

Appendix A

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

Product Name: ECHO MIRROR

Trade Mark: FENCHILIN

Test Model: MZMGJ0089

Environmental Conditions

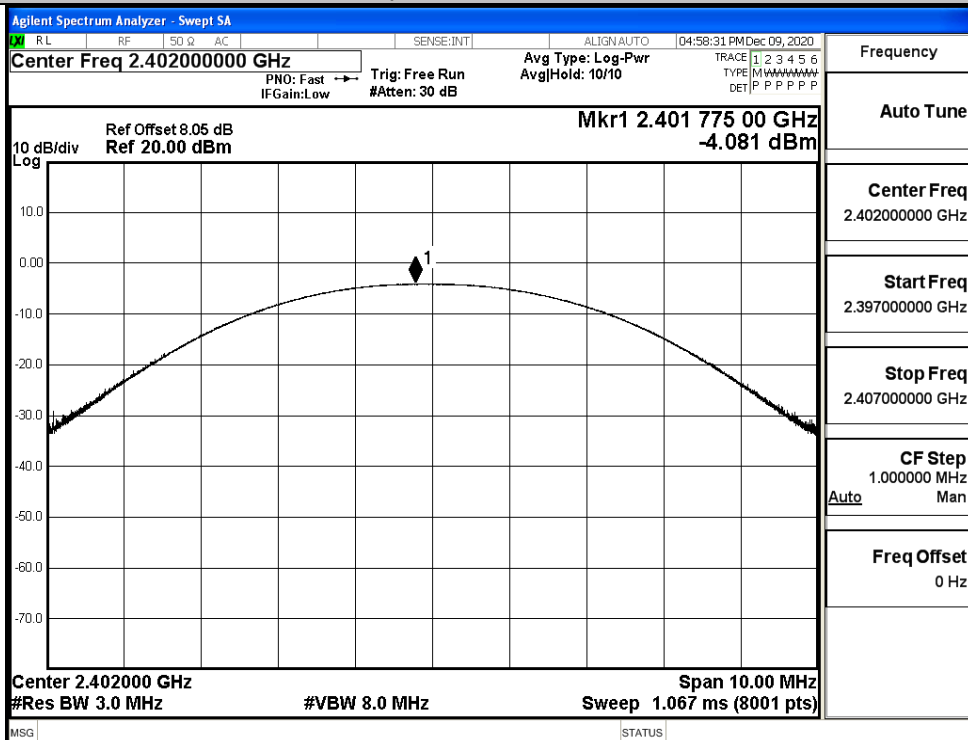
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

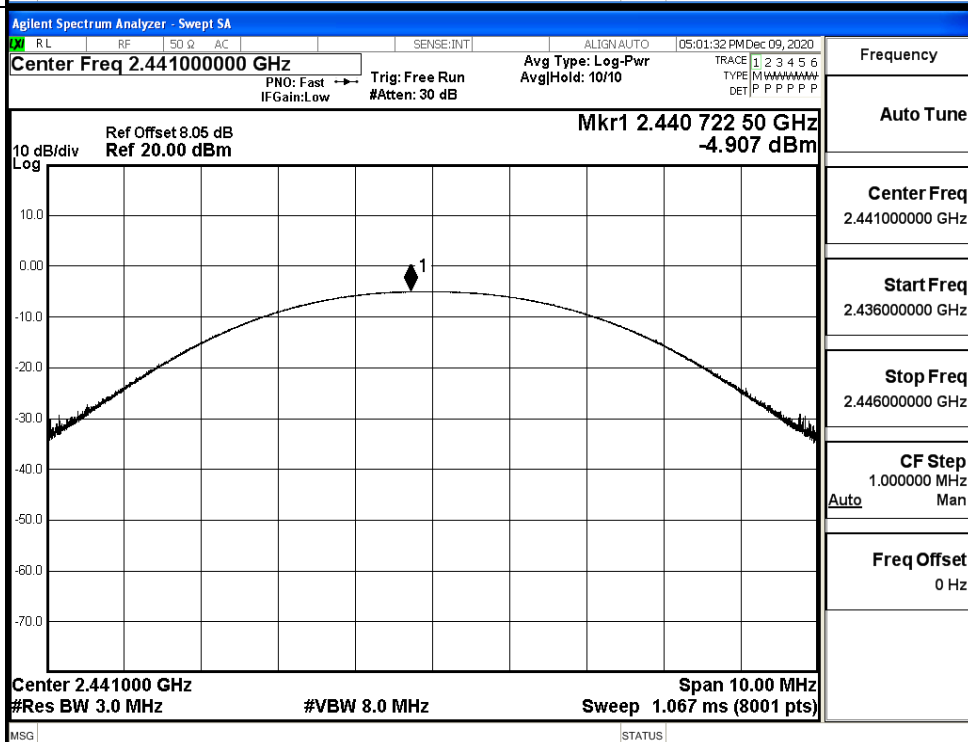
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-4.081	21	PASS
	MCH	-4.907	21	PASS
	HCH	-6.075	21	PASS
$\pi/4$ DQPSK	LCH	-1.799	21	PASS
	MCH	-2.758	21	PASS
	HCH	-3.854	21	PASS
8DPSK	LCH	-1.235	21	PASS
	MCH	-2.082	21	PASS
	HCH	-3.182	21	PASS

Test Graphs

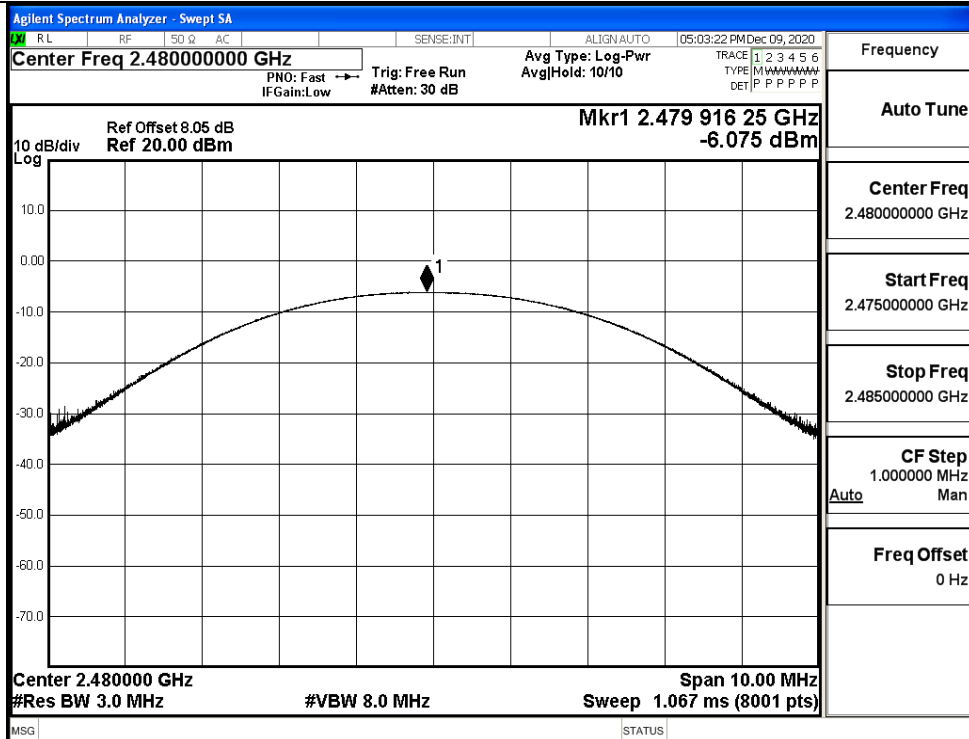
GFSK/LCH



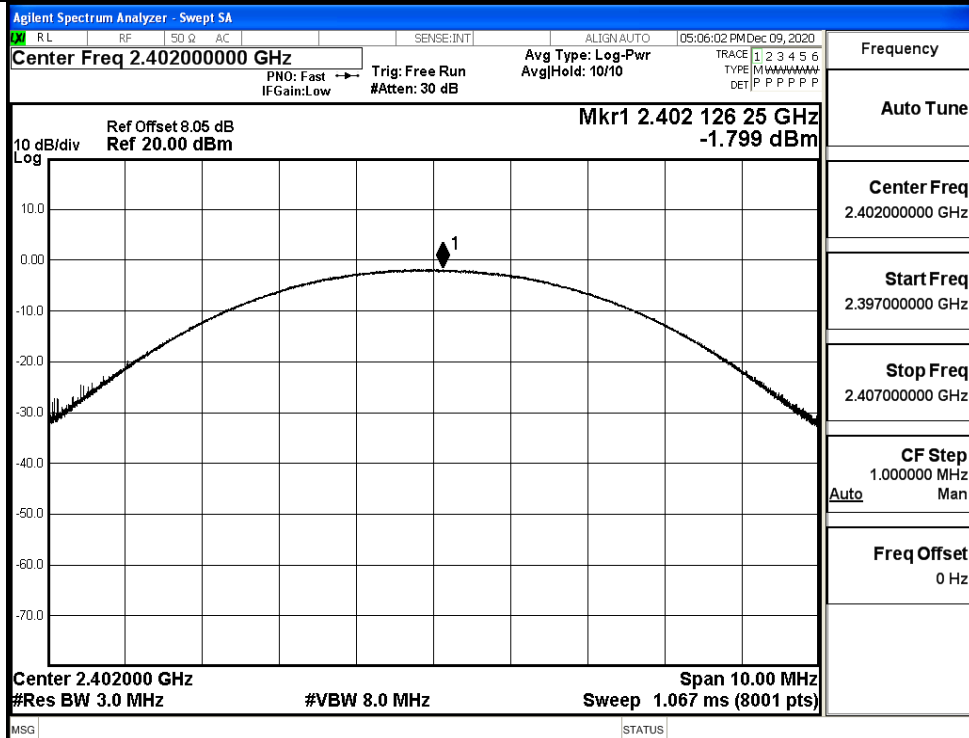
GFSK/MCH



GFSK/HCH

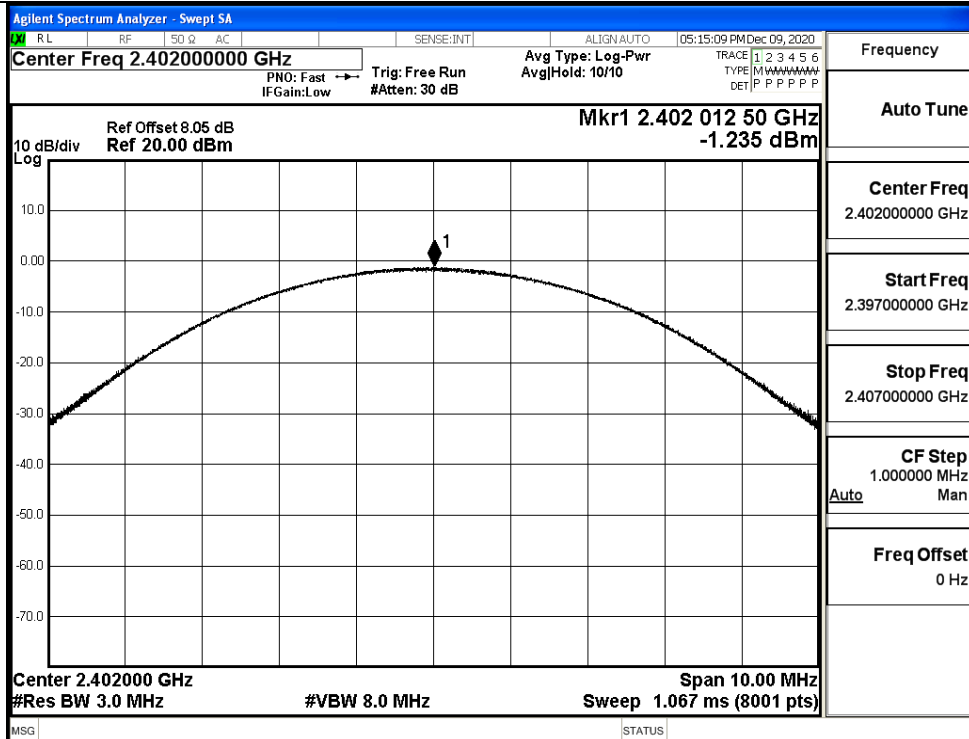


$\pi/4$ DQPSK/LCH

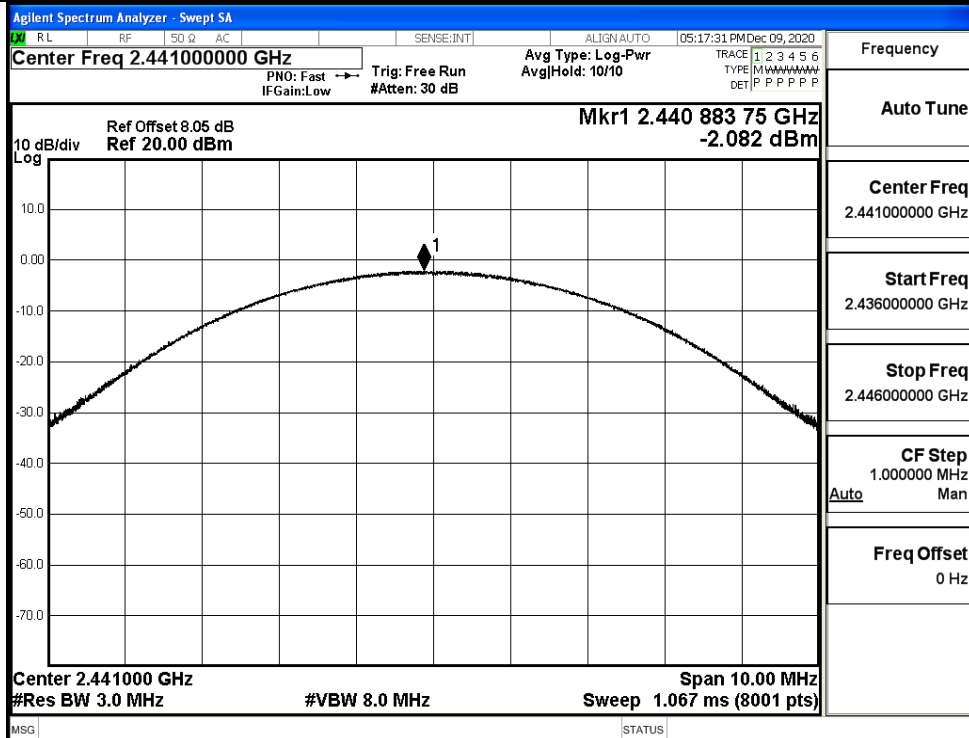


$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC SENSE:INT ALIGN: AUTO 05:09:11 PM Dec 09, 2020 Center Freq 2.441000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE: M W W W W W W W DET: P P P P P P P 10 dB/div Log Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.440 770 00 GHz -2.758 dBm Center 2.441000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 10.00 MHz Sweep 1.067 ms (8001 pts) MSG STATUS Frequency Auto Tune Center Freq 2.441000000 GHz Start Freq 2.436000000 GHz Stop Freq 2.446000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz
$\pi/4$DQPSK/HCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Q AC SENSE:INT ALIGN: AUTO 05:10:49 PM Dec 09, 2020 Center Freq 2.480000000 GHz PNO: Fast IF Gain: Low Trig: Free Run #Atten: 30 dB Avg Type: Log-Pwr Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE: M W W W W W W W DET: P P P P P P P 10 dB/div Log Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.479 963 75 GHz -3.854 dBm Center 2.480000 GHz #Res BW 3.0 MHz #VBW 8.0 MHz Span 10.00 MHz Sweep 1.067 ms (8001 pts) MSG STATUS Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.475000000 GHz Stop Freq 2.485000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz

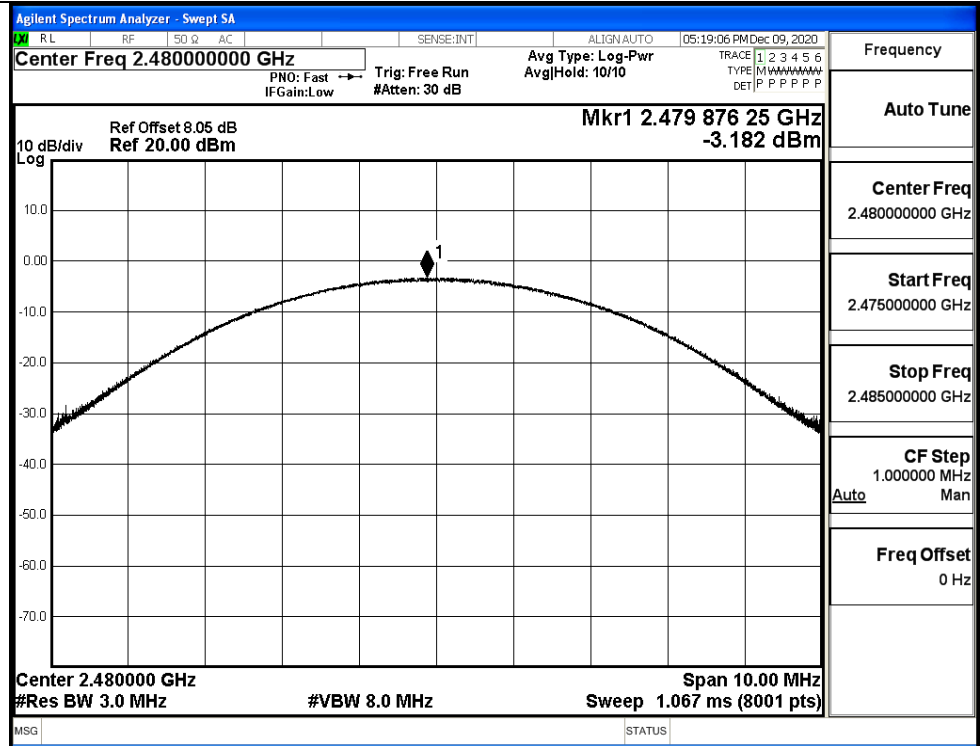
8DPSK/LCH



8DPSK/MCH



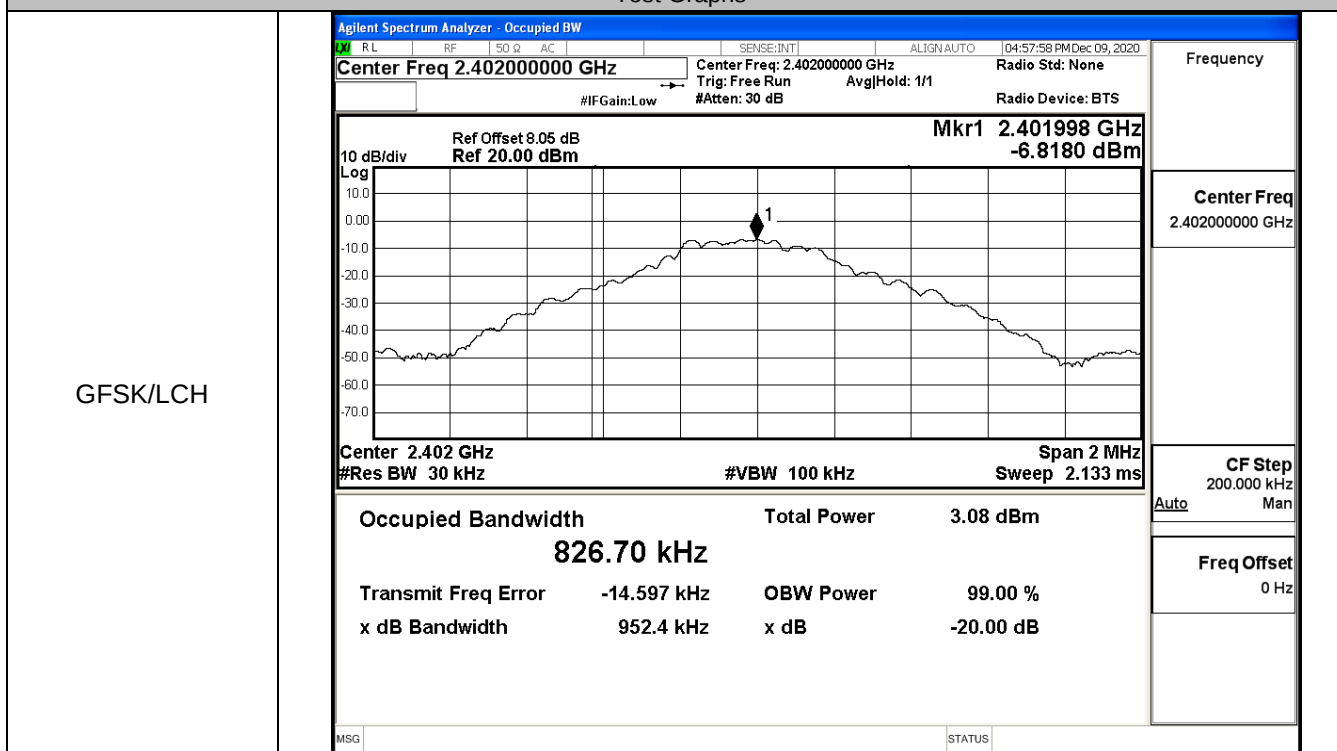
8DPSK/HCH



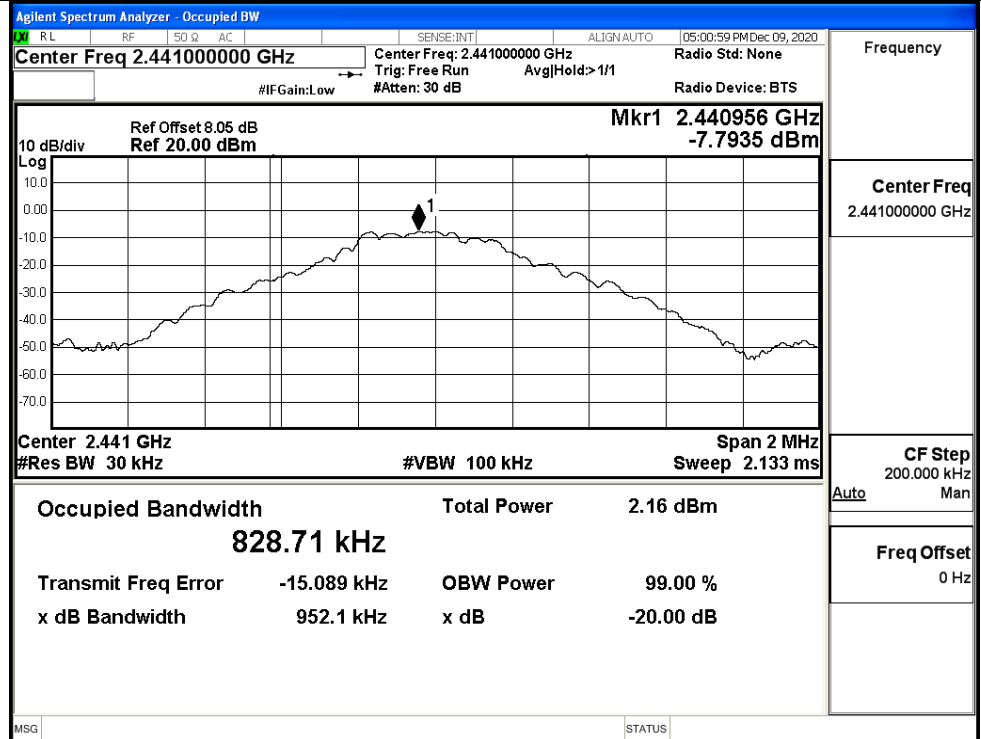
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9524	Not Specified	PASS
	MCH	0.9521	Not Specified	PASS
	HCH	0.9525	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.323	Not Specified	PASS
	MCH	1.323	Not Specified	PASS
	HCH	1.324	Not Specified	PASS
8DPSK	LCH	1.303	Not Specified	PASS
	MCH	1.303	Not Specified	PASS
	HCH	1.305	Not Specified	PASS

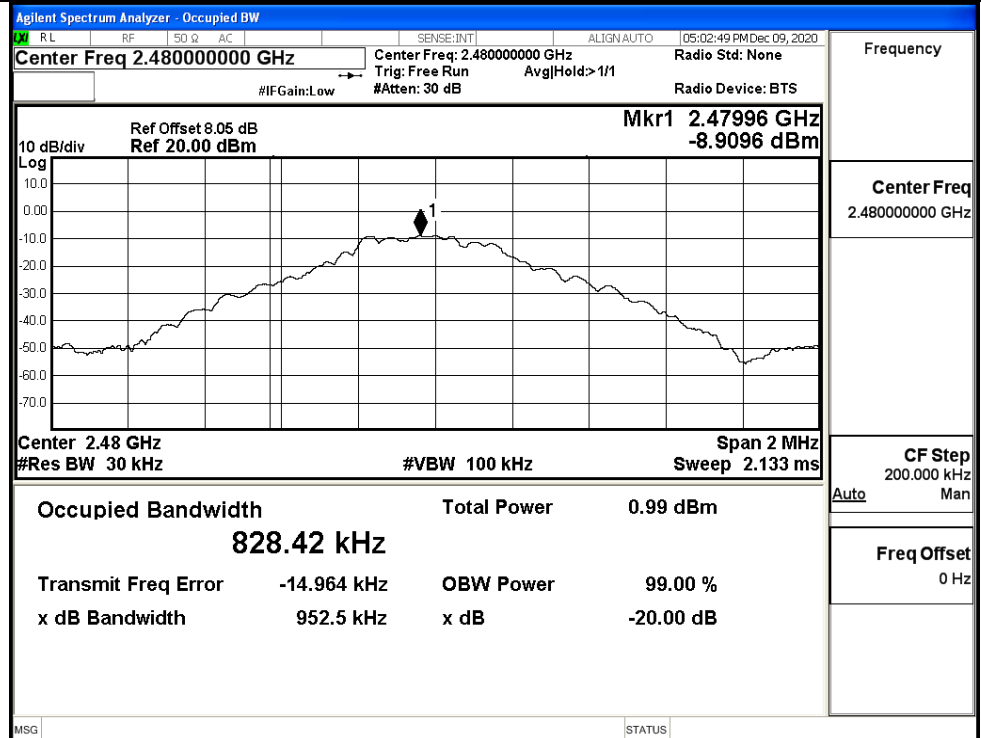
Test Graphs

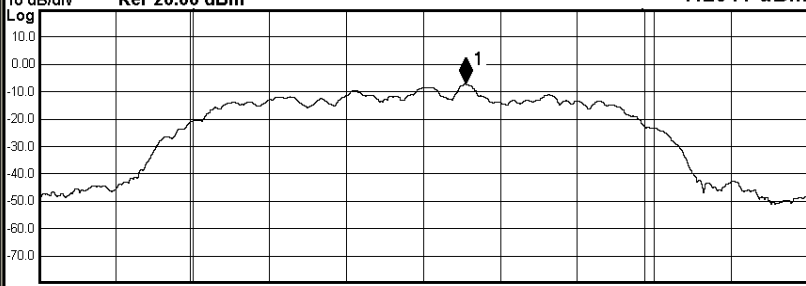
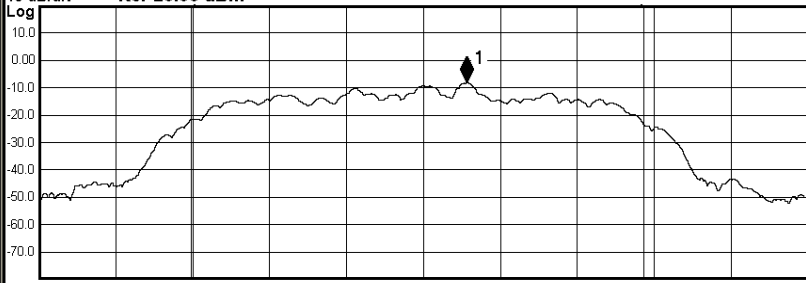


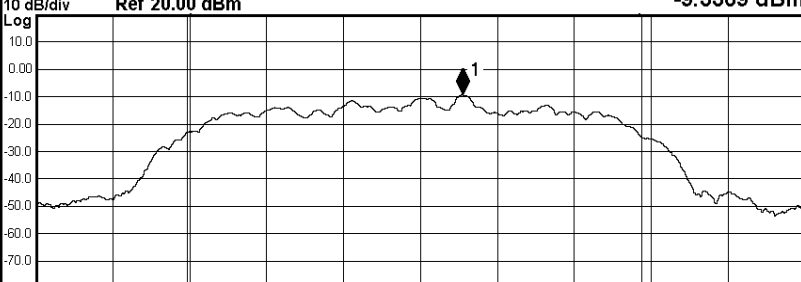
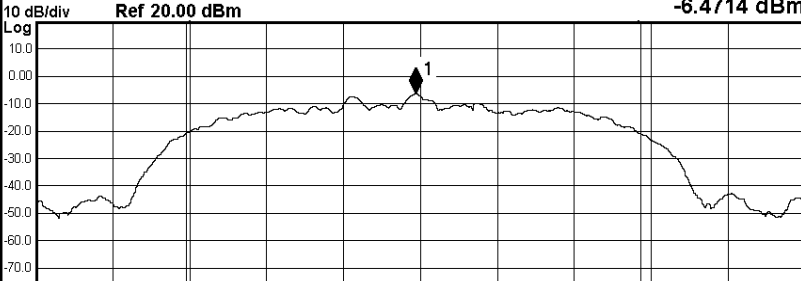
GFSK/MCH



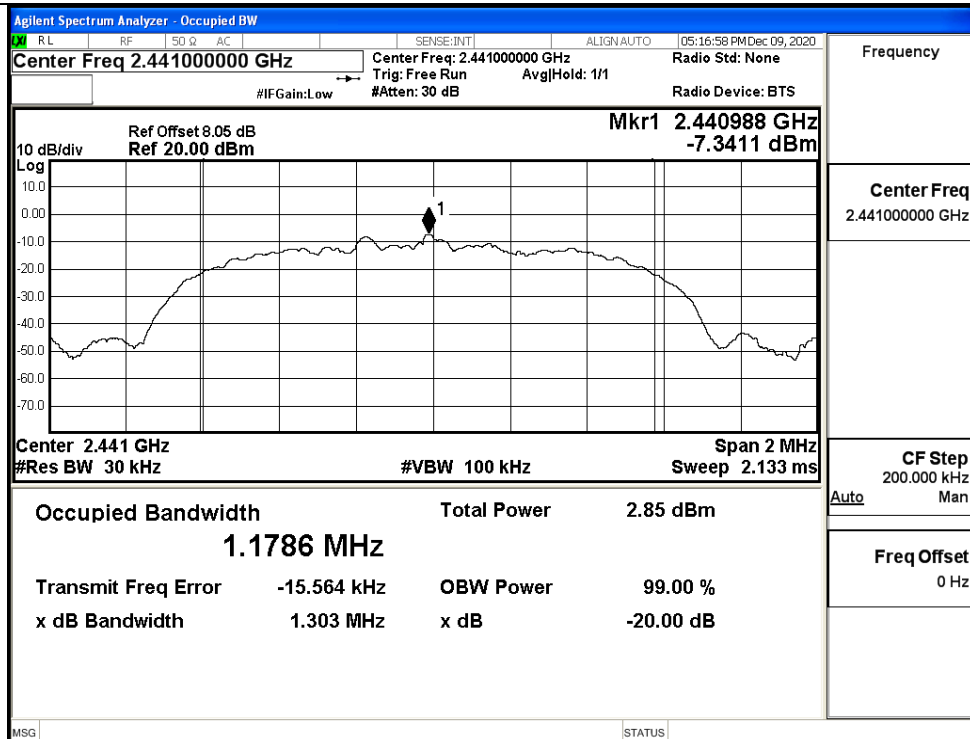
GFSK/HCH



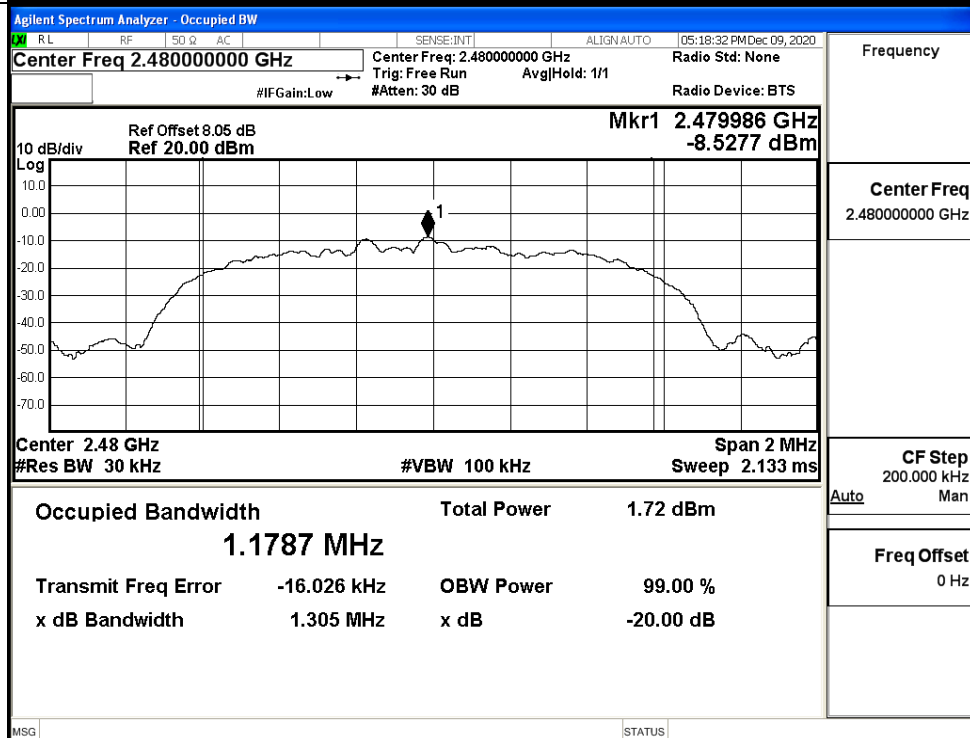
$\pi/4$ DQPSK/LCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Q AC SENSE:INT ALIGN: AUTO 05:05:26 PM Dec 09, 2020 Center Freq 2.40200000 GHz Trig: Free Run Avg Hold: > 1/1 Radio Std: None #IFGain: Low #Atten: 30 dB Radio Device: BTS			Frequency
	10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.40211 GHz -7.2541 dBm 		Center Freq 2.402000000 GHz	
	Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms		CF Step 200.000 kHz Auto Man	
	Occupied Bandwidth 1.1774 MHz Total Power 3.15 dBm		Freq Offset 0 Hz	
	Transmit Freq Error -14.343 kHz OBW Power 99.00 % x dB Bandwidth 1.323 MHz x dB -20.00 dB			
$\pi/4$ DQPSK/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Q AC SENSE:INT ALIGN: AUTO 05:08:38 PM Dec 09, 2020 Center Freq 2.44100000 GHz Trig: Free Run Avg Hold: > 1/1 Radio Std: None #IFGain: Low #Atten: 30 dB Radio Device: BTS			Frequency
	10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.441112 GHz -8.1792 dBm 		Center Freq 2.441000000 GHz	
	Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms		CF Step 200.000 kHz Auto Man	
	Occupied Bandwidth 1.1758 MHz Total Power 2.24 dBm		Freq Offset 0 Hz	
	Transmit Freq Error -15.550 kHz OBW Power 99.00 % x dB Bandwidth 1.323 MHz x dB -20.00 dB			

π/4DQPSK/HCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.48000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run Avg Hold: 1/1 Radio Std: None Radio Device: BTS Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.48011 GHz -9.3369 dBm  Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.1783 MHz Total Power 1.05 dBm Transmit Freq Error -14.908 kHz OBW Power 99.00 % x dB Bandwidth 1.324 MHz x dB -20.00 dB <td> Frequency Center Freq 2.480000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz </td>			Frequency Center Freq 2.480000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
	MSG STATUS			
8DPSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run Avg Hold: 1/1 Radio Std: None Radio Device: BTS Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.401988 GHz -6.4714 dBm  Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.1780 MHz Total Power 3.77 dBm Transmit Freq Error -16.084 kHz OBW Power 99.00 % x dB Bandwidth 1.303 MHz x dB -20.00 dB <td> Frequency Center Freq 2.402000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz </td>			Frequency Center Freq 2.402000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
	MSG STATUS			

8DPSK/MCH



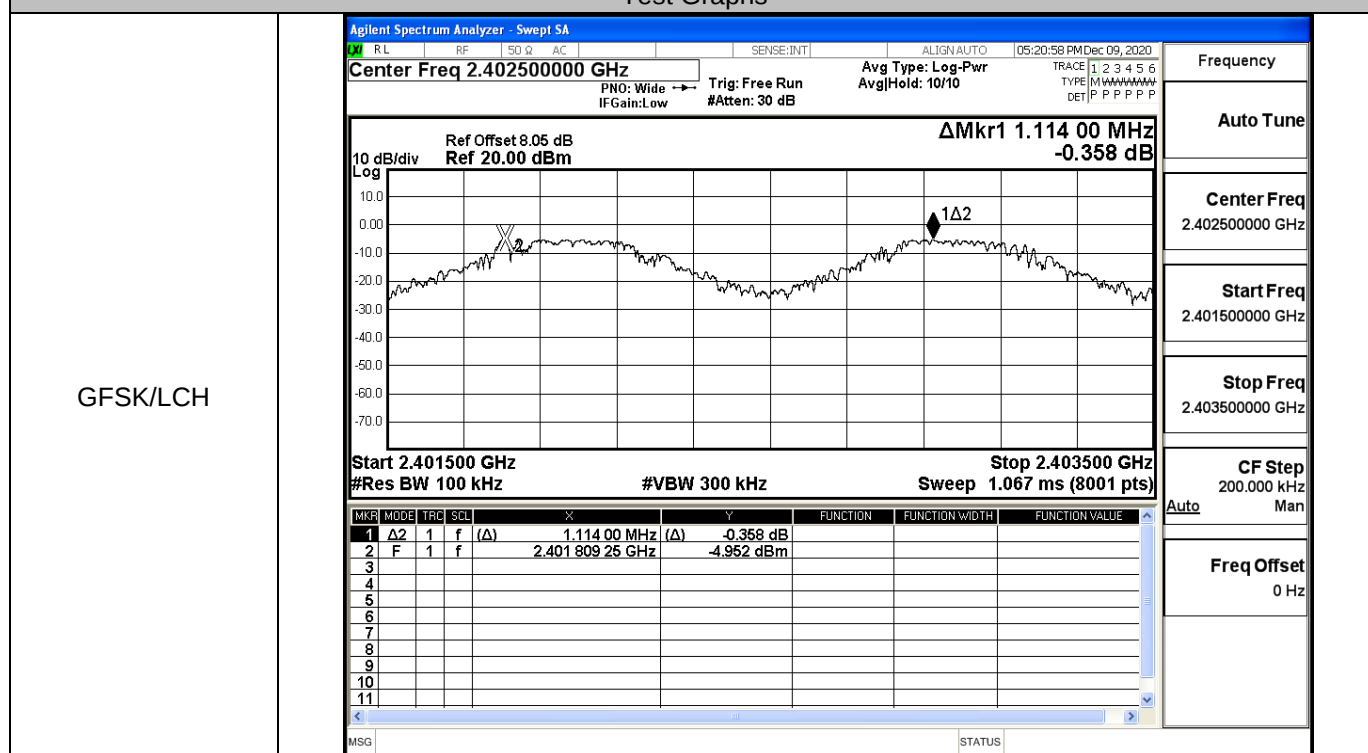
8DPSK/HCH



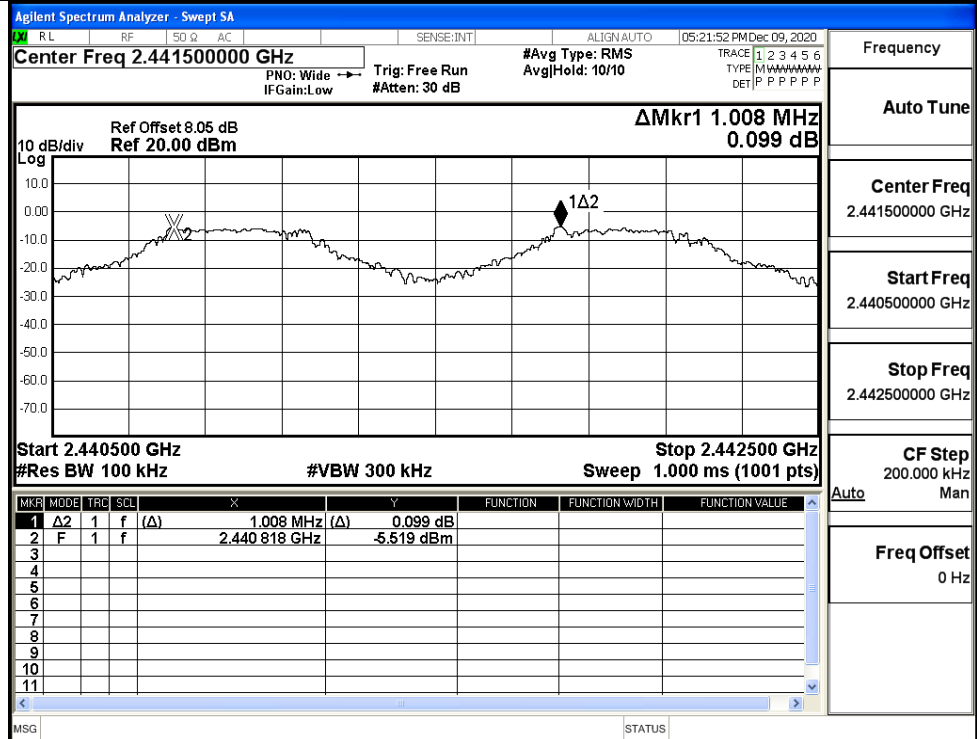
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.114	0.635	PASS
	MCH	1.008	0.635	PASS
	HCH	1.022	0.635	PASS
$\pi/4$ DQPSK	LCH	1.188	0.883	PASS
	MCH	1.304	0.883	PASS
	HCH	0.994	0.883	PASS
8DPSK	LCH	1.154	0.870	PASS
	MCH	1.002	0.870	PASS
	HCH	0.980	0.870	PASS

Test Graphs



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

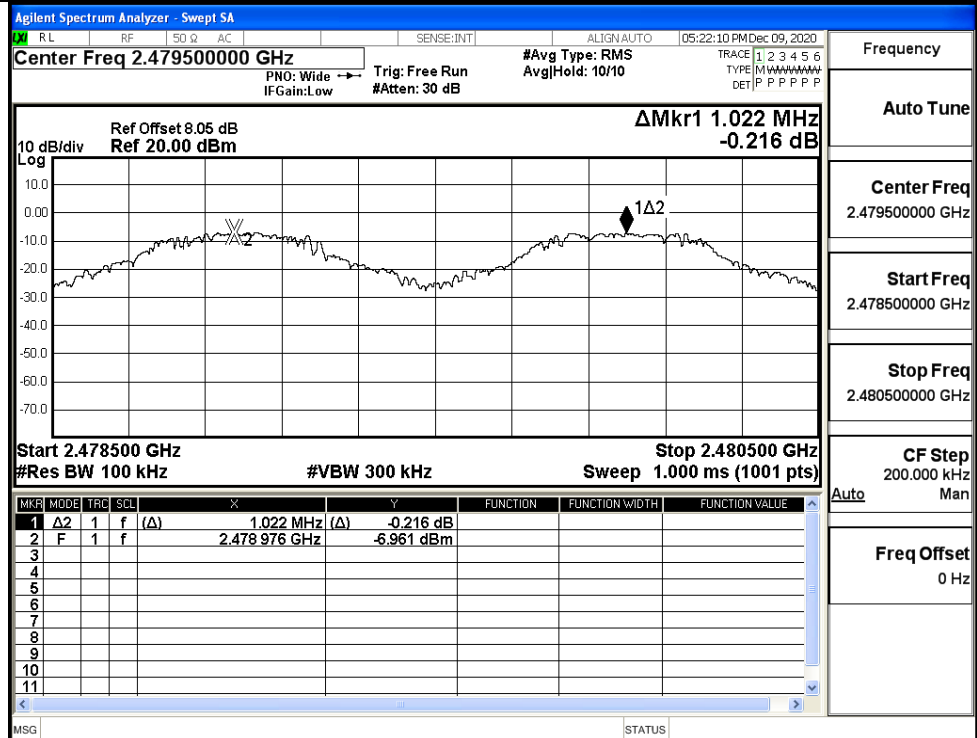
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

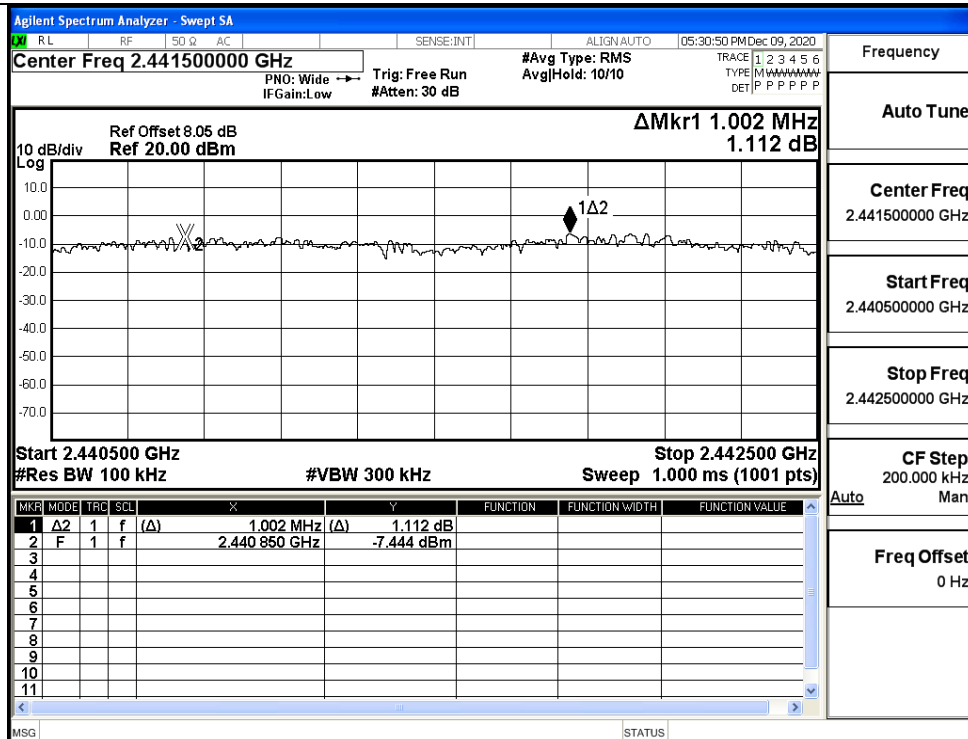
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

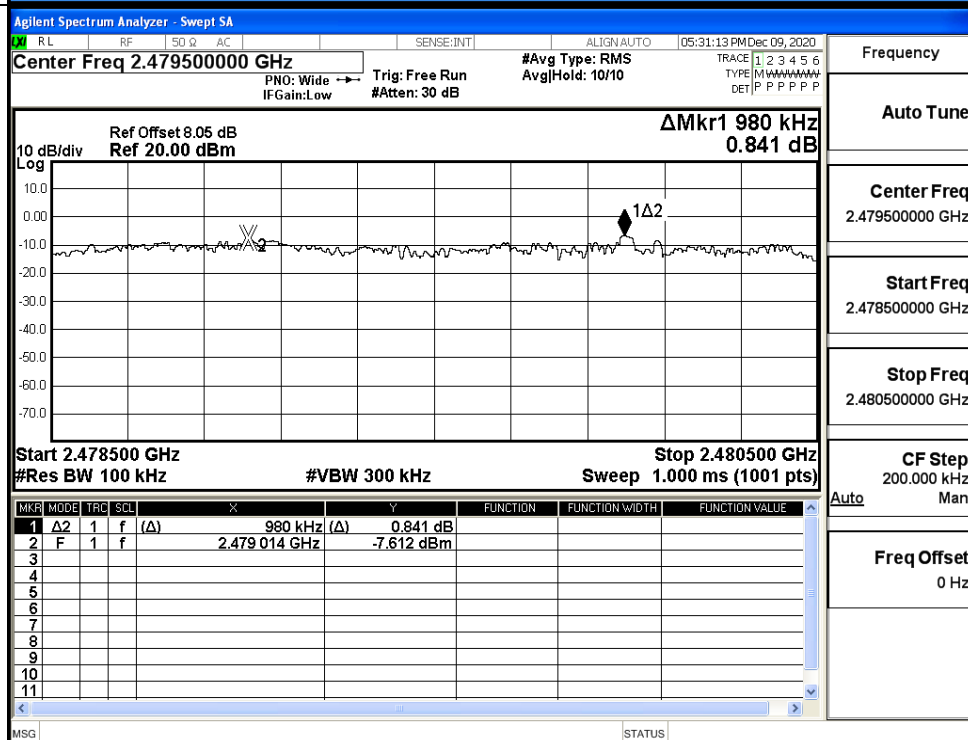
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

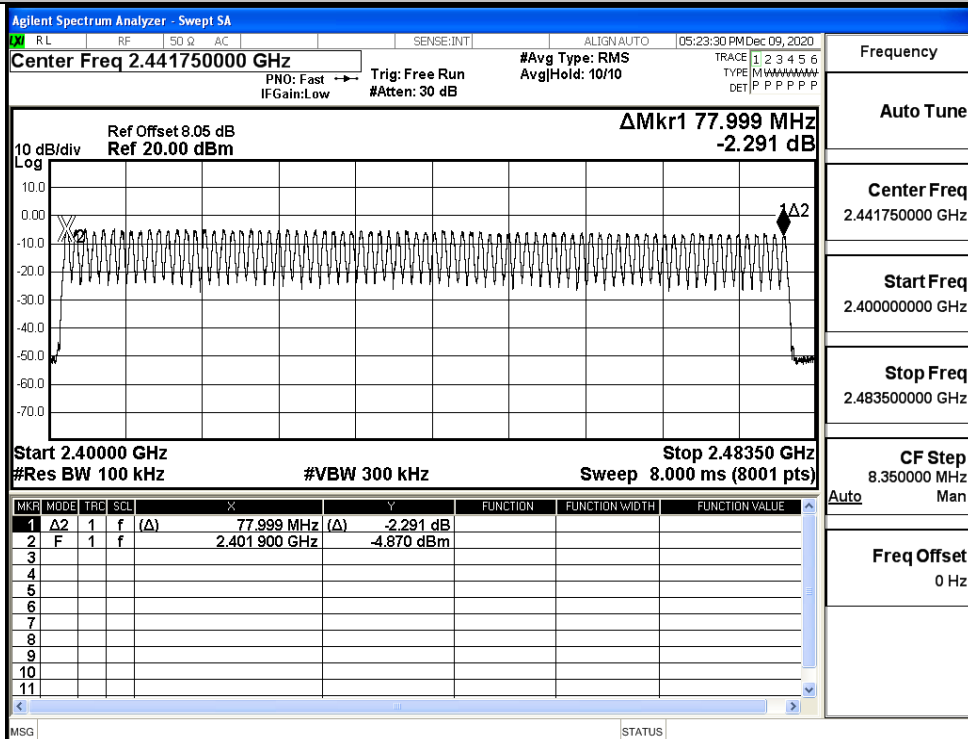
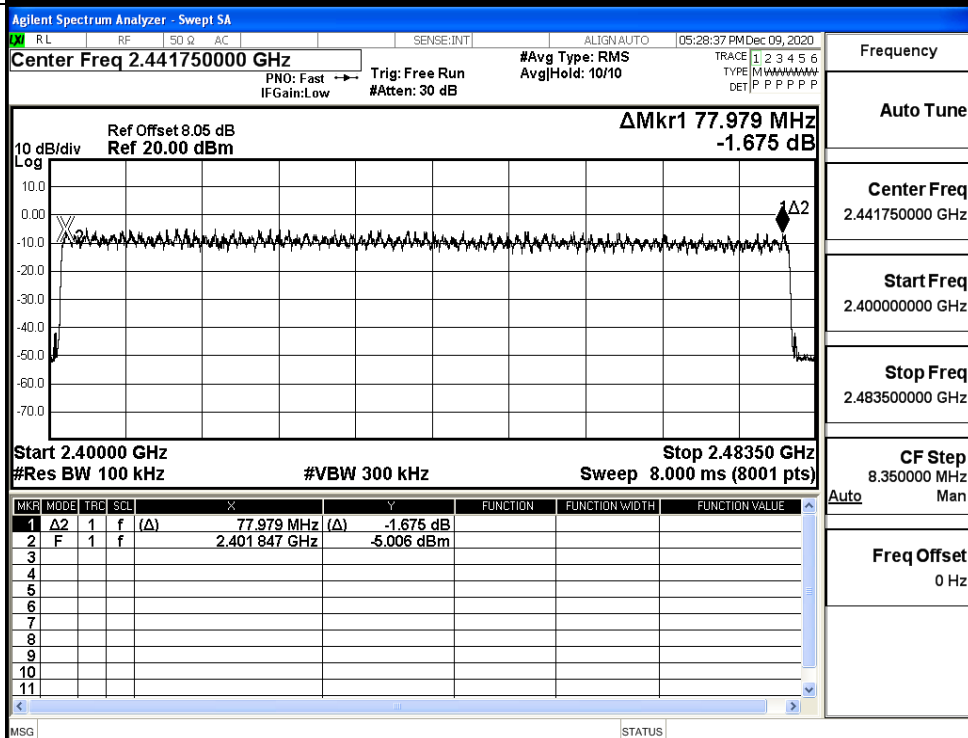
Freq Offset
0 Hz

A.4 Hopping Channel Number

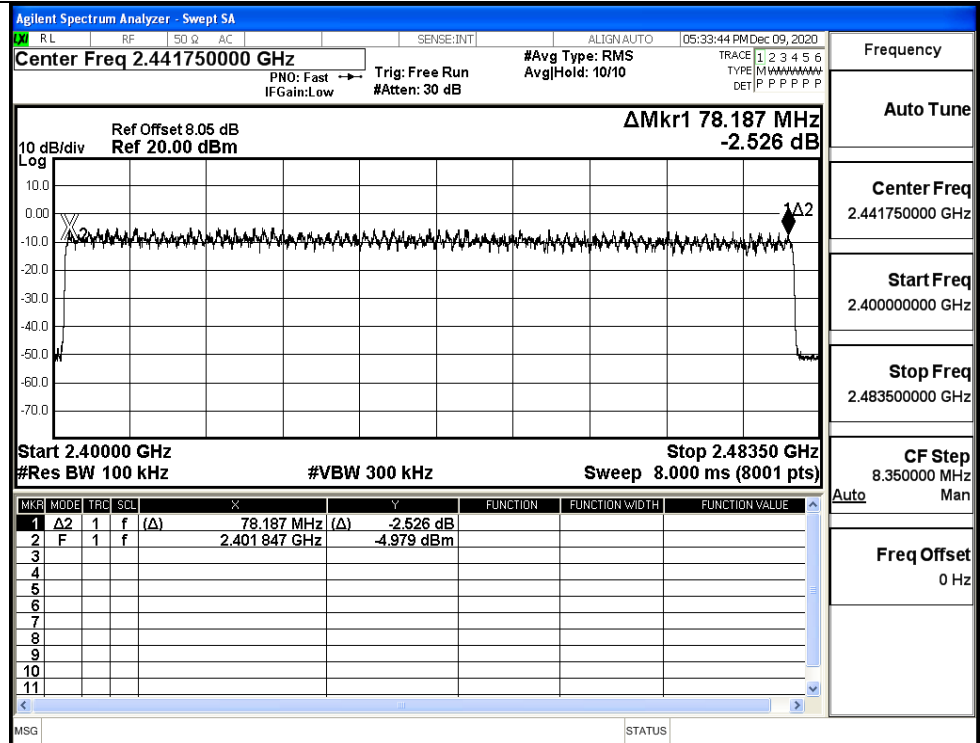
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

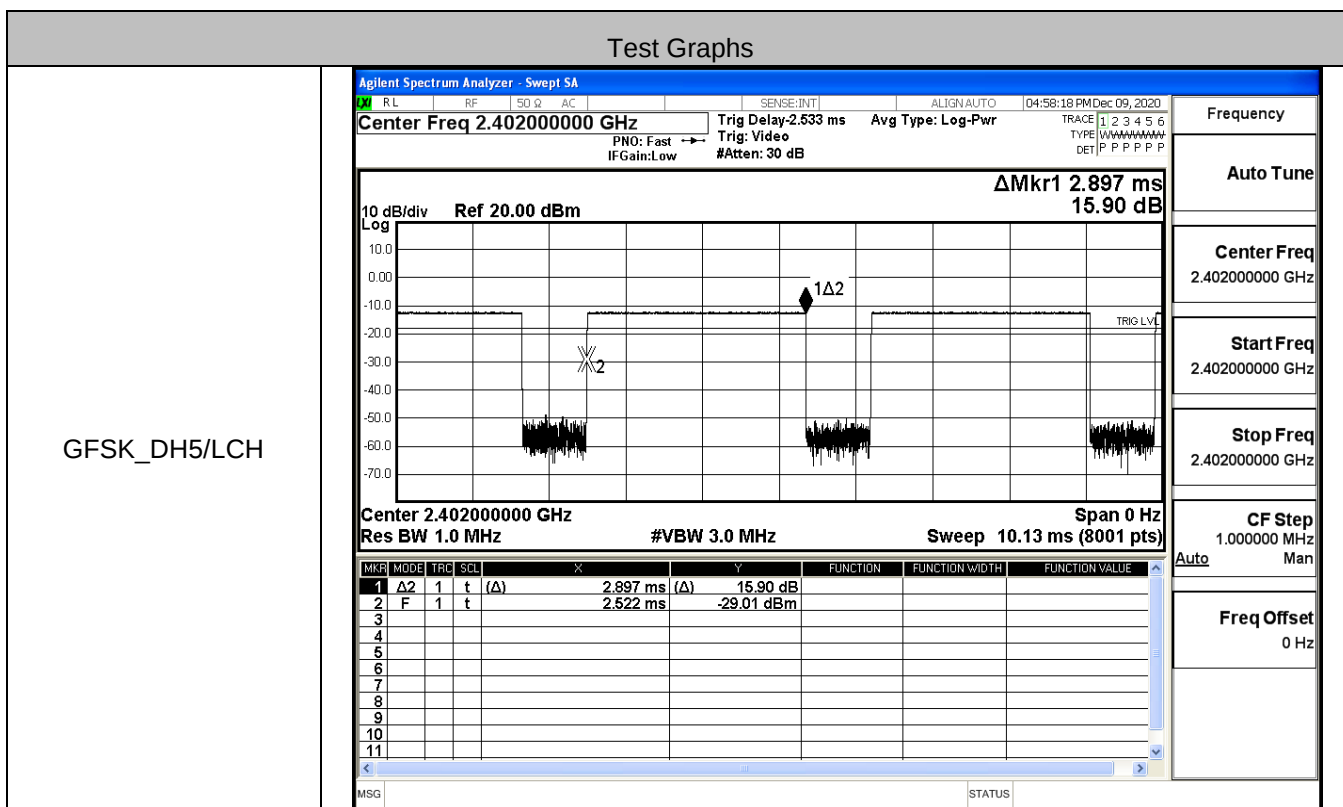
 $\pi/4$ DQPSK/Hop

8DPSK/Hop

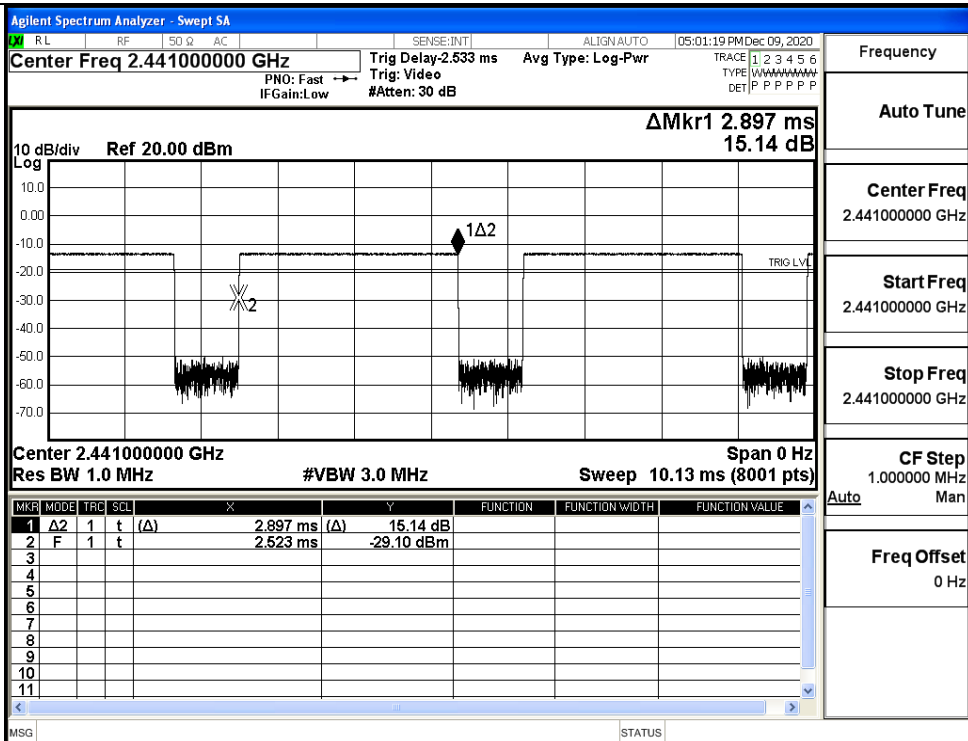


A.5 Dwell Time

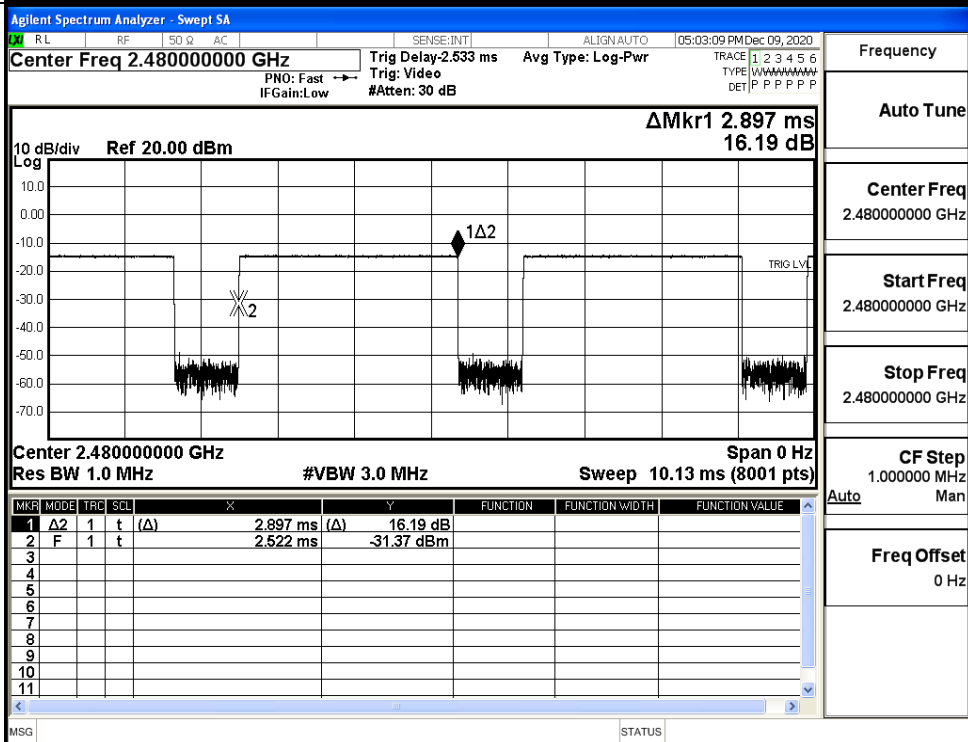
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7	0.309	0.4	PASS
8DPSK	3DH5	LCH	2.9	106.7	0.309	0.4	PASS
	3DH5	MCH	2.9	106.7	0.309	0.4	PASS
	3DH5	HCH	2.9	106.7	0.309	0.4	PASS



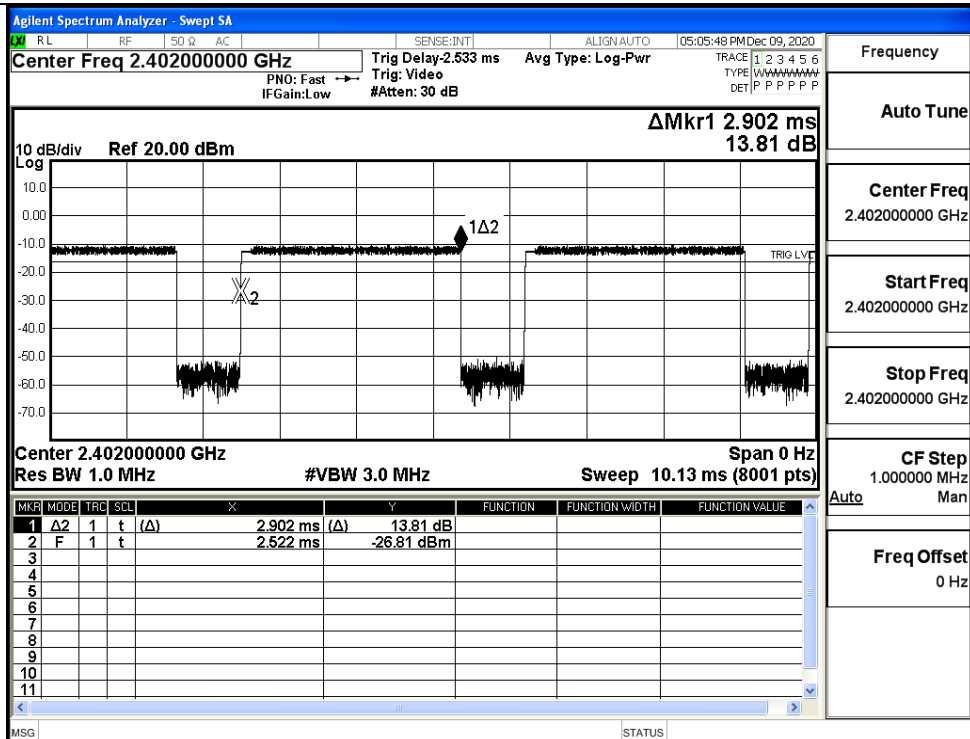
GFSK_DH5/MCH



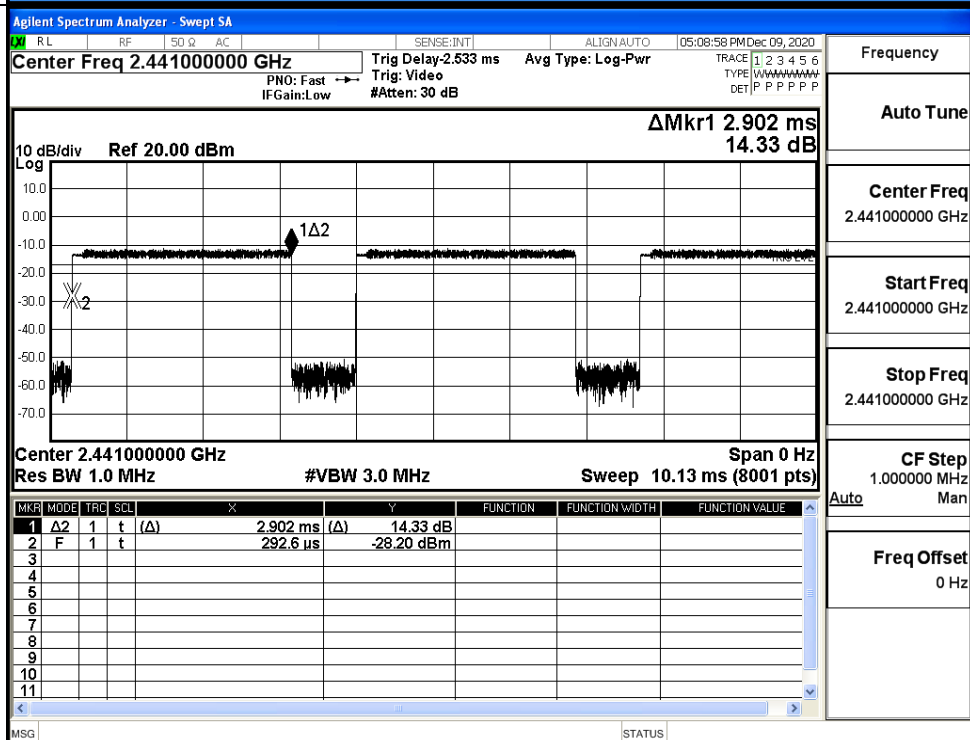
GFSK_DH5/HCH



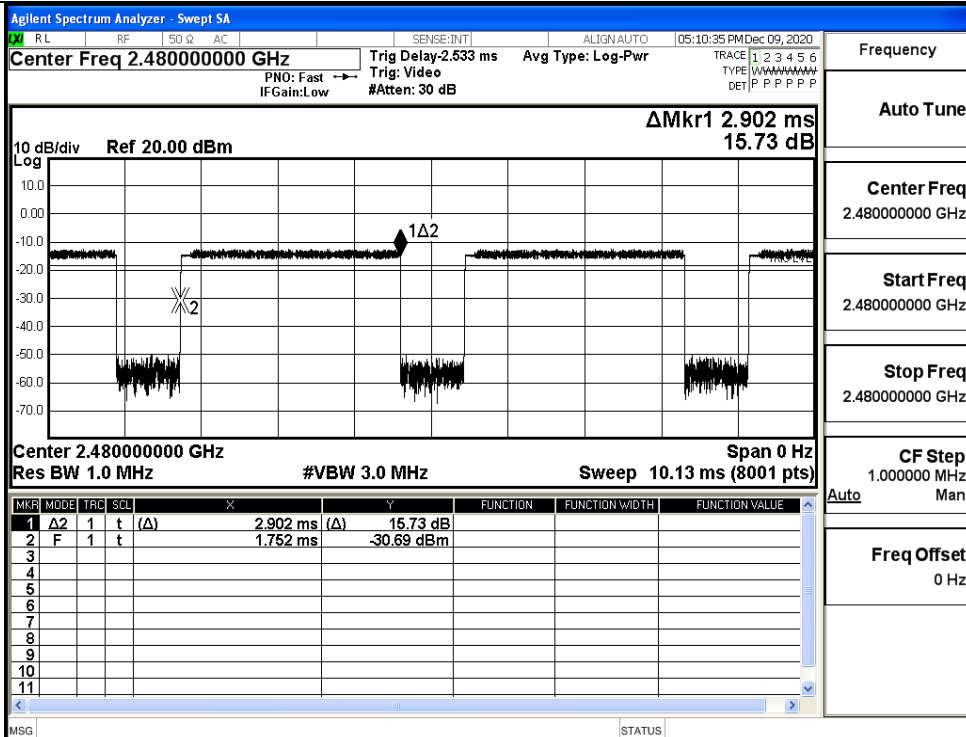
$\pi/4$ DQPSK
_2DH5/LCH



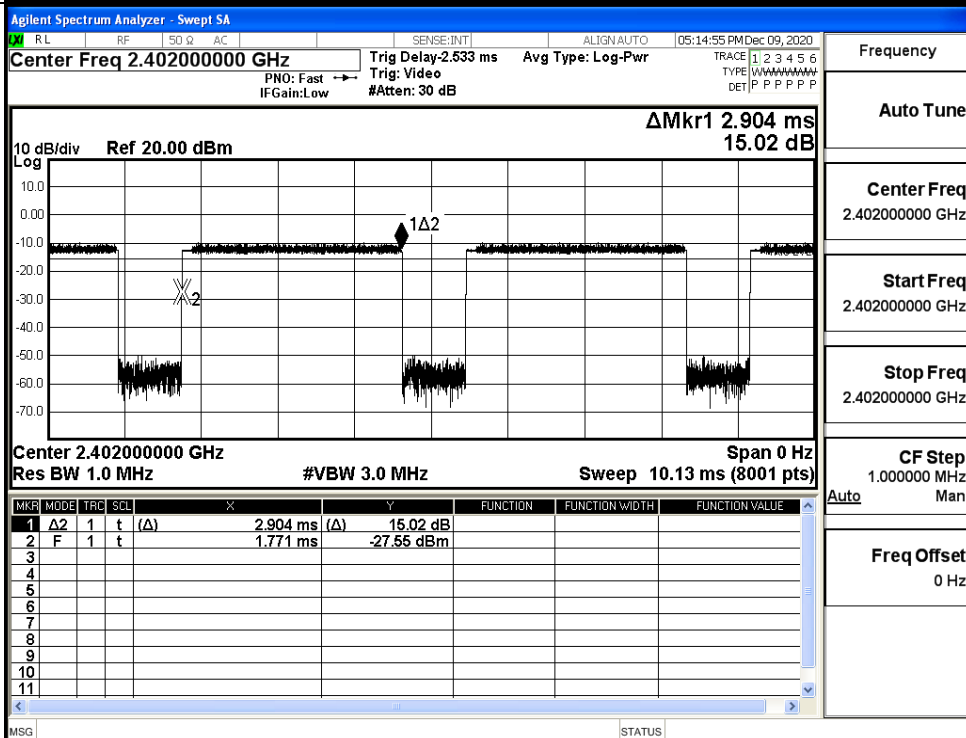
$\pi/4$ DQPSK
_2DH5/MCH



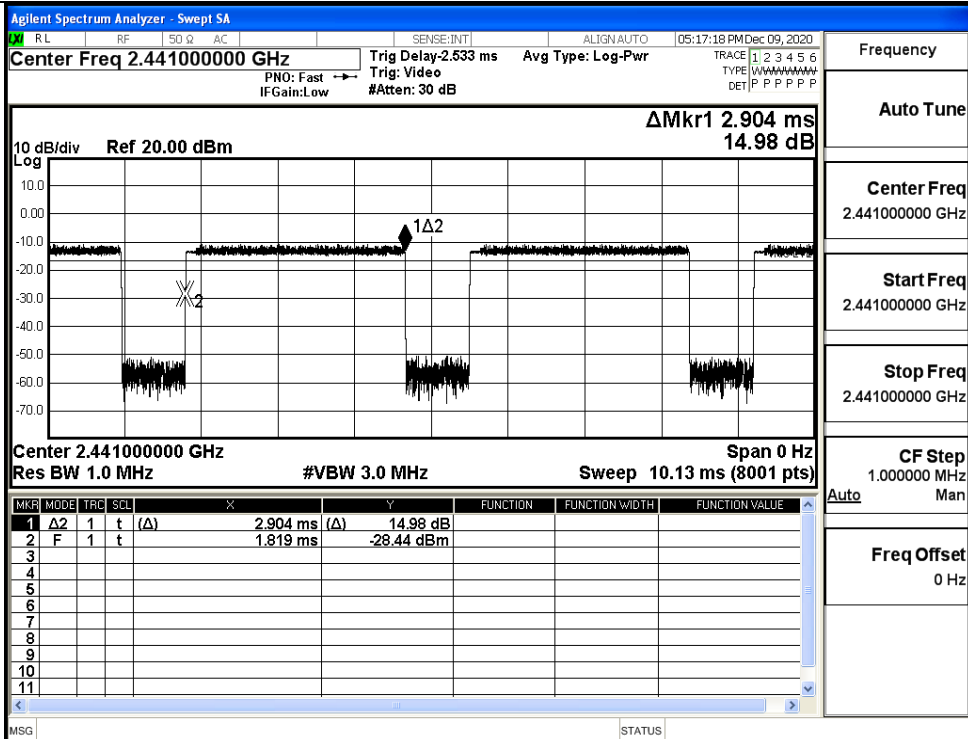
$\pi/4$ DQPSK
_2DH5/HCH



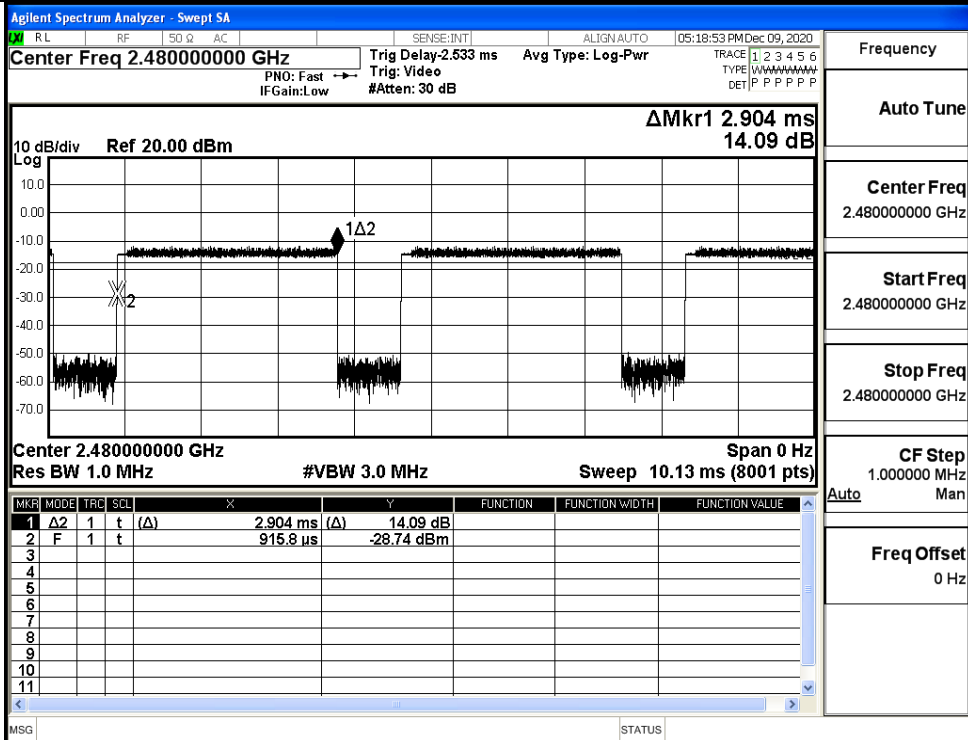
8DPSK_3DH5/LCH



8DPSK_3DH5/MCH

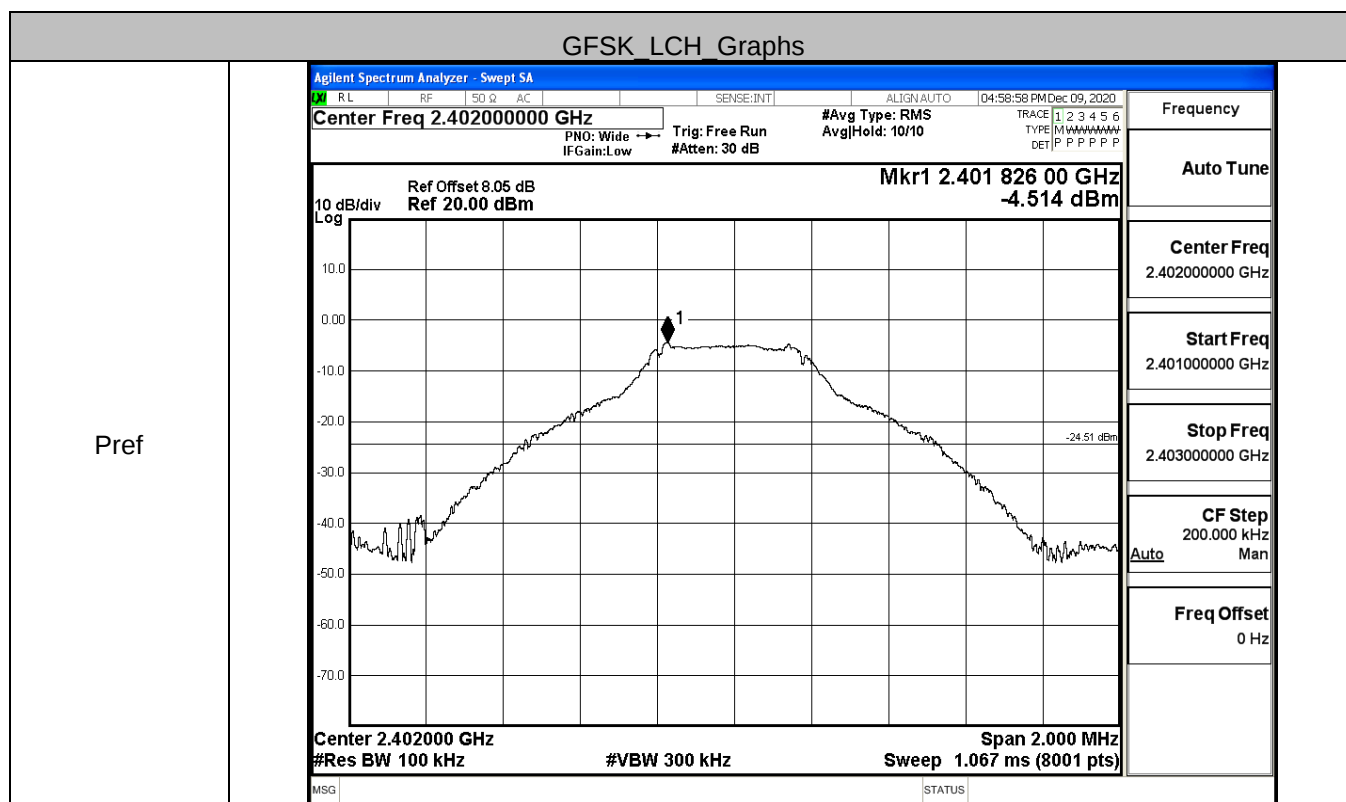


8DPSK_3DH5/HCH

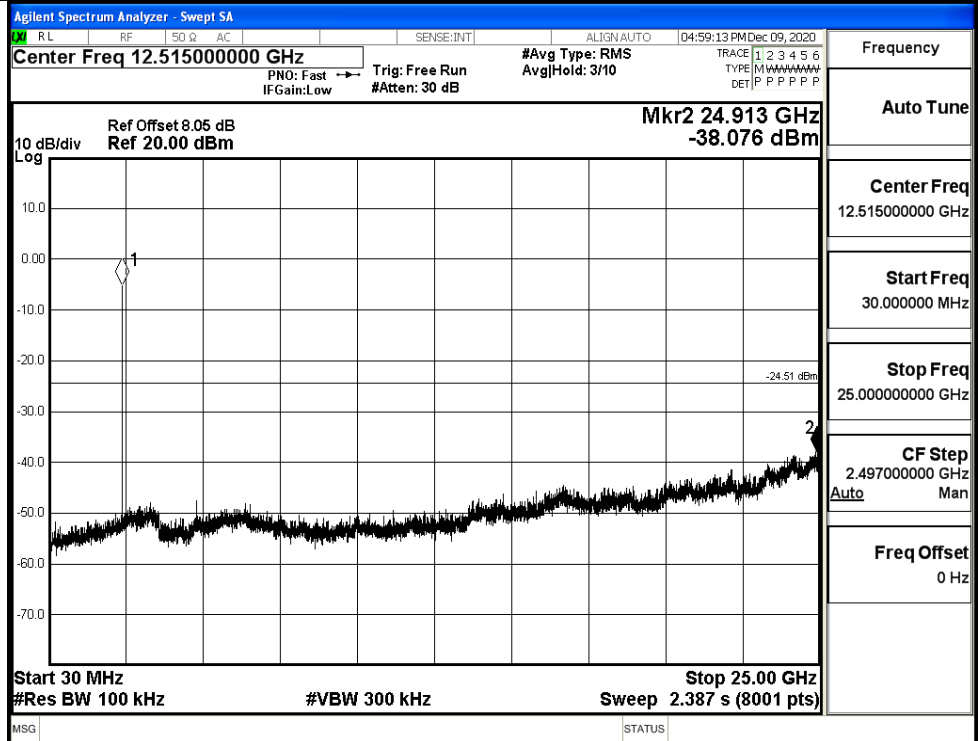


A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-4.514	-38.076	-24.514	PASS
	MCH	-5.433	-37.670	-25.433	PASS
	HCH	-6.952	-37.840	-26.952	PASS
$\pi/4$ DQPSK	LCH	-4.696	-37.112	-24.696	PASS
	MCH	-5.607	-36.870	-25.607	PASS
	HCH	-6.862	-37.394	-26.862	PASS
8DPSK	LCH	-4.56	-37.619	-24.560	PASS
	MCH	-5.679	-37.591	-25.679	PASS
	HCH	-6.611	-37.792	-26.611	PASS

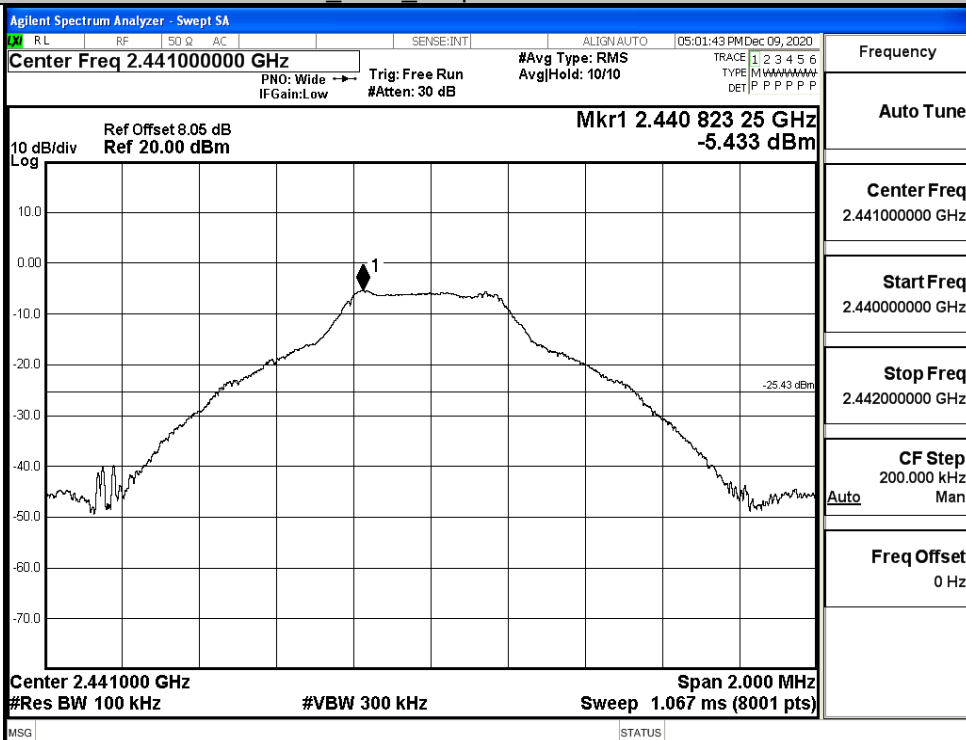


Puw

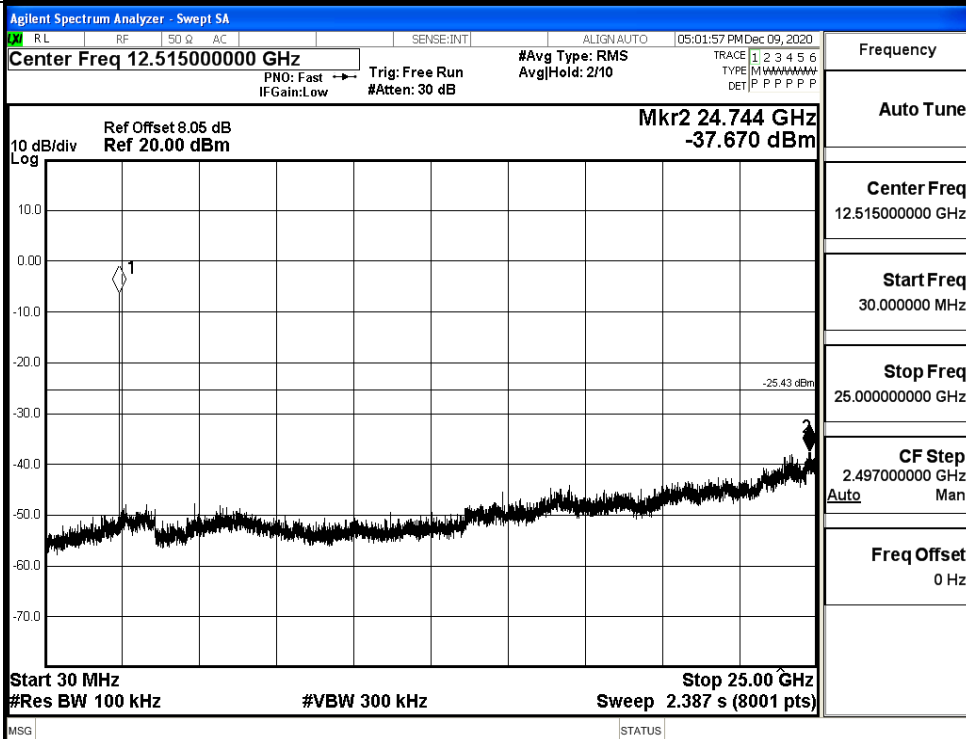


GFSK_MCH_Graphs

Pref

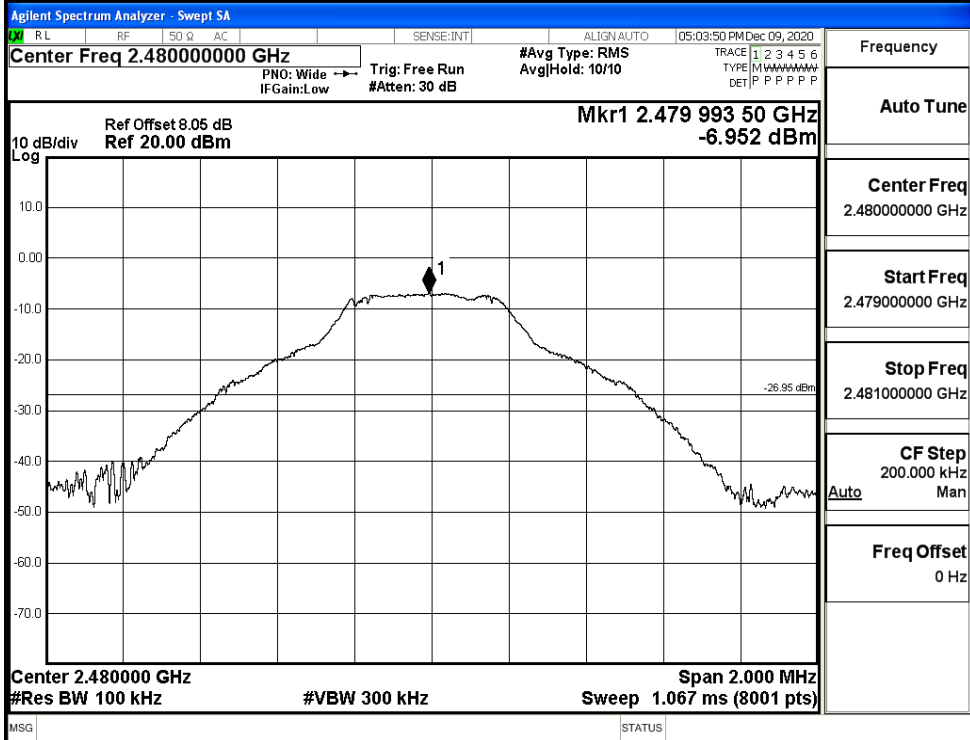


Puw

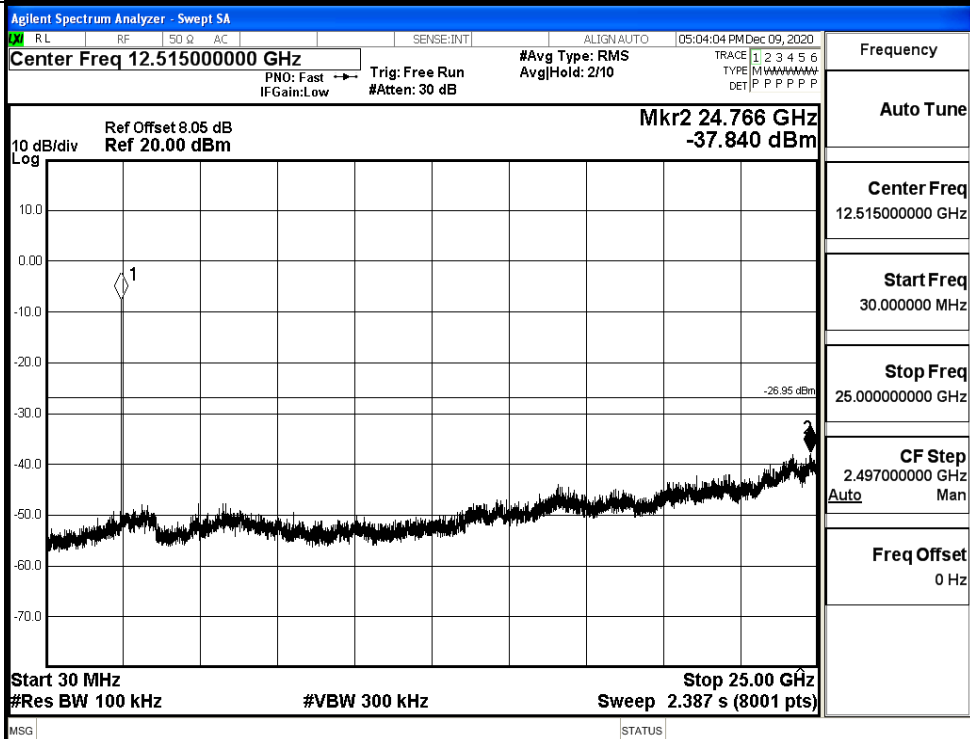


GFSK HCH_Graphs

Pref

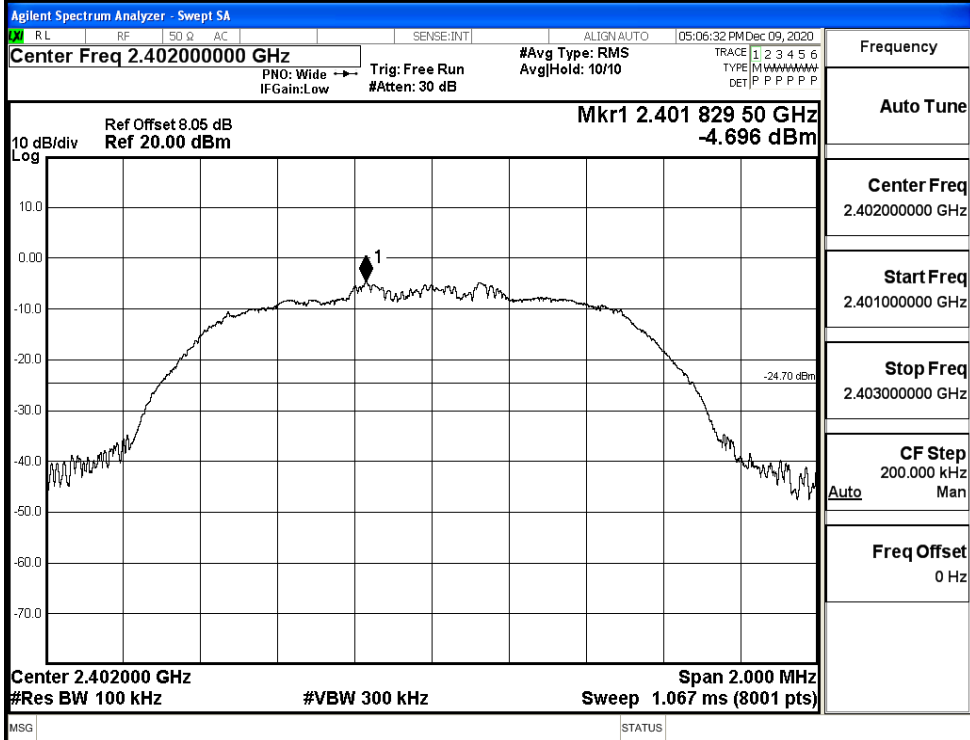


Puw

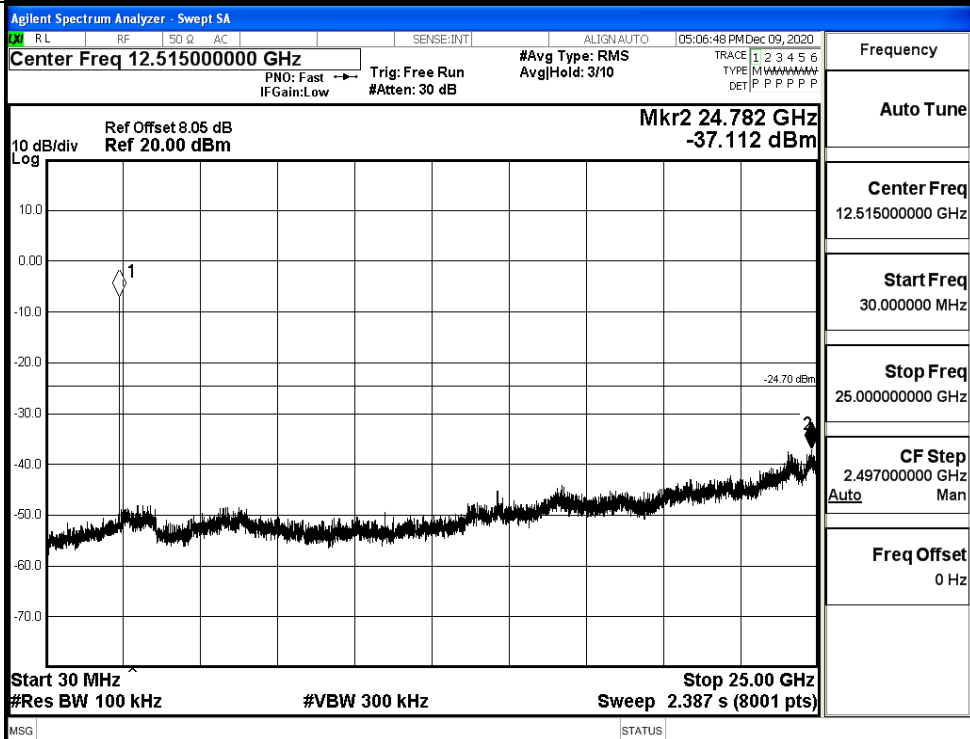


$\pi/4$ DQPSK_LCH_Graphs

Pref

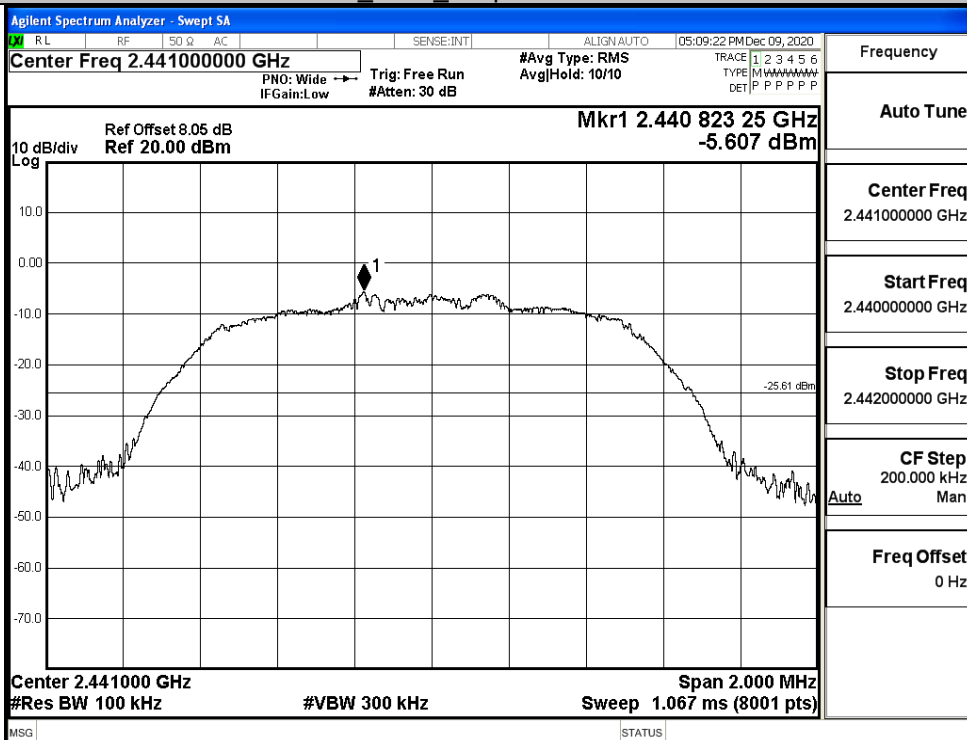


Puw

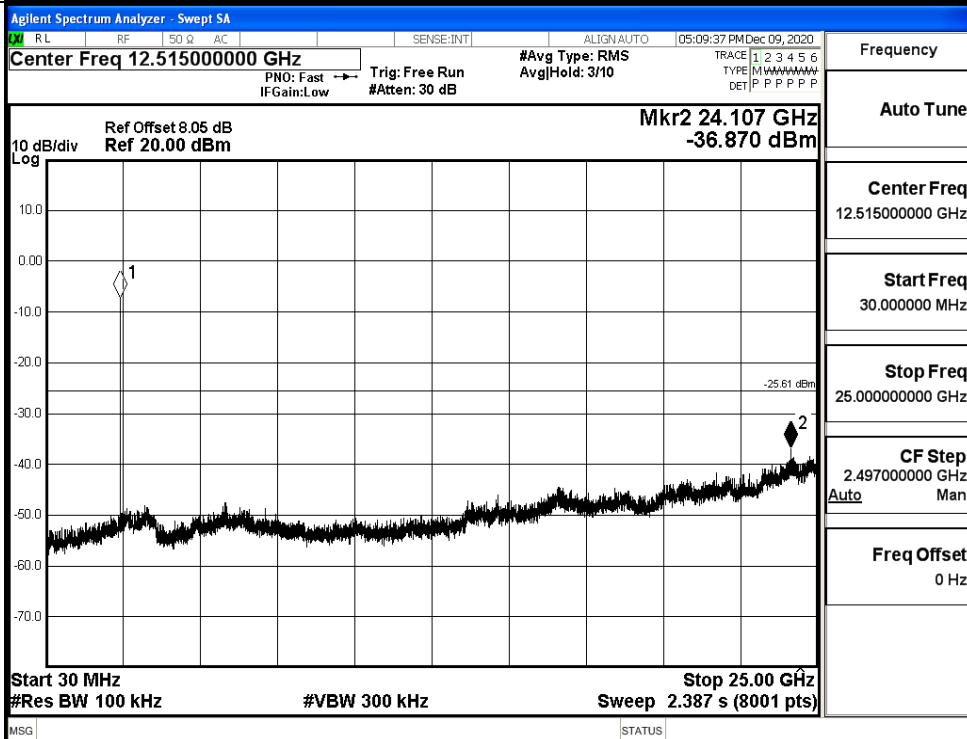


$\pi/4$ DQPSK_MCH_Graphs

Pref

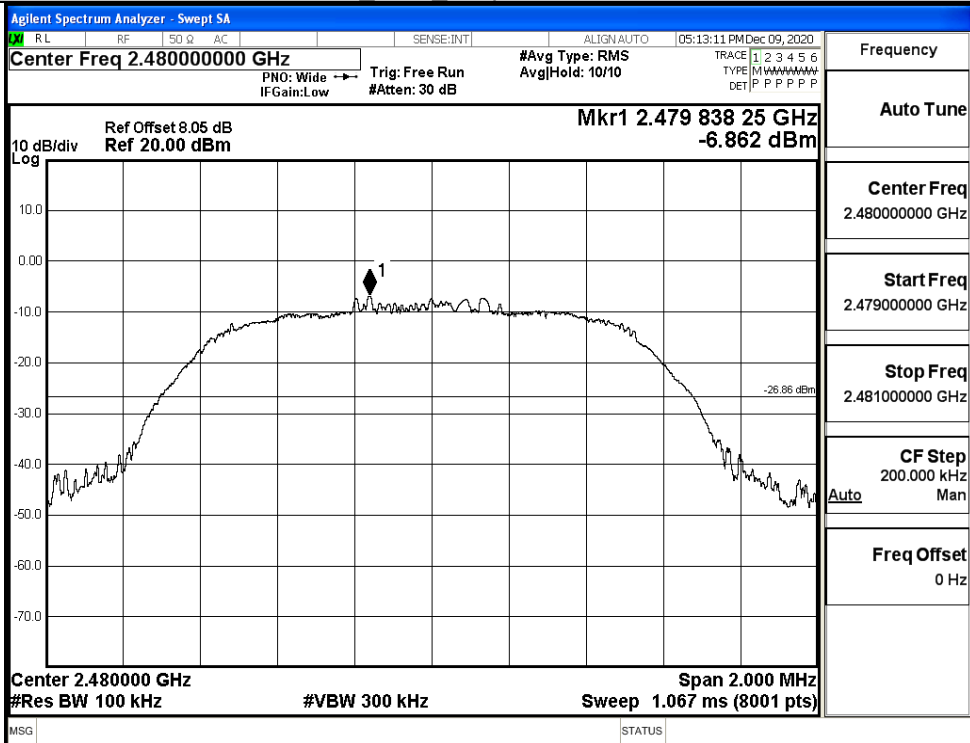


Puw

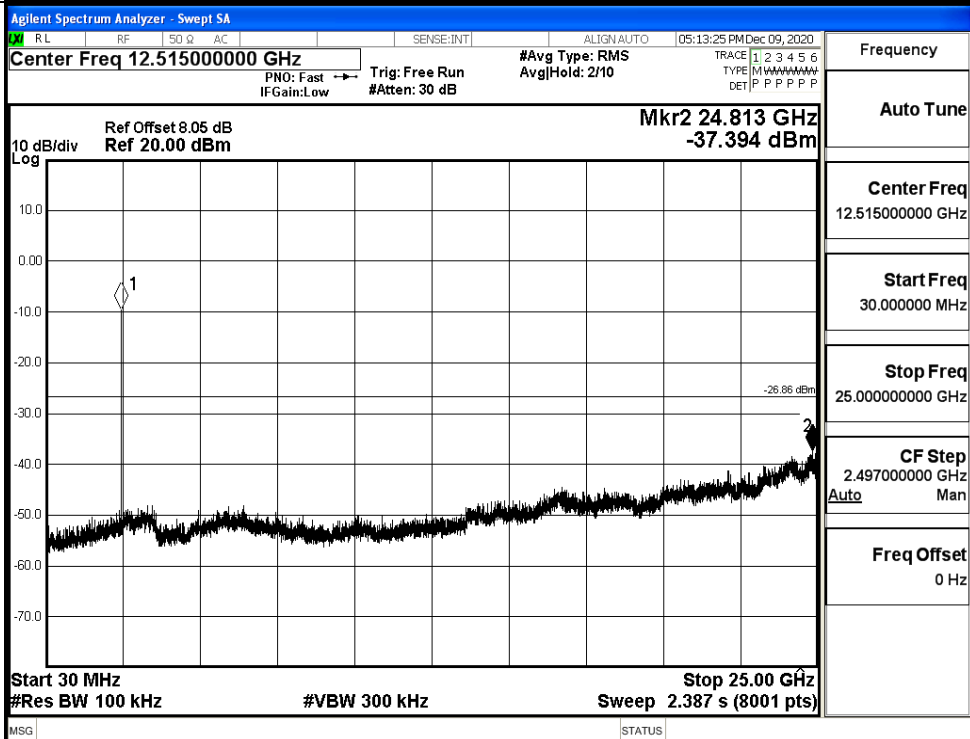


$\pi/4$ DQPSK_HCH_Graphs

Pref

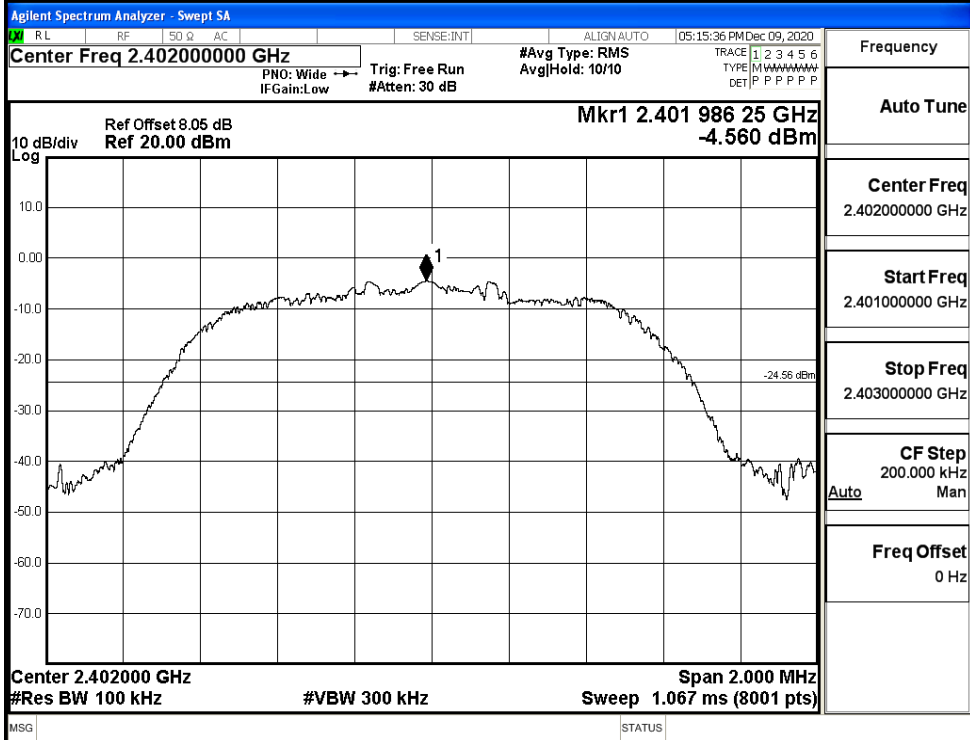


Puw

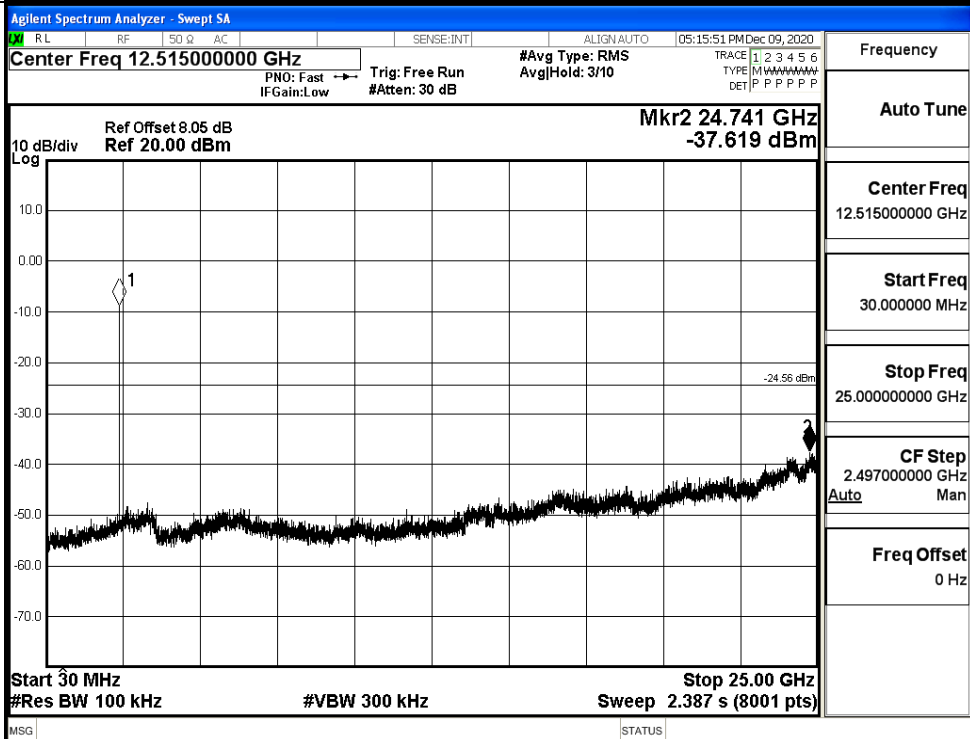


8DPSK_LCH_Graphs

Pref

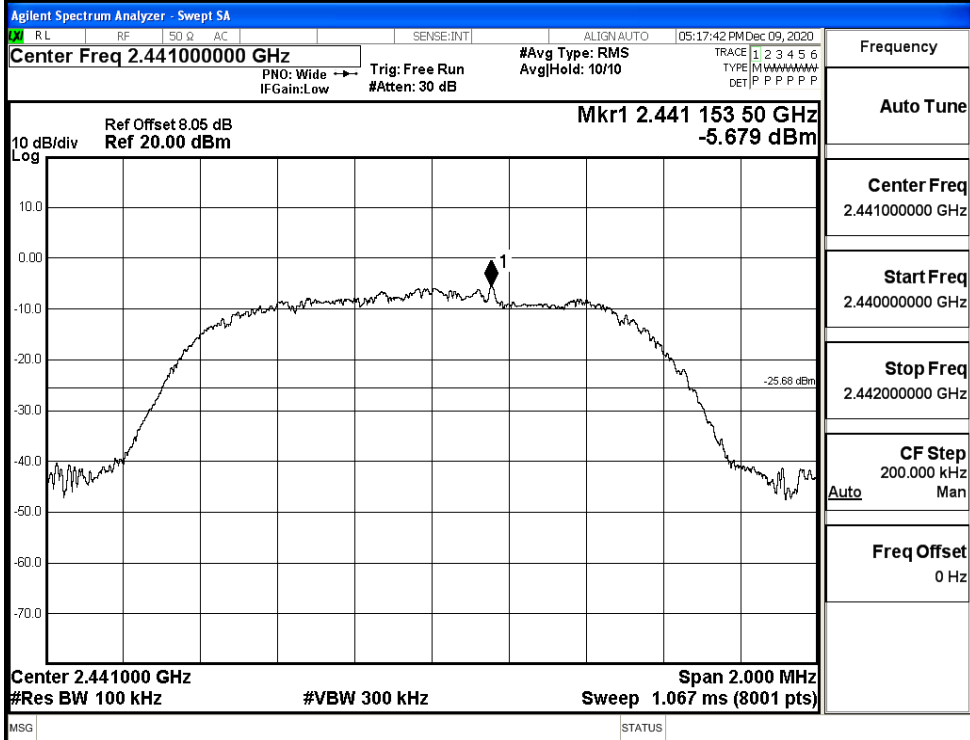


Puw

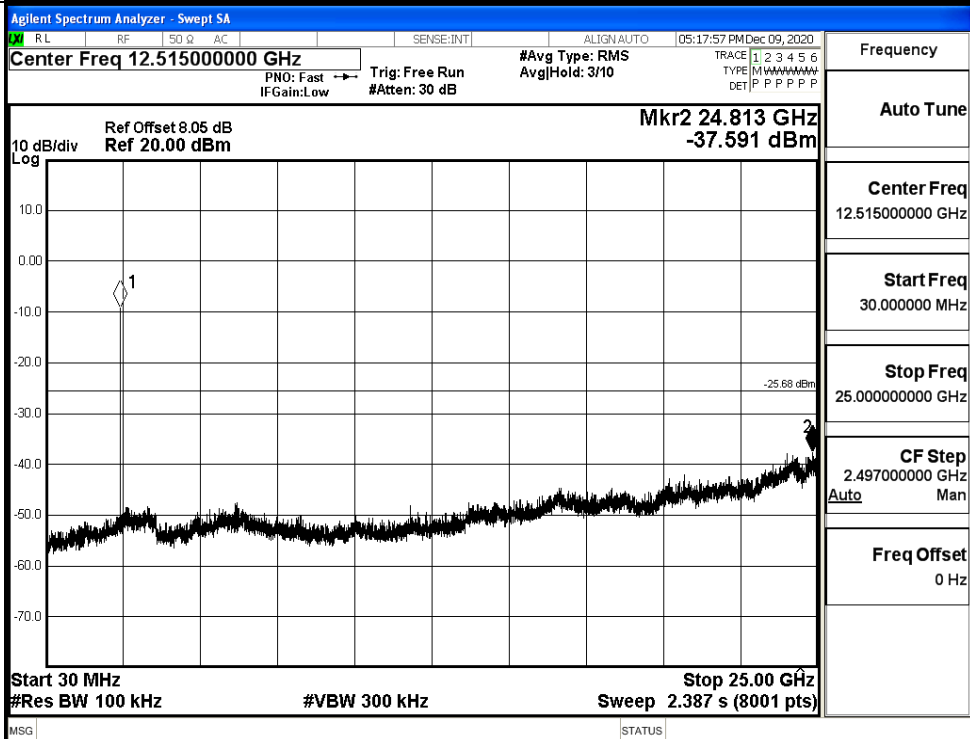


8DPSK_MCH_Graphs

Pref

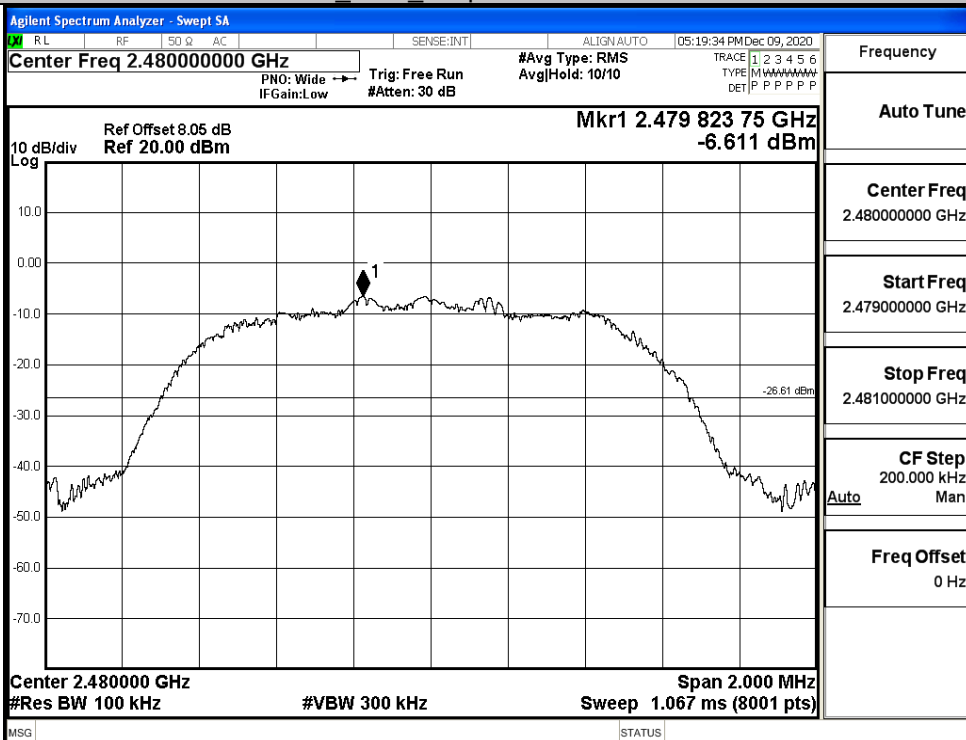


Puw

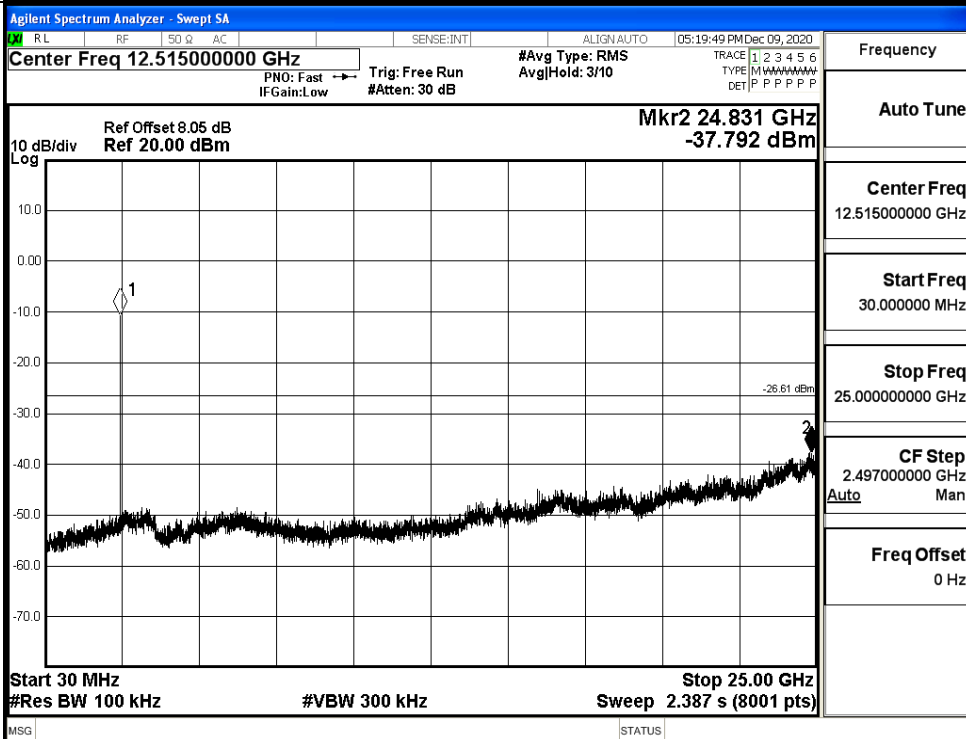


8DPSK_HCH_Graphs

Pref



Puw

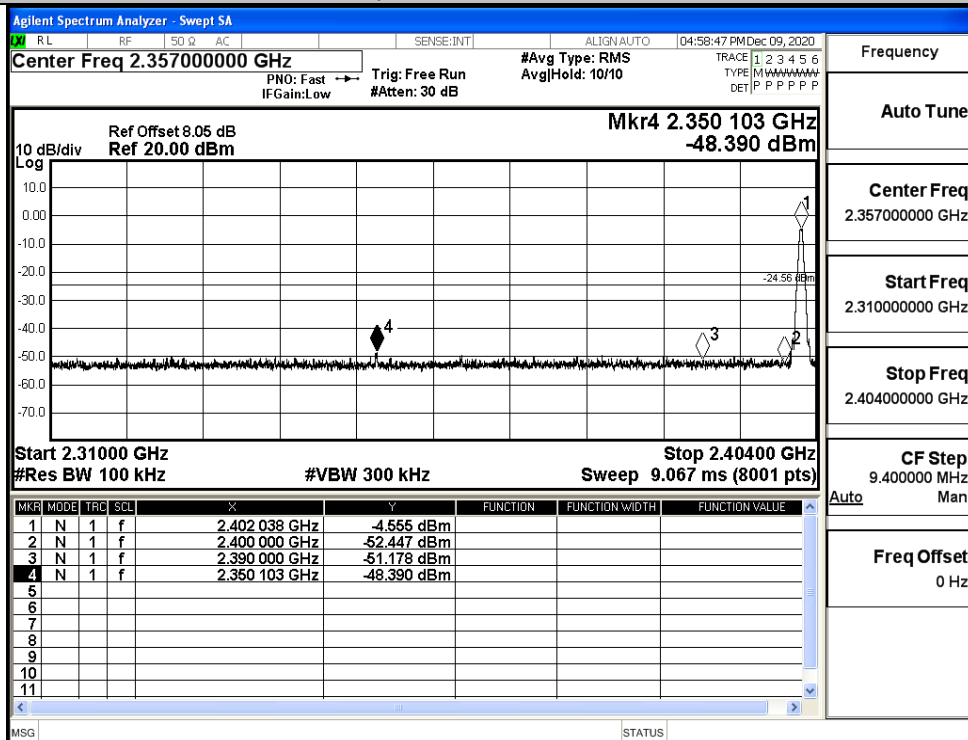


A.7 Band-edge for RF Conducted Emissions

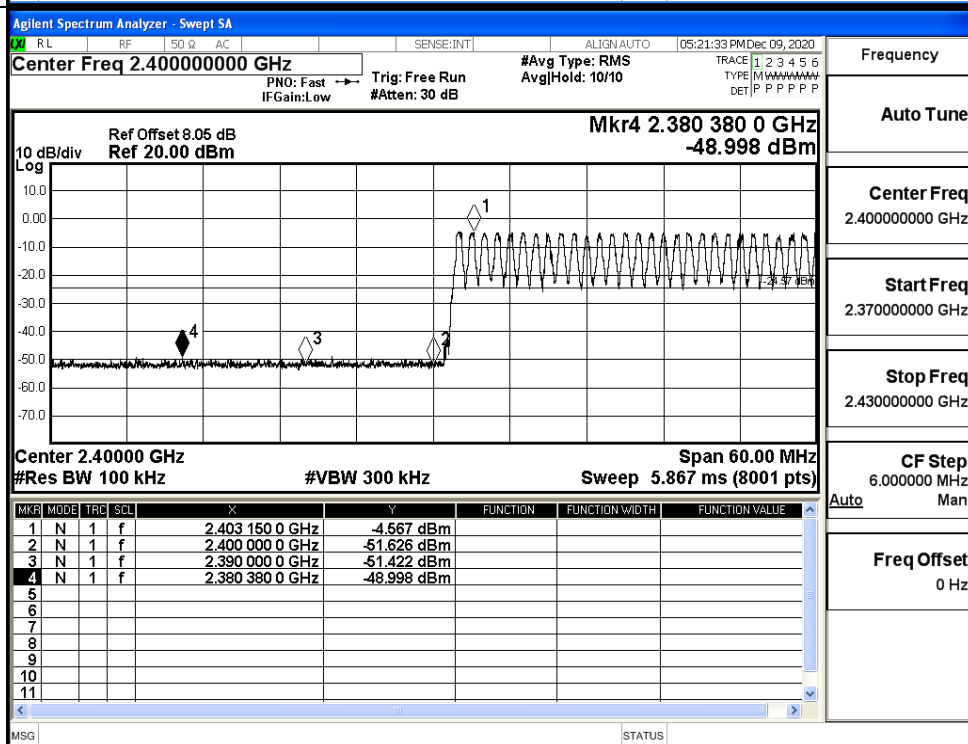
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-4.555	Off	-48.390	-24.56	PASS
			-4.567	On	-48.998	-24.57	PASS
	HCH	2480	-6.551	Off	-48.849	-26.55	PASS
			-5.884	On	-48.848	-25.88	PASS
$\pi/4$ DQPSK	LCH	2402	-4.995	Off	-48.956	-25	PASS
			-4.763	On	-49.190	-24.76	PASS
	HCH	2480	-6.724	Off	-48.848	-26.72	PASS
			-6.018	On	-48.800	-26.02	PASS
8DPSK	LCH	2402	-4.459	Off	-49.439	-24.46	PASS
			-4.694	On	-49.003	-24.69	PASS
	HCH	2480	-6.633	Off	-48.984	-26.63	PASS
			-5.844	On	-48.589	-25.84	PASS

Test Graphs

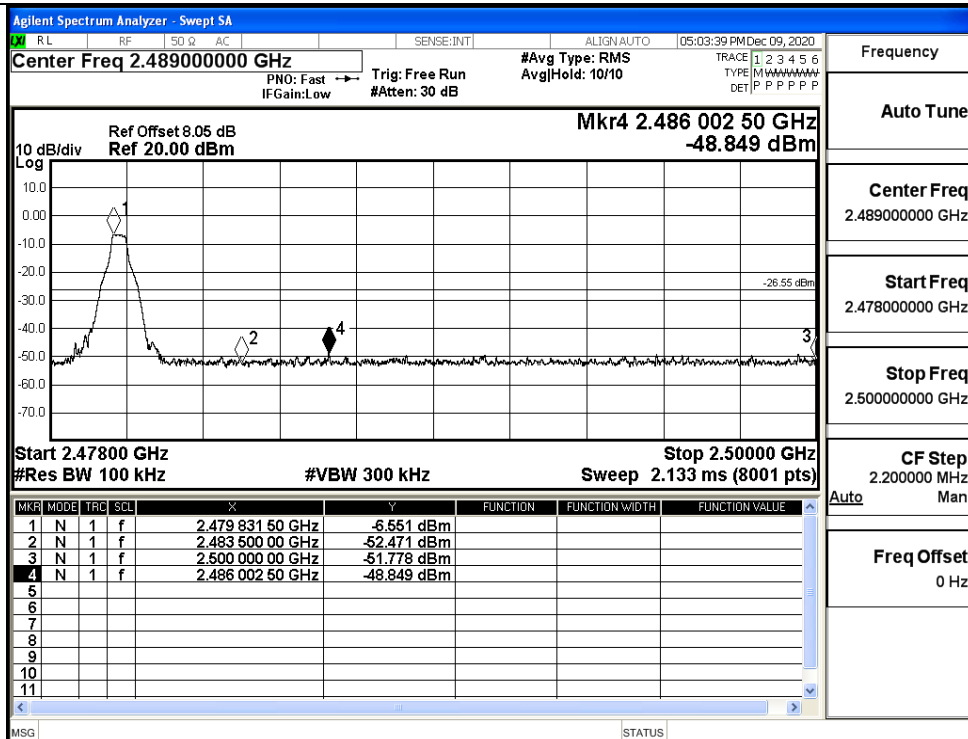
GFSK/LCH/No Hop



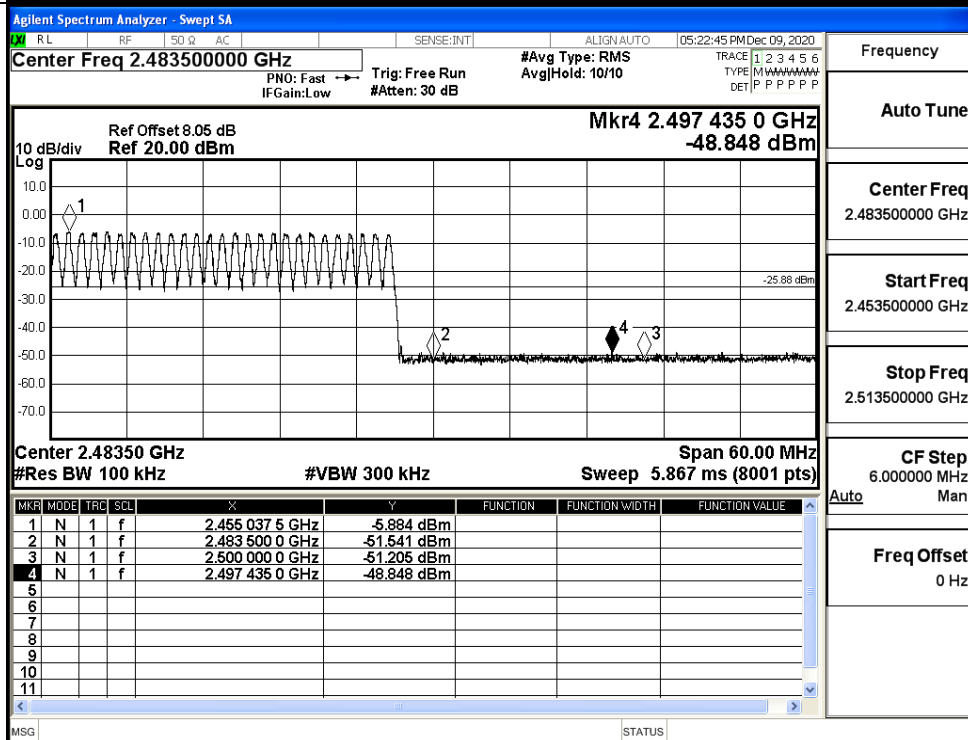
GFSK/LCH/Hop



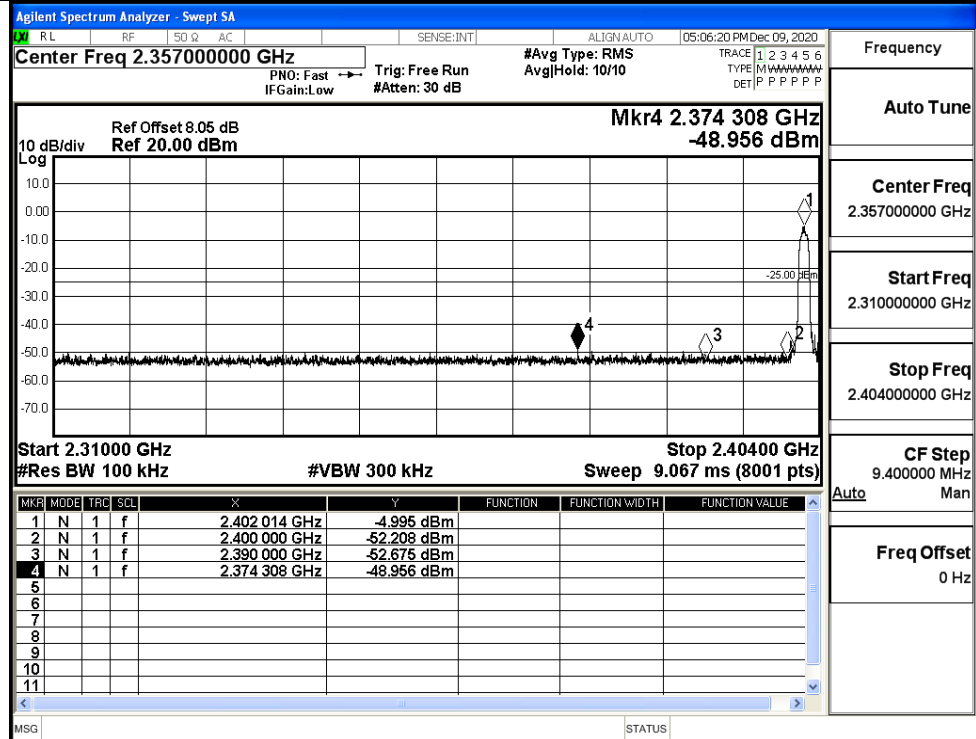
GFSK/HCH/No Hop



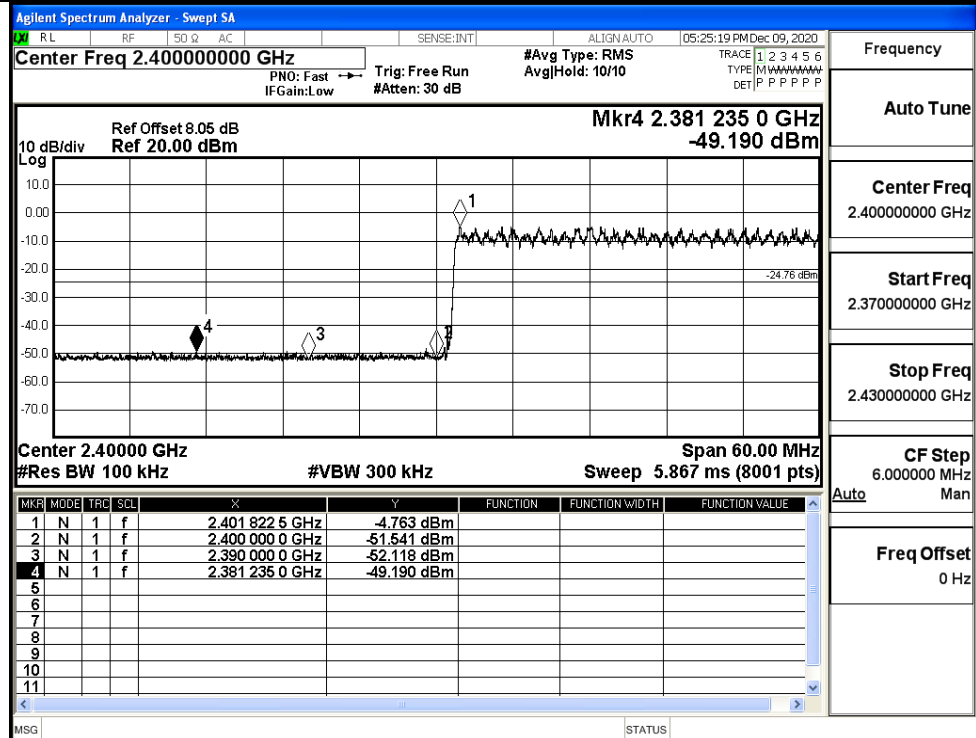
GFSK/HCH/Hop



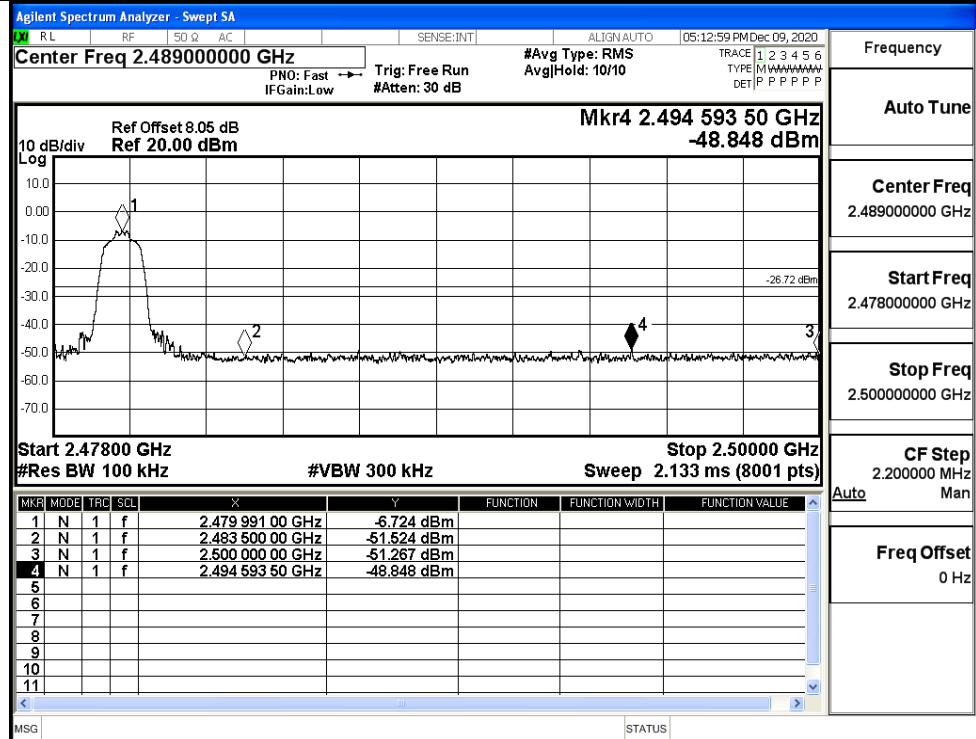
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

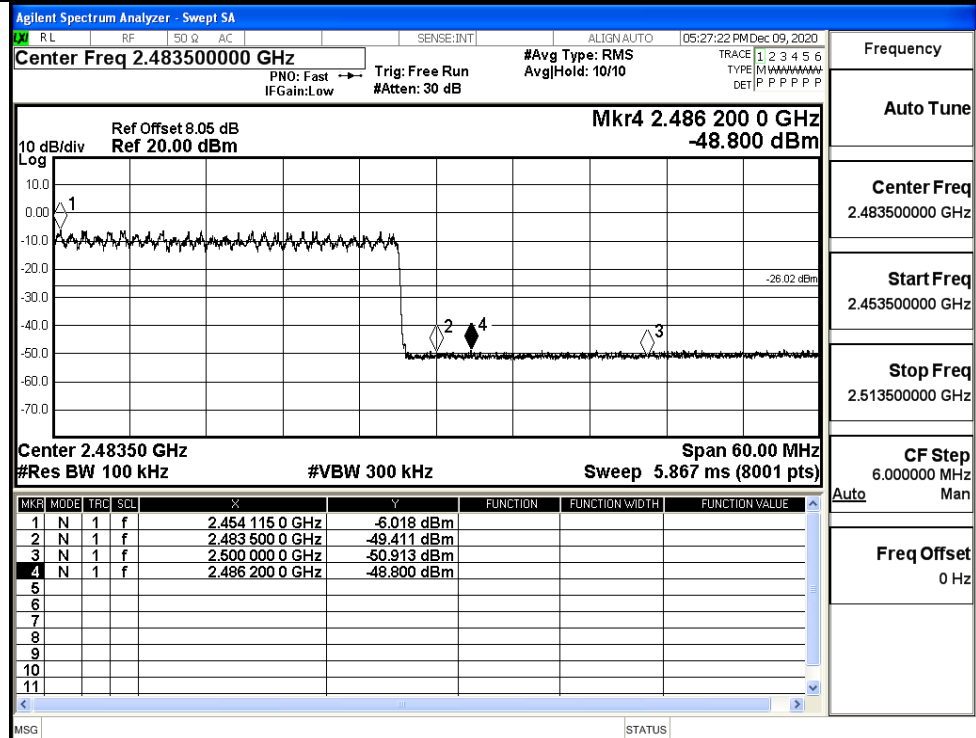
Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

CF Step
2.200000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

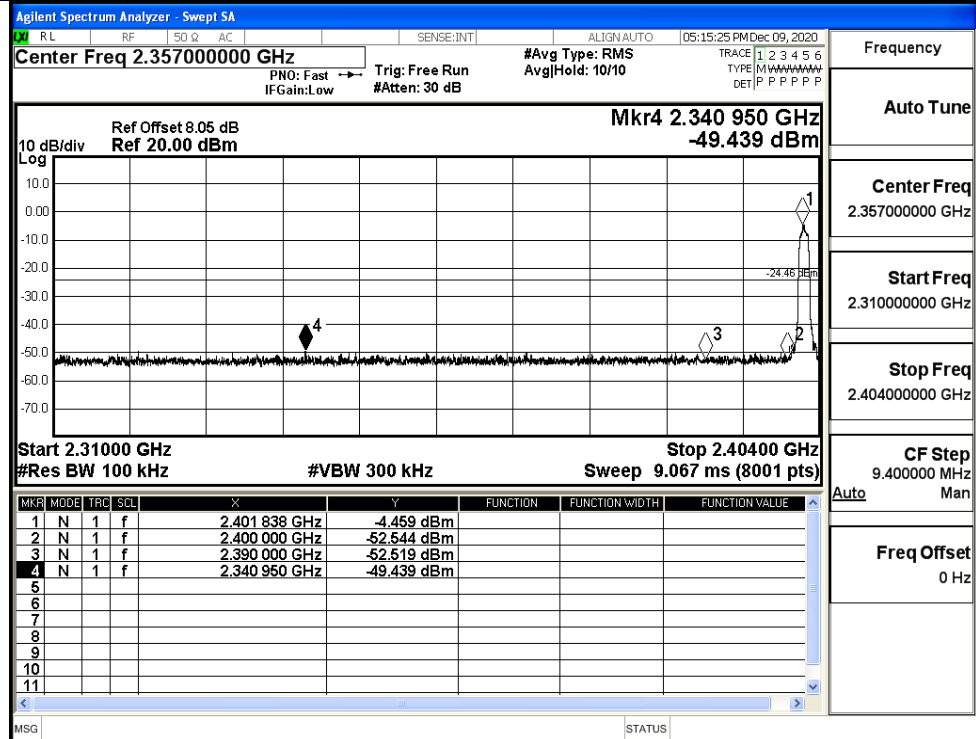
Start Freq
2.453500000 GHz

Stop Freq
2.513500000 GHz

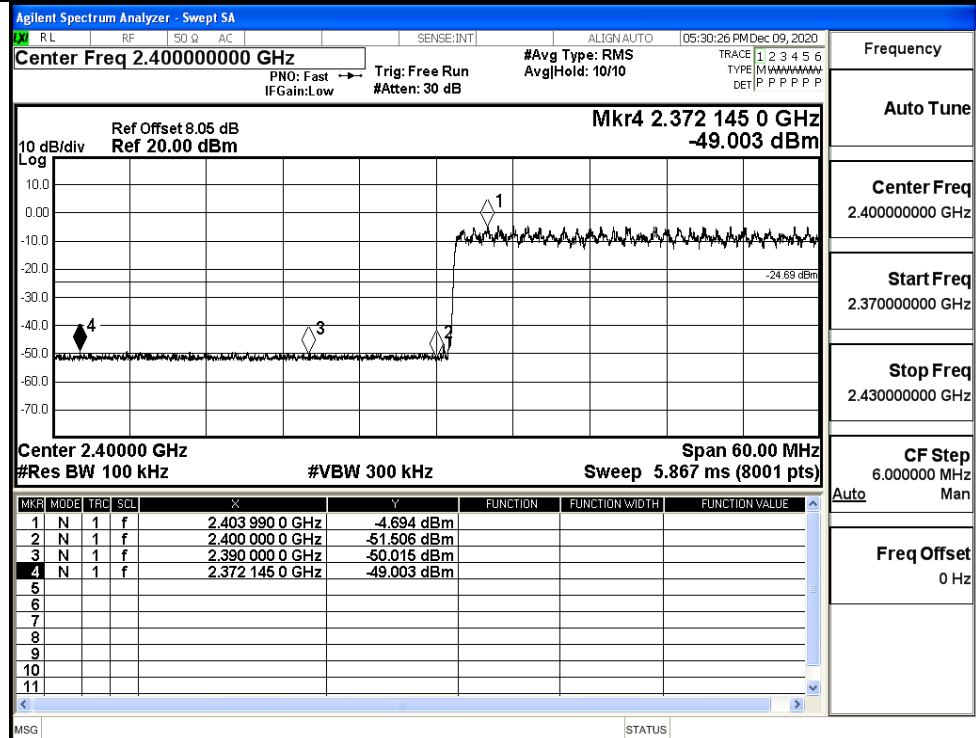
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

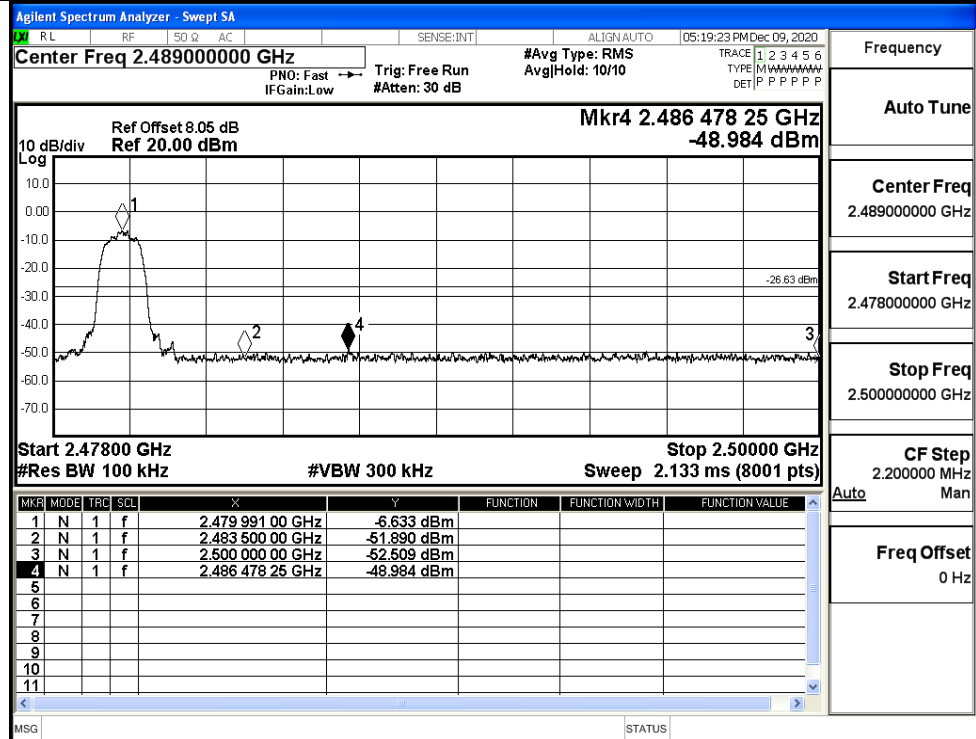
8DPSK/LCH/No Hop



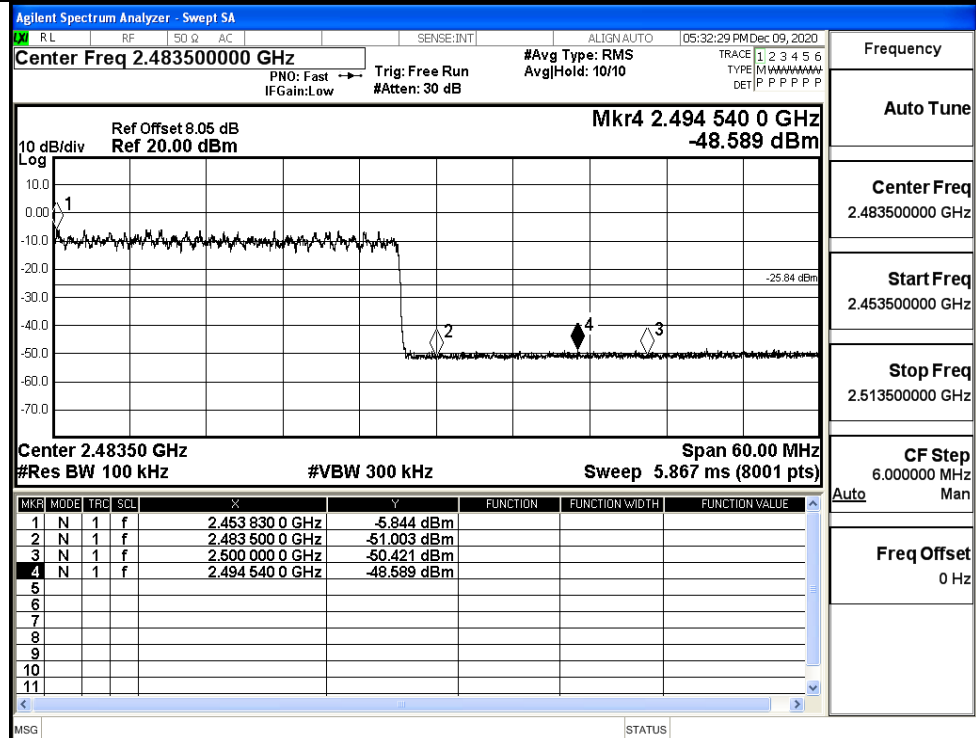
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



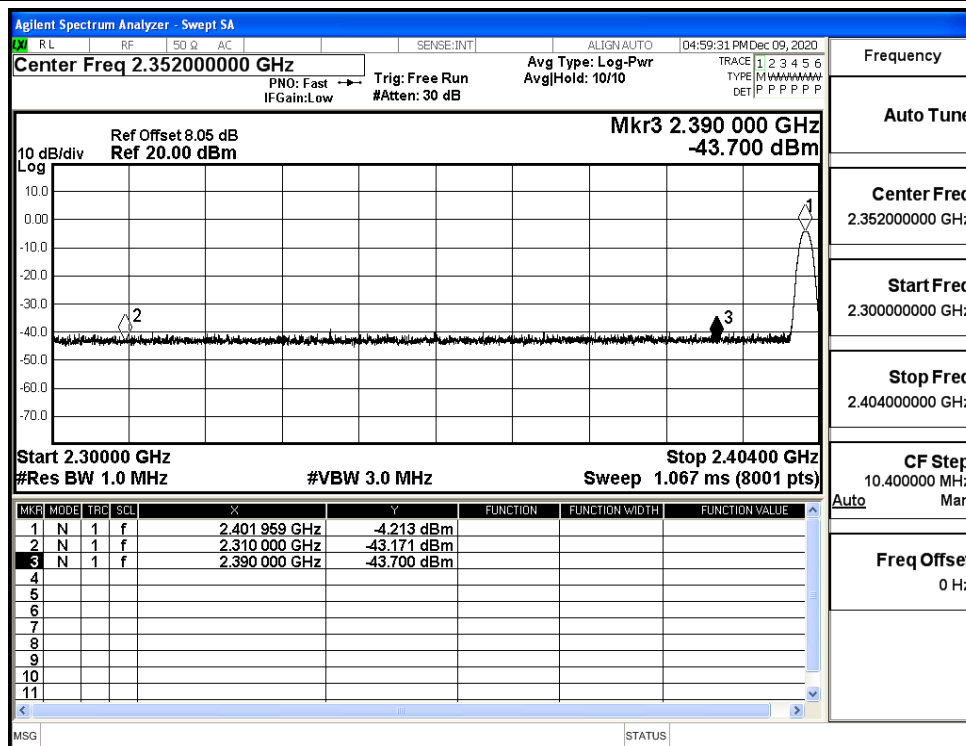
8DPSK/HCH/Hop



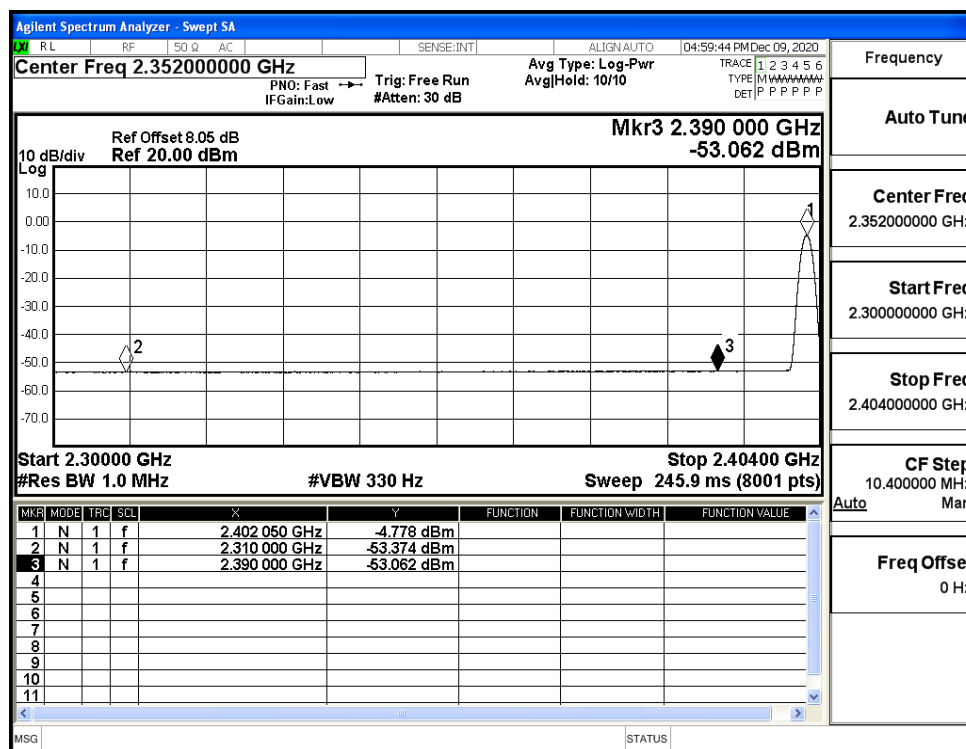
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.17	2.0	0	52.09	PEAK	74	PASS
	Off	2310.0	-53.37	2.0	0	41.88	AV	54	PASS
	Off	2390.0	-43.70	2.0	0	51.56	PEAK	74	PASS
	Off	2390.0	-53.06	2.0	0	42.20	AV	54	PASS
	Off	2483.5	-42.96	2.0	0	52.30	PEAK	74	PASS
	Off	2483.5	-52.52	2.0	0	42.74	AV	54	PASS
	Off	2500.0	-42.54	2.0	0	52.72	PEAK	74	PASS
	Off	2500.0	-52.40	2.0	0	42.86	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.15	2.0	0	52.11	PEAK	74	PASS
	Off	2310.0	-53.33	2.0	0	41.93	AV	54	PASS
	Off	2390.0	-42.01	2.0	0	53.25	PEAK	74	PASS
	Off	2390.0	-53.05	2.0	0	42.21	AV	54	PASS
	Off	2483.5	-41.78	2.0	0	53.48	PEAK	74	PASS
	Off	2483.5	-52.43	2.0	0	42.83	AV	54	PASS
	Off	2500.0	-43.70	2.0	0	51.56	PEAK	74	PASS
	Off	2500.0	-52.34	2.0	0	42.92	AV	54	PASS
8DPSK	Off	2310.0	-42.64	2.0	0	52.62	PEAK	74	PASS
	Off	2310.0	-53.37	2.0	0	41.89	AV	54	PASS
	Off	2390.0	-43.31	2.0	0	51.95	PEAK	74	PASS
	Off	2390.0	-53.12	2.0	0	42.14	AV	54	PASS
	Off	2483.5	-41.95	2.0	0	53.31	PEAK	74	PASS
	Off	2483.5	-52.55	2.0	0	42.71	AV	54	PASS
	Off	2500.0	-41.59	2.0	0	53.67	PEAK	74	PASS
	Off	2500.0	-52.42	2.0	0	42.84	AV	54	PASS

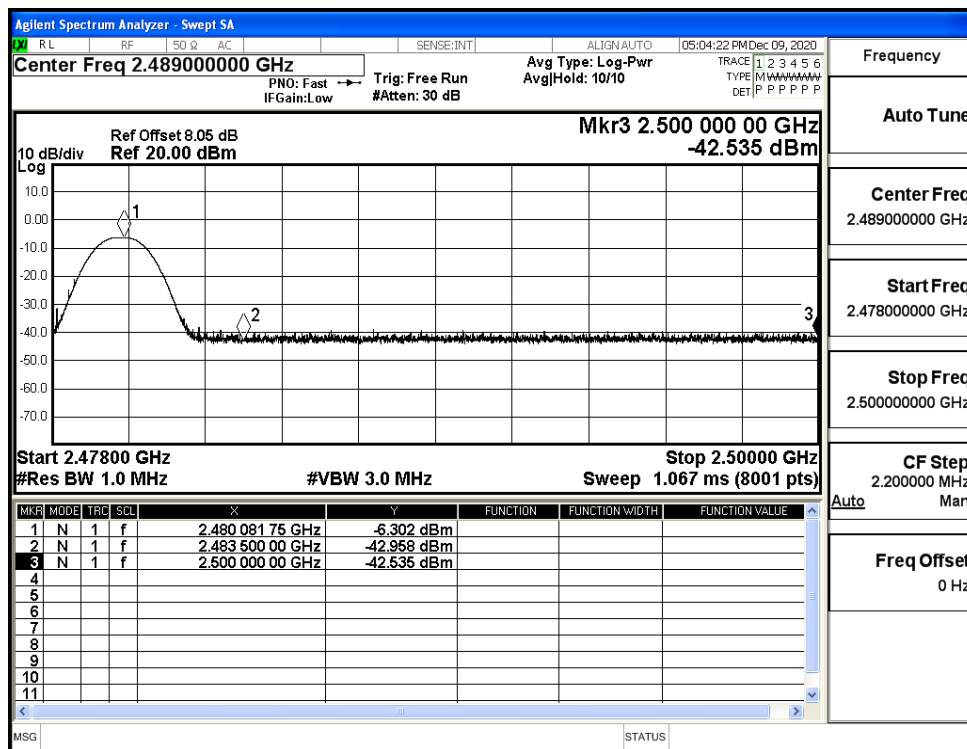
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



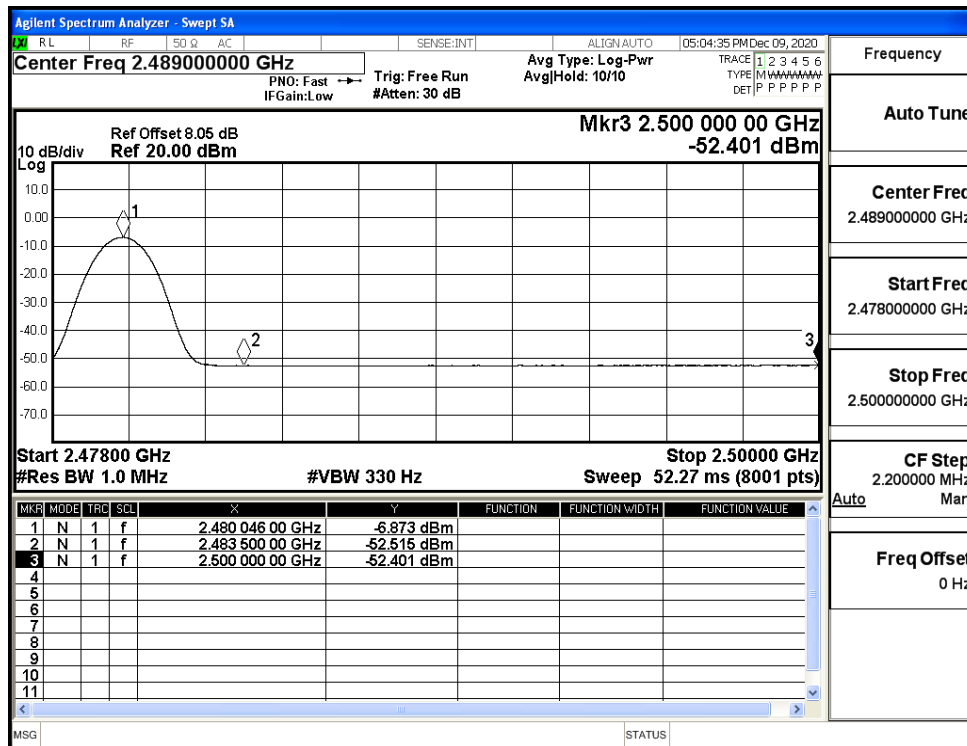
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



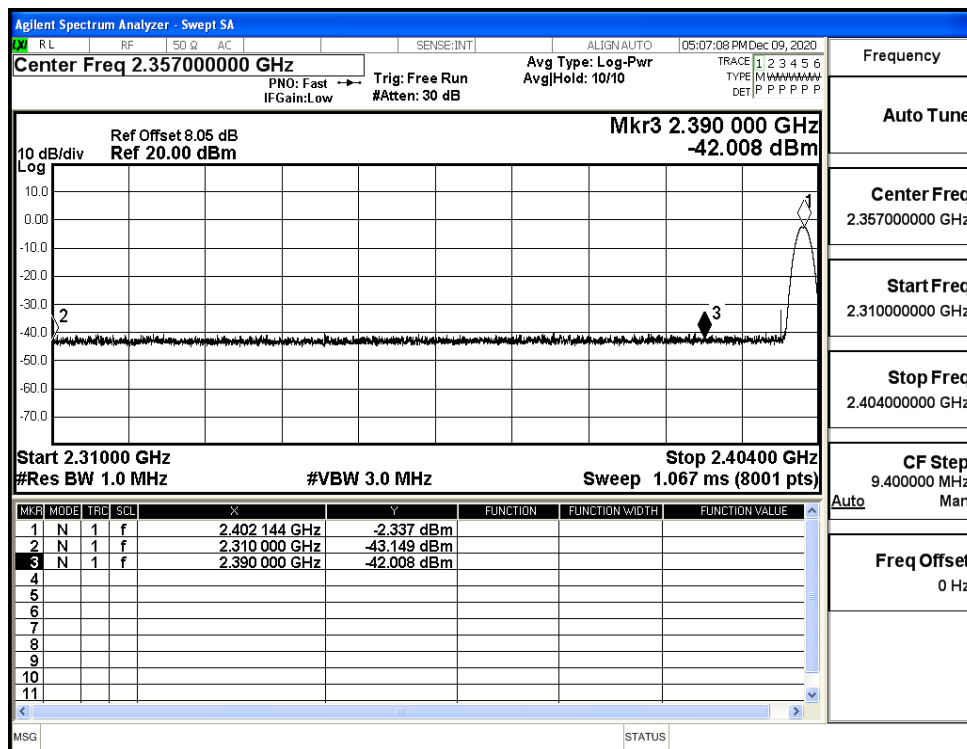
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



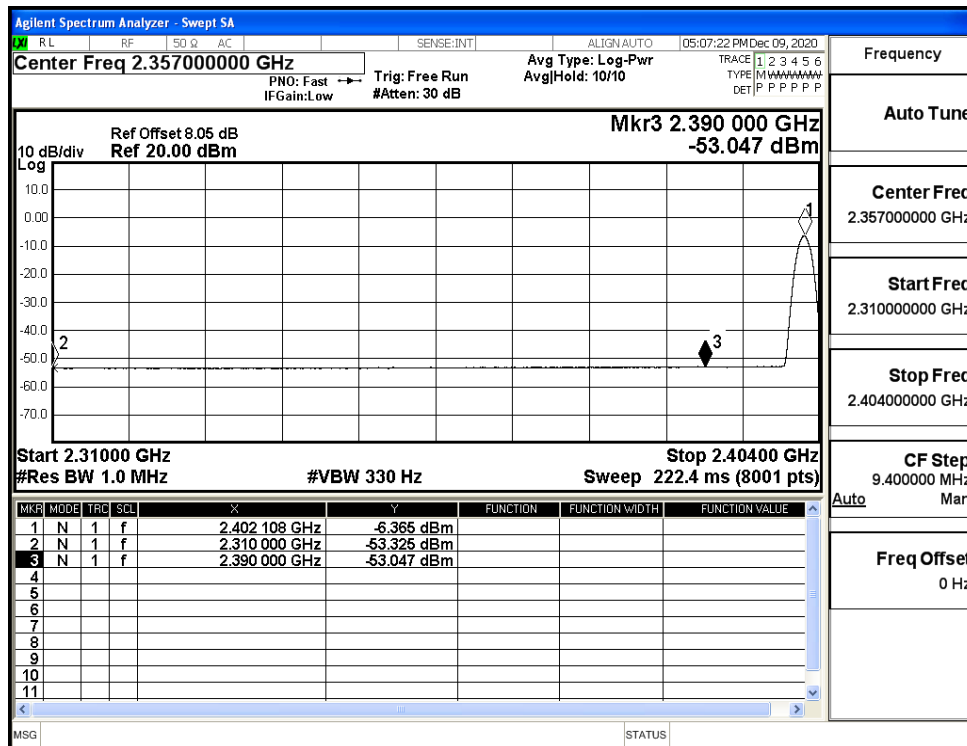
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



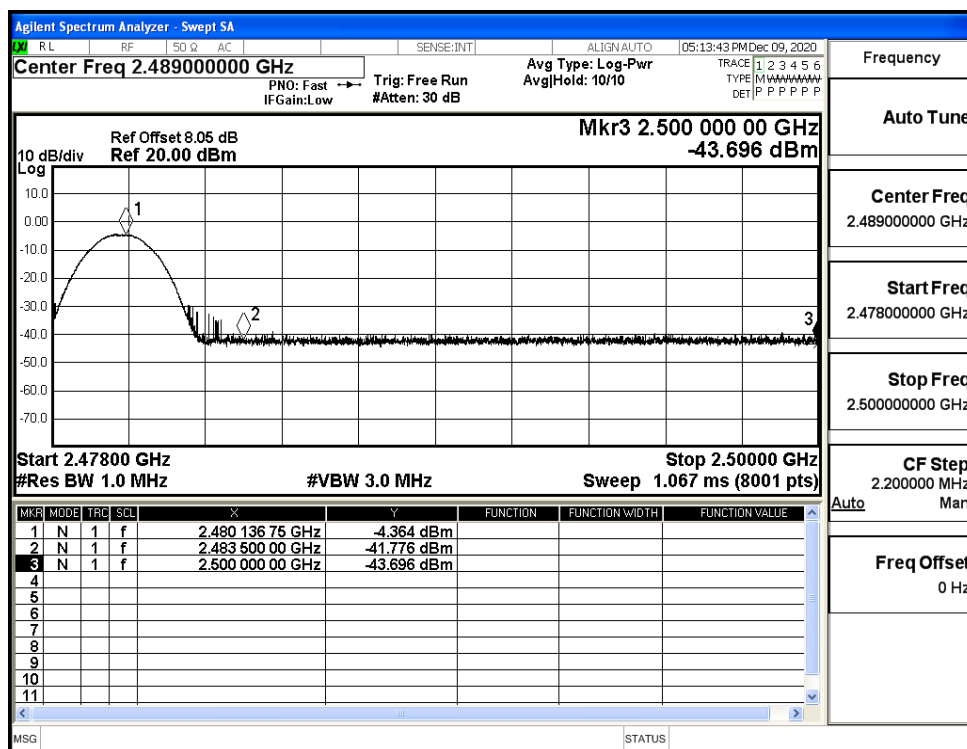
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



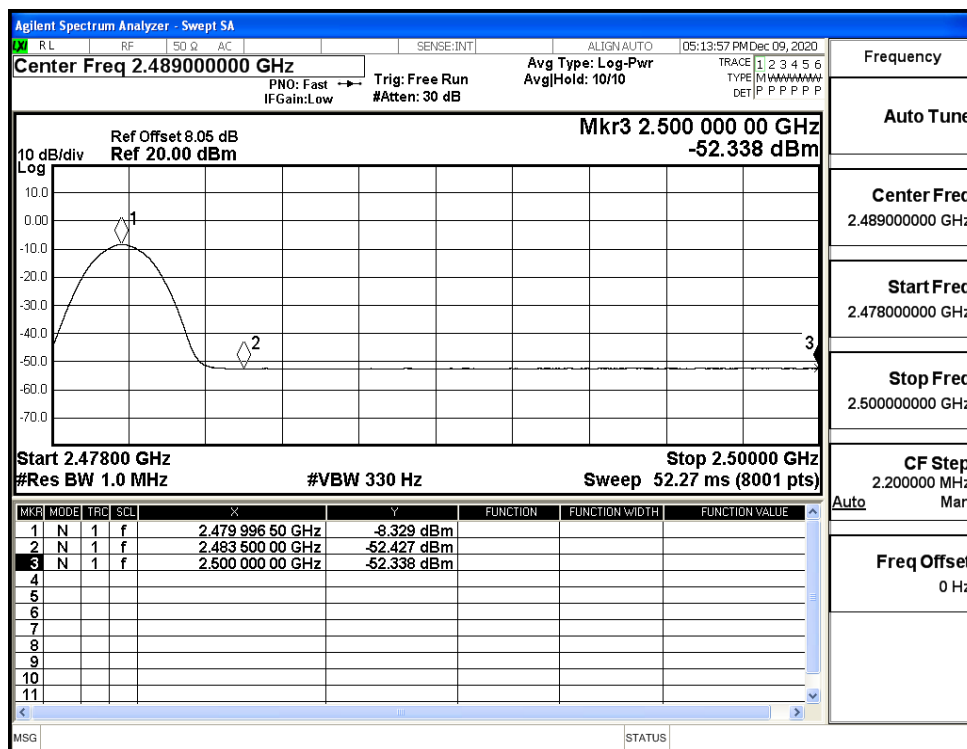
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



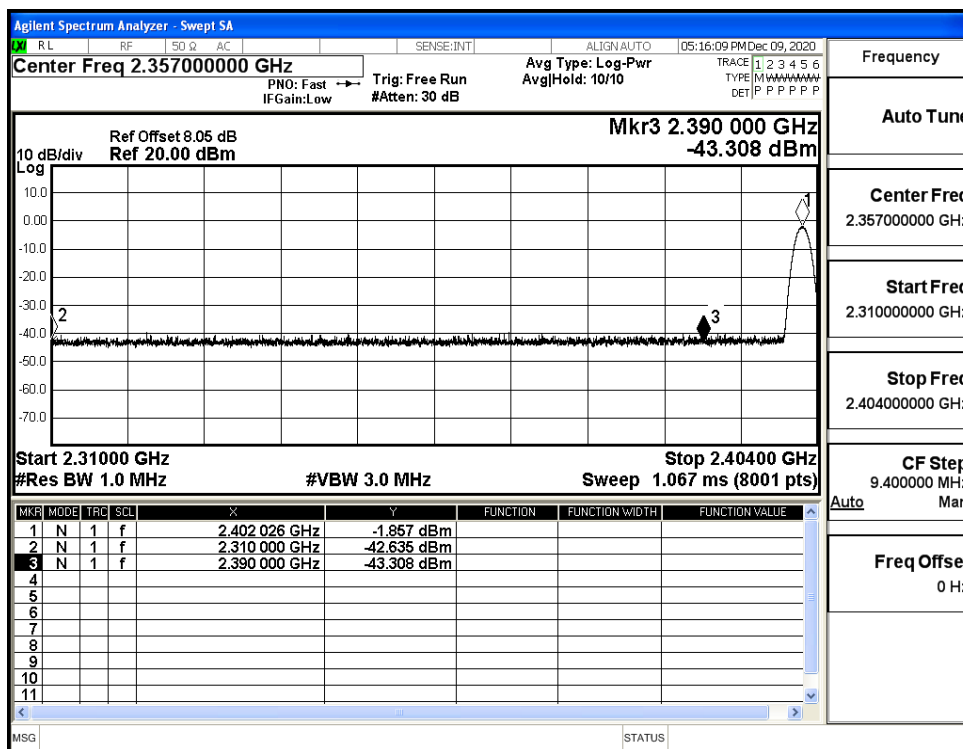
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



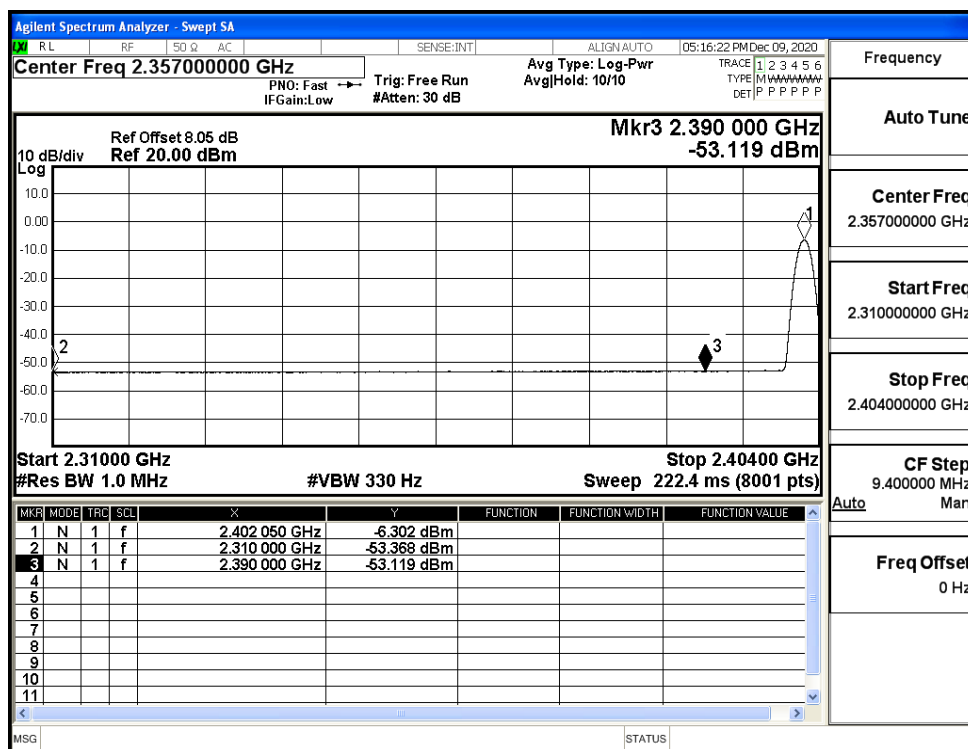
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



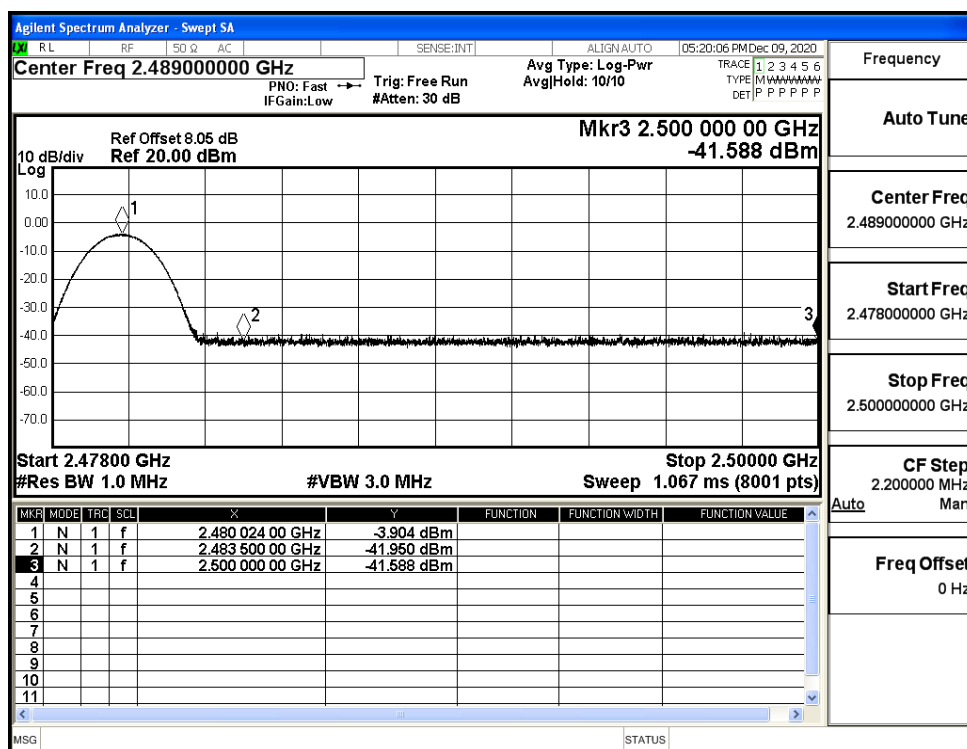
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

