

Appendix A

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

Product Name: TWS Bluetooth headset

Trade Mark: AU

Test Model: T20B

Environmental Conditions

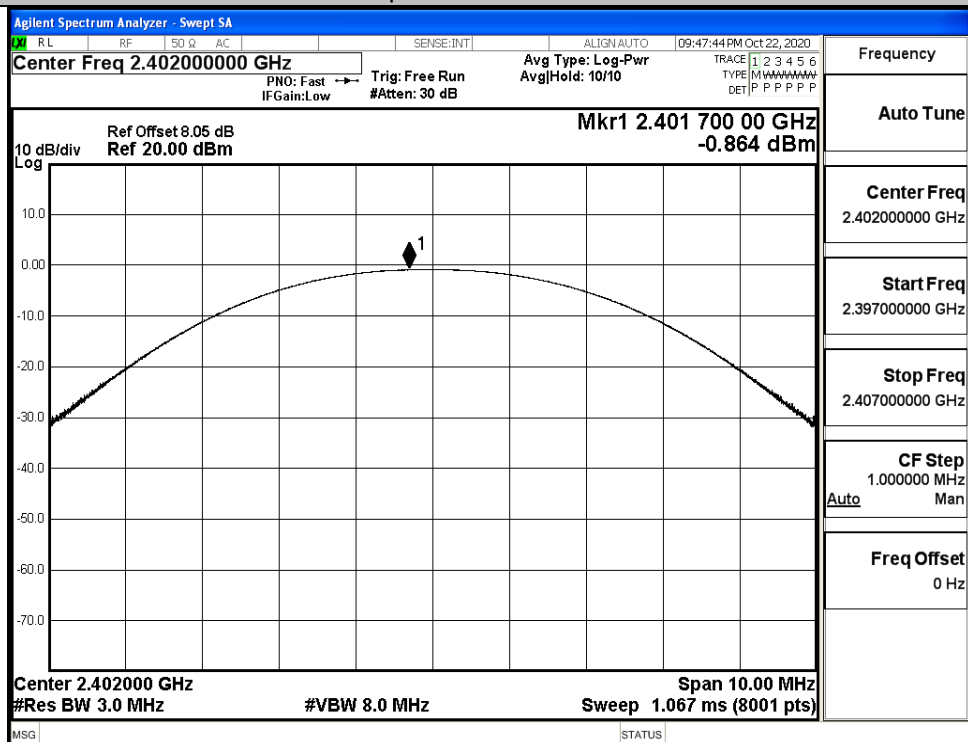
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

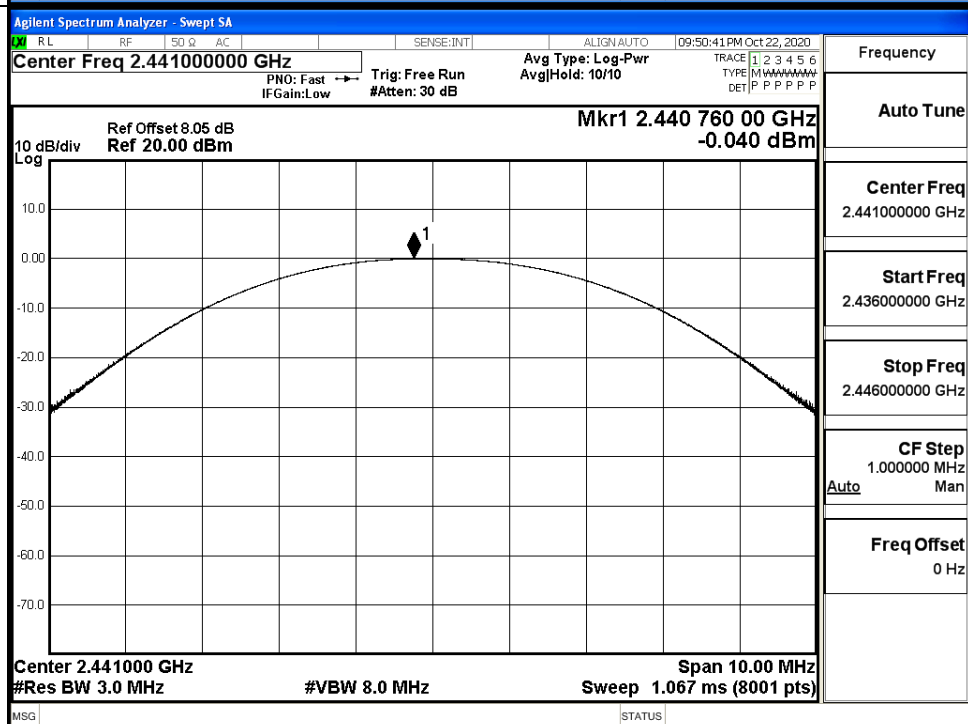
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.864	21	PASS
	MCH	-0.040	21	PASS
	HCH	-1.688	21	PASS
$\pi/4$ DQPSK	LCH	1.461	21	PASS
	MCH	-1.724	21	PASS
	HCH	-1.420	21	PASS
8DPSK	LCH	-0.353	21	PASS
	MCH	-1.556	21	PASS
	HCH	0.780	21	PASS

Test Graphs

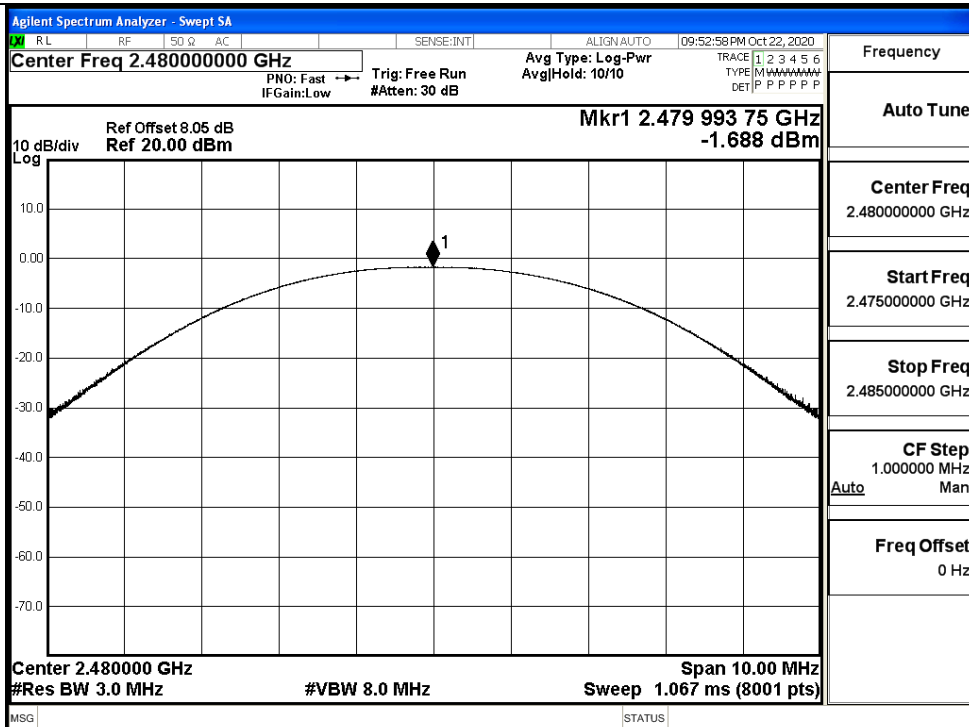
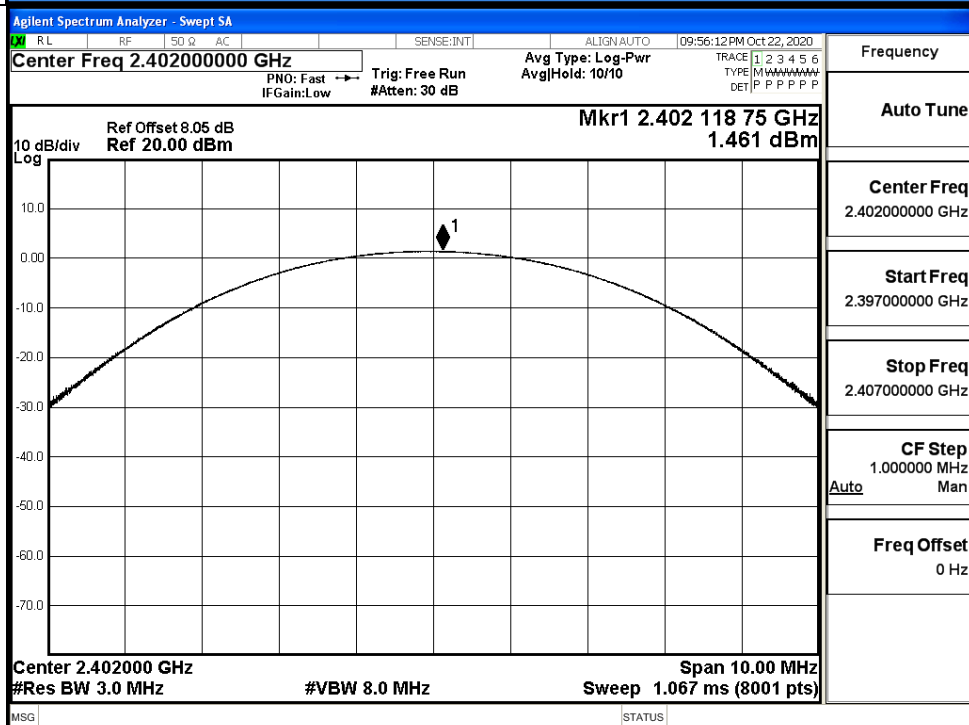
GFSK/LCH

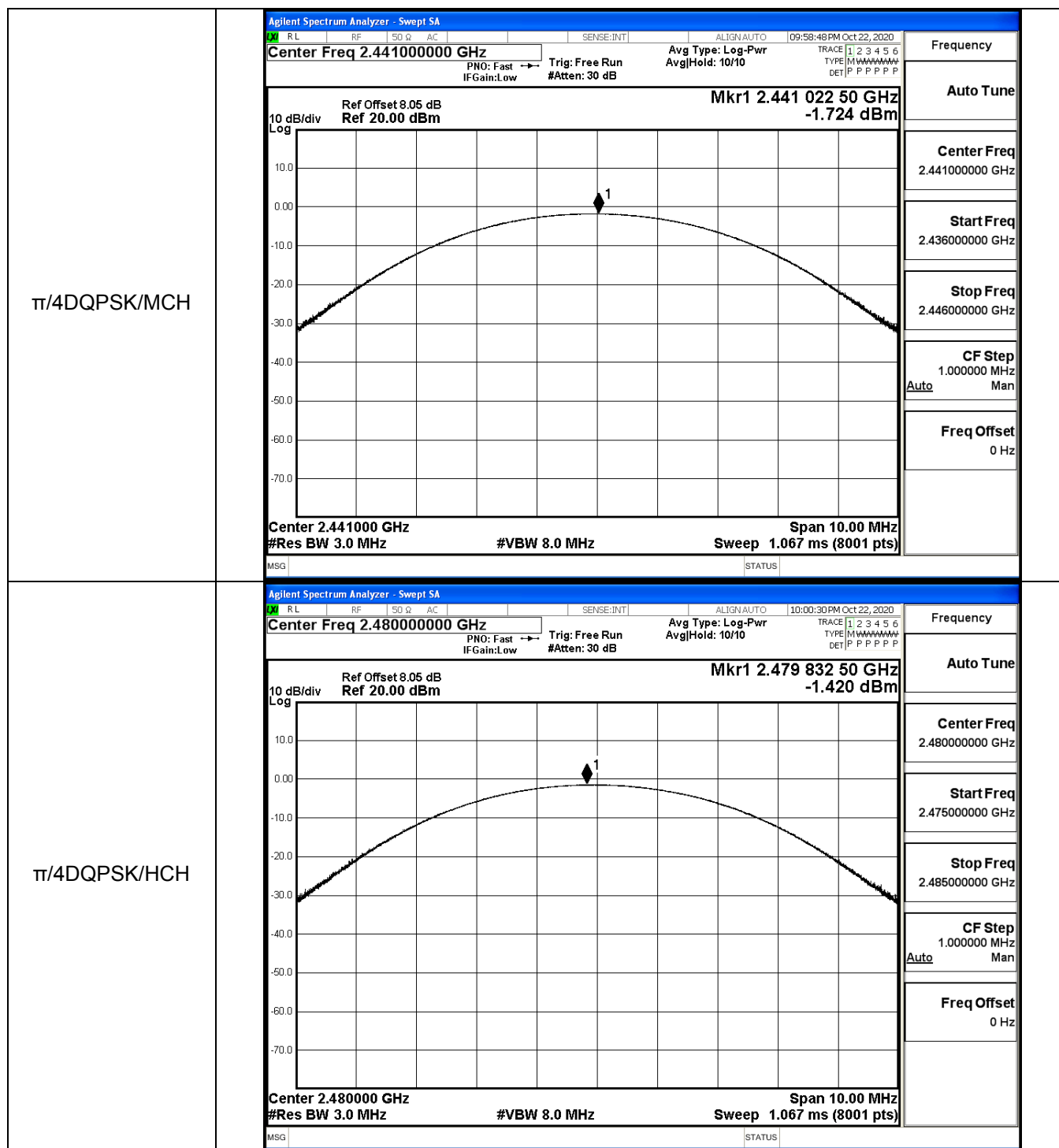


GFSK/MCH

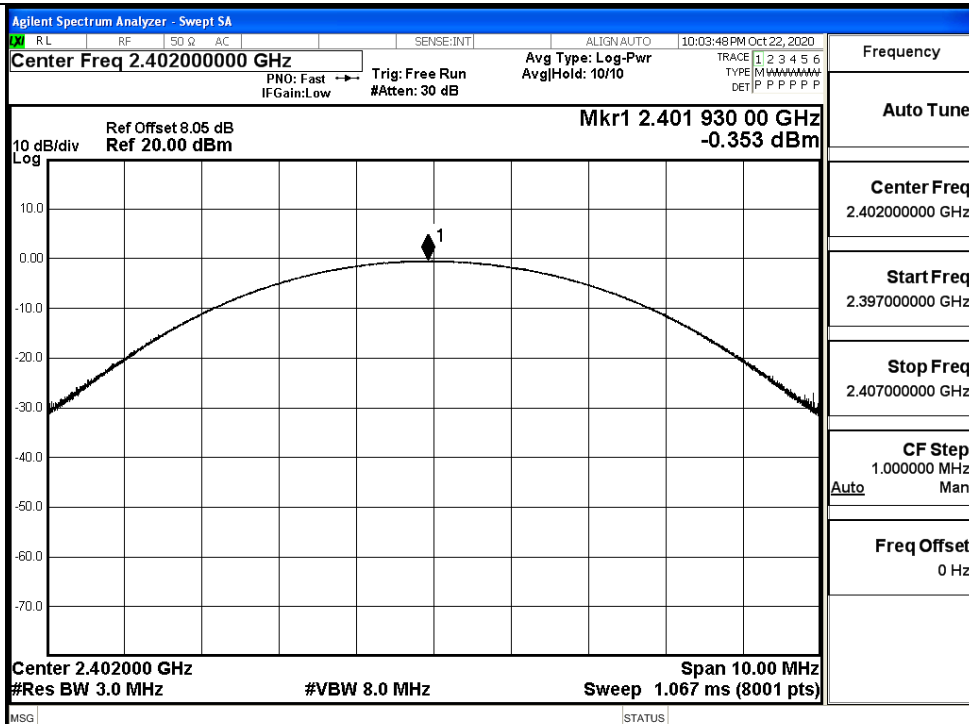


GFSK/HCH

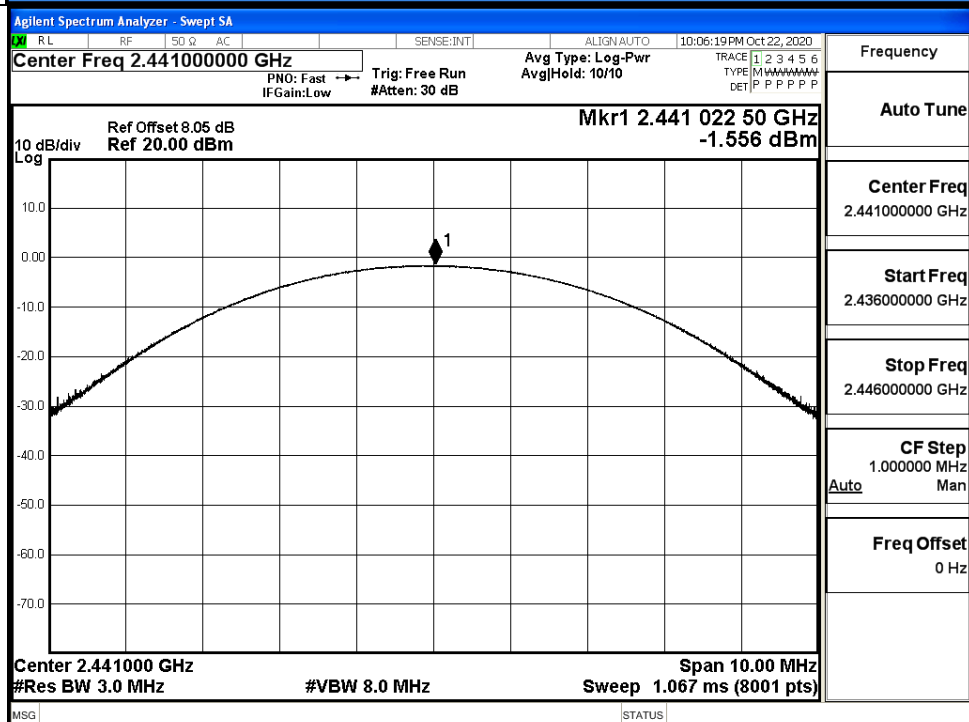
 π /4DQPSK/LCH



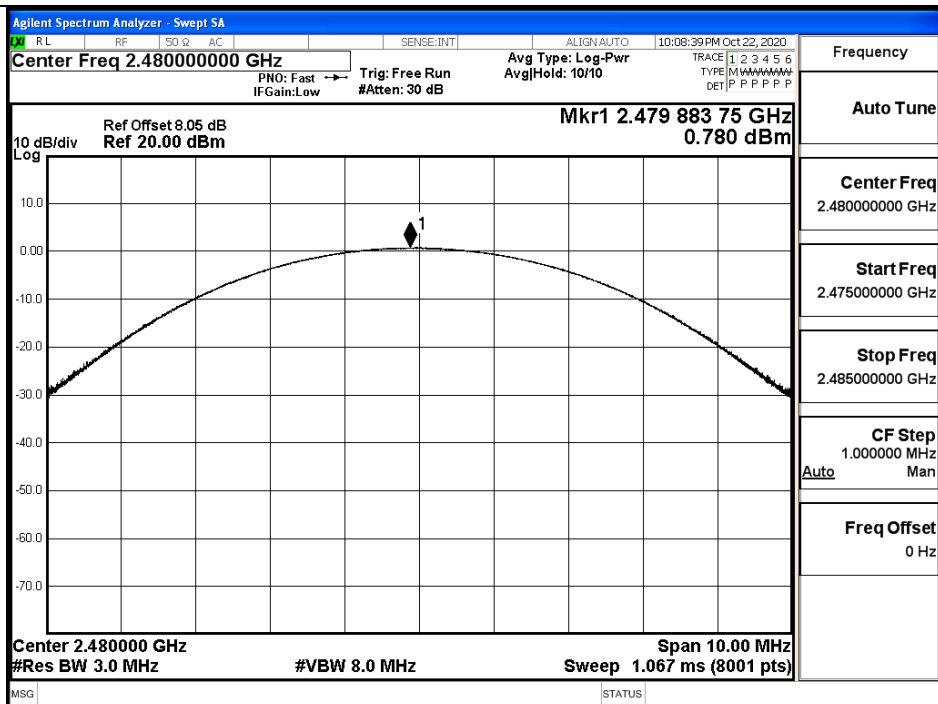
8DPSK/LCH



8DPSK/MCH



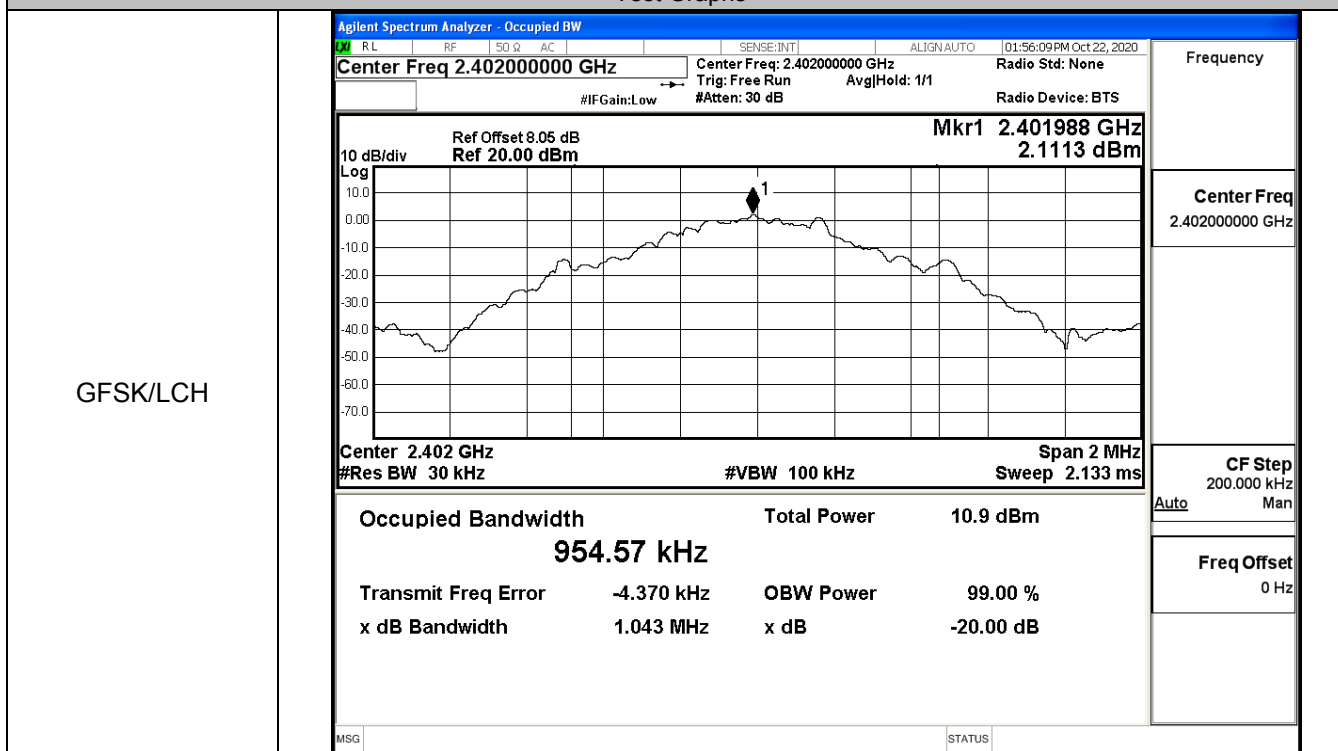
8DPSK/HCH



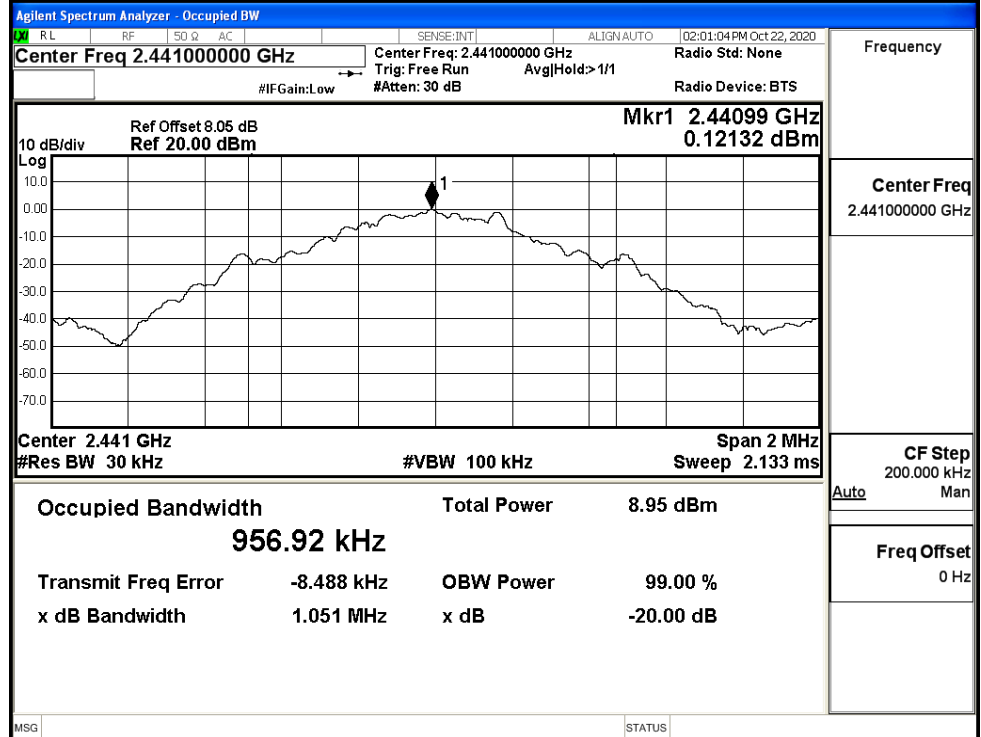
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.043	Not Specified	PASS
	MCH	1.051	Not Specified	PASS
	HCH	1.049	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.195	Not Specified	PASS
	MCH	1.196	Not Specified	PASS
	HCH	1.195	Not Specified	PASS
8DPSK	LCH	1.243	Not Specified	PASS
	MCH	1.244	Not Specified	PASS
	HCH	1.238	Not Specified	PASS

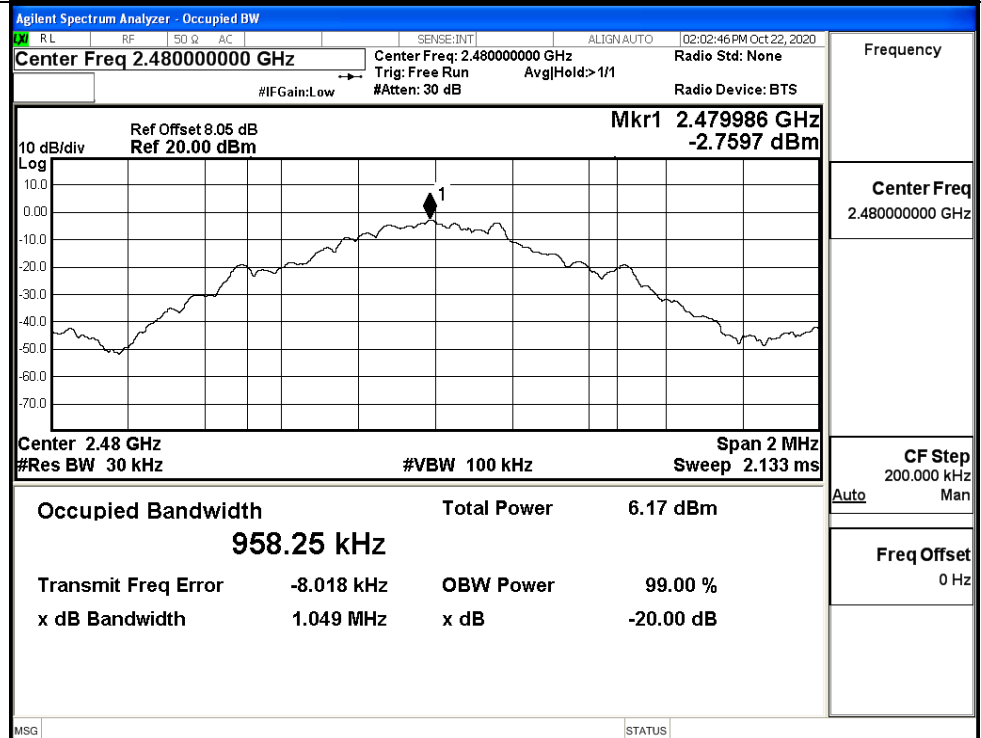
Test Graphs

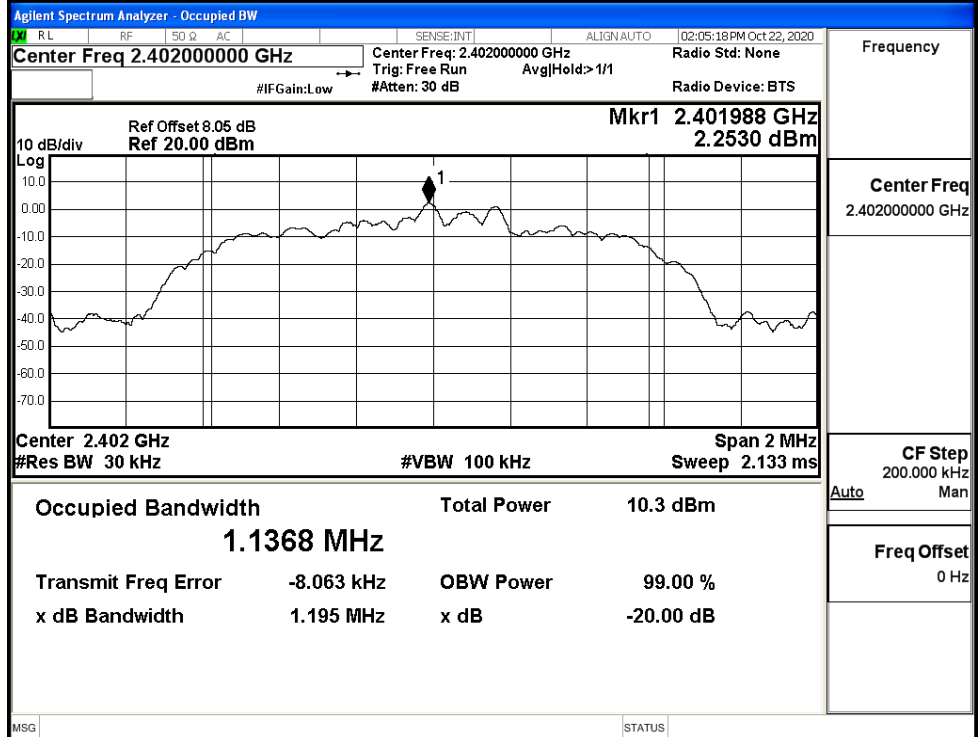
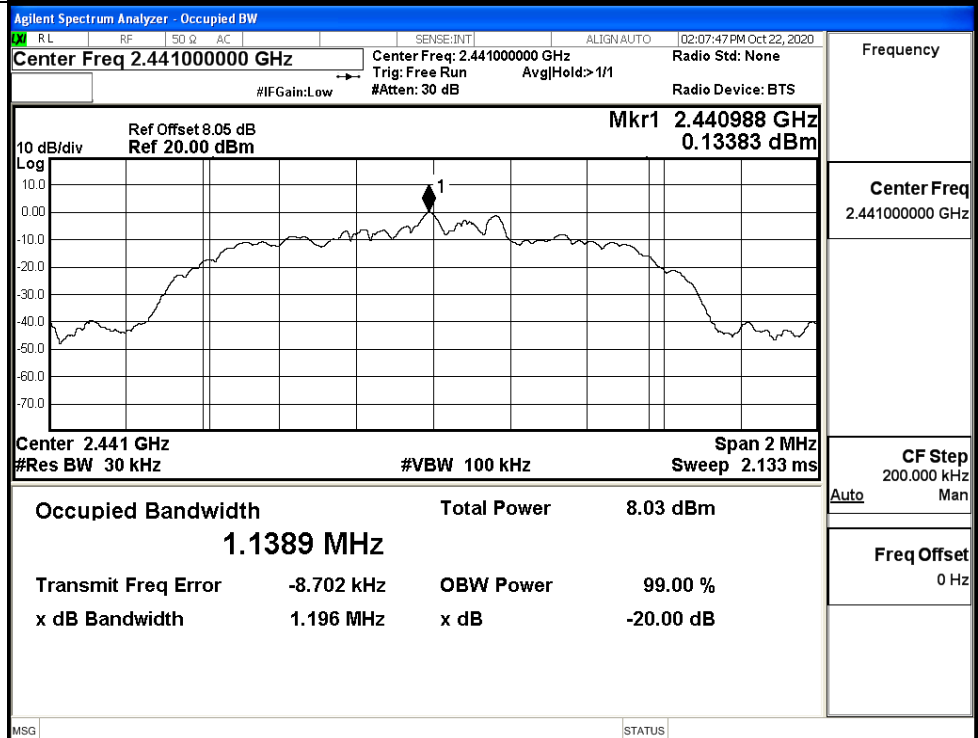


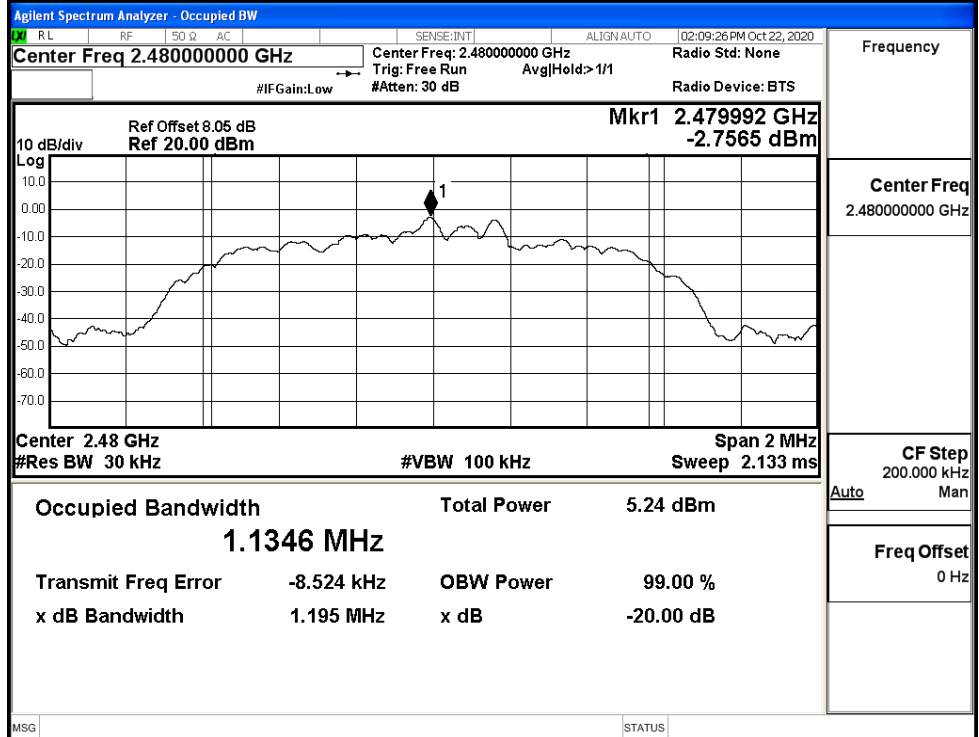
GFSK/MCH



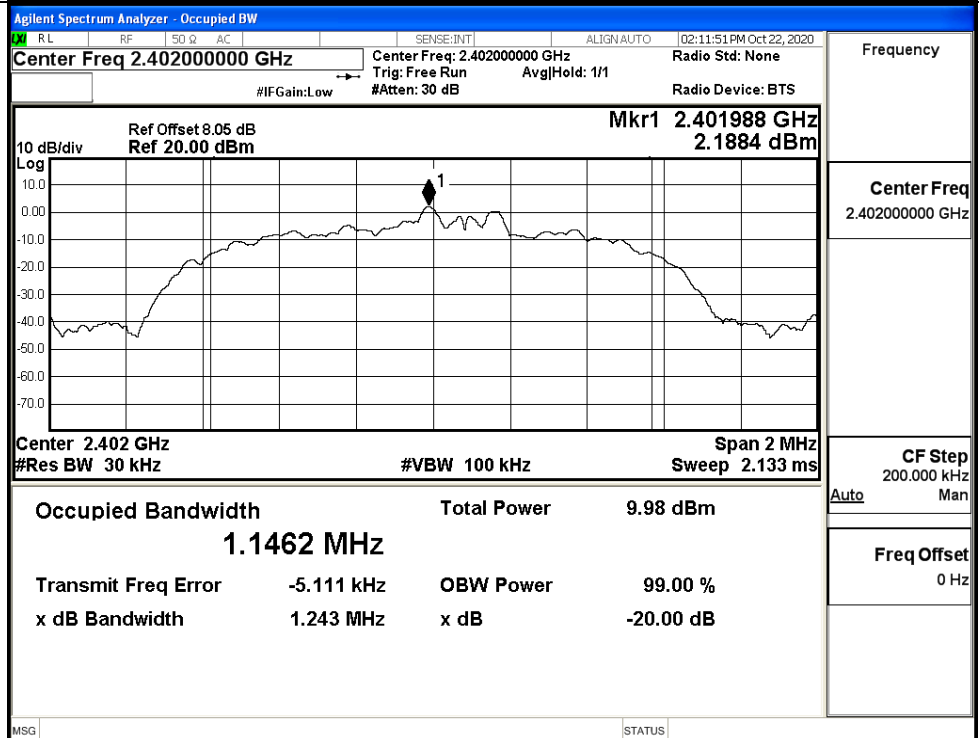
GFSK/HCH



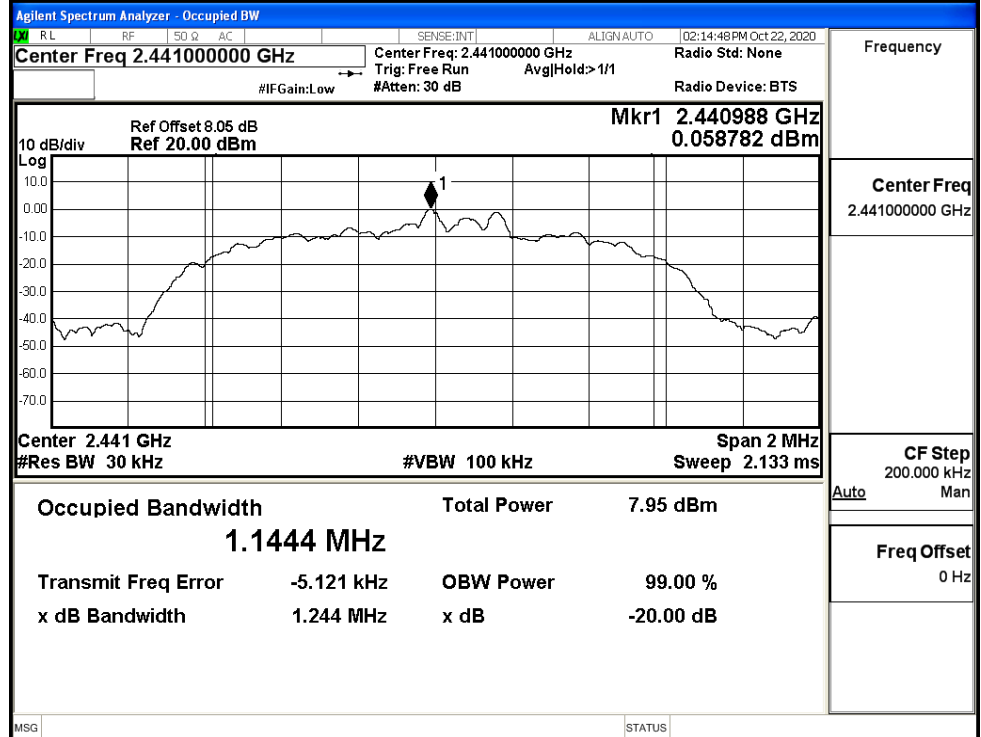
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

π /4DQPSK/HCH

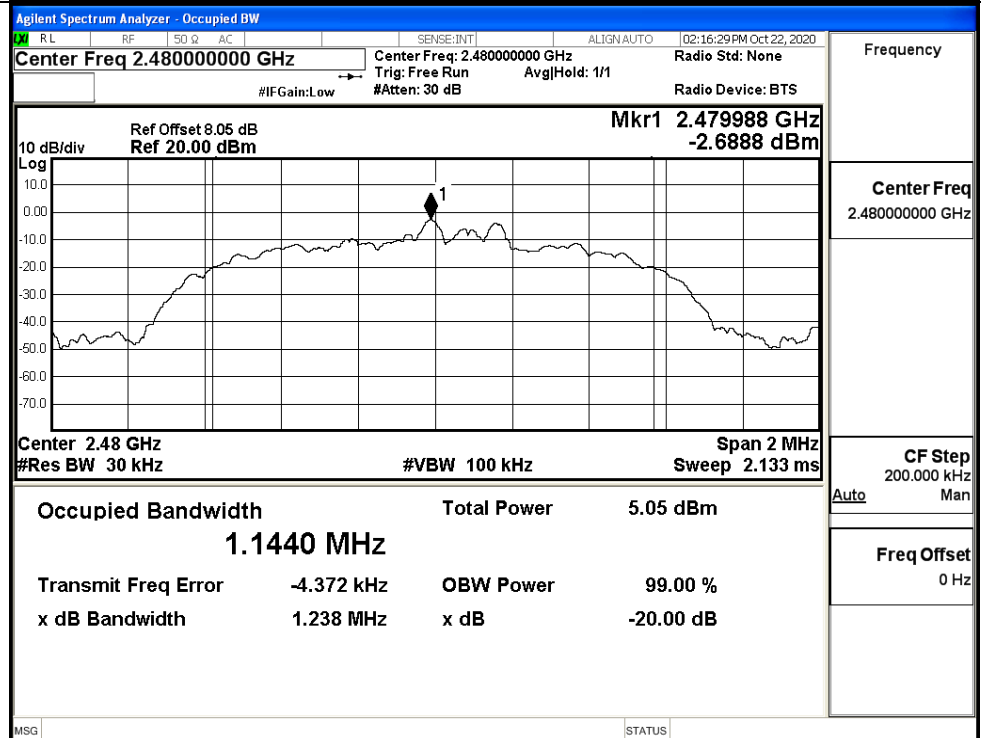
8DPSK/LCH



8DPSK/MCH



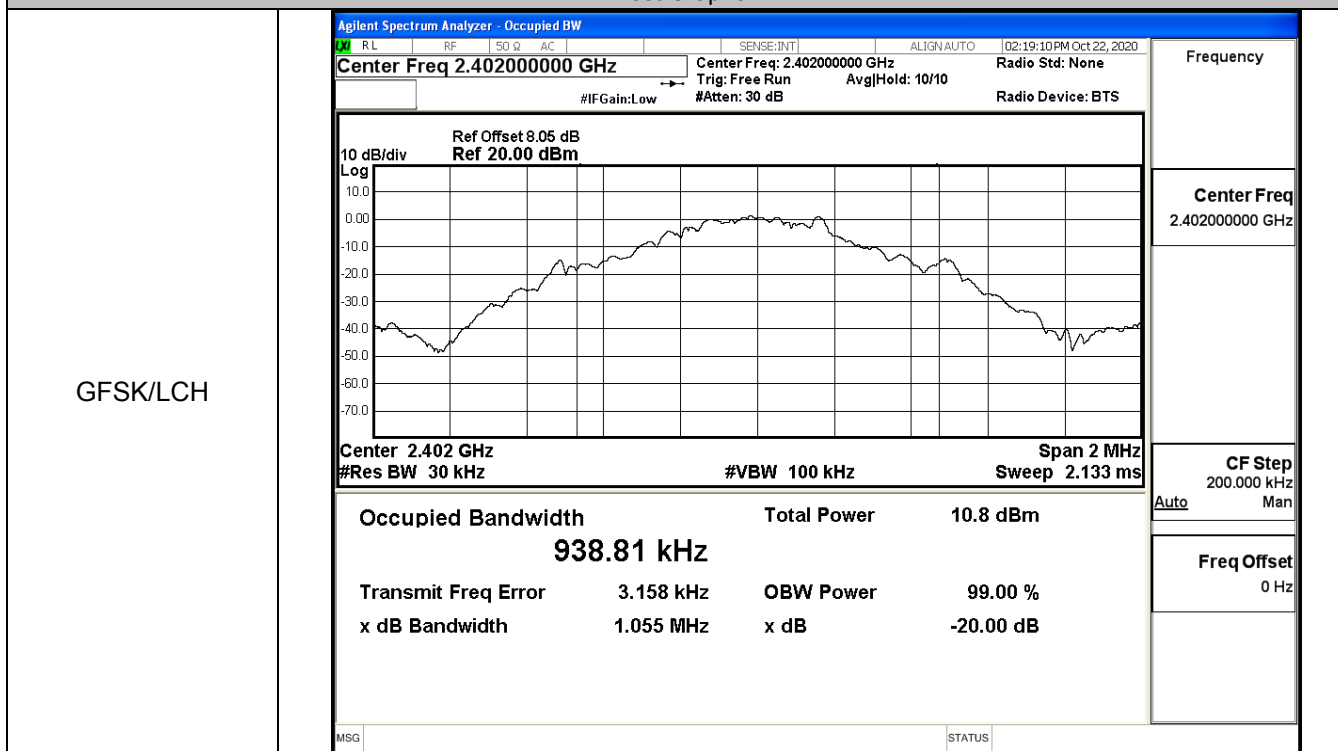
8DPSK/HCH



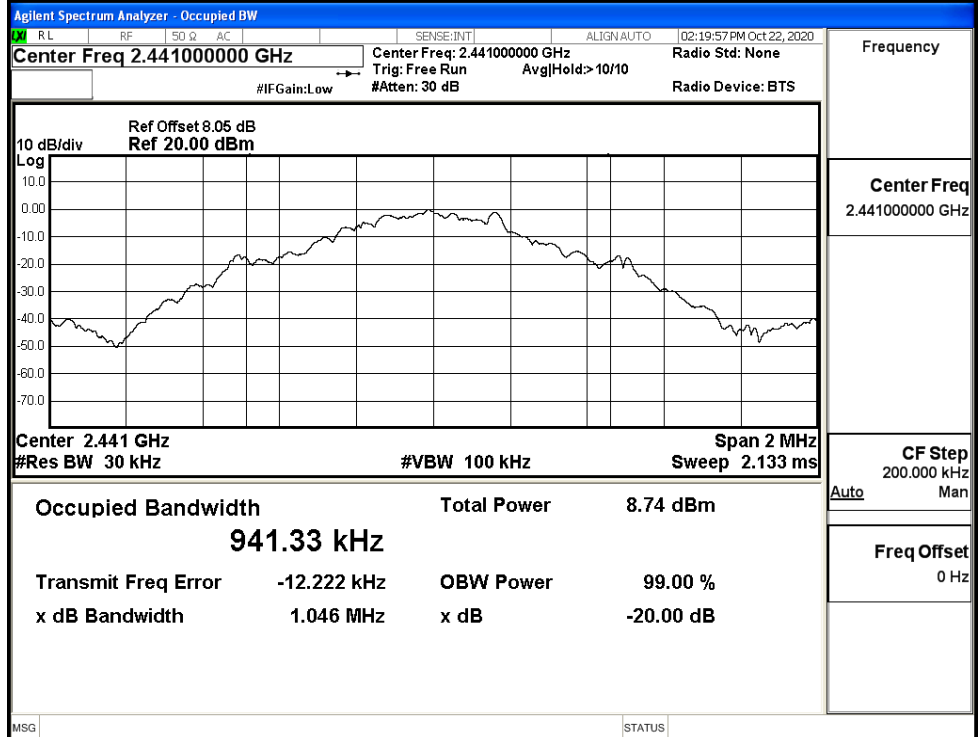
A.3 Occupied Bandwidth

Mode	Channel.	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.93881	Not Specified	PASS
	MCH	0.94133	Not Specified	PASS
	HCH	0.94947	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.1397	Not Specified	PASS
	MCH	1.1409	Not Specified	PASS
	HCH	1.1409	Not Specified	PASS
8DPSK	LCH	1.1507	Not Specified	PASS
	MCH	1.1514	Not Specified	PASS
	HCH	1.1424	Not Specified	PASS

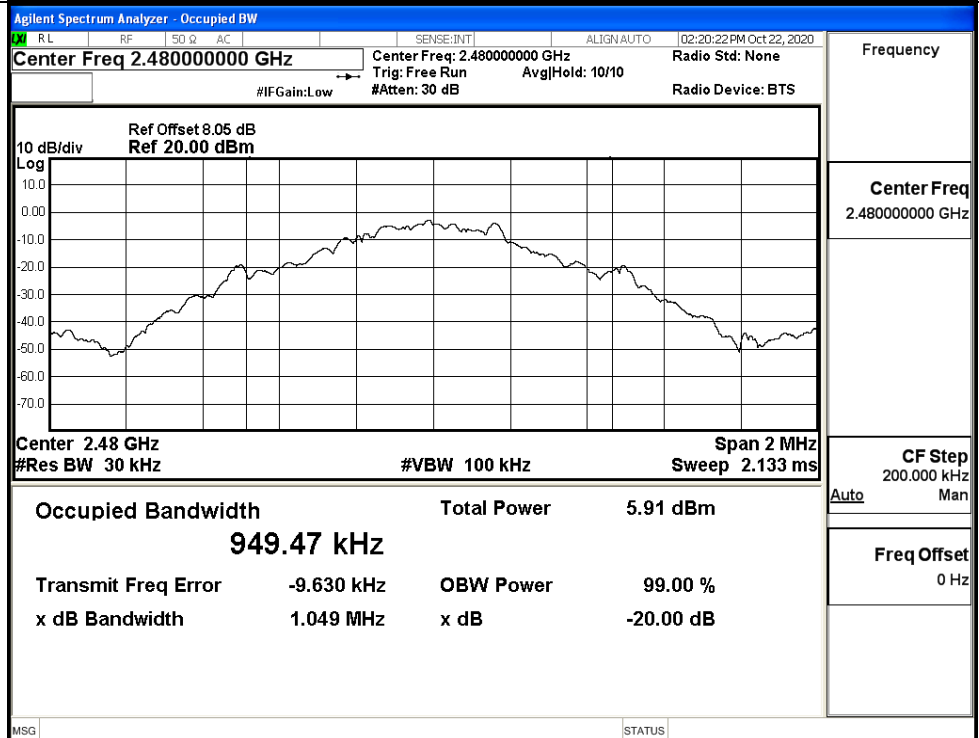
Test Graphs

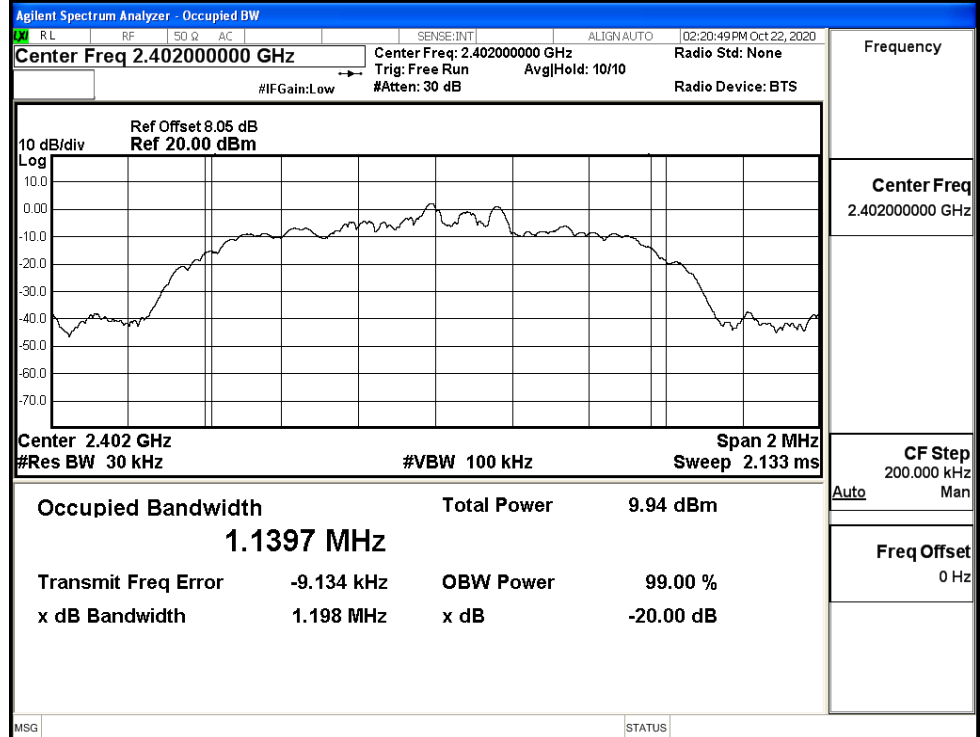
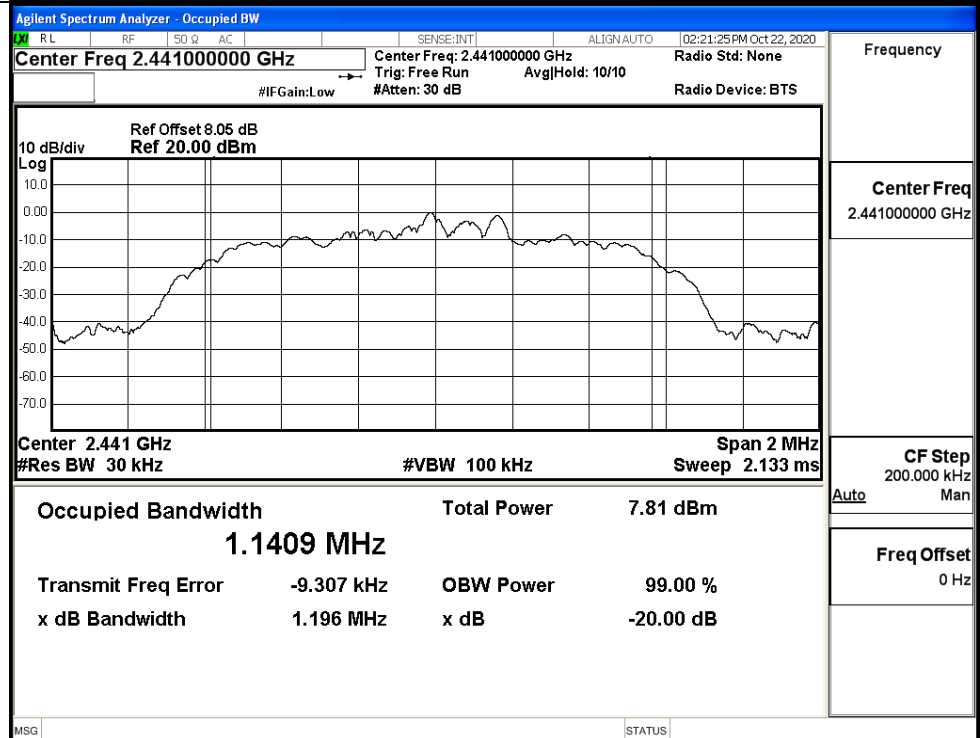


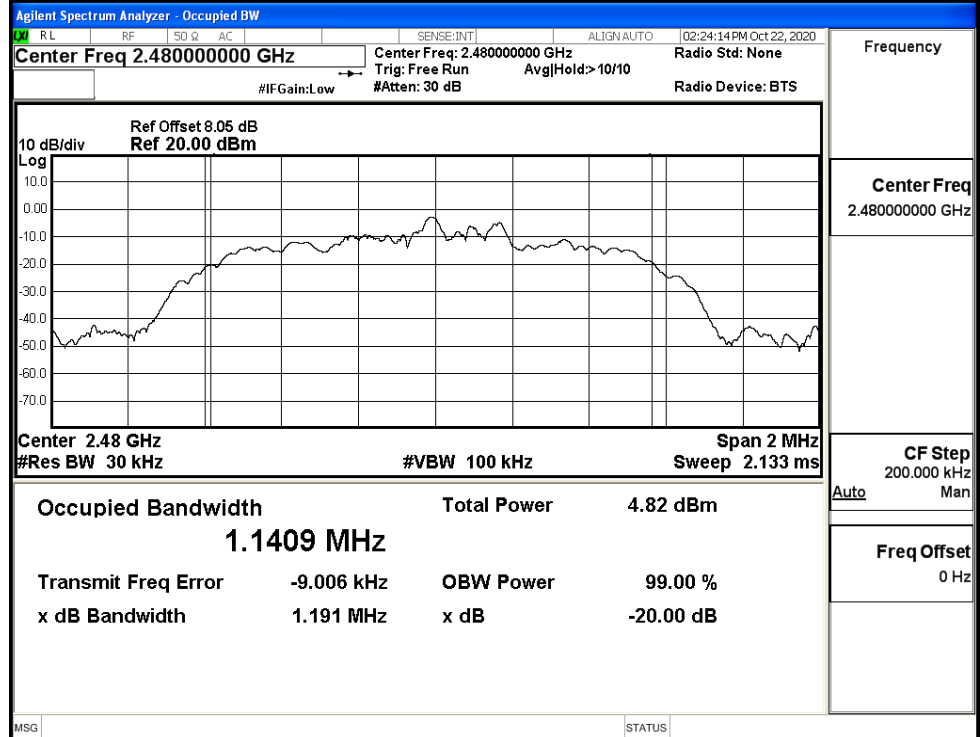
GFSK/MCH



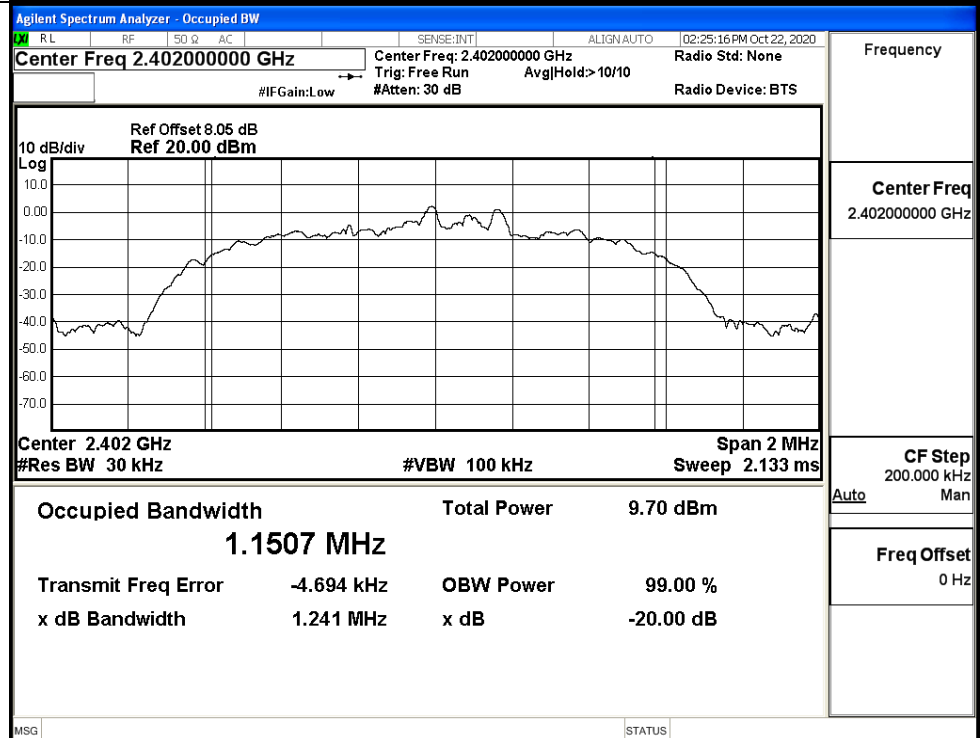
GFSK/HCH



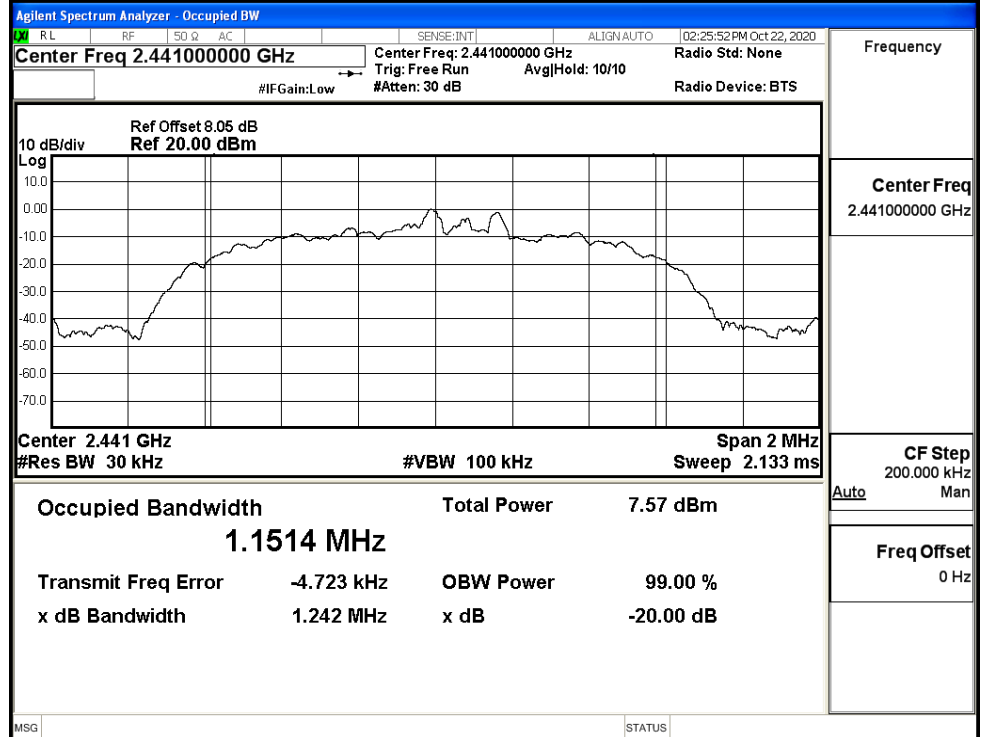
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

π /4DQPSK/HCH

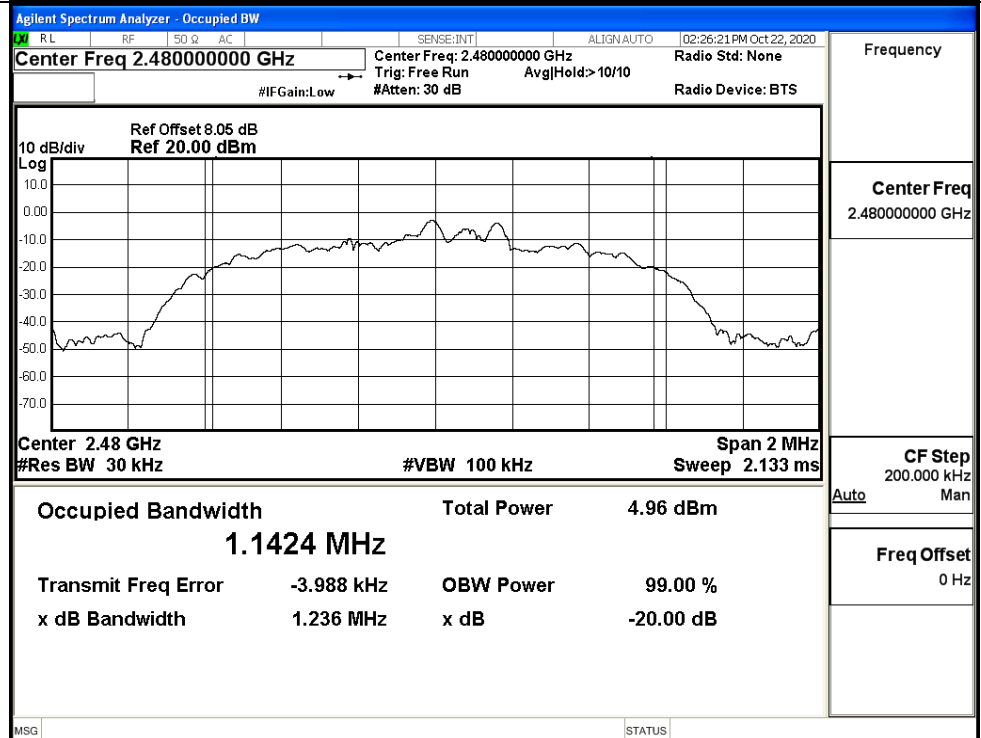
8DPSK/LCH



8DPSK/MCH



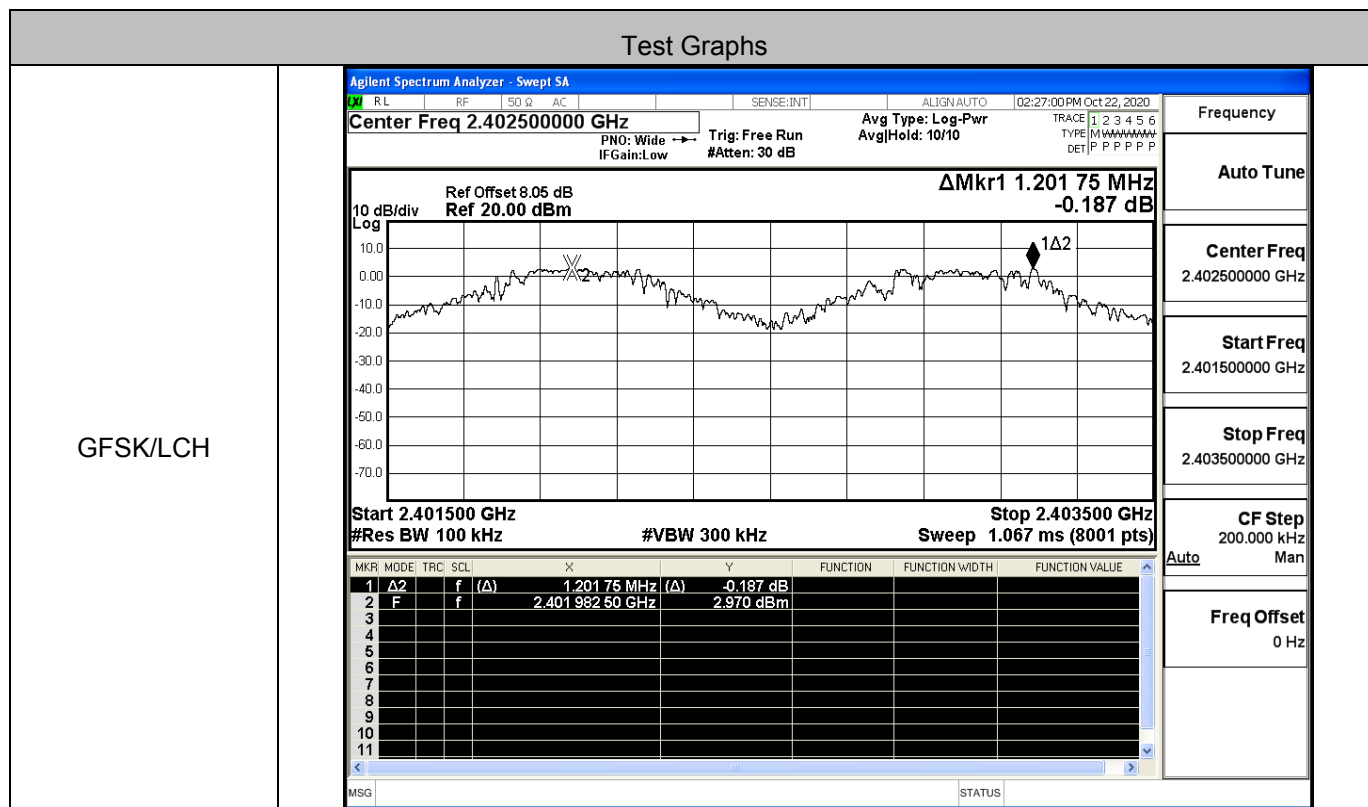
8DPSK/HCH



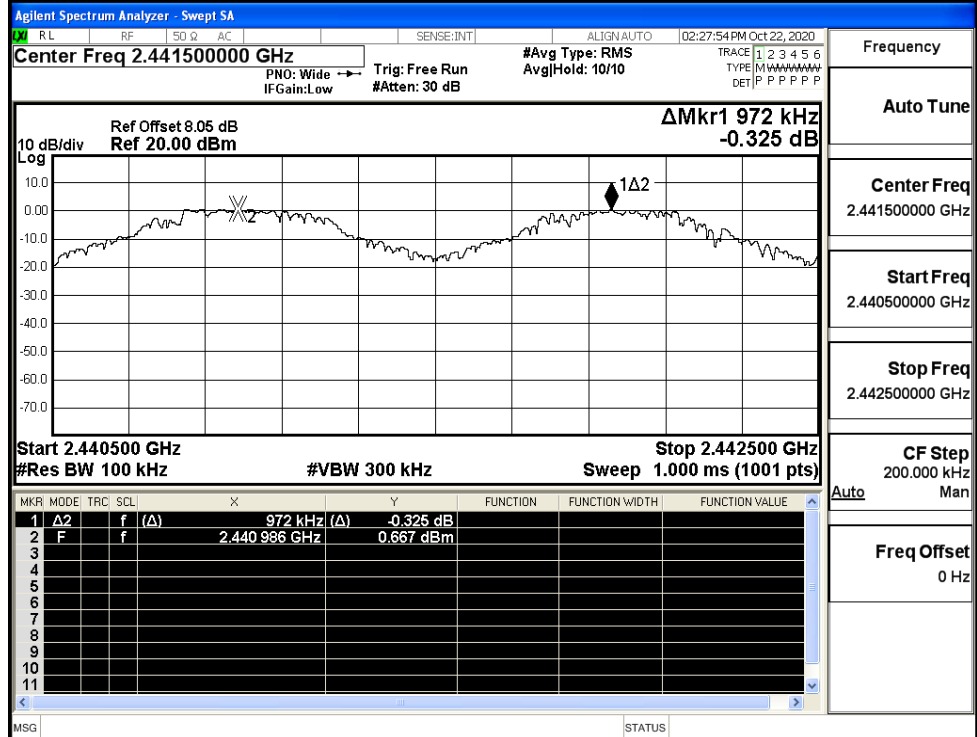
A.4 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.202	0.701	PASS
	MCH	0.972	0.701	PASS
	HCH	0.992	0.701	PASS
$\pi/4$ DQPSK	LCH	1.008	0.797	PASS
	MCH	0.890	0.797	PASS
	HCH	0.956	0.797	PASS
8DPSK	LCH	1.004	0.829	PASS
	MCH	1.016	0.829	PASS
	HCH	1.222	0.829	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

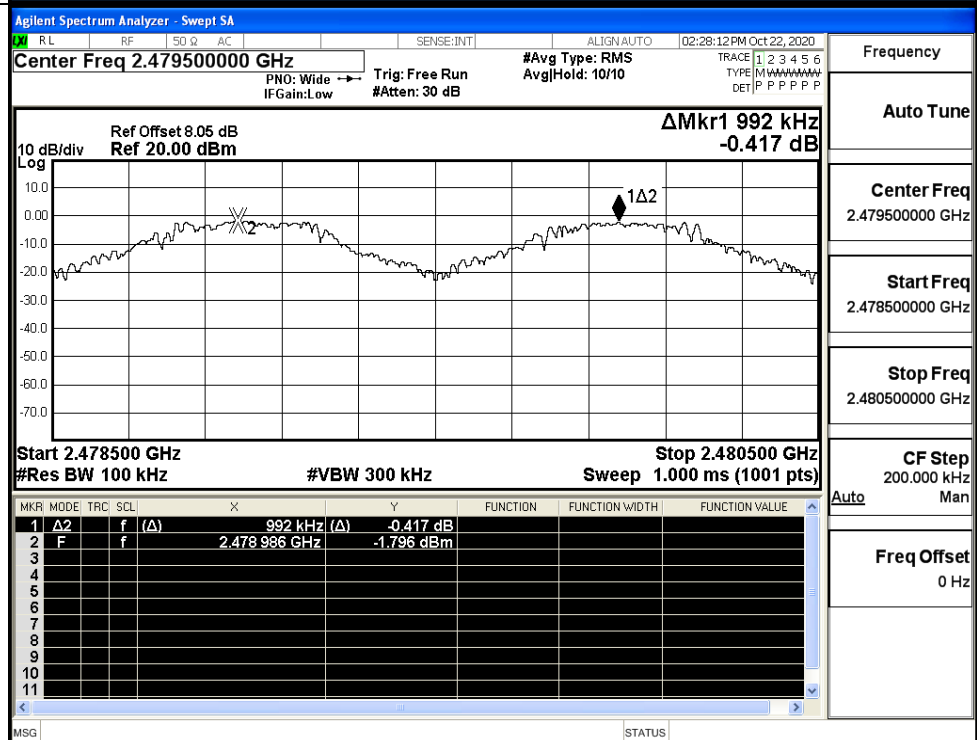
200.000 kHz

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

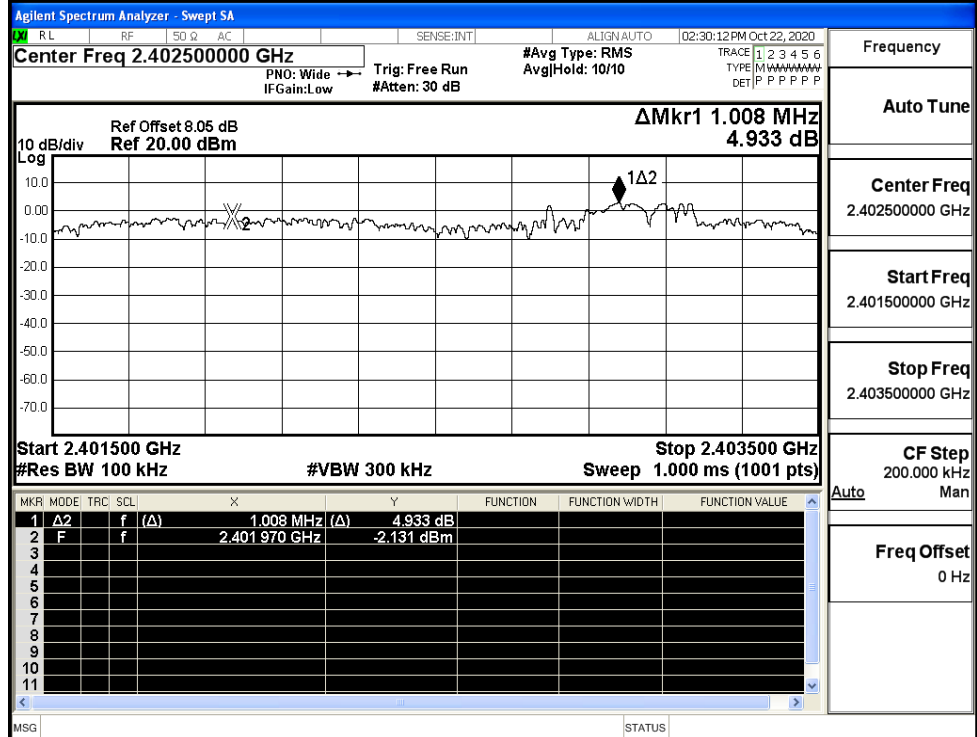
CF Step

200.000 kHz

Man

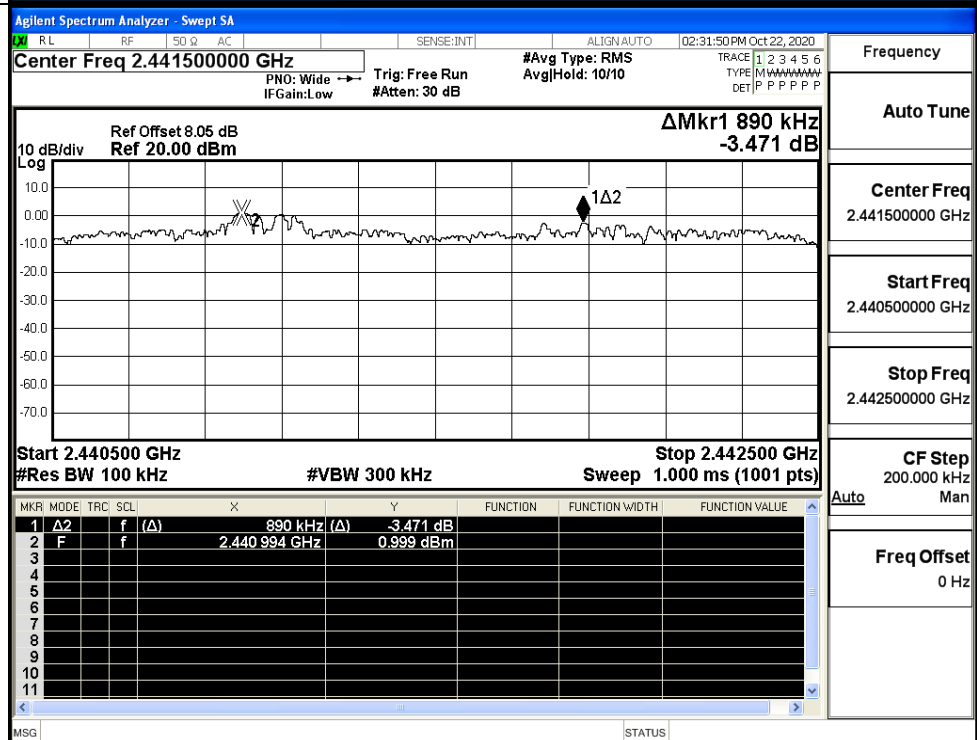
Freq Offset

0 Hz

$\pi/4$ DQPSK/LCH

Frequency

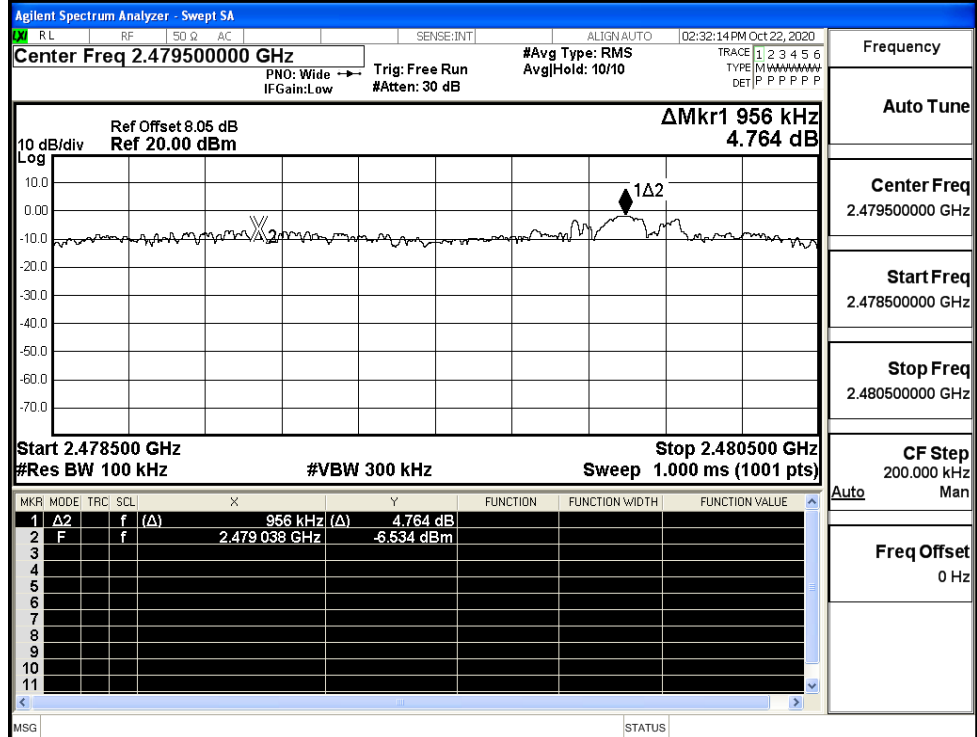
Auto Tune

Center Freq
2.402500000 GHzStart Freq
2.401500000 GHzStop Freq
2.403500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz $\pi/4$ DQPSK/MCH

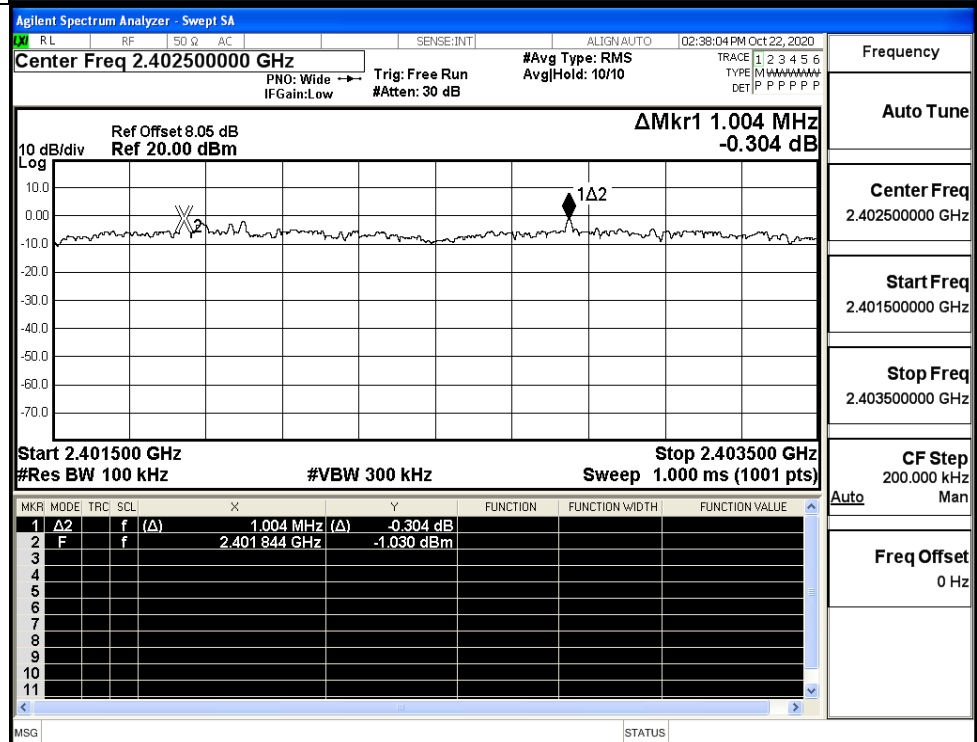
Frequency

Auto Tune

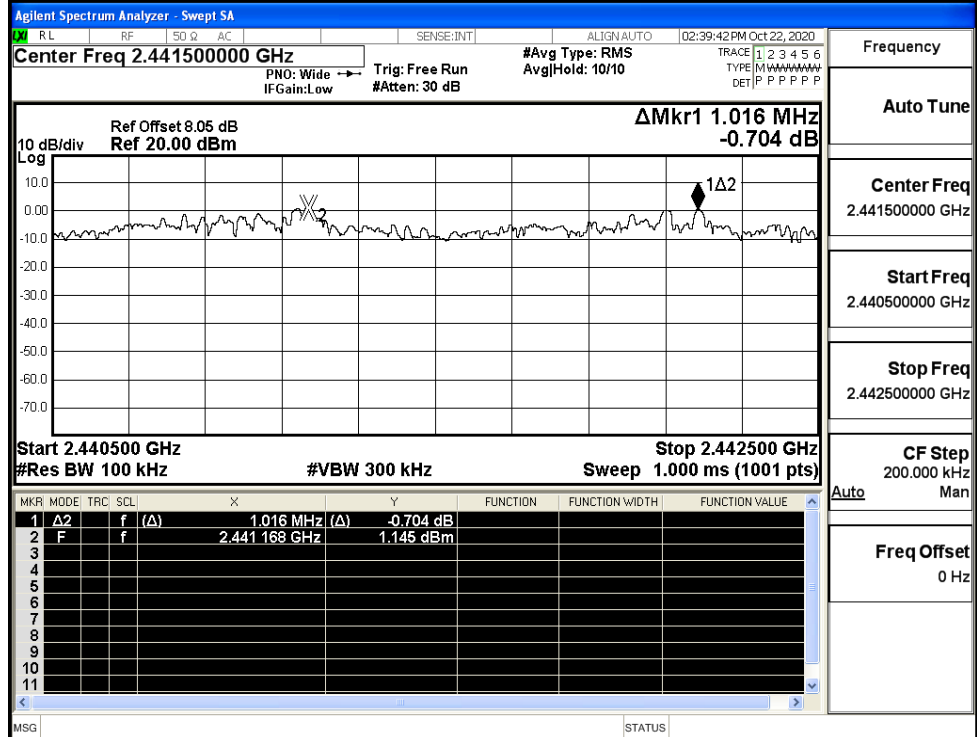
Center Freq
2.441500000 GHzStart Freq
2.440500000 GHzStop Freq
2.442500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

π /4DQPSK/HCH

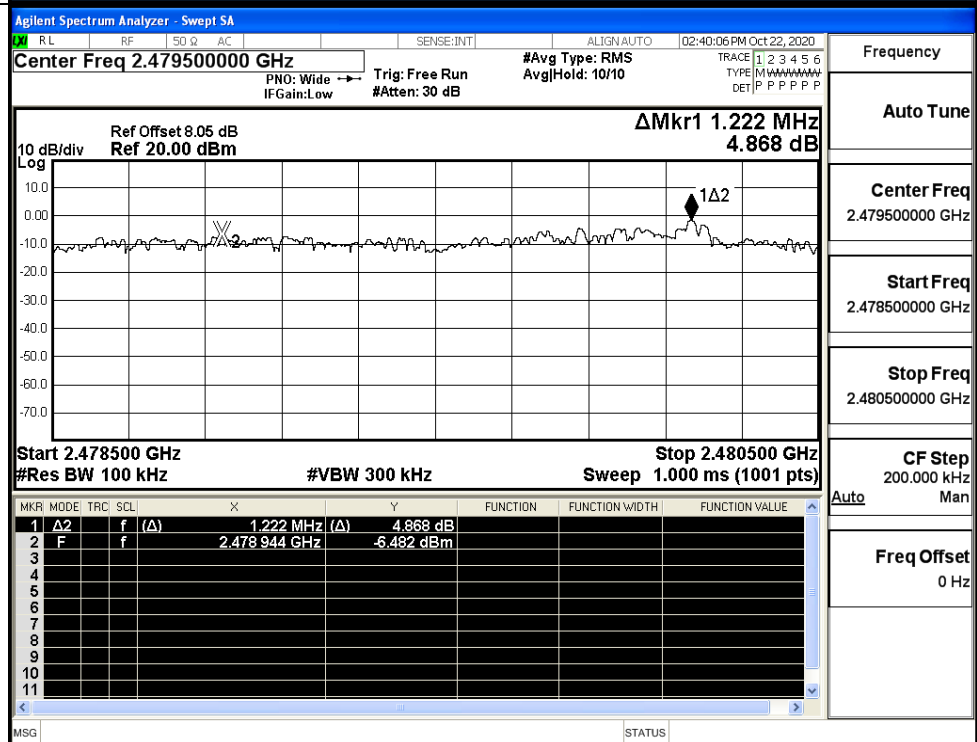
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

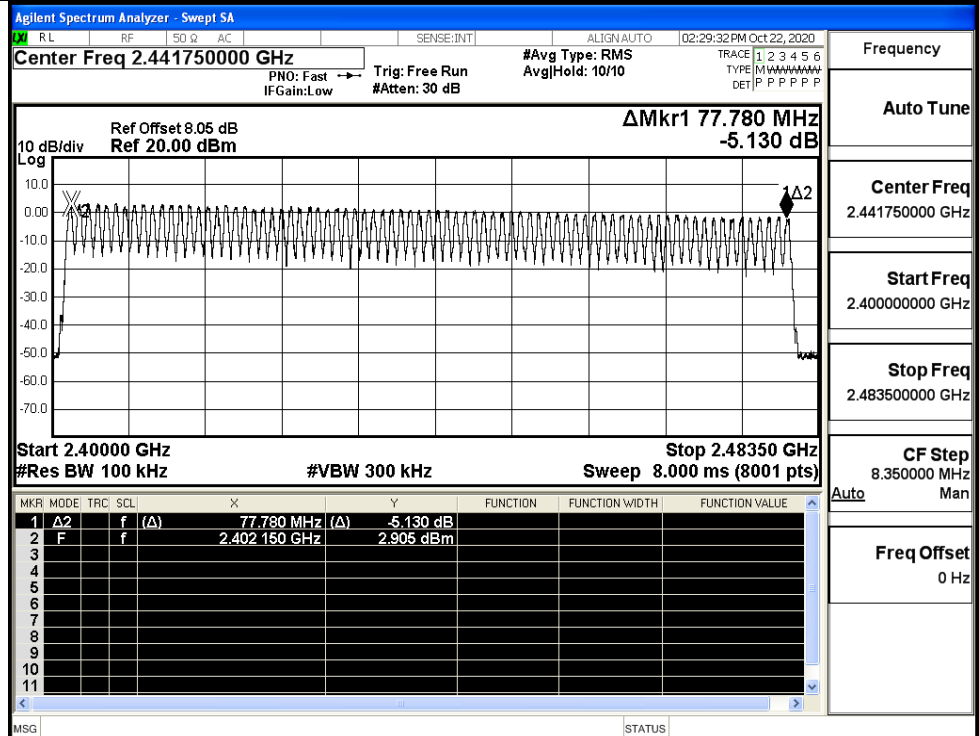
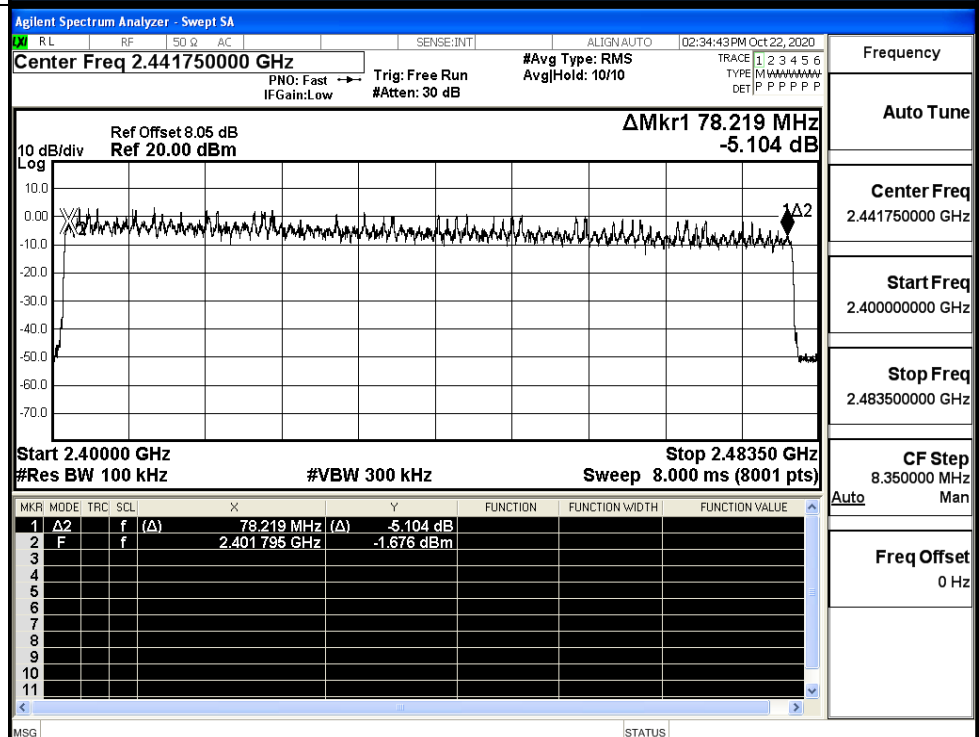


A.5 Hopping Channel Number

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

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.441750000 GHz #Avg Type: RMS TRAC 1 2 3 4 5 6
 PNO: Fast → Trig: Free Run Avg|Hold: 10/10 TYPE [M] [A] [V] [P]
 IF Gain: Low #Atten: 30 dB DET [P] [R] [S] [N]

Ref Offset 8.05 dB ΔMkr1 78.198 MHz
 Ref 20.00 dBm -5.560 dB

Start 2.40000 GHz Stop 2.48350 GHz
 #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	f	(Δ)	78.198 MHz	-5.560 dBm			
2	F	f		2.401941 GHz	-1.024 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

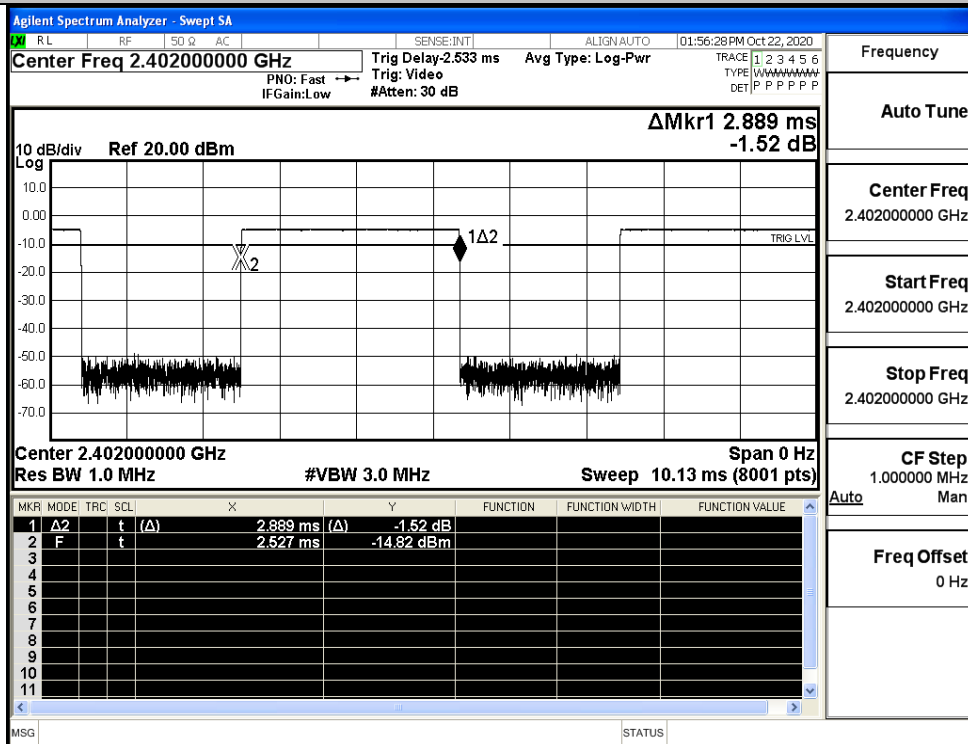
Frequency Auto Tune
 Center Freq 2.441750000 GHz
 Start Freq 2.400000000 GHz
 Stop Freq 2.483500000 GHz
 CF Step 8.350000 MHz
 Man
 Freq Offset 0 Hz

A.6 Dwell Time

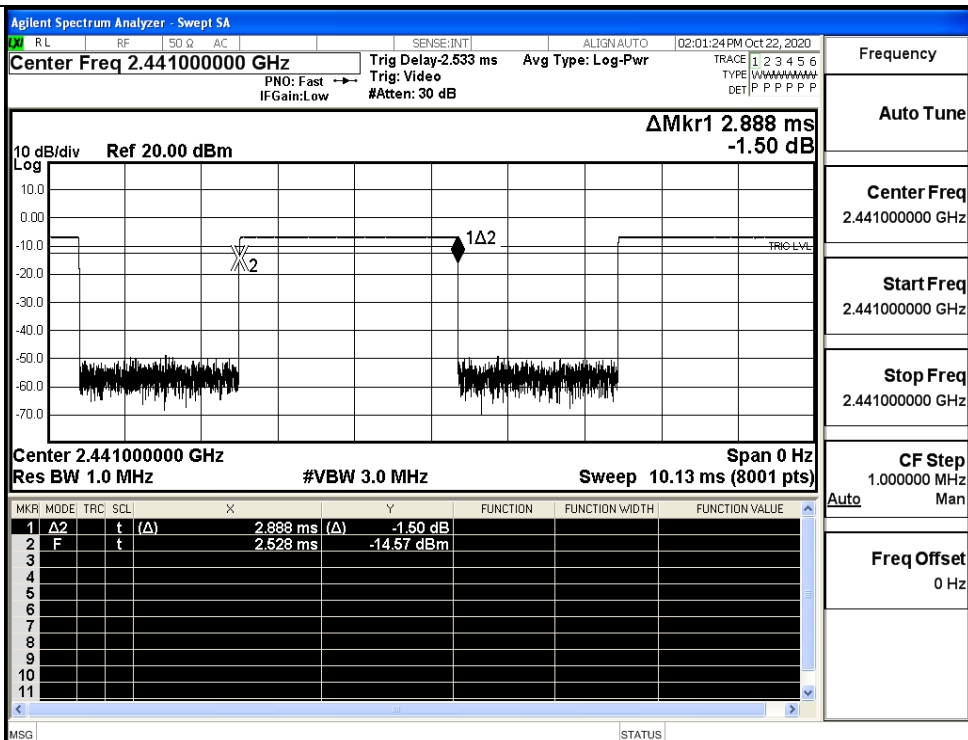
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.89	106.7	0.308	0.4	PASS
	DH5	MCH	2.89	106.7	0.308	0.4	PASS
	DH5	HCH	2.89	106.7	0.308	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.89	106.7	0.308	0.4	PASS
	2DH5	MCH	2.89	106.7	0.308	0.4	PASS
	2DH5	HCH	2.89	106.7	0.308	0.4	PASS
8DPSK	3DH5	LCH	2.89	106.7	0.308	0.4	PASS
	3DH5	MCH	2.89	106.7	0.308	0.4	PASS
	3DH5	HCH	2.89	106.7	0.309	0.4	PASS

Test Graphs

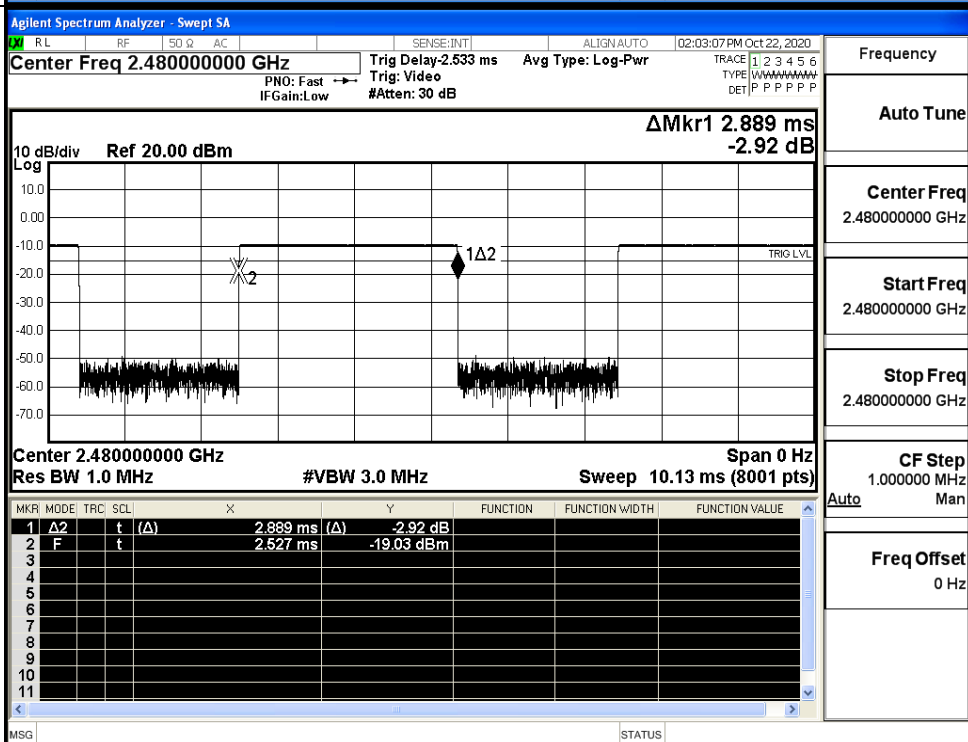
GFSK_DH5/LCH

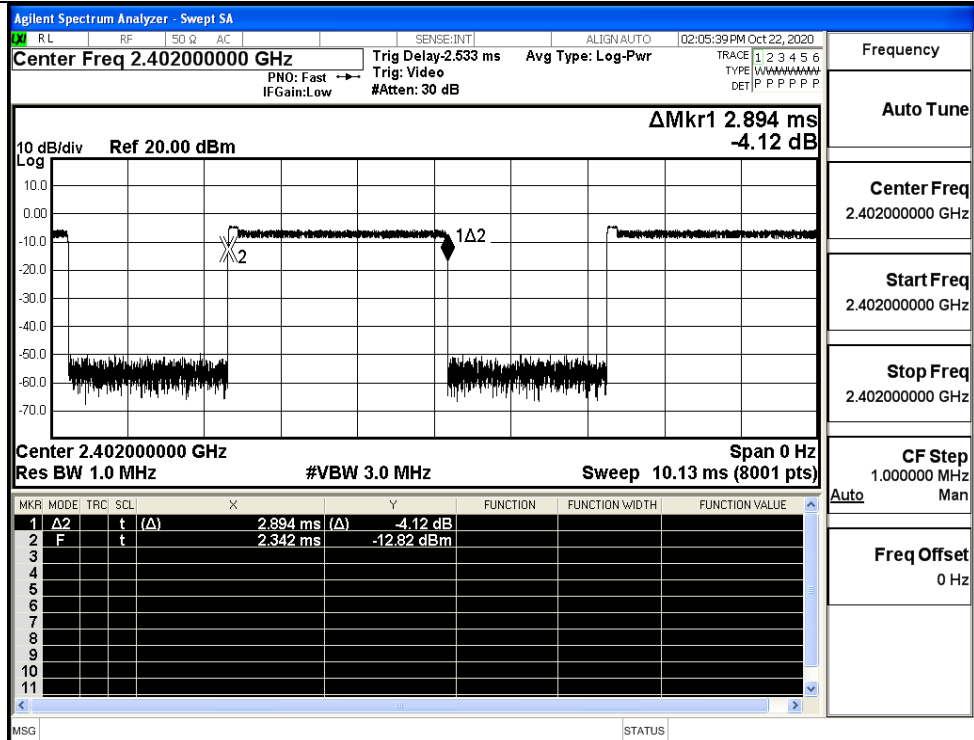
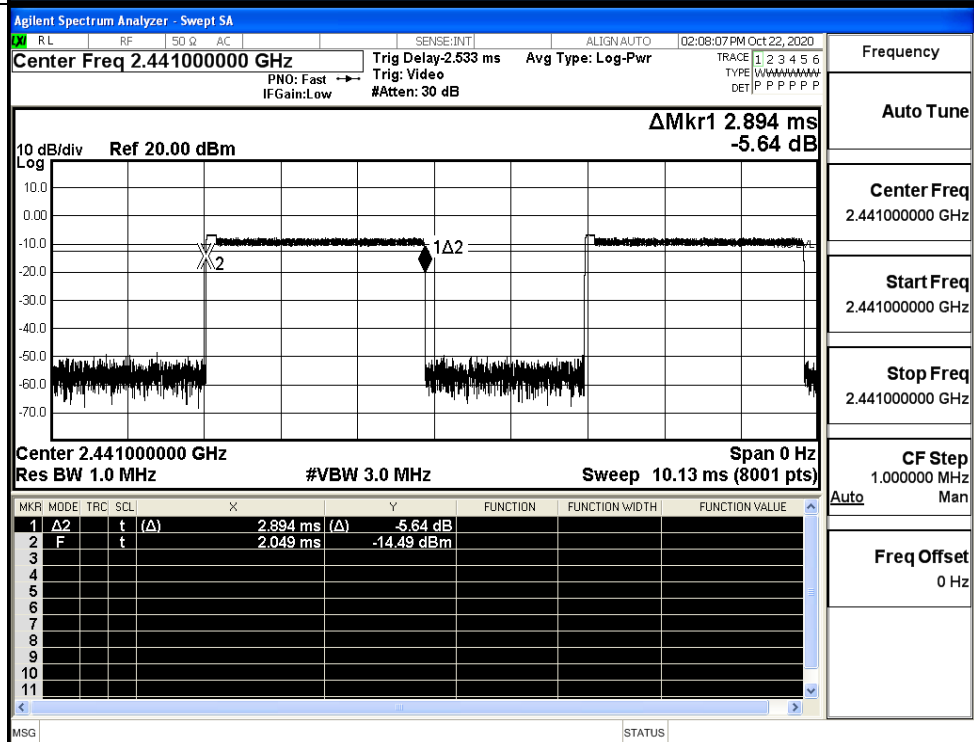


GFSK_DH5/MCH

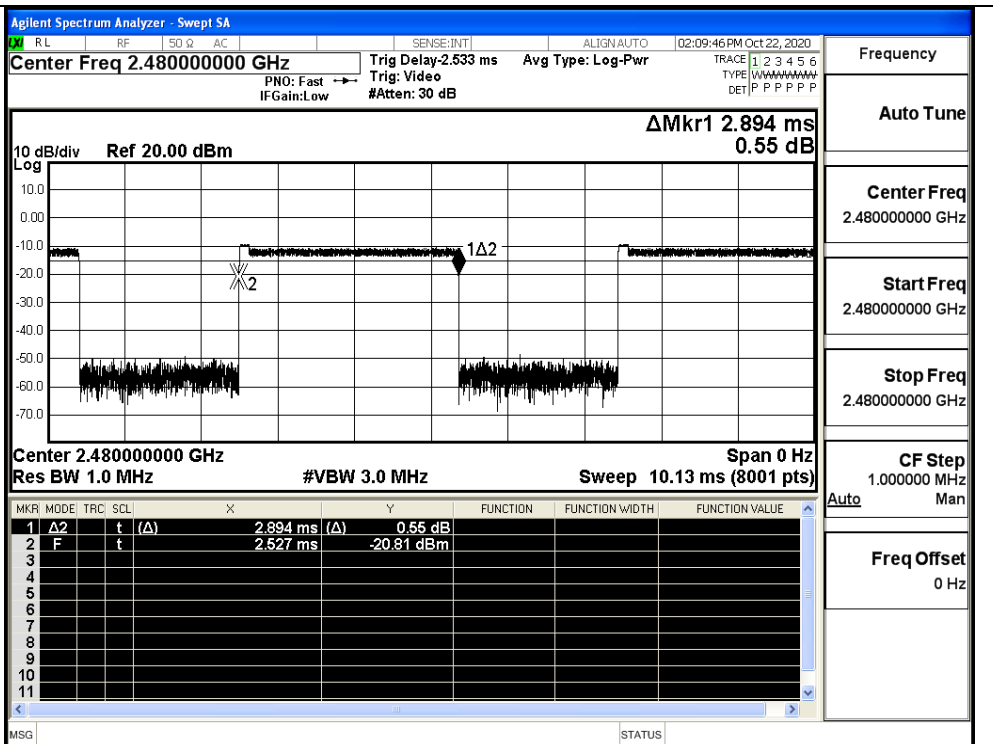


GFSK_DH5/HCH

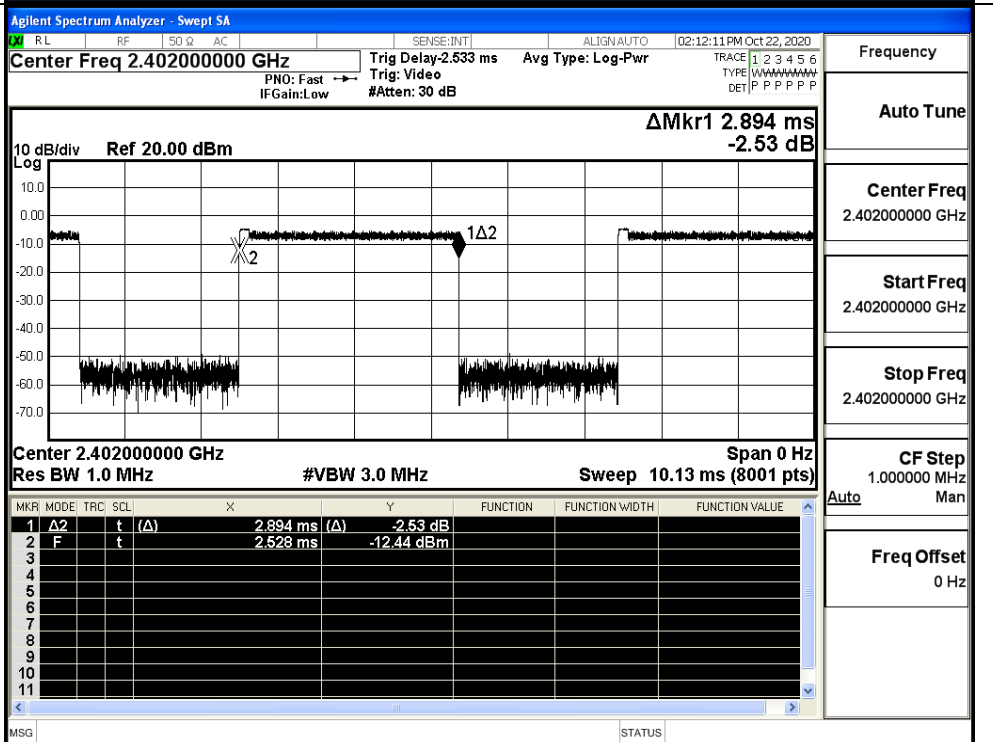


$\pi/4$ DQPSK
_2DH5/LCH $\pi/4$ DQPSK
_2DH5/MCH

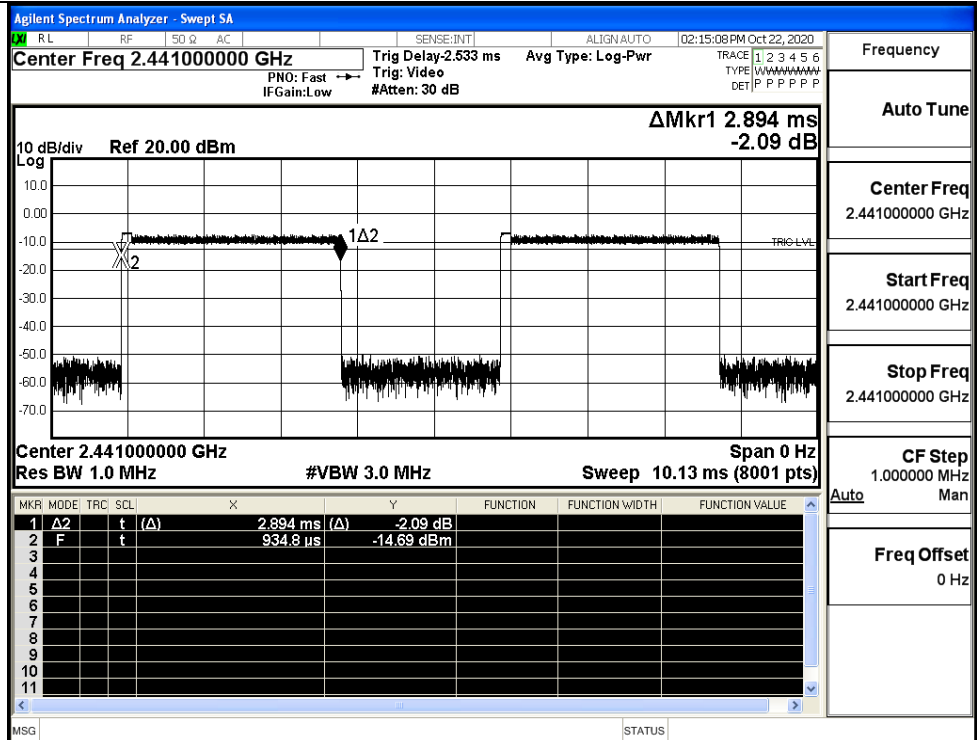
$\pi/4$ DQPSK
_2DH5/HCH



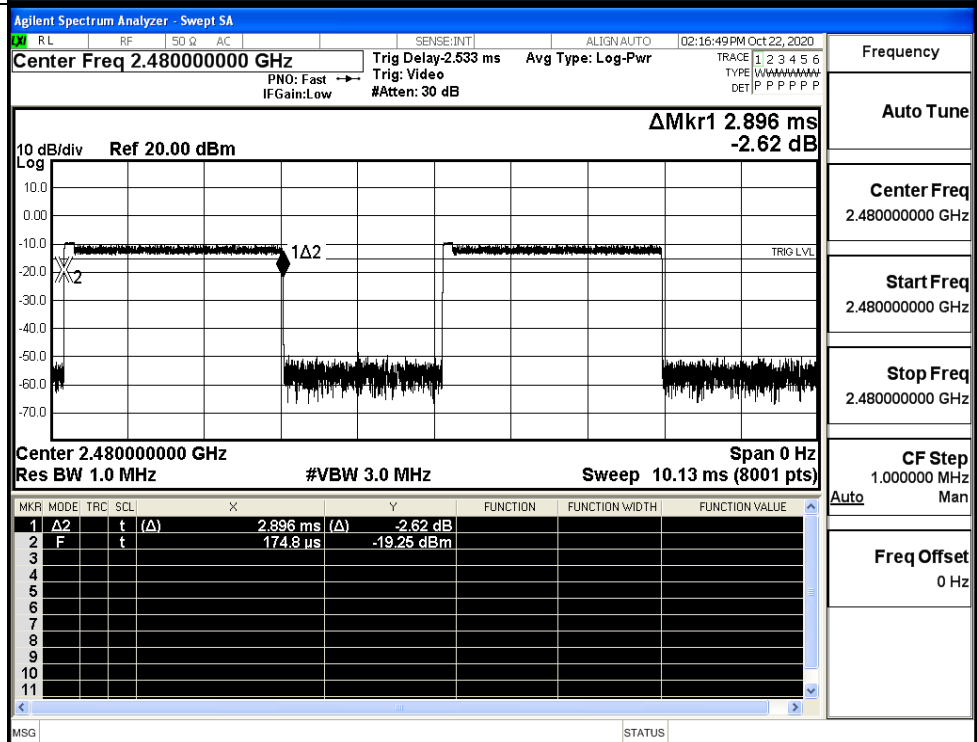
8DPSK_3DH5/LCH



8DPSK_3DH5/MCH



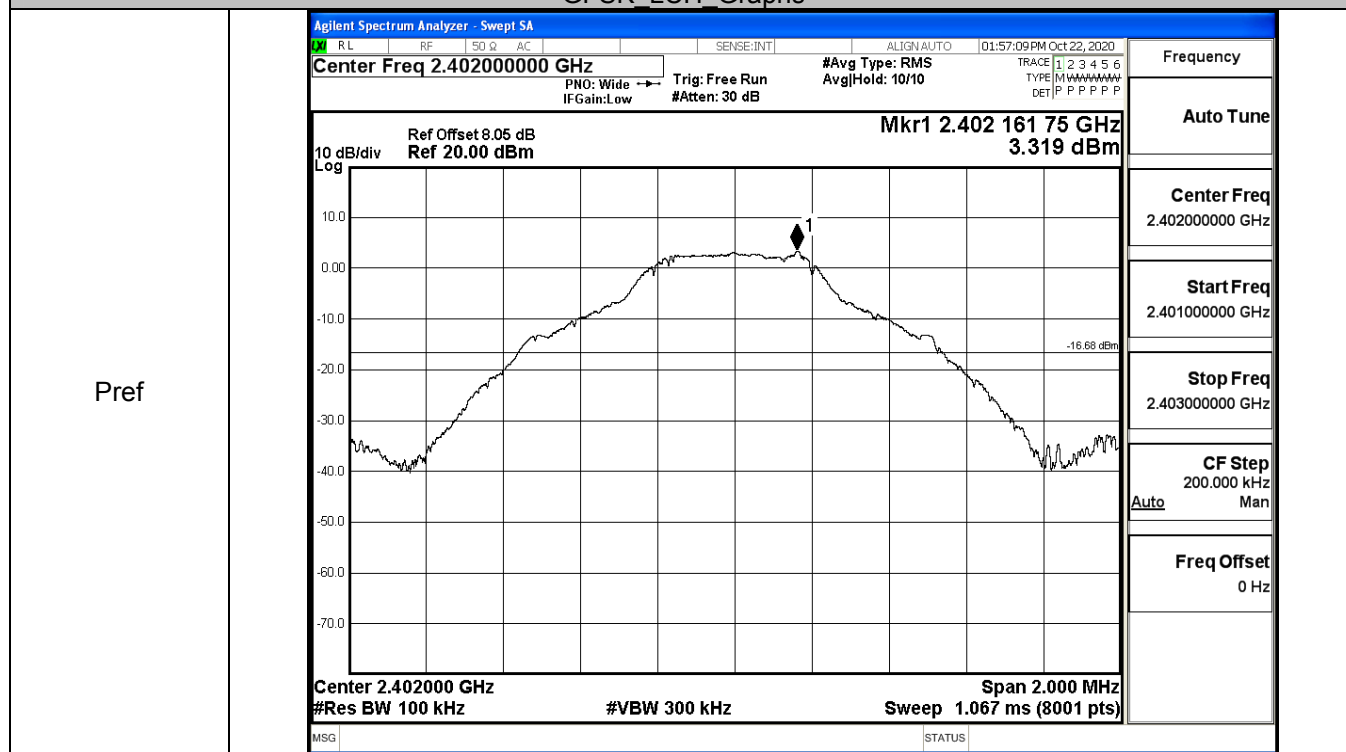
8DPSK_3DH5/HCH

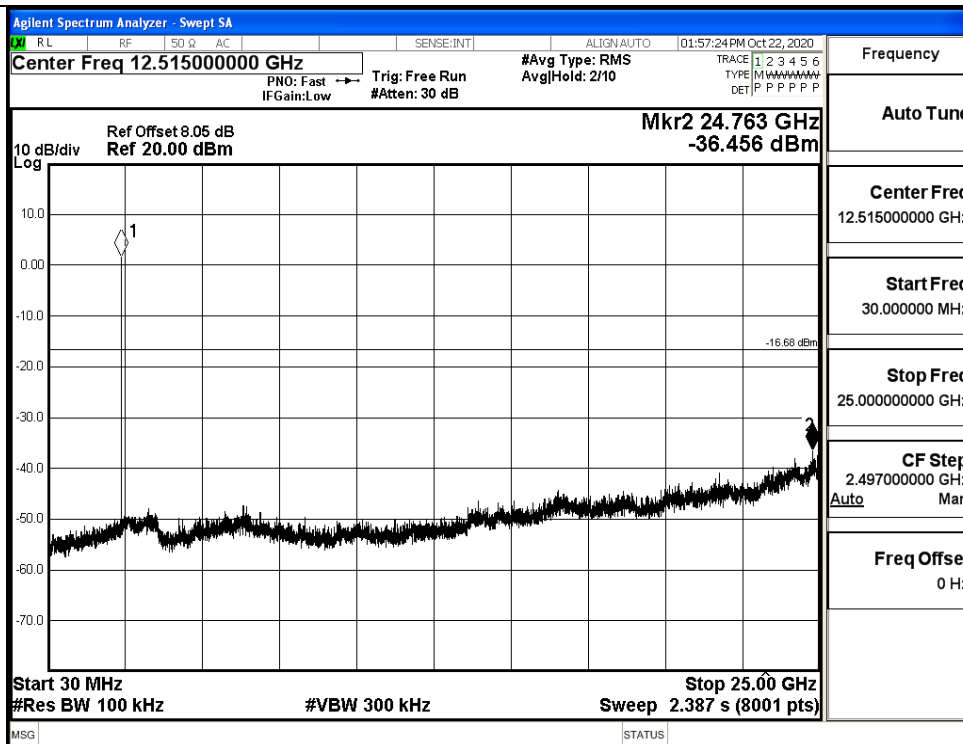


A.7 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.319	-36.456	-16.681	PASS
	MCH	1.194	-37.057	-18.806	PASS
	HCH	-1.551	-37.333	-21.551	PASS
π /4DQPSK	LCH	3.117	-37.909	-16.883	PASS
	MCH	1.043	-37.731	-18.957	PASS
	HCH	-1.722	-37.301	-21.722	PASS
8DPSK	LCH	2.511	-37.078	-17.489	PASS
	MCH	1.178	-36.970	-18.822	PASS
	HCH	-1.602	-37.102	-21.602	PASS

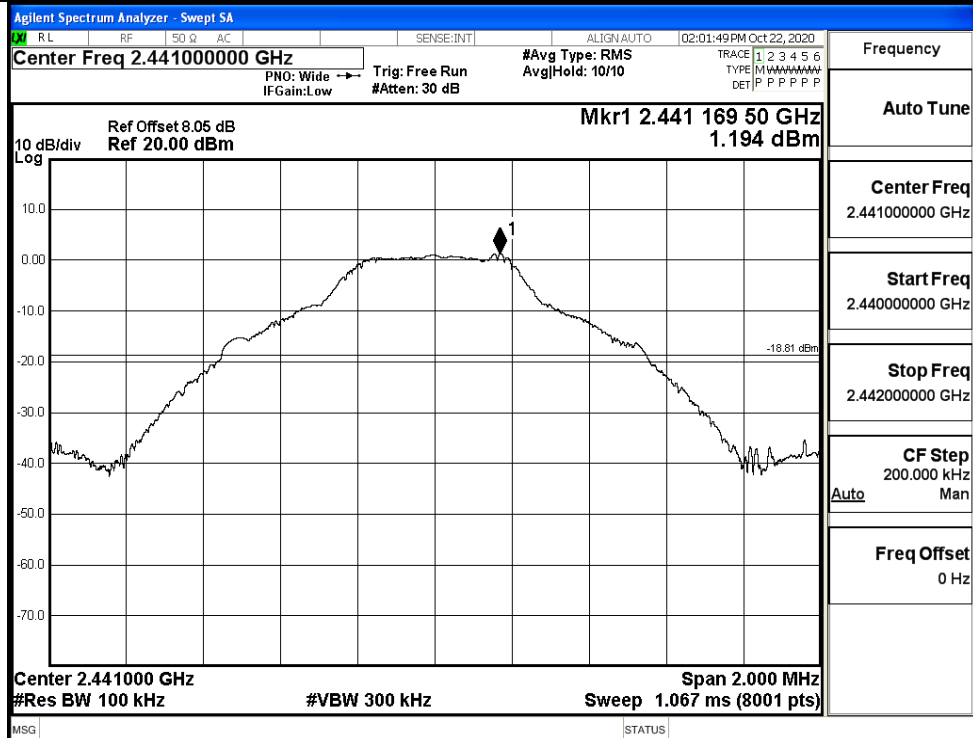
GFSK LCH Graphs



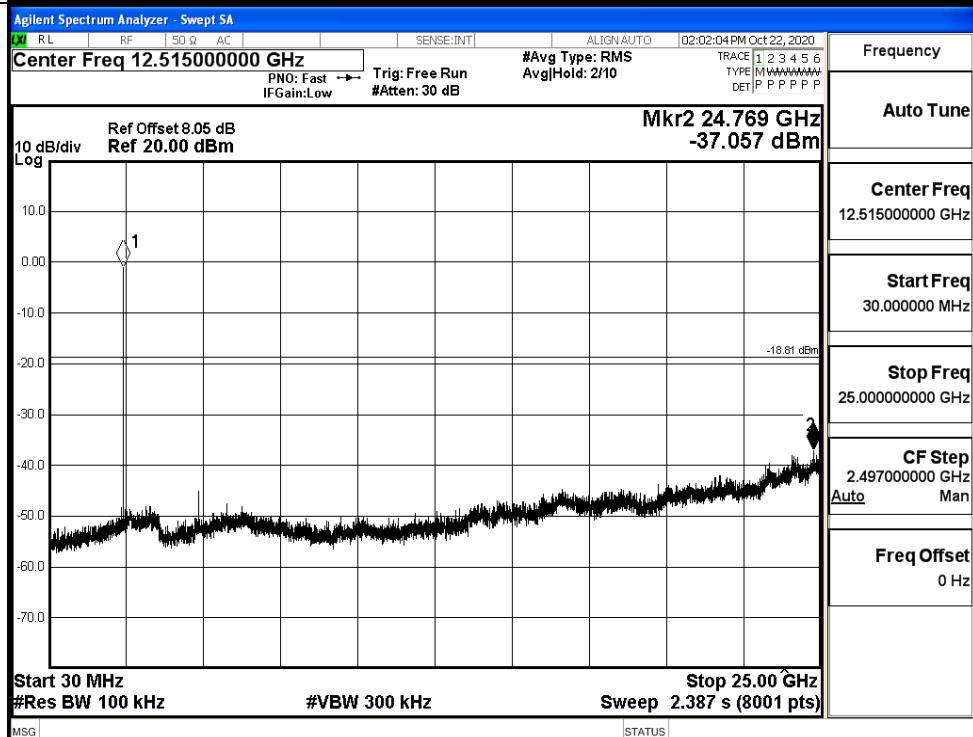
P_{uw}

GFSK_MCH_Graphs

Pref

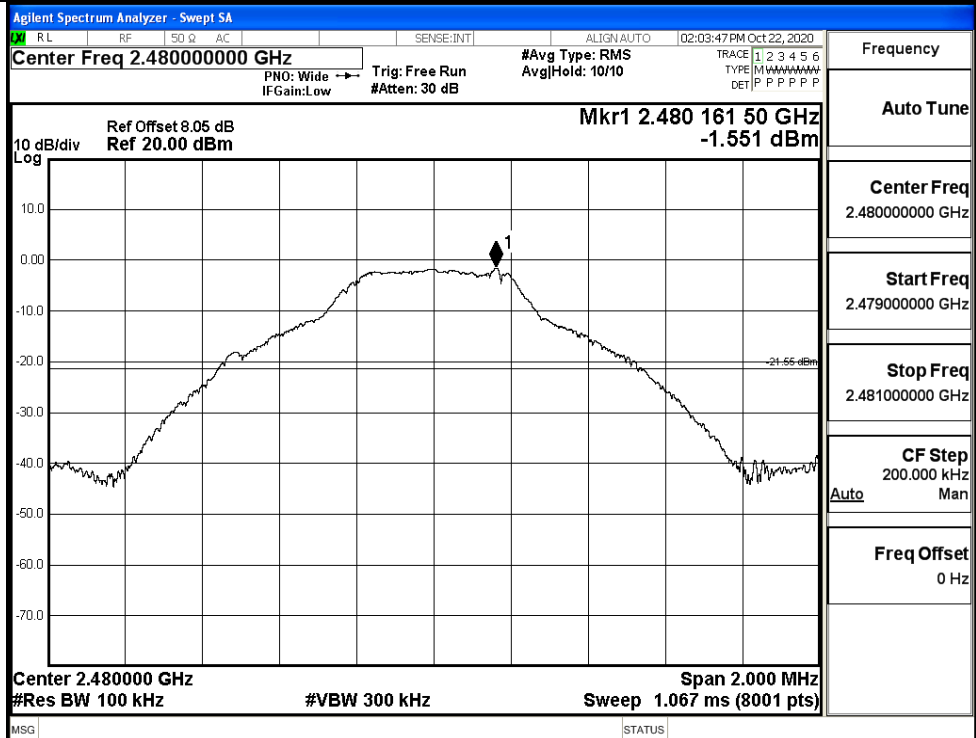


Puw

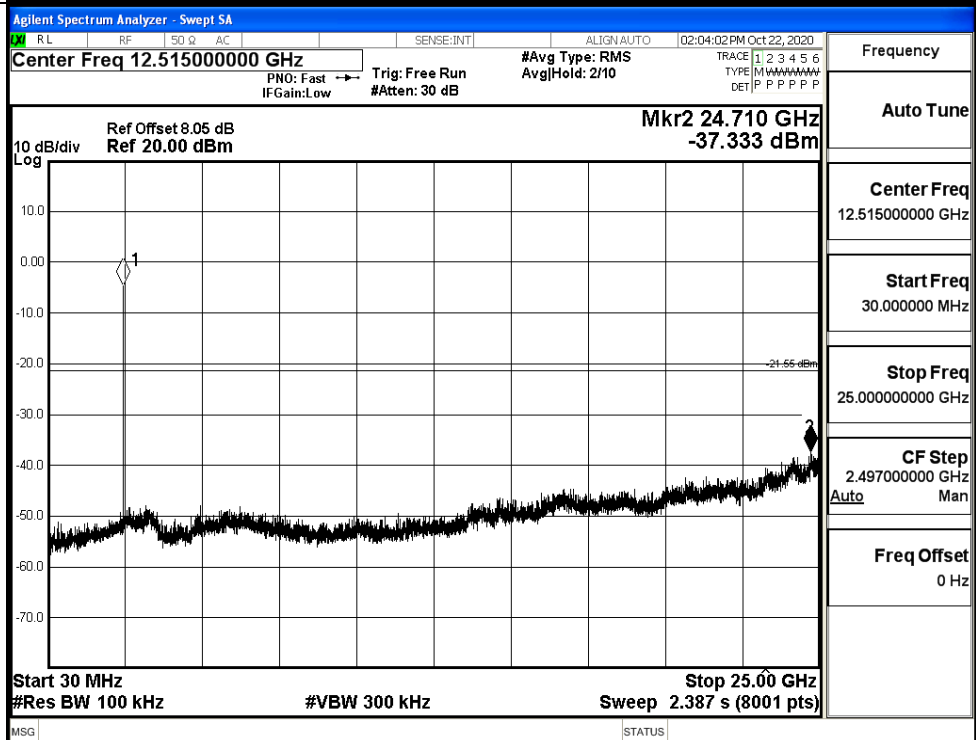


GFSK HCH_Graphs

Pref

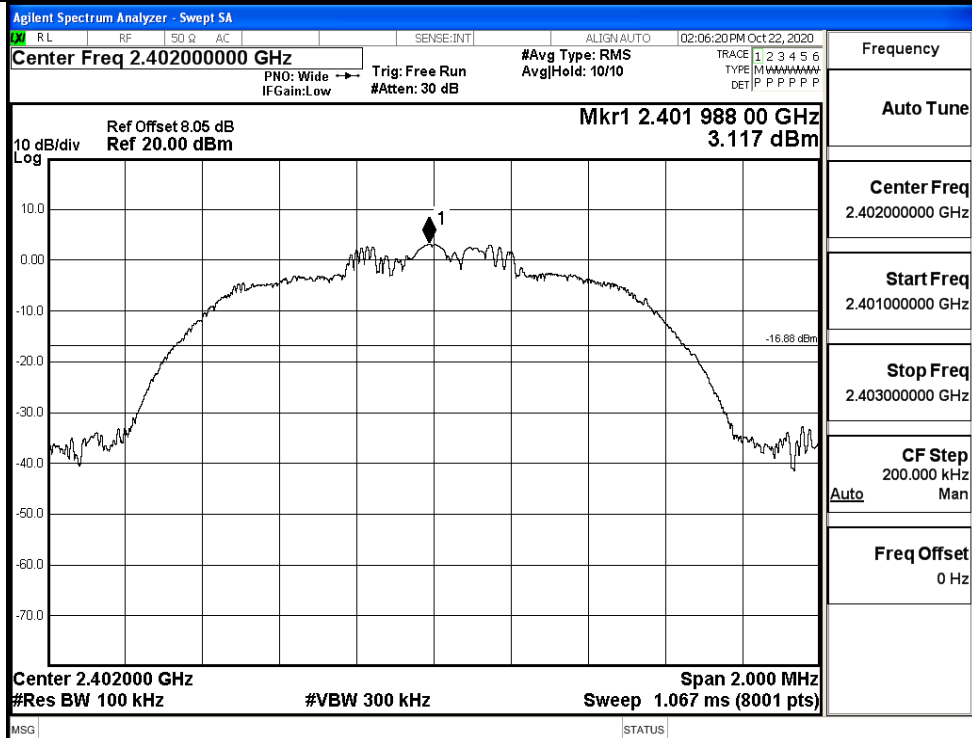


Puw

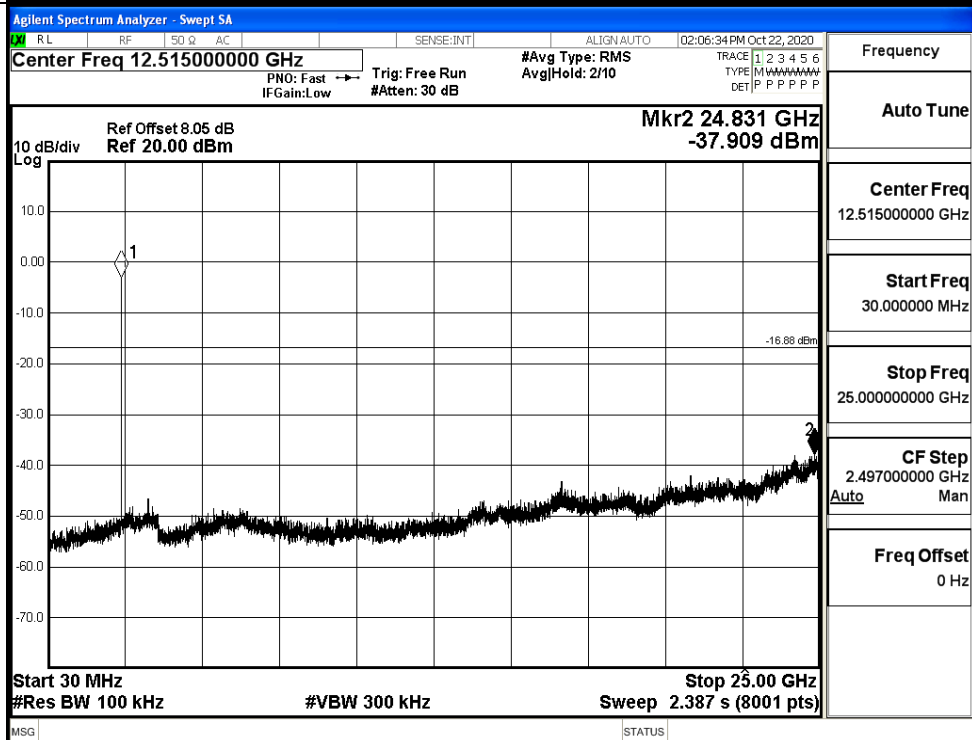


$\pi/4$ DQPSK LCH_Graphs

Pref

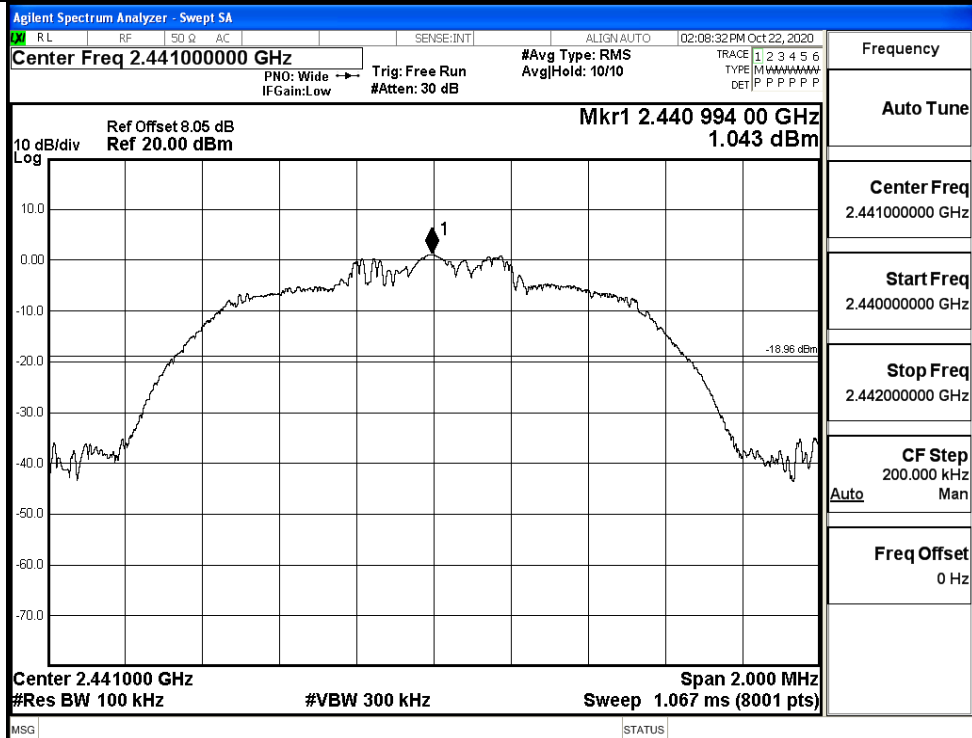


Puw

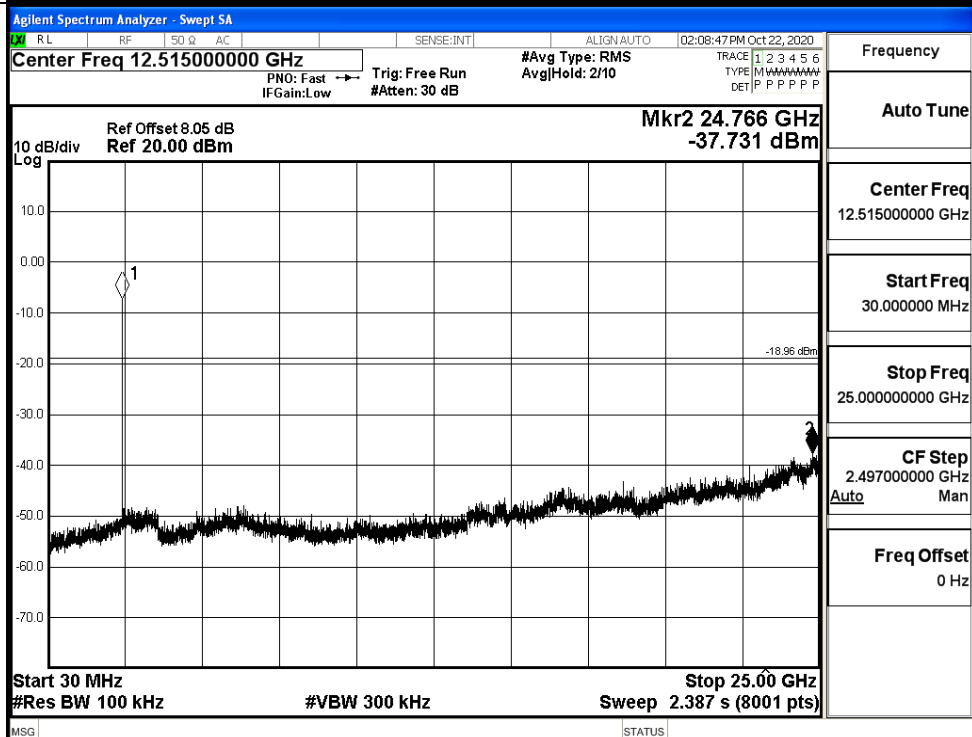


$\pi/4$ DQPSK_MCH_Graphs

Pref

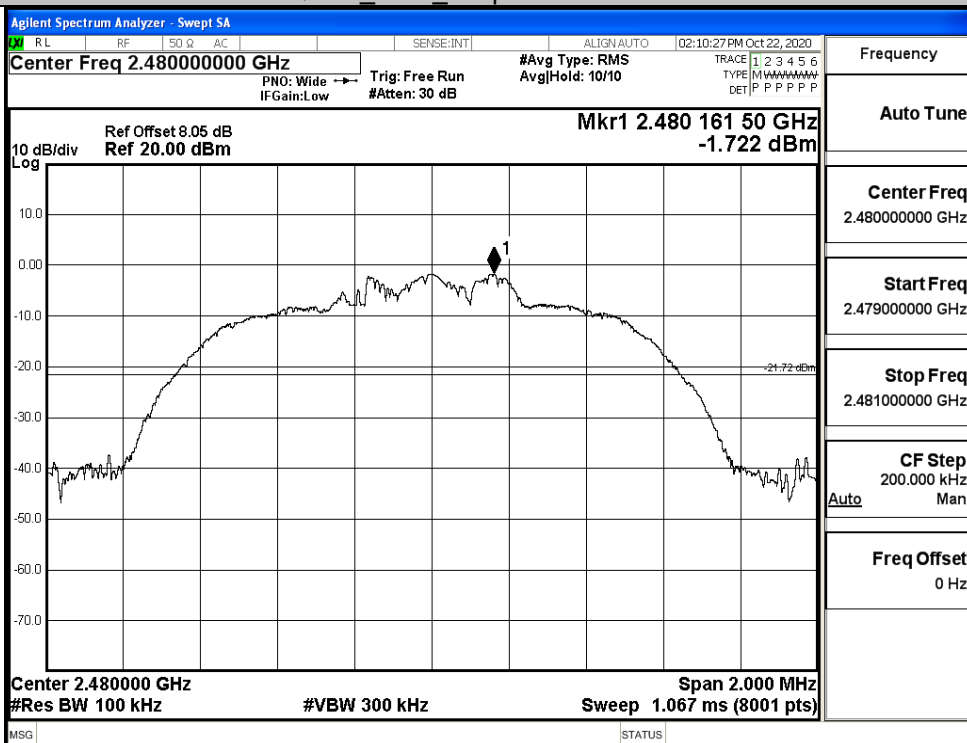


Puw

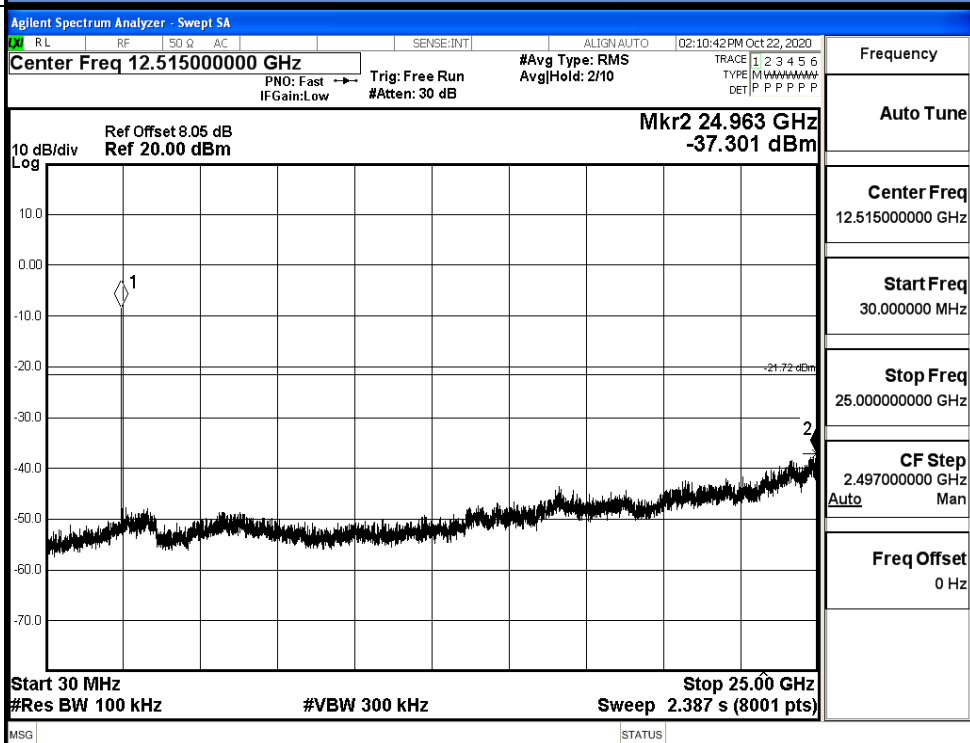


$\pi/4$ DQPSK_HCH_Graphs

Pref

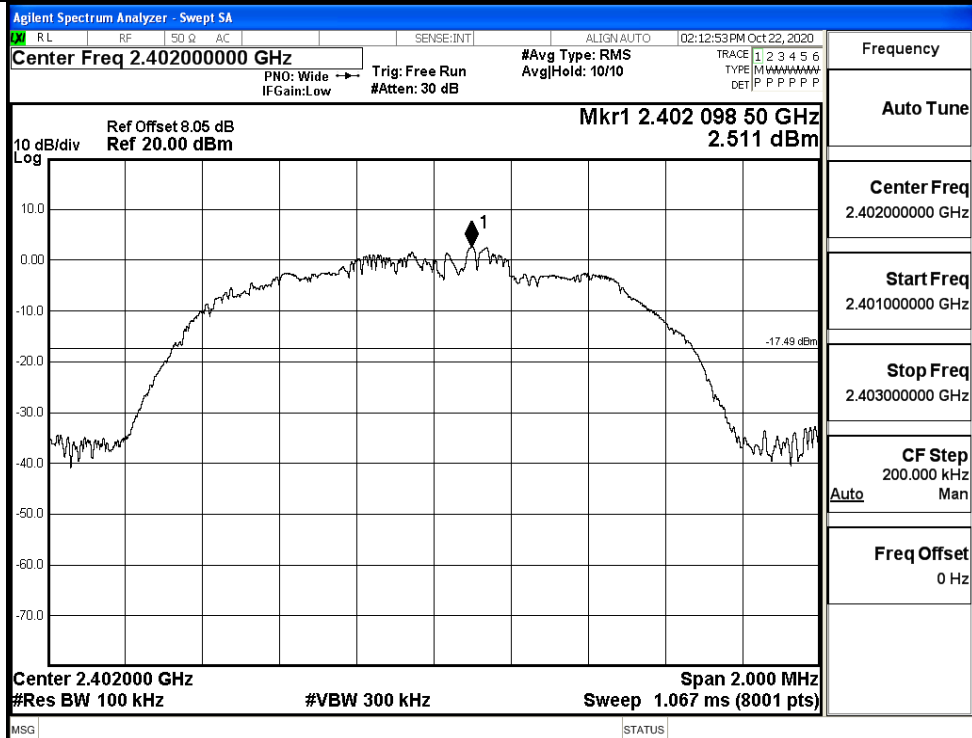


Puw

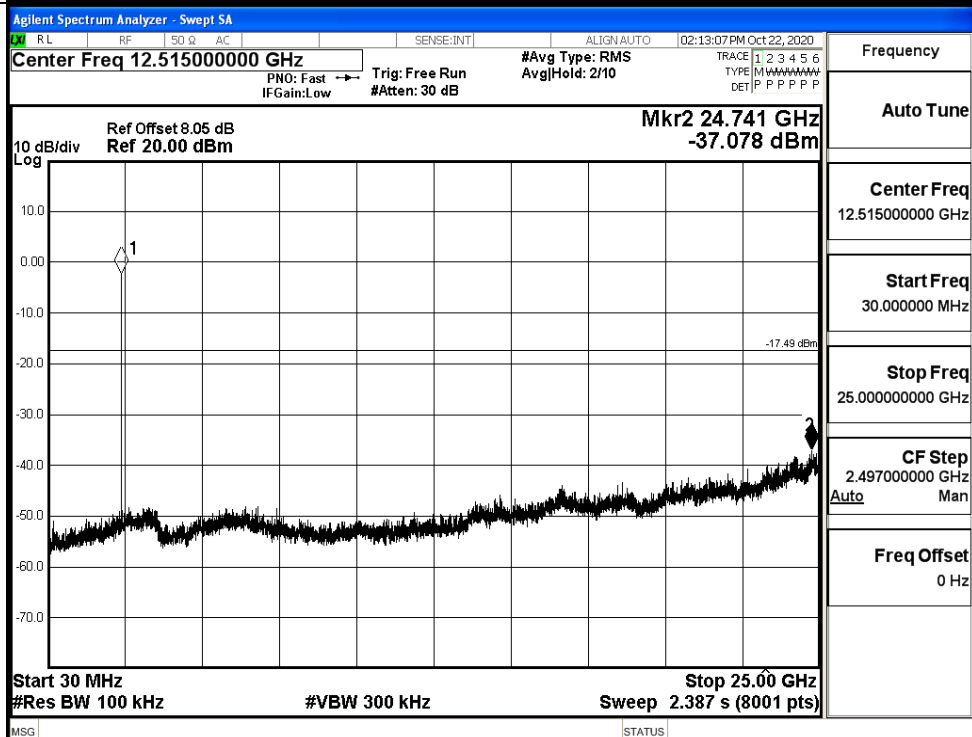


8DPSK_LCH_Graphs

Pref

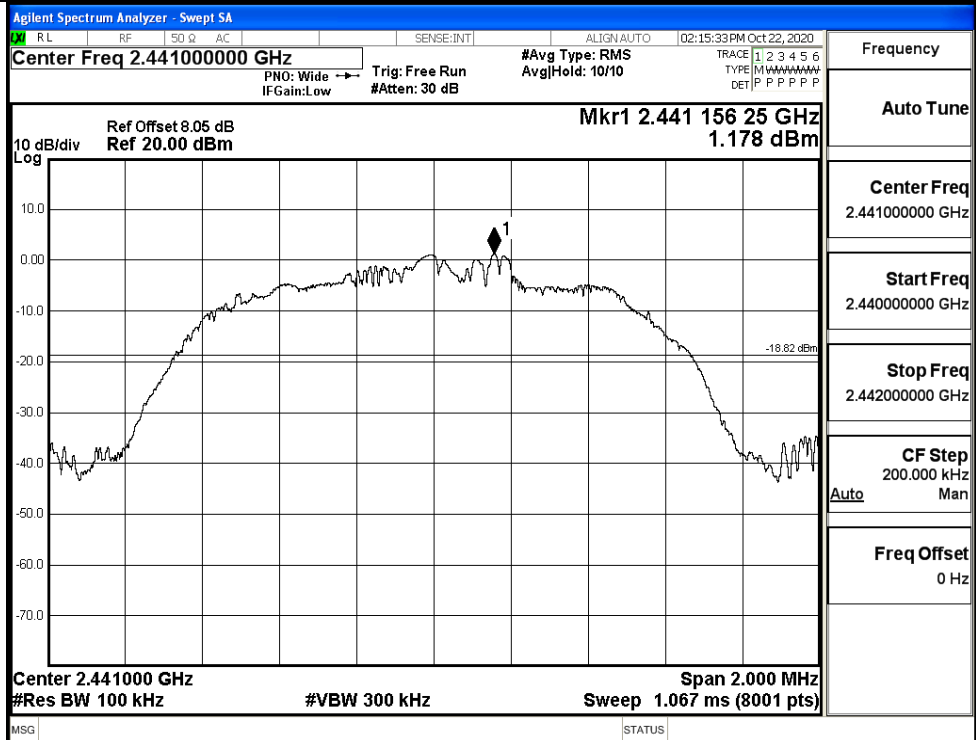


Puw

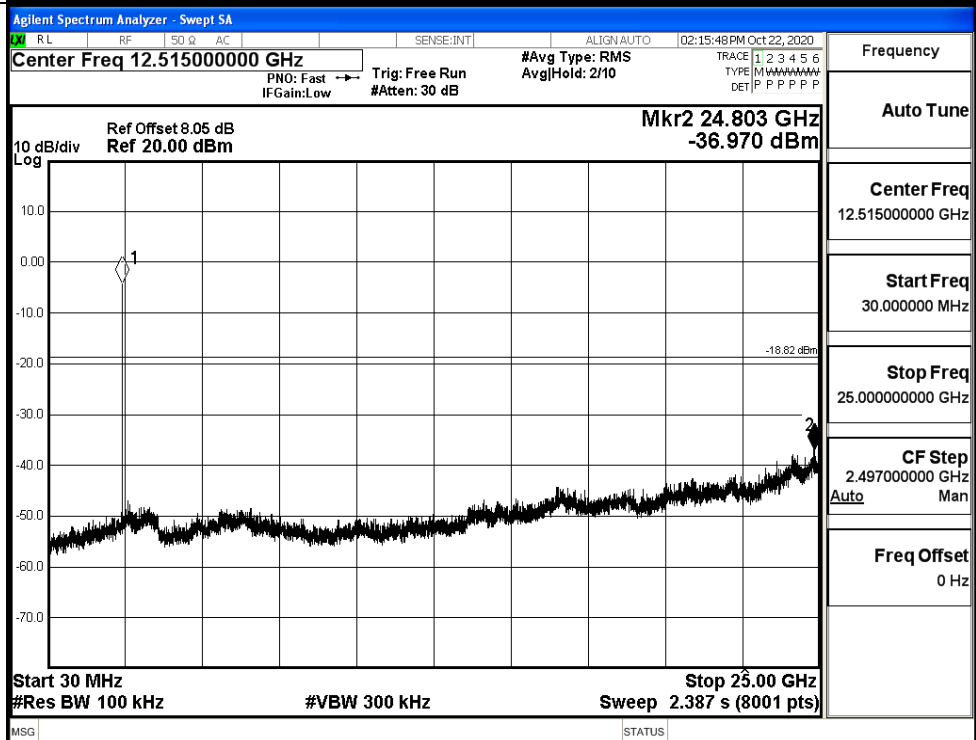


8DPSK MCH_Graphs

Pref

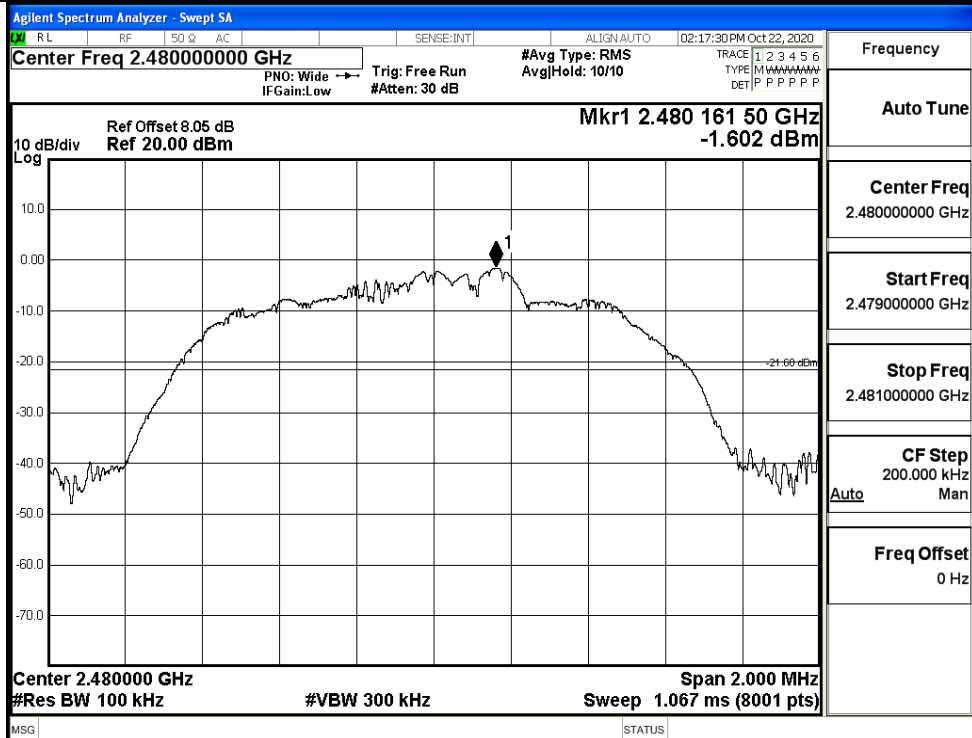


Puw

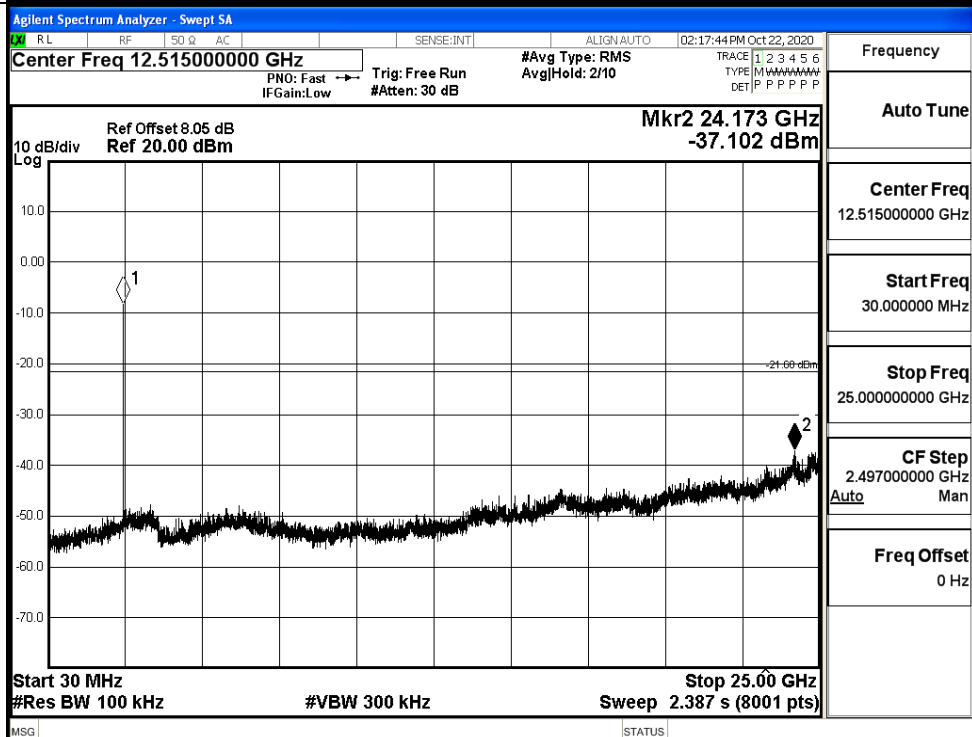


8DPSK_HCH_Graphs

Pref



Puw

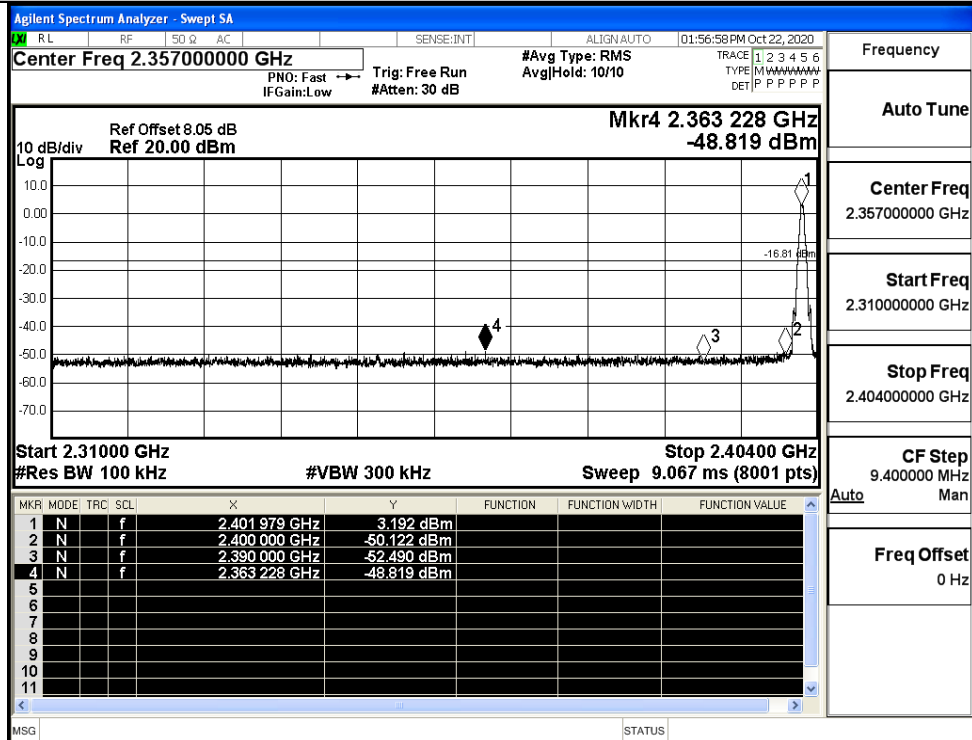


A.8 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	3.192	Off	-48.819	-16.81	PASS
			3.186	On	-48.169	-16.81	PASS
	HCH	2480	-1.530	Off	-49.070	-21.53	PASS
			0.097	On	-48.687	-19.9	PASS
$\pi/4$ DQPSK	LCH	2402	0.321	Off	-48.926	-19.68	PASS
			3.351	On	-49.229	-16.65	PASS
	HCH	2480	-1.800	Off	-49.028	-21.8	PASS
			-0.224	On	-48.498	-20.22	PASS
8DPSK	LCH	2402	3.343	Off	-49.490	-16.66	PASS
			3.354	On	-48.306	-16.65	PASS
	HCH	2480	-1.773	Off	-48.766	-21.77	PASS
			0.049	On	-48.471	-19.95	PASS

Test Graphs

GFSK/LCH/No Hop

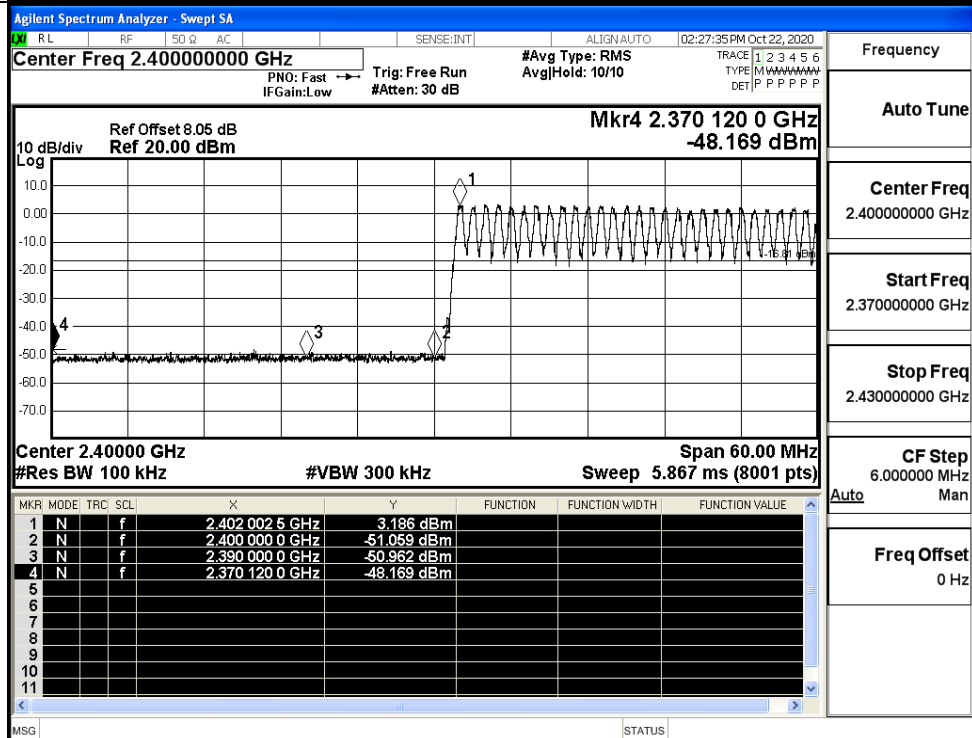


Frequency

Auto Tune

Center Freq
2.357000000 GHzStart Freq
2.310000000 GHzStop Freq
2.404000000 GHzCF Step
9.400000 MHz
Auto ManFreq Offset
0 Hz

GFSK/LCH/Hop

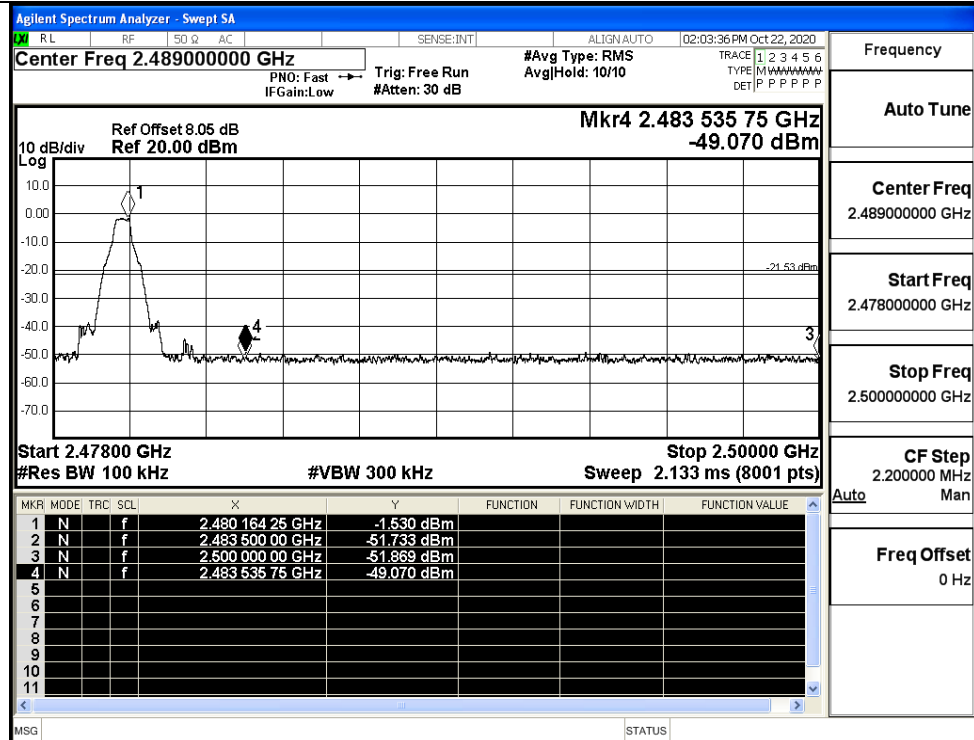


Frequency

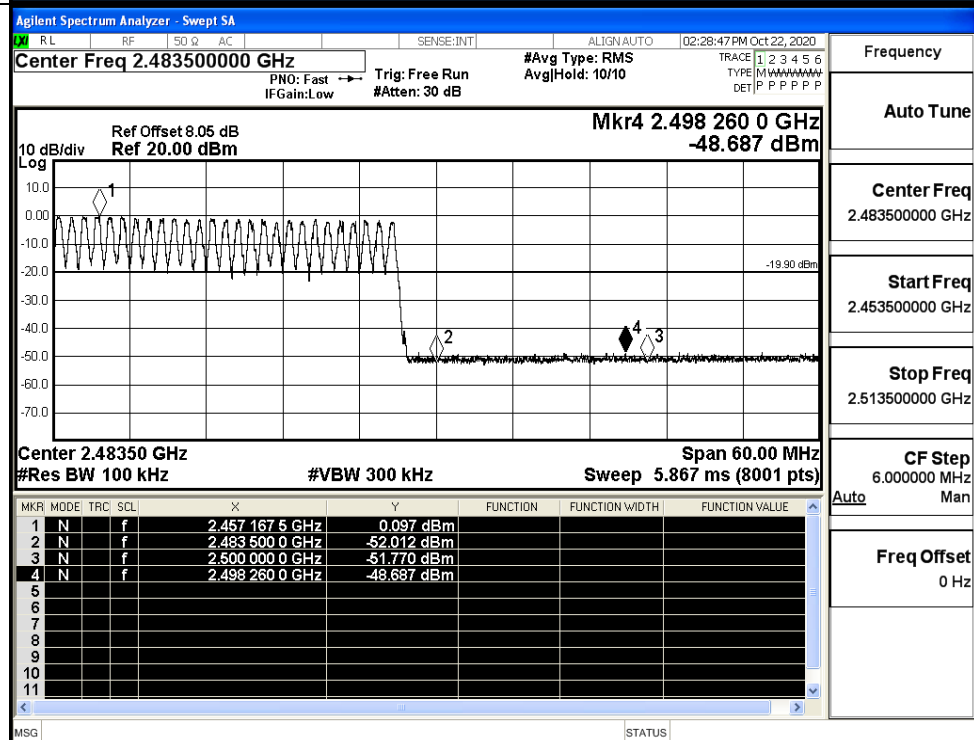
Auto Tune

Center Freq
2.400000000 GHzStart Freq
2.370000000 GHzStop Freq
2.430000000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

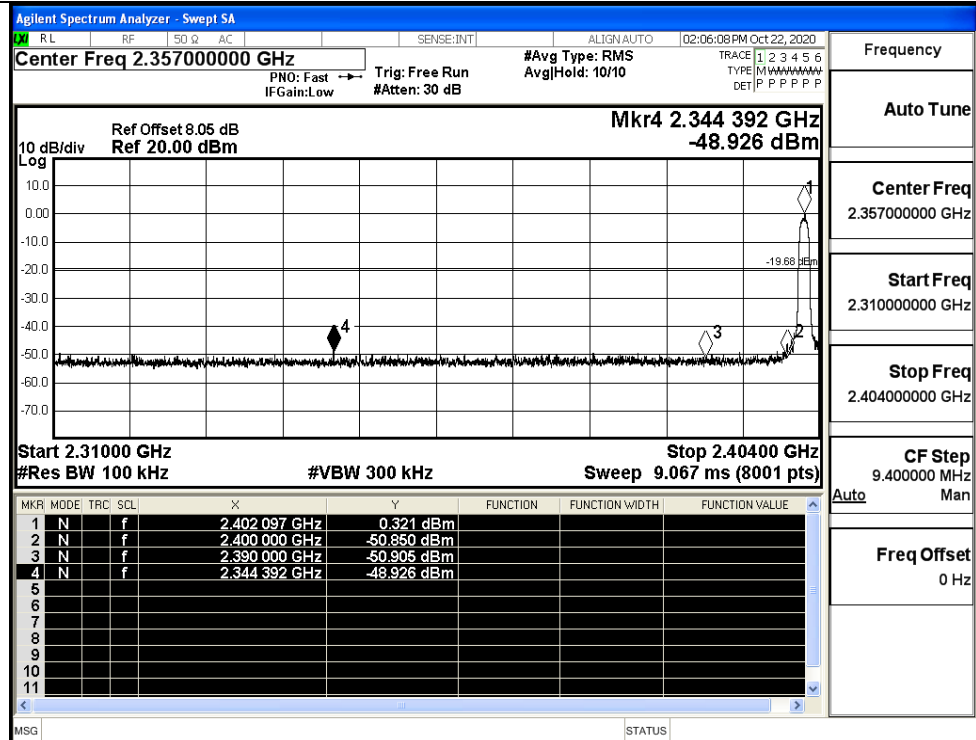
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

Start Freq
2.310000000 GHz

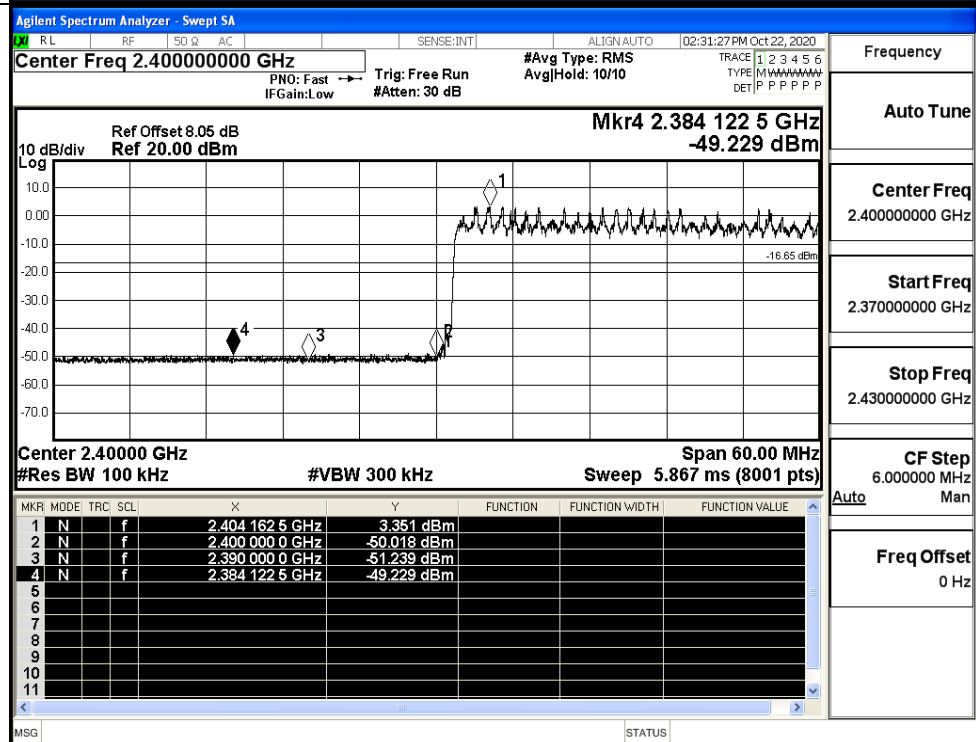
Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz

Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

Start Freq
2.370000000 GHz

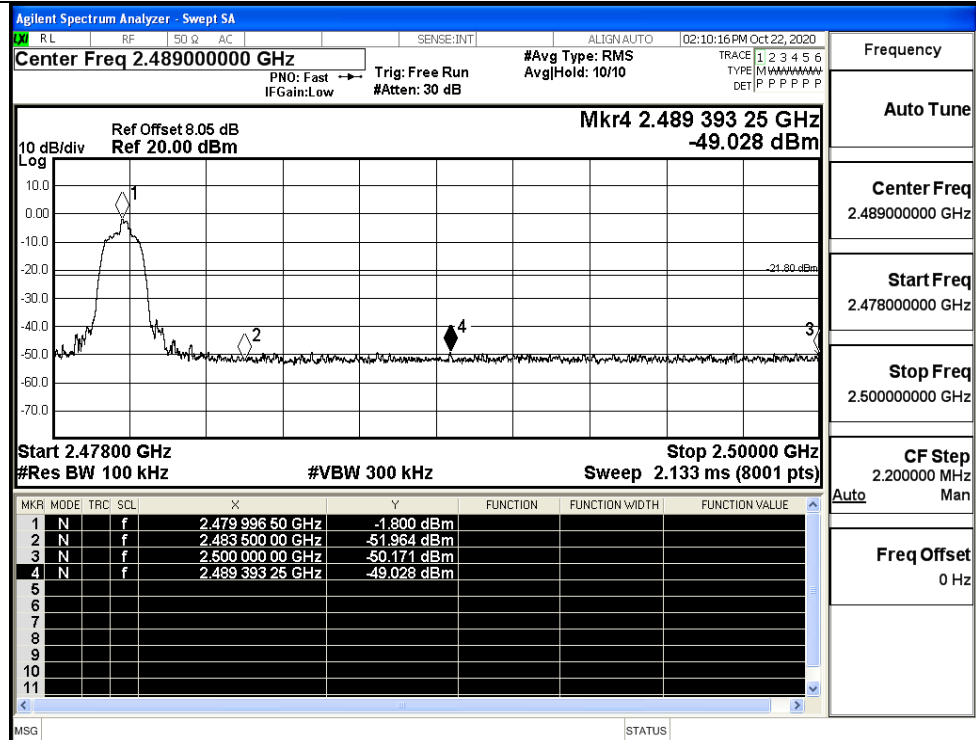
Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz

Auto Man

Freq Offset
0 Hz

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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

Start Freq
2.478000000 GHz

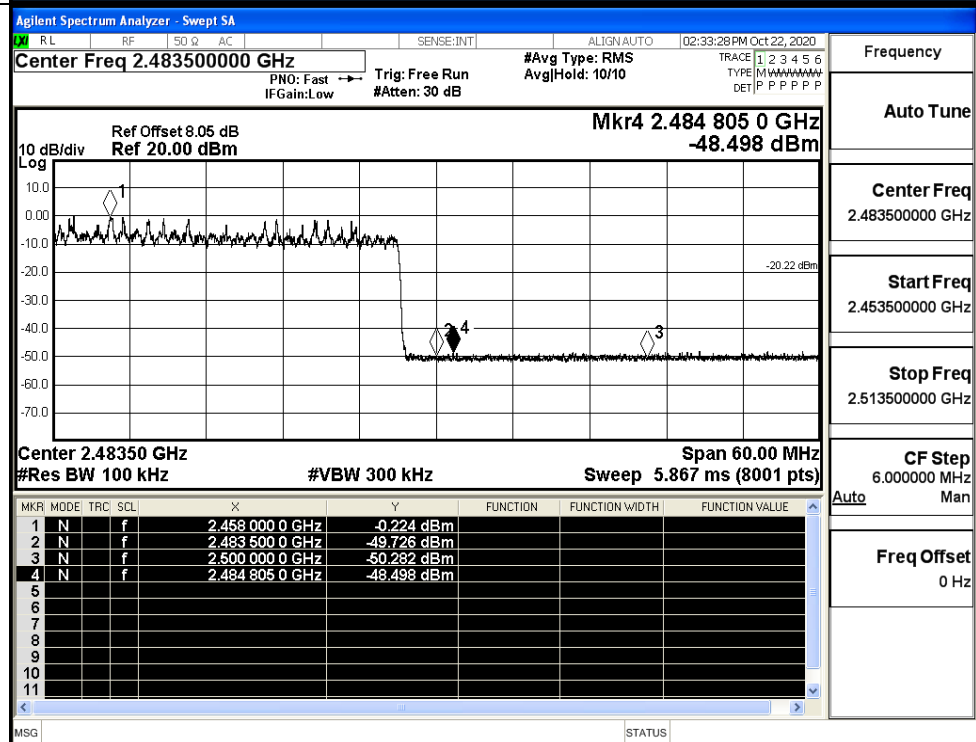
Stop Freq
2.500000000 GHz

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

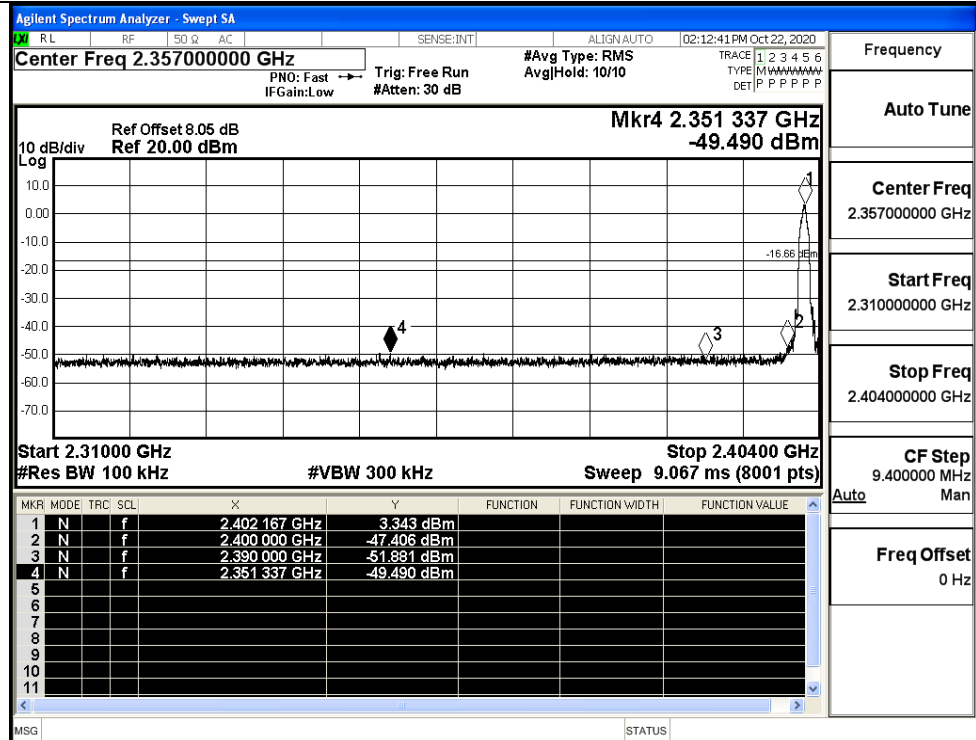
Stop Freq
2.513500000 GHz

CF Step
6.000000 MHz

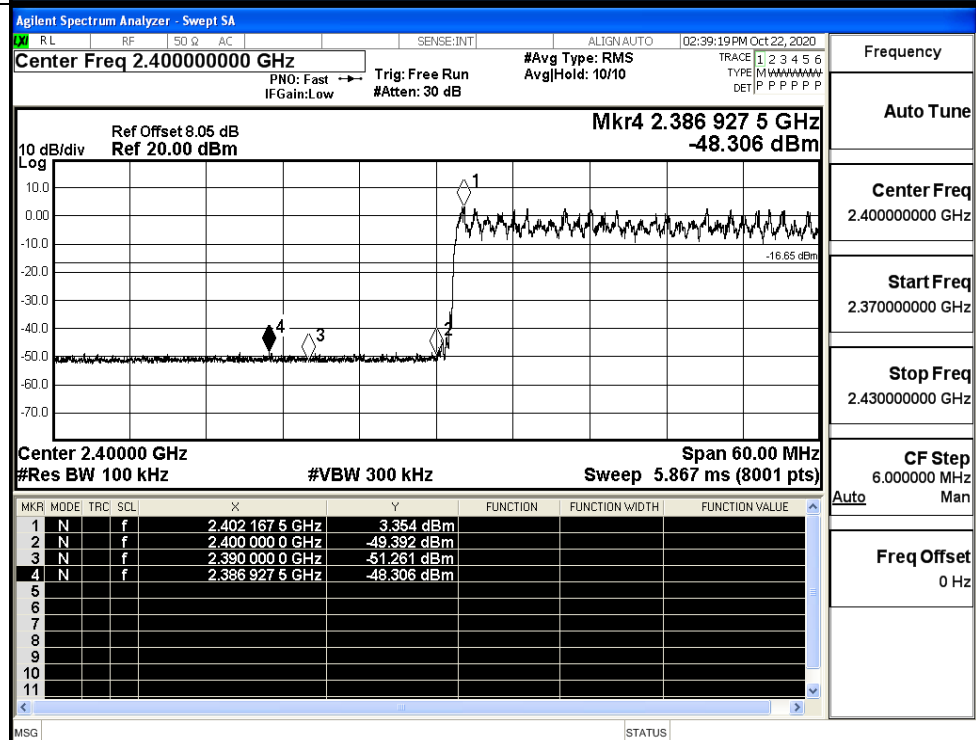
Auto Man

Freq Offset
0 Hz

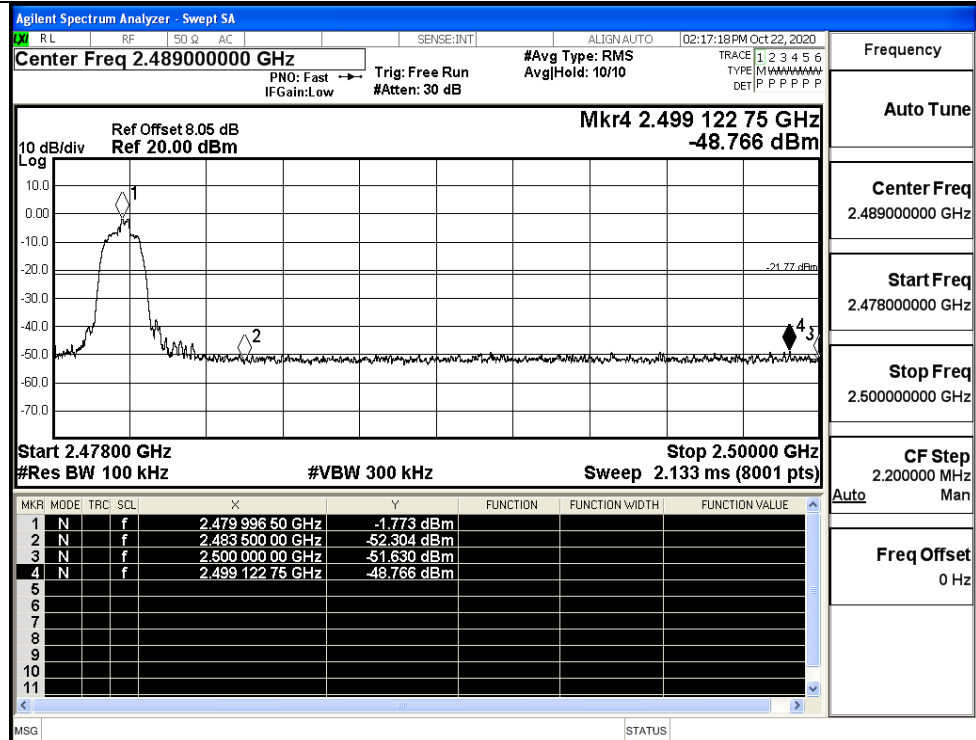
8DPSK/LCH/No Hop



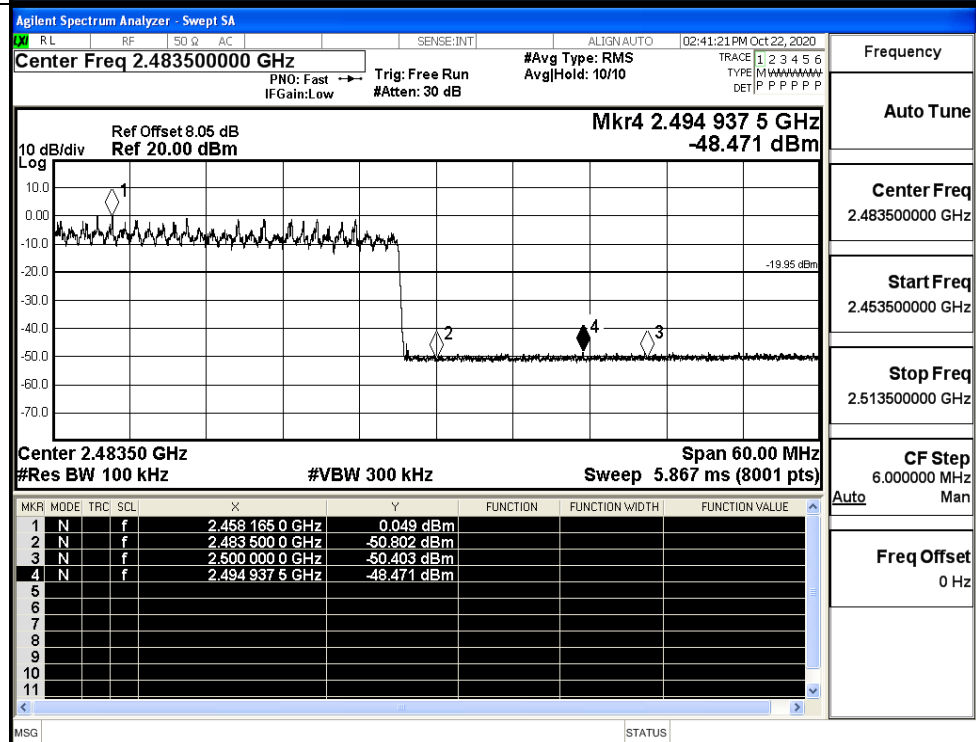
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



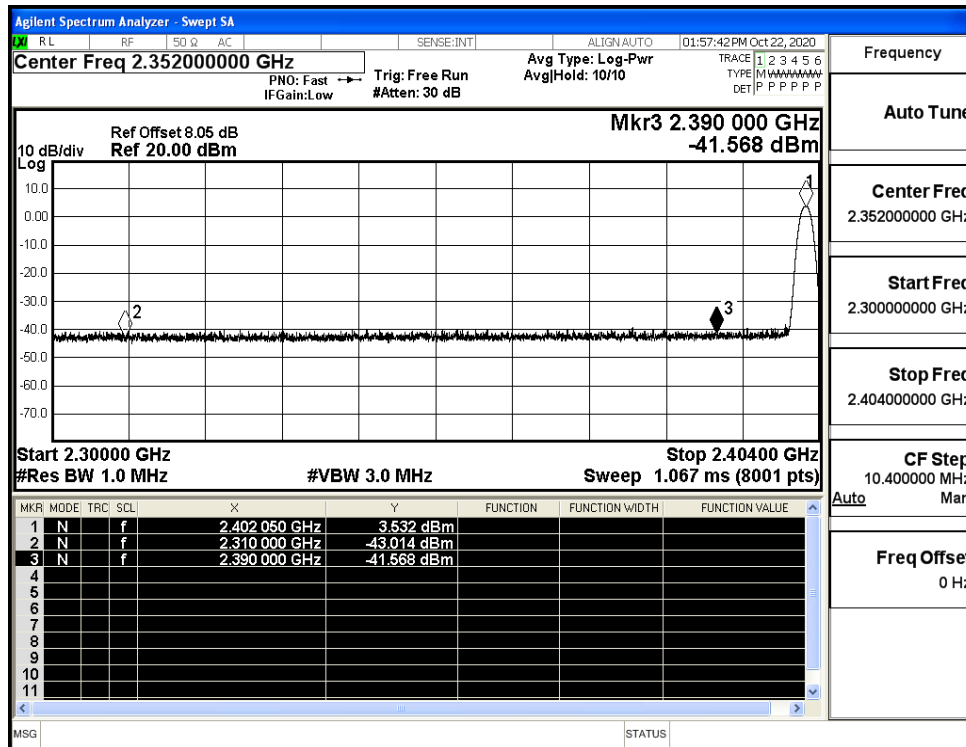
8DPSK/HCH/Hop



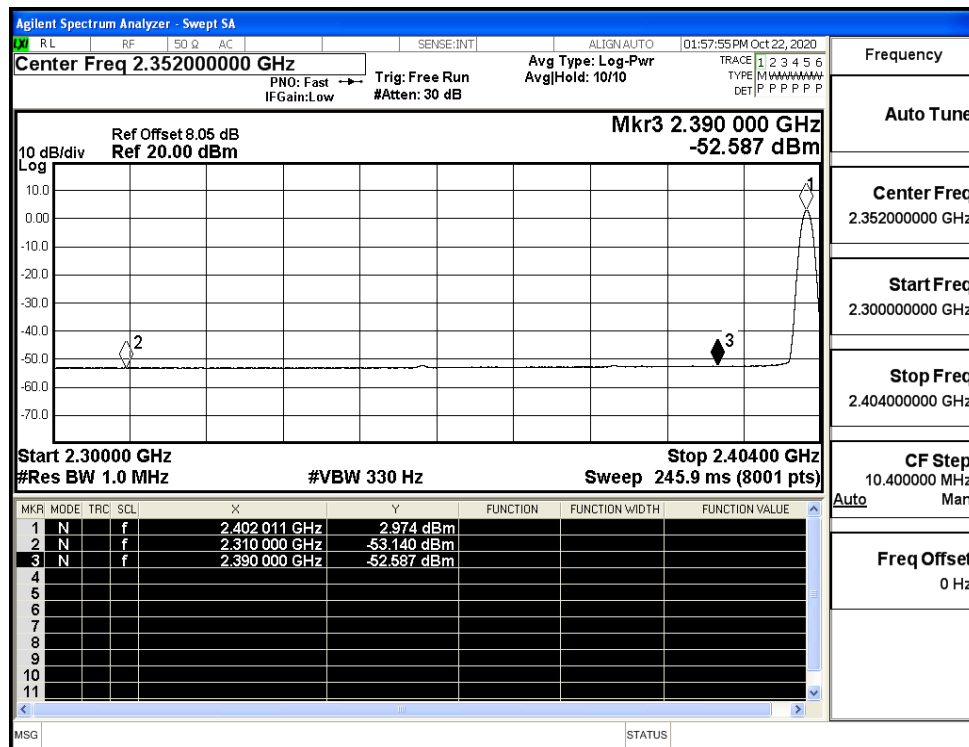
A.9 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.01	2.0	0	52.24	PEAK	74	PASS
	Off	2310.0	-53.14	2.0	0	42.12	AV	54	PASS
	Off	2390.0	-41.57	2.0	0	53.69	PEAK	74	PASS
	Off	2390.0	-52.59	2.0	0	42.67	AV	54	PASS
	Off	2483.5	-41.83	2.0	0	53.42	PEAK	74	PASS
	Off	2483.5	-52.19	2.0	0	43.06	AV	54	PASS
	Off	2500.0	-42.24	2.0	0	53.02	PEAK	74	PASS
	Off	2500.0	-52.06	2.0	0	43.19	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.89	2.0	0	52.37	PEAK	74	PASS
	Off	2310.0	-53.09	2.0	0	42.17	AV	54	PASS
	Off	2390.0	-42.61	2.0	0	52.65	PEAK	74	PASS
	Off	2390.0	-52.66	2.0	0	42.6	AV	54	PASS
	Off	2483.5	-42.27	2.0	0	52.99	PEAK	74	PASS
	Off	2483.5	-52.01	2.0	0	43.25	AV	54	PASS
	Off	2500.0	-41.63	2.0	0	53.63	PEAK	74	PASS
	Off	2500.0	-52.03	2.0	0	43.23	AV	54	PASS
8DPSK	Off	2310.0	-41.11	2.0	0	54.15	PEAK	74	PASS
	Off	2310.0	-53.18	2.0	0	42.08	AV	54	PASS
	Off	2390.0	-42.94	2.0	0	52.32	PEAK	74	PASS
	Off	2390.0	-52.79	2.0	0	42.47	AV	54	PASS
	Off	2483.5	-42.03	2.0	0	53.22	PEAK	74	PASS
	Off	2483.5	-52.05	2.0	0	43.21	AV	54	PASS
	Off	2500.0	-42.15	2.0	0	53.11	PEAK	74	PASS
	Off	2500.0	-51.96	2.0	0	43.29	AV	54	PASS

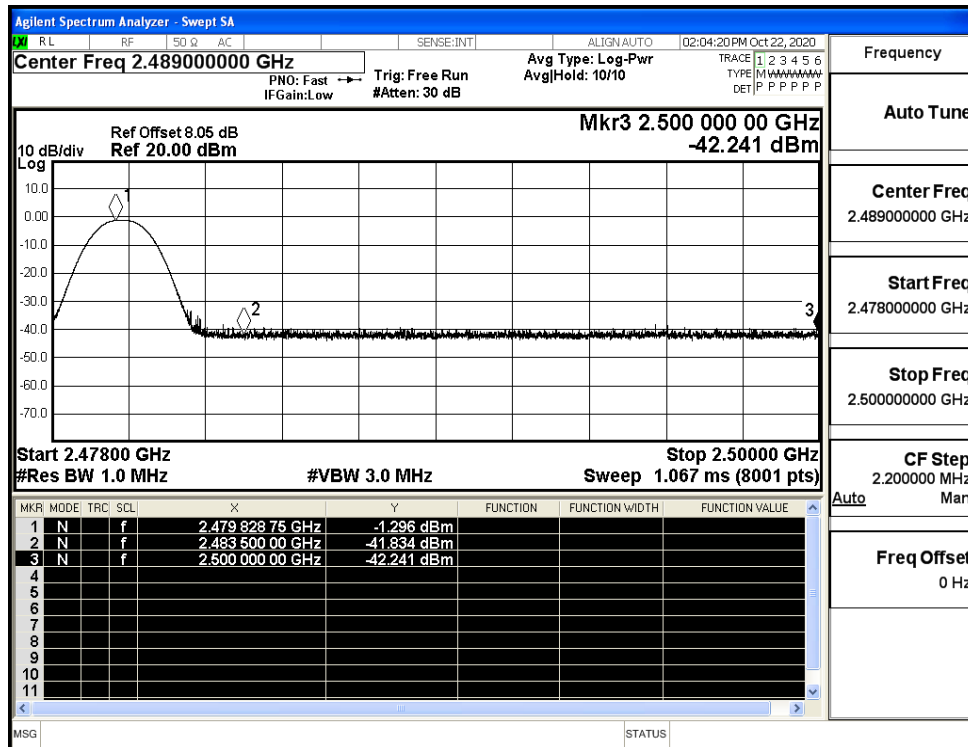
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



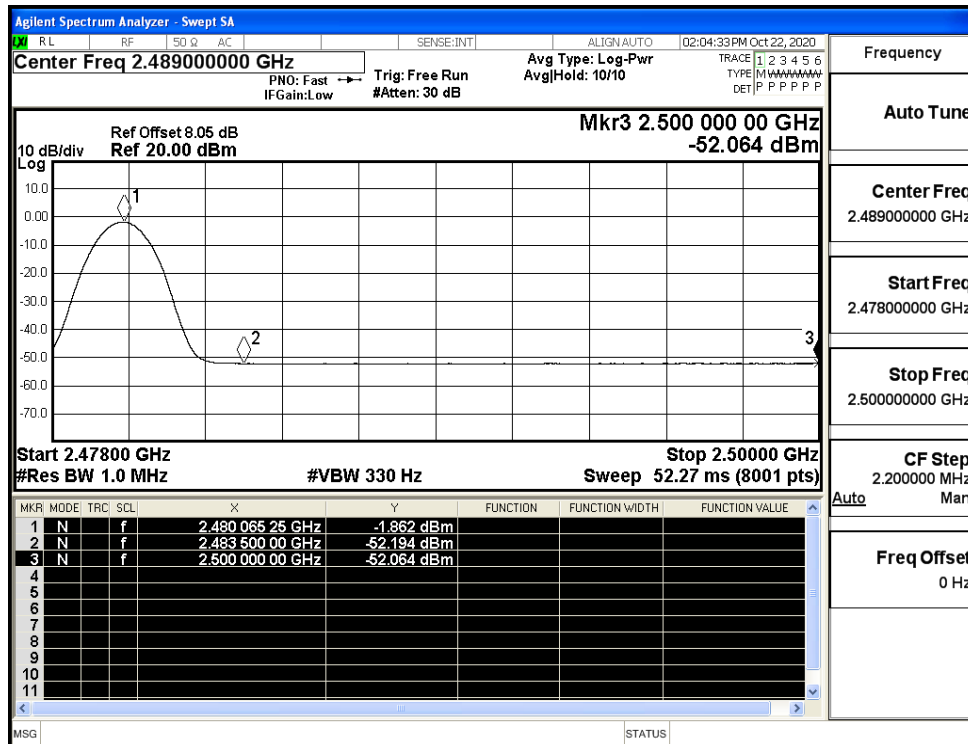
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

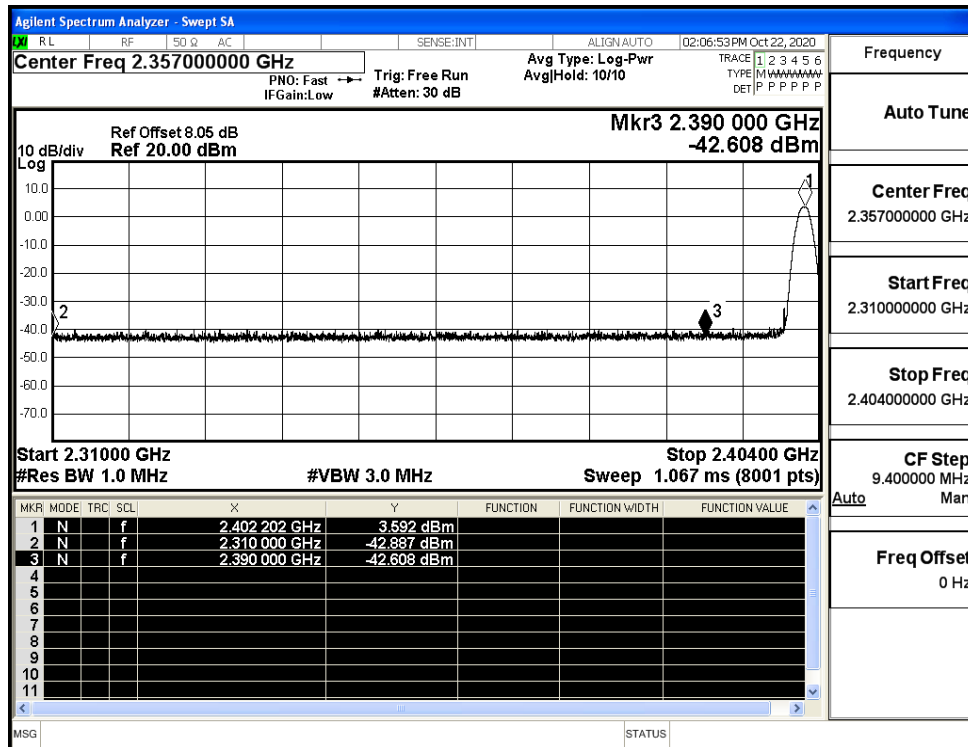
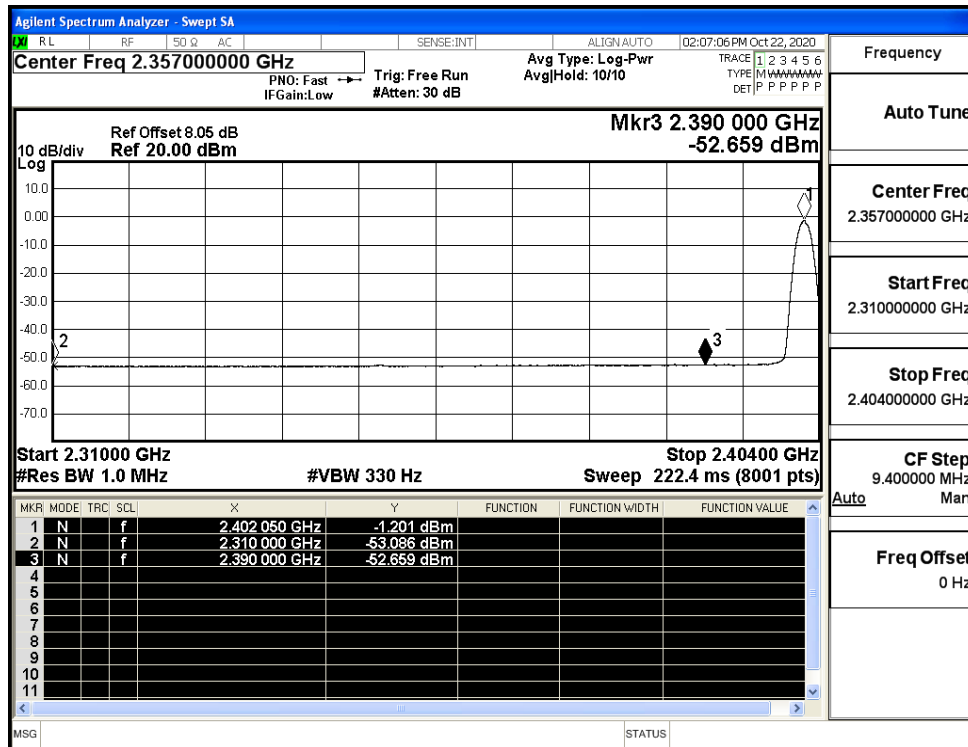


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

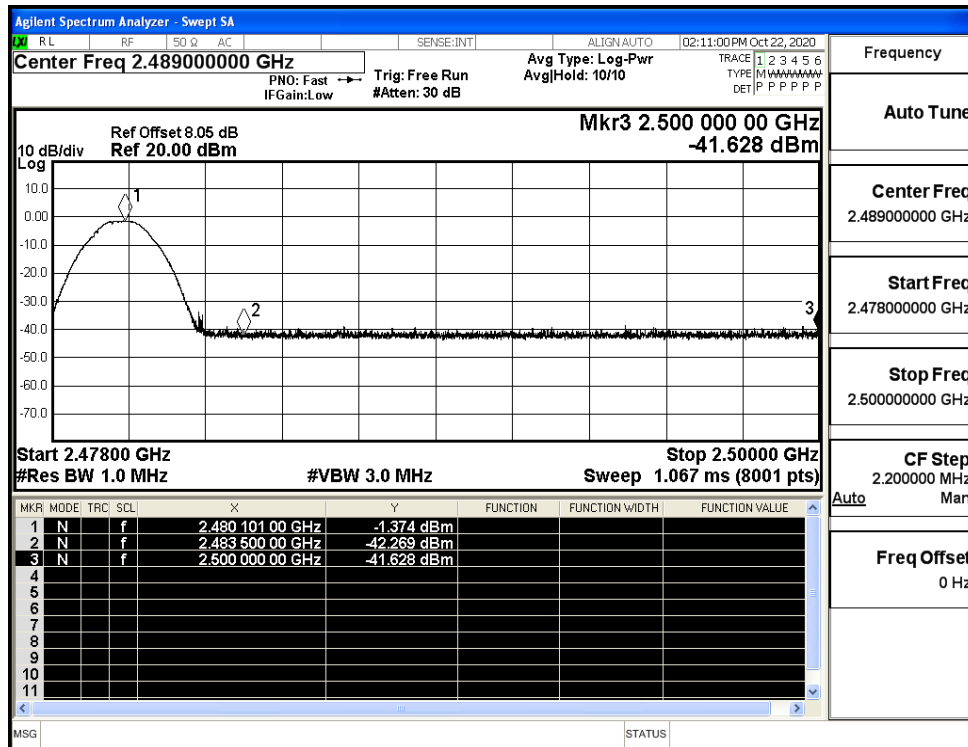


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

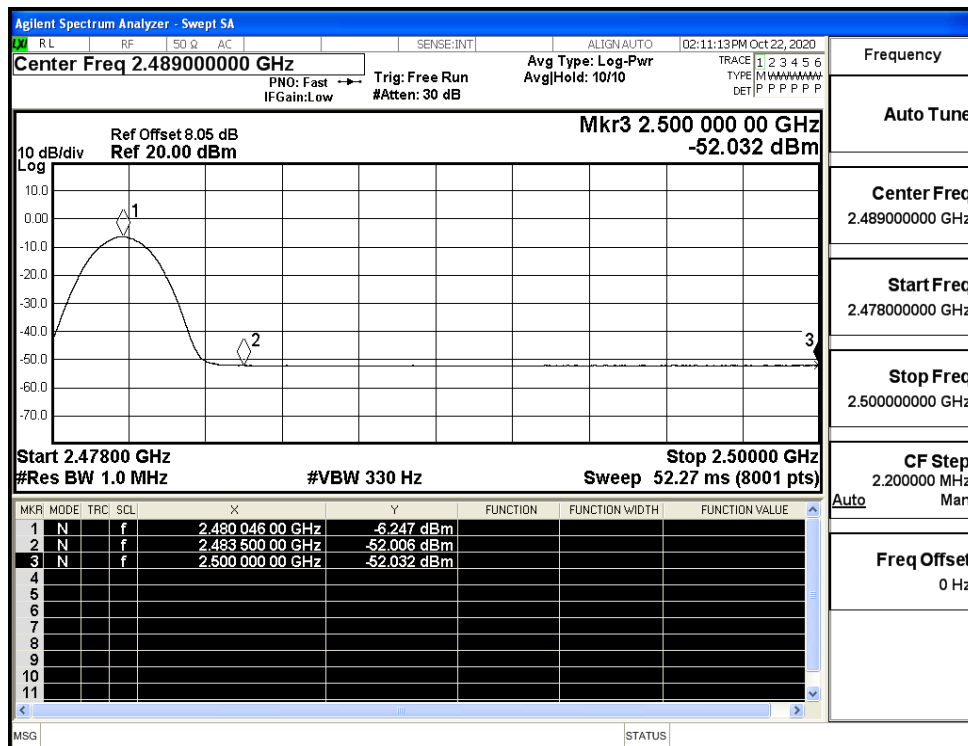


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

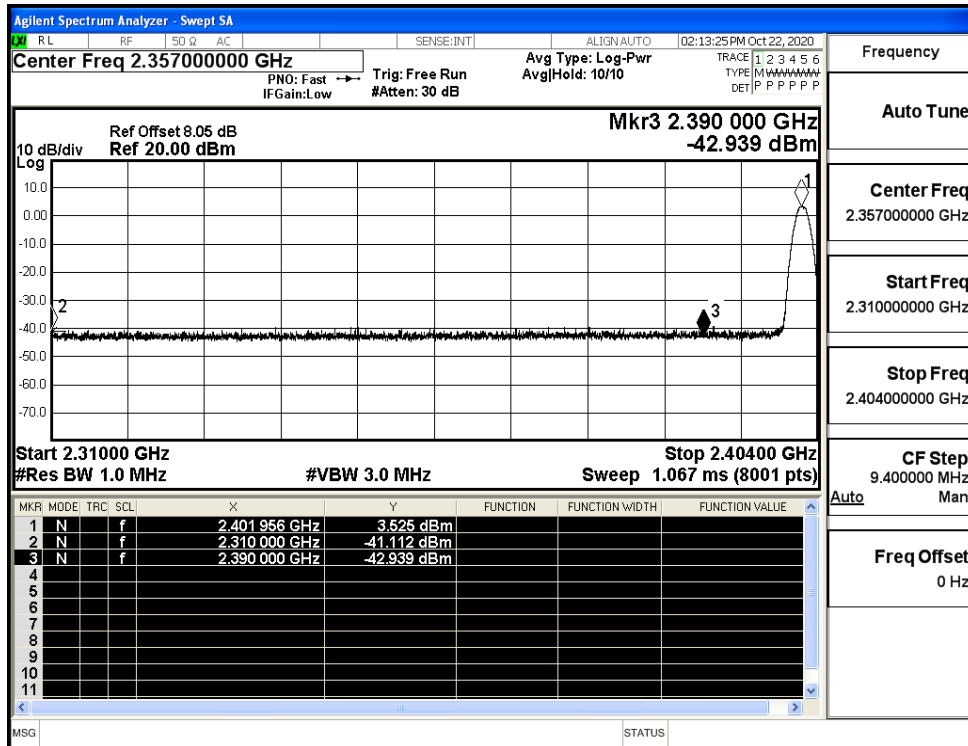
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



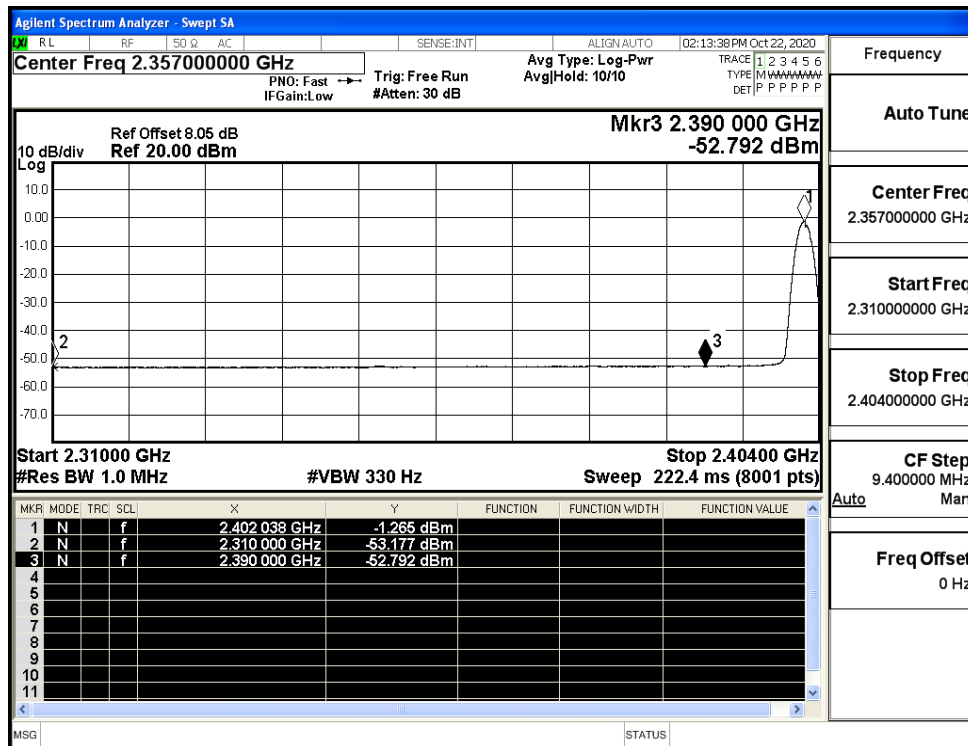
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



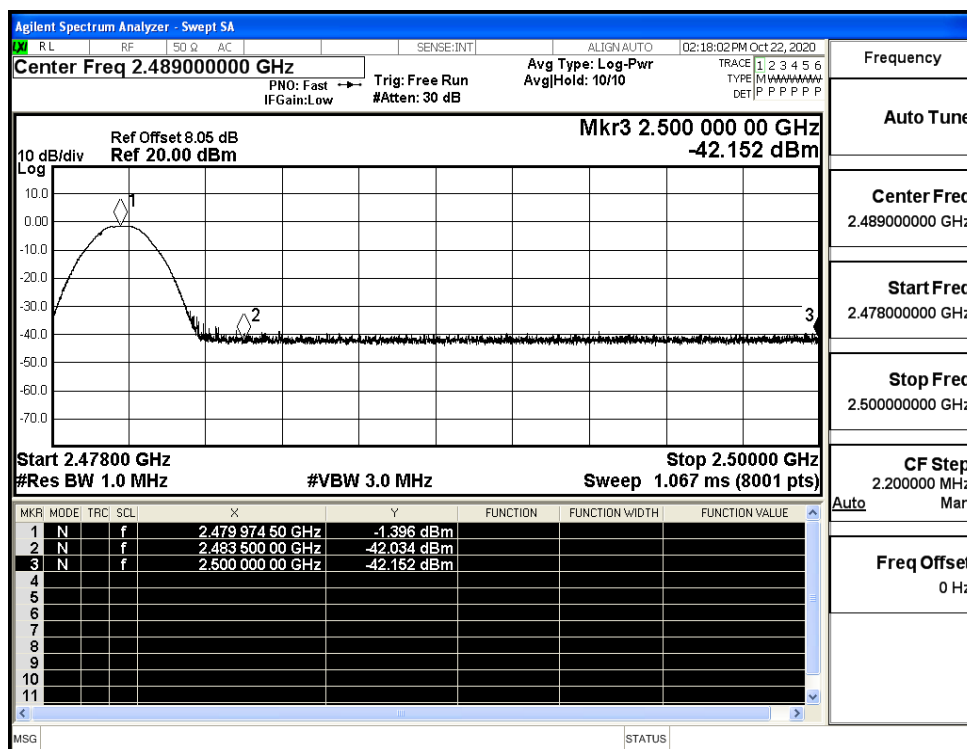
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

