Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: Multi function projector

Trade Mark: N/A

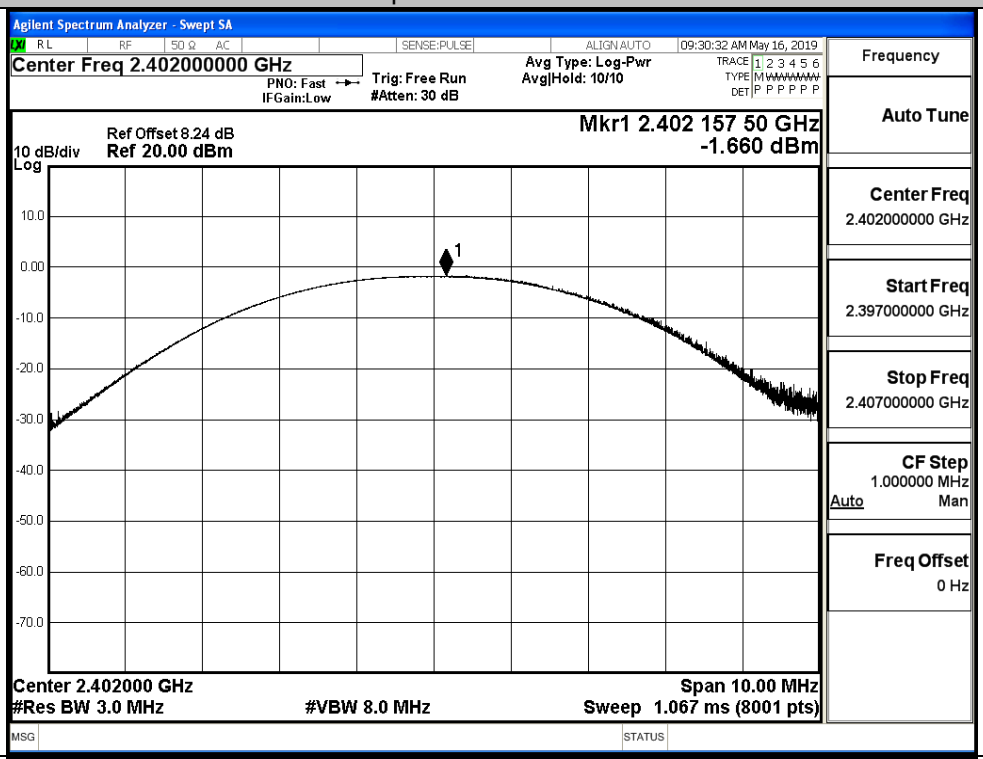
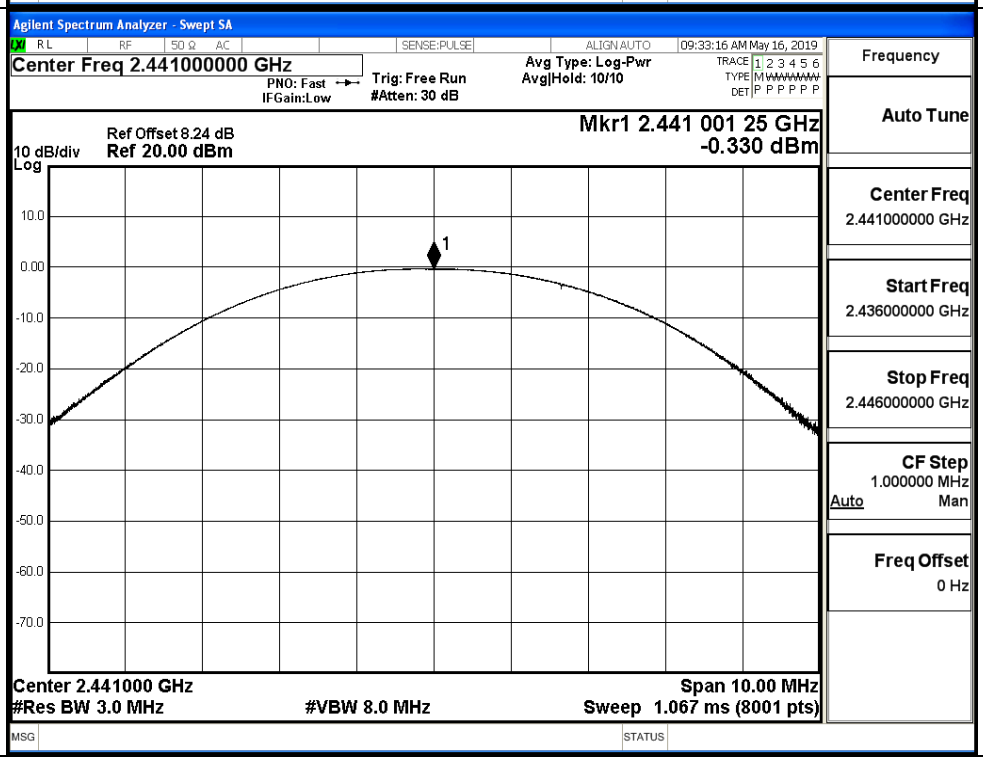
Test Model: NeoPix Easy+

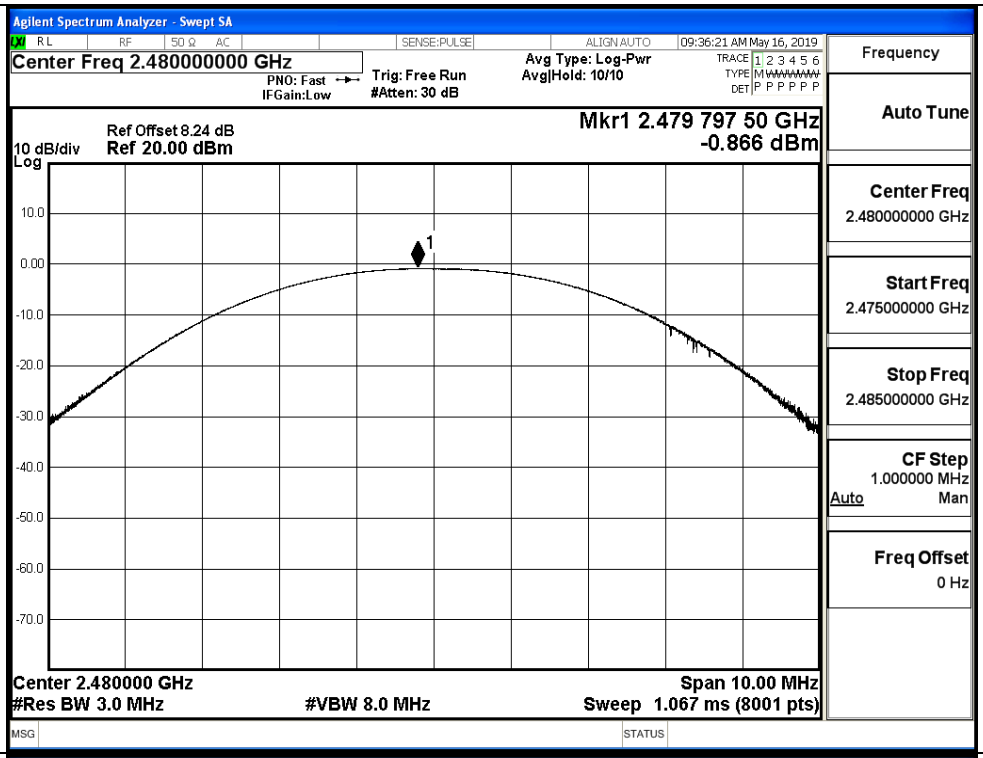
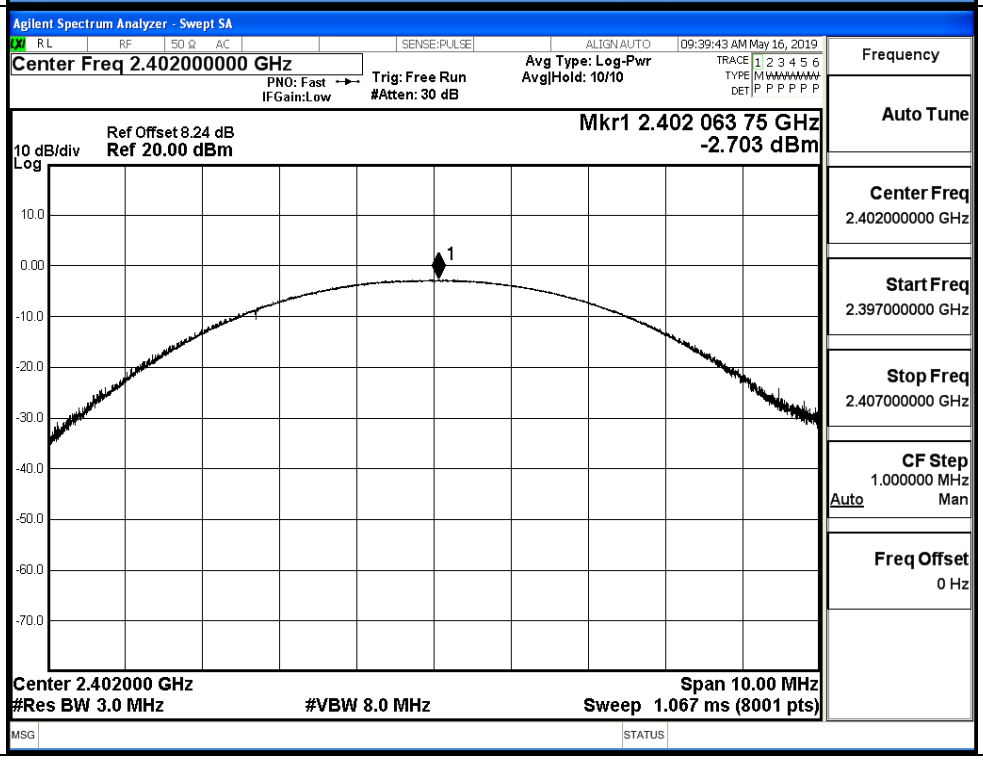
Environmental Conditions

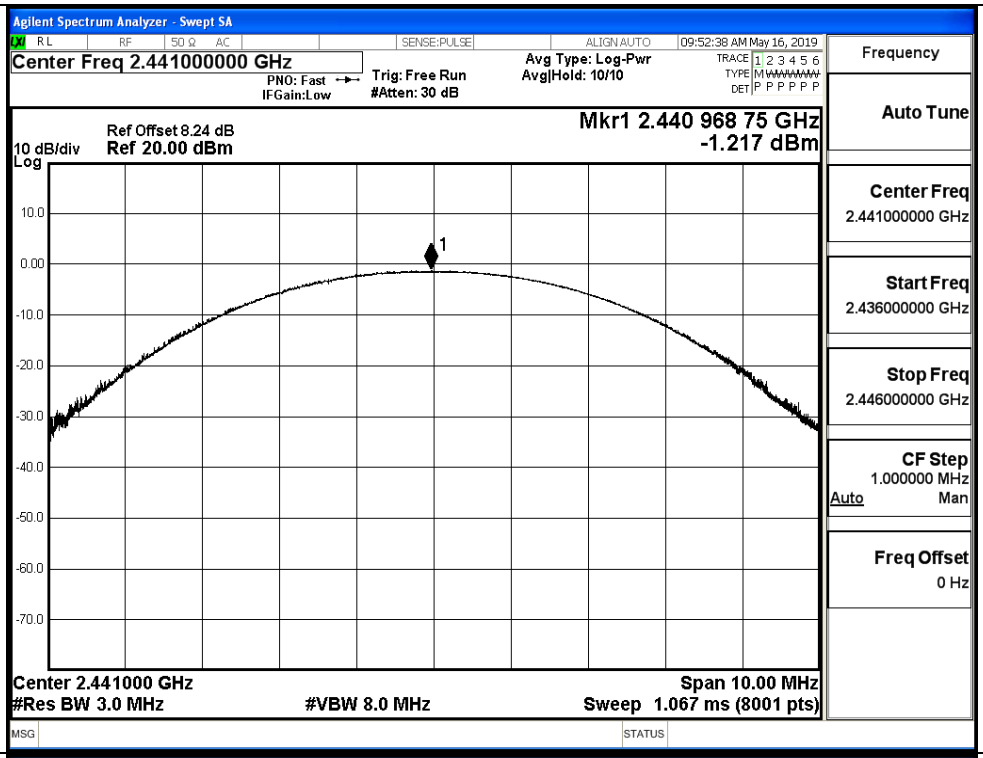
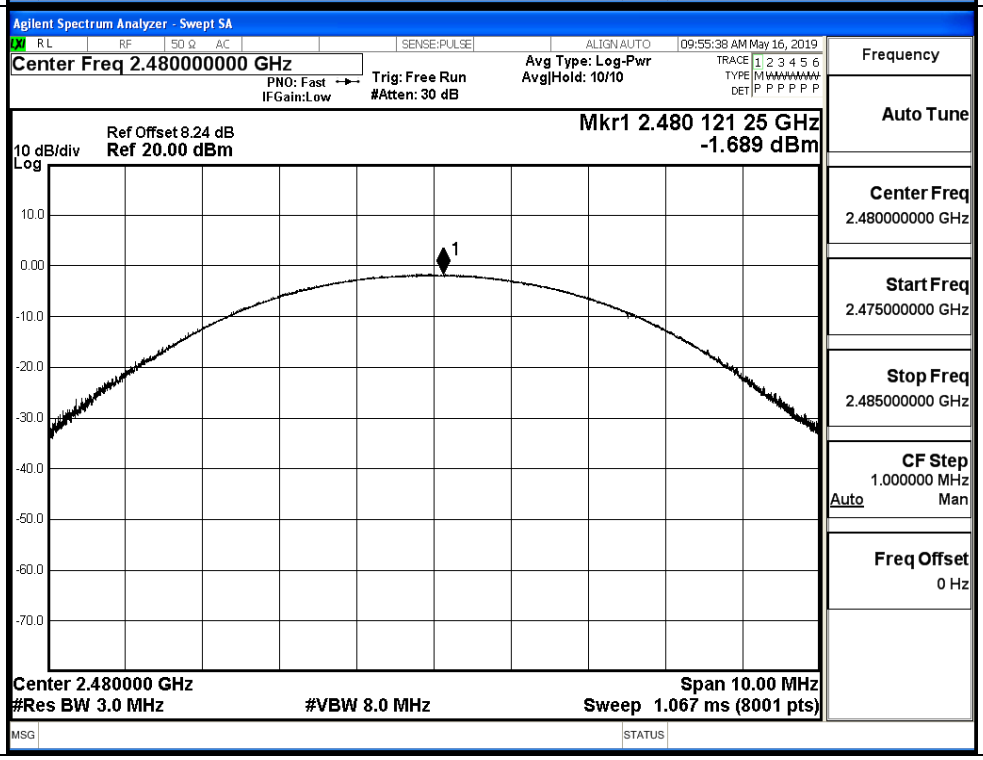
Temperature:	23.4 ° C
Relative Humidity:	53.9%
ATM Pressure:	100.0 kPa
Test Engineer:	SCENT HU
Supervised by:	Tom.Liu

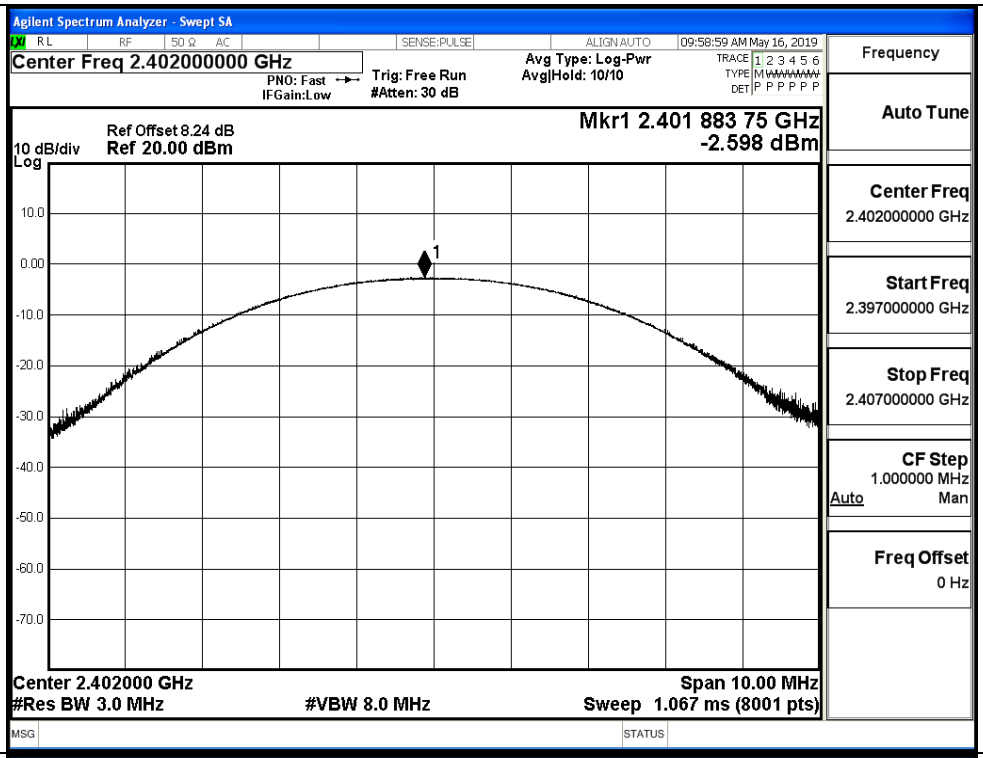
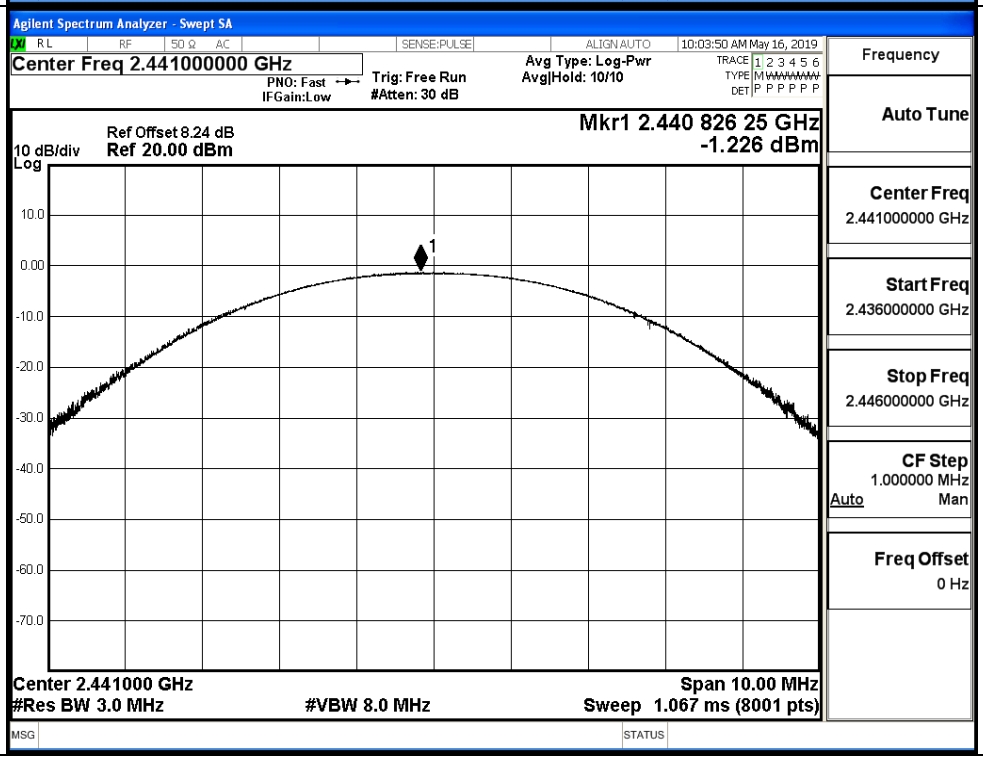
A.1 Maxmum Conducted Peak Output Power

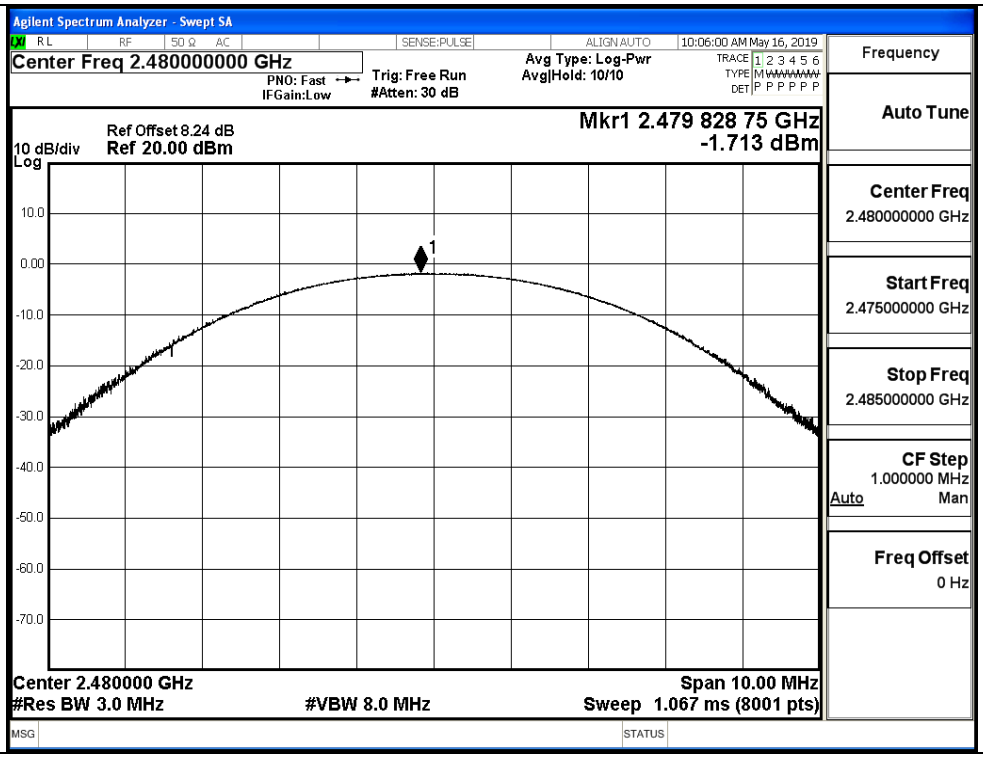
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.660	30	PASS
	MCH	-0.330	30	PASS
	HCH	-0.866	30	PASS
π/4DQPSK	LCH	-2.703	21	PASS
	MCH	-1.217	21	PASS
	HCH	-1.689	21	PASS
8DPSK	LCH	-2.598	21	PASS
	MCH	-1.226	21	PASS
	HCH	-1.713	21	PASS

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

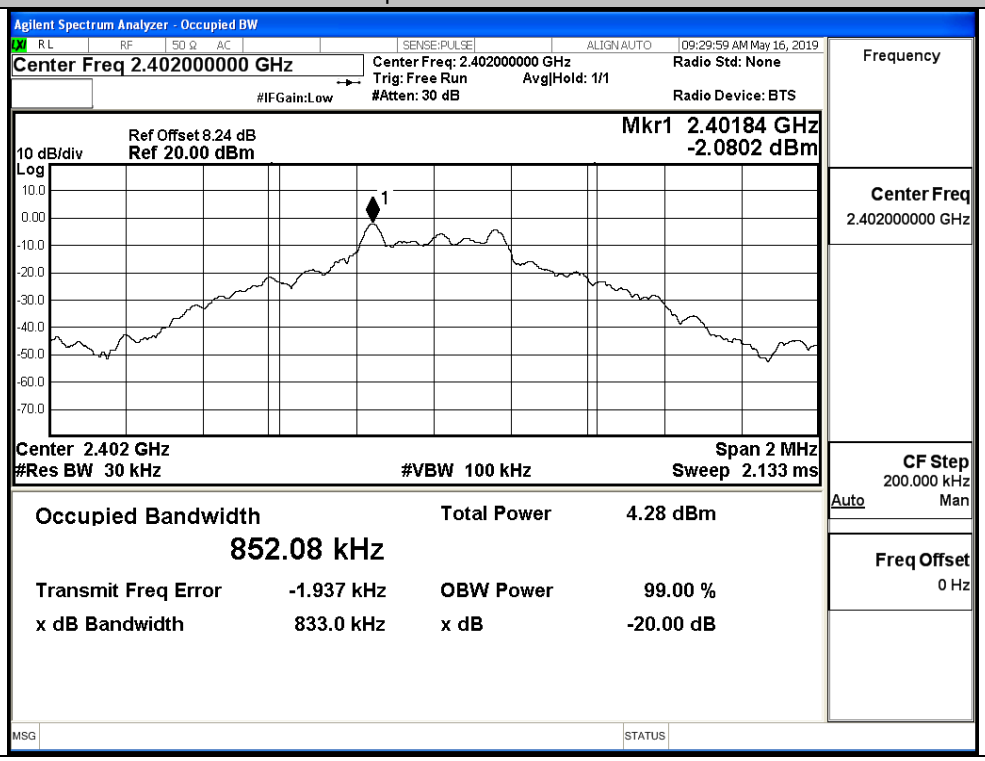
8DPSK/LCH	
8DPSK/MCH	

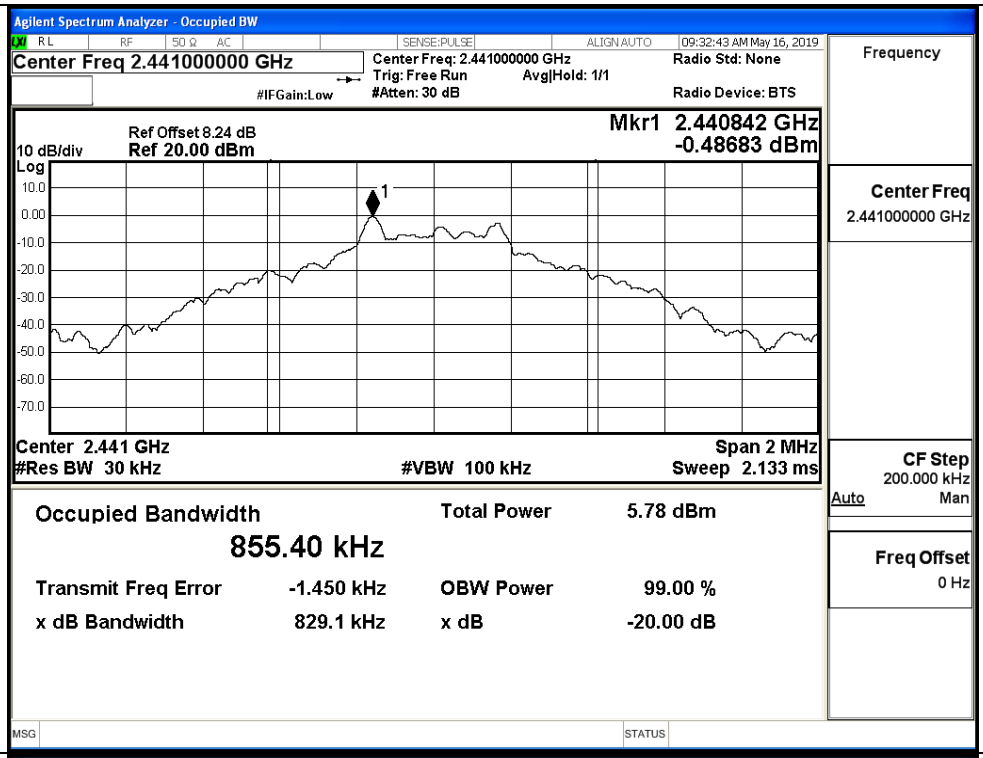
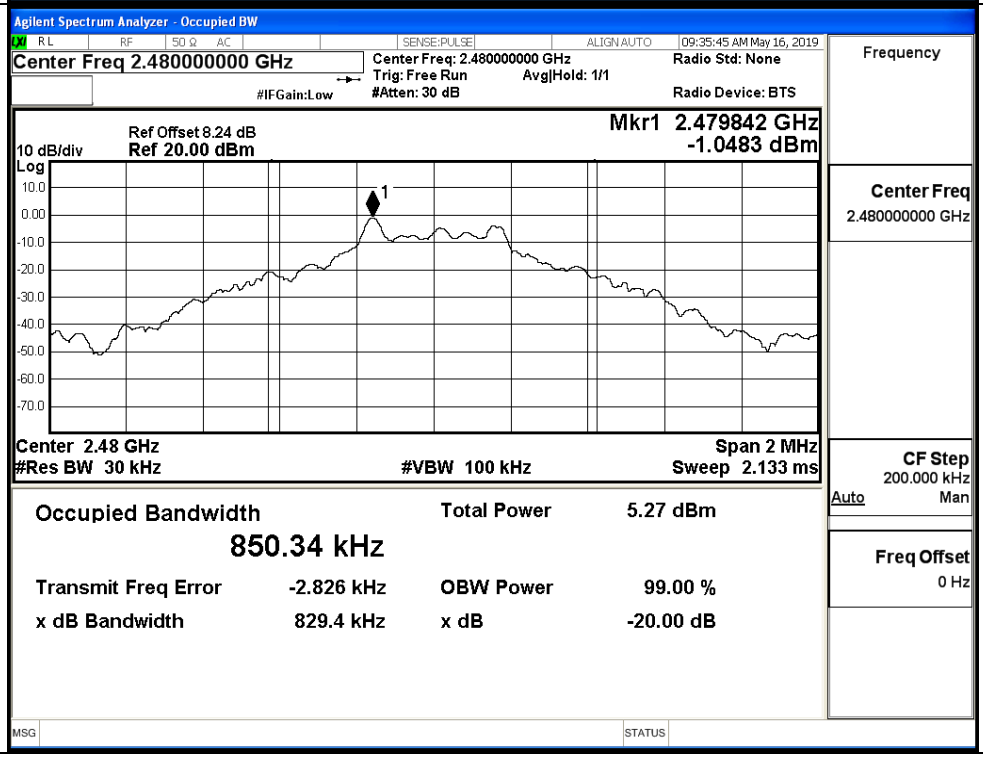
8DPSK/HCH	

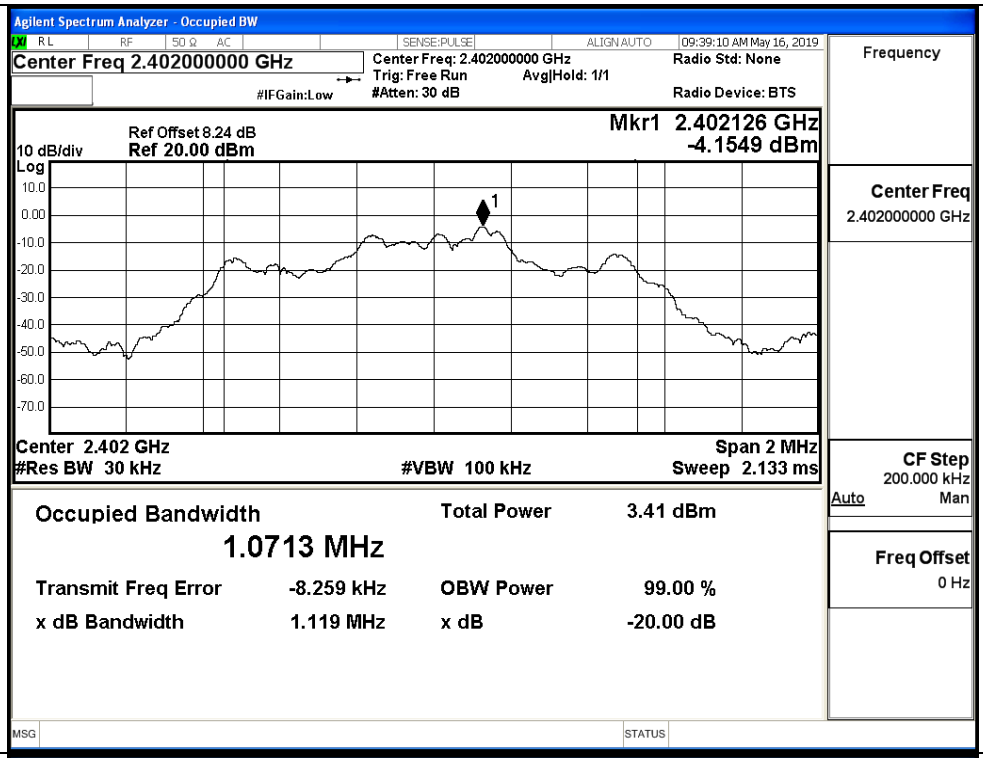
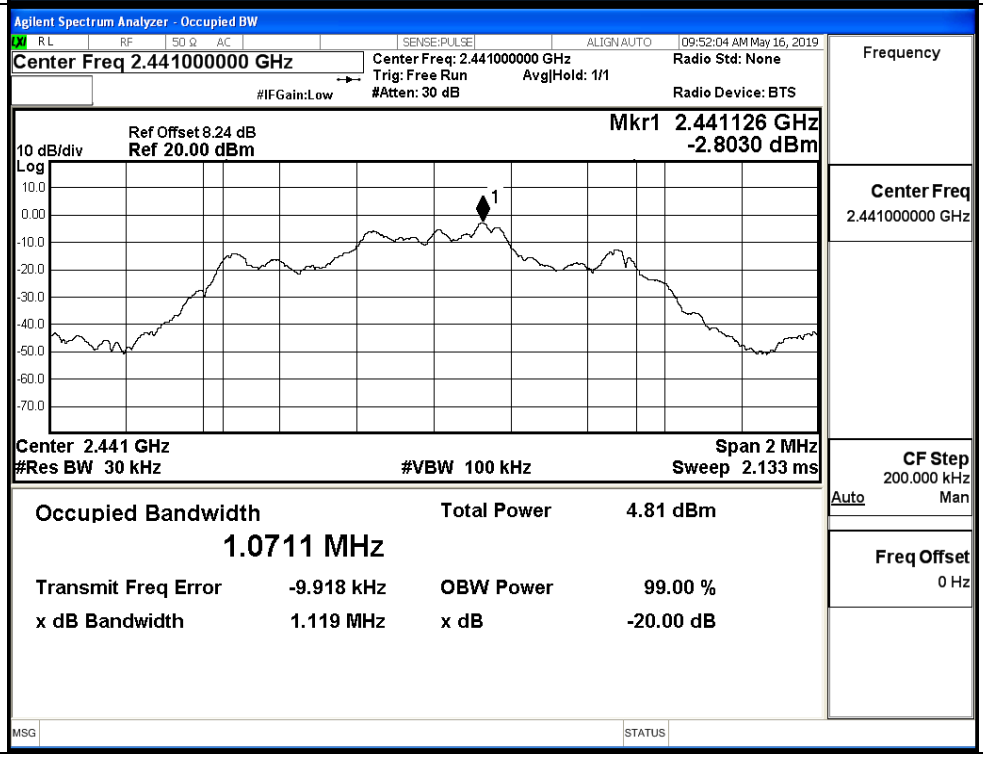
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
10:06:00 AM May 16, 2019
Ref Offset 8.24 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 828 75 GHz
-1.713 dBm
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
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

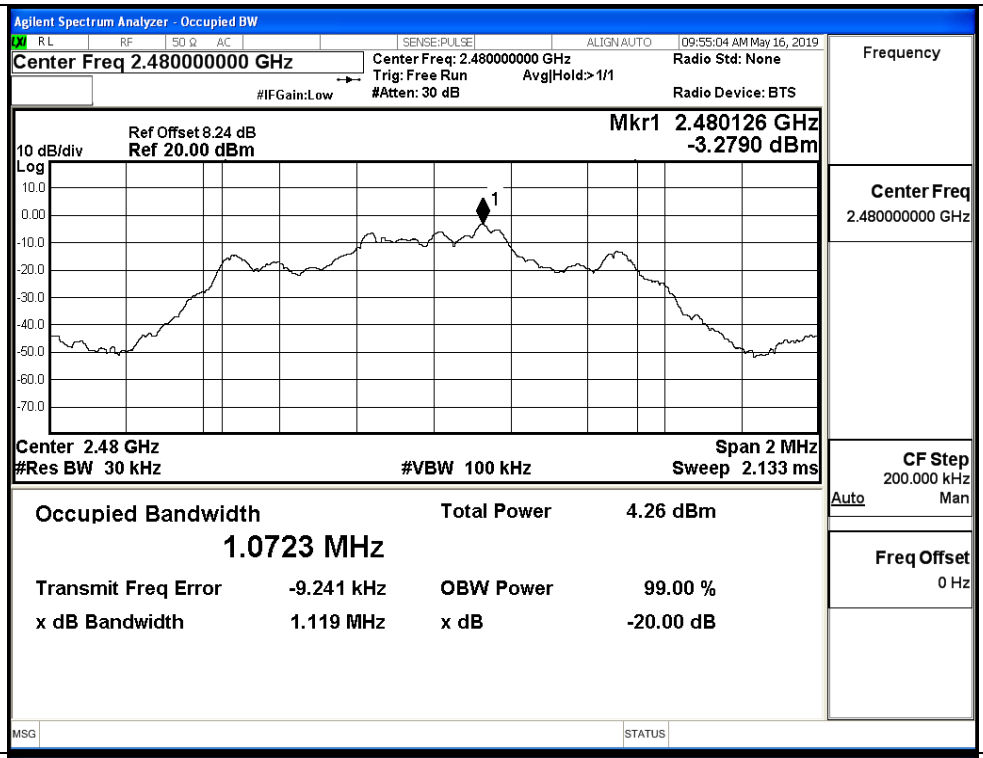
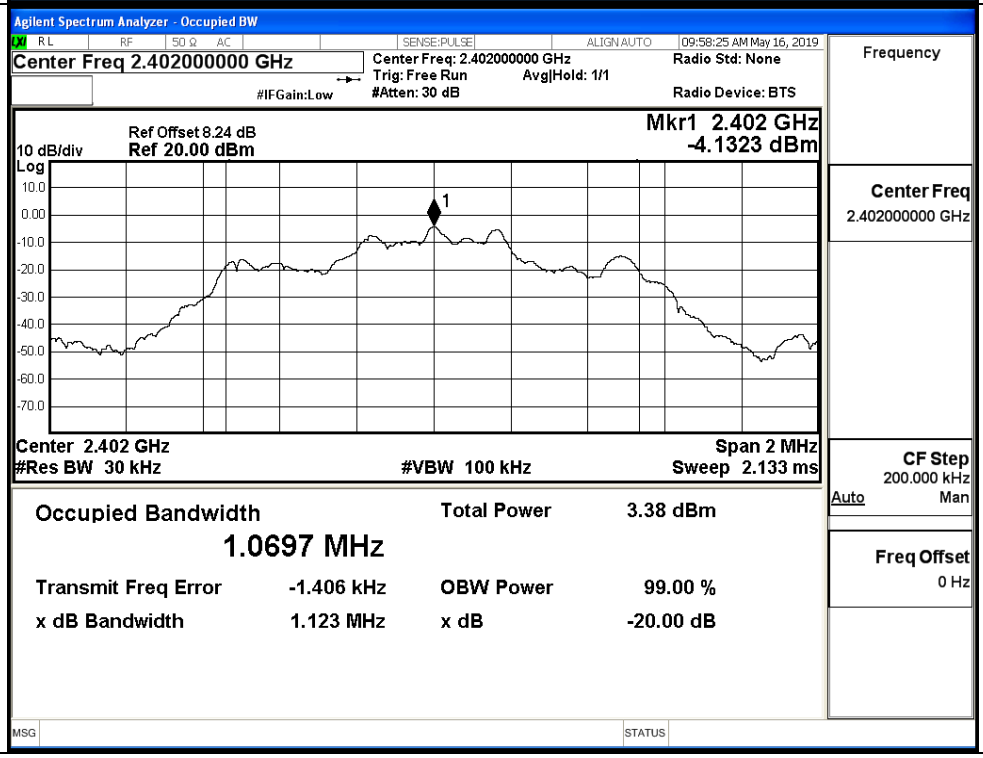
A.2 20dB Bandwidth

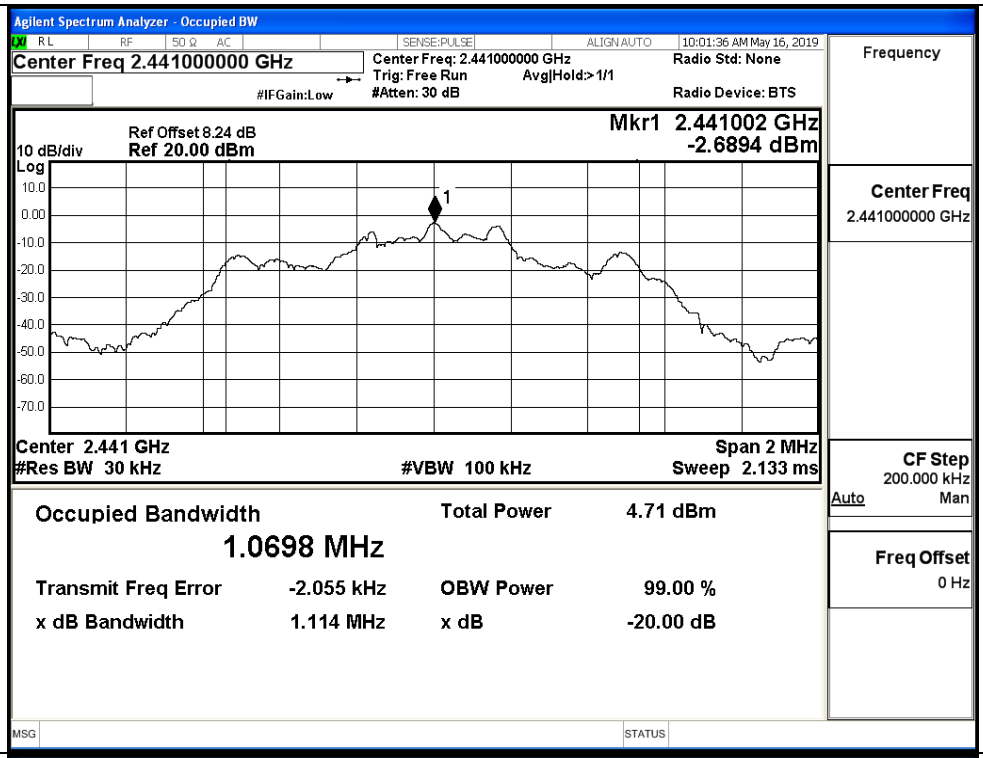
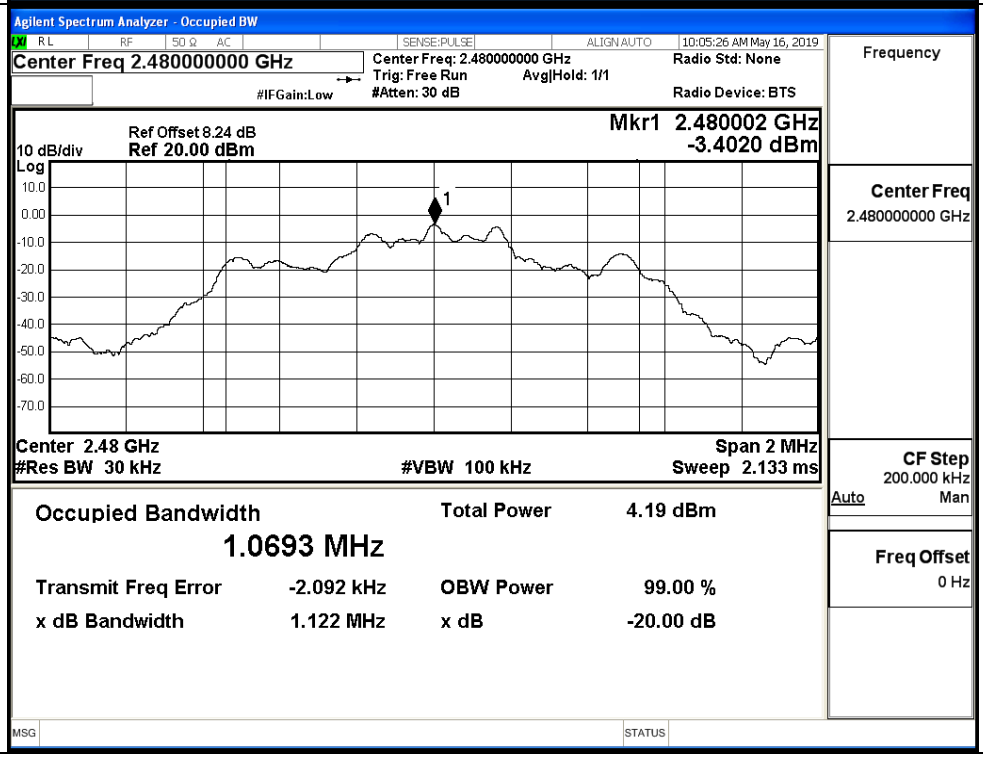
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.8330	Not Specified	PASS
	MCH	0.8291	Not Specified	PASS
	HCH	0.8294	Not Specified	PASS
π/4DQPSK	LCH	1.119	Not Specified	PASS
	MCH	1.119	Not Specified	PASS
	HCH	1.119	Not Specified	PASS
8DPSK	LCH	1.123	Not Specified	PASS
	MCH	1.114	Not Specified	PASS
	HCH	1.122	Not Specified	PASS

Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	

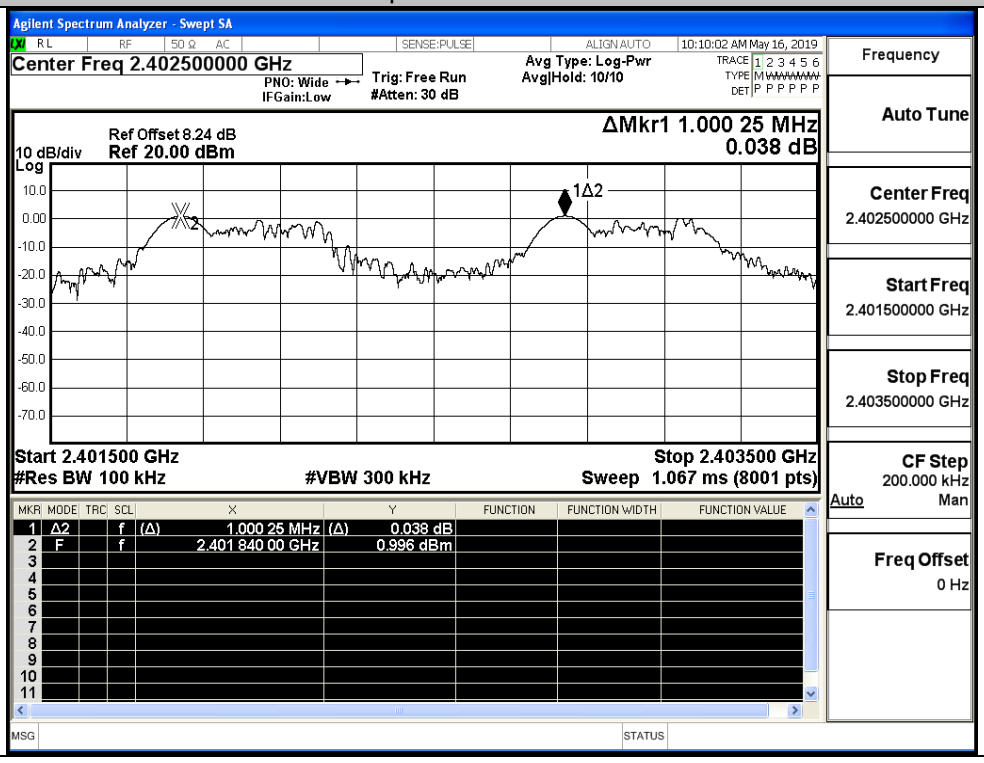
8DPSK/MCH	
8DPSK/HCH	

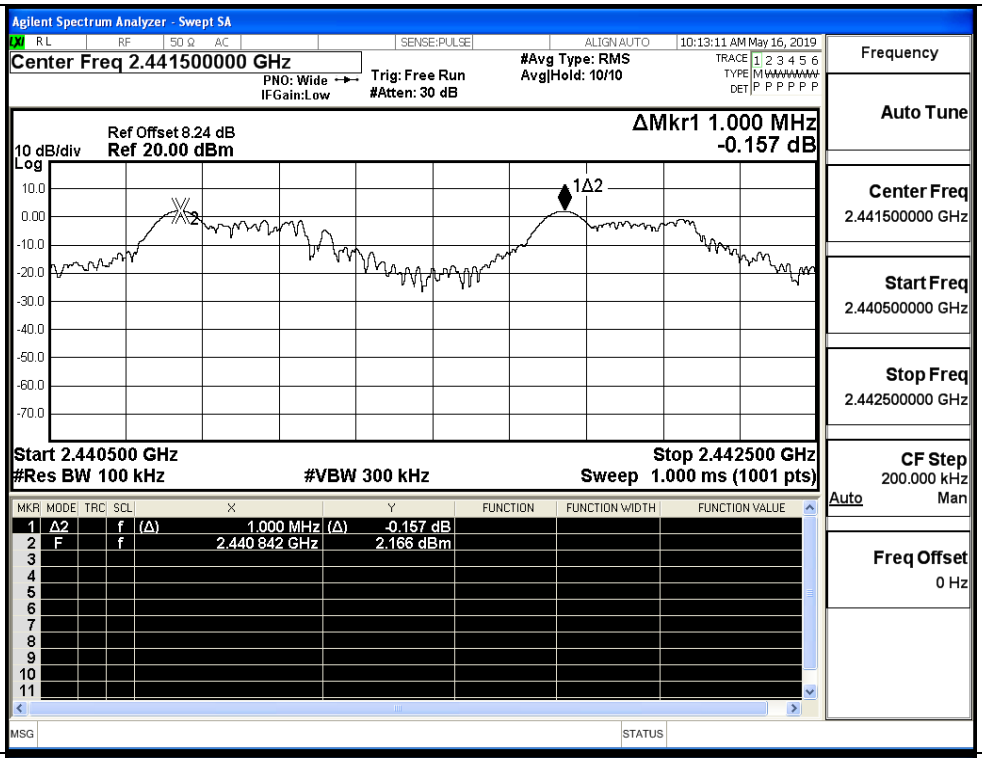
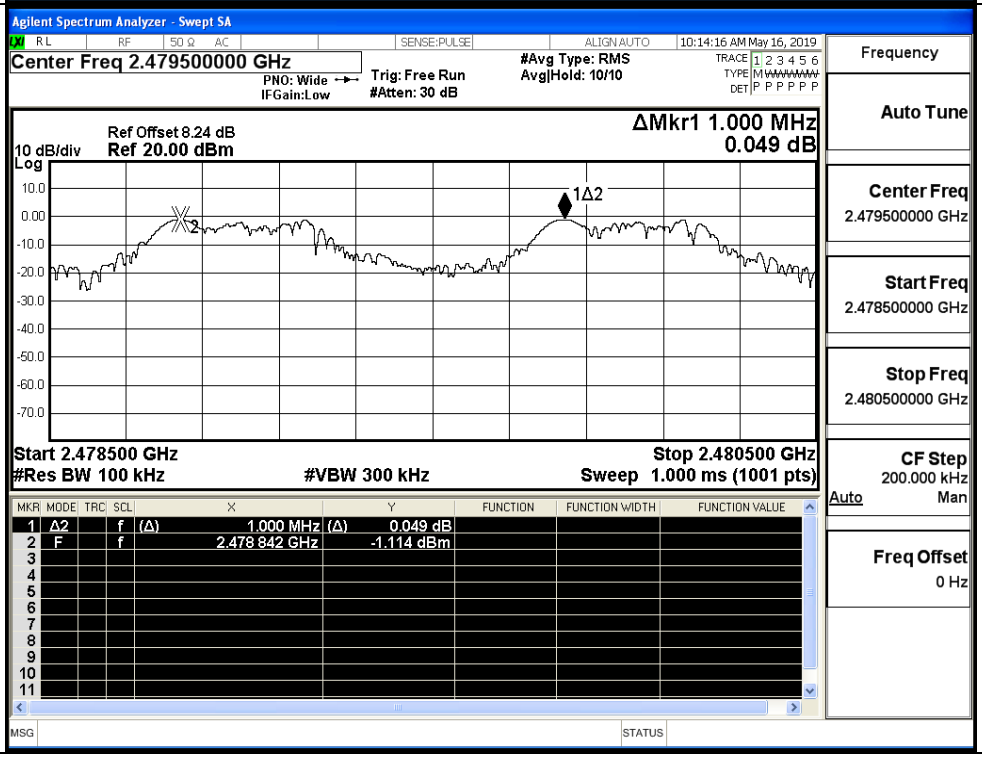
A.3 Carrier Frequency Separation

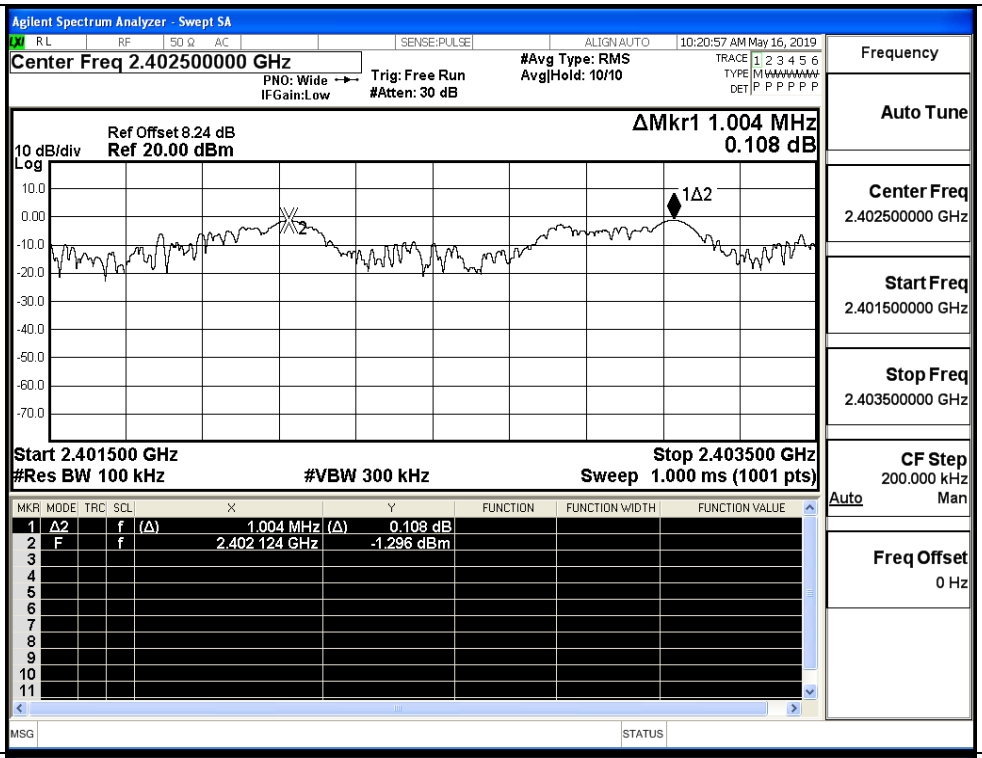
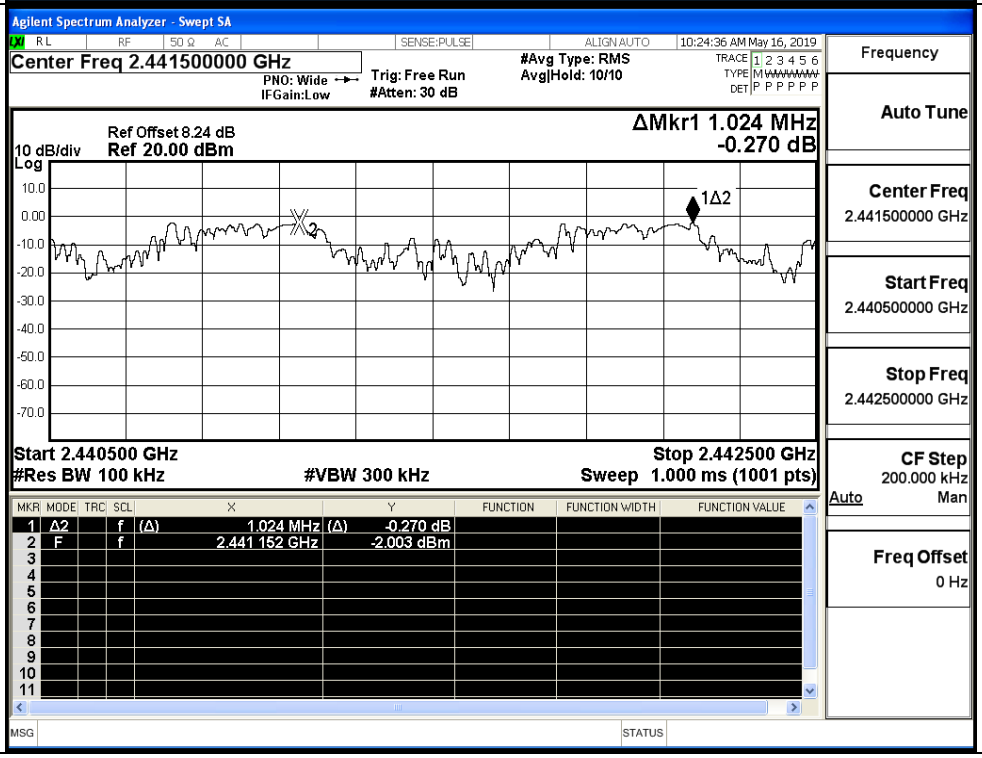
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.000	0.555	PASS
	MCH	1.000	0.555	PASS
	HCH	1.000	0.555	PASS
π/4DQPSK	LCH	1.004	0.746	PASS
	MCH	1.024	0.746	PASS
	HCH	0.714	0.746	PASS
8DPSK	LCH	1.016	0.749	PASS
	MCH	0.992	0.749	PASS
	HCH	1.090	0.749	PASS

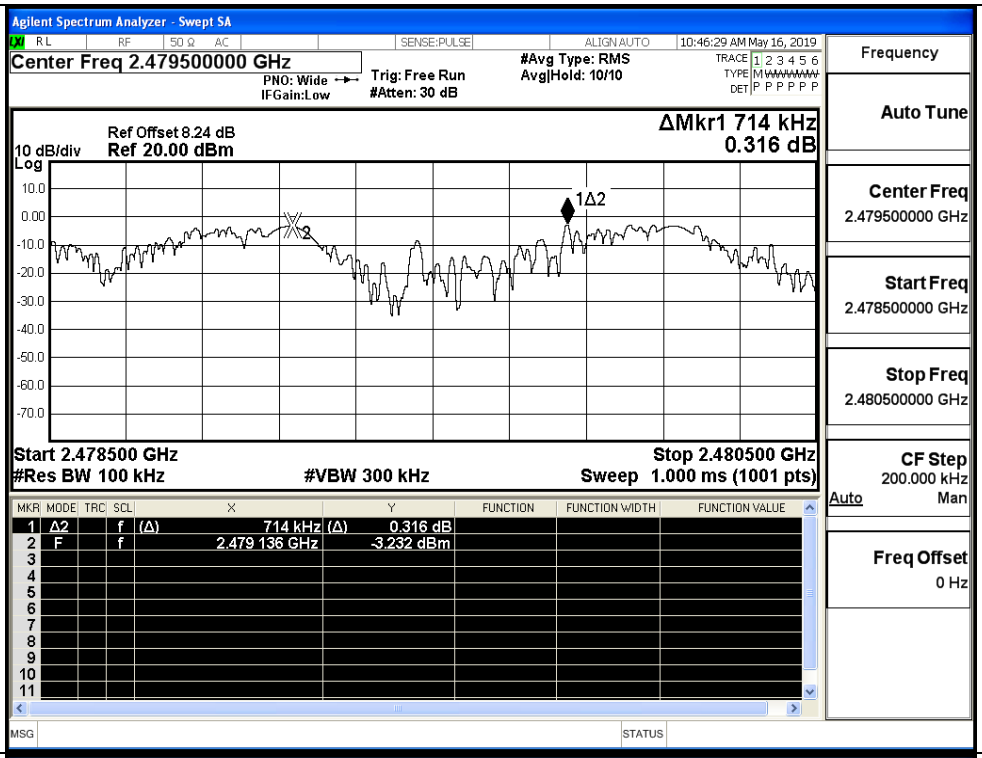
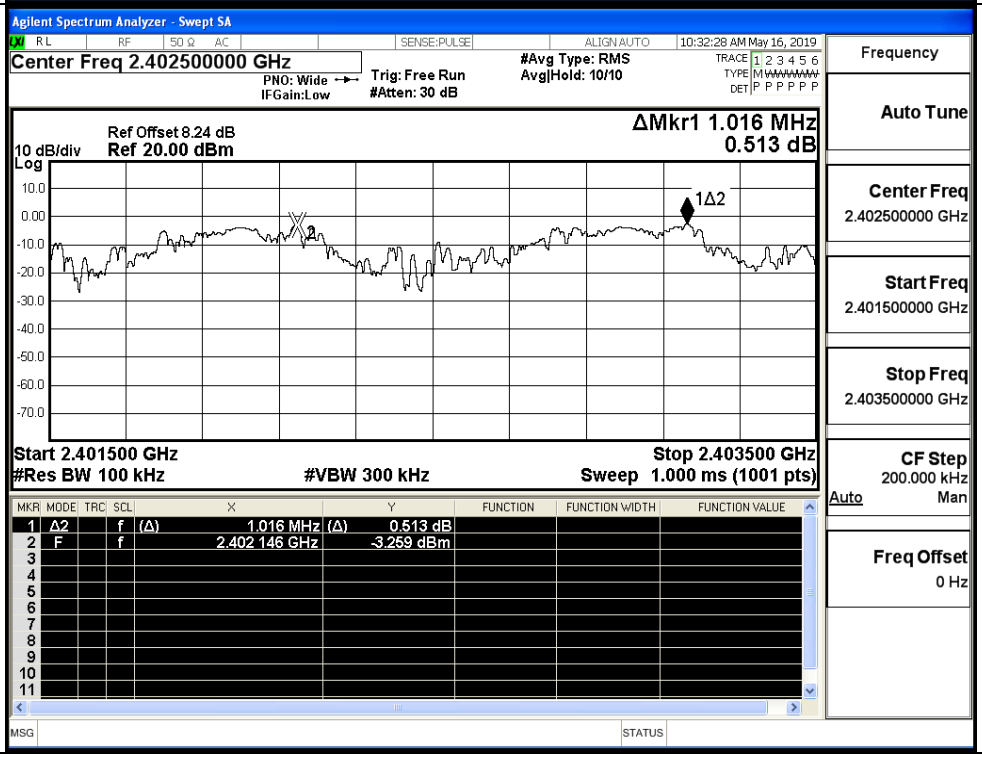
Test Graphs

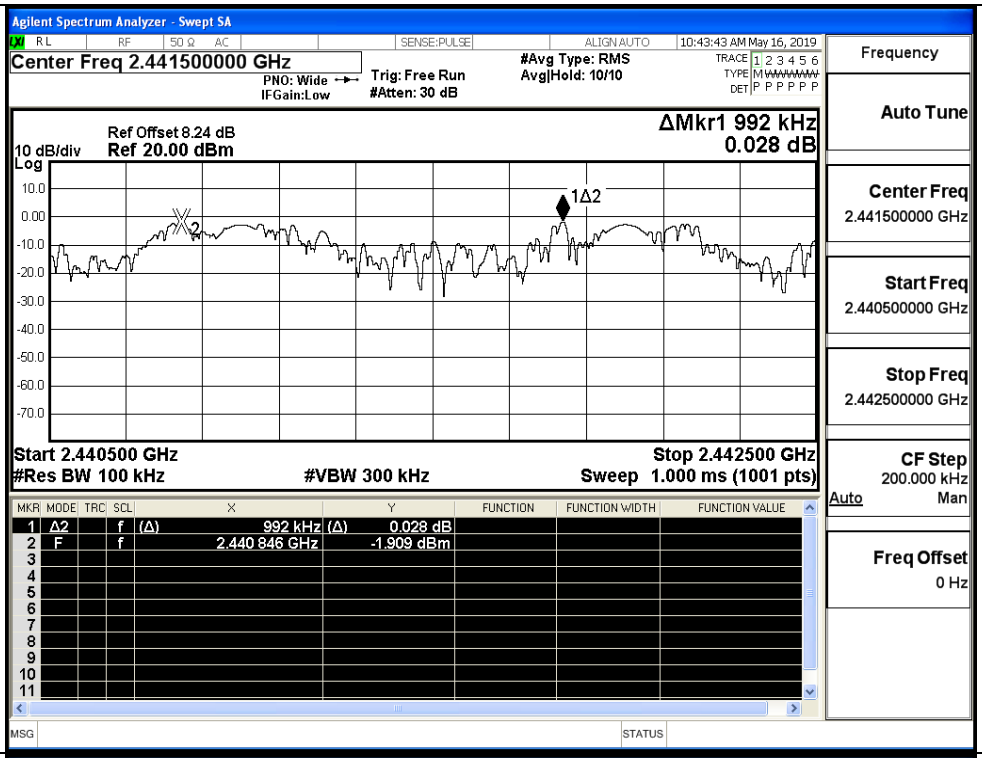
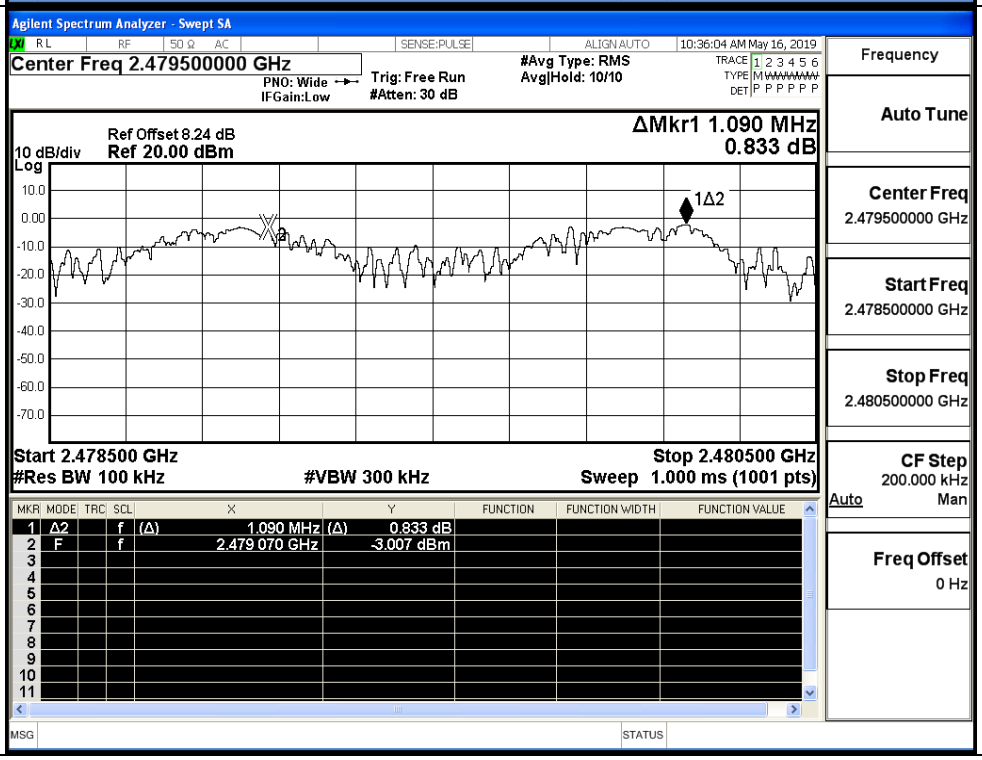
GFSK/LCH



GFSK/MCH	
GFSK/HCH	

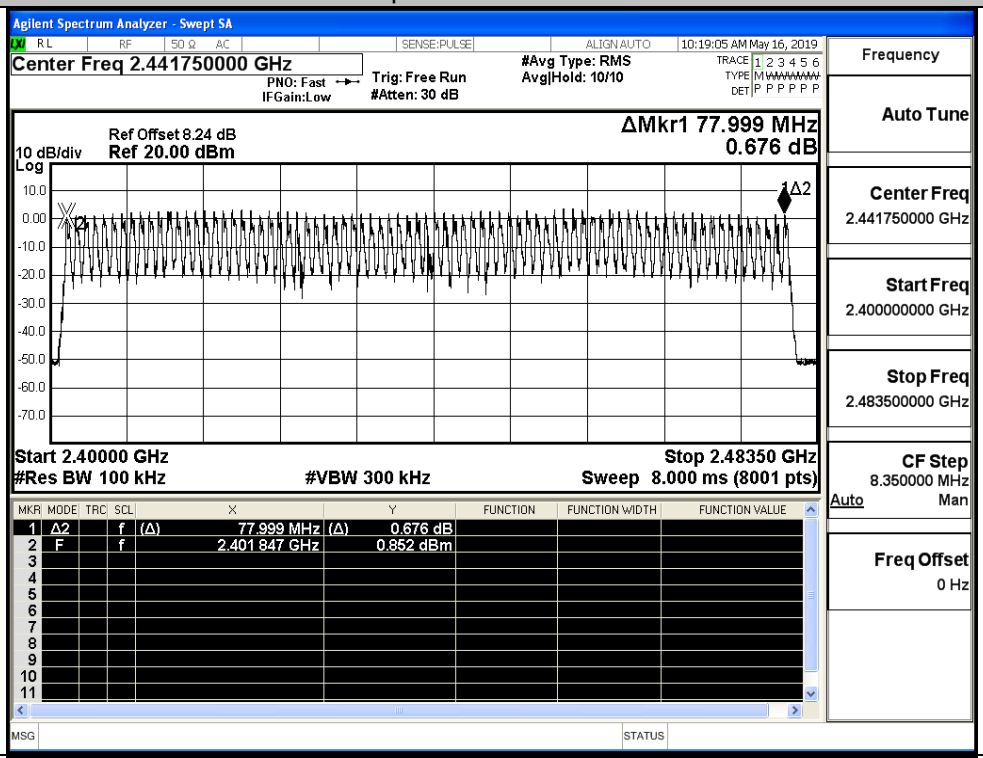
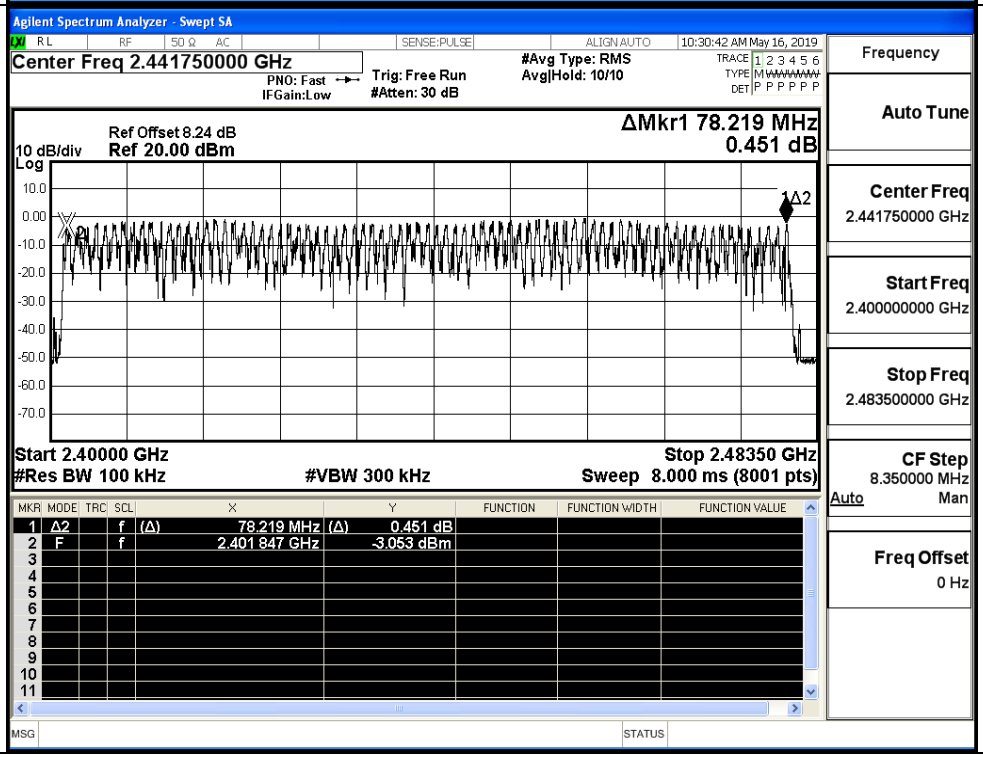
π/4DQPSK/LCH	
π/4DQPSK/MCH	

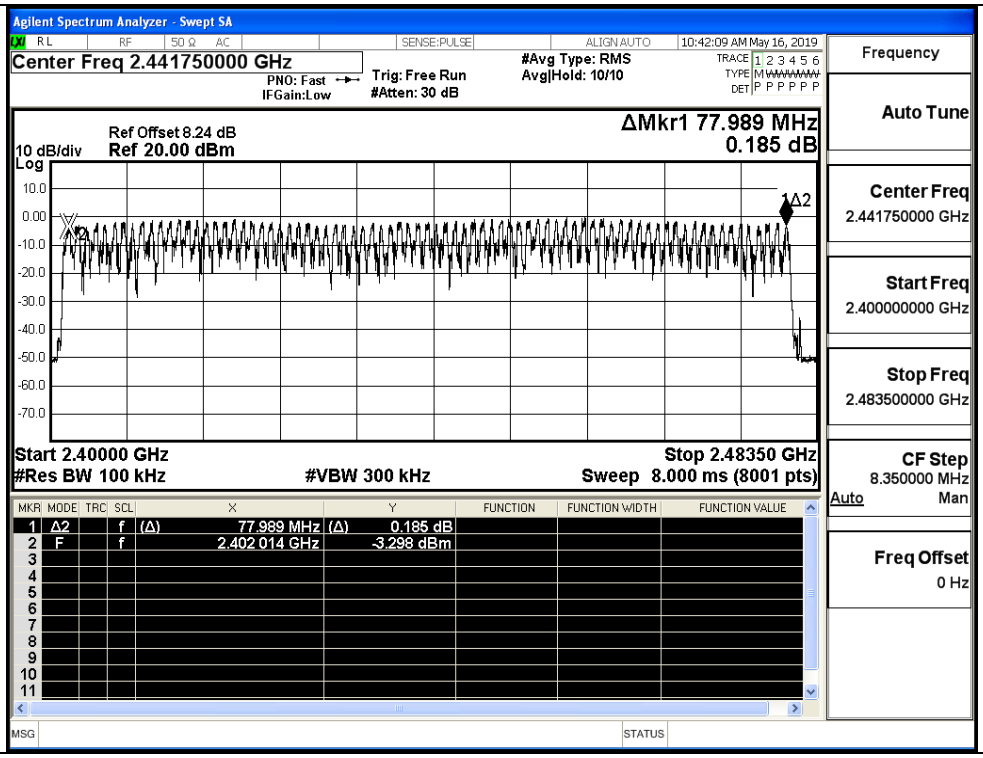
π/4DQPSK/HCH	
8DPSK/LCH	

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	

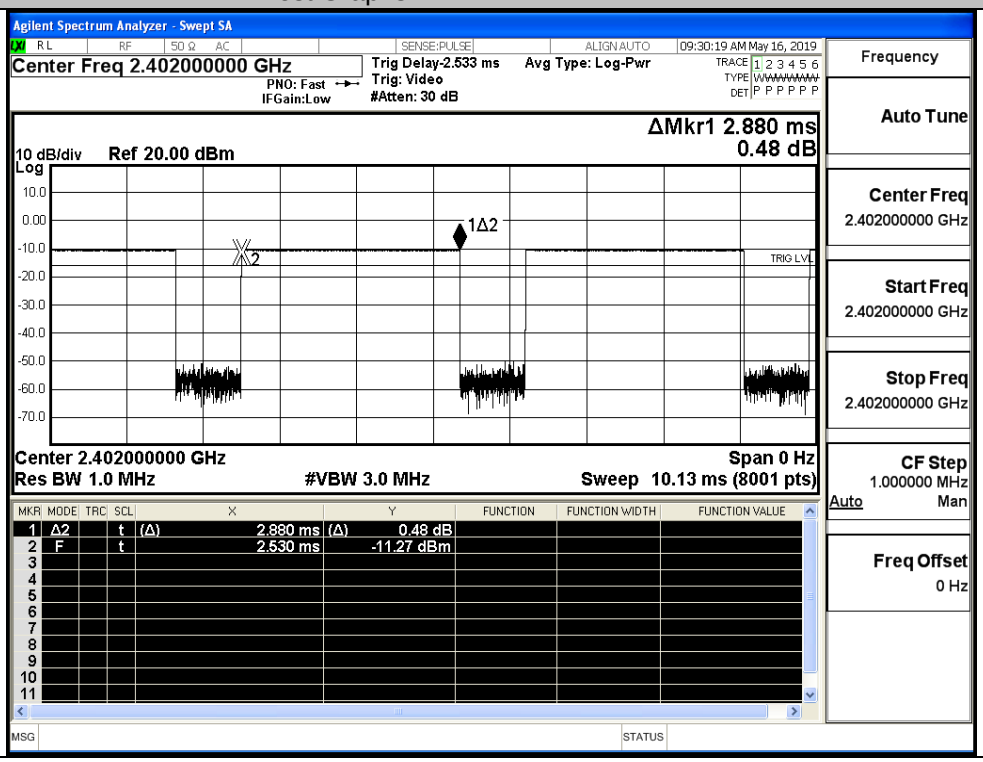
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
10:42:09 AM May 16, 2019
Ref Offset 8.24 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 77.989 MHz
0.185 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 77.989 MHz (Δ) 0.185 dB
2 F f 2.402 014 GHz -3.298 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

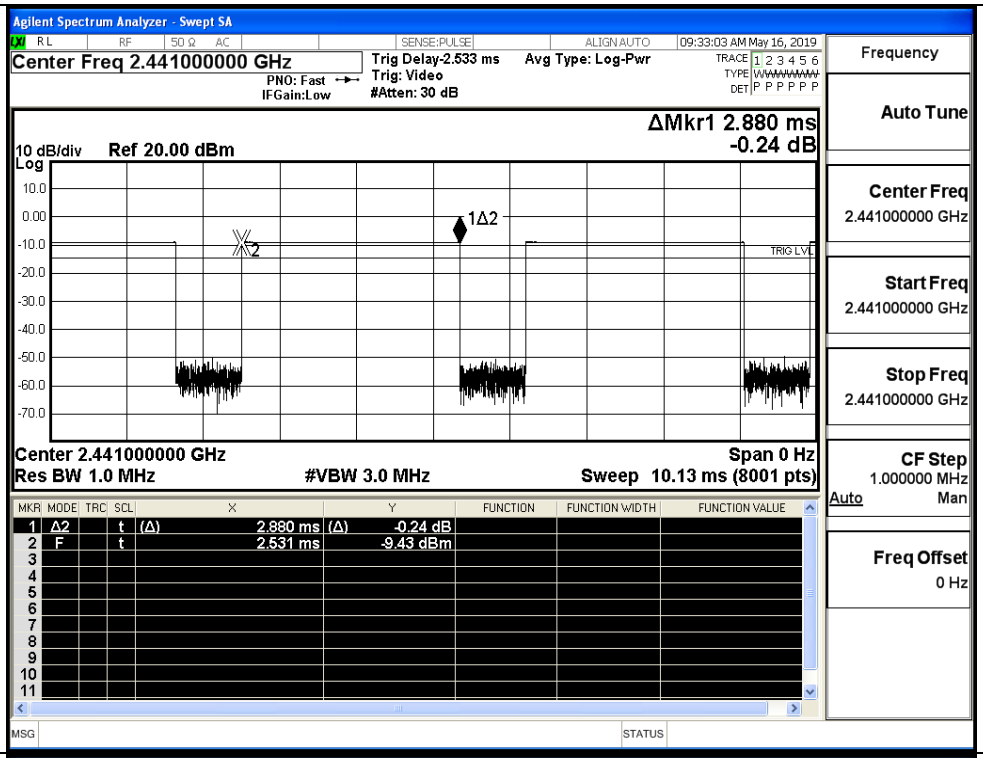
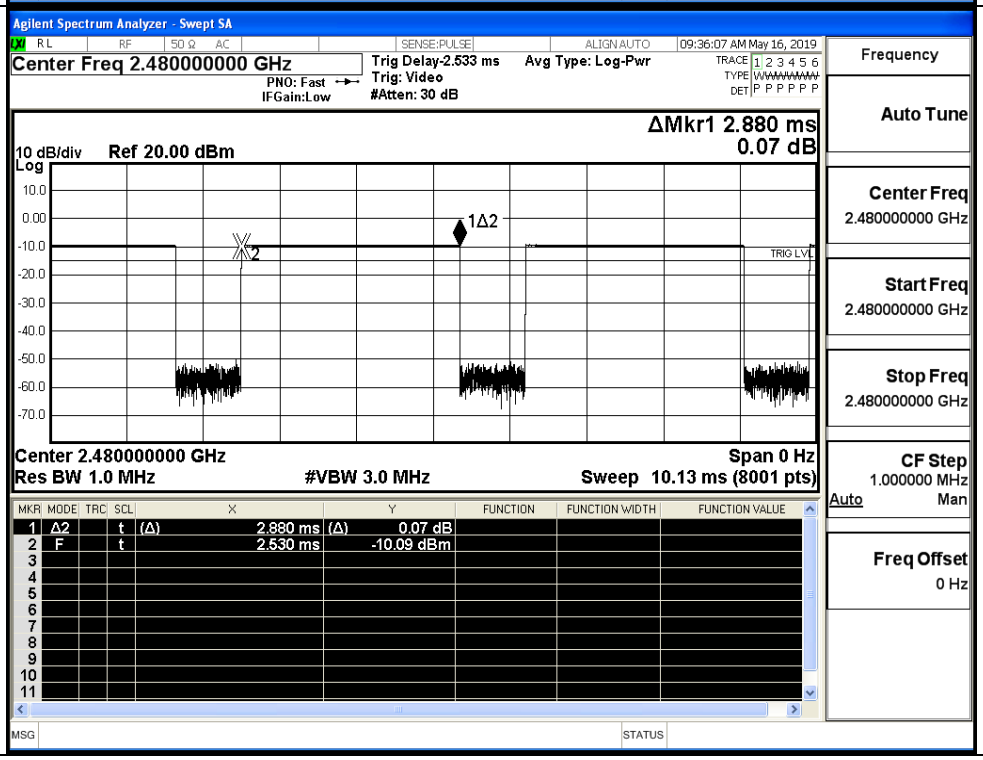
A.5 Dwell Time

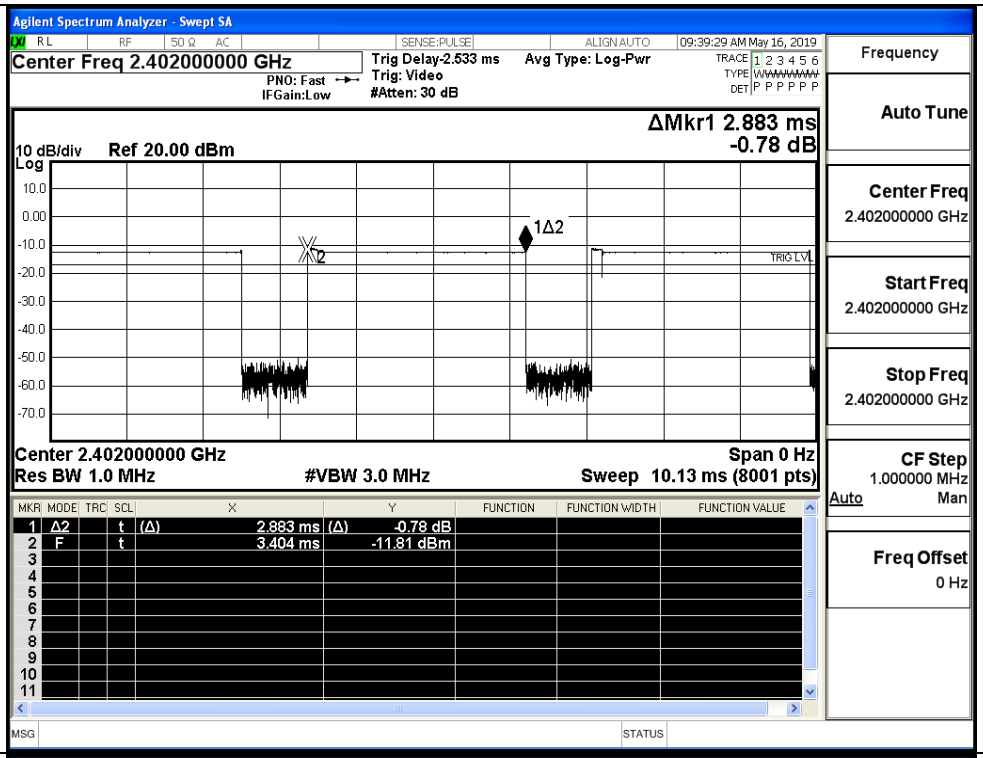
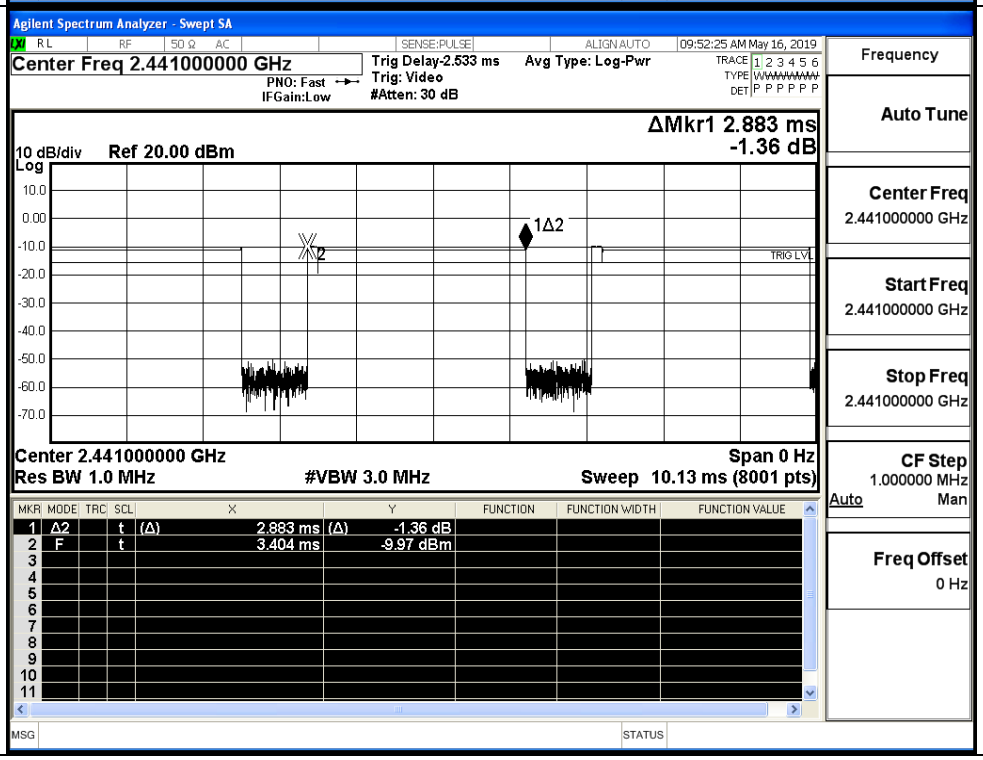
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7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

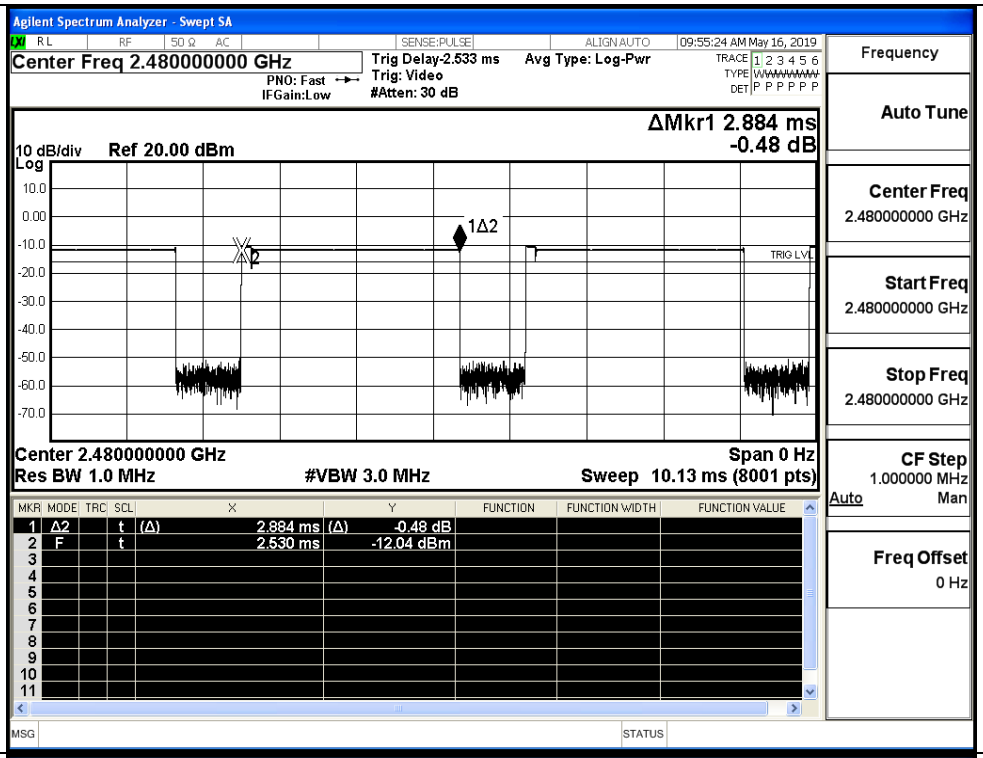
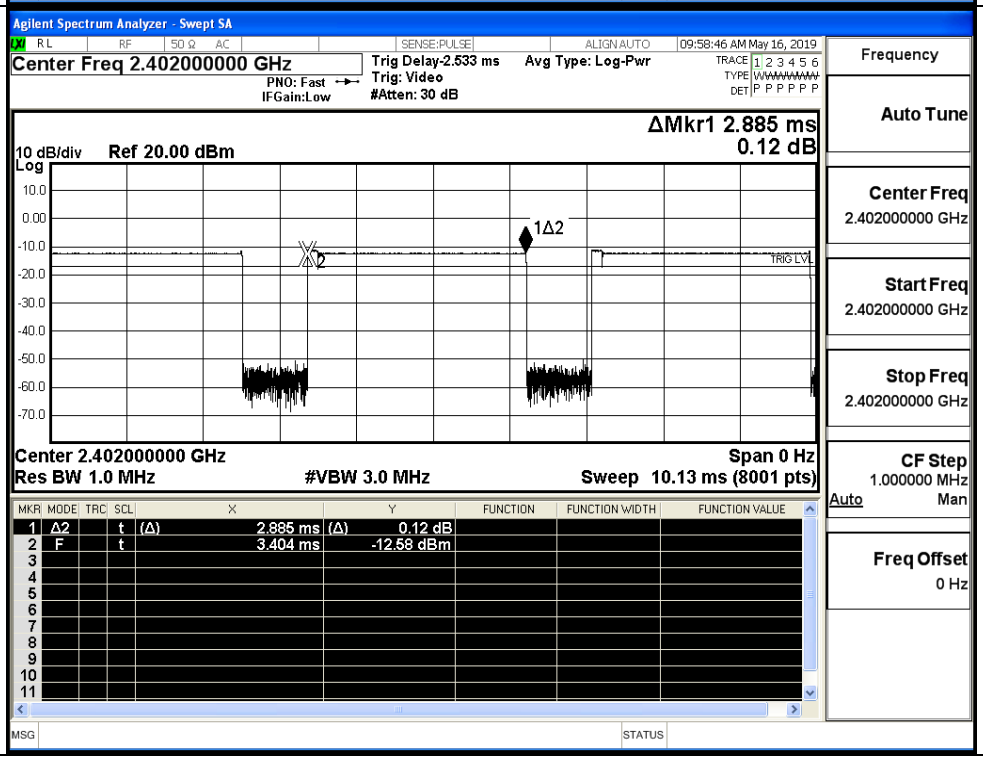
Test Graphs

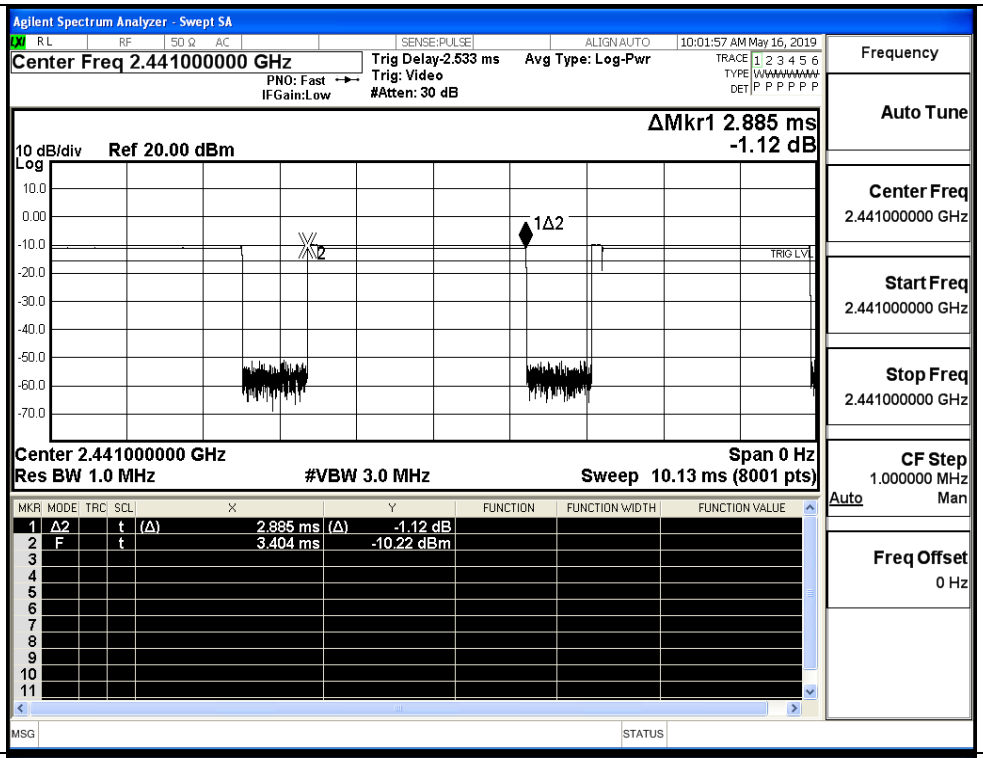
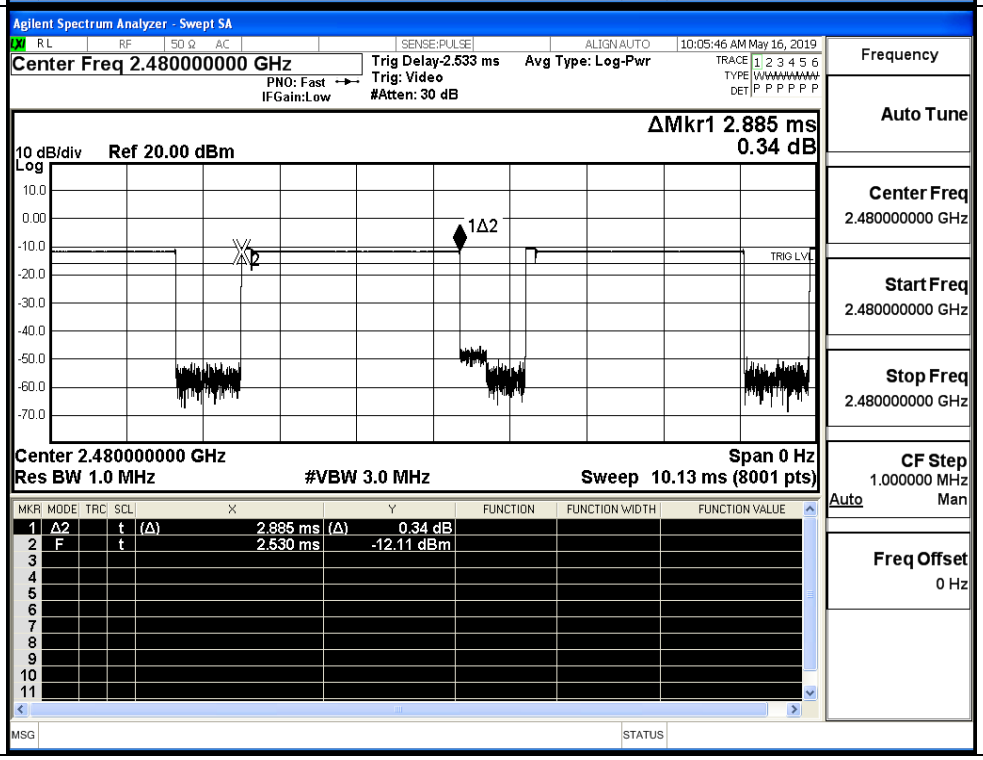
GFSK_DH5/LCH



GFSK_DH5/MCH	
GFSK_DH5/HCH	

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

π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

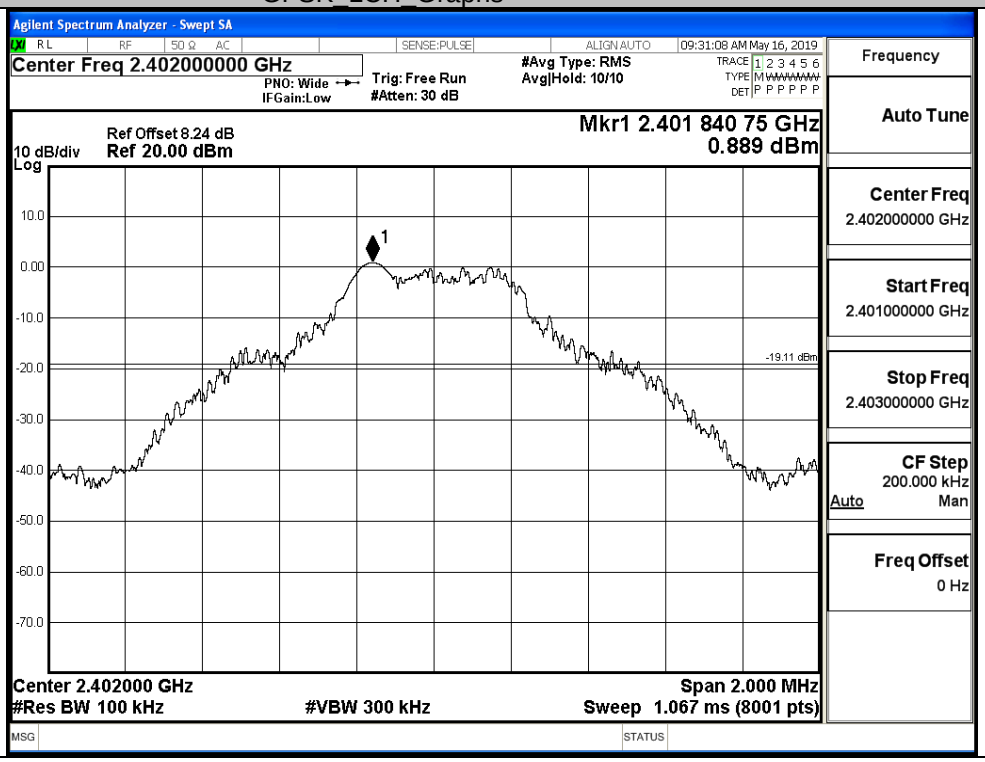
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

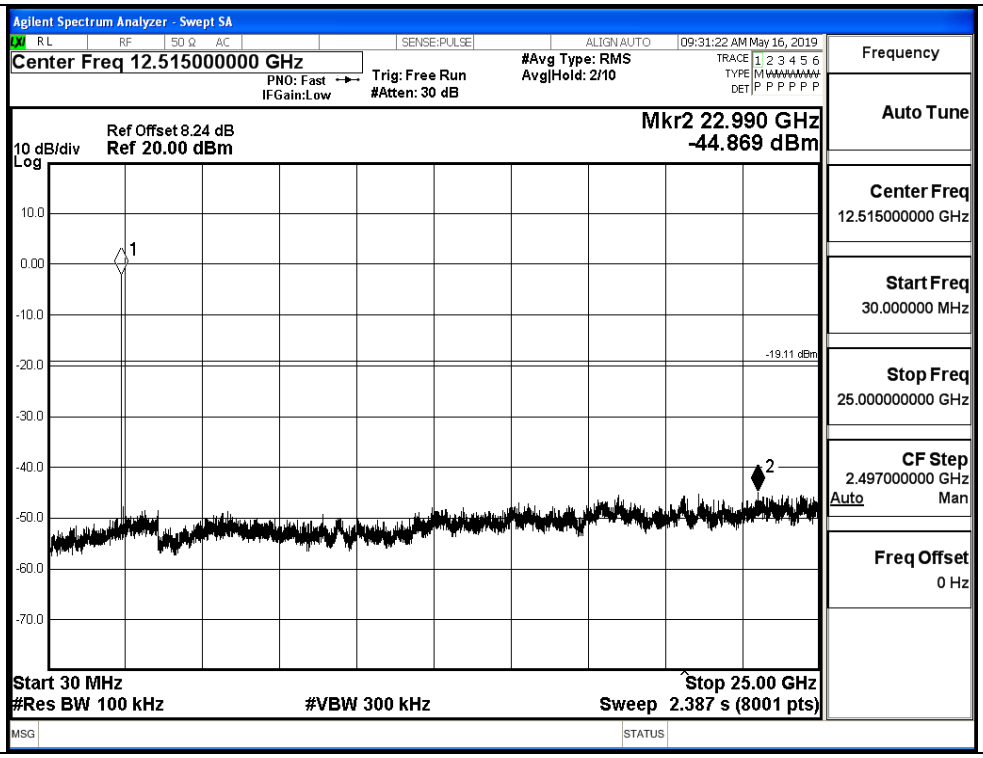
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.889	-44.869	-19.111	PASS
	MCH	-0.509	-44.934	-20.509	PASS
	HCH	-0.917	-42.346	-20.917	PASS
π/4DQPSK	LCH	-0.592	-43.859	-20.592	PASS
	MCH	-1.728	-45.400	-21.728	PASS
	HCH	-2.264	-44.748	-22.264	PASS
8DPSK	LCH	-0.374	-43.803	-20.374	PASS
	MCH	-1.684	-44.611	-21.684	PASS
	HCH	-2.154	-44.586	-22.154	PASS

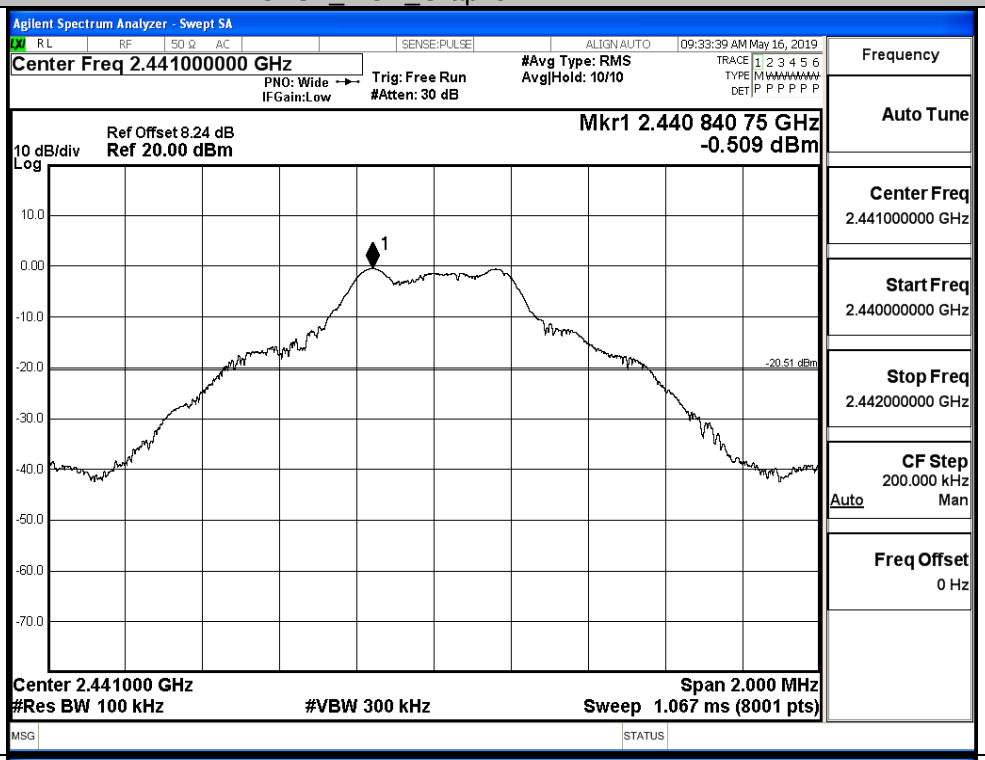
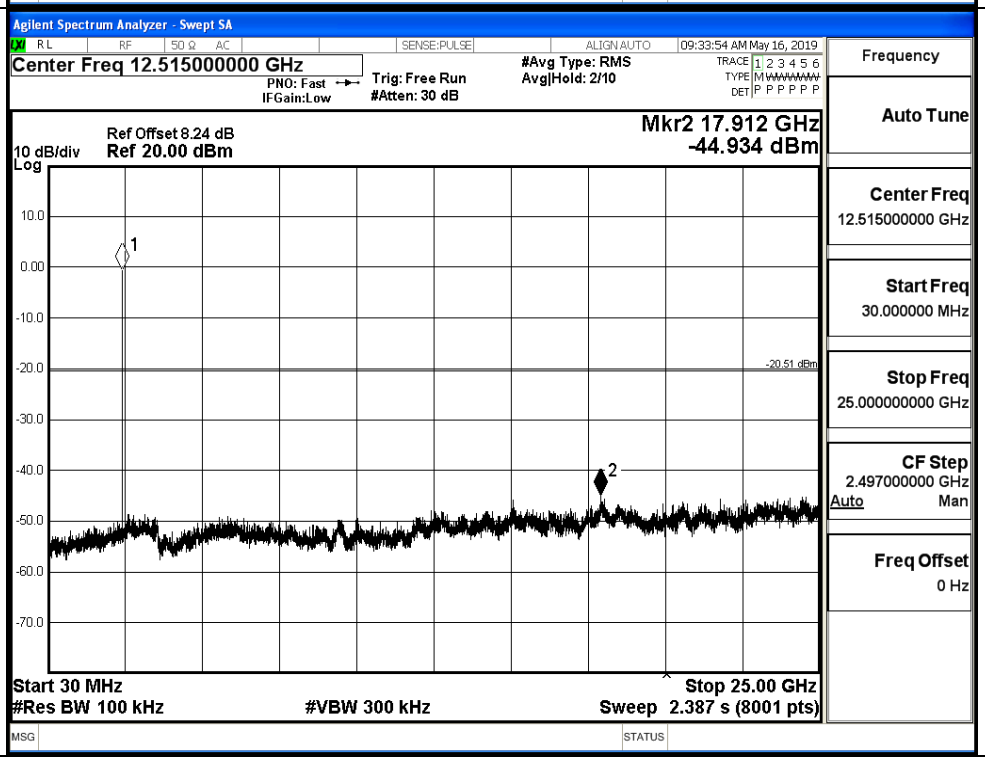
GFSK_LCH_Graphs

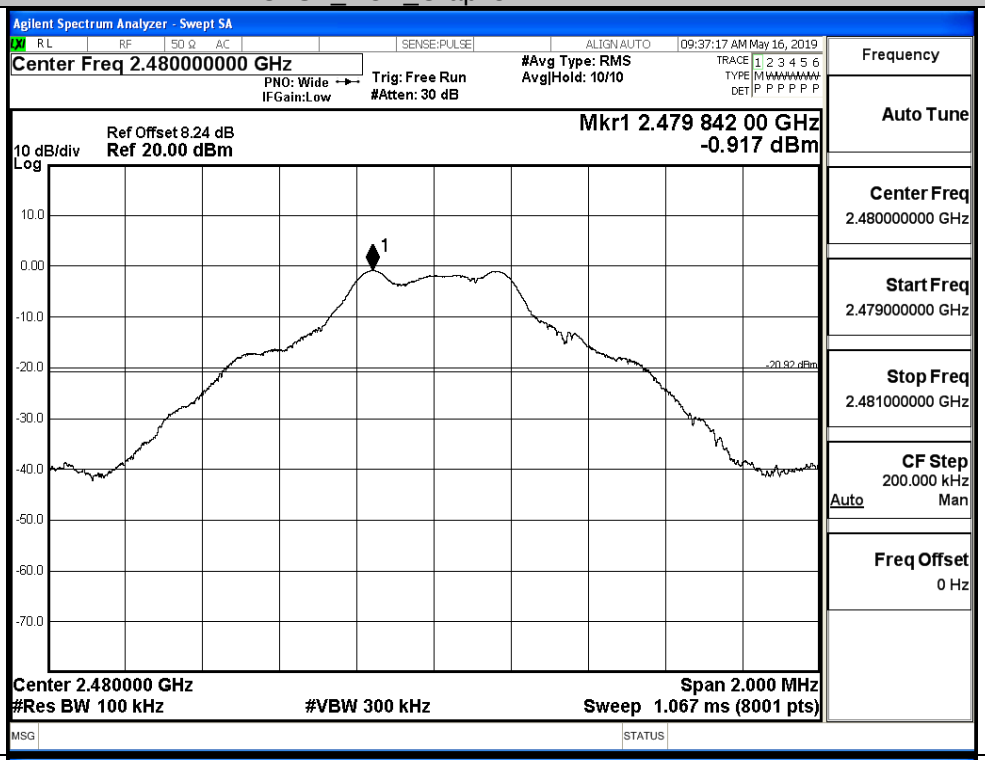
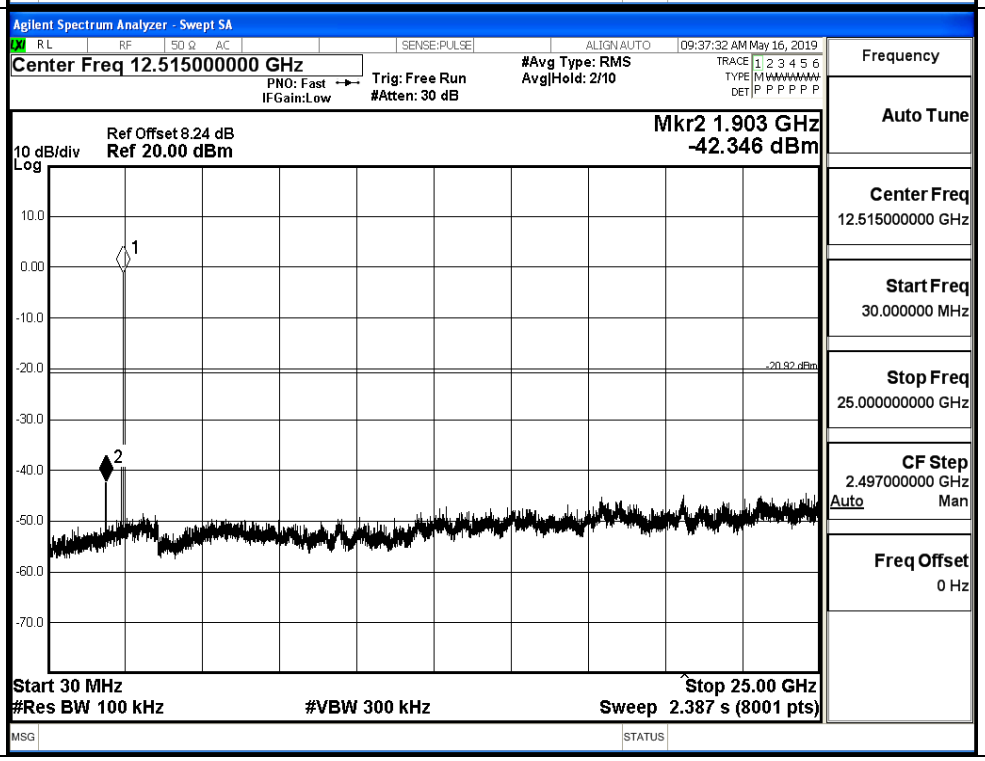
Pref

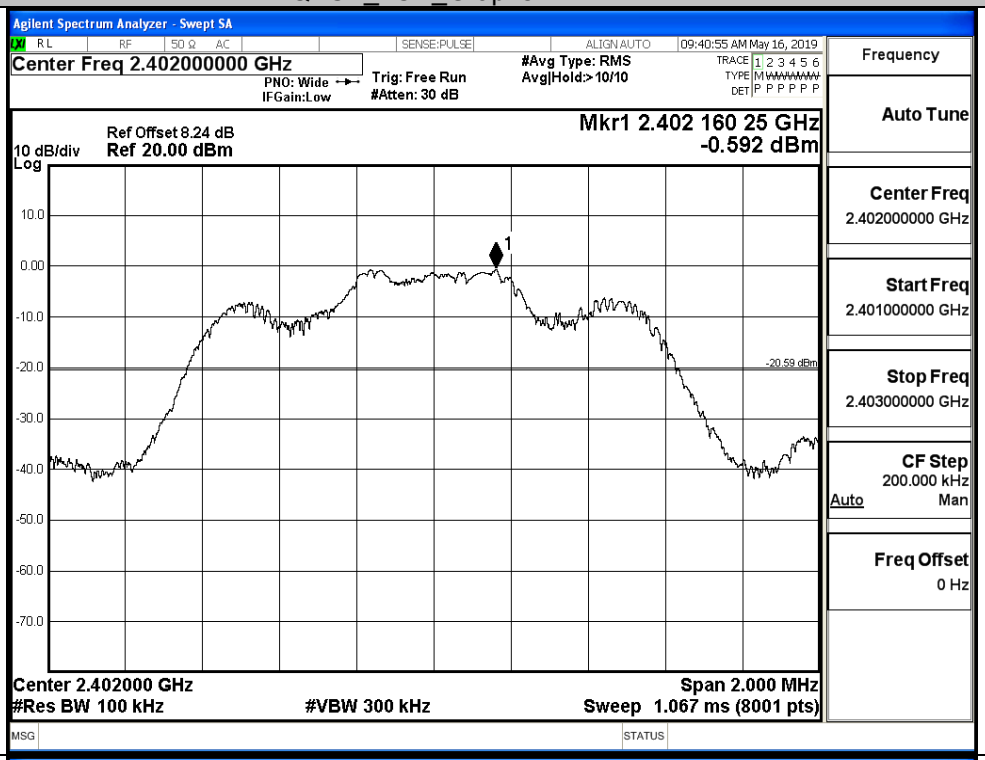
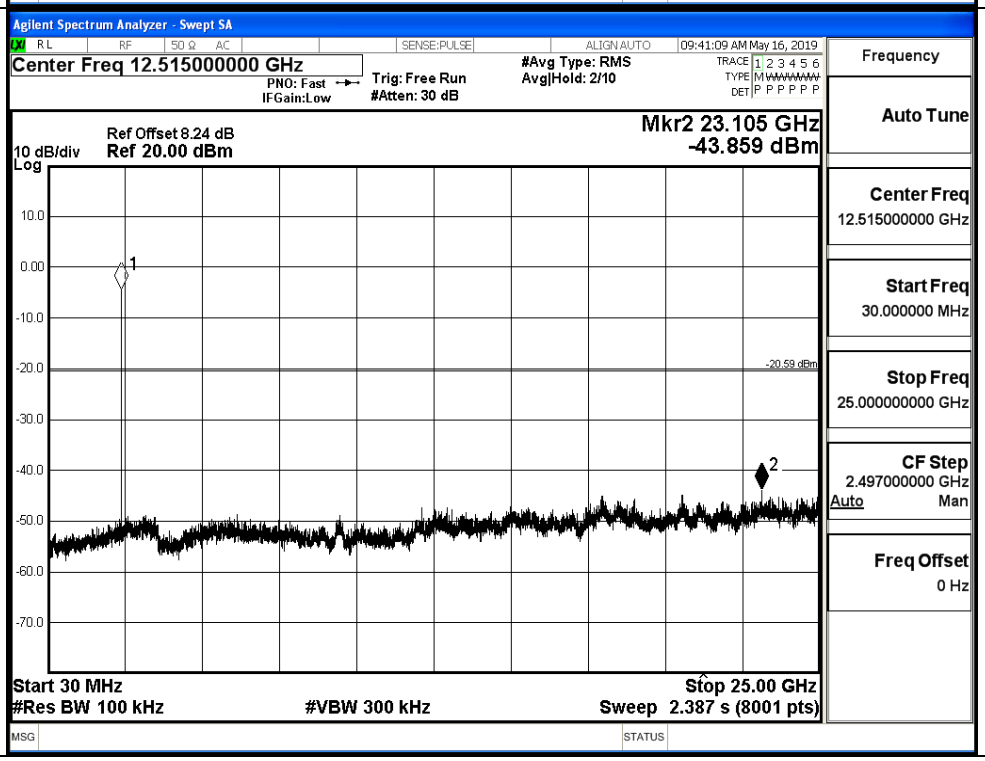


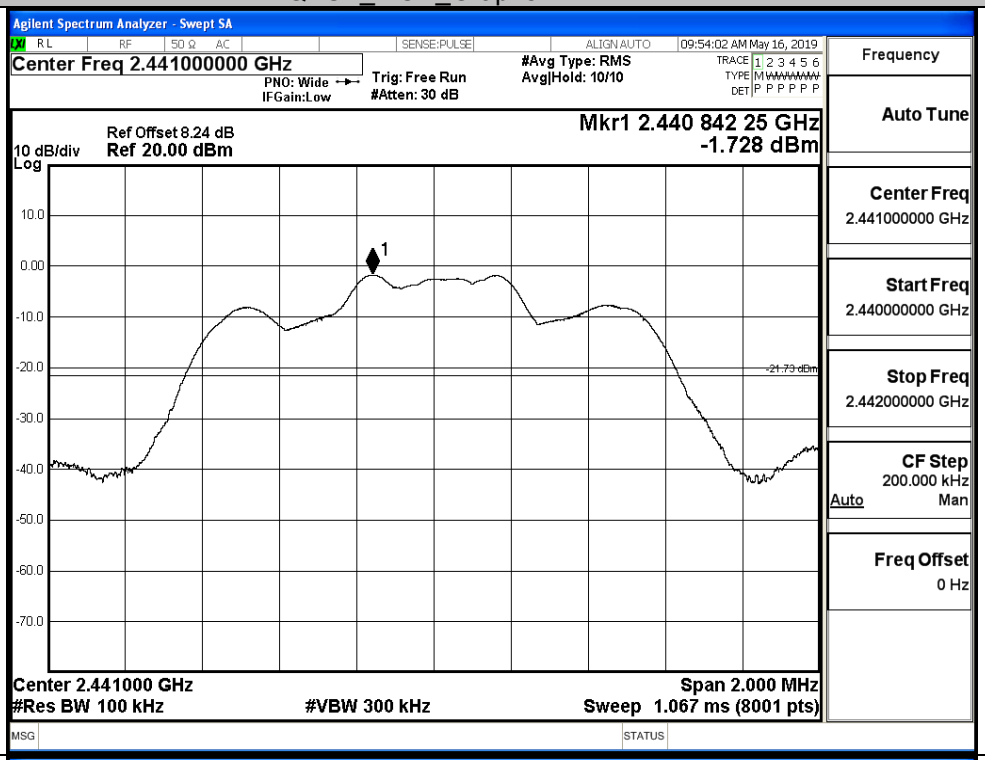
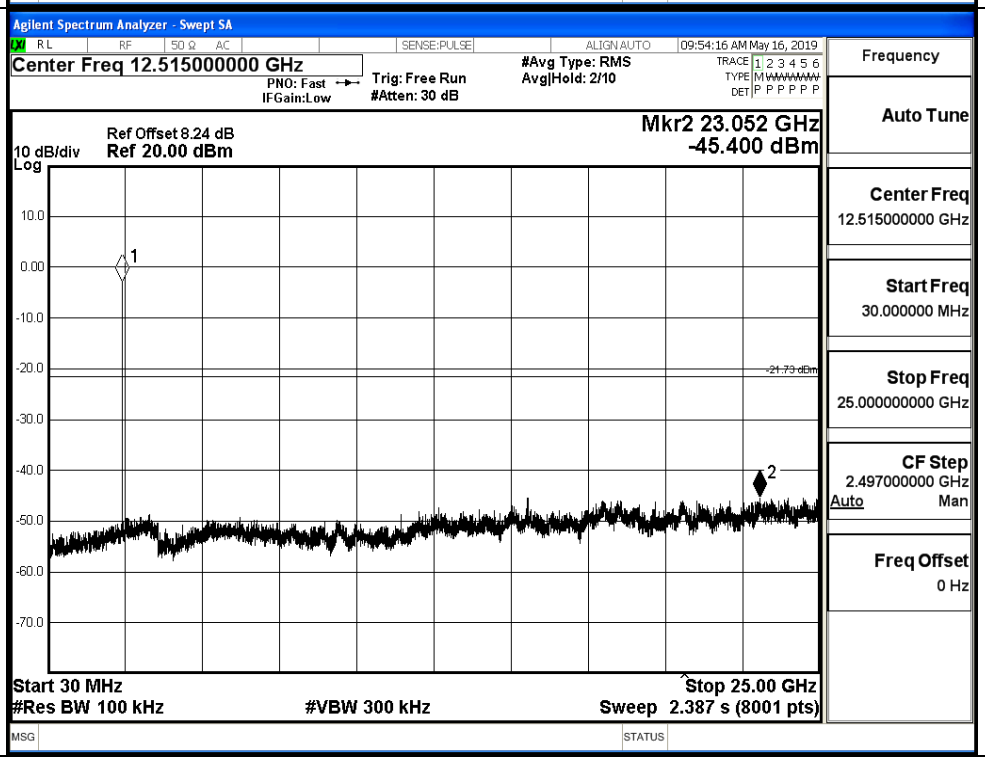
Puw		

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
09:31:22 AM May 16, 2019
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
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
Mkr2 22.990 GHz
-44.869 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-19.11 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (8001 pts)
MSG
STATUS
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		

GFSK_HCH_Graphs		
Pref		
Puw		

π/4DQPSK_LCH_Graphs		
Pref		
Puw		

π/4DQPSK_MCH_Graphs			
Pref			
Puw			

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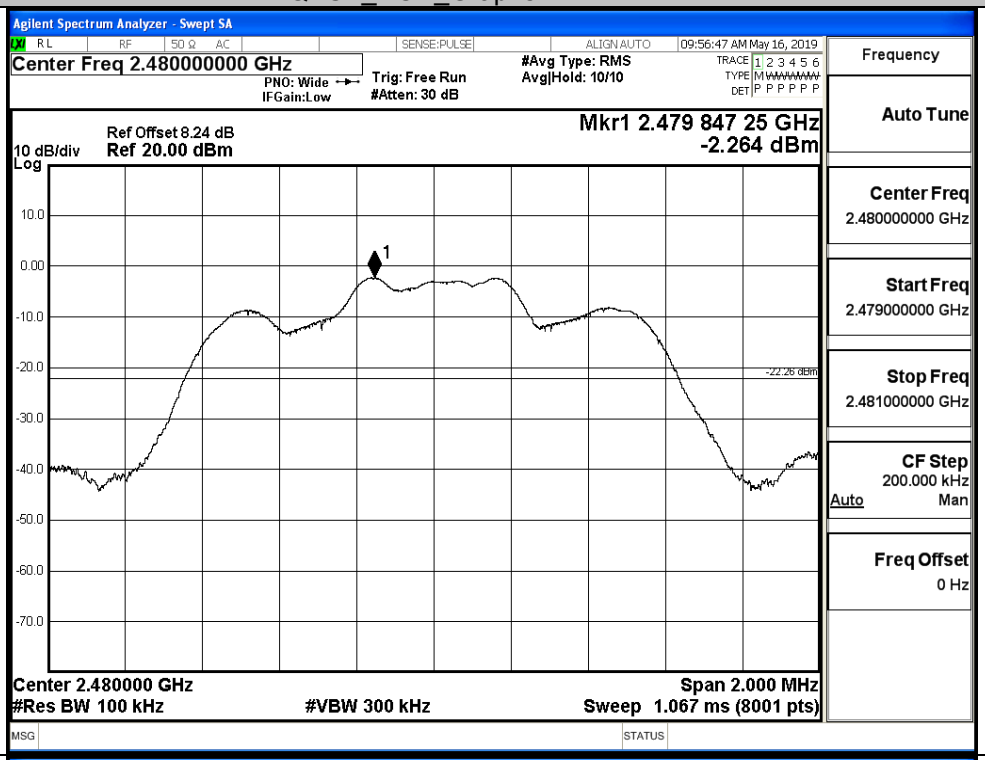
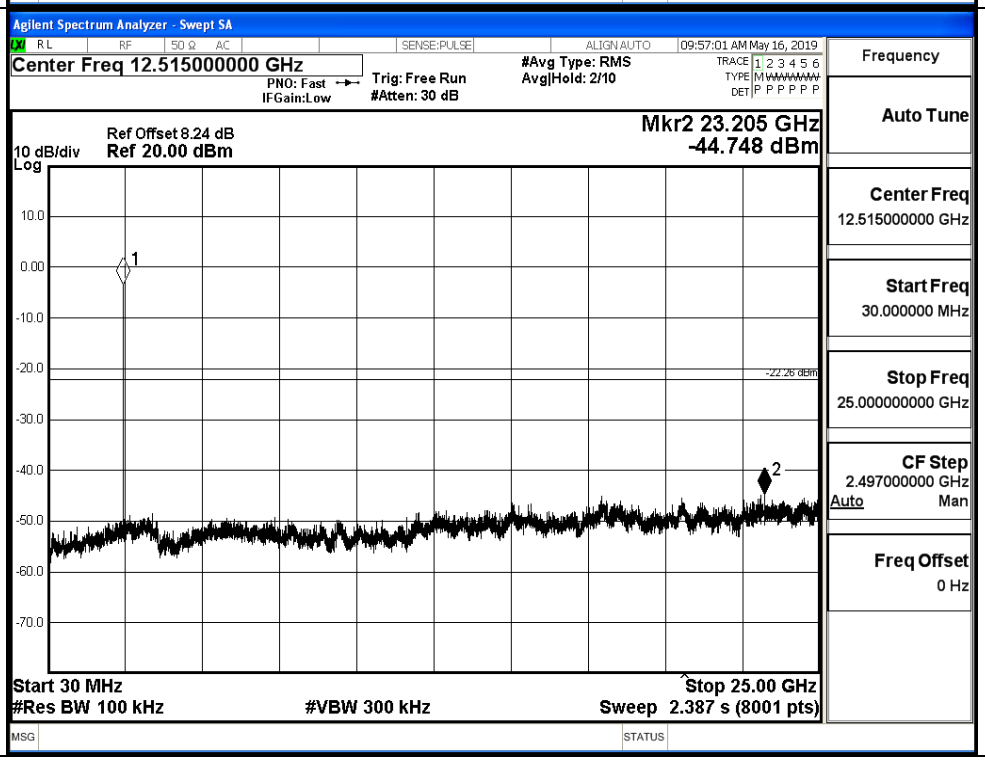
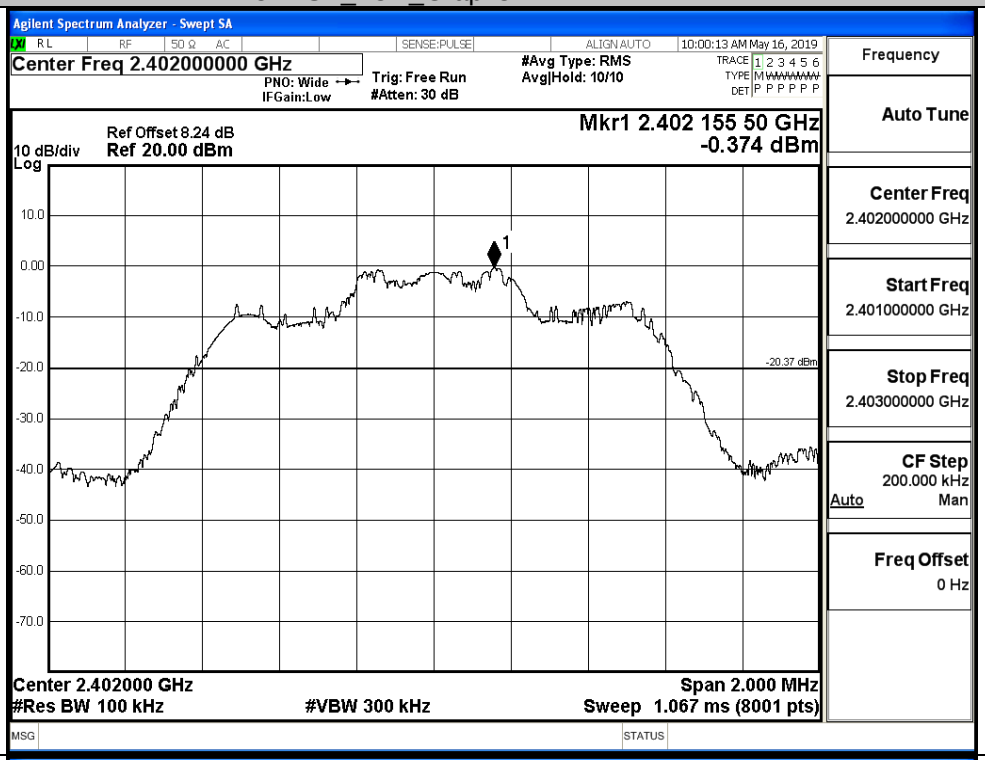
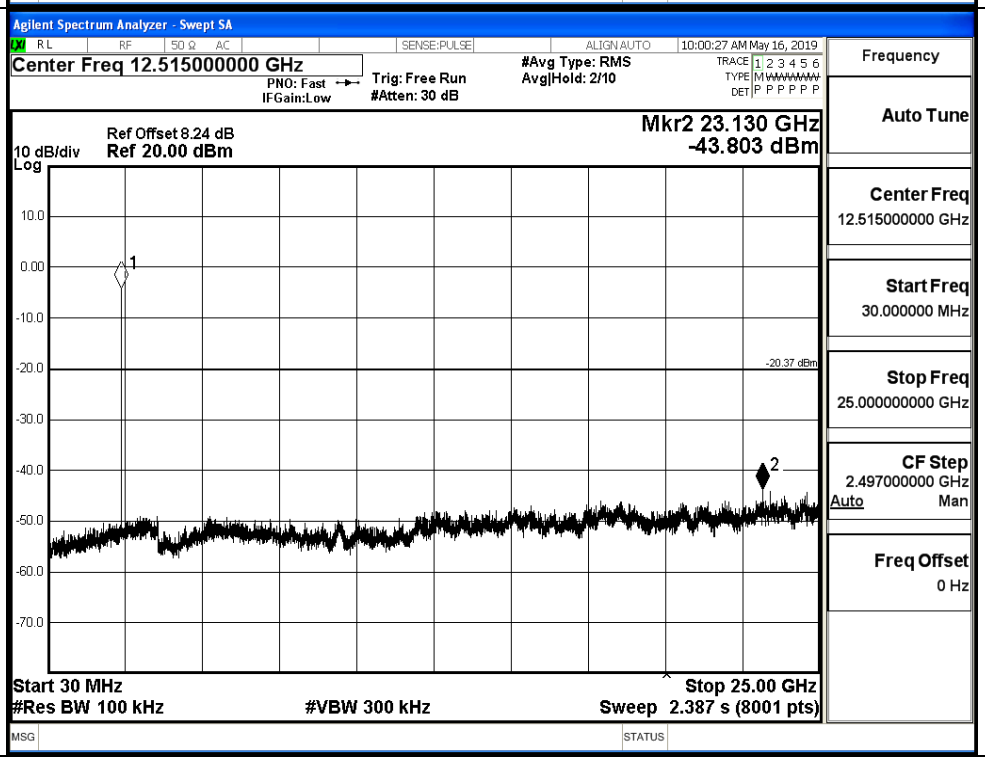
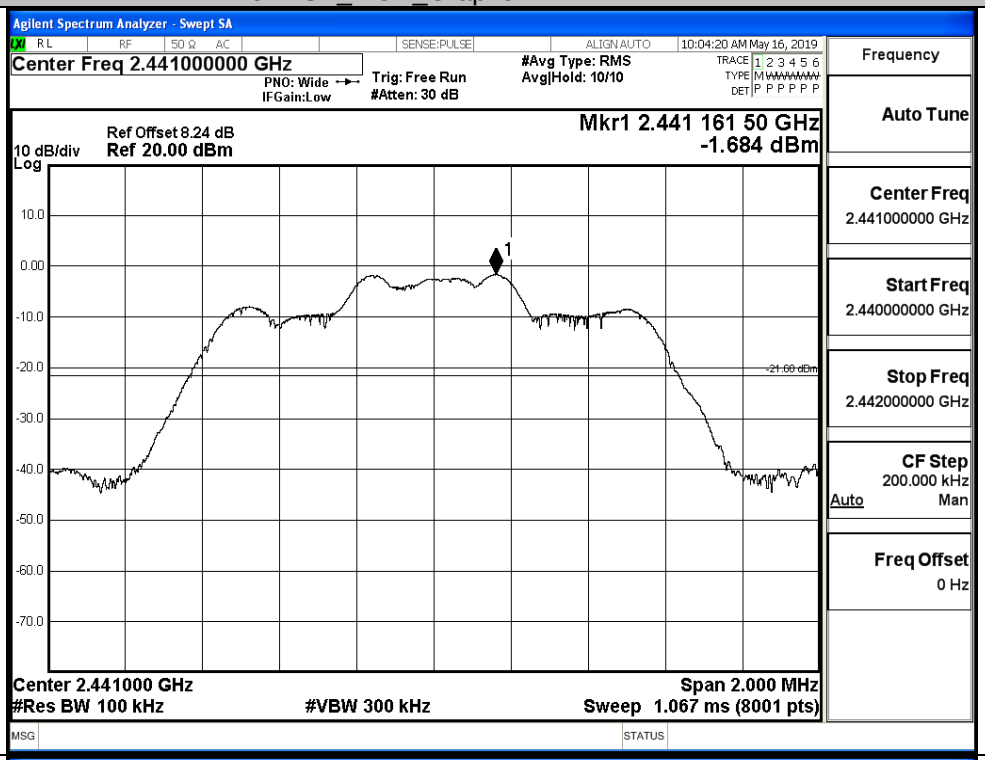
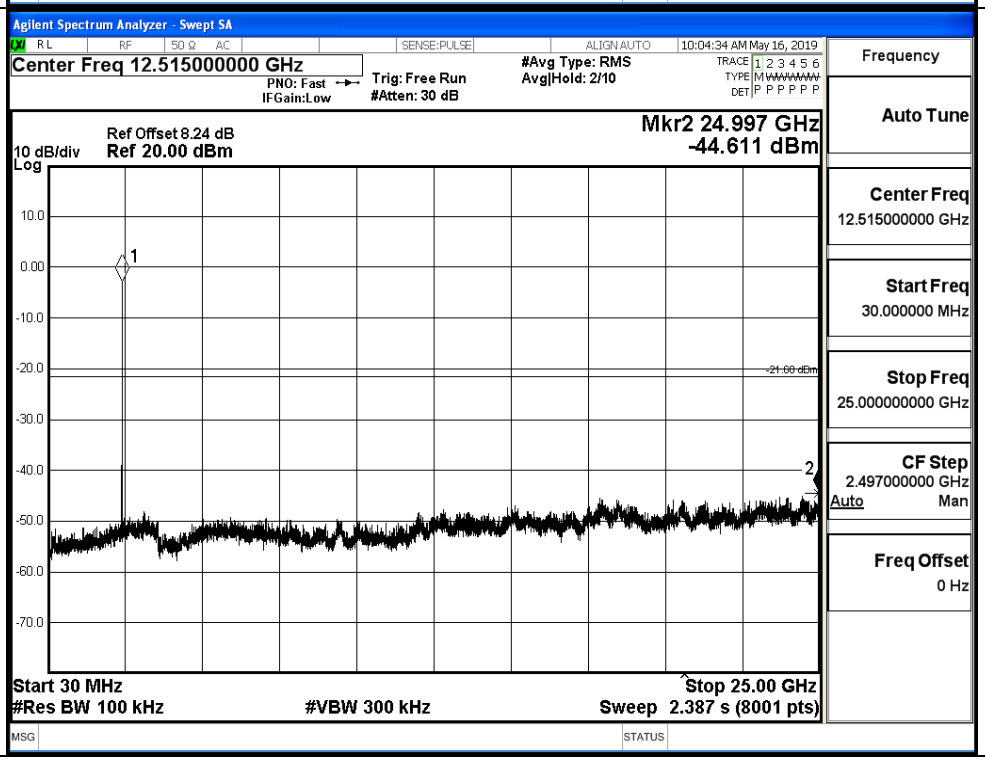
Pref		
Puw		

8DPSK_LCH_Graphs		
Pref		
Puw		

8DPSK_MCH_Graphs			
Pref			
Puw			

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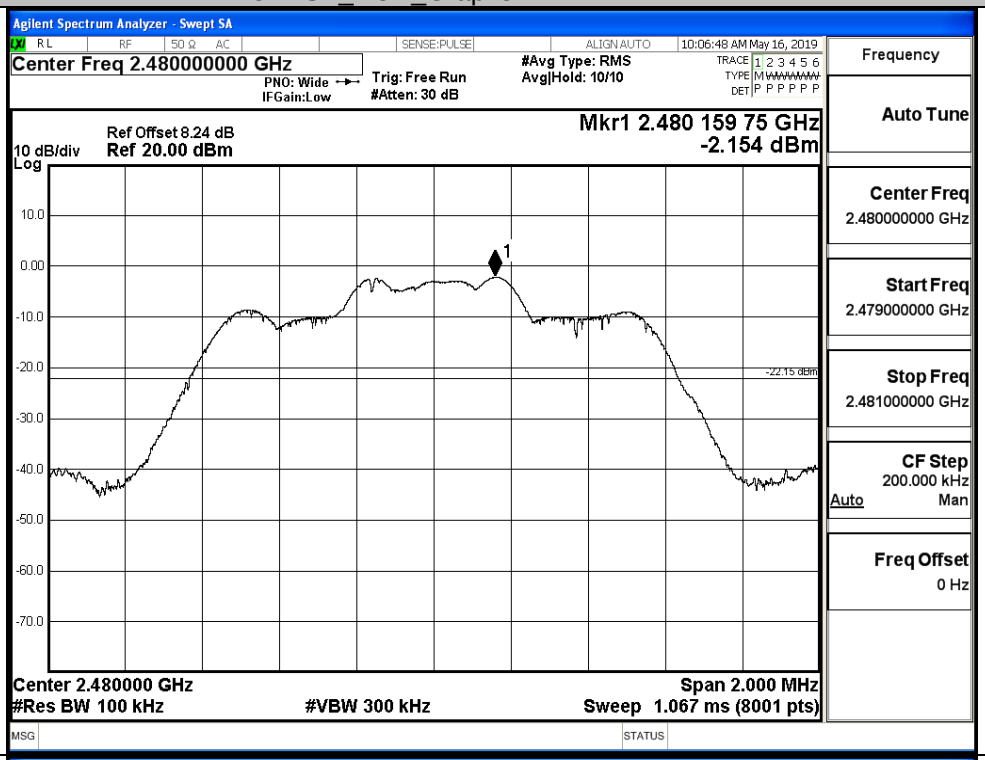
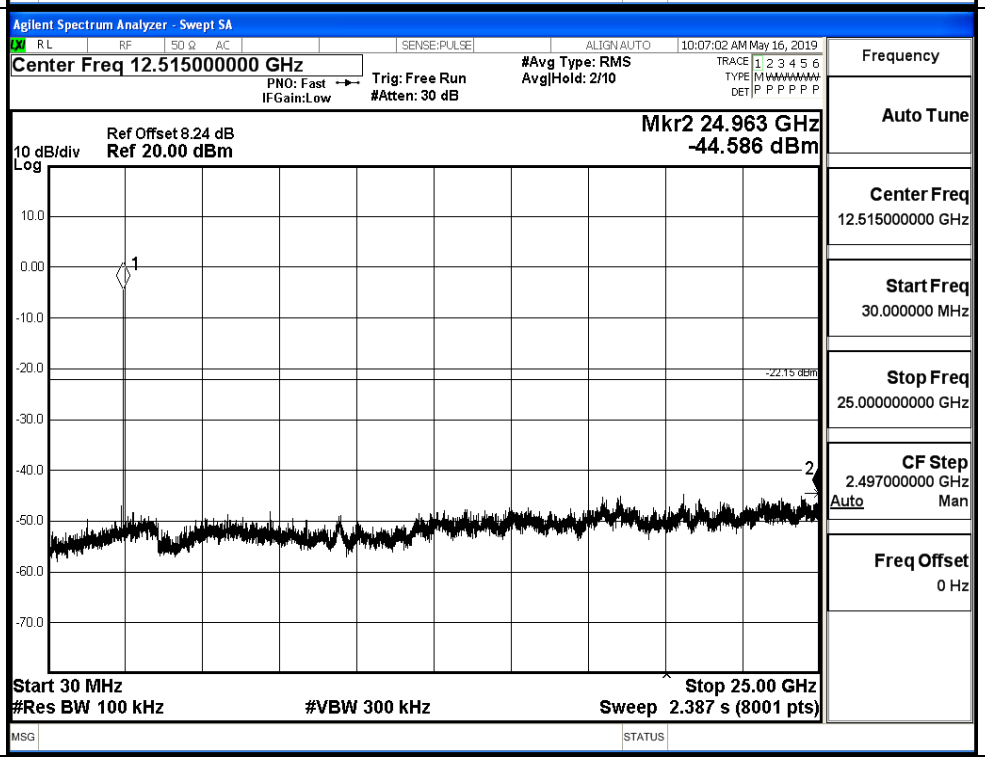
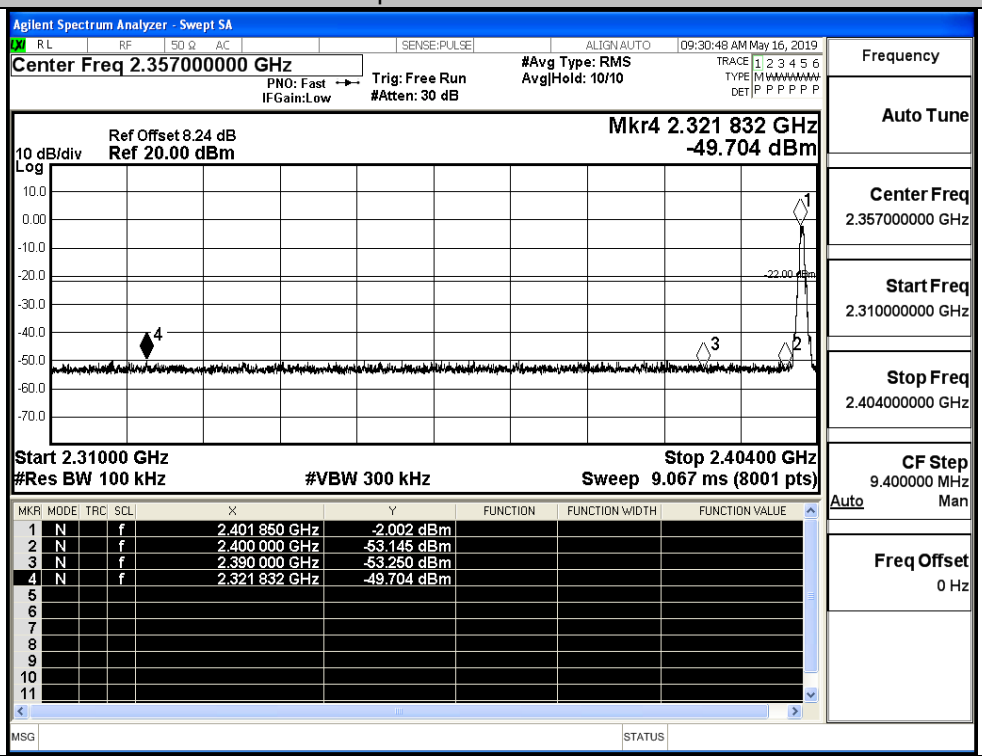
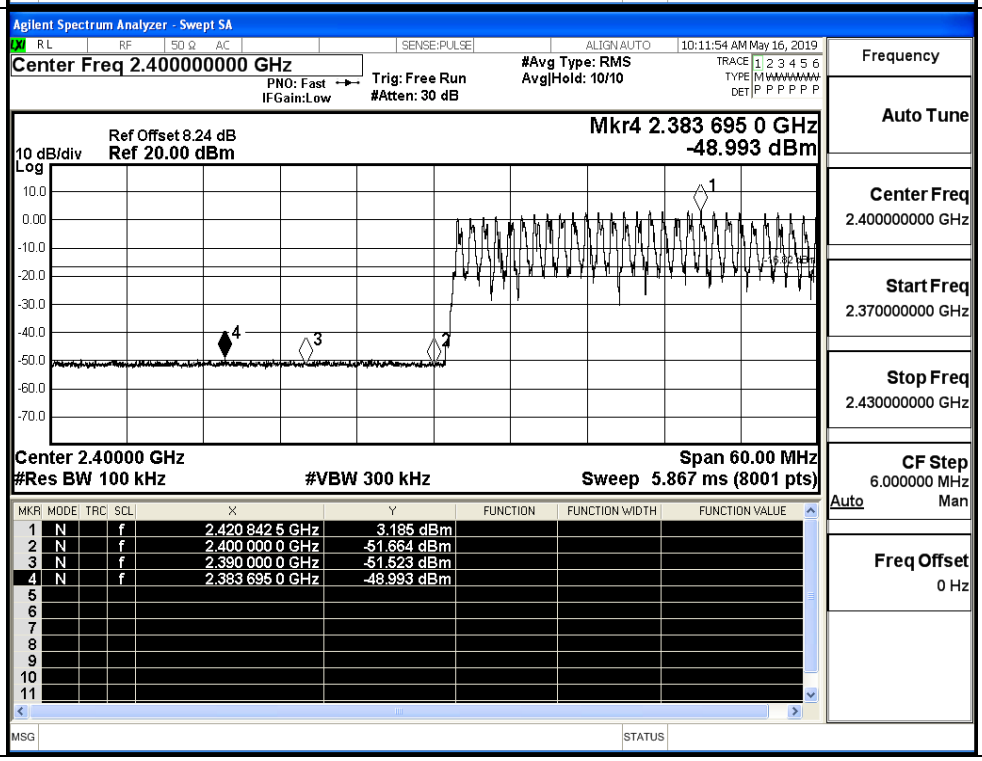
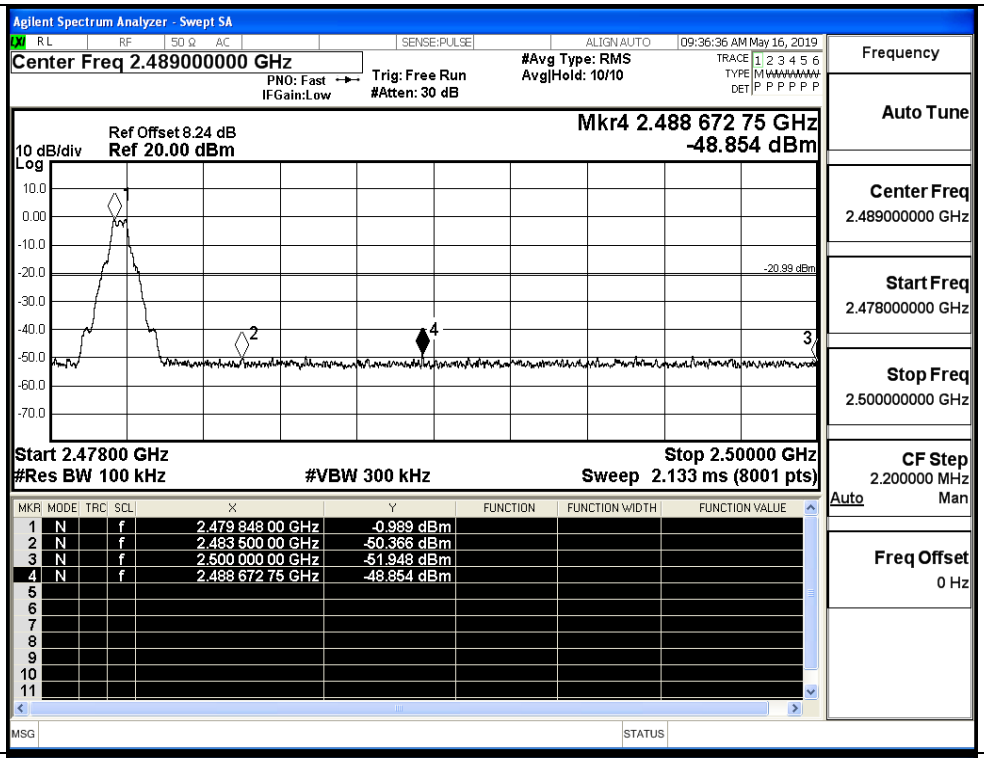
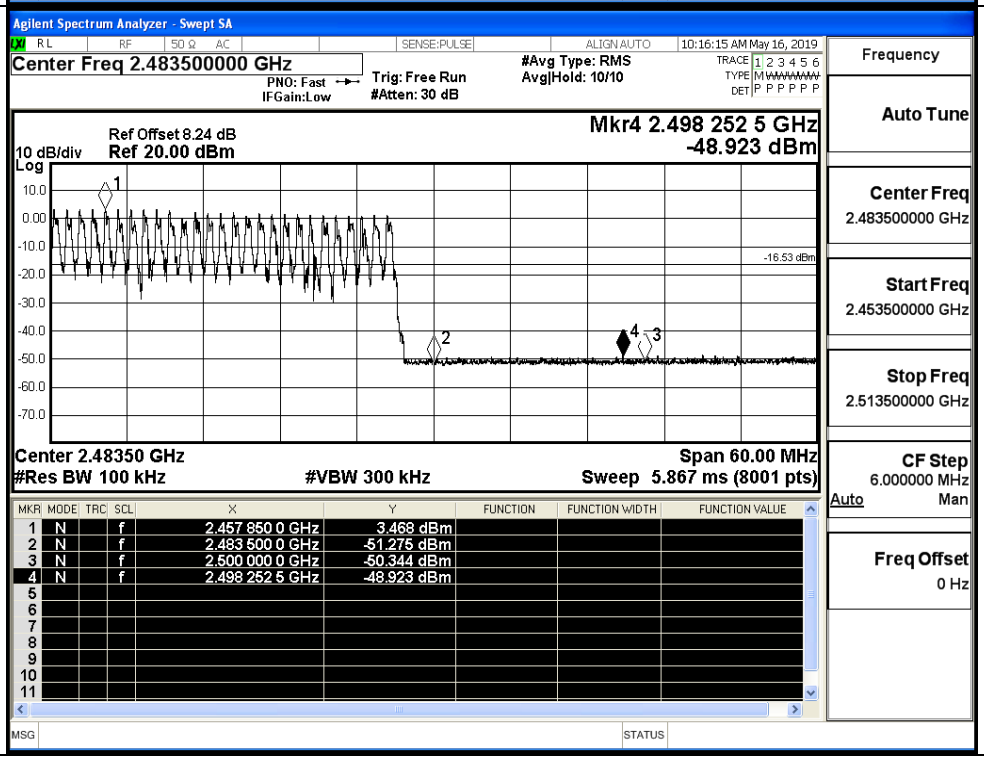
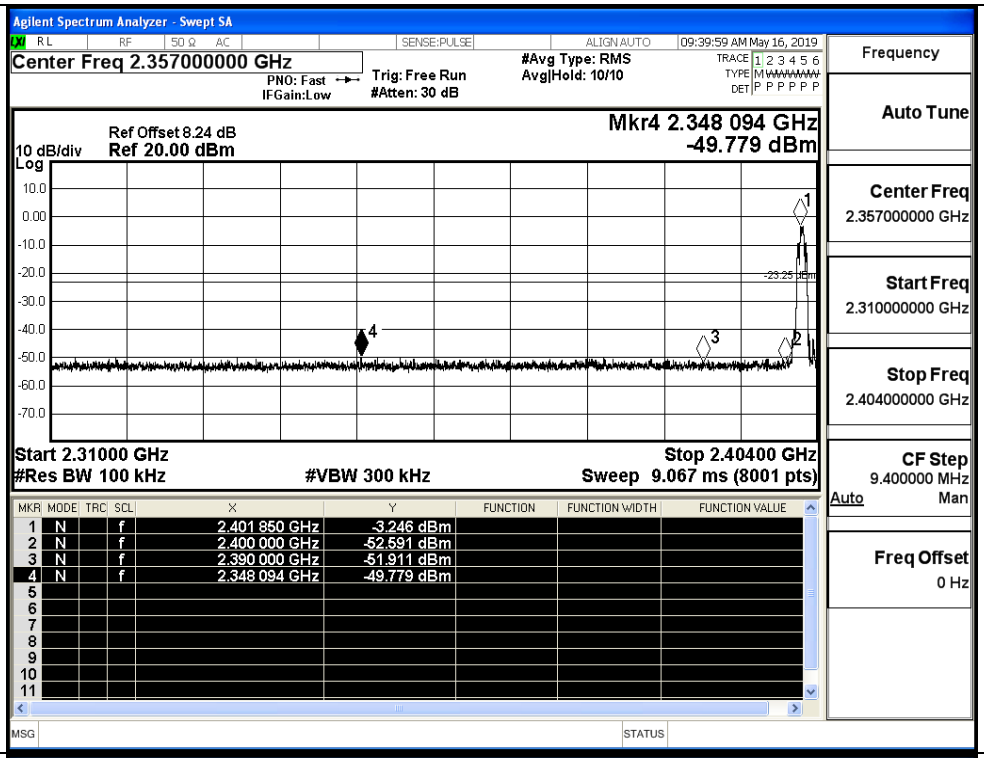
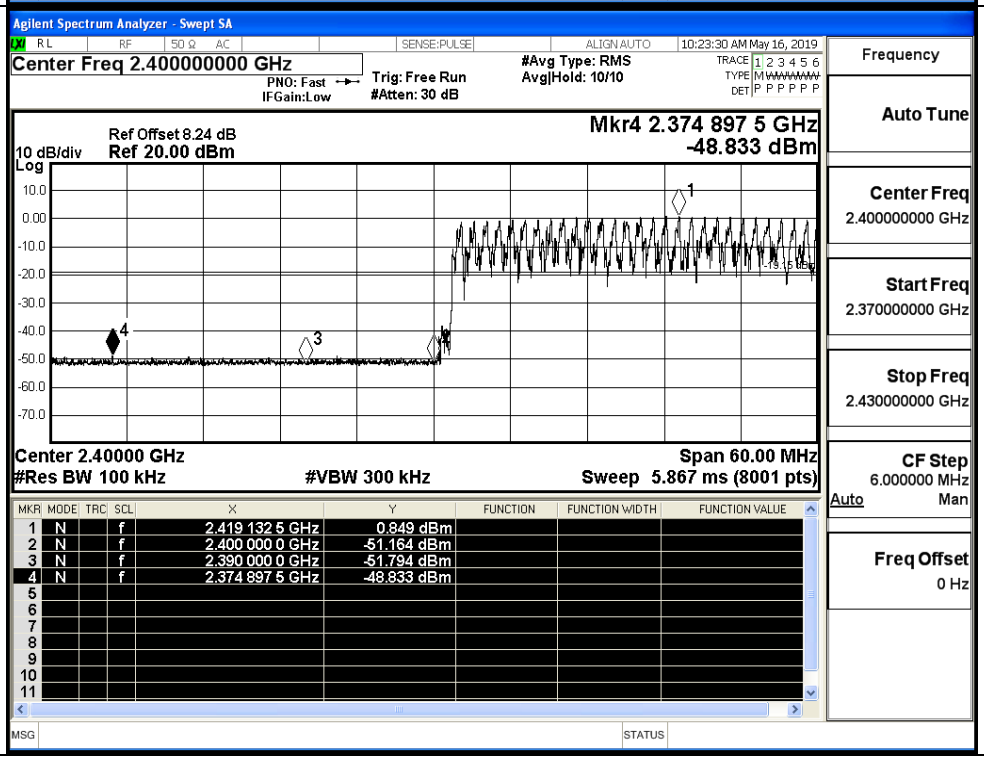
Pref			
Puw			

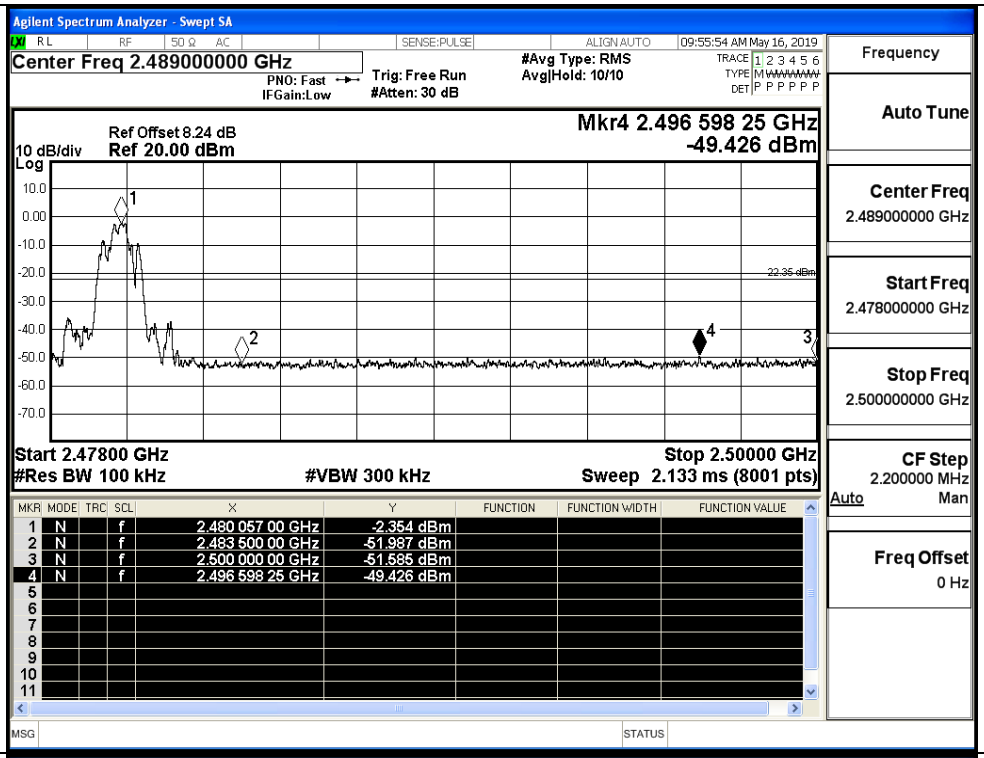
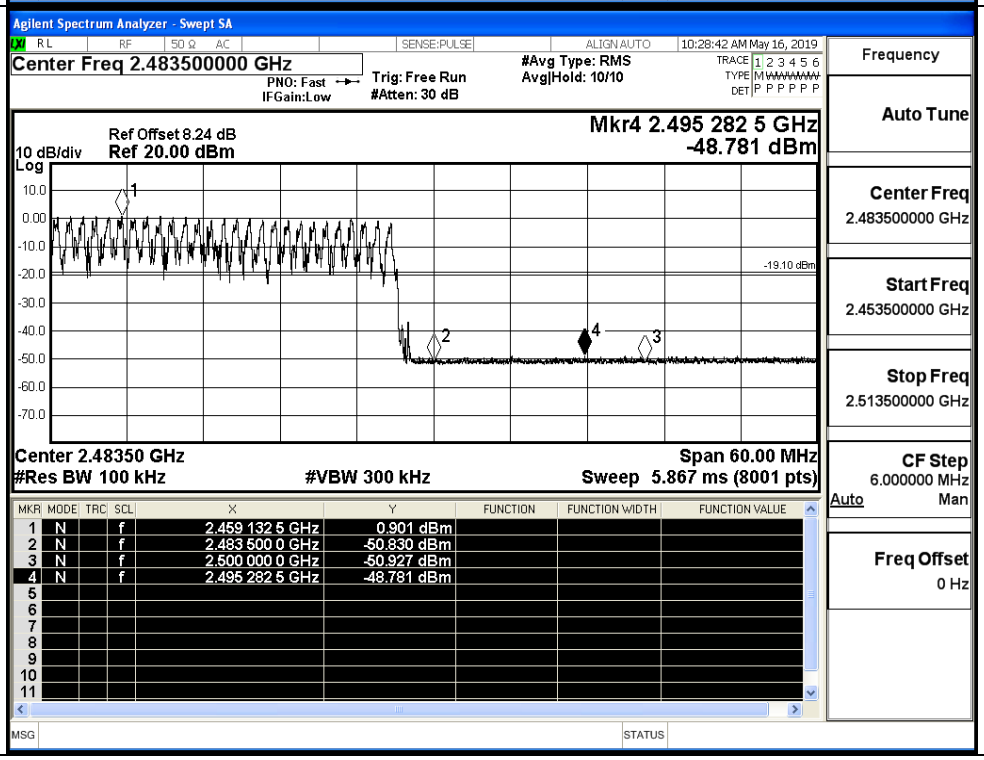
A.7 Band-edge for RF Conducted Emissions

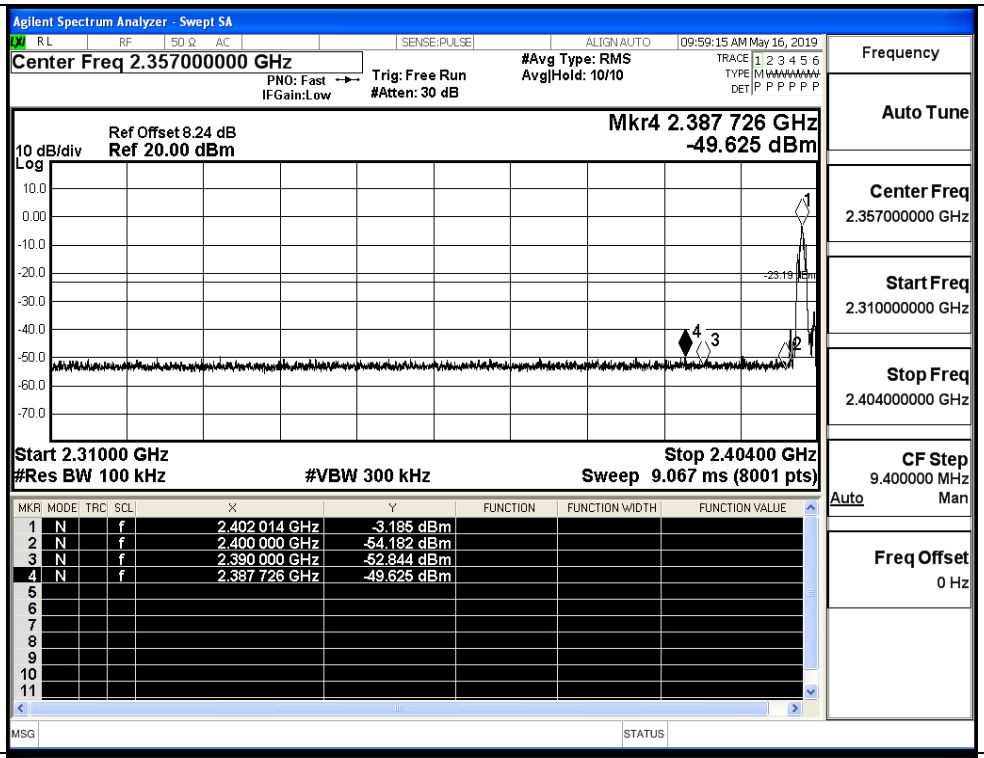
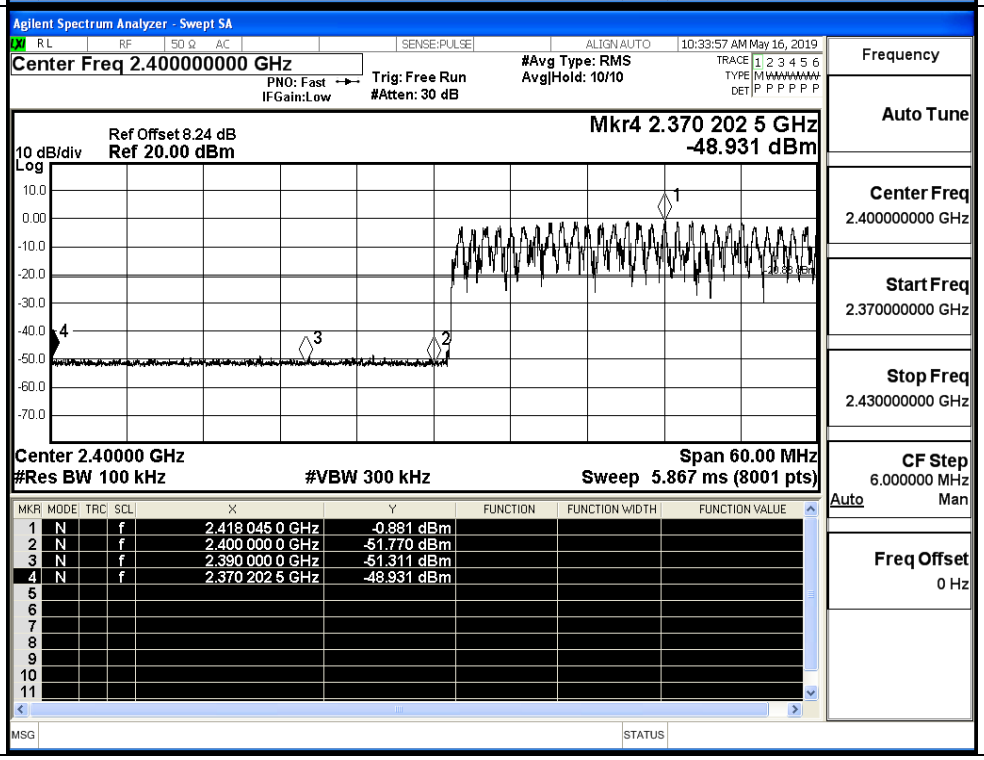
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-2.002	Off	-49.704	-22	PASS
			3.185	On	-48.993	-16.82	PASS
	HCH	2480	-0.989	Off	-48.854	-20.99	PASS
			3.468	On	-48.923	-16.53	PASS
π/4DQPSK	LCH	2402	-3.246	Off	-49.779	-23.25	PASS
			0.849	On	-48.833	-19.15	PASS
	HCH	2480	-2.354	Off	-49.426	-22.35	PASS
			0.901	On	-48.781	-19.1	PASS
8DPSK	LCH	2402	-3.185	Off	-49.625	-23.19	PASS
			-0.881	On	-48.931	-20.88	PASS
	HCH	2480	-2.250	Off	-49.807	-22.25	PASS
			-0.295	On	-48.165	-20.3	PASS

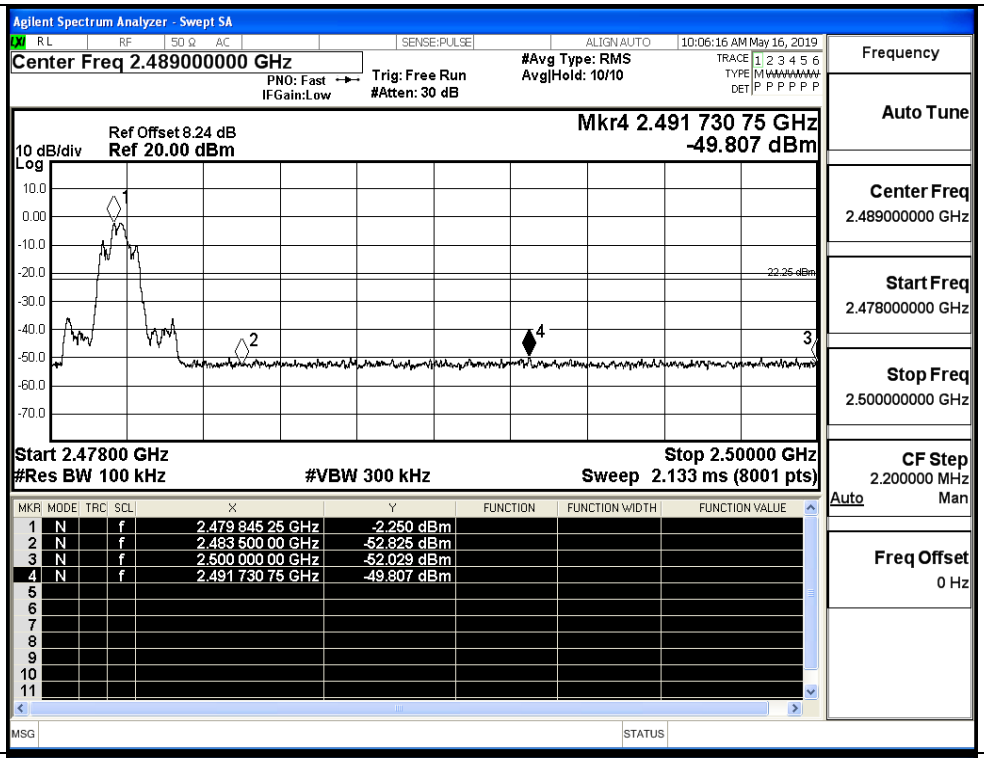
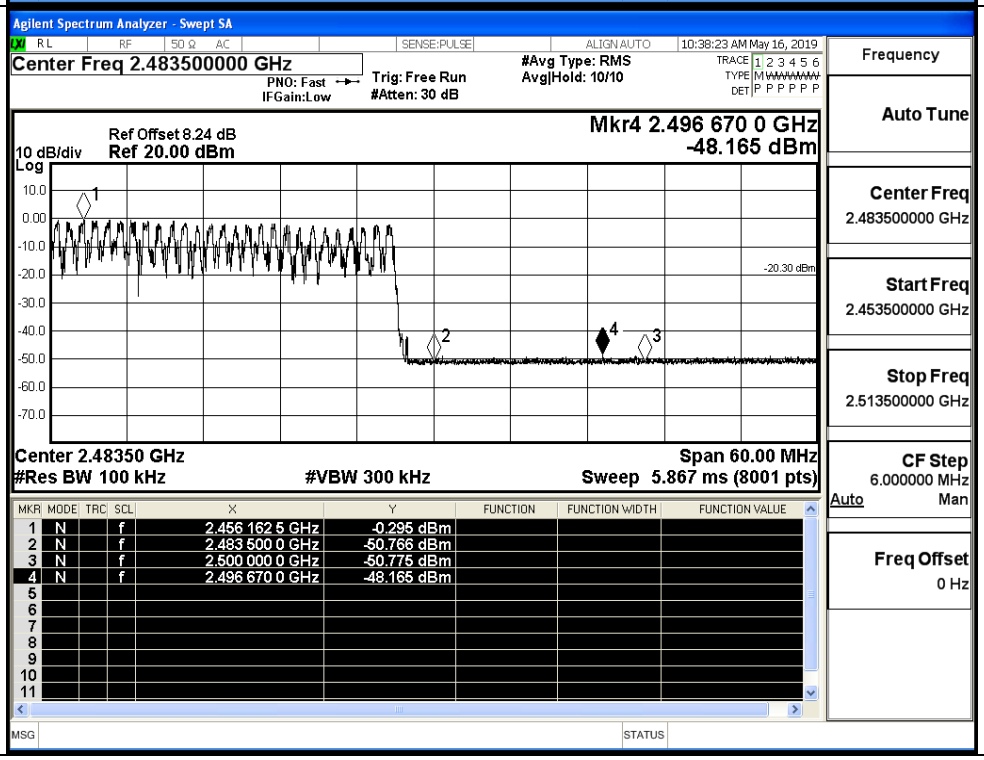
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

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	

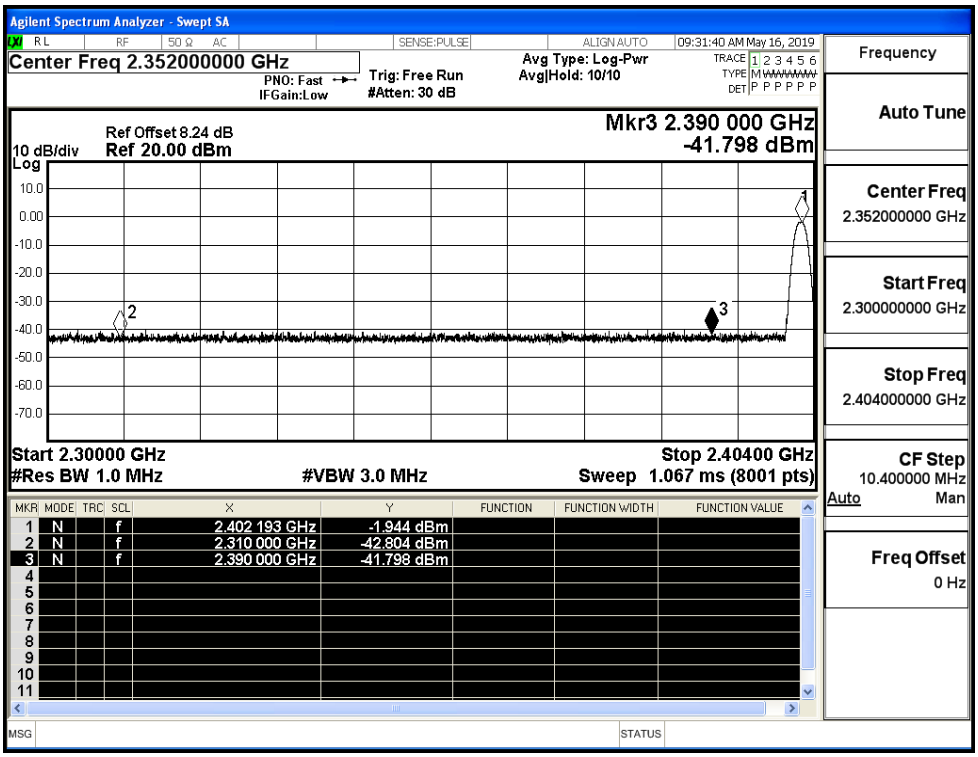
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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

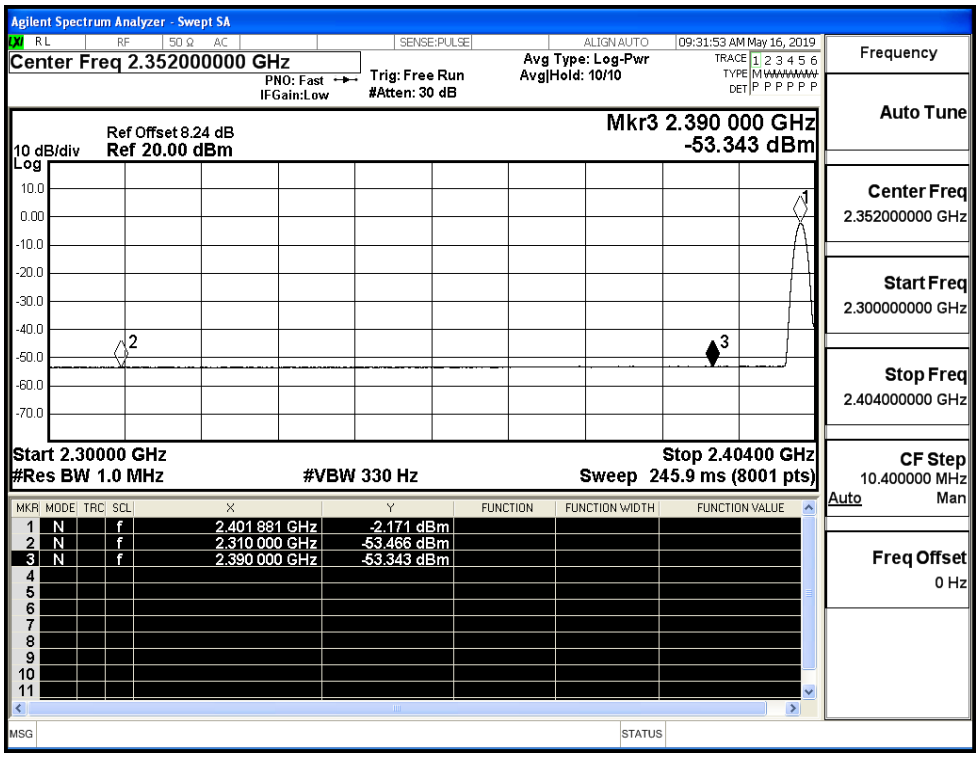
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.80	2.0	0	52.45	PEAK	74	PASS
	Off	2310.0	-53.47	2.0	0	41.79	AV	54	PASS
	Off	2390.0	-41.80	2.0	0	53.46	PEAK	74	PASS
	Off	2390.0	-53.34	2.0	0	41.91	AV	54	PASS
	Off	2483.5	-42.20	2.0	0	53.06	PEAK	74	PASS
	Off	2483.5	-52.95	2.0	0	42.31	AV	54	PASS
	Off	2500.0	-42.81	2.0	0	52.44	PEAK	74	PASS
	Off	2500.0	-52.73	2.0	0	42.53	AV	54	PASS
π/4DQPSK	Off	2310.0	-44.55	2.0	0	50.71	PEAK	74	PASS
	Off	2310.0	-53.45	2.0	0	41.81	AV	54	PASS
	Off	2390.0	-42.63	2.0	0	52.63	PEAK	74	PASS
	Off	2390.0	-53.25	2.0	0	42.01	AV	54	PASS
	Off	2483.5	-41.64	2.0	0	53.62	PEAK	74	PASS
	Off	2483.5	-52.84	2.0	0	42.42	AV	54	PASS
	Off	2500.0	-42.93	2.0	0	52.32	PEAK	74	PASS
	Off	2500.0	-52.81	2.0	0	42.45	AV	54	PASS
8DPSK	Off	2310.0	-43.22	2.0	0	52.04	PEAK	74	PASS
	Off	2310.0	-53.46	2.0	0	41.80	AV	54	PASS
	Off	2390.0	-42.97	2.0	0	52.29	PEAK	74	PASS
	Off	2390.0	-53.08	2.0	0	42.18	AV	54	PASS
	Off	2483.5	-41.18	2.0	0	54.08	PEAK	74	PASS
	Off	2483.5	-53.04	2.0	0	42.22	AV	54	PASS
	Off	2500.0	-42.70	2.0	0	52.56	PEAK	74	PASS
	Off	2500.0	-52.83	2.0	0	42.43	AV	54	PASS

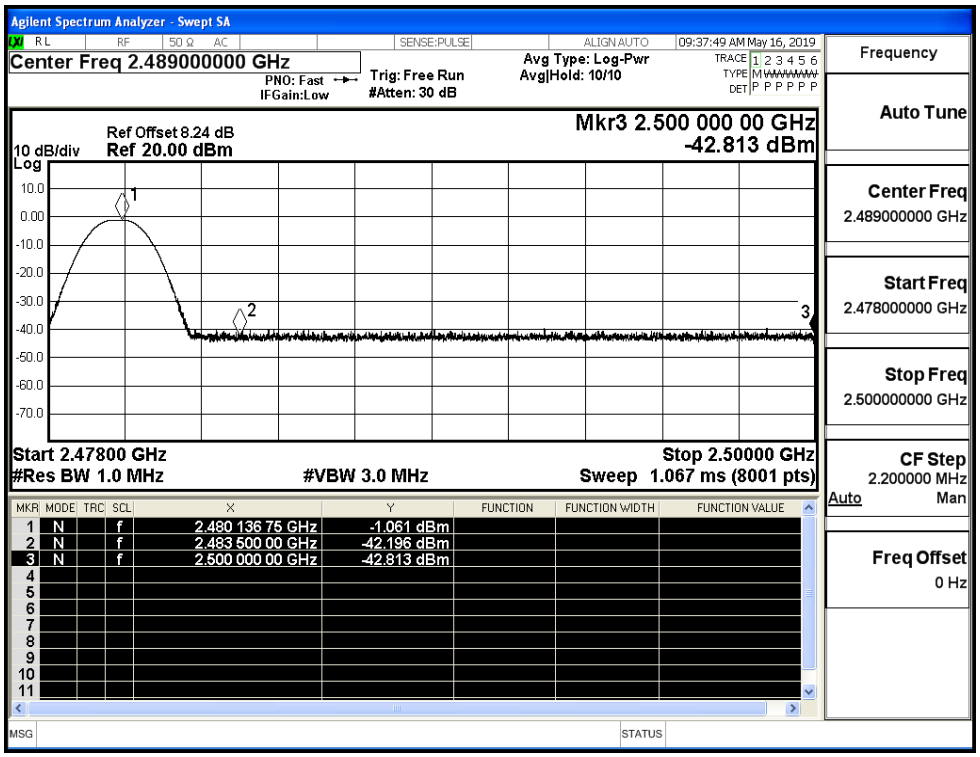
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



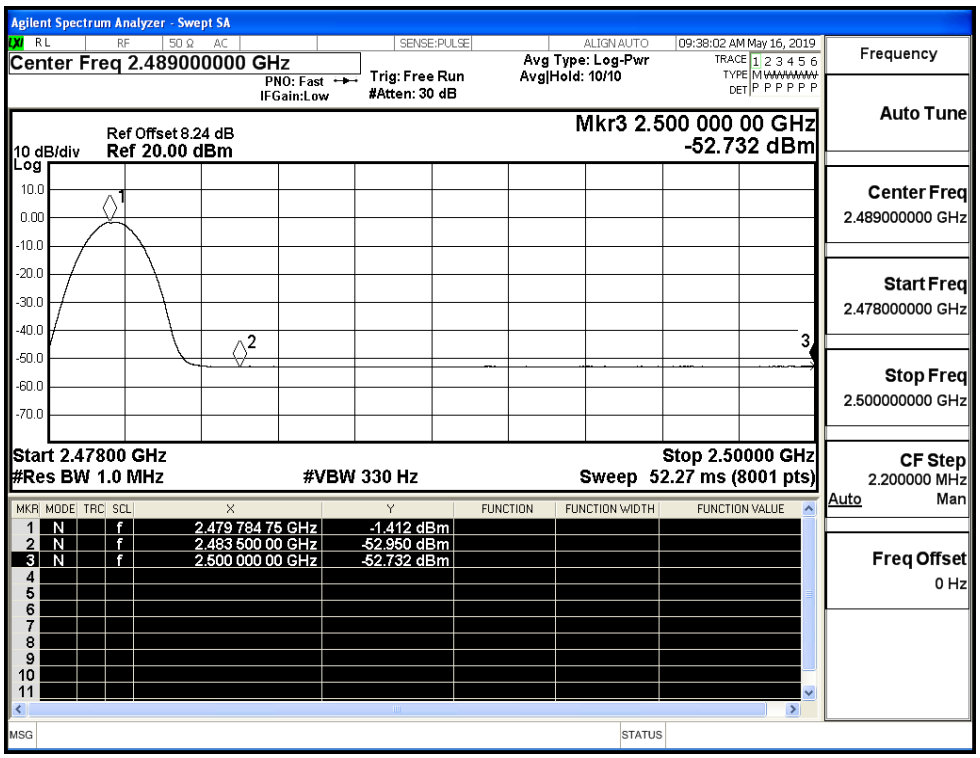
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



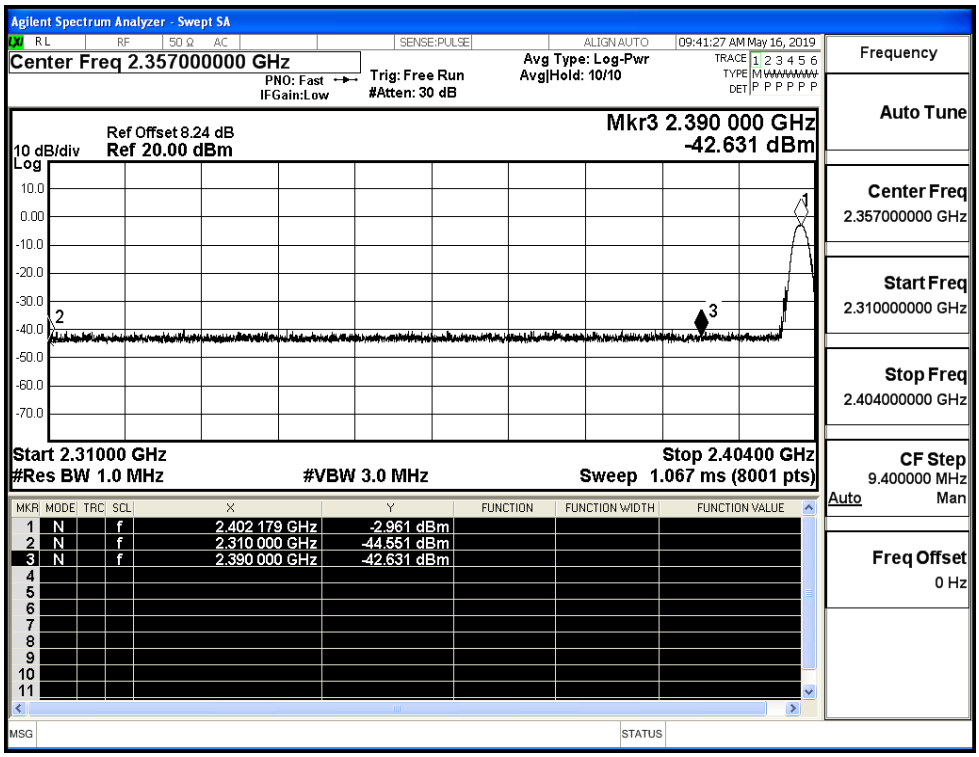
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



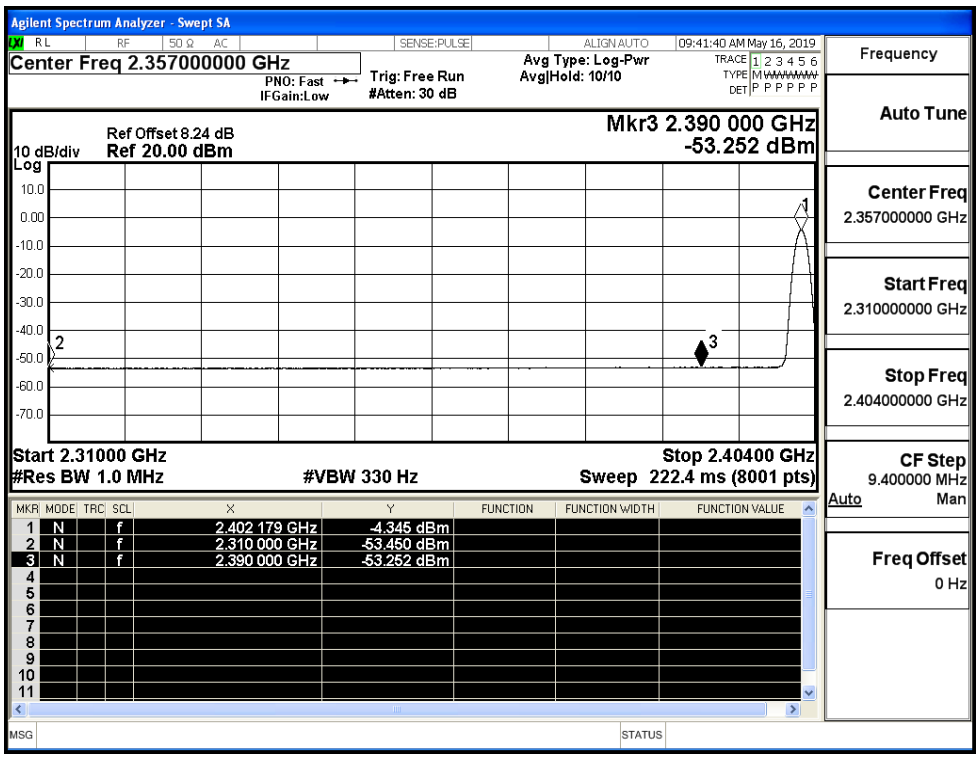
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



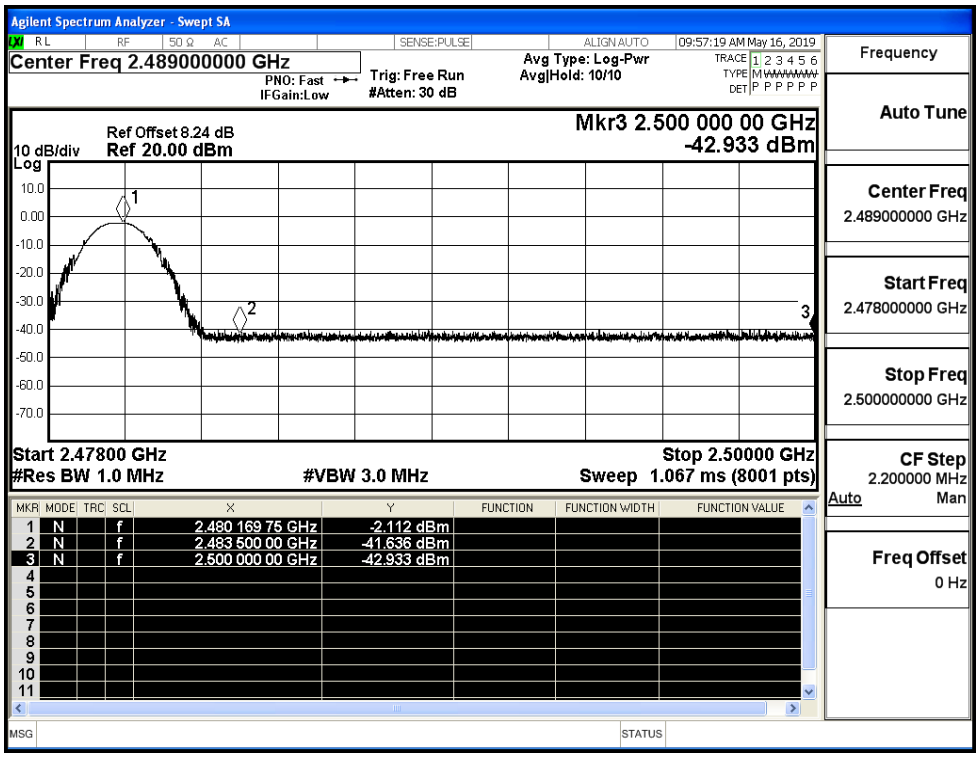
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



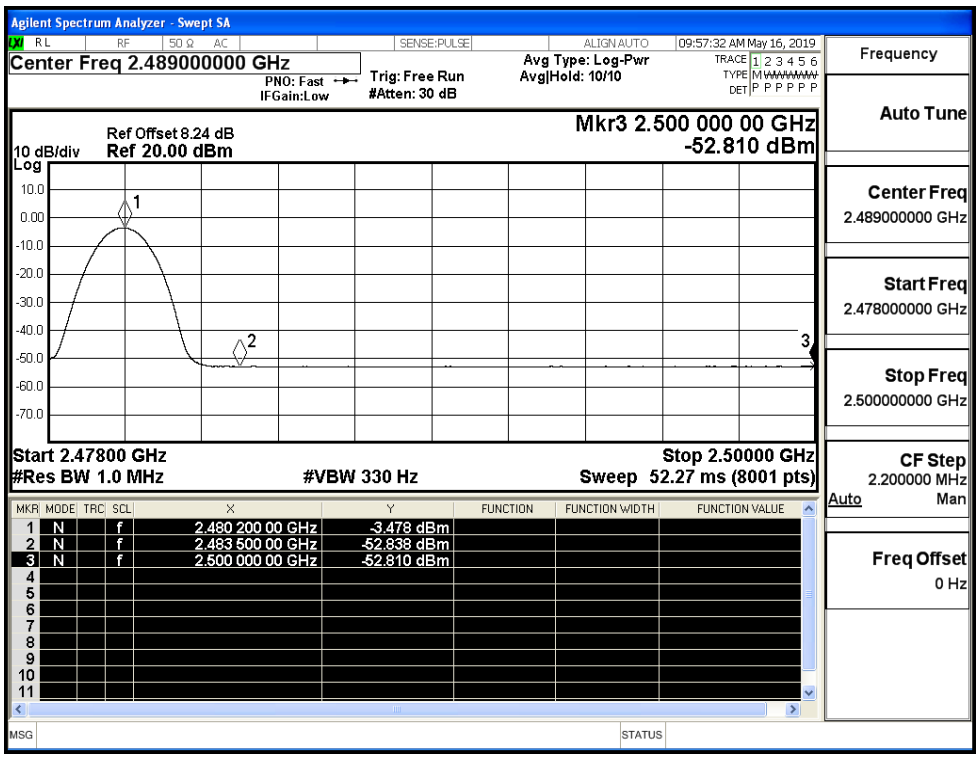
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



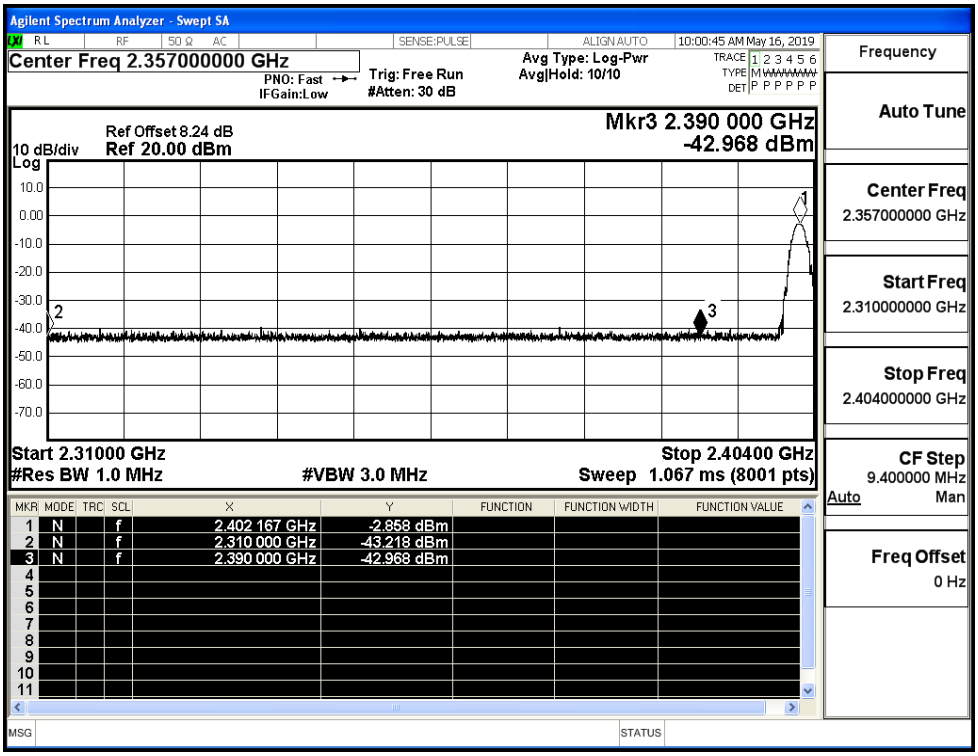
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



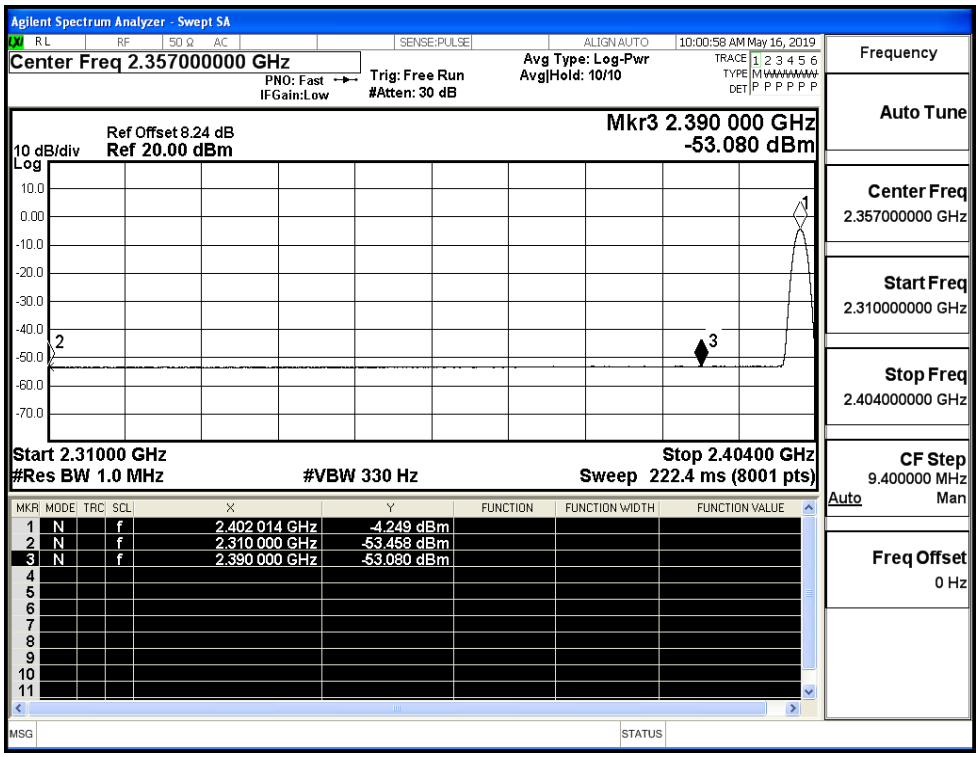
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



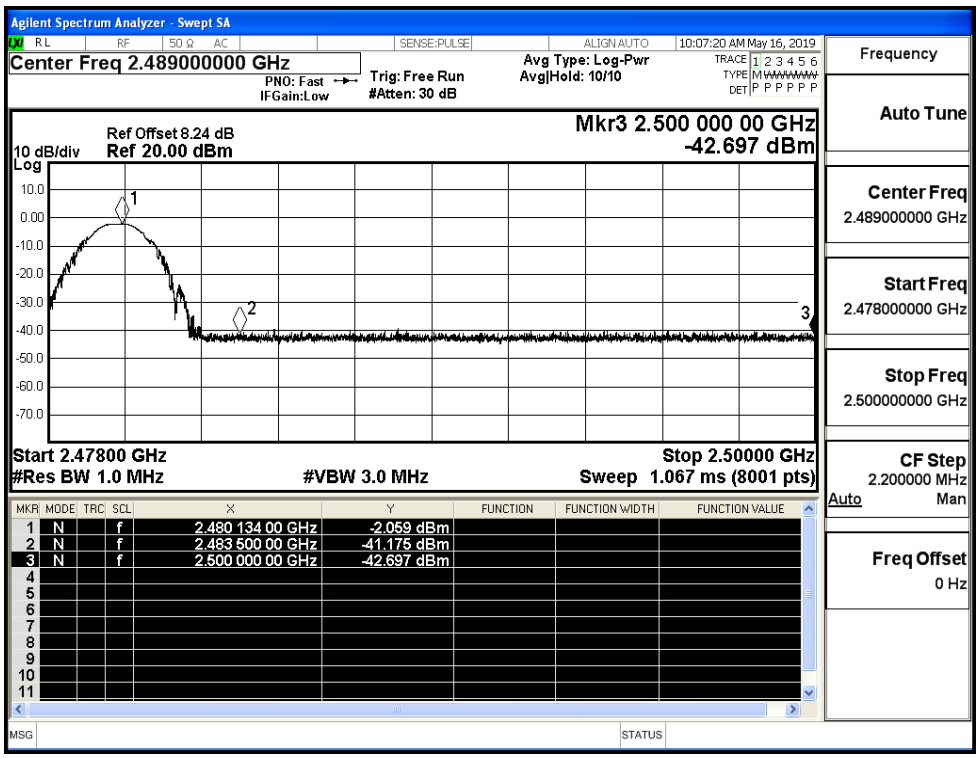
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)