

Appendix A

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

Product Name: TWS Slider TCH AX-38

Trade Mark: N/A

Test Model: HC-AU-BE-110

Environmental Conditions

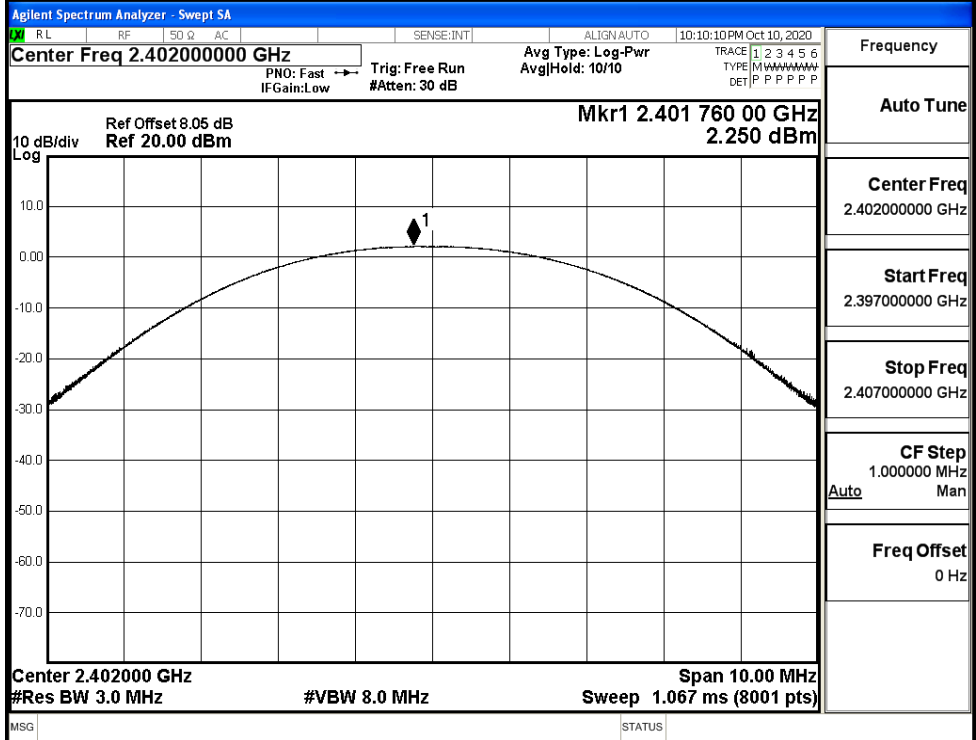
Temperature:	23.9° C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jam Zheng
Supervised by:	Li Huan

A.1 Maxmum Conducted Peak Output Power

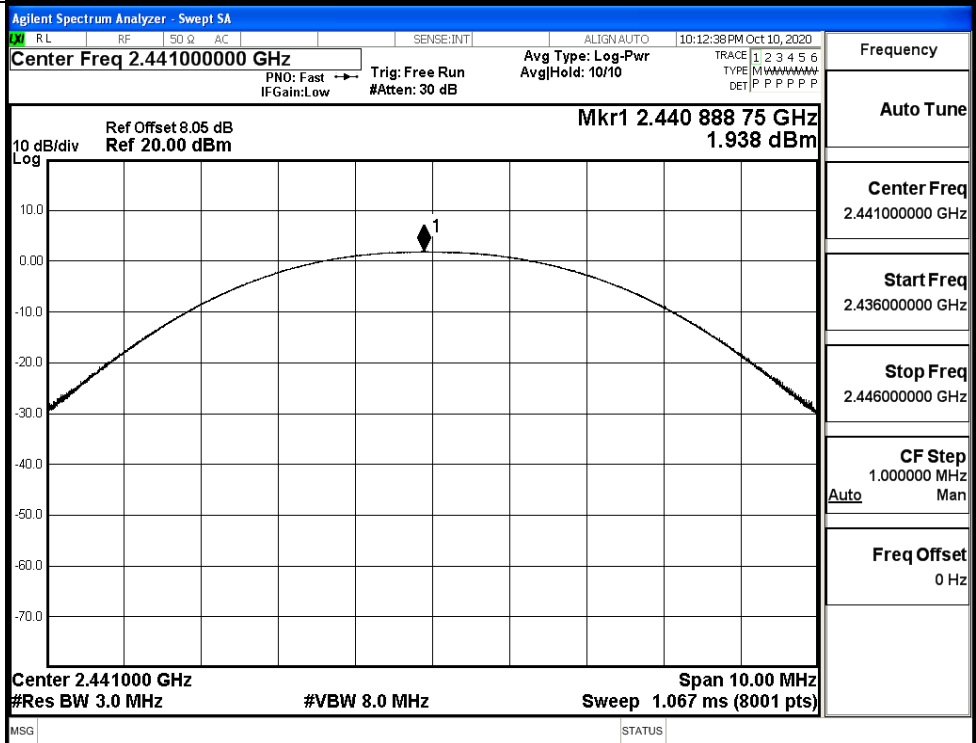
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.250	21	PASS
	MCH	1.938	21	PASS
	HCH	0.307	21	PASS
$\pi/4$ DQPSK	LCH	4.973	21	PASS
	MCH	4.353	21	PASS
	HCH	3.078	21	PASS
8DPSK	LCH	5.759	21	PASS
	MCH	5.479	21	PASS
	HCH	4.283	21	PASS

Test Graphs

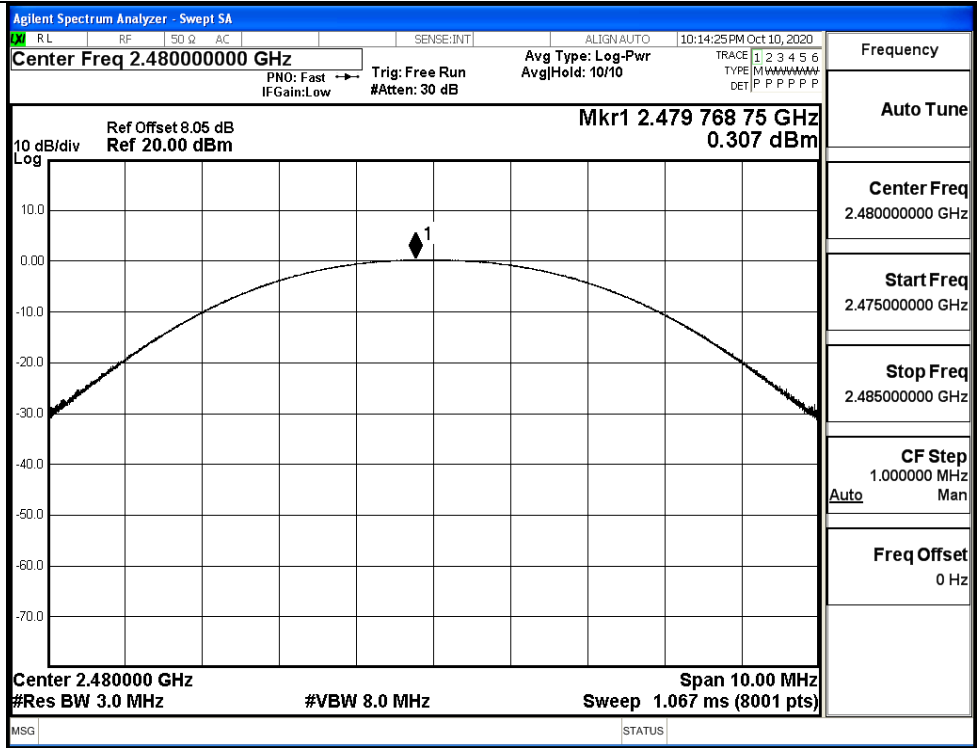
GFSK/LCH



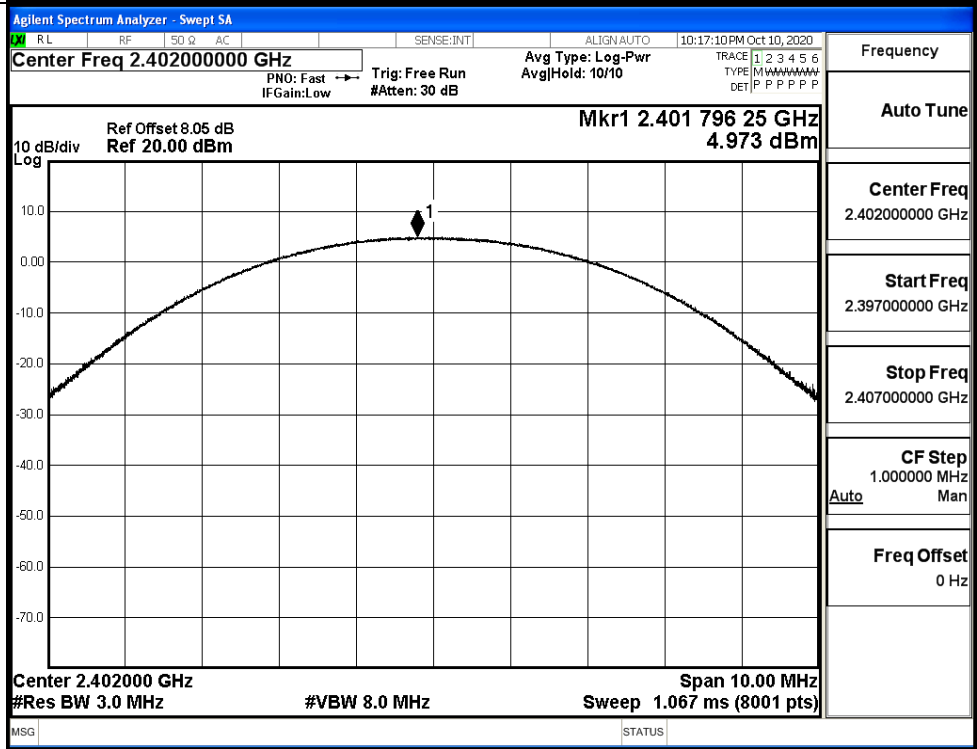
GFSK/MCH

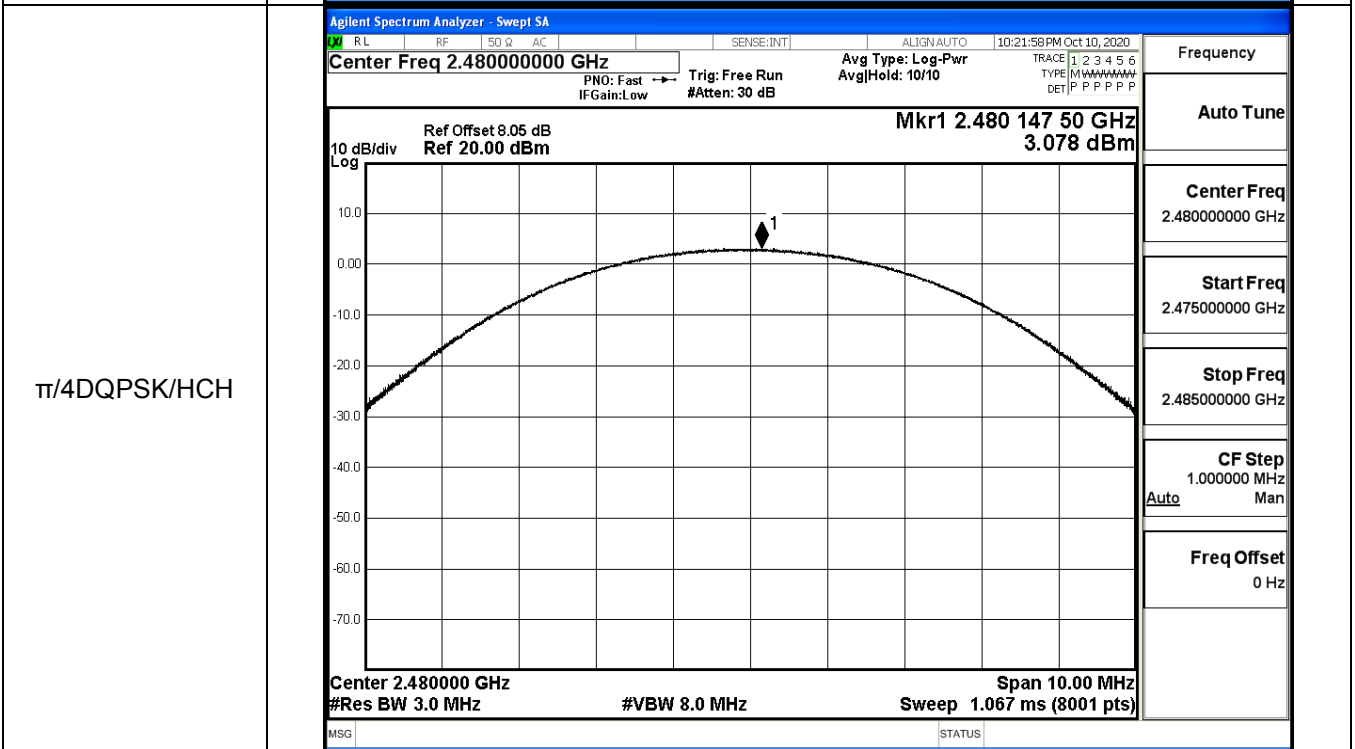
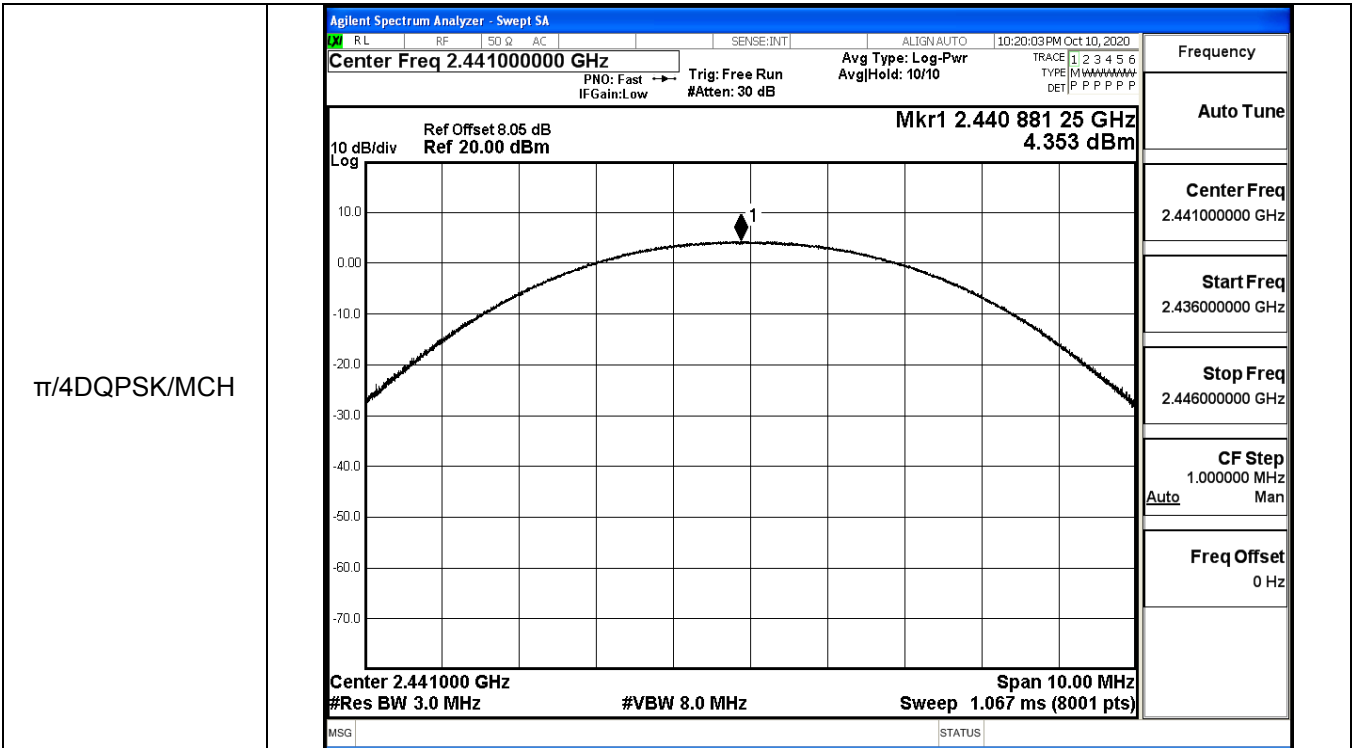


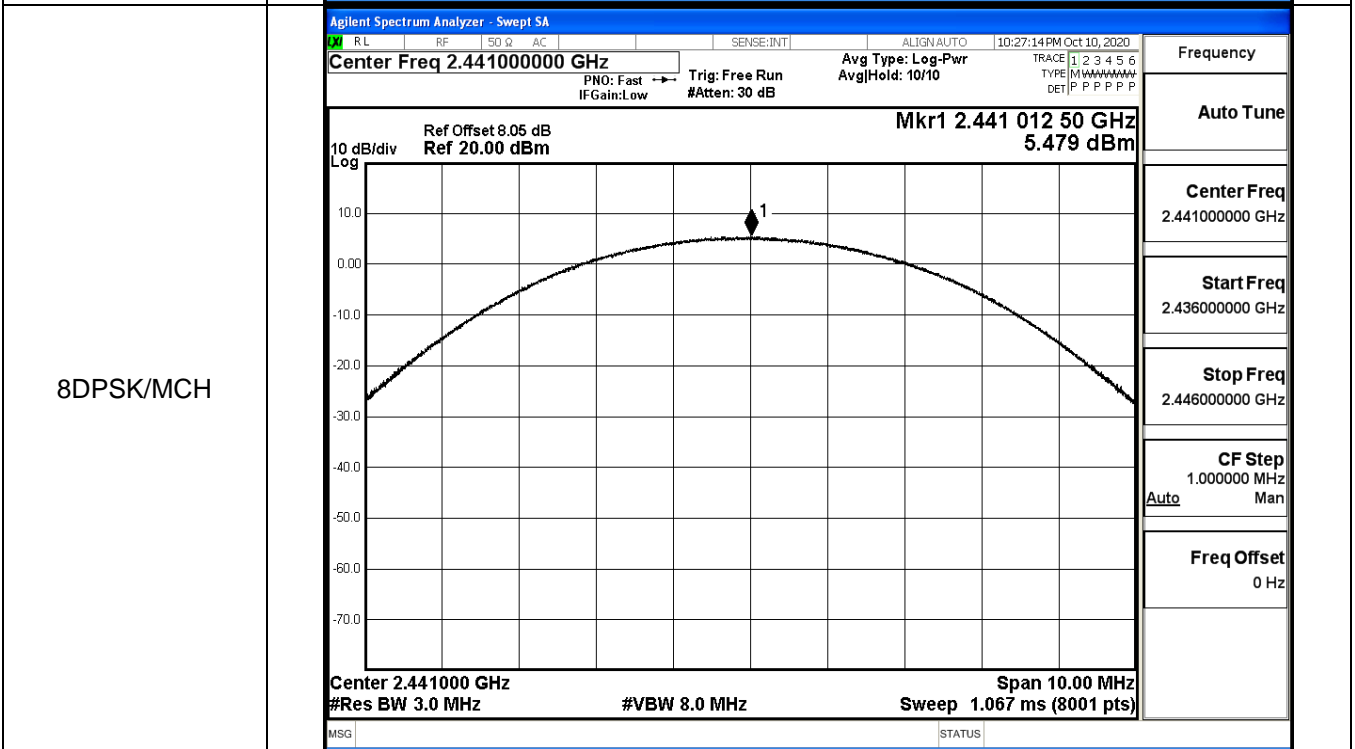
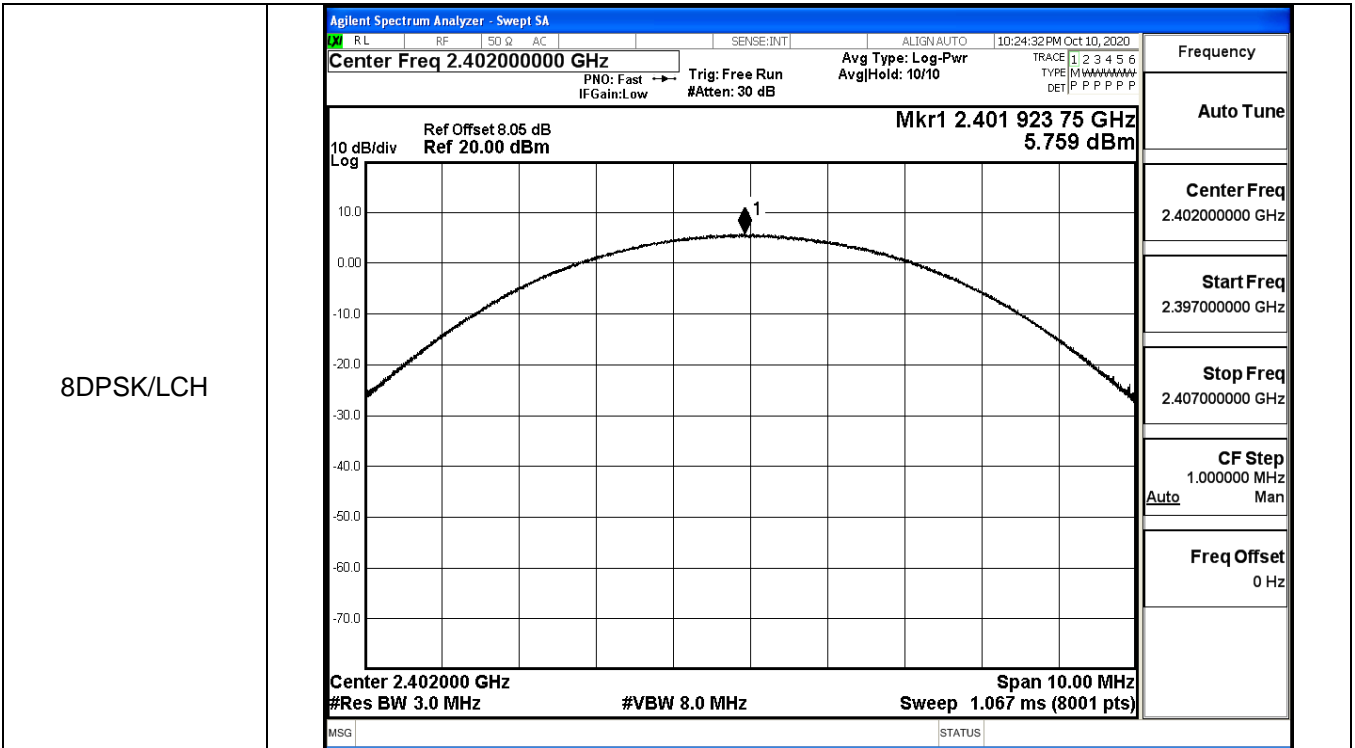
GFSK/HCH



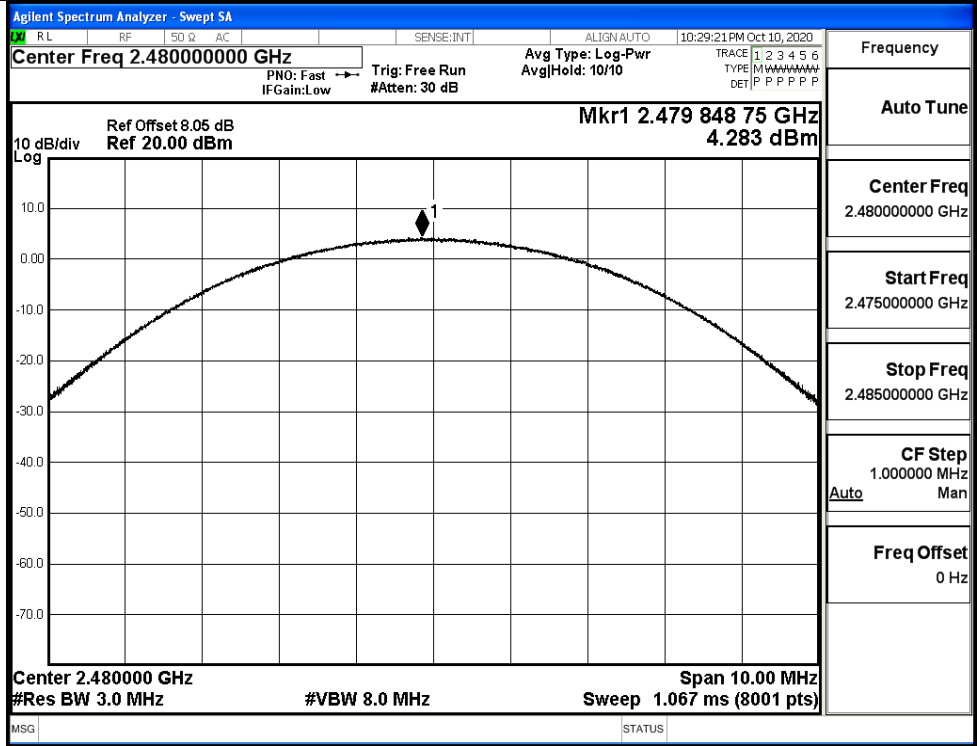
$\pi/4$ DQPSK/LCH





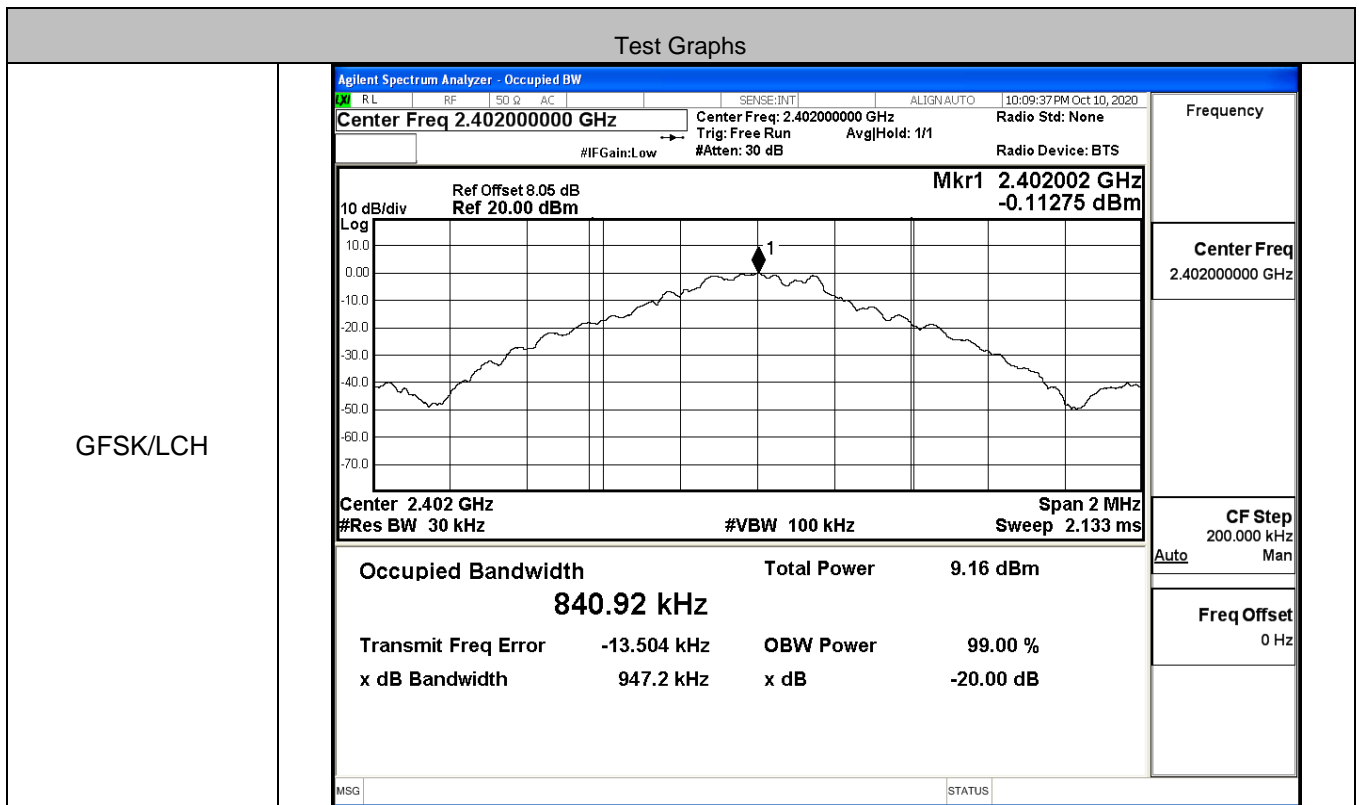


8DPSK/HCH

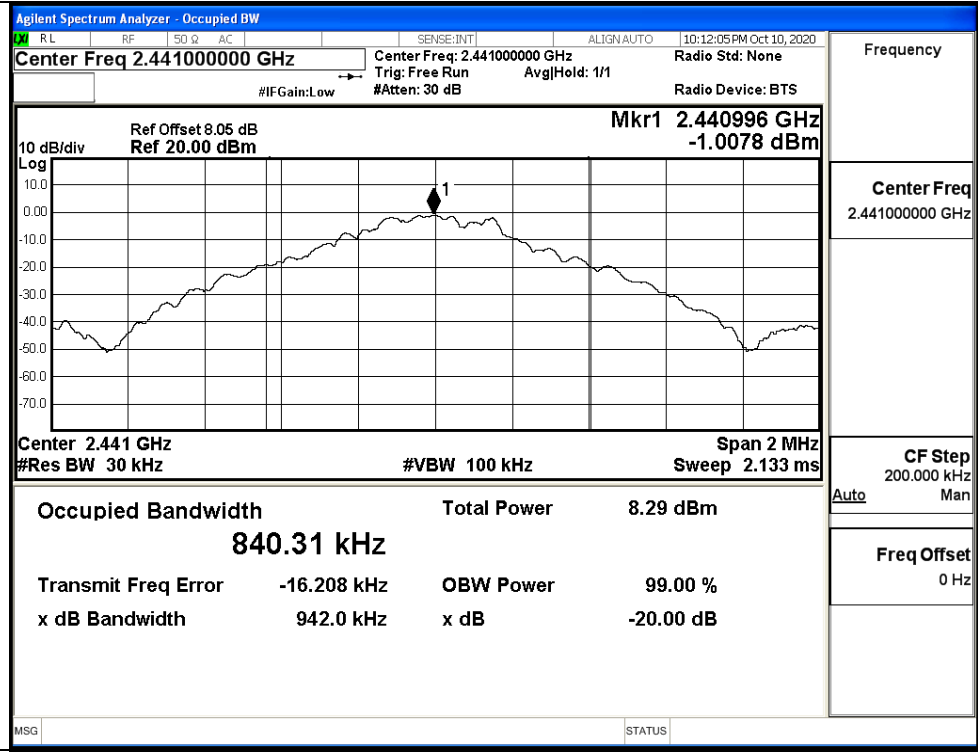


A.2 20dB Bandwidth

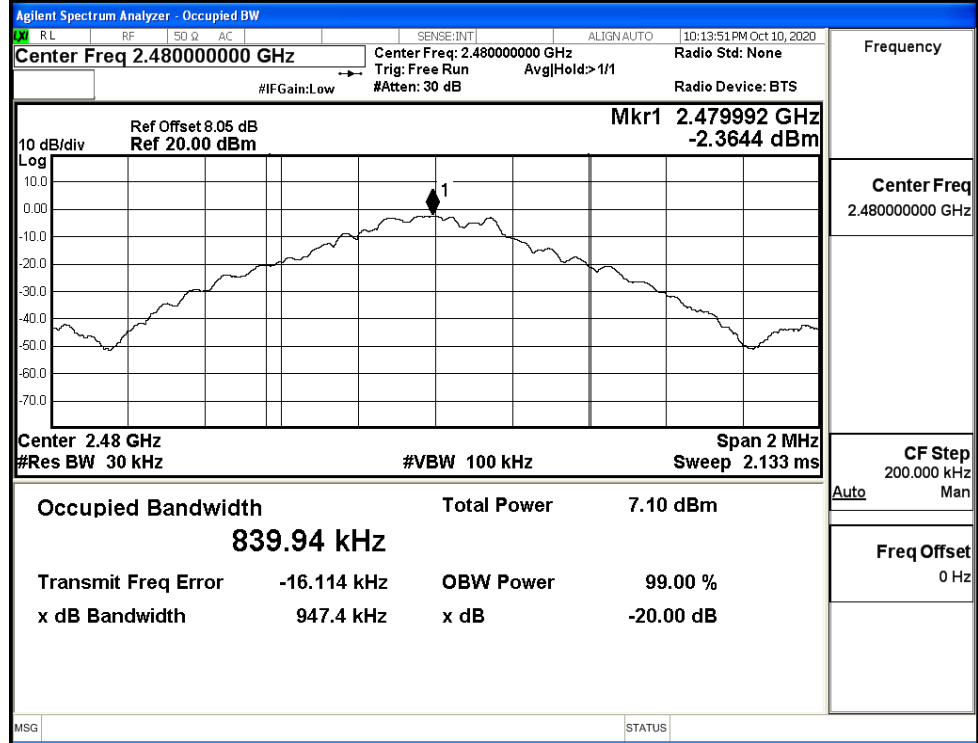
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9472	Not Specified	PASS
	MCH	0.9420	Not Specified	PASS
	HCH	0.9474	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.316	Not Specified	PASS
	MCH	1.319	Not Specified	PASS
	HCH	1.316	Not Specified	PASS
8DPSK	LCH	1.310	Not Specified	PASS
	MCH	1.313	Not Specified	PASS
	HCH	1.311	Not Specified	PASS



GFSK/MCH

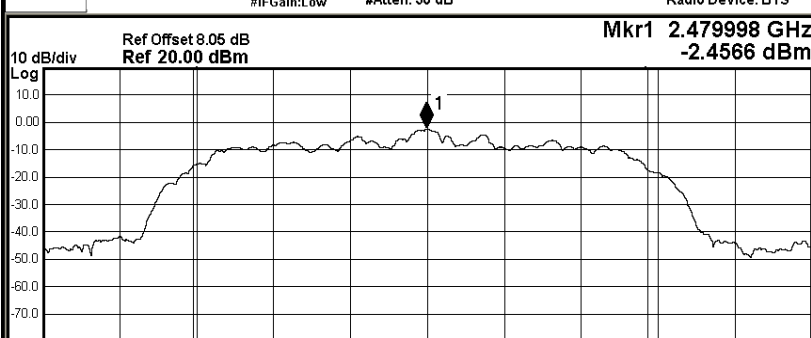


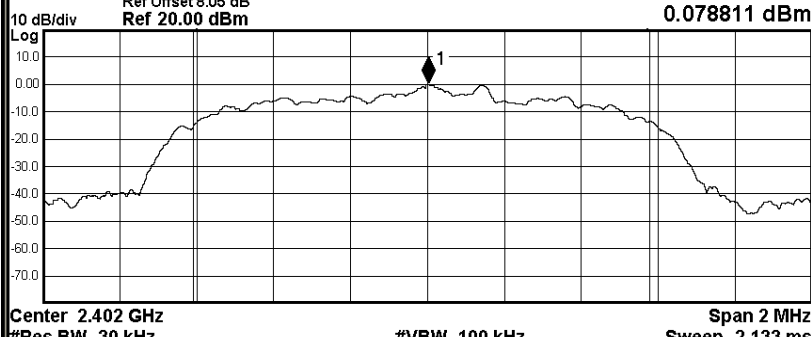
GFSK/HCH

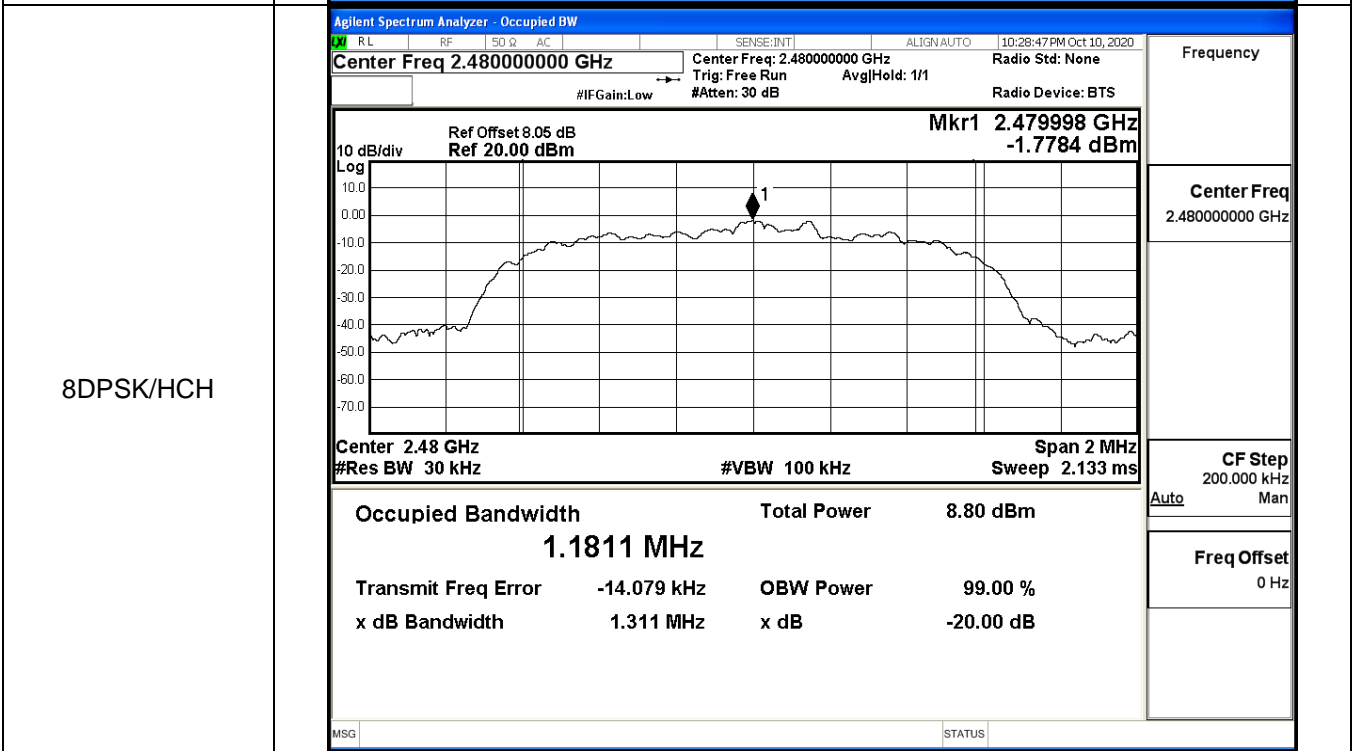
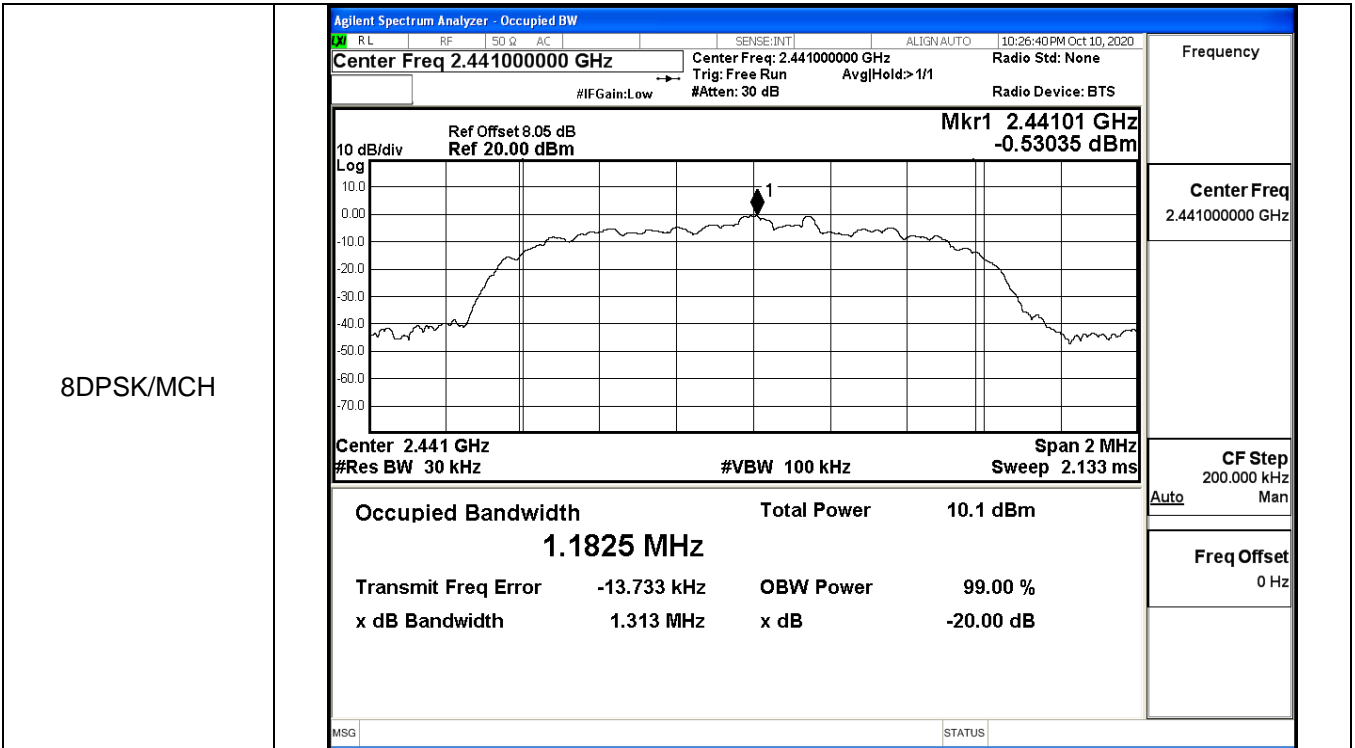


$\pi/4$ DQPSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.40200000 GHz #IFGain:Low #Atten: 30 dB		SENSE:INT ALIGN AUTO 10:16:37 PM Oct 10, 2020 Radio Std: None Radio Device: BTS	Frequency 2.40200000 GHz	
	Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.401998 GHz -0.24472 dBm				Center Freq 2.40200000 GHz
	Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms		Occupied Bandwidth 1.1756 MHz Total Power 9.98 dBm		CF Step 200.000 kHz Auto Man
	Transmit Freq Error -17.716 kHz x dB Bandwidth 1.316 MHz		OBW Power 99.00 % x dB -20.00 dB		Freq Offset 0 Hz

$\pi/4$ DQPSK/MCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.44100000 GHz #IFGain:Low #Atten: 30 dB		SENSE:INT ALIGN AUTO 10:19:29 PM Oct 10, 2020 Radio Std: None Radio Device: BTS	Frequency 2.44100000 GHz	
	Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.440998 GHz -1.1564 dBm				Center Freq 2.44100000 GHz
	Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms		Occupied Bandwidth 1.1821 MHz Total Power 9.22 dBm		CF Step 200.000 kHz Auto Man
	Transmit Freq Error -15.436 kHz x dB Bandwidth 1.319 MHz		OBW Power 99.00 % x dB -20.00 dB		Freq Offset 0 Hz

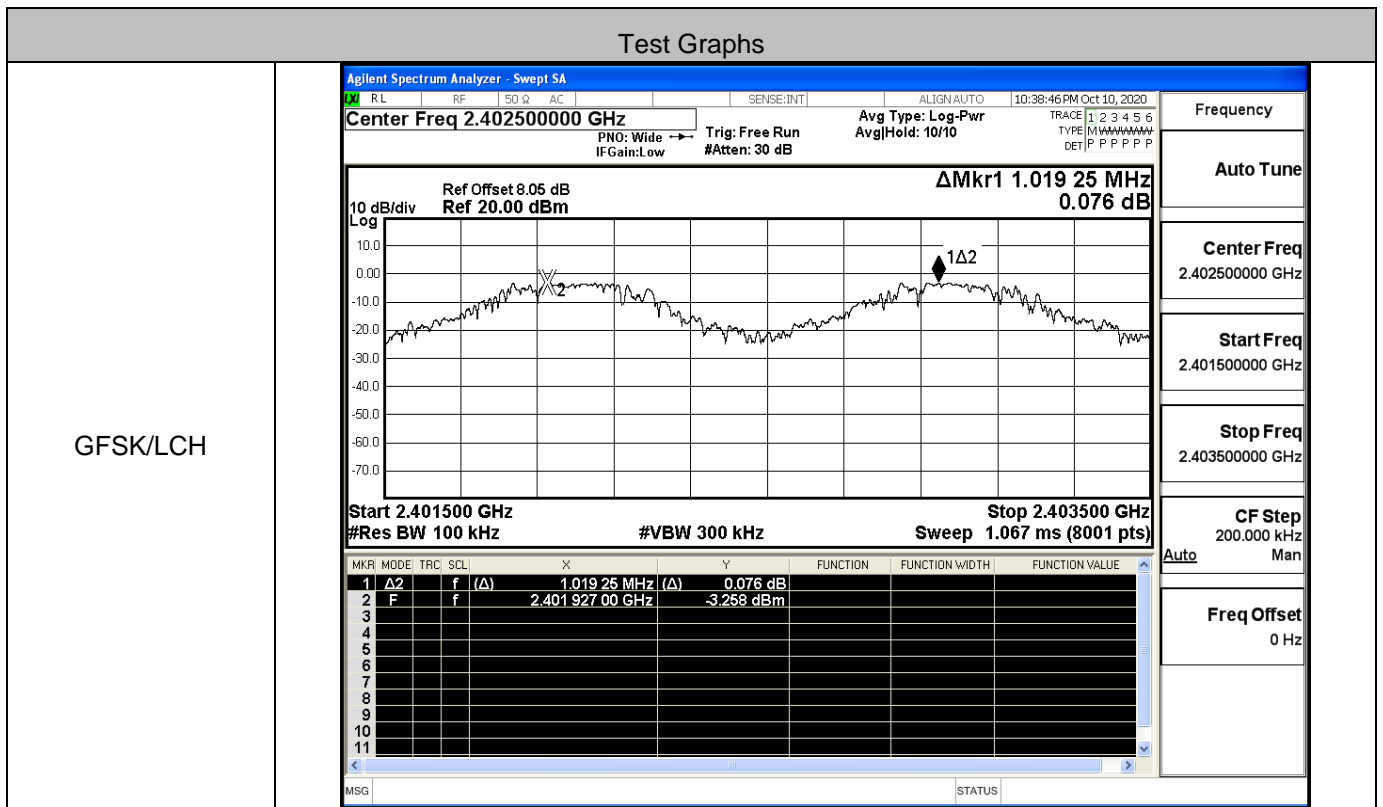
$\pi/4$ DQPSK/HCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.48000000 GHz #IFGain: Low #Atten: 30 dB Mkr1 2.479998 GHz -2.4566 dBm 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm  Center 2.48 GHz Span 2 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.133 ms Occupied Bandwidth 1.1787 MHz Total Power 7.82 dBm Transmit Freq Error -16.181 kHz OBW Power 99.00 % x dB Bandwidth 1.316 MHz x dB -20.00 dB	Frequency 2.48000000 GHz CF Step 200.000 kHz Freq Offset 0 Hz
	Auto Man	
	MSG STATUS	
	Frequency Center Freq 2.48000000 GHz CF Step 200.000 kHz Freq Offset 0 Hz	

8DPSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.40200000 GHz #IFGain: Low #Atten: 30 dB Mkr1 2.402002 GHz 0.078811 dBm 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm  Center 2.402 GHz Span 2 MHz #Res BW 30 kHz #VBW 100 kHz Sweep 2.133 ms Occupied Bandwidth 1.1830 MHz Total Power 10.4 dBm Transmit Freq Error -13.776 kHz OBW Power 99.00 % x dB Bandwidth 1.310 MHz x dB -20.00 dB	Frequency 2.40200000 GHz CF Step 200.000 kHz Freq Offset 0 Hz
	Auto Man	
	MSG STATUS	
	Frequency Center Freq 2.40200000 GHz CF Step 200.000 kHz Freq Offset 0 Hz	

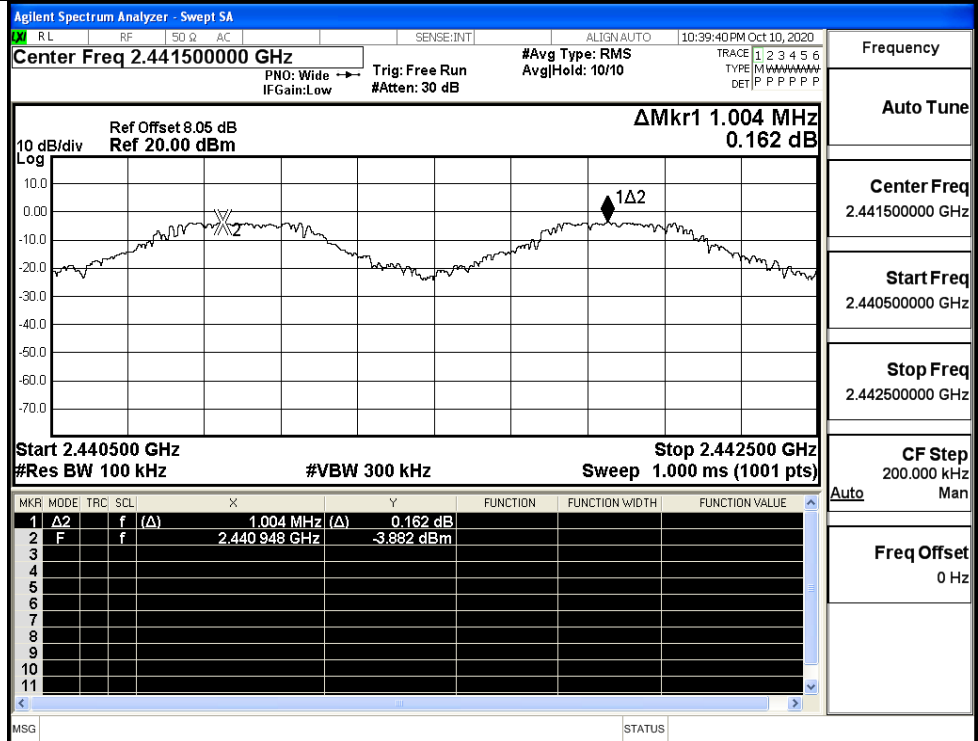


A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.019	0.631	PASS
	MCH	1.004	0.628	PASS
	HCH	0.966	0.632	PASS
π/4DQPSK	LCH	0.912	0.877	PASS
	MCH	1.276	0.879	PASS
	HCH	0.986	0.877	PASS
8DPSK	LCH	1.040	0.873	PASS
	MCH	1.172	0.875	PASS
	HCH	1.010	0.874	PASS

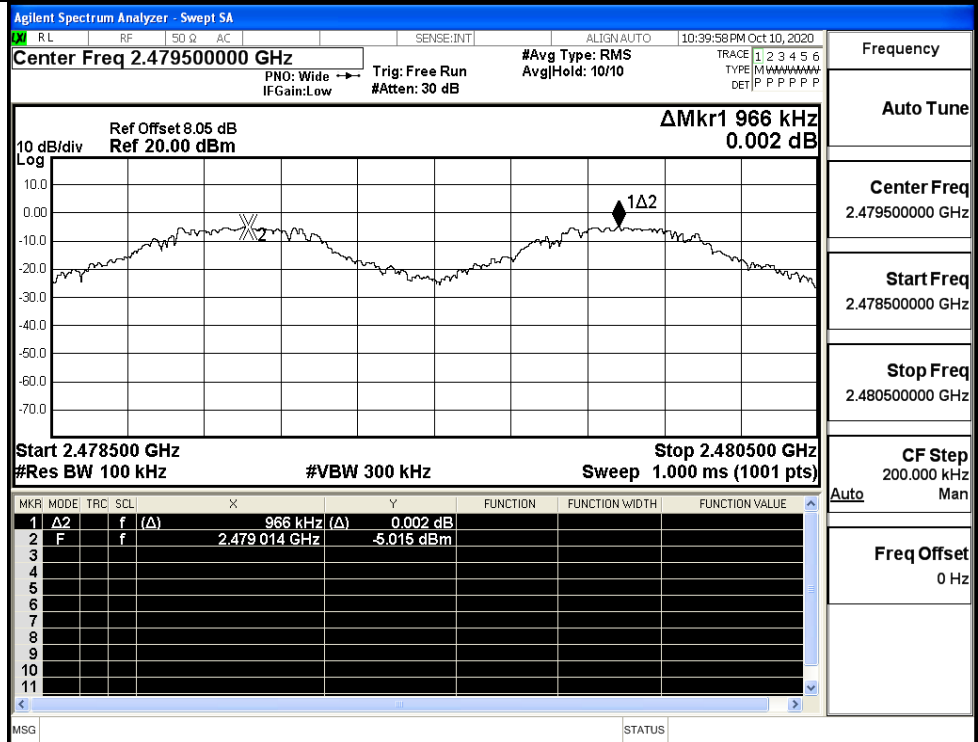


GFSK/MCH



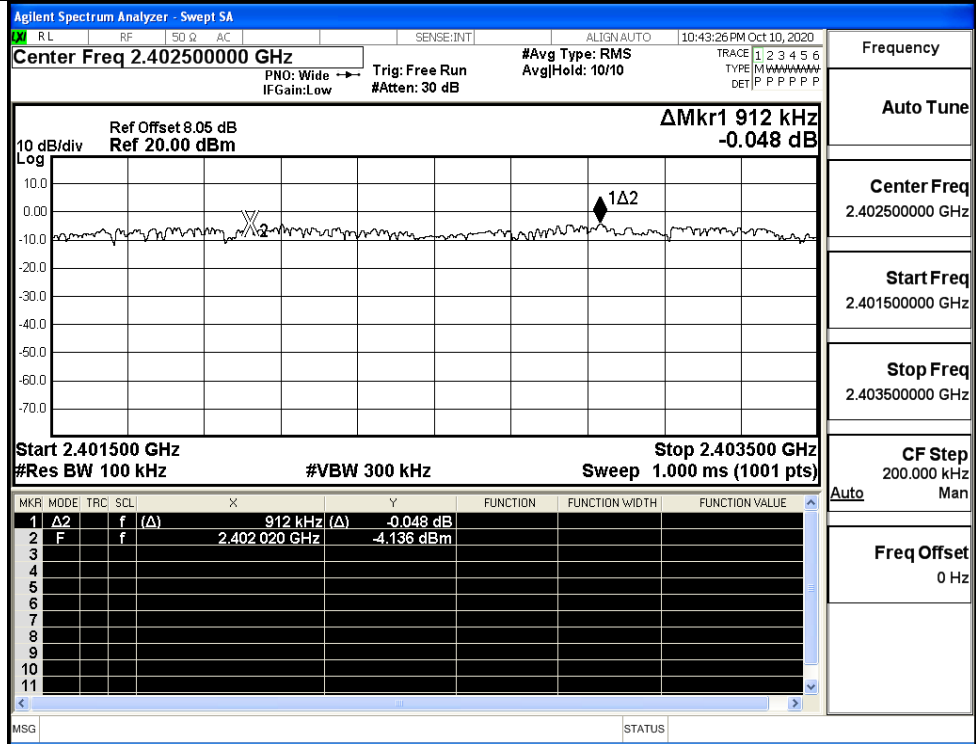
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

GFSK/HCH

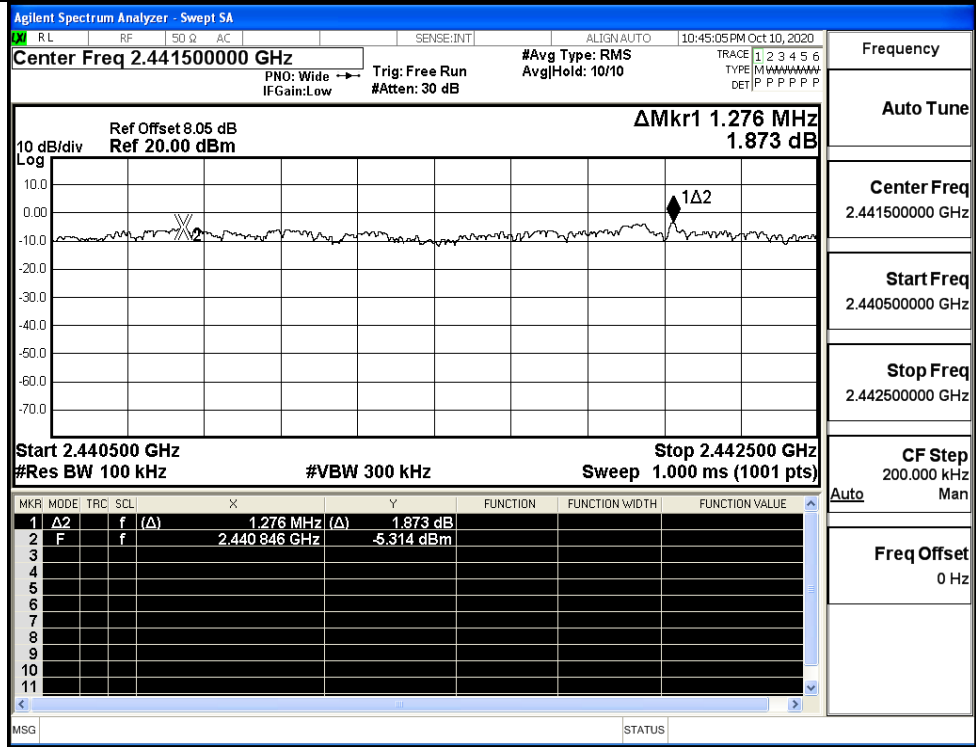


Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

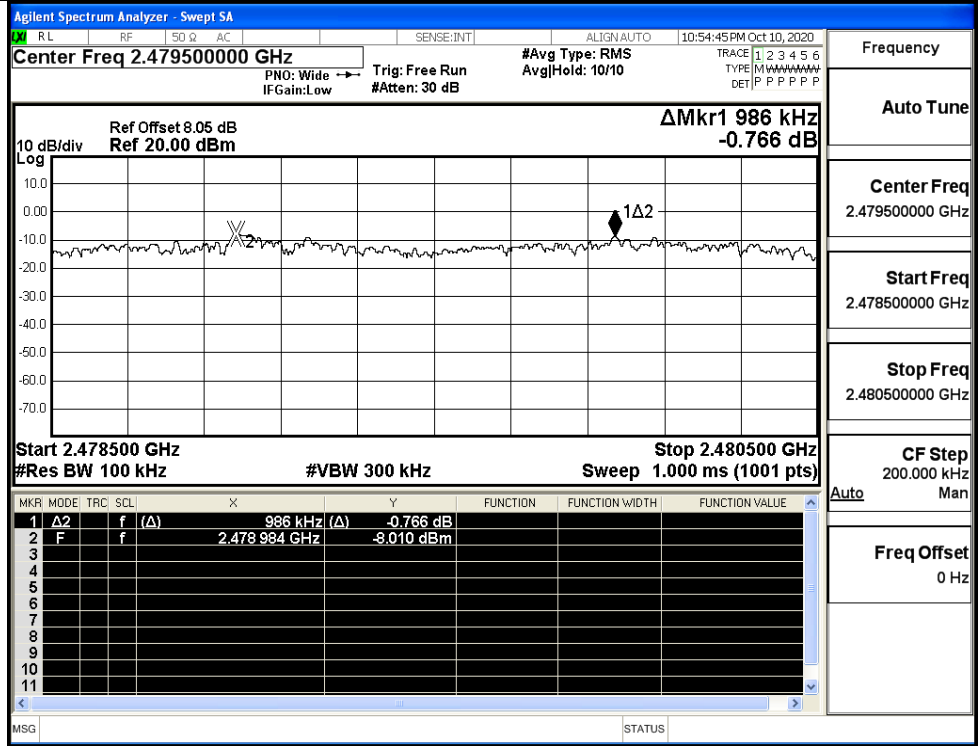
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH

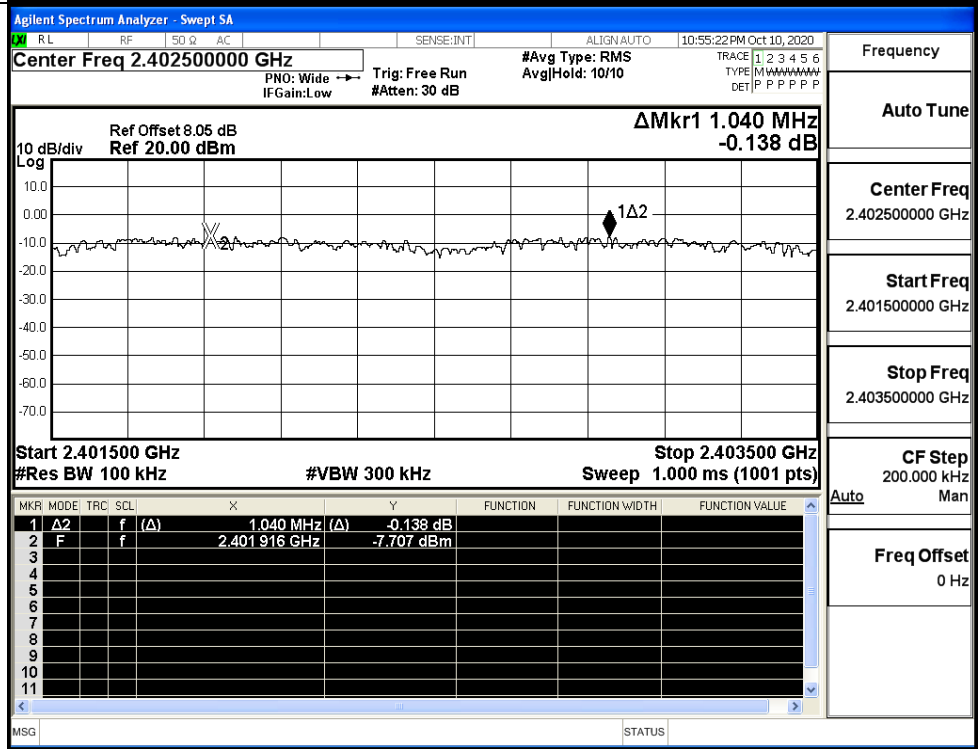


π/4DQPSK/HCH



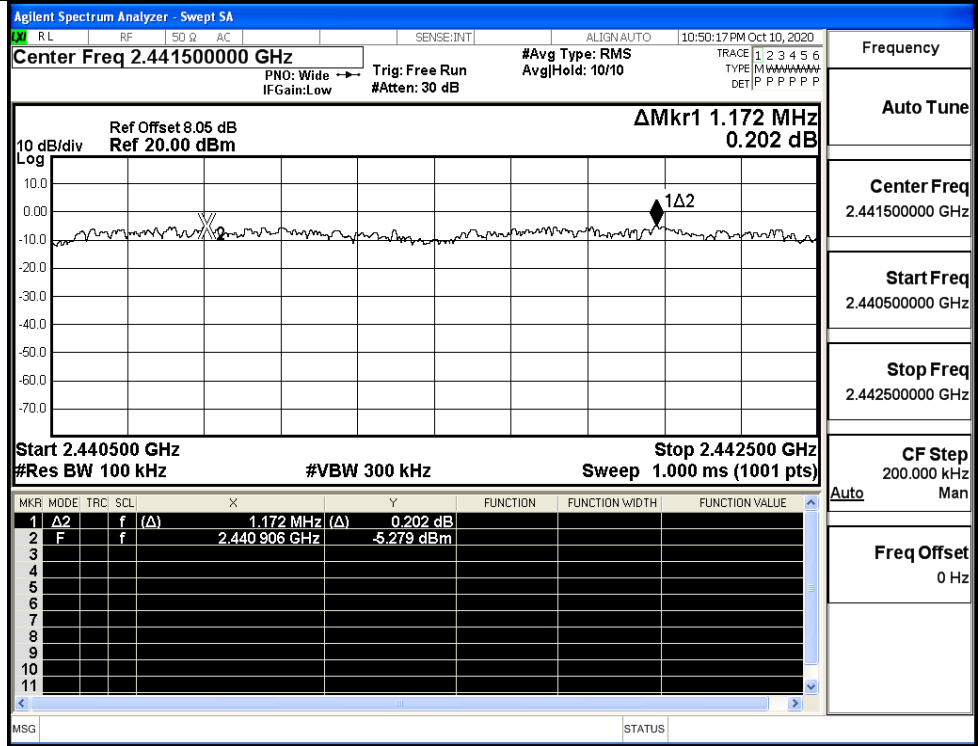
Frequency
Auto Tune
Center Freq 2.479500000 GHz
Start Freq 2.478500000 GHz
Stop Freq 2.480500000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

8DPSK/LCH



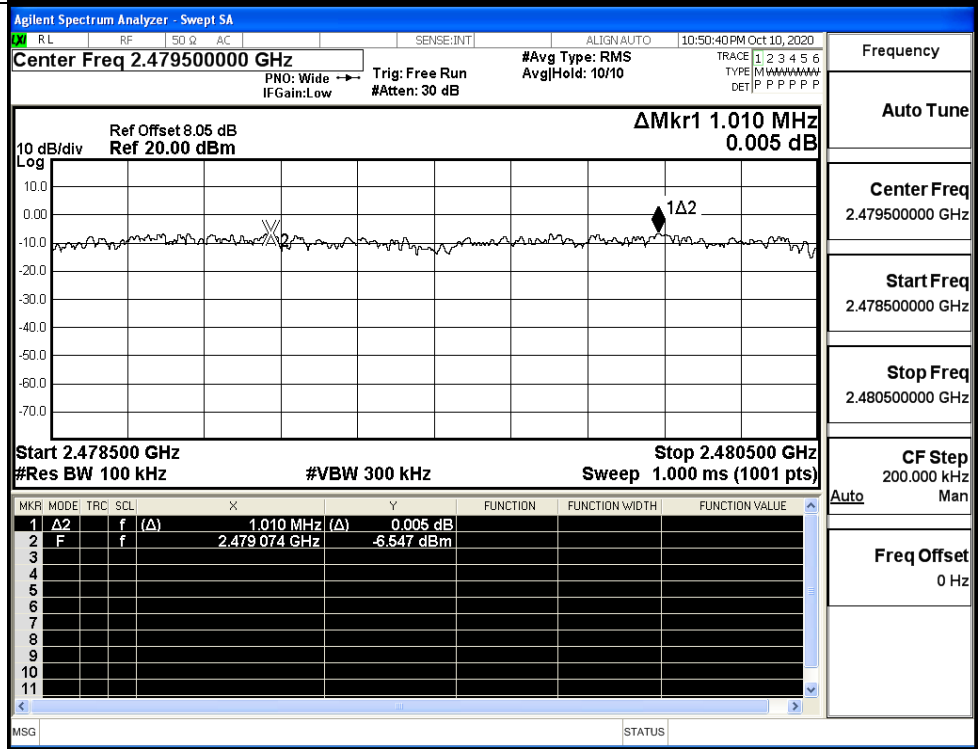
Frequency
Auto Tune
Center Freq 2.402500000 GHz
Start Freq 2.401500000 GHz
Stop Freq 2.403500000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

8DPSK/MCH



Frequency	2.441500000 GHz
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

8DPSK/HCH



Frequency	2.479500000 GHz
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

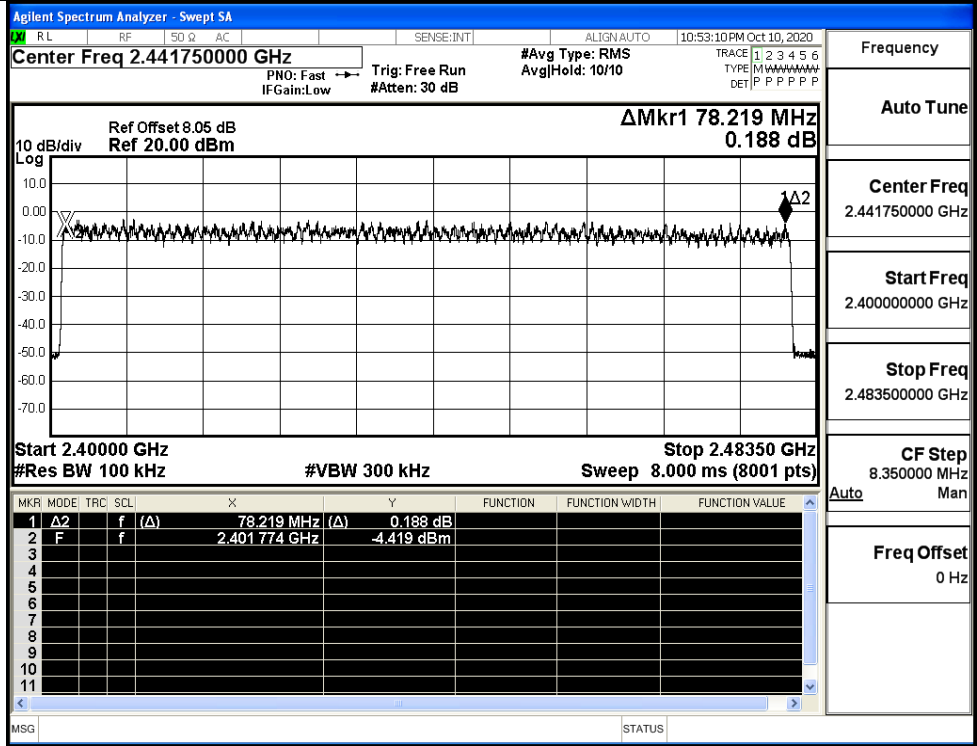
A.4 Hopping Channel Number

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

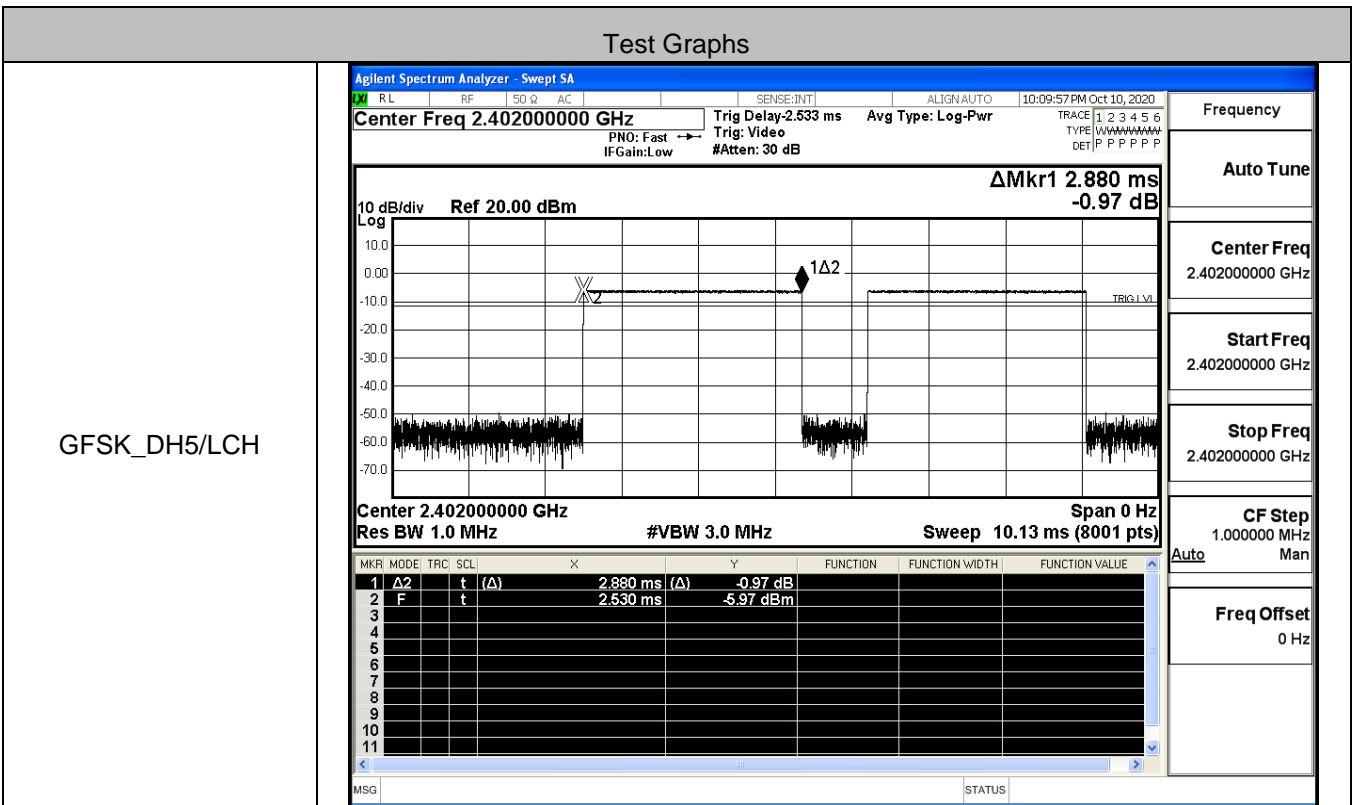
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 8.05 dB Ref 20.00 dBm ΔMkr1 77.968 MHz -1.456 dB Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (8001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>f</td> <td>(Δ)</td> <td>77.968 MHz (Δ)</td> <td>-1.456 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td>(Δ)</td> <td>2.402046 GHz</td> <td>-2.832 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.968 MHz (Δ)	-1.456 dB				2	F	f	(Δ)	2.402046 GHz	-2.832 dBm				Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Auto Man Freq Offset 0 Hz
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.968 MHz (Δ)	-1.456 dB																								
2	F	f	(Δ)	2.402046 GHz	-2.832 dBm																								
$\pi/4$ DQPSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 8.05 dB Ref 20.00 dBm ΔMkr1 77.916 MHz -1.306 dB Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (8001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>f</td> <td>(Δ)</td> <td>77.916 MHz (Δ)</td> <td>-1.306 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td>(Δ)</td> <td>2.402077 GHz</td> <td>-4.566 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.916 MHz (Δ)	-1.306 dB				2	F	f	(Δ)	2.402077 GHz	-4.566 dBm				Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Auto Man Freq Offset 0 Hz
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.916 MHz (Δ)	-1.306 dB																								
2	F	f	(Δ)	2.402077 GHz	-4.566 dBm																								

8DPSK/Hop

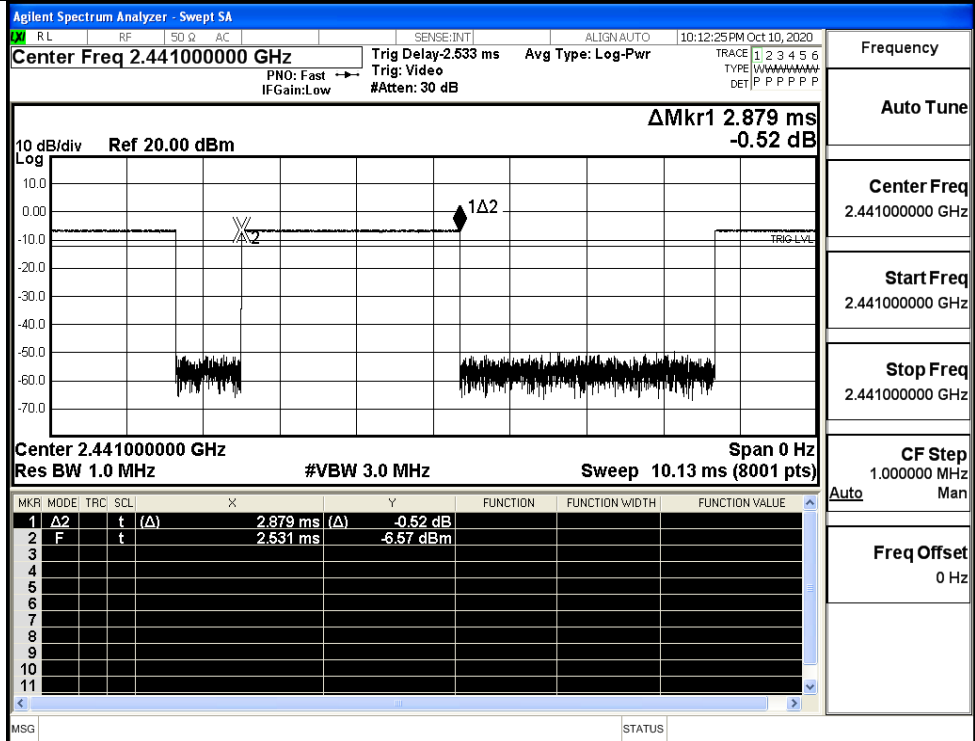


A.5 Dwell Time

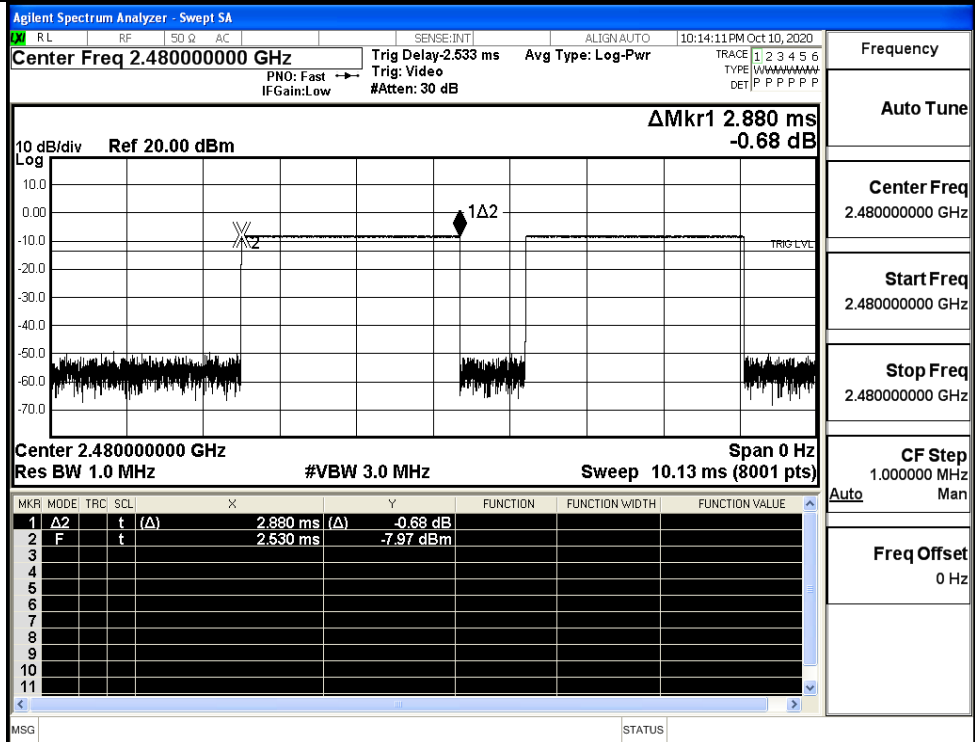
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.015	0.4	PASS
	2DH5	MCH	2.88	106.7	0.015	0.4	PASS
	2DH5	HCH	2.88	106.7	0.015	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.015	0.4	PASS
	3DH5	MCH	2.88	106.7	0.015	0.4	PASS
	3DH5	HCH	2.88	106.7	0.015	0.4	PASS



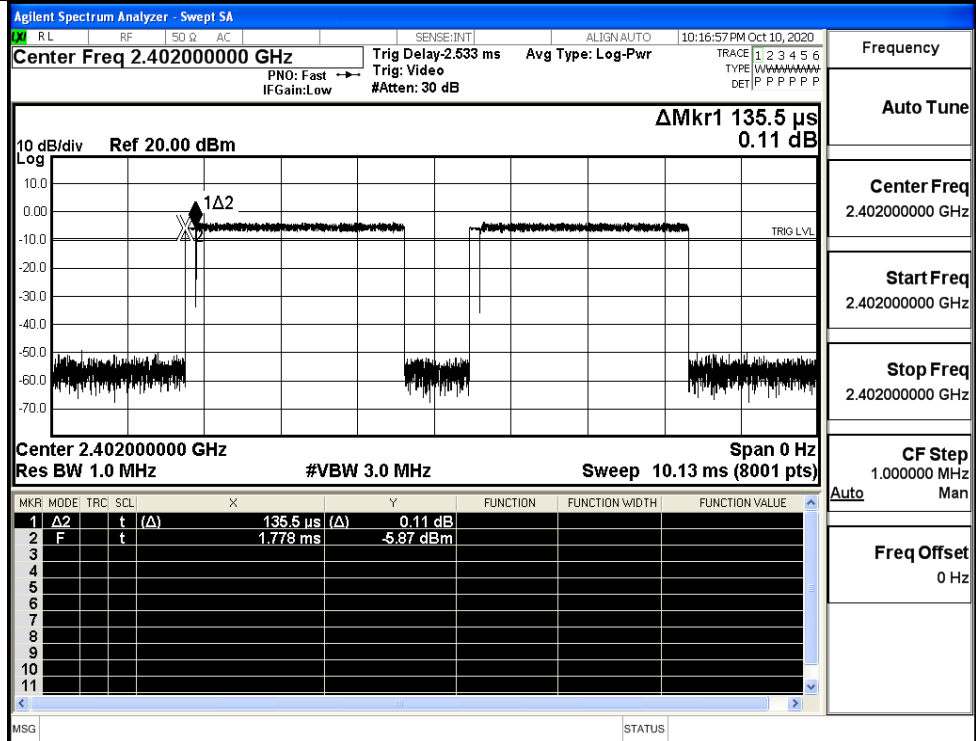
GFSK_DH5/MCH



GFSK_DH5/HCH

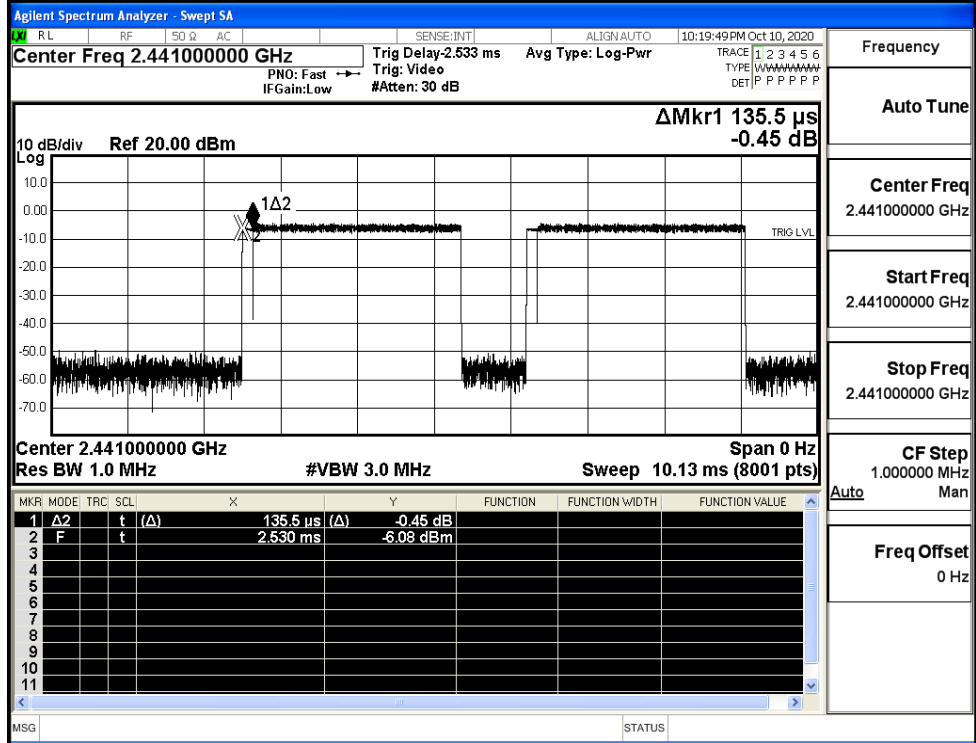


$\pi/4$ DQPSK
_2DH5/LCH



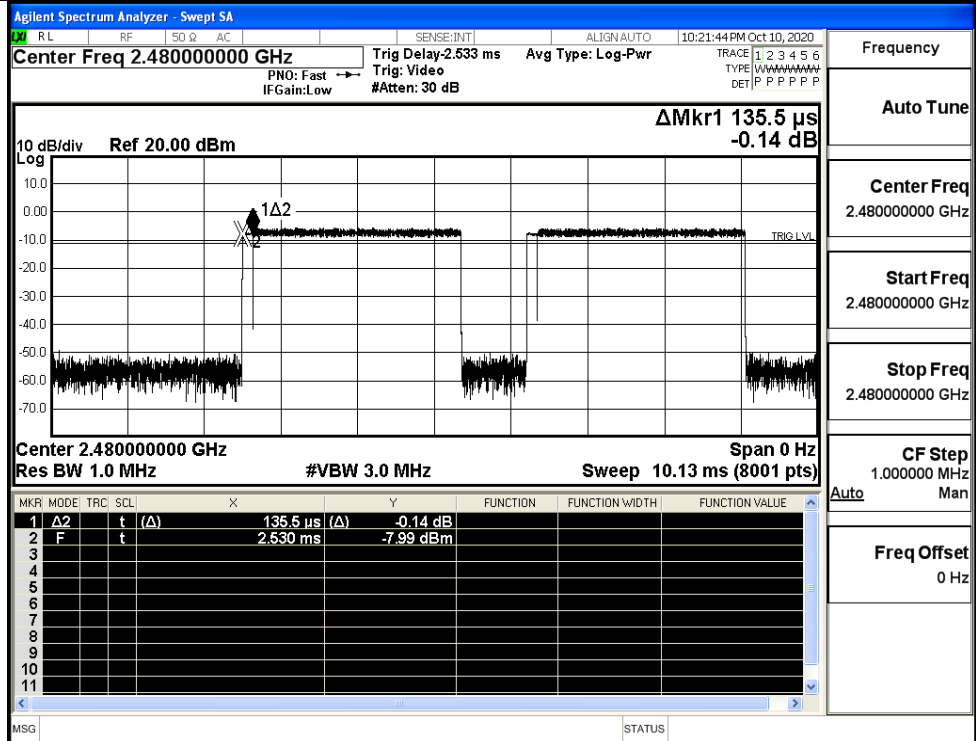
Frequency	2.402000000 GHz
Auto Tune	
Center Freq	2.402000000 GHz
Start Freq	2.402000000 GHz
Stop Freq	2.402000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK
_2DH5/MCH

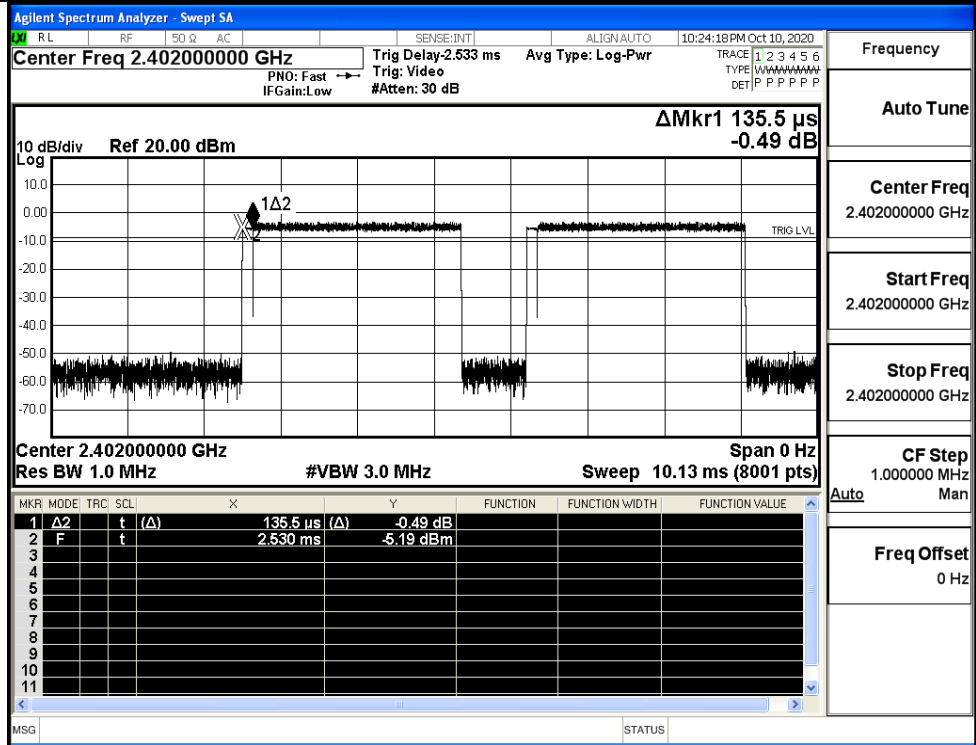


Frequency	2.441000000 GHz
Auto Tune	
Center Freq	2.441000000 GHz
Start Freq	2.441000000 GHz
Stop Freq	2.441000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

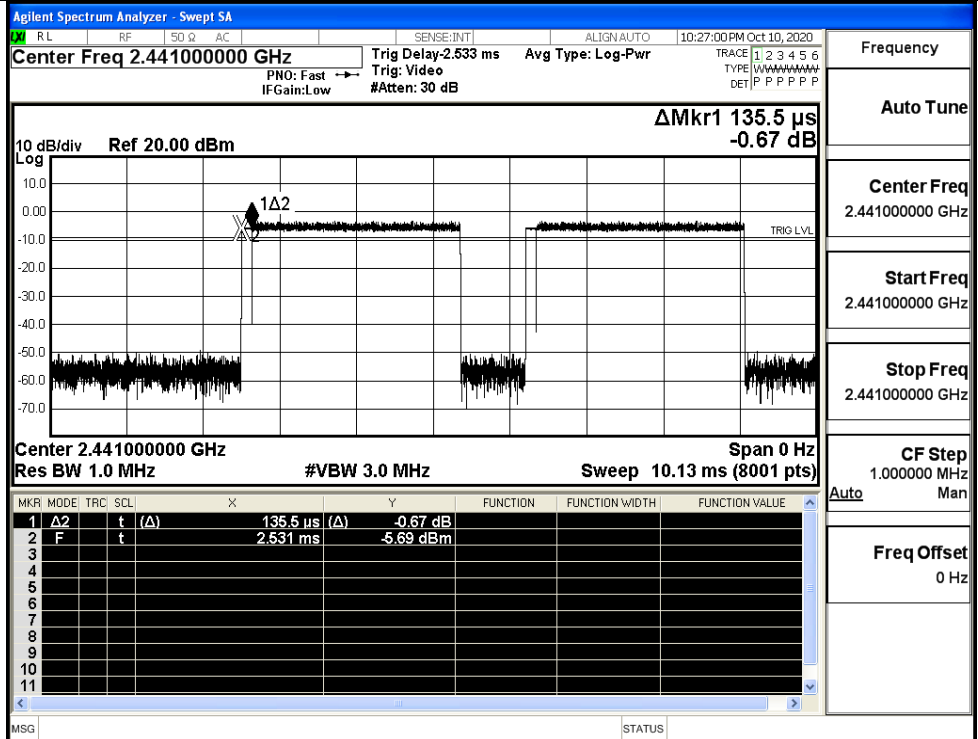
$\pi/4$ DQPSK
_2DH5/HCH



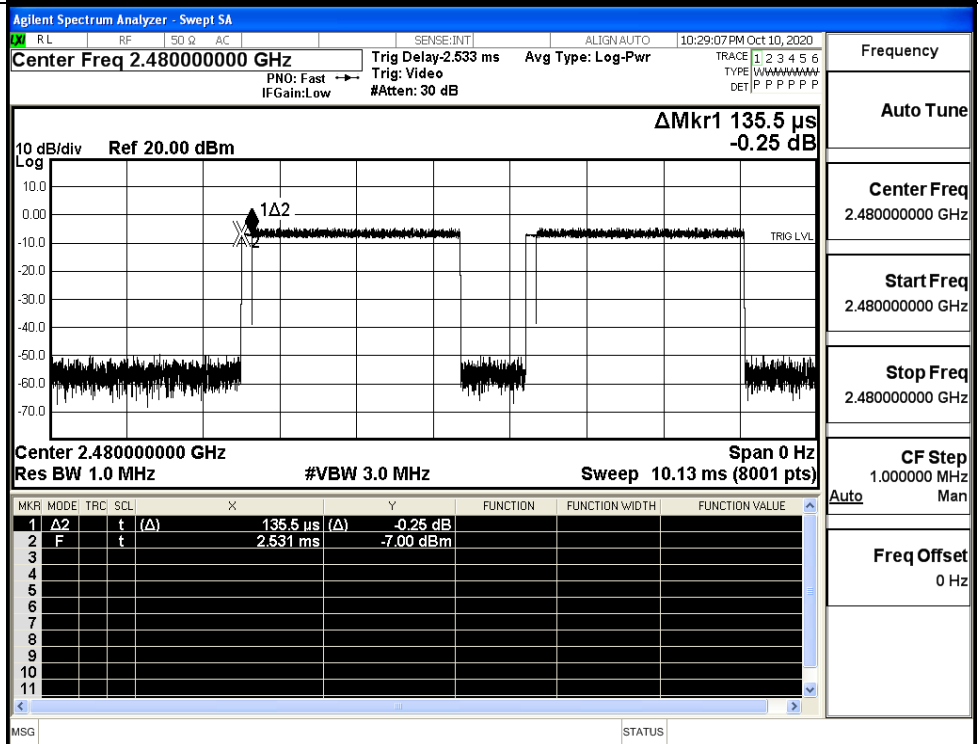
8DPSK_3DH5/LCH



8DPSK_3DH5/MCH



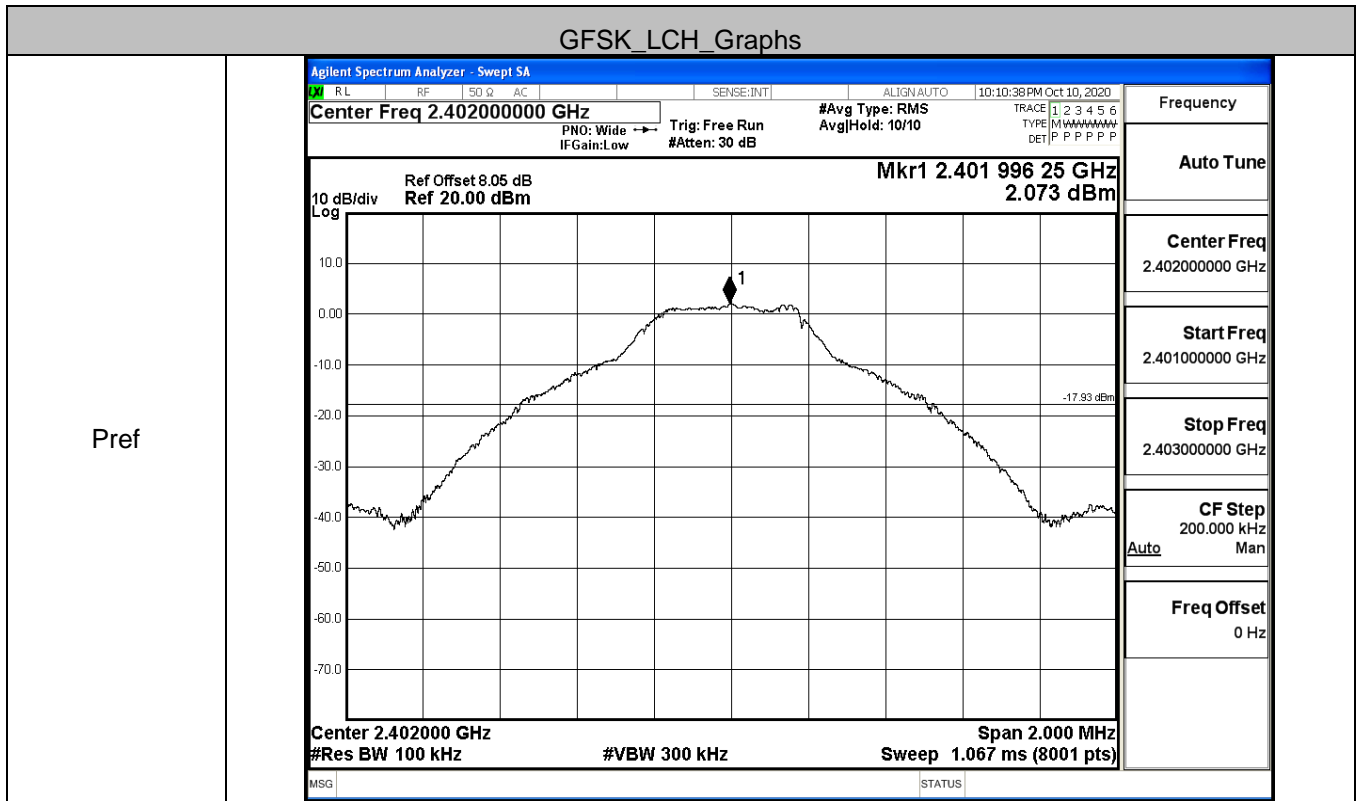
8DPSK_3DH5/HCH

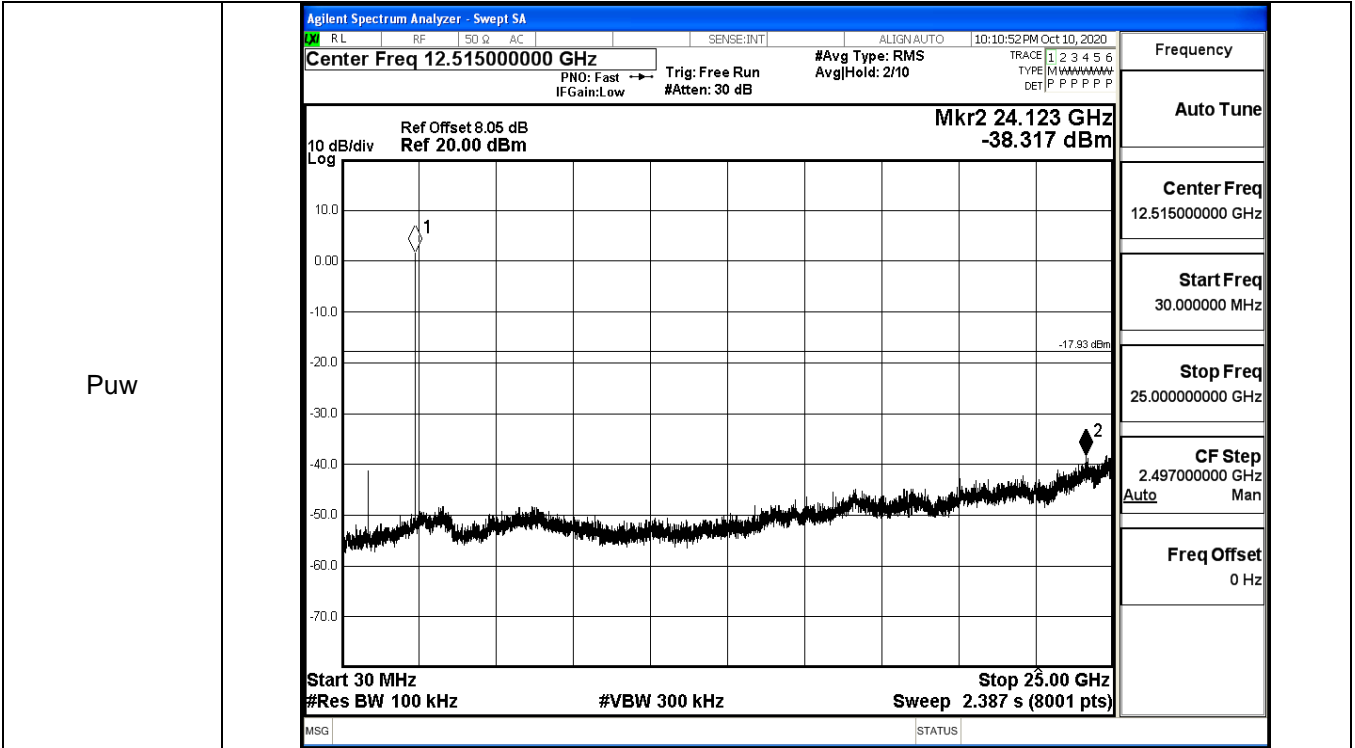


A.6 RF Conducted Spurious Emissions

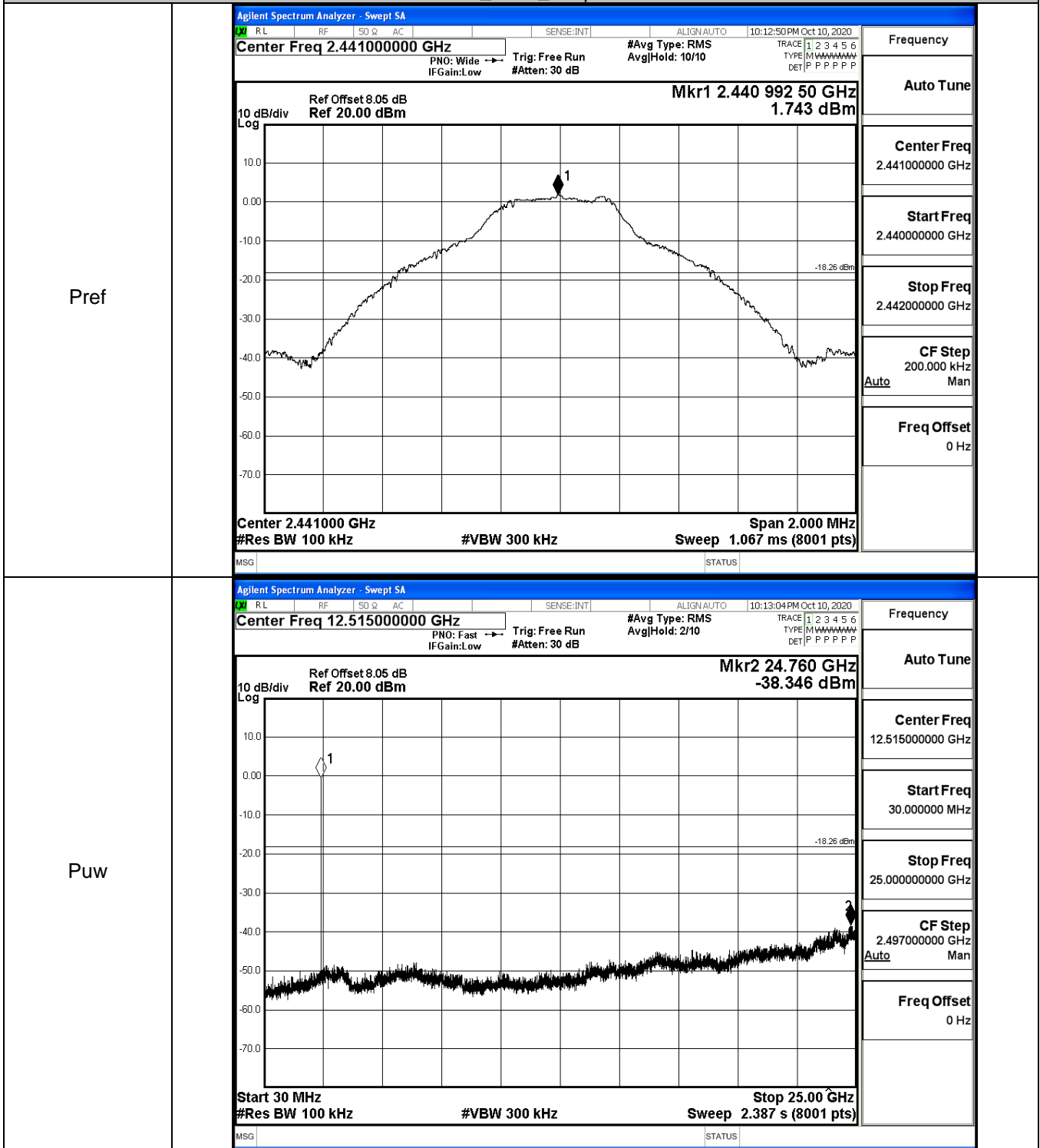
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.073	-38.317	-17.927	PASS
	MCH	1.743	-38.346	-18.257	PASS
	HCH	-0.509	-38.289	-20.509	PASS
π /4DQPSK	LCH	2.089	-37.821	-17.911	PASS
	MCH	1.388	-38.153	-18.612	PASS
	HCH	0.198	-37.563	-19.802	PASS
8DPSK	LCH	2.632	-37.183	-17.368	PASS
	MCH	2.408	-38.222	-17.592	PASS
	HCH	1.231	-37.331	-18.769	PASS

GFSK_LCH_Graphs

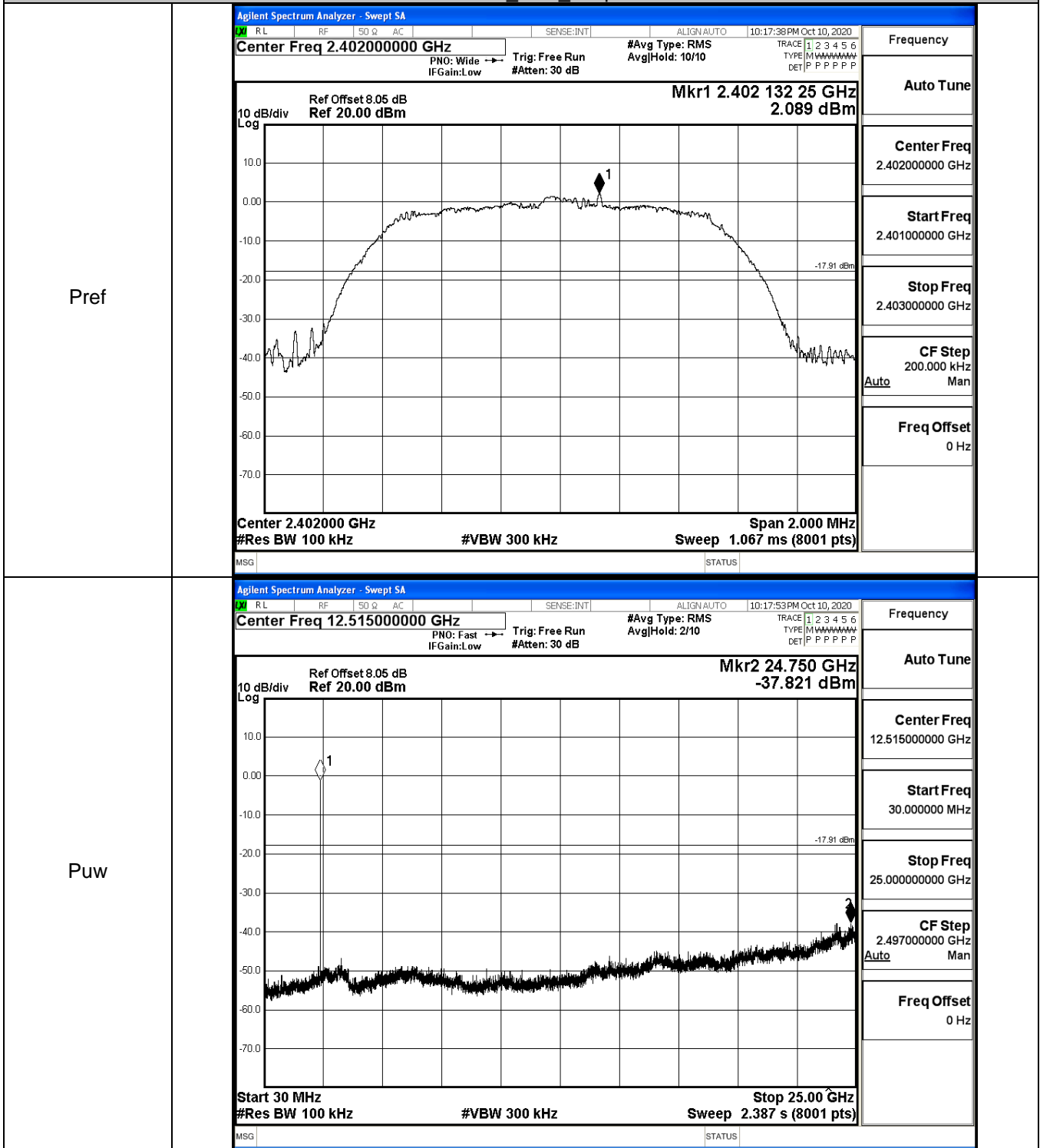




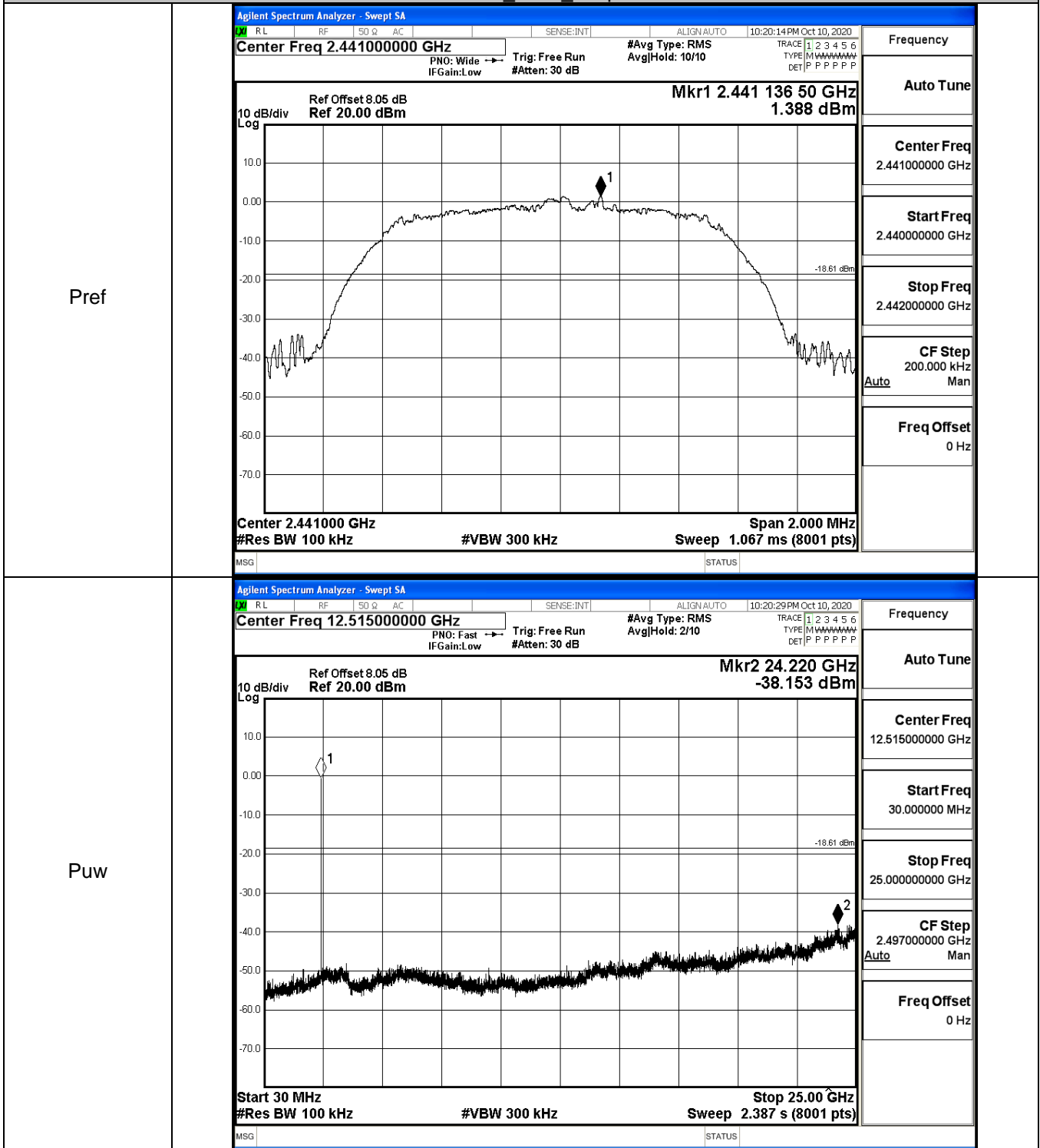
GFSK_MCH_Graphs



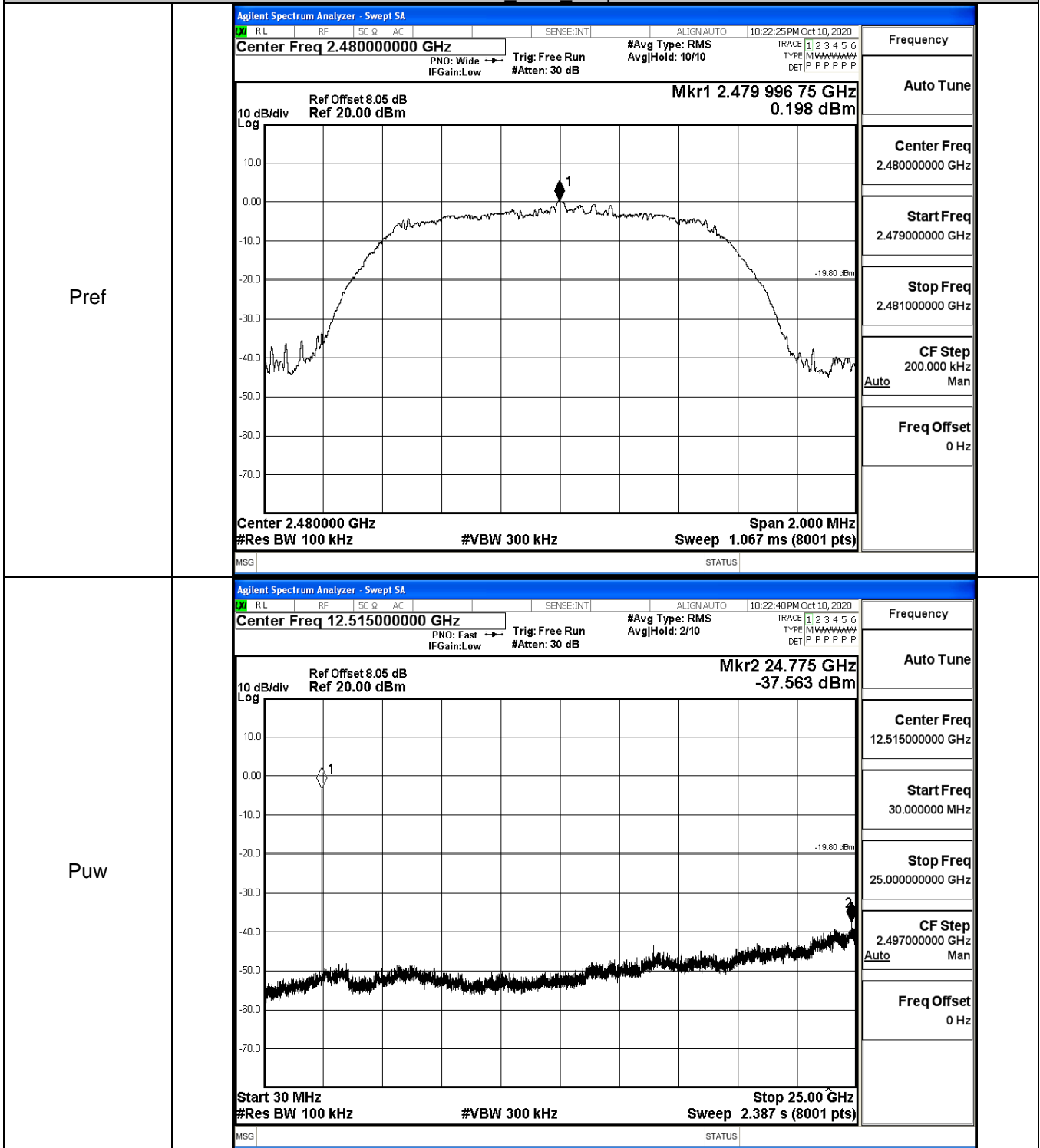
$\pi/4$ DQPSK_LCH_Graphs



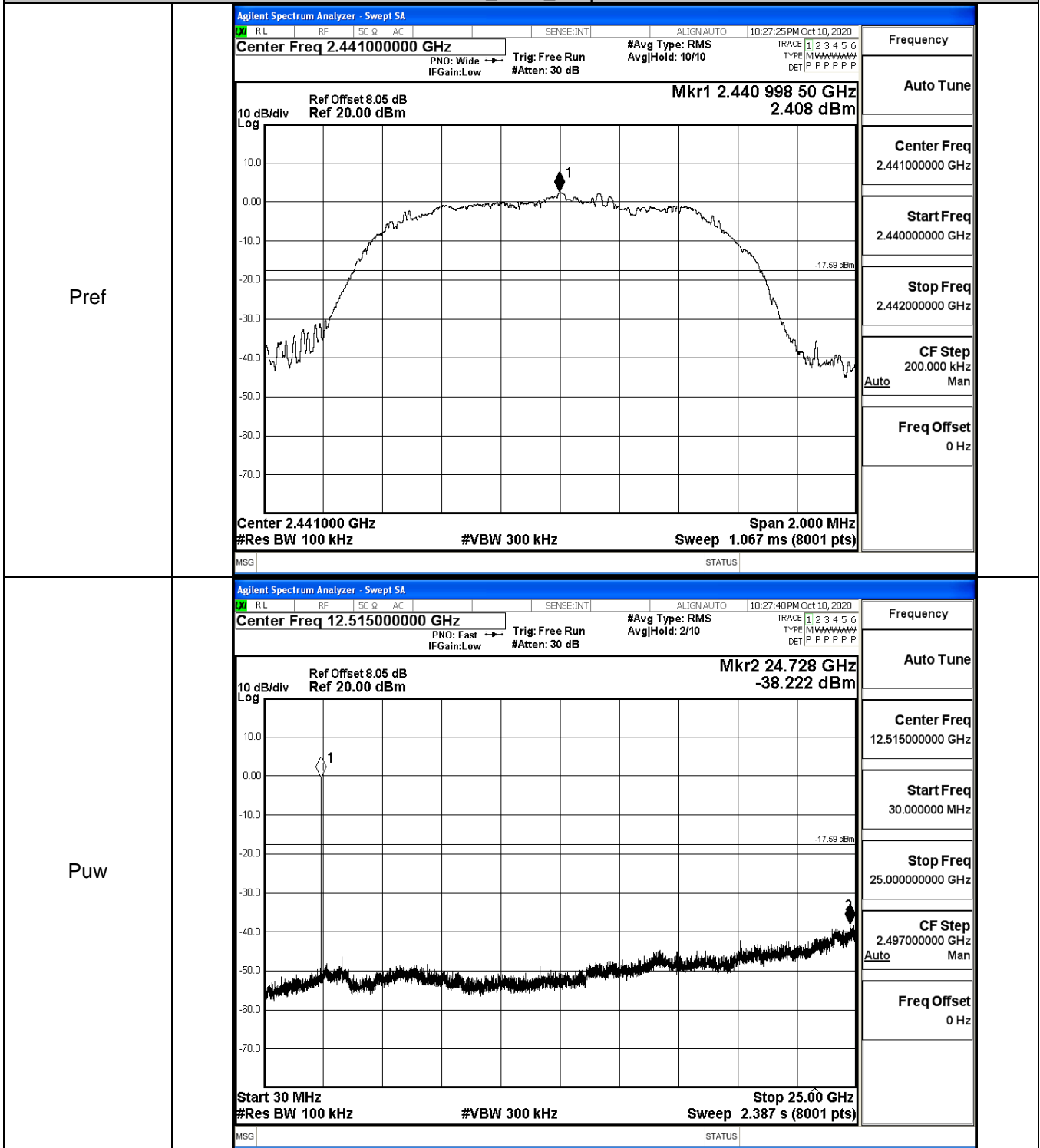
$\pi/4$ DQPSK_MCH_Graphs



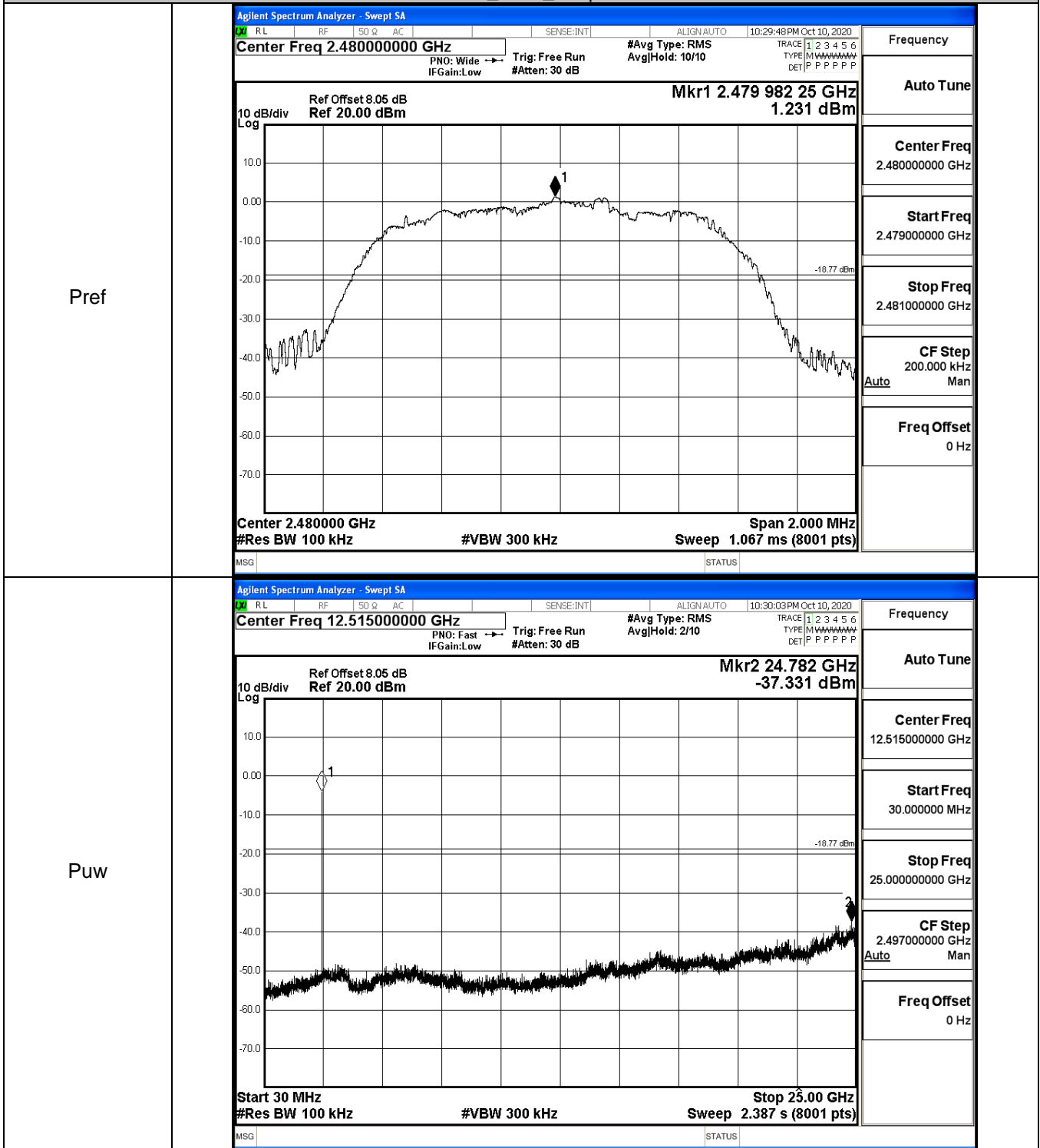
$\pi/4$ DQPSK_HCH_Graphs



8DPSK_MCH_Graphs



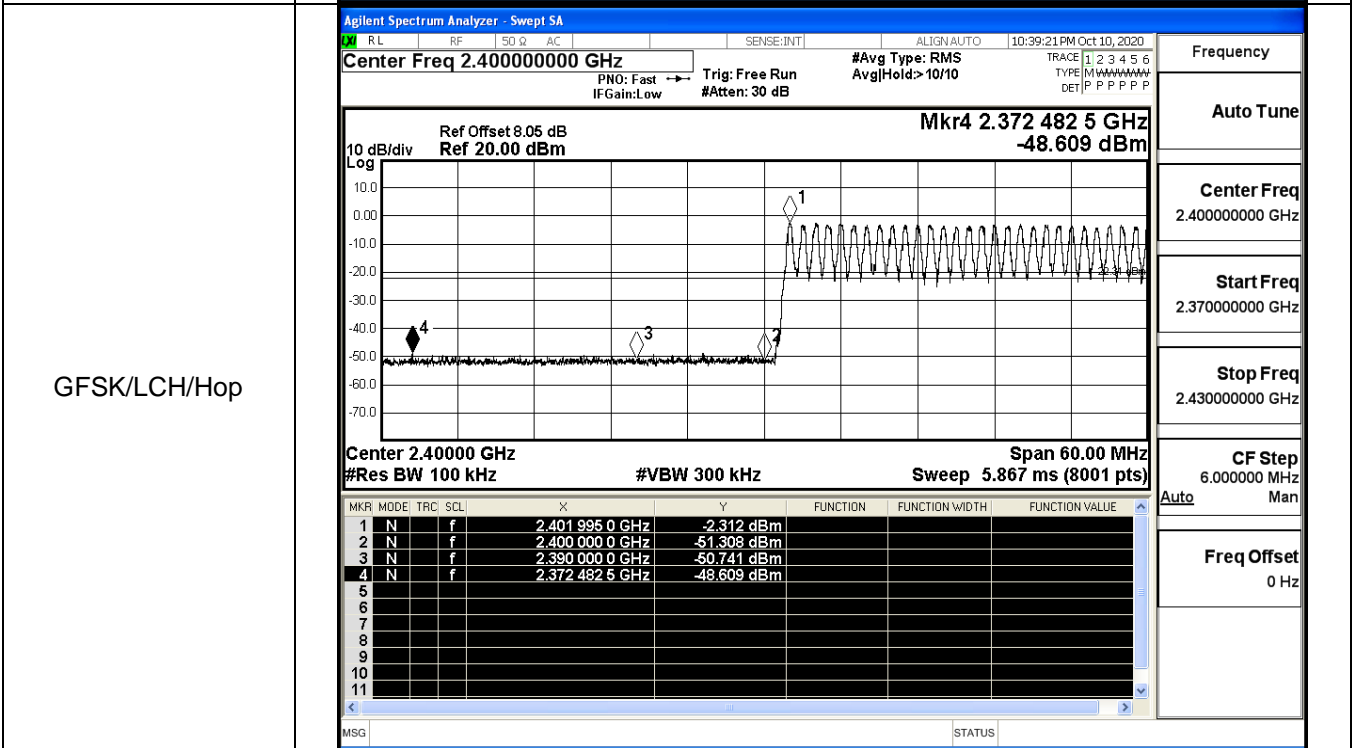
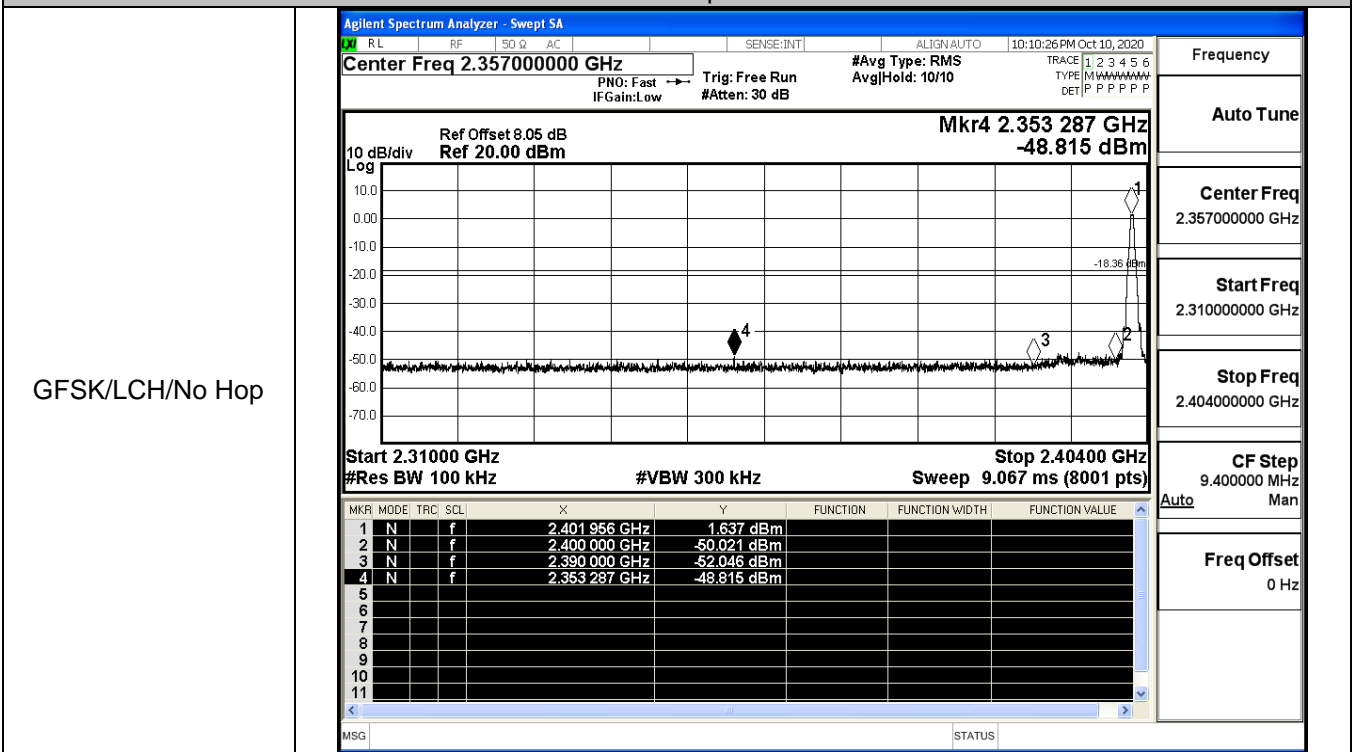
8DPSK_HCH_Graphs



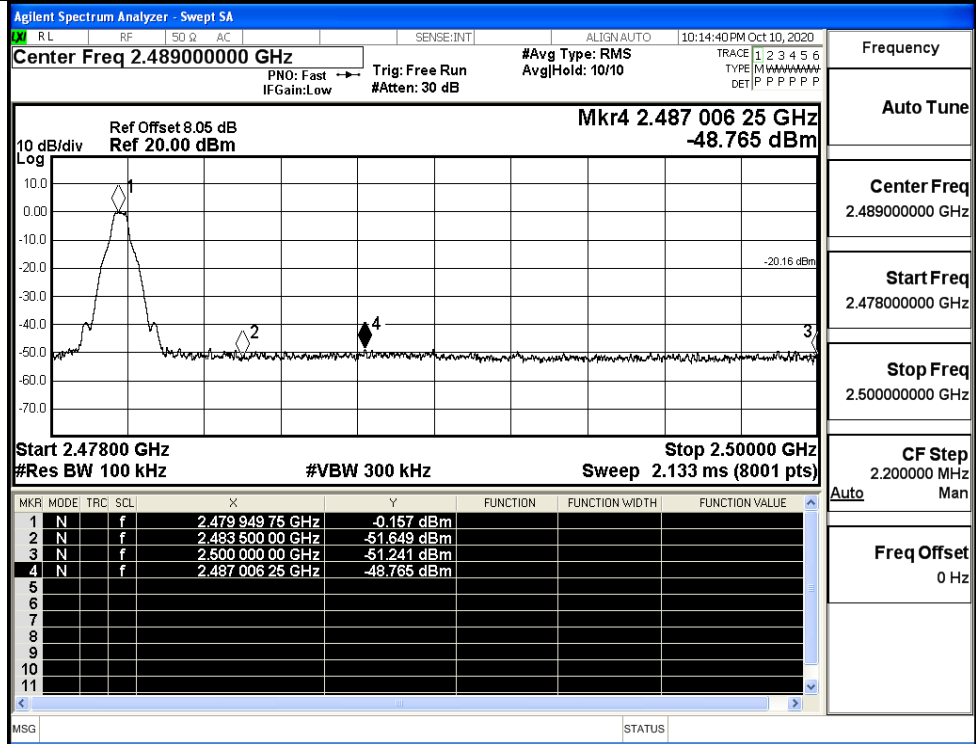
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.637	Off	-48.815	-18.36	PASS
			-2.312	On	-48.609	-22.31	PASS
	HCH	2480	-0.157	Off	-48.765	-20.16	PASS
			-3.899	On	-48.207	-23.9	PASS
$\pi/4$ DQPSK	LCH	2402	2.269	Off	-49.344	-17.73	PASS
			-2.038	On	-48.463	-22.04	PASS
	HCH	2480	-0.663	Off	-48.018	-20.66	PASS
			-3.743	On	-48.382	-23.74	PASS
8DPSK	LCH	2402	2.664	Off	-49.590	-17.34	PASS
			-2.307	On	-48.691	-22.31	PASS
	HCH	2480	1.202	Off	-47.837	-18.8	PASS
			-3.647	On	-48.280	-23.65	PASS

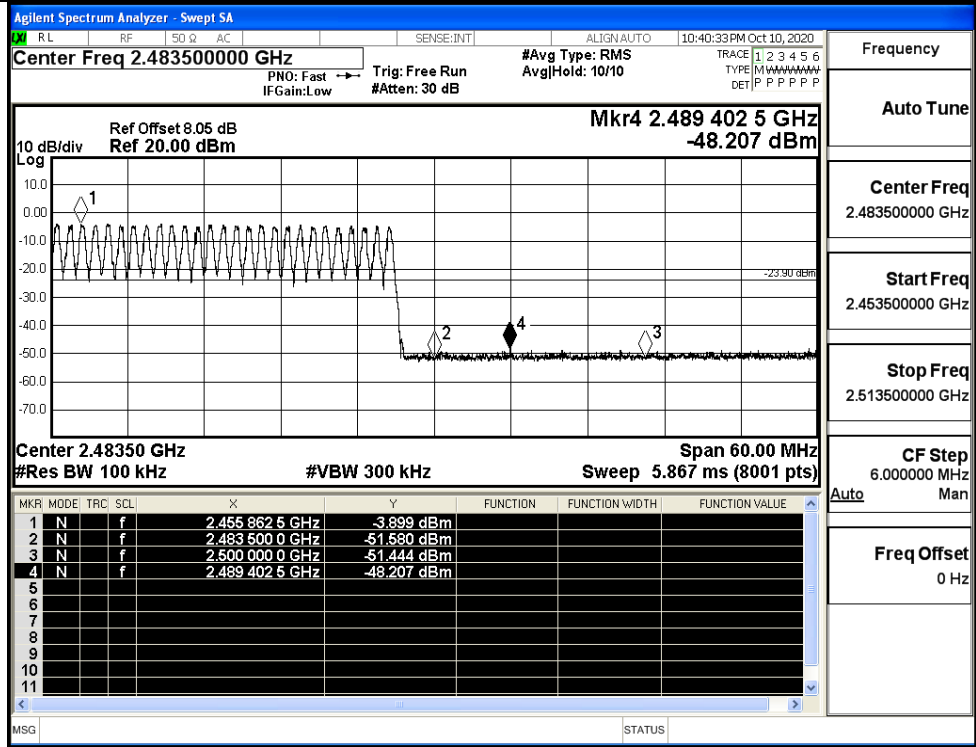
Test Graphs



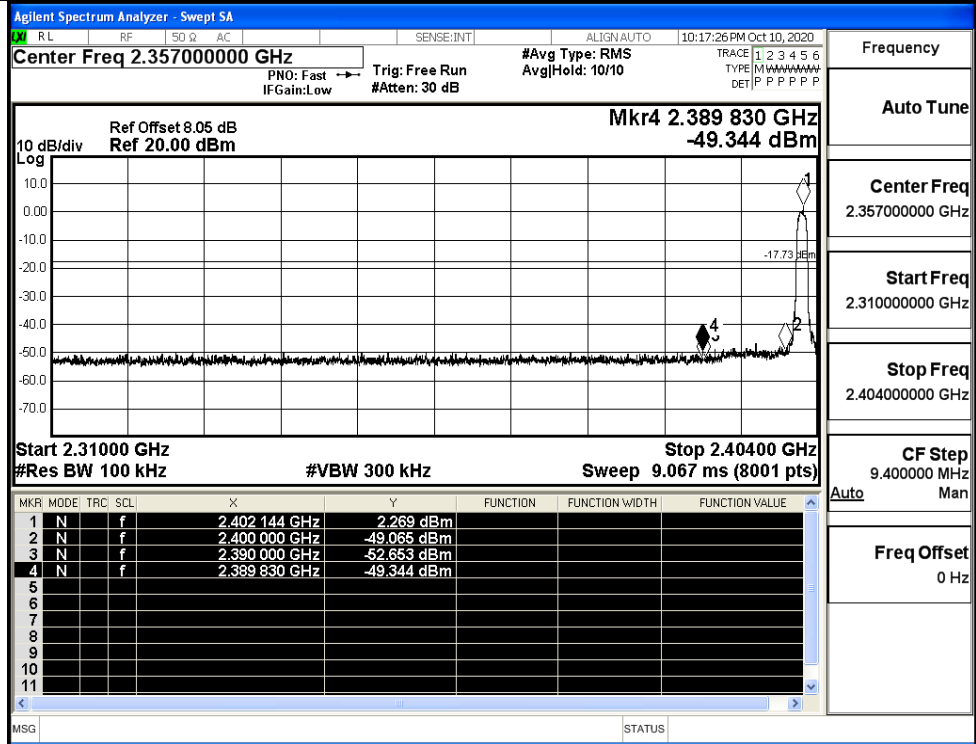
GFSK/HCH/No Hop



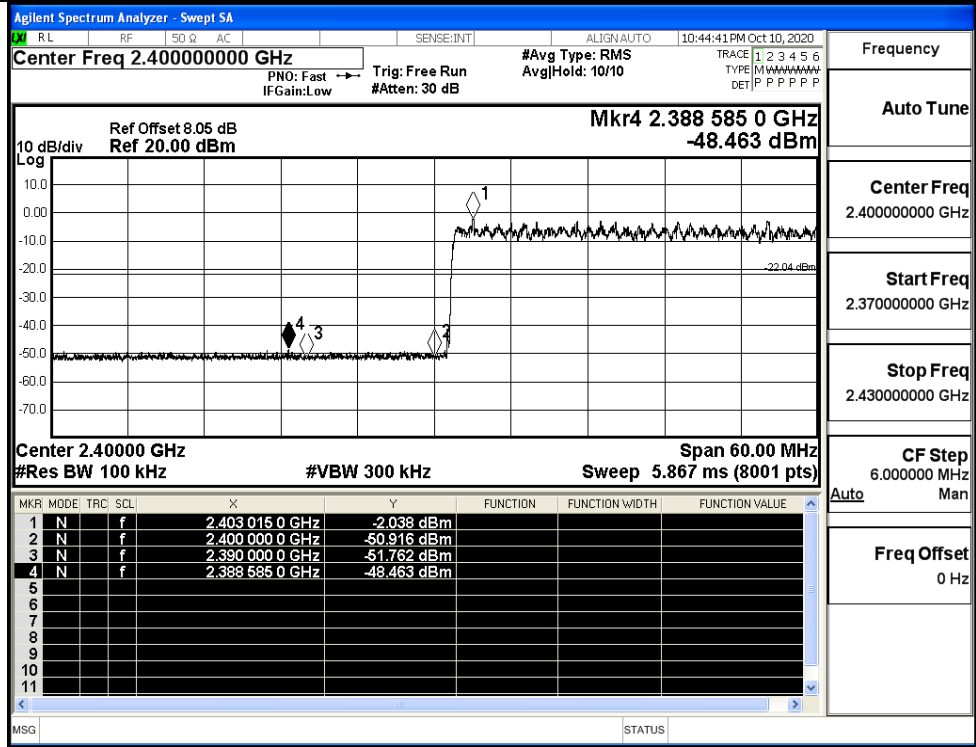
GFSK/HCH/Hop



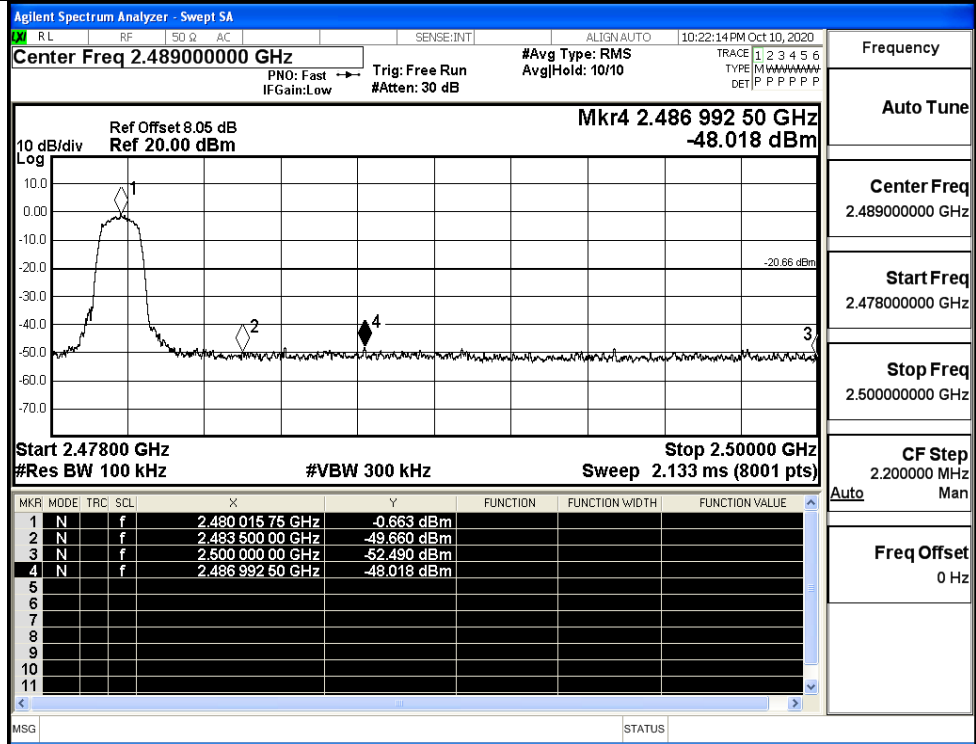
$\pi/4$ DQPSK/LCH/No Hop



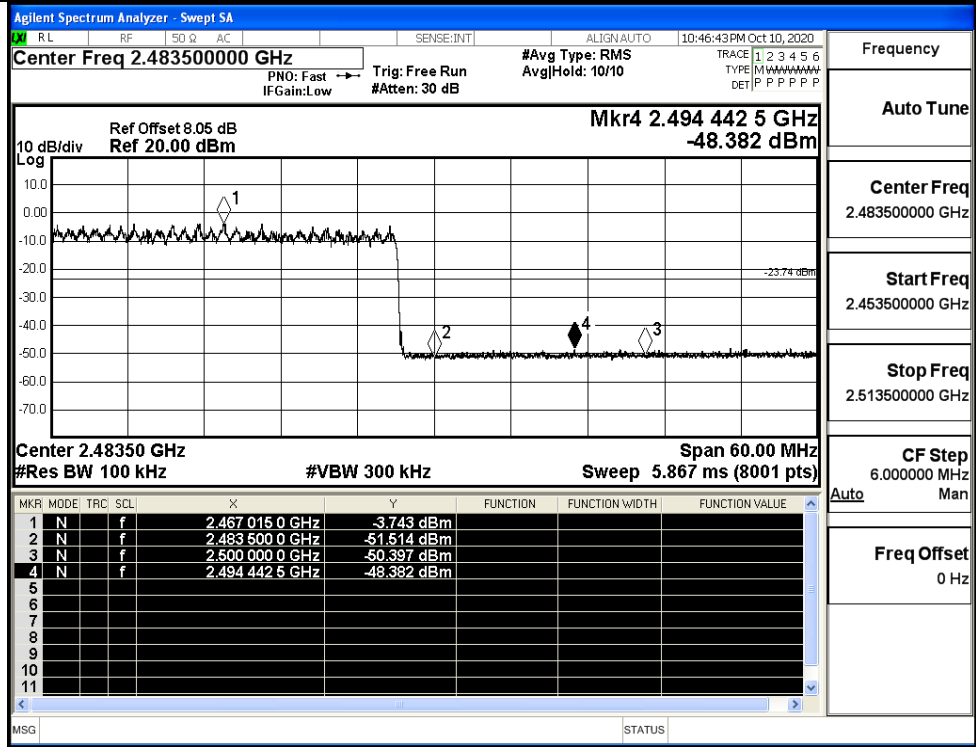
$\pi/4$ DQPSK/LCH/Hop



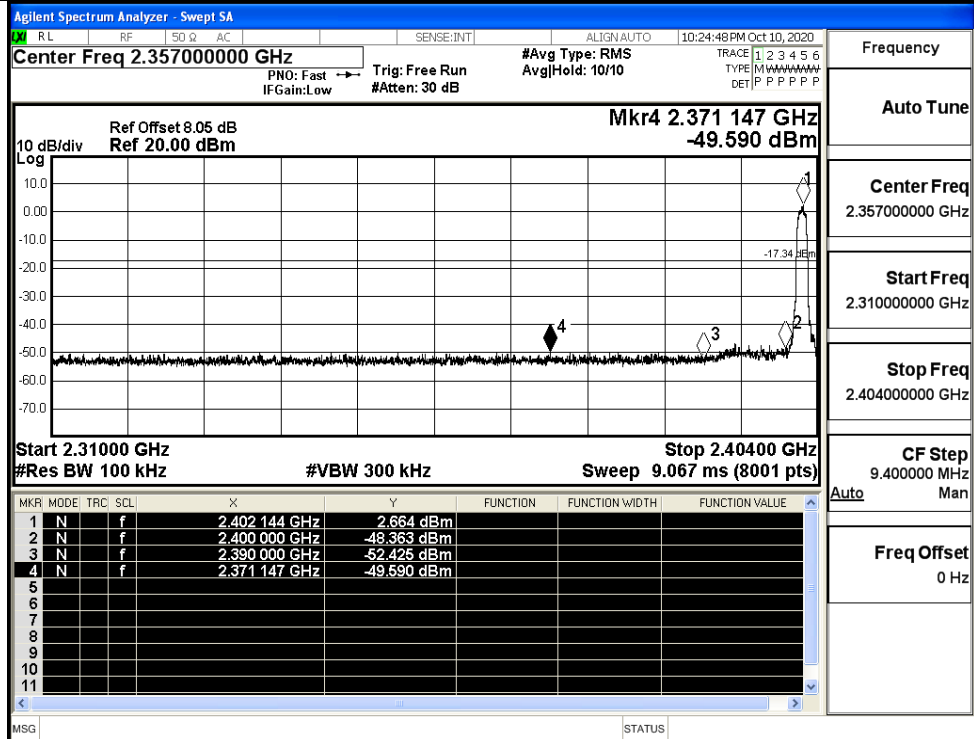
π /4DQPSK/HCH/No
Hop



π /4DQPSK/HCH/Hop

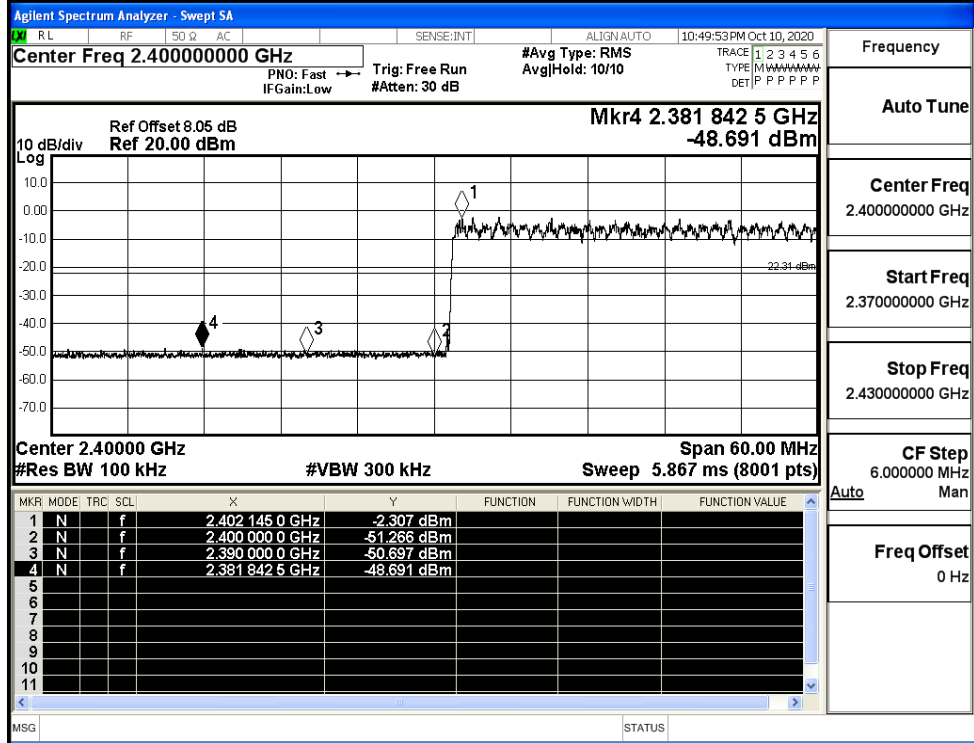


8DPSK/LCH/No Hop



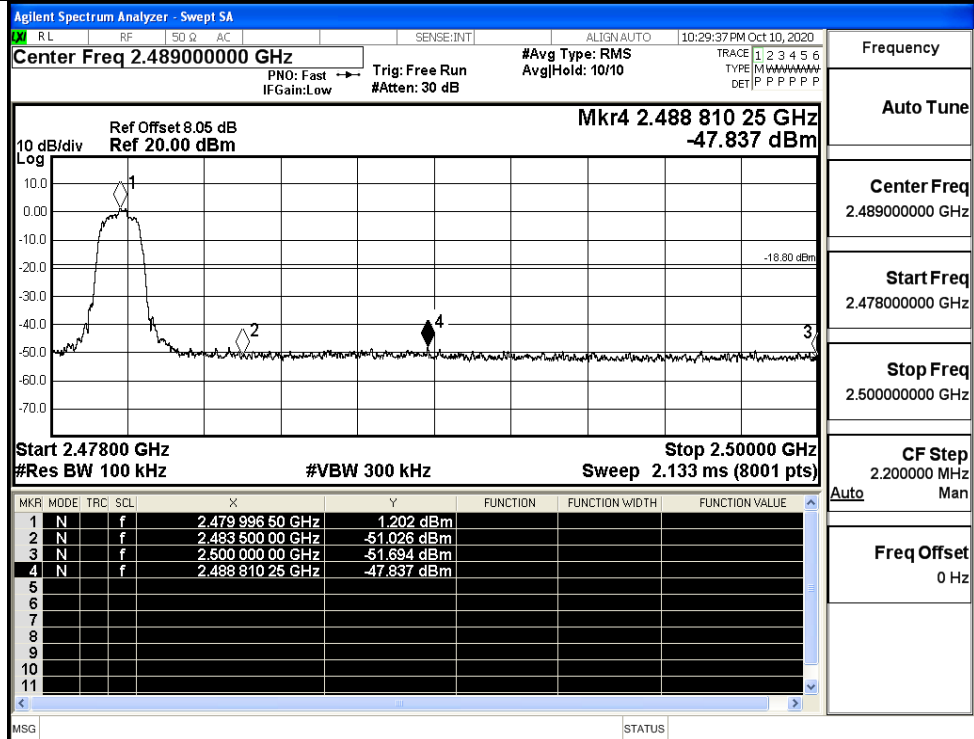
Frequency	
Auto Tune	
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz
Freq Offset	0 Hz

8DPSK/LCH/Hop



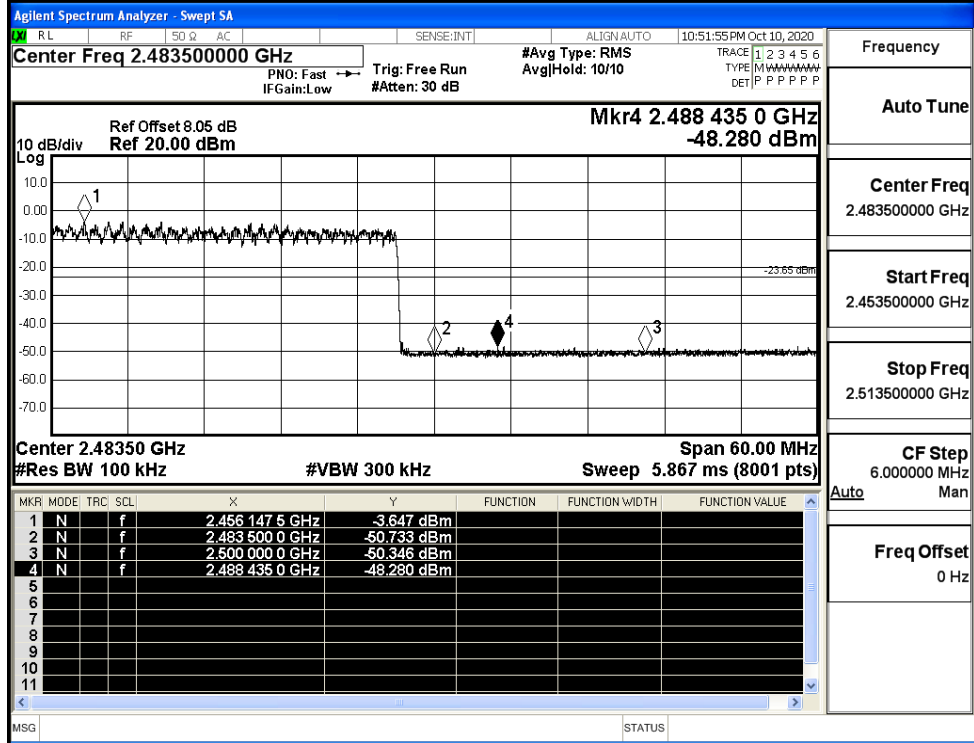
Frequency	
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

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
Auto Man
Freq Offset
0 Hz

8DPSK/HCH/Hop

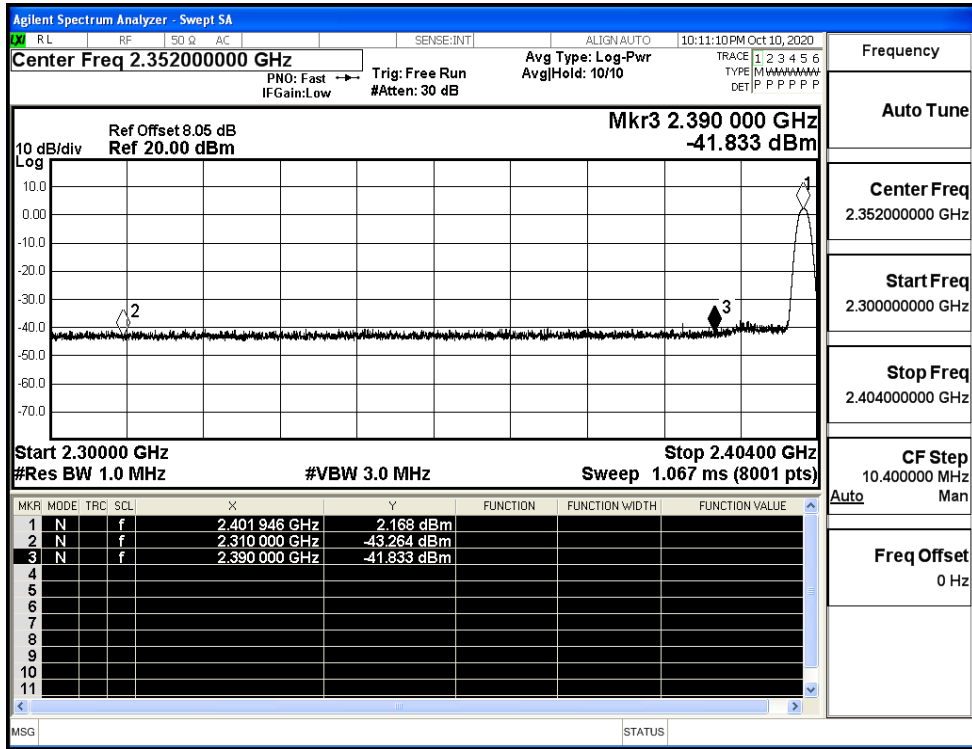


Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.453500000 GHz
Stop Freq
2.513500000 GHz
CF Step
6.000000 MHz
Auto Man
Freq Offset
0 Hz

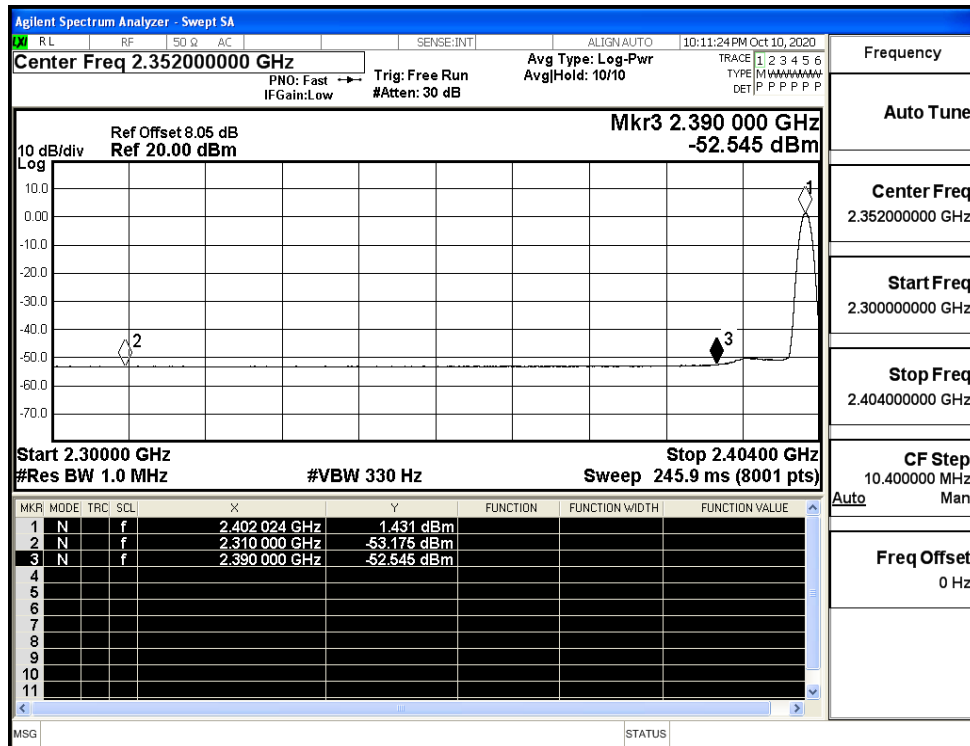
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.26	2.0	0	53.97	PEAK	74	PASS
	Off	2310.0	-53.18	2.0	0	44.05	AV	54	PASS
	Off	2390.0	-41.83	2.0	0	55.40	PEAK	74	PASS
	Off	2390.0	-52.55	2.0	0	44.68	AV	54	PASS
	Off	2483.5	-41.26	2.0	0	55.97	PEAK	74	PASS
	Off	2483.5	-51.52	2.0	0	45.71	AV	54	PASS
	Off	2500.0	-42.27	2.0	0	54.96	PEAK	74	PASS
	Off	2500.0	-52.38	2.0	0	44.85	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.73	2.0	0	53.50	PEAK	74	PASS
	Off	2310.0	-53.16	2.0	0	44.07	AV	54	PASS
	Off	2390.0	-42.06	2.0	0	55.17	PEAK	74	PASS
	Off	2390.0	-52.51	2.0	0	44.72	AV	54	PASS
	Off	2483.5	-41.94	2.0	0	55.29	PEAK	74	PASS
	Off	2483.5	-51.49	2.0	0	45.74	AV	54	PASS
	Off	2500.0	-42.40	2.0	0	54.83	PEAK	74	PASS
	Off	2500.0	-52.29	2.0	0	44.94	AV	54	PASS
8DPSK	Off	2310.0	-43.51	2.0	0	53.72	PEAK	74	PASS
	Off	2310.0	-53.19	2.0	0	44.04	AV	54	PASS
	Off	2390.0	-40.73	2.0	0	56.50	PEAK	74	PASS
	Off	2390.0	-52.57	2.0	0	44.66	AV	54	PASS
	Off	2483.5	-42.00	2.0	0	55.23	PEAK	74	PASS
	Off	2483.5	-51.21	2.0	0	46.02	AV	54	PASS
	Off	2500.0	-42.86	2.0	0	54.37	PEAK	74	PASS
	Off	2500.0	-52.28	2.0	0	44.95	AV	54	PASS

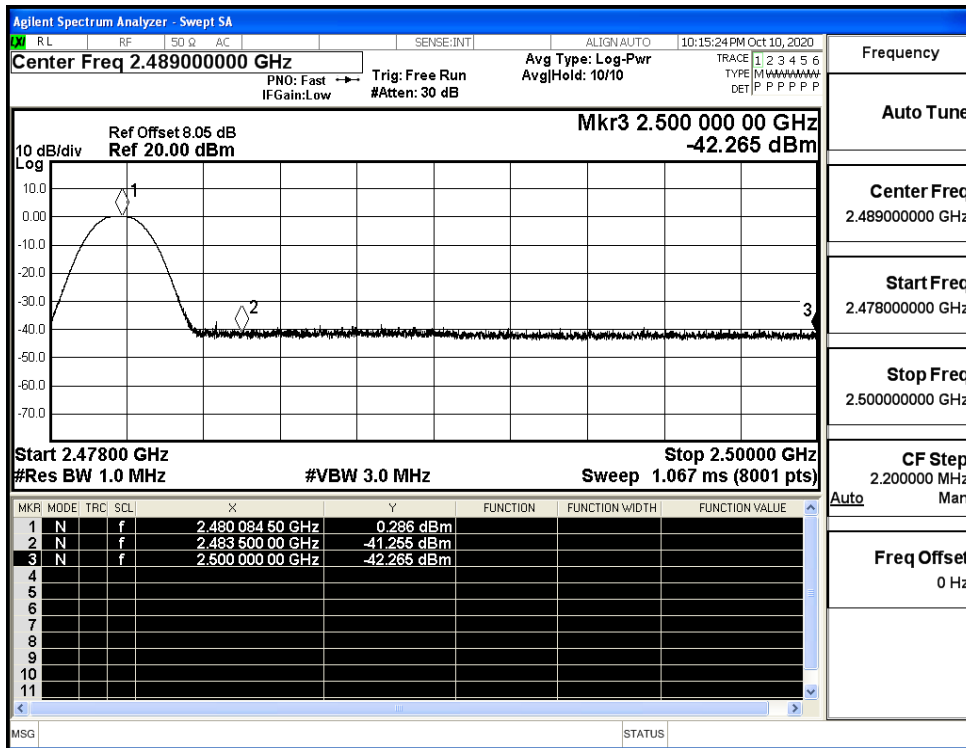
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



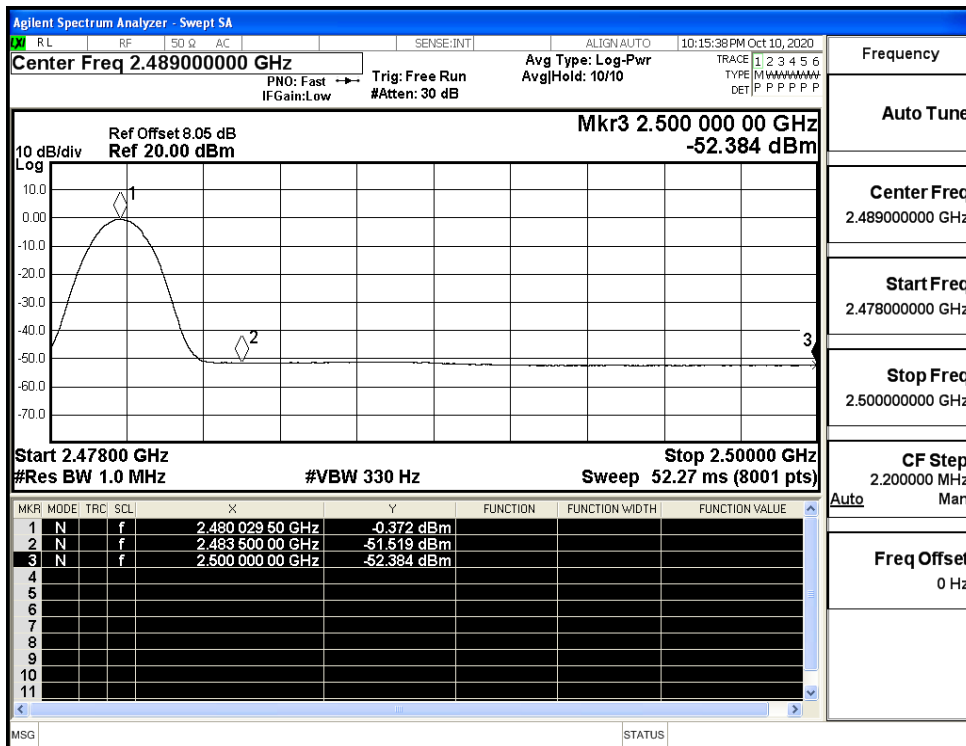
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



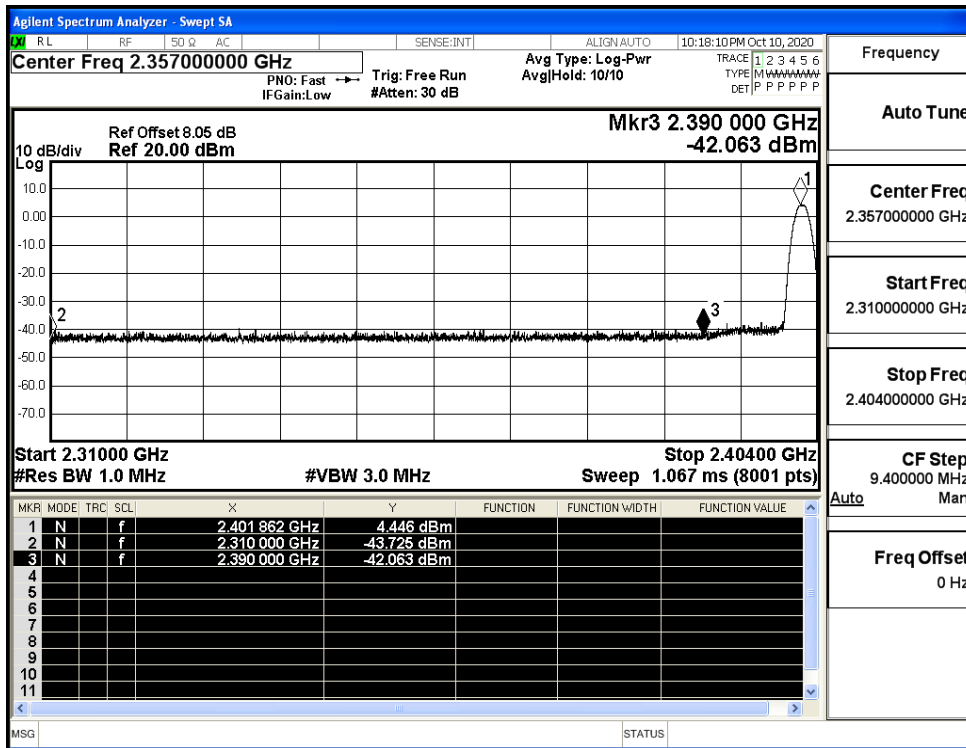
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



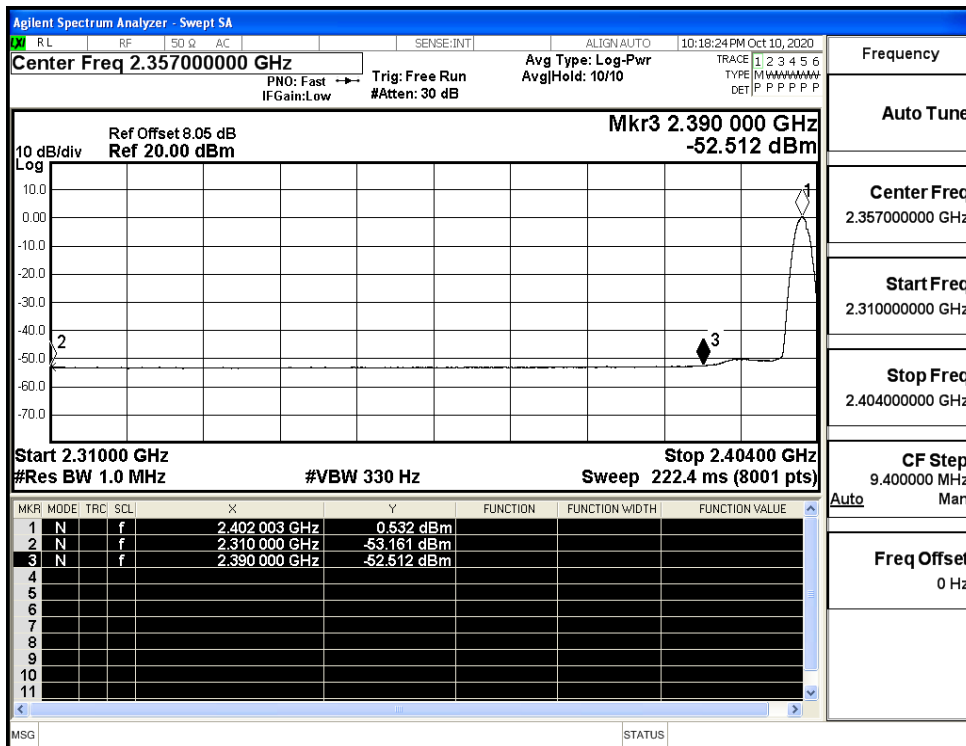
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



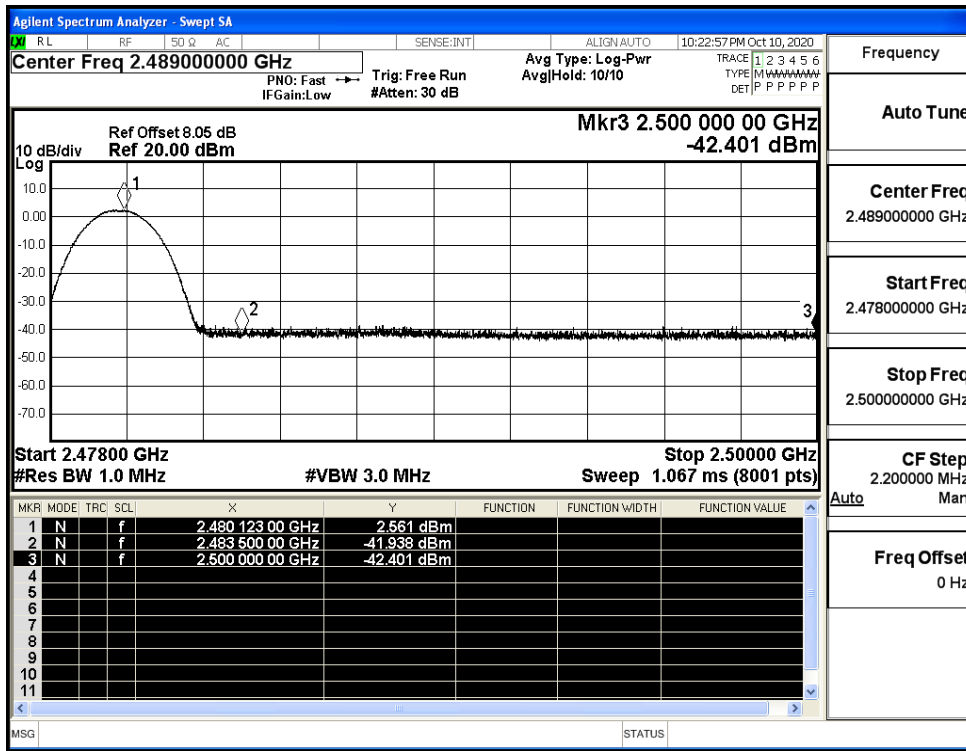
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



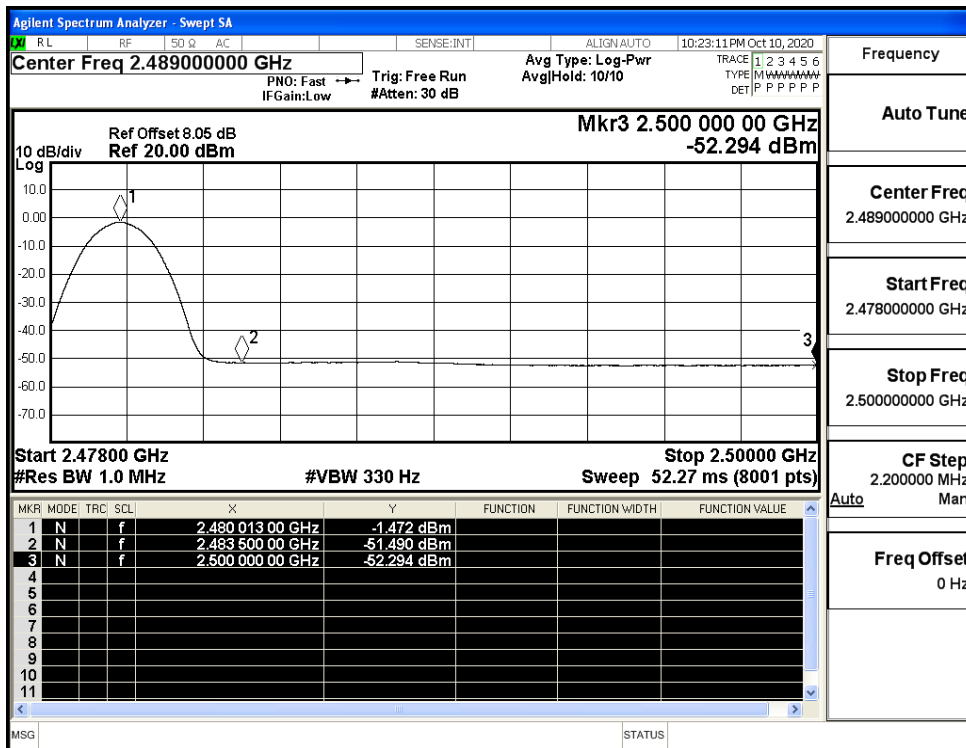
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



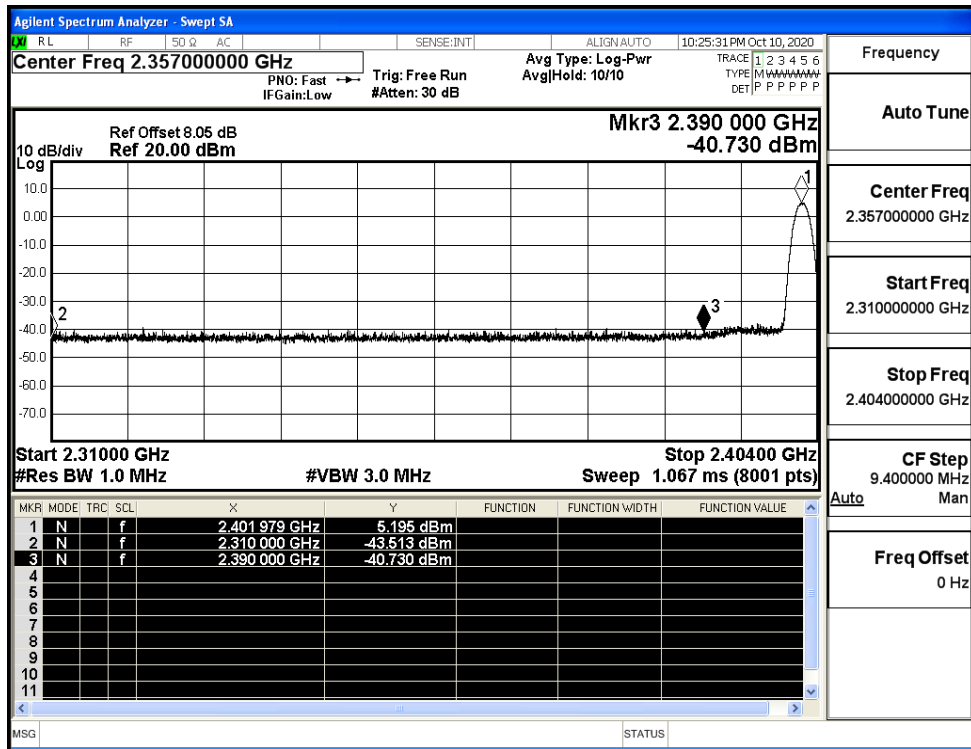
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



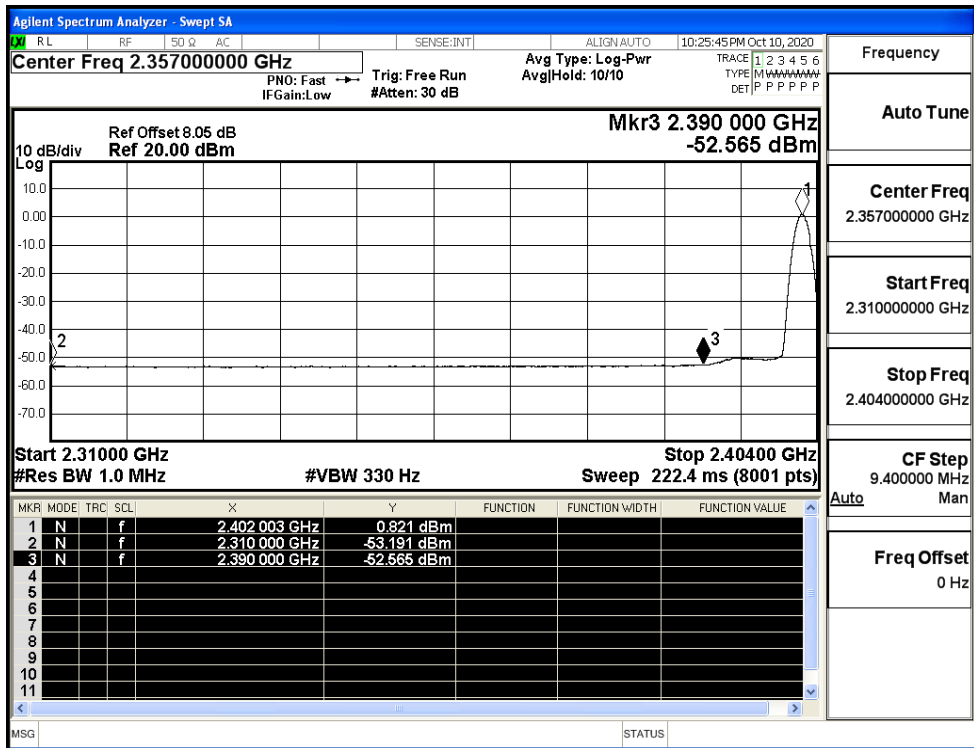
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



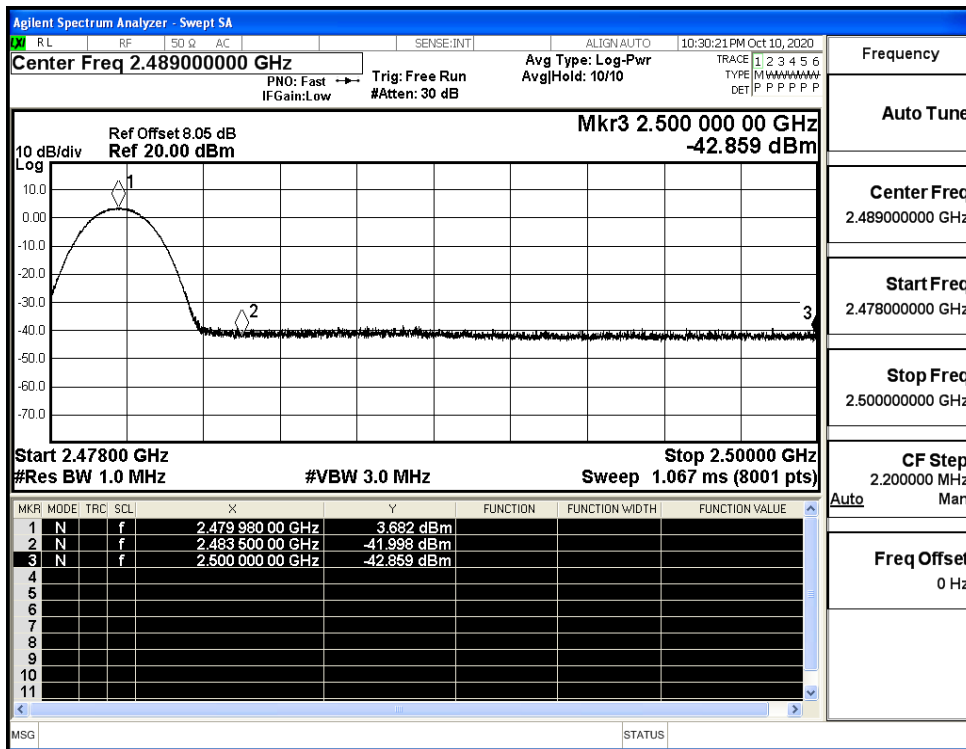
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

