Appendix C

RF Test Data for 2.4G WIFI (Conducted Measurement)
Product Name: VIM3
Trade Mark: Khadas
Test Model: VIM3 Pro

Environmental Conditions

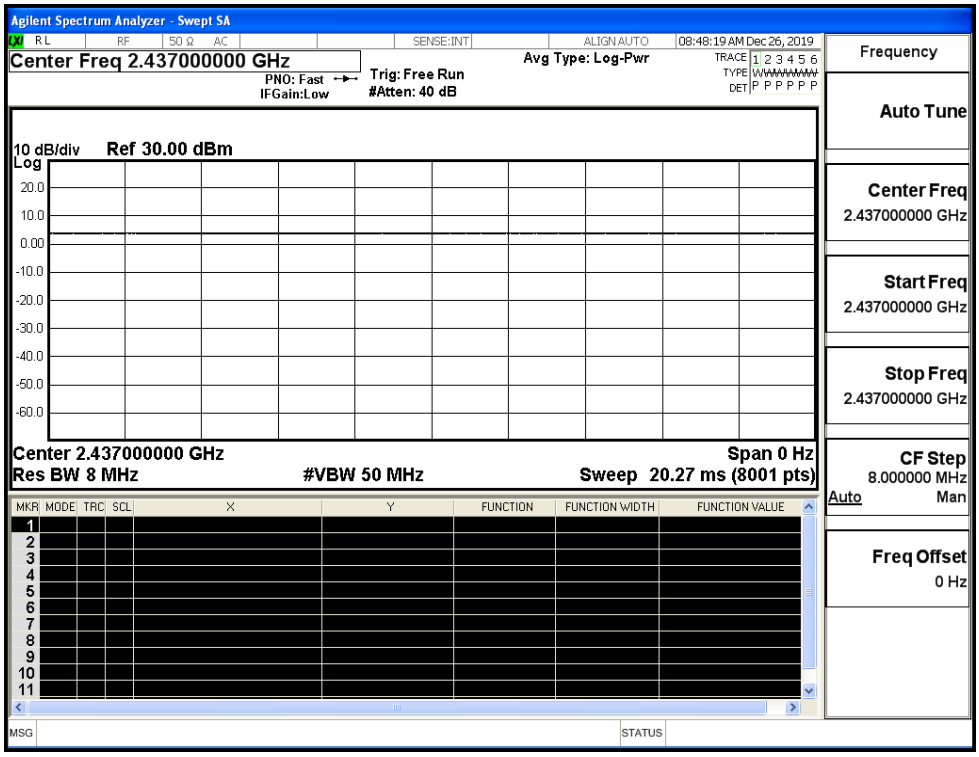
Temperature:	23.9 °C
Relative Humidity:	54.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Qu Xin
Supervised by:	Wang Chuang

C.1 Duty Cycle

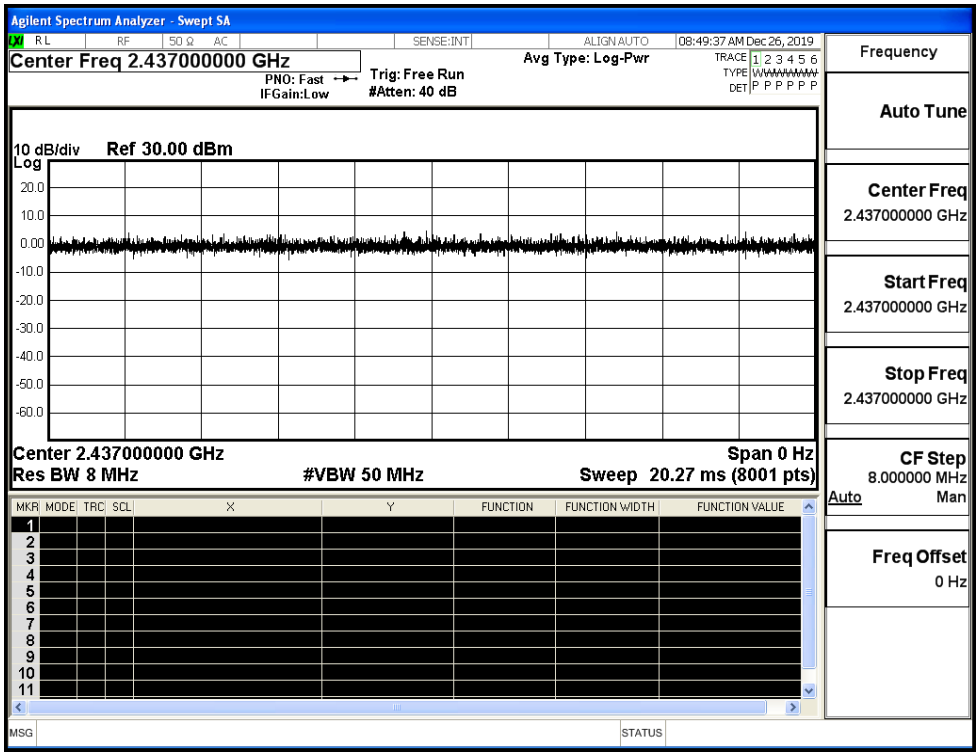
Ant0

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

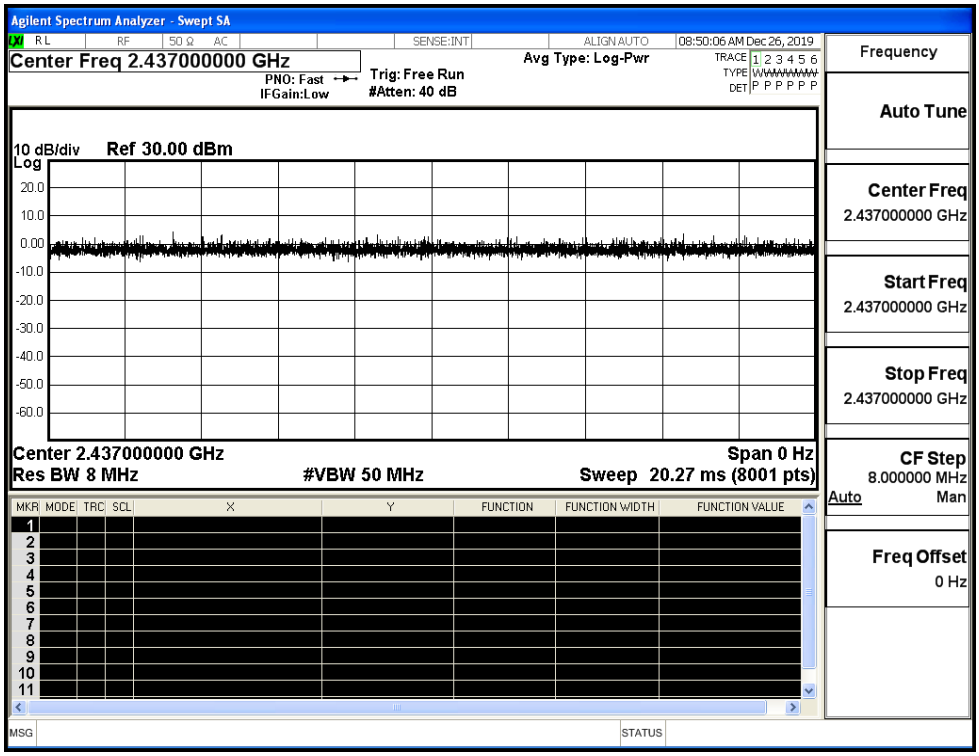
Duty Cycle_11B_2437_Ant0



Duty Cycle_11G_2437_Ant0



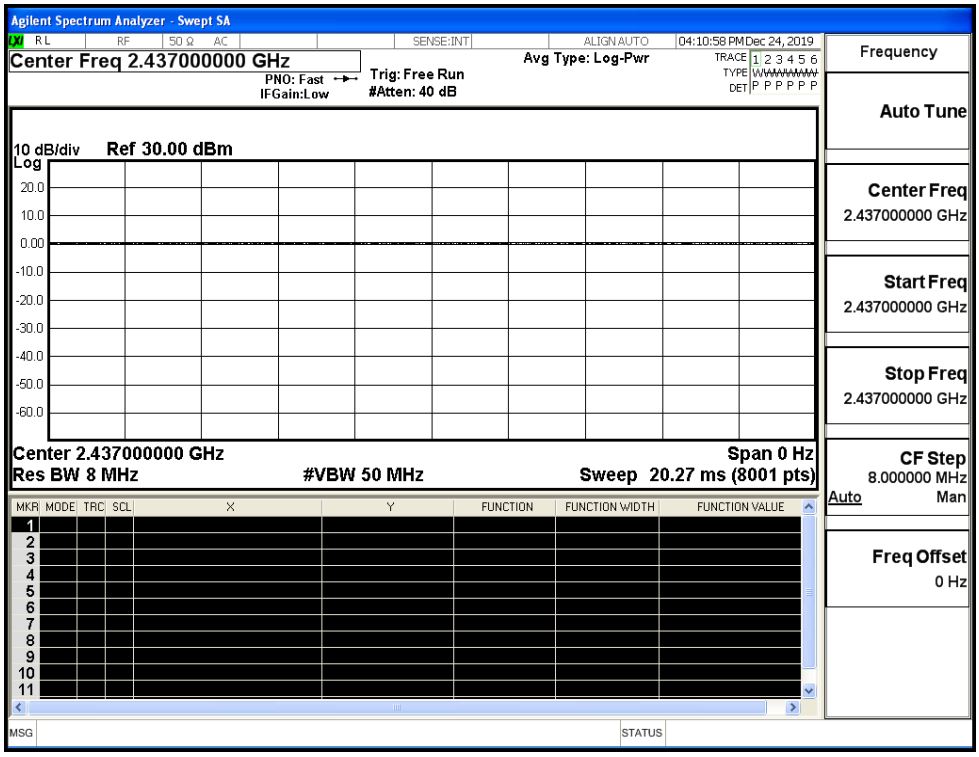
Duty Cycle_11N20SISO_2437_Ant0



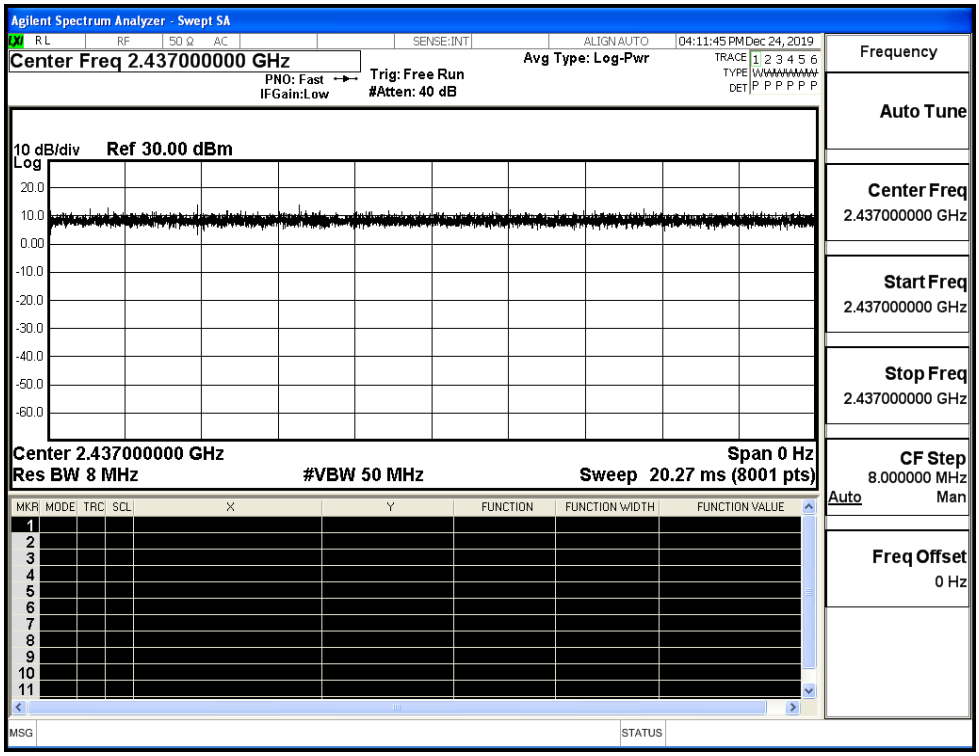
Ant1

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

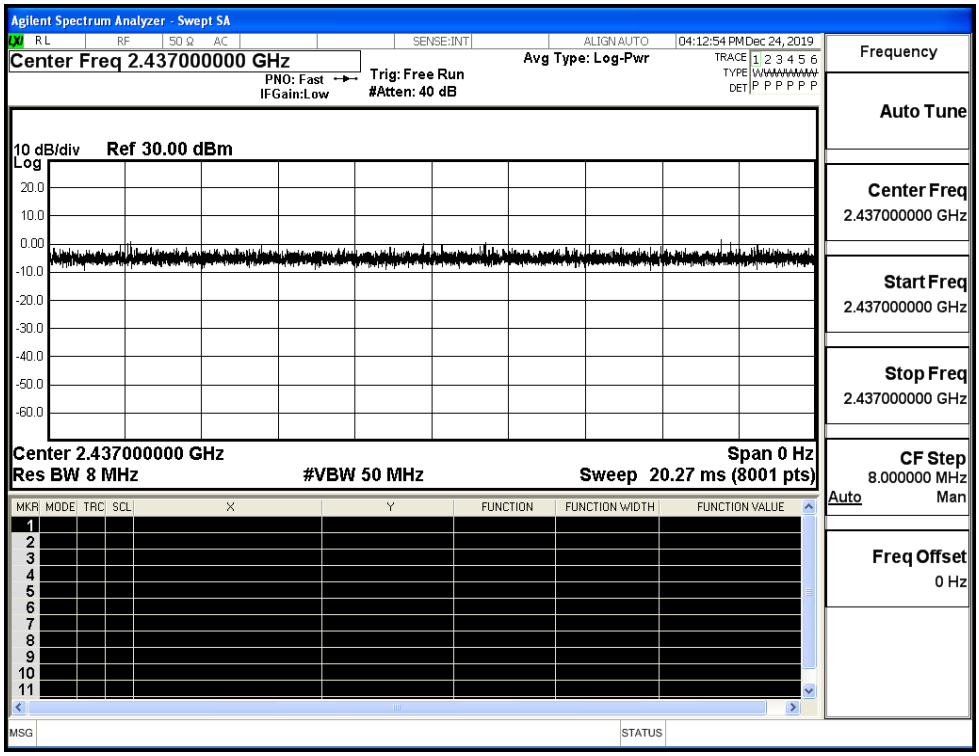
Duty Cycle_11B_2437_Ant1



Duty Cycle_11G_2437_Ant1



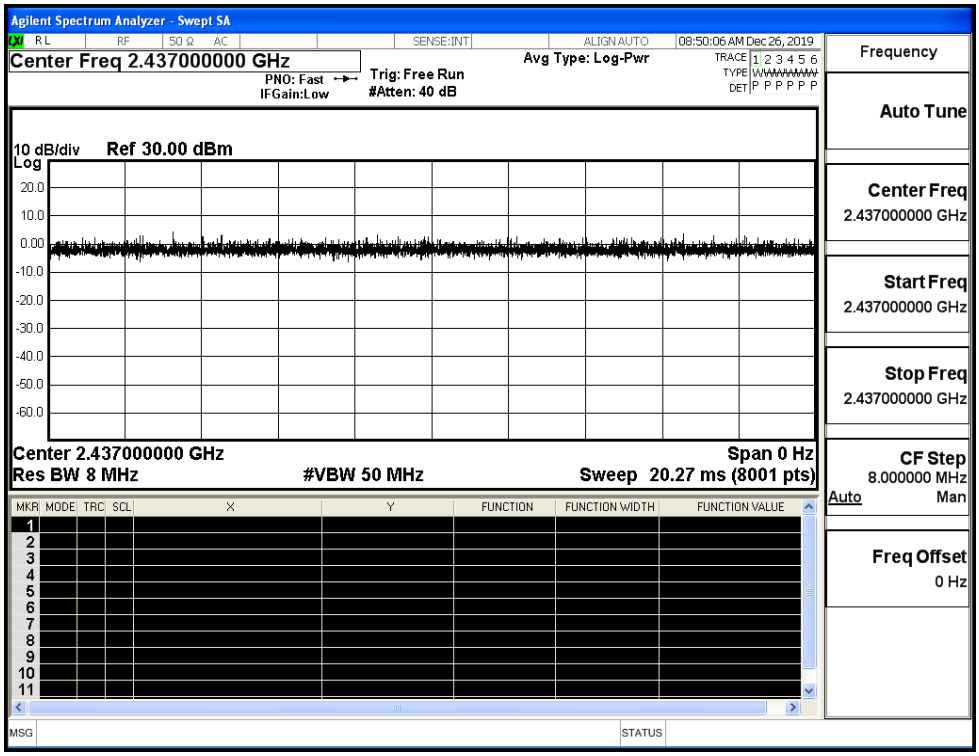
Duty Cycle_11N20SISO_2437_Ant1



Ant0+1

Test Mode	Test Channel	Ant	Duty Cycle[%]	Verdict
11N20SISO	2437	Ant0+1	100	PASS

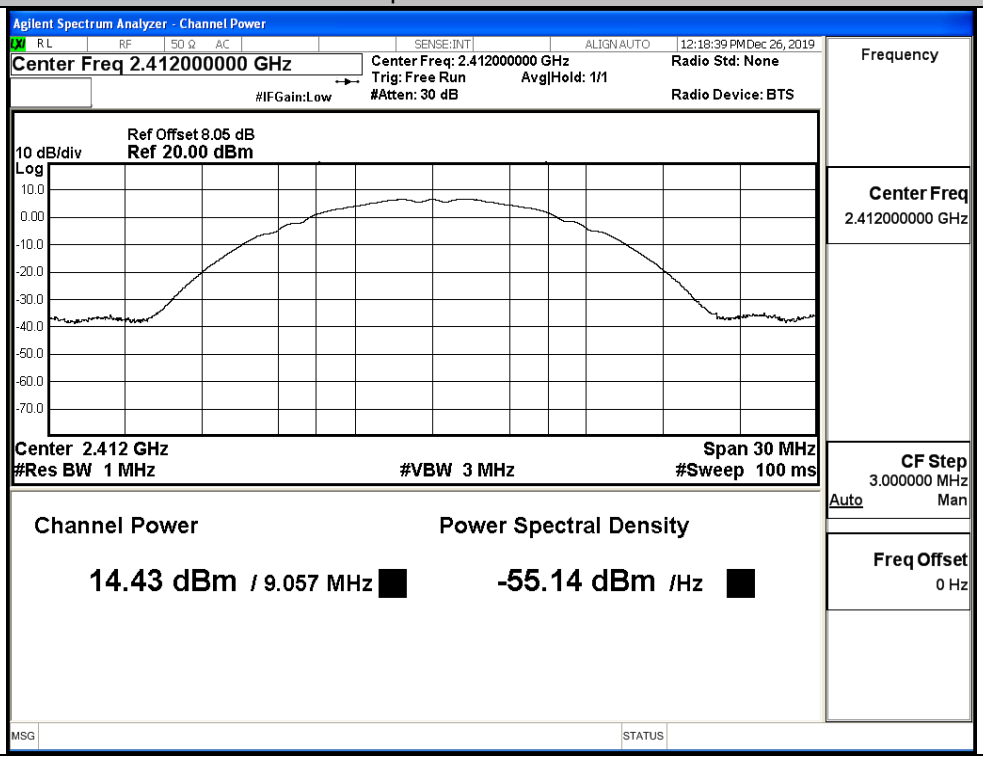
Duty Cycle_11N20SISO_2437_Ant0+1

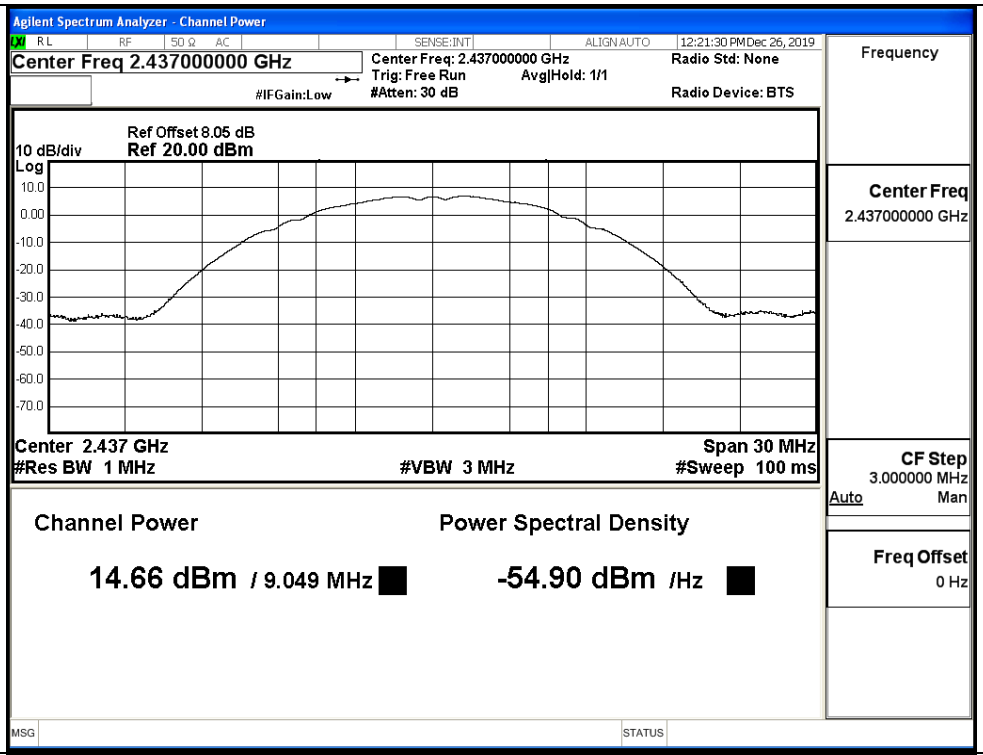
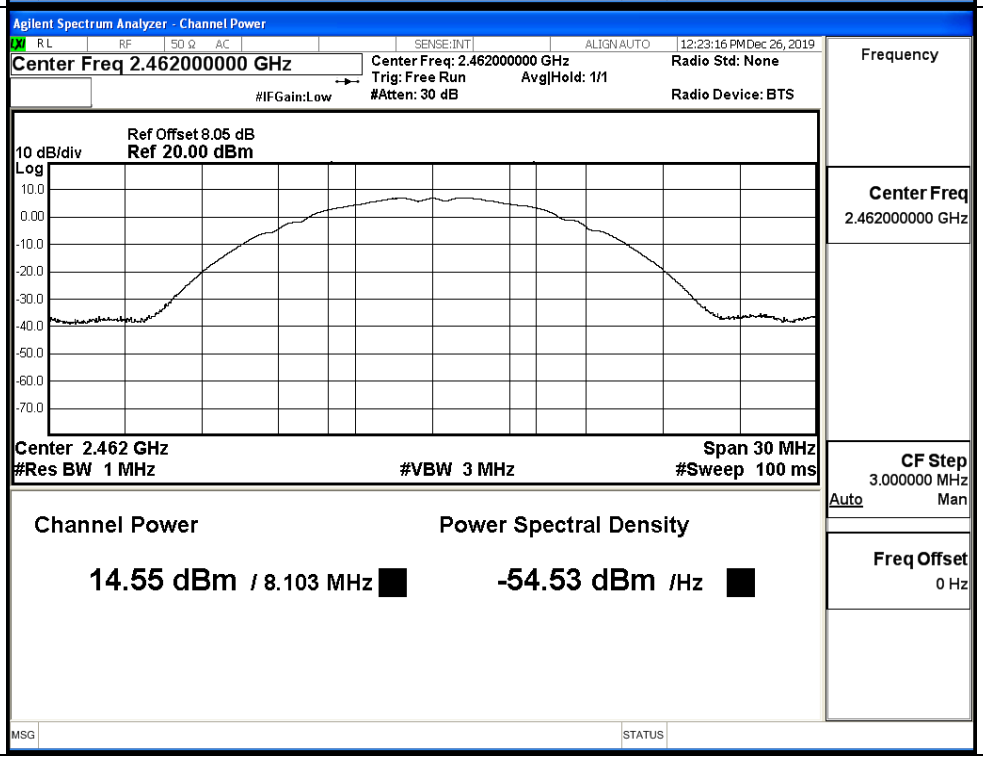


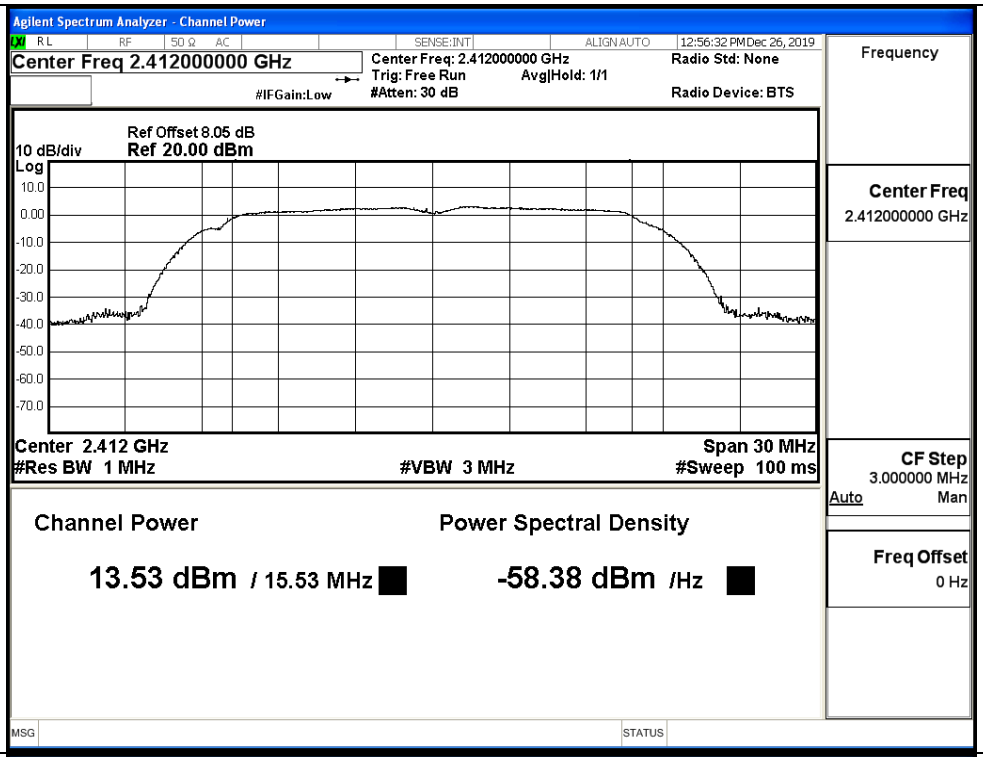
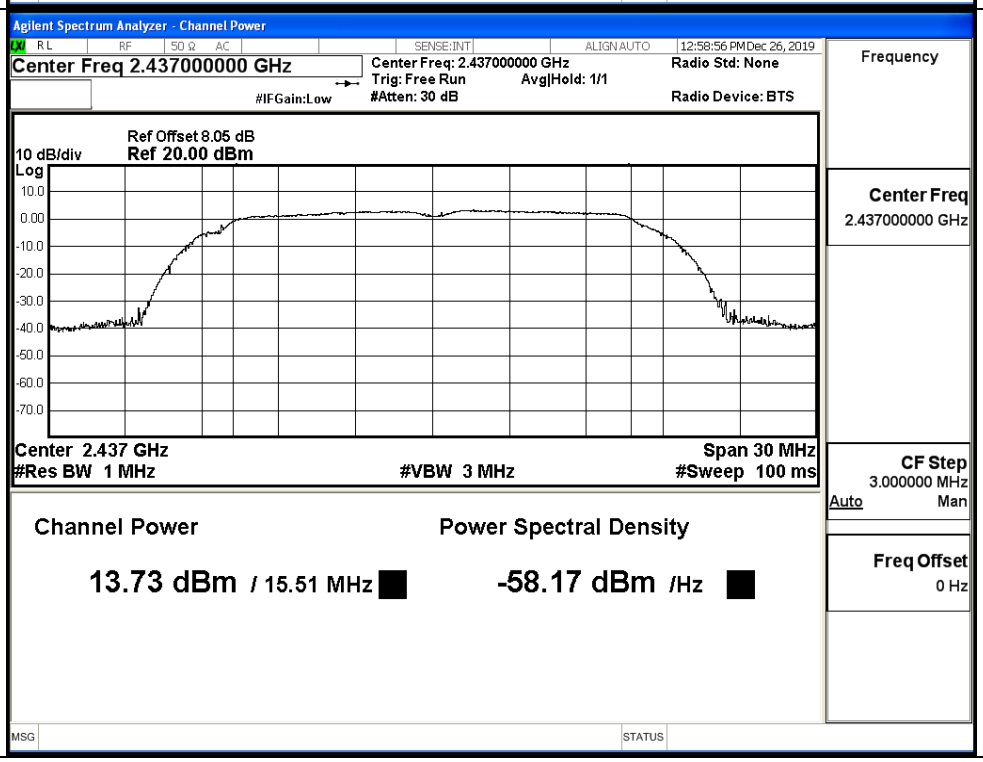
C.2 Maximum Conducted Output Power

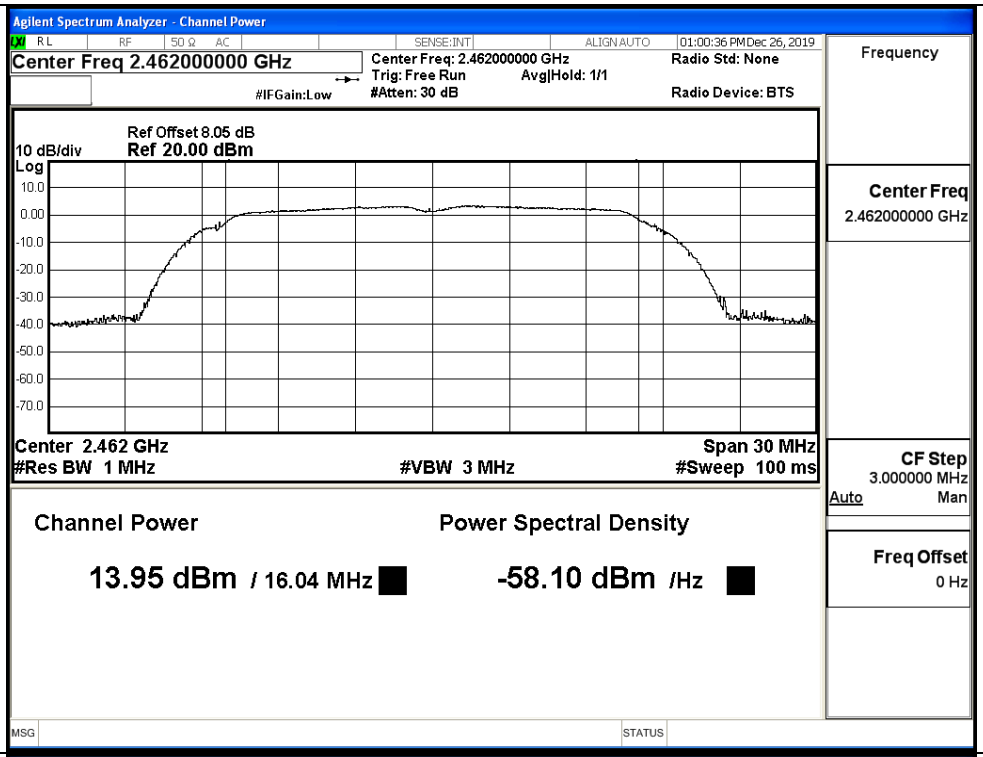
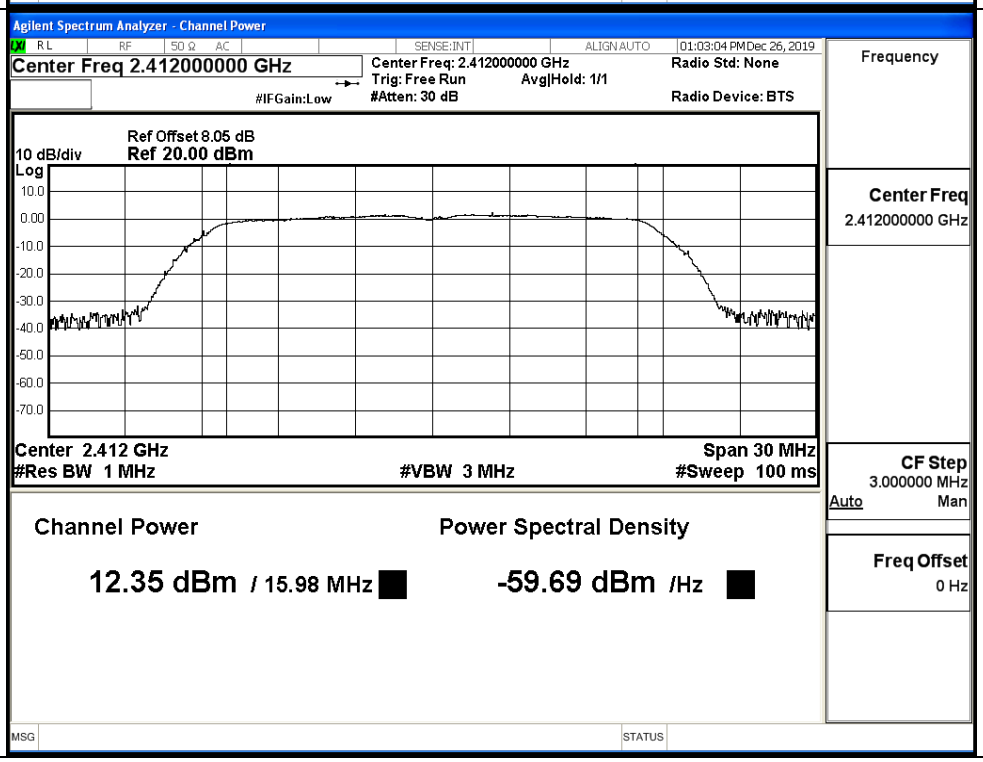
Ant0

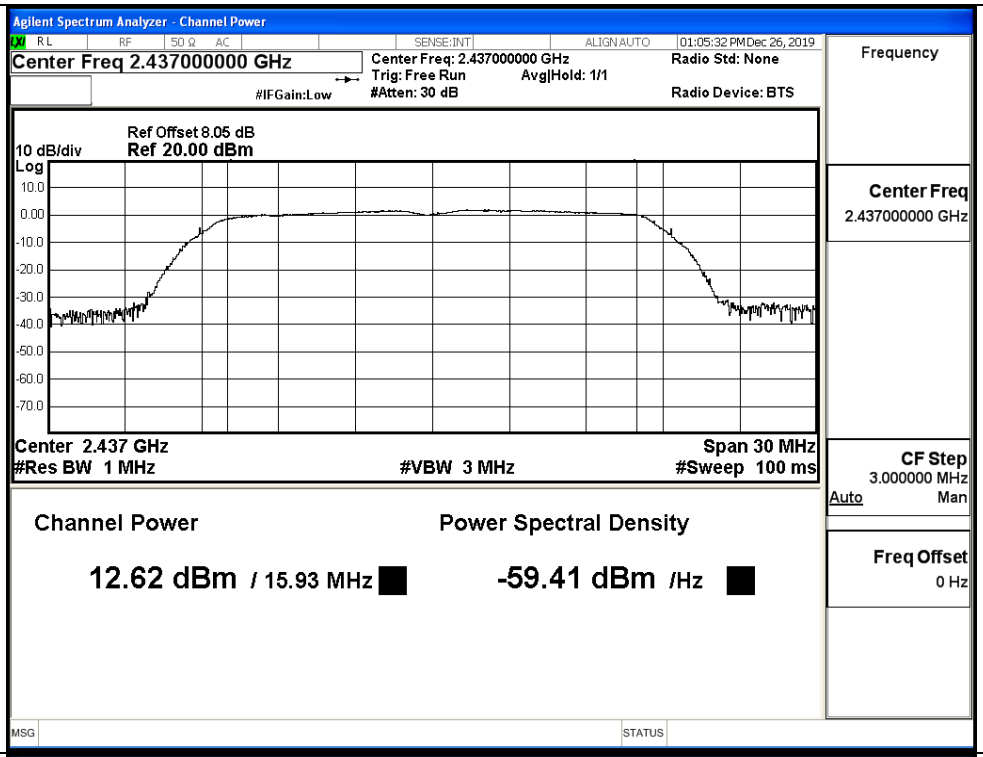
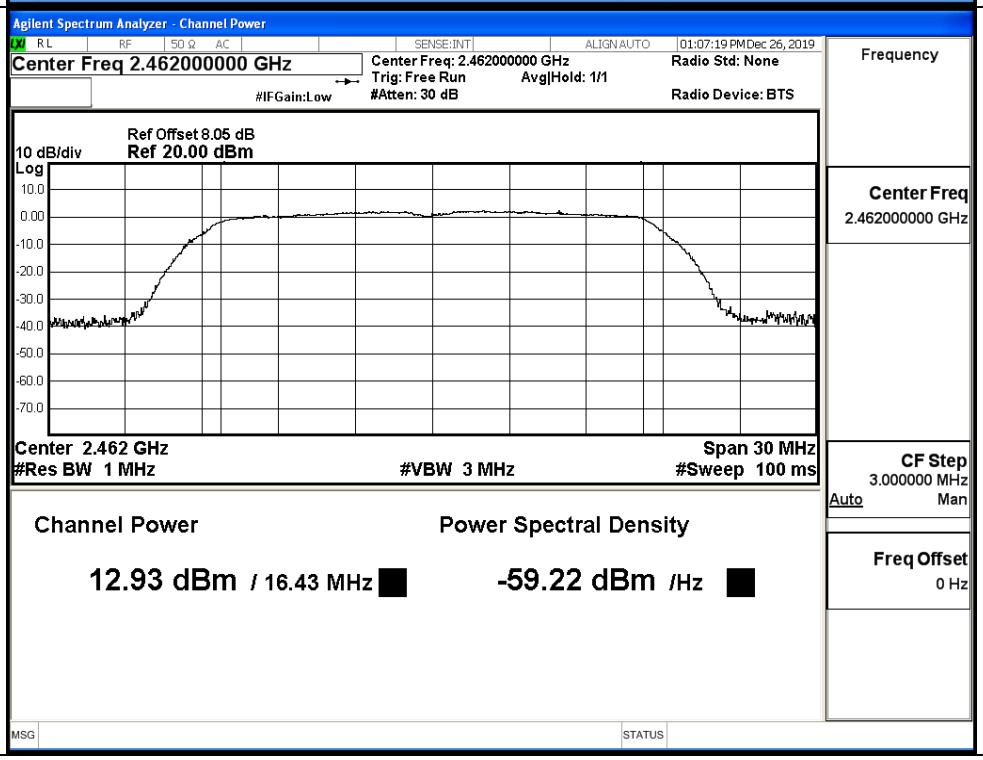
Mode	Channel	Meas.Level [dBm]	Limit [dBm]	Verdict
11B	LCH	14.43	30	PASS
	MCH	14.66	30	PASS
	HCH	14.55	30	PASS
11G	LCH	13.53	30	PASS
	MCH	13.73	30	PASS
	HCH	13.95	30	PASS
11N20SISO	LCH	12.35	30	PASS
	MCH	12.62	30	PASS
	HCH	12.93	30	PASS

Test Graphs	
11B/LCH	

11B/MCH	
11B/HCH	

11G/LCH		
11G/MCH		

11G/HCH	
11N20SISO/LCH	

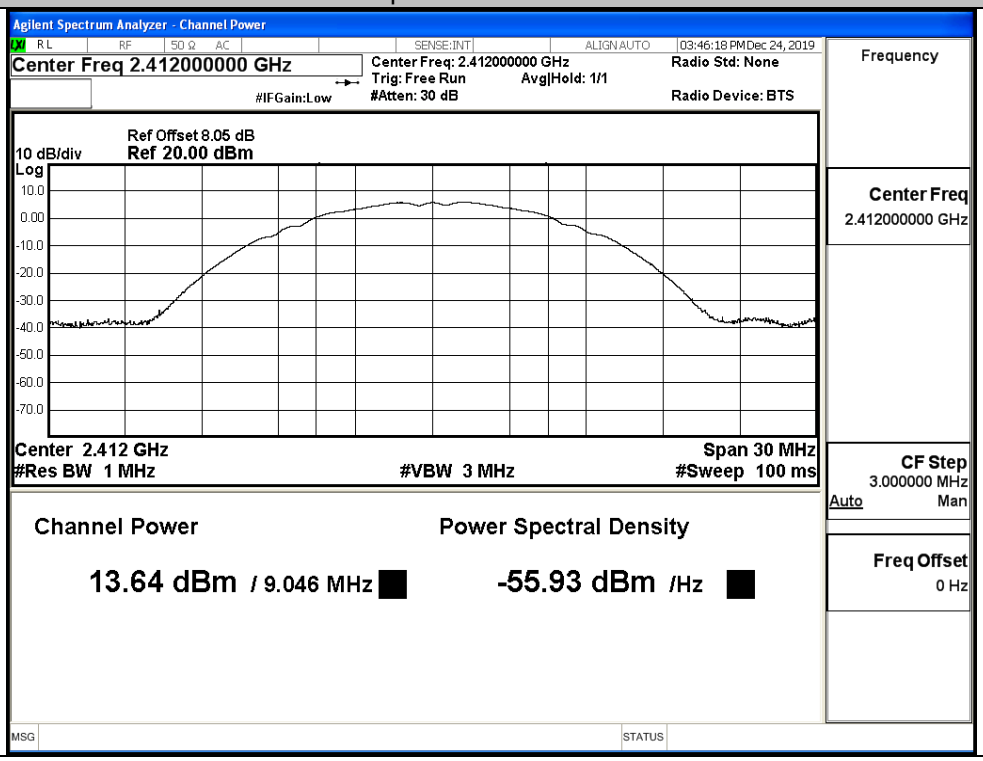
11N20SISO/MCH	
11N20SISO/HCH	

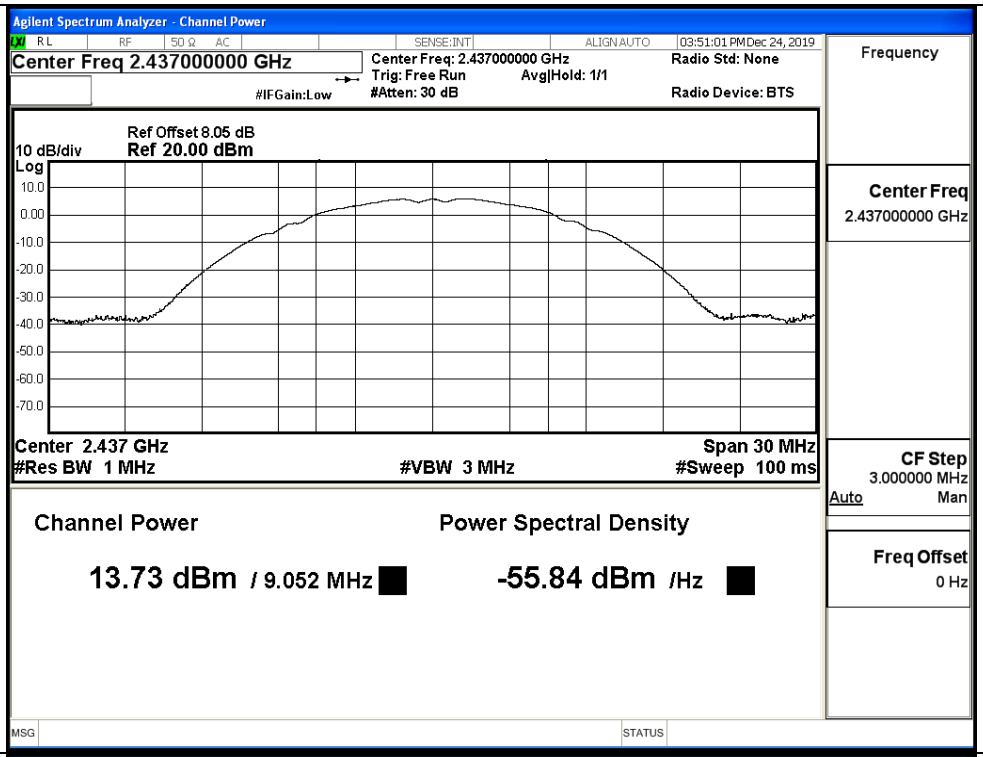
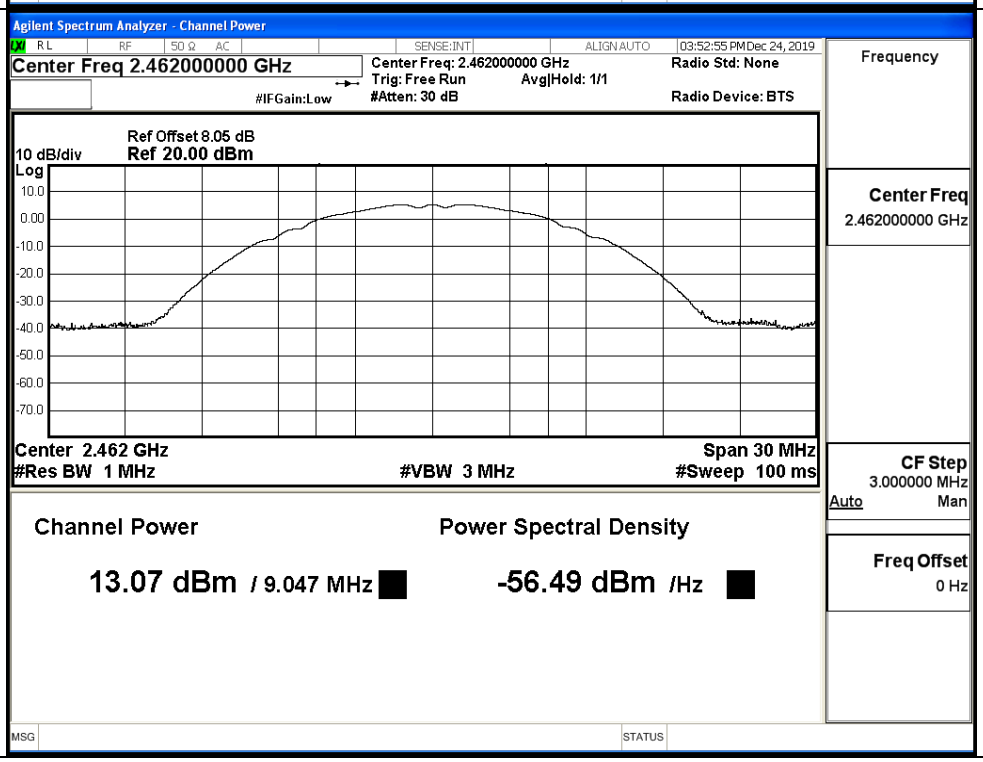
Ant1

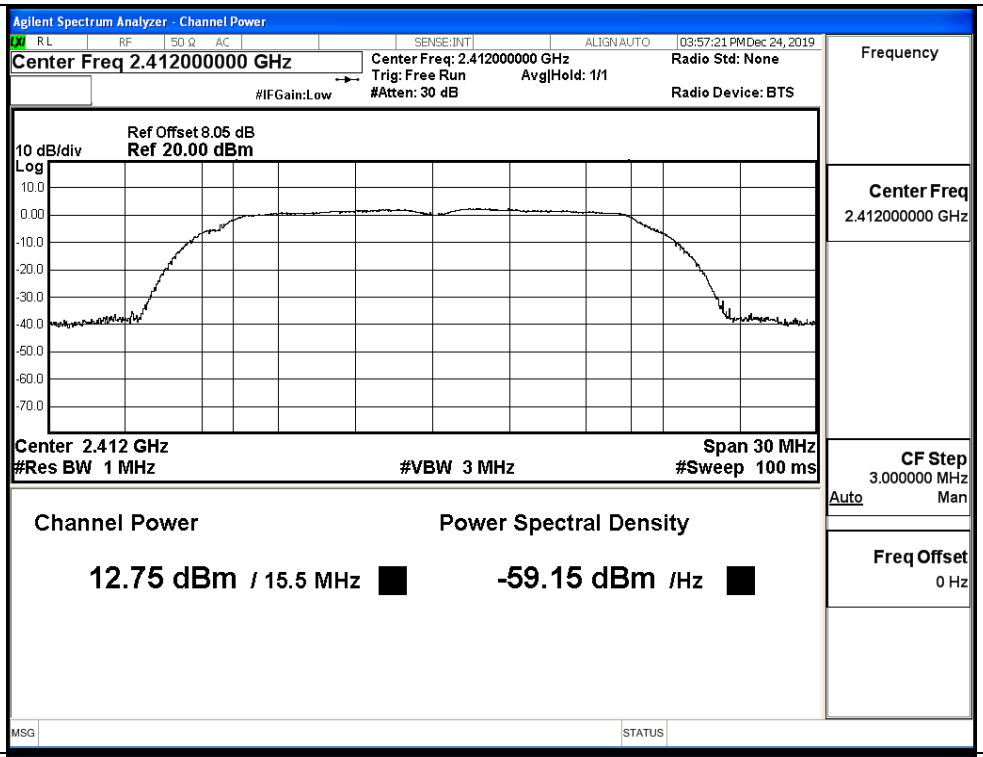
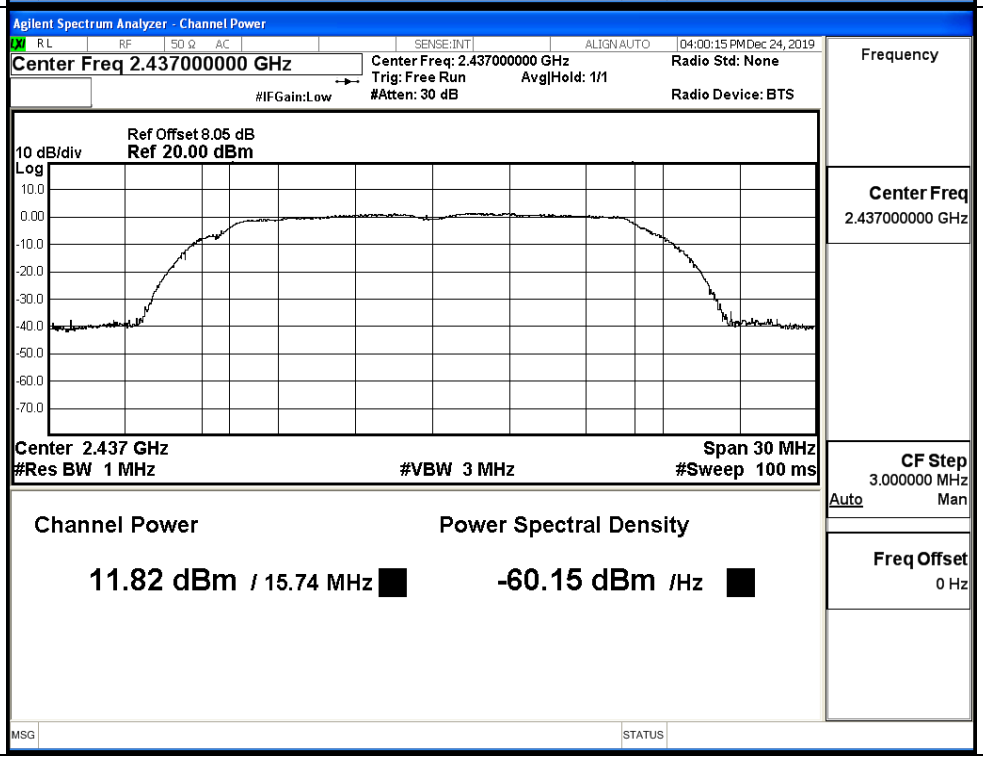
Mode	Channel	Meas.Level [dBm]	Limit [dBm]	Verdict
11B	LCH	13.64	30	PASS
	MCH	13.73	30	PASS
	HCH	13.07	30	PASS
11G	LCH	12.75	30	PASS
	MCH	11.82	30	PASS
	HCH	12.09	30	PASS
11N20SISO	LCH	10.69	30	PASS
	MCH	10.03	30	PASS
	HCH	10.45	30	PASS

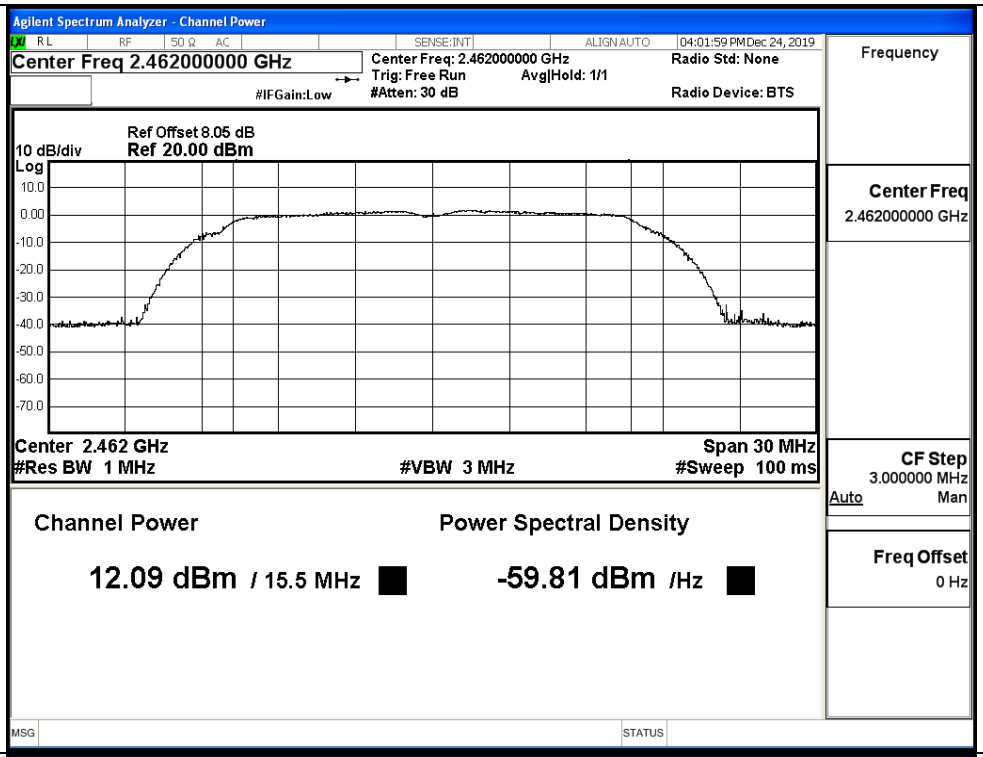
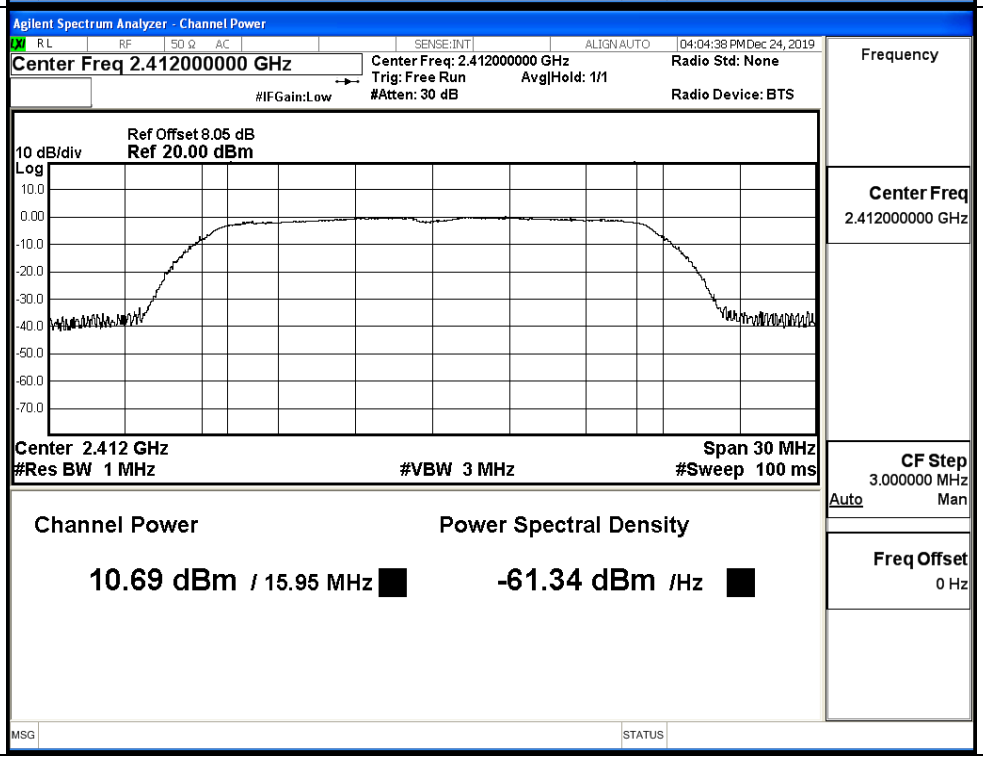
Test Graphs

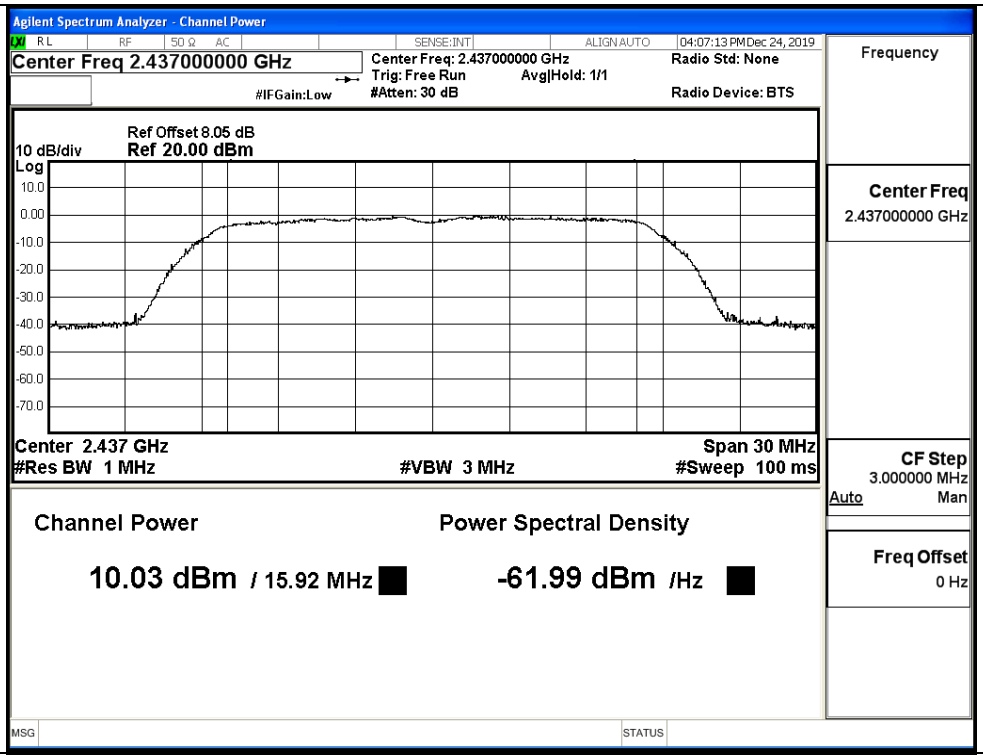
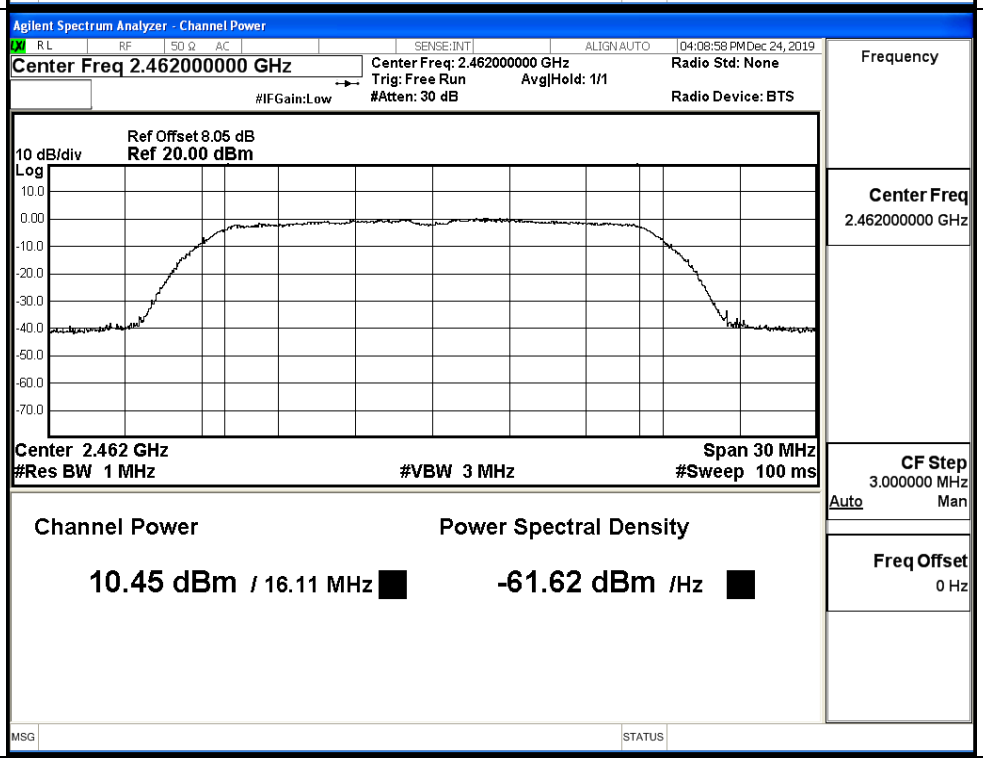
11B/LCH



11B/MCH		
11B/HCH		

11G/LCH	
11G/MCH	

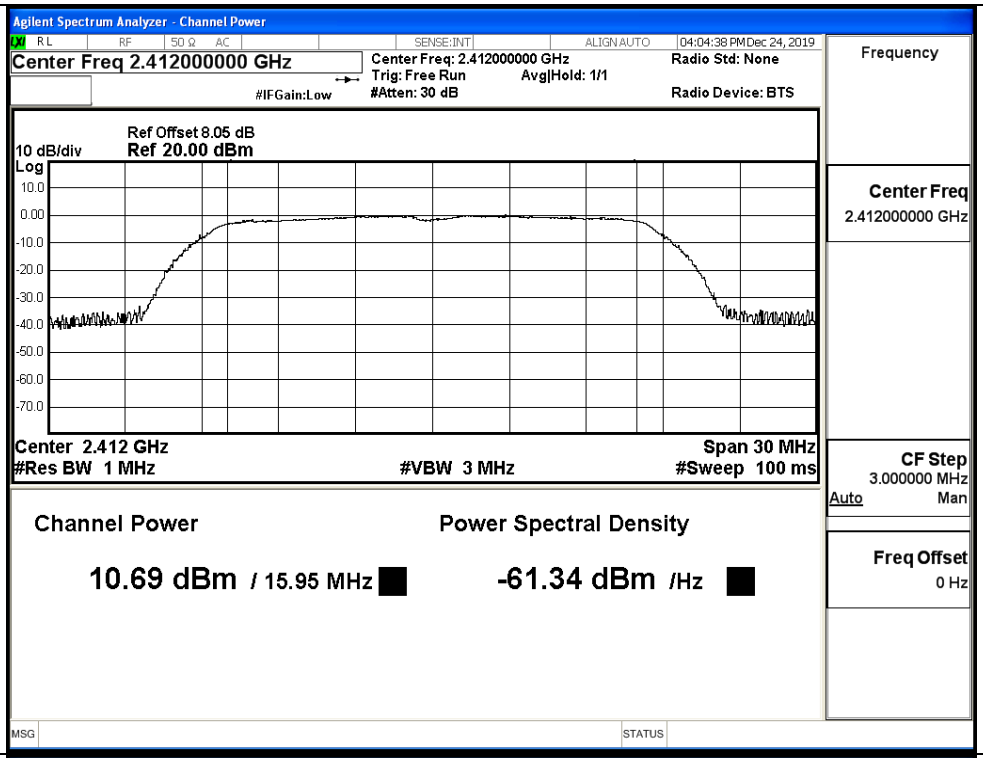
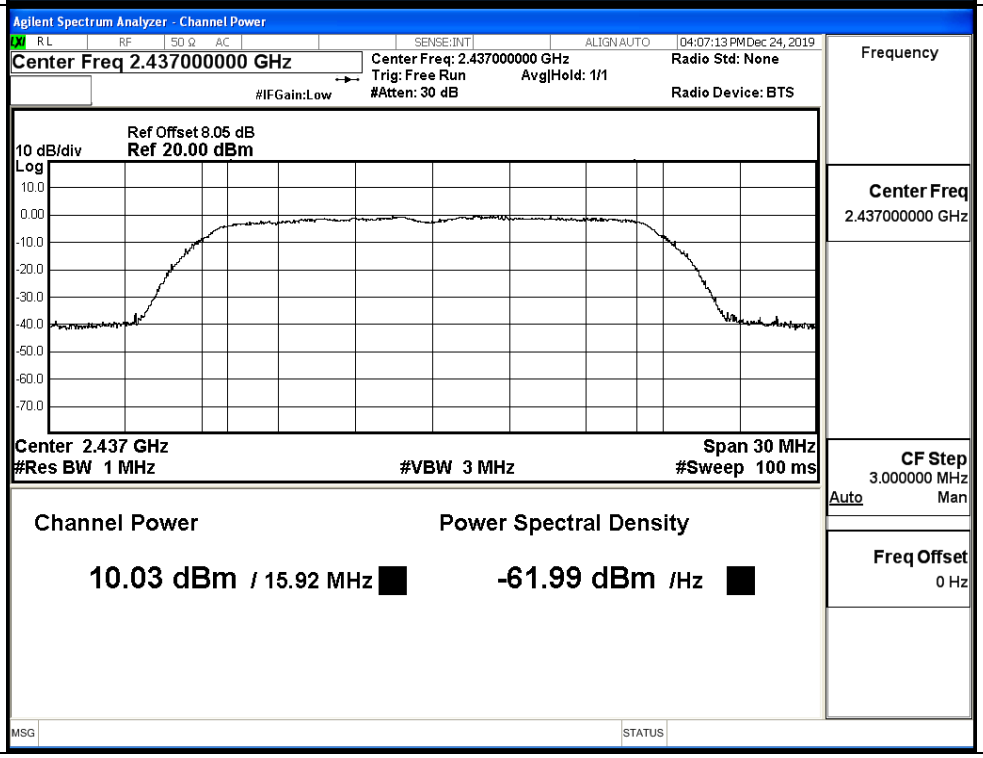
11G/HCH	
11N20SISO/LCH	

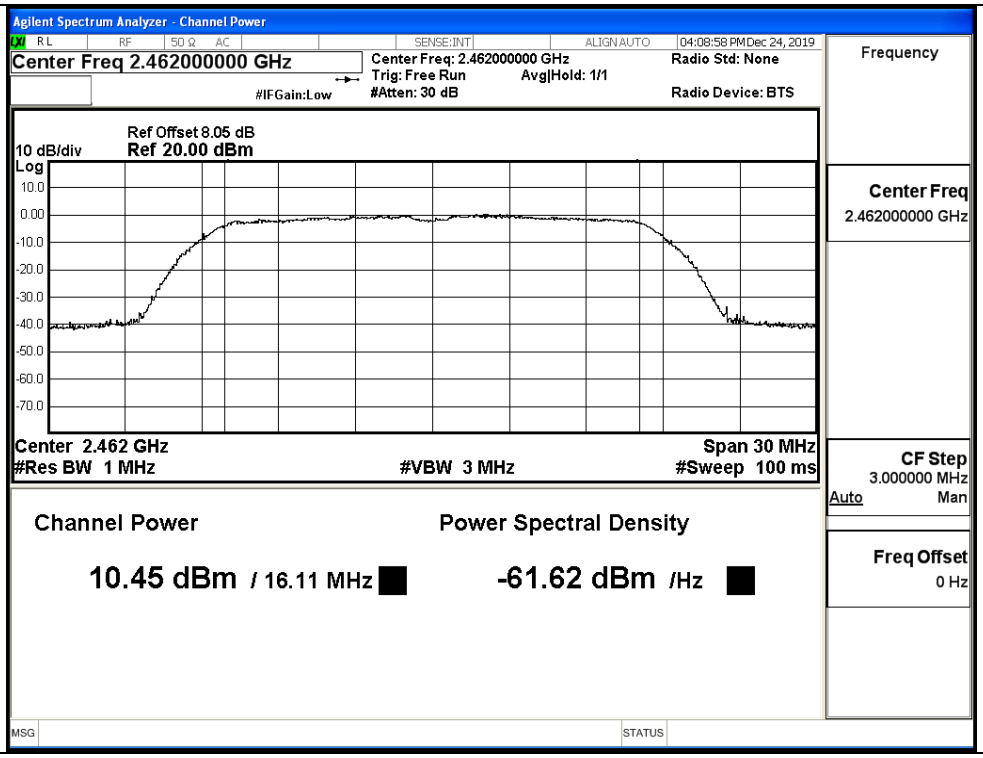
11N20SISO/MCH	
11N20SISO/HCH	

Ant0+1

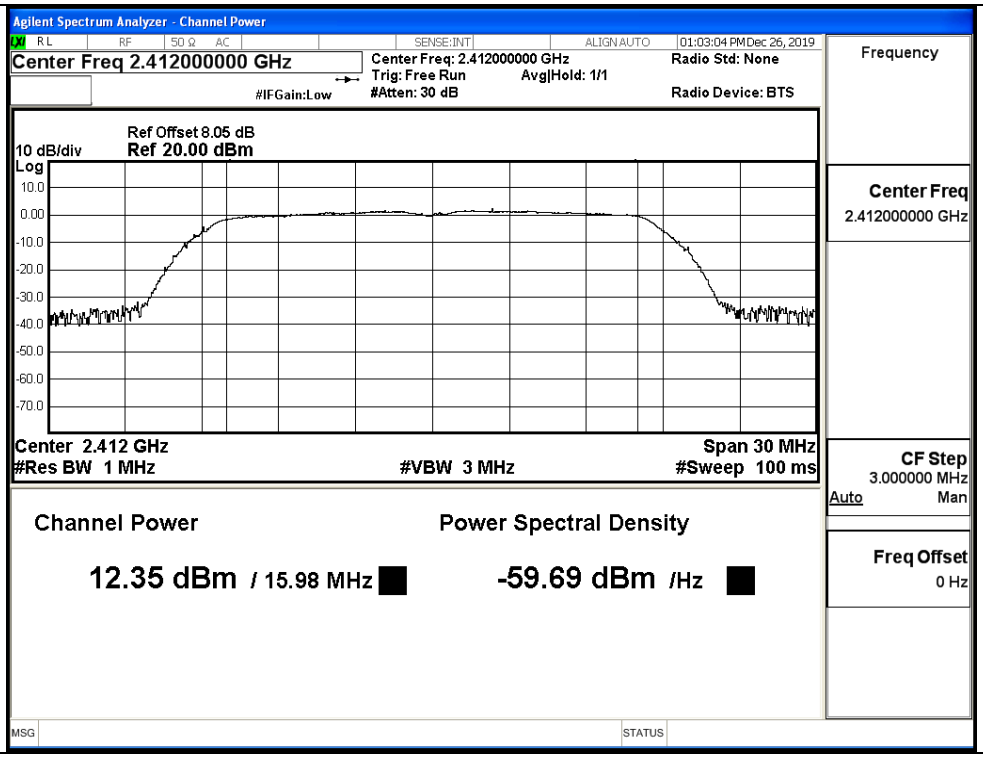
Mode	Channel	ANT 0 [dBm]	ANT 1 [dBm]	MIMO [dBm]	Limit [dBm]	Verdict
11N20SISO	LCH	12.35	10.69	14.61	30	PASS
	MCH	12.62	10.03	14.53	30	PASS
	HCH	12.93	10.45	14.87	30	PASS

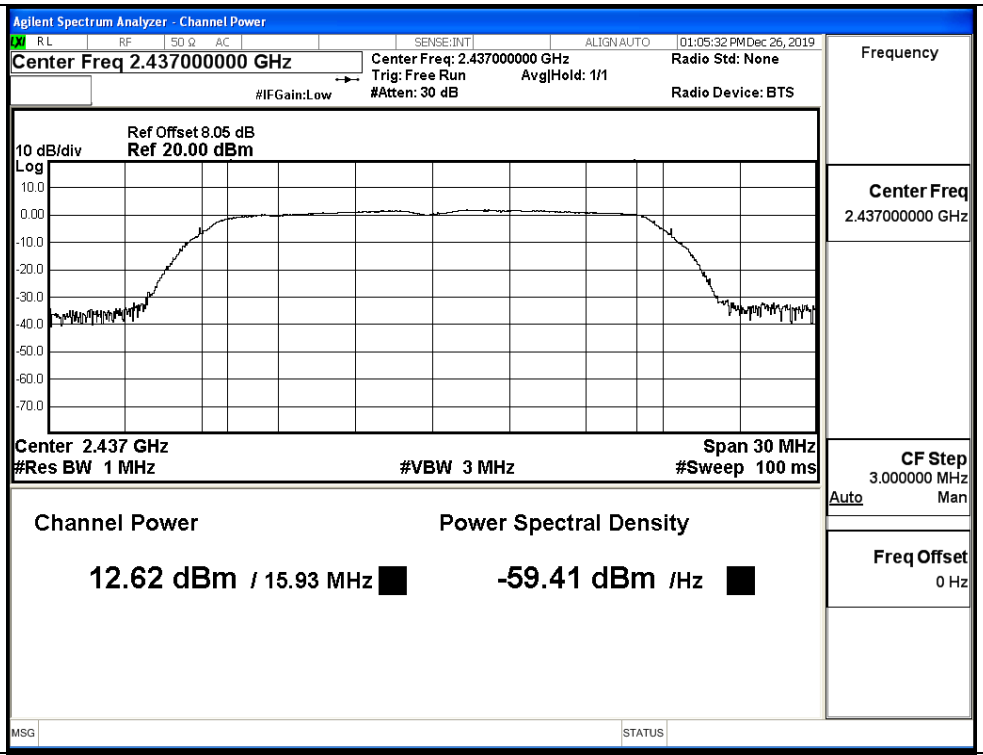
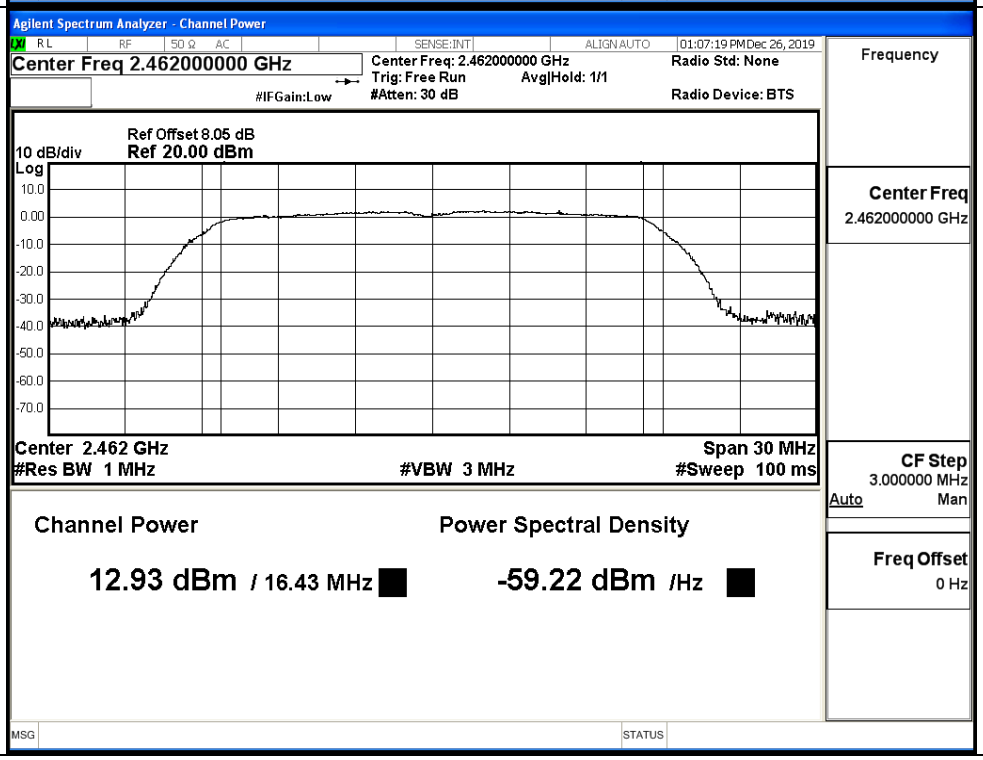
ANT 1

11N20SISO/LCH	
11N20SISO/MCH	

11N20SISO/HCH	

ANT 0

11N20SISO/LCH	

11N20SISO/MCH	
11N20SISO/HCH	

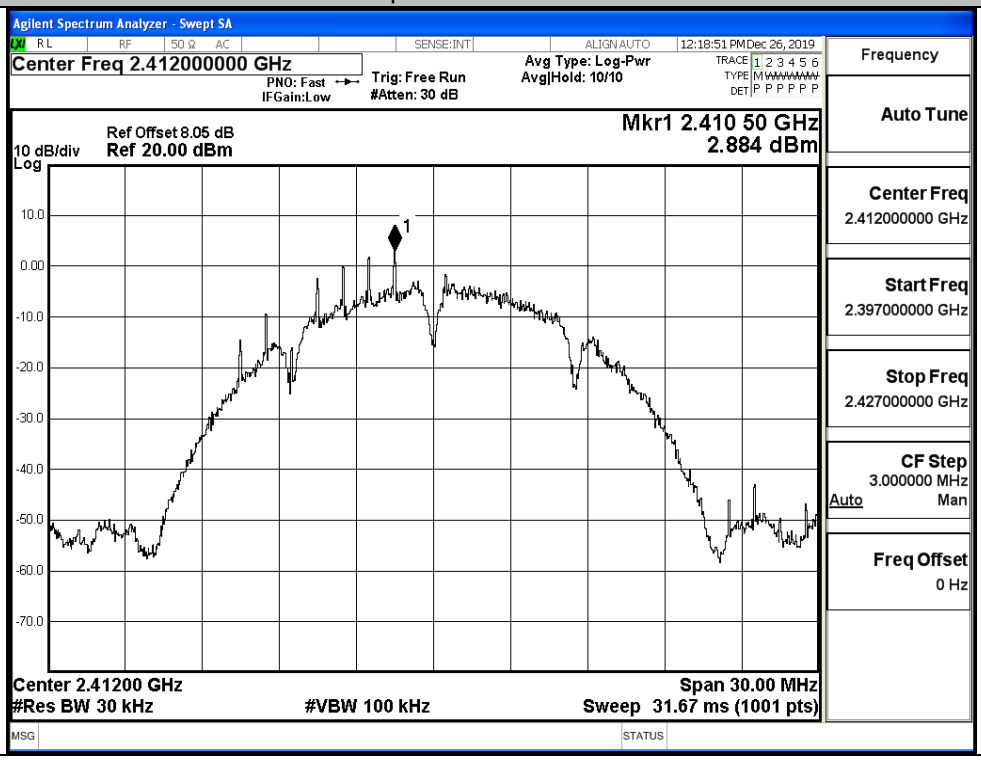
C.3 Maximum Power Spectral Density

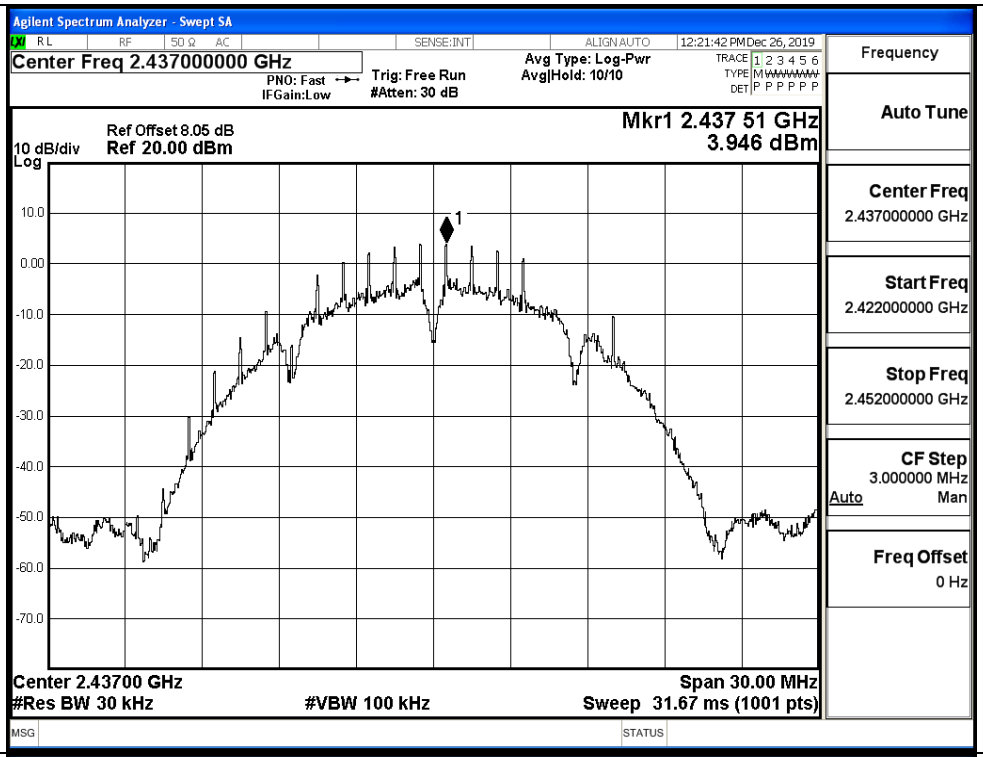
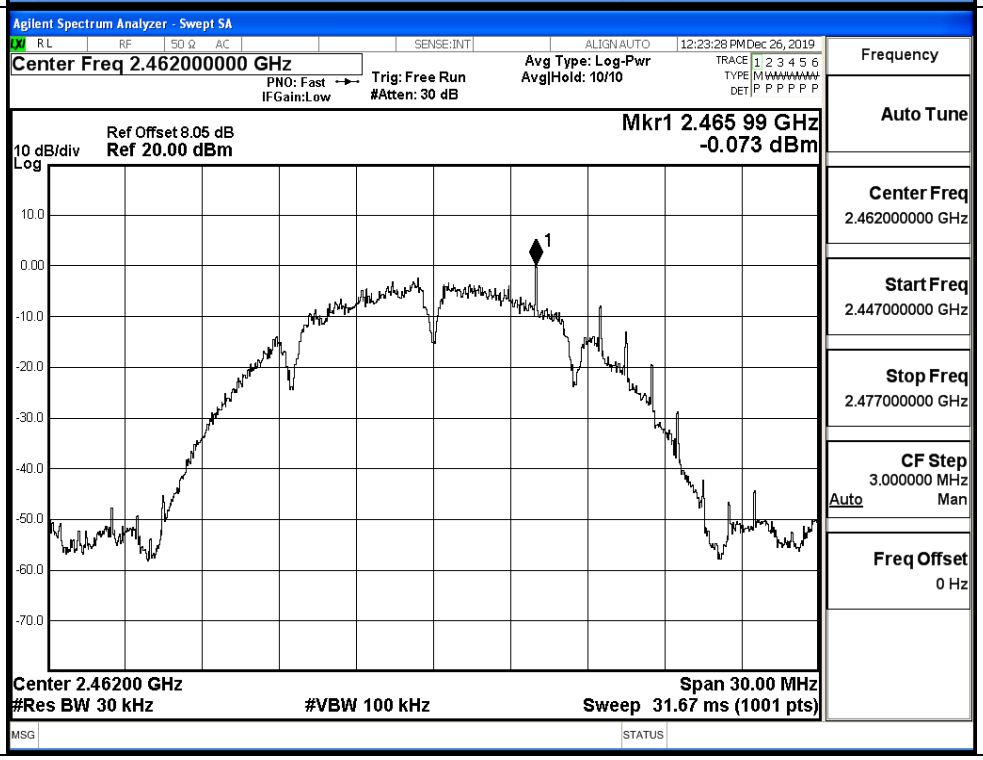
Ant0

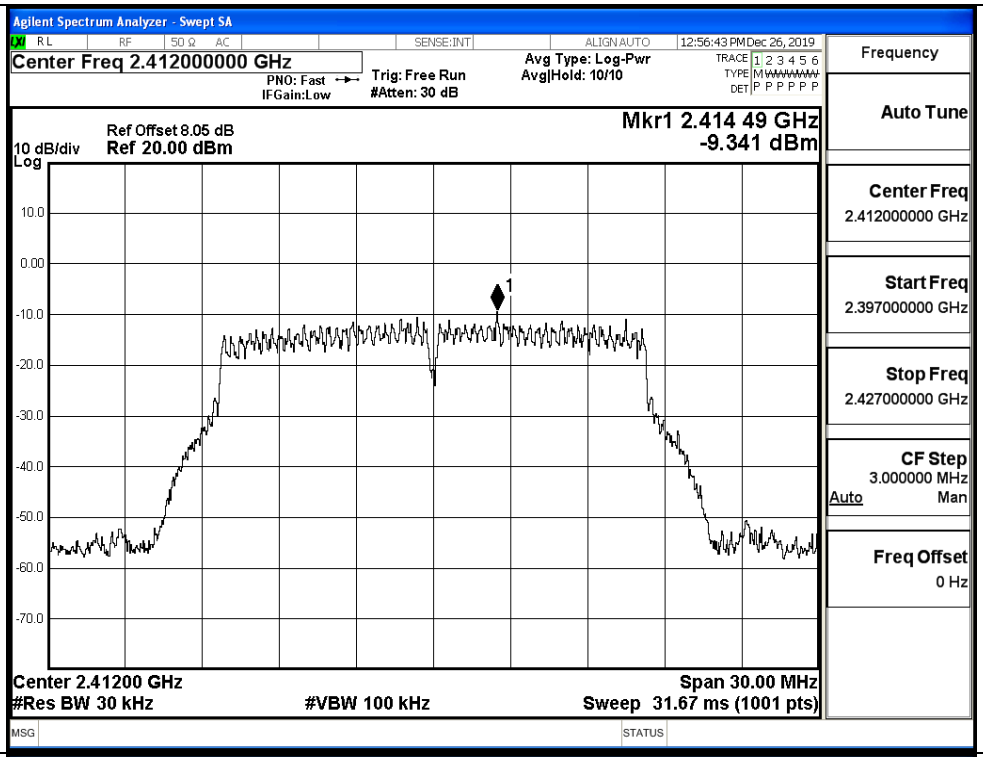
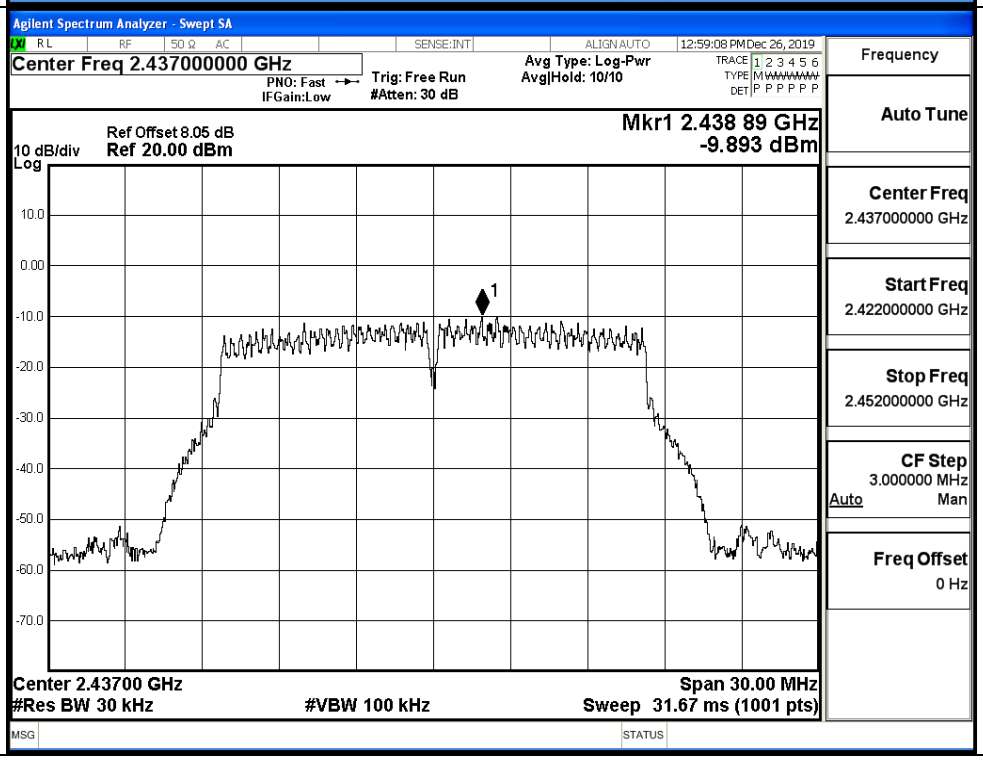
Mode	Channel	Meas.Level [dBm/30KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	2.884	8	PASS
	MCH	3.946	8	PASS
	HCH	-0.073	8	PASS
11G	LCH	-9.341	8	PASS
	MCH	-9.893	8	PASS
	HCH	-10.195	8	PASS
11N20SISO	LCH	-11.312	8	PASS
	MCH	-10.677	8	PASS
	HCH	-9.991	8	PASS

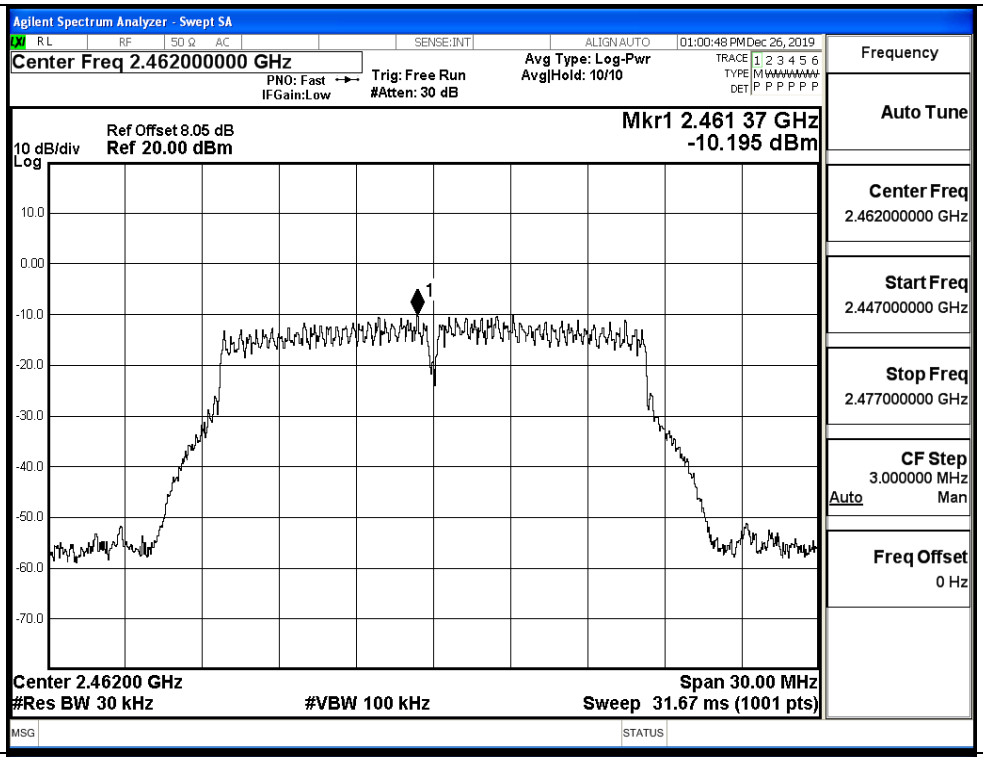
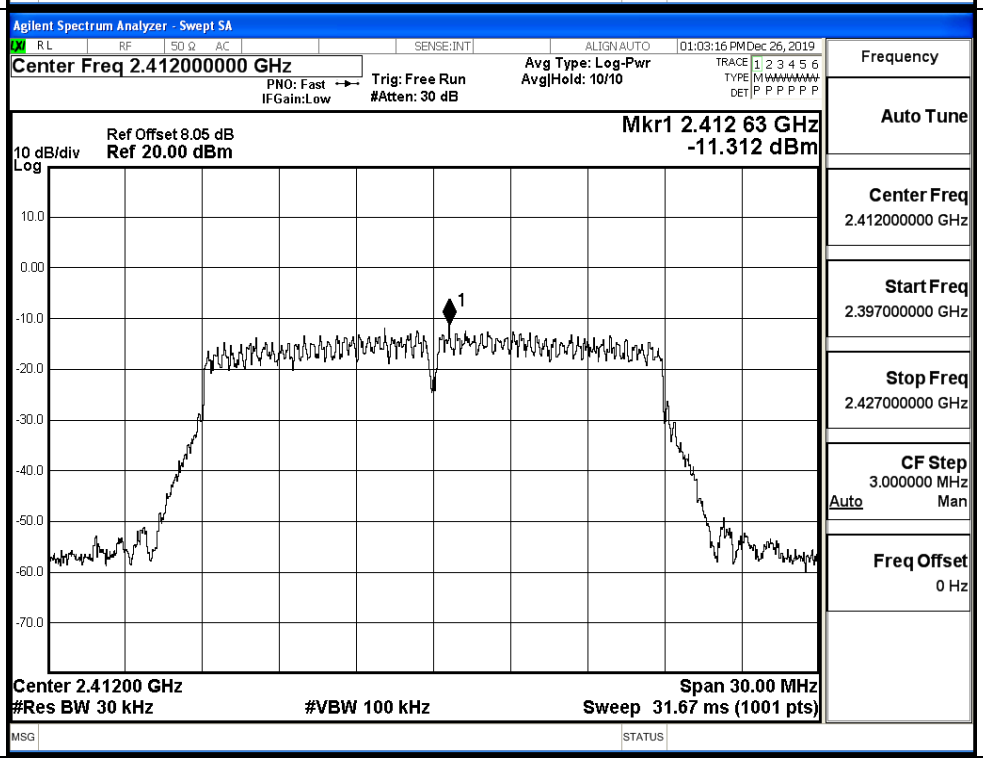
Test Graphs

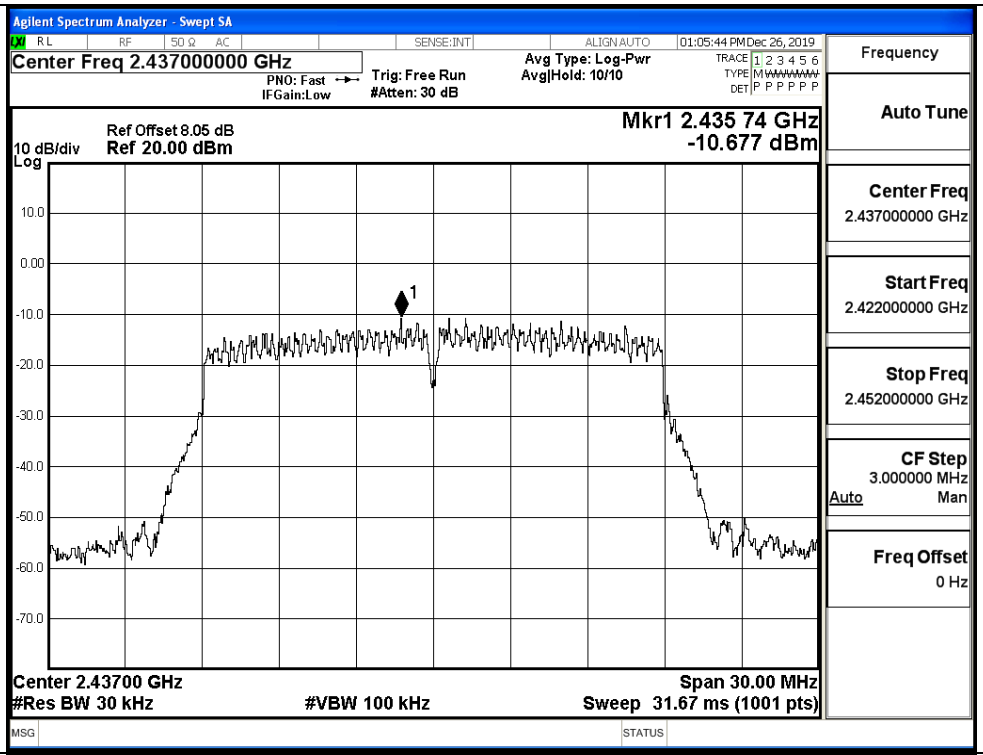
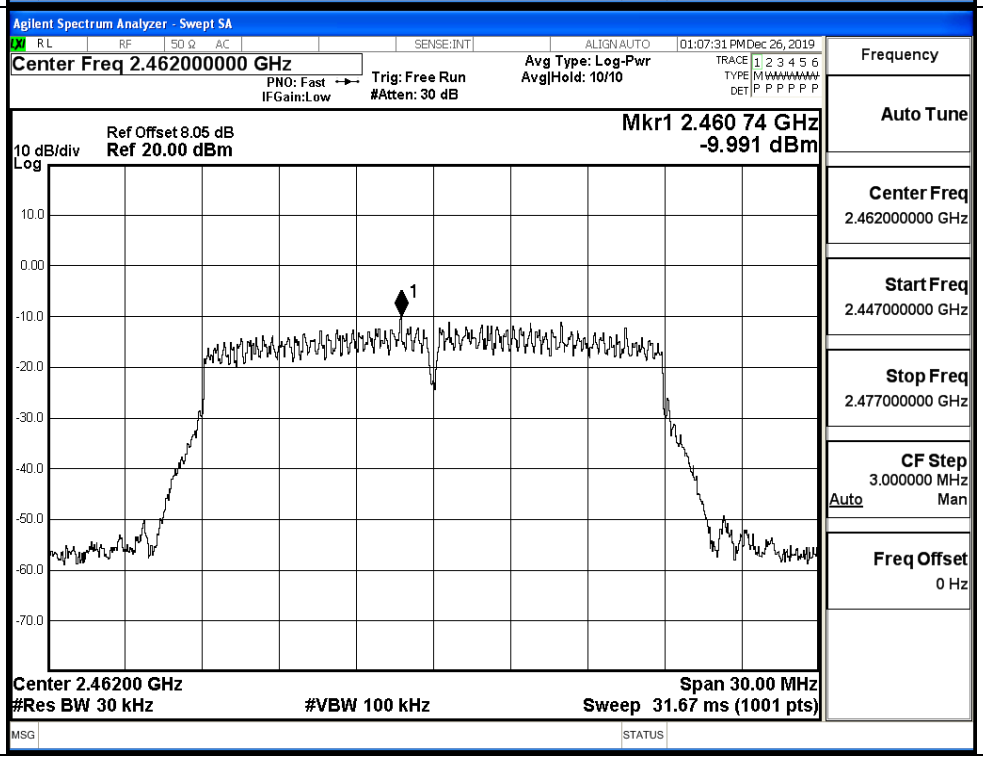
11B/LCH



11B/MCH	
11B/HCH	

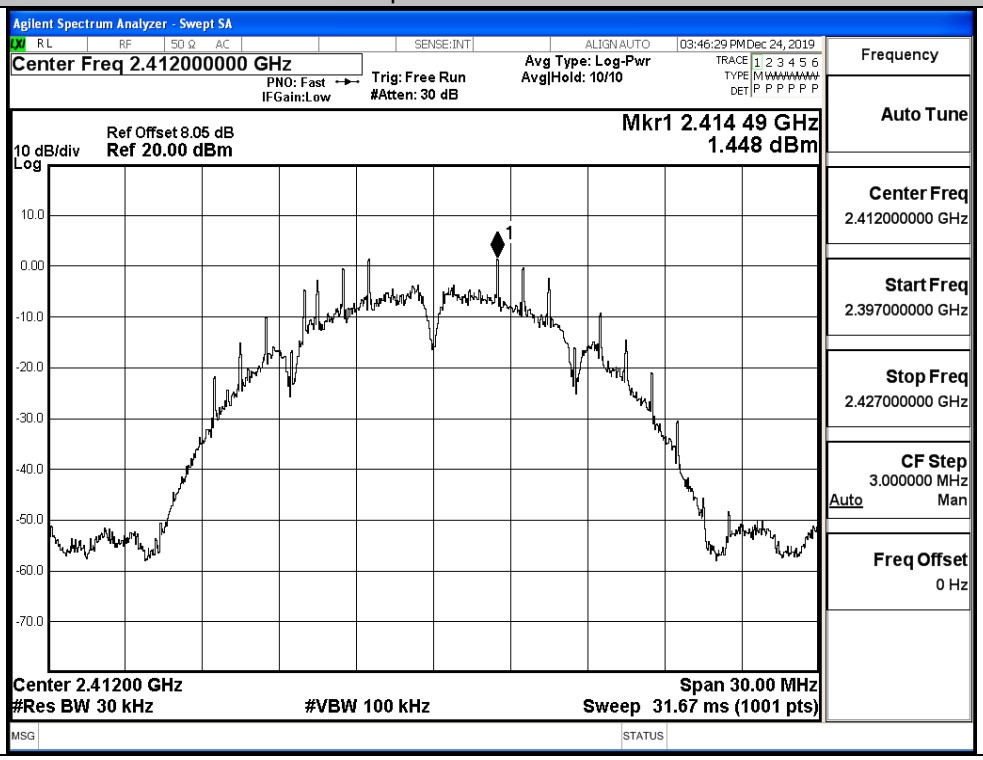
11G/LCH	
11G/MCH	

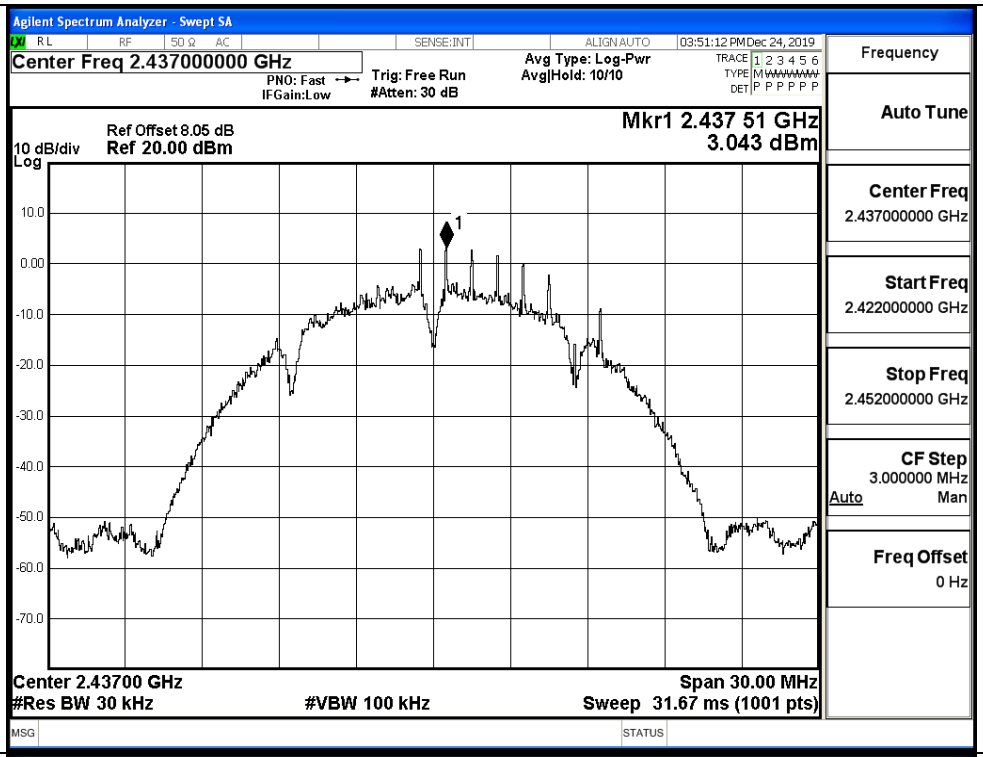
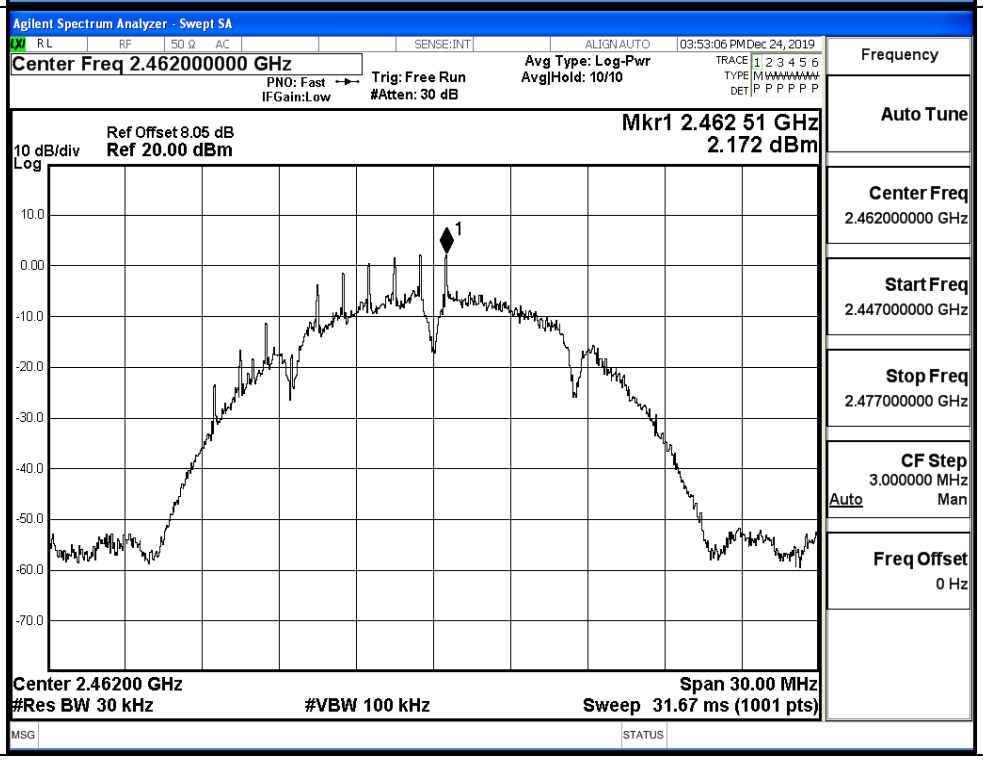
11G/HCH	
11N20SISO/LCH	

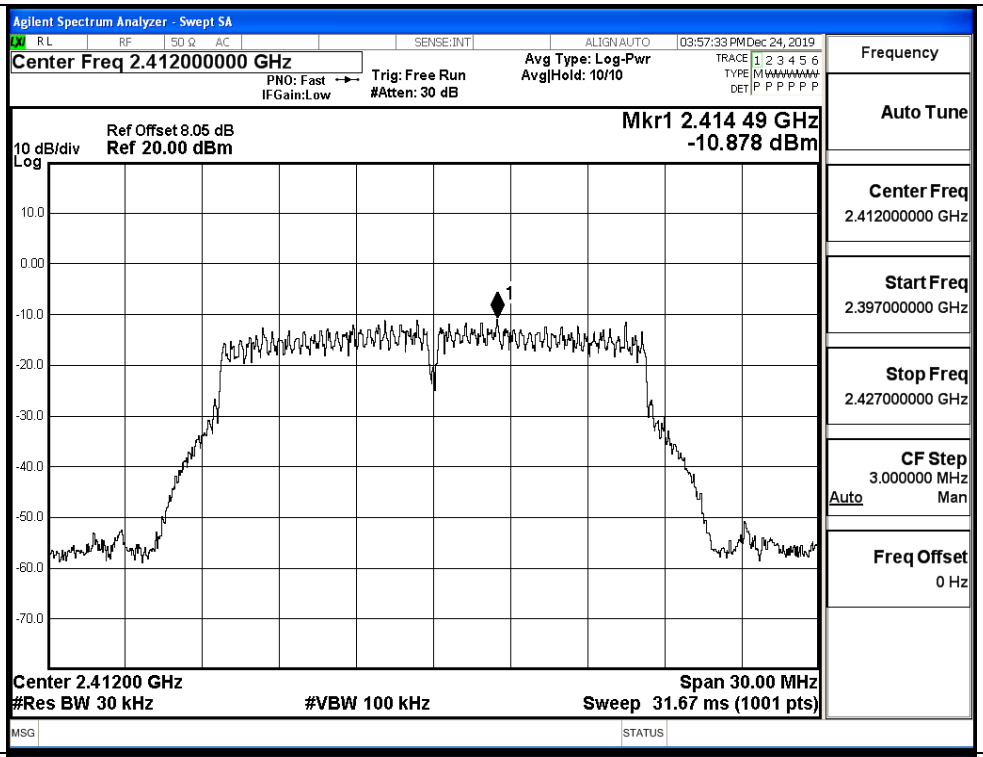
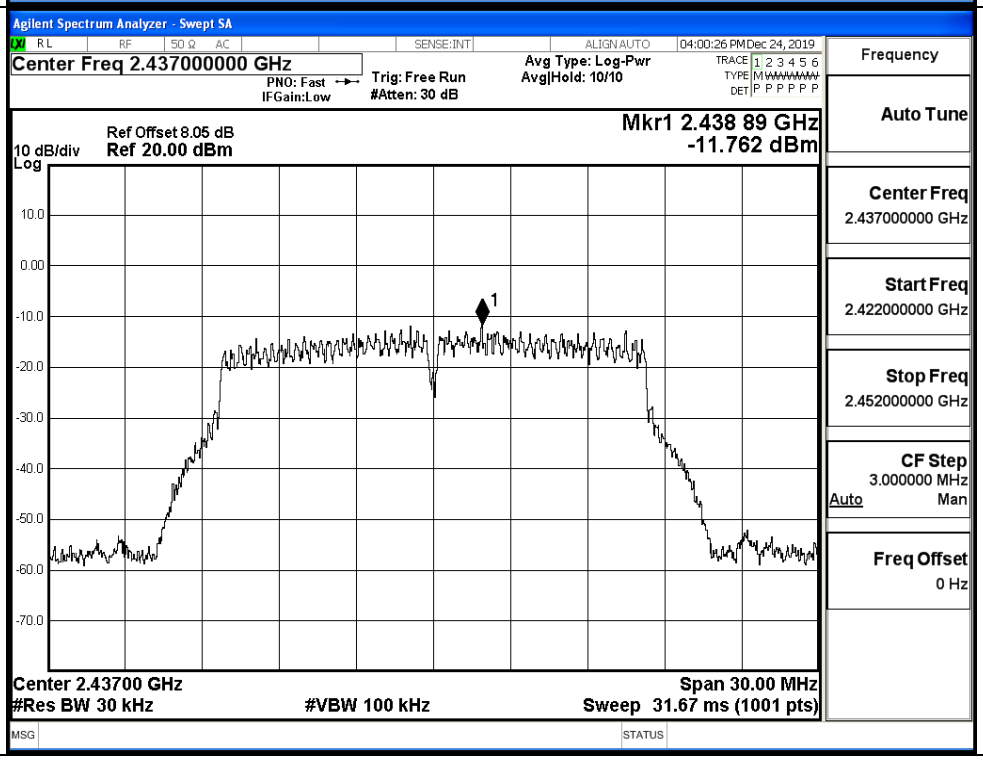
11N20SISO/MCH	
11N20SISO/HCH	

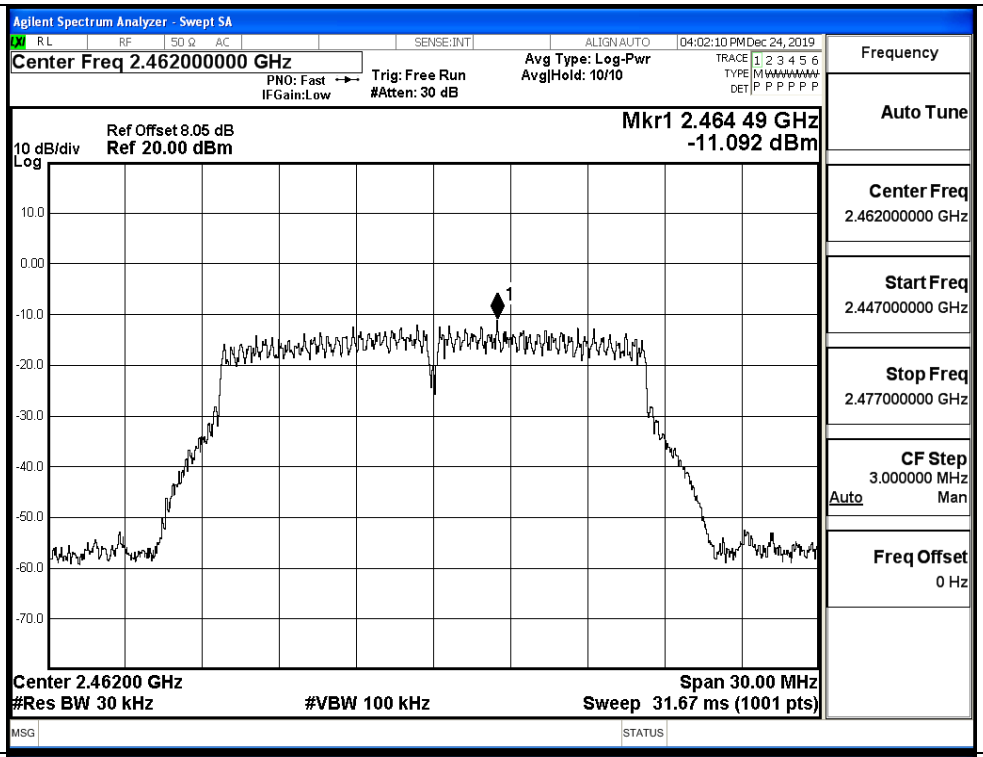
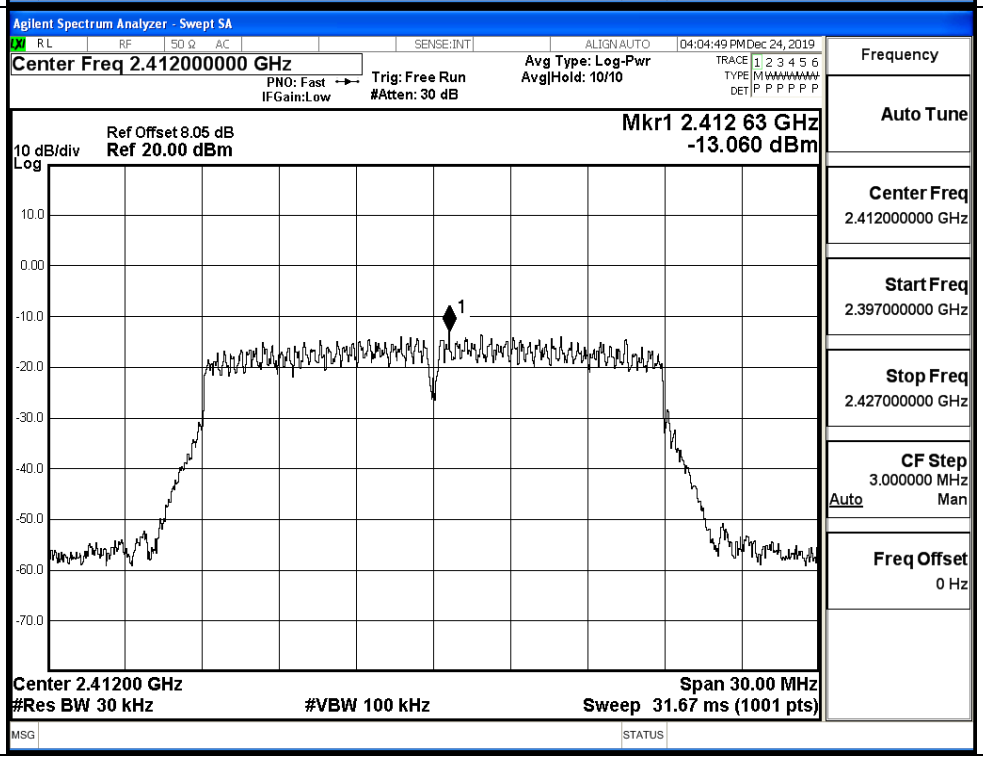
Ant1

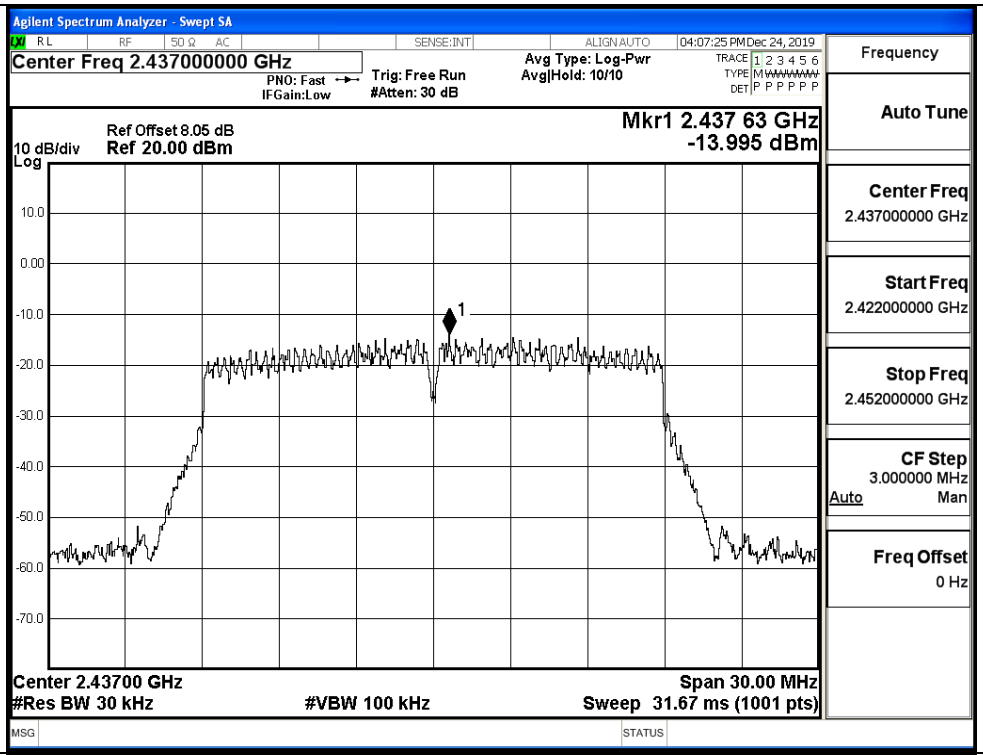
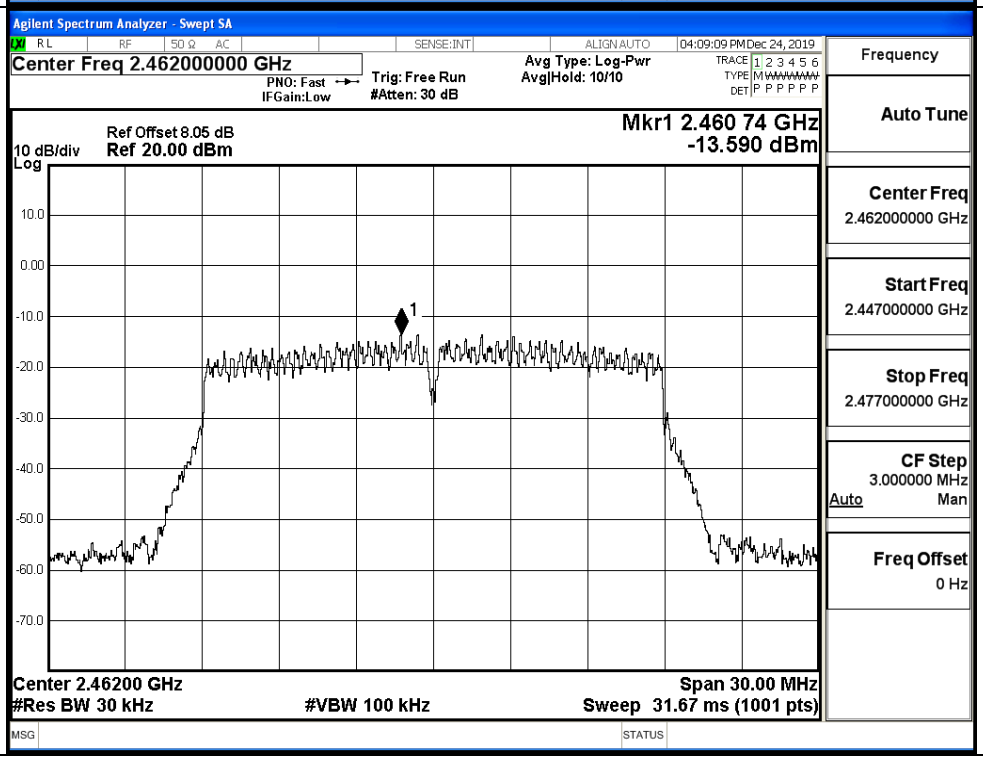
Mode	Channel	Meas.Level [dBm/30KHz]	Limit [dBm/3KHz]	Verdict
11B	LCH	1.448	8	PASS
	MCH	3.043	8	PASS
	HCH	2.172	8	PASS
11G	LCH	-10.878	8	PASS
	MCH	-11.762	8	PASS
	HCH	-11.092	8	PASS
11N20SISO	LCH	-13.060	8	PASS
	MCH	-13.995	8	PASS
	HCH	-13.590	8	PASS

Test Graphs	
11B/LCH	

11B/MCH	
11B/HCH	

11G/LCH	
11G/MCH	

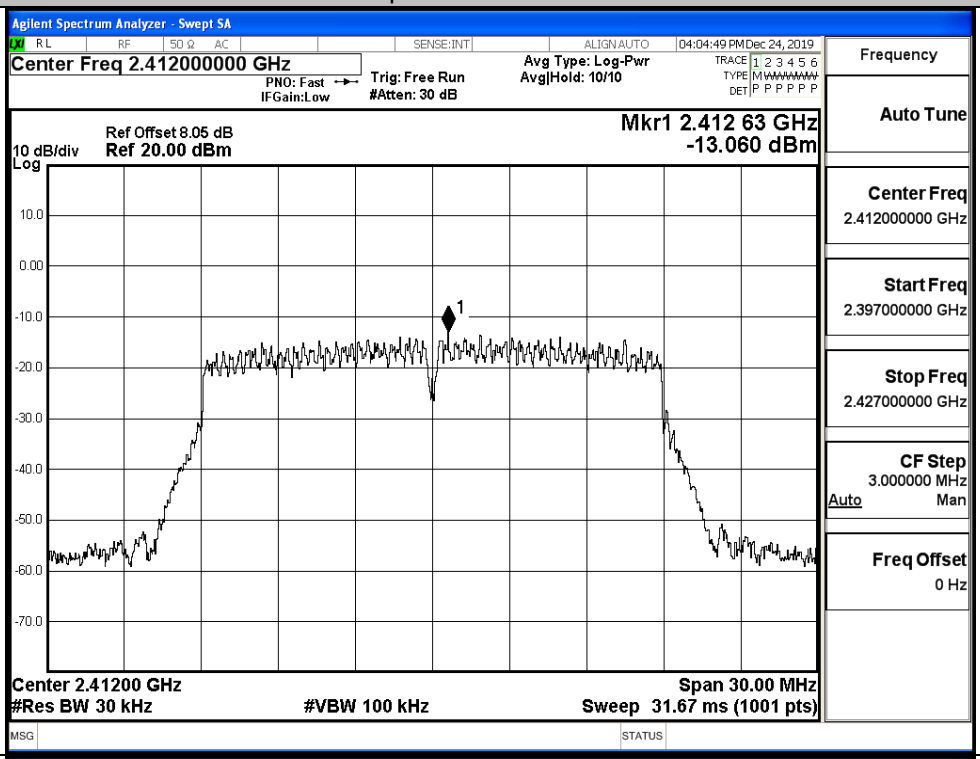
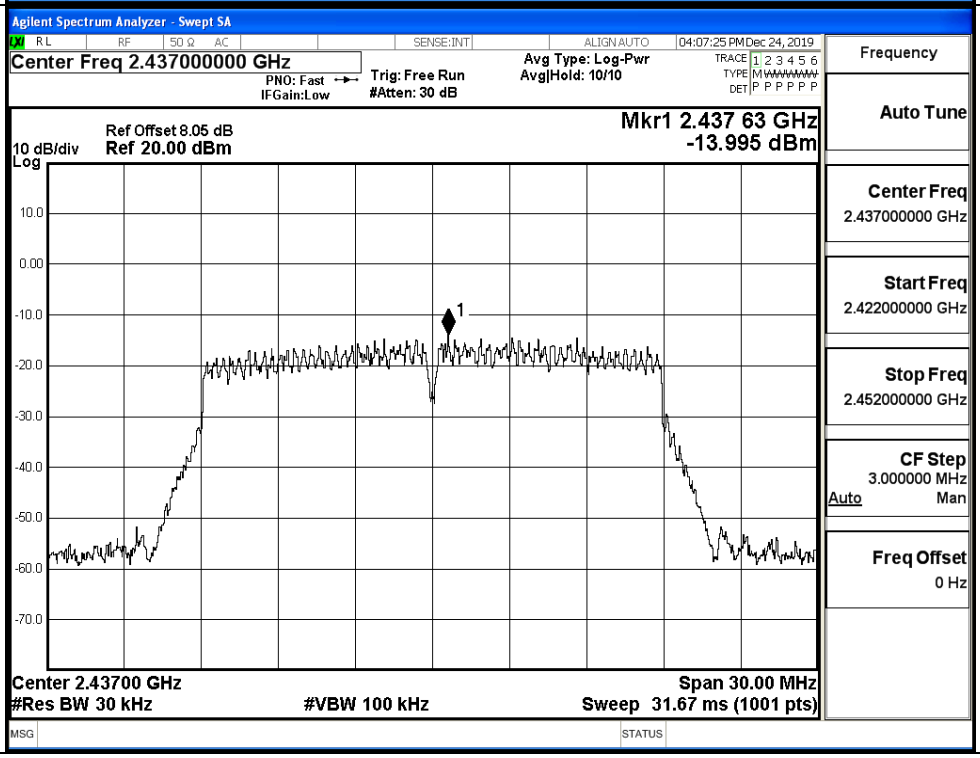
11G/HCH	
11N20SISO/LCH	

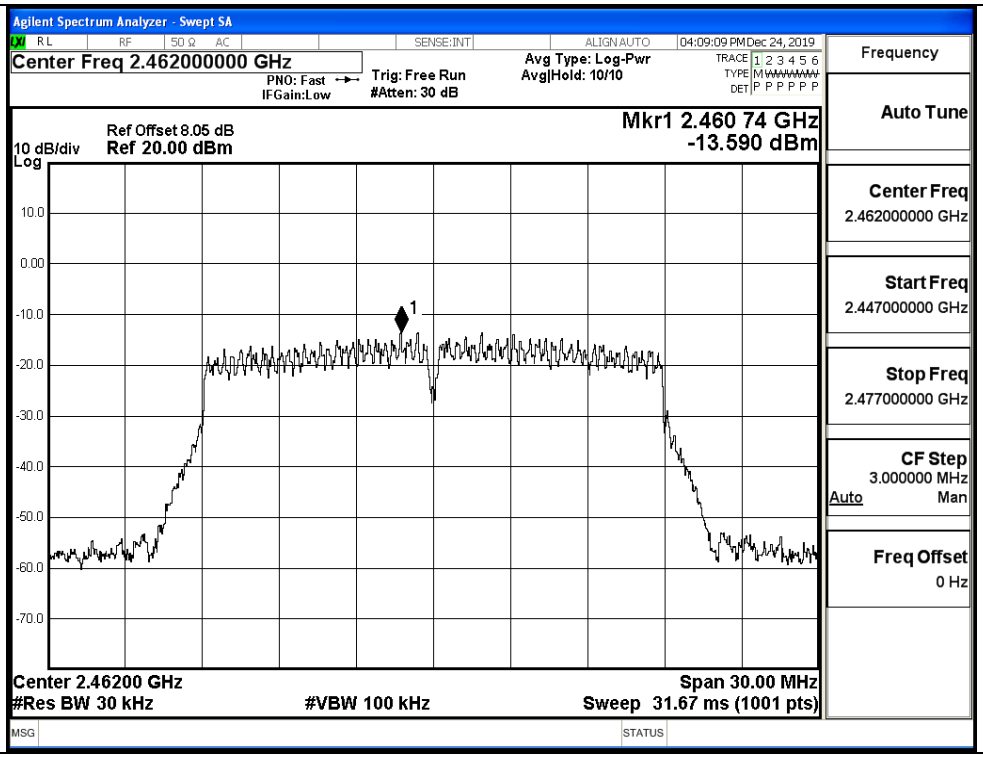
11N20SISO/MCH	
11N20SISO/HCH	

Ant0+1

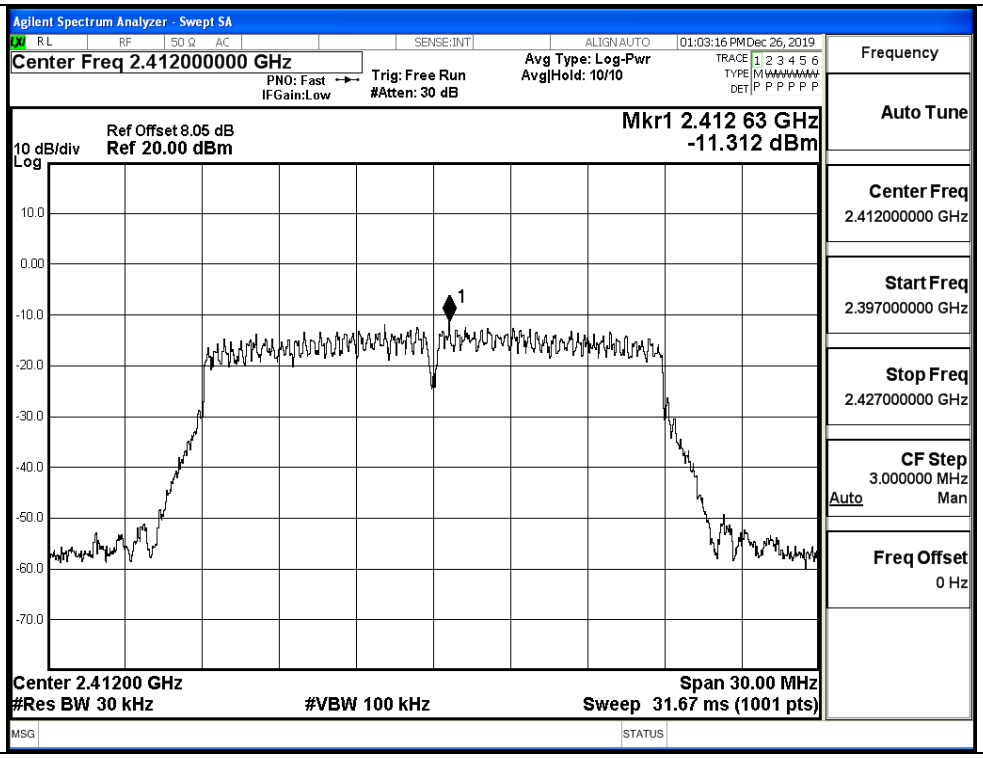
Mode	Channel	ANT 0 [dBm/30KHz]	ANT 1 [dBm/30KHz]	ANT 0+1 [dBm/30KHz]	Limit [dBm/3KHz]	Verdict
11N20SISO	LCH	-13.060	-11.312	-9.09	8	PASS
	MCH	-13.995	-10.677	-9.02	8	PASS
	HCH	-13.590	-9.991	-8.42	8	PASS

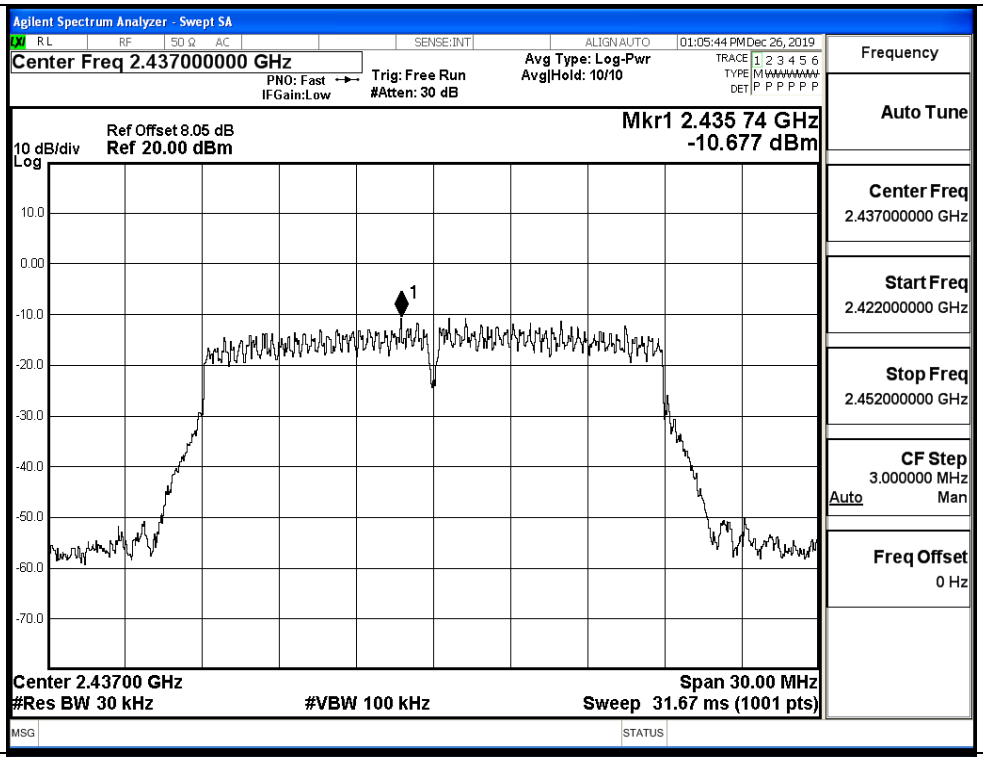
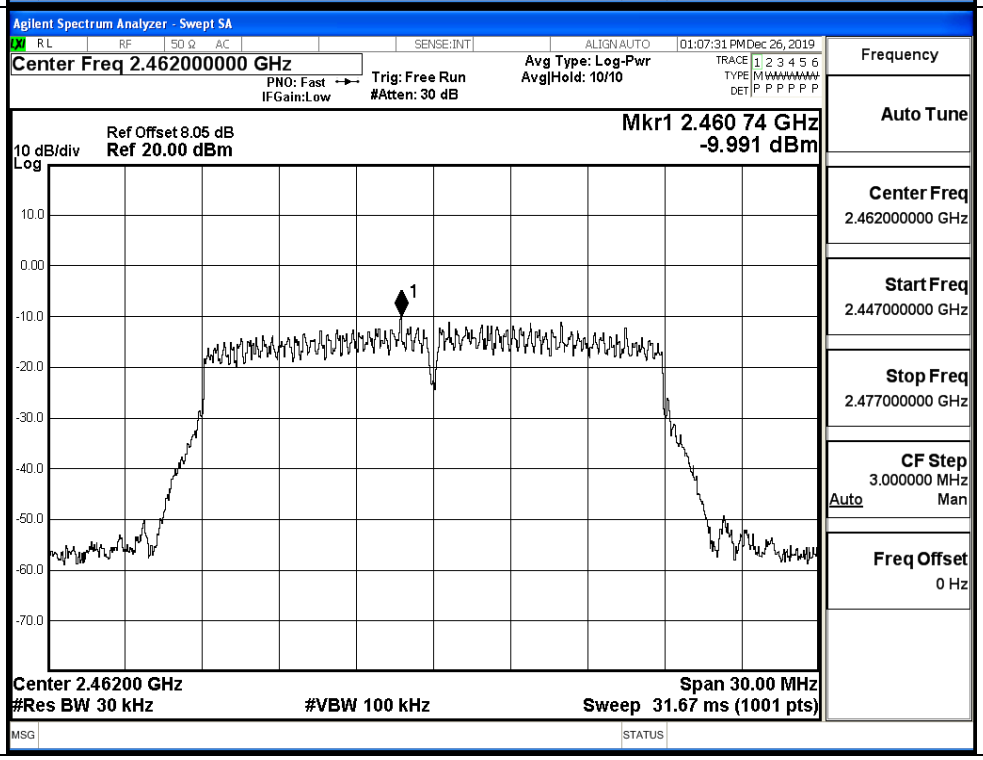
ANT 0

Test Graphs	
11N20SISO/LCH	
11N20SISO/MCH	

11N20SISO/HCH	

ANT 1

11N20SISO/LCH	

11N20SISO/MCH	
11N20SISO/HCH	

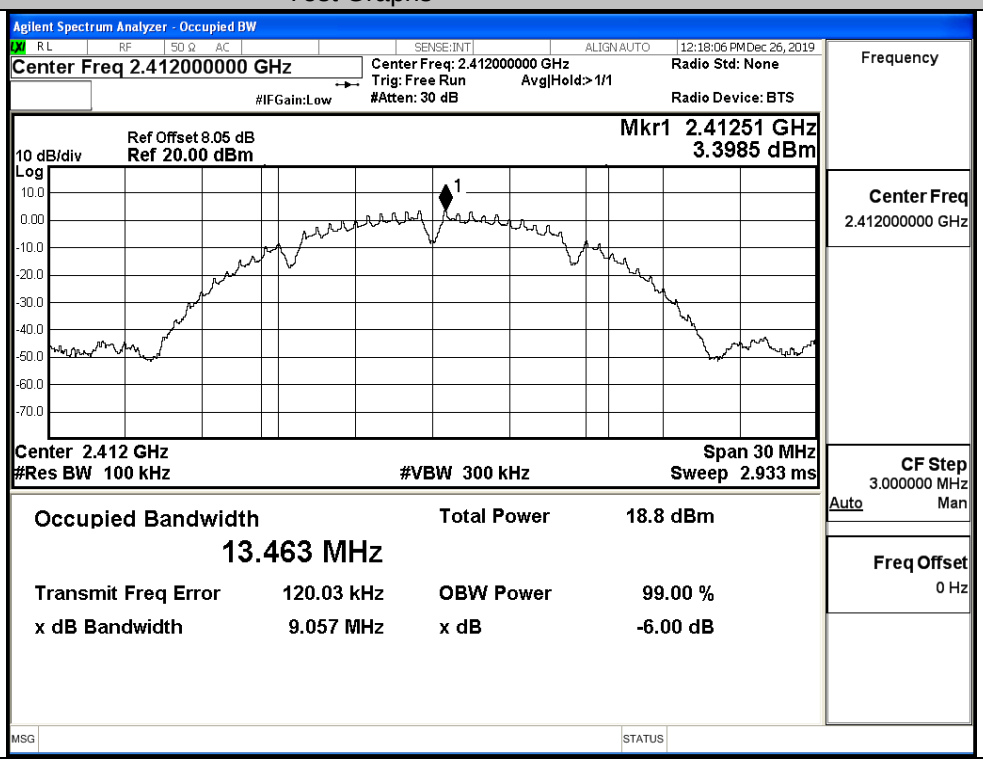
C.4 6dB Bandwidth

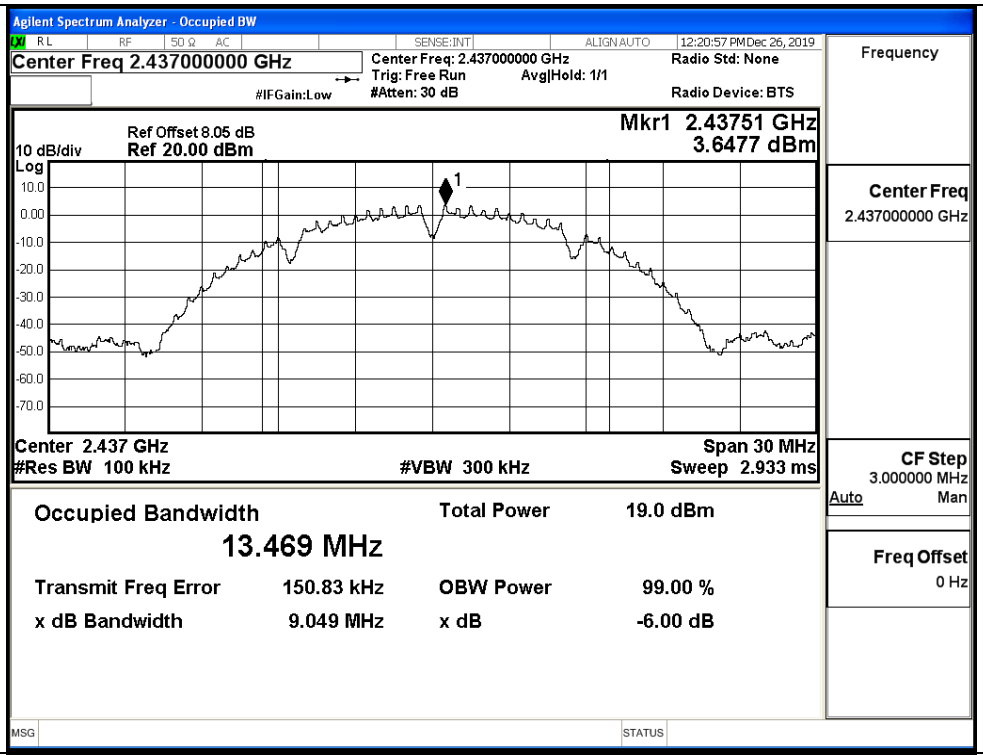
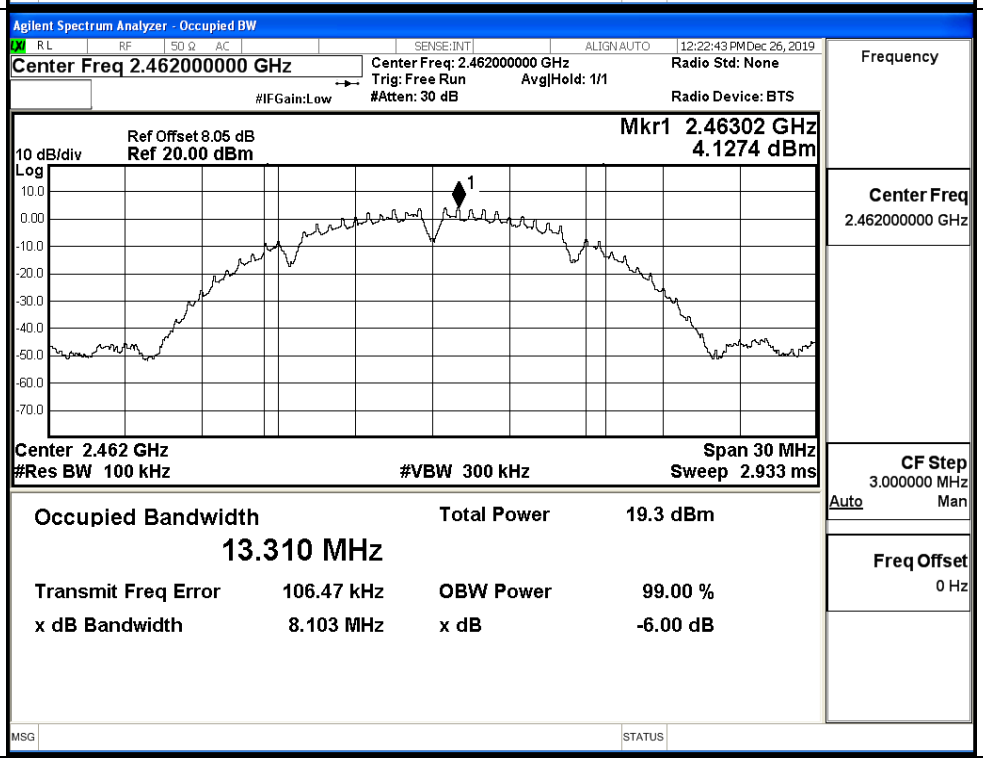
Ant0

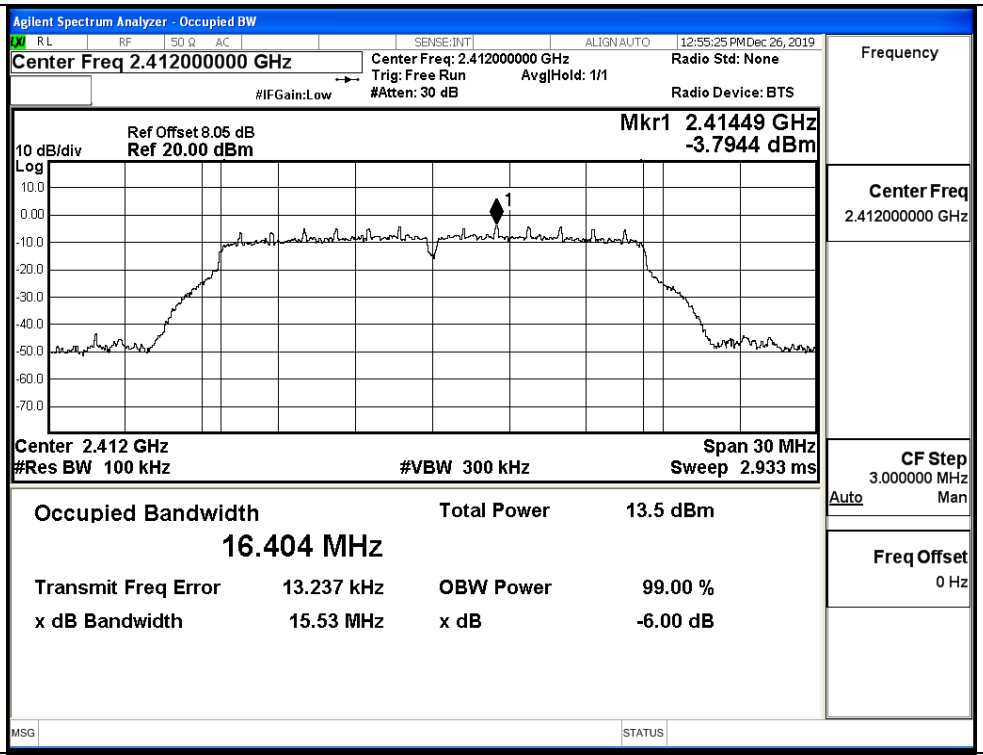
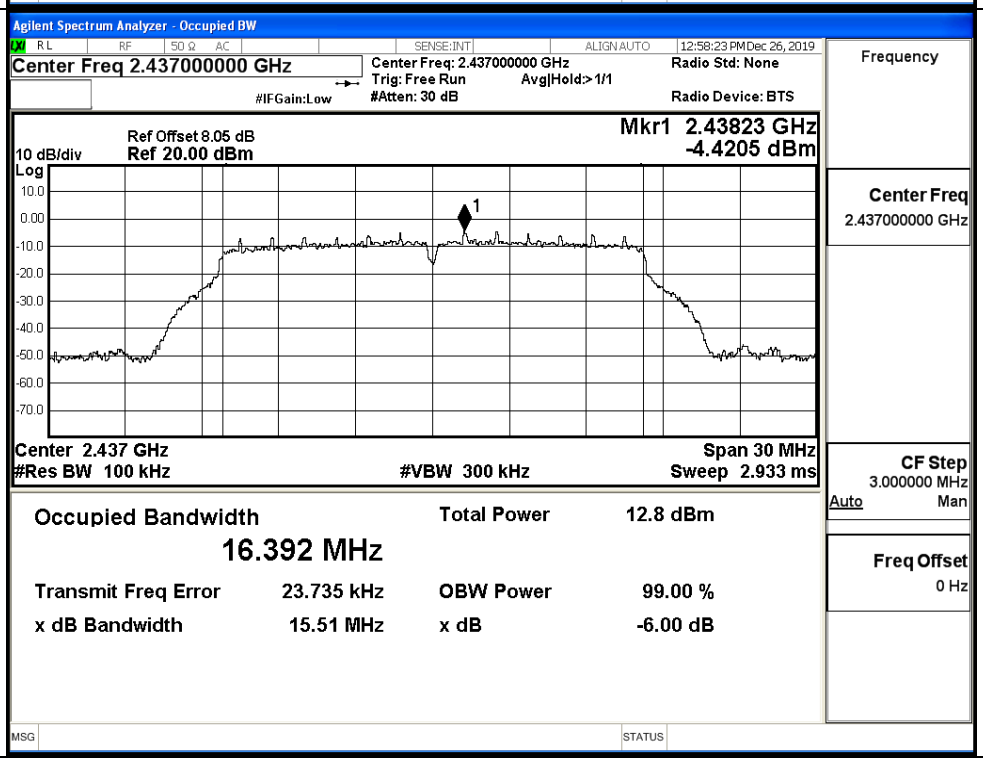
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.057	≥0.5	PASS
	MCH	9.049	≥0.5	PASS
	HCH	8.103	≥0.5	PASS
11G	LCH	15.53	≥0.5	PASS
	MCH	15.51	≥0.5	PASS
	HCH	16.04	≥0.5	PASS
11N20SISO	LCH	15.98	≥0.5	PASS
	MCH	15.93	≥0.5	PASS
	HCH	16.43	≥0.5	PASS

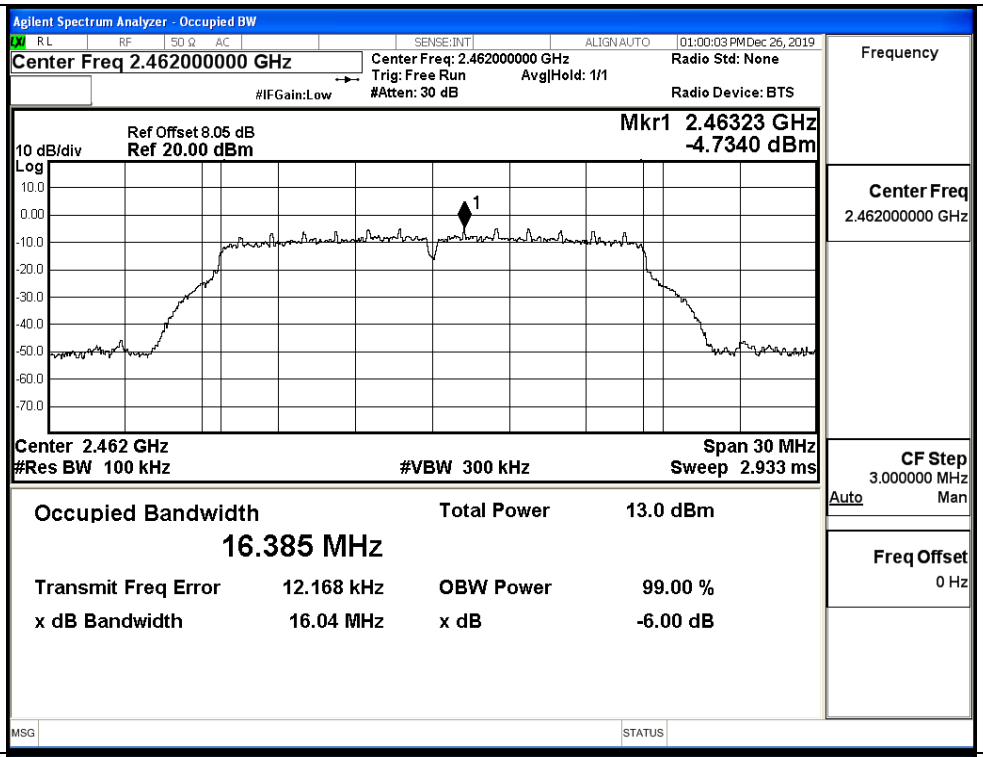
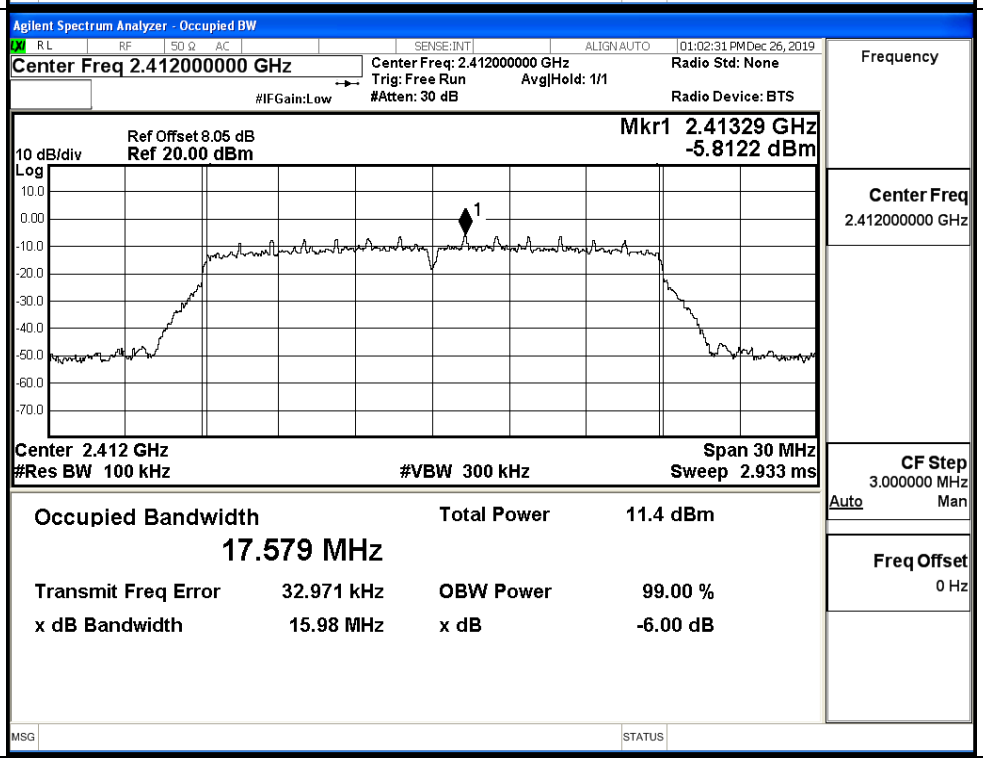
Test Graphs

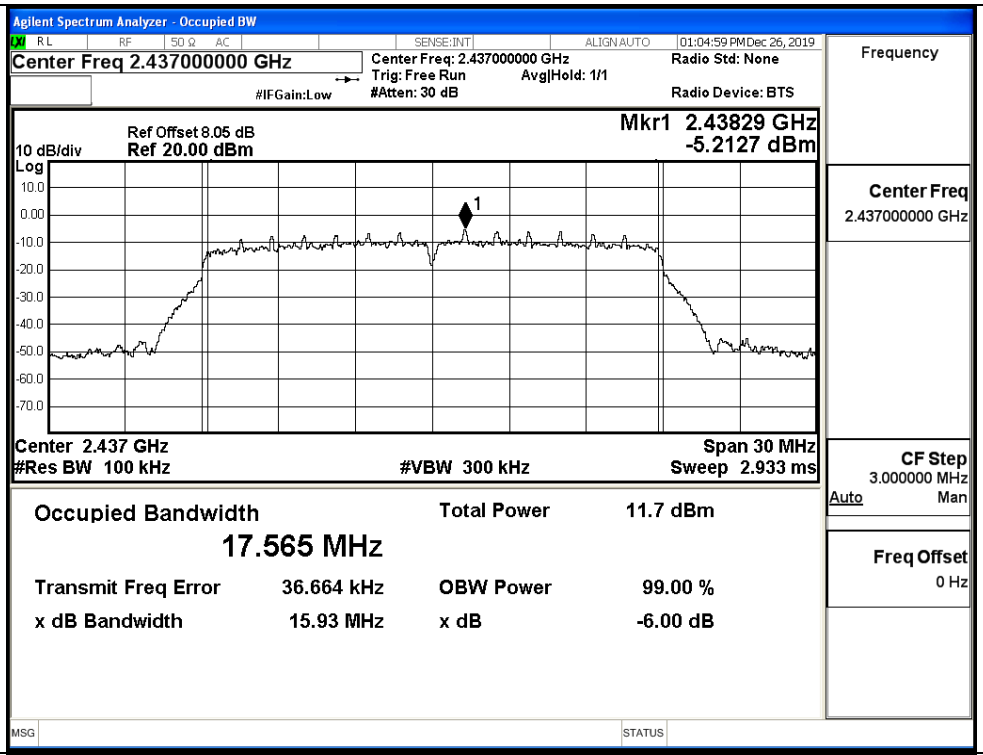
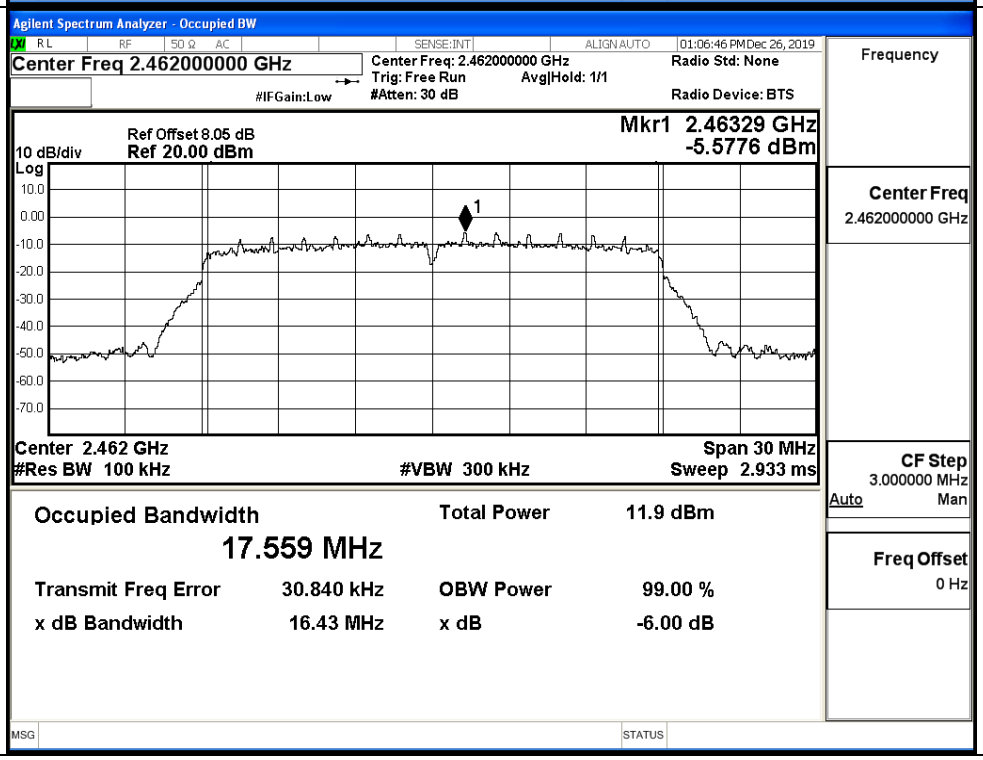
11B/LCH



11B/MCH	
11B/HCH	

11G/LCH	
11G/MCH	

11G/HCH	
11N20SISO/LCH	

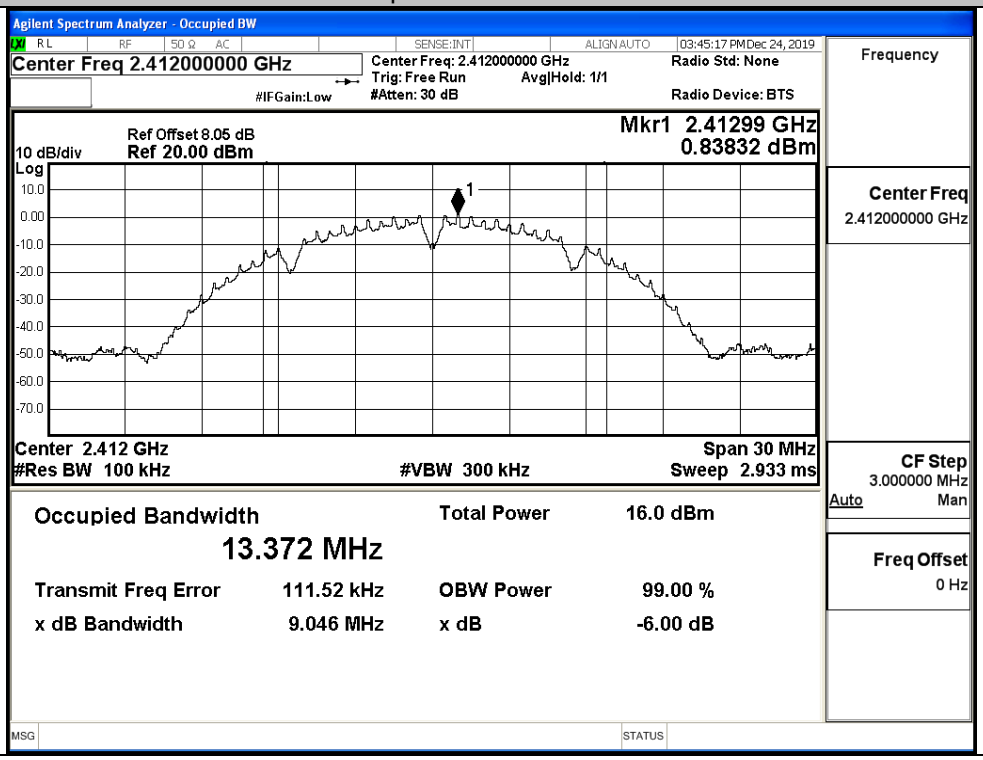
11N20SISO/MCH	
11N20SISO/HCH	

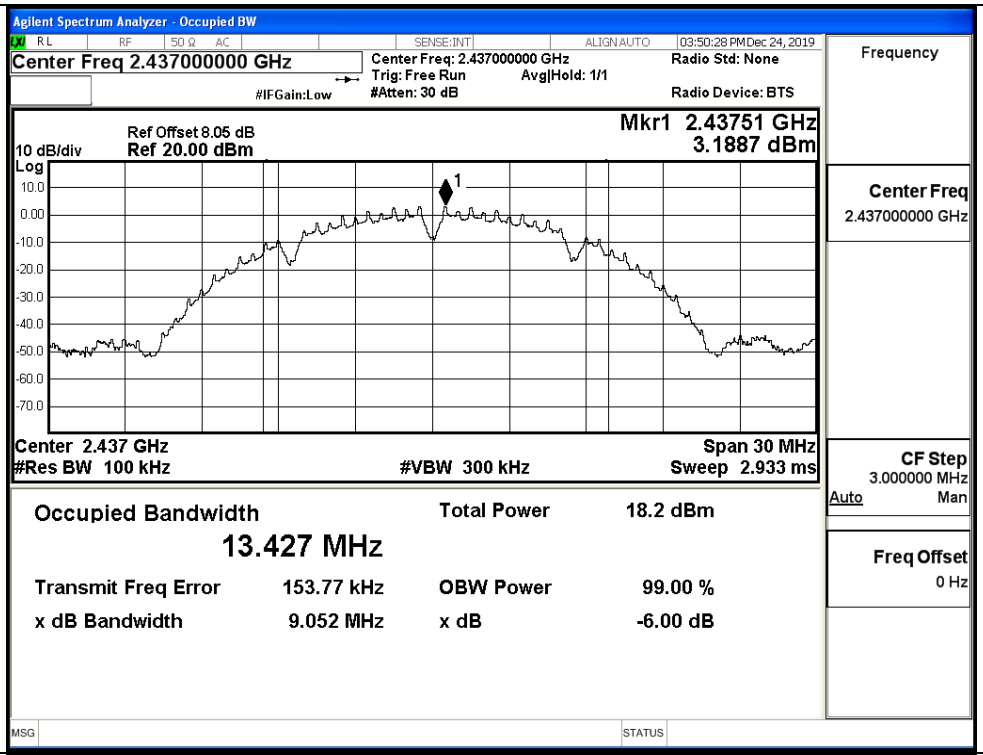
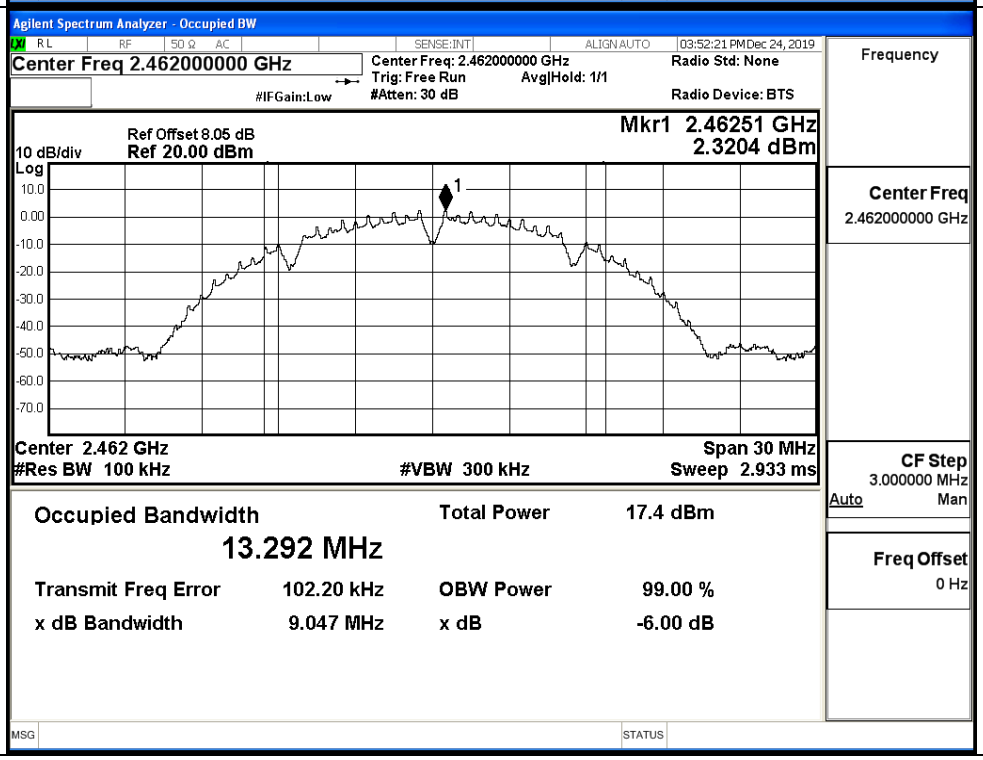
Ant1

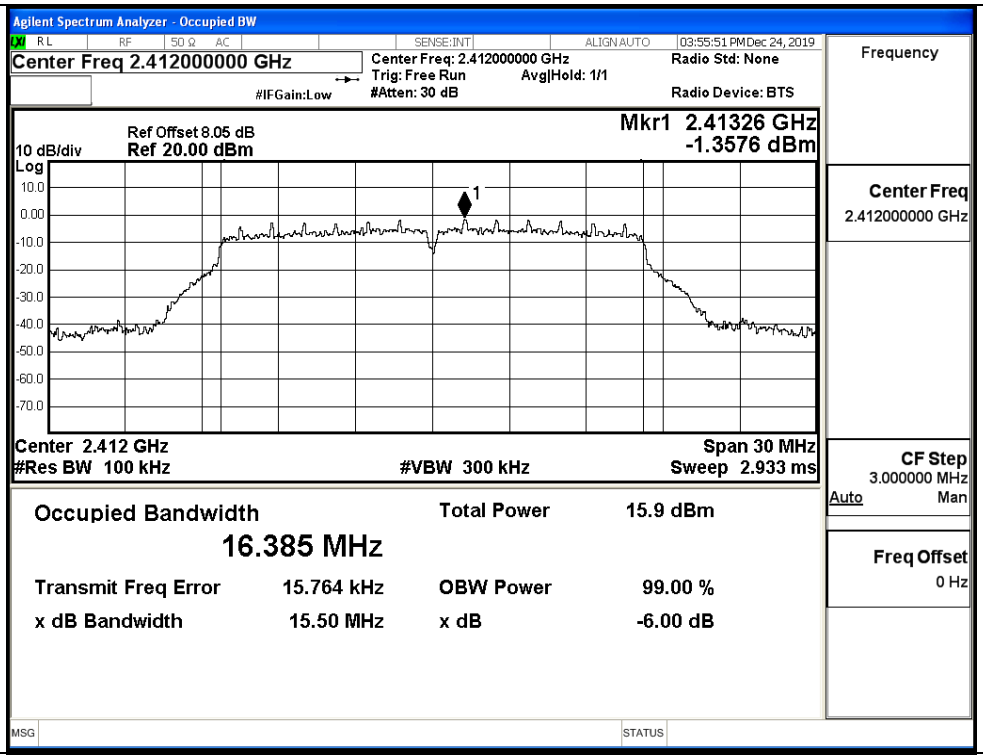
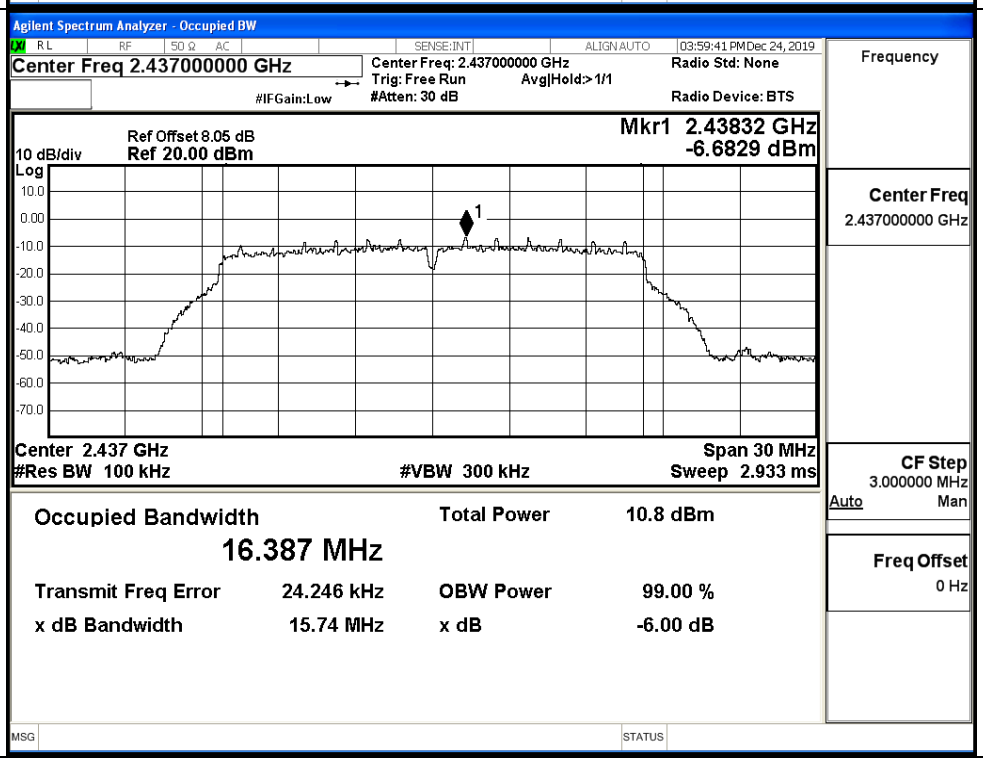
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11B	LCH	9.046	≥0.5	PASS
	MCH	9.052	≥0.5	PASS
	HCH	9.047	≥0.5	PASS
11G	LCH	15.50	≥0.5	PASS
	MCH	15.74	≥0.5	PASS
	HCH	15.50	≥0.5	PASS
11N20SISO	LCH	15.95	≥0.5	PASS
	MCH	15.92	≥0.5	PASS
	HCH	16.11	≥0.5	PASS

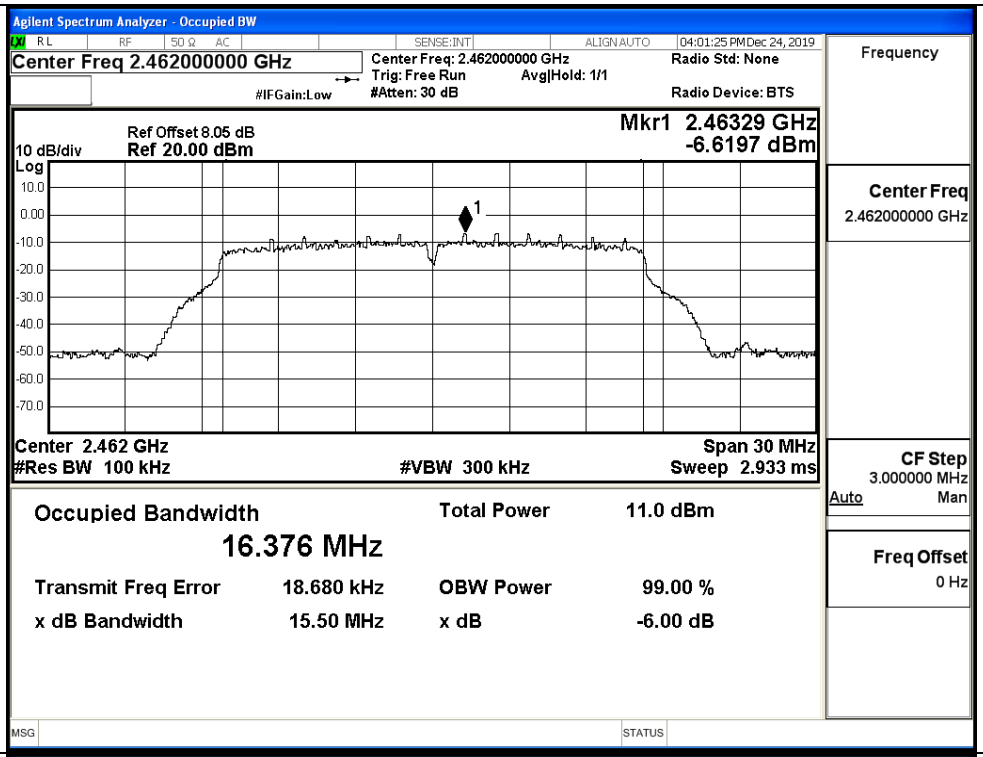
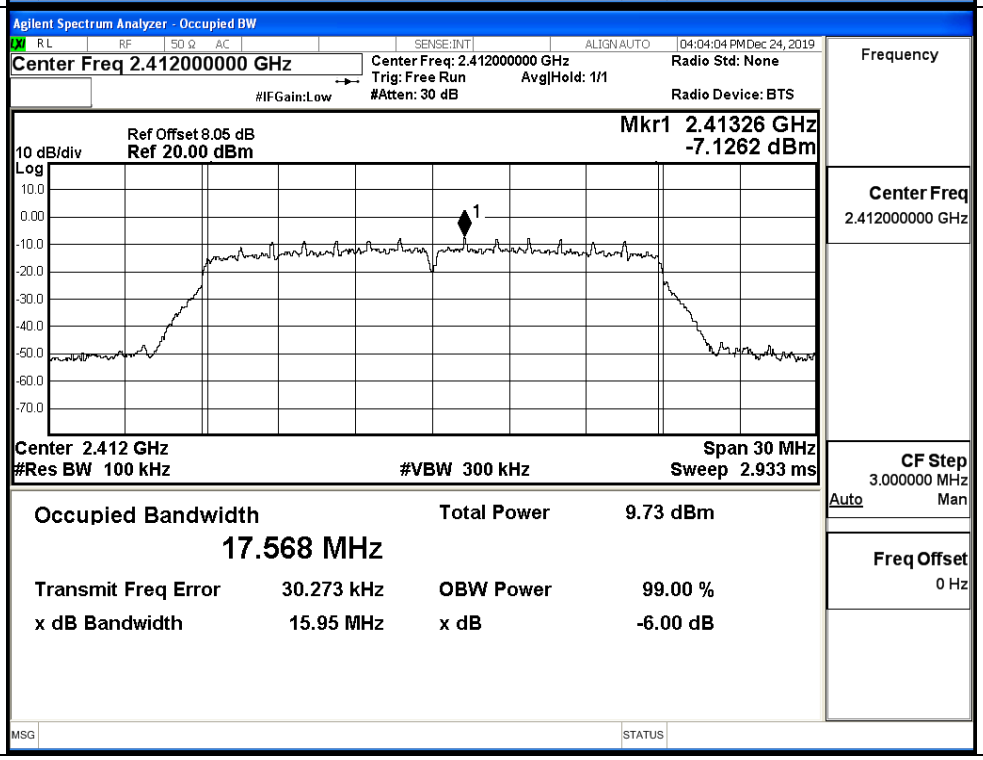
Test Graphs

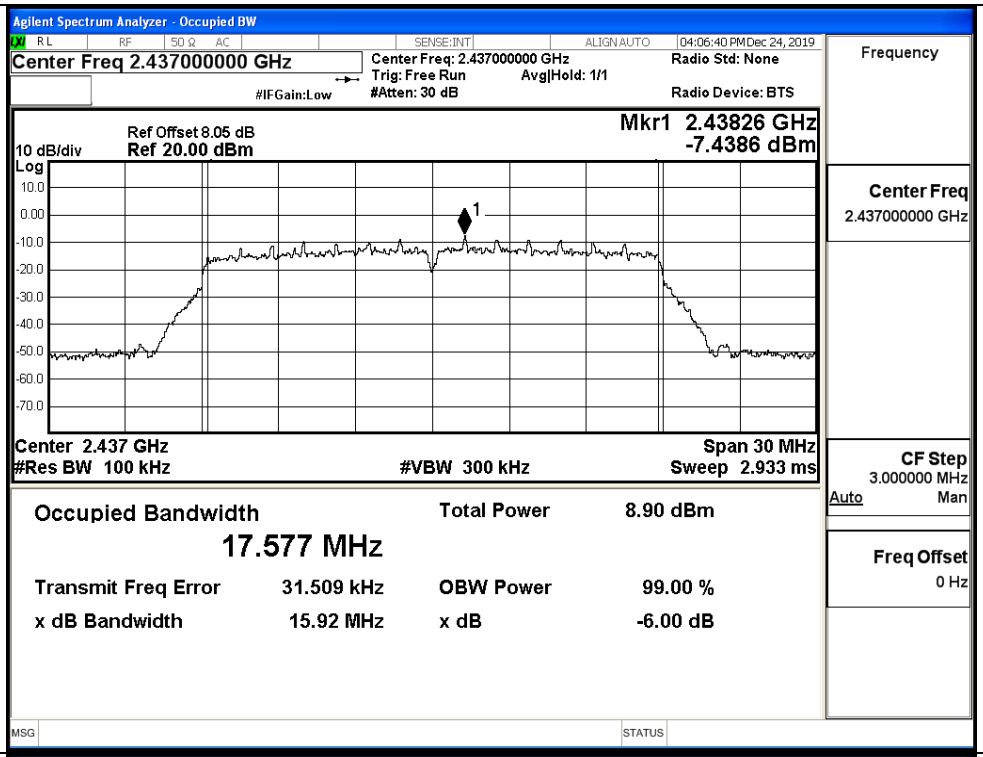
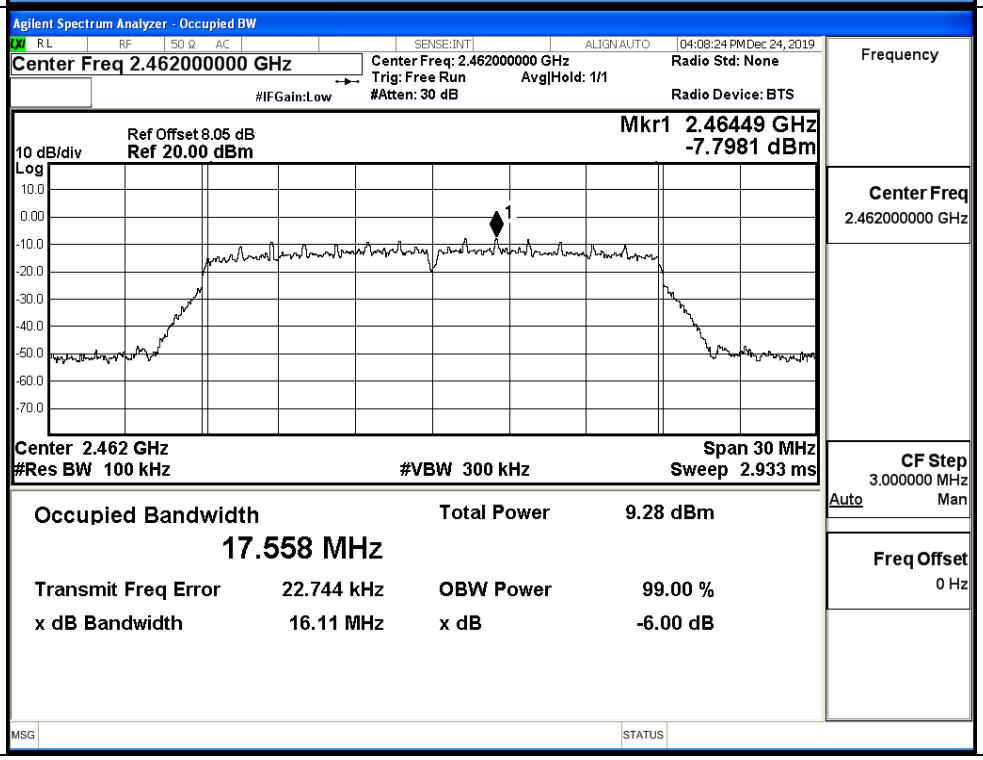
11B/LCH



11B/MCH	
11B/HCH	

11G/LCH	
11G/MCH	

11G/HCH	
11N20SISO/LCH	

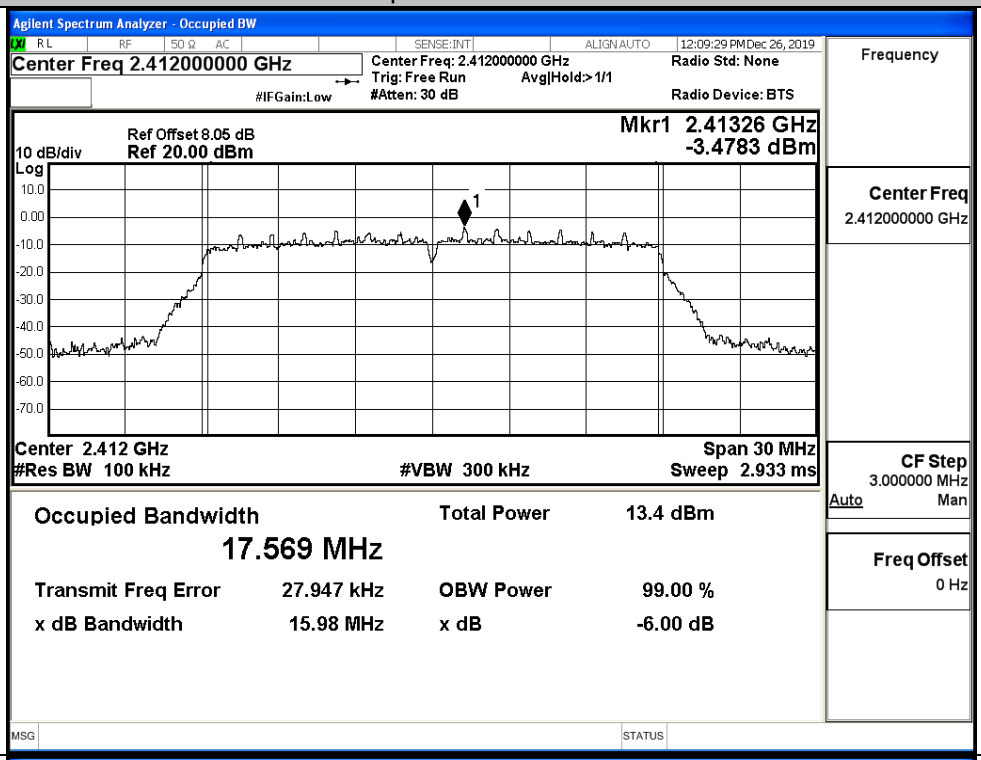
11N20SISO/MCH	
11N20SISO/HCH	

Ant0+1

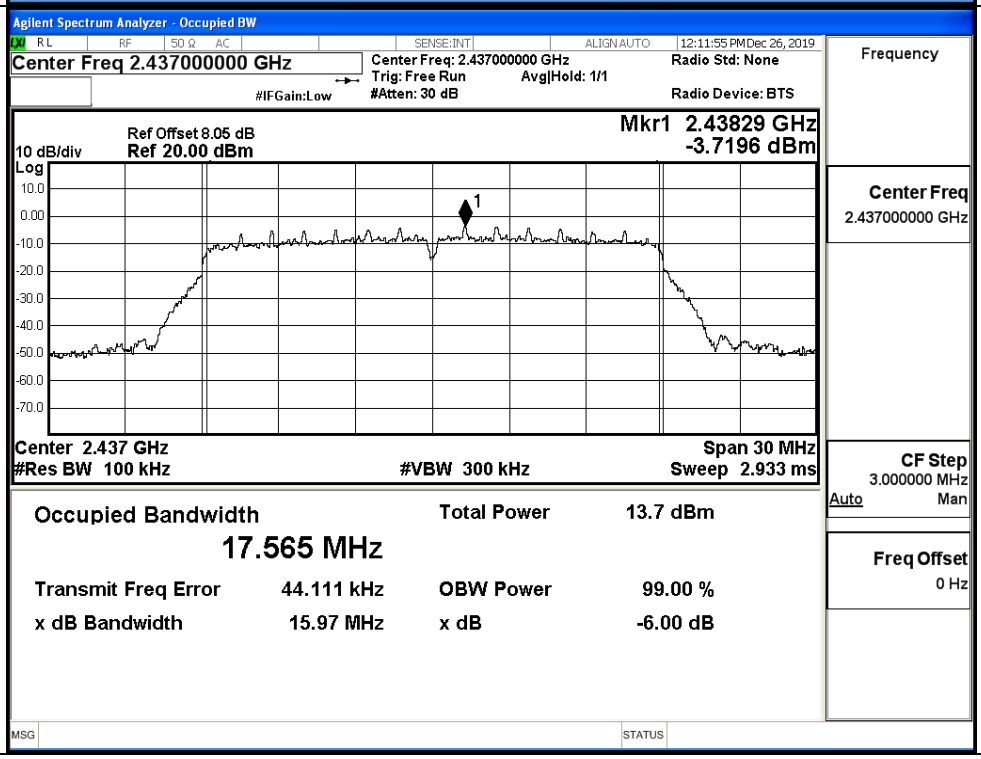
Mode	Channel	6dB Bandwidth [MHz]	Limit [MHz]	Verdict
11N20SISO	LCH	15.98	⩾0.5	PASS
	MCH	15.97	⩾0.5	PASS
	HCH	15.98	⩾0.5	PASS

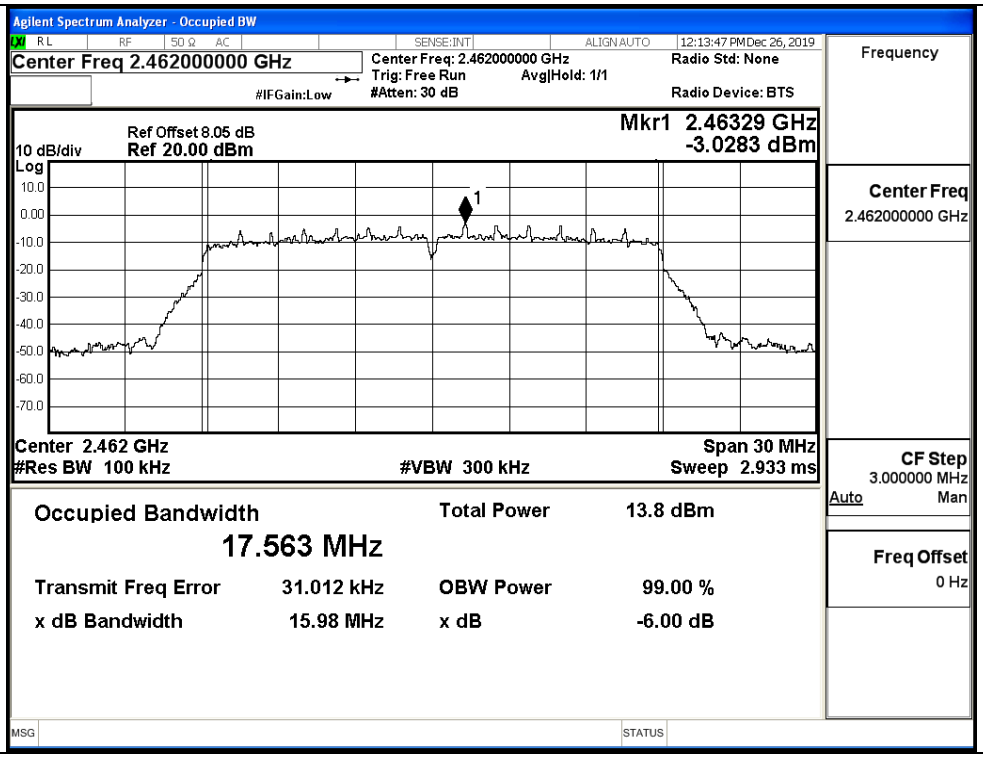
Test Graphs

11N20SISO/LCH



11N20SISO/MCH

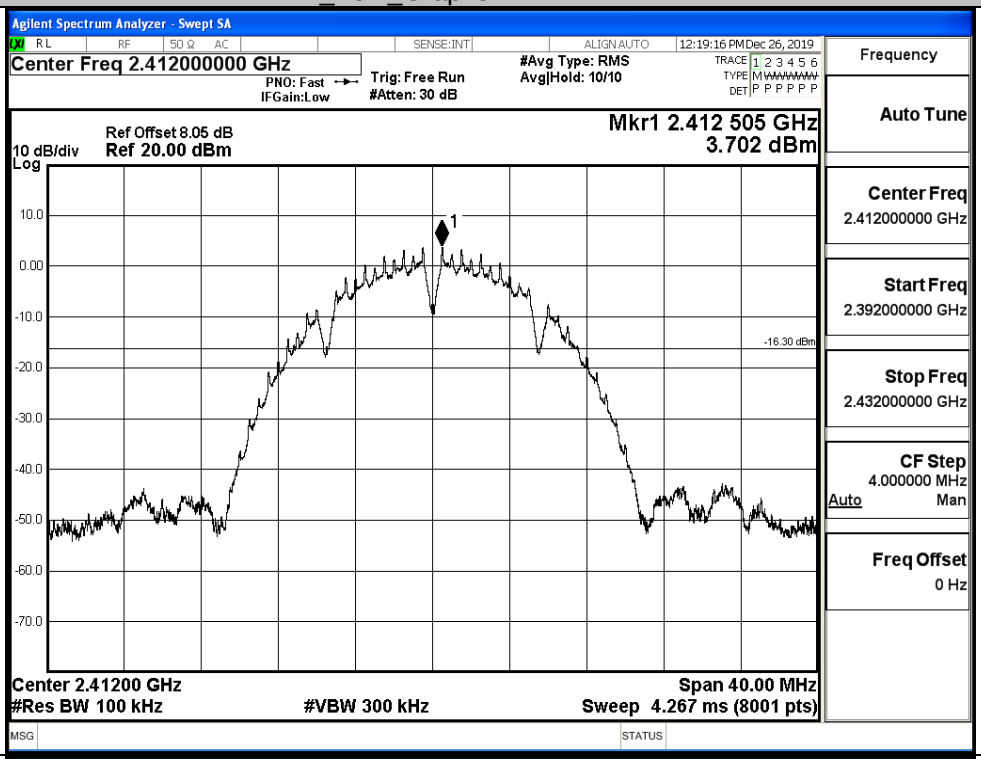
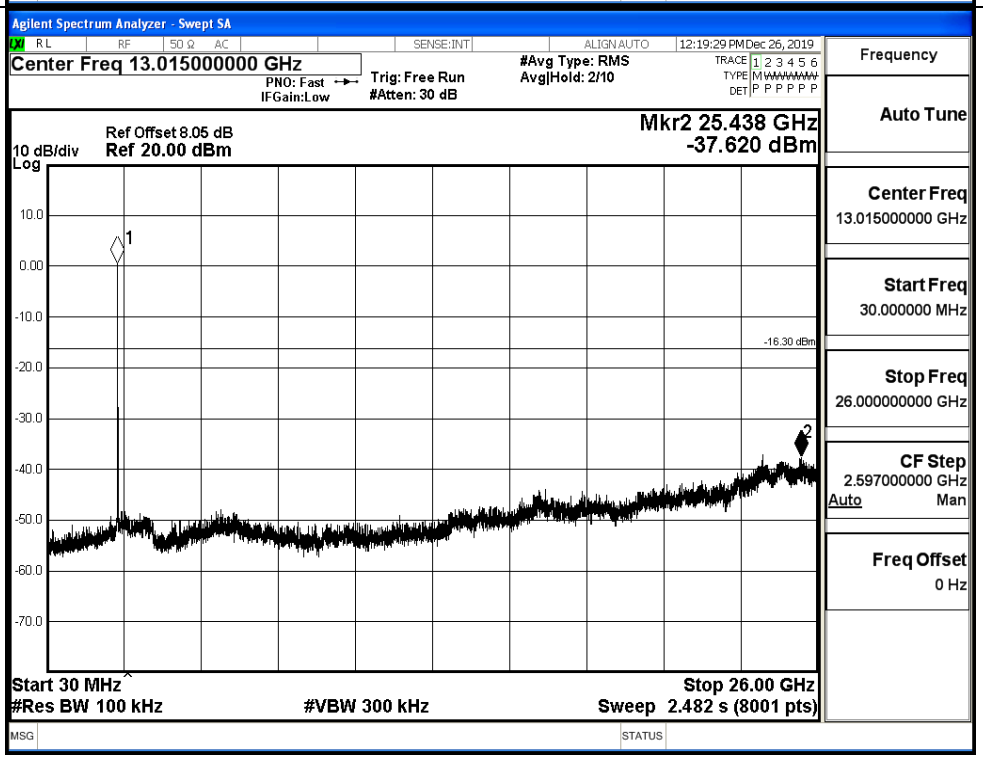


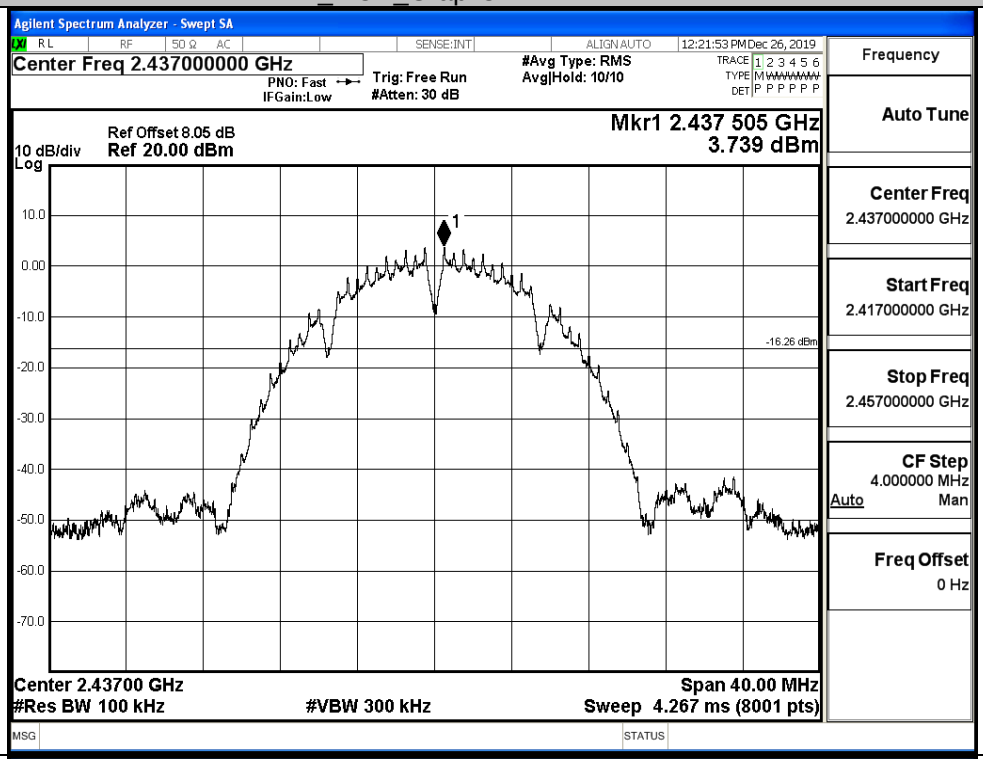
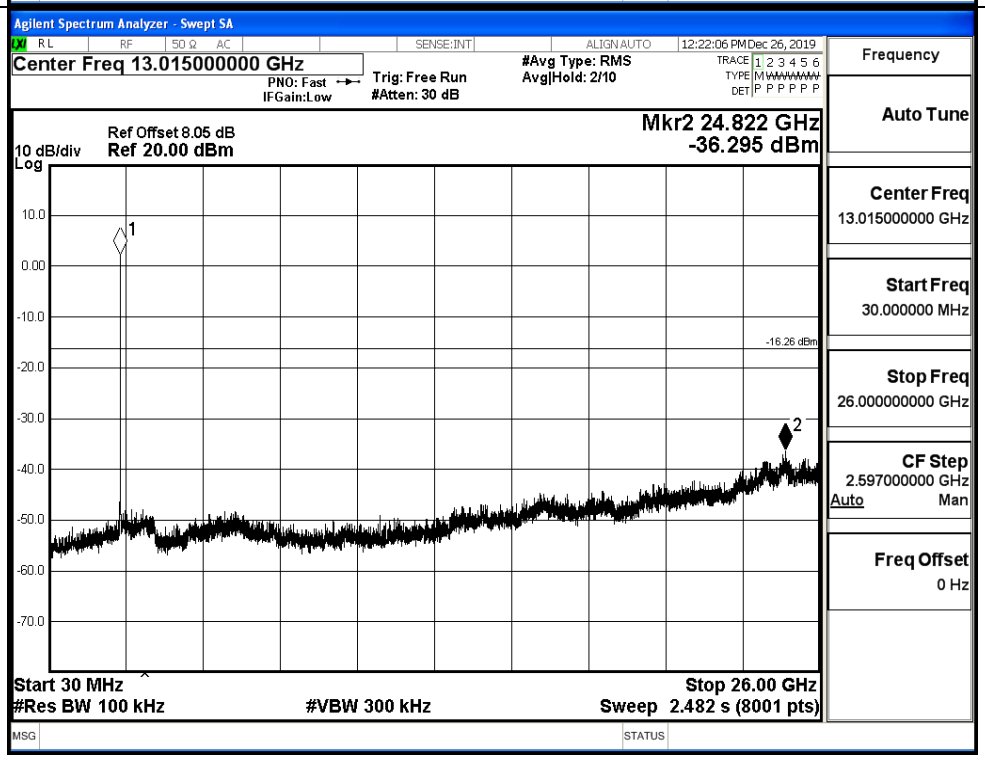
11N20SISO/HCH	

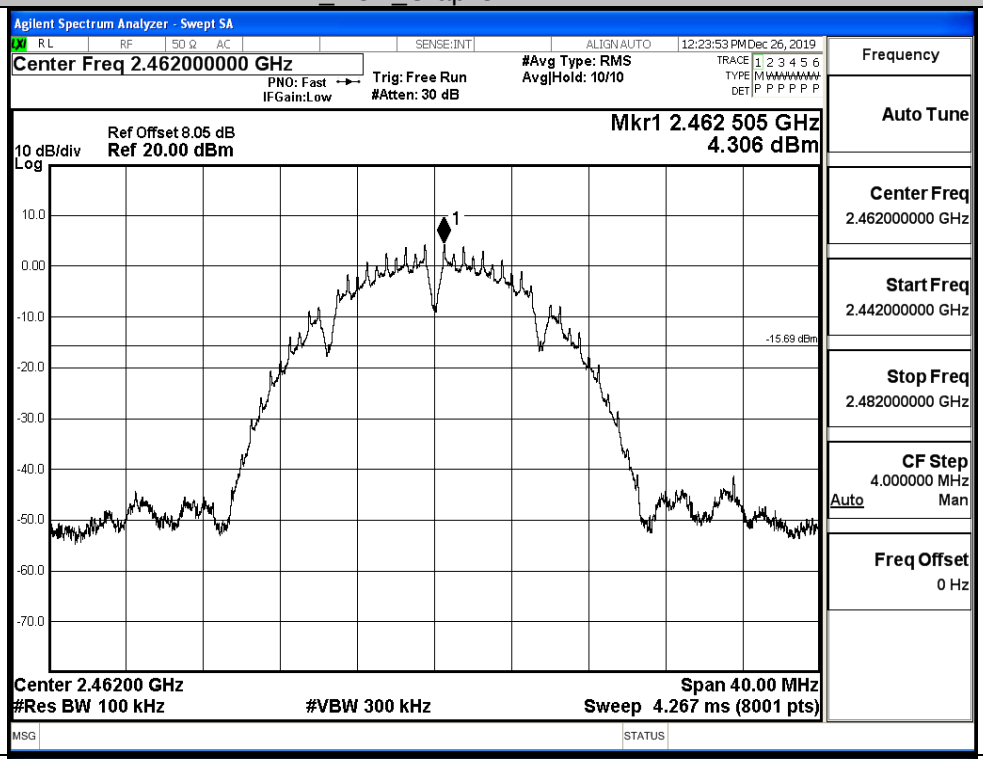
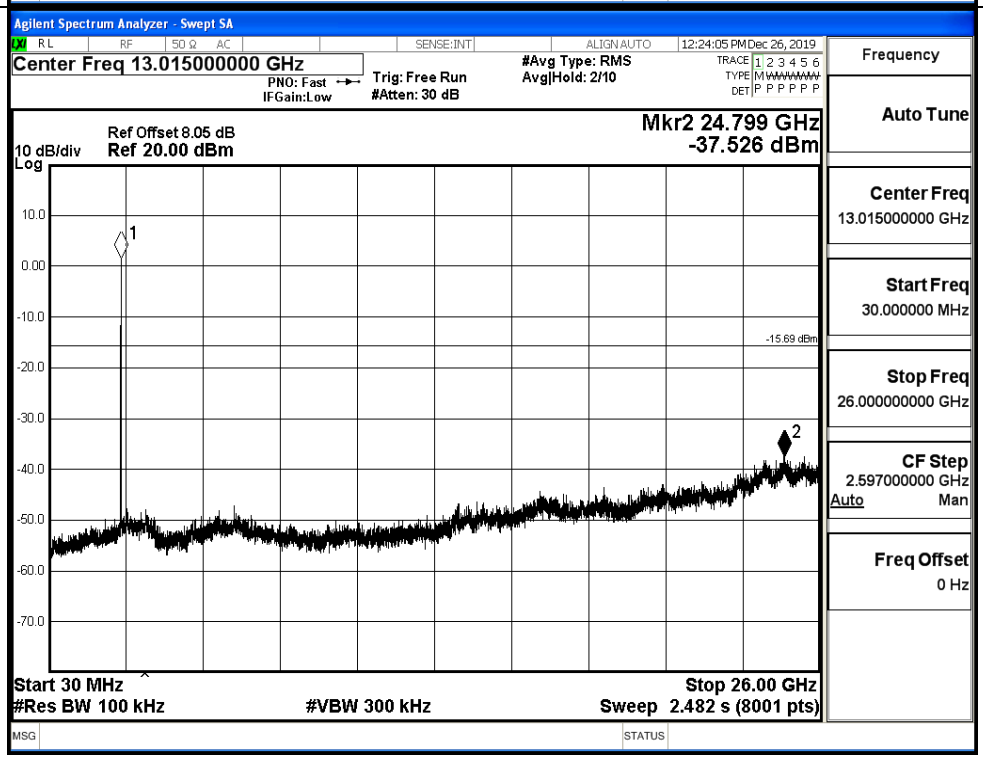
C.5 RF Conducted Spurious Emissions

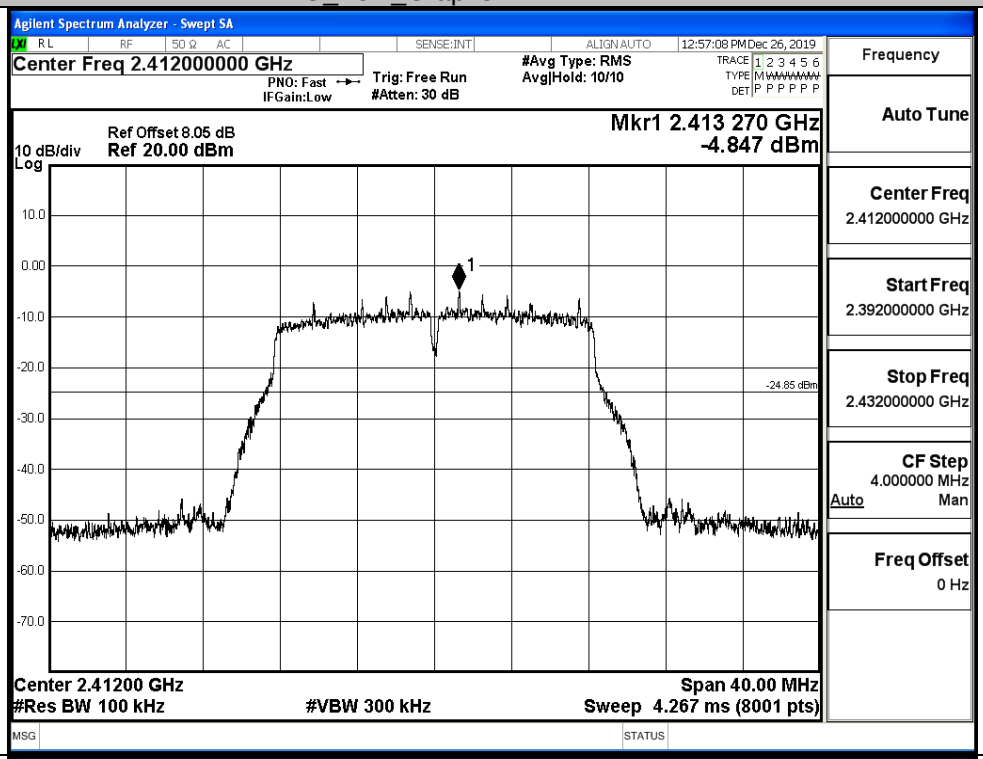
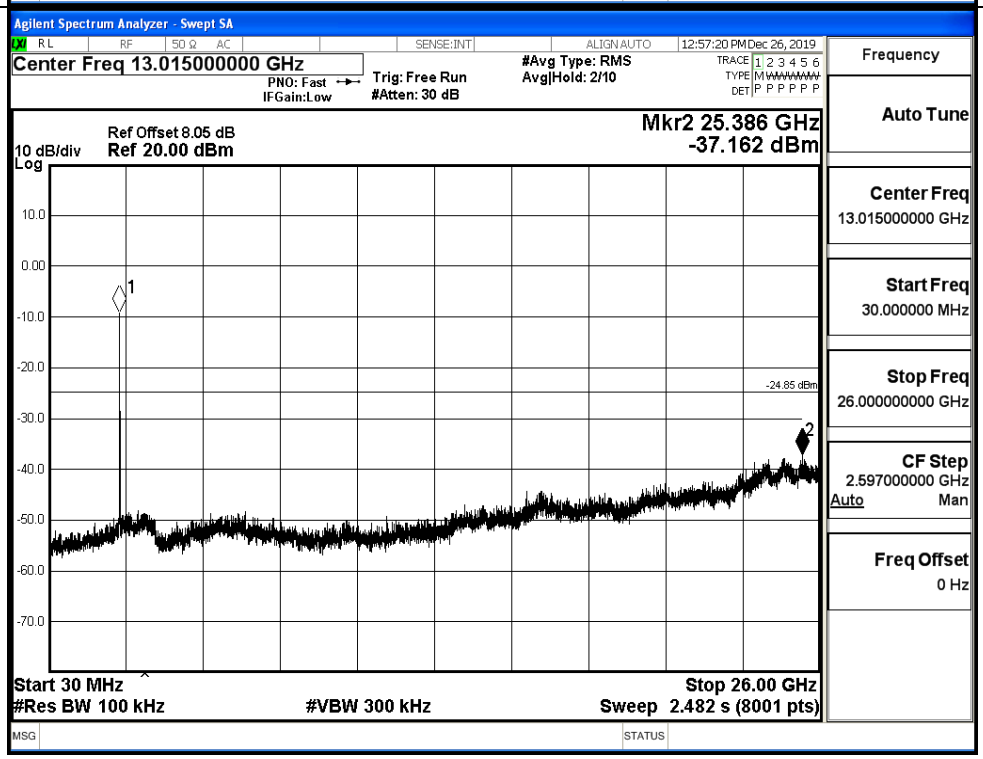
Ant0

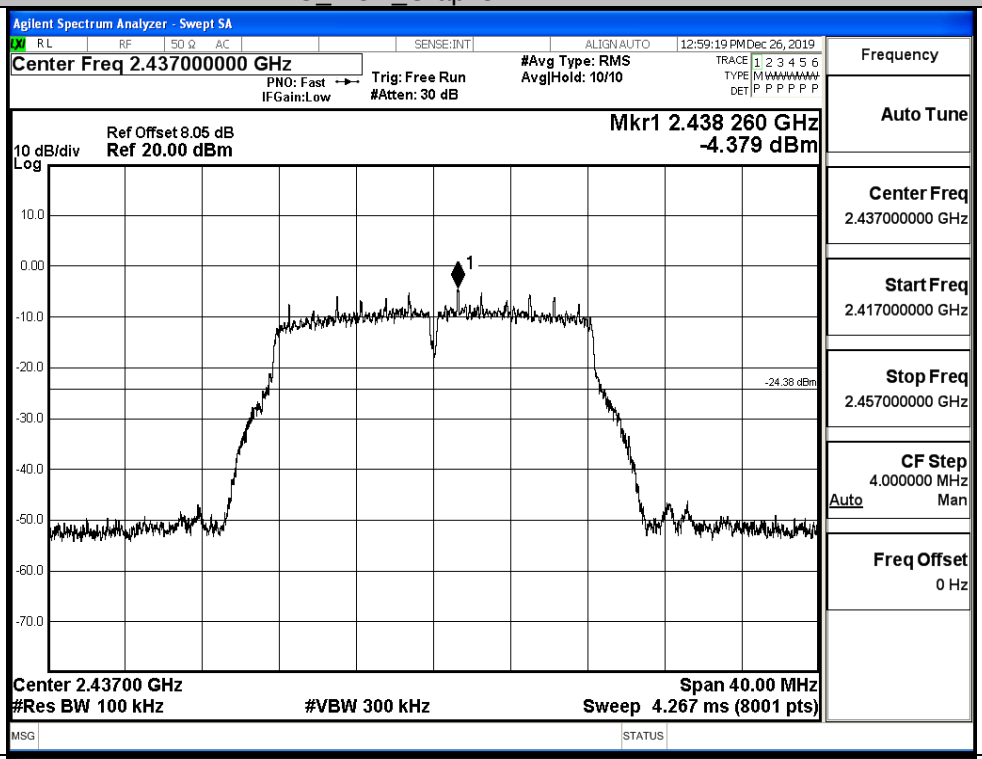
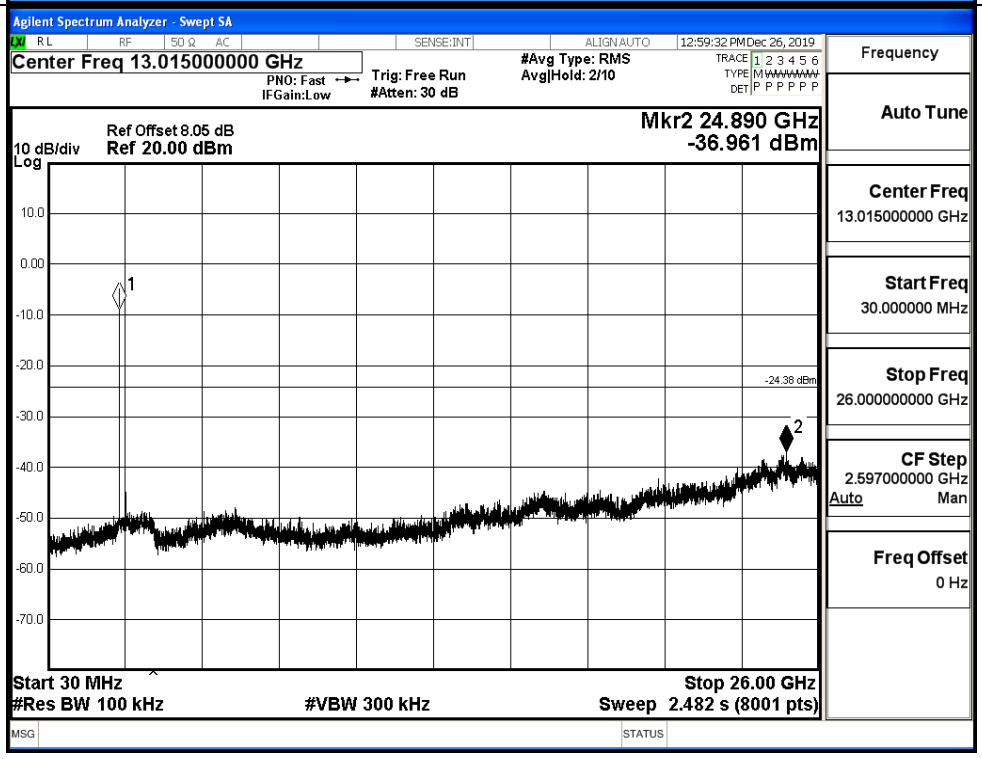
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	3.702	-37.620	-16.298	PASS
	MCH	3.739	-36.295	-16.261	PASS
	HCH	4.306	-37.526	-15.694	PASS
11G	LCH	-4.847	-37.162	-24.847	PASS
	MCH	-4.379	-36.961	-24.379	PASS
	HCH	-4.262	-36.812	-24.262	PASS
11N20 SISO	LCH	-5.966	-37.439	-25.966	PASS
	MCH	-5.347	-37.115	-25.347	PASS
	HCH	-5.05	-37.320	-25.050	PASS

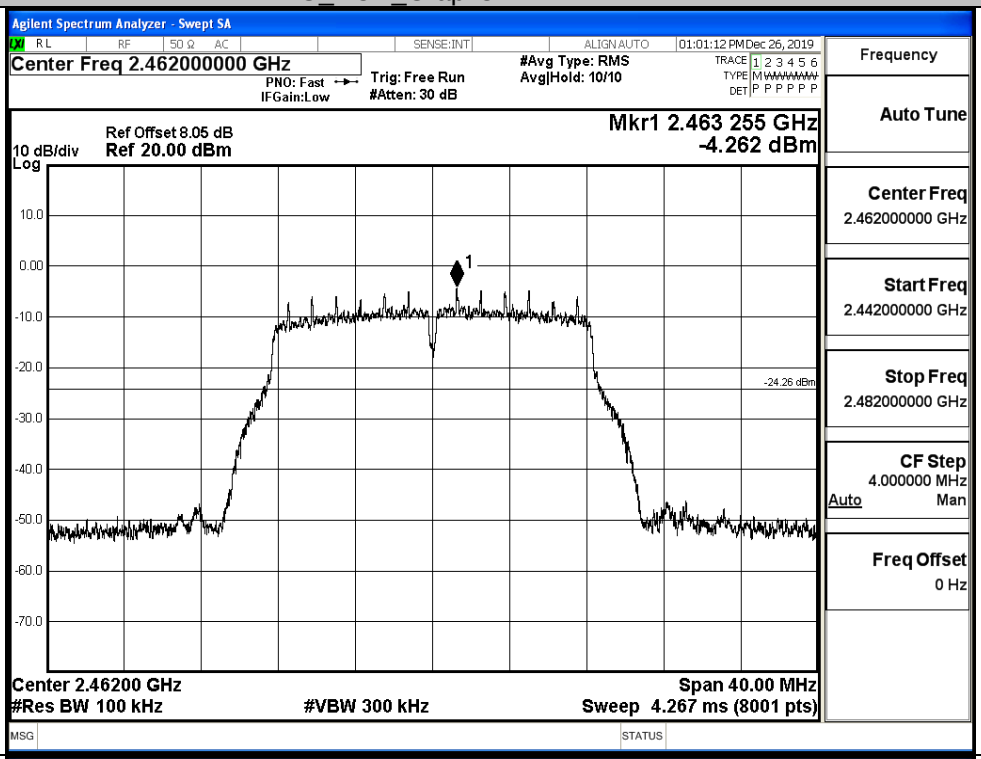
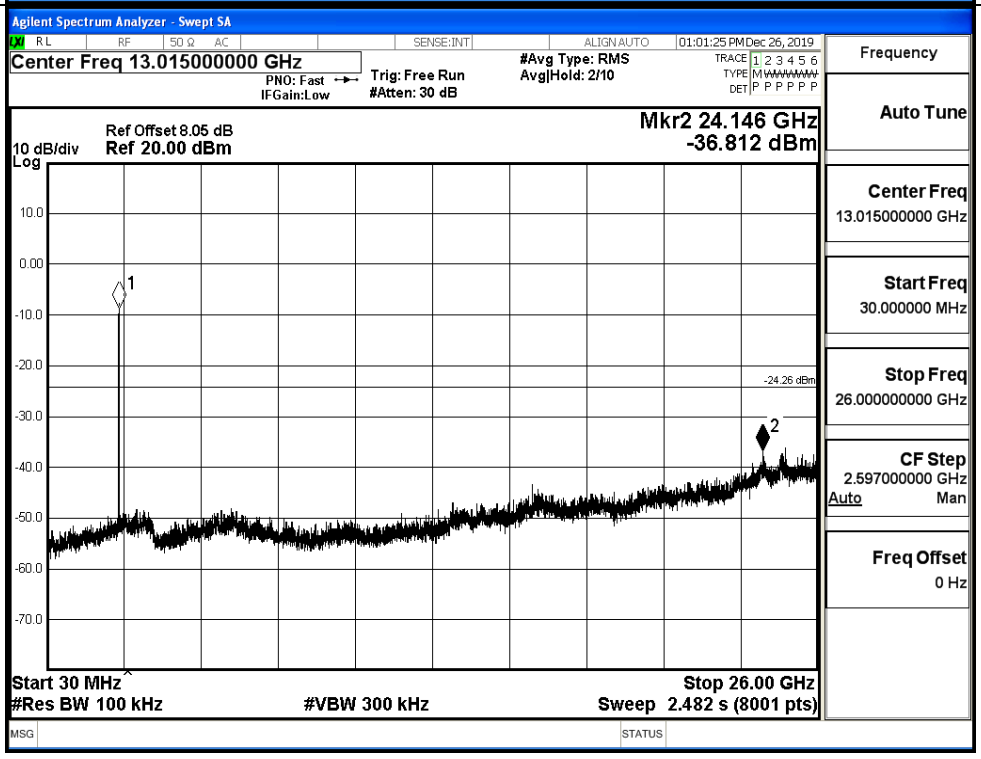
11B_LCH_Graphs	
Pref/11B/LCH	
Puw/11B/LCH	

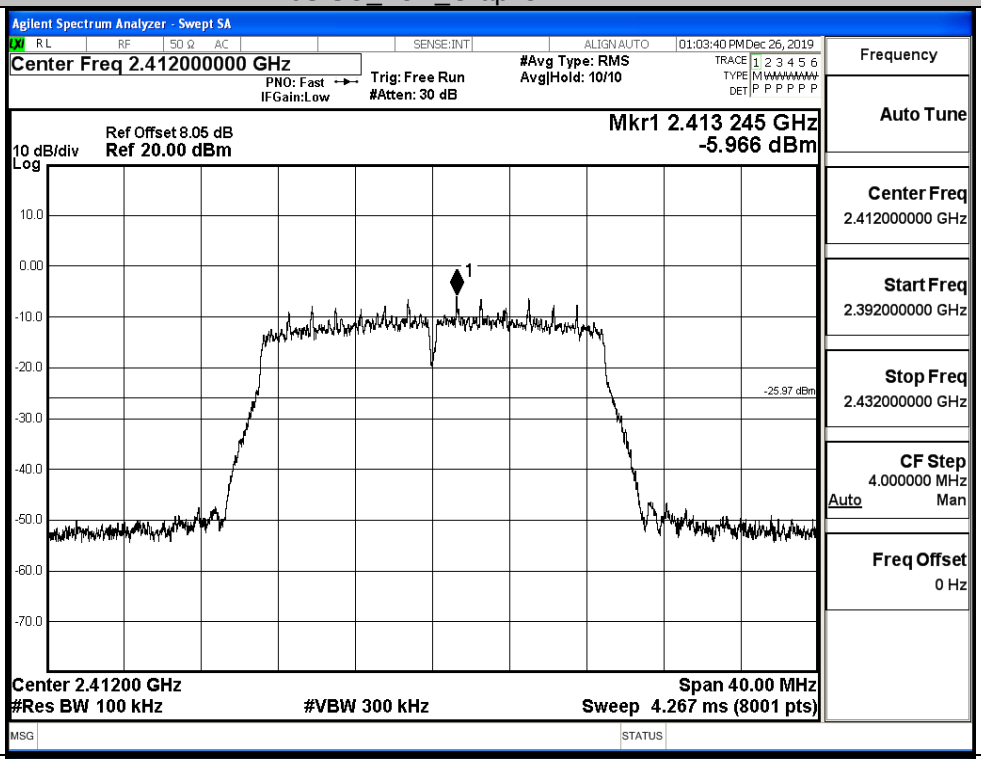
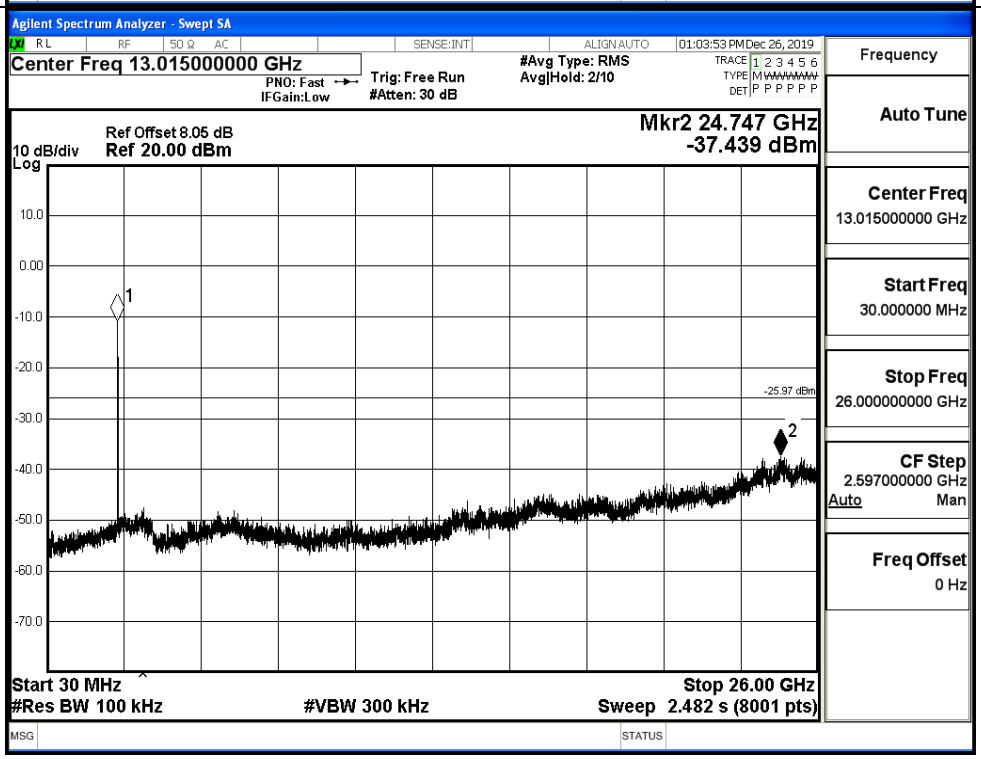
11B_MCH_Graphs	
Pref/11B/MCH	
Puw/11B/MCH	

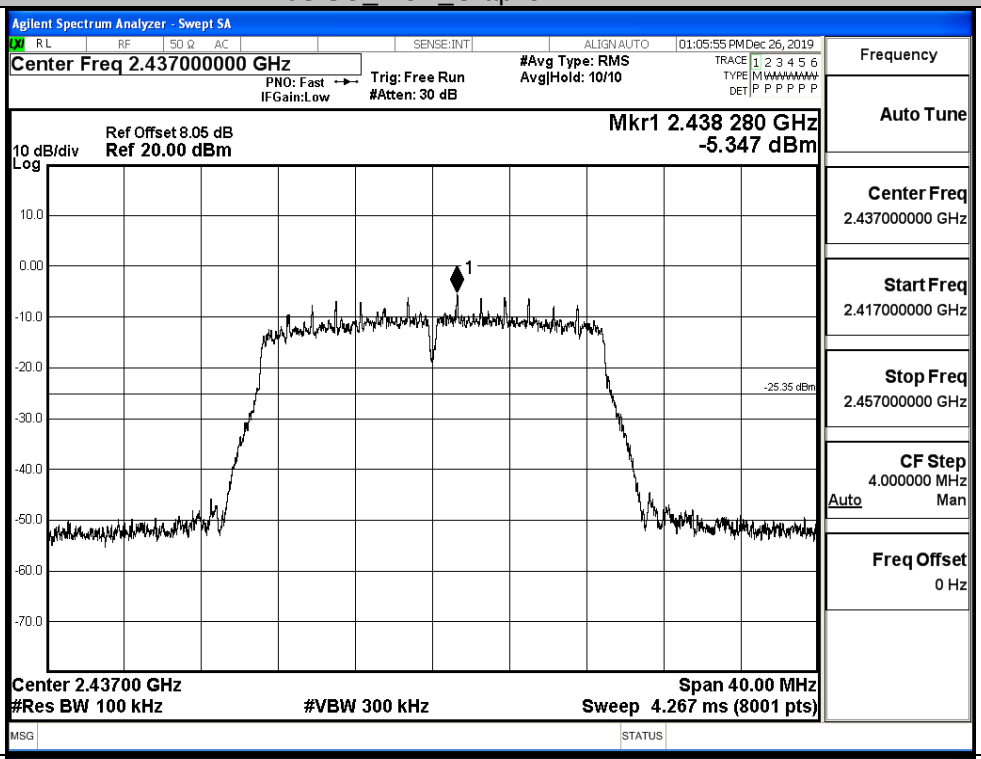
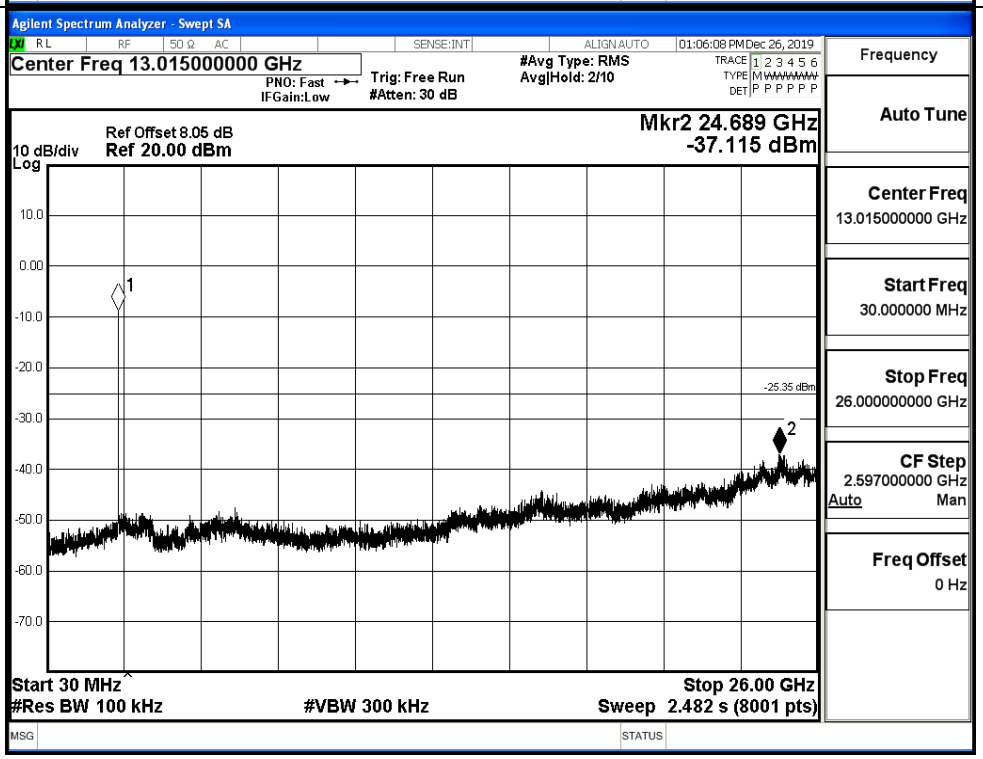
11B_HCH_Graphs	
Pref/11B/HCH	
Puw/11B/HCH	

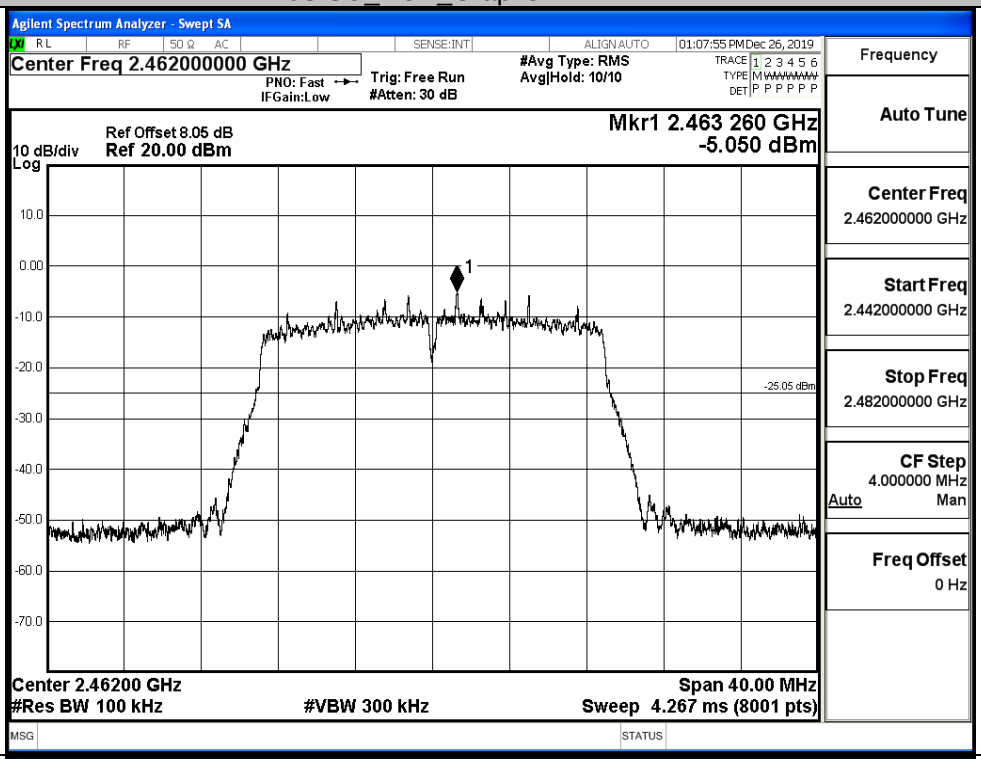
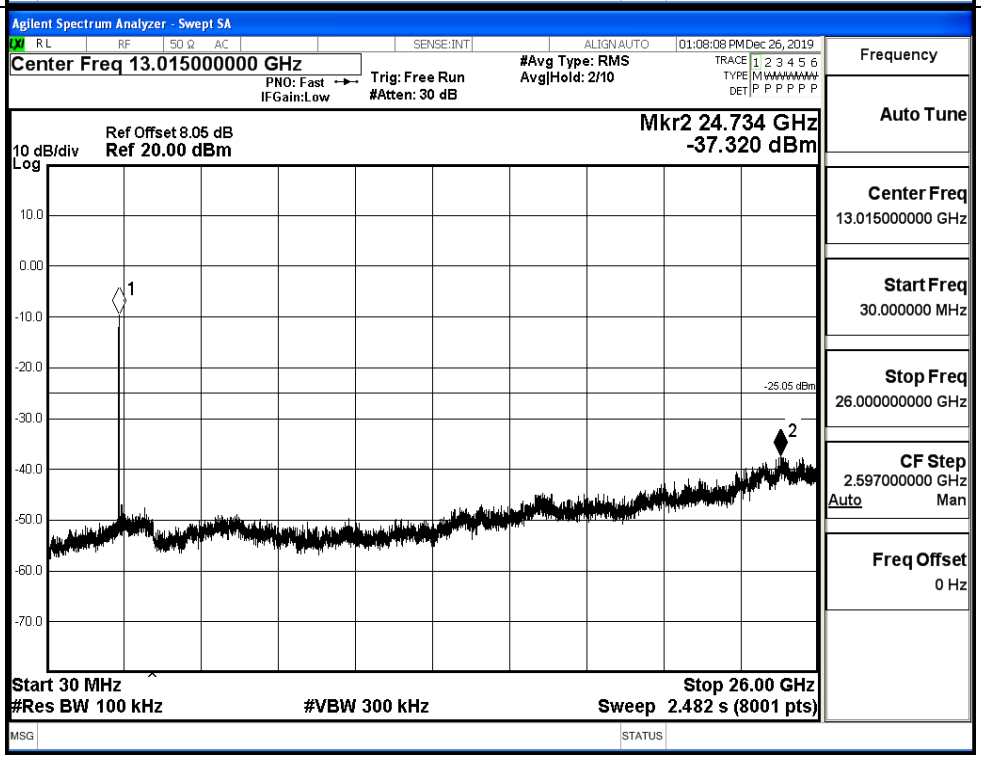
11G_LCH_Graphs	
Pref/11G/LCH	
Puw/11G/LCH	

11G_MCH_Graphs	
Pref/11G/MCH	
Puw/11G/MCH	

11G_HCH_Graphs	
Pref/11G/HCH	
Puw/11G/HCH	

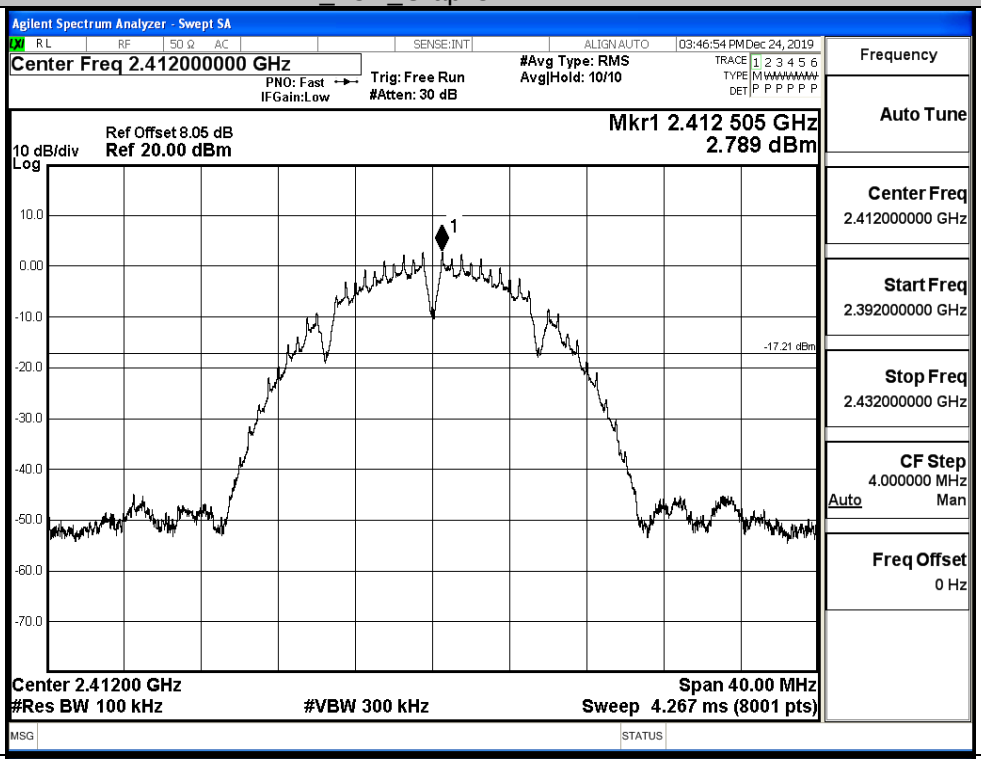
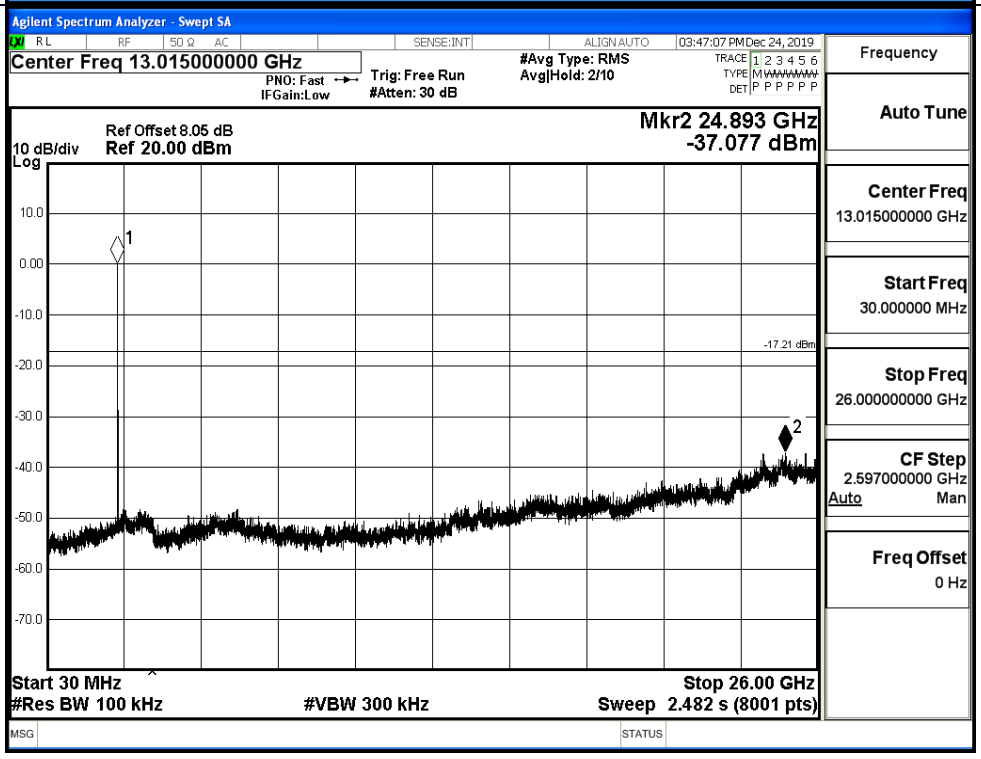
11N20SISO_LCH_Graphs	
Pref/11N20SISO/LCH	
Puw/11N20SISO/LCH	

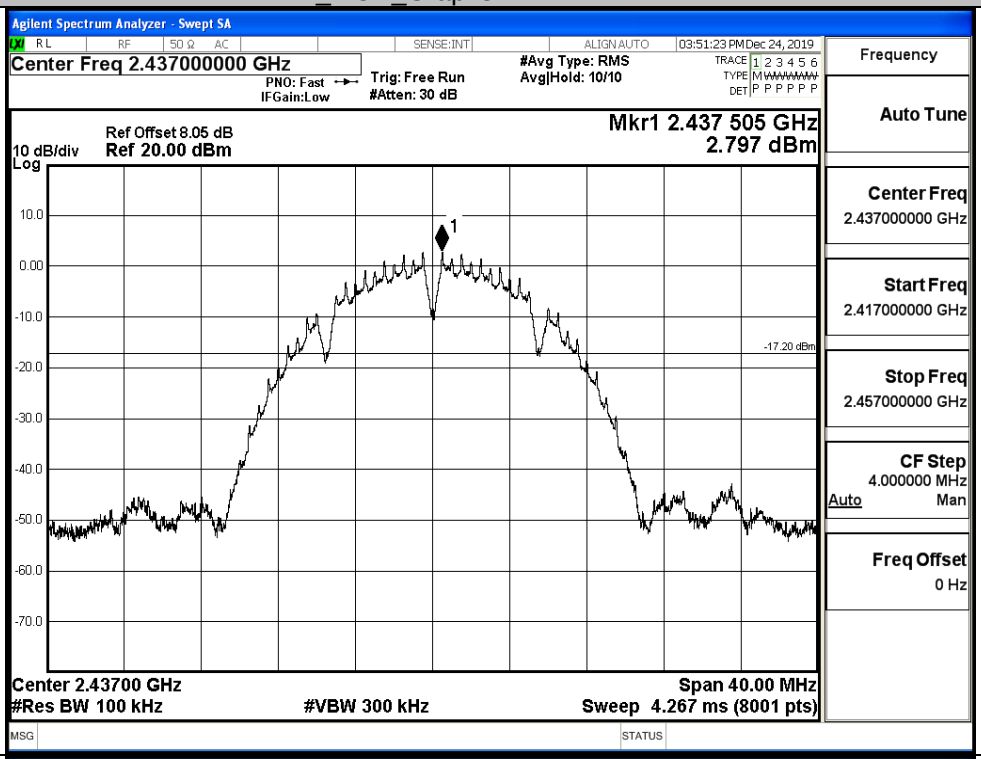
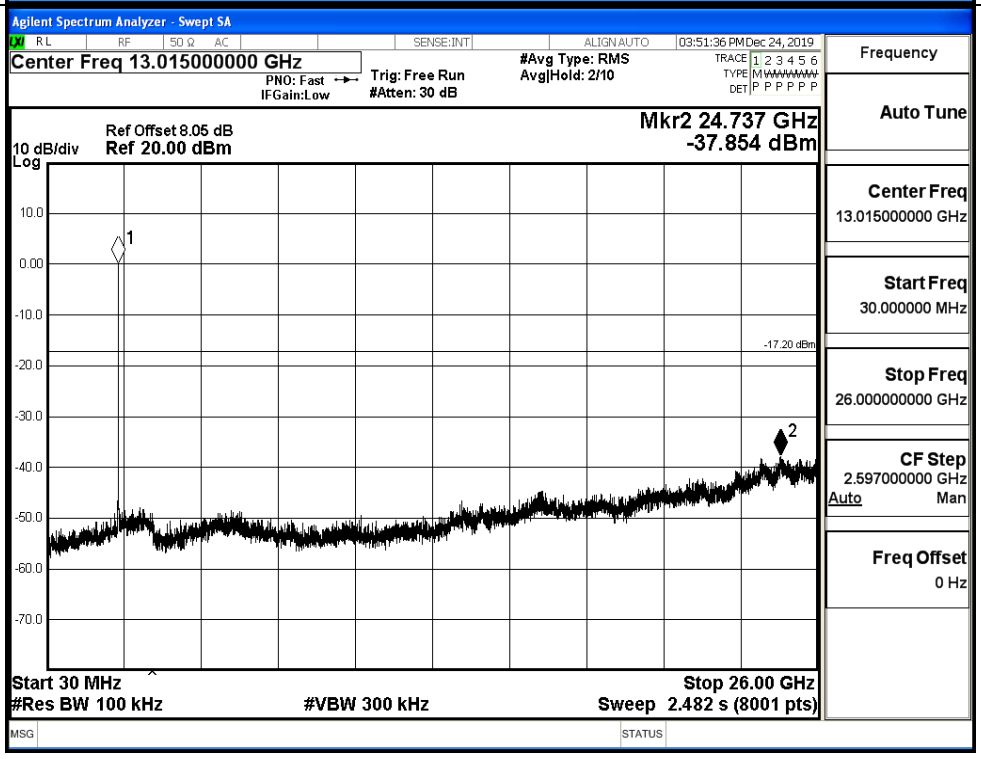
11N20SISO_MCH_Graphs	
Pref/11N20 SISO/MCH	
Puw/11N20 SISO/MCH	

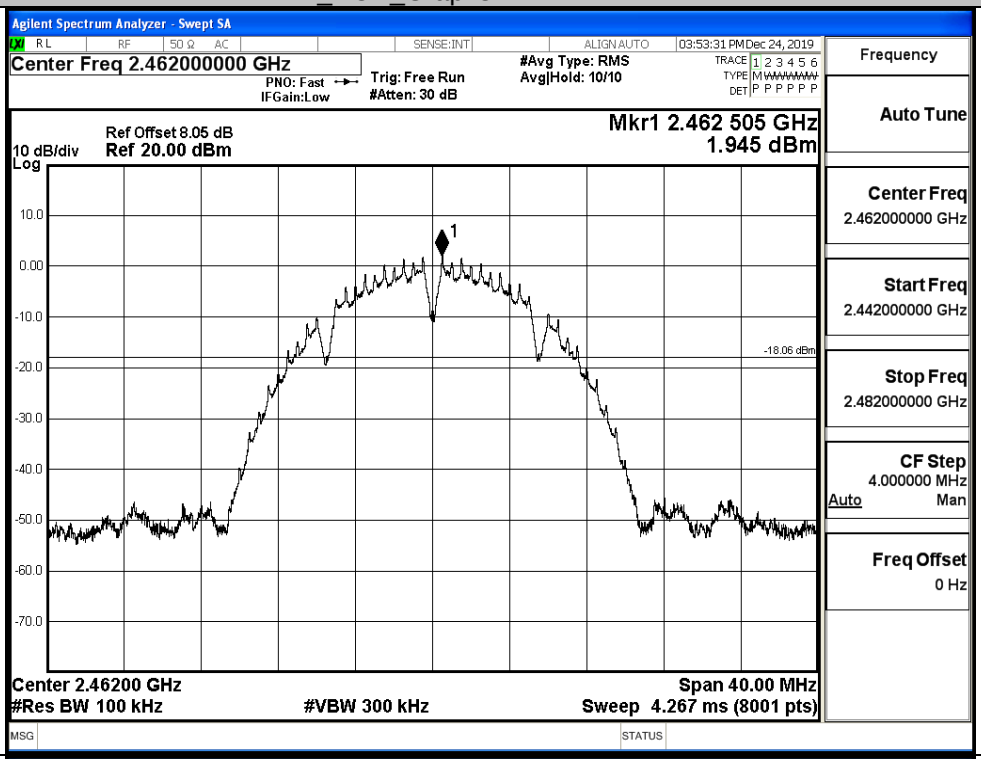
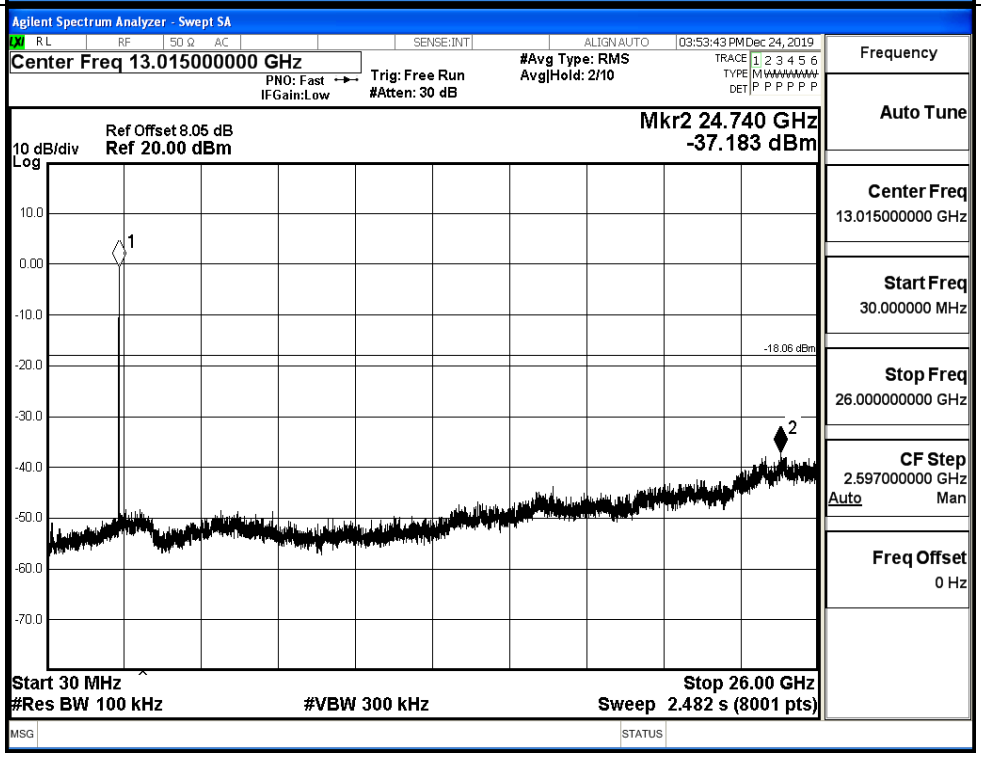
11N20SISO_HCH_Graphs	
Pref/11N20 SISO/HCH	
Puw/11N20 SISO/HCH	

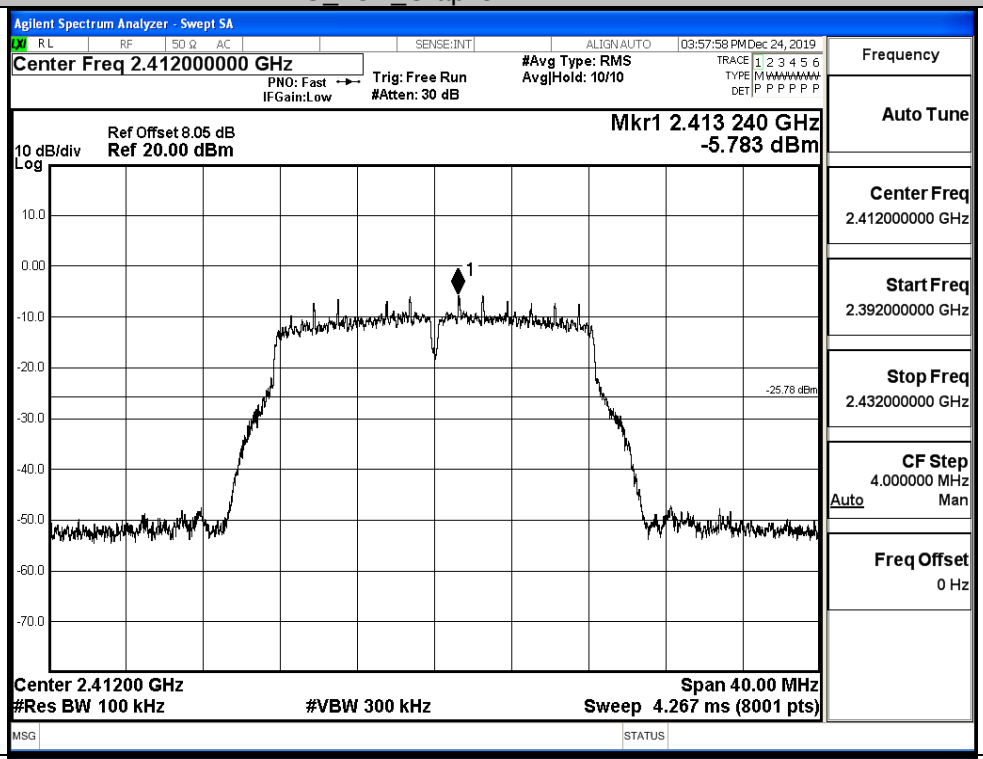
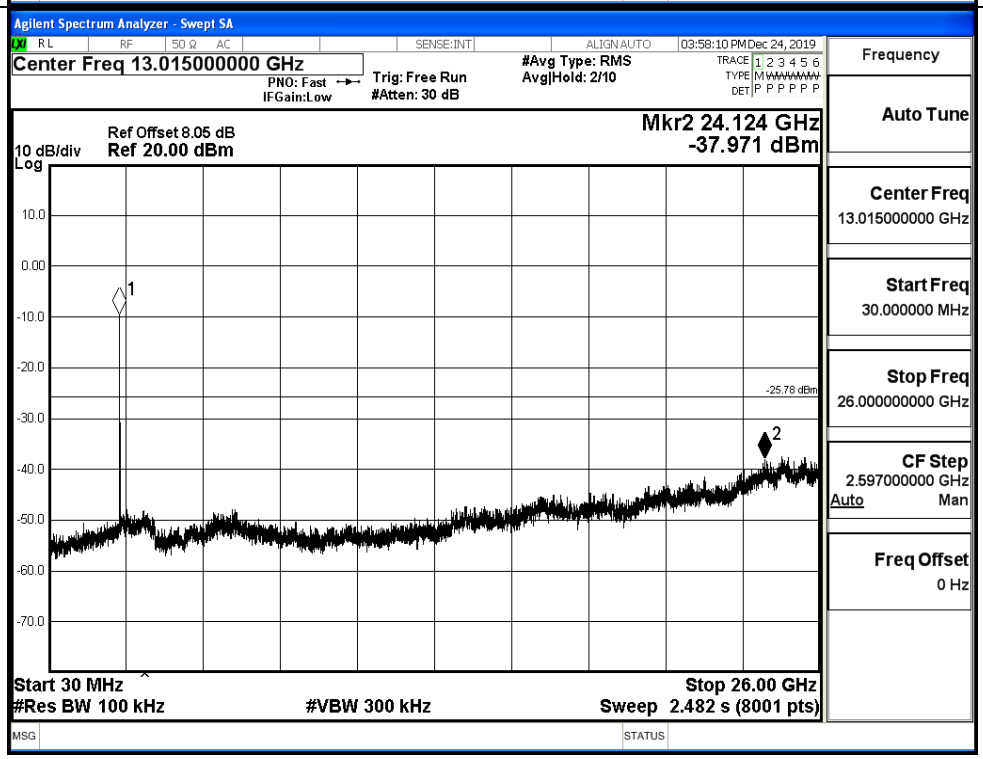
Ant1

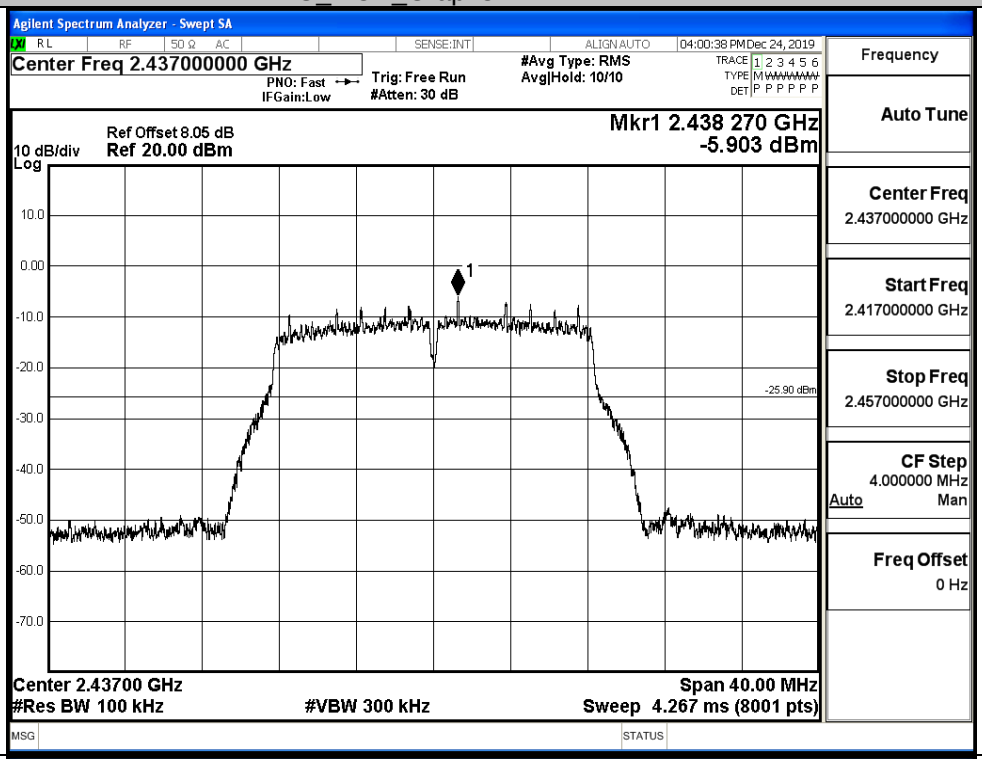
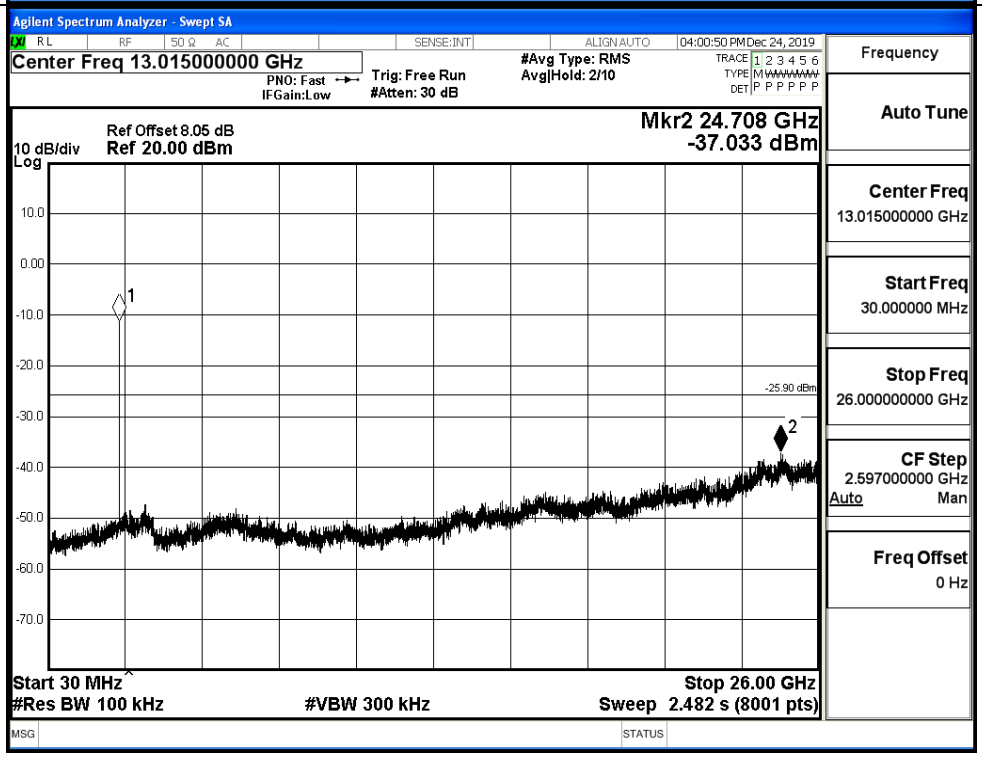
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	LCH	2.789	-37.077	-17.211	PASS
	MCH	2.797	-37.854	-17.203	PASS
	HCH	1.945	-37.183	-18.055	PASS
11G	LCH	-5.783	-37.971	-25.783	PASS
	MCH	-5.903	-37.033	-25.903	PASS
	HCH	-7.032	-37.746	-27.032	PASS
11N20 SISO	LCH	-7.872	-37.364	-27.872	PASS
	MCH	-8.661	-37.820	-28.661	PASS
	HCH	-7.463	-37.681	-27.463	PASS

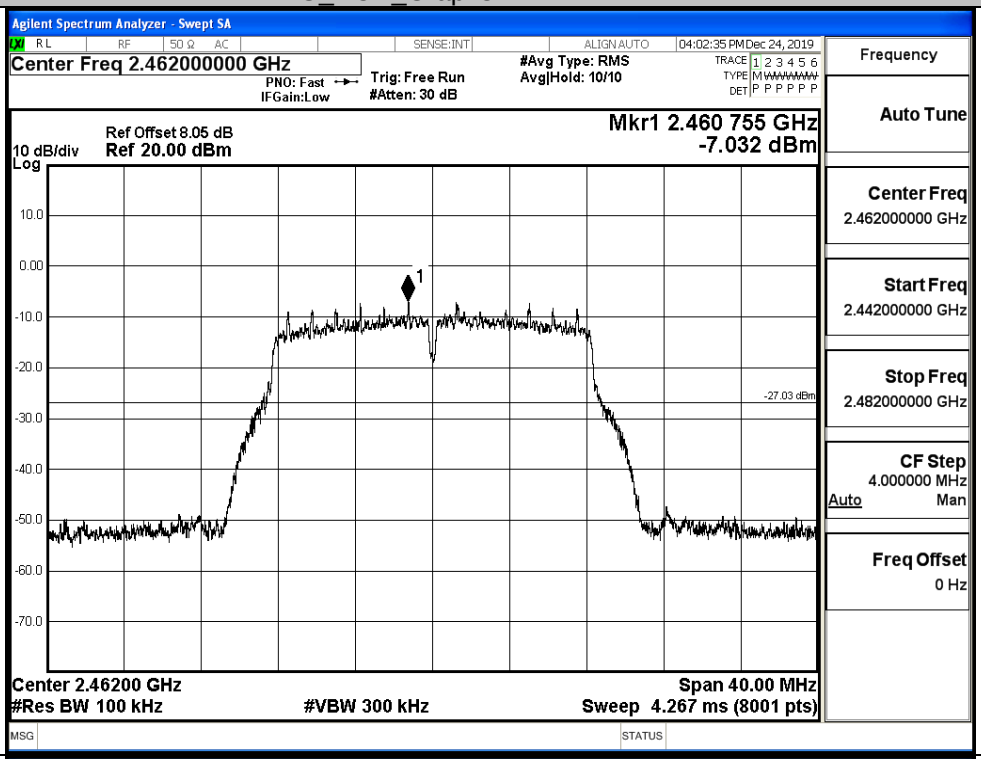
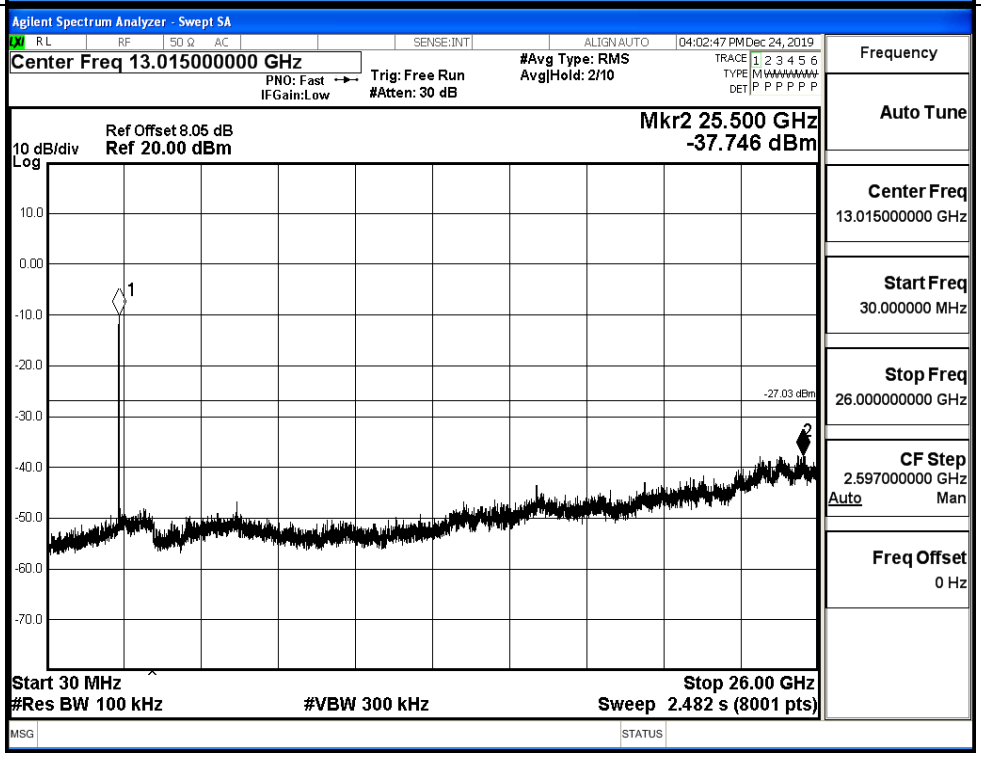
11B_LCH_Graphs	
Pref/11B/LCH	
Puw/11B/LCH	

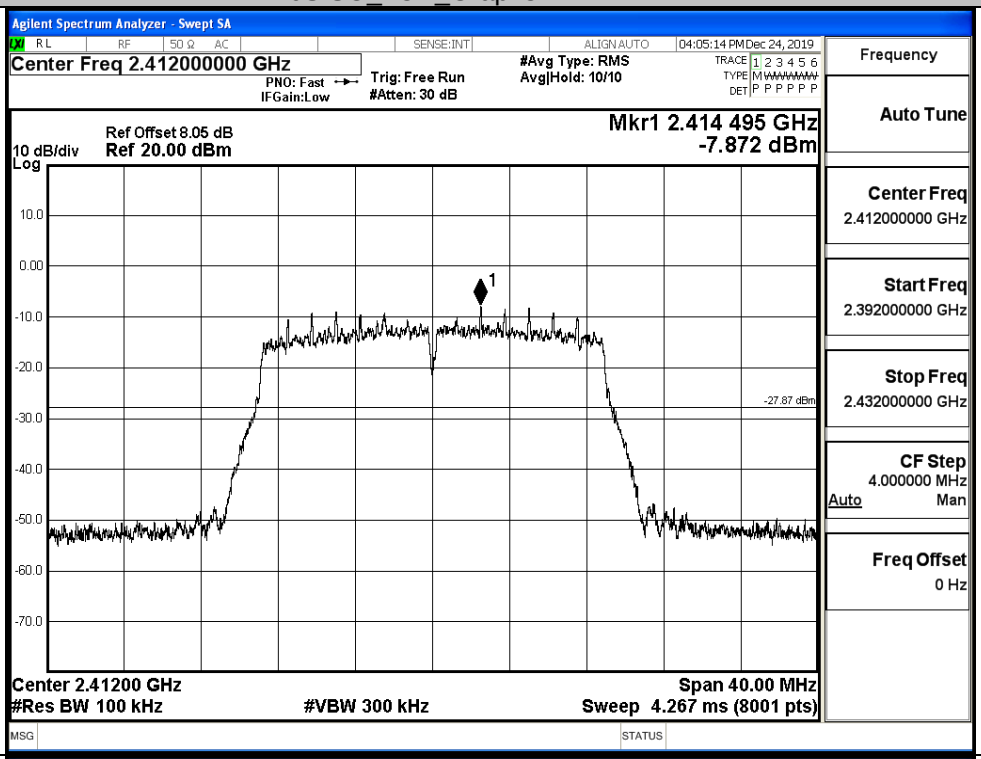
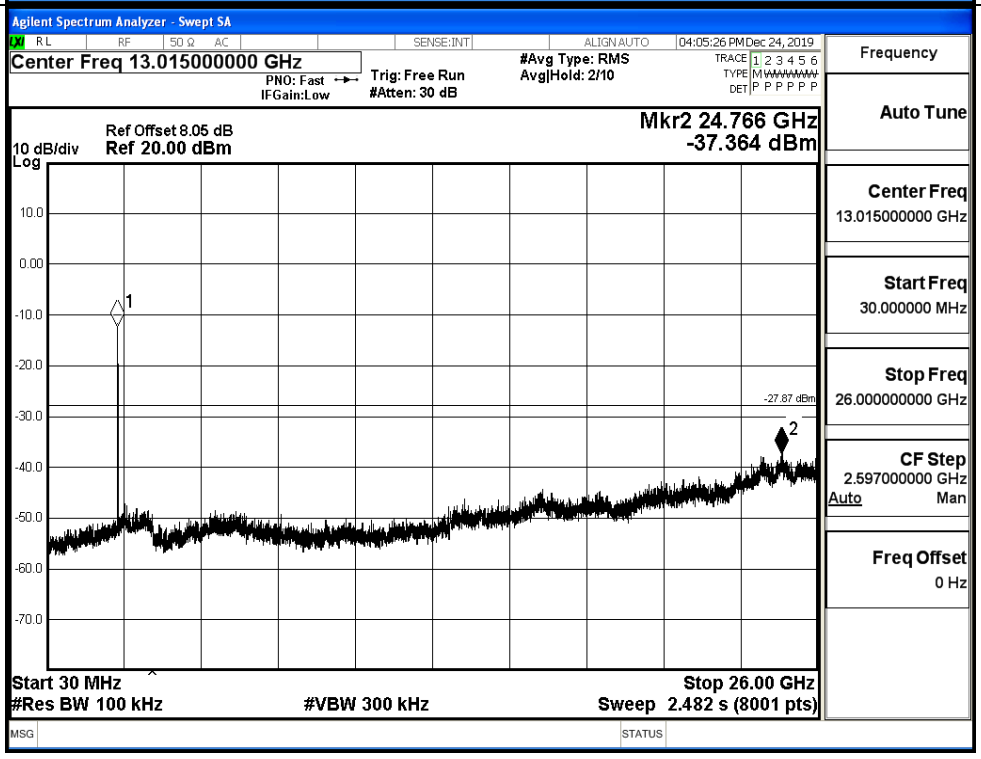
11B_MCH_Graphs	
Pref/11B/MCH	
Puw/11B/MCH	

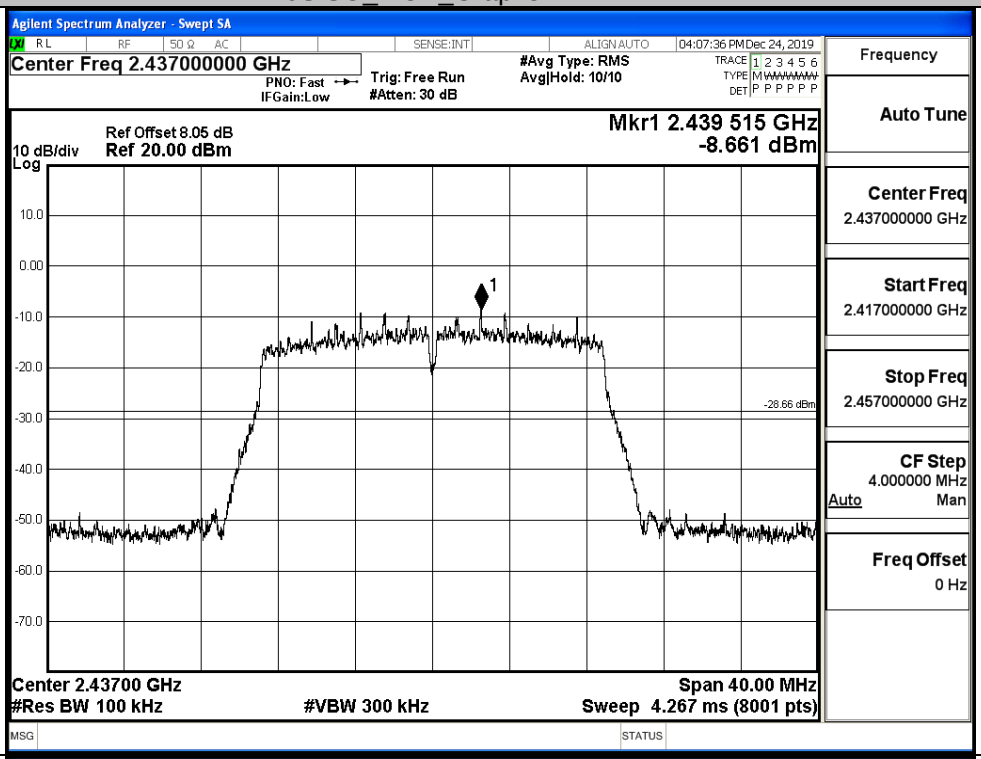
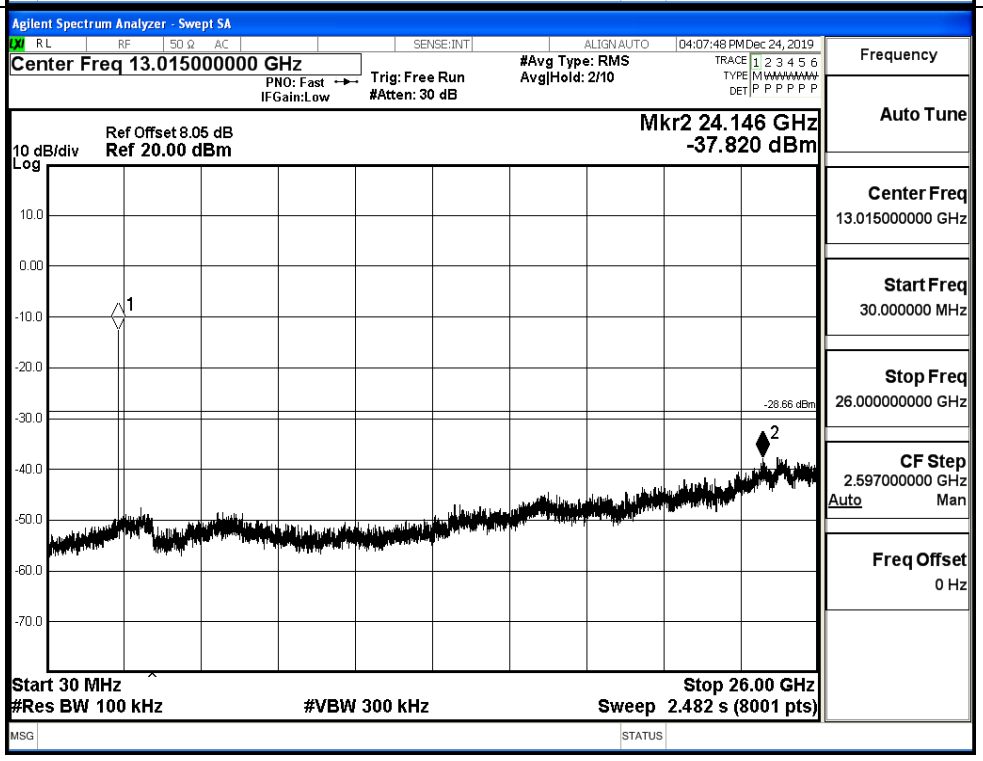
11B_HCH_Graphs	
Pref/11B/HCH	
Puw/11B/HCH	

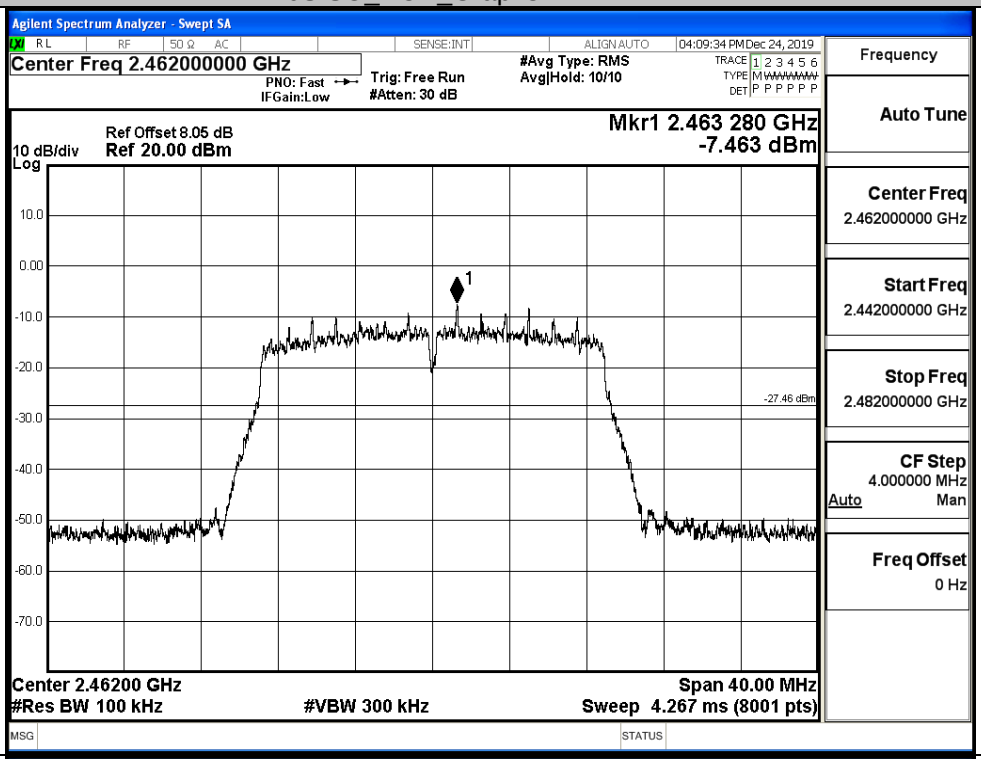
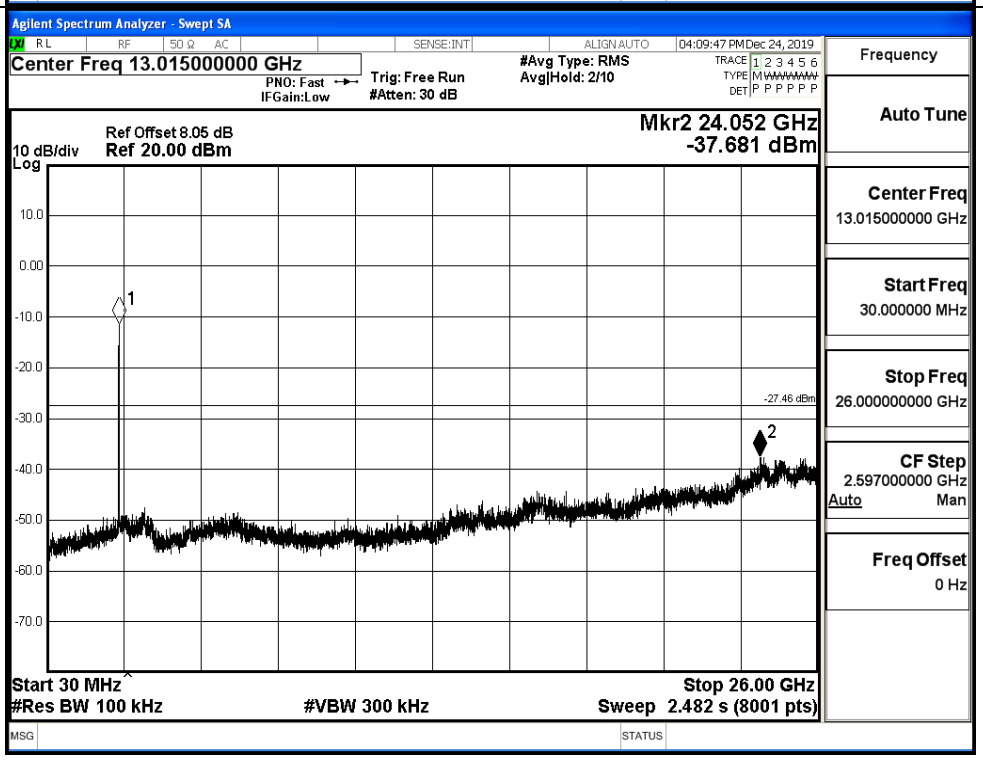
11G_LCH_Graphs	
Pref/11G/LCH	
Puw/11G/LCH	

11G_MCH_Graphs	
Pref/11G/MCH	
Puw/11G/MCH	

11G_HCH_Graphs	
Pref/11G/HCH	
Puw/11G/HCH	

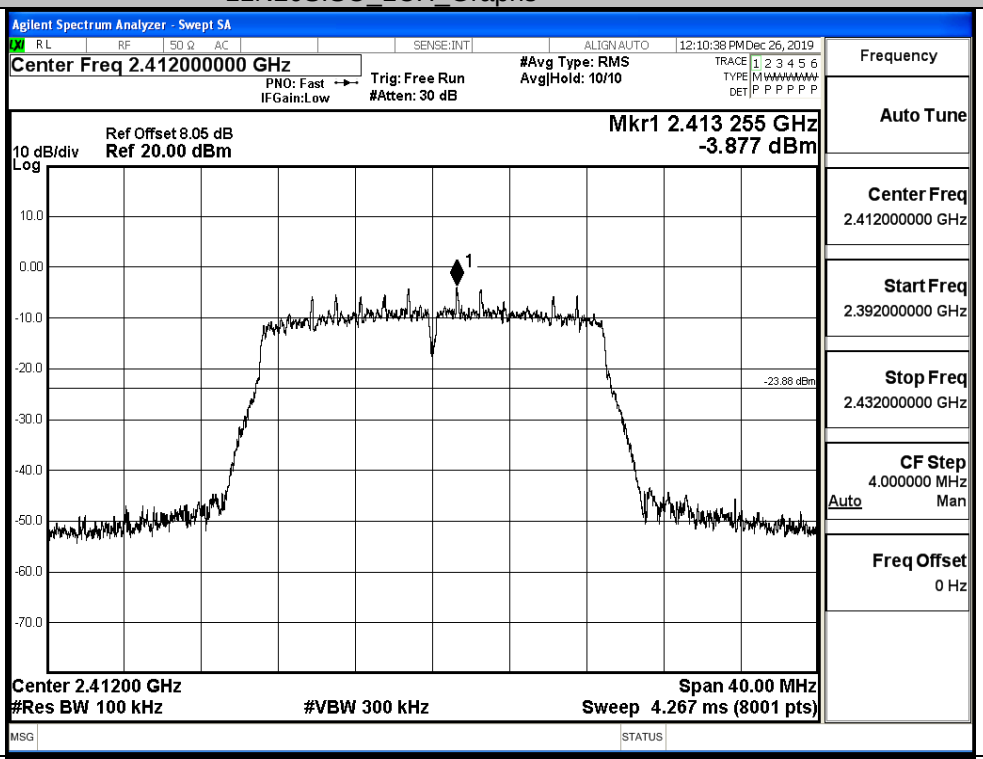
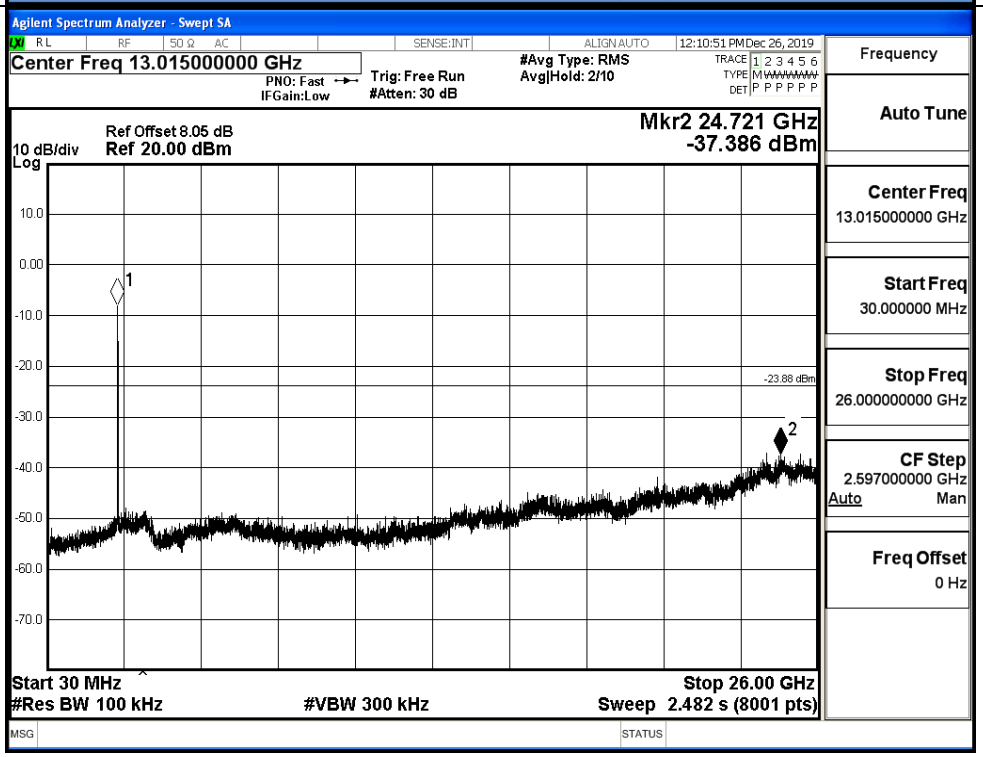
11N20SISO_LCH_Graphs	
Pref/11N20SISO/LCH	
Puw/11N20SISO/LCH	

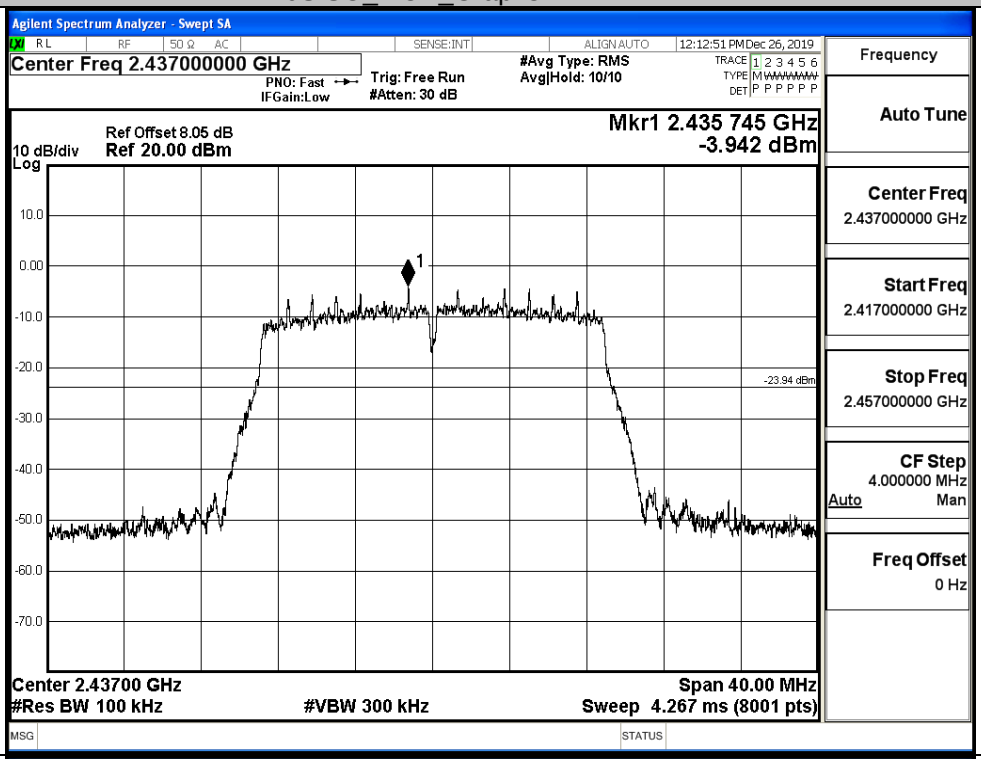
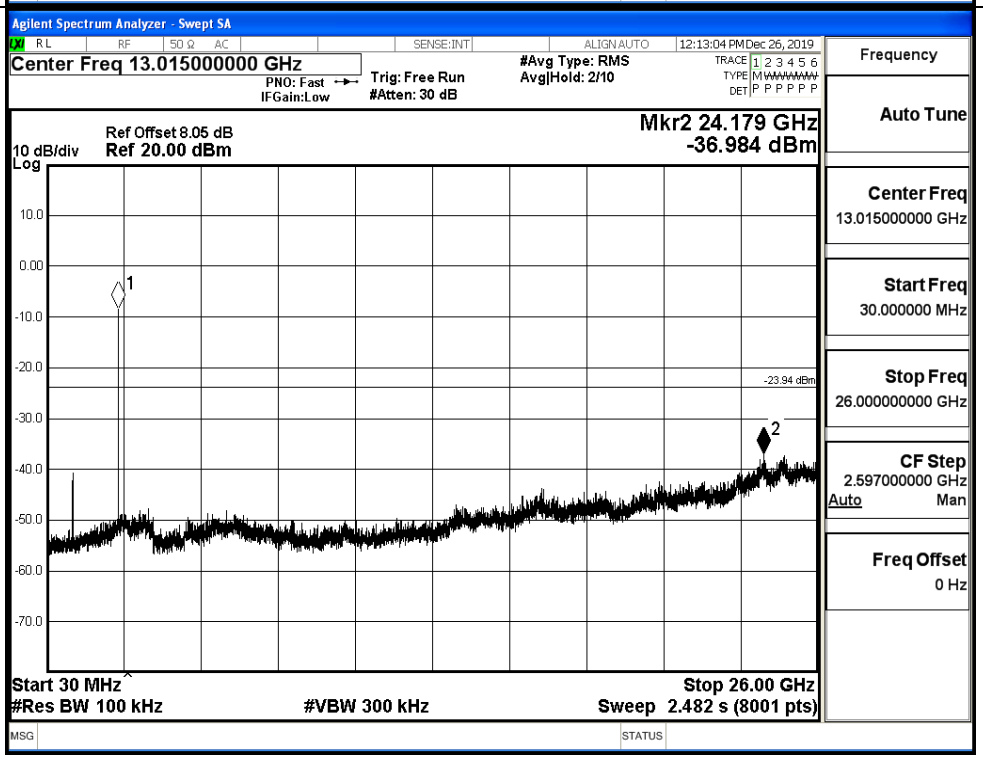
11N20SISO_MCH_Graphs	
Pref/11N20 SISO/MCH	
Puw/11N20 SISO/MCH	

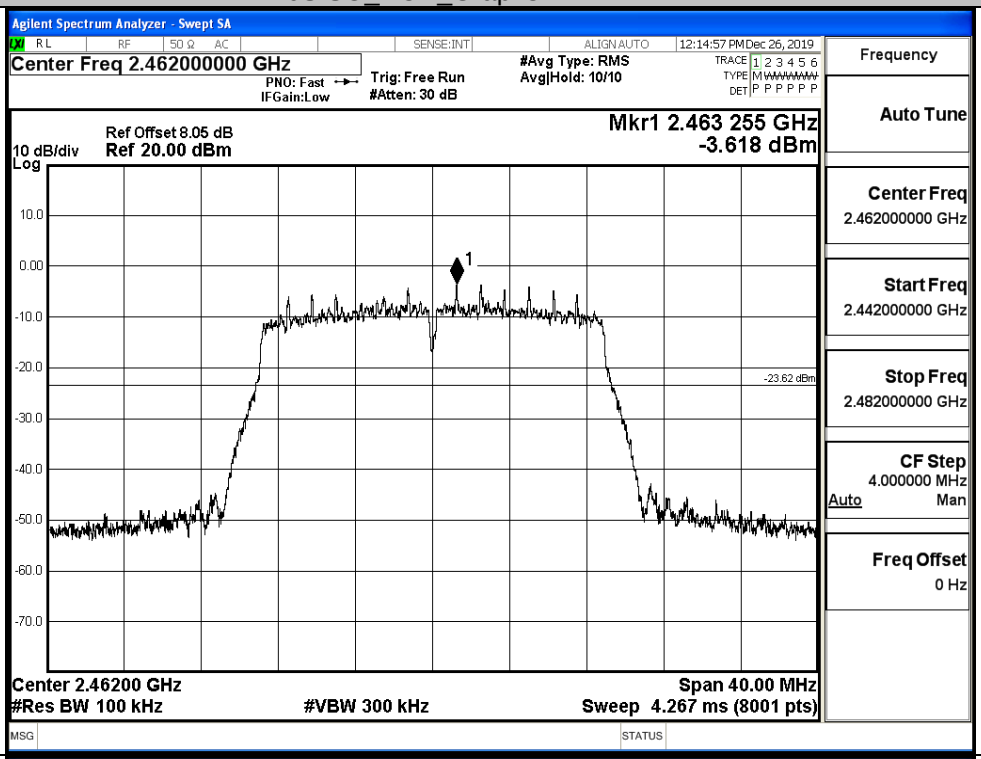
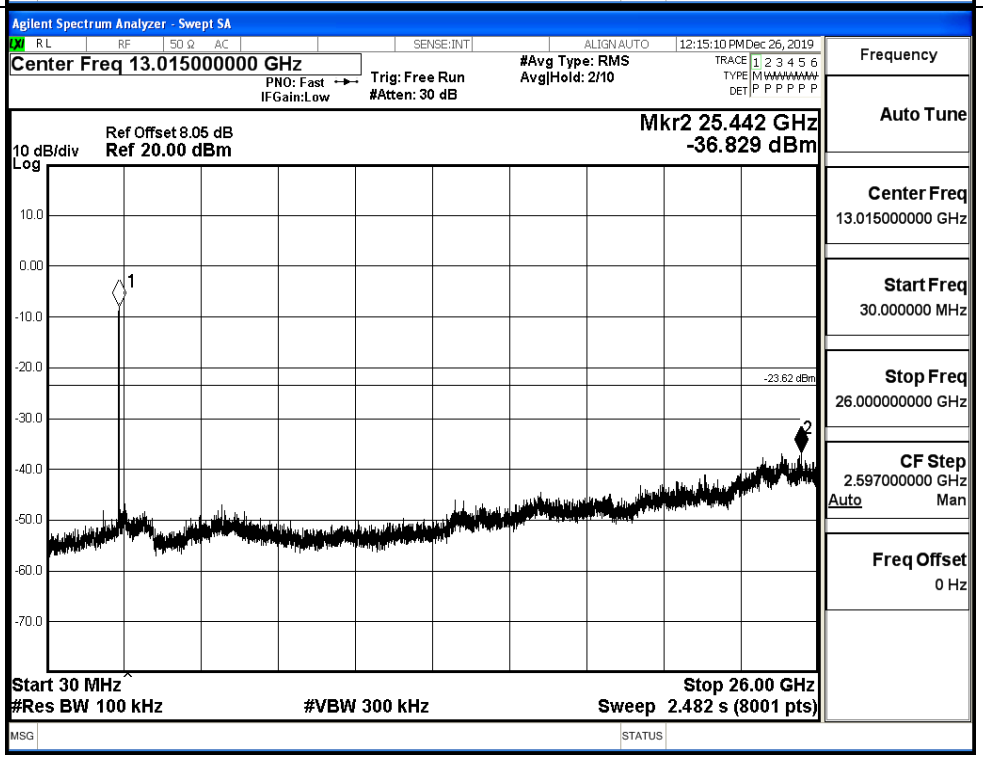
11N20SISO_HCH_Graphs	
Pref/11N20 SISO/HCH	
Puw/11N20 SISO/HCH	

Ant0+1

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11N20 SISO	LCH	-3.877	-37.386	-23.877	PASS
	MCH	-3.942	-36.984	-23.942	PASS
	HCH	-3.618	-36.829	-23.618	PASS

11N20SISO_LCH_Graphs	
Pref/11N20SISO/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	

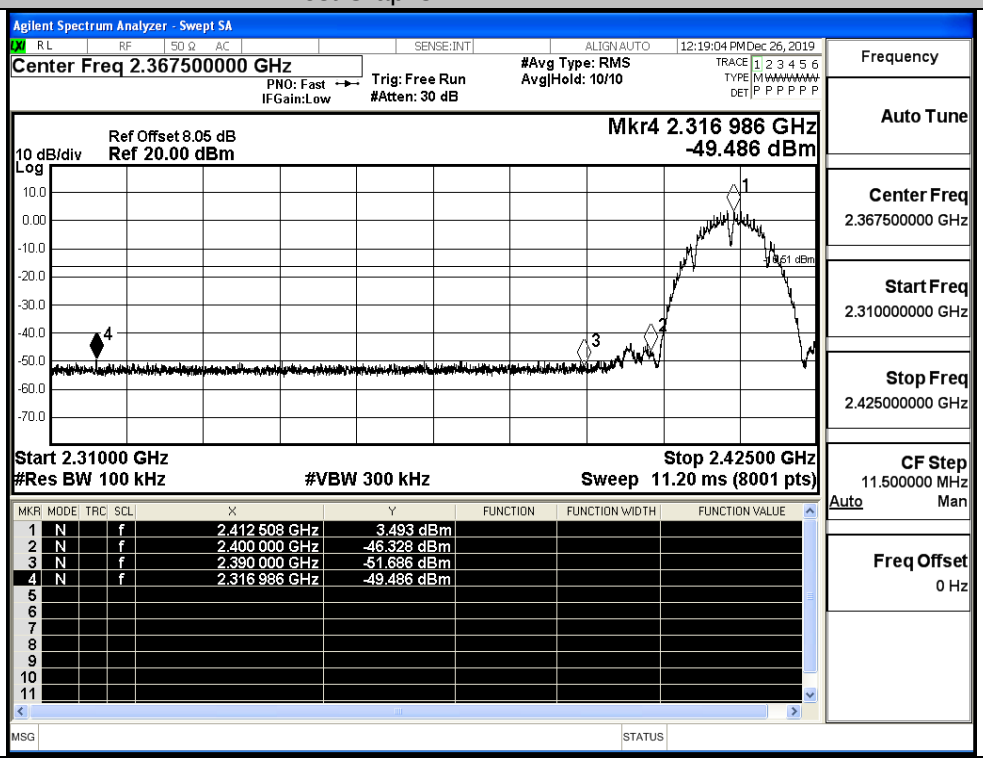
C.6 Band-edge for RF Conducted Emissions

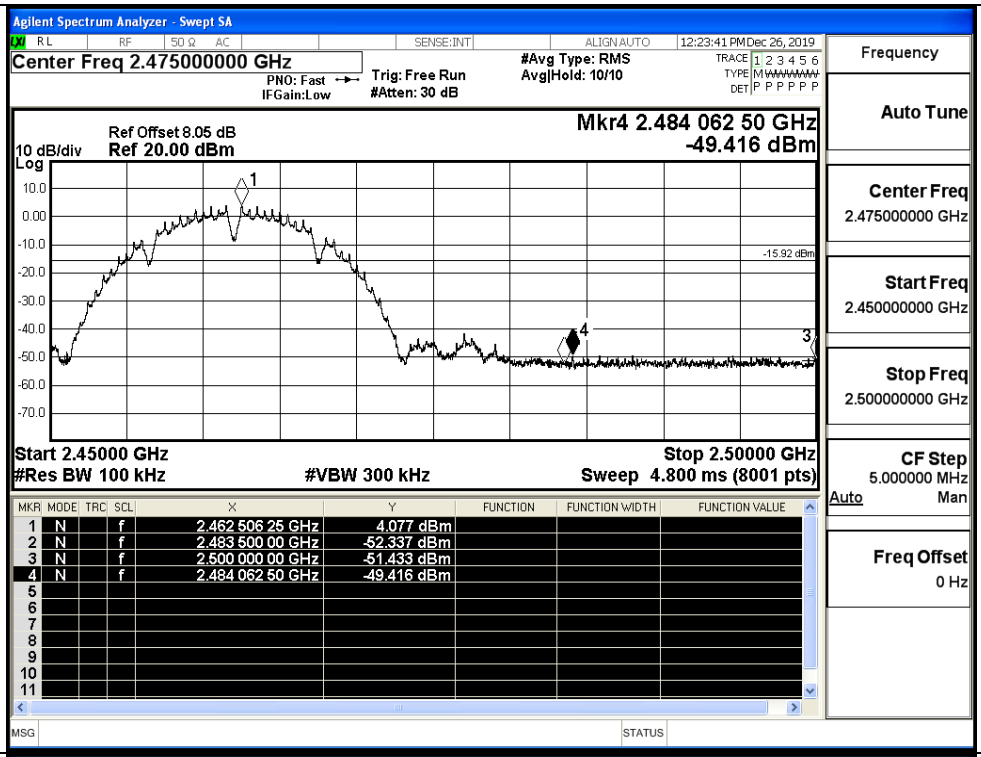
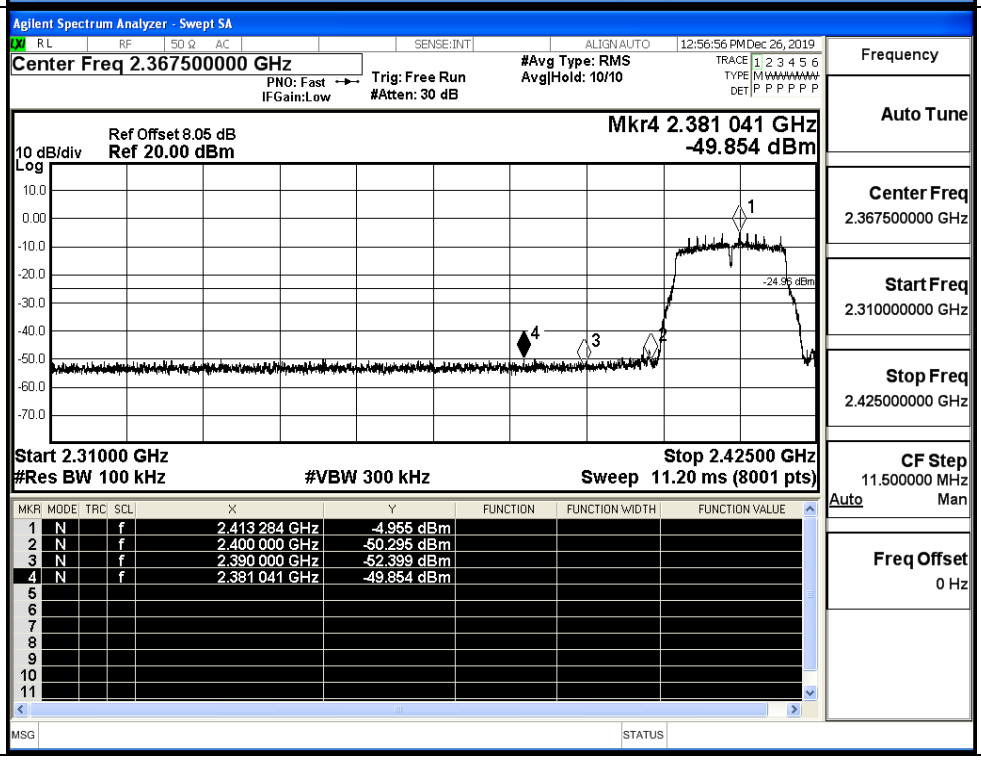
Ant0

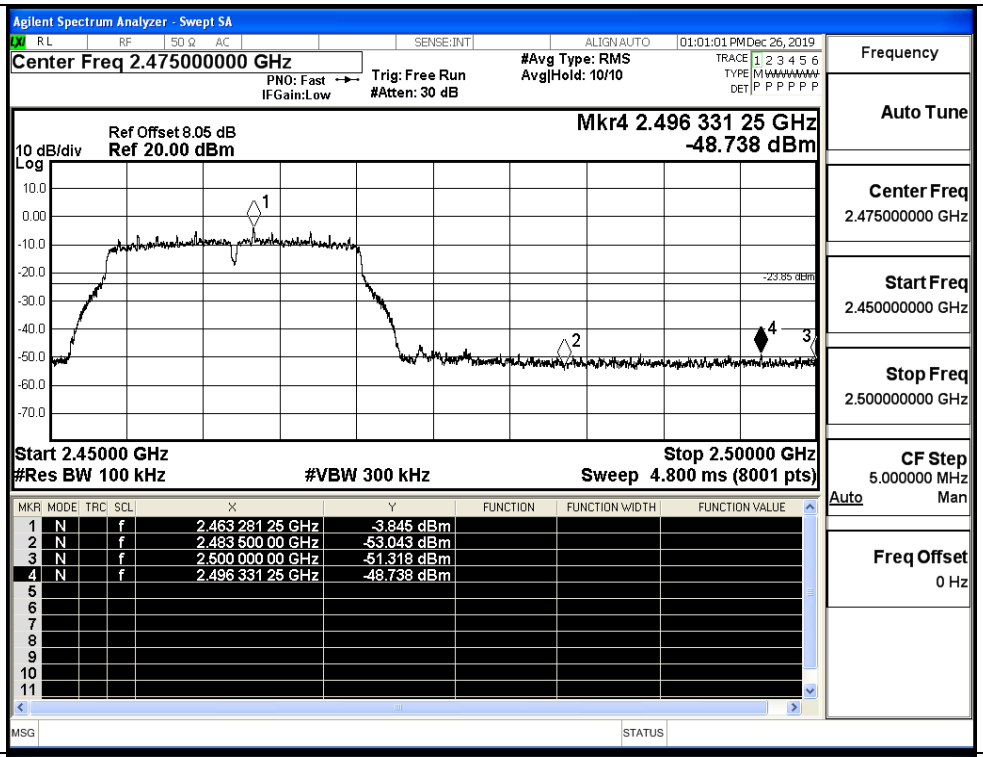
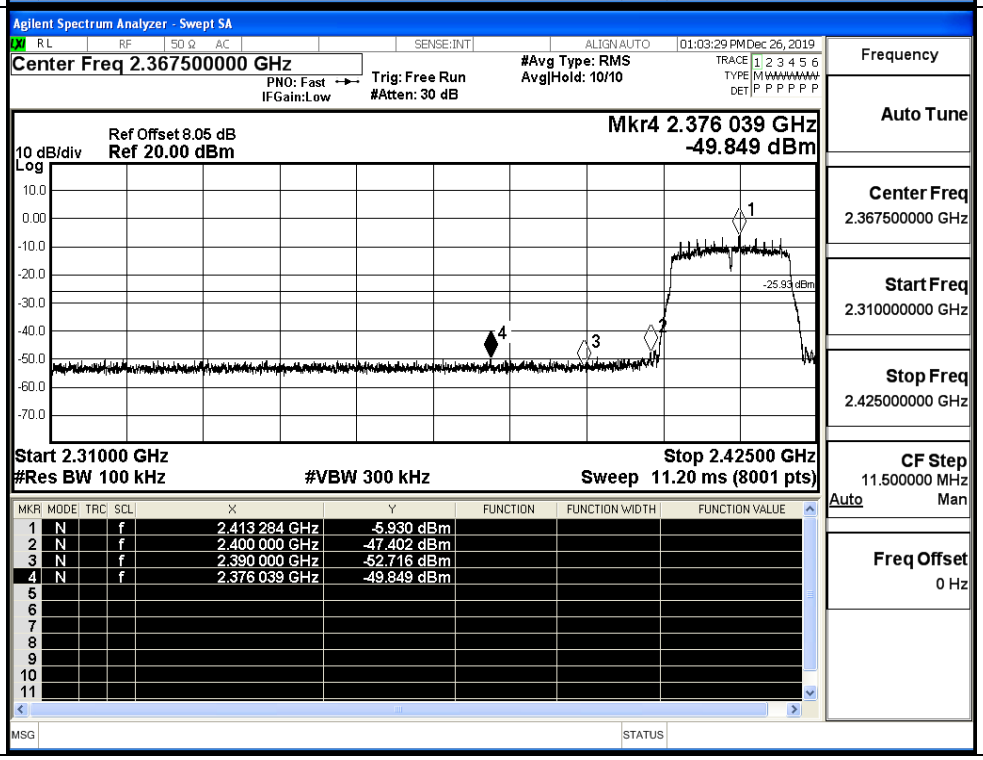
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	3.493	-49.486	-16.51	PASS
	HCH	4.077	-49.416	-15.92	PASS
11G	LCH	-4.955	-49.854	-24.96	PASS
	HCH	-3.845	-48.738	-23.85	PASS
11N20SISO	LCH	-5.930	-49.849	-25.93	PASS
	HCH	-5.721	-48.835	-25.72	PASS

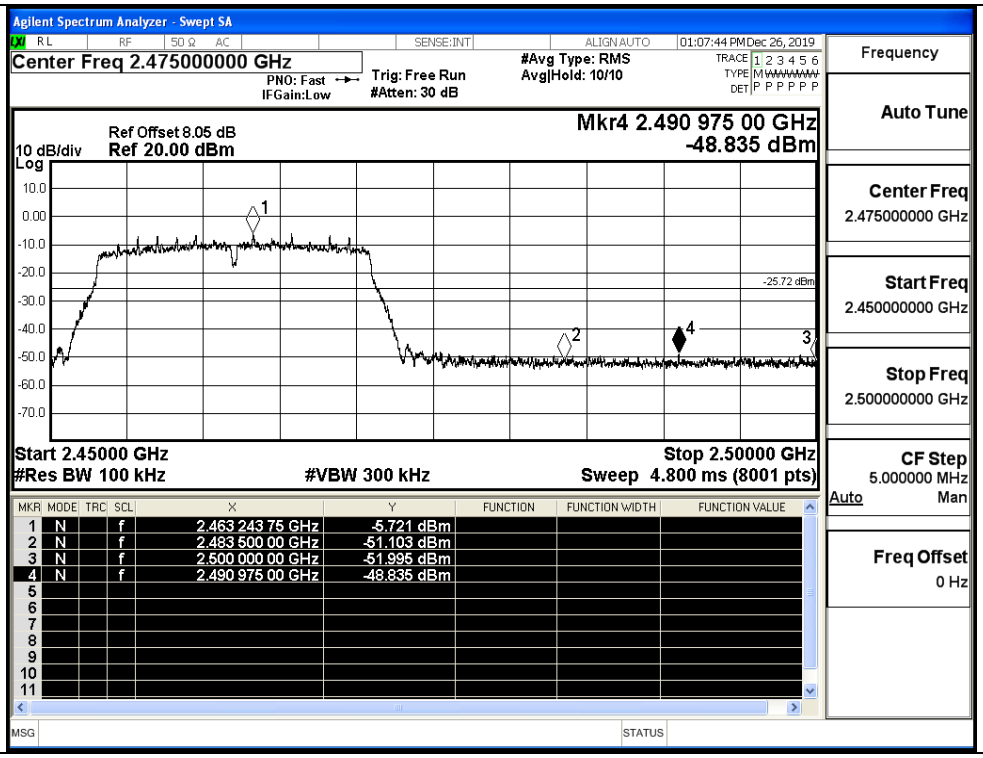
Test Graphs

11B/LCH



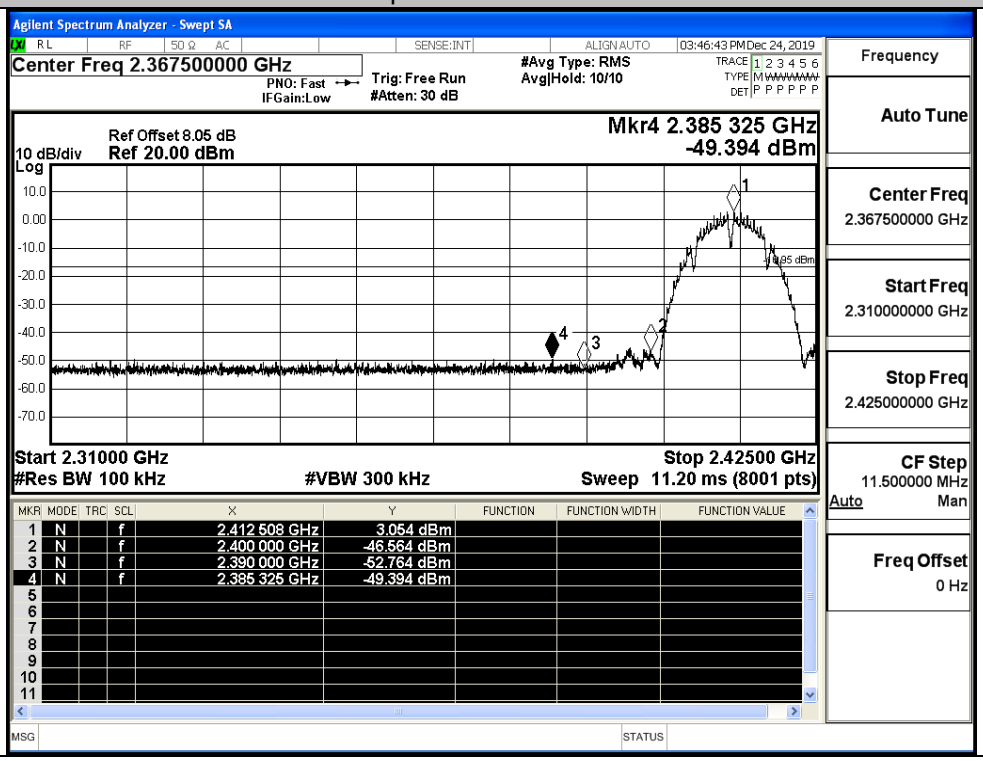
11B/HCH	
11G/LCH	

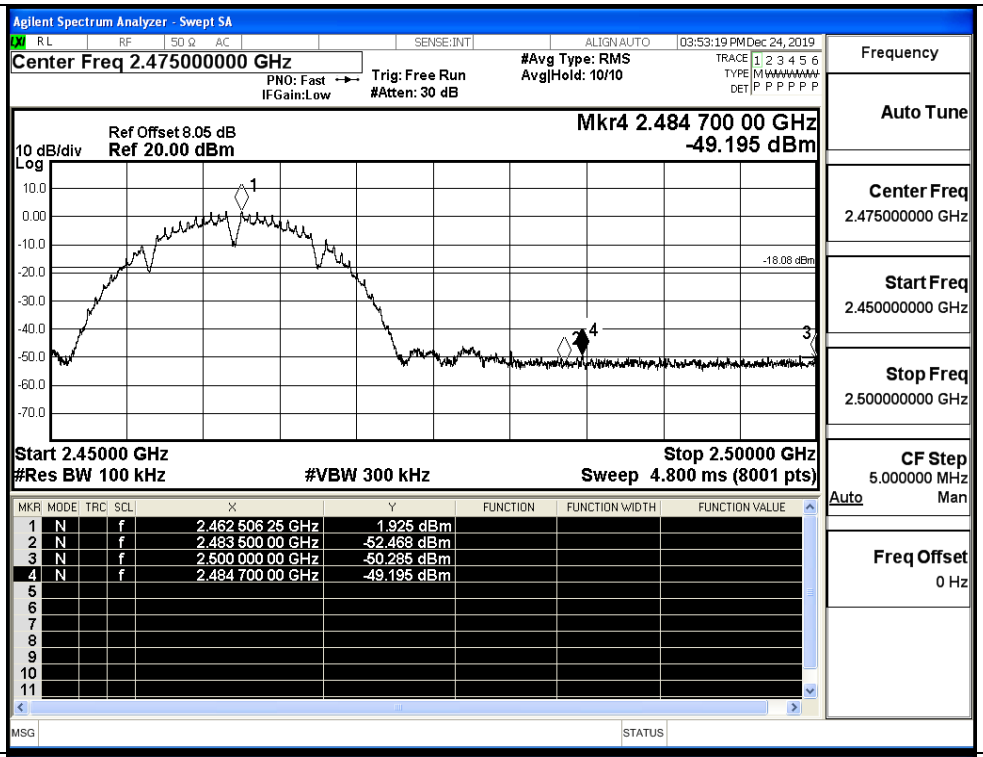
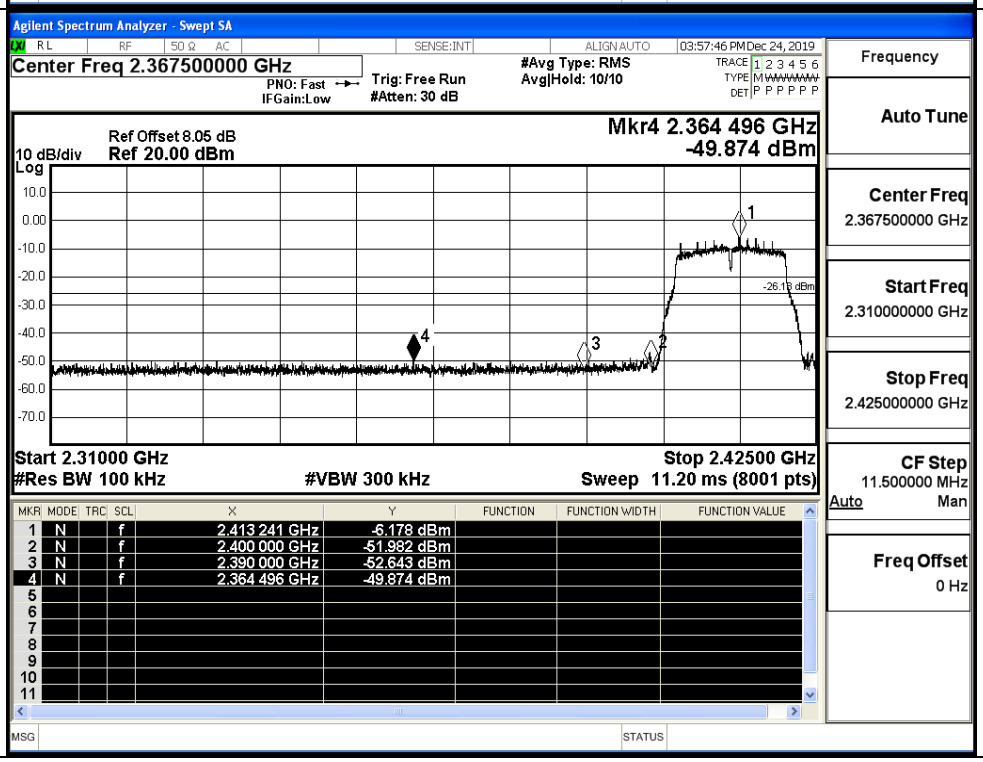
11G/HCH	
11N20SISO/LCH	

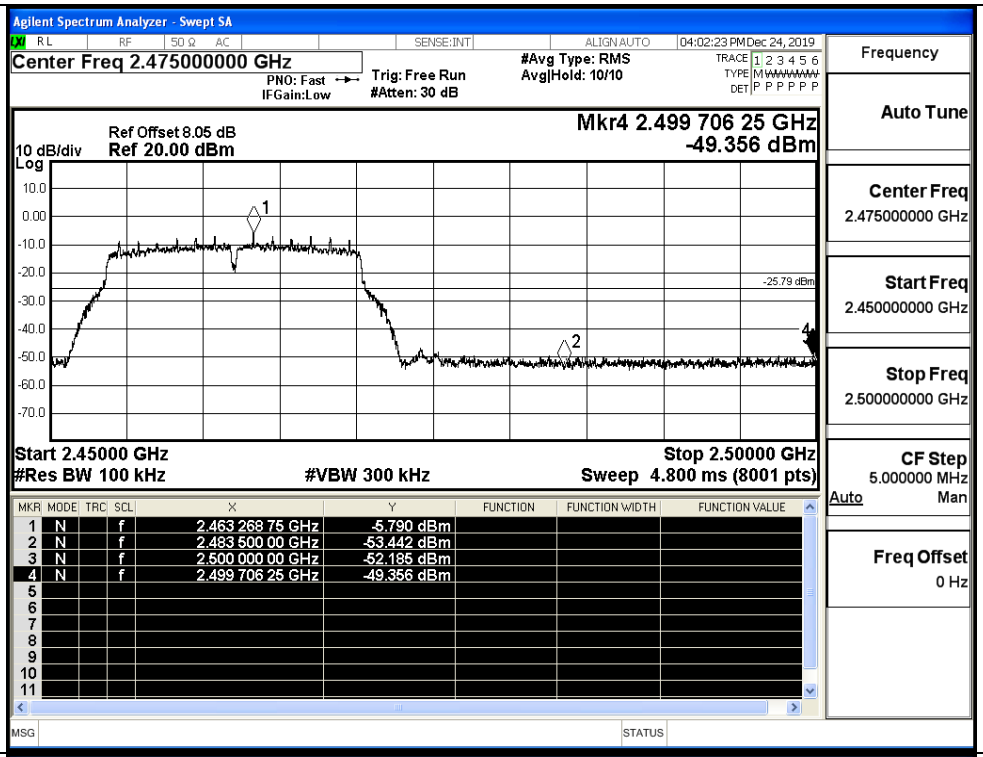
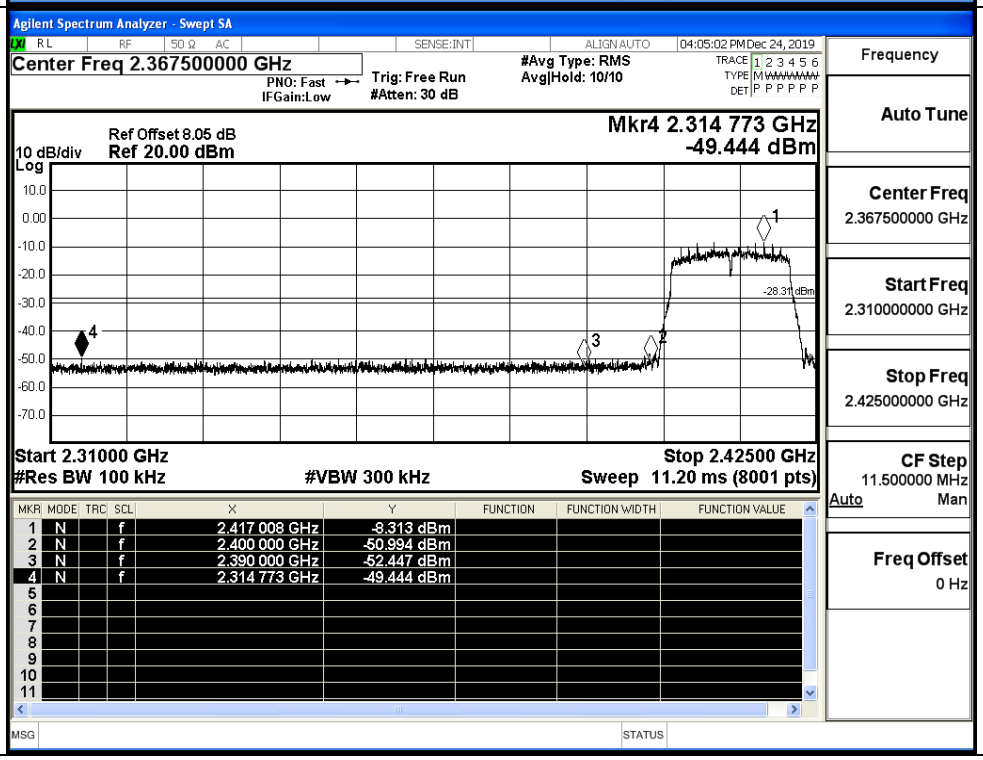
11N20SISO/HCH	

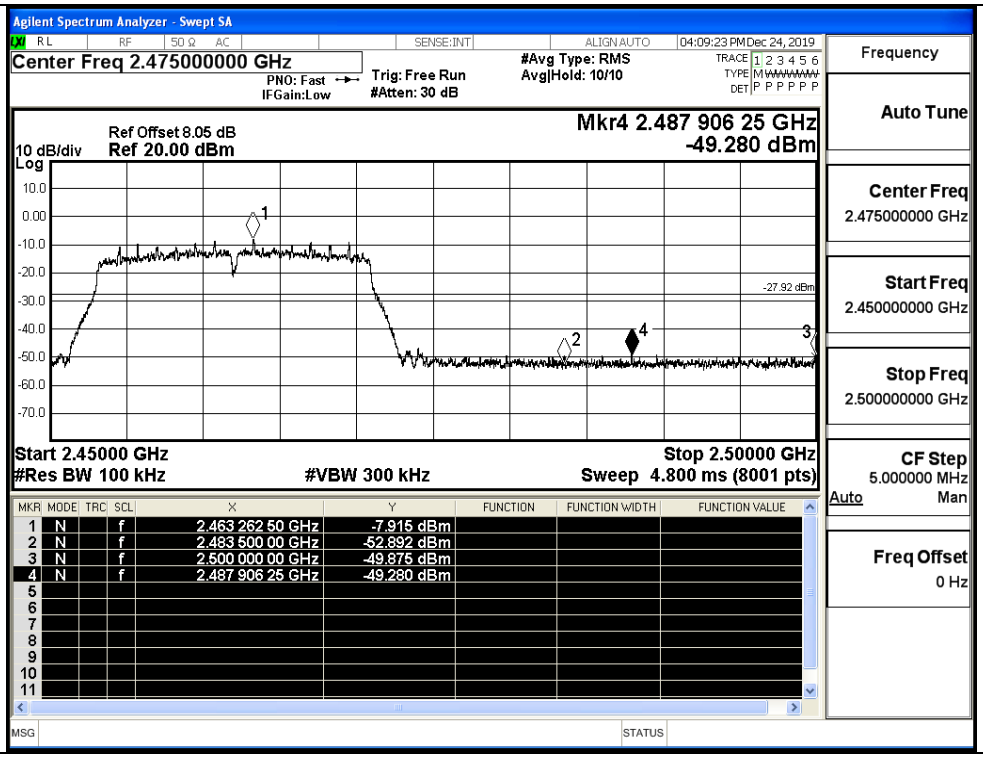
Ant1

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	3.054	-49.394	-16.95	PASS
	HCH	1.925	-49.195	-18.08	PASS
11G	LCH	-6.178	-49.874	-26.18	PASS
	HCH	-5.790	-49.356	-25.79	PASS
11N20SISO	LCH	-8.313	-49.444	-28.31	PASS
	HCH	-7.915	-49.280	-27.92	PASS

Test Graphs	
11B/LCH	

11B/HCH	
11G/LCH	

11G/HCH	
11N20SISO/LCH	

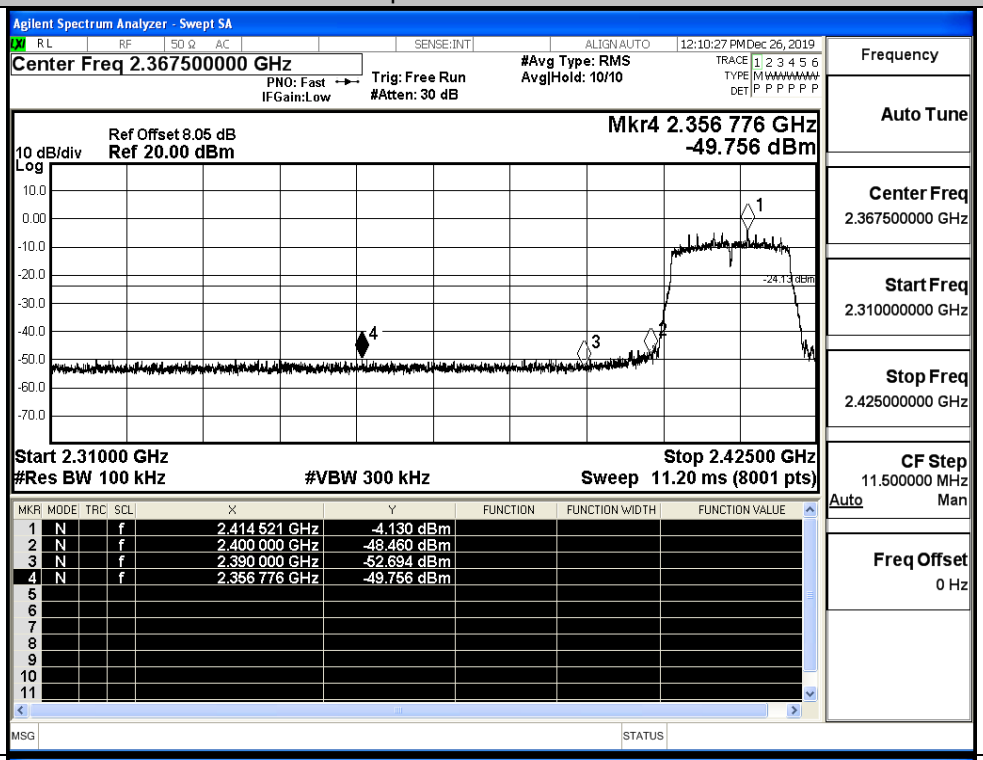
11N20SISO/HCH	

Ant0+1

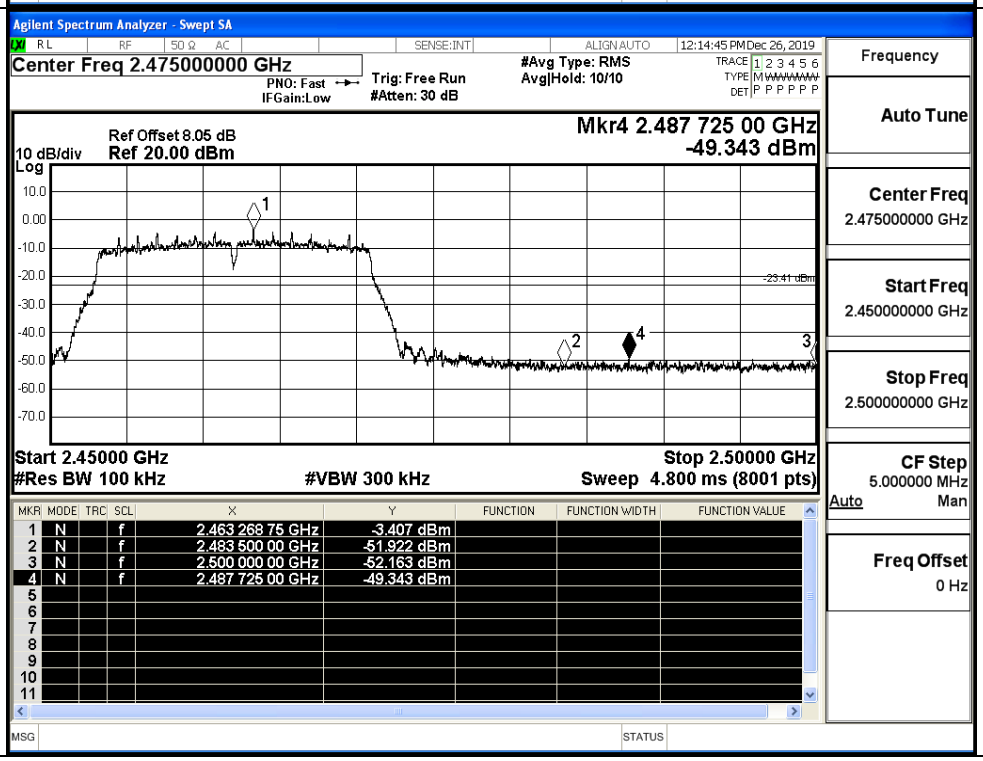
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11N20SISO	LCH	-4.130	-49.756	-24.13	PASS
	HCH	-3.407	-49.343	-23.41	PASS

Test Graphs

11N20SISO/LCH



11N20SISO/HCH



C.7 Restrict-band band-edge measurements

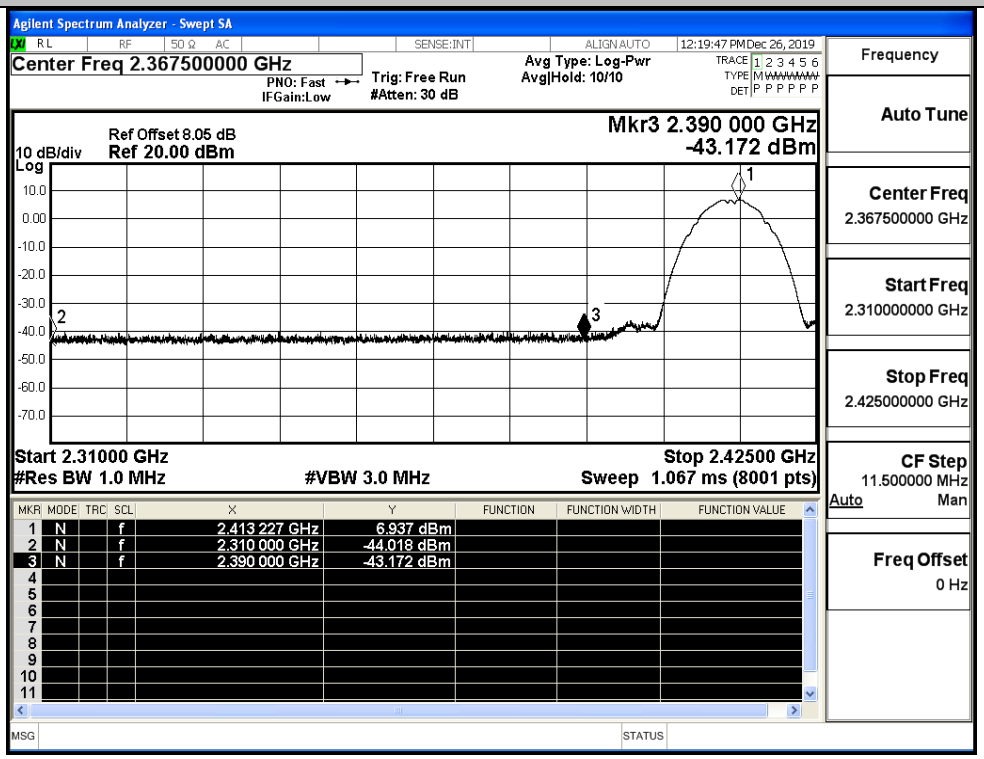
Ant0

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
11B	2412	Ant1	2310.0	-44.02	-3.7	0	53.24	PEAK	74	PASS
	2412	Ant1	2310.0	-53.46	-3.7	0	43.80	AV	54	PASS
	2412	Ant1	2390.0	-43.17	-3.7	0	54.09	PEAK	74	PASS
	2412	Ant1	2390.0	-52.99	-3.7	0	44.27	AV	54	PASS
	2462	Ant1	2483.5	-41.27	-3.7	0	55.98	PEAK	74	PASS
	2462	Ant1	2483.5	-52.52	-3.7	0	44.74	AV	54	PASS
	2462	Ant1	2500.0	-42.15	-3.7	0	55.11	PEAK	74	PASS
	2462	Ant1	2500.0	-52.39	-3.7	0	44.87	AV	54	PASS
11G	2412	Ant1	2310.0	-42.52	-3.7	0	54.74	PEAK	74	PASS
	2412	Ant1	2310.0	-53.45	-3.7	0	43.81	AV	54	PASS
	2412	Ant1	2390.0	-41.73	-3.7	0	55.53	PEAK	74	PASS
	2412	Ant1	2390.0	-52.81	-3.7	0	44.45	AV	54	PASS
	2462	Ant1	2483.5	-42.13	-3.7	0	55.13	PEAK	74	PASS
	2462	Ant1	2483.5	-52.50	-3.7	0	44.76	AV	54	PASS
	2462	Ant1	2500.0	-42.10	-3.7	0	55.16	PEAK	74	PASS
	2462	Ant1	2500.0	-52.43	-3.7	0	44.83	AV	54	PASS
11N20 SISO	2412	Ant1	2310.0	-43.54	-3.7	0	53.72	PEAK	74	PASS
	2412	Ant1	2310.0	-53.46	-3.7	0	43.80	AV	54	PASS
	2412	Ant1	2390.0	-41.41	-3.7	0	55.85	PEAK	74	PASS
	2412	Ant1	2390.0	-52.95	-3.7	0	44.31	AV	54	PASS
	2462	Ant1	2483.5	-42.29	-3.7	0	54.97	PEAK	74	PASS
	2462	Ant1	2483.5	-52.51	-3.7	0	44.74	AV	54	PASS
	2462	Ant1	2500.0	-42.68	-3.7	0	54.58	PEAK	74	PASS
	2462	Ant1	2500.0	-52.43	-3.7	0	44.83	AV	54	PASS

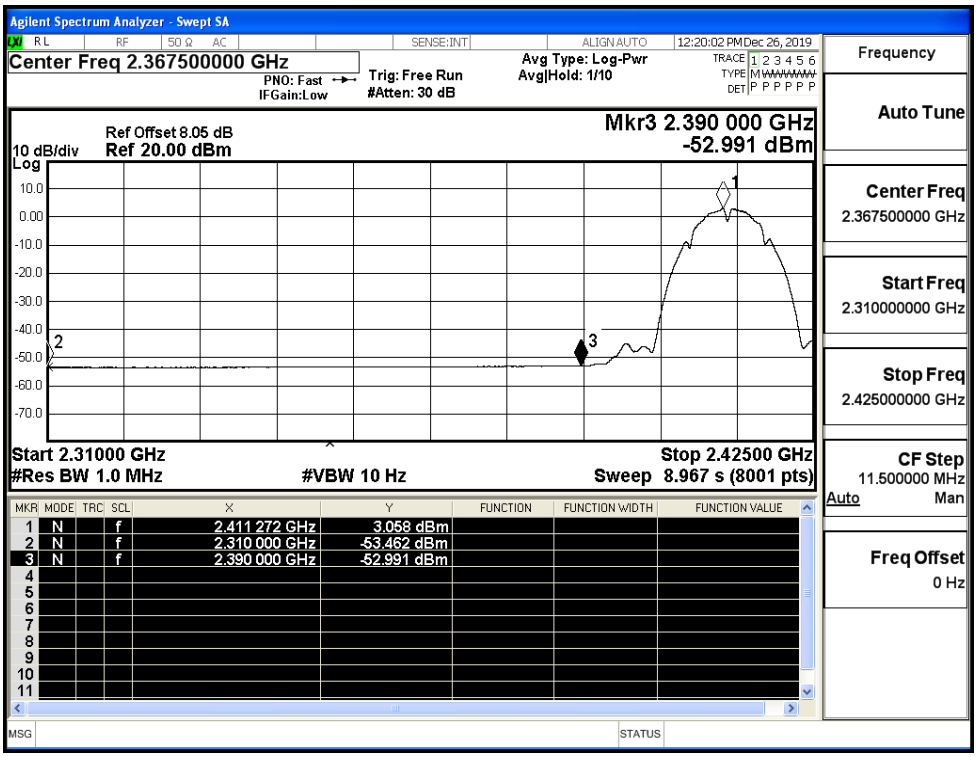
E [dBuV/m]= Power [dBm] + Gain + Ground Factor + 95.26

The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

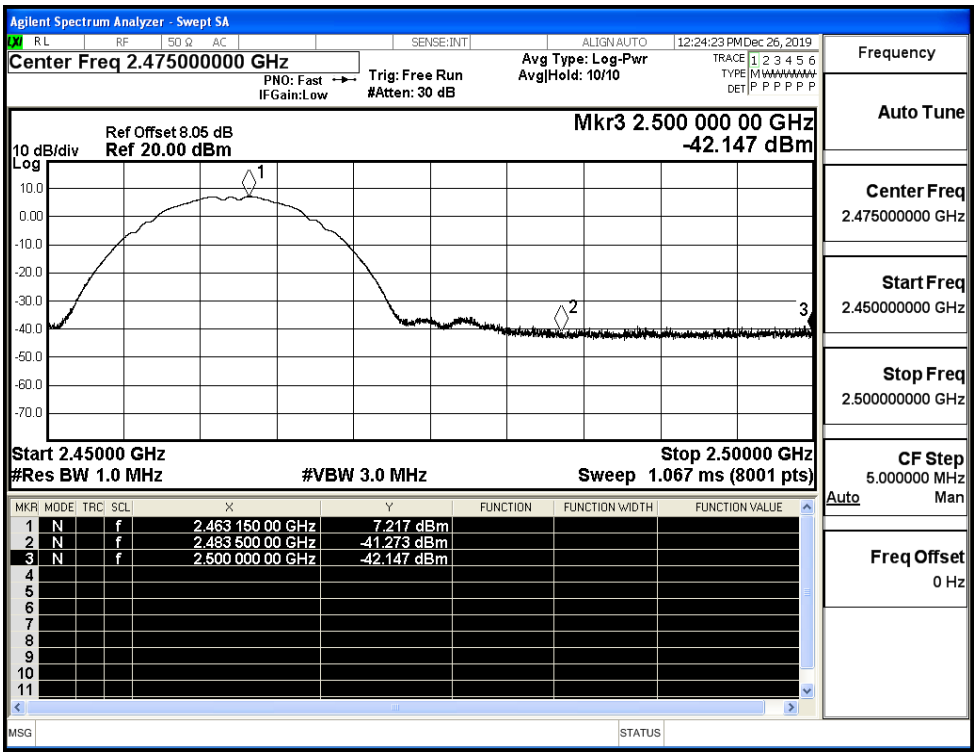
Restrict-band band-edge measurements_11B_2412_Ant1_PEAK



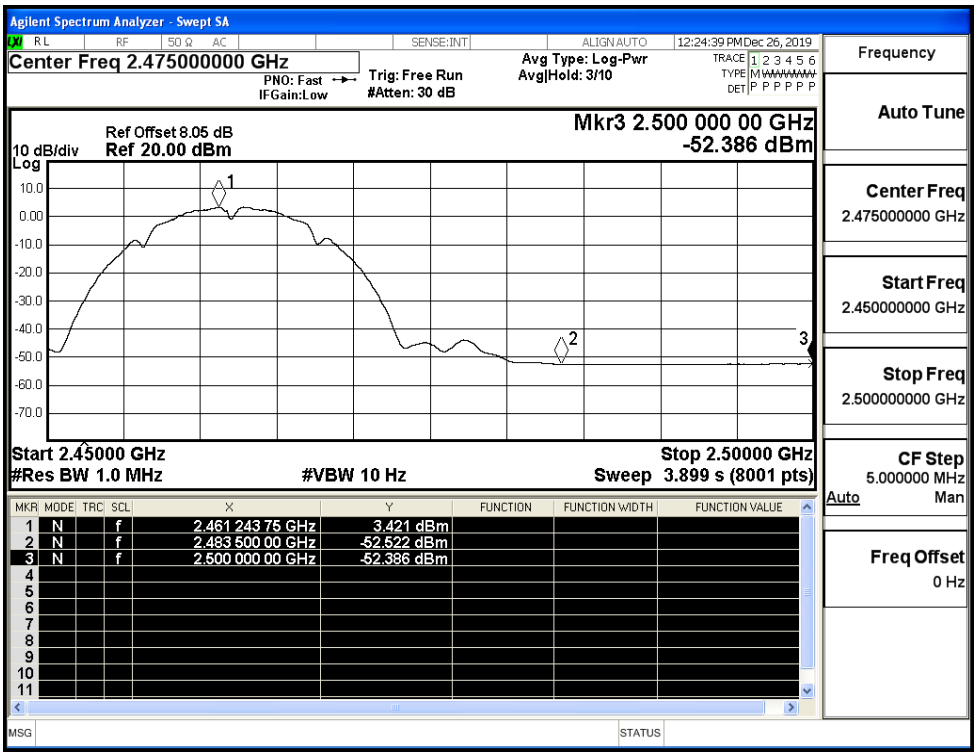
Restrict-band band-edge measurements_11B_2412_Ant1_AV



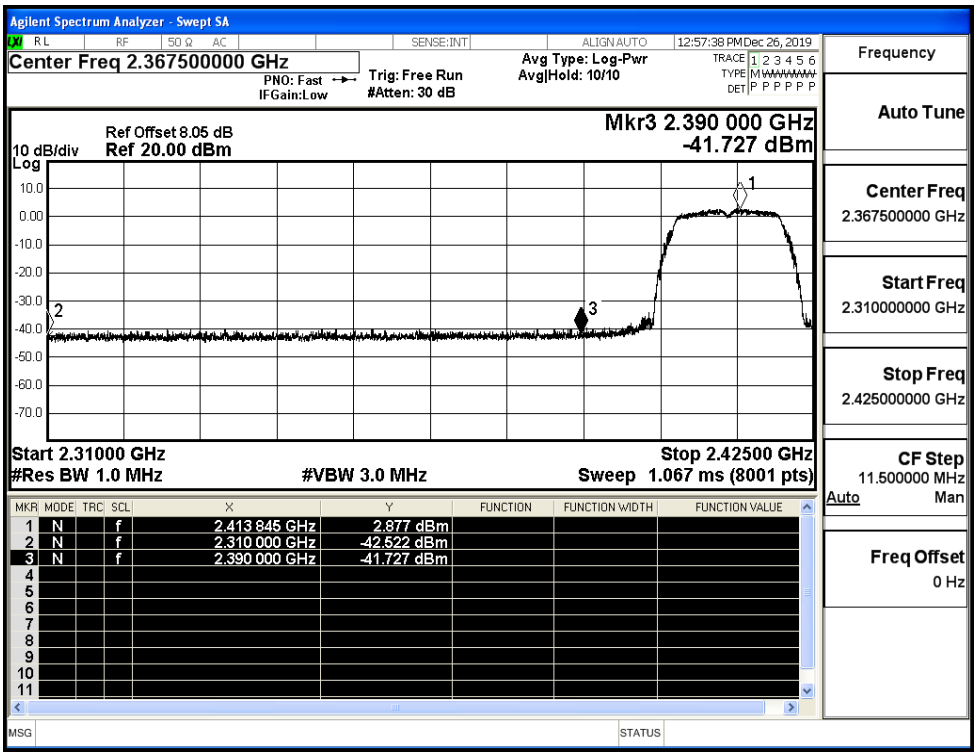
Restrict-band band-edge measurements_11B_2462_Ant1_PEAK



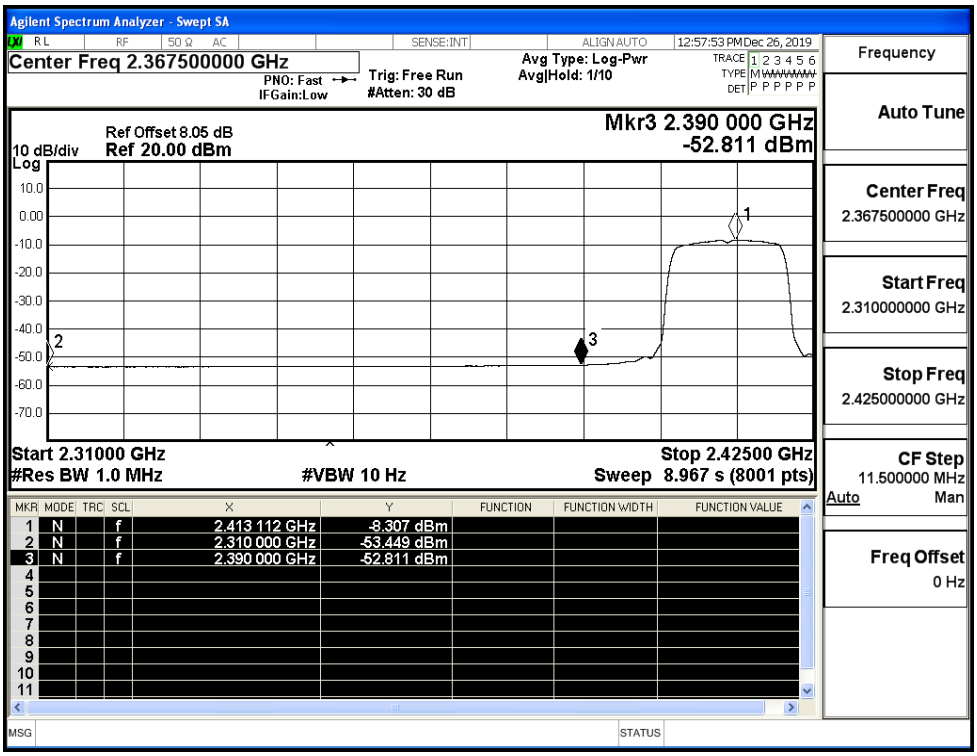
Restrict-band band-edge measurements_11B_2462_Ant1_AV



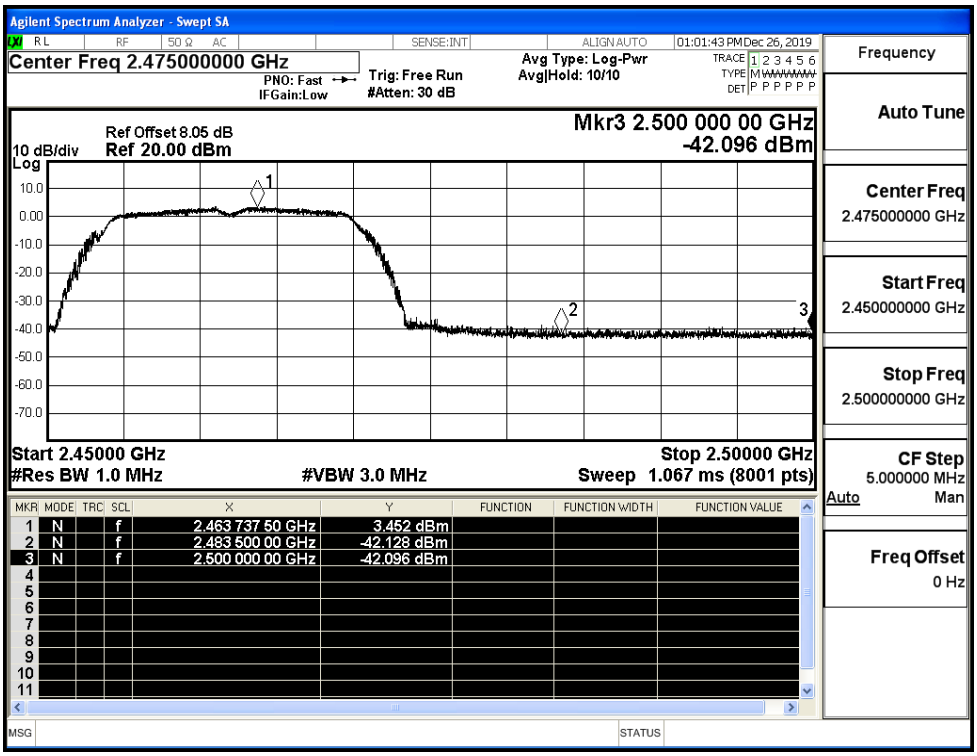
Restrict-band band-edge measurements_11G_2412_Ant1_PEAK



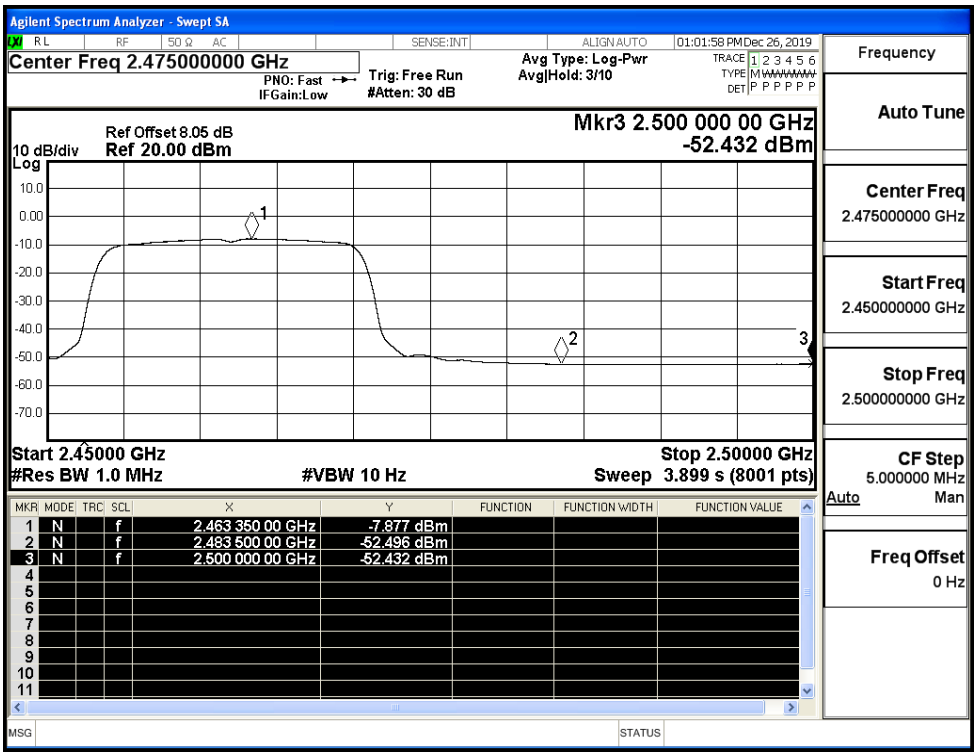
Restrict-band band-edge measurements_11G_2412_Ant1_AV



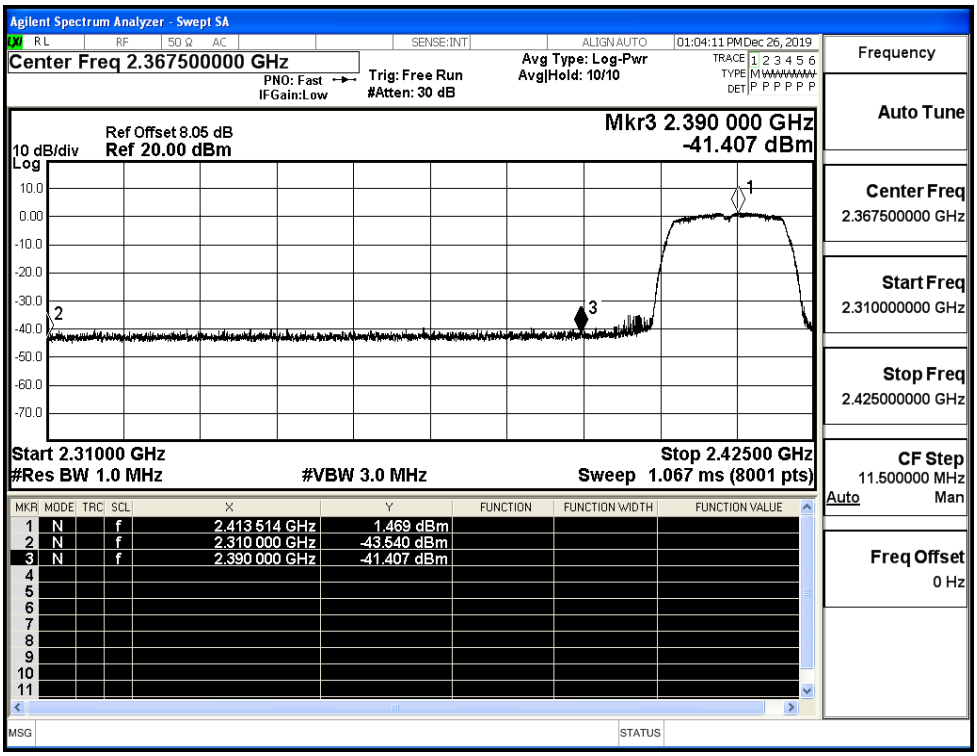
Restrict-band band-edge measurements_11G_2462_Ant1_PEAK



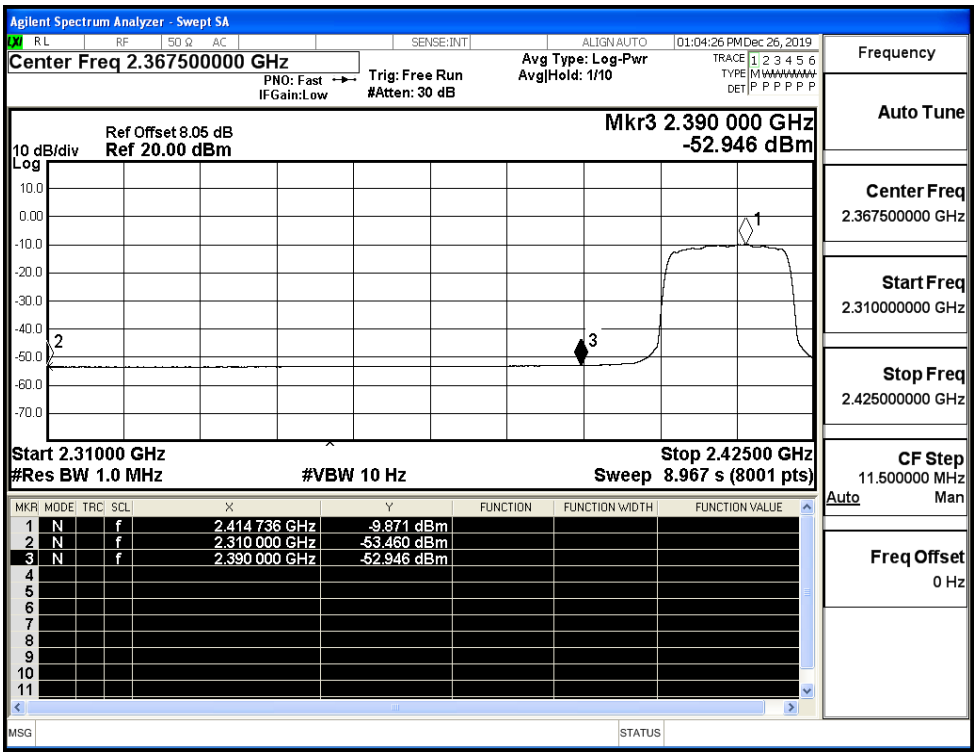
Restrict-band band-edge measurements_11G_2462_Ant1_AV



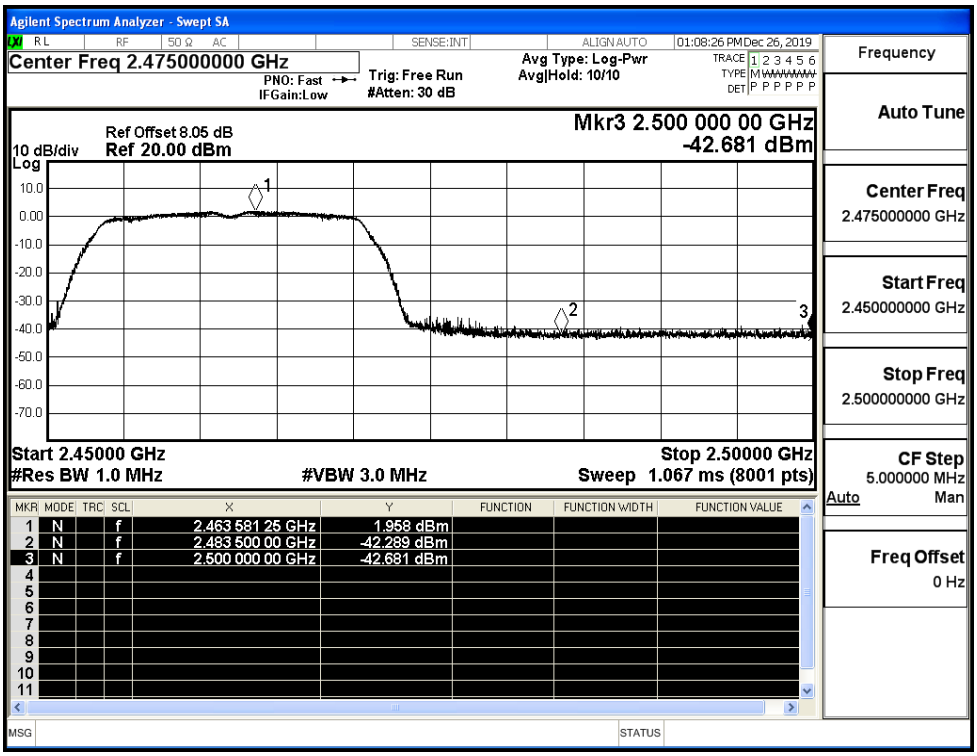
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



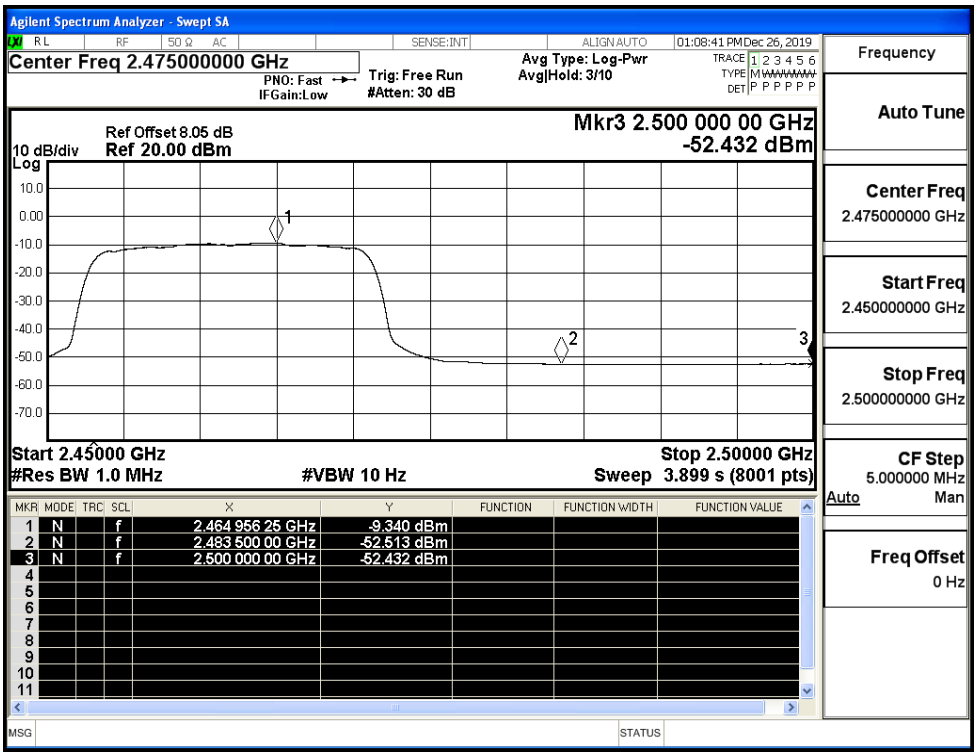
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV



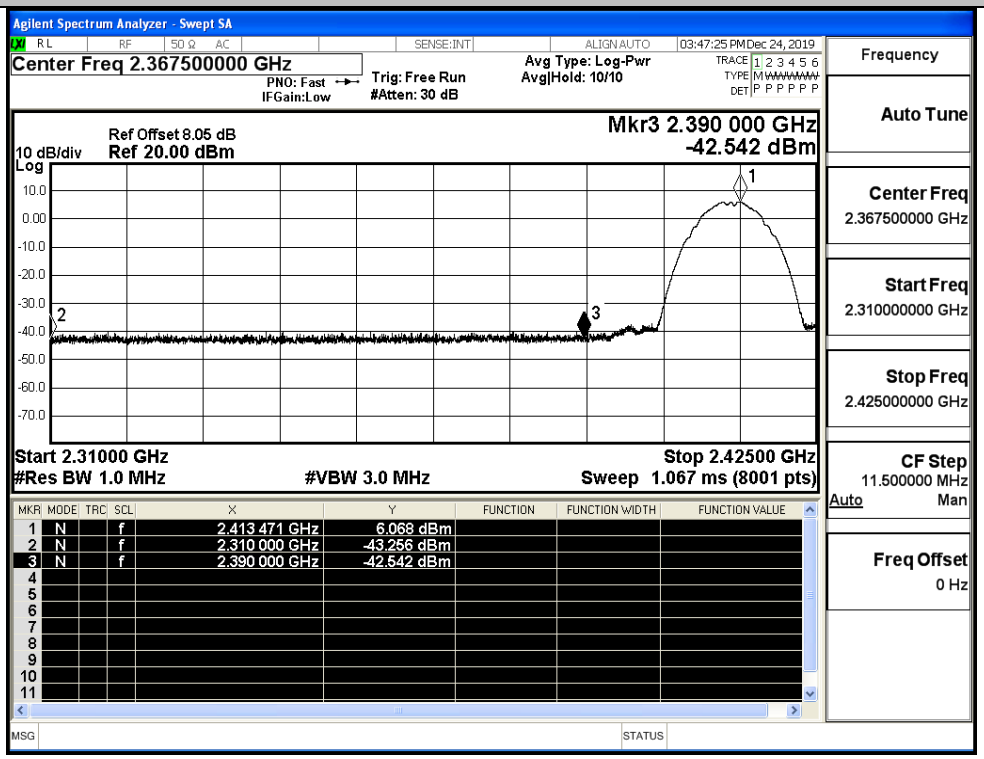
Ant1

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
11B	2412	Ant1	2310.0	-43.26	-3.7	0	54.00	PEAK	74	PASS
	2412	Ant1	2310.0	-53.44	-3.7	0	43.82	AV	54	PASS
	2412	Ant1	2390.0	-42.54	-3.7	0	54.72	PEAK	74	PASS
	2412	Ant1	2390.0	-52.98	-3.7	0	44.28	AV	54	PASS
	2462	Ant1	2483.5	-42.21	-3.7	0	55.05	PEAK	74	PASS
	2462	Ant1	2483.5	-52.65	-3.7	0	44.61	AV	54	PASS
	2462	Ant1	2500.0	-40.50	-3.7	0	56.76	PEAK	74	PASS
	2462	Ant1	2500.0	-52.45	-3.7	0	44.81	AV	54	PASS
11G	2412	Ant1	2310.0	-43.03	-3.7	0	54.23	PEAK	74	PASS
	2412	Ant1	2310.0	-53.49	-3.7	0	43.76	AV	54	PASS
	2412	Ant1	2390.0	-42.22	-3.7	0	55.04	PEAK	74	PASS
	2412	Ant1	2390.0	-52.95	-3.7	0	44.31	AV	54	PASS
	2462	Ant1	2483.5	-42.08	-3.7	0	55.18	PEAK	74	PASS
	2462	Ant1	2483.5	-52.60	-3.7	0	44.66	AV	54	PASS
	2462	Ant1	2500.0	-42.00	-3.7	0	55.26	PEAK	74	PASS
	2462	Ant1	2500.0	-52.45	-3.7	0	44.81	AV	54	PASS
11N20 SISO	2412	Ant1	2310.0	-43.08	-3.7	0	54.18	PEAK	74	PASS
	2412	Ant1	2310.0	-53.55	-3.7	0	43.70	AV	54	PASS
	2412	Ant1	2390.0	-43.21	-3.7	0	54.04	PEAK	74	PASS
	2412	Ant1	2390.0	-53.05	-3.7	0	44.21	AV	54	PASS
	2462	Ant1	2483.5	-42.96	-3.7	0	54.30	PEAK	74	PASS
	2462	Ant1	2483.5	-52.67	-3.7	0	44.59	AV	54	PASS
	2462	Ant1	2500.0	-41.85	-3.7	0	55.41	PEAK	74	PASS
	2462	Ant1	2500.0	-52.52	-3.7	0	44.74	AV	54	PASS

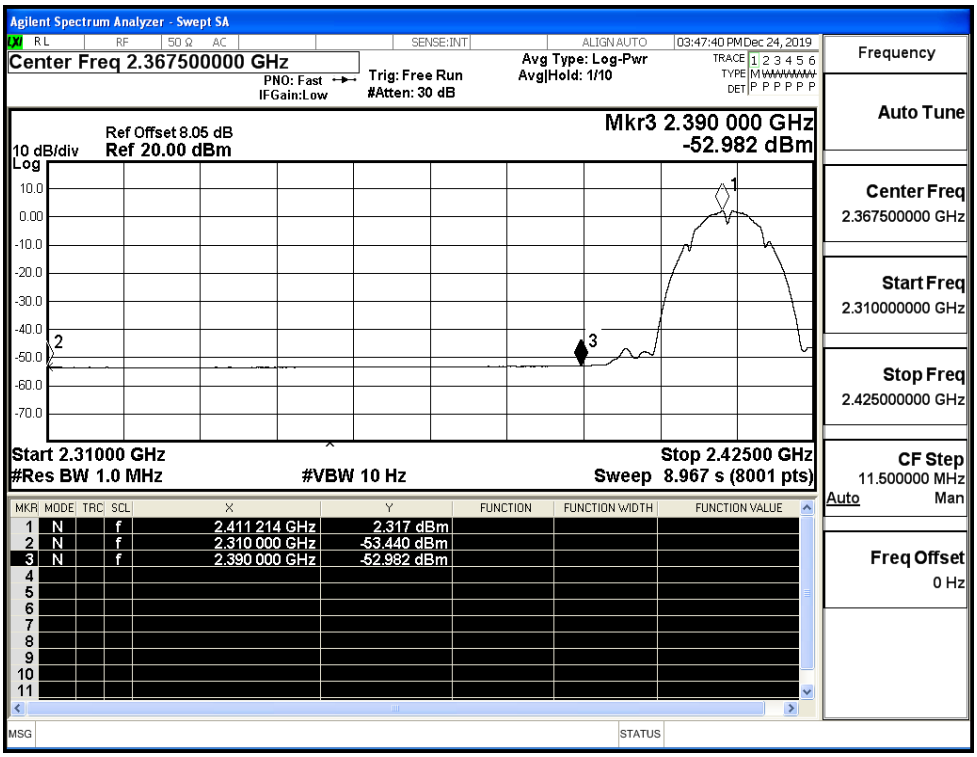
E [dBuV/m]= Power [dBm] + Gain + Ground Factor + 95.26

The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

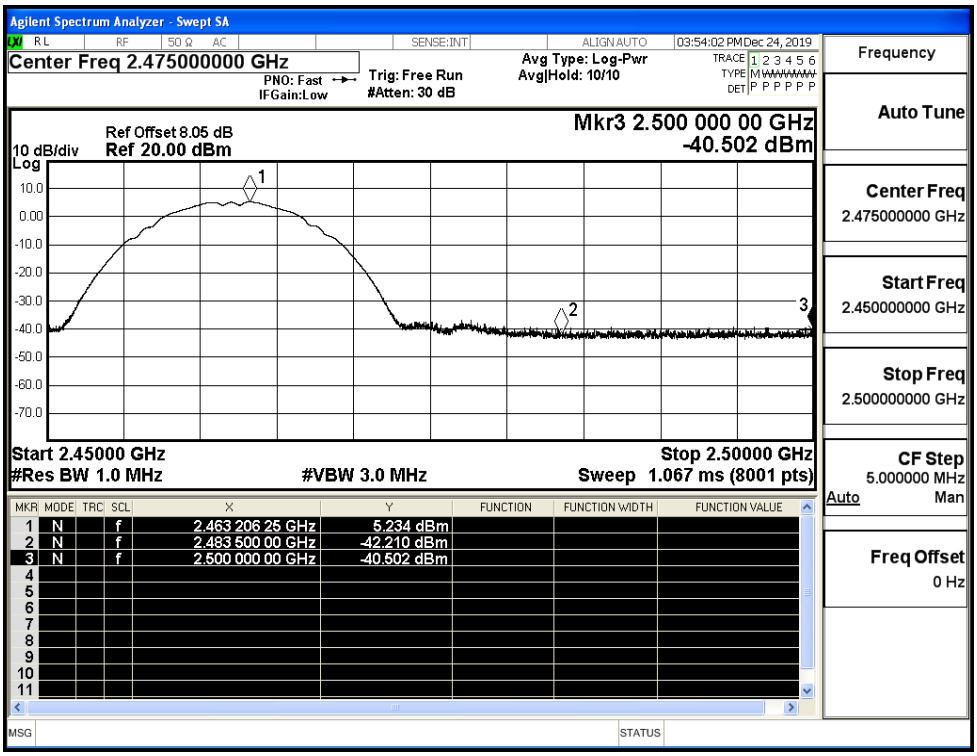
Restrict-band band-edge measurements_11B_2412_Ant1_PEAK



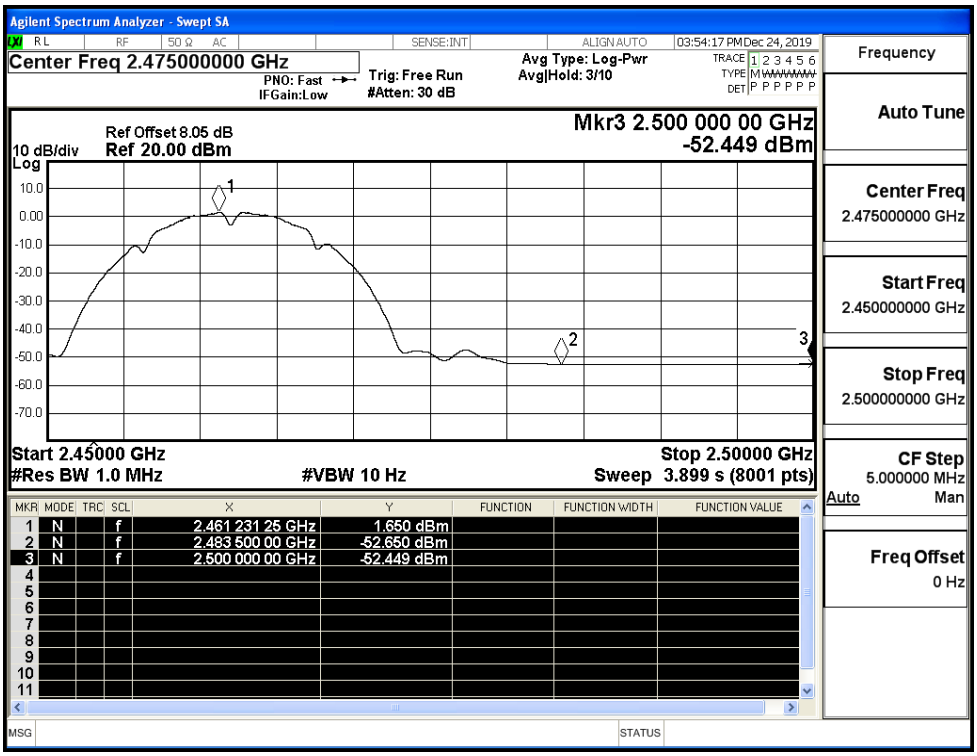
Restrict-band band-edge measurements_11B_2412_Ant1_AV



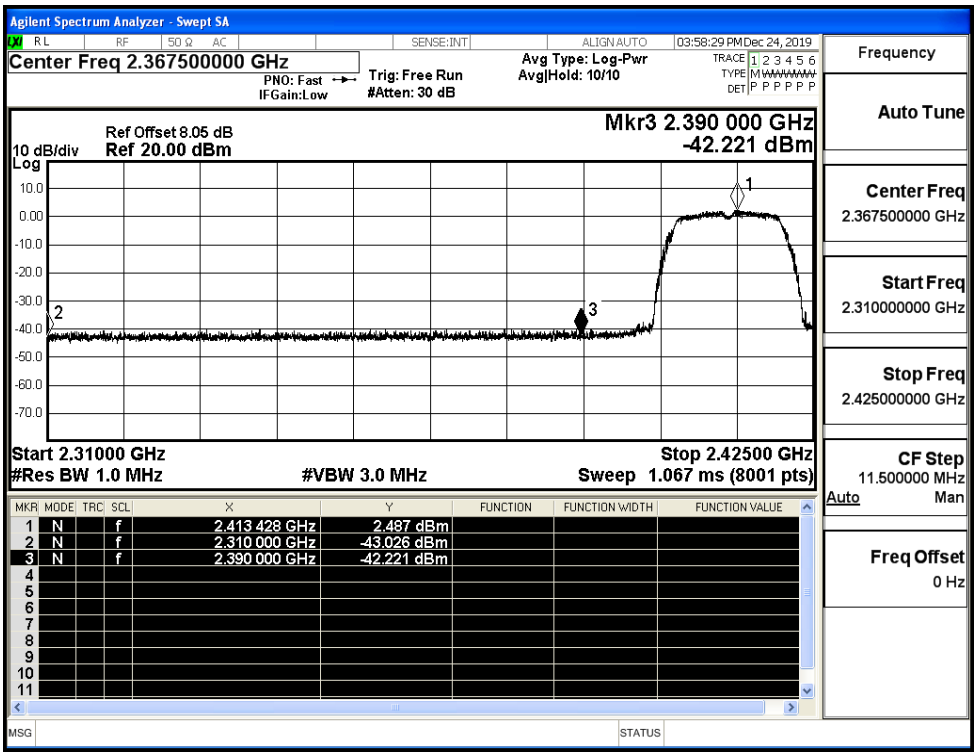
Restrict-band band-edge measurements_11B_2462_Ant1_PEAK



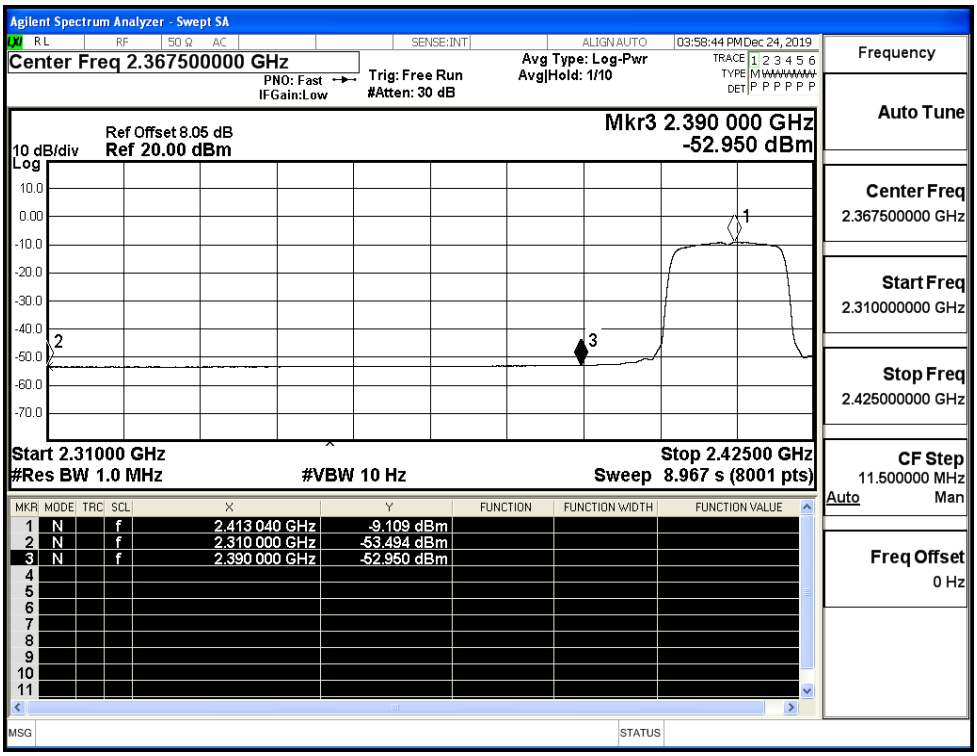
Restrict-band band-edge measurements_11B_2462_Ant1_AV



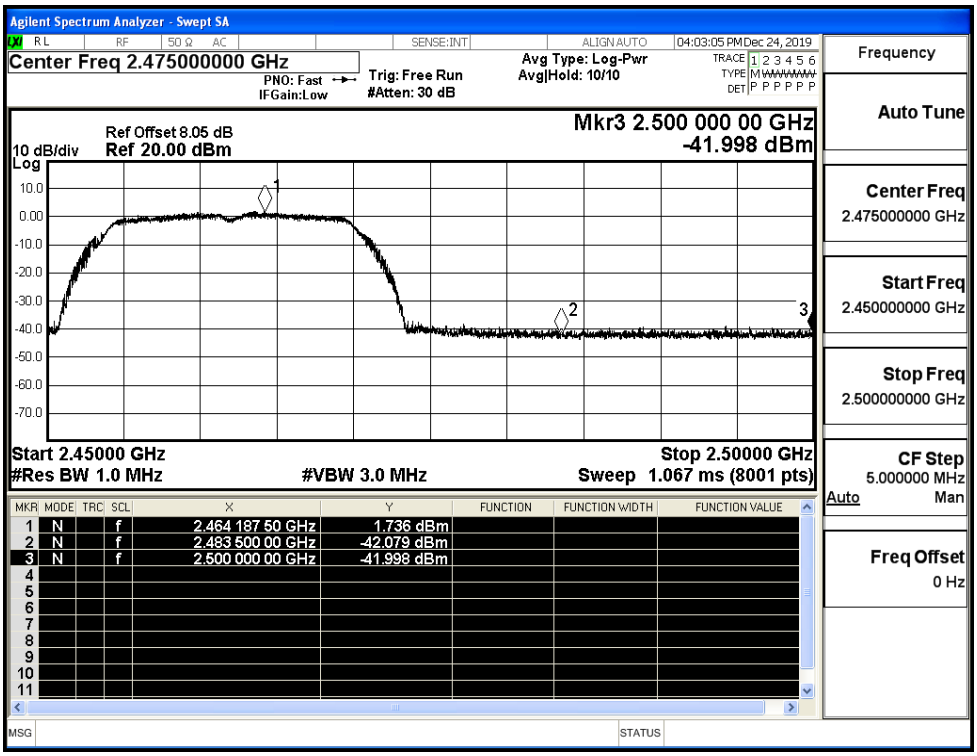
Restrict-band band-edge measurements_11G_2412_Ant1_PEAK



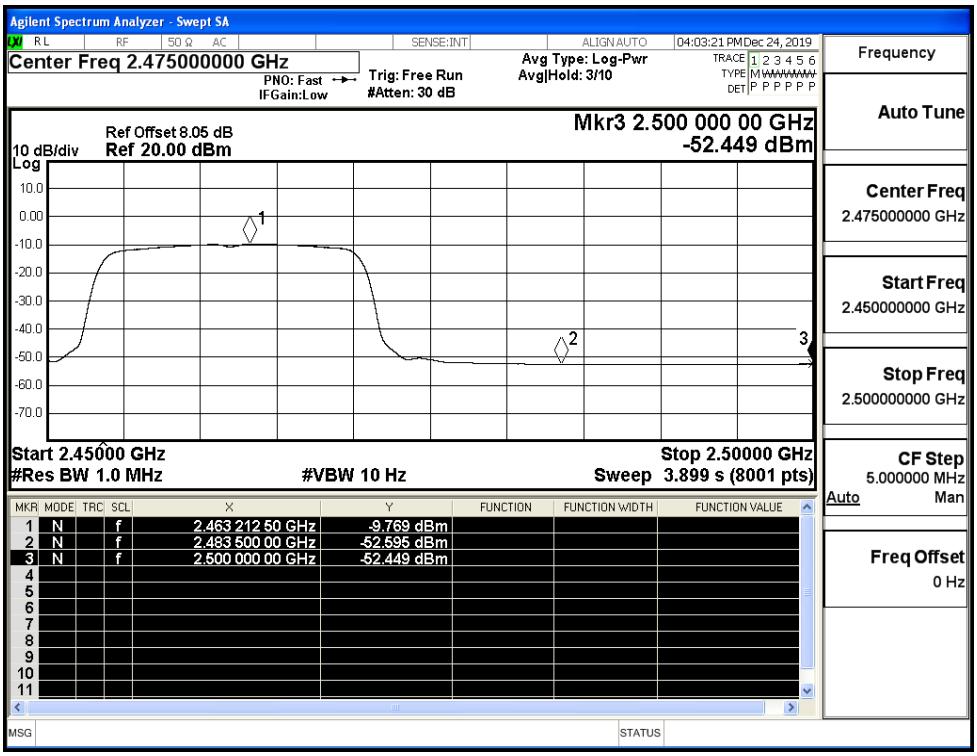
Restrict-band band-edge measurements_11G_2412_Ant1_AV



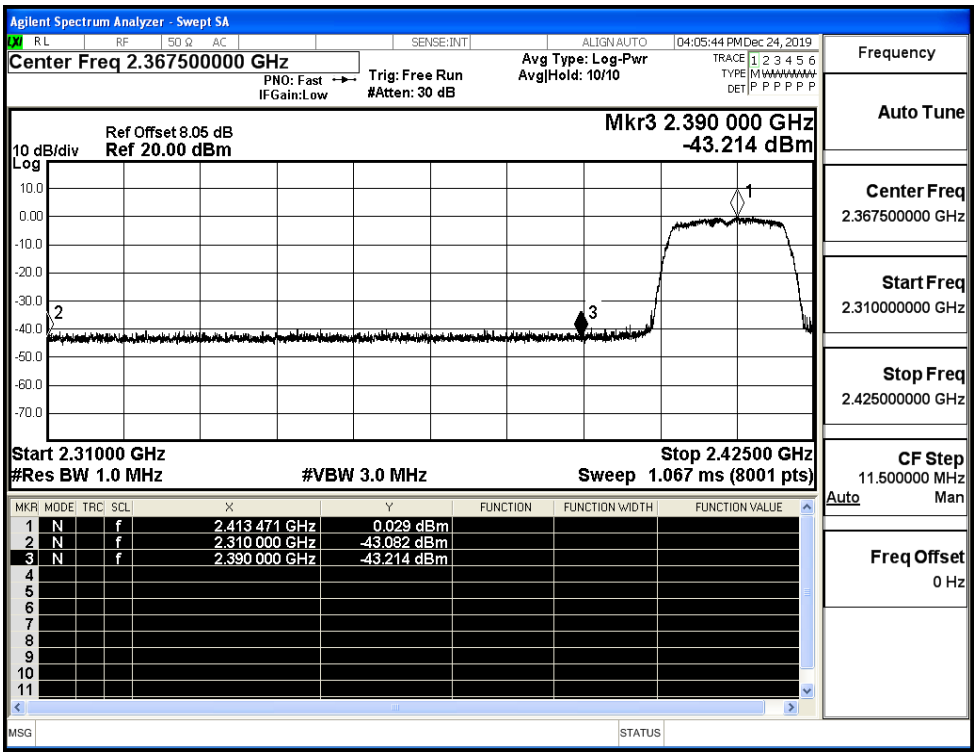
Restrict-band band-edge measurements_11G_2462_Ant1_PEAK



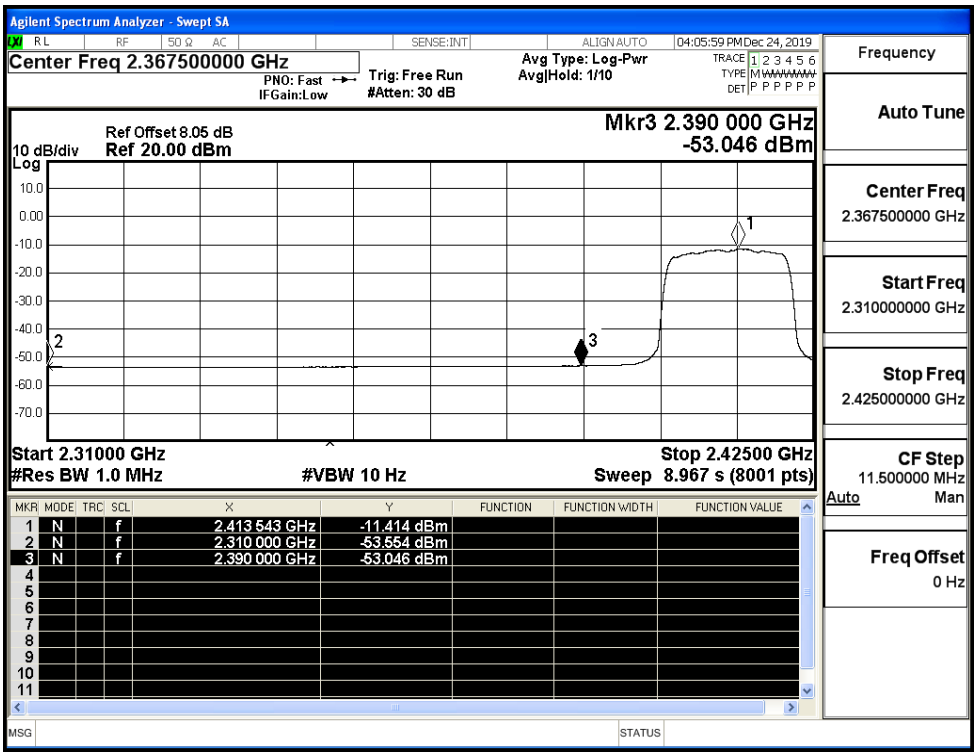
Restrict-band band-edge measurements_11G_2462_Ant1_AV



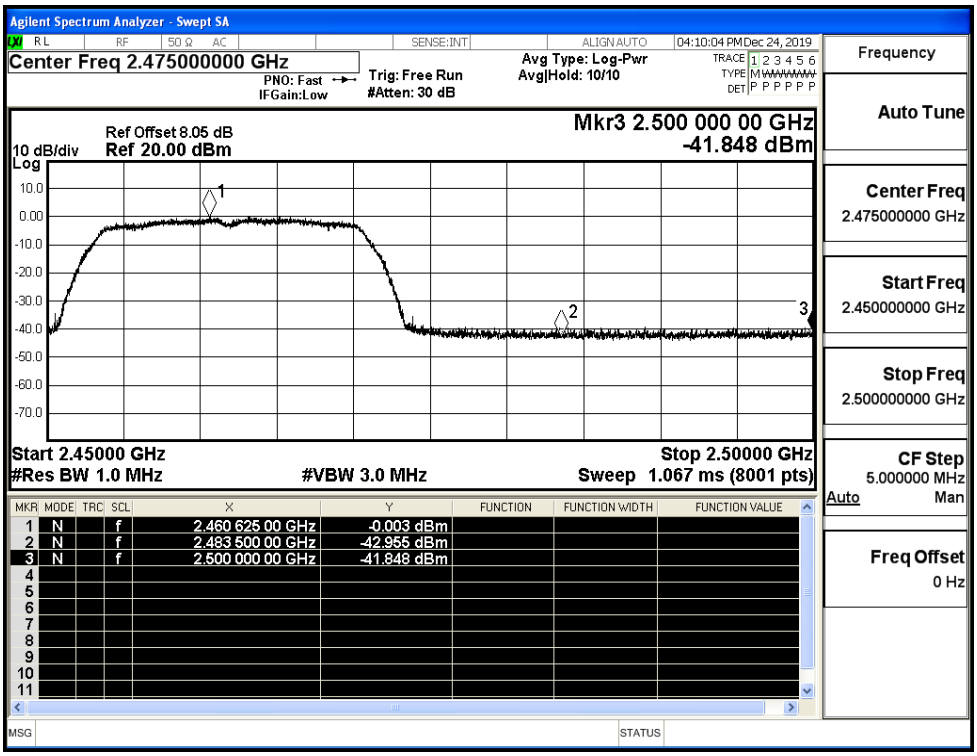
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



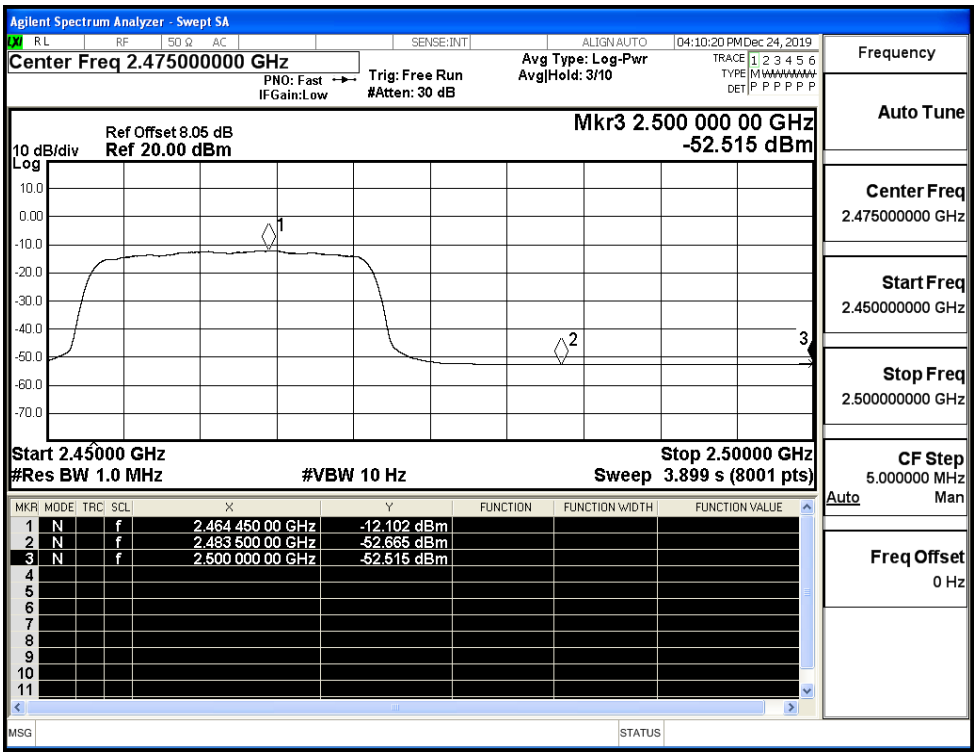
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV



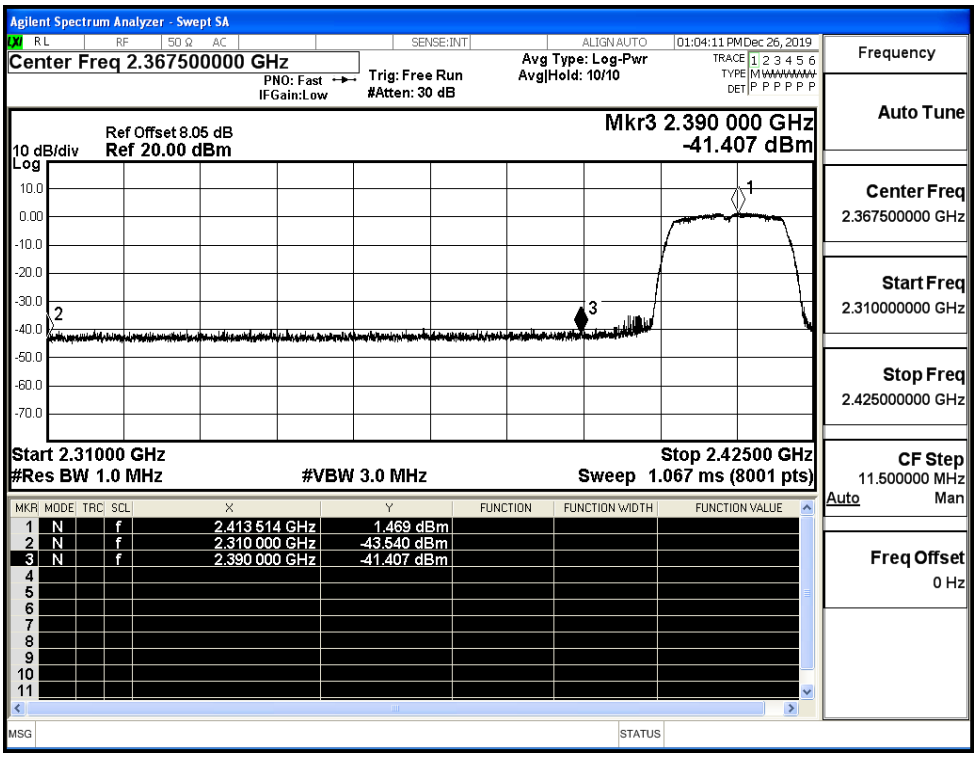
Ant0+1

Test Mode	Test Channel	Ant	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
11N20 SISO	2412	Ant1	2310.0	-40.29	-0.69	0	56.97	PEAK	74	PASS
	2412	Ant1	2310.0	-50.49	-0.69	0	46.77	AV	54	PASS
	2412	Ant1	2390.0	-39.21	-0.69	0	58.05	PEAK	74	PASS
	2412	Ant1	2390.0	-49.99	-0.69	0	47.27	AV	54	PASS
	2462	Ant1	2483.5	-39.60	-0.69	0	57.66	PEAK	74	PASS
	2462	Ant1	2483.5	-49.58	-0.69	0	47.68	AV	54	PASS
	2462	Ant1	2500.0	-39.23	-0.69	0	58.03	PEAK	74	PASS
	2462	Ant1	2500.0	-49.46	-0.69	0	47.80	AV	54	PASS

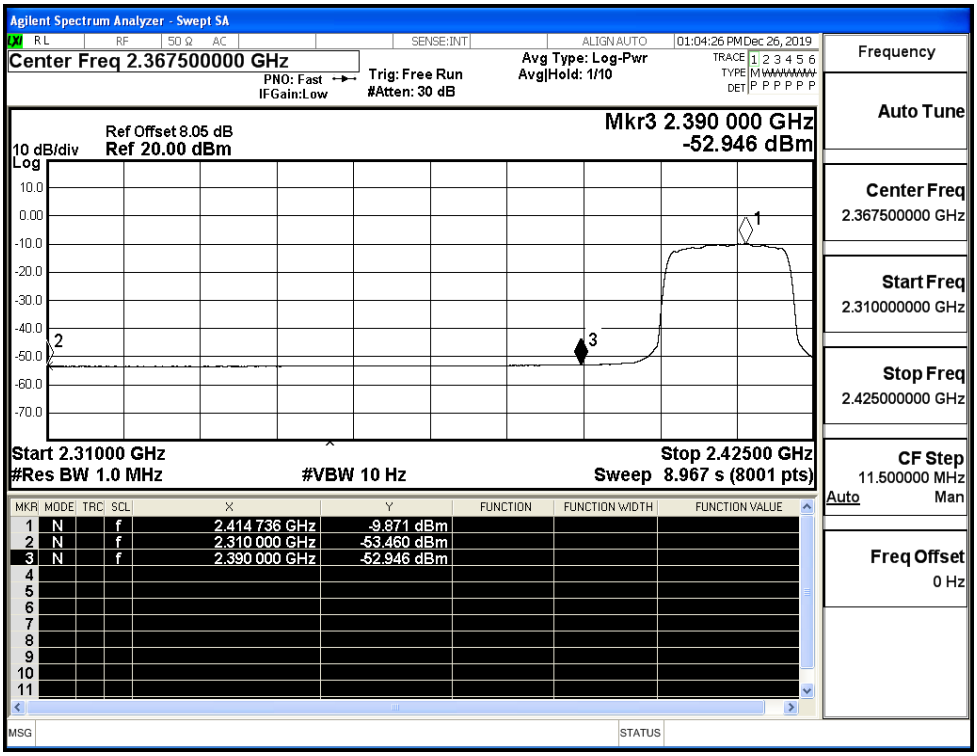
E [dBuV/m]= Power [dBm] + Gain + Ground Factor + 95.26

The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

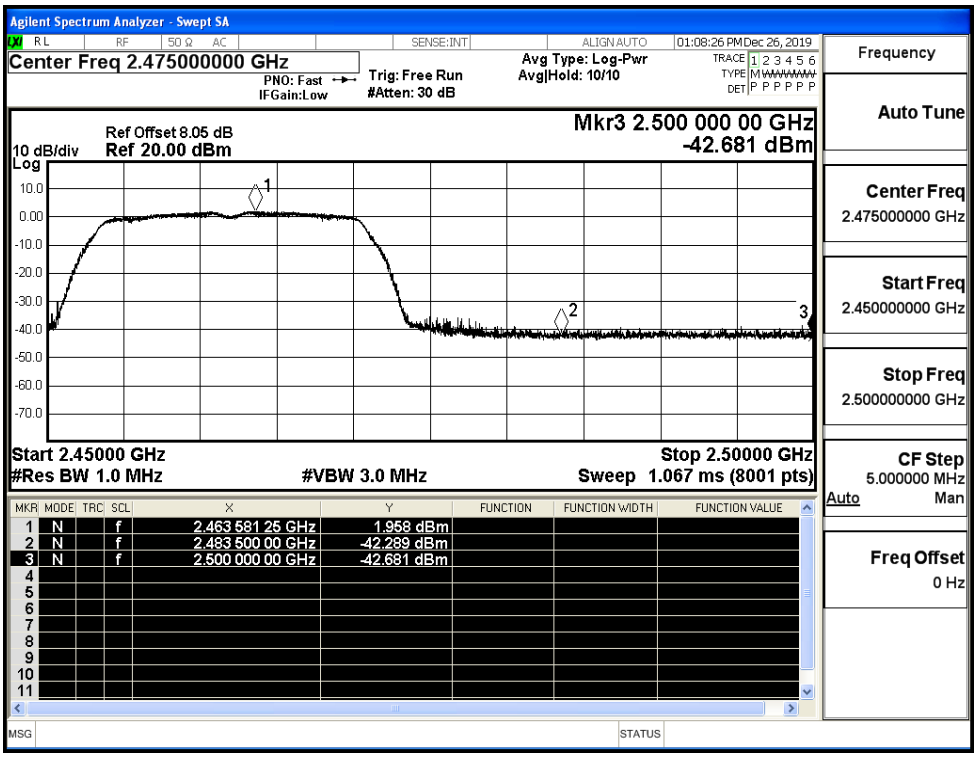
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



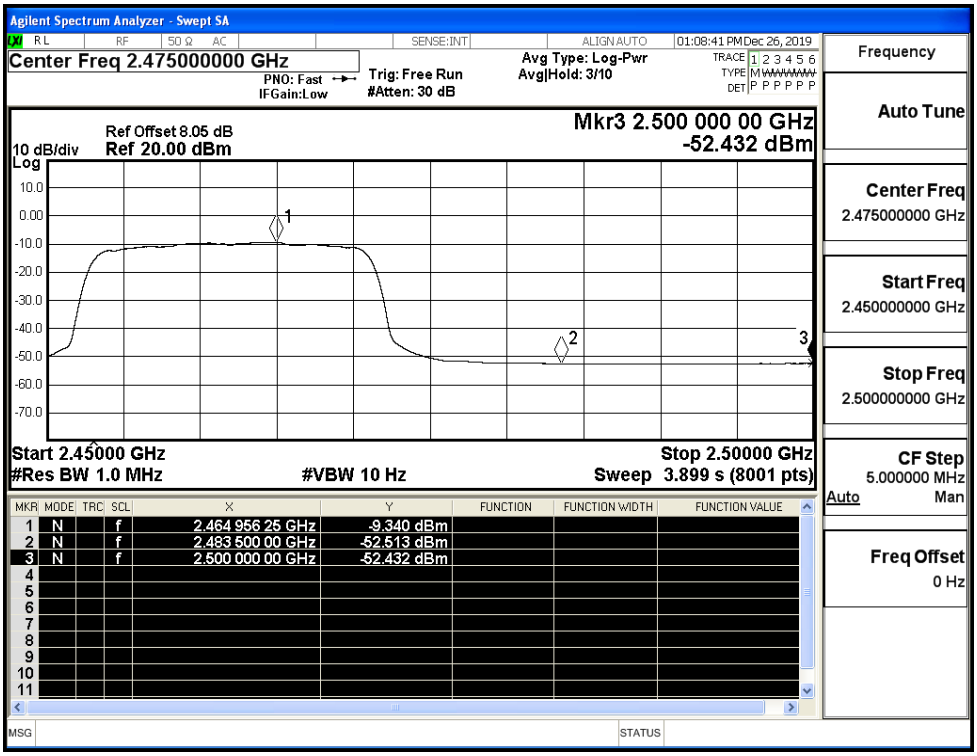
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



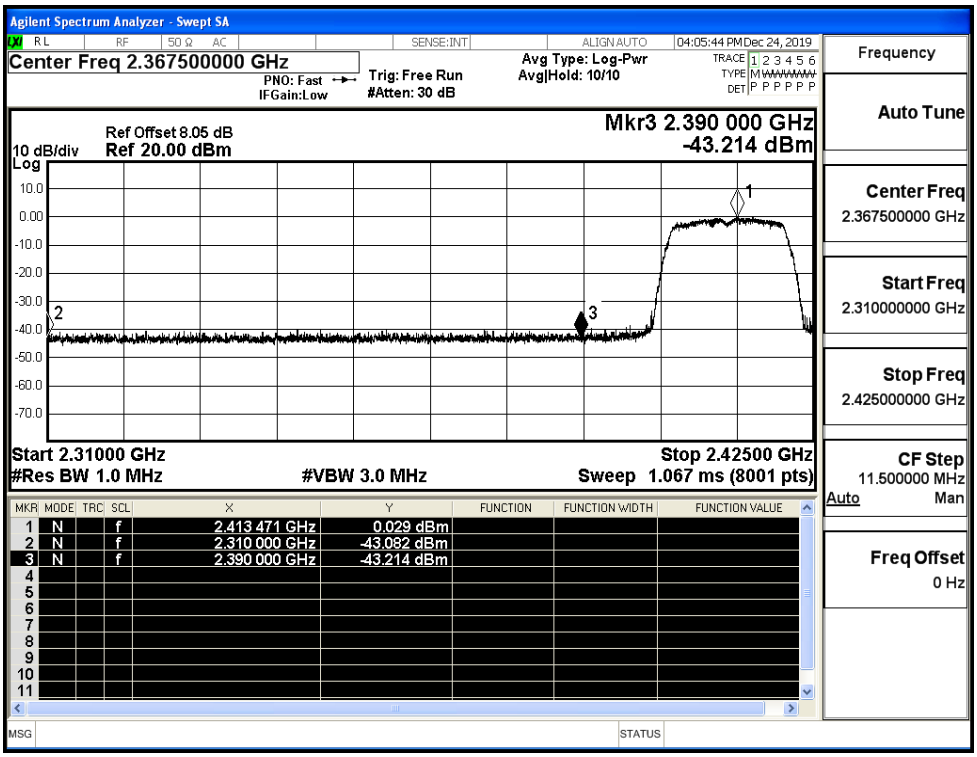
Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



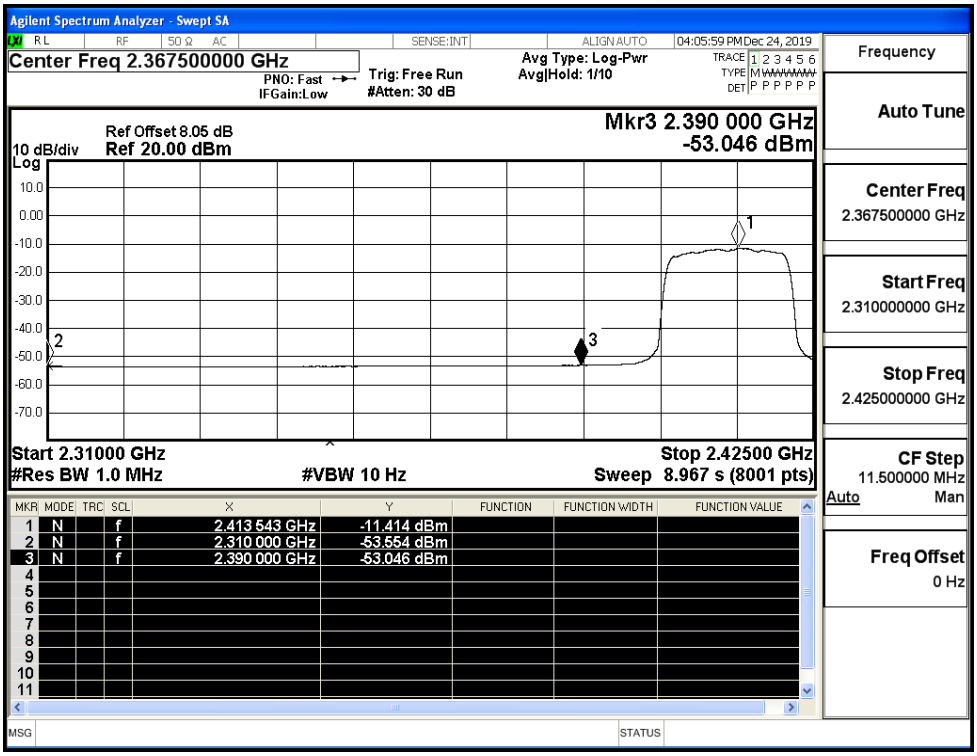
Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
01:08:41 PM Dec 26, 2019
Center Freq 2.475000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 3/10
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P P
Ref Offset 8.05 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr3 2.500 000 00 GHz
-52.432 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.45000 GHz
#Res BW 1.0 MHz
#VBW 10 Hz
Stop 2.50000 GHz
Sweep 3.899 s (8001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N f 2.464 956 25 GHz -9.340 dBm
2 N f 2.483 500 00 GHz -52.513 dBm
3 N f 2.500 000 00 GHz -52.432 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

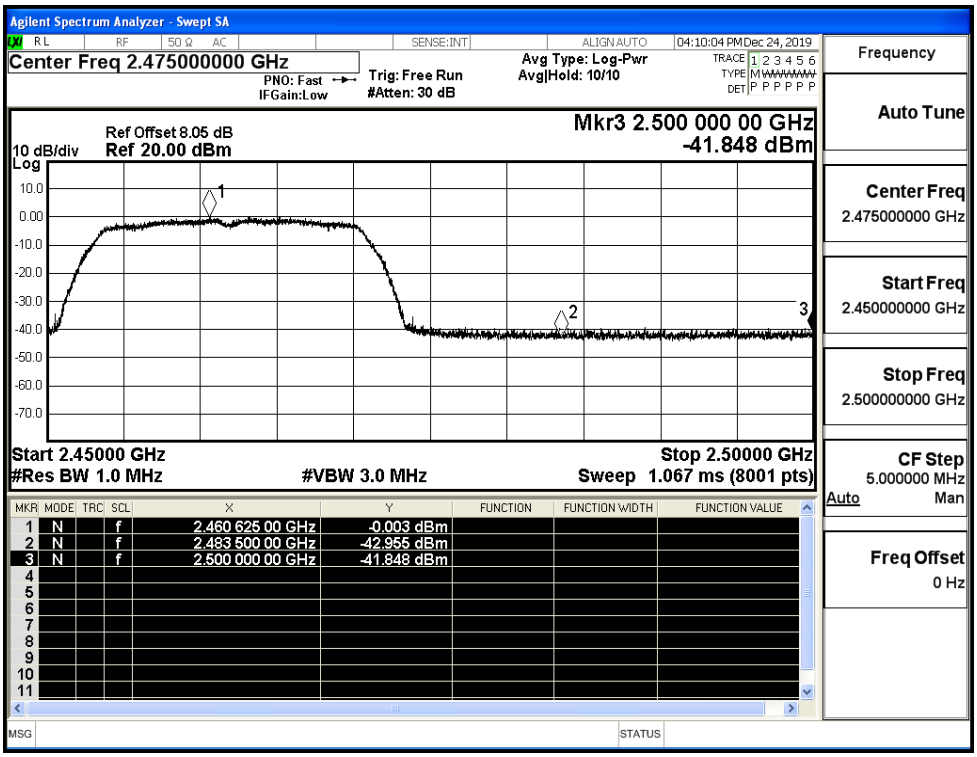
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_PEAK



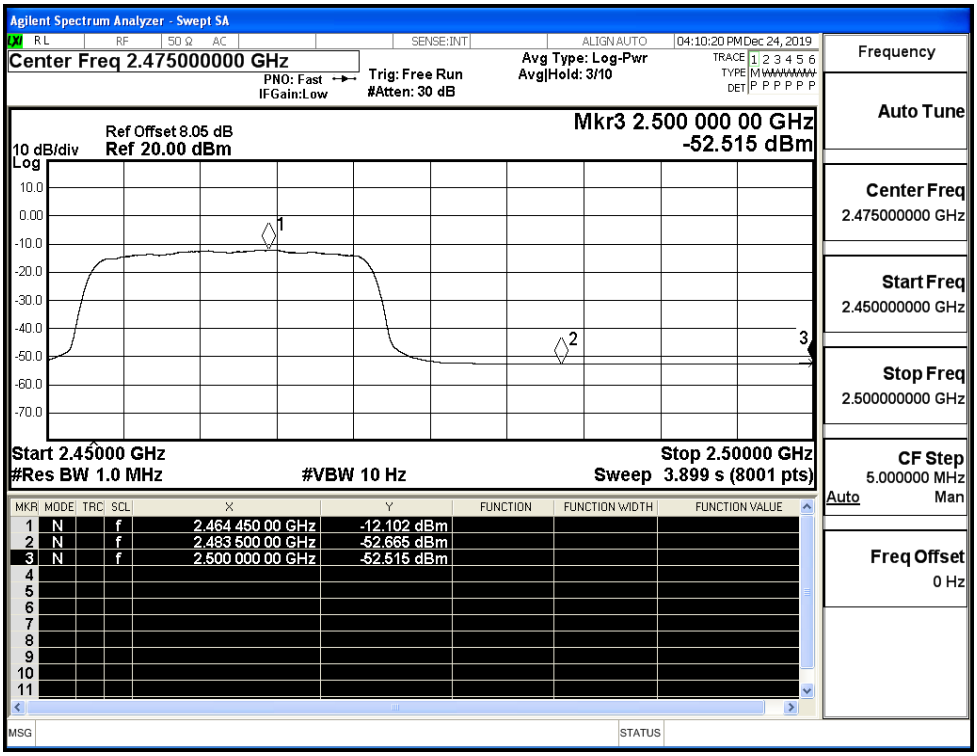
Restrict-band band-edge measurements_11N20SISO_2412_Ant1_AV



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_PEAK



Restrict-band band-edge measurements_11N20SISO_2462_Ant1_AV


Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
04:10:20 PM Dec 24, 2019
Center Freq 2.475000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 3/10
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P P
Ref Offset 8.05 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr3 2.500 000 00 GHz
-52.515 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.45000 GHz
#Res BW 1.0 MHz
#VBW 10 Hz
Stop 2.50000 GHz
Sweep 3.899 s (8001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N f 2.464 450 00 GHz -12.102 dBm
2 N f 2.483 500 00 GHz -52.665 dBm
3 N f 2.500 000 00 GHz -52.515 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