

Appendix A

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

Product Name: MEE audio X20 Truly Wireless Earphones

Trade Mark: MEE audio

Test Model: X20

Environmental Conditions

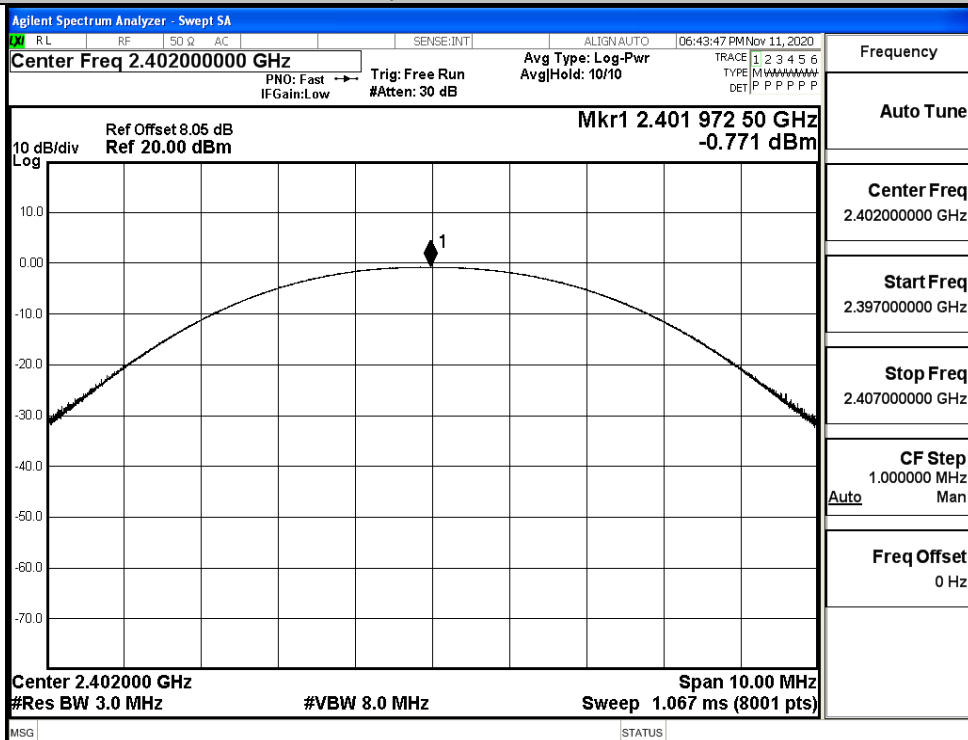
Temperature:	22.5°C
Relative Humidity:	51.8%
ATM Pressure:	100.0 kPa
Test Engineer:	Kay Hu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

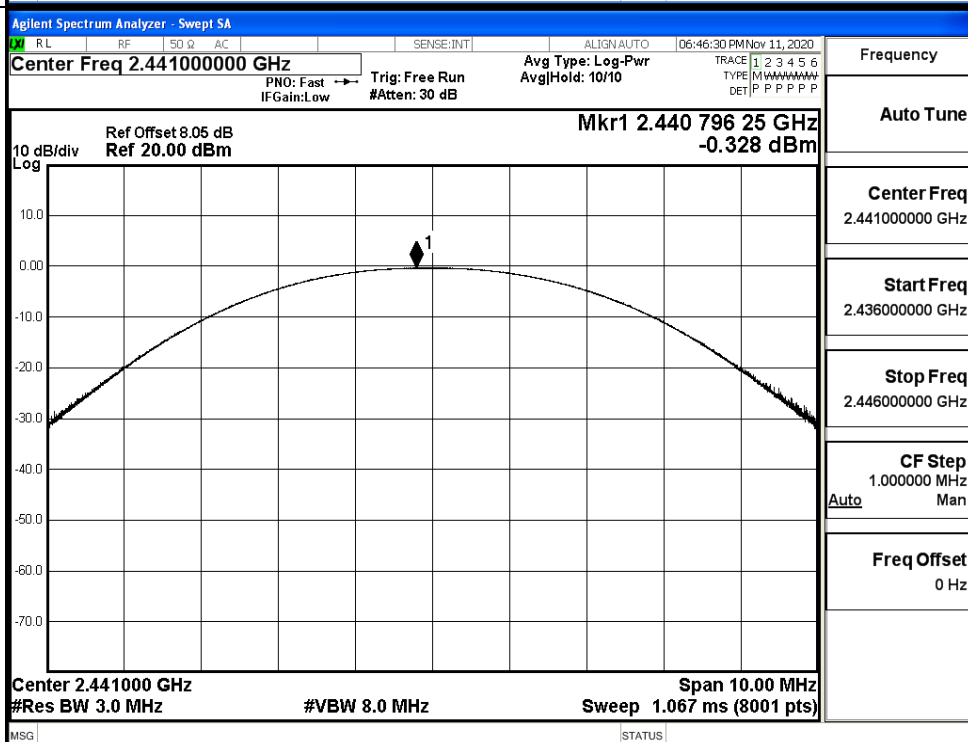
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.771	30	PASS
	MCH	-0.328	30	PASS
	HCH	-0.845	30	PASS
$\pi/4$ DQPSK	LCH	-0.816	21	PASS
	MCH	-0.355	21	PASS
	HCH	-0.942	21	PASS
8DPSK	LCH	-0.804	21	PASS
	MCH	-0.389	21	PASS
	HCH	-0.888	21	PASS

Test Graphs

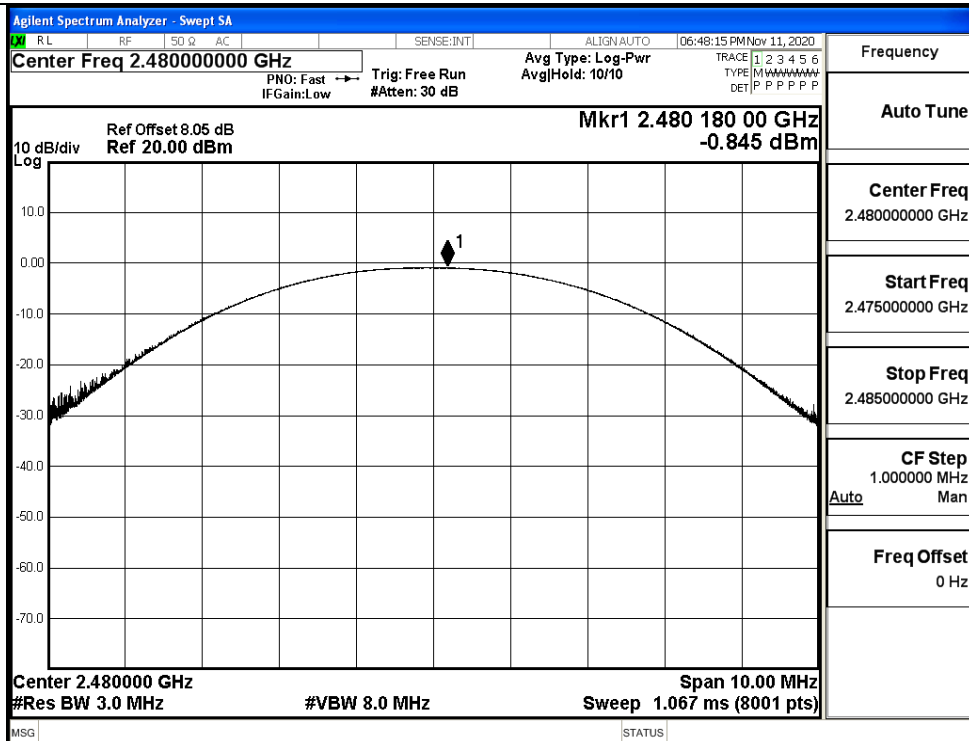
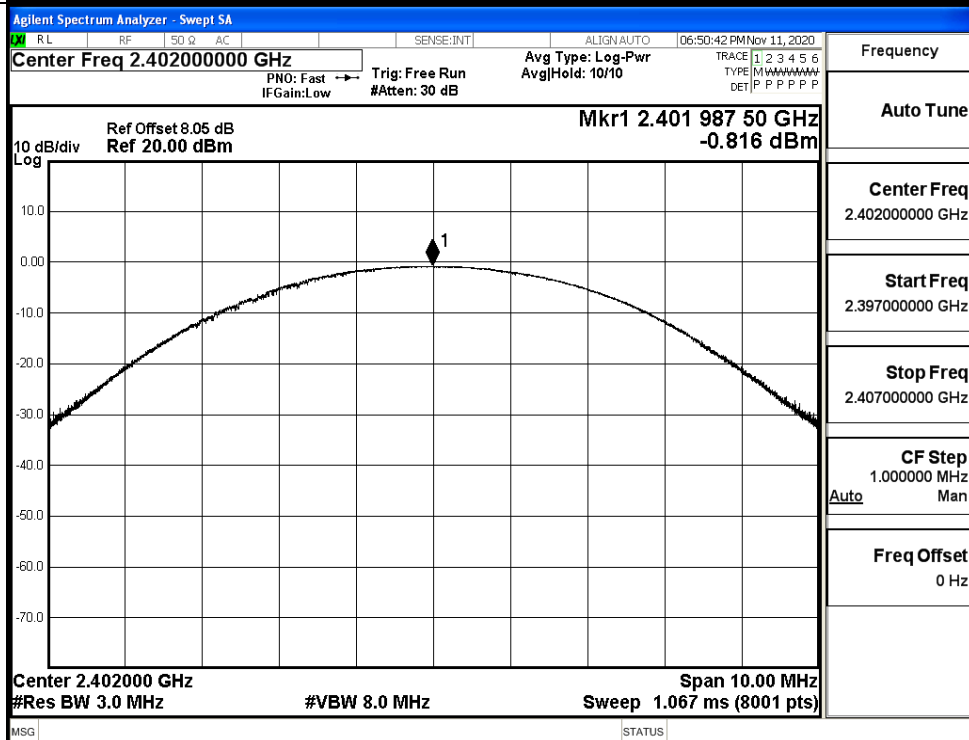
GFSK/LCH

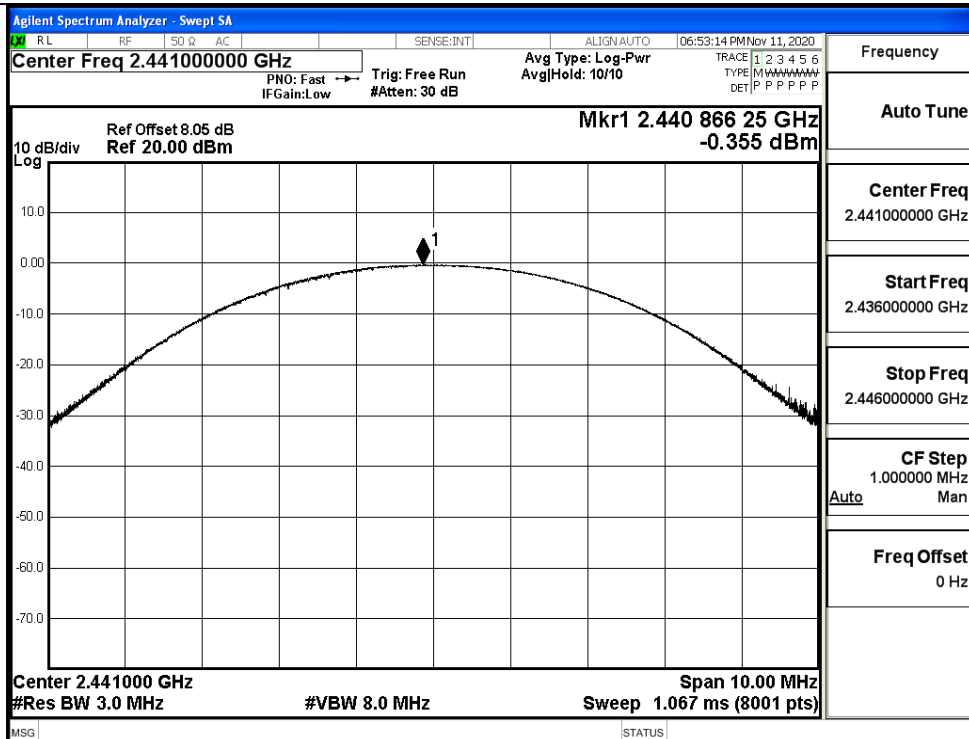
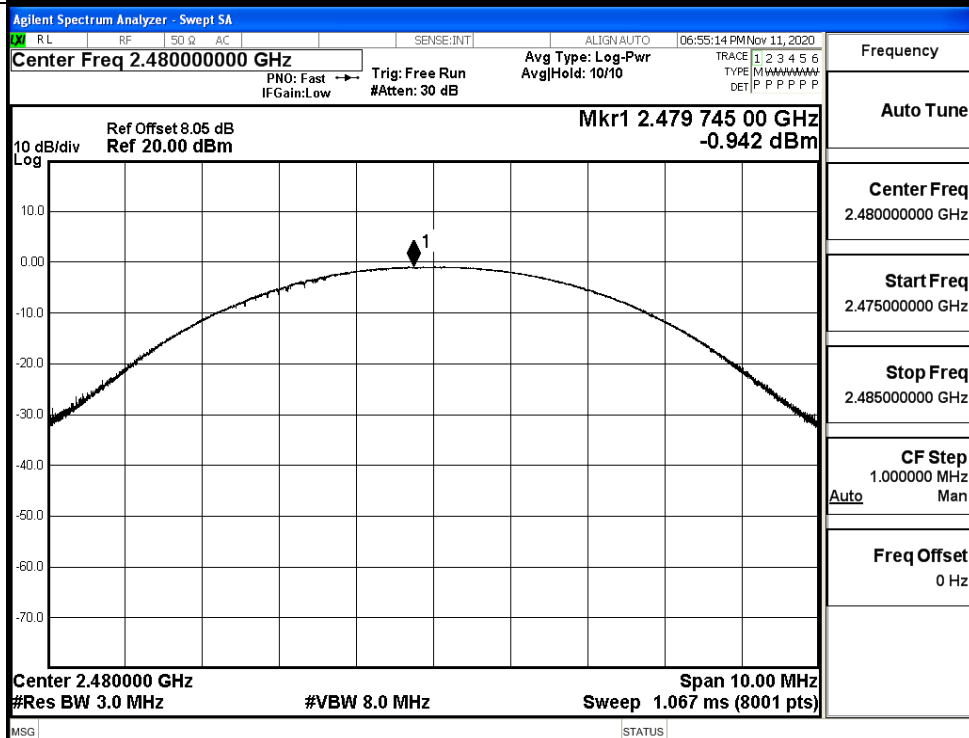


GFSK/MCH

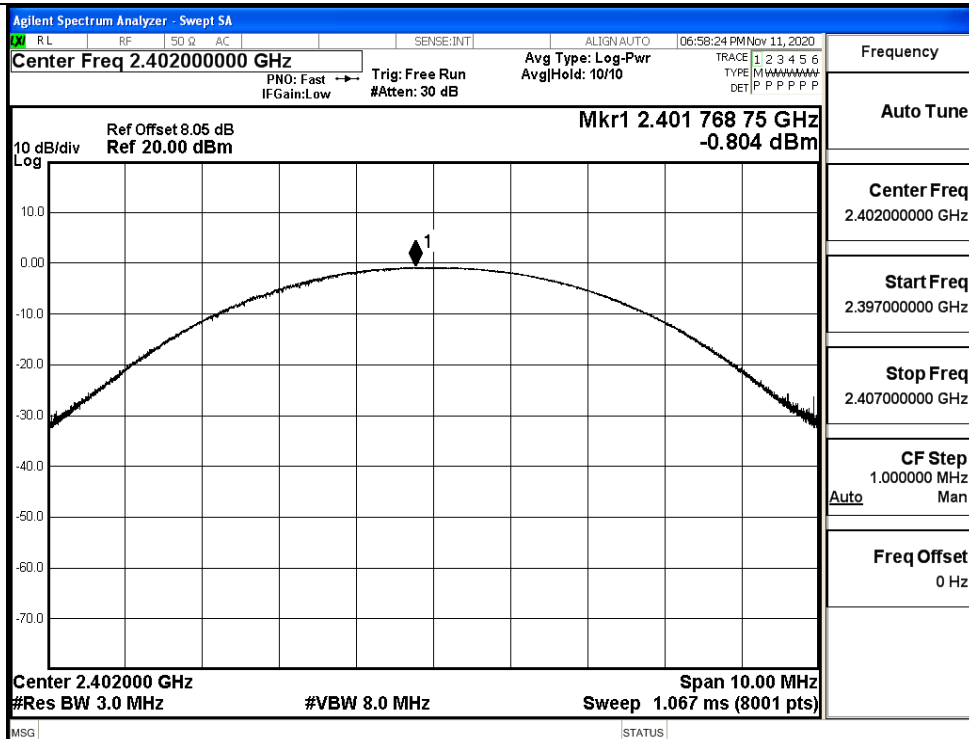


GFSK/HCH

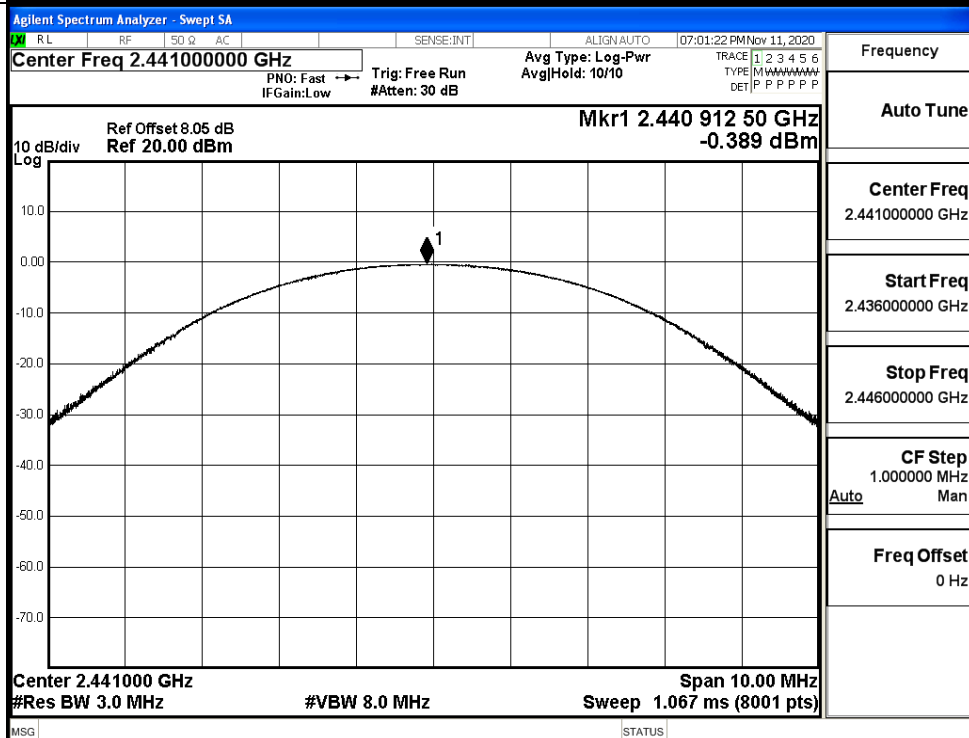
 $\pi/4$ DQPSK/LCH

$\pi/4$ DQPSK/MCH $\pi/4$ DQPSK/HCH

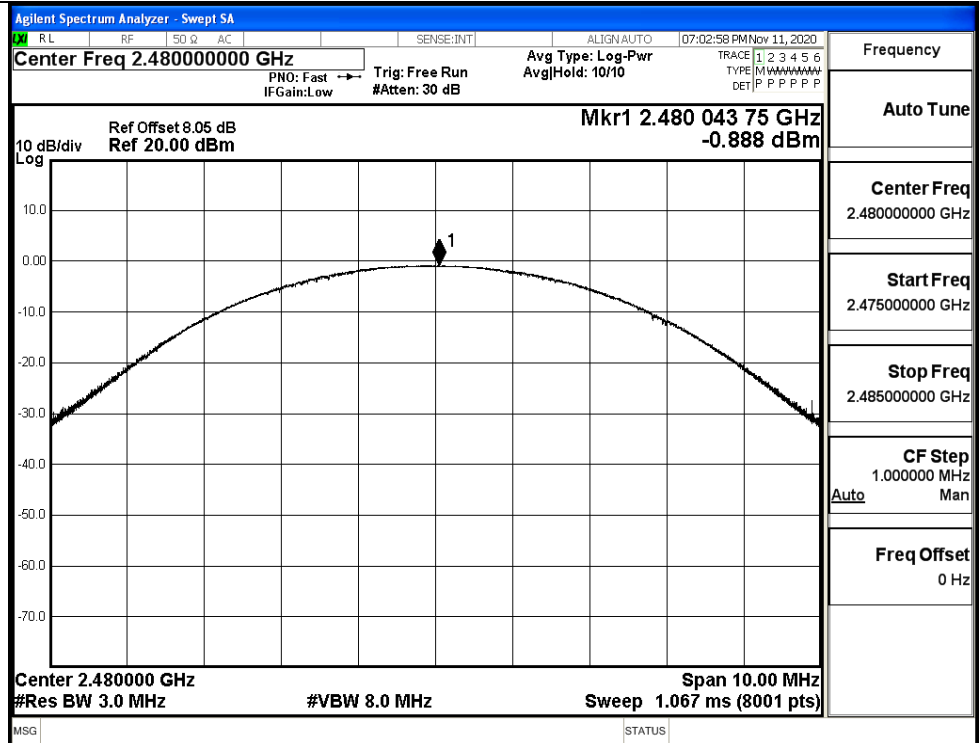
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

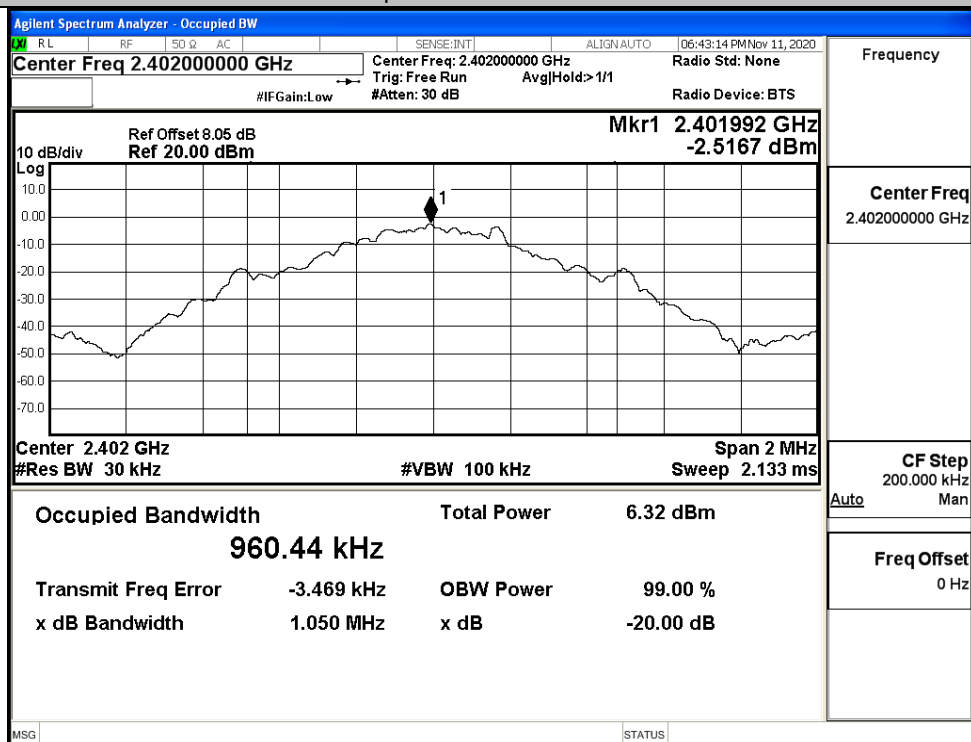


A.2 20dB Bandwidth

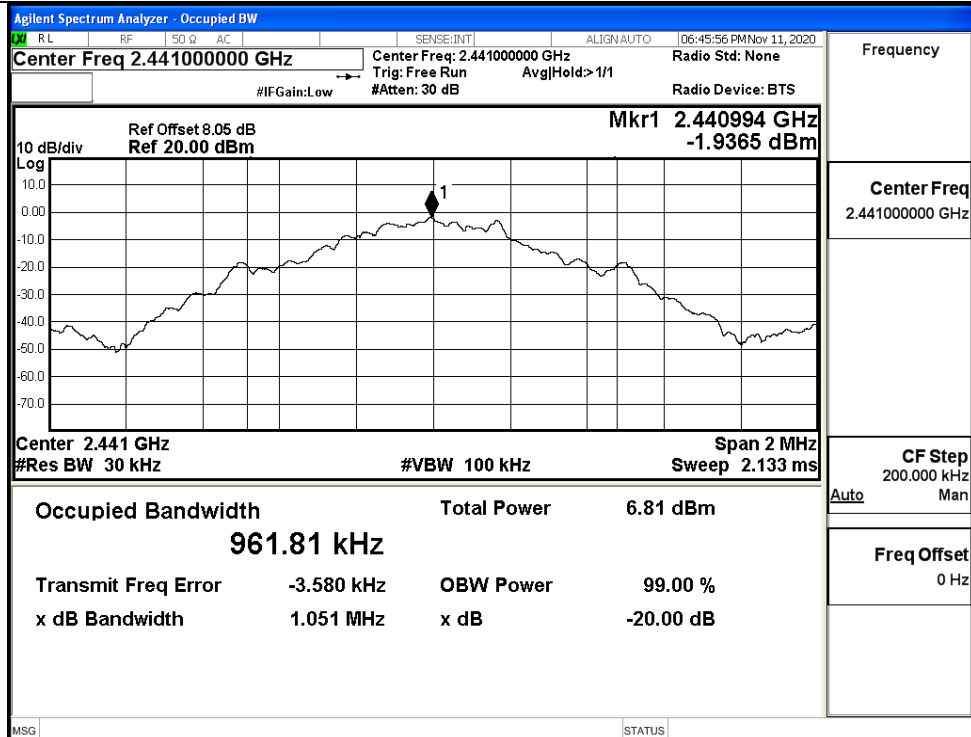
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.050	Not Specified	PASS
	MCH	1.051	Not Specified	PASS
	HCH	1.051	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.193	Not Specified	PASS
	MCH	1.190	Not Specified	PASS
	HCH	1.190	Not Specified	PASS
8DPSK	LCH	1.234	Not Specified	PASS
	MCH	1.230	Not Specified	PASS
	HCH	1.197	Not Specified	PASS

Test Graphs

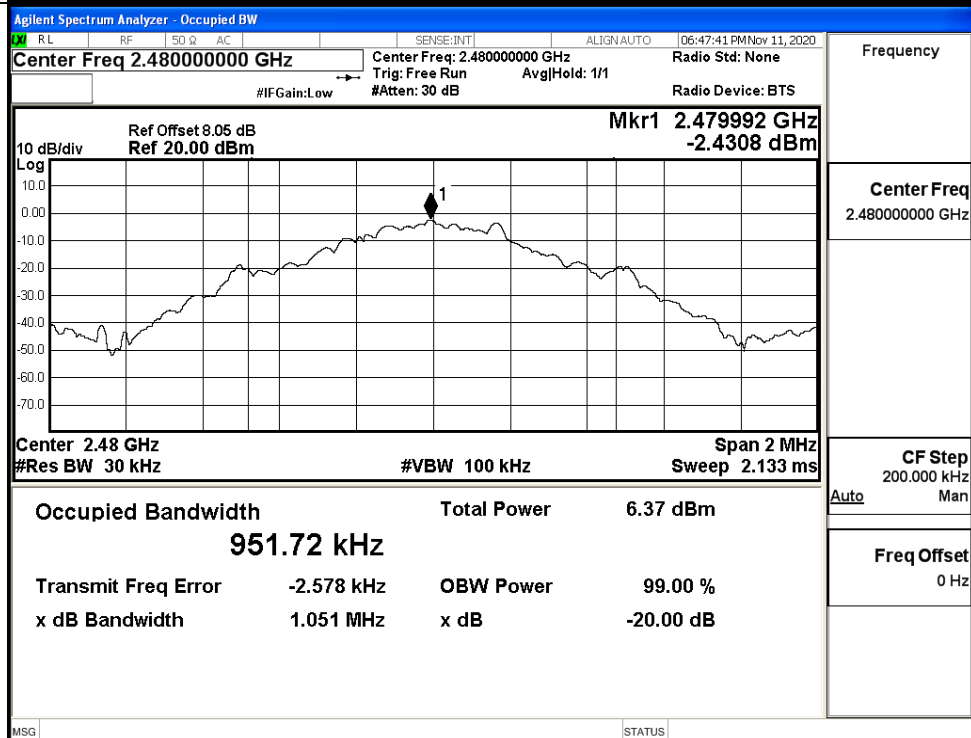
GFSK/LCH

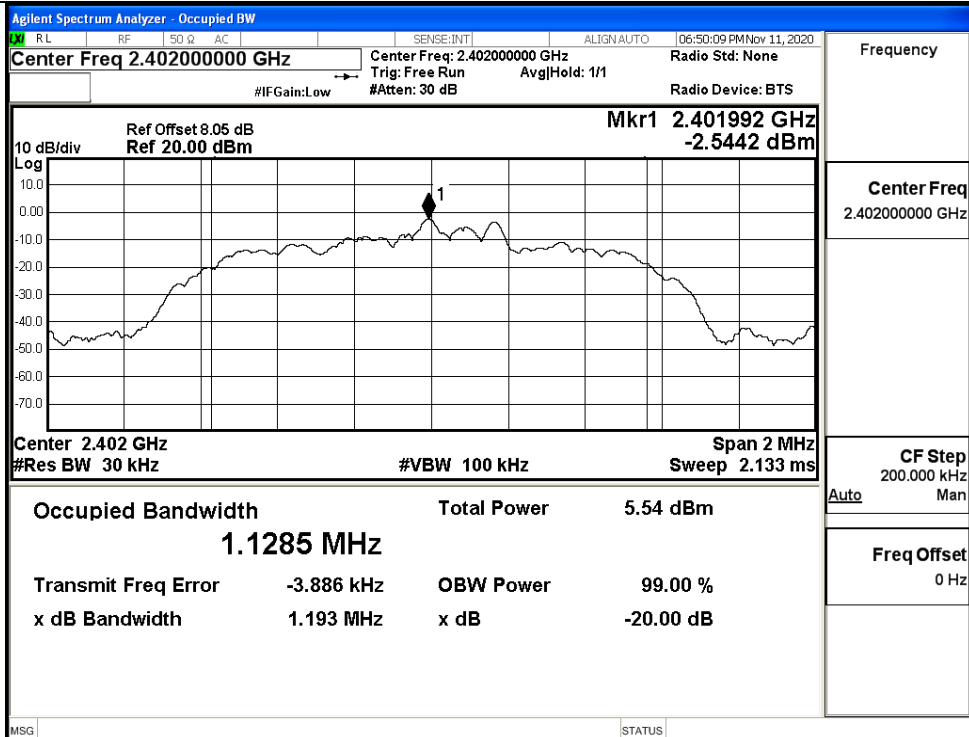


GFSK/MCH

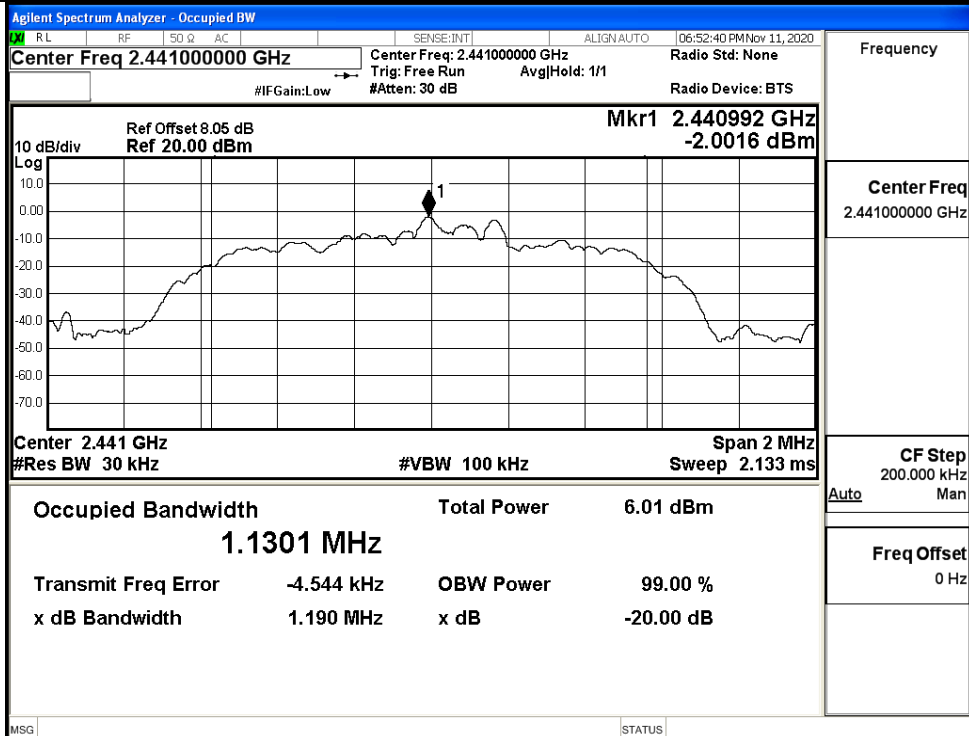


GFSK/HCH



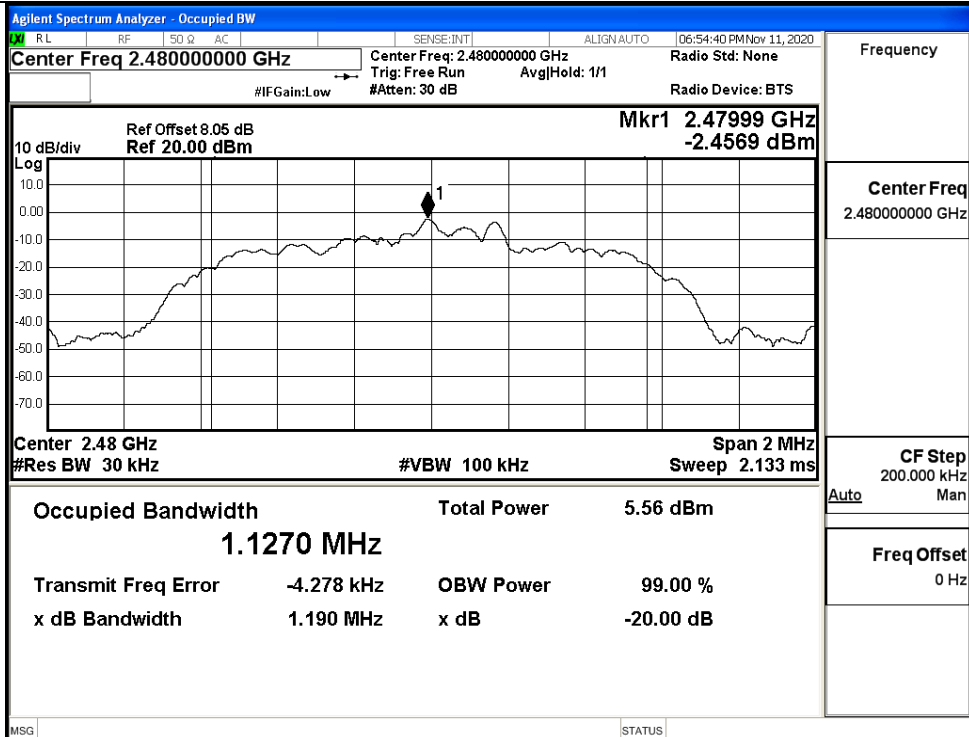
$\pi/4$ DQPSK/LCH

Frequency

Center Freq
2.40200000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz $\pi/4$ DQPSK/MCH

Frequency

Center Freq
2.44100000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH

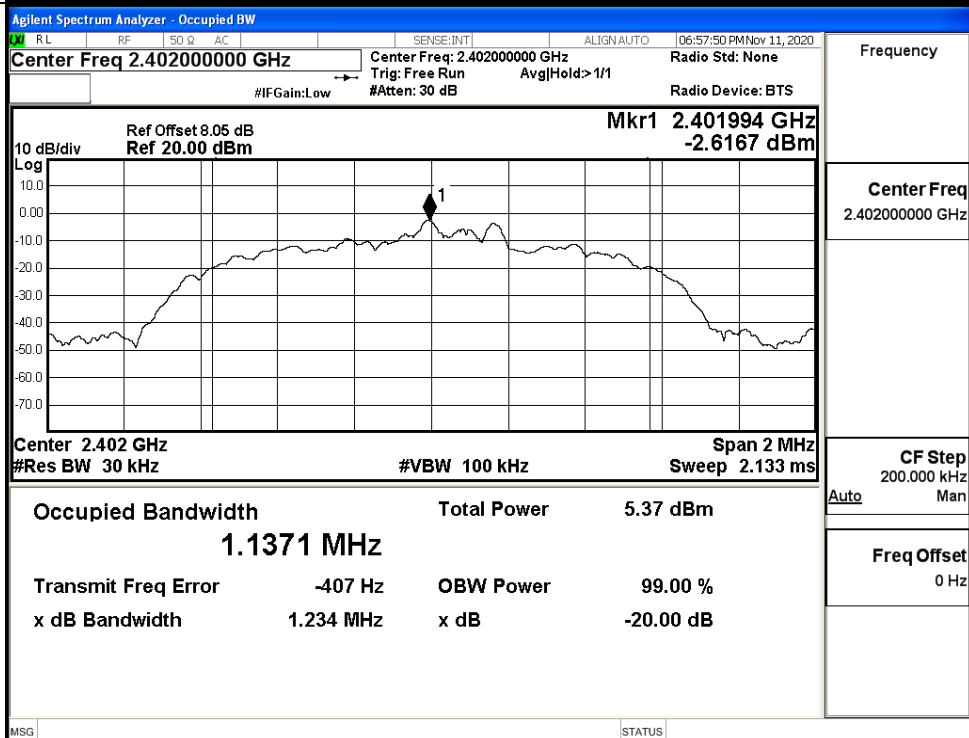
Frequency

Center Freq
2.48000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

8DPSK/LCH



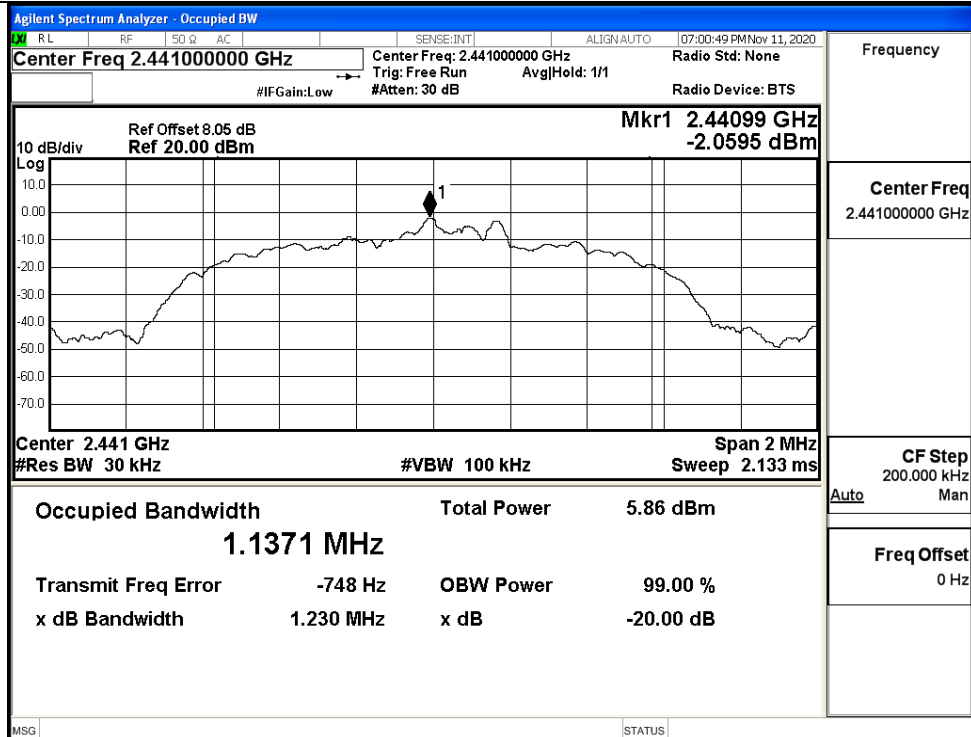
Frequency

Center Freq
2.40200000 GHzCF Step
200.000 kHz
Man

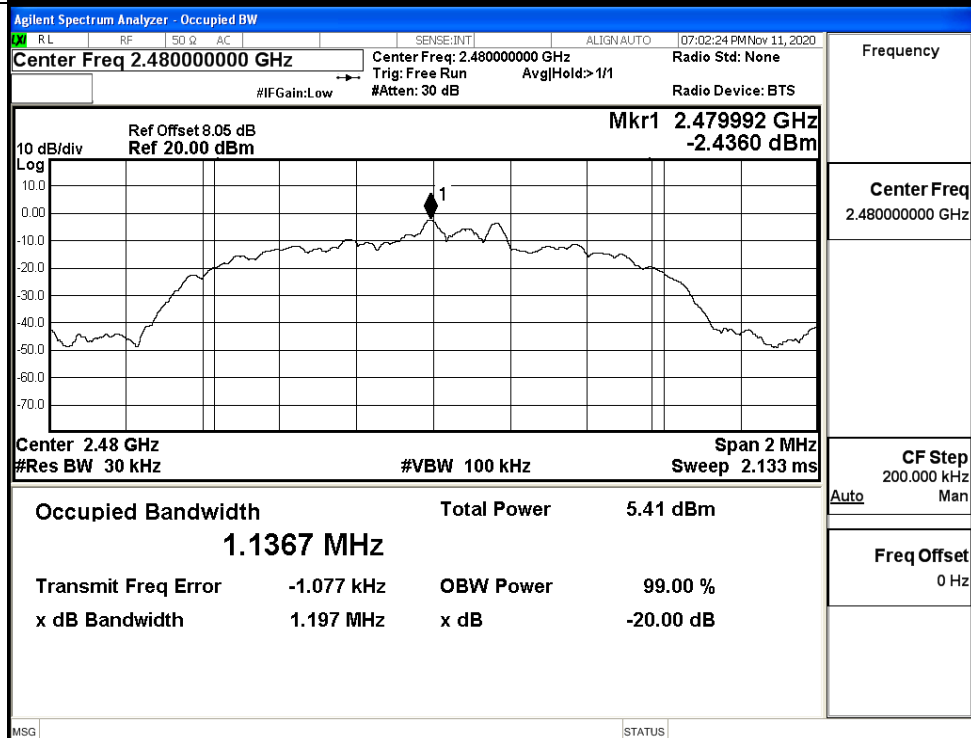
Auto

Freq Offset
0 Hz

8DPSK/MCH



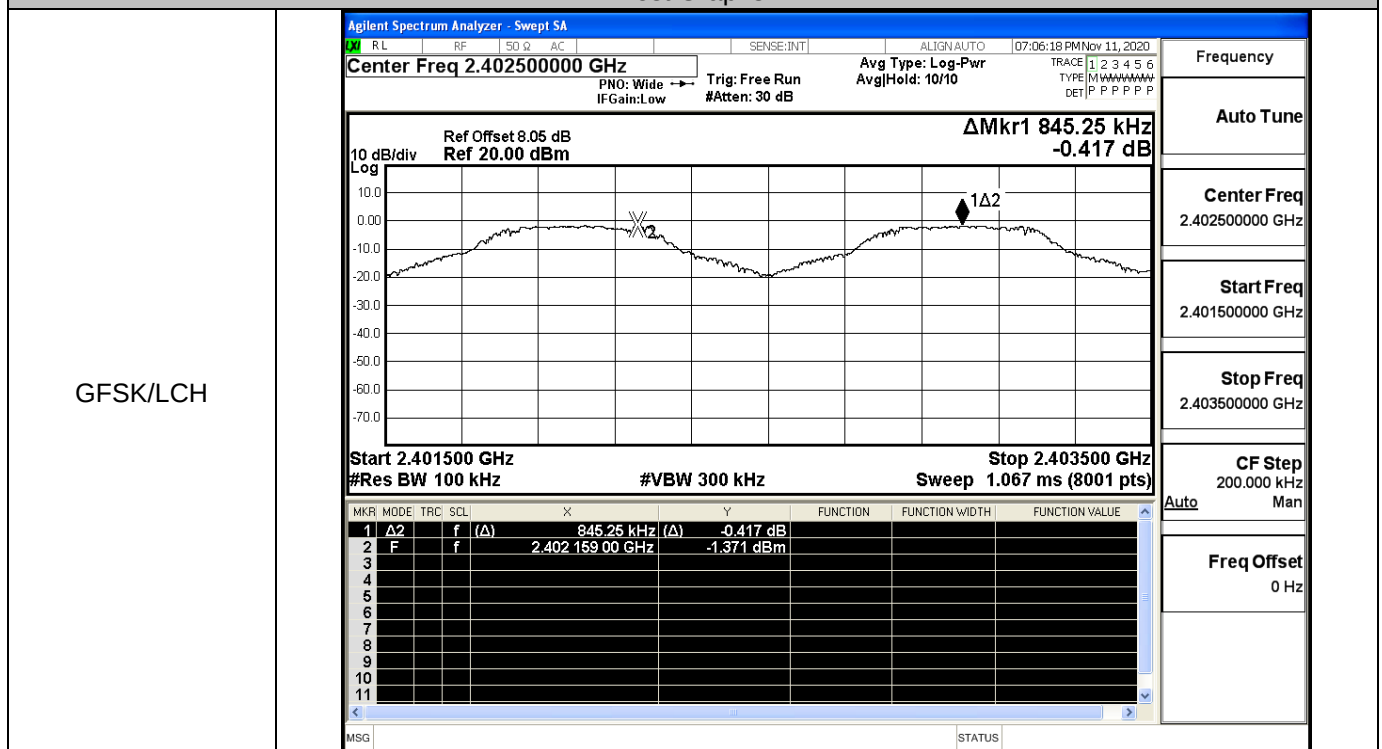
8DPSK/HCH



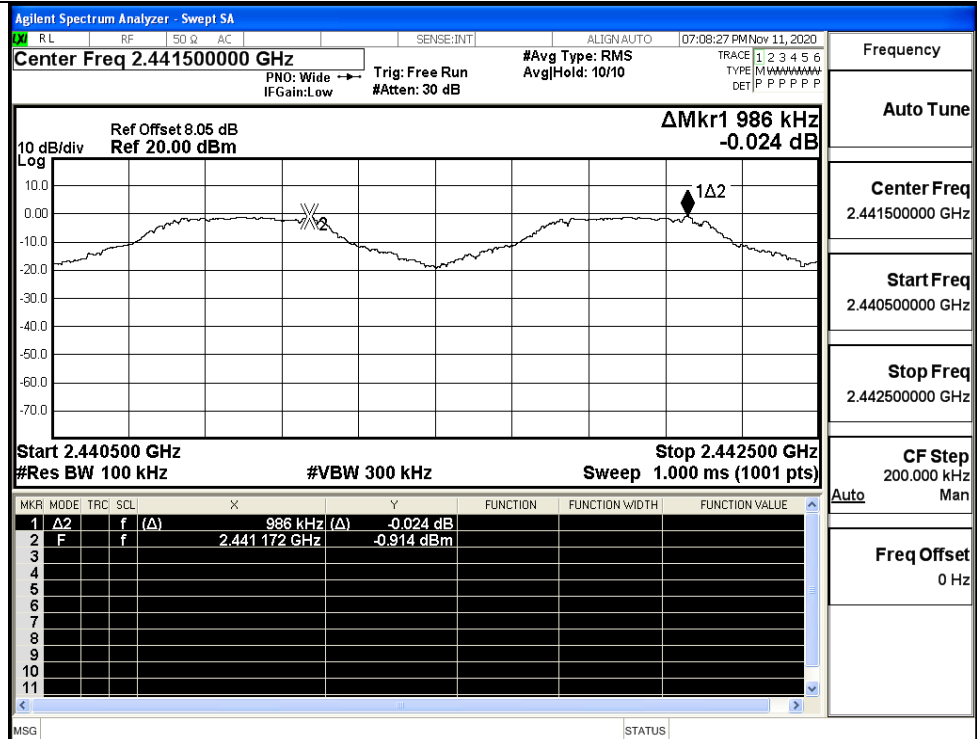
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.845	0.701	PASS
	MCH	0.986	0.701	PASS
	HCH	0.828	0.701	PASS
π /4DQPSK	LCH	0.992	0.795	PASS
	MCH	0.894	0.795	PASS
	HCH	1.040	0.795	PASS
8DPSK	LCH	0.888	0.823	PASS
	MCH	1.054	0.823	PASS
	HCH	1.136	0.823	PASS

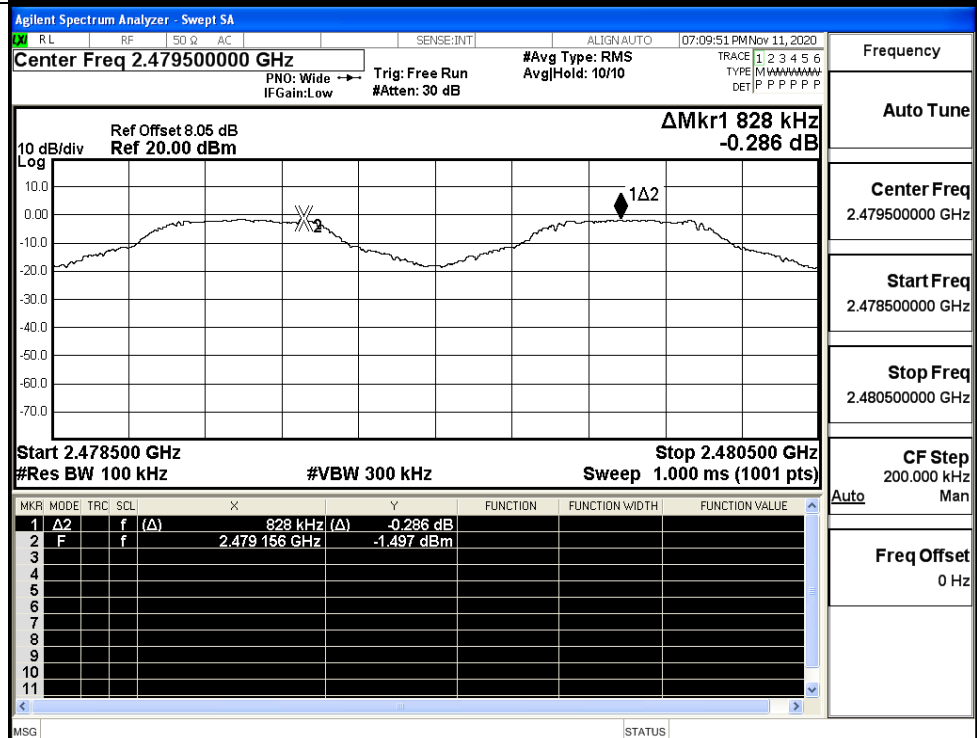
Test Graphs

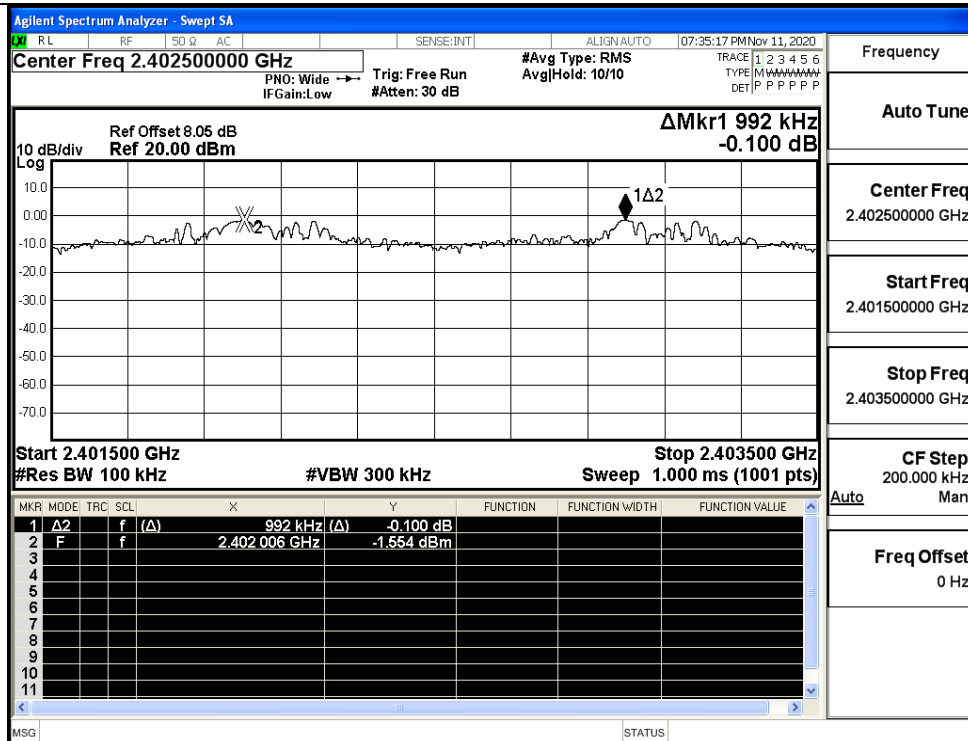
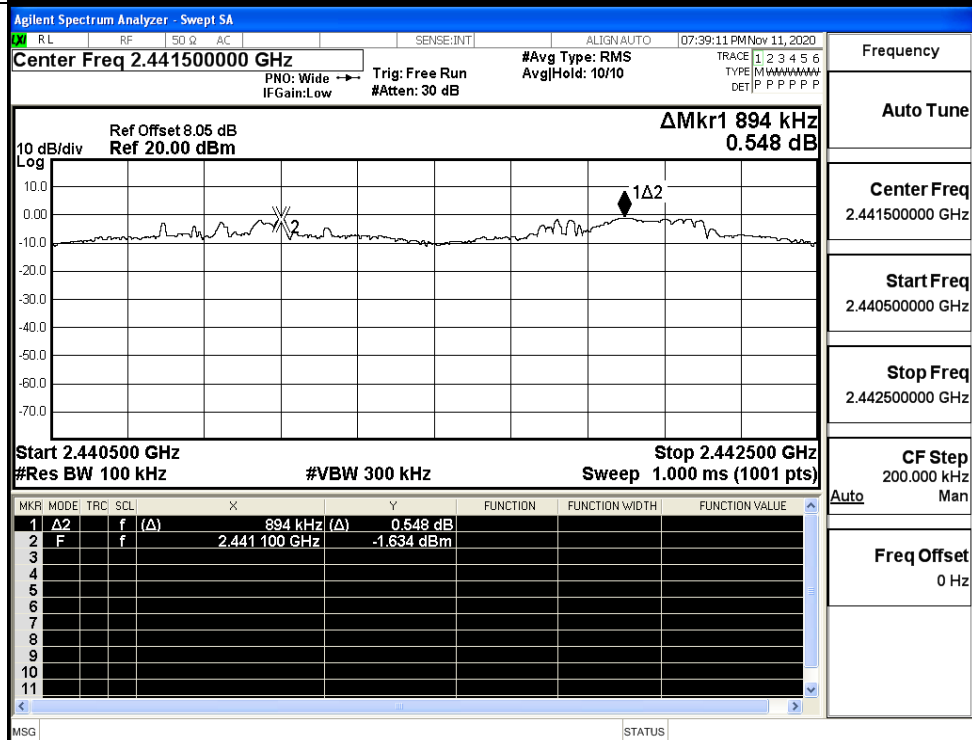


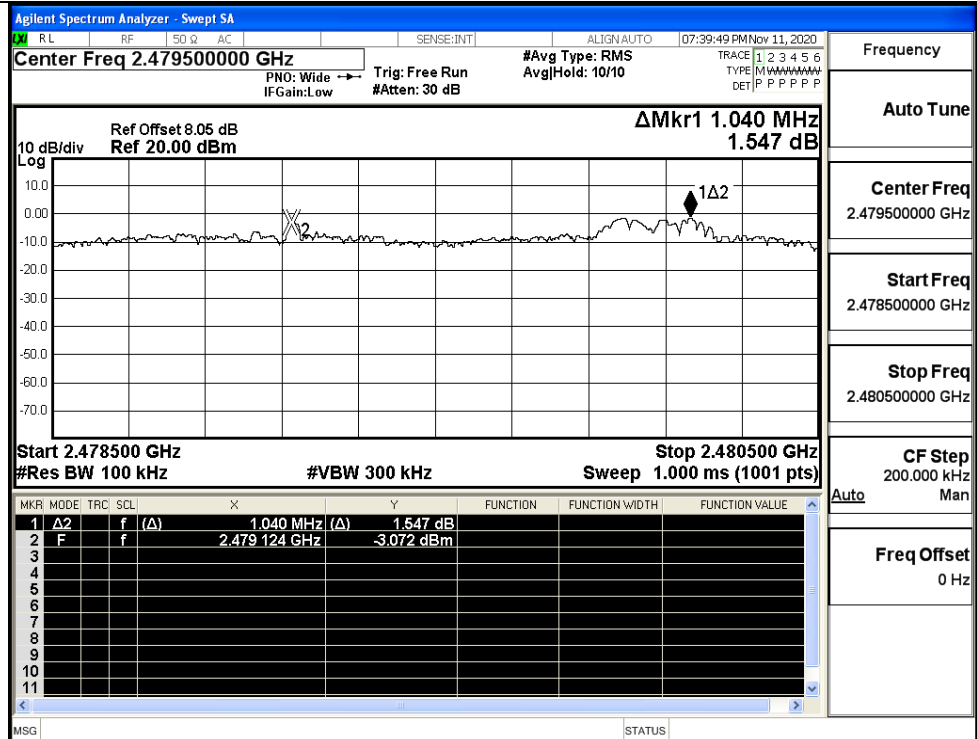
GFSK/MCH



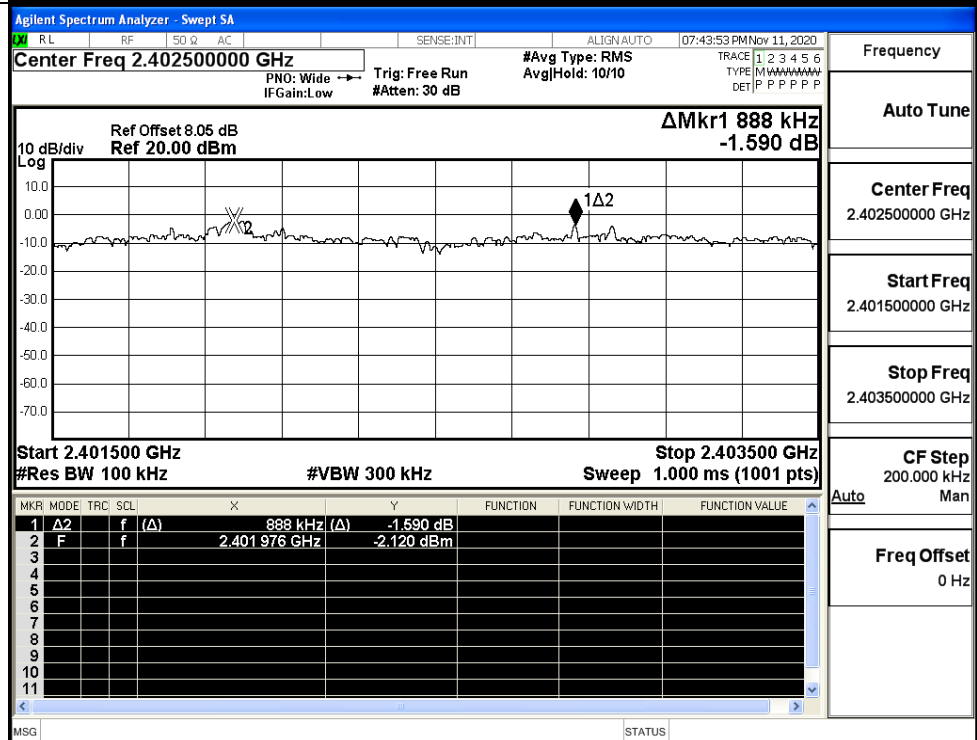
GFSK/HCH



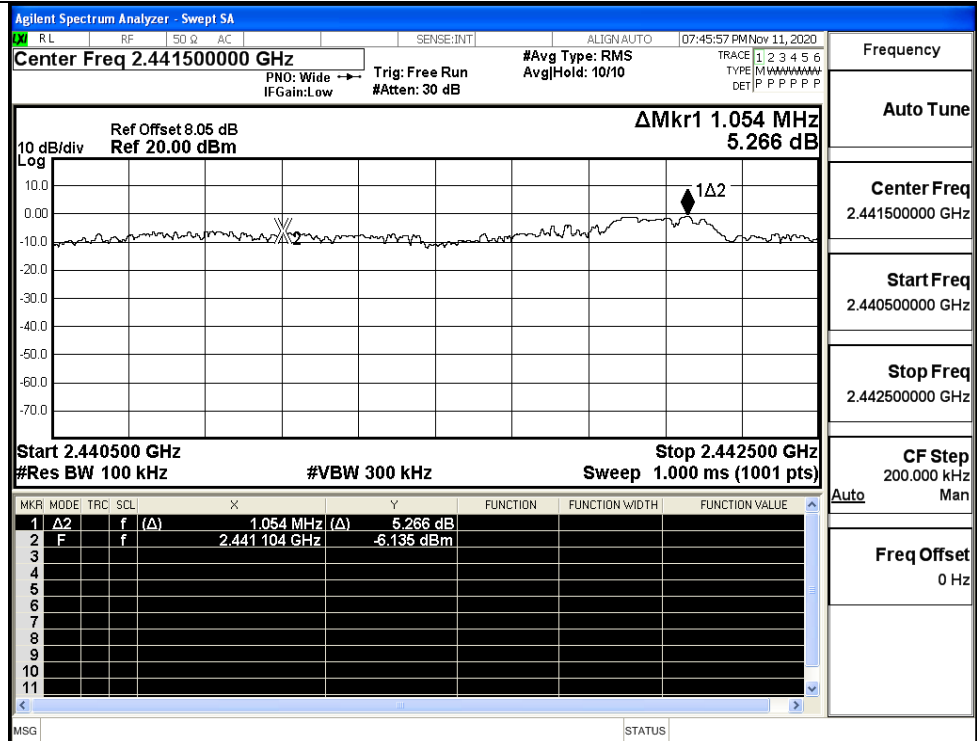
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

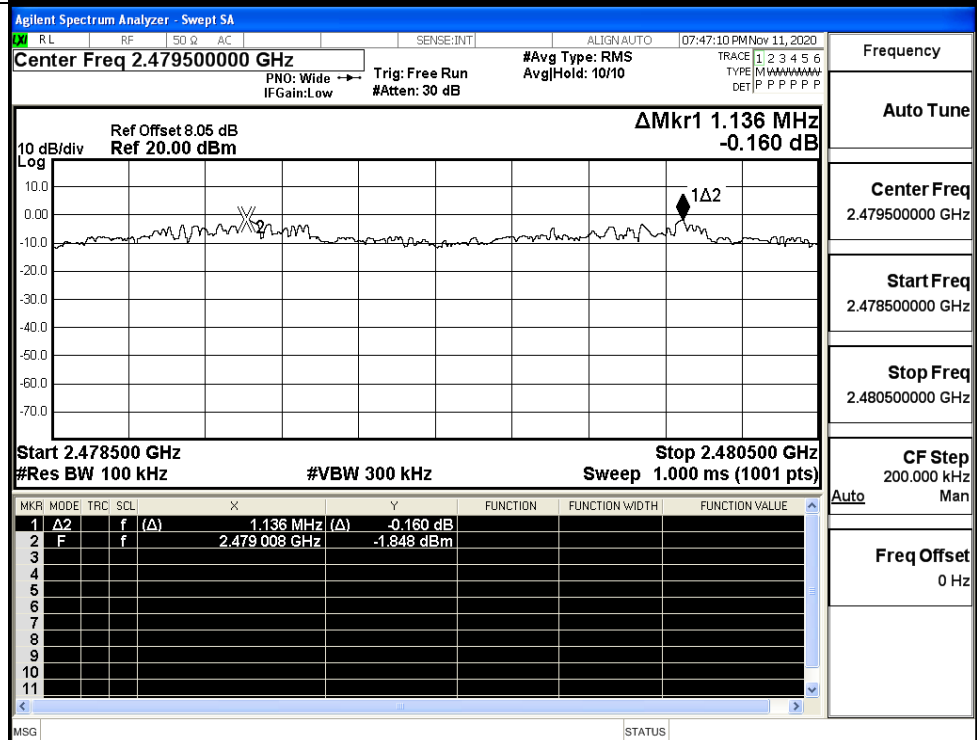
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

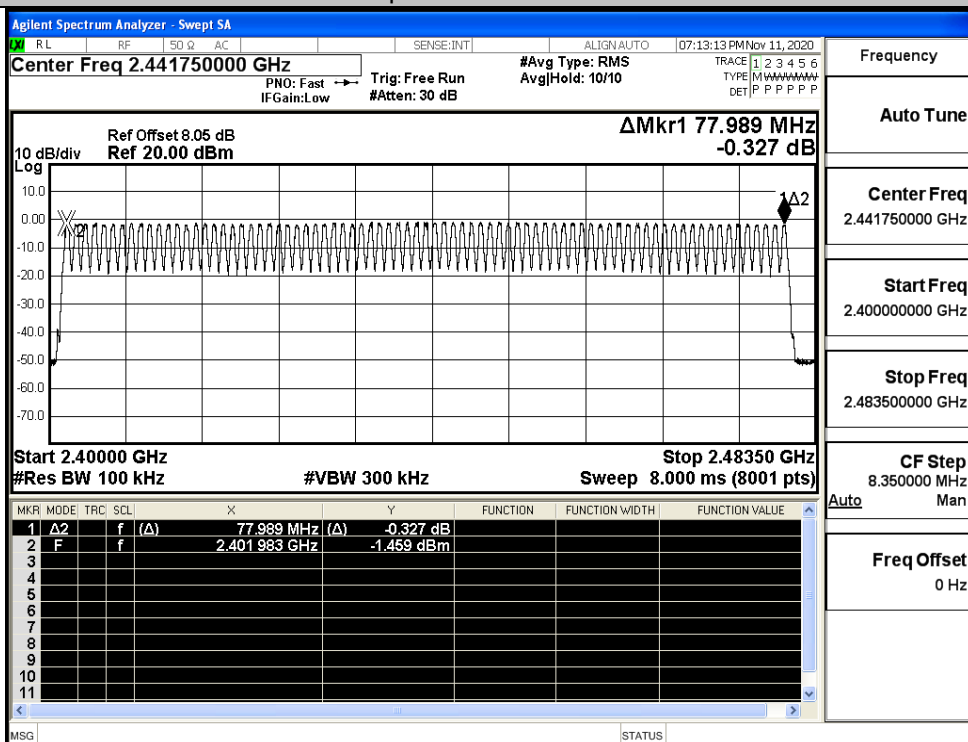


A.4 Hopping Channel Number

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

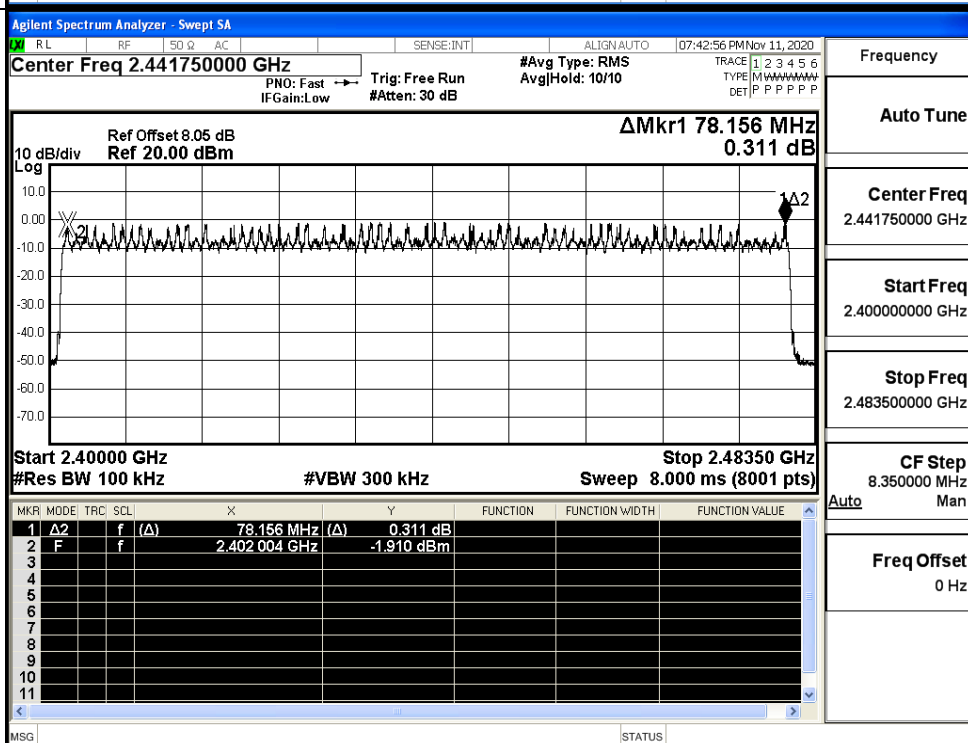
Test Graphs

GFSK/Hop



Frequency

Auto Tune

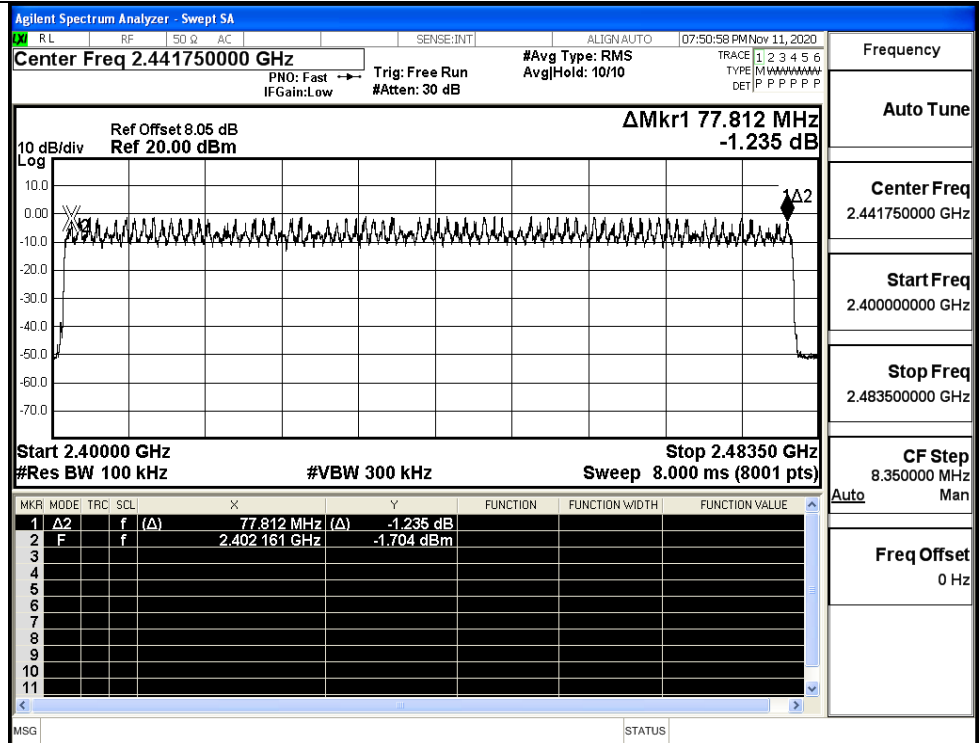
Center Freq
2.441750000 GHzStart Freq
2.400000000 GHzStop Freq
2.483500000 GHzCF Step
8.350000 MHz
ManFreq Offset
0 Hz $\pi/4$ DQPSK/Hop

Frequency

Auto Tune

Center Freq
2.441750000 GHzStart Freq
2.400000000 GHzStop Freq
2.483500000 GHzCF Step
8.350000 MHz
ManFreq Offset
0 Hz

8DPSK/Hop

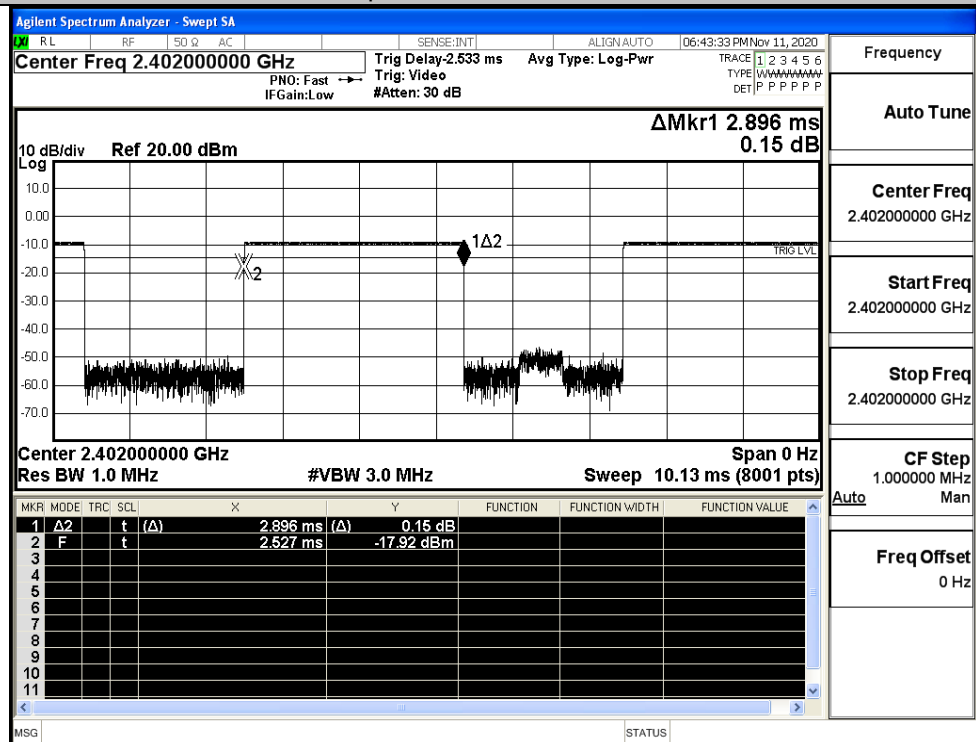


A.5 Dwell Time

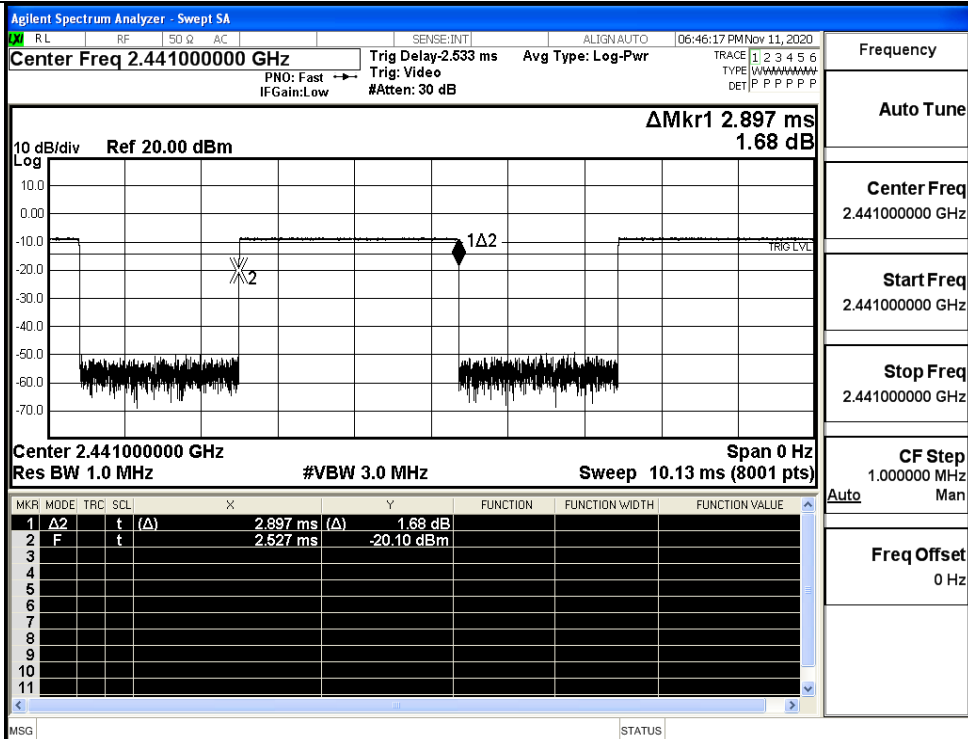
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7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

Test Graphs

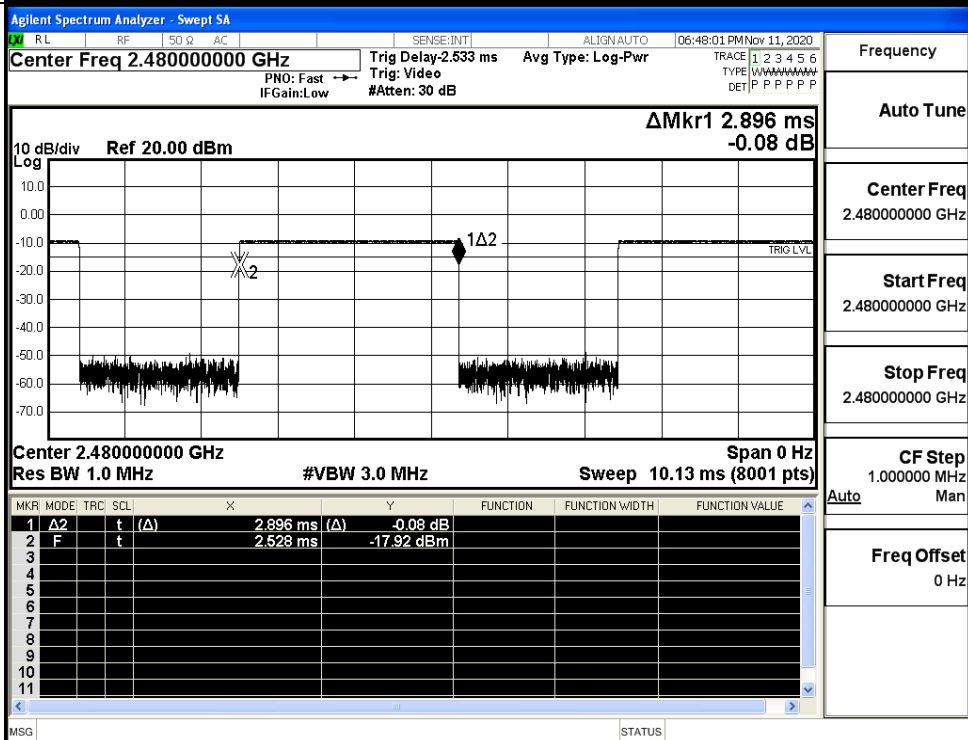
GFSK_DH5/LCH



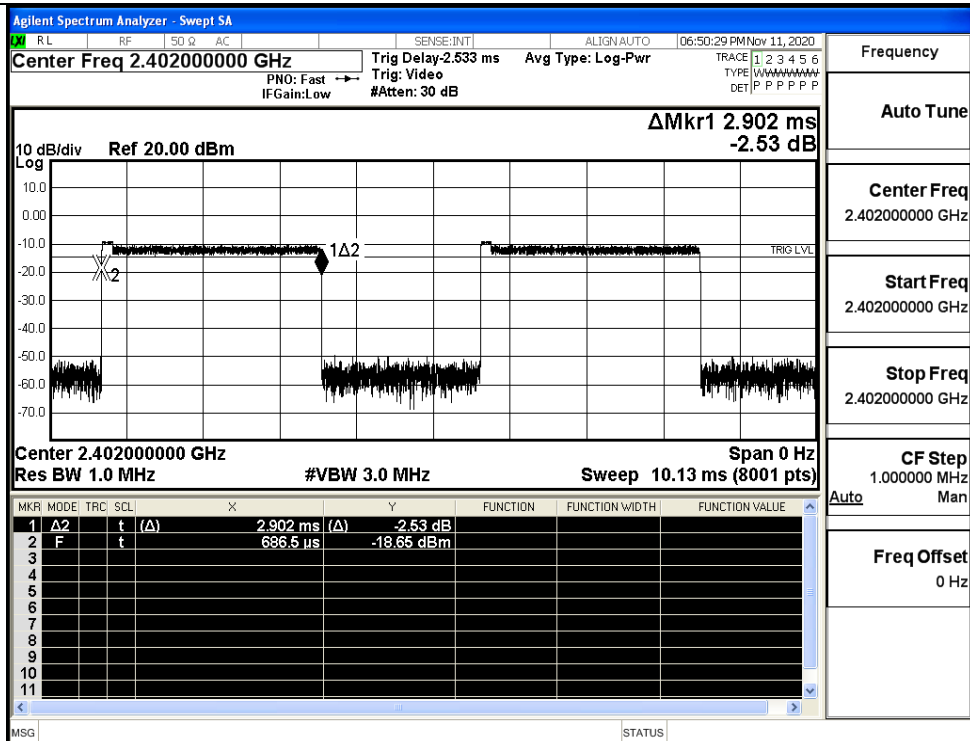
GFSK_DH5/MCH



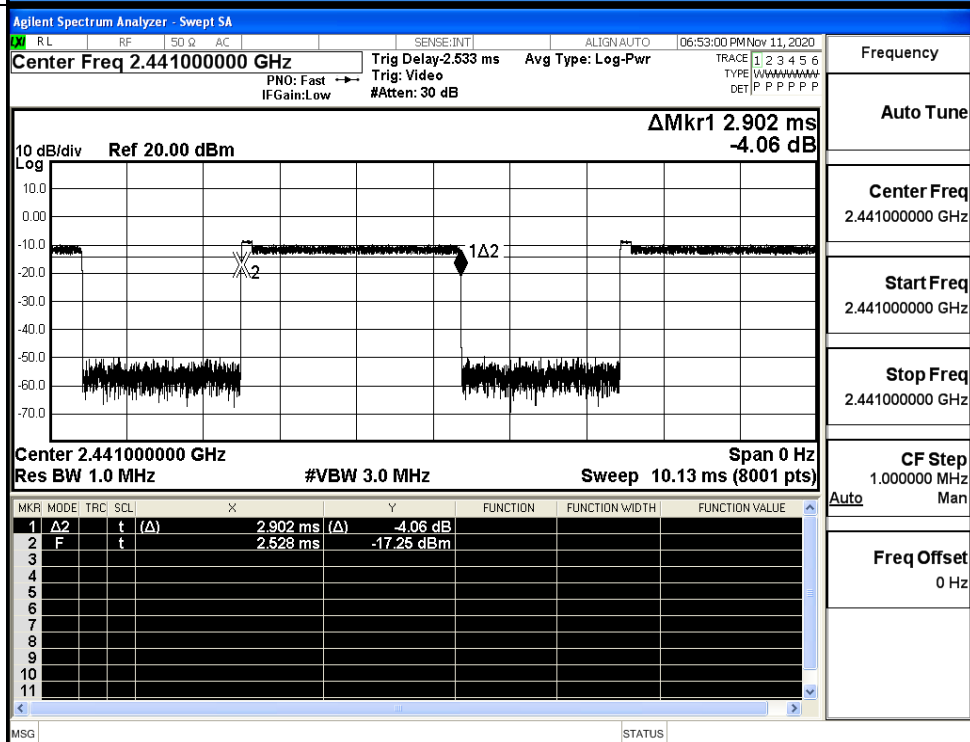
GFSK_DH5/HCH



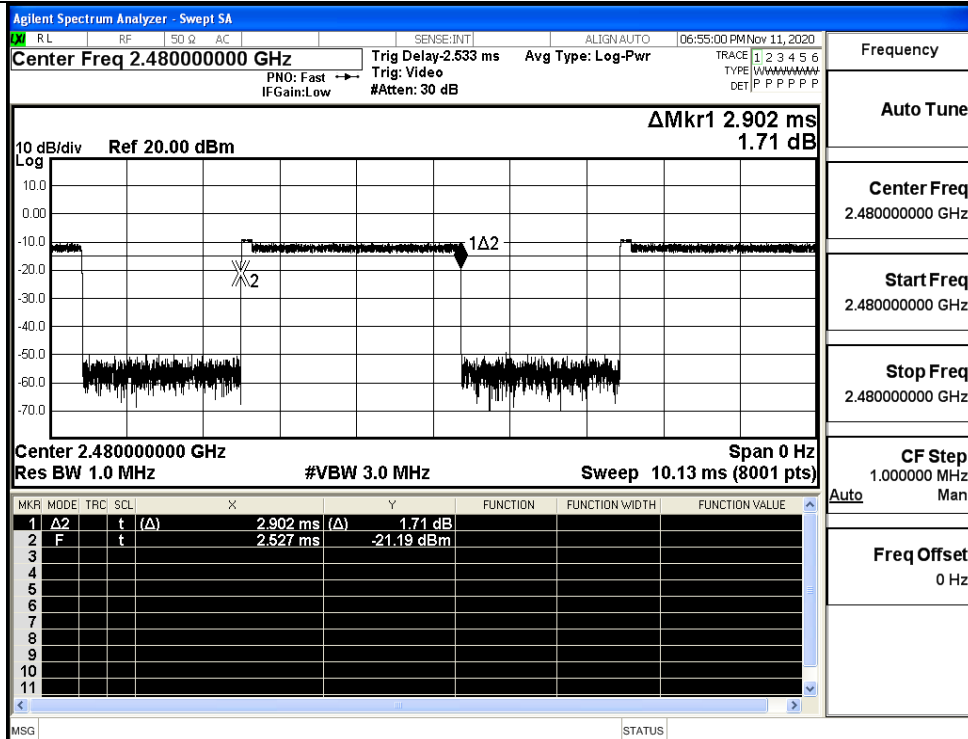
$\pi/4$ DQPSK
_2DH5/LCH



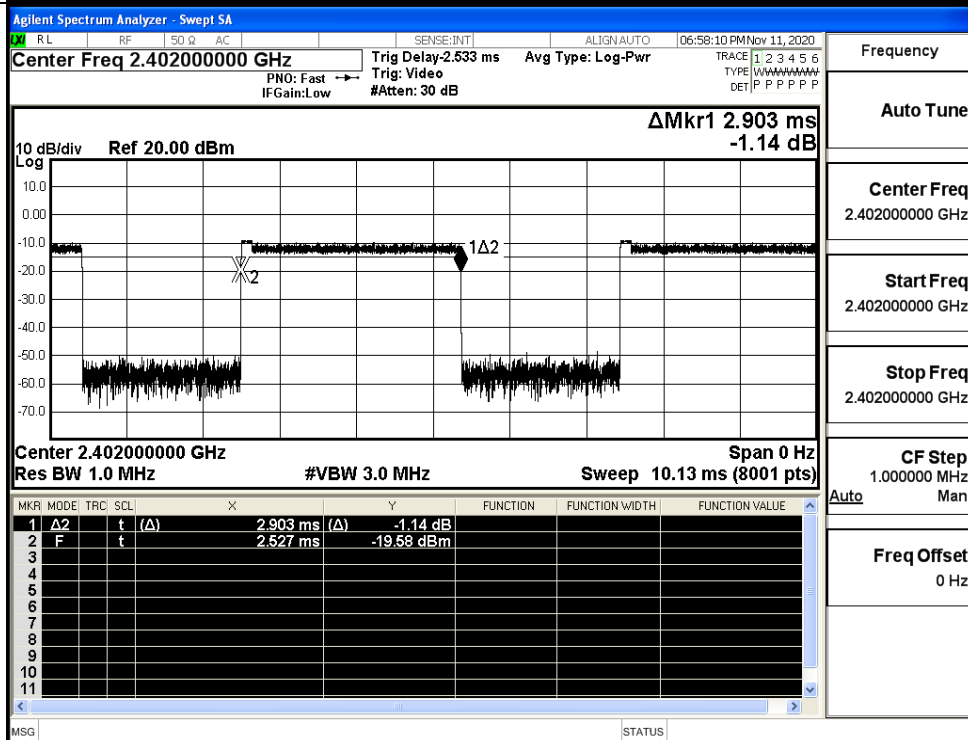
$\pi/4$ DQPSK
_2DH5/MCH



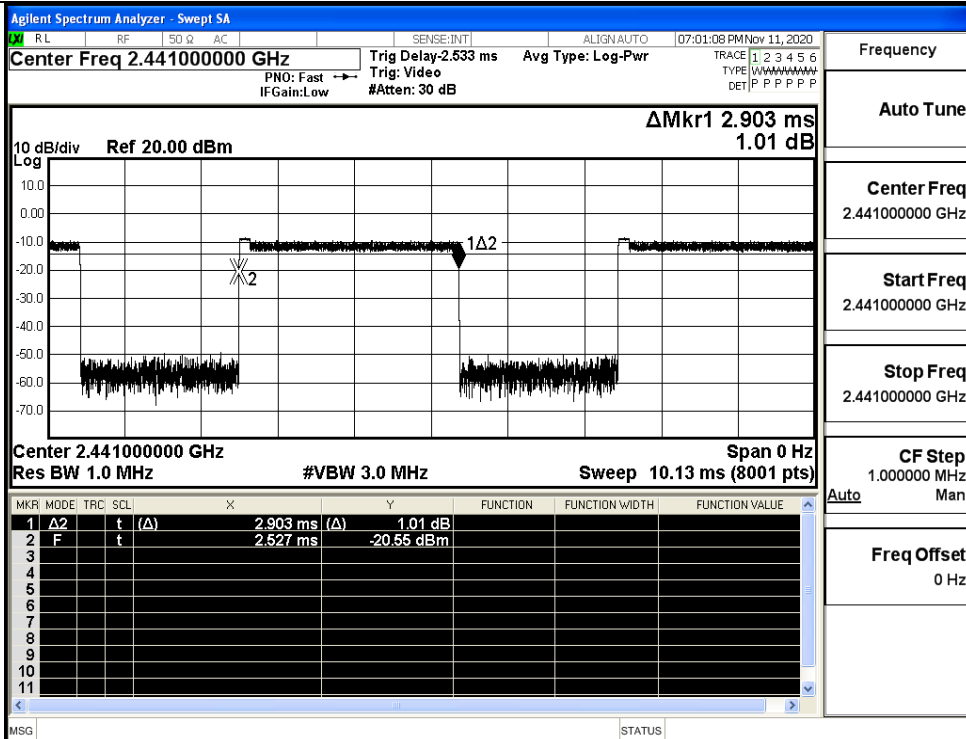
$\pi/4$ DQPSK
_2DH5/HCH



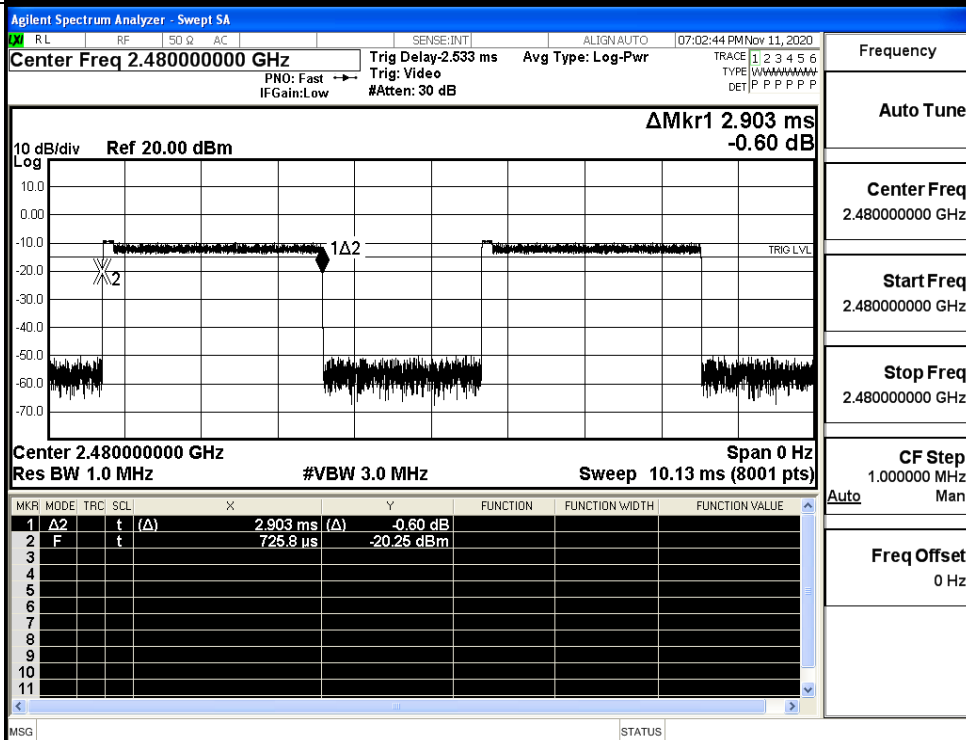
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



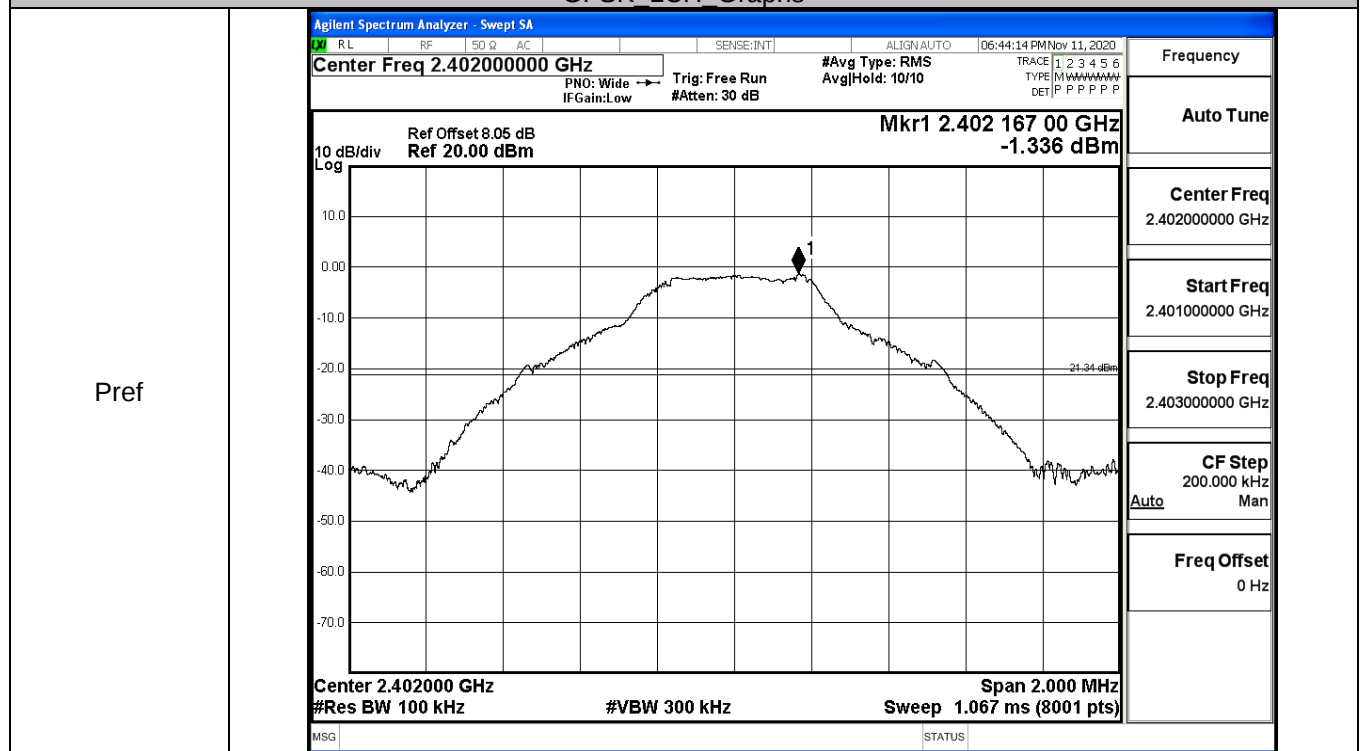
8DPSK_3DH5/HCH



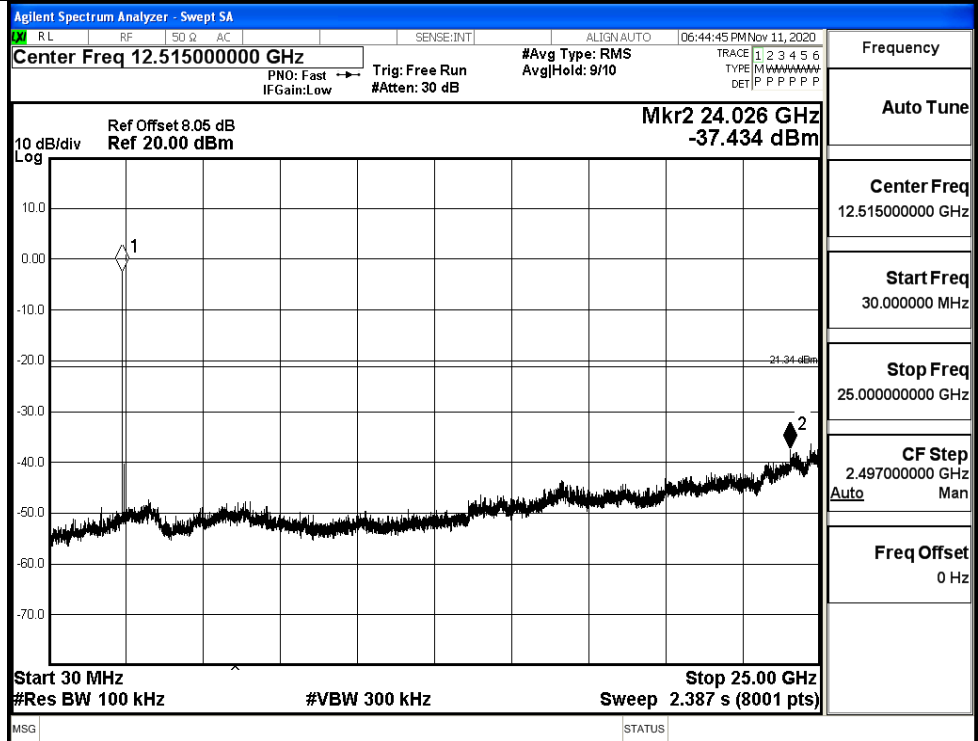
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.336	-37.434	-21.336	PASS
	MCH	-0.996	-36.860	-20.996	PASS
	HCH	-1.577	-37.777	-21.577	PASS
$\pi/4$ DQPSK	LCH	-1.468	-37.673	-21.468	PASS
	MCH	-1.506	-37.732	-21.506	PASS
	HCH	-2.089	-36.665	-22.089	PASS
8DPSK	LCH	-1.362	-36.264	-21.362	PASS
	MCH	-0.916	-37.952	-20.916	PASS
	HCH	-1.394	-37.134	-21.394	PASS

GFSK LCH Graphs

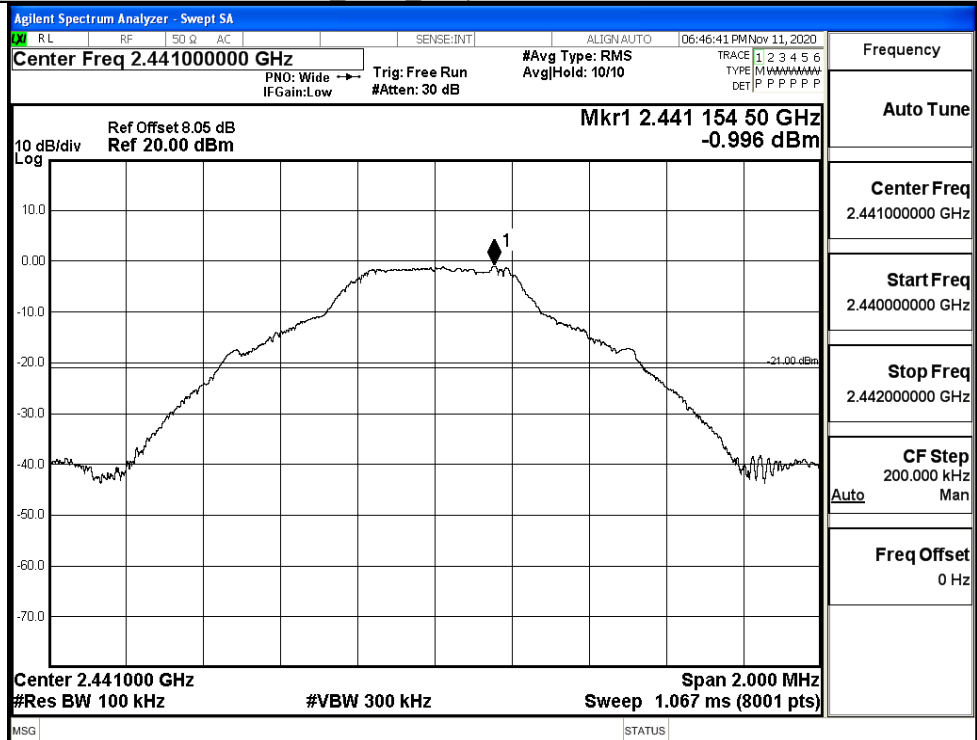


Puw

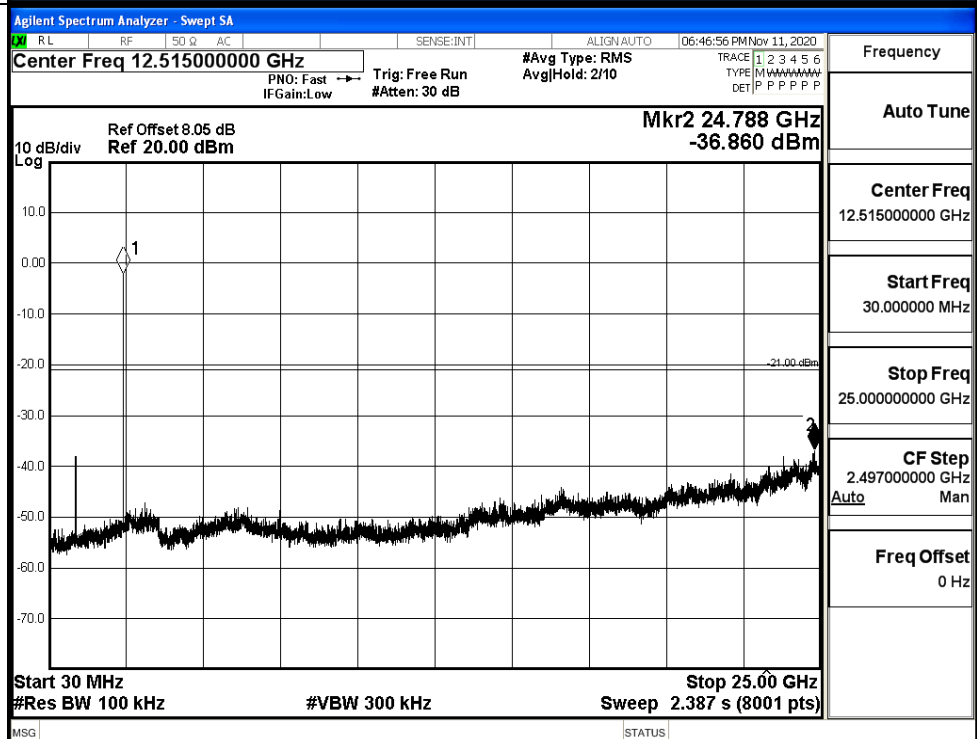


GFSK_MCH_Graphs

Pref

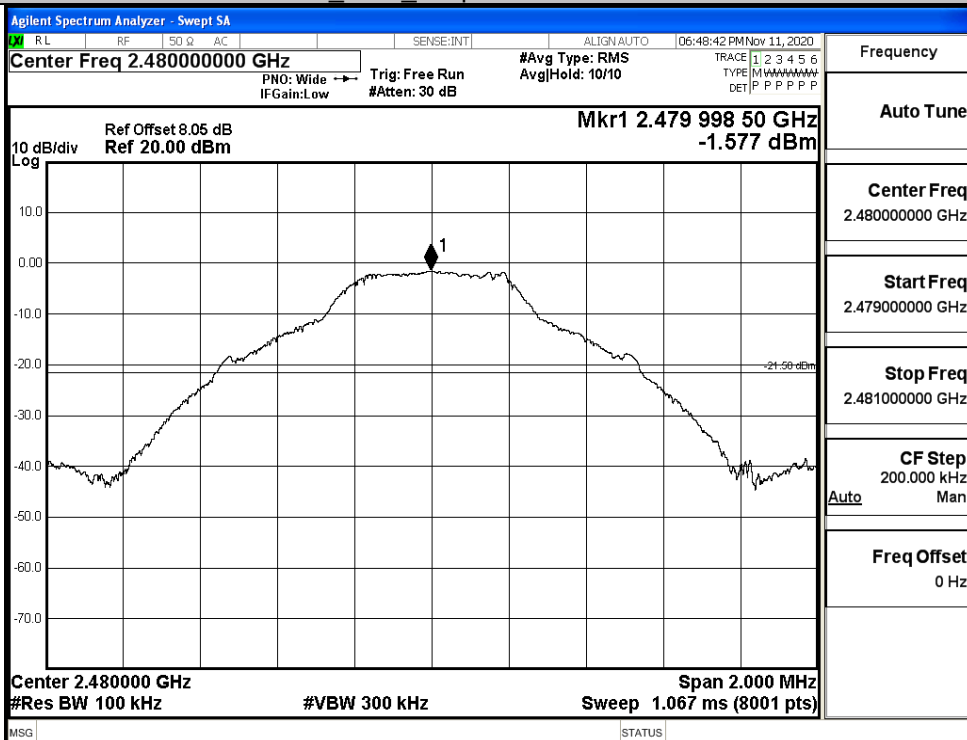


Puw

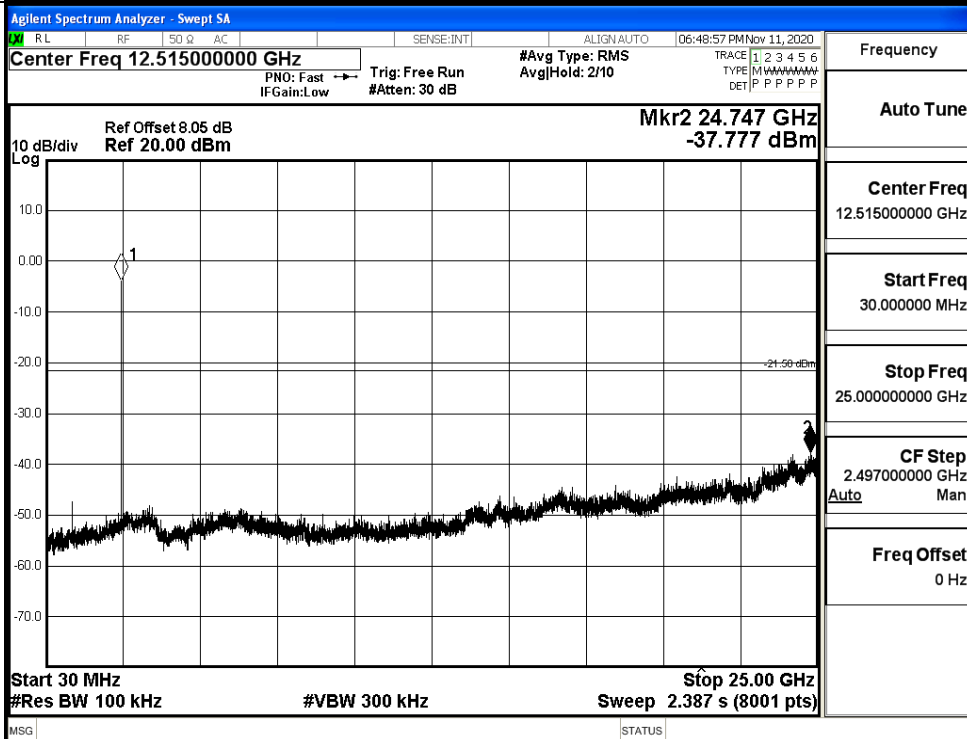


GFSK HCH Graphs

Pref

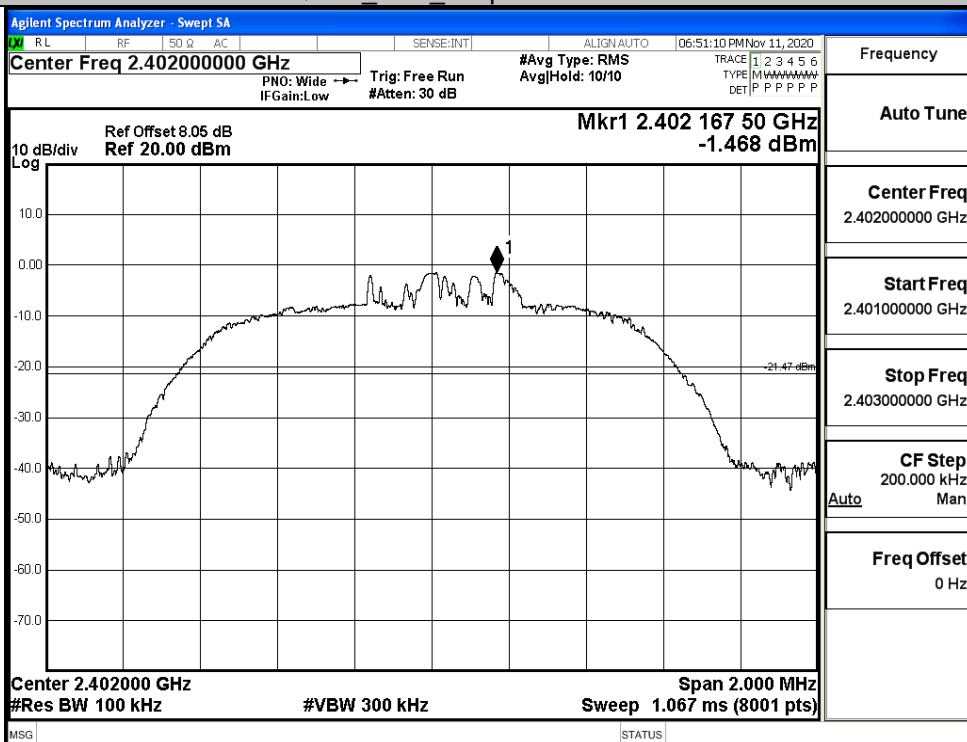


Puw

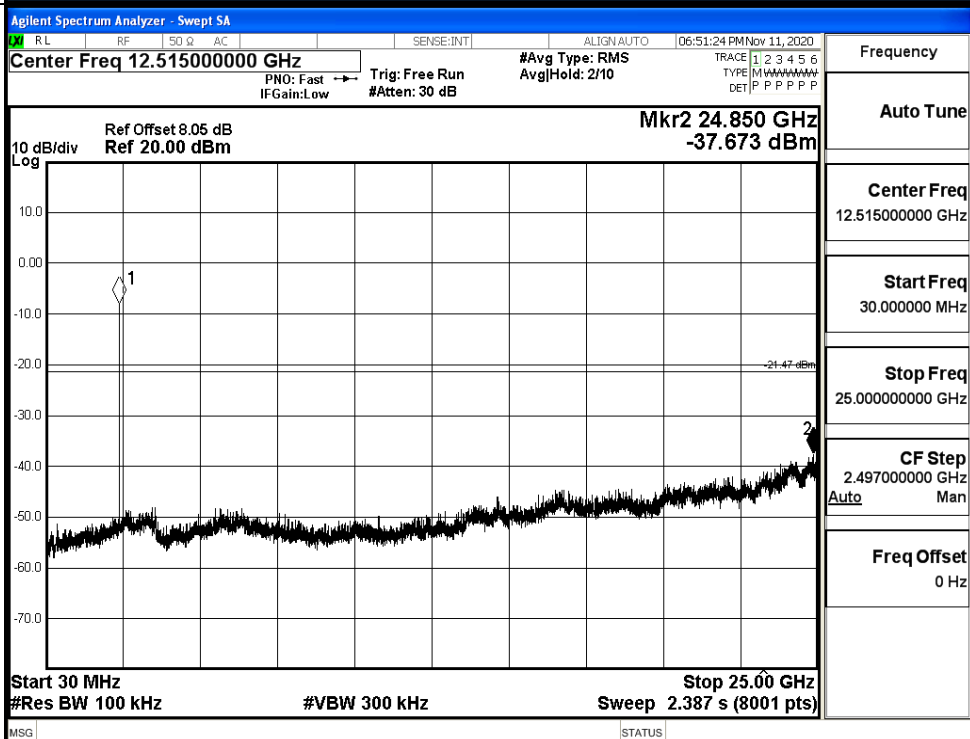


$\pi/4$ DQPSK LCH_Graphs

Pref

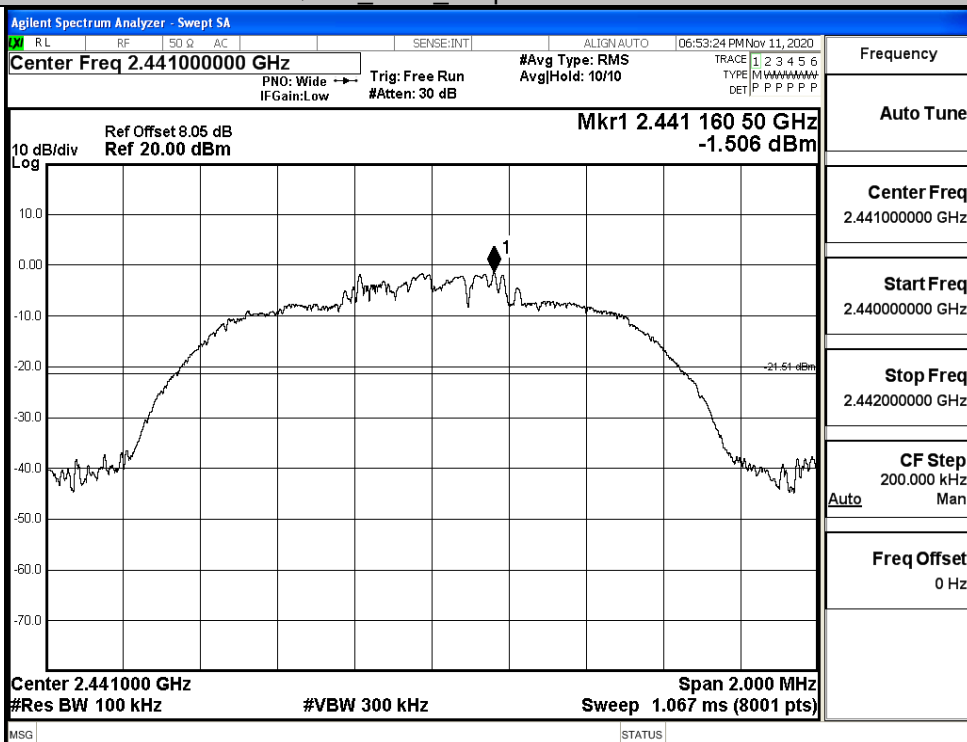


Puw

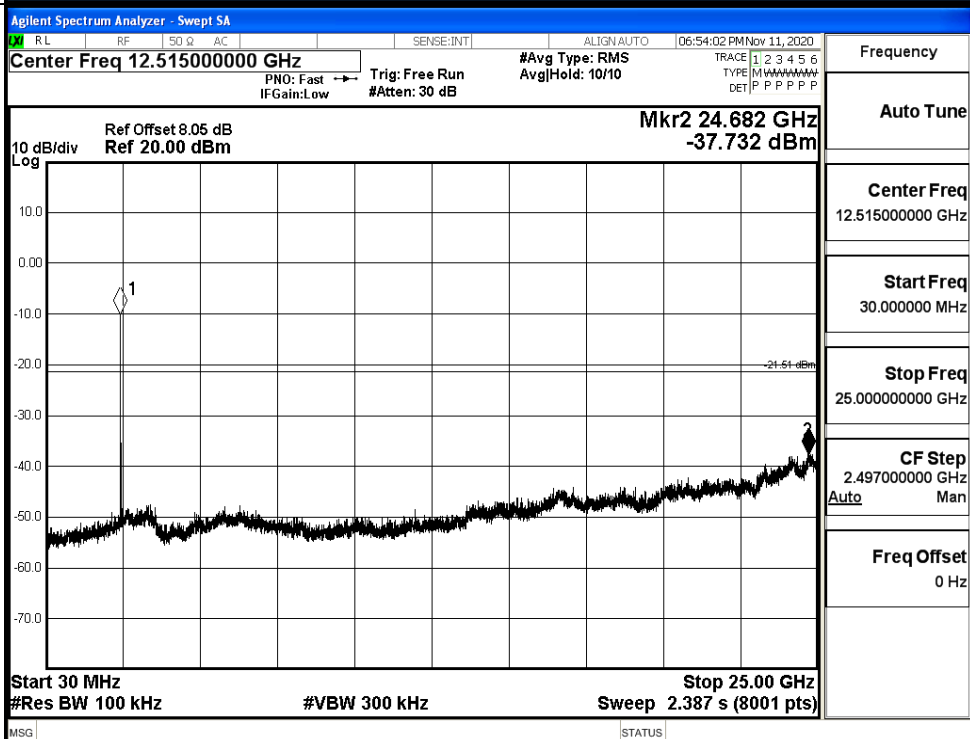


π /4DQPSK_MCH_Graphs

Pref

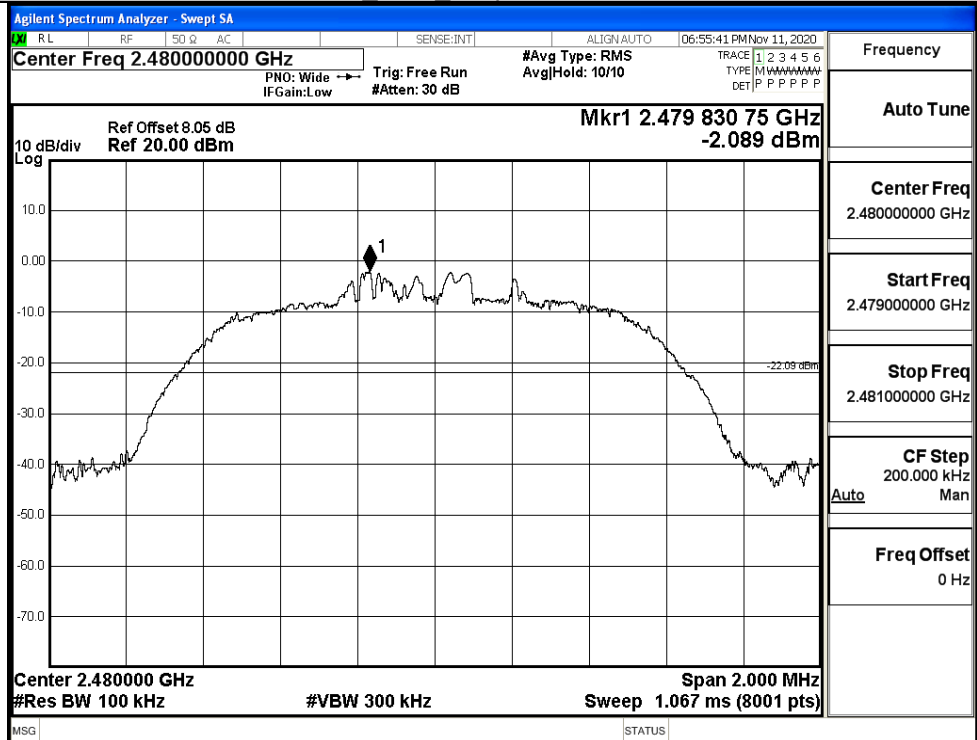


Puw

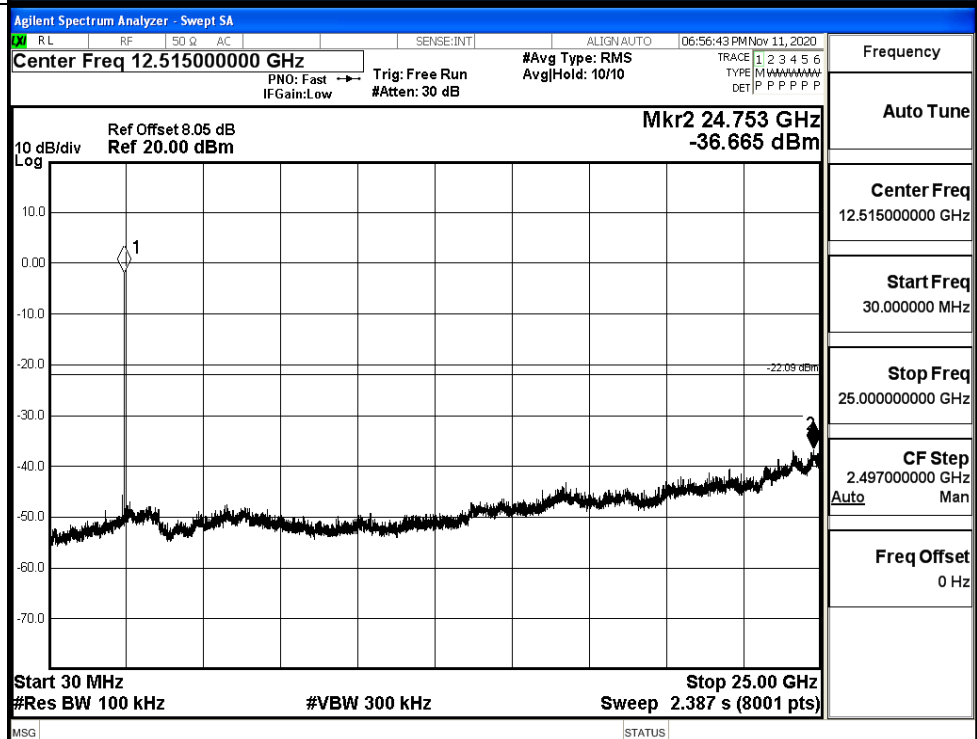


π /4DQPSK_HCH_Graphs

Pref

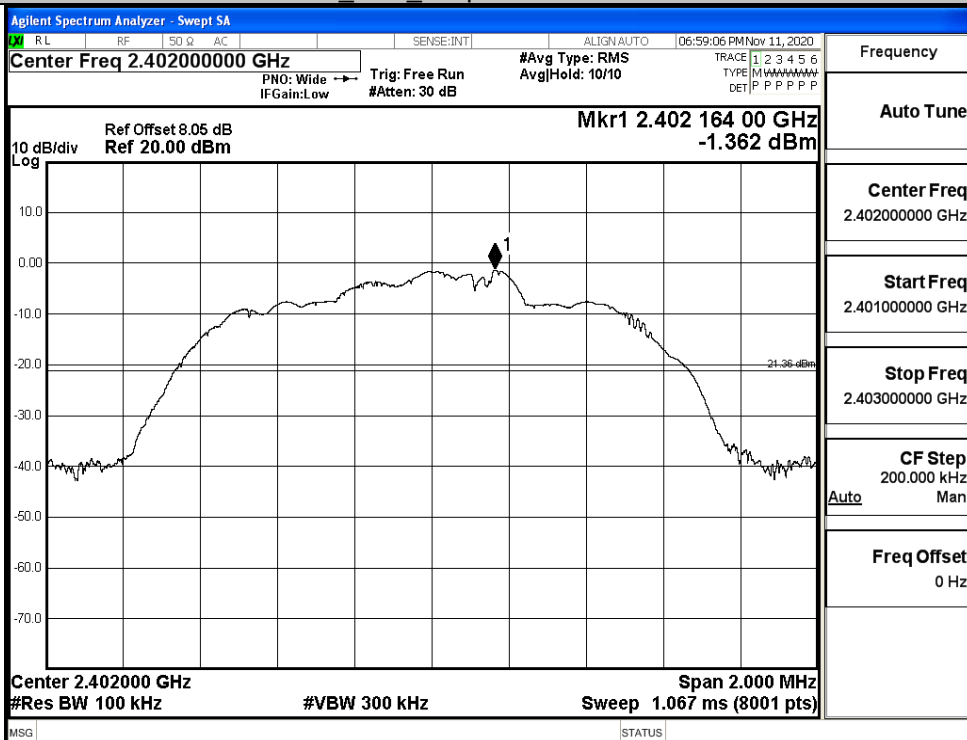


Puw

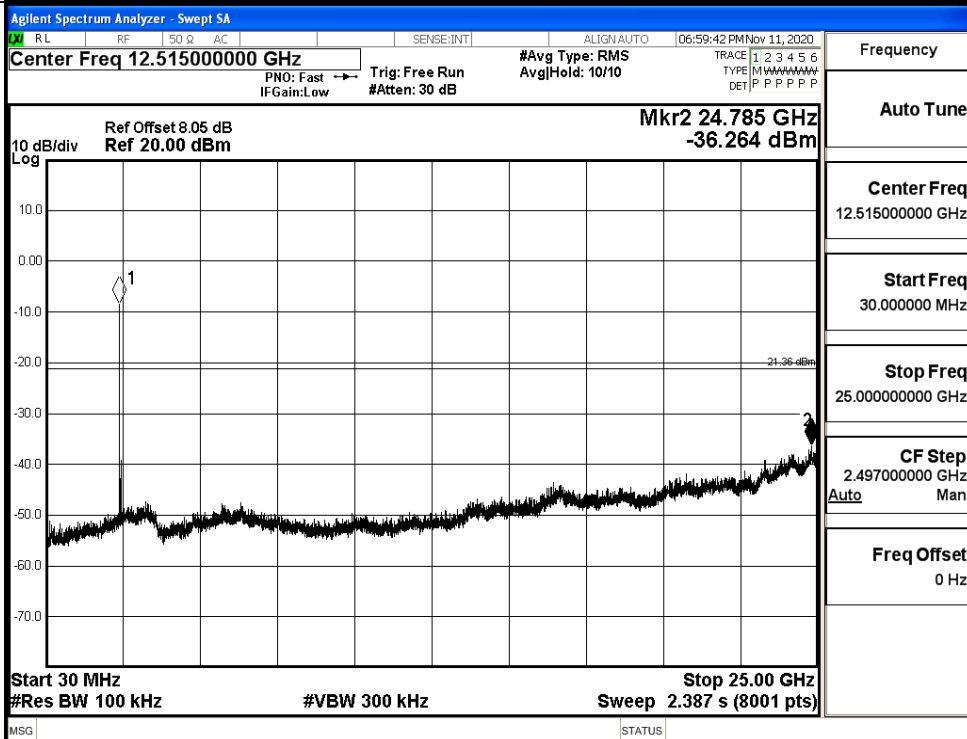


8DPSK_LCH_Graphs

Pref

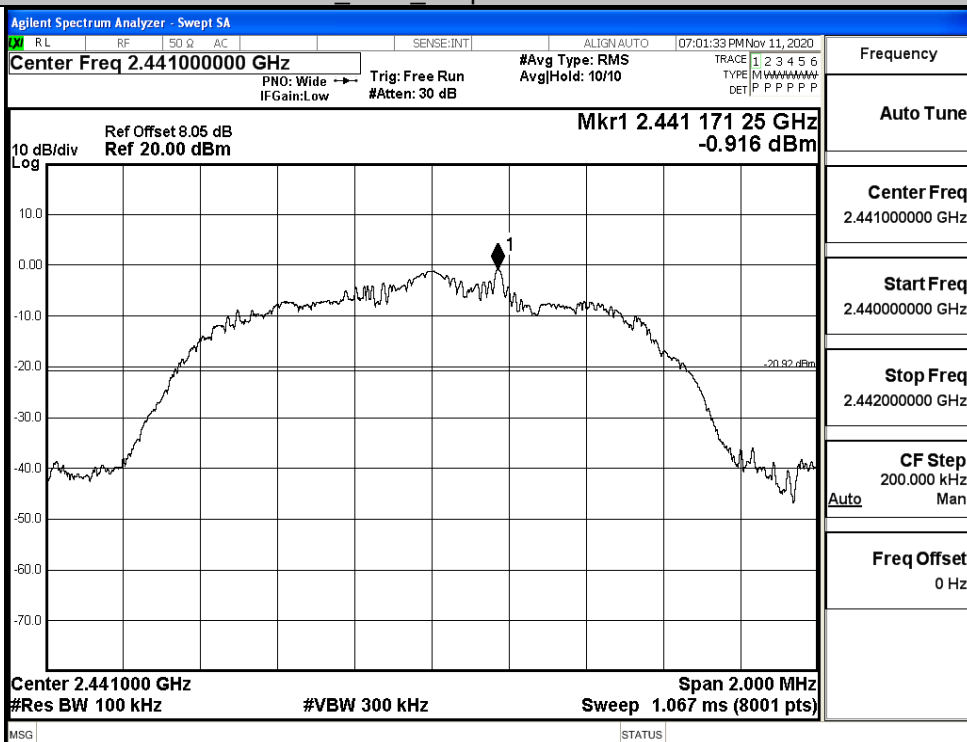


Puw

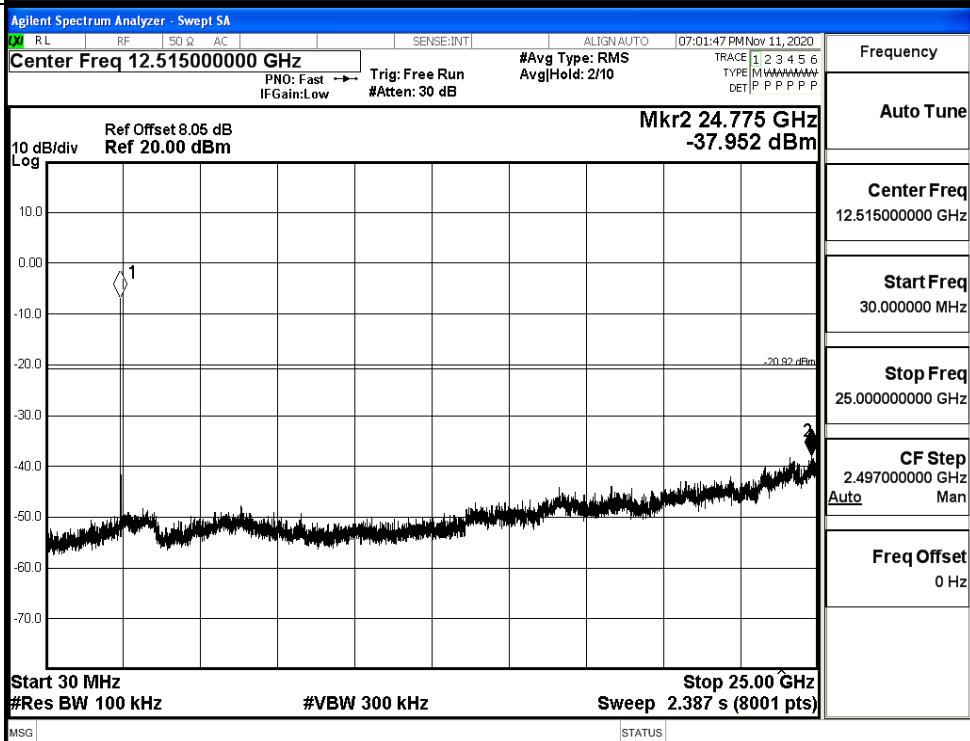


8DPSK_MCH_Graphs

Pref

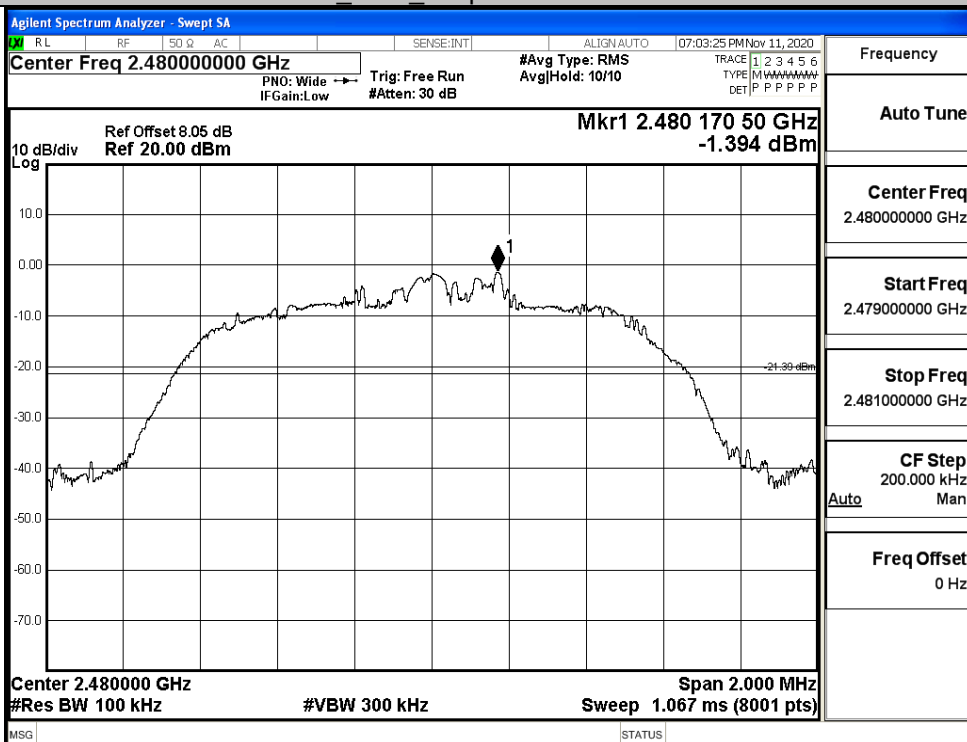


Puw

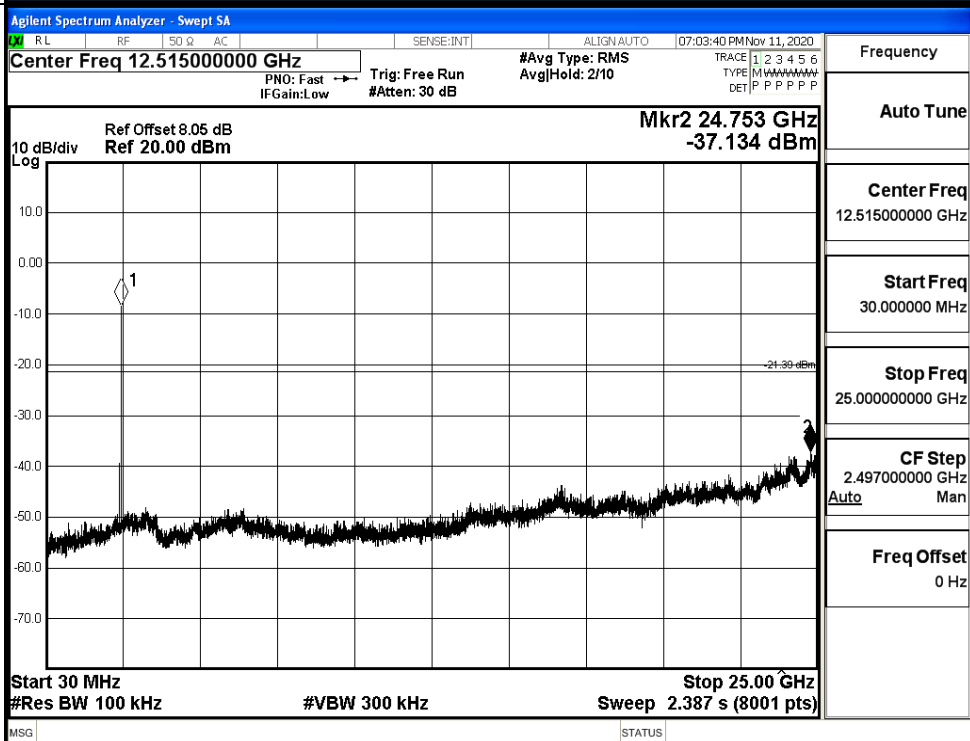


8DPSK_HCH_Graphs

Pref



Puw

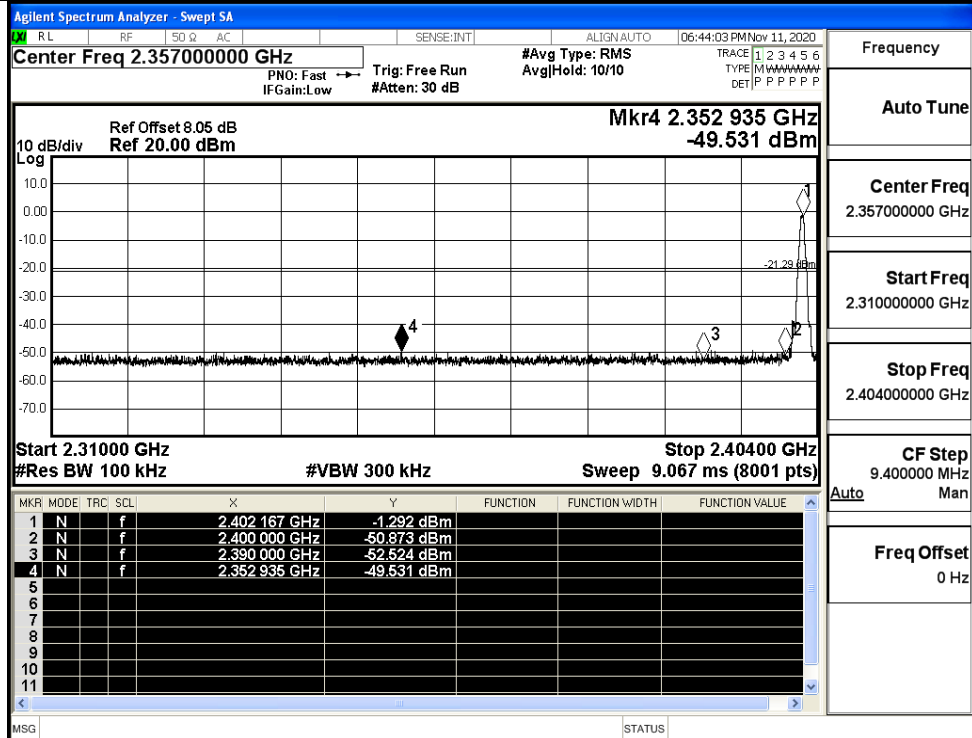


A.7 Band-edge for RF Conducted Emissions

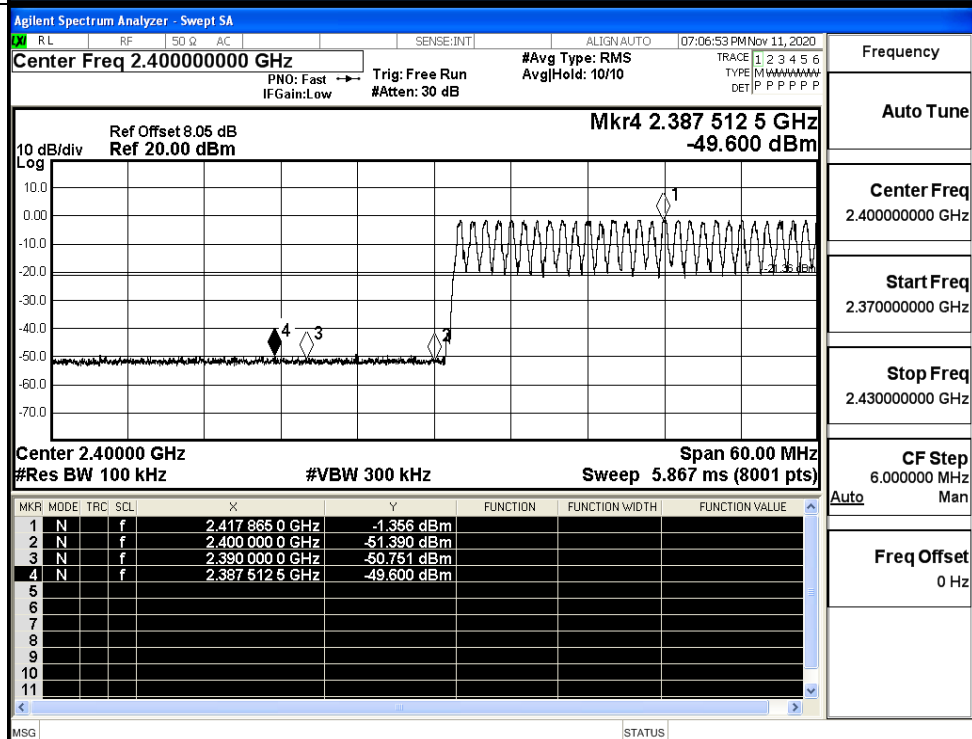
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.292	Off	-49.531	-21.29	PASS
			-1.356	On	-49.600	-21.36	PASS
	HCH	2480	-1.479	Off	-48.914	-21.48	PASS
			-1.020	On	-48.699	-21.02	PASS
$\pi/4$ DQPSK	LCH	2402	-1.318	Off	-49.270	-21.32	PASS
			-1.259	On	-49.076	-21.26	PASS
	HCH	2480	-1.480	Off	-49.796	-21.48	PASS
			-1.212	On	-48.281	-21.21	PASS
8DPSK	LCH	2402	-1.696	Off	-49.249	-21.7	PASS
			-1.158	On	-49.194	-21.16	PASS
	HCH	2480	-1.494	Off	-49.251	-21.49	PASS
			-1.043	On	-47.871	-21.04	PASS

Test Graphs

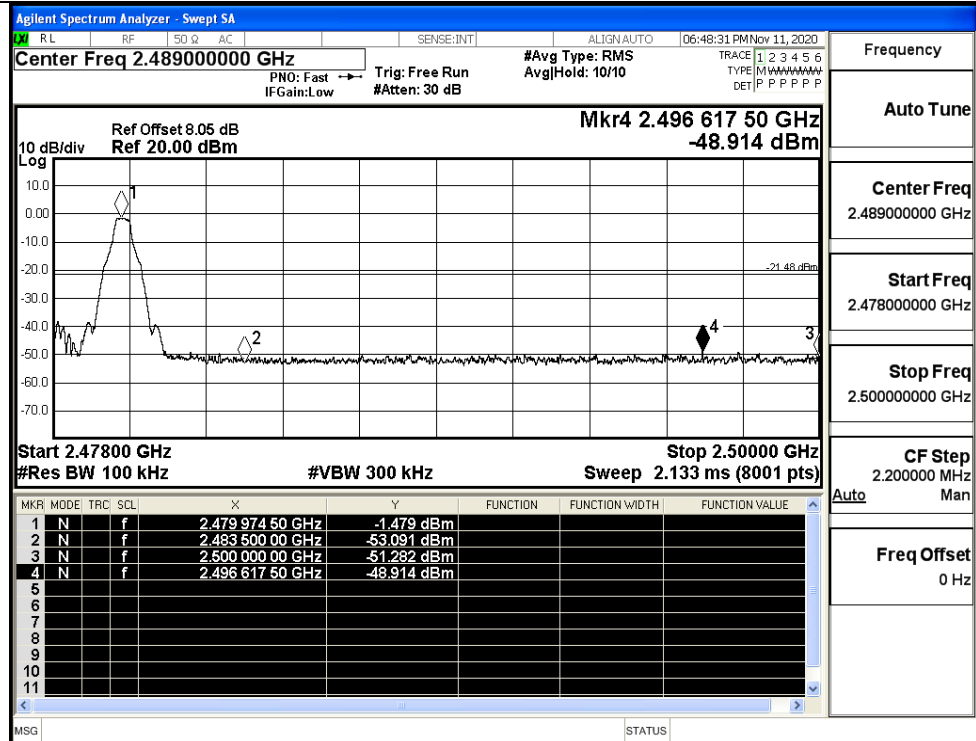
GFSK/LCH/No Hop



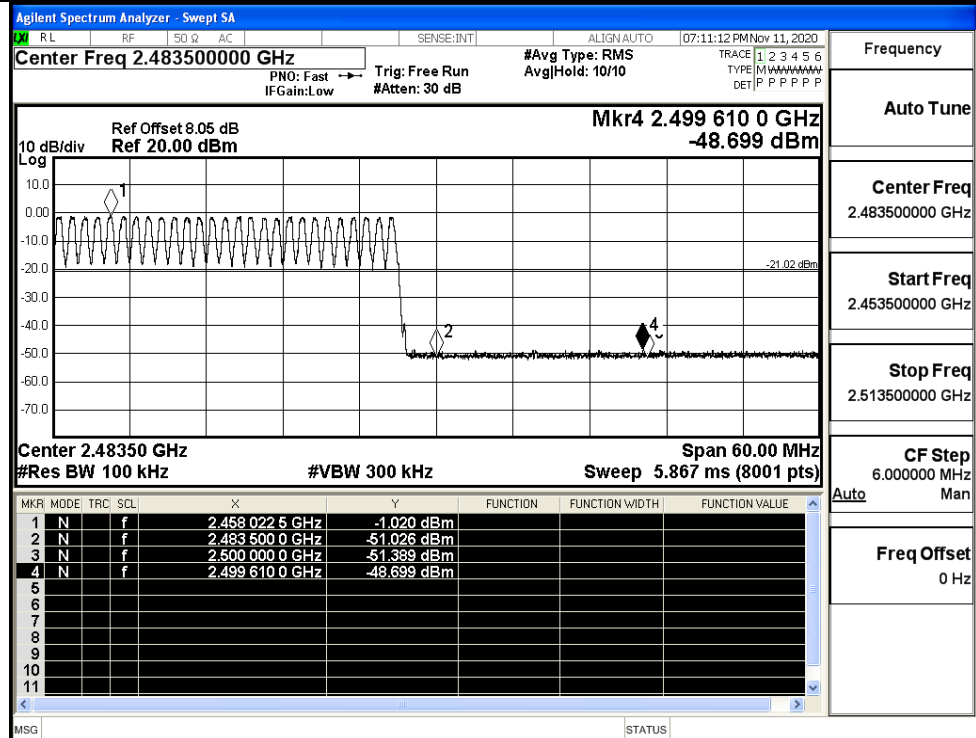
GFSK/LCH/Hop



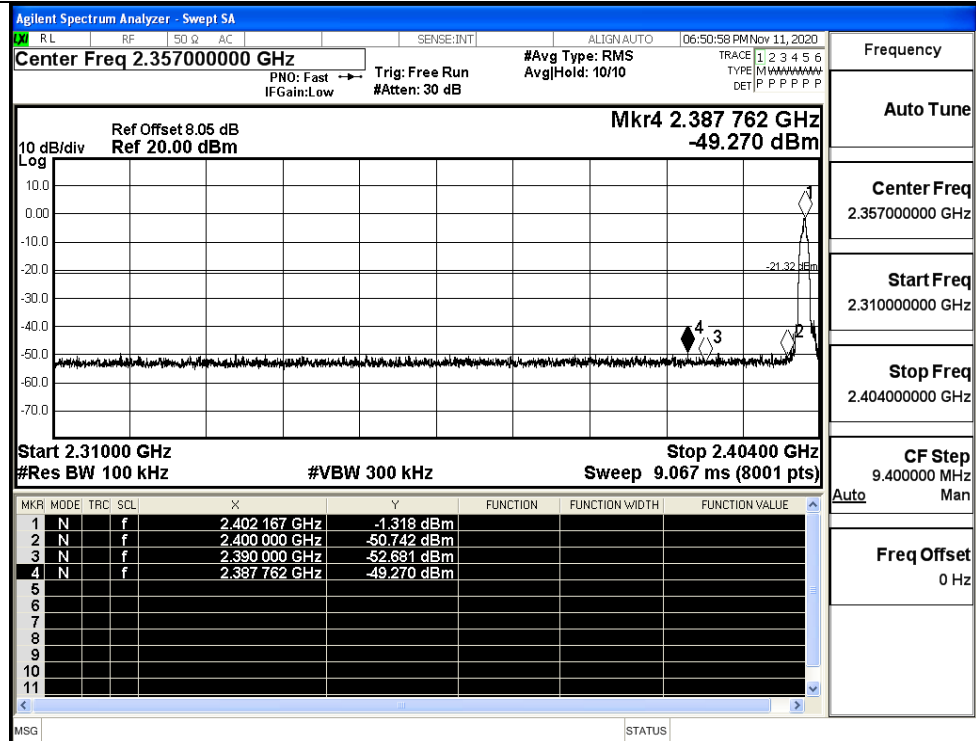
GFSK/HCH/No Hop



GFSK/HCH/Hop



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

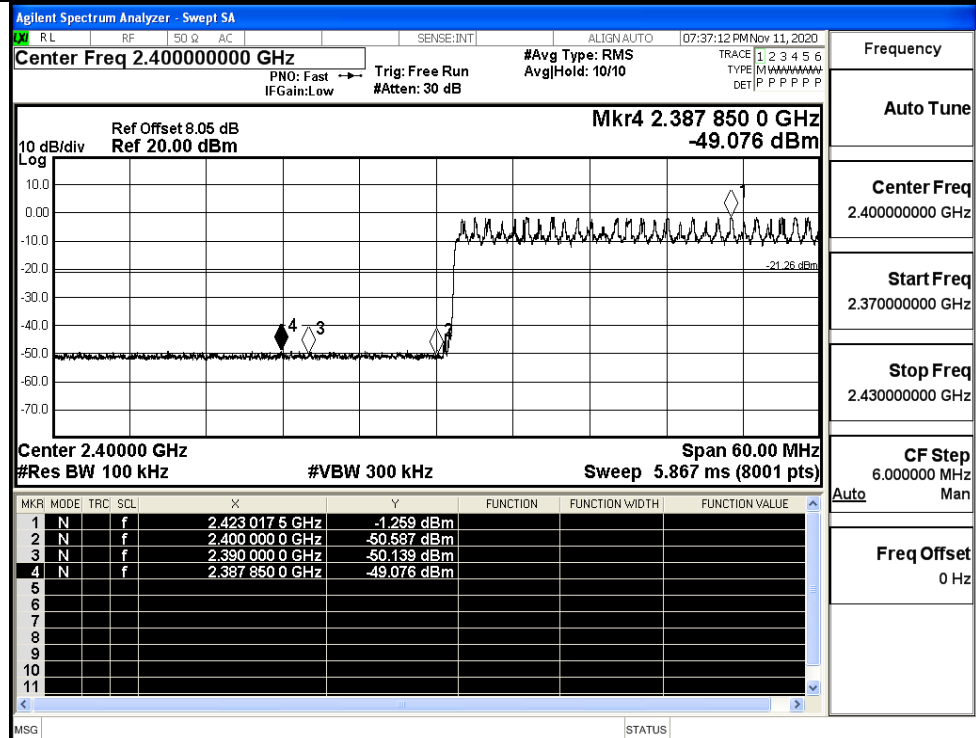


Frequency

Auto Tune

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

$\pi/4$ DQPSK/LCH/Hop

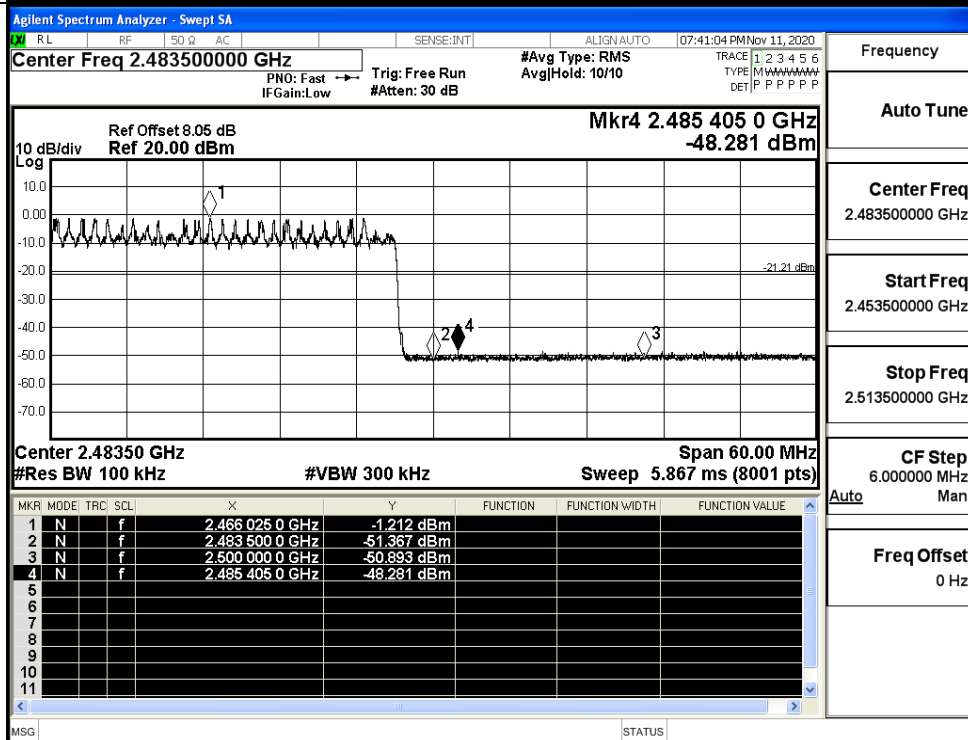


Frequency

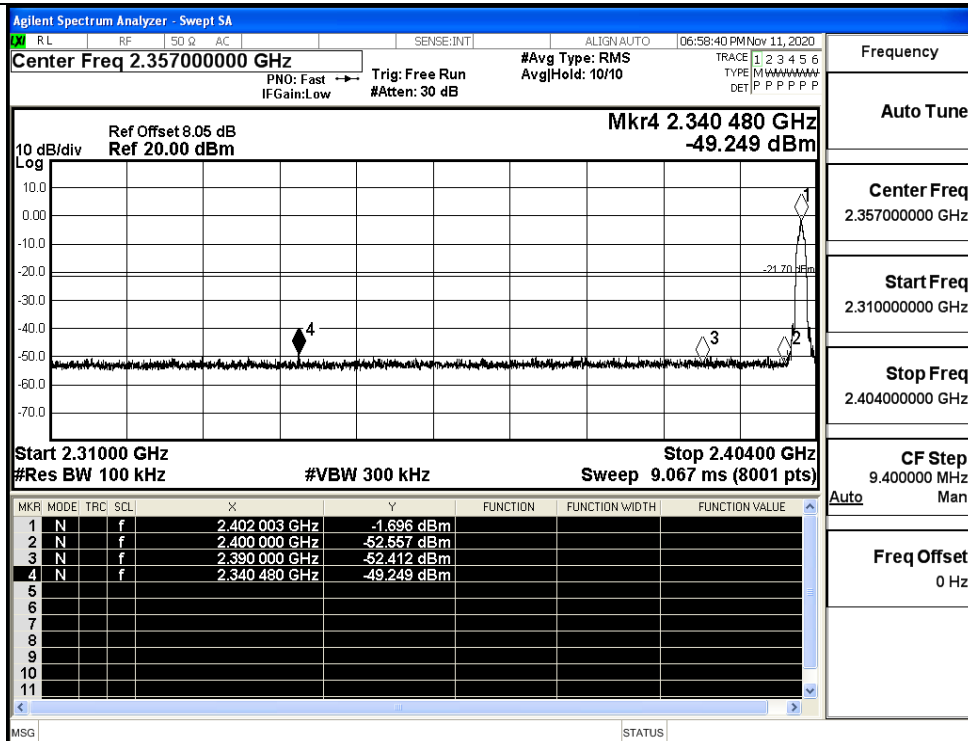
Auto Tune

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

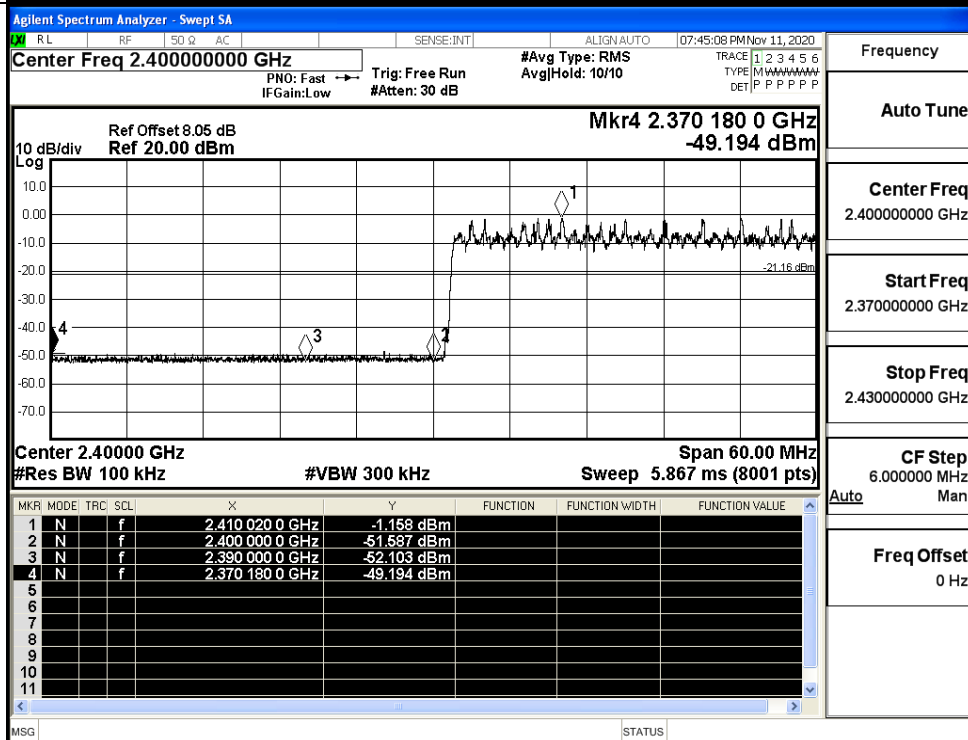
$\pi/4$ DQPSK/HCH/Hop



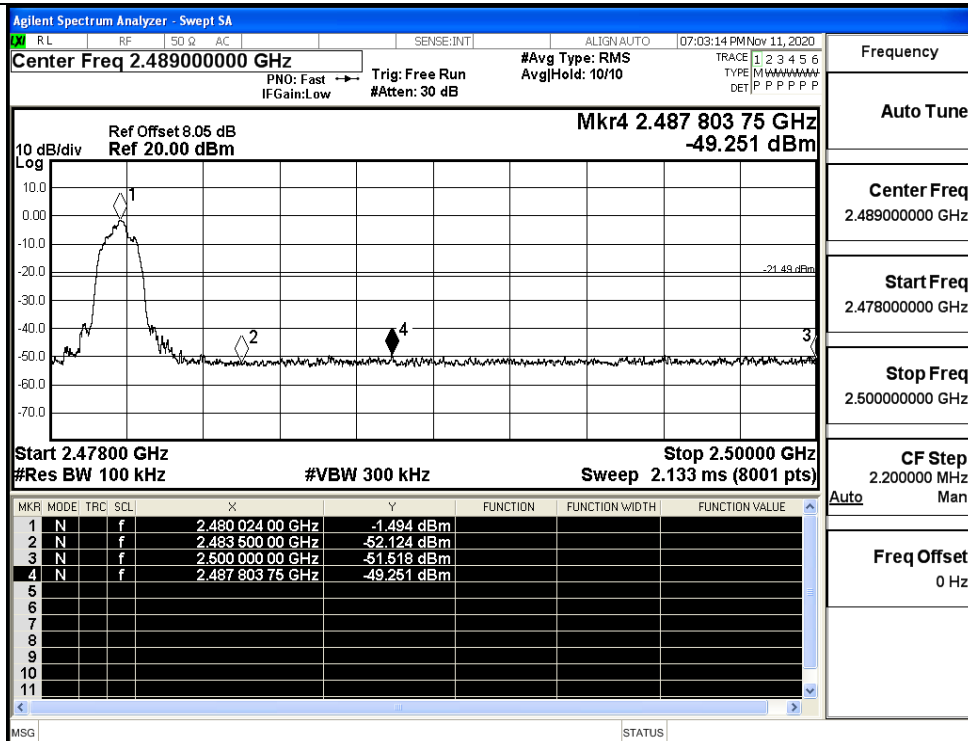
8DPSK/LCH/No Hop



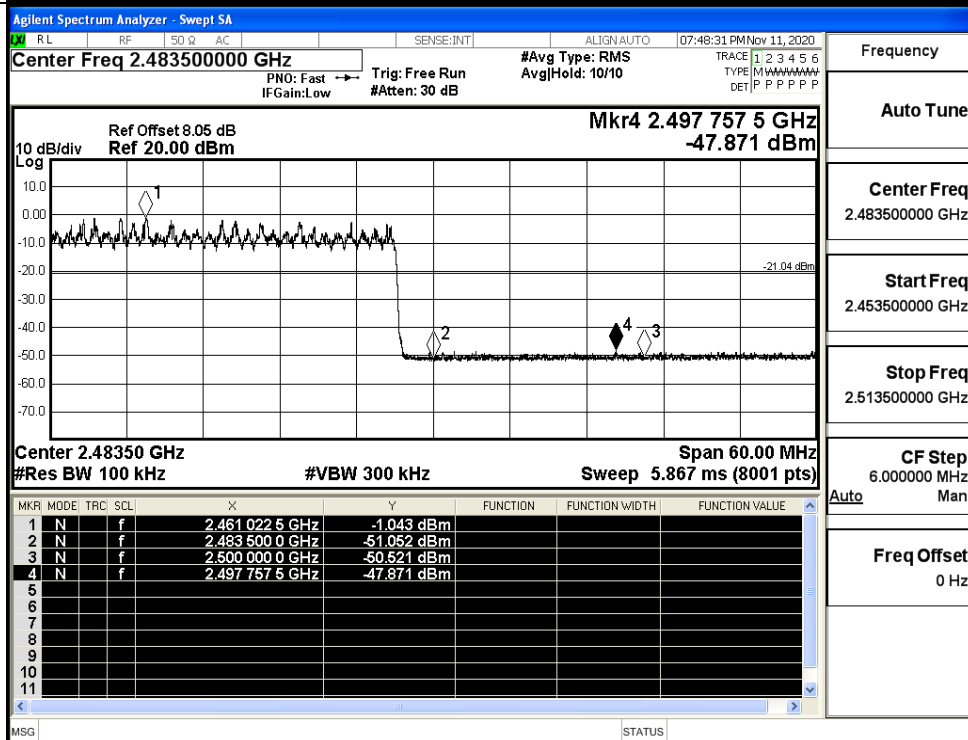
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



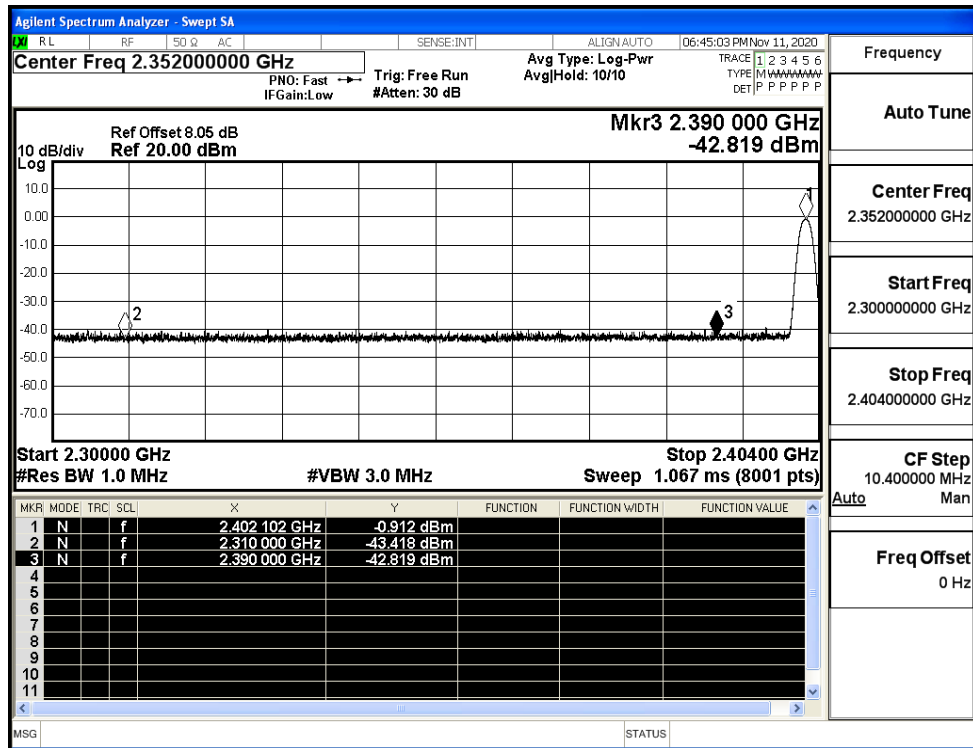
8DPSK/HCH/Hop



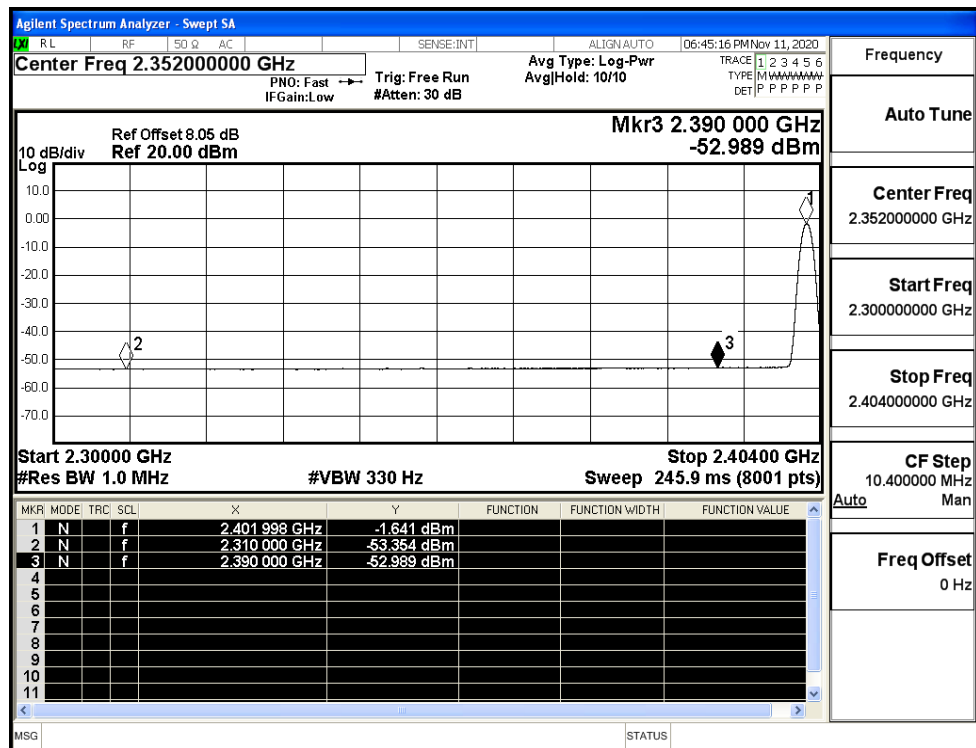
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.42	2.0	0	53.84	PEAK	74	PASS
	Off	2310.0	-53.35	2.0	0	43.9	AV	54	PASS
	Off	2390.0	-42.82	2.0	0	54.44	PEAK	74	PASS
	Off	2390.0	-52.99	2.0	0	44.27	AV	54	PASS
	Off	2483.5	-41.32	2.0	0	55.94	PEAK	74	PASS
	Off	2483.5	-52.36	2.0	0	44.9	AV	54	PASS
	Off	2500.0	-42.01	2.0	0	55.25	PEAK	74	PASS
	Off	2500.0	-52.24	2.0	0	45.02	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.79	2.0	0	53.47	PEAK	74	PASS
	Off	2310.0	-53.38	2.0	0	43.88	AV	54	PASS
	Off	2390.0	-42.76	2.0	0	54.49	PEAK	74	PASS
	Off	2390.0	-53.08	2.0	0	44.17	AV	54	PASS
	Off	2483.5	-42.06	2.0	0	55.19	PEAK	74	PASS
	Off	2483.5	-52.44	2.0	0	44.81	AV	54	PASS
	Off	2500.0	-42.42	2.0	0	54.84	PEAK	74	PASS
	Off	2500.0	-52.23	2.0	0	45.03	AV	54	PASS
8DPSK	Off	2310.0	-43.26	2.0	0	54	PEAK	74	PASS
	Off	2310.0	-53.31	2.0	0	43.94	AV	54	PASS
	Off	2390.0	-41.31	2.0	0	55.95	PEAK	74	PASS
	Off	2390.0	-52.99	2.0	0	44.27	AV	54	PASS
	Off	2483.5	-40.60	2.0	0	56.66	PEAK	74	PASS
	Off	2483.5	-52.38	2.0	0	44.88	AV	54	PASS
	Off	2500.0	-42.32	2.0	0	54.93	PEAK	74	PASS
	Off	2500.0	-52.25	2.0	0	45.01	AV	54	PASS

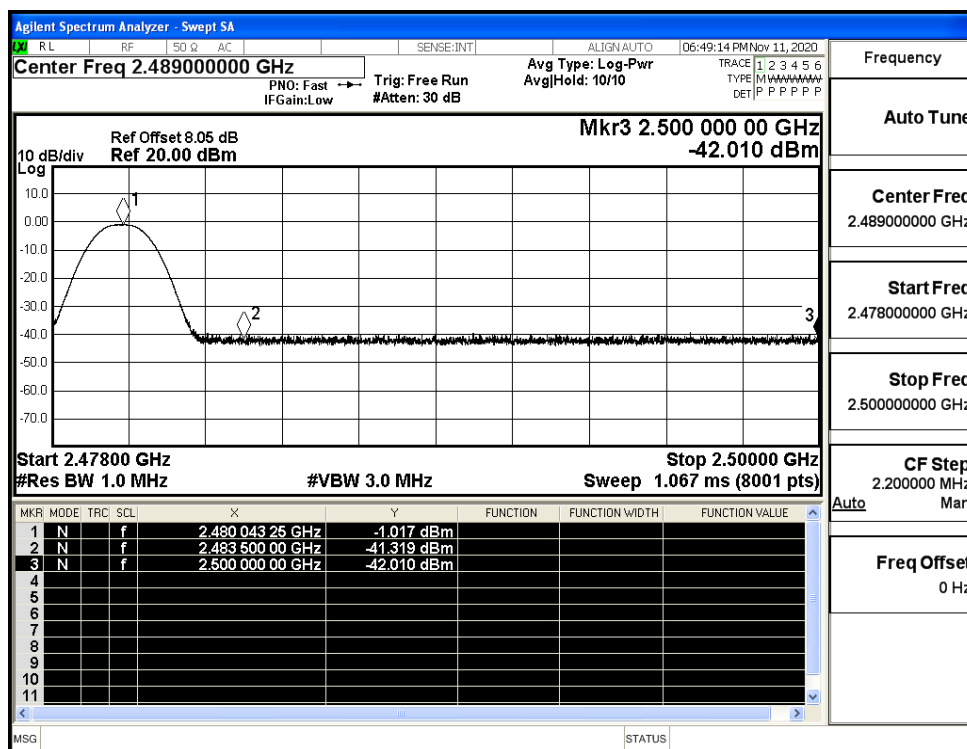
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



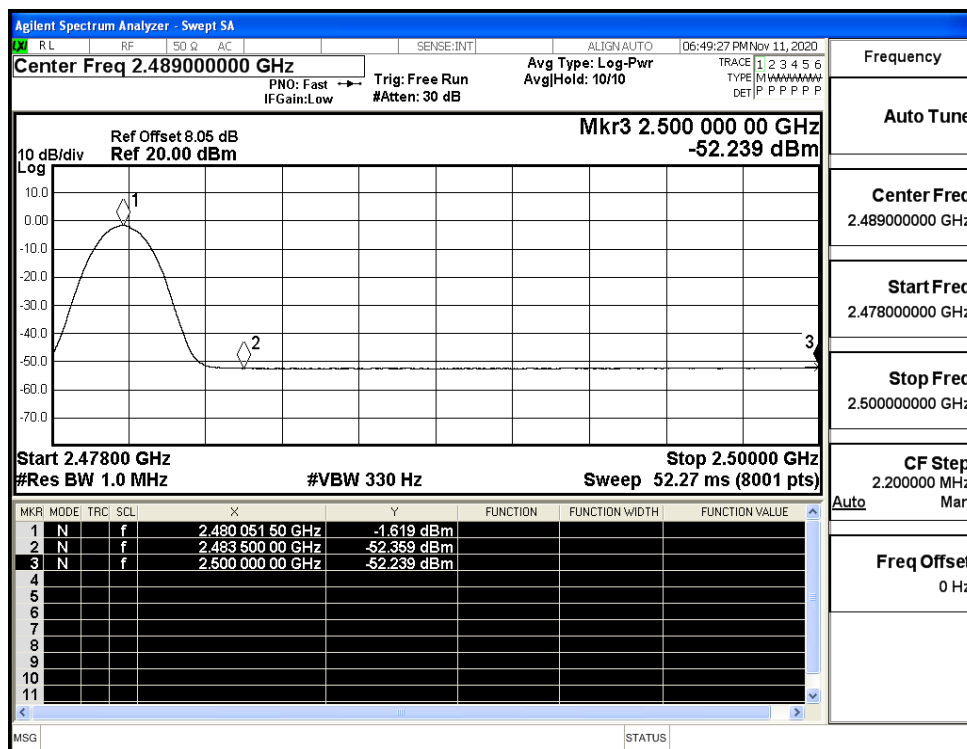
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

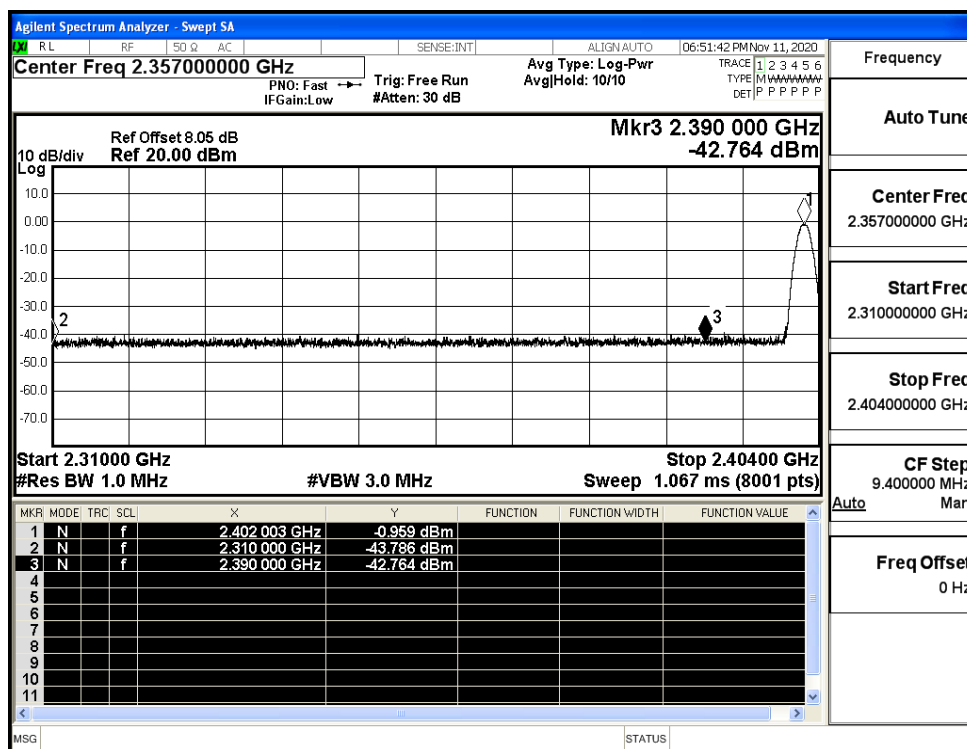
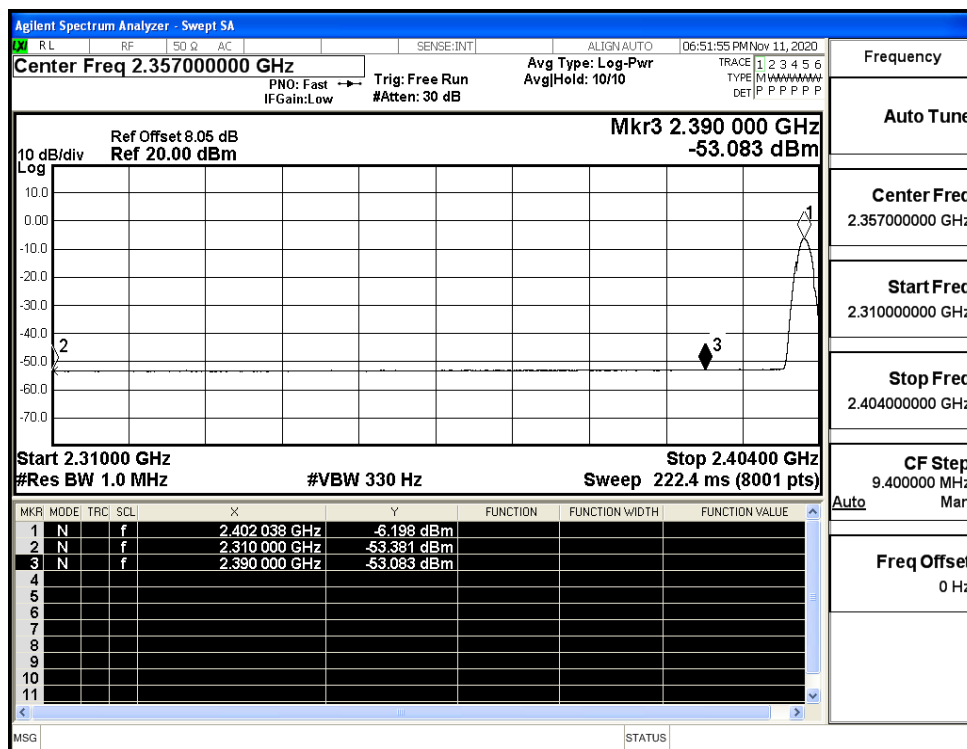


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

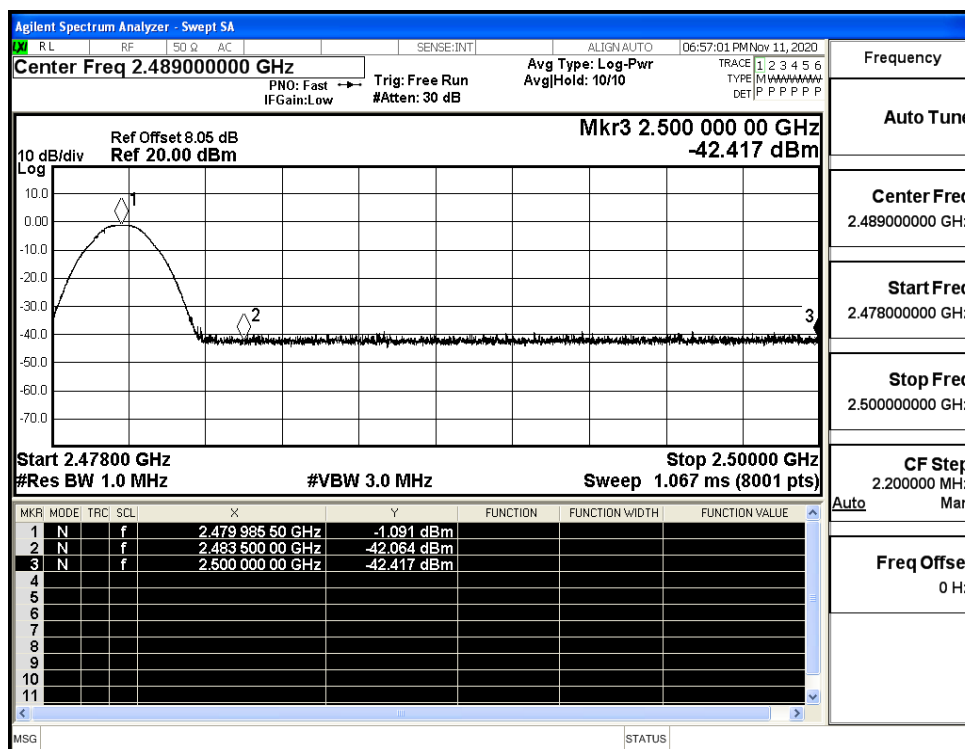


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

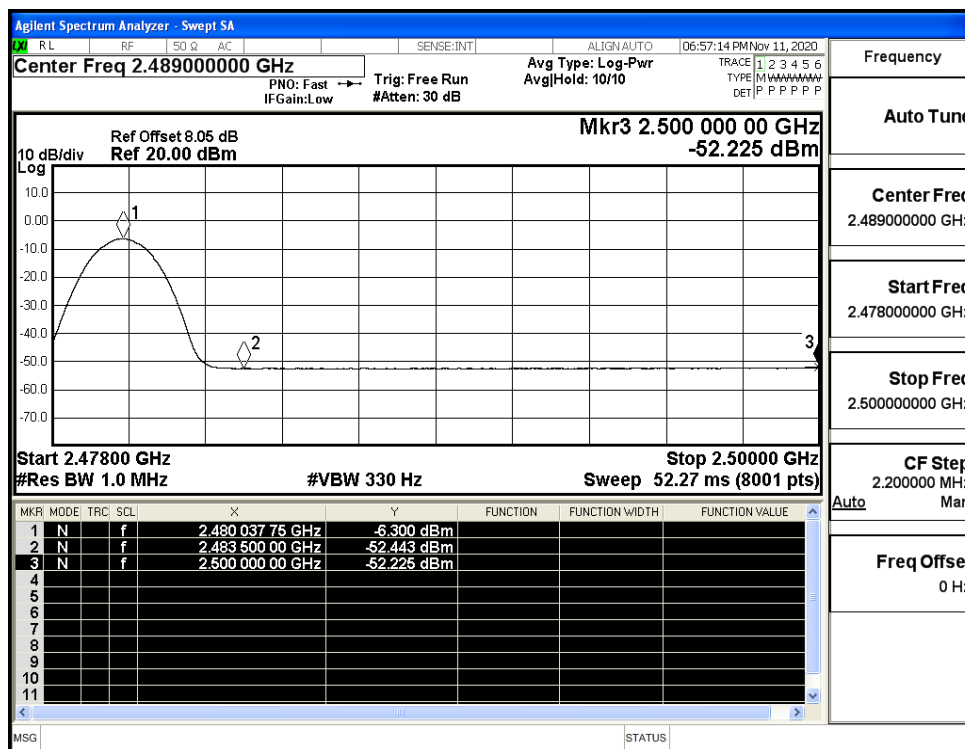


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

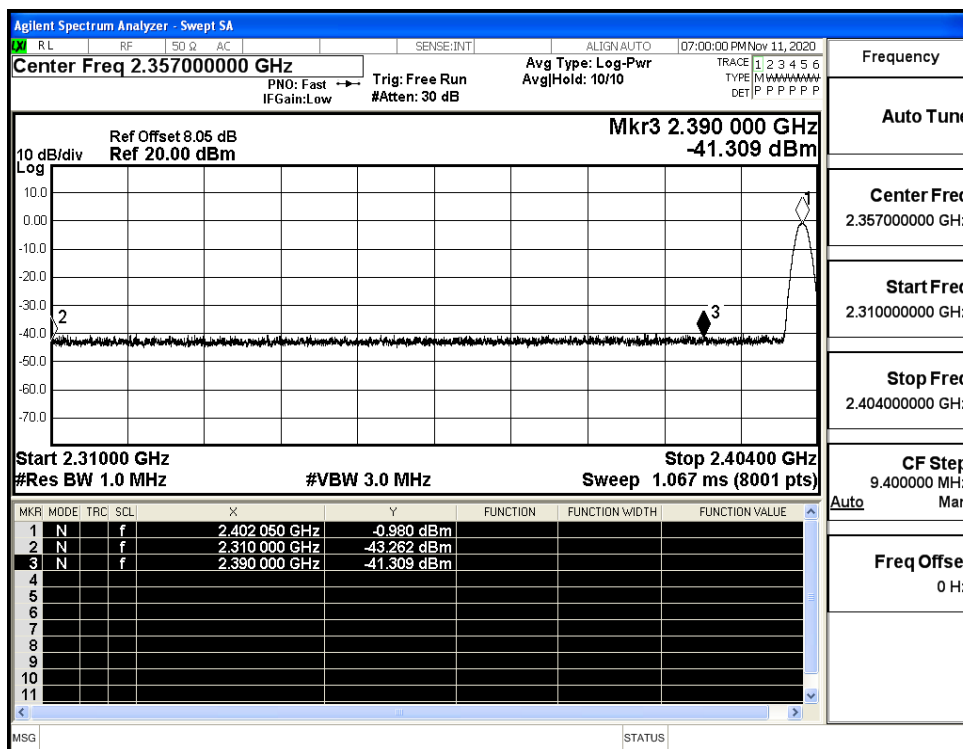
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



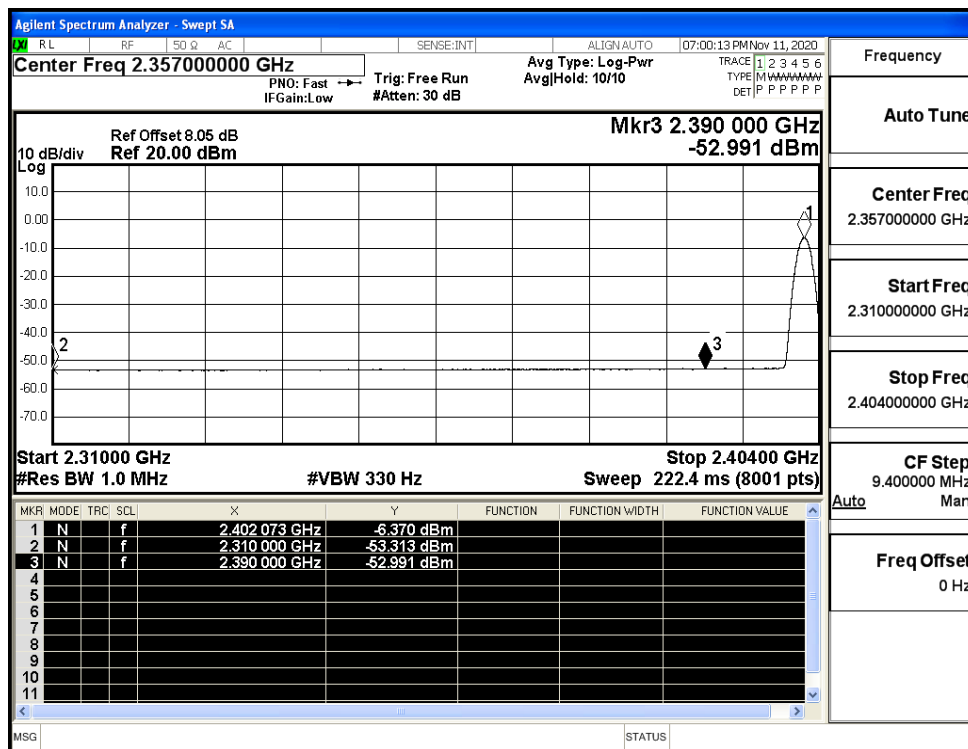
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



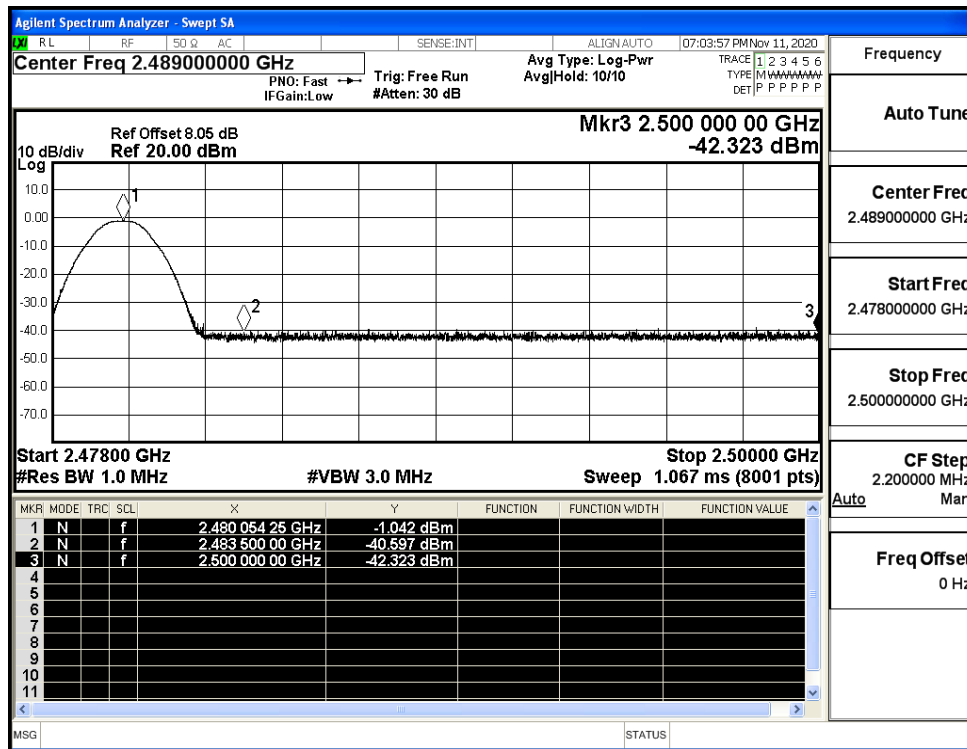
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

