

Appendix A

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

Product Name: HyFlip
Trade Mark: Hyundai
Test Model: HTLF14INC4Z1SSG

Environmental Conditions

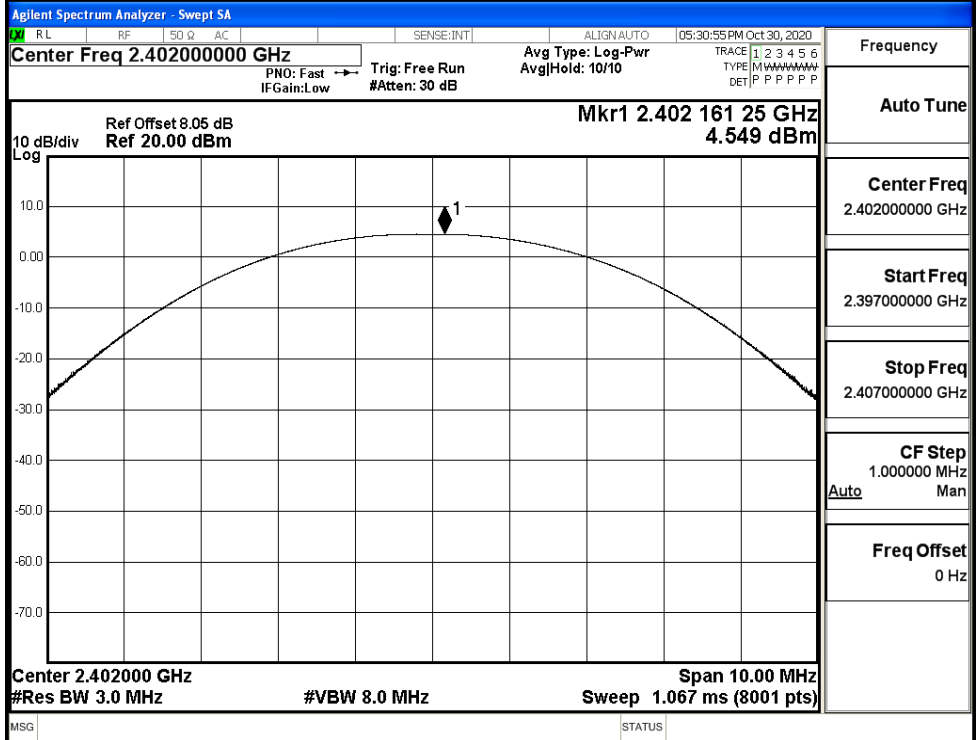
Temperature:	24.2 ° C
Relative Humidity:	53.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jenny Wu
Supervised by:	Li Huan

A.1 Maxmum Conducted Peak Output Power

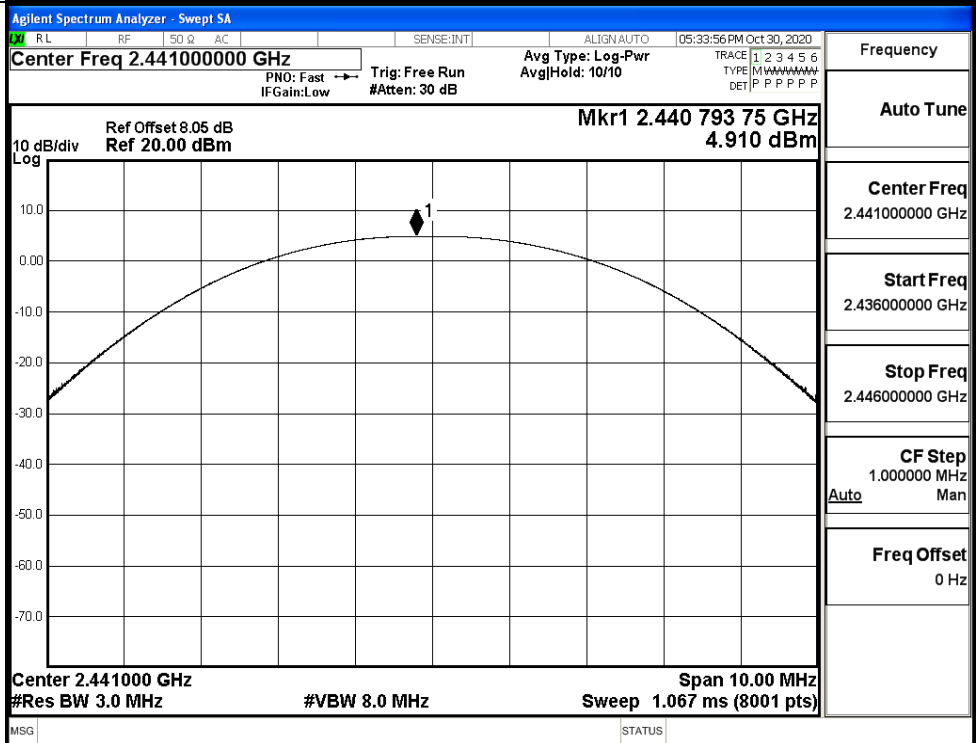
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.549	30	PASS
	MCH	4.910	30	PASS
	HCH	4.347	30	PASS
π/4DQPSK	LCH	1.014	21	PASS
	MCH	1.472	21	PASS
	HCH	0.931	21	PASS
8DPSK	LCH	1.263	21	PASS
	MCH	1.748	21	PASS
	HCH	1.190	21	PASS

Test Graphs

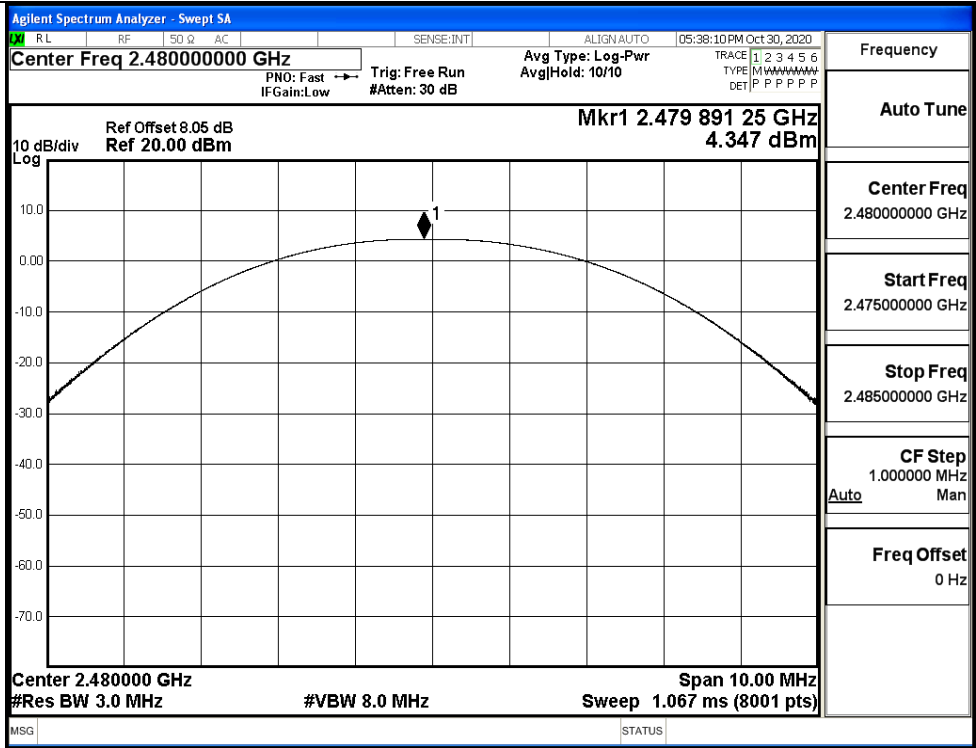
GFSK/LCH



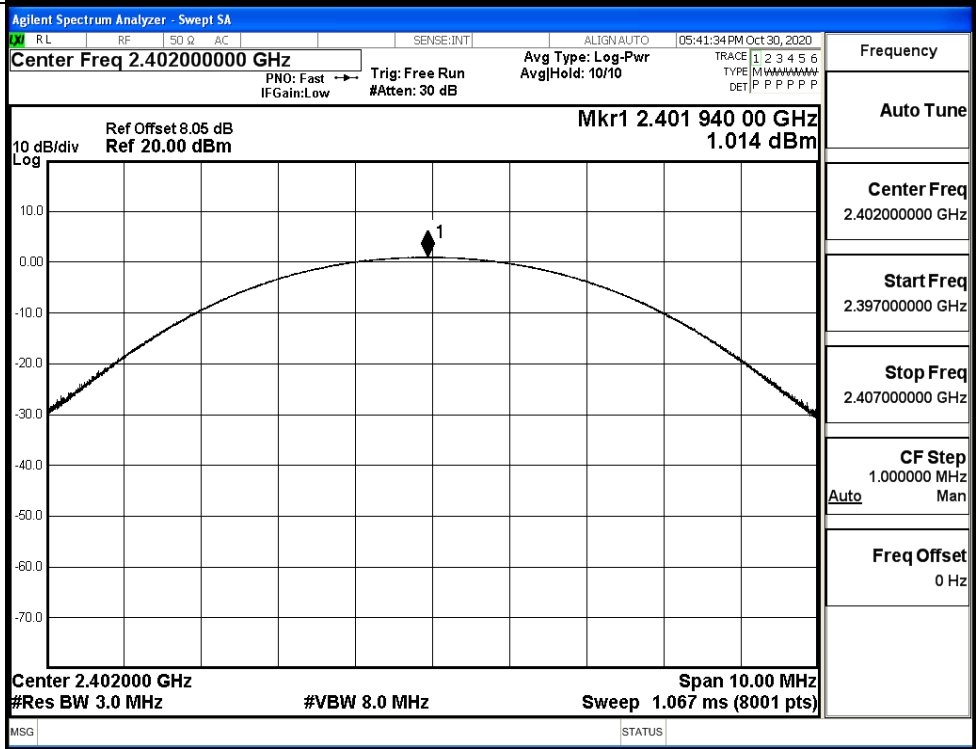
GFSK/MCH

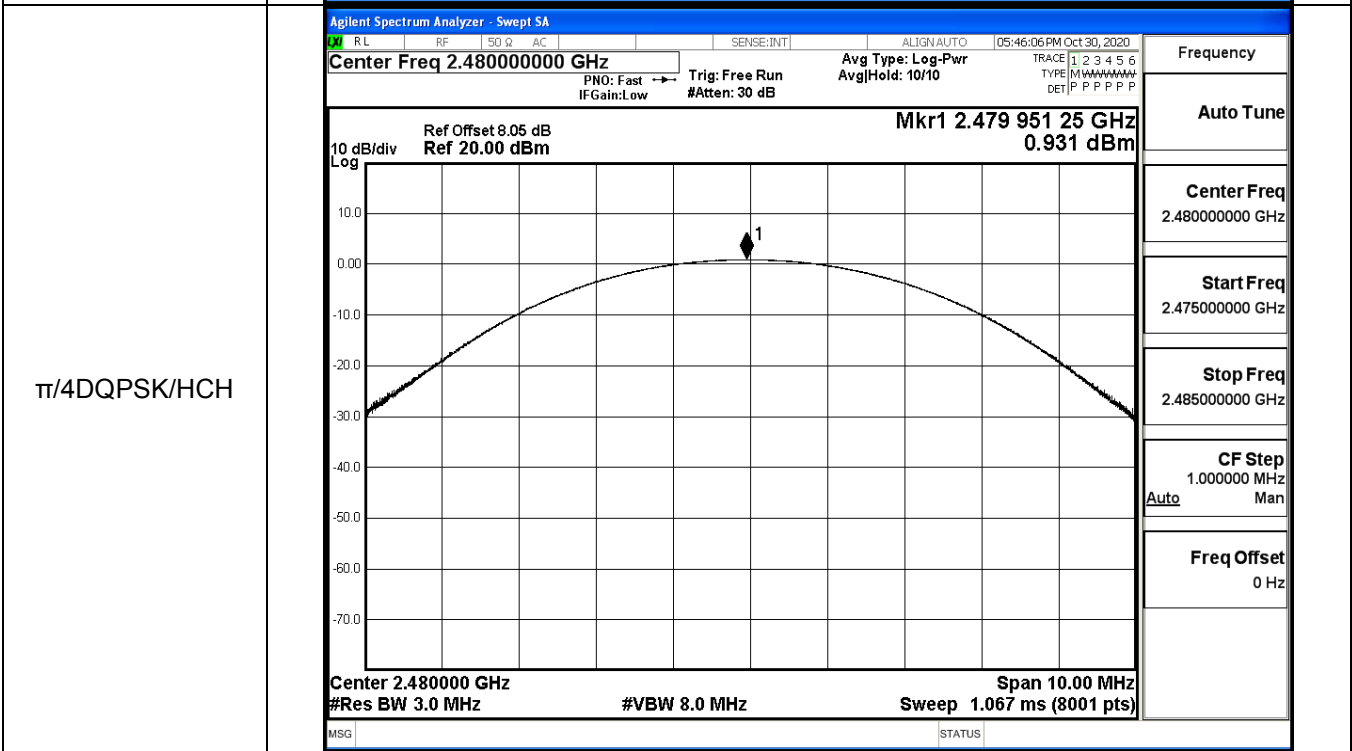
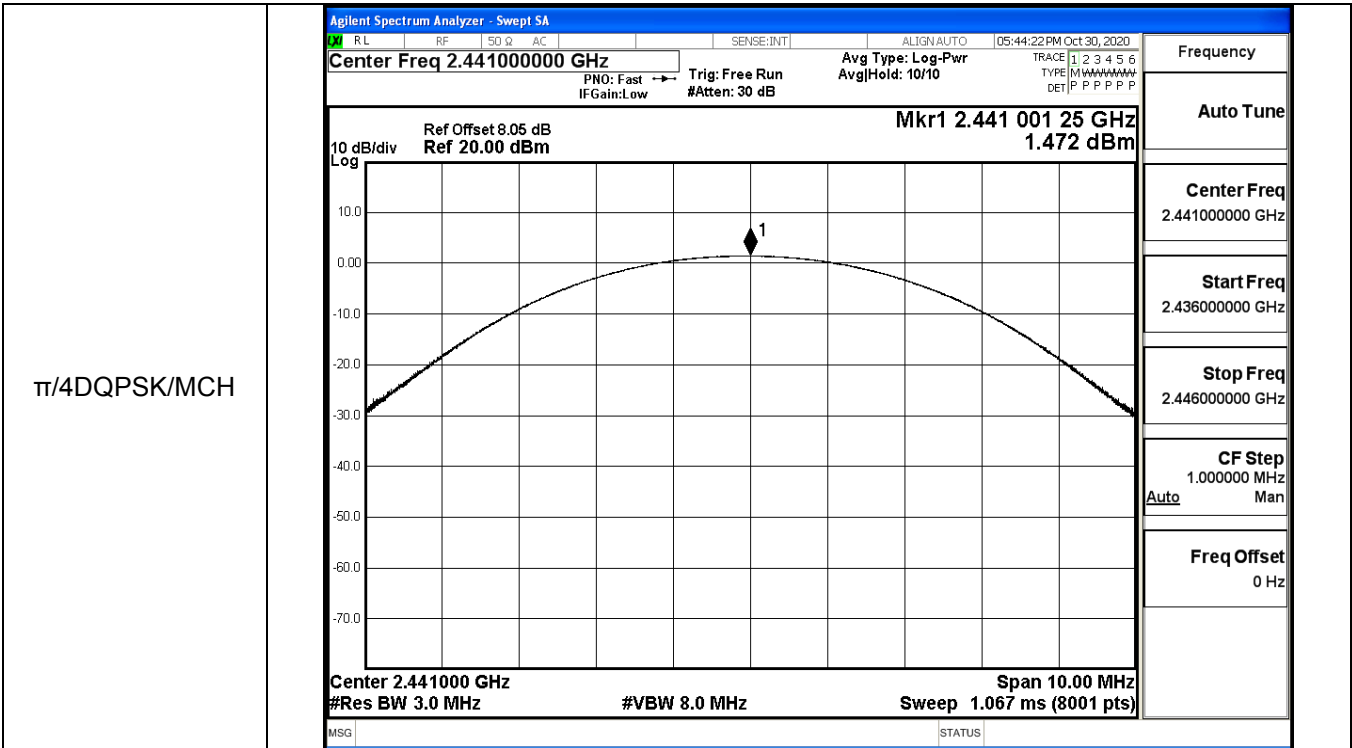


GFSK/HCH

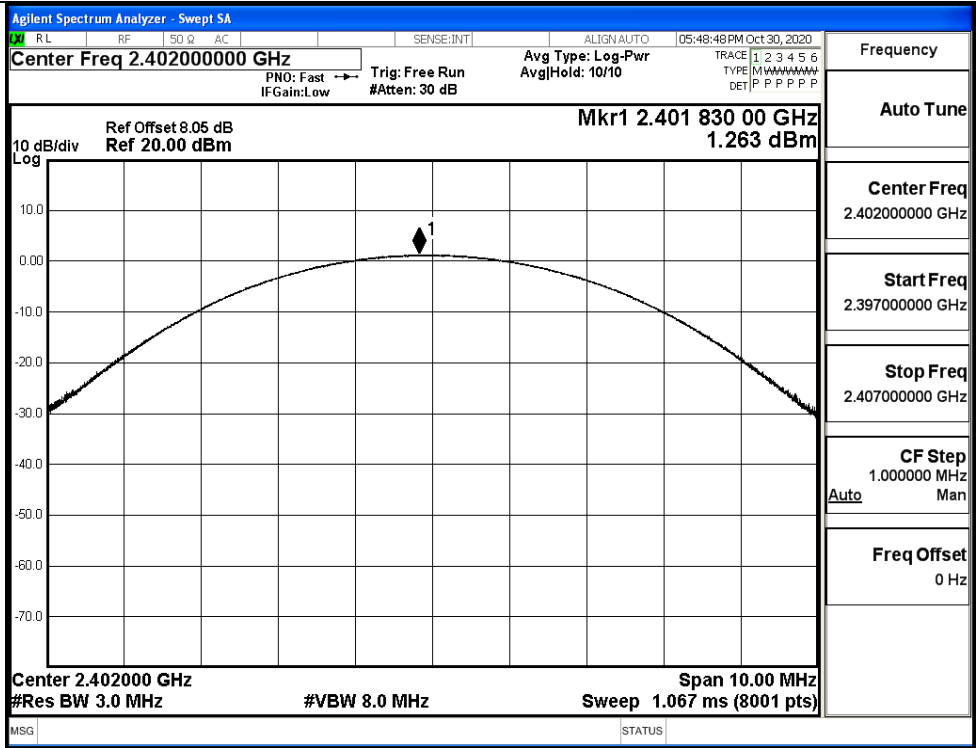


$\pi/4$ DQPSK/LCH

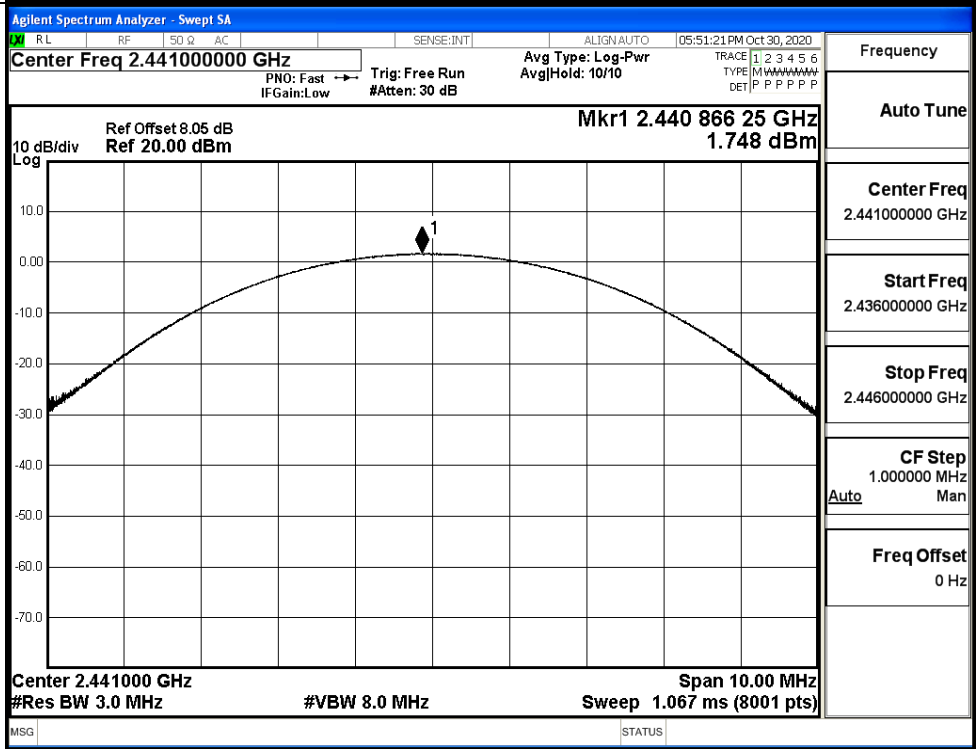




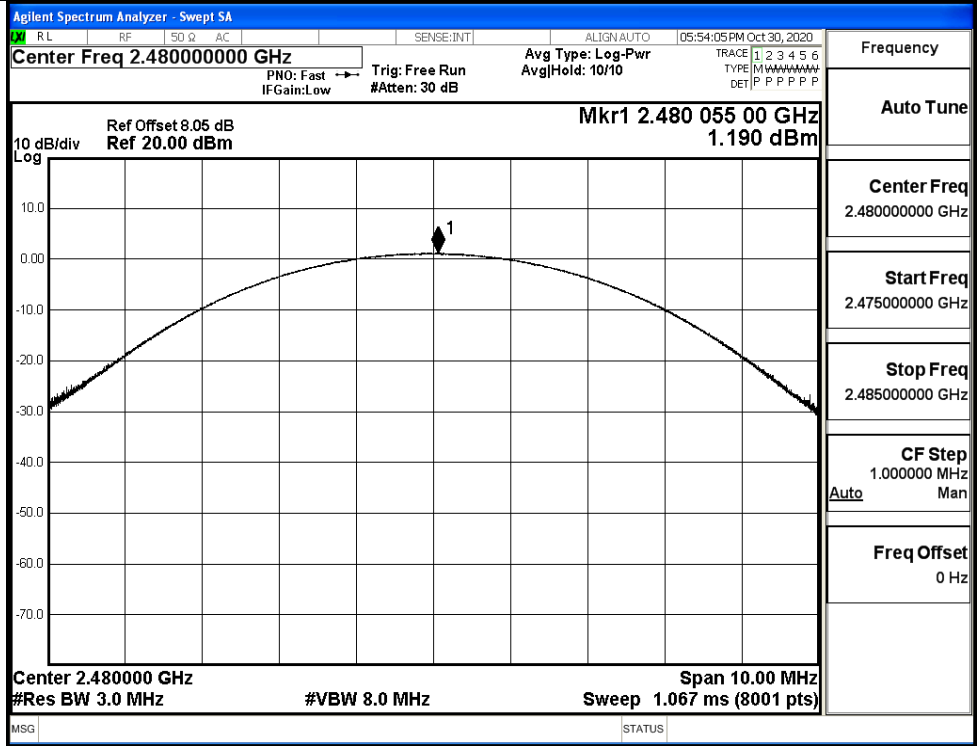
8DPSK/LCH



8DPSK/MCH

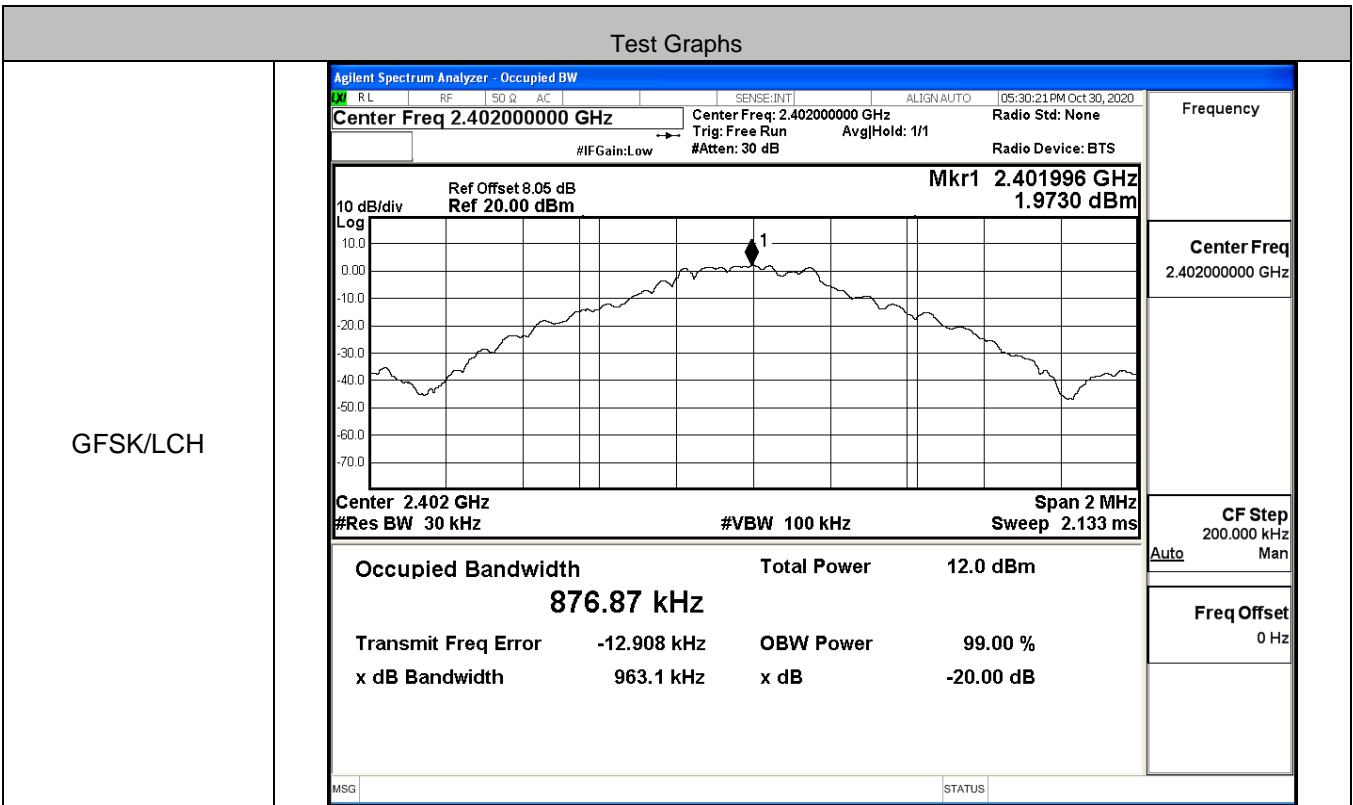


8DPSK/HCH

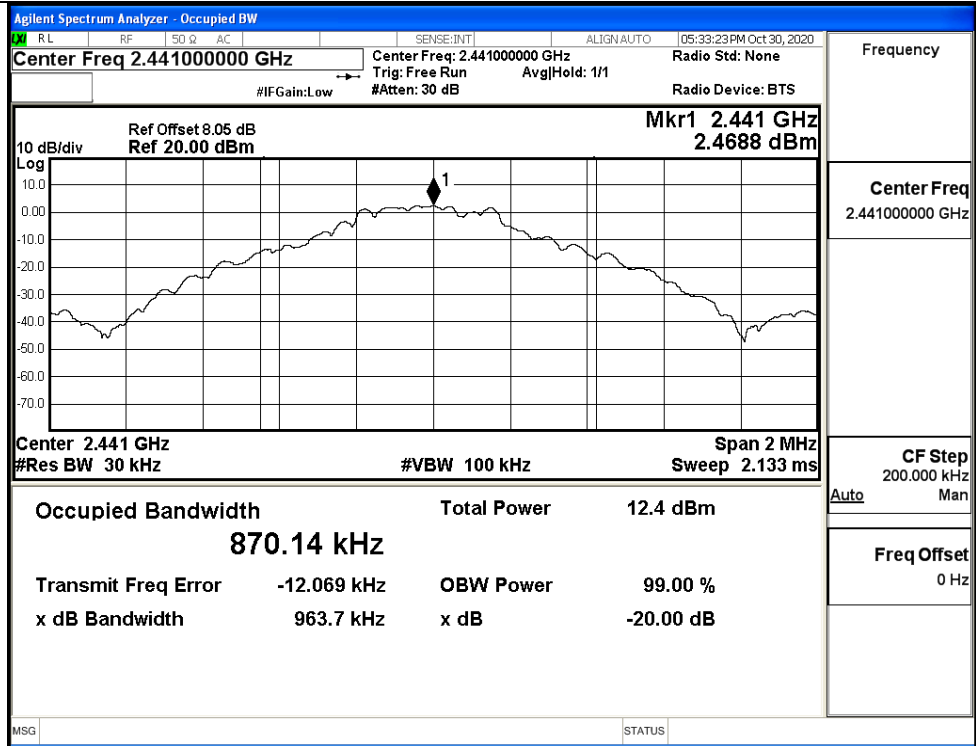


A.2 20dB Bandwidth

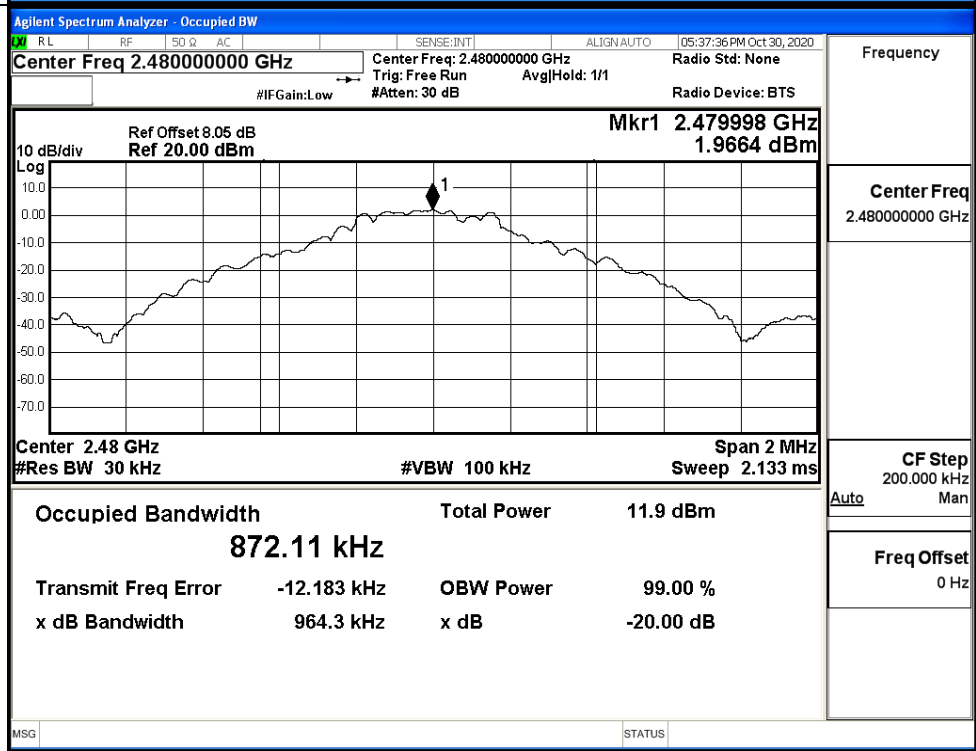
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9631	Not Specified	PASS
	MCH	0.9637	Not Specified	PASS
	HCH	0.9643	Not Specified	PASS
π/4DQPSK	LCH	1.520	Not Specified	PASS
	MCH	1.520	Not Specified	PASS
	HCH	1.521	Not Specified	PASS
8DPSK	LCH	1.513	Not Specified	PASS
	MCH	1.508	Not Specified	PASS
	HCH	1.501	Not Specified	PASS



GFSK/MCH



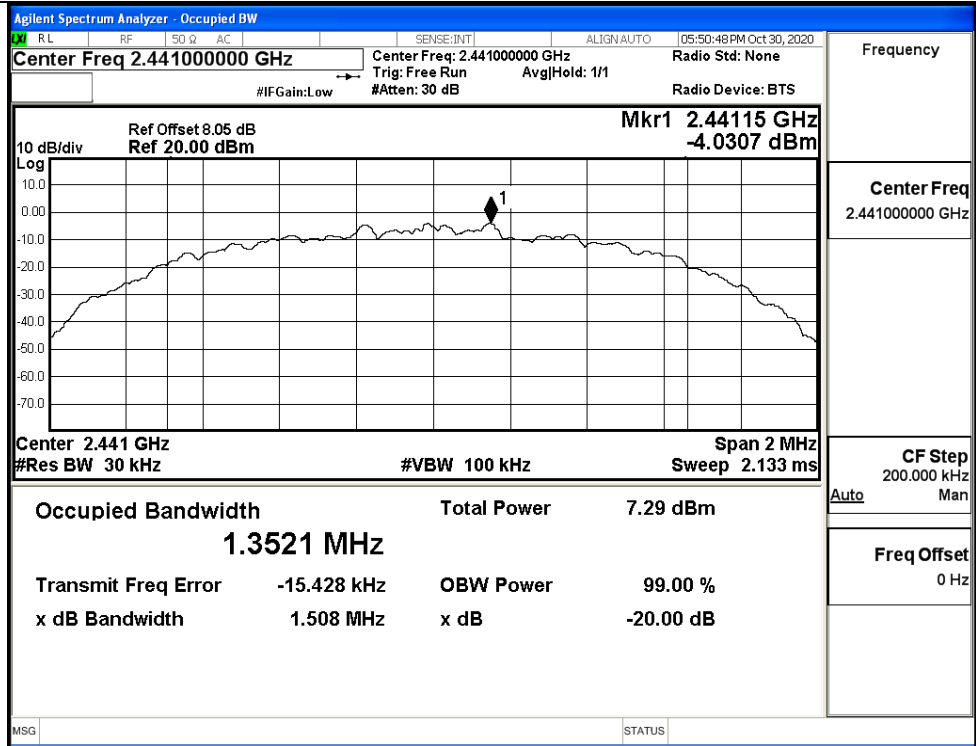
GFSK/HCH



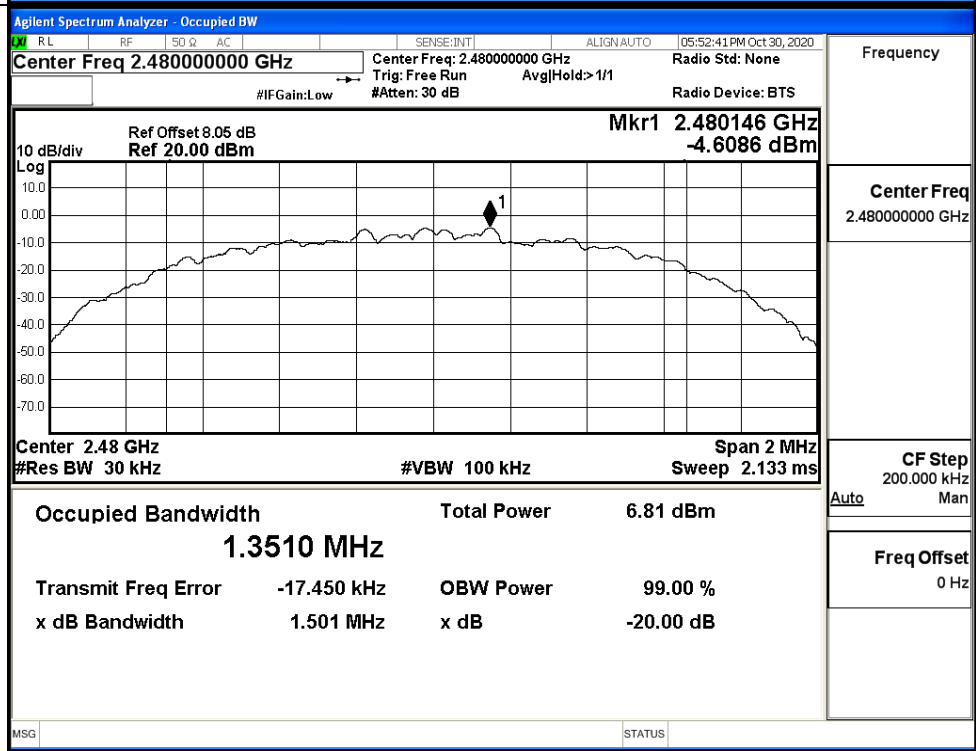
<p>π/4DQPSK/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz</p> <p>Mkr1 2.401982 GHz -4.6693 dBm</p> <p>10 dB/div</p> <p>Log</p> <p>Center 2.402 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 2 MHz</p> <p>Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.3531 MHz</p> <p>Total Power 6.50 dBm</p> <p>Transmit Freq Error -16.548 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 1.520 MHz</p> <p>x dB -20.00 dB</p>	<p>Frequency</p> <p>2.40200000 GHz</p> <p>Center Freq</p> <p>2.40200000 GHz</p> <p>CF Step</p> <p>200.000 kHz</p> <p>Auto Man</p> <p>Freq Offset</p> <p>0 Hz</p>
<p>π/4DQPSK/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.44100000 GHz</p> <p>Mkr1 2.440984 GHz -4.1318 dBm</p> <p>10 dB/div</p> <p>Log</p> <p>Center 2.441 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 2 MHz</p> <p>Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.3514 MHz</p> <p>Total Power 7.01 dBm</p> <p>Transmit Freq Error -15.274 kHz</p> <p>OBW Power 99.00 %</p> <p>x dB Bandwidth 1.520 MHz</p> <p>x dB -20.00 dB</p>	<p>Frequency</p> <p>2.44100000 GHz</p> <p>Center Freq</p> <p>2.44100000 GHz</p> <p>CF Step</p> <p>200.000 kHz</p> <p>Auto Man</p> <p>Freq Offset</p> <p>0 Hz</p>

<p style="text-align: center;">π/4DQPSK/HCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.48000000 GHz</p> <p>Mkr1 2.479982 GHz -4.7147 dBm</p> <p>10 dB/div</p> <p>Log</p> <p>Center 2.48 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 2 MHz</p> <p>Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.3510 MHz</p> <p>Total Power 6.46 dBm</p> <p>Transmit Freq Error -16.110 kHz</p> <p>x dB Bandwidth 1.521 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -20.00 dB</p>	<p>Frequency</p> <p>2.48000000 GHz</p> <p>Center Freq</p> <p>2.48000000 GHz</p> <p>CF Step</p> <p>200.000 kHz</p> <p>Auto Man</p> <p>Freq Offset</p> <p>0 Hz</p>
<p style="text-align: center;">8DPSK/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz</p> <p>Mkr1 2.402142 GHz -4.6412 dBm</p> <p>10 dB/div</p> <p>Log</p> <p>Center 2.402 GHz</p> <p>#Res BW 30 kHz</p> <p>#VBW 100 kHz</p> <p>Span 2 MHz</p> <p>Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.3529 MHz</p> <p>Total Power 6.77 dBm</p> <p>Transmit Freq Error -15.036 kHz</p> <p>x dB Bandwidth 1.513 MHz</p> <p>OBW Power 99.00 %</p> <p>x dB -20.00 dB</p>	<p>Frequency</p> <p>2.40200000 GHz</p> <p>Center Freq</p> <p>2.40200000 GHz</p> <p>CF Step</p> <p>200.000 kHz</p> <p>Auto Man</p> <p>Freq Offset</p> <p>0 Hz</p>

8DPSK/MCH

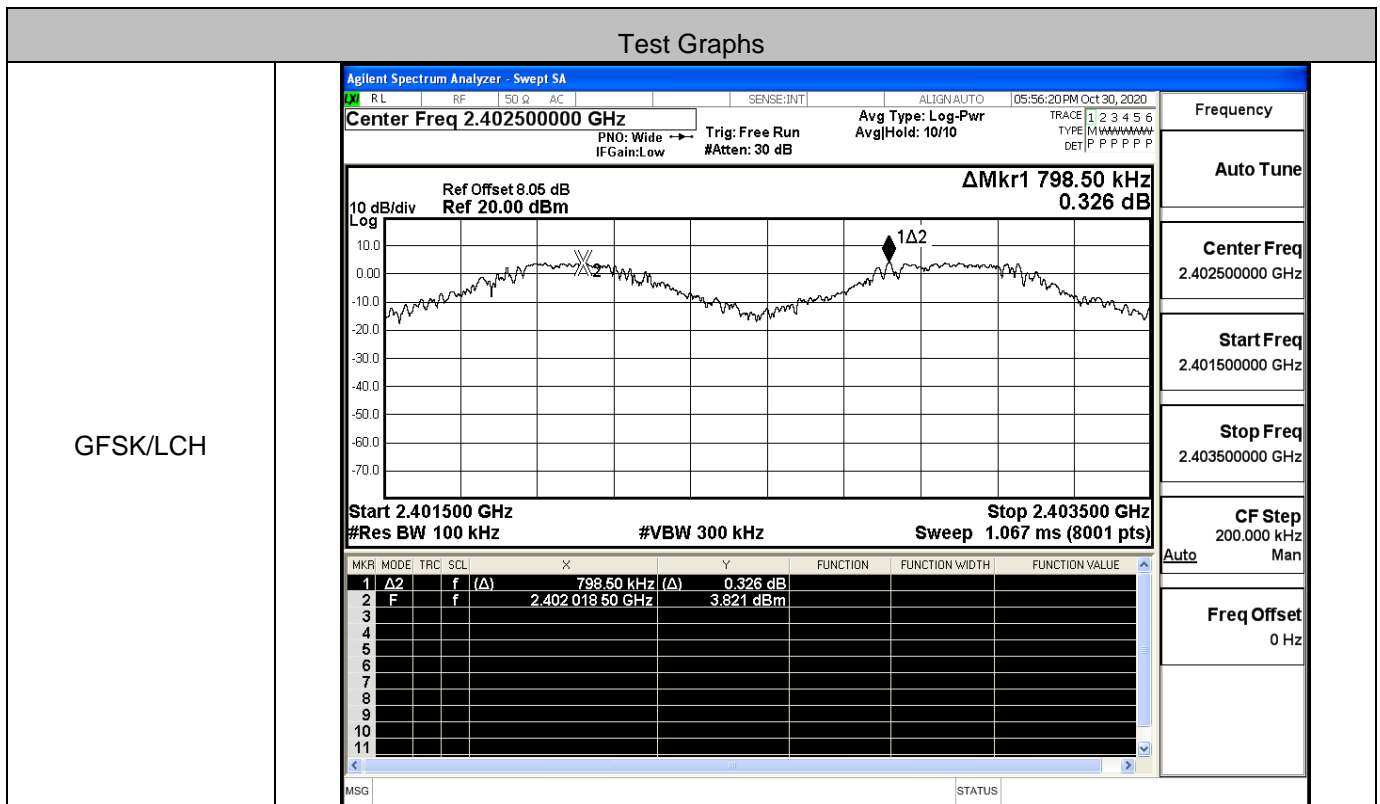


8DPSK/HCH

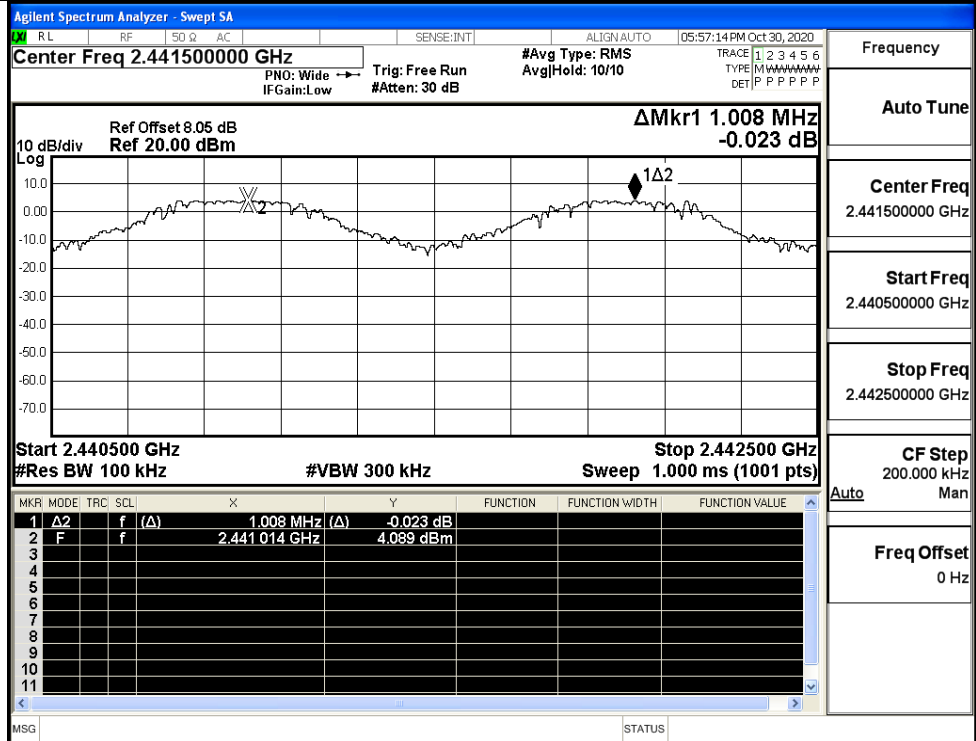


A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.798	0.643	PASS
	MCH	1.008	0.643	PASS
	HCH	1.224	0.643	PASS
π/4DQPSK	LCH	1.128	1.014	PASS
	MCH	1.070	1.014	PASS
	HCH	1.038	1.014	PASS
8DPSK	LCH	1.254	1.009	PASS
	MCH	1.232	1.009	PASS
	HCH	1.130	1.009	PASS

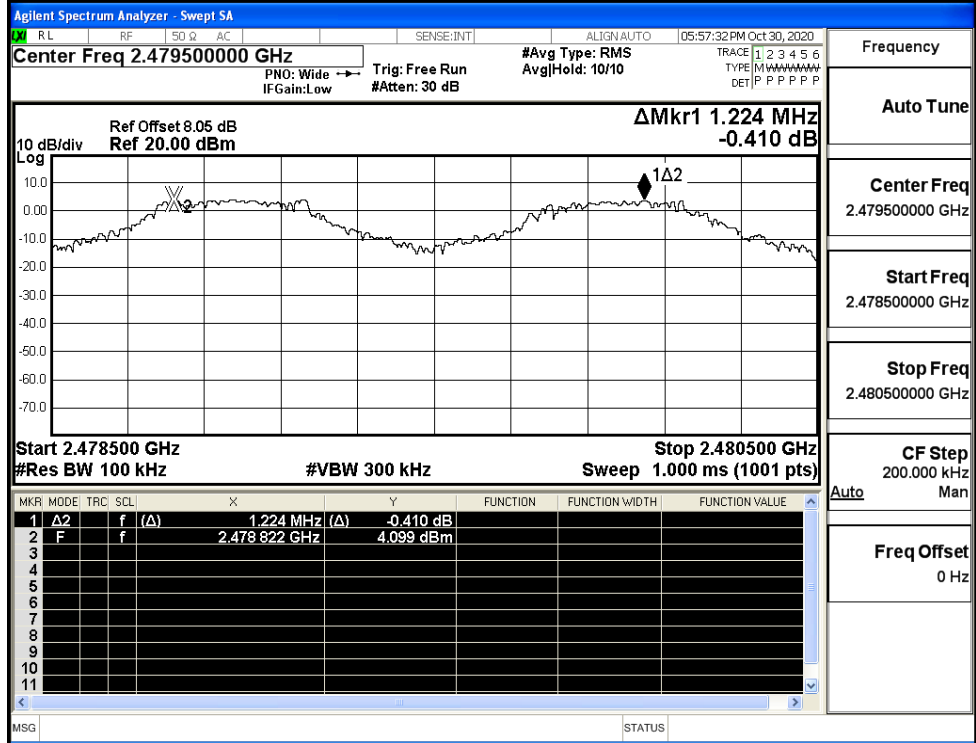


GFSK/MCH



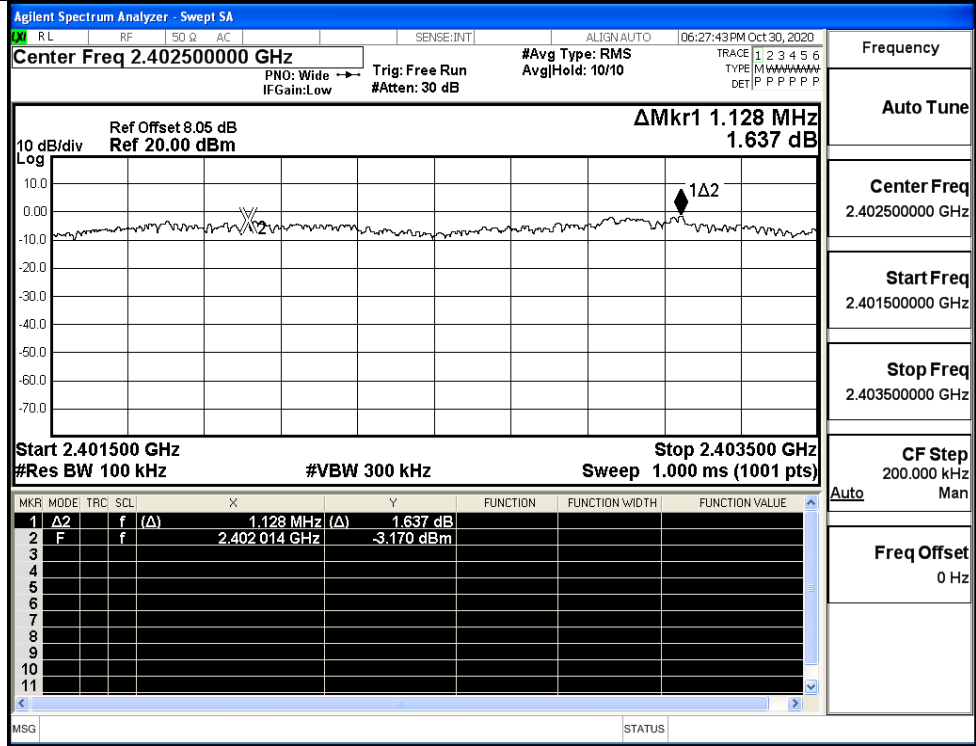
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

GFSK/HCH

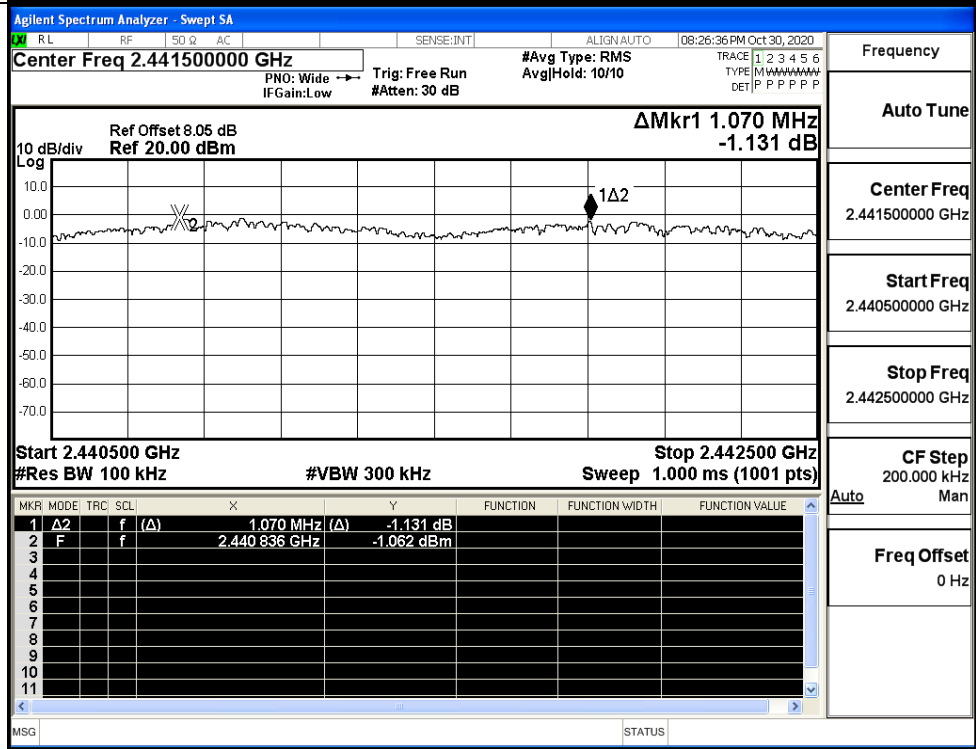


Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

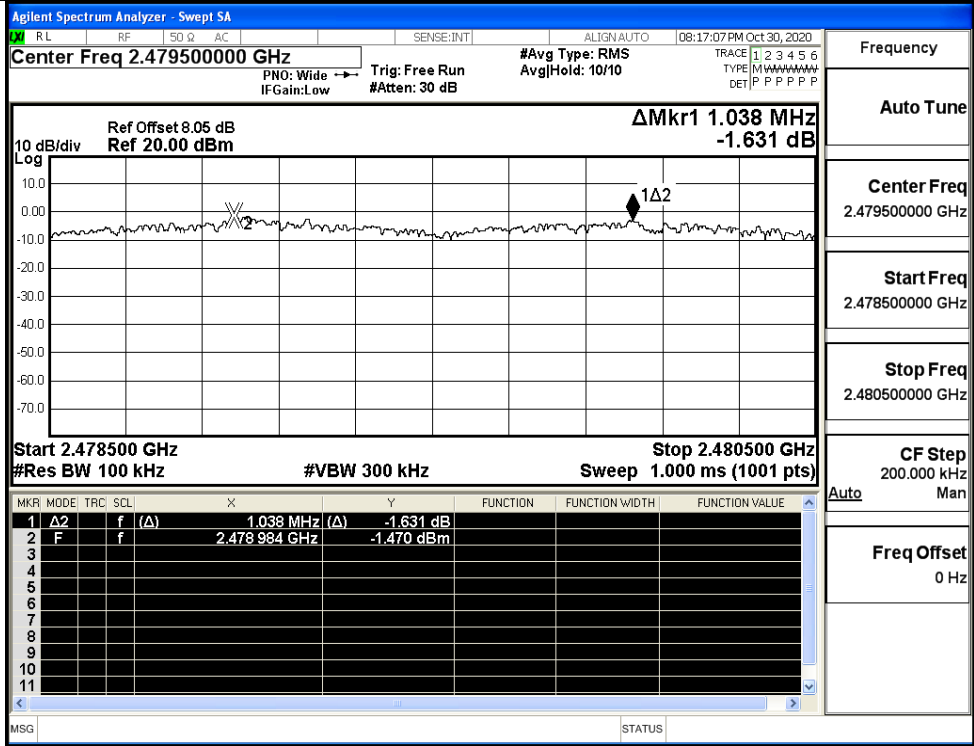
π/4DQPSK/LCH



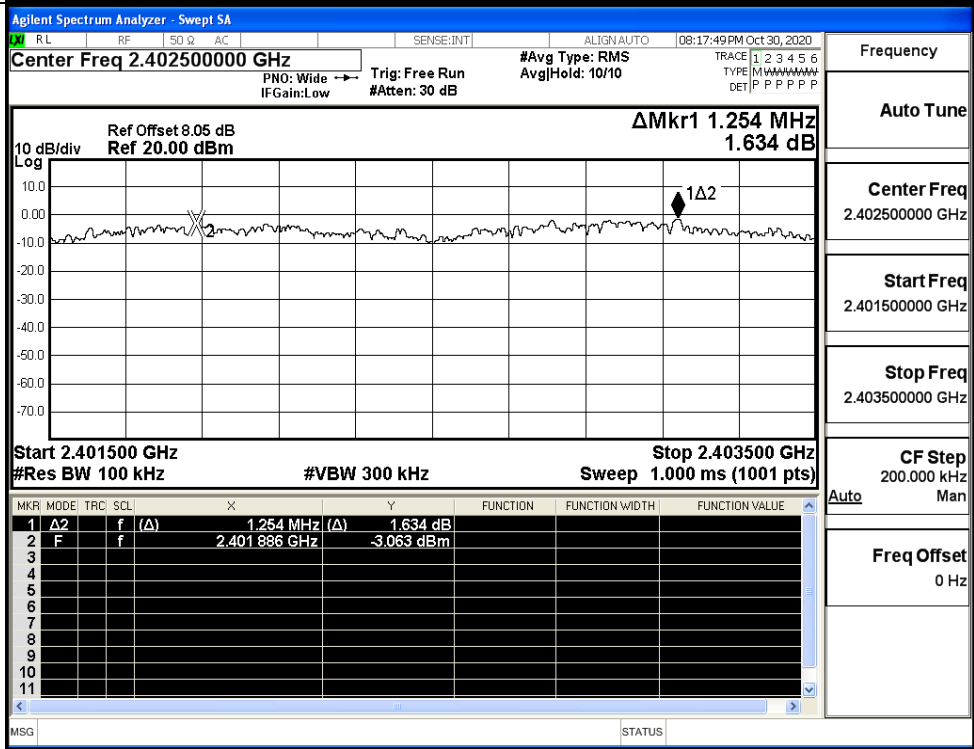
π/4DQPSK/MCH

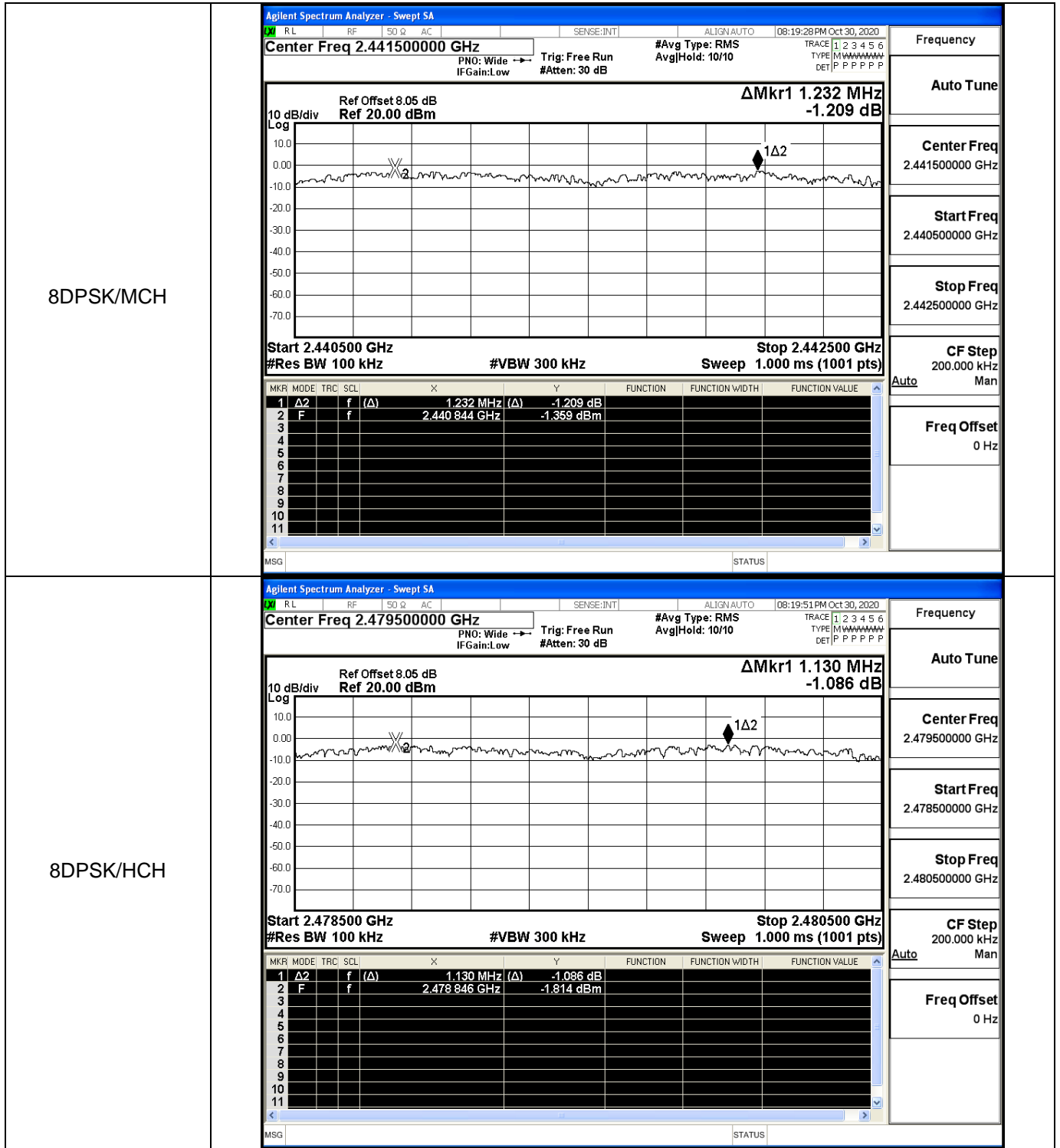


π/4DQPSK/HCH



8DPSK/LCH



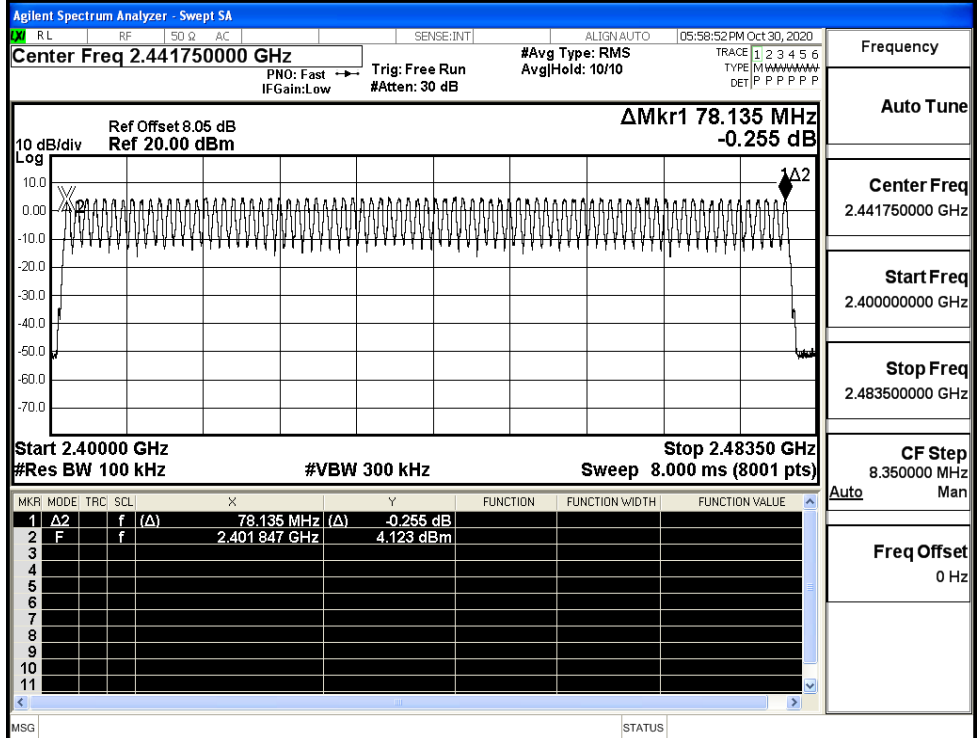


A.4 Hopping Channel Number

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

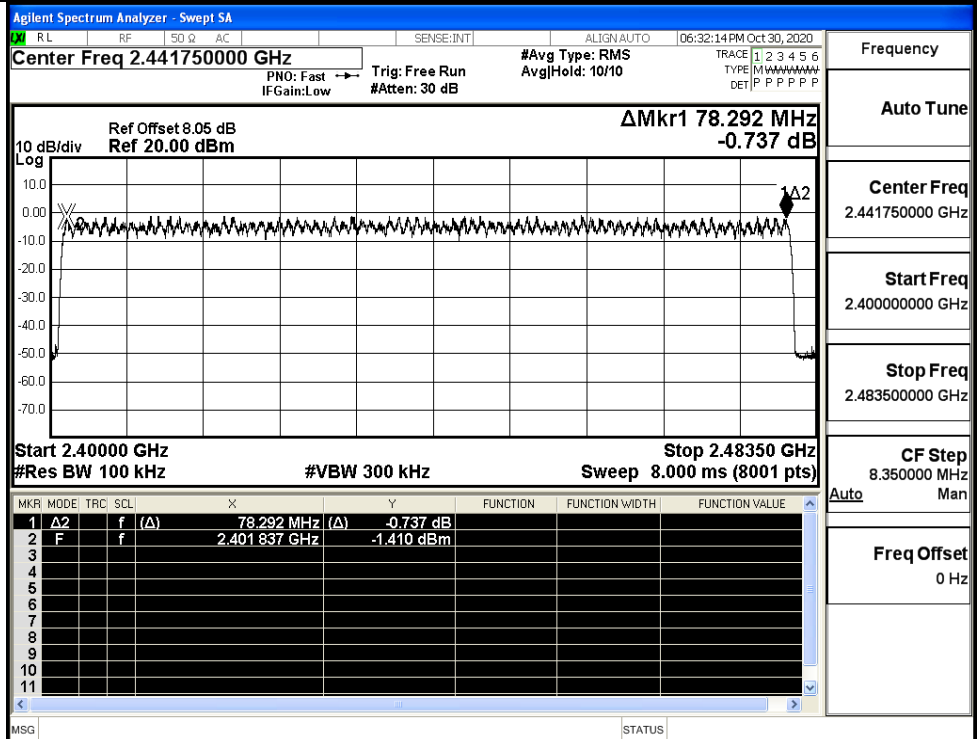
Test Graphs

GFSK/Hop



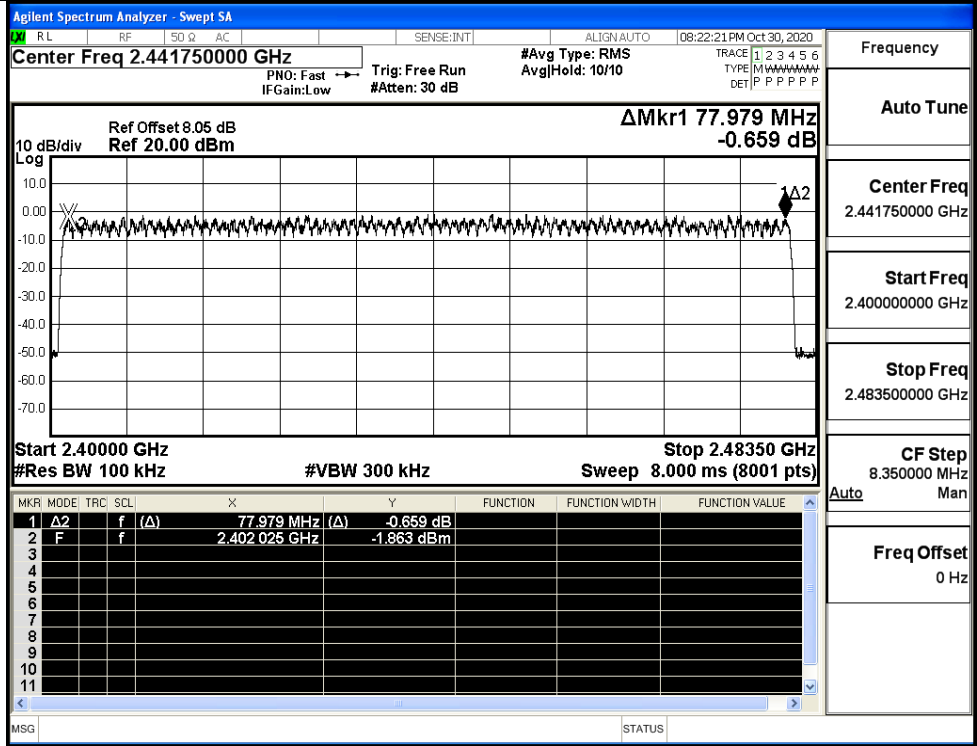
Frequency
Auto Tune
Center Freq 2.441750000 GHz
Start Freq 2.400000000 GHz
Stop Freq 2.483500000 GHz
CF Step 8.350000 MHz
Auto Man
Freq Offset 0 Hz

$\pi/4$ DQPSK/Hop



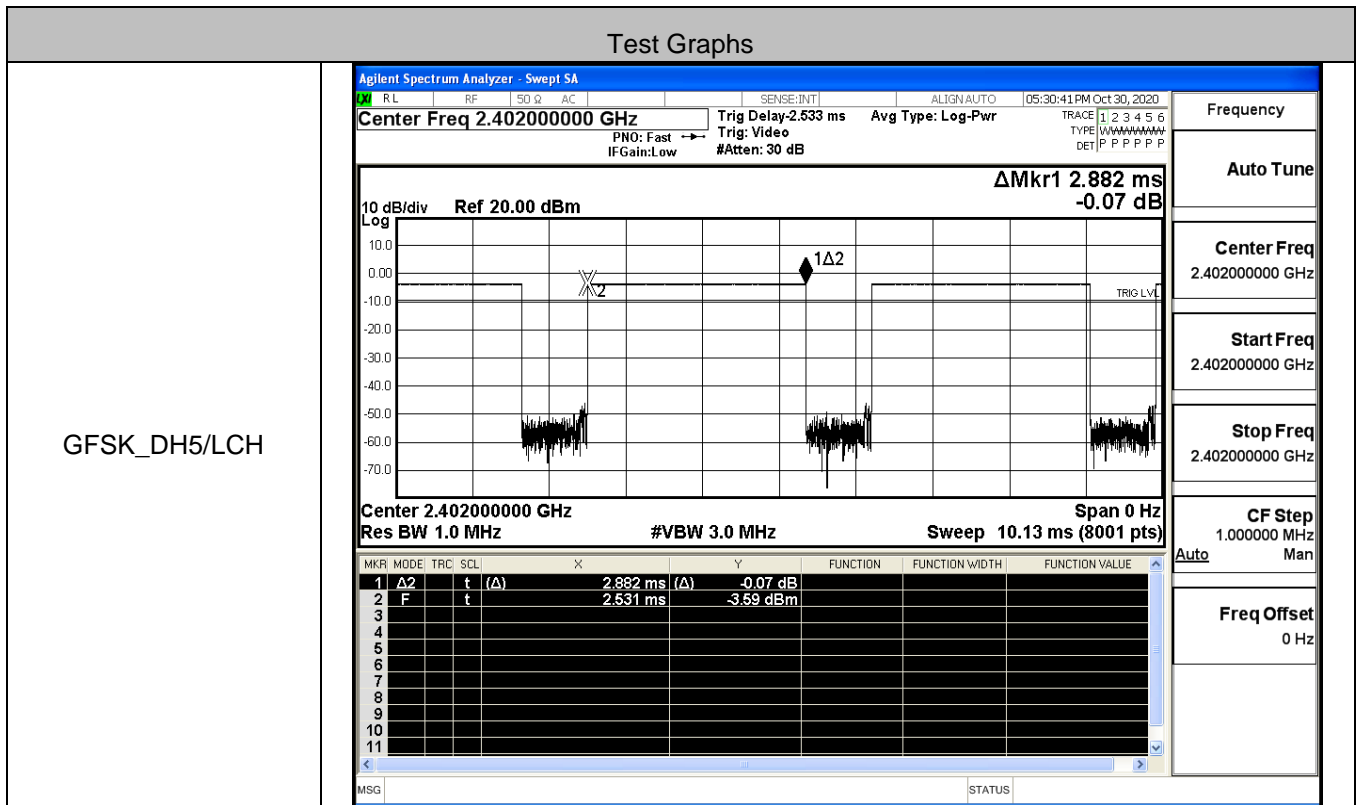
Frequency
Auto Tune
Center Freq 2.441750000 GHz
Start Freq 2.400000000 GHz
Stop Freq 2.483500000 GHz
CF Step 8.350000 MHz
Auto Man
Freq Offset 0 Hz

8DPSK/Hop

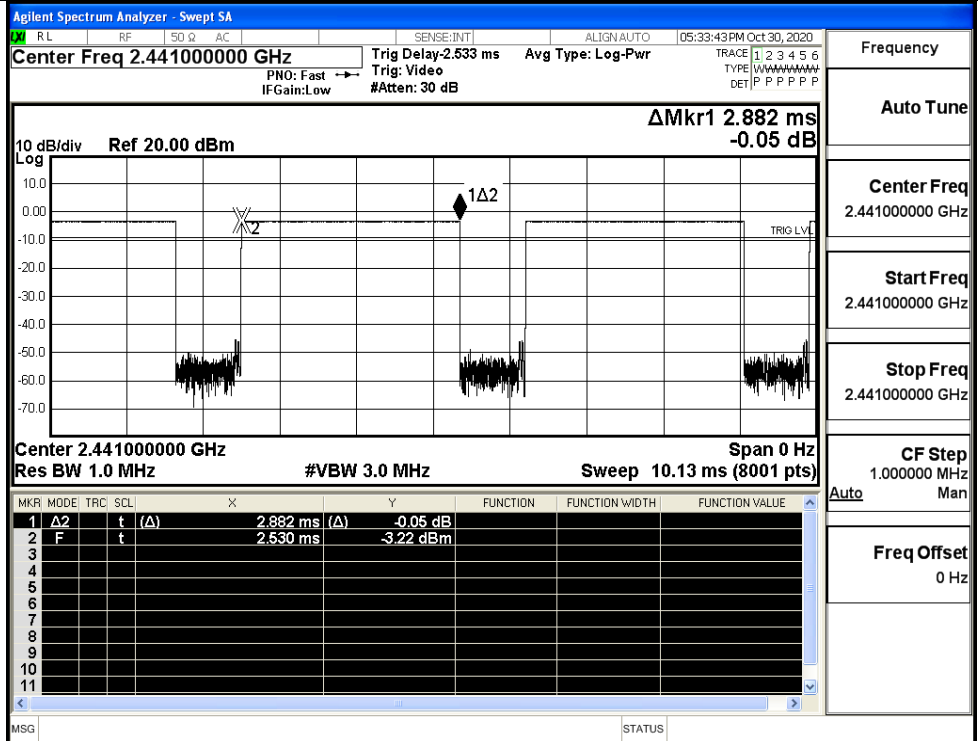


A.5 Dwell Time

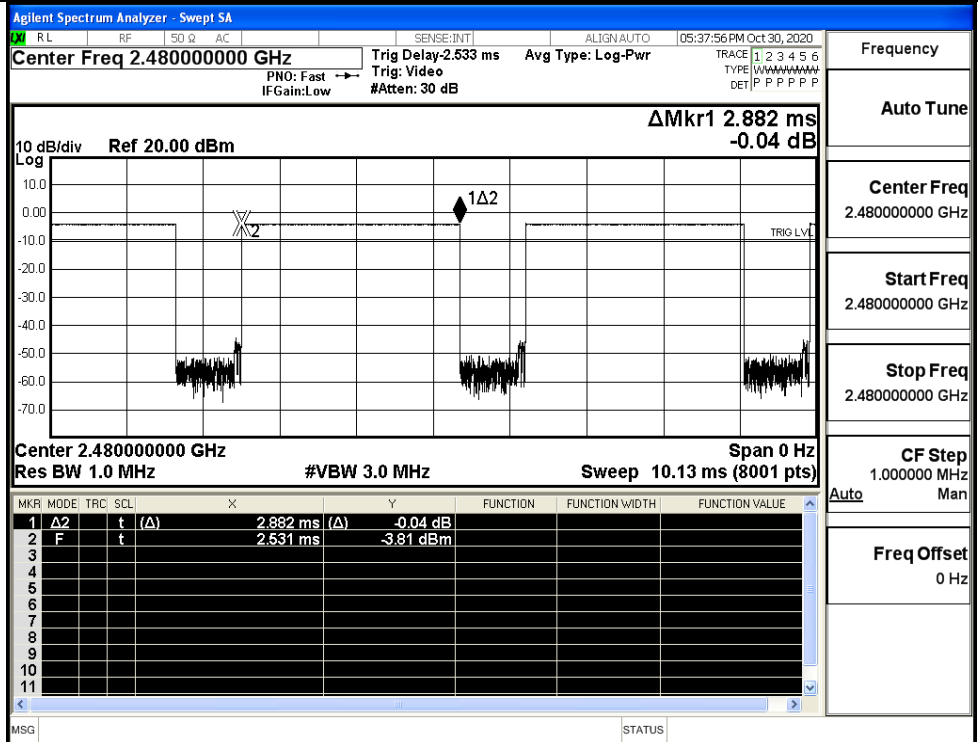
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.015	0.4	PASS
	2DH5	MCH	2.88	106.7	0.015	0.4	PASS
	2DH5	HCH	2.88	106.7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



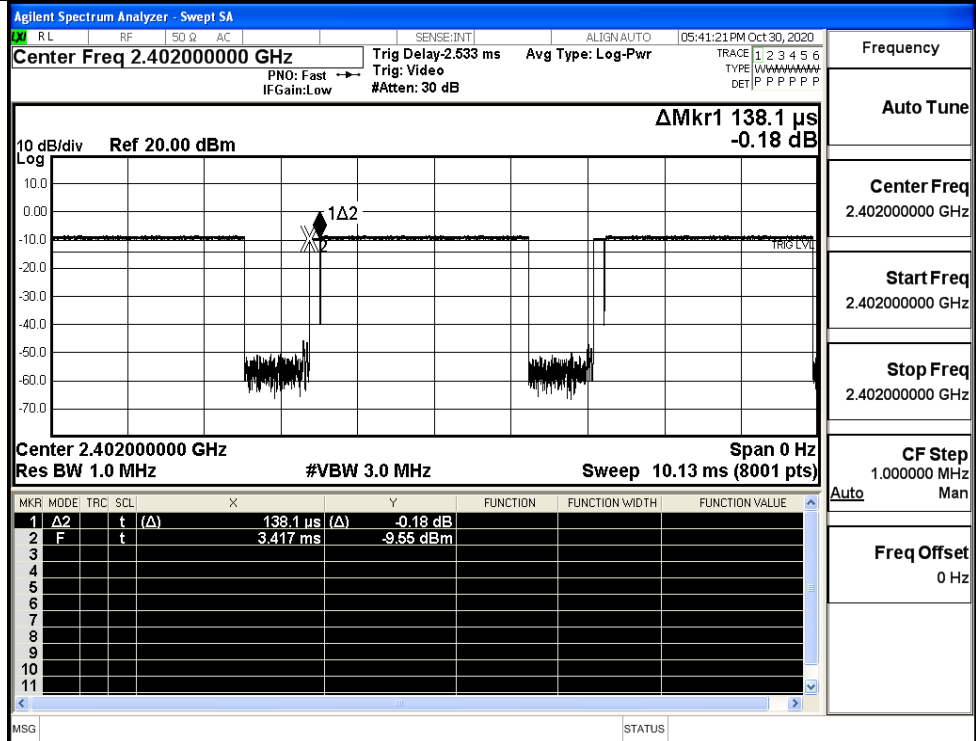
GFSK_DH5/MCH



GFSK_DH5/HCH

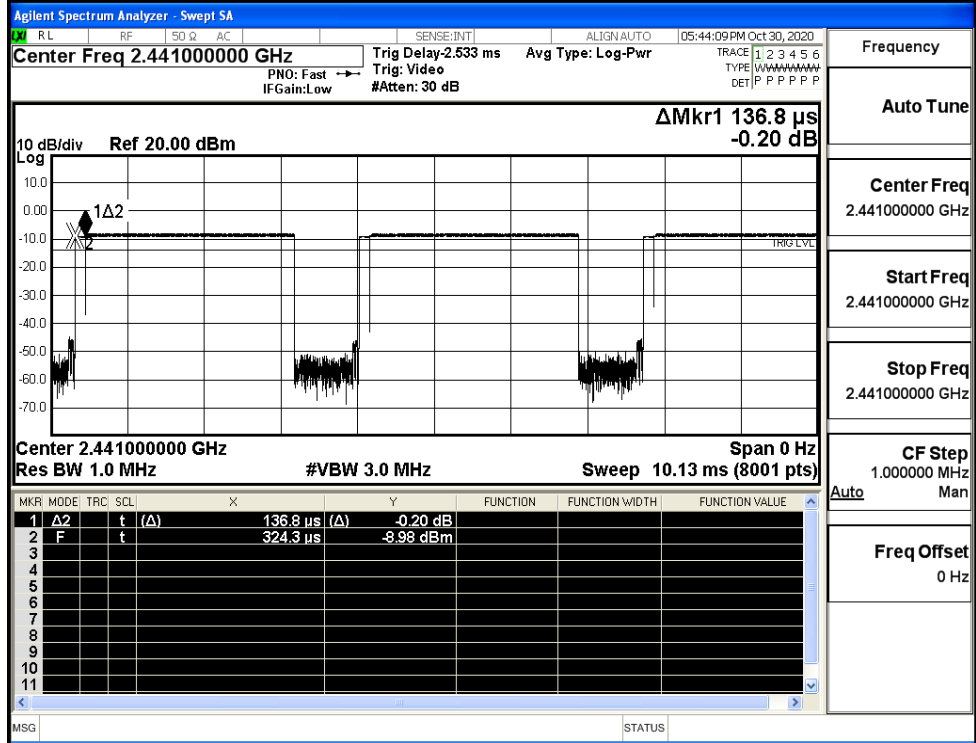


$\pi/4$ DQPSK
_2DH5/LCH



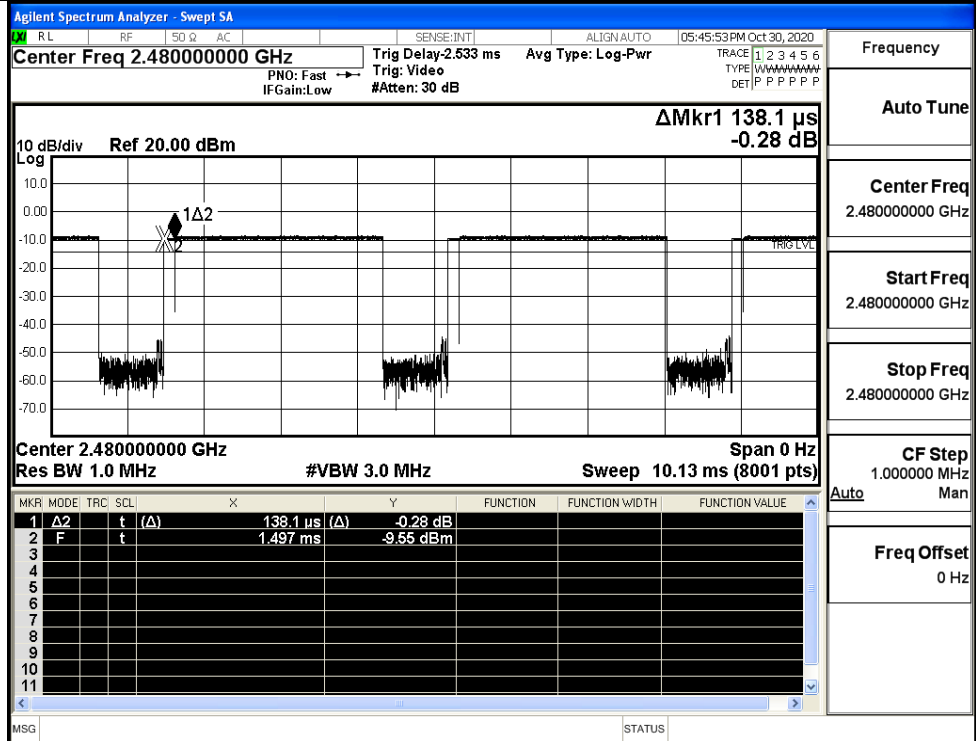
Frequency	
Auto Tune	
Center Freq	2.40200000 GHz
Start Freq	2.40200000 GHz
Stop Freq	2.40200000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK
_2DH5/MCH



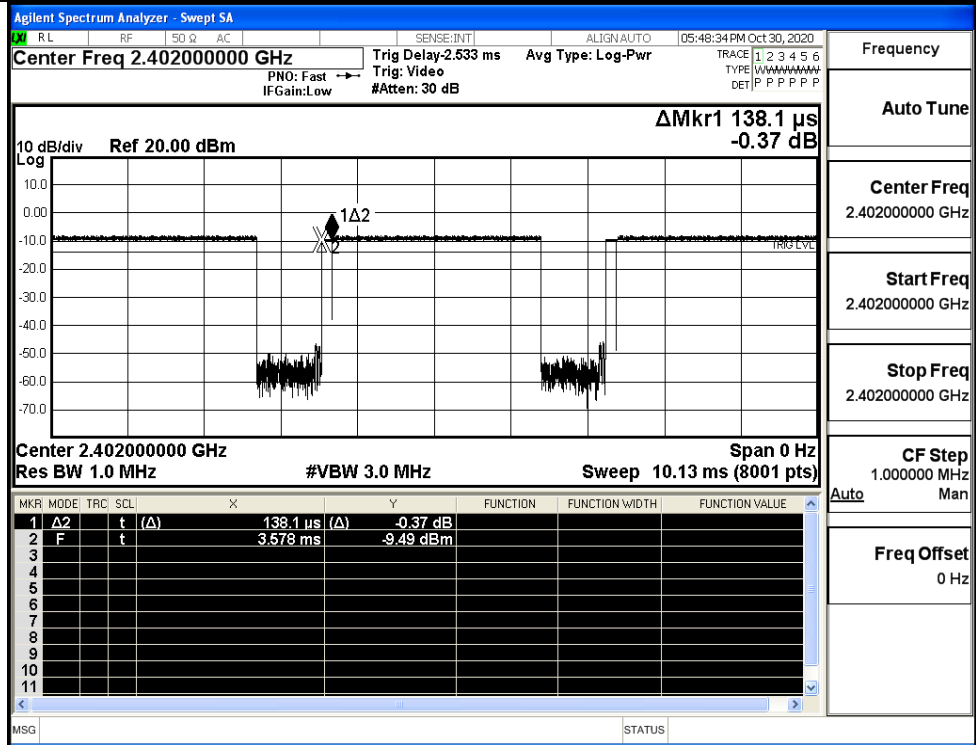
Frequency	
Auto Tune	
Center Freq	2.44100000 GHz
Start Freq	2.44100000 GHz
Stop Freq	2.44100000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK
_2DH5/HCH



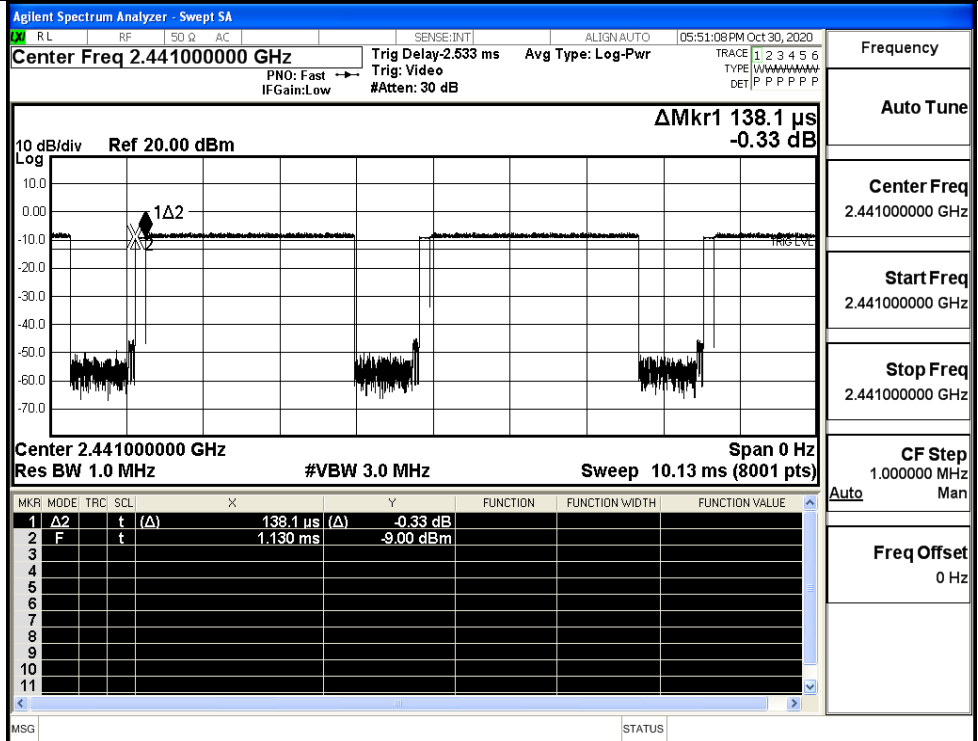
Frequency	2.480000000 GHz
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

8DPSK_3DH5/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

8DPSK_3DH5/MCH



Frequency

Auto Tune

Center Freq
2.441000000 GHz

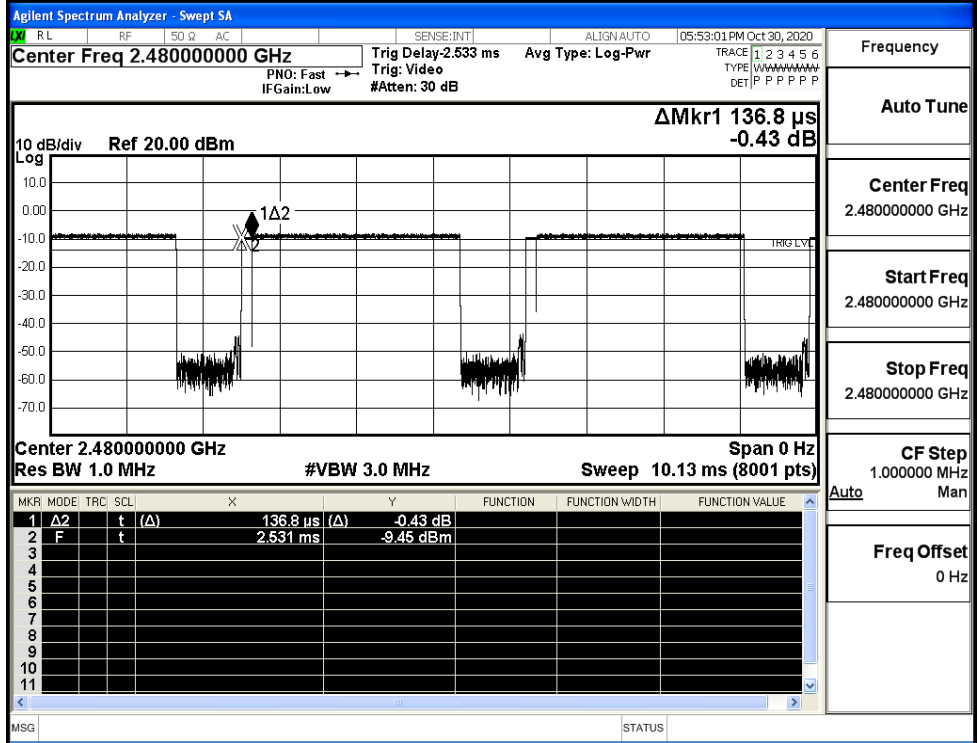
Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK_3DH5/HCH



Frequency

Auto Tune

Center Freq
2.480000000 GHz

Start Freq
2.480000000 GHz

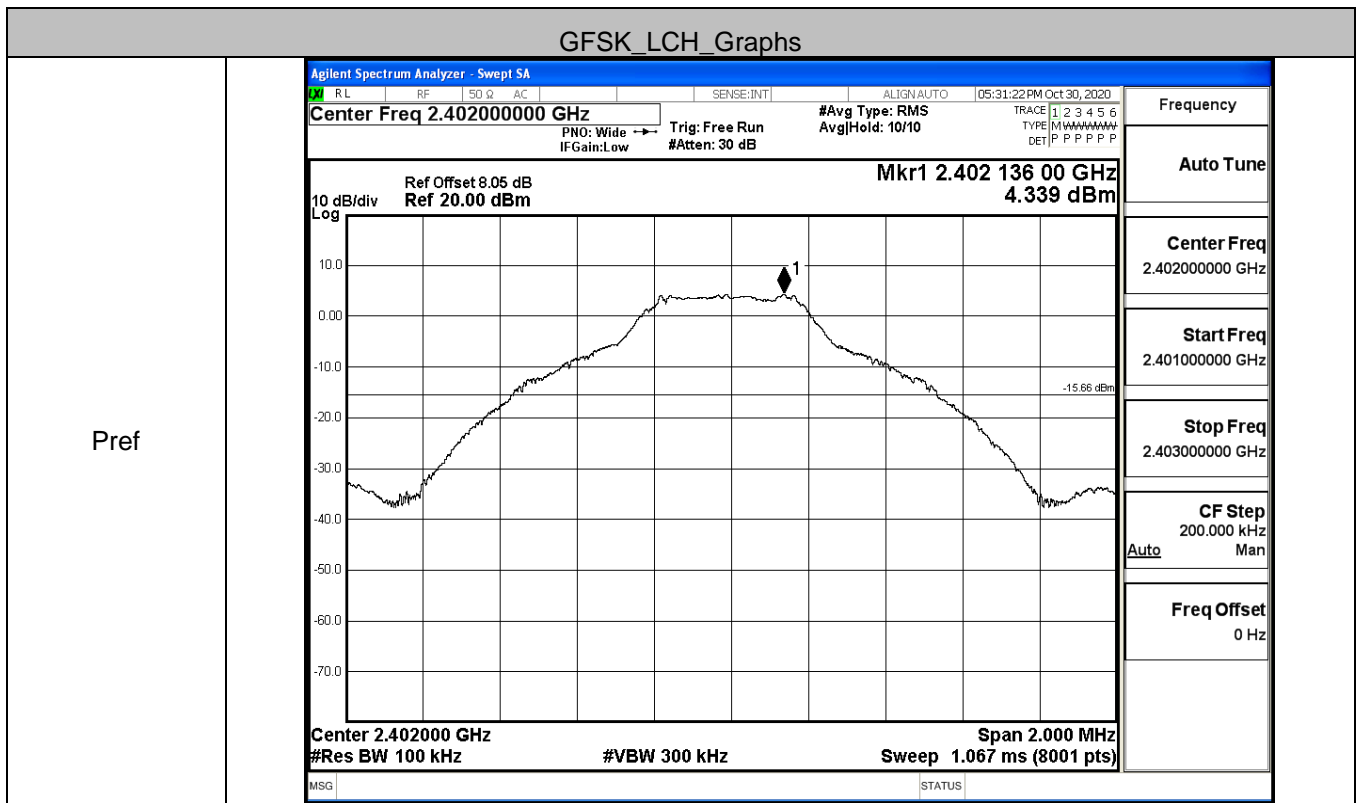
Stop Freq
2.480000000 GHz

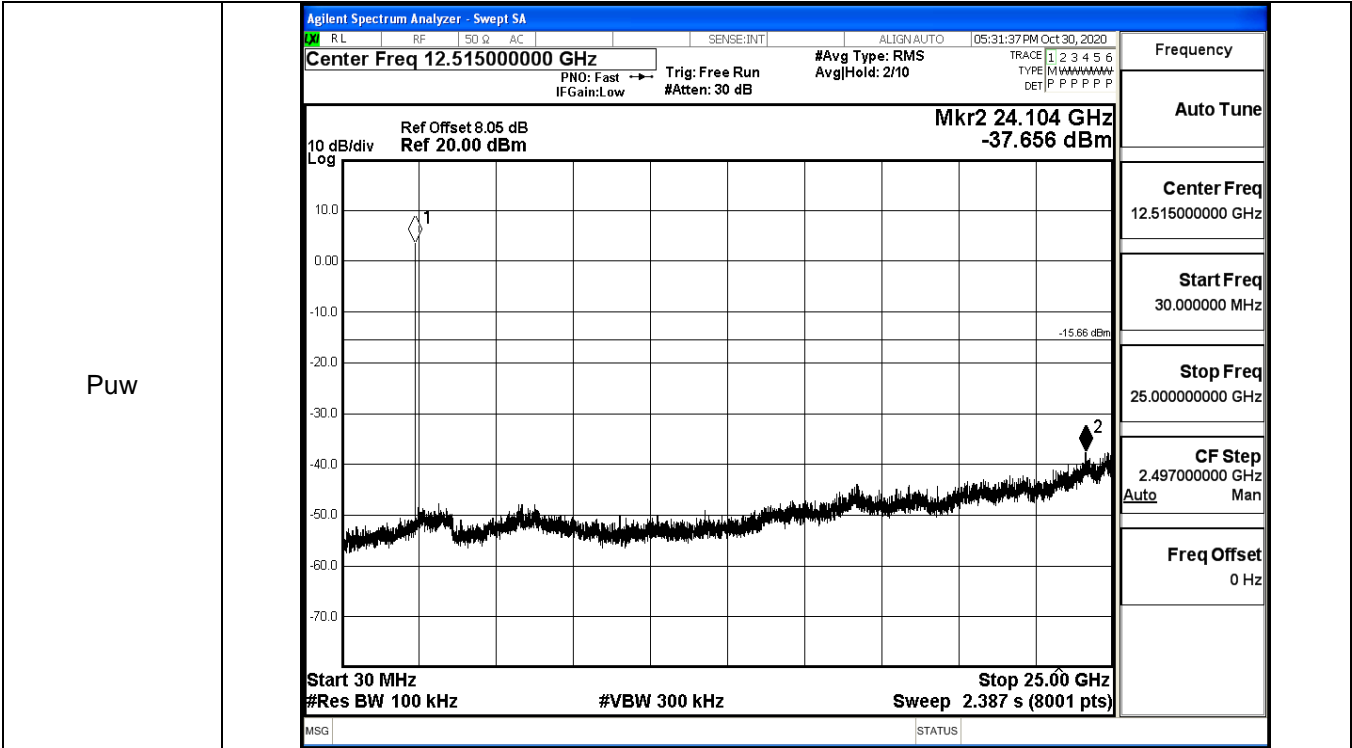
CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

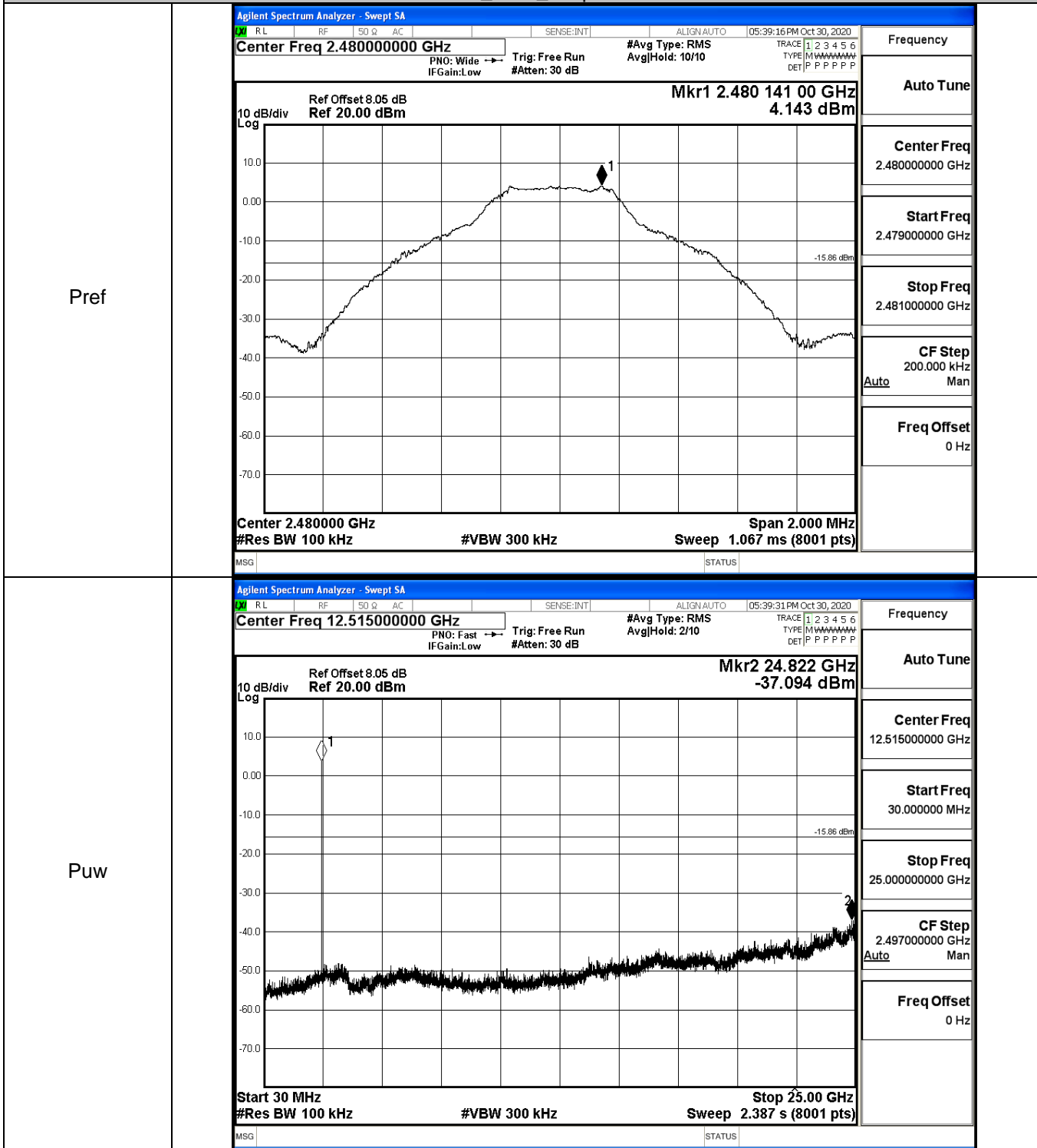
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.339	-37.656	-15.661	PASS
	MCH	4.799	-37.012	-15.201	PASS
	HCH	4.143	-37.094	-15.857	PASS
π /4DQPSK	LCH	-1.613	-37.698	-21.613	PASS
	MCH	-1.083	-38.042	-21.083	PASS
	HCH	-1.533	-37.119	-21.533	PASS
8DPSK	LCH	-1.636	-37.424	-21.636	PASS
	MCH	-0.902	-37.847	-20.902	PASS
	HCH	-1.519	-37.383	-21.519	PASS

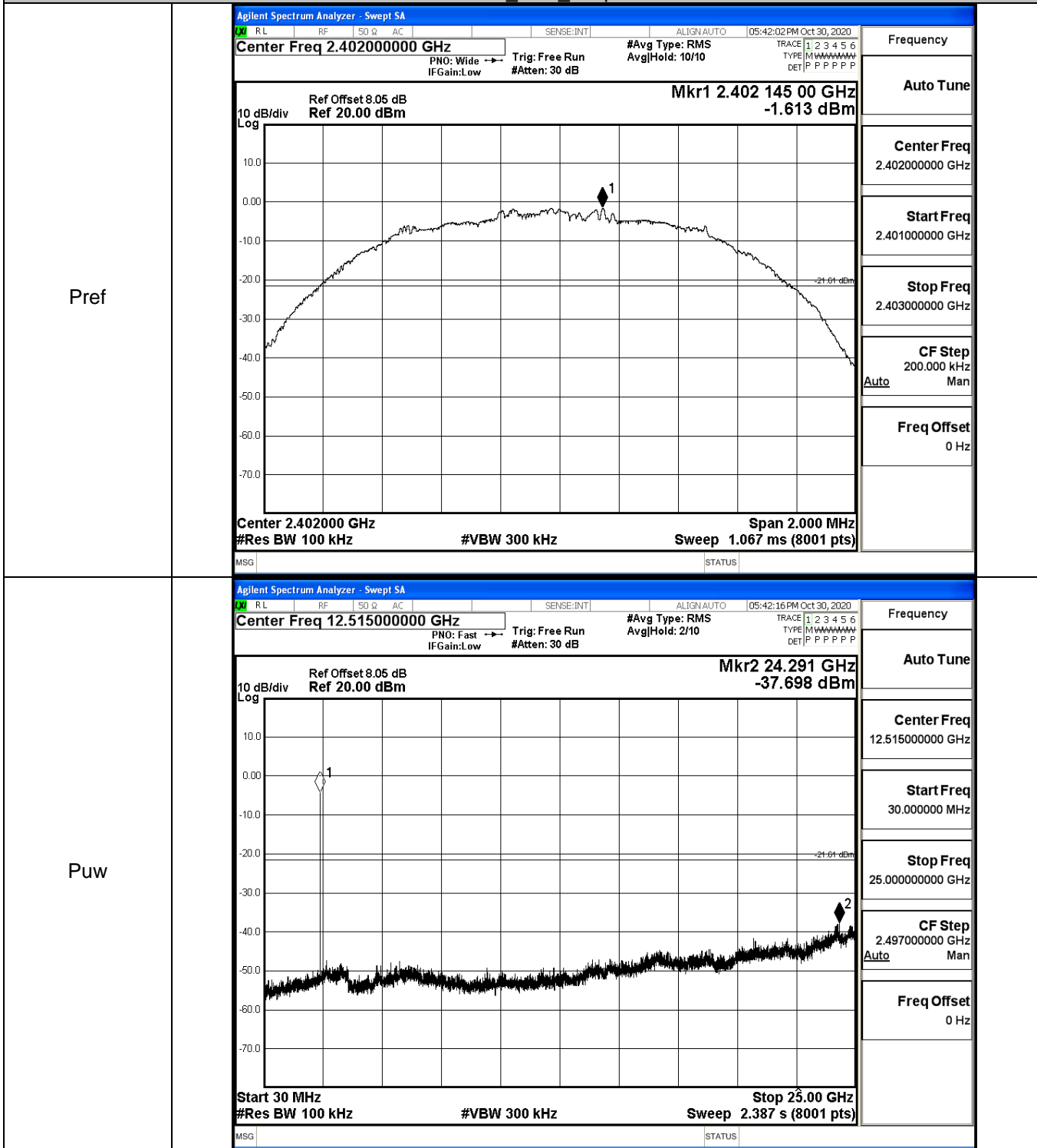




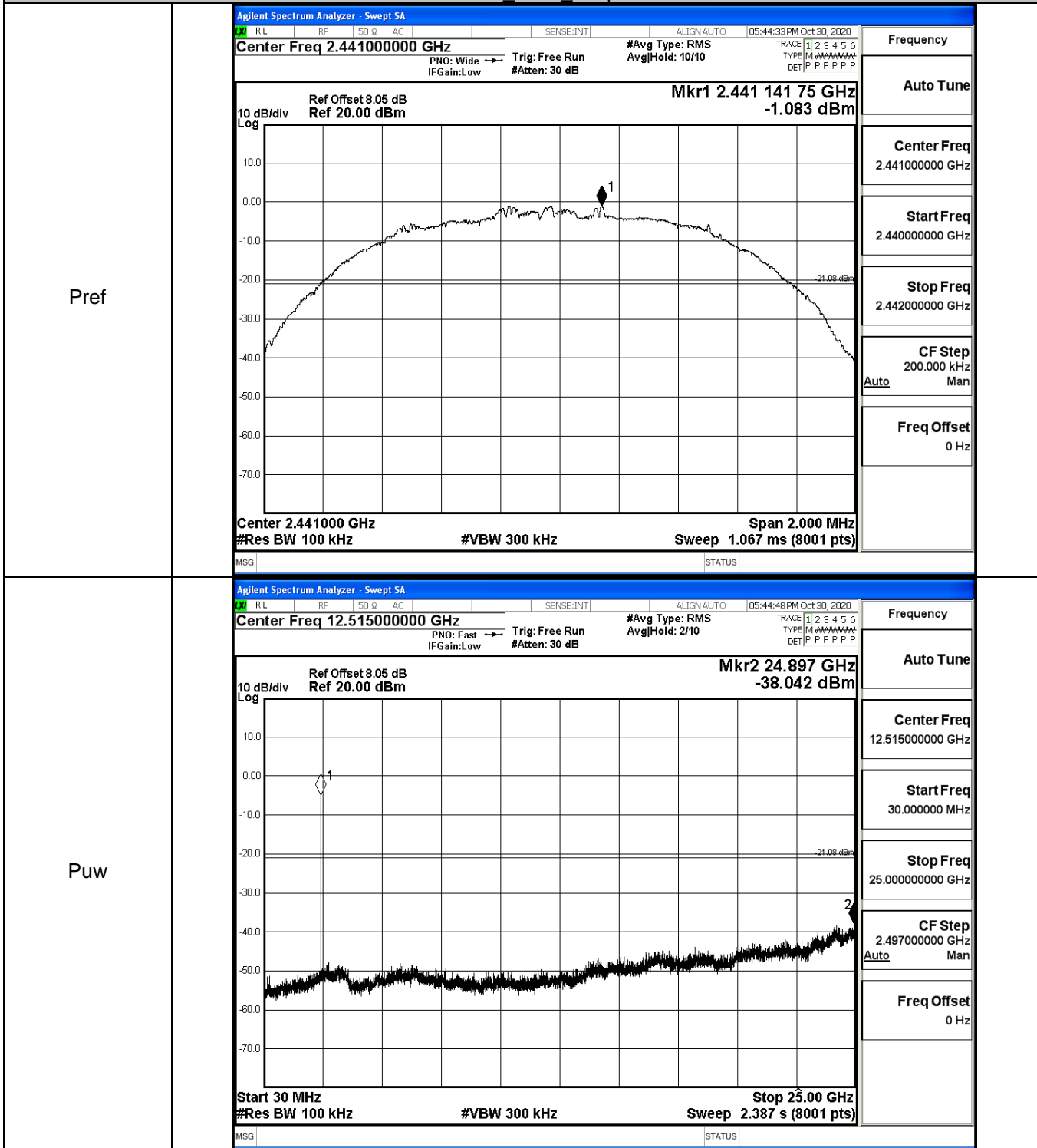
GFSK_HCH_Graphs



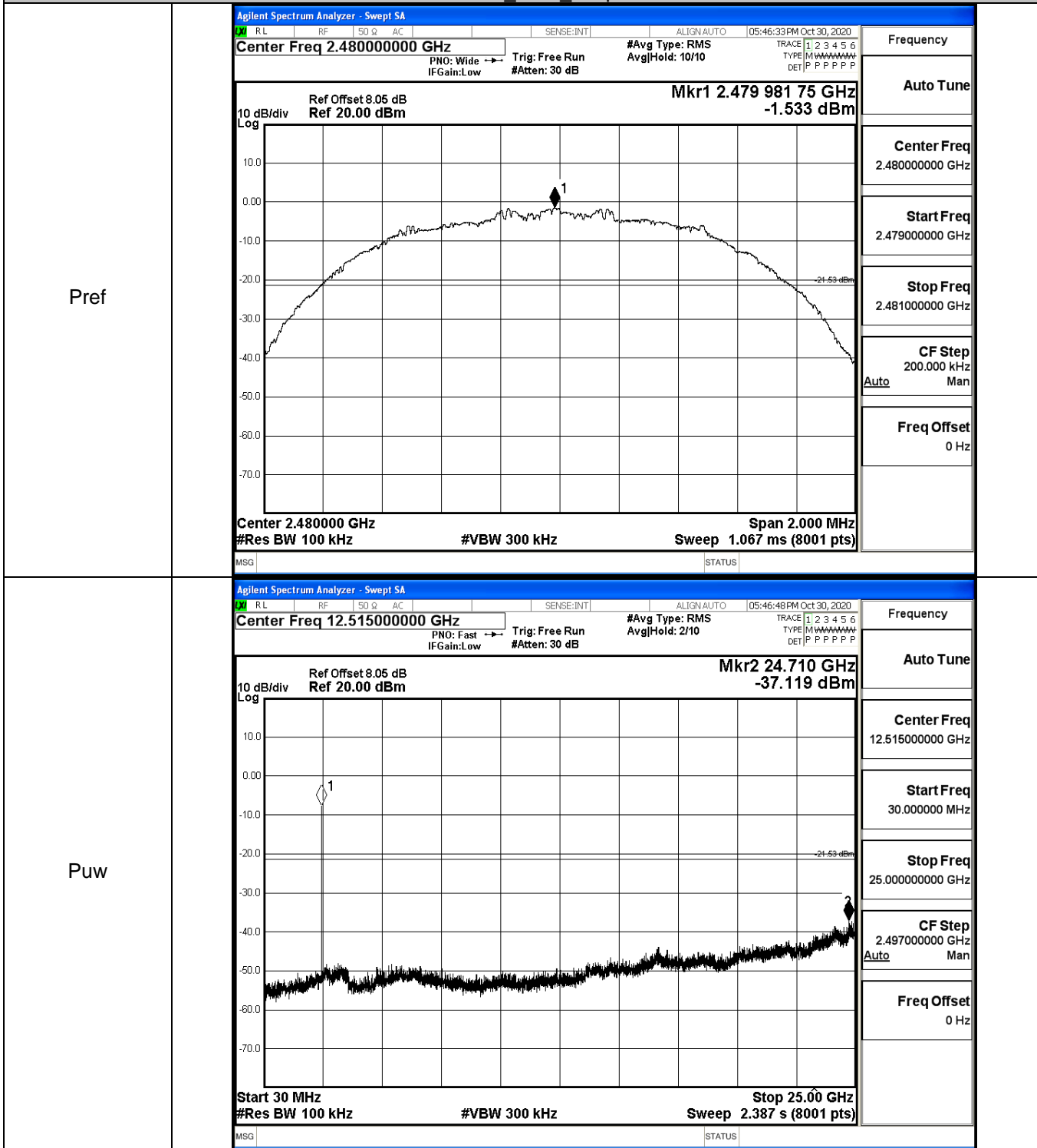
$\pi/4$ DQPSK_LCH_Graphs



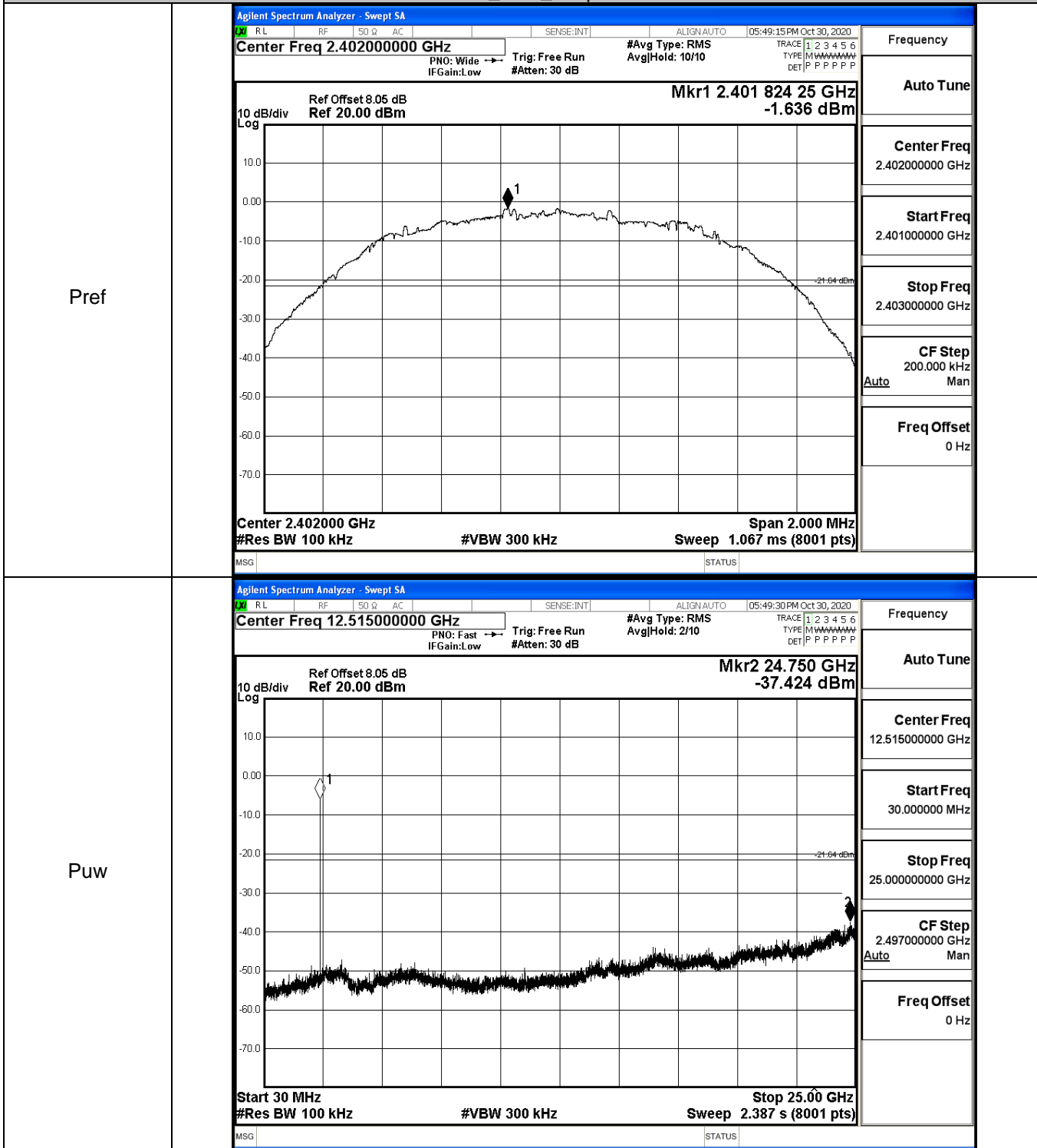
$\pi/4$ DQPSK_MCH_Graphs



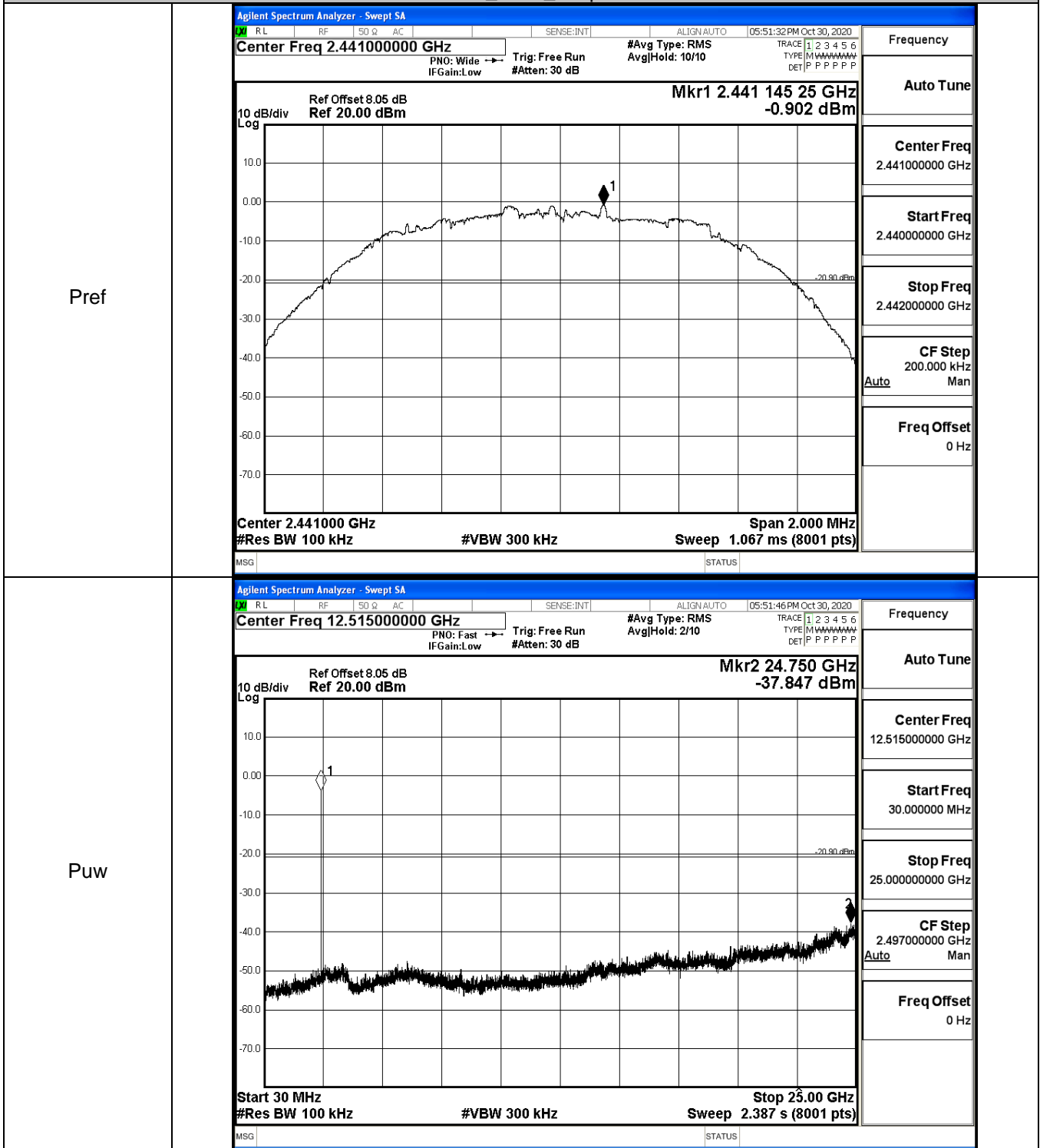
$\pi/4$ DQPSK_HCH_Graphs



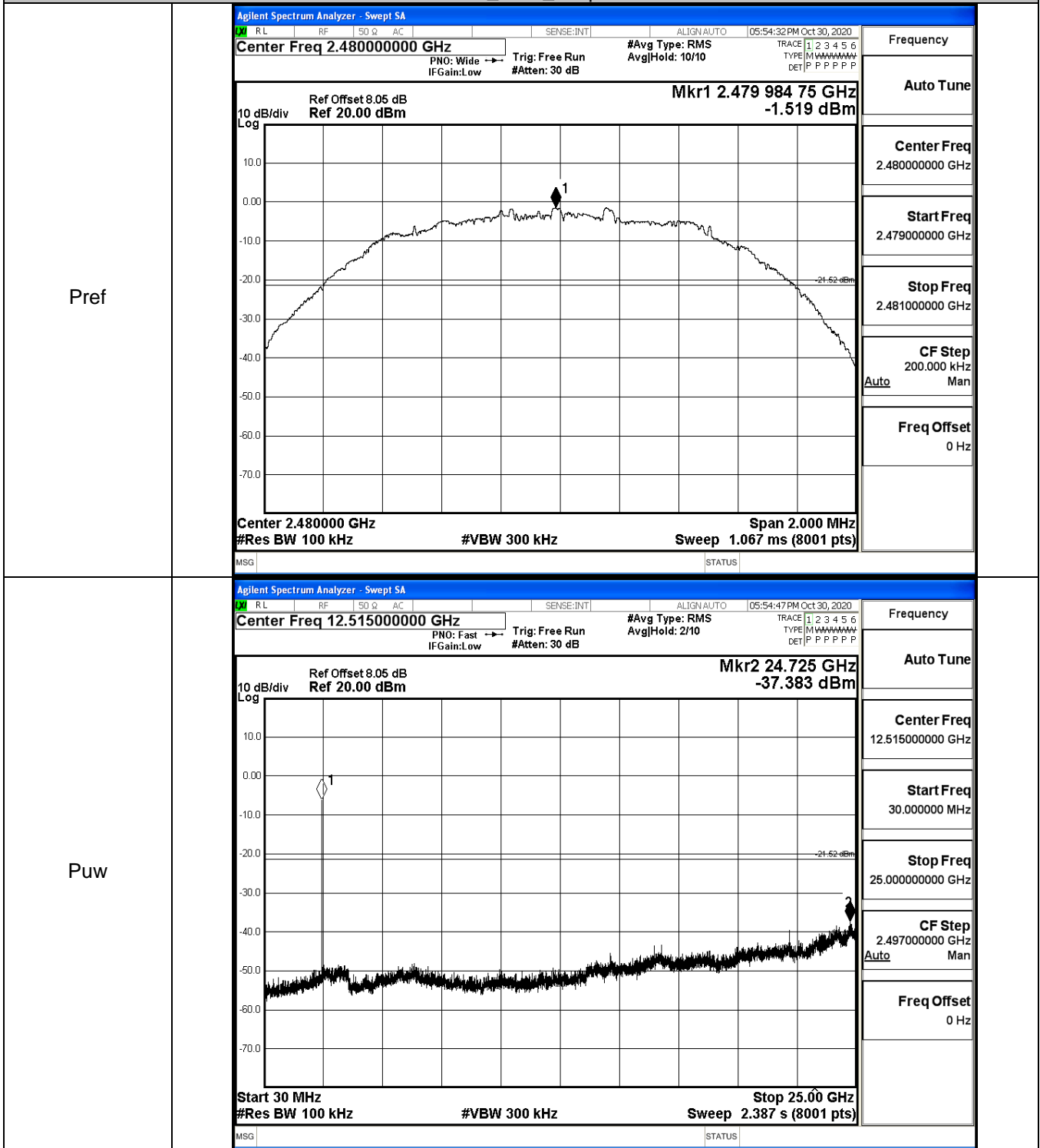
8DPSK_LCH_Graphs



8DPSK_MCH_Graphs



8DPSK_HCH_Graphs

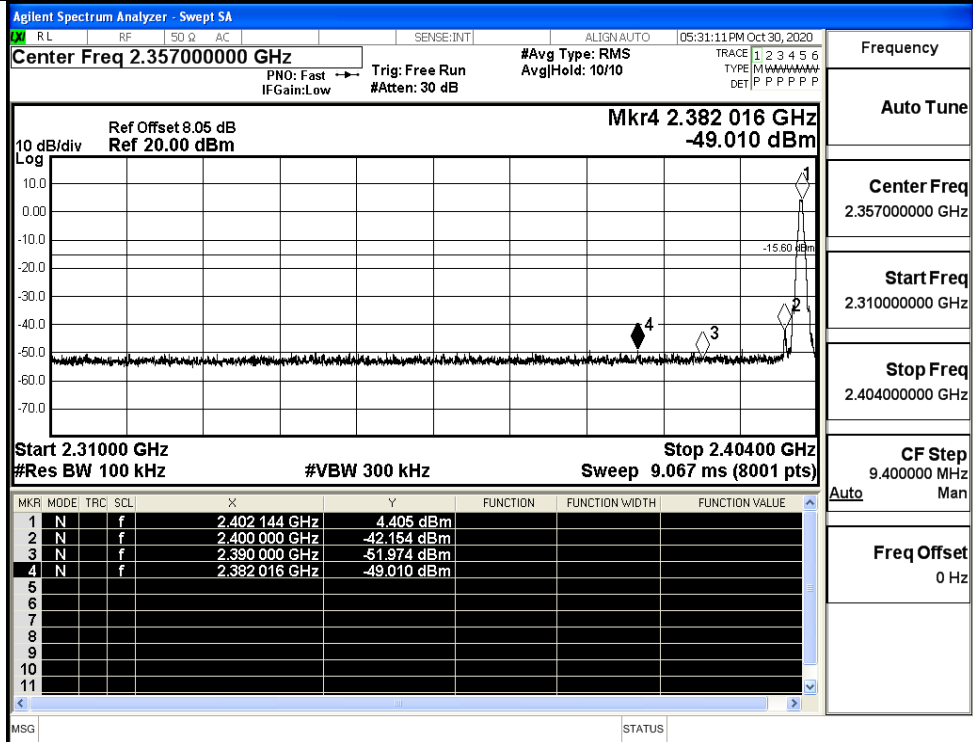


A.7 Band-edge for RF Conducted Emissions

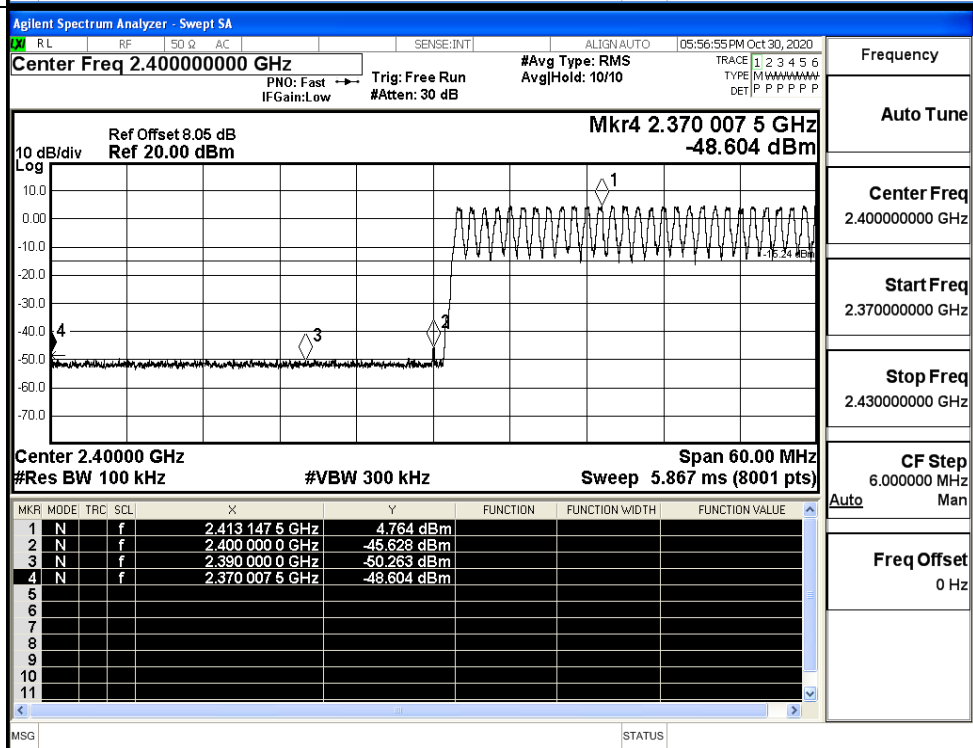
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.405	Off	-49.010	-15.6	PASS
			4.764	On	-48.604	-15.24	PASS
	HCH	2480	4.217	Off	-41.872	-15.78	PASS
			4.481	On	-48.892	-15.52	PASS
π/4DQPSK	LCH	2402	-1.477	Off	-49.592	-21.48	PASS
			-1.095	On	-48.509	-21.1	PASS
	HCH	2480	-1.516	Off	-40.472	-21.52	PASS
			-1.168	On	-43.536	-21.17	PASS
8DPSK	LCH	2402	-1.632	Off	-49.618	-21.63	PASS
			-0.833	On	-48.540	-20.83	PASS
	HCH	2480	-1.715	Off	-39.935	-21.72	PASS
			-0.949	On	-39.738	-20.95	PASS

Test Graphs

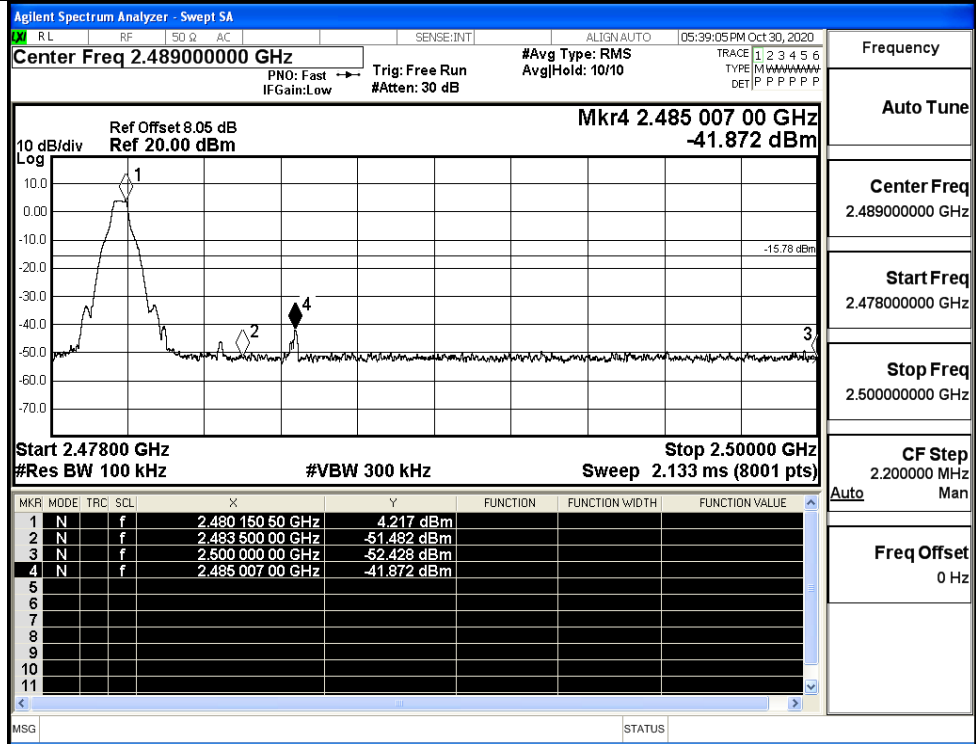
GFSK/LCH/No Hop



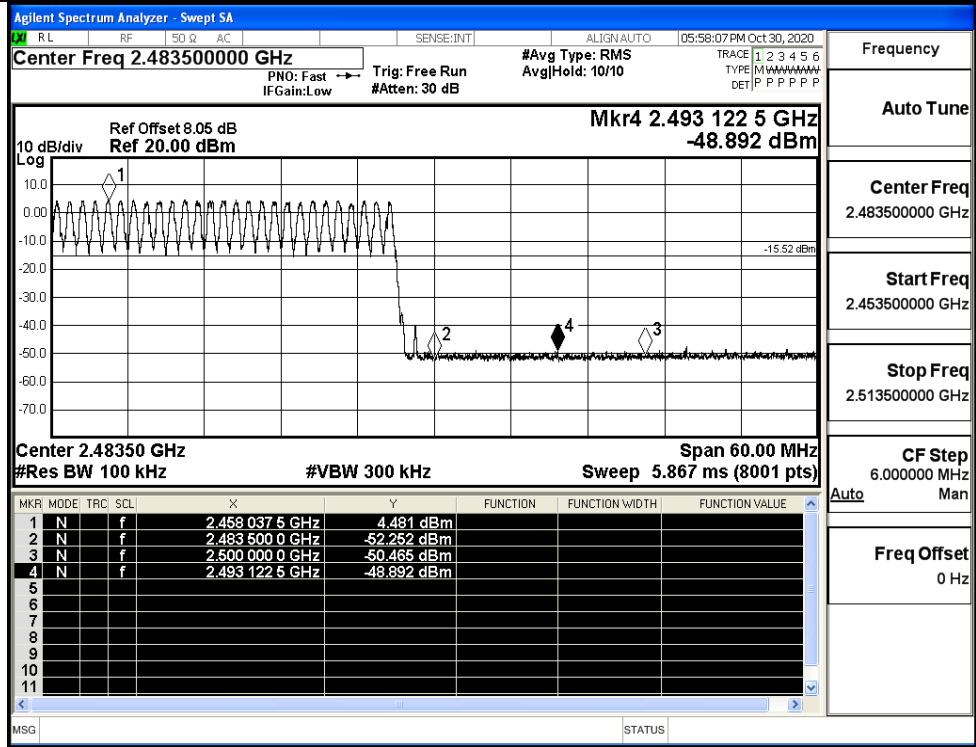
GFSK/LCH/Hop



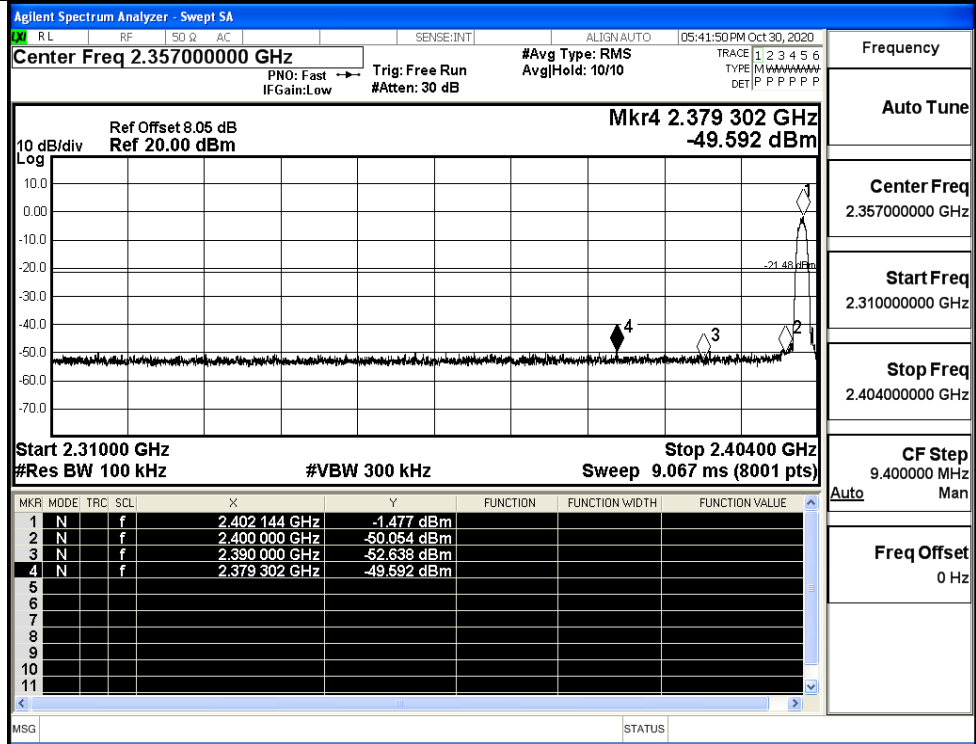
GFSK/HCH/No Hop



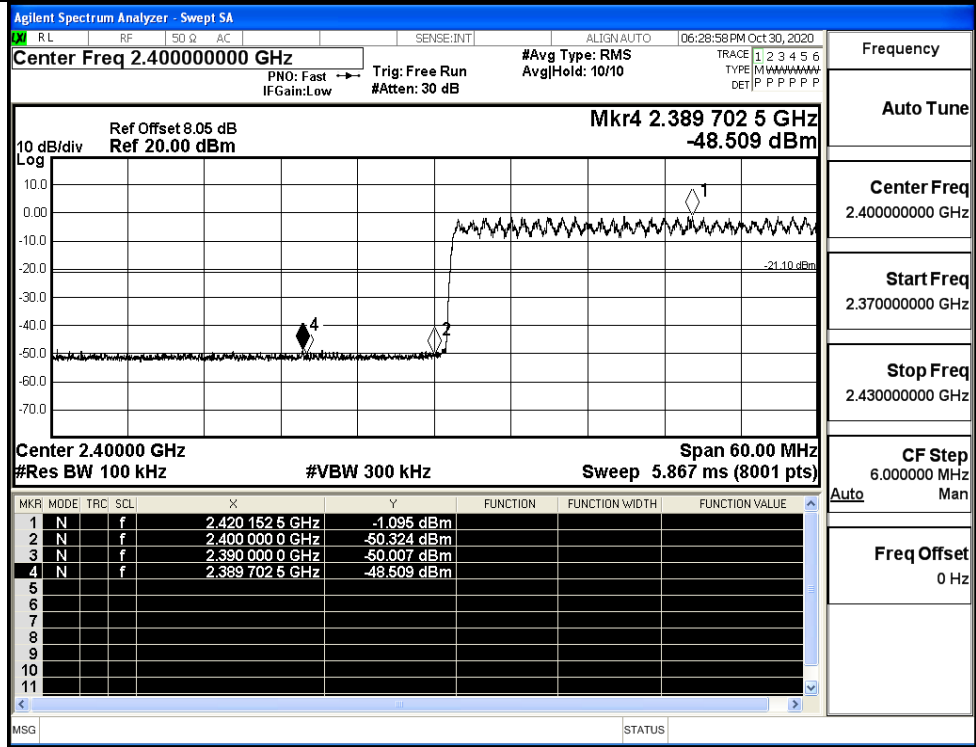
GFSK/HCH/Hop



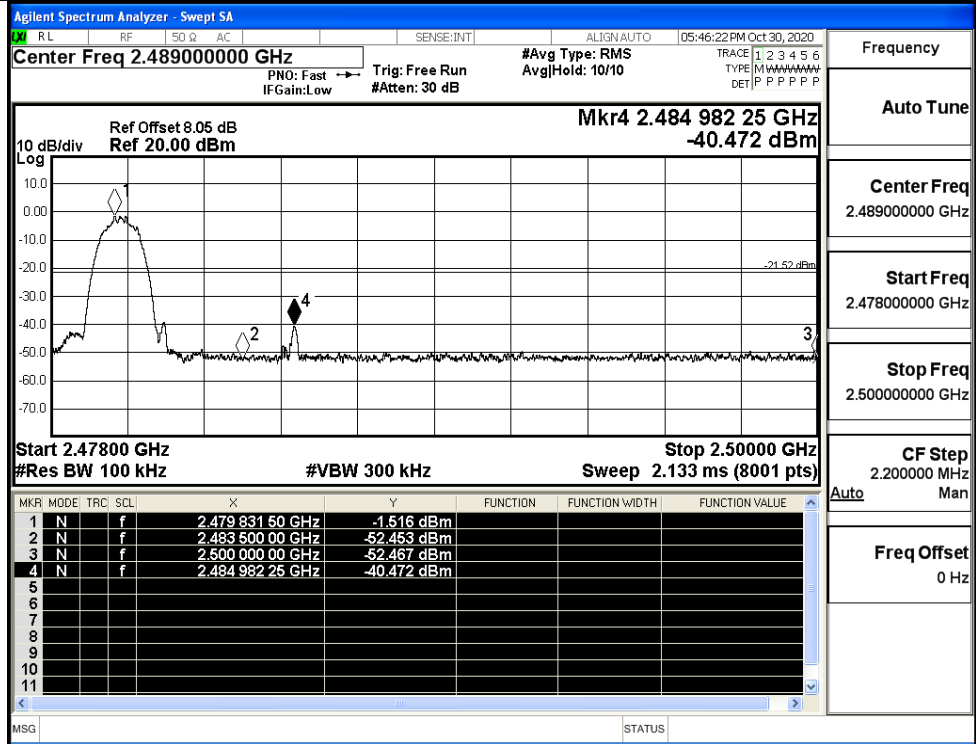
$\pi/4$ DQPSK/LCH/No Hop



$\pi/4$ DQPSK/LCH/Hop

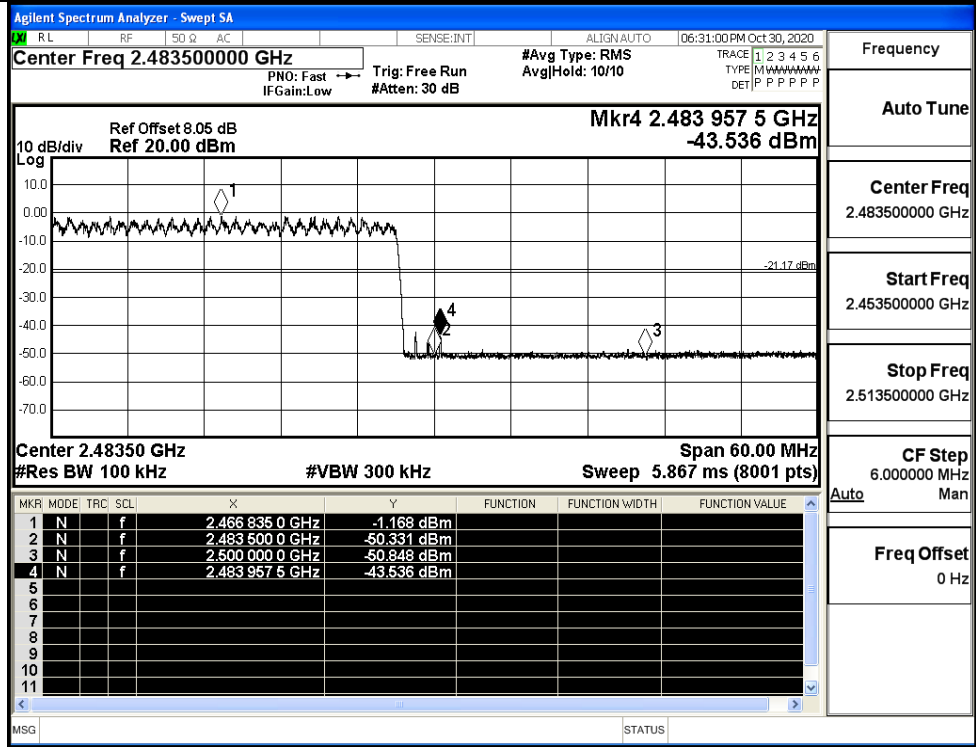


π /4DQPSK/HCH/No
Hop



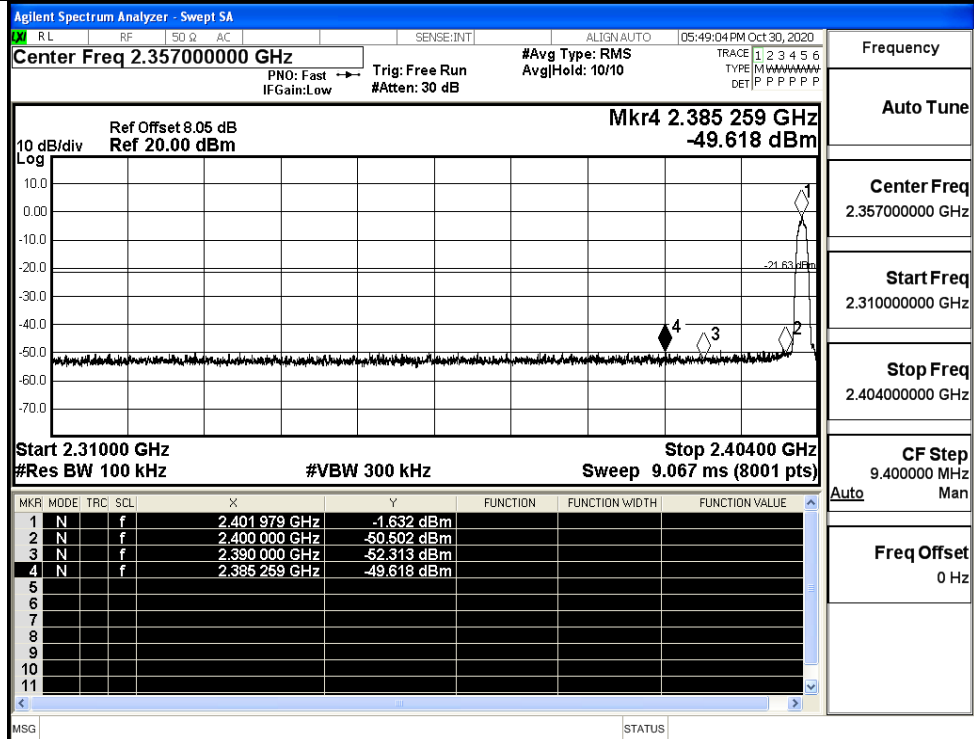
Frequency	
Auto Tune	
Center Freq	2.489000000 GHz
Start Freq	2.478000000 GHz
Stop Freq	2.500000000 GHz
CF Step	2.200000 MHz
Freq Offset	0 Hz

π /4DQPSK/HCH/Hop



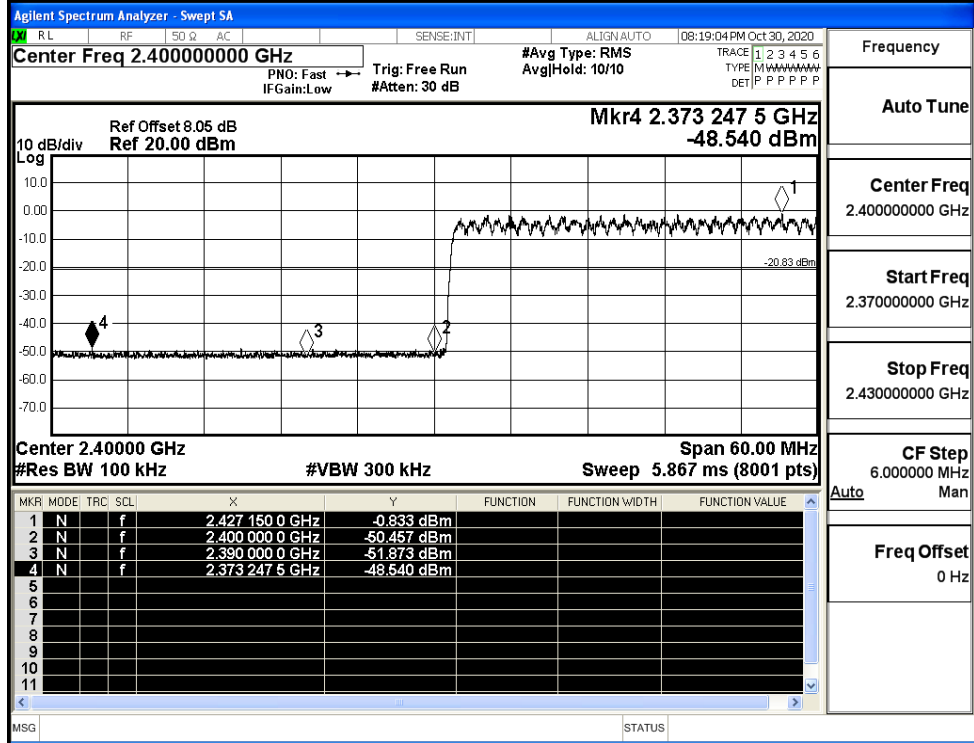
Frequency	
Auto Tune	
Center Freq	2.483500000 GHz
Start Freq	2.463500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

8DPSK/LCH/No Hop



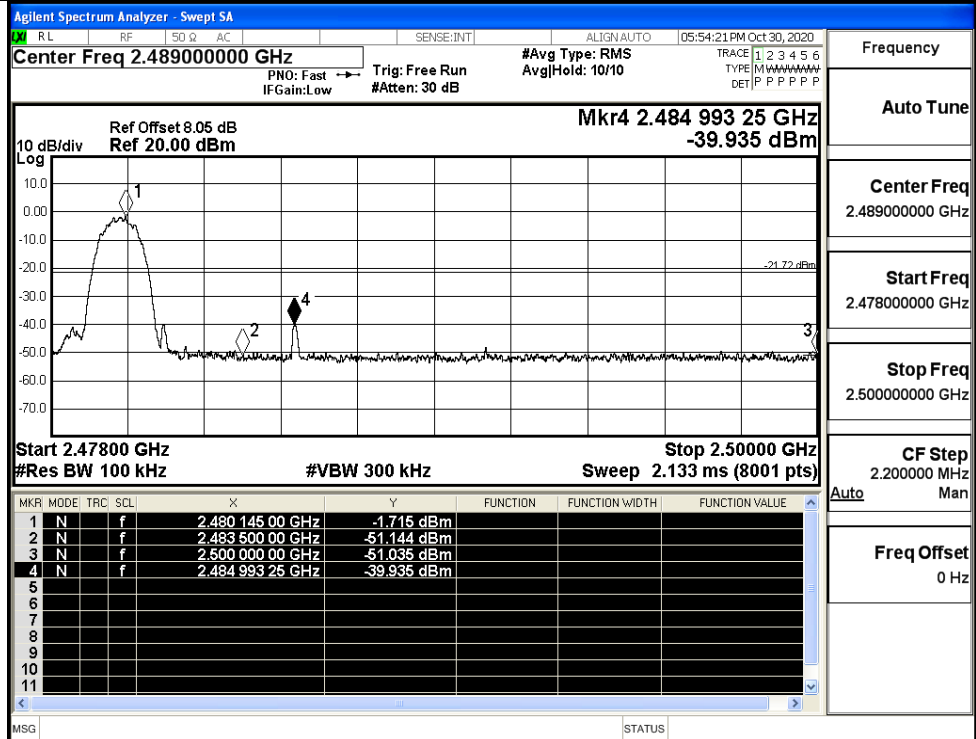
Frequency
Auto Tune
Center Freq
2.357000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.404000000 GHz
CF Step
9.400000 MHz
Freq Offset
0 Hz

8DPSK/LCH/Hop



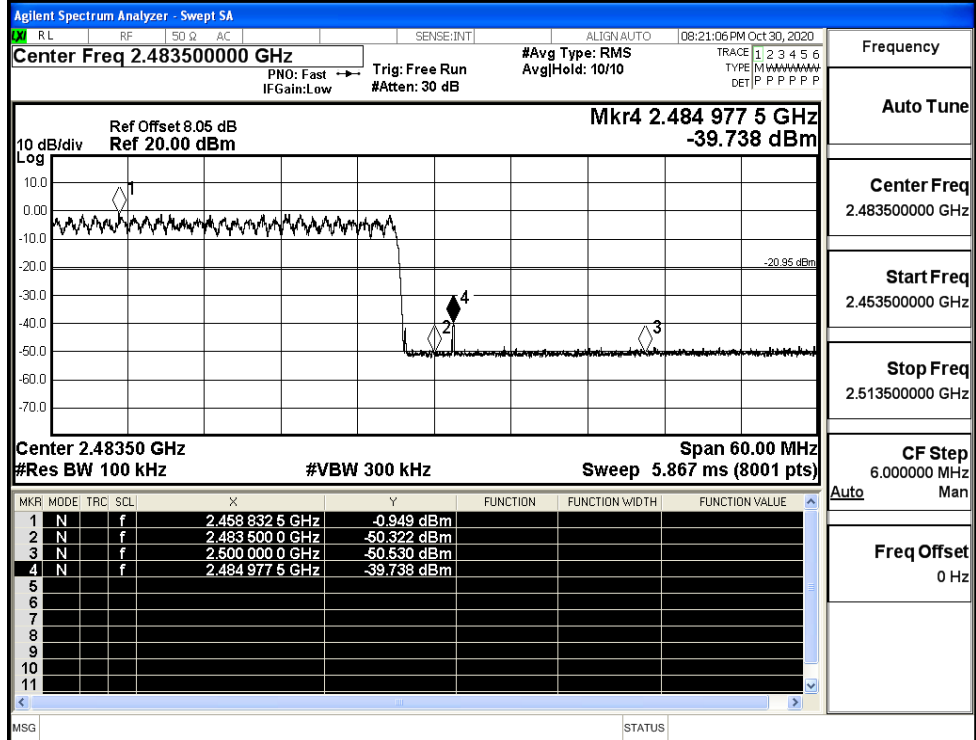
Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.370000000 GHz
Stop Freq
2.430000000 GHz
CF Step
6.000000 MHz
Freq Offset
0 Hz

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
Freq Offset	0 Hz

8DPSK/HCH/Hop

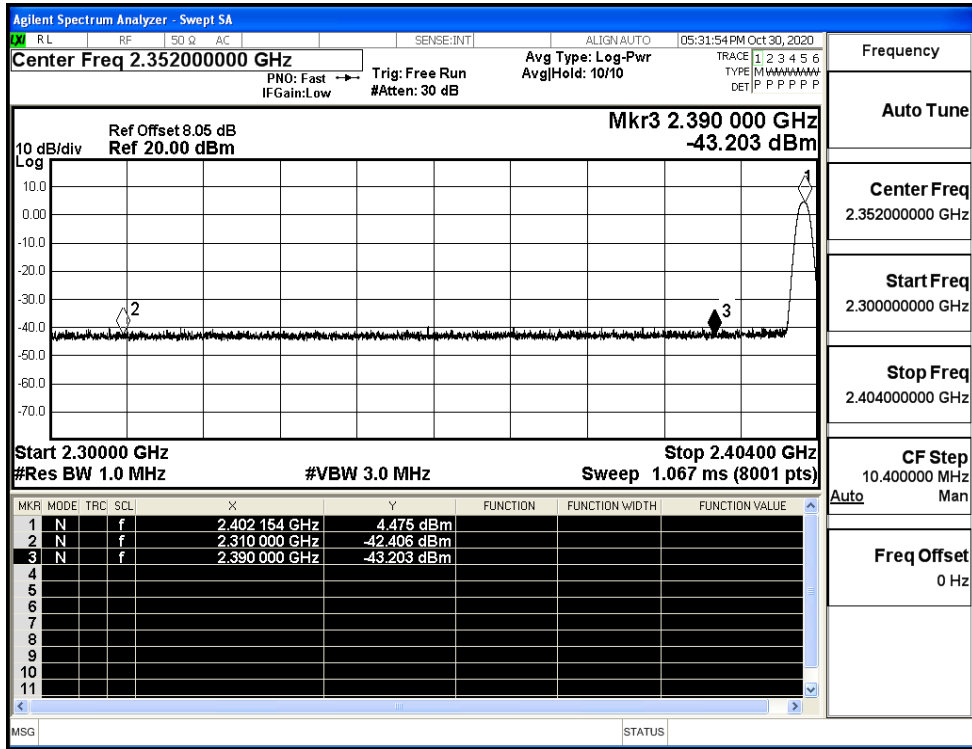


Frequency	
Auto Tune	
Center Freq	2.483500000 GHz
Start Freq	2.453500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

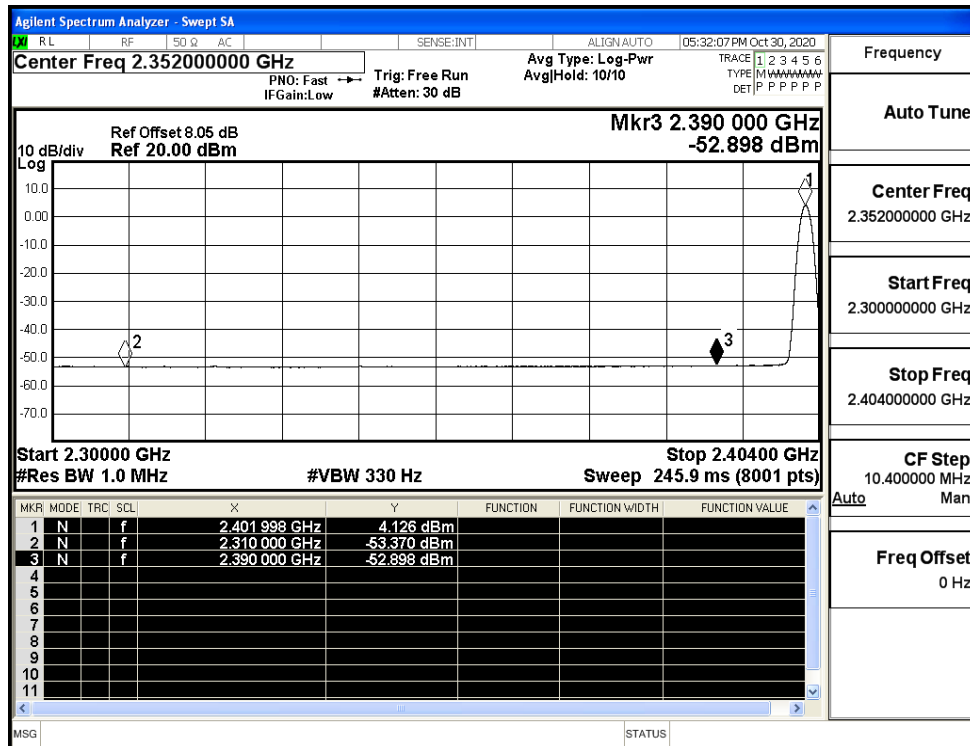
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.41	2.05	0	54.9	PEAK	74	PASS
	Off	2310.0	-53.37	2.05	0	43.94	AV	54	PASS
	Off	2390.0	-43.20	2.05	0	54.11	PEAK	74	PASS
	Off	2390.0	-52.90	2.05	0	44.41	AV	54	PASS
	Off	2483.5	-41.71	2.05	0	55.6	PEAK	74	PASS
	Off	2483.5	-52.28	2.05	0	45.03	AV	54	PASS
	Off	2500.0	-42.18	2.05	0	55.13	PEAK	74	PASS
	Off	2500.0	-52.32	2.05	0	44.99	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.60	2.05	0	54.71	PEAK	74	PASS
	Off	2310.0	-53.28	2.05	0	44.03	AV	54	PASS
	Off	2390.0	-41.56	2.05	0	55.75	PEAK	74	PASS
	Off	2390.0	-52.95	2.05	0	44.36	AV	54	PASS
	Off	2483.5	-42.30	2.05	0	55.01	PEAK	74	PASS
	Off	2483.5	-52.24	2.05	0	45.07	AV	54	PASS
	Off	2500.0	-42.38	2.05	0	54.93	PEAK	74	PASS
	Off	2500.0	-52.28	2.05	0	45.03	AV	54	PASS
8DPSK	Off	2310.0	-43.81	2.05	0	53.5	PEAK	74	PASS
	Off	2310.0	-53.31	2.05	0	44	AV	54	PASS
	Off	2390.0	-43.32	2.05	0	53.99	PEAK	74	PASS
	Off	2390.0	-52.96	2.05	0	44.35	AV	54	PASS
	Off	2483.5	-40.99	2.05	0	56.32	PEAK	74	PASS
	Off	2483.5	-52.01	2.05	0	45.3	AV	54	PASS
	Off	2500.0	-43.00	2.05	0	54.31	PEAK	74	PASS
	Off	2500.0	-52.25	2.05	0	45.06	AV	54	PASS

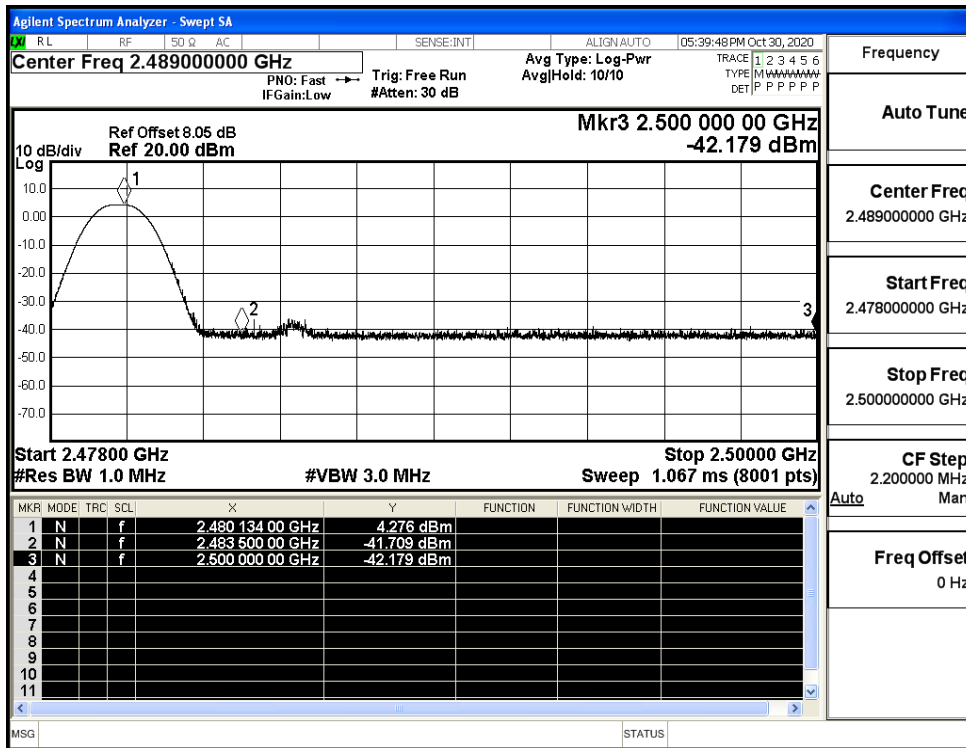
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



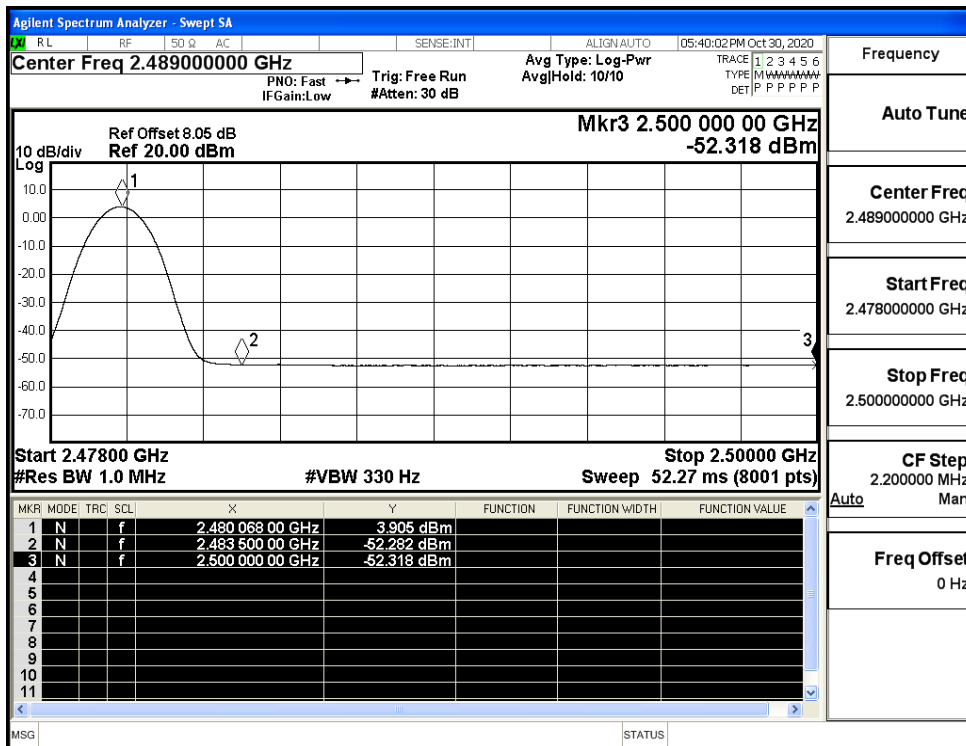
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



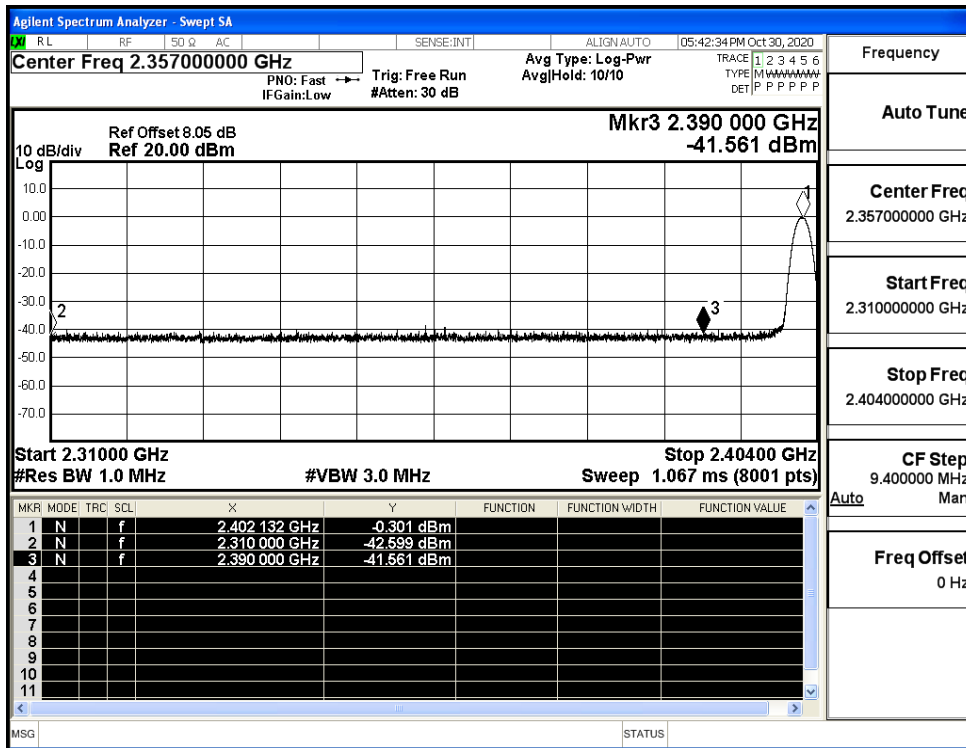
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



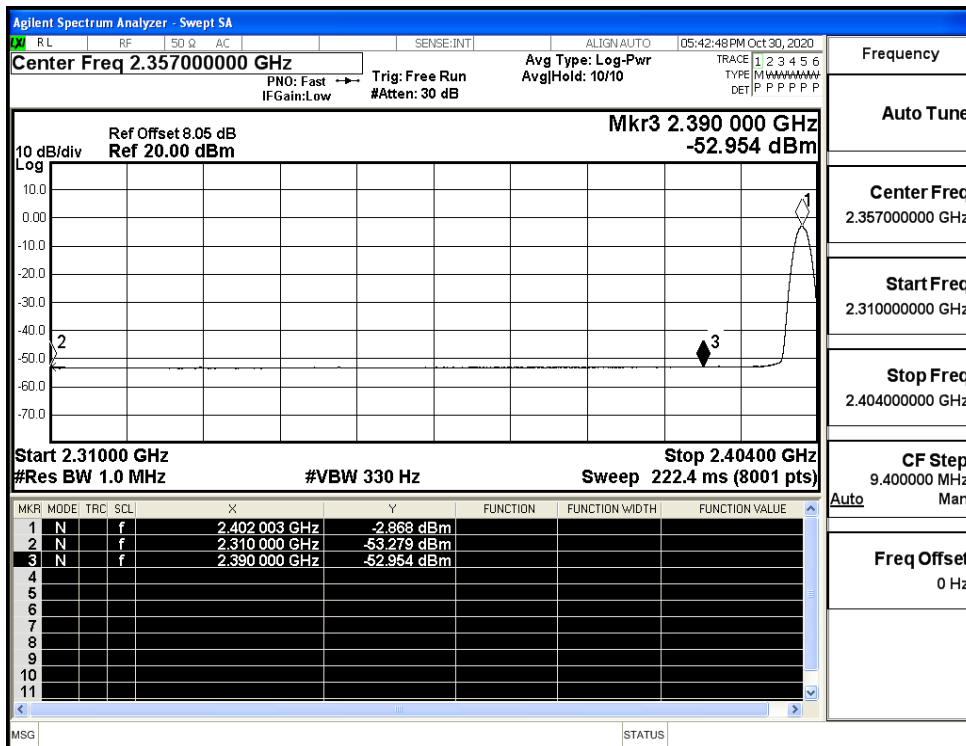
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



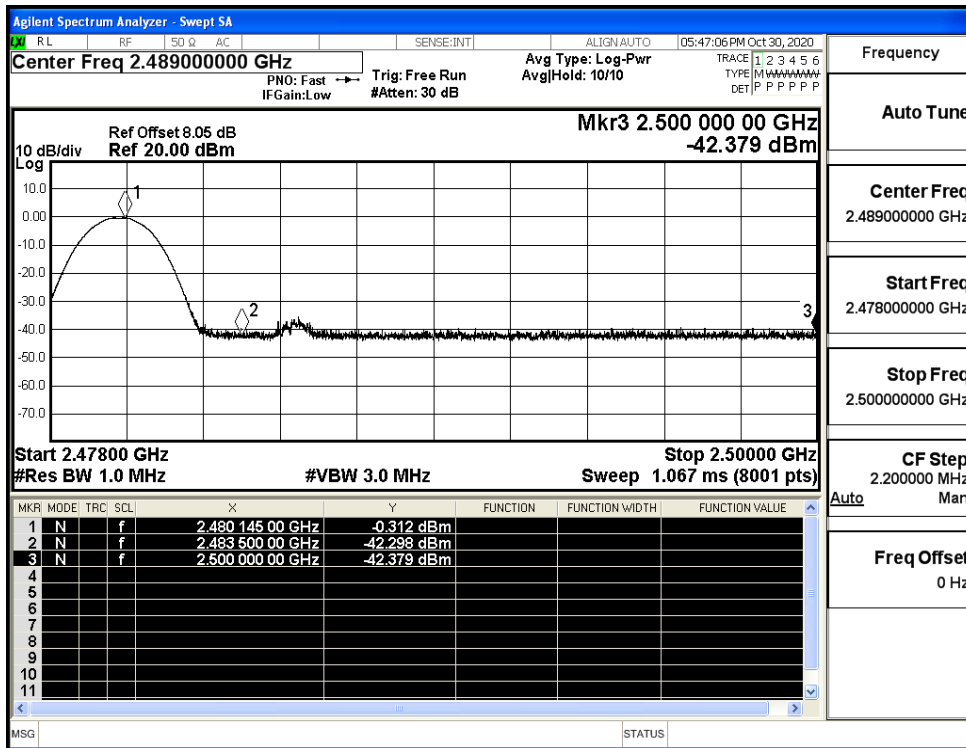
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



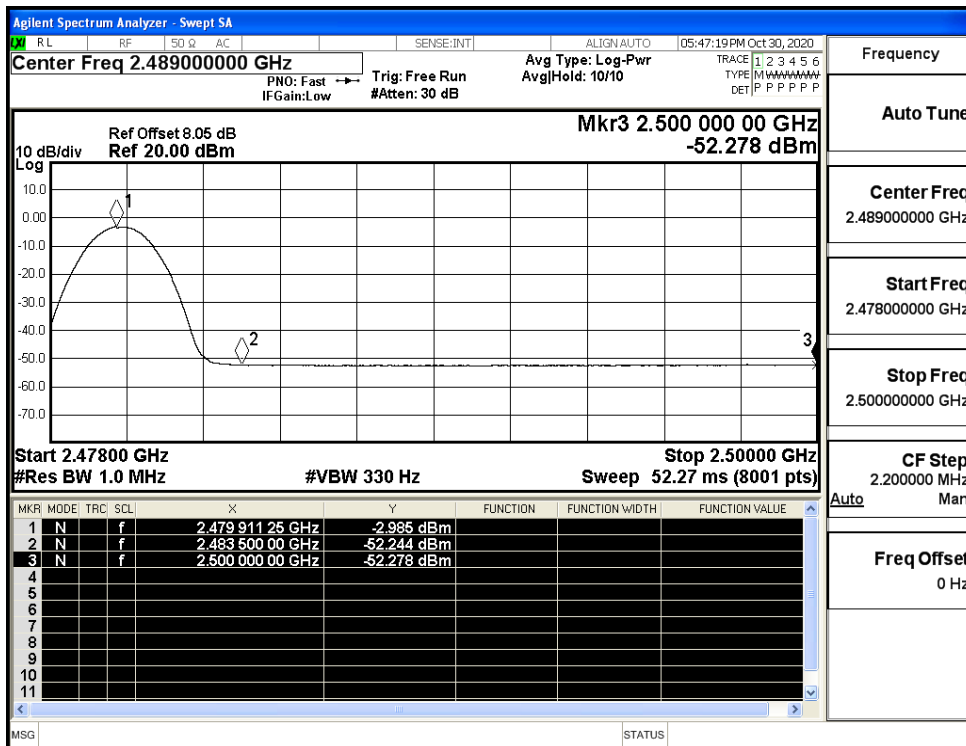
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



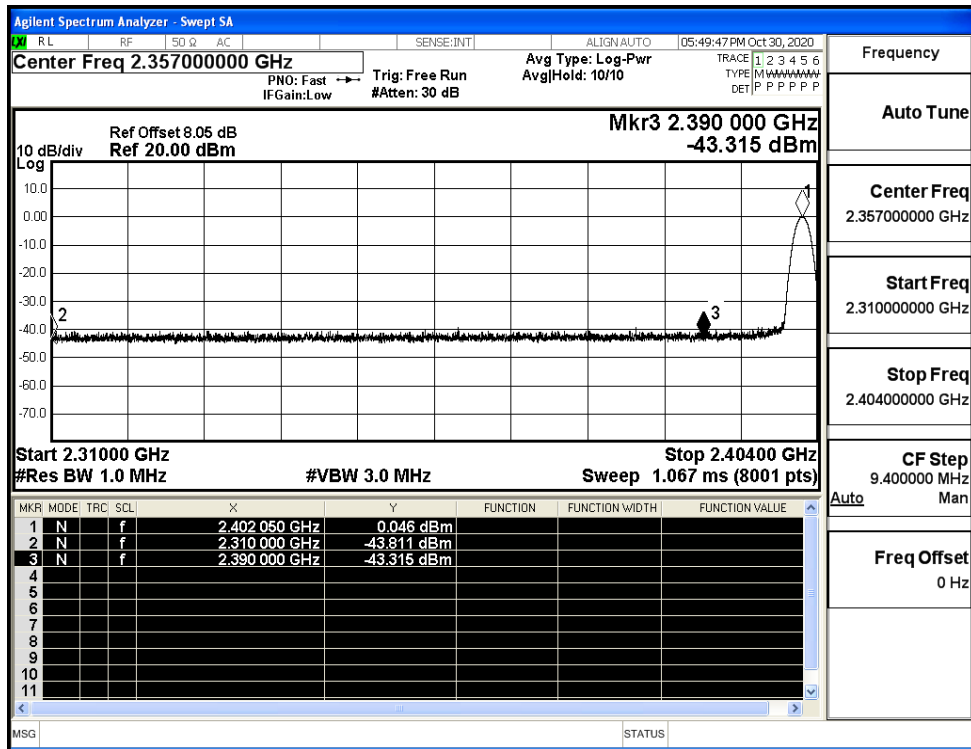
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



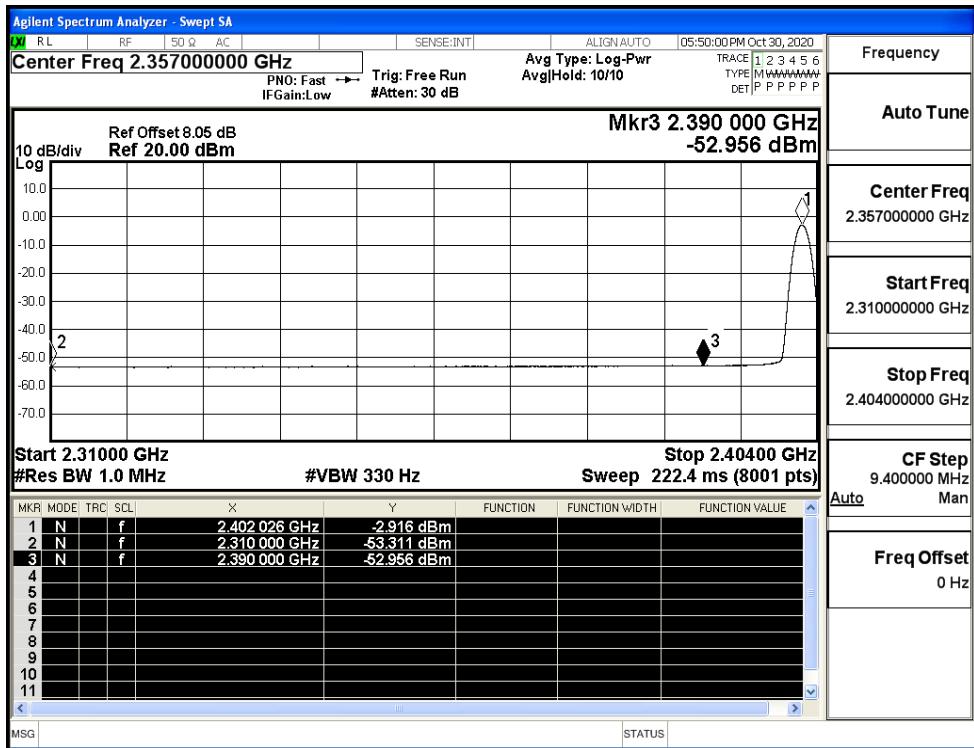
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



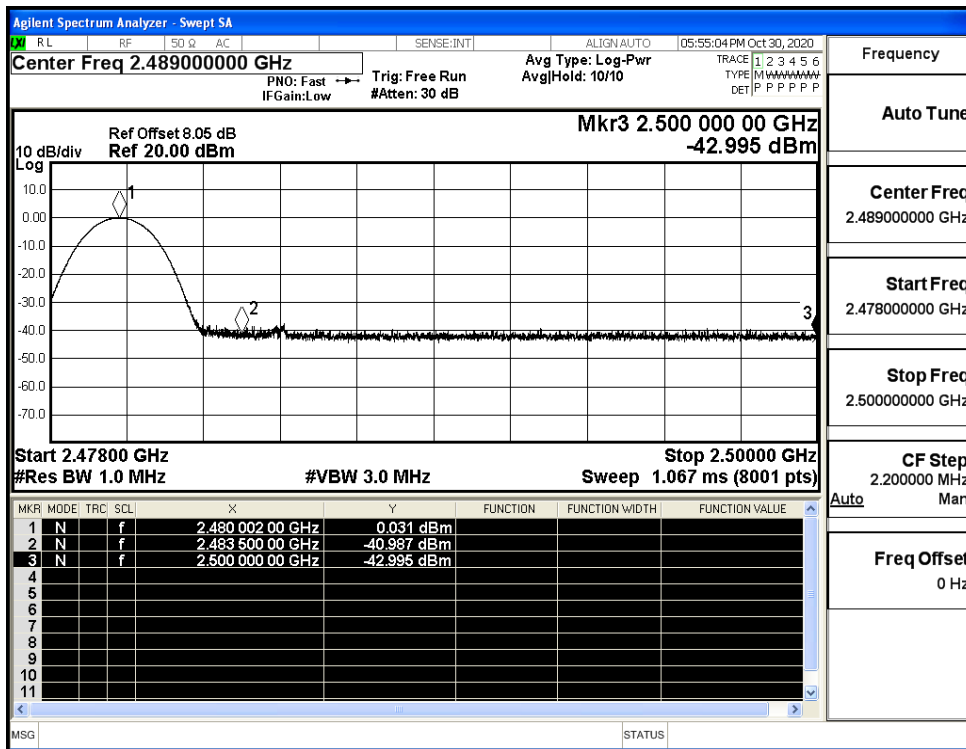
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

