Appendix A

RF Test Data for BT V4.0 (BDR/EDR) (Conducted Measurement)

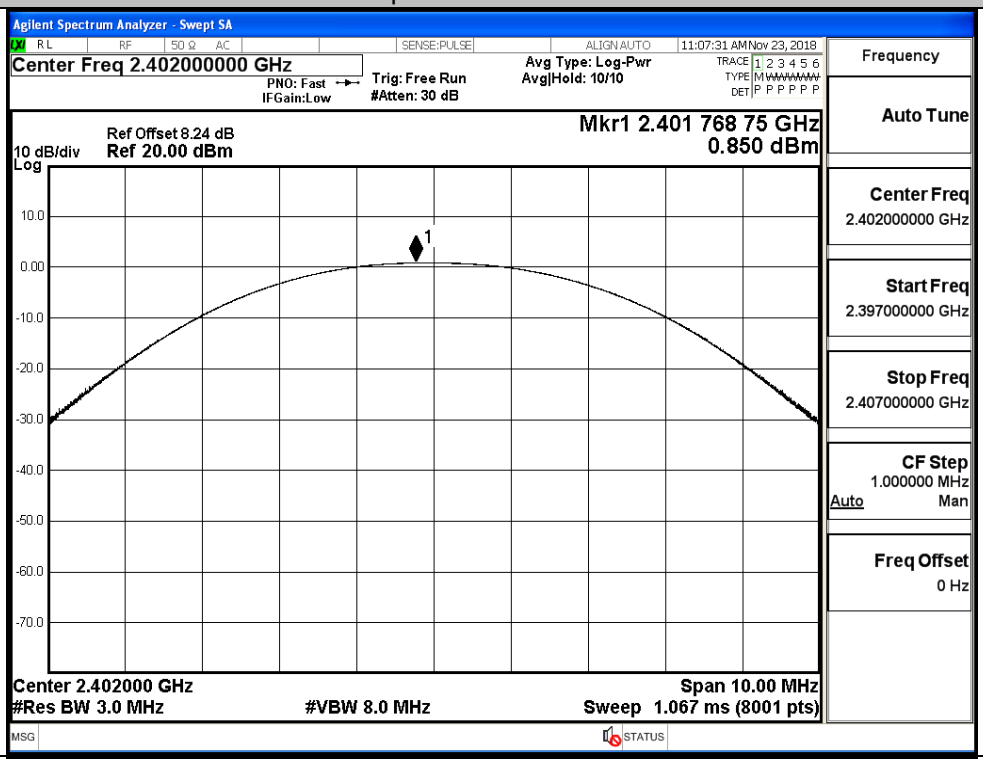
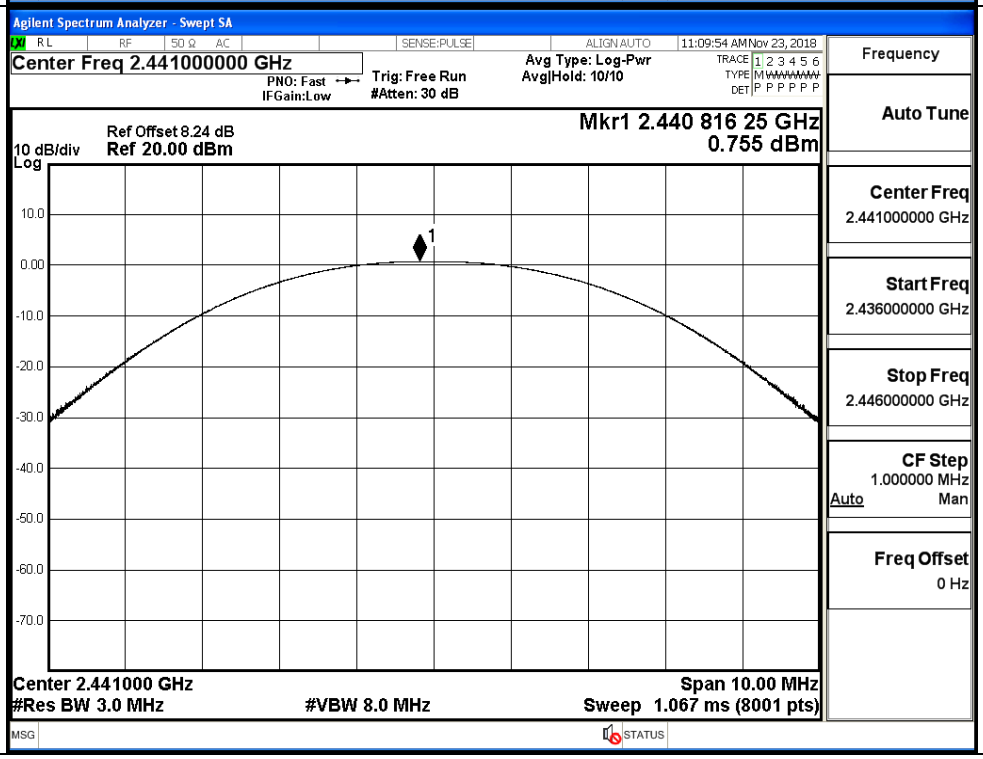
Product Name: Bluetooth Speaker
Trade Mark: N/A
Test Model: MS-F1

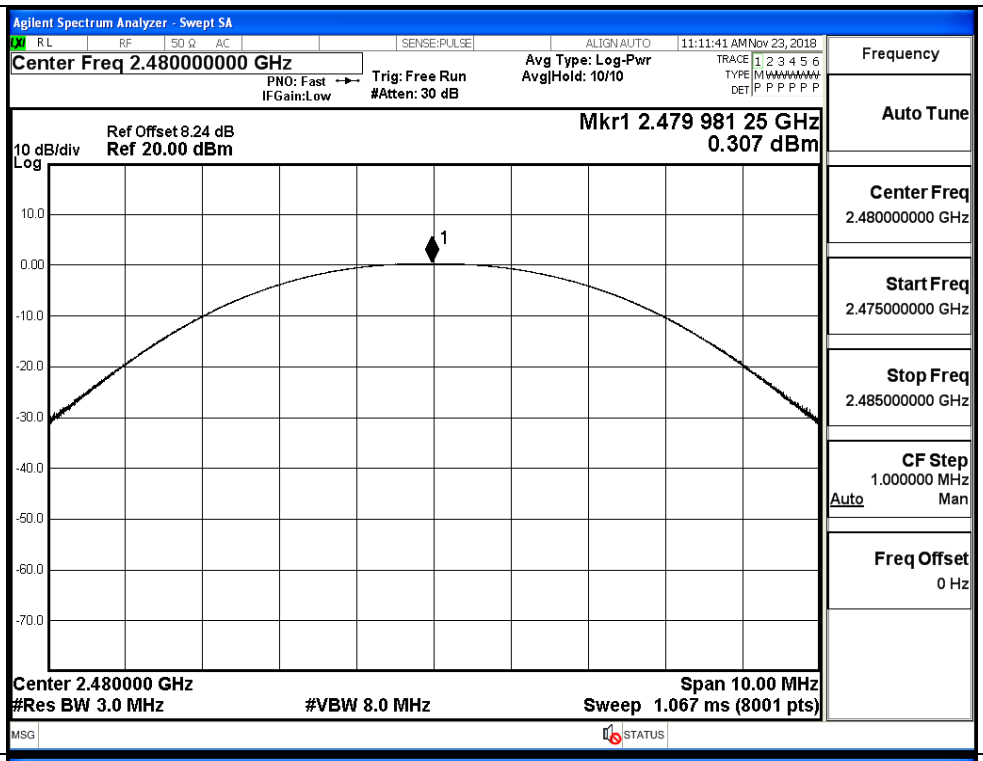
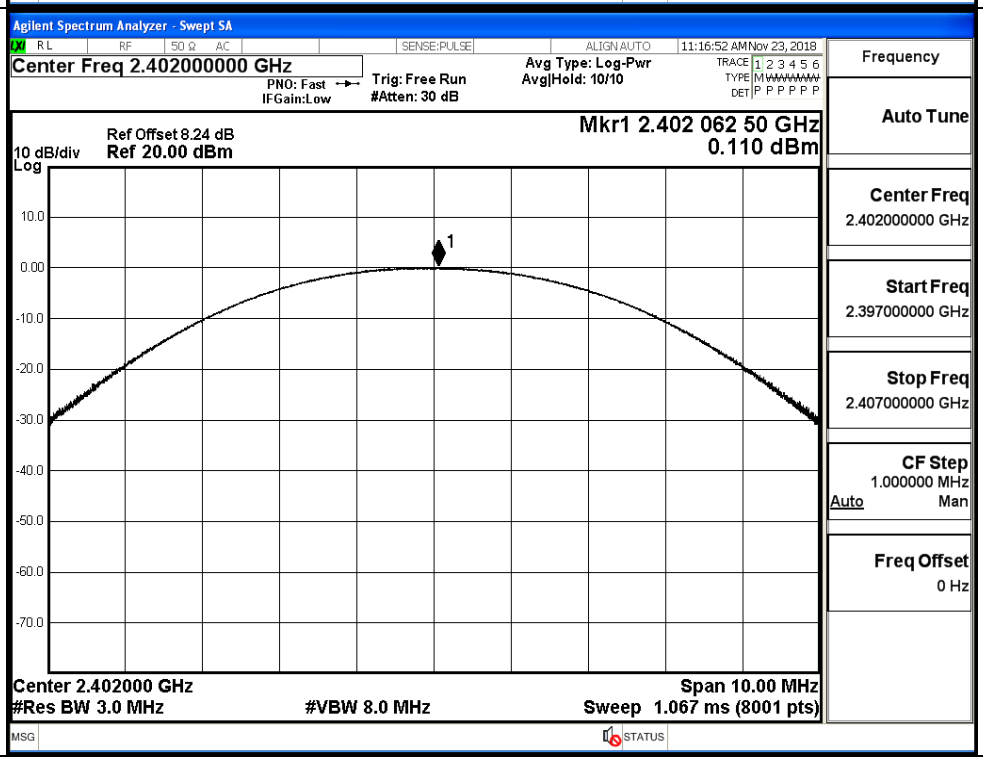
Environmental Conditions

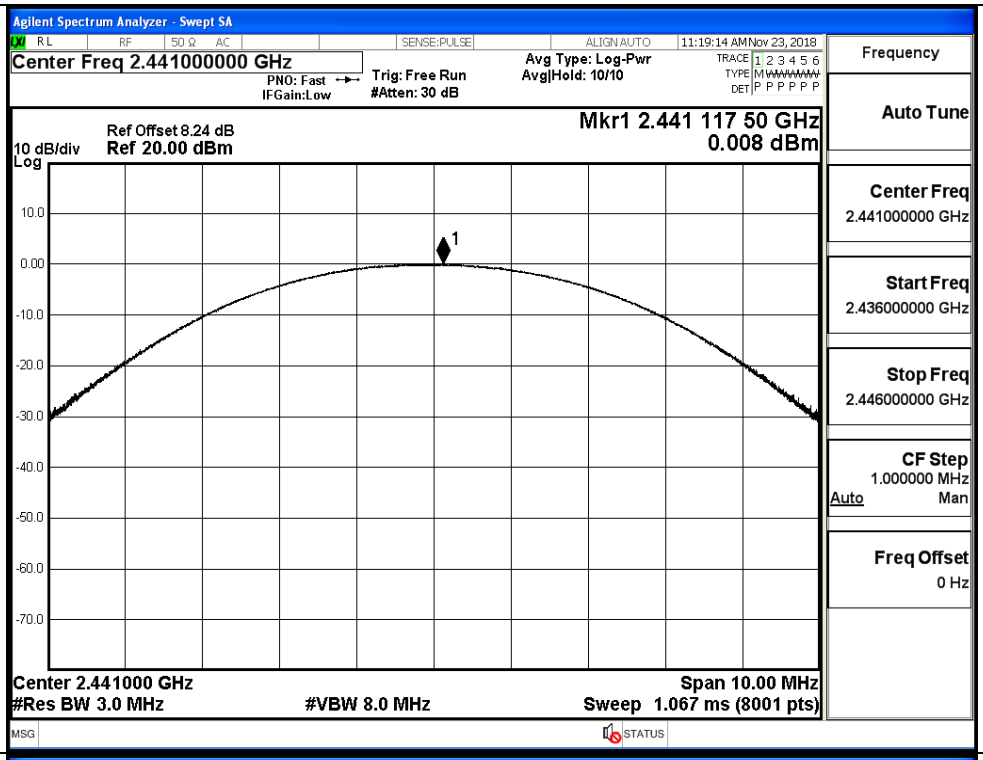
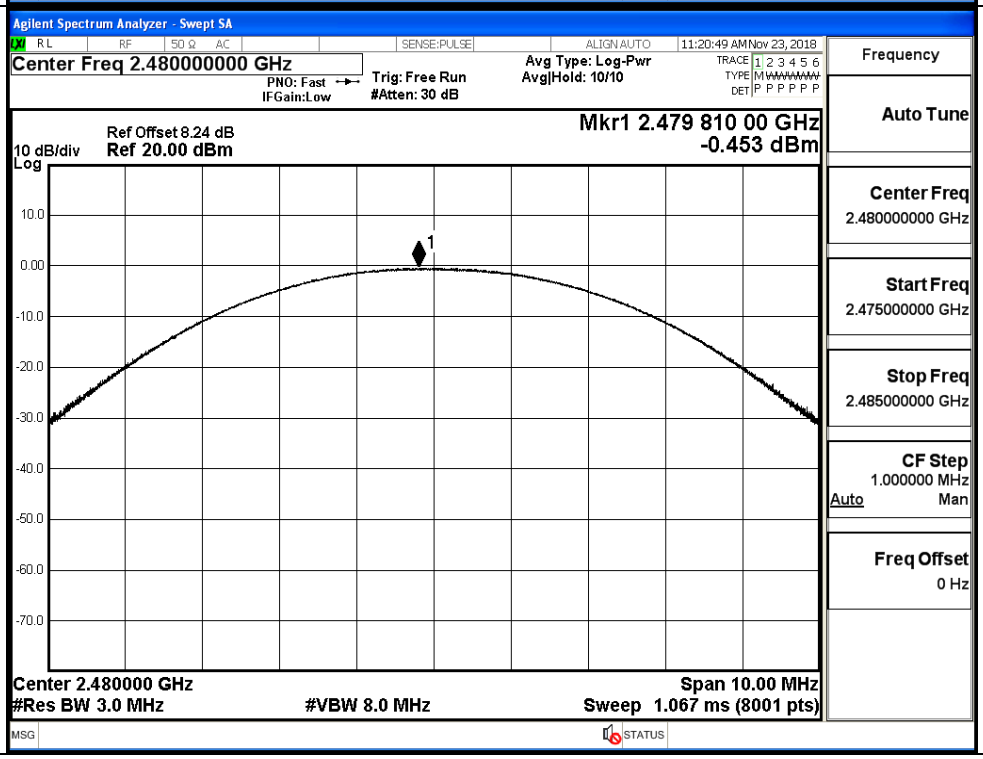
Temperature:	23.4 ° C
Relative Humidity:	53.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Mina.Xu
Supervised by:	Jayden.Zhuo

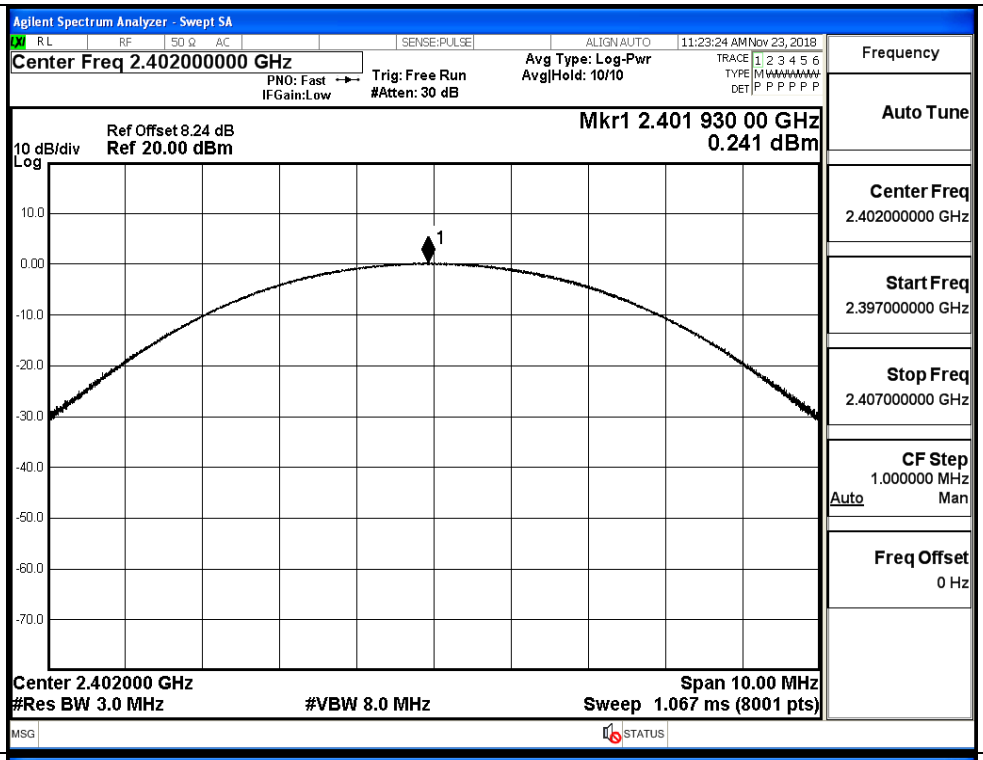
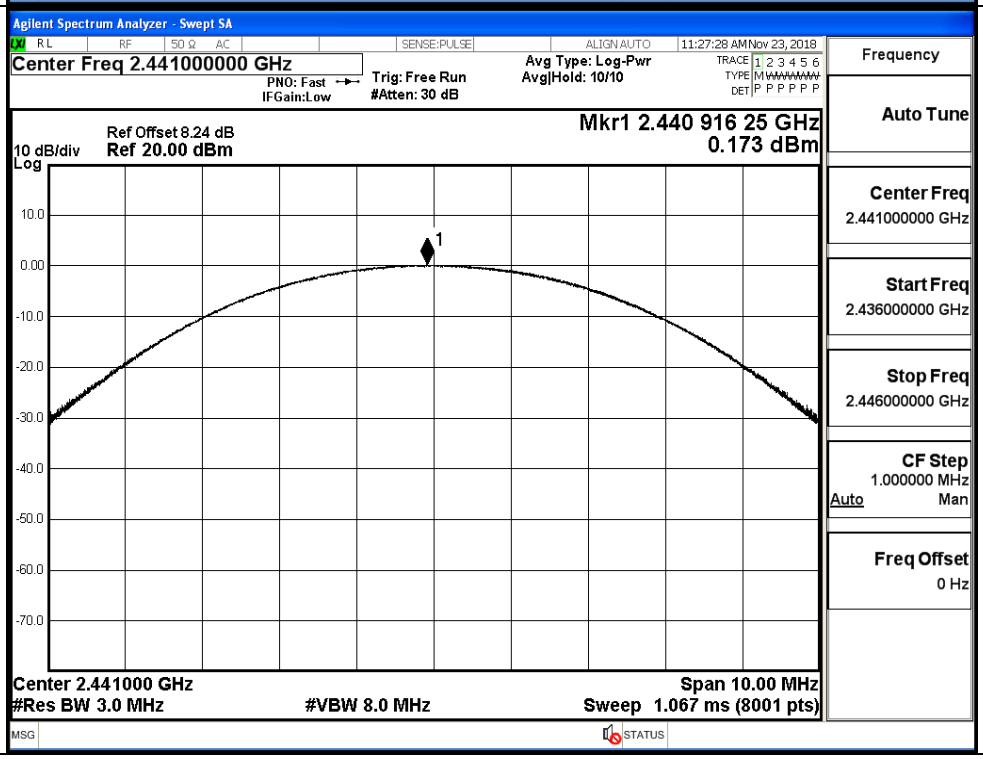
A.1 Maximum Conducted Peak Output Power

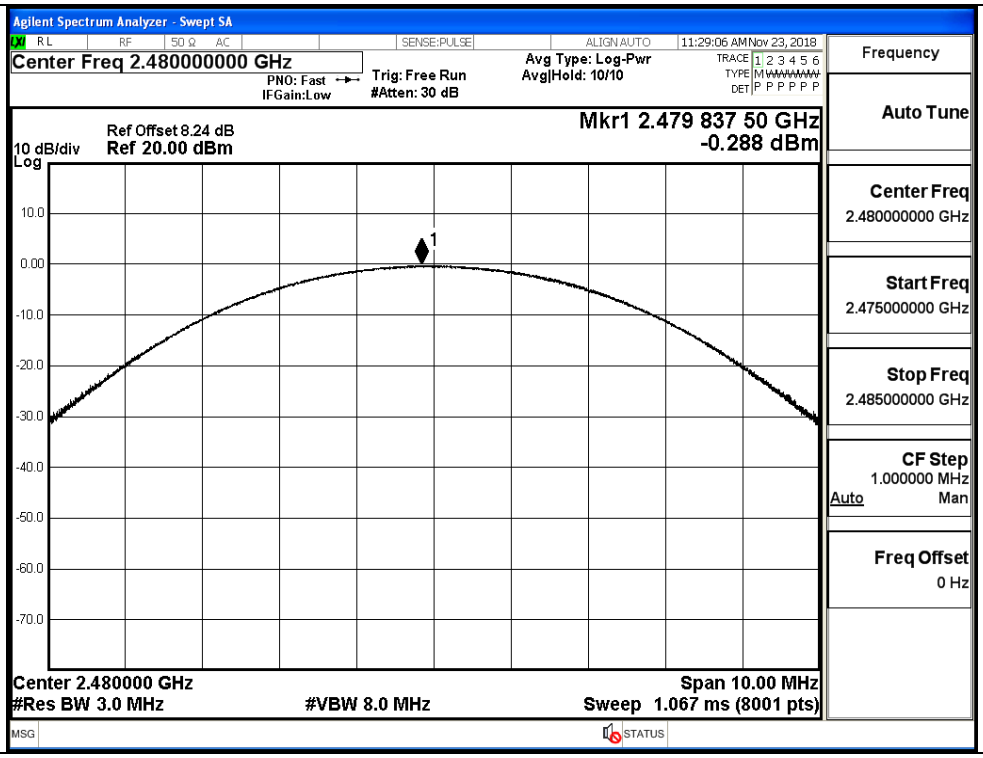
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.850	21	PASS
	MCH	0.755	21	PASS
	HCH	0.307	21	PASS
π/4DQPSK	LCH	0.110	21	PASS
	MCH	0.008	21	PASS
	HCH	-0.453	21	PASS
8DPSK	LCH	0.241	21	PASS
	MCH	0.173	21	PASS
	HCH	-0.288	21	PASS

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH		
π/4DQPSK/HCH		

8DPSK/LCH		
8DPSK/MCH		

8DPSK/HCH	

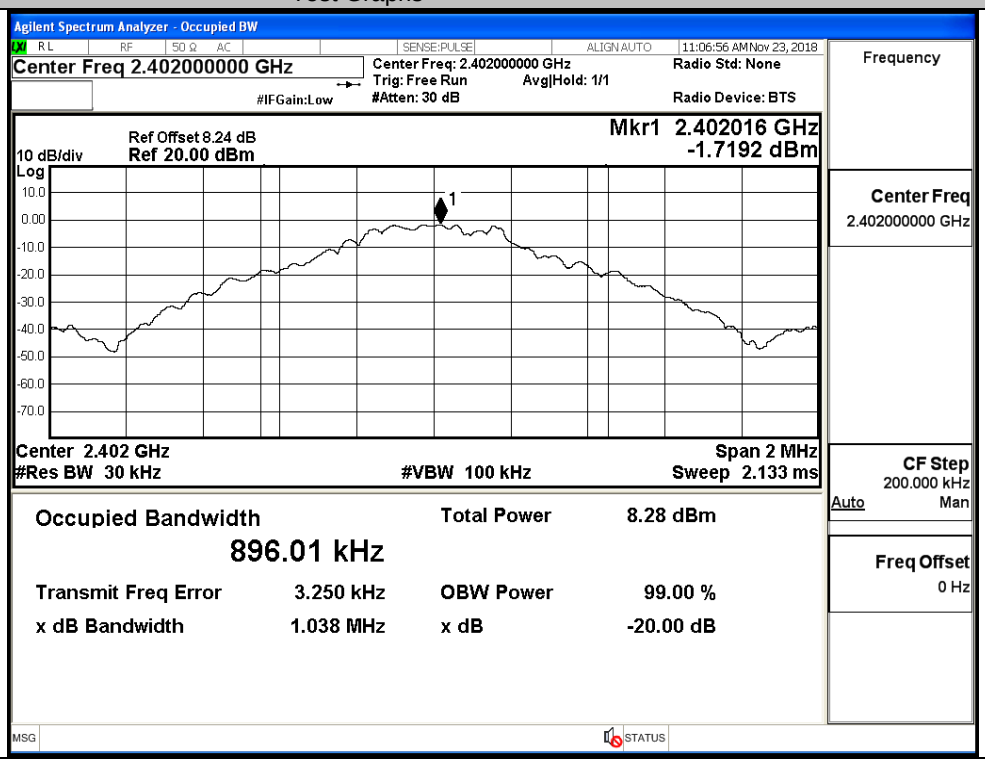
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
11:29:06 AM Nov 23, 2018
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 837 50 GHz
-0.288 dBm
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 10.00 MHz
Sweep 1.067 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.475000000 GHz
Stop Freq
2.485000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

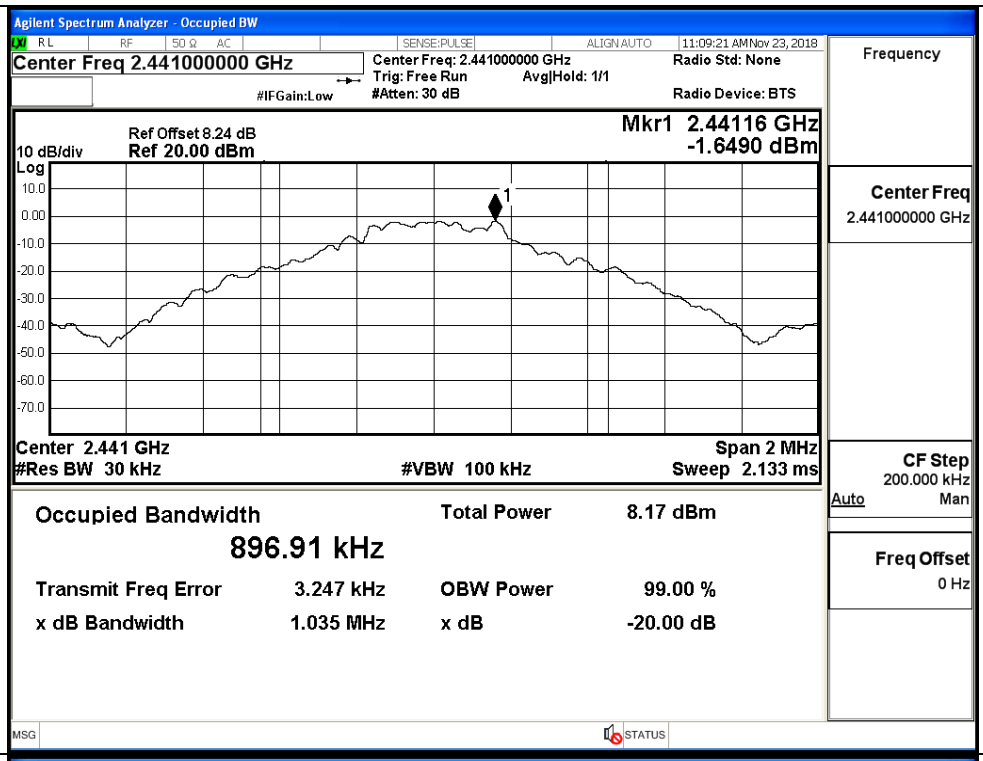
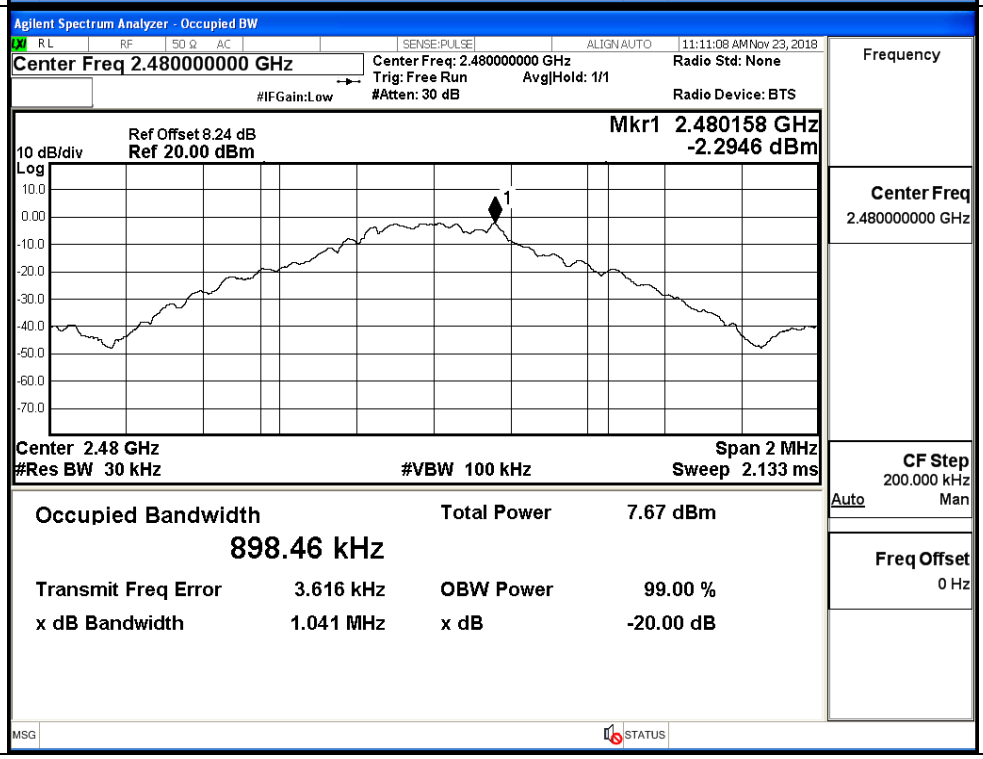
A.2 99% and 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.89601	1.038	Not Specified	PASS
	MCH	0.89691	1.035	Not Specified	PASS
	HCH	0.89846	1.041	Not Specified	PASS
π/4DQPSK	LCH	1.1732	1.290	Not Specified	PASS
	MCH	1.1745	1.292	Not Specified	PASS
	HCH	1.1707	1.289	Not Specified	PASS
8DPSK	LCH	1.1830	1.292	Not Specified	PASS
	MCH	1.1816	1.298	Not Specified	PASS
	HCH	1.1782	1.294	Not Specified	PASS

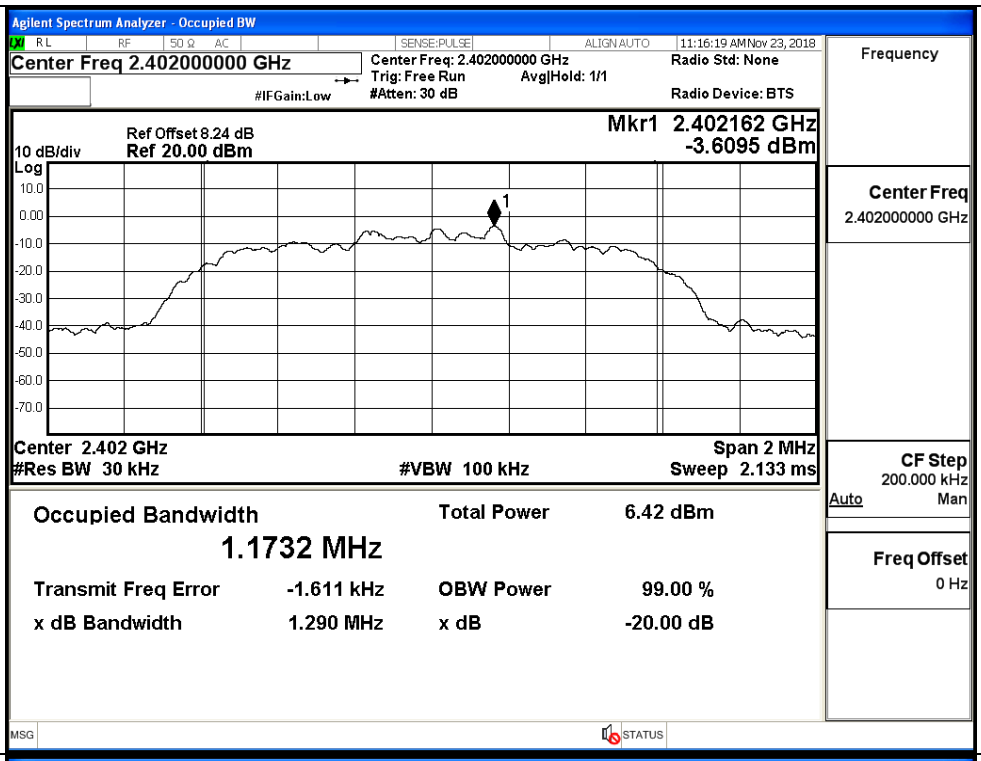
Test Graphs

GFSK/LCH

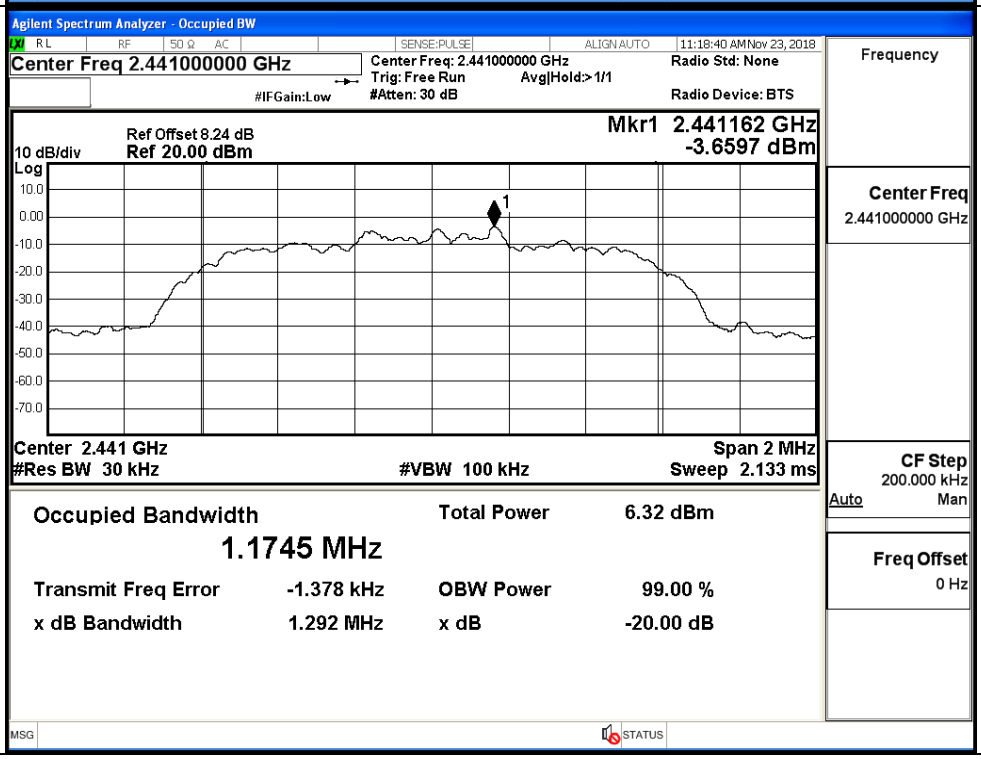


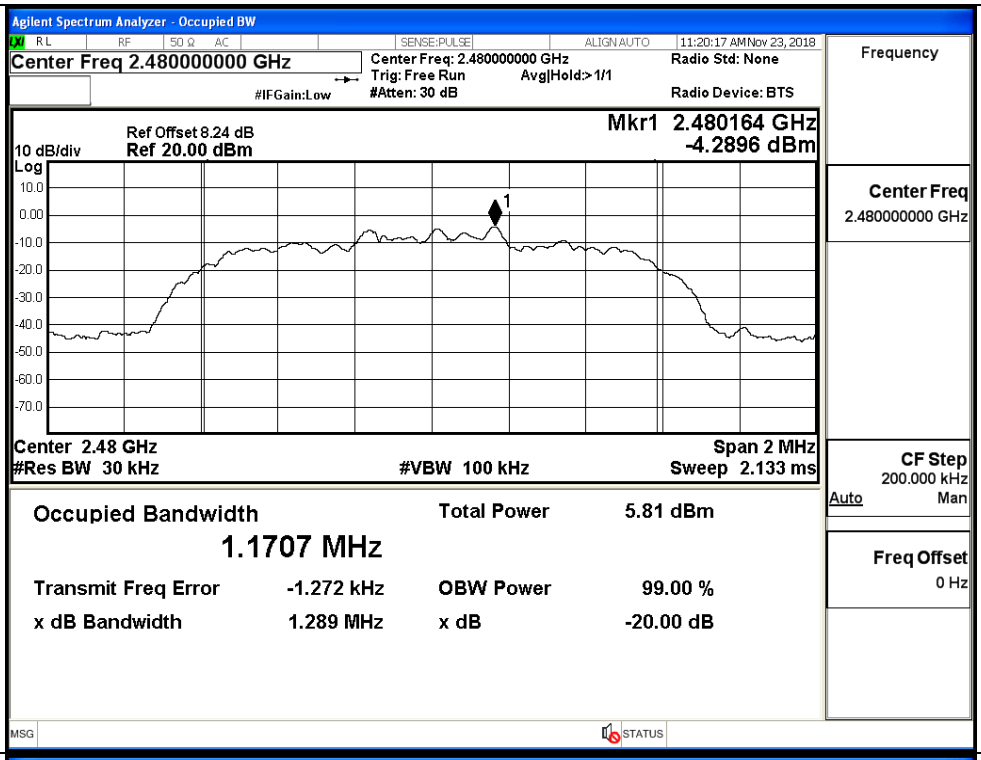
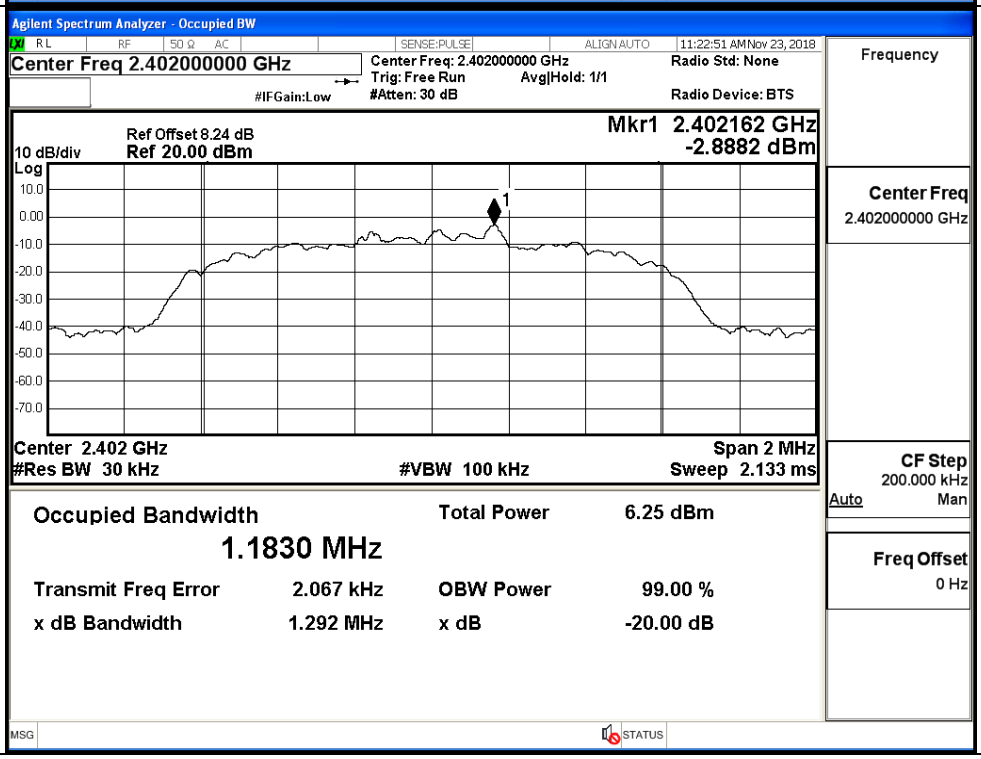
GFSK/MCH	
GFSK/HCH	

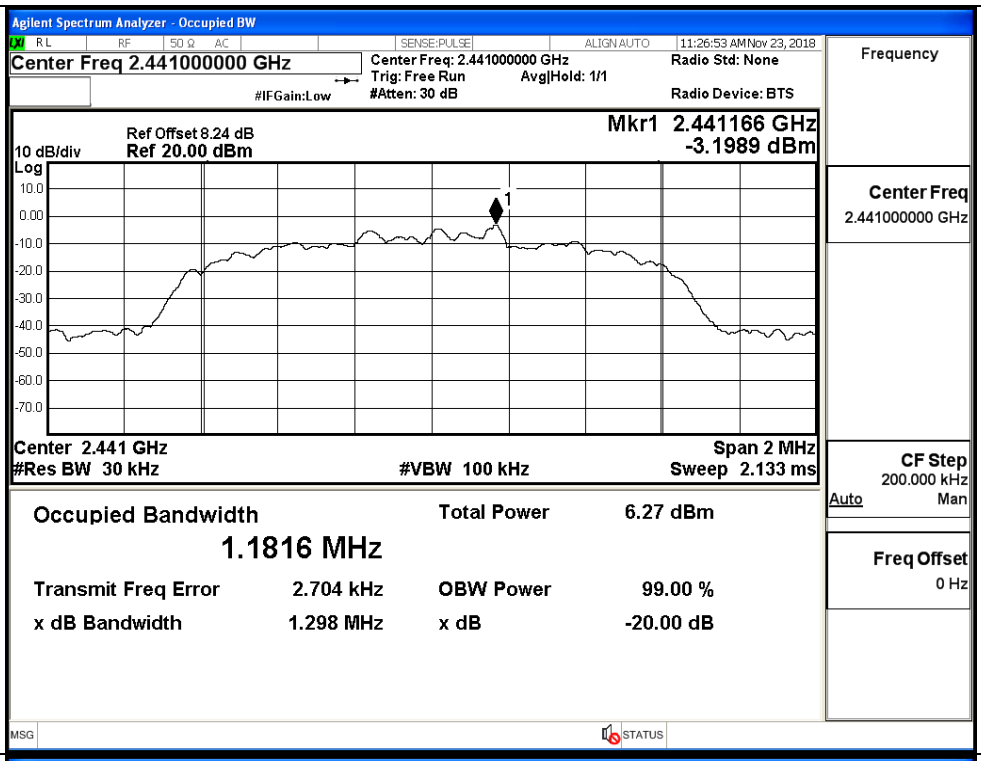
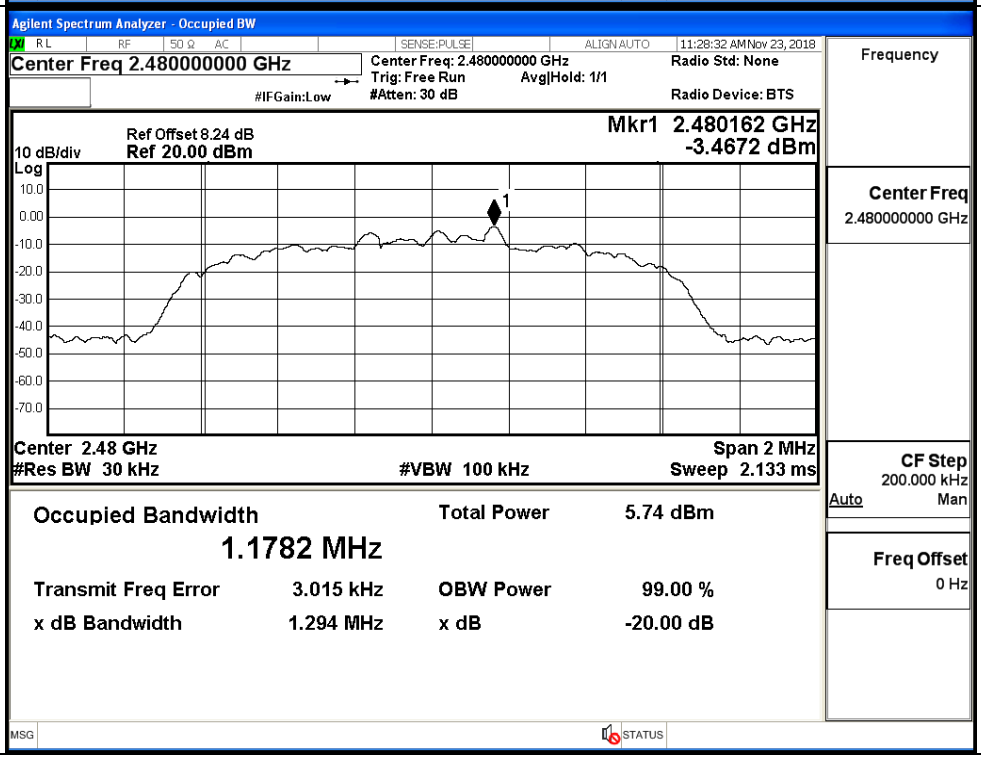
π/4DQPSK/LCH



π/4DQPSK/MCH

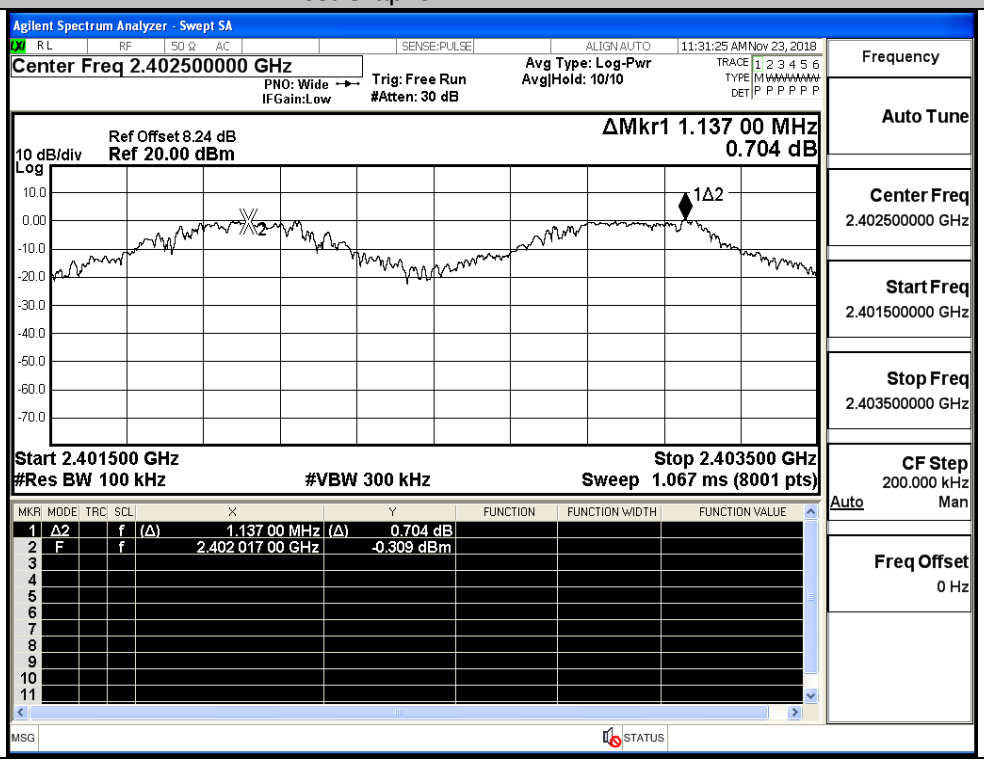


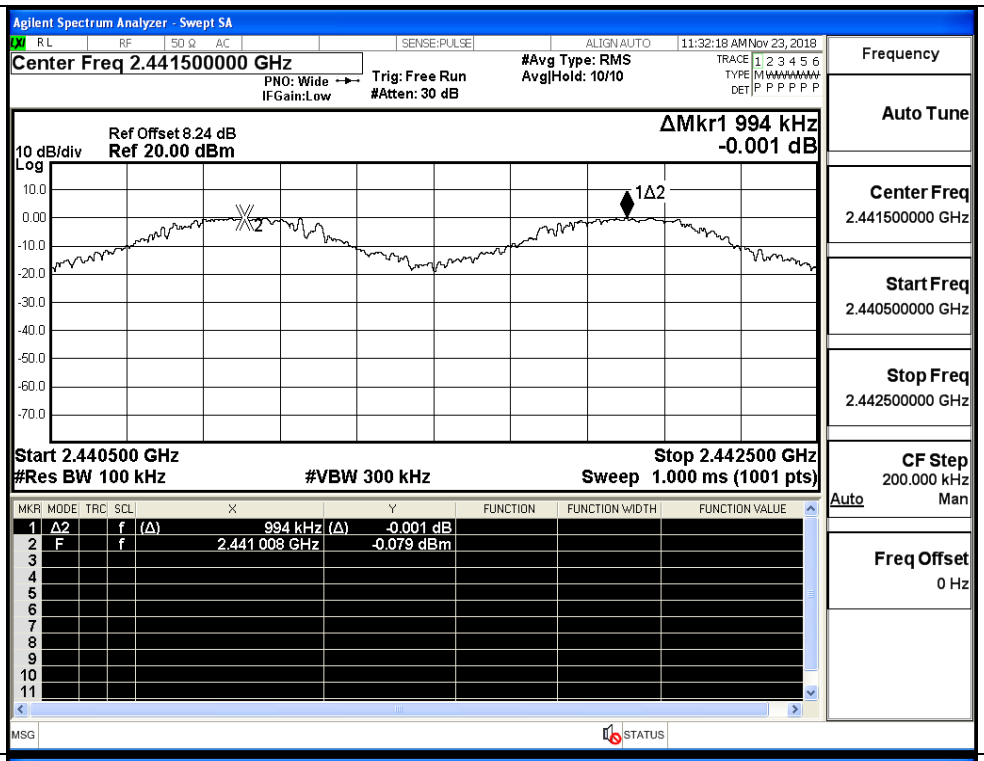
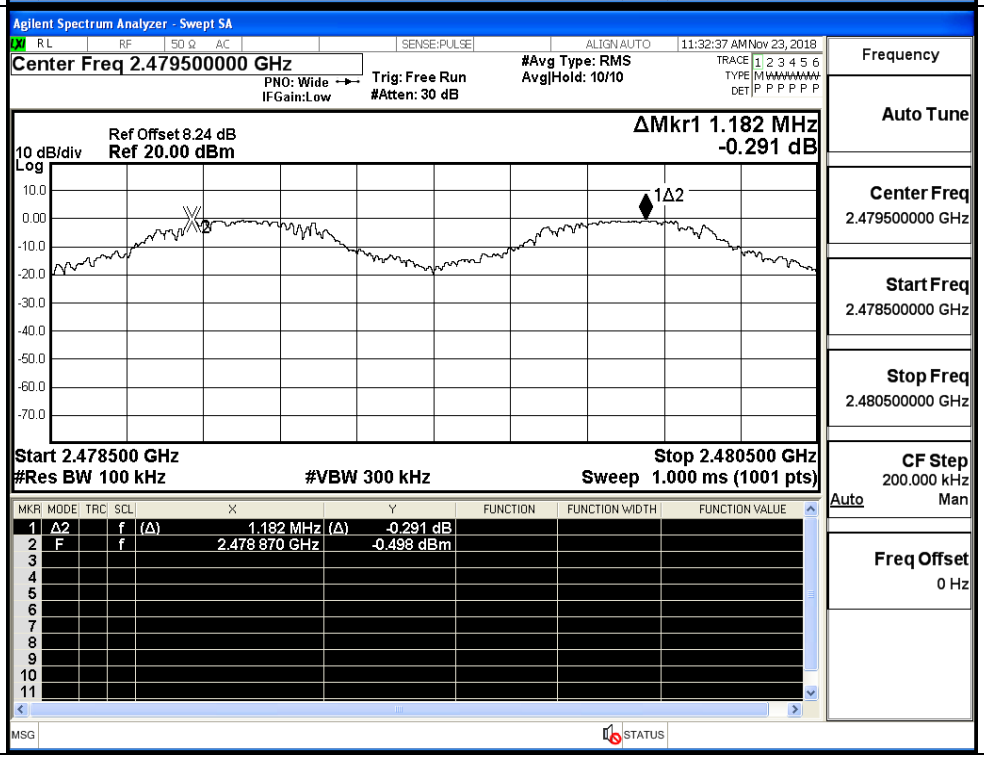
π/4DQPSK/HCH	
8DPSK/LCH	

8DPSK/MCH	
8DPSK/HCH	

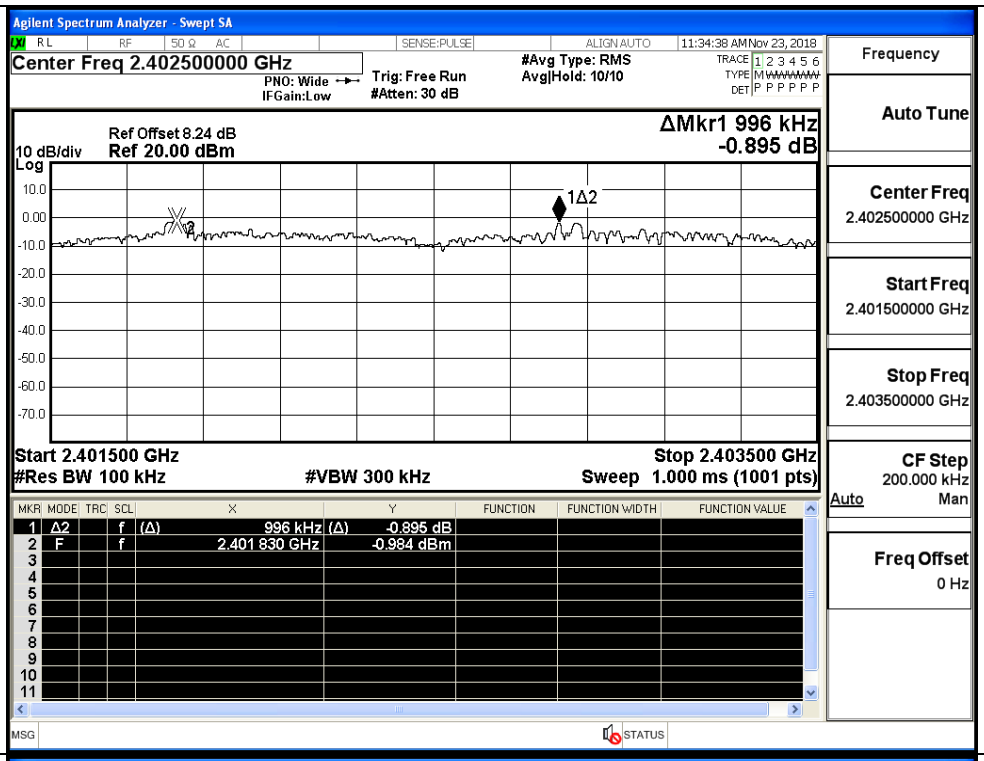
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.137	0.694	PASS
	MCH	0.994	0.694	PASS
	HCH	1.182	0.694	PASS
π/4DQPSK	LCH	0.996	0.861	PASS
	MCH	1.002	0.861	PASS
	HCH	1.012	0.861	PASS
8DPSK	LCH	0.890	0.865	PASS
	MCH	1.164	0.865	PASS
	HCH	1.098	0.865	PASS

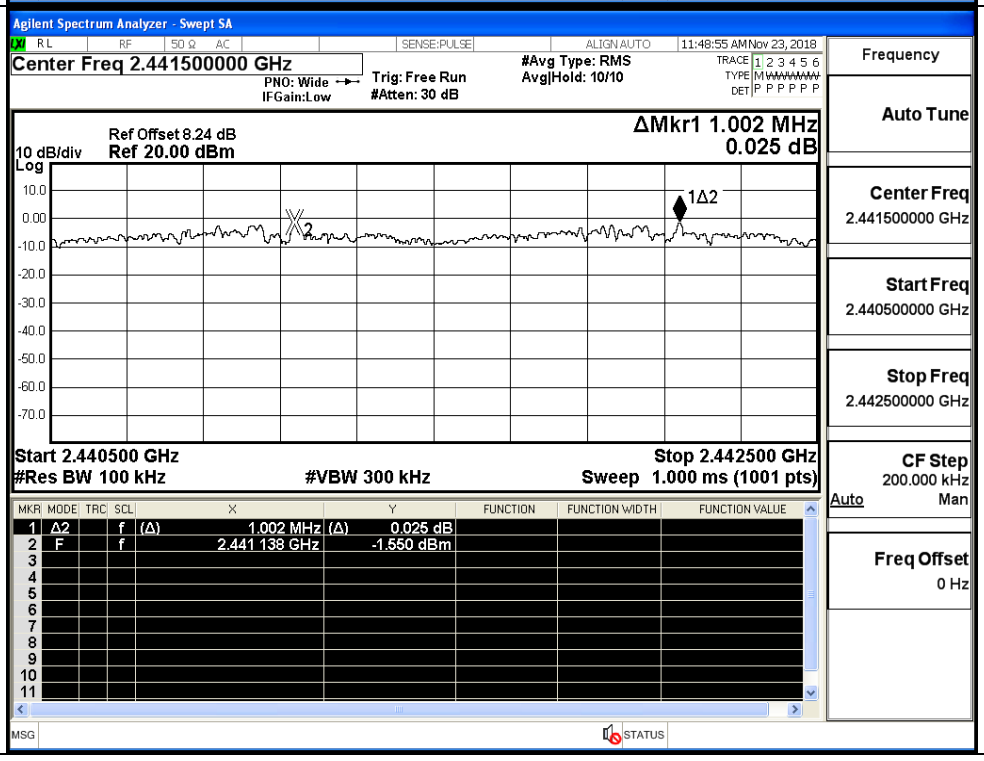
Test Graphs		
GFSK/LCH		

GFSK/MCH		
GFSK/HCH		

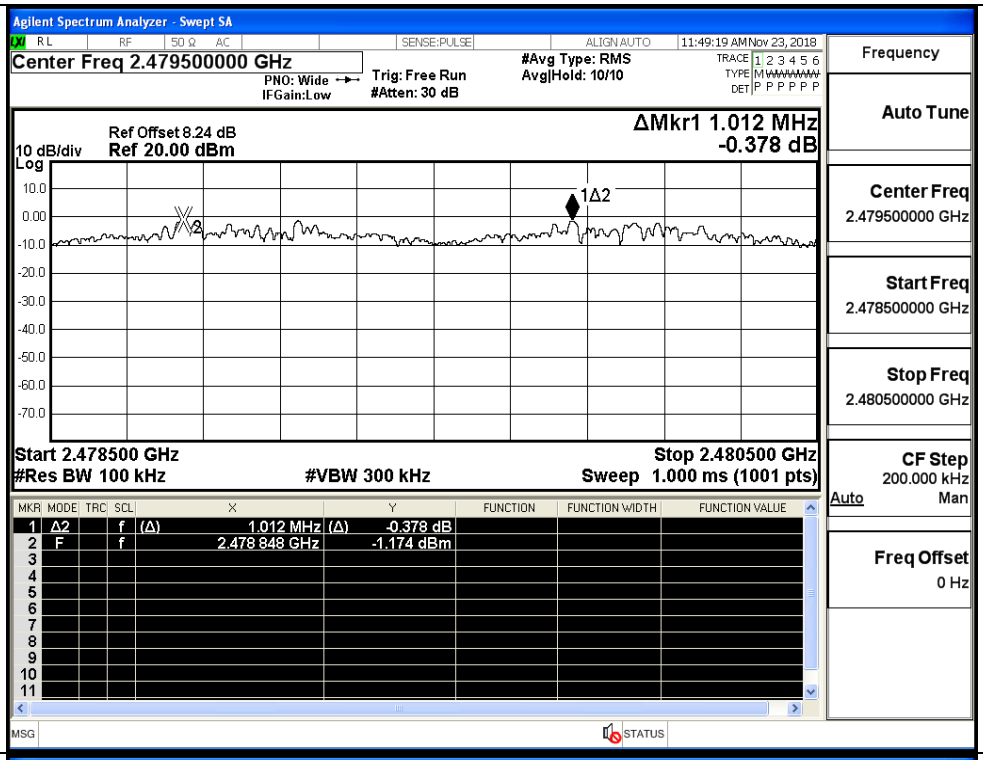
π/4DQPSK/LCH



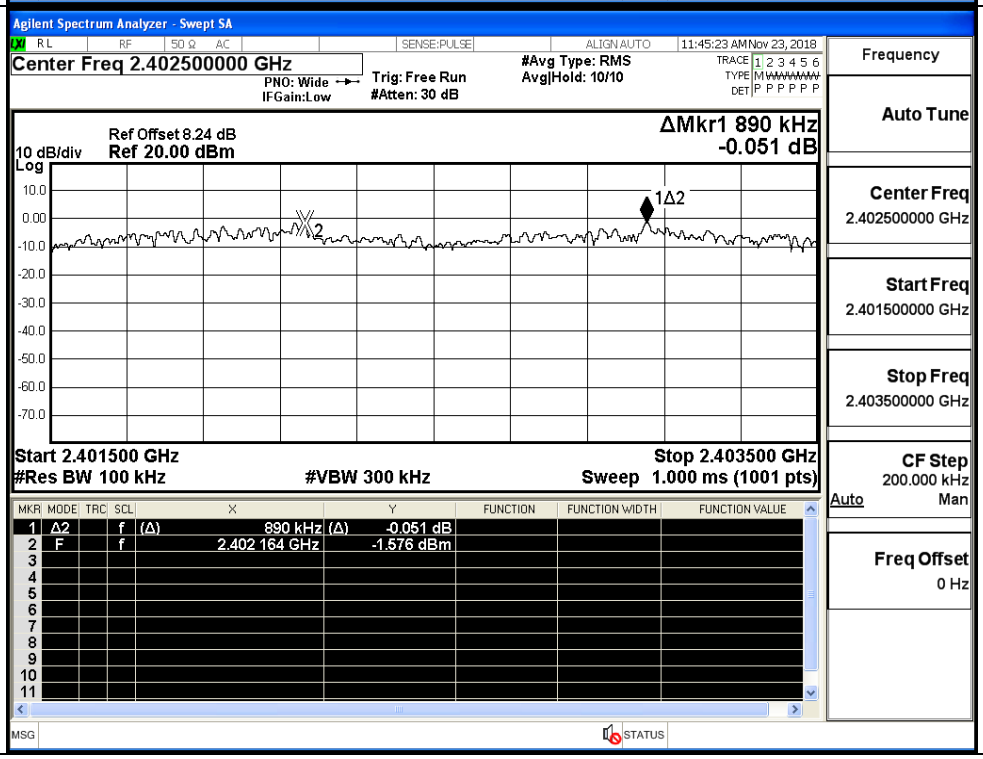
π/4DQPSK/MCH



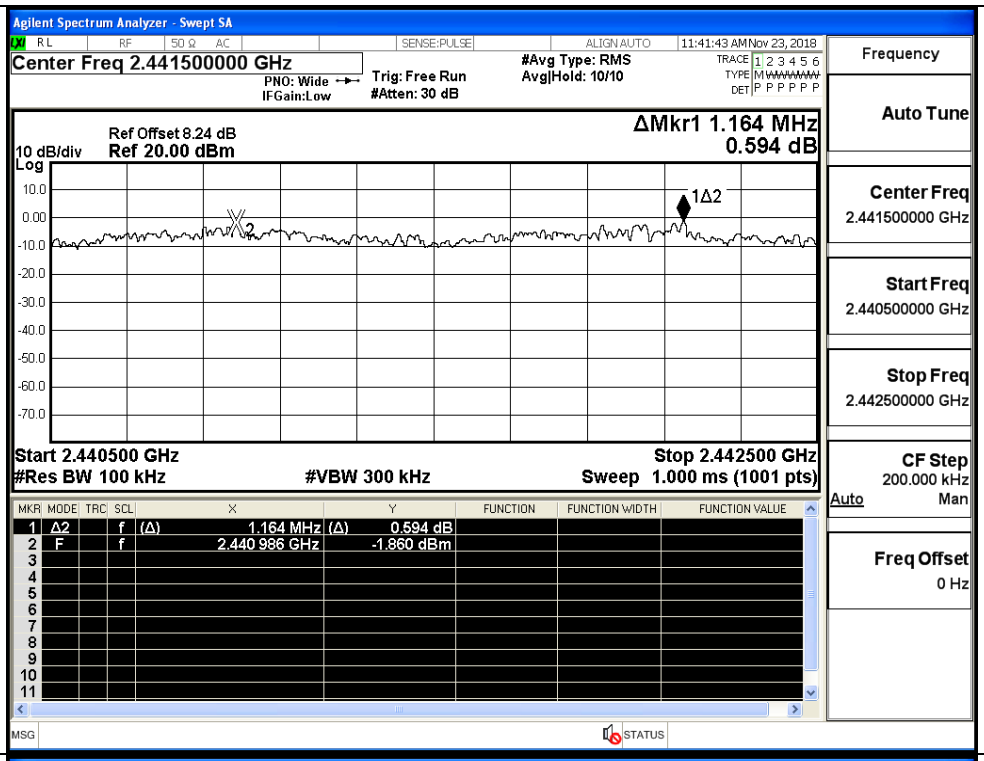
π/4DQPSK/HCH



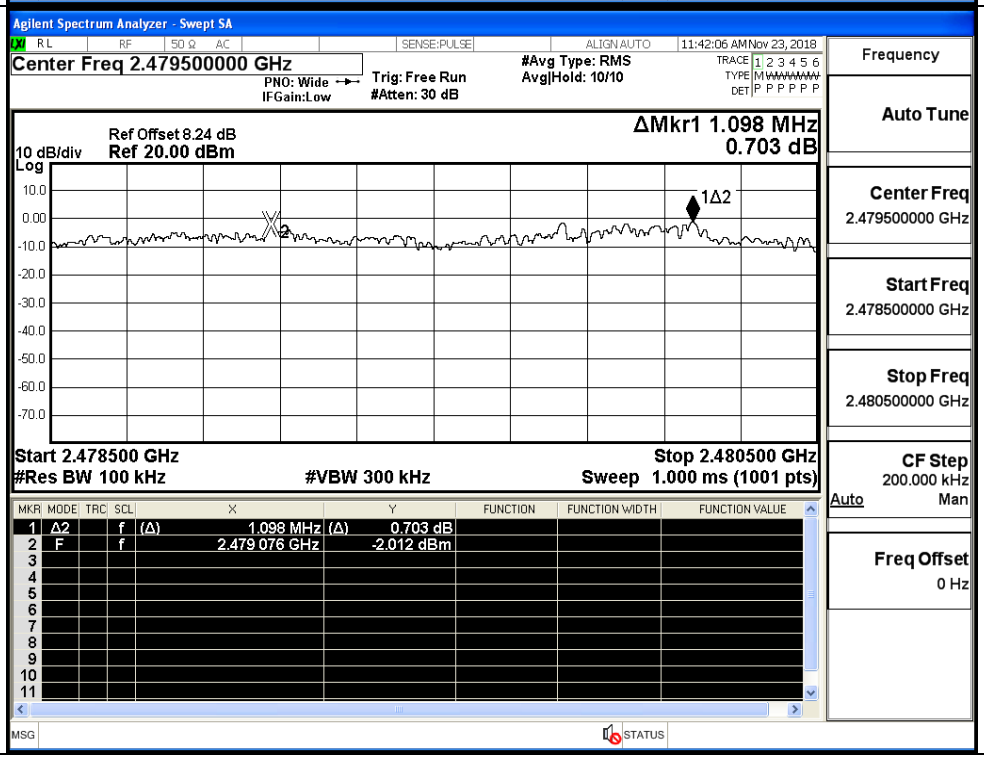
8DPSK/LCH



8DPSK/MCH

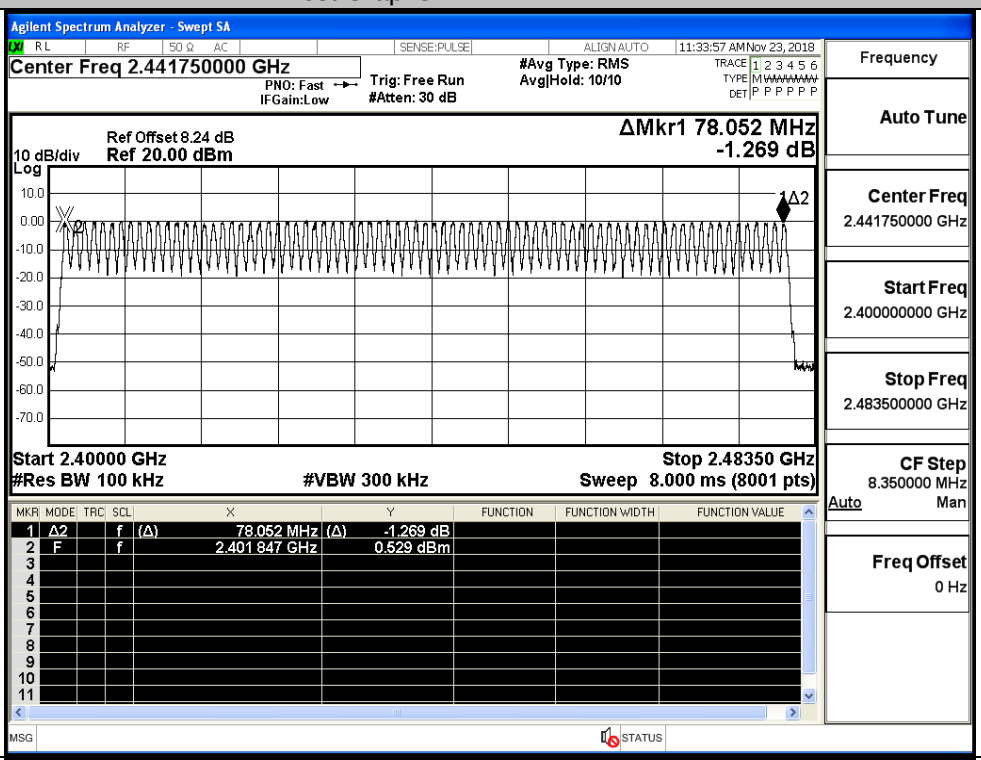
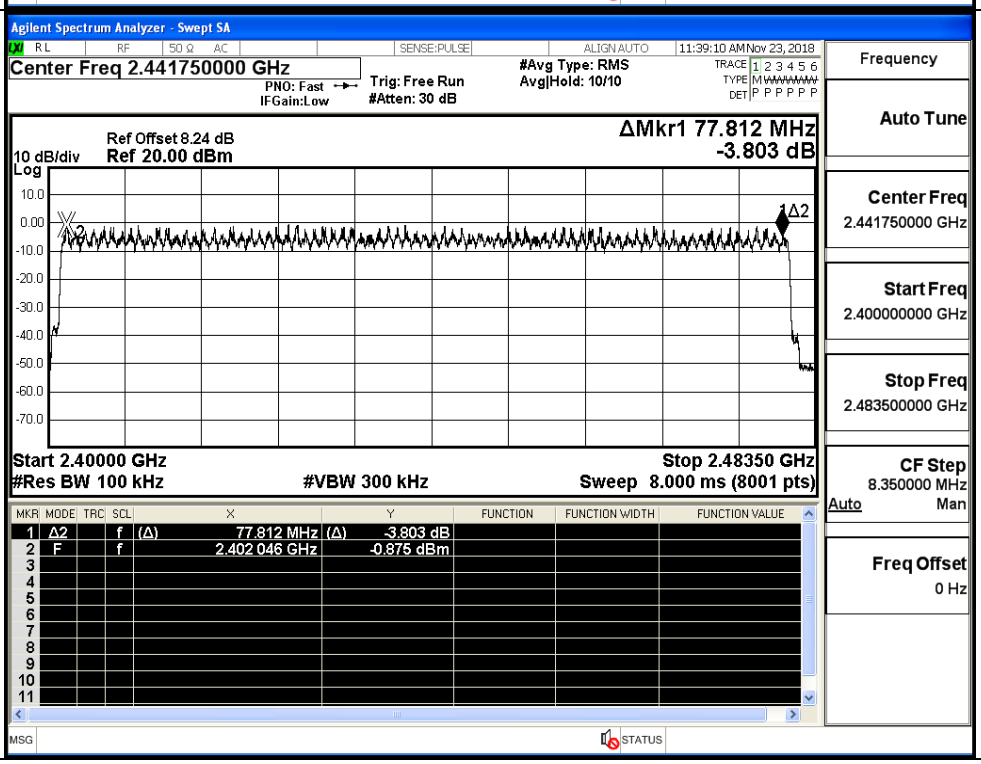


8DPSK/HCH

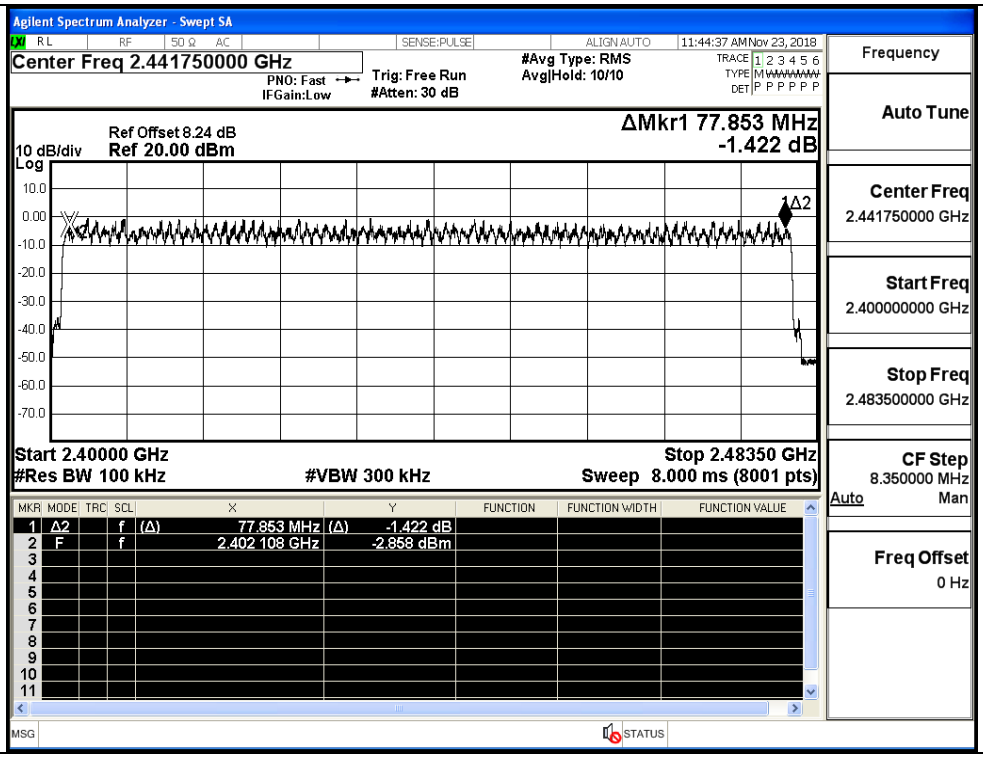


A.4 Hopping Channel Number

Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

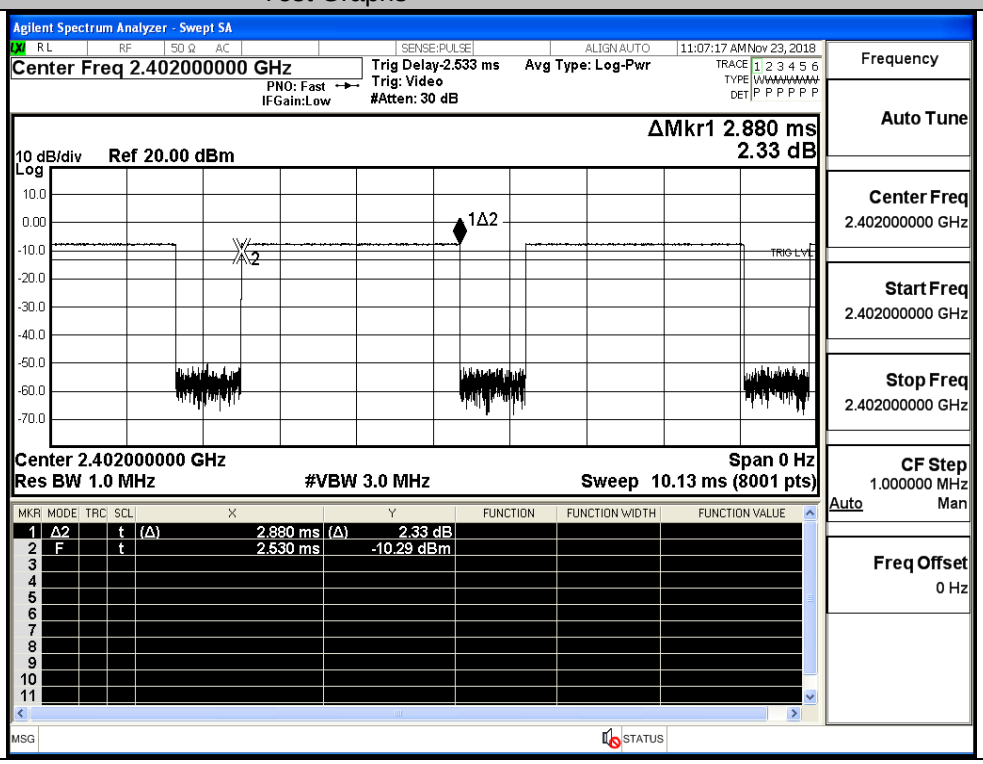
Test Graphs	
GFSK/Hop	
π/4DQPSK/Hop	

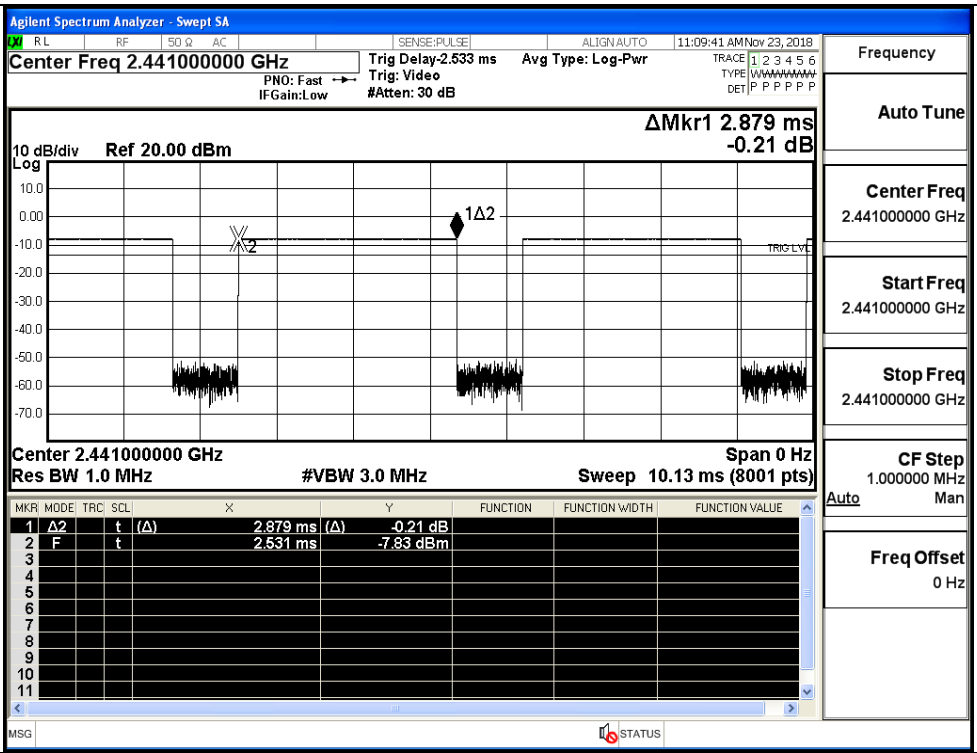
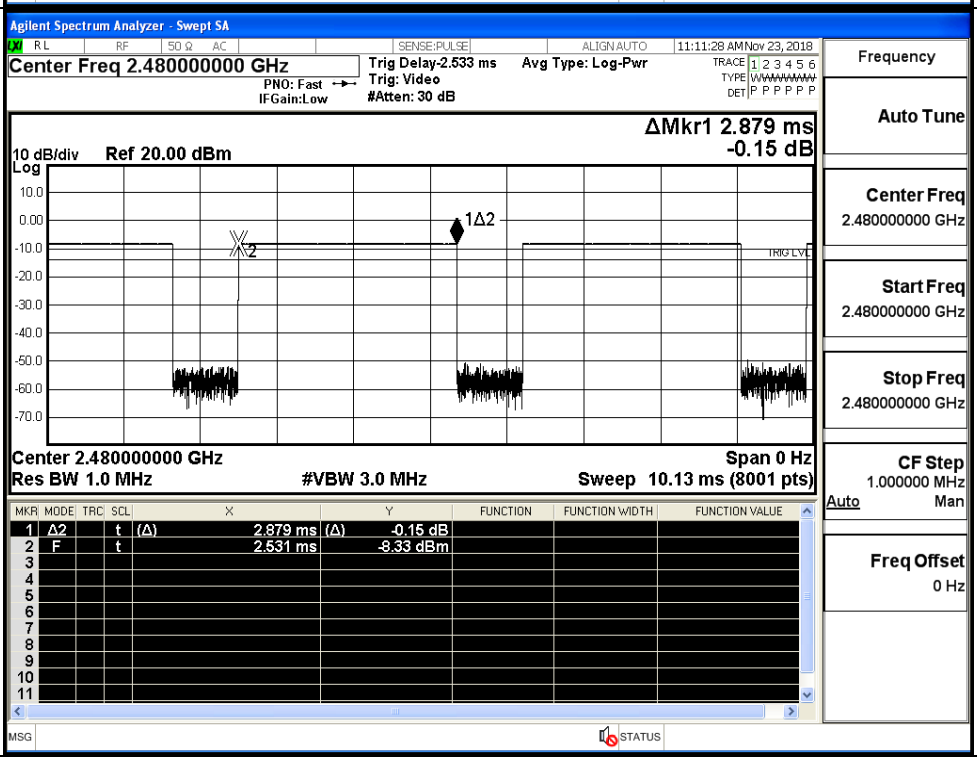
8DPSK/Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
11:44:37 AM Nov 23, 2018
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
ΔMkr1 77.853 MHz
-1.422 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 77.853 MHz (Δ) -1.422 dB
2 F f 2.402 108 GHz -2.858 dBm
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto Man
Freq Offset
0 Hz

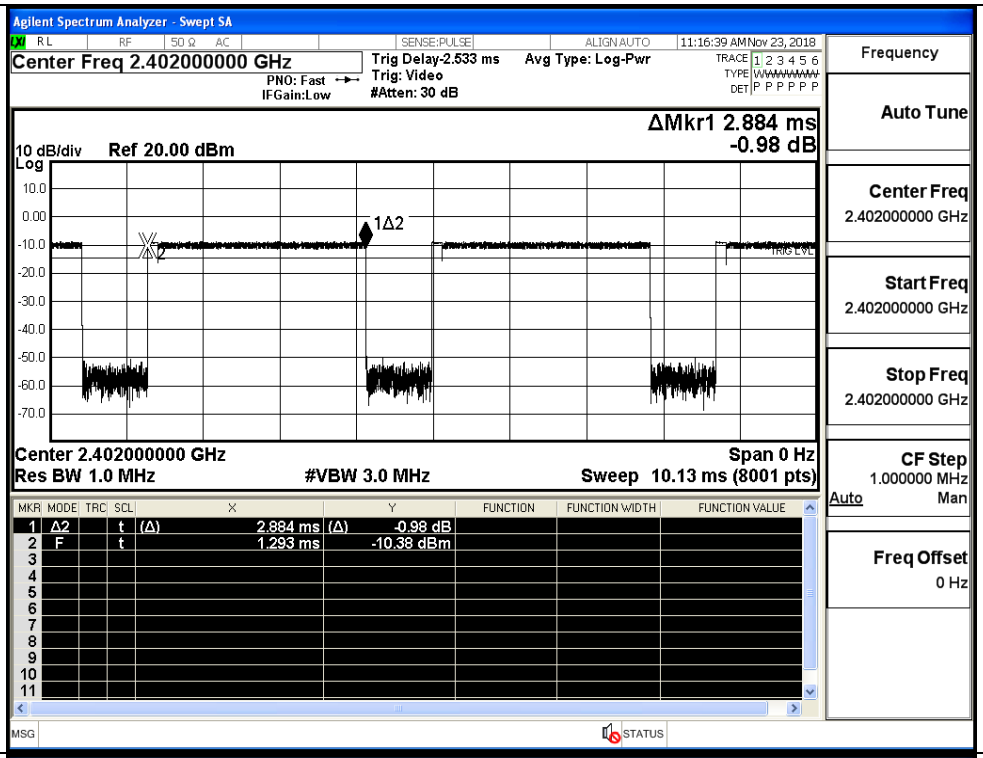
A.5 Dwell Time

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.89	106.7	0.308	0.4	PASS
	3DH5	MCH	2.89	106.7	0.308	0.4	PASS
	3DH5	HCH	2.89	106.7	0.308	0.4	PASS

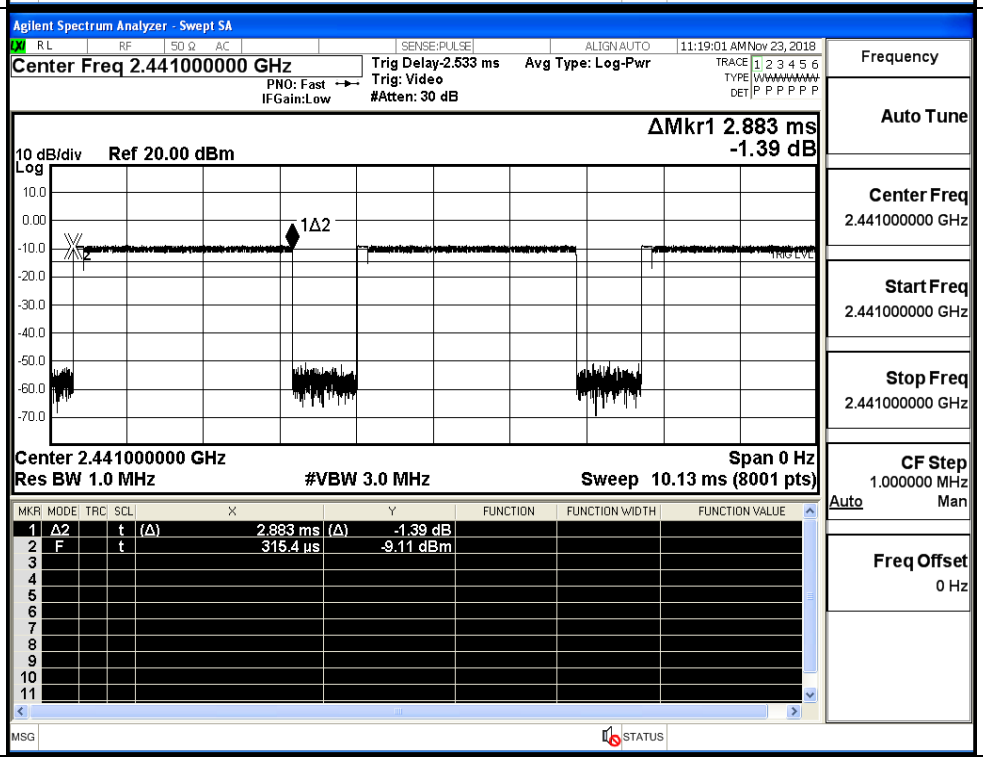
Test Graphs	
GFSK_DH5/LCH	

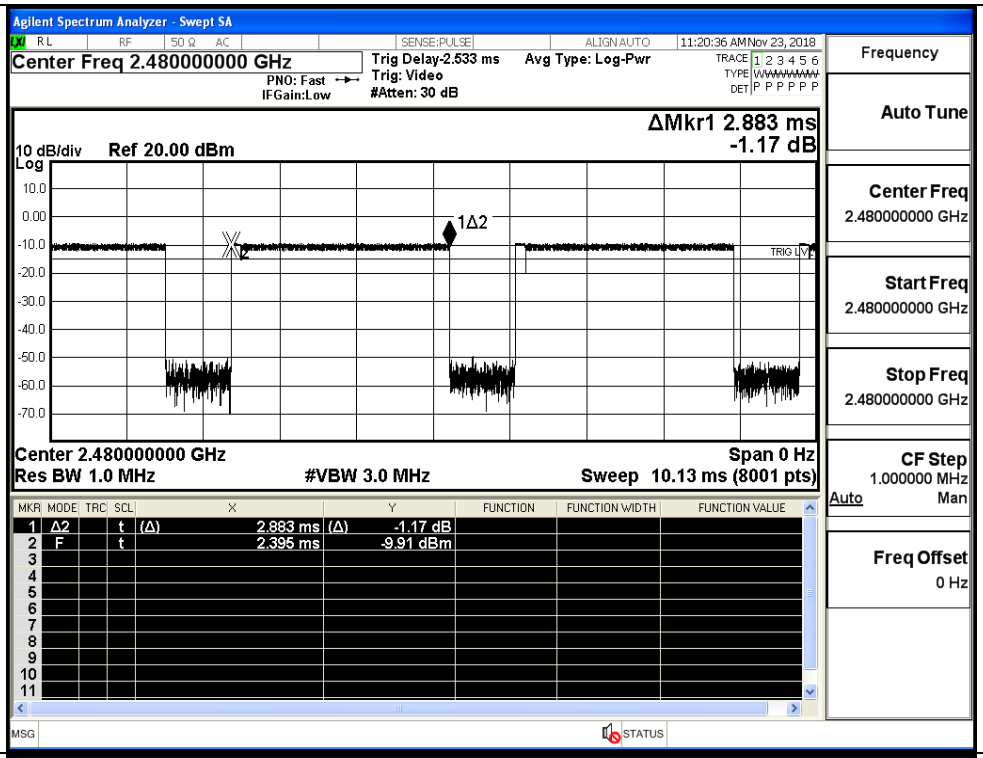
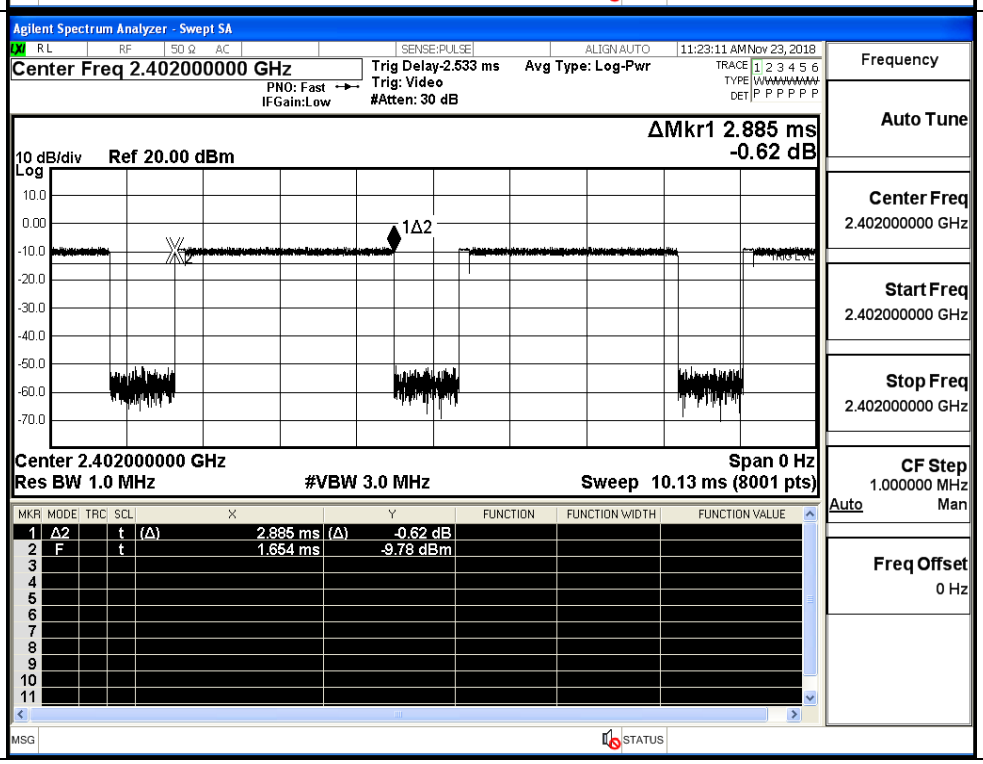
GFSK_DH5/MCH	
GFSK_DH5/HCH	

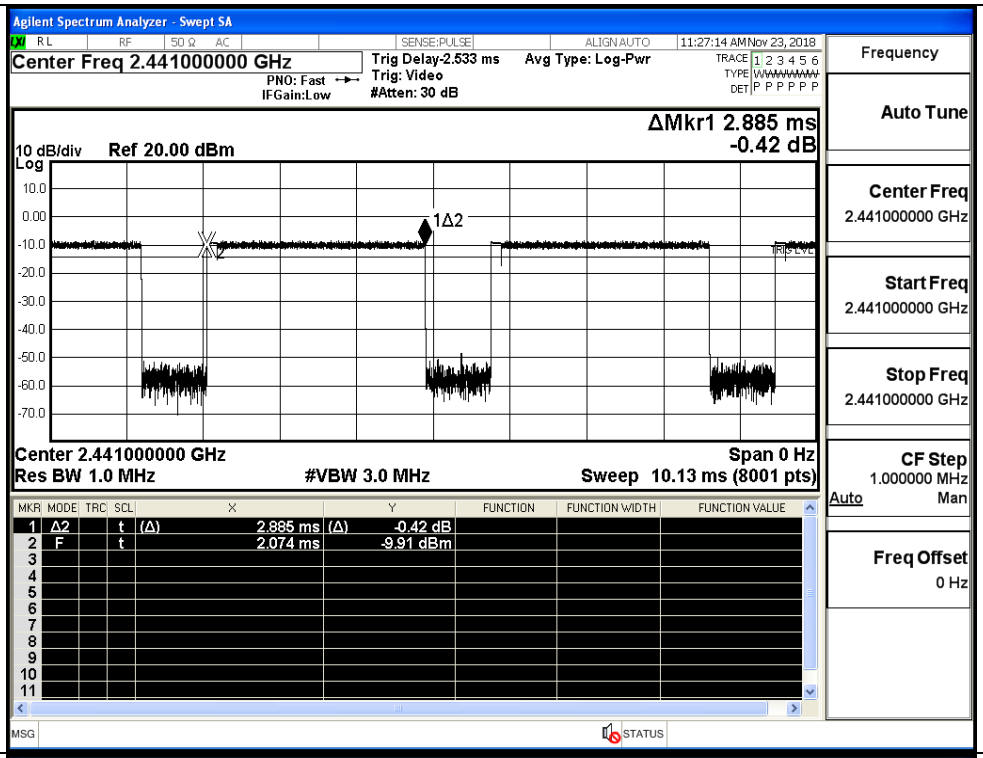
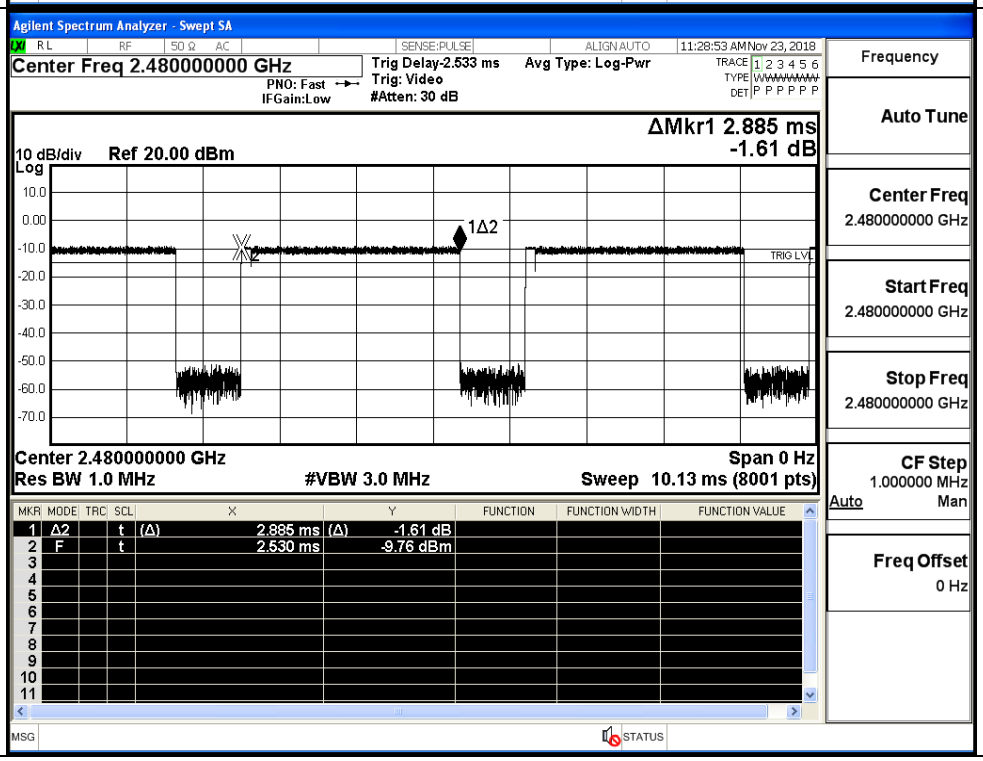
π/4DQPSK
_2DH5/LCH



π/4DQPSK
_2DH5/MCH

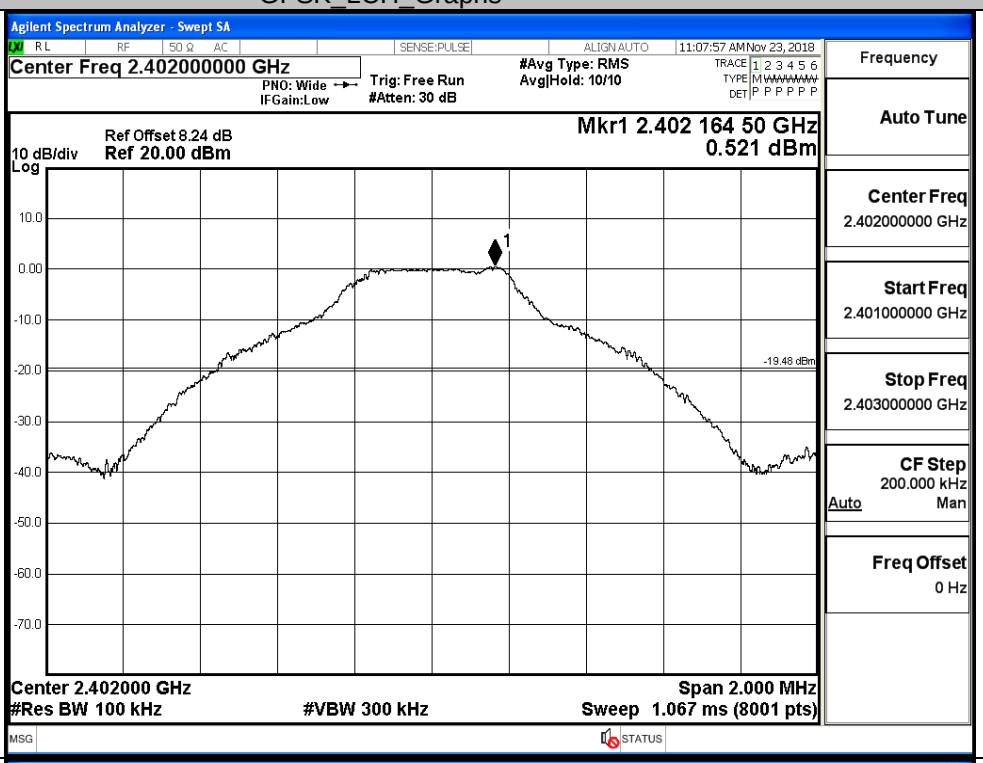
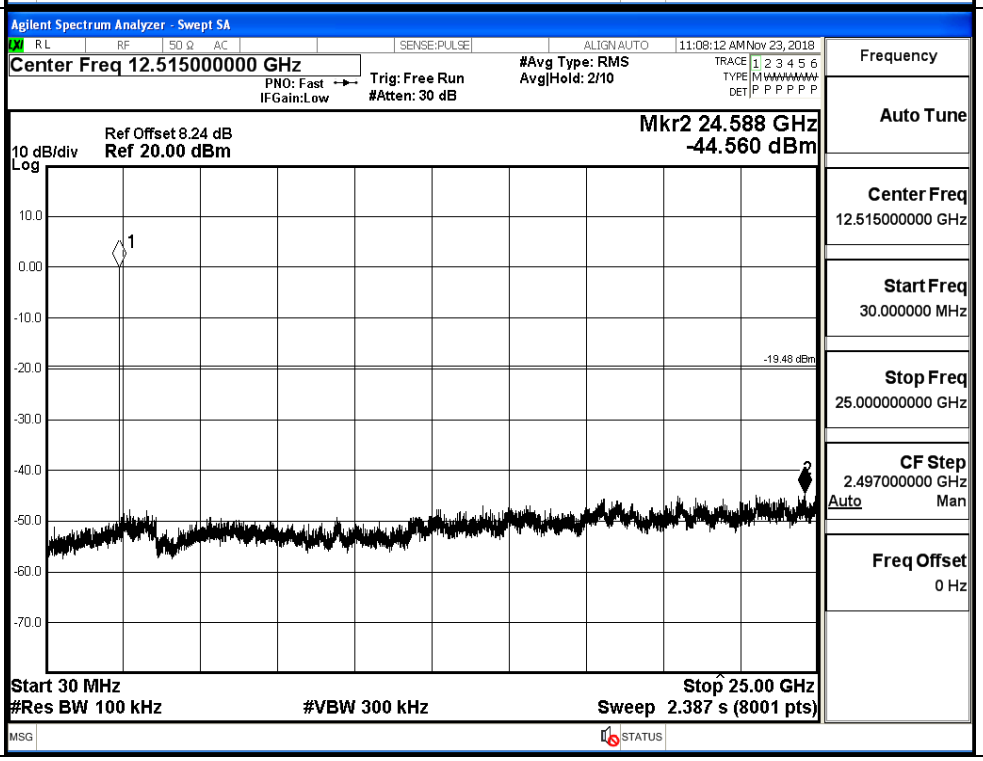


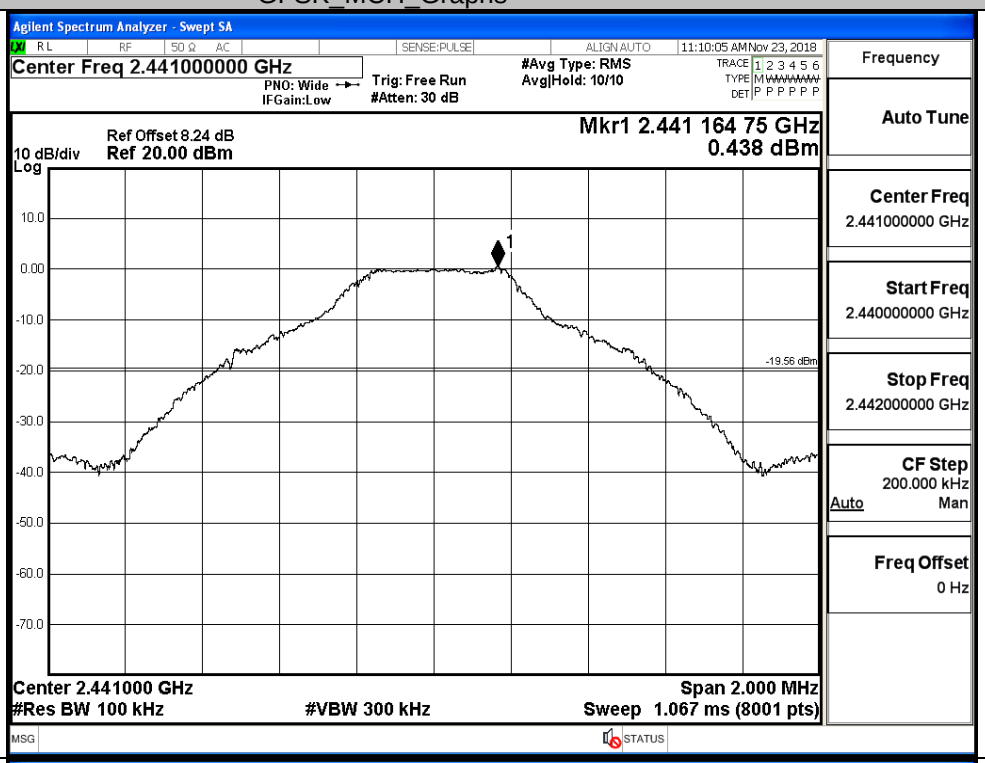
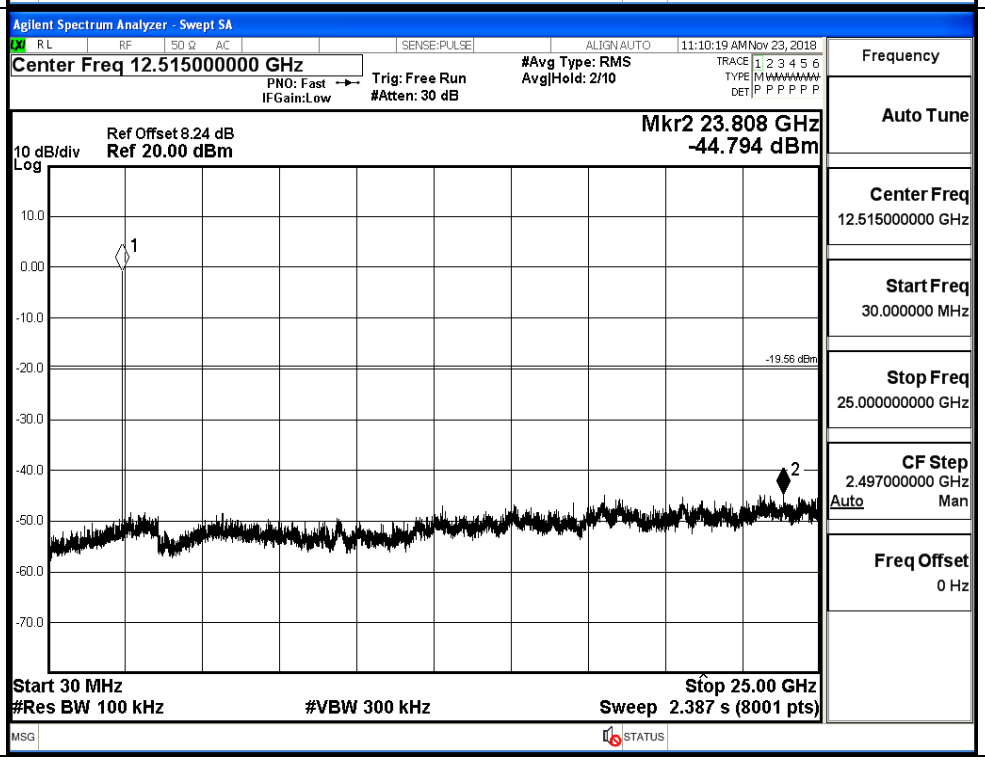
π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.521	-44.560	-19.479	PASS
	MCH	0.438	-44.794	-19.562	PASS
	HCH	-0.007	-44.218	-20.007	PASS
π/4DQPSK	LCH	-0.95	-44.788	-20.950	PASS
	MCH	-1.077	-43.988	-21.077	PASS
	HCH	-1.394	-44.295	-21.394	PASS
8DPSK	LCH	-1.008	-44.545	-21.008	PASS
	MCH	-0.879	-44.295	-20.879	PASS
	HCH	-1.586	-44.443	-21.586	PASS

GFSK_LCH_Graphs		
Pref		
Puw		

GFSK_MCH_Graphs		
Pref		
Puw		

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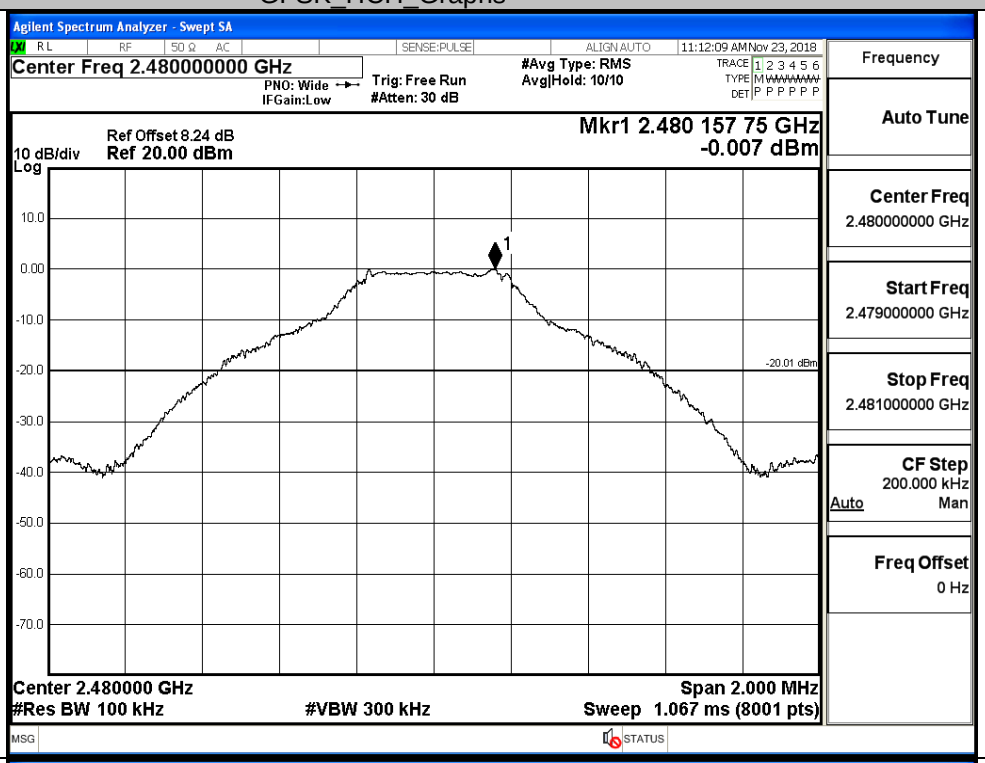
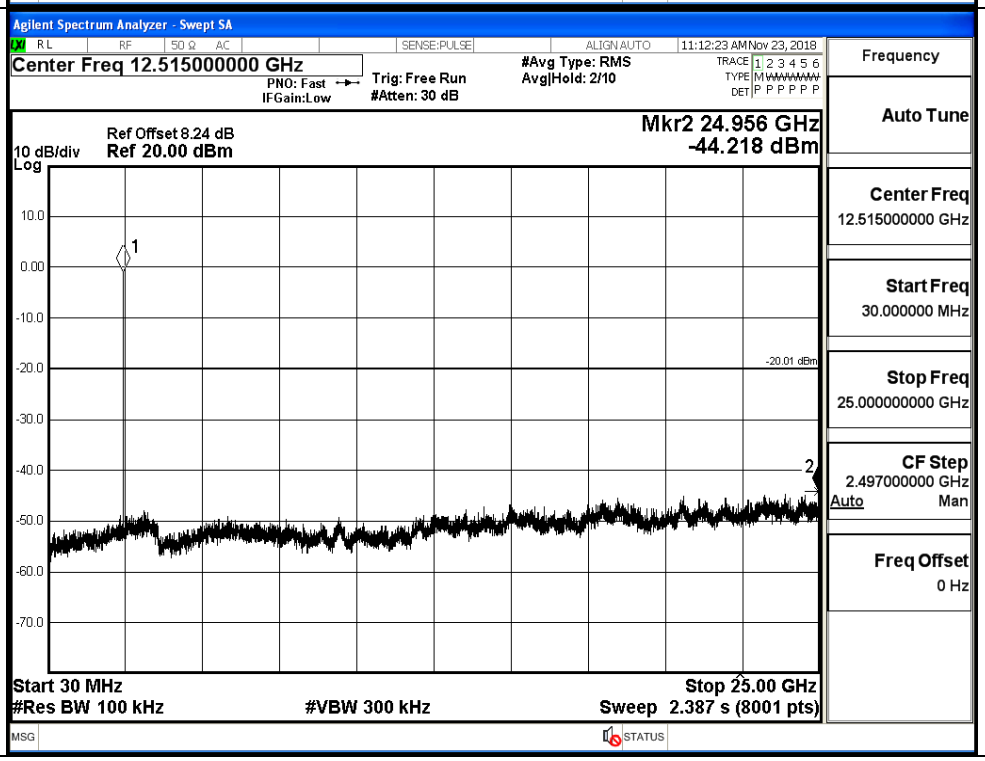
Pref		
Puw		

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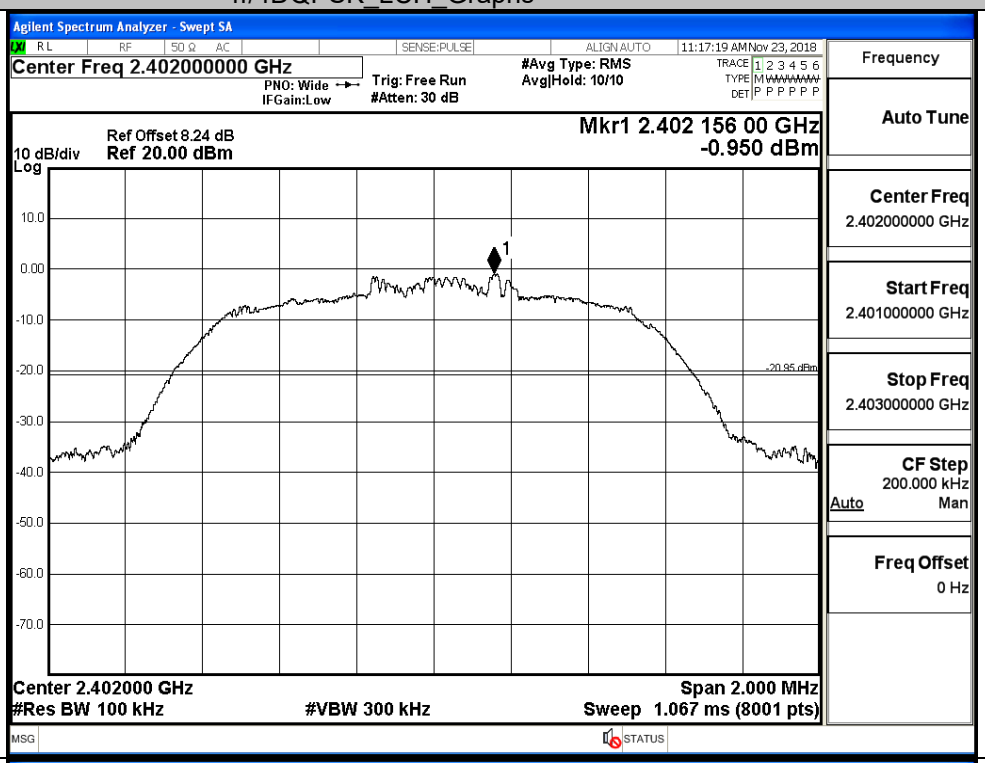
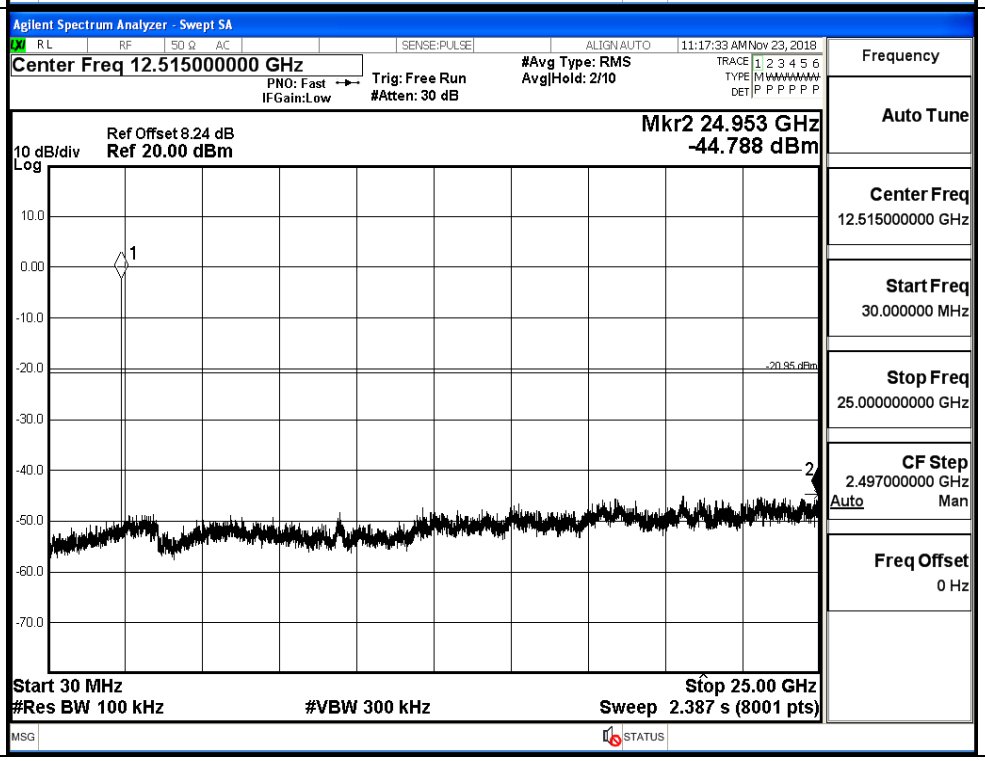
Pref		
Puw		

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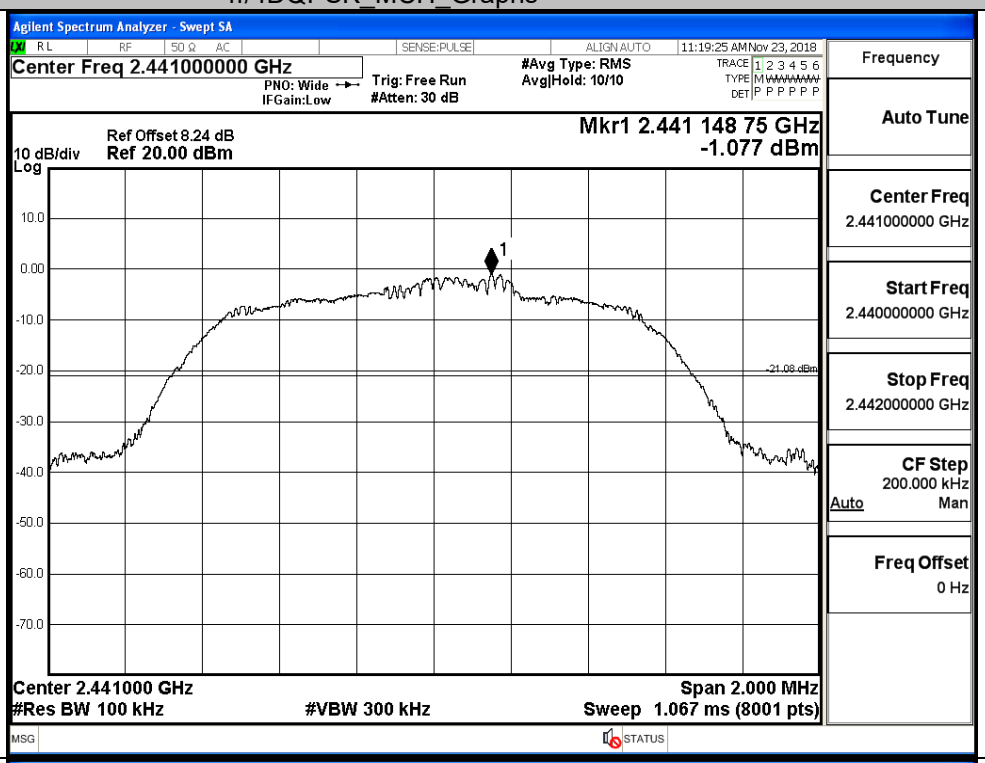
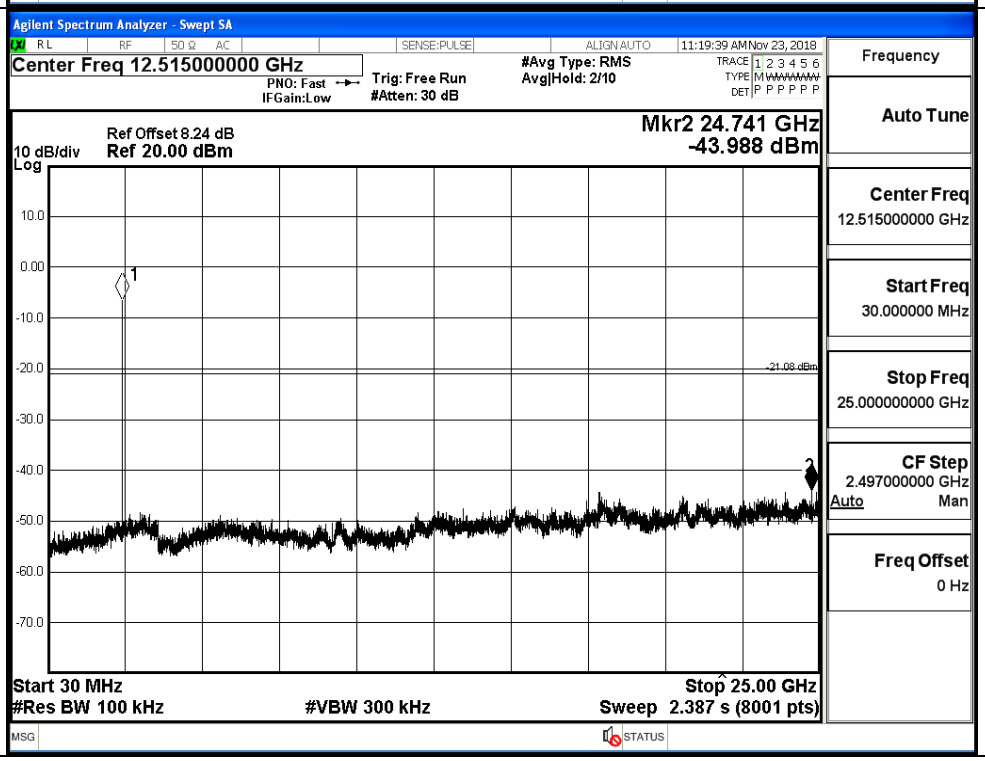
Pref		
Puw		

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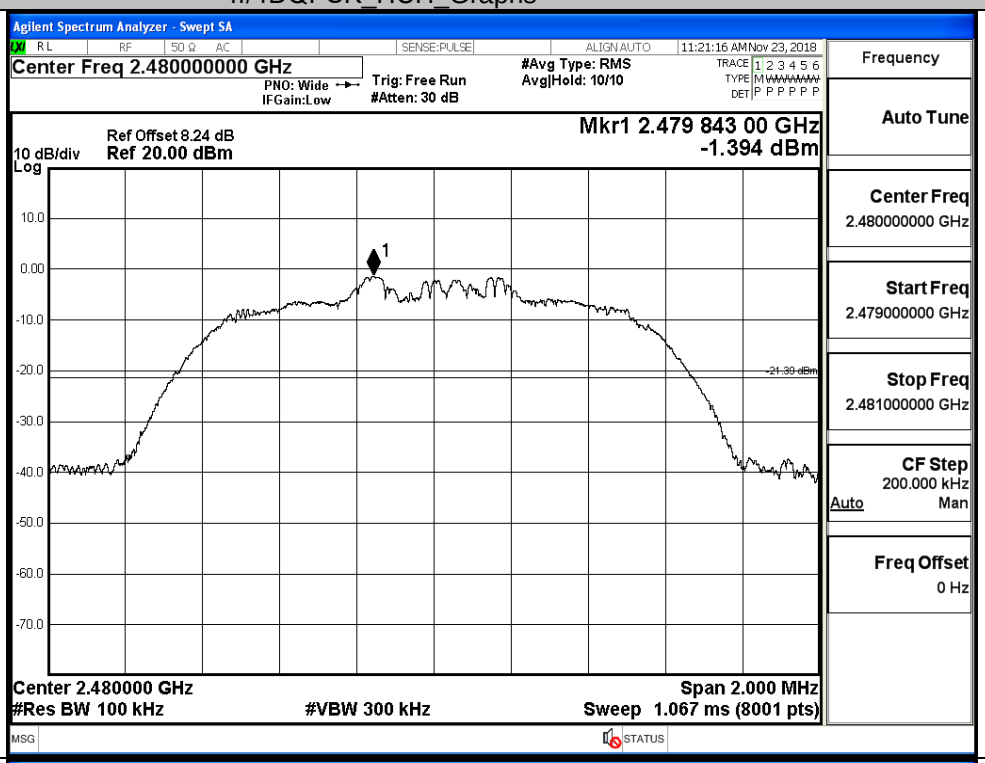
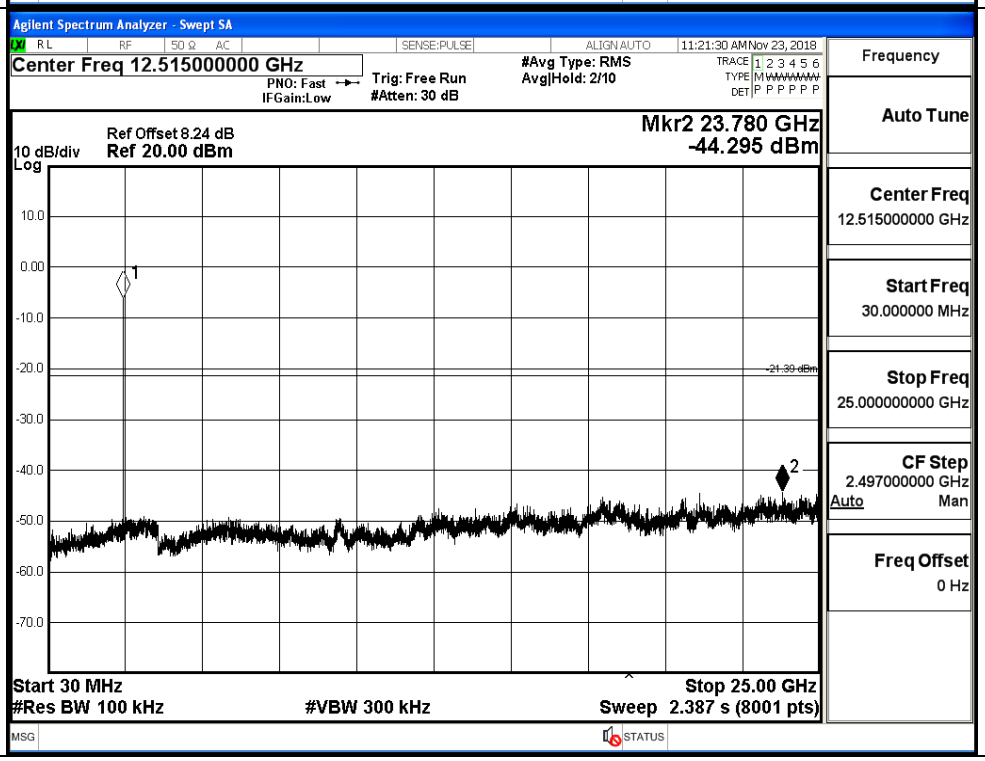
Pref		
Puw		

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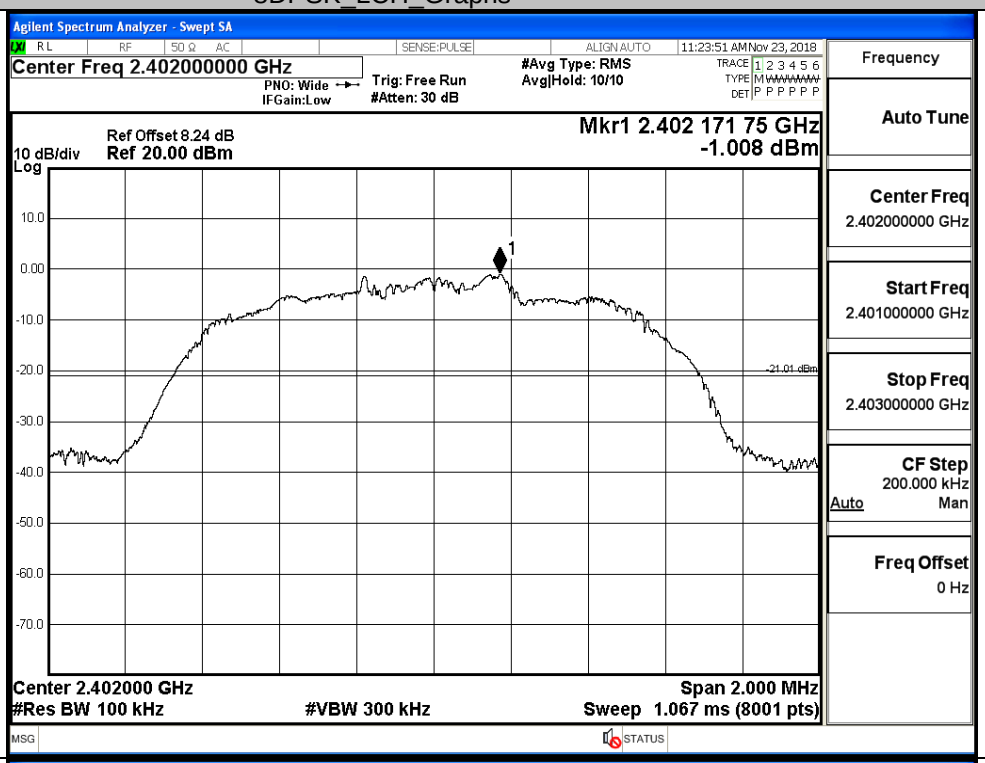
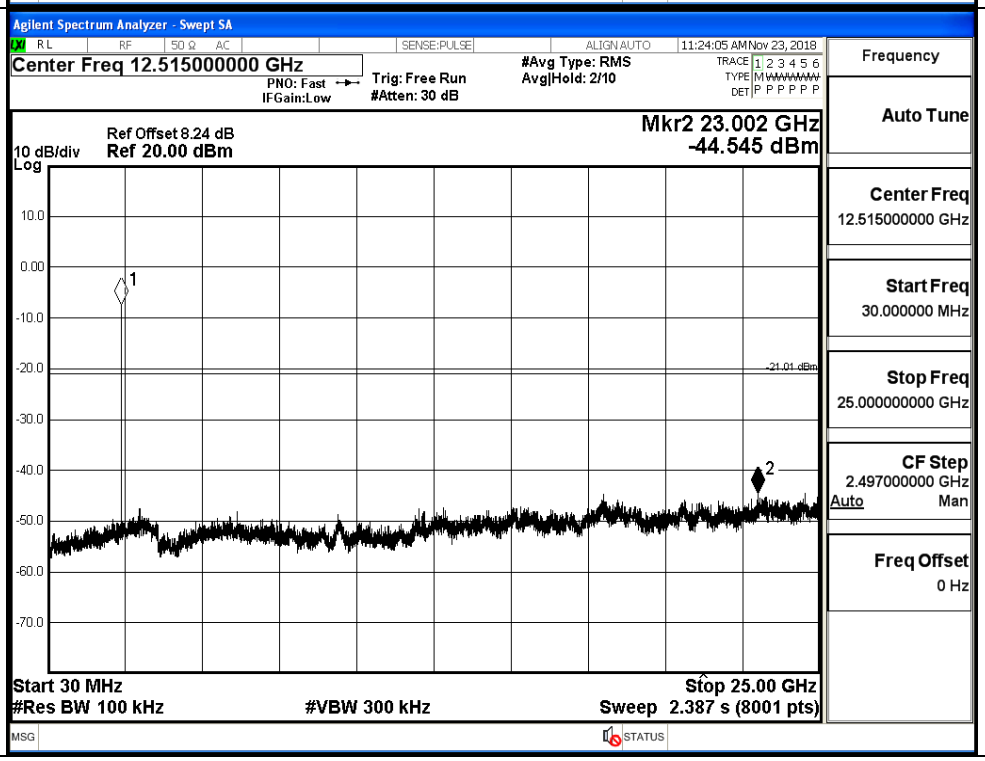
Pref		
Puw		

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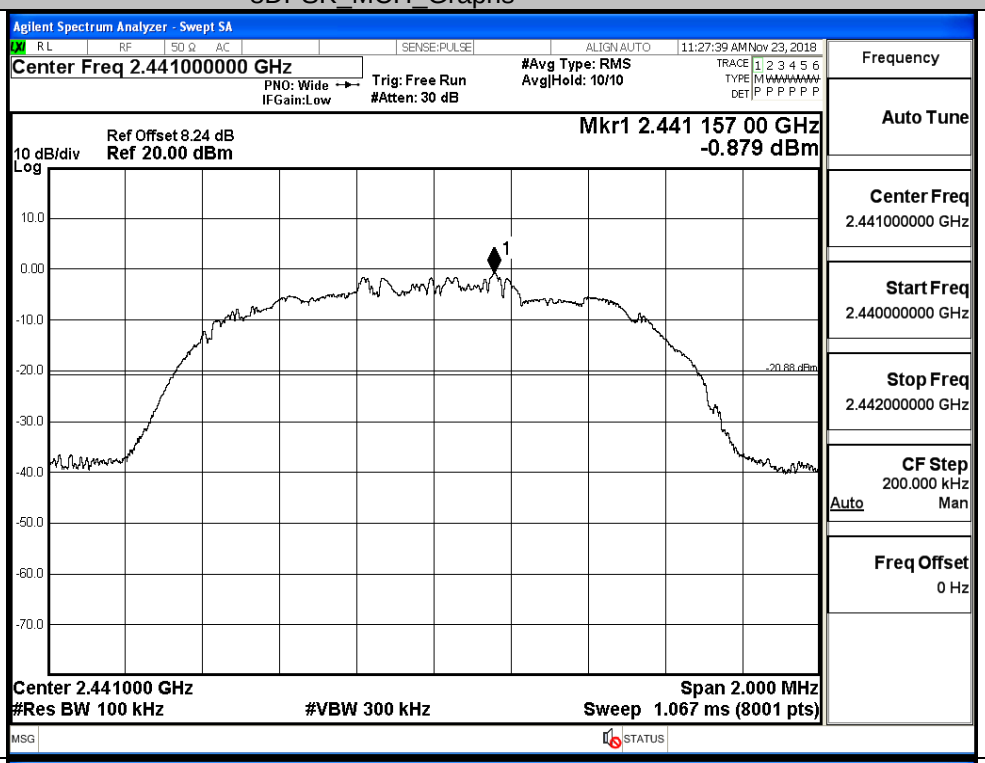
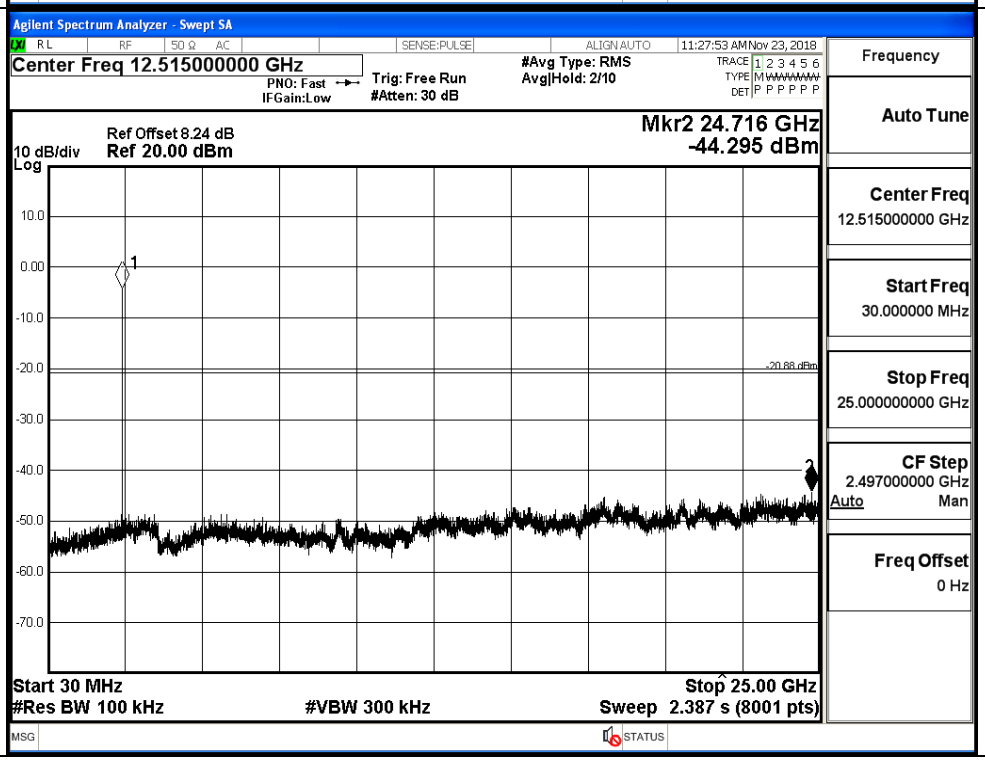
Pref		
Puw		

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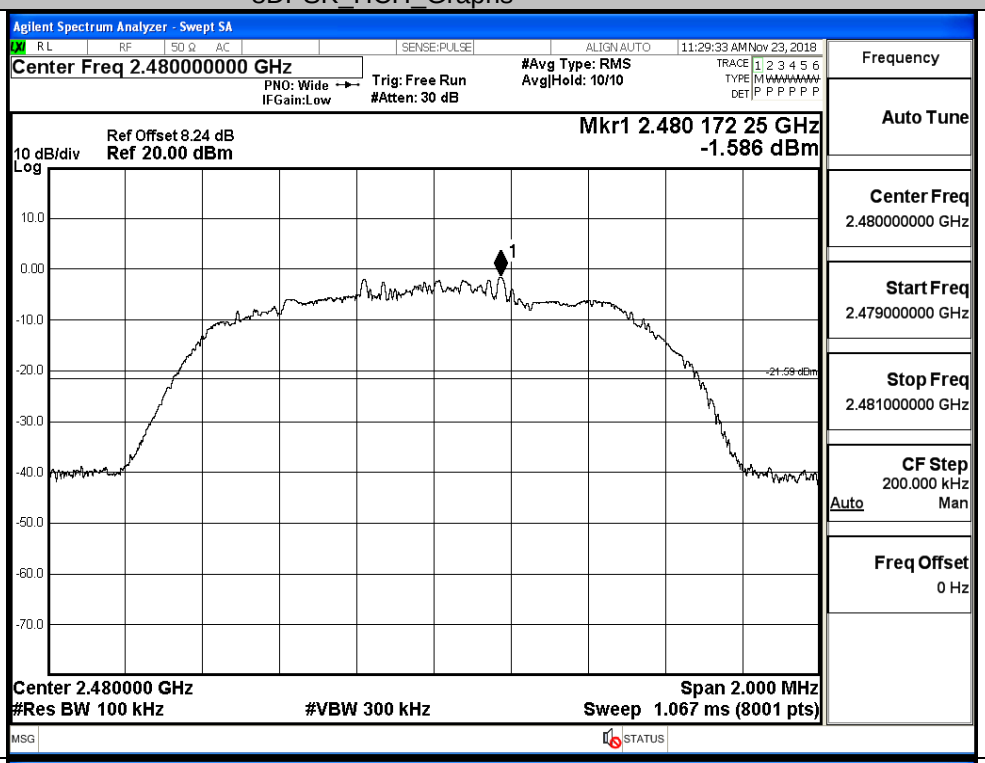
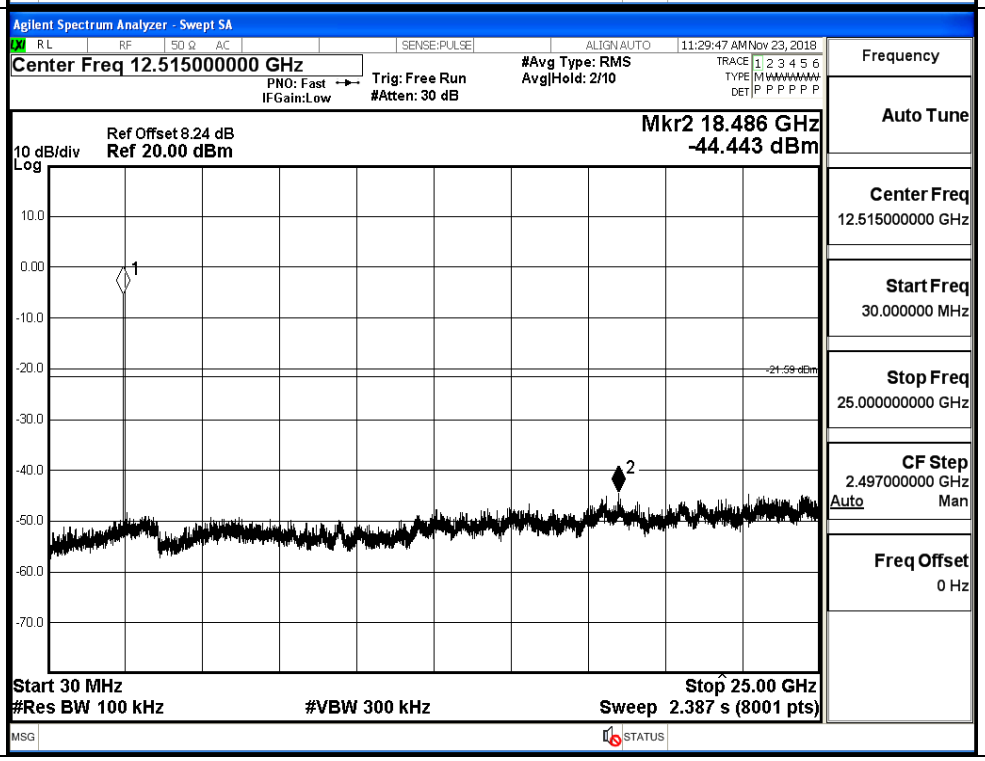
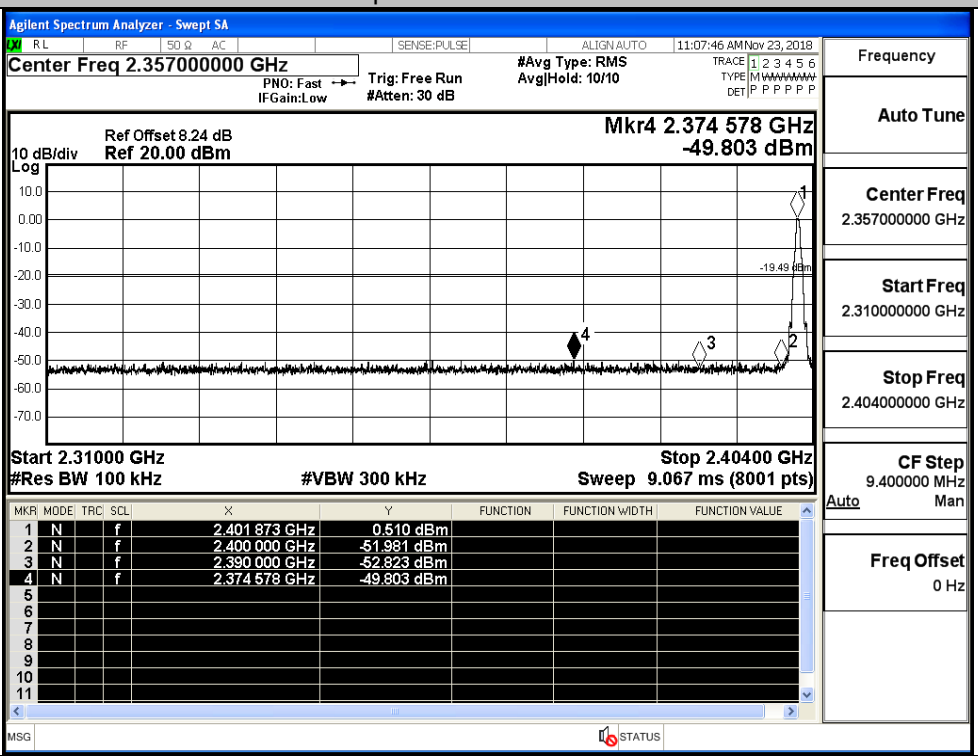
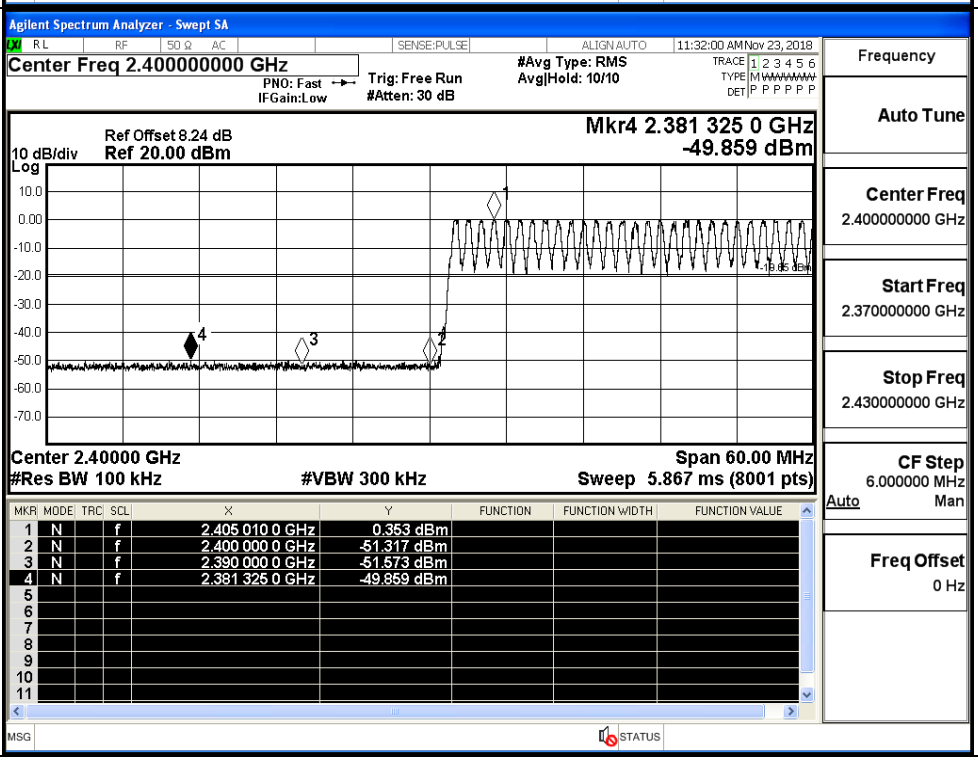
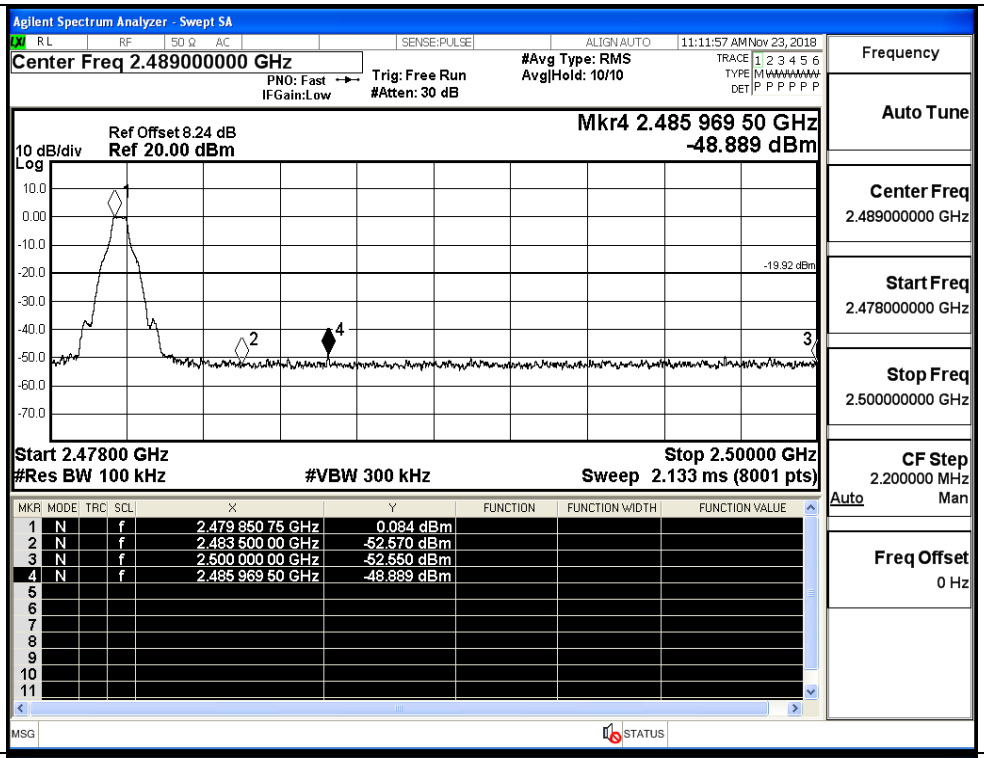
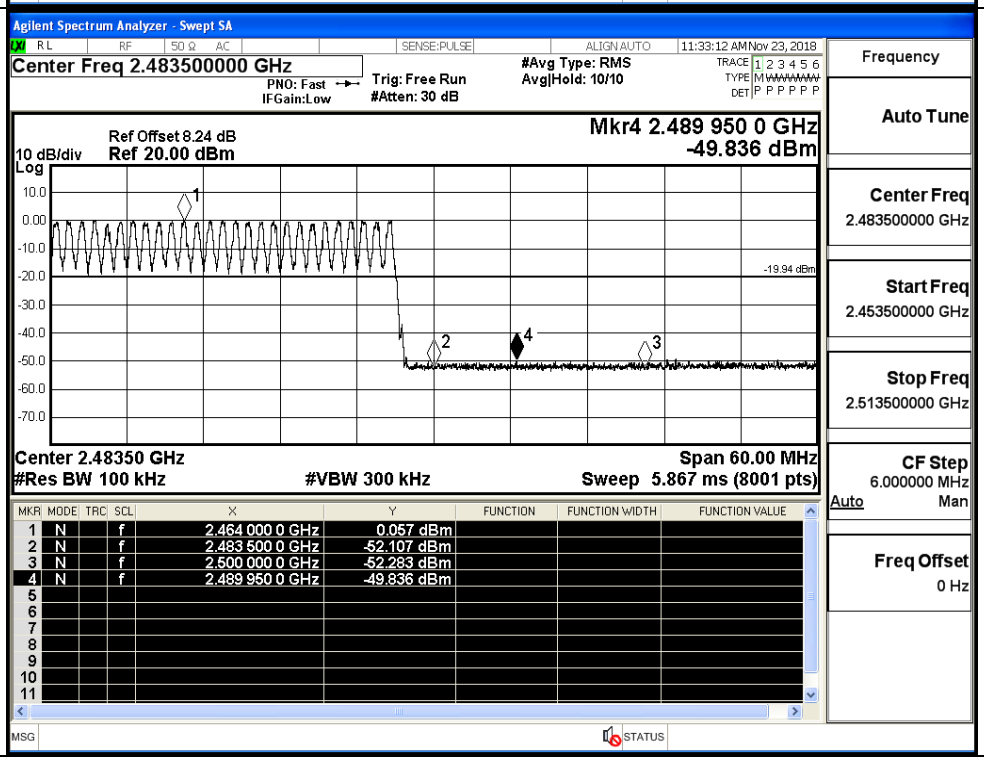
Pref		
Puw		

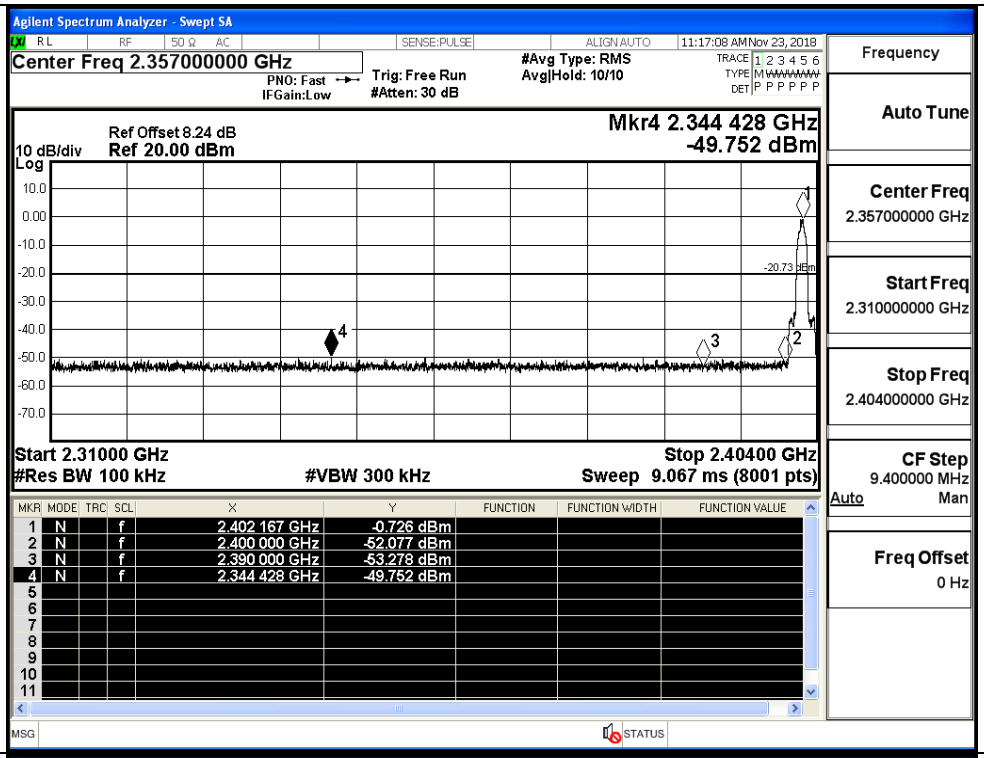
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.510	Off	-49.803	-19.49	PASS
			0.353	On	-49.859	-19.65	PASS
	HCH	2480	0.084	Off	-48.889	-19.92	PASS
			0.057	On	-49.836	-19.94	PASS
π/4DQPSK	LCH	2402	-0.726	Off	-49.752	-20.73	PASS
			-0.946	On	-49.319	-20.95	PASS
	HCH	2480	-1.320	Off	-49.813	-21.32	PASS
			-0.965	On	-48.944	-20.97	PASS
8DPSK	LCH	2402	-1.432	Off	-50.091	-21.43	PASS
			-0.712	On	-48.791	-20.71	PASS
	HCH	2480	-1.356	Off	-49.858	-21.36	PASS
			-1.103	On	-48.828	-21.1	PASS

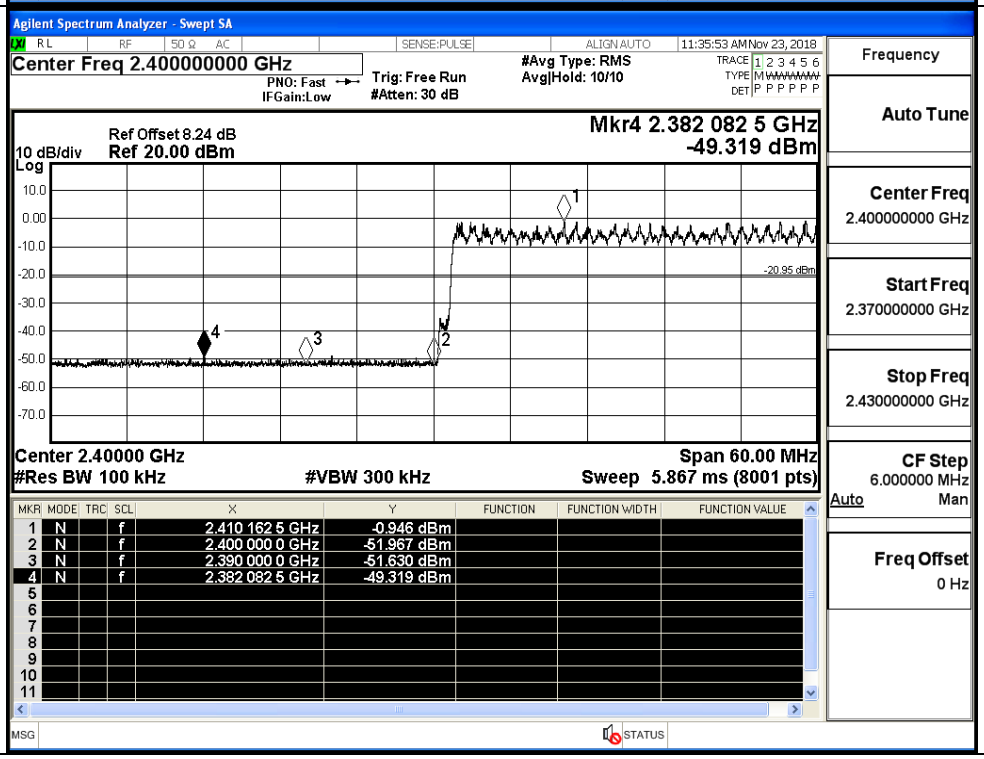
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

GFSK/HCH/No Hop	
GFSK/HCH/Hop	

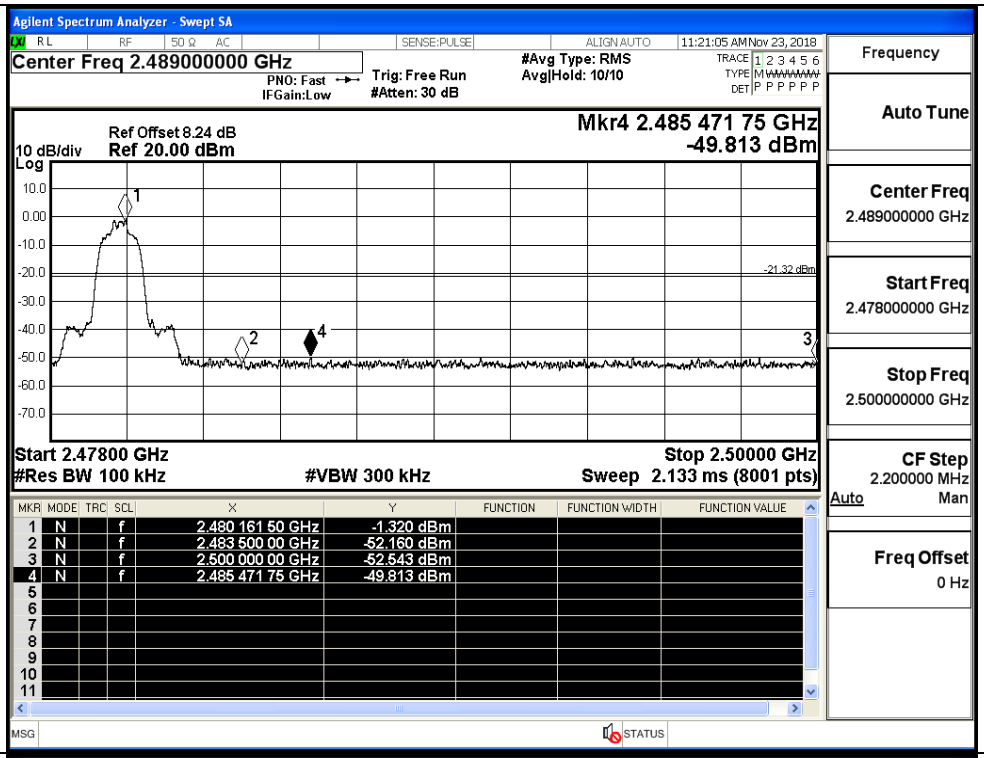
π/4DQPSK/LCH/No Hop



π/4DQPSK/LCH/Hop



π/4DQPSK/HCH/No Hop



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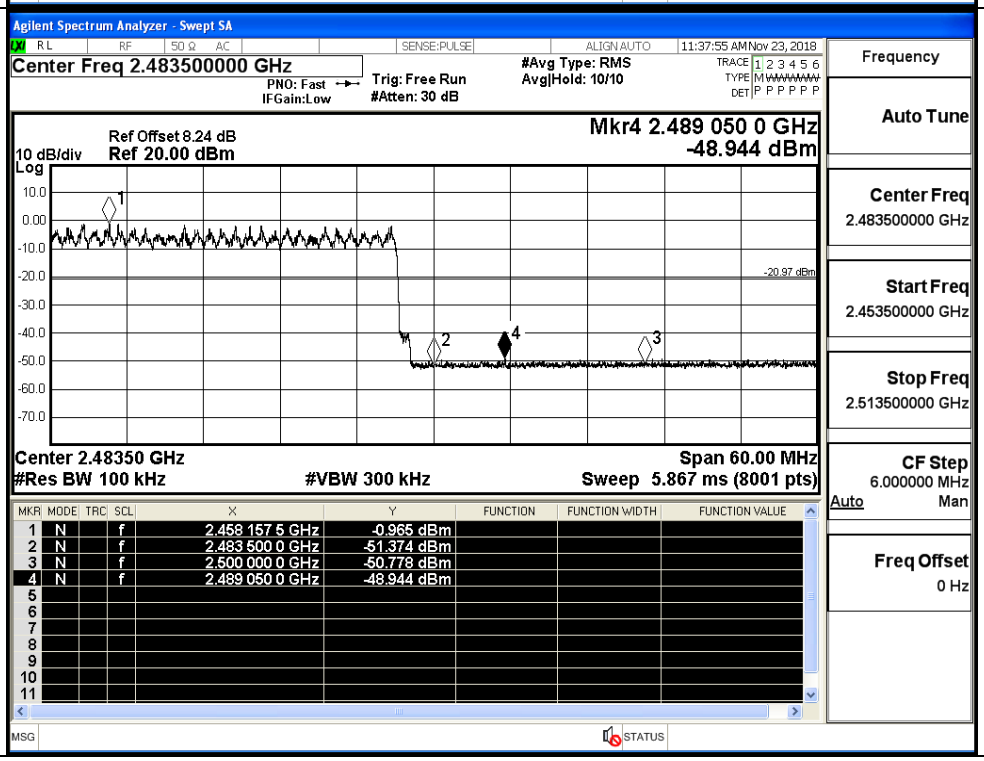
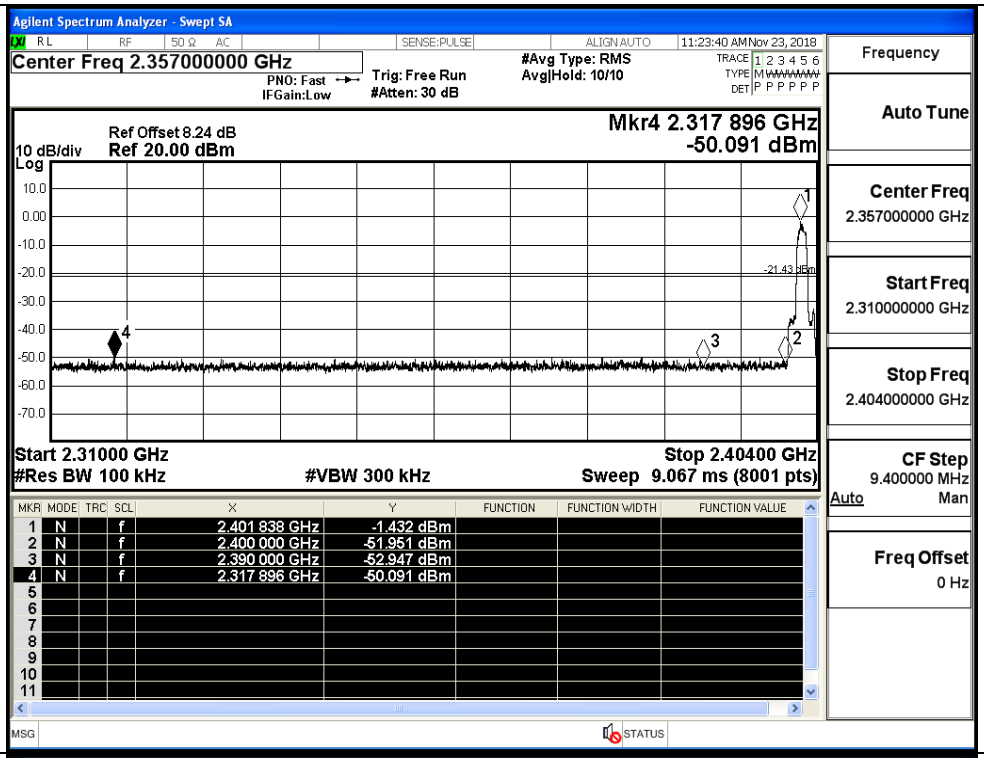
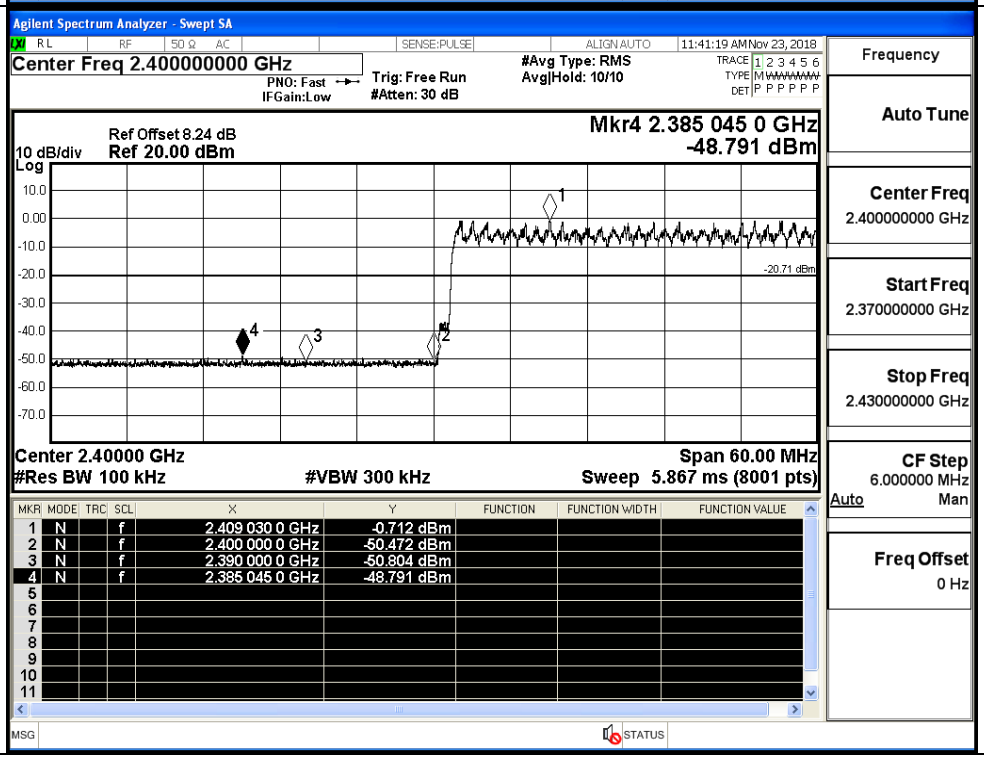
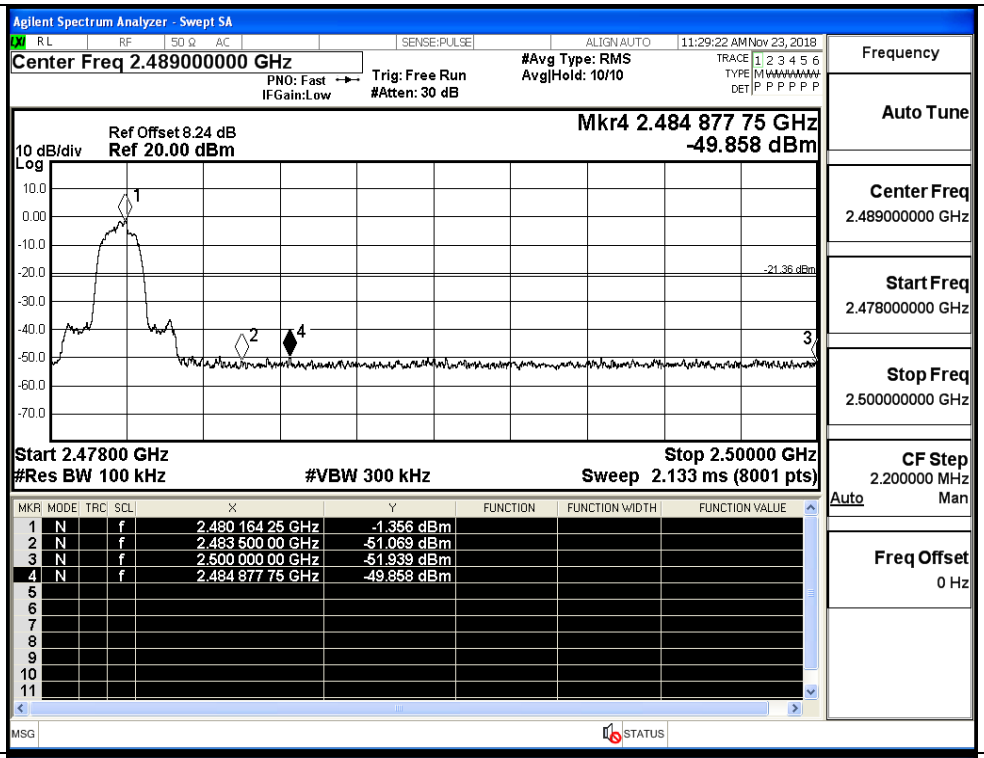
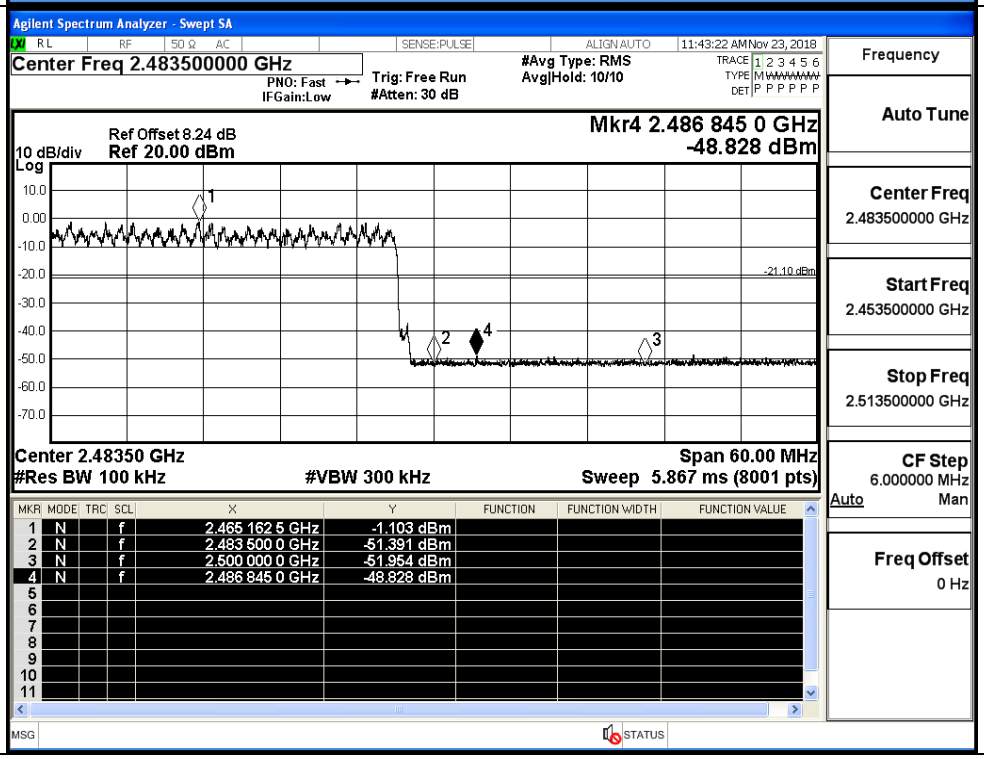


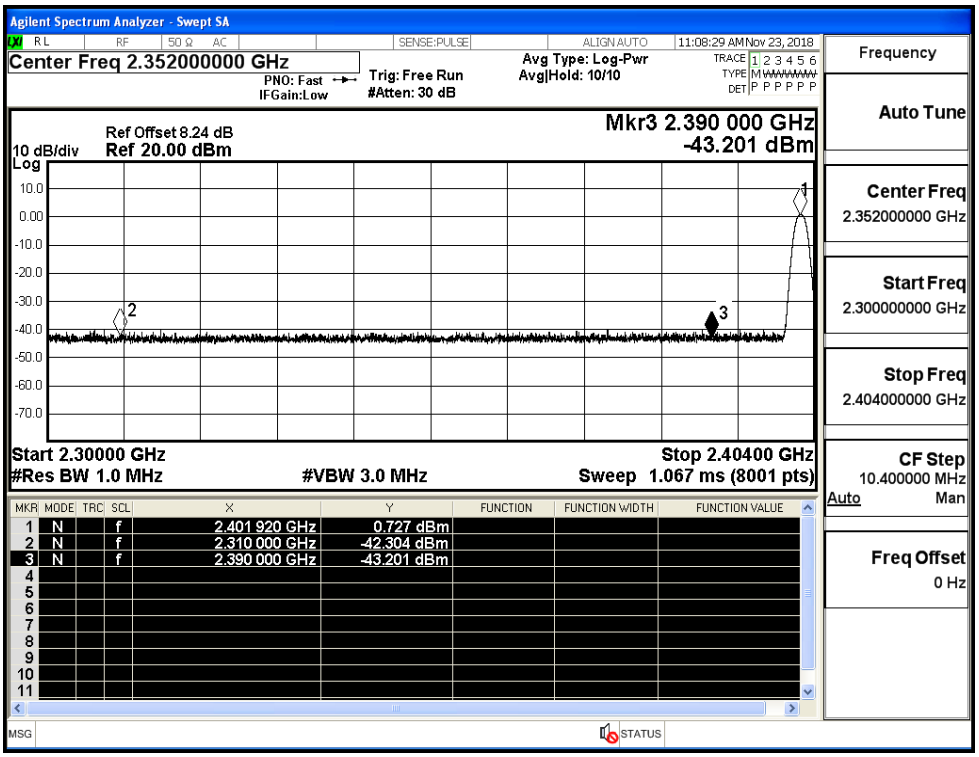
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

8DPSK/HCH/No Hop	
8DPSK/HCH/Hop	

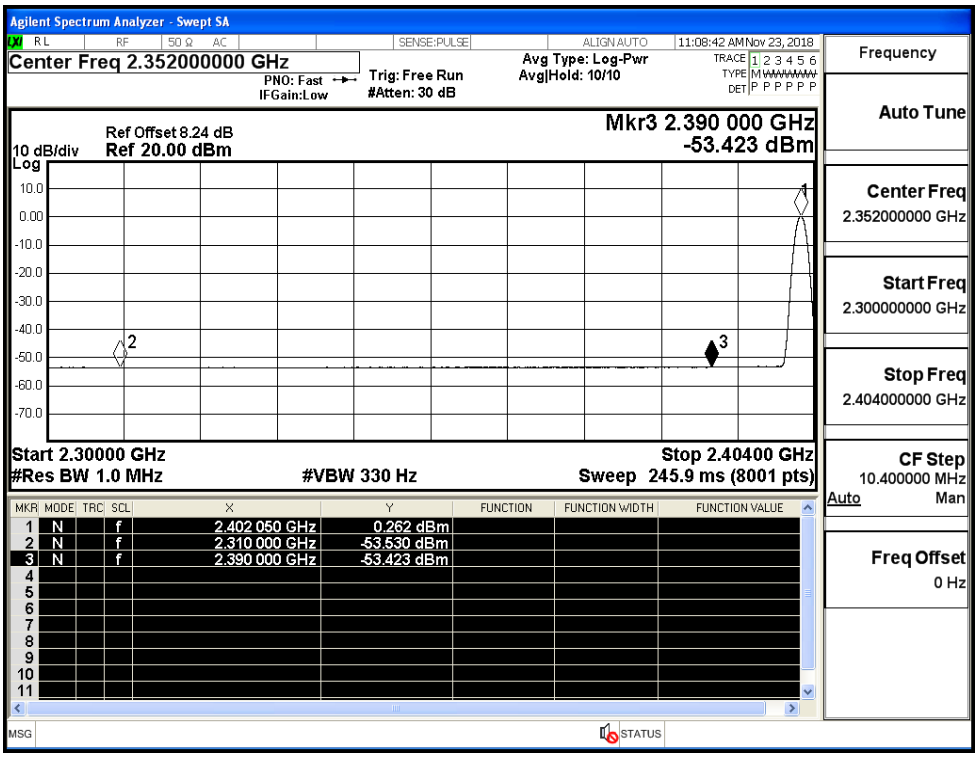
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.304	4.00	0	56.924	PEAK	74	PASS
	Off	2310.0	-53.530	4.00	0	45.698	AV	54	PASS
	Off	2390.0	-43.201	4.00	0	56.027	PEAK	74	PASS
	Off	2390.0	-53.423	4.00	0	45.805	AV	54	PASS
	Off	2483.5	-42.588	4.00	0	56.640	PEAK	74	PASS
	Off	2483.5	-52.983	4.00	0	46.245	AV	54	PASS
	Off	2500.0	-41.851	4.00	0	57.377	PEAK	74	PASS
	Off	2500.0	-52.922	4.00	0	46.306	AV	54	PASS
π/4DQPSK	Off	2310.0	-43.704	4.00	0	55.524	PEAK	74	PASS
	Off	2310.0	-53.493	4.00	0	45.735	AV	54	PASS
	Off	2390.0	-43.534	4.00	0	55.694	PEAK	74	PASS
	Off	2390.0	-53.310	4.00	0	45.918	AV	54	PASS
	Off	2483.5	-42.473	4.00	0	56.755	PEAK	74	PASS
	Off	2483.5	-53.038	4.00	0	46.190	AV	54	PASS
	Off	2500.0	-42.956	4.00	0	56.272	PEAK	74	PASS
	Off	2500.0	-52.930	4.00	0	46.298	AV	54	PASS
8DPSK	Off	2310.0	-43.434	4.00	0	55.794	PEAK	74	PASS
	Off	2310.0	-53.588	4.00	0	45.640	AV	54	PASS
	Off	2390.0	-43.592	4.00	0	55.636	PEAK	74	PASS
	Off	2390.0	-53.359	4.00	0	45.869	AV	54	PASS
	Off	2483.5	-43.221	4.00	0	56.007	PEAK	74	PASS
	Off	2483.5	-53.034	4.00	0	46.194	AV	54	PASS
	Off	2500.0	-42.739	4.00	0	56.489	PEAK	74	PASS
	Off	2500.0	-52.934	4.00	0	46.294	AV	54	PASS

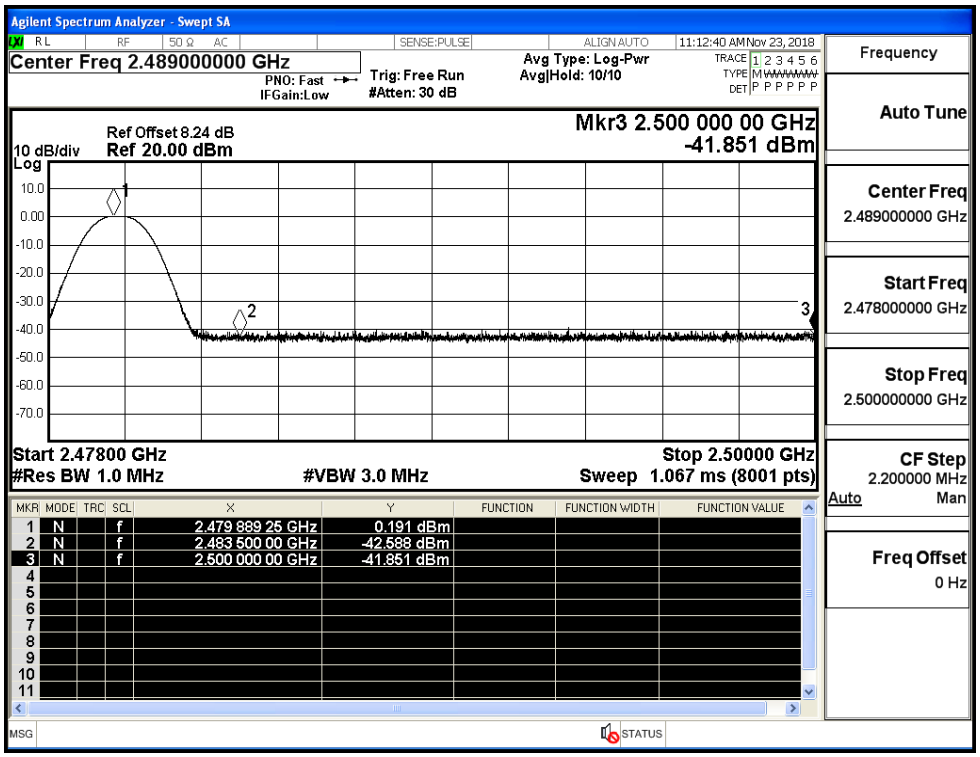
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



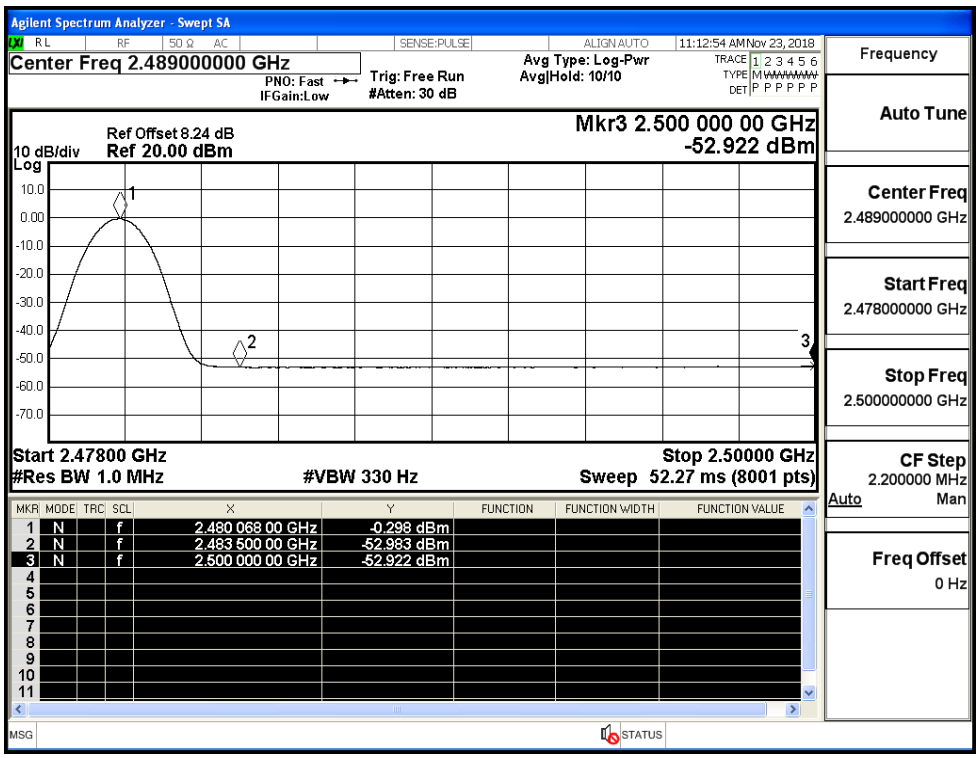
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



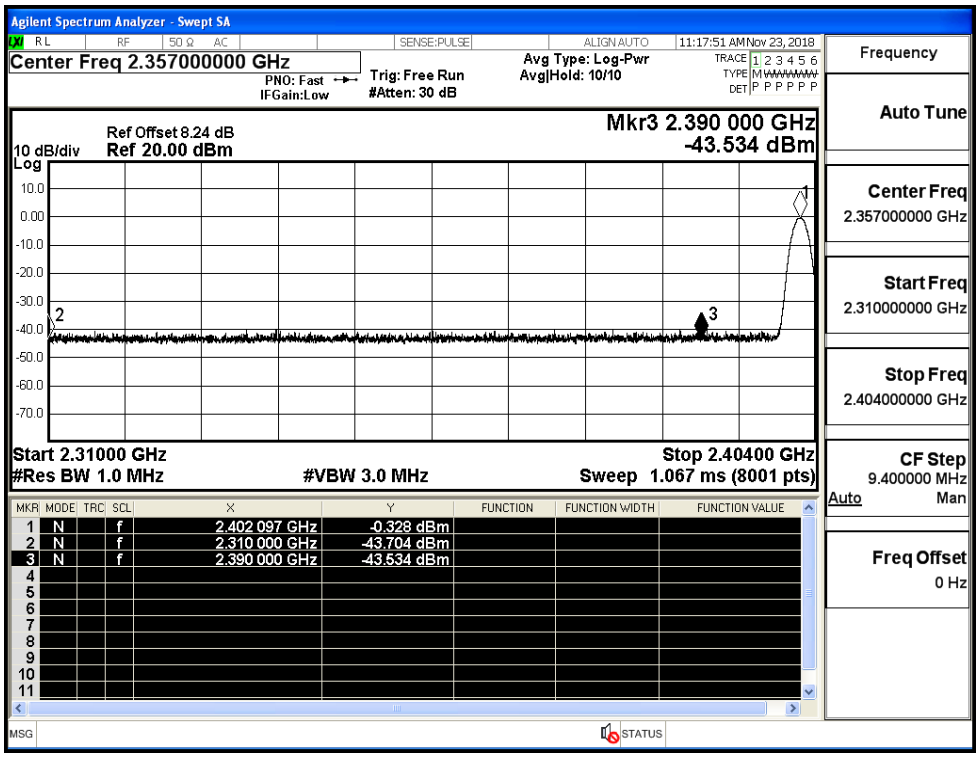
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



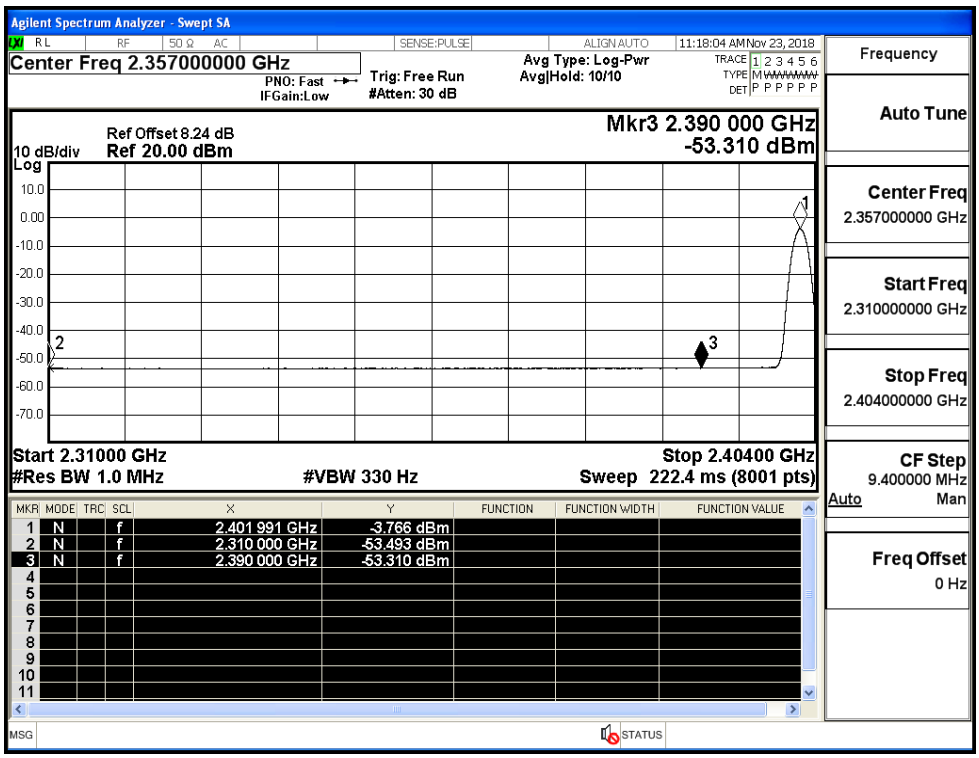
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



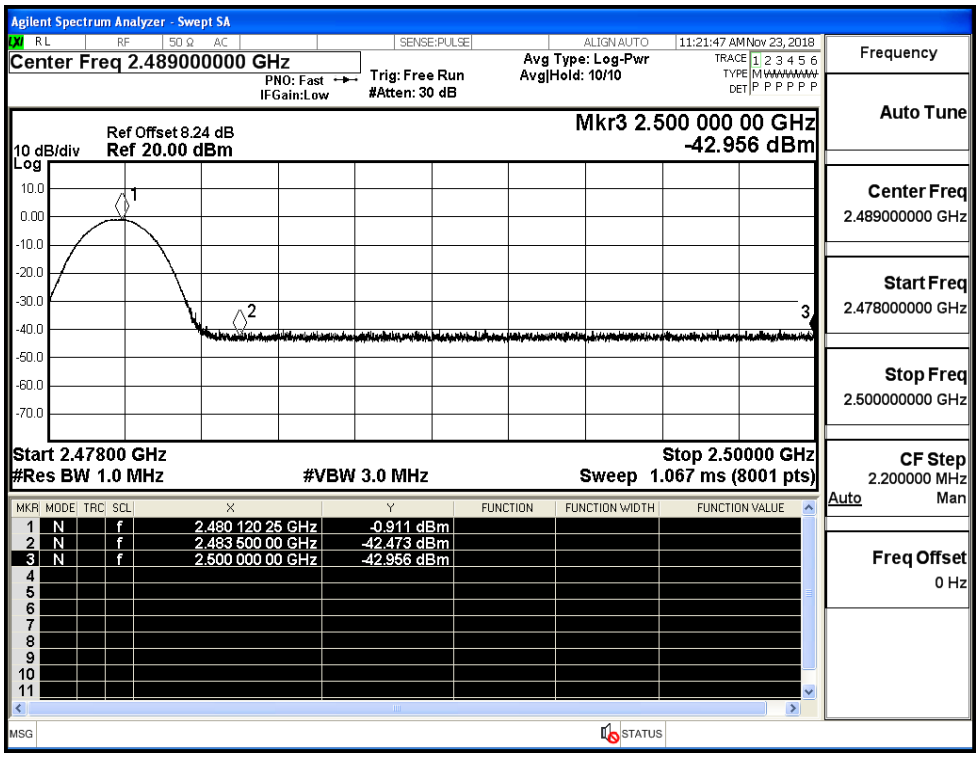
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



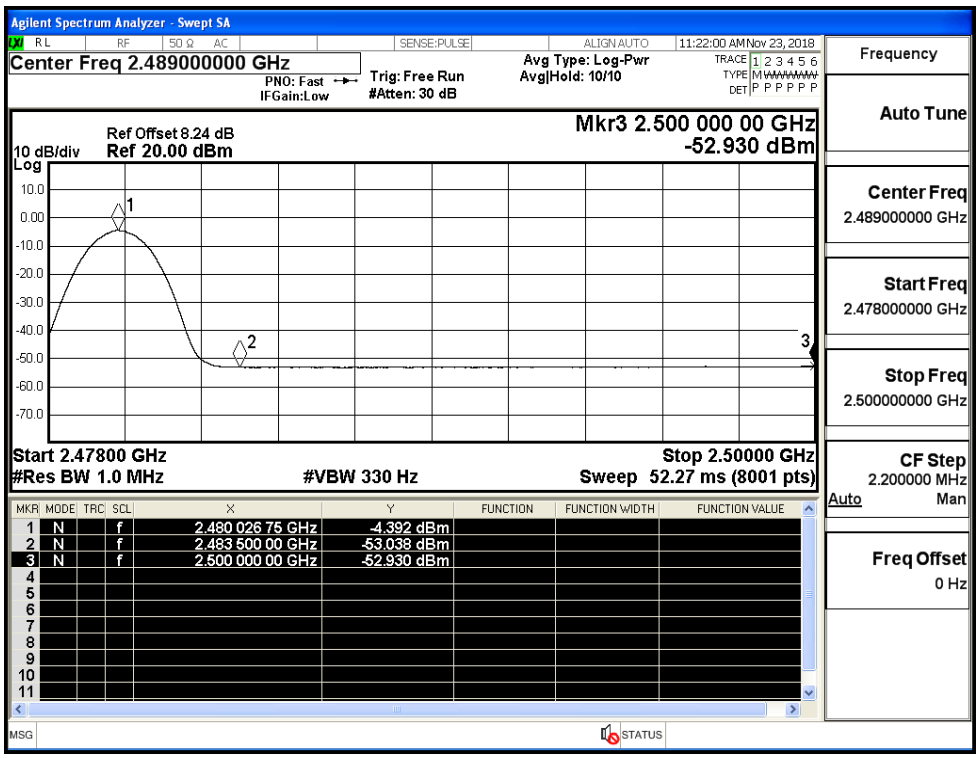
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



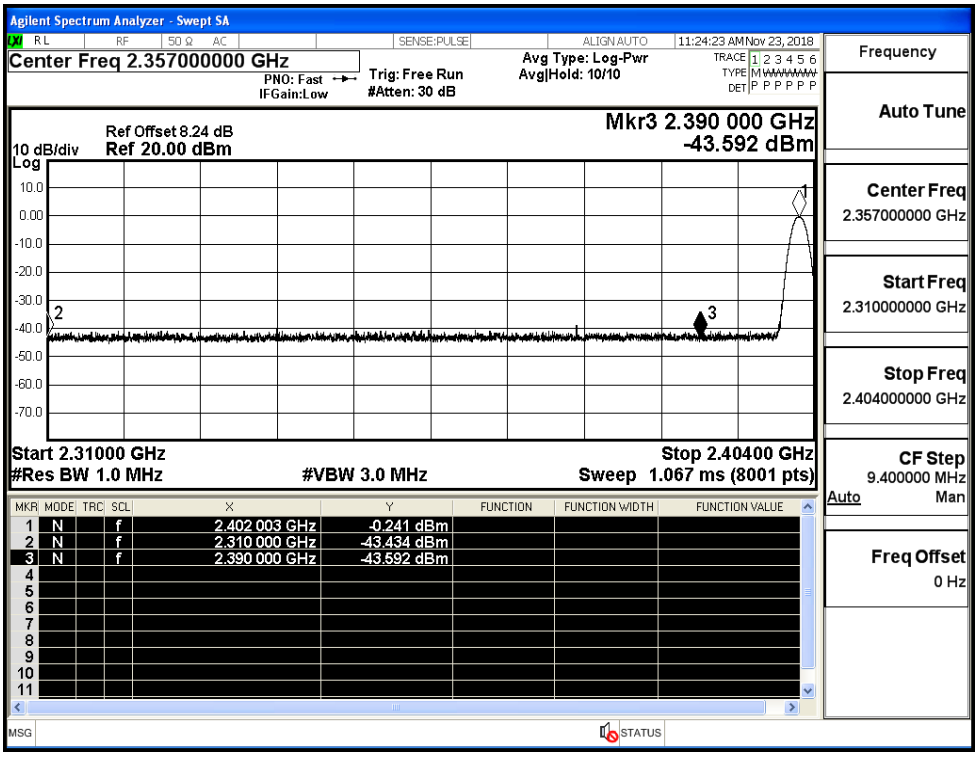
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



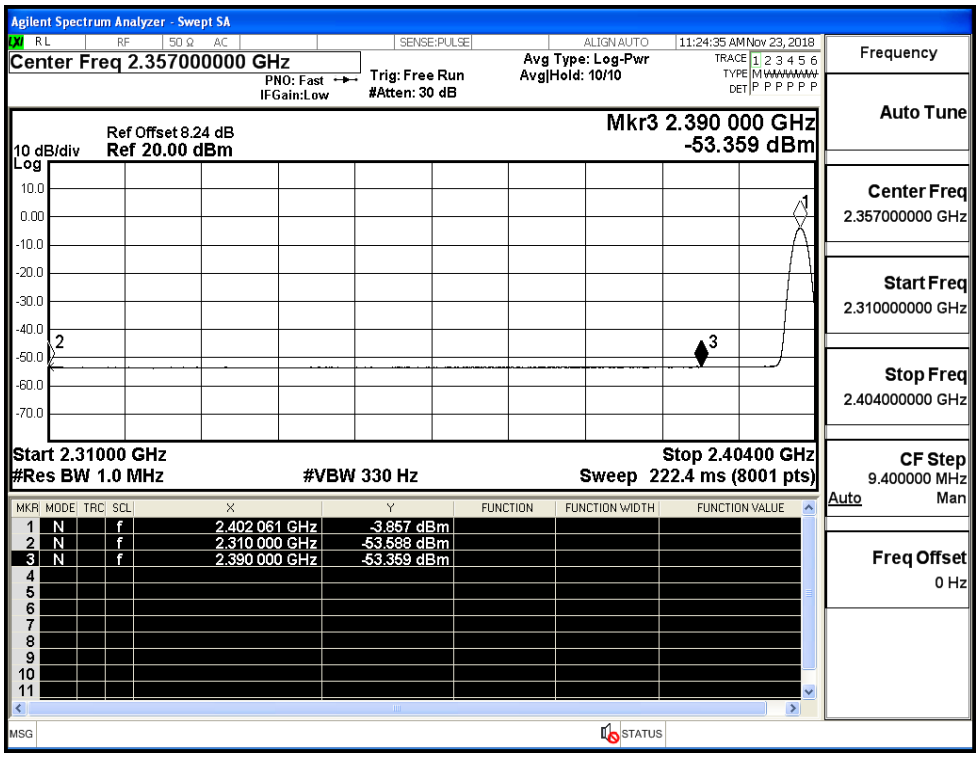
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



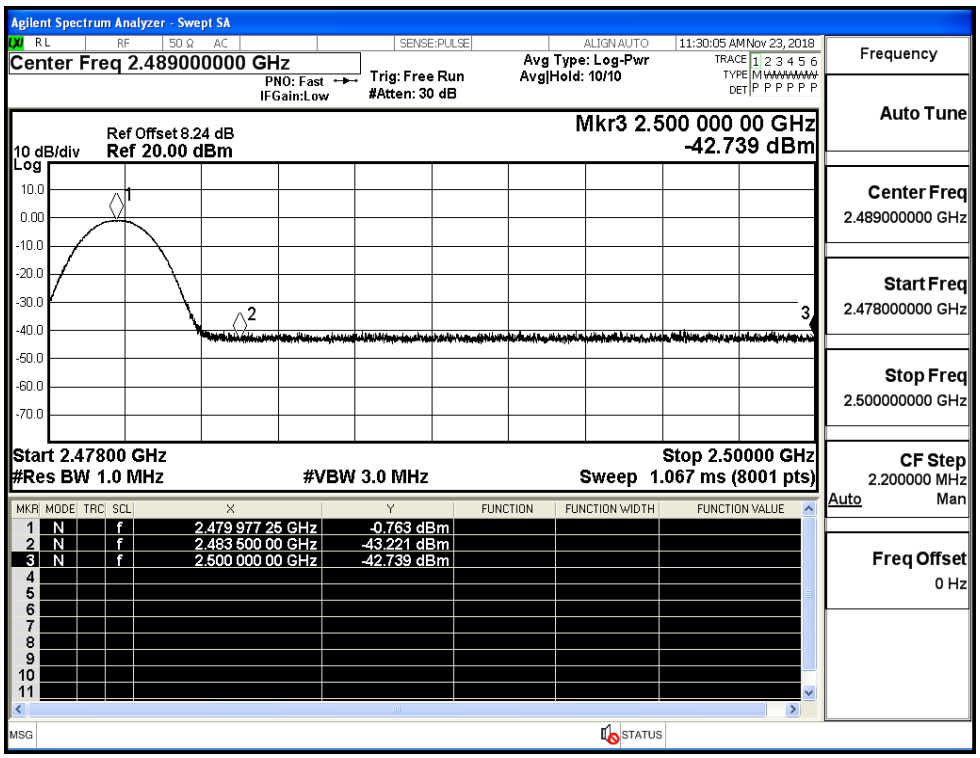
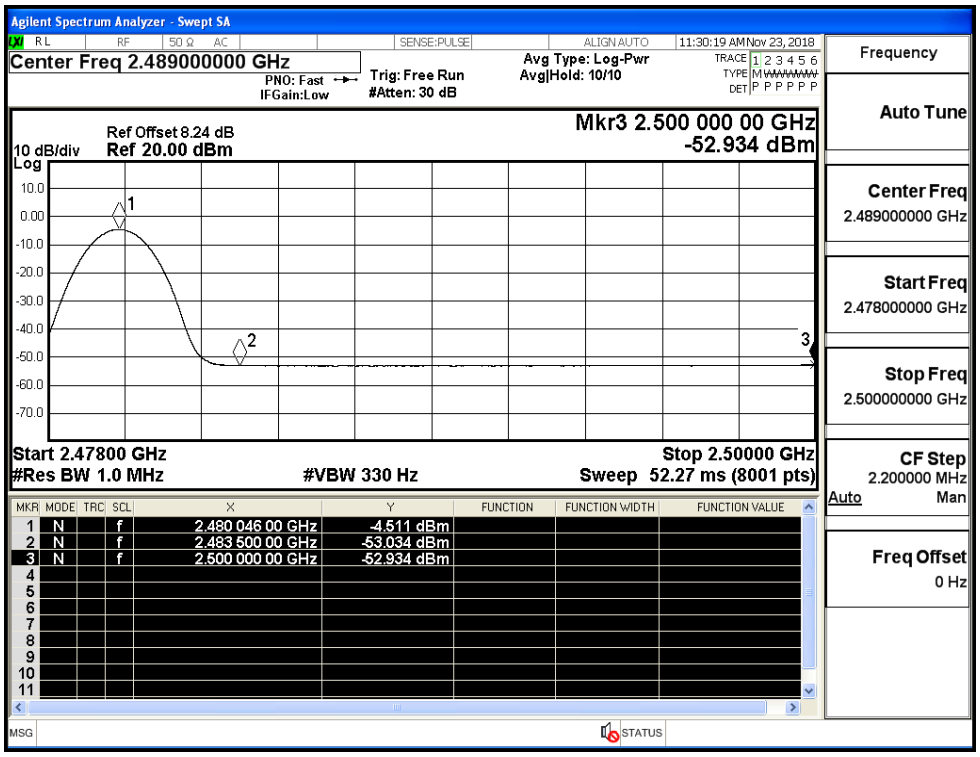
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)