Appendix A

RF Test Data for BT V4.1 (BDR/EDR) (Conducted Measurement)

Product Name: Survey Camera

Trade Mark: MAPIR

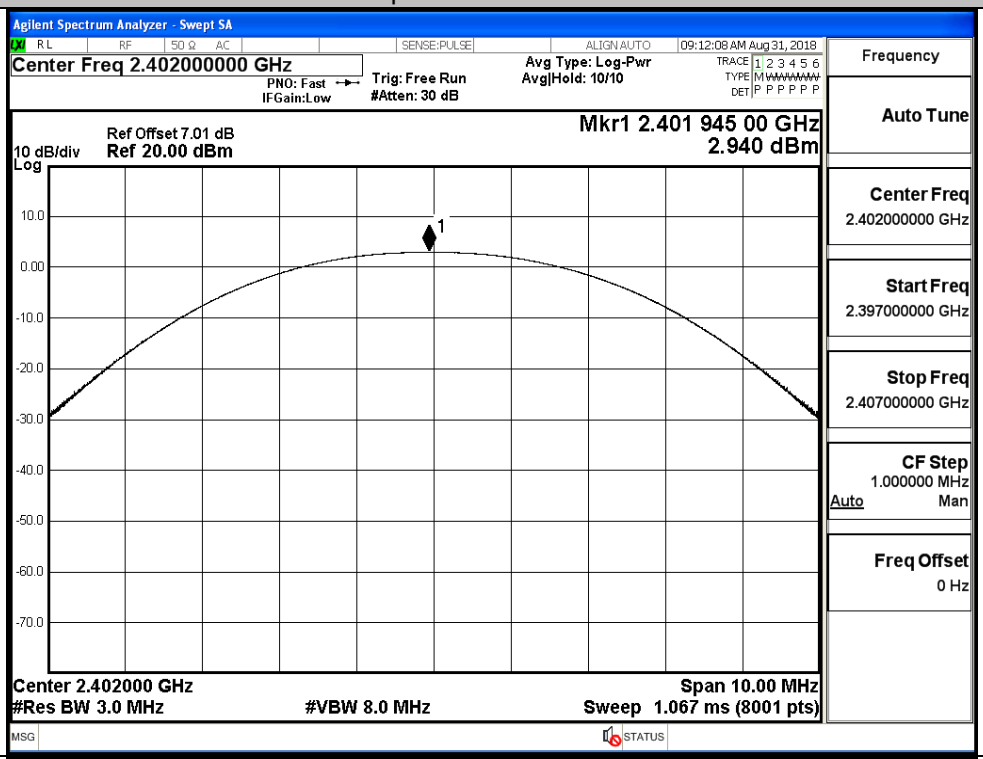
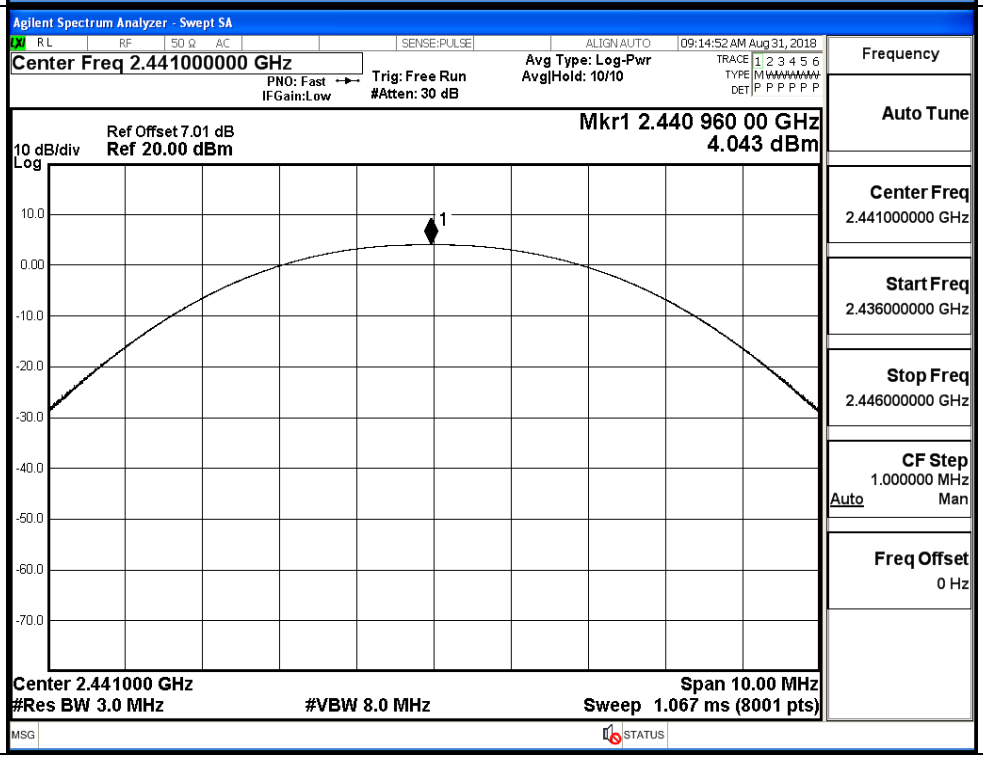
Test Model: Survey3

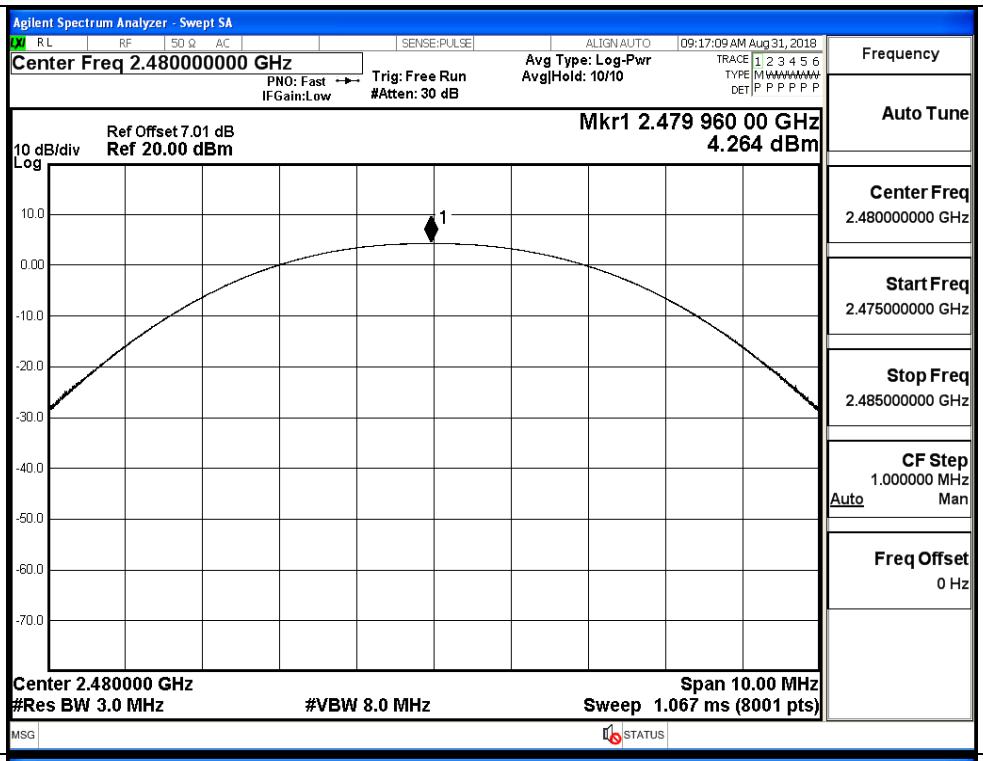
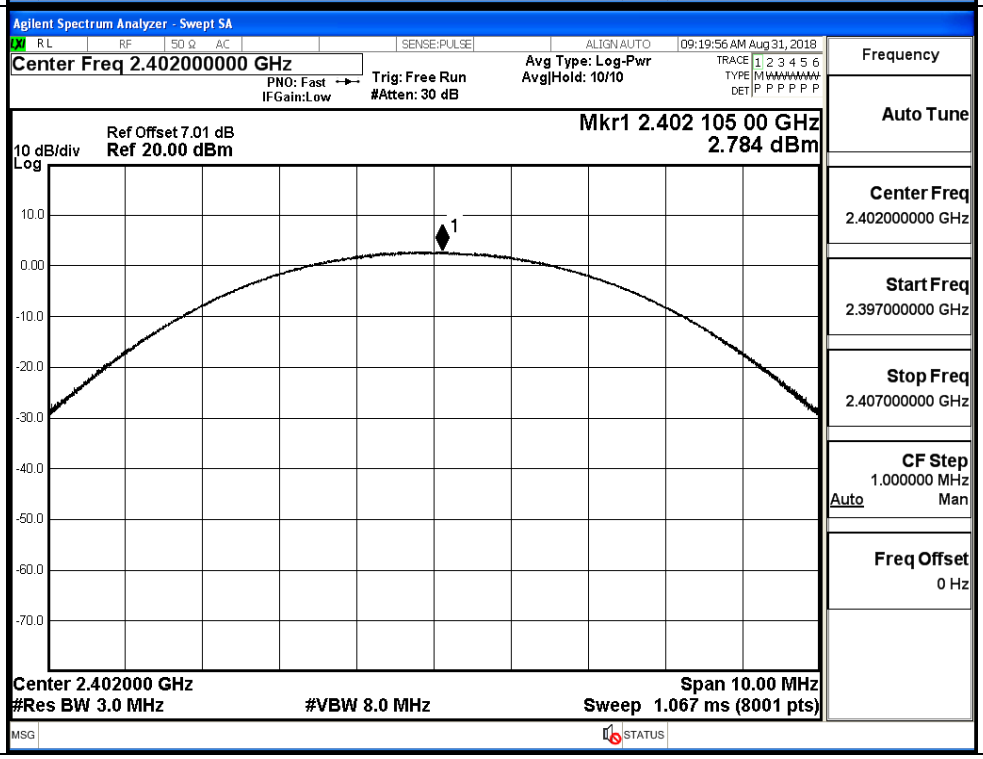
Environmental Conditions

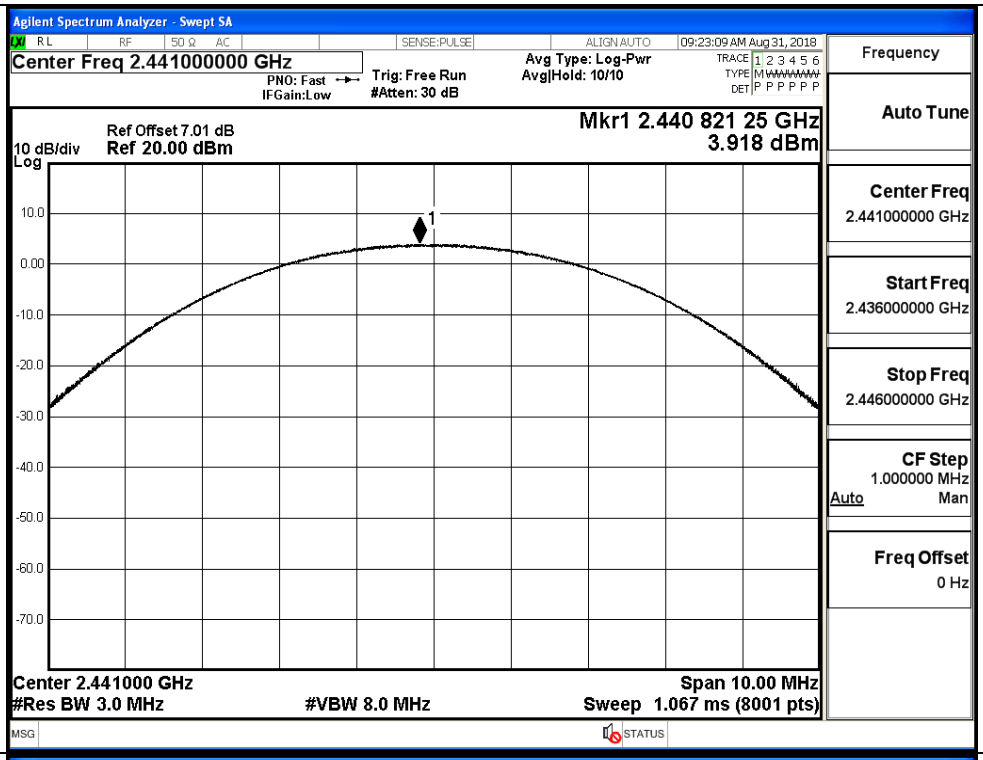
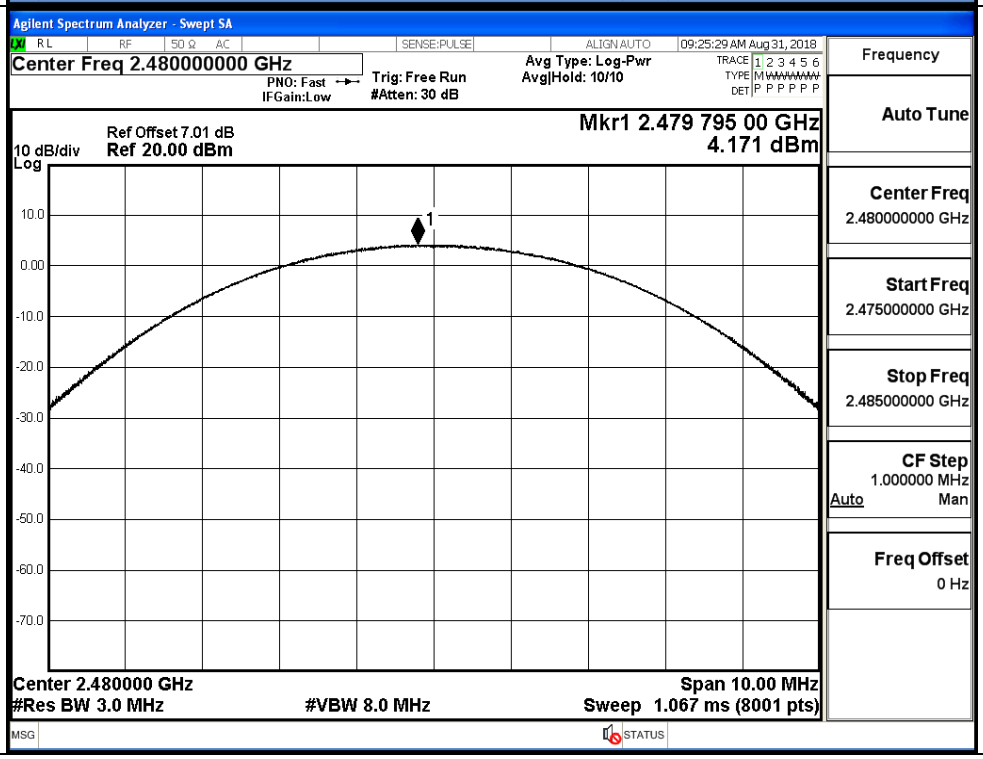
Temperature:	23.6° C
Relative Humidity:	53.6%
ATM Pressure:	100.0 kPa
Test Engineer:	
Supervised by:	Jayden.Zhuo

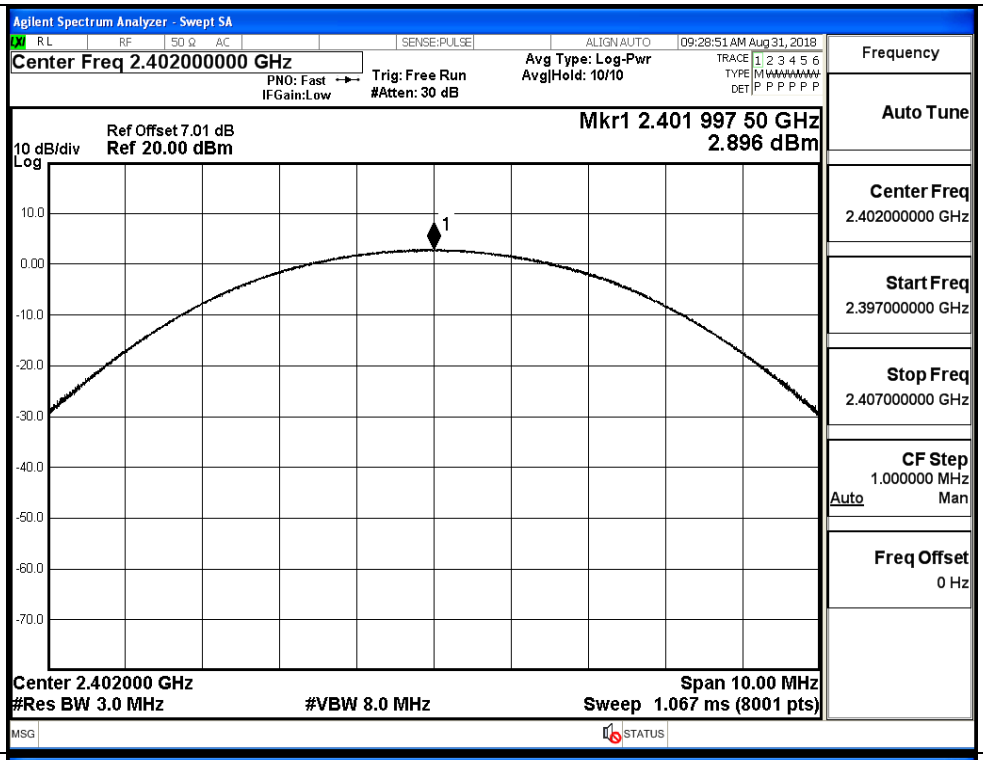
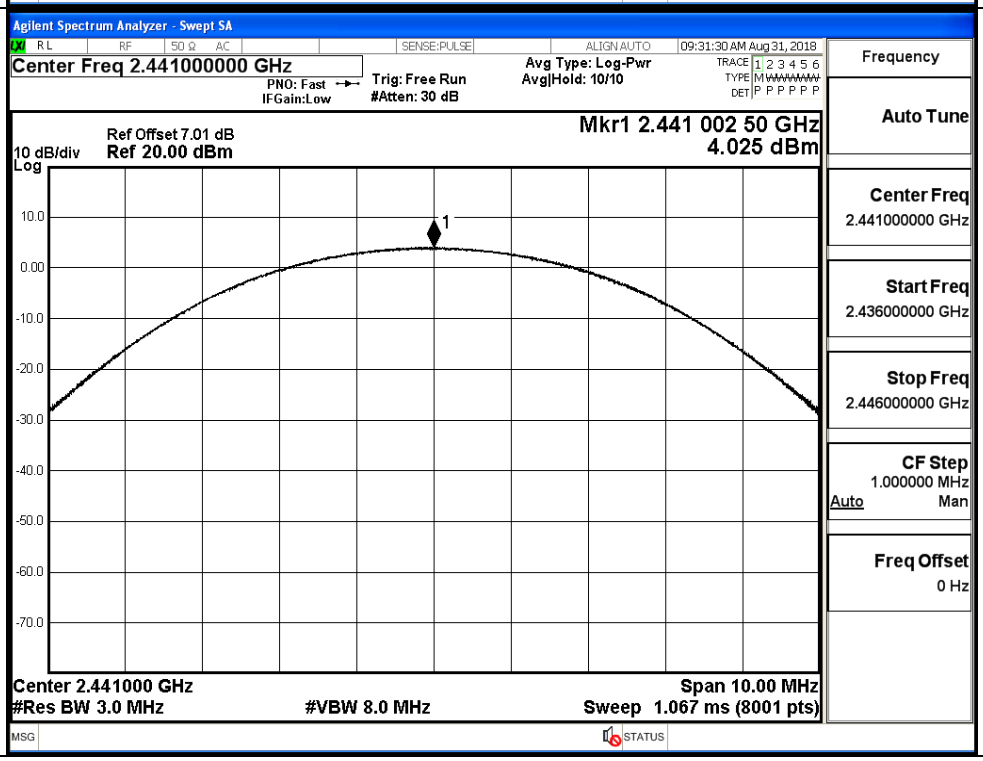
A.1 Maximum Conducted Peak Output Power

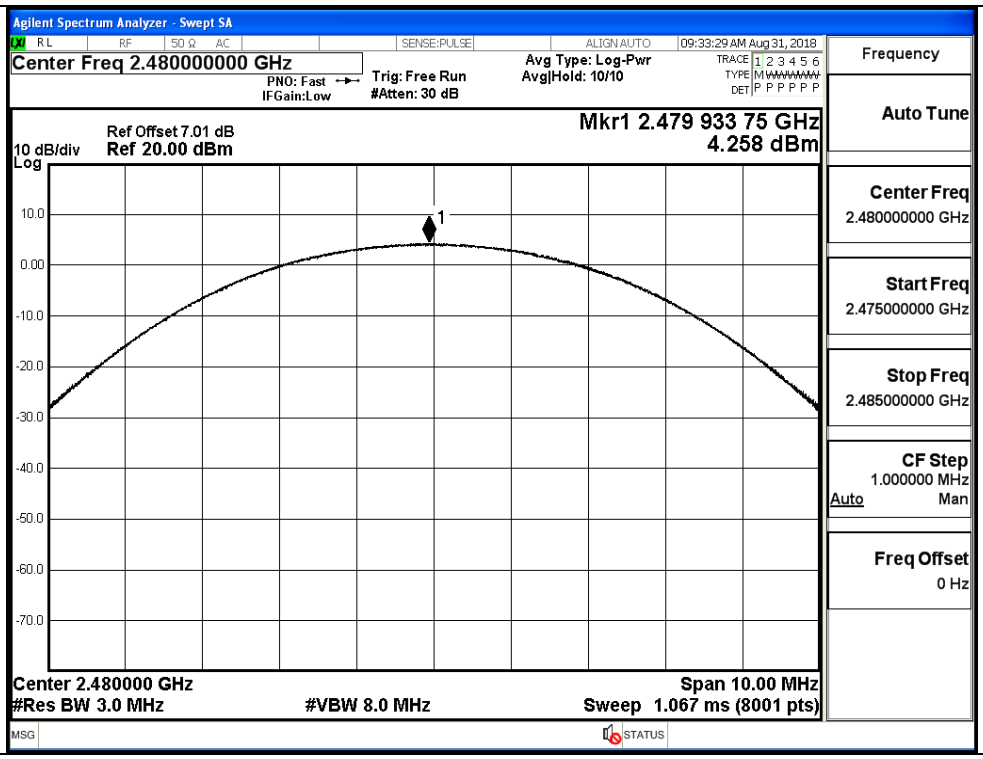
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.940	21	PASS
	MCH	4.043	21	PASS
	HCH	4.264	21	PASS
π/4DQPSK	LCH	2.784	21	PASS
	MCH	3.918	21	PASS
	HCH	4.171	21	PASS
8DPSK	LCH	2.896	21	PASS
	MCH	4.025	21	PASS
	HCH	4.258	21	PASS

Test Graphs		
GFSK/LCH		
GFSK/MCH		

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

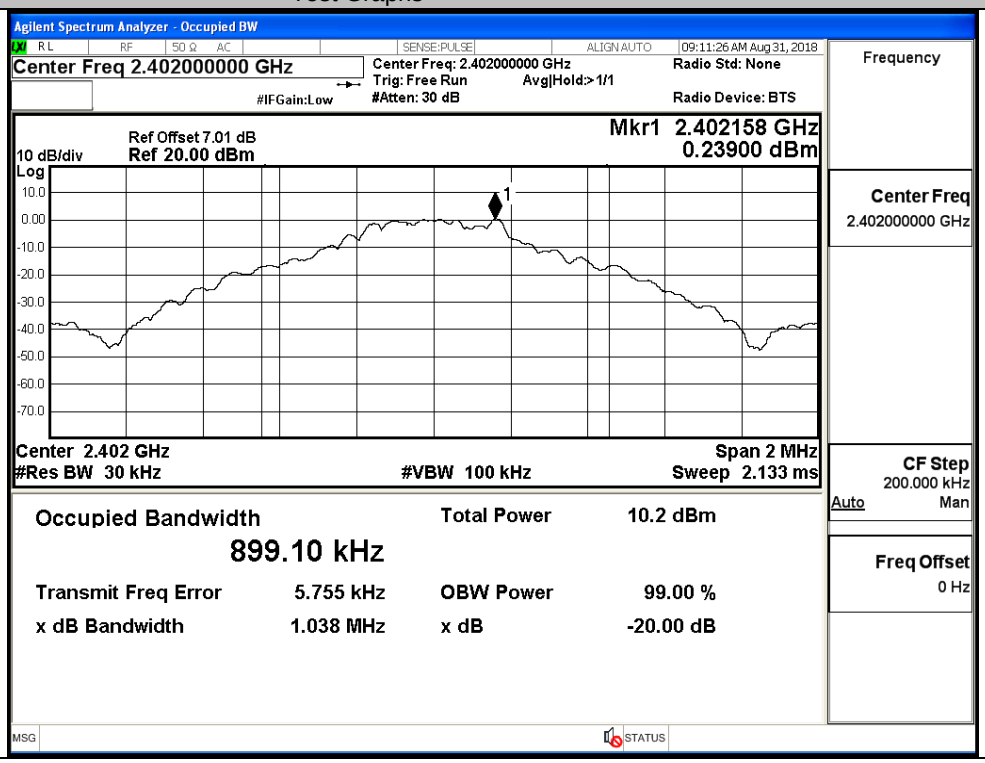
8DPSK/LCH	
8DPSK/MCH	

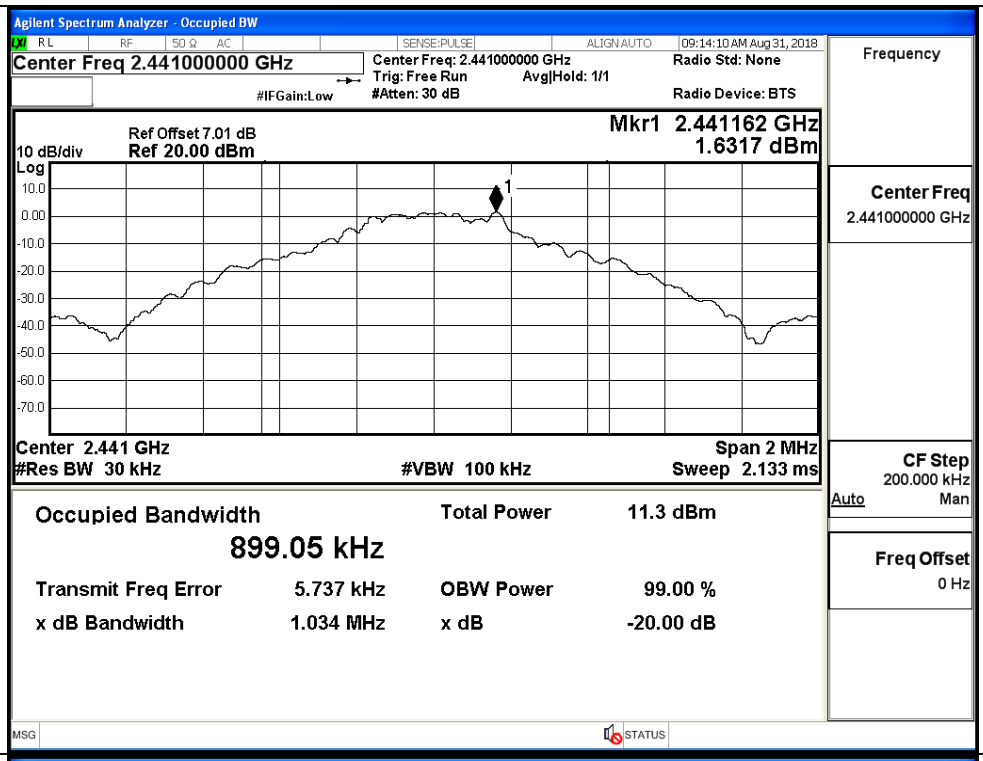
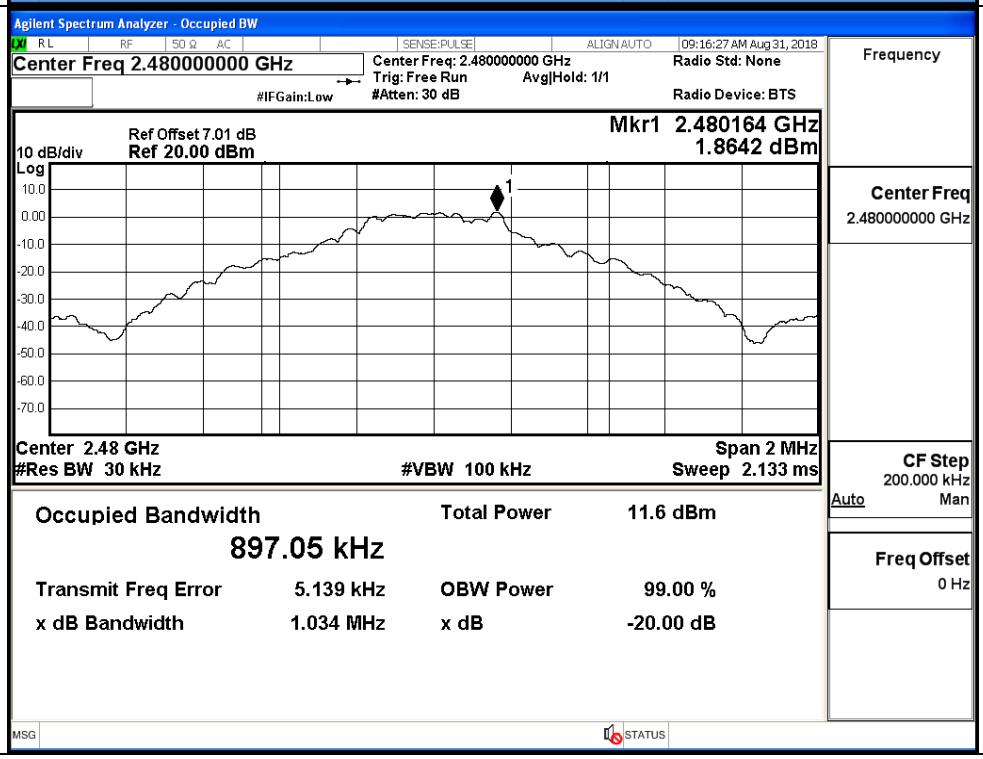
8DPSK/HCH		

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
09:33:29 AM Aug 31, 2018
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 933 75 GHz
4.258 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

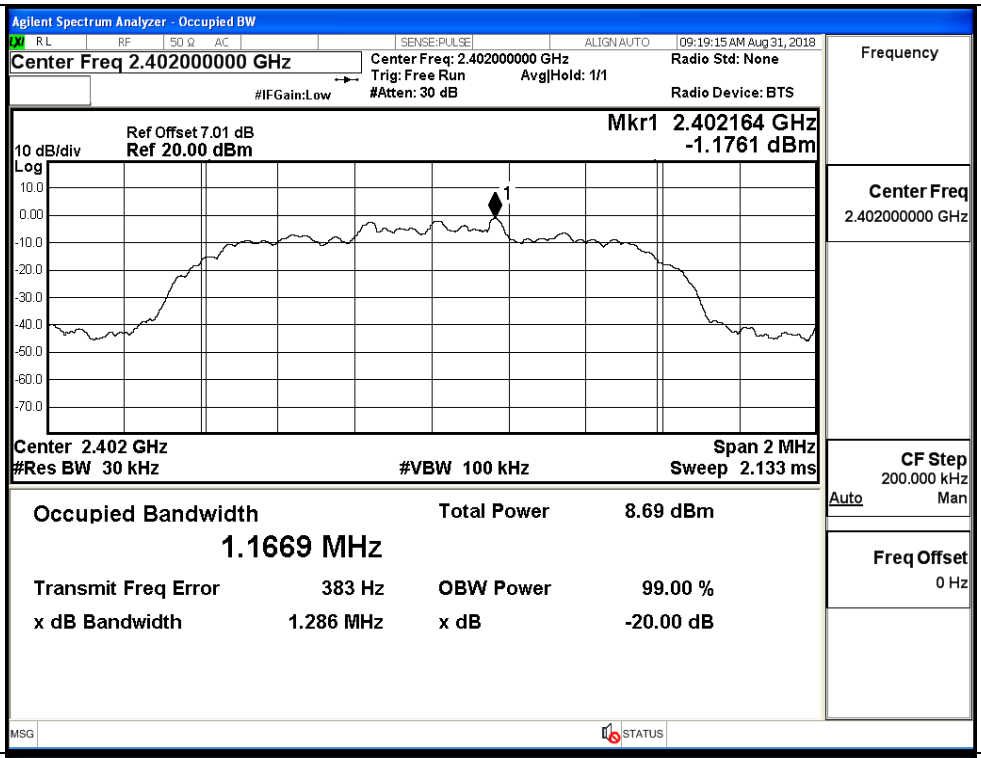
A.2 99% and 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.89910	1.038	Not Specified	PASS
	MCH	0.89905	1.034	Not Specified	PASS
	HCH	0.89705	1.034	Not Specified	PASS
π/4DQPSK	LCH	1.1699	1.286	Not Specified	PASS
	MCH	1.1650	1.286	Not Specified	PASS
	HCH	1.1659	1.288	Not Specified	PASS
8DPSK	LCH	1.1663	1.285	Not Specified	PASS
	MCH	1.1660	1.283	Not Specified	PASS
	HCH	1.1679	1.285	Not Specified	PASS

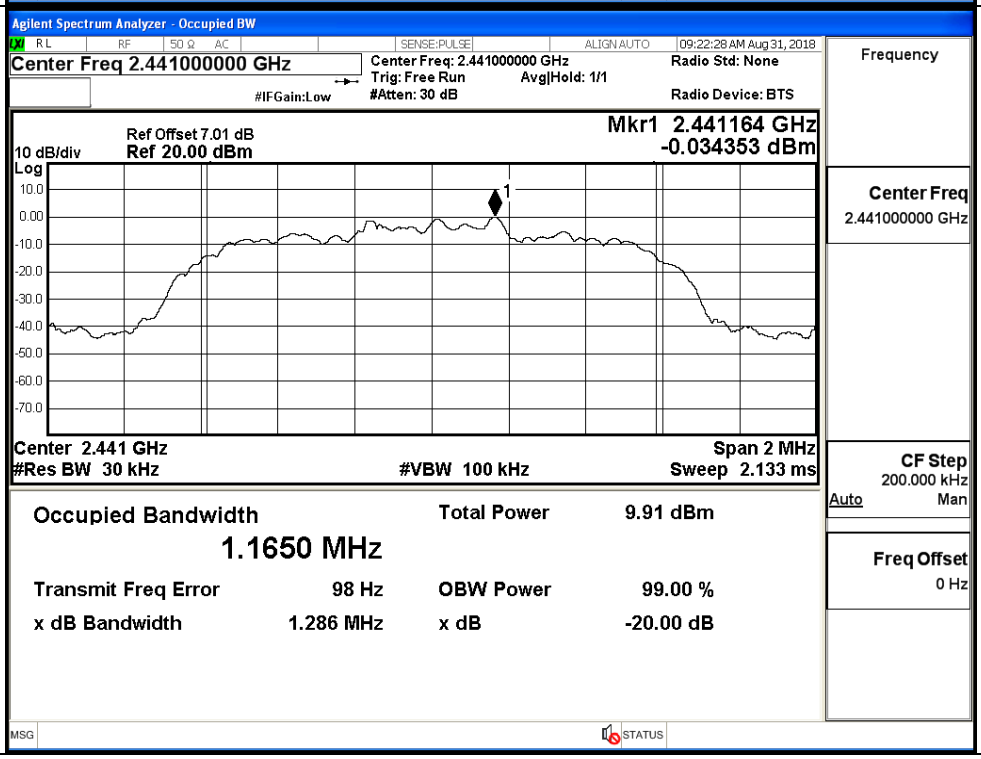
Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

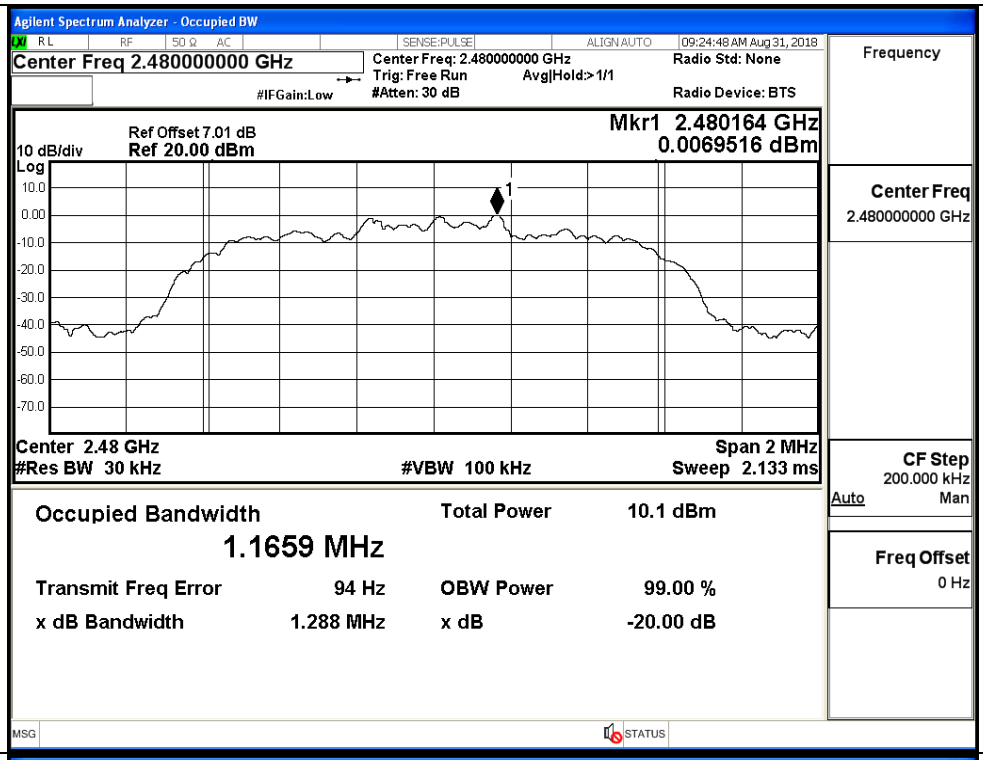
π/4DQPSK/LCH



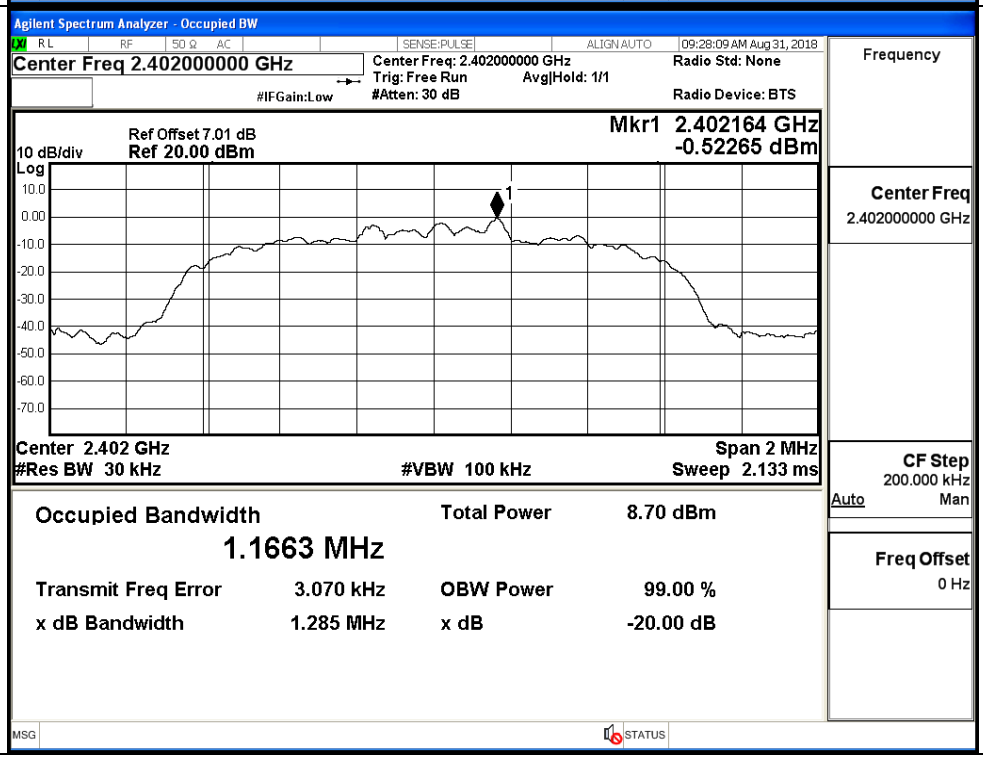
π/4DQPSK/MCH

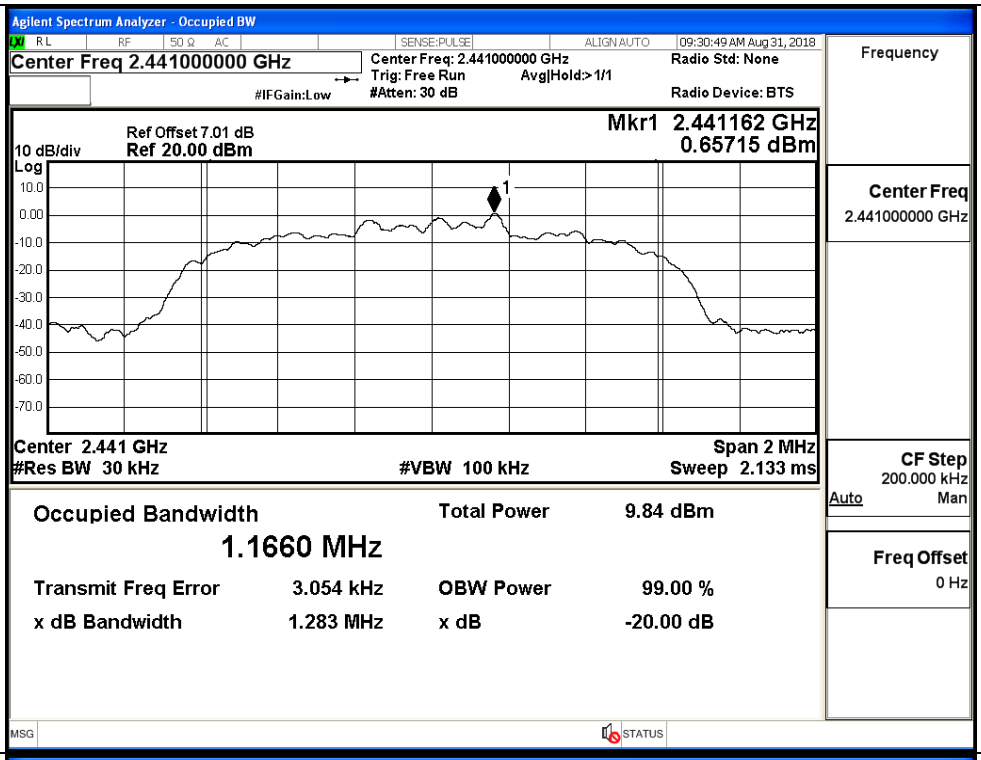
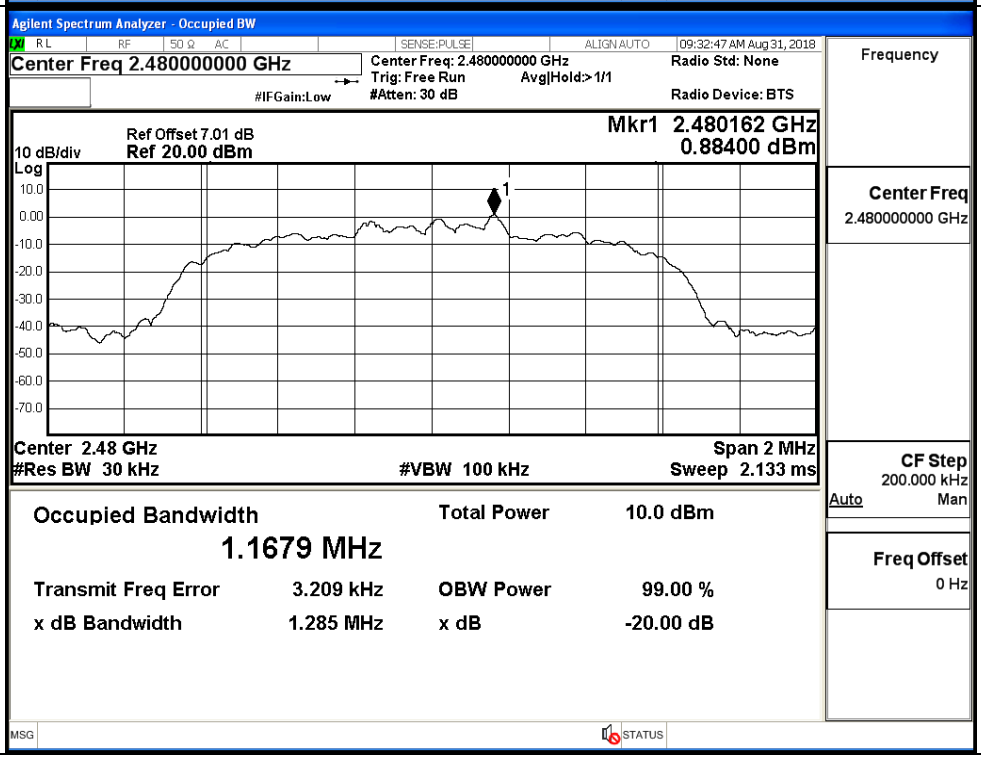


π/4DQPSK/HCH



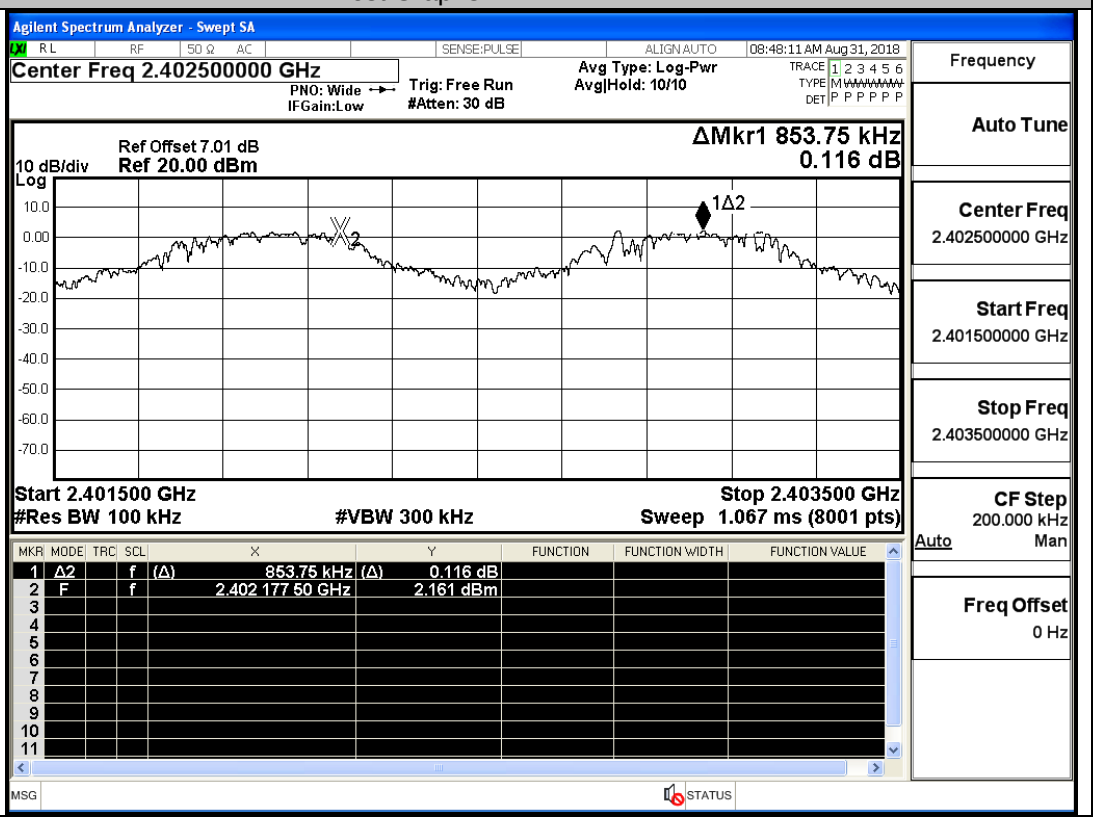
8DPSK/LCH

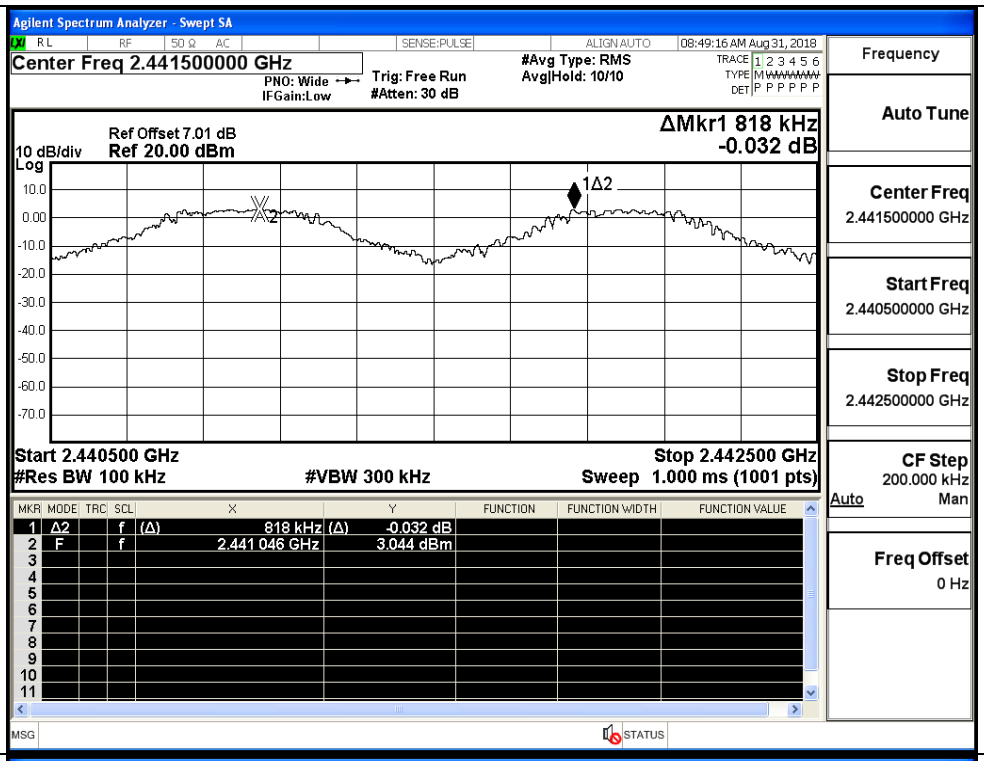
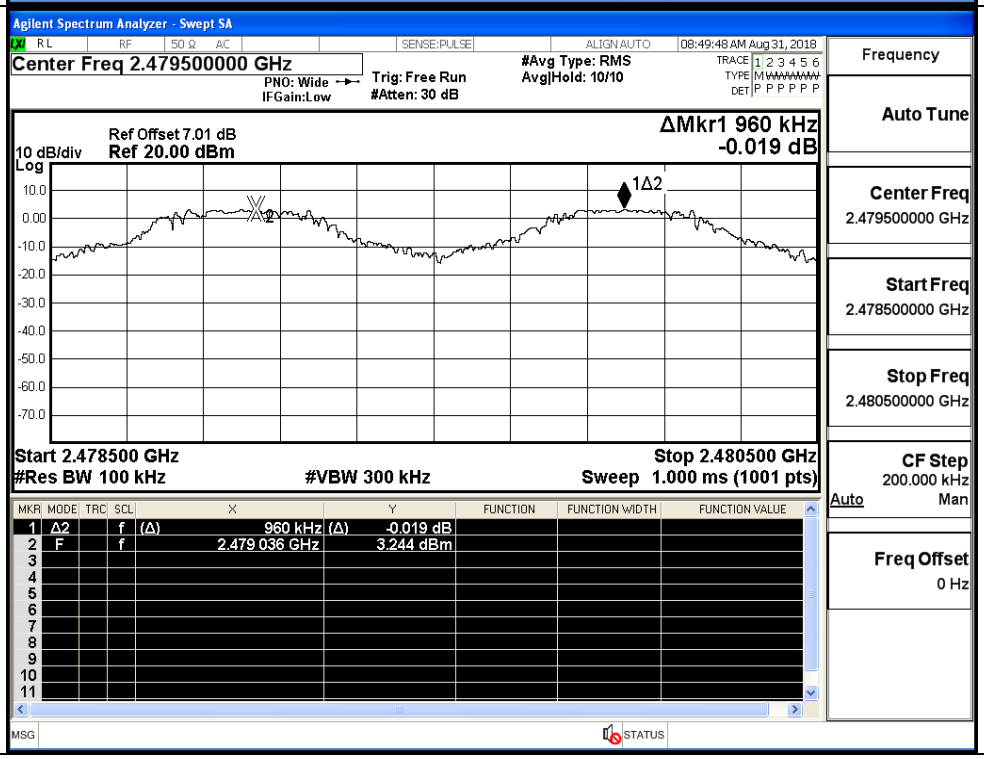


8DPSK/MCH	
8DPSK/HCH	

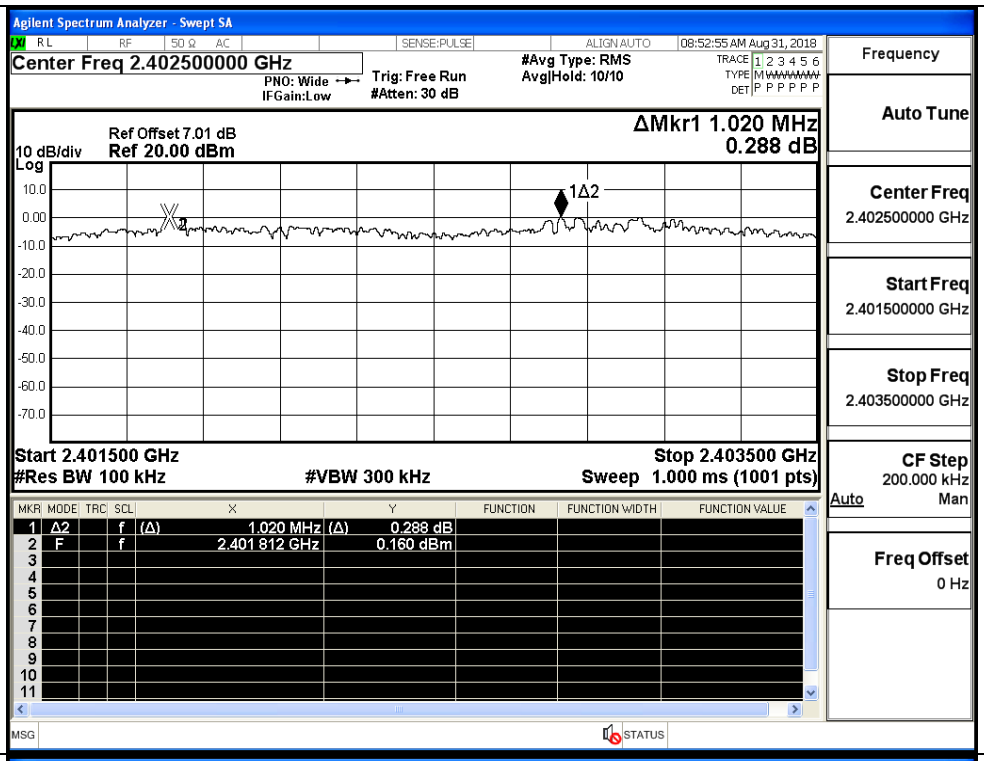
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.854	0.692	PASS
	MCH	0.818	0.689	PASS
	HCH	0.960	0.689	PASS
π/4DQPSK	LCH	1.020	0.857	PASS
	MCH	1.018	0.857	PASS
	HCH	1.122	0.859	PASS
8DPSK	LCH	1.002	0.857	PASS
	MCH	0.828	0.855	PASS
	HCH	0.700	0.857	PASS

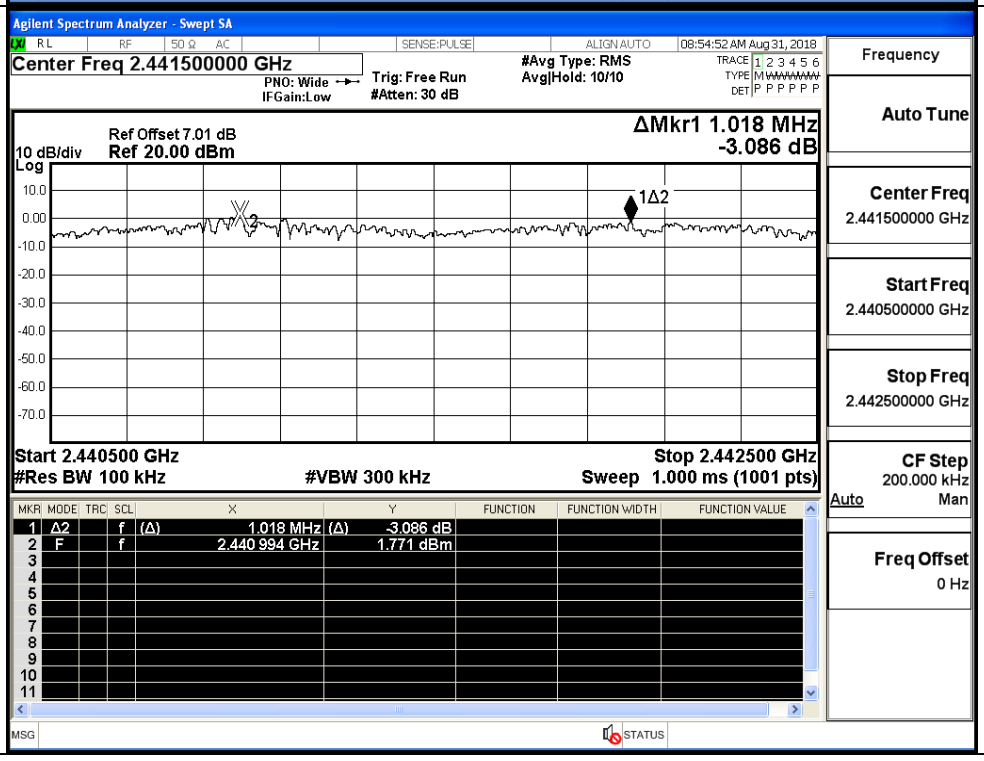
Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

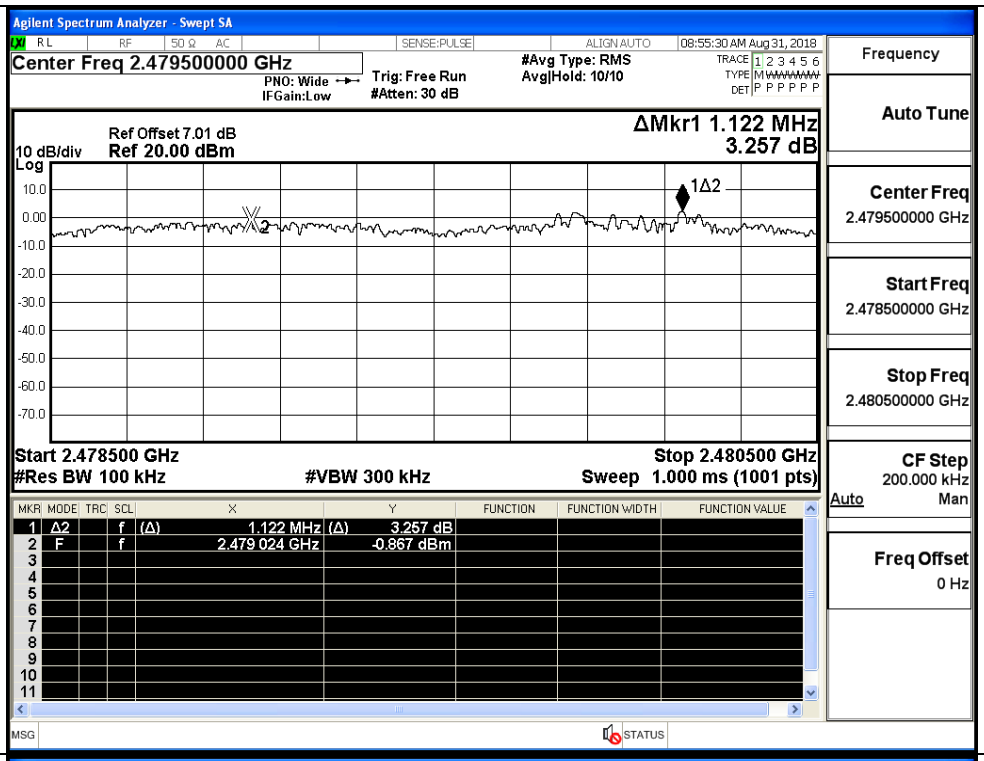
π/4DQPSK/LCH



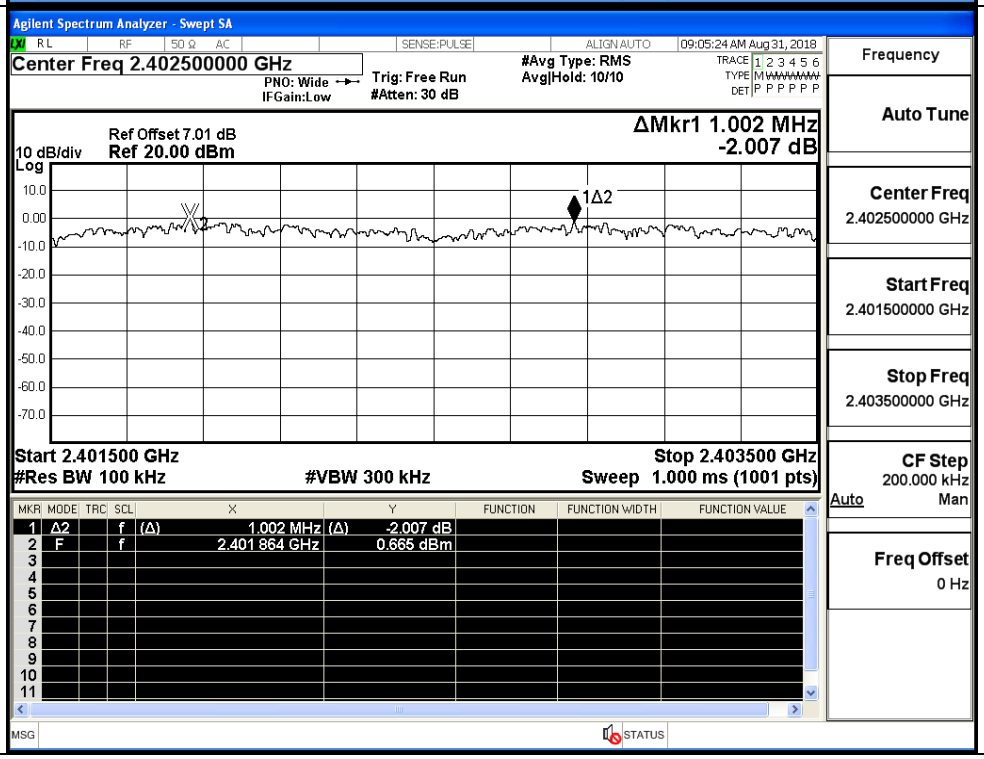
π/4DQPSK/MCH

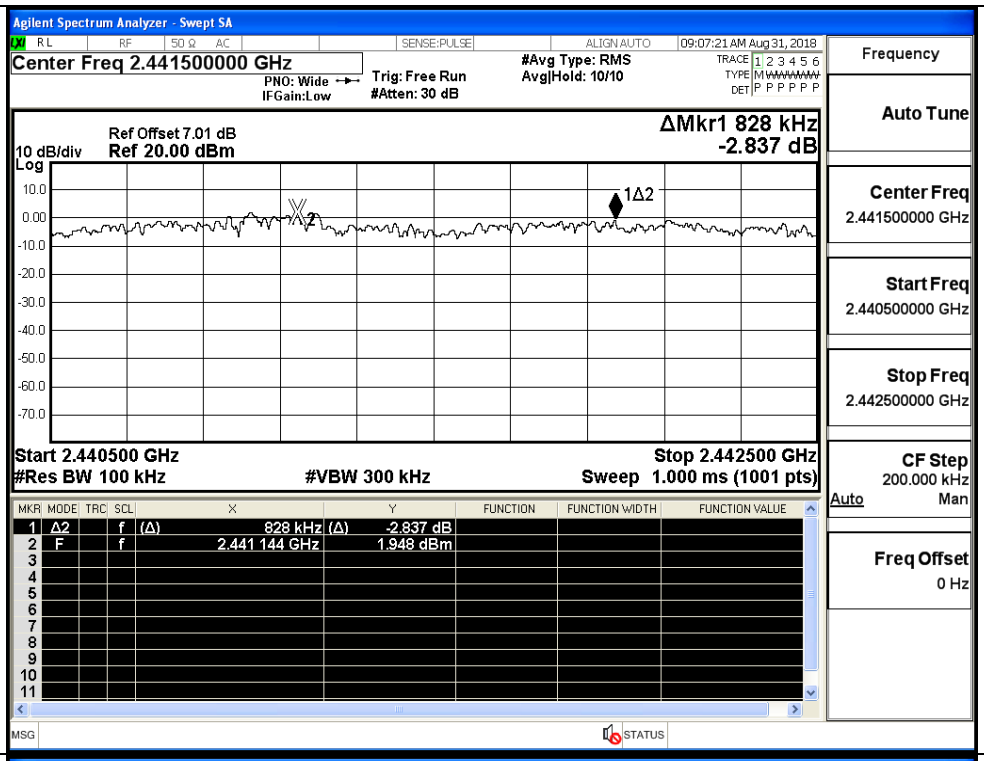
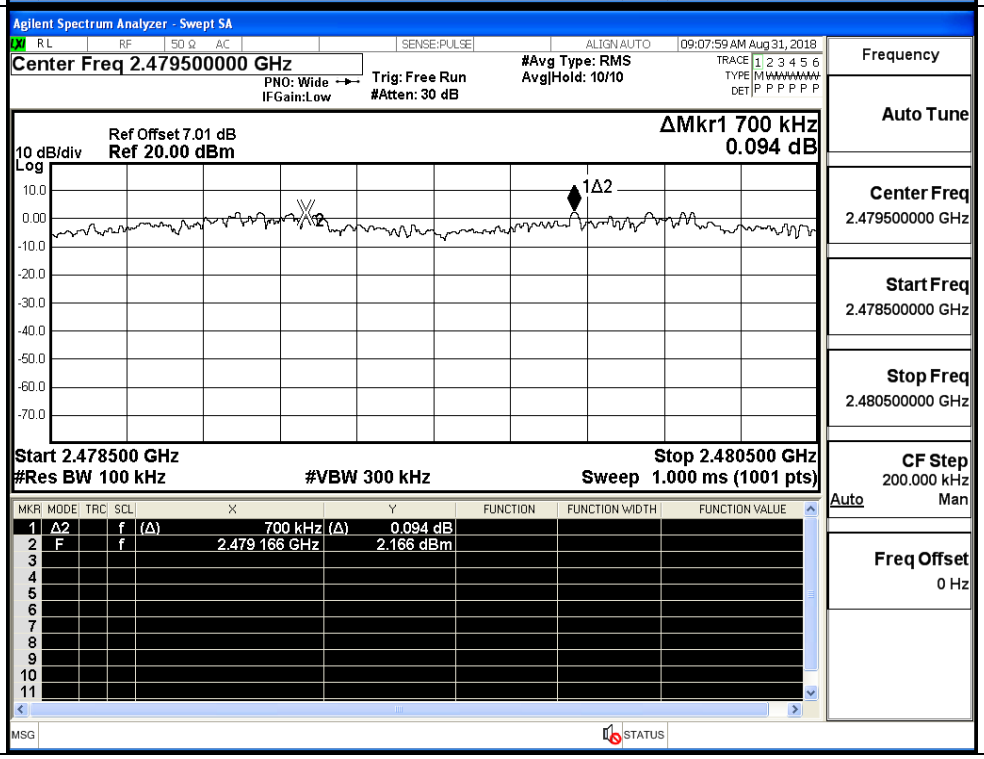


π/4DQPSK/HCH



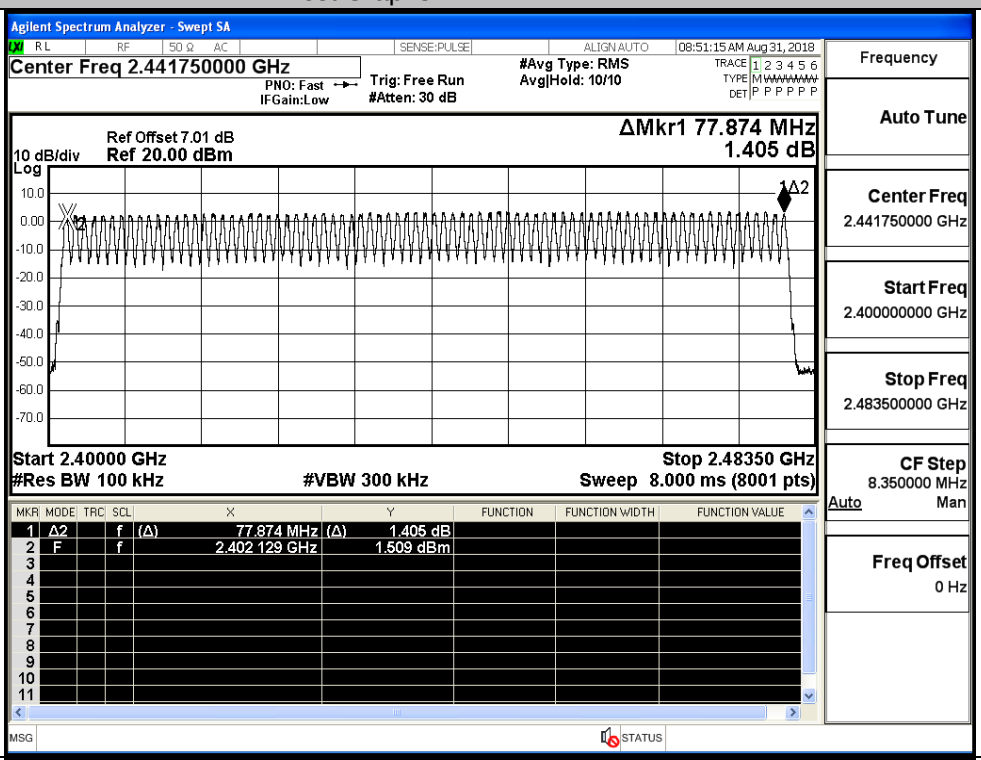
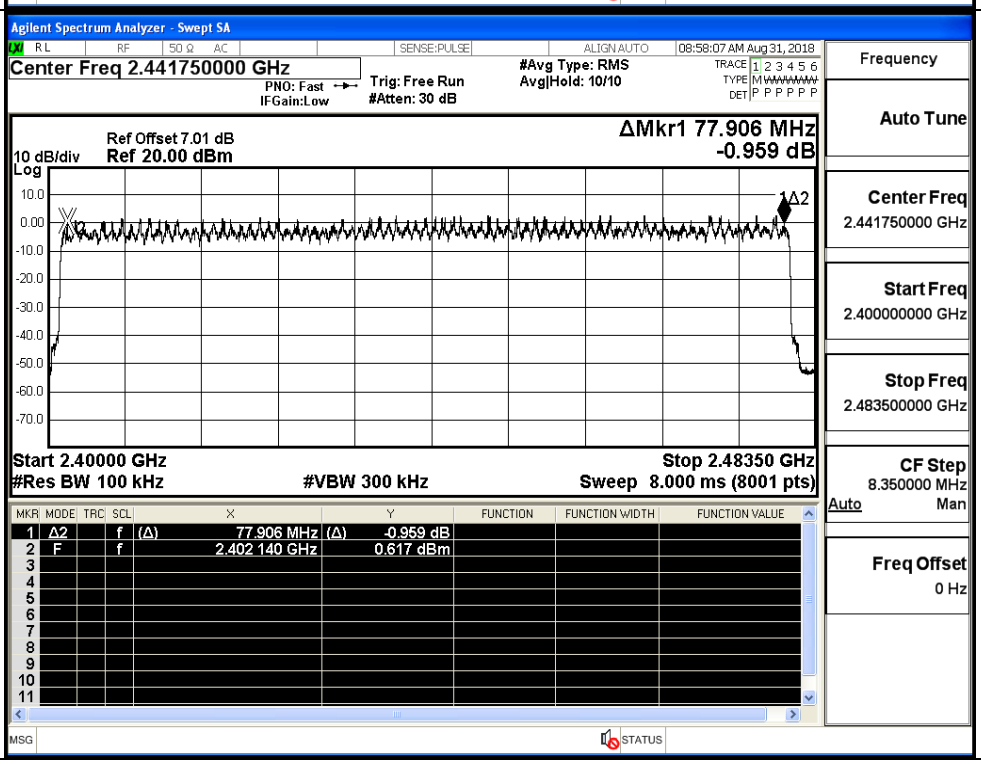
8DPSK/LCH



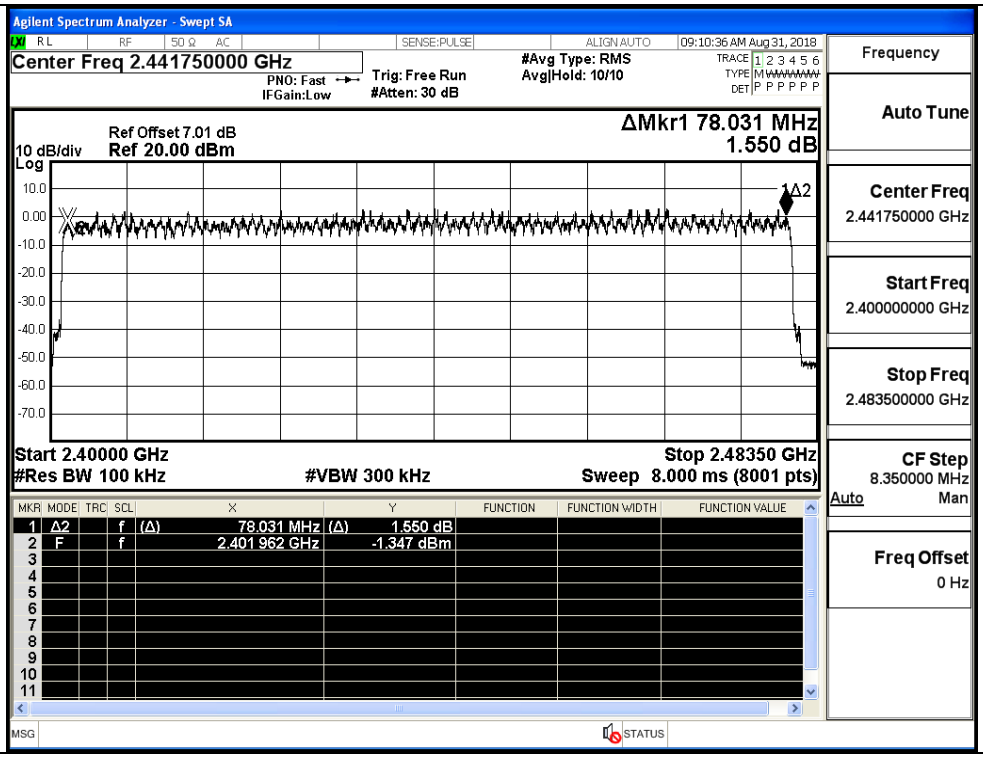
8DPSK/MCH	
8DPSK/HCH	

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

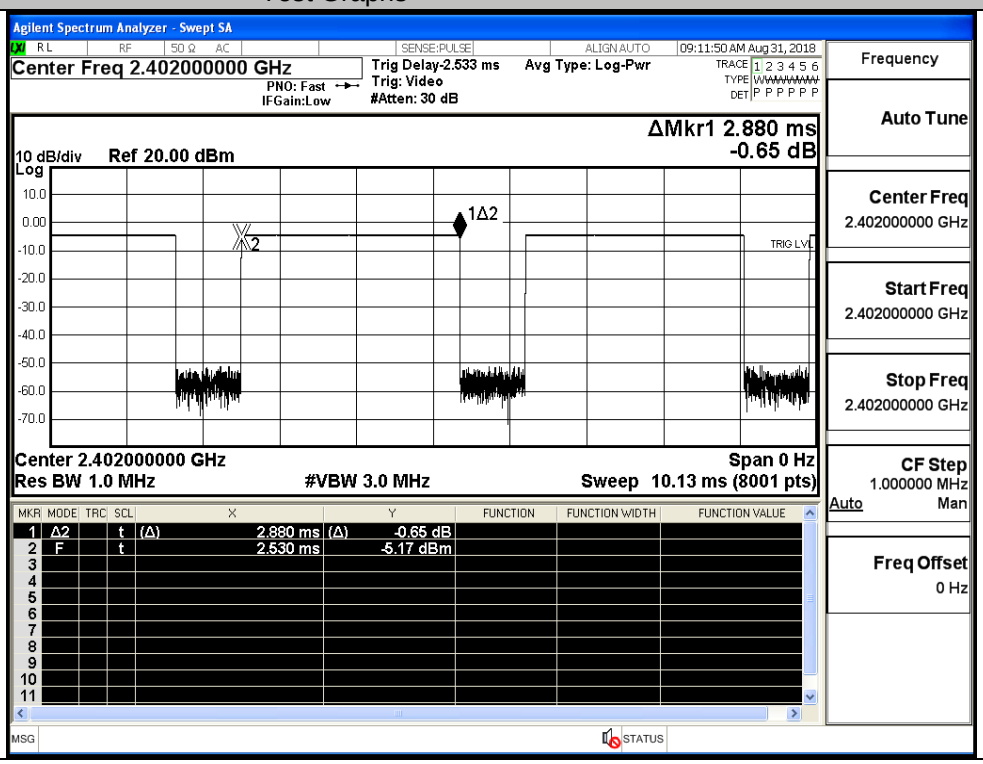
Test Graphs		
GFSK/Hop		
π/4DQPSK/Hop		

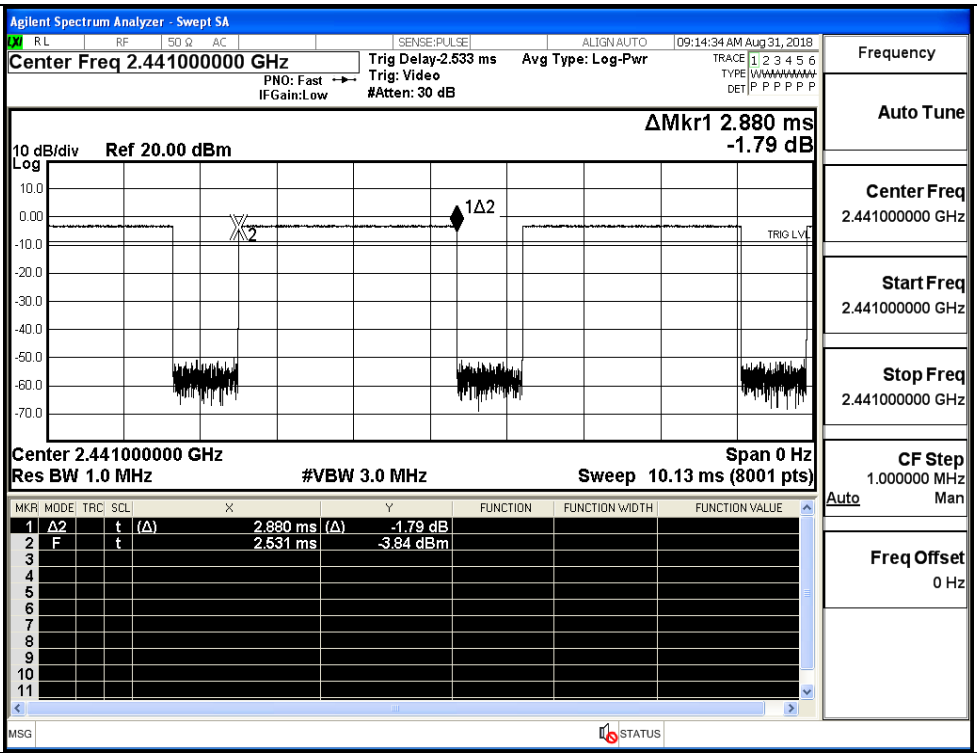
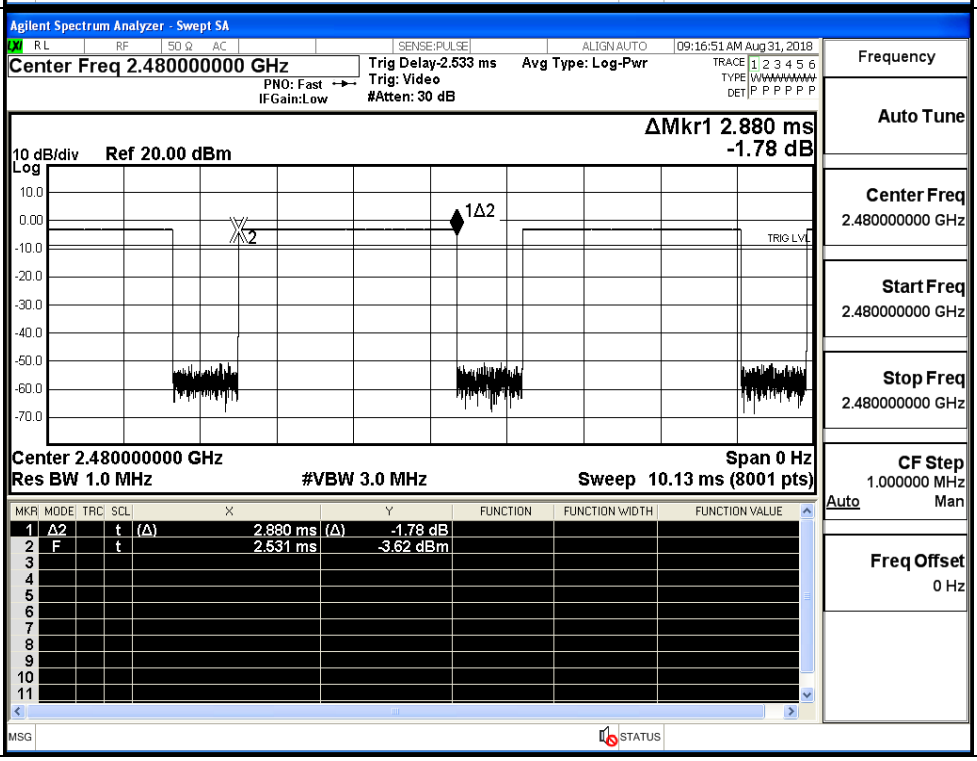
8DPSK/Hop

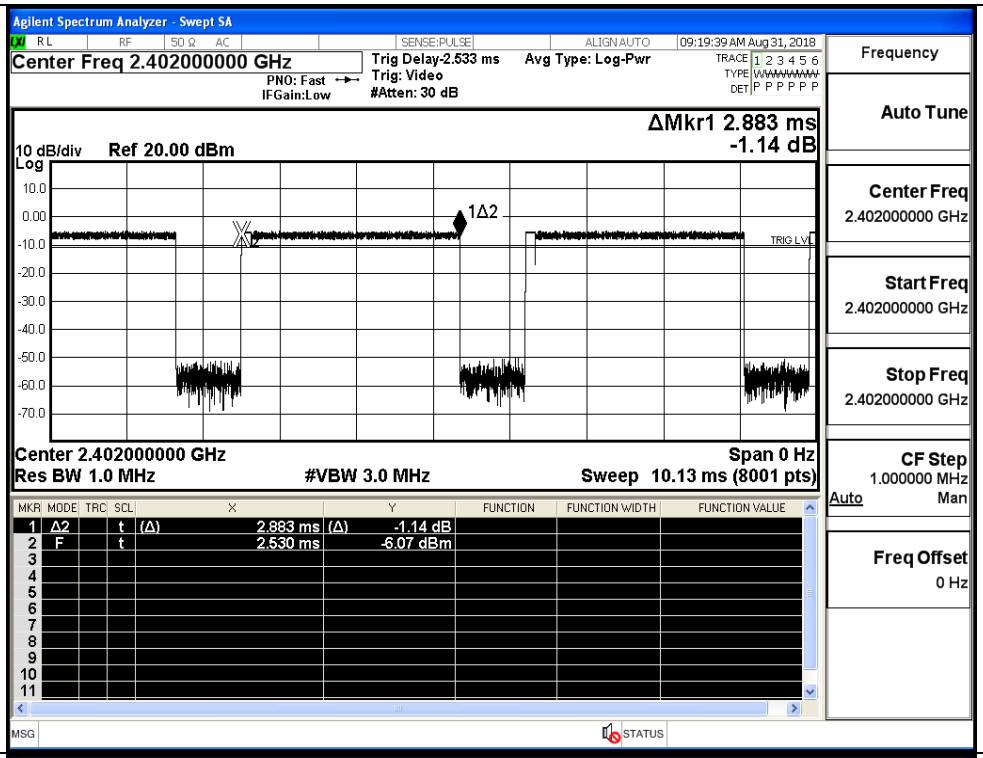
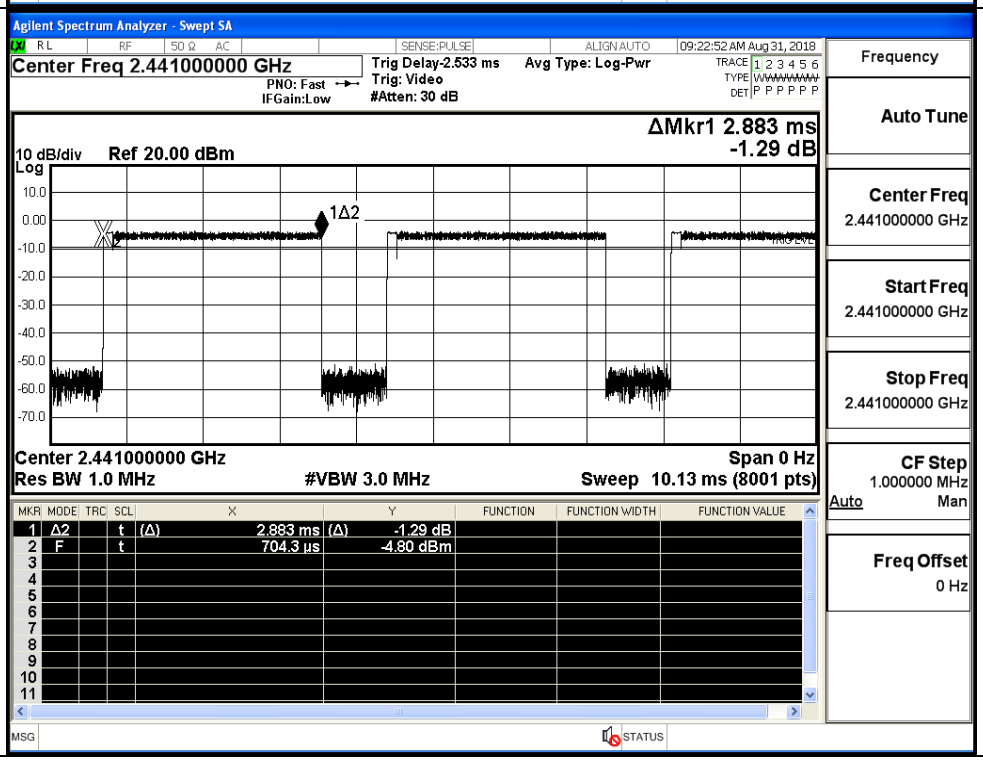

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
09:10:36 AM Aug 31, 2018
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 78.031 MHz
1.550 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 78.031 MHz (Δ) 1.550 dB
2 F f 2.401 962 GHz -1.347 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

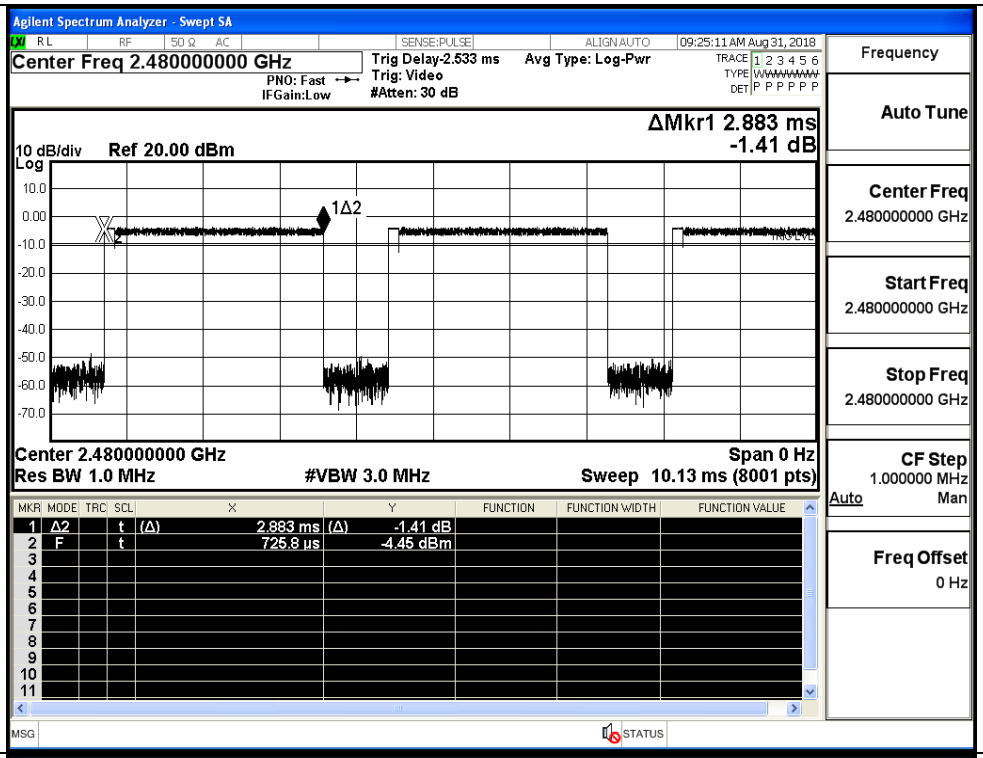
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7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

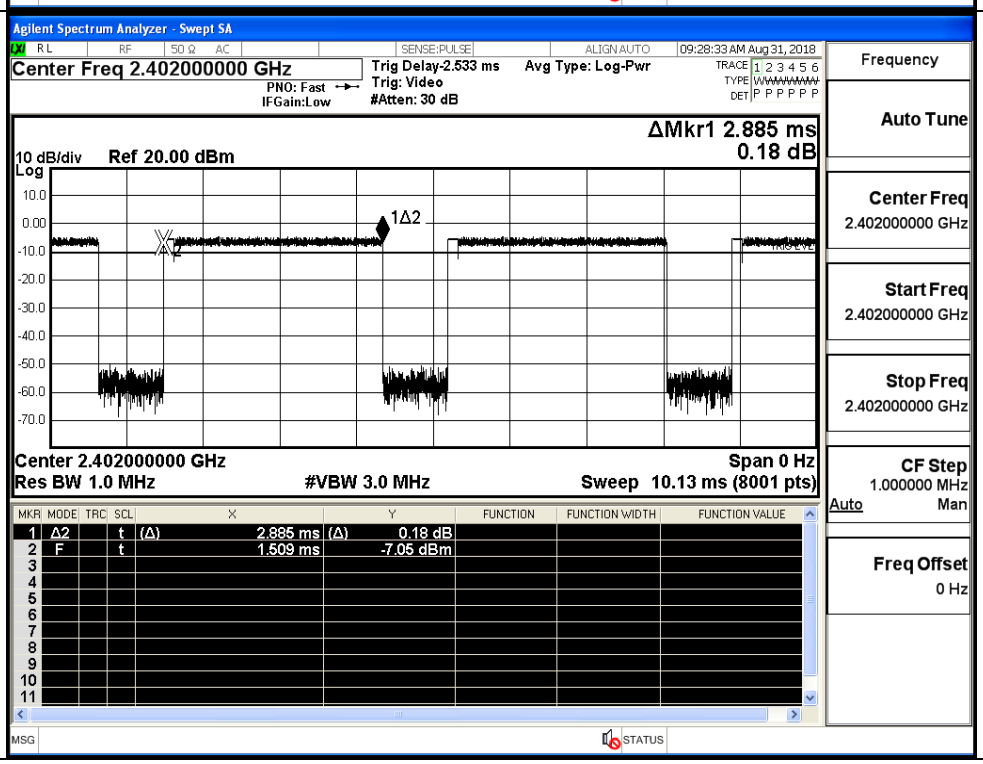
GFSK_DH5/MCH	
GFSK_DH5/HCH	

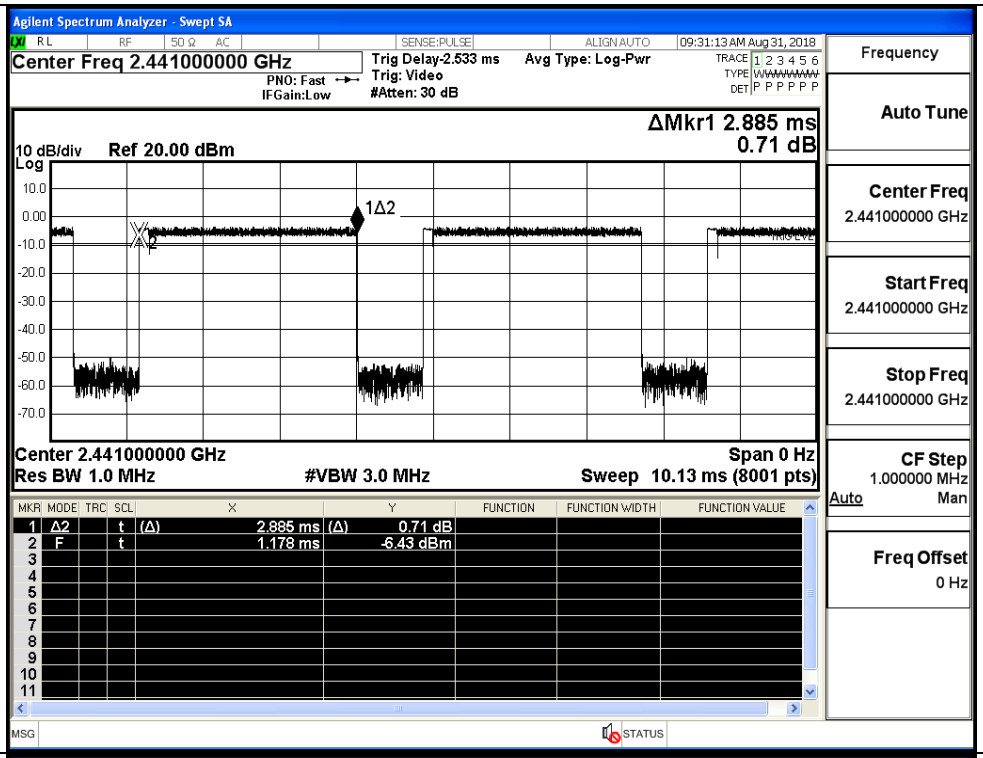
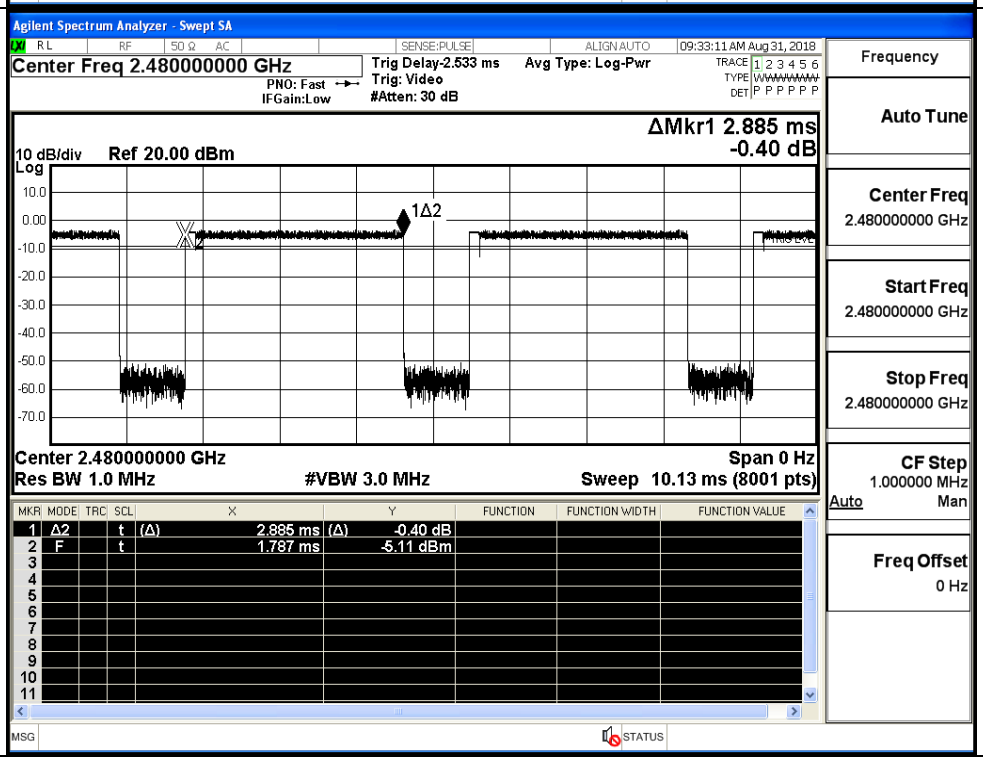
π/4DQPSK _2DH5/LCH	
π/4DQPSK _2DH5/MCH	

π/4DQPSK _2DH5/HCH



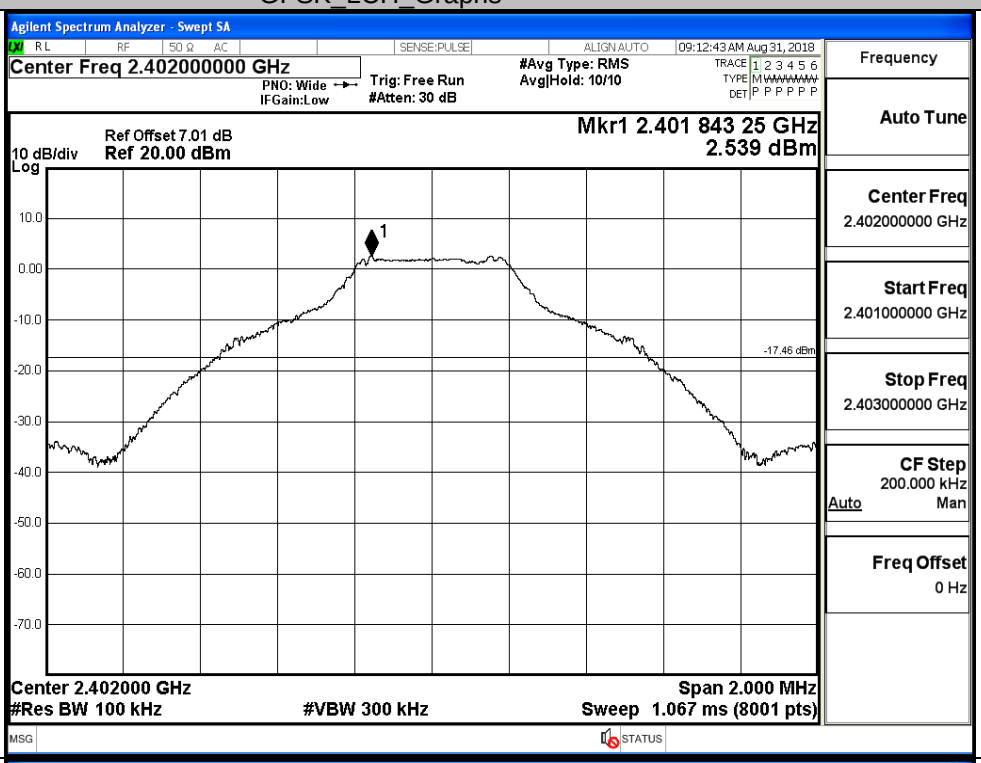
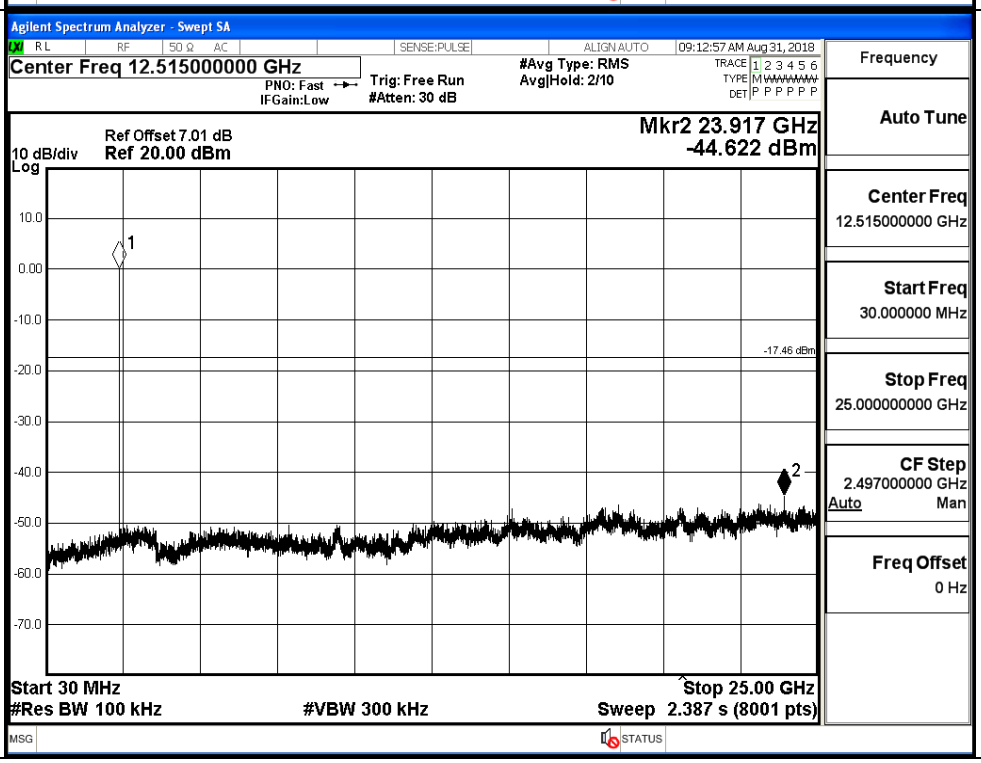
8DPSK _3DH5/LCH

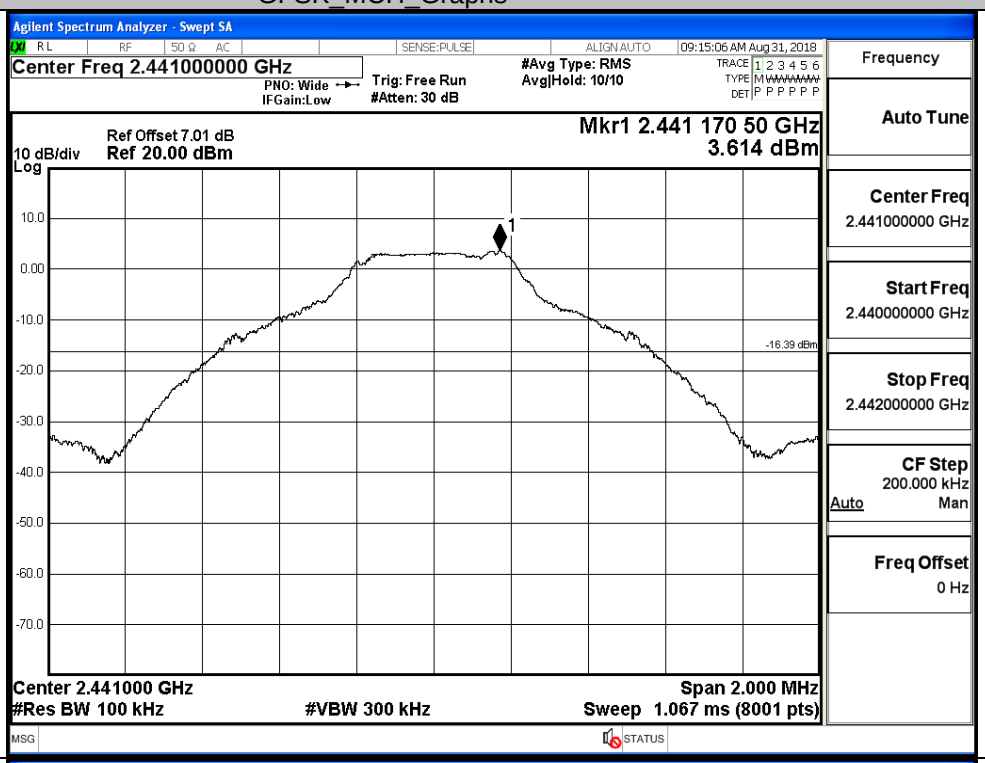
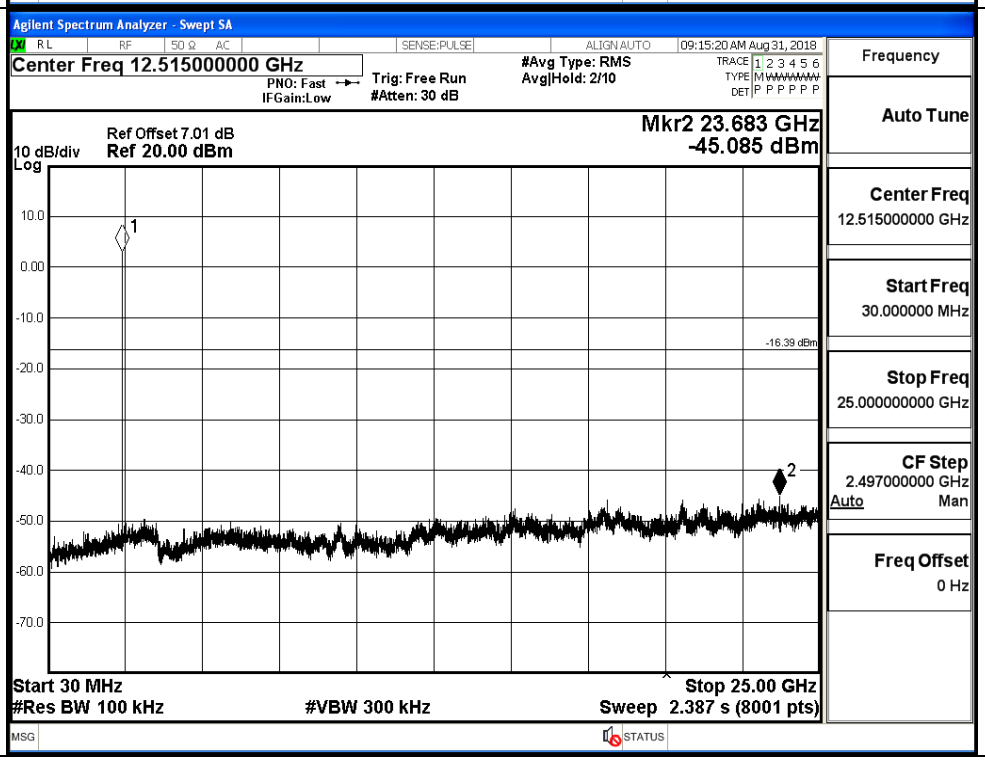


8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.539	-44.622	-17.461	PASS
	MCH	3.614	-45.085	-16.386	PASS
	HCH	3.773	-45.303	-16.227	PASS
π/4DQPSK	LCH	1.484	-44.760	-18.516	PASS
	MCH	2.695	-44.423	-17.305	PASS
	HCH	2.263	-45.242	-17.737	PASS
8DPSK	LCH	1.523	-45.437	-18.477	PASS
	MCH	2.679	-46.018	-17.321	PASS
	HCH	2.546	-45.699	-17.454	PASS

GFSK_LCH_Graphs		
Pref		
Puw		

GFSK_MCH_Graphs			
Pref			
Puw			

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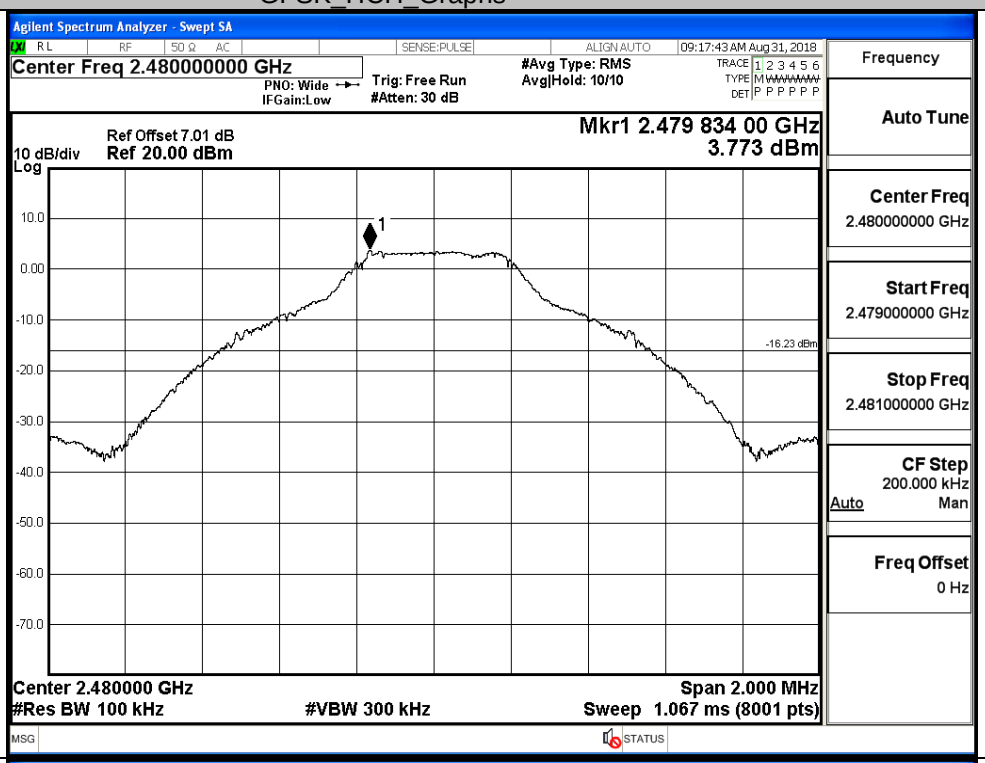
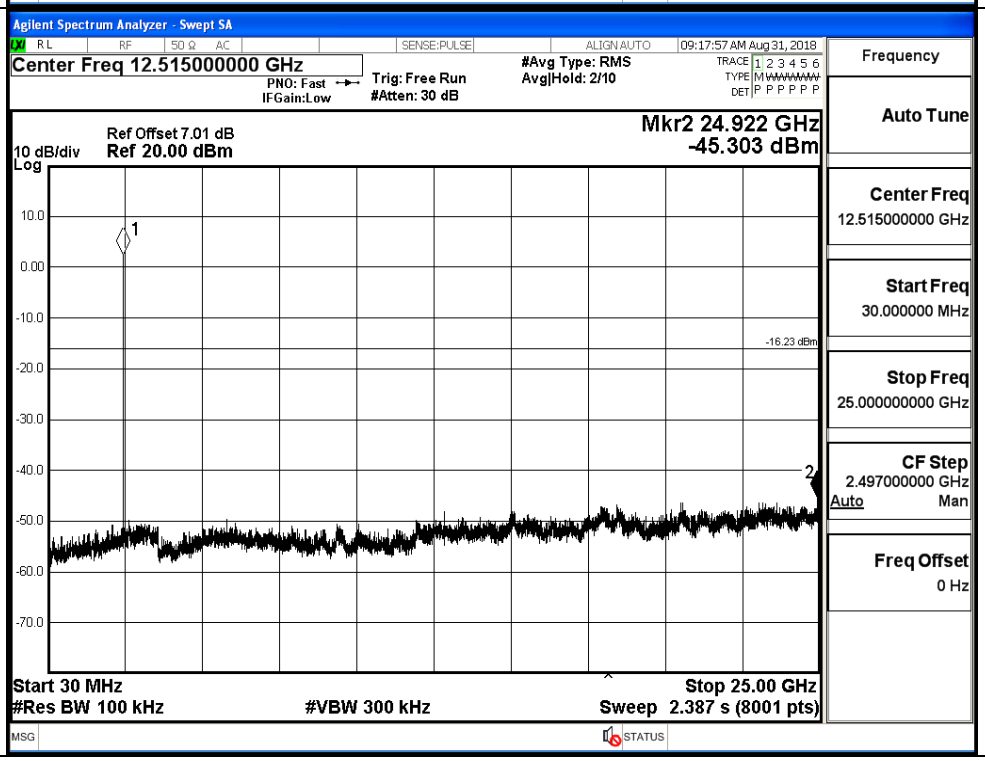
Pref		
Puw		

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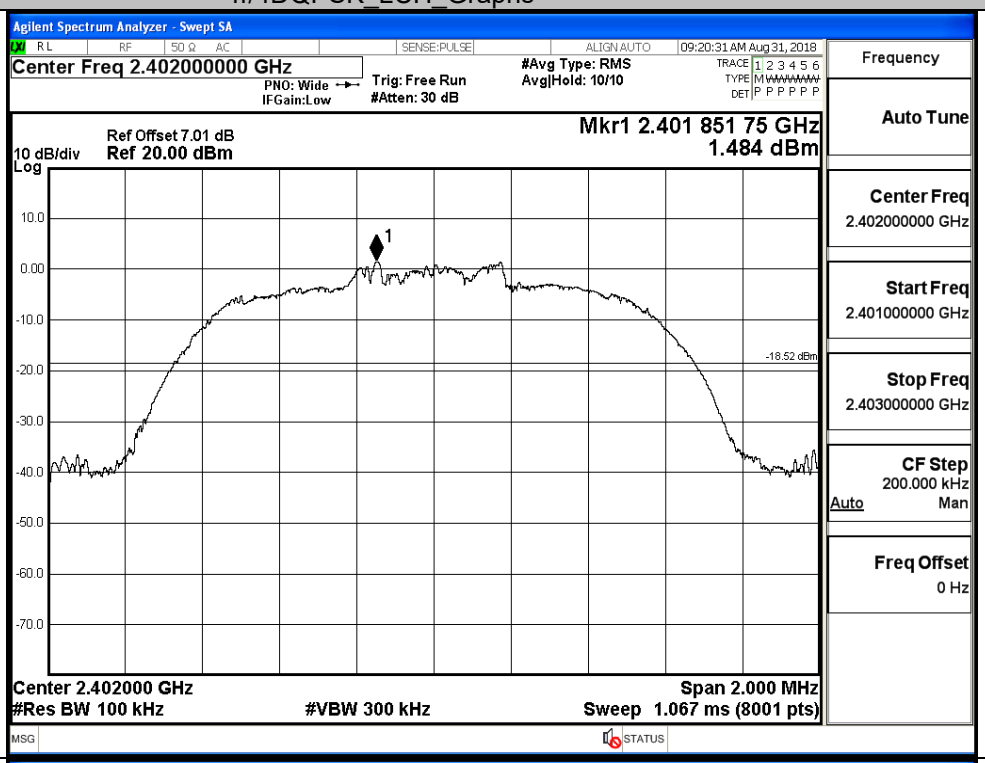
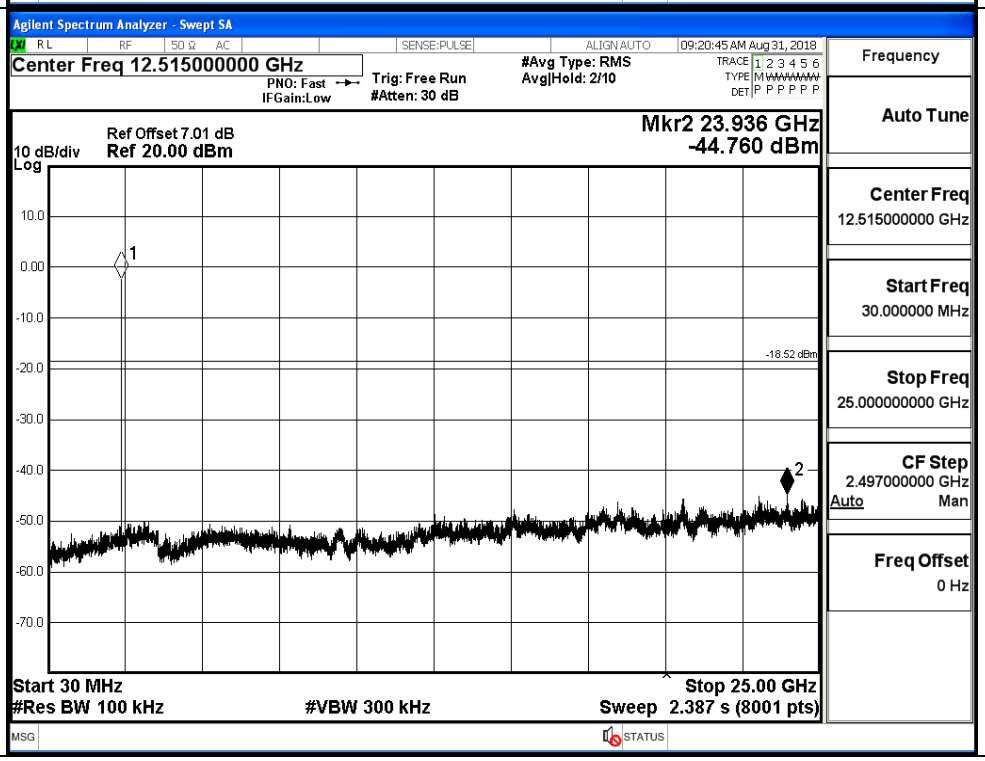
Pref		
Puw		

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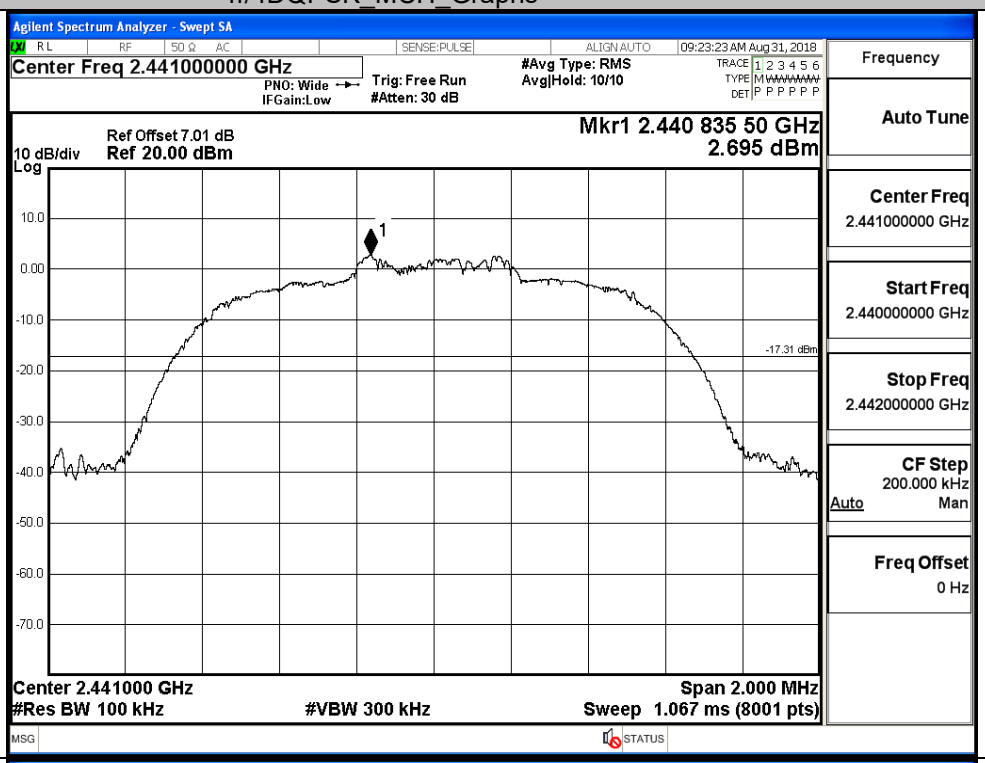
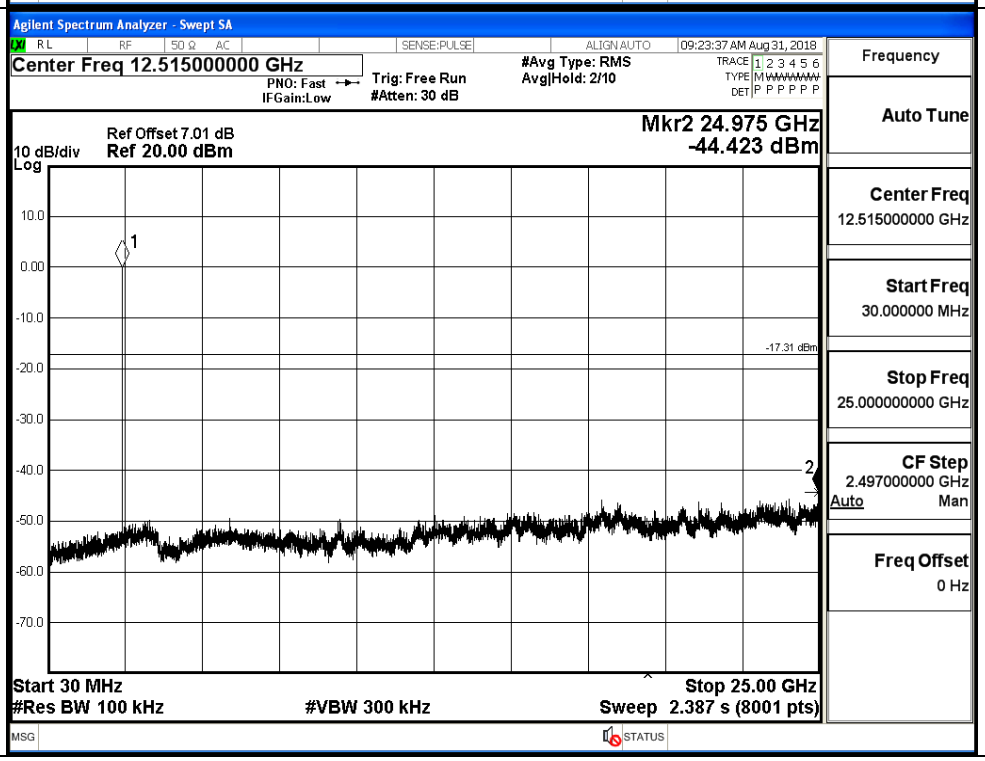
Pref		
Puw		

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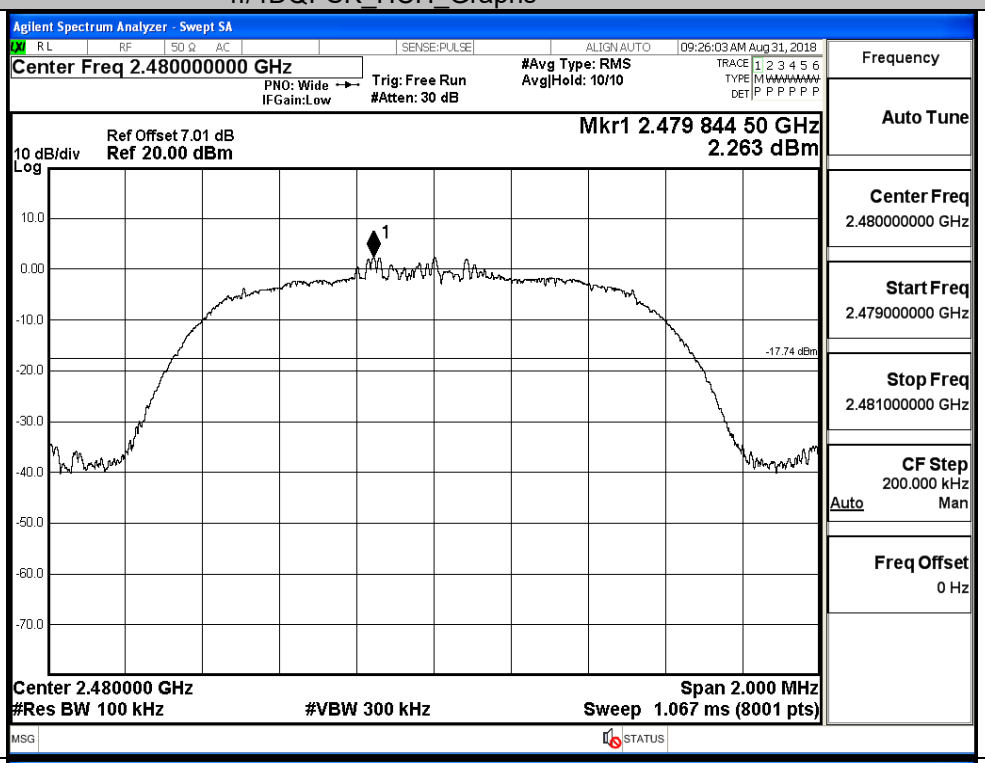
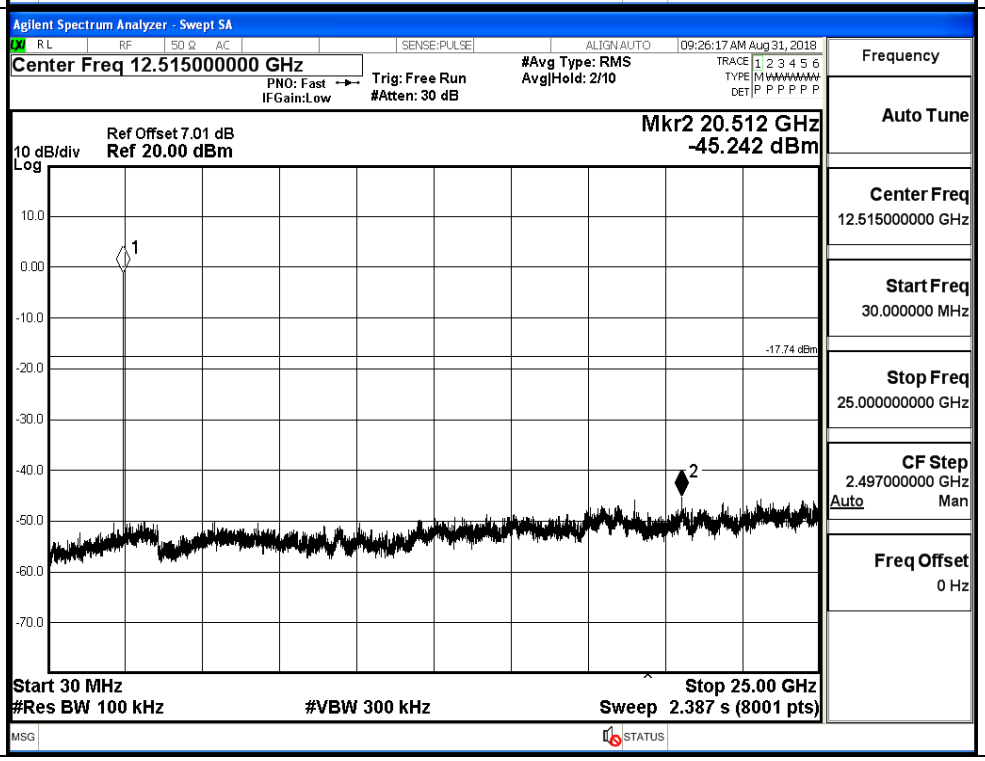
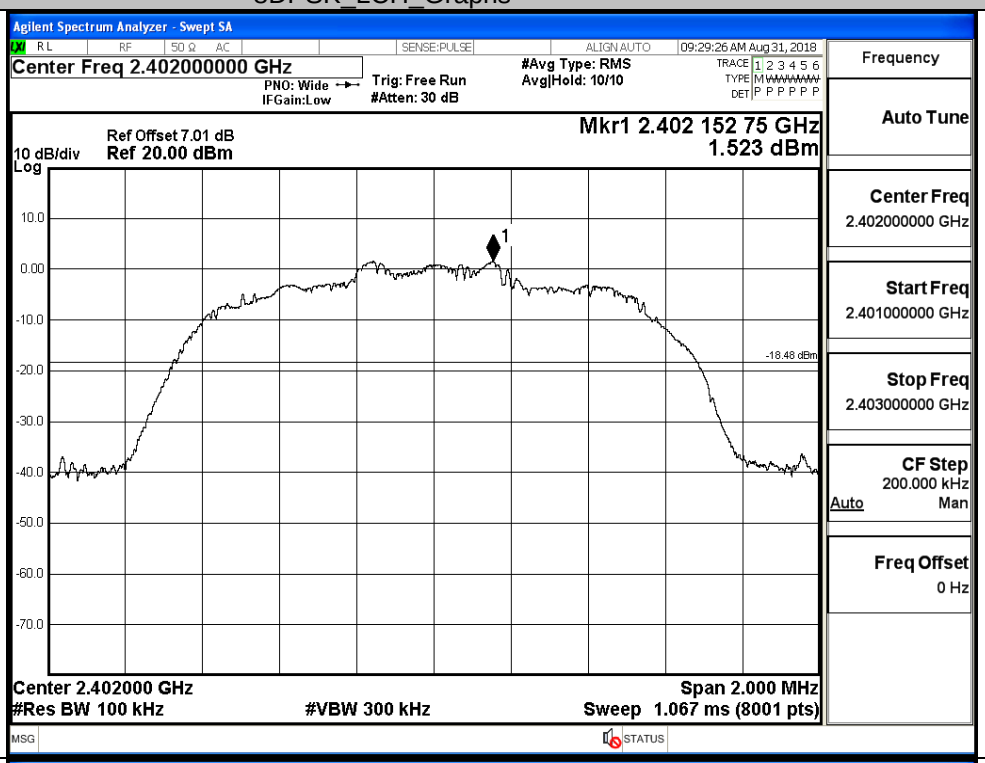
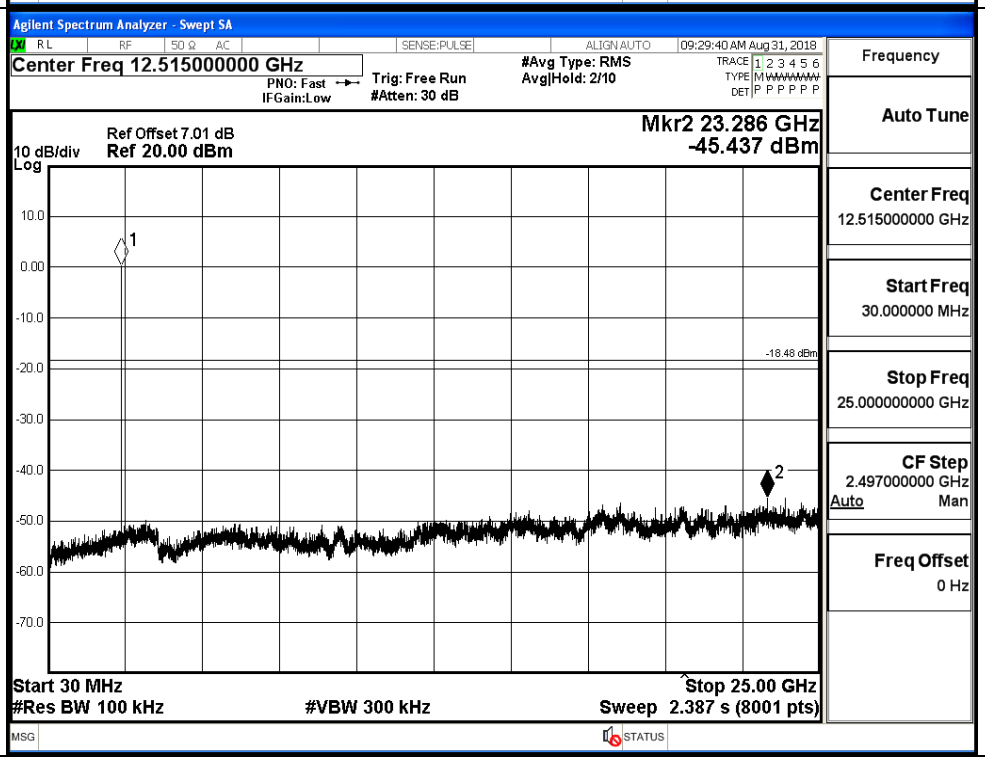
Pref		
Puw		

8DPSK_LCH_Graphs		
Pref		
Puw		

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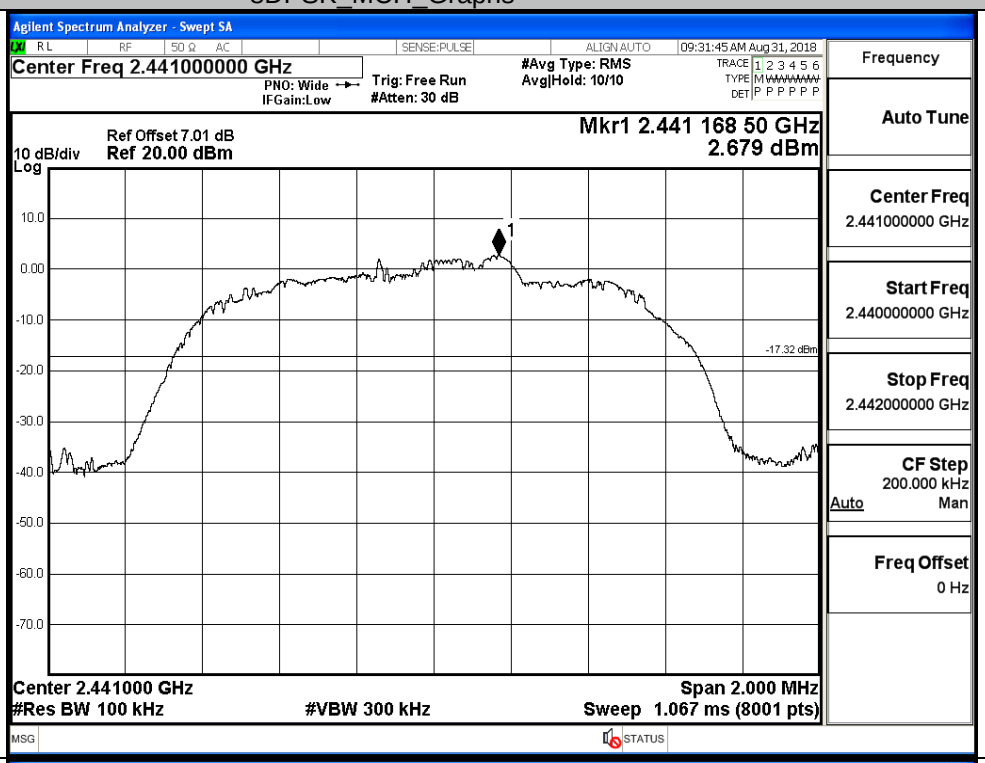
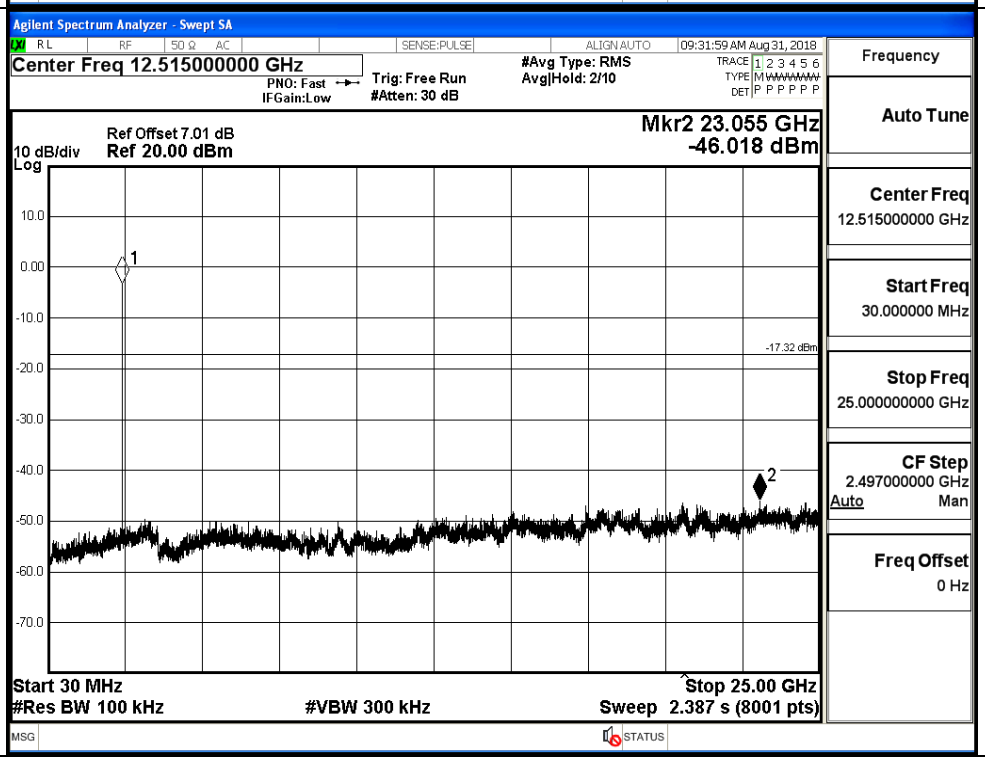
Pref		
Puw		

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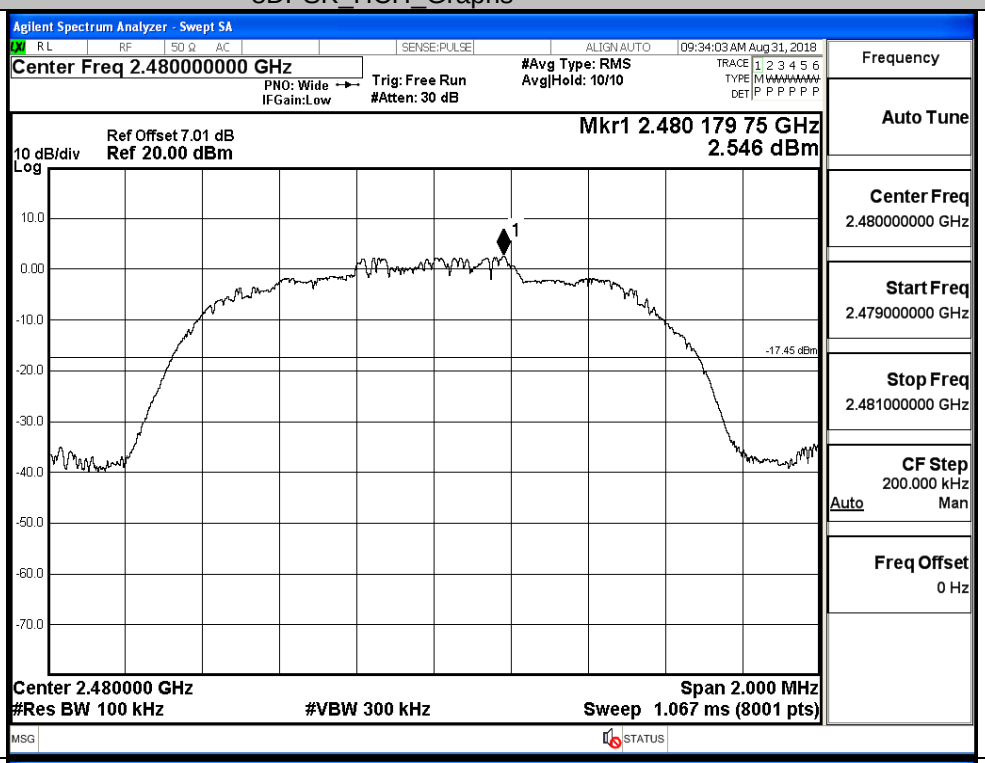
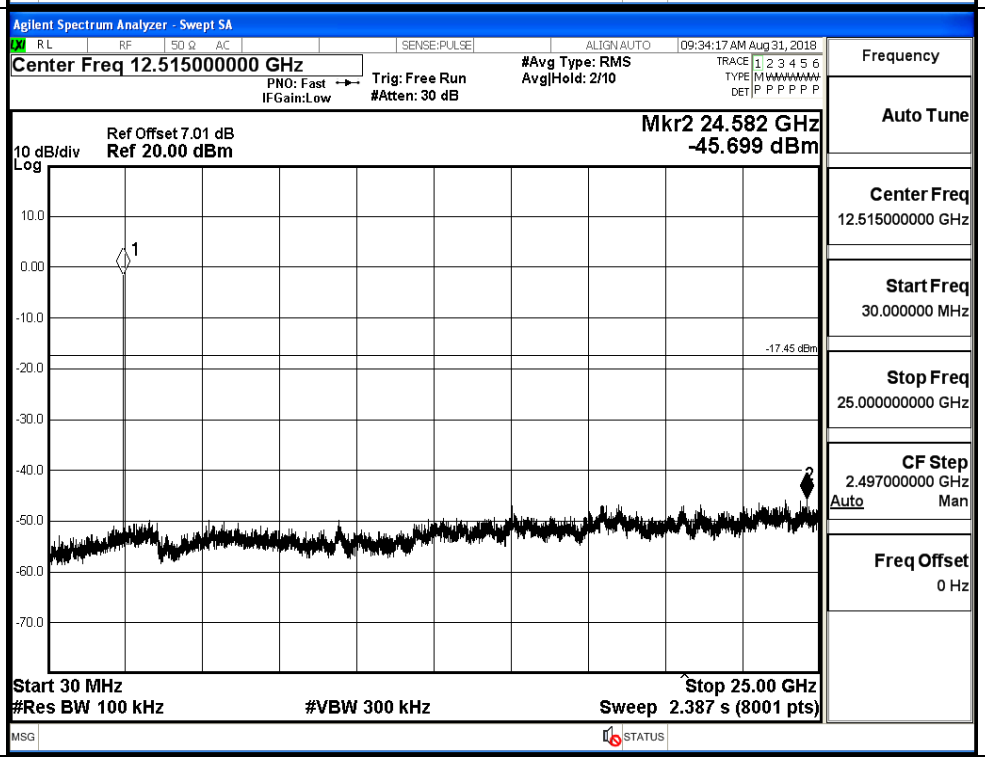
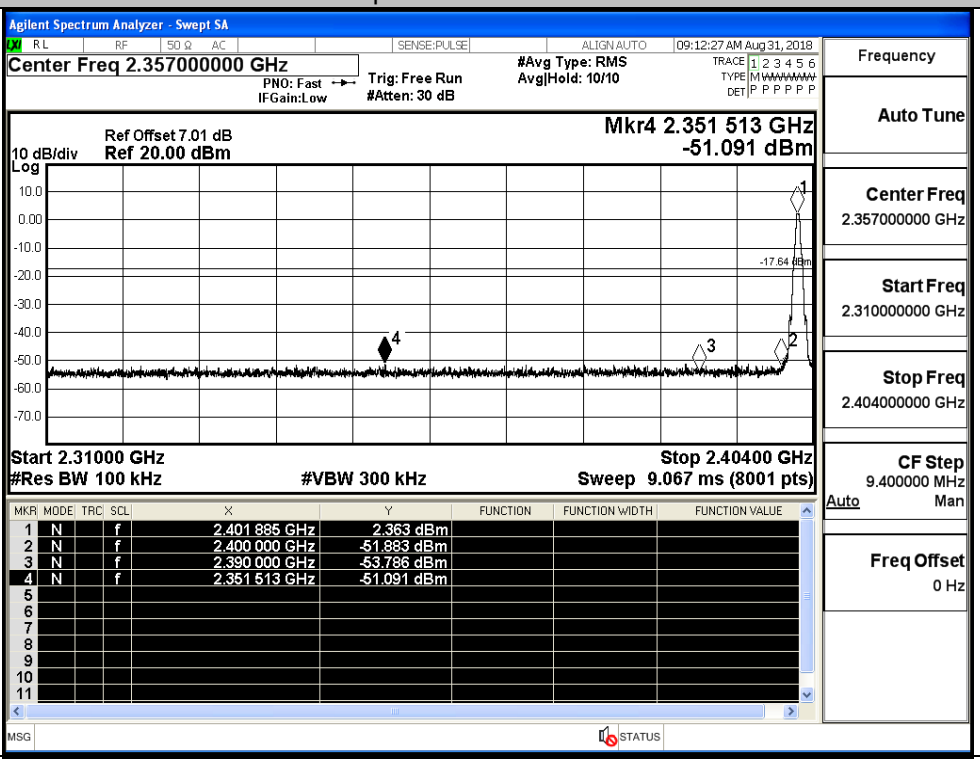
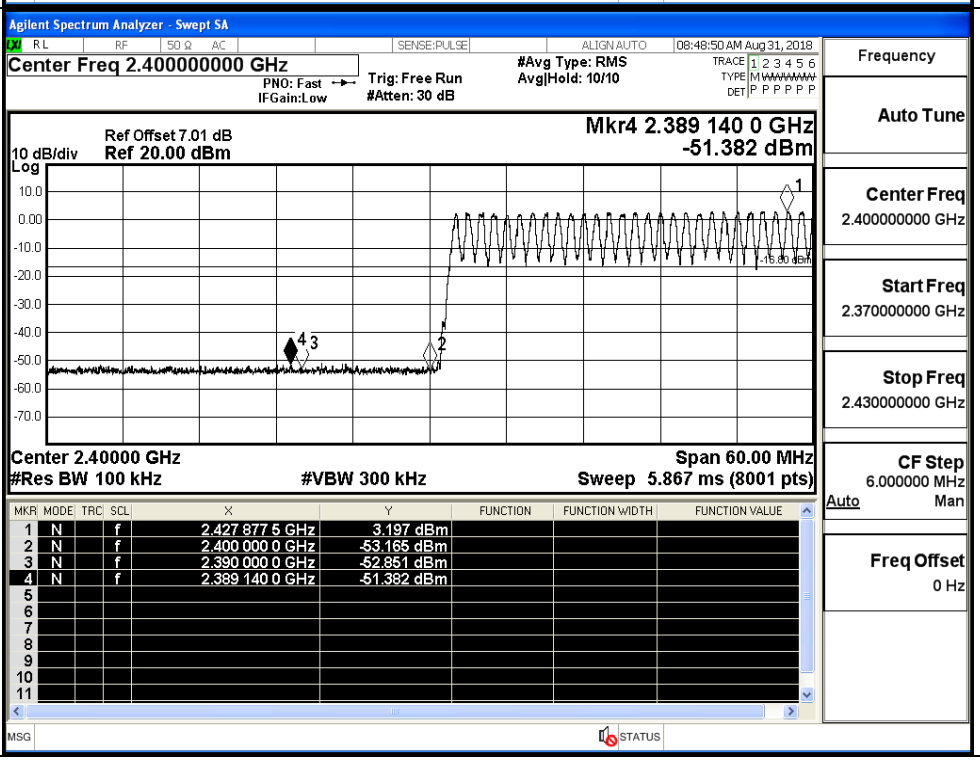
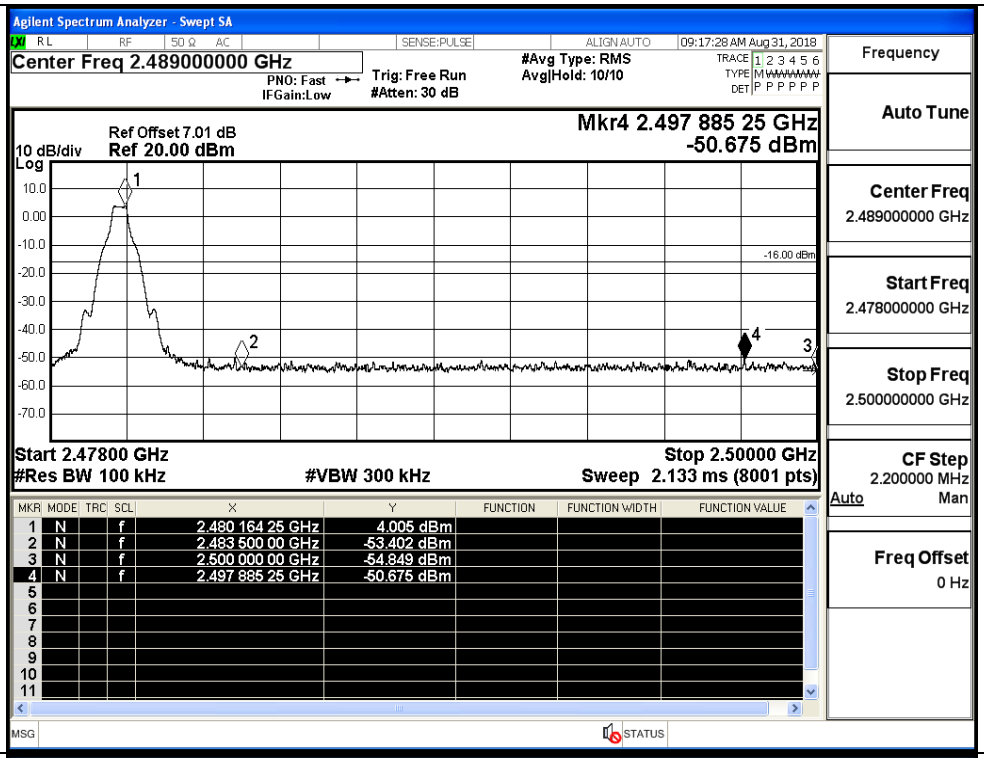
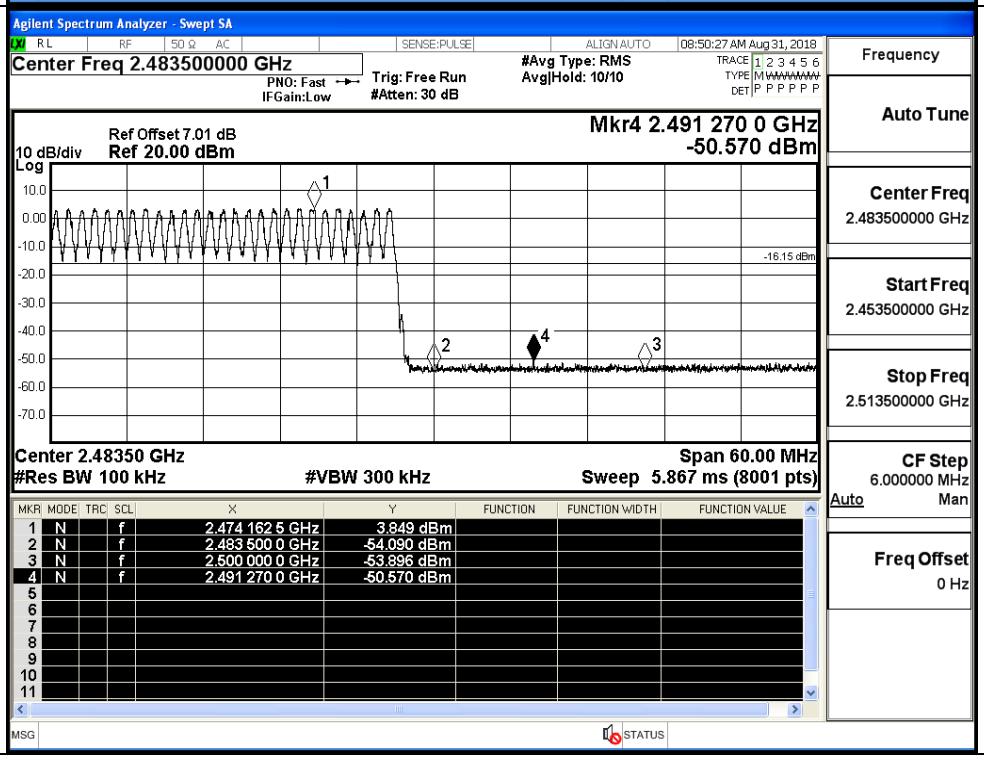
Pref		
Puw		

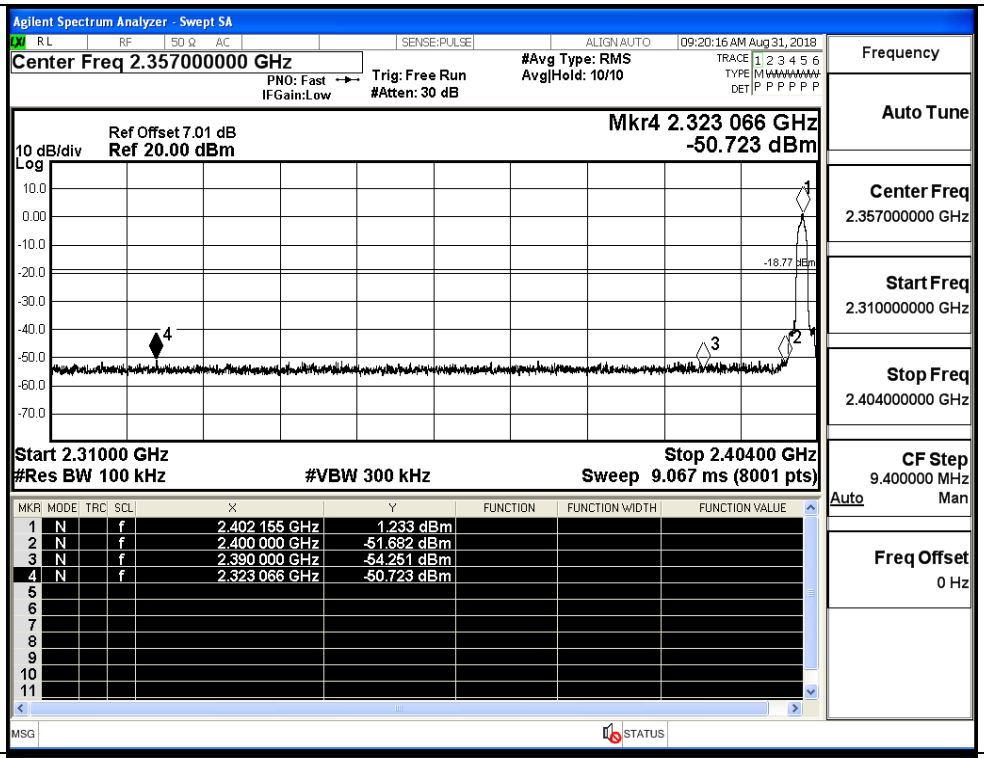
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	2.363	Off	-51.091	-17.64	PASS
			3.197	On	-51.382	-16.8	PASS
	HCH	2480	4.005	Off	-50.675	-16	PASS
			3.849	On	-50.570	-16.15	PASS
π/4DQPSK	LCH	2402	1.233	Off	-50.723	-18.77	PASS
			2.087	On	-50.012	-17.91	PASS
	HCH	2480	3.027	Off	-51.259	-16.97	PASS
			2.731	On	-50.275	-17.27	PASS
8DPSK	LCH	2402	1.466	Off	-50.863	-18.53	PASS
			2.261	On	-50.644	-17.74	PASS
	HCH	2480	2.858	Off	-51.644	-17.14	PASS
			3.080	On	-50.374	-16.92	PASS

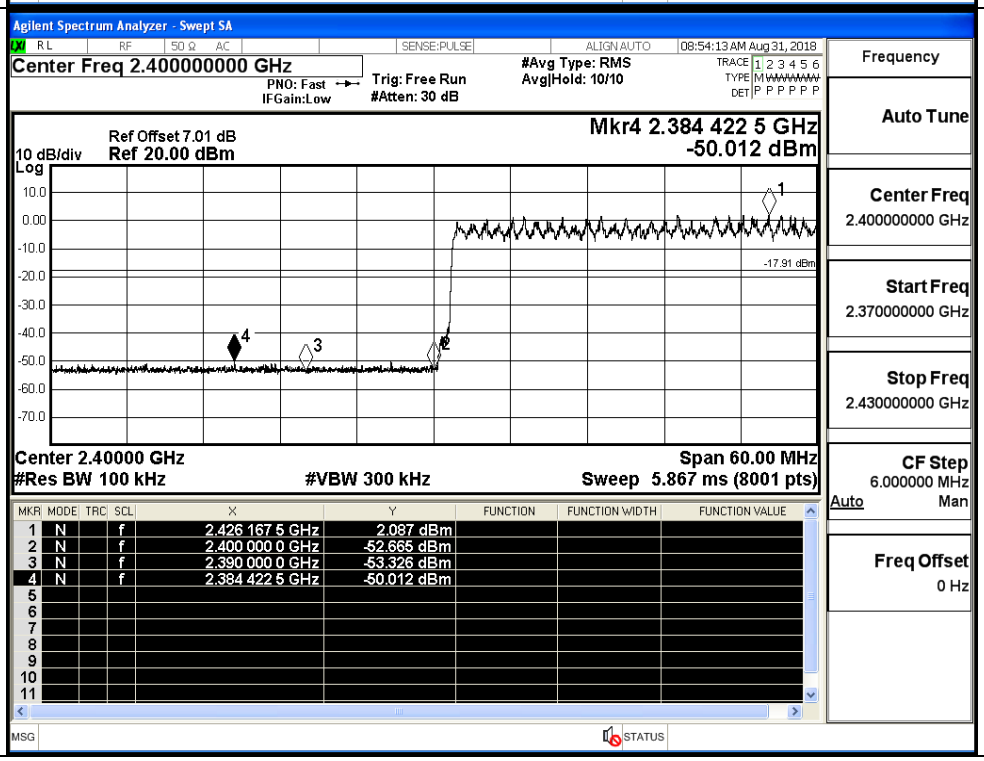
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

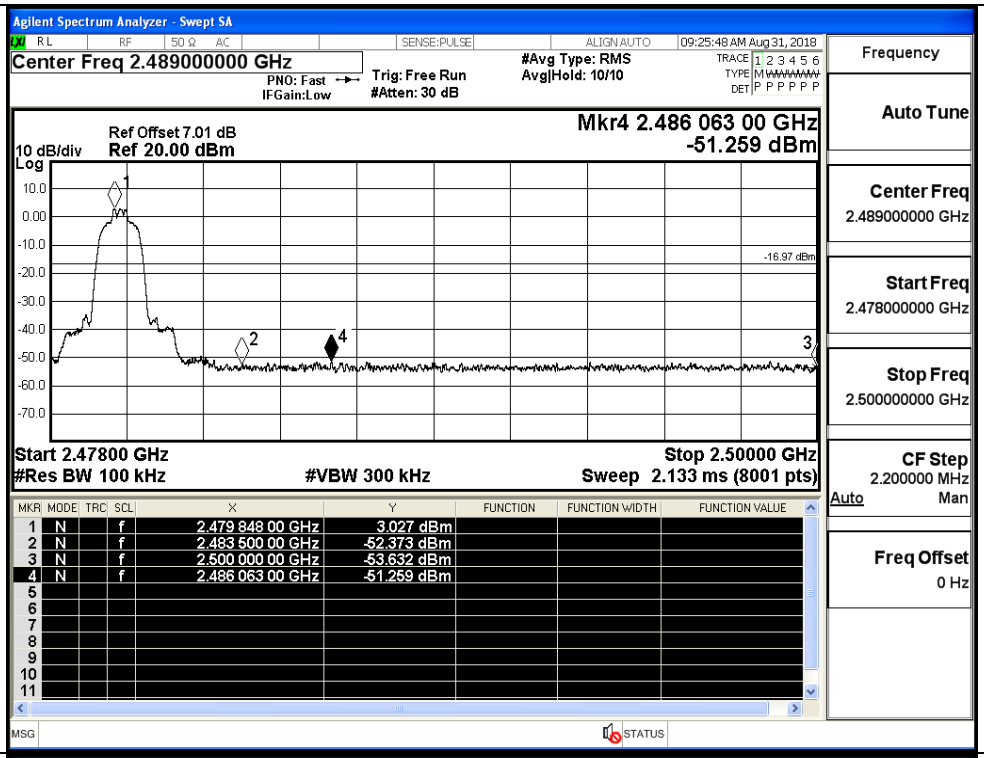
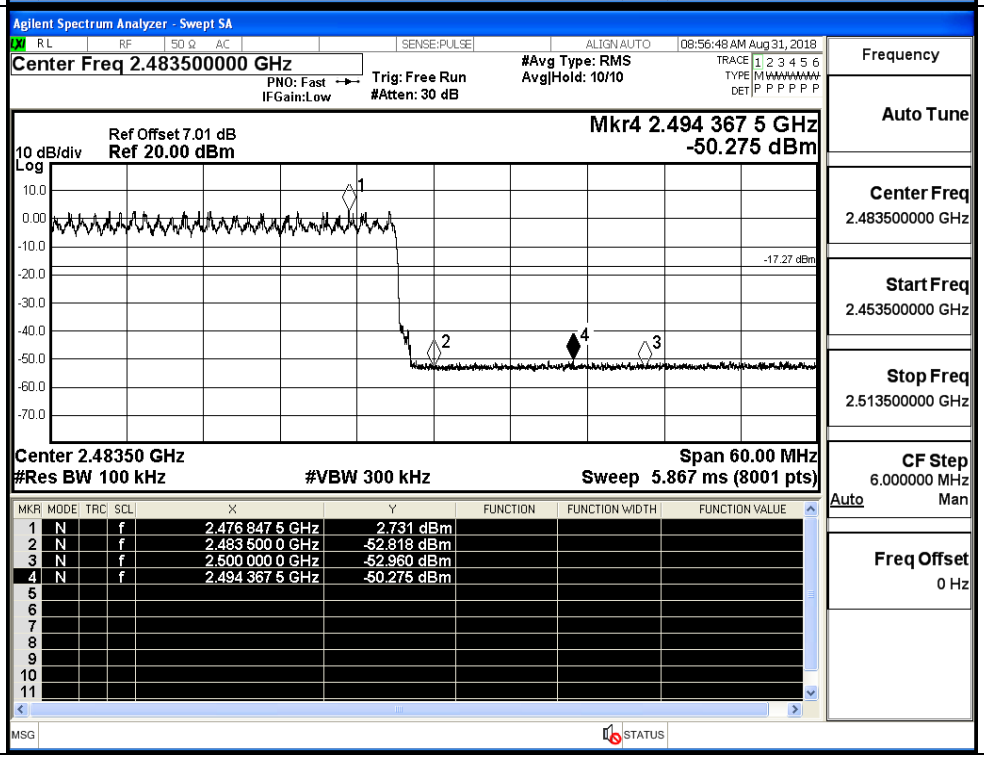
GFSK/HCH/No Hop	
GFSK/HCH/Hop	

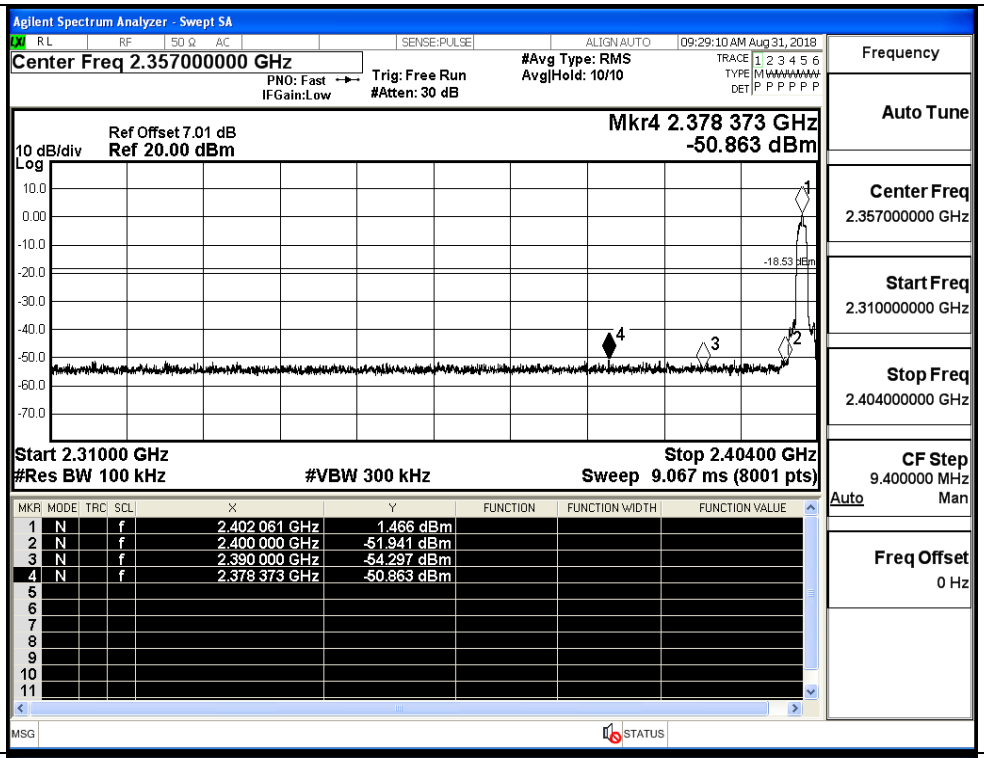
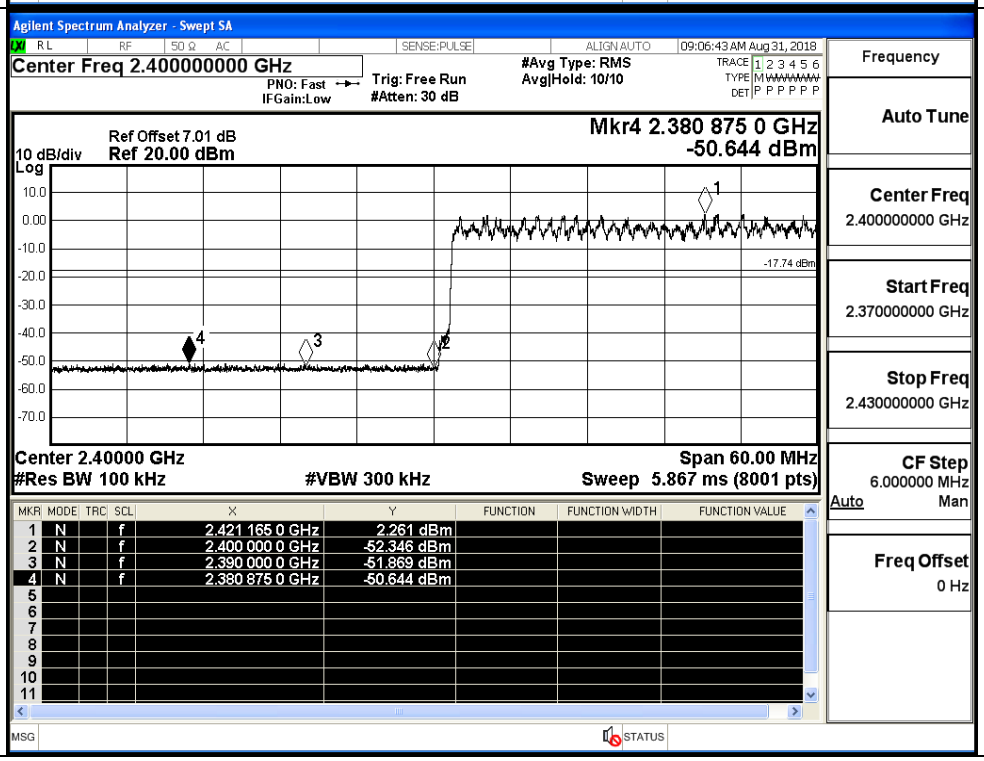
π/4DQPSK/LCH/No Hop

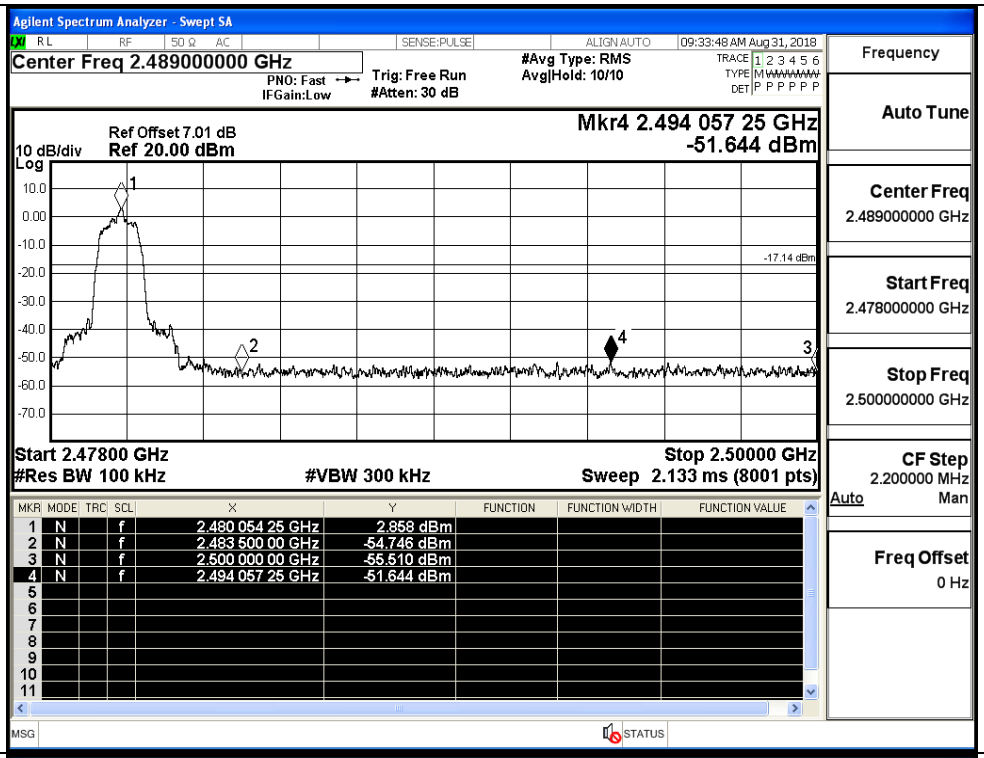
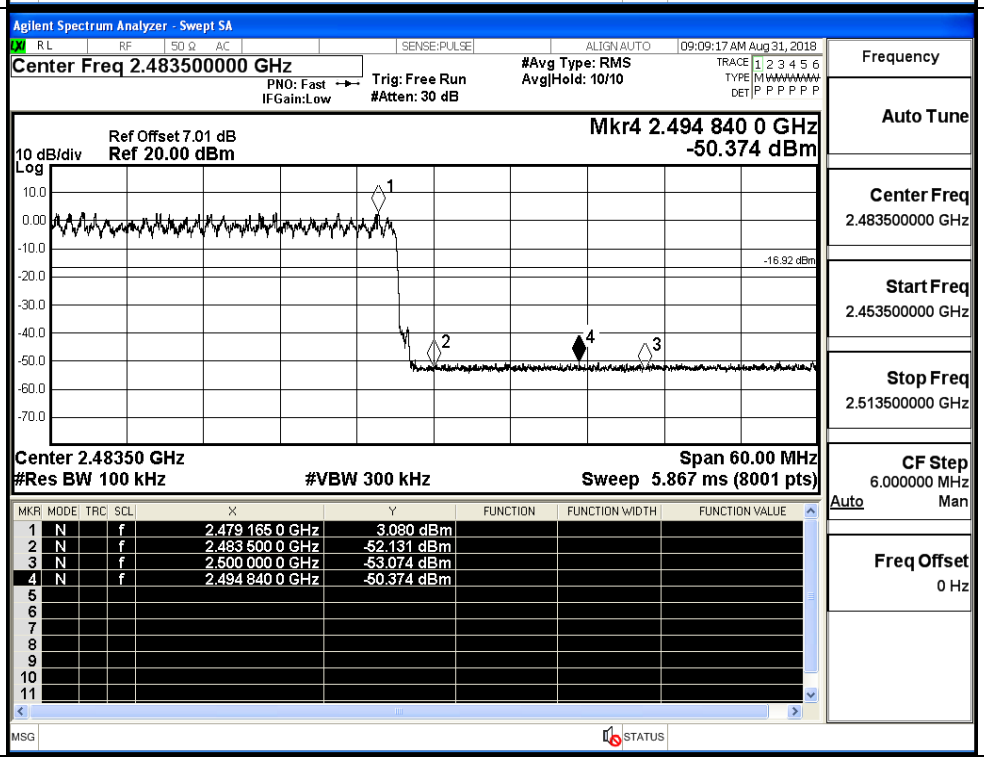


π/4DQPSK/LCH/Hop



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

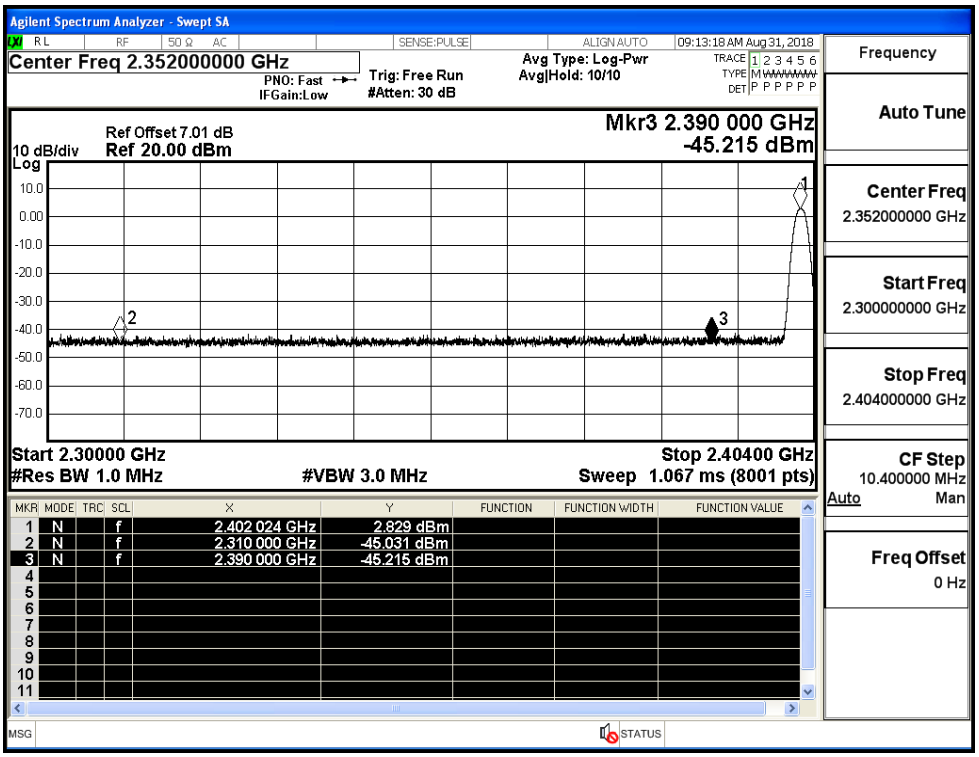
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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

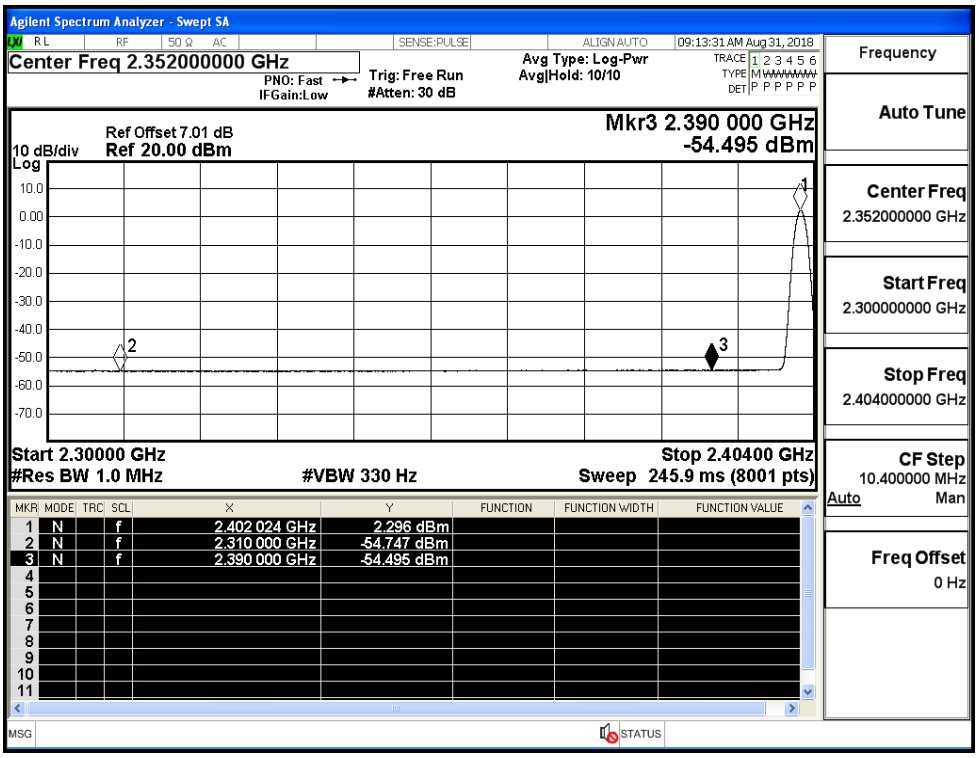
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-45.03	2.43	0	52.60	PEAK	74	PASS
	Off	2310.0	-54.75	2.43	0	42.88	AV	54	PASS
	Off	2390.0	-45.22	2.43	0	52.41	PEAK	74	PASS
	Off	2390.0	-54.50	2.43	0	43.13	AV	54	PASS
	Off	2483.5	-44.02	2.43	0	53.61	PEAK	74	PASS
	Off	2483.5	-54.01	2.43	0	43.62	AV	54	PASS
	Off	2500.0	-43.05	2.43	0	54.58	PEAK	74	PASS
	Off	2500.0	-54.15	2.43	0	43.48	AV	54	PASS
π/4DQPSK	Off	2310.0	-44.52	2.43	0	53.11	PEAK	74	PASS
	Off	2310.0	-54.79	2.43	0	42.84	AV	54	PASS
	Off	2390.0	-44.89	2.43	0	52.74	PEAK	74	PASS
	Off	2390.0	-54.56	2.43	0	43.07	AV	54	PASS
	Off	2483.5	-44.16	2.43	0	53.47	PEAK	74	PASS
	Off	2483.5	-54.00	2.43	0	43.63	AV	54	PASS
	Off	2500.0	-43.27	2.43	0	54.36	PEAK	74	PASS
	Off	2500.0	-54.01	2.43	0	43.62	AV	54	PASS
8DPSK	Off	2310.0	-43.85	2.43	0	53.78	PEAK	74	PASS
	Off	2310.0	-54.66	2.43	0	42.97	AV	54	PASS
	Off	2390.0	-44.42	2.43	0	53.21	PEAK	74	PASS
	Off	2390.0	-54.49	2.43	0	43.14	AV	54	PASS
	Off	2483.5	-44.75	2.43	0	52.88	PEAK	74	PASS
	Off	2483.5	-53.97	2.43	0	43.66	AV	54	PASS
	Off	2500.0	-43.60	2.43	0	54.03	PEAK	74	PASS
	Off	2500.0	-54.10	2.43	0	43.53	AV	54	PASS

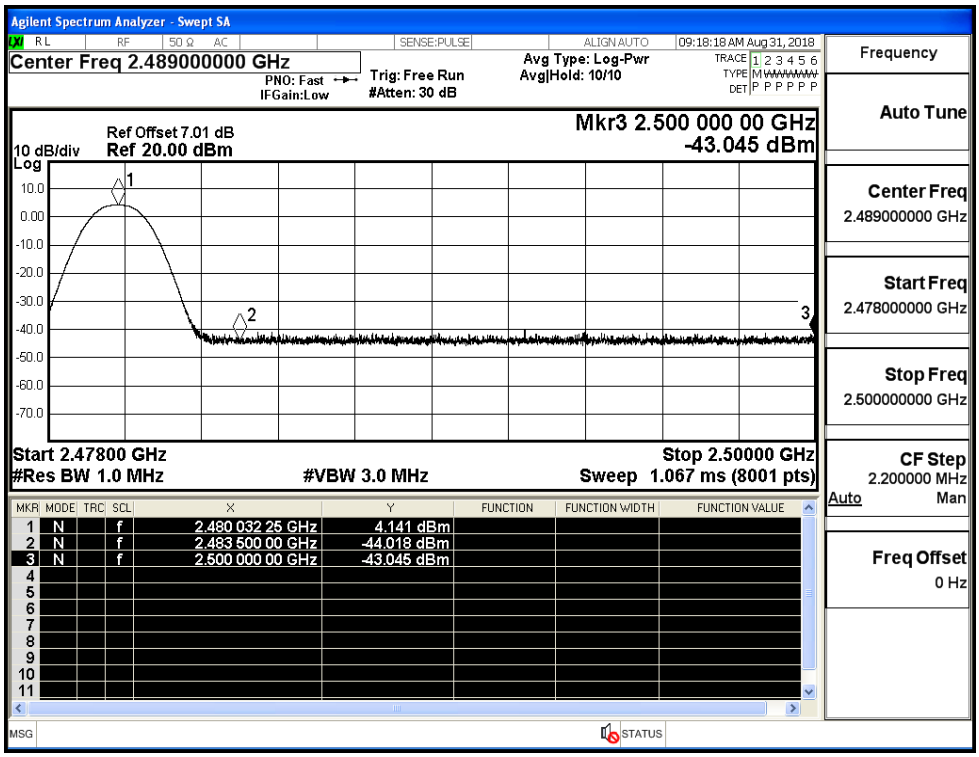
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



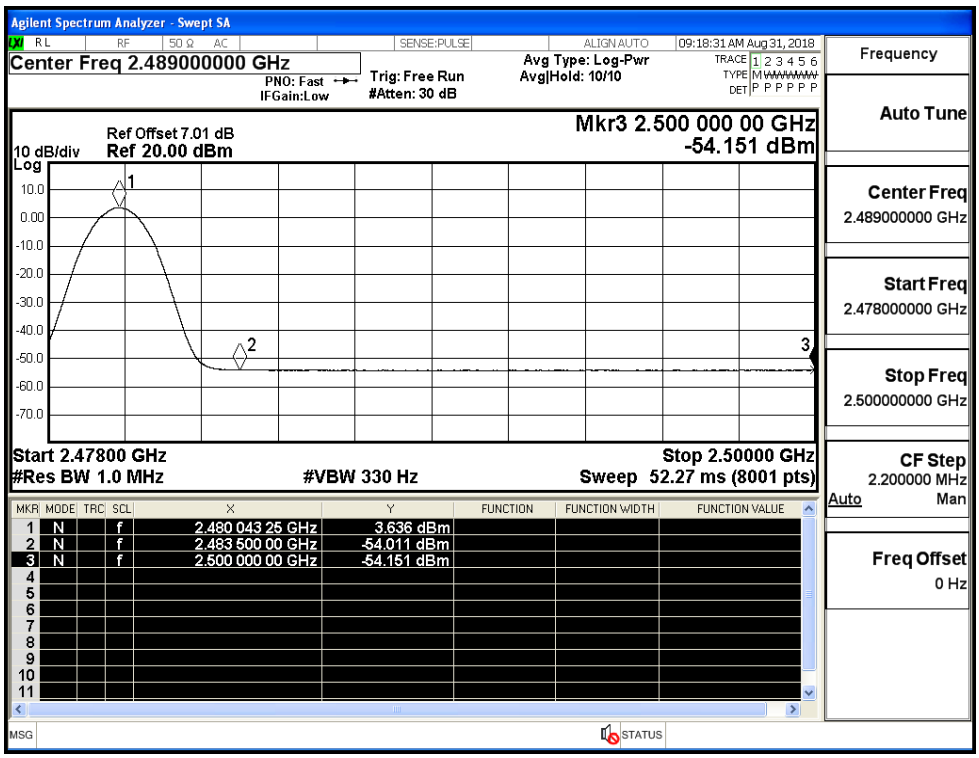
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



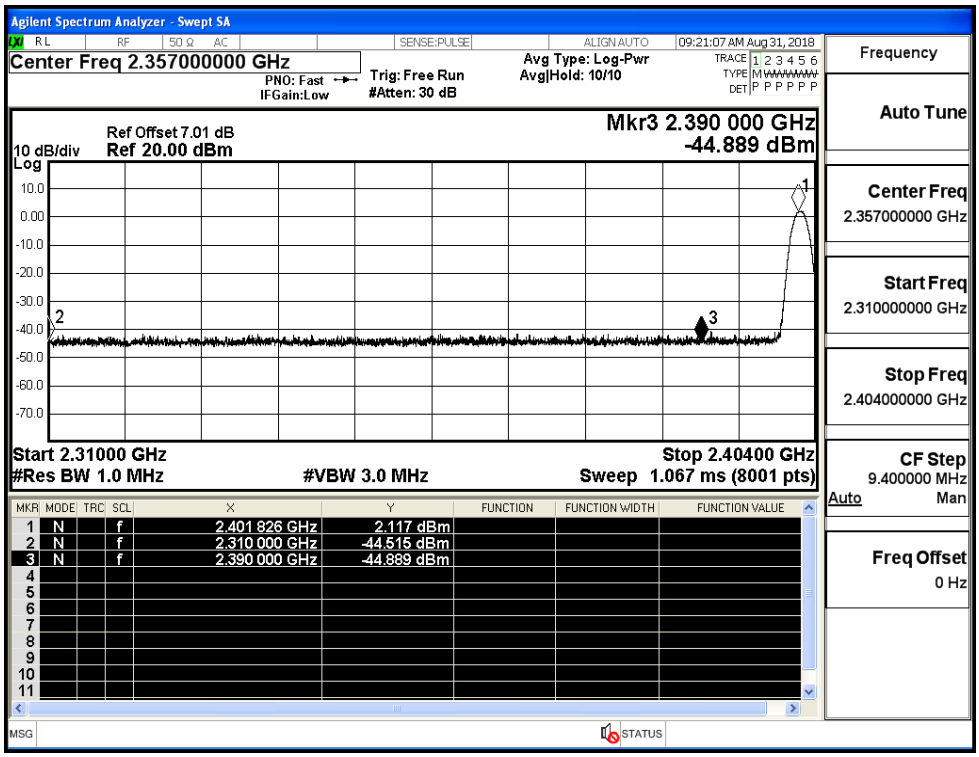
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



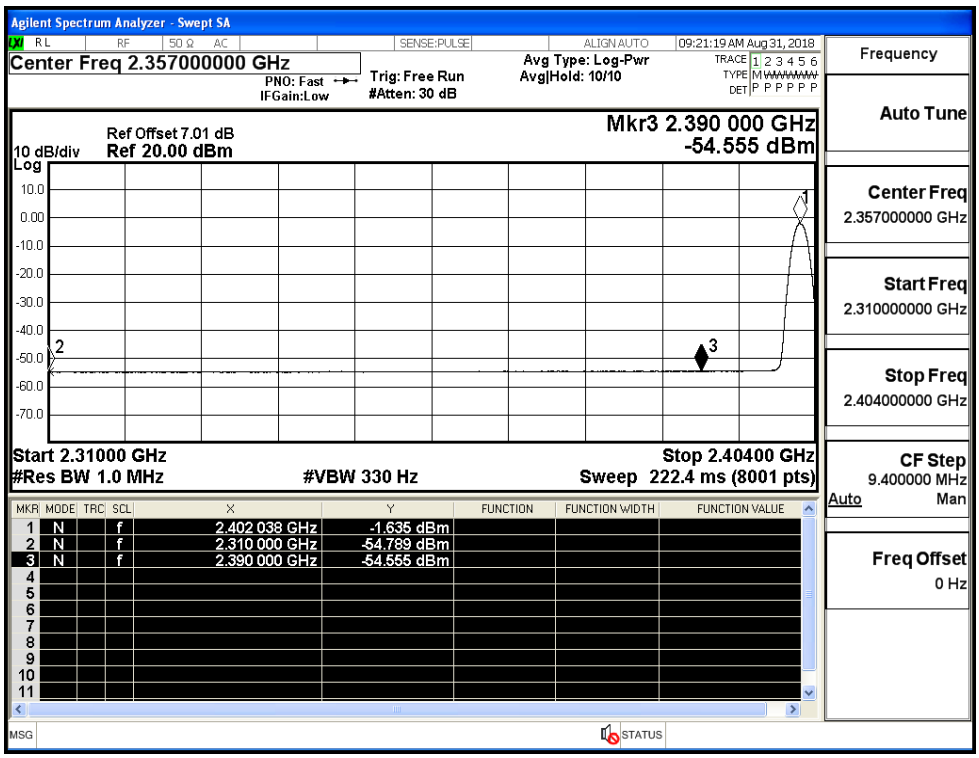
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



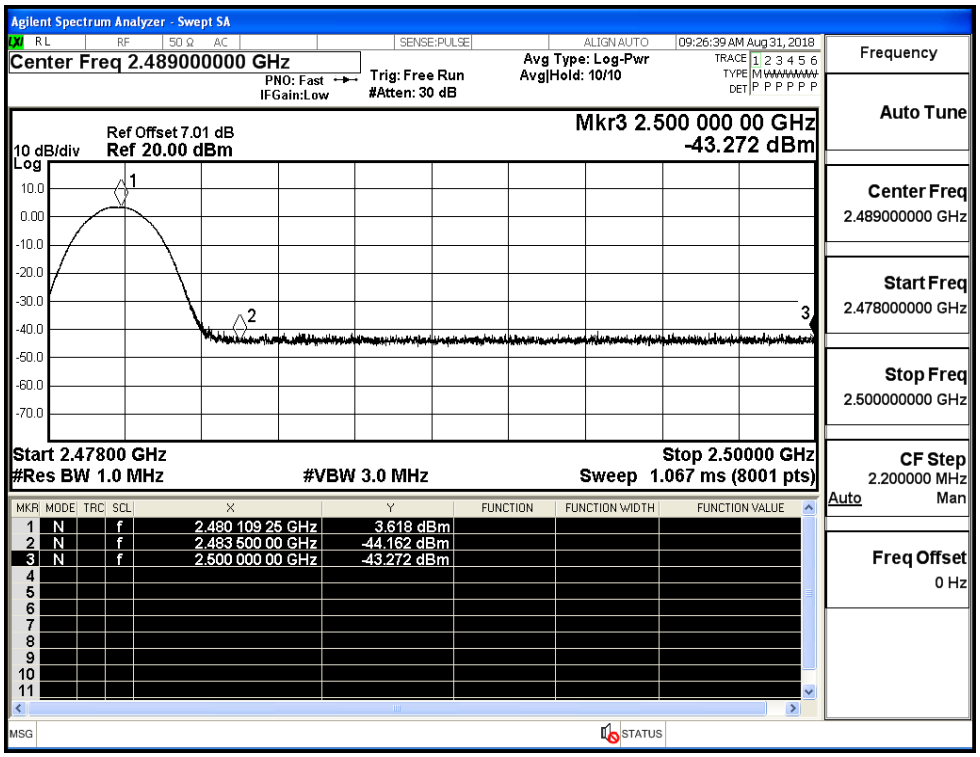
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



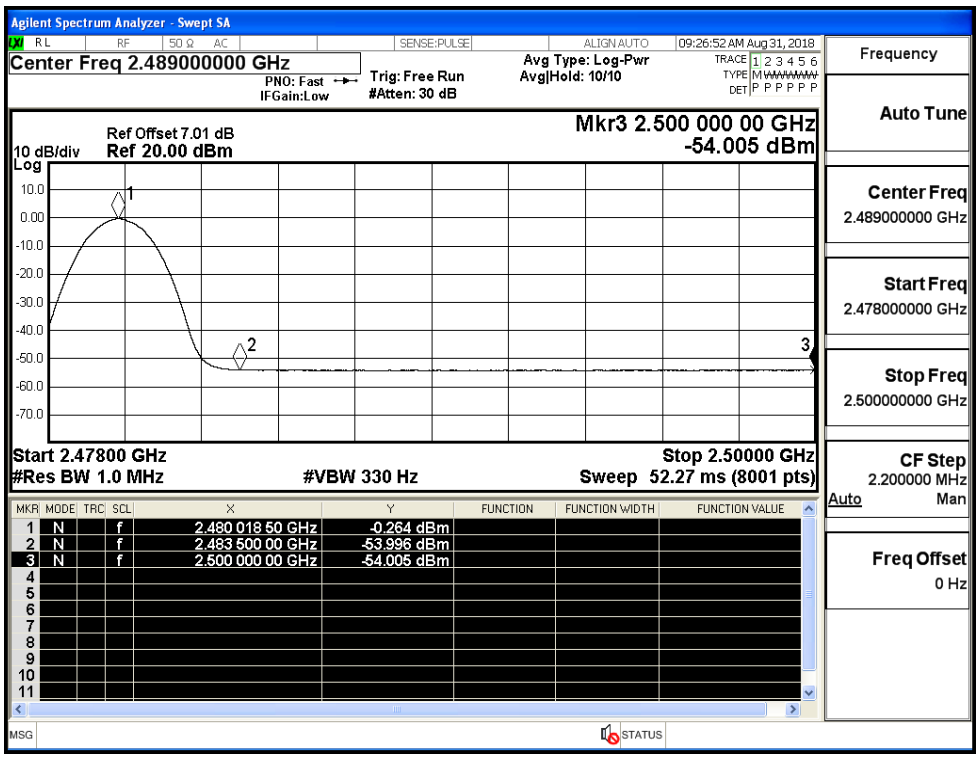
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



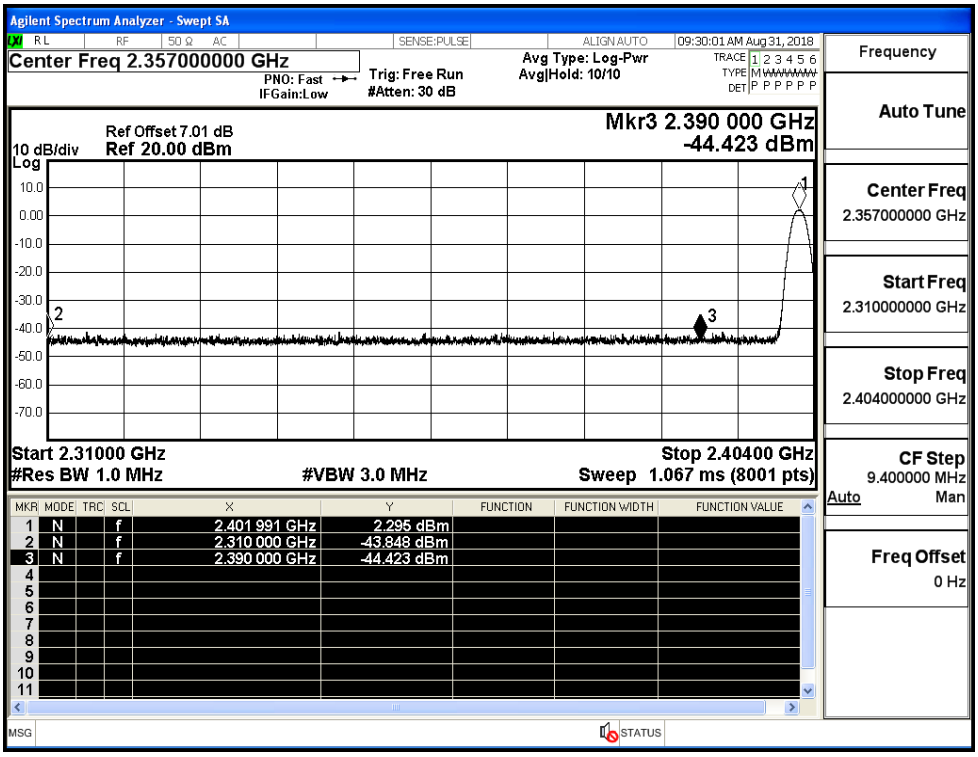
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



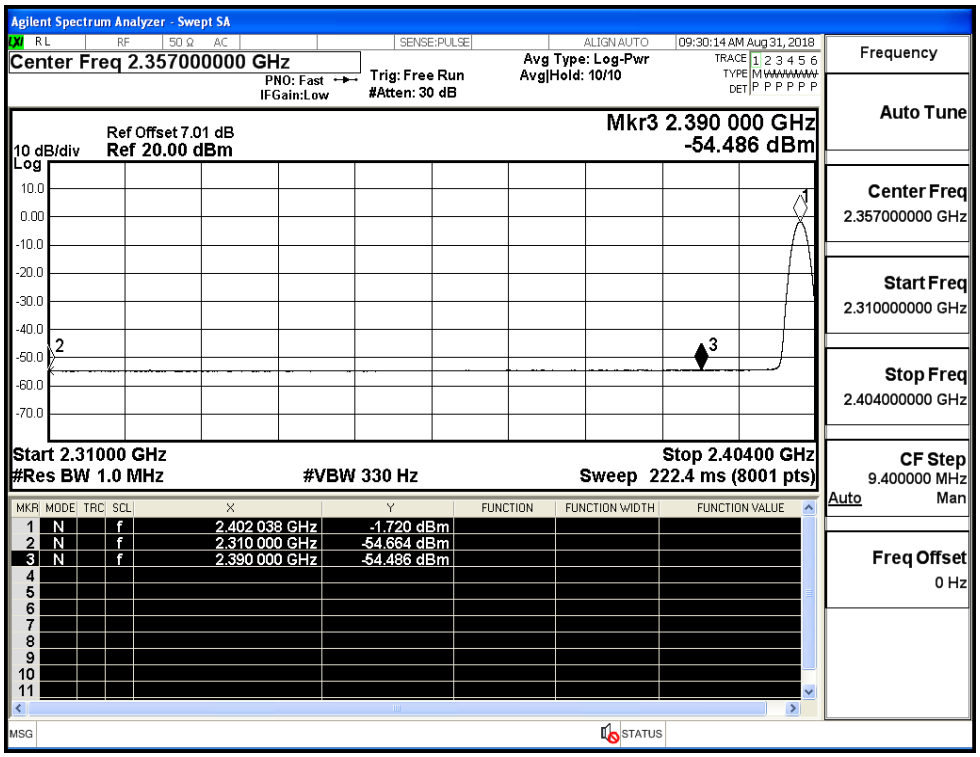
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



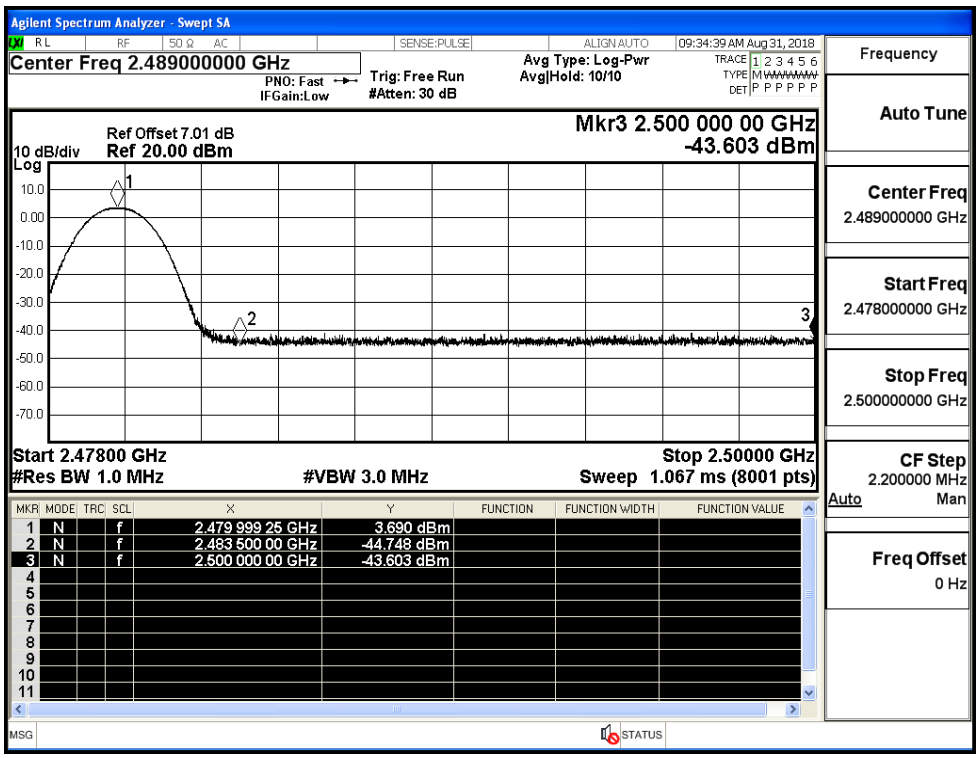
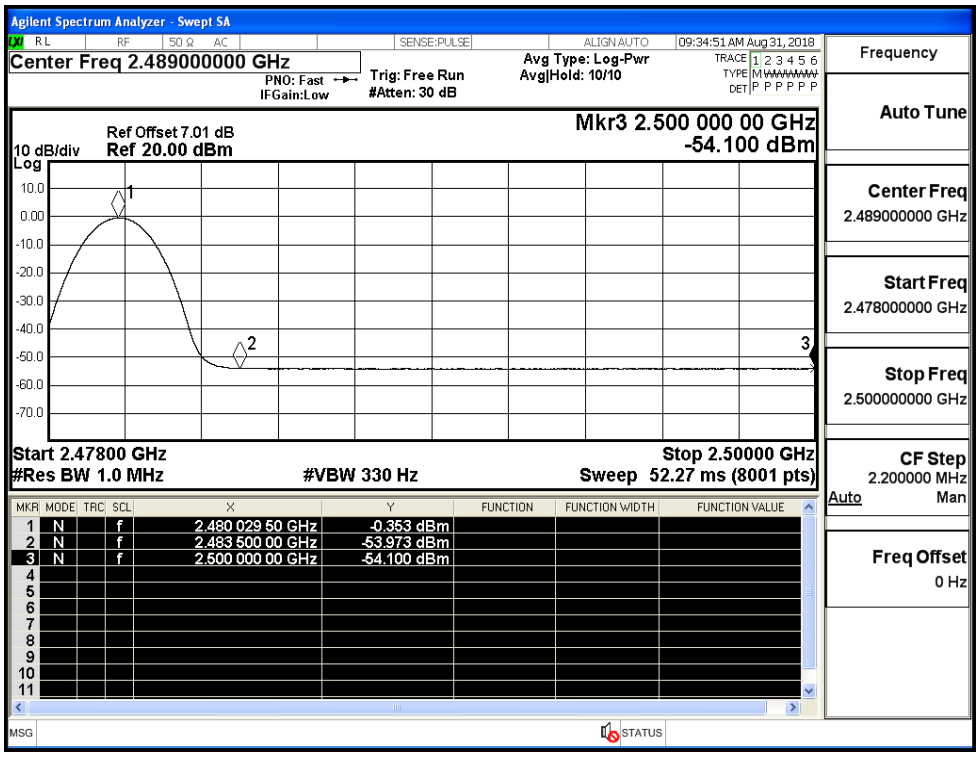
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)