Appendix A

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

Product Name: t-Four

Trade Mark: N/A

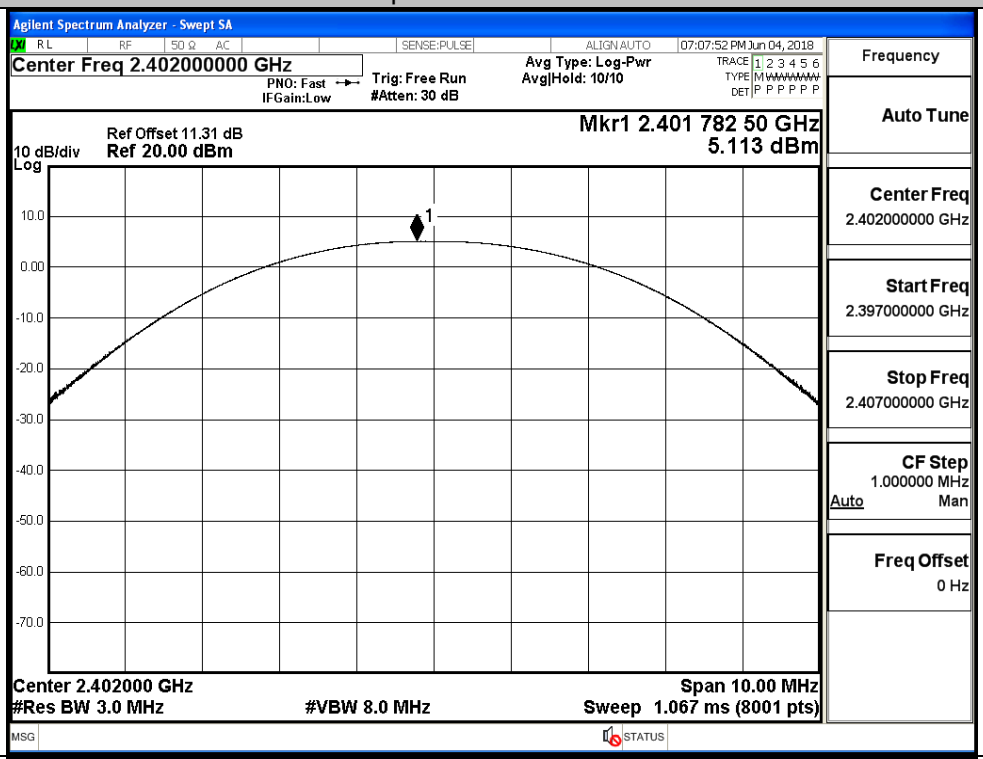
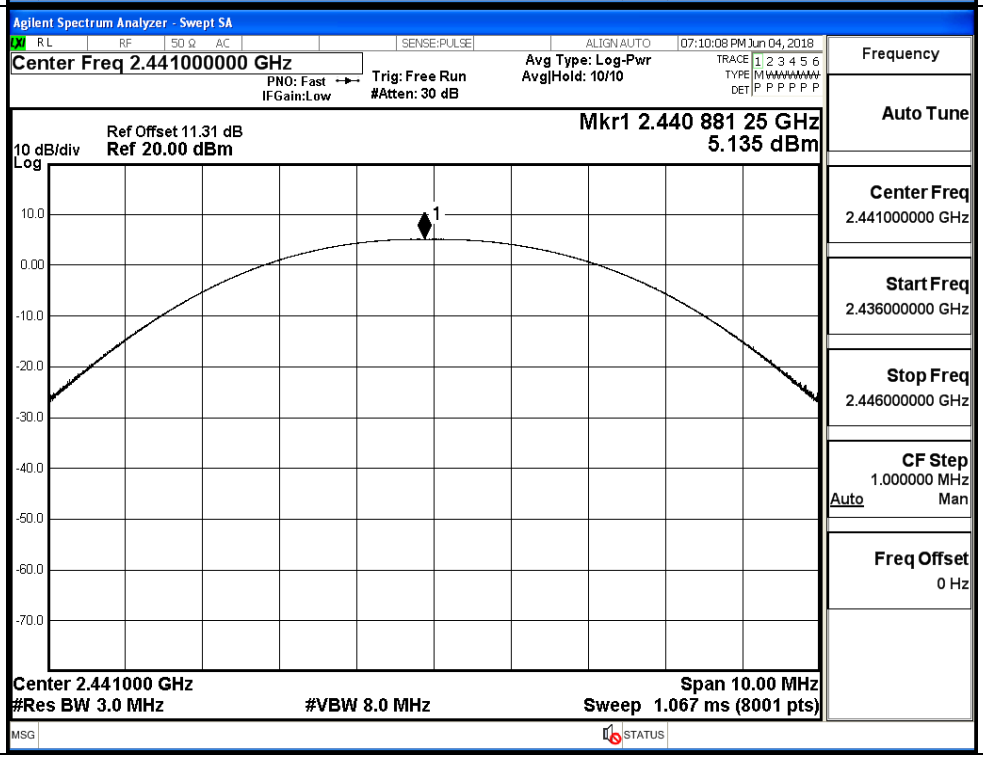
Test Model: T00215

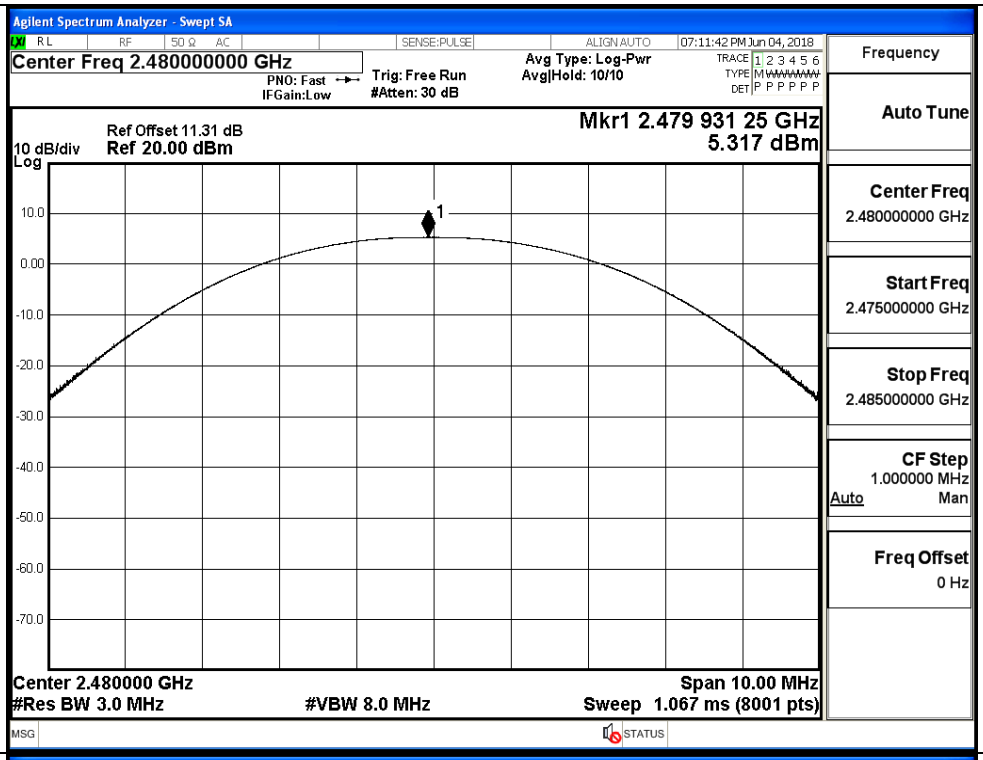
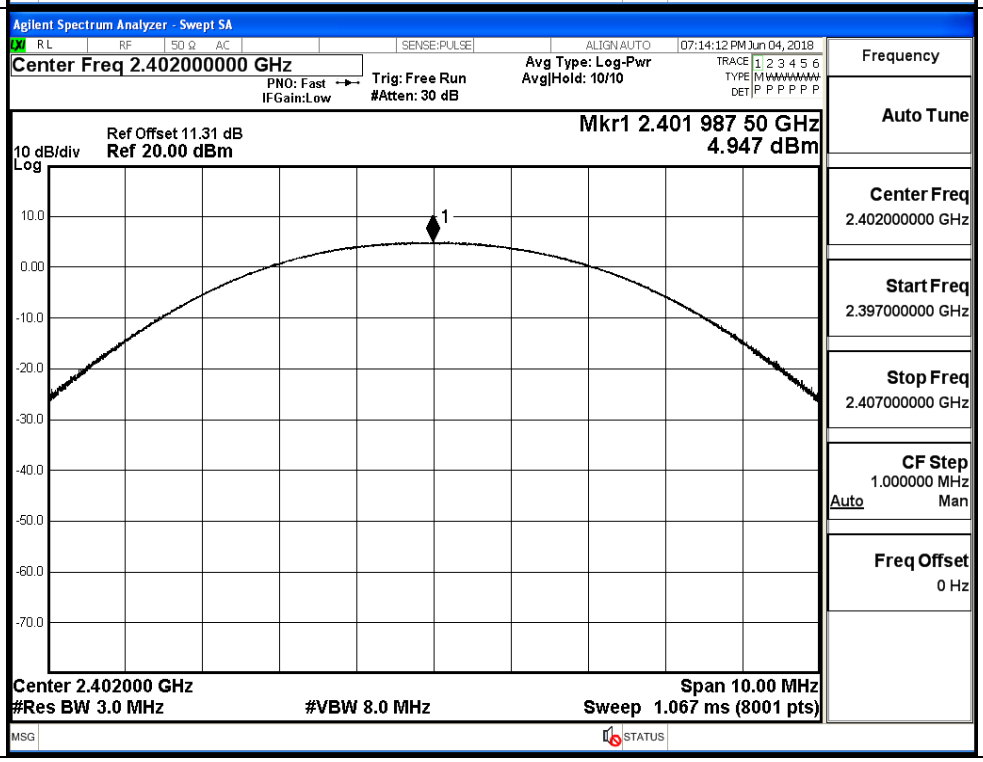
Environmental Conditions

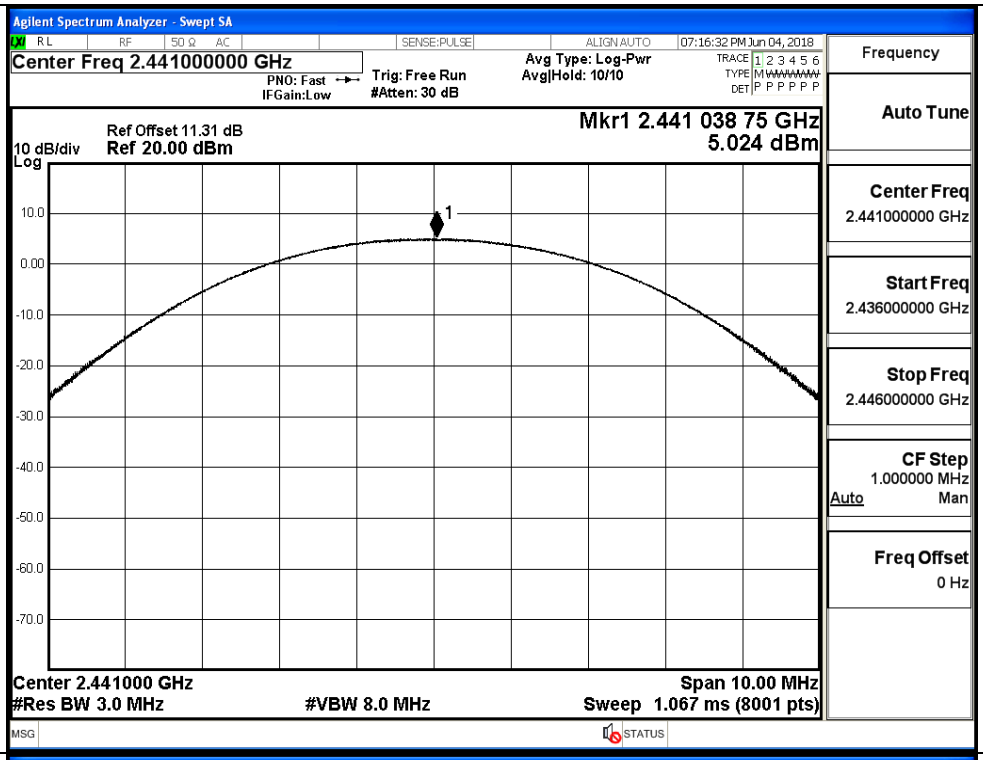
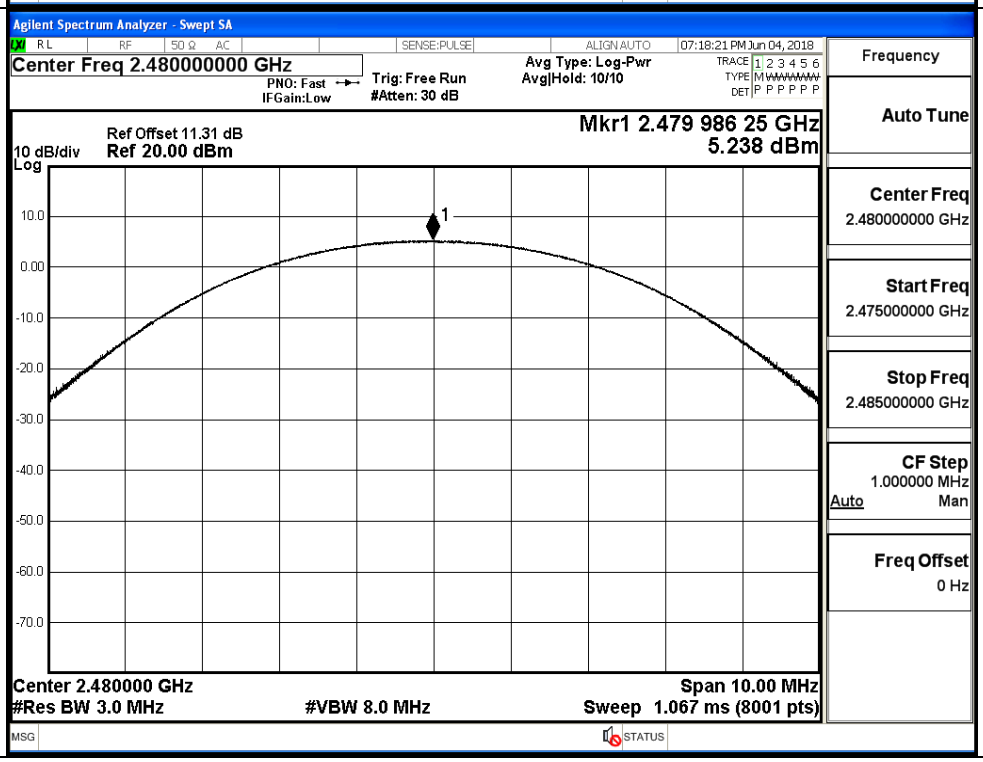
Temperature:	22.3 ° C
Relative Humidity:	53.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Wilson Hong
Supervised by:	Jayden.Zhuo

A.1 Maxmum Conducted Peak Output Power

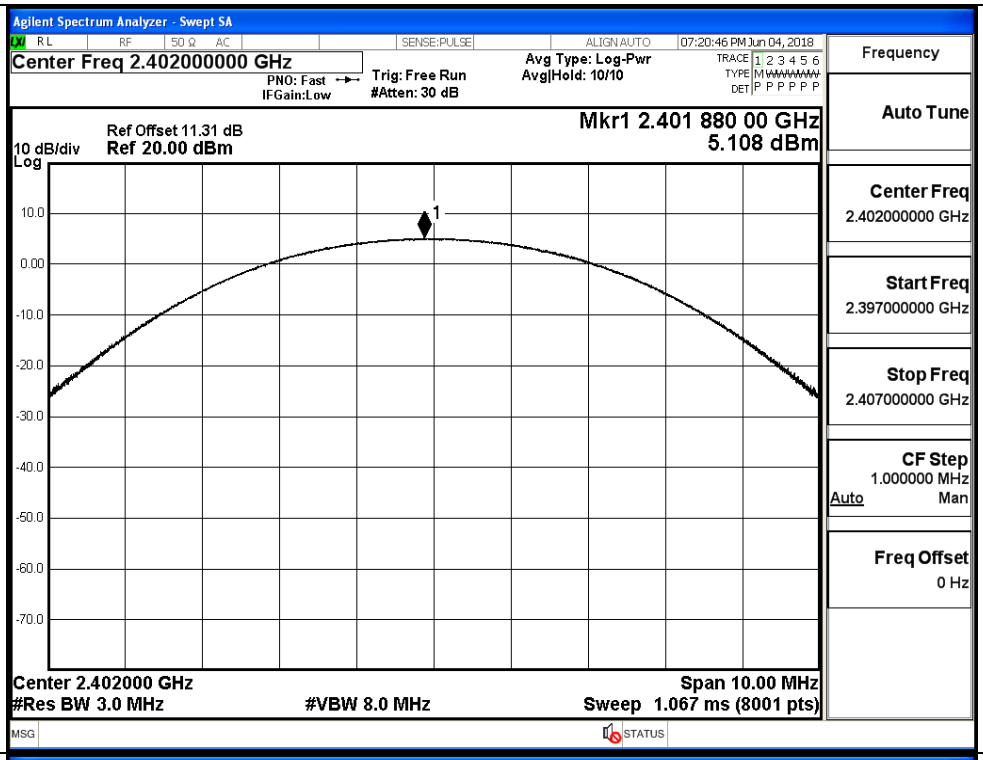
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	5.113	30	PASS
	MCH	5.135	30	PASS
	HCH	5.317	30	PASS
π/4DQPSK	LCH	4.947	21	PASS
	MCH	5.024	21	PASS
	HCH	5.238	21	PASS
8DPSK	LCH	5.108	21	PASS
	MCH	5.222	21	PASS
	HCH	5.415	21	PASS

Test Graphs		
GFSK/LCH		
GFSK/MCH		

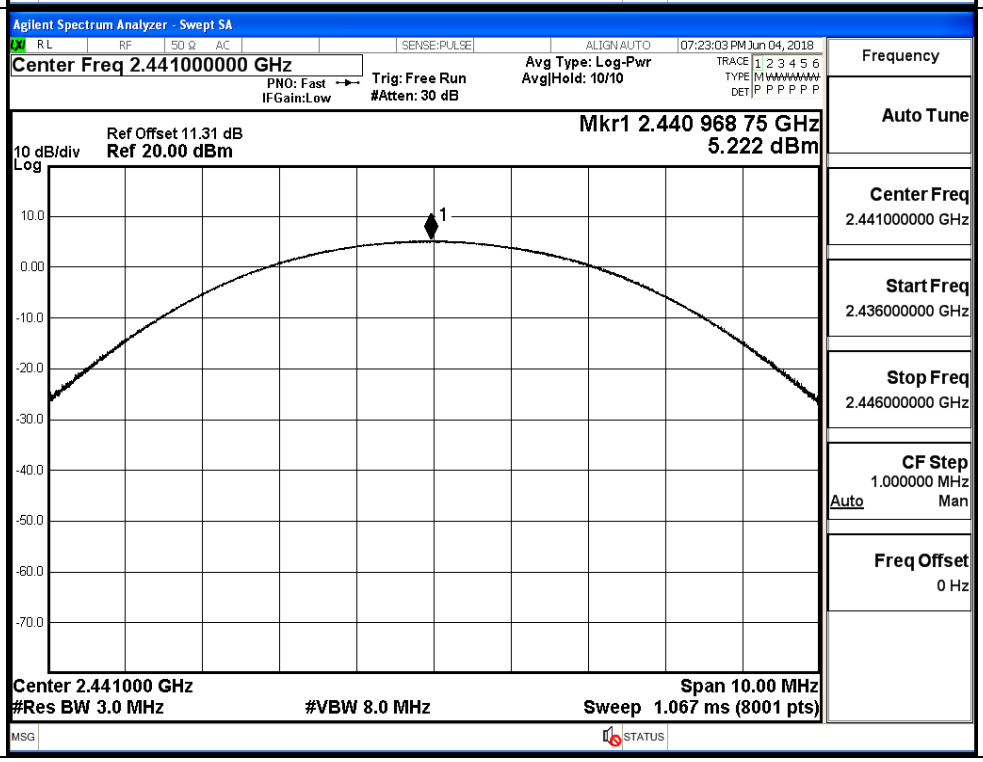
GFSK/HCH	
π/4DQPSK/LCH	

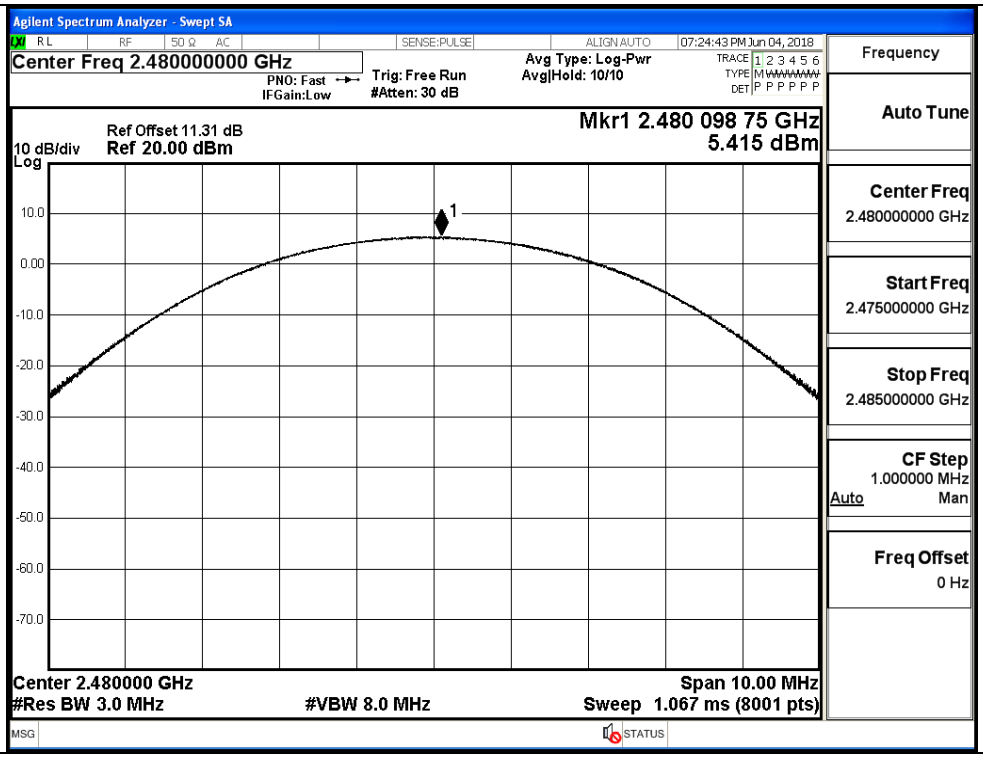
π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH



8DPSK/MCH

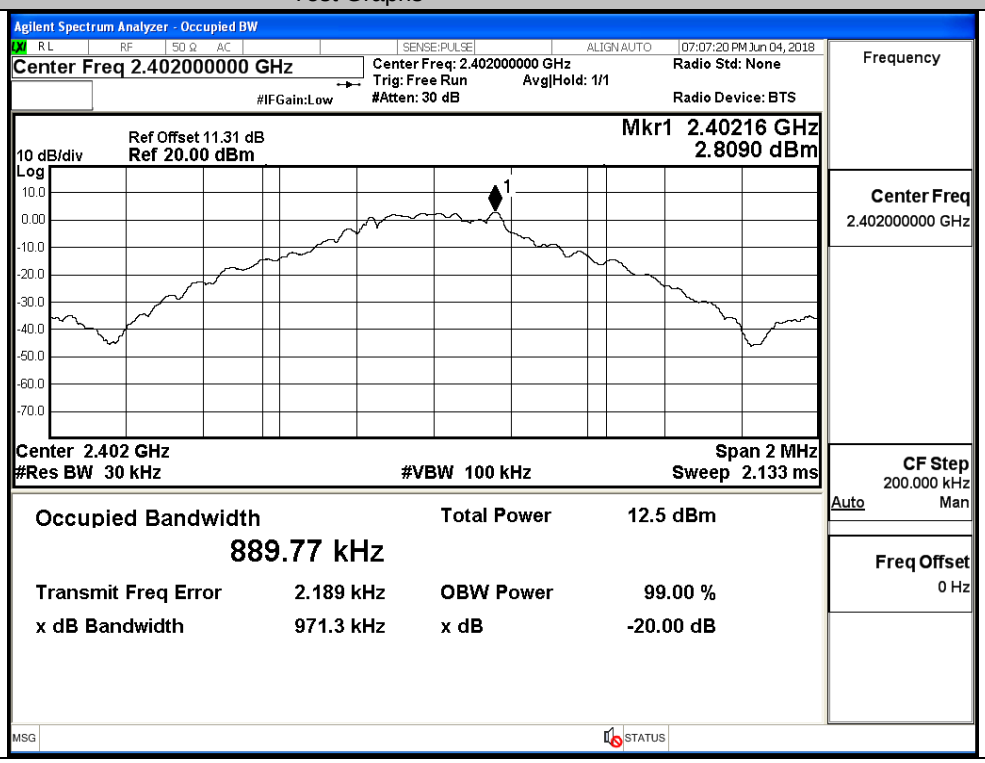


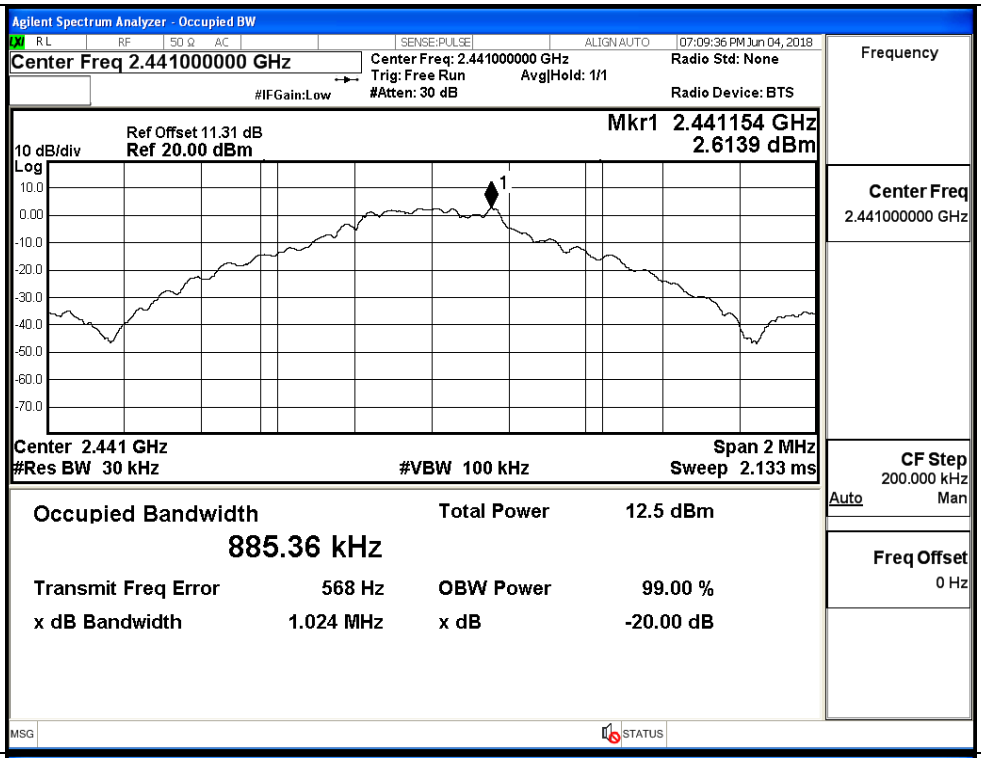
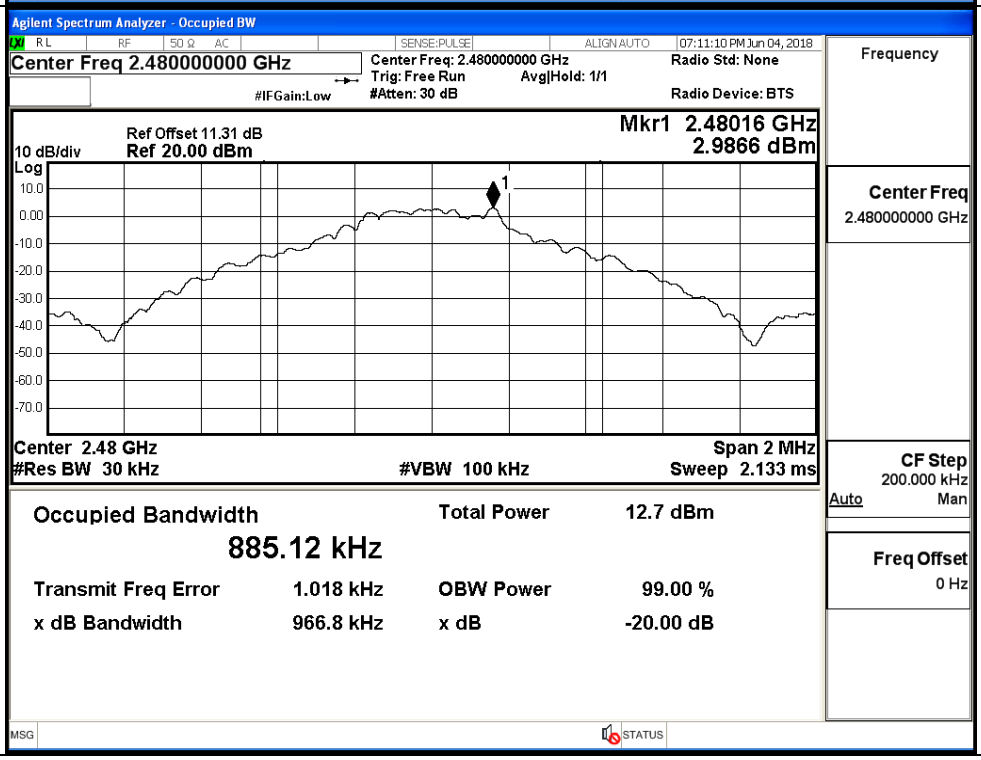
8DPSK/HCH	

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
07:24:43 PM Jun 04, 2018
Ref Offset 11.31 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.480 098 75 GHz
5.415 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

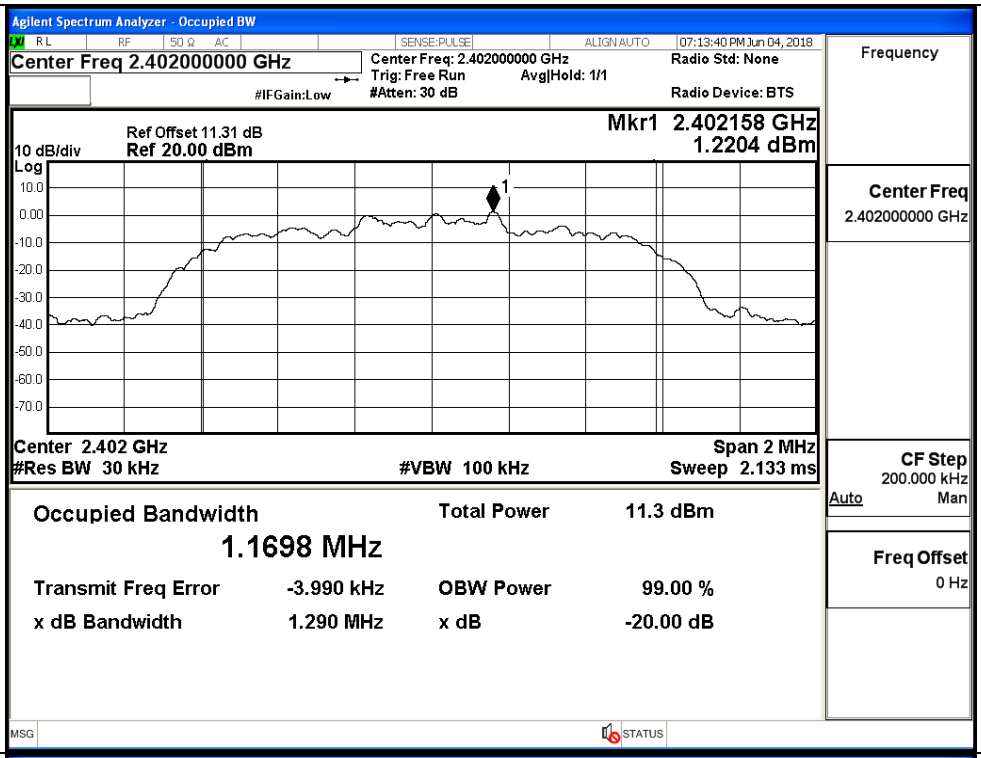
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9713	Not Specified	PASS
	MCH	1.024	Not Specified	PASS
	HCH	0.9668	Not Specified	PASS
π/4DQPSK	LCH	1.290	Not Specified	PASS
	MCH	1.287	Not Specified	PASS
	HCH	1.286	Not Specified	PASS
8DPSK	LCH	1.293	Not Specified	PASS
	MCH	1.291	Not Specified	PASS
	HCH	1.289	Not Specified	PASS

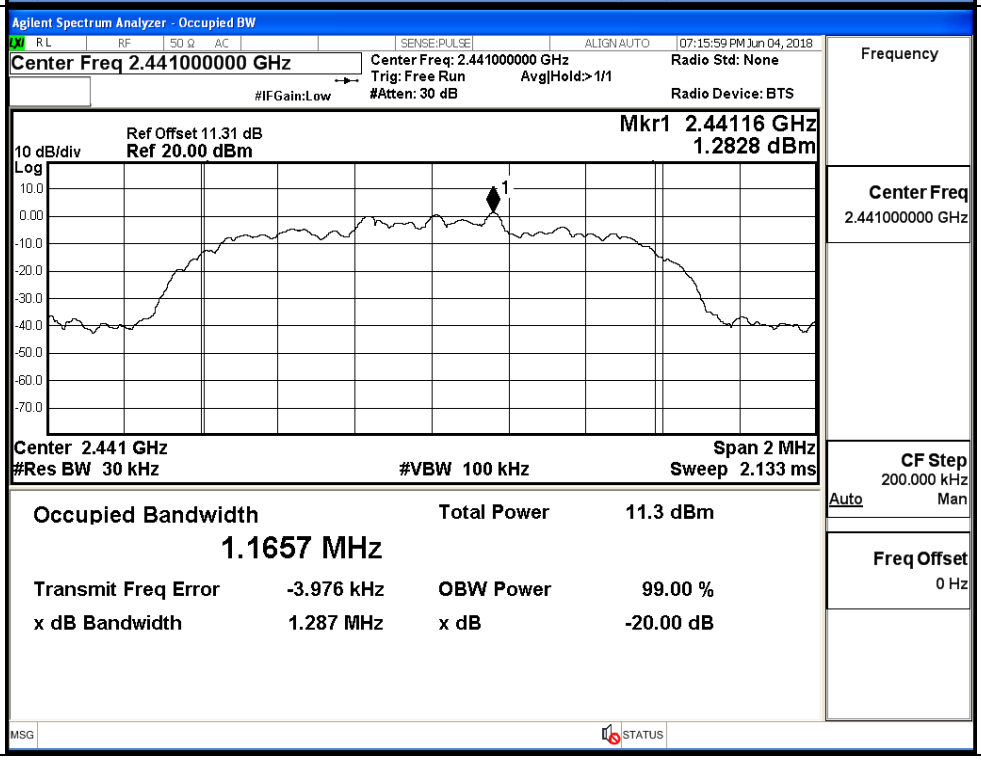
Test Graphs		
GFSK/LCH		

GFSK/MCH	
GFSK/HCH	

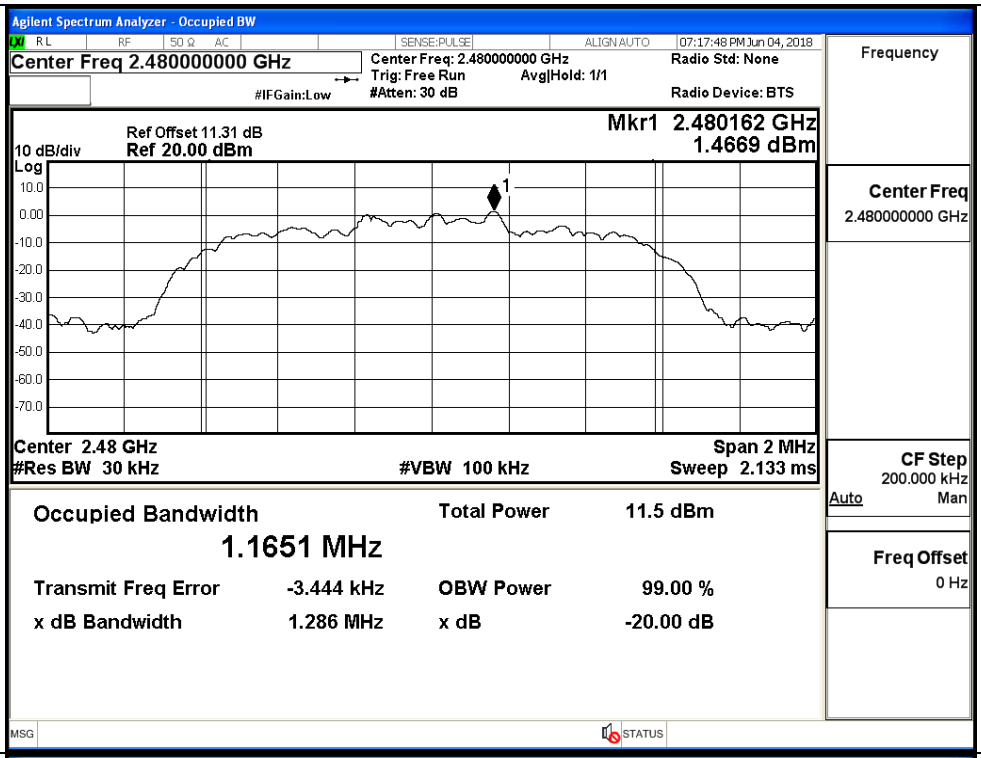
π/4DQPSK/LCH



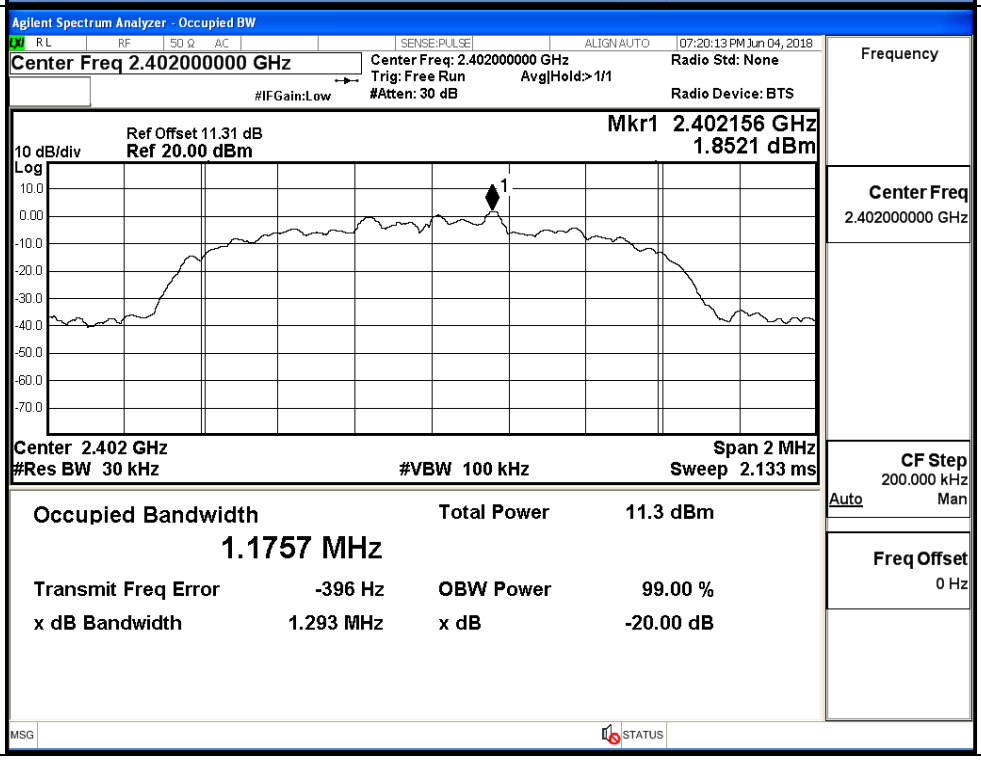
π/4DQPSK/MCH

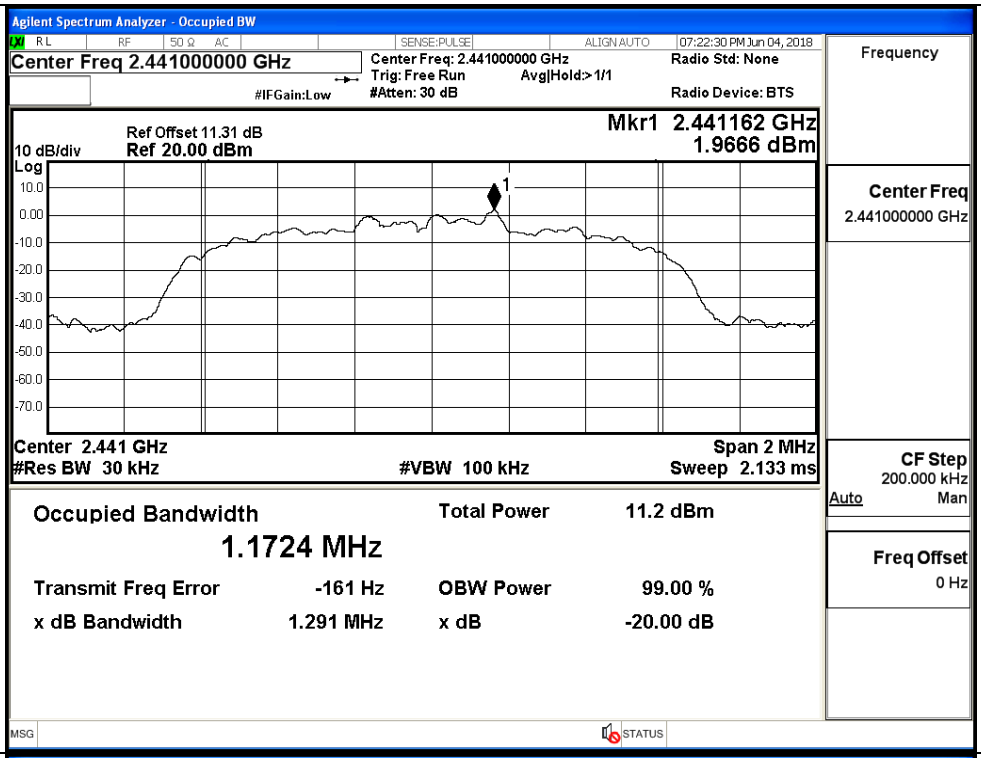
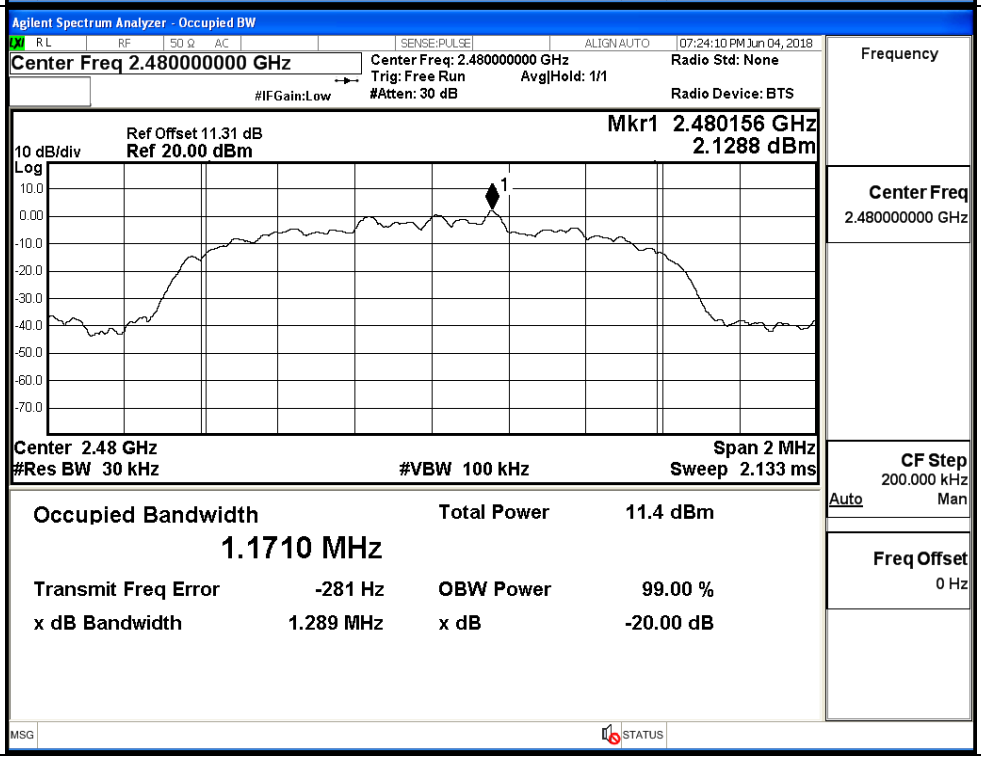


π/4DQPSK/HCH



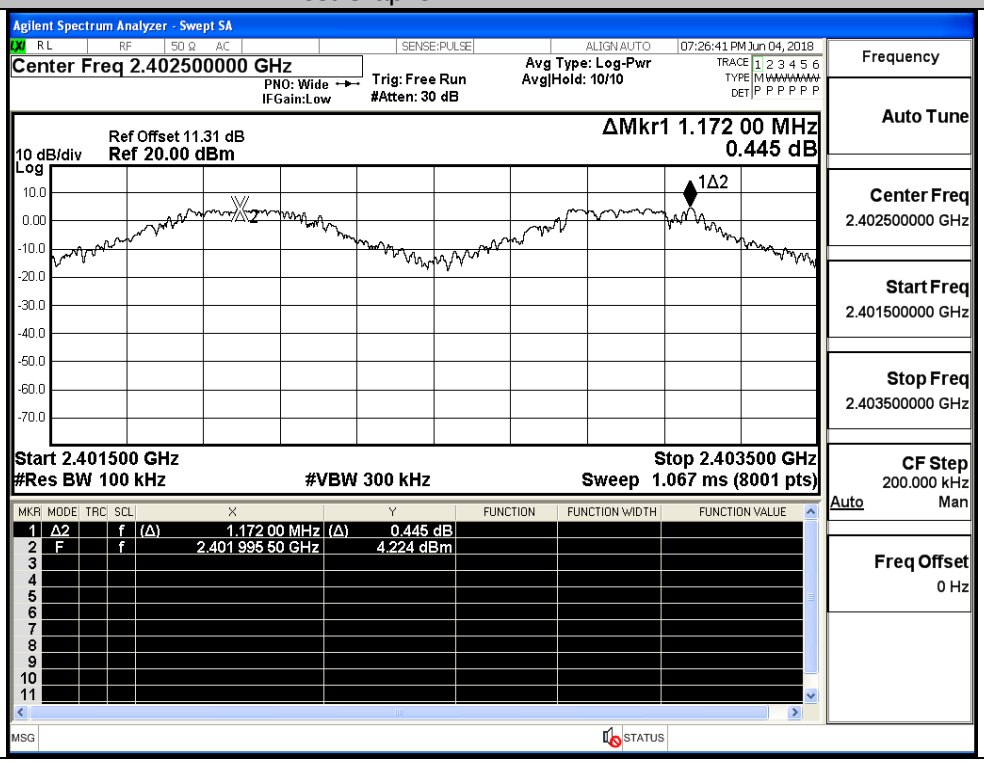
8DPSK/LCH

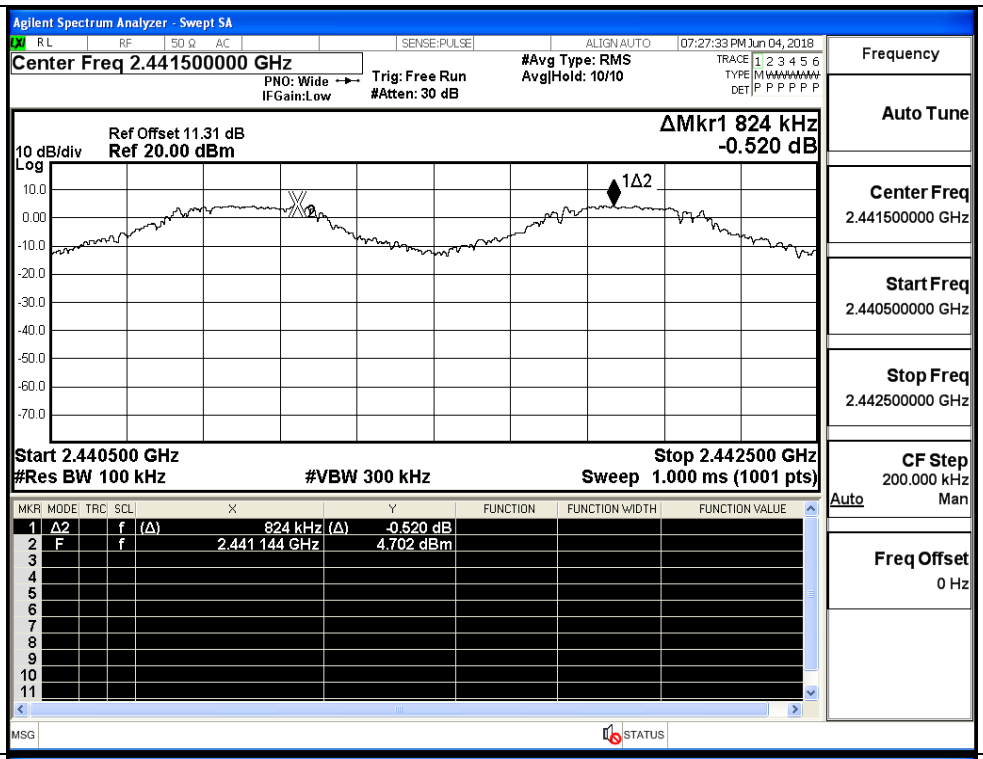
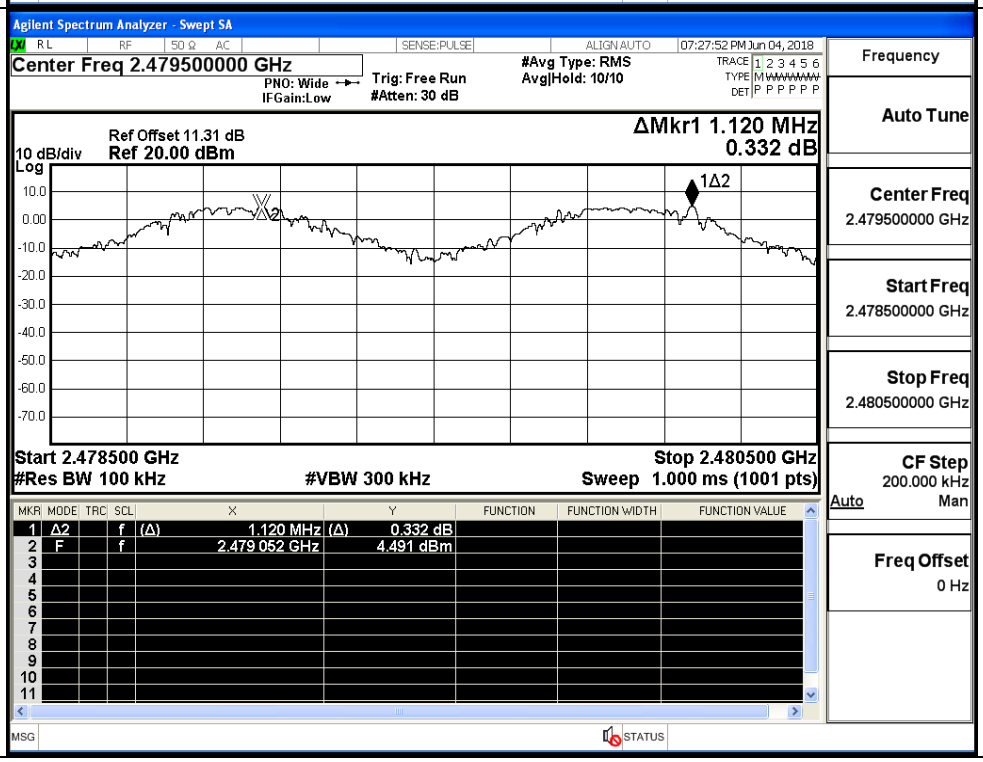


8DPSK/MCH	
8DPSK/HCH	

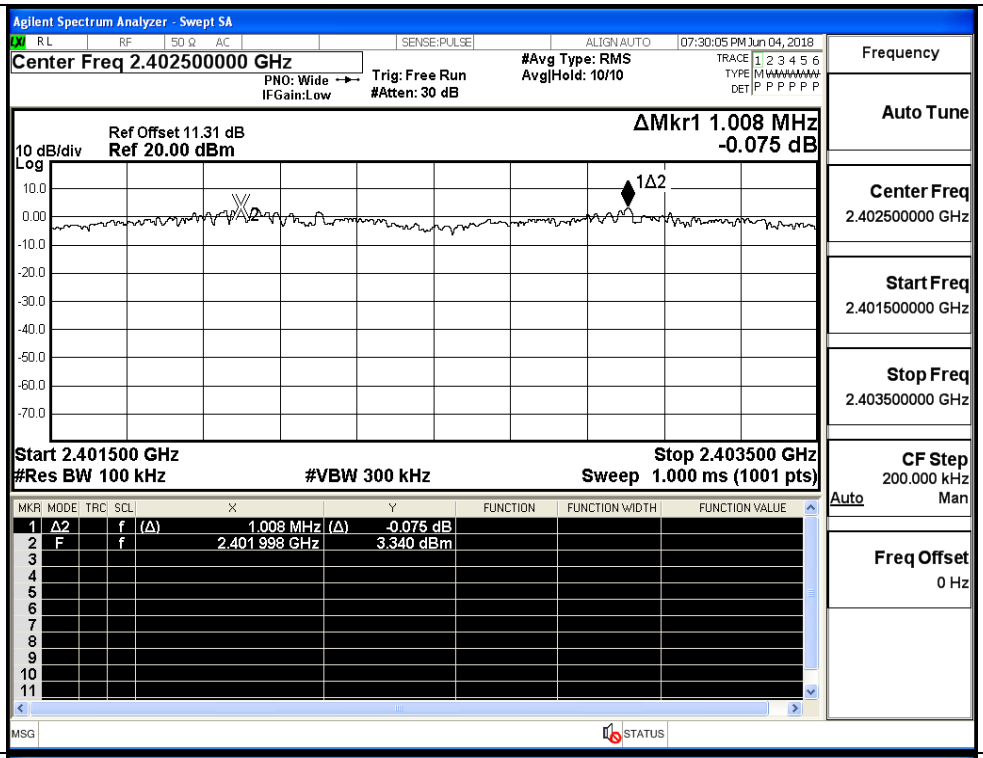
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.172	0.683	PASS
	MCH	0.824	0.683	PASS
	HCH	1.120	0.683	PASS
π/4DQPSK	LCH	1.008	0.860	PASS
	MCH	0.972	0.860	PASS
	HCH	1.148	0.860	PASS
8DPSK	LCH	1.270	0.862	PASS
	MCH	0.922	0.862	PASS
	HCH	1.248	0.862	PASS

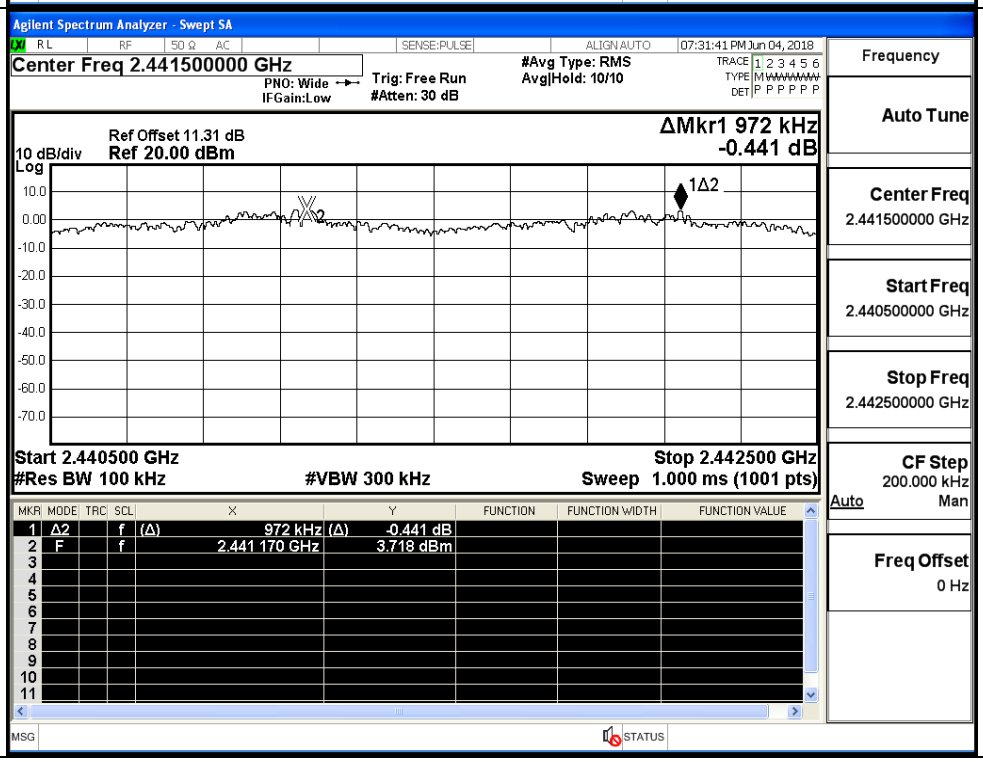
Test Graphs	
GFSK/LCH	

GFSK/MCH		
GFSK/HCH		

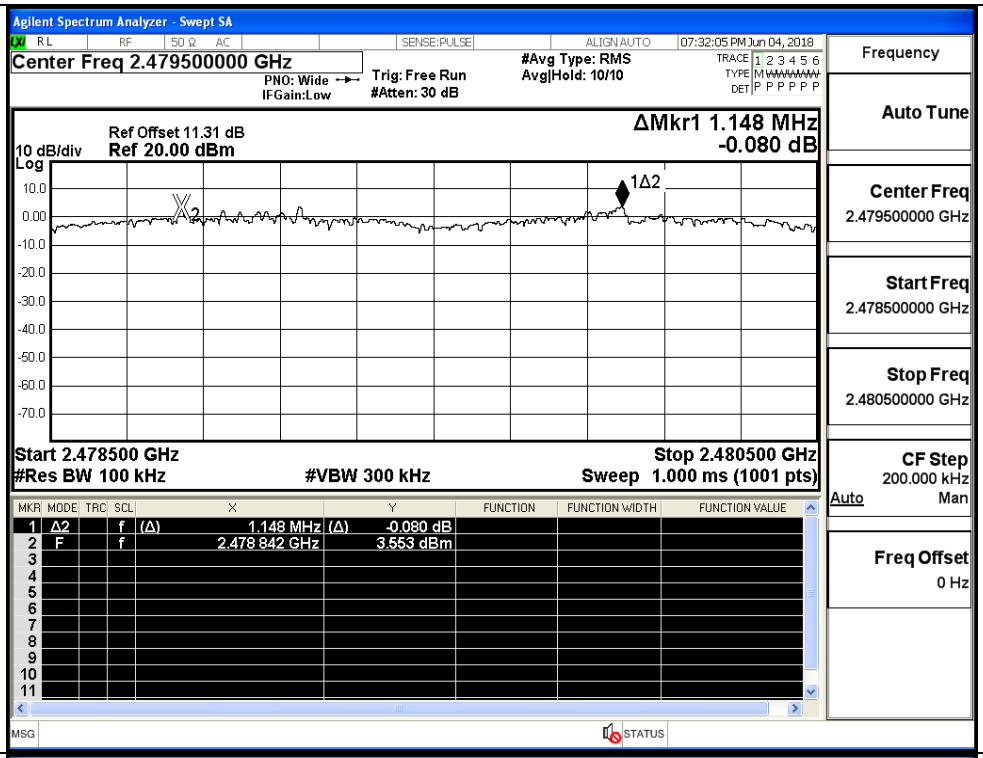
π/4DQPSK/LCH



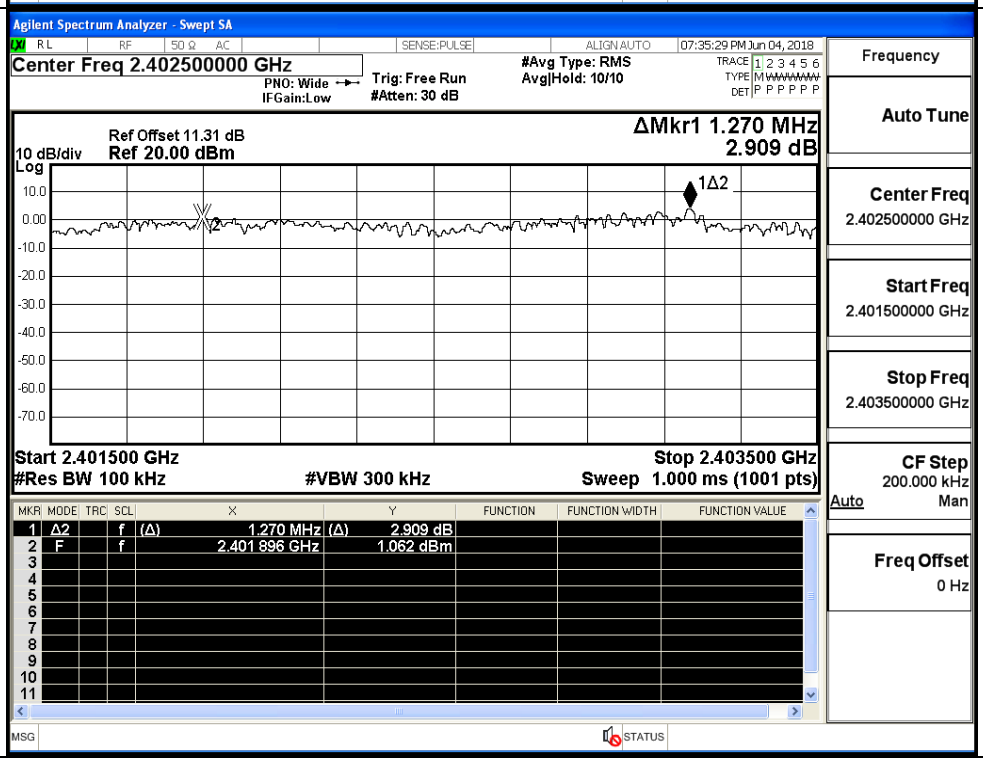
π/4DQPSK/MCH

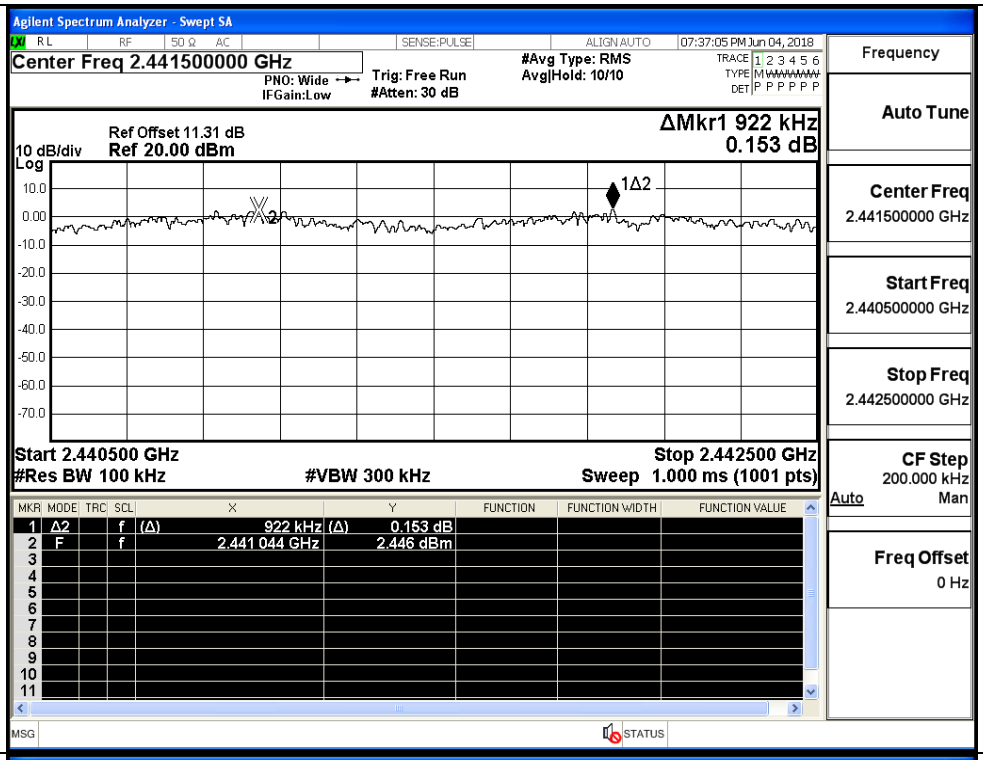
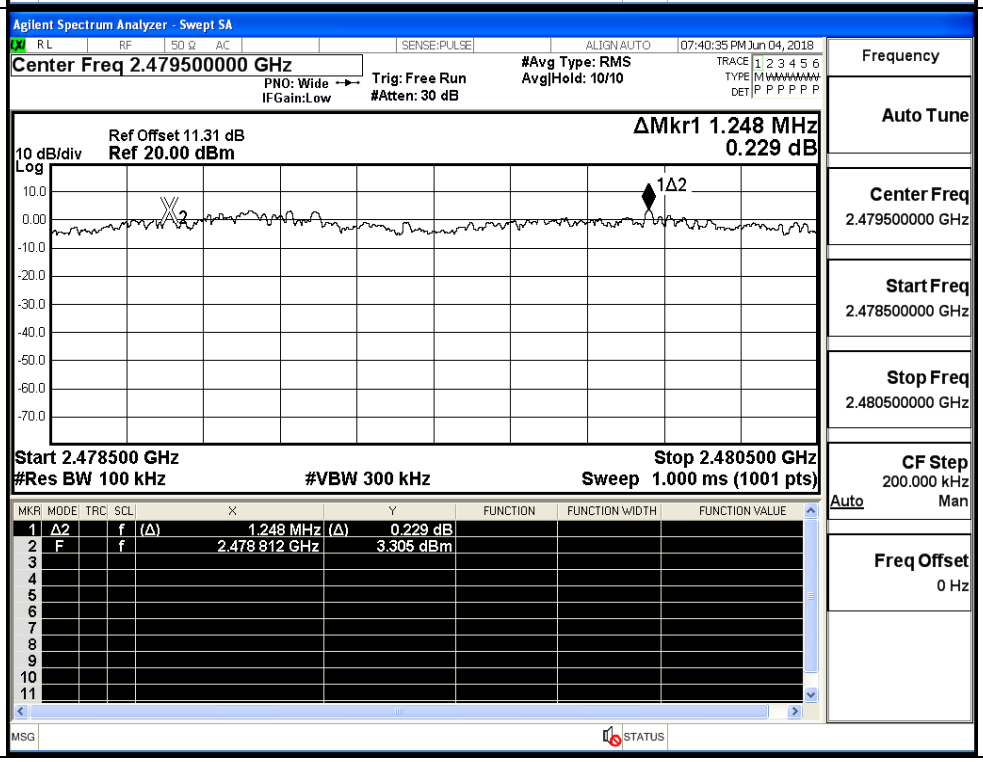


π/4DQPSK/HCH



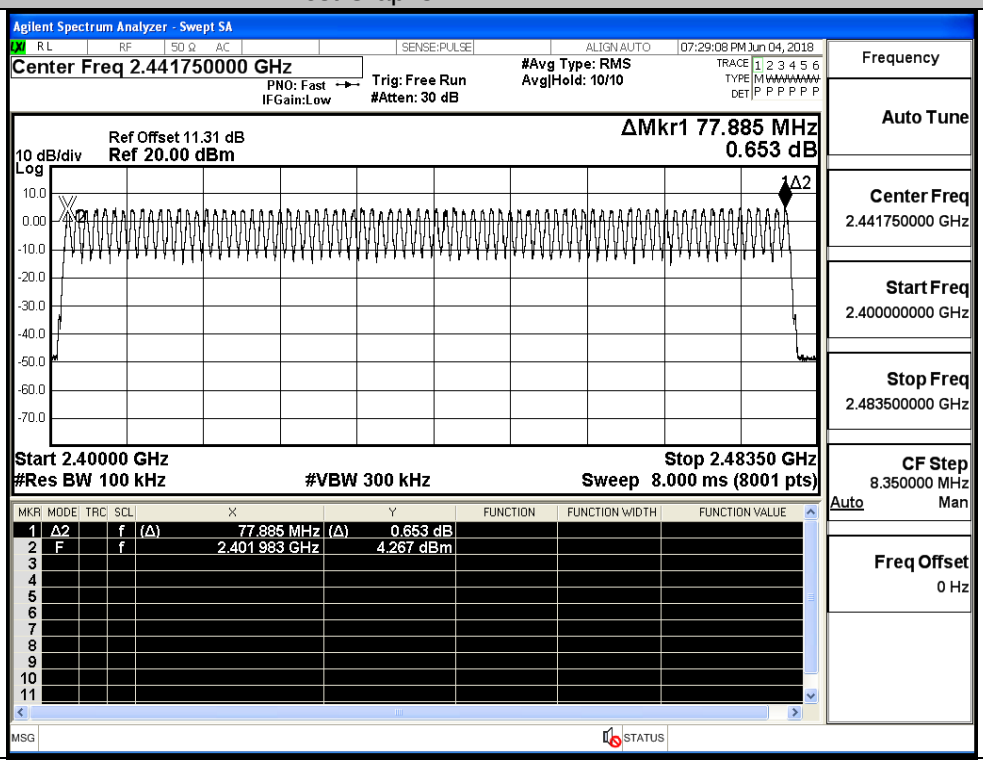
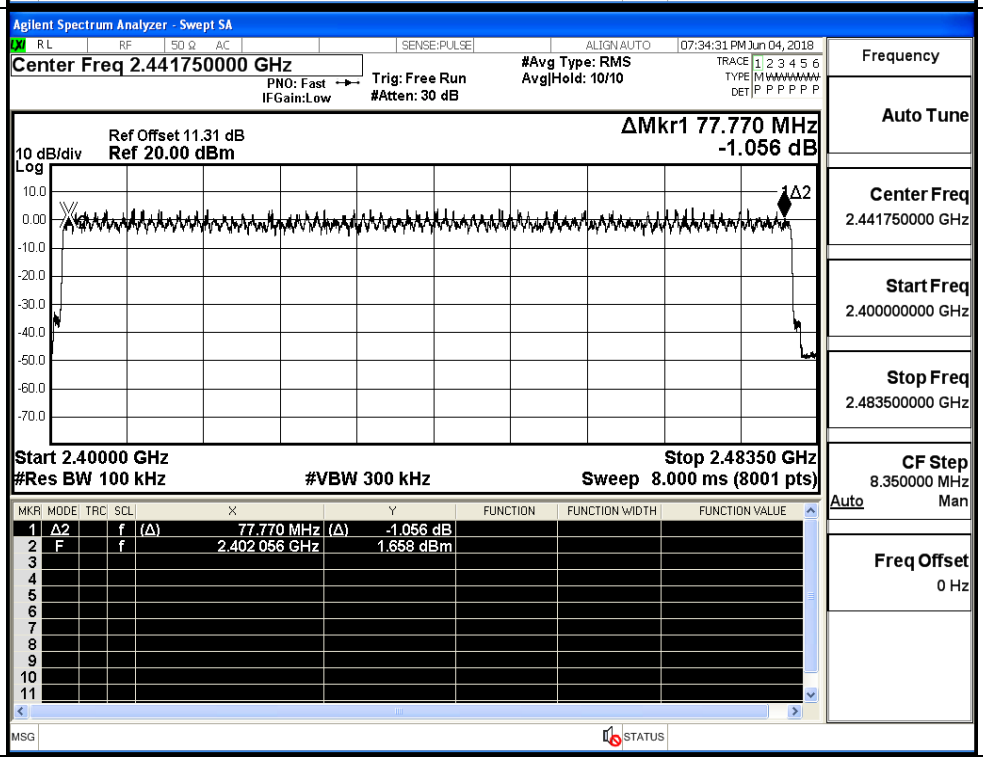
8DPSK/LCH

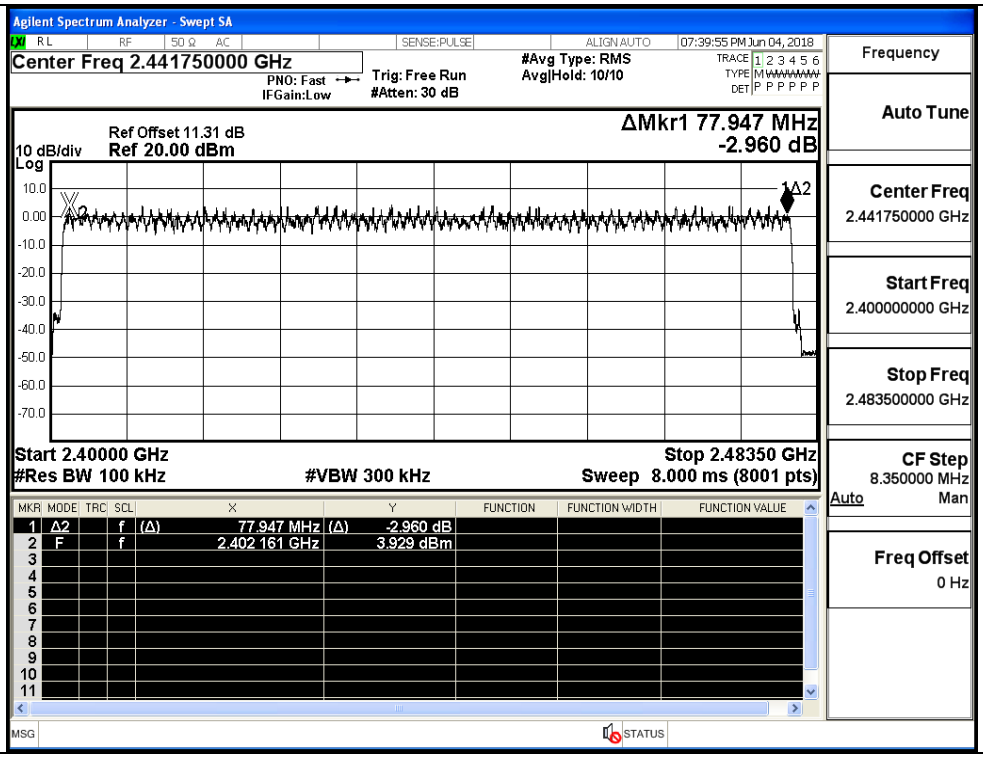


8DPSK/MCH		
8DPSK/HCH		

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

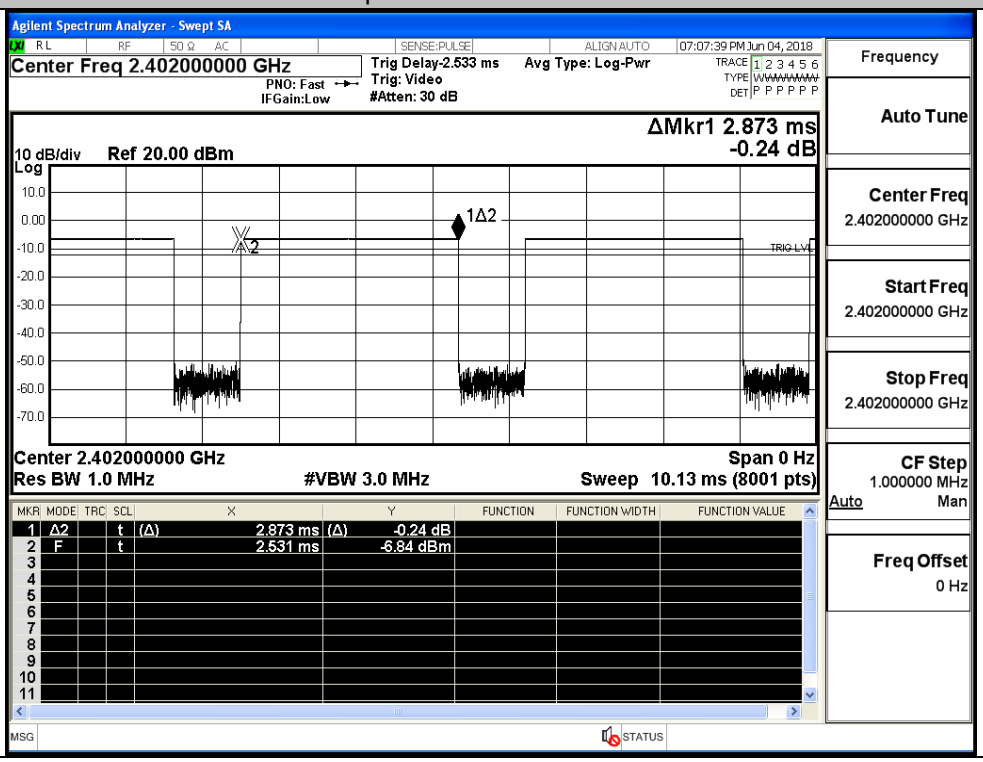
Test Graphs	
GFSK/Hop	
π/4DQPSK/Hop	

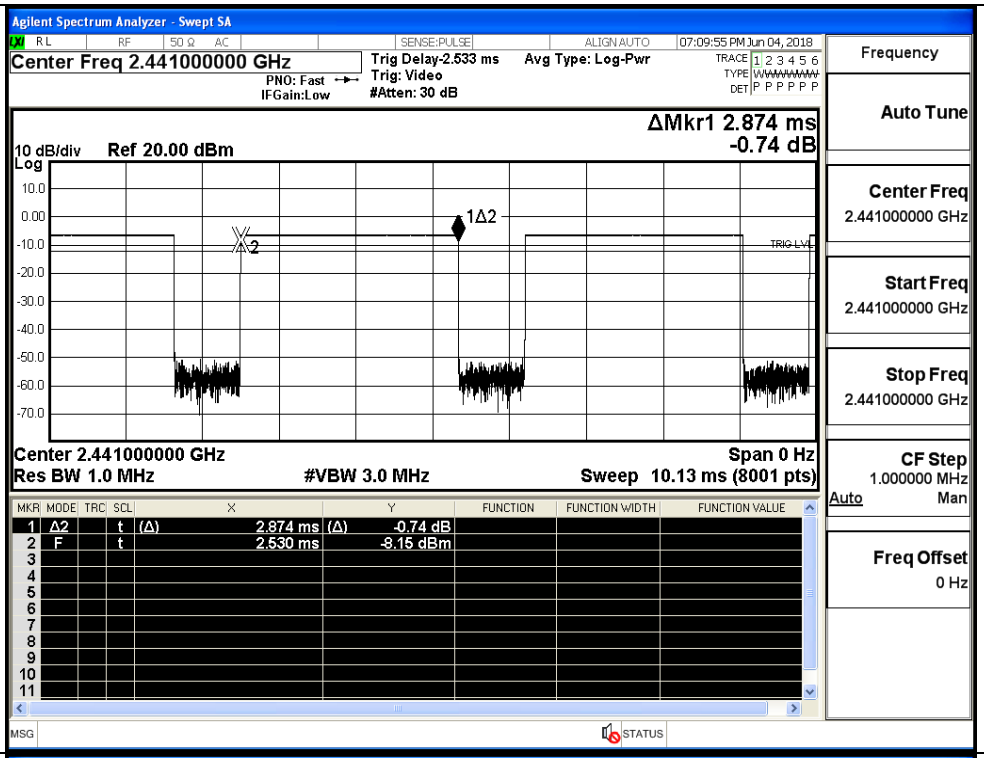
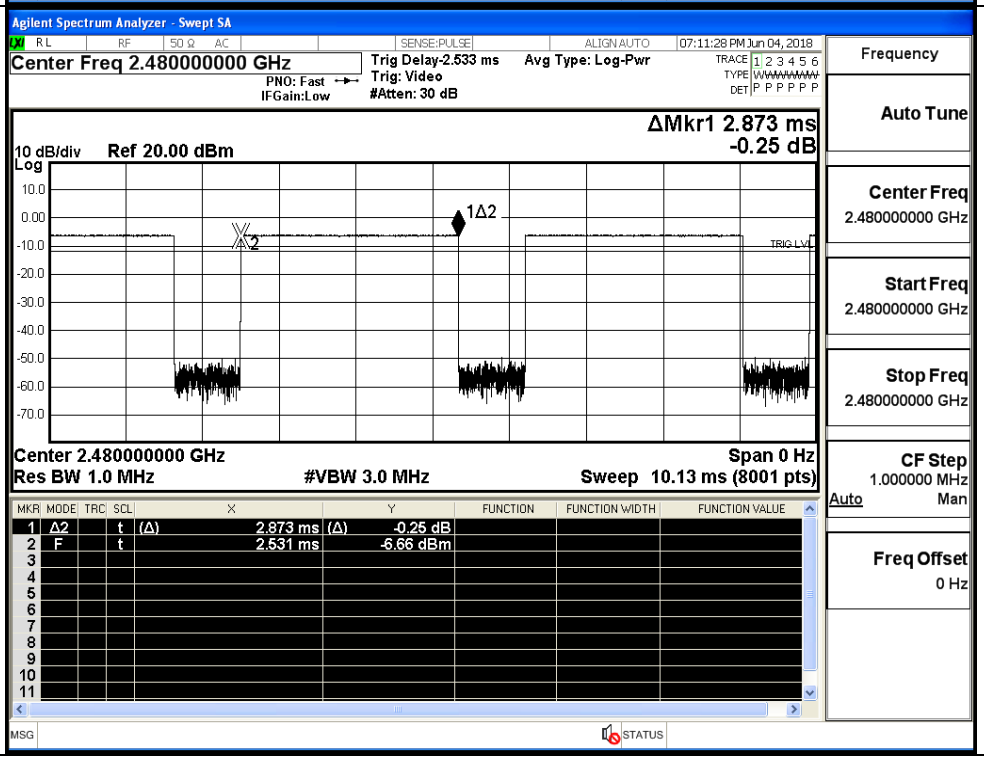
8DPSK/Hop		

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
07:39:55 PM Jun 04, 2018
Ref Offset 11.31 dB
10 dB/div
Ref 20.00 dBm
Log
ΔMkr1 77.947 MHz
-2.960 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) 77.947 MHz (Δ) -2.960 dB
2 F f 2.402 161 GHz 3.929 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

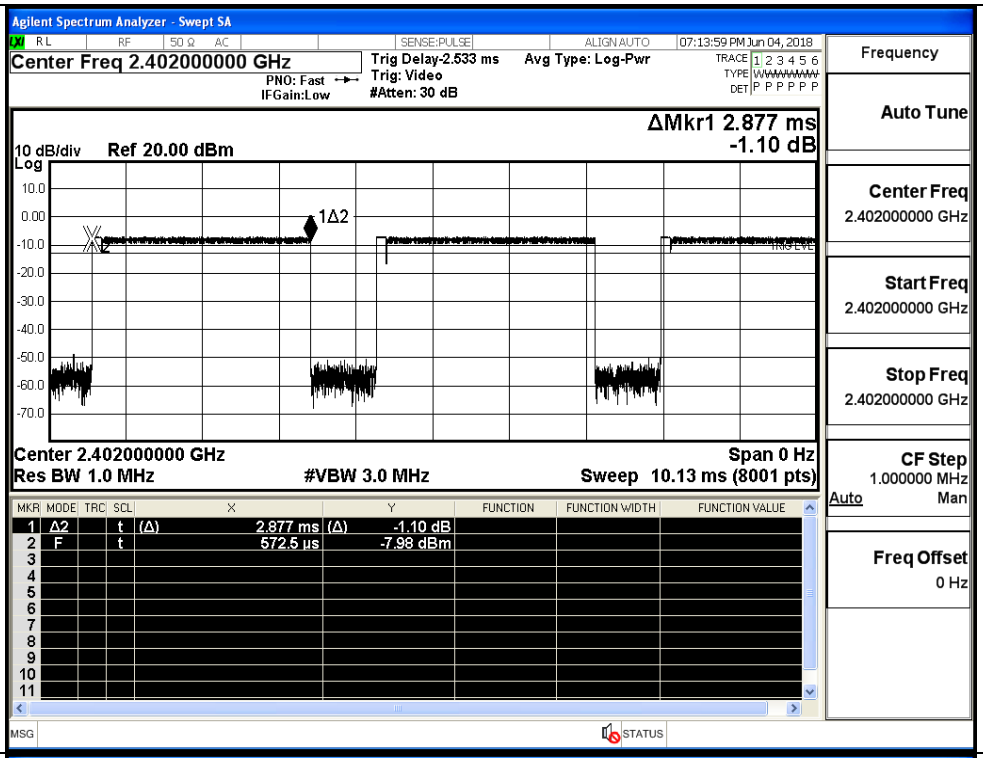
A.5 Dwell Time

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
π/4DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
	2DH5	HCH	2.87	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.87	106.7	0.307	0.4	PASS
	3DH5	MCH	2.87	106.7	0.307	0.4	PASS
	3DH5	HCH	2.87	106.7	0.307	0.4	PASS

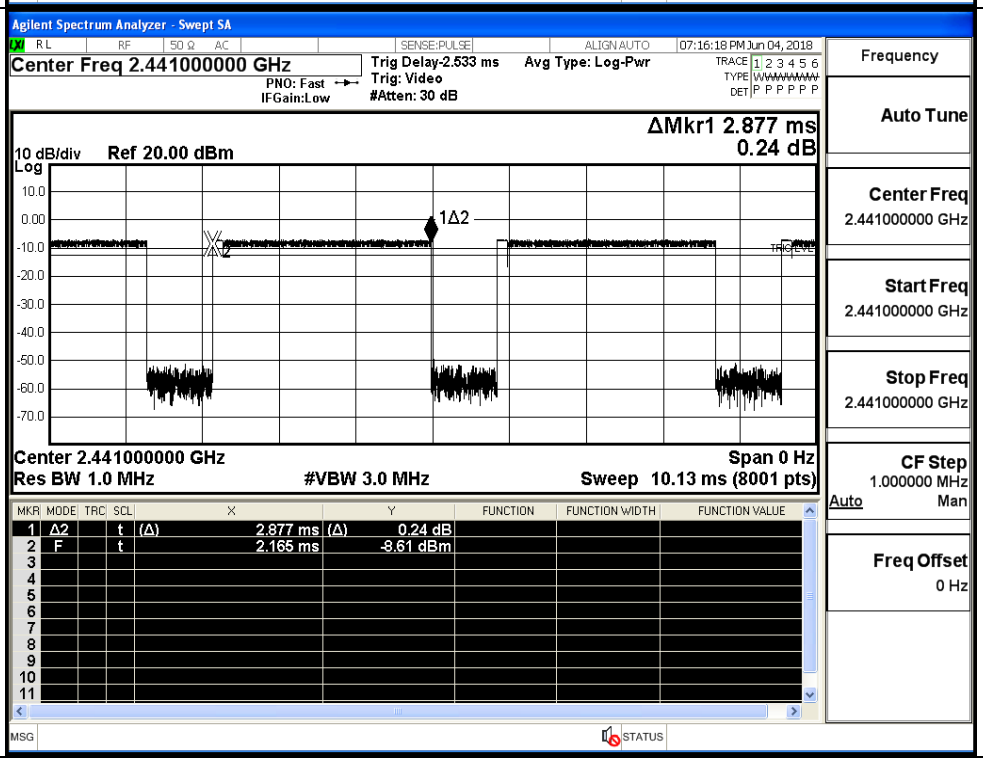
Test Graphs	
GFSK_DH5/LCH	

GFSK_DH5/MCH	
GFSK_DH5/HCH	

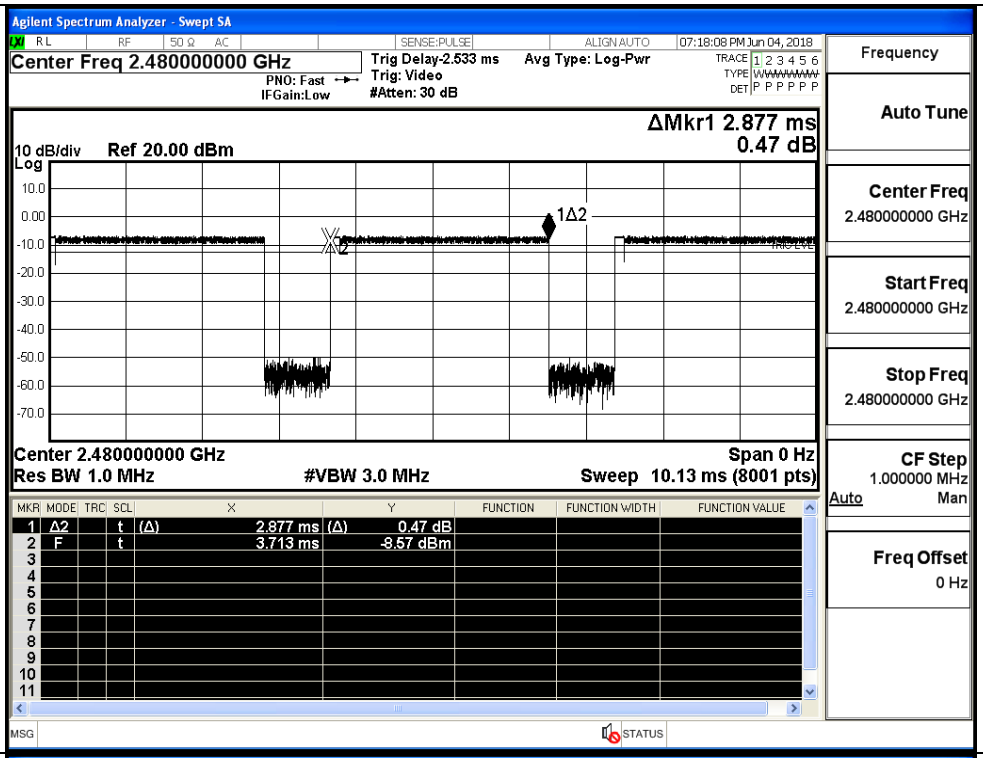
π/4DQPSK
_2DH5/LCH



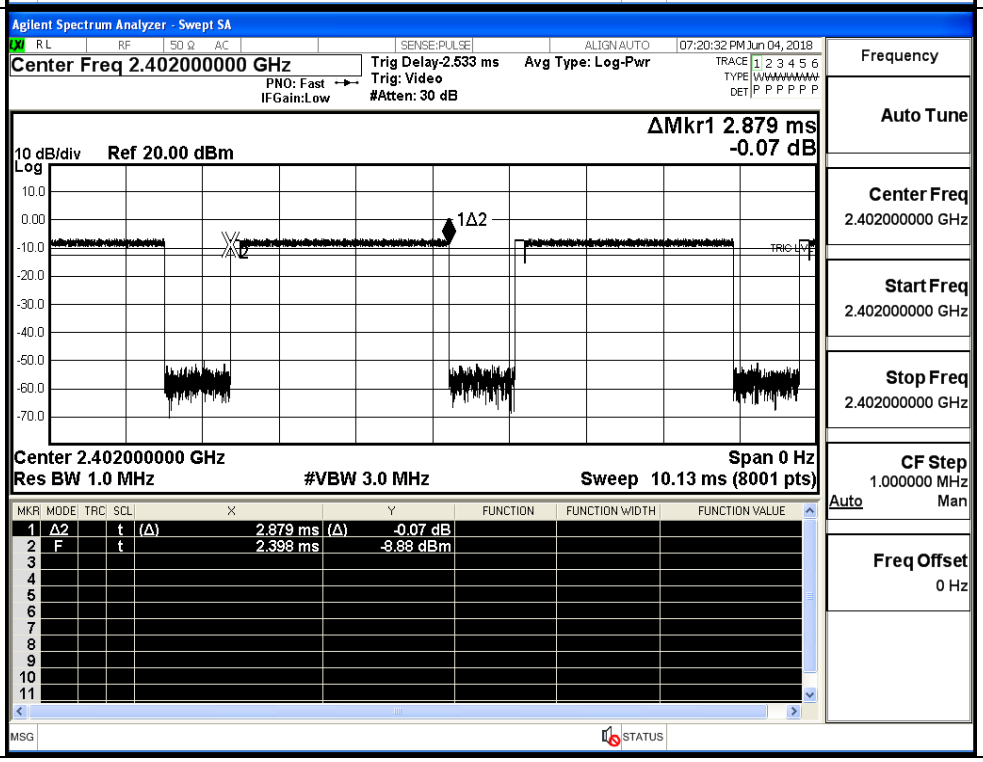
π/4DQPSK
_2DH5/MCH

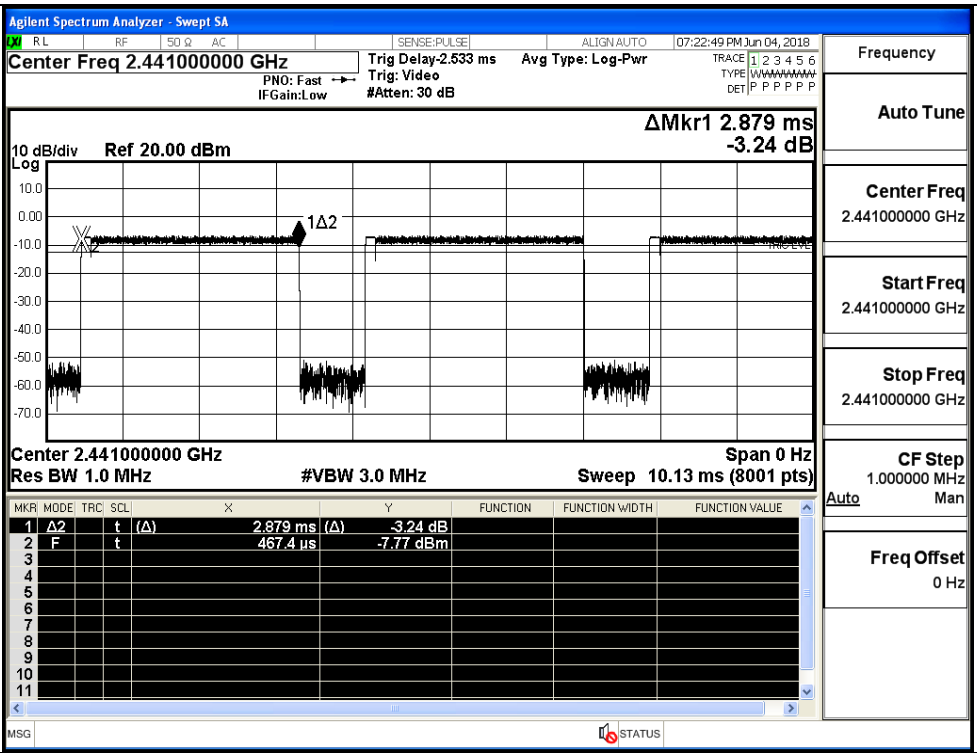
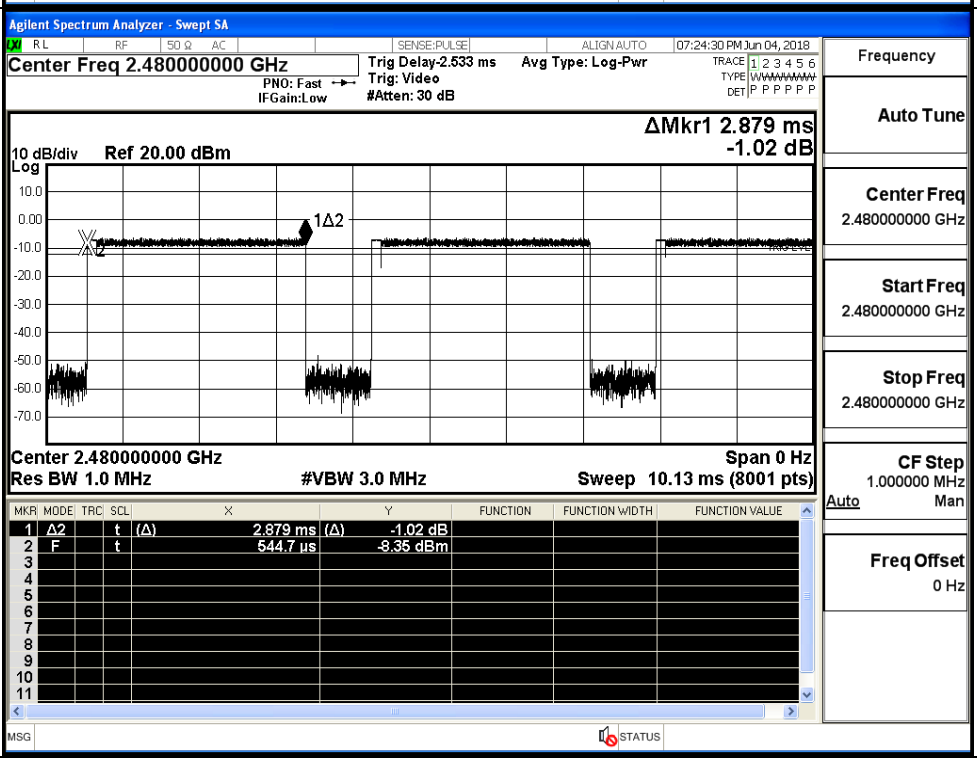


π/4DQPSK _2DH5/HCH



8DPSK _3DH5/LCH



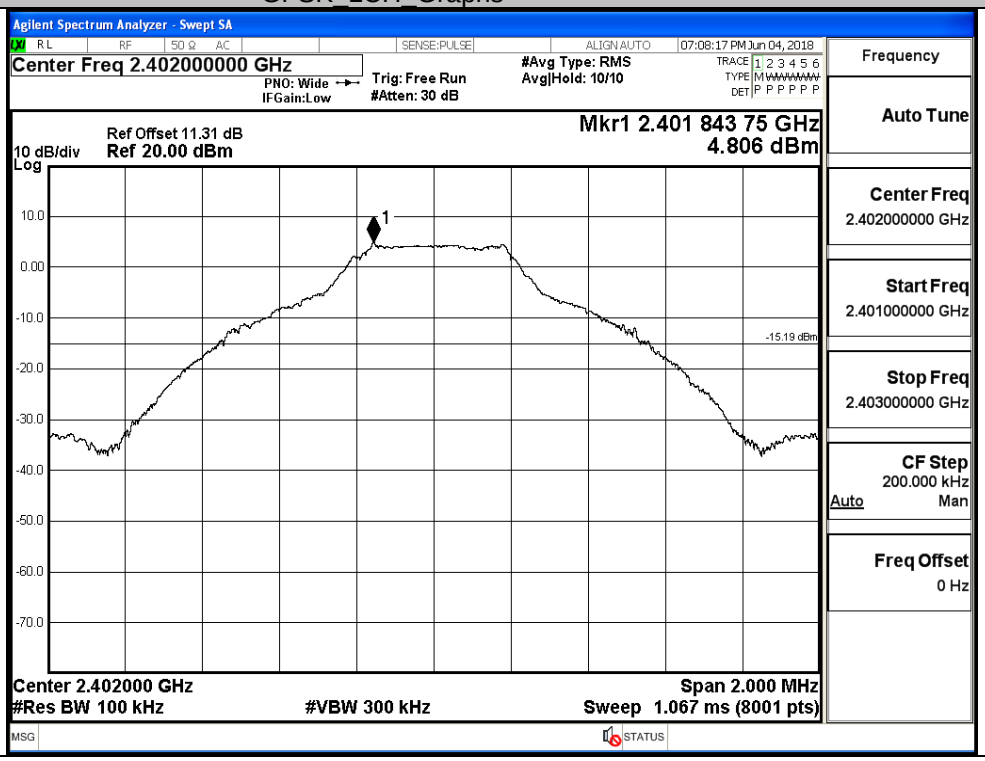
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

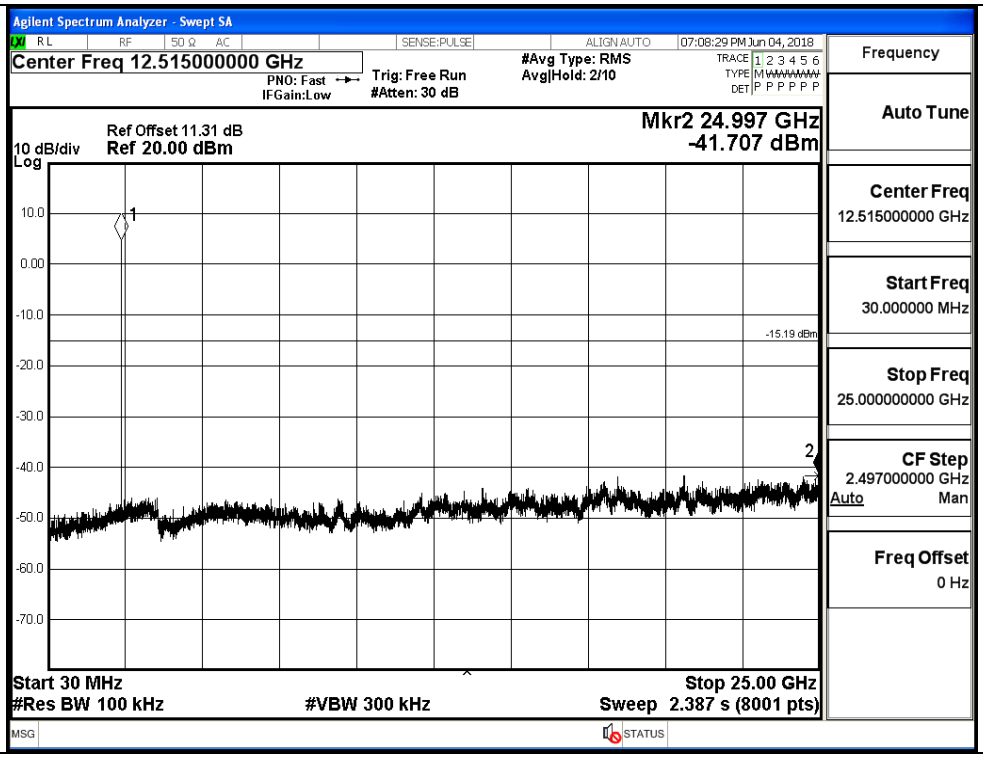
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.806	-41.707	-15.194	PASS
	MCH	4.876	-41.914	-15.124	PASS
	HCH	5.112	-41.260	-14.888	PASS
π/4DQPSK	LCH	4.128	-41.566	-15.872	PASS
	MCH	3.781	-41.284	-16.219	PASS
	HCH	4.225	-41.323	-15.775	PASS
8DPSK	LCH	3.744	-41.864	-16.256	PASS
	MCH	3.757	-41.929	-16.243	PASS
	HCH	4.278	-41.139	-15.722	PASS

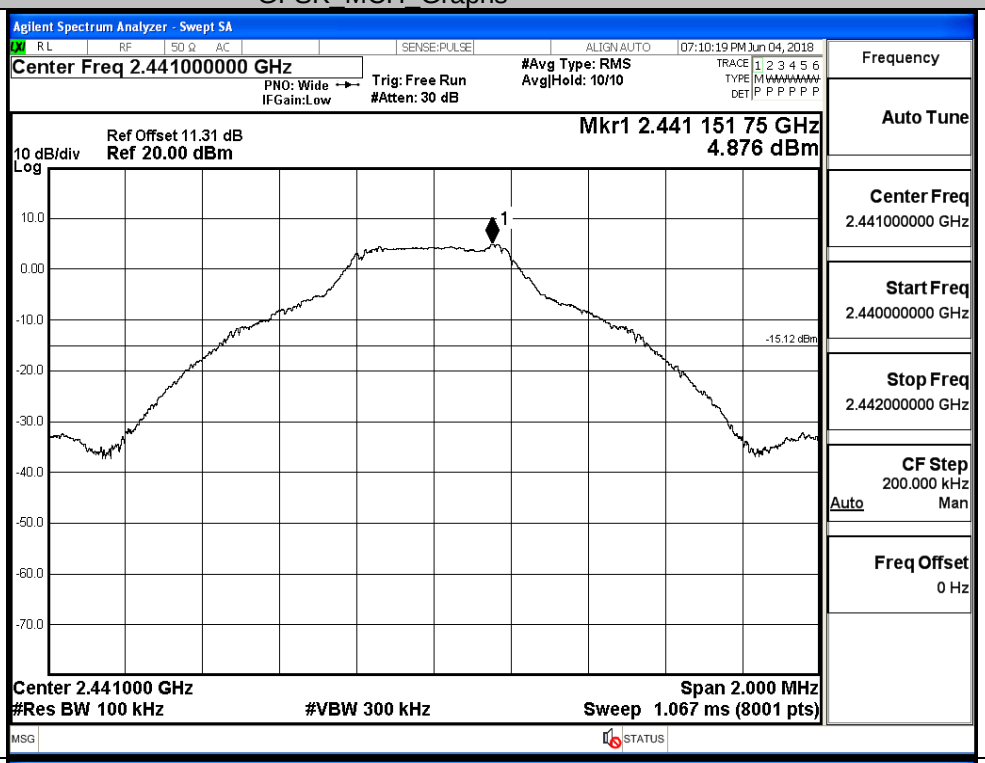
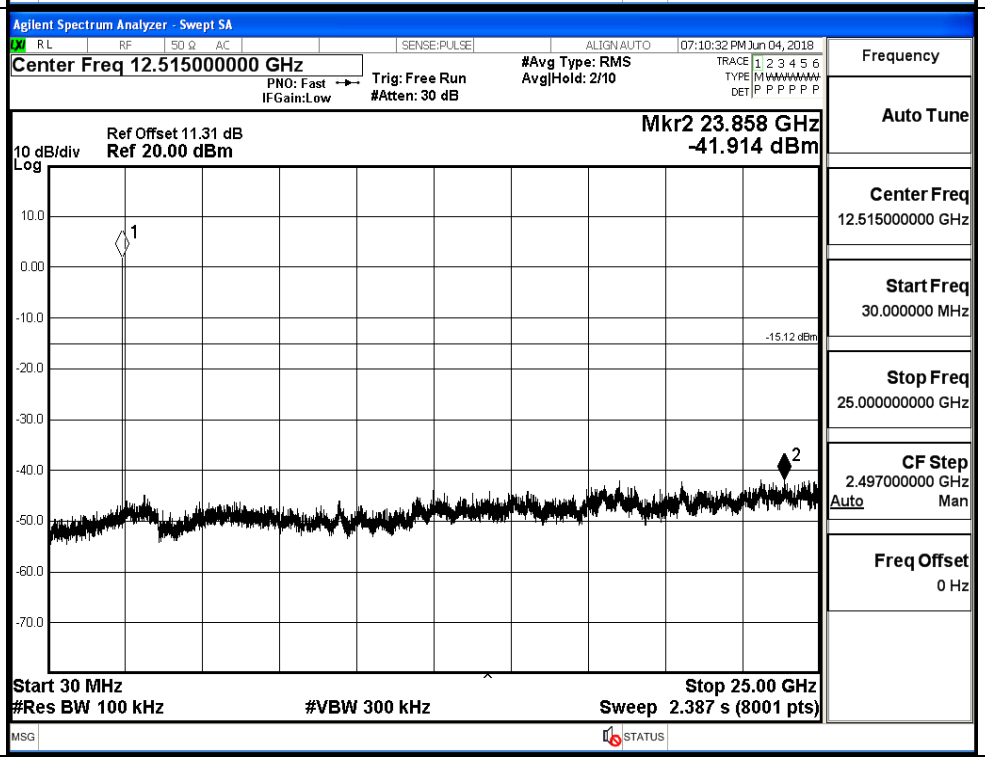
GFSK_LCH_Graphs

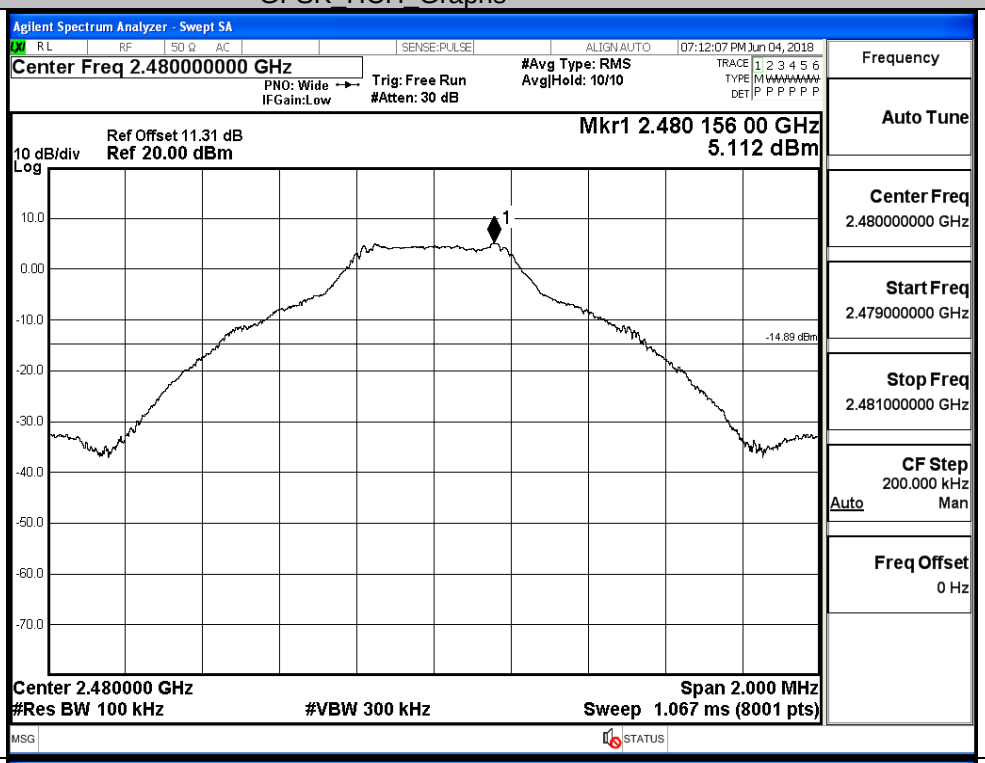
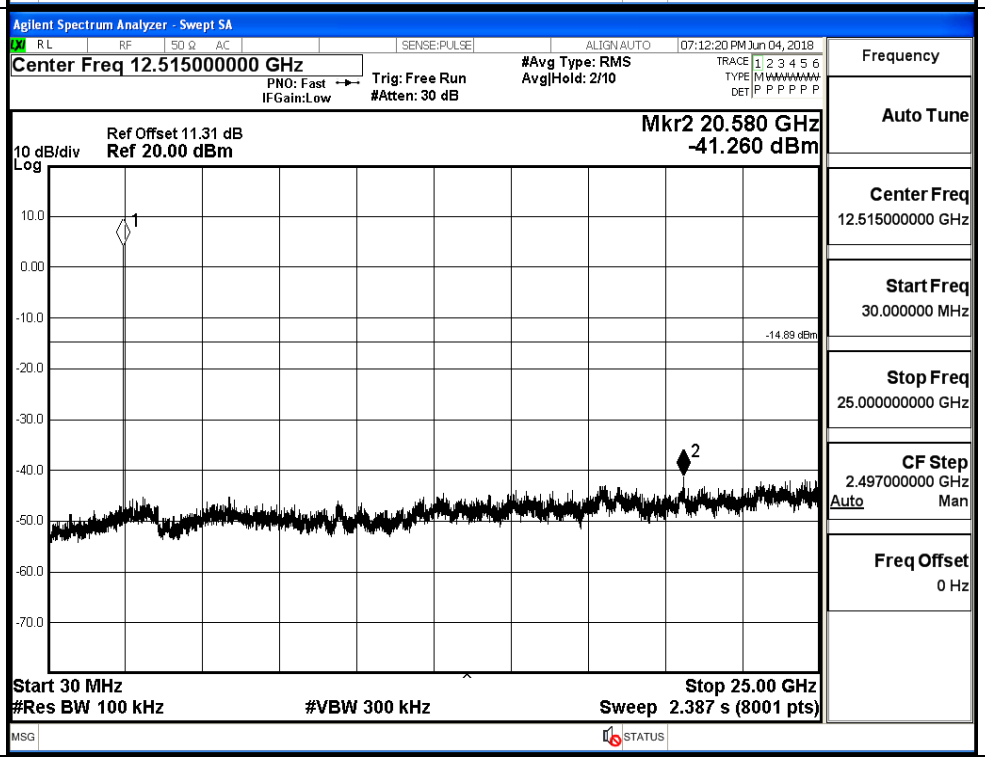
Pref

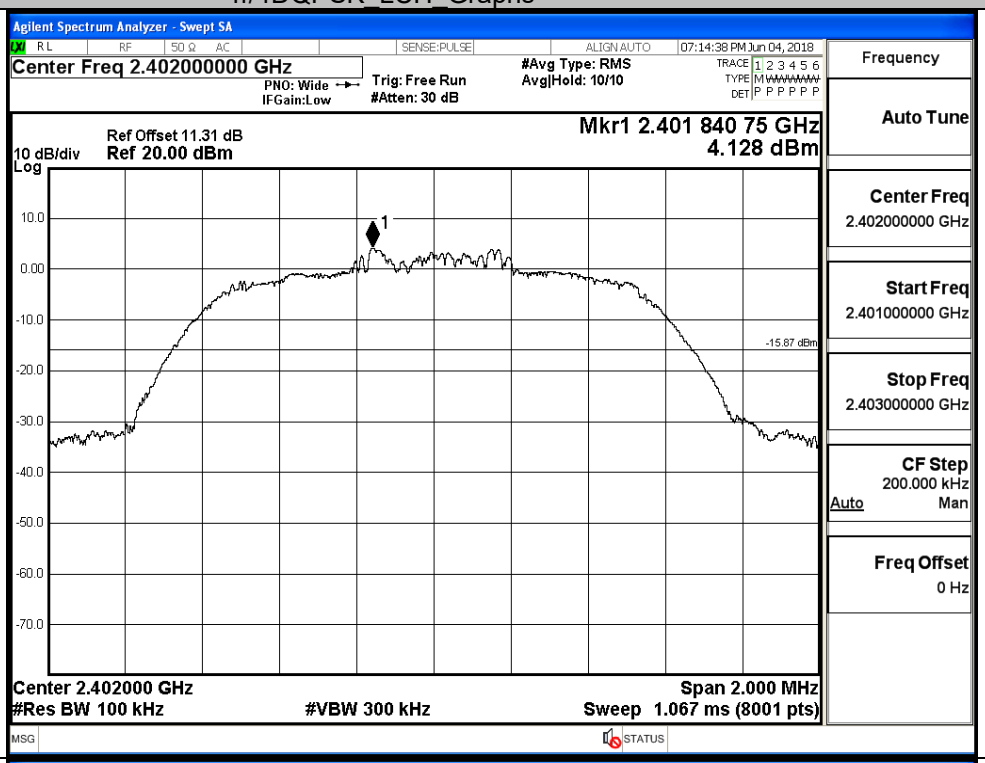
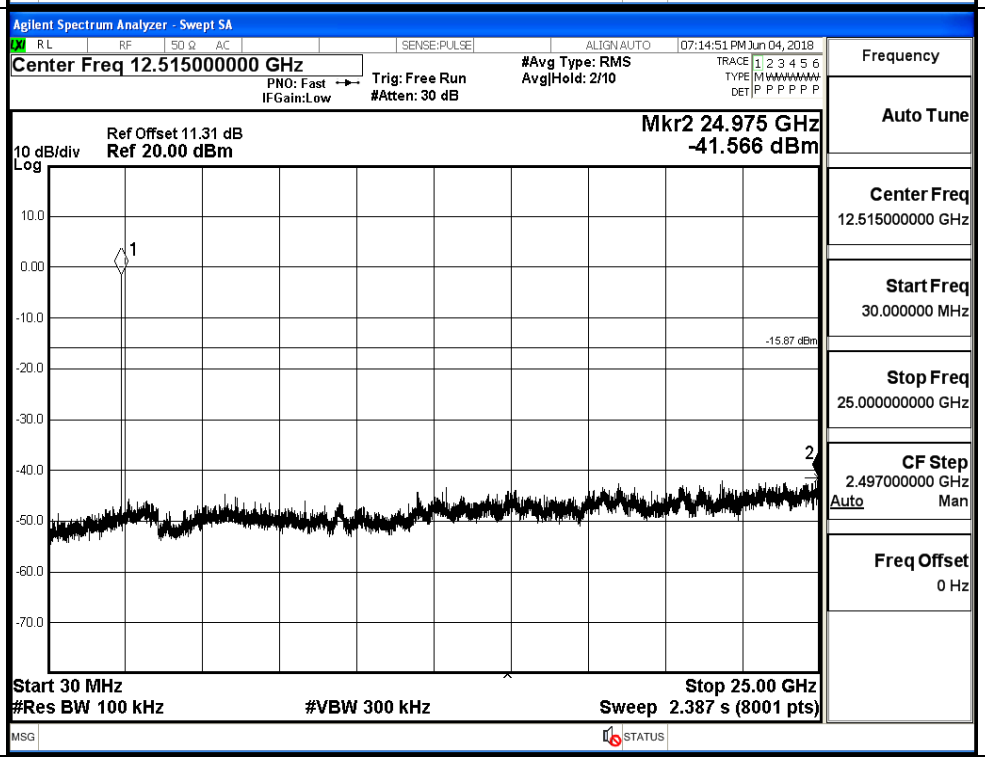


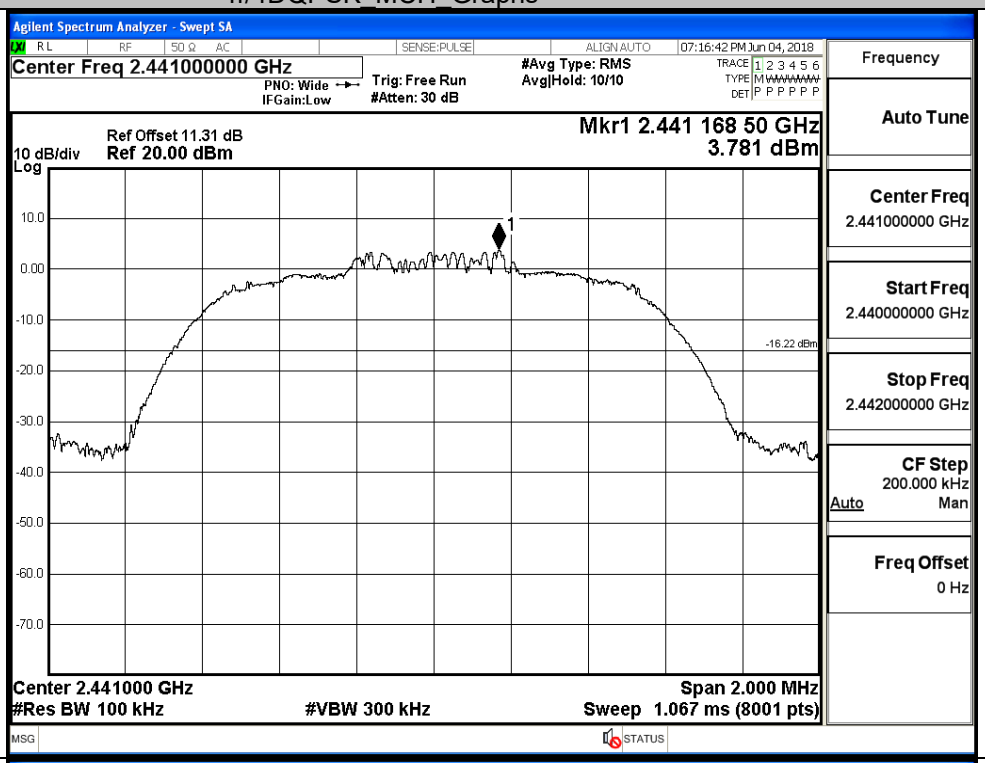
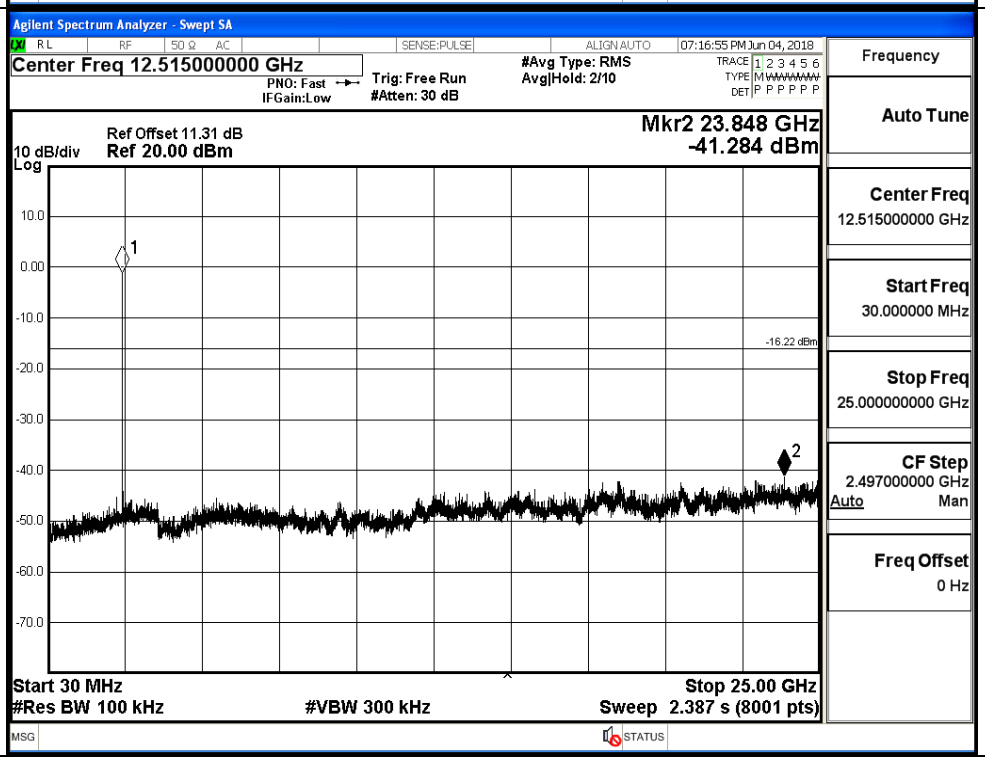
Puw		

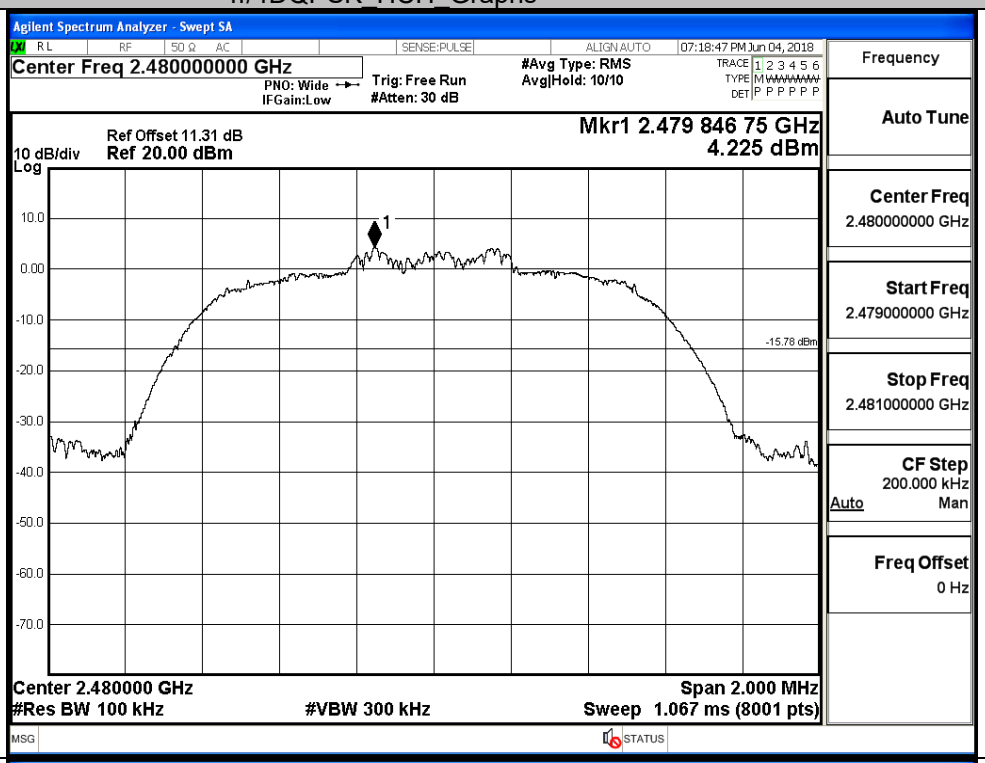
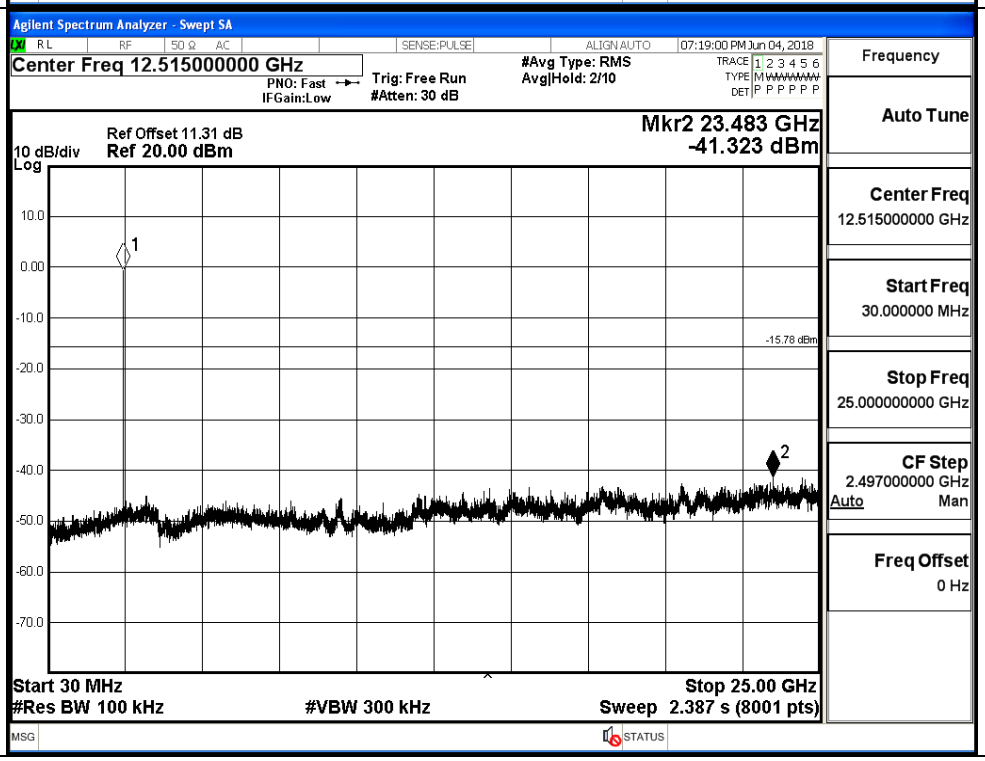
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
07:08:29 PM Jun 04, 2018
Ref Offset 11.31 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 24.997 GHz
-41.707 dBm
-15.19 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 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

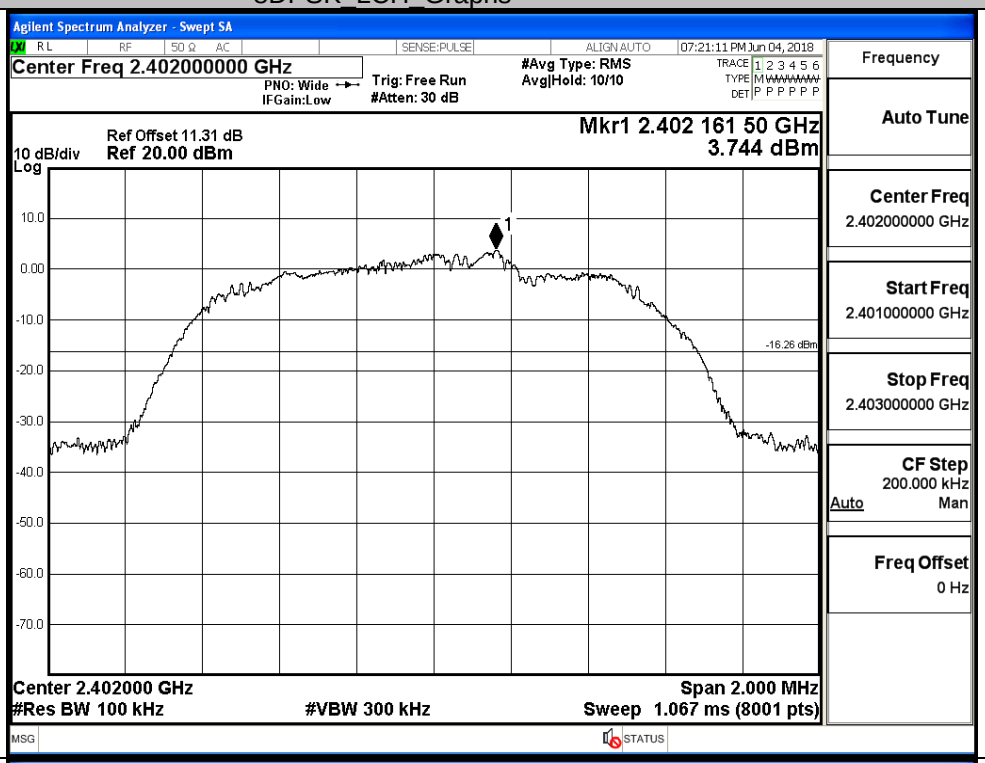
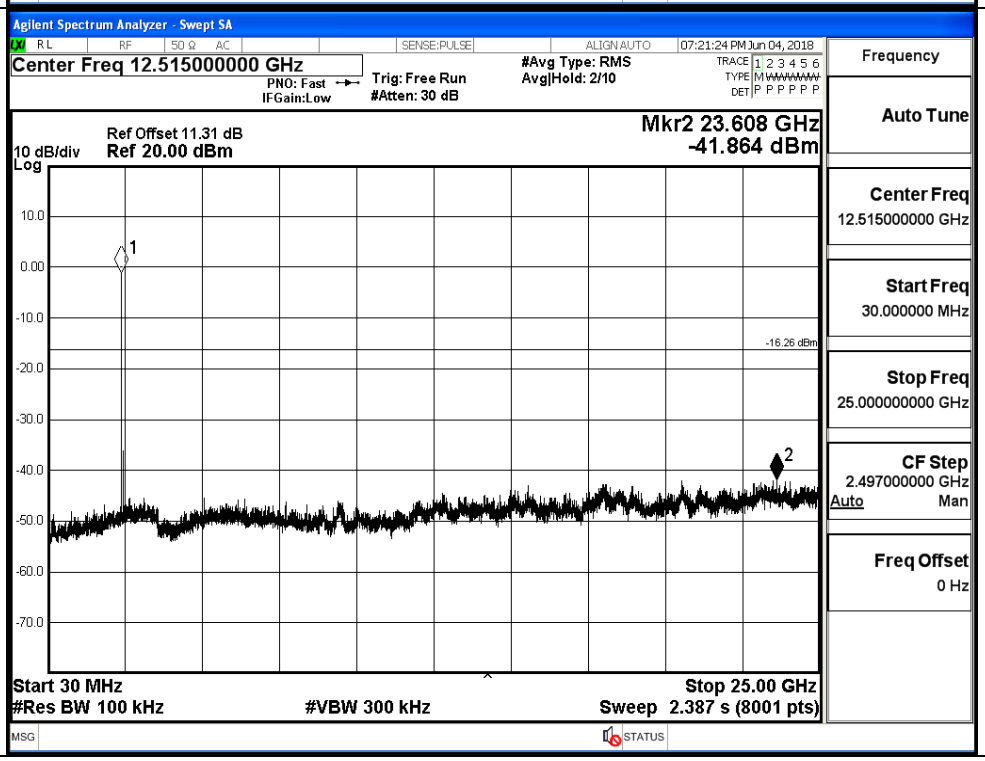
GFSK_MCH_Graphs		
Pref		
Puw		

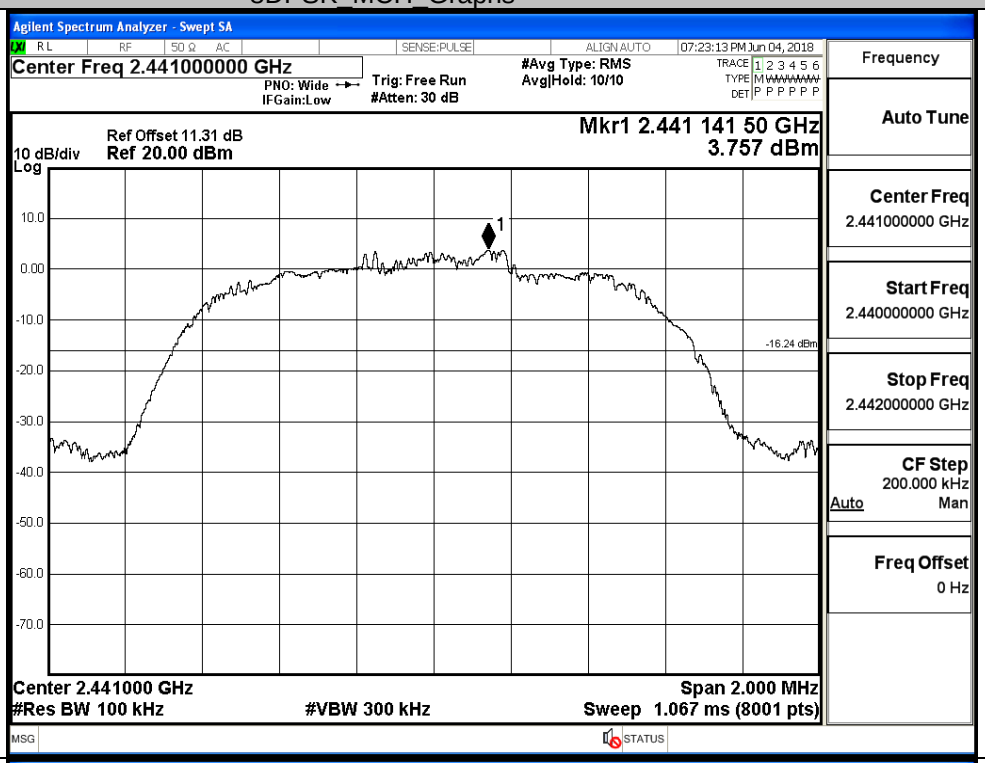
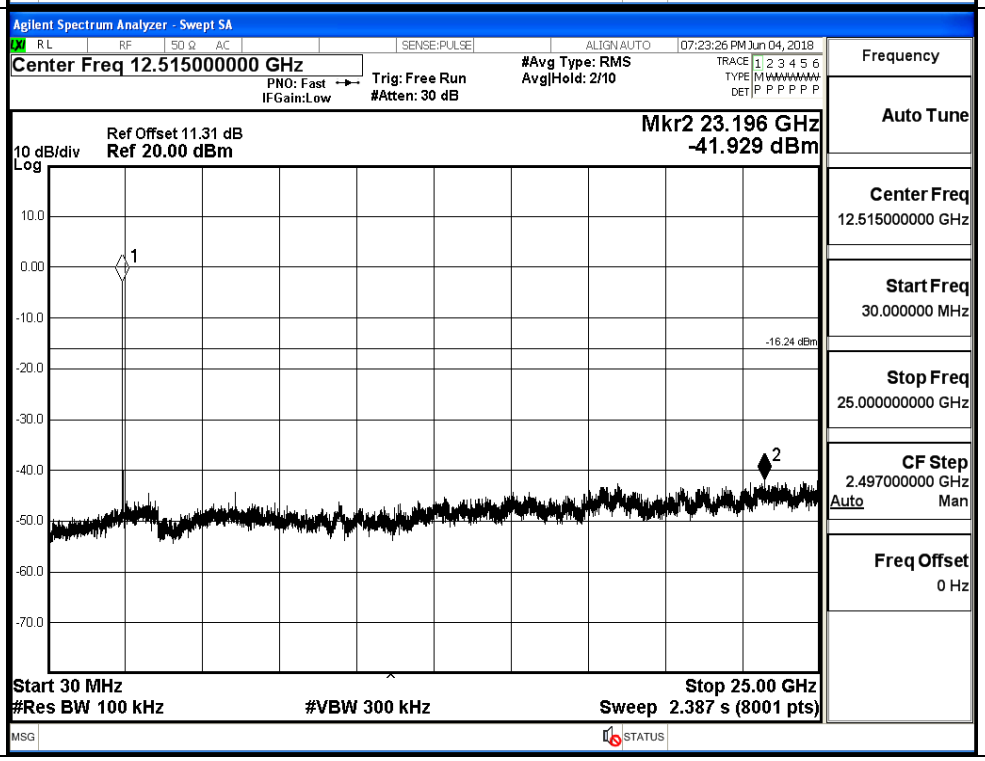
GFSK_HCH_Graphs		
Pref		
Puw		

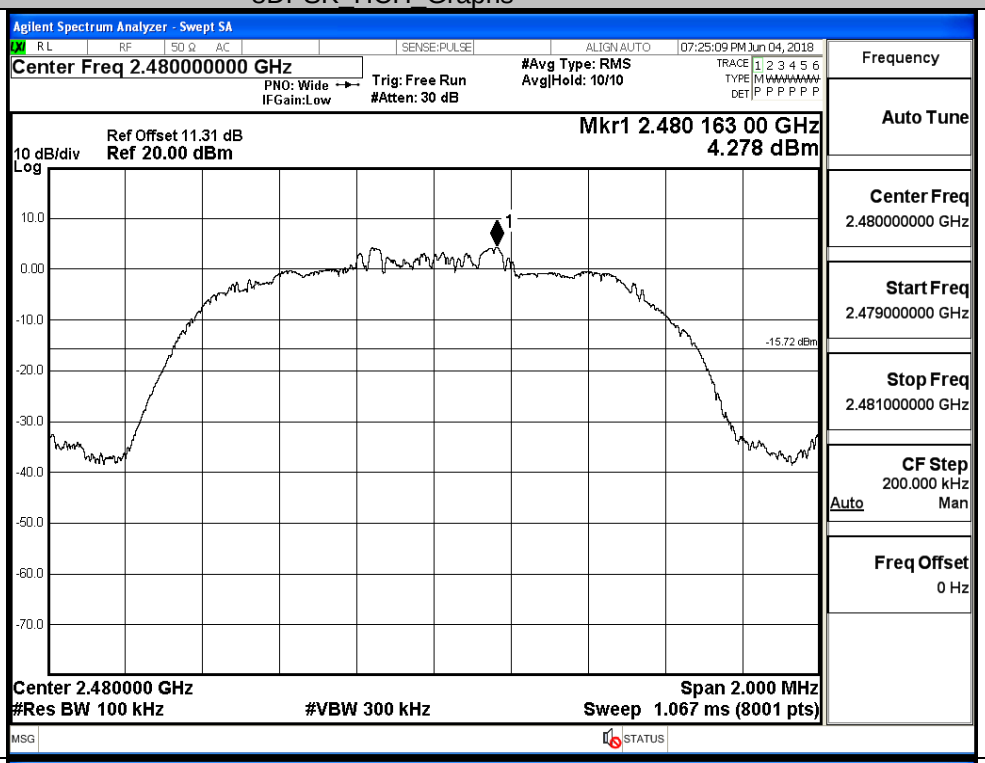
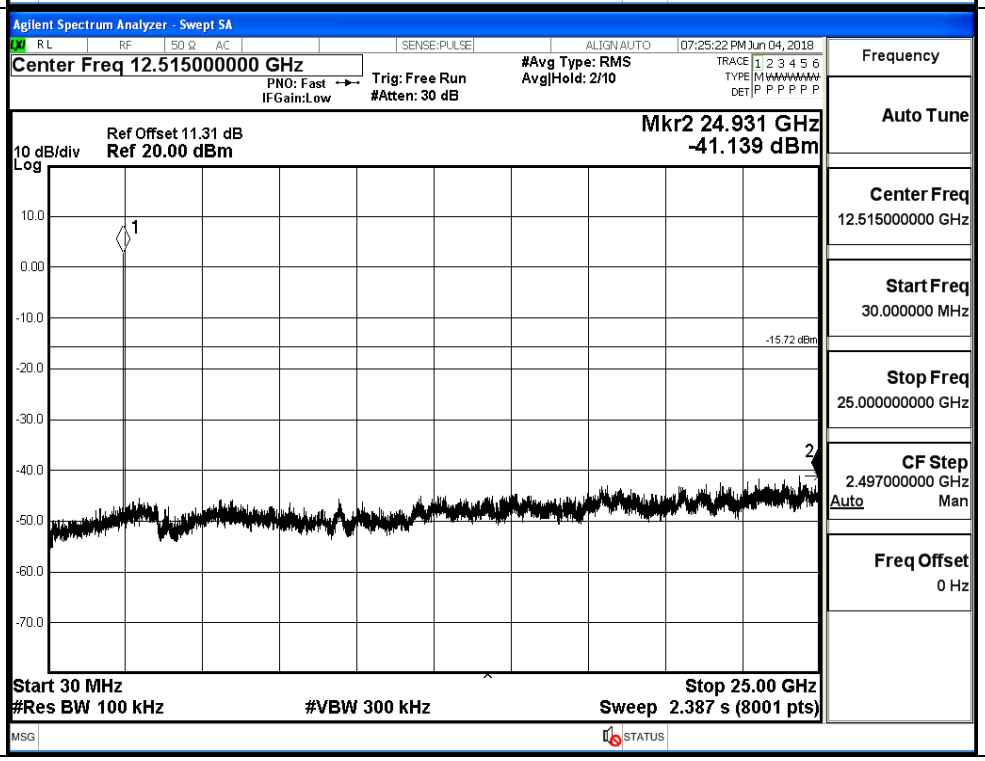
π/4DQPSK_LCH_Graphs		
Pref		
Puw		

π/4DQPSK_MCH_Graphs		
Pref		
Puw		

π/4DQPSK_HCH_Graphs		
Pref		
Puw		

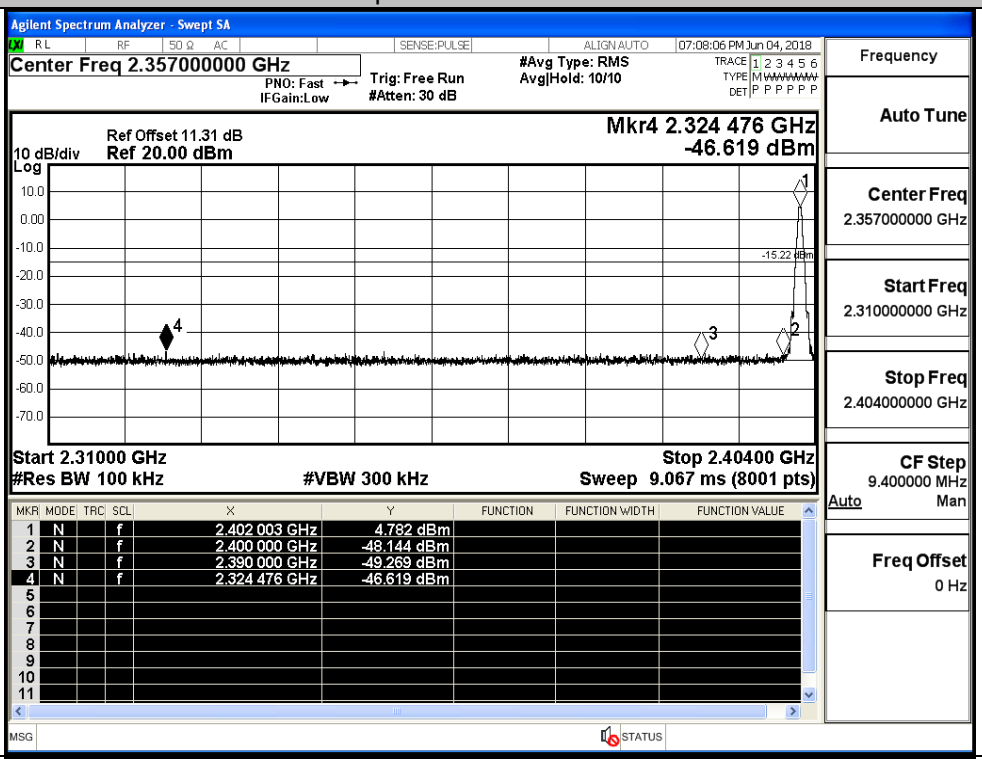
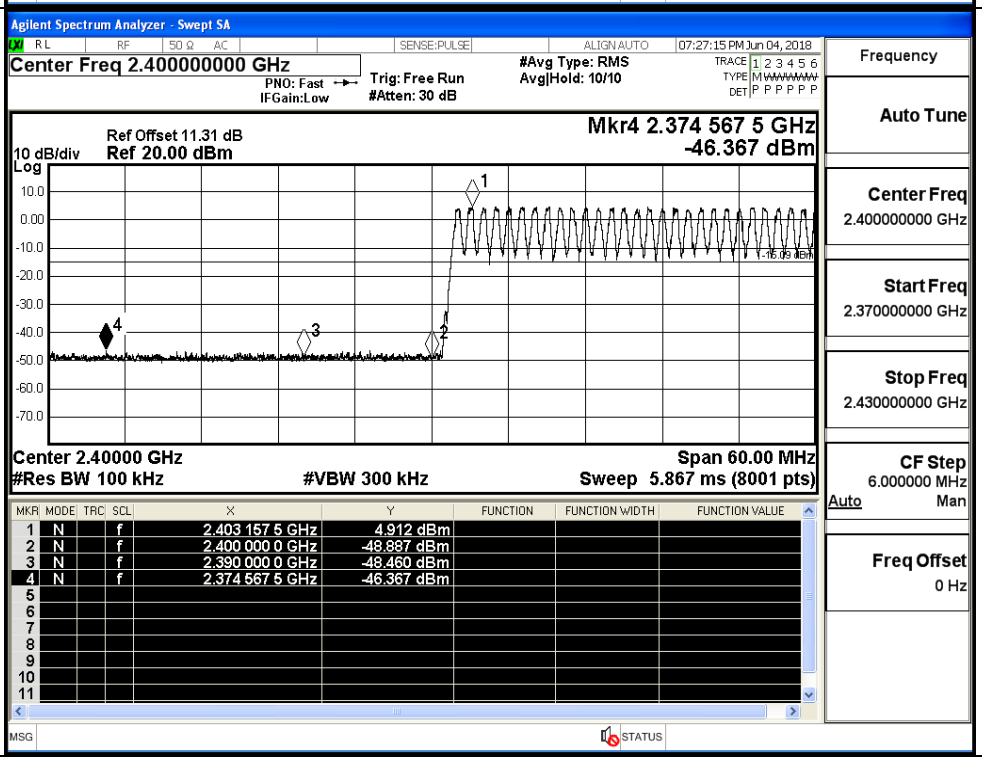
8DPSK_LCH_Graphs		
Pref		
Puw		

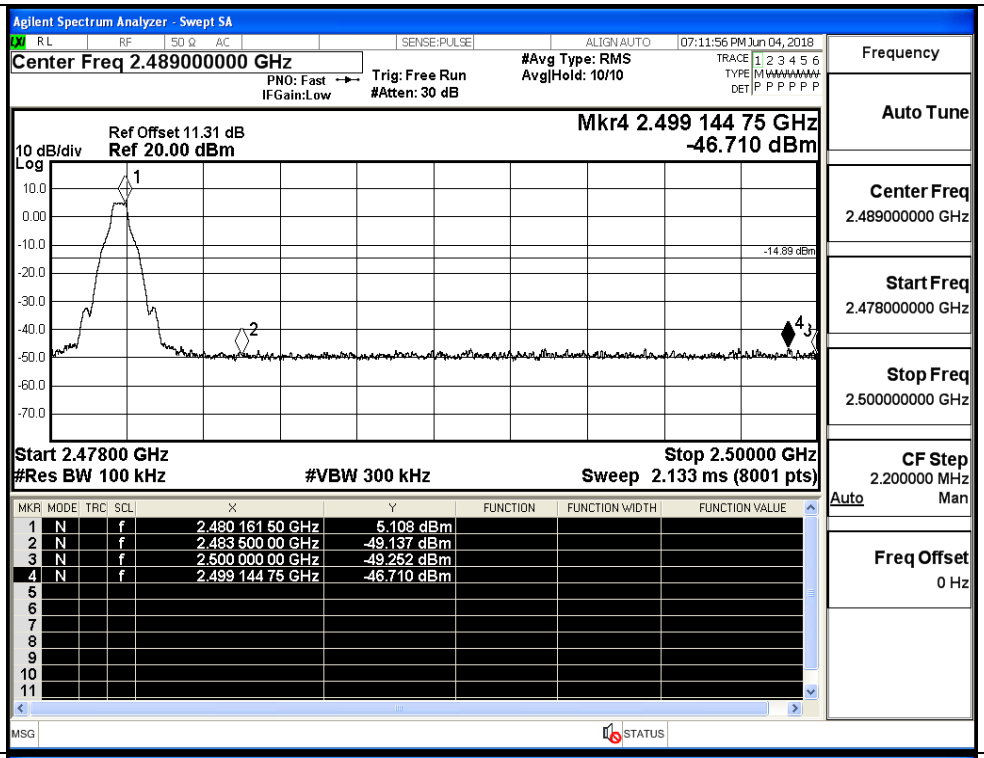
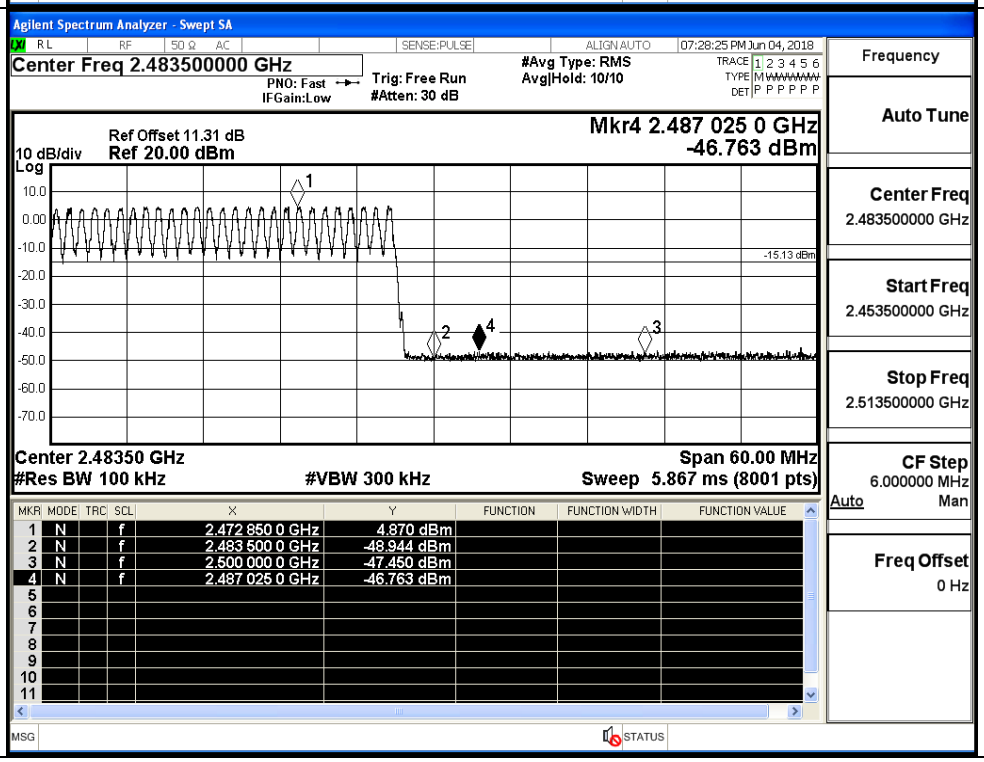
8DPSK_MCH_Graphs		
Pref		
Puw		

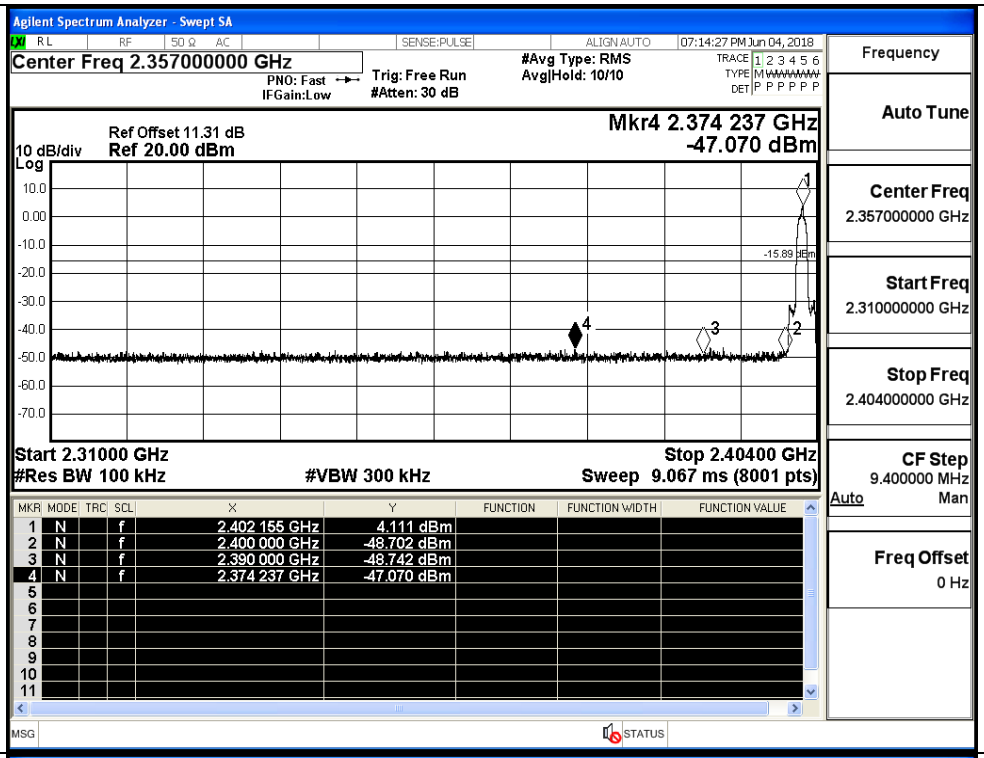
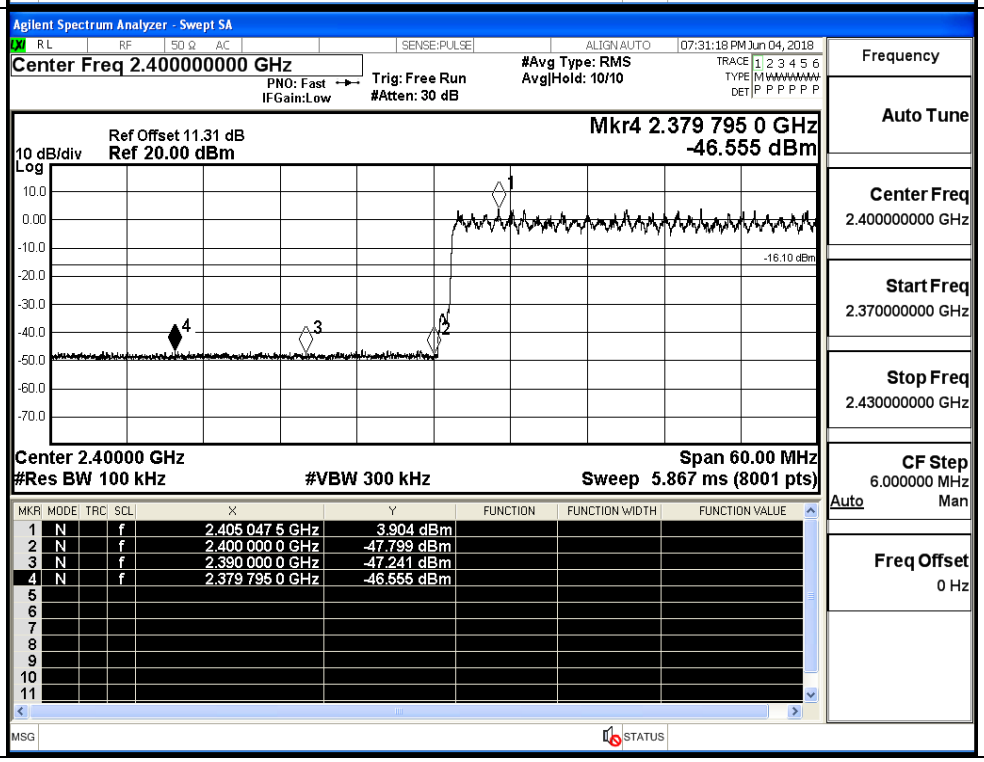
8DPSK_HCH_Graphs		
Pref		
Puw		

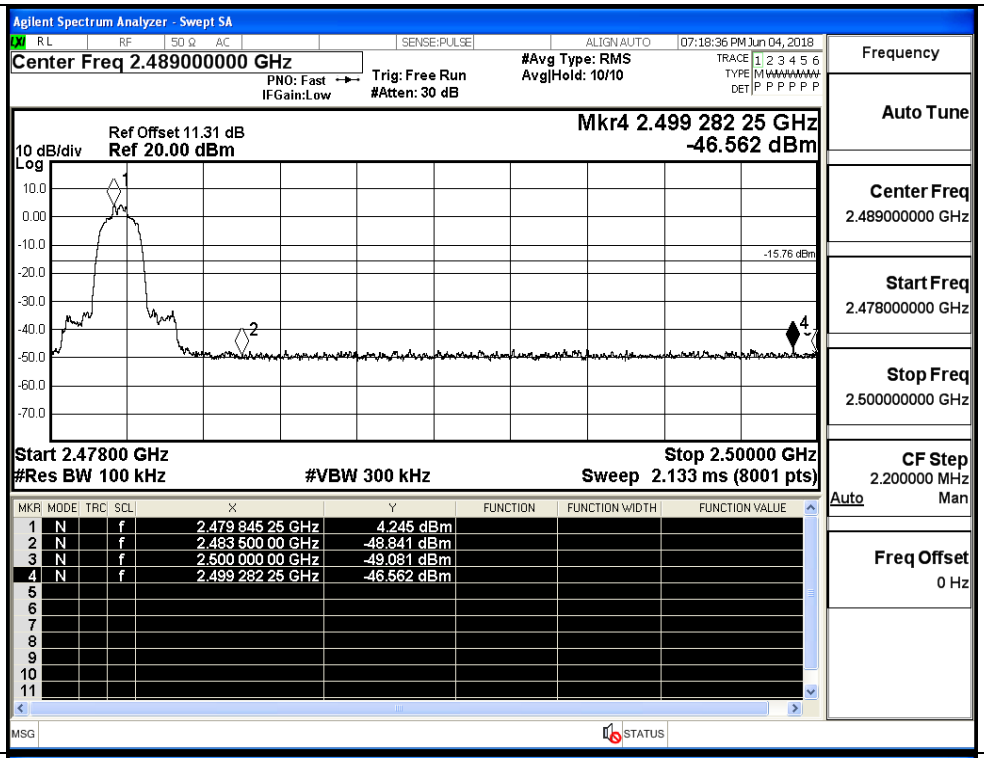
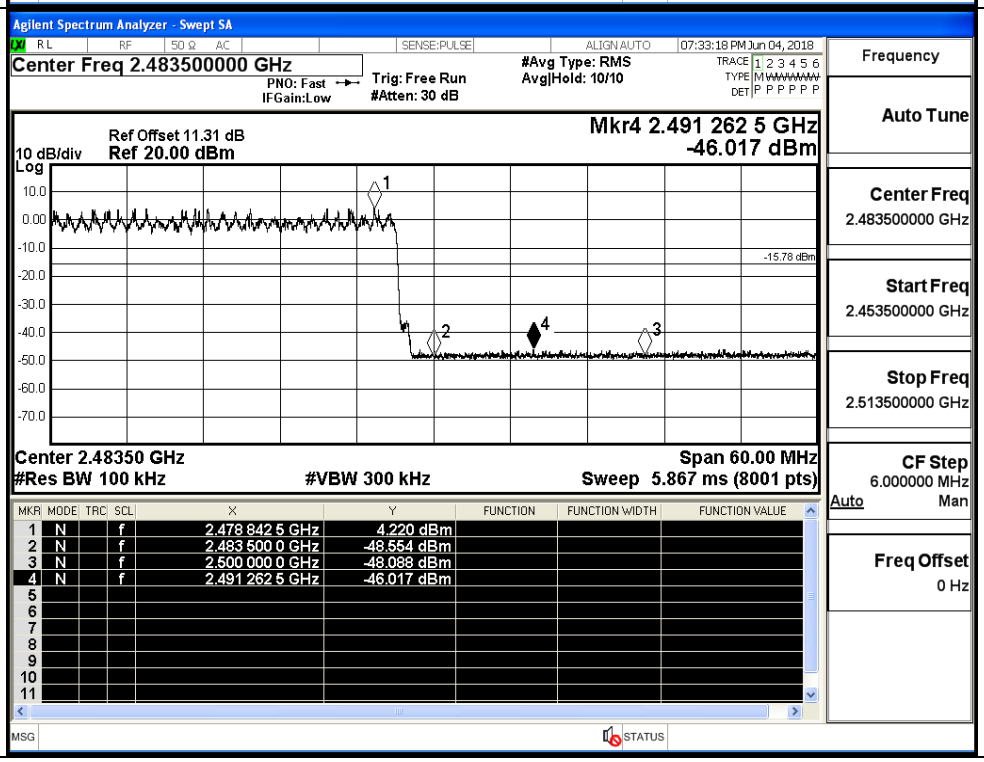
A.7 Band-edge for RF Conducted Emissions

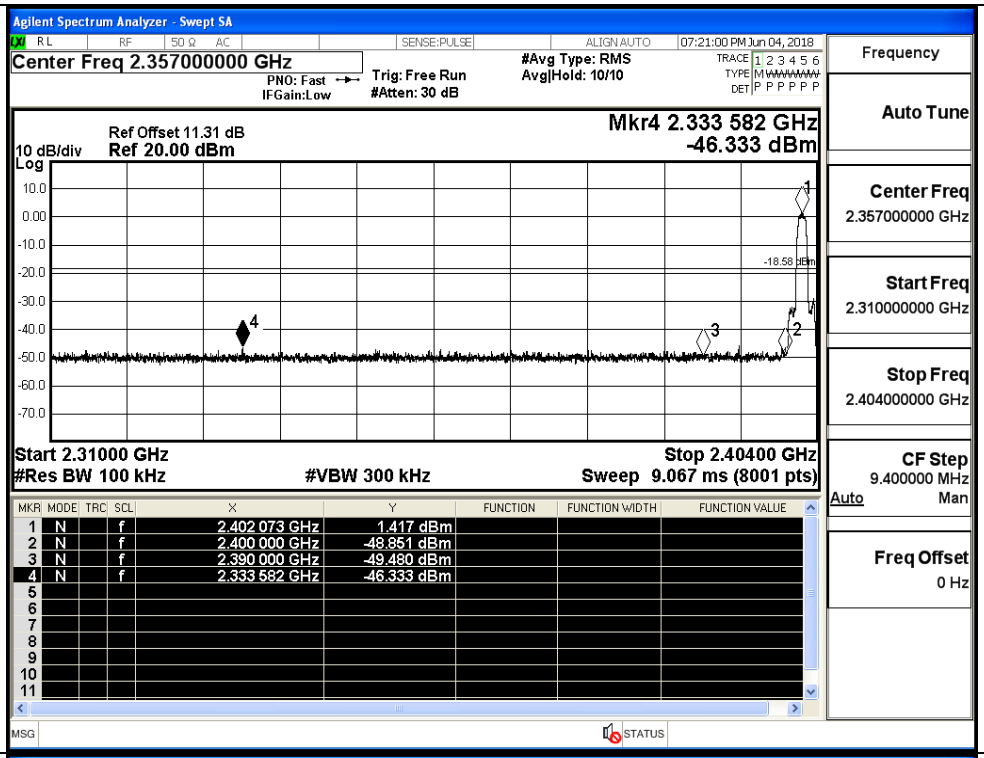
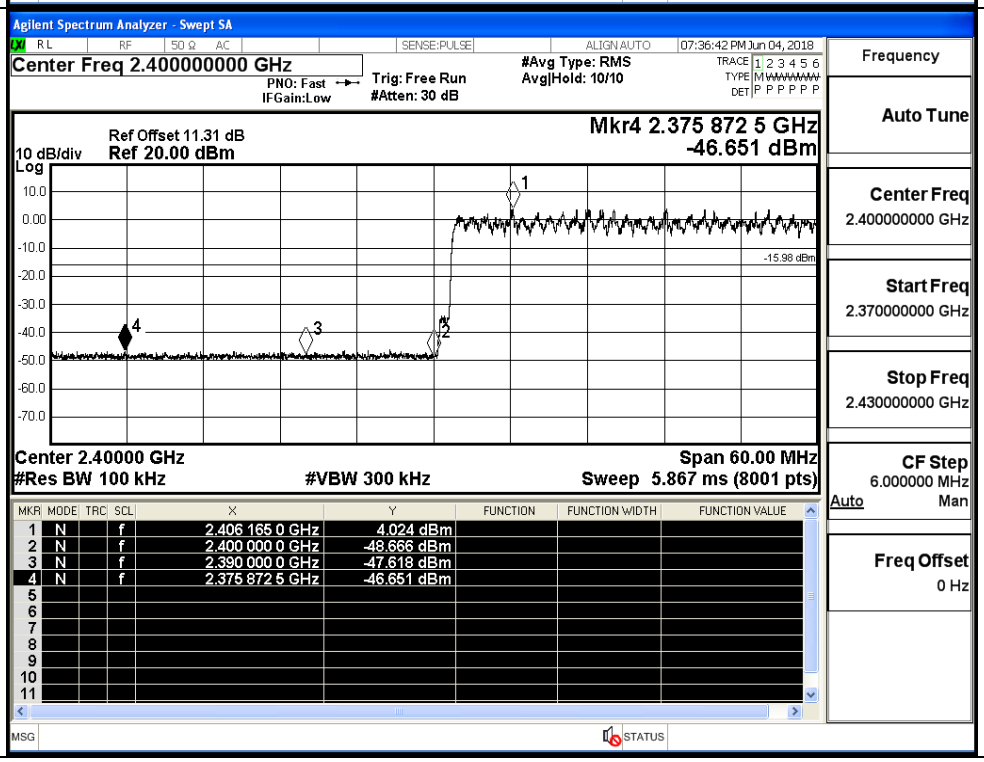
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.782	Off	-46.619	-15.22	PASS
			4.912	On	-46.367	-15.09	PASS
	HCH	2480	5.108	Off	-46.710	-14.89	PASS
			4.870	On	-46.763	-15.13	PASS
π/4DQPSK	LCH	2402	4.111	Off	-47.070	-15.89	PASS
			3.904	On	-46.555	-16.1	PASS
	HCH	2480	4.245	Off	-46.562	-15.76	PASS
			4.220	On	-46.017	-15.78	PASS
8DPSK	LCH	2402	1.417	Off	-46.333	-18.58	PASS
			4.024	On	-46.651	-15.98	PASS
	HCH	2480	4.330	Off	-46.611	-15.67	PASS
			4.138	On	-45.895	-15.86	PASS

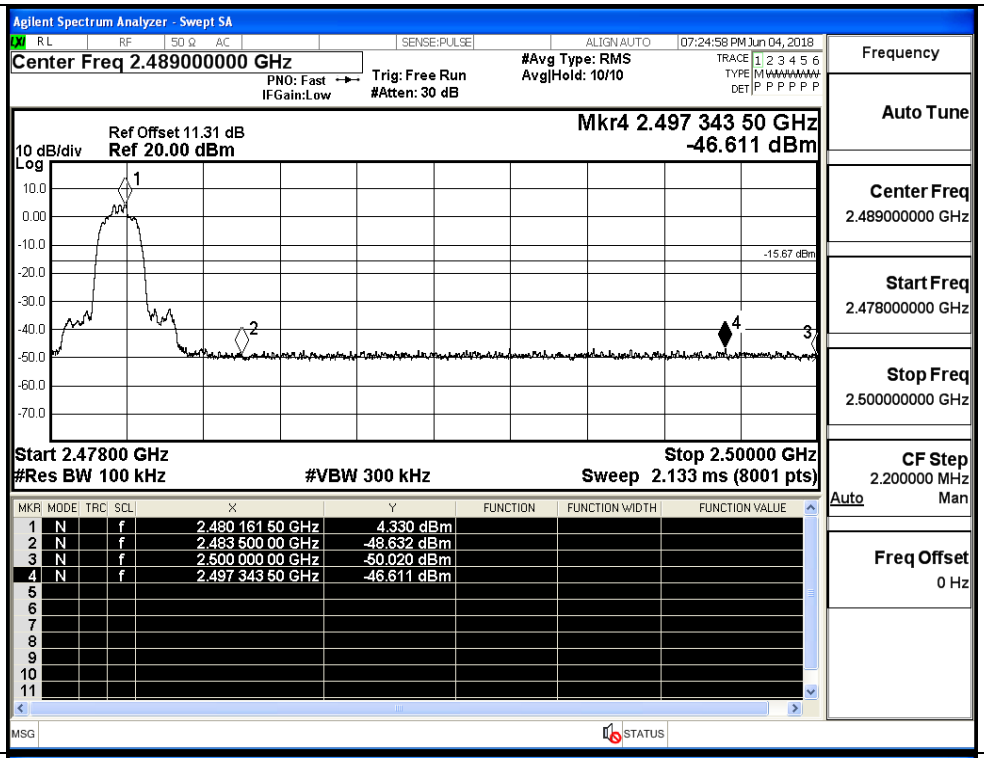
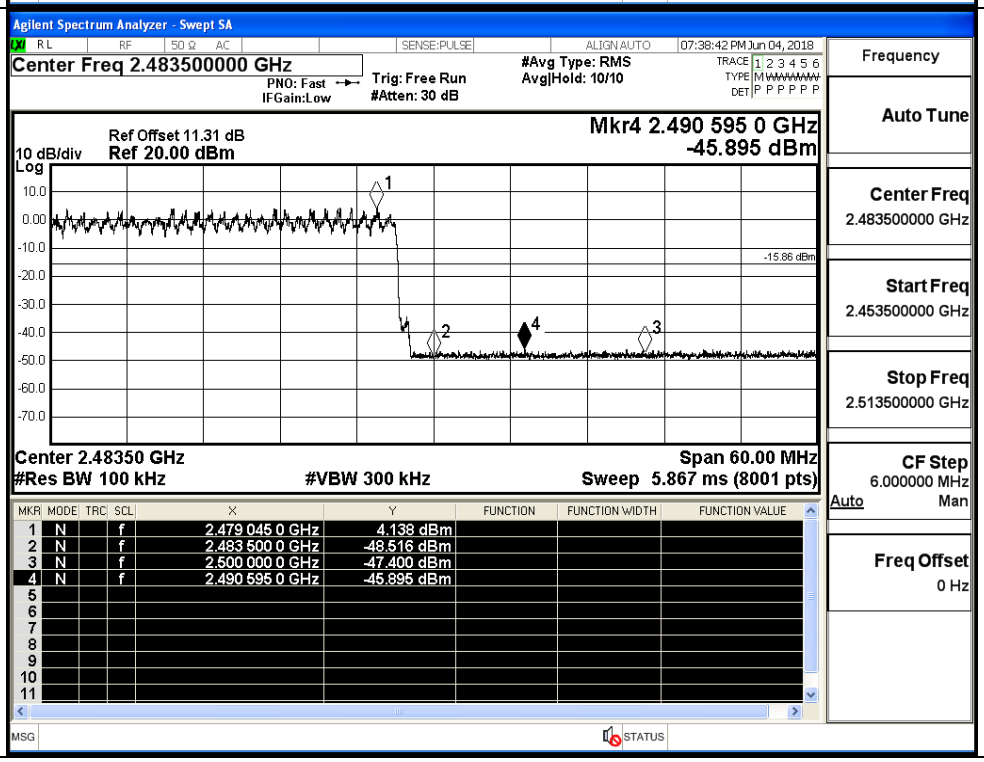
Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

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	

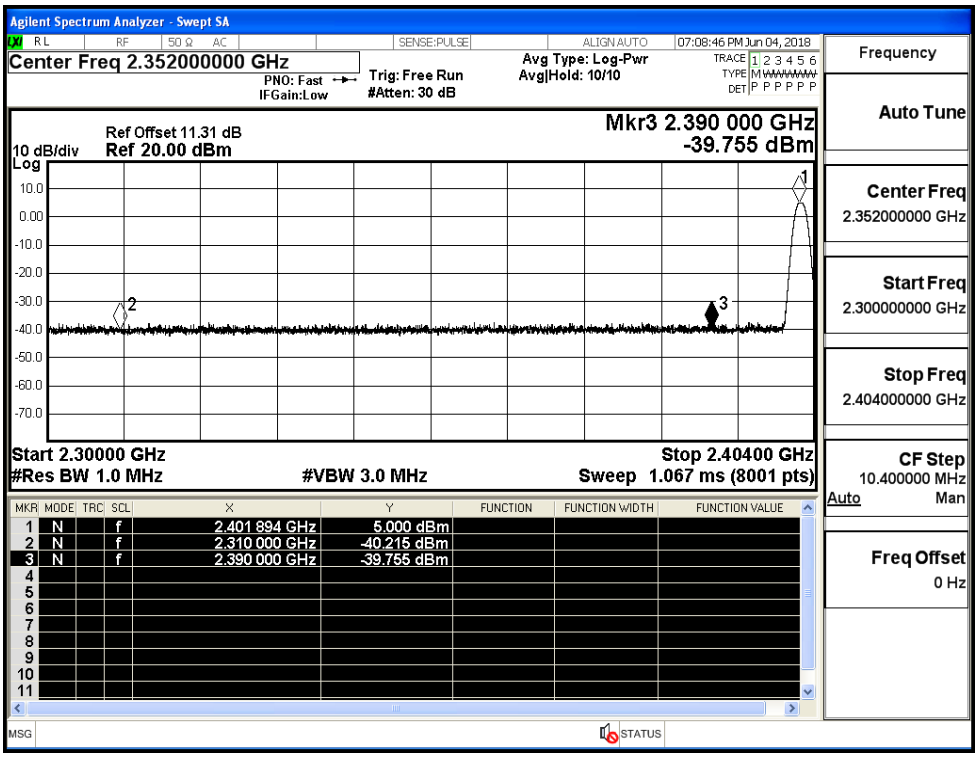
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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

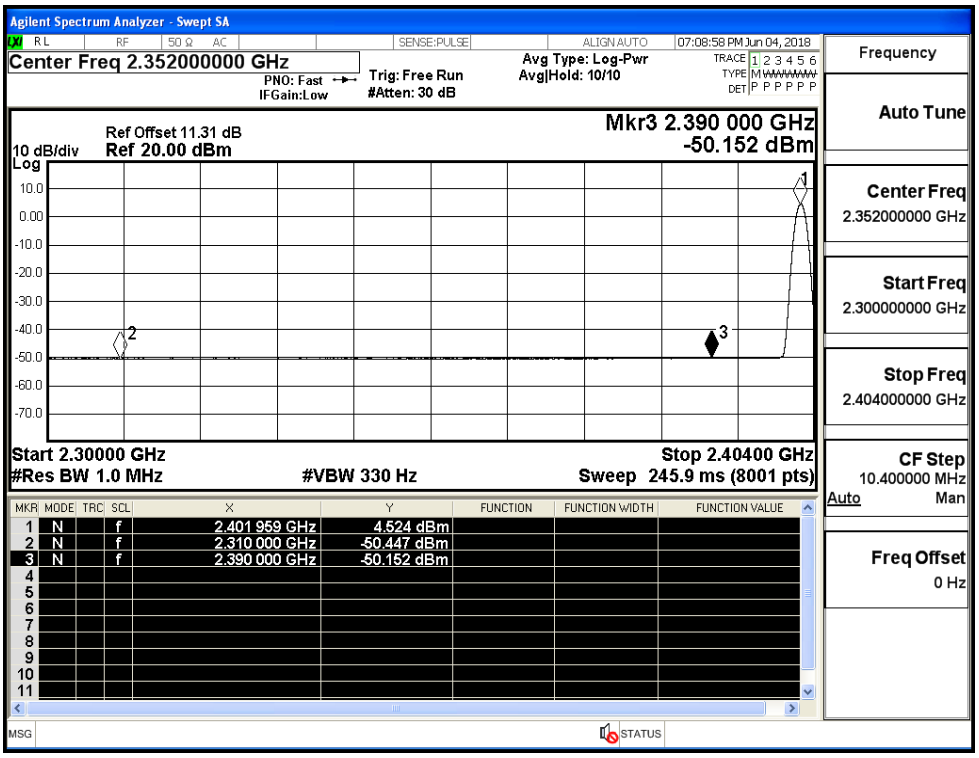
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-40.22	2.0	0	55.04	PEAK	74	PASS
	Off	2310.0	-50.45	2.0	0	44.81	AV	54	PASS
	Off	2390.0	-39.76	2.0	0	55.50	PEAK	74	PASS
	Off	2390.0	-50.15	2.0	0	45.11	AV	54	PASS
	Off	2483.5	-39.14	2.0	0	56.11	PEAK	74	PASS
	Off	2483.5	-49.95	2.0	0	45.31	AV	54	PASS
	Off	2500.0	-38.67	2.0	0	56.59	PEAK	74	PASS
	Off	2500.0	-49.88	2.0	0	45.38	AV	54	PASS
π/4DQPSK	Off	2310.0	-38.59	2.0	0	56.67	PEAK	74	PASS
	Off	2310.0	-50.40	2.0	0	44.86	AV	54	PASS
	Off	2390.0	-39.55	2.0	0	55.71	PEAK	74	PASS
	Off	2390.0	-50.25	2.0	0	45.01	AV	54	PASS
	Off	2483.5	-39.95	2.0	0	55.30	PEAK	74	PASS
	Off	2483.5	-49.80	2.0	0	45.46	AV	54	PASS
	Off	2500.0	-39.61	2.0	0	55.65	PEAK	74	PASS
	Off	2500.0	-49.84	2.0	0	45.42	AV	54	PASS
8DPSK	Off	2310.0	-39.56	2.0	0	55.69	PEAK	74	PASS
	Off	2310.0	-50.46	2.0	0	44.80	AV	54	PASS
	Off	2390.0	-39.25	2.0	0	56.01	PEAK	74	PASS
	Off	2390.0	-50.28	2.0	0	44.97	AV	54	PASS
	Off	2483.5	-39.42	2.0	0	55.84	PEAK	74	PASS
	Off	2483.5	-49.85	2.0	0	45.41	AV	54	PASS
	Off	2500.0	-39.92	2.0	0	55.34	PEAK	74	PASS
	Off	2500.0	-49.82	2.0	0	45.44	AV	54	PASS

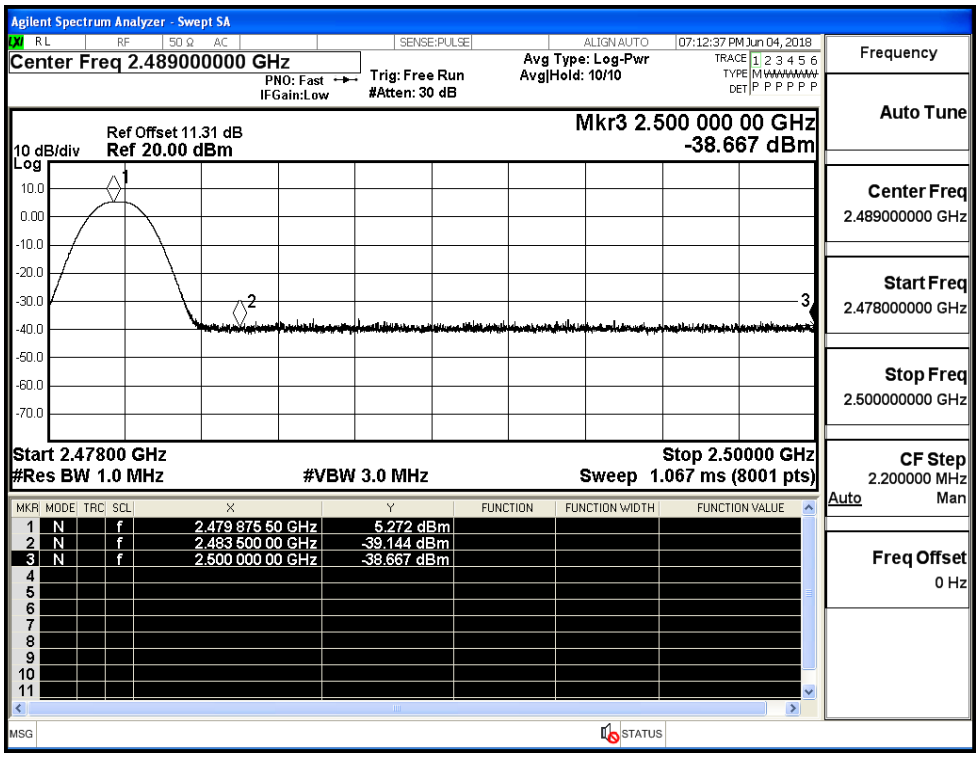
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



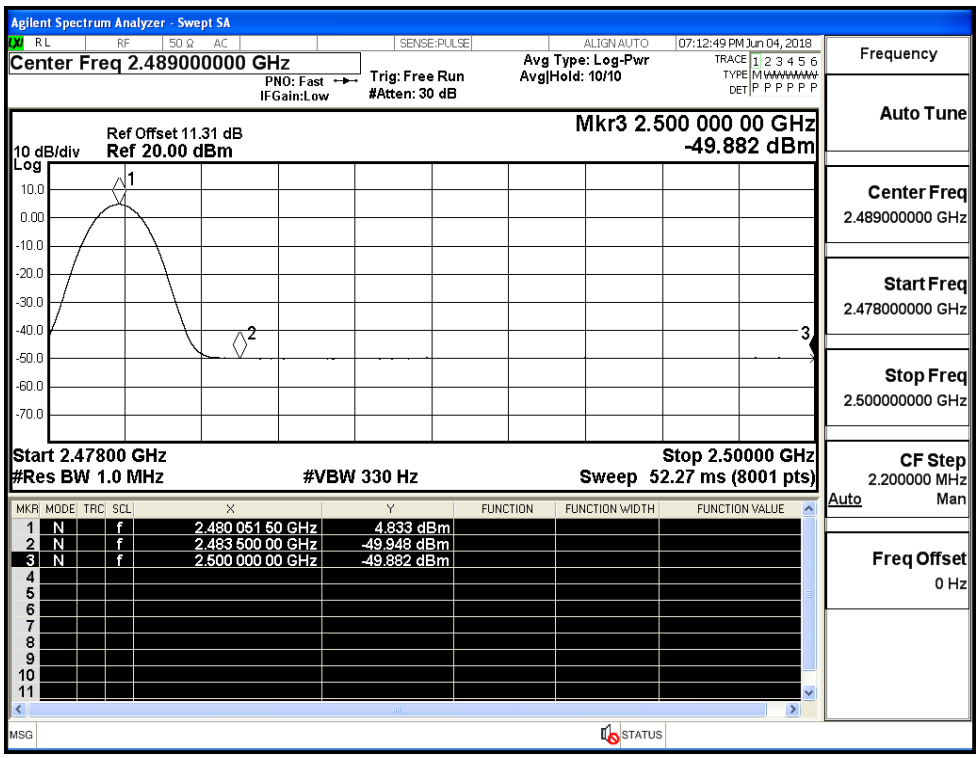
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



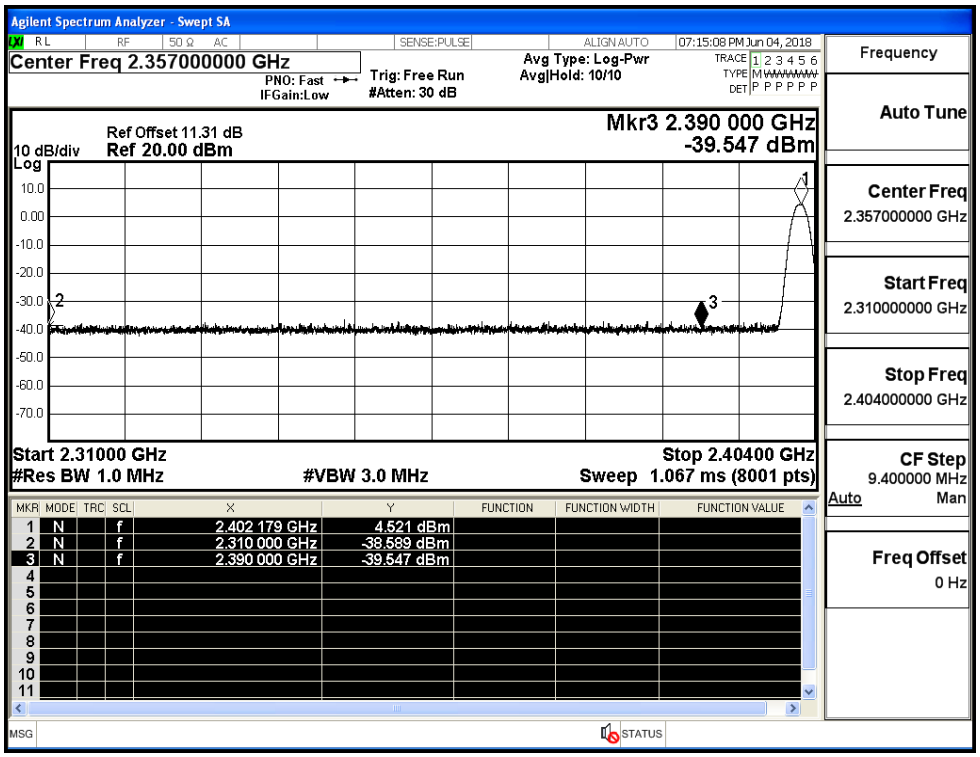
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



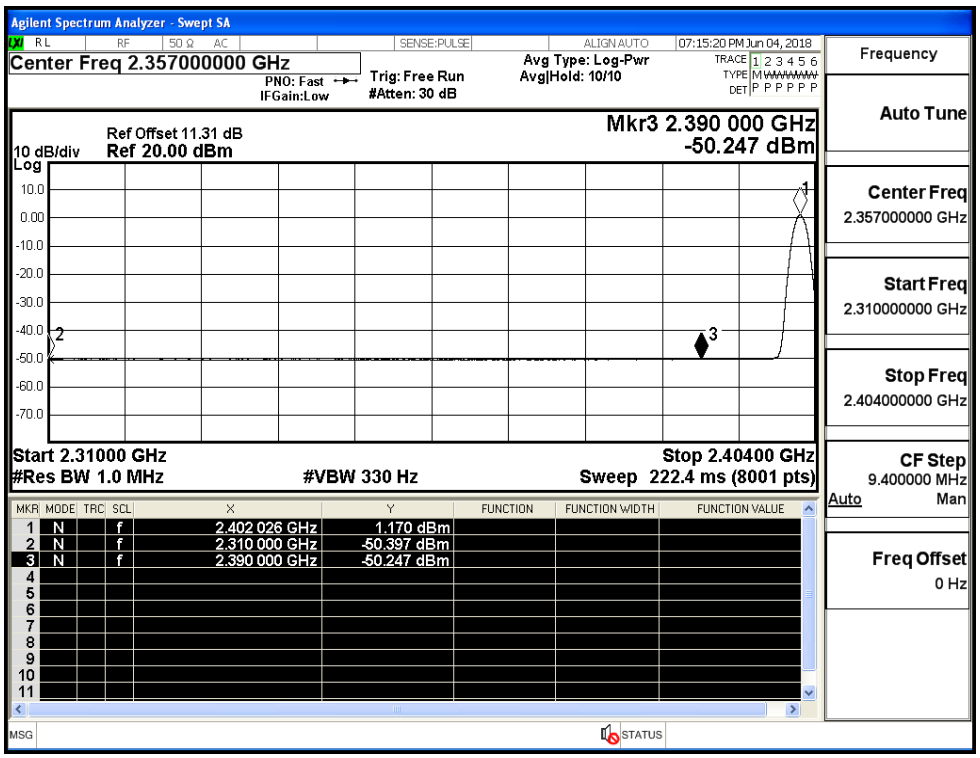
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



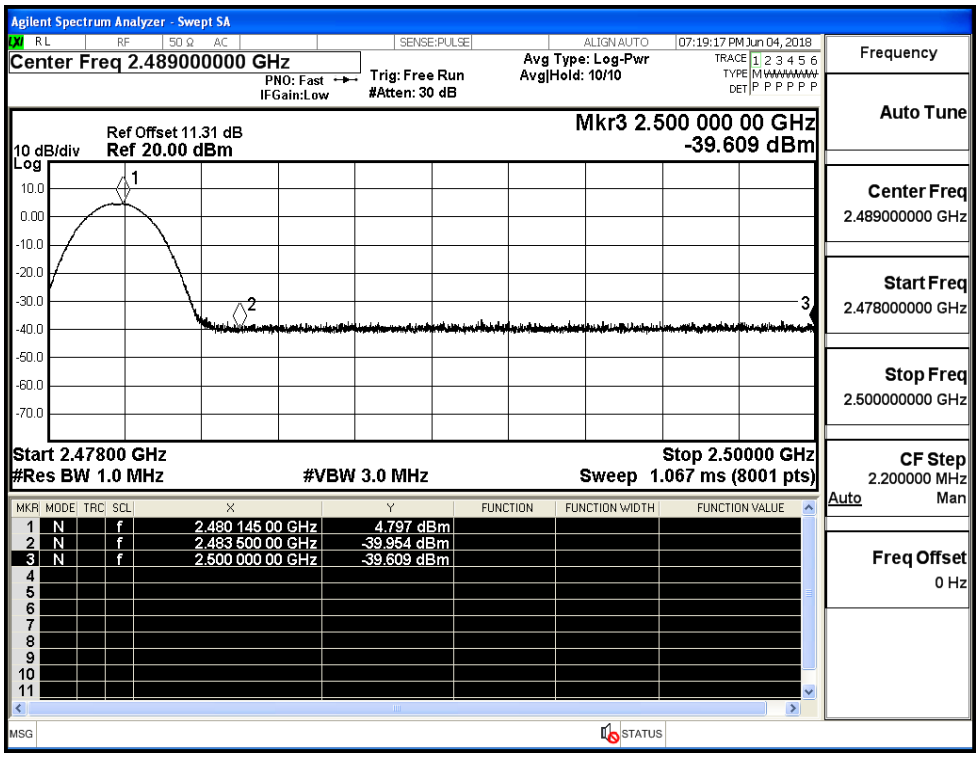
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



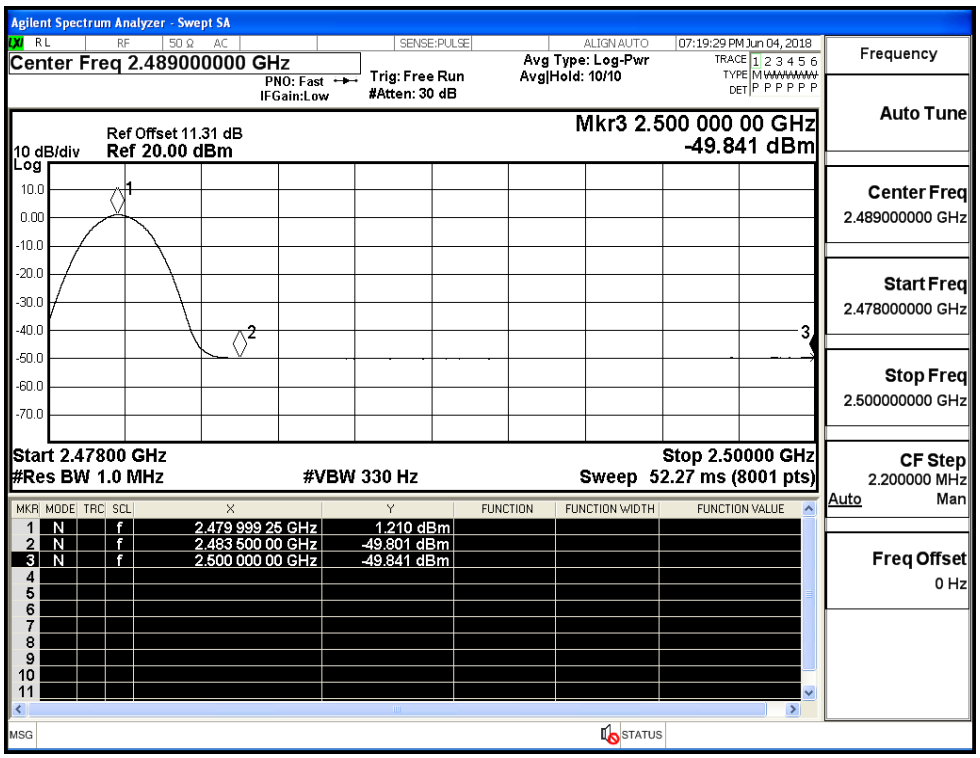
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



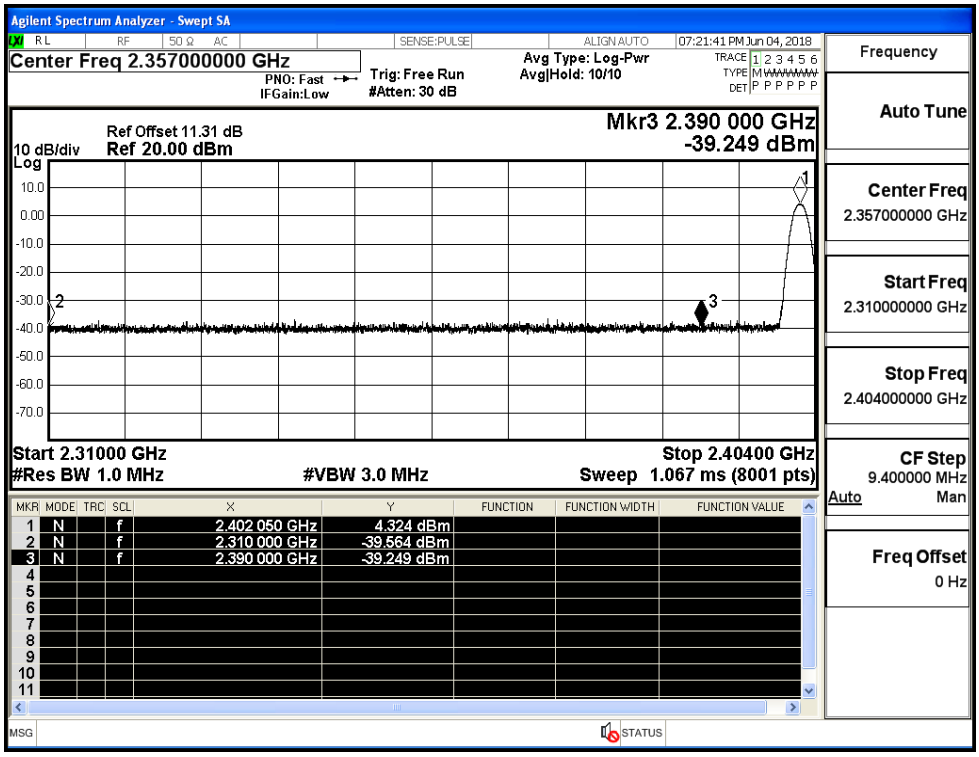
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



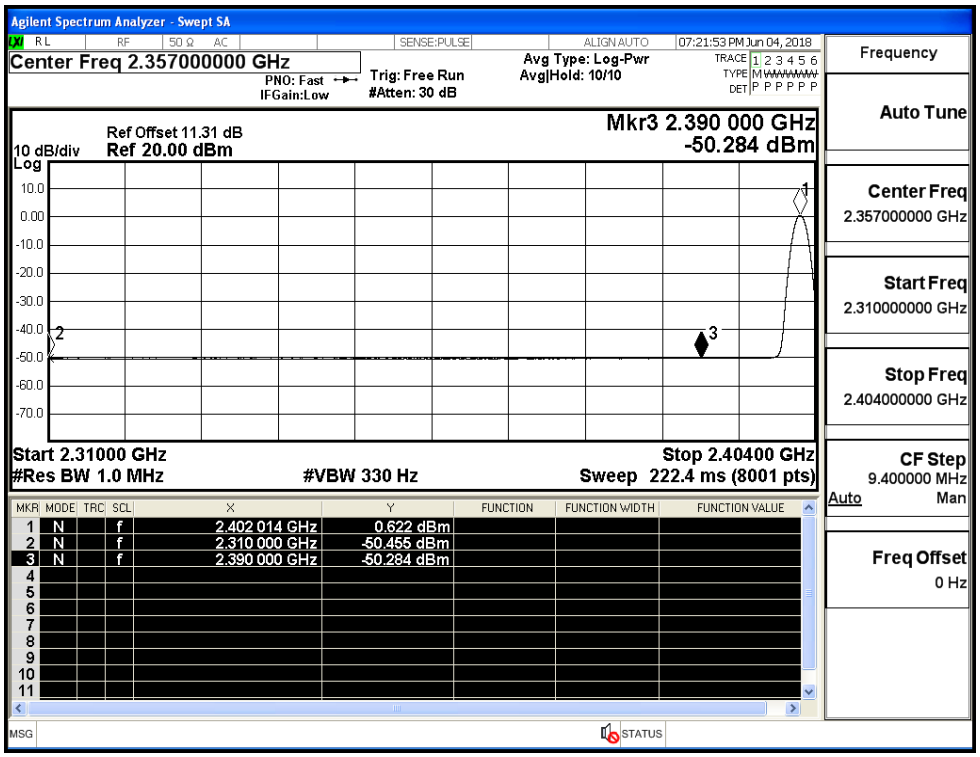
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



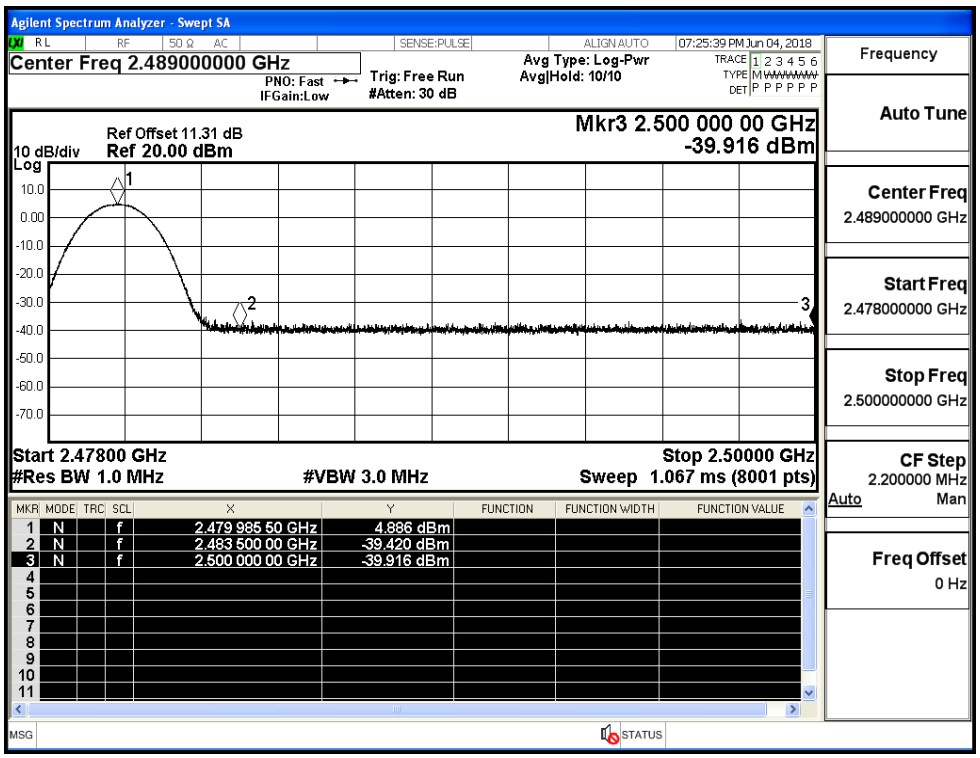
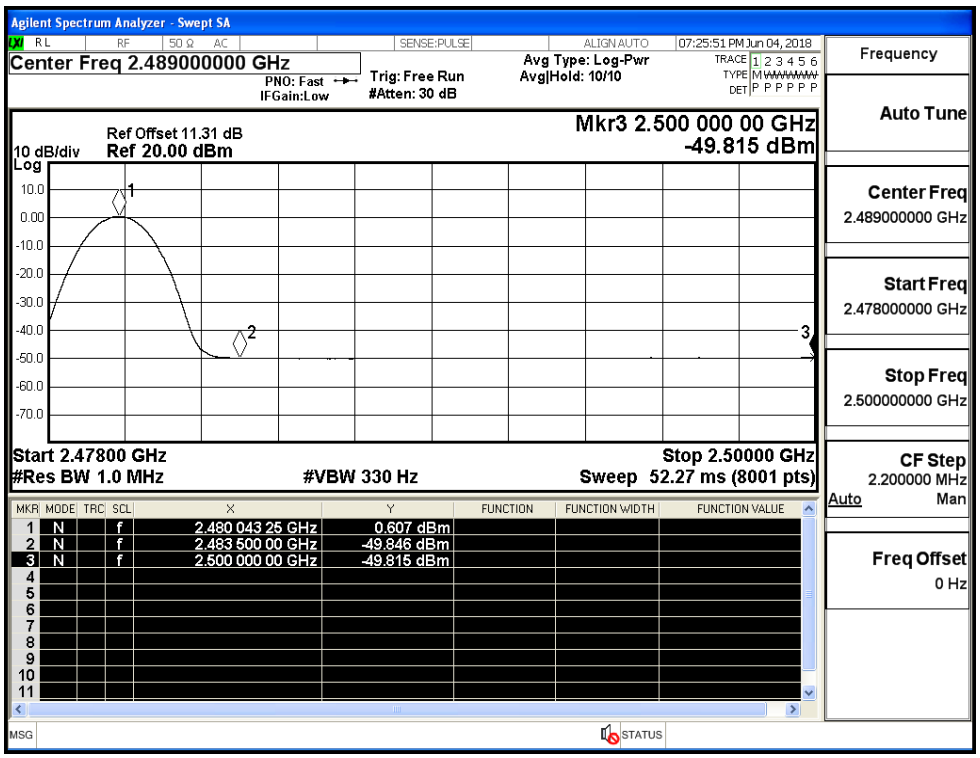
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)