Appendix A

RF Test Data for BT 5.0 (BDR/EDR) (Conducted Measurement)

Product Name: Aries True Wireless Bluetooth® Earbuds

Trade Mark: Gemline

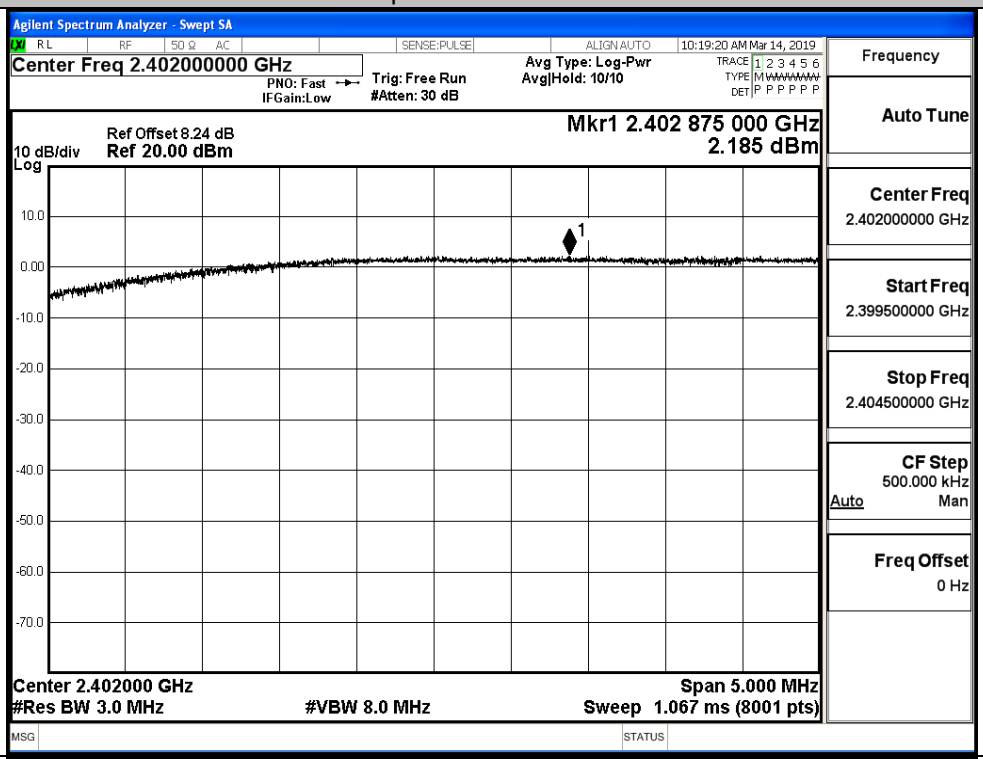
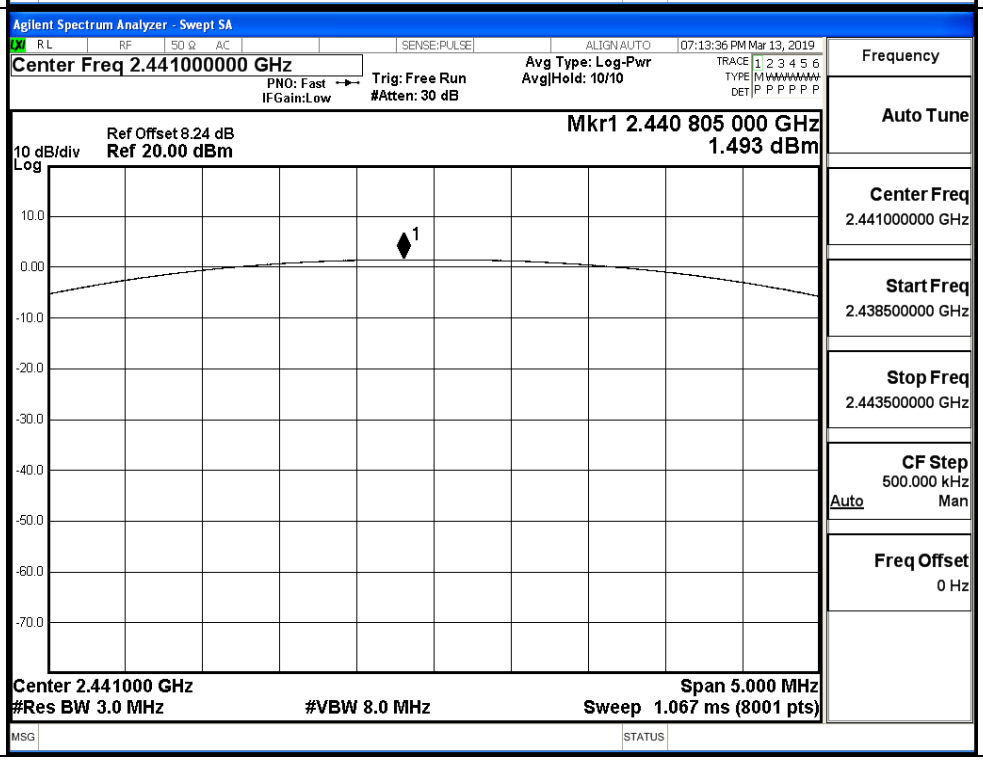
Test Model: 100244-001B

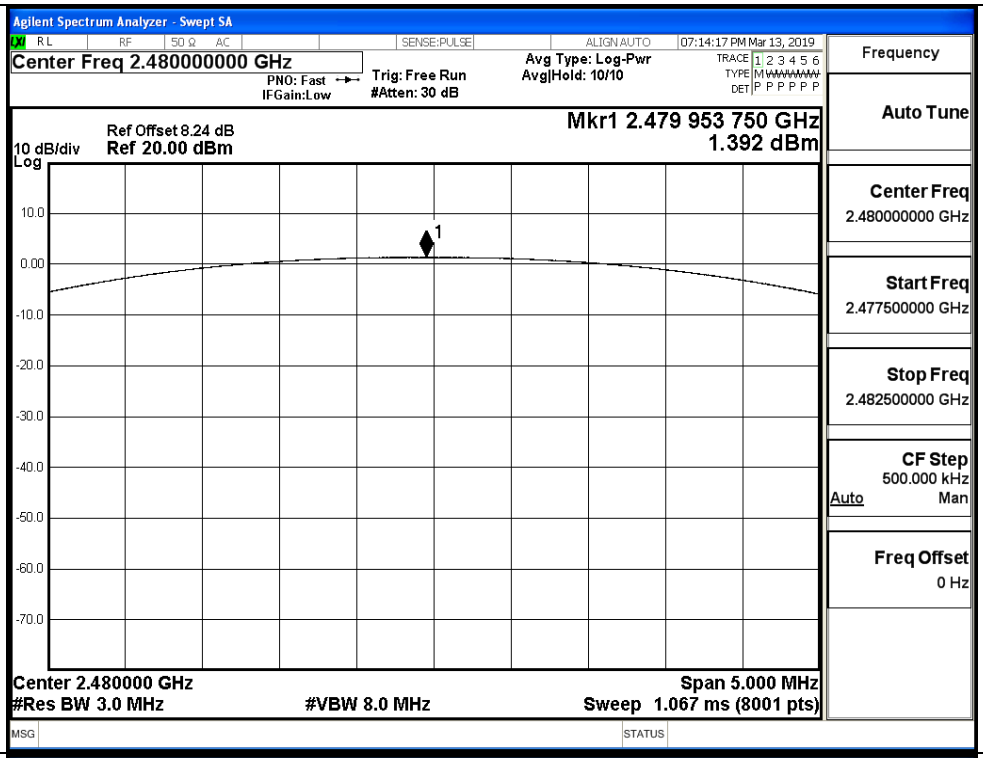
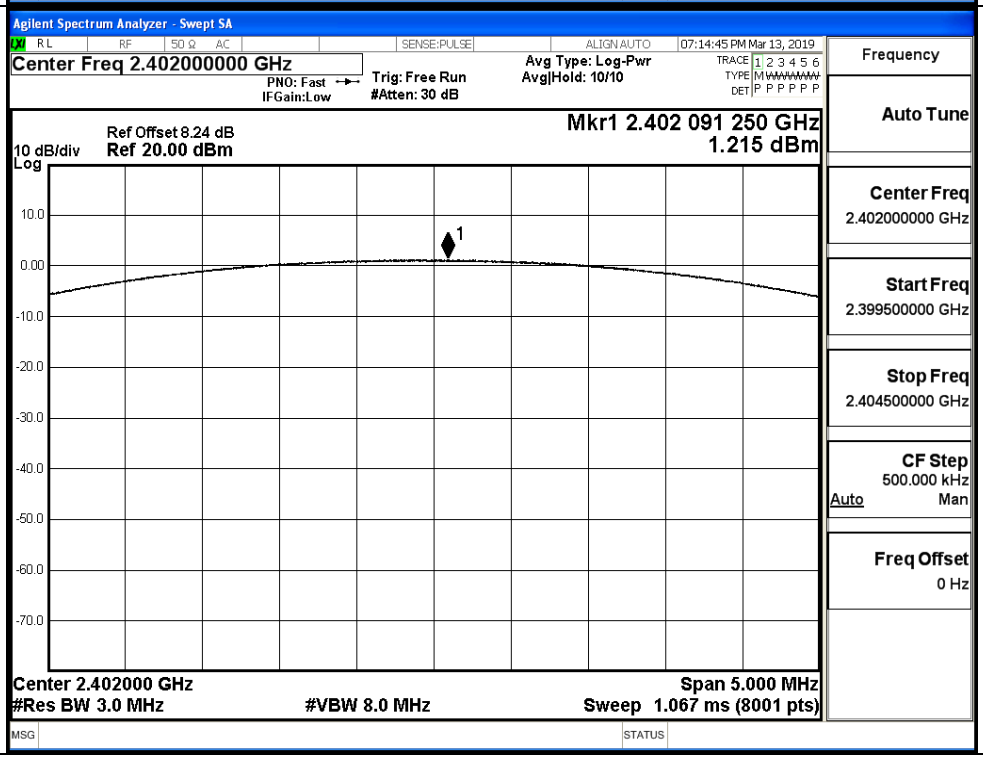
Environmental Conditions

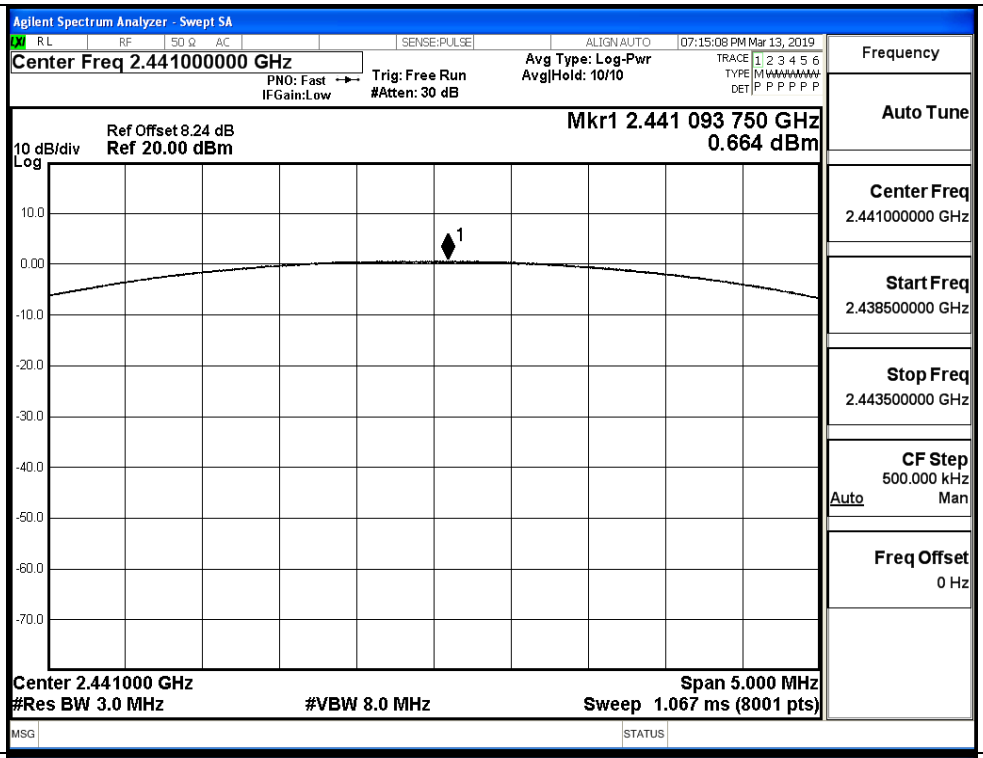
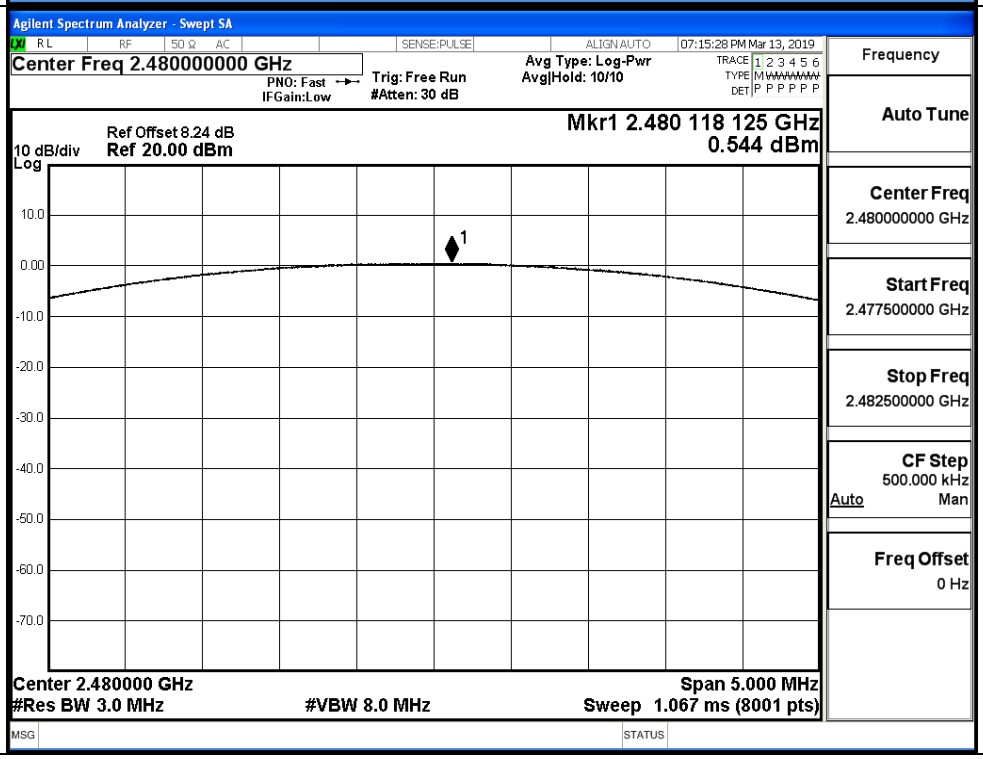
Temperature:	22.4 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom. liu

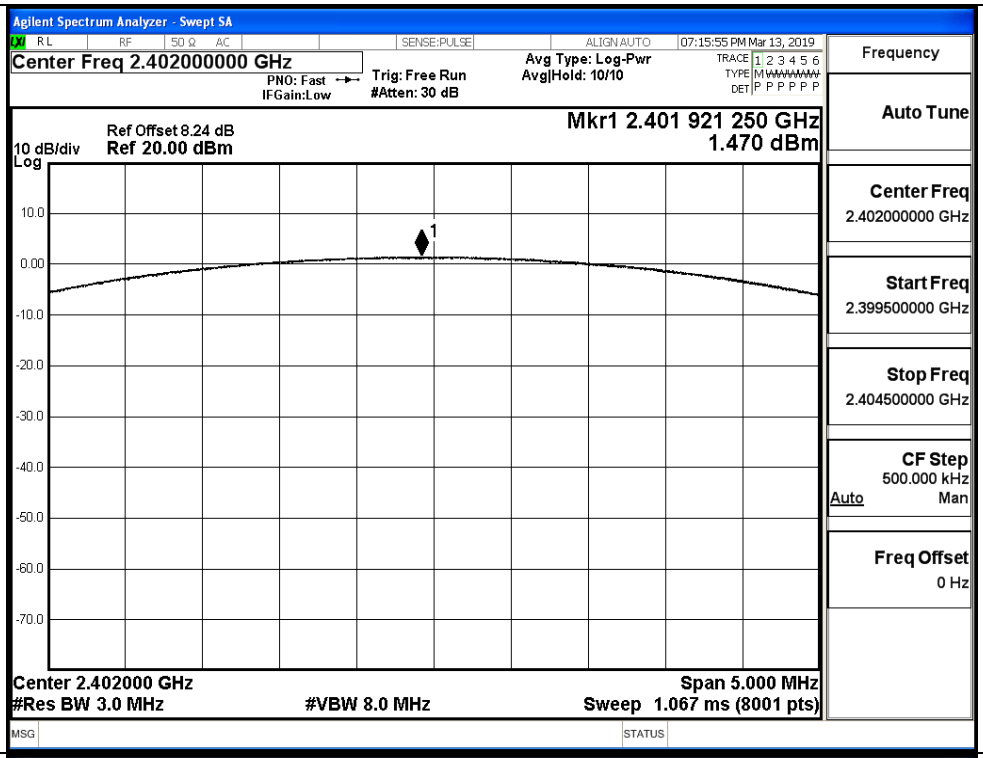
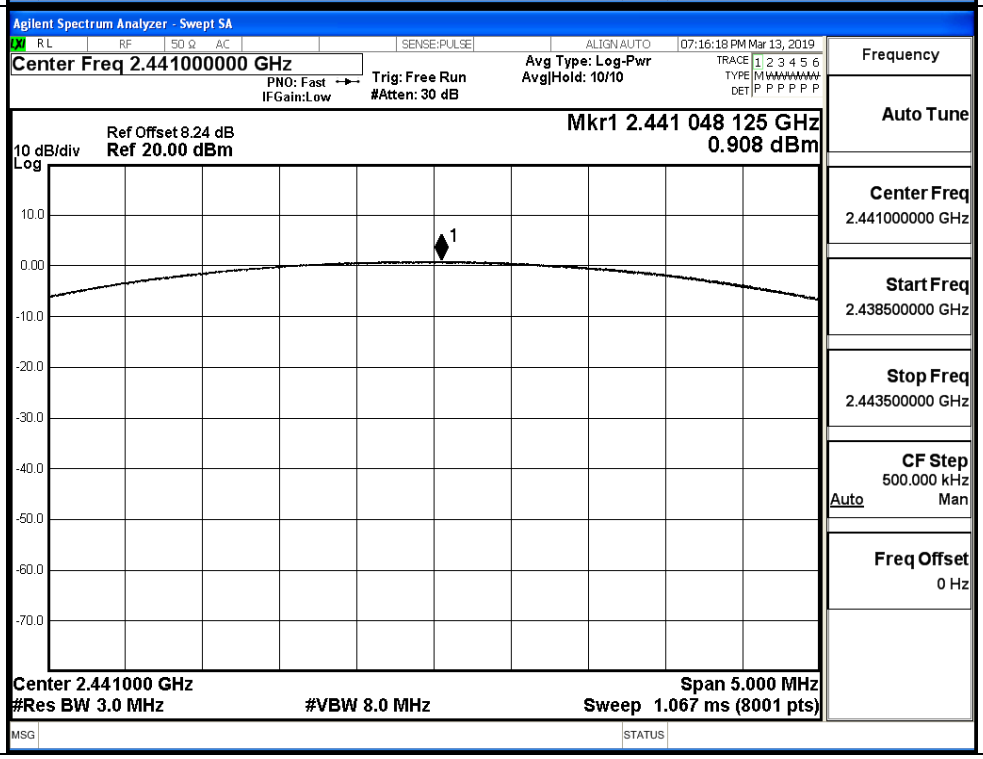
A.1 Maximum Conducted Peak Output Power

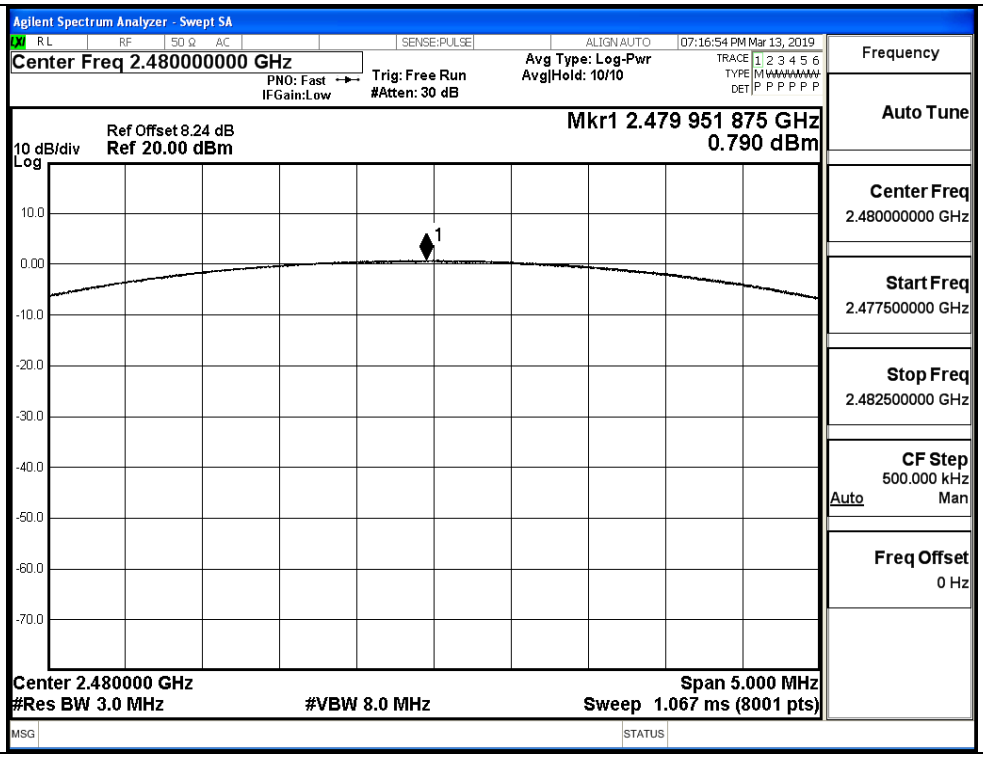
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.185	21	PASS
	MCH	1.493	21	PASS
	HCH	1.392	21	PASS
π/4DQPSK	LCH	1.215	21	PASS
	MCH	0.664	21	PASS
	HCH	0.544	21	PASS
8DPSK	LCH	1.470	21	PASS
	MCH	0.908	21	PASS
	HCH	0.790	21	PASS

Test Graphs		
GFSK/LCH		
GFSK/MCH		

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH		
π/4DQPSK/HCH		

8DPSK/LCH		
8DPSK/MCH		

8DPSK/HCH	

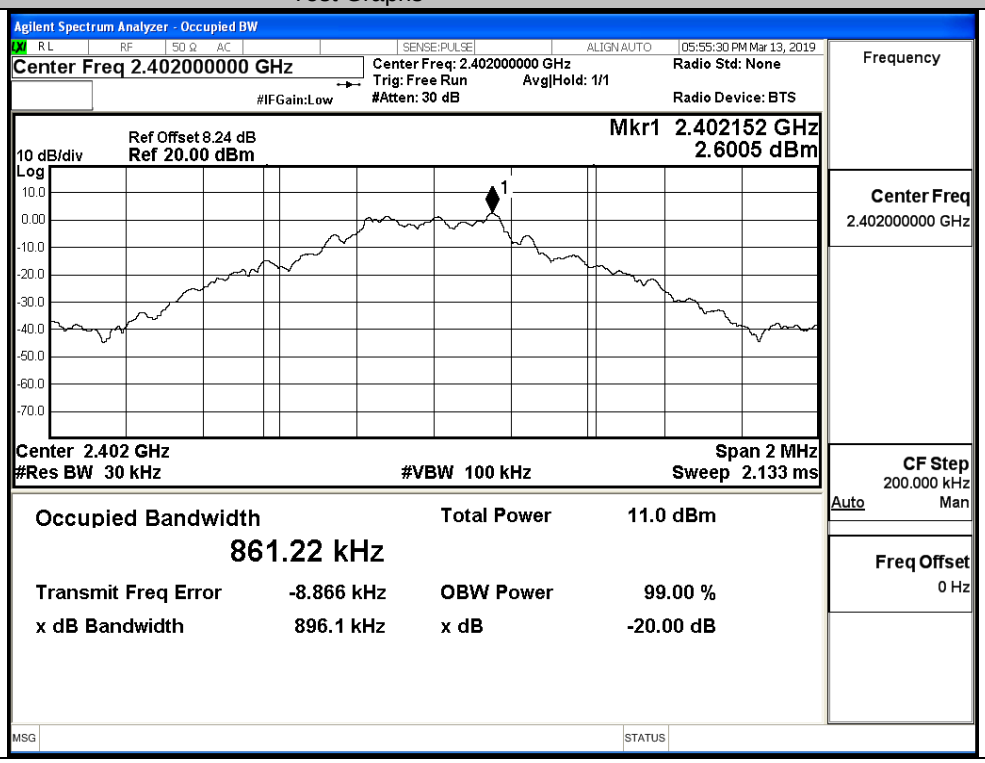
Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
07:16:54 PM Mar 13, 2019
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 8.24 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 951 875 GHz
0.790 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 5.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

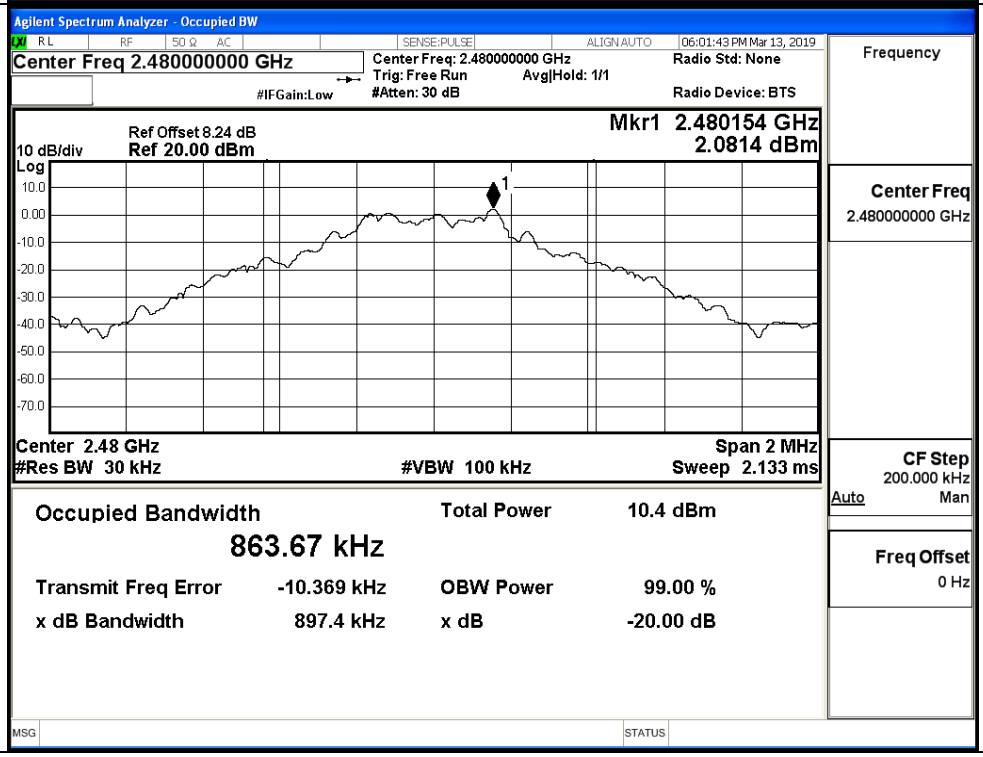
A.2 99% and 20dB Bandwidth

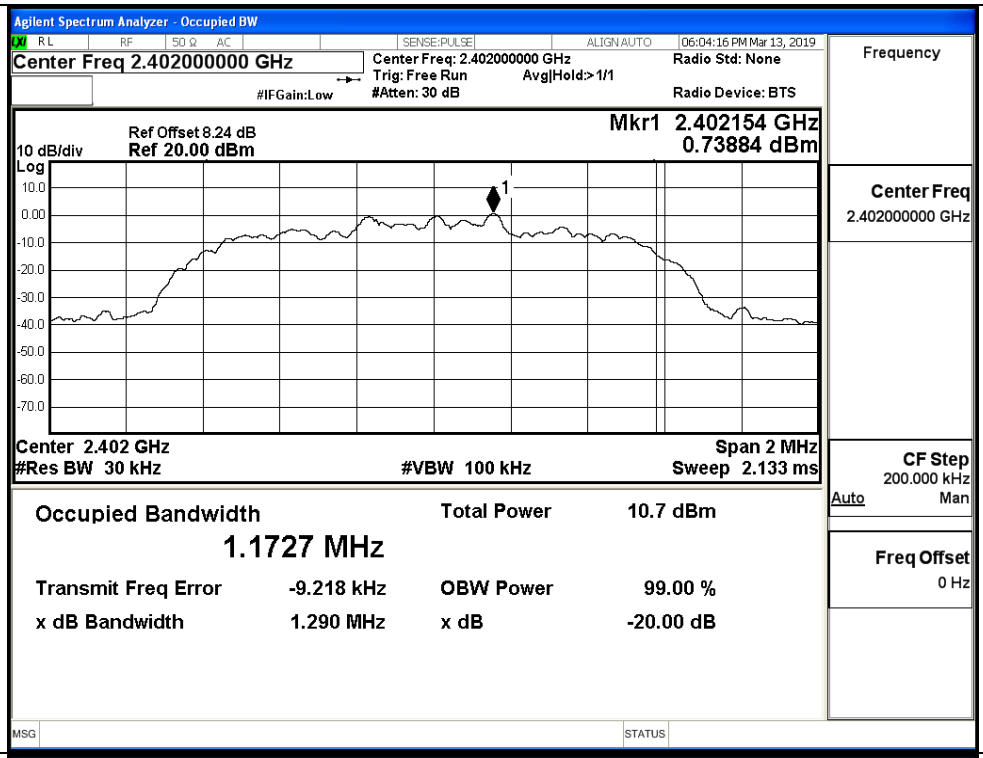
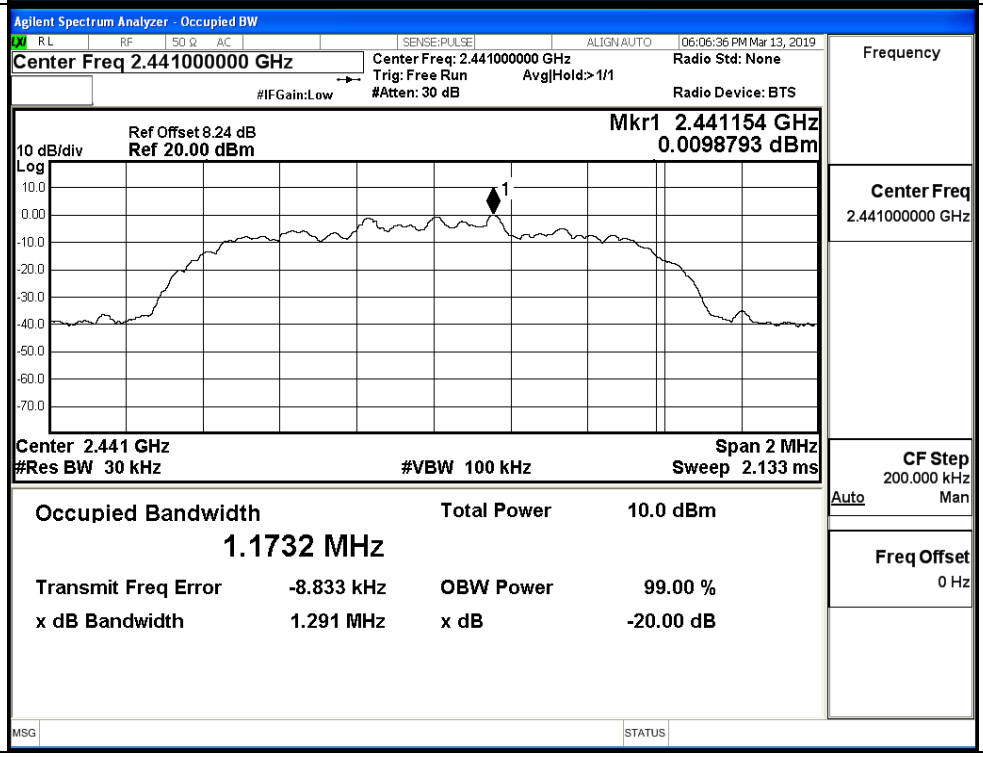
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.86122	0.8961	Not Specified	PASS
	MCH	0.86102	0.8976	Not Specified	PASS
	HCH	0.86367	0.8974	Not Specified	PASS
π/4DQPSK	LCH	1.1727	1.290	Not Specified	PASS
	MCH	1.1732	1.291	Not Specified	PASS
	HCH	1.1715	1.288	Not Specified	PASS
8DPSK	LCH	1.1829	1.292	Not Specified	PASS
	MCH	1.1801	1.293	Not Specified	PASS
	HCH	1.1813	1.309	Not Specified	PASS

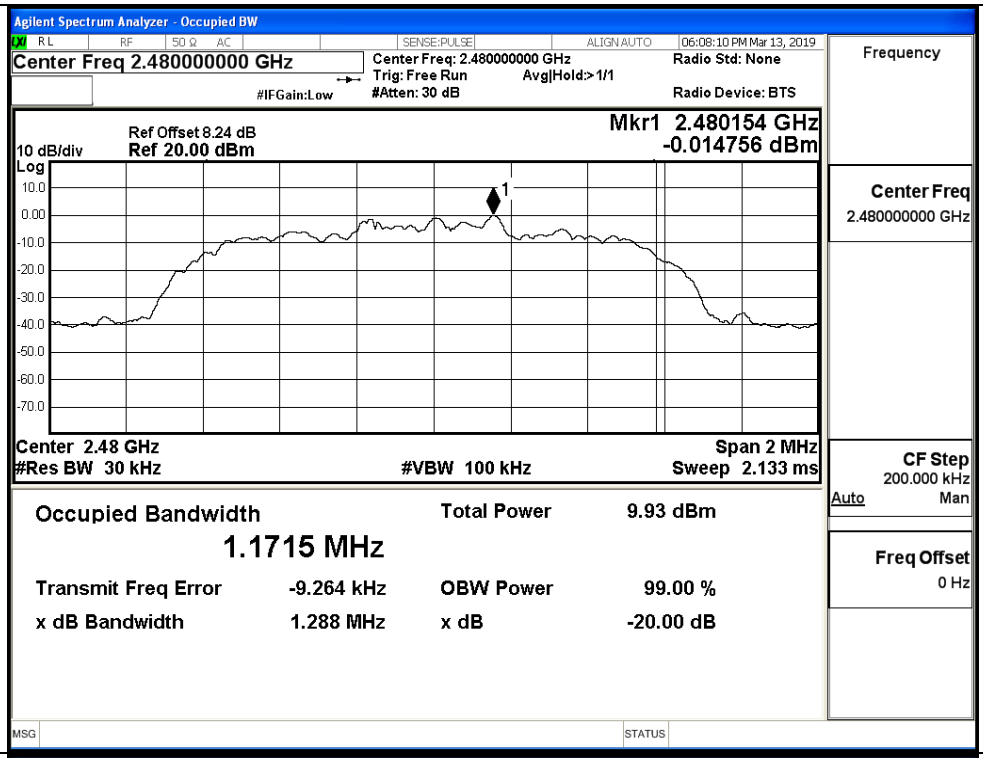
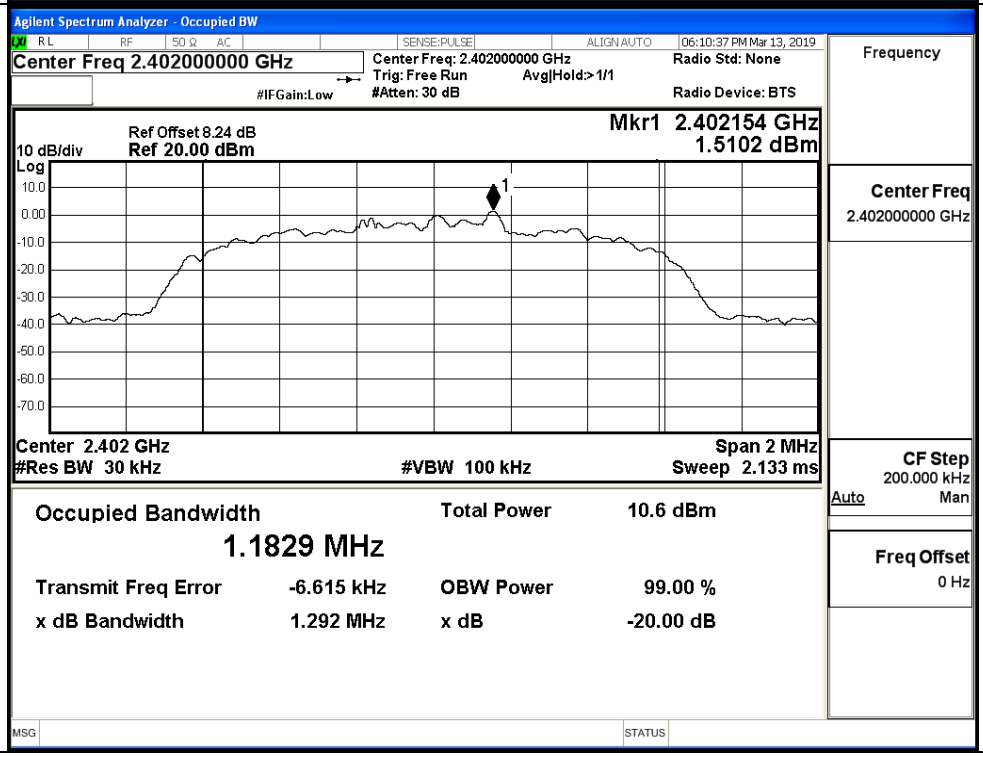
Test Graphs

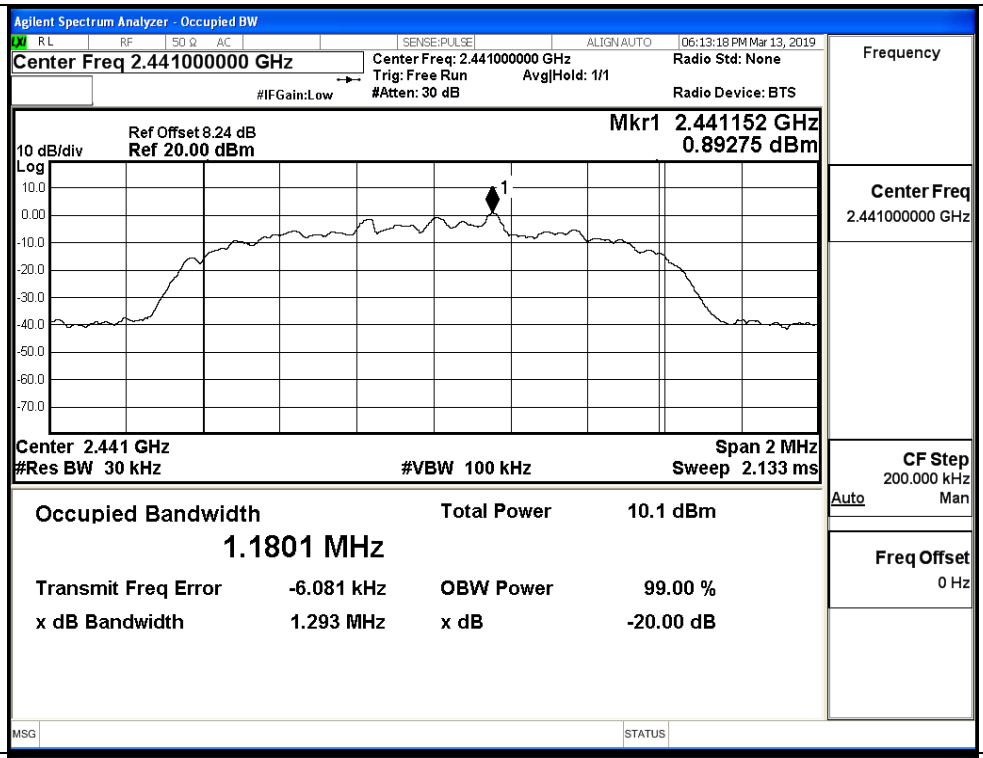
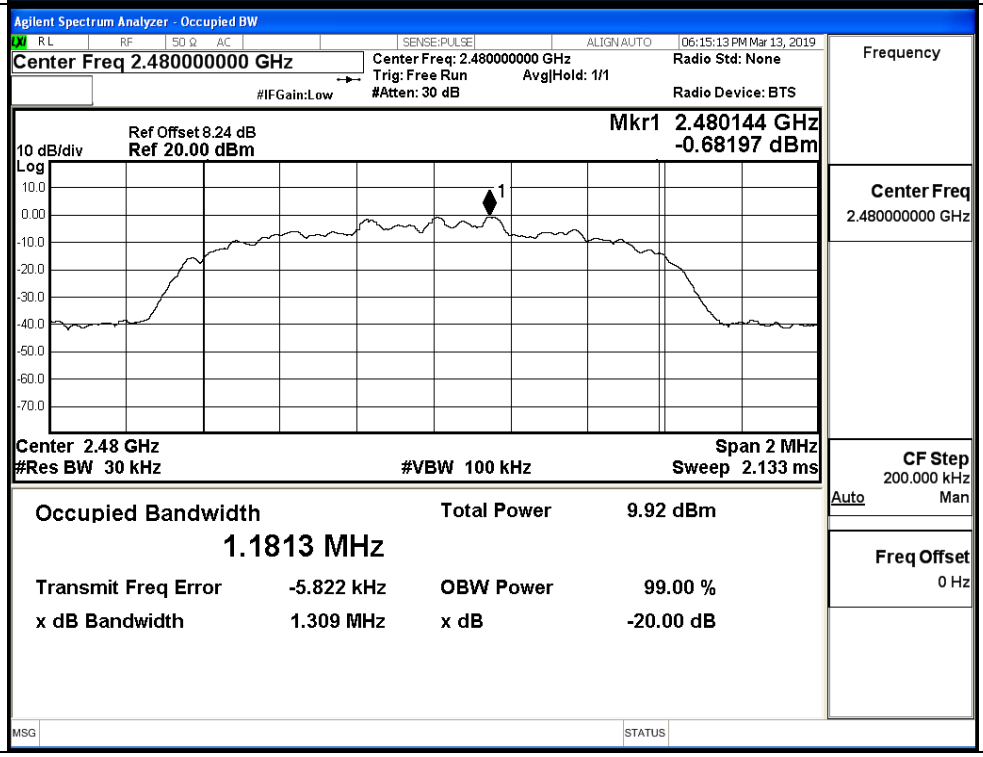
GFSK/LCH



GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	

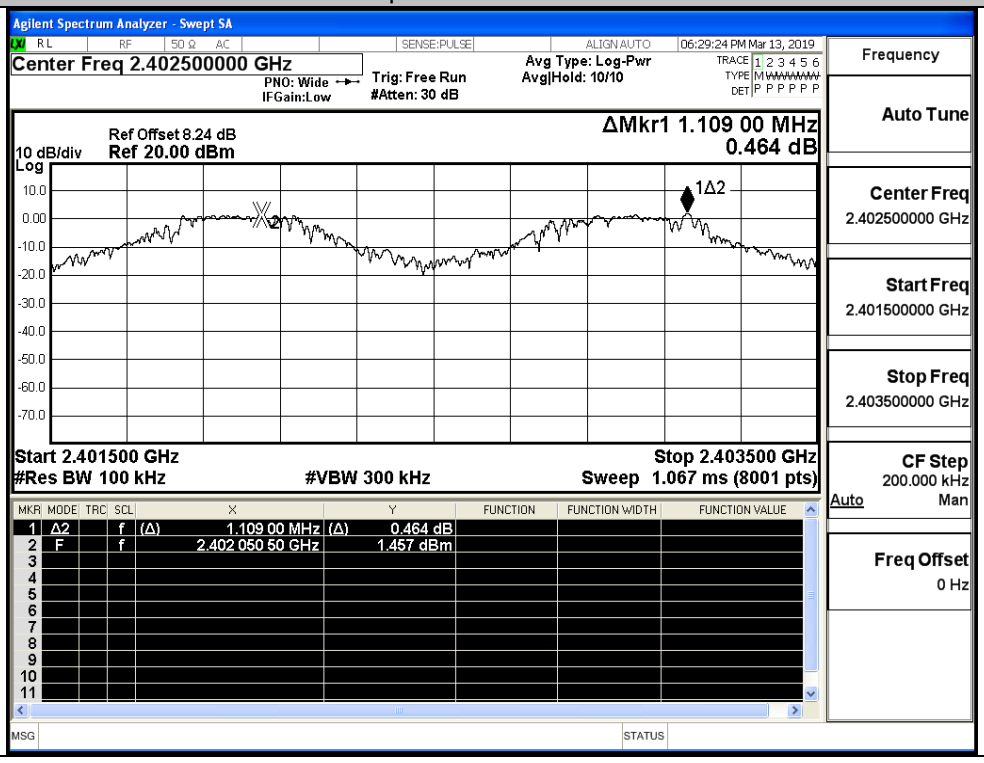
8DPSK/MCH	
8DPSK/HCH	

A.3 Carrier Frequency Separation

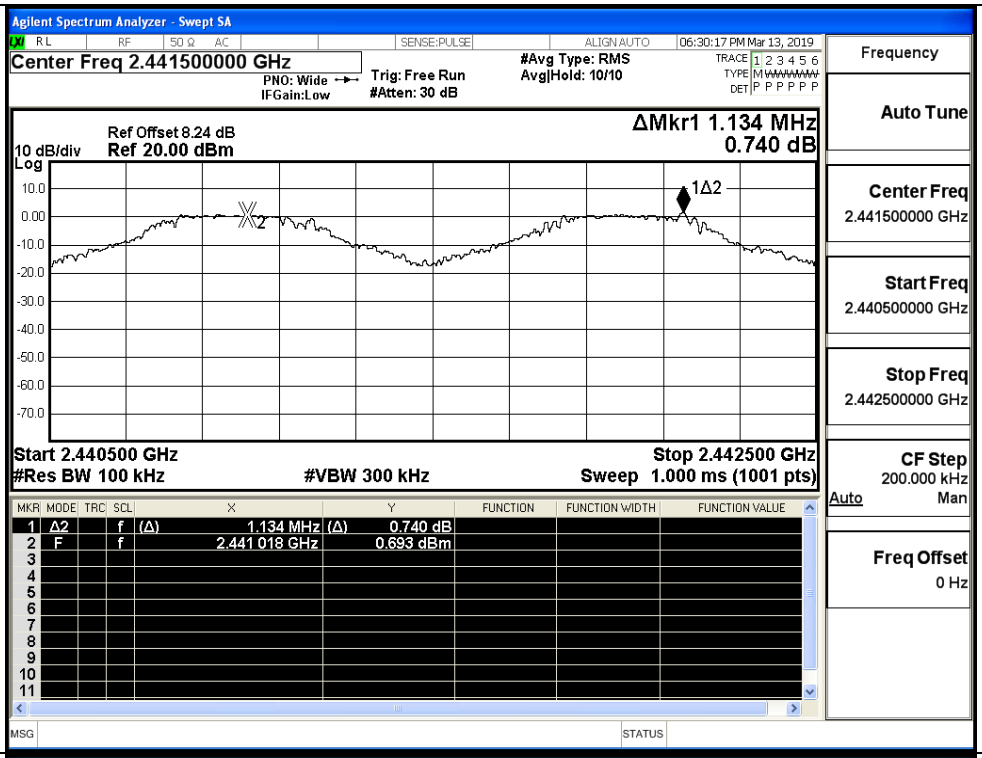
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.109	0.598	PASS
	MCH	1.134	0.598	PASS
	HCH	1.036	0.598	PASS
π/4DQPSK	LCH	0.998	0.861	PASS
	MCH	0.904	0.861	PASS
	HCH	0.996	0.861	PASS
8DPSK	LCH	1.264	0.873	PASS
	MCH	1.068	0.873	PASS
	HCH	1.008	0.873	PASS

Test Graphs

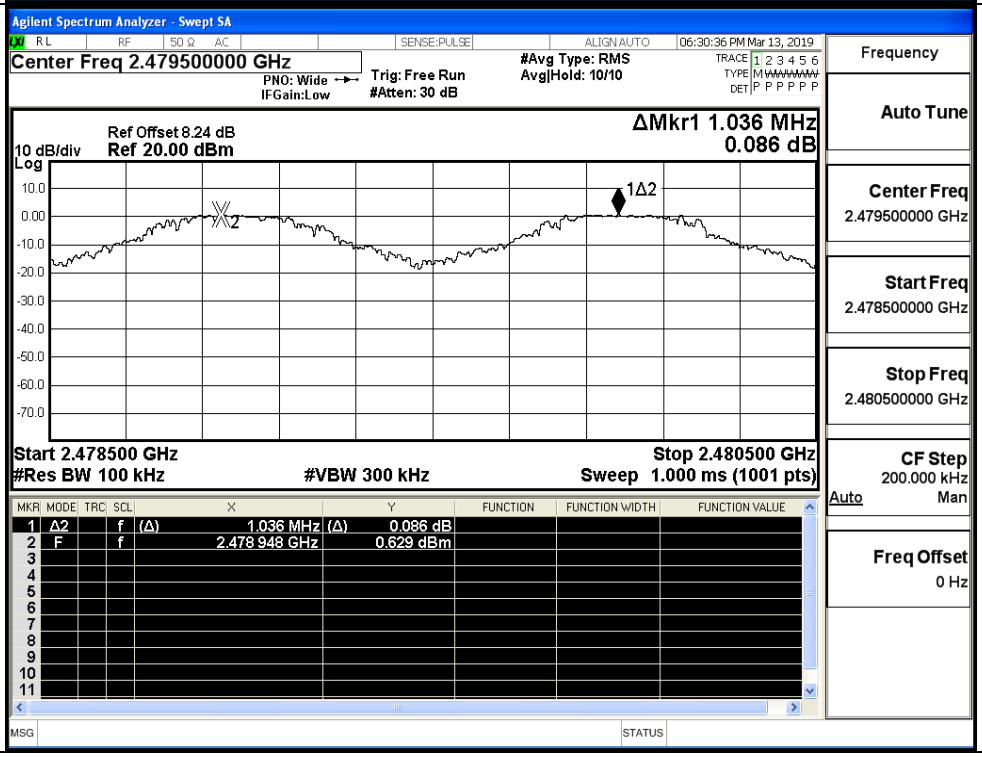
GFSK/LCH

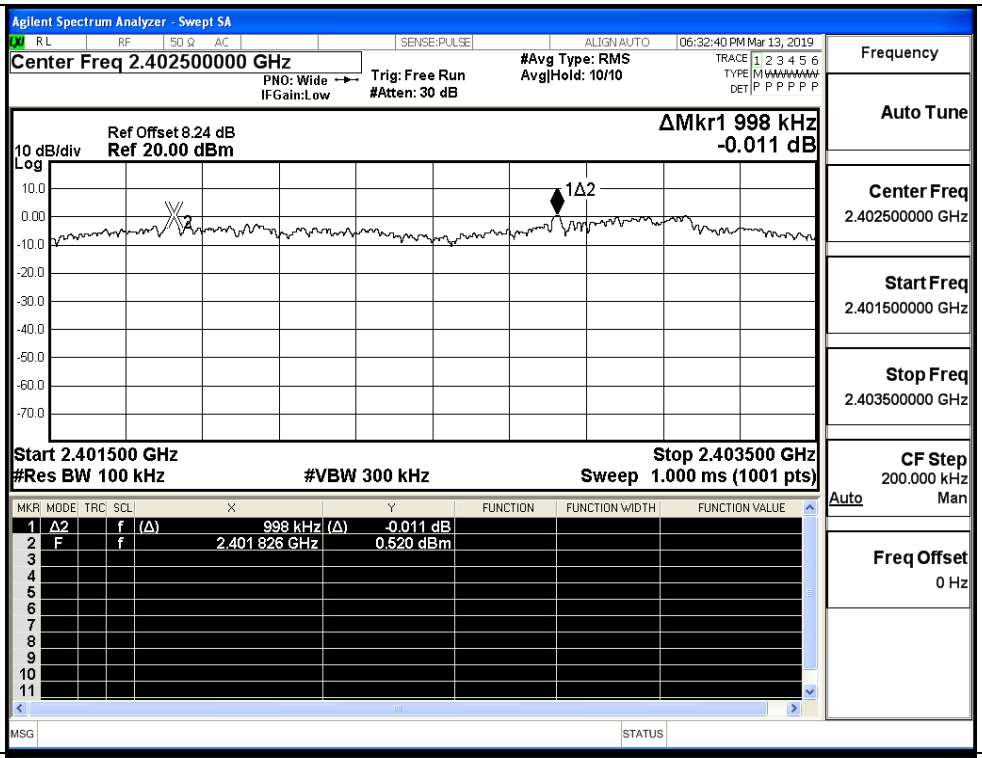
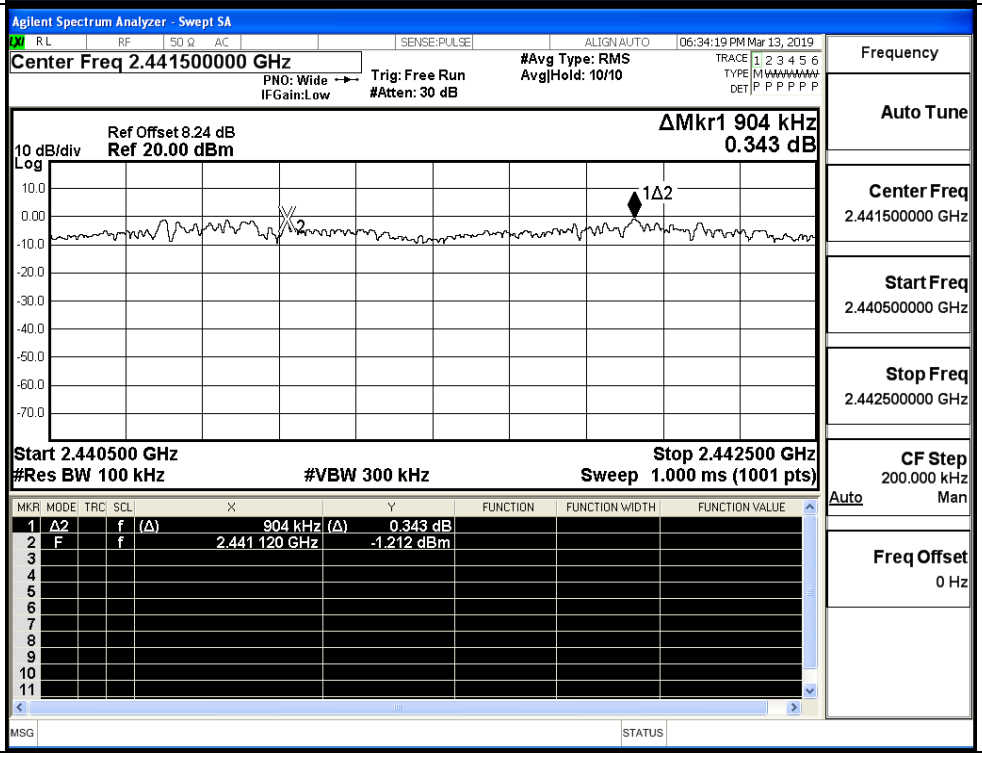


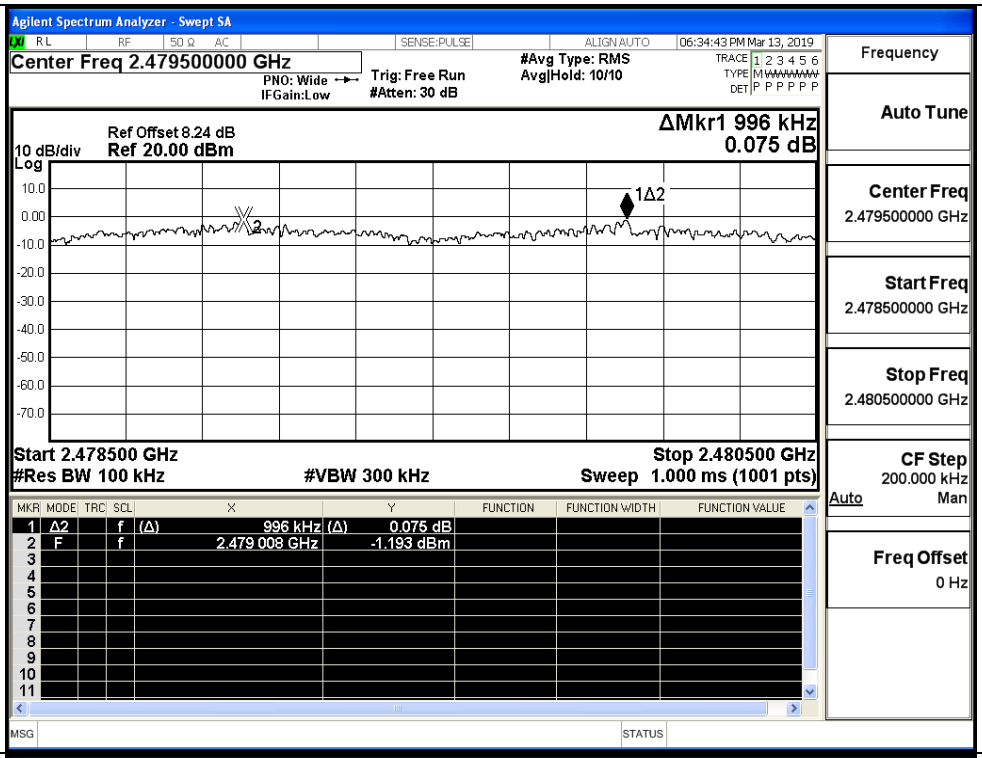
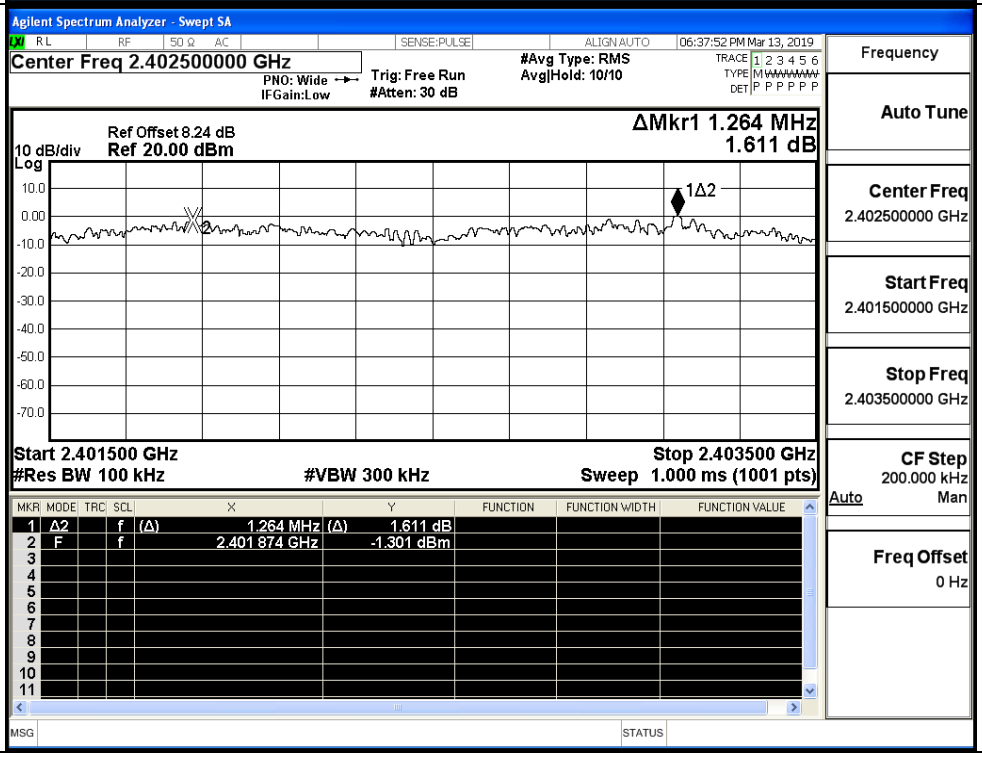
GFSK/MCH



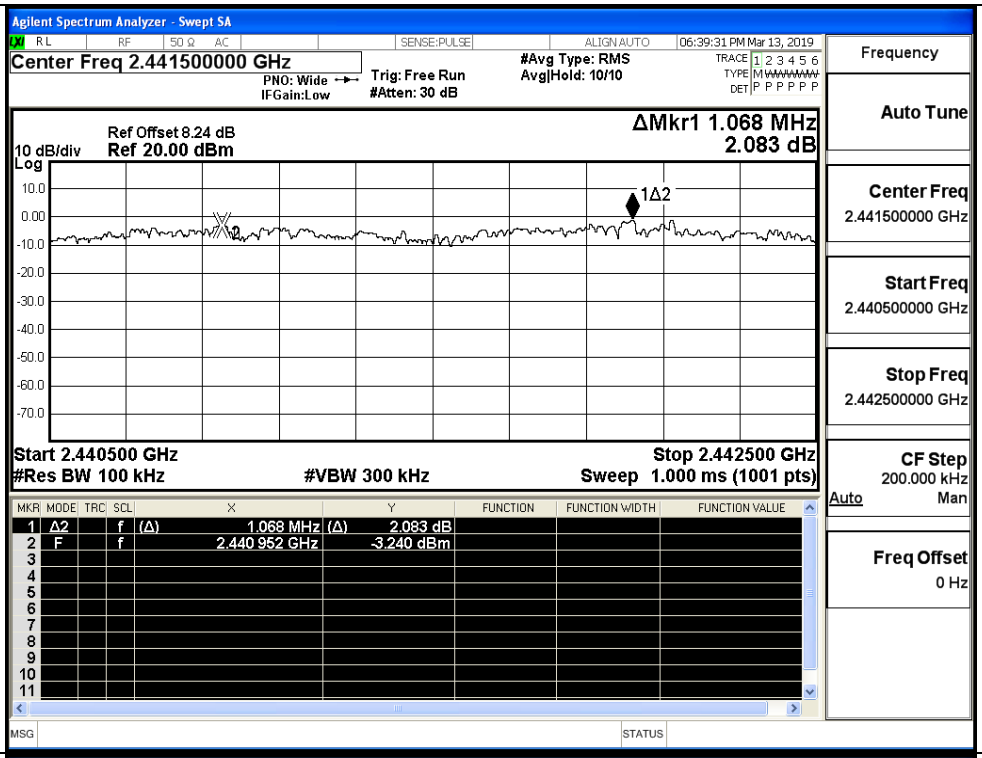
GFSK/HCH



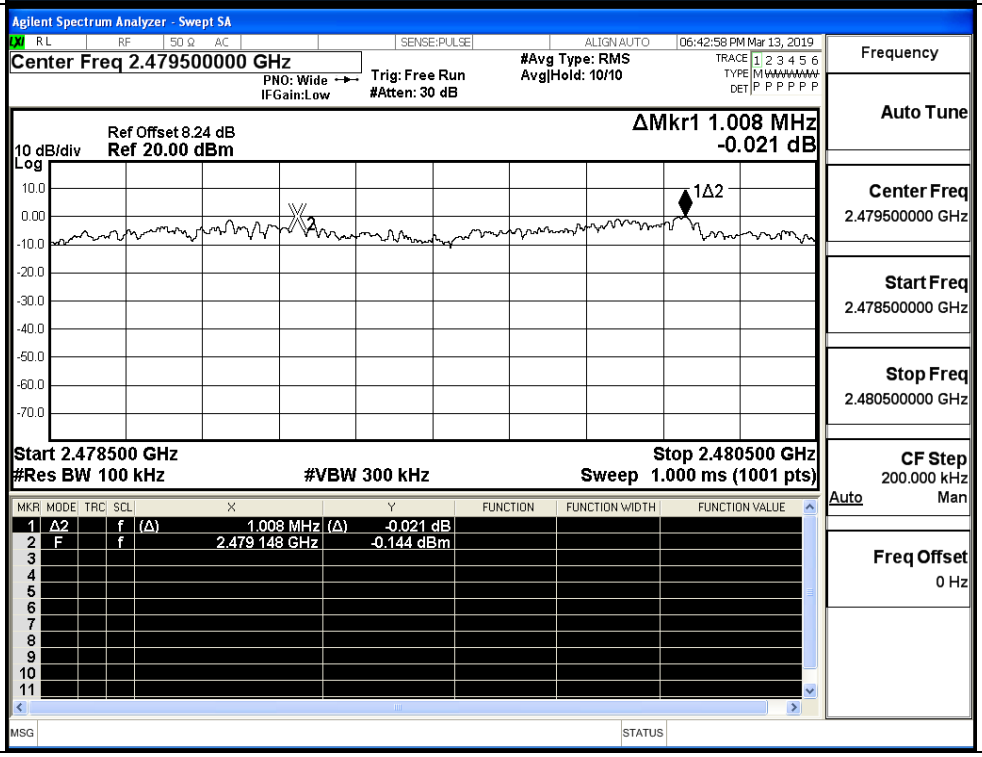
π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	

8DPSK/MCH

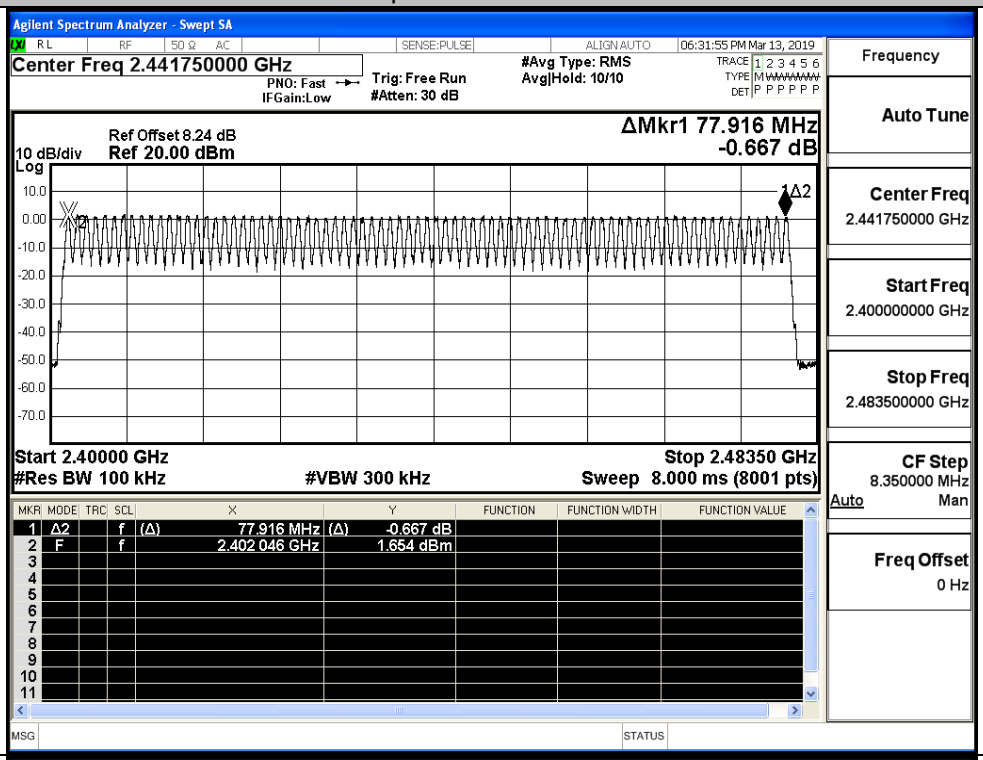
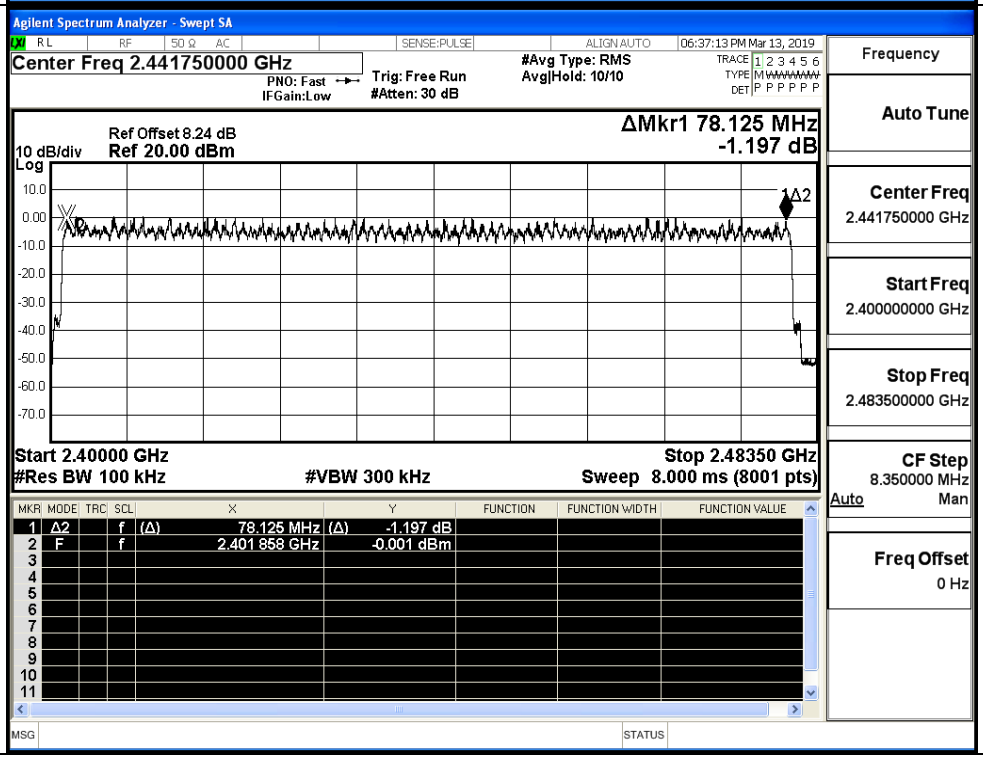


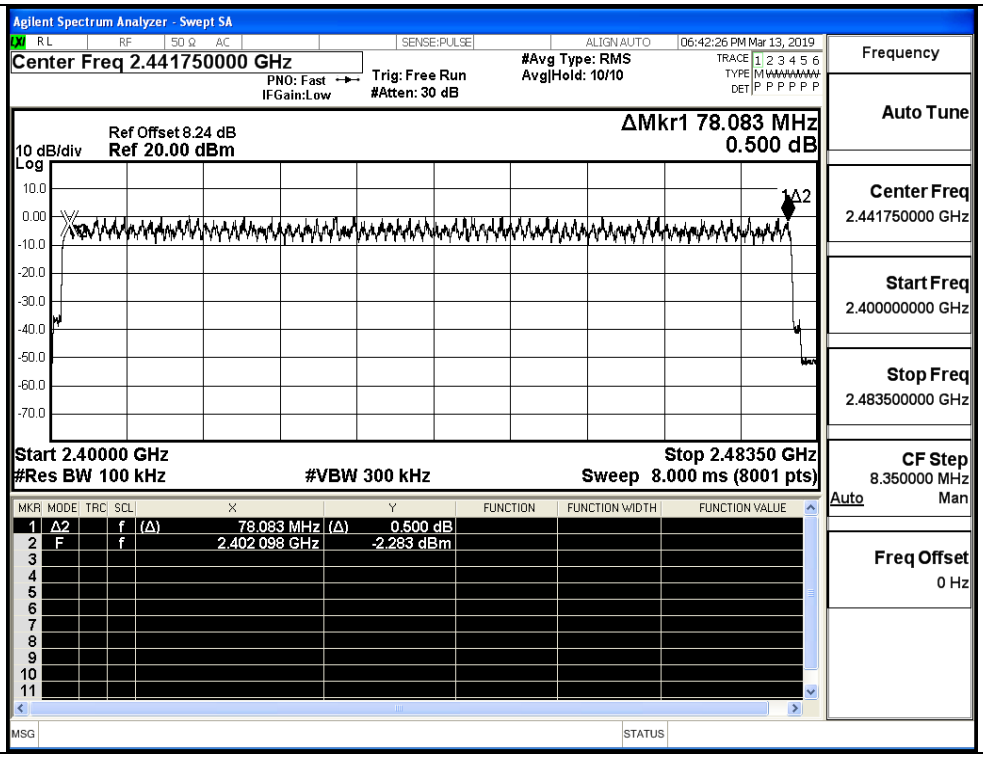
8DPSK/HCH



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	

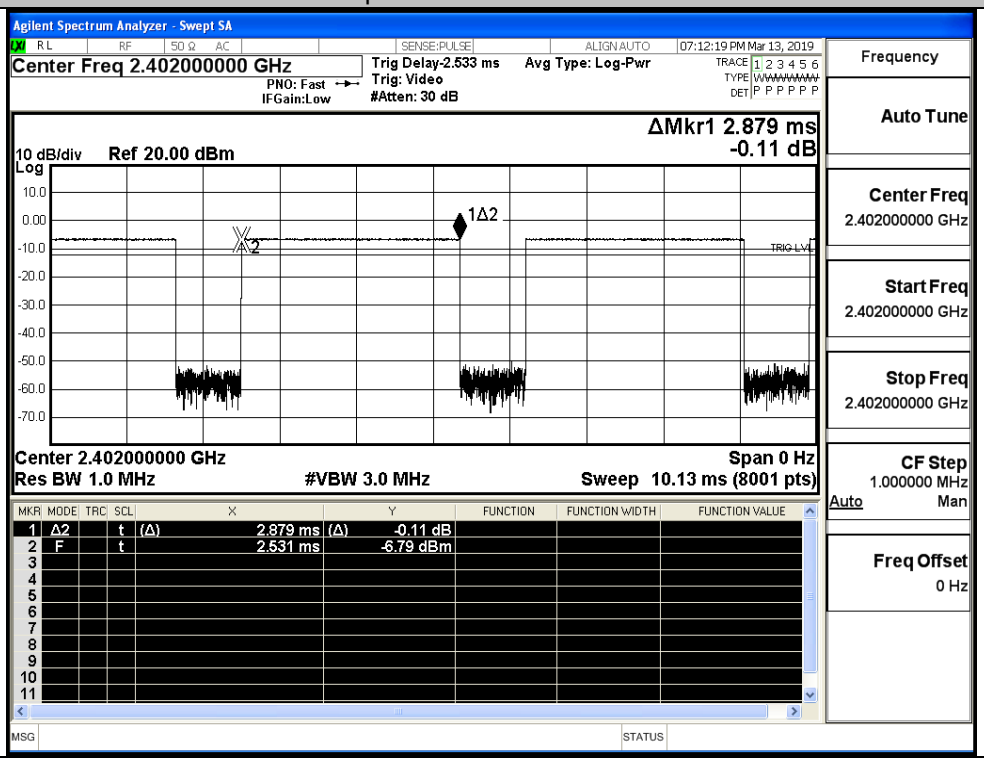
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
06:42:26 PM Mar 13, 2019
Ref Offset 8.24 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 78.083 MHz
0.500 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 78.083 MHz (Δ) 0.500 dB
2 F f 2.402 098 GHz -2.283 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

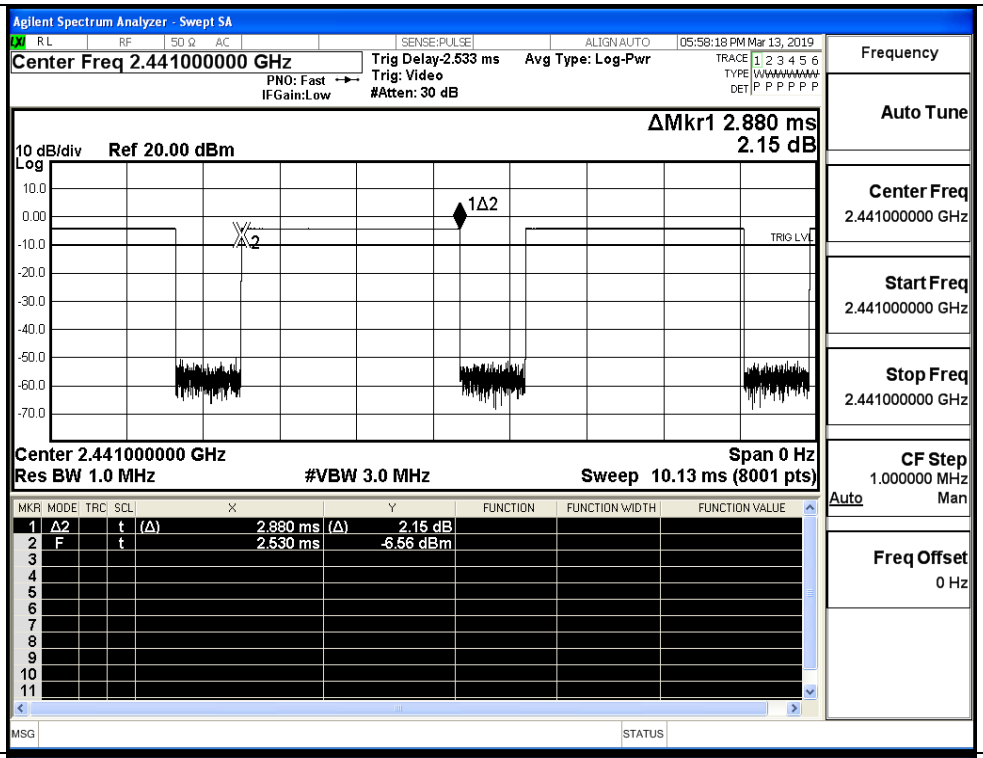
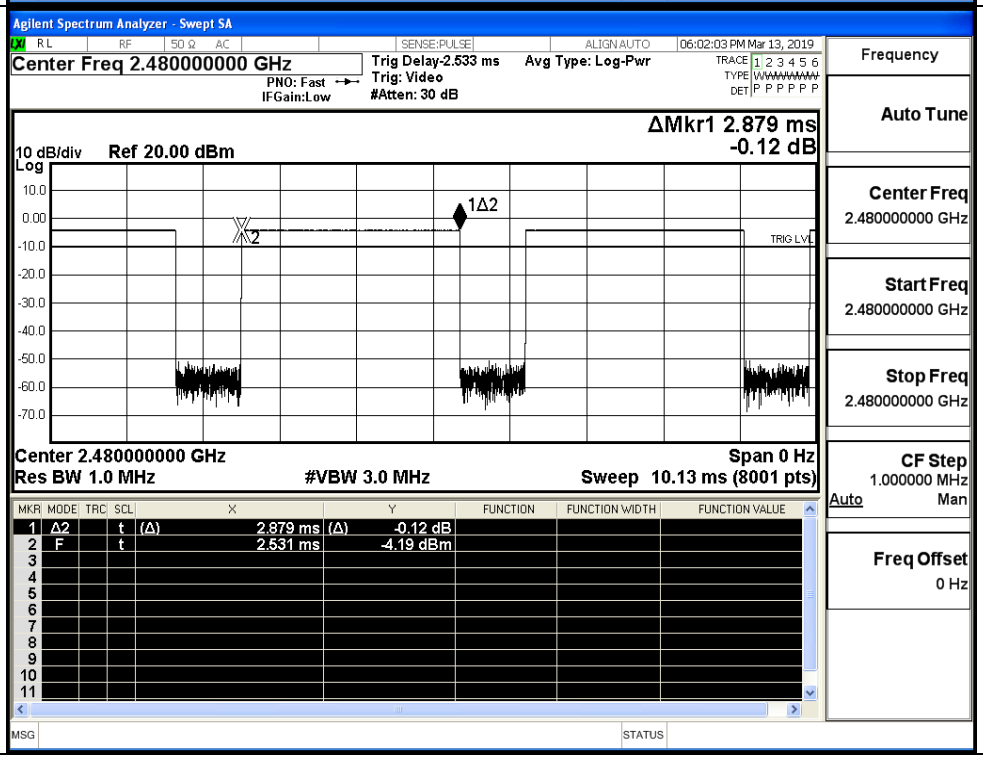
A.5 Dwell Time

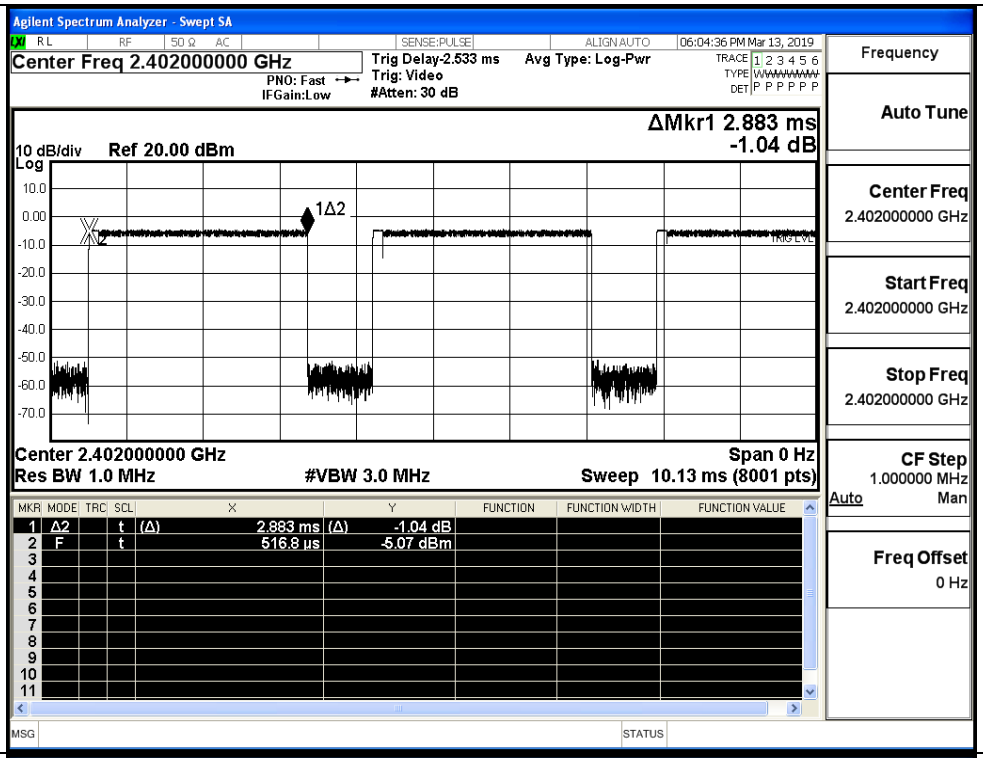
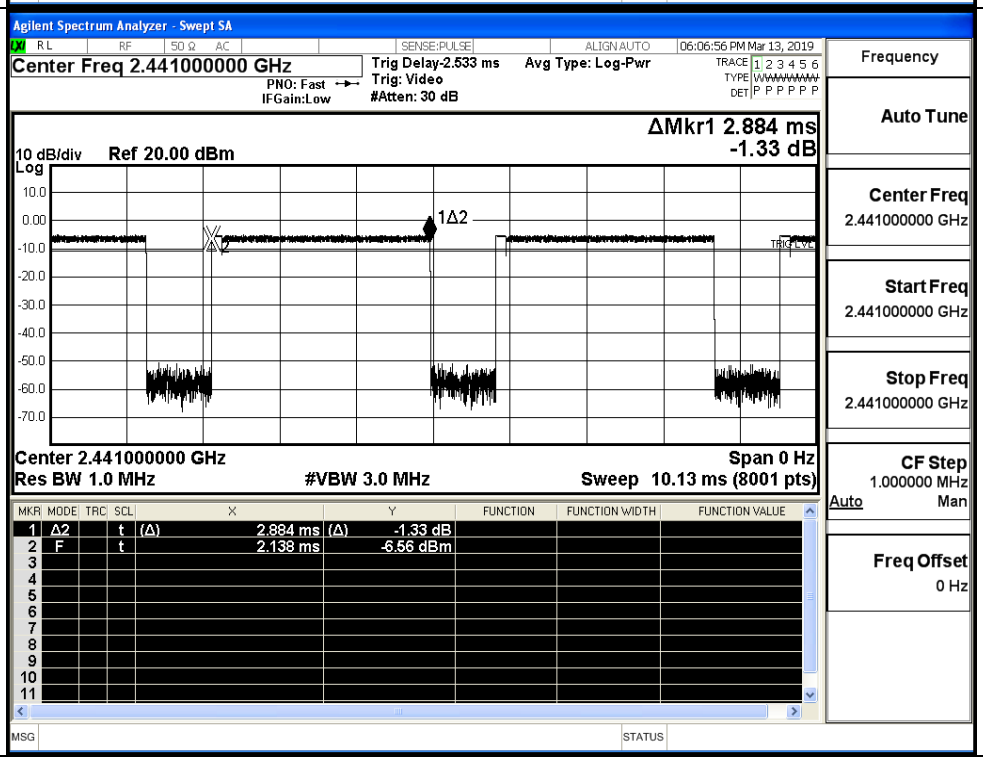
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7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

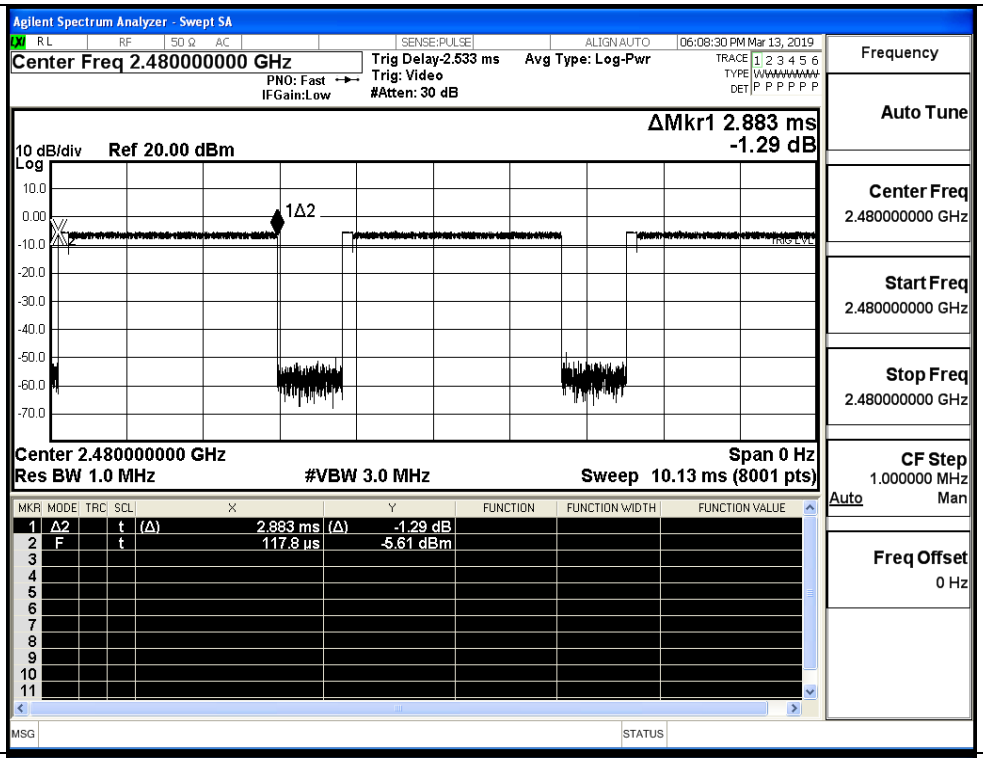
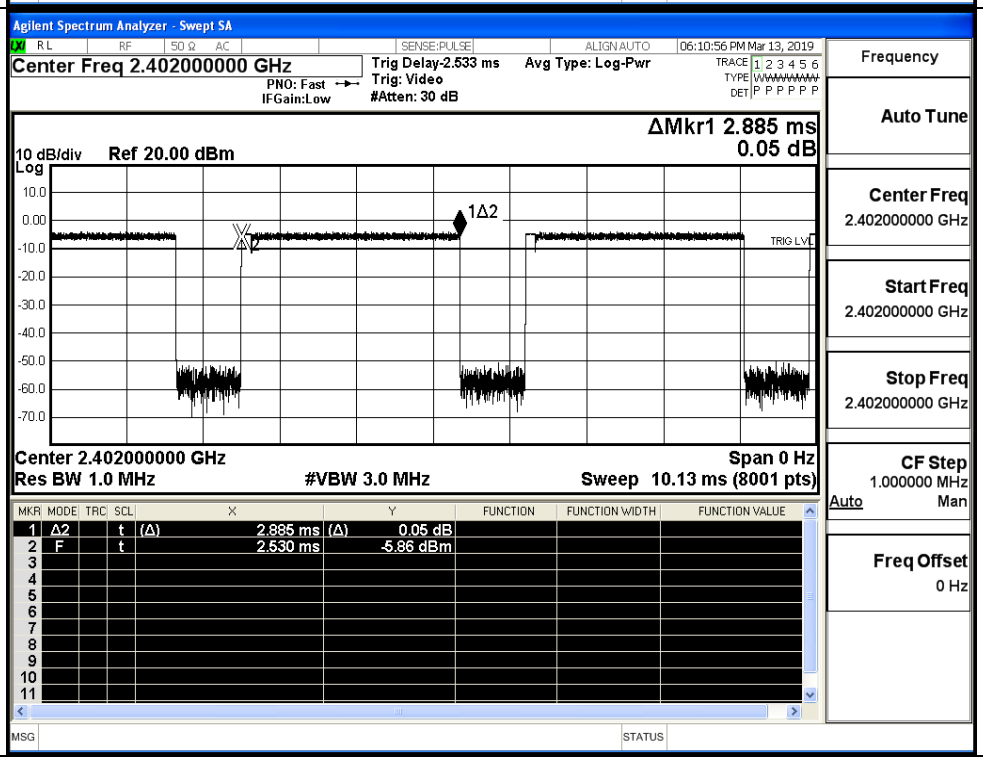
Test Graphs

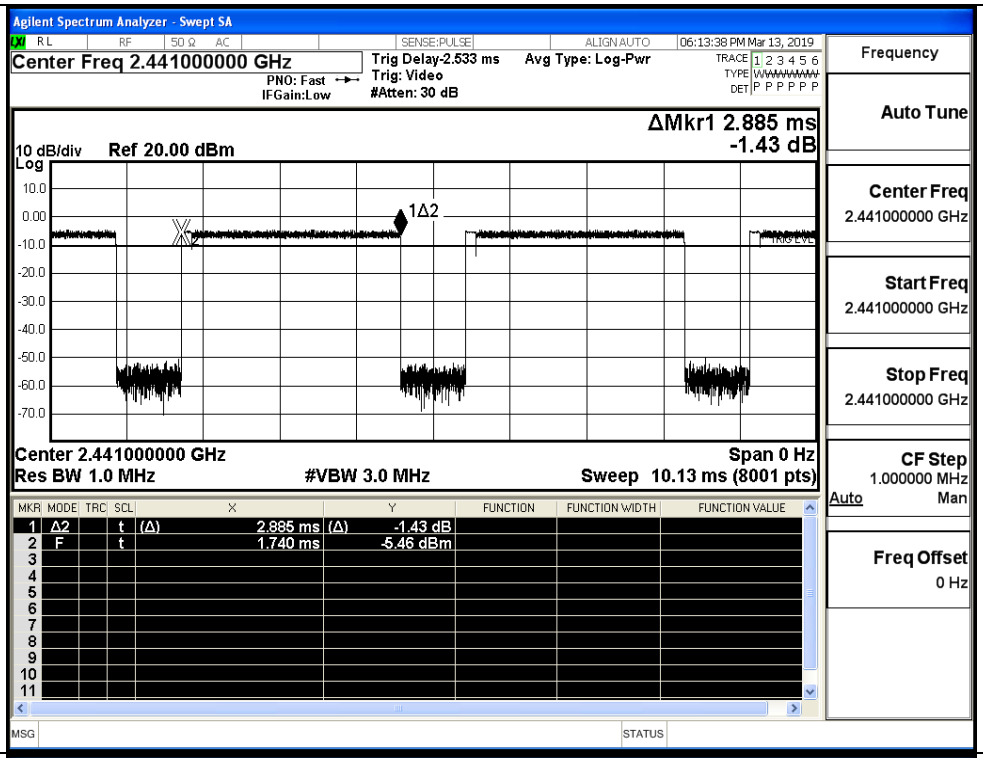
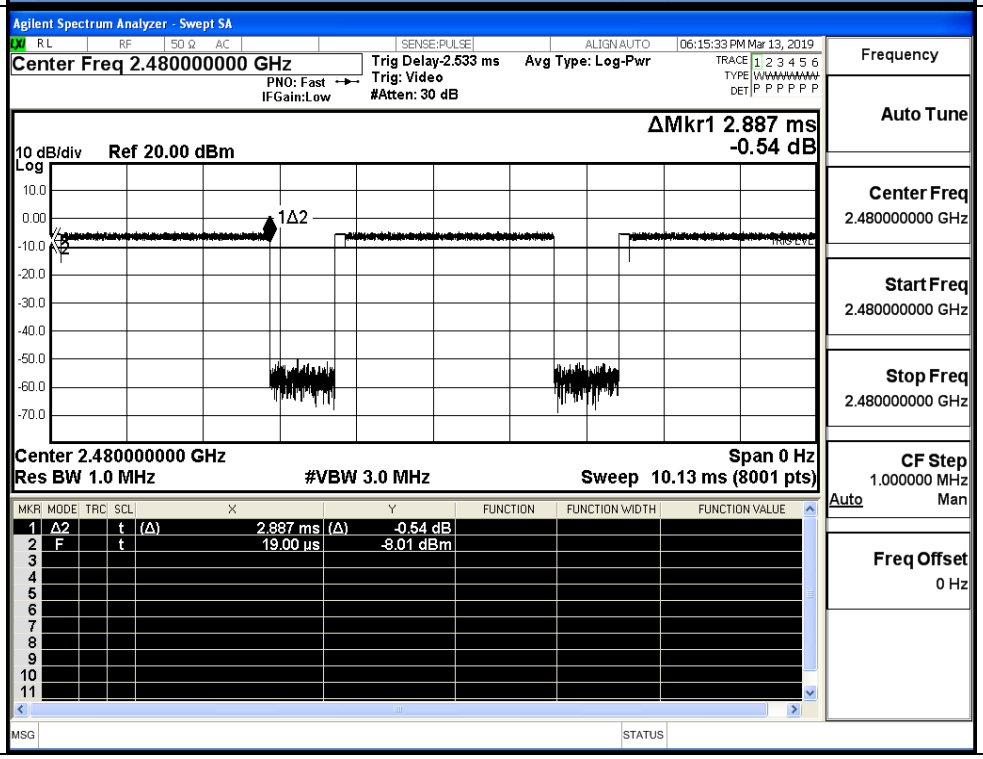
GFSK_DH5/LCH



GFSK_DH5/MCH	
GFSK_DH5/HCH	

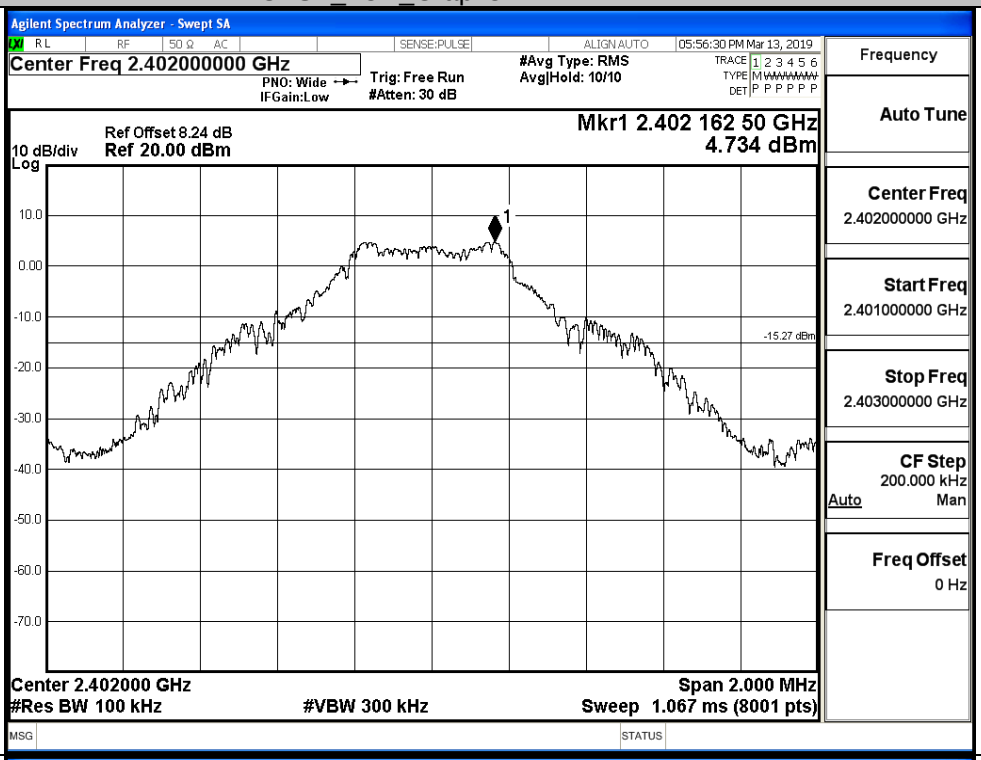
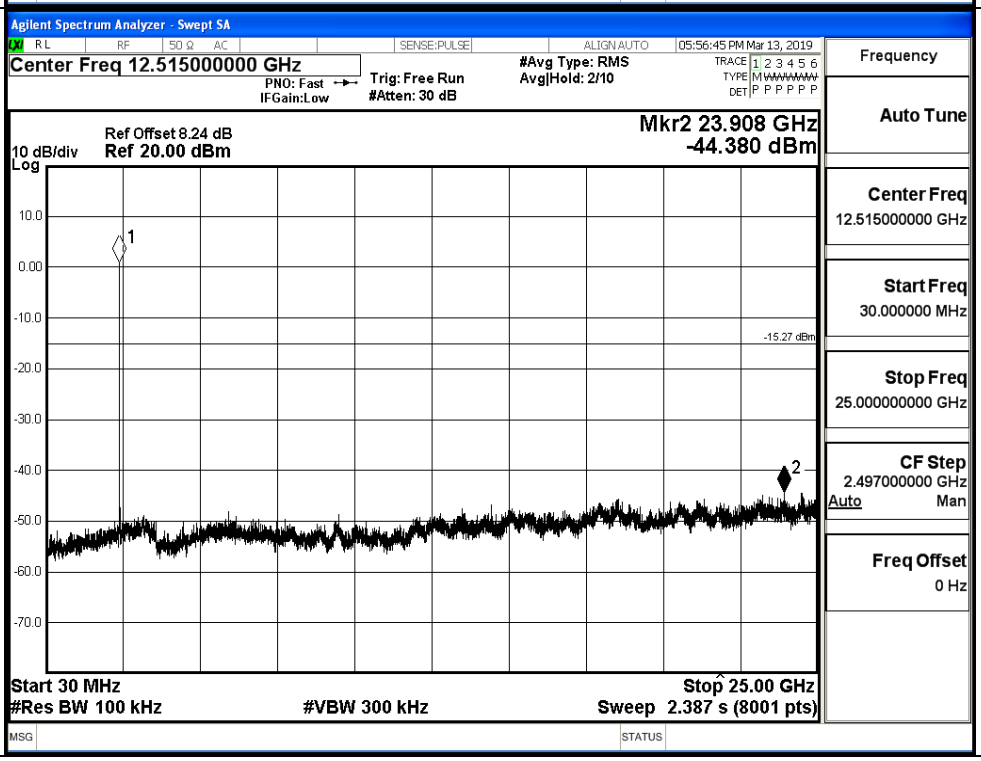
π/4DQPSK _2DH5/LCH	
π/4DQPSK _2DH5/MCH	

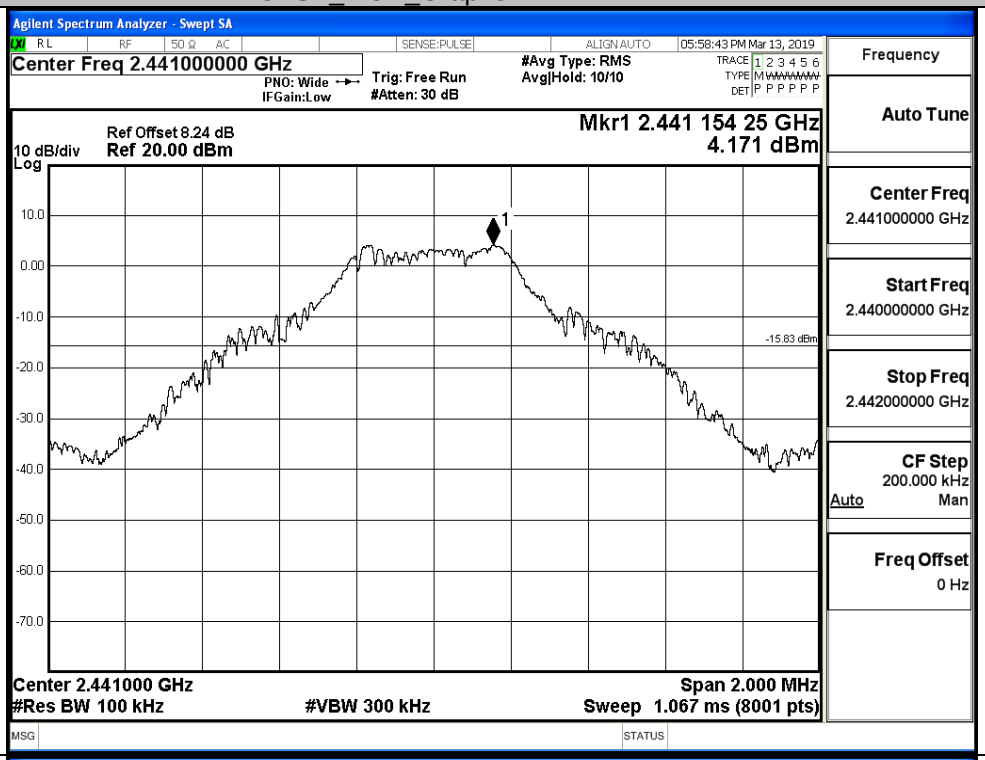
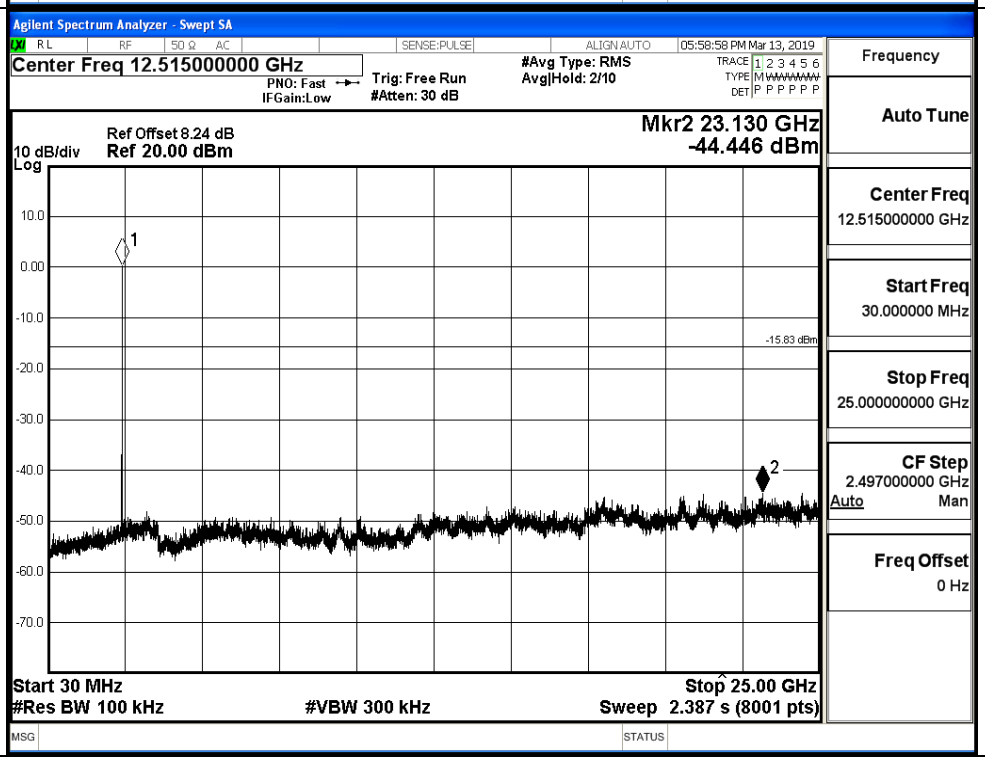
π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

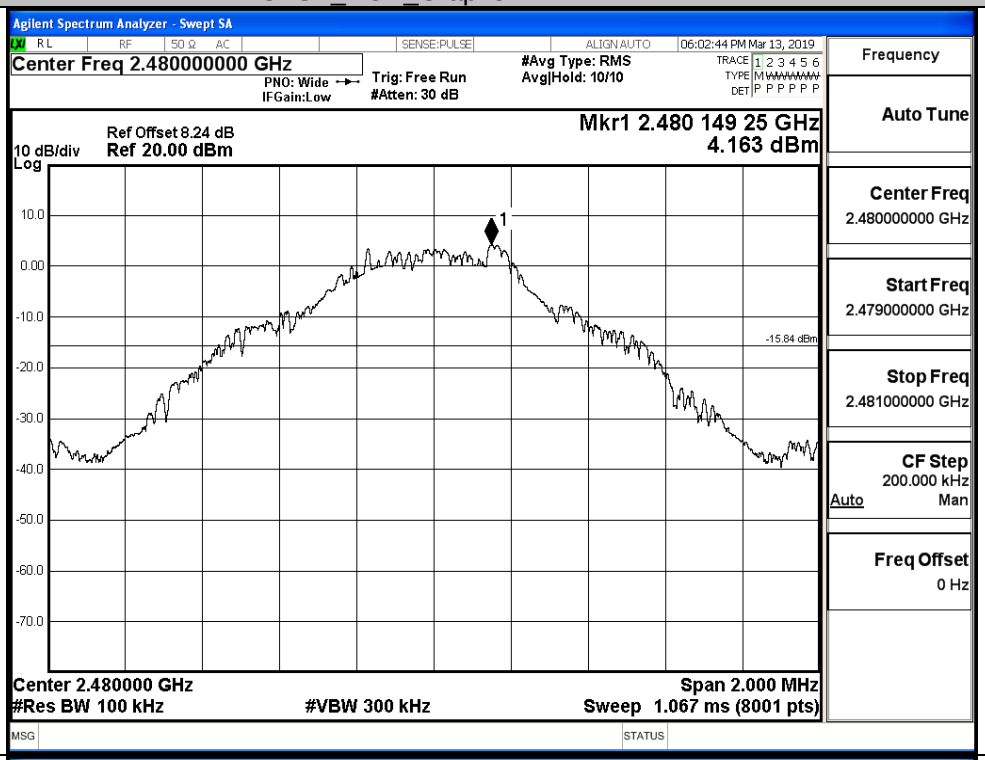
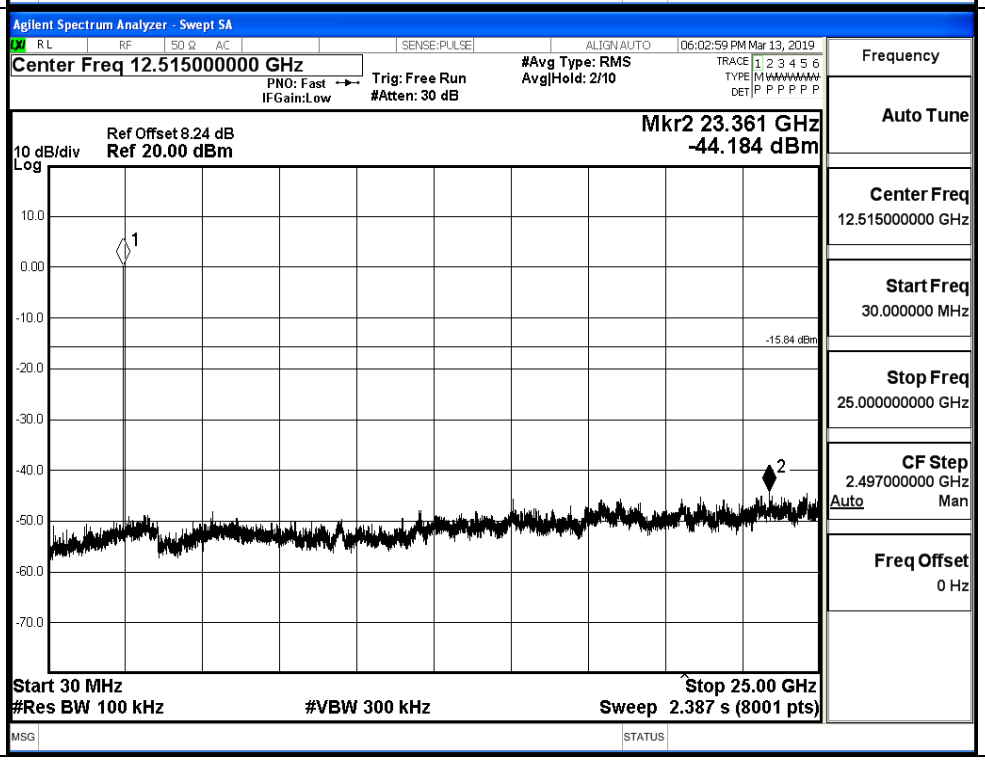
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

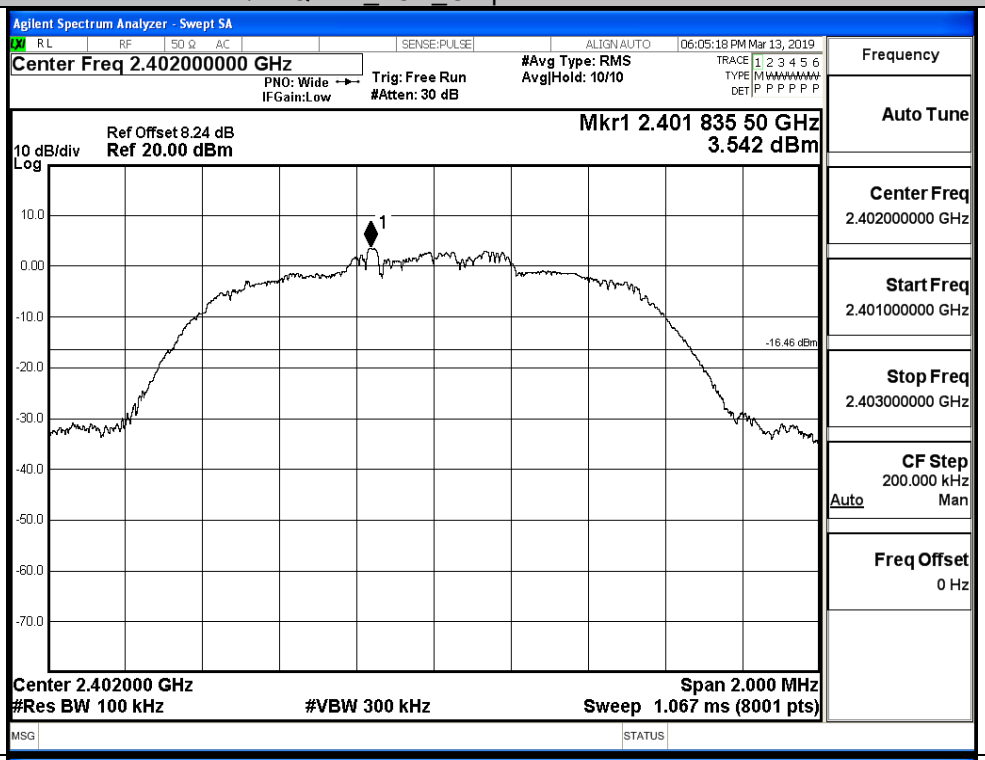
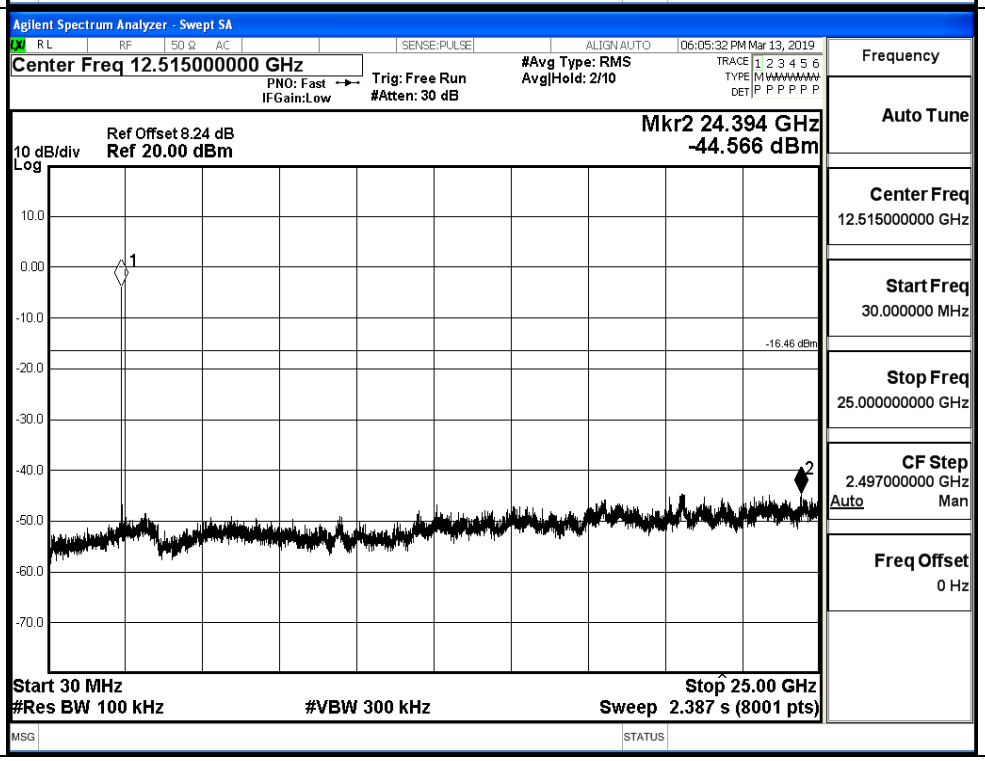
A.6 RF Conducted Spurious Emissions

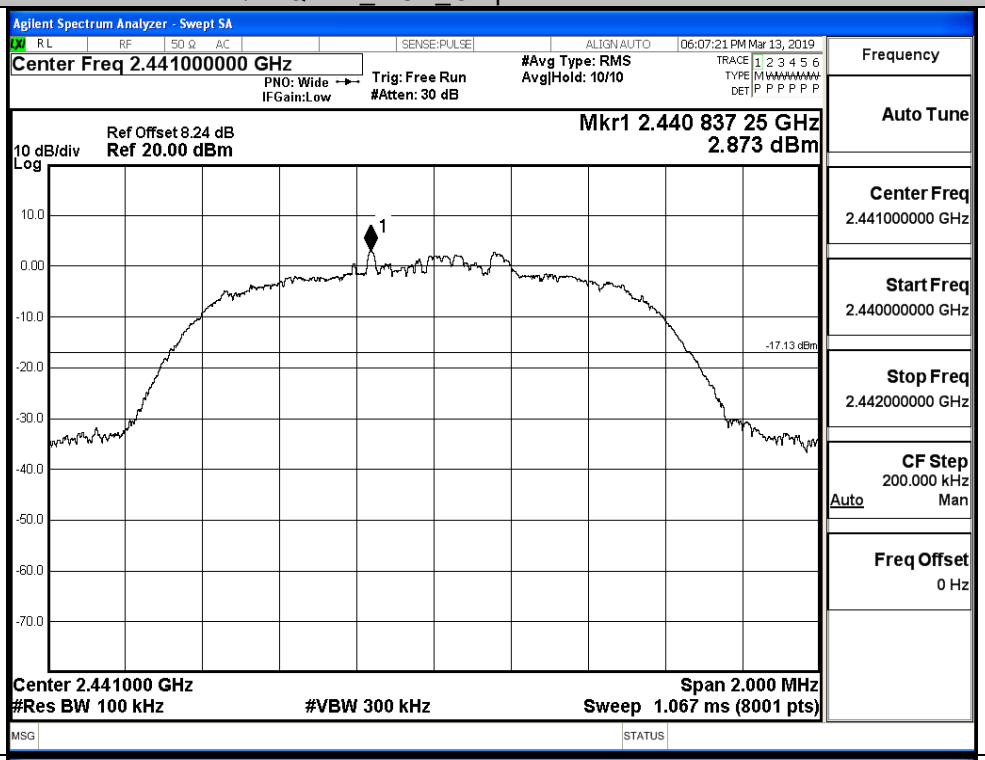
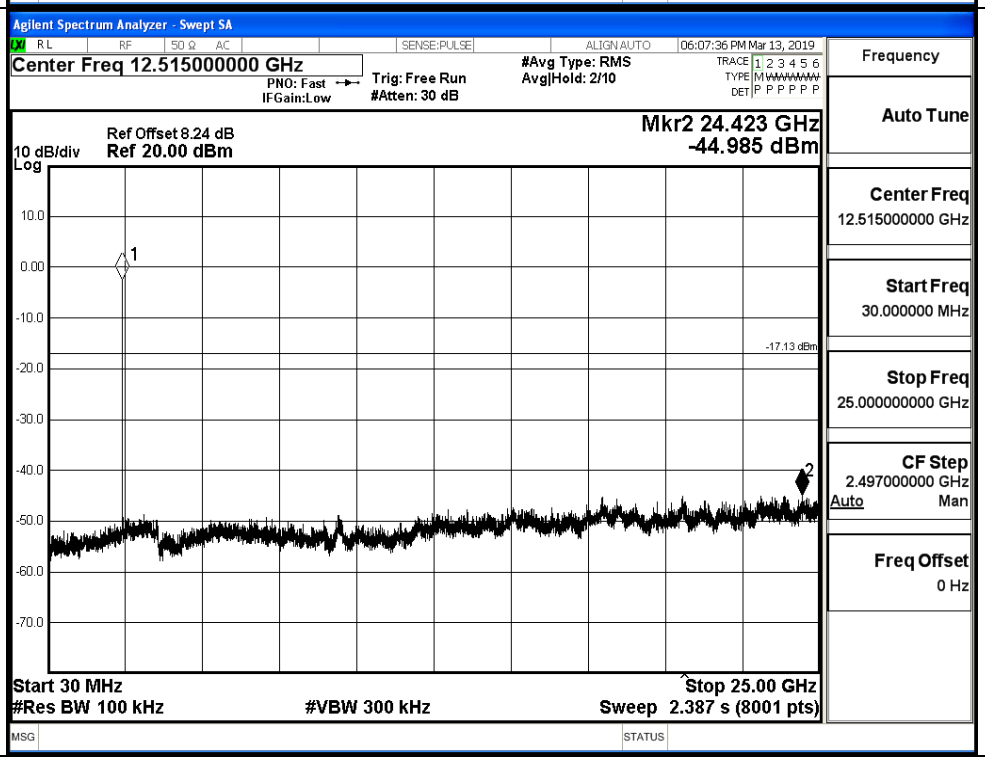
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.734	-44.380	-15.266	PASS
	MCH	4.171	-44.446	-15.829	PASS
	HCH	4.163	-44.184	-15.837	PASS
π/4DQPSK	LCH	3.542	-44.566	-16.458	PASS
	MCH	2.873	-44.985	-17.127	PASS
	HCH	2.627	-44.461	-17.373	PASS
8DPSK	LCH	3.587	-44.907	-16.413	PASS
	MCH	2.875	-44.836	-17.125	PASS
	HCH	2.593	-41.177	-17.407	PASS

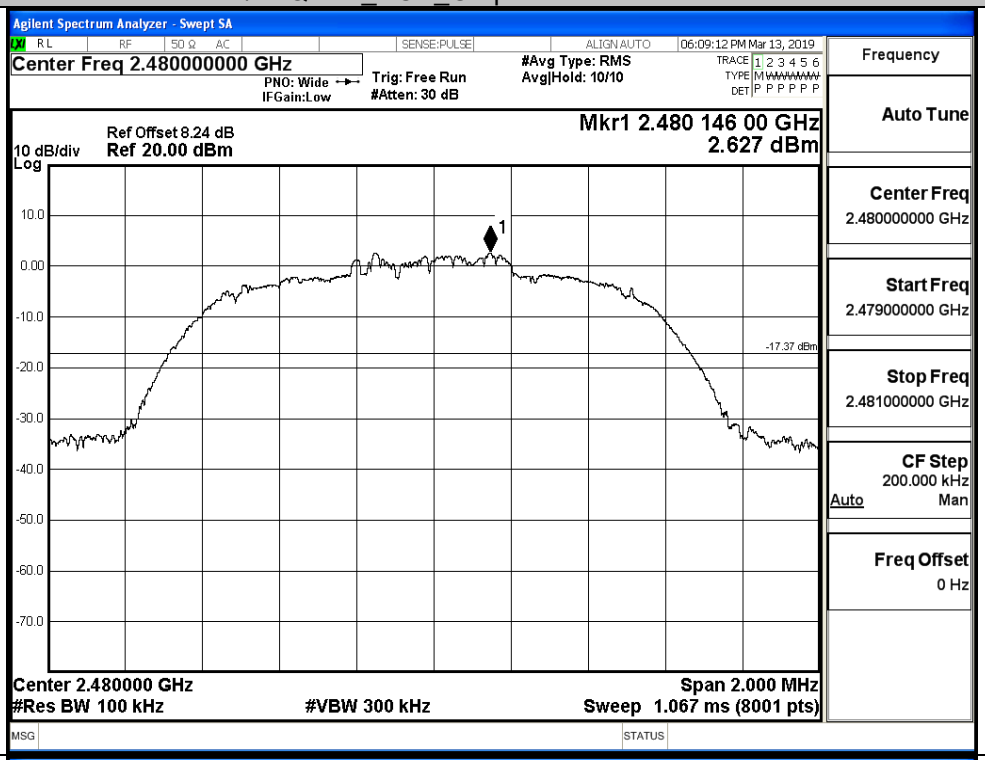
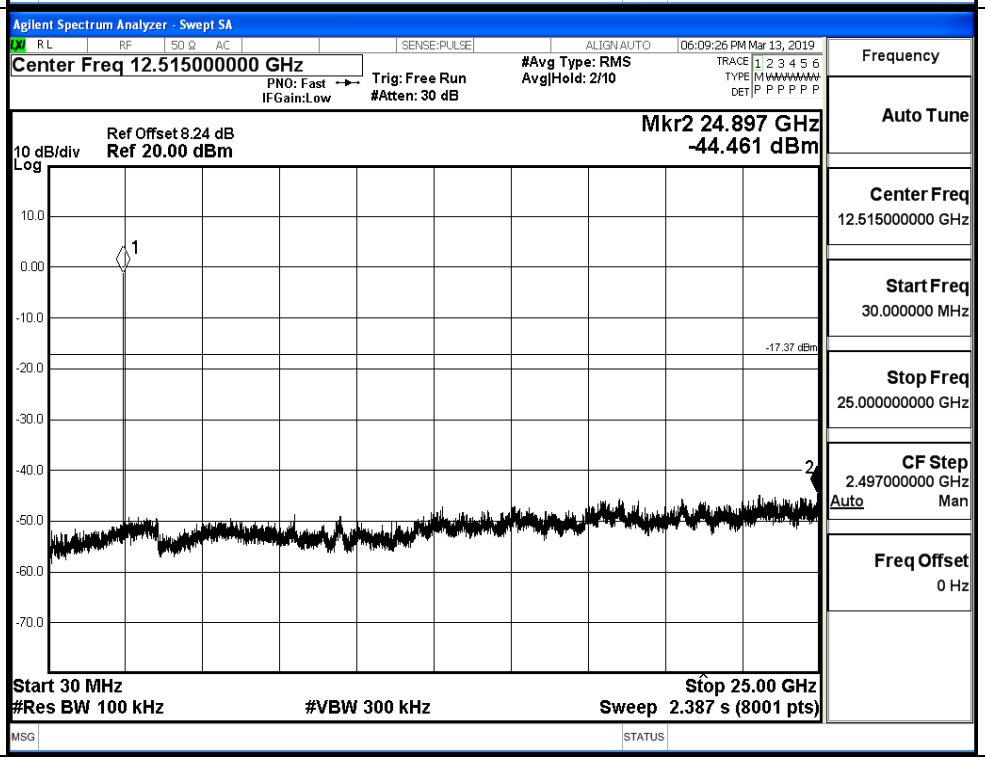
GFSK_LCH_Graphs		
Pref		
Puw		

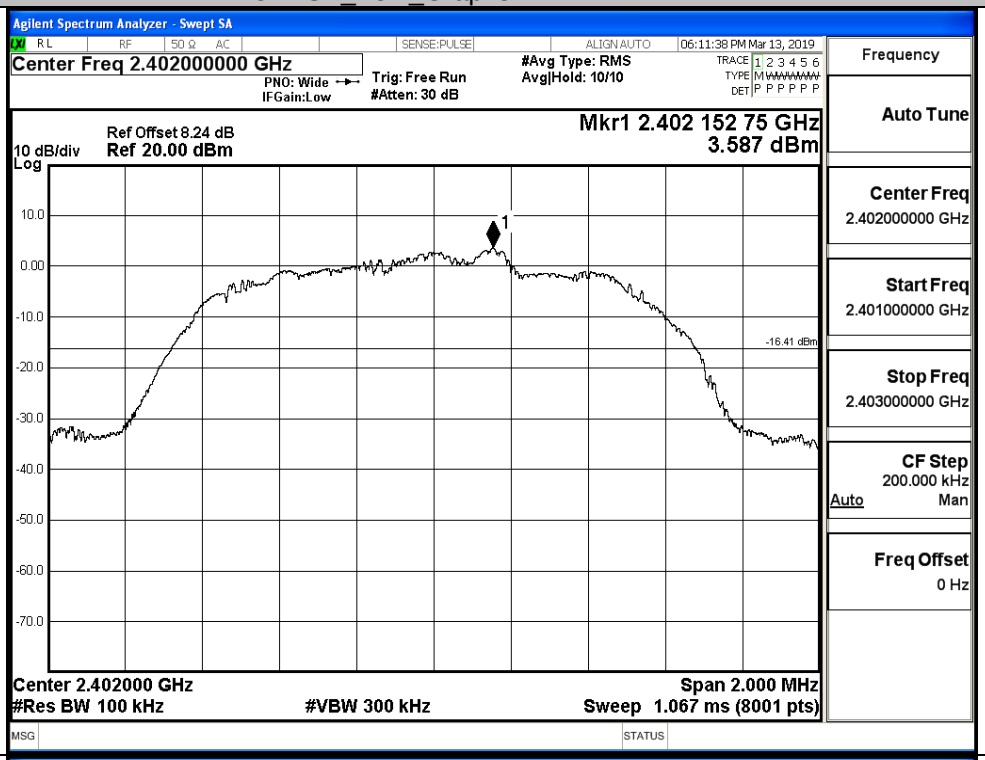
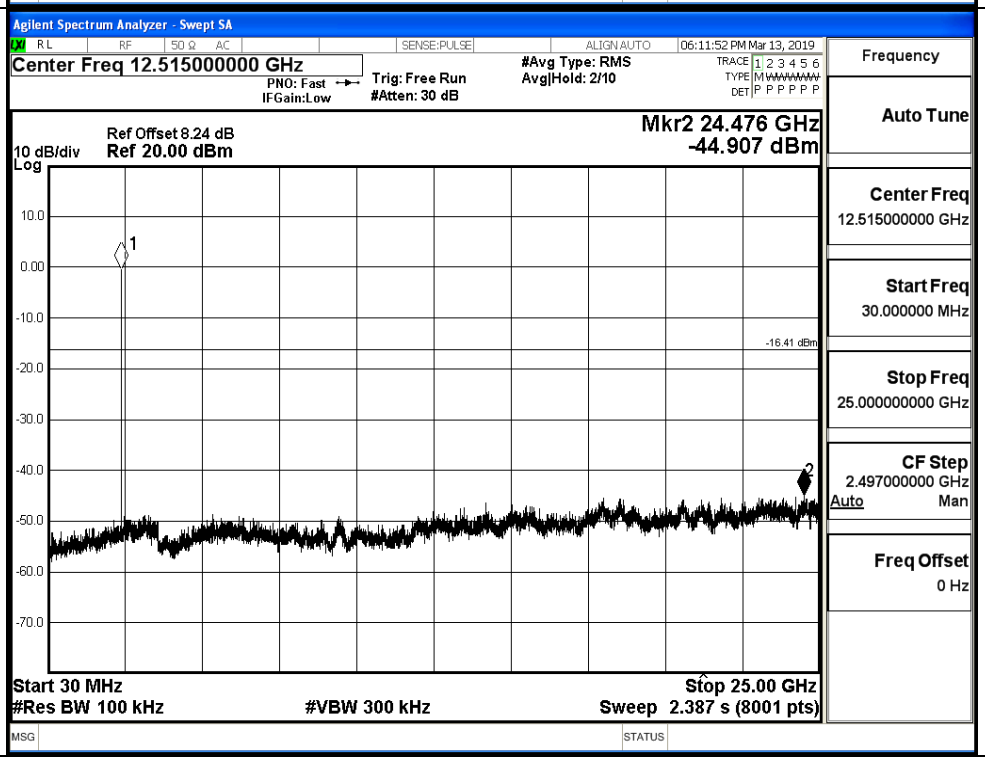
GFSK_MCH_Graphs			
Pref			
Puw			

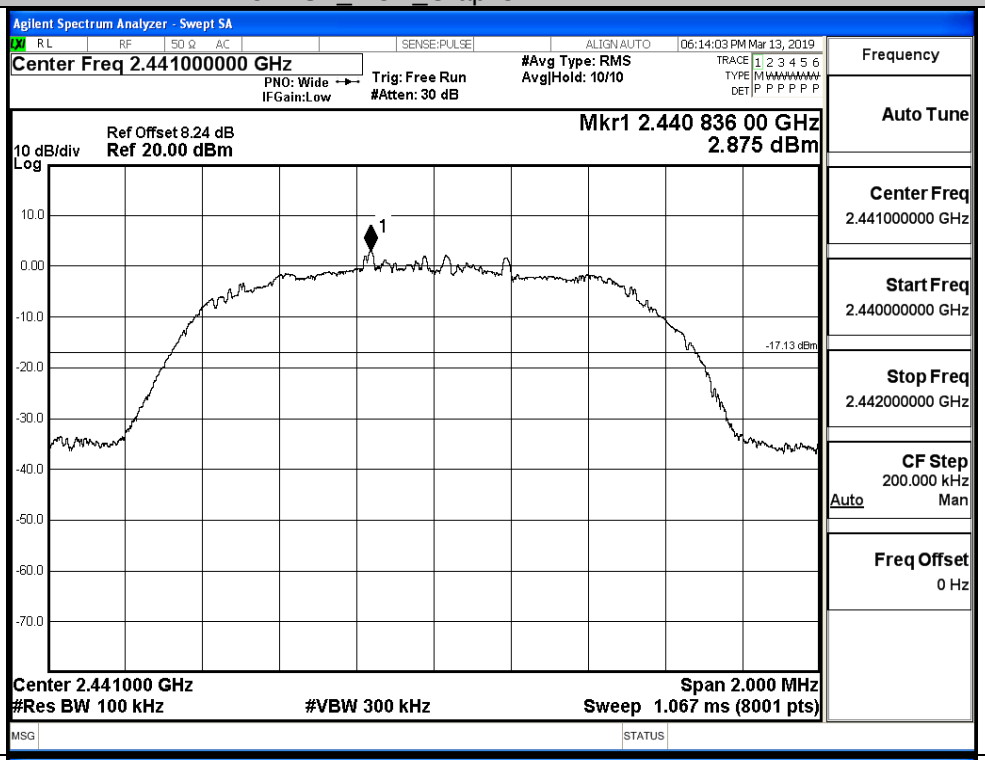
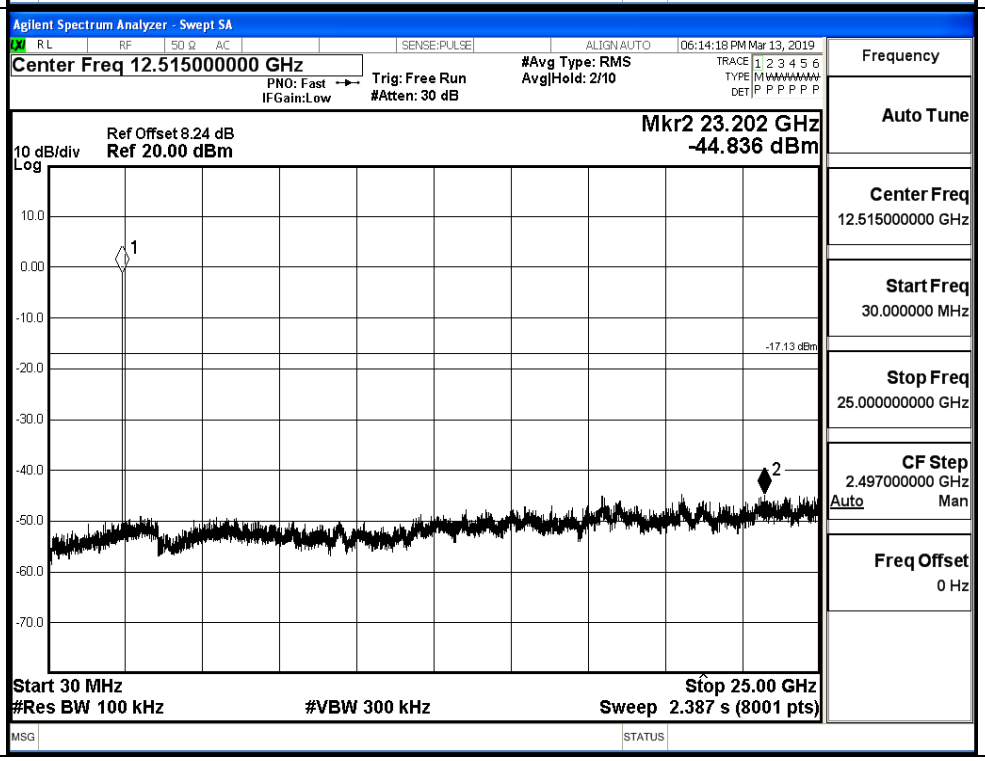
GFSK_HCH_Graphs			
Pref			
Puw			

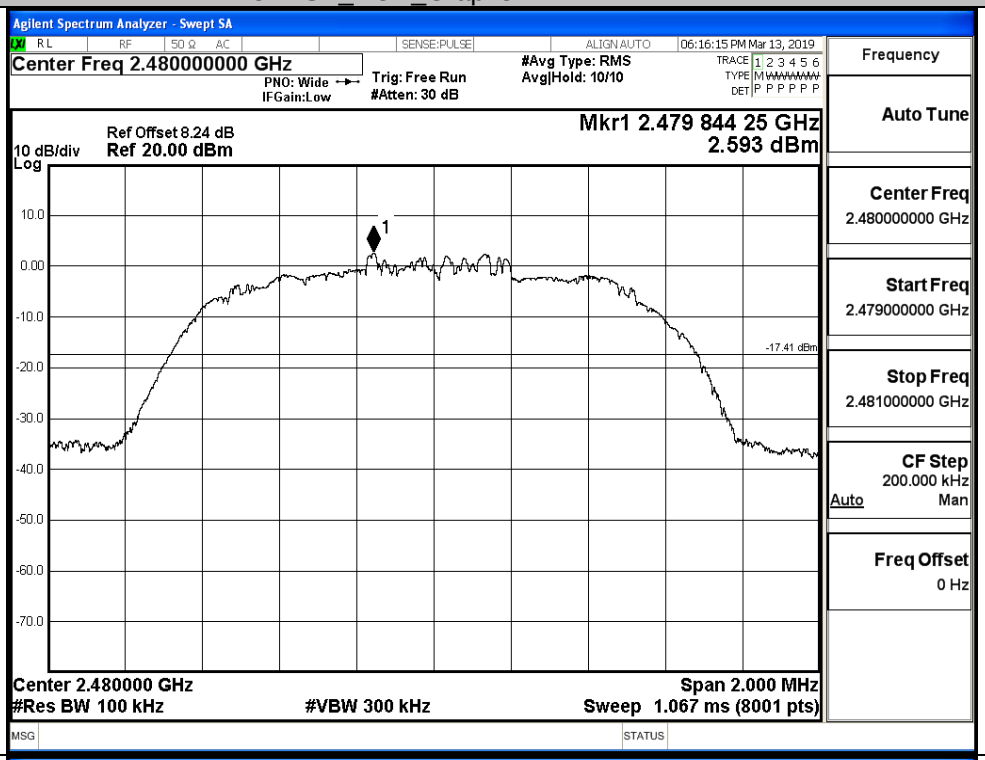
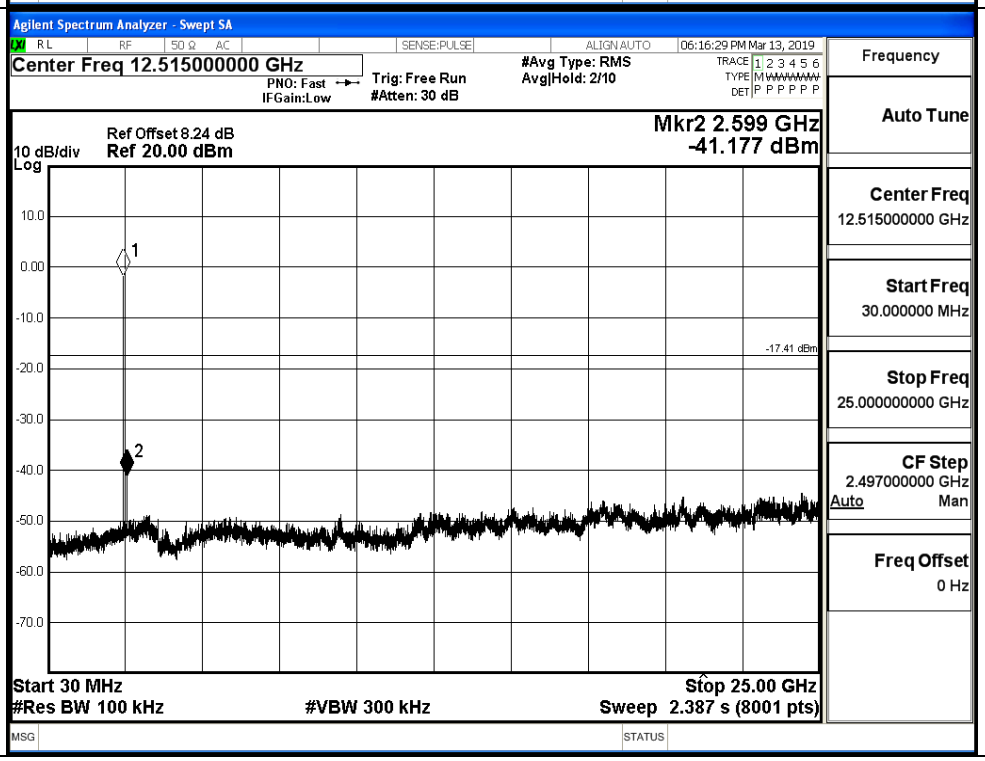
π/4DQPSK_LCH_Graphs		
Pref		
Puw		

π/4DQPSK_MCH_Graphs		
Pref		
Puw		

π/4DQPSK_HCH_Graphs			
Pref			
Puw			

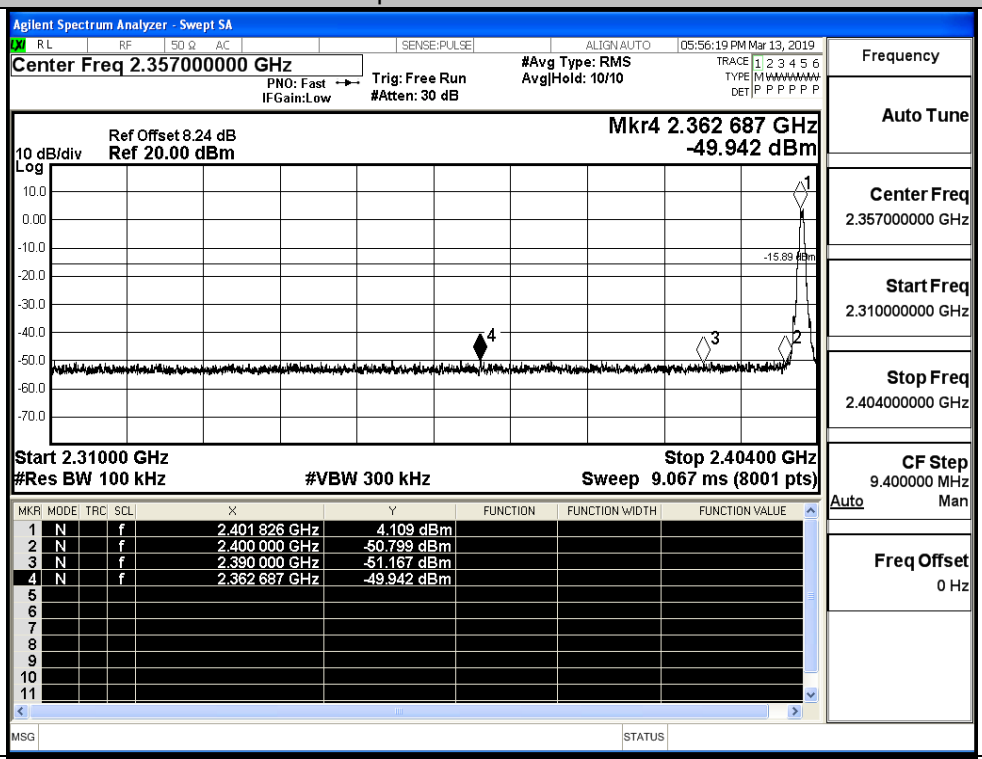
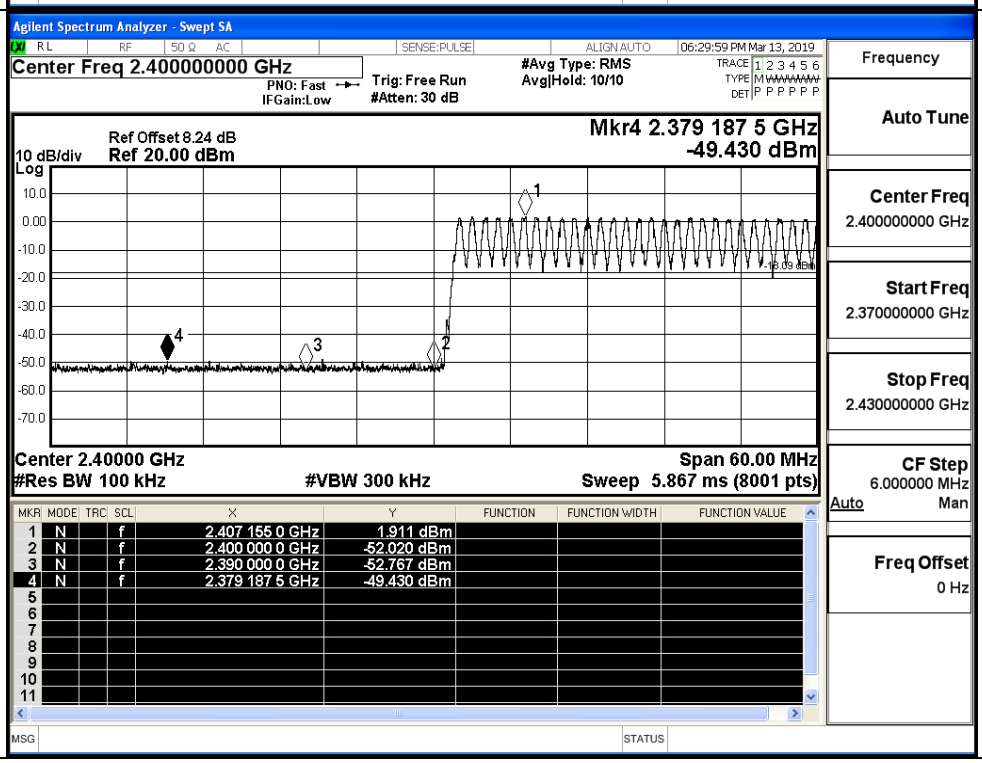
8DPSK_LCH_Graphs			
Pref			
Puw			

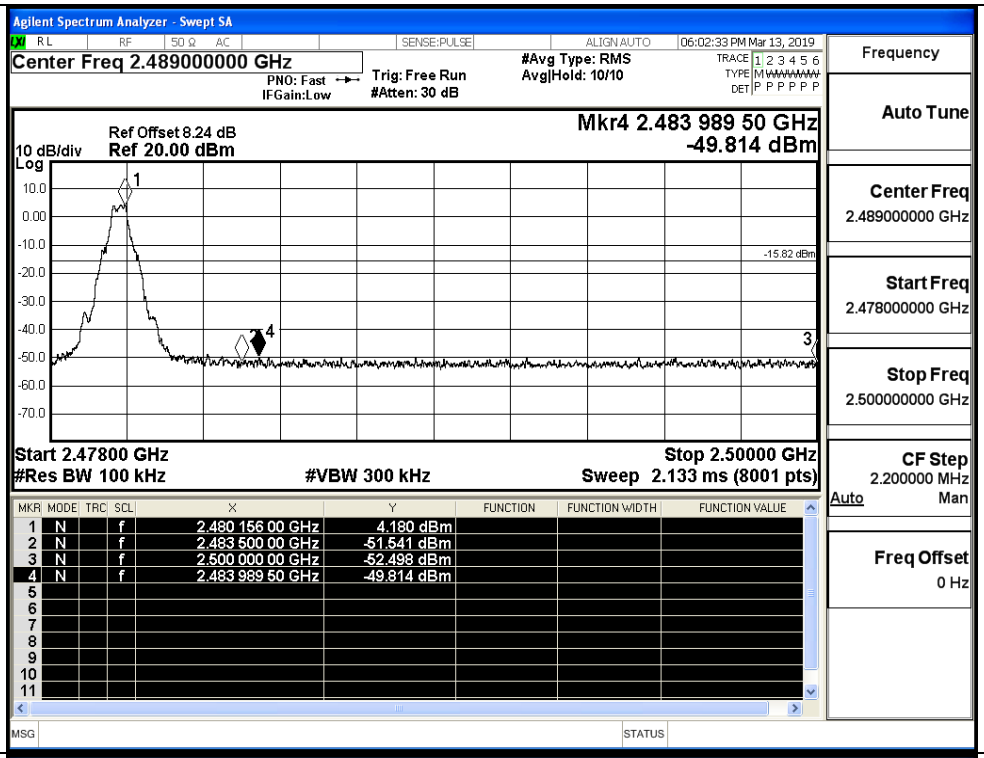
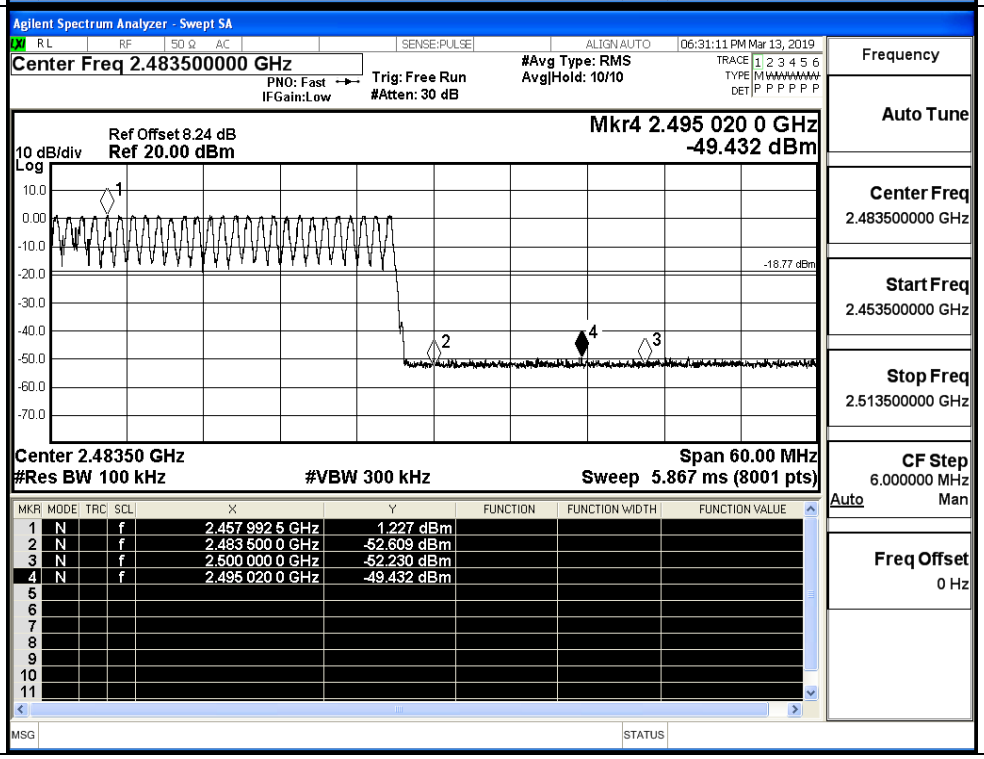
8DPSK_MCH_Graphs			
Pref			
Puw			

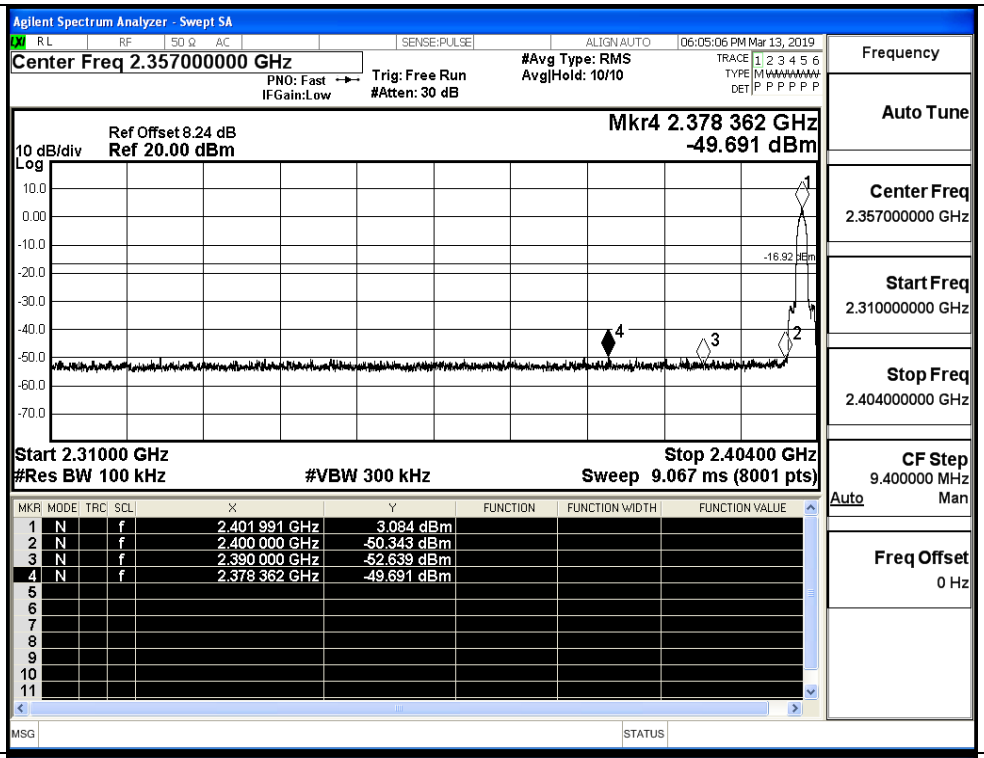
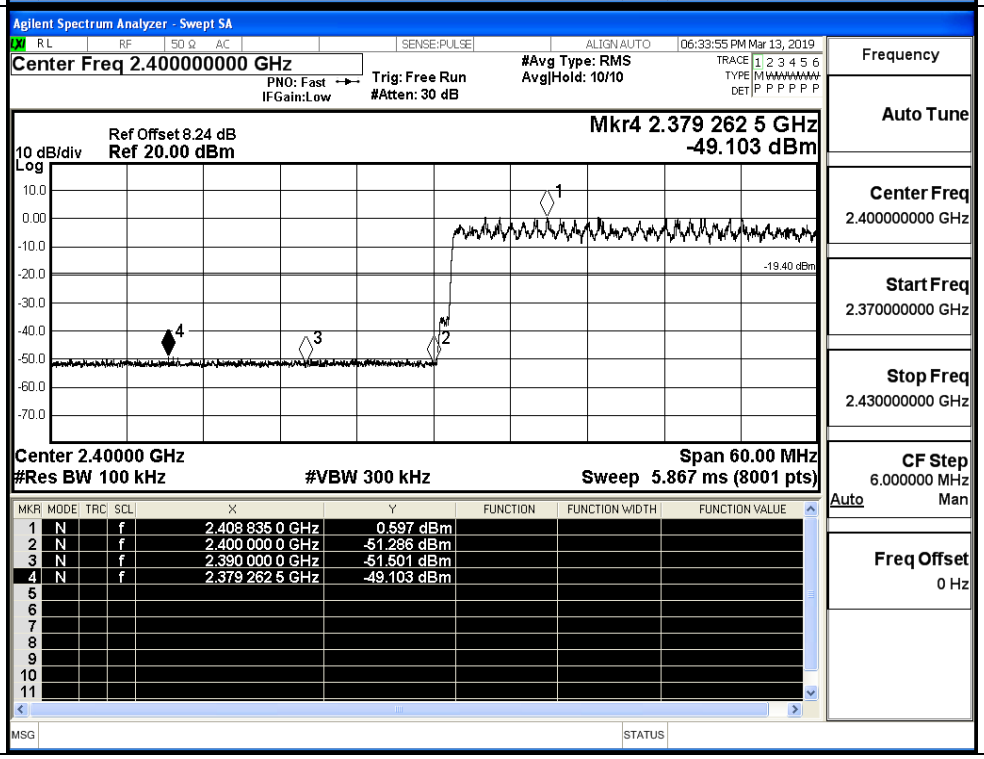
8DPSK_HCH_Graphs		
Pref		
Puw		

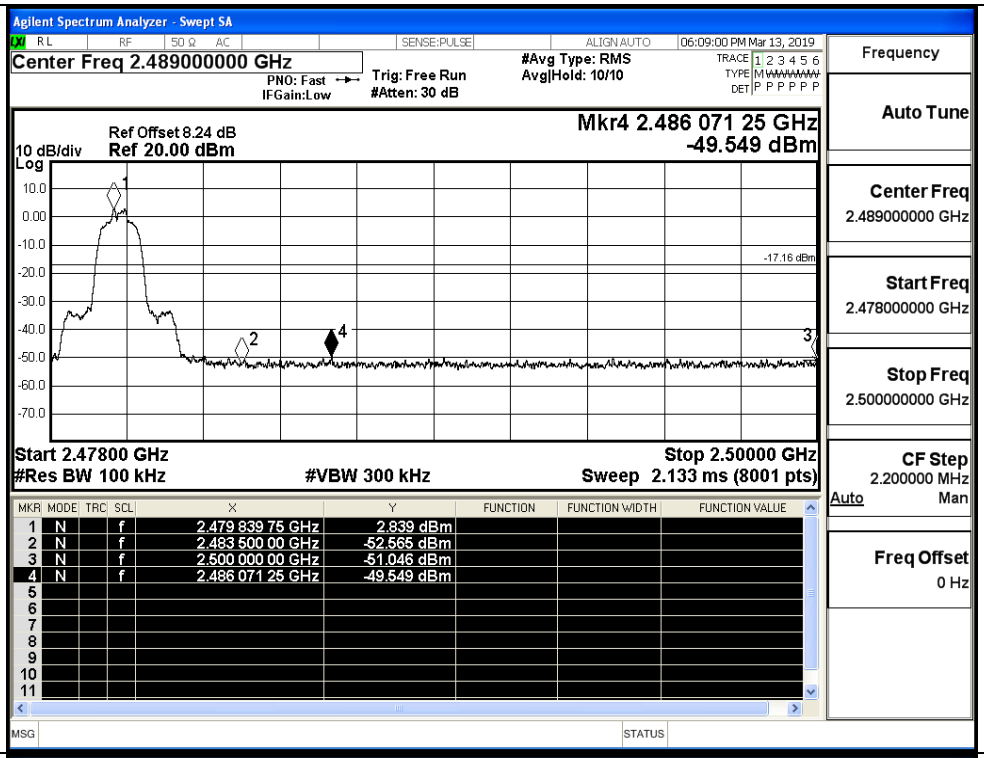
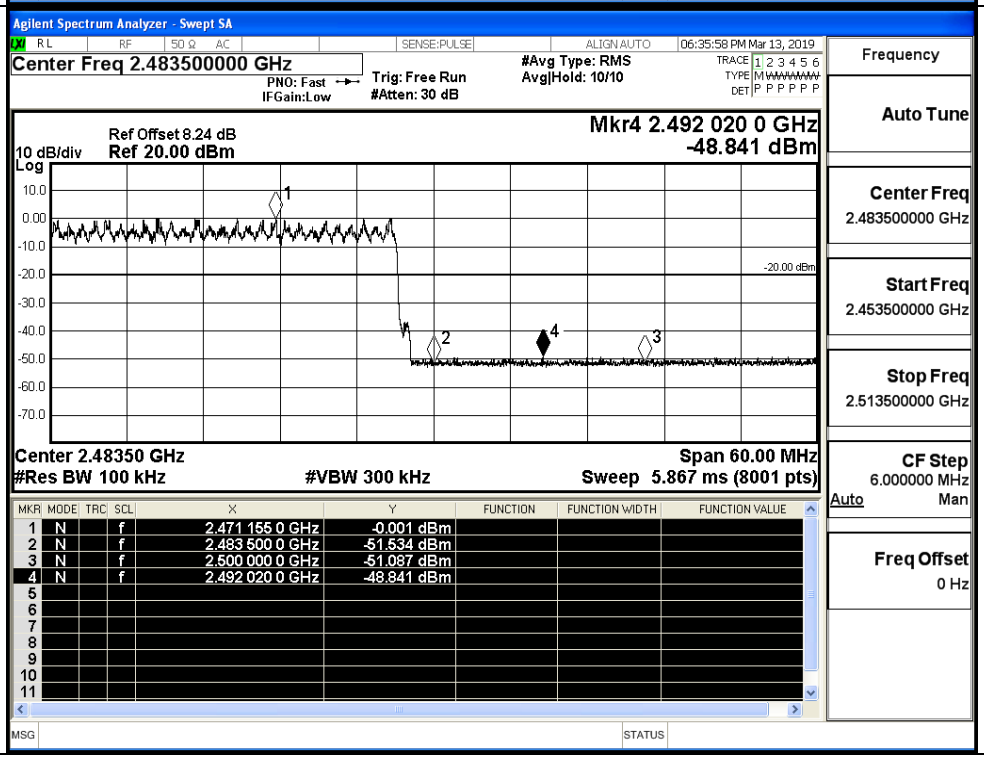
A.7 Band-edge for RF Conducted Emissions

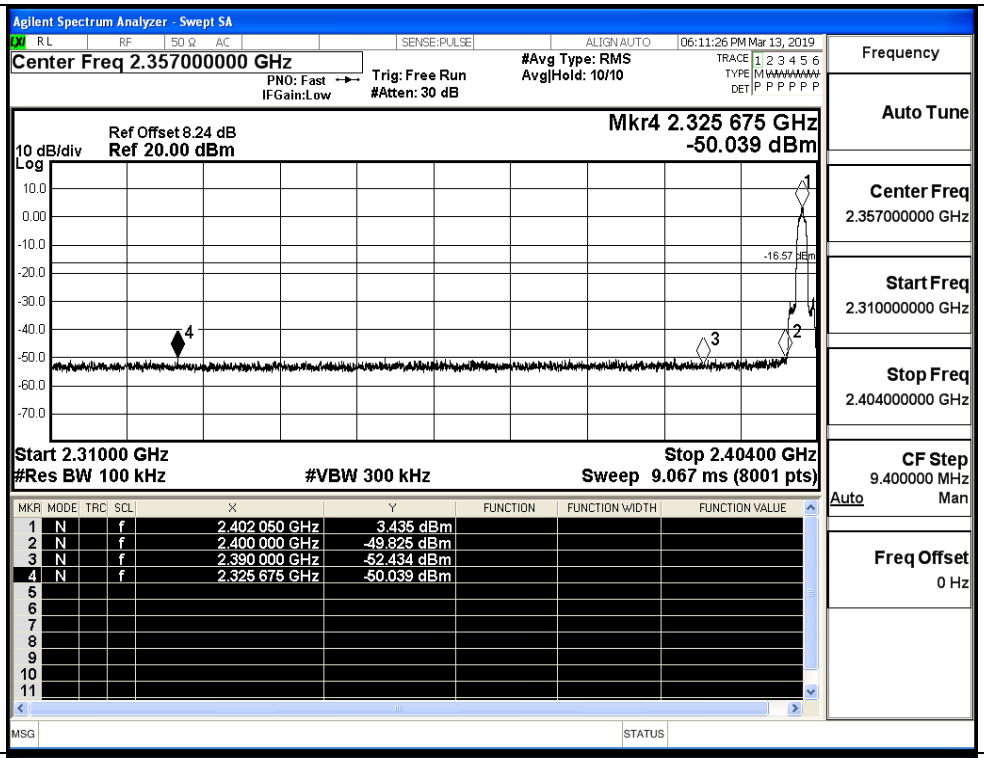
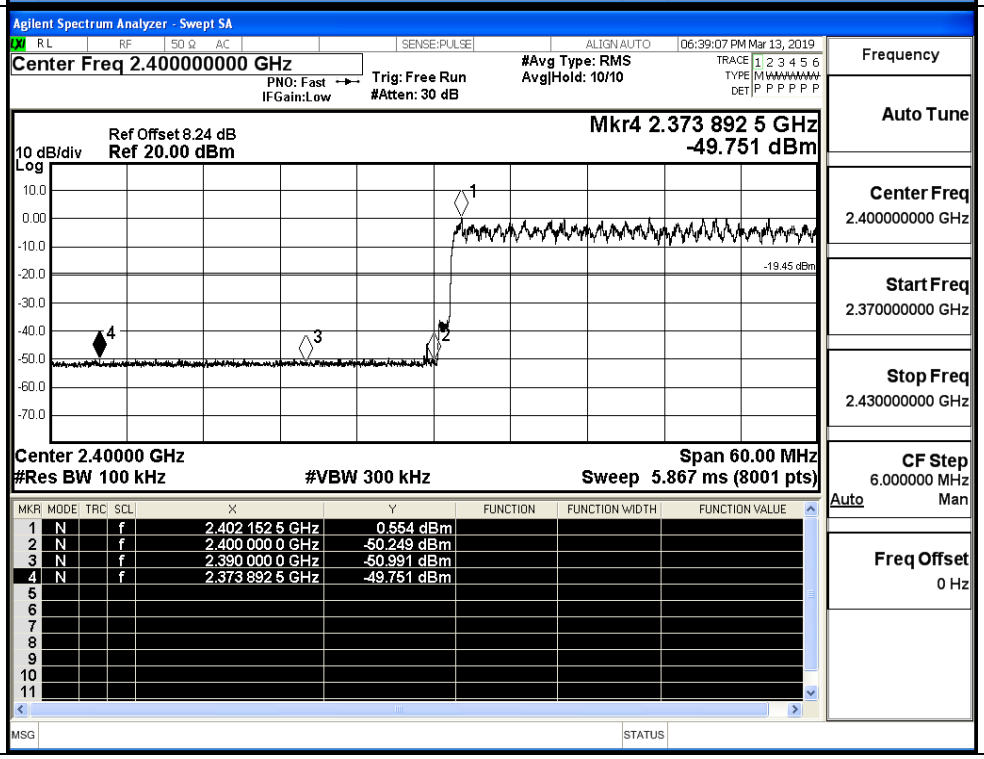
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.109	Off	-49.942	-15.89	PASS
			1.911	On	-49.430	-18.09	PASS
	HCH	2480	4.180	Off	-49.814	-15.82	PASS
			1.227	On	-49.432	-18.77	PASS
π/4DQPSK	LCH	2402	3.084	Off	-49.691	-16.92	PASS
			0.597	On	-49.103	-19.4	PASS
	HCH	2480	2.839	Off	-49.549	-17.16	PASS
			-0.001	On	-48.841	-20	PASS
8DPSK	LCH	2402	3.435	Off	-50.039	-16.57	PASS
			0.554	On	-49.751	-19.45	PASS
	HCH	2480	2.869	Off	-49.698	-17.13	PASS
			0.004	On	-47.936	-20	PASS

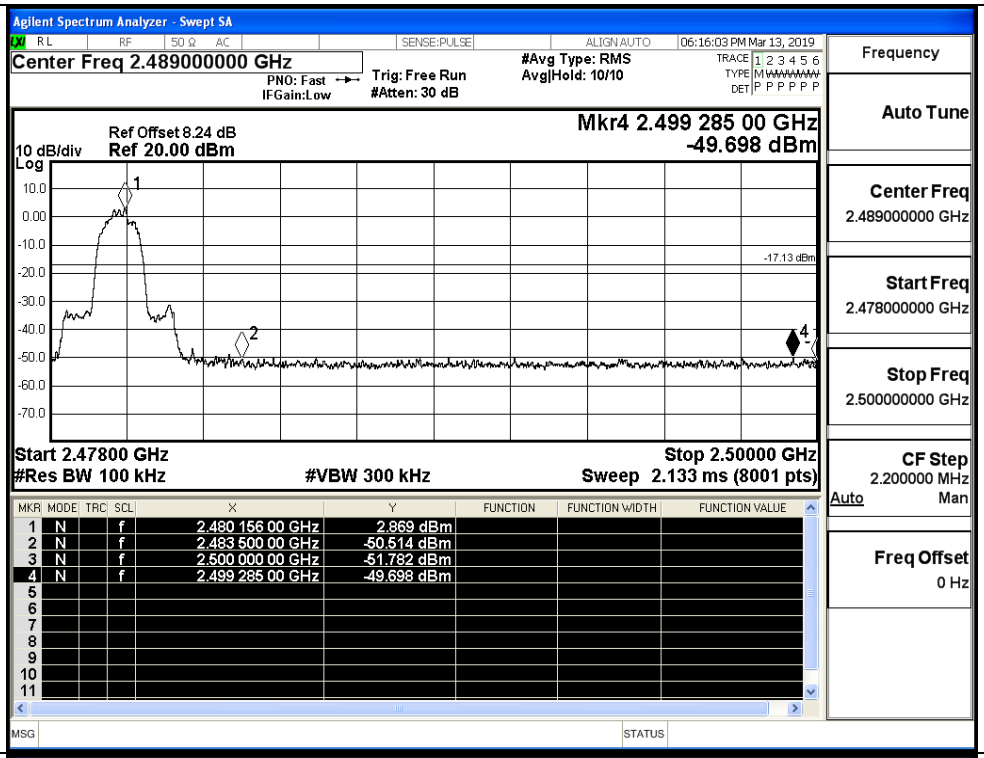
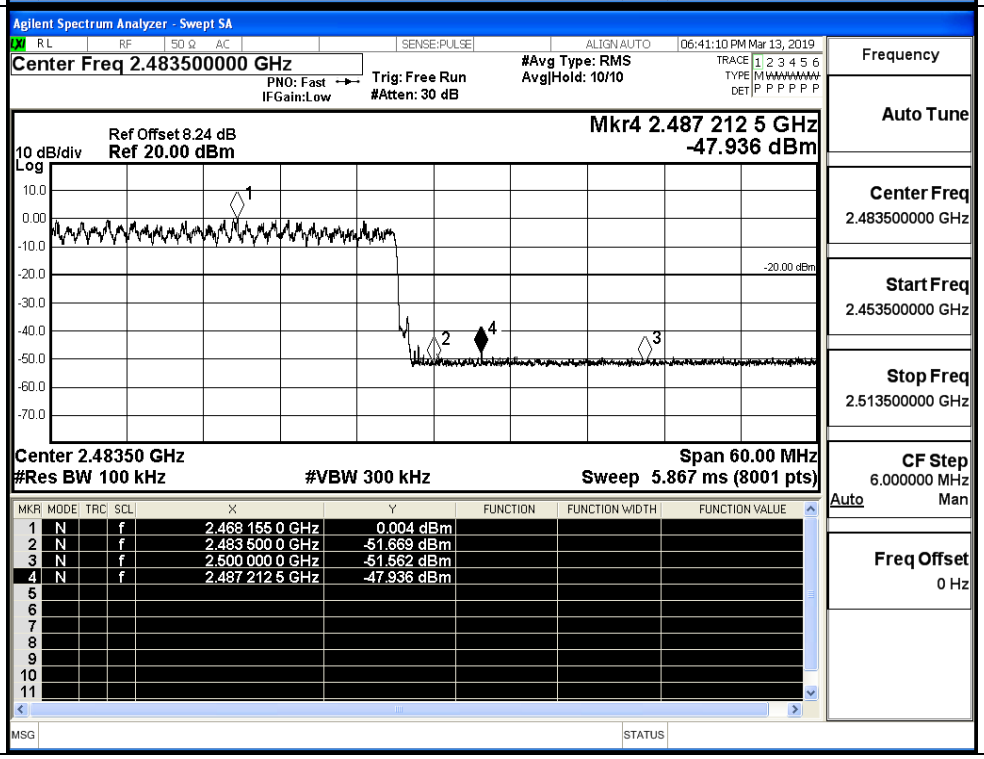
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

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	

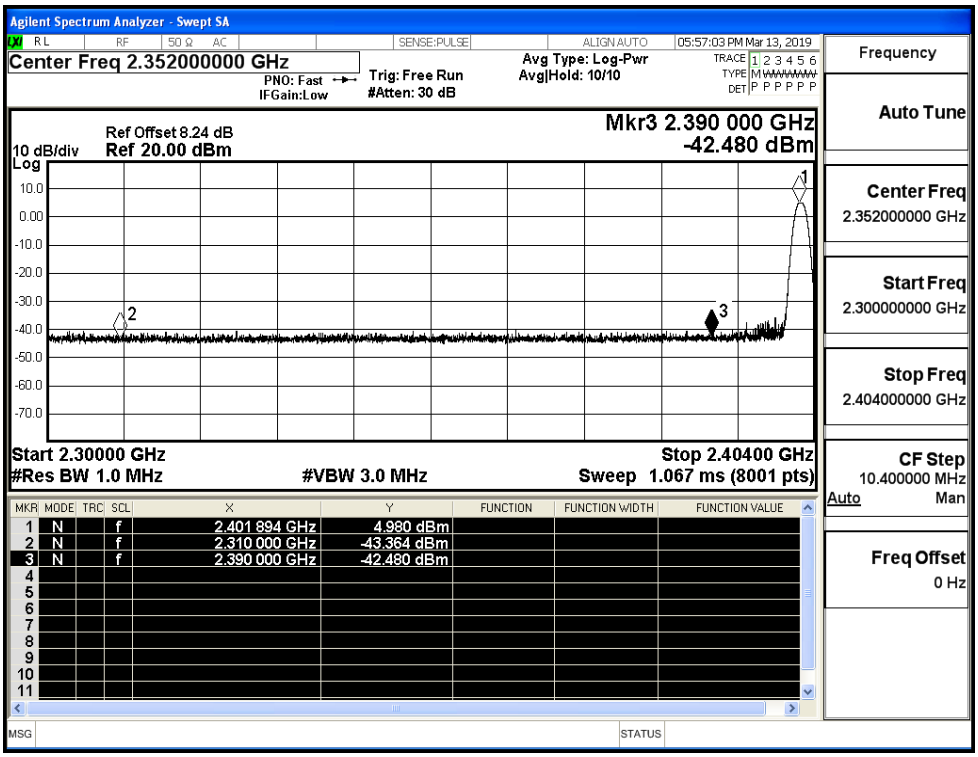
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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

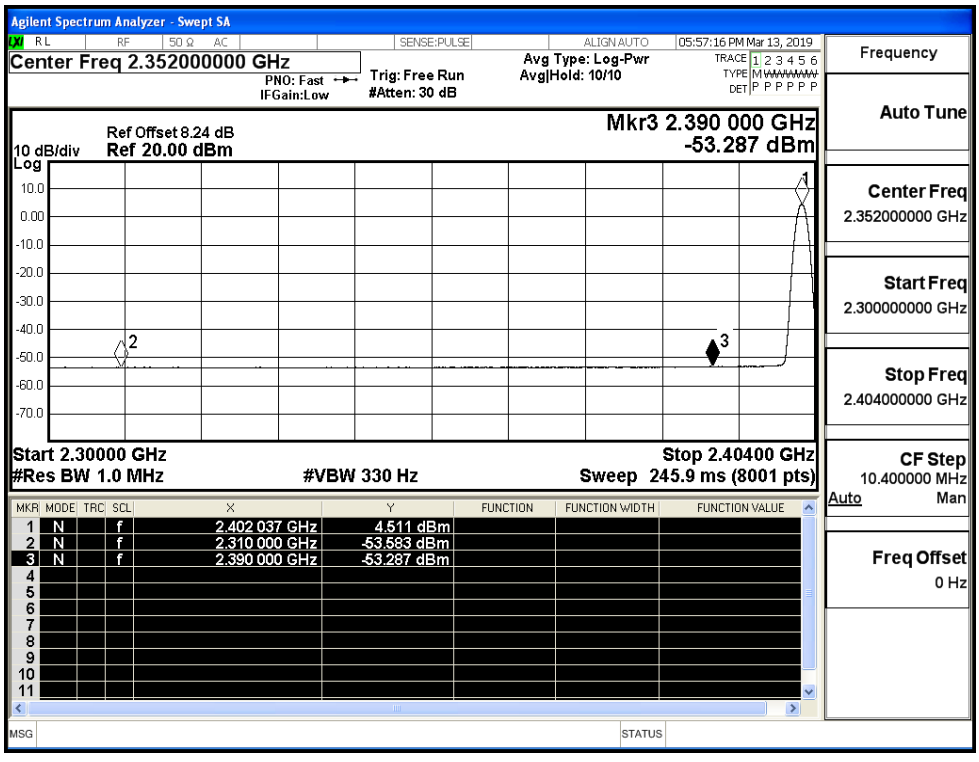
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.36	2.0	0	51.89	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	41.67	AV	54	PASS
	Off	2390.0	-42.48	2.0	0	52.78	PEAK	74	PASS
	Off	2390.0	-53.29	2.0	0	41.97	AV	54	PASS
	Off	2483.5	-39.16	2.0	0	56.10	PEAK	74	PASS
	Off	2483.5	-52.59	2.0	0	42.67	AV	54	PASS
	Off	2500.0	-43.03	2.0	0	52.22	PEAK	74	PASS
	Off	2500.0	-49.51	2.0	0	45.75	AV	54	PASS
π/4DQPSK	Off	2310.0	-43.86	2.0	0	51.40	PEAK	74	PASS
	Off	2310.0	-53.60	2.0	0	41.66	AV	54	PASS
	Off	2390.0	-43.31	2.0	0	51.95	PEAK	74	PASS
	Off	2390.0	-53.29	2.0	0	41.96	AV	54	PASS
	Off	2483.5	-41.34	2.0	0	53.92	PEAK	74	PASS
	Off	2483.5	-52.68	2.0	0	42.58	AV	54	PASS
	Off	2500.0	-41.66	2.0	0	53.60	PEAK	74	PASS
	Off	2500.0	-52.94	2.0	0	42.32	AV	54	PASS
8DPSK	Off	2310.0	-43.80	2.0	0	51.45	PEAK	74	PASS
	Off	2310.0	-53.61	2.0	0	41.65	AV	54	PASS
	Off	2390.0	-42.74	2.0	0	52.52	PEAK	74	PASS
	Off	2390.0	-53.28	2.0	0	41.98	AV	54	PASS
	Off	2483.5	-42.50	2.0	0	52.76	PEAK	74	PASS
	Off	2483.5	-52.71	2.0	0	42.55	AV	54	PASS
	Off	2500.0	-42.12	2.0	0	53.14	PEAK	74	PASS
	Off	2500.0	-52.93	2.0	0	42.32	AV	54	PASS

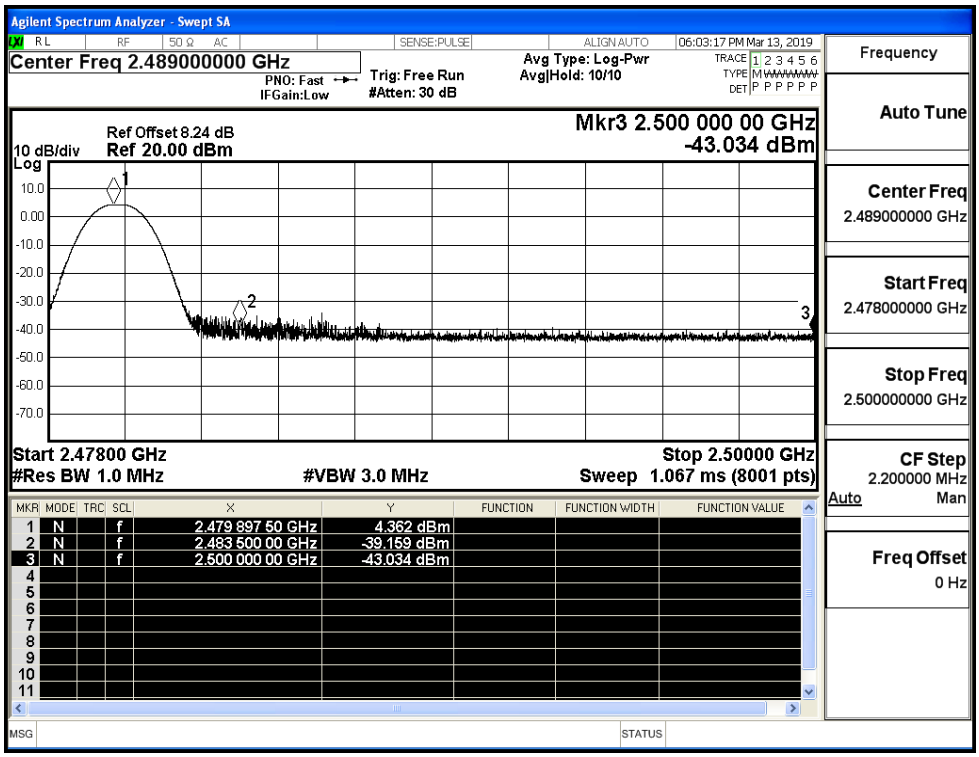
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



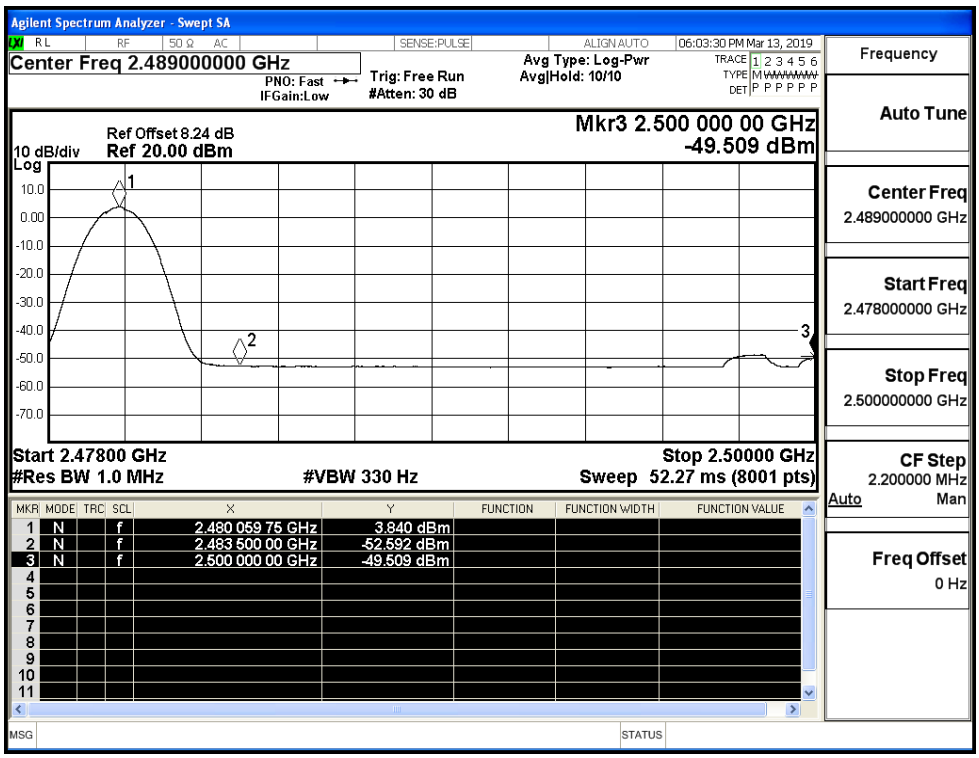
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



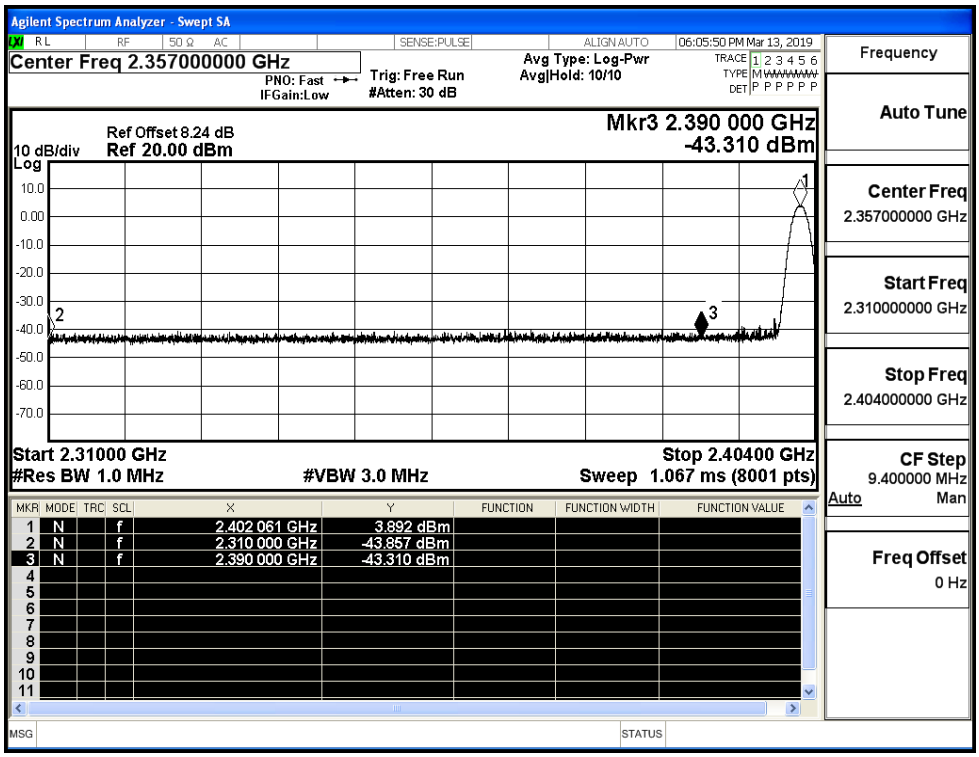
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



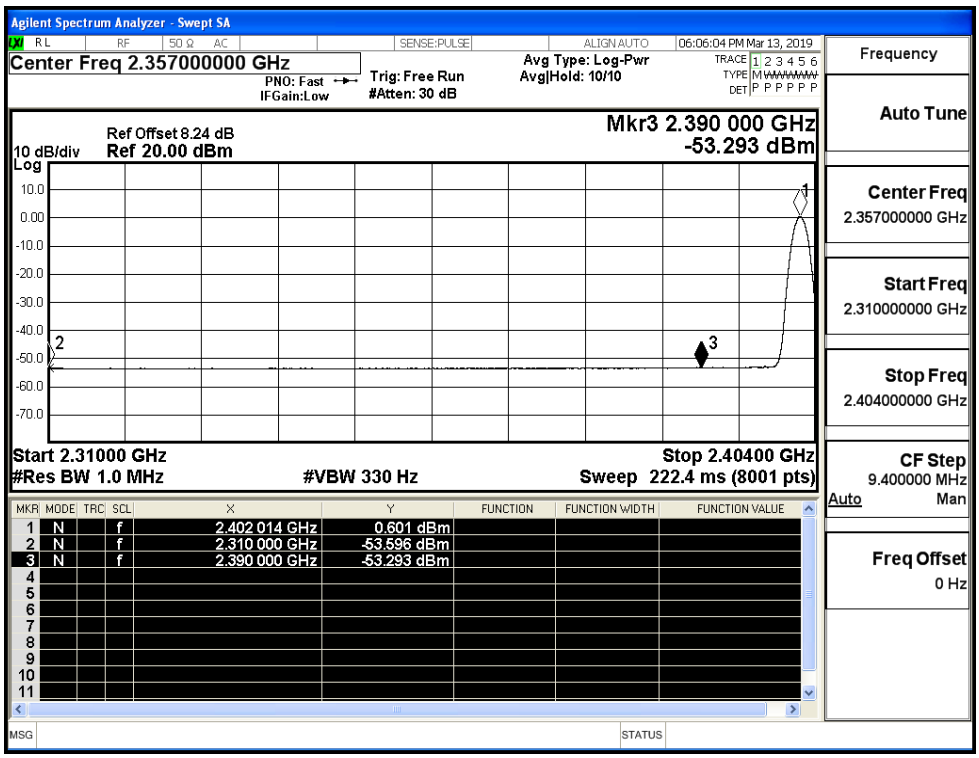
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



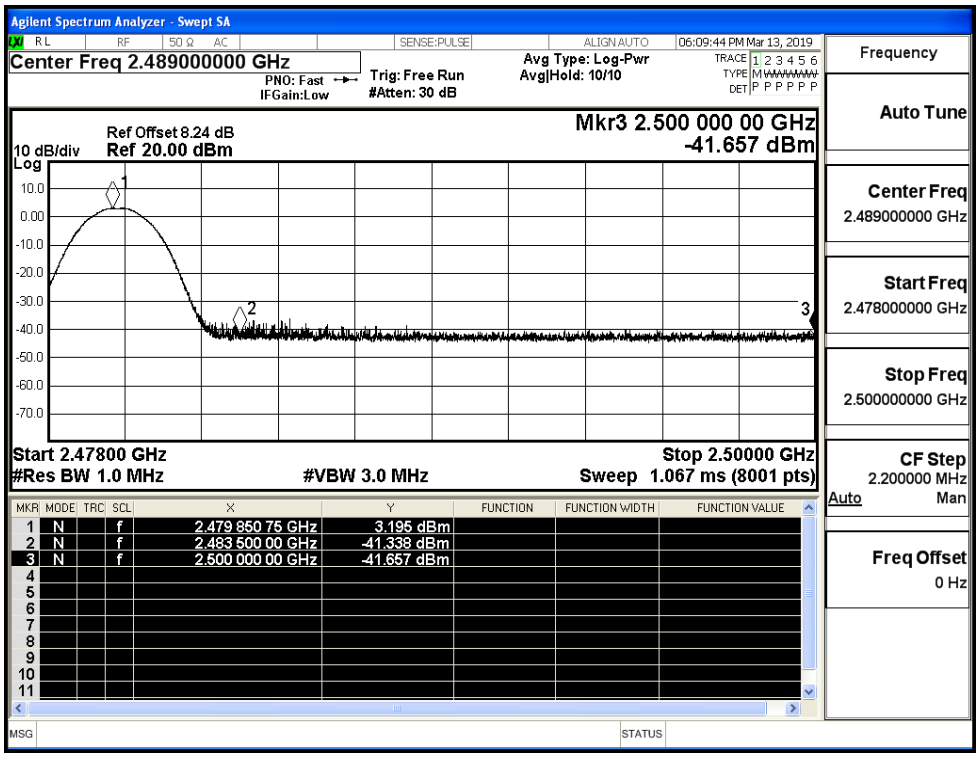
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



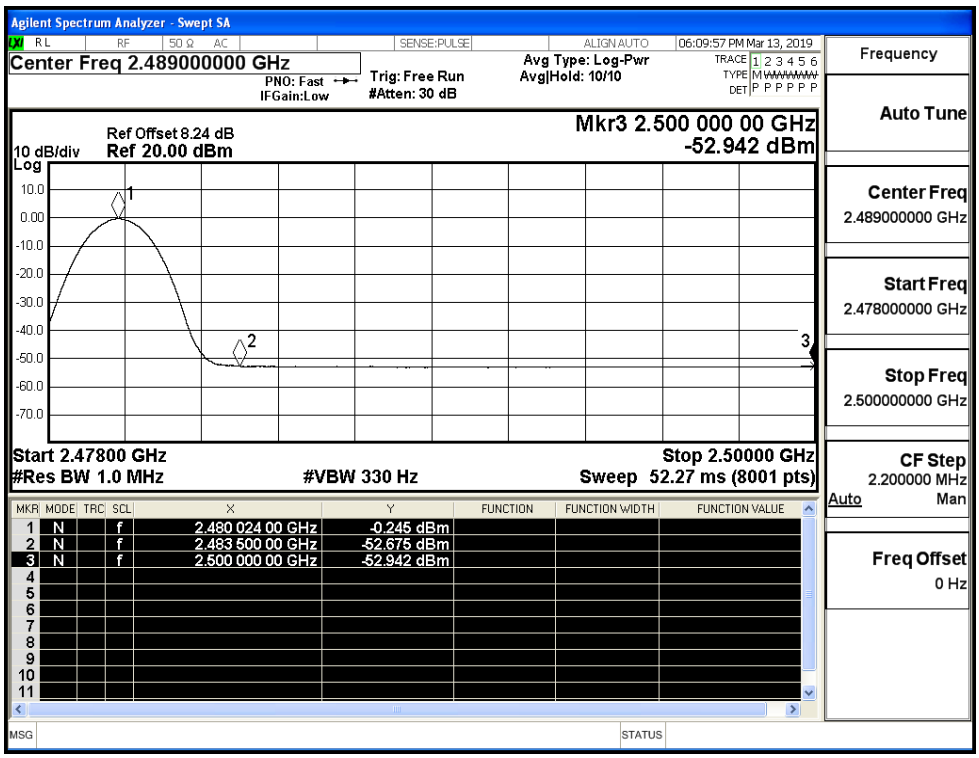
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



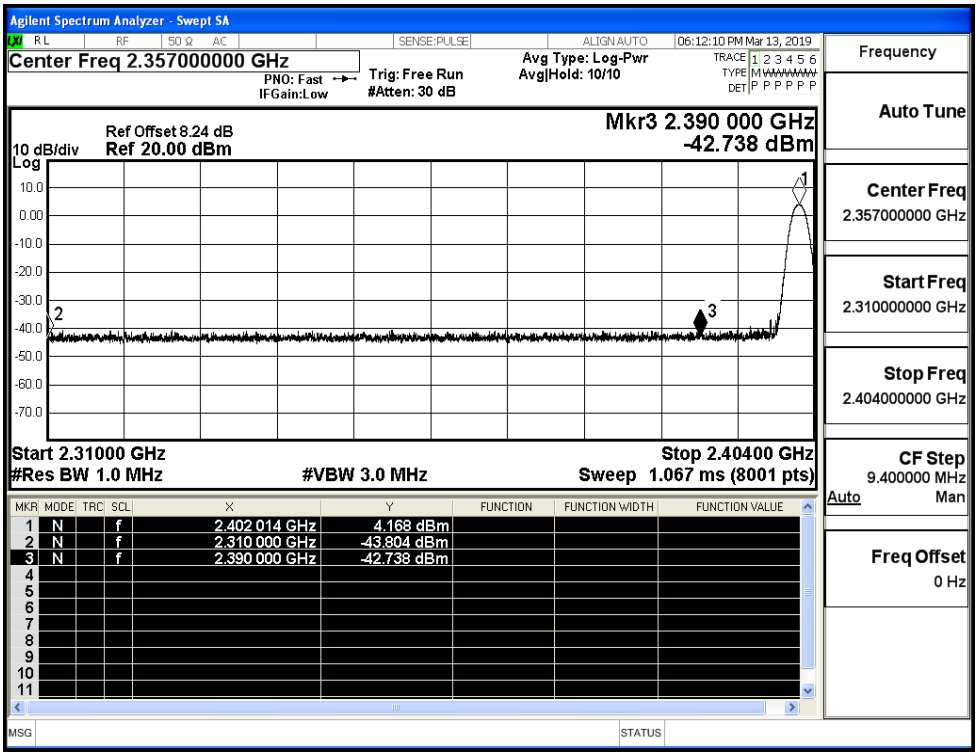
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



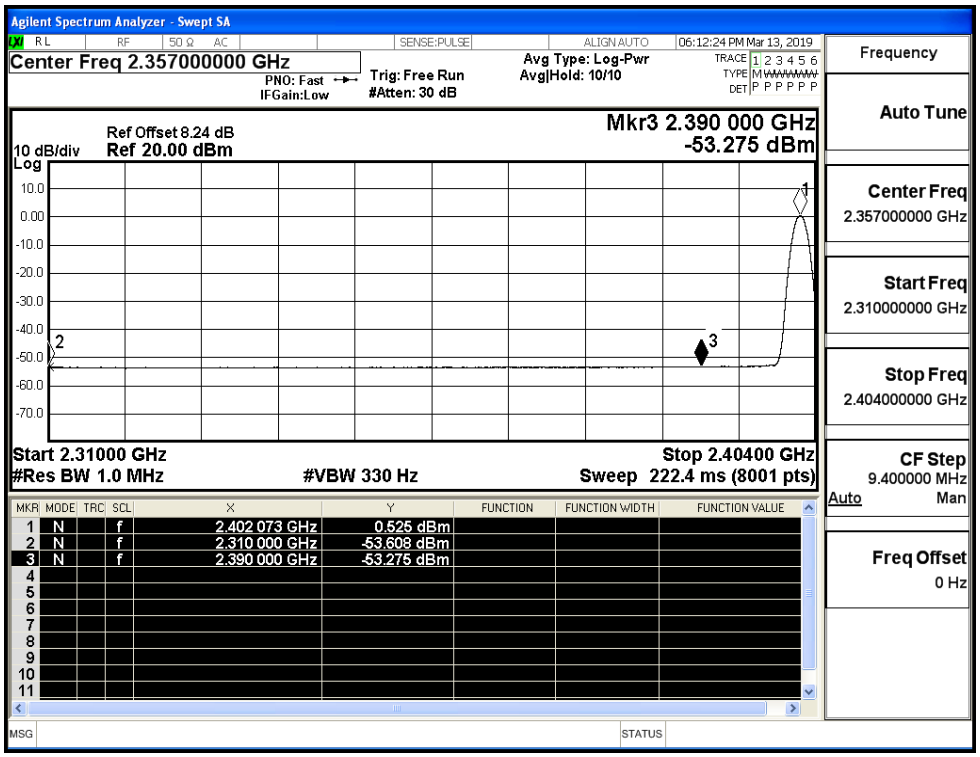
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



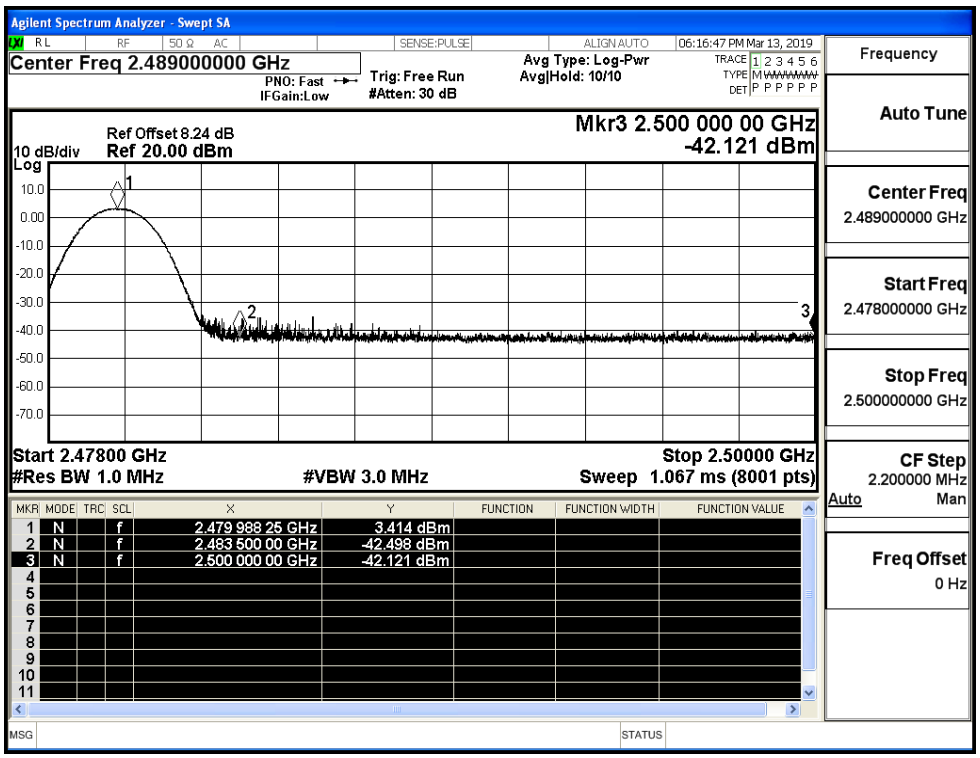
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)