

Appendix A

RF Test Data for BT V4.0(BDR/EDR) (Conducted Measurement)

Product Name: Projector

Trade Mark: N/A

Test Model: F-402

Environmental Conditions

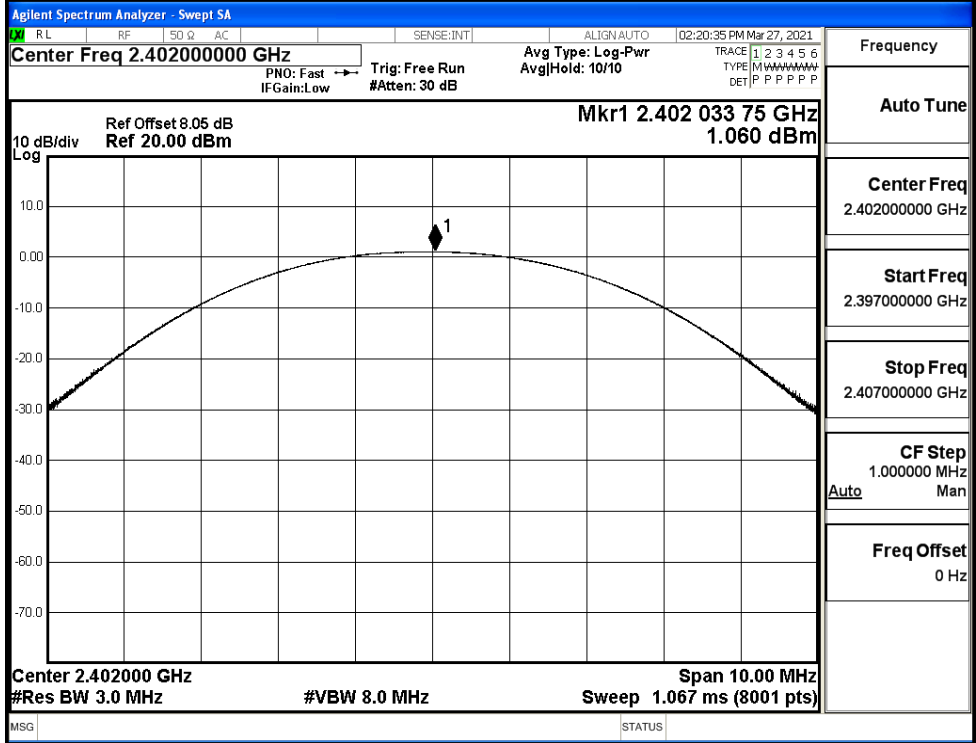
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond Lu
Supervised by:	Li Huan

A.1 Maxmum Conducted Peak Output Power

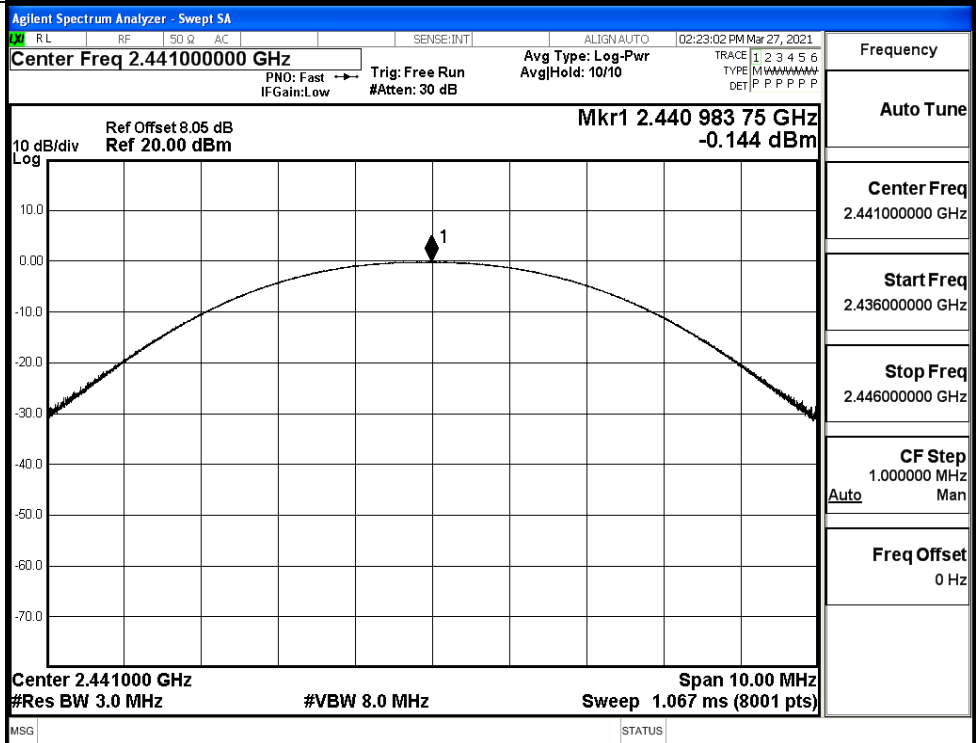
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.060	21	PASS
	MCH	-0.144	21	PASS
	HCH	-0.234	21	PASS
$\pi/4$ DQPSK	LCH	0.312	21	PASS
	MCH	-0.879	21	PASS
	HCH	-0.710	21	PASS
8DPSK	LCH	0.917	21	PASS
	MCH	2.292	21	PASS
	HCH	2.421	21	PASS

Test Graphs

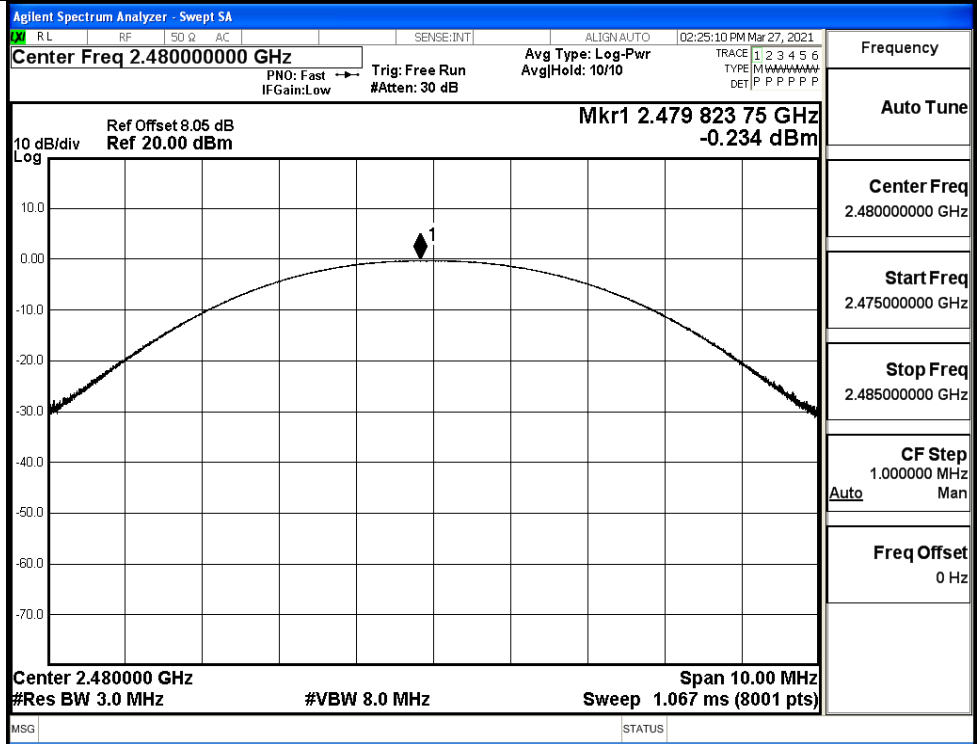
GFSK/LCH



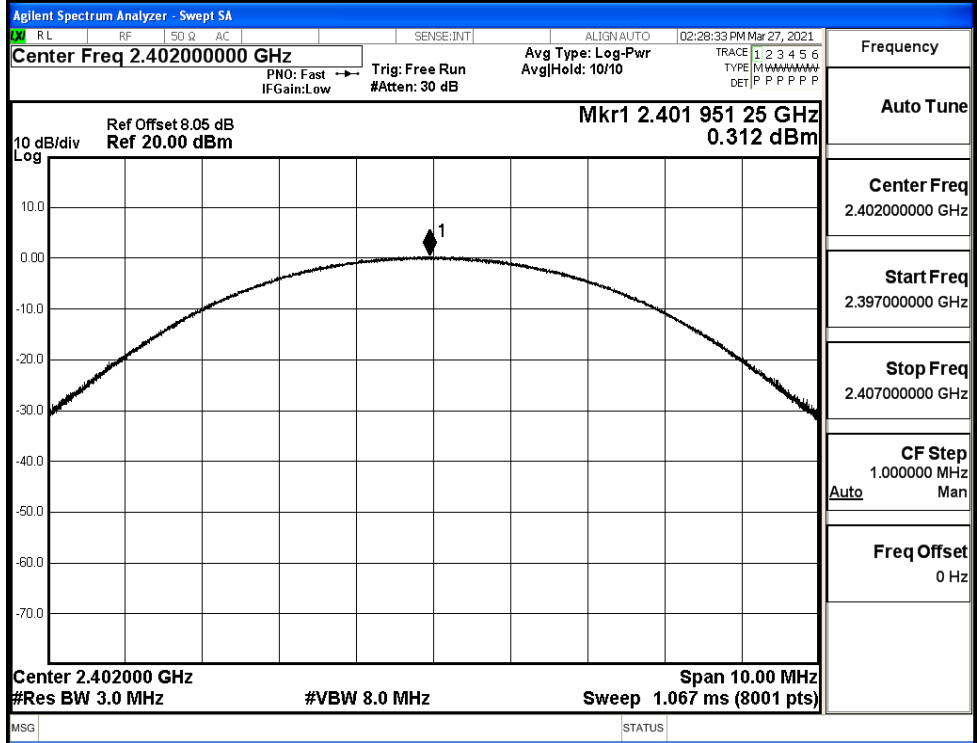
GFSK/MCH



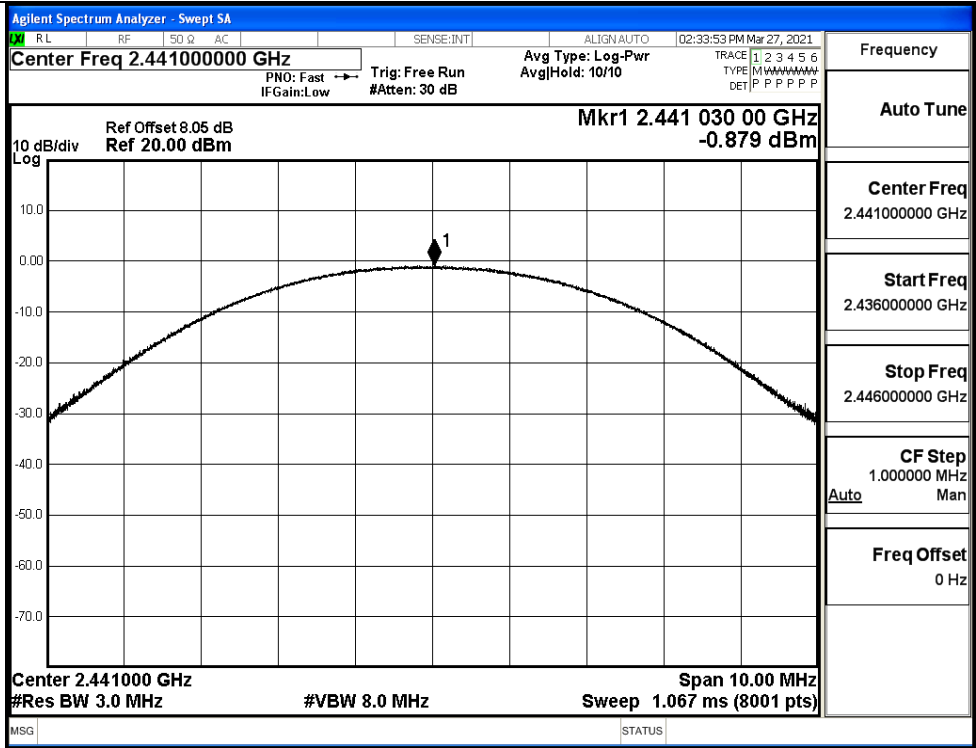
GFSK/HCH



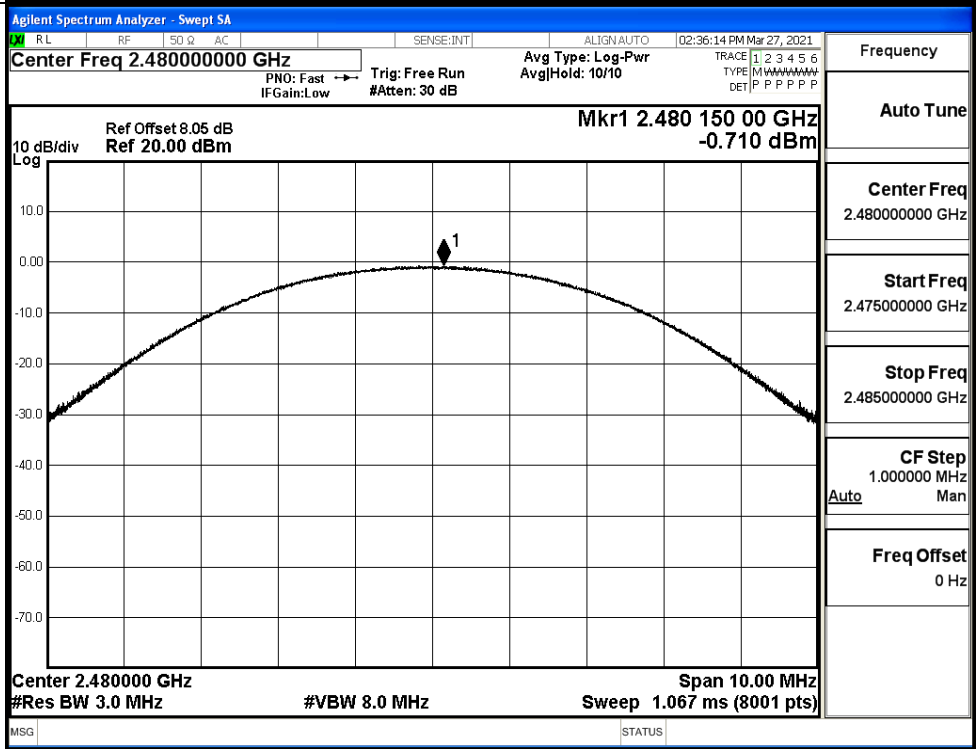
π /4DQPSK/LCH



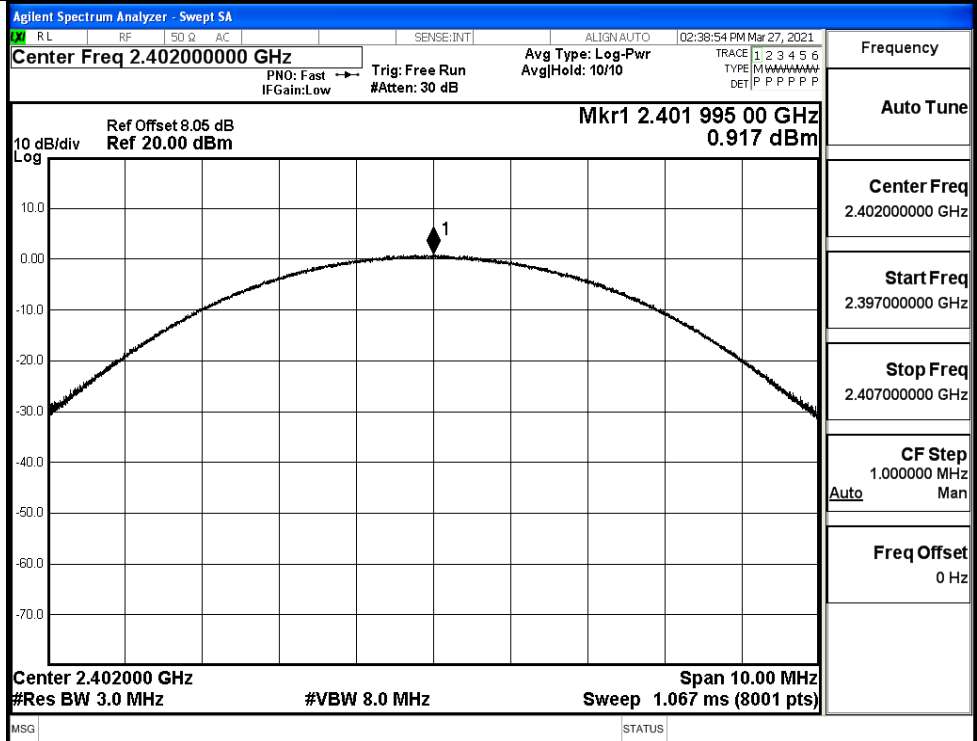
$\pi/4$ DQPSK/MCH



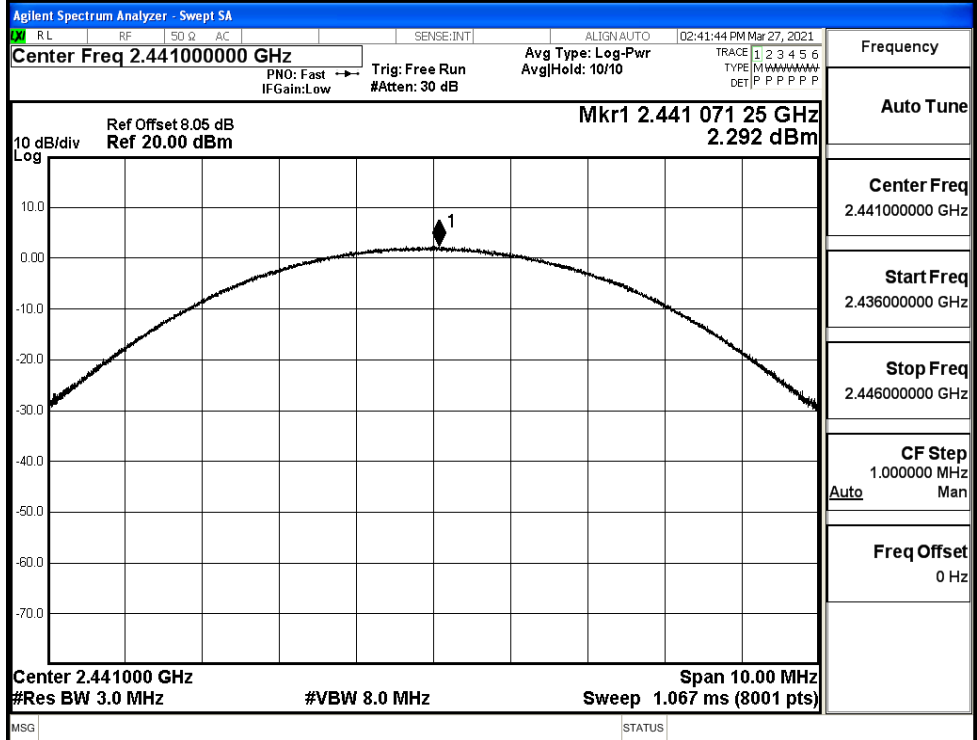
$\pi/4$ DQPSK/HCH



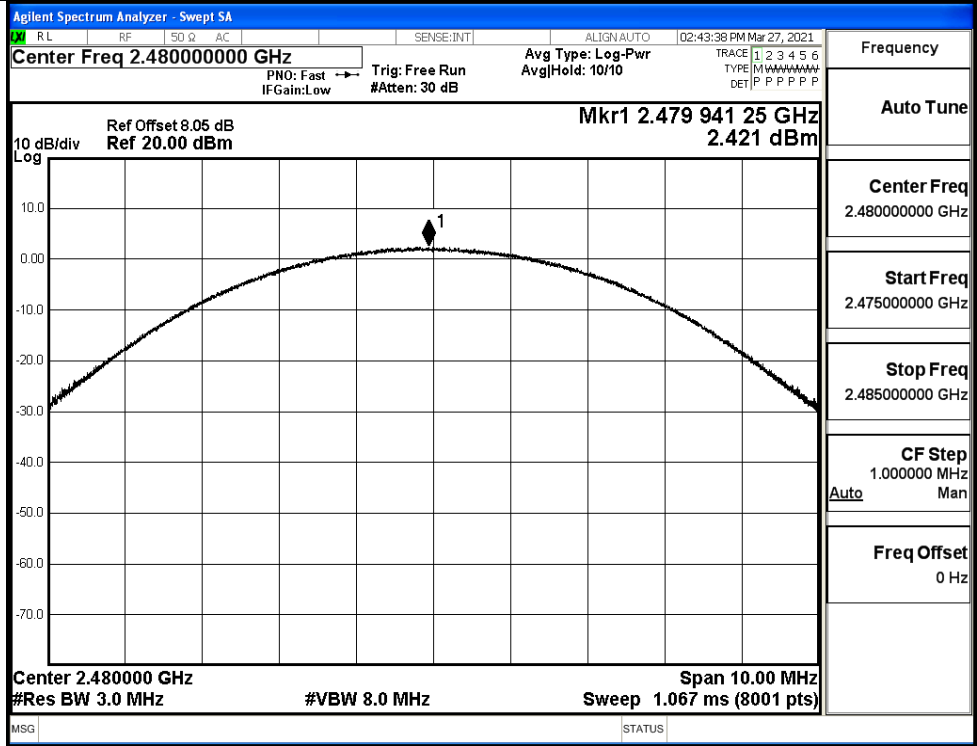
8DPSK/LCH



8DPSK/MCH

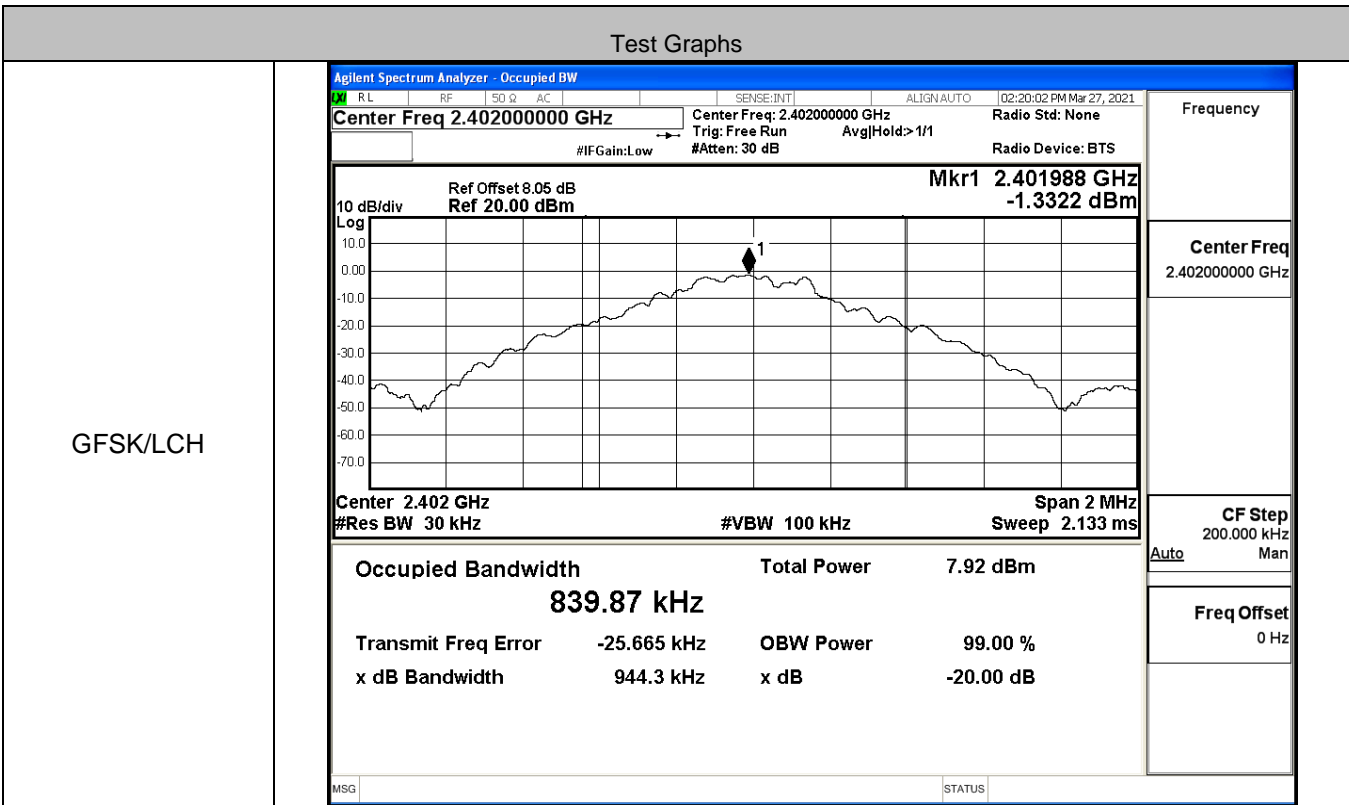


8DPSK/HCH

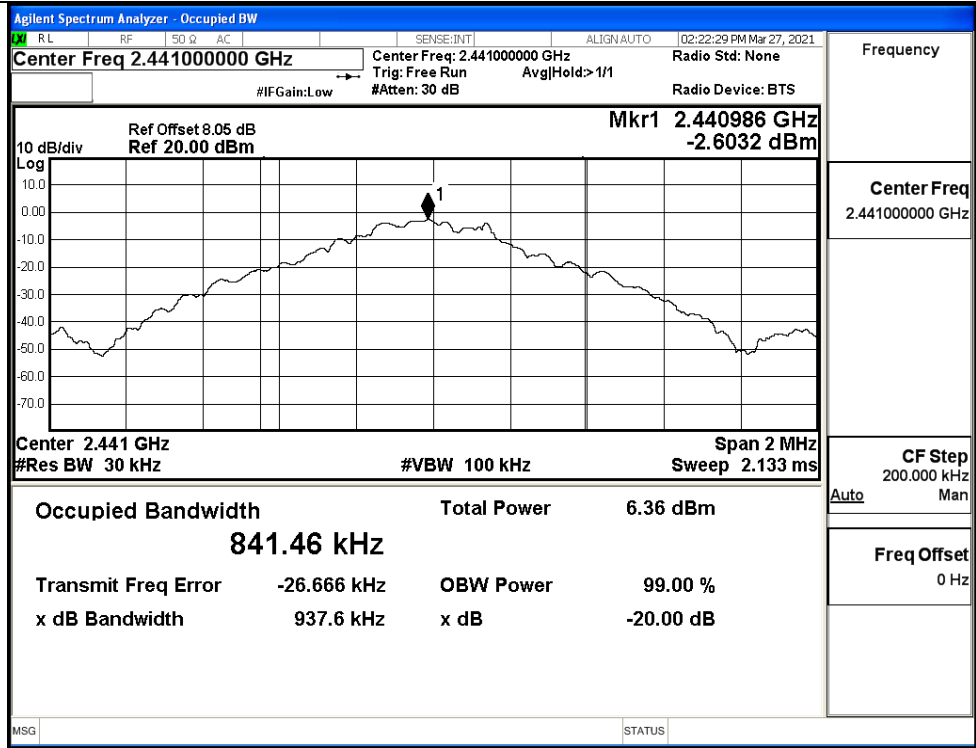


A.2 20dB Bandwidth

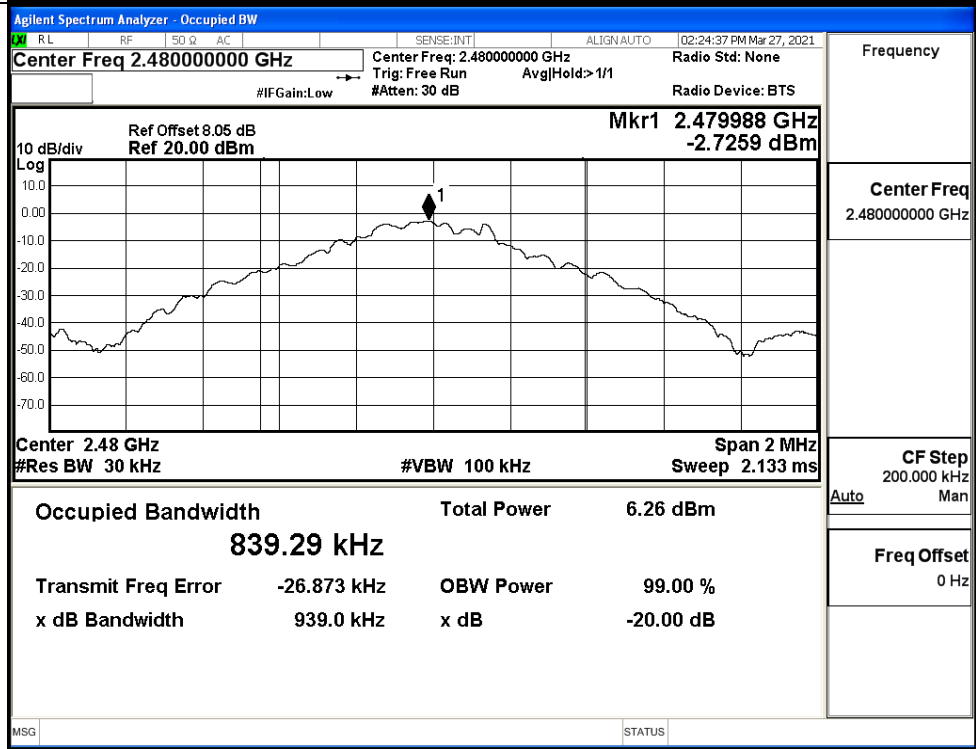
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9443	Not Specified	PASS
	MCH	0.9376	Not Specified	PASS
	HCH	0.9390	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.322	Not Specified	PASS
	MCH	1.322	Not Specified	PASS
	HCH	1.318	Not Specified	PASS
8DPSK	LCH	1.312	Not Specified	PASS
	MCH	1.310	Not Specified	PASS
	HCH	1.308	Not Specified	PASS



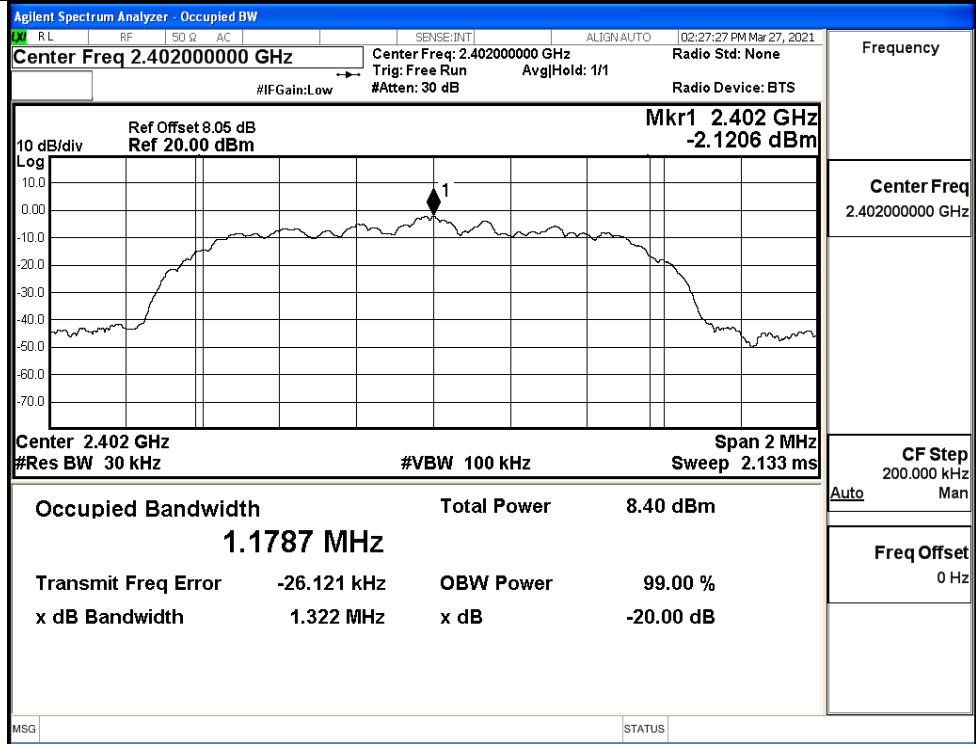
GFSK/MCH



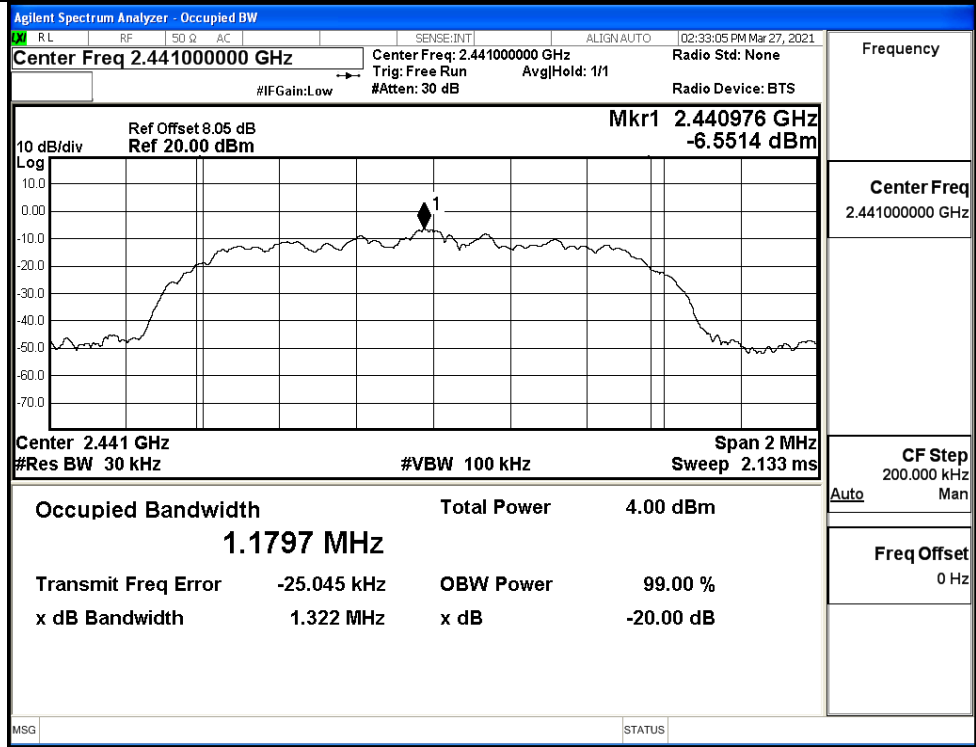
GFSK/HCH



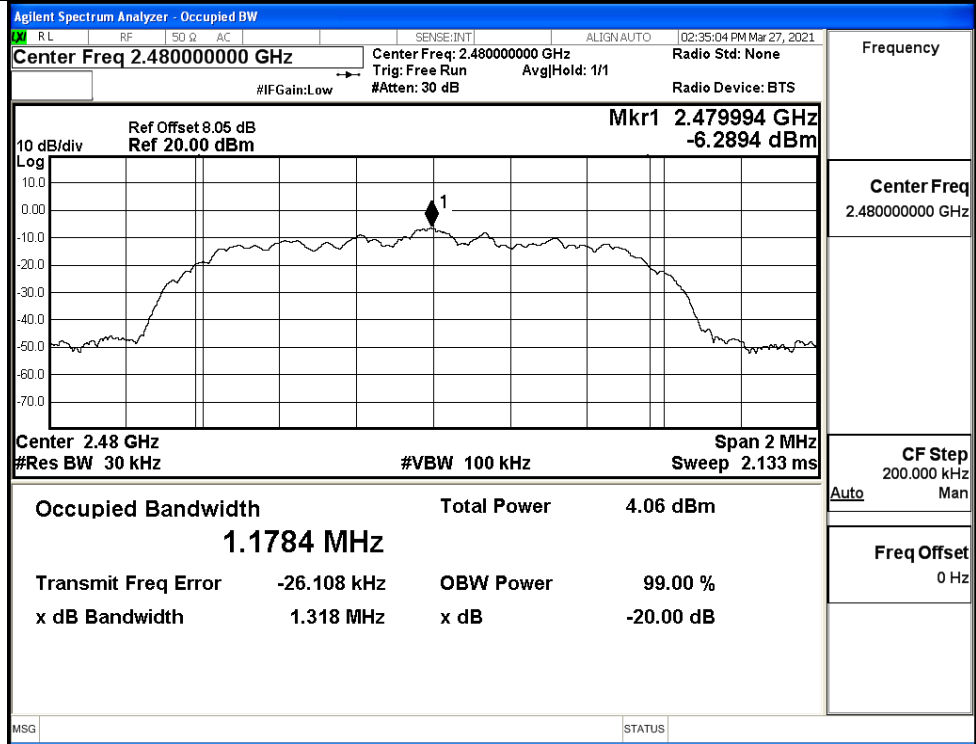
$\pi/4$ DQPSK/LCH



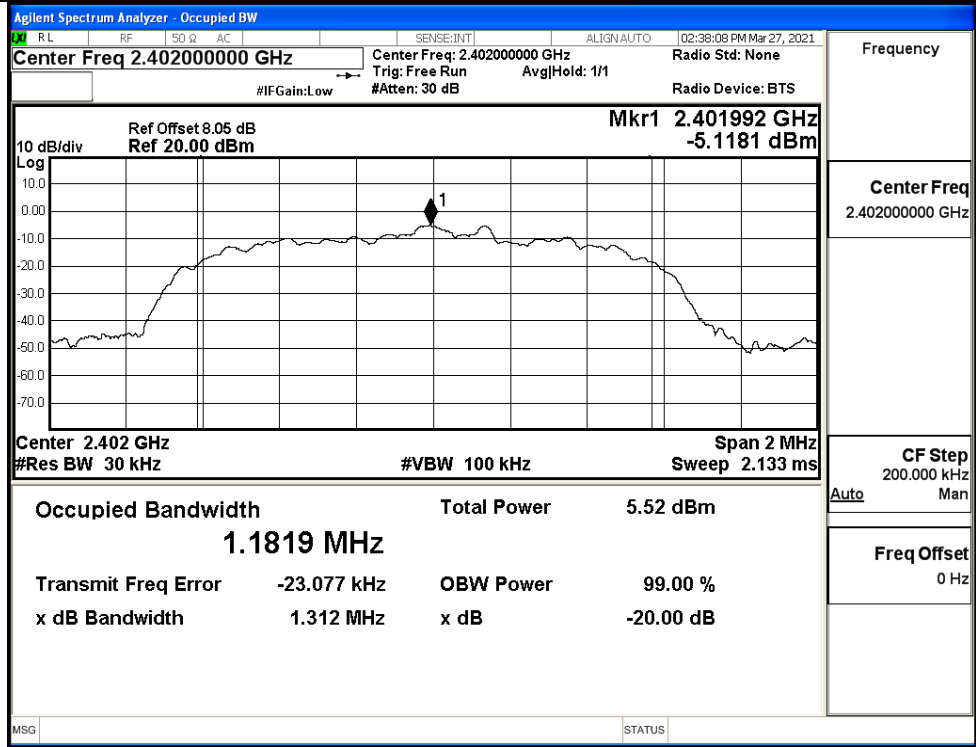
$\pi/4$ DQPSK/MCH



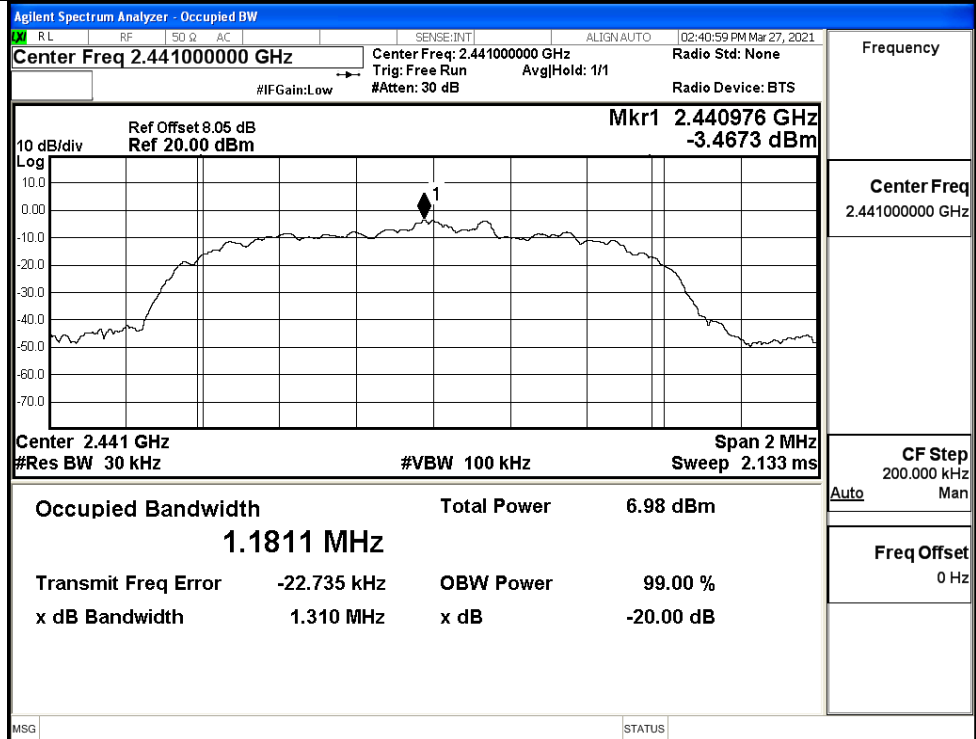
$\pi/4$ DQPSK/HCH



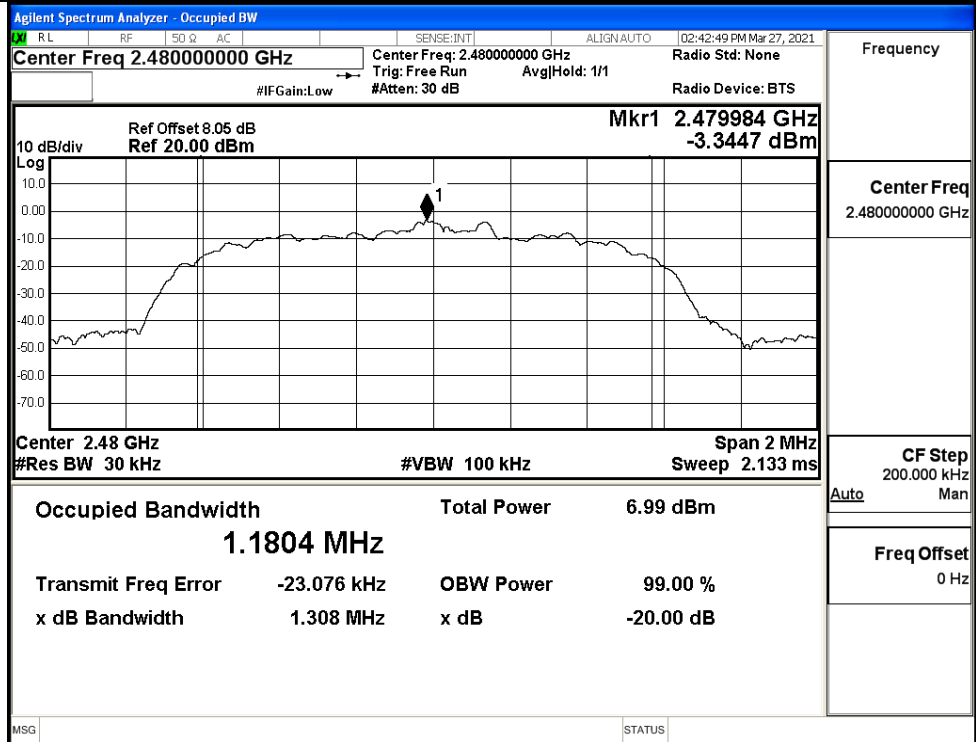
8DPSK/LCH



8DPSK/MCH

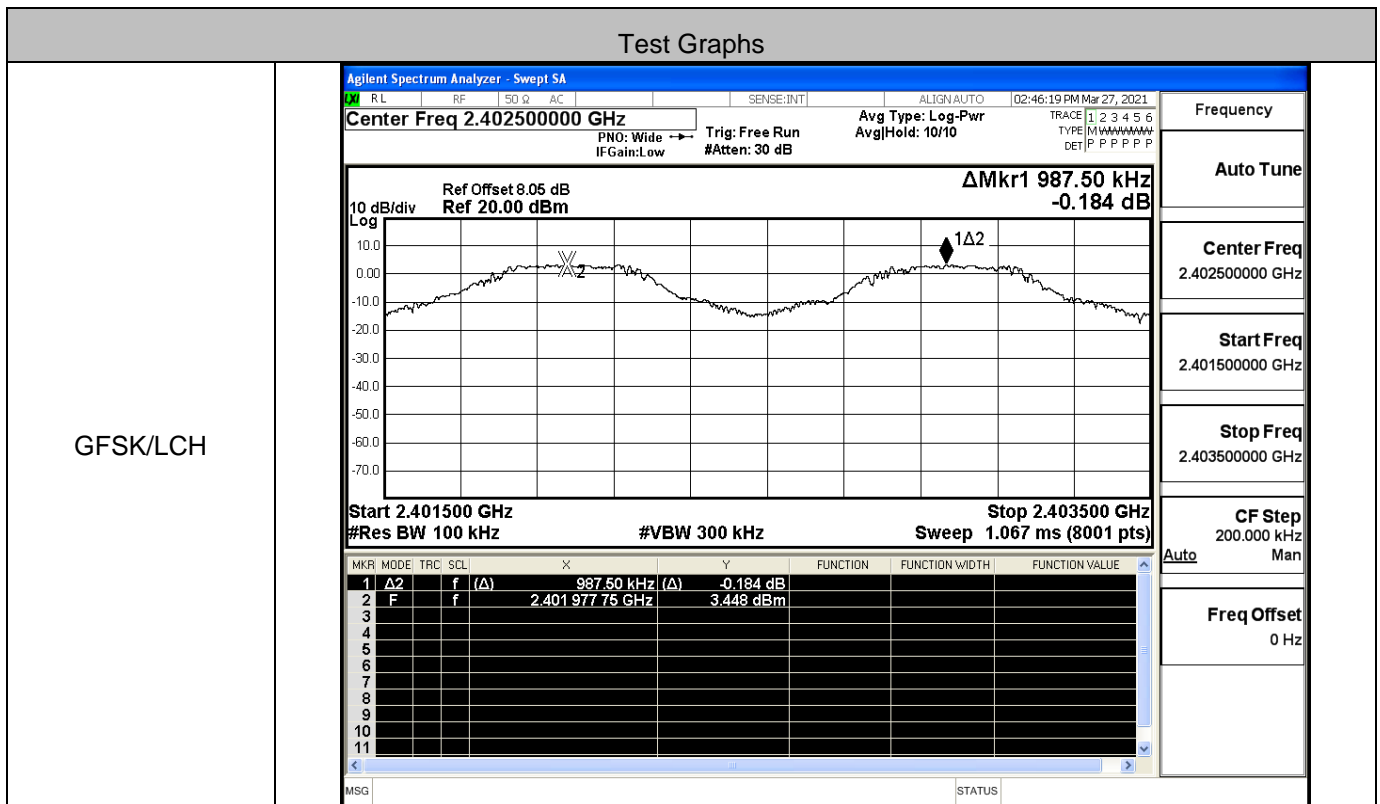


8DPSK/HCH

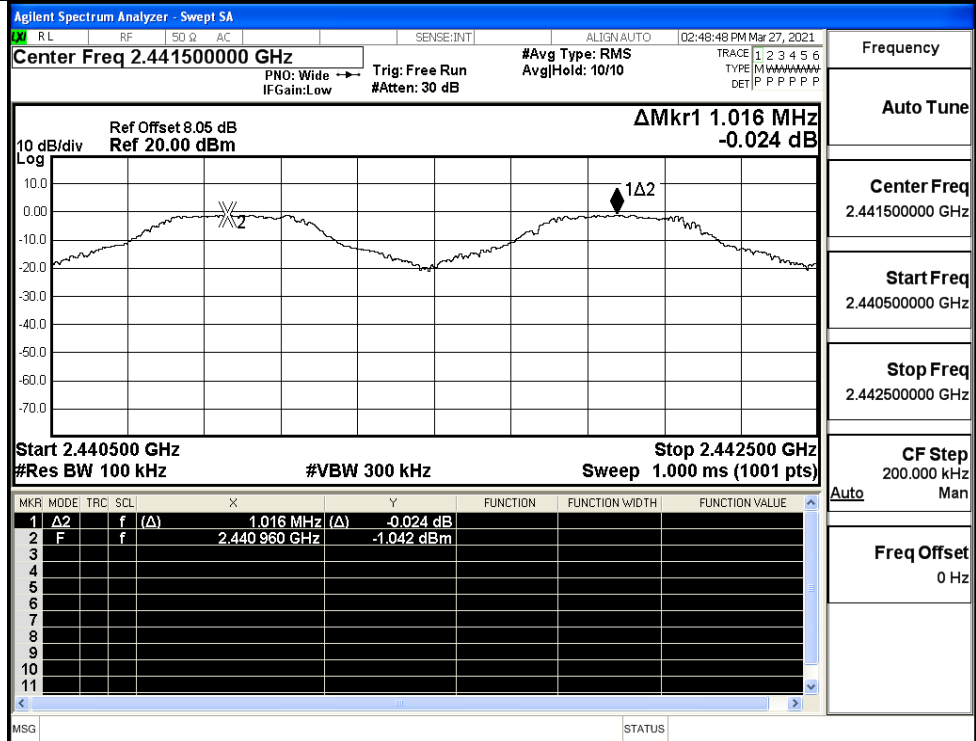


A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.988	0.630	PASS
	MCH	1.016	0.630	PASS
	HCH	0.988	0.630	PASS
π/4DQPSK	LCH	1.138	0.881	PASS
	MCH	0.990	0.881	PASS
	HCH	1.012	0.881	PASS
8DPSK	LCH	0.962	0.875	PASS
	MCH	1.024	0.875	PASS
	HCH	1.056	0.875	PASS



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

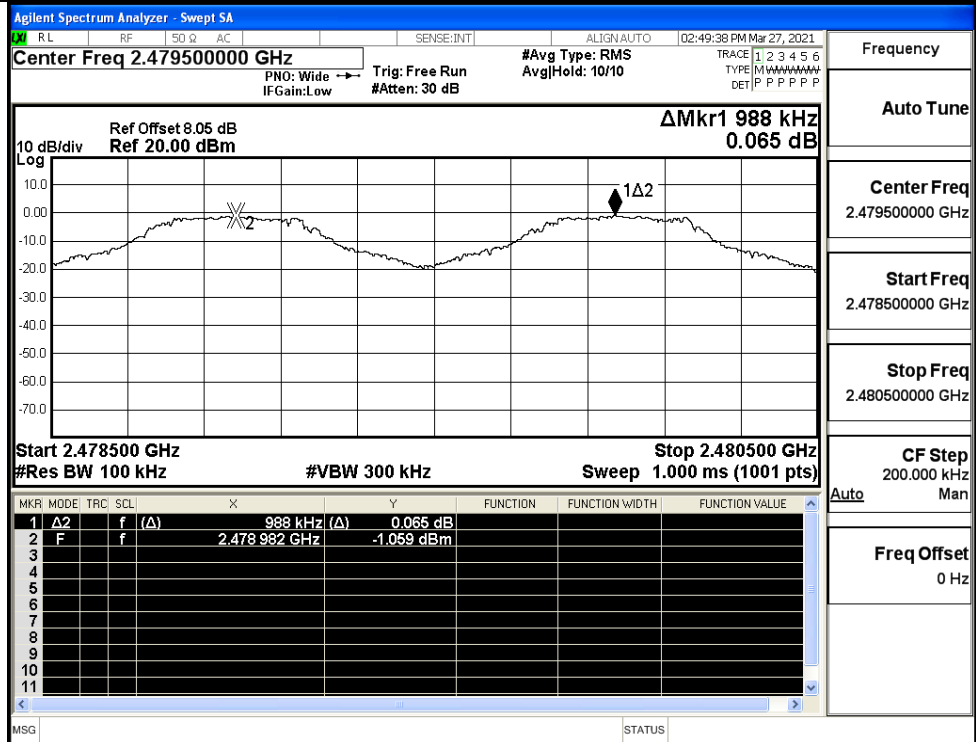
Start Freq
2.440500000 GHz

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

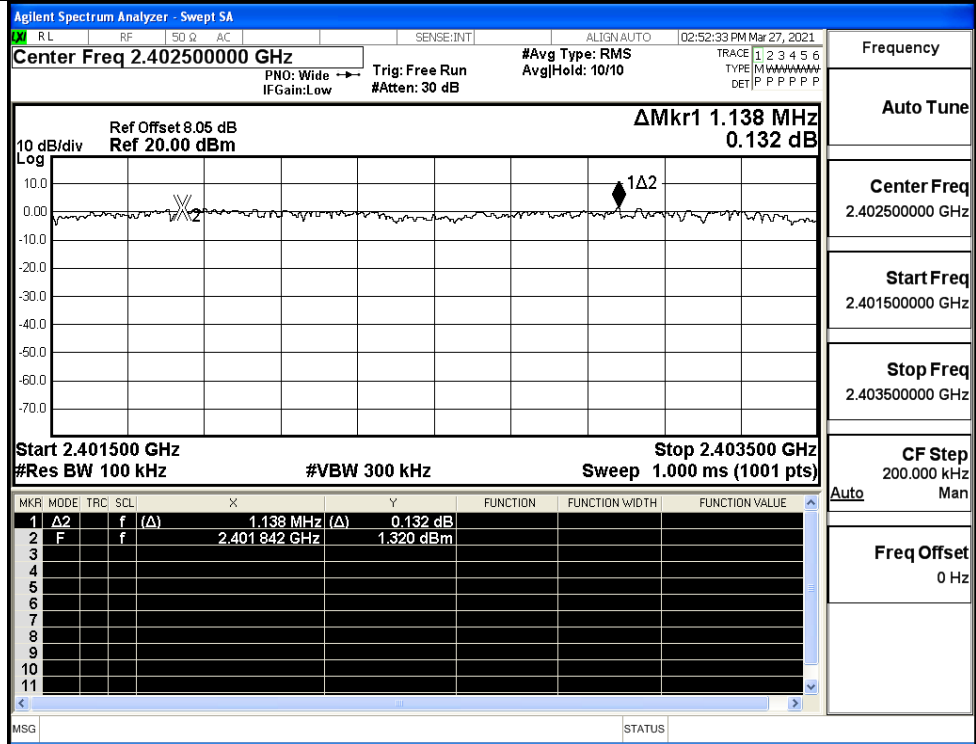
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Auto Man

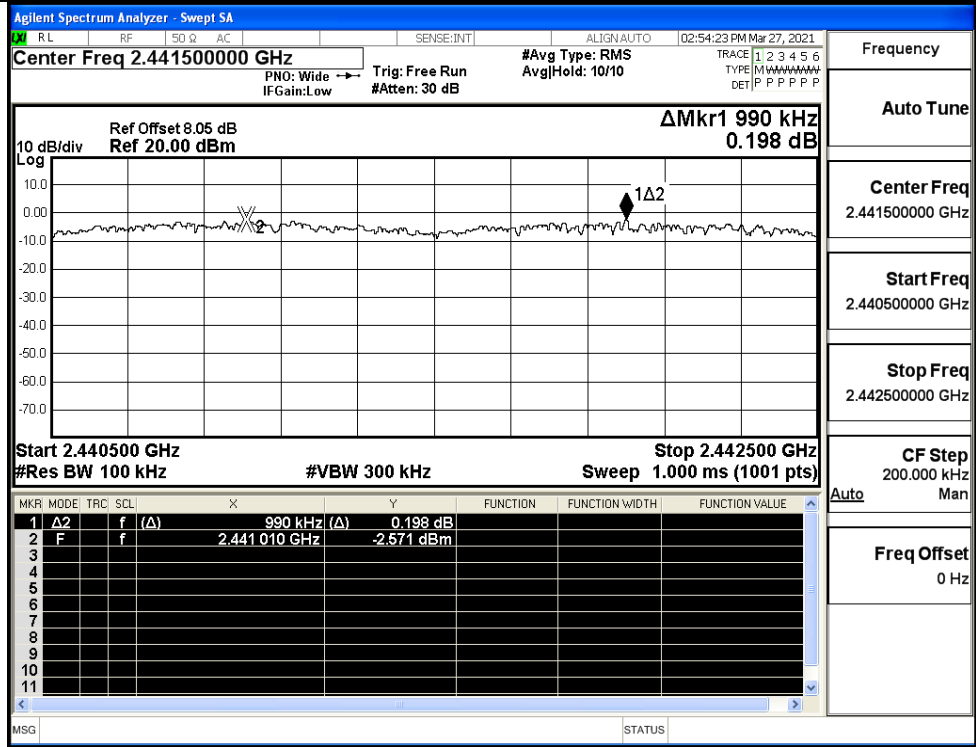
Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH



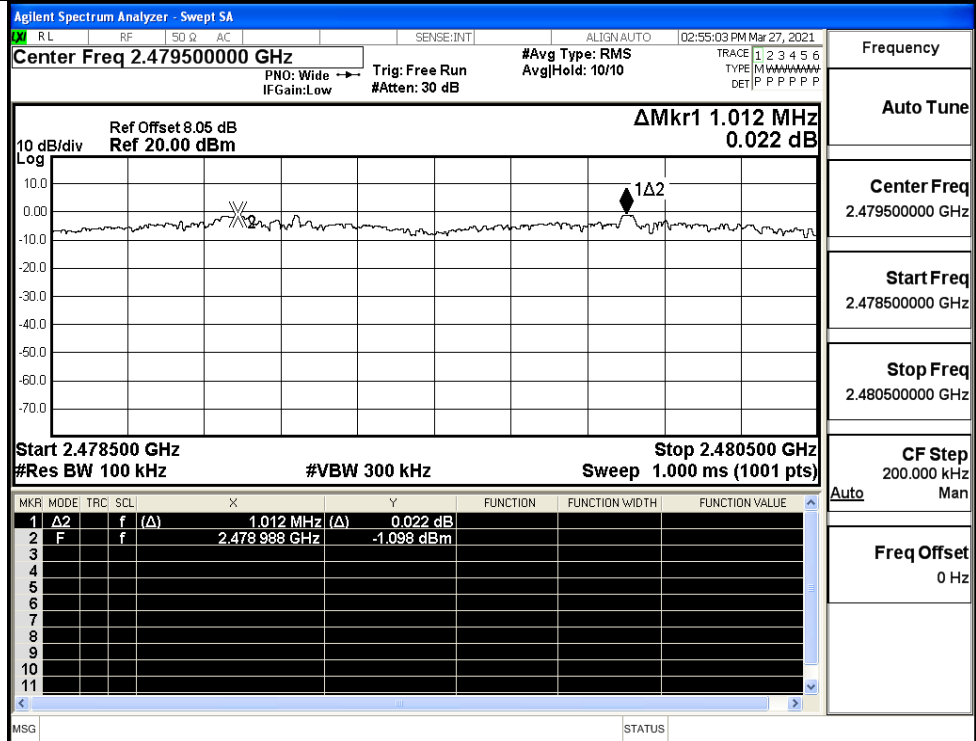
Frequency	2.402500000 GHz
Auto Tune	
Center Freq	2.402500000 GHz
Start Freq	2.401500000 GHz
Stop Freq	2.403500000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK/MCH



Frequency	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

π/4DQPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

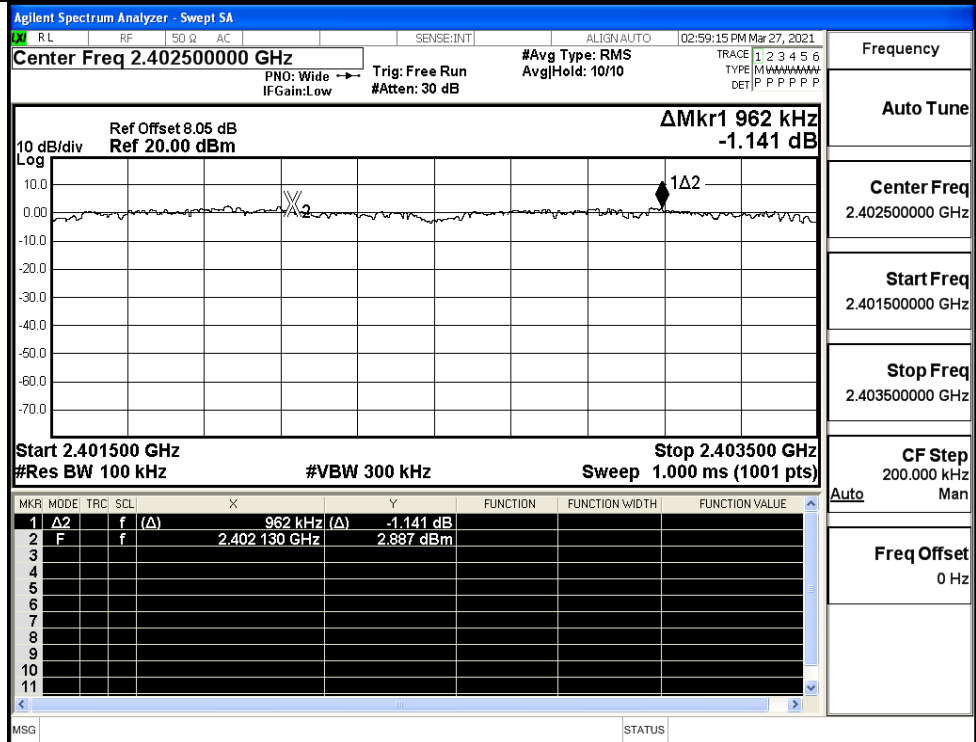
Start Freq
2.478500000 GHz

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

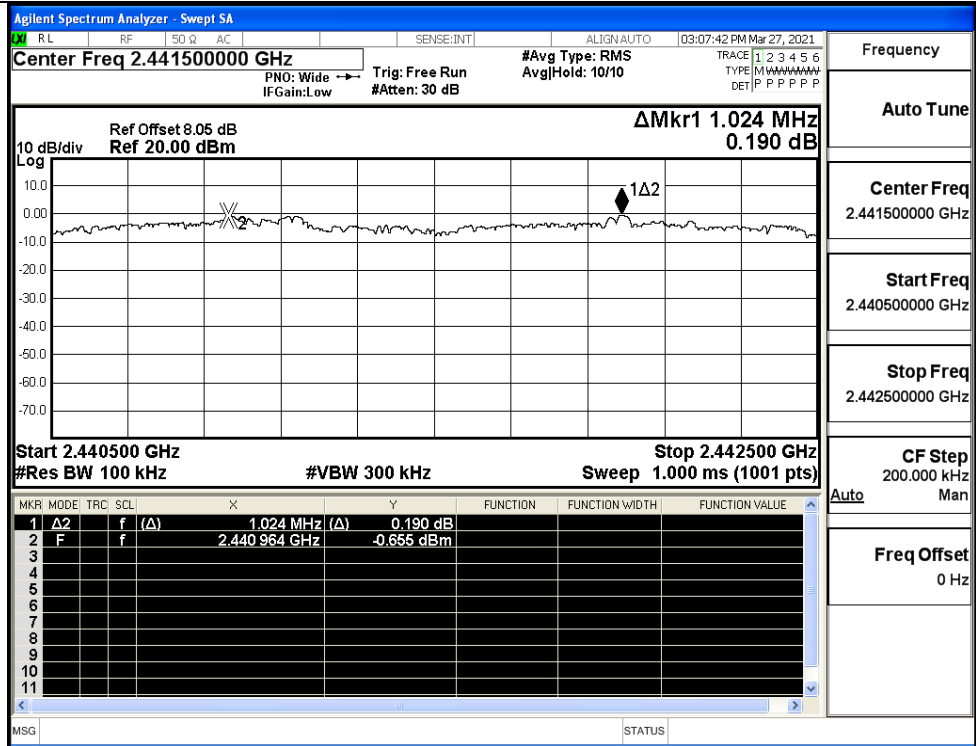
Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

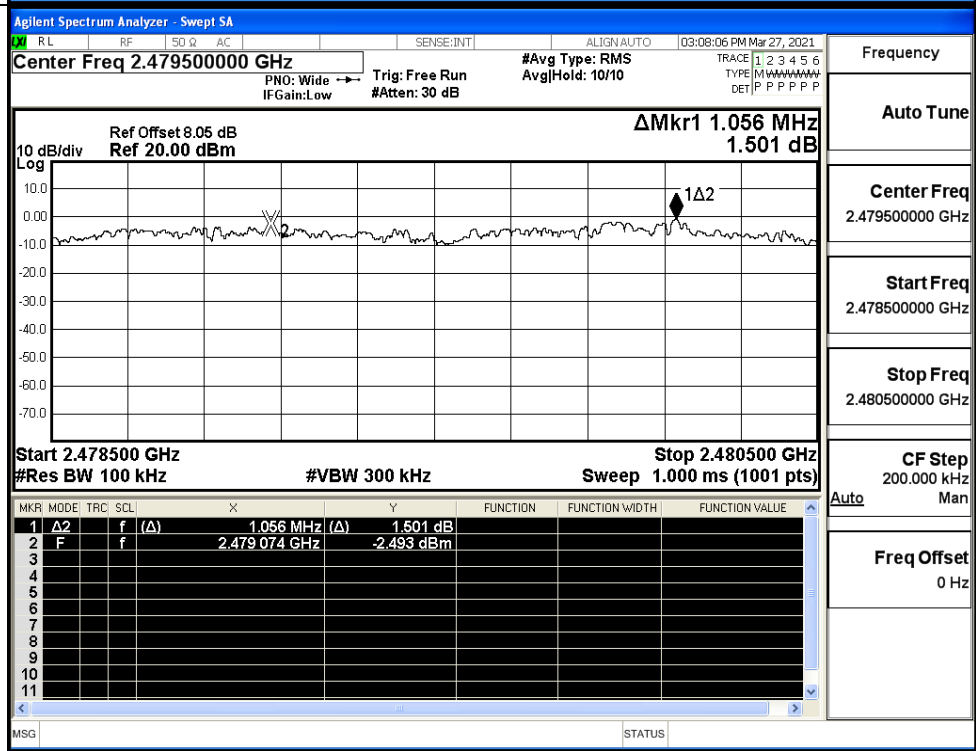
CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

8DPSK/MCH



8DPSK/HCH



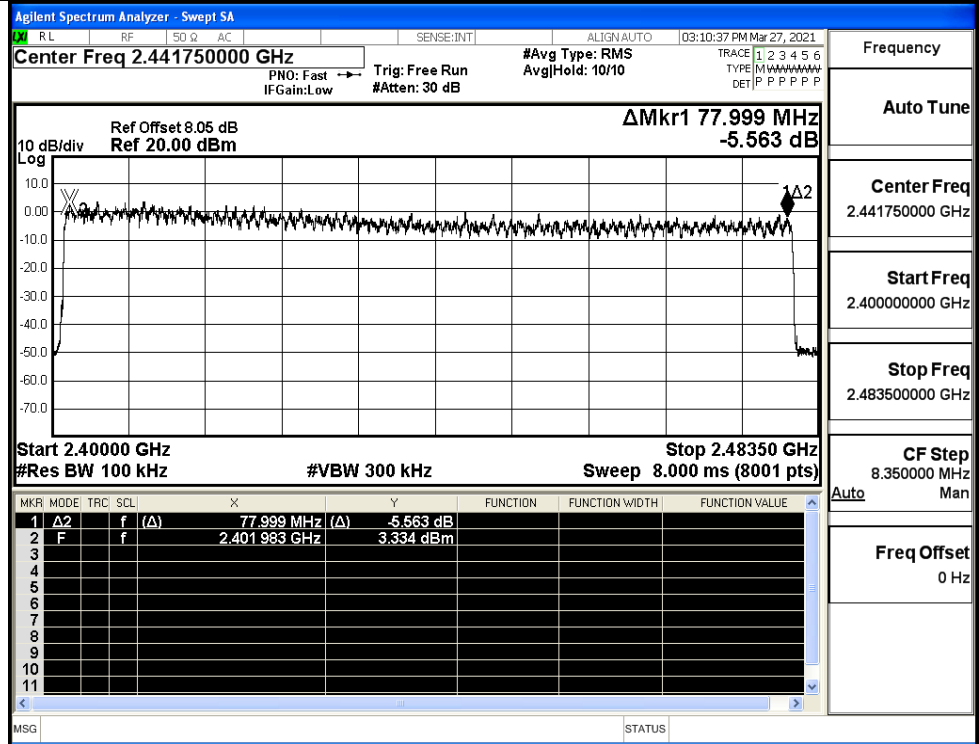
A.4 Hopping Channel Number

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

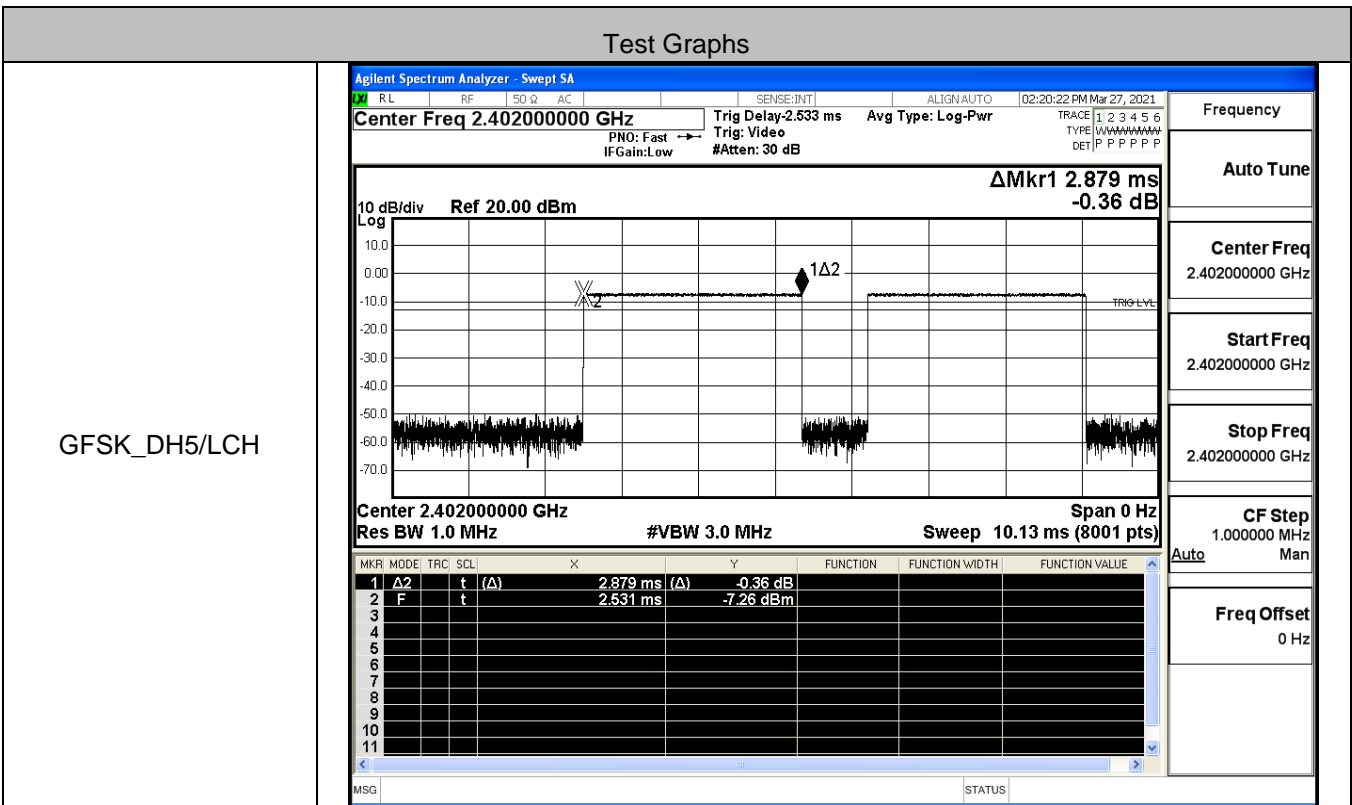
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 8.05 dB Ref 20.00 dBm ΔMkr1 77.979 MHz -4.145 dB Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <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>77.979 MHz</td> <td>(Δ)</td> <td>-4.145 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.401994 GHz</td> <td></td> <td>2.933 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.979 MHz	(Δ)	-4.145 dB			2	F	f		2.401994 GHz		2.933 dBm			Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Man Freq Offset 0 Hz
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.979 MHz	(Δ)	-4.145 dB																							
2	F	f		2.401994 GHz		2.933 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 77.947 MHz -5.739 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"> <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>77.947 MHz</td> <td>(Δ)</td> <td>-5.739 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.401983 GHz</td> <td></td> <td>3.607 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.947 MHz	(Δ)	-5.739 dB			2	F	f		2.401983 GHz		3.607 dBm			Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Man Freq Offset 0 Hz
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.947 MHz	(Δ)	-5.739 dB																							
2	F	f		2.401983 GHz		3.607 dBm																							

8DPSK/Hop

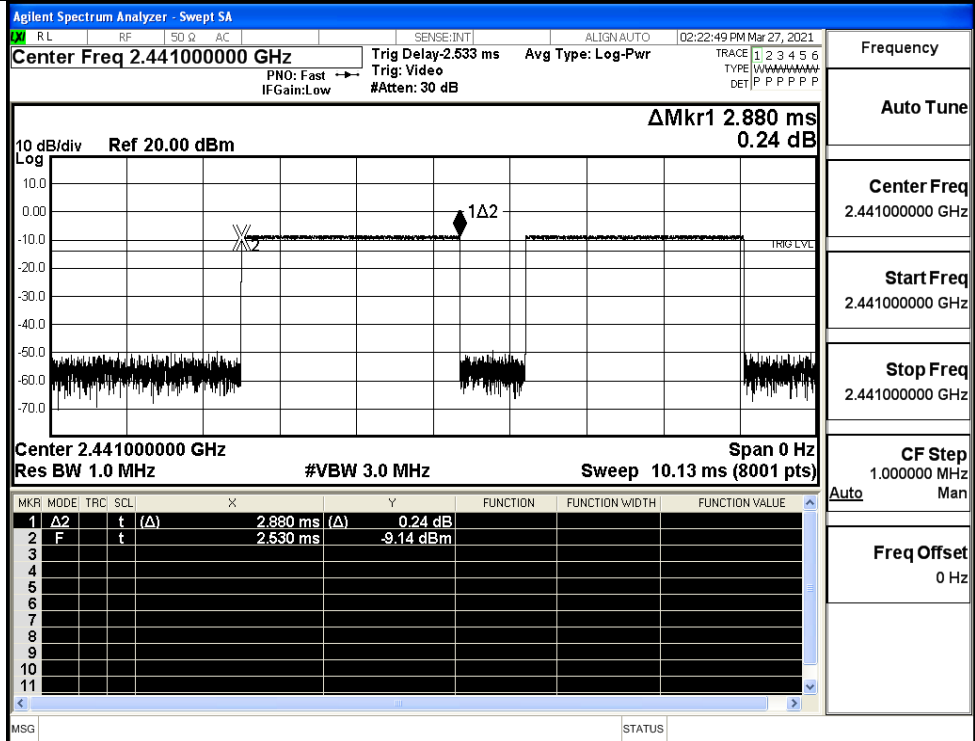


A.5 Dwell Time

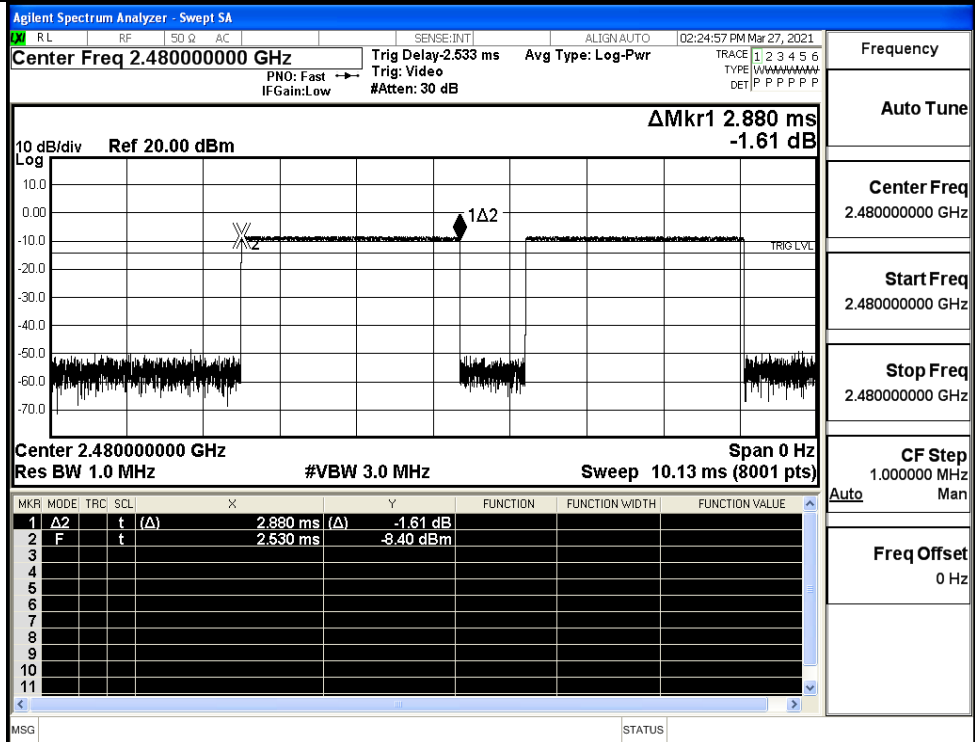
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7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



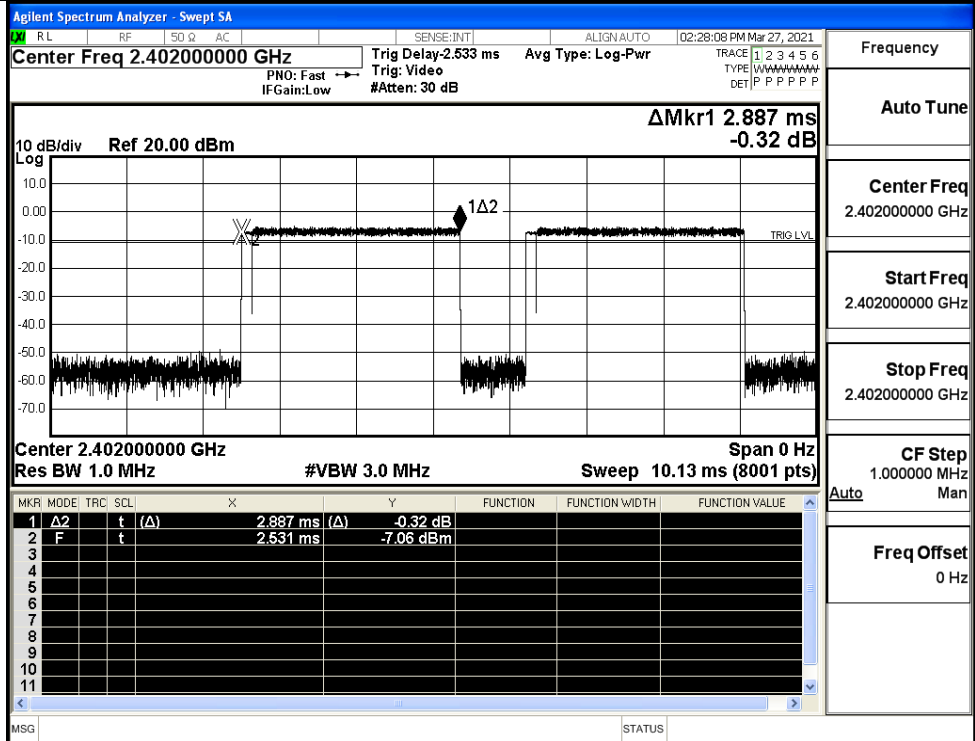
GFSK_DH5/MCH



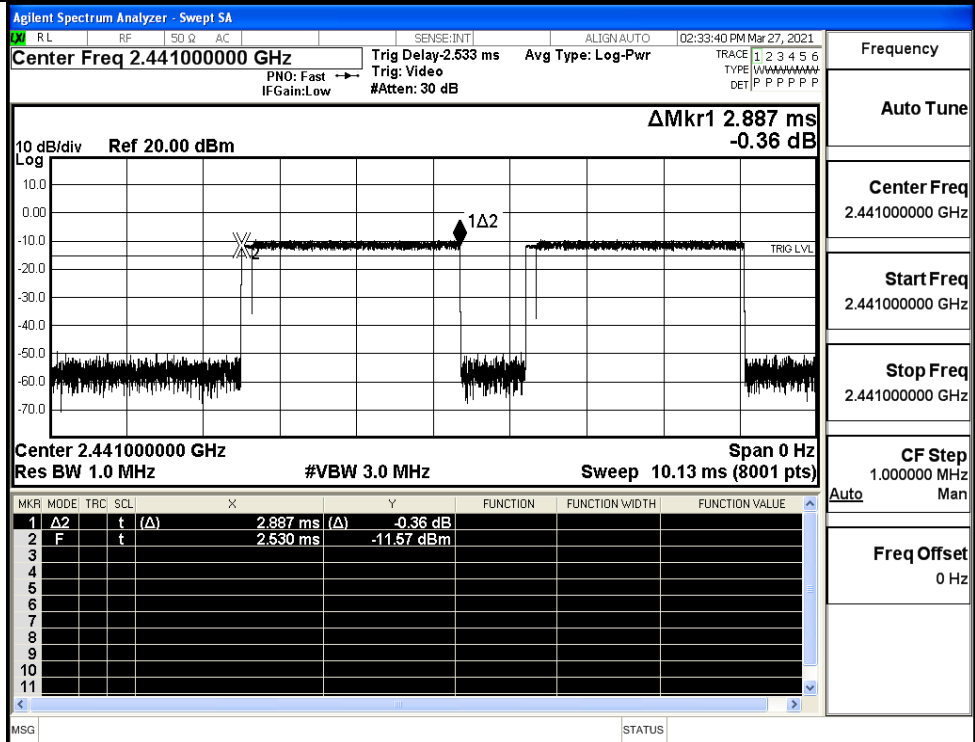
GFSK_DH5/HCH



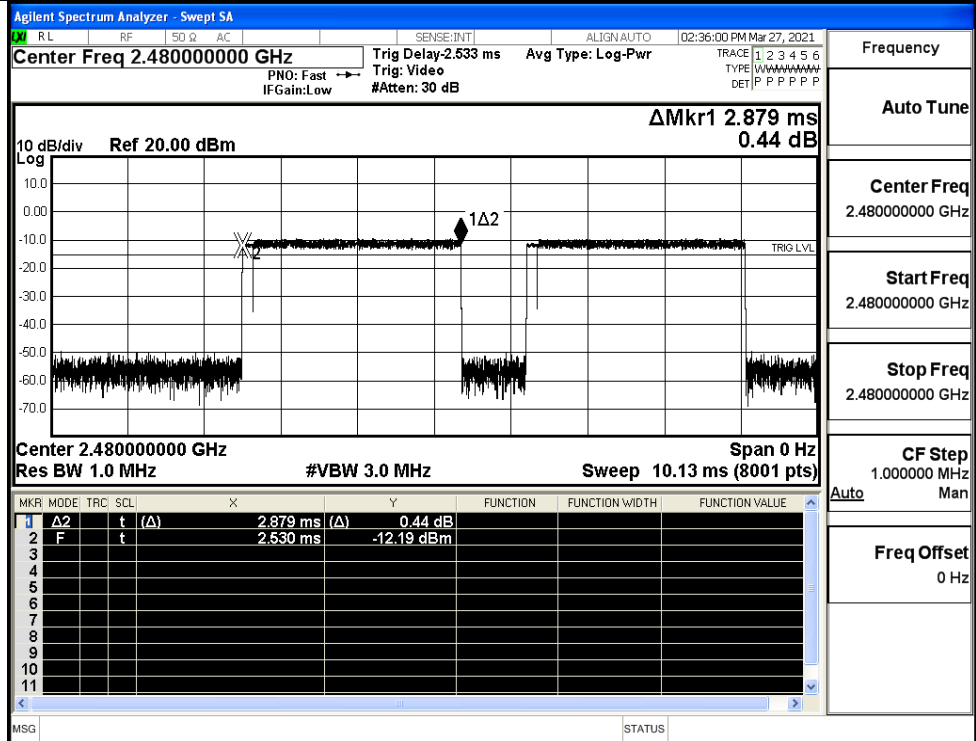
$\pi/4$ DQPSK
_2DH5/LCH



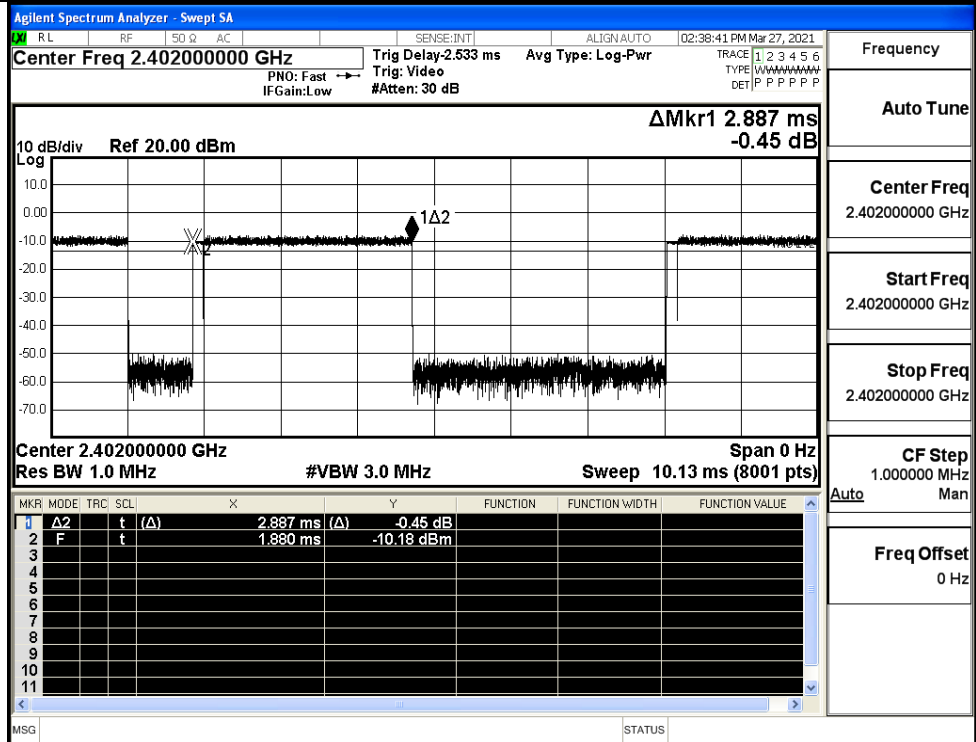
$\pi/4$ DQPSK
_2DH5/MCH



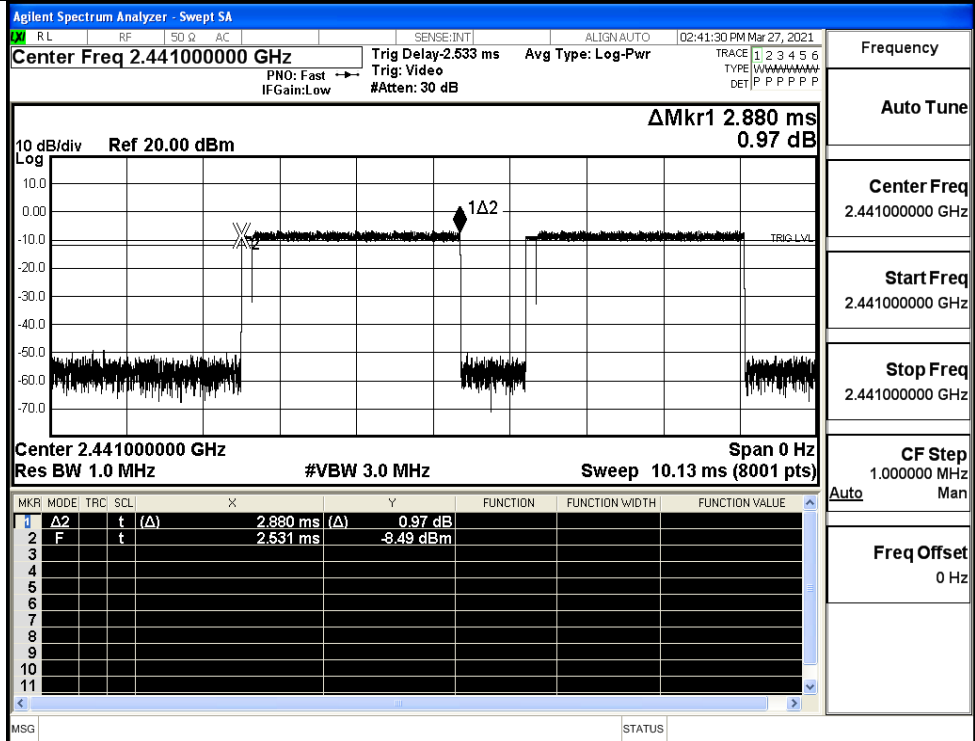
$\pi/4$ DQPSK
_2DH5/HCH



8DPSK_3DH5/LCH



8DPSK_3DH5/MCH



Frequency

Auto Tune

Center Freq 2.441000000 GHz

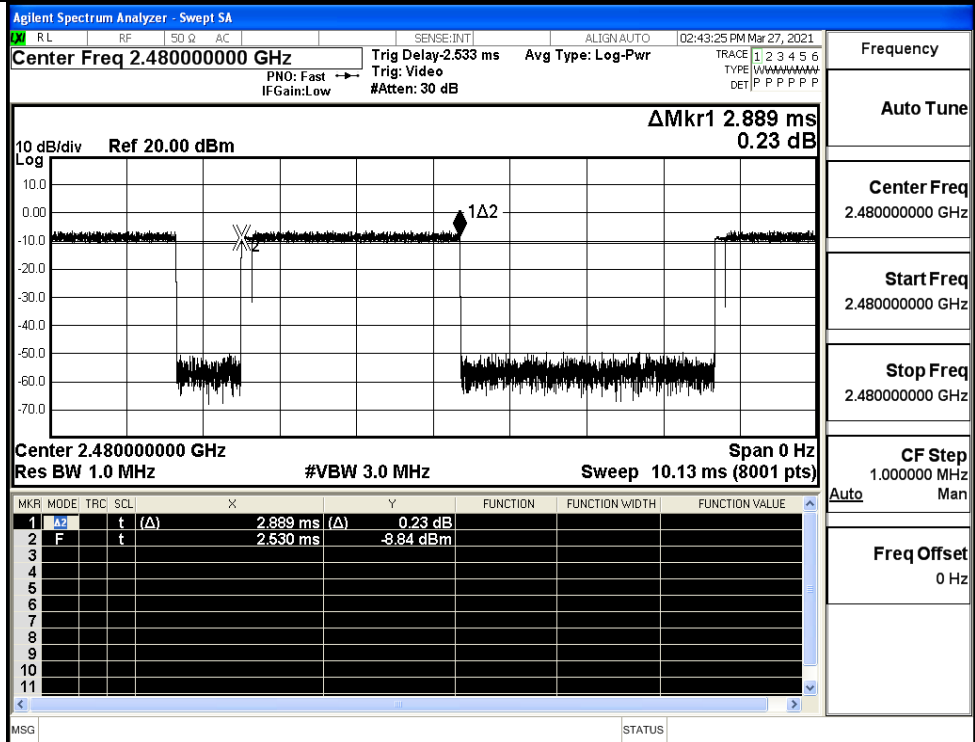
Start Freq 2.441000000 GHz

Stop Freq 2.441000000 GHz

CF Step 1.000000 MHz

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

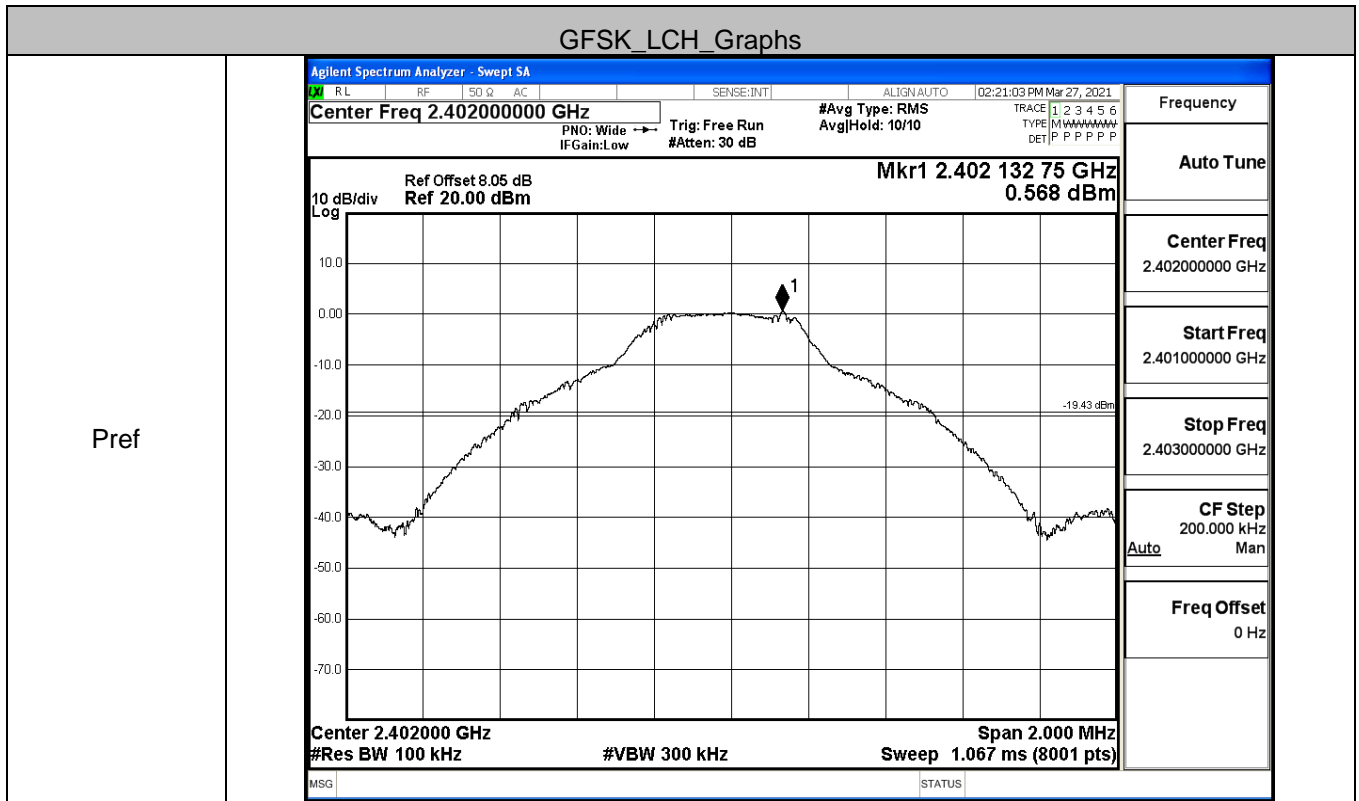
CF Step 1.000000 MHz

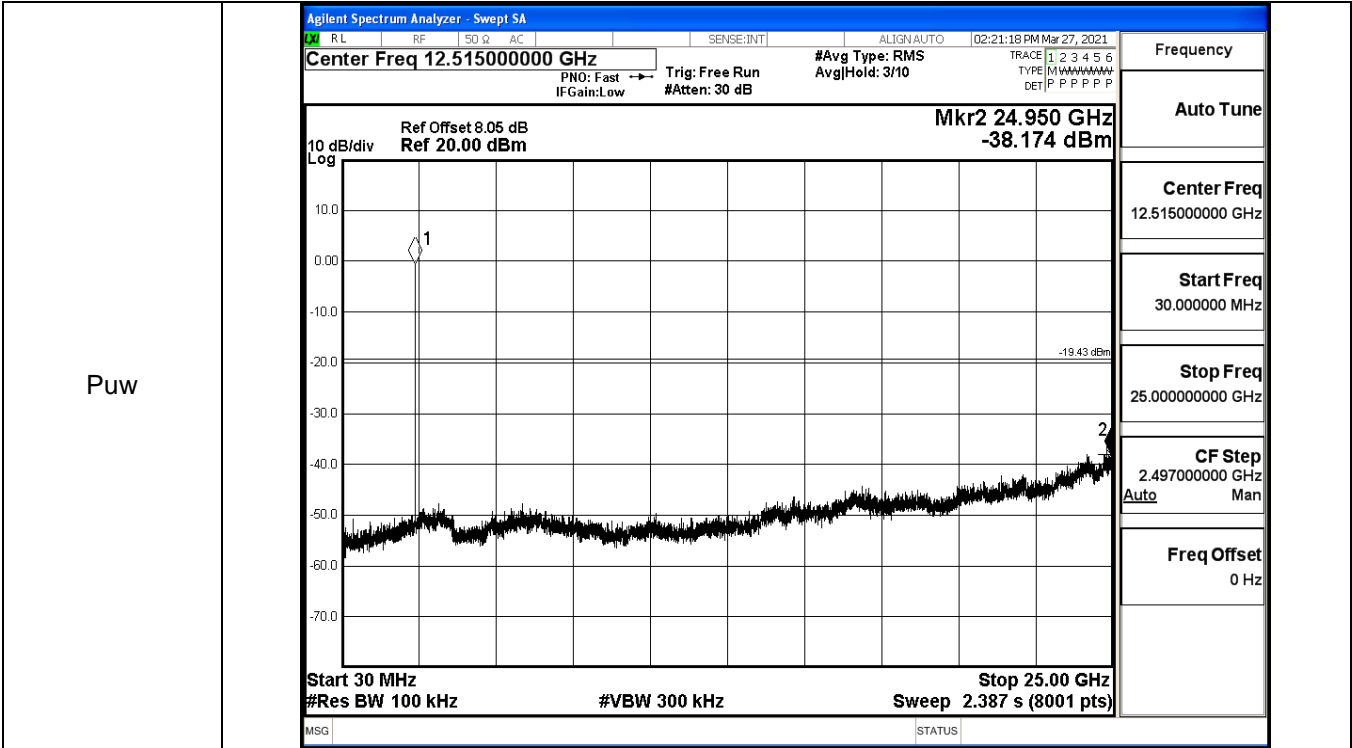
Freq Offset 0 Hz

A.6 RF Conducted Spurious Emissions

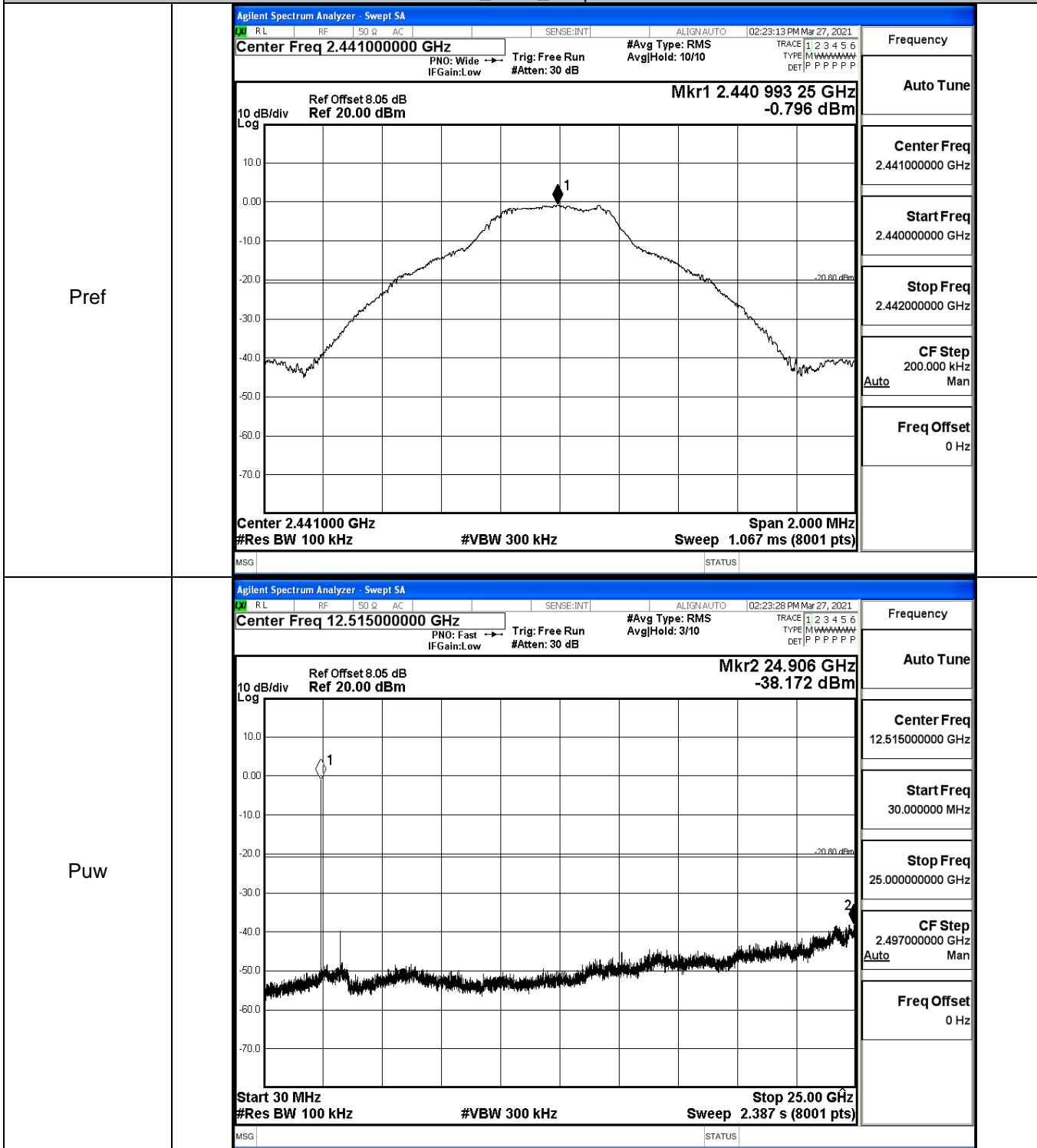
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.568	-38.174	-19.432	PASS
	MCH	-0.796	-38.172	-20.796	PASS
	HCH	-0.612	-36.843	-20.612	PASS
π /4DQPSK	LCH	-2.296	-37.196	-22.296	PASS
	MCH	-3.791	-37.390	-23.791	PASS
	HCH	-3.413	-36.936	-23.413	PASS
8DPSK	LCH	-2.298	-37.885	-22.298	PASS
	MCH	-1.041	-37.867	-21.041	PASS
	HCH	-0.806	-37.978	-20.806	PASS

GFSK_LCH_Graphs

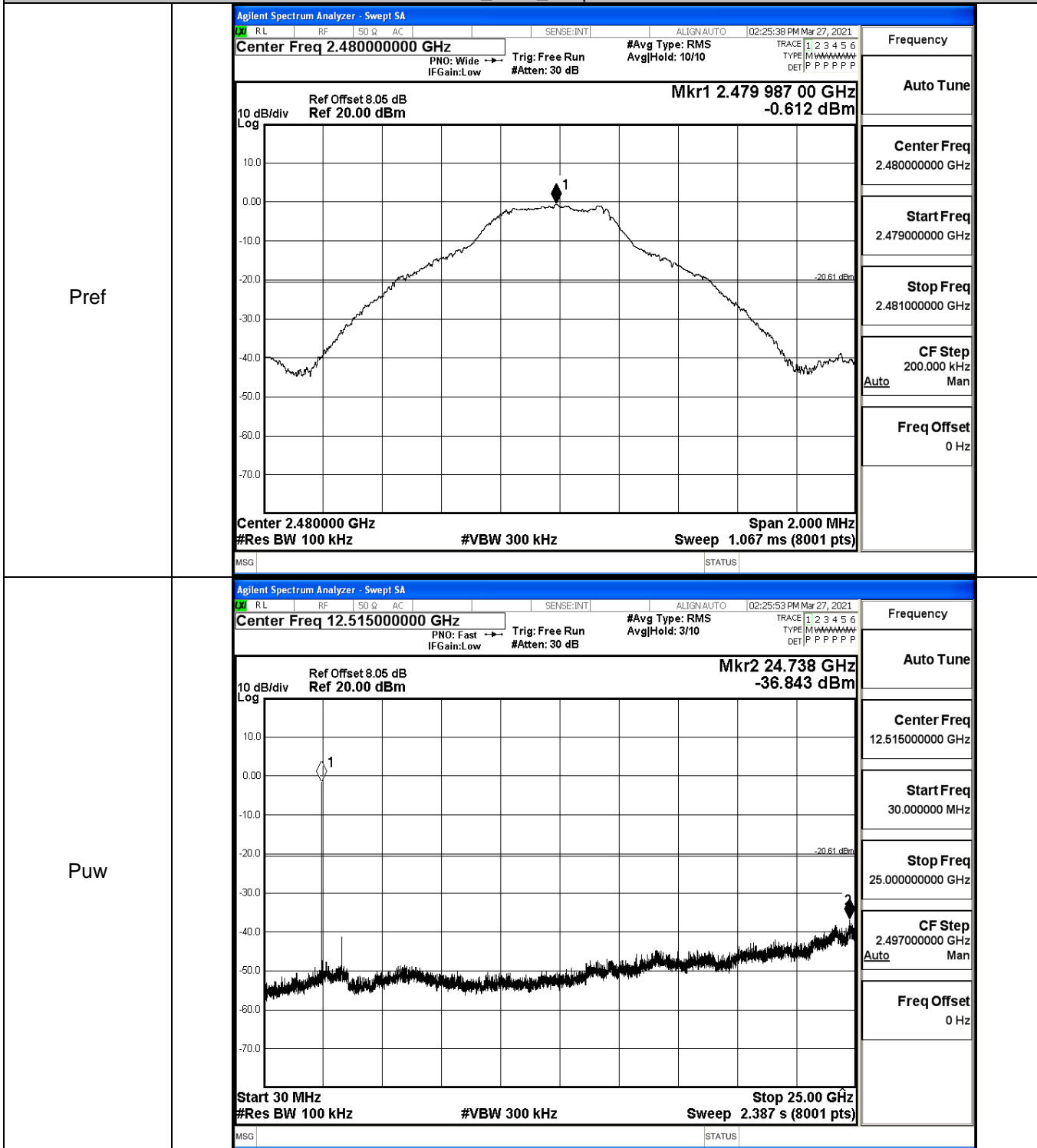




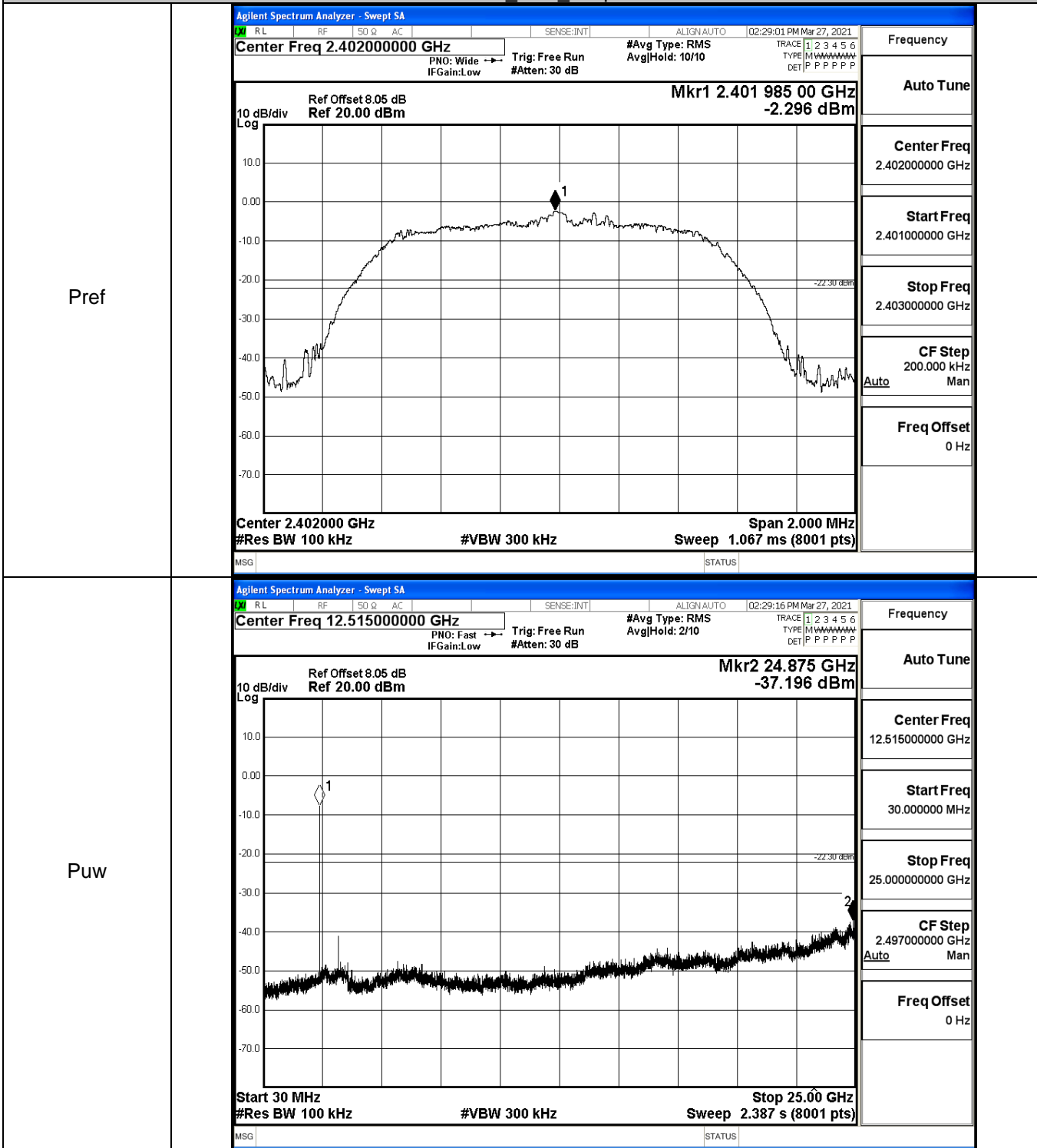
GFSK_MCH_Graphs




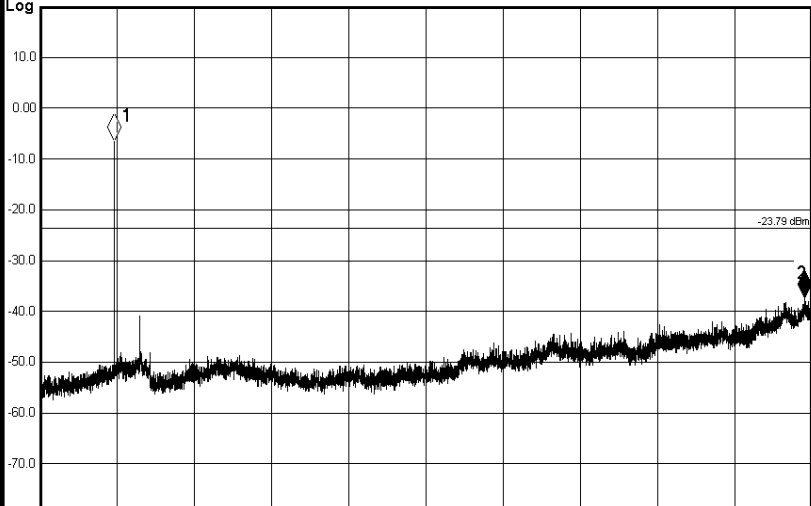
GFSK_HCH_Graphs



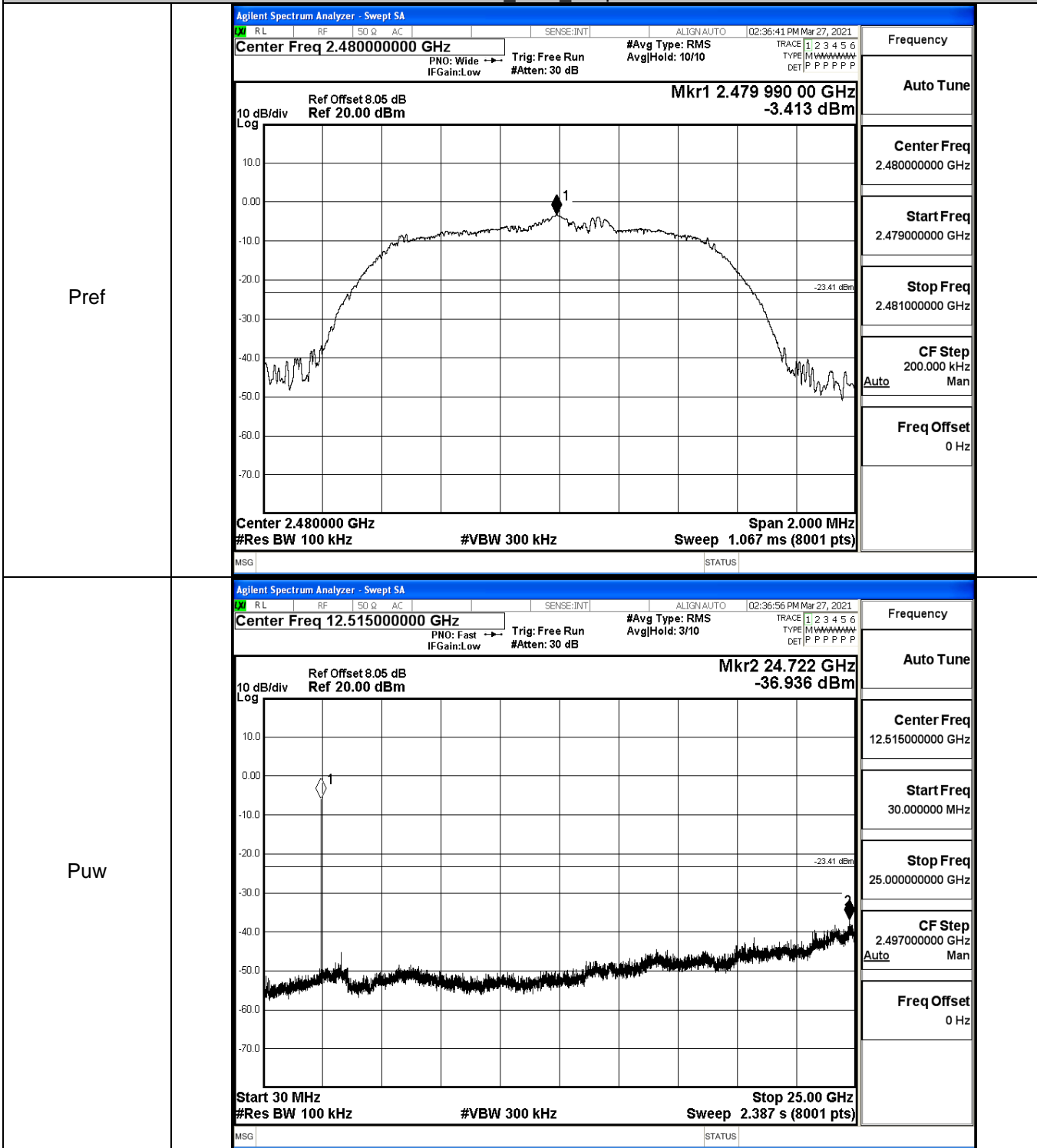
$\pi/4$ DQPSK_LCH_Graphs



$\pi/4$ DQPSK_MCH_Graphs

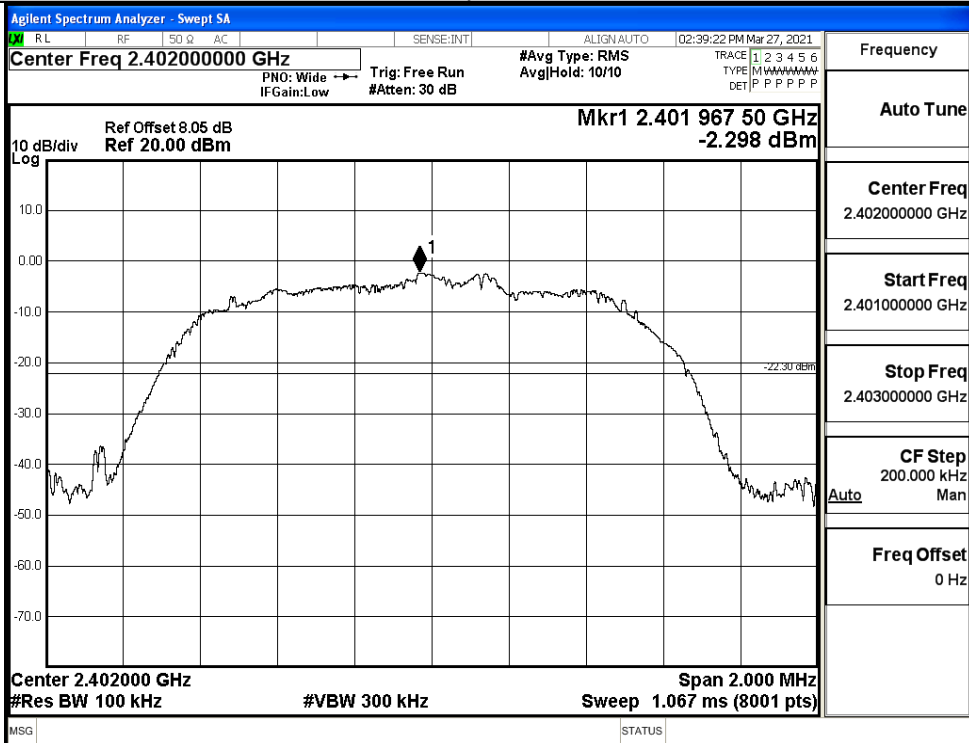
Pref	<div data-bbox="411 237 1378 972"> <p>Agilent Spectrum Analyzer - Swept SA</p> <p>RL RF SO Q AC SENSE:INT ALIGN: AUTO 02:34:04 PM Mar 27, 2021</p> <p>Center Freq 2.441000000 GHz #Avg Type: RMS #Res BW 100 kHz #VBW 300 kHz #BW 300 kHz Sweep 1.067 ms (8001 pts)</p> <p>Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.44096275 GHz -3.791 dBm</p>  <p>10 dB/div Log</p> <p>Center 2.441000 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 1.067 ms (8001 pts)</p> <p>MSG STATUS</p> </div>	<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.441000000 GHz</p> <p>Start Freq 2.440000000 GHz</p> <p>Stop Freq 2.442000000 GHz</p> <p>CF Step 200.000 kHz Auto Man</p> <p>Freq Offset 0 Hz</p>
Puw	<div data-bbox="411 981 1378 1718"> <p>Agilent Spectrum Analyzer - Swept SA</p> <p>RL RF SO Q AC SENSE:INT ALIGN: AUTO 02:34:19 PM Mar 27, 2021</p> <p>Center Freq 12.515000000 GHz #Avg Type: RMS #Res BW 100 kHz #VBW 300 kHz #BW 300 kHz Sweep 2.387 s (8001 pts)</p> <p>Trig: Free Run #Atten: 30 dB</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm Mkr2 24.763 GHz -37.390 dBm</p>  <p>10 dB/div Log</p> <p>Start 30 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.387 s (8001 pts)</p> <p>MSG STATUS</p> </div>	<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 12.515000000 GHz</p> <p>Start Freq 30.000000 MHz</p> <p>Stop Freq 25.000000000 GHz</p> <p>CF Step 2.497000000 GHz Auto Man</p> <p>Freq Offset 0 Hz</p>

$\pi/4$ DQPSK_HCH_Graphs

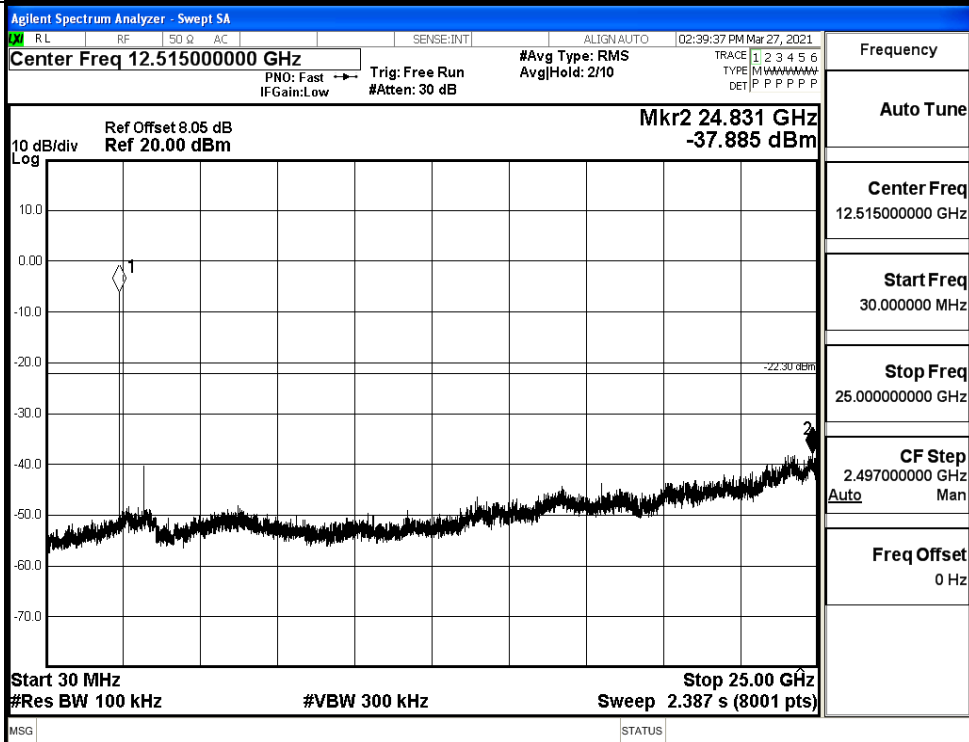


8DPSK_LCH_Graphs

Pref

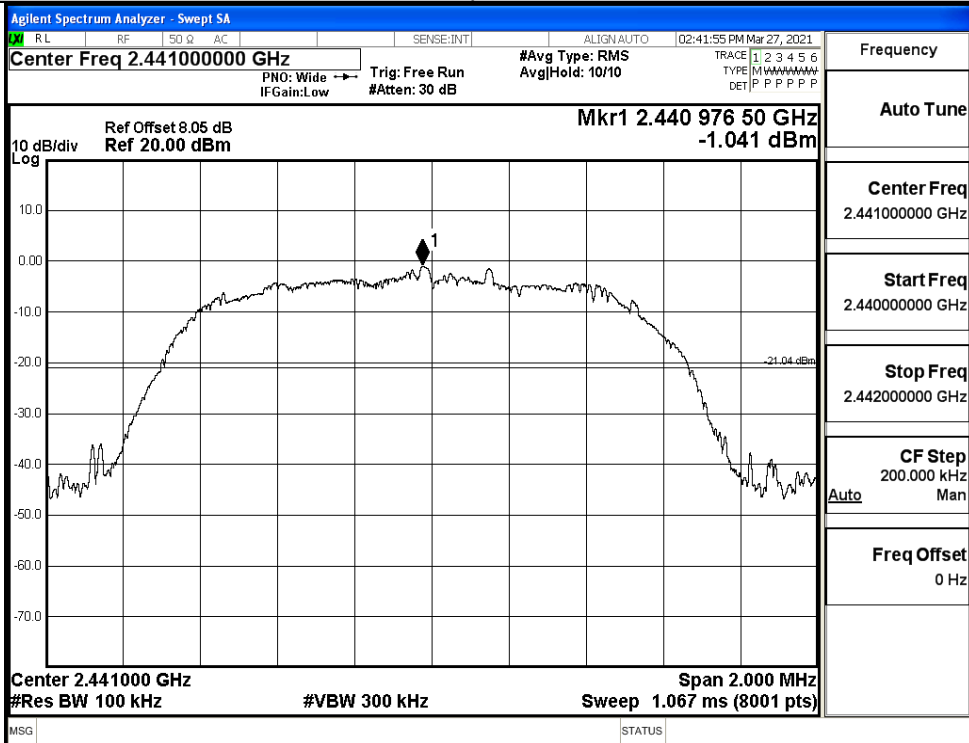


Puw

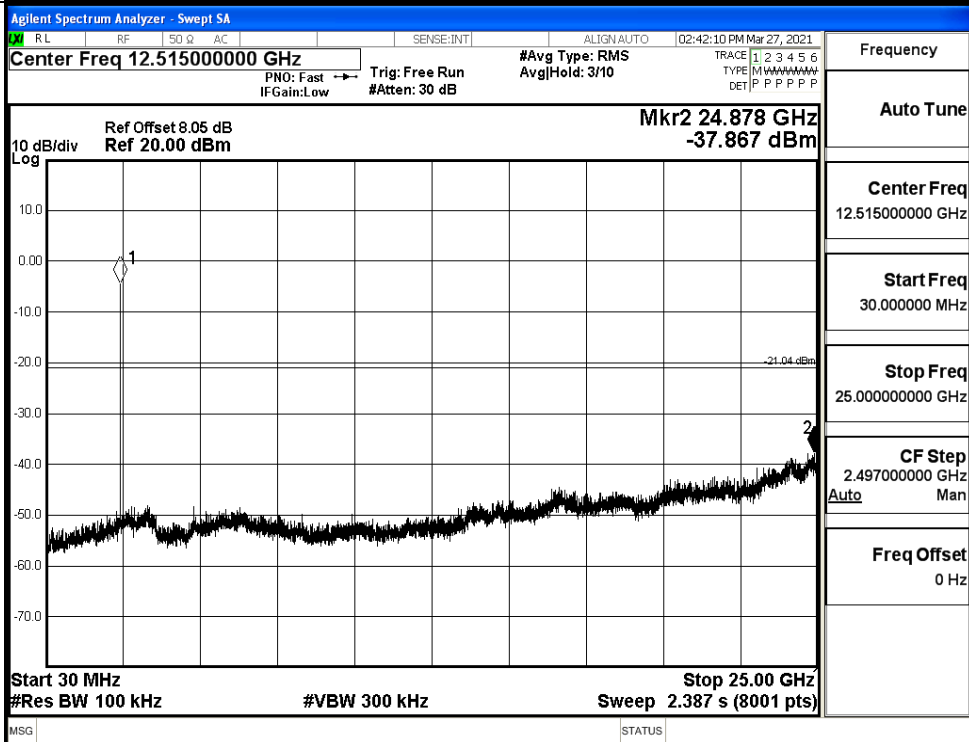


8DPSK_MCH_Graphs

Pref

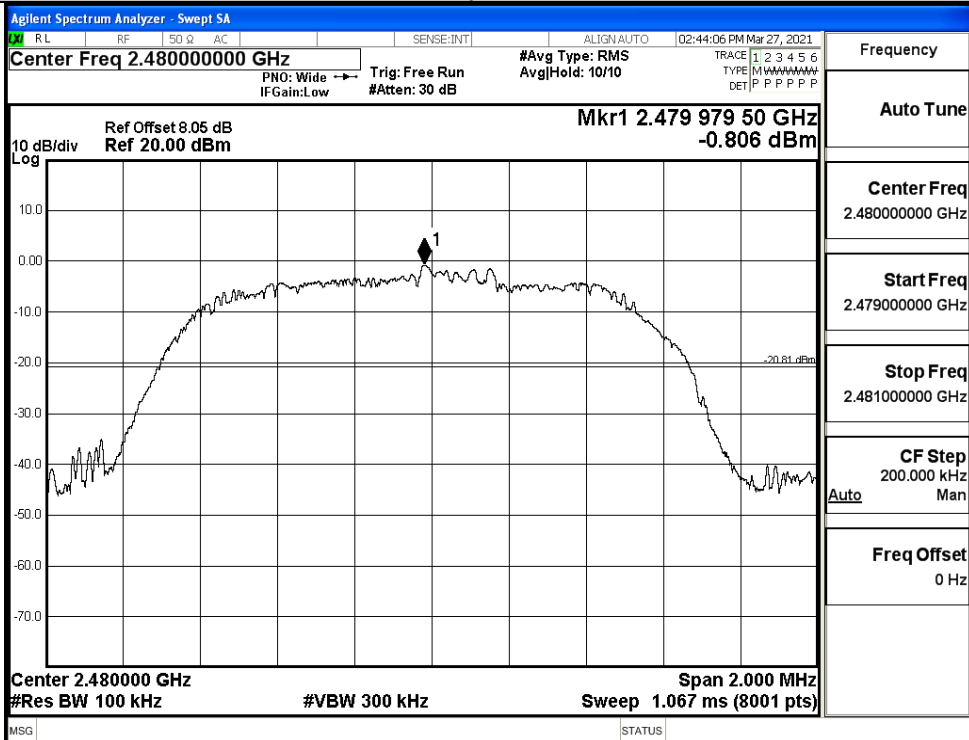


Puw

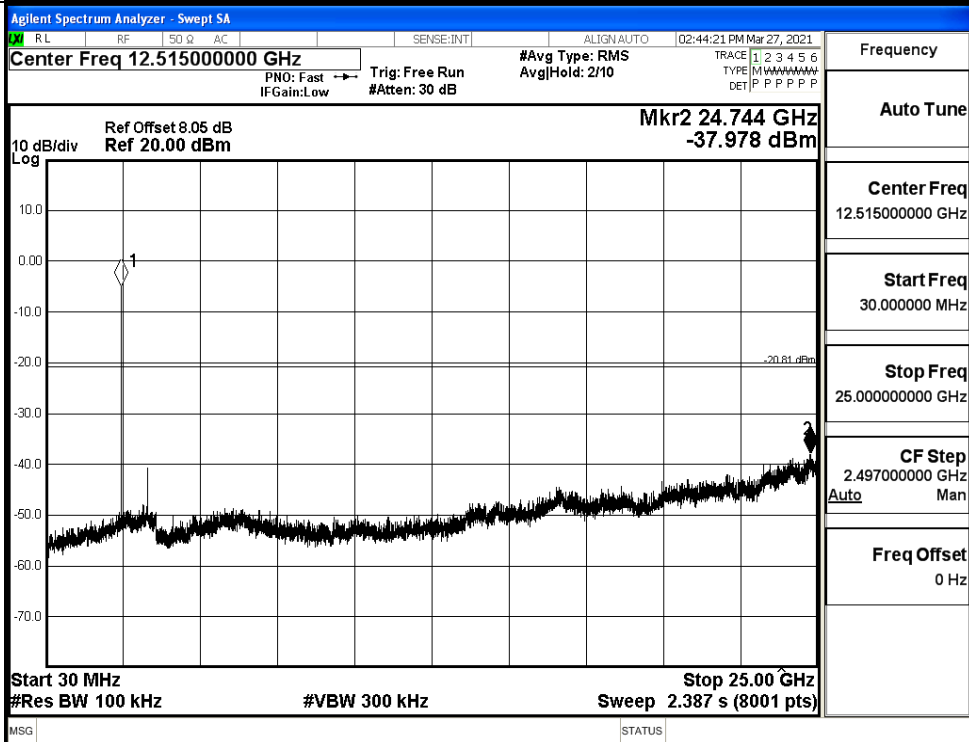


8DPSK_HCH_Graphs

Pref



Puw

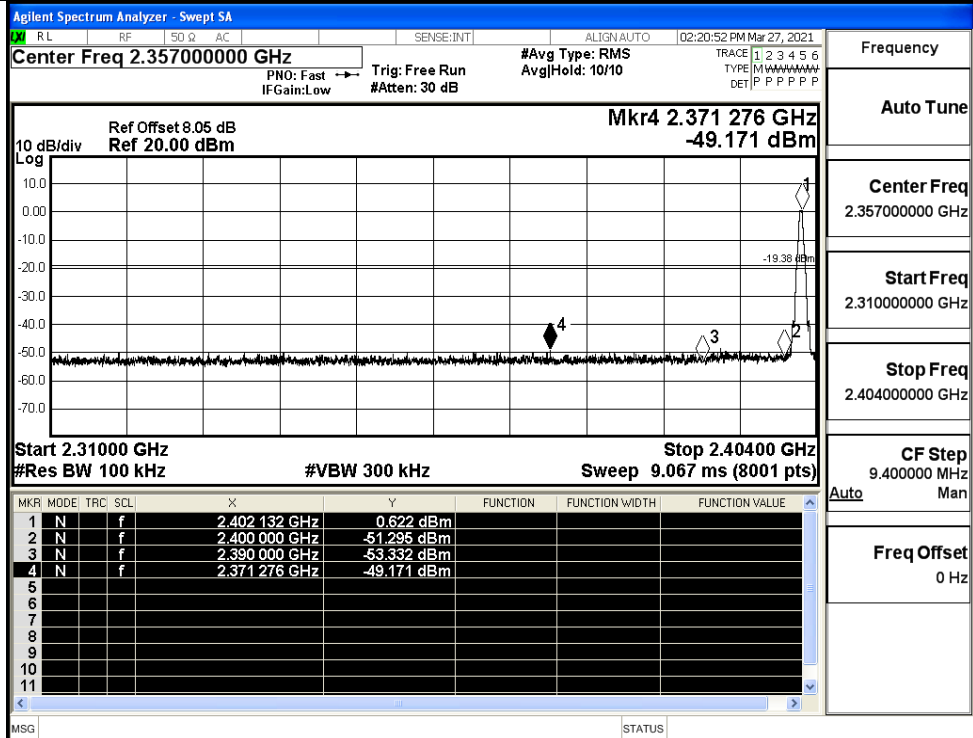


A.7 Band-edge for RF Conducted Emissions

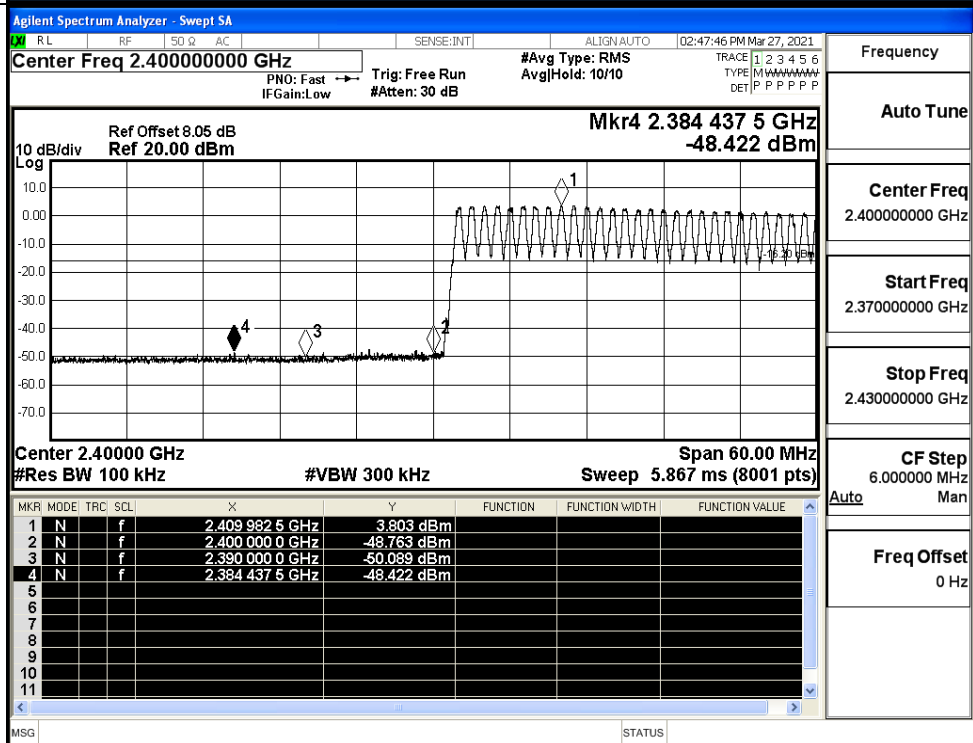
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.622	Off	-49.171	-19.38	PASS
			3.803	On	-48.422	-16.2	PASS
	HCH	2480	-0.429	Off	-46.762	-20.43	PASS
			-0.856	On	-47.574	-20.86	PASS
$\pi/4$ DQPSK	LCH	2402	-2.622	Off	-49.605	-22.62	PASS
			3.758	On	-47.555	-16.24	PASS
	HCH	2480	-3.962	Off	-47.727	-23.96	PASS
			-0.885	On	-47.615	-20.89	PASS
8DPSK	LCH	2402	-3.258	Off	-49.231	-23.26	PASS
			3.605	On	-48.917	-16.4	PASS
	HCH	2480	-0.729	Off	-46.257	-20.73	PASS
			-0.805	On	-46.296	-20.81	PASS

Test Graphs

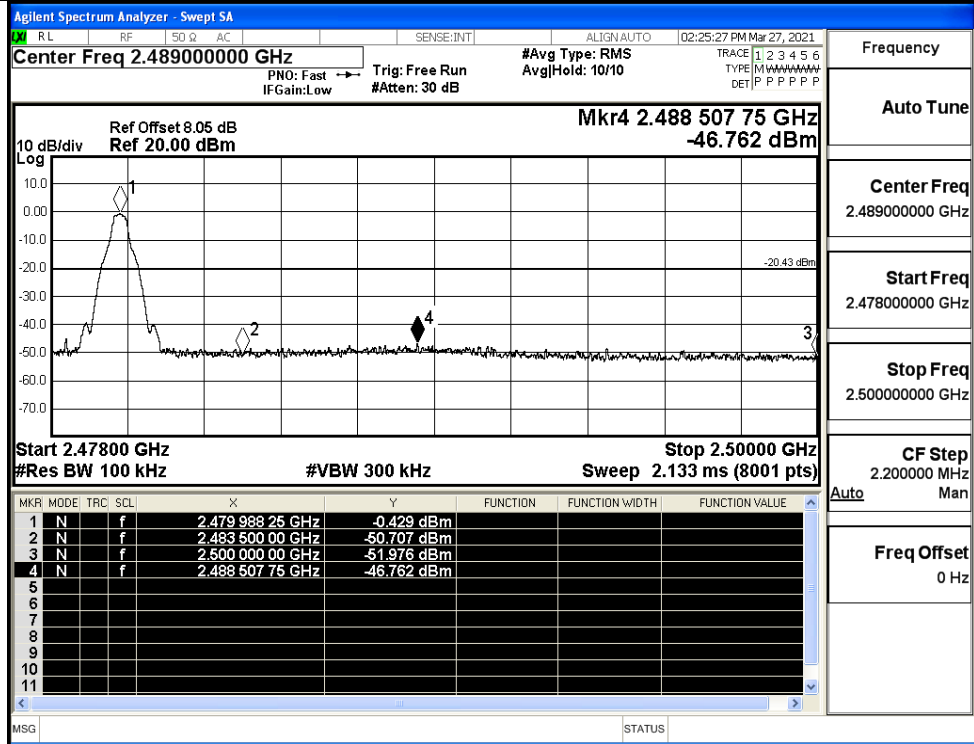
GFSK/LCH/No Hop



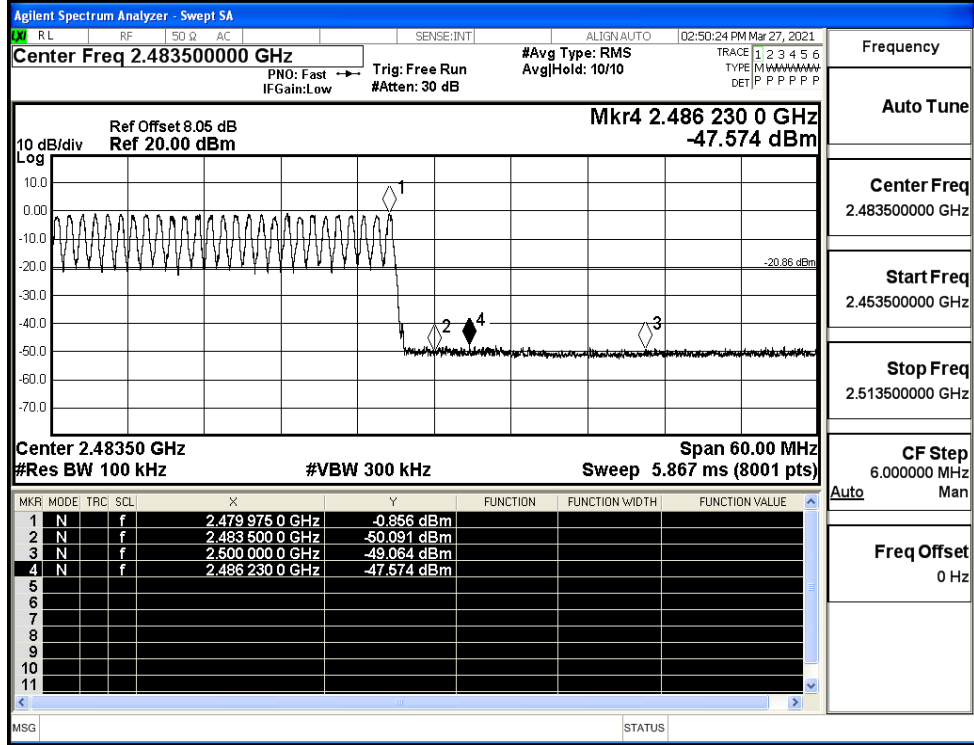
GFSK/LCH/Hop



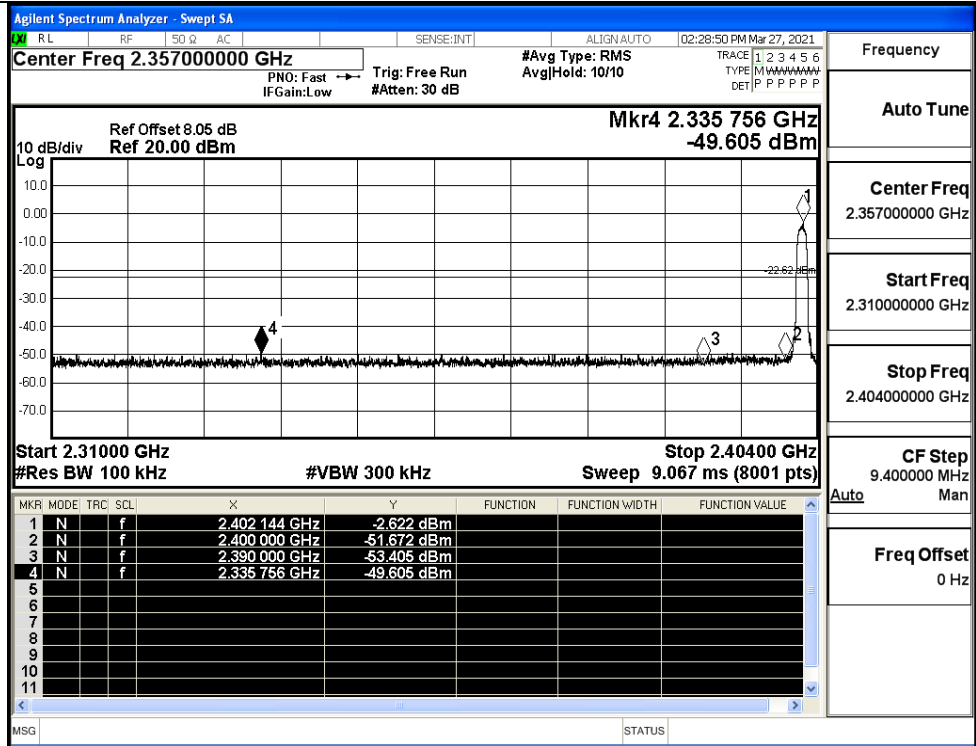
GFSK/HCH/No Hop



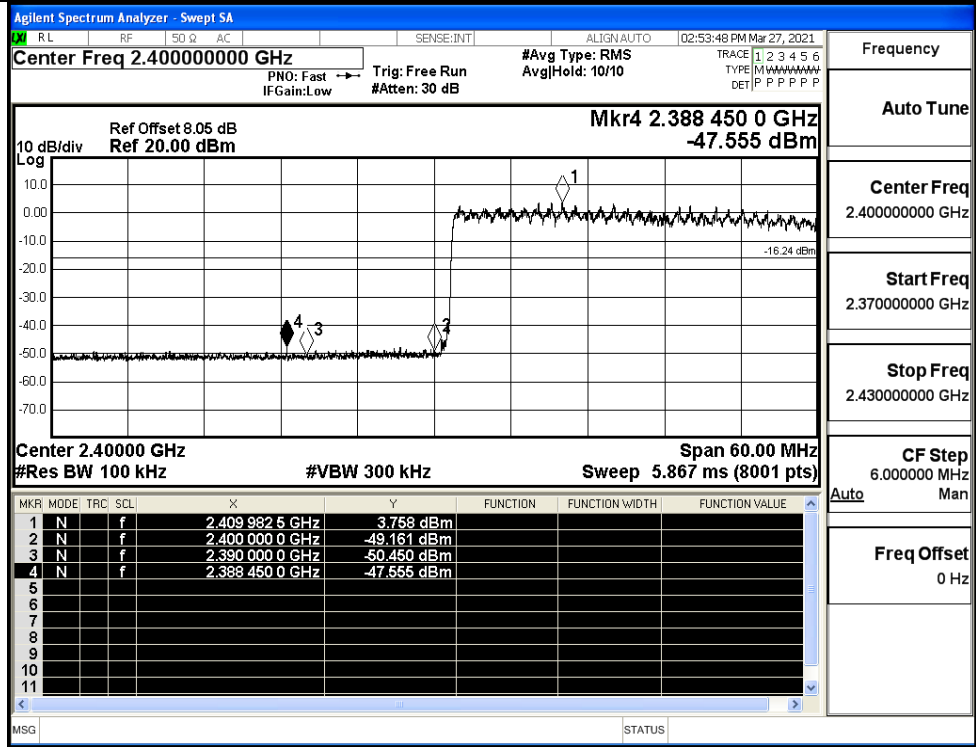
GFSK/HCH/Hop



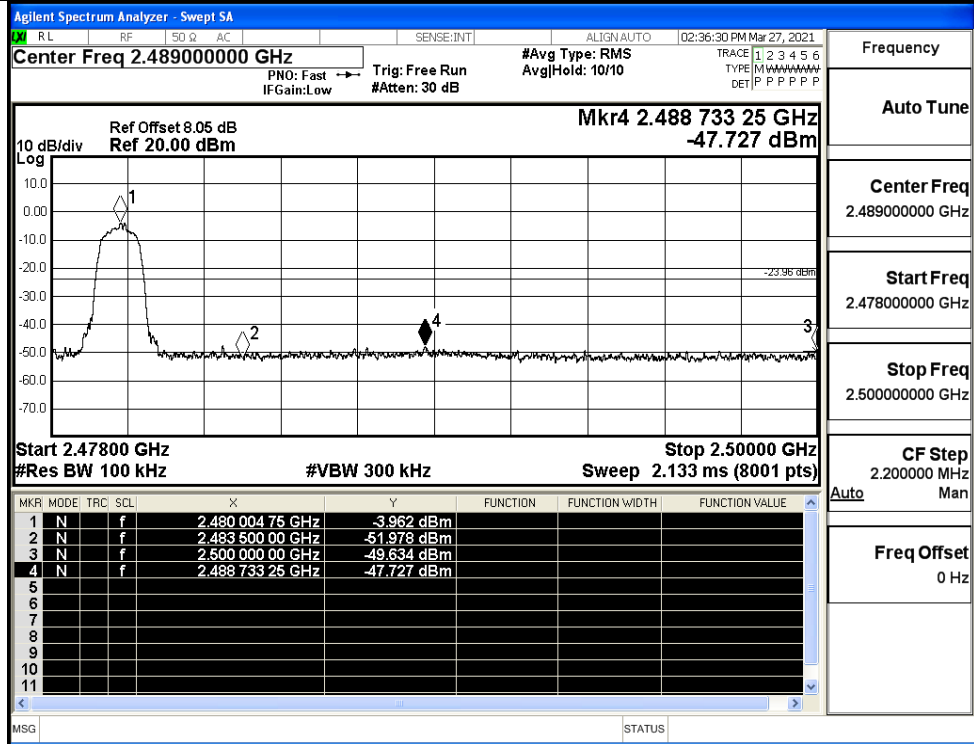
$\pi/4$ DQPSK/LCH/No Hop



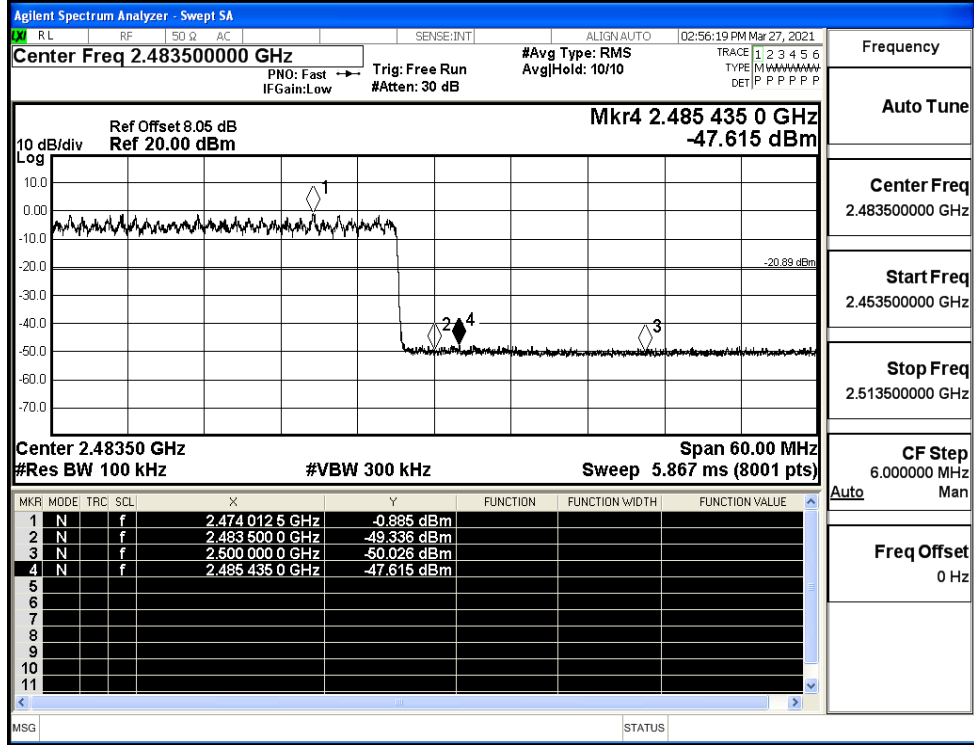
$\pi/4$ DQPSK/LCH/Hop



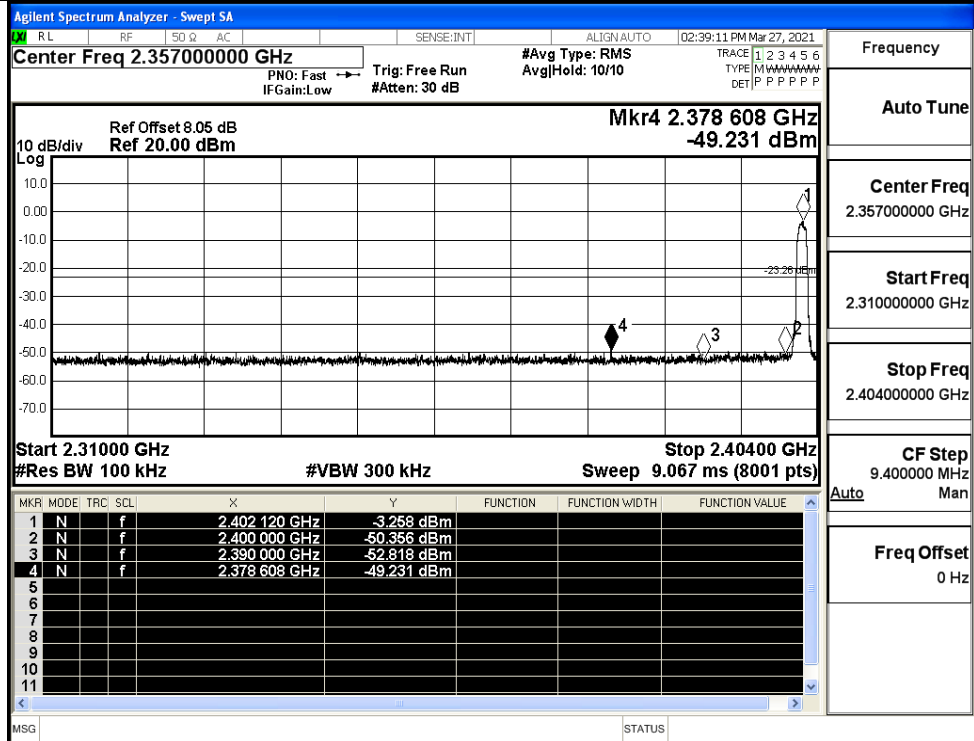
π /4DQPSK/HCH/No
Hop



π /4DQPSK/HCH/Hop



8DPSK/LCH/No Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

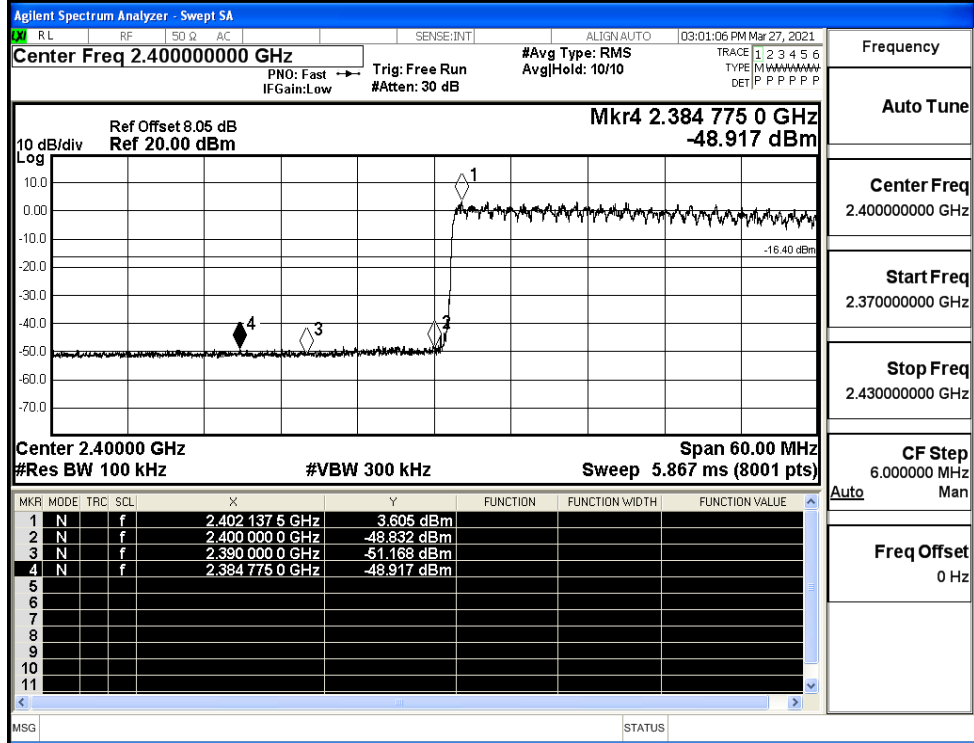
Start Freq
2.310000000 GHz

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

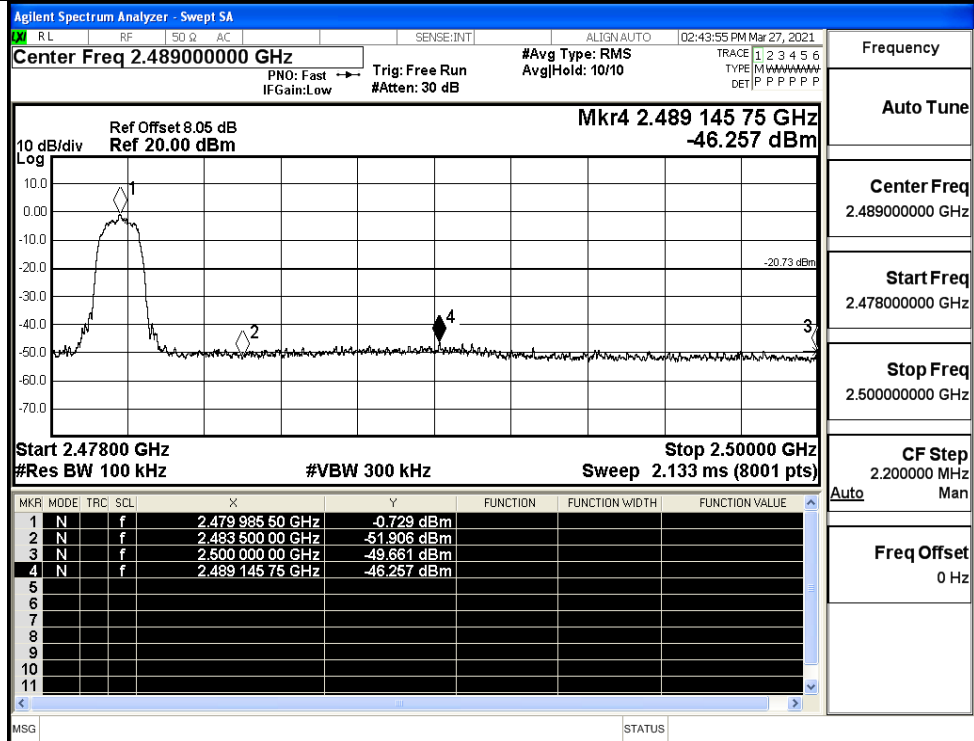
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz

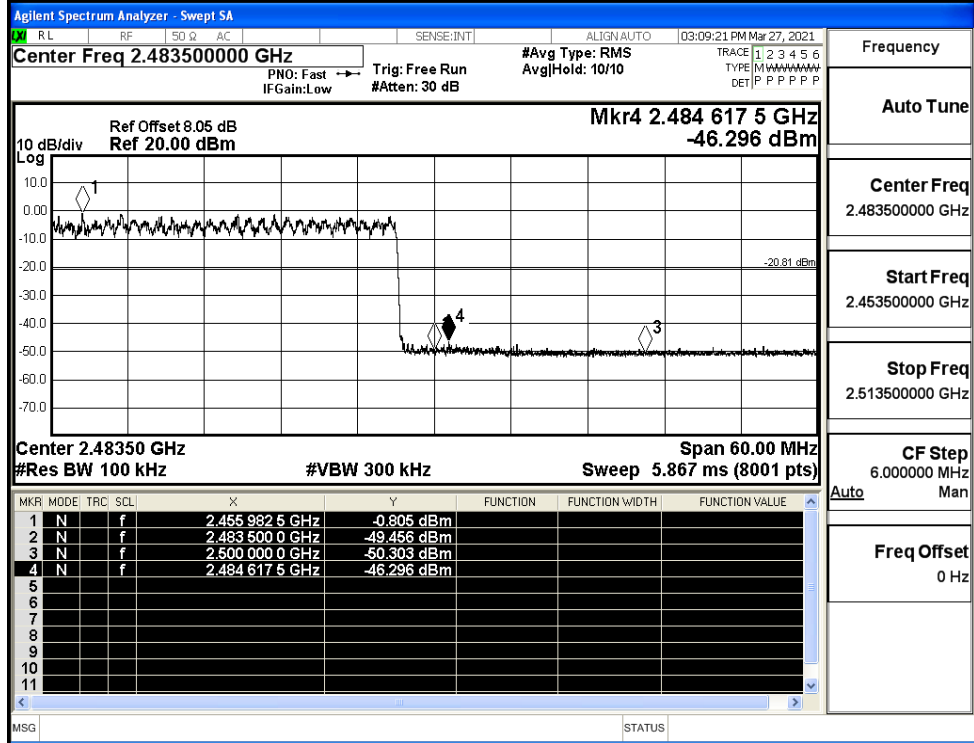
Freq Offset
0 Hz

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

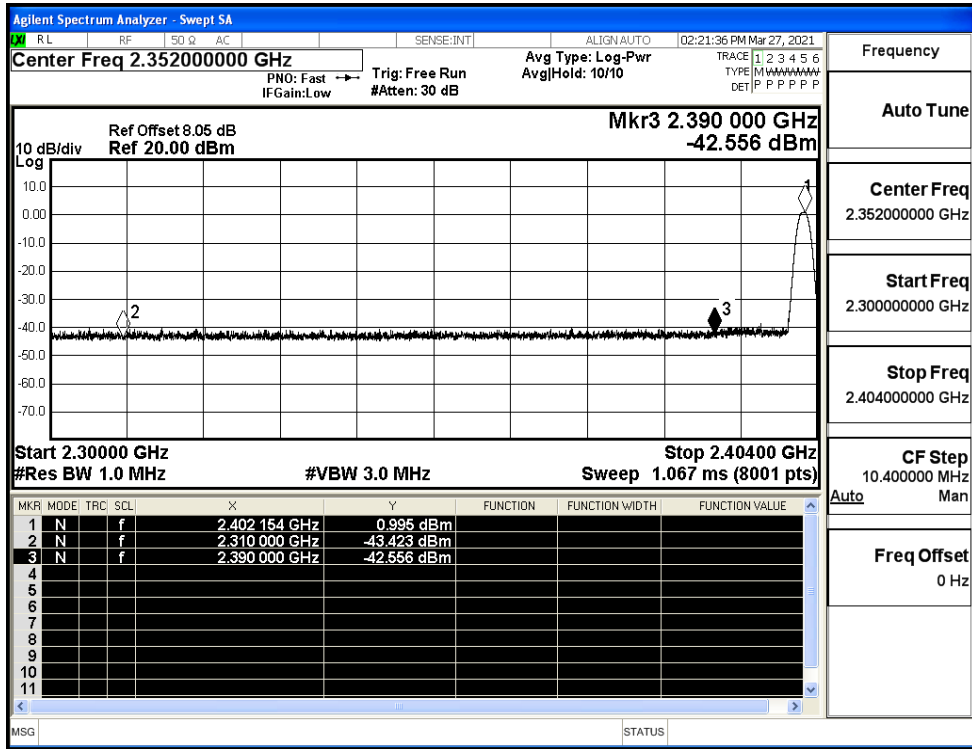


Frequency
Auto Tune
Center Freq
2.483500000 GHz
Start Freq
2.453500000 GHz
Stop Freq
2.513500000 GHz
CF Step
6.000000 MHz
Auto Man
Freq Offset
0 Hz

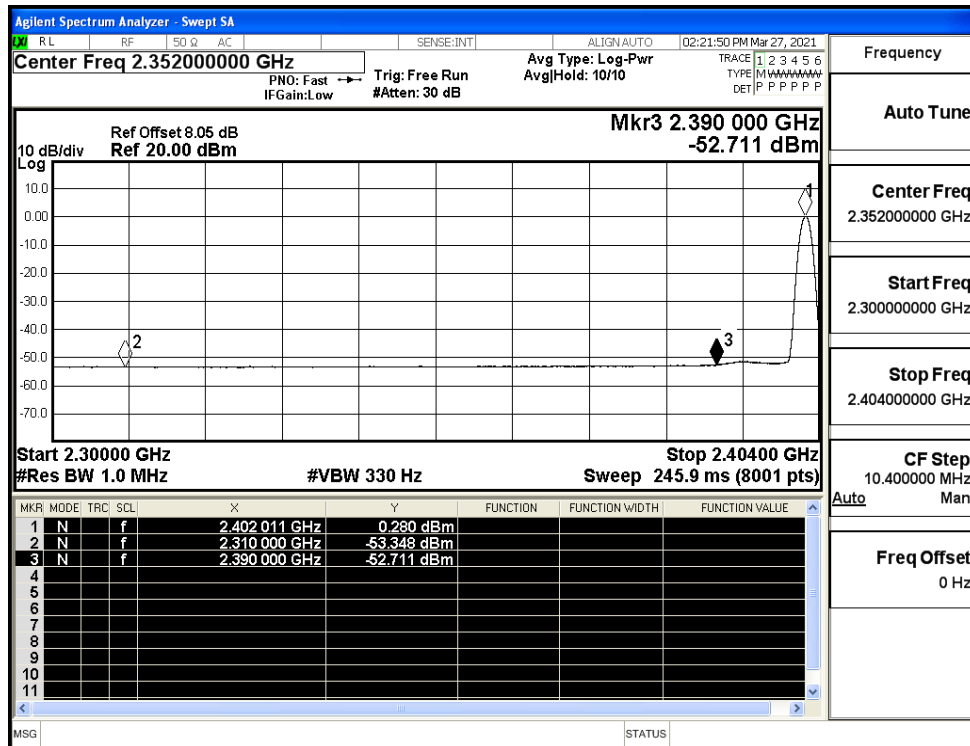
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.42	2.0	0	53.84	PEAK	74	PASS
	Off	2310.0	-53.35	2.0	0	43.91	AV	54	PASS
	Off	2390.0	-42.56	2.0	0	54.7	PEAK	74	PASS
	Off	2390.0	-52.71	2.0	0	44.55	AV	54	PASS
	Off	2483.5	-39.82	2.0	0	57.44	PEAK	74	PASS
	Off	2483.5	-50.62	2.0	0	46.64	AV	54	PASS
	Off	2500.0	-40.26	2.0	0	57	PEAK	74	PASS
	Off	2500.0	-52.10	2.0	0	45.16	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.80	2.0	0	53.46	PEAK	74	PASS
	Off	2310.0	-53.42	2.0	0	43.84	AV	54	PASS
	Off	2390.0	-42.63	2.0	0	54.63	PEAK	74	PASS
	Off	2390.0	-52.68	2.0	0	44.58	AV	54	PASS
	Off	2483.5	-41.26	2.0	0	56	PEAK	74	PASS
	Off	2483.5	-51.56	2.0	0	45.7	AV	54	PASS
	Off	2500.0	-42.56	2.0	0	54.7	PEAK	74	PASS
	Off	2500.0	-52.24	2.0	0	45.02	AV	54	PASS
8DPSK	Off	2310.0	-42.74	2.0	0	54.52	PEAK	74	PASS
	Off	2310.0	-53.42	2.0	0	43.84	AV	54	PASS
	Off	2390.0	-42.91	2.0	0	54.35	PEAK	74	PASS
	Off	2390.0	-52.83	2.0	0	44.43	AV	54	PASS
	Off	2483.5	-40.49	2.0	0	56.77	PEAK	74	PASS
	Off	2483.5	-50.67	2.0	0	46.59	AV	54	PASS
	Off	2500.0	-41.32	2.0	0	55.94	PEAK	74	PASS
	Off	2500.0	-52.25	2.0	0	45.01	AV	54	PASS

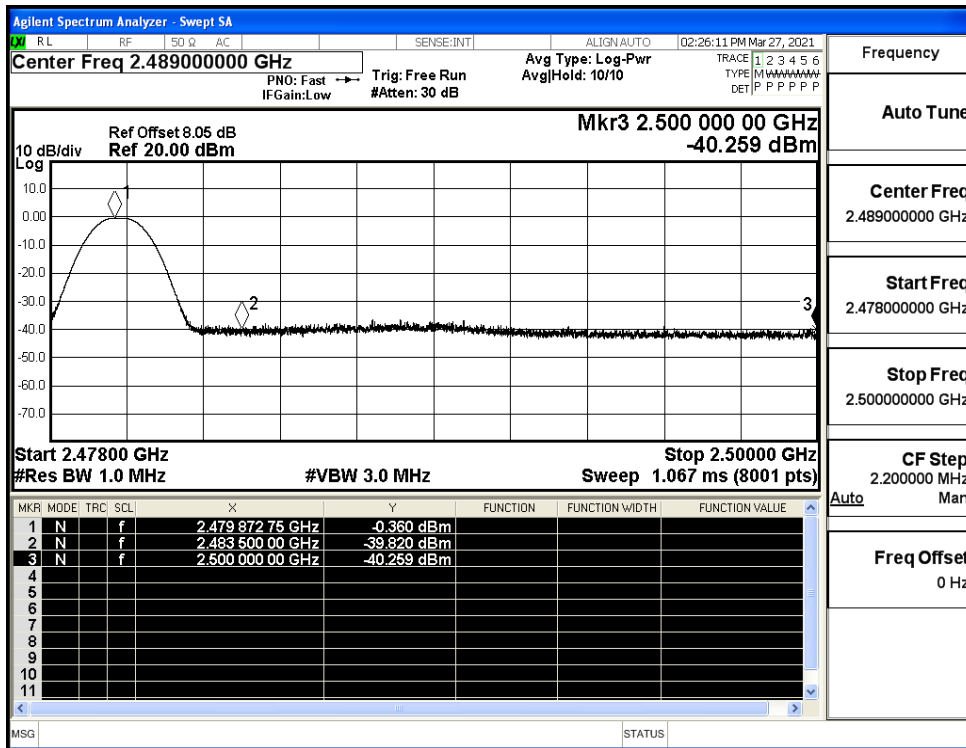
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



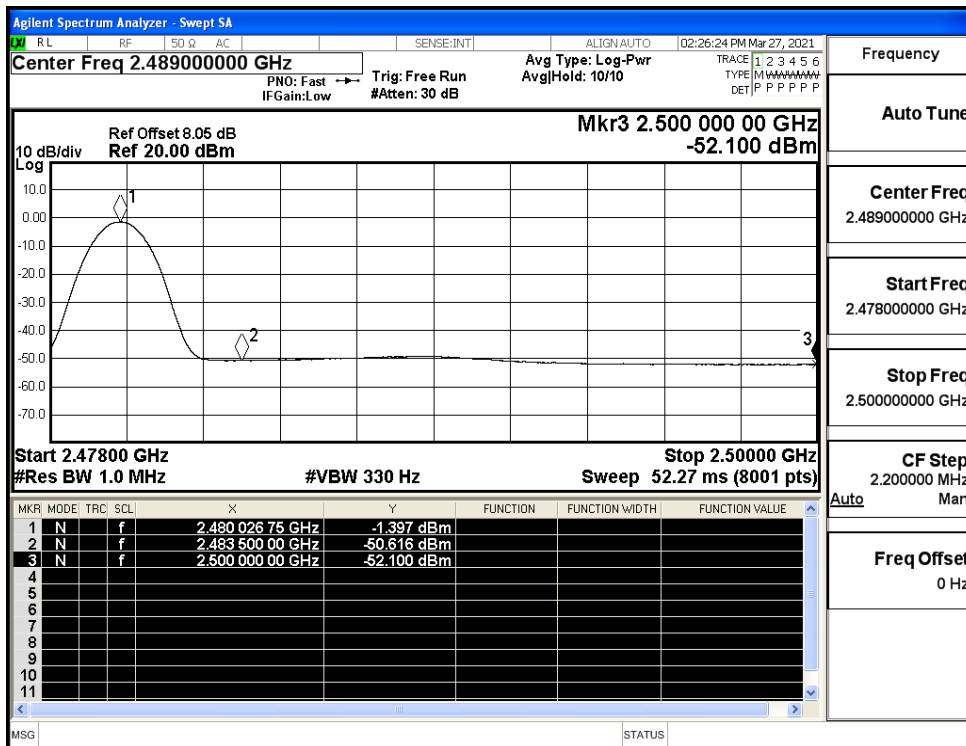
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



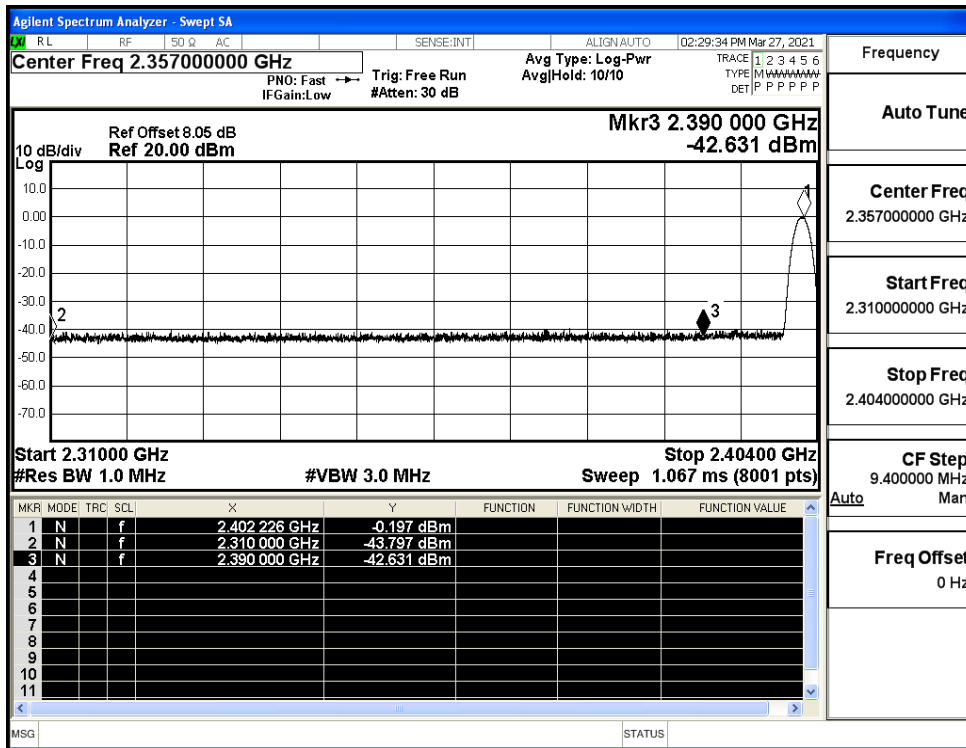
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



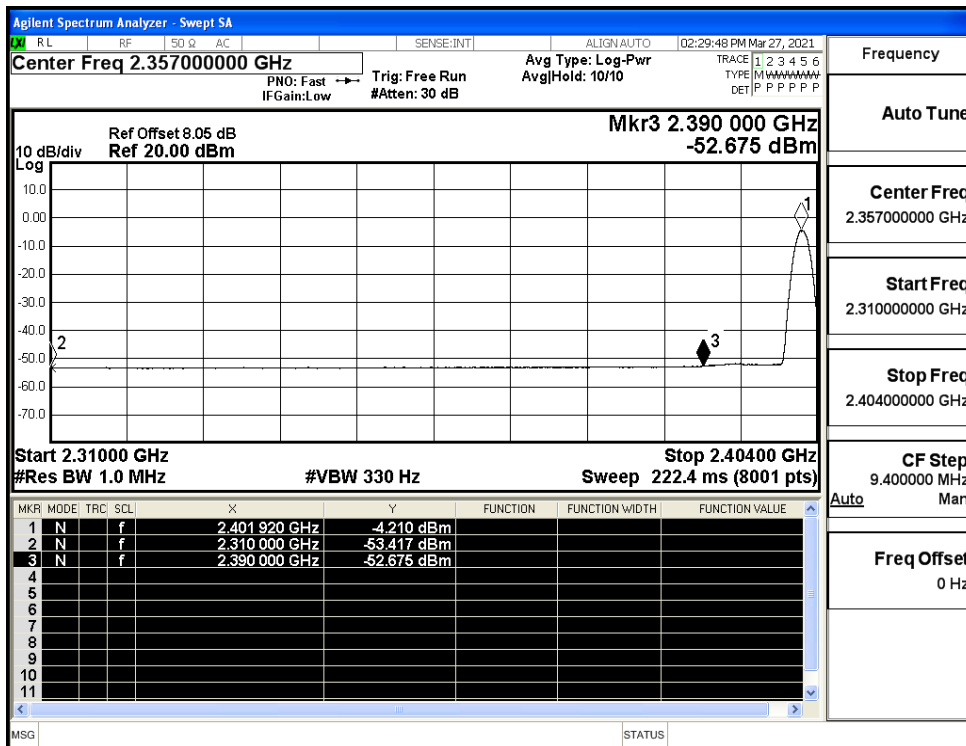
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



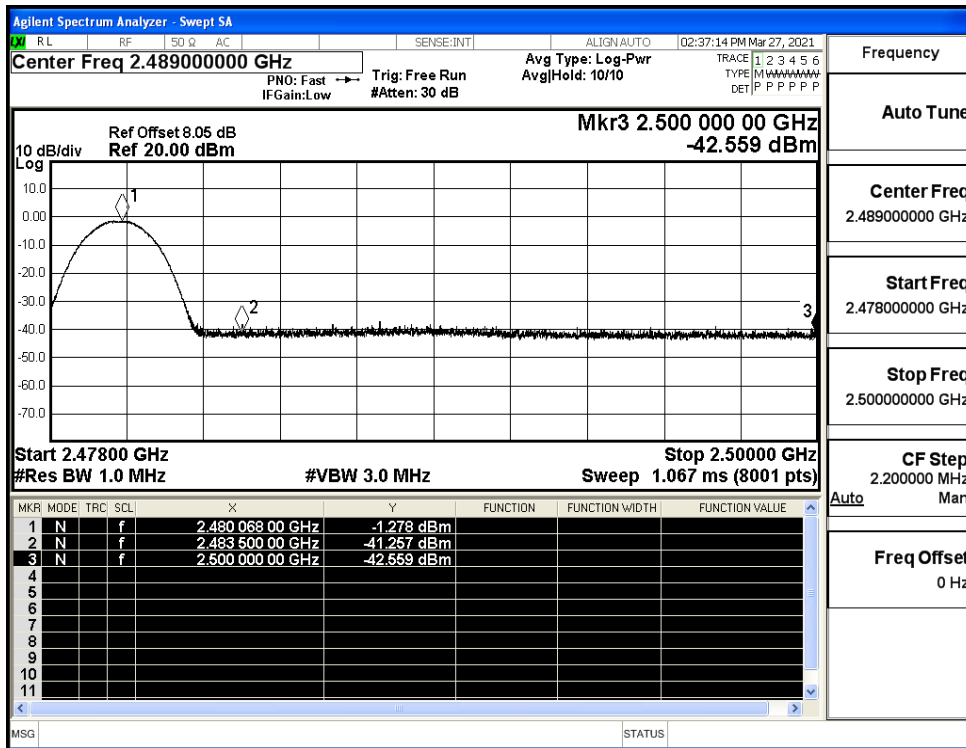
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



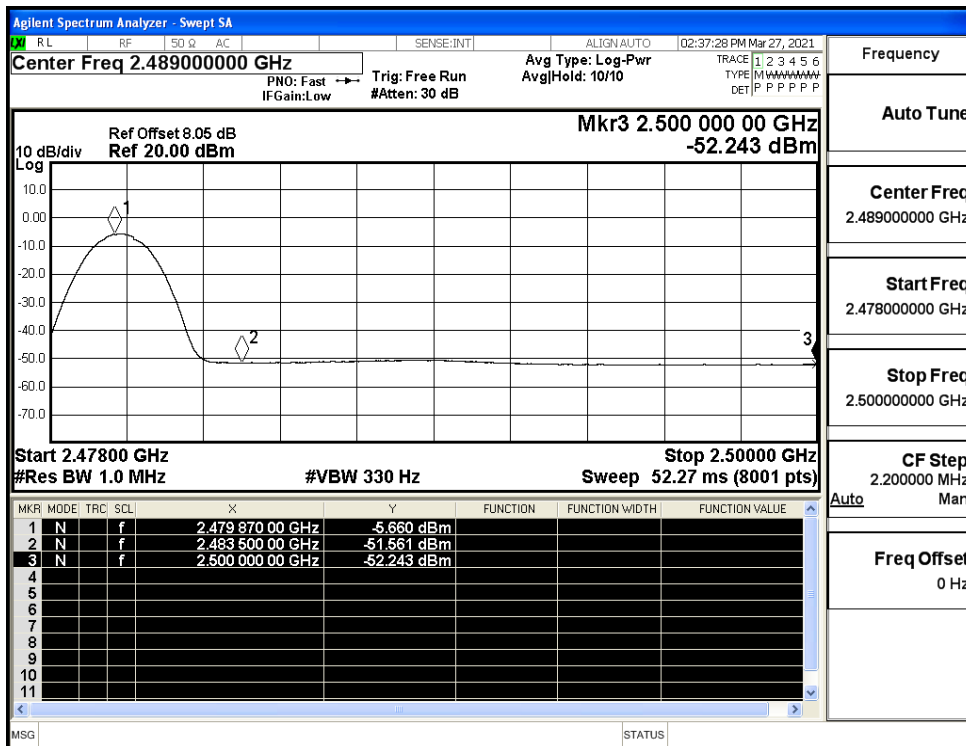
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



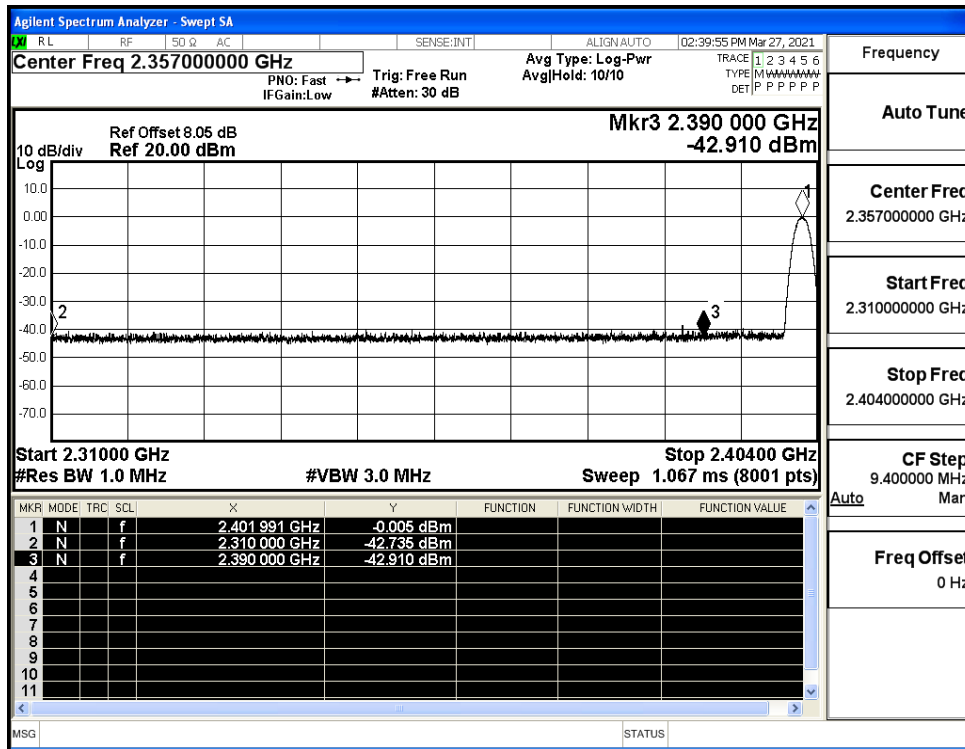
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



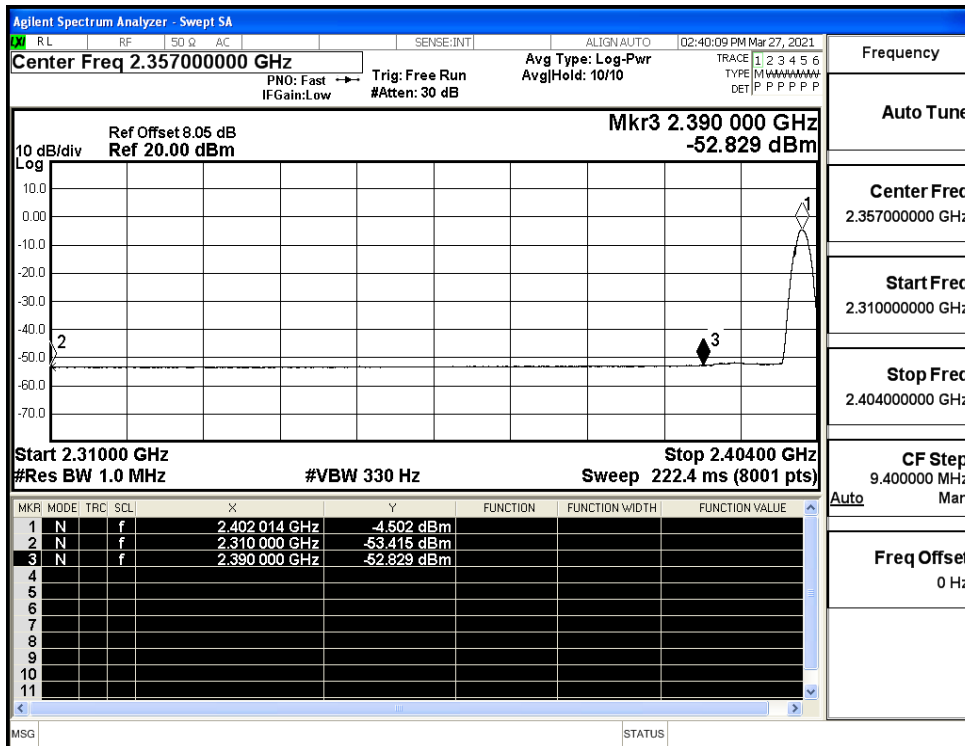
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



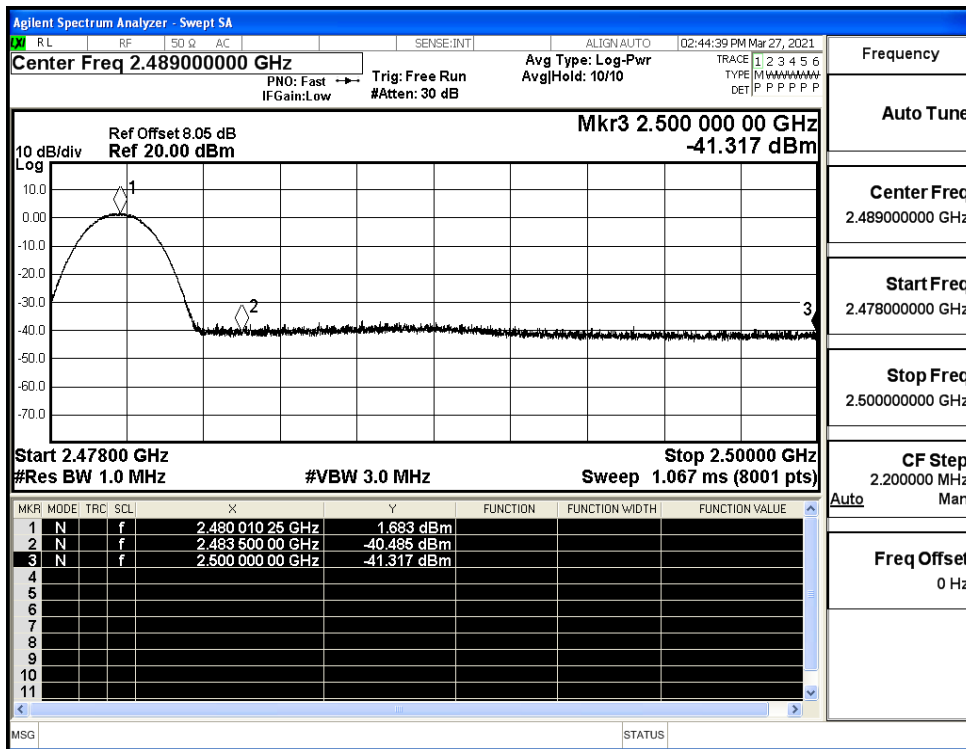
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

