

## Appendix A

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

Product Name: TWS earbuds

Trade Mark: N/A

Test Model: XO-9799

#### Environmental Conditions

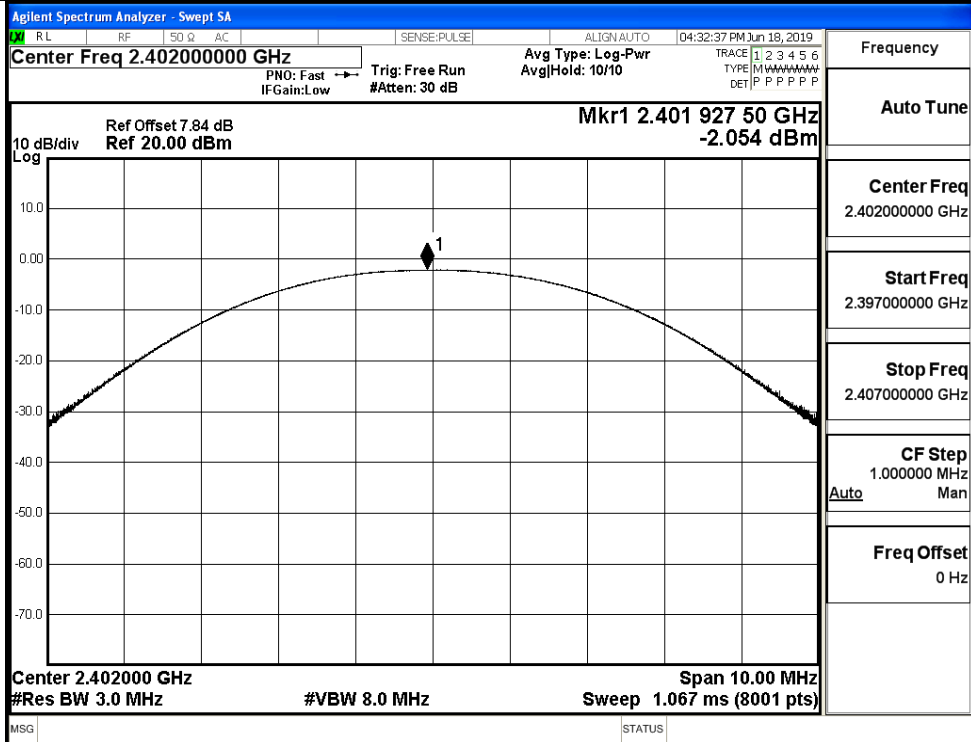
Temperature:	24.6 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	WANGCHUANG
Supervised by:	Tom.Liu

#### A.1 Maxmum Conducted Peak Output Power

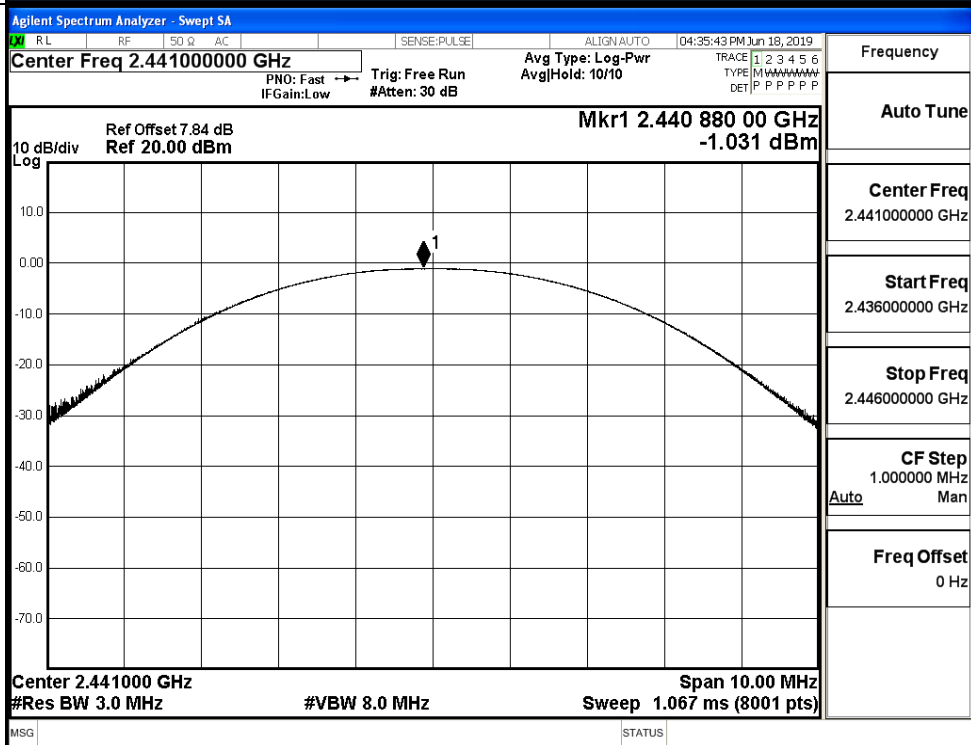
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.054	30	PASS
	MCH	-1.031	30	PASS
	HCH	-2.014	30	PASS
$\pi/4$ DQPSK	LCH	-2.670	21	PASS
	MCH	-1.799	21	PASS
	HCH	-2.724	21	PASS
8DPSK	LCH	-2.667	21	PASS
	MCH	-1.506	21	PASS
	HCH	-2.336	21	PASS

Test Graphs

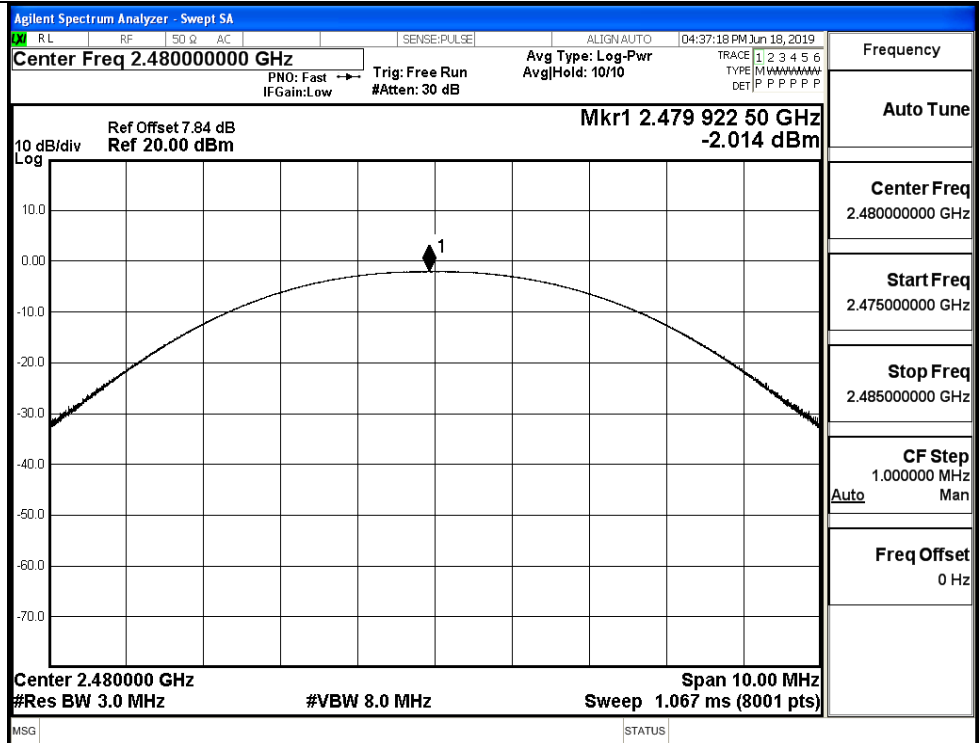
GFSK/LCH



GFSK/MCH

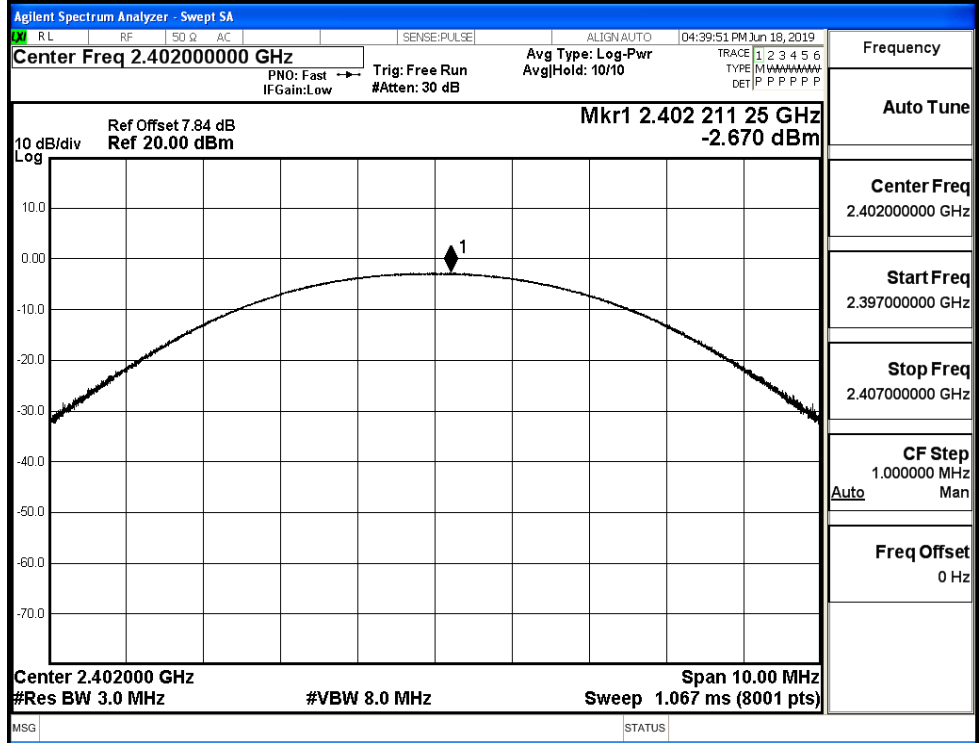


GFSK/HCH



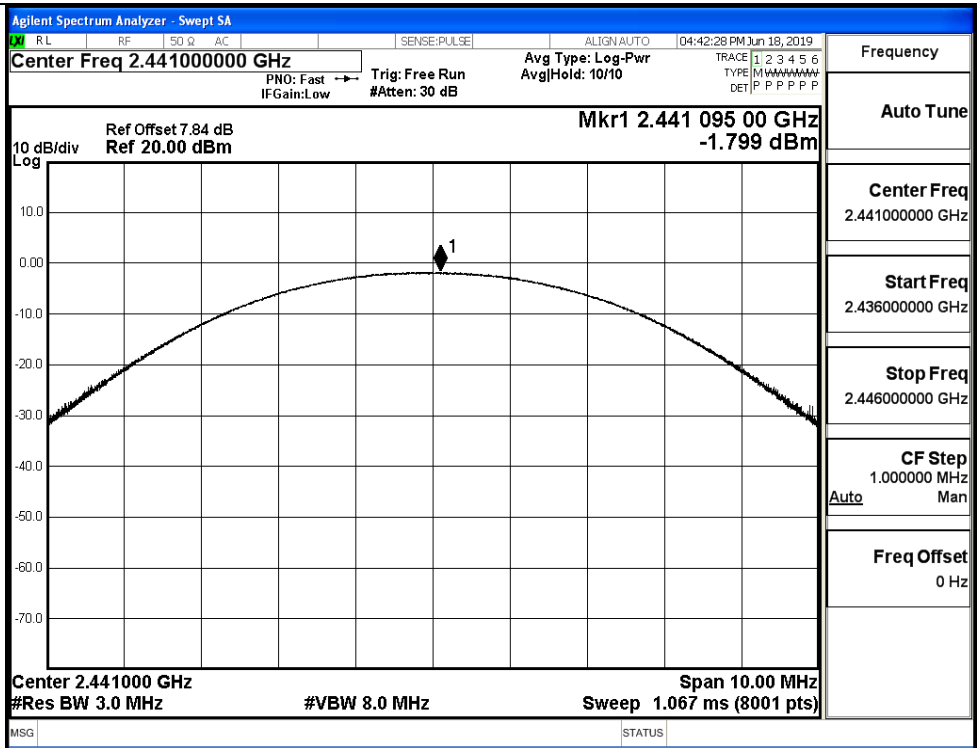
Frequency	2.48000000 GHz
Auto Tune	
Center Freq	2.48000000 GHz
Start Freq	2.47500000 GHz
Stop Freq	2.48500000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK/LCH

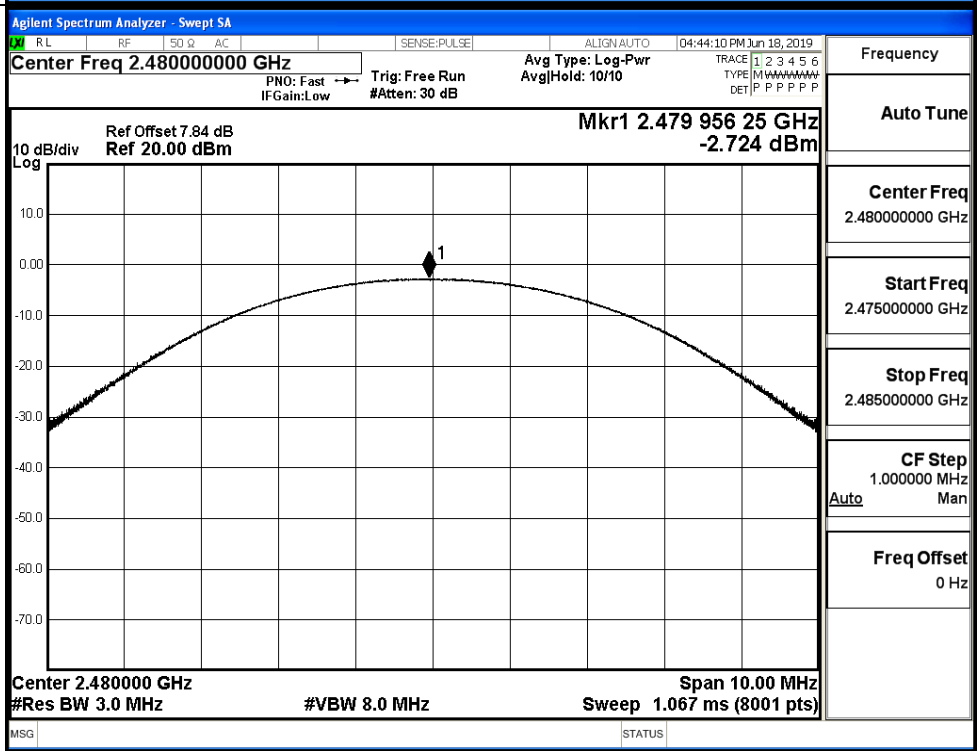


Frequency	2.40200000 GHz
Auto Tune	
Center Freq	2.40200000 GHz
Start Freq	2.39700000 GHz
Stop Freq	2.40700000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

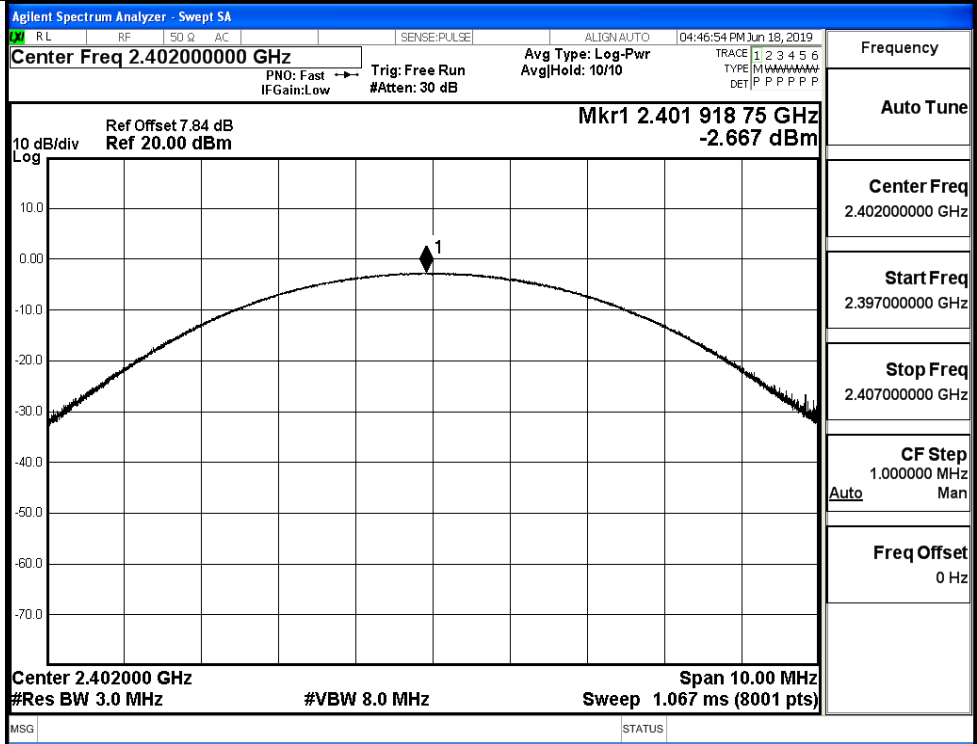
$\pi$ /4DQPSK/MCH



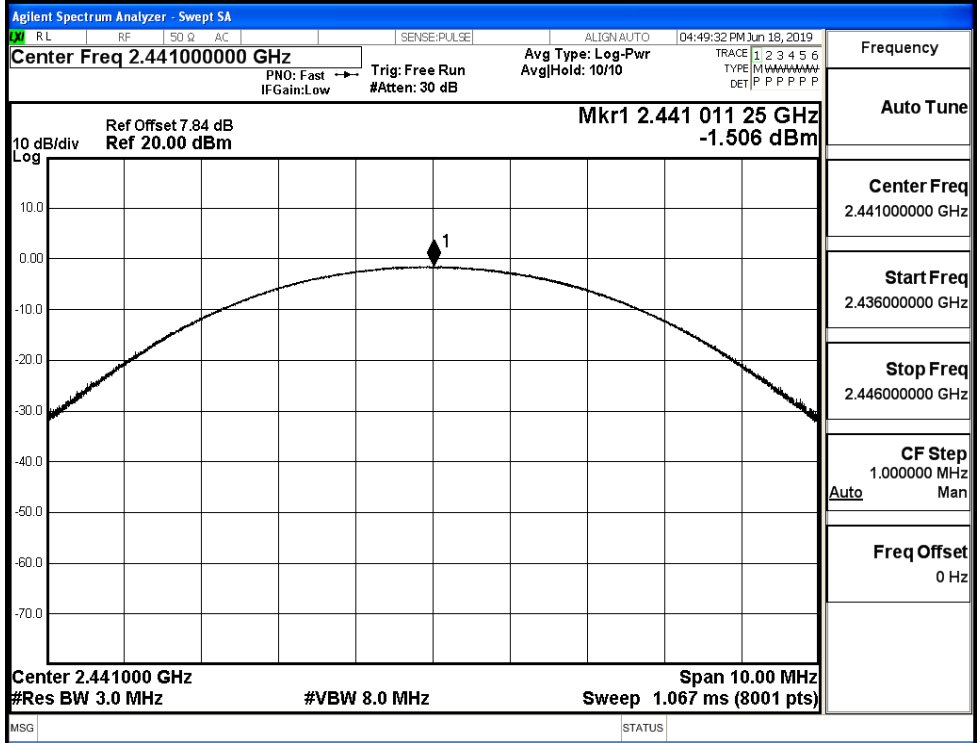
$\pi$ /4DQPSK/HCH



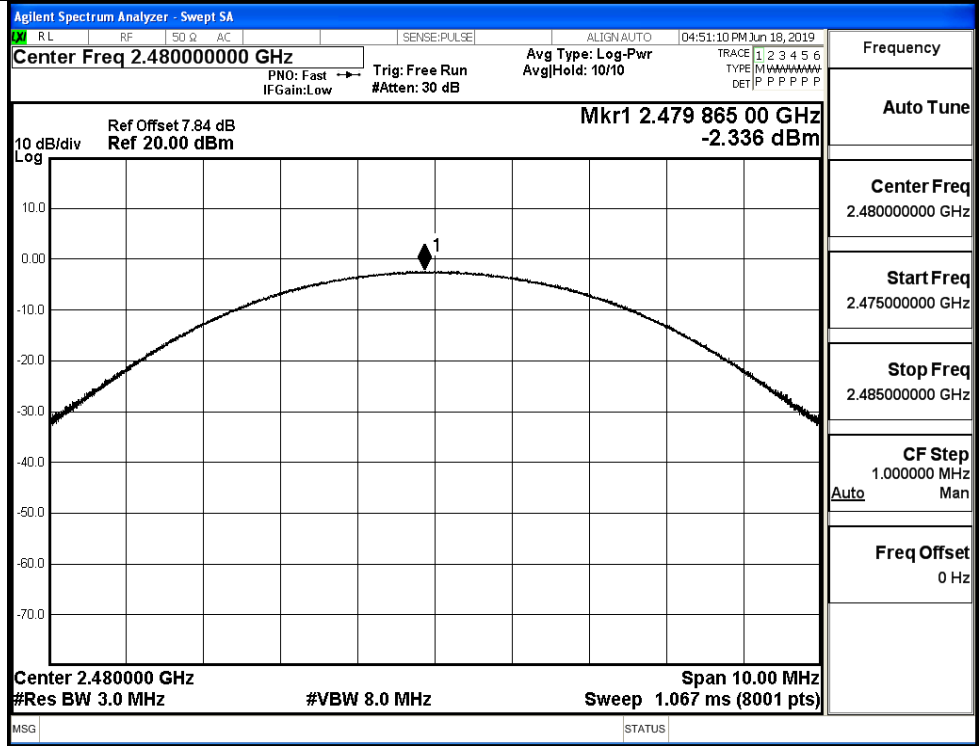
8DPSK/LCH



8DPSK/MCH

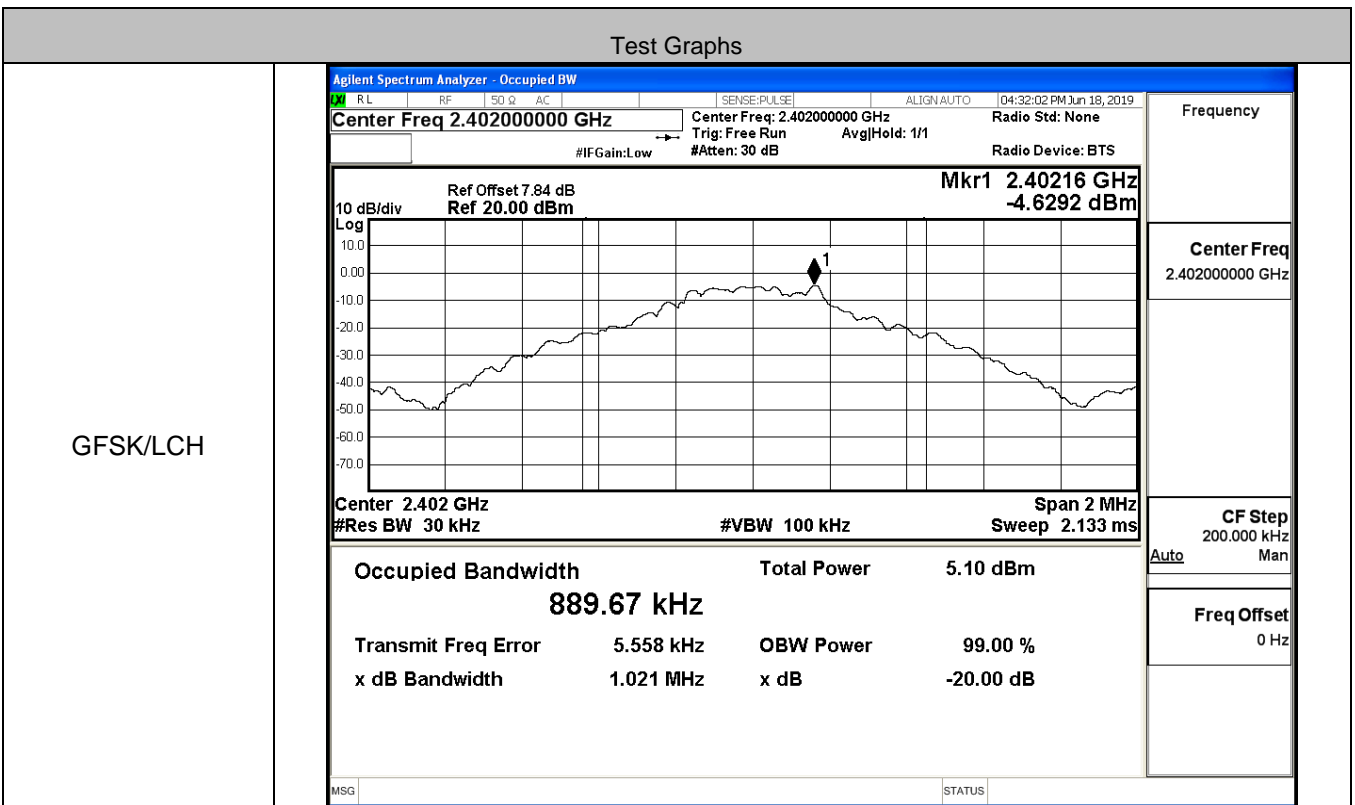


8DPSK/HCH

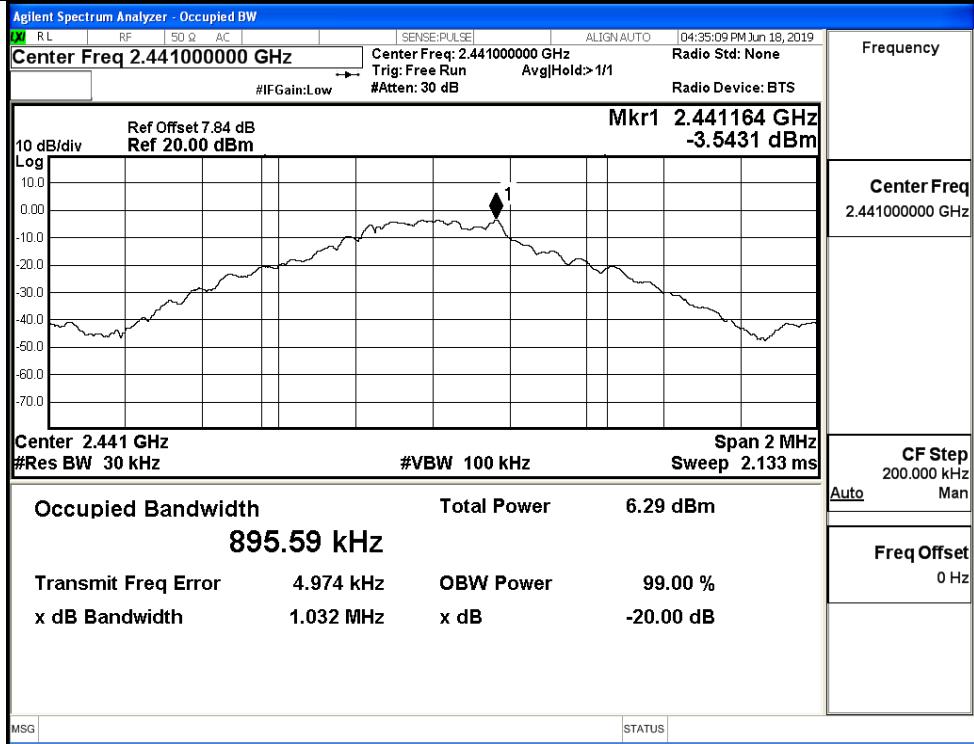


**A.2 20dB Bandwidth**

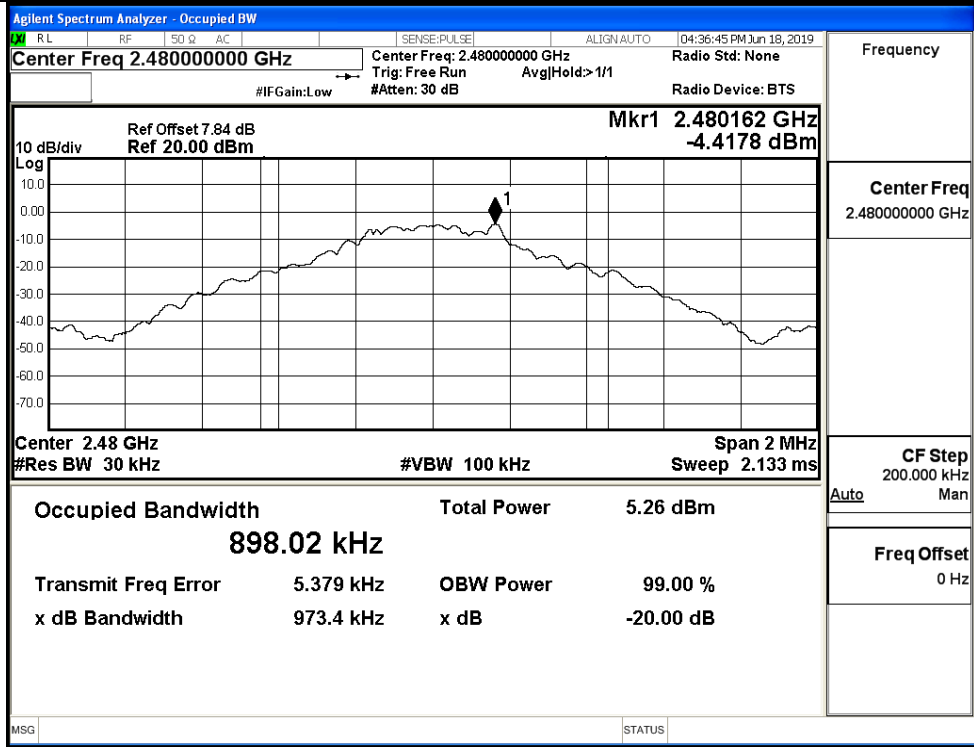
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.021	Not Specified	PASS
	MCH	1.032	Not Specified	PASS
	HCH	0.9734	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.294	Not Specified	PASS
	MCH	1.292	Not Specified	PASS
	HCH	1.305	Not Specified	PASS
8DPSK	LCH	1.297	Not Specified	PASS
	MCH	1.305	Not Specified	PASS
	HCH	1.298	Not Specified	PASS



GFSK/MCH

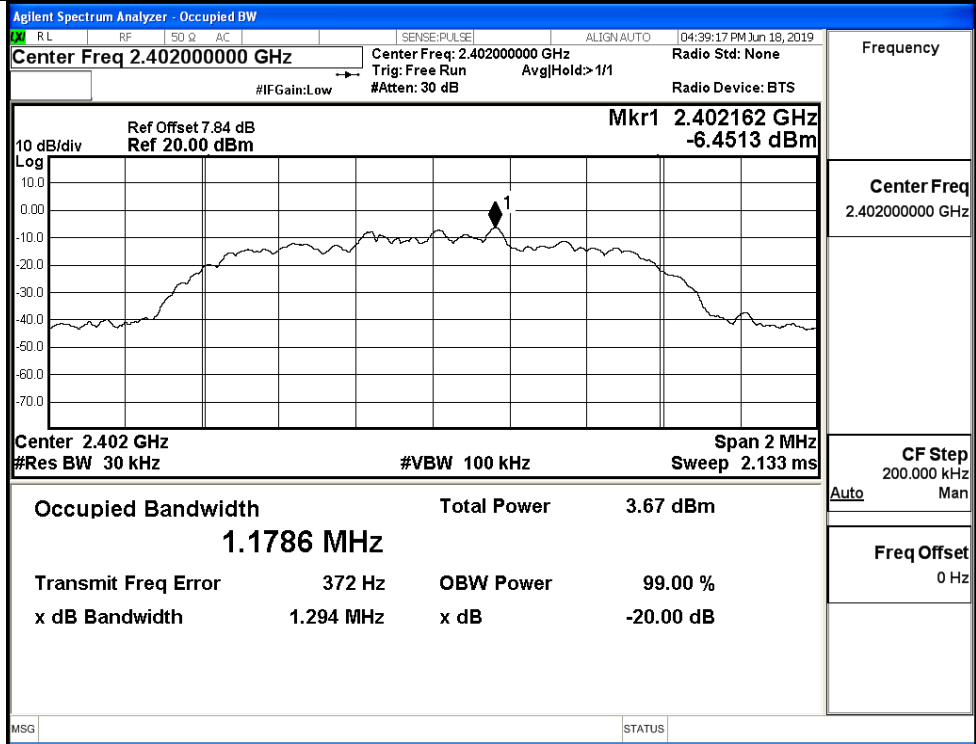


GFSK/HCH

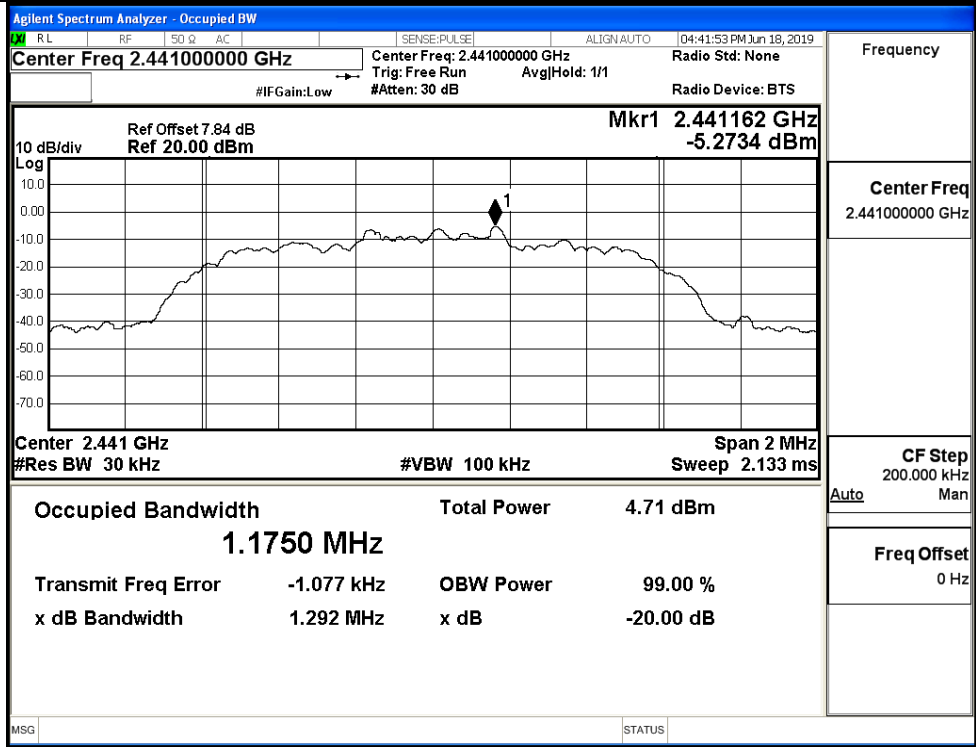




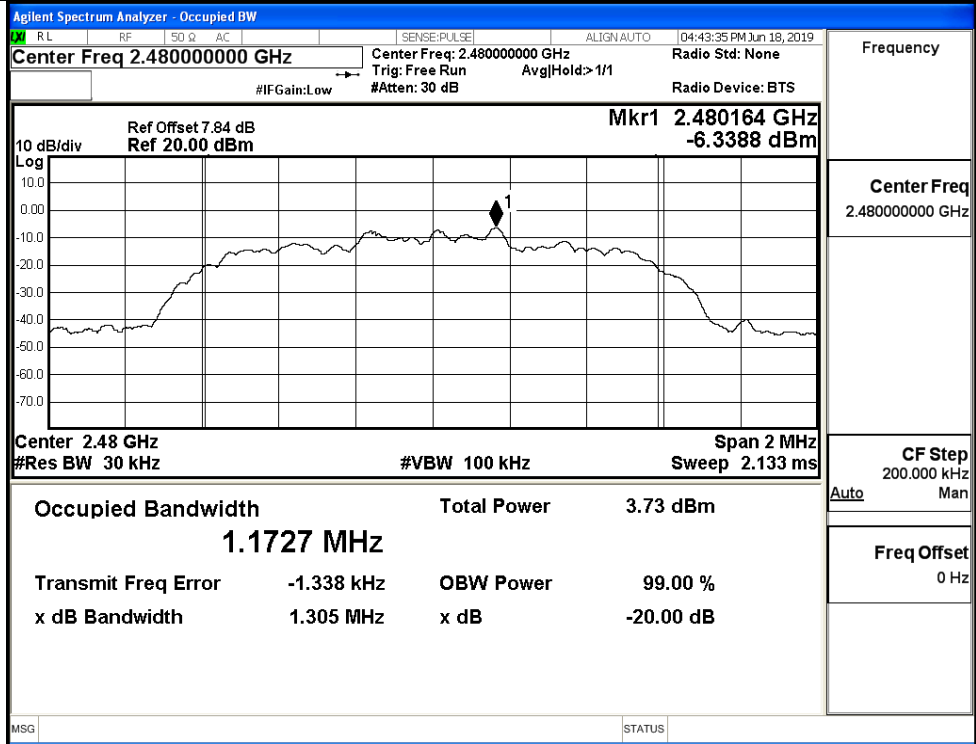
$\pi/4$ DQPSK/LCH



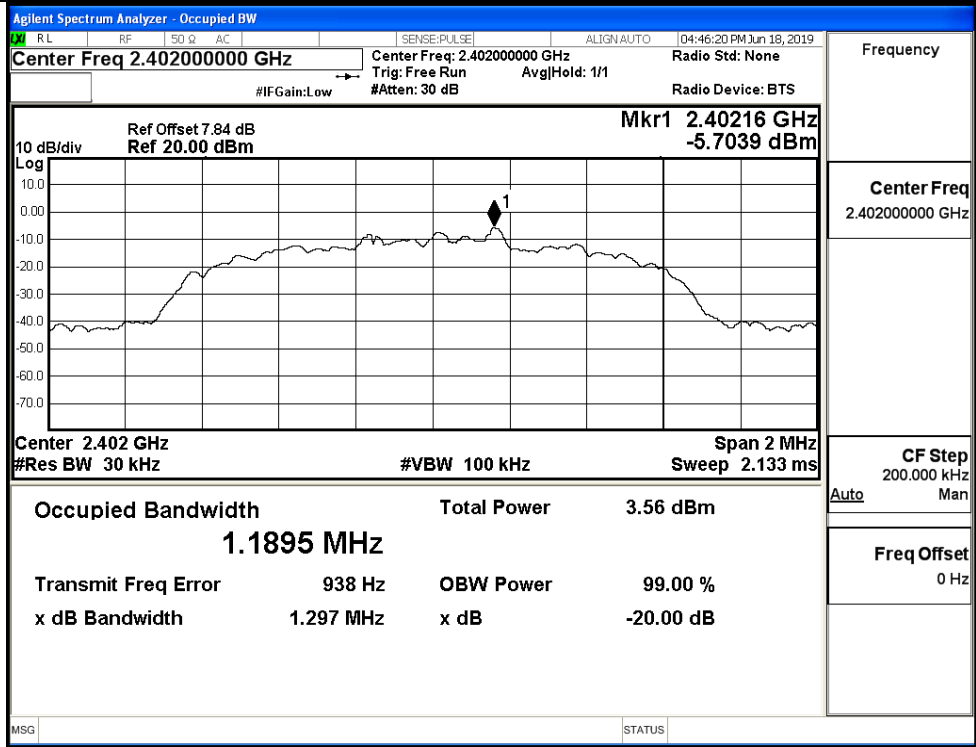
$\pi/4$ DQPSK/MCH



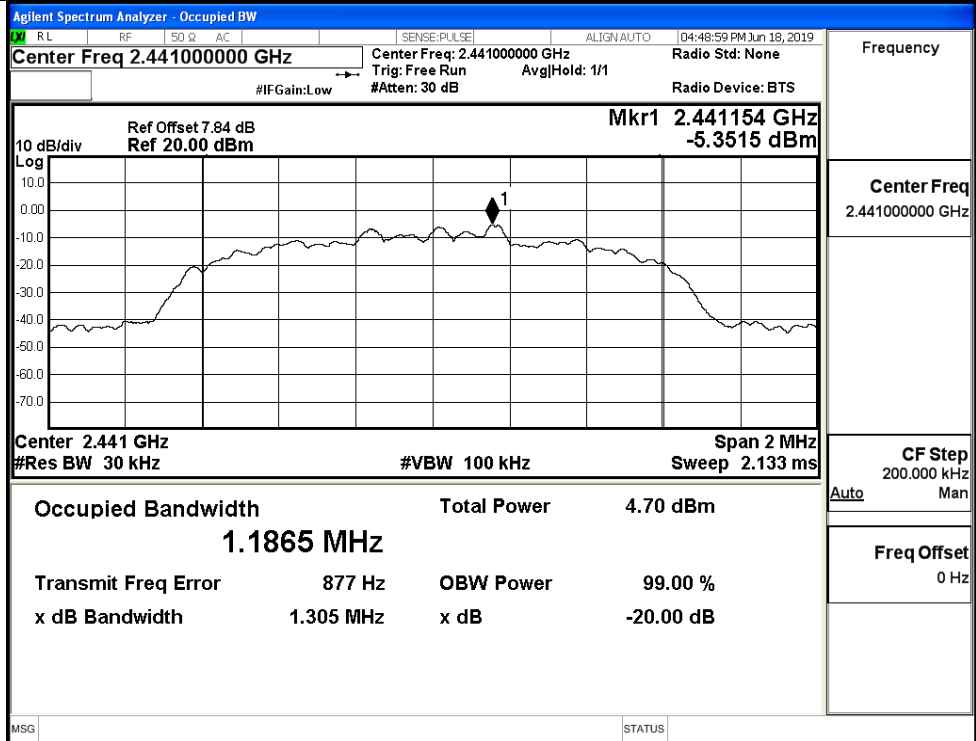
$\pi/4$ DQPSK/HCH



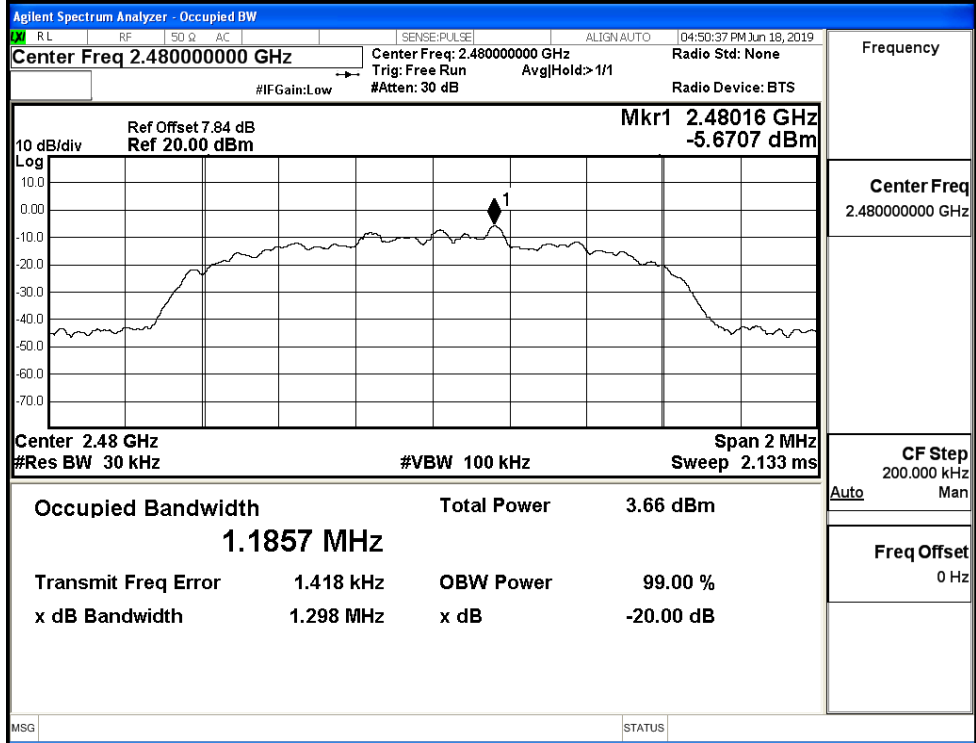
8DPSK/LCH



8DPSK/MCH

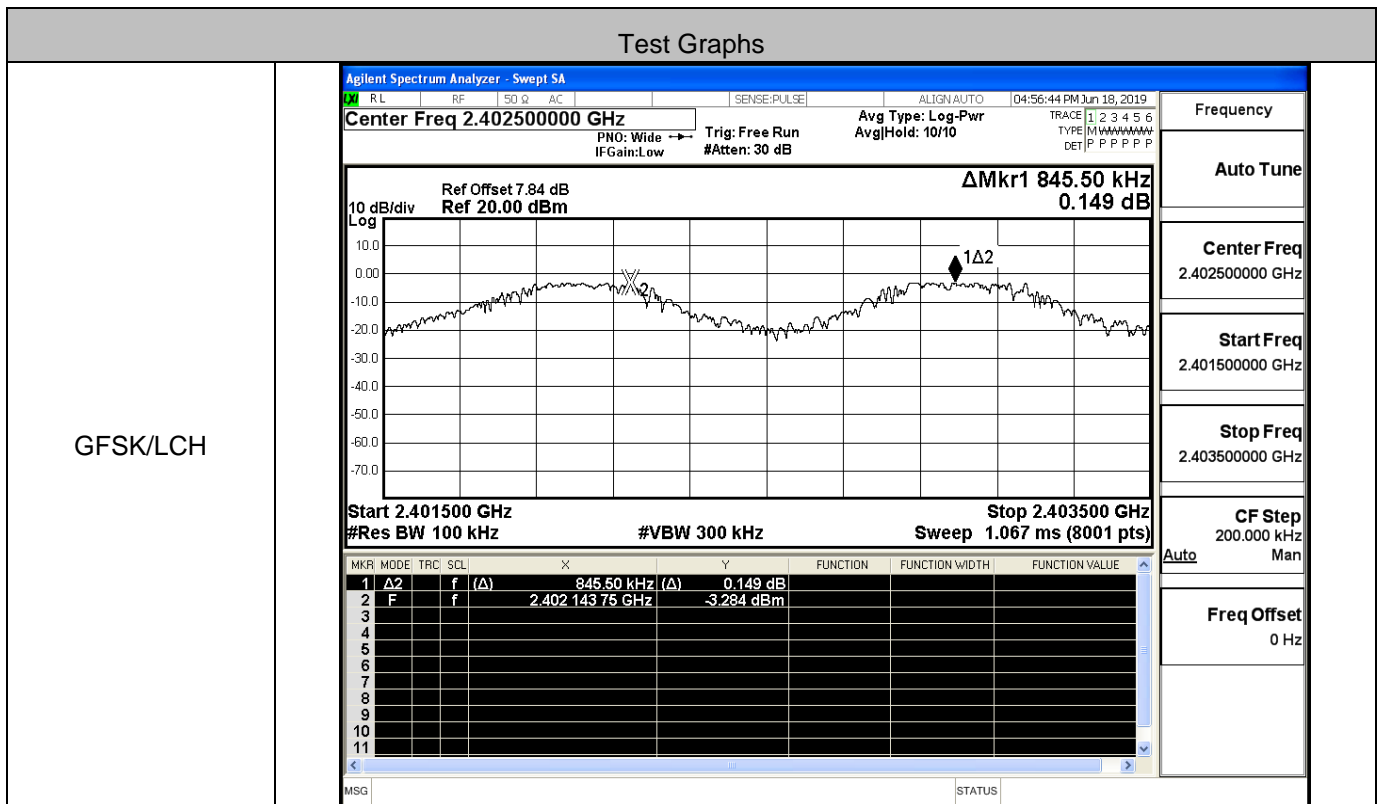


8DPSK/HCH

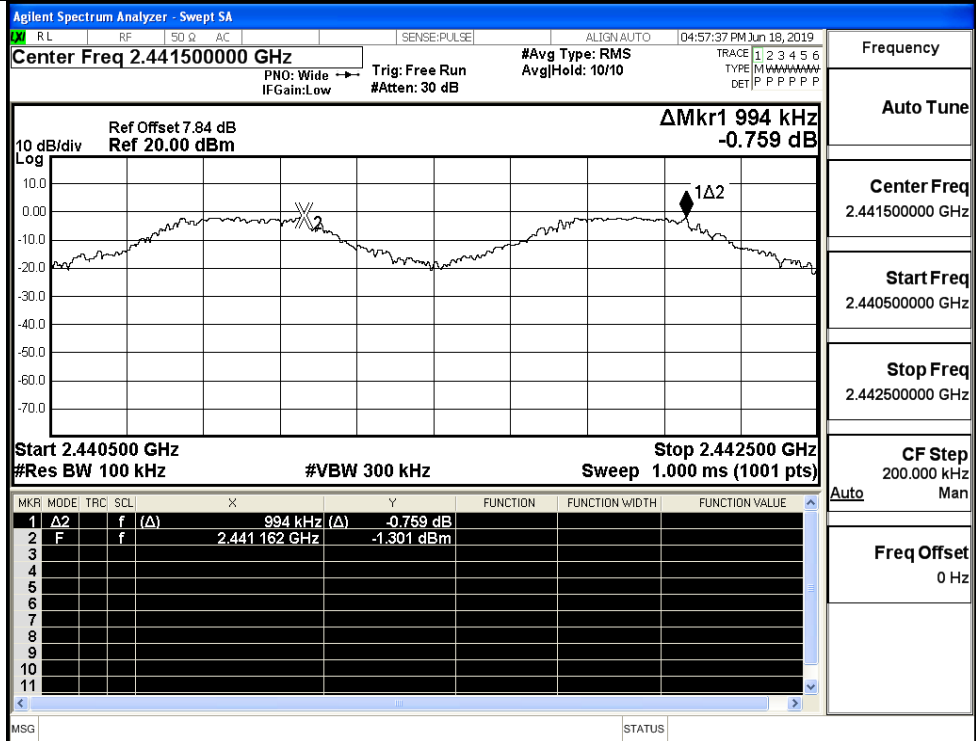


### A.3 Carrier Frequency Separation

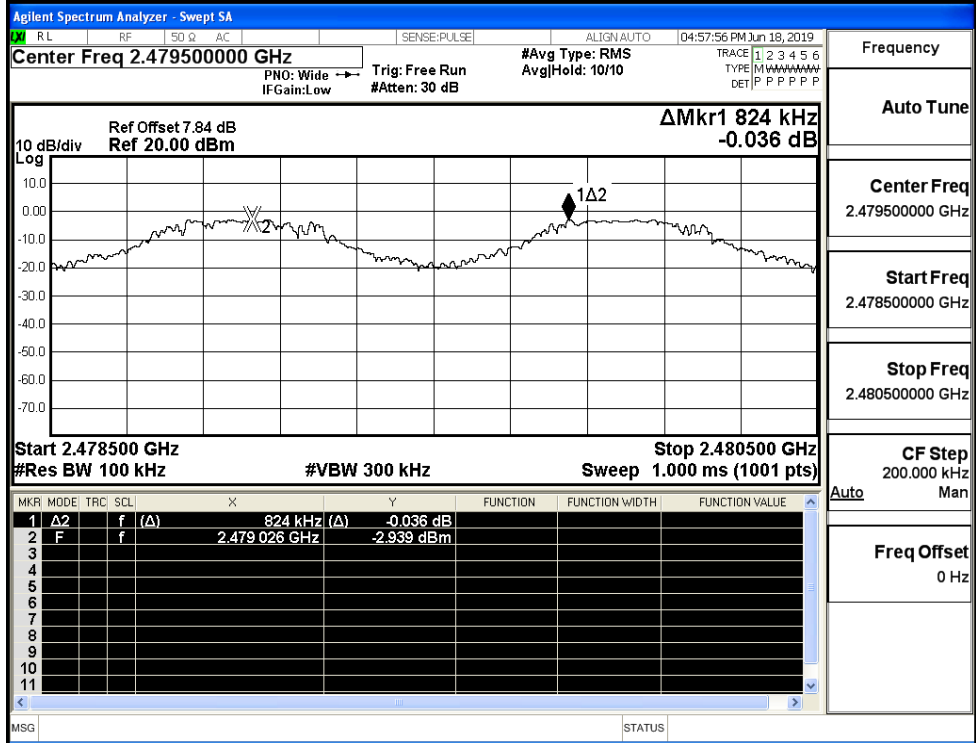
Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.845	0.688	PASS
	MCH	0.994	0.688	PASS
	HCH	0.824	0.688	PASS
π/4DQPSK	LCH	1.152	0.870	PASS
	MCH	1.016	0.870	PASS
	HCH	1.192	0.870	PASS
8DPSK	LCH	0.950	0.870	PASS
	MCH	1.292	0.870	PASS
	HCH	1.196	0.870	PASS



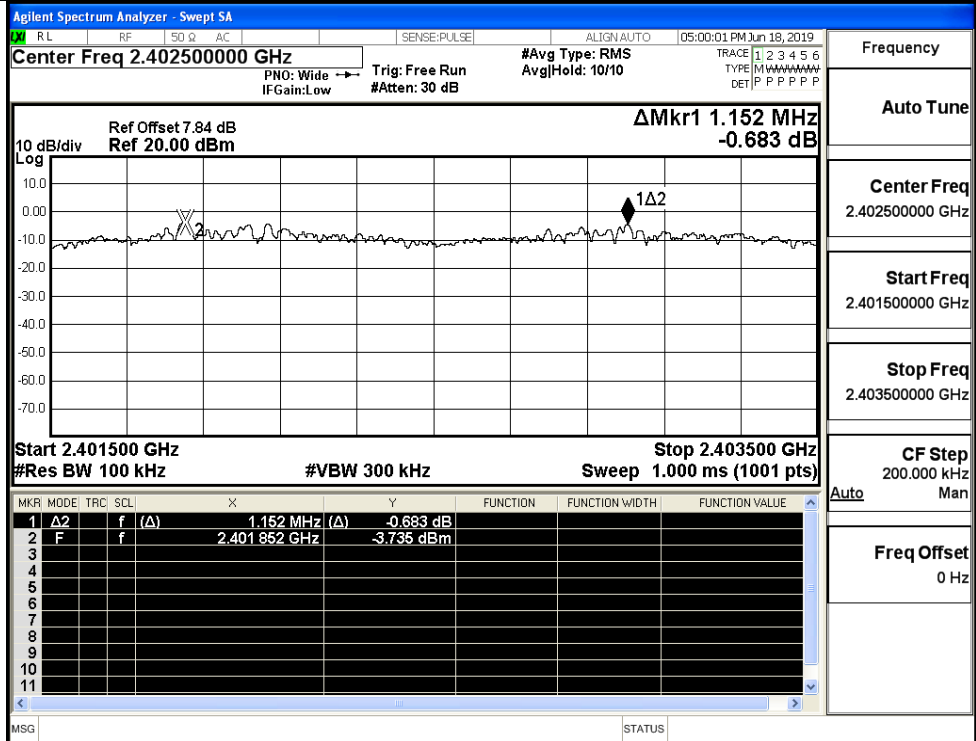
GFSK/MCH



GFSK/HCH

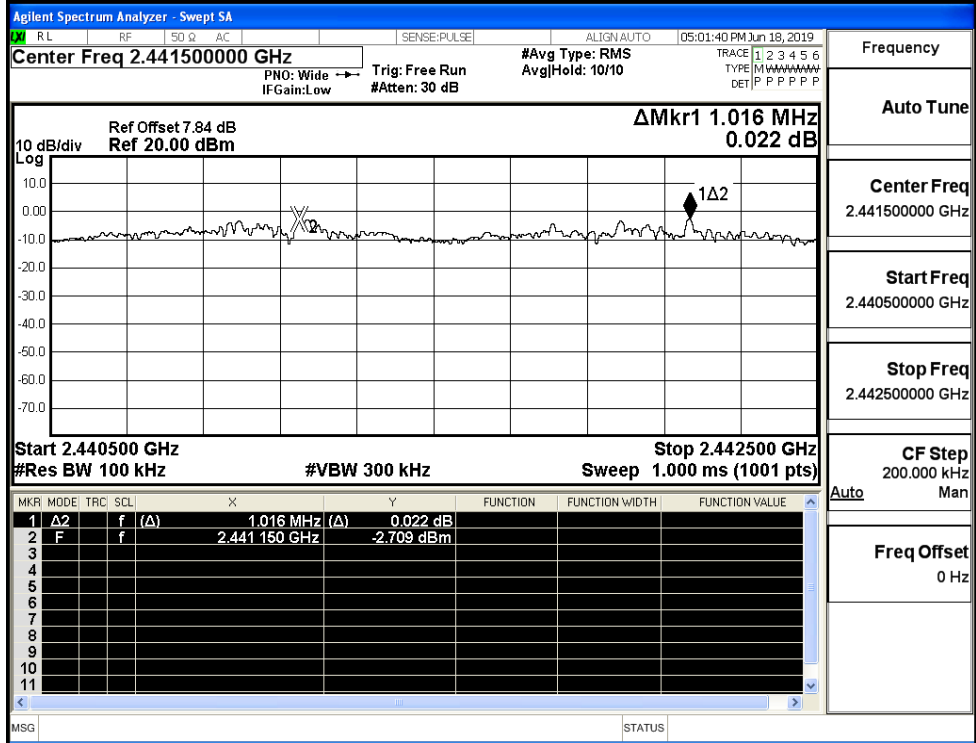


$\pi/4$ DQPSK/LCH



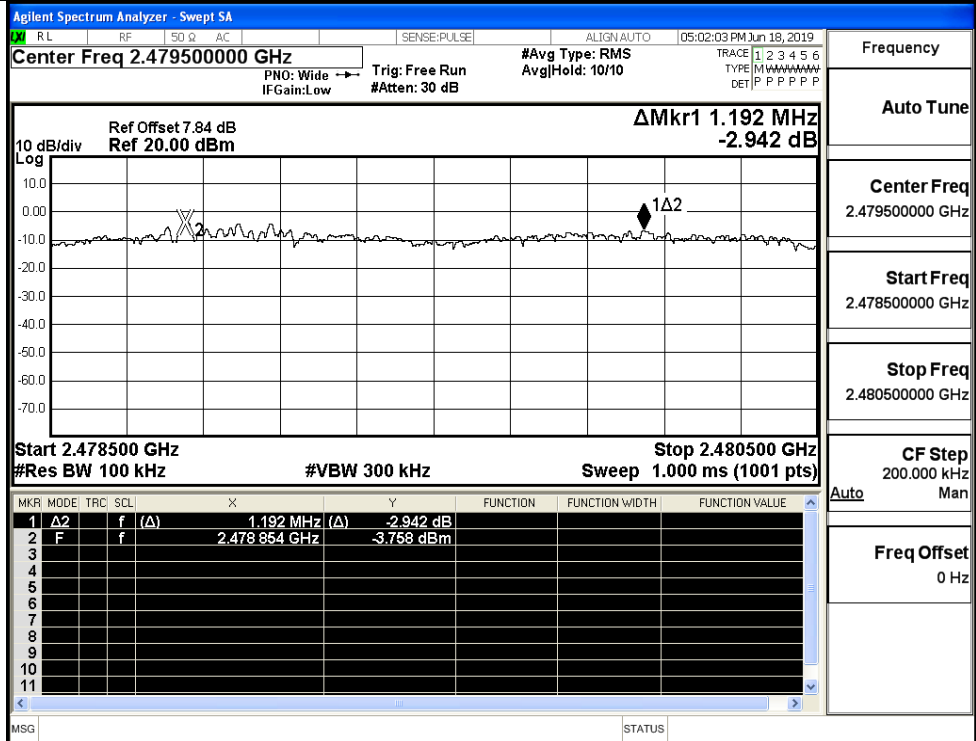
Frequency  
Auto Tune  
Center Freq  
2.402500000 GHz  
Start Freq  
2.401500000 GHz  
Stop Freq  
2.403500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

$\pi/4$ DQPSK/MCH



Frequency  
Auto Tune  
Center Freq  
2.441500000 GHz  
Start Freq  
2.440500000 GHz  
Stop Freq  
2.442500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

π/4DQPSK/HCH



Frequency

Auto Tune

Center Freq  
2.479500000 GHz

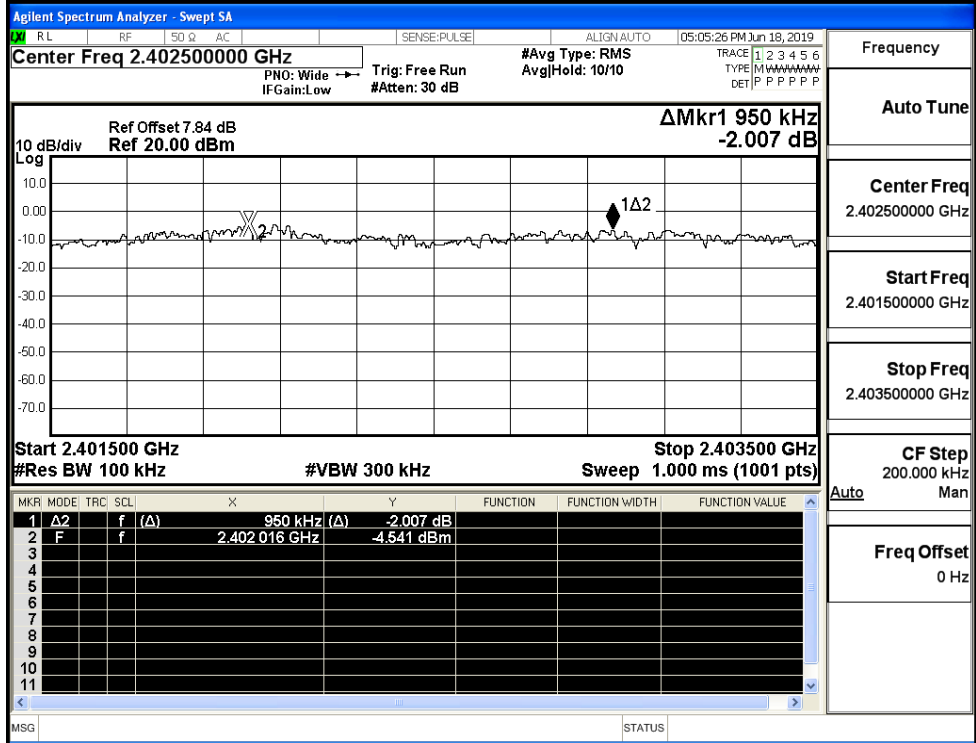
Start Freq  
2.478500000 GHz

Stop Freq  
2.480500000 GHz

CF Step  
200.000 kHz  
Auto Man

Freq Offset  
0 Hz

8DPSK/LCH



Frequency

Auto Tune

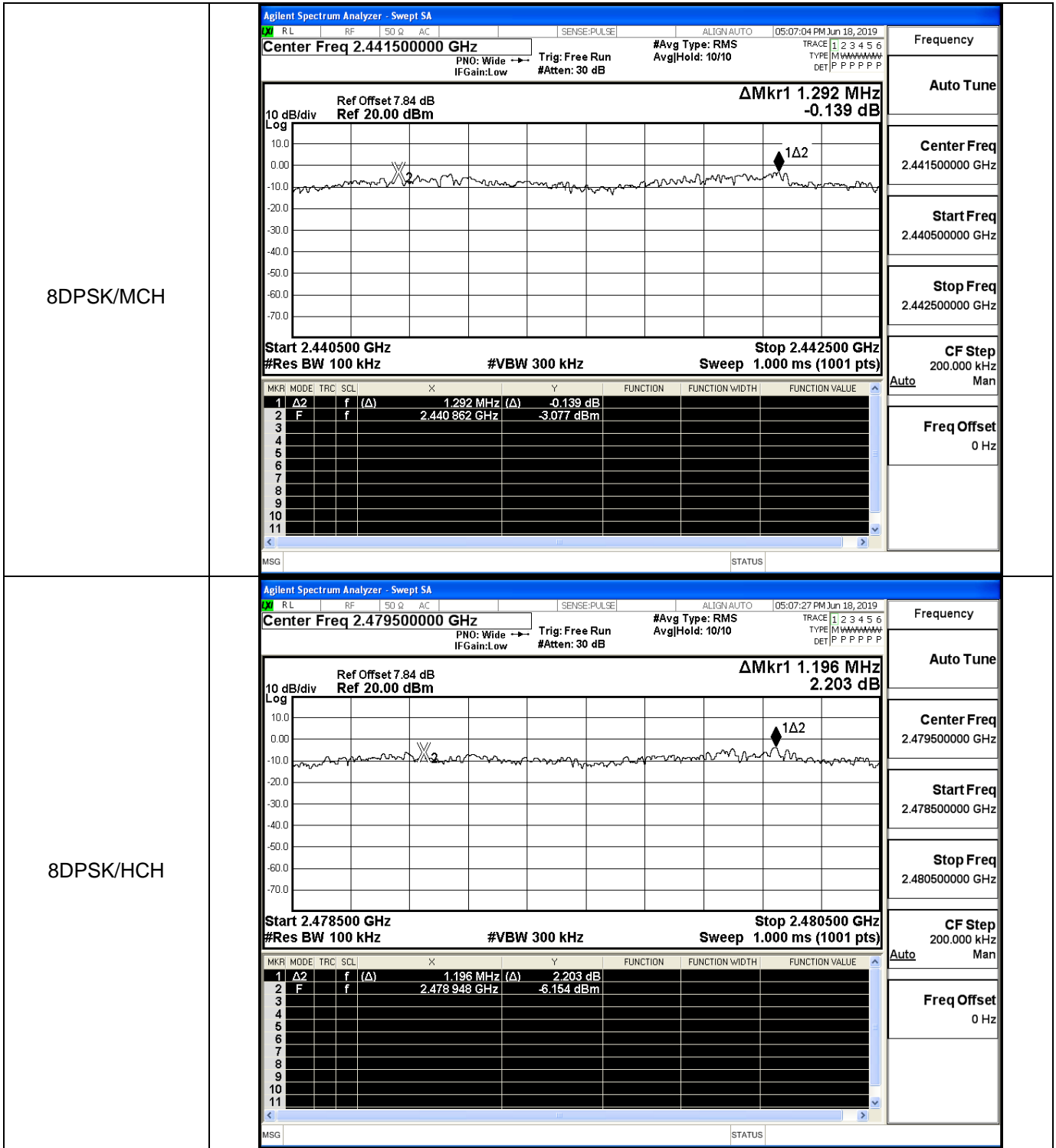
Center Freq  
2.402500000 GHz

Start Freq  
2.401500000 GHz

Stop Freq  
2.403500000 GHz

CF Step  
200.000 kHz  
Auto Man

Freq Offset  
0 Hz



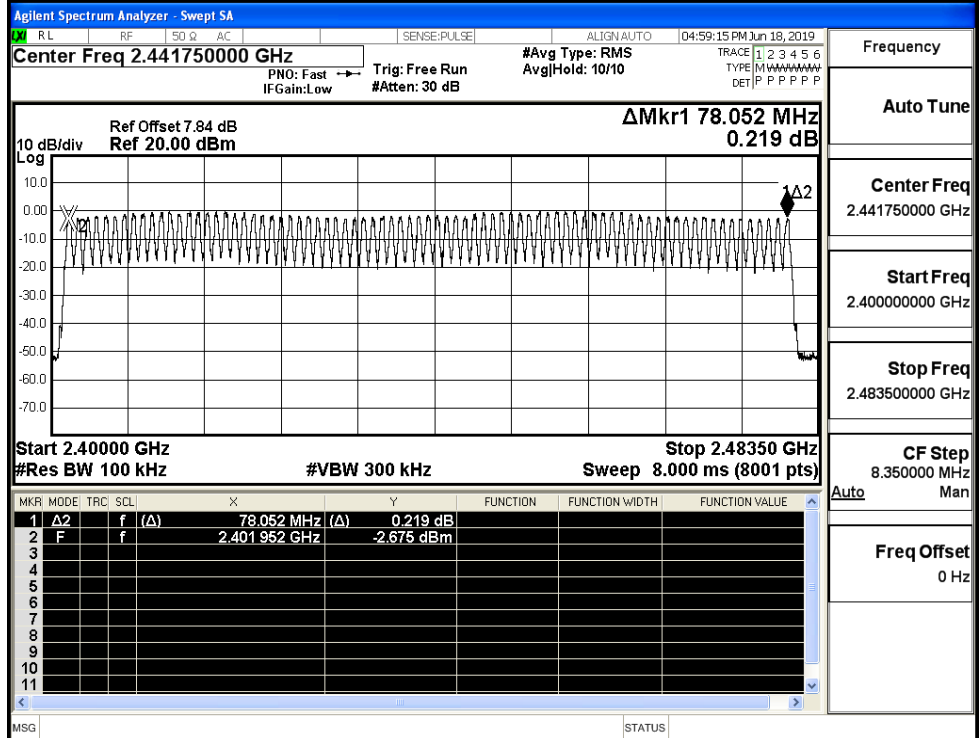
**A.4 Hopping Channel Number**

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



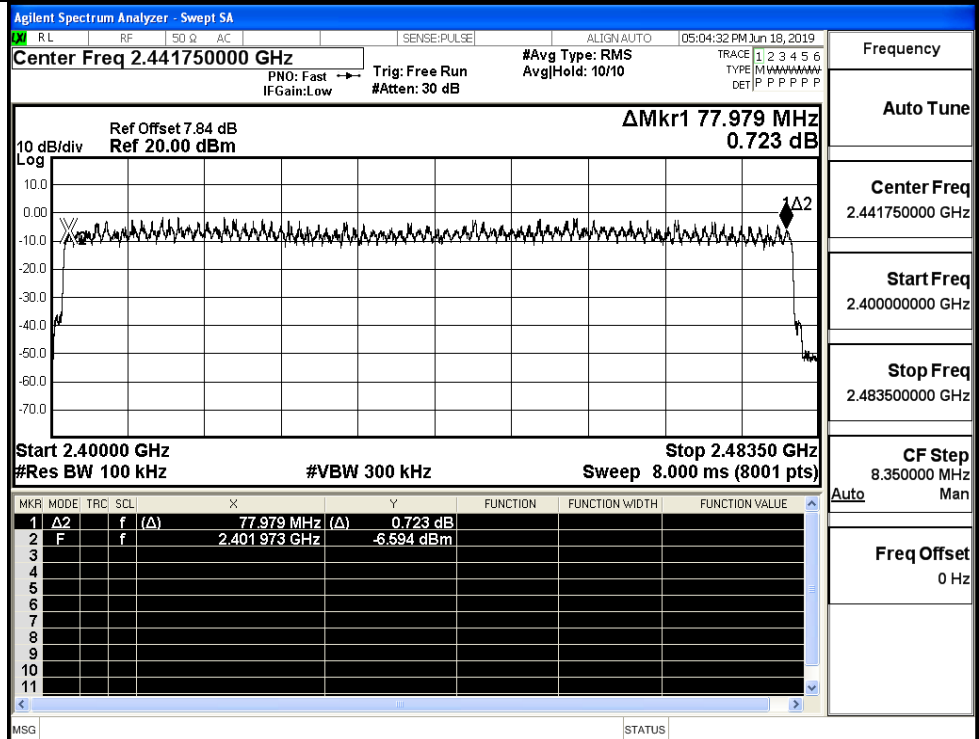
Test Graphs

GFSK/Hop



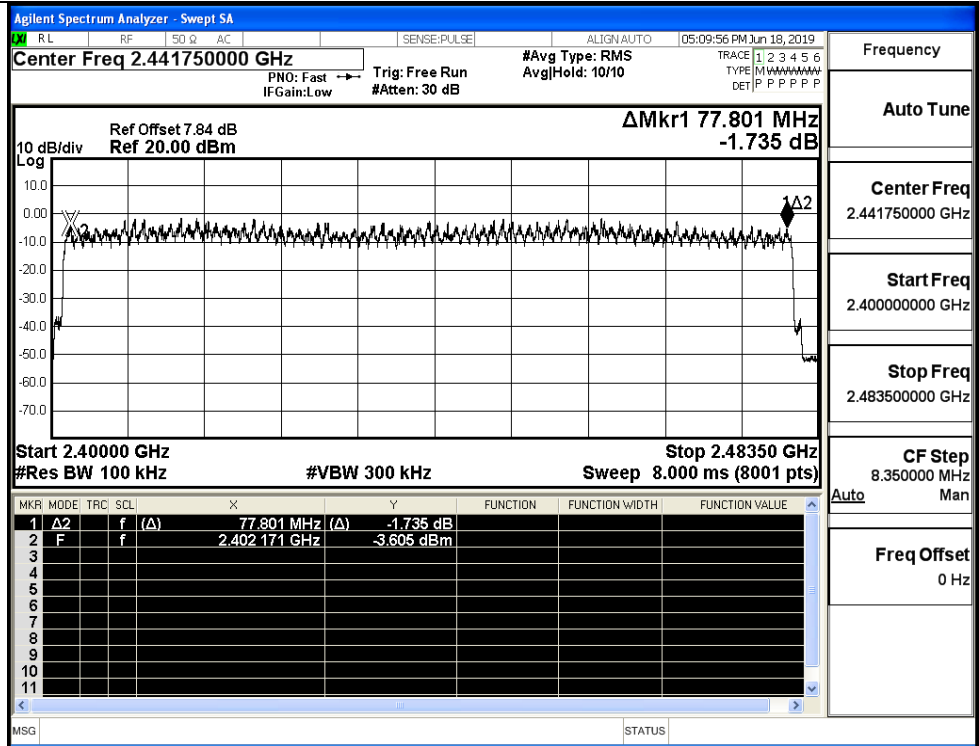
Frequency
Auto Tune
Center Freq 2.441750000 GHz
Start Freq 2.400000000 GHz
Stop Freq 2.483500000 GHz
CF Step 8.350000 MHz
Auto Man
Freq Offset 0 Hz

$\pi/4$ DQPSK/Hop



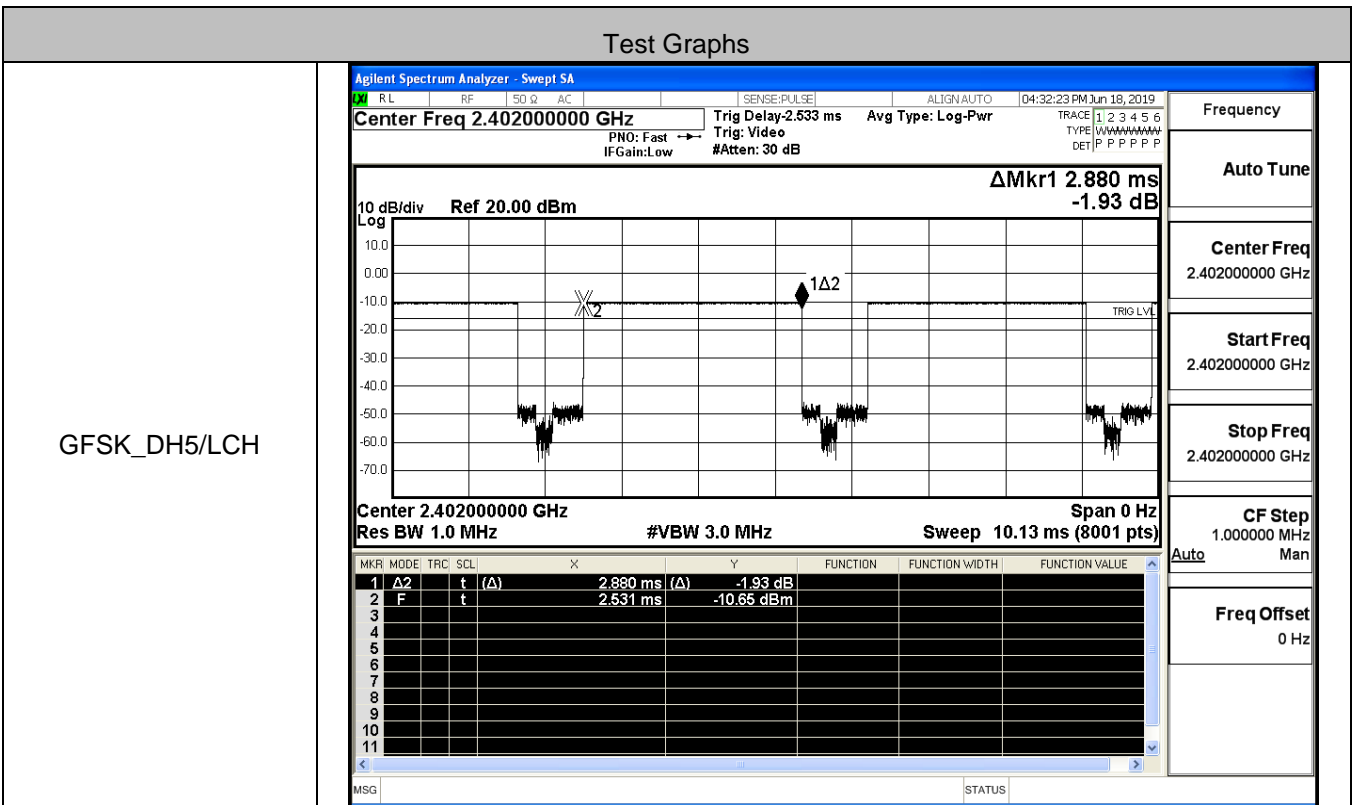
Frequency
Auto Tune
Center Freq 2.441750000 GHz
Start Freq 2.400000000 GHz
Stop Freq 2.483500000 GHz
CF Step 8.350000 MHz
Auto Man
Freq Offset 0 Hz

8DPSK/Hop

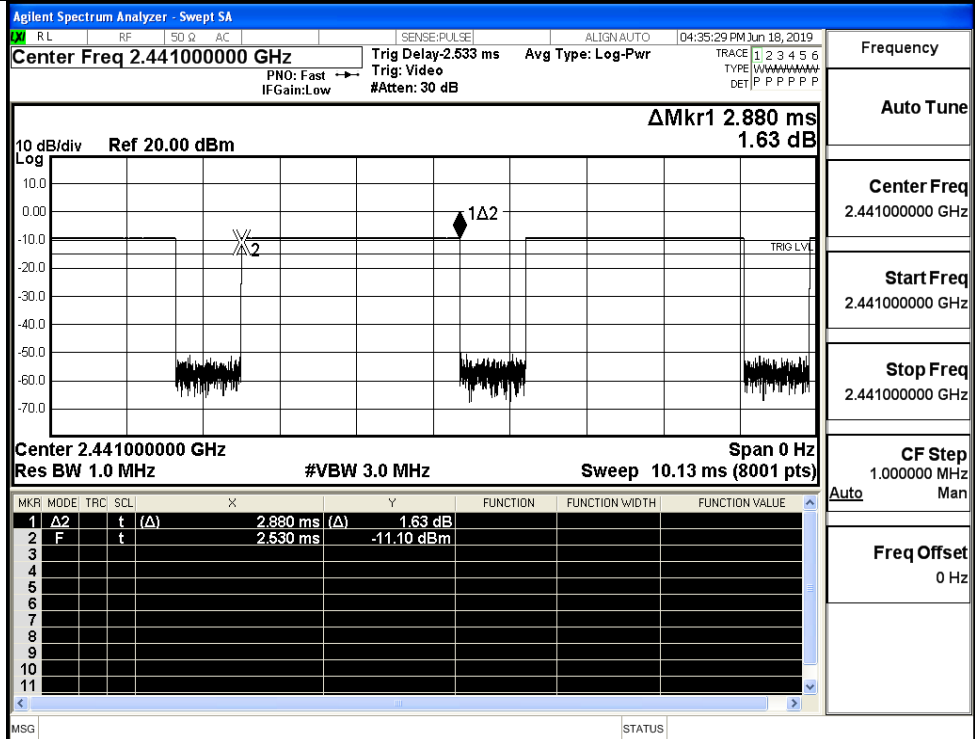


**A.5 Dwell Time**

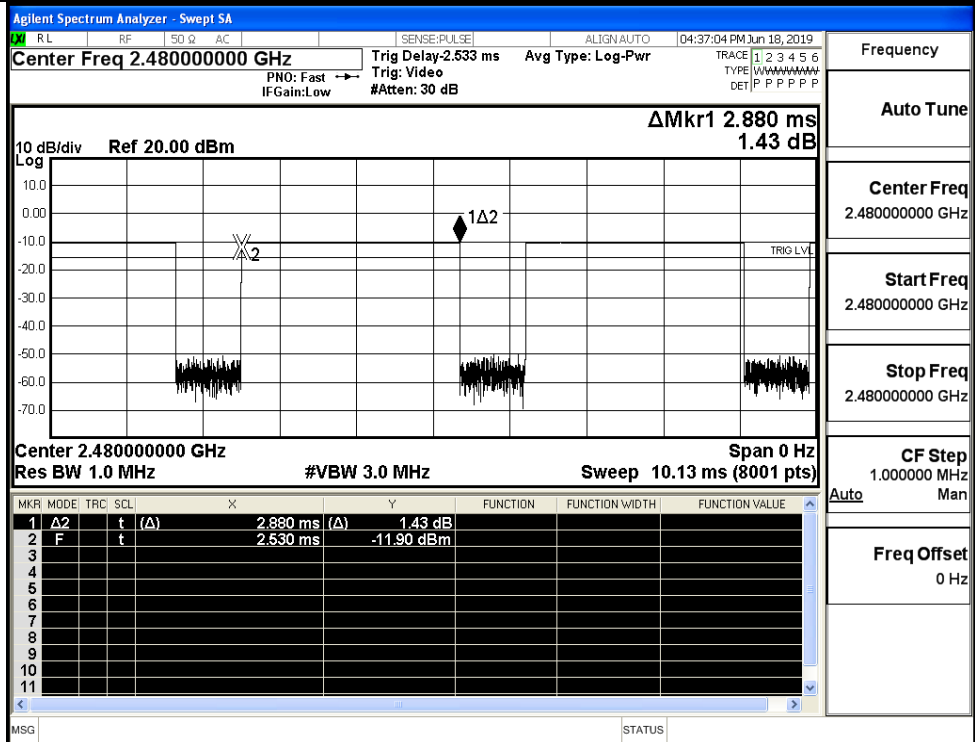
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7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



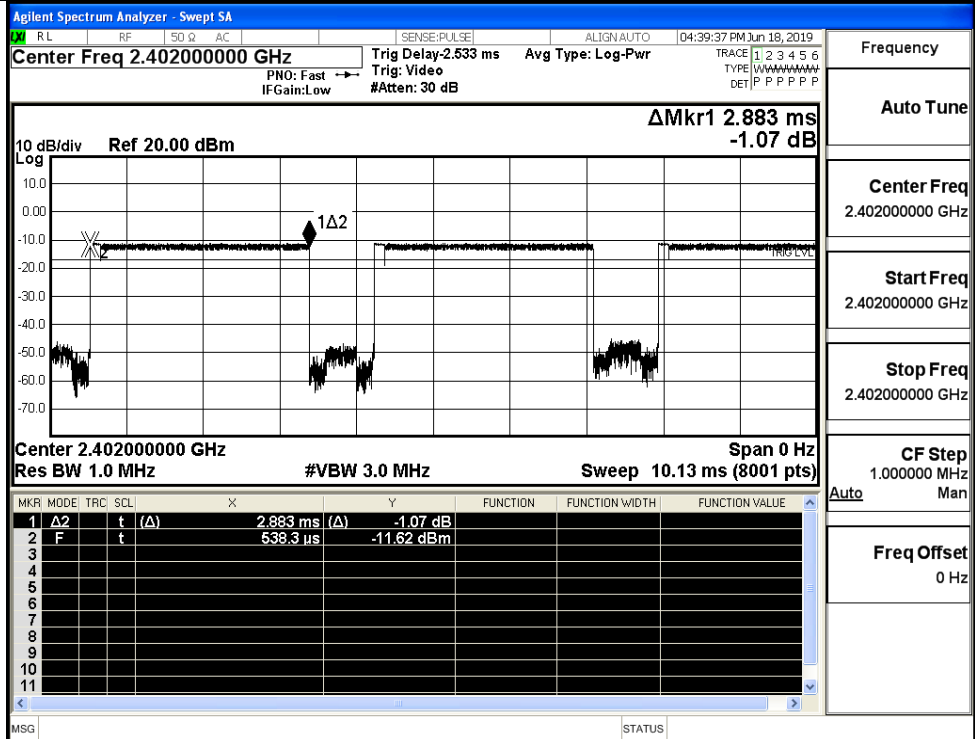
GFSK\_DH5/MCH



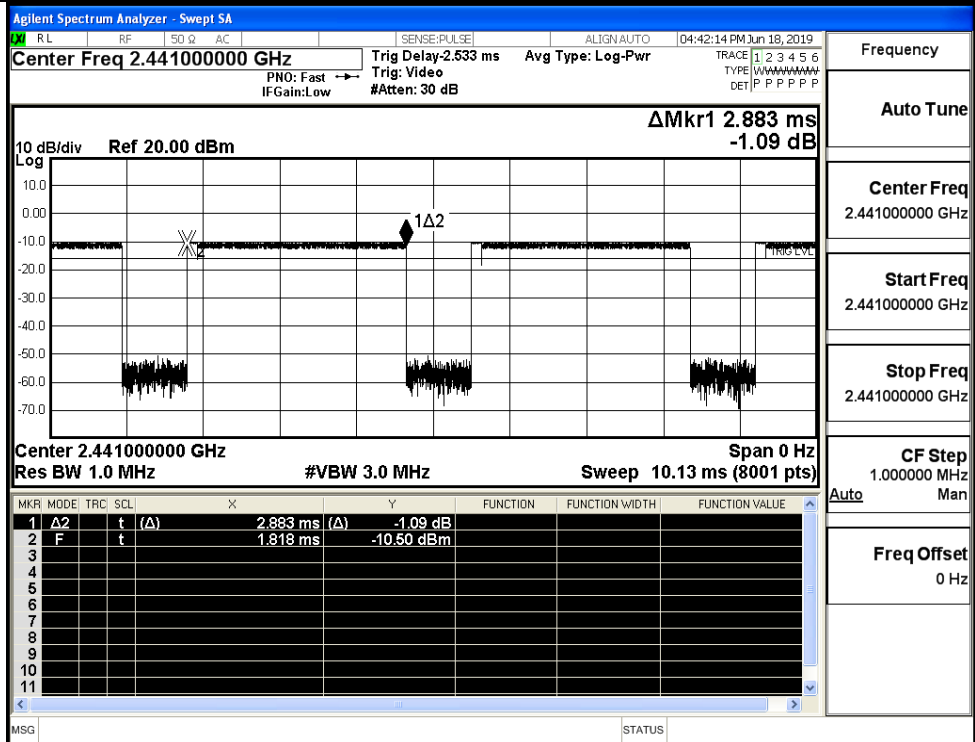
GFSK\_DH5/HCH



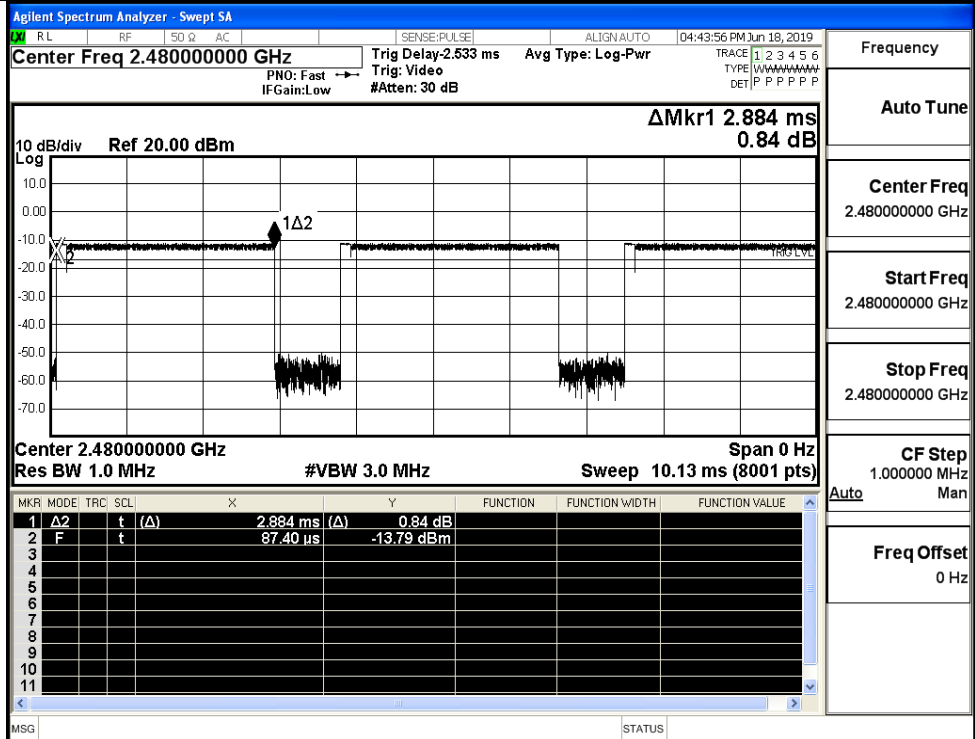
$\pi/4$ DQPSK  
\_2DH5/LCH



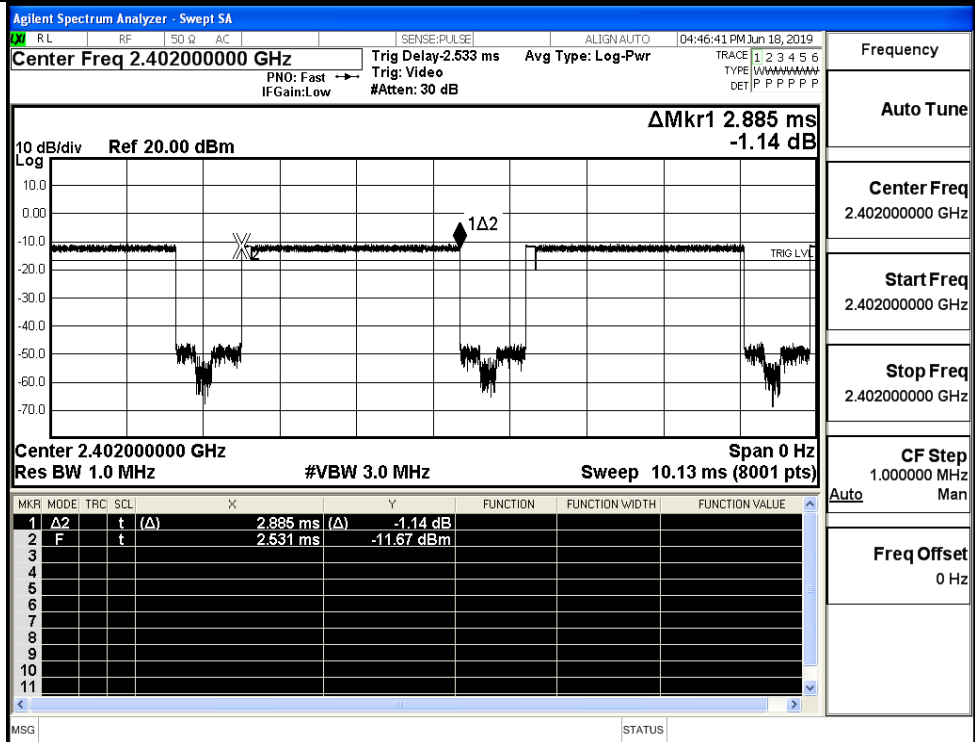
$\pi/4$ DQPSK  
\_2DH5/MCH



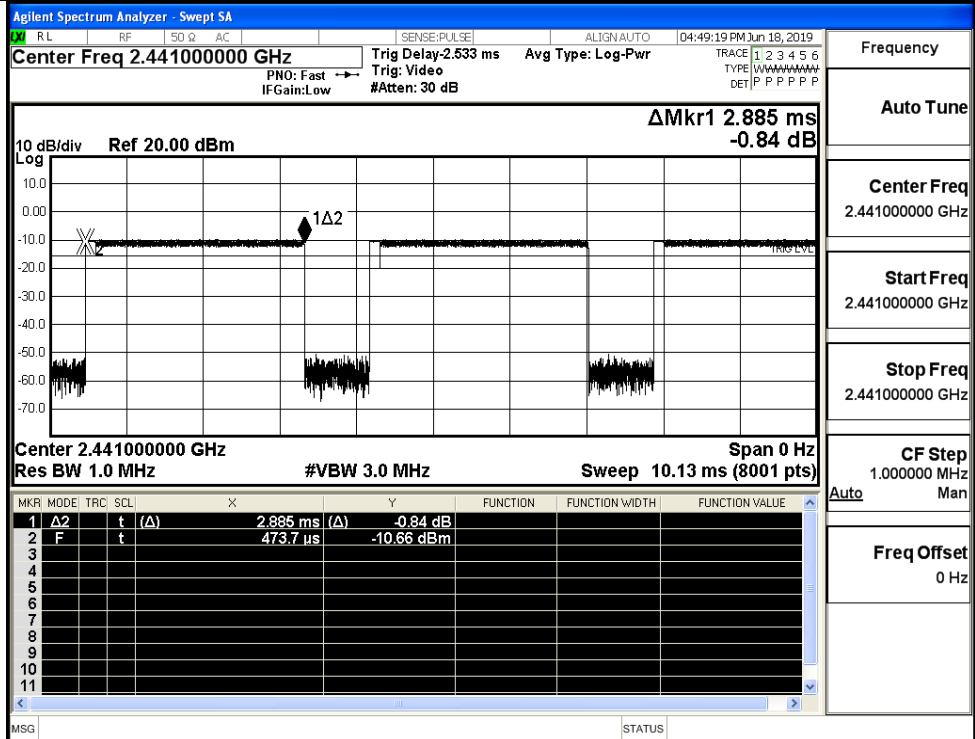
$\pi/4$ DQPSK  
\_2DH5/HCH



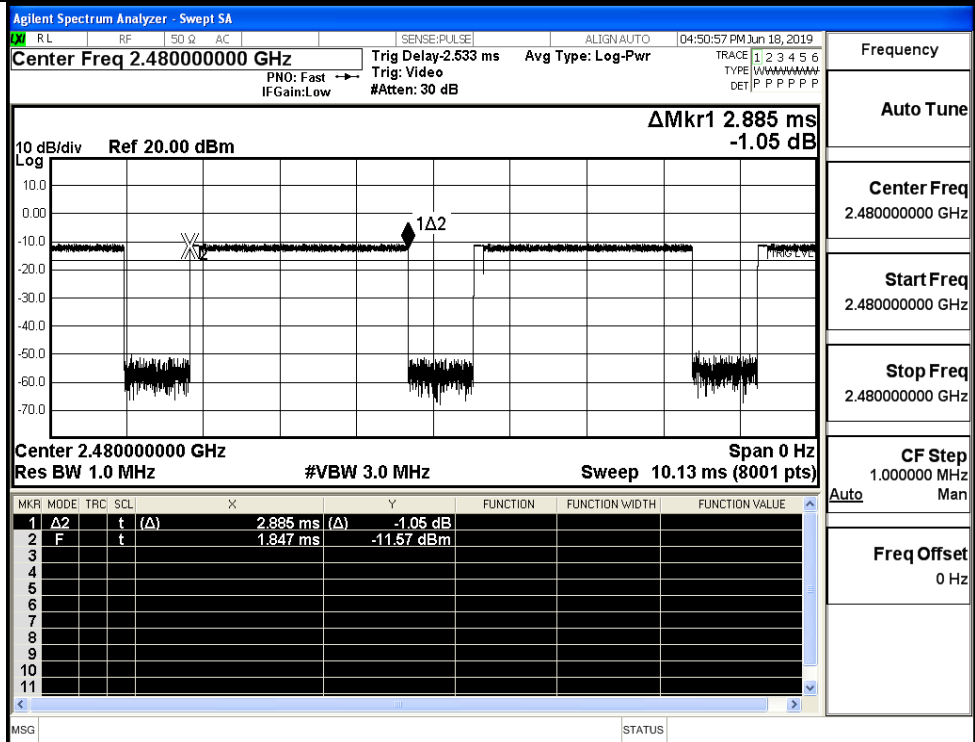
8DPSK\_3DH5/LCH



8DPSK\_3DH5/MCH



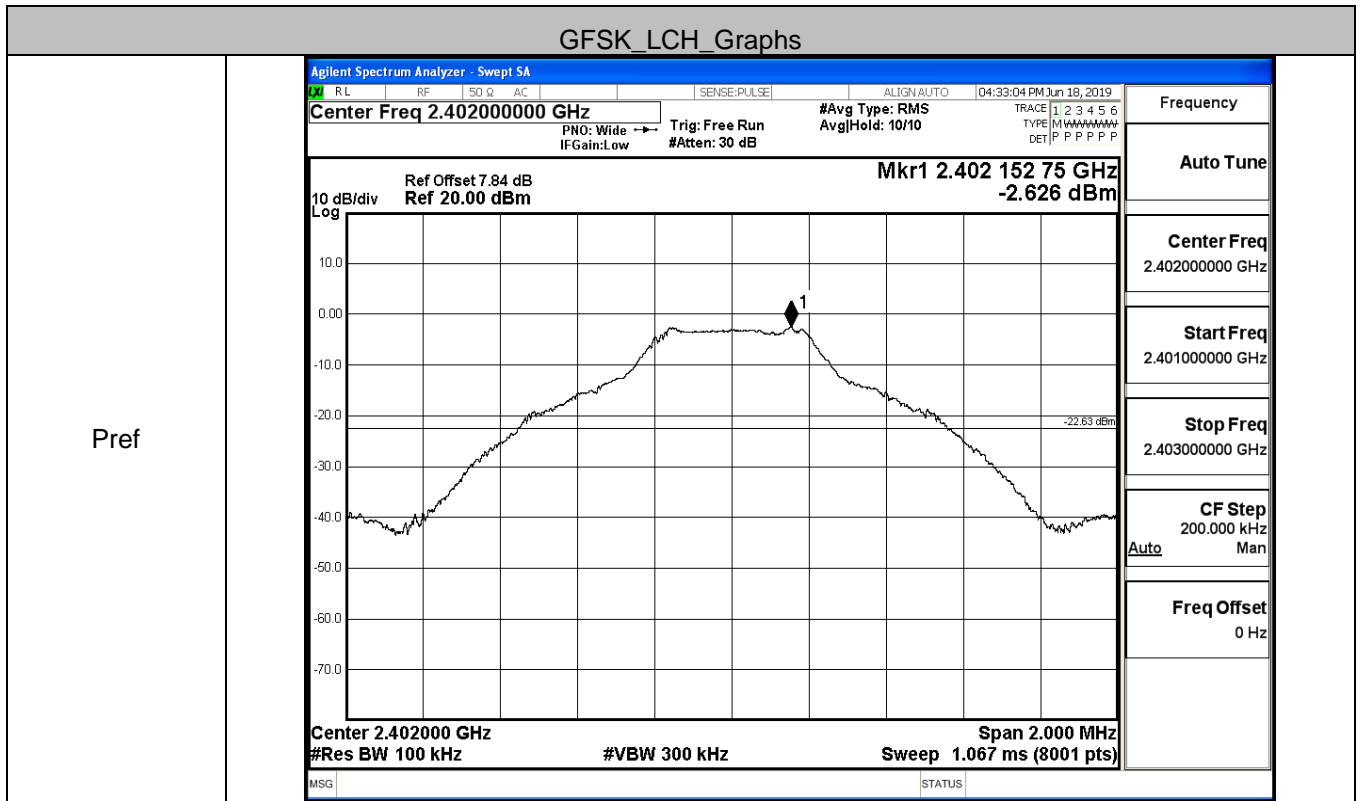
8DPSK\_3DH5/HCH



**A.6 RF Conducted Spurious Emissions**

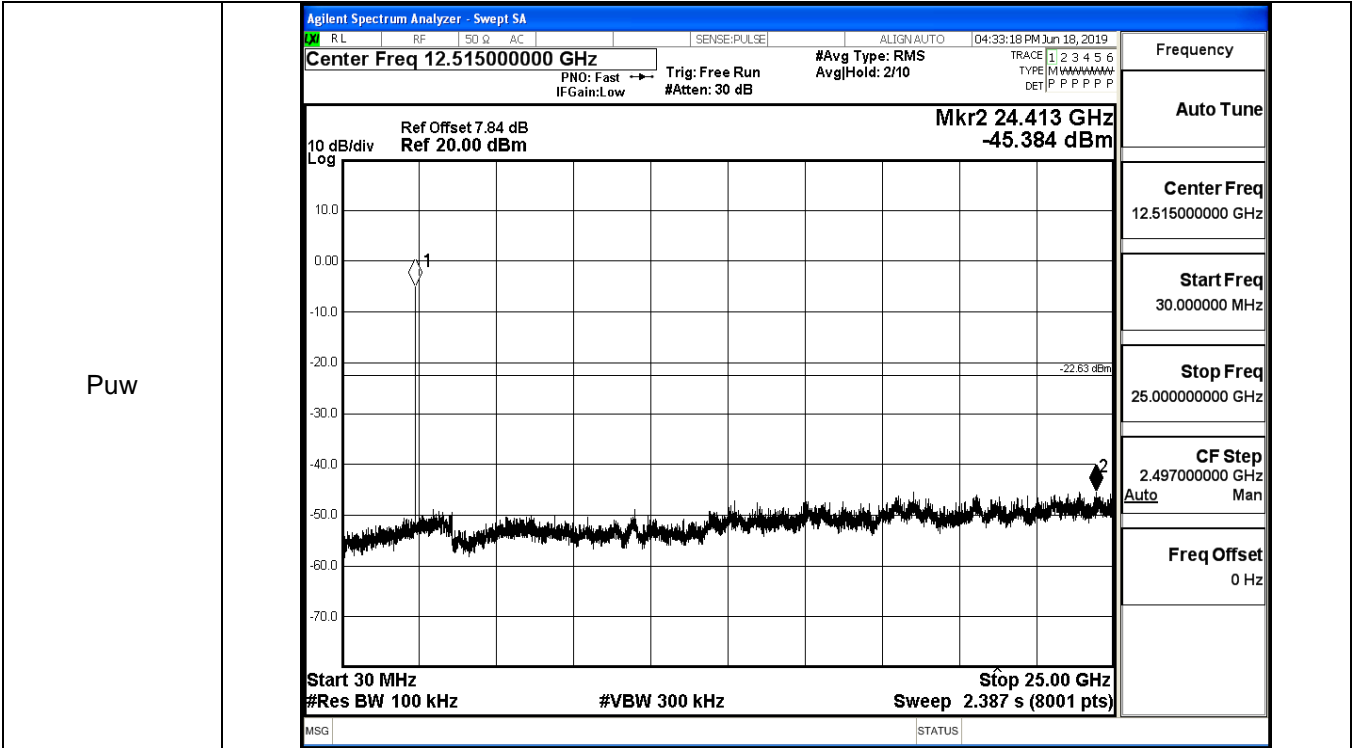
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.626	-45.384	-22.626	PASS
	MCH	-1.335	-44.183	-21.335	PASS
	HCH	-2.58	-45.280	-22.580	PASS
$\pi$ /4DQPSK	LCH	-3.613	-45.380	-23.613	PASS
	MCH	-2.549	-43.777	-22.549	PASS
	HCH	-3.62	-45.251	-23.620	PASS
8DPSK	LCH	-3.608	-44.417	-23.608	PASS
	MCH	-2.561	-44.776	-22.561	PASS
	HCH	-3.799	-44.901	-23.799	PASS

GFSK\_LCH\_Graphs

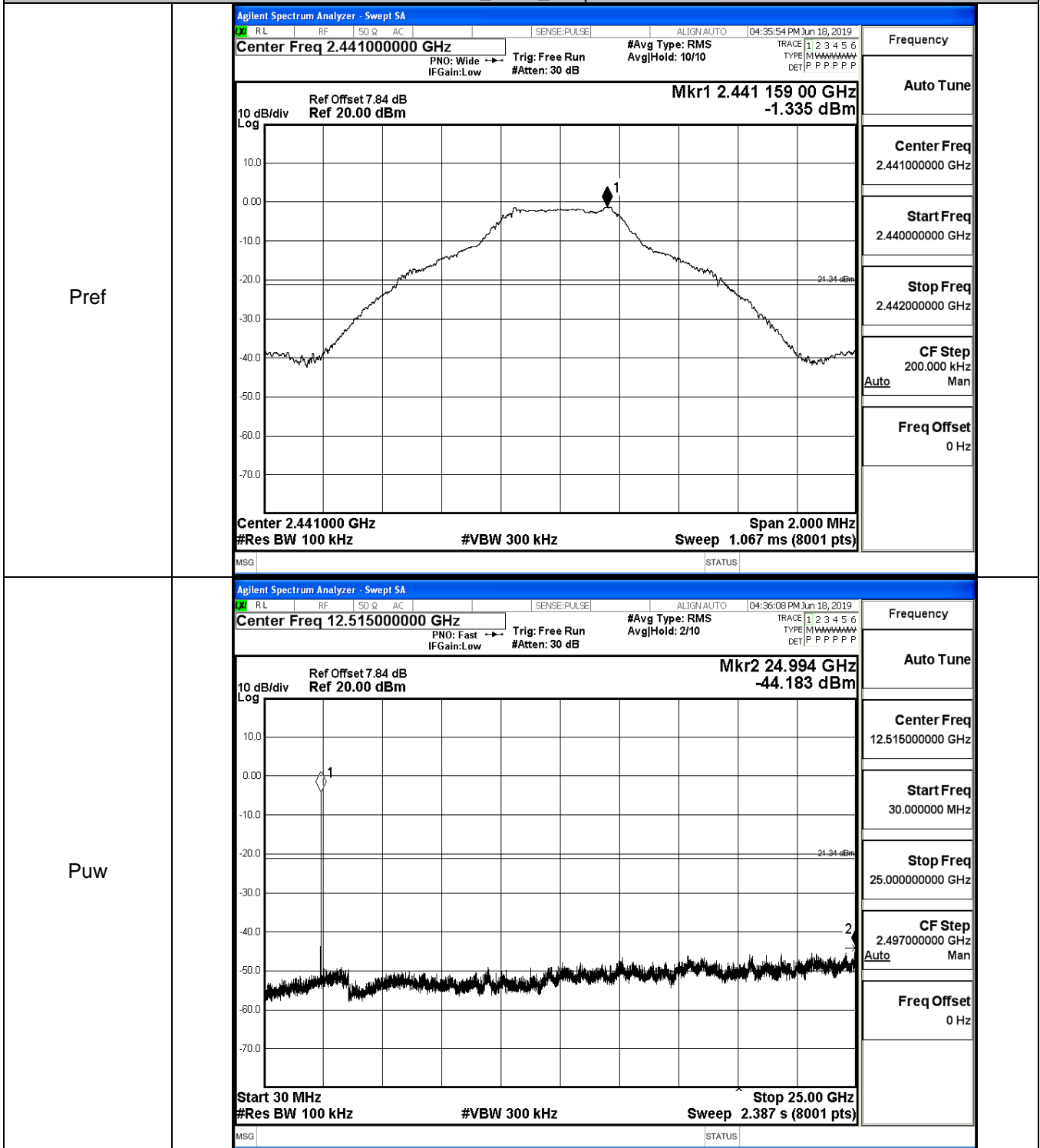


Pref

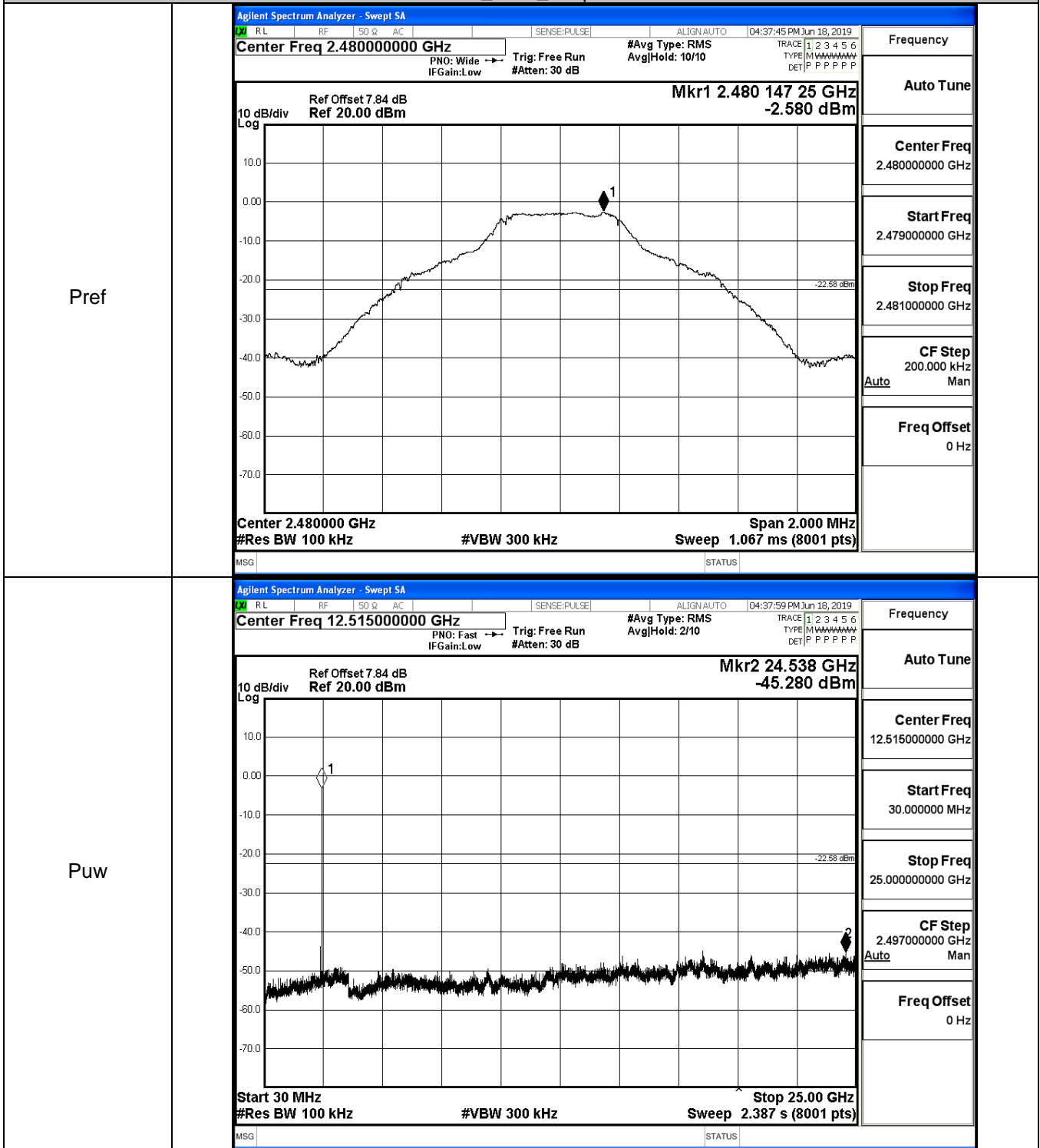




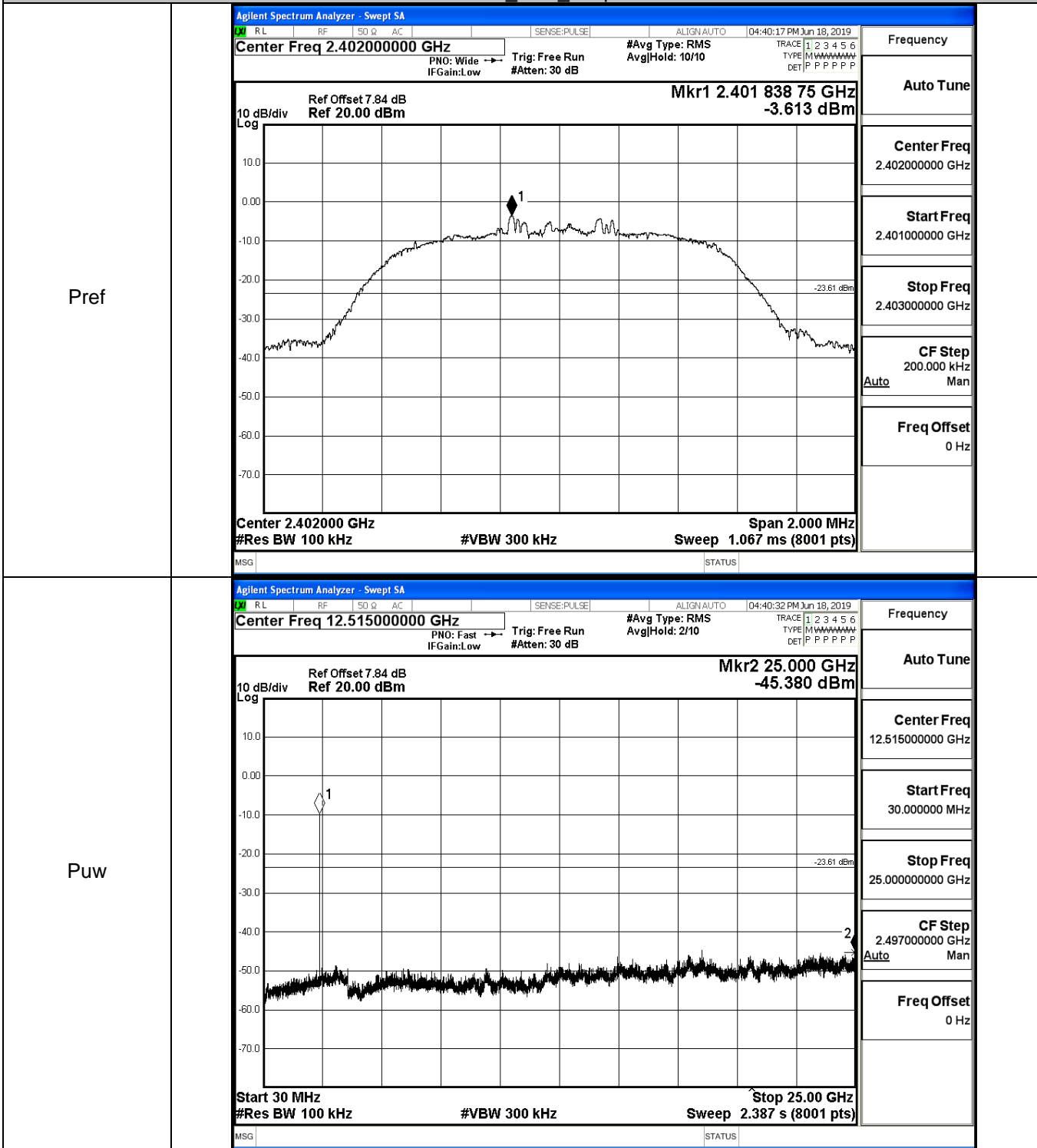
GFSK\_MCH\_Graphs



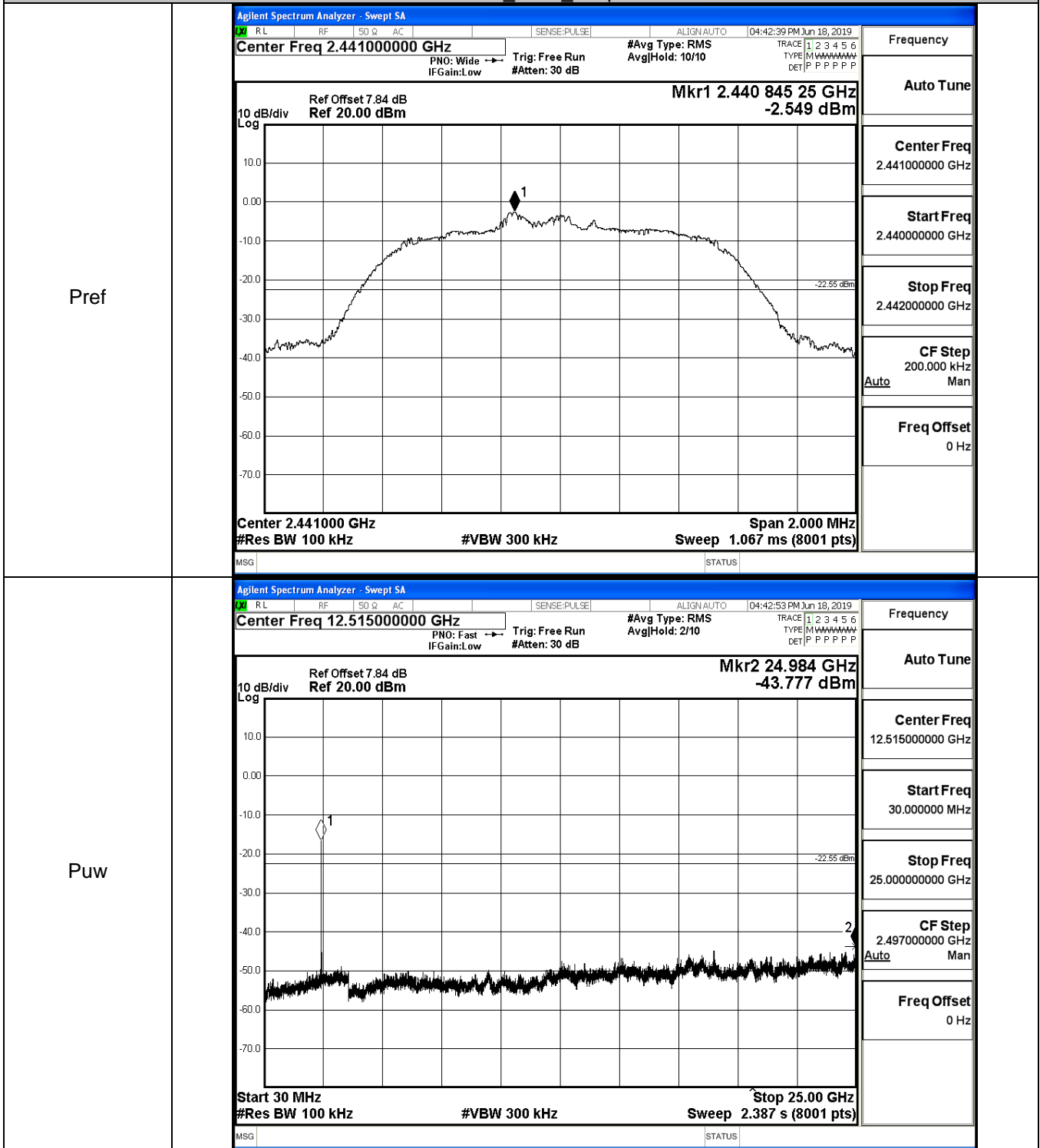
GFSK\_HCH\_Graphs



$\pi/4$ DQPSK\_LCH\_Graphs

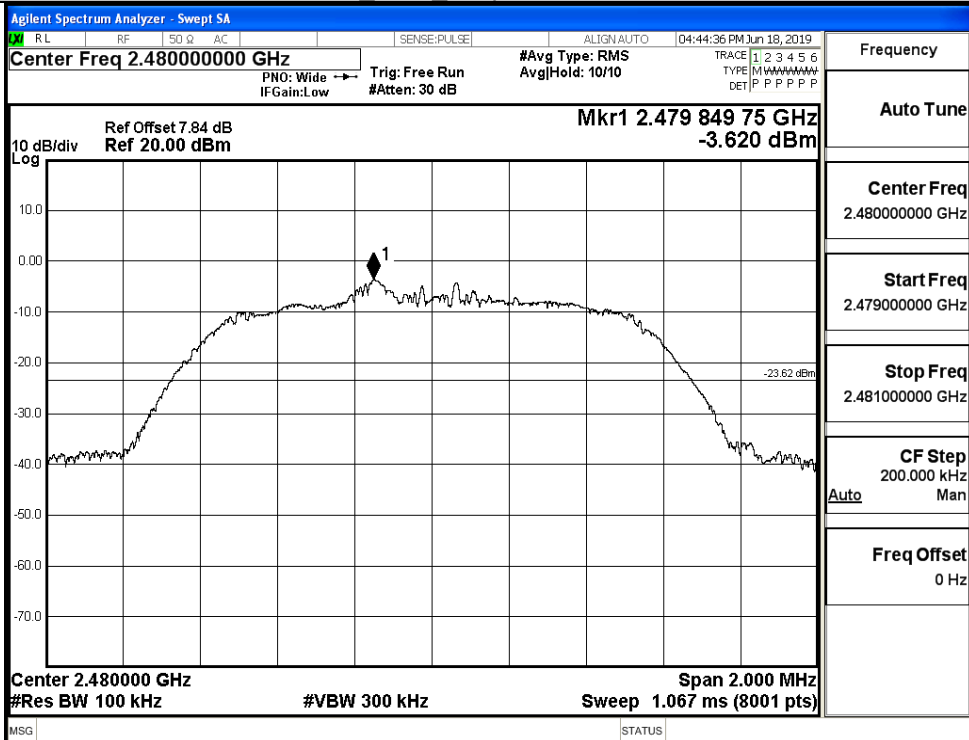


$\pi$ /4DQPSK\_MCH\_Graphs

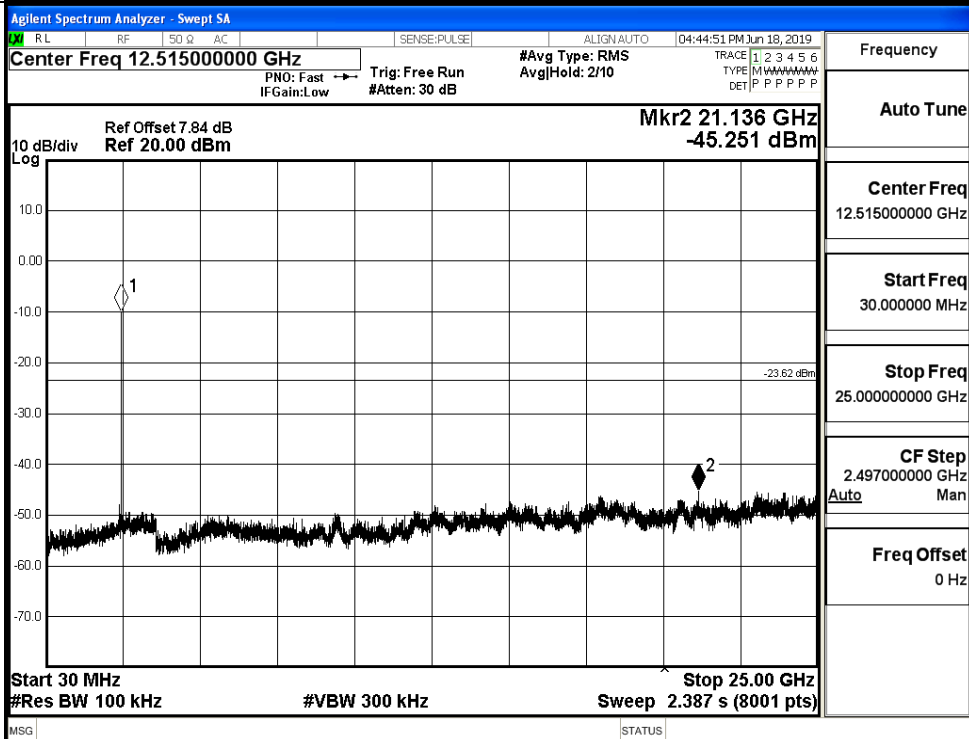


$\pi/4$ DQPSK\_HCH\_Graphs

Pref

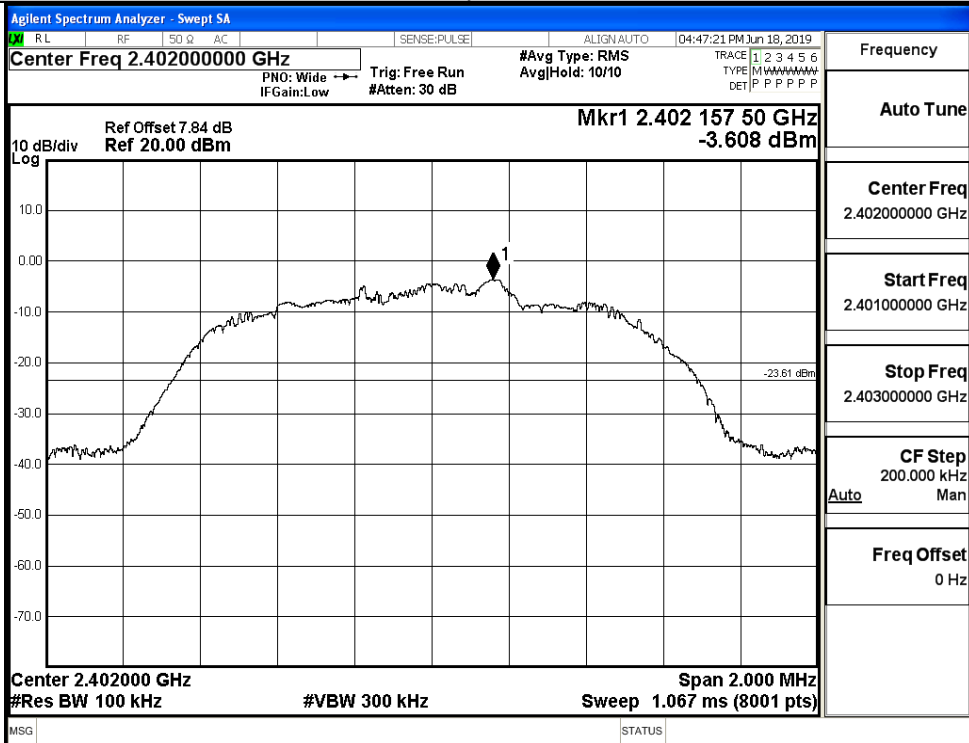


Puw

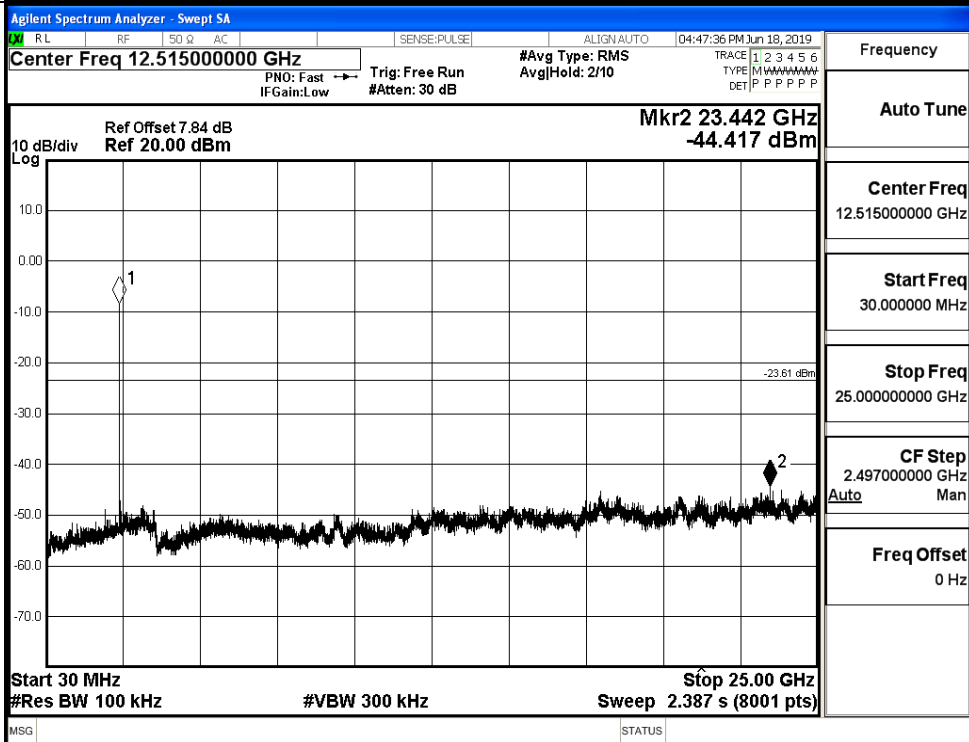


8DPSK\_LCH\_Graphs

Pref

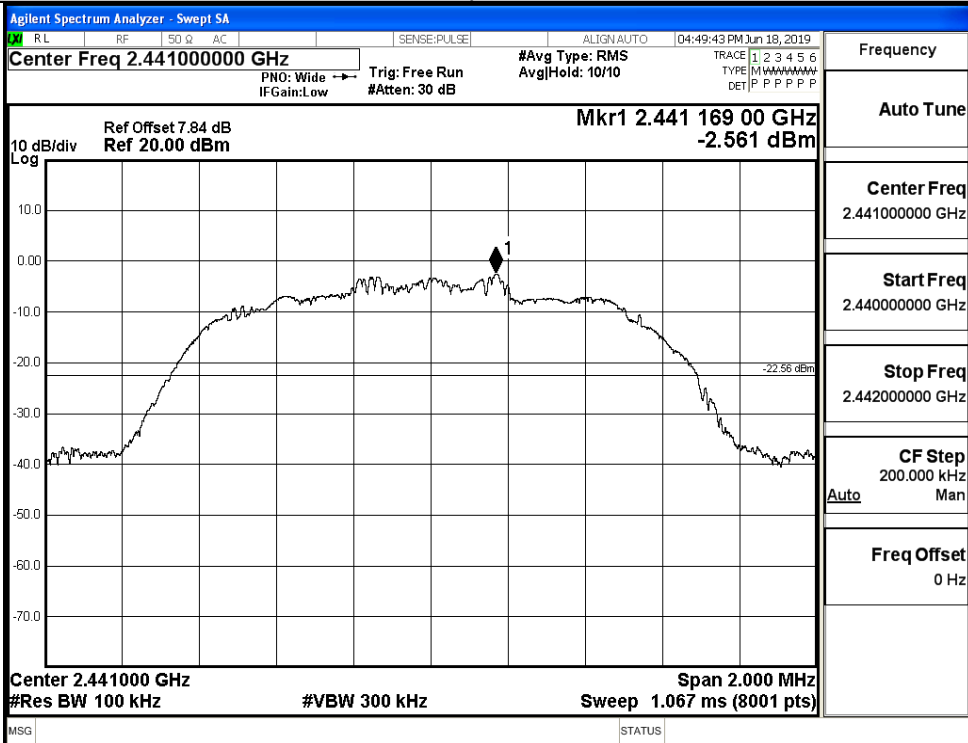


Puw

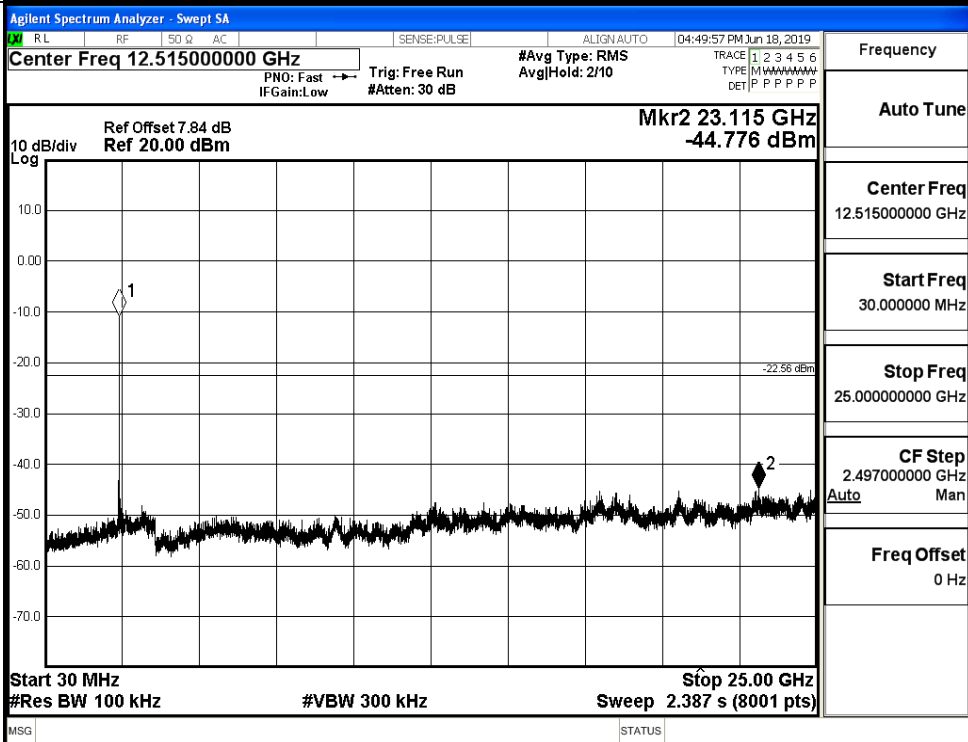


8DPSK\_MCH\_Graphs

Pref



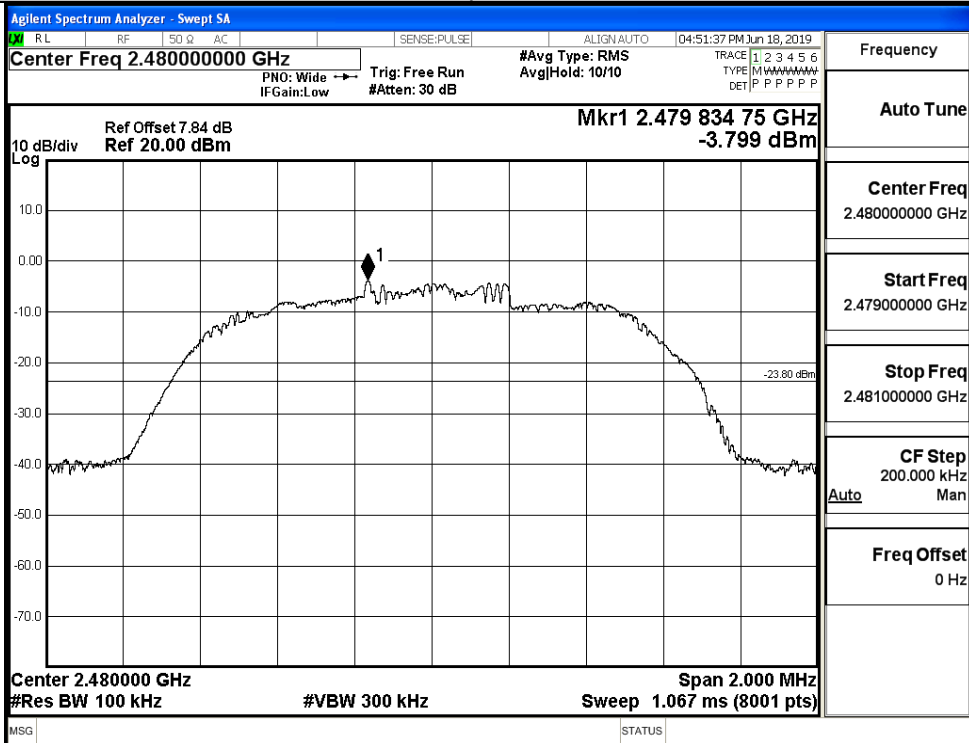
Puw



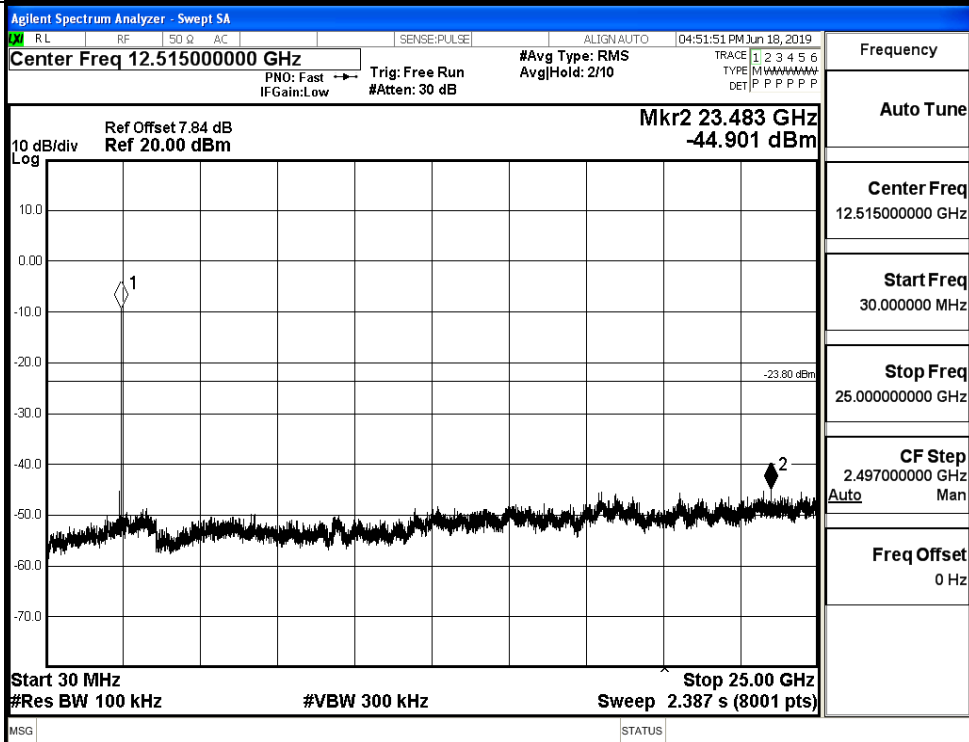


8DPSK\_HCH\_Graphs

Pref



Puw

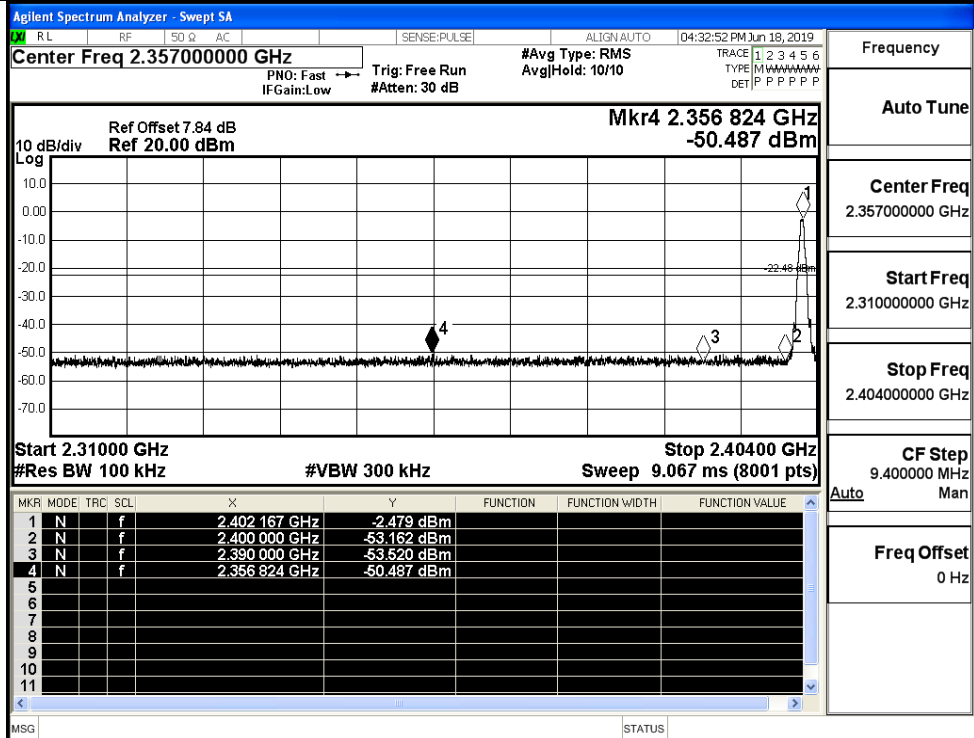


## A.7 Band-edge for RF Conducted Emissions

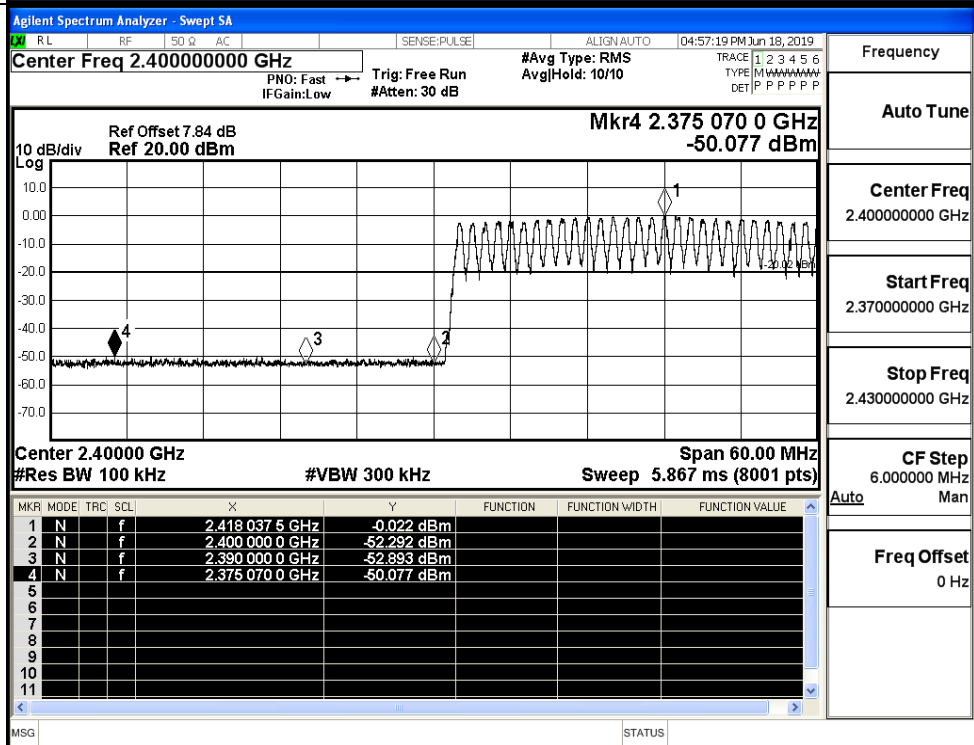
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-2.479	Off	-50.487	-22.48	PASS
			-0.022	On	-50.077	-20.02	PASS
	HCH	2480	-2.210	Off	-49.780	-22.21	PASS
			-0.113	On	-48.944	-20.11	PASS
$\pi/4$ DQPSK	LCH	2402	-4.913	Off	-49.874	-24.91	PASS
			-1.496	On	-49.703	-21.5	PASS
	HCH	2480	-3.502	Off	-50.197	-23.5	PASS
			-1.359	On	-49.173	-21.36	PASS
8DPSK	LCH	2402	-3.856	Off	-49.447	-23.86	PASS
			-1.368	On	-49.586	-21.37	PASS
	HCH	2480	-3.587	Off	-49.540	-23.59	PASS
			-1.448	On	-47.344	-21.45	PASS

Test Graphs

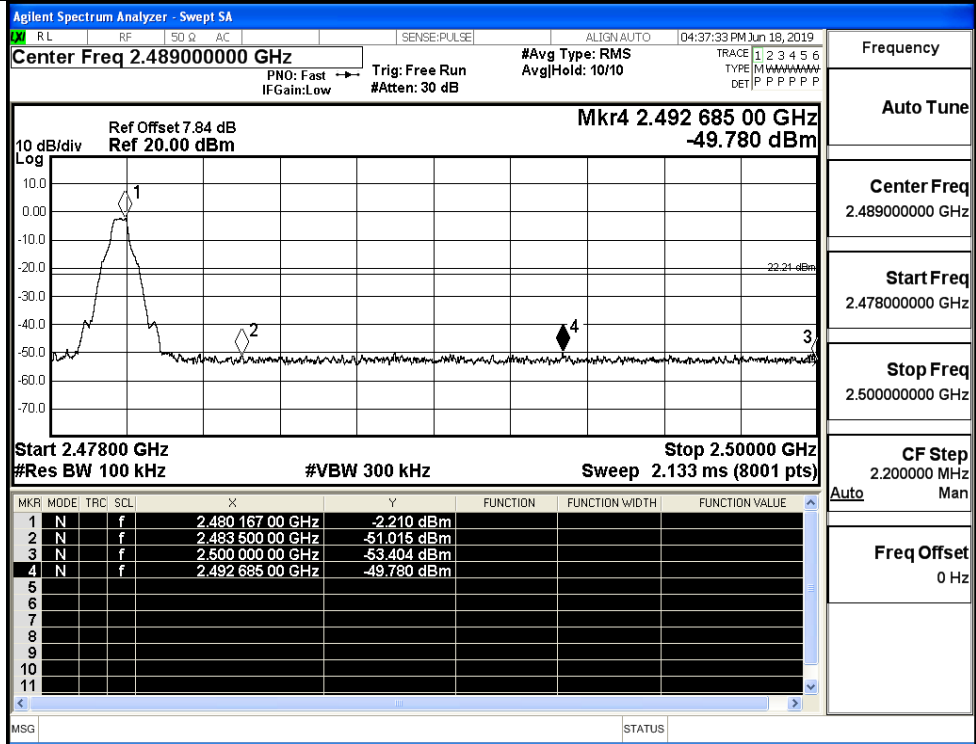
GFSK/LCH/No Hop



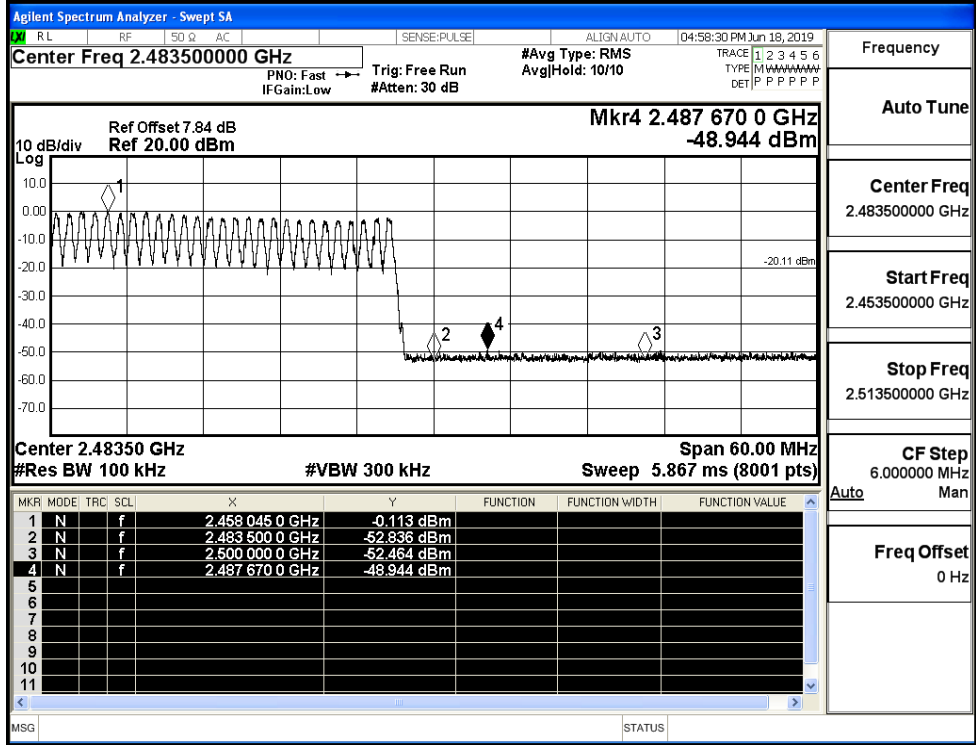
GFSK/LCH/Hop



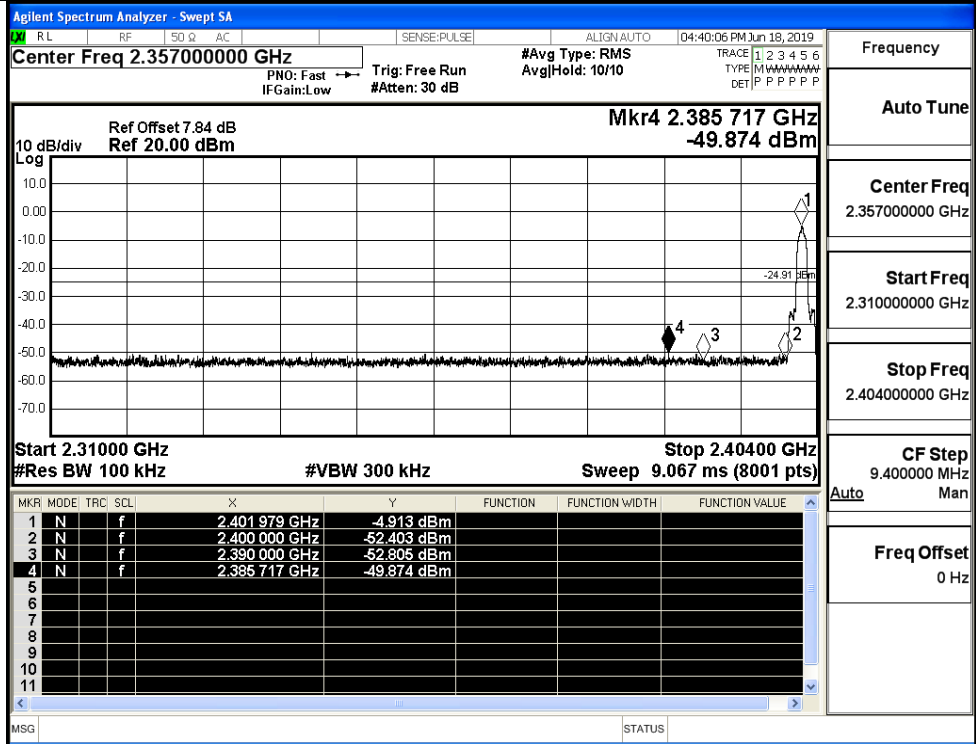
GFSK/HCH/No Hop



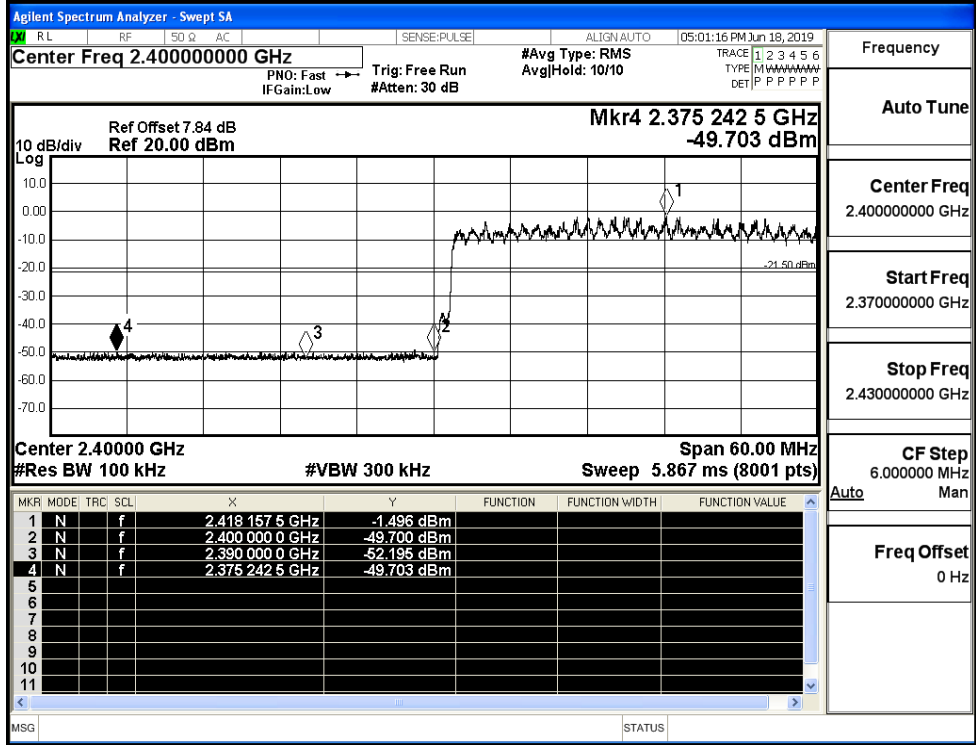
GFSK/HCH/Hop



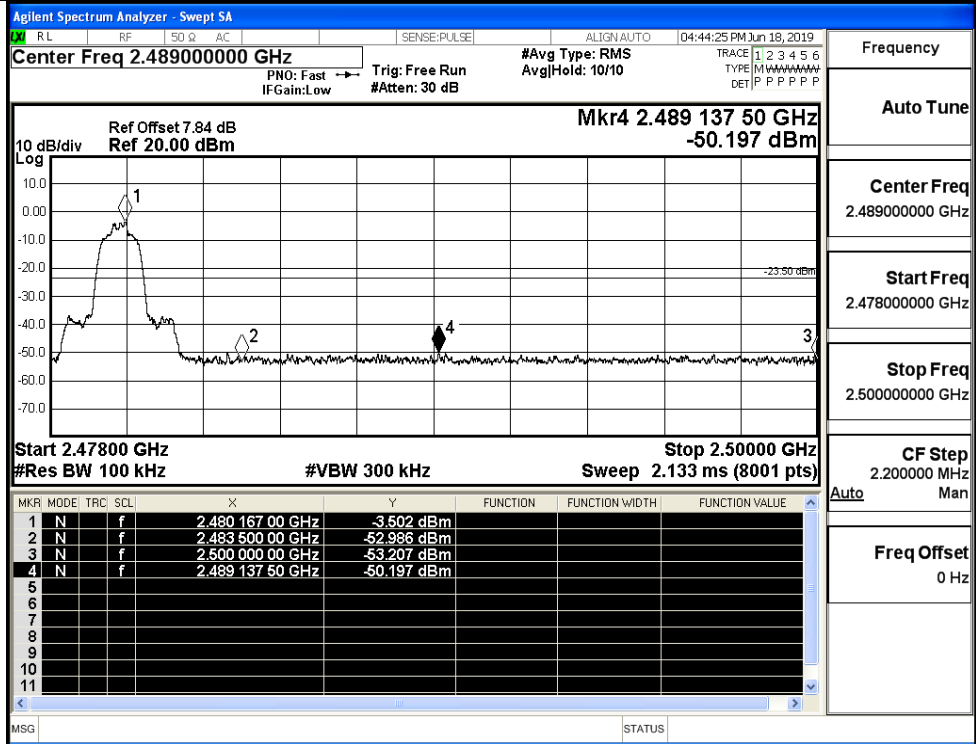
$\pi$ /4DQPSK/LCH/No Hop



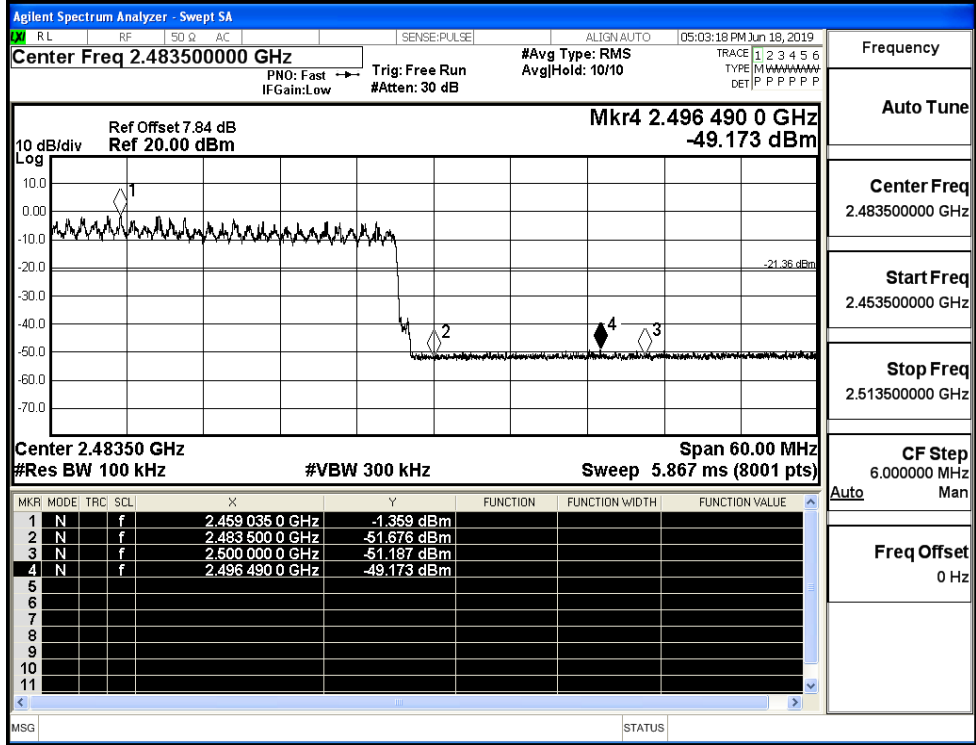
$\pi$ /4DQPSK/LCH/Hop



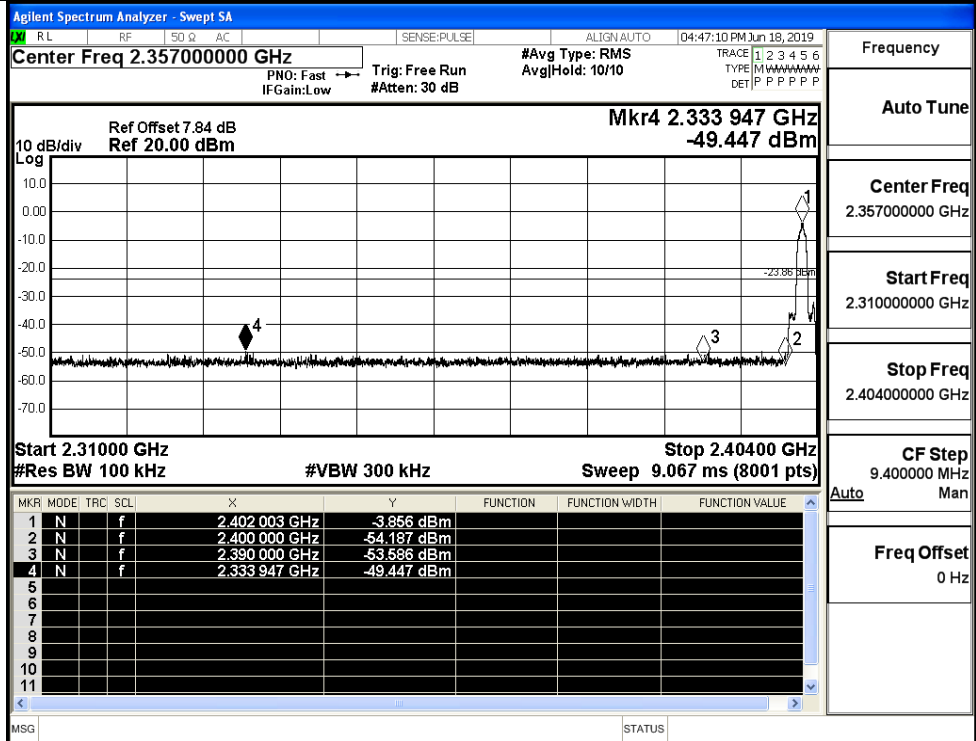
$\pi$ /4DQPSK/HCH/No  
Hop



$\pi$ /4DQPSK/HCH/Hop

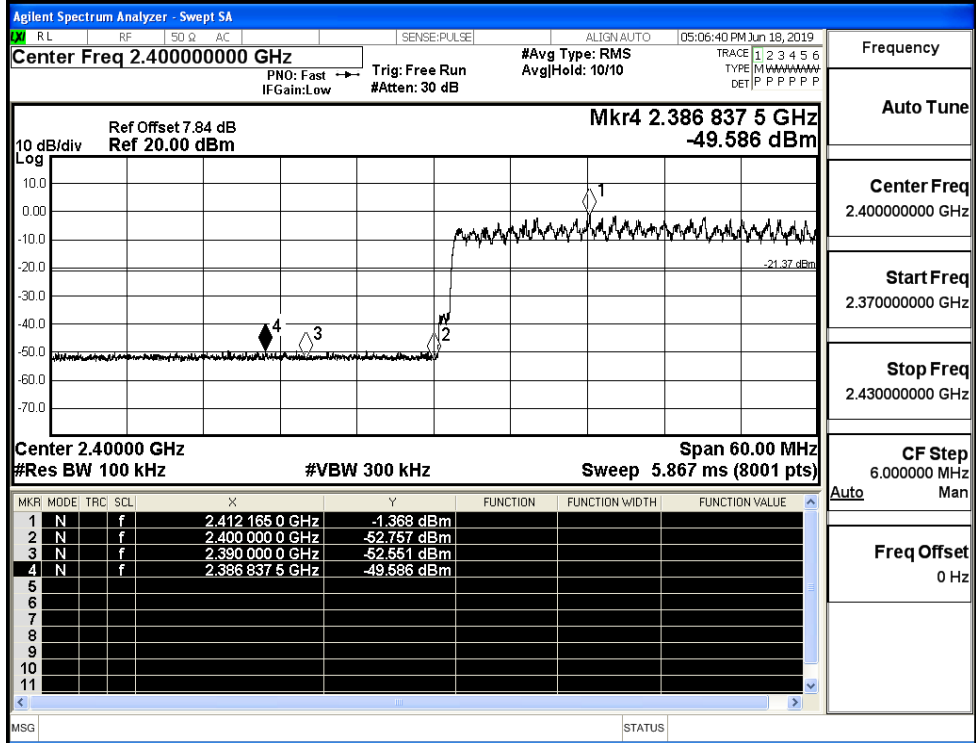


8DPSK/LCH/No Hop



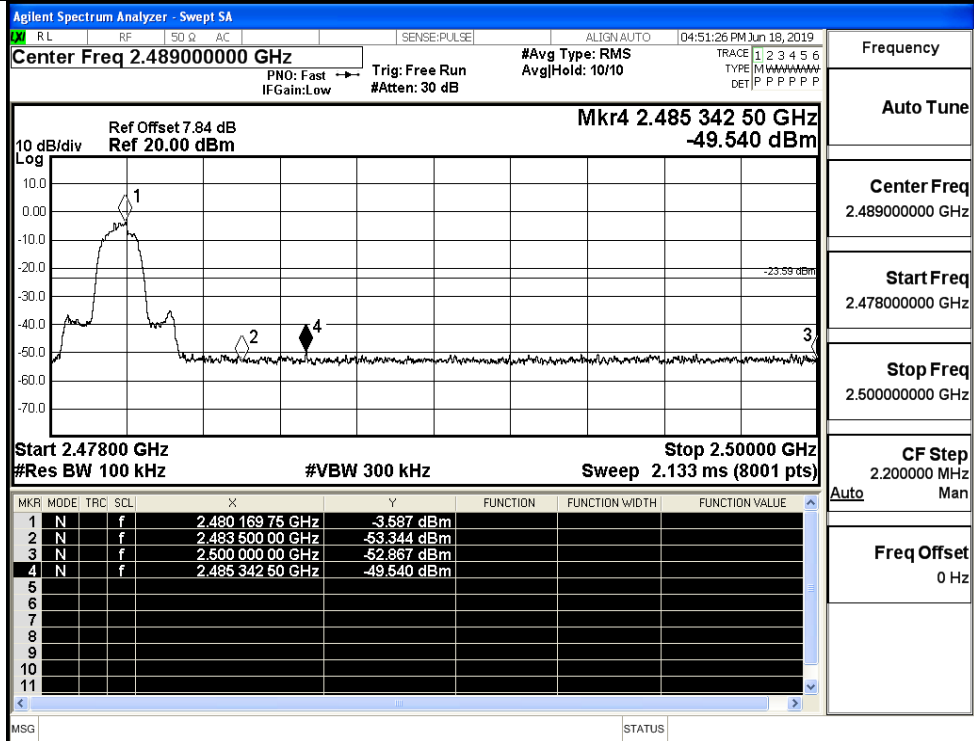
Frequency  
Auto Tune  
Center Freq  
2.357000000 GHz  
Start Freq  
2.310000000 GHz  
Stop Freq  
2.404000000 GHz  
CF Step  
9.400000 MHz  
Auto Man  
Freq Offset  
0 Hz

8DPSK/LCH/Hop



Frequency  
Auto Tune  
Center Freq  
2.400000000 GHz  
Start Freq  
2.370000000 GHz  
Stop Freq  
2.430000000 GHz  
CF Step  
6.000000 MHz  
Auto Man  
Freq Offset  
0 Hz

8DPSK/HCH/No Hop



Frequency

Auto Tune

Center Freq  
2.489000000 GHz

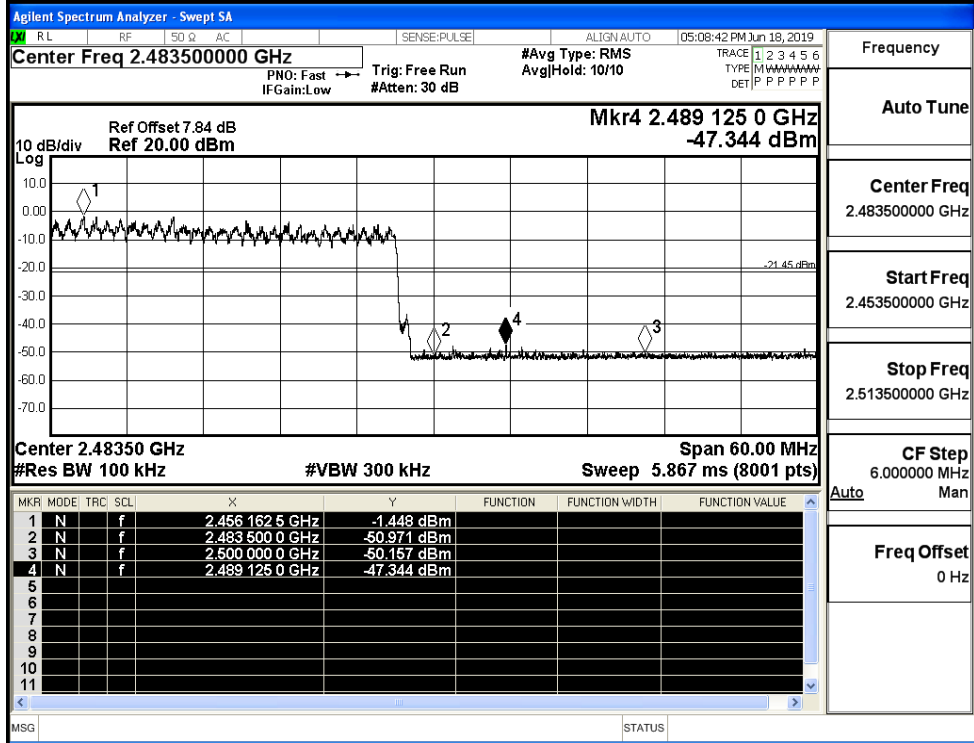
Start Freq  
2.478000000 GHz

Stop Freq  
2.500000000 GHz

CF Step  
2.200000 MHz

Freq Offset  
0 Hz

8DPSK/HCH/Hop



Frequency

Auto Tune

Center Freq  
2.483500000 GHz

Start Freq  
2.453500000 GHz

Stop Freq  
2.513500000 GHz

CF Step  
6.000000 MHz

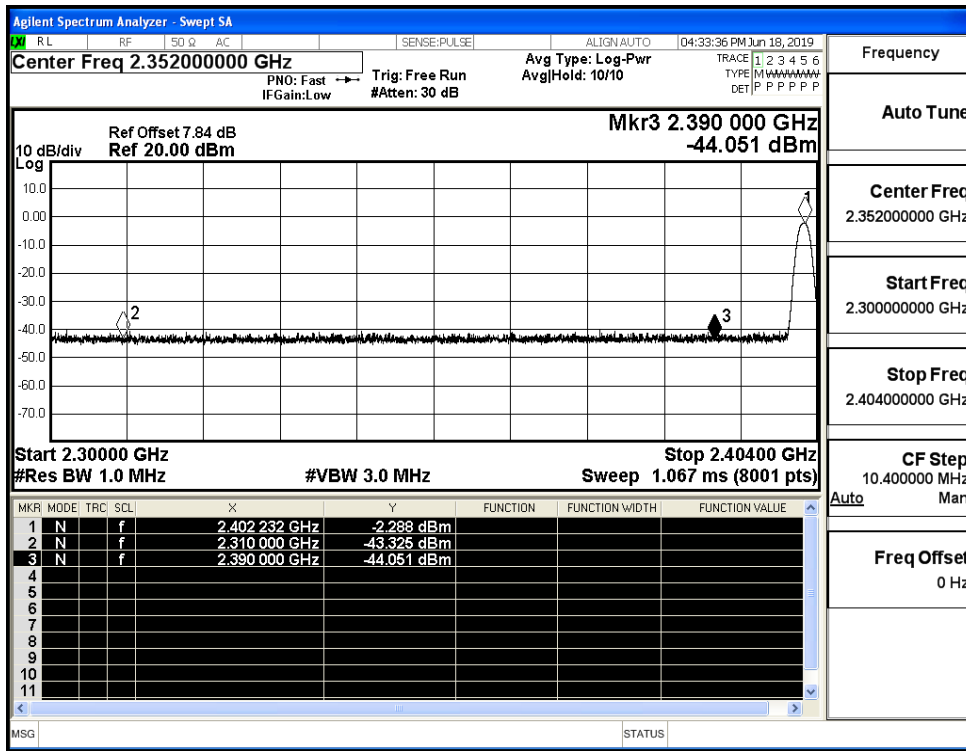
Freq Offset  
0 Hz



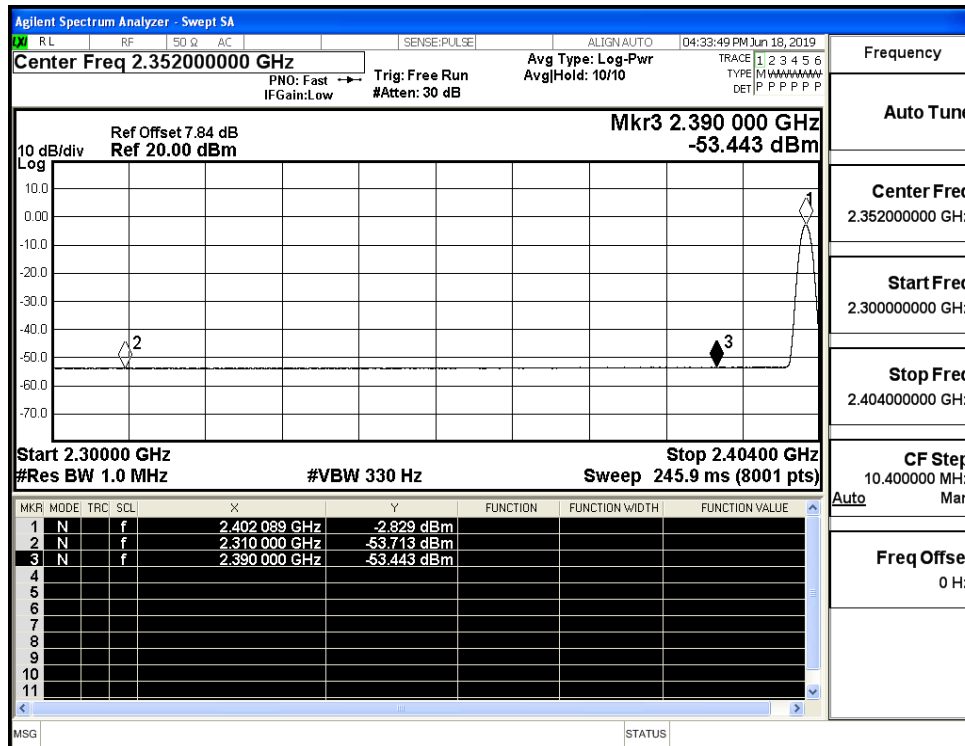
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.33	2.0	0	53.93	PEAK	74	PASS
	Off	2310.0	-53.71	2.0	0	43.54	AV	54	PASS
	Off	2390.0	-44.05	2.0	0	53.21	PEAK	74	PASS
	Off	2390.0	-53.44	2.0	0	43.81	AV	54	PASS
	Off	2483.5	-42.93	2.0	0	54.33	PEAK	74	PASS
	Off	2483.5	-53.27	2.0	0	43.99	AV	54	PASS
	Off	2500.0	-43.03	2.0	0	54.22	PEAK	74	PASS
	Off	2500.0	-53.12	2.0	0	44.14	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.08	2.0	0	54.18	PEAK	74	PASS
	Off	2310.0	-53.82	2.0	0	43.44	AV	54	PASS
	Off	2390.0	-43.25	2.0	0	54.01	PEAK	74	PASS
	Off	2390.0	-53.48	2.0	0	43.78	AV	54	PASS
	Off	2483.5	-42.51	2.0	0	54.75	PEAK	74	PASS
	Off	2483.5	-53.28	2.0	0	43.98	AV	54	PASS
	Off	2500.0	-42.00	2.0	0	55.26	PEAK	74	PASS
	Off	2500.0	-53.18	2.0	0	44.08	AV	54	PASS
8DPSK	Off	2310.0	-44.10	2.0	0	53.16	PEAK	74	PASS
	Off	2310.0	-53.79	2.0	0	43.47	AV	54	PASS
	Off	2390.0	-42.48	2.0	0	54.78	PEAK	74	PASS
	Off	2390.0	-53.50	2.0	0	43.75	AV	54	PASS
	Off	2483.5	-43.45	2.0	0	53.81	PEAK	74	PASS
	Off	2483.5	-53.12	2.0	0	44.13	AV	54	PASS
	Off	2500.0	-42.39	2.0	0	54.87	PEAK	74	PASS
	Off	2500.0	-53.17	2.0	0	44.08	AV	54	PASS

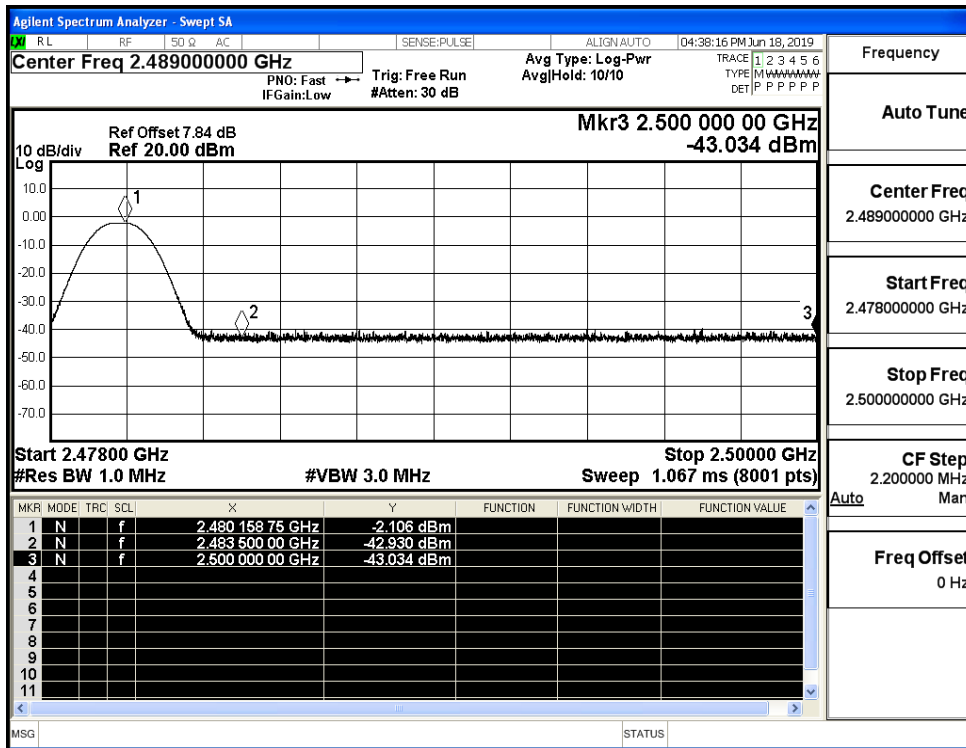
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



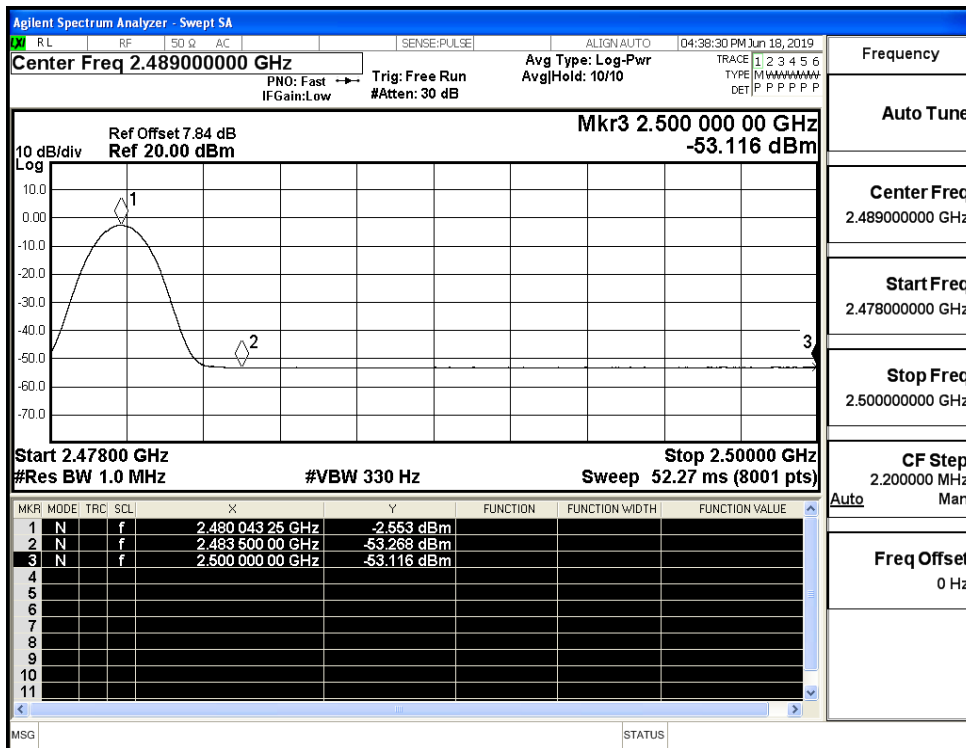
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



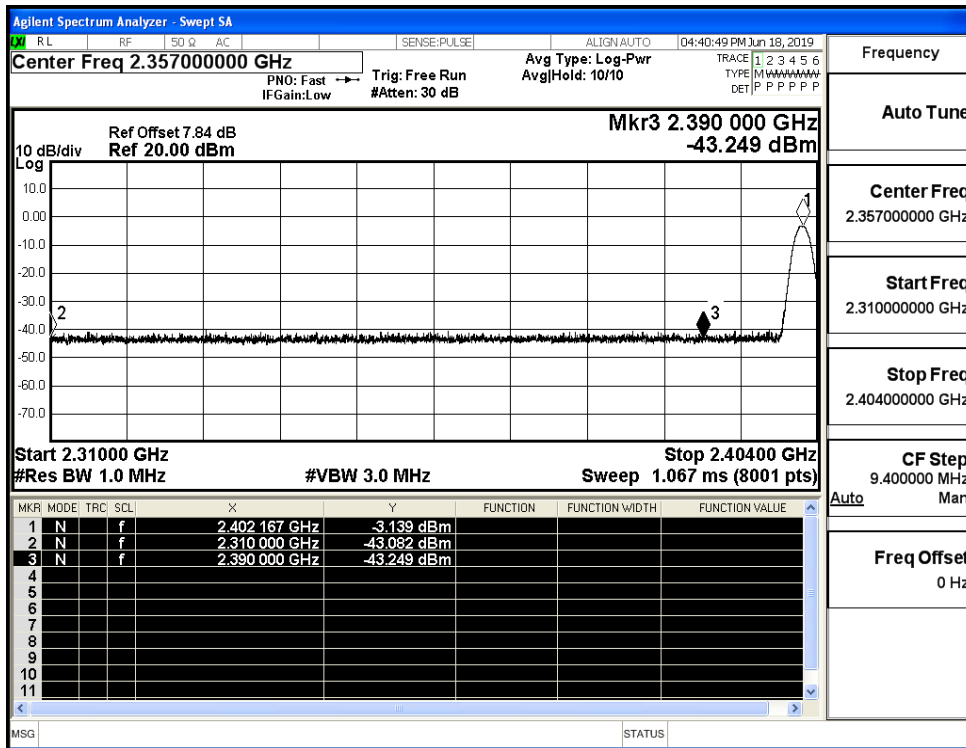
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)



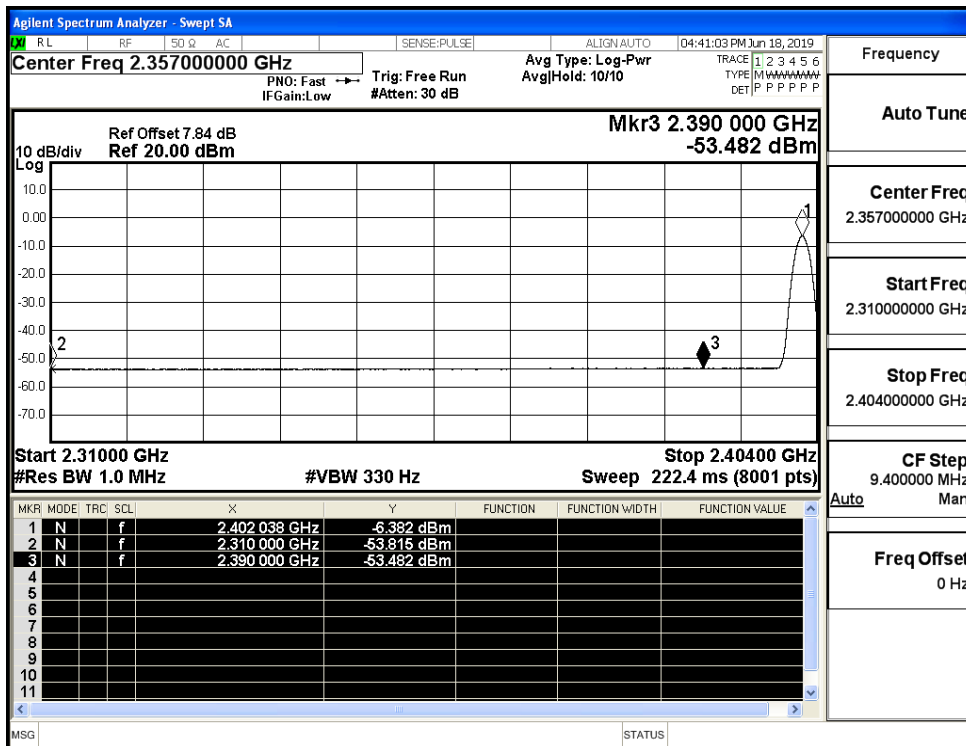
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)



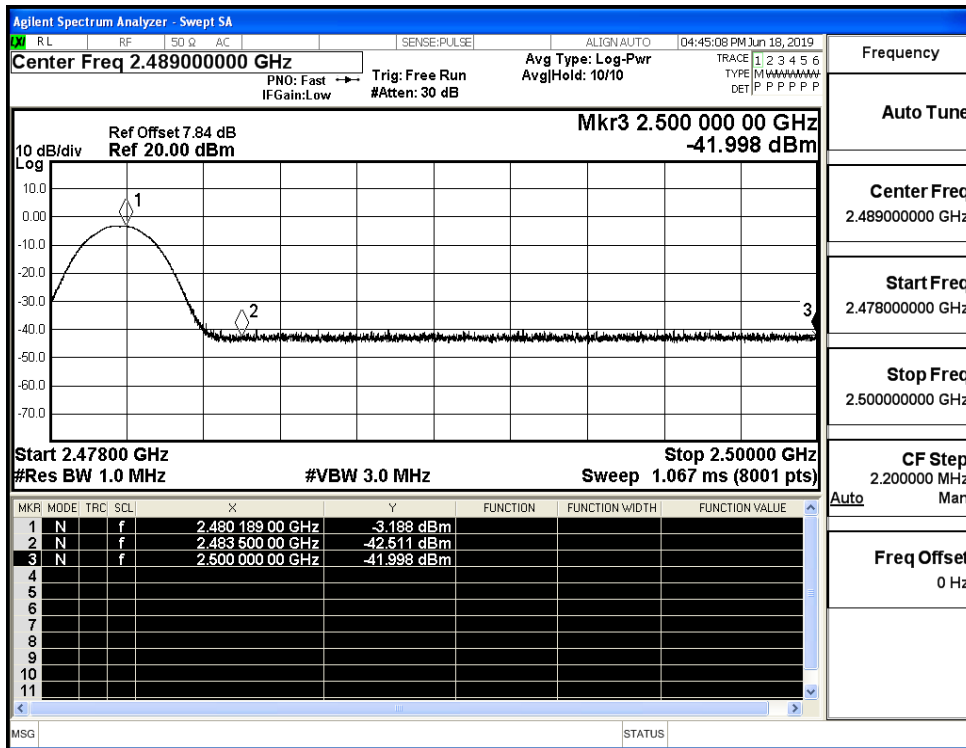
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)



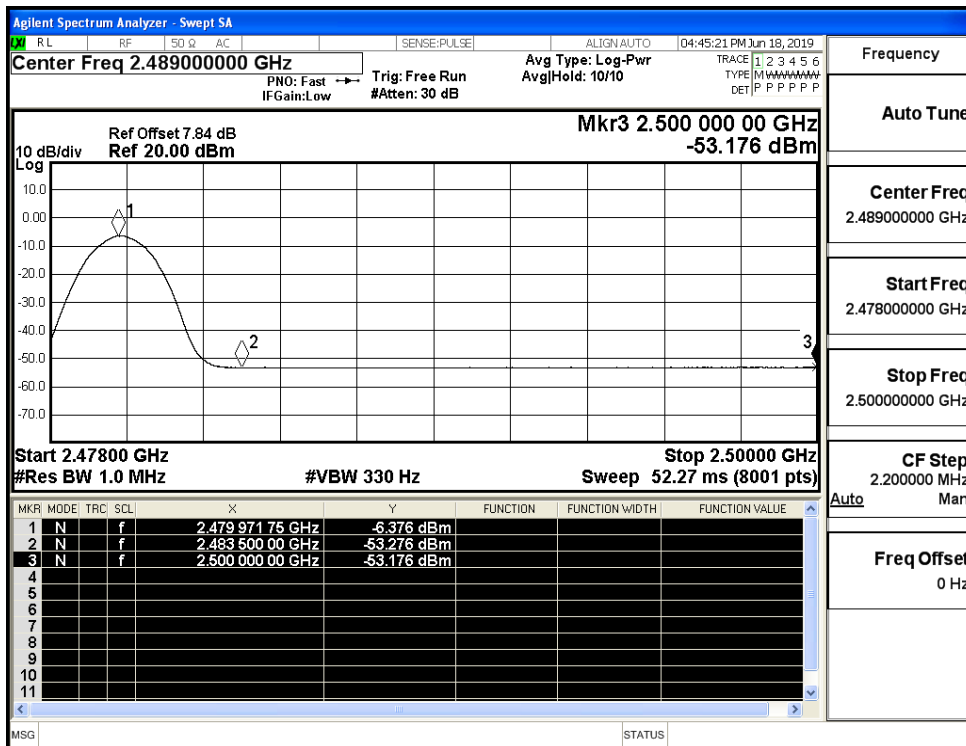
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)



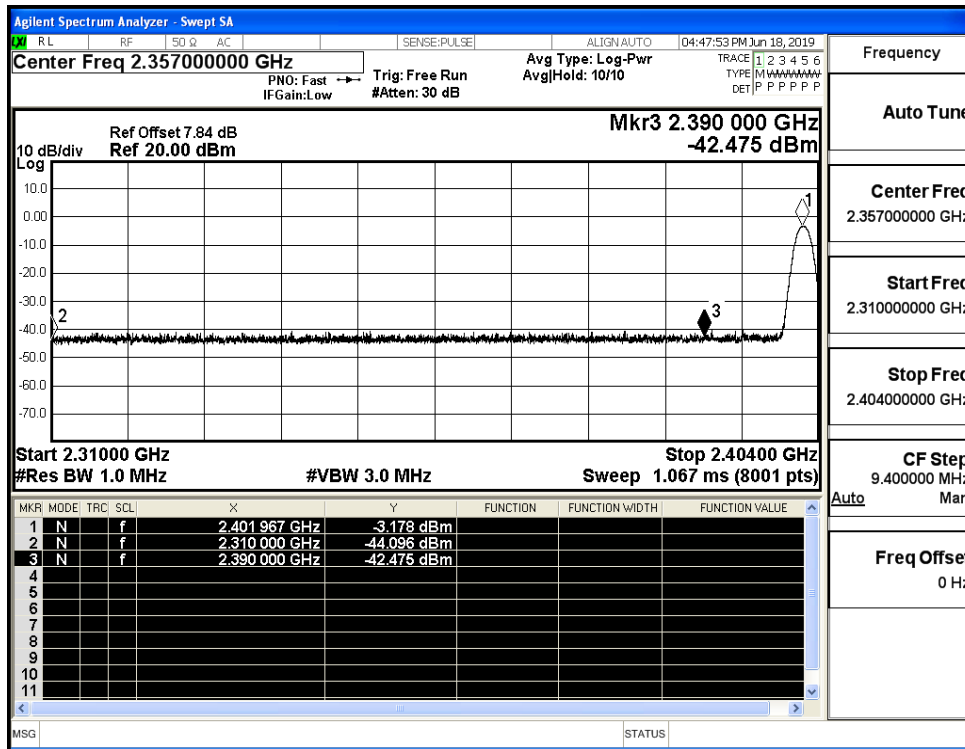
Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (High Channel)



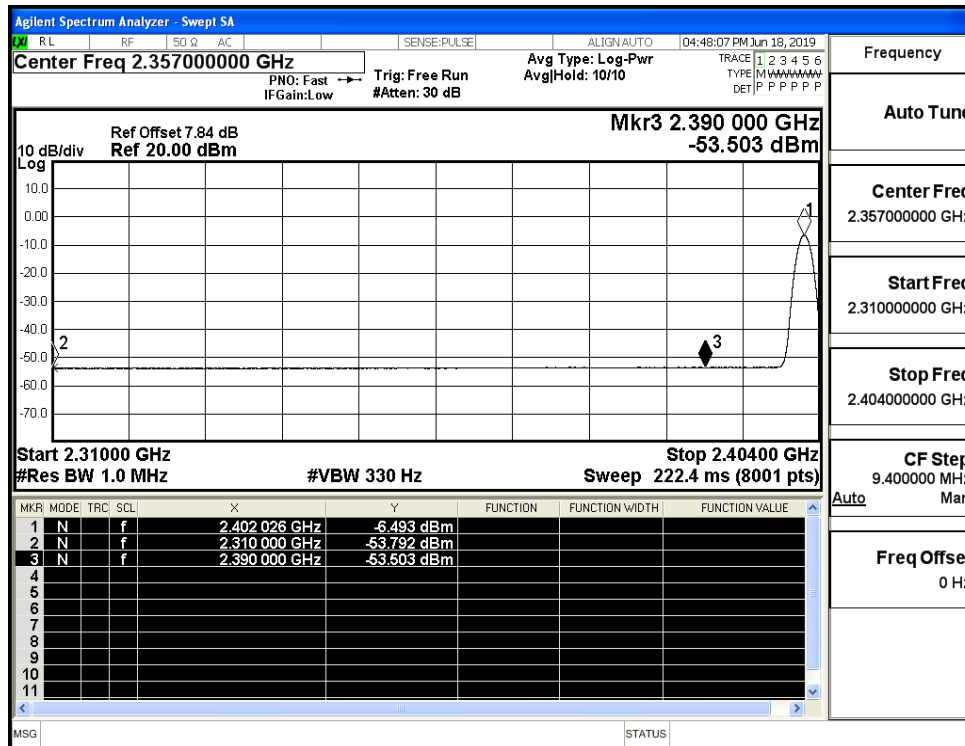
Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (High Channel)



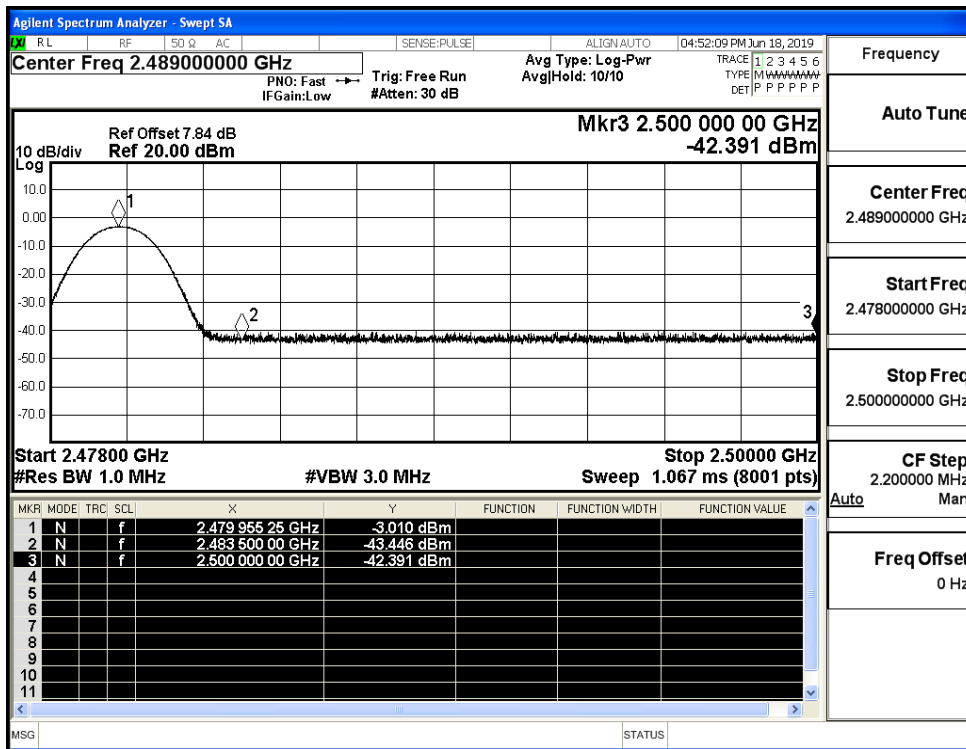
Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



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)

