

Appendix A

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

Product Name: Grant Bluetooth® Compact Speaker

Trade Mark: 100243-001B

Test Model: Gemline

Environmental Conditions

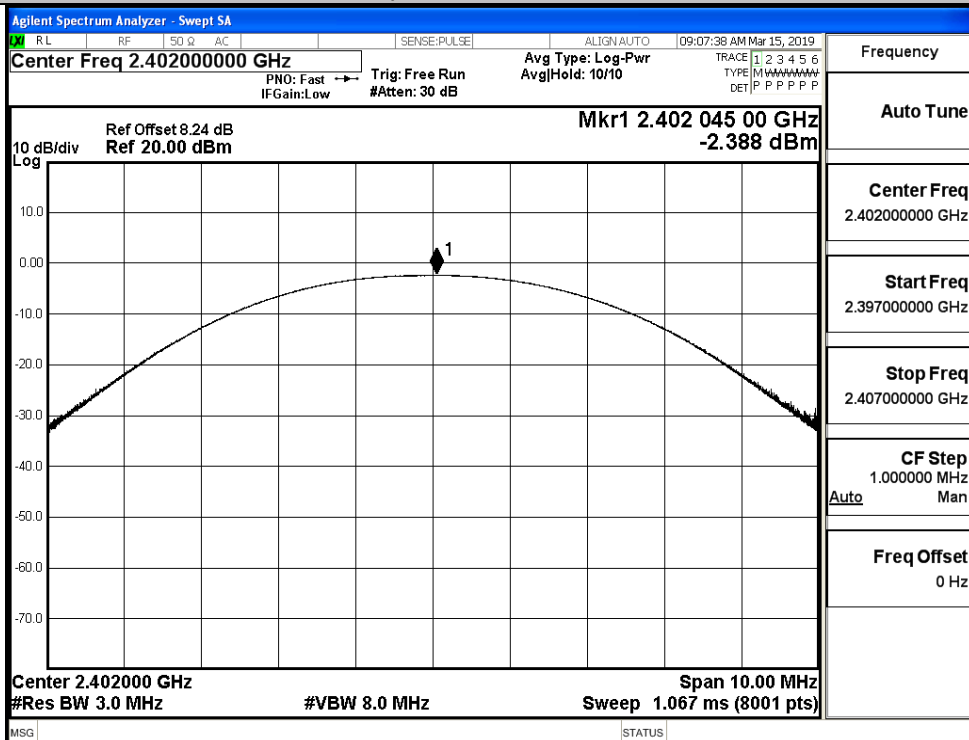
Temperature:	21.8 ° C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

A.1 Maximum Conducted Peak Output Power

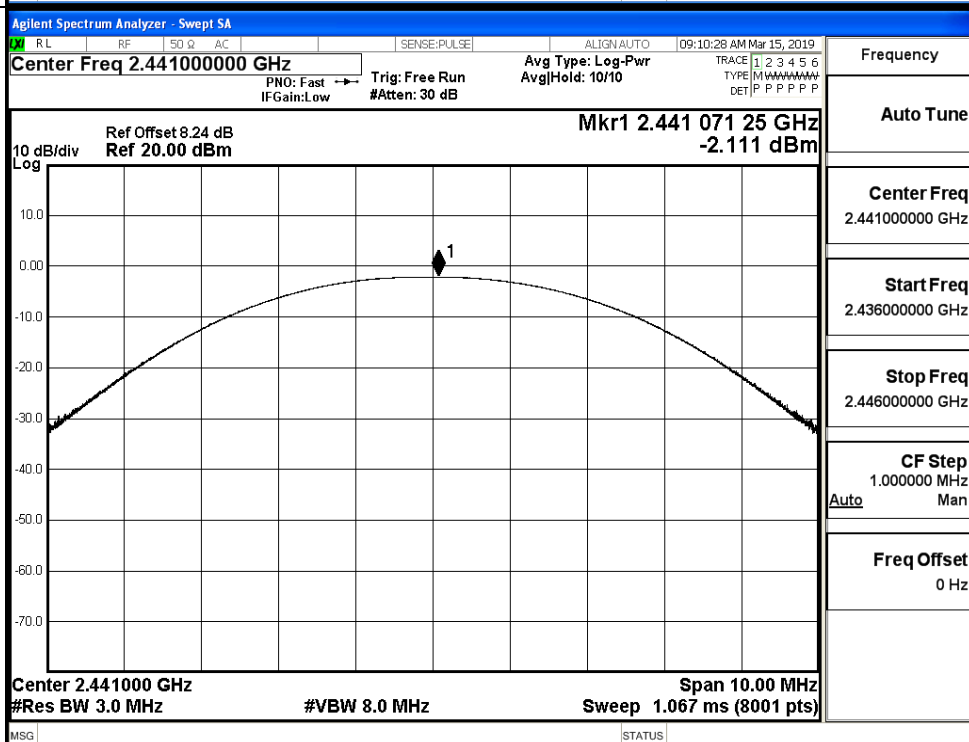
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.388	21	PASS
	MCH	-2.111	21	PASS
	HCH	-2.537	21	PASS
$\pi/4$ DQPSK	LCH	-3.245	21	PASS
	MCH	-2.692	21	PASS
	HCH	-1.492	21	PASS
8DPSK	LCH	-3.048	21	PASS
	MCH	-2.528	21	PASS
	HCH	-2.933	21	PASS

Test Graphs

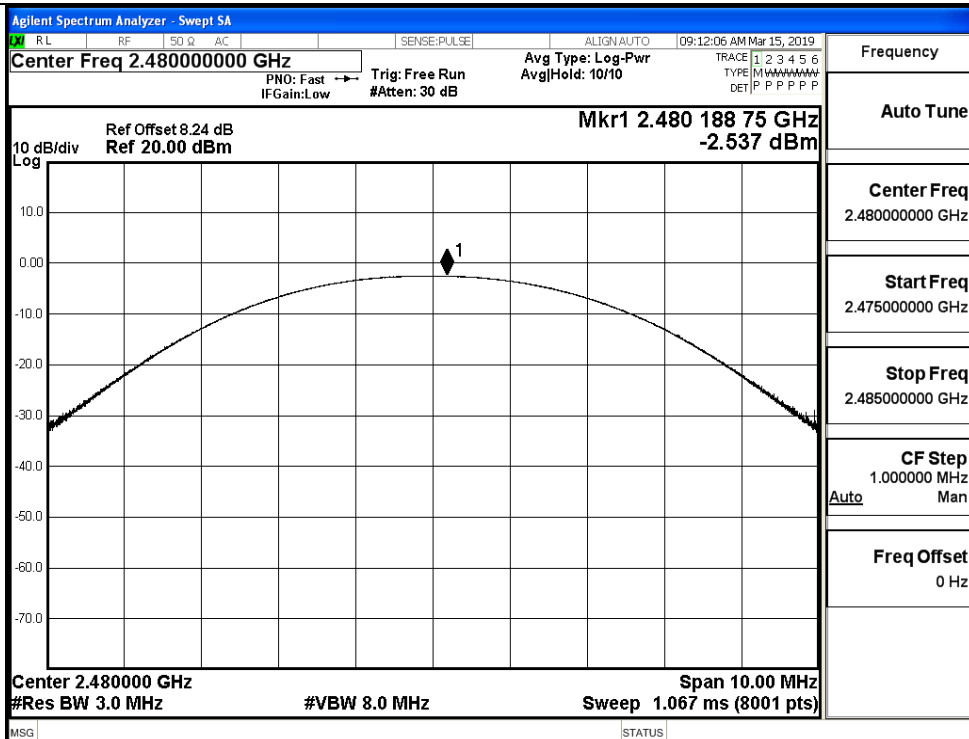
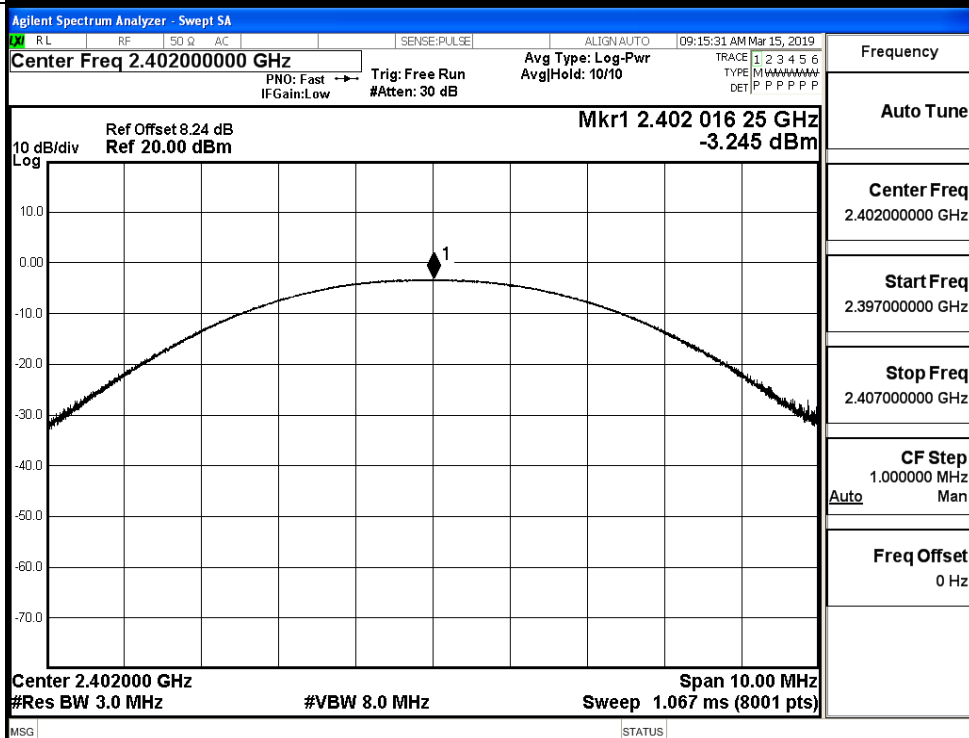
GFSK/LCH

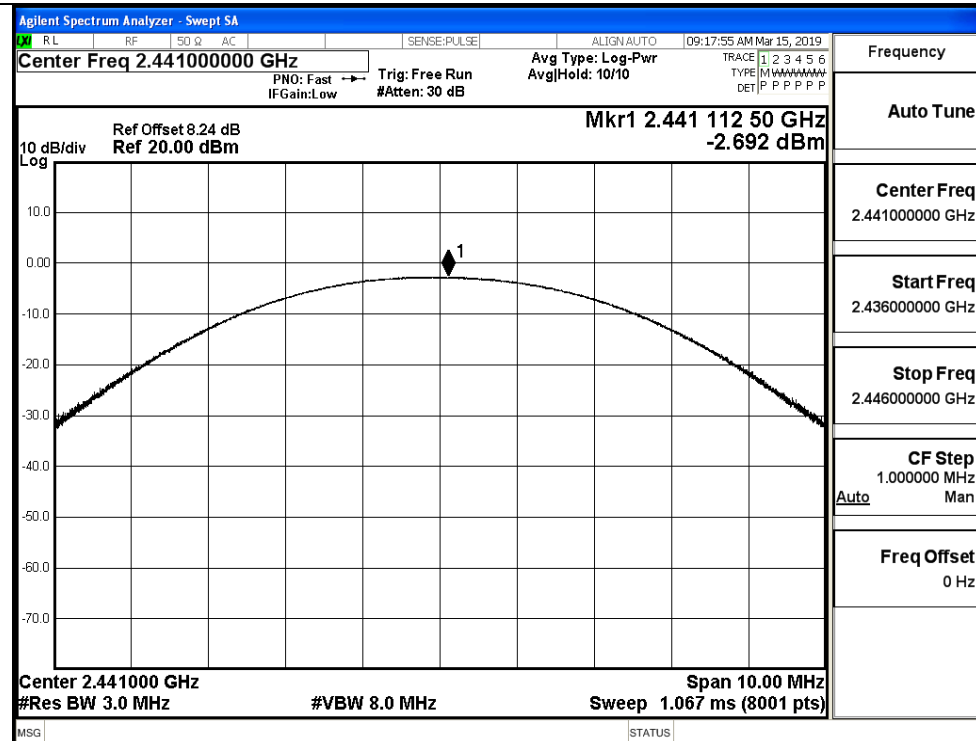
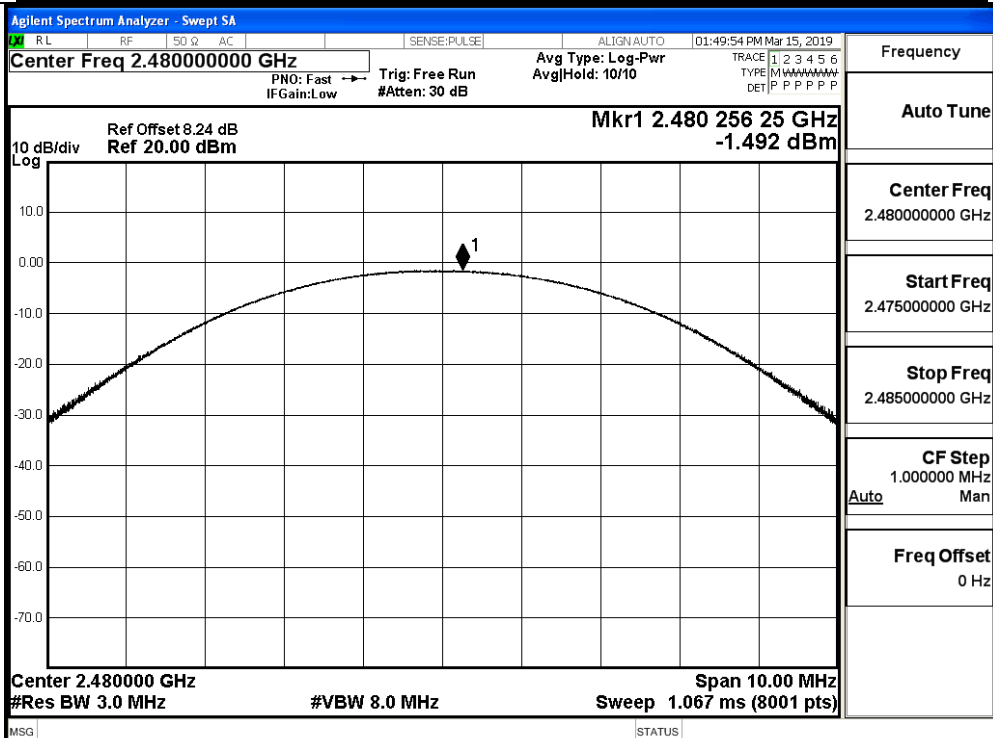


GFSK/MCH

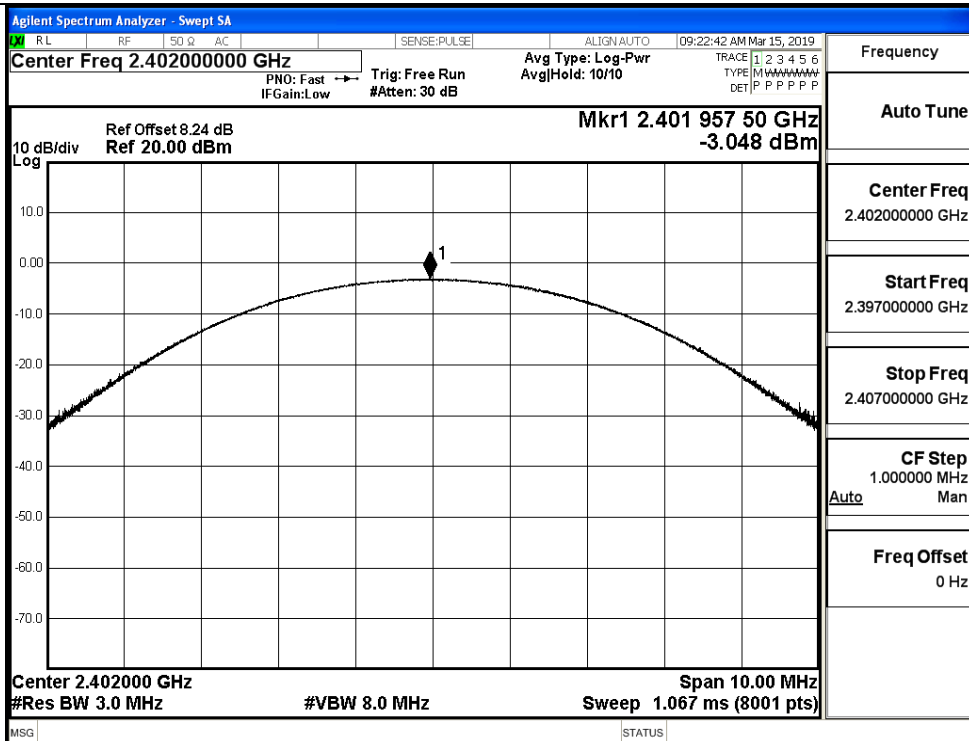


GFSK/HCH

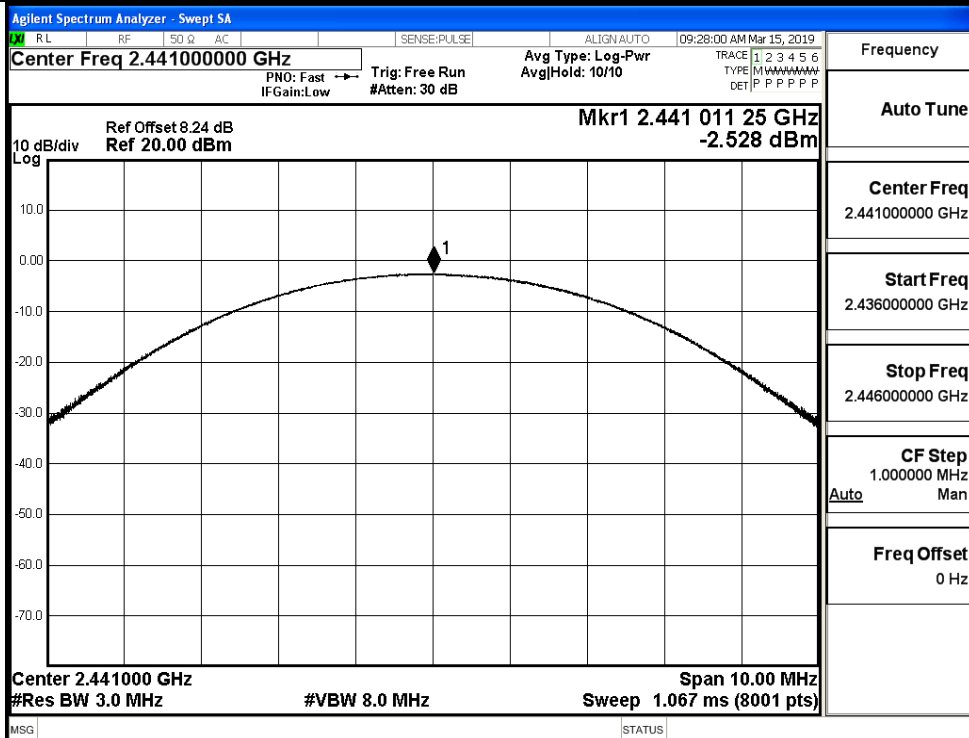
 π /4DQPSK/LCH

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

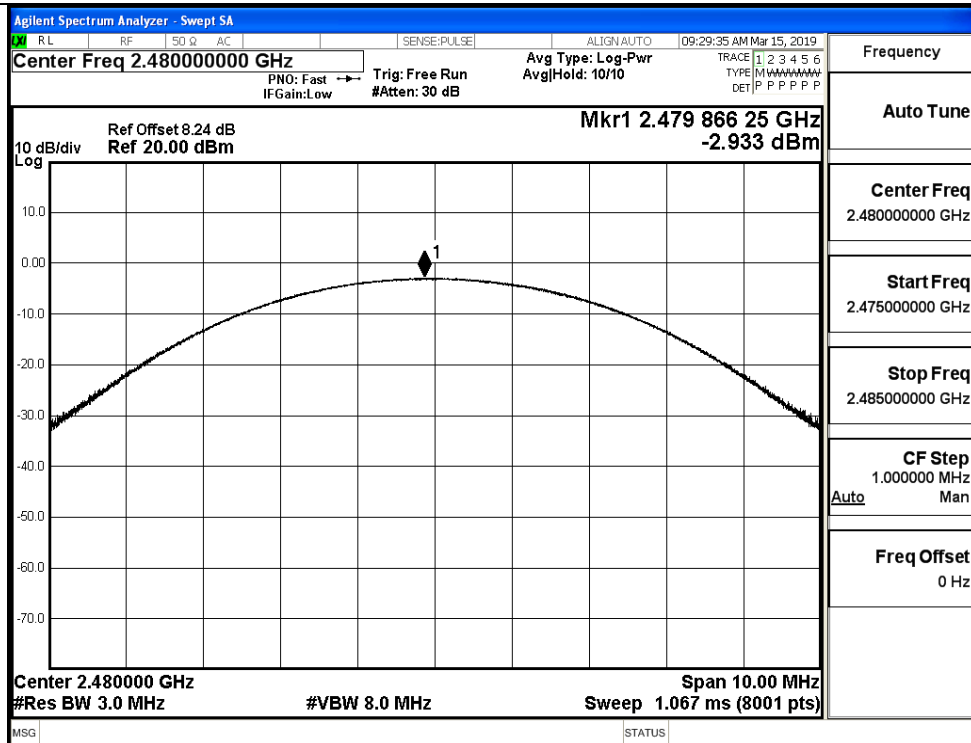
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

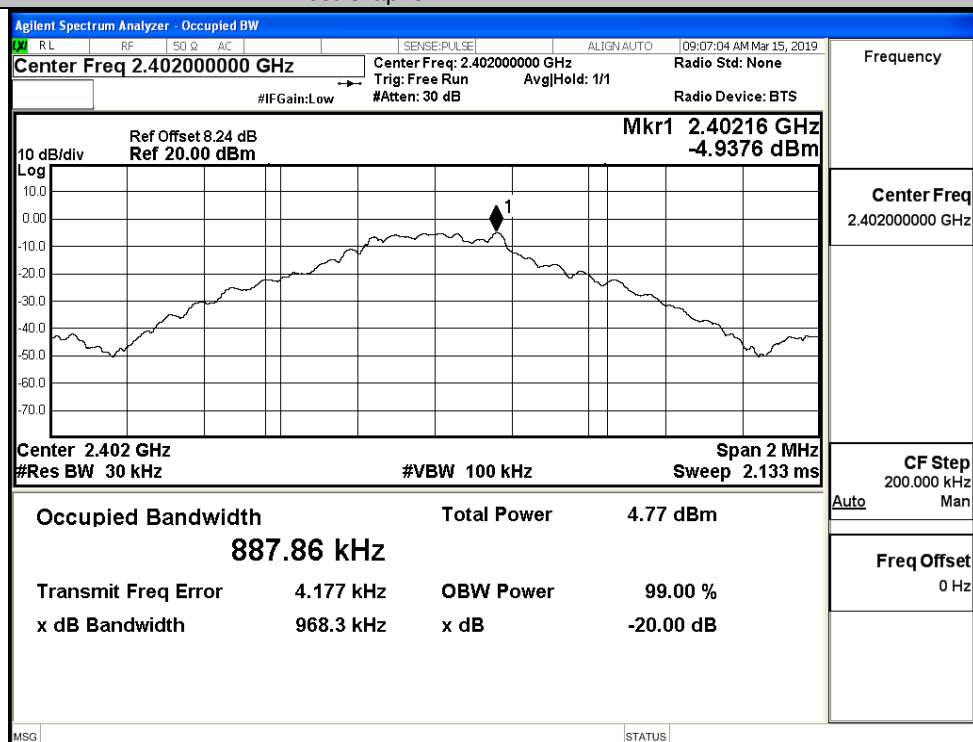


A.2 99% and 20dB Bandwidth

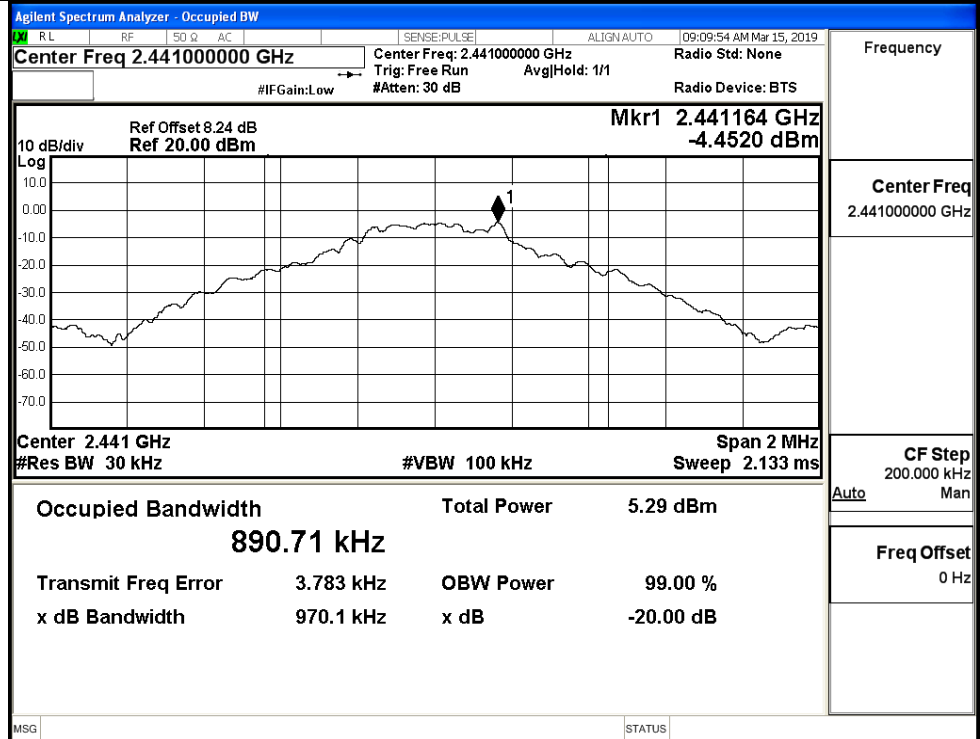
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.88786	0.9683	Not Specified	PASS
	MCH	0.89071	0.9701	Not Specified	PASS
	HCH	0.89549	1.025	Not Specified	PASS
π /4DQPSK	LCH	1.1783	1.293	Not Specified	PASS
	MCH	1.1769	1.309	Not Specified	PASS
	HCH	1.1750	1.292	Not Specified	PASS
8DPSK	LCH	1.1878	1.297	Not Specified	PASS
	MCH	1.1915	1.297	Not Specified	PASS
	HCH	1.1878	1.298	Not Specified	PASS

Test Graphs

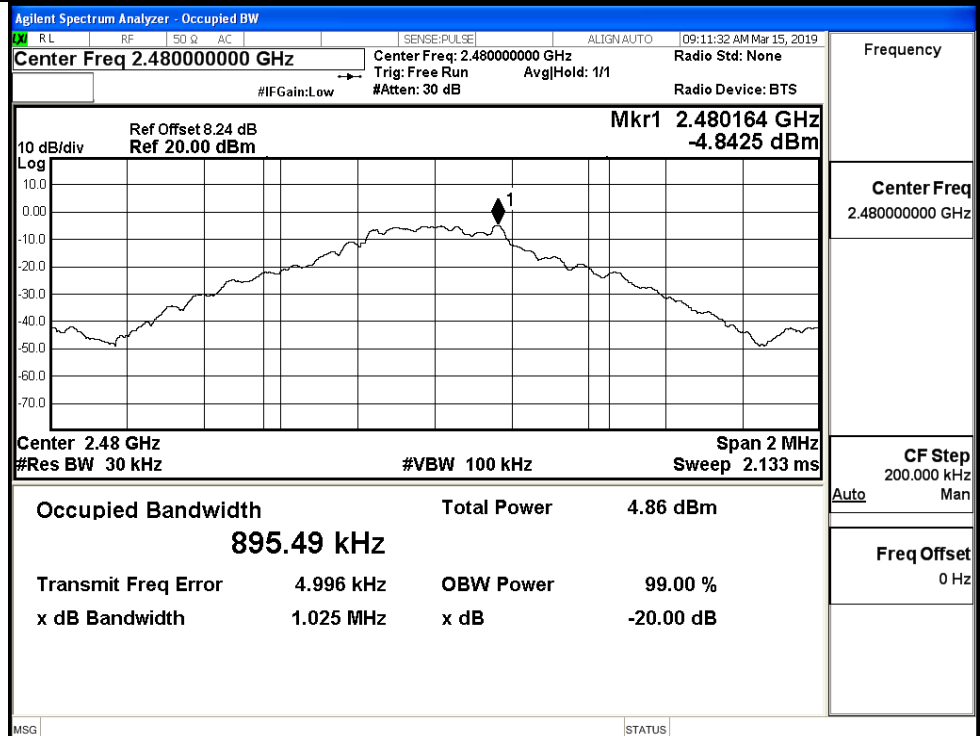
GFSK/LCH

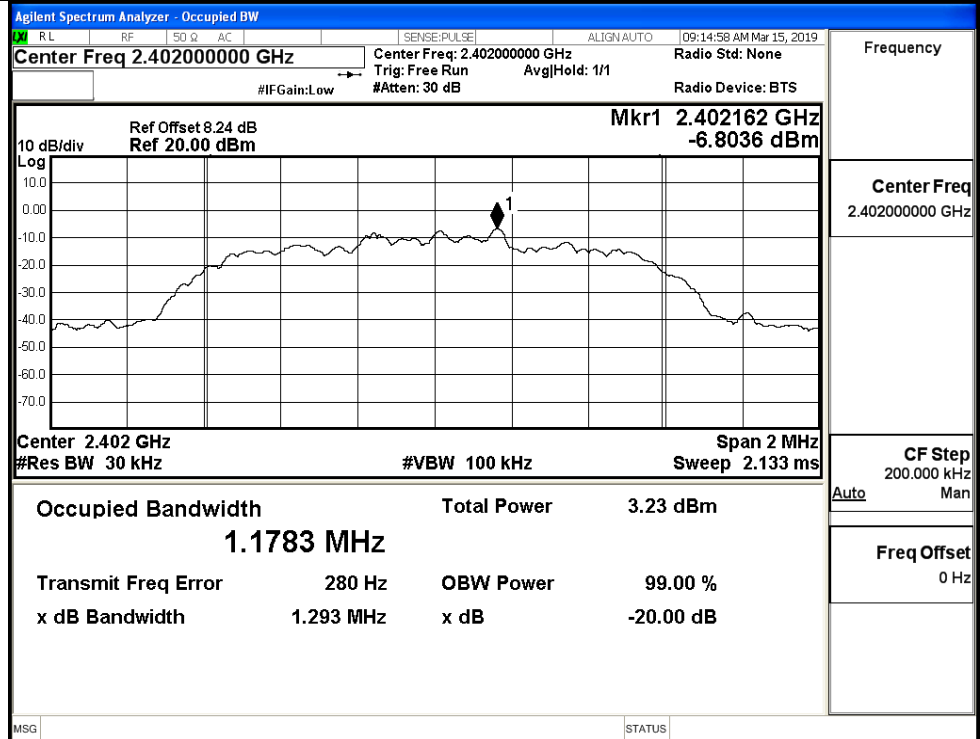
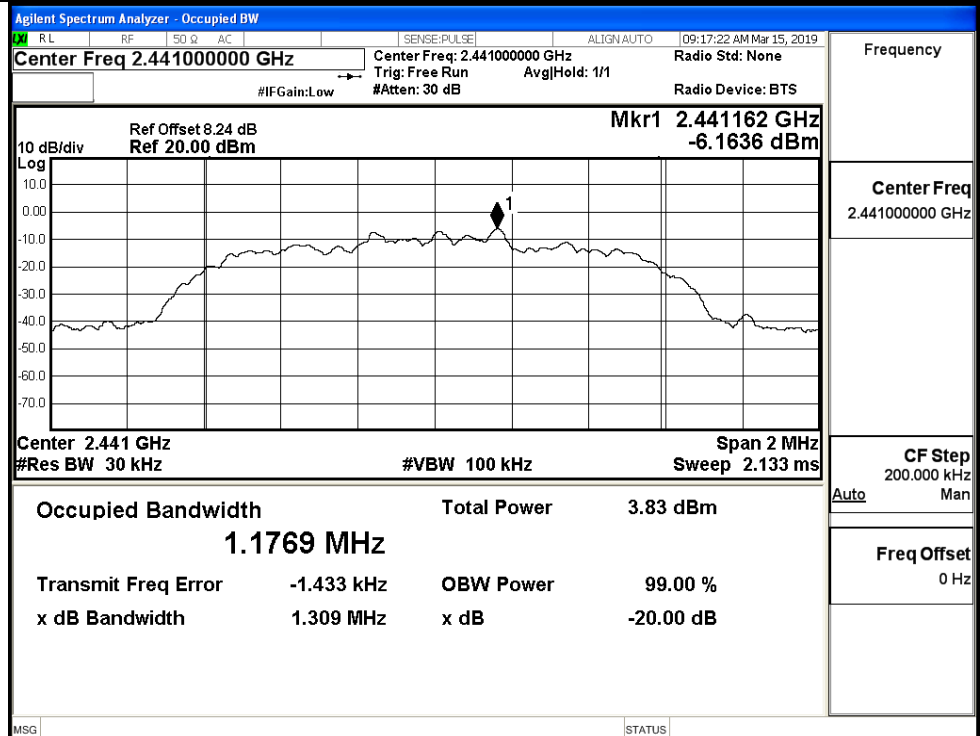


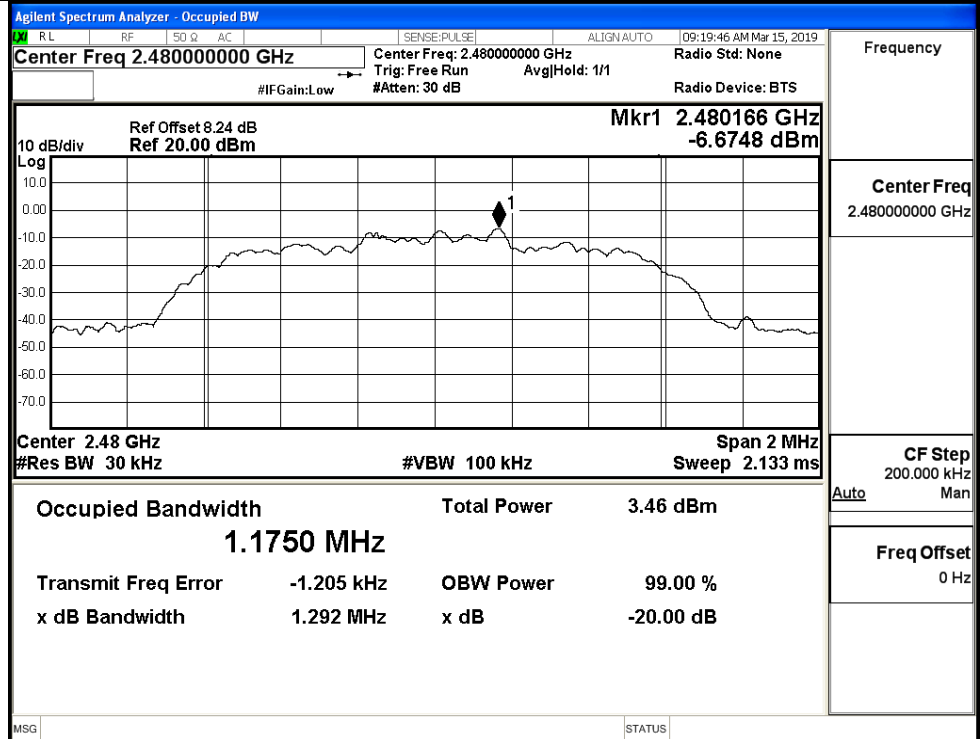
GFSK/MCH



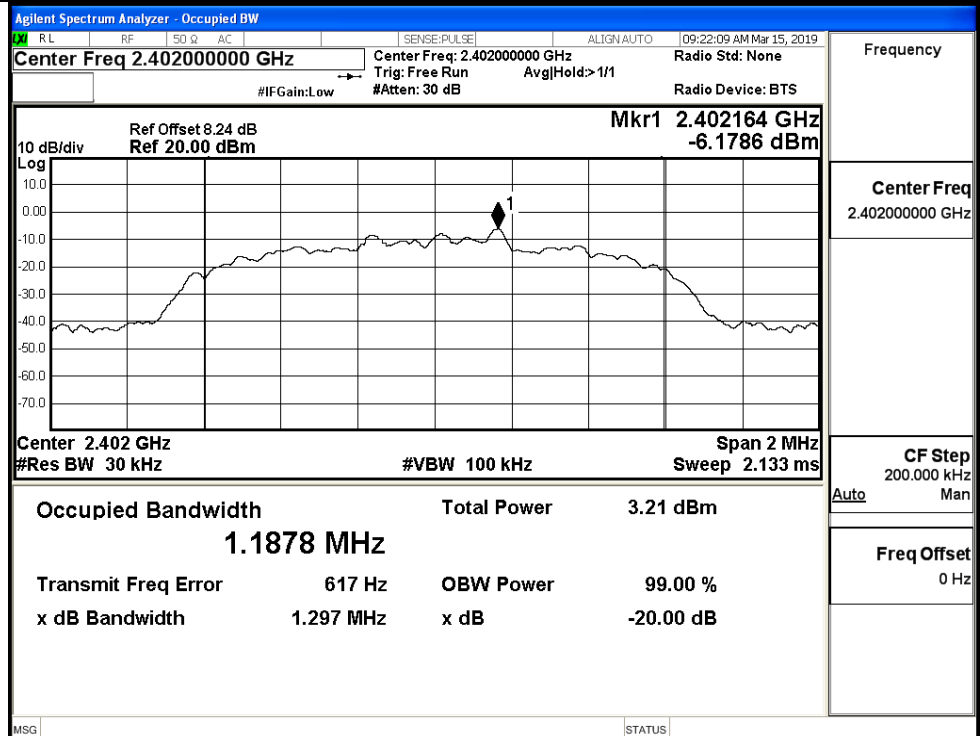
GFSK/HCH



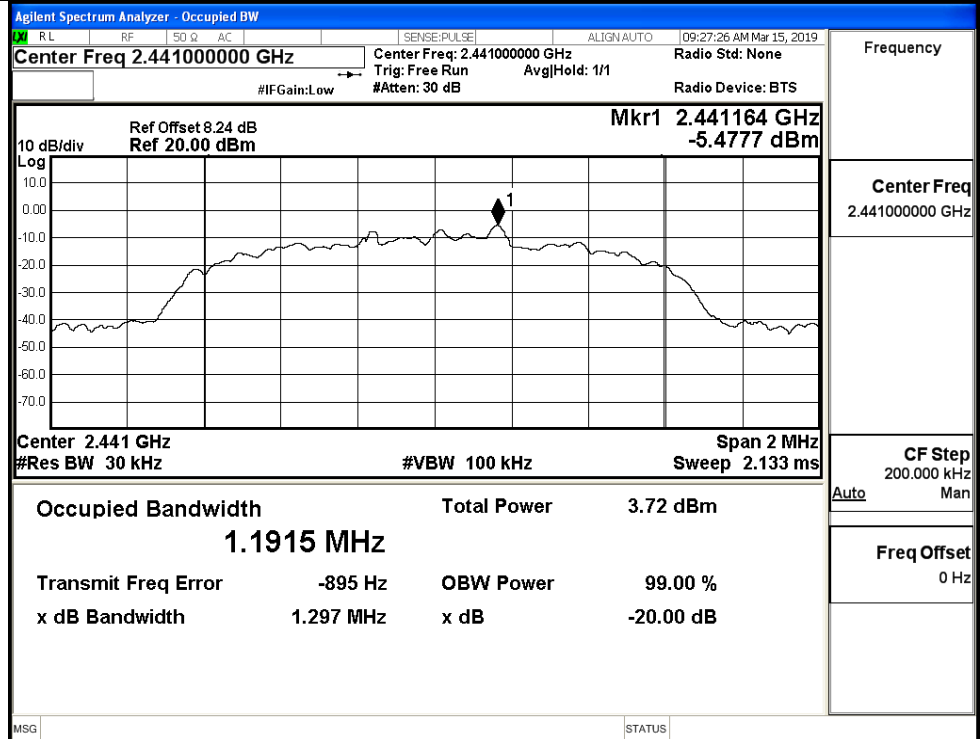
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

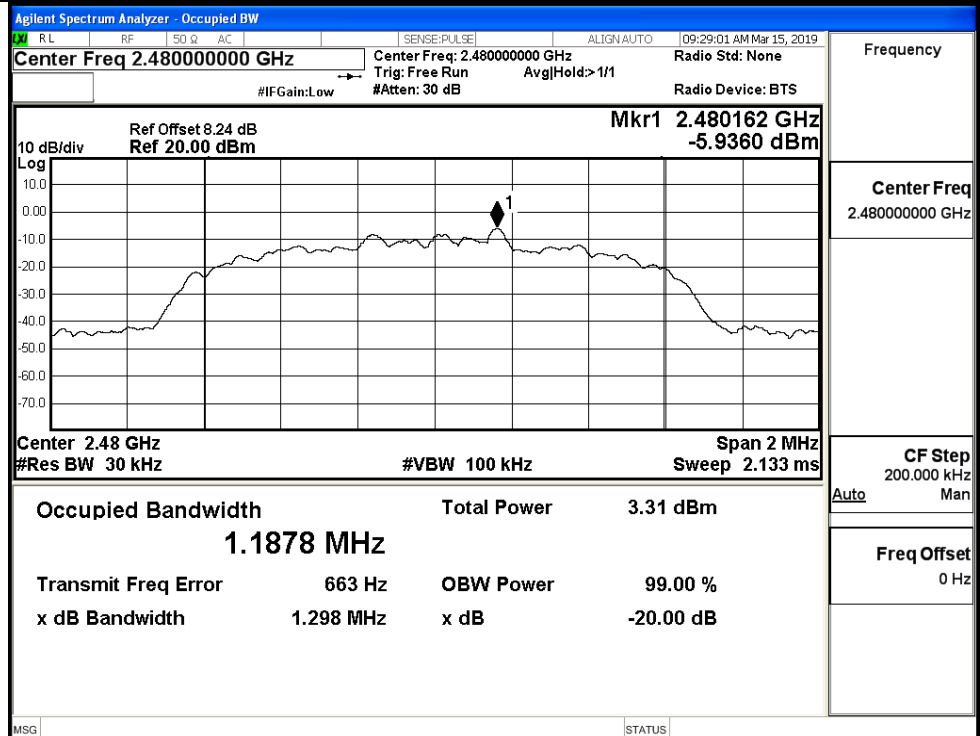
8DPSK/LCH



8DPSK/MCH



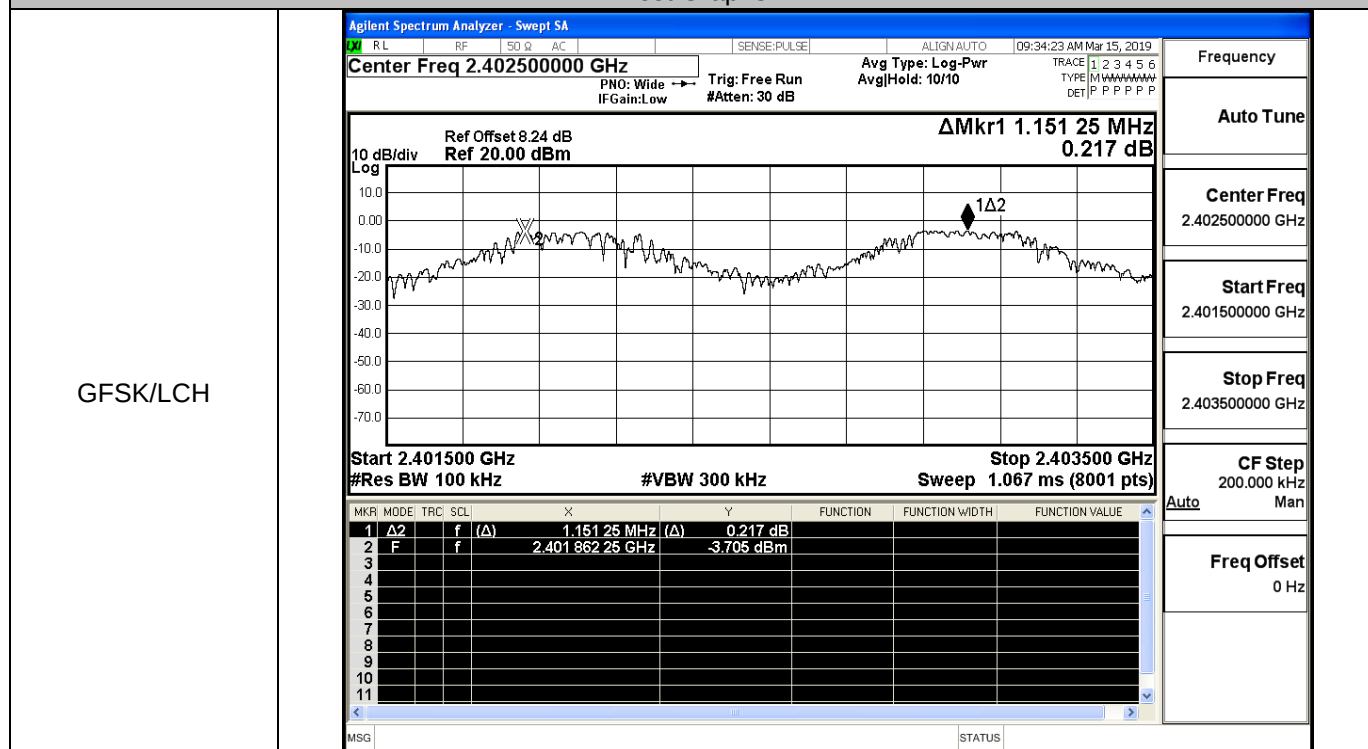
8DPSK/HCH



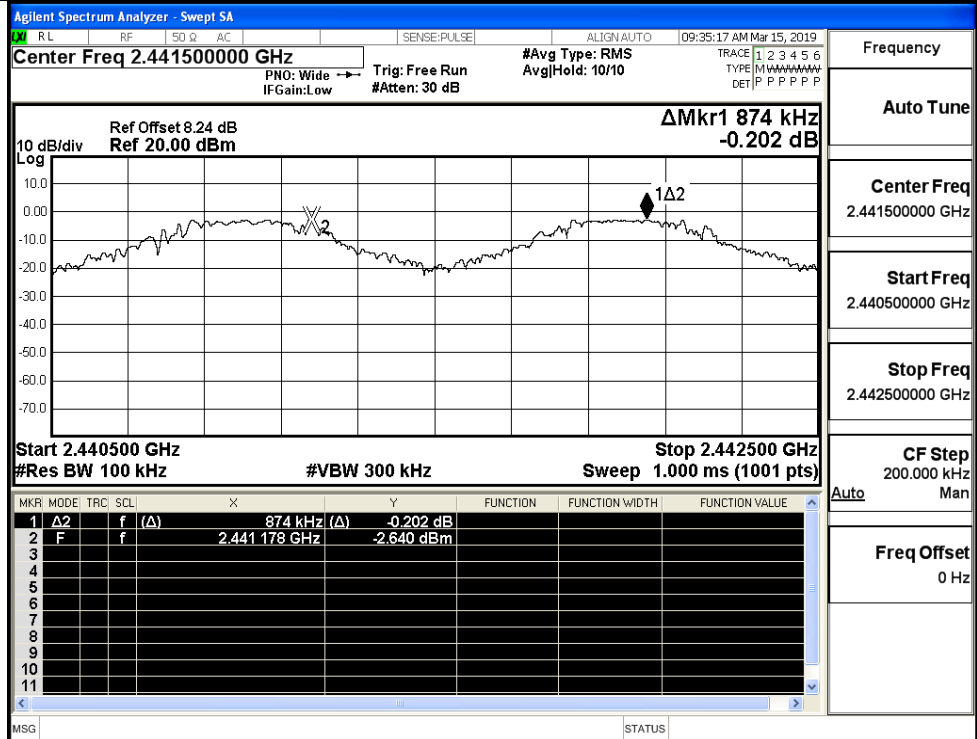
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.151	0.683	PASS
	MCH	0.874	0.683	PASS
	HCH	1.068	0.683	PASS
π /4DQPSK	LCH	1.220	0.873	PASS
	MCH	1.134	0.873	PASS
	HCH	0.908	0.873	PASS
8DPSK	LCH	0.964	0.865	PASS
	MCH	1.186	0.865	PASS
	HCH	1.184	0.865	PASS

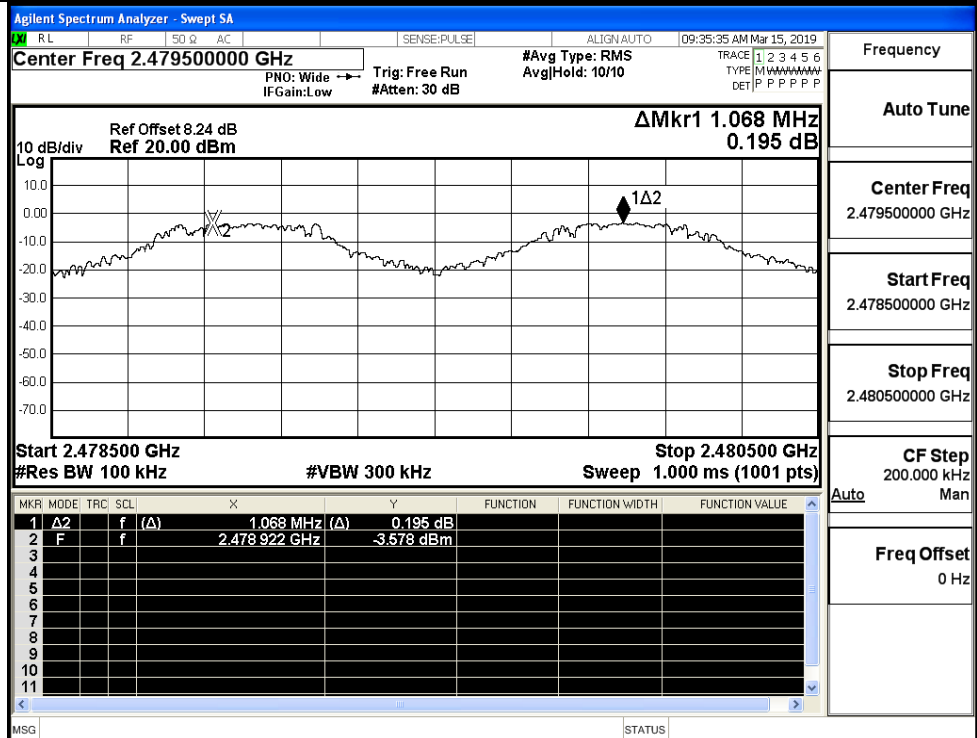
Test Graphs

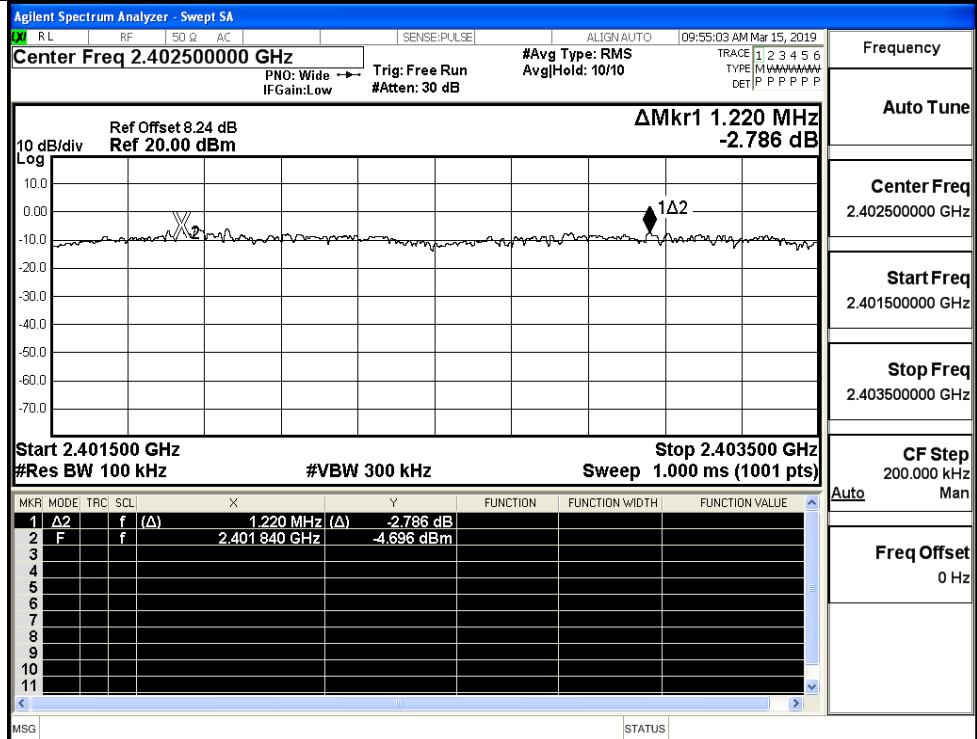
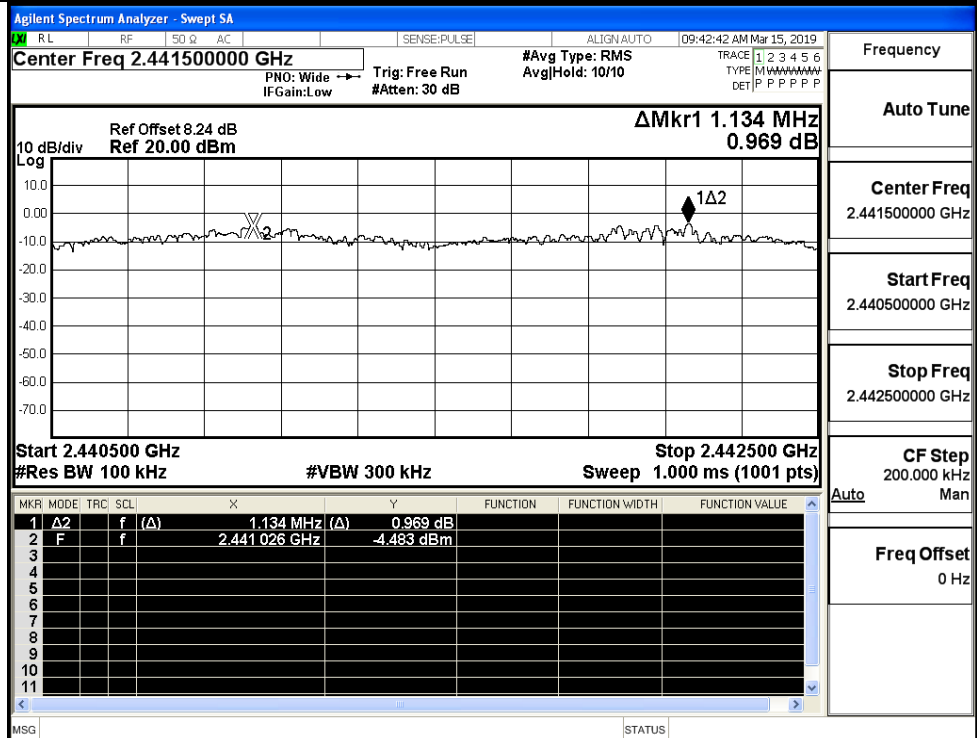


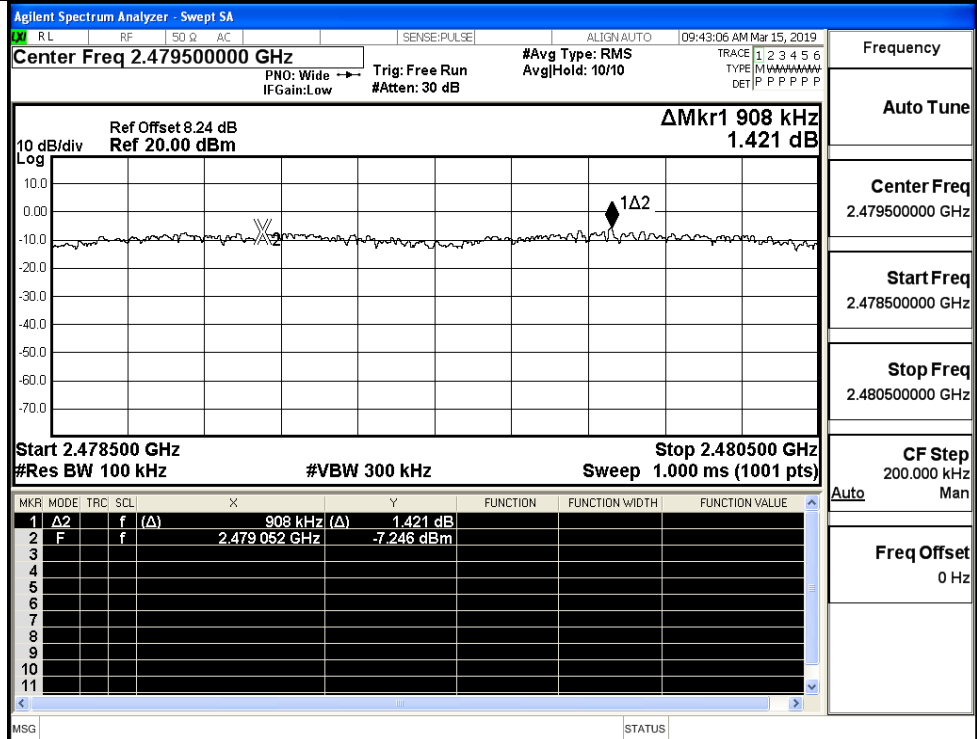
GFSK/MCH



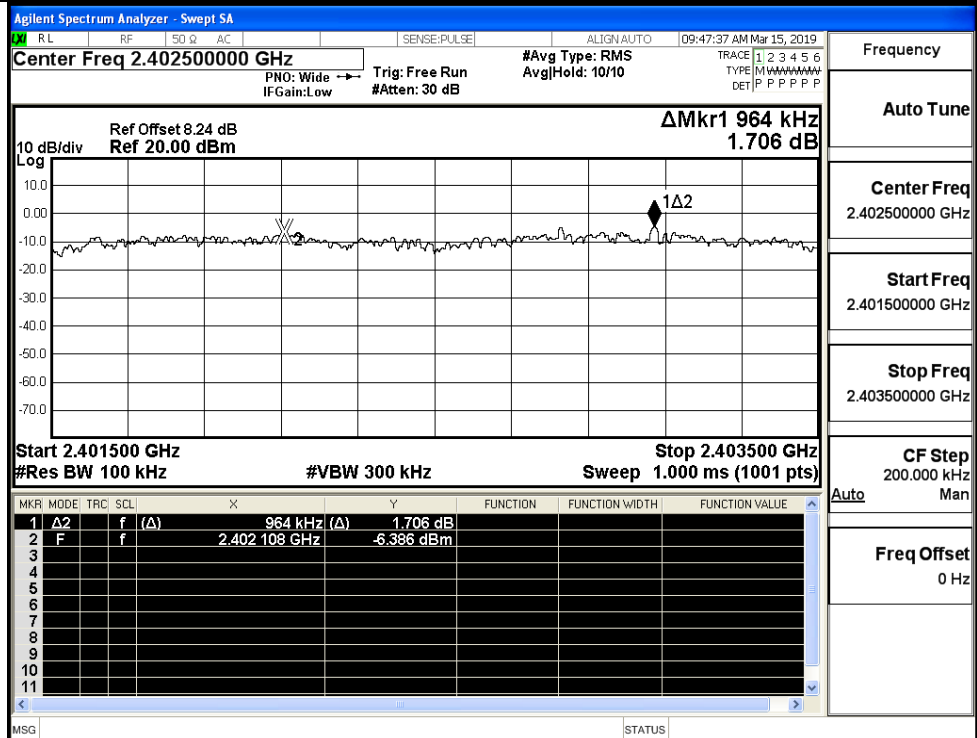
GFSK/HCH



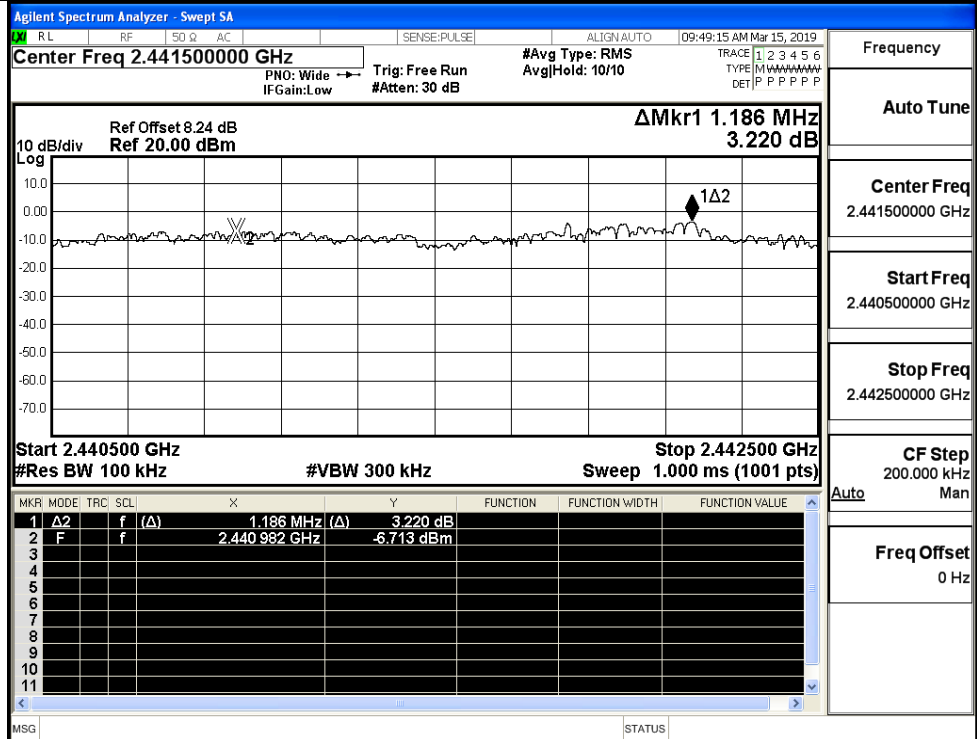
π /4DQPSK/LCH π /4DQPSK/MCH

$\pi/4$ DQPSK/HCH

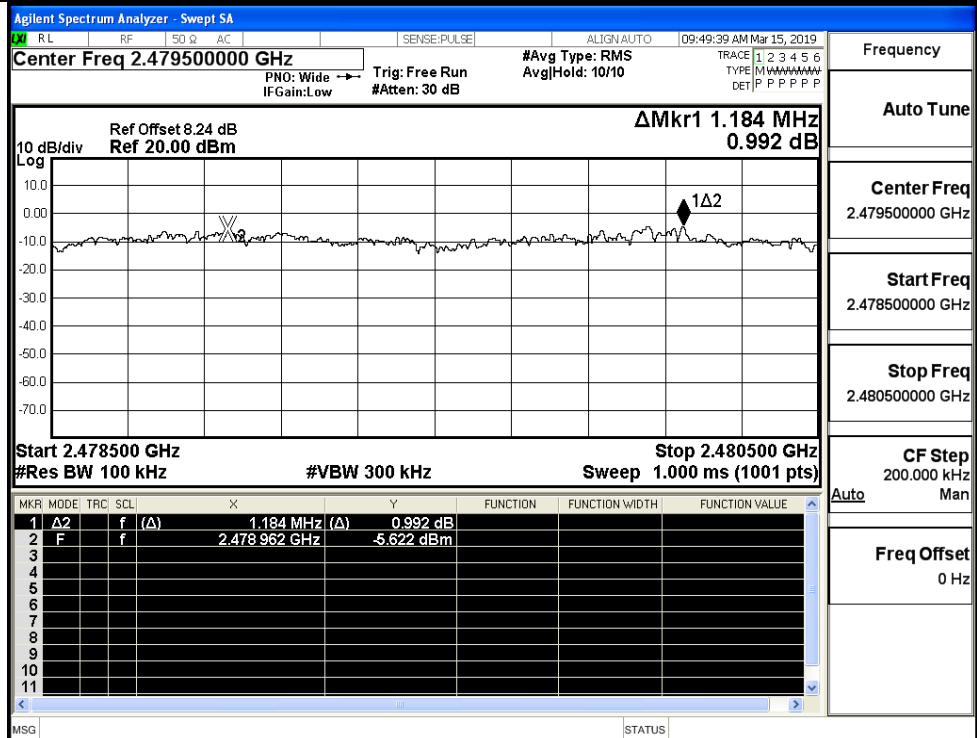
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

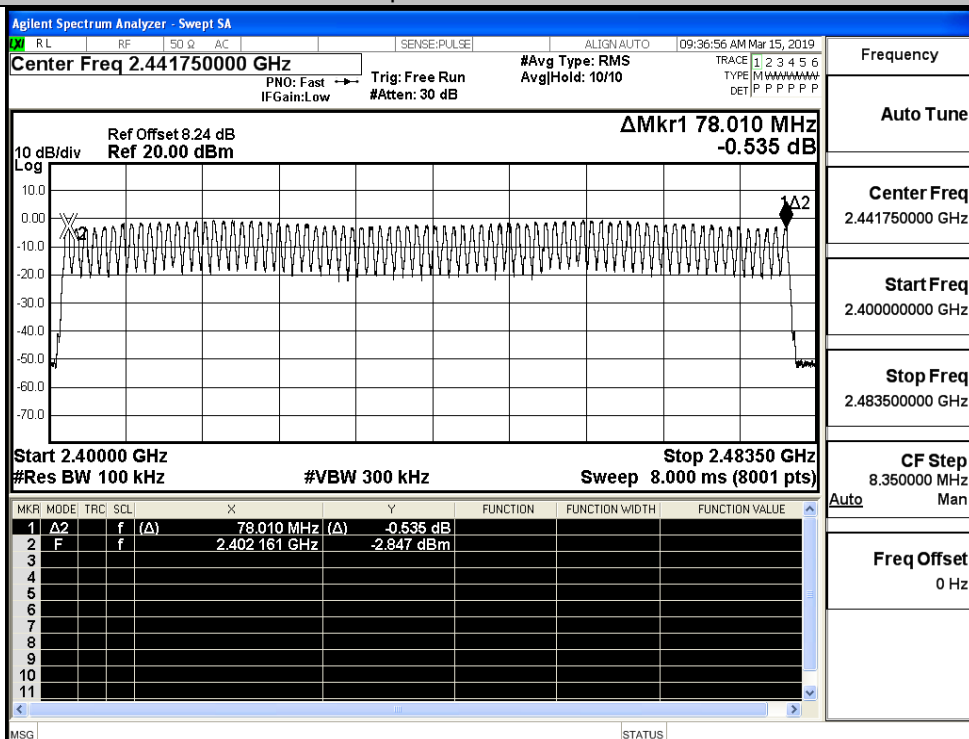
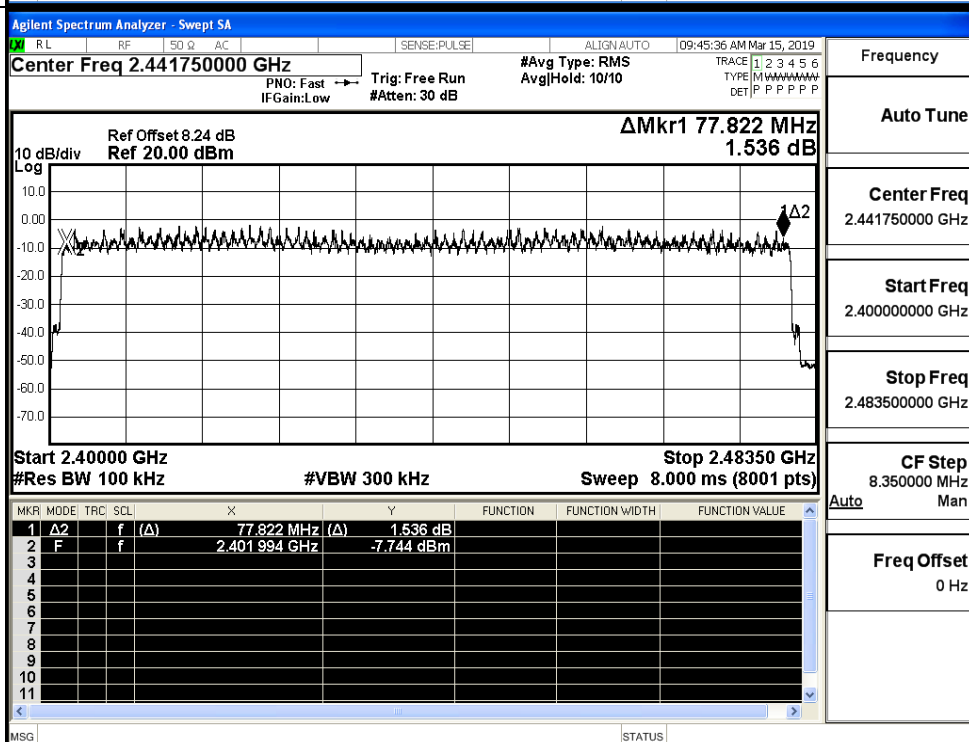


A.4 Hopping Channel Number

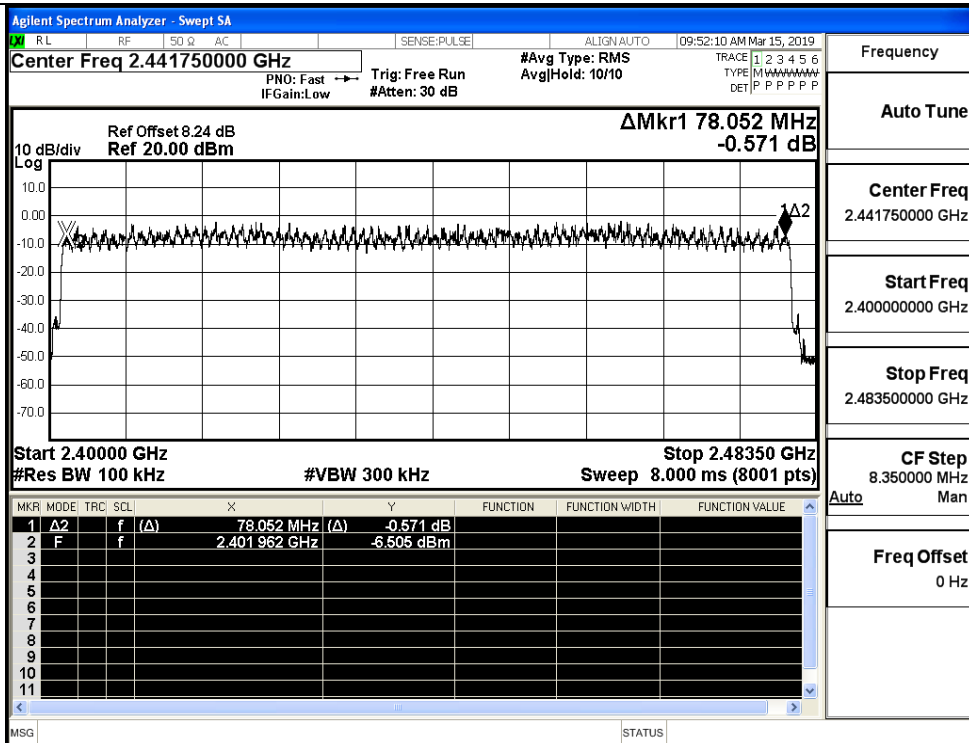
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

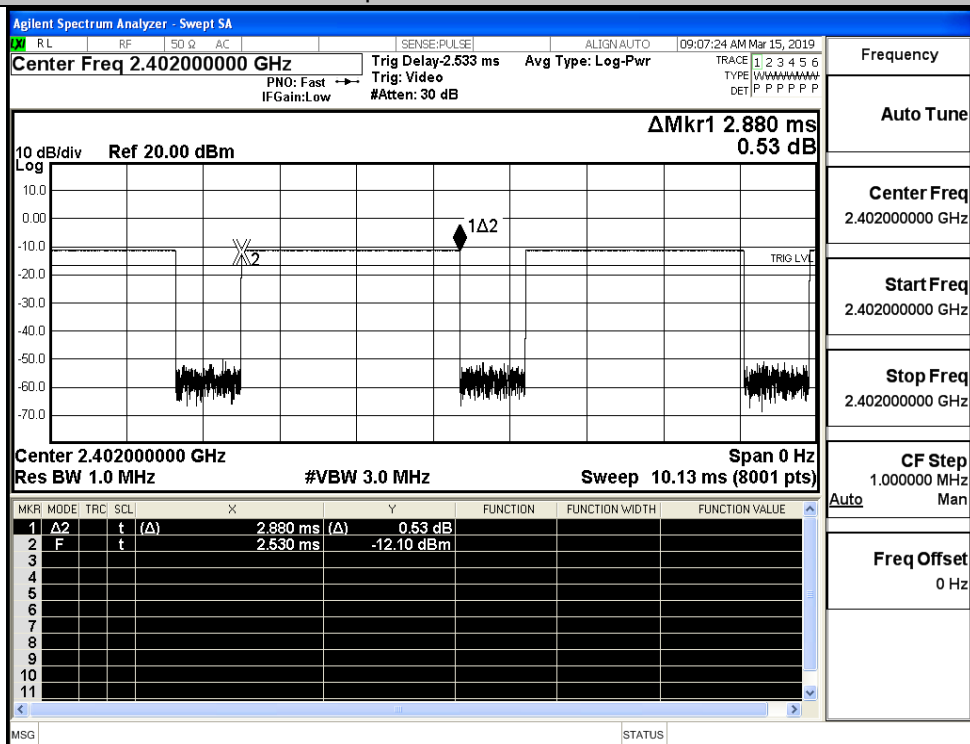
8DPSK/Hop



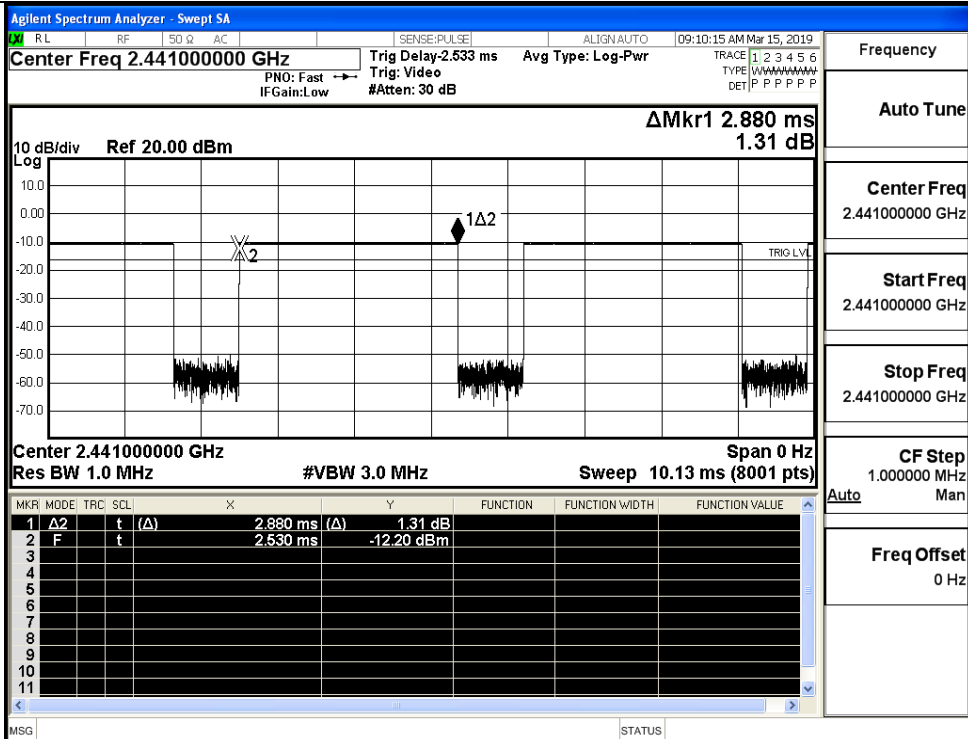
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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



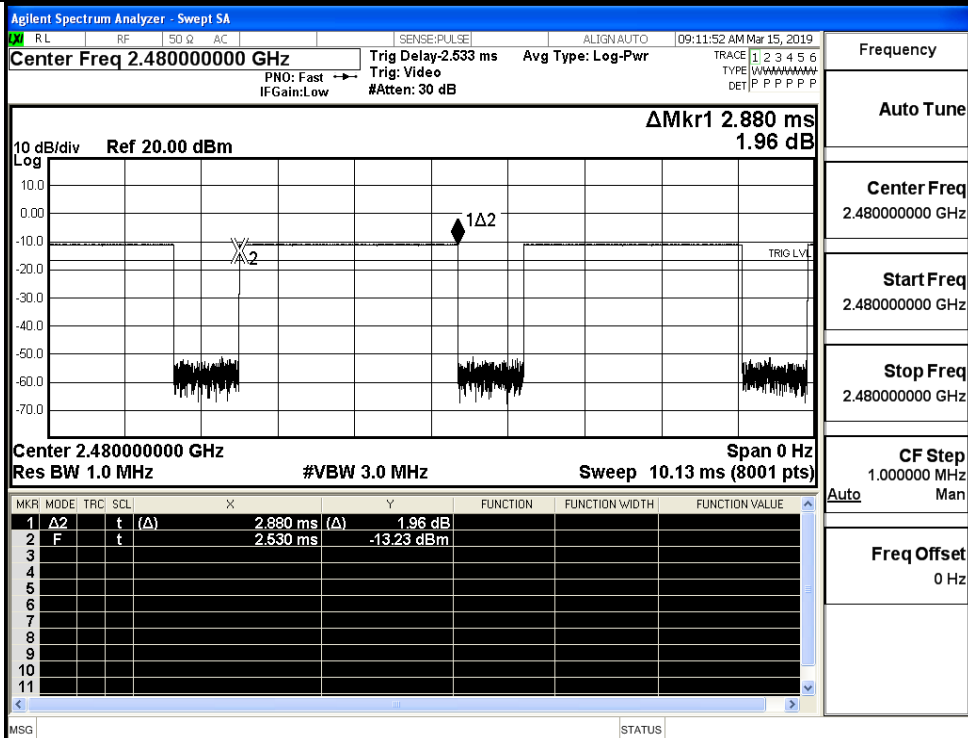
GFSK DH5/LCH



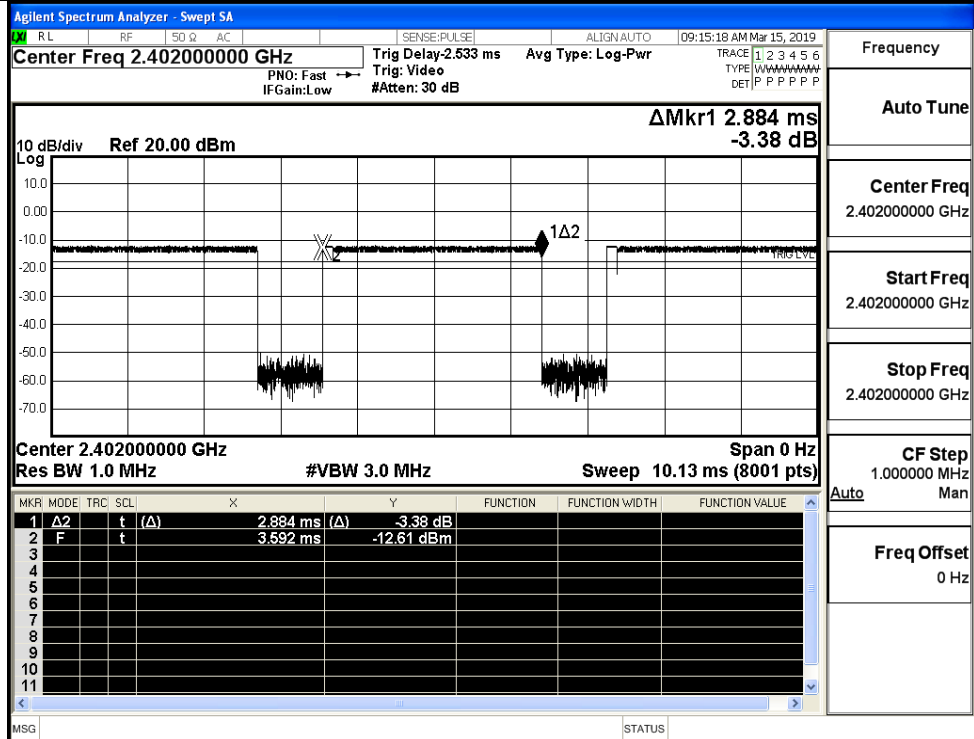
GFSK_DH5/MCH



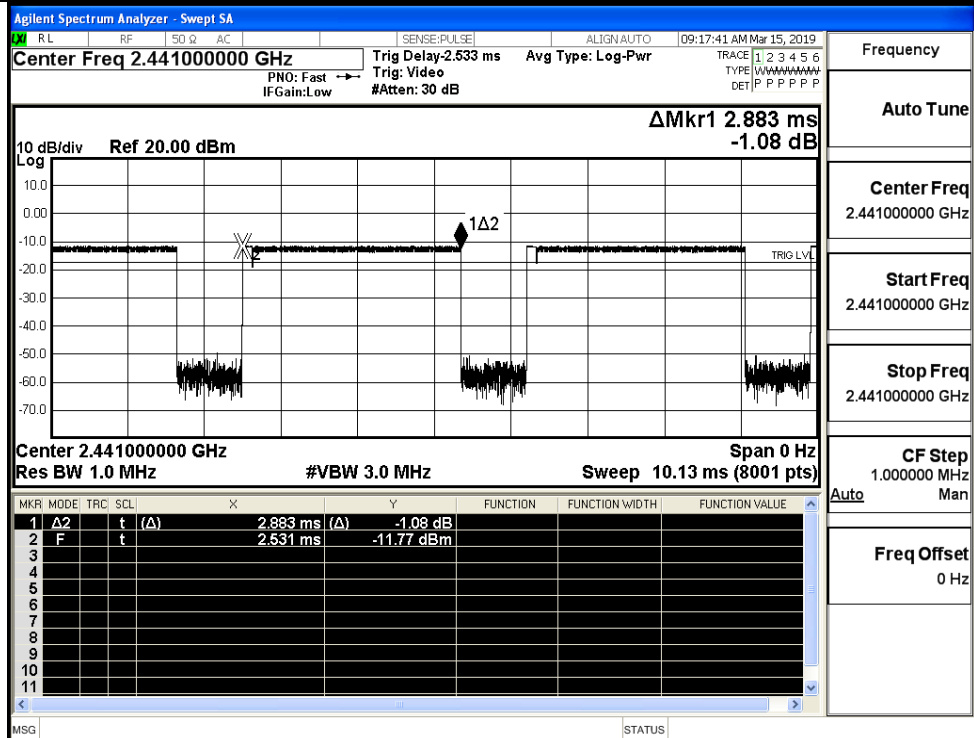
GFSK_DH5/HCH



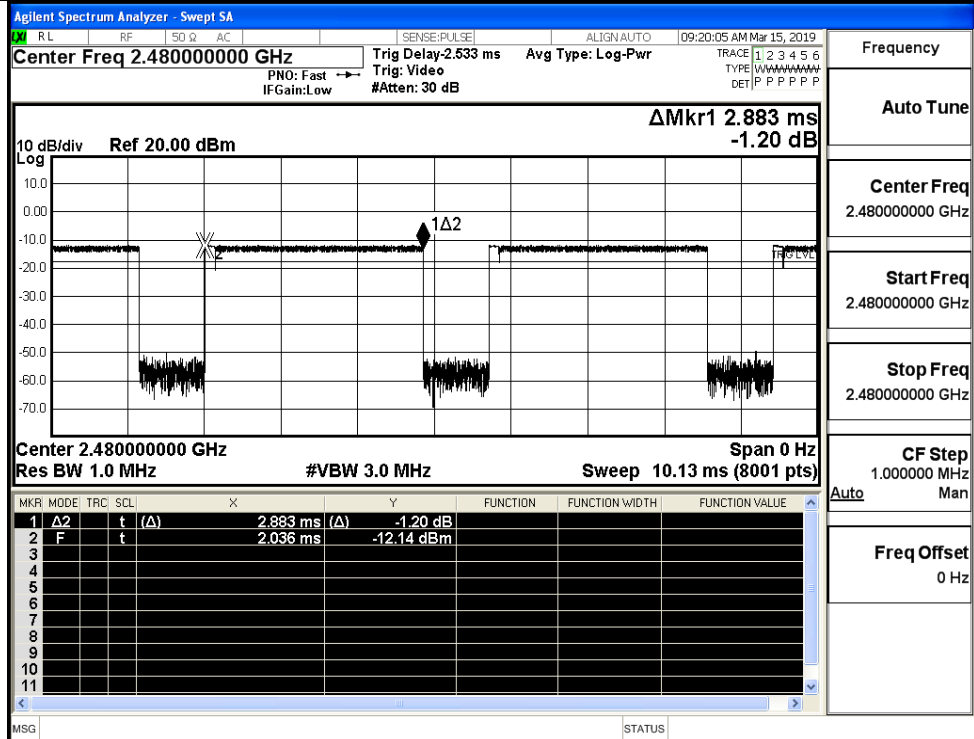
$\pi/4$ DQPSK
_2DH5/LCH



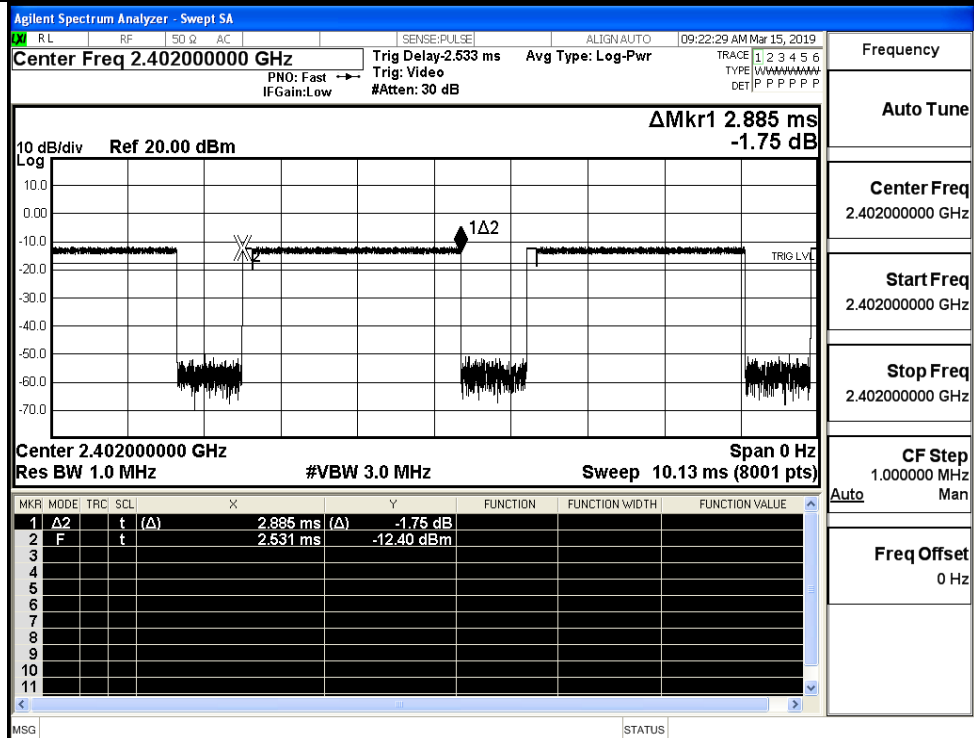
$\pi/4$ DQPSK
_2DH5/MCH



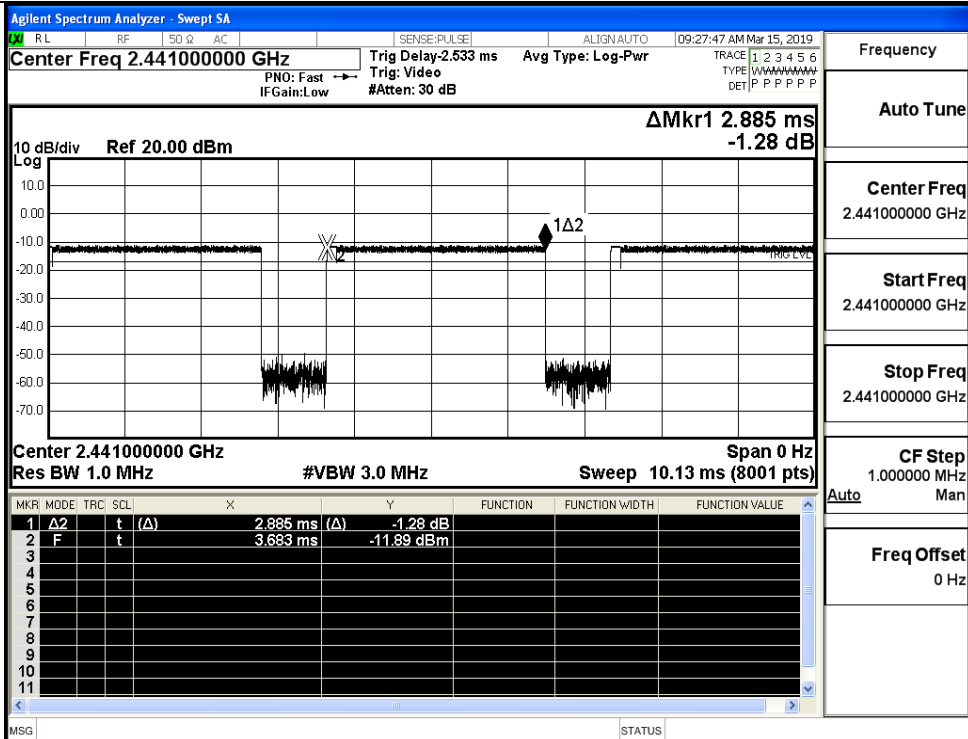
$\pi/4$ DQPSK
_2DH5/HCH



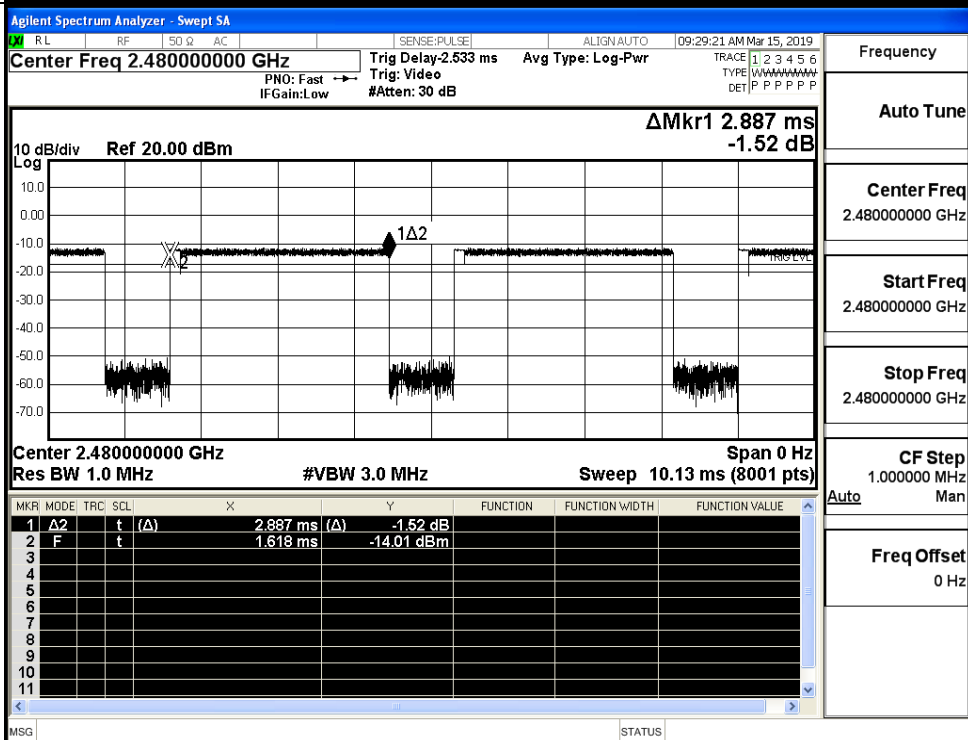
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



8DPSK_3DH5/HCH

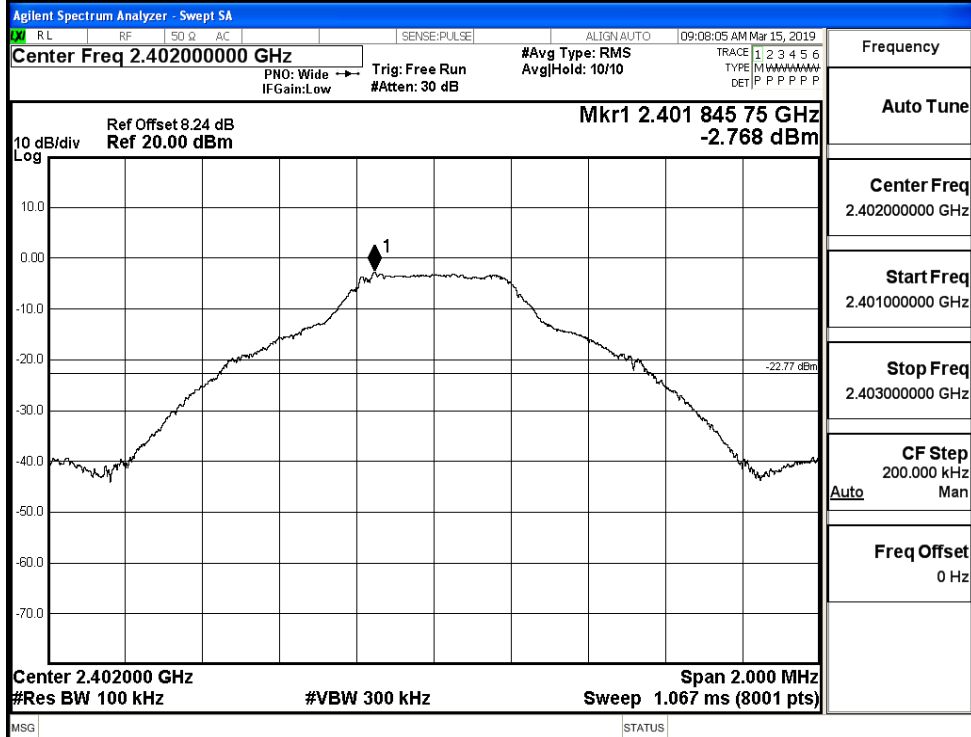


A.6 RF Conducted Spurious Emissions

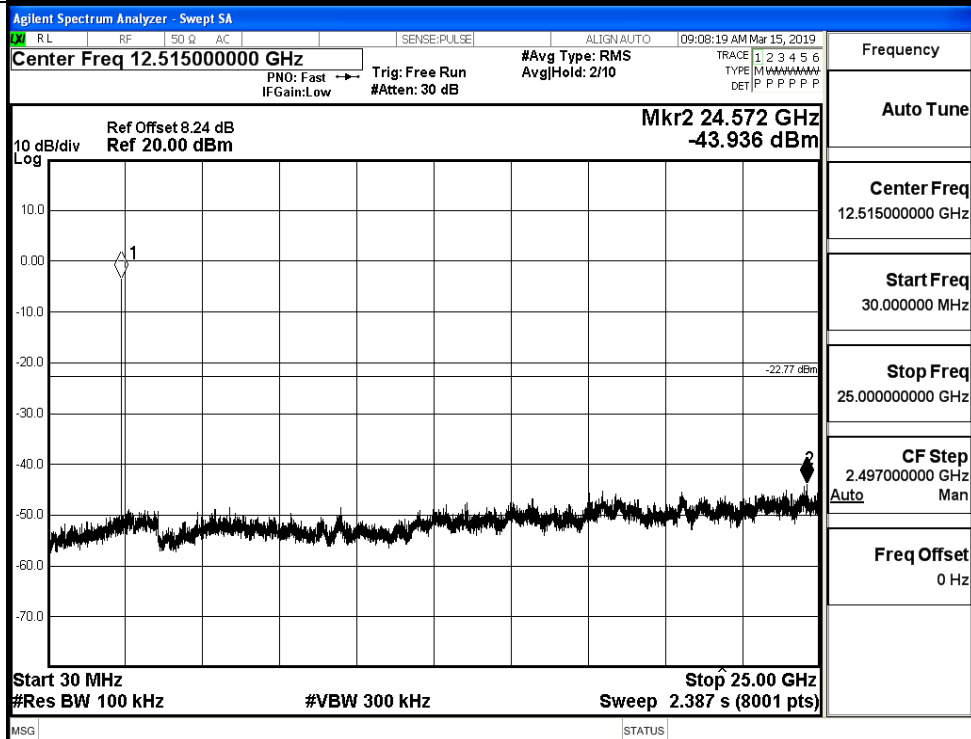
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.768	-43.936	-22.768	PASS
	MCH	-2.343	-45.068	-22.343	PASS
	HCH	-3.324	-45.156	-23.324	PASS
$\pi/4$ DQPSK	LCH	-4.017	-44.506	-24.017	PASS
	MCH	-4.134	-44.728	-24.134	PASS
	HCH	-3.863	-44.911	-23.863	PASS
8DPSK	LCH	-4.009	-44.857	-24.009	PASS
	MCH	-3.434	-44.270	-23.434	PASS
	HCH	-4.041	-44.356	-24.041	PASS

GFSK LCH Graphs

Pref

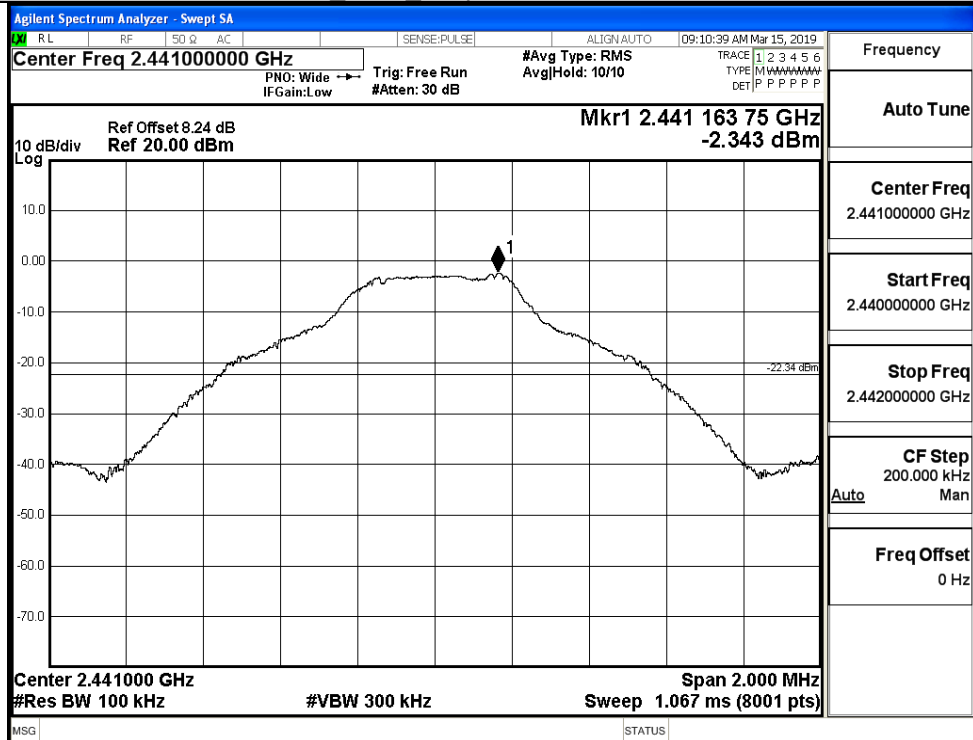


Puw

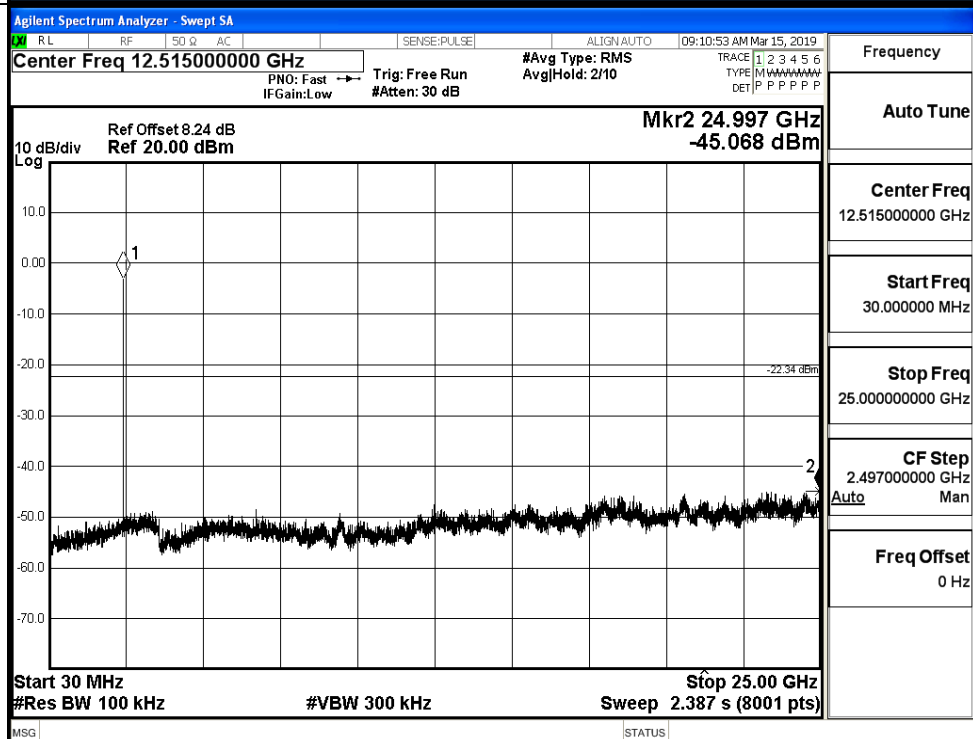


GFSK_MCH_Graphs

Pref

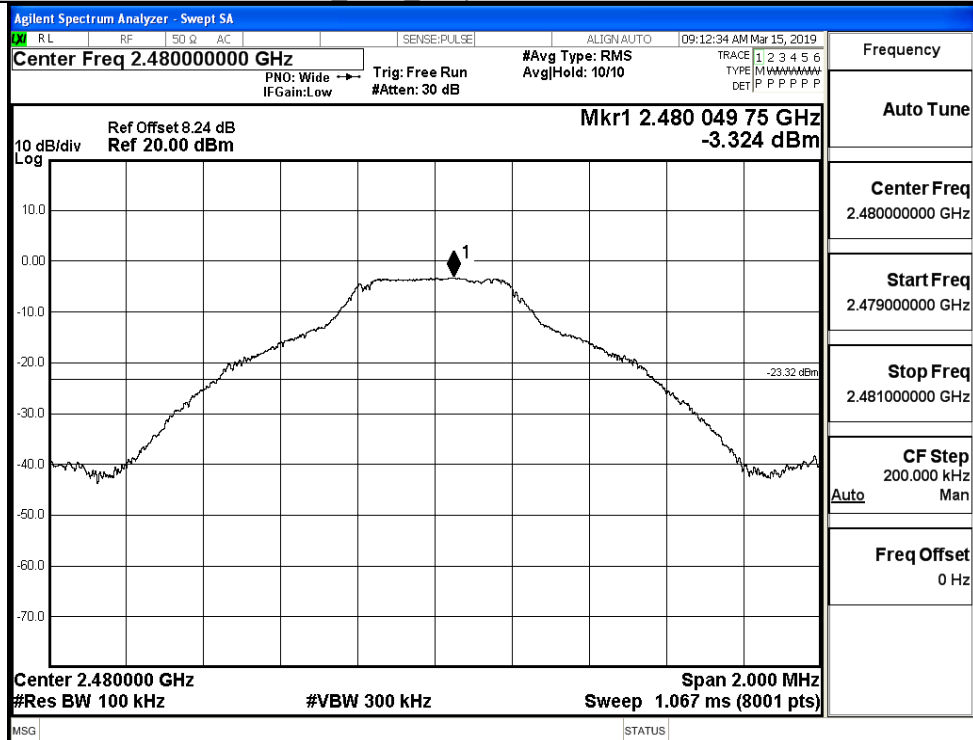


Puw

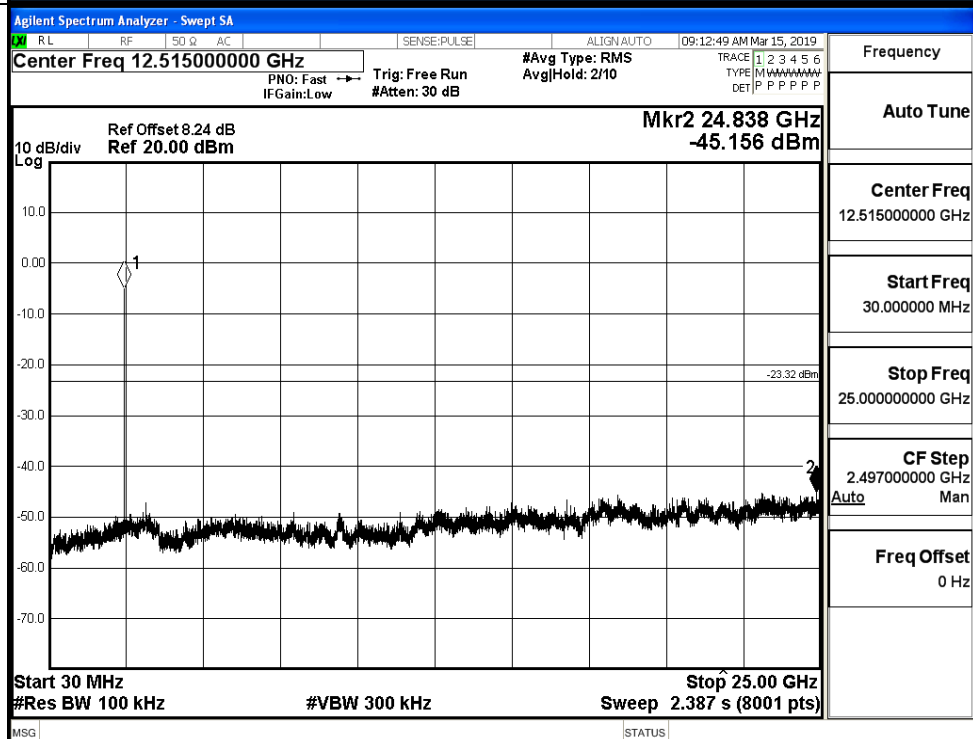


GFSK_HCH_Graphs

Pref

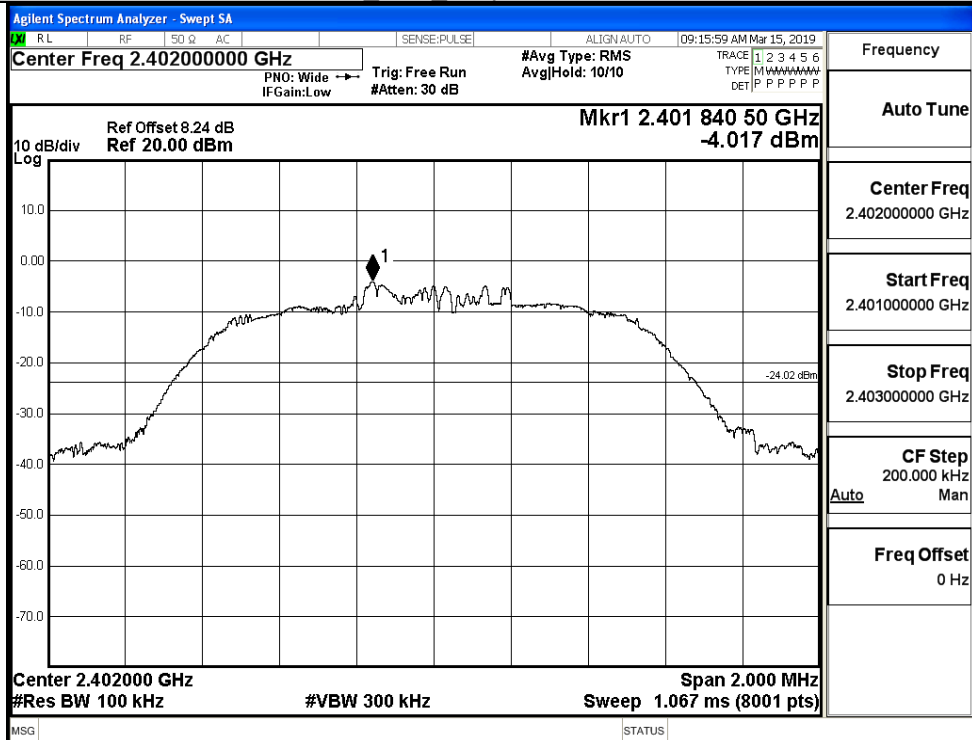


Puw

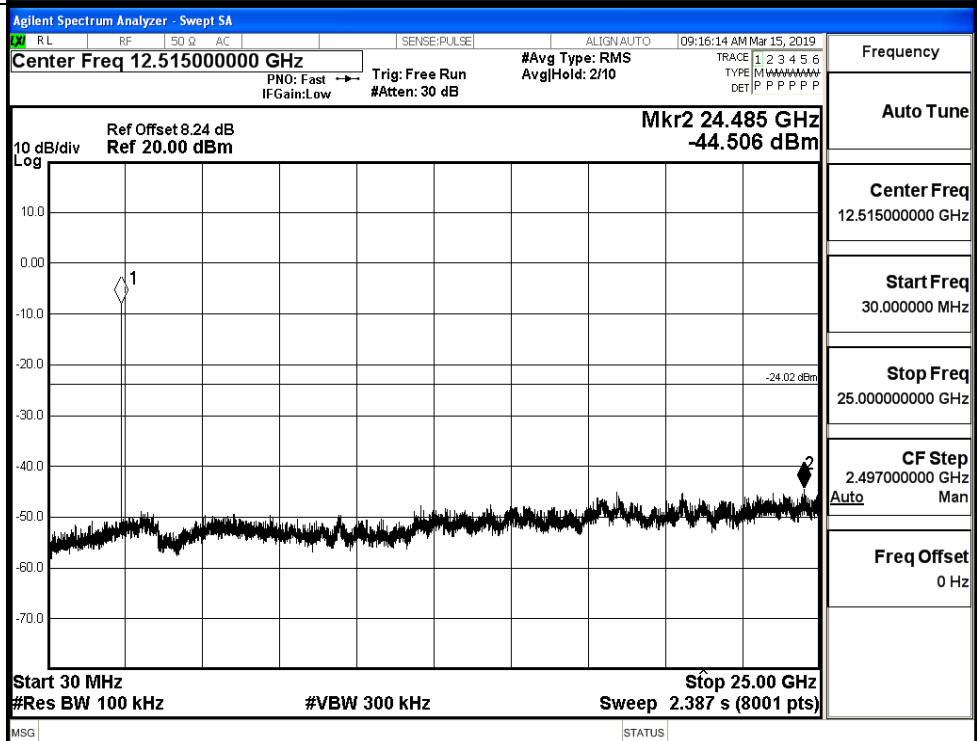


$\pi/4$ DQPSK LCH_Graphs

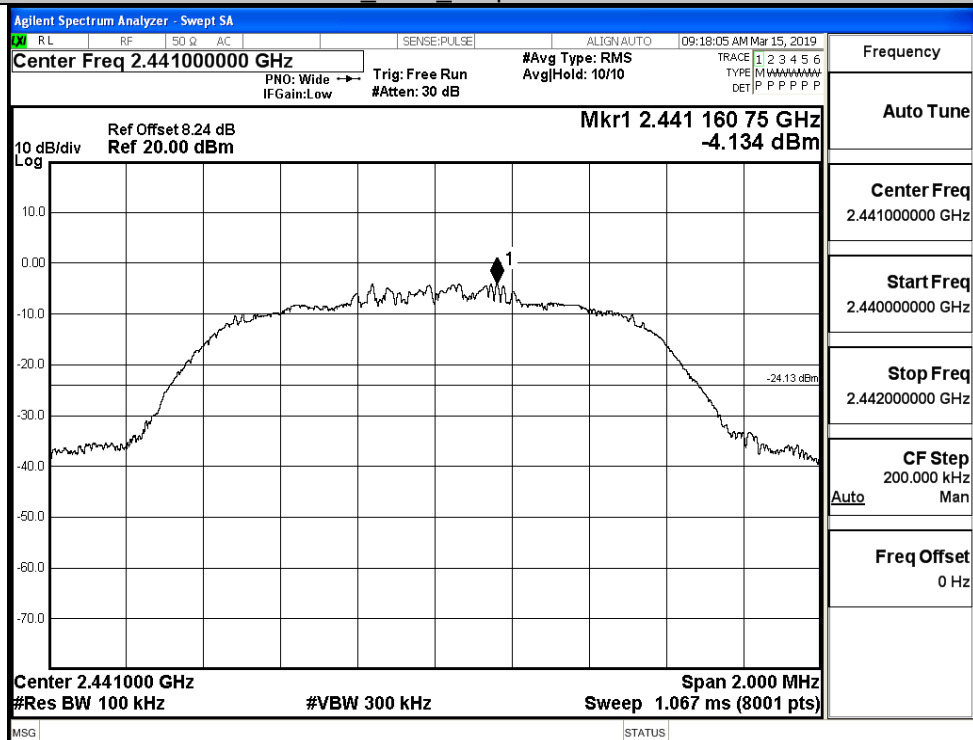
Pref



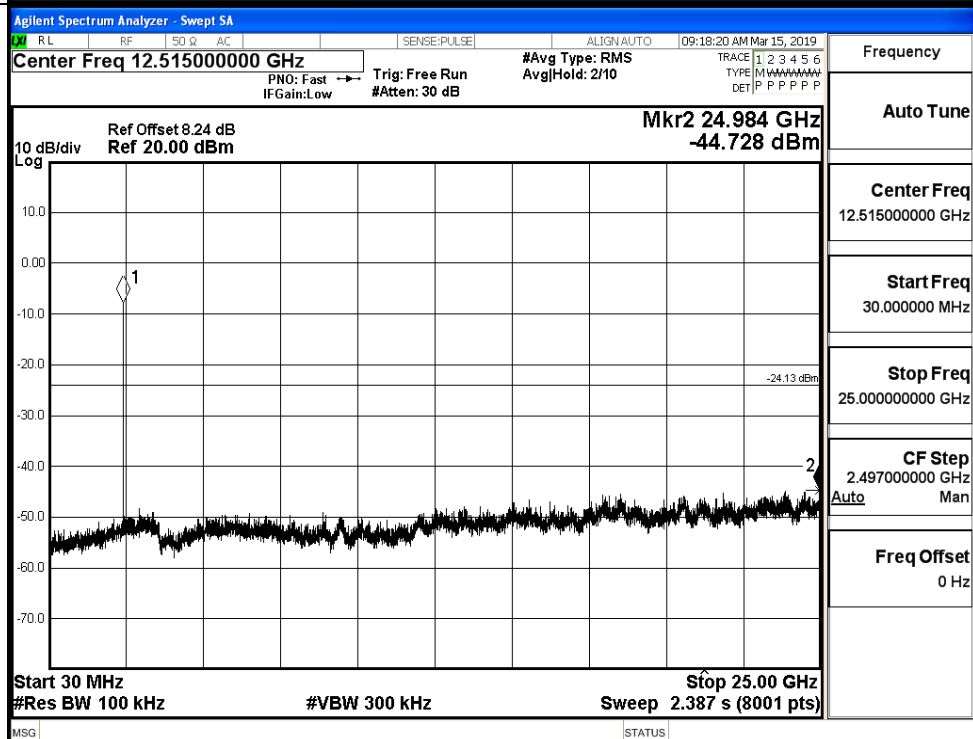
Puw



Pref

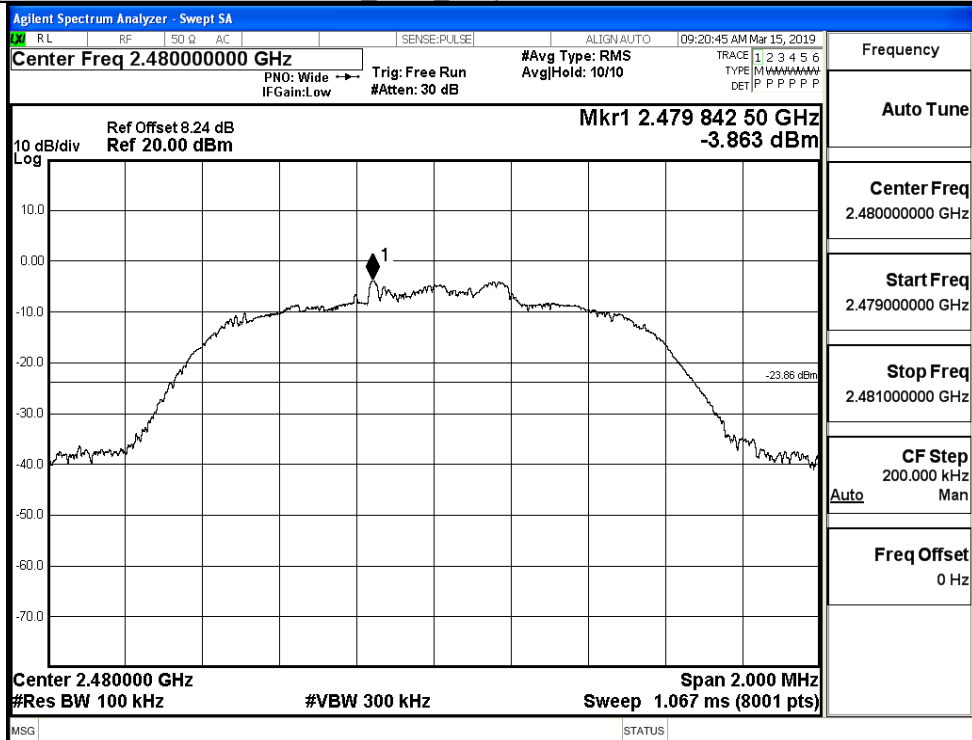


Puw

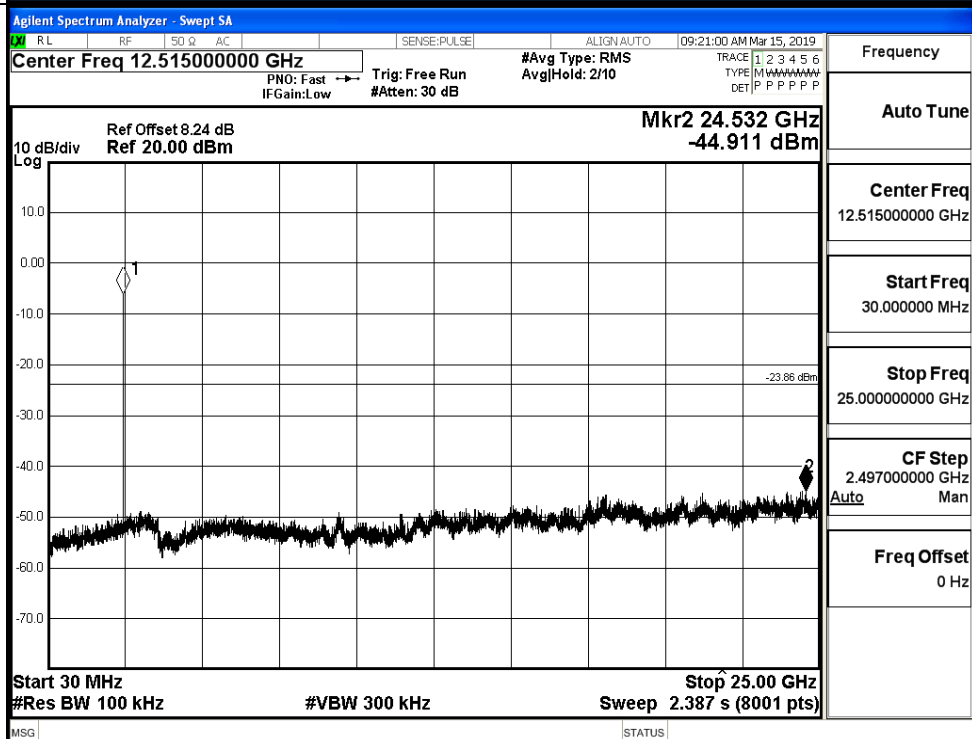


$\pi/4$ DQPSK_HCH_Graphs

Pref

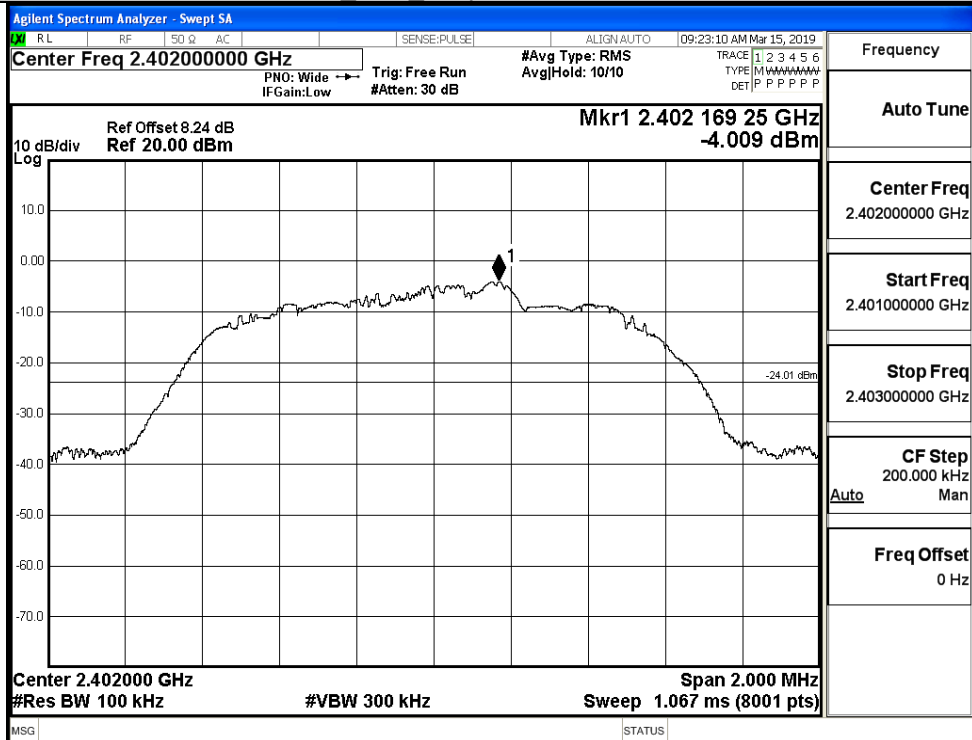


Puw

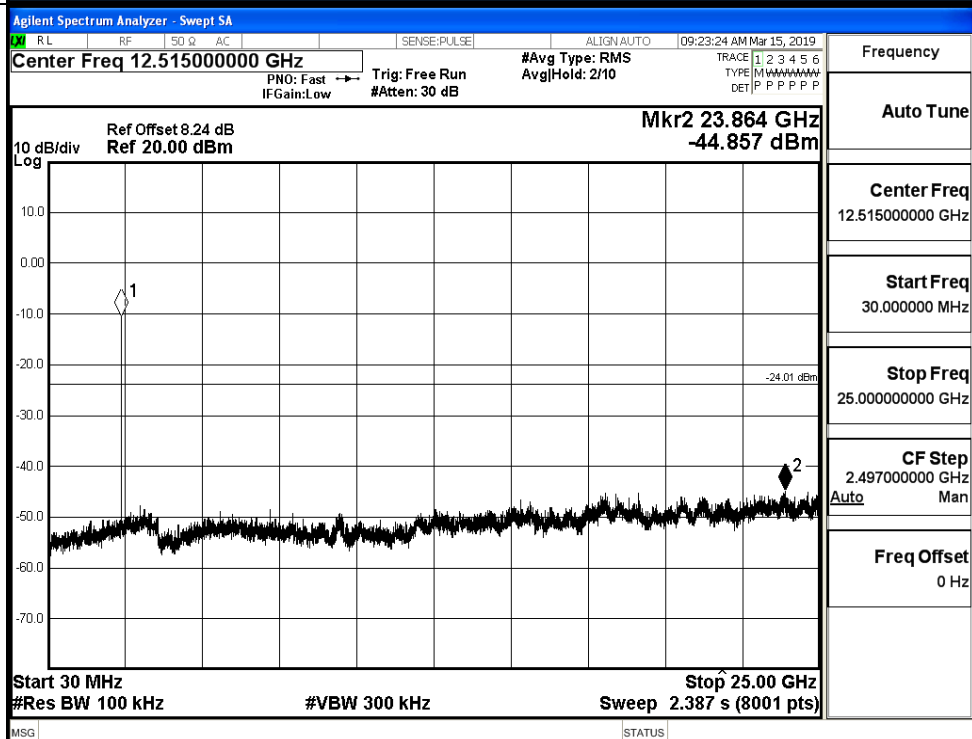


8DPSK_LCH_Graphs

Pref

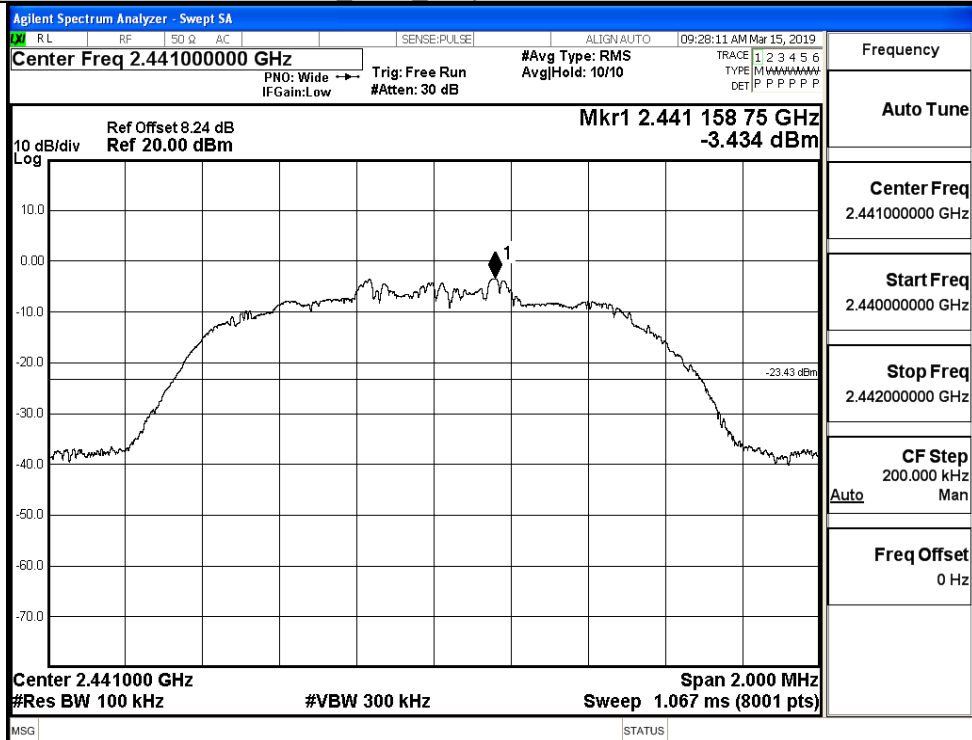


Puw

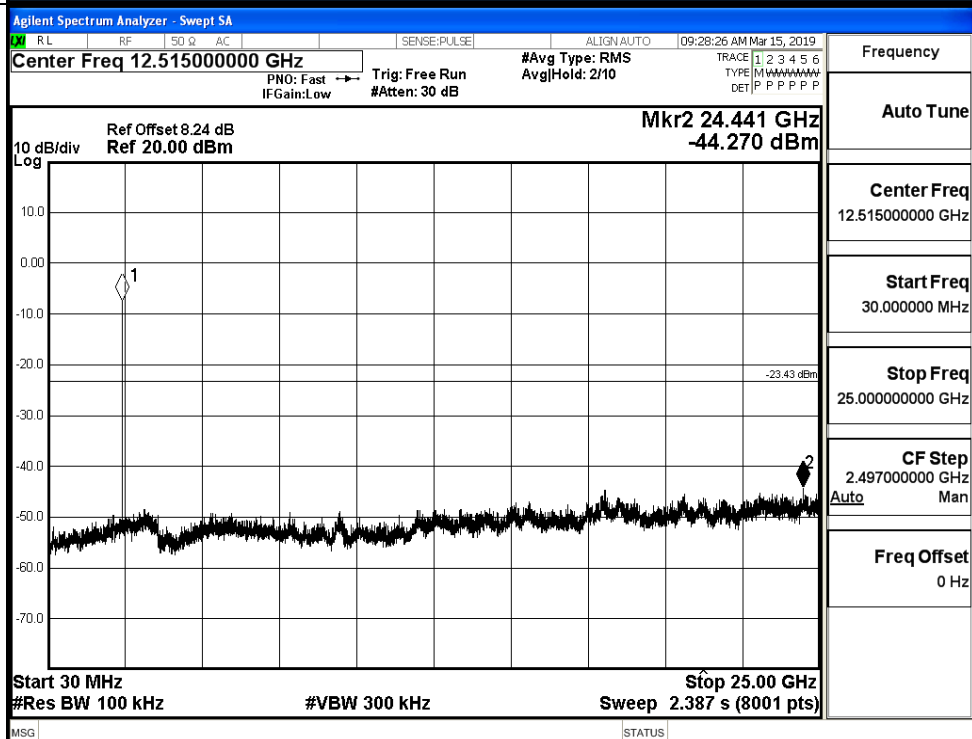


8DPSK_MCH_Graphs

Pref

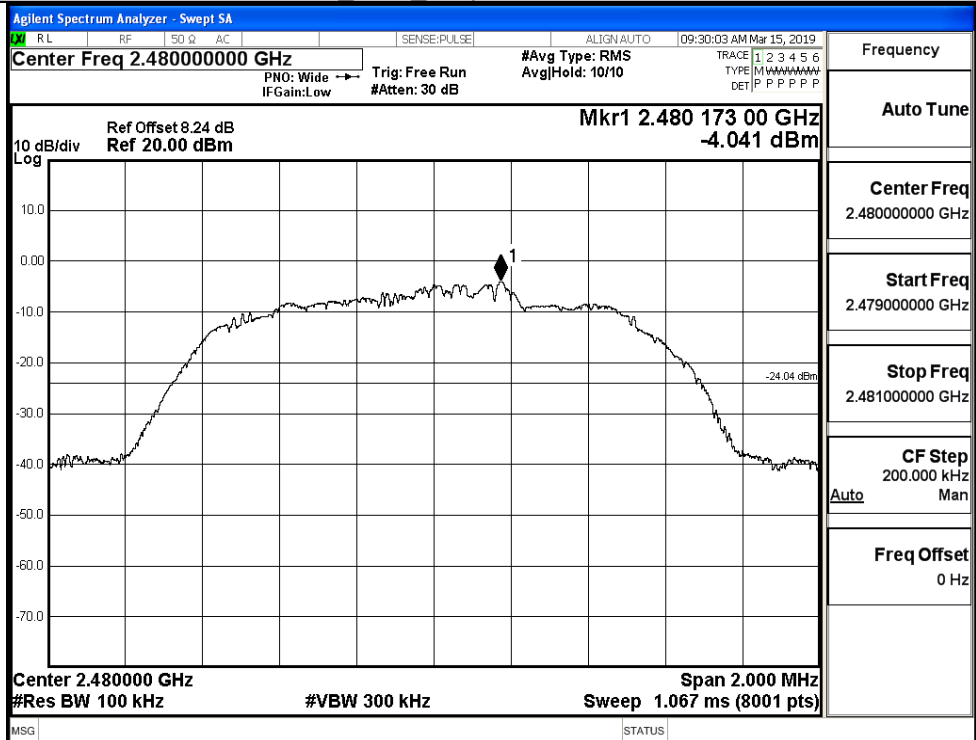


Puw

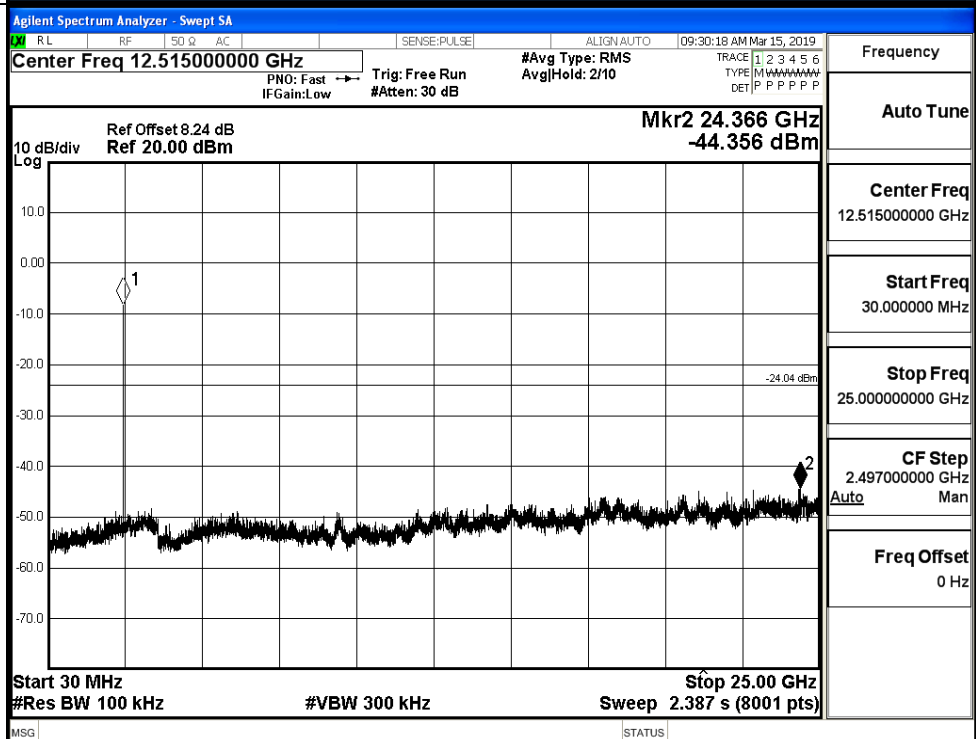


8DPSK_HCH_Graphs

Pref



Puw

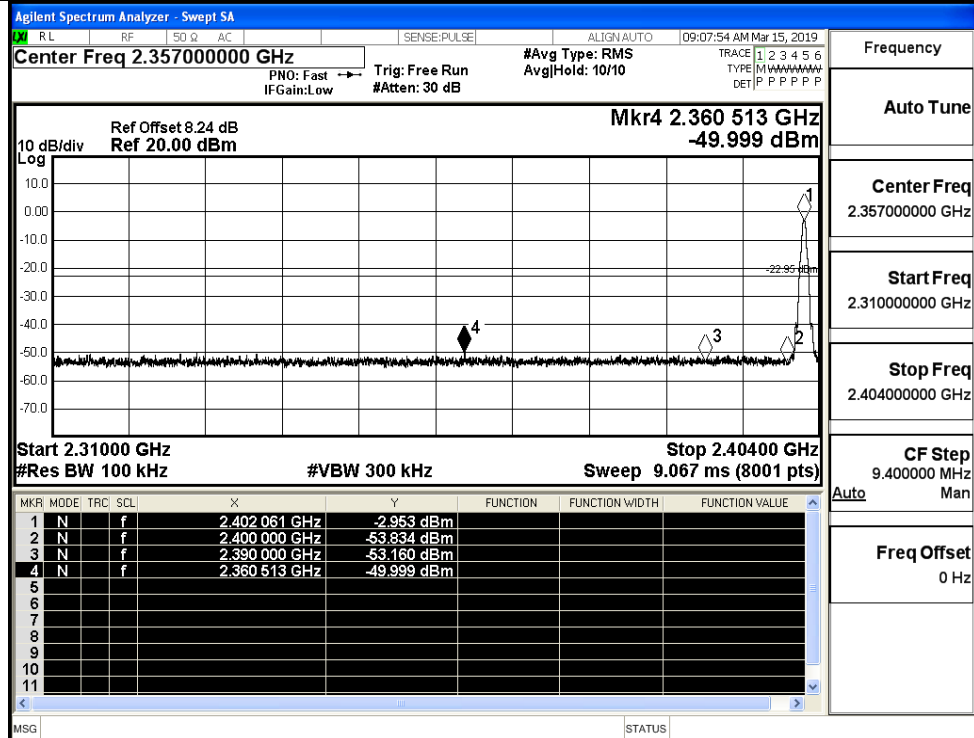


A.7 Band-edge for RF Conducted Emissions

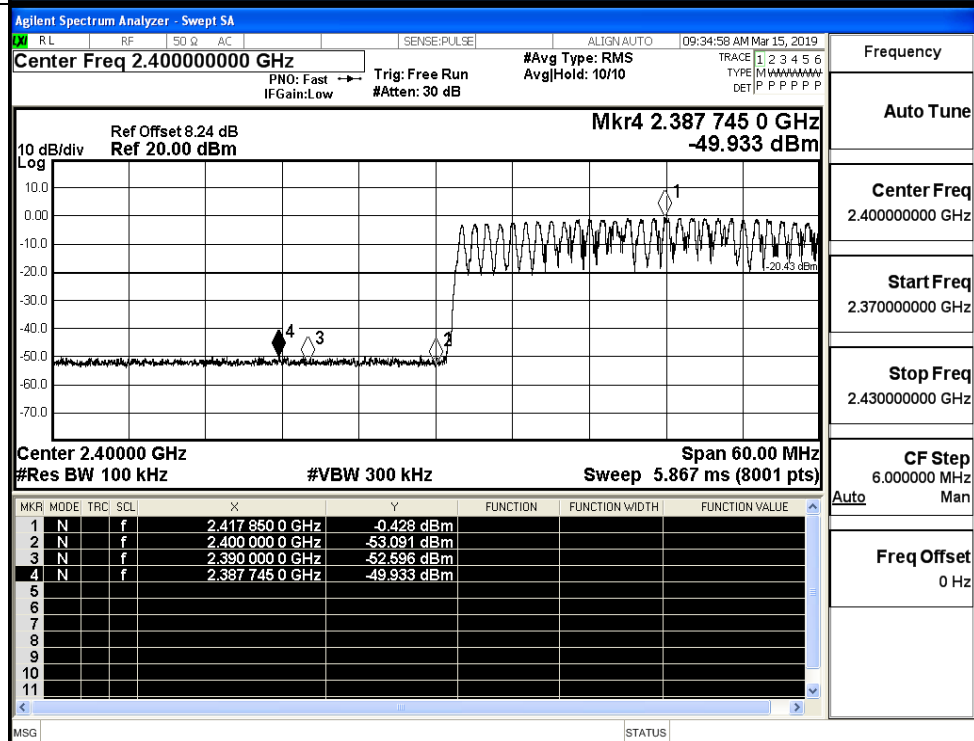
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-2.953	Off	-49.999	-22.95	PASS
			-0.428	On	-49.933	-20.43	PASS
	HCH	2480	-2.861	Off	-50.328	-22.86	PASS
			-0.451	On	-49.194	-20.45	PASS
$\pi/4$ DQPSK	LCH	2402	-4.417	Off	-50.221	-24.42	PASS
			-2.010	On	-49.355	-22.01	PASS
	HCH	2480	-3.770	Off	-49.855	-23.77	PASS
			-1.953	On	-47.660	-21.95	PASS
8DPSK	LCH	2402	-4.029	Off	-49.880	-24.03	PASS
			-1.908	On	-49.372	-21.91	PASS
	HCH	2480	-3.850	Off	-49.847	-23.85	PASS
			-1.663	On	-48.884	-21.66	PASS

Test Graphs

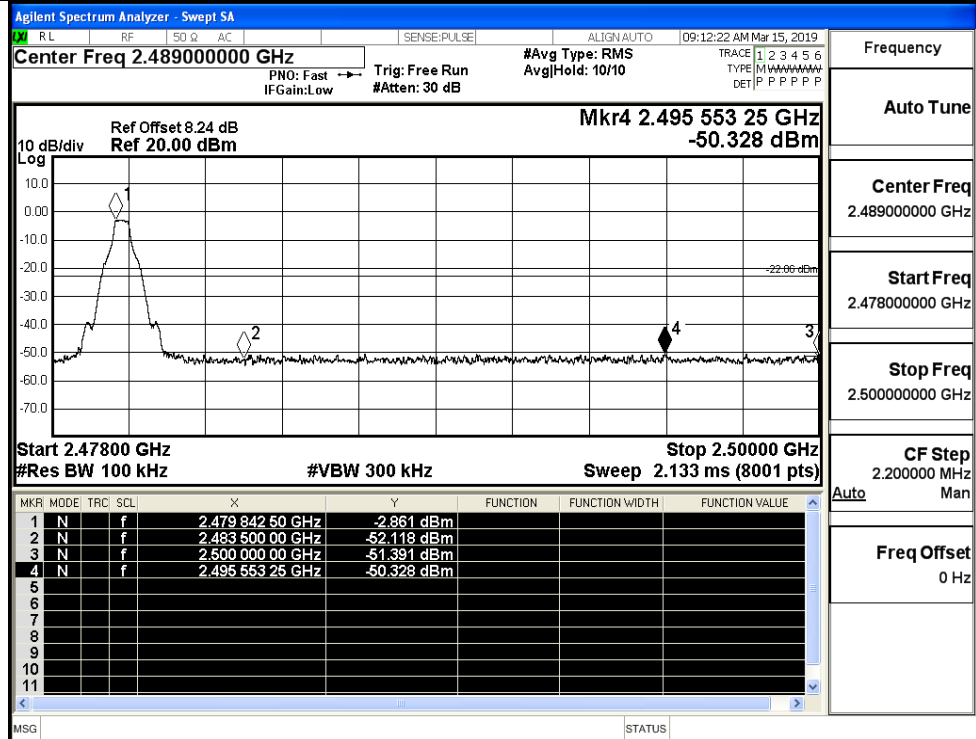
GFSK/LCH/No Hop



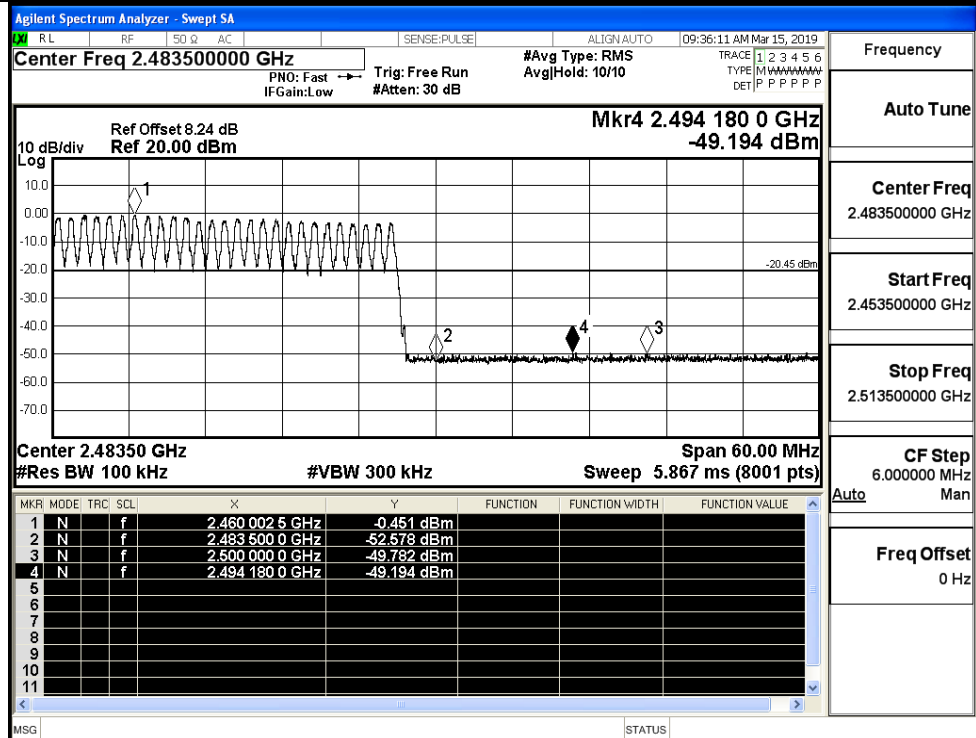
GFSK/LCH/Hop



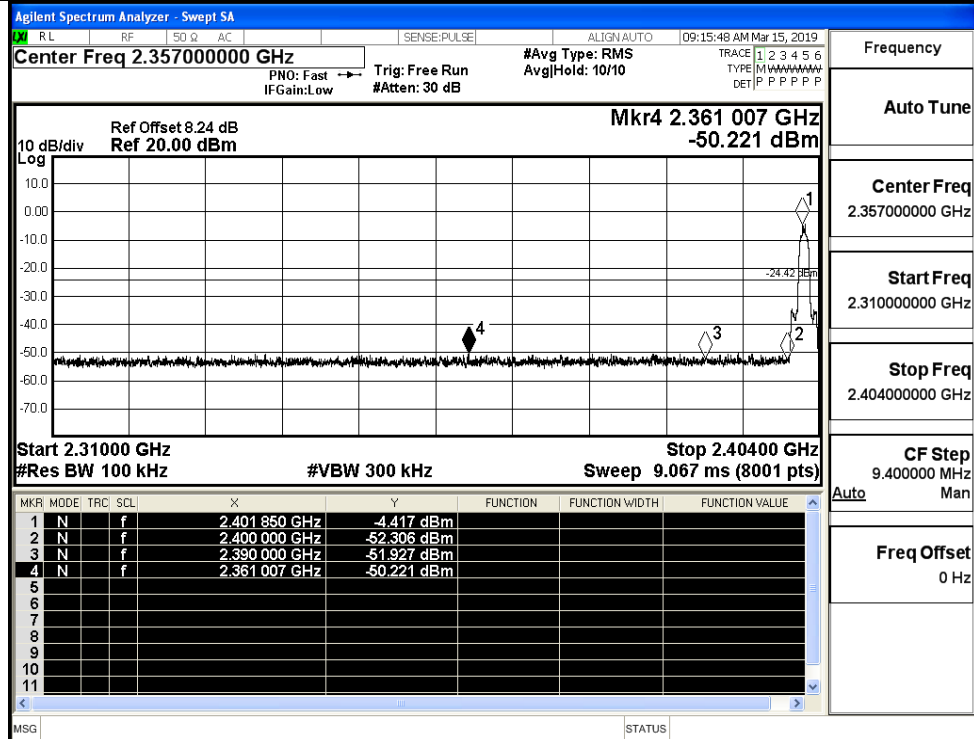
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

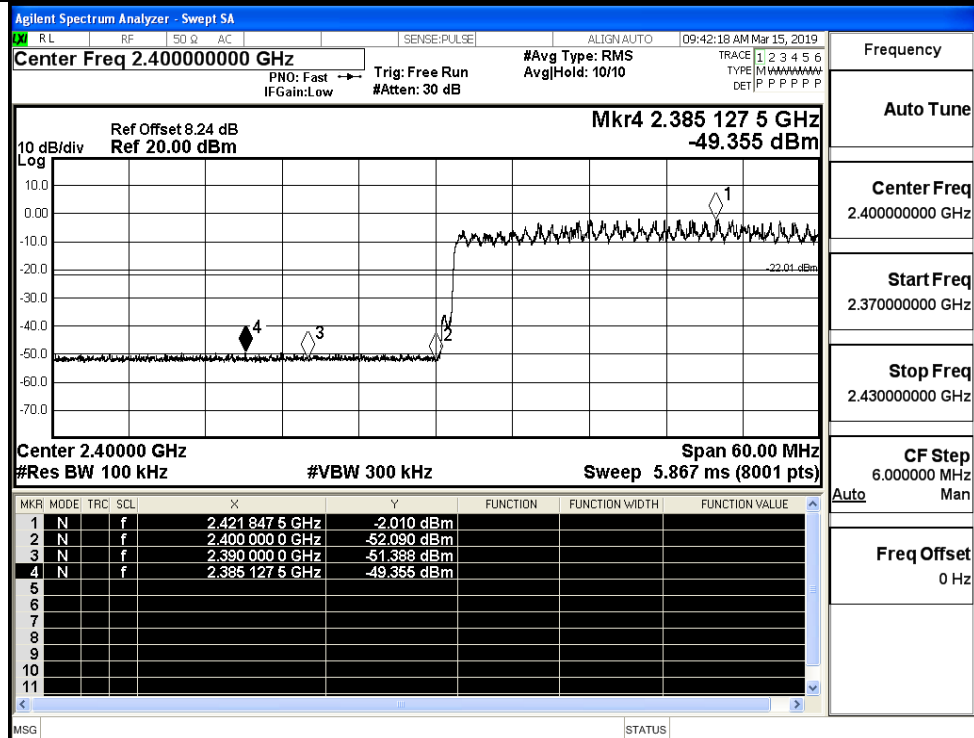
Start Freq
2.310000000 GHz

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

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 09:20:34 AM Mar 15, 2019

Center Freq 2.48900000 GHz

PNO: Fast IF Gain: Low Trg: Free Run Avg|Hold: 10/10 #Atten: 30 dB

TRACE 1 2 3 4 5 6
TYPE M W W W W W W W
DET P P P P P P

Mkr4 2.486 063 00 GHz
-49.855 dBm

Ref Offset 8.24 dB
Ref 20.00 dBm

10 dB/div
Log

Start 2.47800 GHz Stop 2.50000 GHz
#Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.479 848 00 GHz	-3.770 dBm			
2	N	f		2.483 500 00 GHz	-51.748 dBm			
3	N	f		2.500 000 00 GHz	-53.126 dBm			
4	N	f		2.486 063 00 GHz	-49.855 dBm			
5								
6								
7								
8								
9								
10								
11								

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

Agilent Spectrum Analyzer - Swept SA

M L R F	SQ Z AC	SENSE:PULSE	ALIGN AUTO	09:44:21 AM Mar 15, 2019
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Center Freq 2.483500000 GHz

PNO: Fast → Trg: Free Run #Atten: 30 dB

#Avg Type: RMS AvgHld: 10/10

TRACE 1 2 3 4 5 6 TYPE M W A V I D E T P P P P P P

Mkr4 2.487 040 0 GHz
-47.660 dBm

Ref Offset 8.24 dB Ref 20.00 dBm

Frequency	Power [dBm]
2.462 042 5 GHz	-1.953
2.483 500 0 GHz	-50.917
2.500 000 0 GHz	-51.501
2.487 040 0 GHz	-47.660

Center Freq 2.48350 GHz Span 60.00 MHz

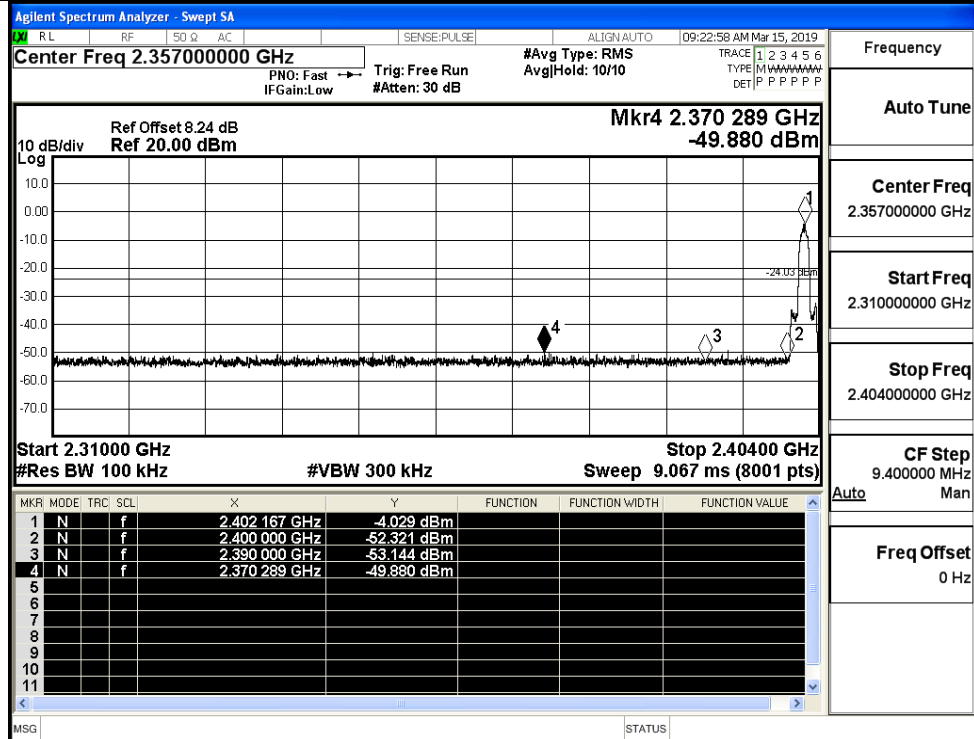
#Res BW 100 kHz Sweep 5.867 ms (8001 pts)

#VBW 300 kHz

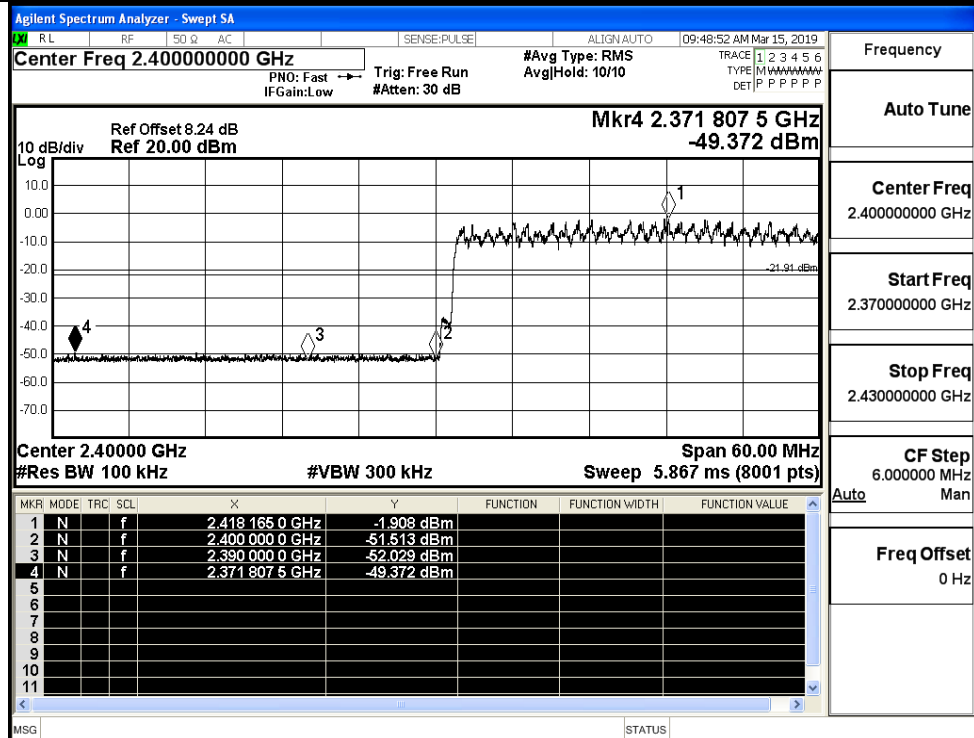
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 N f 2.462 042 5 GHz -1.953 dBm
2 N f 2.483 500 0 GHz -50.917 dBm
3 N f 2.500 000 0 GHz -51.501 dBm
4 N f 2.487 040 0 GHz -47.660 dBm
5
6
7
8
9
10
11

CF Step 6.000000 MHz Auto Man
Freq Offset 0 Hz

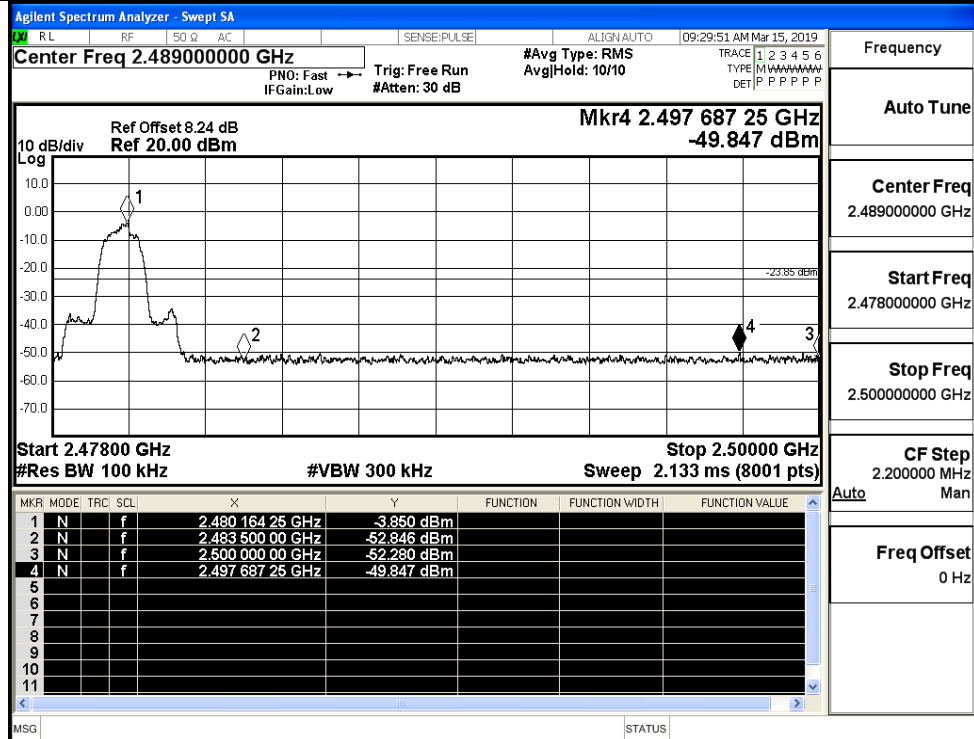
8DPSK/LCH/No Hop



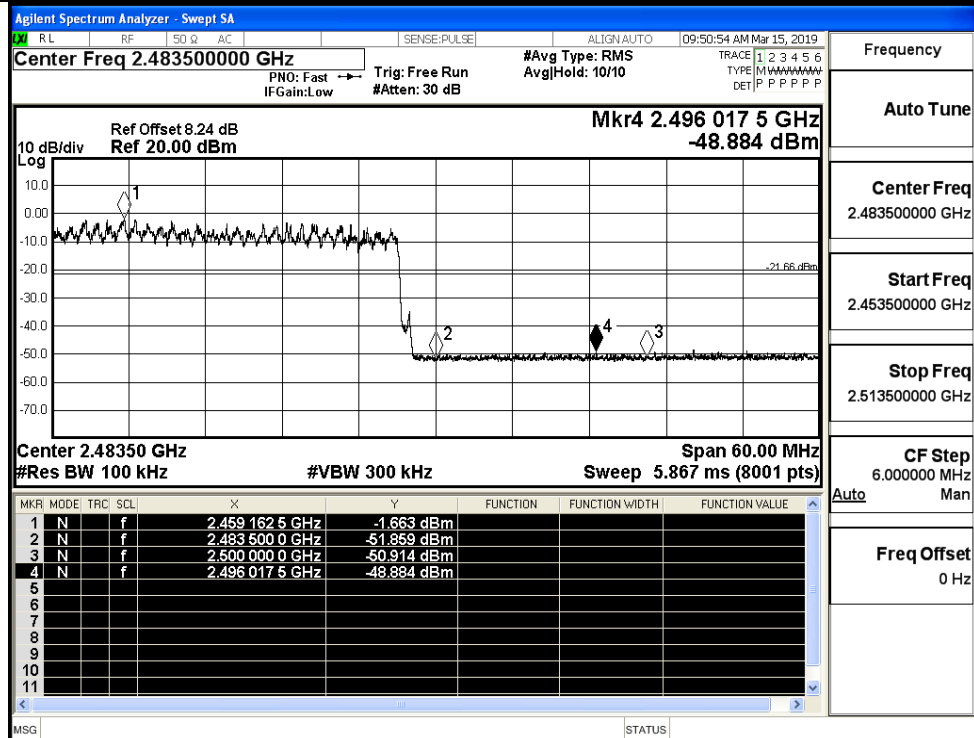
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



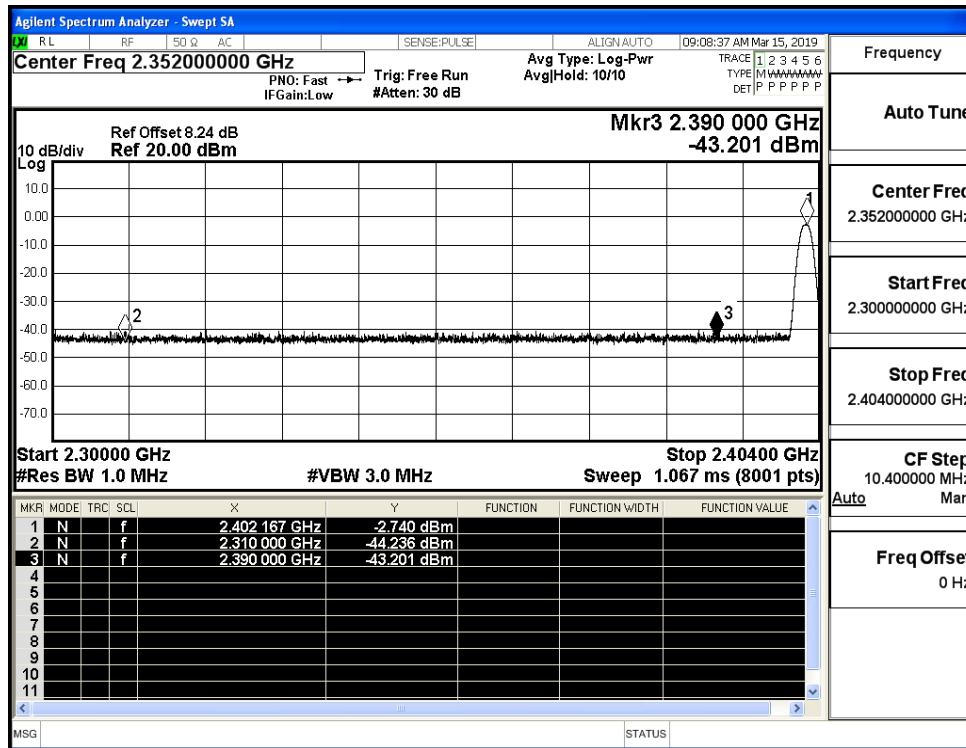
8DPSK/HCH/Hop



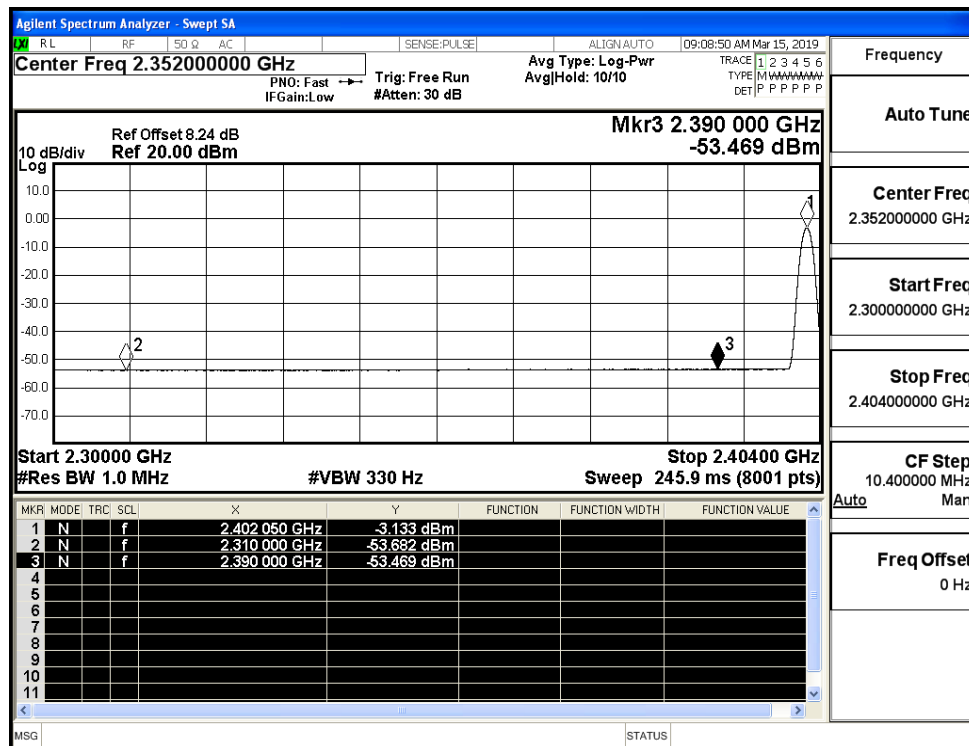
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.24	2.0	0	51.02	PEAK	74	PASS
	Off	2310.0	-53.68	2.0	0	41.58	AV	54	PASS
	Off	2390.0	-43.20	2.0	0	52.06	PEAK	74	PASS
	Off	2390.0	-53.47	2.0	0	41.79	AV	54	PASS
	Off	2483.5	-41.89	2.0	0	53.37	PEAK	74	PASS
	Off	2483.5	-53.21	2.0	0	42.05	AV	54	PASS
	Off	2500.0	-41.86	2.0	0	53.40	PEAK	74	PASS
	Off	2500.0	-53.08	2.0	0	42.18	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.58	2.0	0	51.67	PEAK	74	PASS
	Off	2310.0	-53.68	2.0	0	41.58	AV	54	PASS
	Off	2390.0	-43.00	2.0	0	52.26	PEAK	74	PASS
	Off	2390.0	-53.46	2.0	0	41.80	AV	54	PASS
	Off	2483.5	-43.28	2.0	0	51.98	PEAK	74	PASS
	Off	2483.5	-53.18	2.0	0	42.08	AV	54	PASS
	Off	2500.0	-42.89	2.0	0	52.37	PEAK	74	PASS
	Off	2500.0	-53.08	2.0	0	42.18	AV	54	PASS
8DPSK	Off	2310.0	-43.20	2.0	0	52.06	PEAK	74	PASS
	Off	2310.0	-53.69	2.0	0	41.57	AV	54	PASS
	Off	2390.0	-41.36	2.0	0	53.90	PEAK	74	PASS
	Off	2390.0	-53.41	2.0	0	41.84	AV	54	PASS
	Off	2483.5	-42.63	2.0	0	52.63	PEAK	74	PASS
	Off	2483.5	-53.09	2.0	0	42.17	AV	54	PASS
	Off	2500.0	-43.56	2.0	0	51.70	PEAK	74	PASS
	Off	2500.0	-52.99	2.0	0	42.27	AV	54	PASS

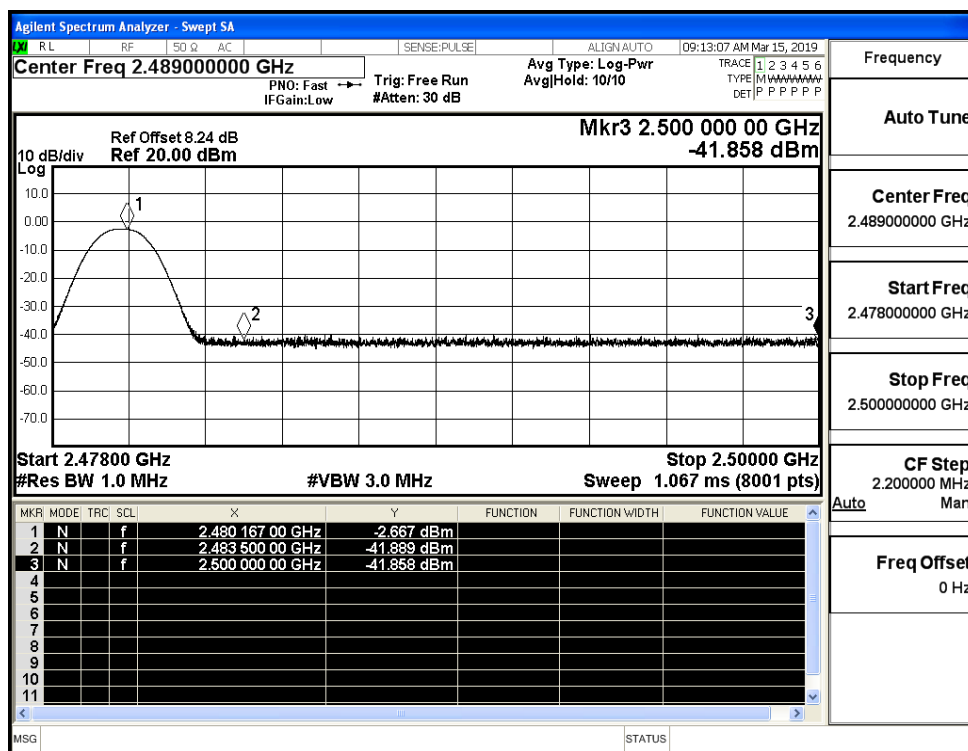
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



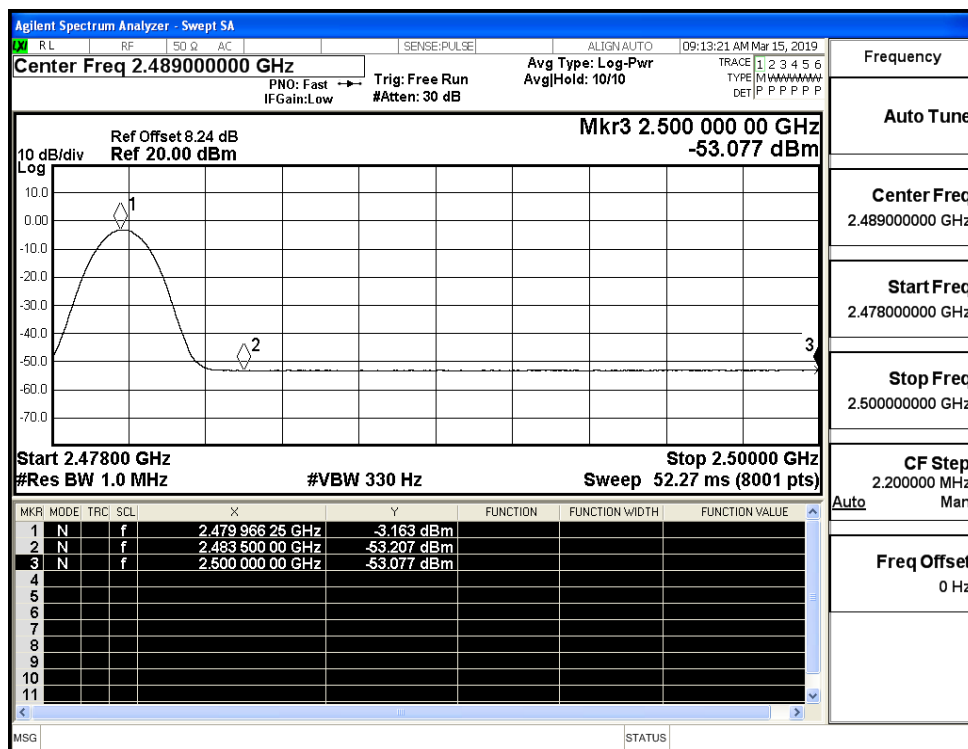
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

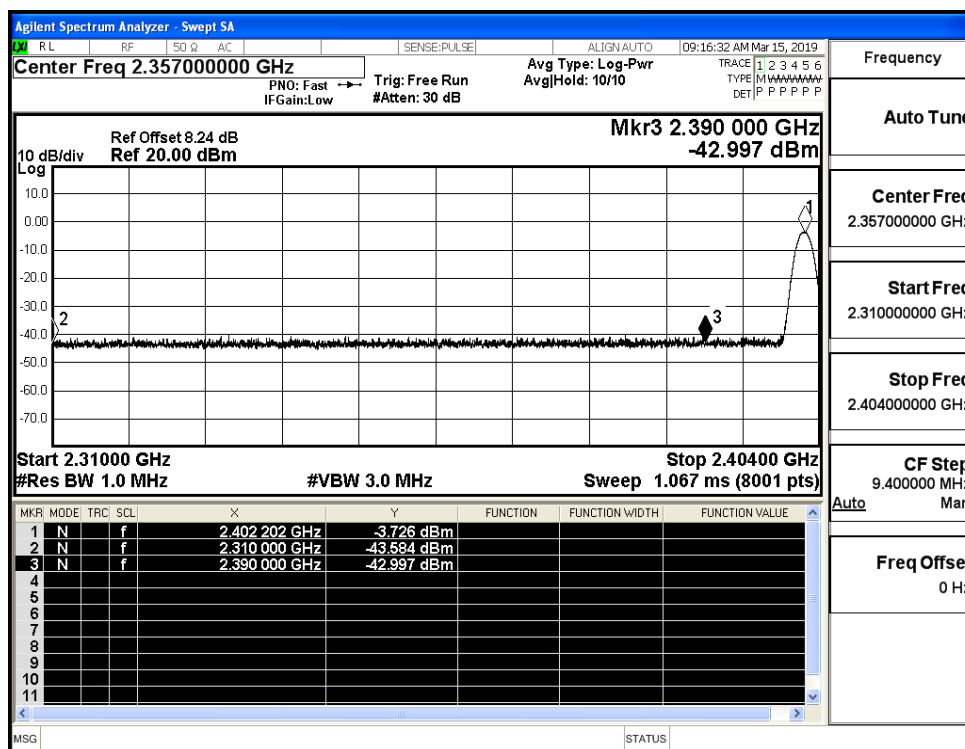
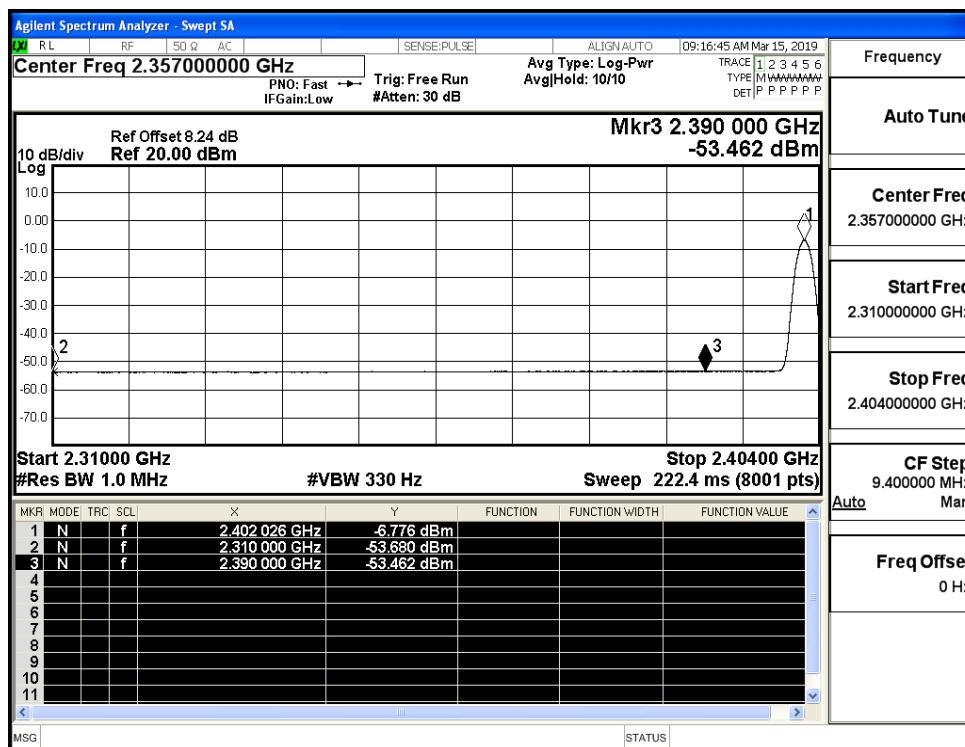


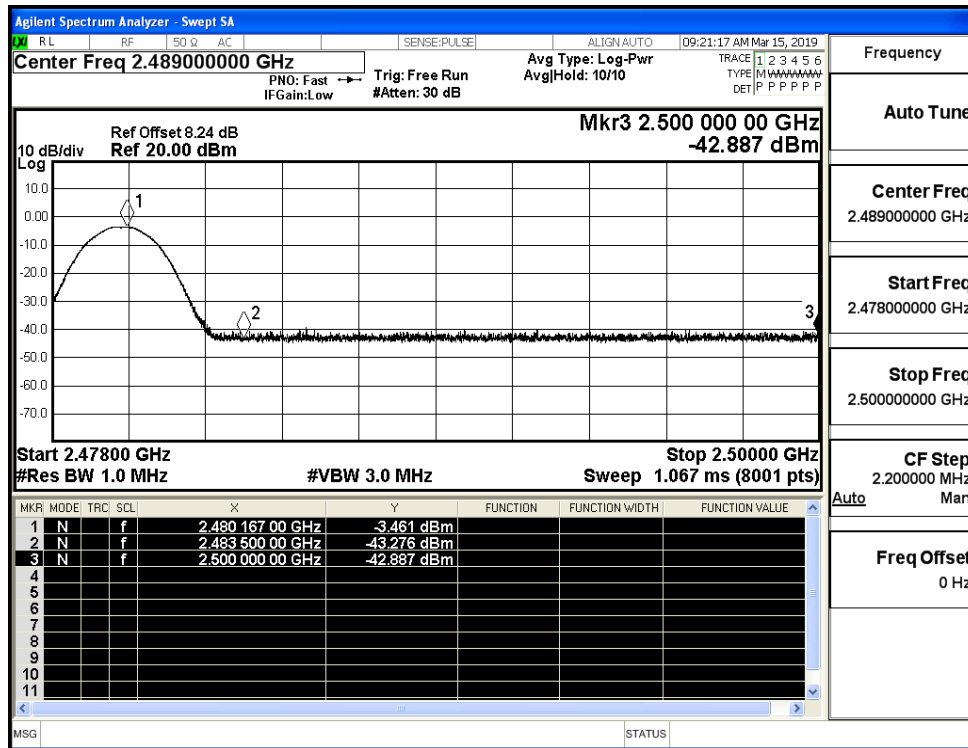
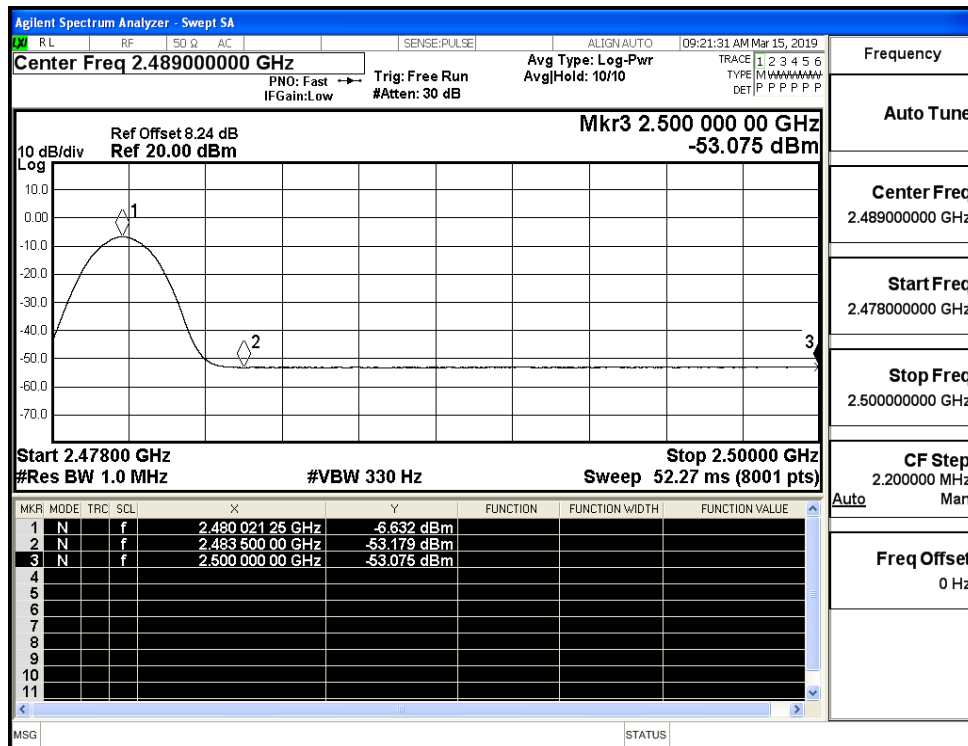
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



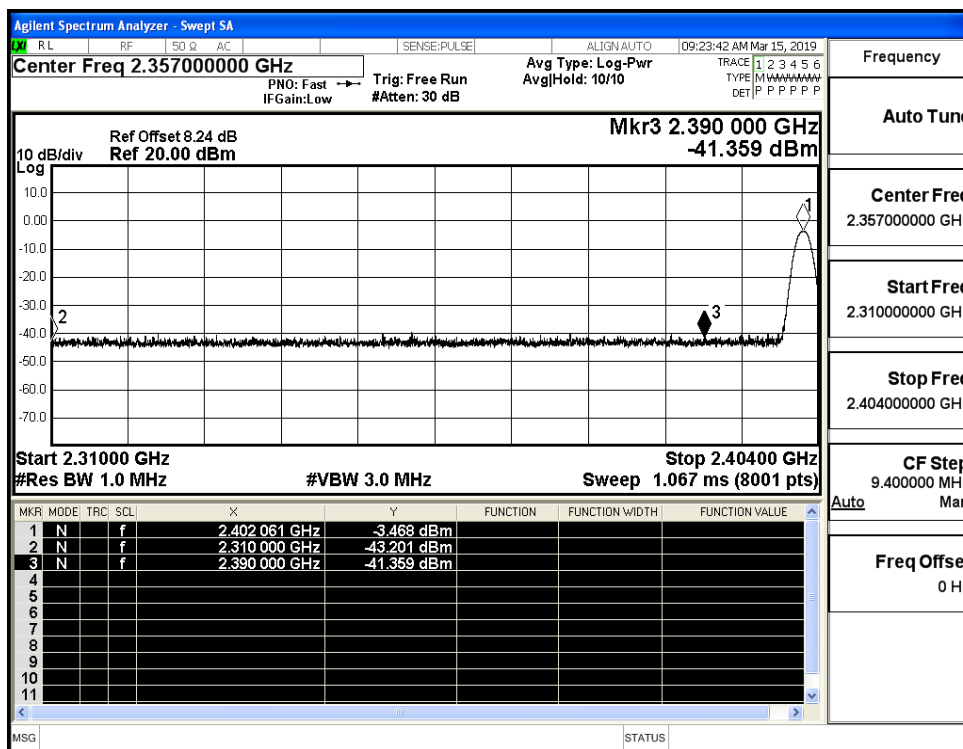
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



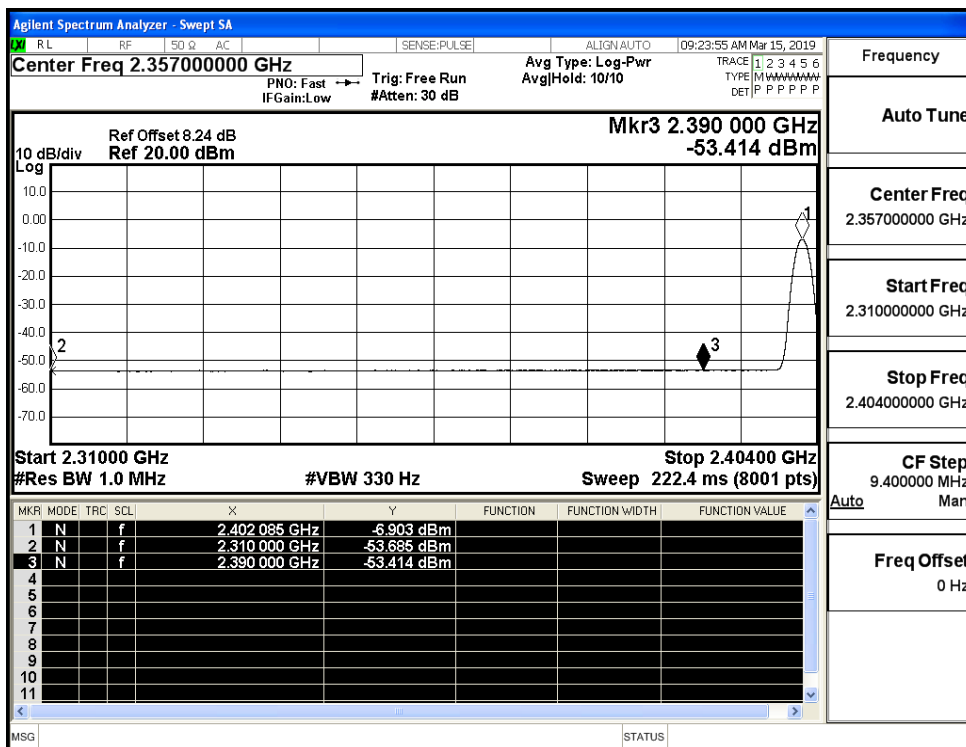
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

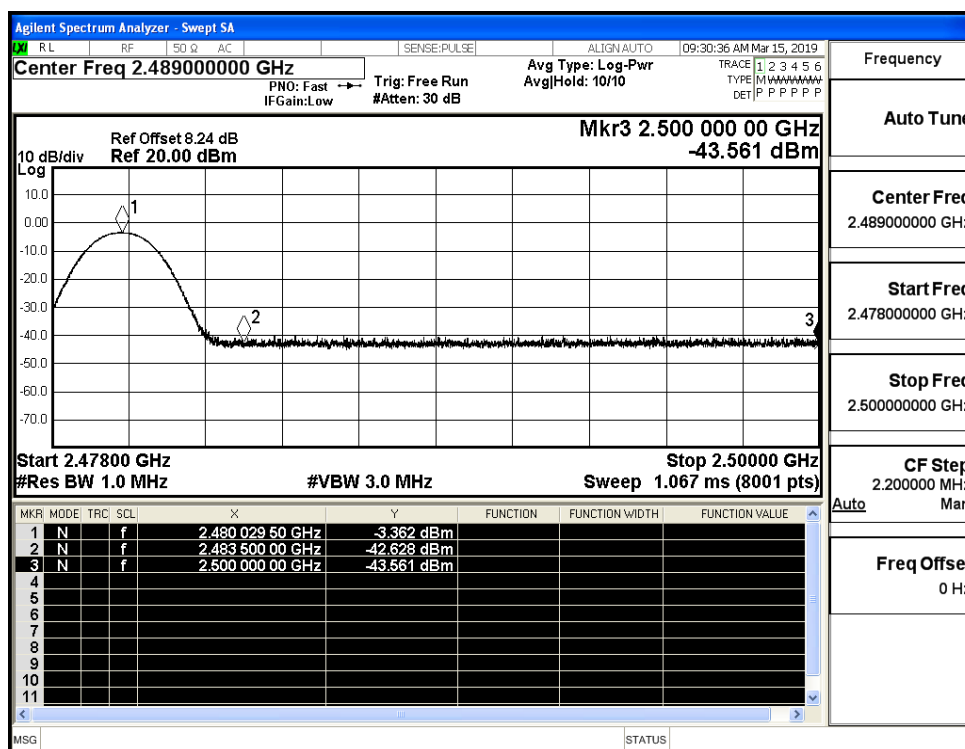
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

