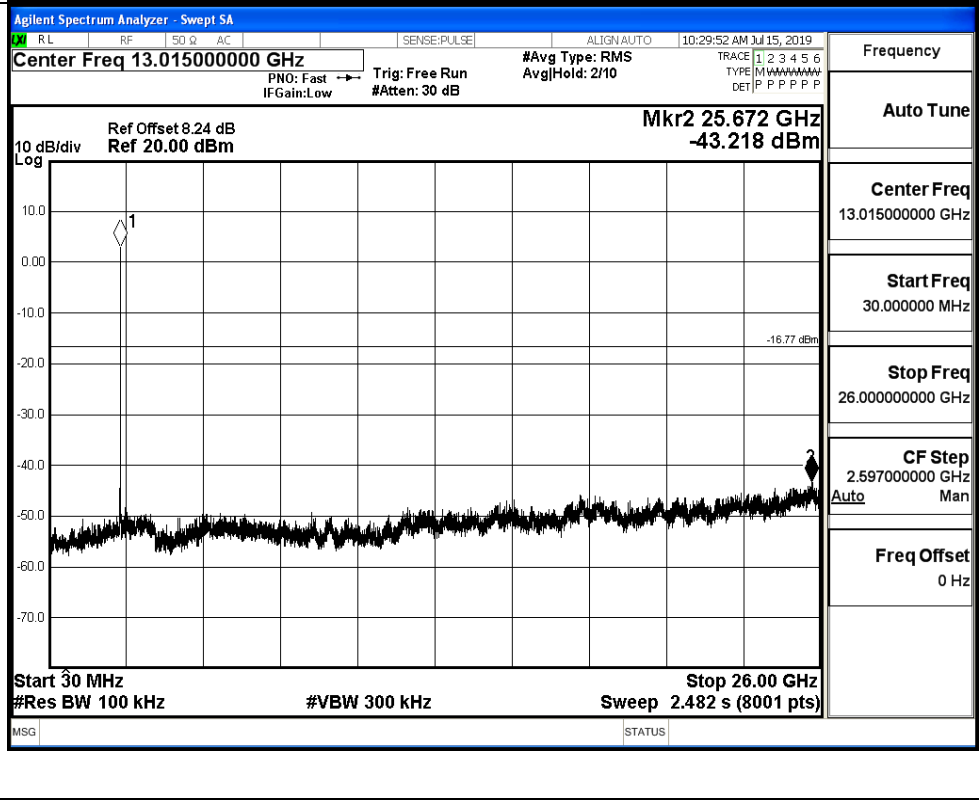


11B_MCH_Graphs

Pref/11B/MCH

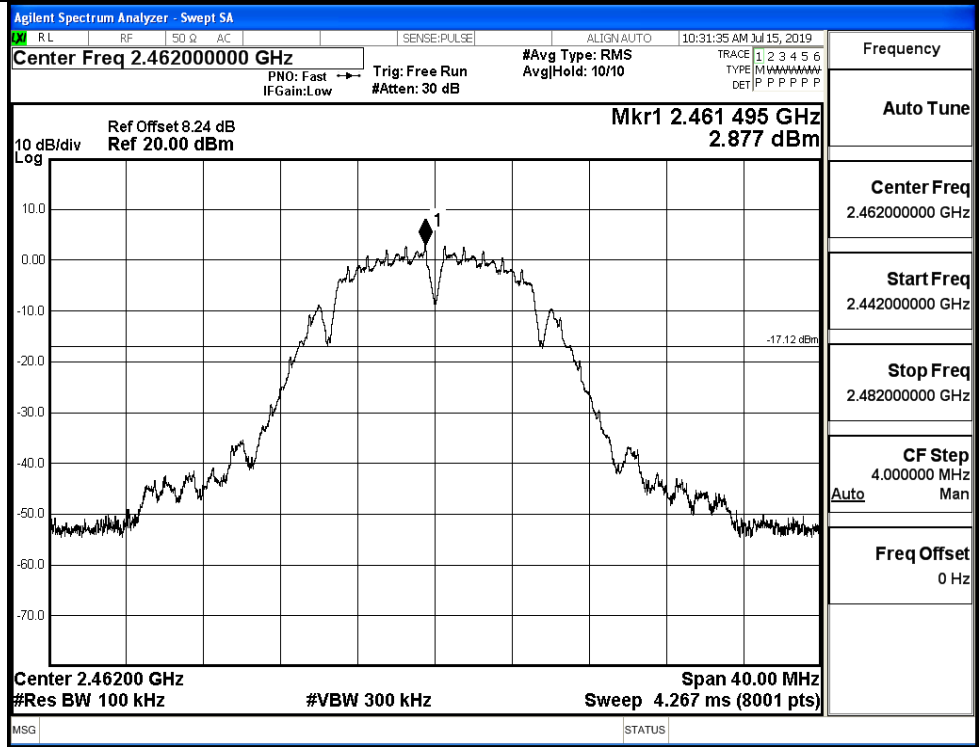


Puw/11B/MCH

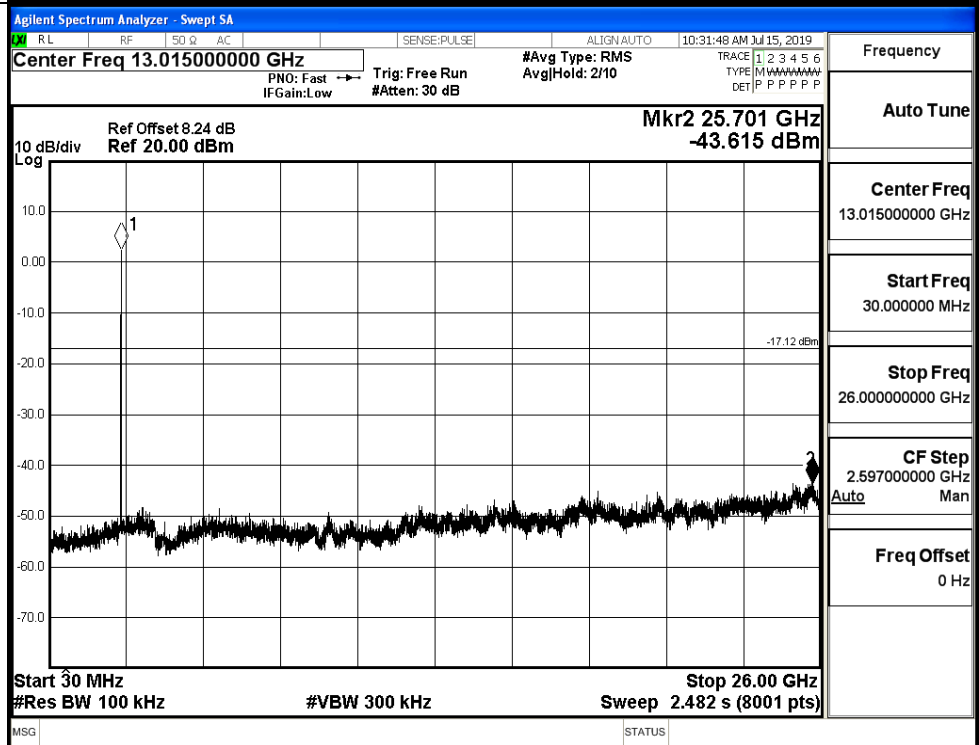


11B_HCH_Graphs

Pref/11B/HCH

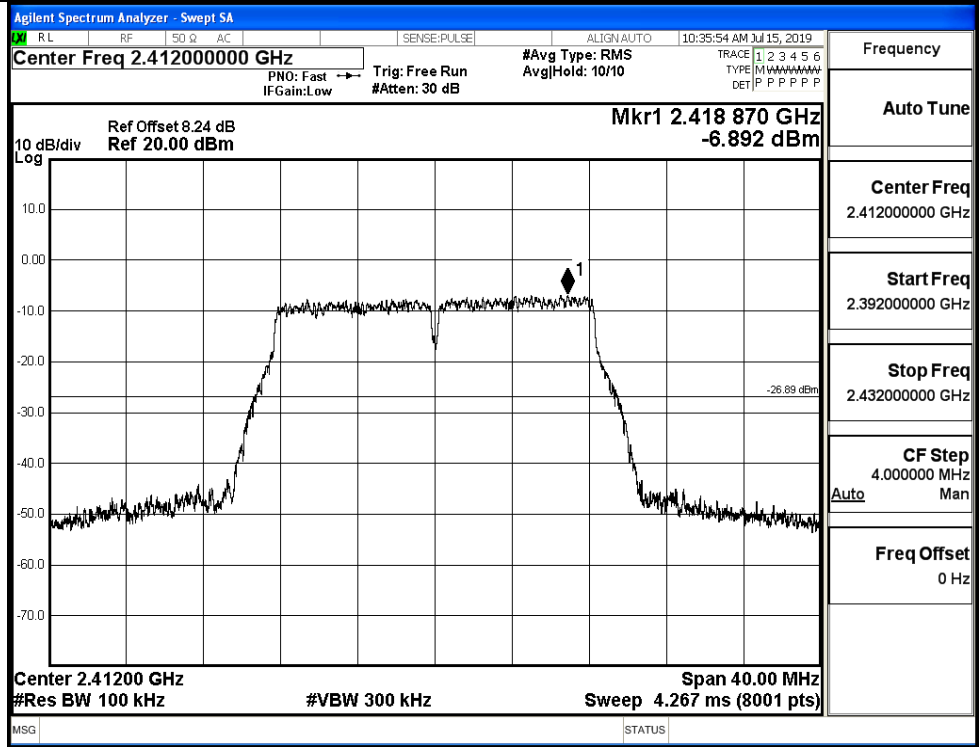


Puw/11B/HCH

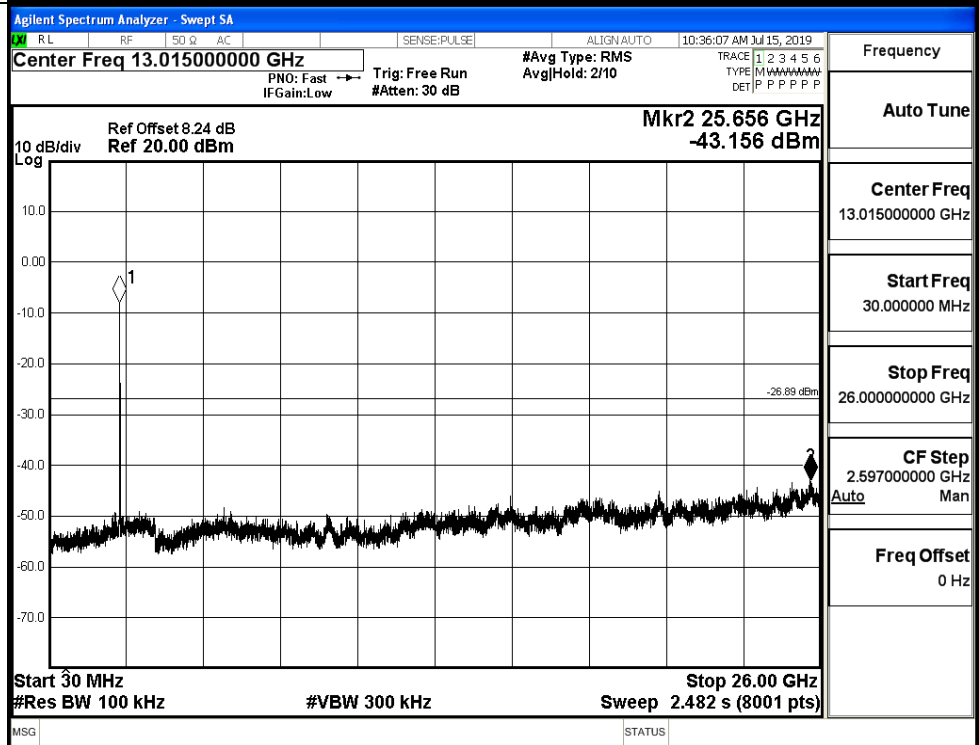


11G_LCH_Graphs

Pref/11G/LCH

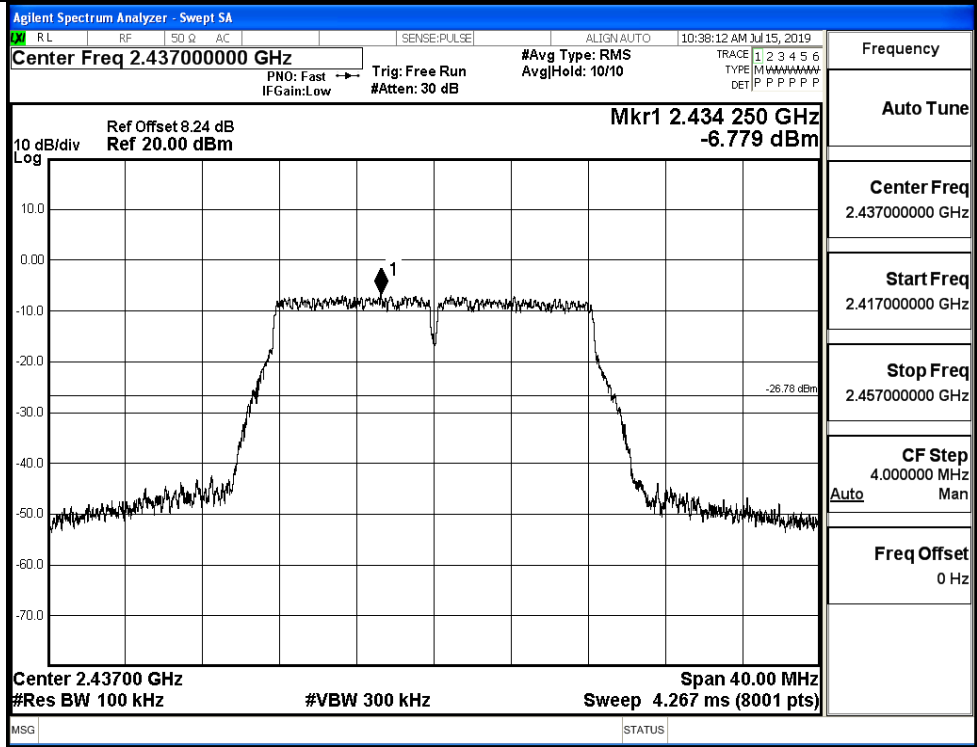


Puw/11G/LCH

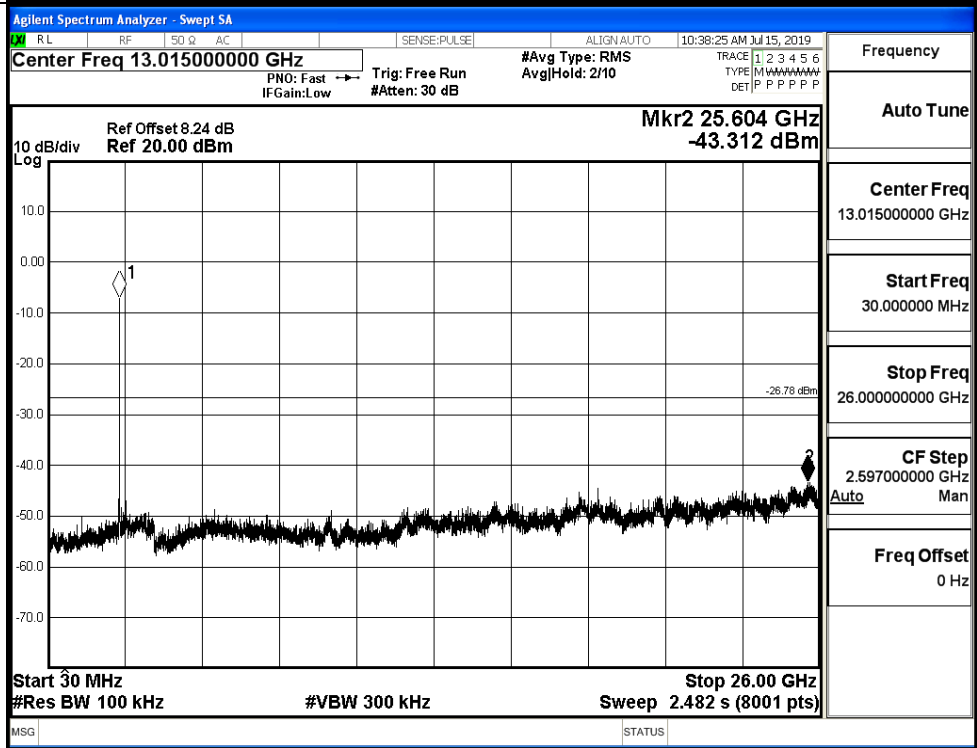


11G_MCH_Graphs

Pref/11G/MCH

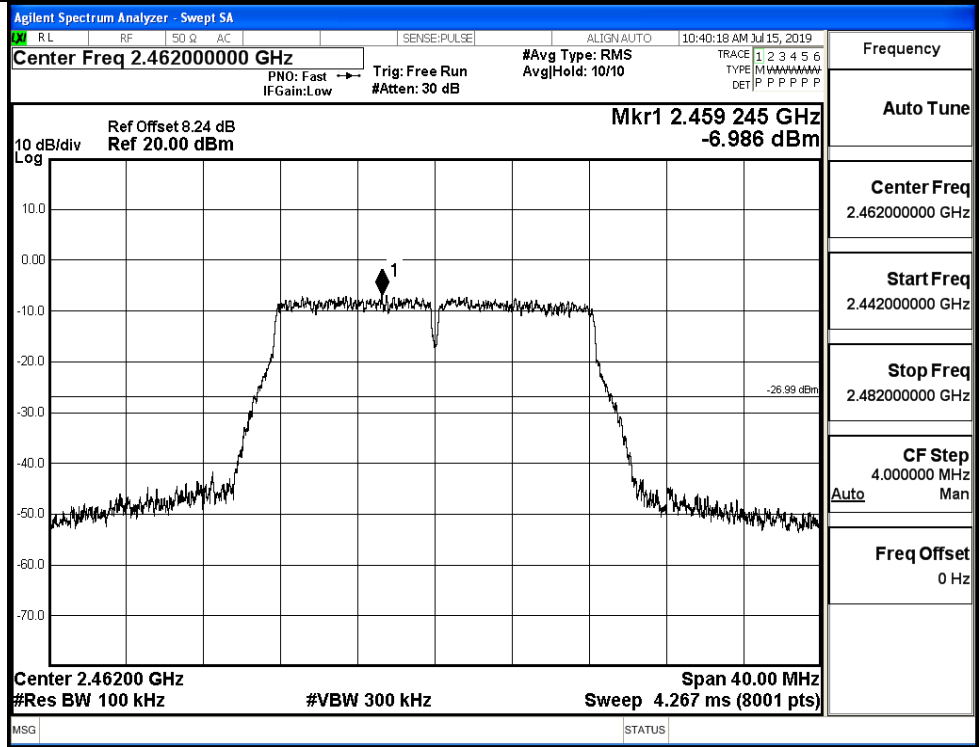


Puw/11G/MCH

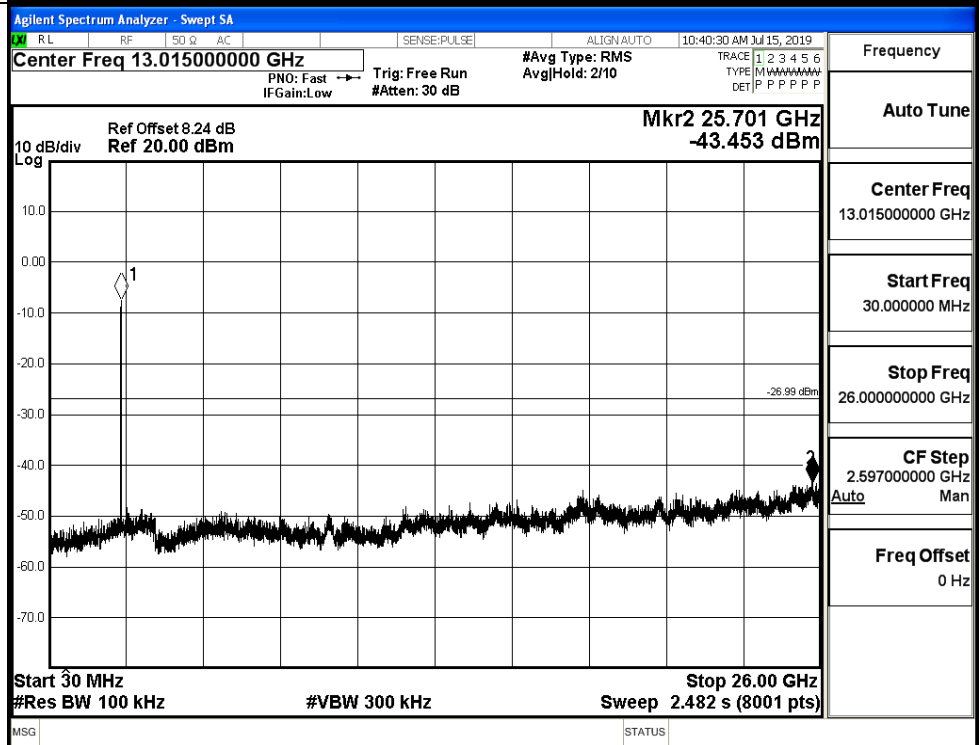


11G_HCH_Graphs

Pref/11G/HCH

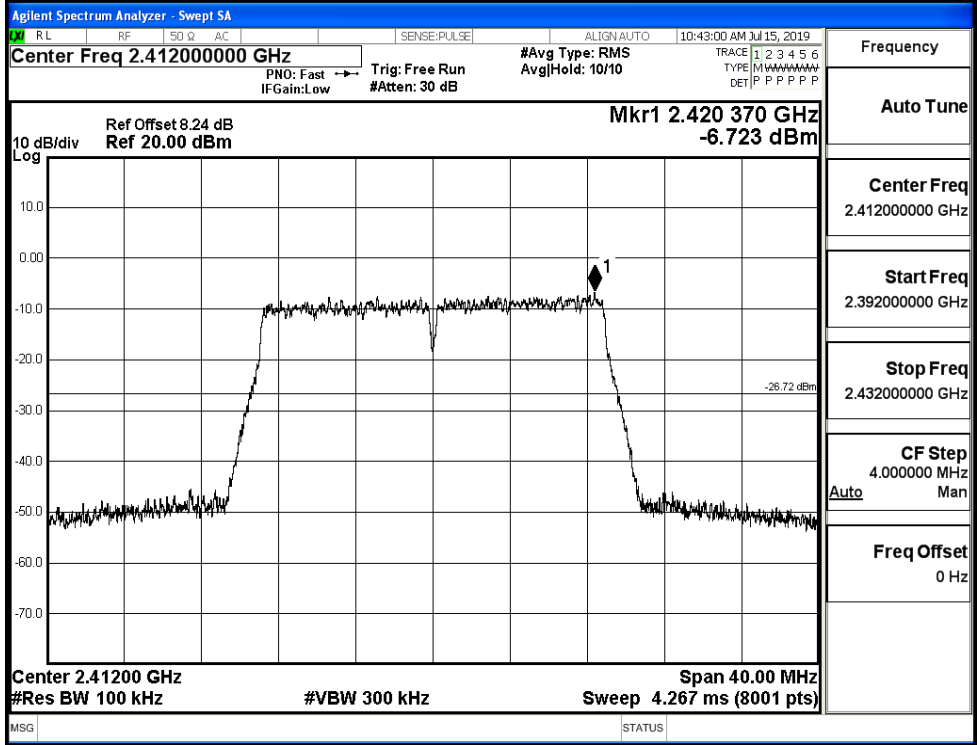


Puw/11G/HCH

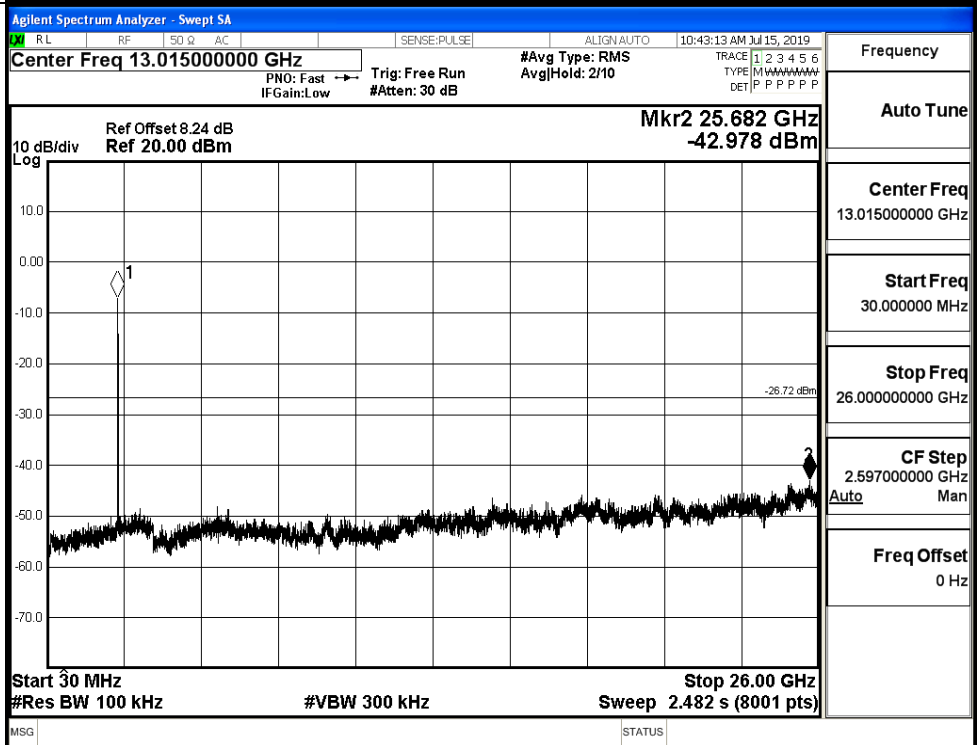


11N20SISO_LCH_Graphs

Pref/11N20SIS
O/LCH

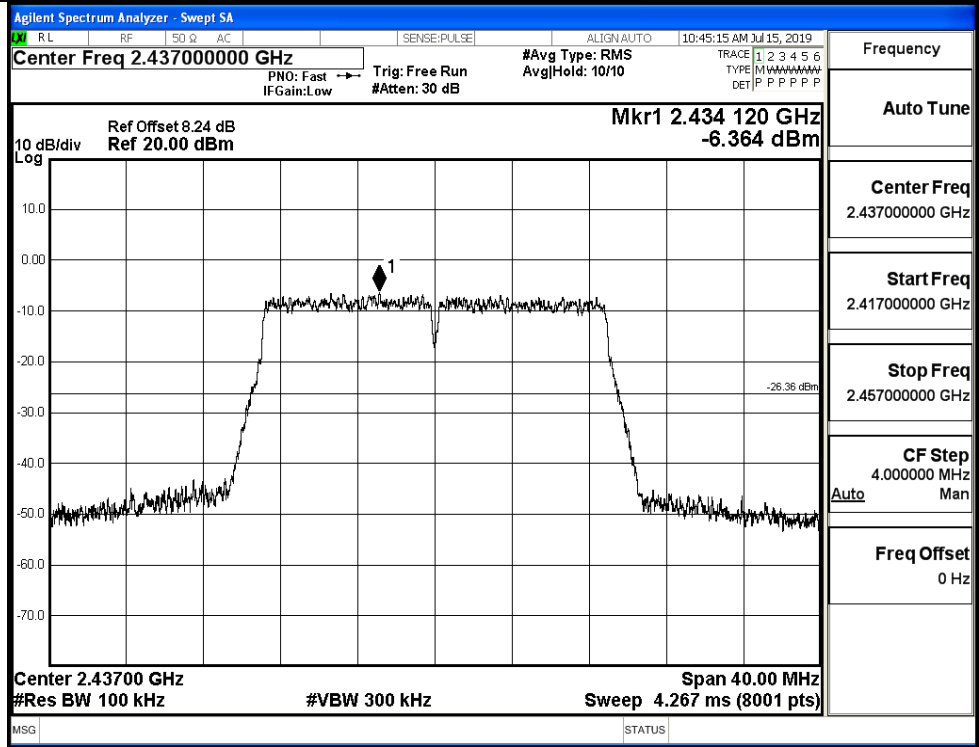


Puw/11N20
SISO/LCH

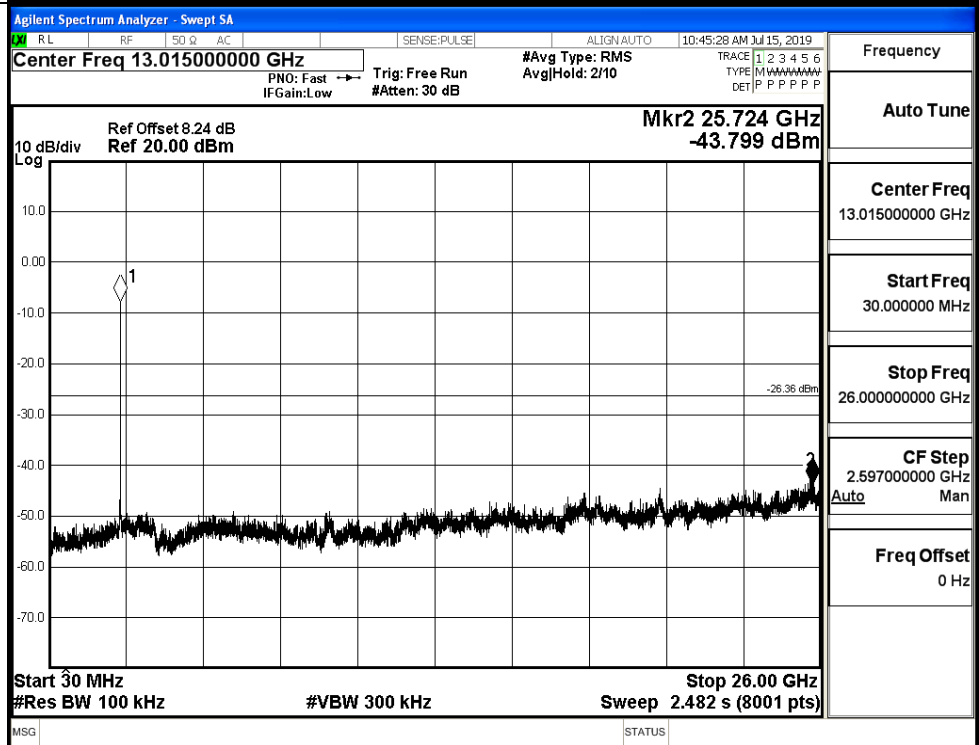


11N20SISO_MCH_Graphs

Pref/11N20
SISO/MCH

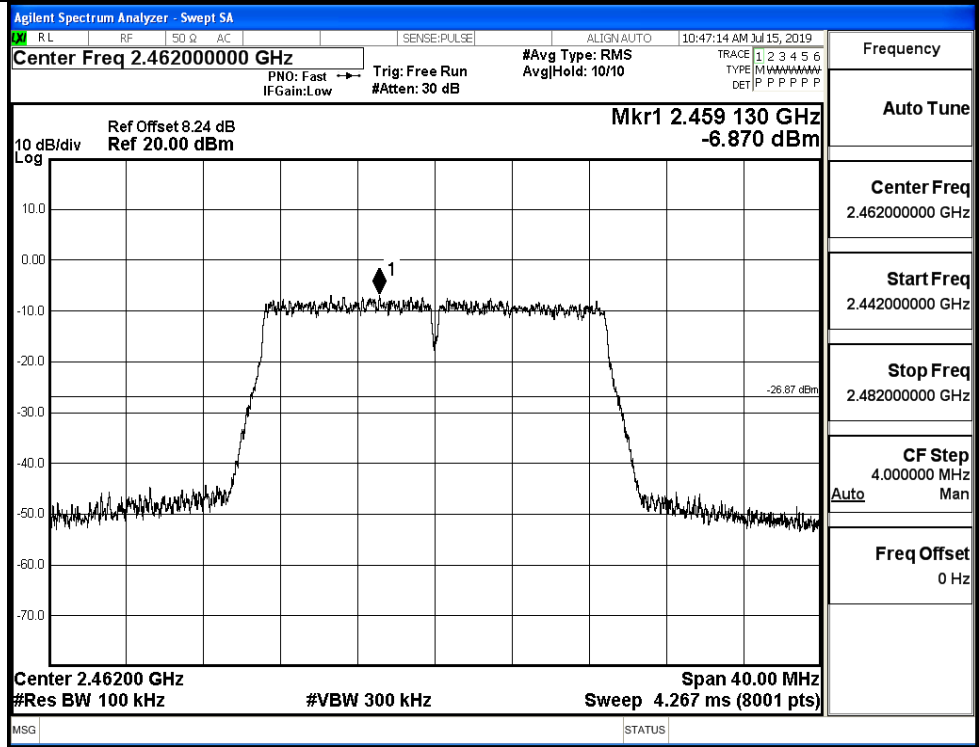


Puw/11N20
SISO/MCH

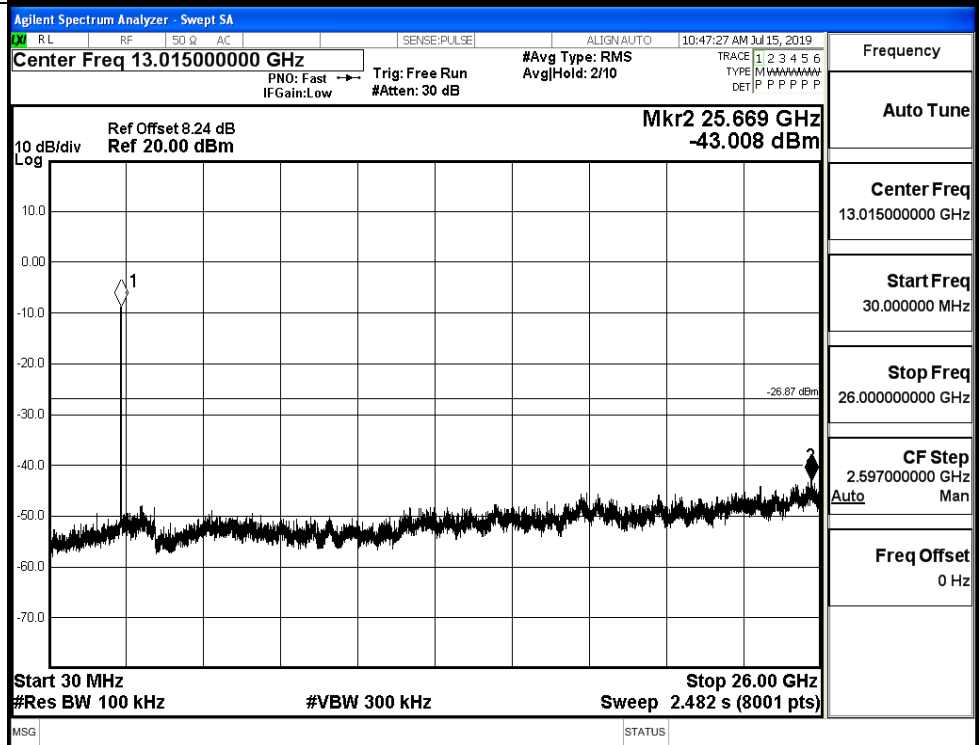


11N20SISO_HCH_Graphs

Pref/11N20
SISO/HCH

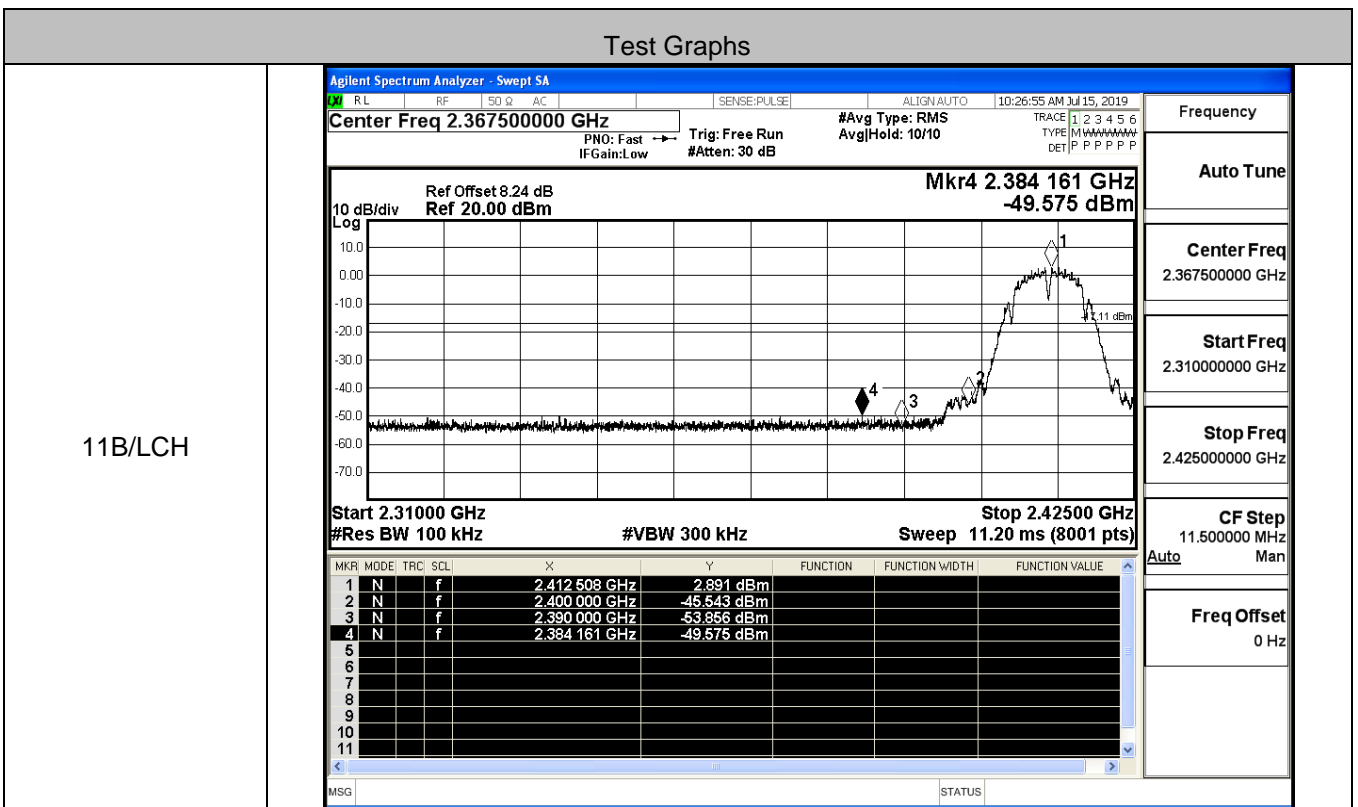


Puw/11N20
SISO/HCH

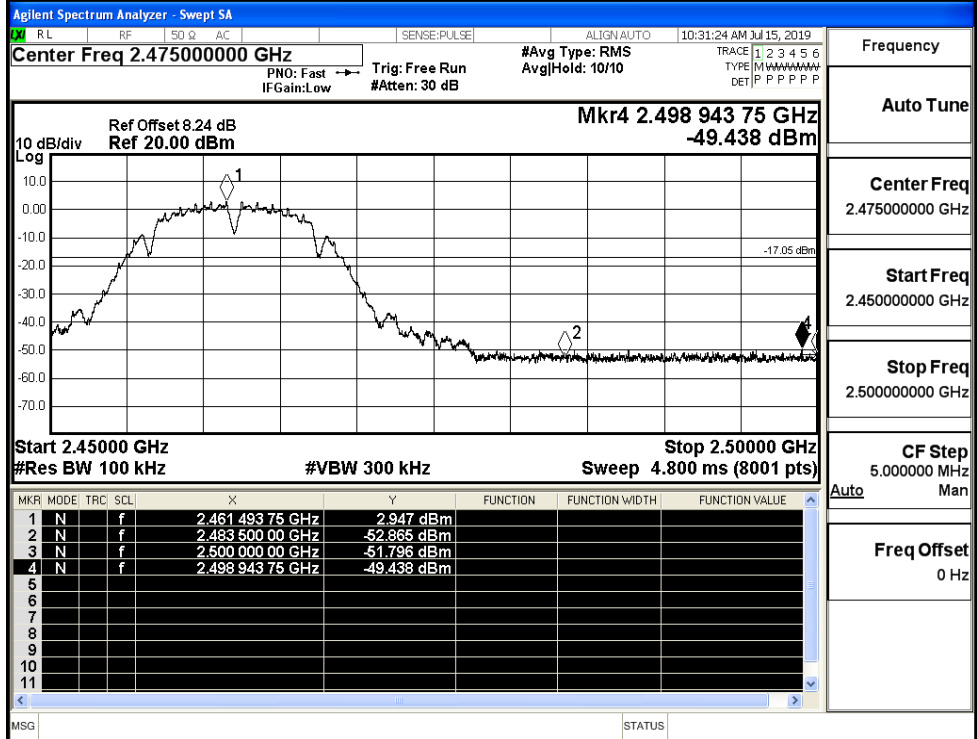


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	2.891	-49.575	-17.11	PASS
	HCH	2.947	-49.438	-17.05	PASS
11G	LCH	-6.846	-49.511	-26.85	PASS
	HCH	-6.980	-50.204	-26.98	PASS
11N20SISO	LCH	-6.759	-50.011	-26.76	PASS
	HCH	-6.772	-49.129	-26.77	PASS

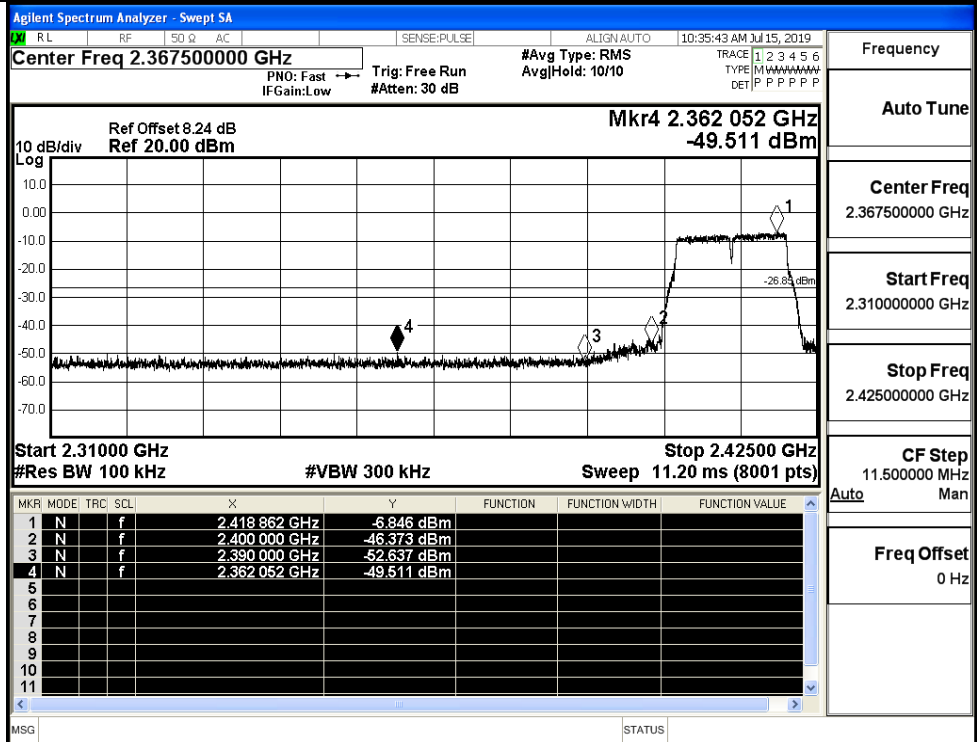


11B/HCH



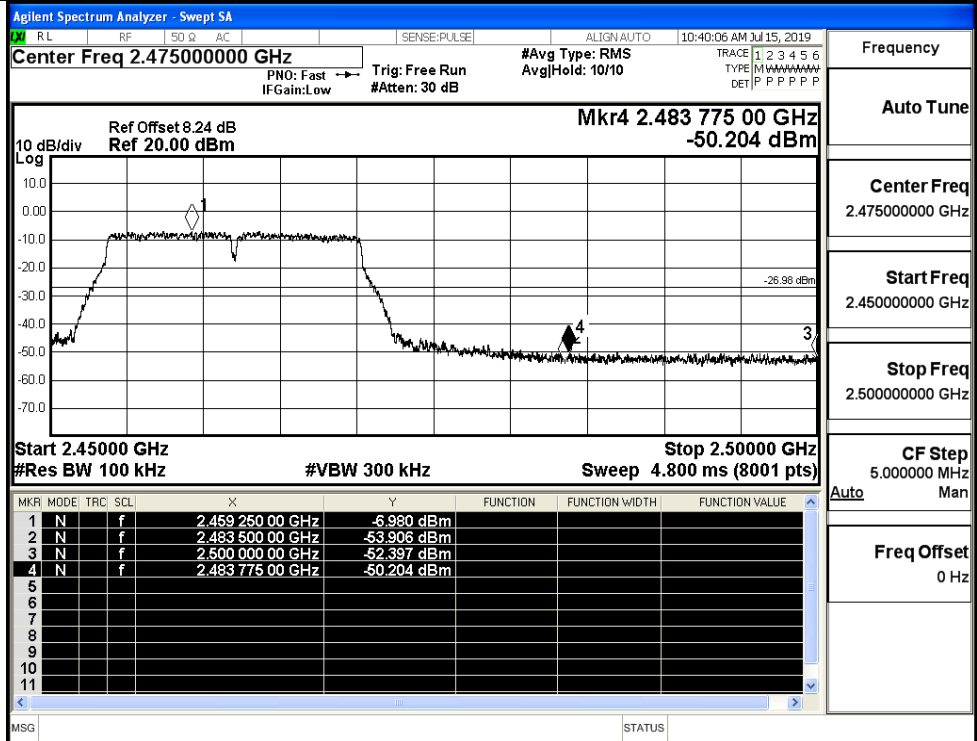
Frequency	
Auto Tune	
Center Freq	2.47500000 GHz
Start Freq	2.45000000 GHz
Stop Freq	2.50000000 GHz
CF Step	5.000000 MHz
Freq Offset	0 Hz

11G/LCH



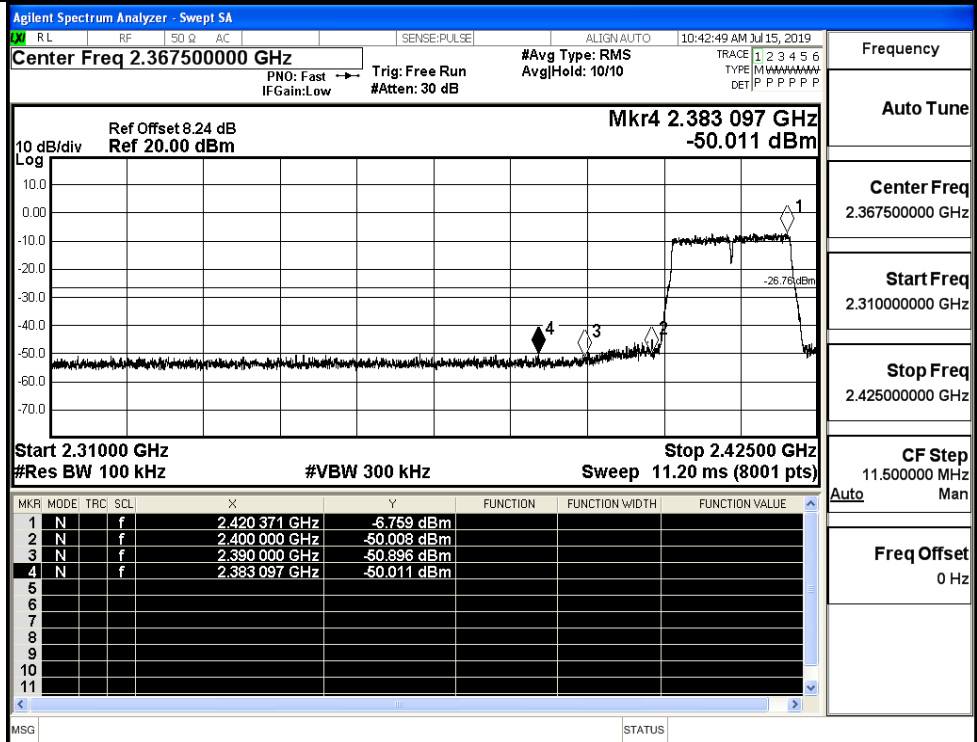
Frequency	
Auto Tune	
Center Freq	2.36750000 GHz
Start Freq	2.31000000 GHz
Stop Freq	2.42500000 GHz
CF Step	11.500000 MHz
Freq Offset	0 Hz

11G/HCH



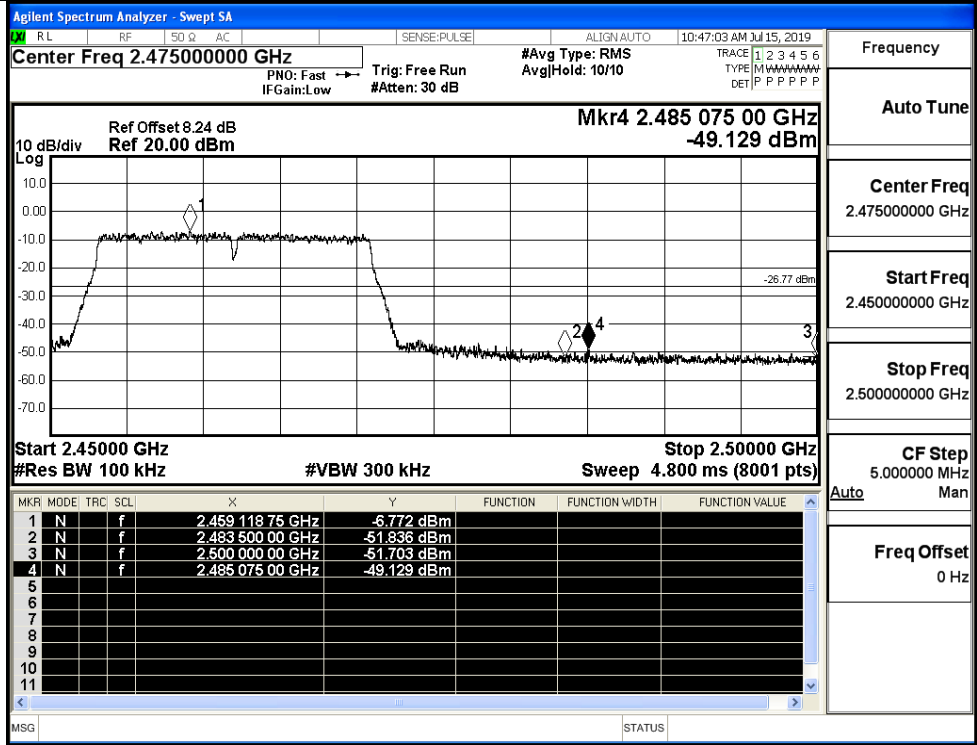
Frequency	
Auto Tune	
Center Freq	2.475000000 GHz
Start Freq	2.450000000 GHz
Stop Freq	2.500000000 GHz
CF Step	5.000000 MHz
Freq Offset	0 Hz

11N20SISO/LCH



Frequency	
Auto Tune	
Center Freq	2.367500000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.425000000 GHz
CF Step	11.500000 MHz
Freq Offset	0 Hz

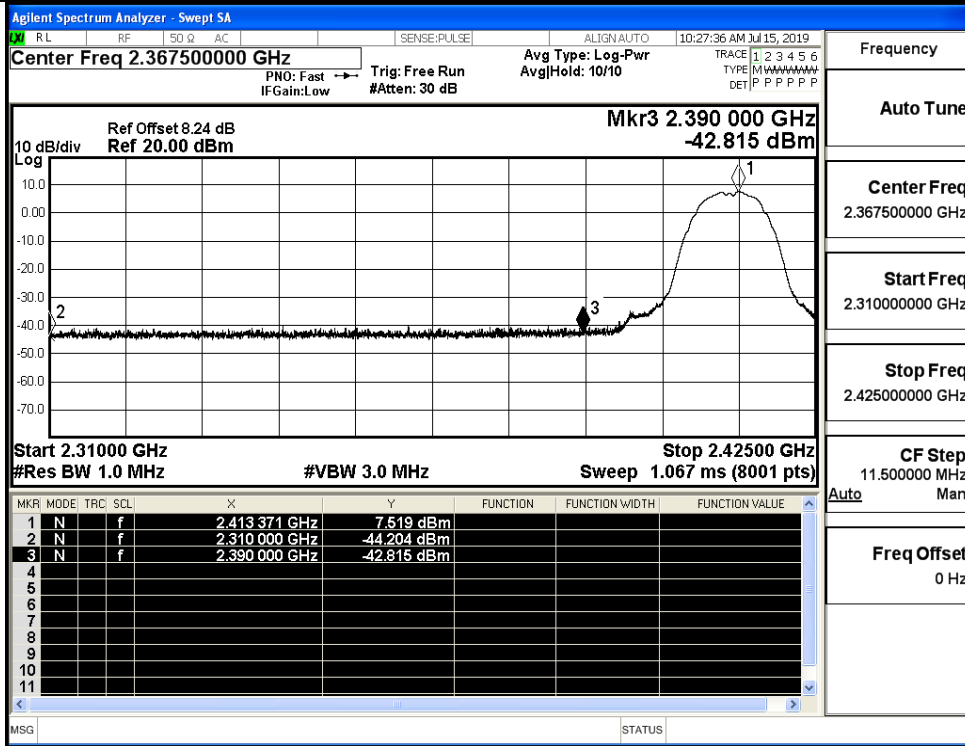
11N20SISO/HCH



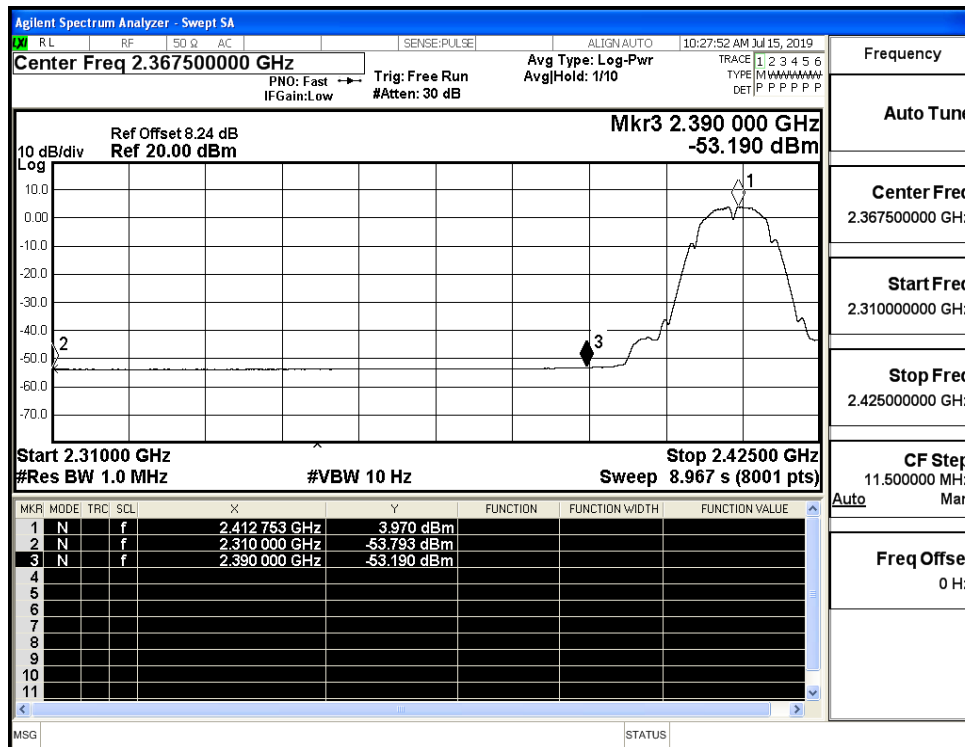
A.8 Restrict-band band-edge measurements

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBu V/m]	Verdict
11B	2412	Ant1	2310.0	-44.20	2.0	0	51.05	PEAK	74	PASS
	2412	Ant1	2310.0	-53.79	2.0	0	41.46	AV	54	PASS
	2412	Ant1	2390.0	-42.82	2.0	0	52.44	PEAK	74	PASS
	2412	Ant1	2390.0	-53.19	2.0	0	42.07	AV	54	PASS
	2462	Ant1	2483.5	-42.80	2.0	0	52.46	PEAK	74	PASS
	2462	Ant1	2483.5	-52.95	2.0	0	42.31	AV	54	PASS
	2462	Ant1	2500.0	-42.80	2.0	0	52.46	PEAK	74	PASS
	2462	Ant1	2500.0	-53.22	2.0	0	42.04	AV	54	PASS
11G	2412	Ant1	2310.0	-43.38	2.0	0	51.88	PEAK	74	PASS
	2412	Ant1	2310.0	-53.81	2.0	0	41.45	AV	54	PASS
	2412	Ant1	2390.0	-42.58	2.0	0	52.68	PEAK	74	PASS
	2412	Ant1	2390.0	-52.86	2.0	0	42.40	AV	54	PASS
	2462	Ant1	2483.5	-40.42	2.0	0	54.84	PEAK	74	PASS
	2462	Ant1	2483.5	-52.58	2.0	0	42.68	AV	54	PASS
	2462	Ant1	2500.0	-42.54	2.0	0	52.72	PEAK	74	PASS
	2462	Ant1	2500.0	-53.18	2.0	0	42.07	AV	54	PASS
11N20 SISO	2412	Ant1	2310.0	-41.93	2.0	0	53.32	PEAK	74	PASS
	2412	Ant1	2310.0	-53.84	2.0	0	41.42	AV	54	PASS
	2412	Ant1	2390.0	-41.77	2.0	0	53.49	PEAK	74	PASS
	2412	Ant1	2390.0	-52.79	2.0	0	42.47	AV	54	PASS
	2462	Ant1	2483.5	-41.35	2.0	0	53.91	PEAK	74	PASS
	2462	Ant1	2483.5	-52.43	2.0	0	42.83	AV	54	PASS
	2462	Ant1	2500.0	-42.99	2.0	0	52.27	PEAK	74	PASS
	2462	Ant1	2500.0	-53.21	2.0	0	42.05	AV	54	PASS

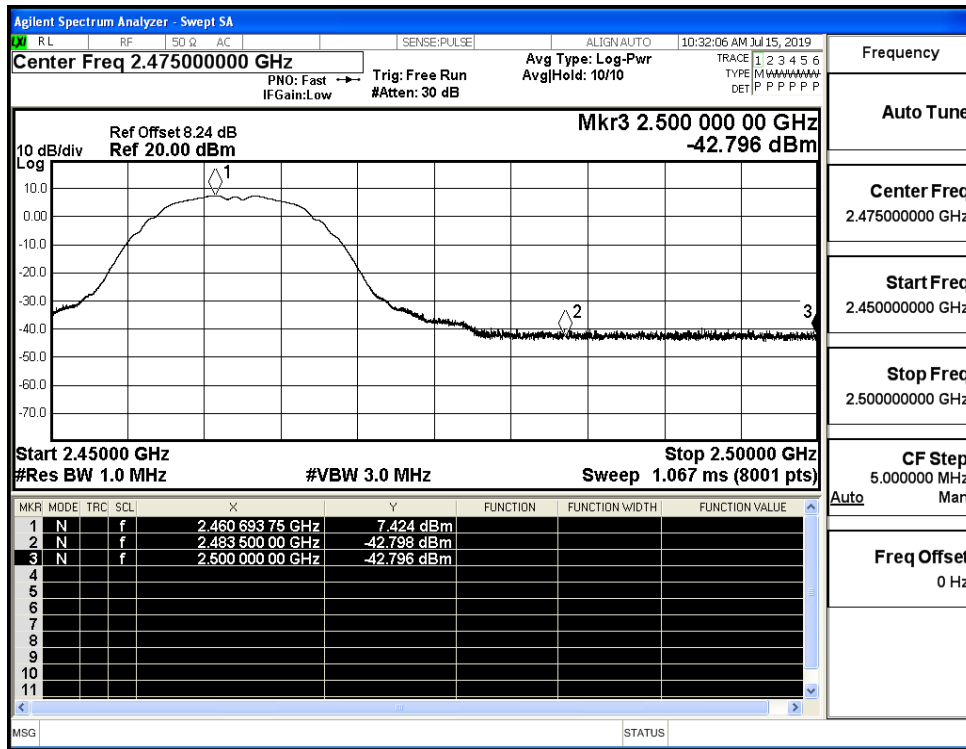
Restrict-band band-edge measurements_11B_2412_Ant1_PEAK



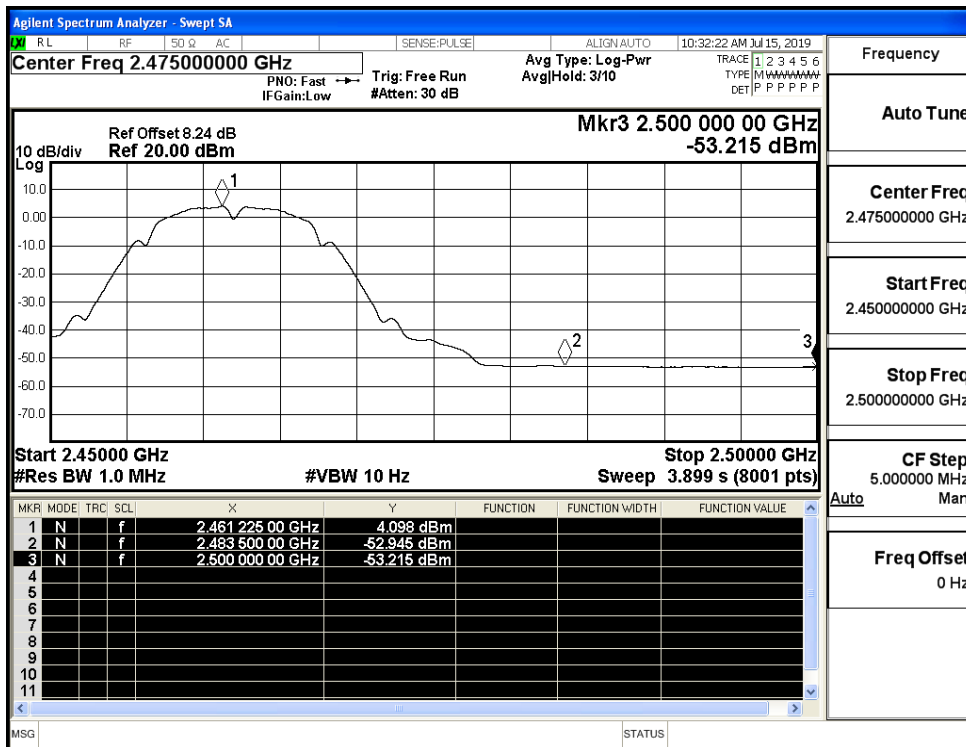
Restrict-band band-edge measurements_11B_2412_Ant1_AV



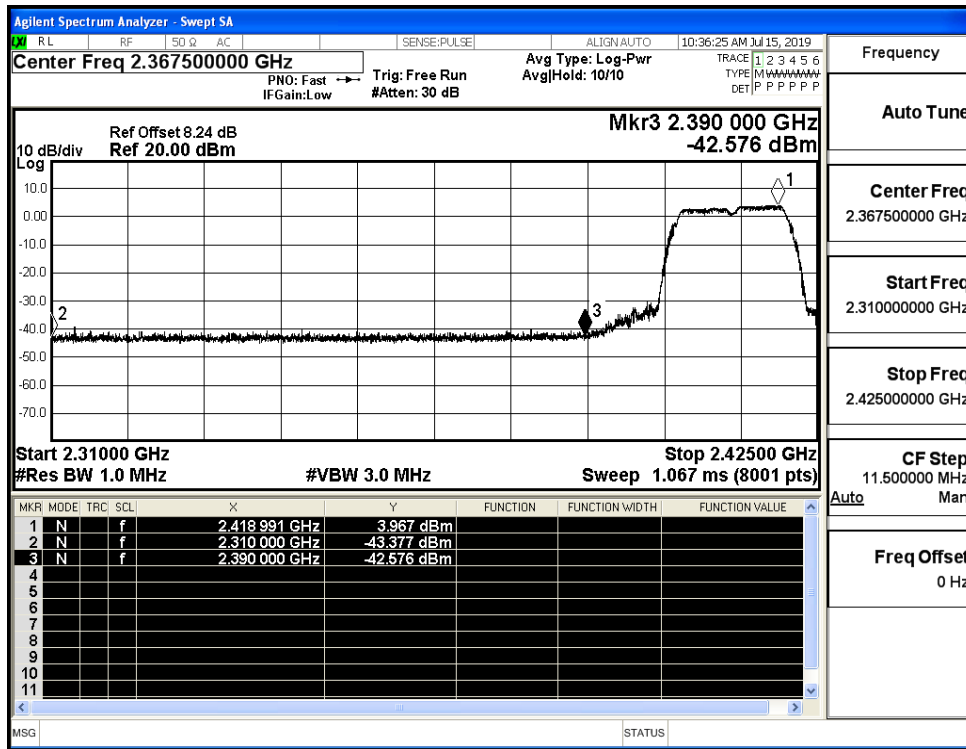
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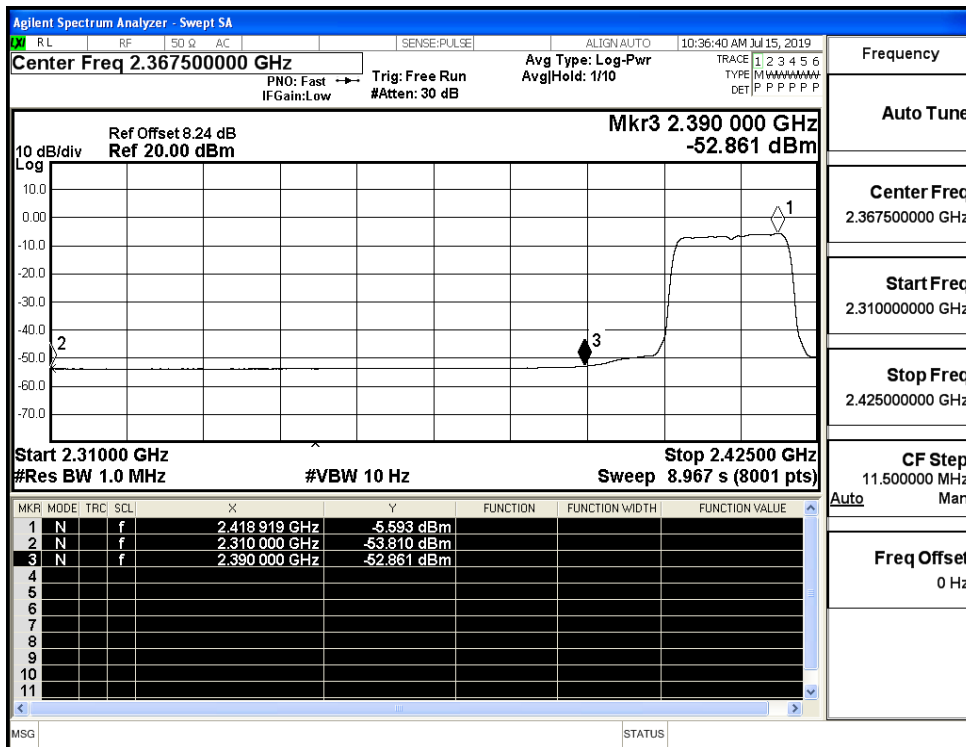
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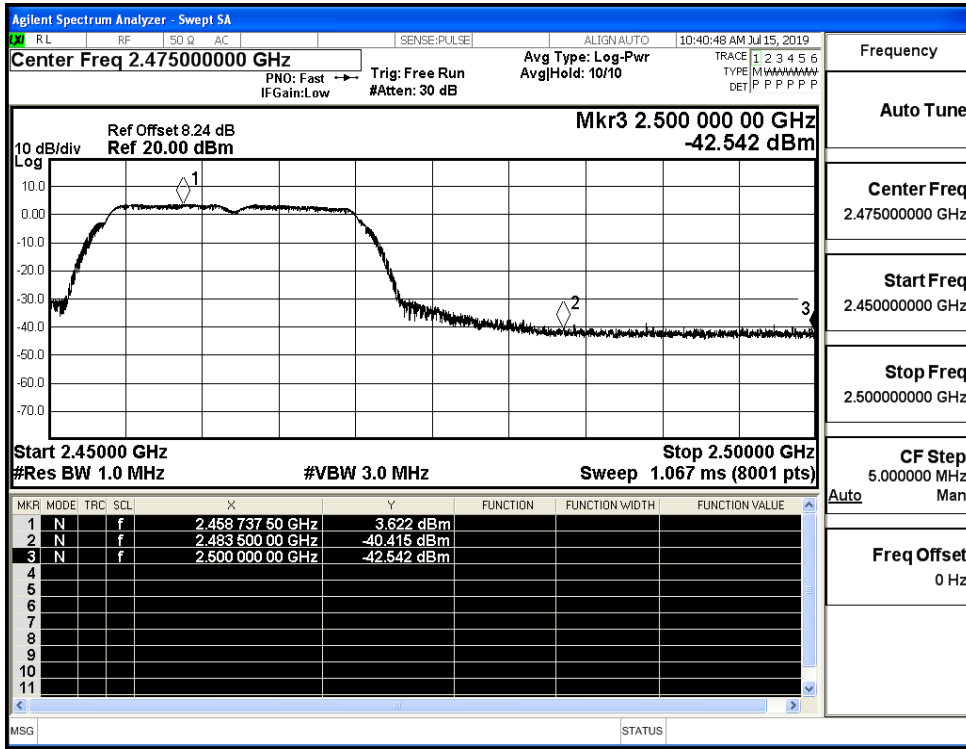
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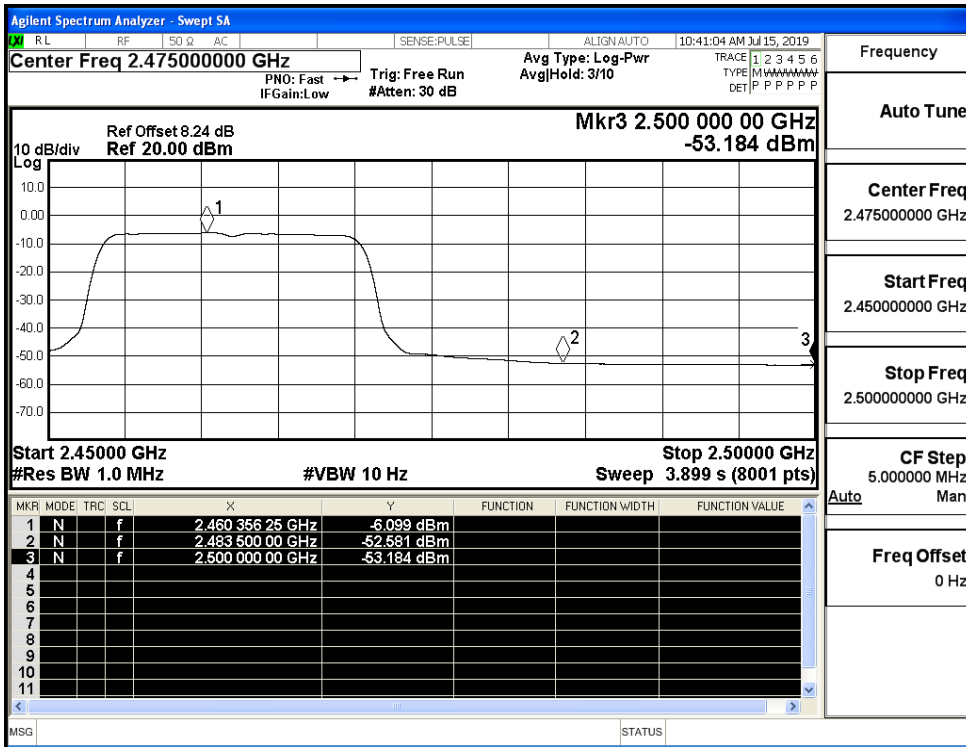
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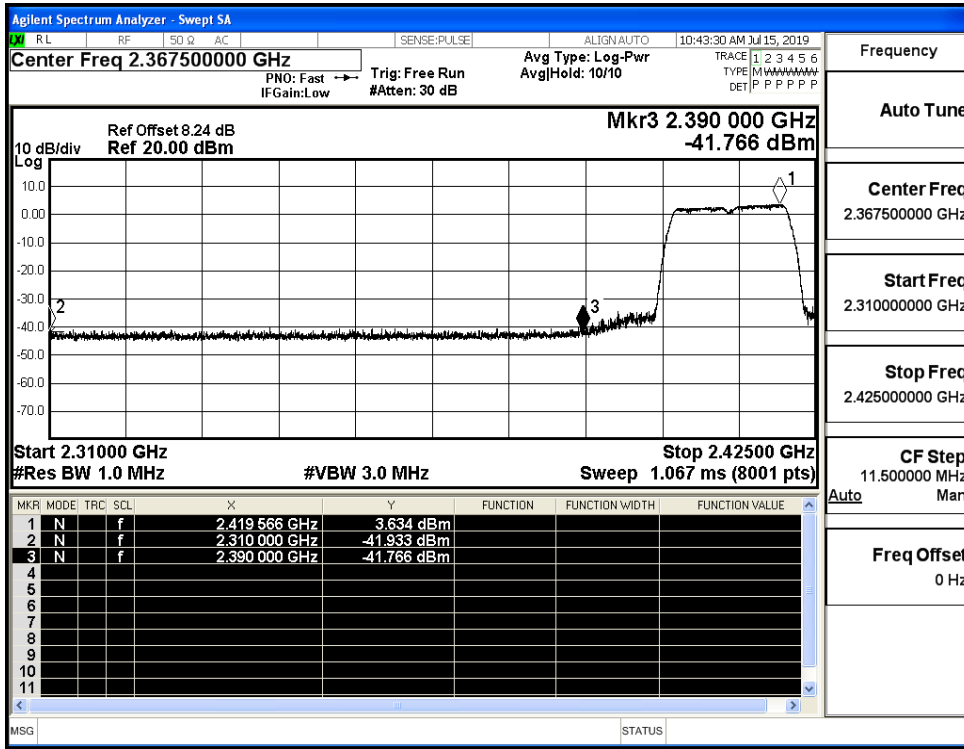
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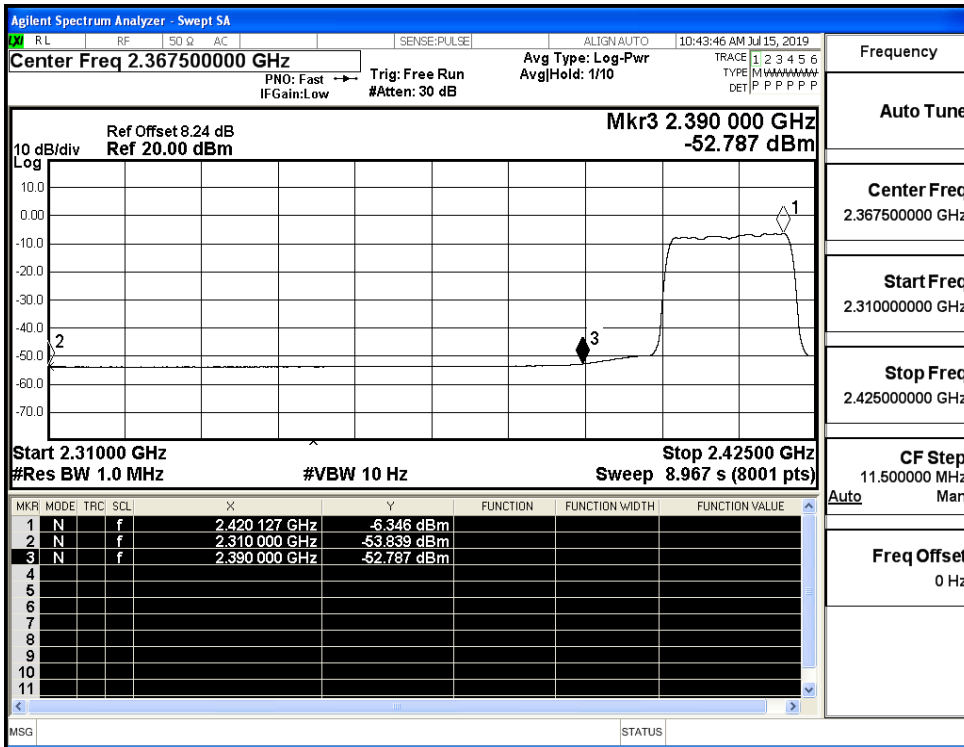
Restrict-band band-edge measurements_11G_2462_Ant1_AV



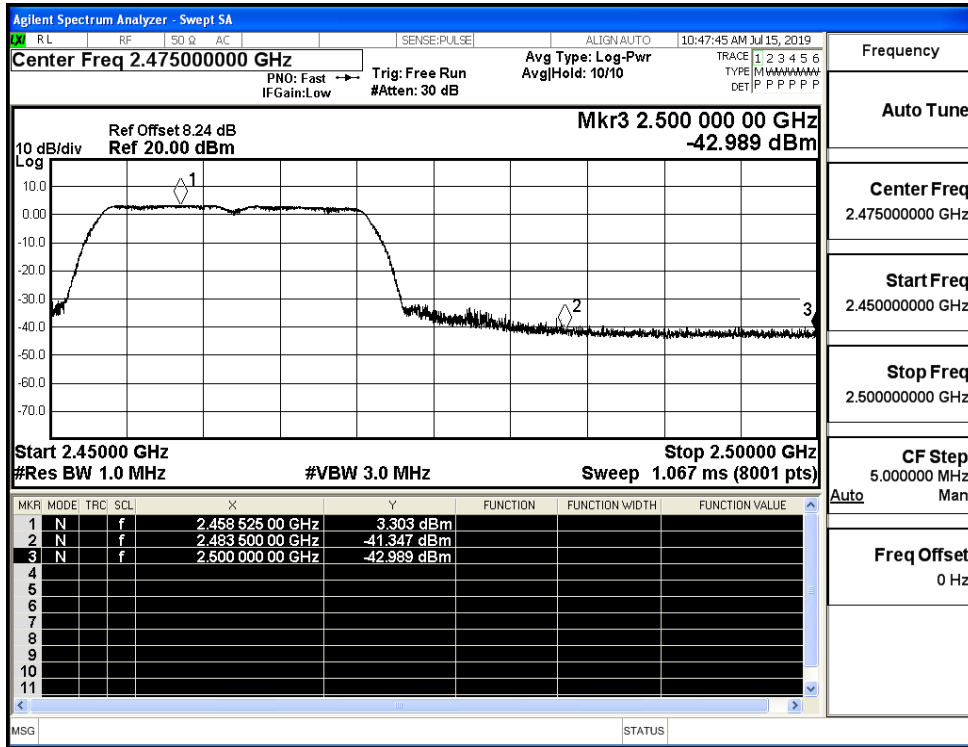
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



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

