Appendix A

RF Test Data for BT V4.2(BDR/EDR) (Conducted Measurement)

Product Name: Bluetooth Speaker

Trade Mark: KOODUU

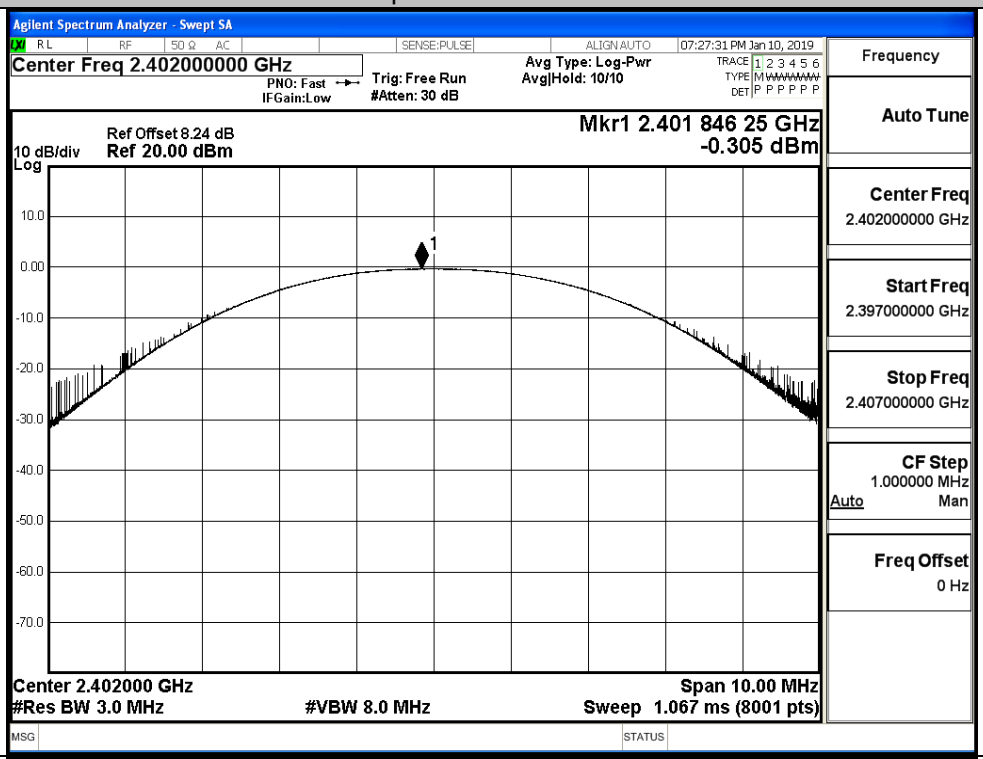
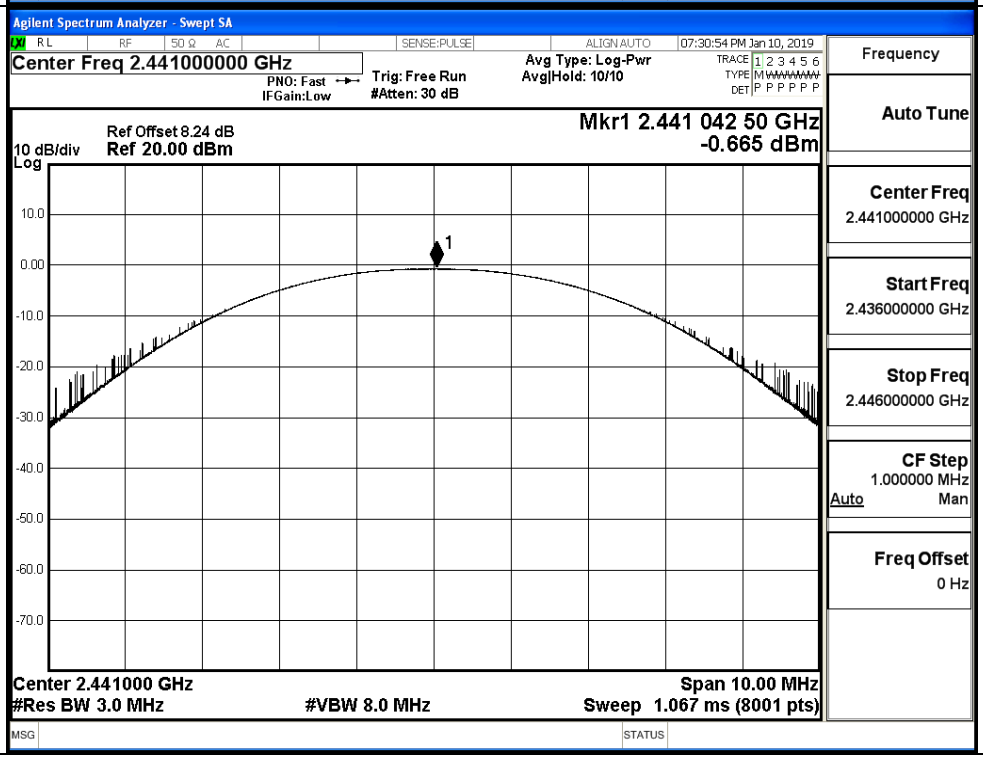
Test Model: Synergy 50 PRO

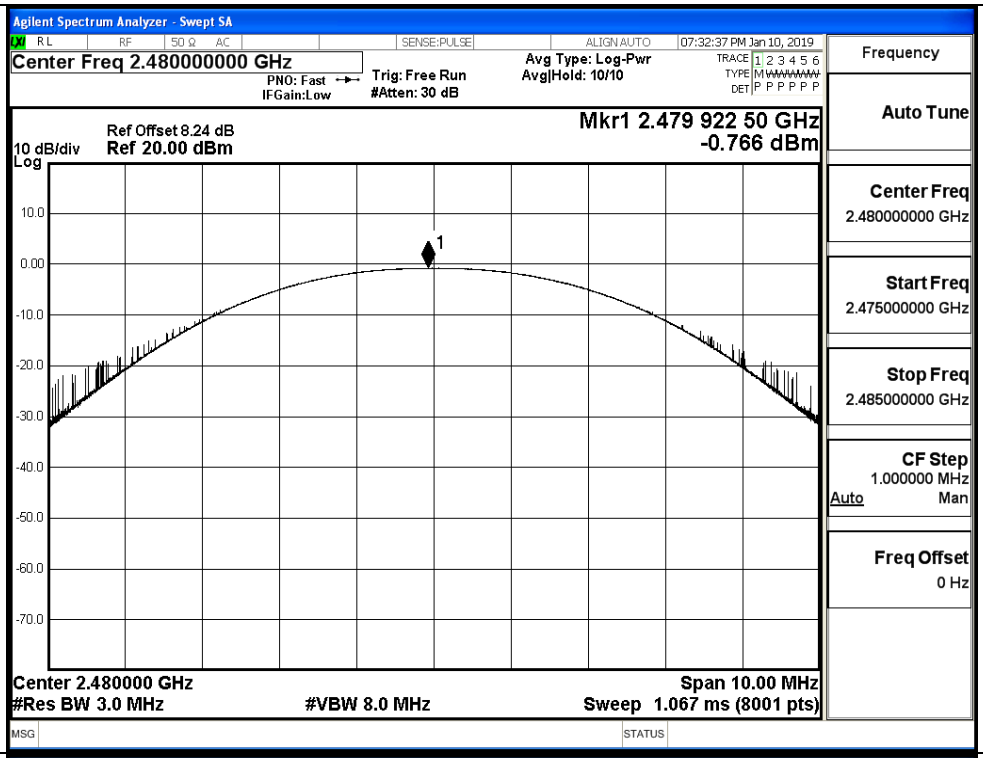
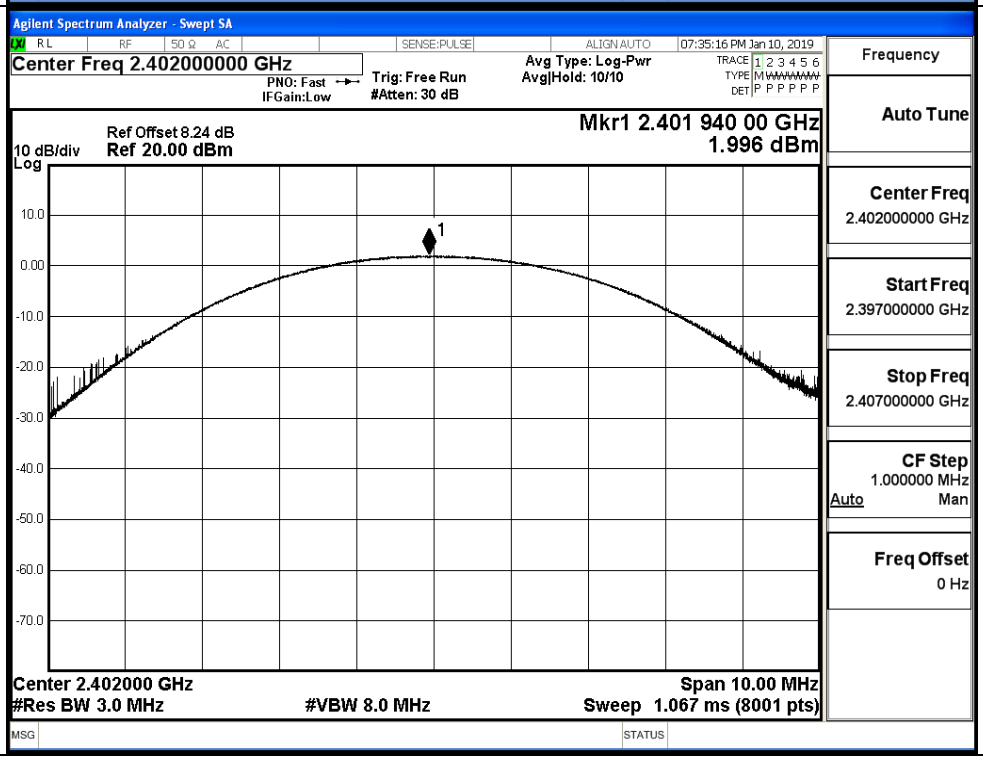
Environmental Conditions

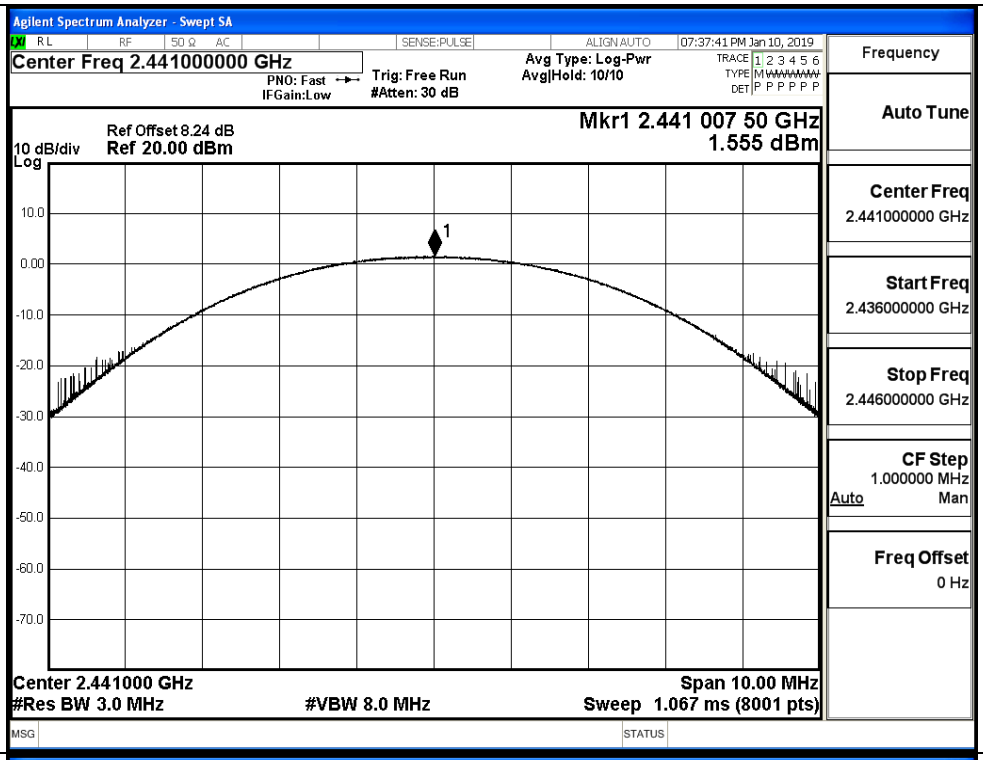
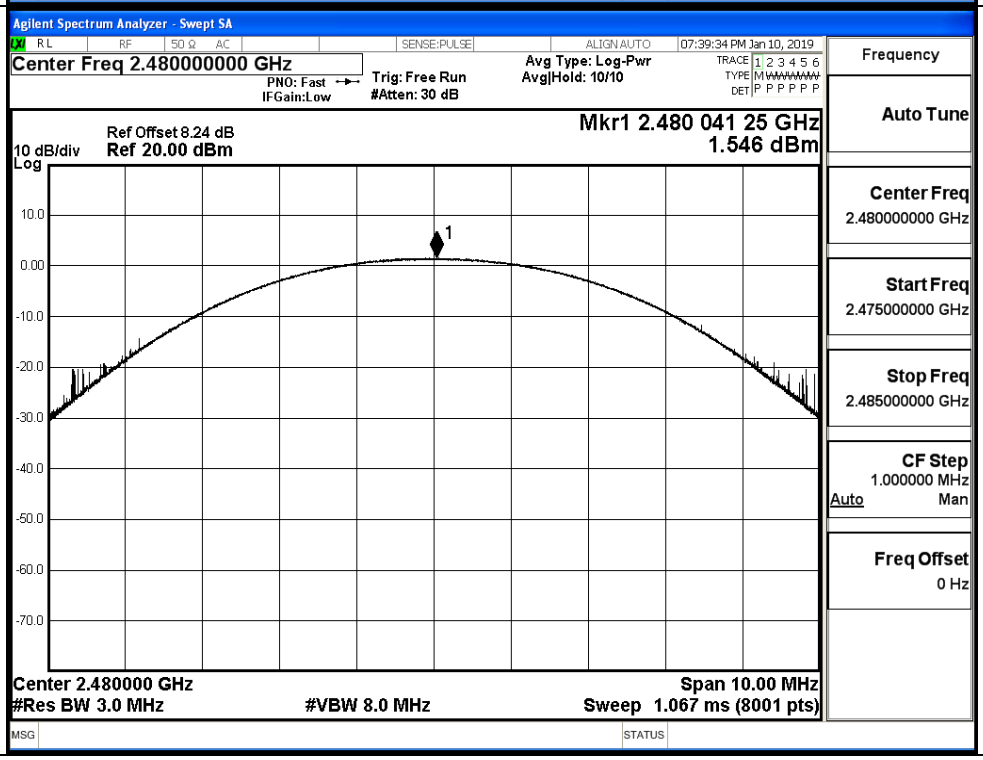
Temperature:	24.1 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	David.Luo
Supervised by:	Jayden.Zhuo

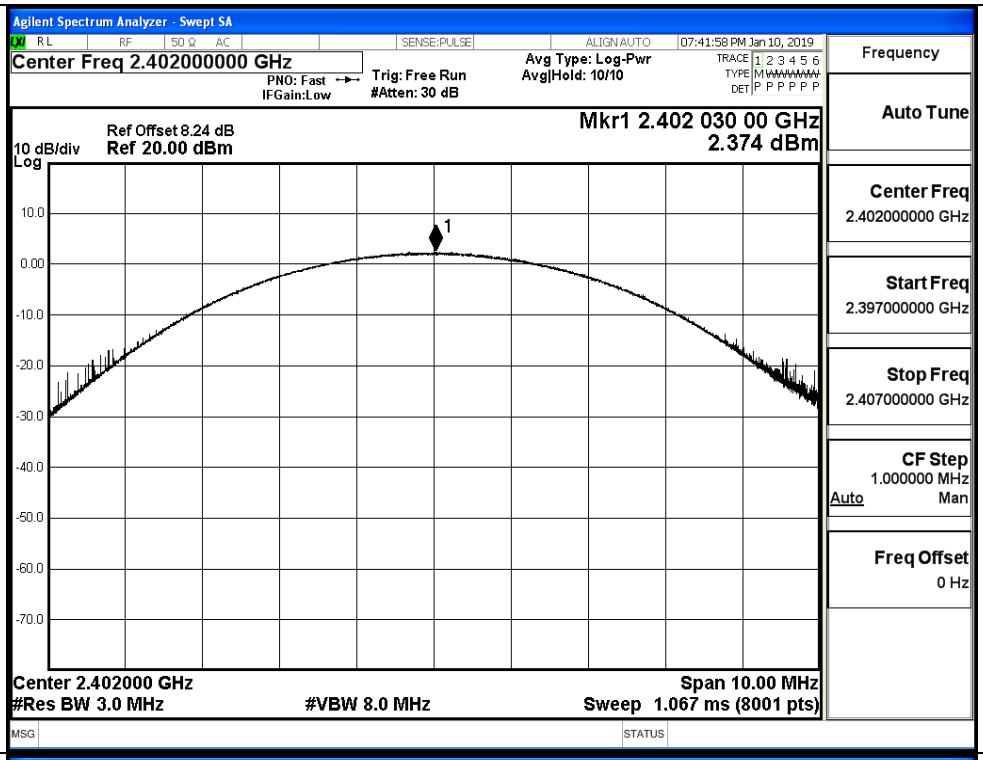
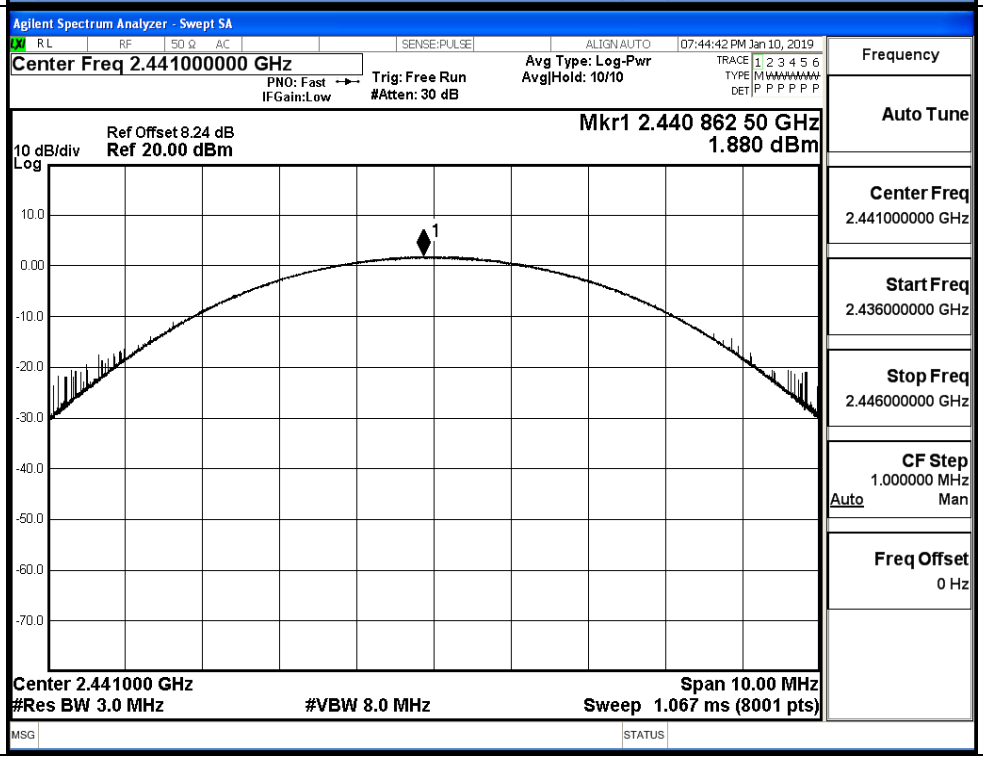
A.1 Maxmum Conducted Peak Output Power

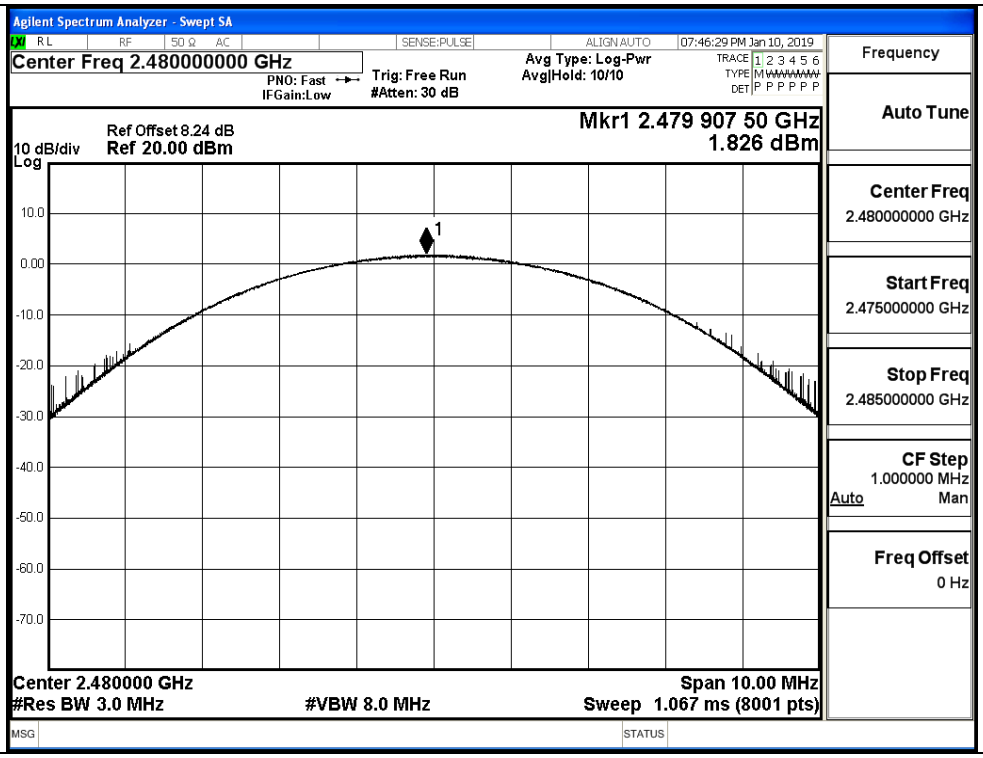
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.305	30	PASS
	MCH	-0.665	30	PASS
	HCH	-0.766	30	PASS
π/4DQPSK	LCH	1.996	21	PASS
	MCH	1.555	21	PASS
	HCH	1.546	21	PASS
8DPSK	LCH	2.374	21	PASS
	MCH	1.880	21	PASS
	HCH	1.826	21	PASS

Test Graphs		
GFSK/LCH		
GFSK/MCH		

GFSK/HCH		
π/4DQPSK/LCH		

π/4DQPSK/MCH		
π/4DQPSK/HCH		

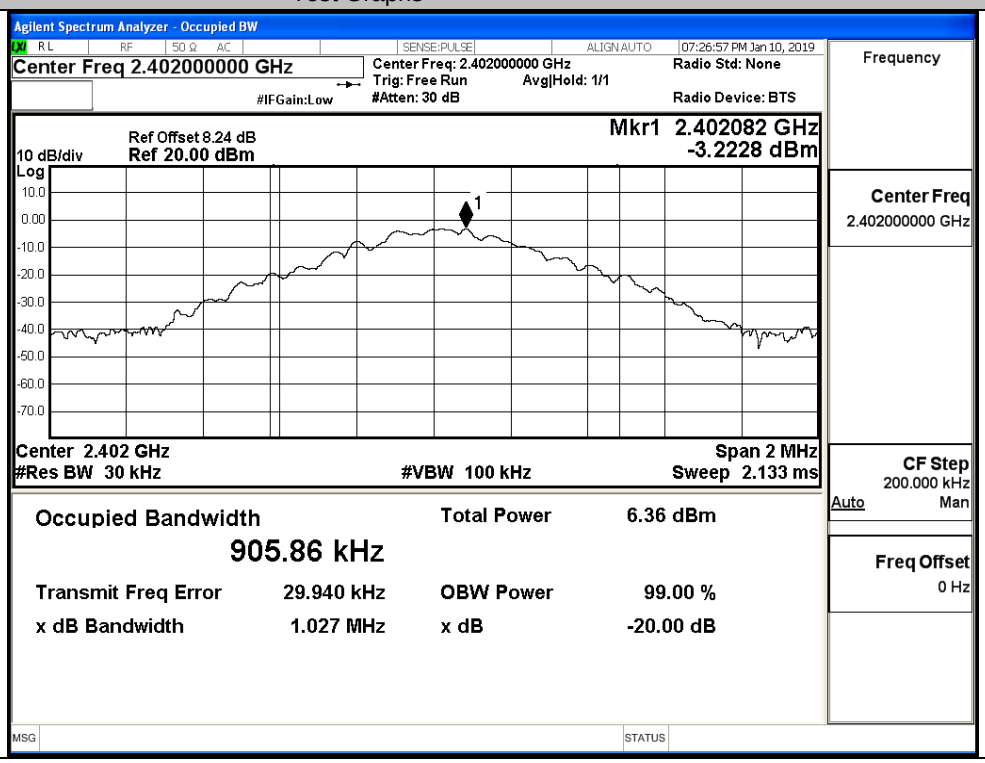
8DPSK/LCH		
8DPSK/MCH		

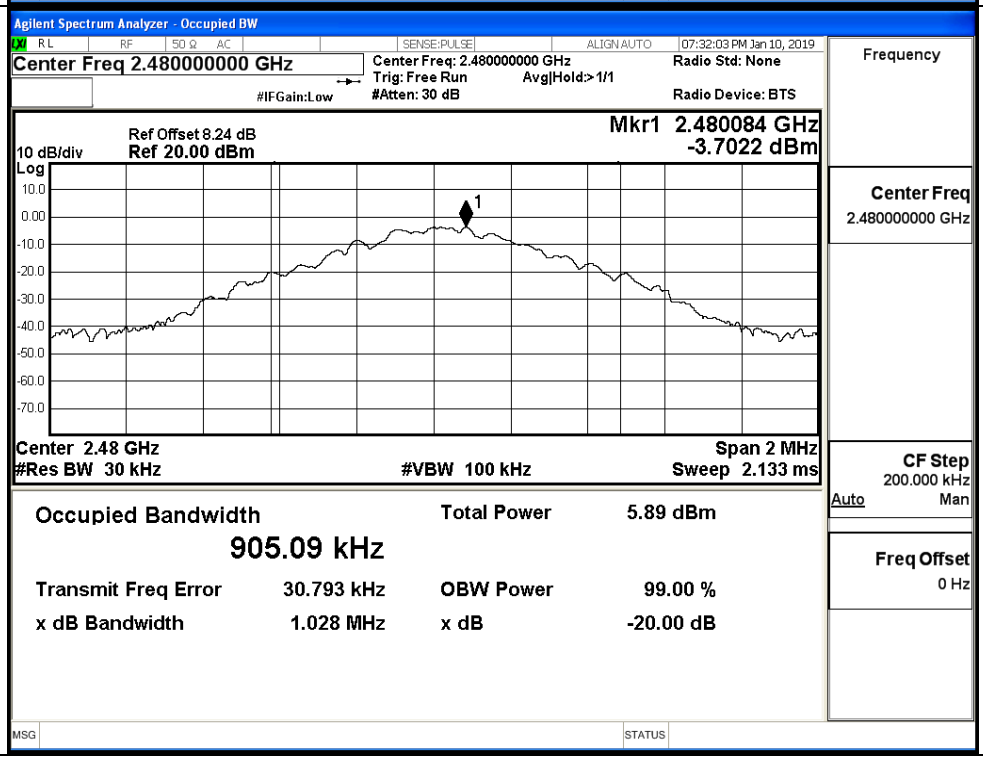
8DPSK/HCH	

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
07:46:29 PM Jan 10, 2019
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 907 50 GHz
1.826 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

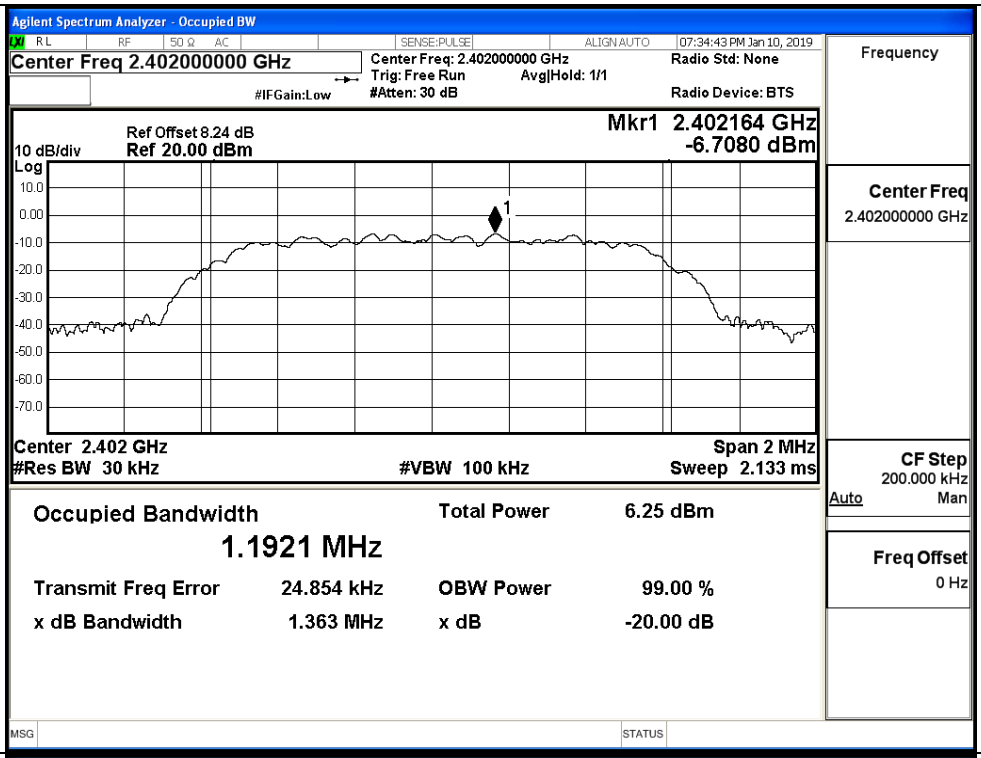
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.027	Not Specified	PASS
	MCH	1.030	Not Specified	PASS
	HCH	1.028	Not Specified	PASS
π/4DQPSK	LCH	1.363	Not Specified	PASS
	MCH	1.365	Not Specified	PASS
	HCH	1.366	Not Specified	PASS
8DPSK	LCH	1.344	Not Specified	PASS
	MCH	1.343	Not Specified	PASS
	HCH	1.344	Not Specified	PASS

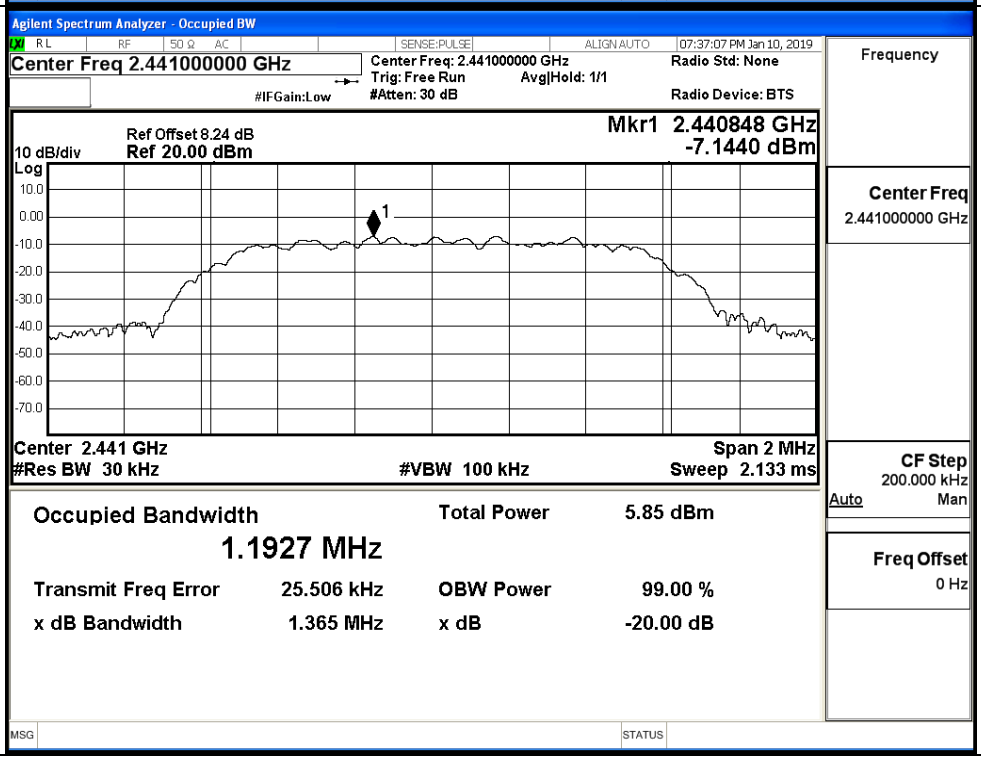
Test Graphs		
GFSK/LCH		

GFSK/MCH	
GFSK/HCH	

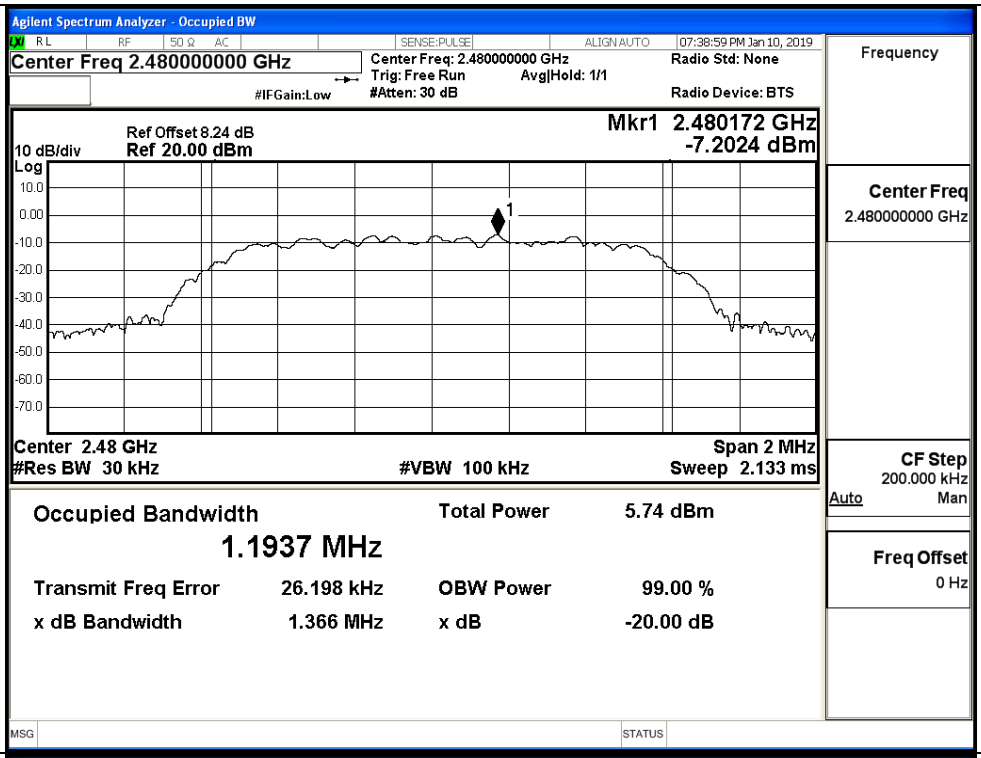
π/4DQPSK/LCH



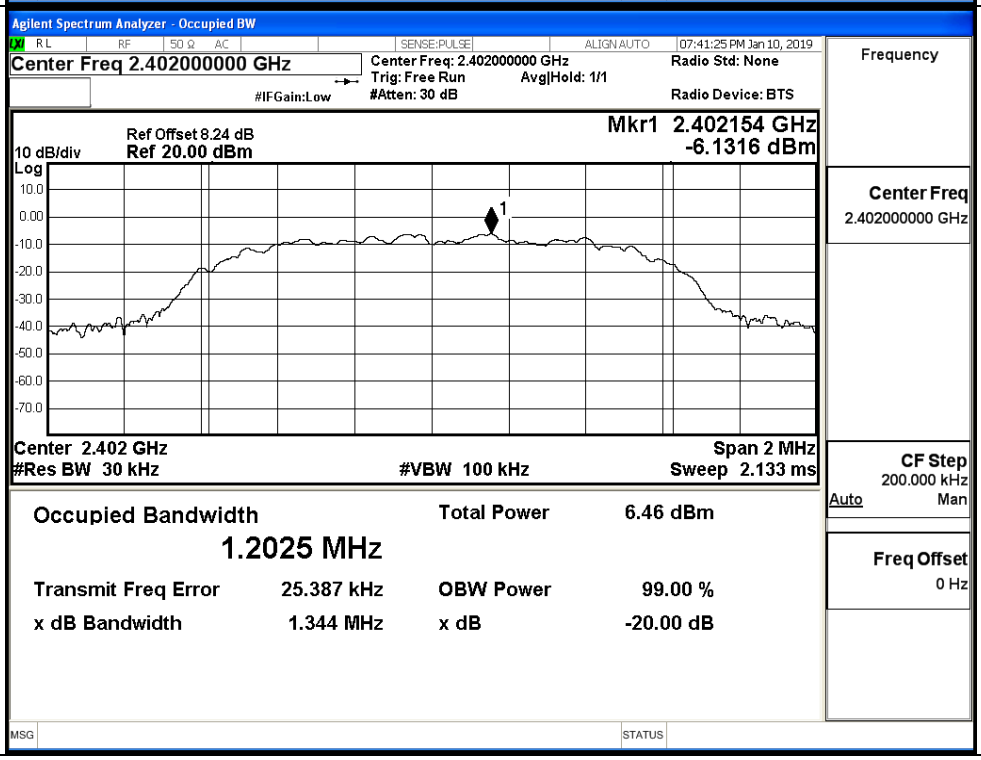
π/4DQPSK/MCH

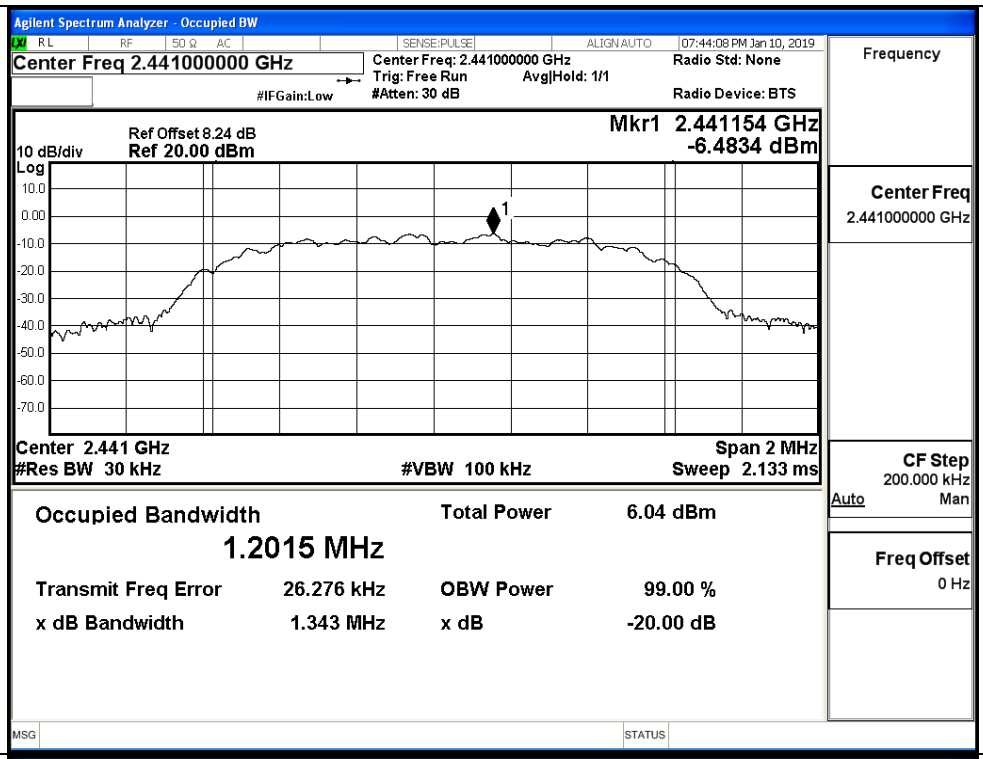
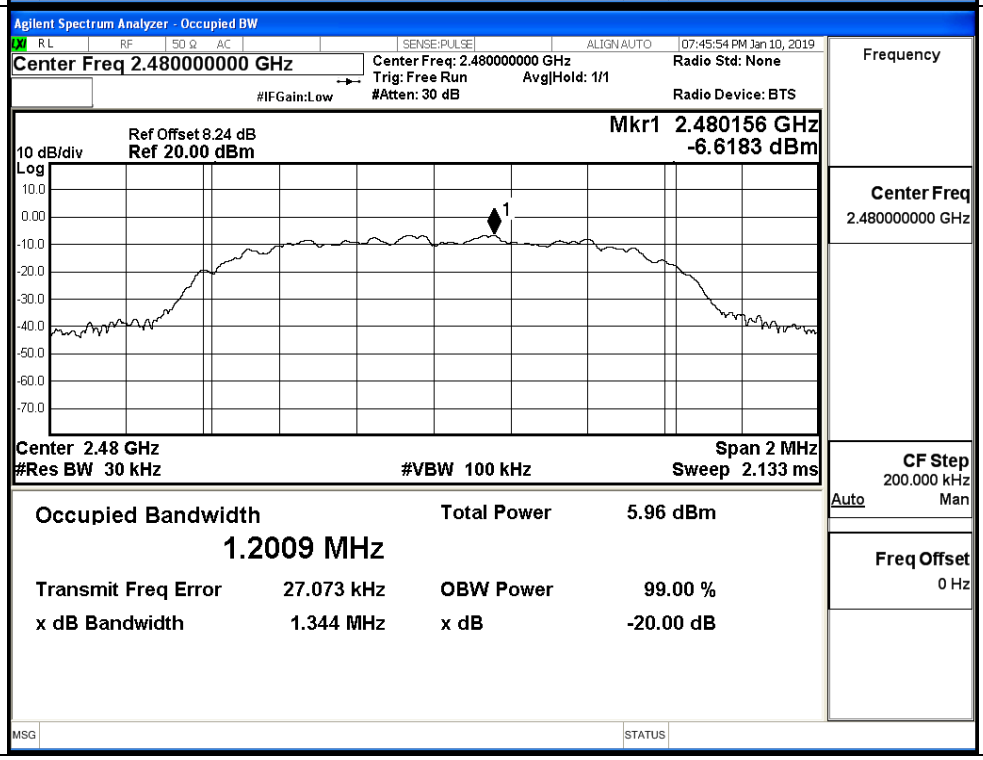


π/4DQPSK/HCH



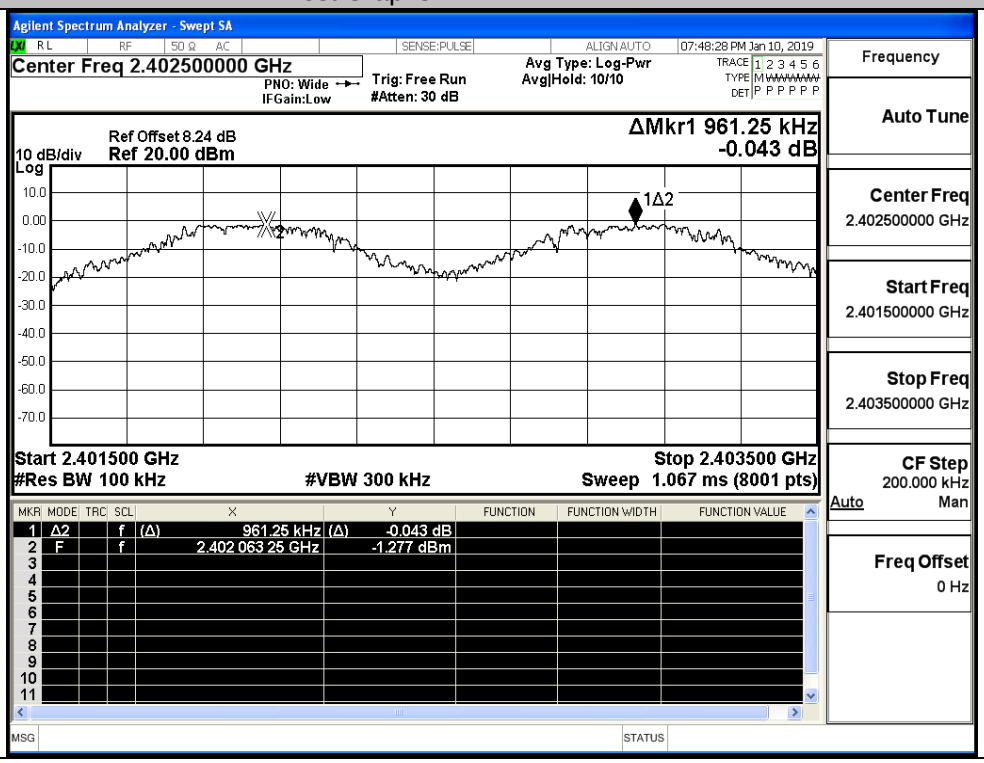
8DPSK/LCH

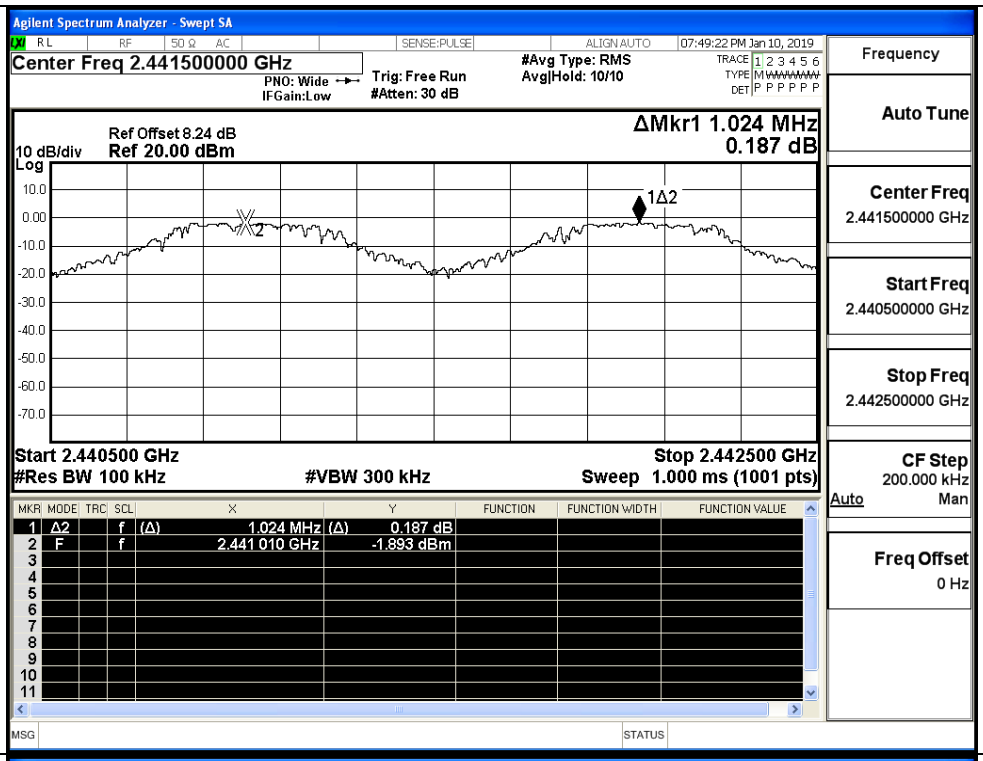
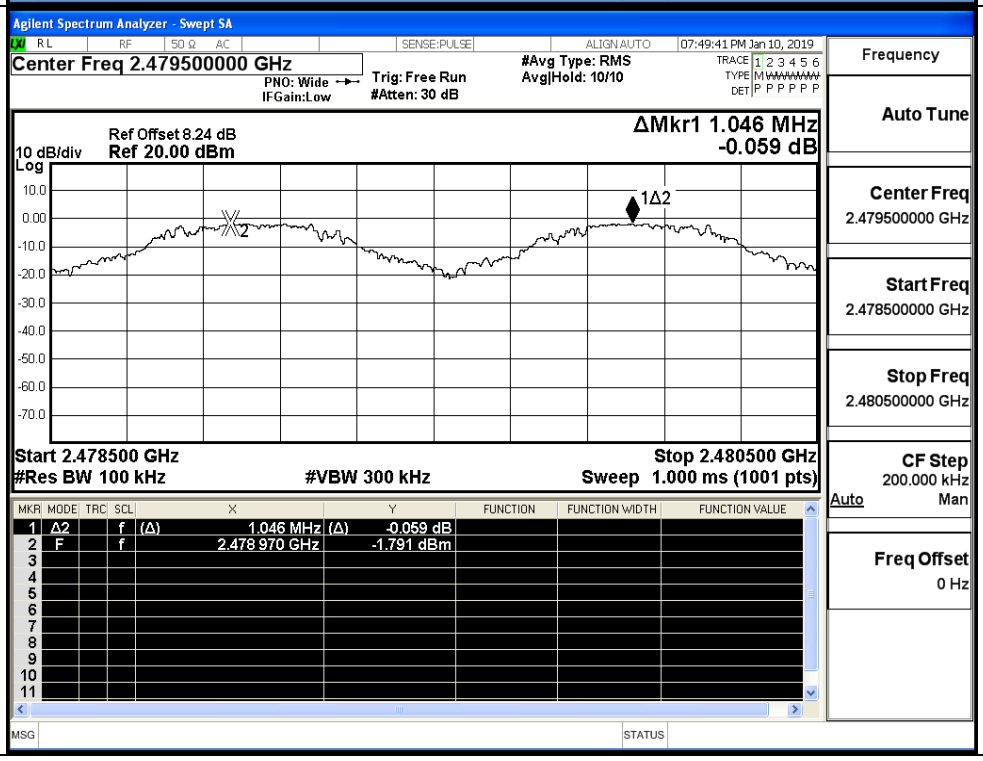


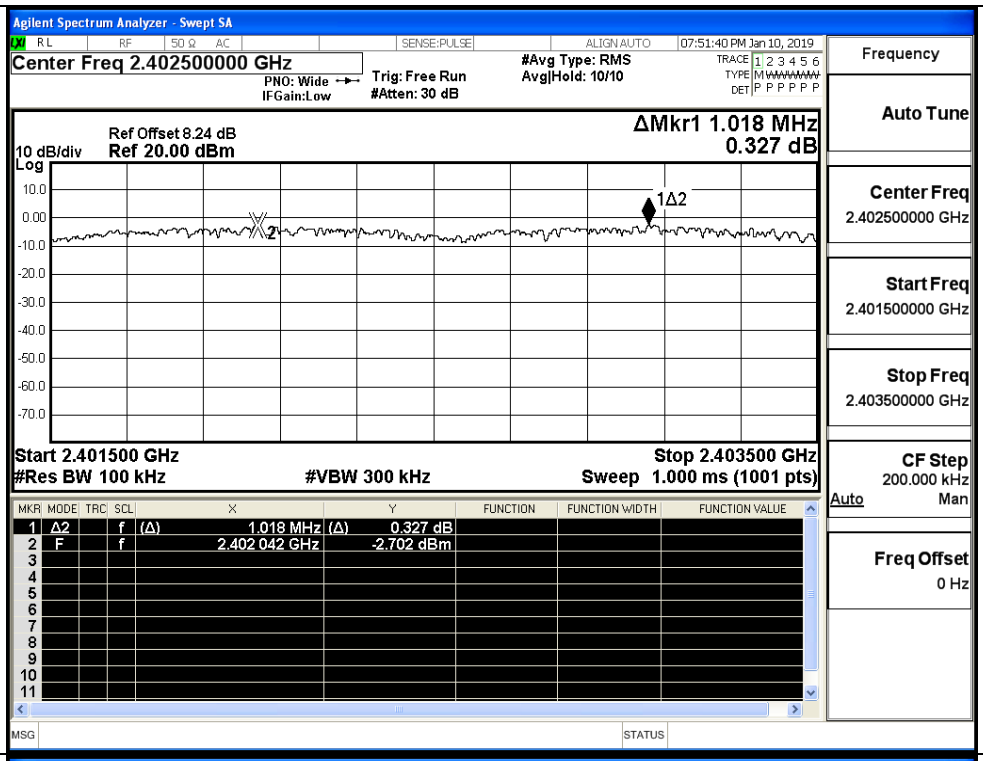
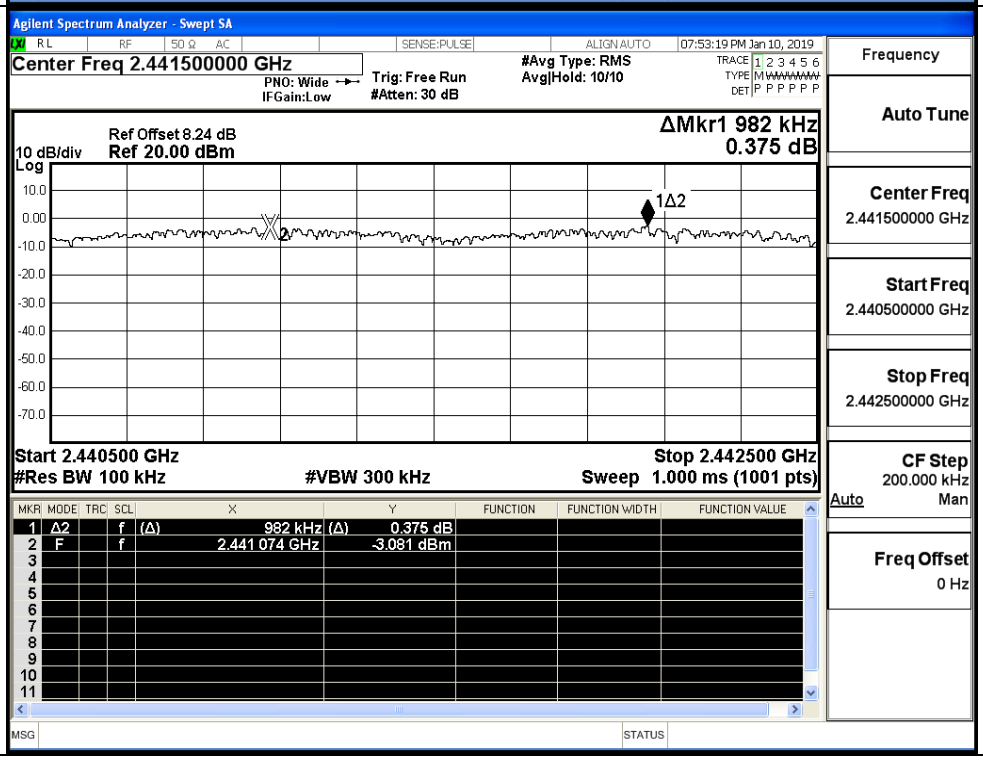
8DPSK/MCH	
8DPSK/HCH	

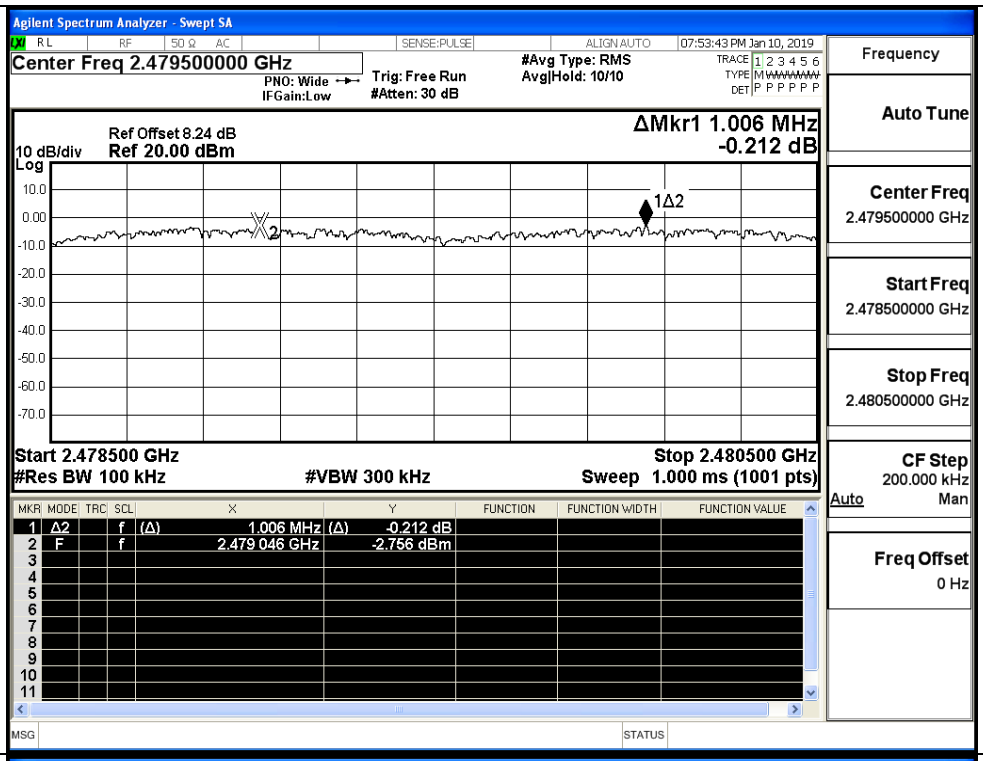
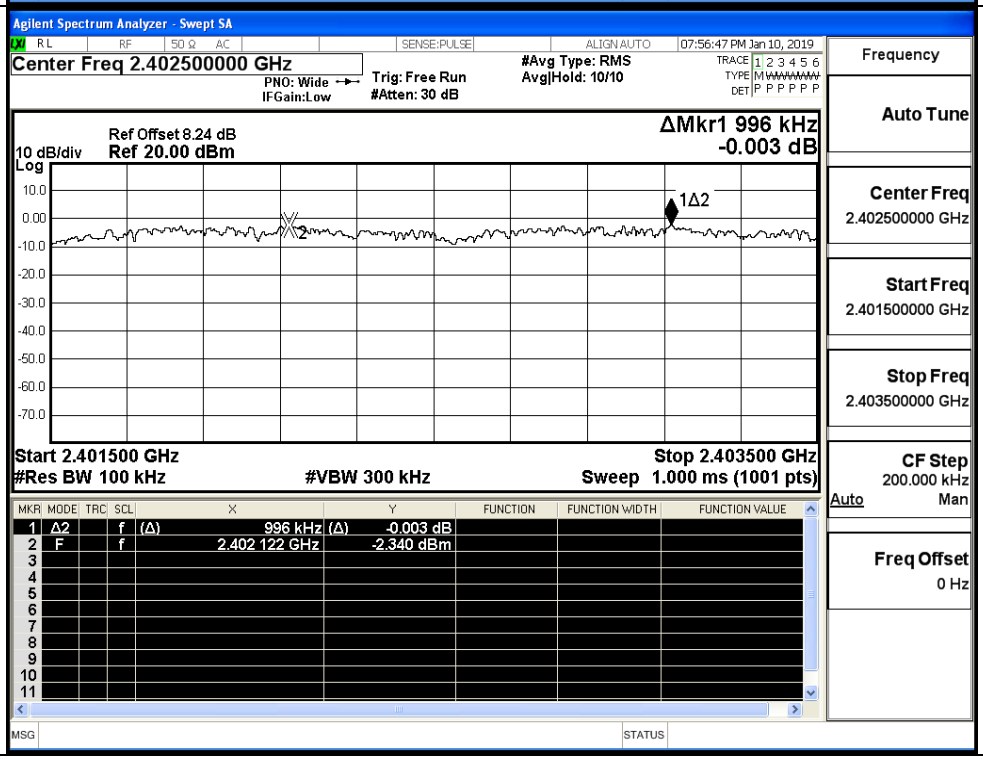
A.3 Carrier Frequency Separation

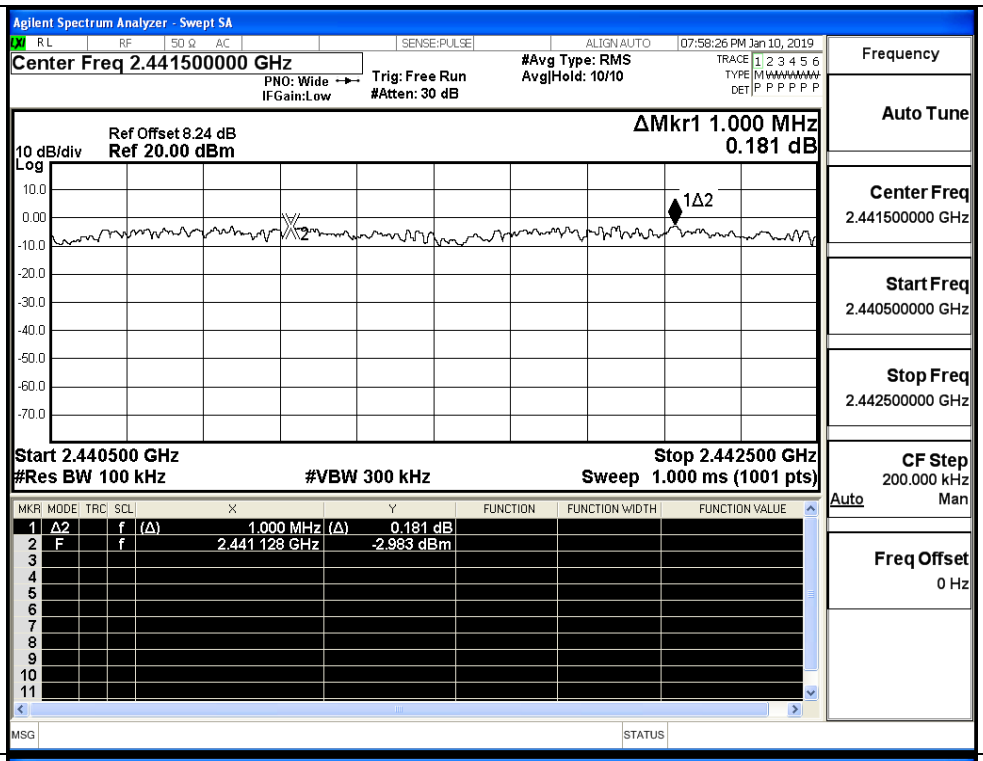
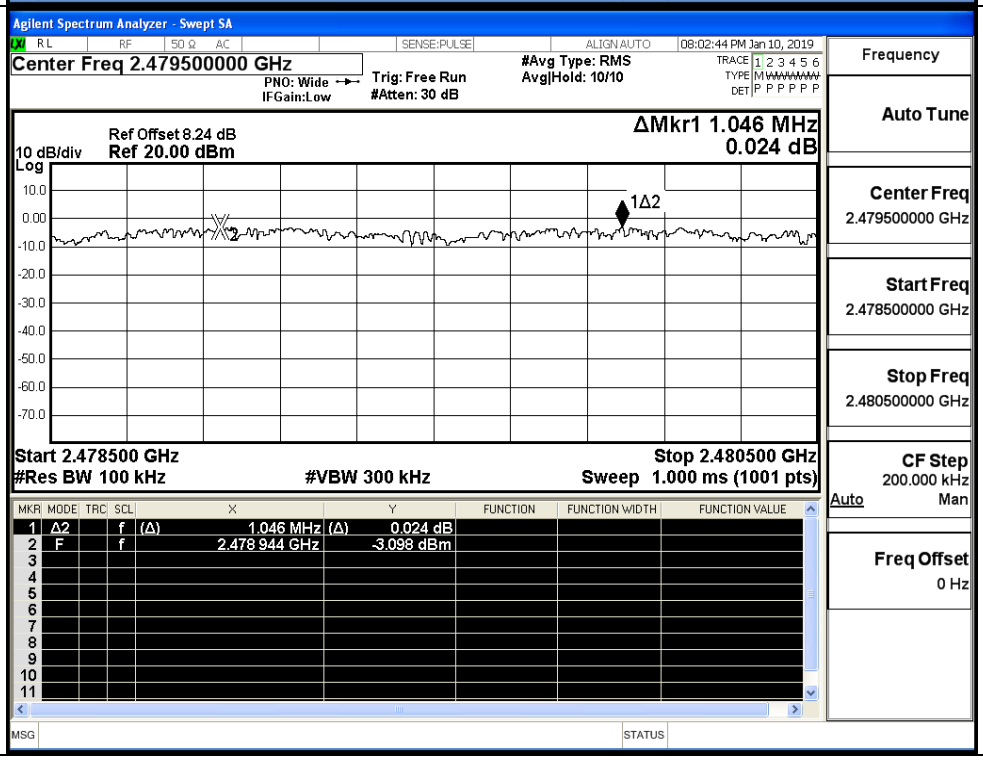
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.961	0.687	PASS
	MCH	1.024	0.687	PASS
	HCH	1.046	0.687	PASS
π/4DQPSK	LCH	1.018	0.911	PASS
	MCH	0.982	0.911	PASS
	HCH	1.006	0.911	PASS
8DPSK	LCH	0.996	0.896	PASS
	MCH	1.000	0.896	PASS
	HCH	1.046	0.896	PASS

Test Graphs	
GFSK/LCH	

GFSK/MCH		
GFSK/HCH		

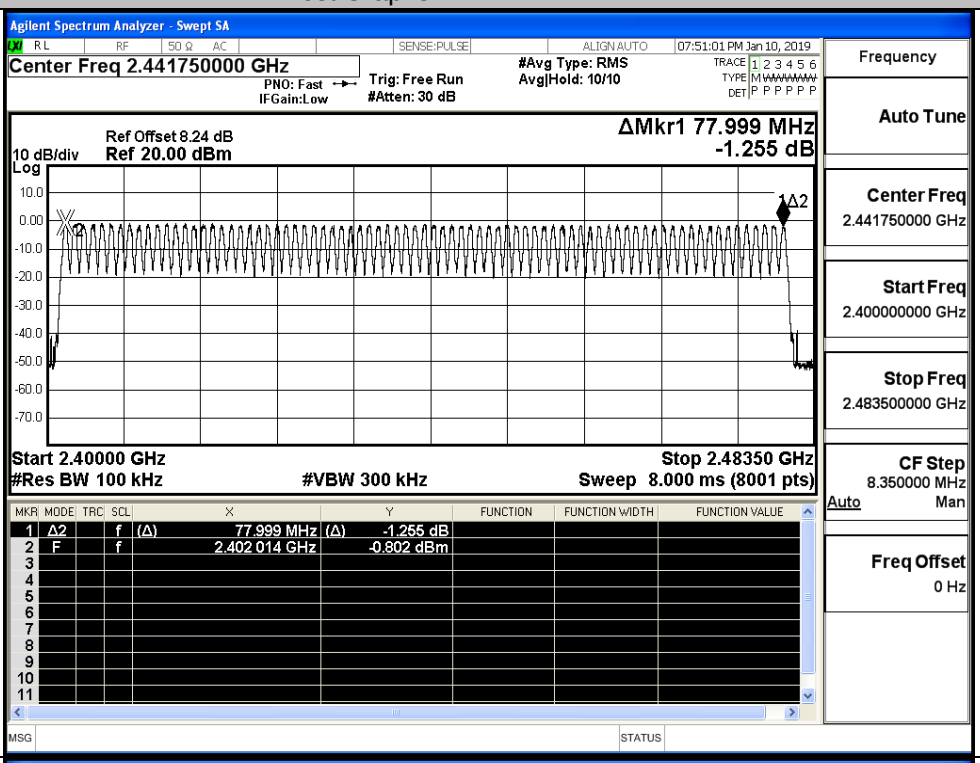
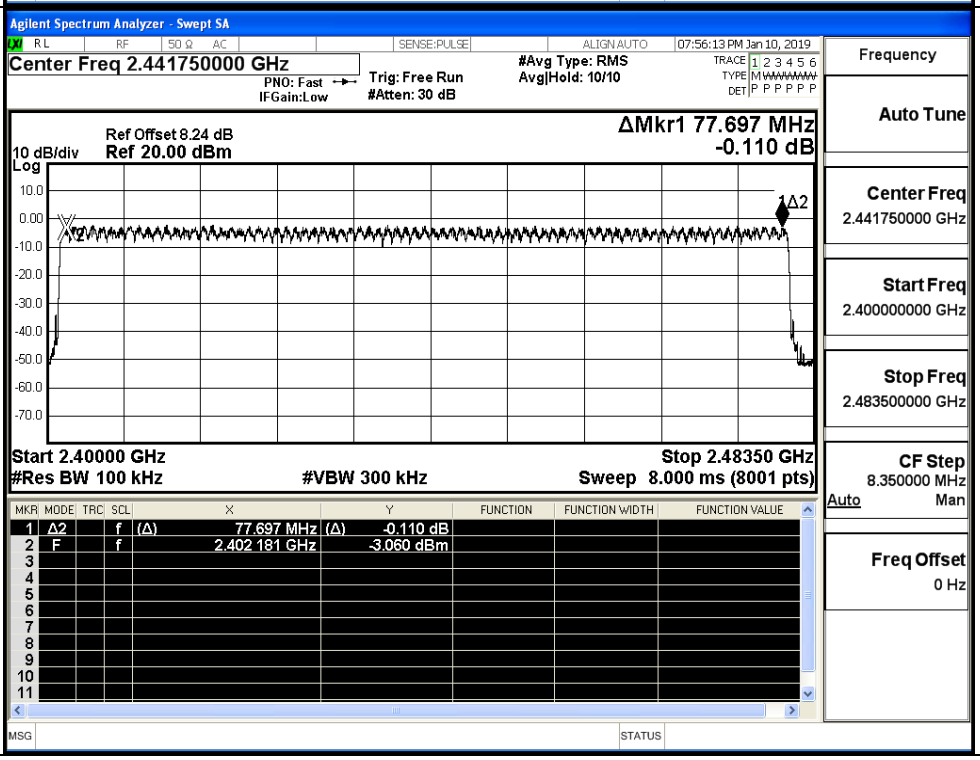
π/4DQPSK/LCH		
π/4DQPSK/MCH		

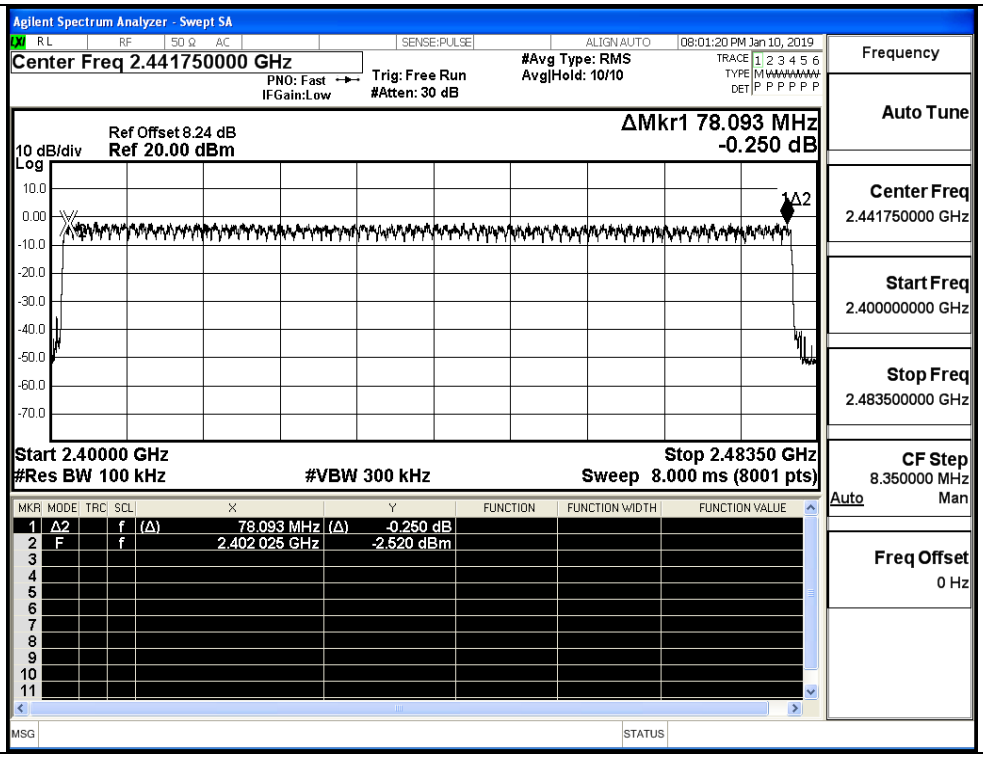
π/4DQPSK/HCH		
8DPSK/LCH		

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

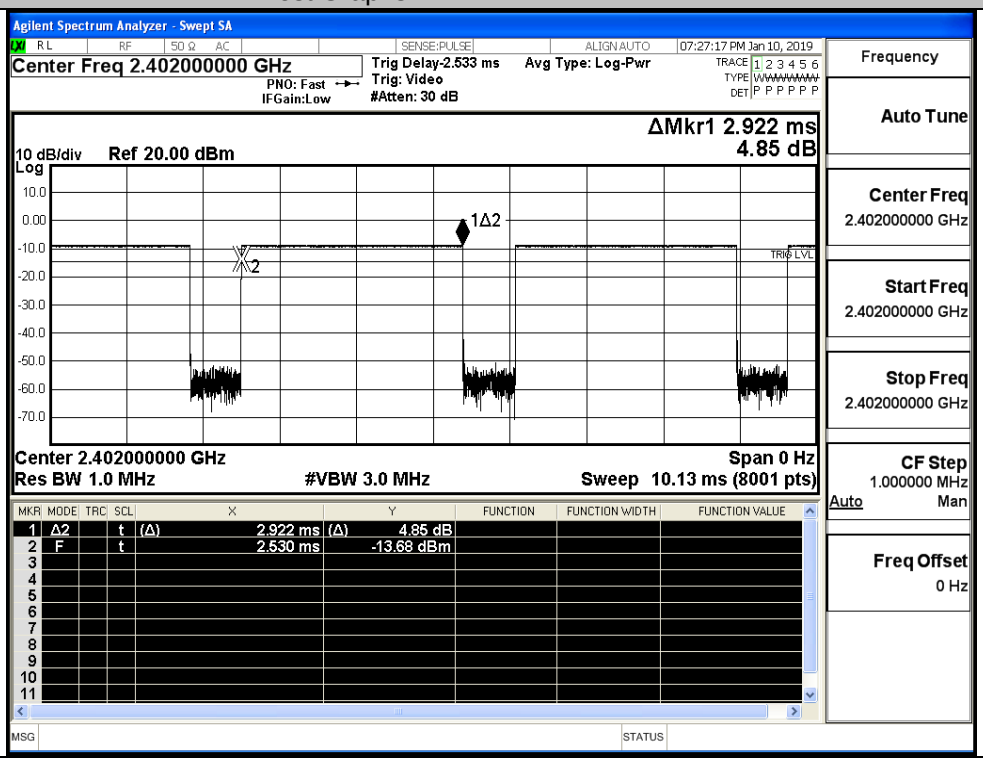
Test Graphs		
GFSK/Hop		
π/4DQPSK/Hop		

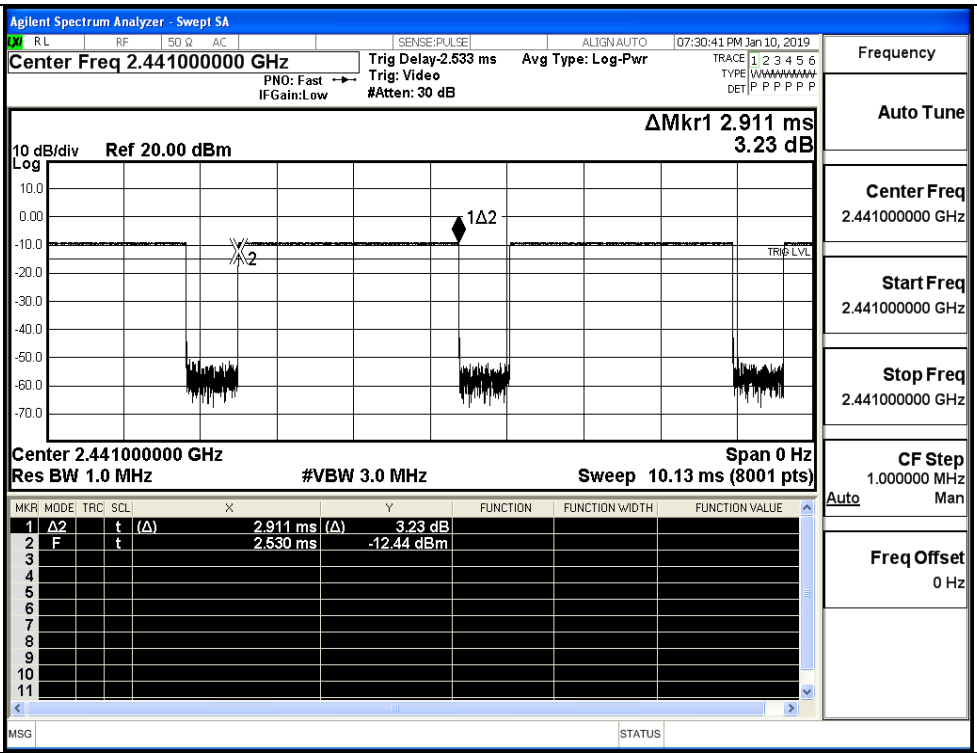
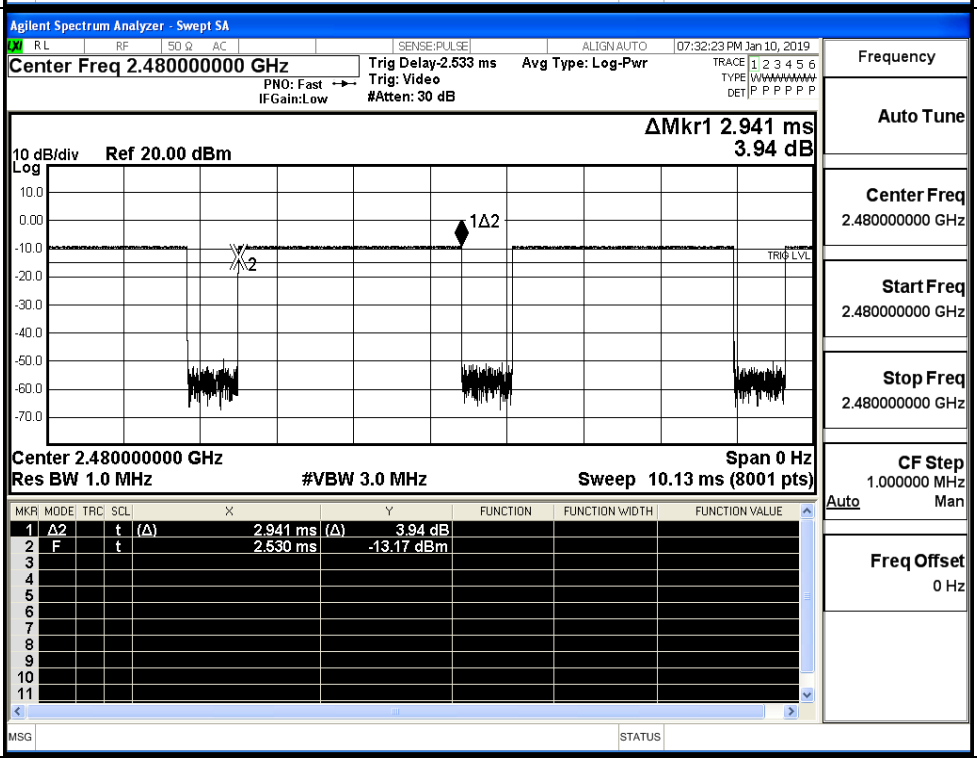
8DPSK/Hop		

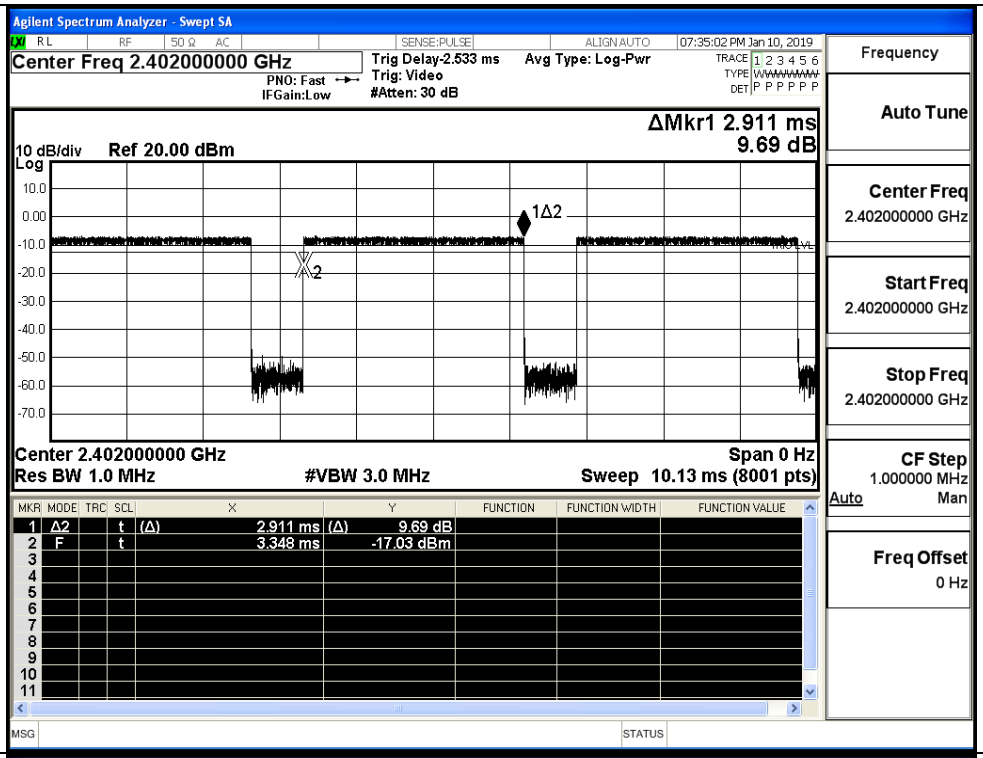
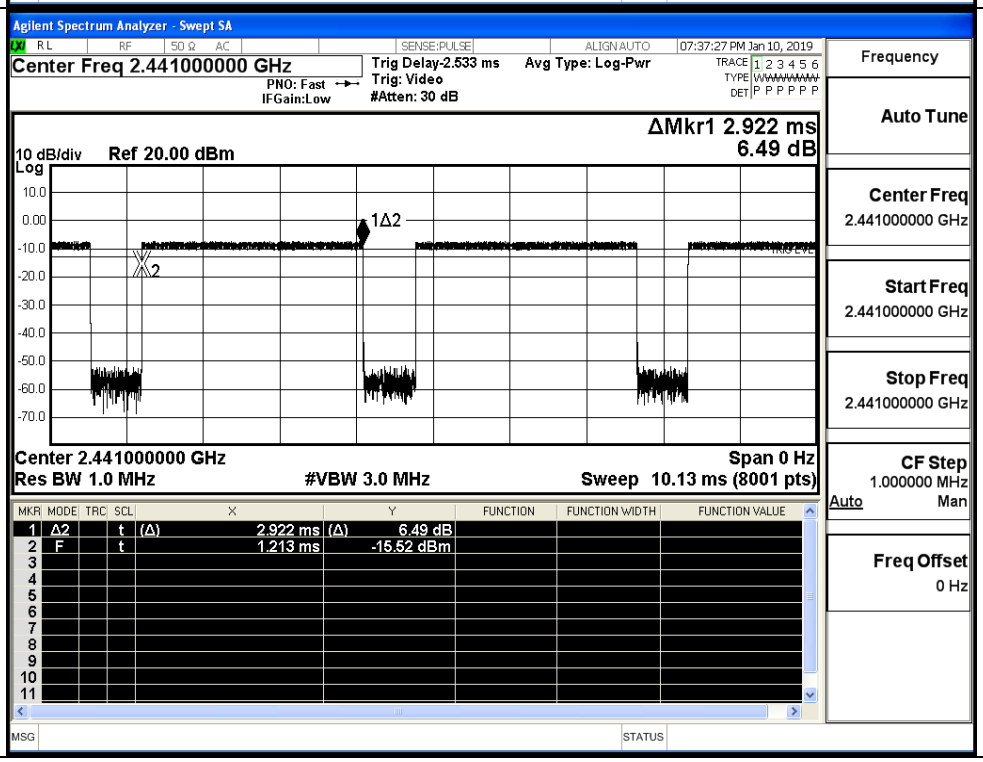
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
08:01:20 PM Jan 10, 2019
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 78.093 MHz
-0.250 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 78.093 MHz (Δ) -0.250 dB
2 F f 2.402 025 GHz -2.520 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

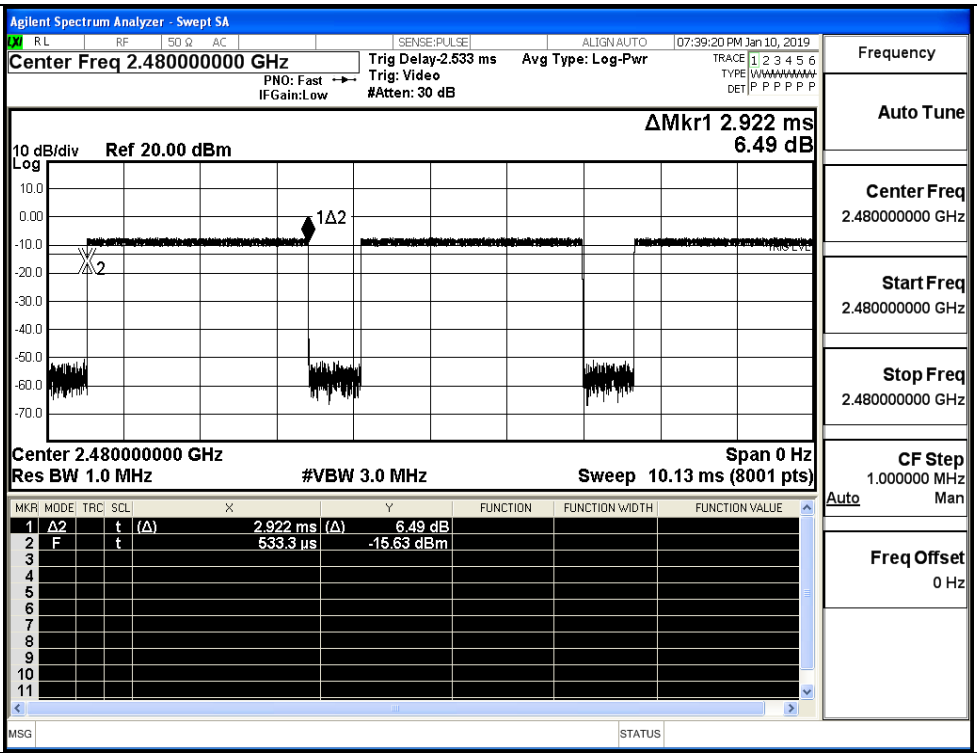
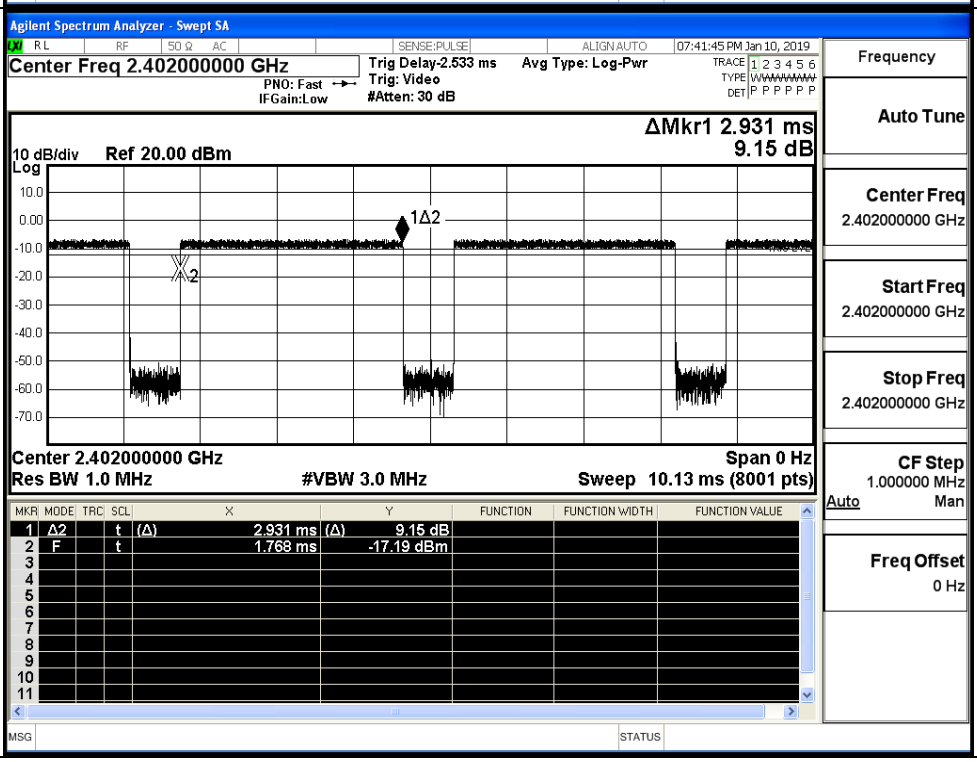
A.5 Dwell Time

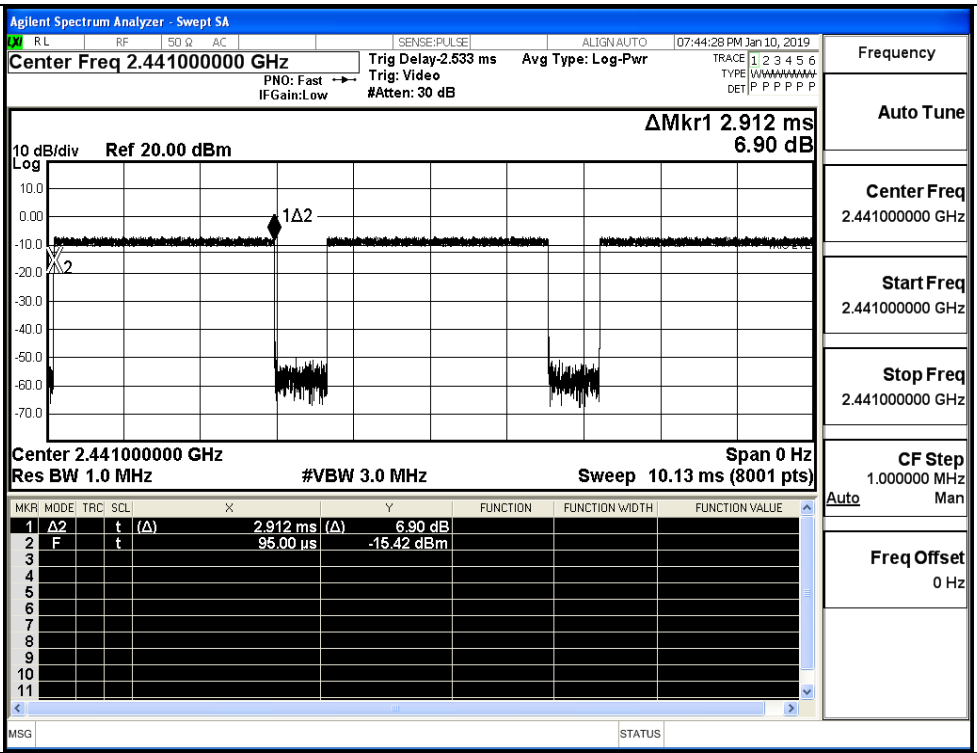
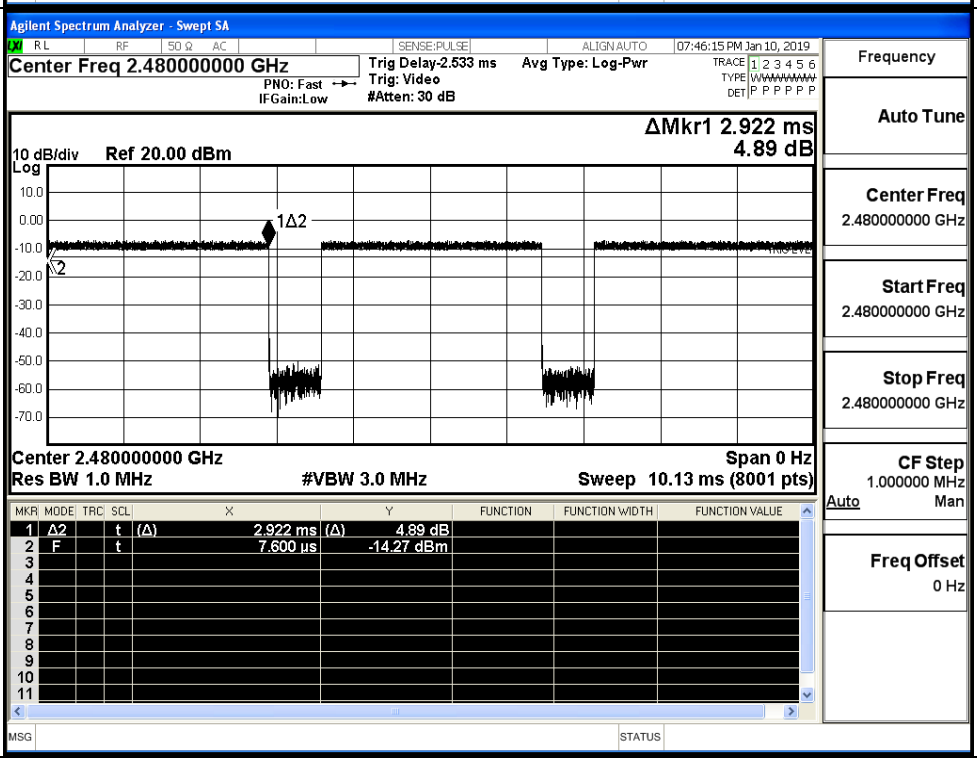
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.92	106.7	0.312	0.4	PASS
	DH5	MCH	2.91	106.7	0.31	0.4	PASS
	DH5	HCH	2.94	106.7	0.314	0.4	PASS
π/4DQPSK	2DH5	LCH	2.92	106.7	0.31	0.4	PASS
	2DH5	MCH	2.91	106.7	0.312	0.4	PASS
	2DH5	HCH	2.94	106.7	0.312	0.4	PASS
8DPSK	3DH5	LCH	2.92	106.7	0.313	0.4	PASS
	3DH5	MCH	2.91	106.7	0.31	0.4	PASS
	3DH5	HCH	2.94	106.7	0.312	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	

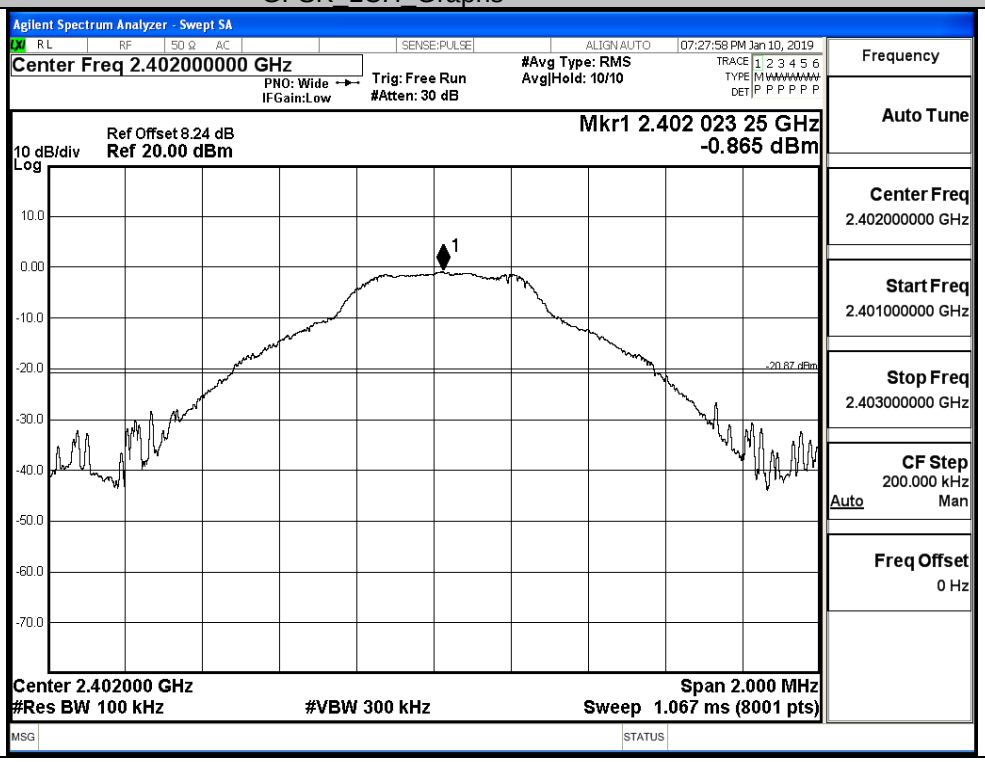
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

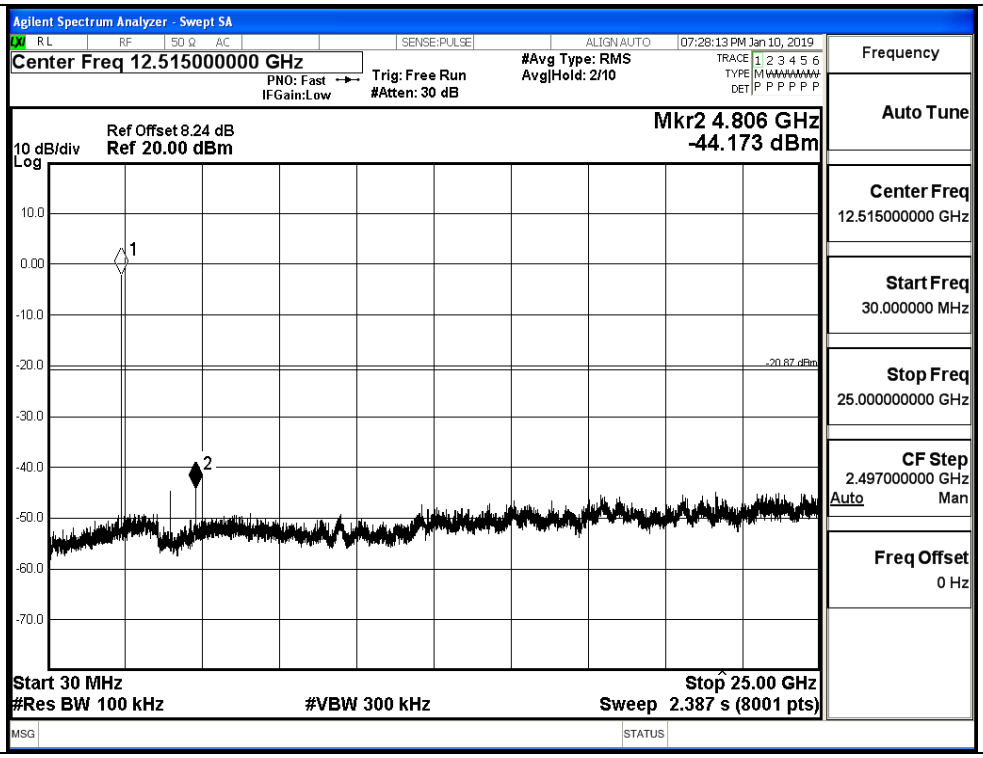
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.865	-44.173	-20.865	PASS
	MCH	-1.298	-44.313	-21.298	PASS
	HCH	-1.342	-44.442	-21.342	PASS
π/4DQPSK	LCH	-2.355	-43.043	-22.355	PASS
	MCH	-2.857	-44.448	-22.857	PASS
	HCH	-2.869	-44.501	-22.869	PASS
8DPSK	LCH	-2.292	-43.890	-22.292	PASS
	MCH	-2.754	-44.597	-22.754	PASS
	HCH	-2.716	-44.734	-22.716	PASS

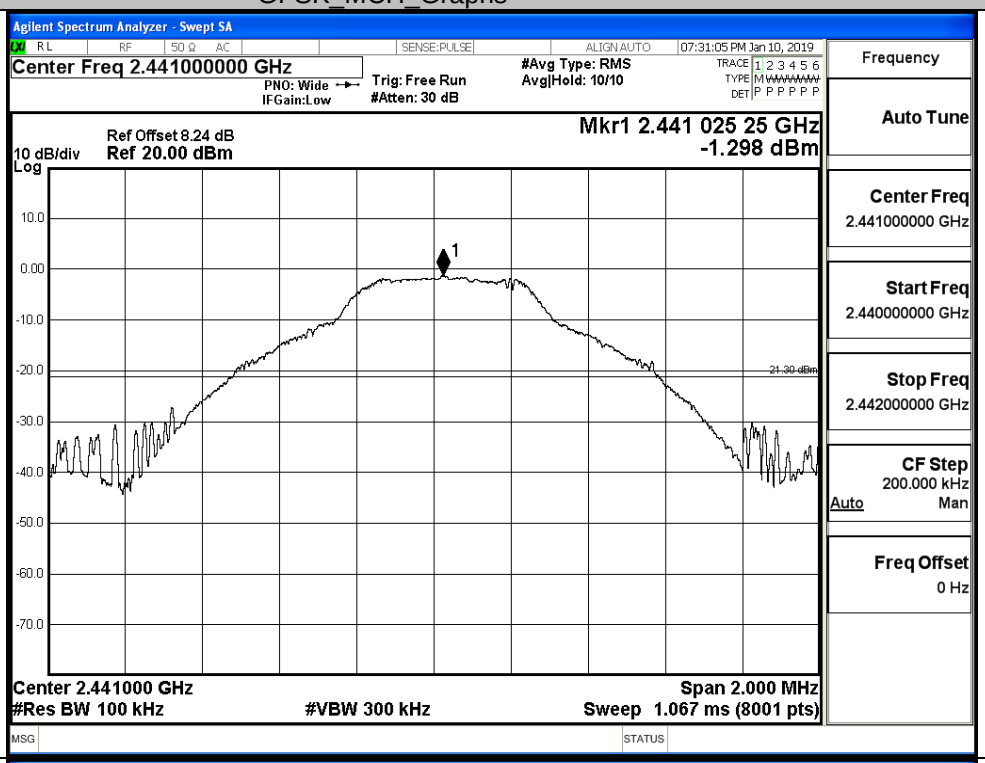
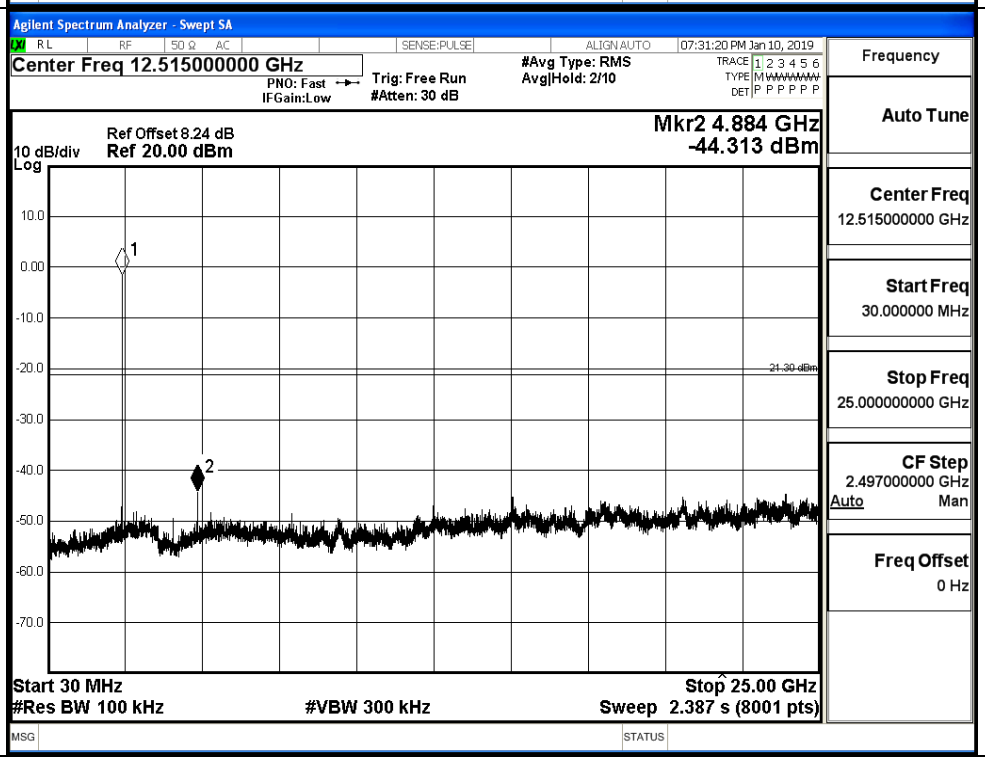
GFSK_LCH_Graphs

Pref



Puw		

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
07:28:13 PM Jan 10, 2019
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 4.806 GHz
-44.173 dBm
-20.87 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (8001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

GFSK_MCH_Graphs			
Pref			
Puw			

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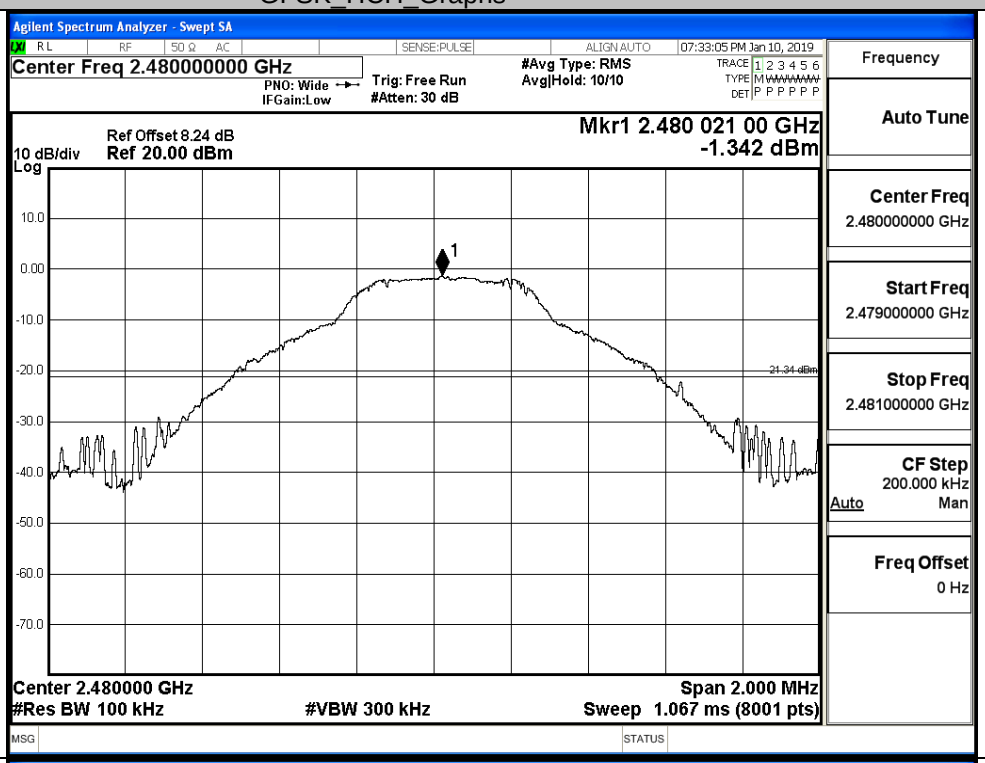
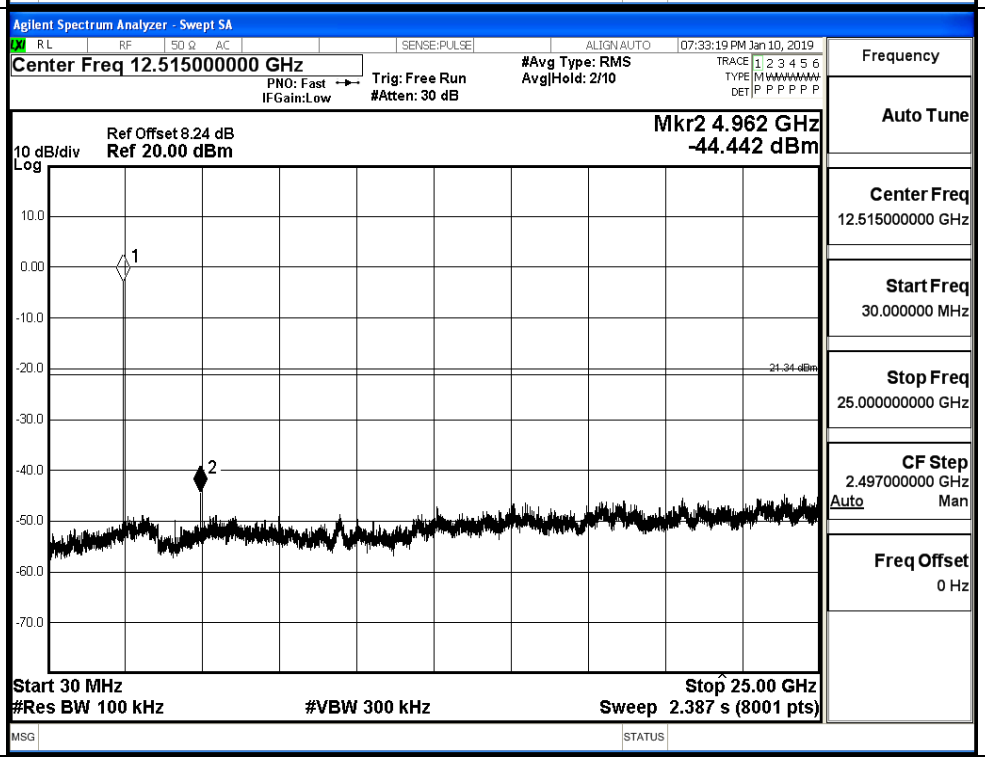
Pref			
Puw			

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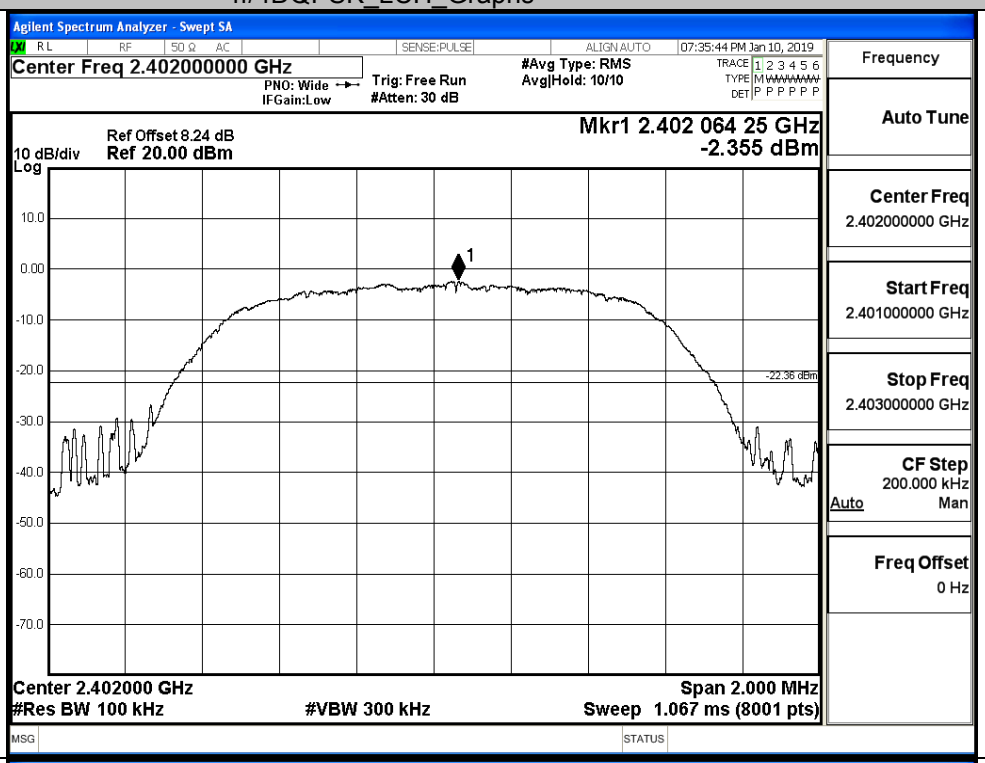
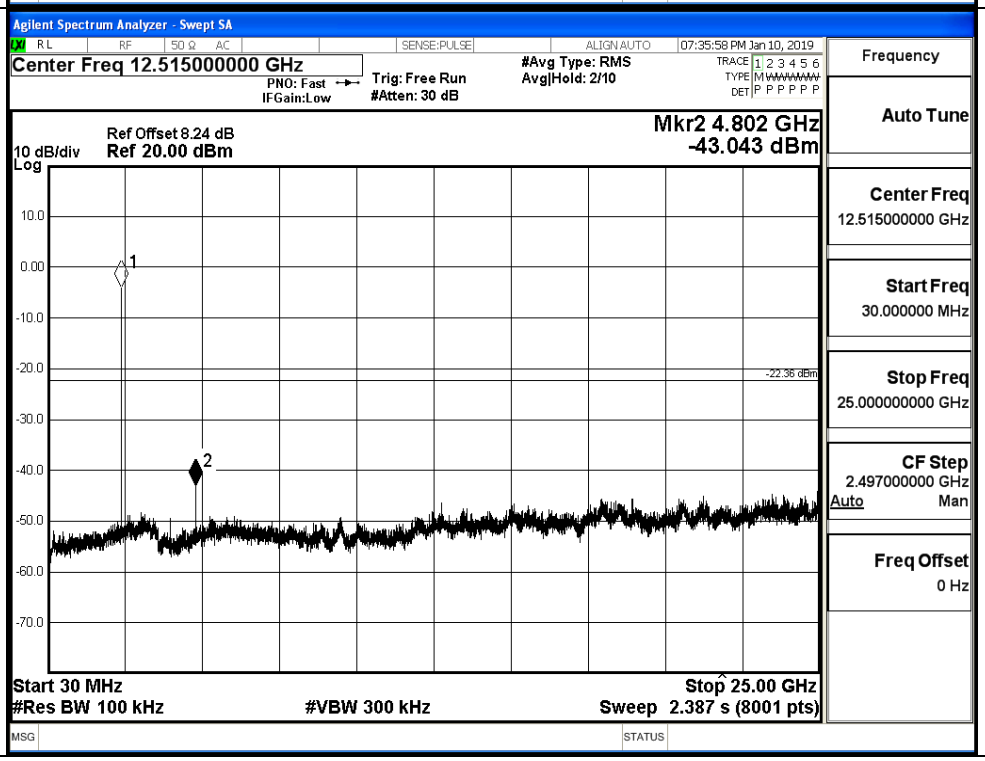
Pref		
Puw		

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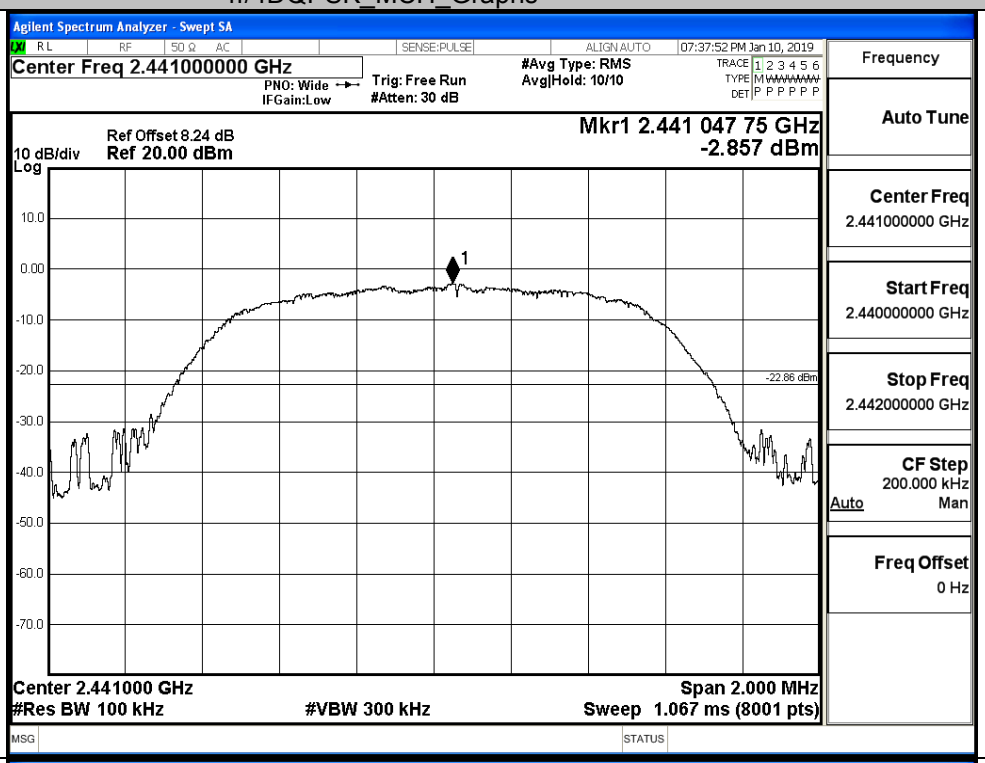
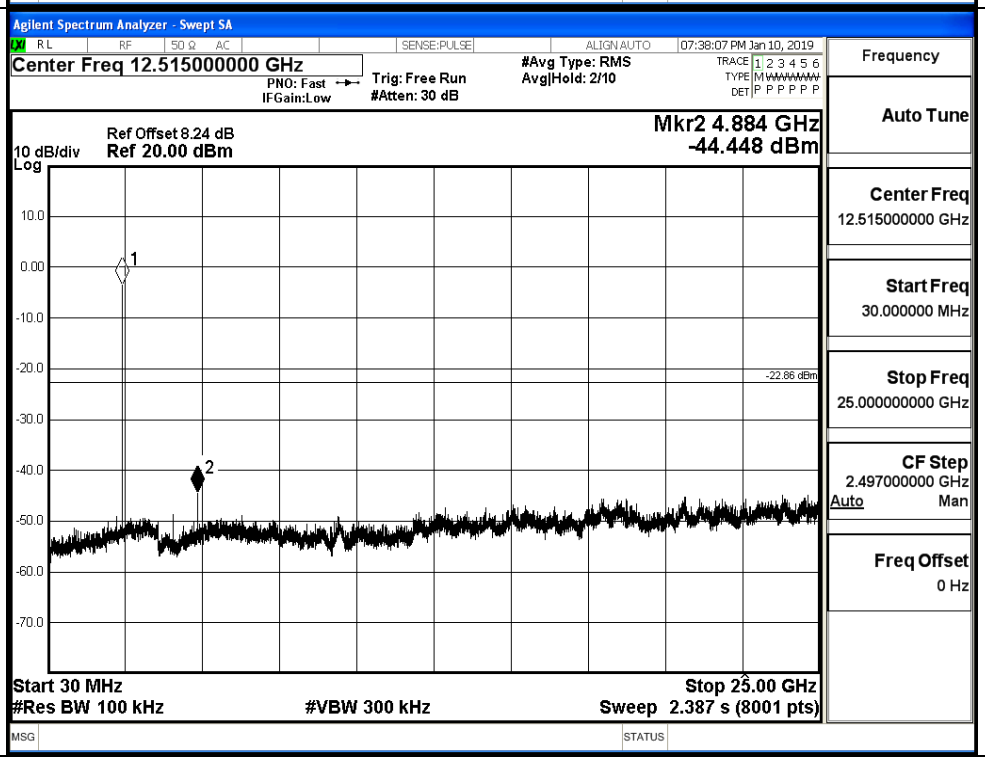
Pref		
Puw		

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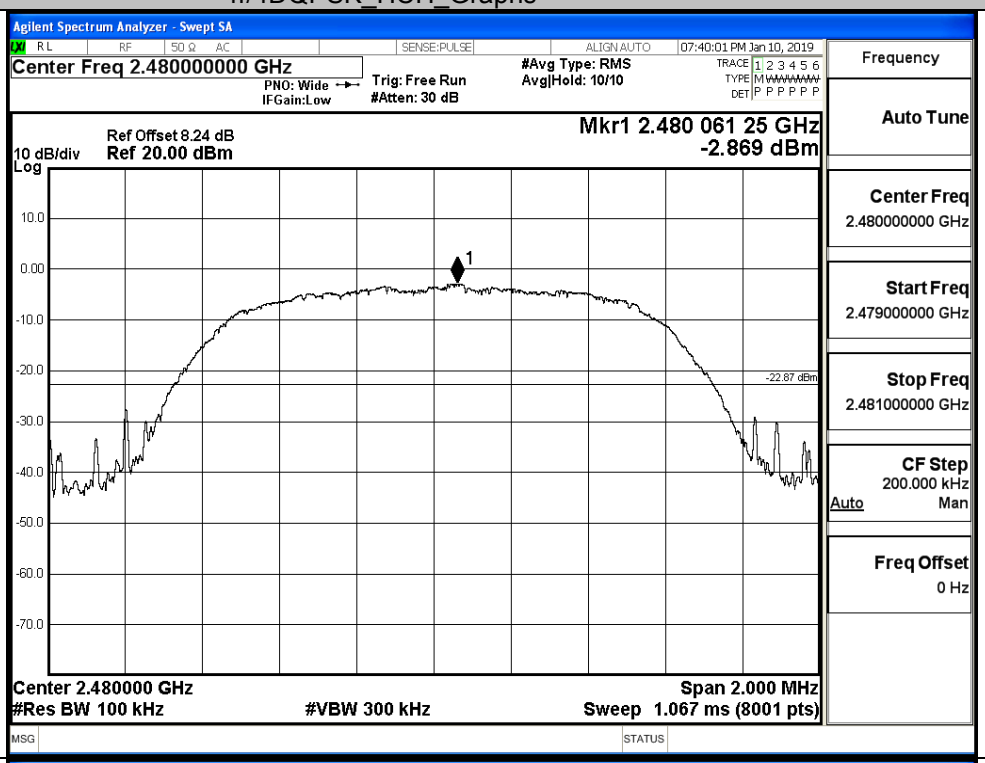
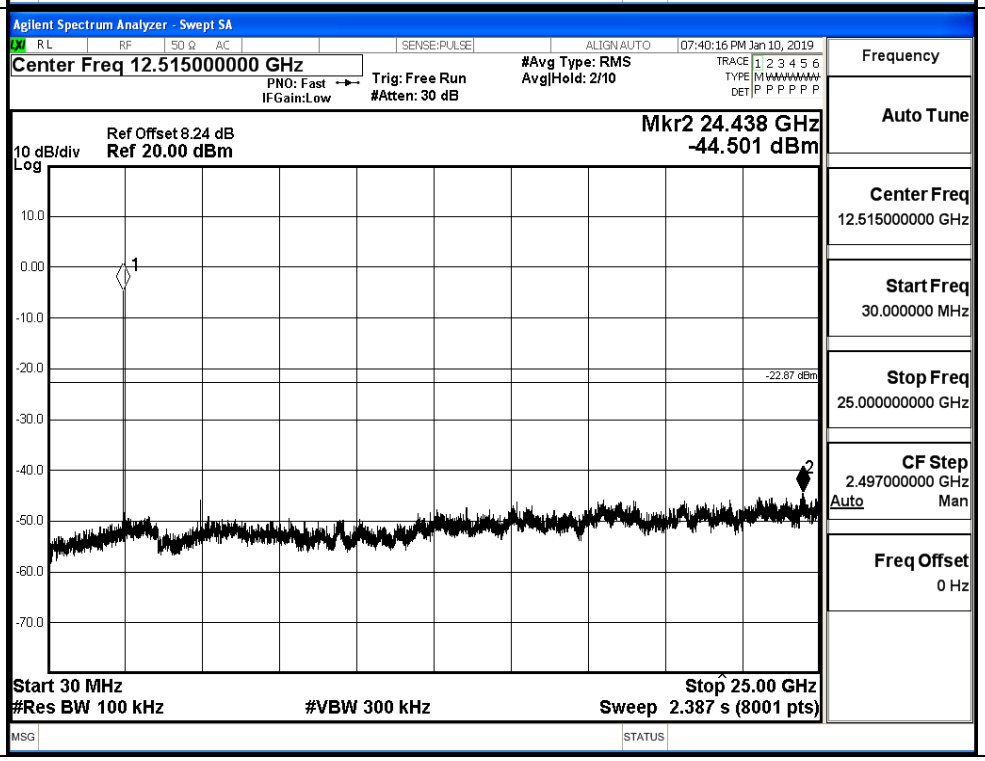
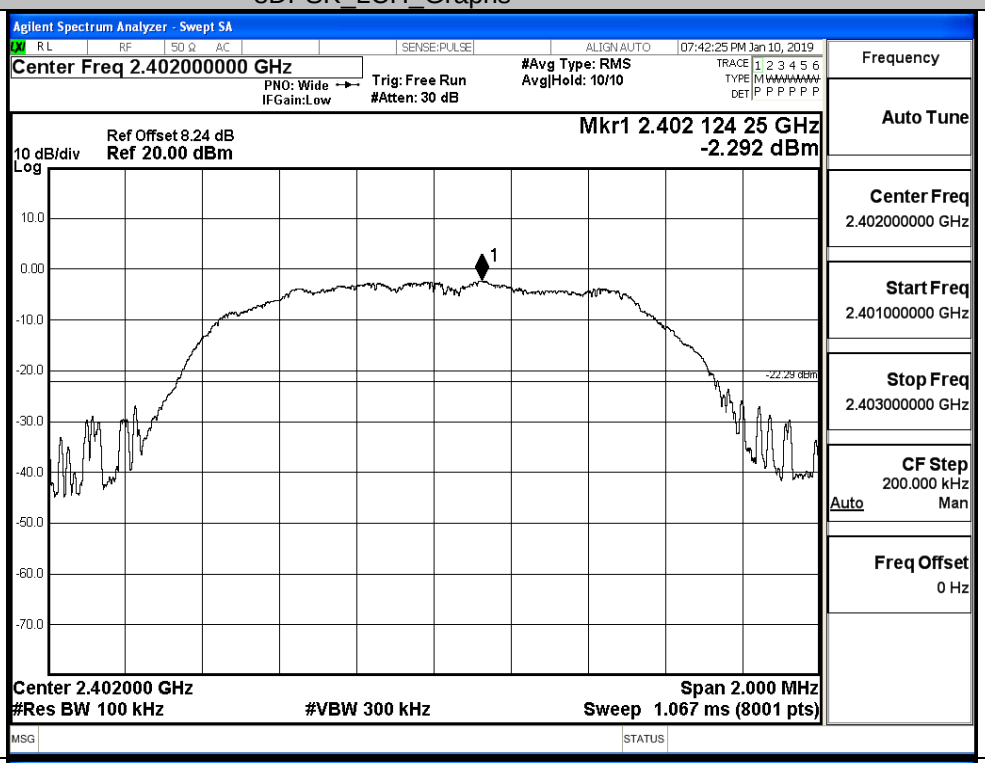
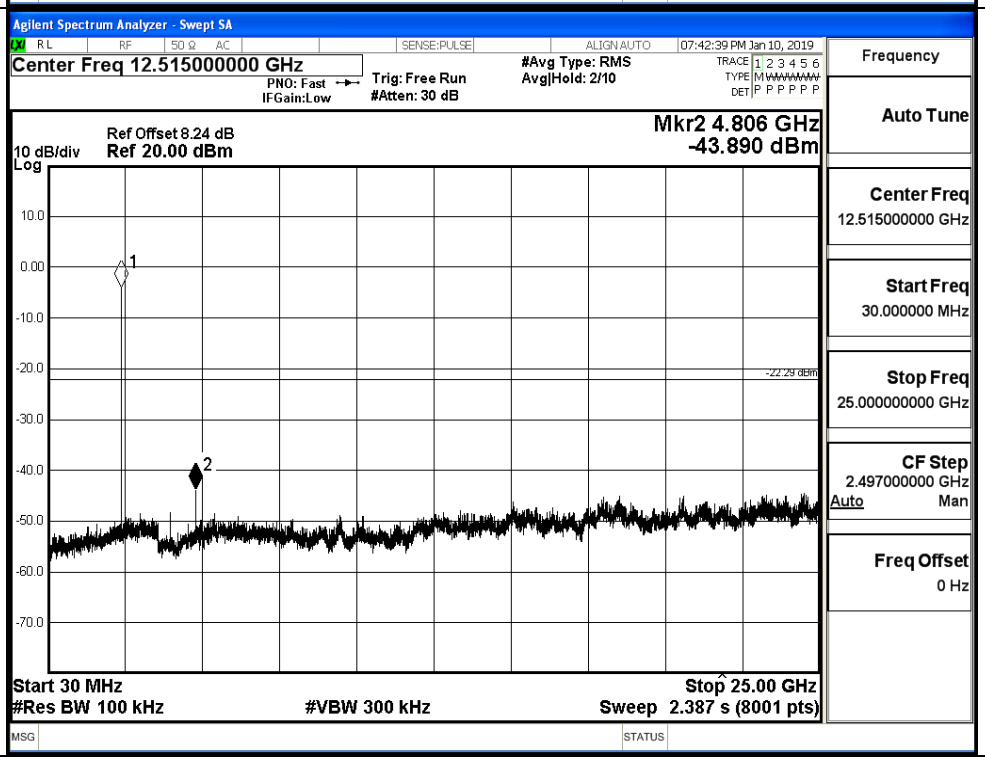
Pref		
Puw		

8DPSK_LCH_Graphs		
Pref		
Puw		

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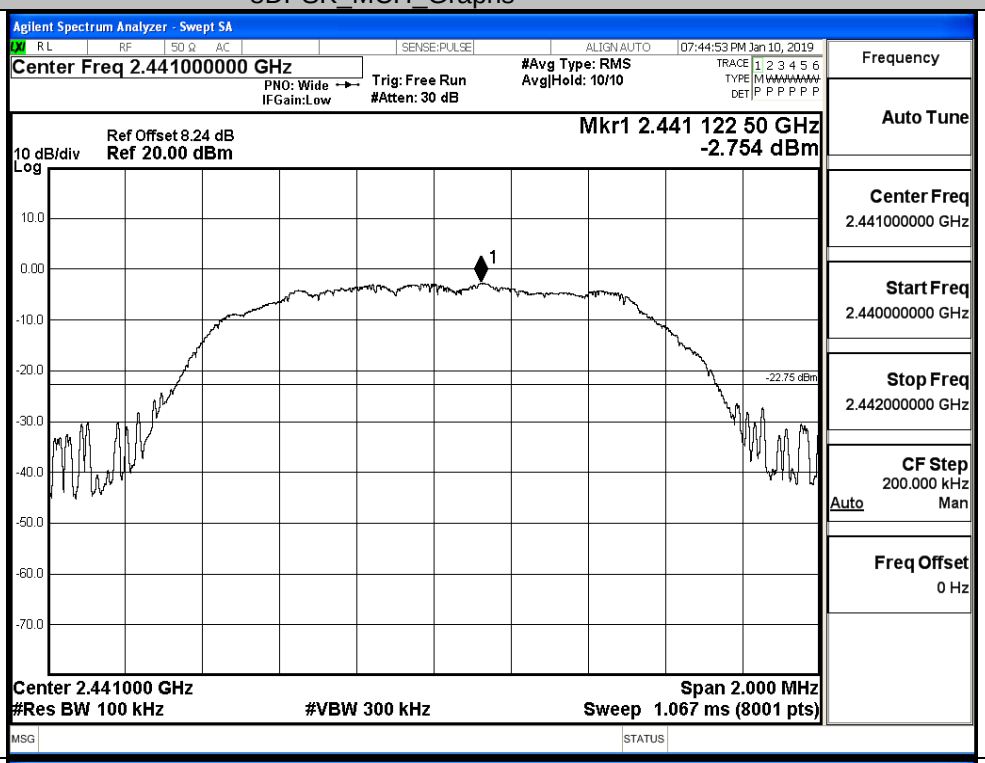
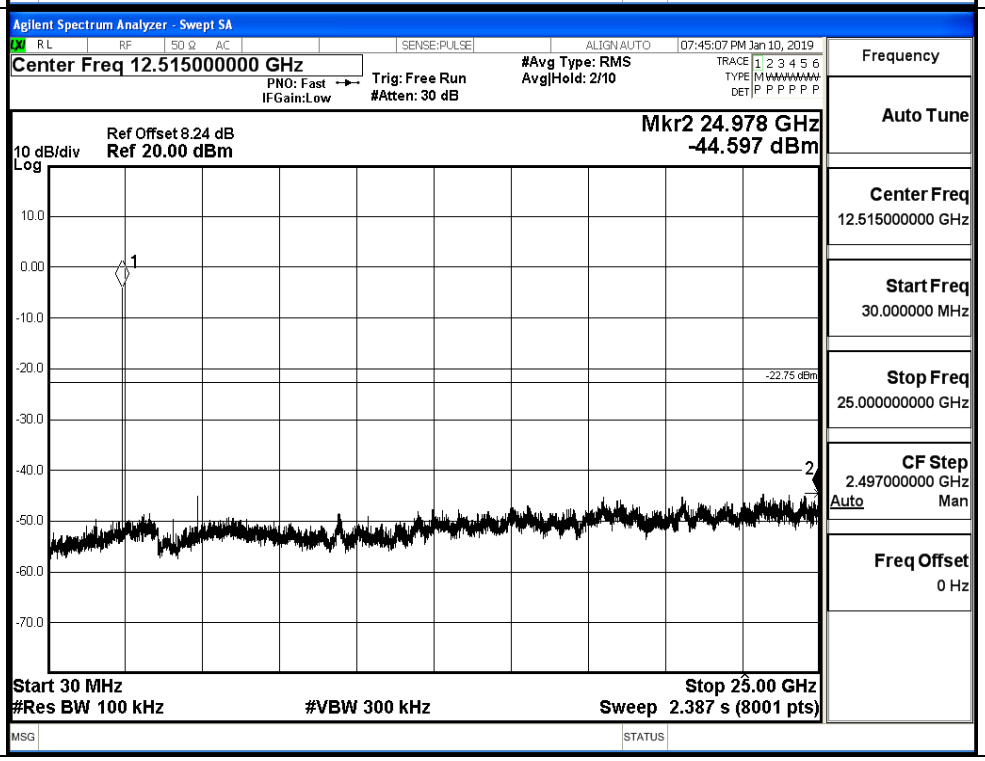
Pref		
Puw		

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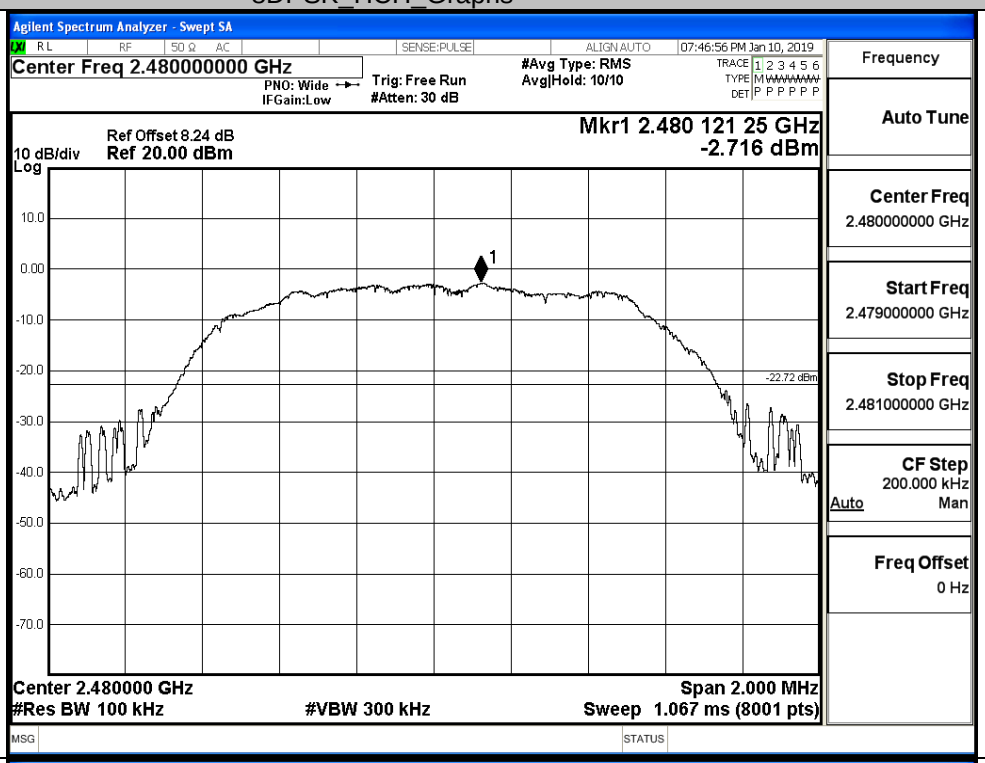
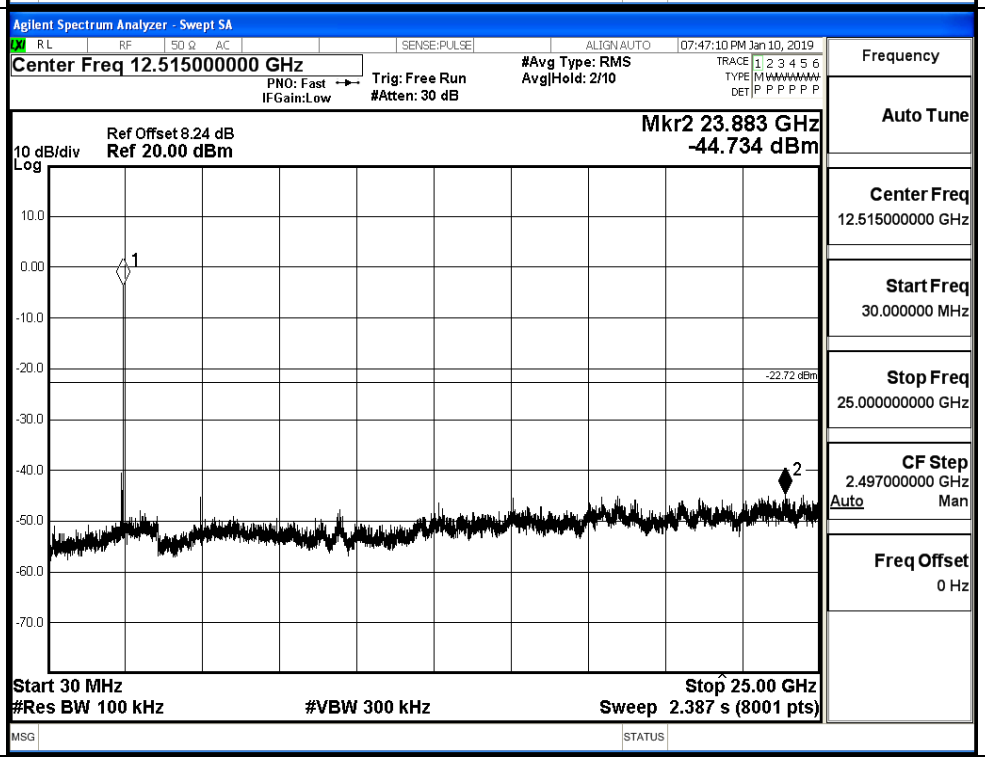
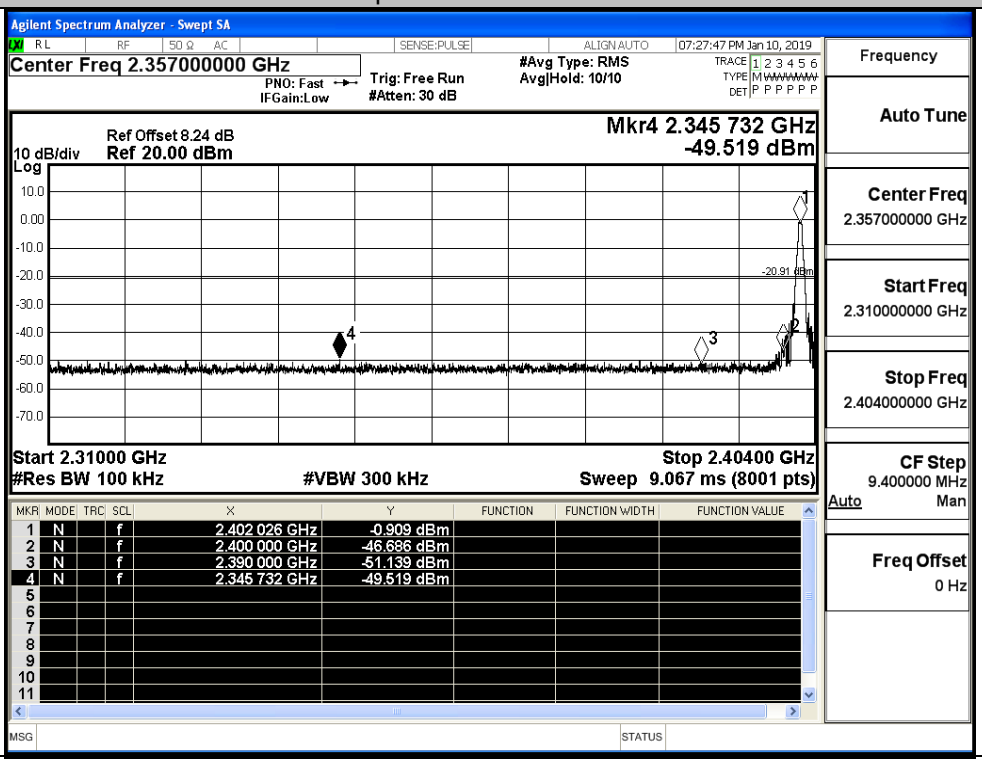
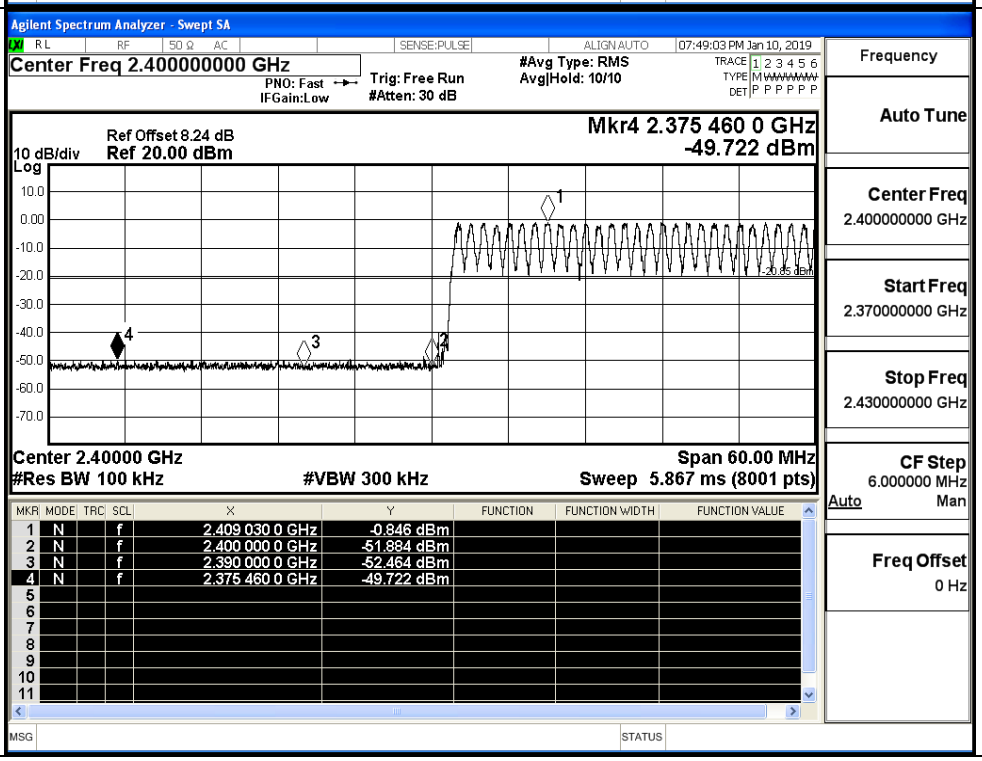
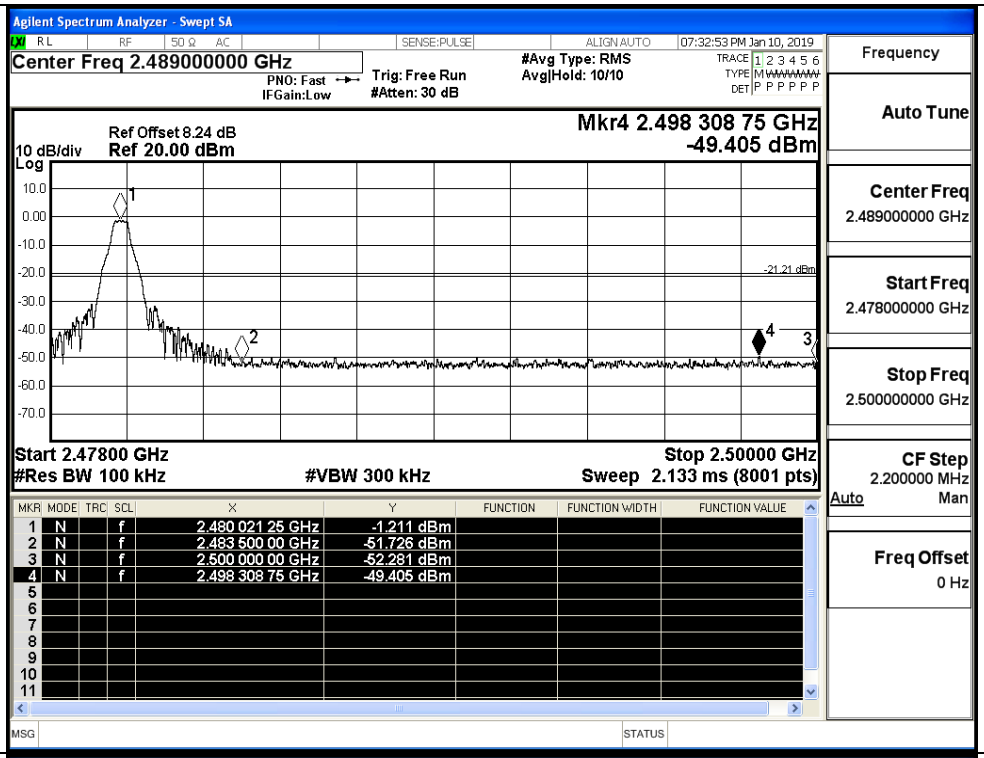
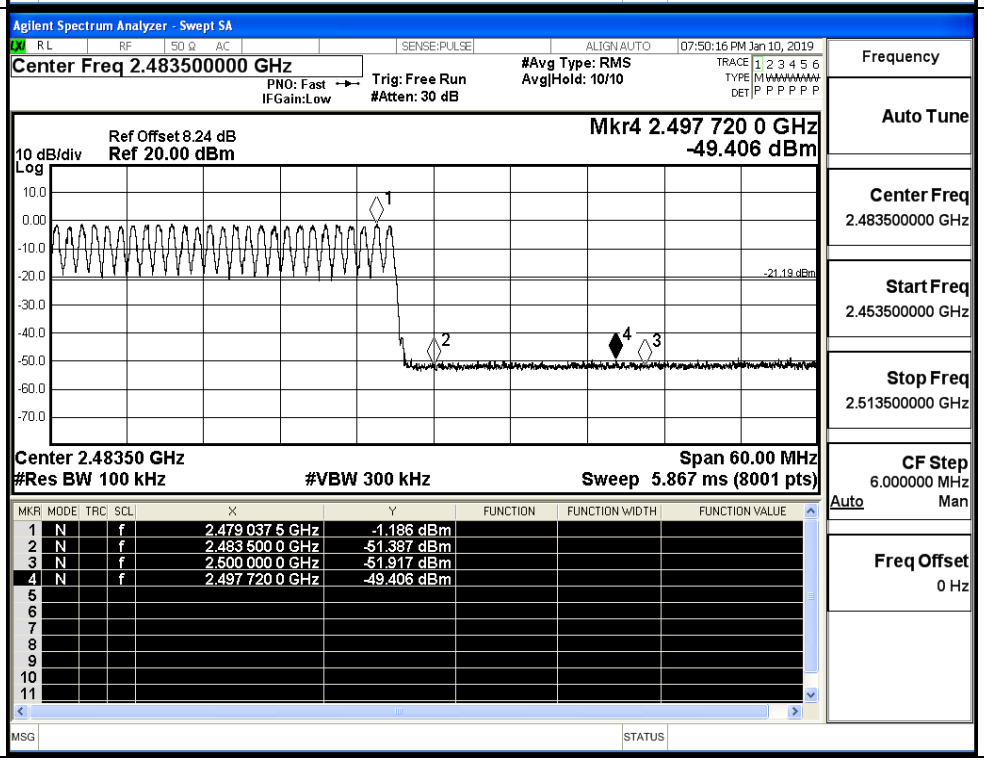
Pref		
Puw		

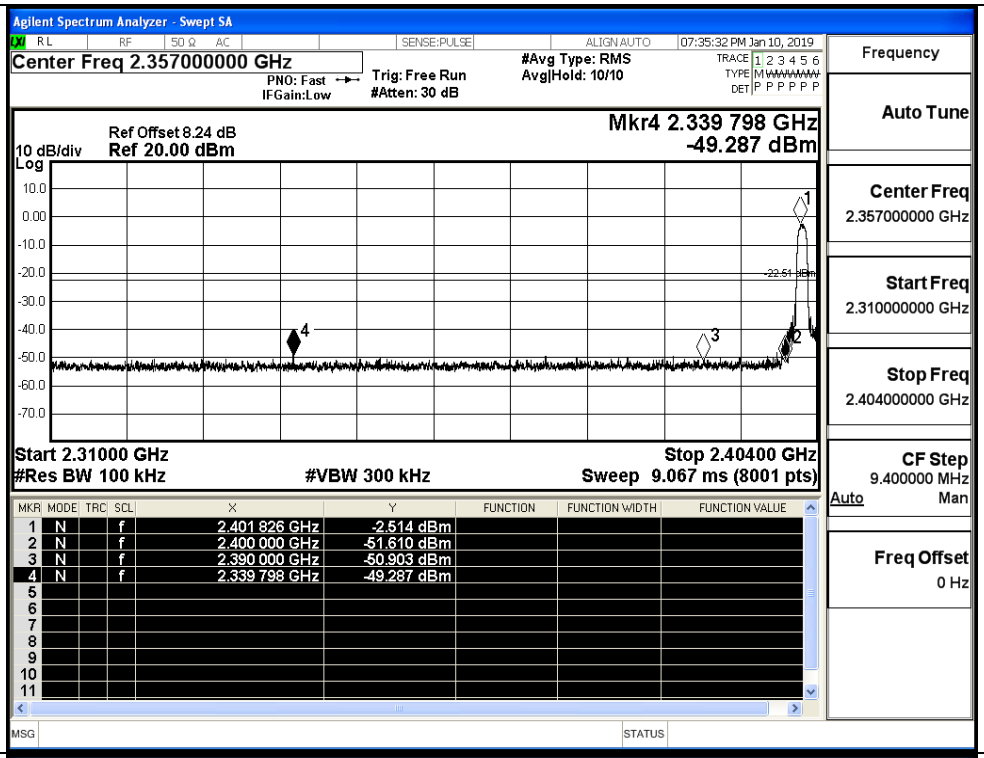
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.909	Off	-49.519	-20.91	PASS
			-0.846	On	-49.722	-20.85	PASS
	HCH	2480	-1.211	Off	-49.405	-21.21	PASS
			-1.186	On	-49.406	-21.19	PASS
π/4DQPSK	LCH	2402	-2.514	Off	-49.287	-22.51	PASS
			-2.161	On	-49.004	-22.16	PASS
	HCH	2480	-2.516	Off	-49.406	-22.52	PASS
			-2.558	On	-48.857	-22.56	PASS
8DPSK	LCH	2402	-2.066	Off	-50.017	-22.07	PASS
			-1.890	On	-49.278	-21.89	PASS
	HCH	2480	-2.415	Off	-49.078	-22.42	PASS
			-2.267	On	-48.566	-22.27	PASS

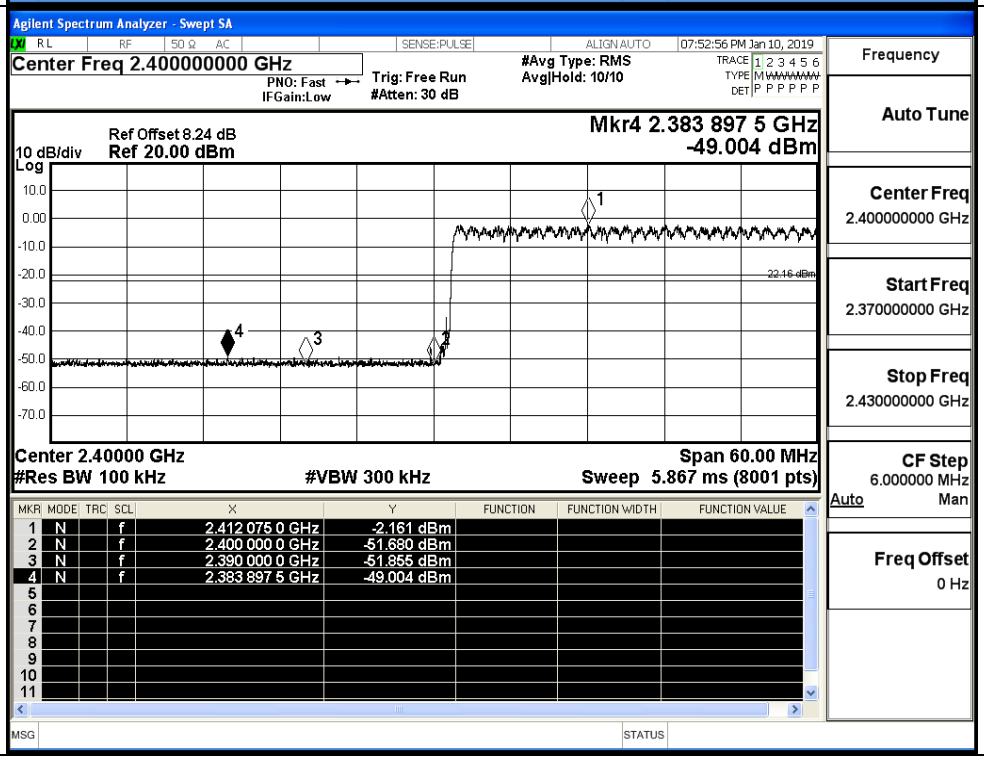
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

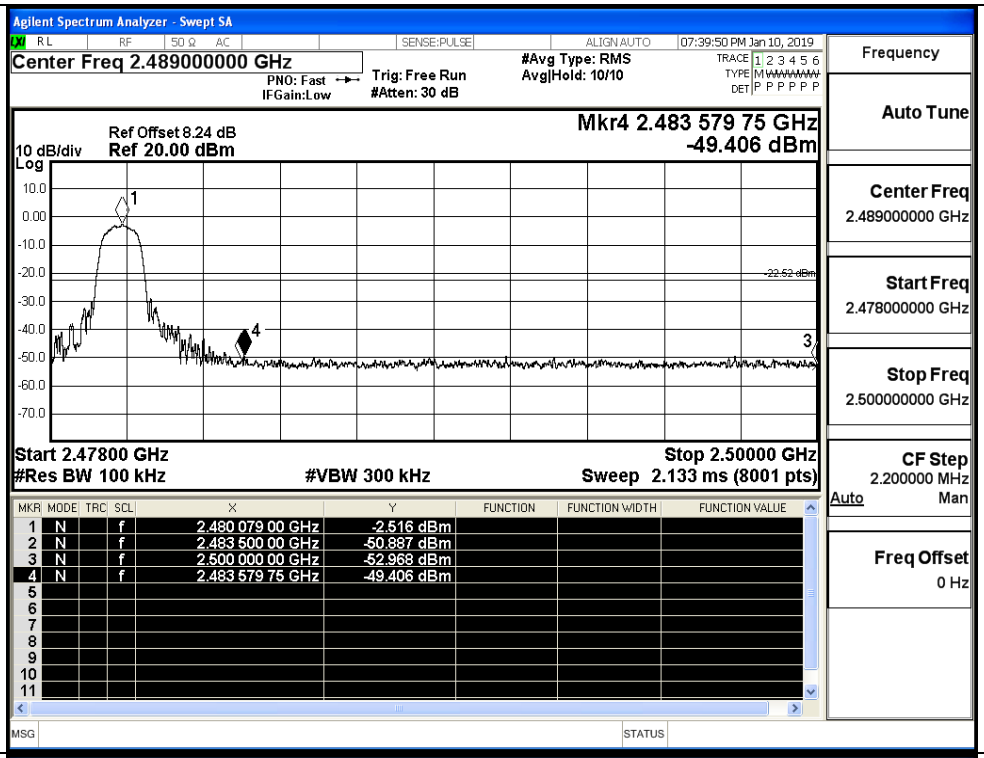
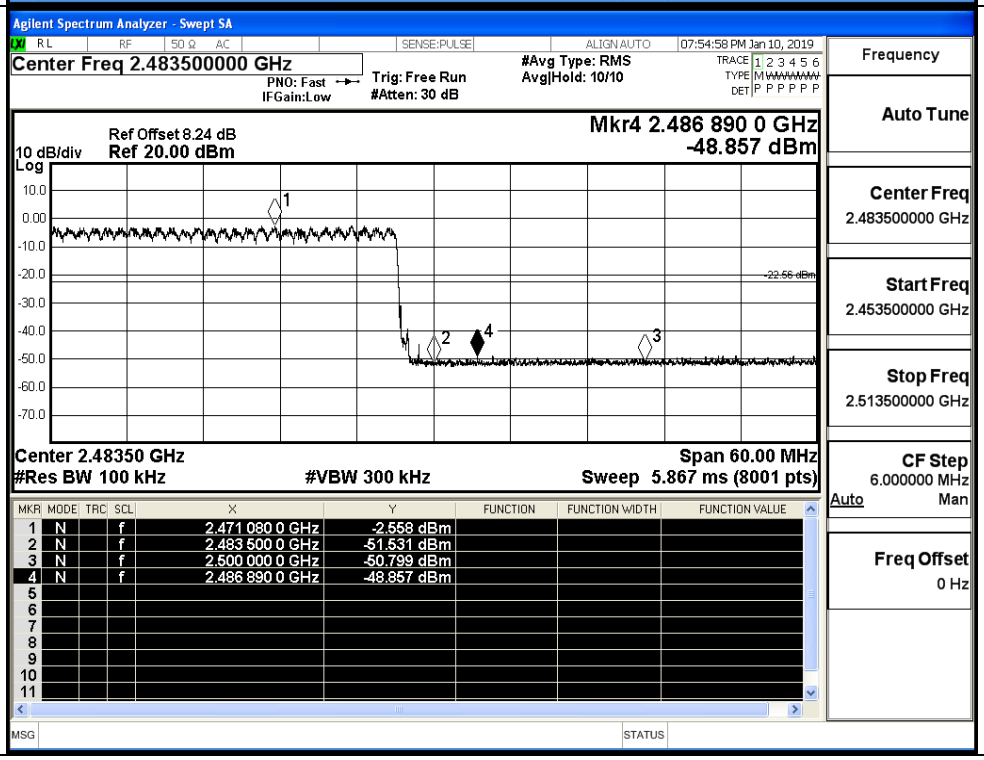
GFSK/HCH/No Hop	
GFSK/HCH/Hop	

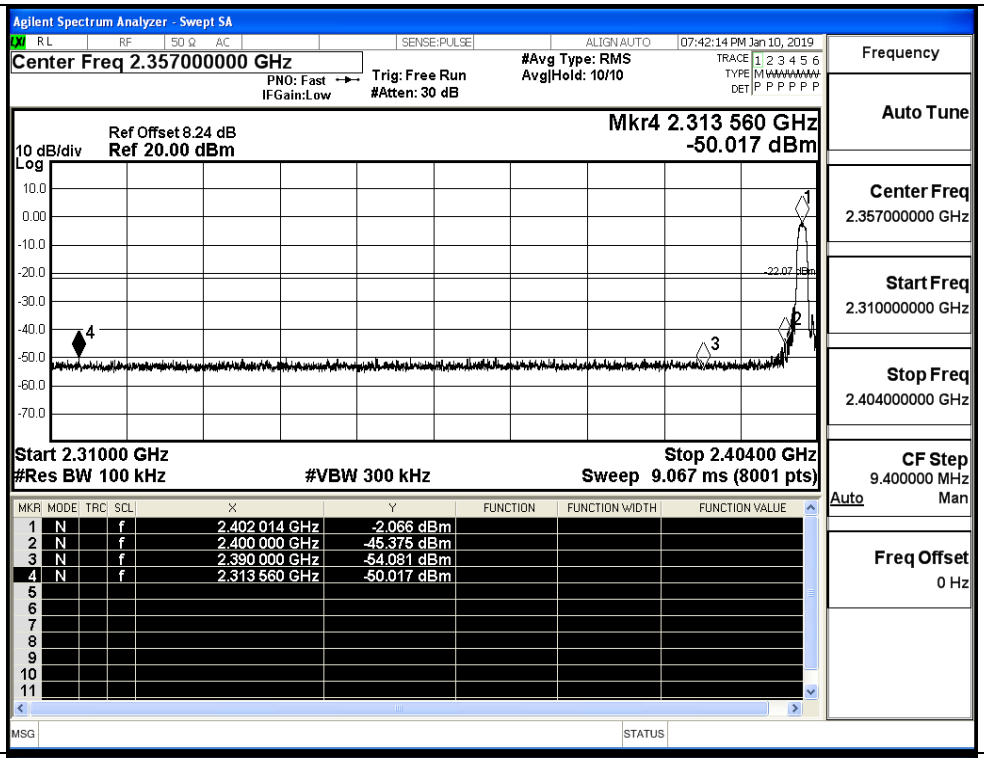
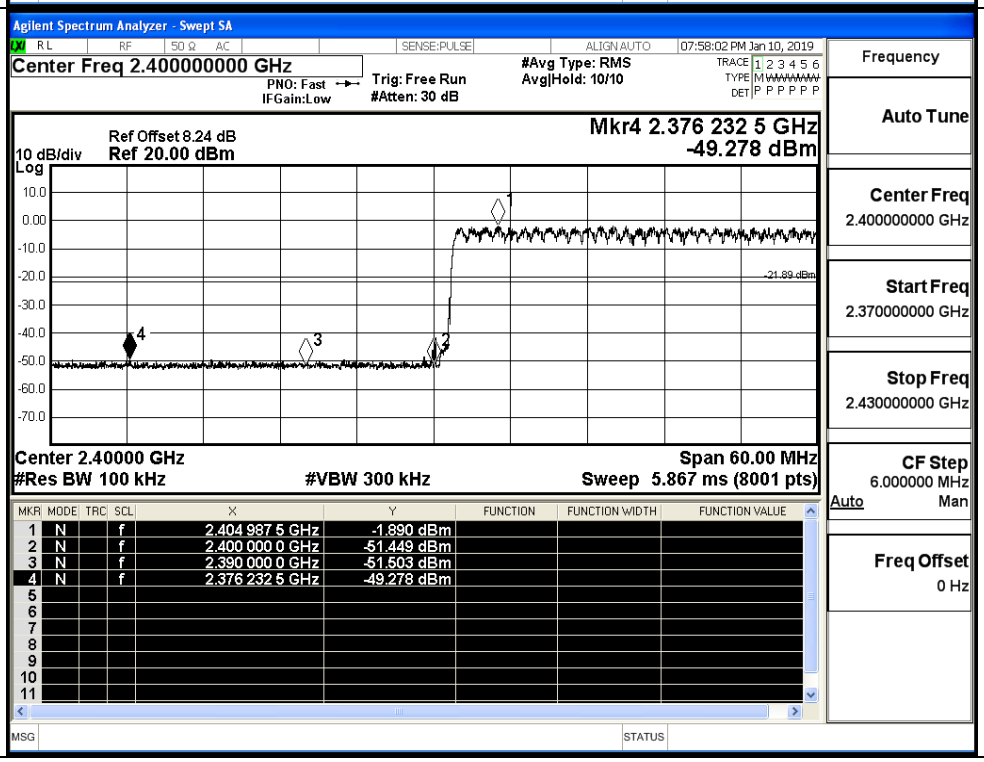
π/4DQPSK/LCH/No Hop

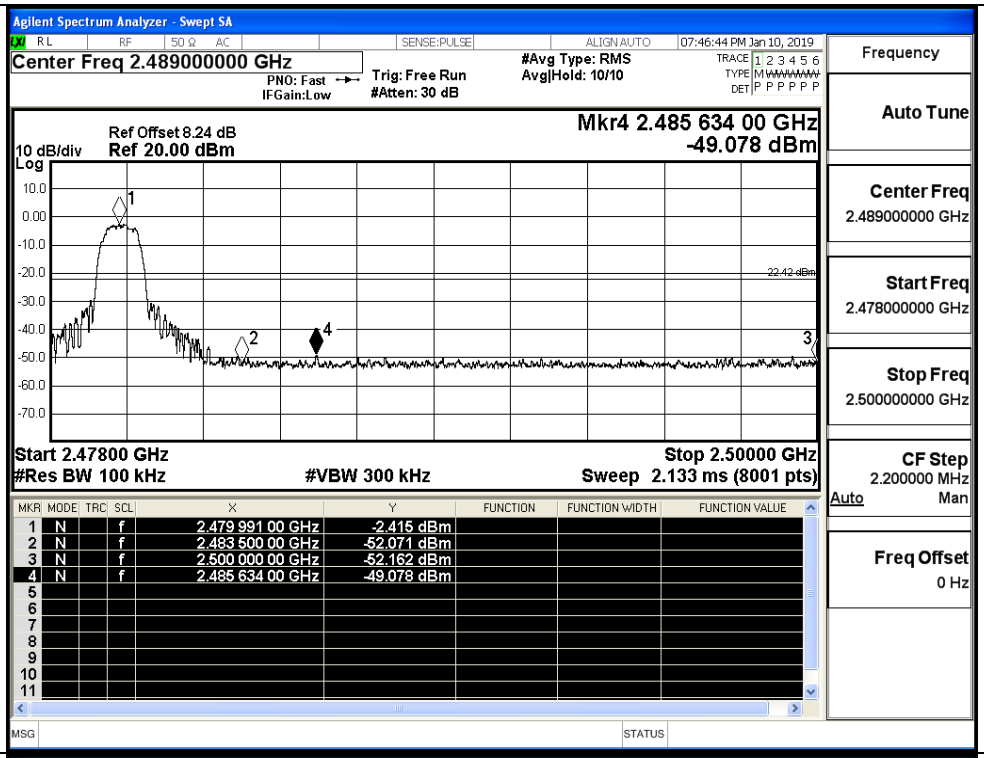
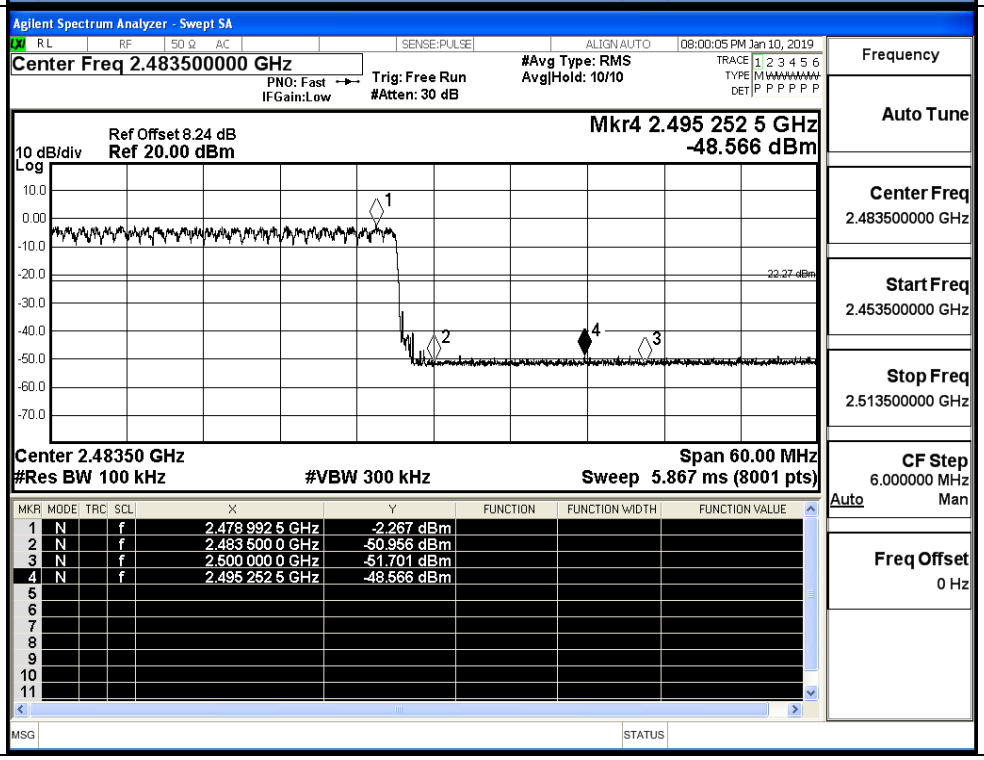


π/4DQPSK/LCH/Hop



π/4DQPSK/HCH/No Hop	
π/4DQPSK/HCH/Hop	

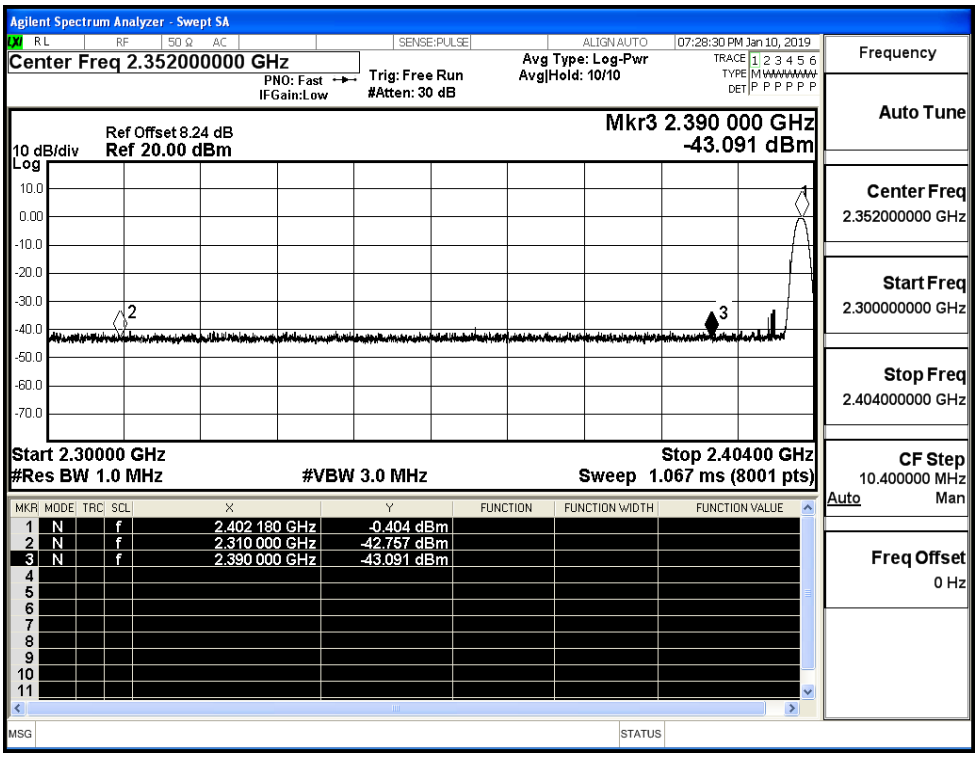
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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

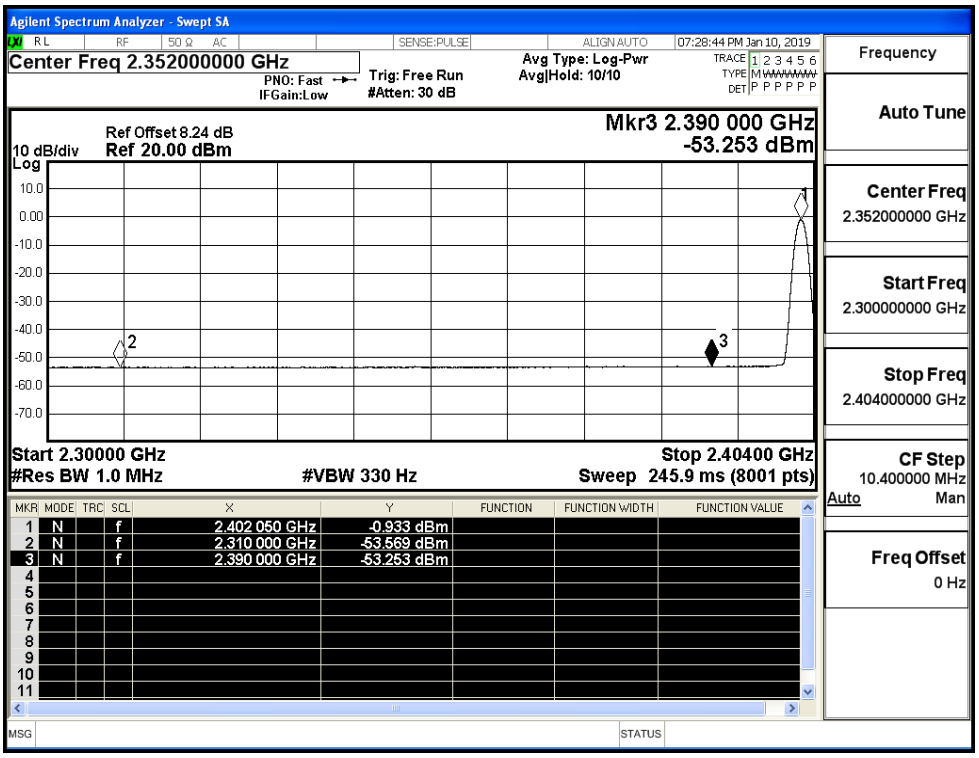
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.76	2.0	0	54.50	PEAK	74	PASS
	Off	2310.0	-53.57	2.0	0	43.69	AV	54	PASS
	Off	2390.0	-43.09	2.0	0	54.17	PEAK	74	PASS
	Off	2390.0	-53.25	2.0	0	44.00	AV	54	PASS
	Off	2483.5	-42.11	2.0	0	55.15	PEAK	74	PASS
	Off	2483.5	-52.70	2.0	0	44.56	AV	54	PASS
	Off	2500.0	-43.40	2.0	0	53.85	PEAK	74	PASS
	Off	2500.0	-52.82	2.0	0	44.44	AV	54	PASS
π/4DQPSK	Off	2310.0	-42.90	2.0	0	54.35	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	43.68	AV	54	PASS
	Off	2390.0	-43.68	2.0	0	53.58	PEAK	74	PASS
	Off	2390.0	-53.00	2.0	0	44.26	AV	54	PASS
	Off	2483.5	-33.78	2.0	0	63.48	PEAK	74	PASS
	Off	2483.5	-52.78	2.0	0	44.48	AV	54	PASS
	Off	2500.0	-41.83	2.0	0	55.43	PEAK	74	PASS
	Off	2500.0	-52.82	2.0	0	44.43	AV	54	PASS
8DPSK	Off	2310.0	-43.42	2.0	0	53.84	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	43.67	AV	54	PASS
	Off	2390.0	-43.20	2.0	0	54.06	PEAK	74	PASS
	Off	2390.0	-53.17	2.0	0	44.08	AV	54	PASS
	Off	2483.5	-39.48	2.0	0	57.78	PEAK	74	PASS
	Off	2483.5	-52.64	2.0	0	44.62	AV	54	PASS
	Off	2500.0	-42.38	2.0	0	54.88	PEAK	74	PASS
	Off	2500.0	-52.81	2.0	0	44.45	AV	54	PASS

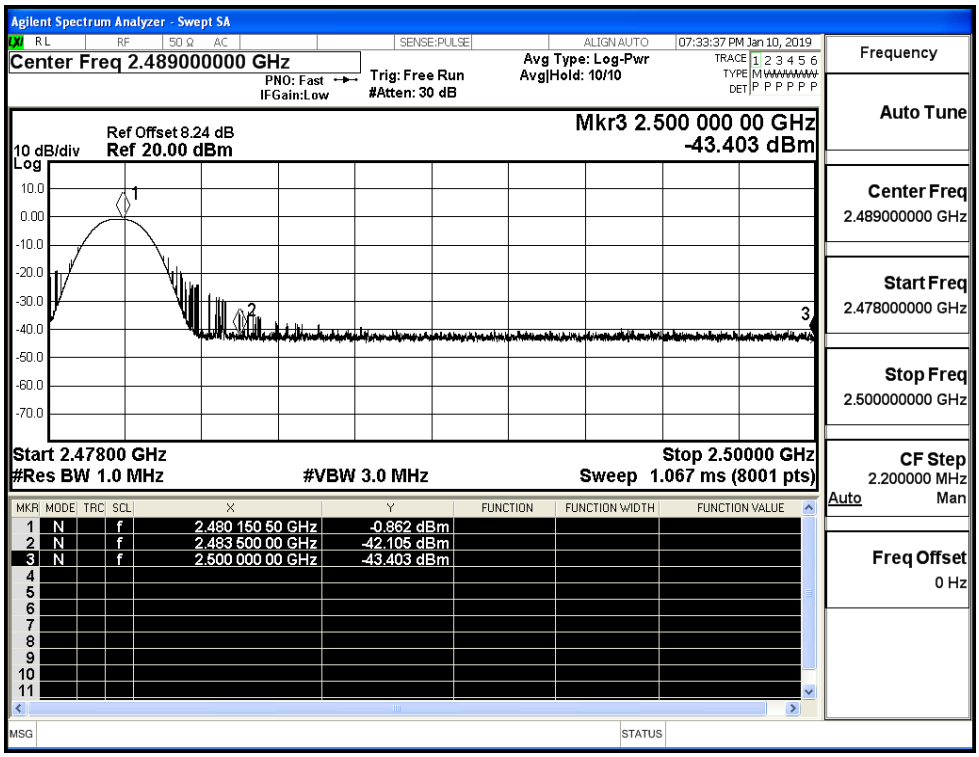
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



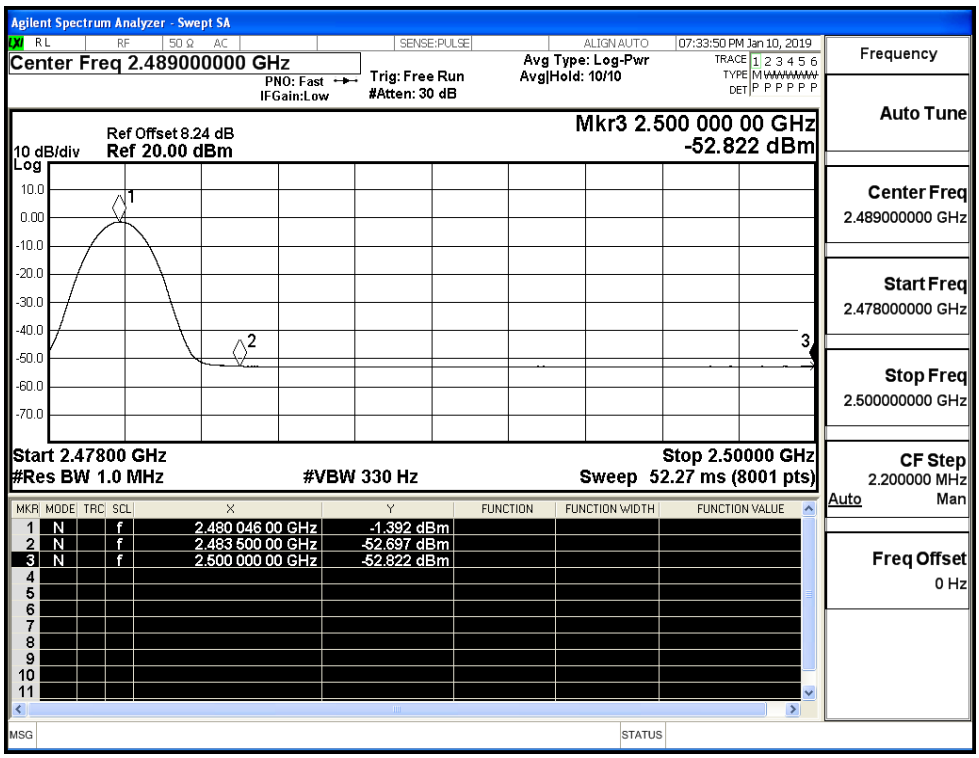
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



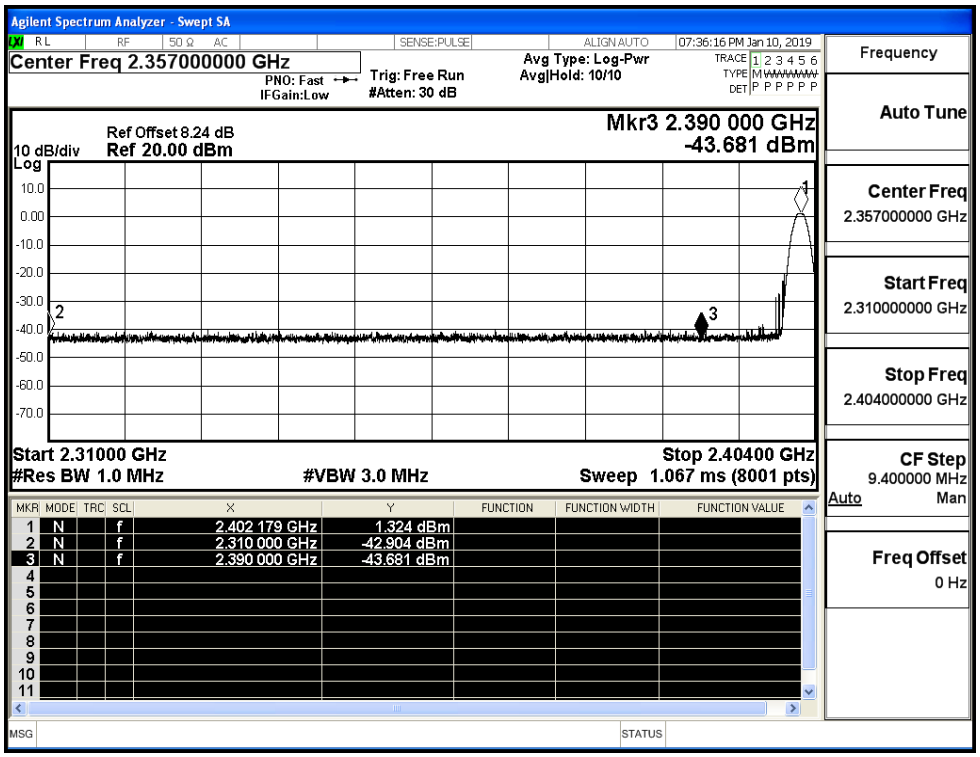
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



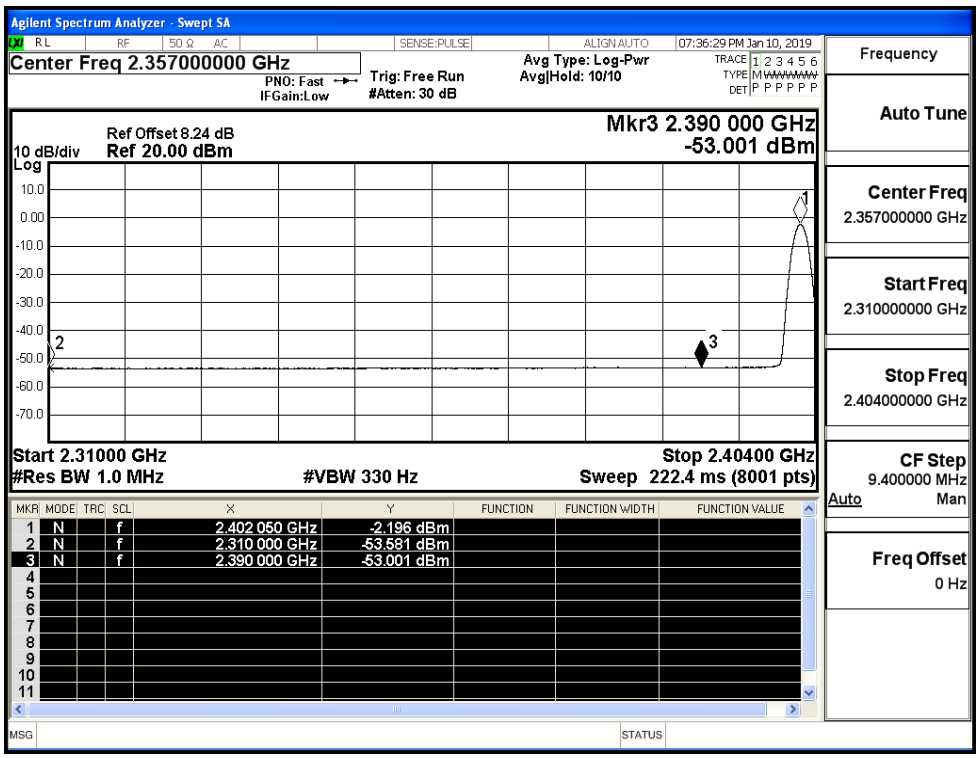
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



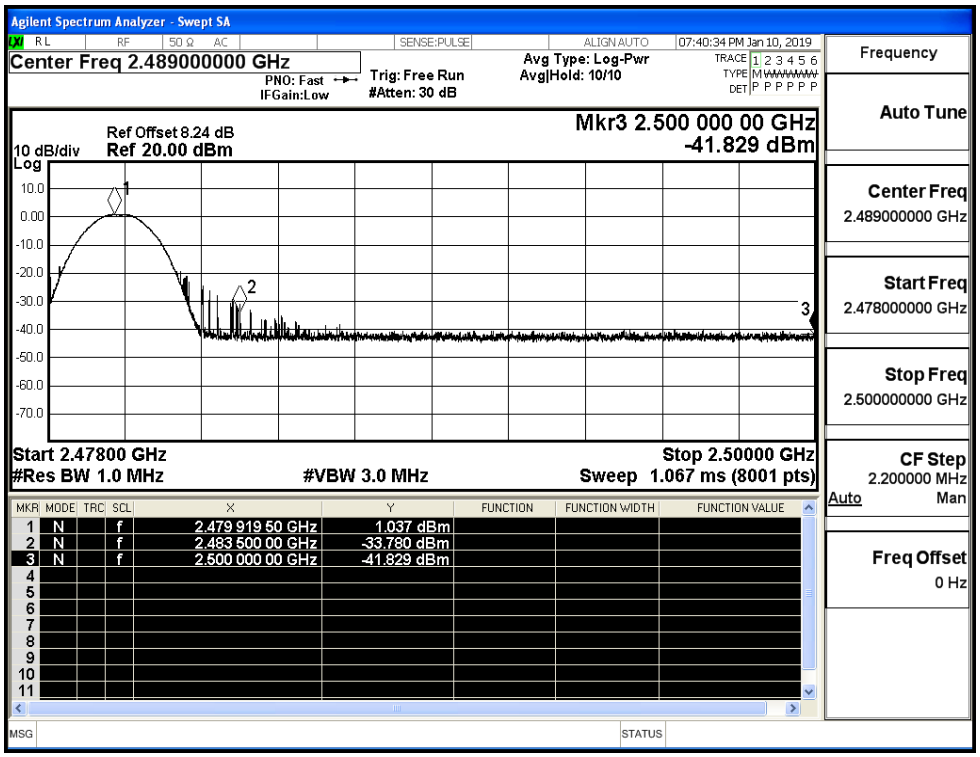
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



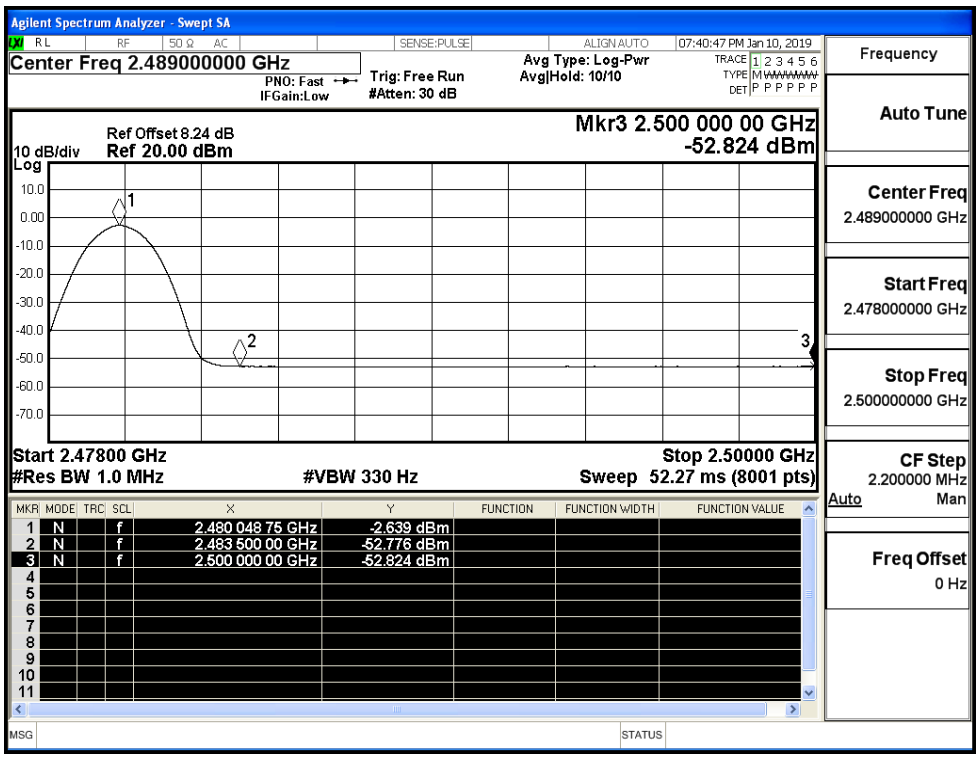
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



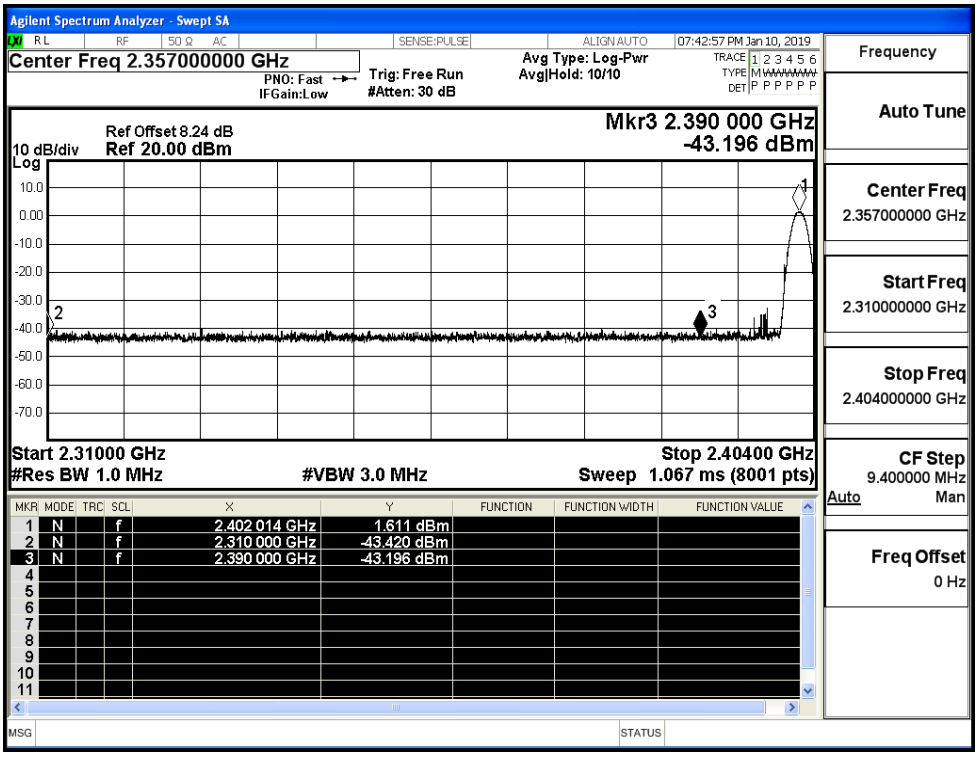
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



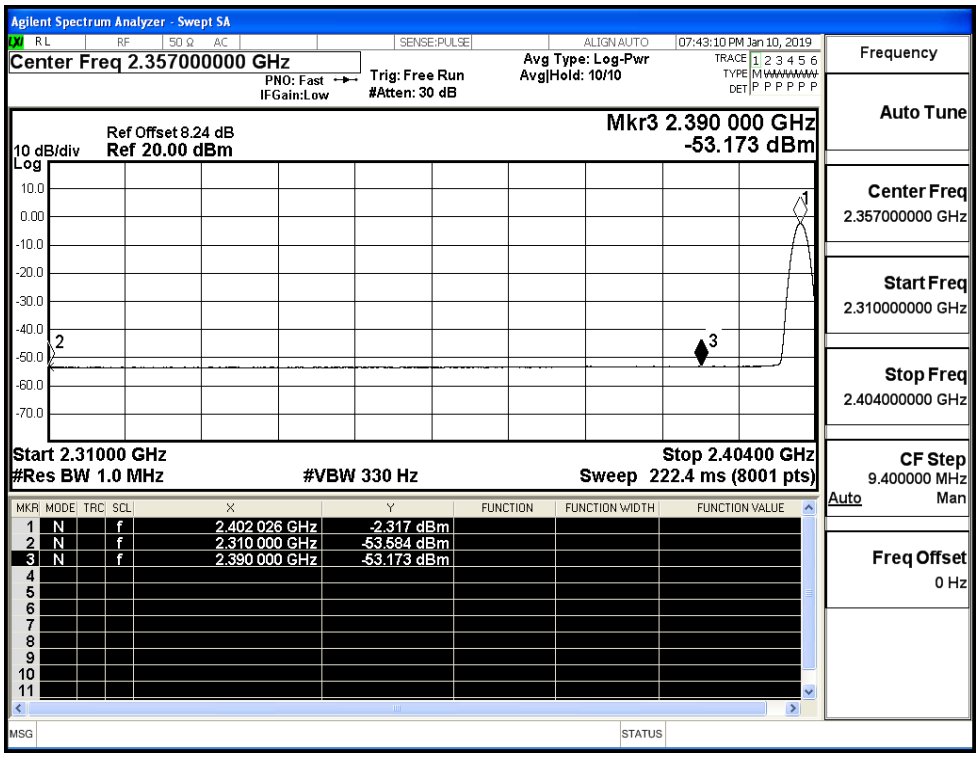
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



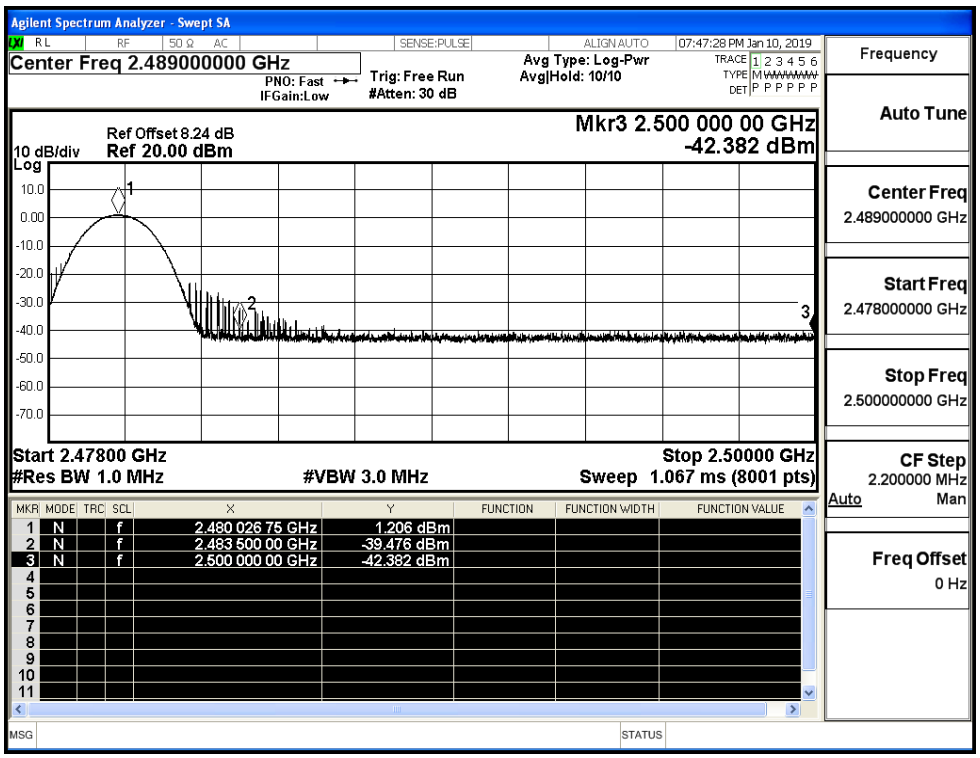
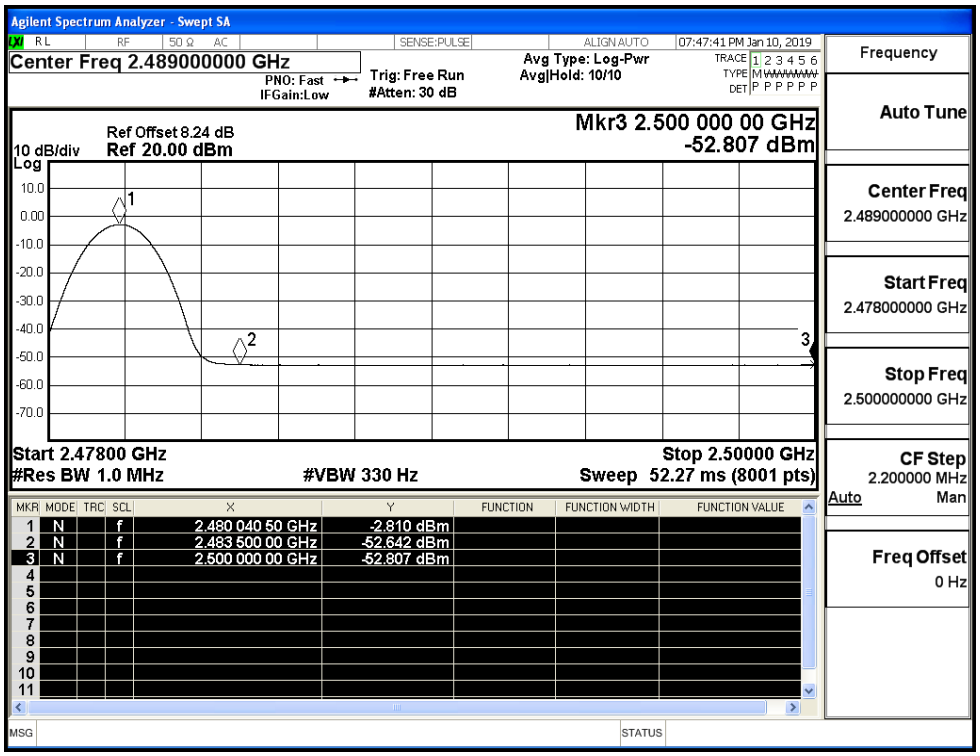
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)