

## Appendix A

### RF Test Data for BT V4.2 (BDR/EDR) (Conducted Measurement)

Product Name: Astra 3D Bluetooth® Headphones

Trade Mark: Gemline

Test Model: 100237-001B

#### Environmental Conditions

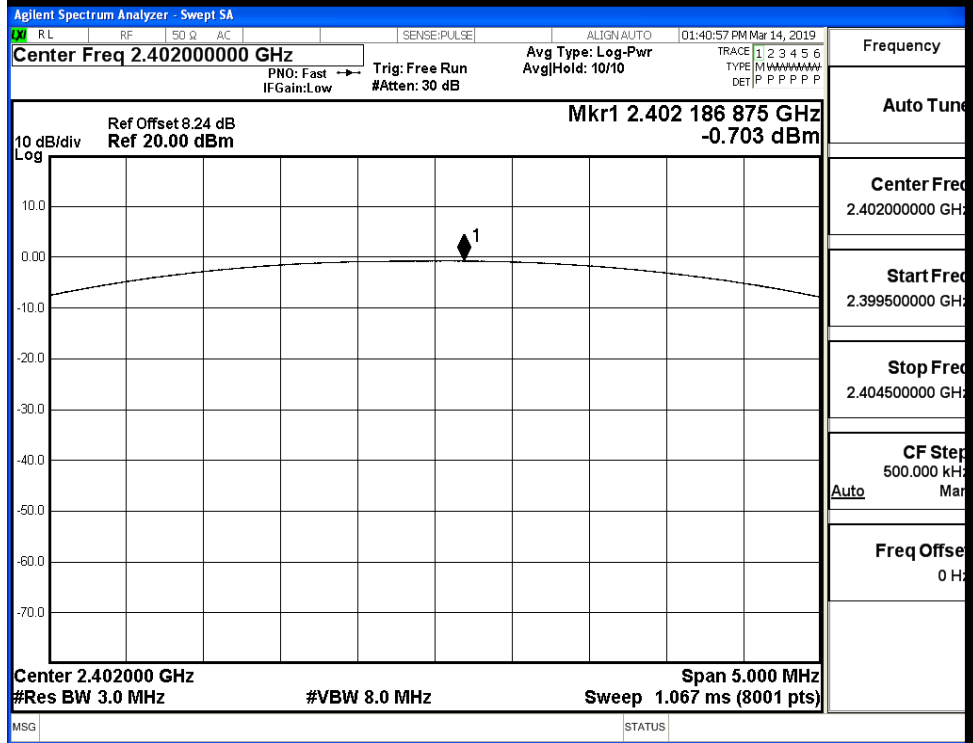
Temperature:	24.5 ° C
Relative Humidity:	53.8%
ATM Pressure:	100.0 kPa
Test Engineer:	JERRY.Zeng
Supervised by:	Tom.Liu

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

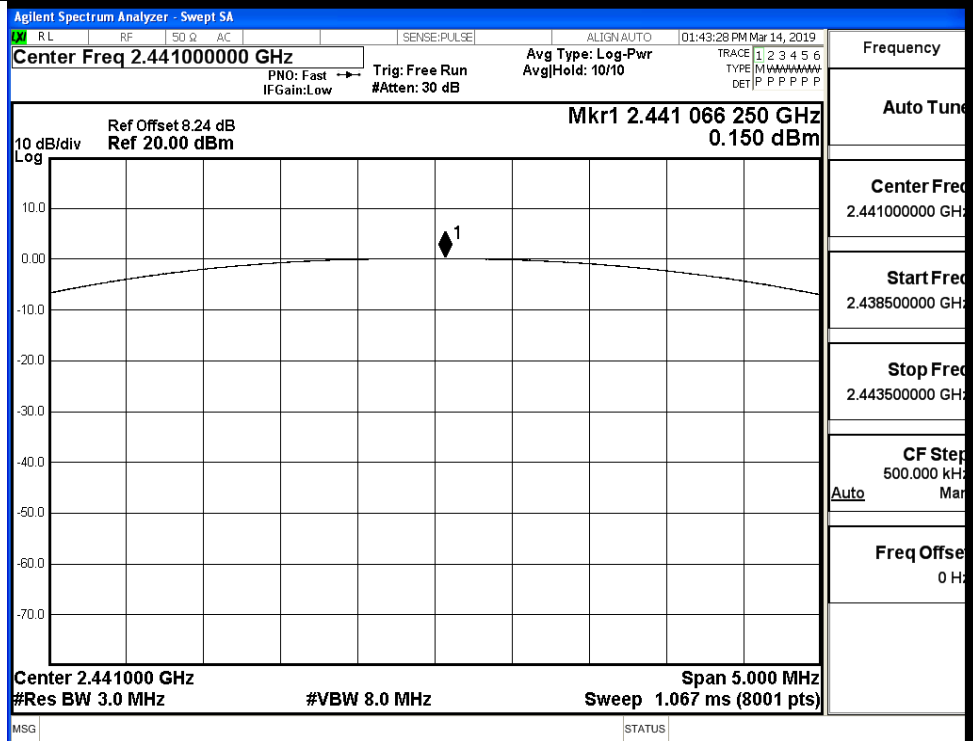
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.703	21	PASS
	MCH	0.150	21	PASS
	HCH	-0.828	21	PASS
$\pi/4$ DQPSK	LCH	-1.216	21	PASS
	MCH	-0.474	21	PASS
	HCH	-1.513	21	PASS
8DPSK	LCH	-1.121	21	PASS
	MCH	-0.310	21	PASS
	HCH	-1.348	21	PASS

Test Graphs

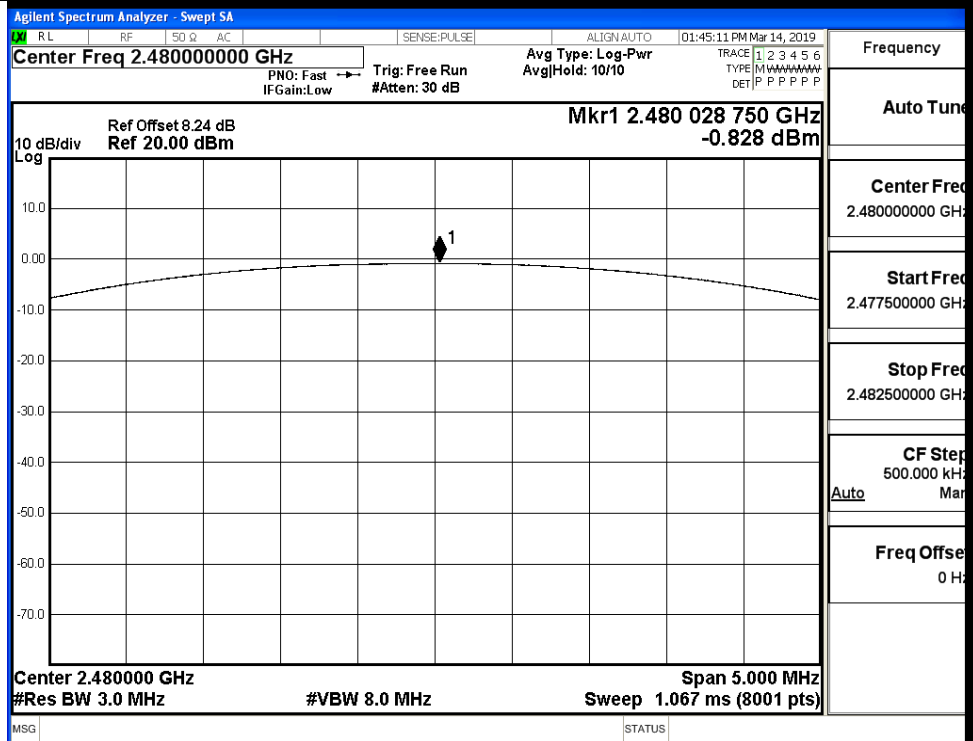
GFSK/LCH



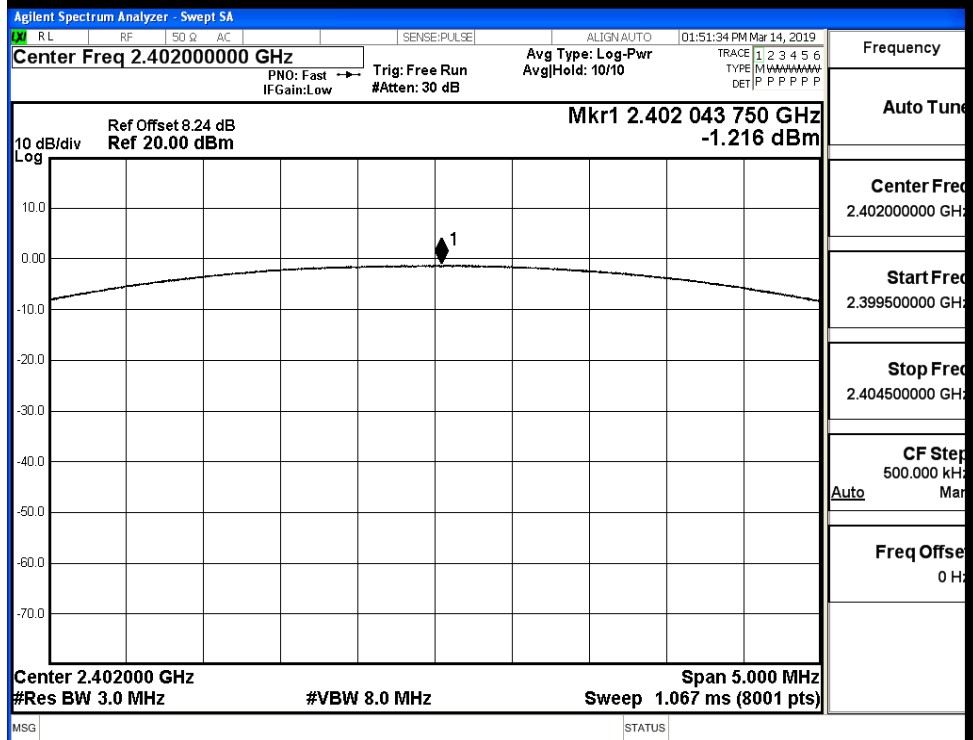
GFSK/MCH



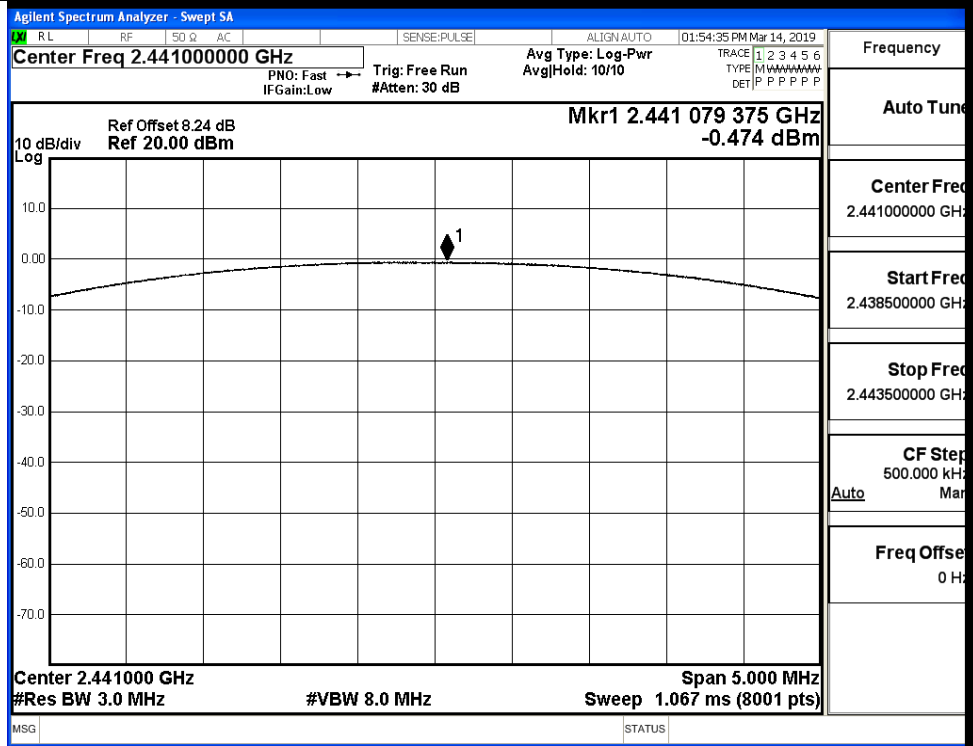
GFSK/HCH



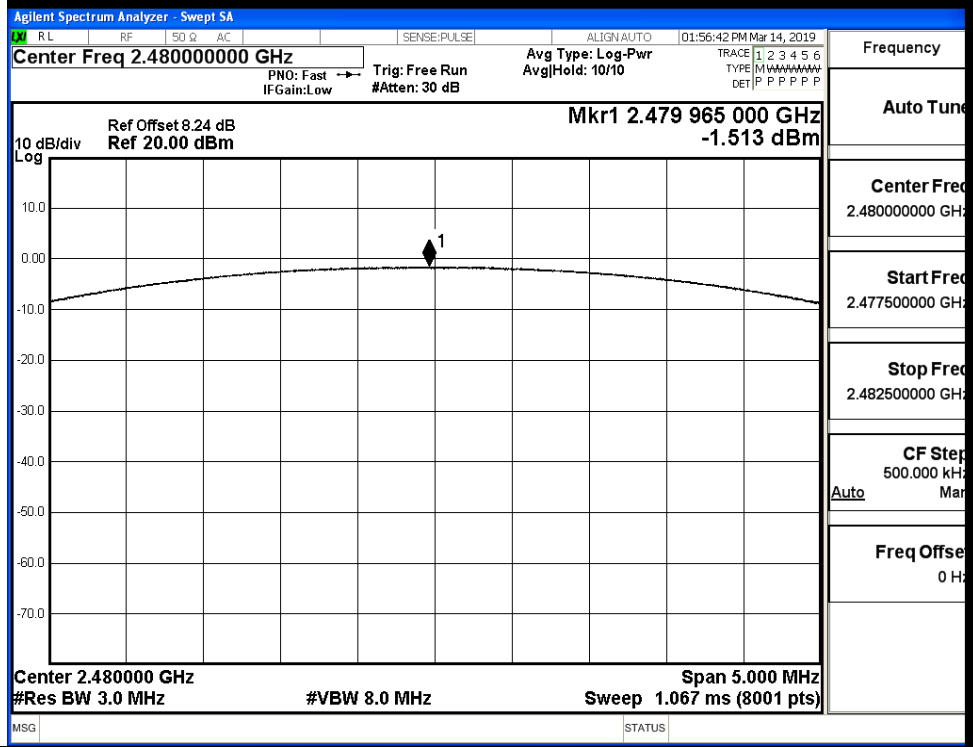
$\pi$ /4DQPSK/LCH



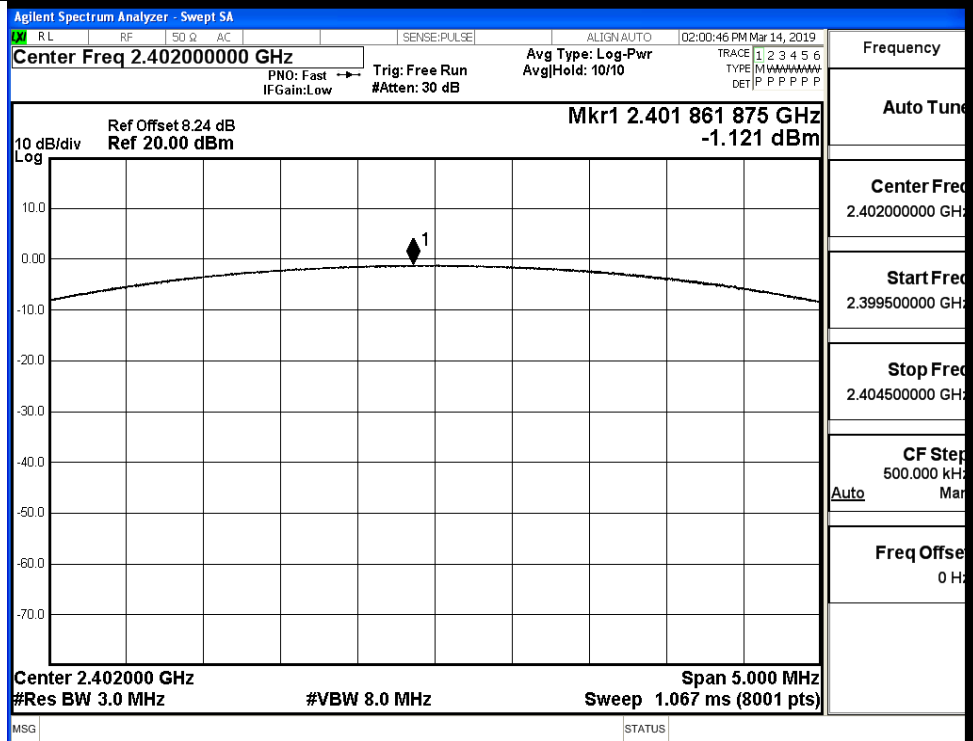
$\pi$ /4DQPSK/MCH



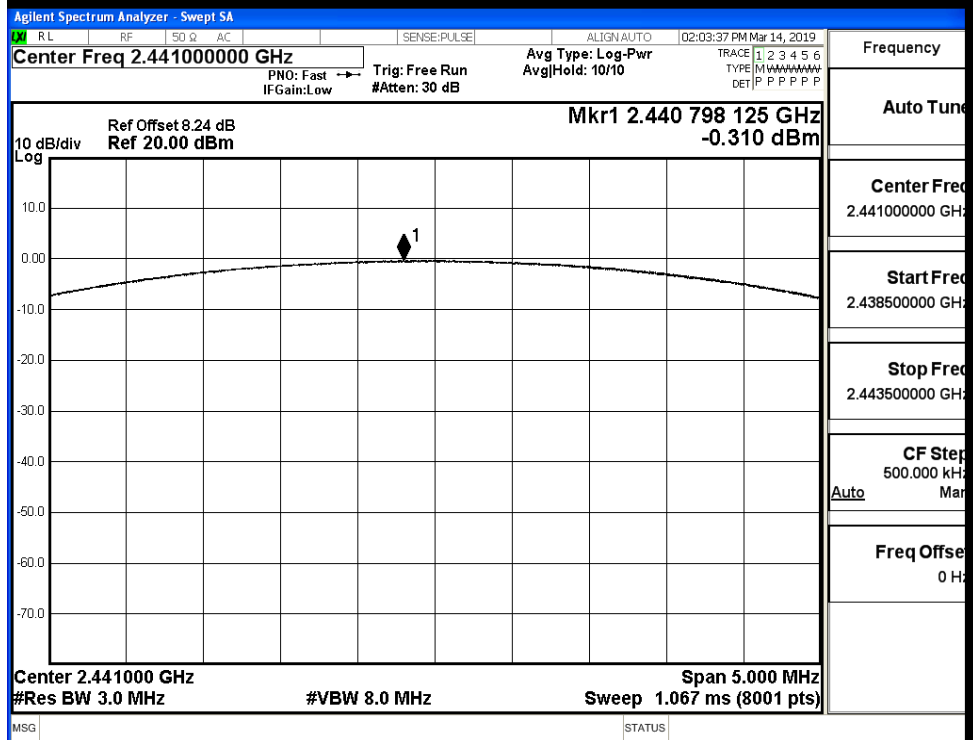
$\pi$ /4DQPSK/HCH



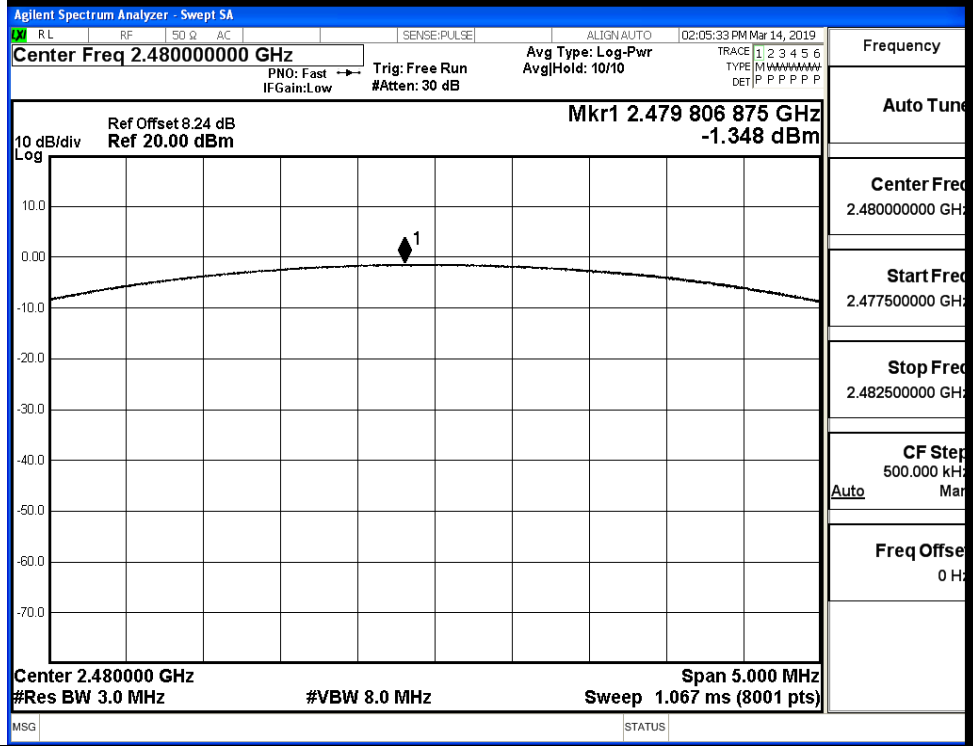
8DPSK/LCH



8DPSK/MCH

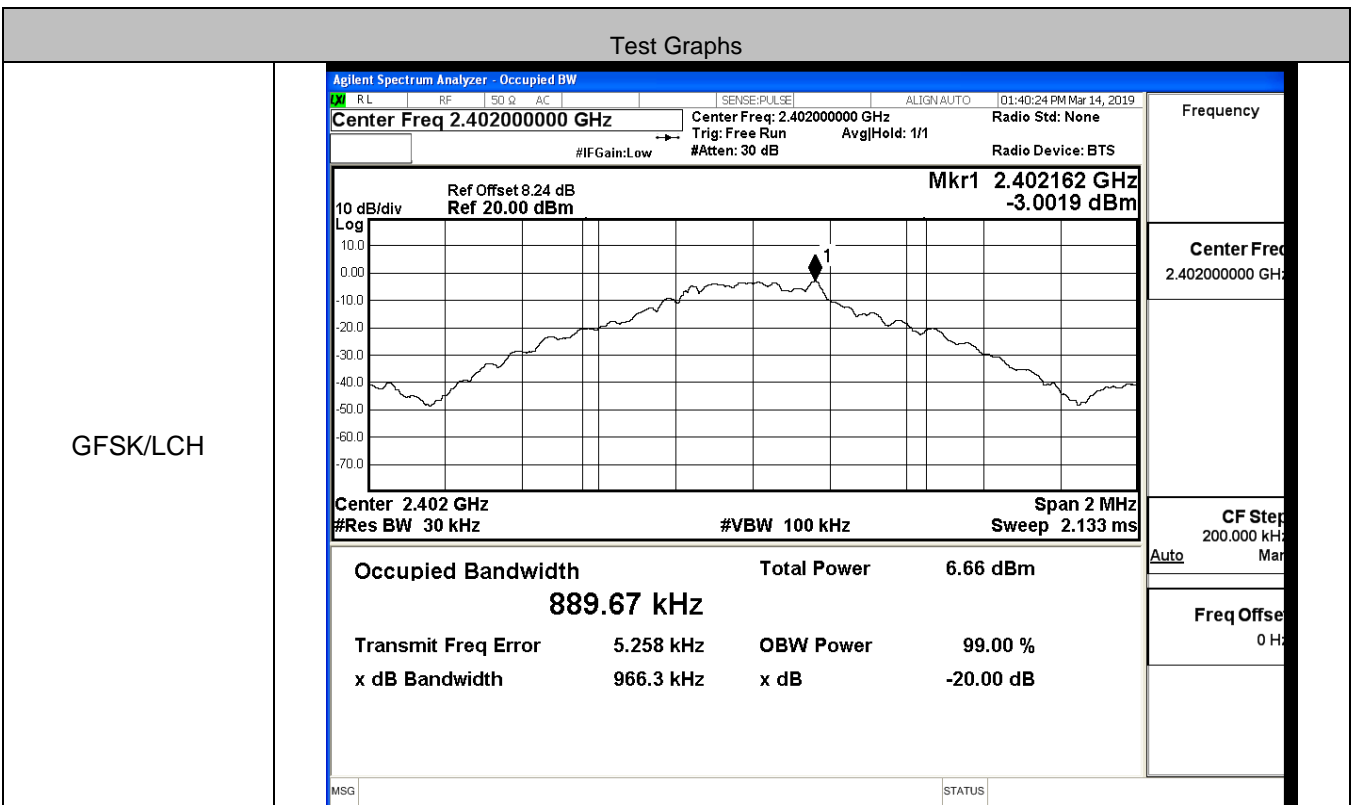


8DPSK/HCH

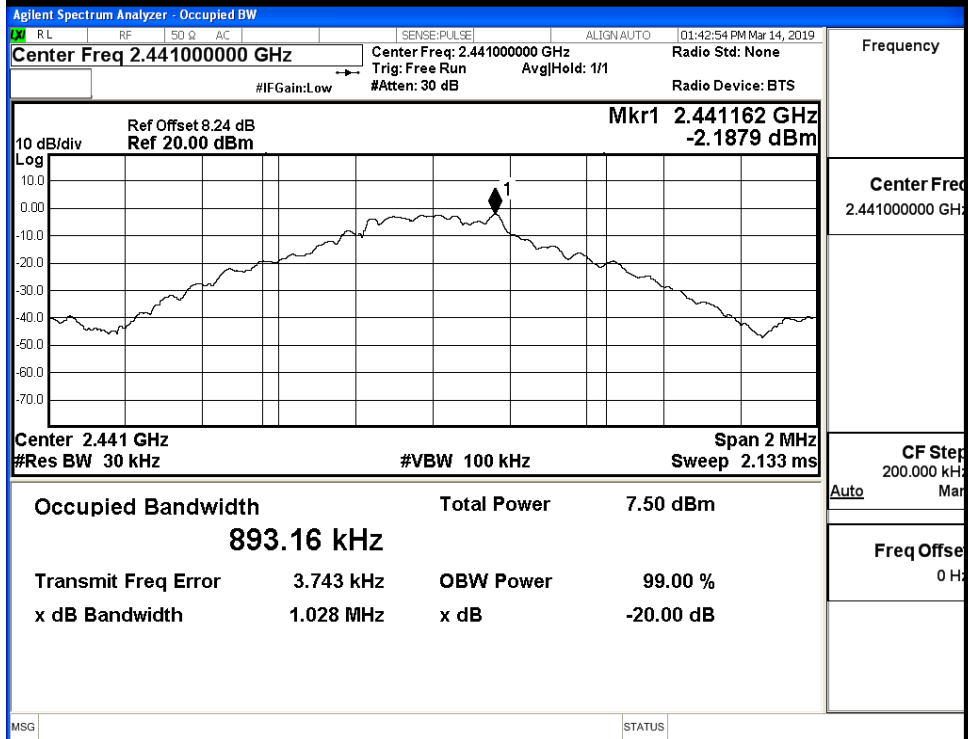


**A.2 99% and 20dB Bandwidth**

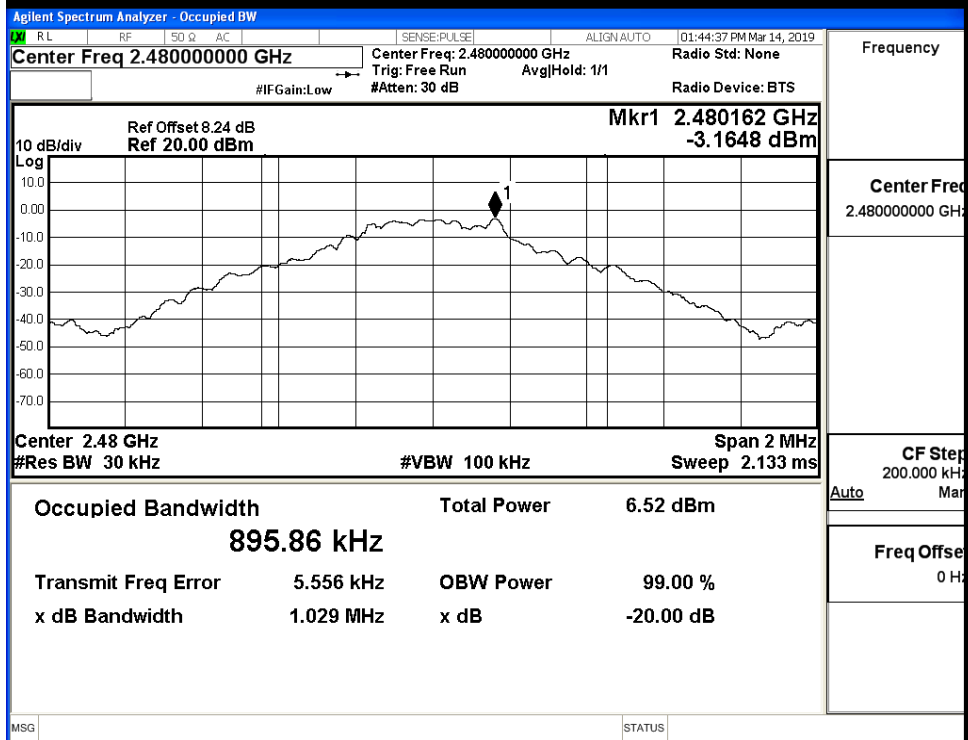
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.88967	0.9663	Not Specified	PASS
	MCH	0.89316	1.028	Not Specified	PASS
	HCH	0.89586	1.029	Not Specified	PASS
π/4DQPSK	LCH	1.1793	1.292	Not Specified	PASS
	MCH	1.1747	1.306	Not Specified	PASS
	HCH	1.1735	1.291	Not Specified	PASS
8DPSK	LCH	1.1888	1.296	Not Specified	PASS
	MCH	1.1880	1.296	Not Specified	PASS
	HCH	1.1870	1.302	Not Specified	PASS



GFSK/MCH

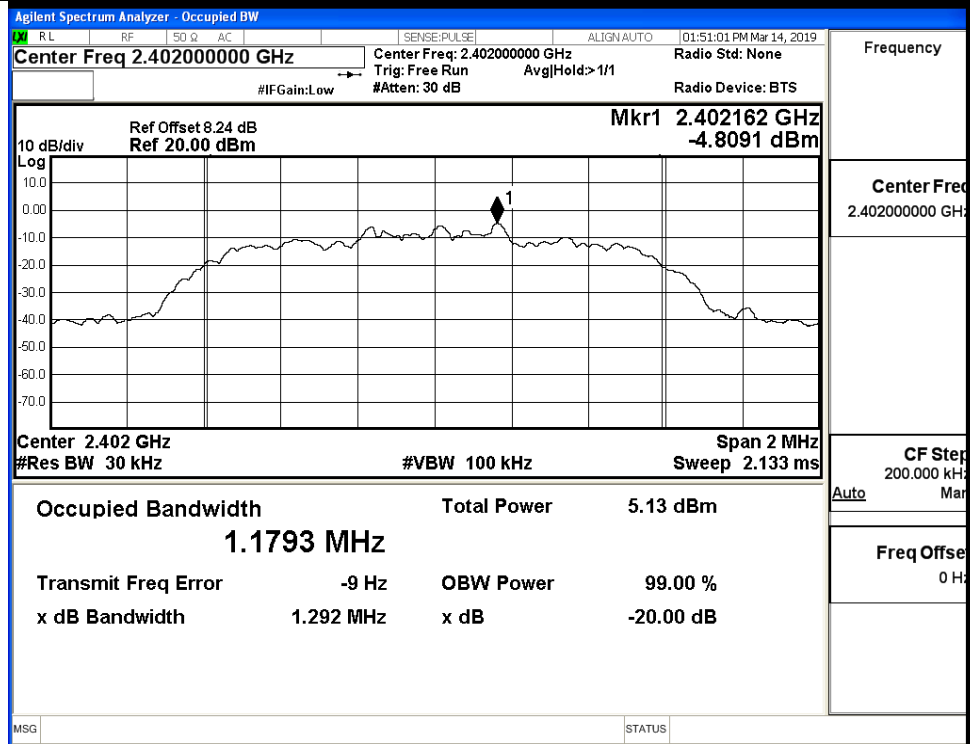


GFSK/HCH

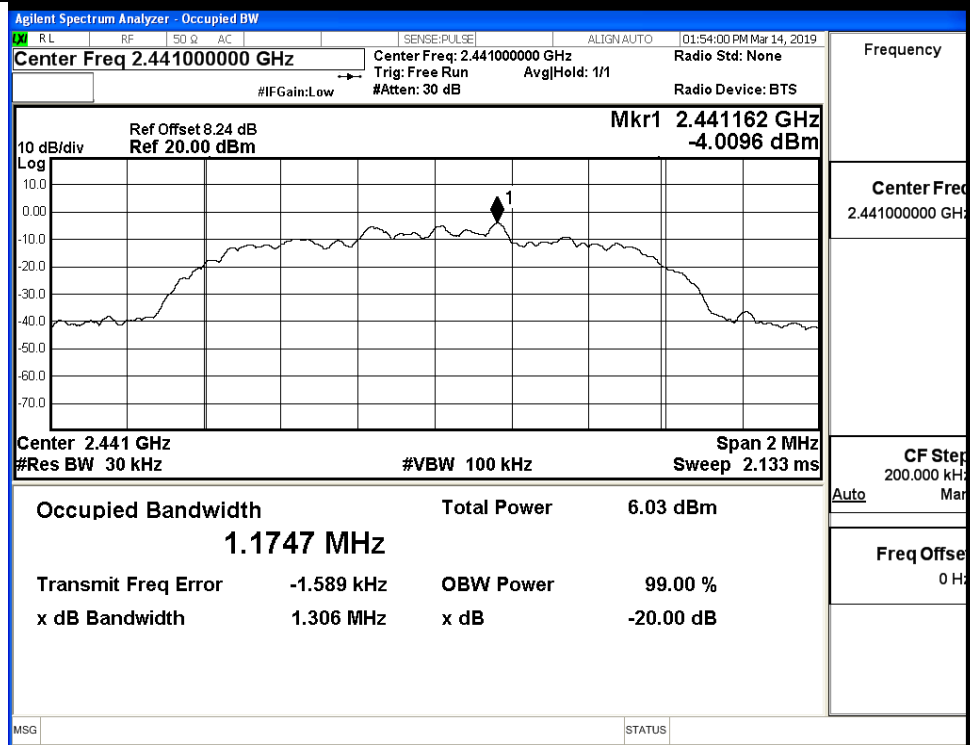




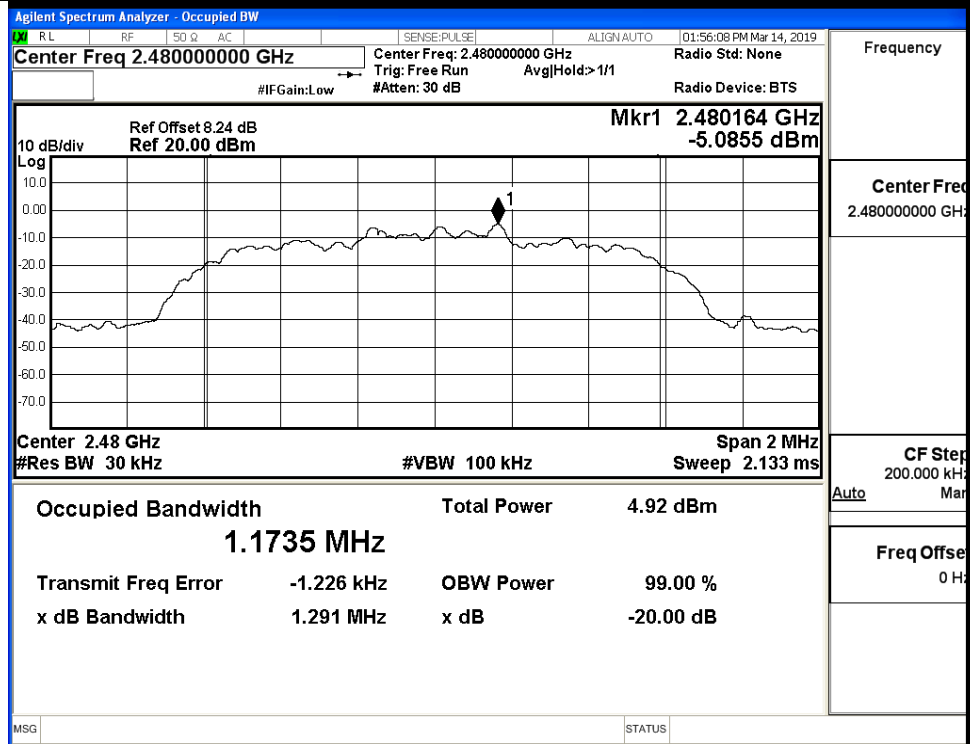
$\pi/4$ DQPSK/LCH



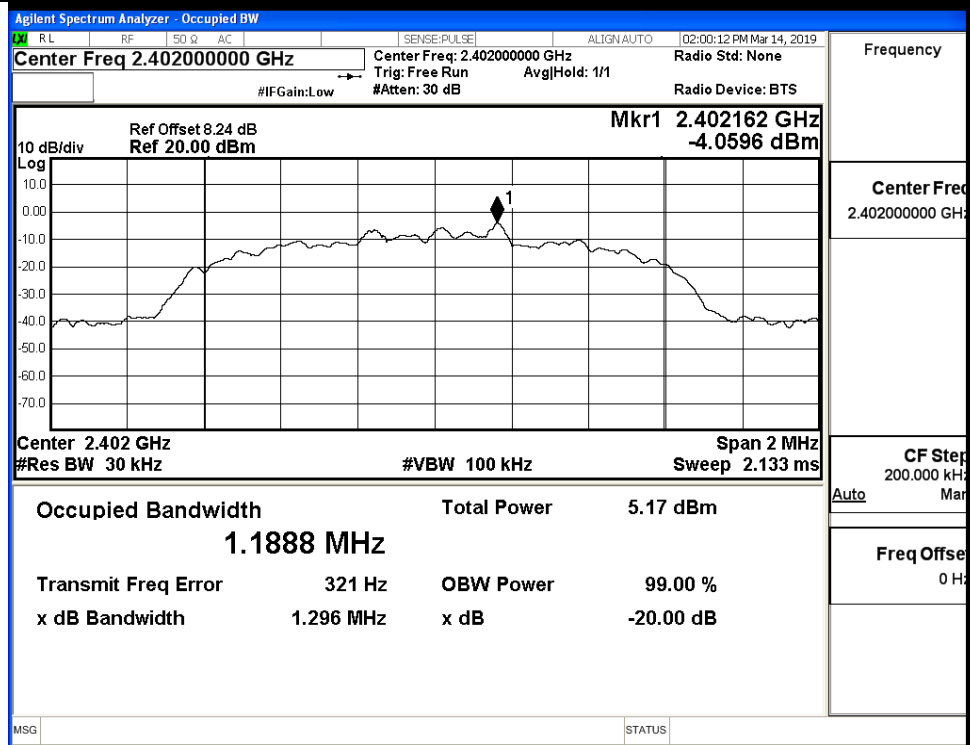
$\pi/4$ DQPSK/MCH



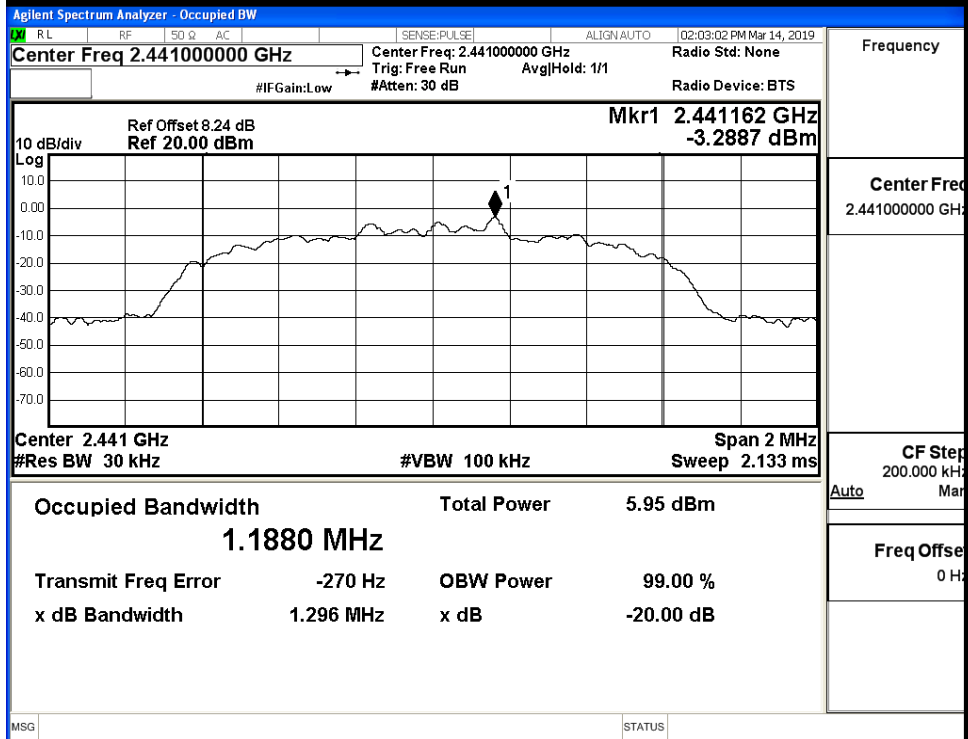
$\pi/4$ DQPSK/HCH



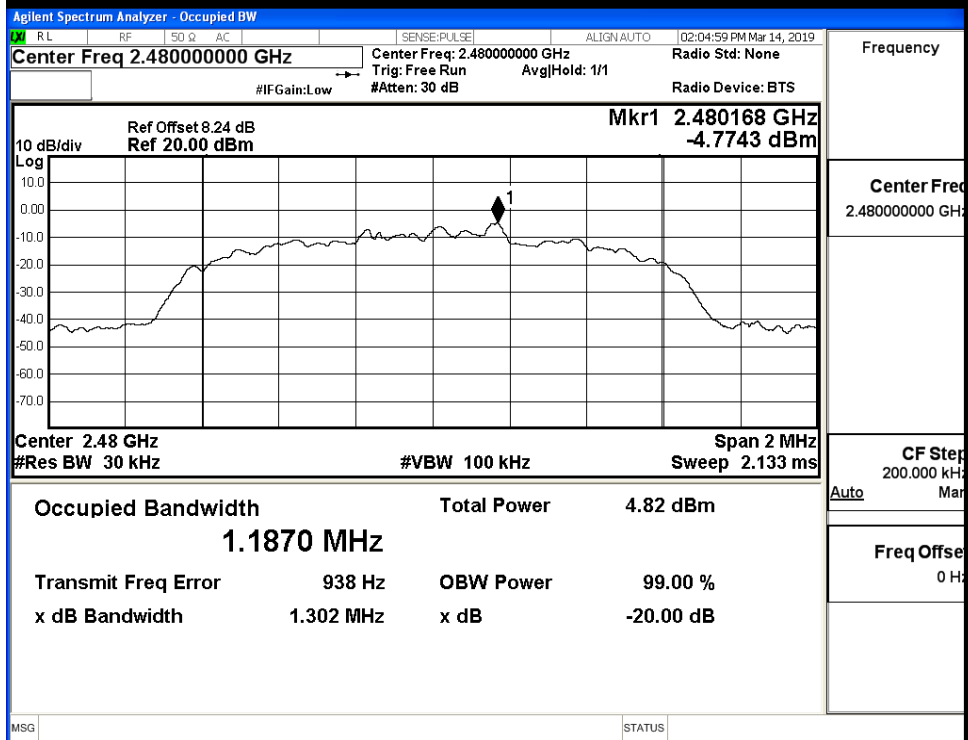
8DPSK/LCH



8DPSK/MCH

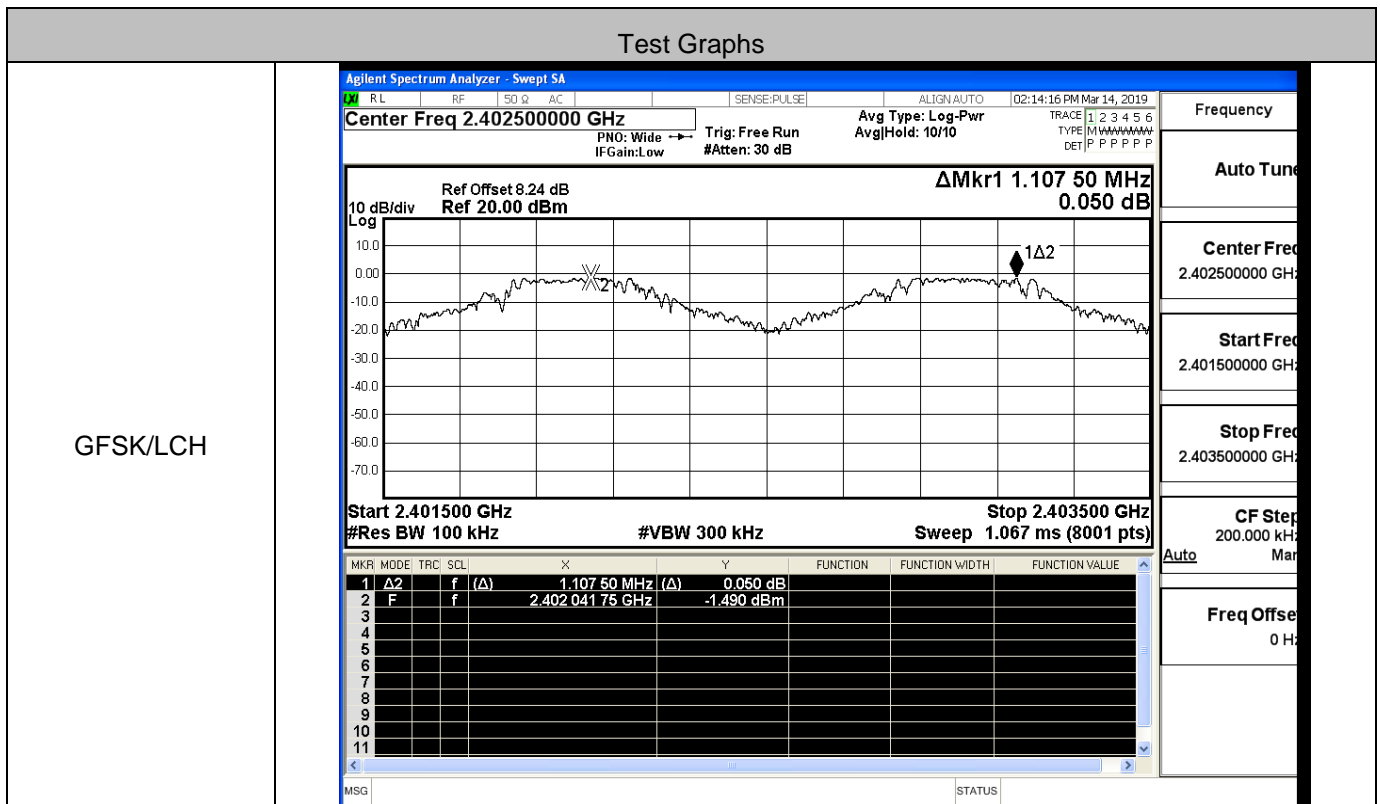


8DPSK/HCH

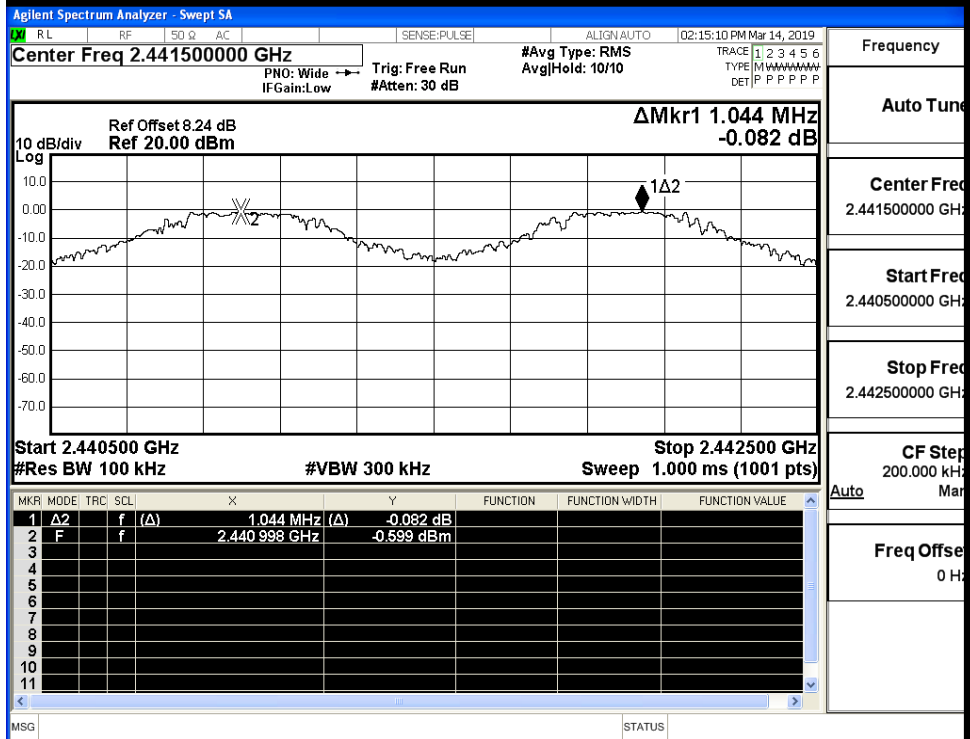


### A.3 Carrier Frequency Separation

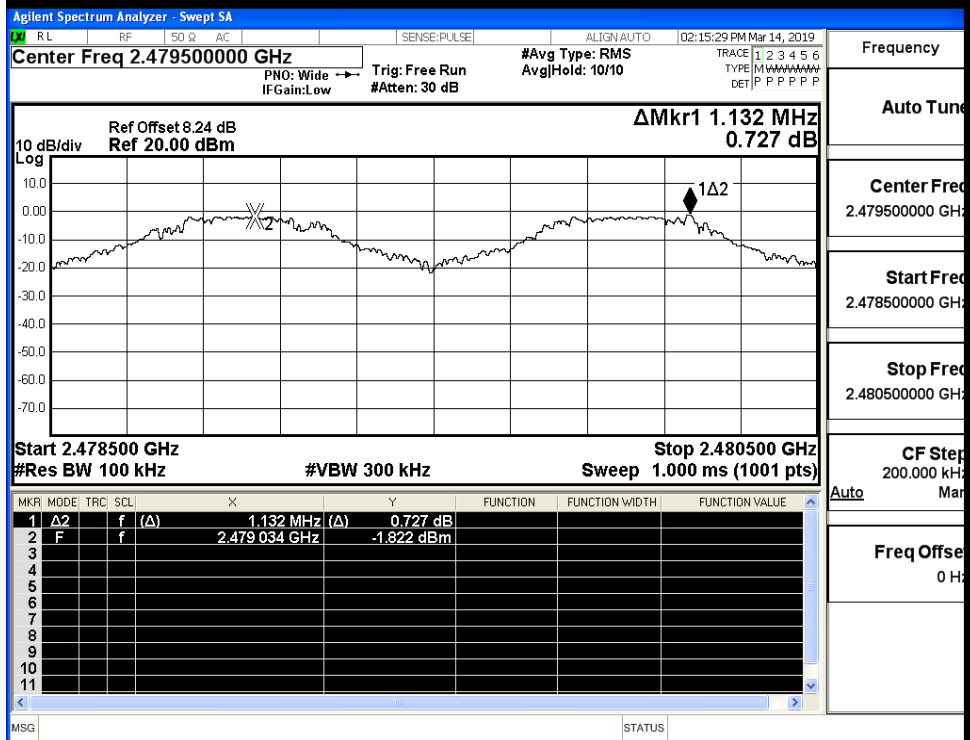
Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.108	0.686	PASS
	MCH	1.044	0.686	PASS
	HCH	1.132	0.686	PASS
π/4DQPSK	LCH	1.076	0.871	PASS
	MCH	0.926	0.871	PASS
	HCH	0.972	0.871	PASS
8DPSK	LCH	0.926	0.868	PASS
	MCH	1.238	0.868	PASS
	HCH	1.250	0.868	PASS



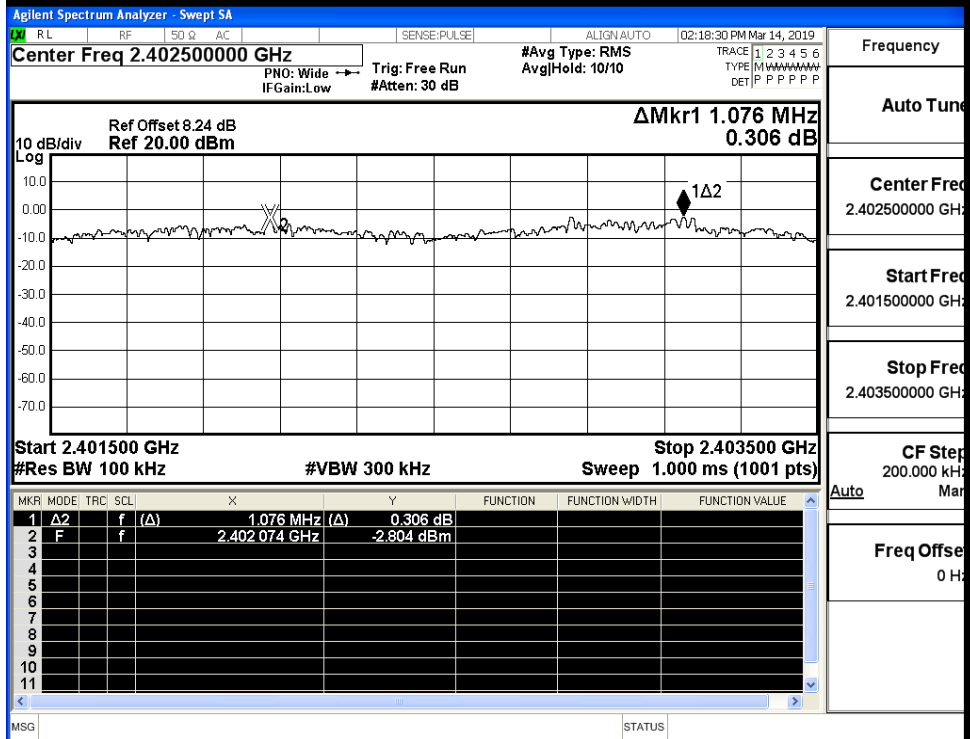
GFSK/MCH



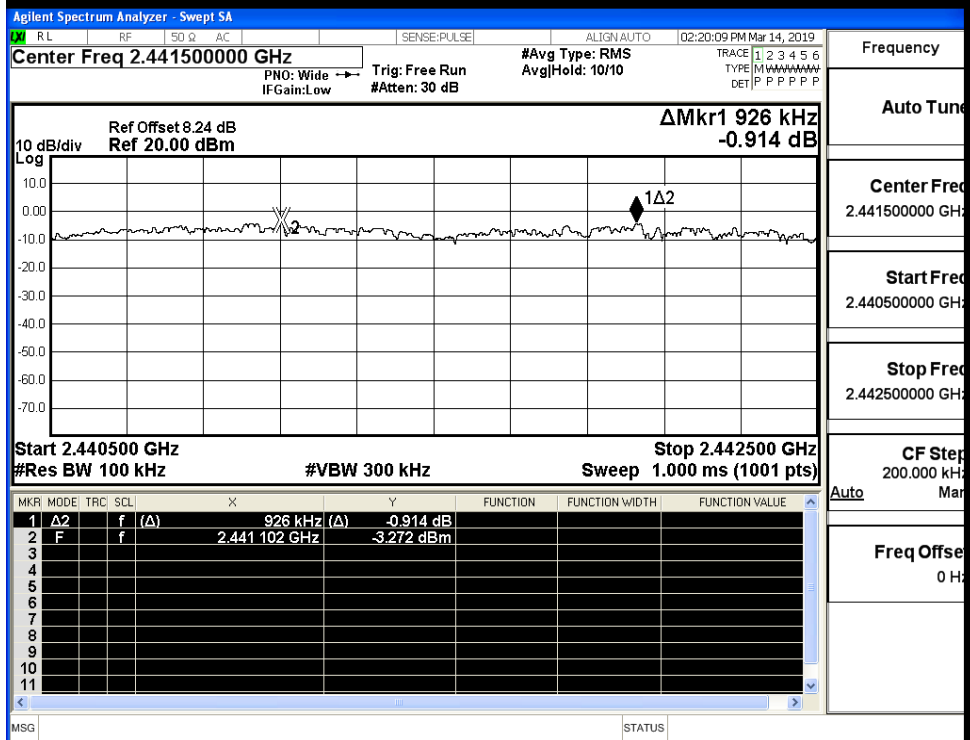
GFSK/HCH



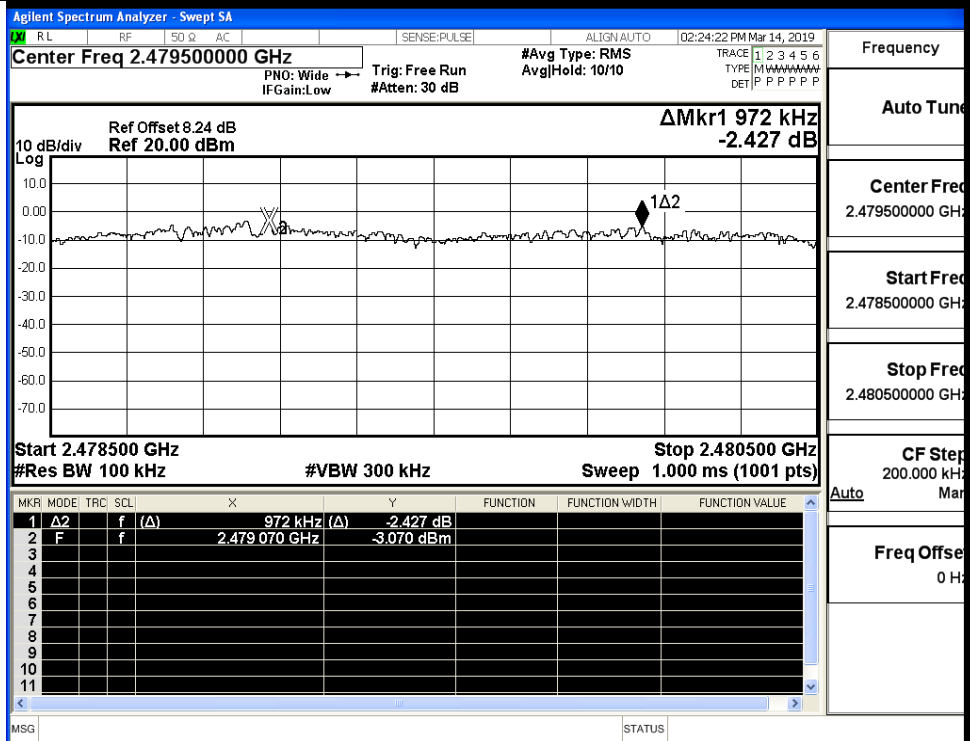
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



π/4DQPSK/HCH



Frequency

Auto Tune

Center Freq  
2.479500000 GHz

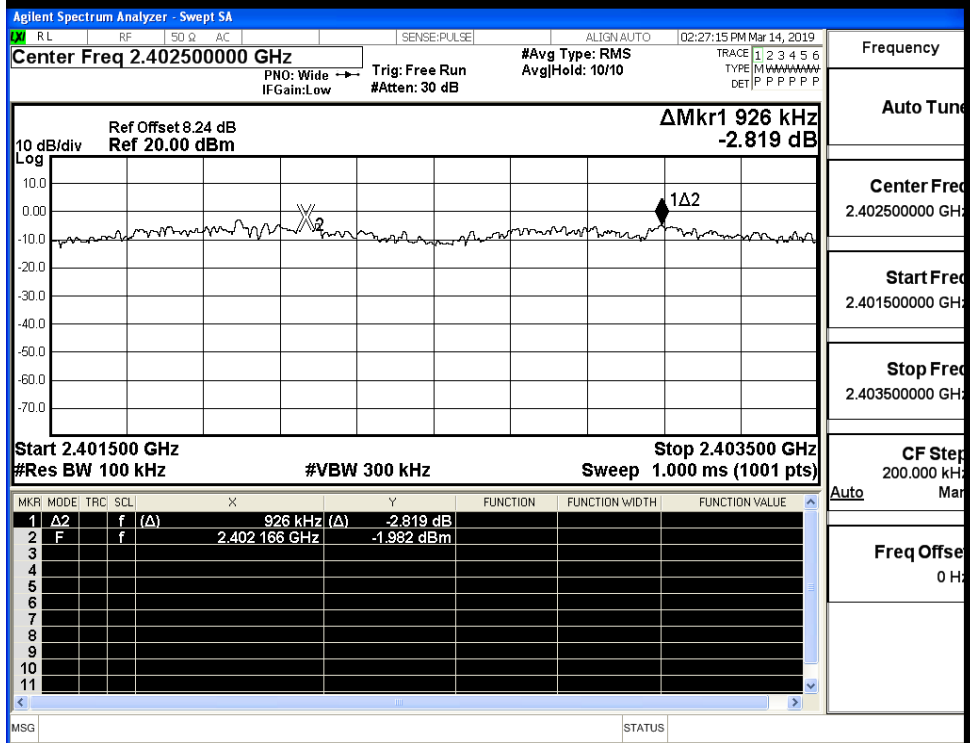
Start Freq  
2.478500000 GHz

Stop Freq  
2.480500000 GHz

CF Step  
200.000 kHz

Freq Offse  
0 Hz

8DPSK/LCH



Frequency

Auto Tune

Center Freq  
2.402500000 GHz

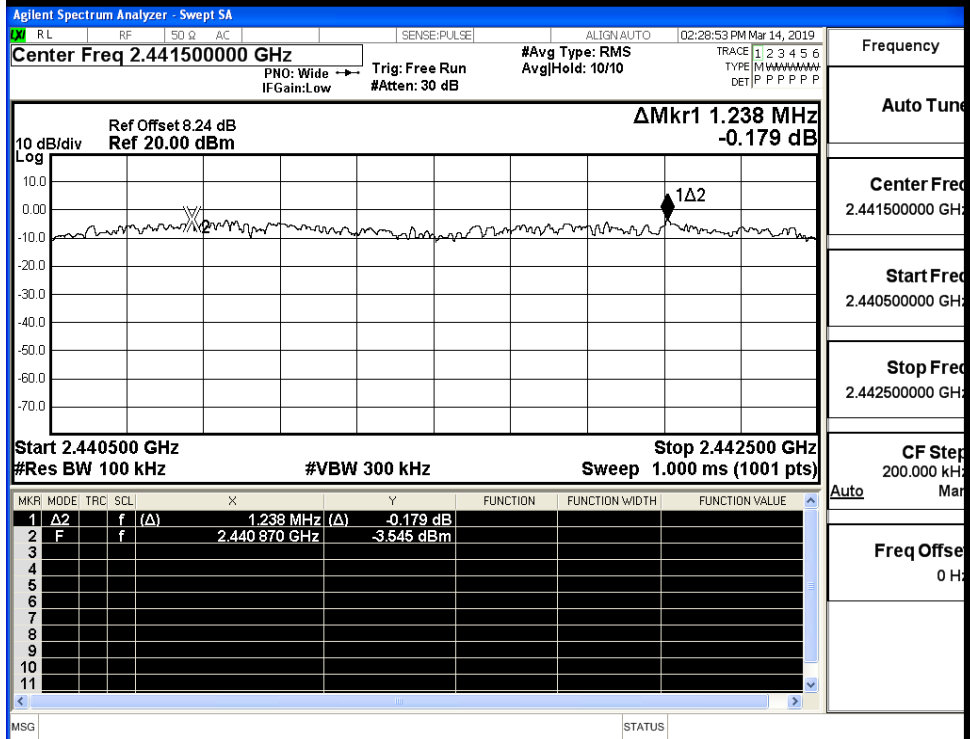
Start Freq  
2.401500000 GHz

Stop Freq  
2.403500000 GHz

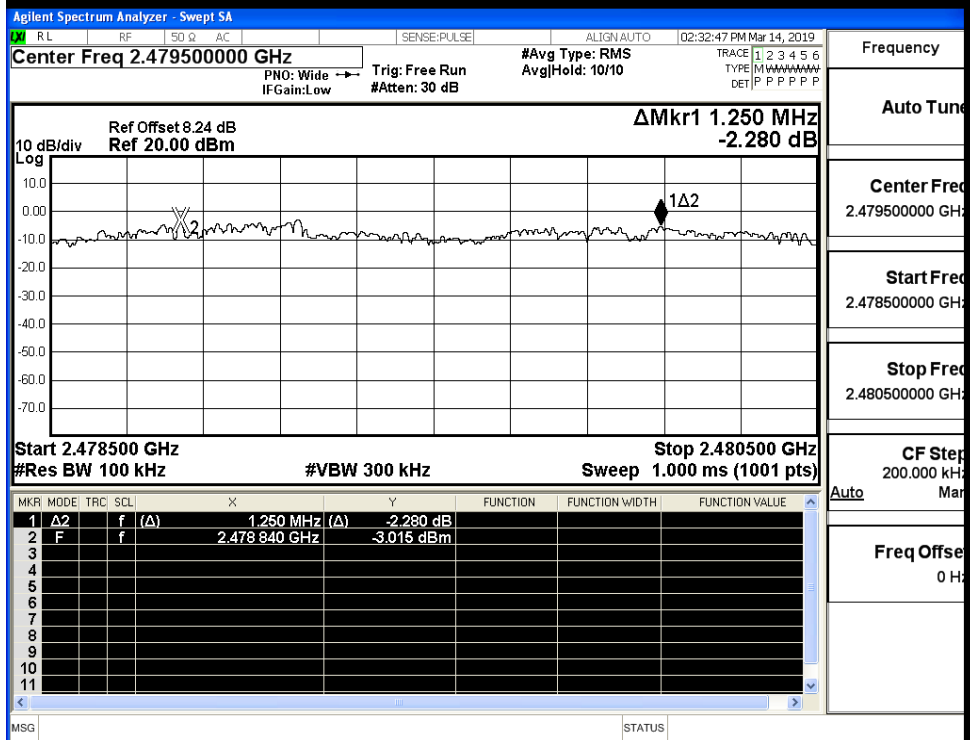
CF Step  
200.000 kHz

Freq Offse  
0 Hz

8DPSK/MCH



8DPSK/HCH



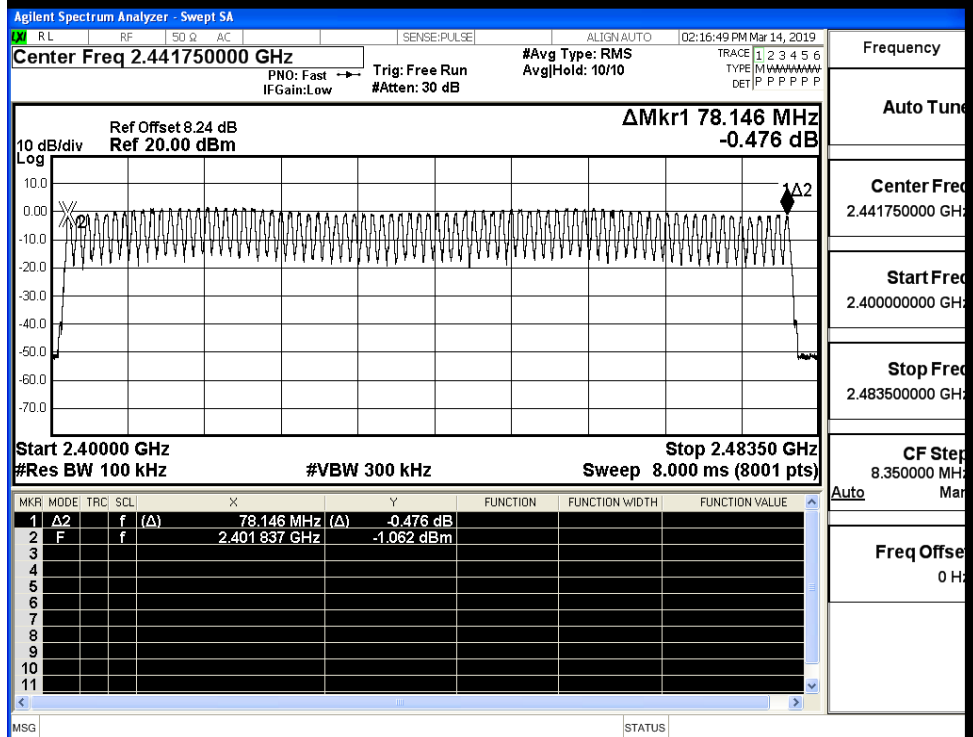


### A.4 Hopping Channel Number

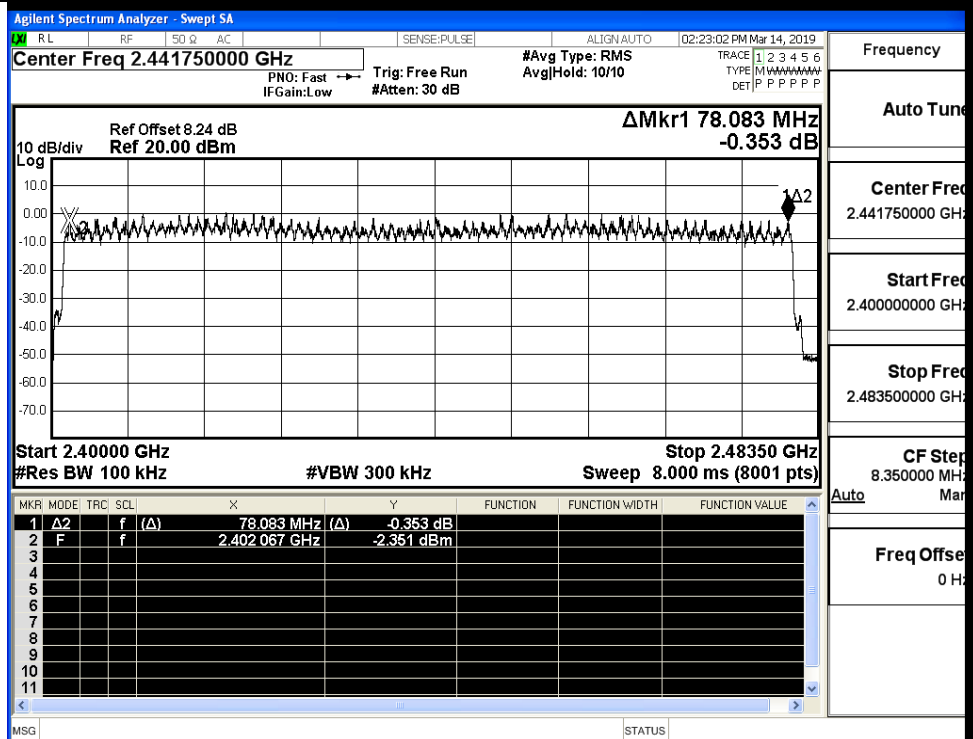
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

#### Test Graphs

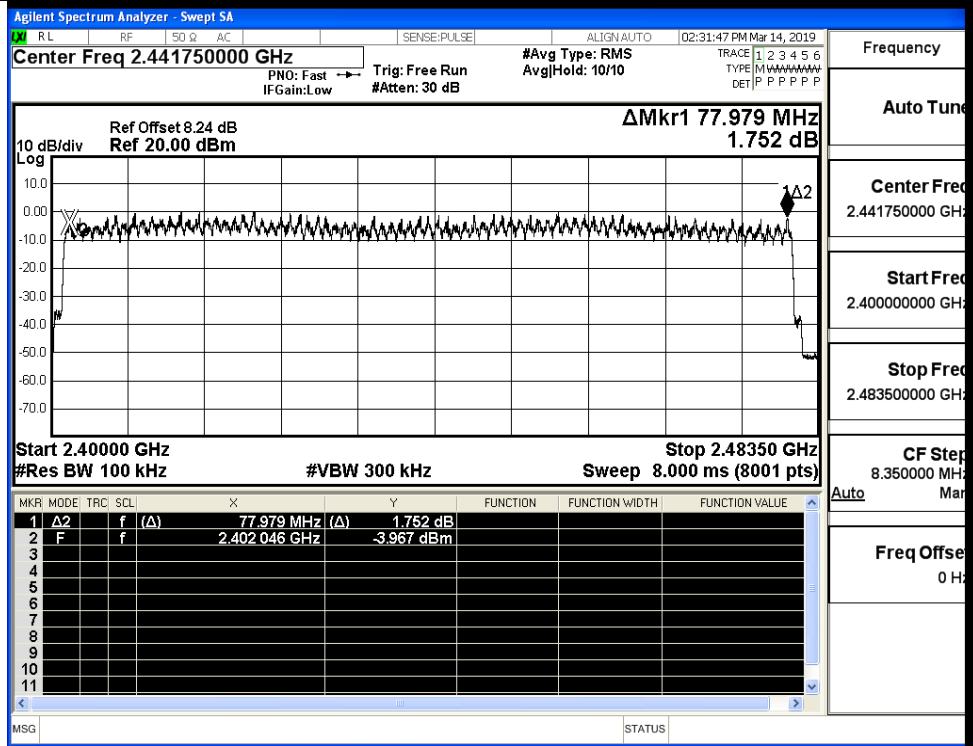
GFSK/Hop



$\pi/4$ DQPSK/Hop

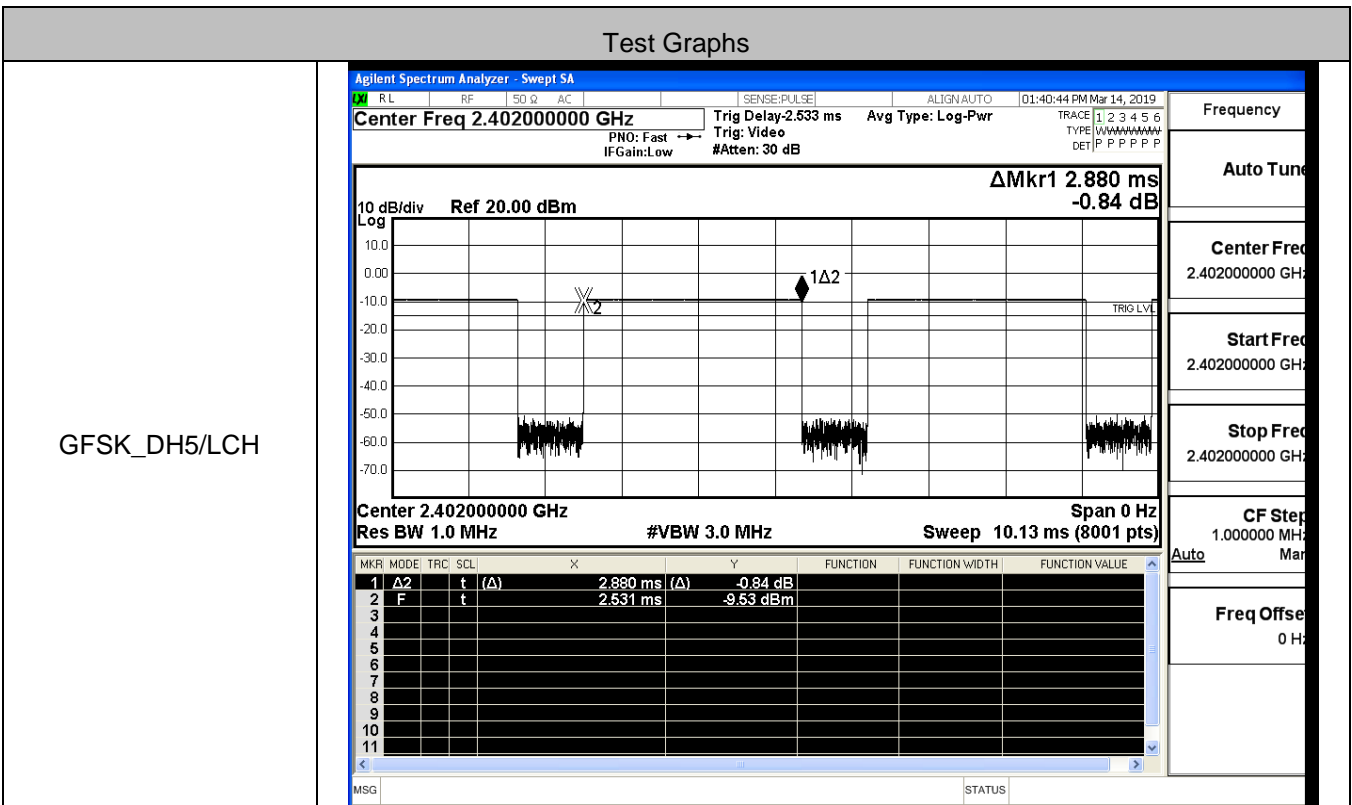


8DPSK/Hop

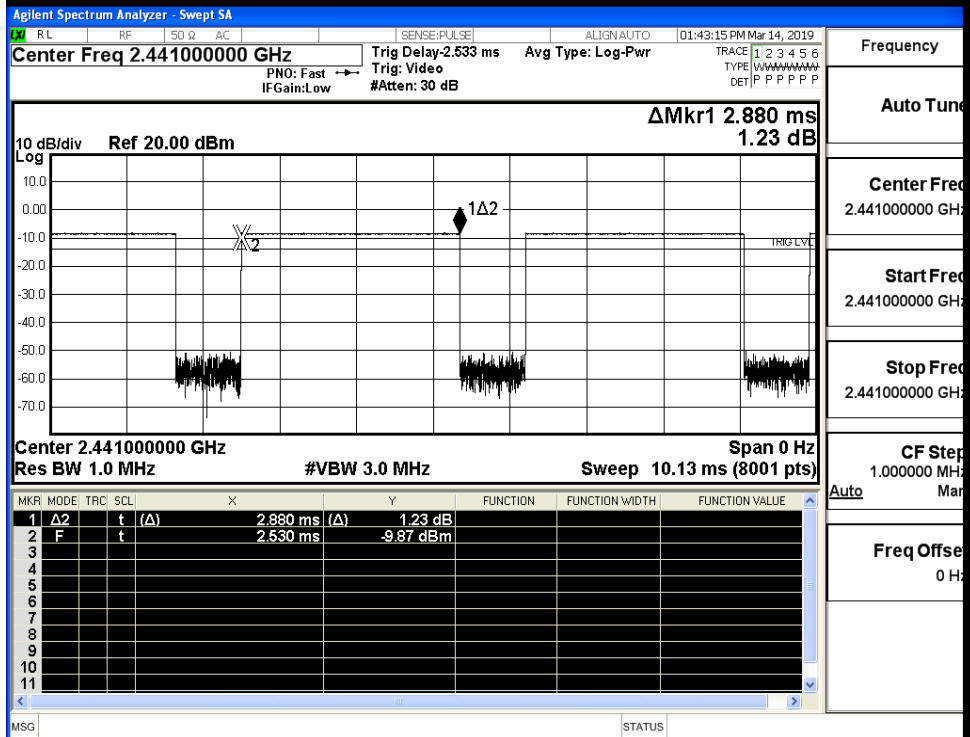


**A.5 Dwell Time**

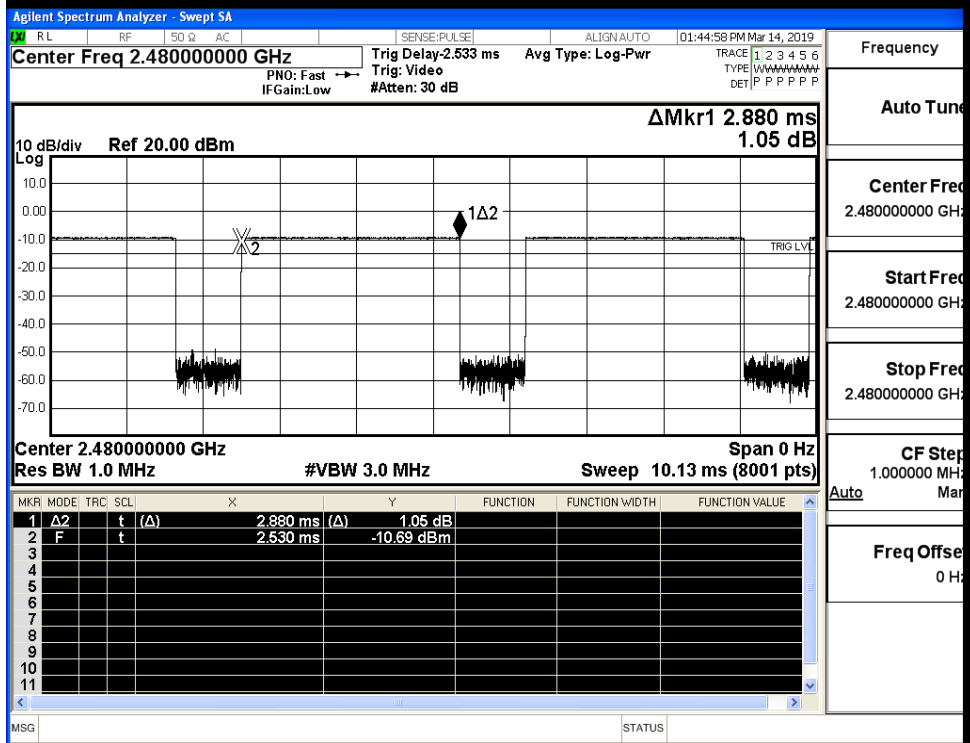
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.89	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



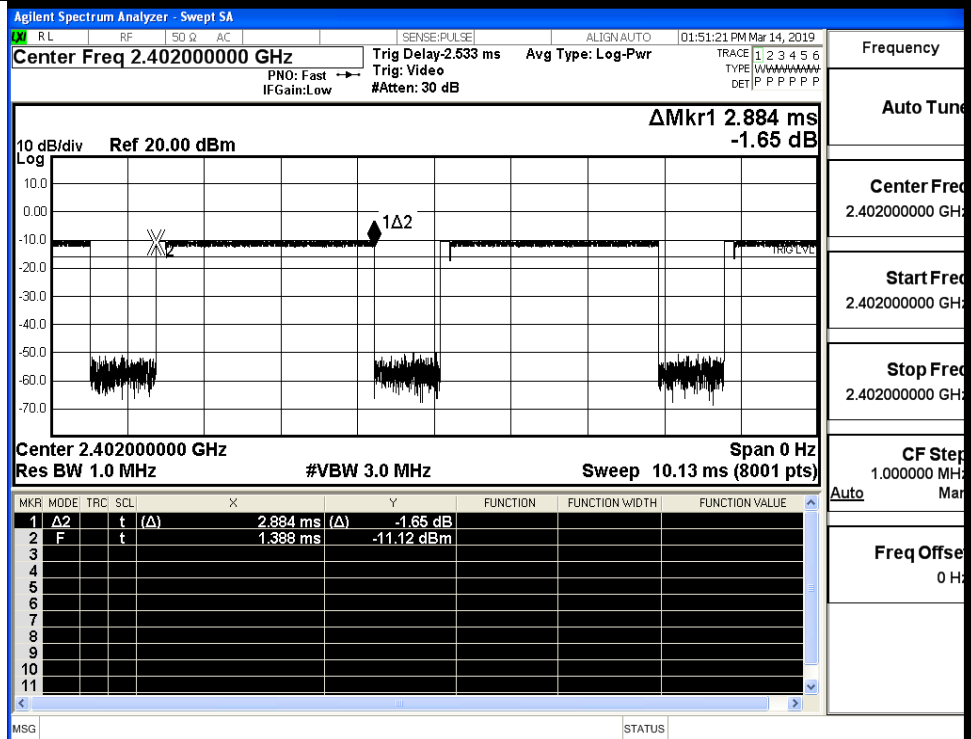
GFSK\_DH5/MCH



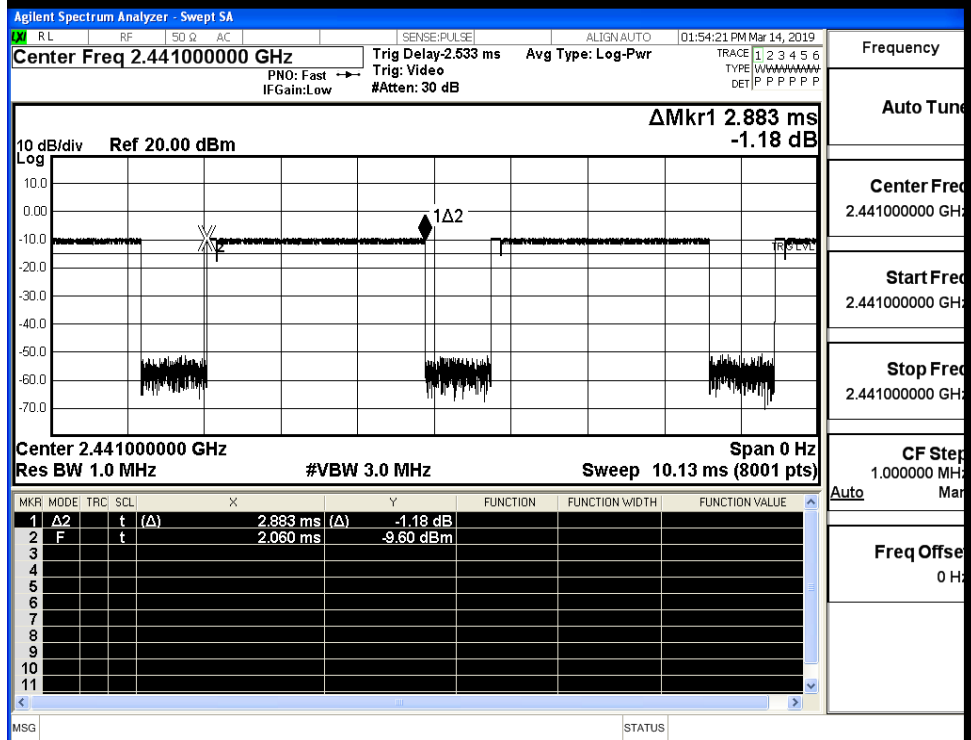
GFSK\_DH5/HCH



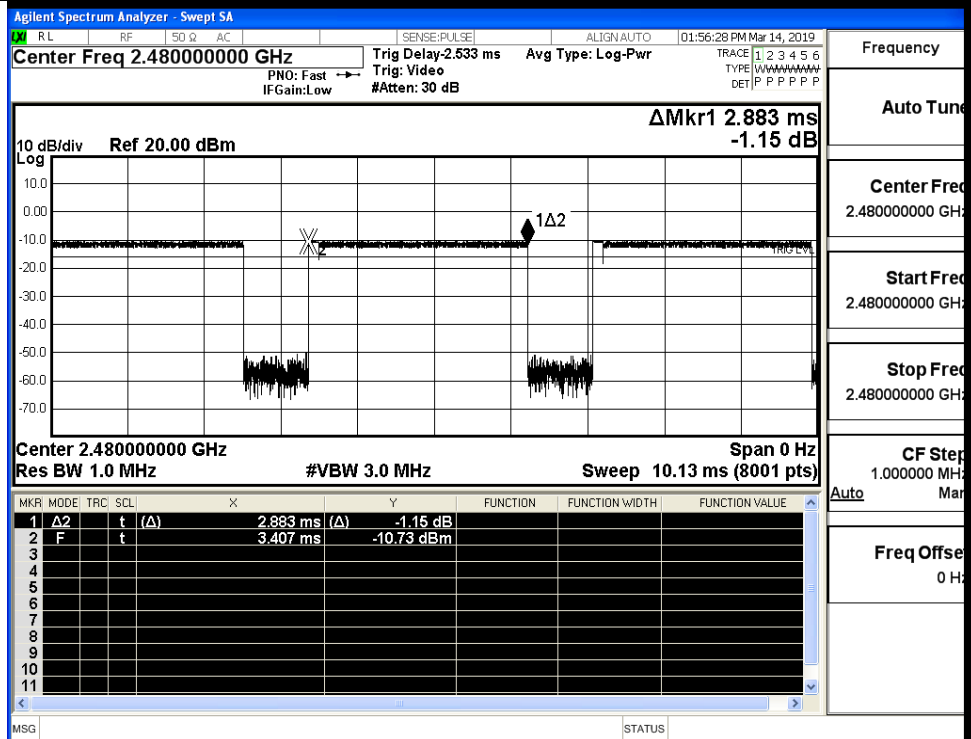
$\pi/4$ DQPSK  
\_2DH5/LCH



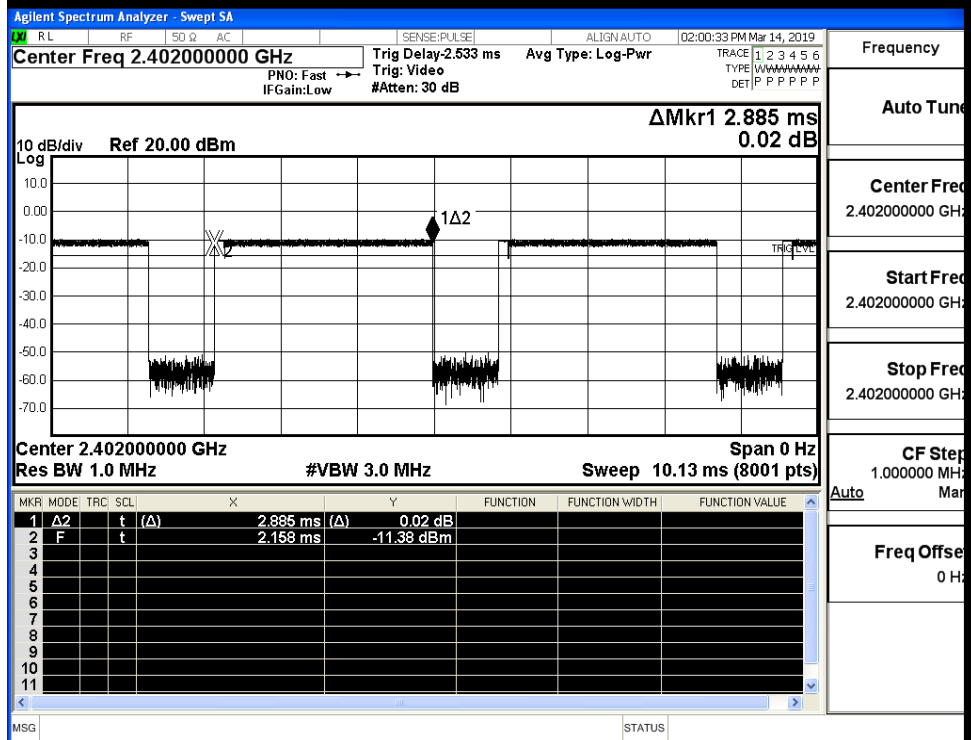
$\pi/4$ DQPSK  
\_2DH5/MCH



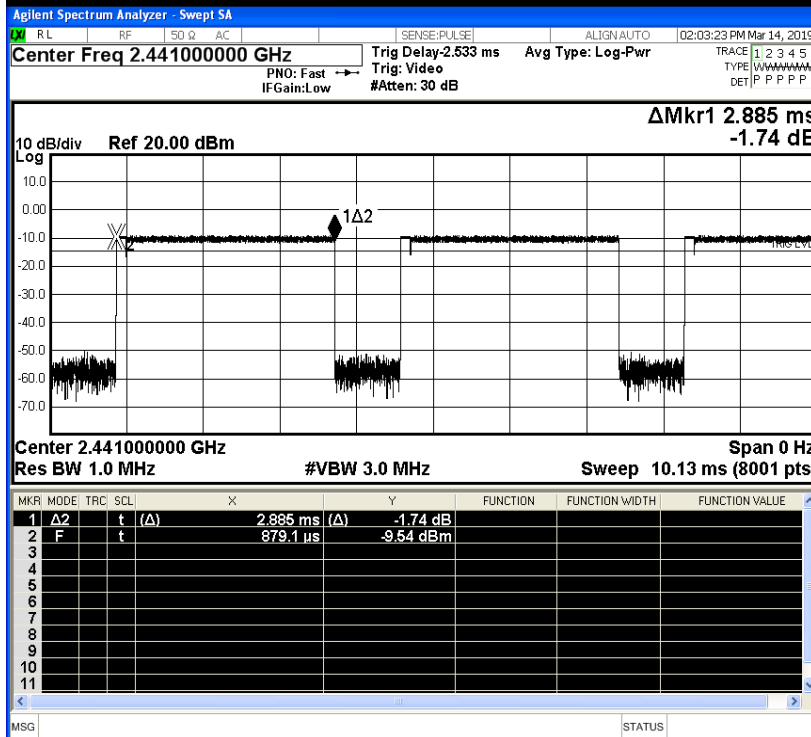
$\pi/4$ DQPSK  
\_2DH5/HCH



8DPSK\_3DH5/LCH

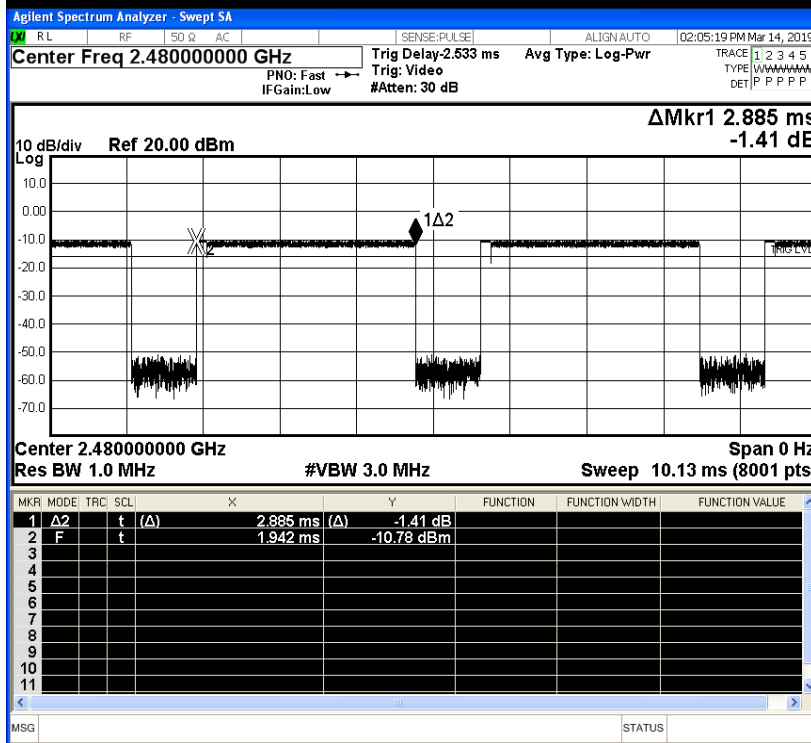


8DPSK\_3DH5/MCH



Frequency	
Auto Tune	
Center Freq	2.441000000 GHz
Start Freq	2.441000000 GHz
Stop Freq	2.441000000 GHz
CF Step	1.000000 MHz
Auto	Mar
Freq Offset	0 Hz

8DPSK\_3DH5/HCH



Frequency	
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Auto	Mar
Freq Offset	0 Hz

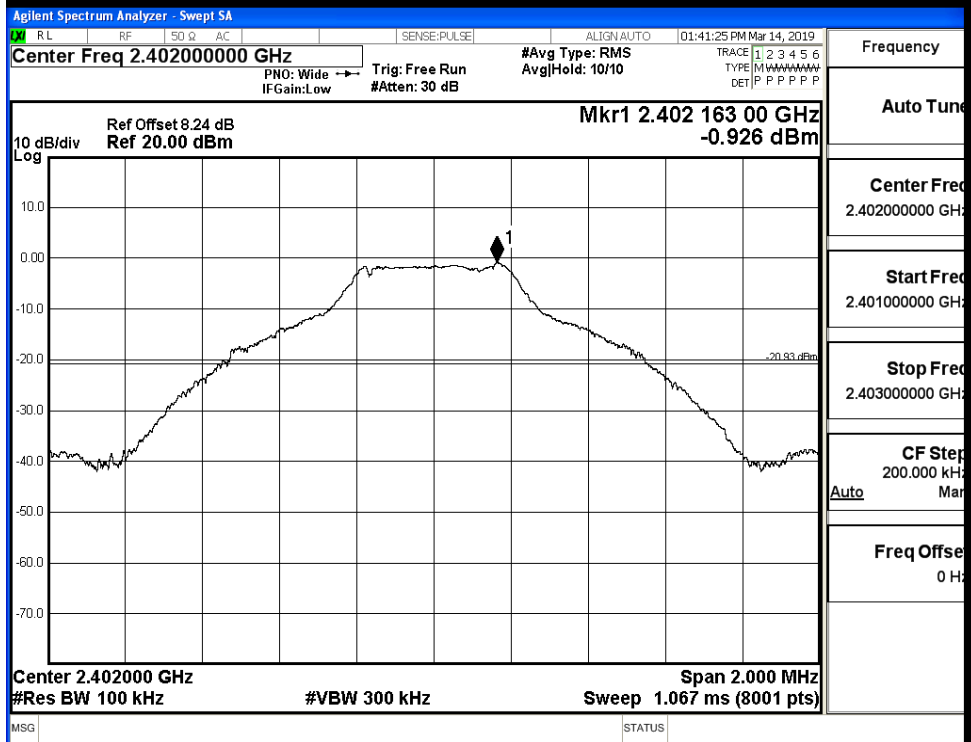
**A.6 RF Conducted Spurious Emissions**

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.926	-44.684	-20.926	PASS
	MCH	-0.091	-44.436	-20.091	PASS
	HCH	-1.065	-44.898	-21.065	PASS
$\pi/4$ DQPSK	LCH	-2.533	-45.144	-22.533	PASS
	MCH	-1.313	-44.905	-21.313	PASS
	HCH	-2.525	-43.556	-22.525	PASS
8DPSK	LCH	-2.121	-44.495	-22.121	PASS
	MCH	-1.345	-44.405	-21.345	PASS
	HCH	-2.326	-44.000	-22.326	PASS

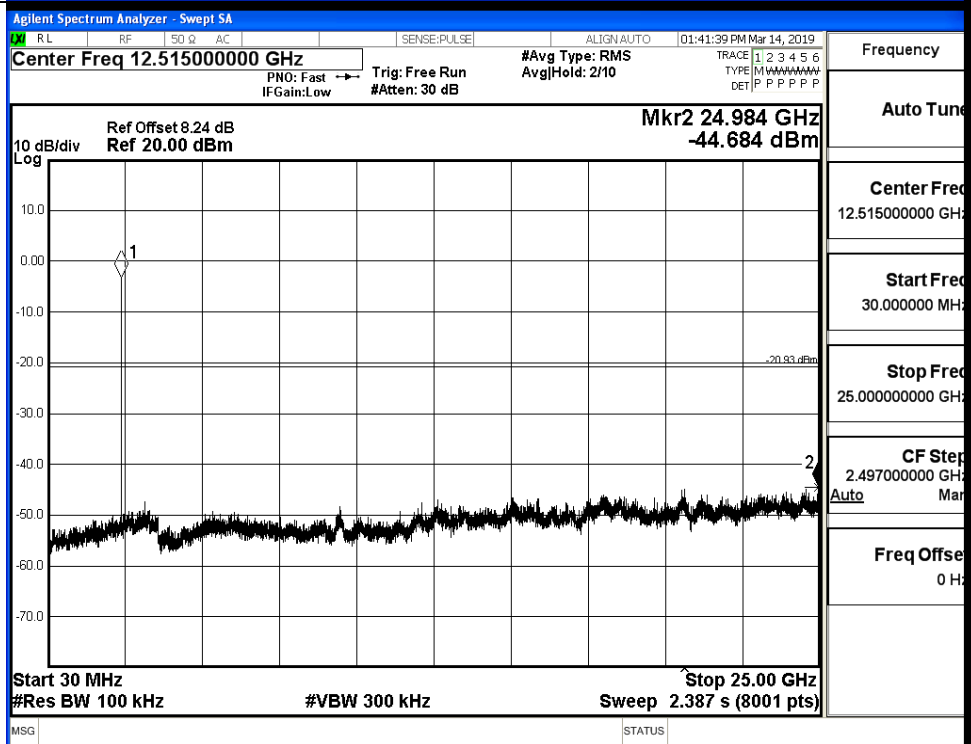


GFSK\_LCH\_Graphs

Pref

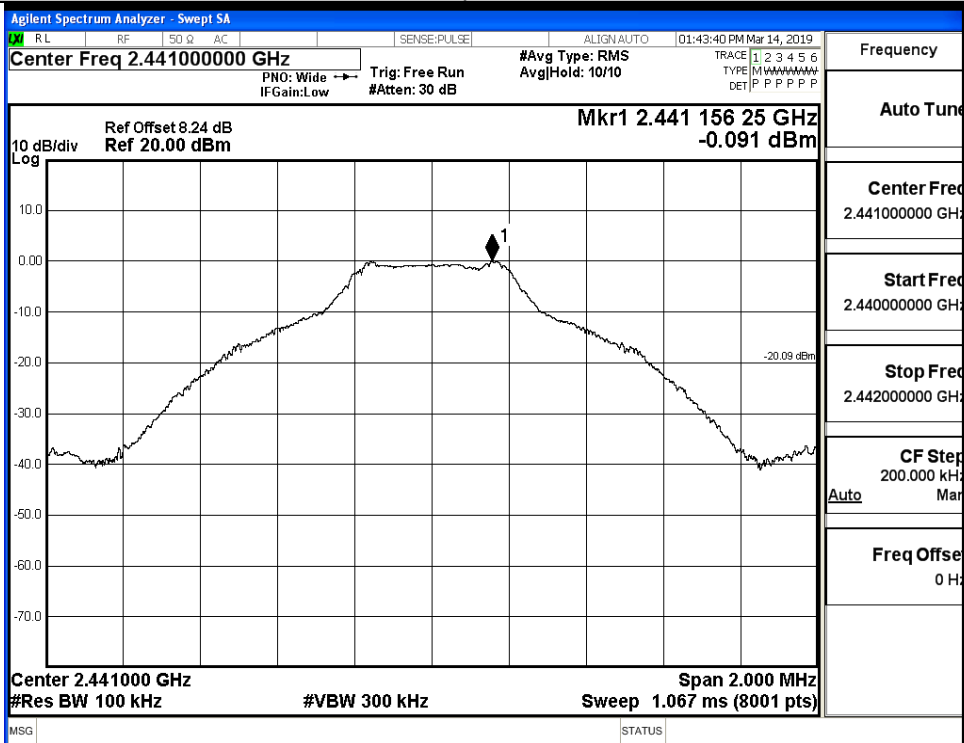


Puw

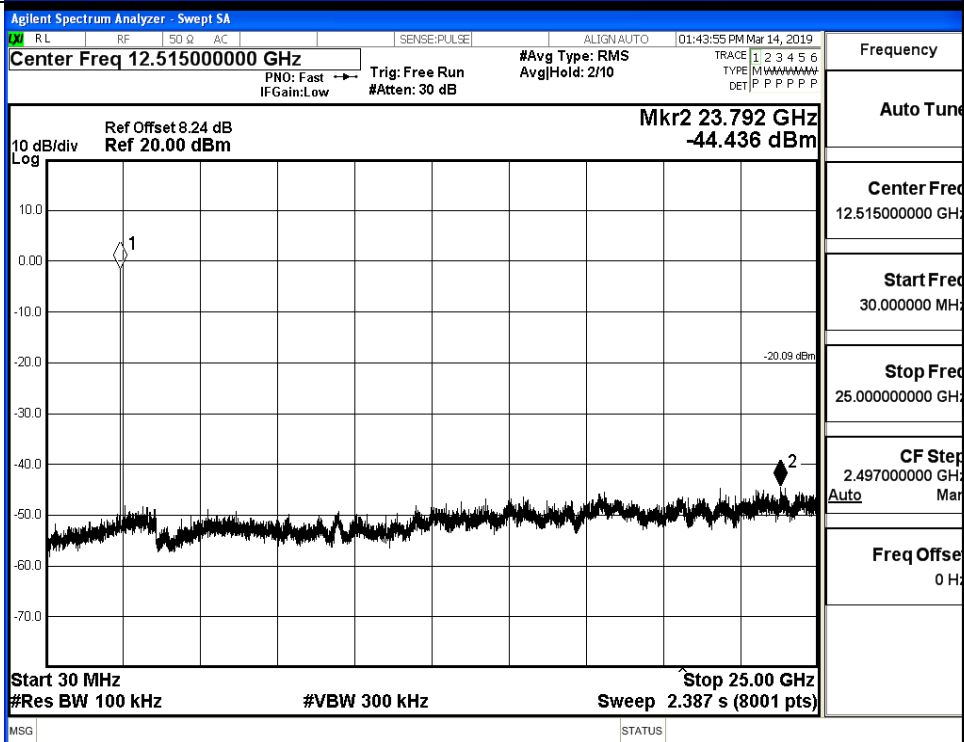


GFSK\_MCH\_Graphs

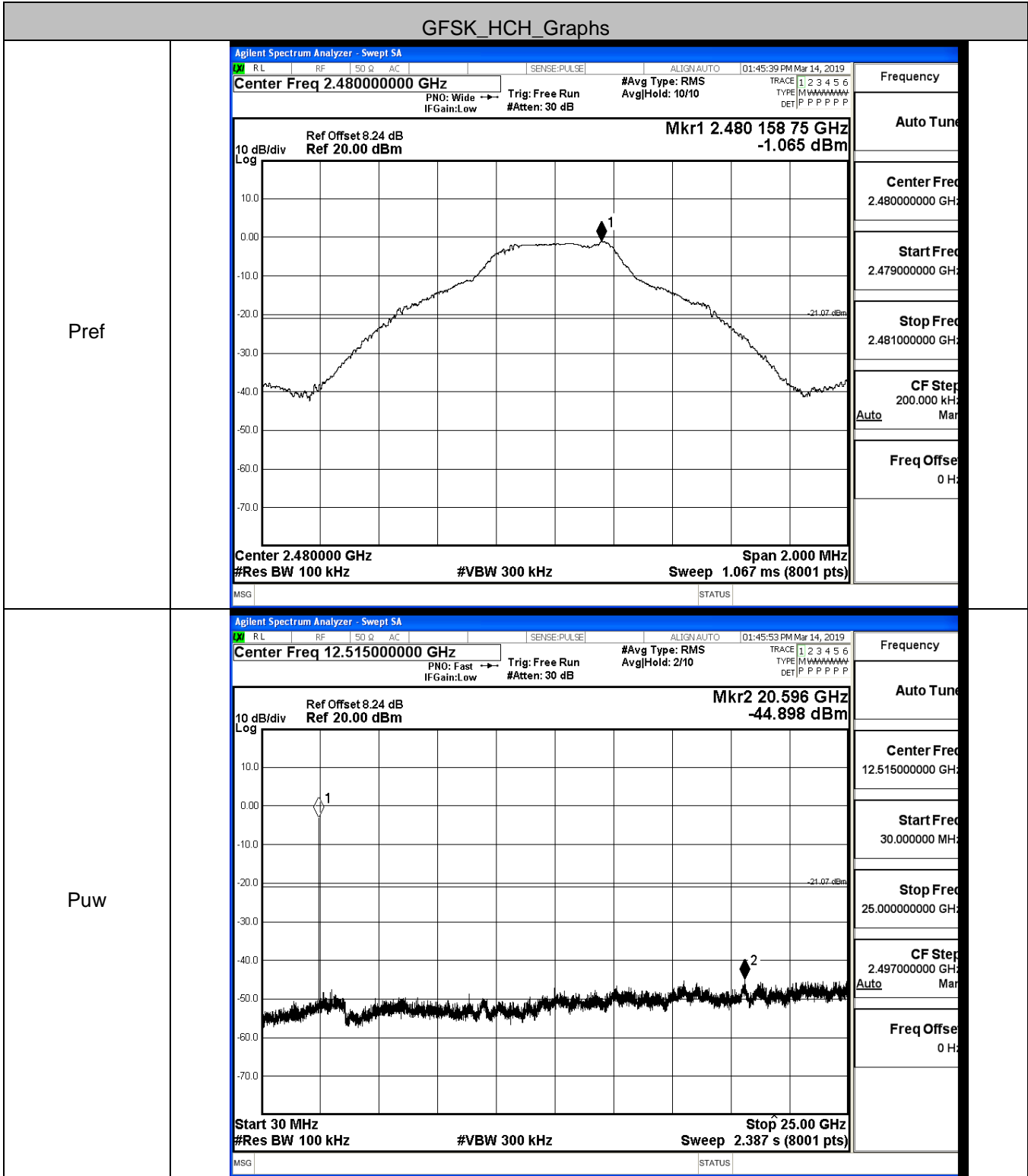
Pref



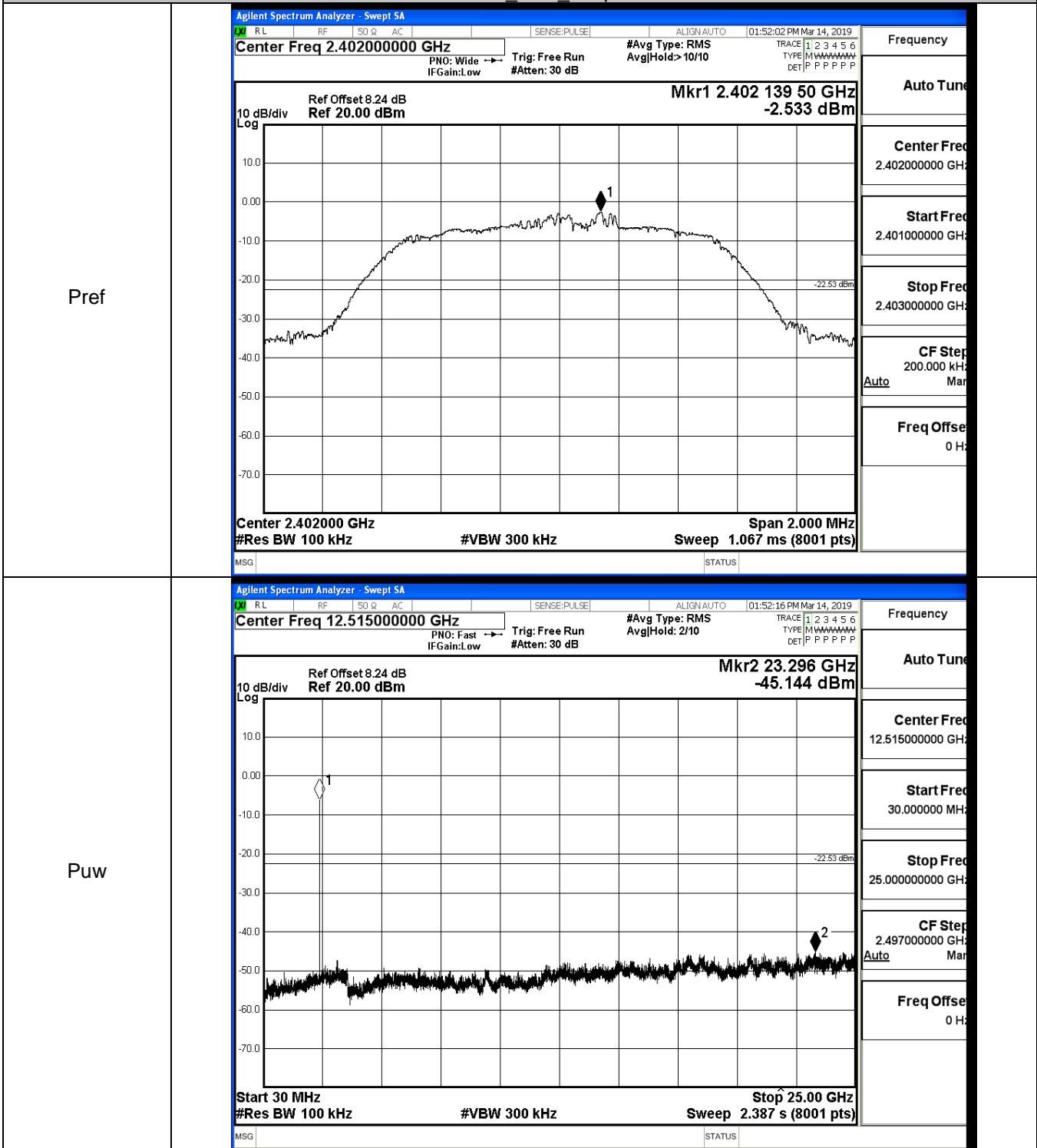
Puw



GFSK\_HCH\_Graphs

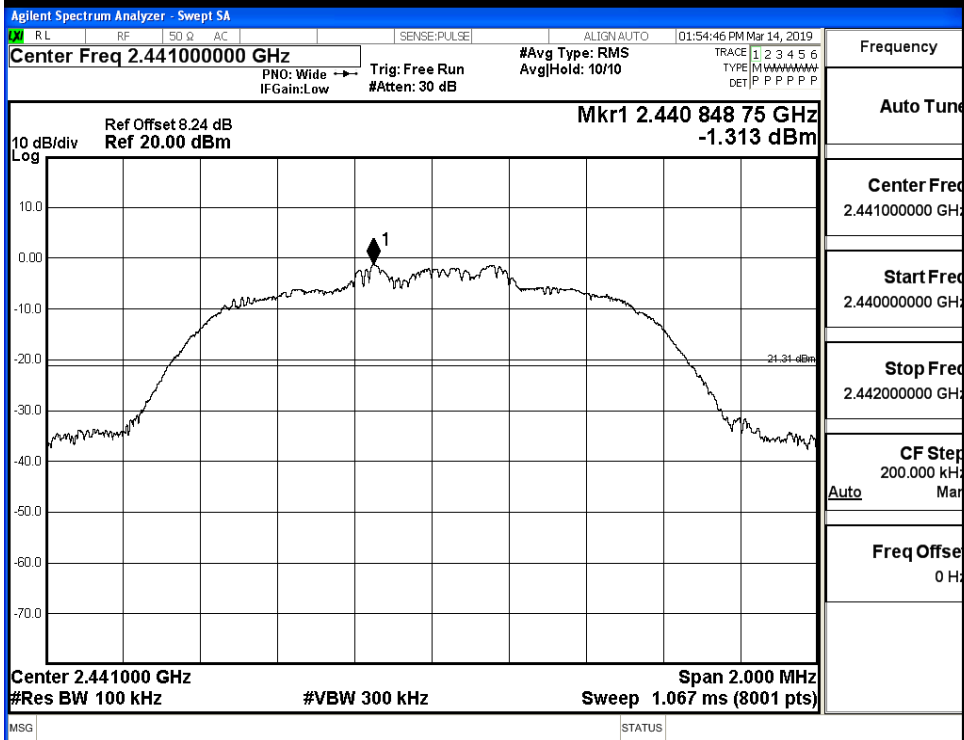


$\pi/4$ DQPSK\_LCH\_Graphs

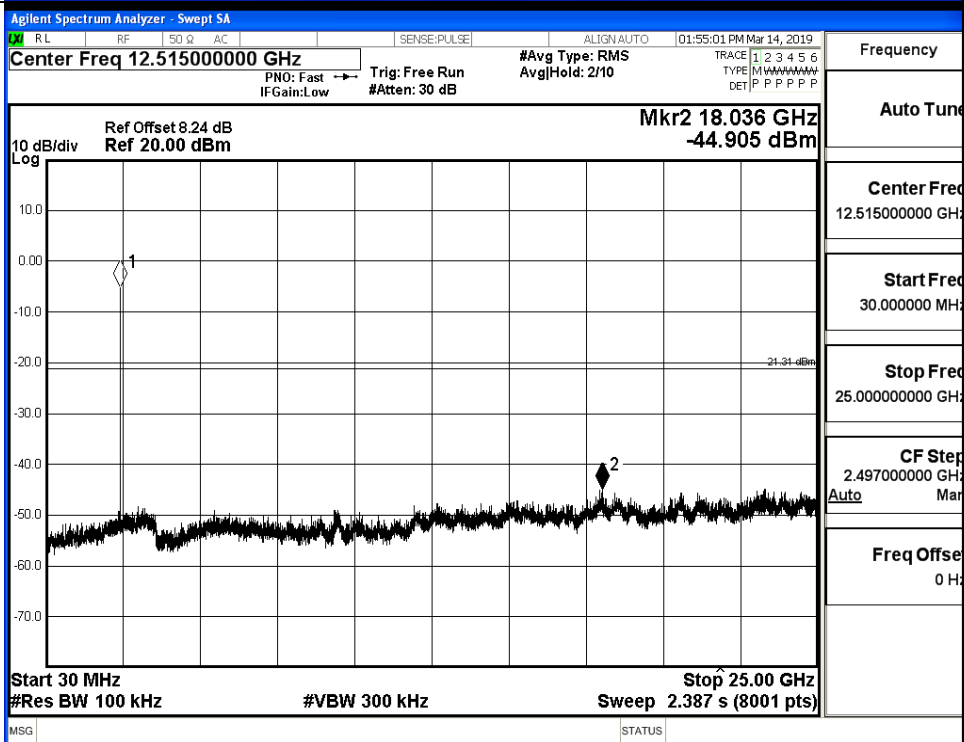


$\pi/4$ DQPSK\_MCH\_Graphs

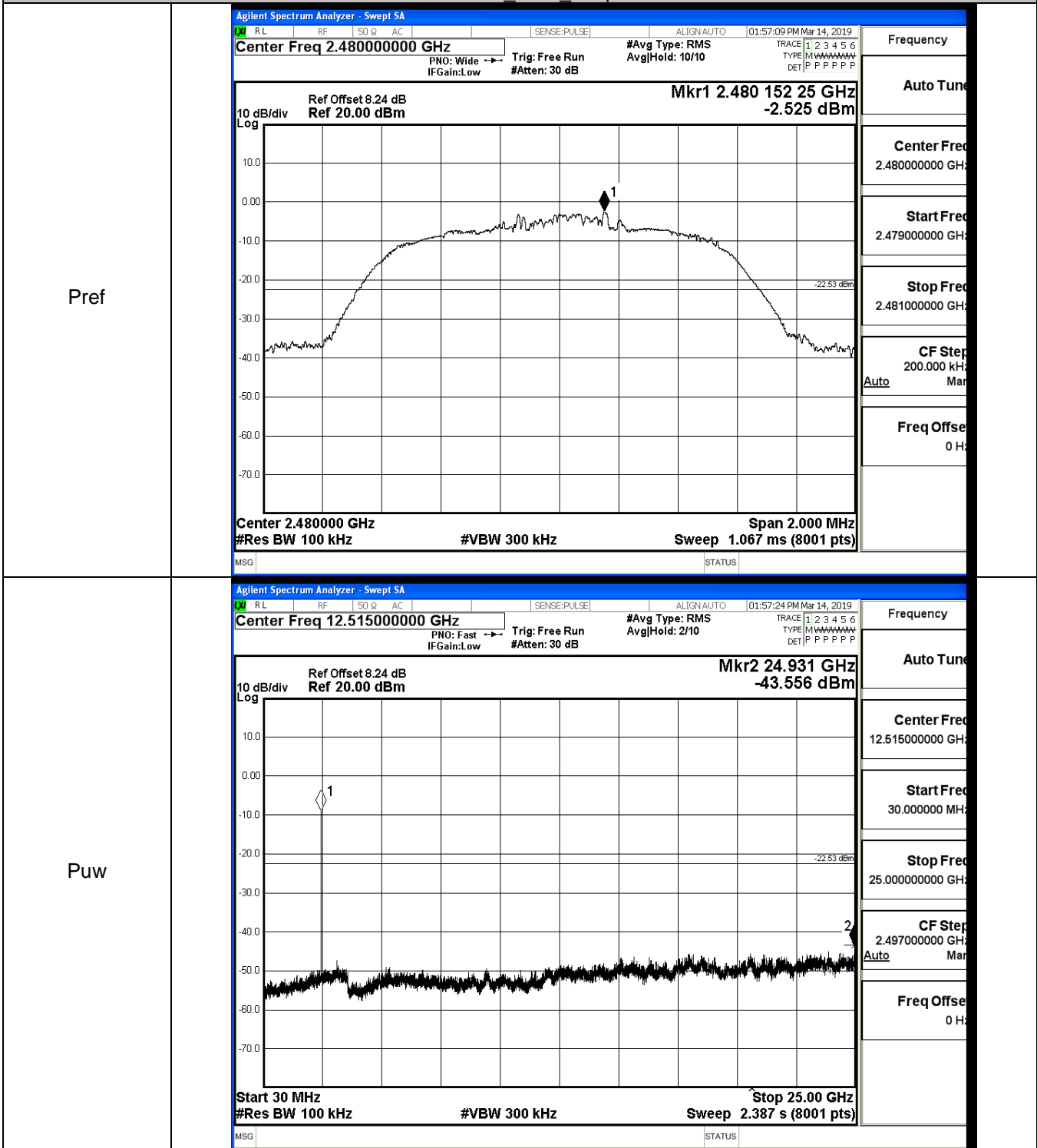
Pref



Puw

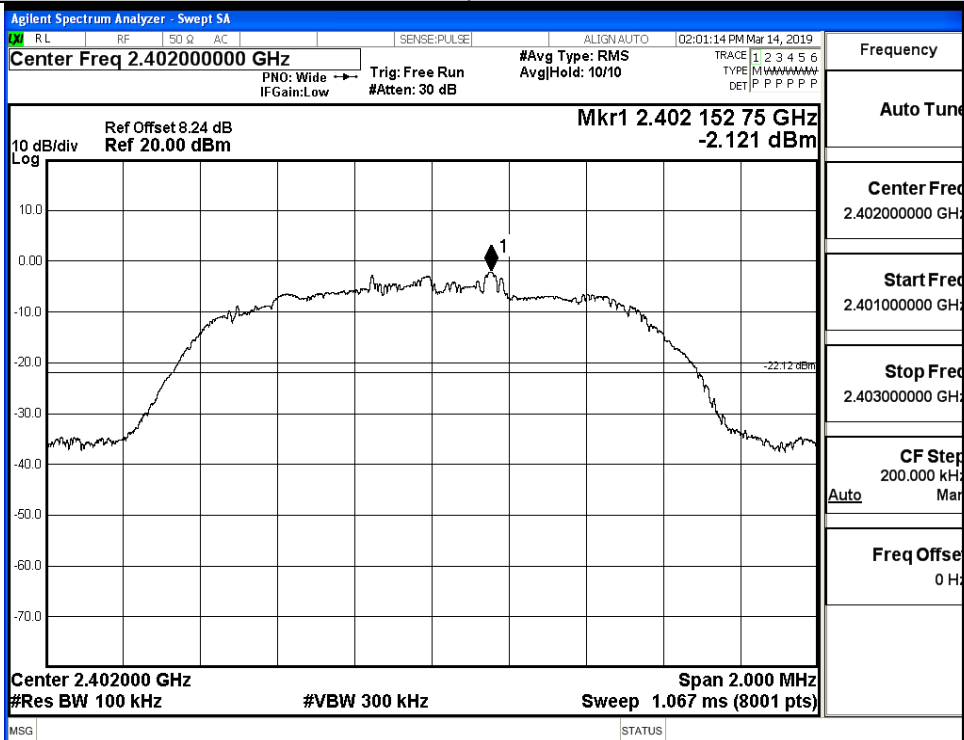


$\pi/4$ DQPSK\_HCH\_Graphs

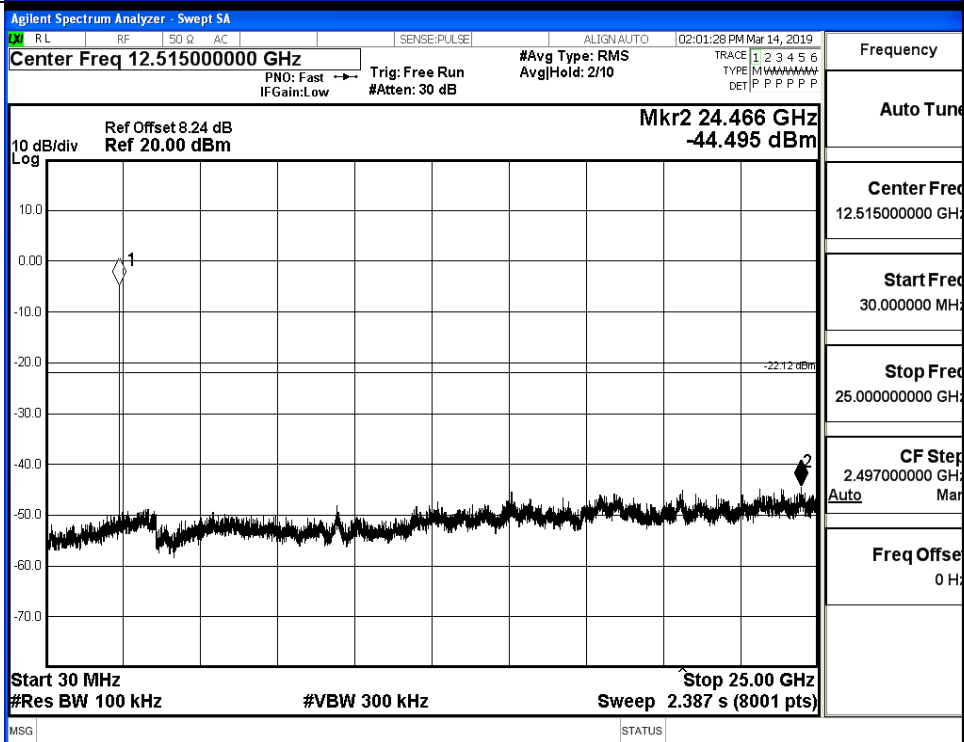


8DPSK\_LCH\_Graphs

Pref

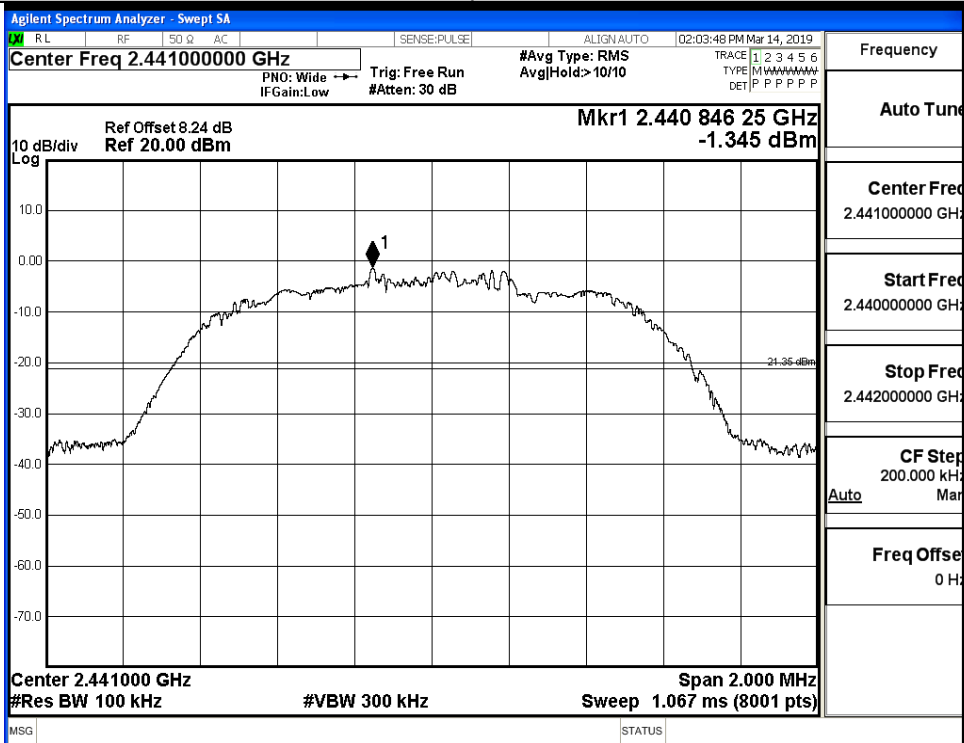


Puw

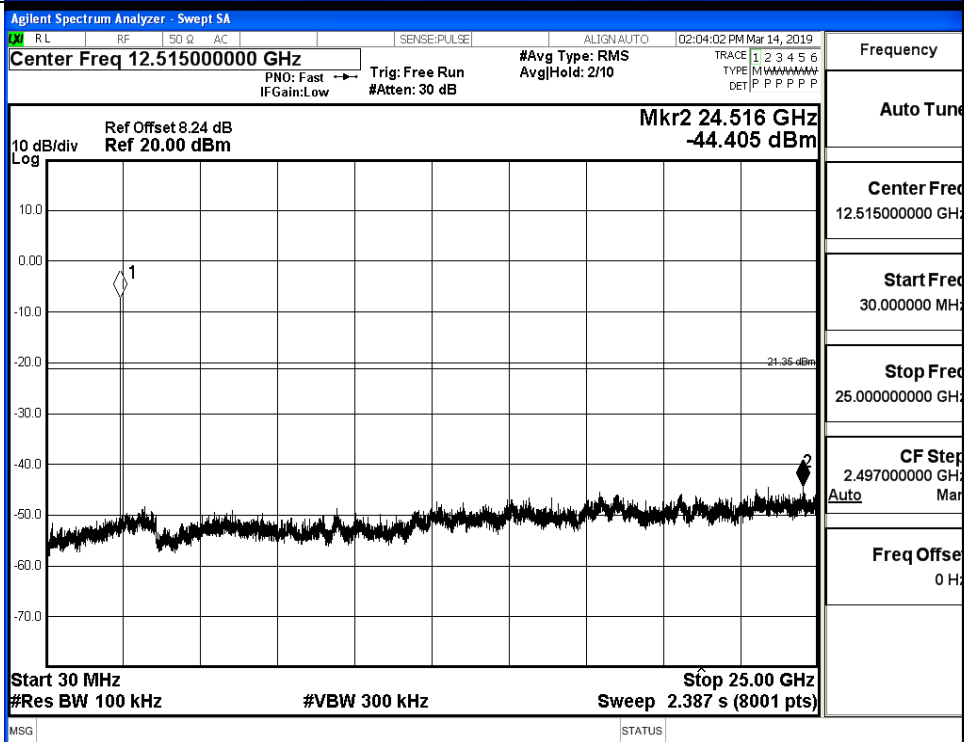


8DPSK\_MCH\_Graphs

Pref



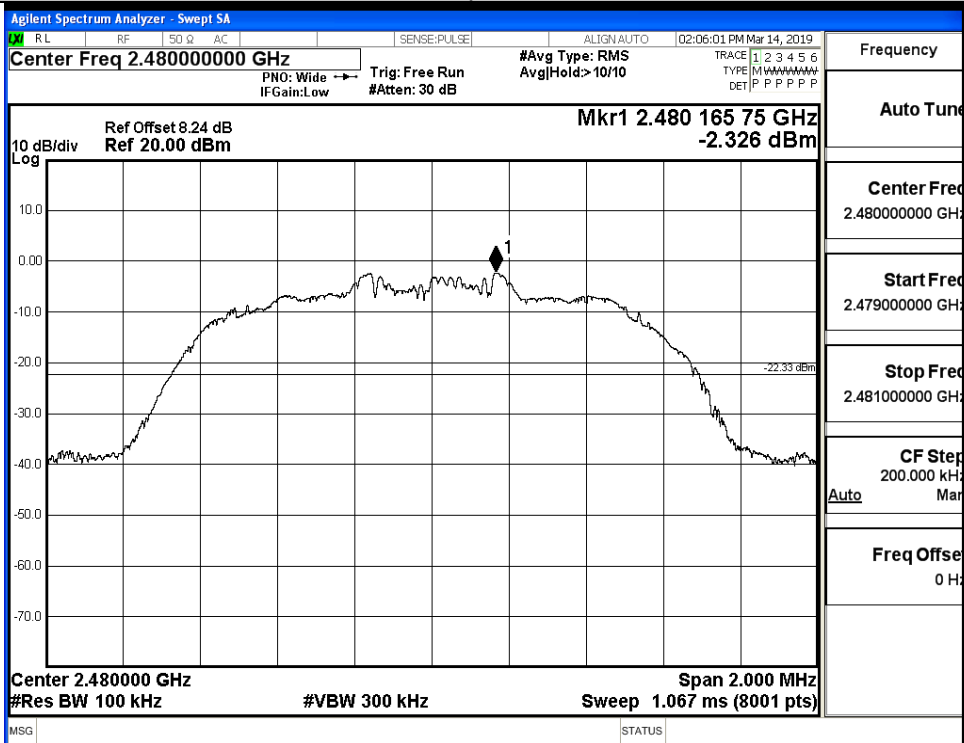
Puw



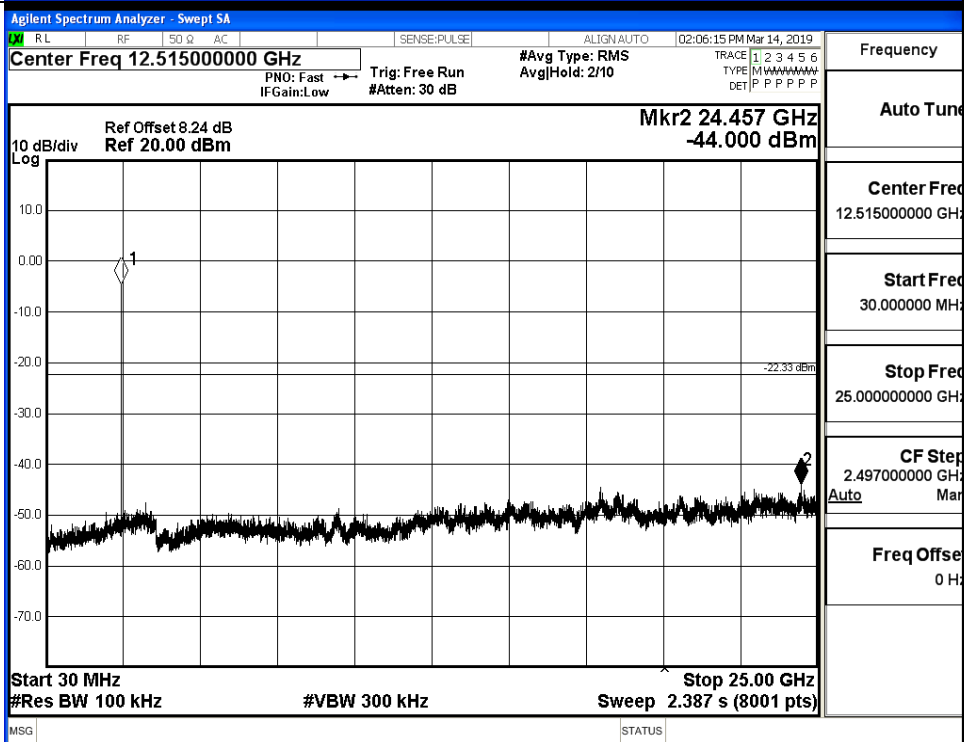


8DPSK\_HCH\_Graphs

Pref



Puw

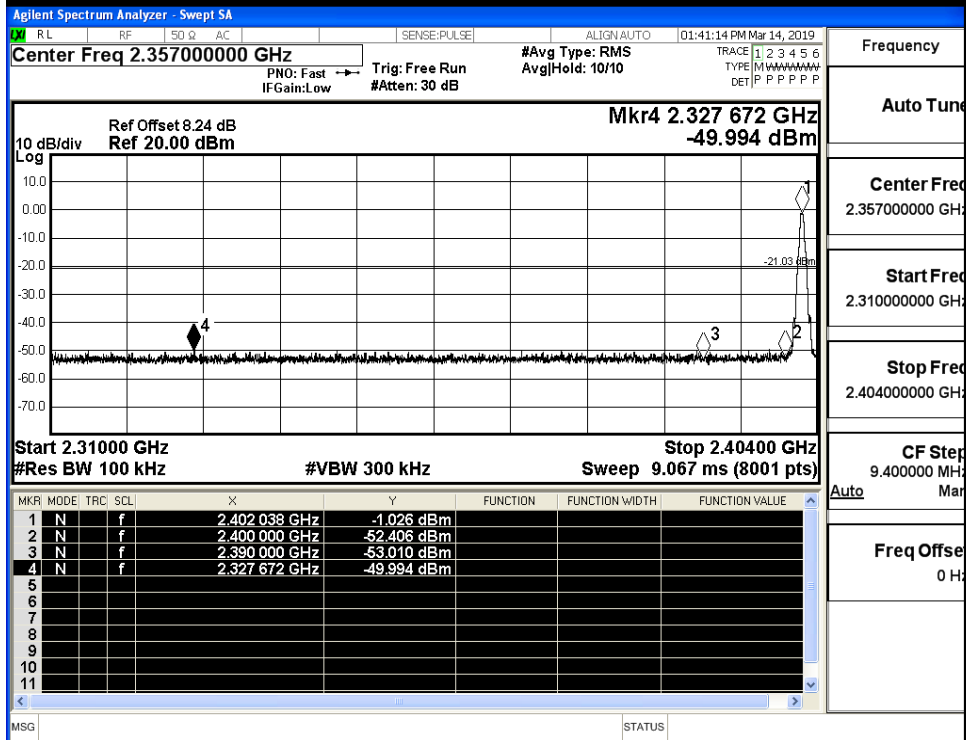


## A.7 Band-edge for RF Conducted Emissions

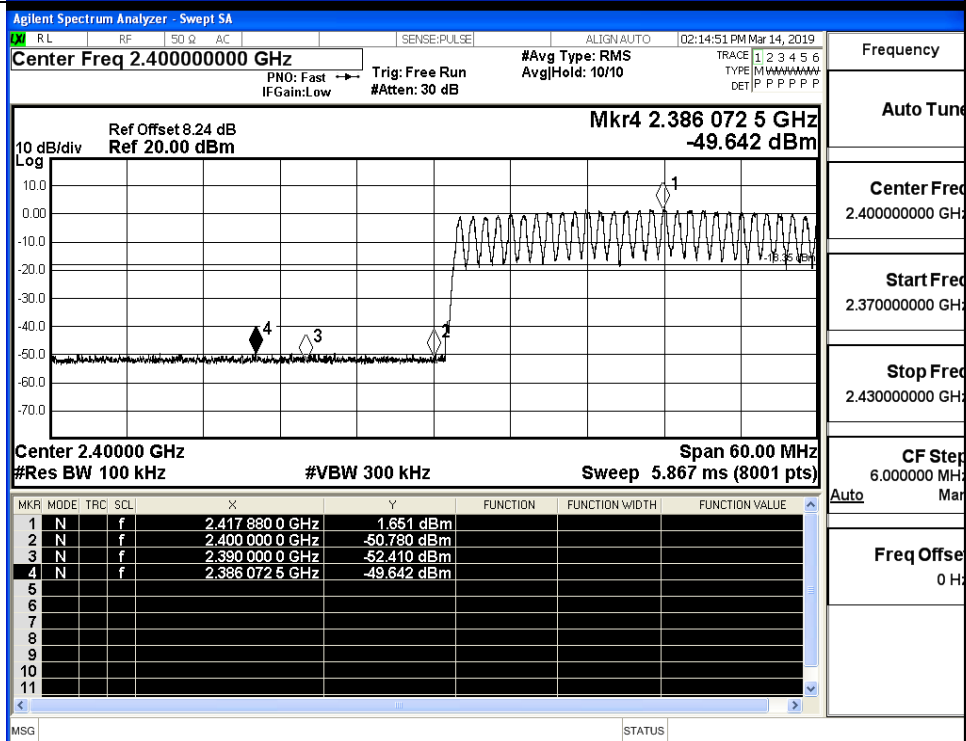
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.026	Off	-49.994	-21.03	PASS
			1.651	On	-49.642	-18.35	PASS
	HCH	2480	-1.073	Off	-48.718	-21.07	PASS
			1.277	On	-49.423	-18.72	PASS
$\pi/4$ DQPSK	LCH	2402	-2.417	Off	-49.956	-22.42	PASS
			-0.192	On	-48.719	-20.19	PASS
	HCH	2480	-2.502	Off	-49.783	-22.5	PASS
			-0.187	On	-48.679	-20.19	PASS
8DPSK	LCH	2402	-1.939	Off	-49.844	-21.94	PASS
			0.326	On	-49.308	-19.67	PASS
	HCH	2480	-2.317	Off	-49.481	-22.32	PASS
			-0.163	On	-49.239	-20.16	PASS

Test Graphs

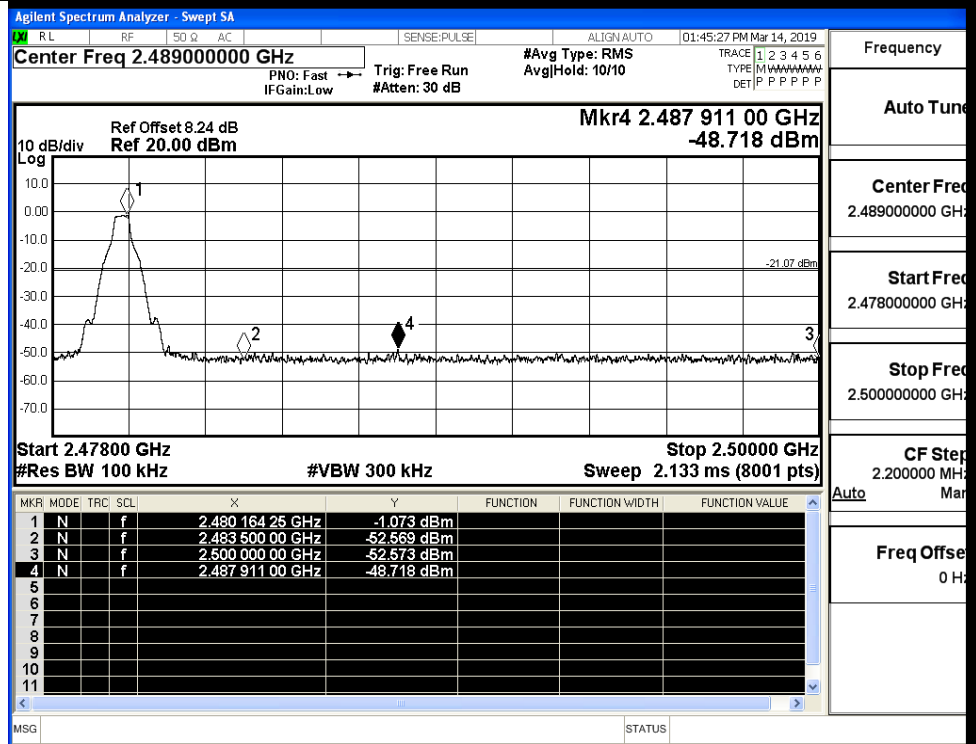
GFSK/LCH/No Hop



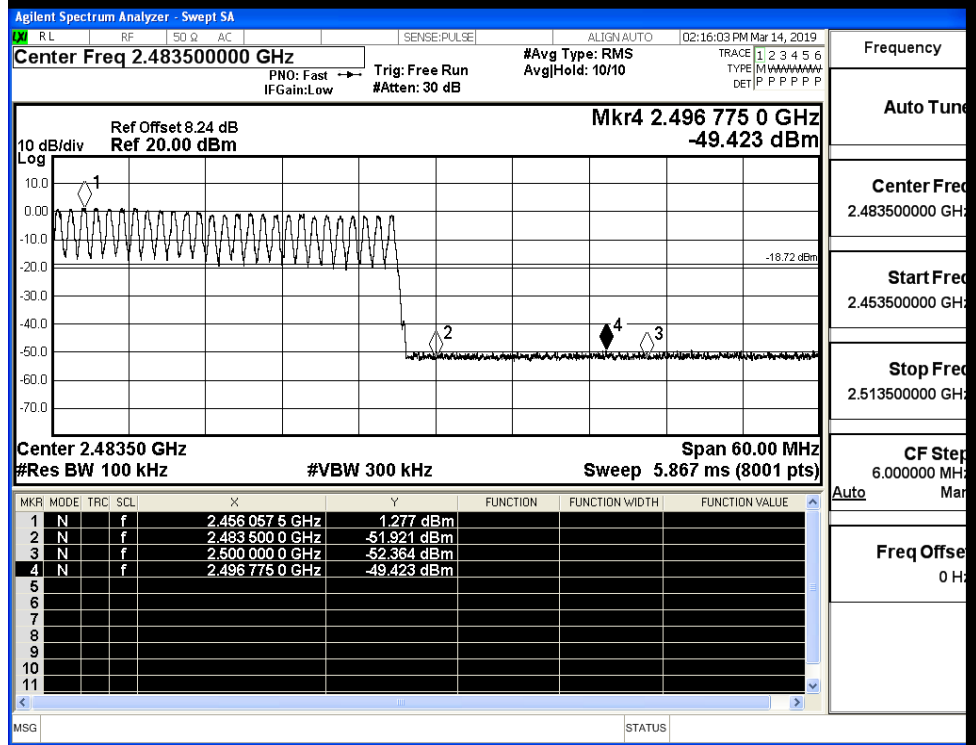
GFSK/LCH/Hop



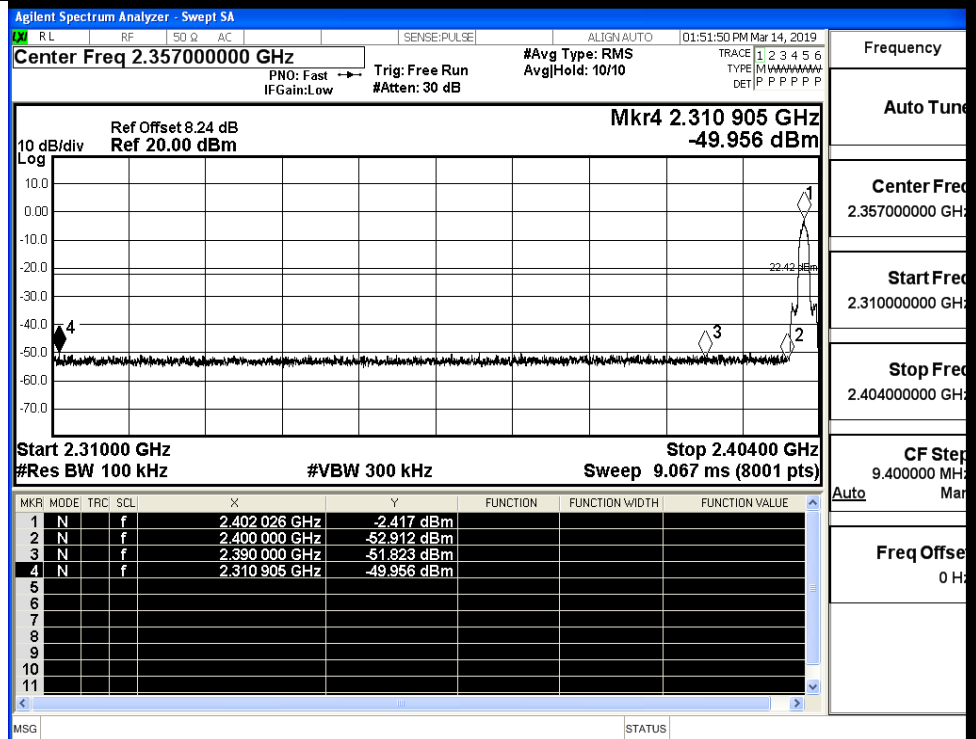
GFSK/HCH/No Hop



GFSK/HCH/Hop

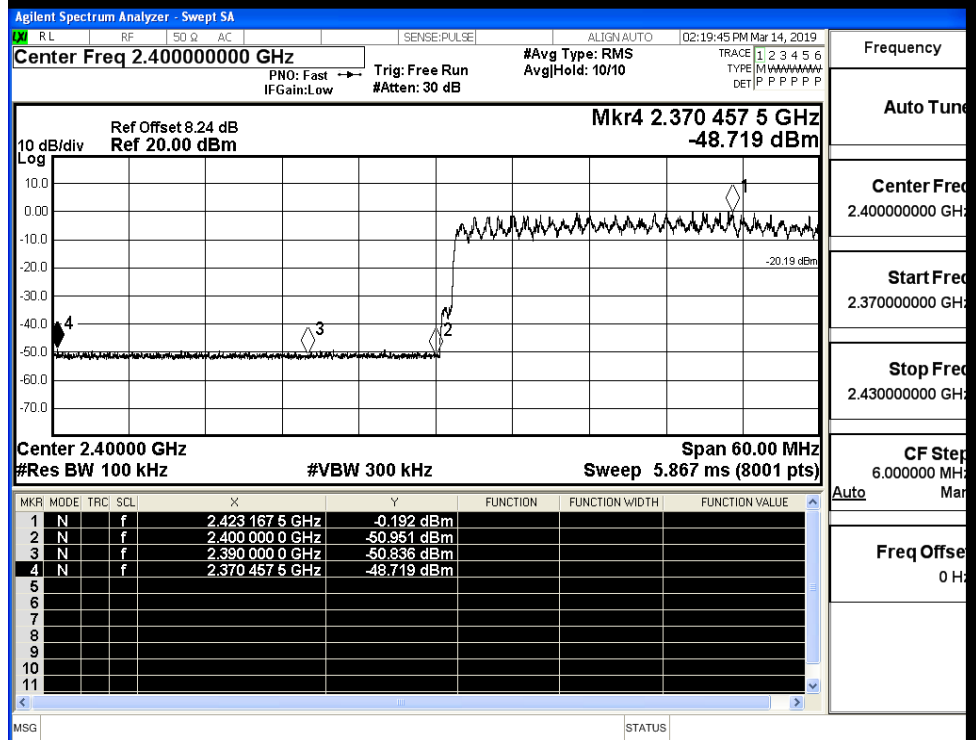


$\pi/4$ DQPSK/LCH/No  
Hop



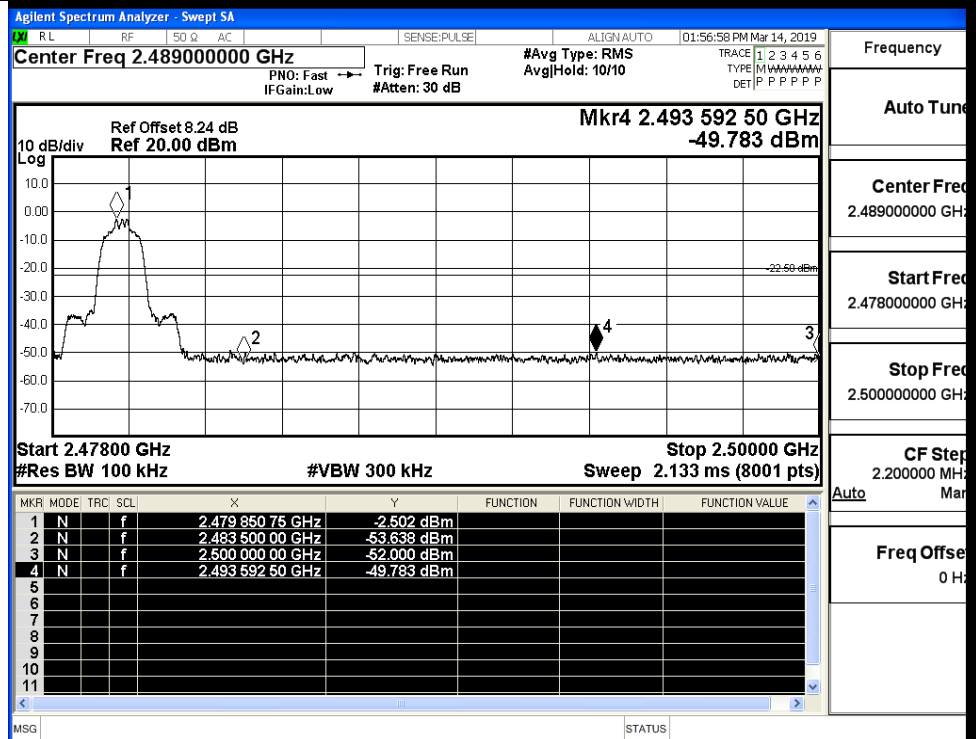
Frequency	
Auto Tune	
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz
Freq Offset	0 Hz

$\pi/4$ DQPSK/LCH/Hop



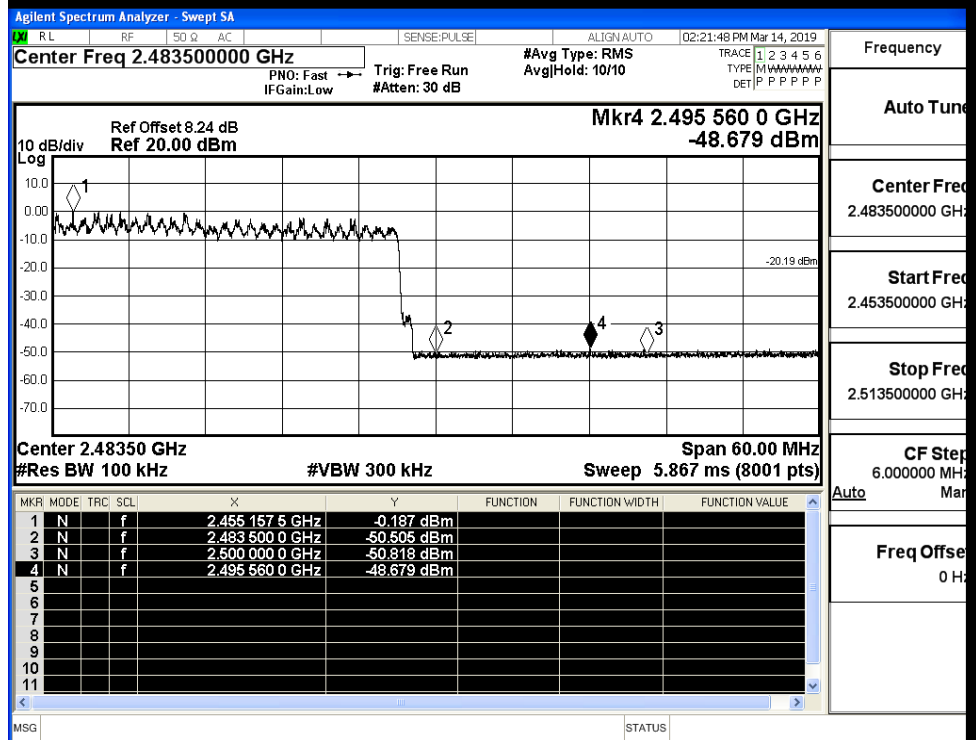
Frequency	
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

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



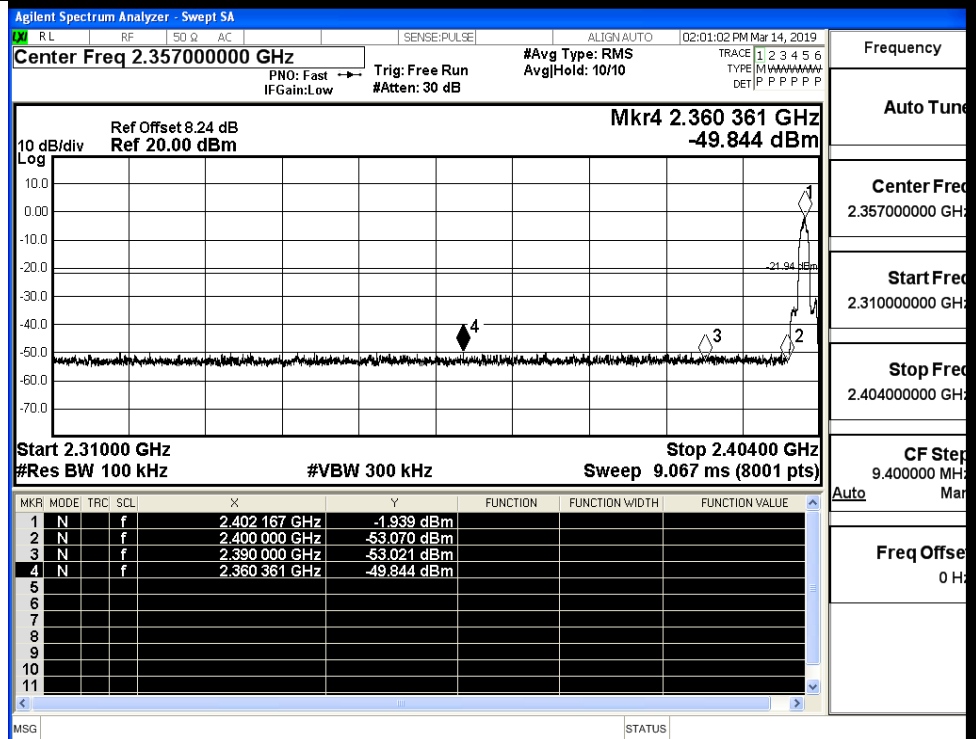
Frequency	
Auto Tune	
Center Freq	2.489000000 GHz
Start Freq	2.478000000 GHz
Stop Freq	2.500000000 GHz
CF Step	2.200000 MHz
Freq Offse	0 Hz

$\pi$ /4DQPSK/HCH/Hop



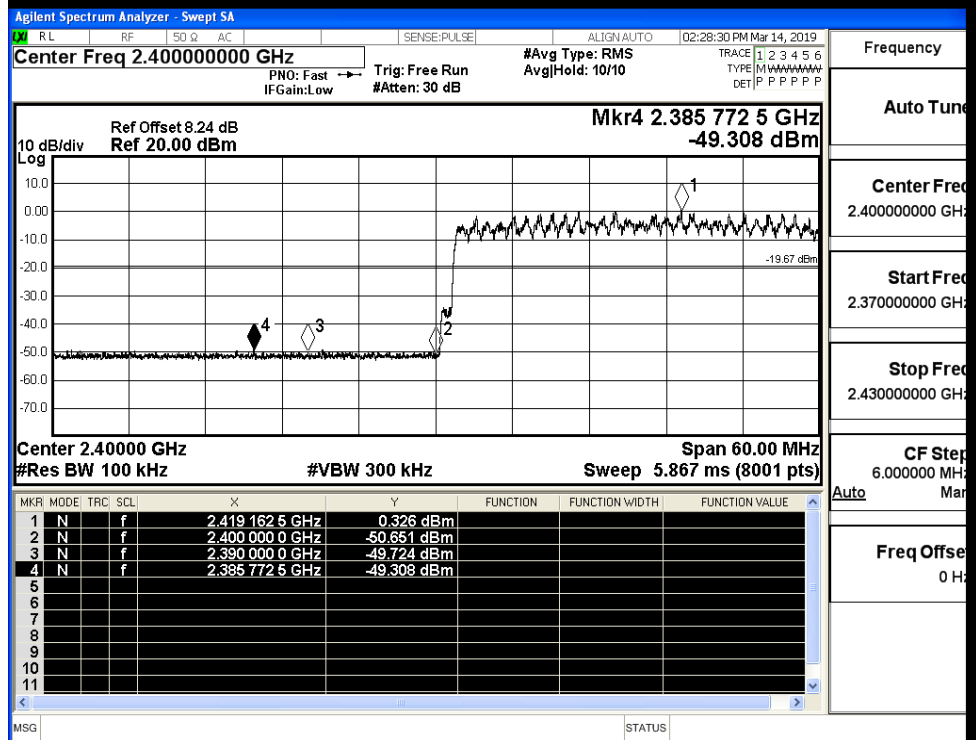
Frequency	
Auto Tune	
Center Freq	2.483500000 GHz
Start Freq	2.453500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Freq Offse	0 Hz

8DPSK/LCH/No Hop



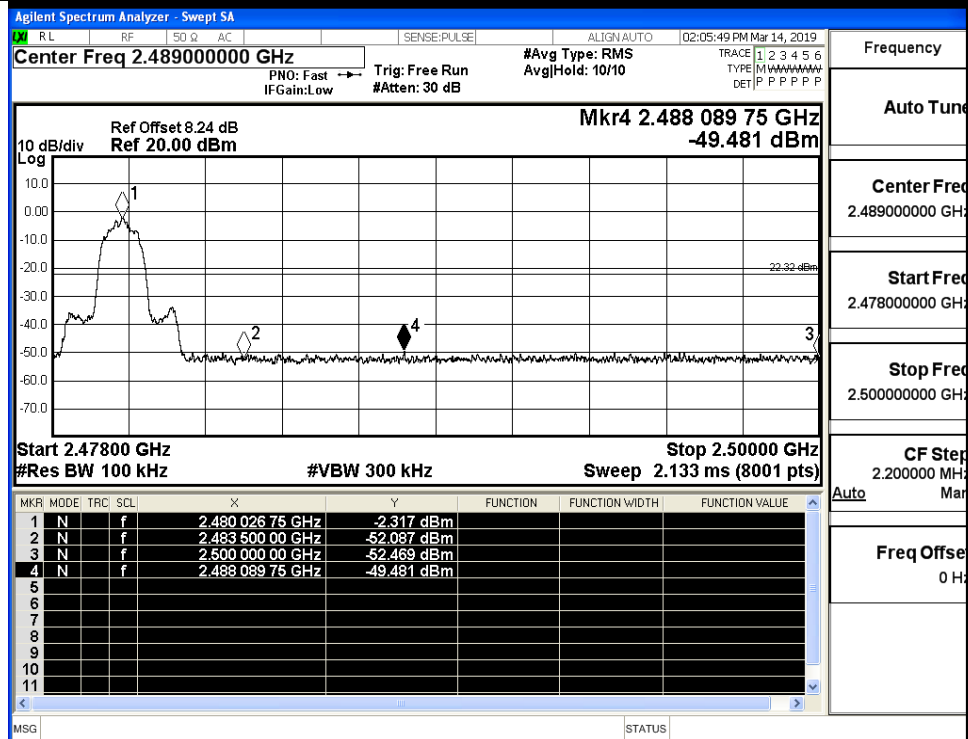
Frequency  
Auto Tune  
Center Freq  
2.357000000 GHz  
Start Freq  
2.310000000 GHz  
Stop Freq  
2.404000000 GHz  
CF Step  
9.400000 MHz  
Auto Mar  
Freq Offse  
0 Hz

8DPSK/LCH/Hop



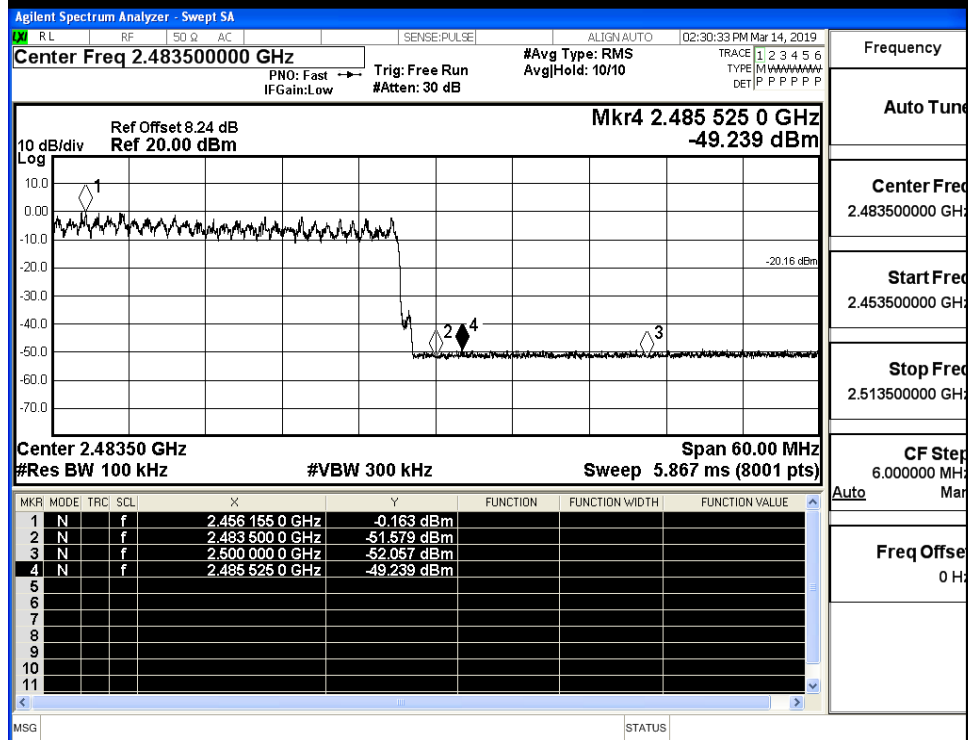
Frequency  
Auto Tune  
Center Freq  
2.400000000 GHz  
Start Freq  
2.370000000 GHz  
Stop Freq  
2.430000000 GHz  
CF Step  
6.000000 MHz  
Auto Mar  
Freq Offse  
0 Hz

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  
Auto Mar  
Freq Offse  
0 Hz

8DPSK/HCH/Hop



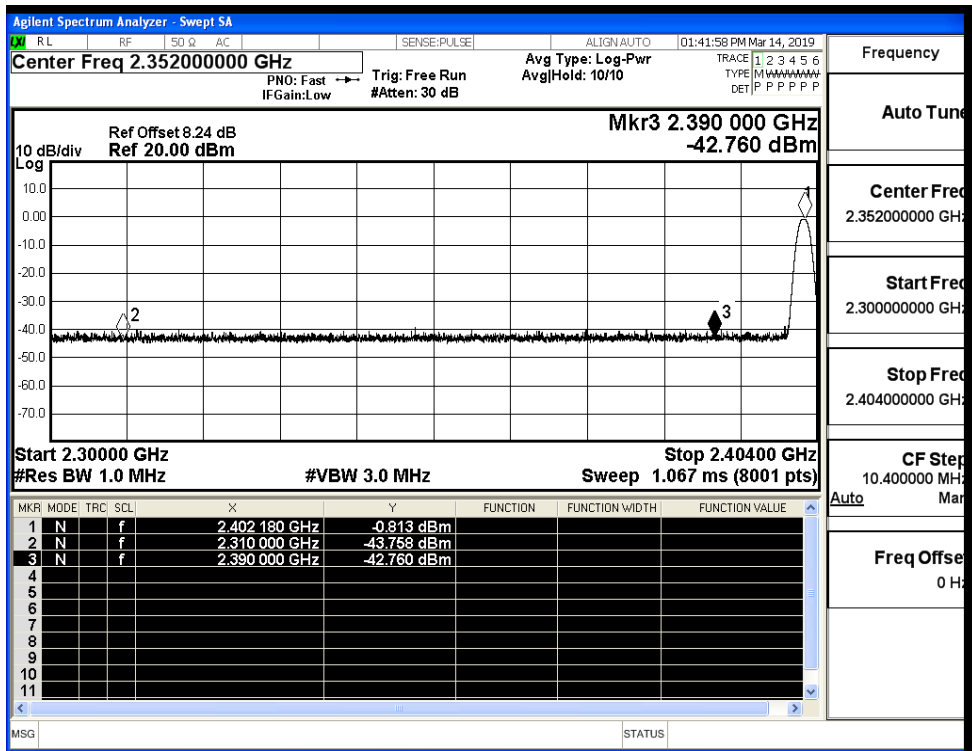
Frequency  
Auto Tune  
Center Freq  
2.483500000 GHz  
Start Freq  
2.453500000 GHz  
Stop Freq  
2.513500000 GHz  
CF Step  
6.000000 MHz  
Auto Mar  
Freq Offse  
0 Hz



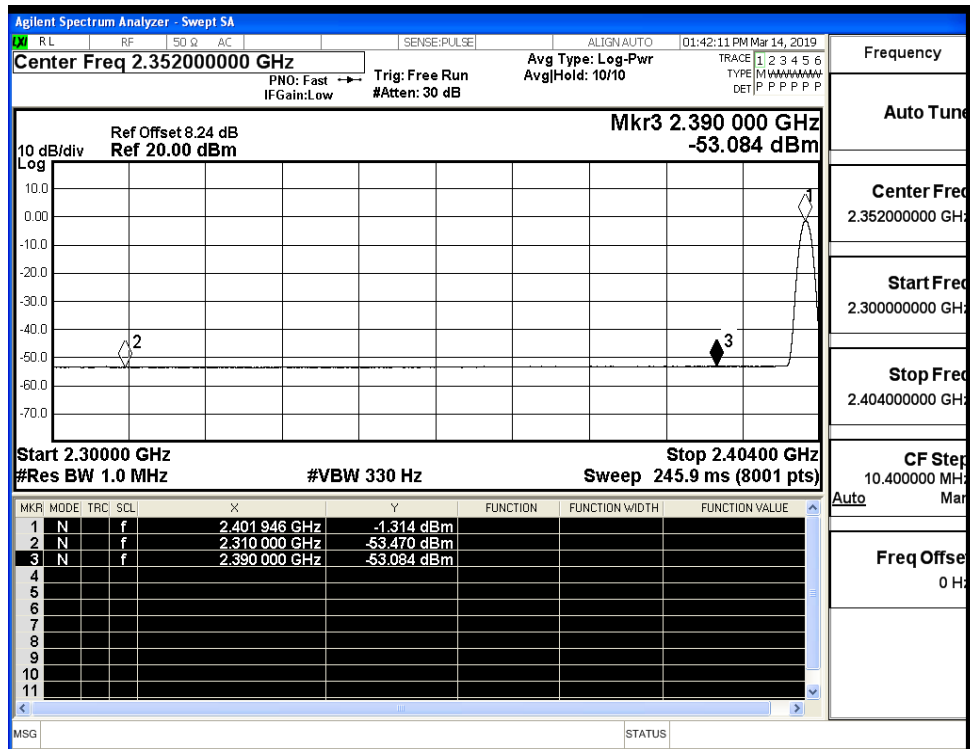
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.76	2.0	0	53.50	PEAK	74	PASS
	Off	2310.0	-53.47	2.0	0	43.79	AV	54	PASS
	Off	2390.0	-42.76	2.0	0	54.50	PEAK	74	PASS
	Off	2390.0	-53.08	2.0	0	44.17	AV	54	PASS
	Off	2483.5	-43.11	2.0	0	54.14	PEAK	74	PASS
	Off	2483.5	-52.91	2.0	0	44.34	AV	54	PASS
	Off	2500.0	-43.23	2.0	0	54.03	PEAK	74	PASS
	Off	2500.0	-52.88	2.0	0	44.38	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.92	2.0	0	54.34	PEAK	74	PASS
	Off	2310.0	-53.36	2.0	0	43.90	AV	54	PASS
	Off	2390.0	-43.18	2.0	0	54.08	PEAK	74	PASS
	Off	2390.0	-53.17	2.0	0	44.09	AV	54	PASS
	Off	2483.5	-41.88	2.0	0	55.38	PEAK	74	PASS
	Off	2483.5	-52.91	2.0	0	44.35	AV	54	PASS
	Off	2500.0	-42.96	2.0	0	54.29	PEAK	74	PASS
	Off	2500.0	-52.74	2.0	0	44.52	AV	54	PASS
8DPSK	Off	2310.0	-42.97	2.0	0	54.29	PEAK	74	PASS
	Off	2310.0	-53.27	2.0	0	43.99	AV	54	PASS
	Off	2390.0	-43.29	2.0	0	53.97	PEAK	74	PASS
	Off	2390.0	-53.20	2.0	0	44.06	AV	54	PASS
	Off	2483.5	-44.12	2.0	0	53.14	PEAK	74	PASS
	Off	2483.5	-52.88	2.0	0	44.38	AV	54	PASS
	Off	2500.0	-43.15	2.0	0	54.10	PEAK	74	PASS
	Off	2500.0	-52.77	2.0	0	44.49	AV	54	PASS

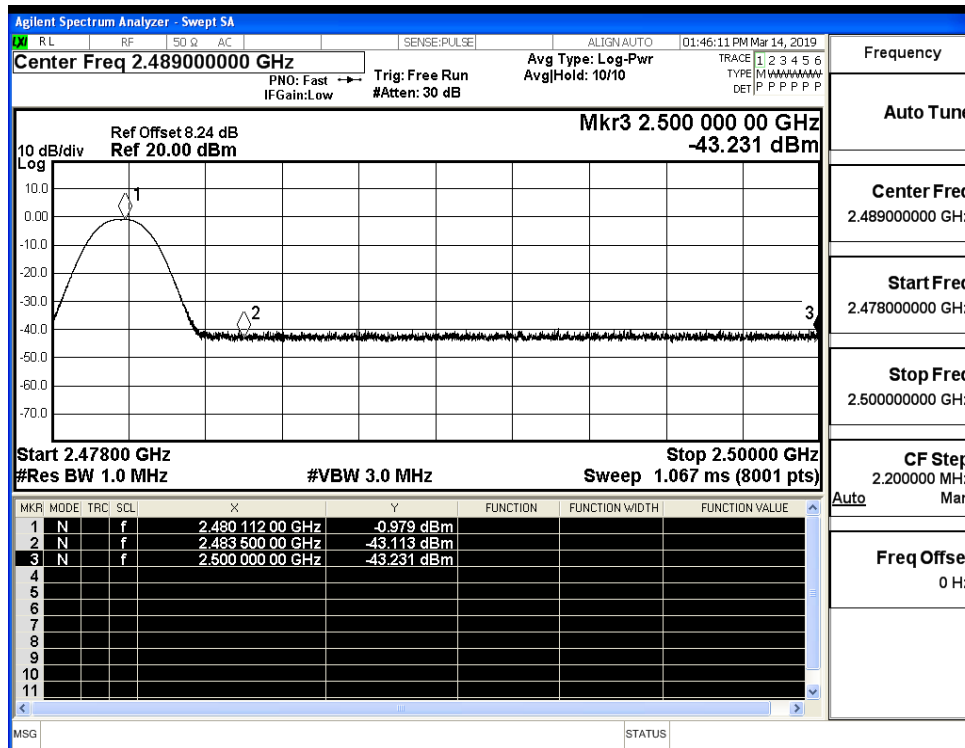
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



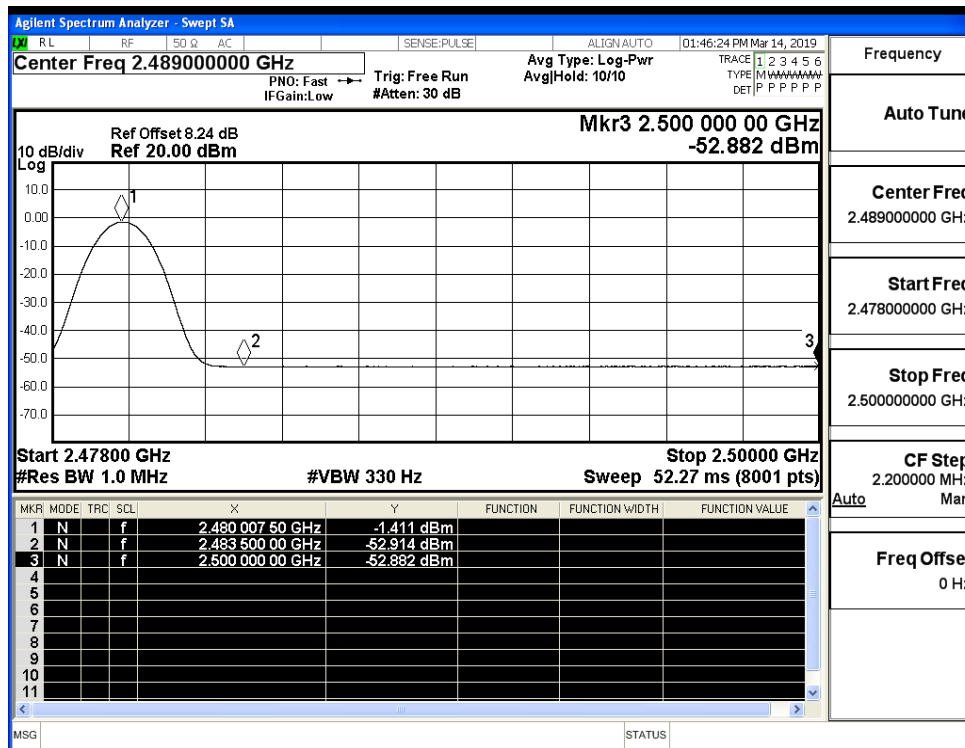
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



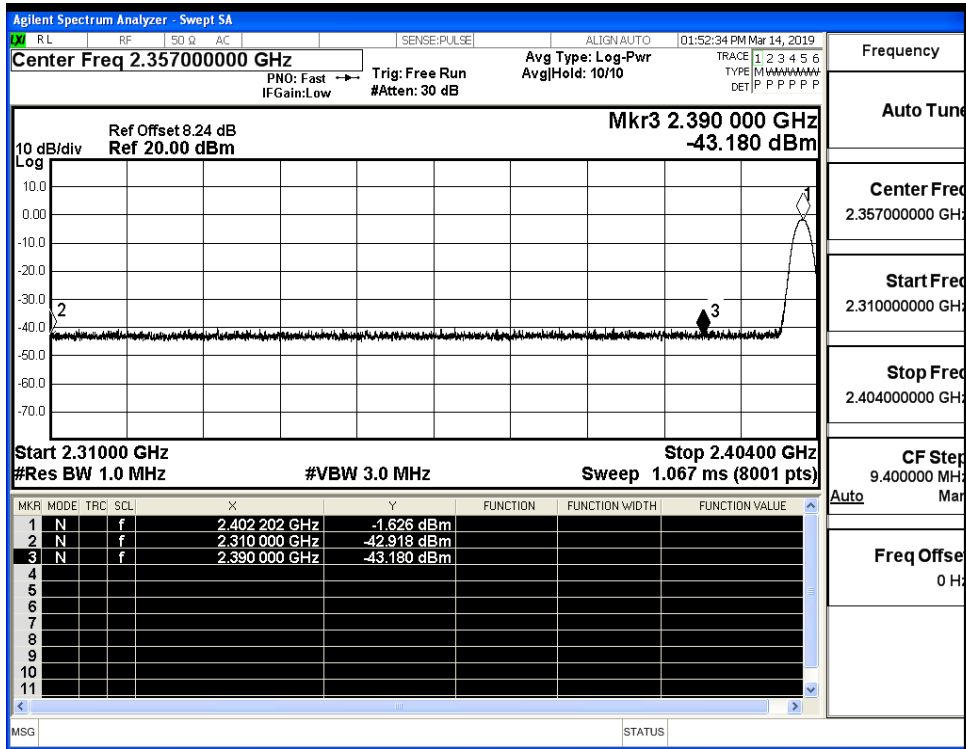
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)



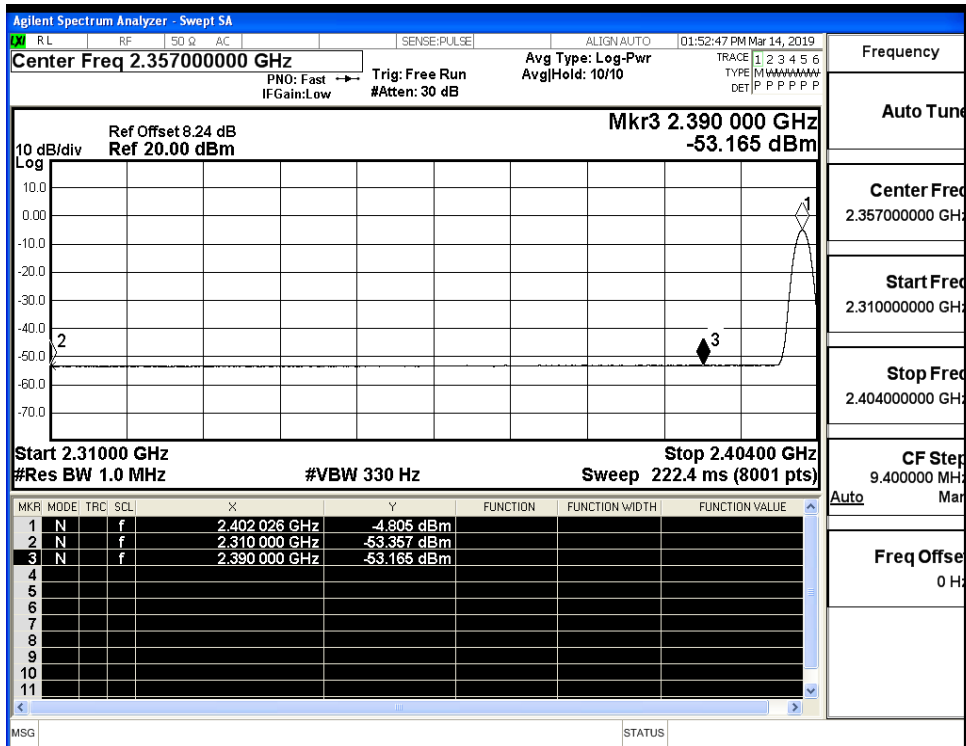
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)



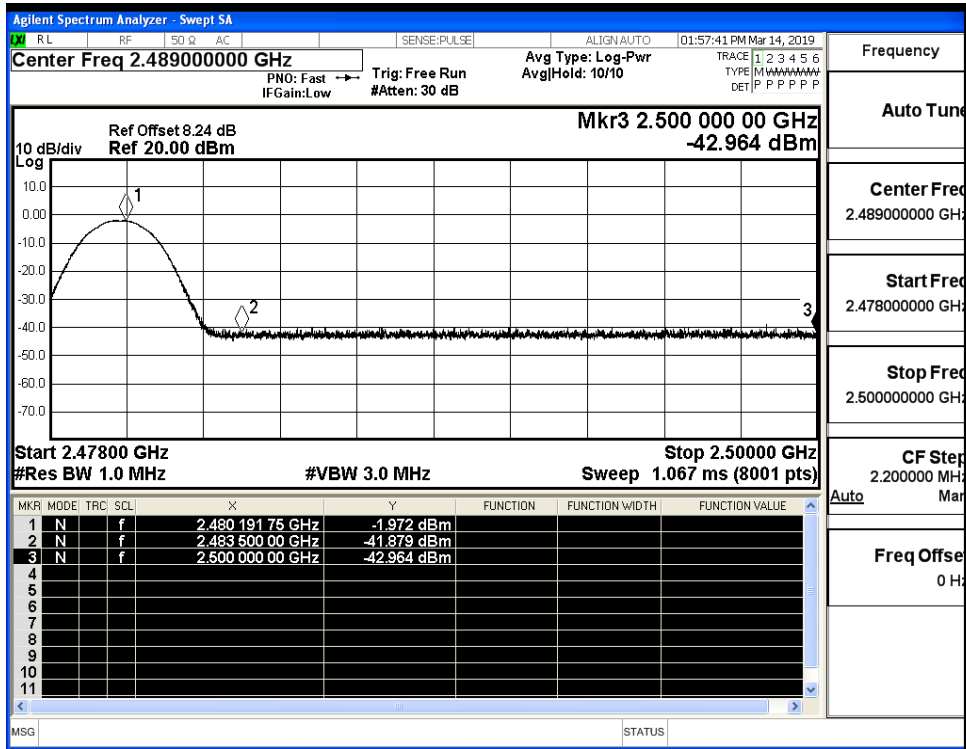
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)



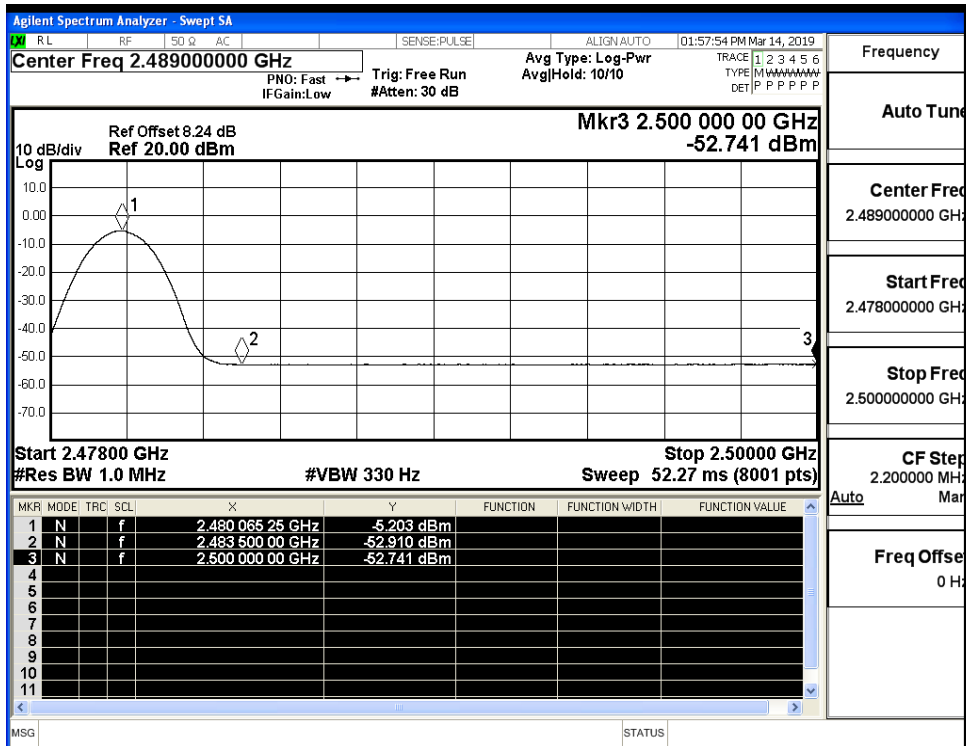
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)



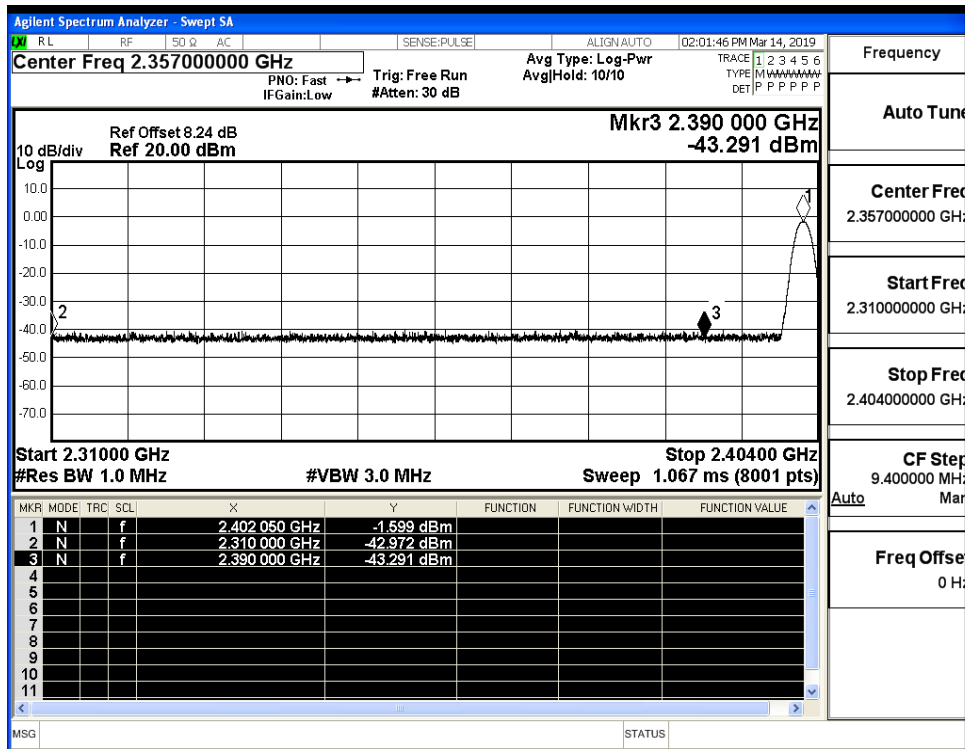
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (High Channel)



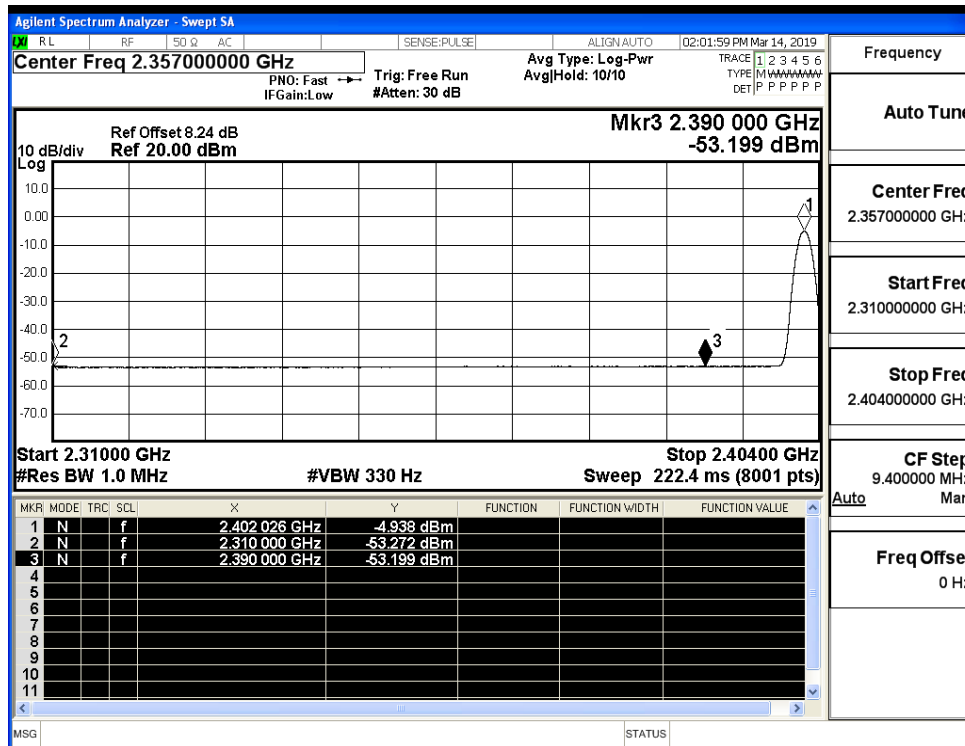
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (High Channel)



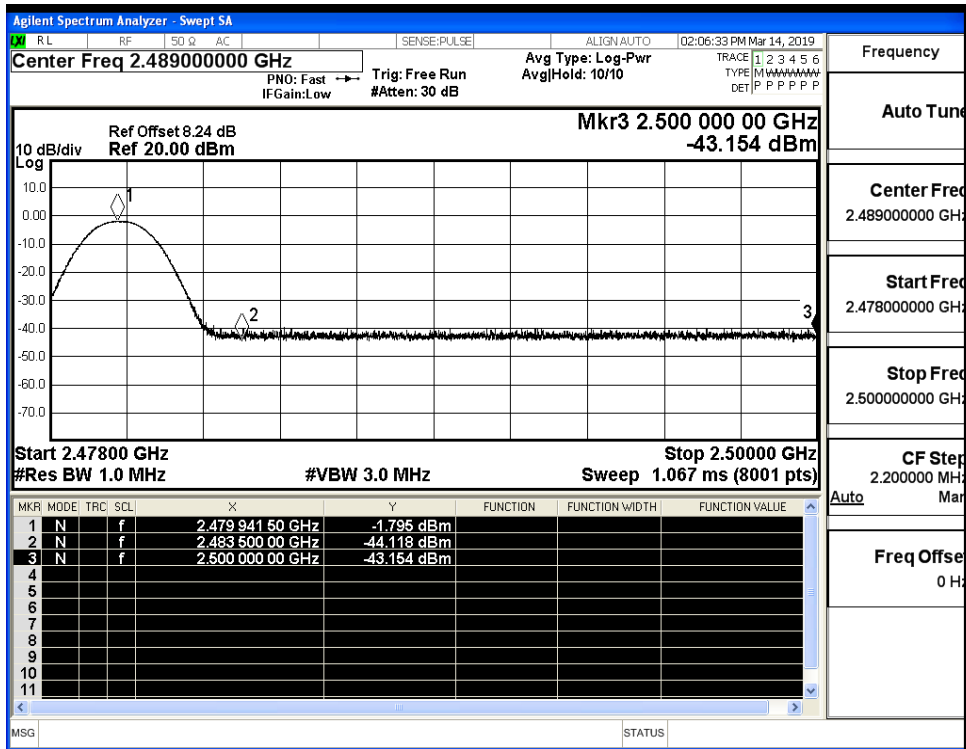
Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



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)

