

Appendix A

RF Test Data for BT 5.0 (BDR/EDR) (Conducted Measurement)

Product Name: Aries True Wireless Bluetooth® Earbuds

Trade Mark: Gemline

Test Model: 100244-001B

Environmental Conditions

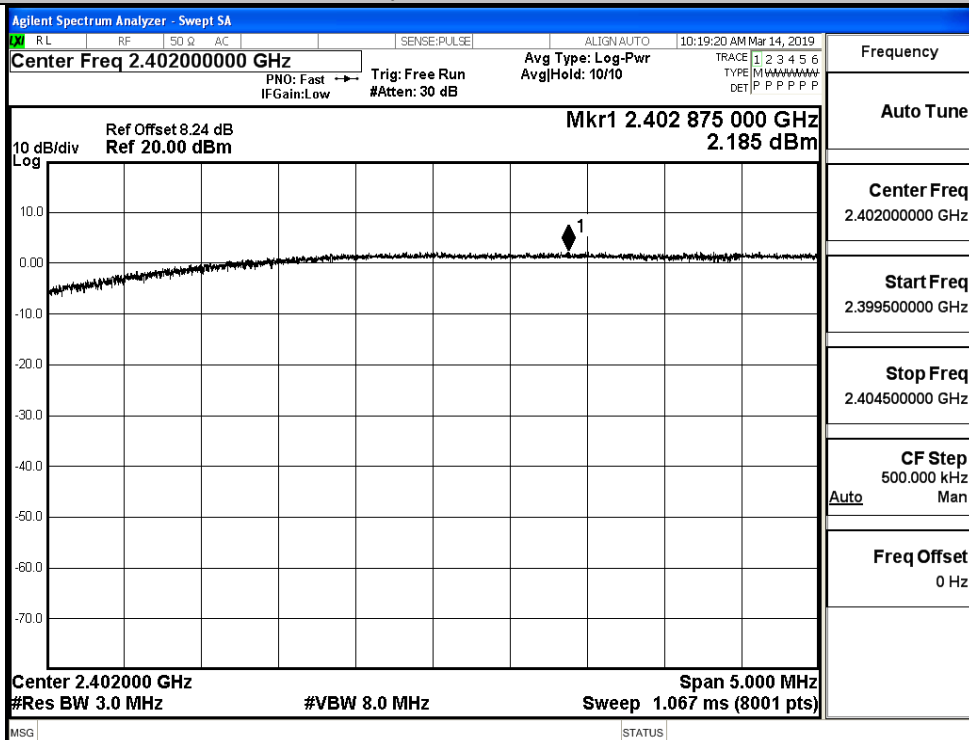
Temperature:	22.4 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom. liu

A.1 Maximum Conducted Peak Output Power

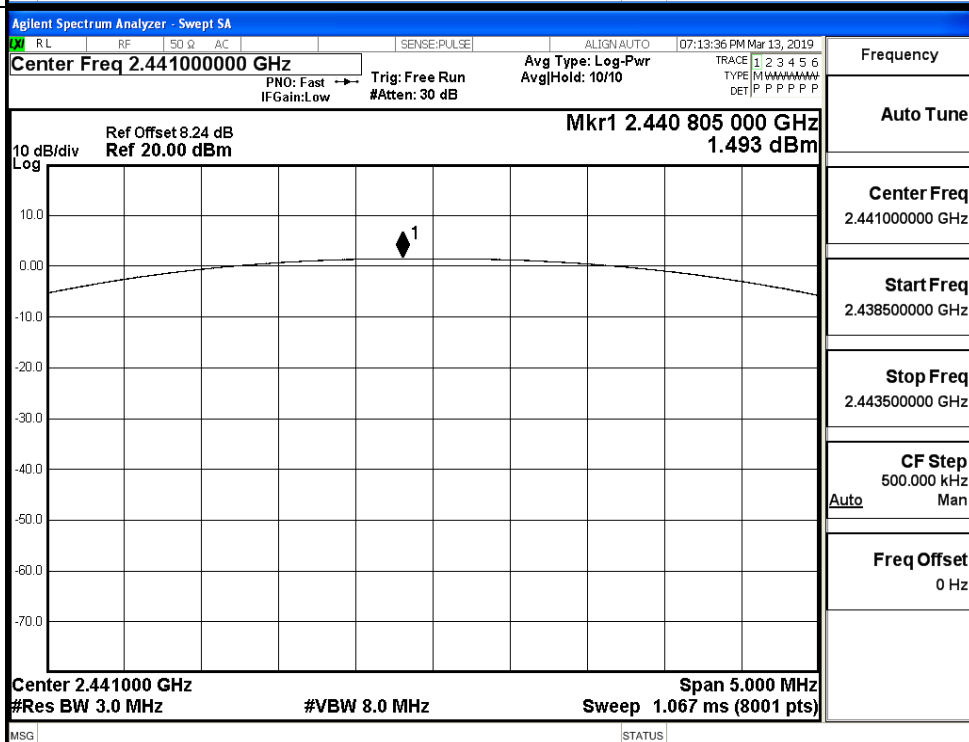
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.185	21	PASS
	MCH	1.493	21	PASS
	HCH	1.392	21	PASS
$\pi/4$ DQPSK	LCH	1.215	21	PASS
	MCH	0.664	21	PASS
	HCH	0.544	21	PASS
8DPSK	LCH	1.470	21	PASS
	MCH	0.908	21	PASS
	HCH	0.790	21	PASS

Test Graphs

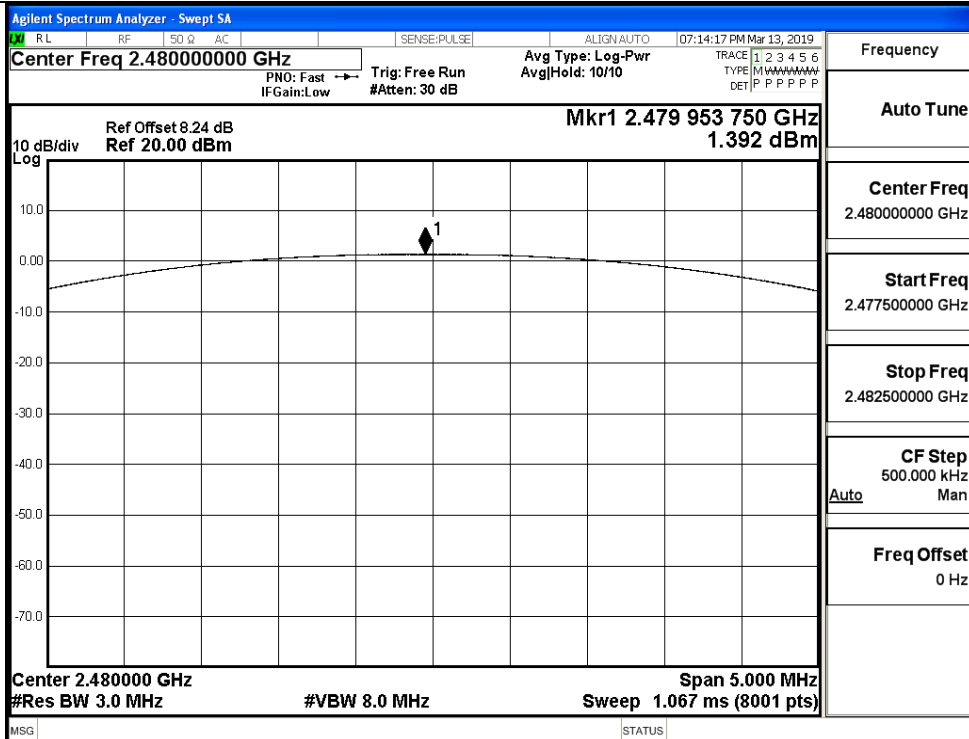
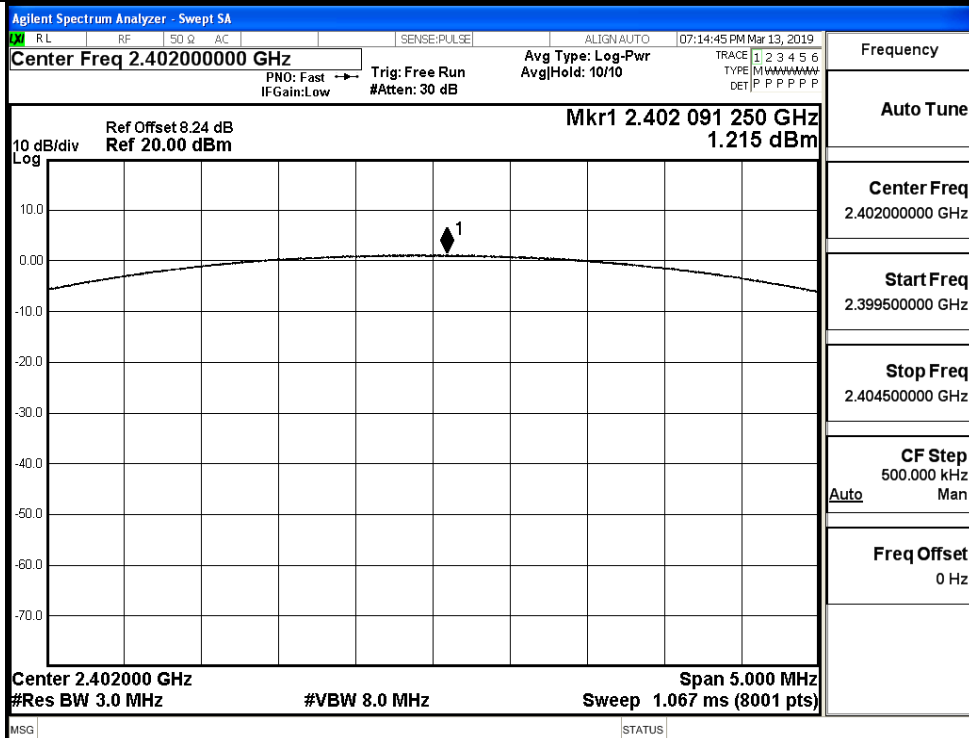
GFSK/LCH

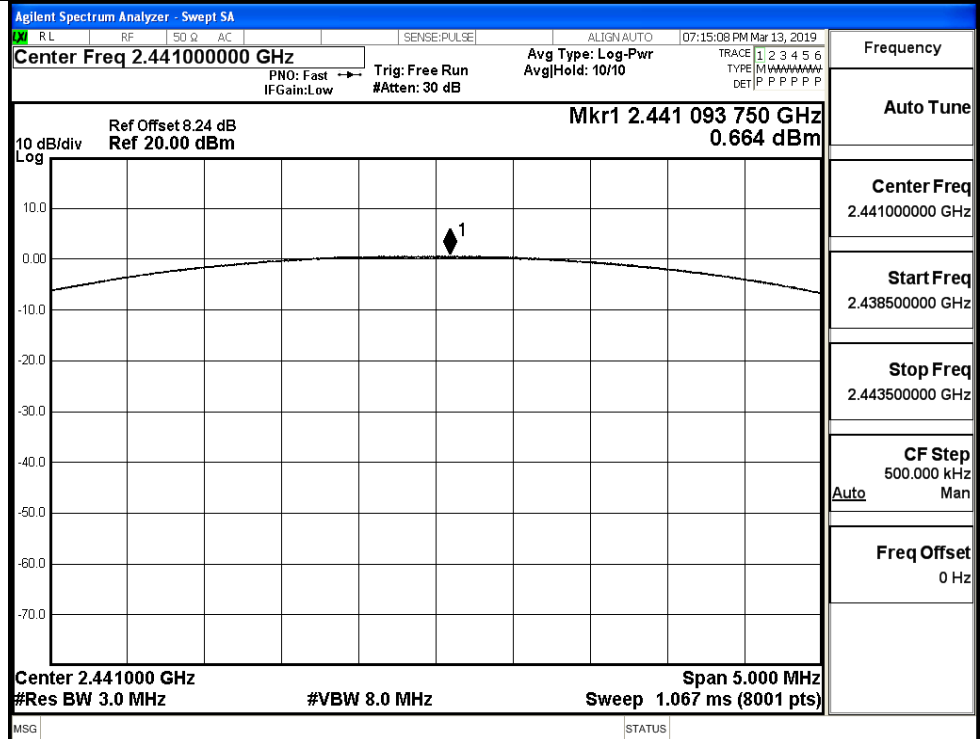
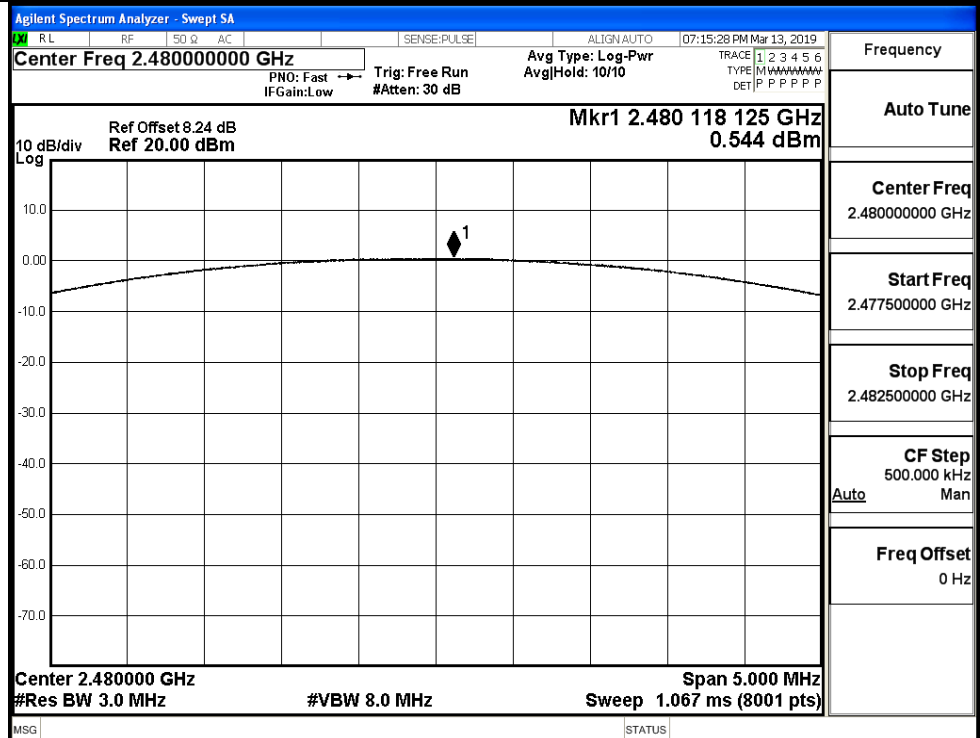


GFSK/MCH

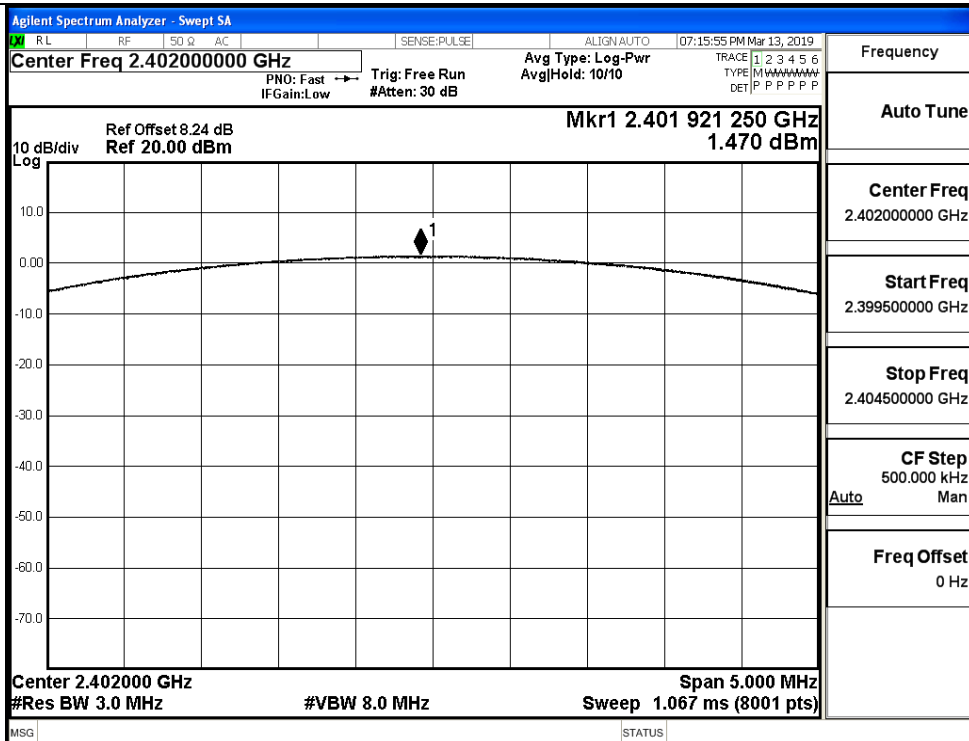


GFSK/HCH

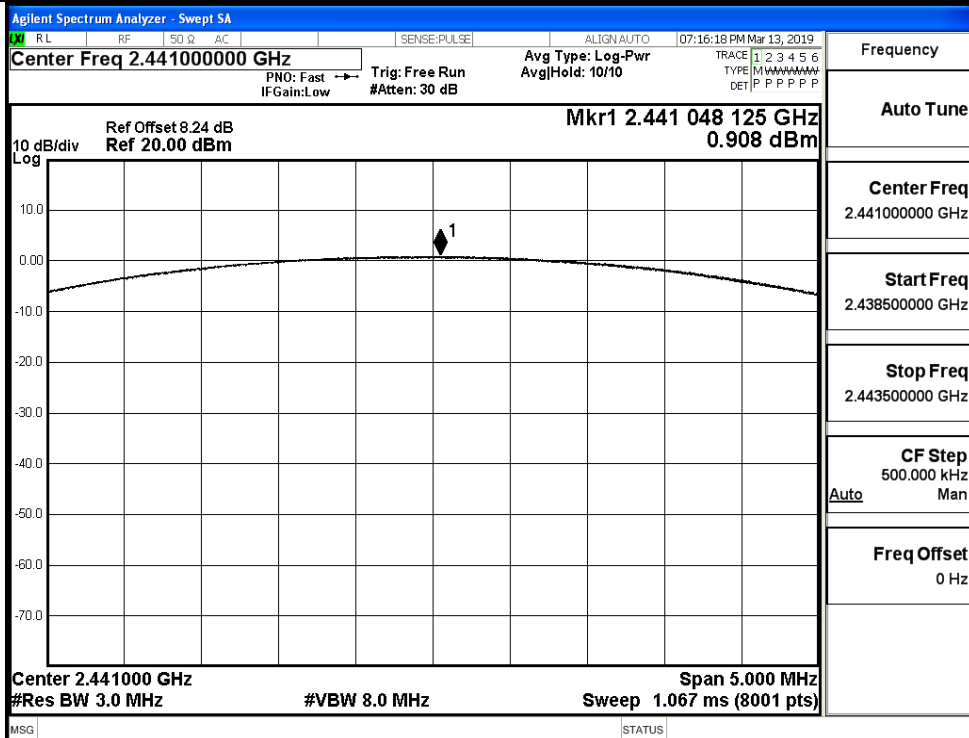
 $\pi/4$ DQPSK/LCH

$\pi/4$ DQPSK/MCH $\pi/4$ DQPSK/HCH

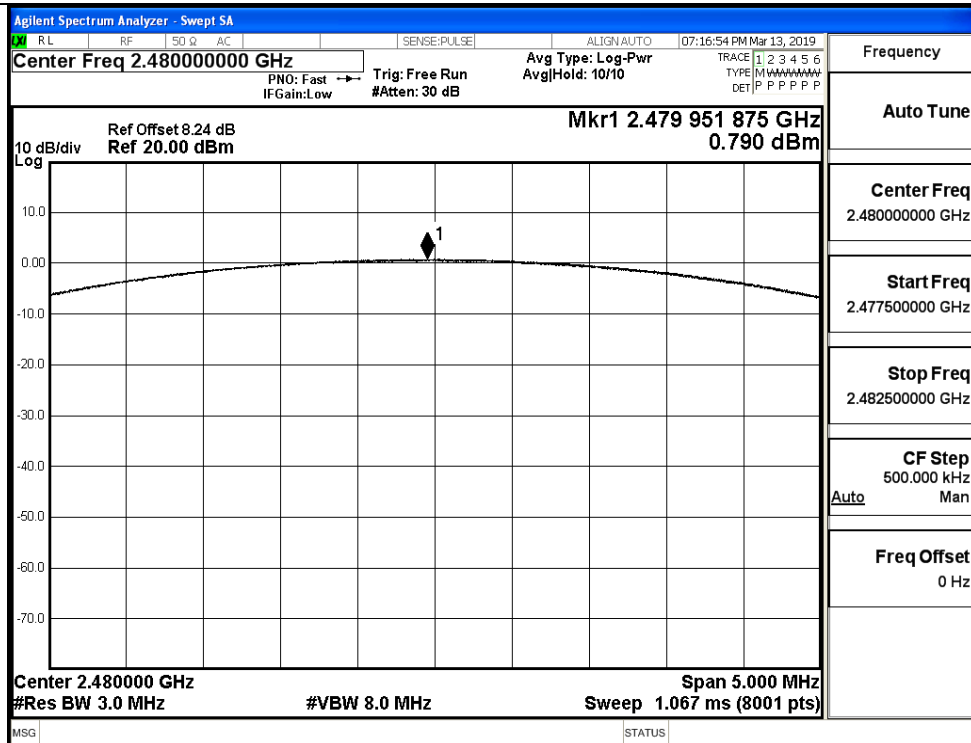
8DPSK/LCH



8DPSK/MCH



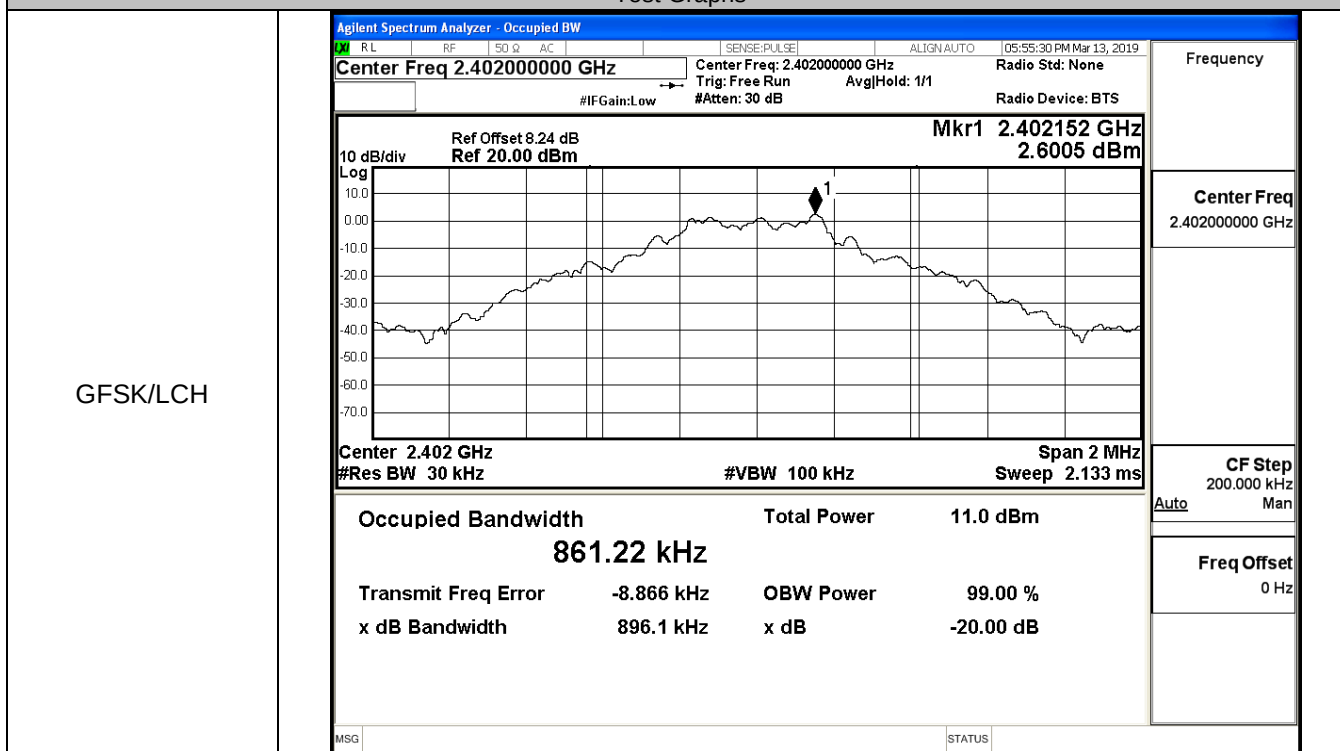
8DPSK/HCH



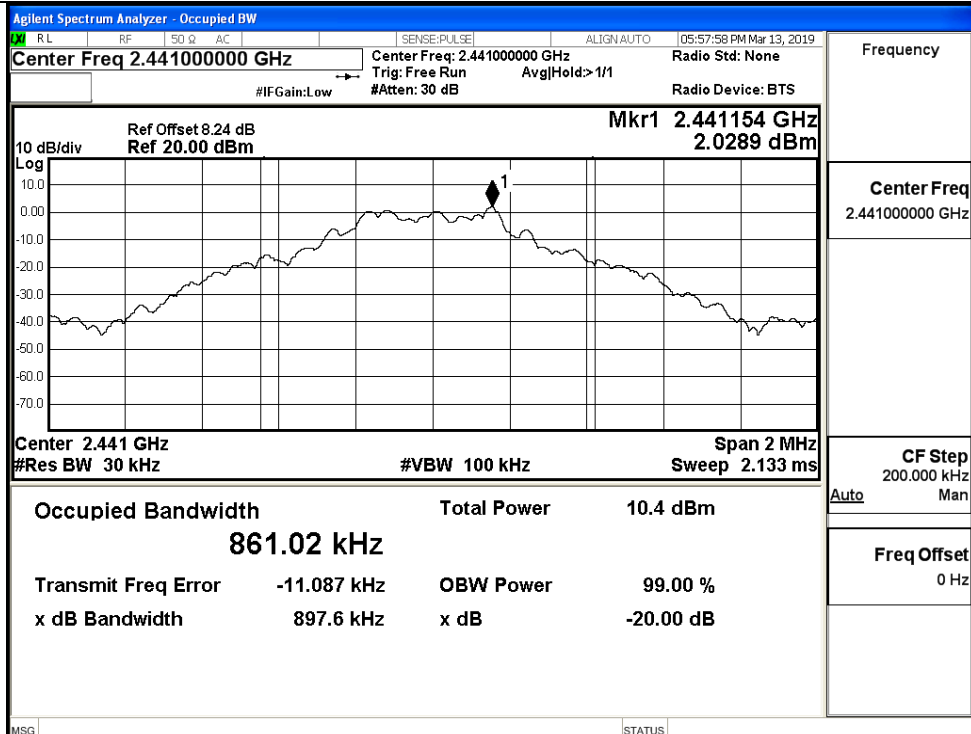
A.2 99% and 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.86122	0.8961	Not Specified	PASS
	MCH	0.86102	0.8976	Not Specified	PASS
	HCH	0.86367	0.8974	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.1727	1.290	Not Specified	PASS
	MCH	1.1732	1.291	Not Specified	PASS
	HCH	1.1715	1.288	Not Specified	PASS
8DPSK	LCH	1.1829	1.292	Not Specified	PASS
	MCH	1.1801	1.293	Not Specified	PASS
	HCH	1.1813	1.309	Not Specified	PASS

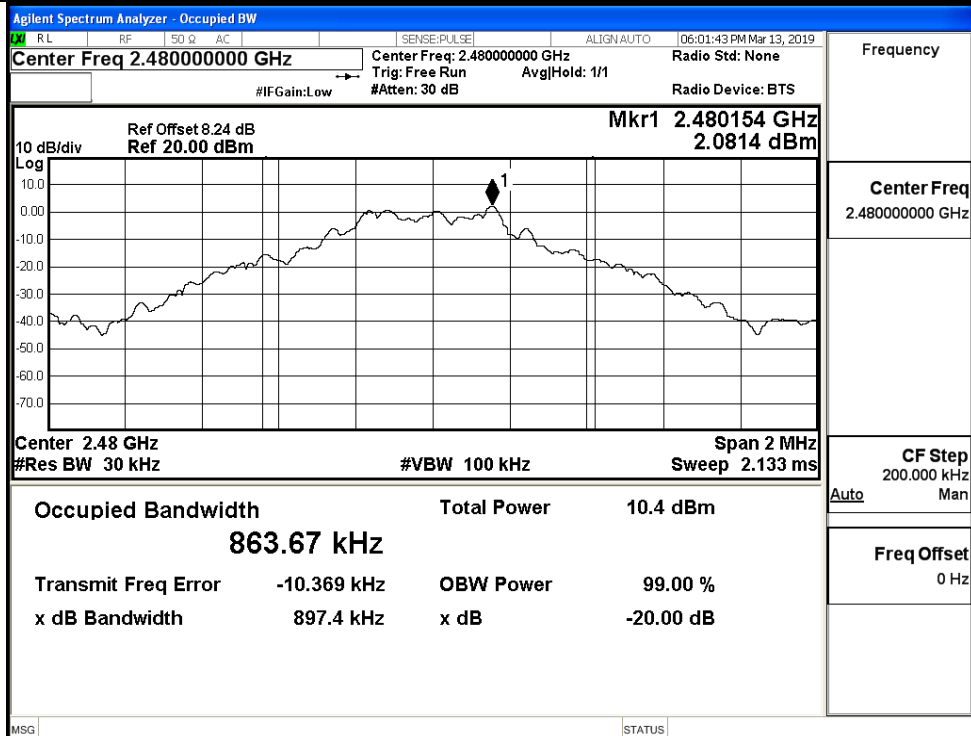
Test Graphs

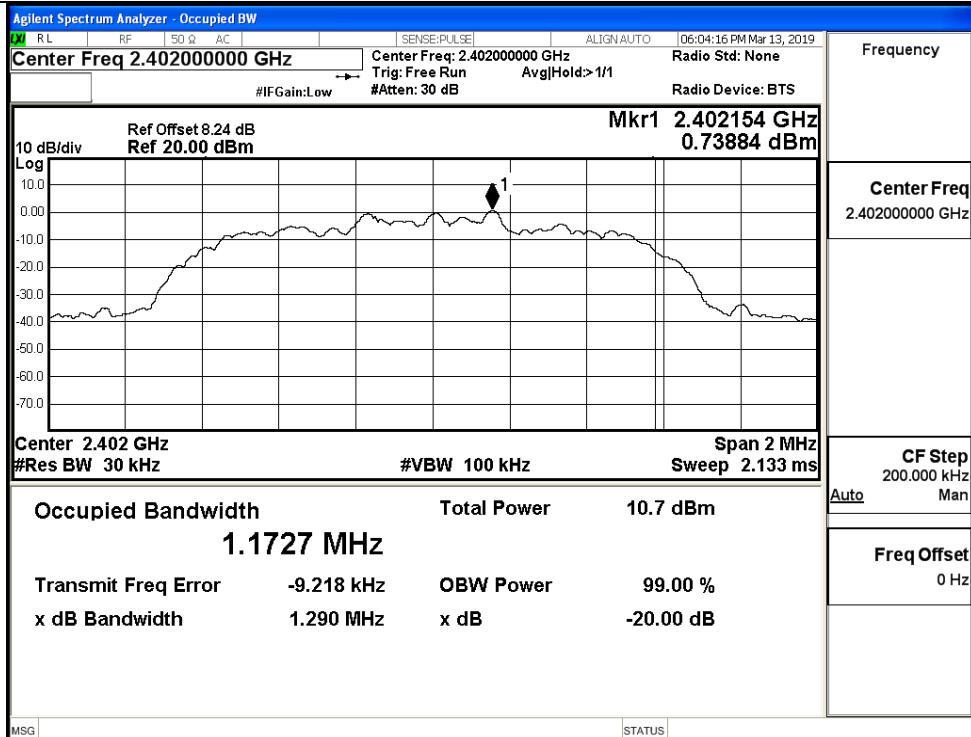
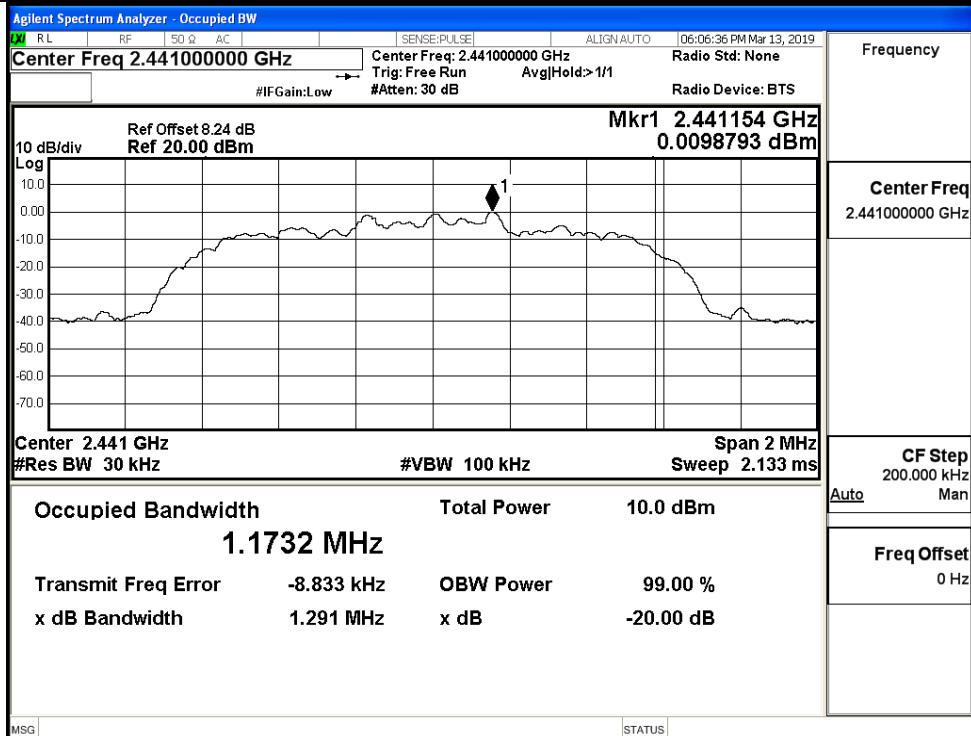


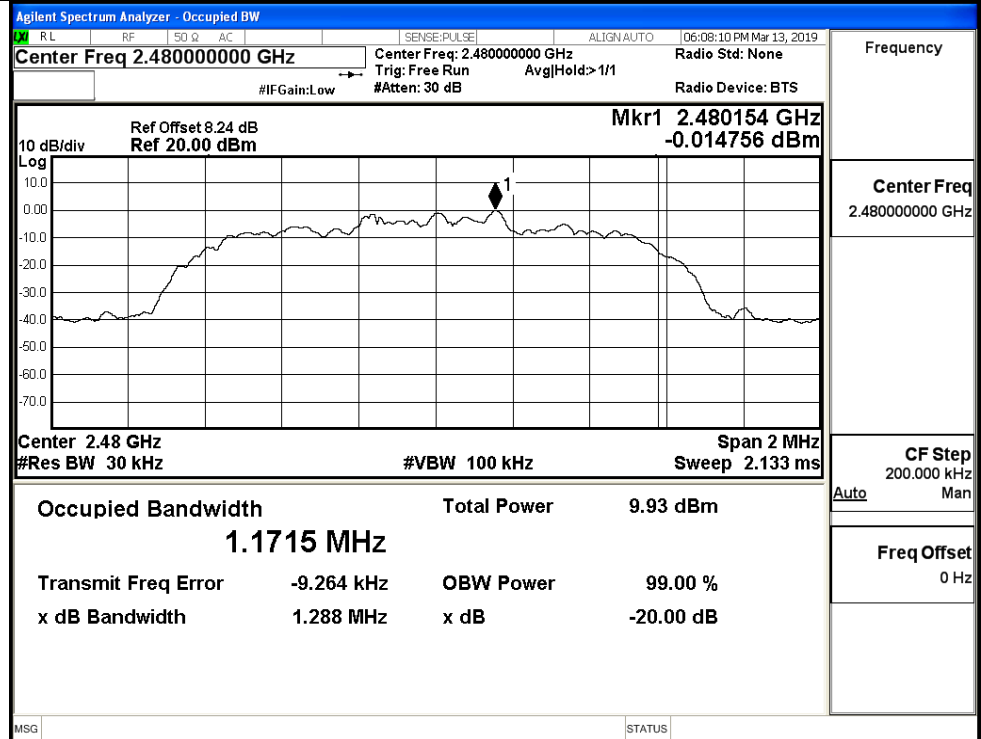
GFSK/MCH



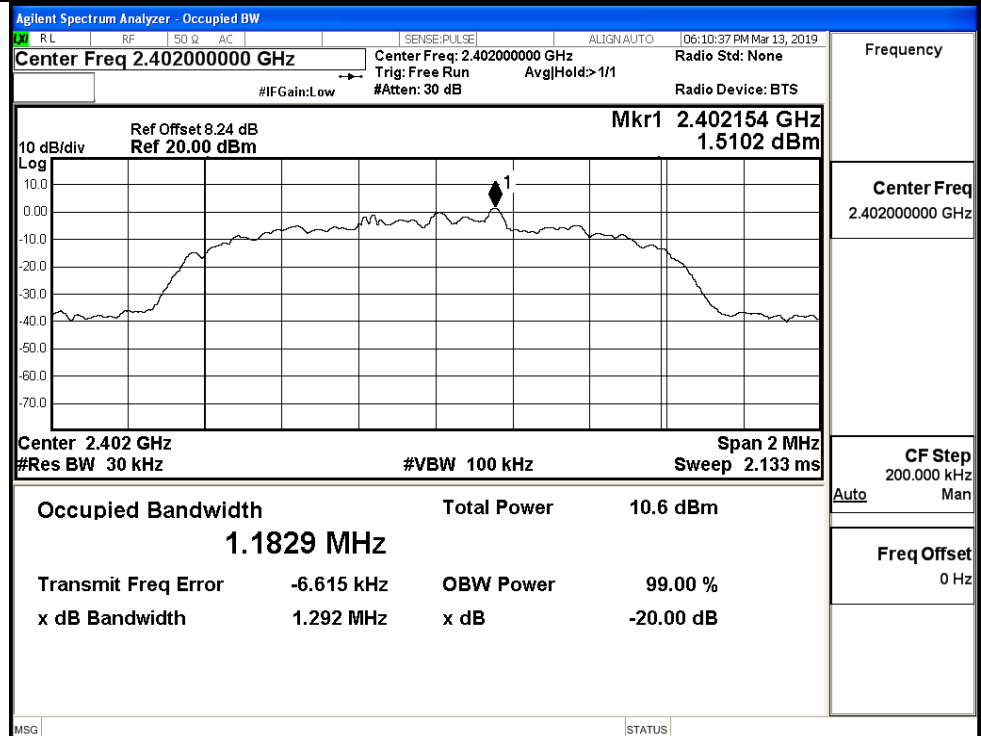
GFSK/HCH



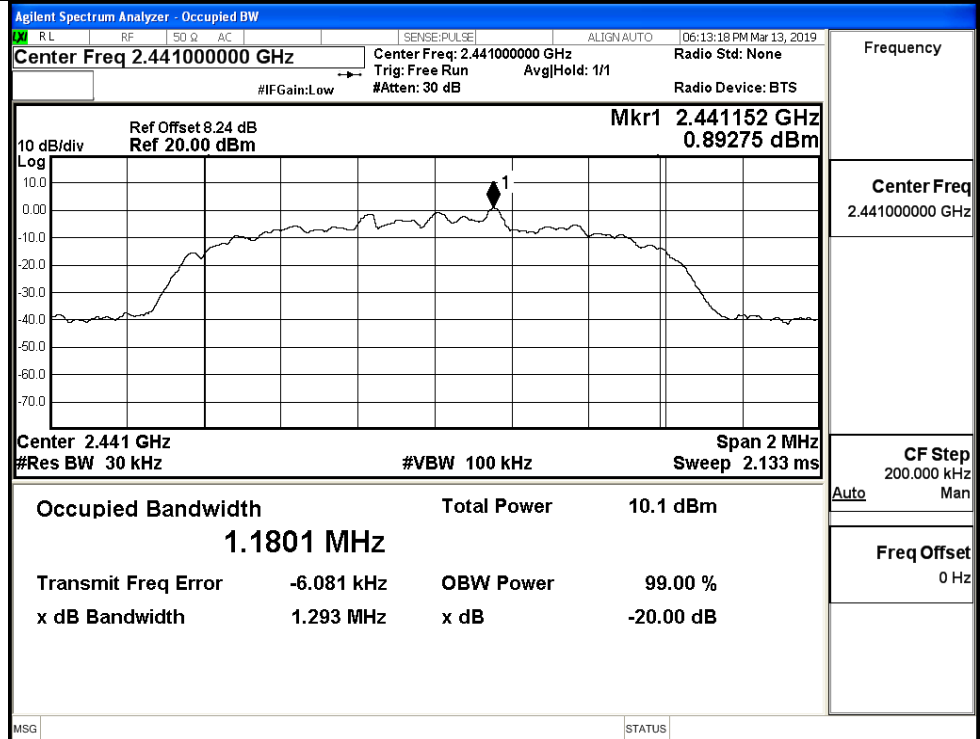
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

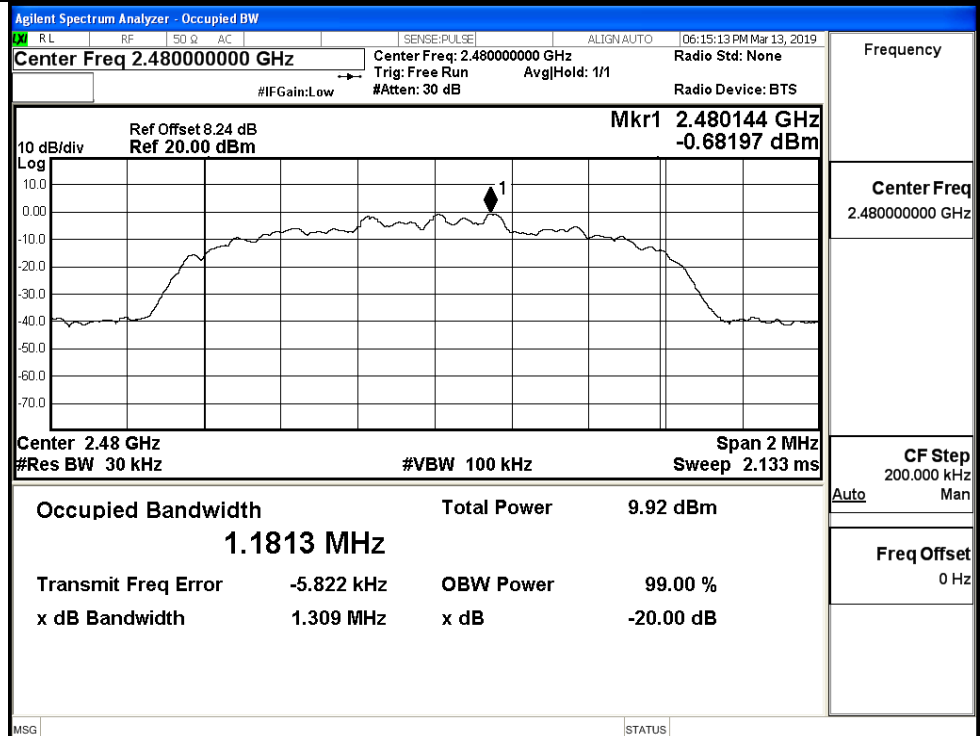
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

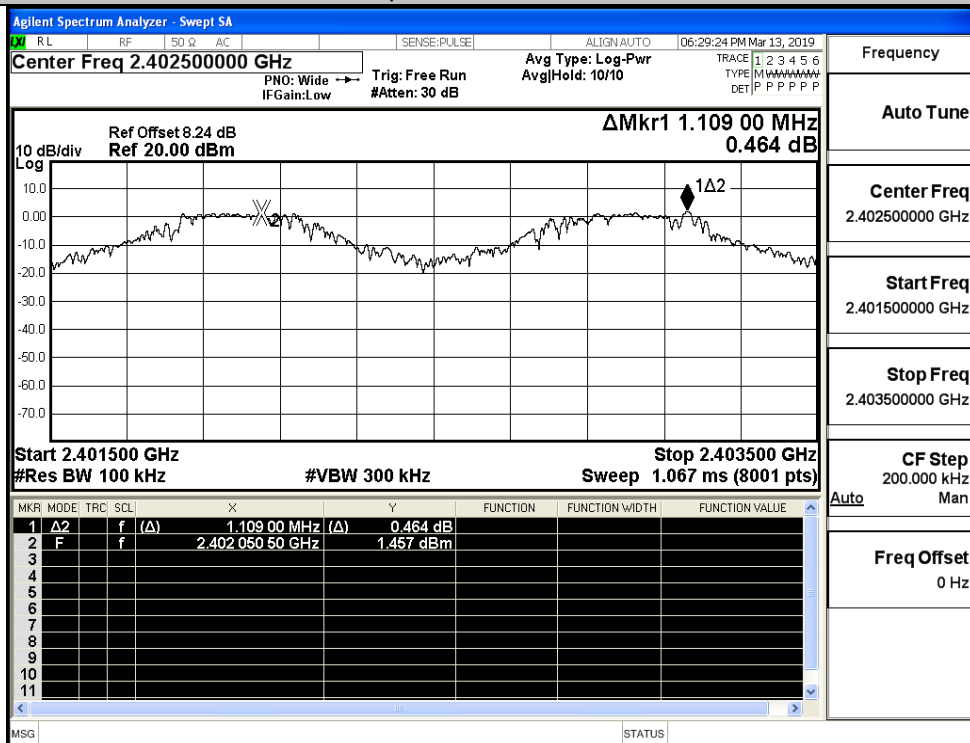


A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.109	0.598	PASS
	MCH	1.134	0.598	PASS
	HCH	1.036	0.598	PASS
$\pi/4$ DQPSK	LCH	0.998	0.861	PASS
	MCH	0.904	0.861	PASS
	HCH	0.996	0.861	PASS
8DPSK	LCH	1.264	0.873	PASS
	MCH	1.068	0.873	PASS
	HCH	1.008	0.873	PASS

Test Graphs

GFSK/LCH



Frequency

Auto Tune

Center Freq

2.402500000 GHz

Start Freq

2.401500000 GHz

Stop Freq

2.403500000 GHz

CF Step

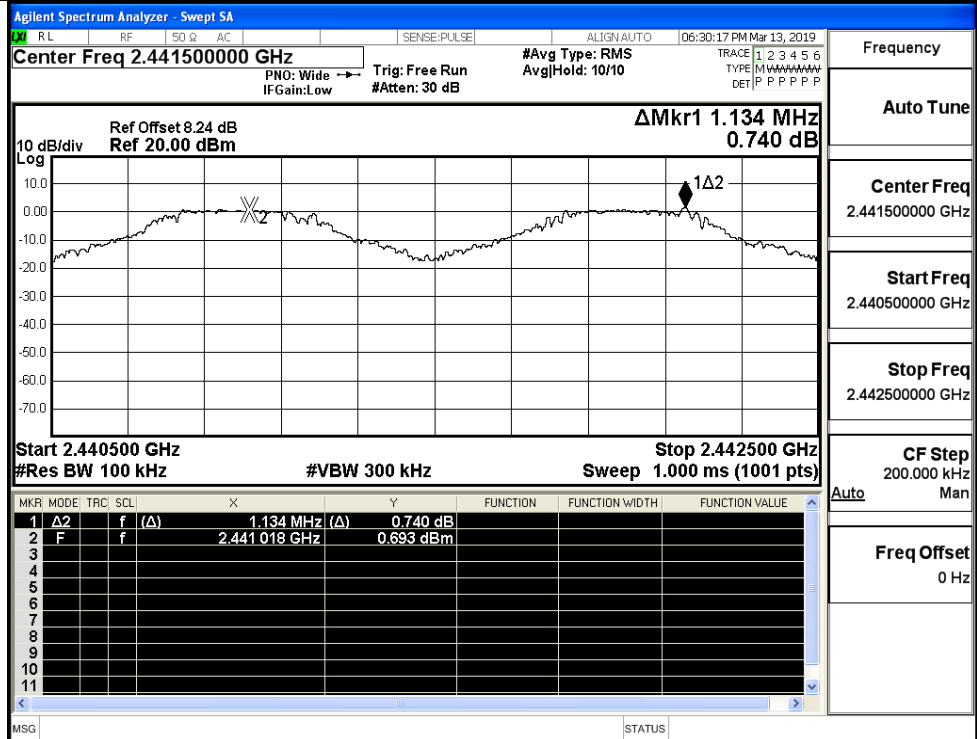
200.000 kHz

Man

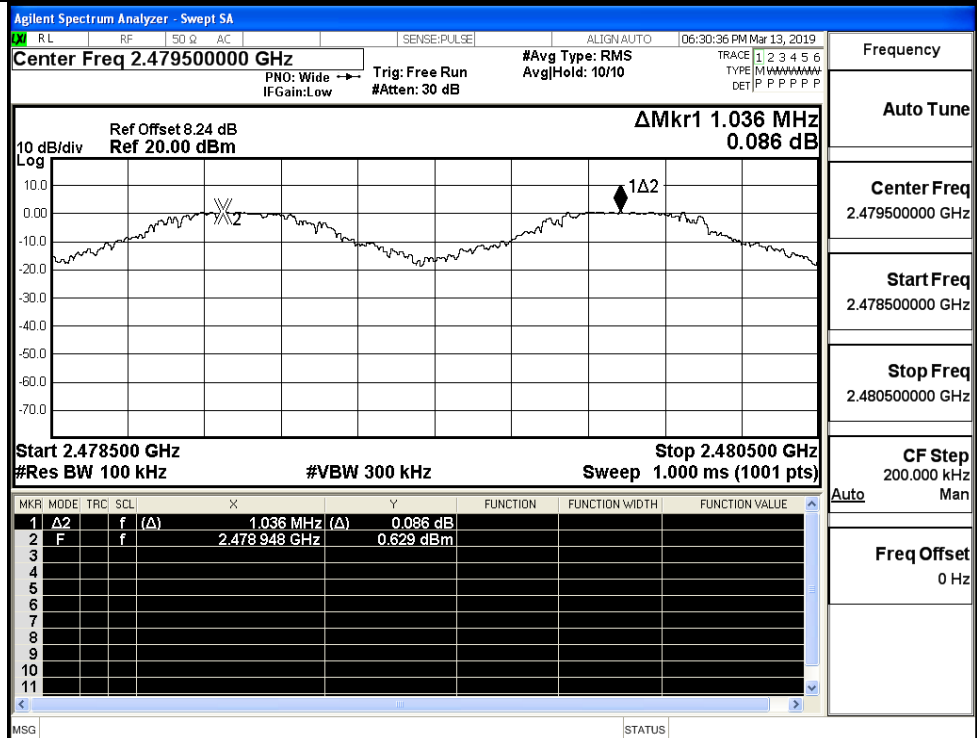
Freq Offset

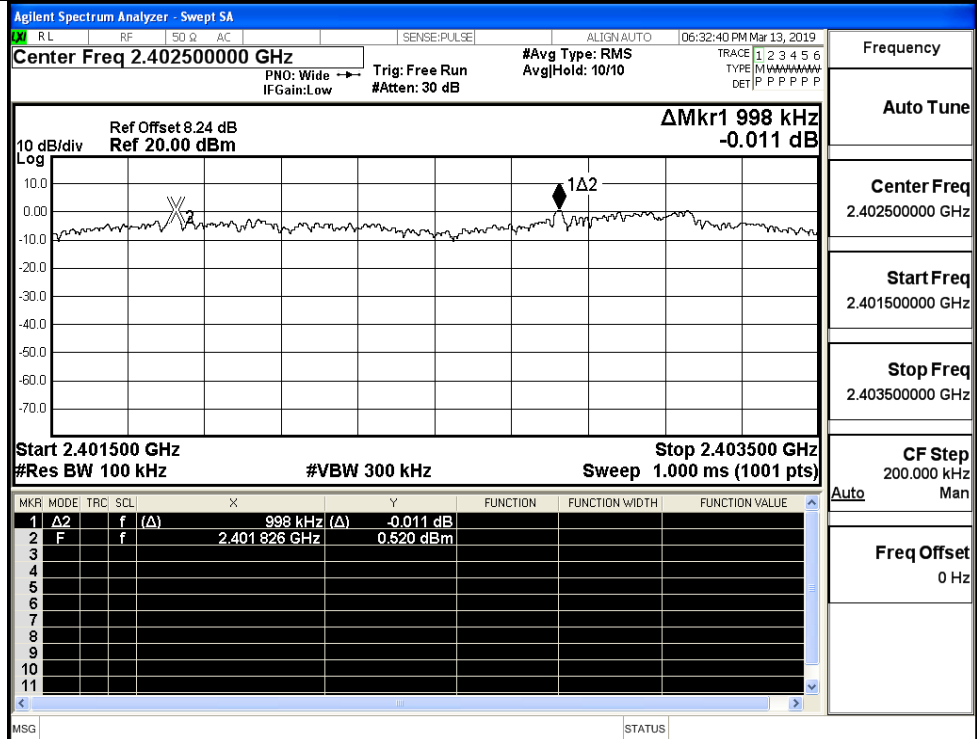
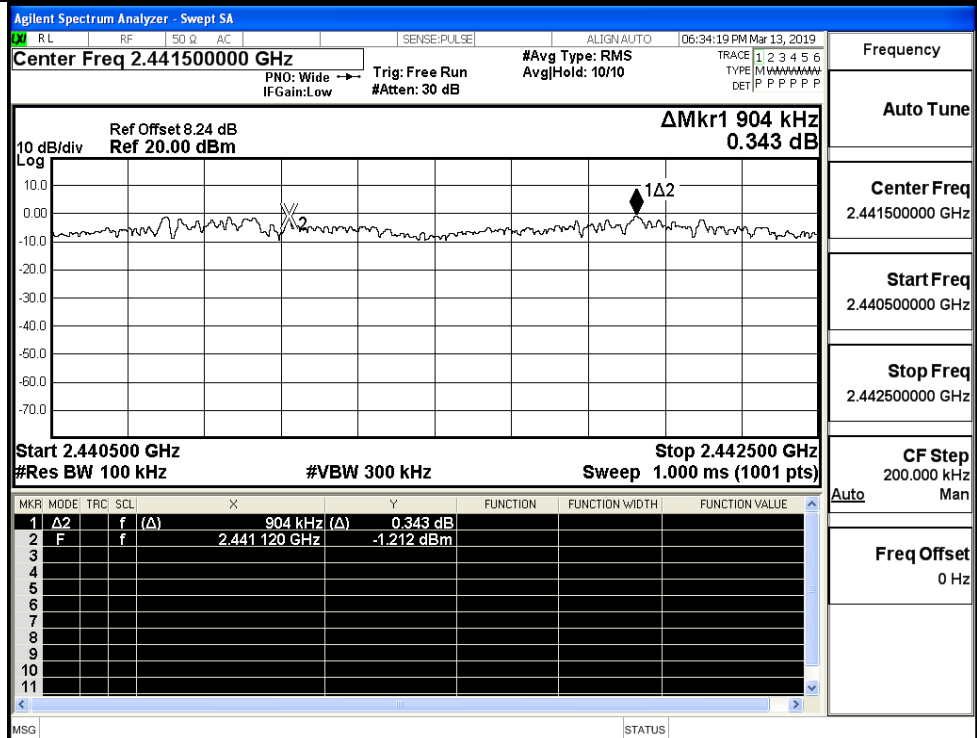
0 Hz

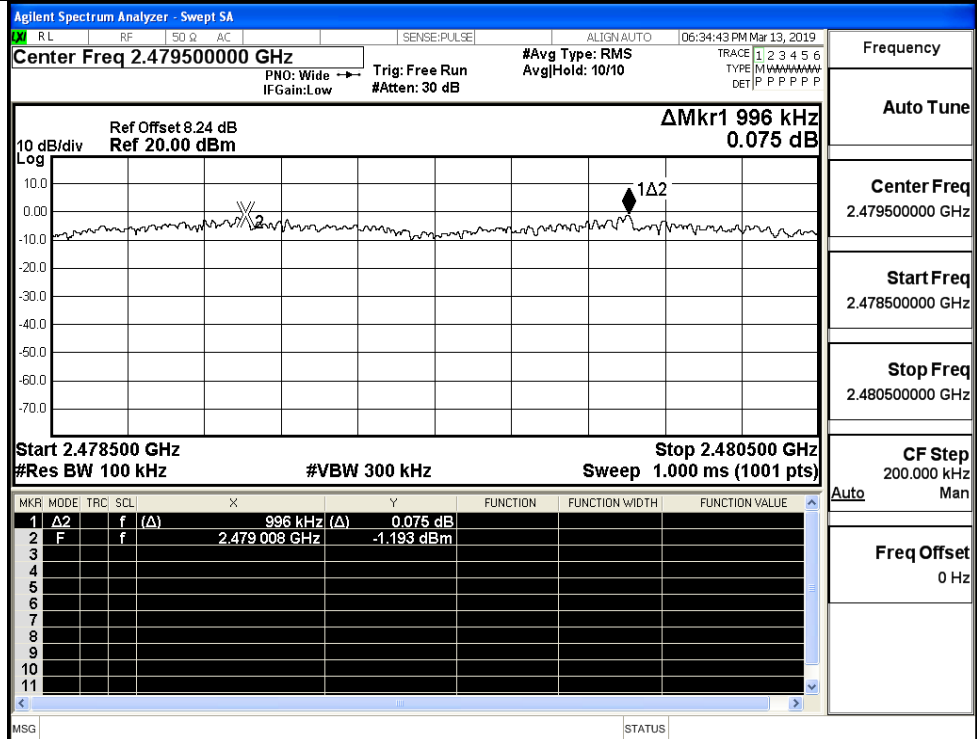
GFSK/MCH



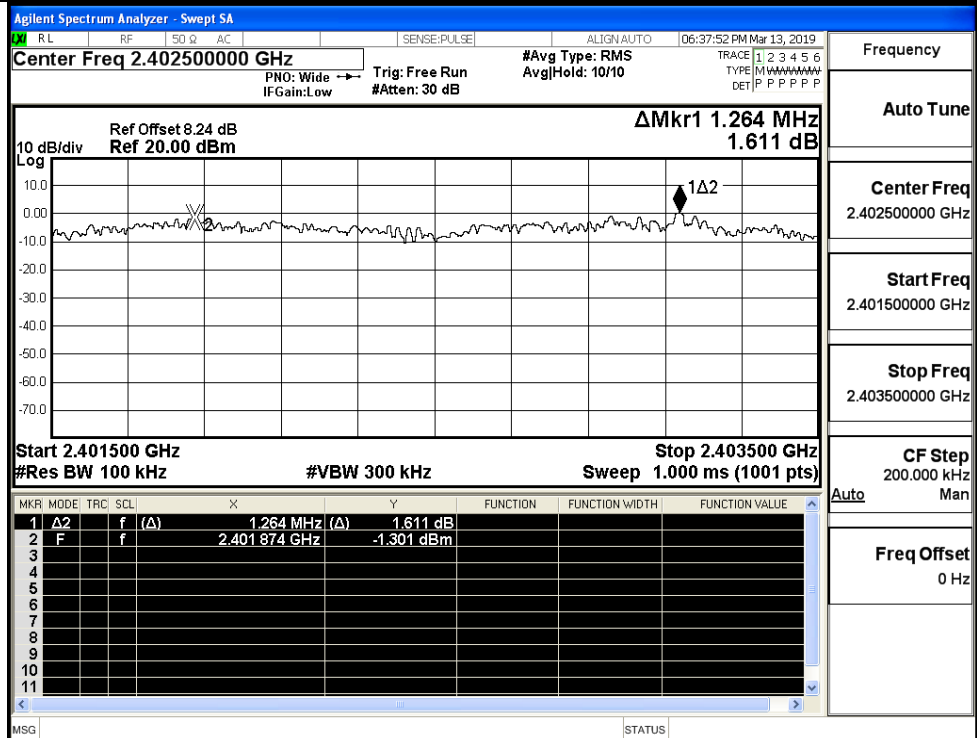
GFSK/HCH



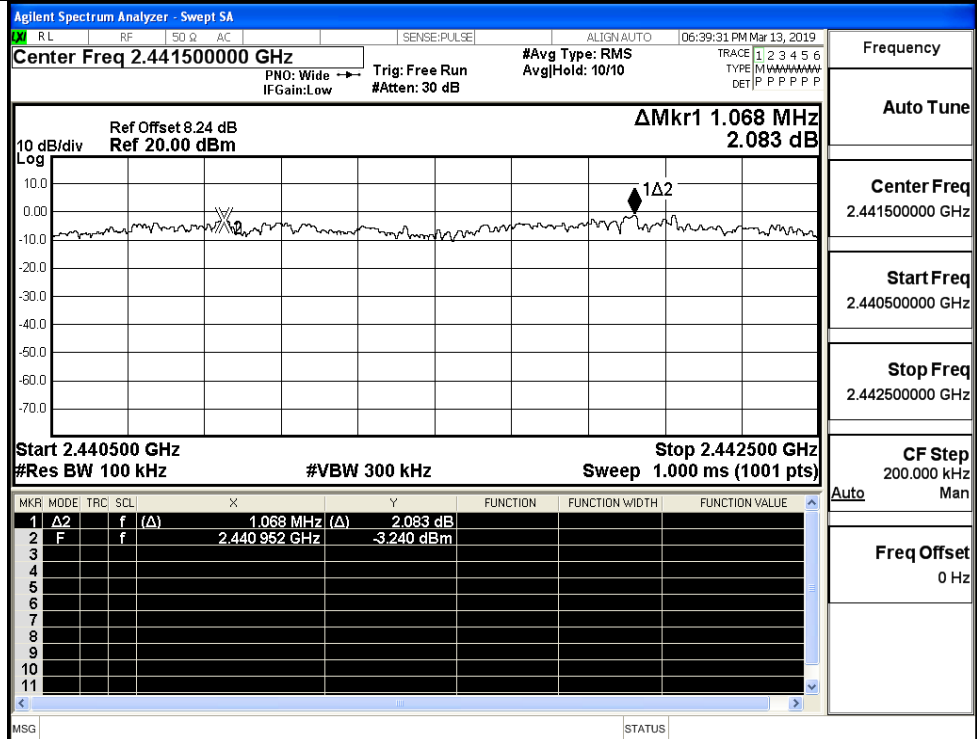
π /4DQPSK/LCH π /4DQPSK/MCH

π /4DQPSK/HCH

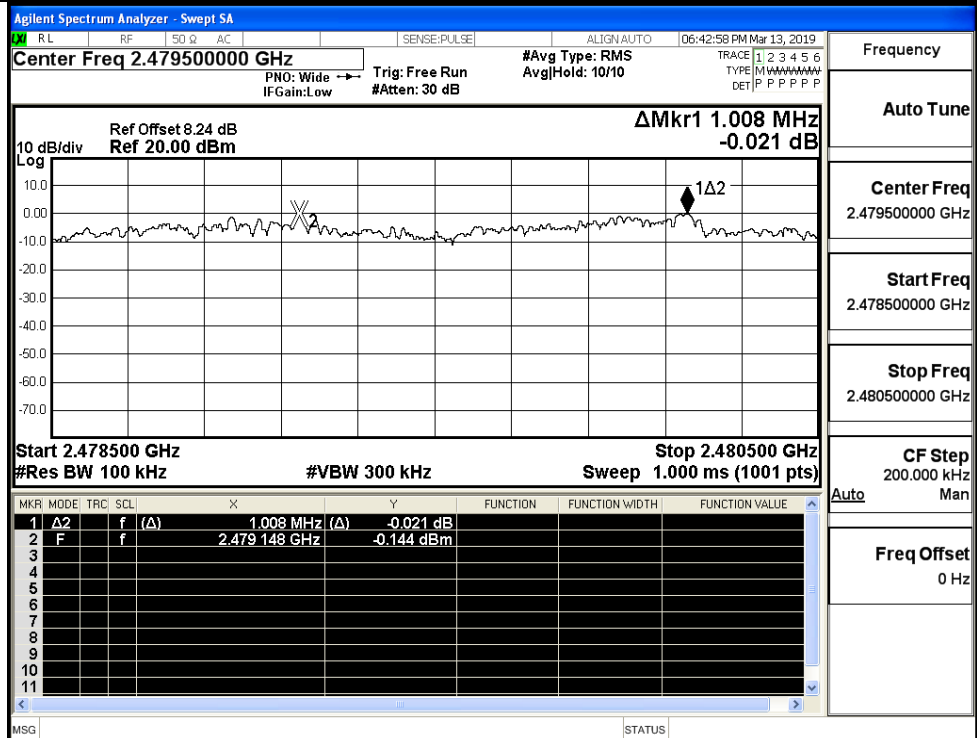
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

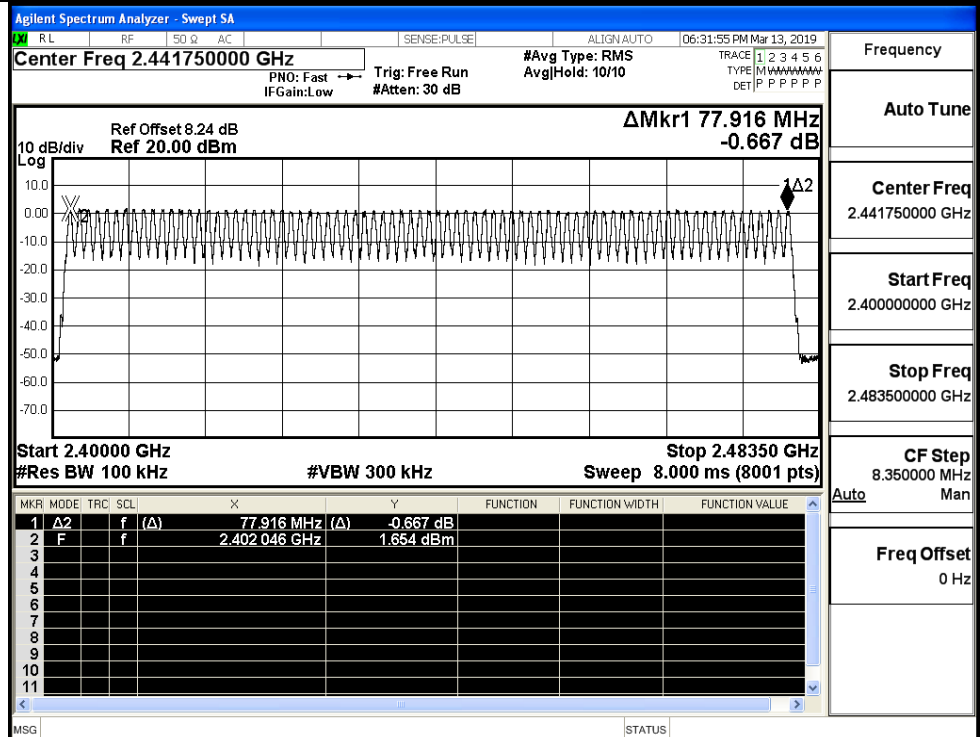
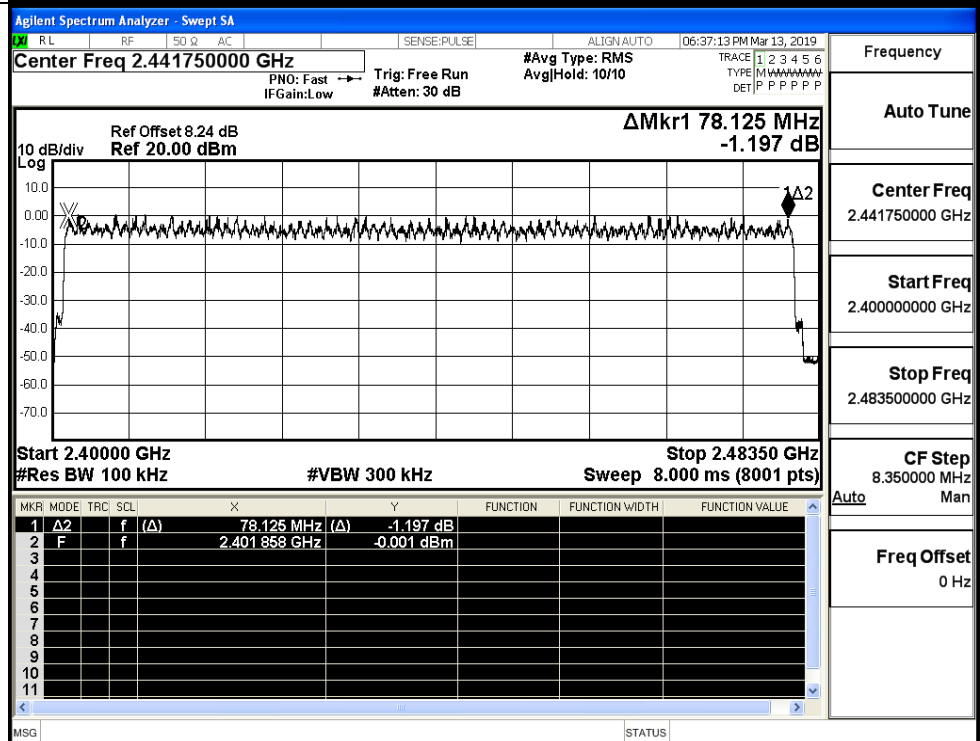


A.4 Hopping Channel Number

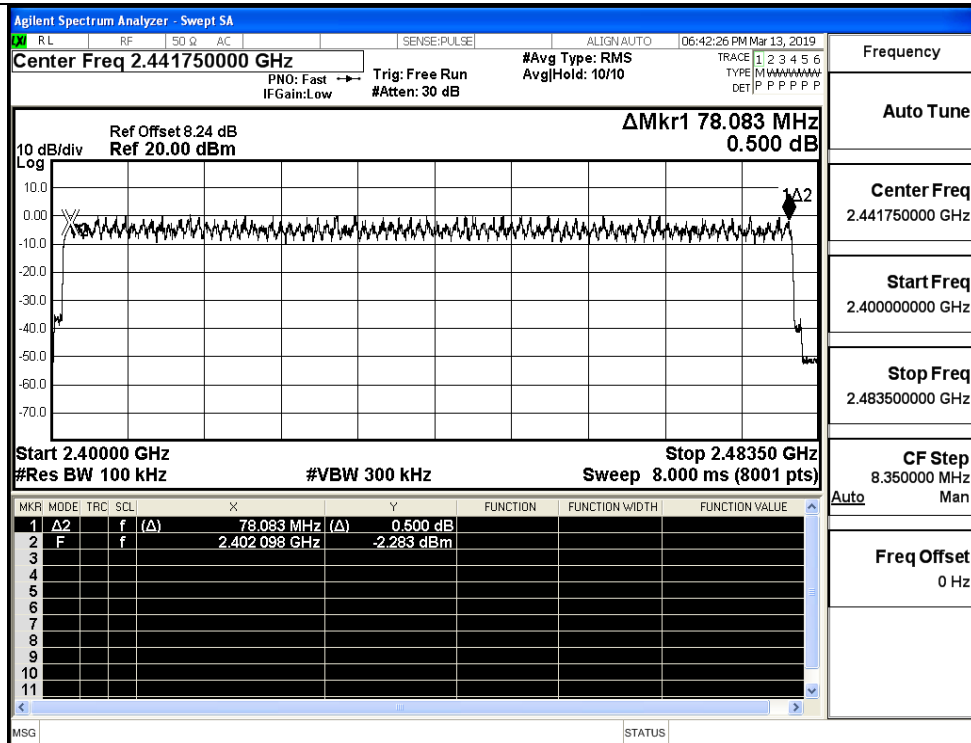
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

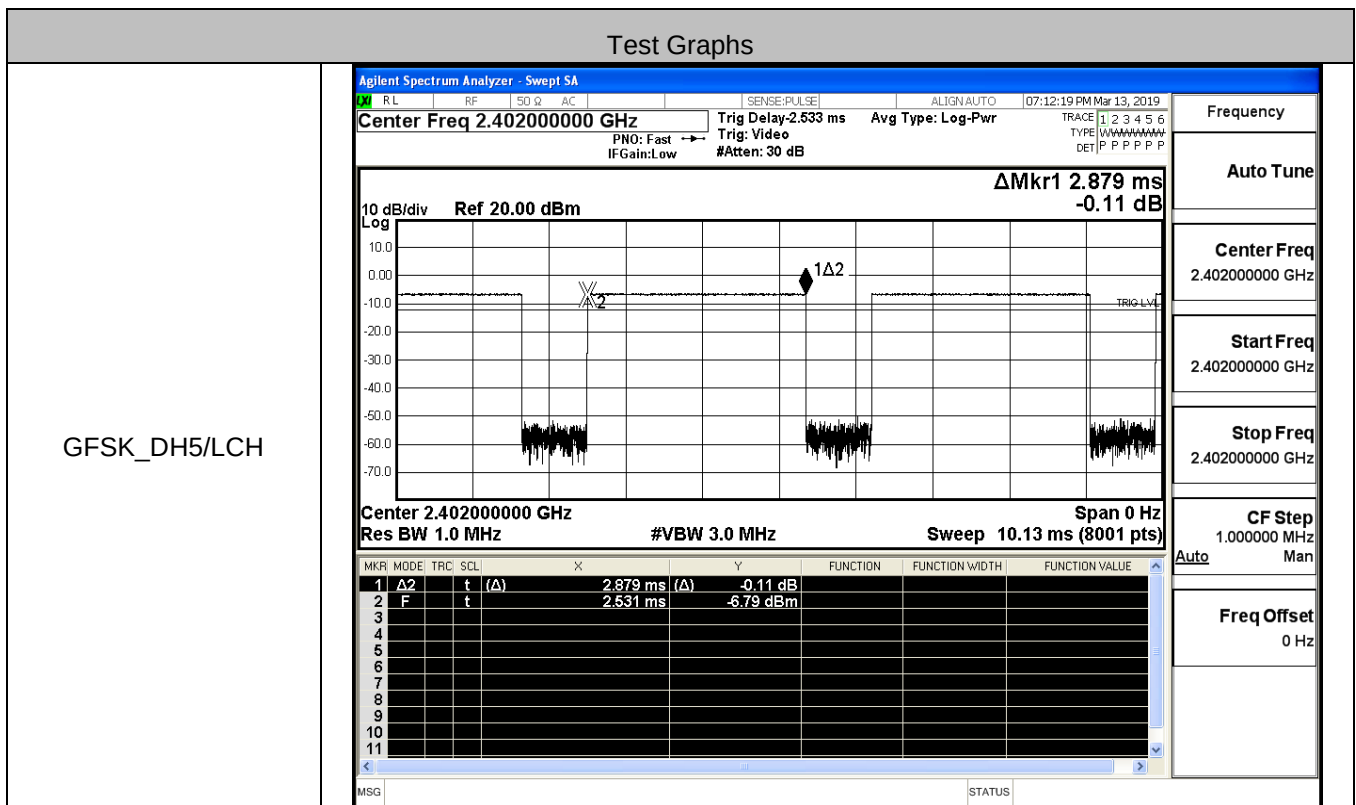
 $\pi/4$ DQPSK/Hop

8DPSK/Hop

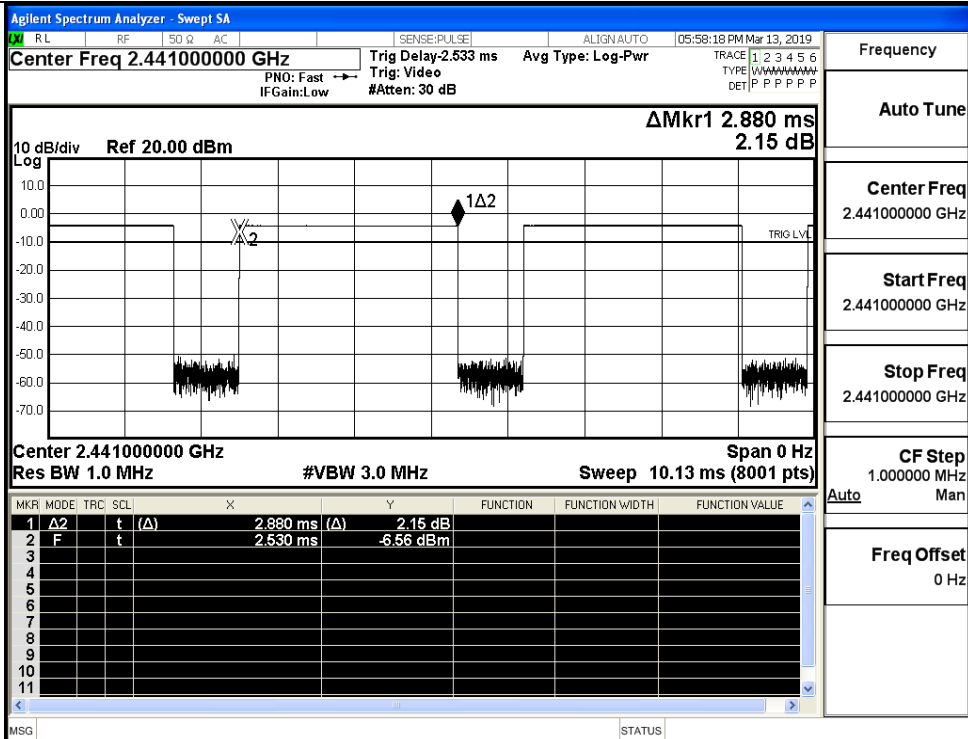


A.5 Dwell Time

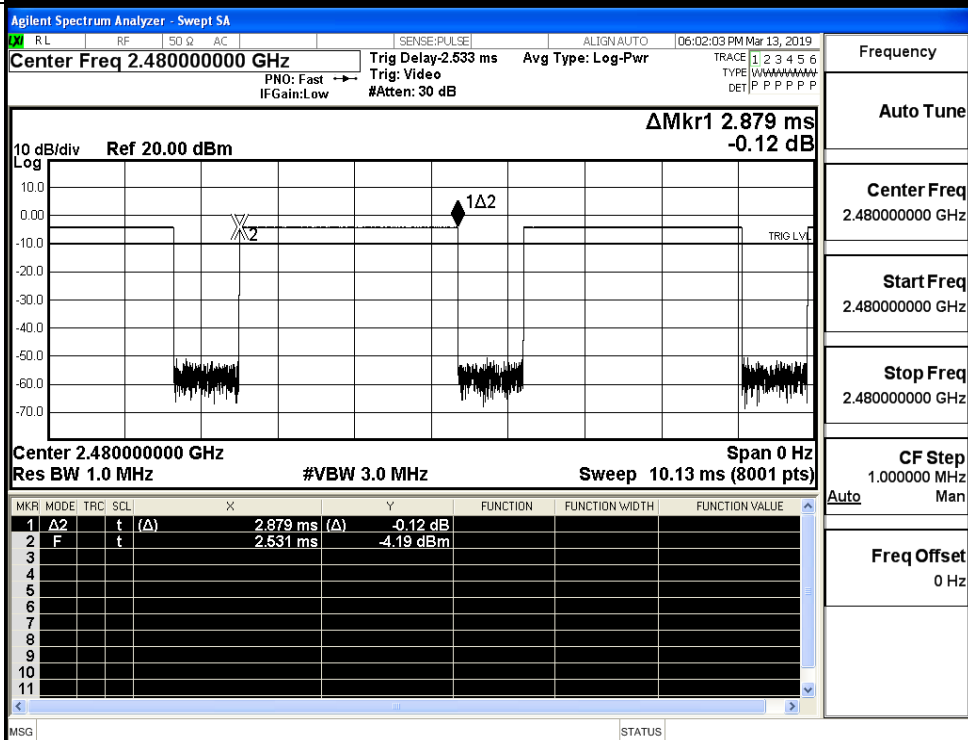
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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



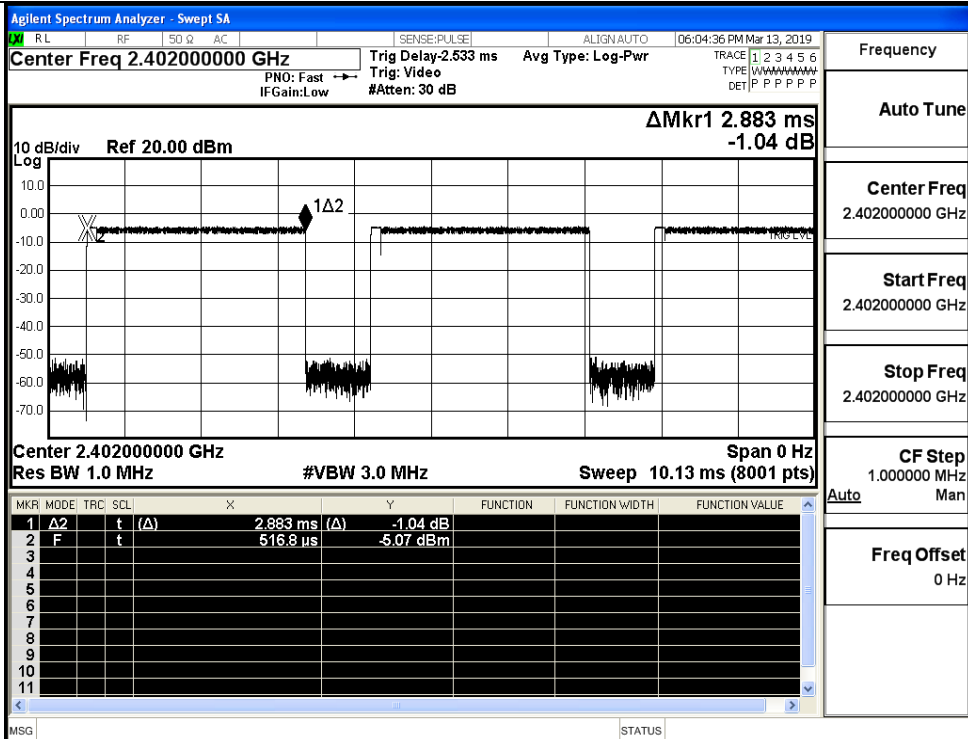
GFSK_DH5/MCH



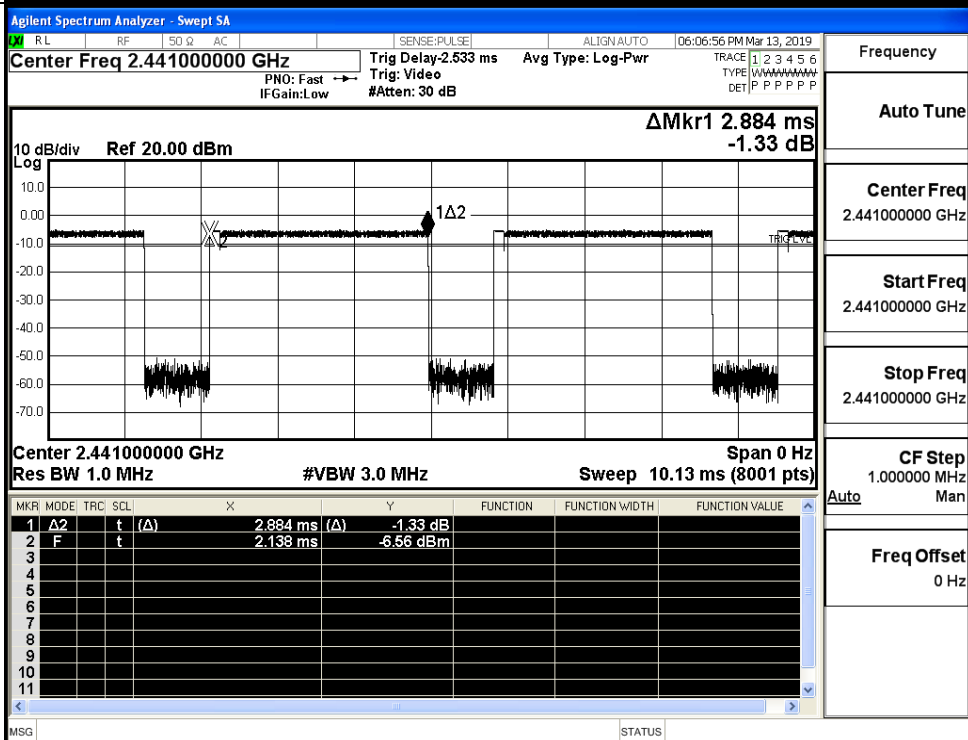
GFSK_DH5/HCH



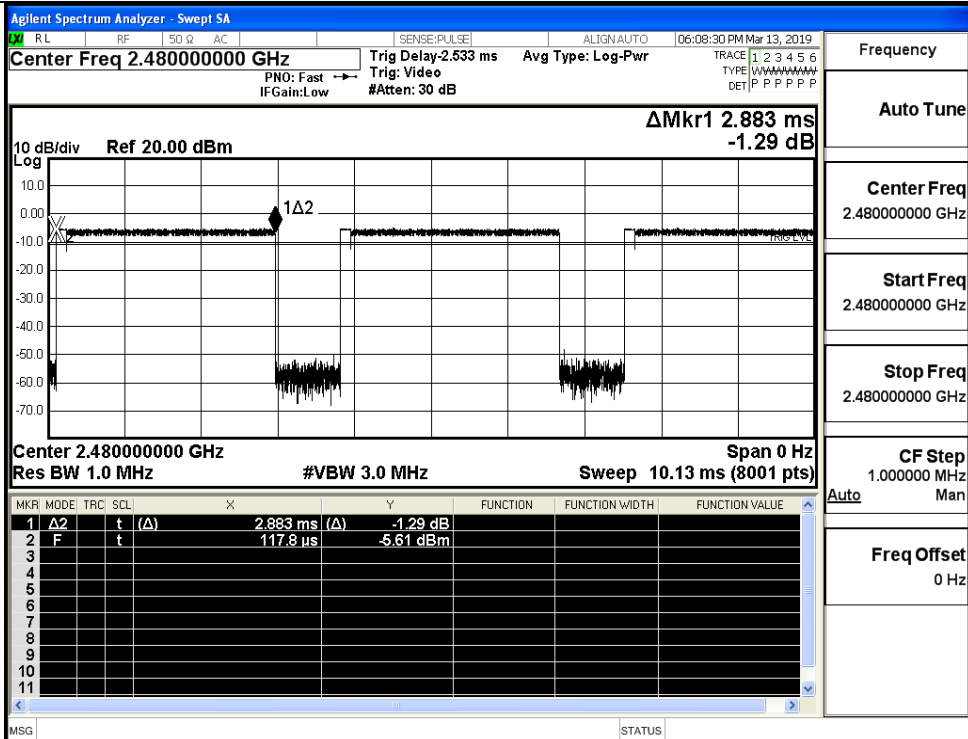
$\pi/4$ DQPSK
_2DH5/LCH



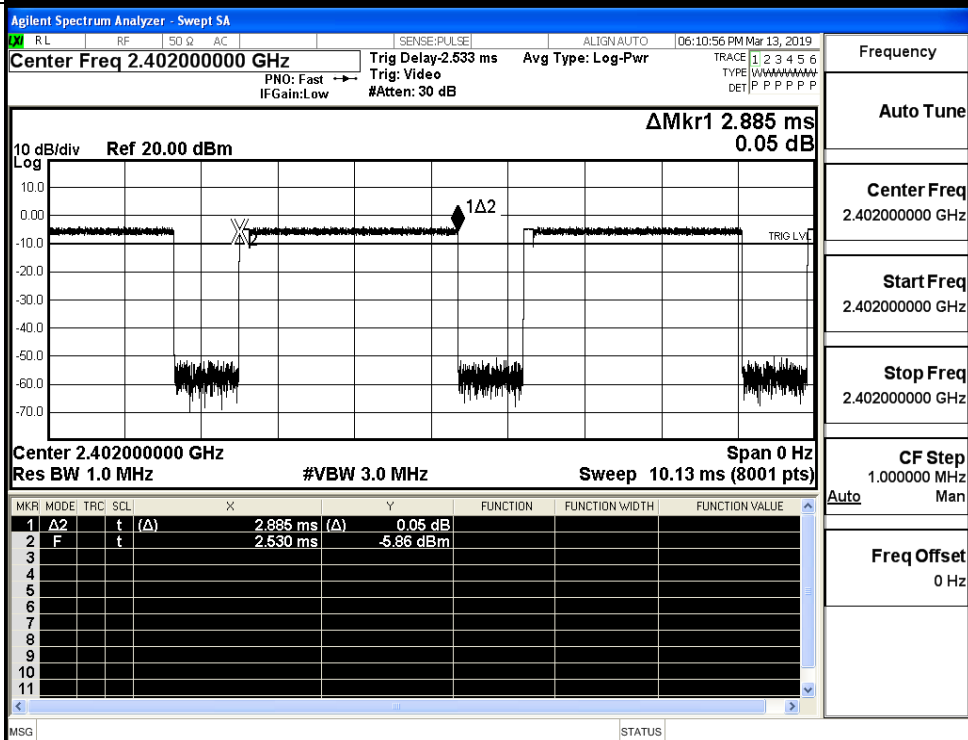
$\pi/4$ DQPSK
_2DH5/MCH



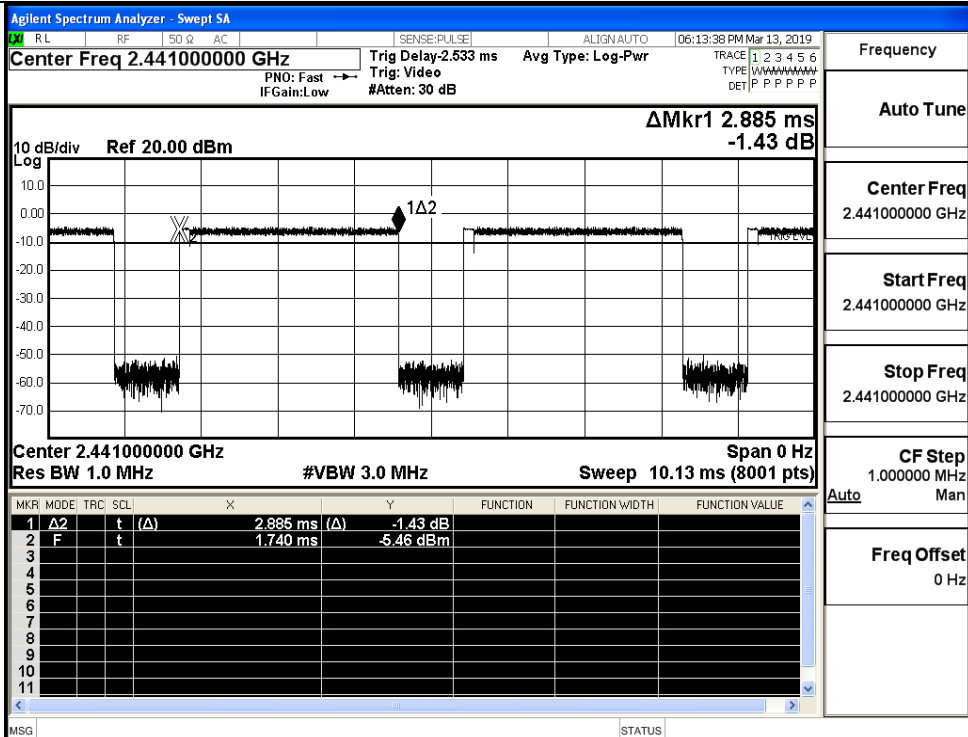
$\pi/4$ DQPSK
_2DH5/HCH



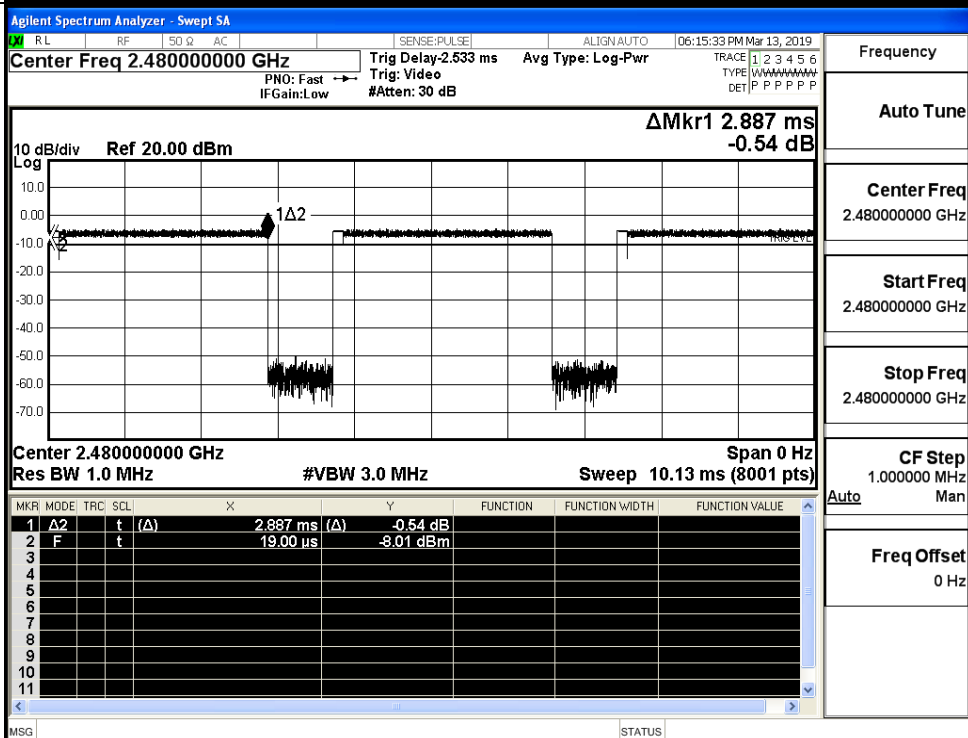
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



8DPSK_3DH5/HCH



A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.734	-44.380	-15.266	PASS
	MCH	4.171	-44.446	-15.829	PASS
	HCH	4.163	-44.184	-15.837	PASS
$\pi/4$ DQPSK	LCH	3.542	-44.566	-16.458	PASS
	MCH	2.873	-44.985	-17.127	PASS
	HCH	2.627	-44.461	-17.373	PASS
8DPSK	LCH	3.587	-44.907	-16.413	PASS
	MCH	2.875	-44.836	-17.125	PASS
	HCH	2.593	-41.177	-17.407	PASS

GFSK_LCH_Graphs

Pref

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.402000000 GHz

Span 2.000 MHz

#Res BW 100 kHz #VBW 300 kHz Sweep 1.067 ms (8001 pts)

Puw

Agilent Spectrum Analyzer - Swept SA

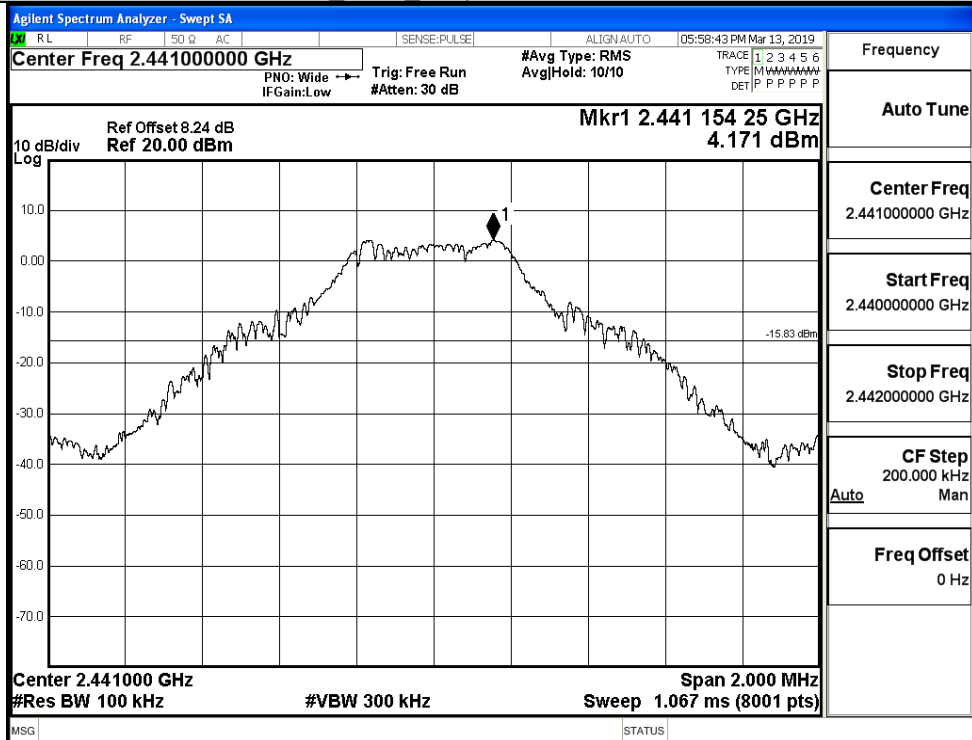
Center Freq 12.515000000 GHz

Span 20.000 MHz

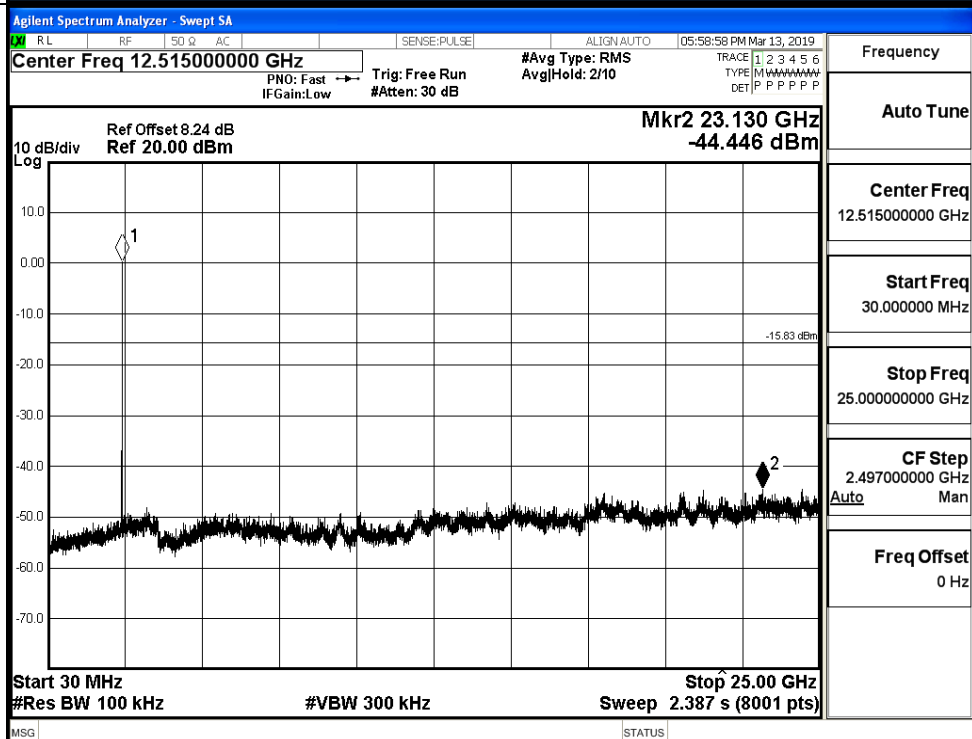
#Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (8001 pts)

GFSK_MCH_Graphs

Pref

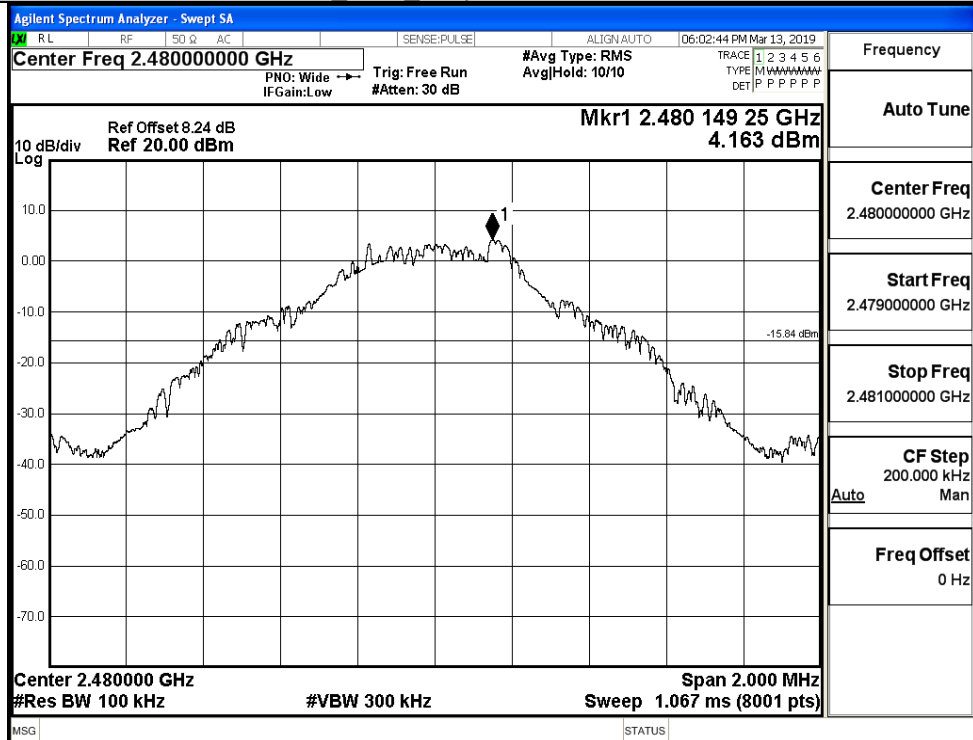


Puw

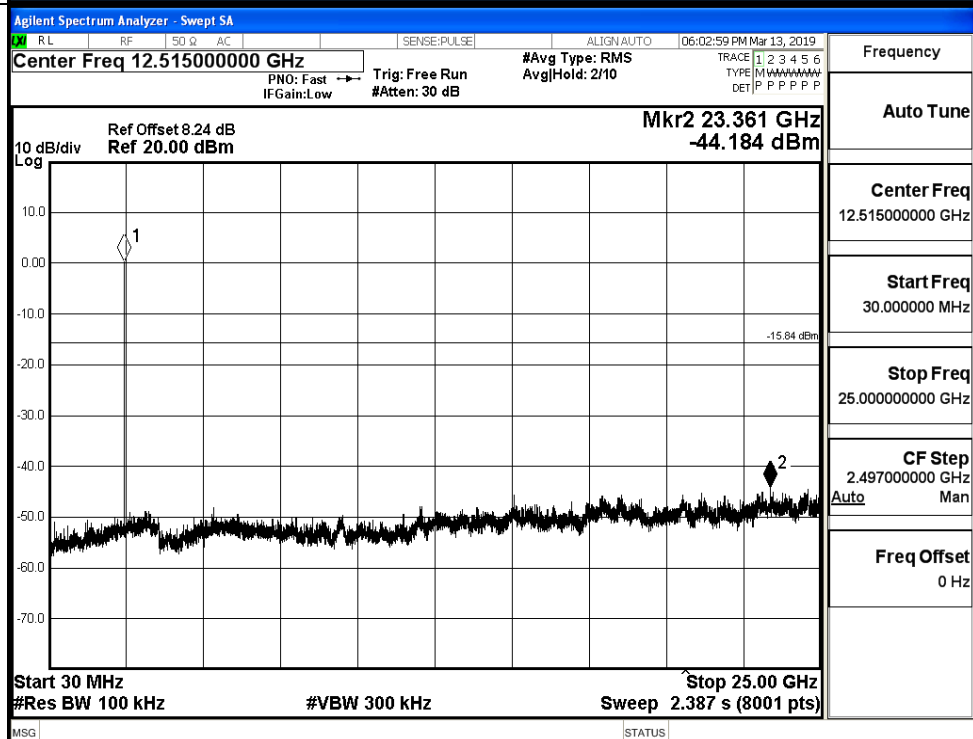


GFSK_HCH_Graphs

Pref

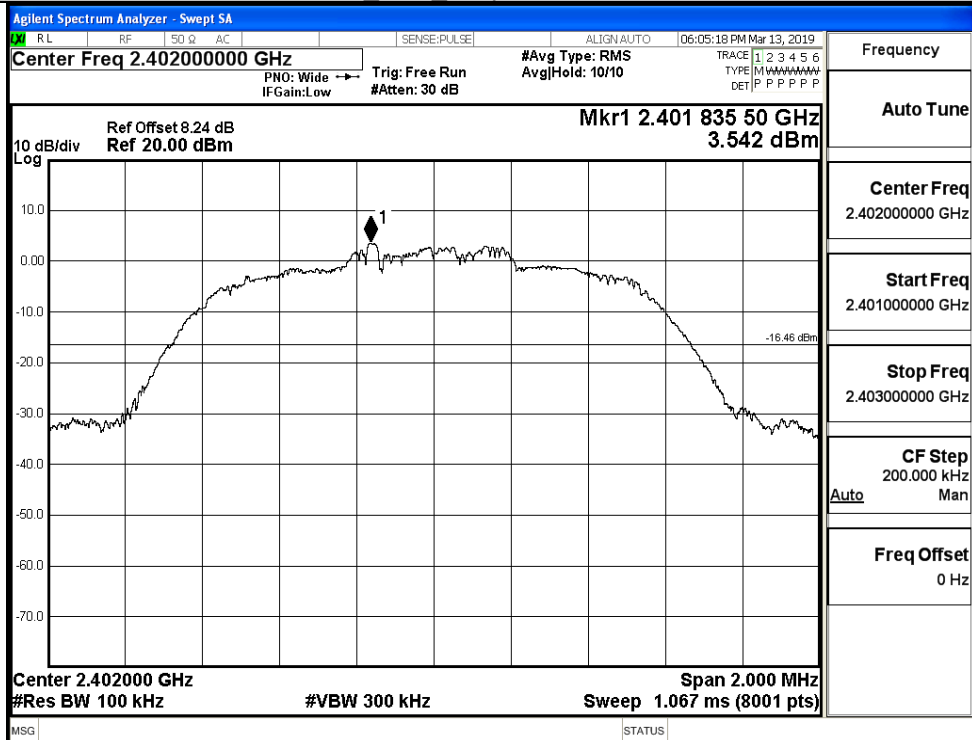


Puw

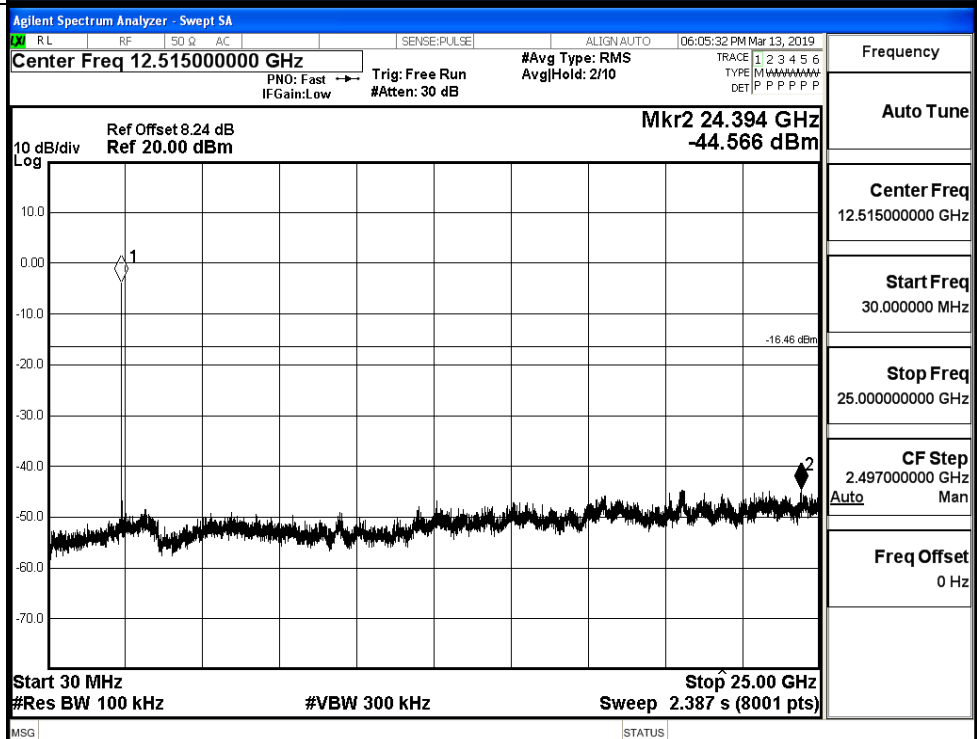


π /4DQPSK_LCH_Graphs

Pref

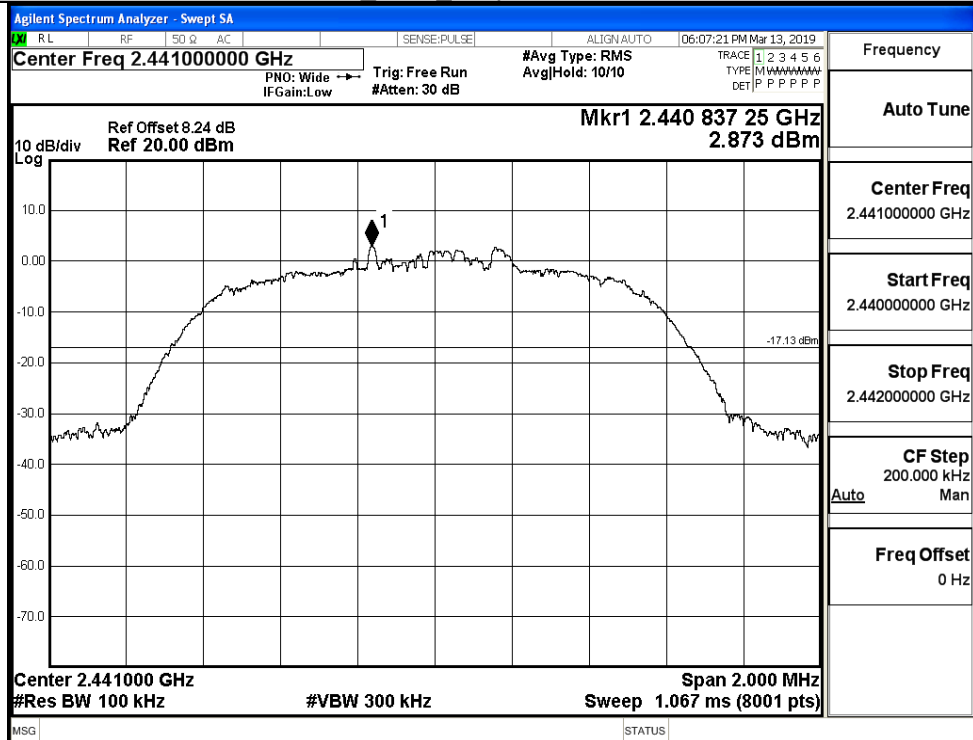


Puw

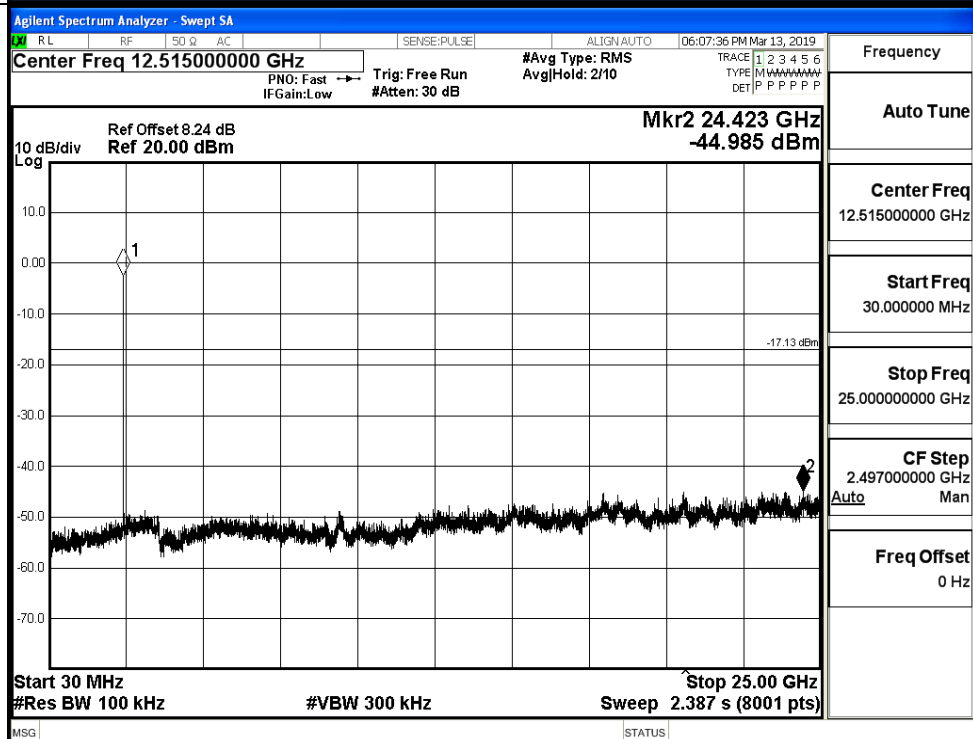


π /4DQPSK_MCH_Graphs

Pref

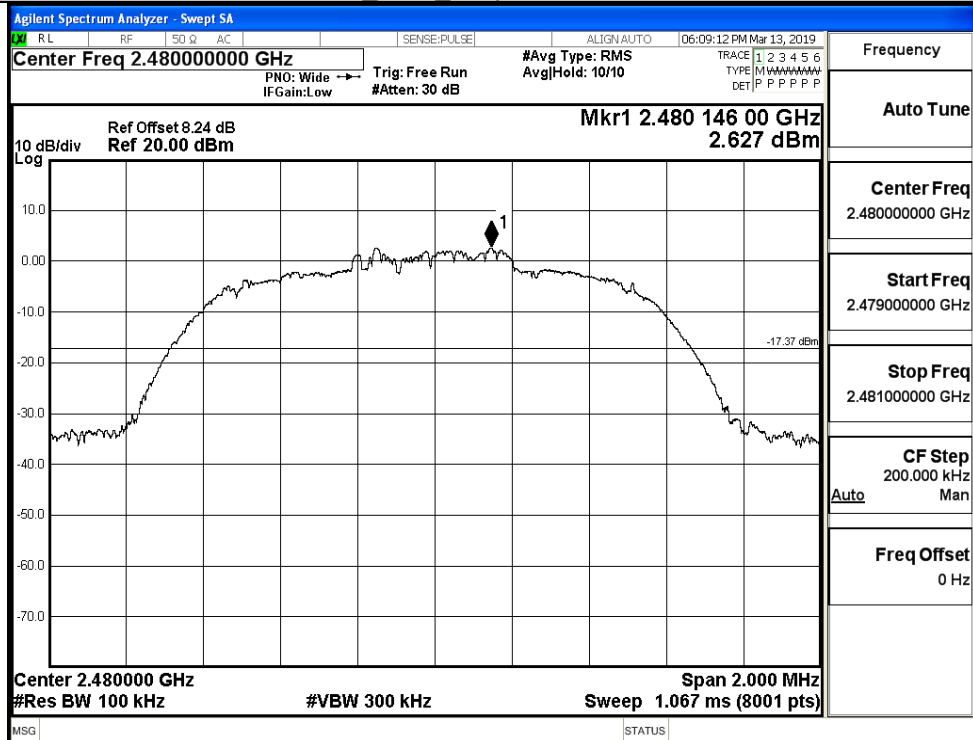


Puw

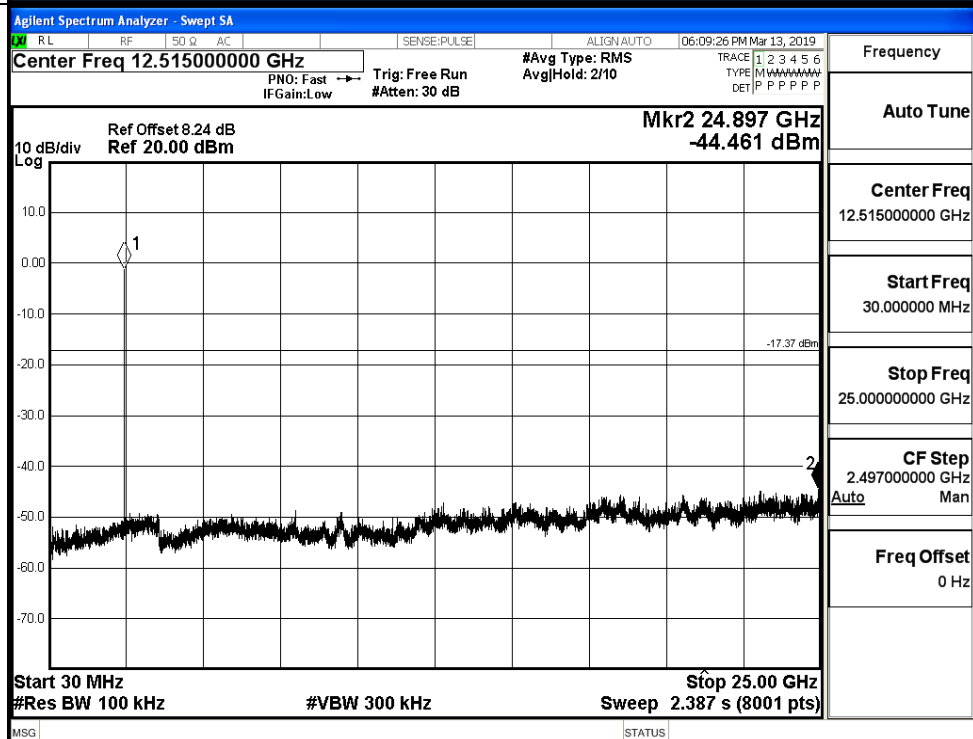


π /4DQPSK_HCH_Graphs

Pref

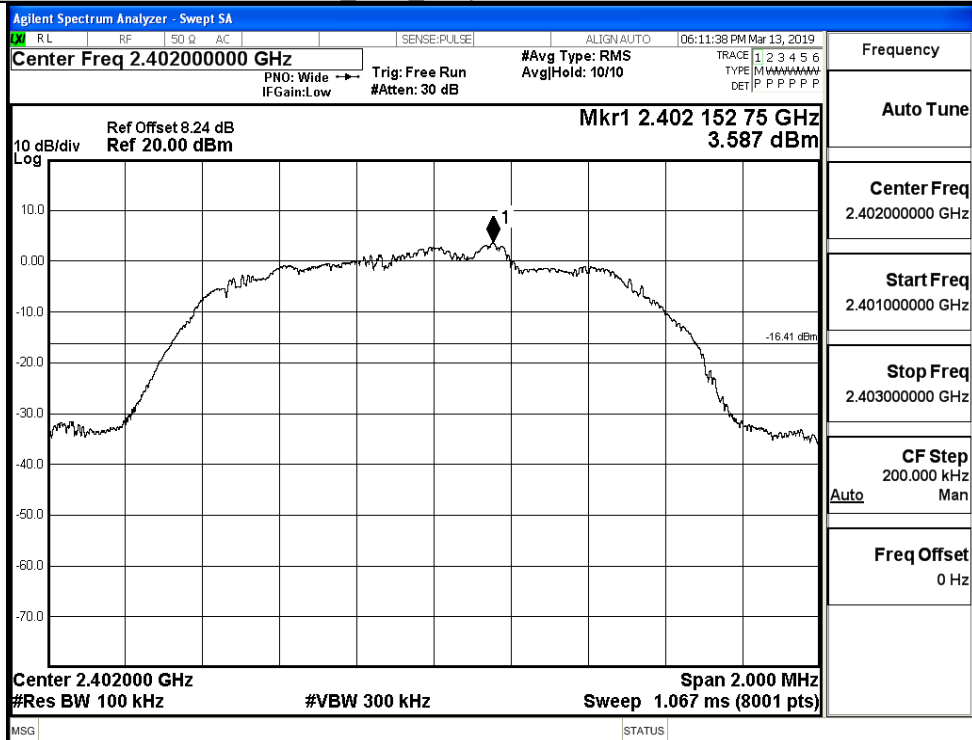


Puw

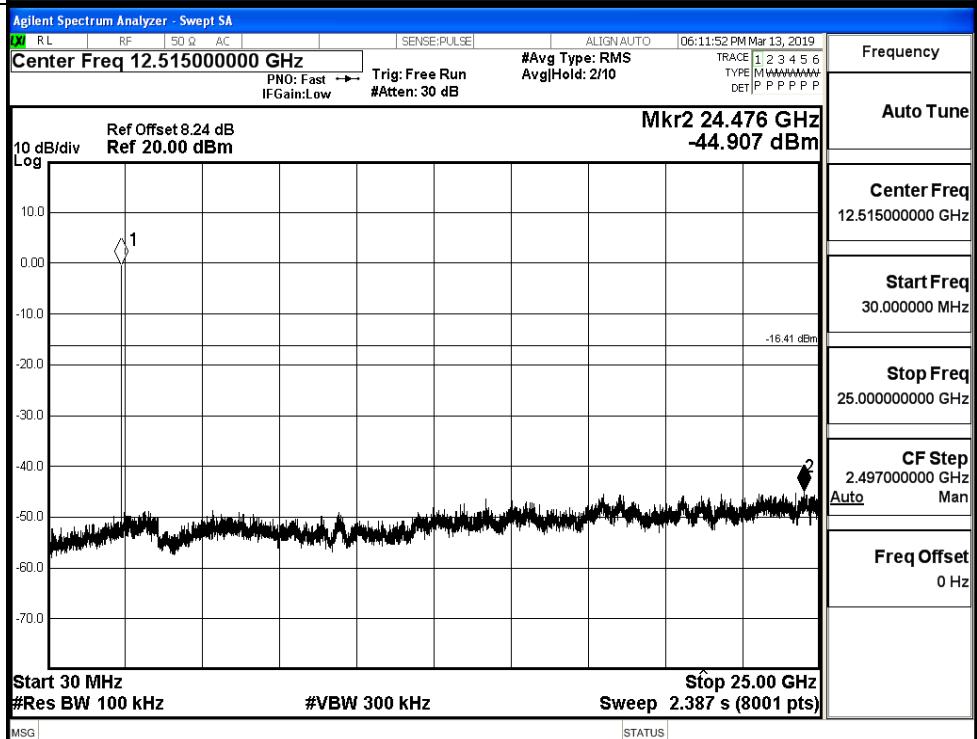


8DPSK_LCH_Graphs

Pref

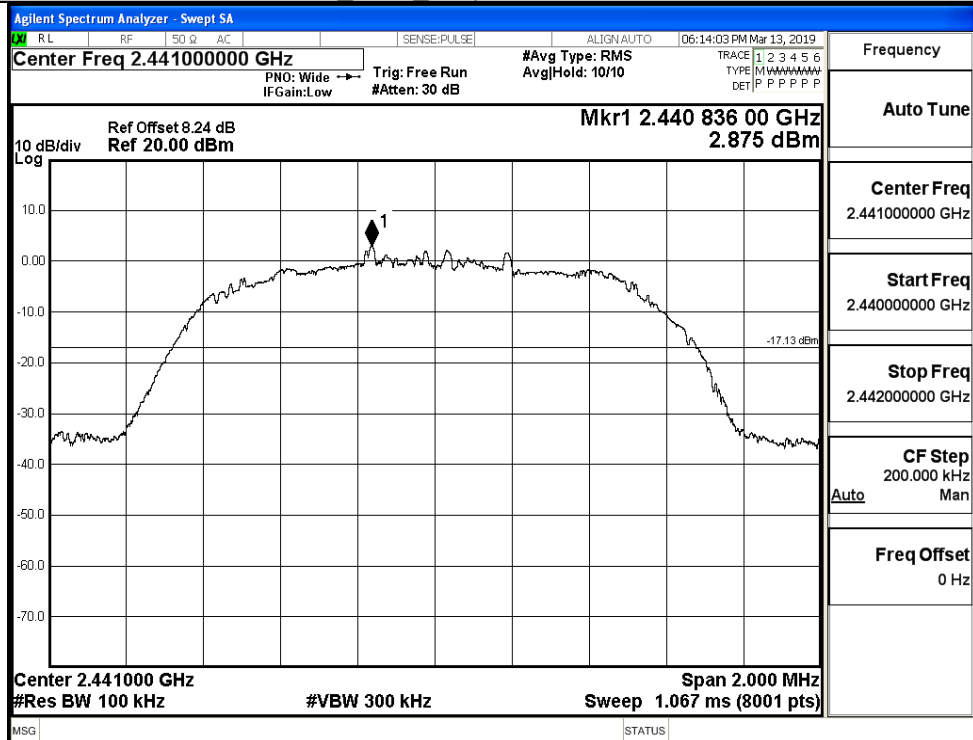


Puw

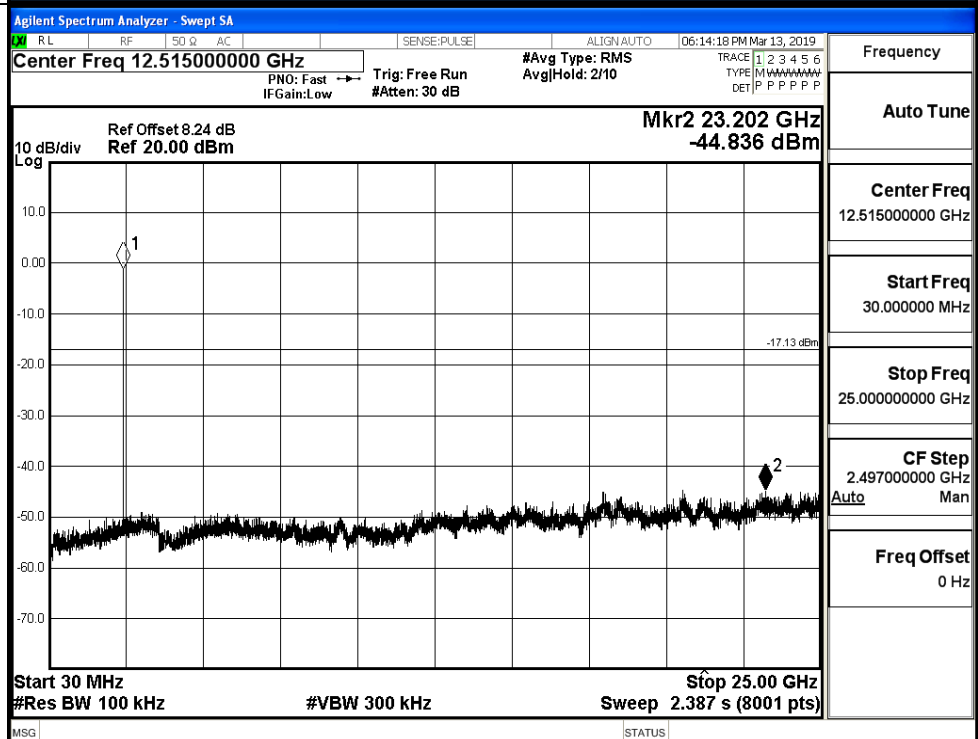


8DPSK_MCH_Graphs

Pref

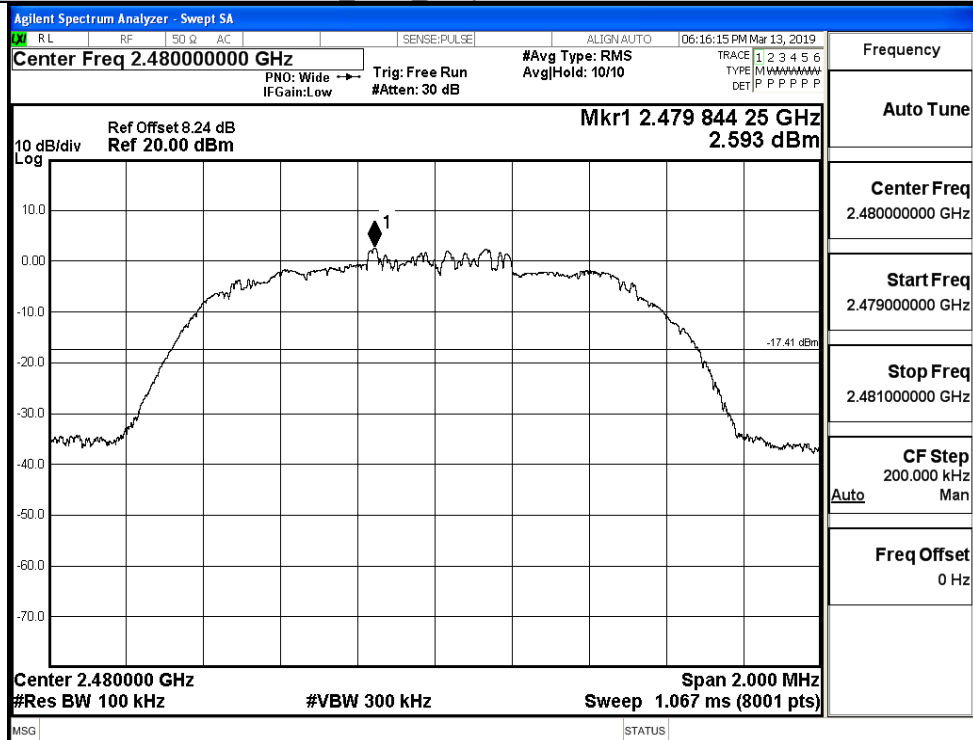


Puw

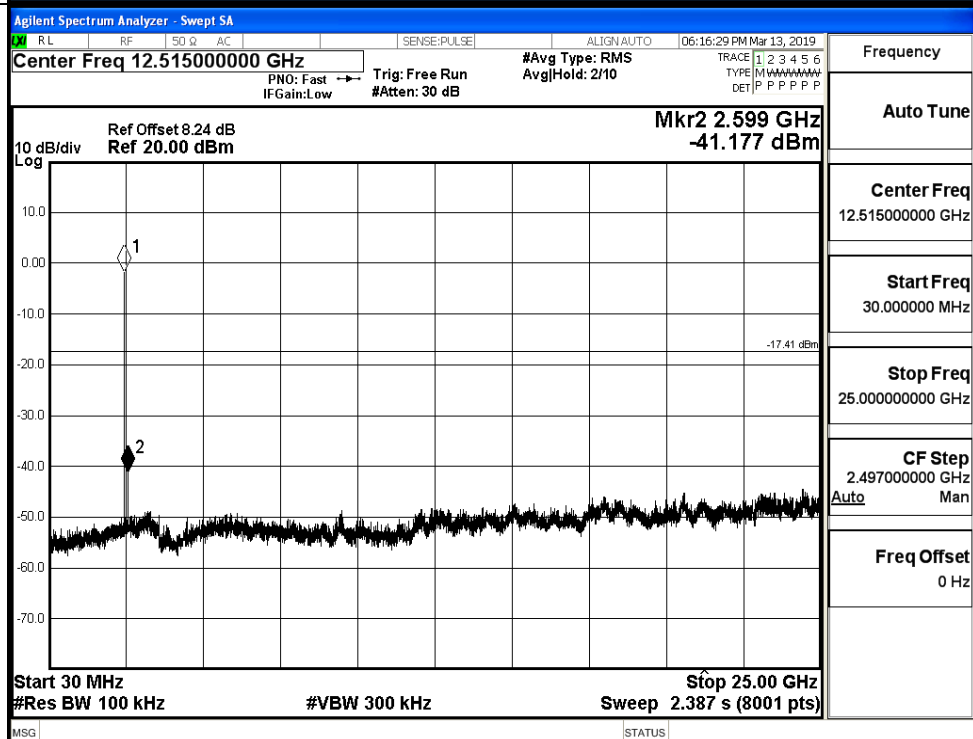


8DPSK_HCH_Graphs

Pref



Puw

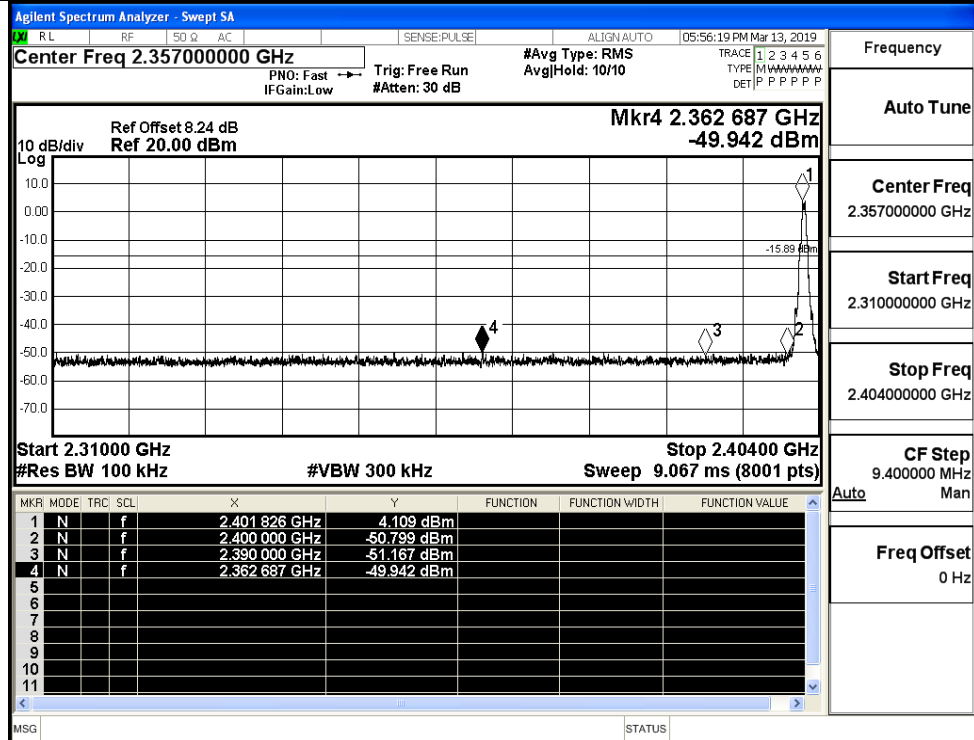


A.7 Band-edge for RF Conducted Emissions

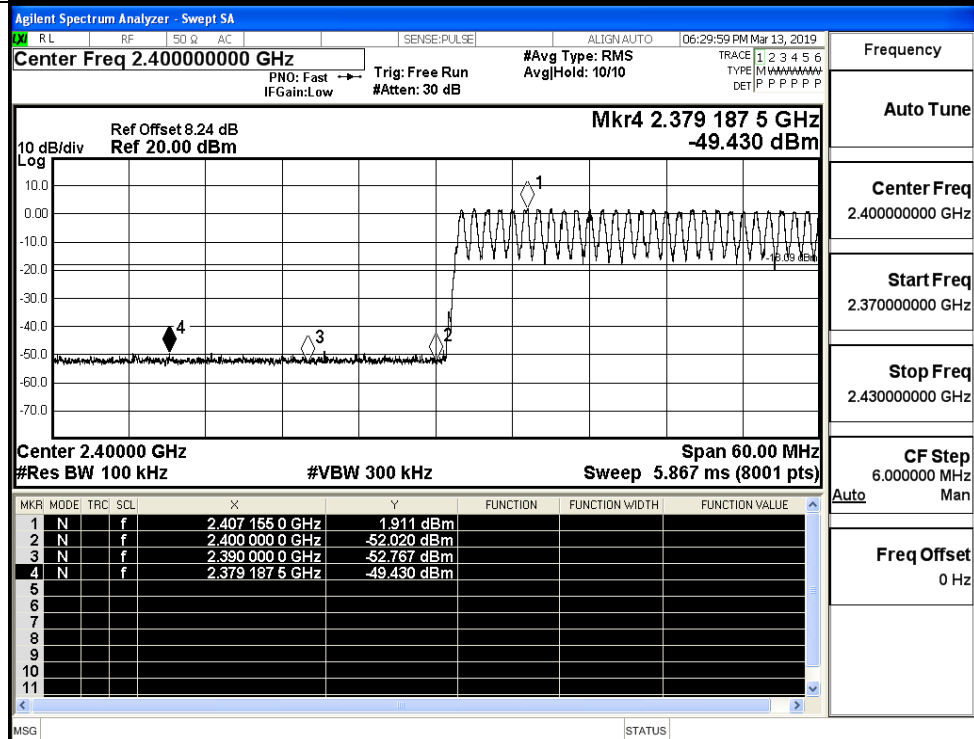
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.109	Off	-49.942	-15.89	PASS
			1.911	On	-49.430	-18.09	PASS
	HCH	2480	4.180	Off	-49.814	-15.82	PASS
			1.227	On	-49.432	-18.77	PASS
$\pi/4$ DQPSK	LCH	2402	3.084	Off	-49.691	-16.92	PASS
			0.597	On	-49.103	-19.4	PASS
	HCH	2480	2.839	Off	-49.549	-17.16	PASS
			-0.001	On	-48.841	-20	PASS
8DPSK	LCH	2402	3.435	Off	-50.039	-16.57	PASS
			0.554	On	-49.751	-19.45	PASS
	HCH	2480	2.869	Off	-49.698	-17.13	PASS
			0.004	On	-47.936	-20	PASS

Test Graphs

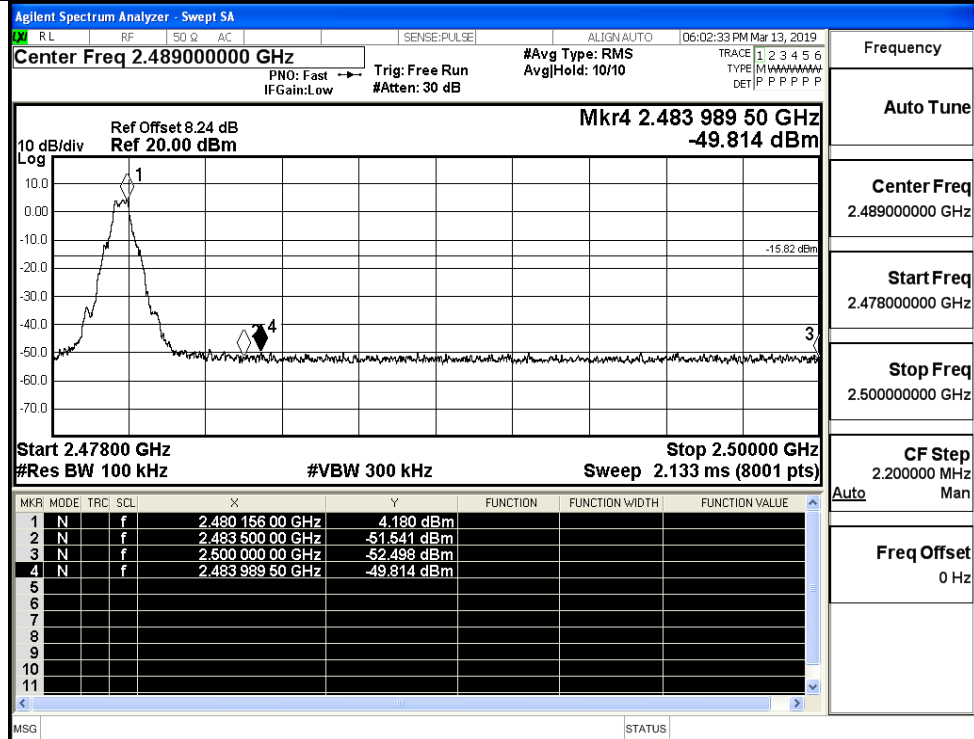
GFSK/LCH/No Hop



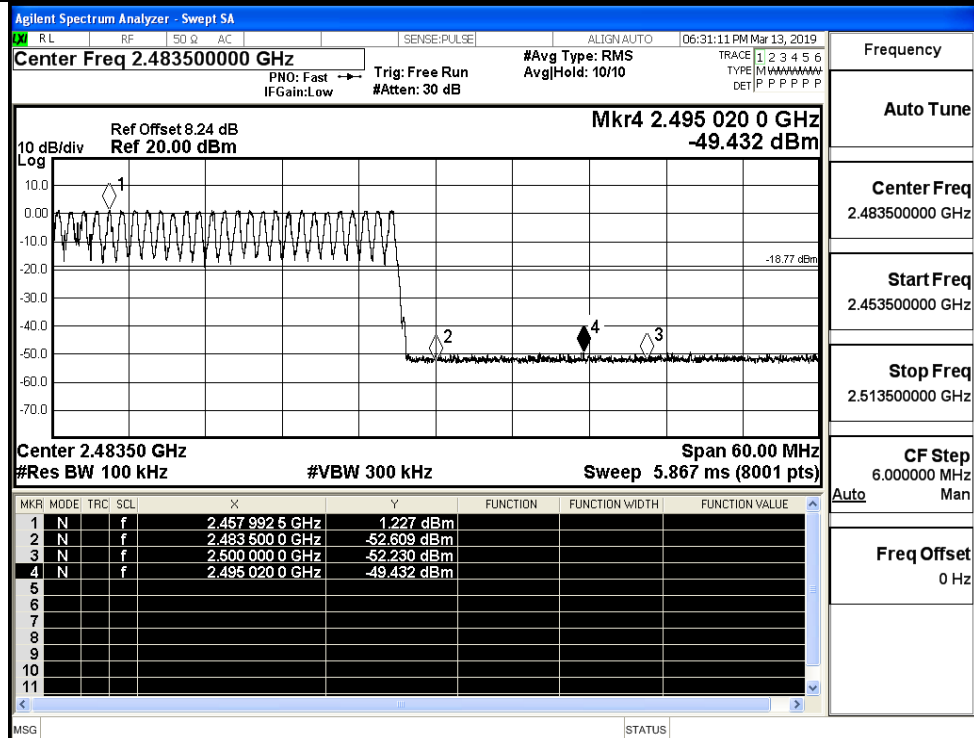
GFSK/LCH/Hop



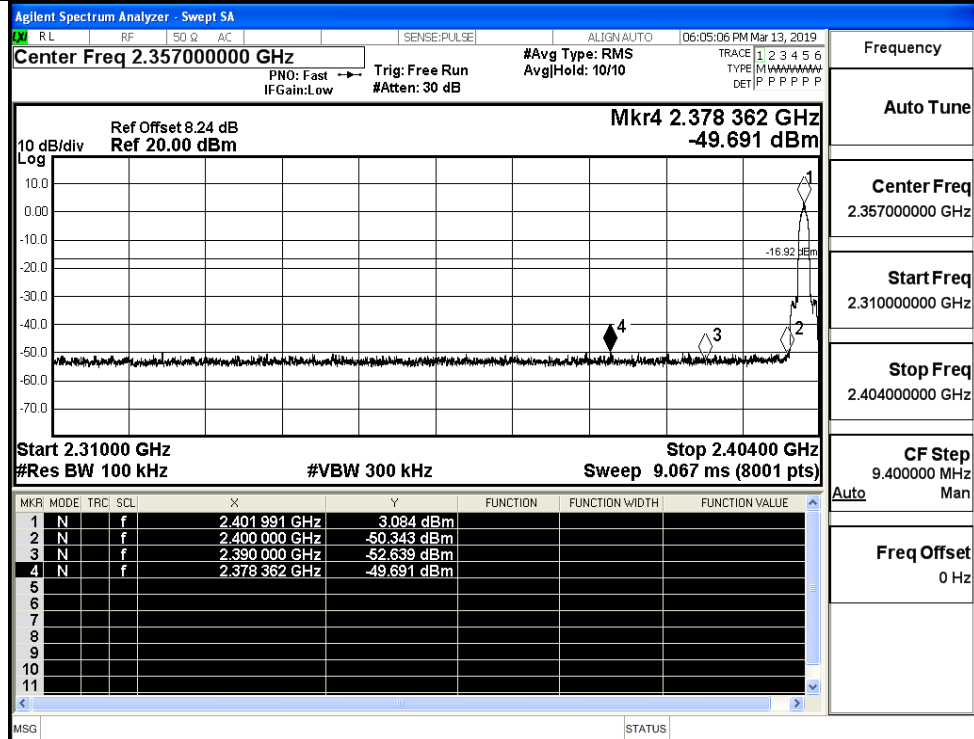
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

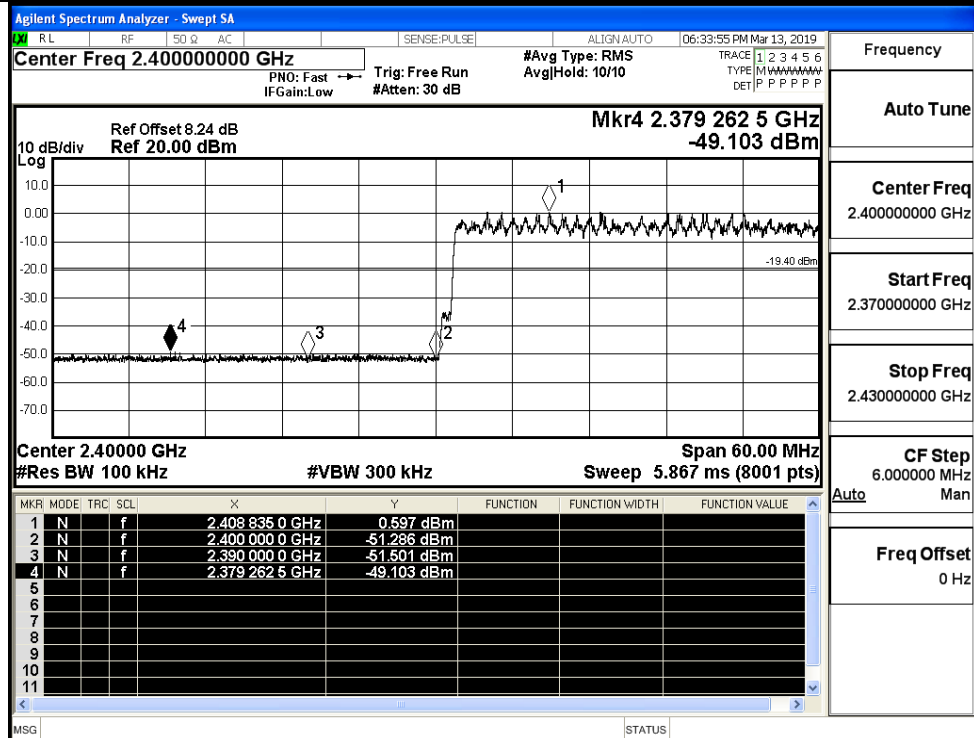
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

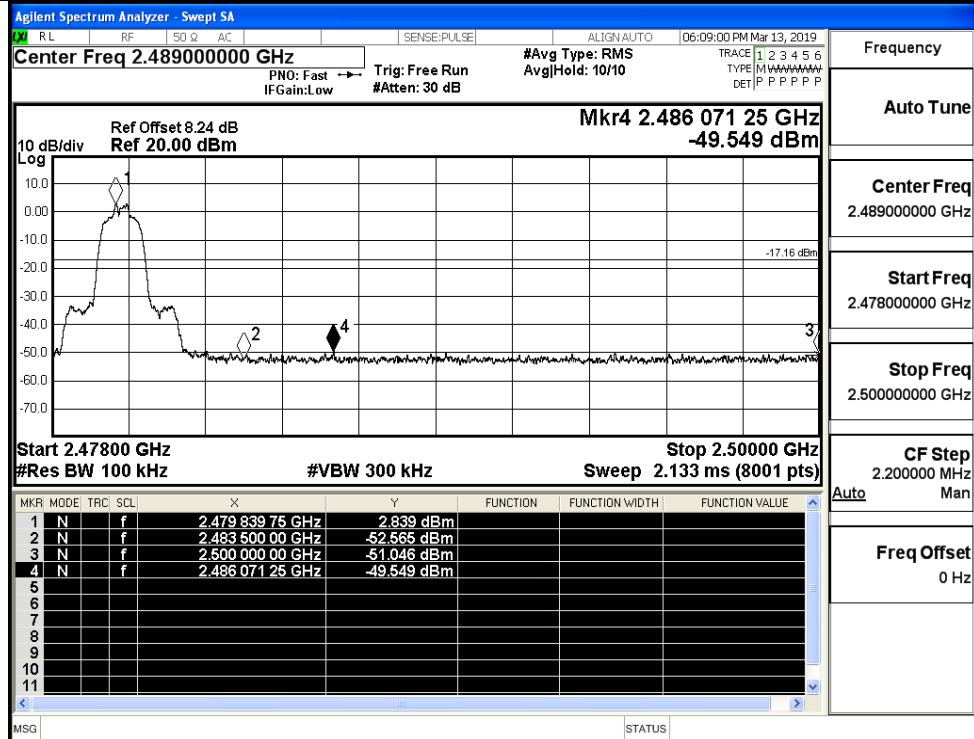
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

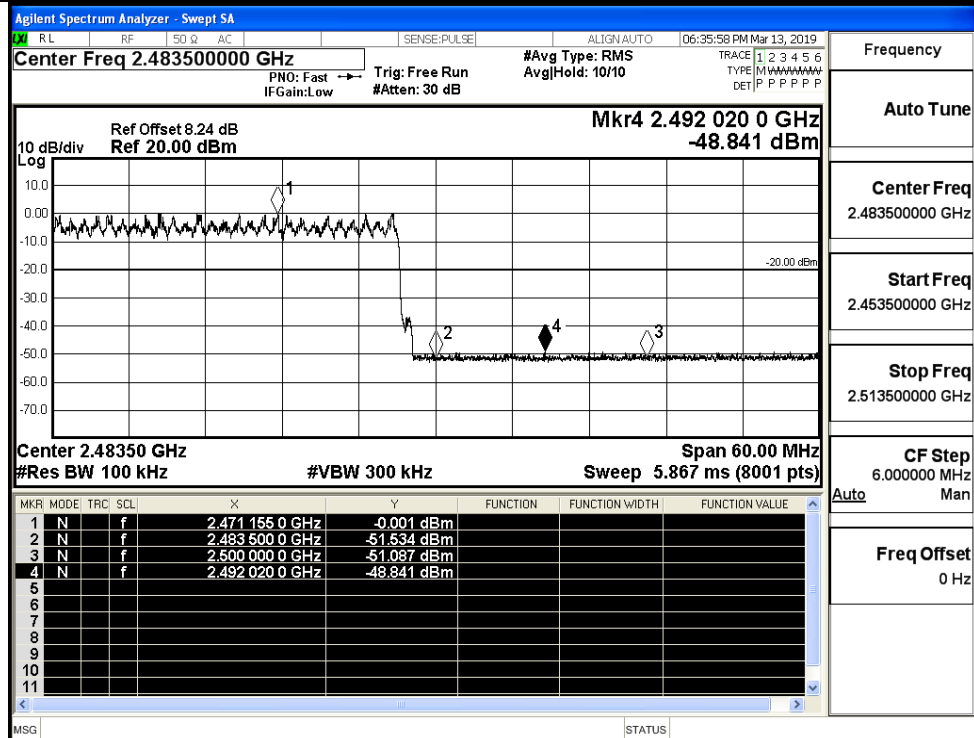
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

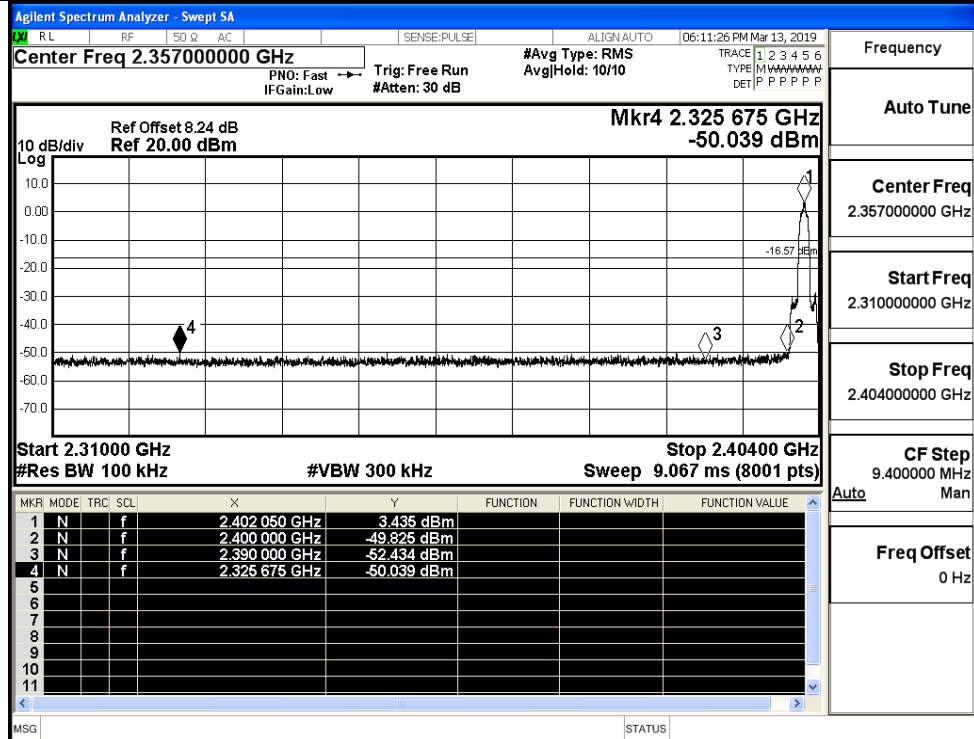
$\pi/4$ DQPSK/HCH/No
Hop



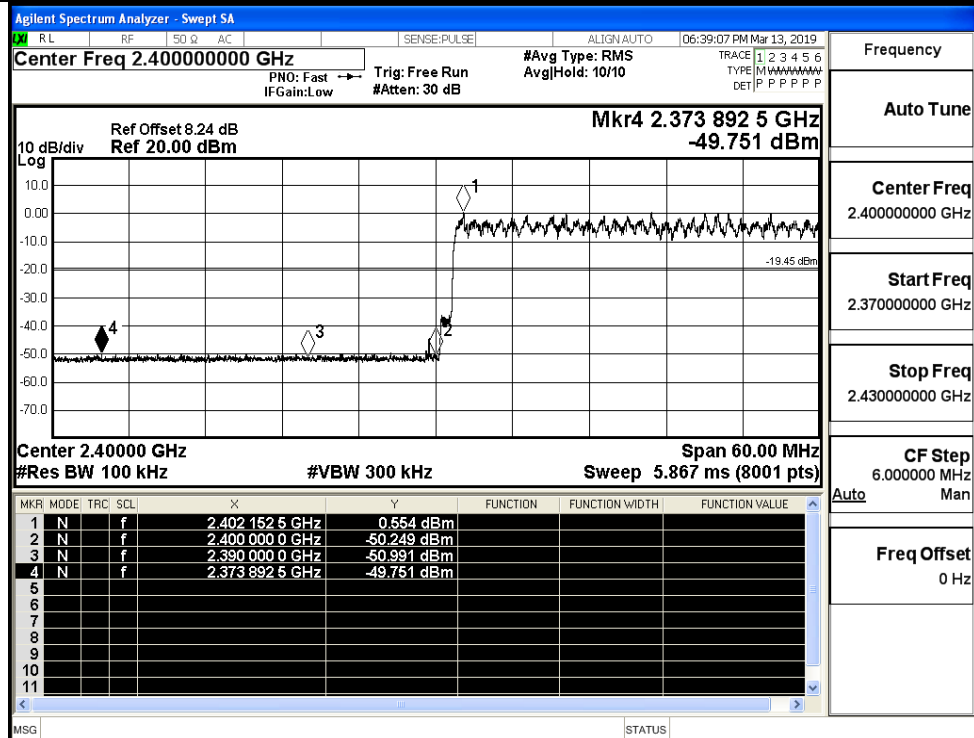
$\pi/4$ DQPSK/HCH/Hop



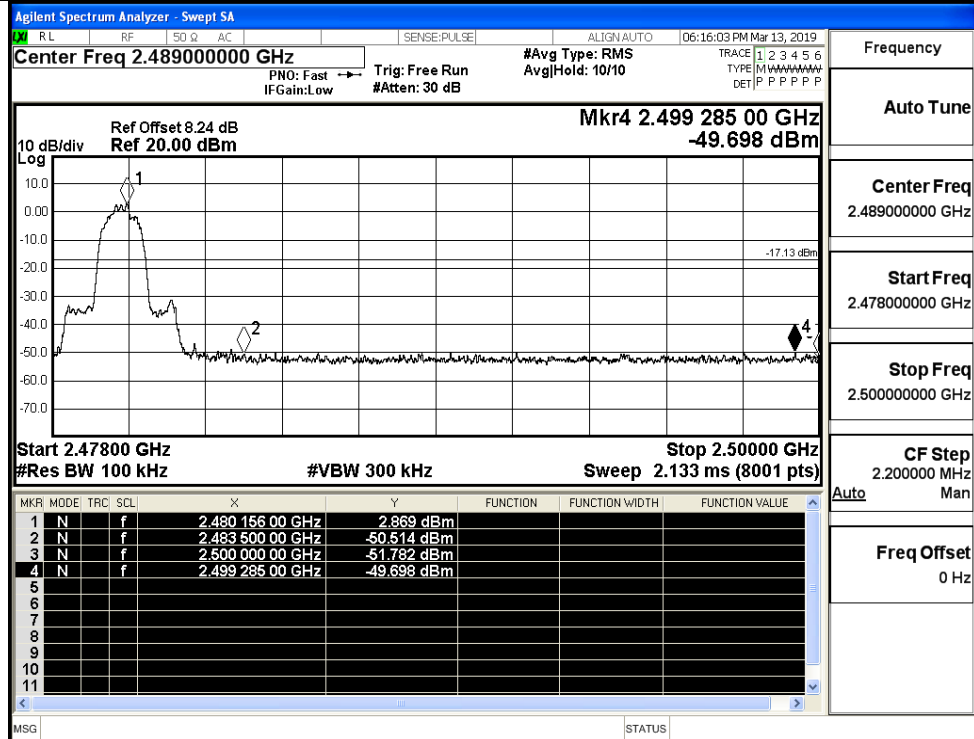
8DPSK/LCH/No Hop



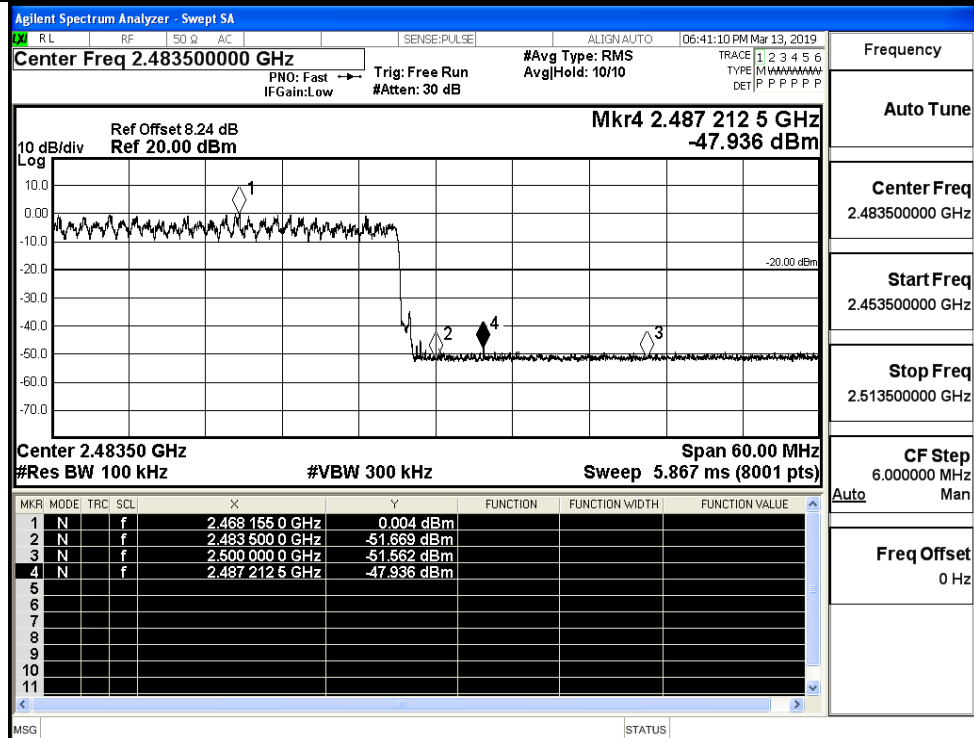
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



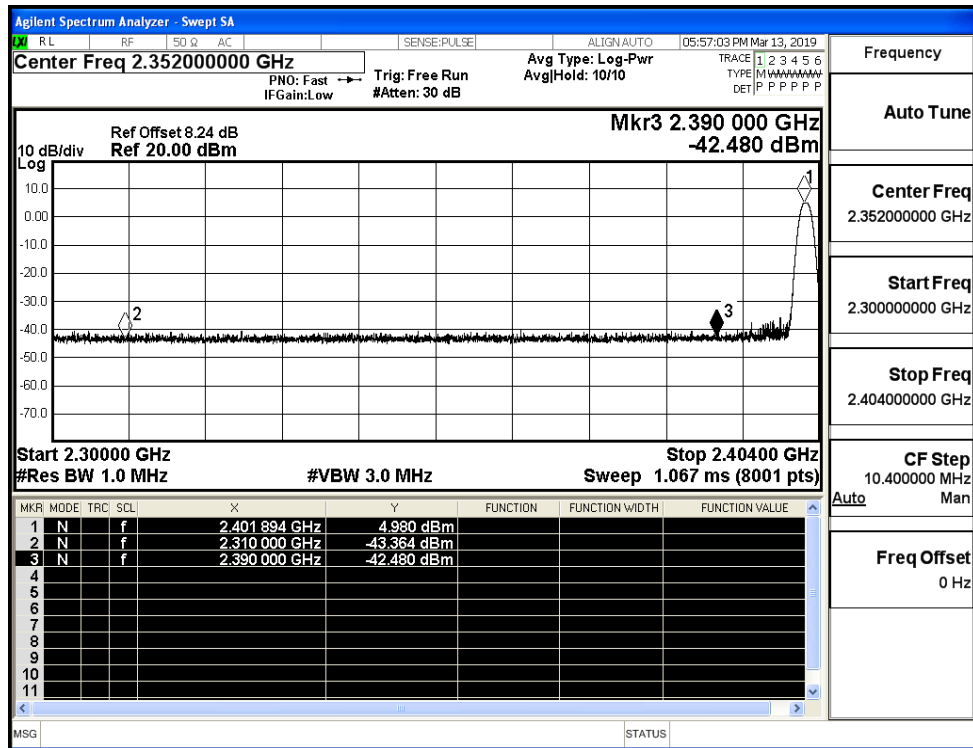
8DPSK/HCH/Hop



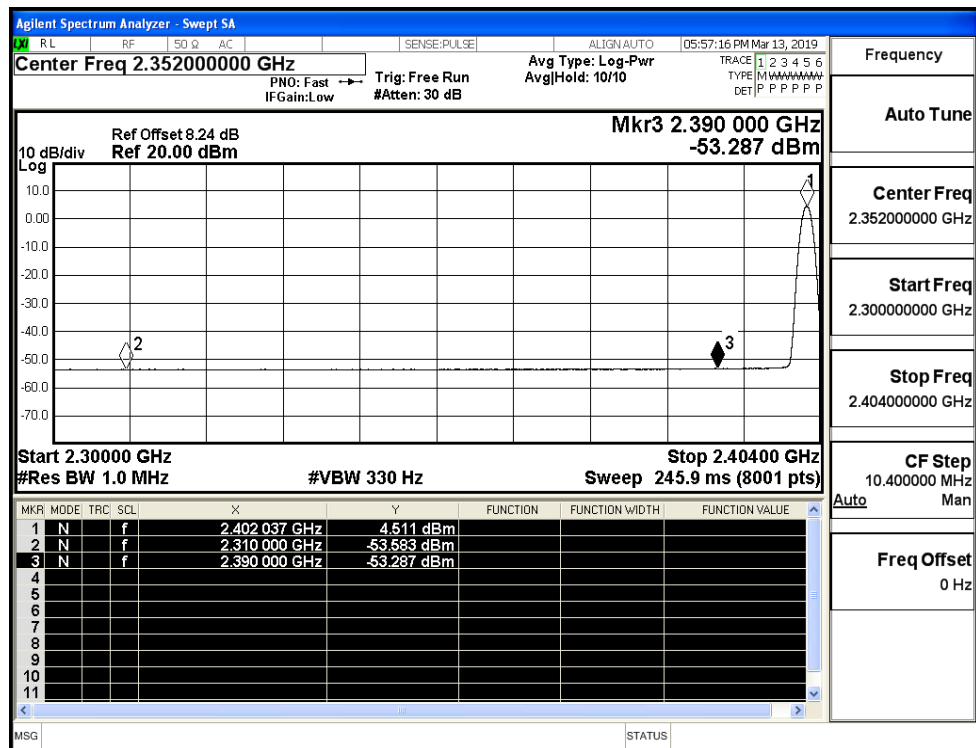
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.36	2.0	0	51.89	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	41.67	AV	54	PASS
	Off	2390.0	-42.48	2.0	0	52.78	PEAK	74	PASS
	Off	2390.0	-53.29	2.0	0	41.97	AV	54	PASS
	Off	2483.5	-39.16	2.0	0	56.10	PEAK	74	PASS
	Off	2483.5	-52.59	2.0	0	42.67	AV	54	PASS
	Off	2500.0	-43.03	2.0	0	52.22	PEAK	74	PASS
	Off	2500.0	-49.51	2.0	0	45.75	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.86	2.0	0	51.40	PEAK	74	PASS
	Off	2310.0	-53.60	2.0	0	41.66	AV	54	PASS
	Off	2390.0	-43.31	2.0	0	51.95	PEAK	74	PASS
	Off	2390.0	-53.29	2.0	0	41.96	AV	54	PASS
	Off	2483.5	-41.34	2.0	0	53.92	PEAK	74	PASS
	Off	2483.5	-52.68	2.0	0	42.58	AV	54	PASS
	Off	2500.0	-41.66	2.0	0	53.60	PEAK	74	PASS
	Off	2500.0	-52.94	2.0	0	42.32	AV	54	PASS
8DPSK	Off	2310.0	-43.80	2.0	0	51.45	PEAK	74	PASS
	Off	2310.0	-53.61	2.0	0	41.65	AV	54	PASS
	Off	2390.0	-42.74	2.0	0	52.52	PEAK	74	PASS
	Off	2390.0	-53.28	2.0	0	41.98	AV	54	PASS
	Off	2483.5	-42.50	2.0	0	52.76	PEAK	74	PASS
	Off	2483.5	-52.71	2.0	0	42.55	AV	54	PASS
	Off	2500.0	-42.12	2.0	0	53.14	PEAK	74	PASS
	Off	2500.0	-52.93	2.0	0	42.32	AV	54	PASS

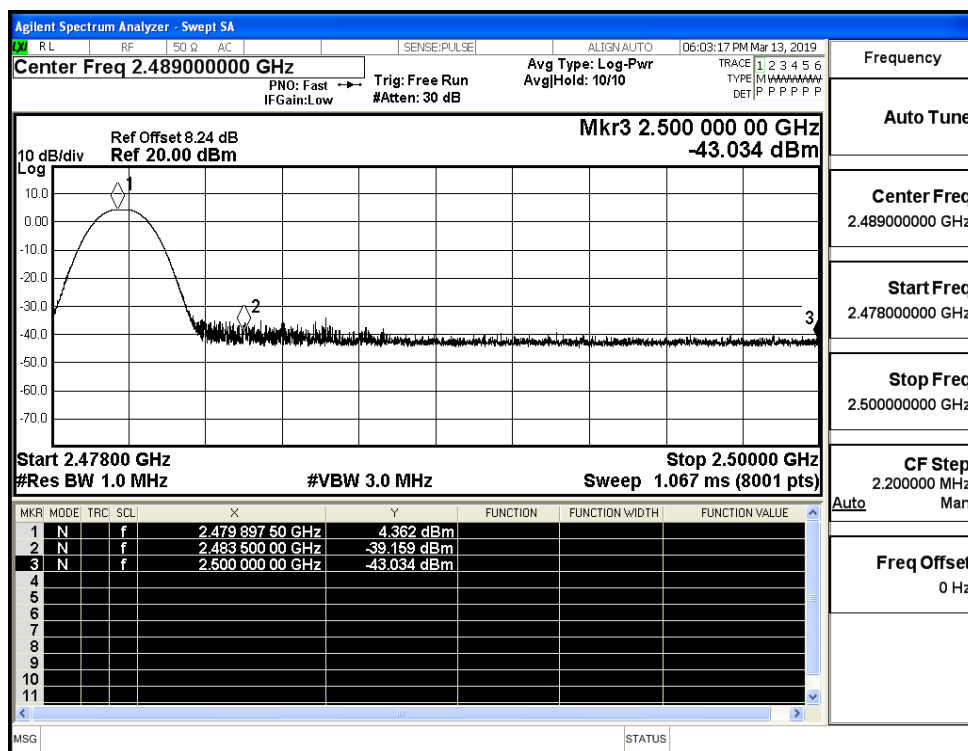
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



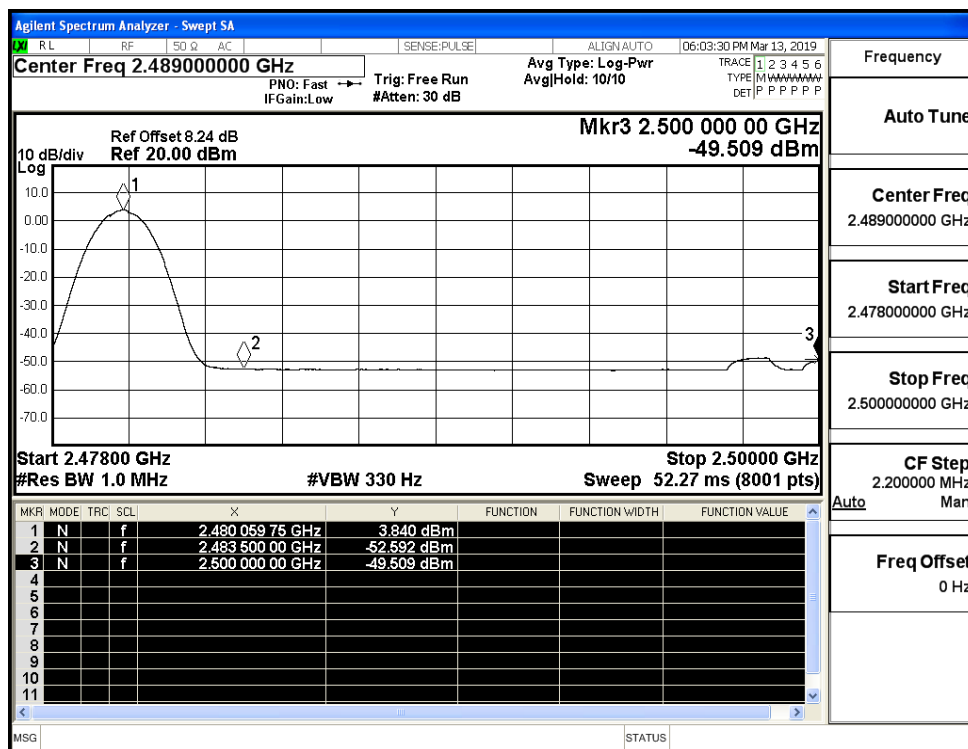
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

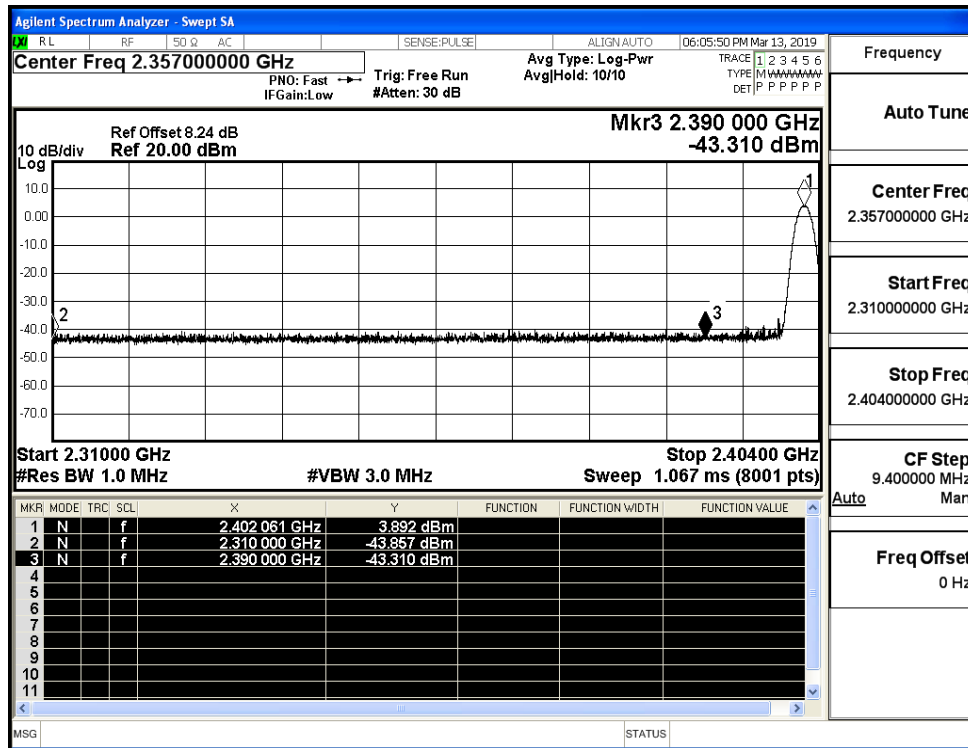
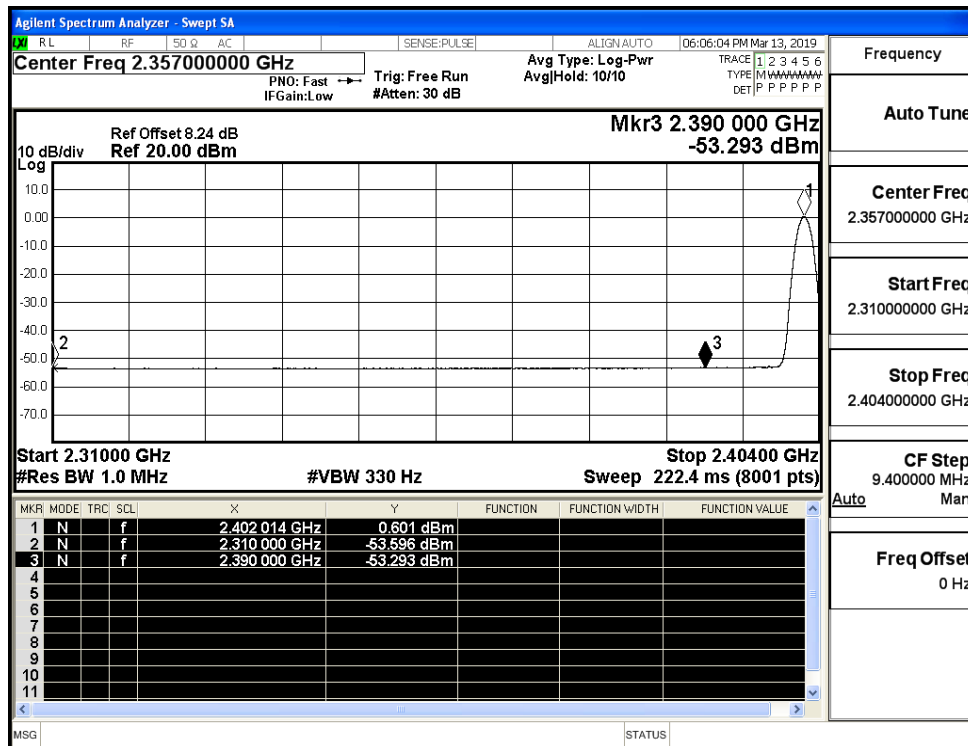


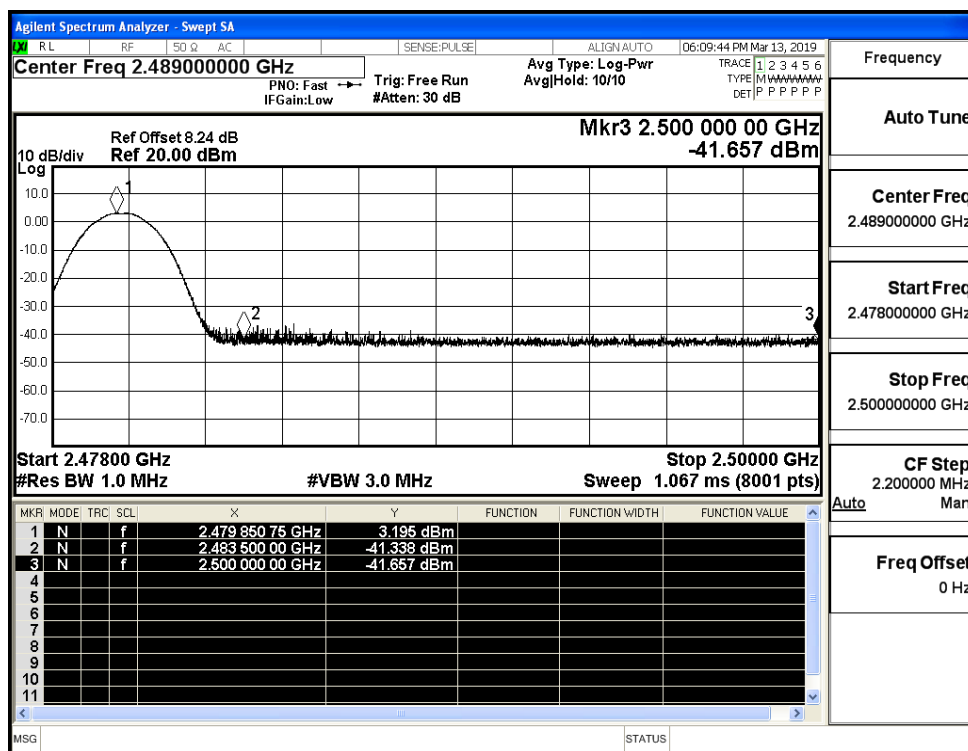
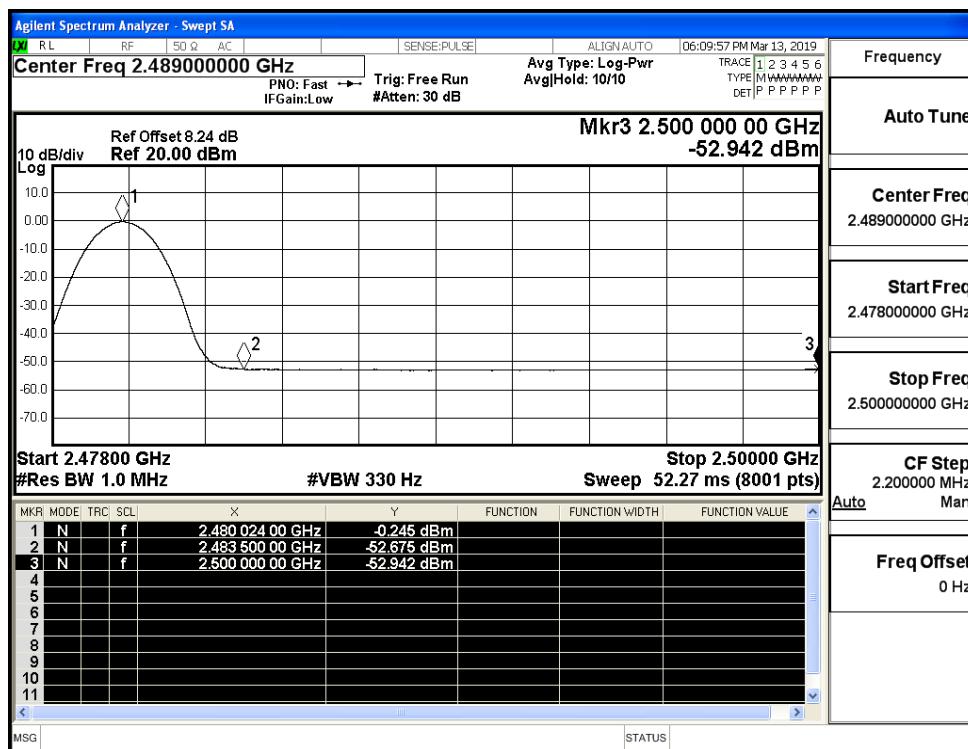
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



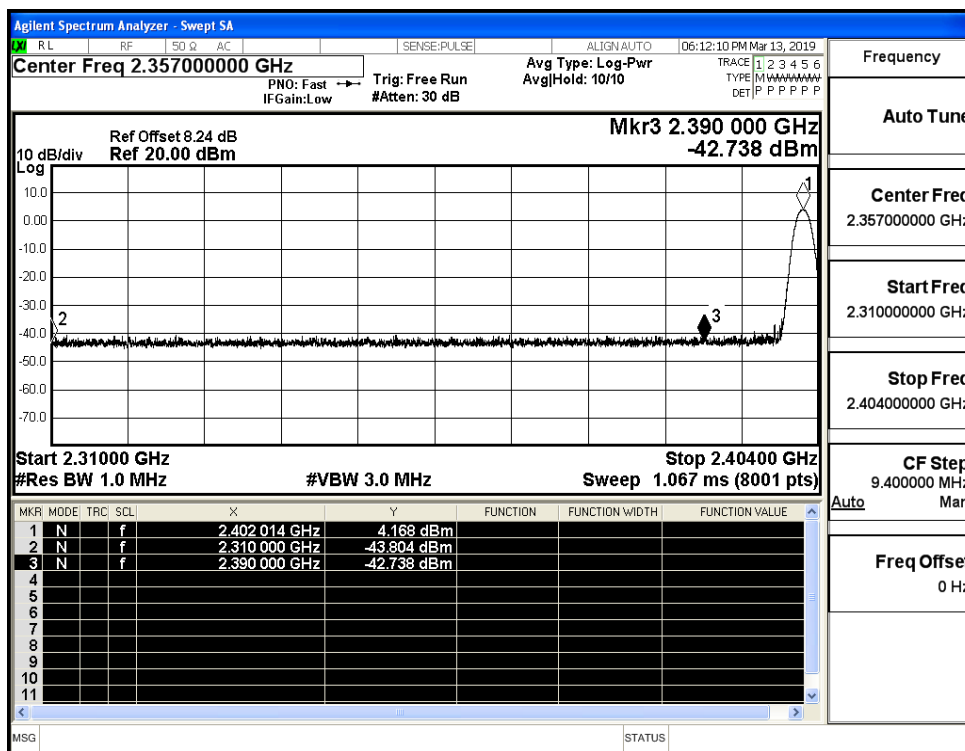
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



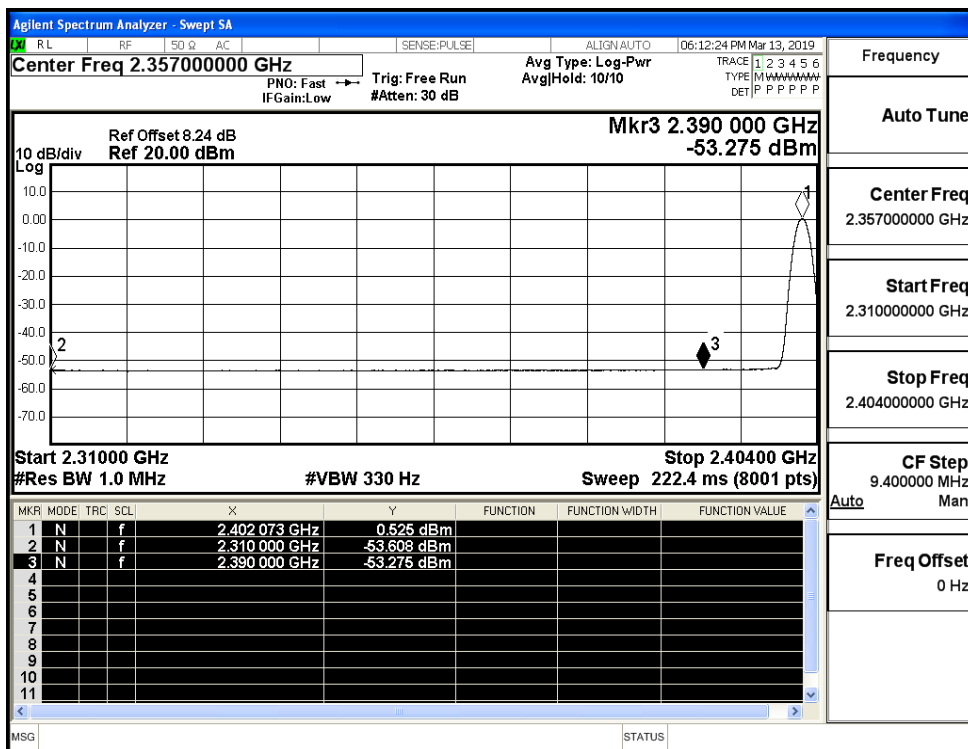
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

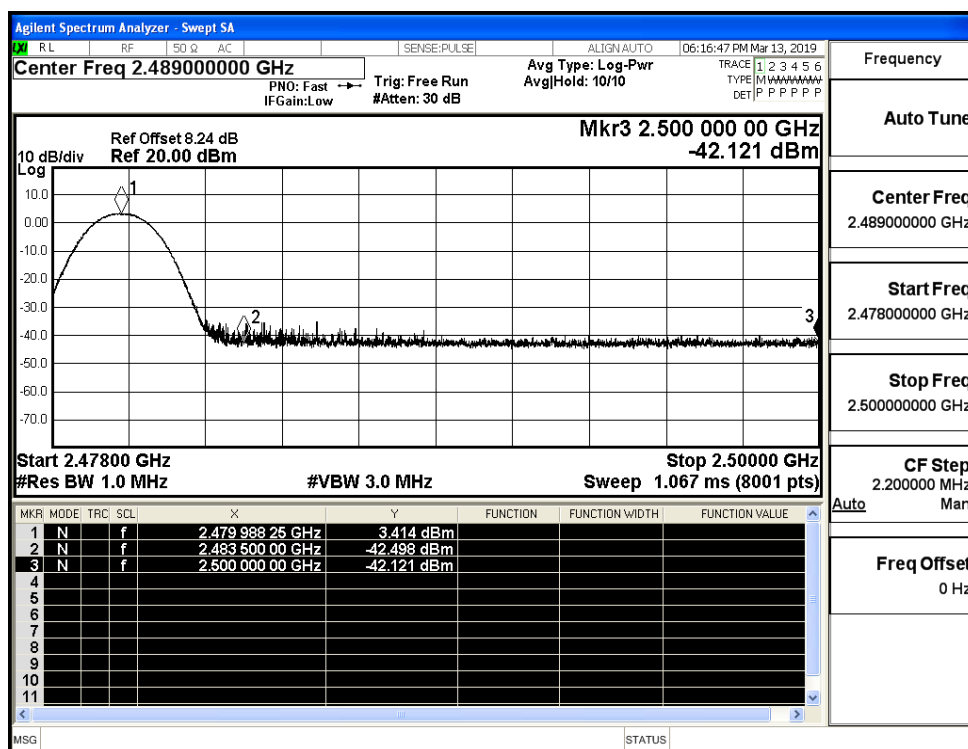
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

