

Appendix A

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

Product Name: TWS Headphones

Trade Mark: N/A

Test Model: E03

Environmental Conditions

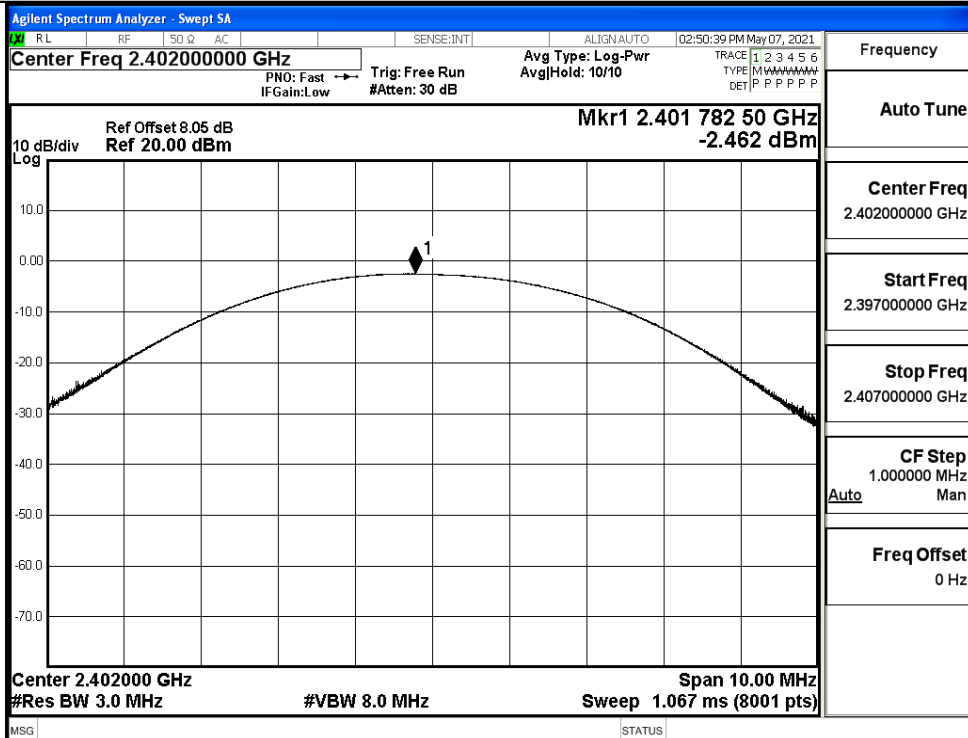
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Carl Fu
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

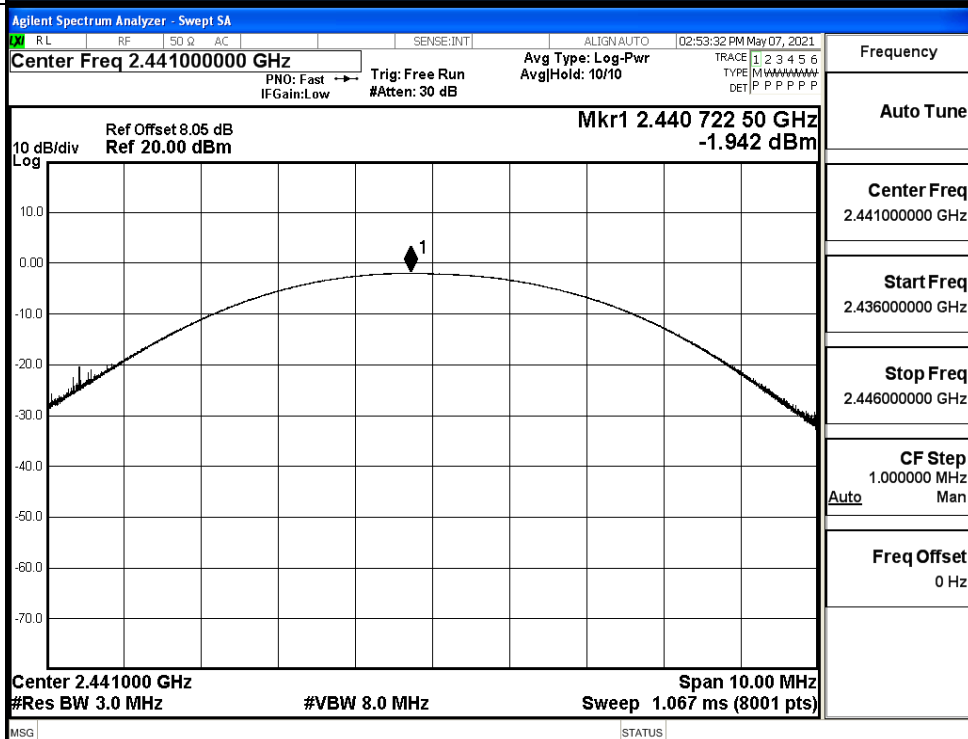
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.462	21	PASS
	MCH	-1.942	21	PASS
	HCH	-2.218	21	PASS
$\pi/4$ DQPSK	LCH	-1.799	21	PASS
	MCH	-1.317	21	PASS
	HCH	-1.615	21	PASS
8DPSK	LCH	-1.761	21	PASS
	MCH	-1.306	21	PASS
	HCH	-1.595	21	PASS

Test Graphs

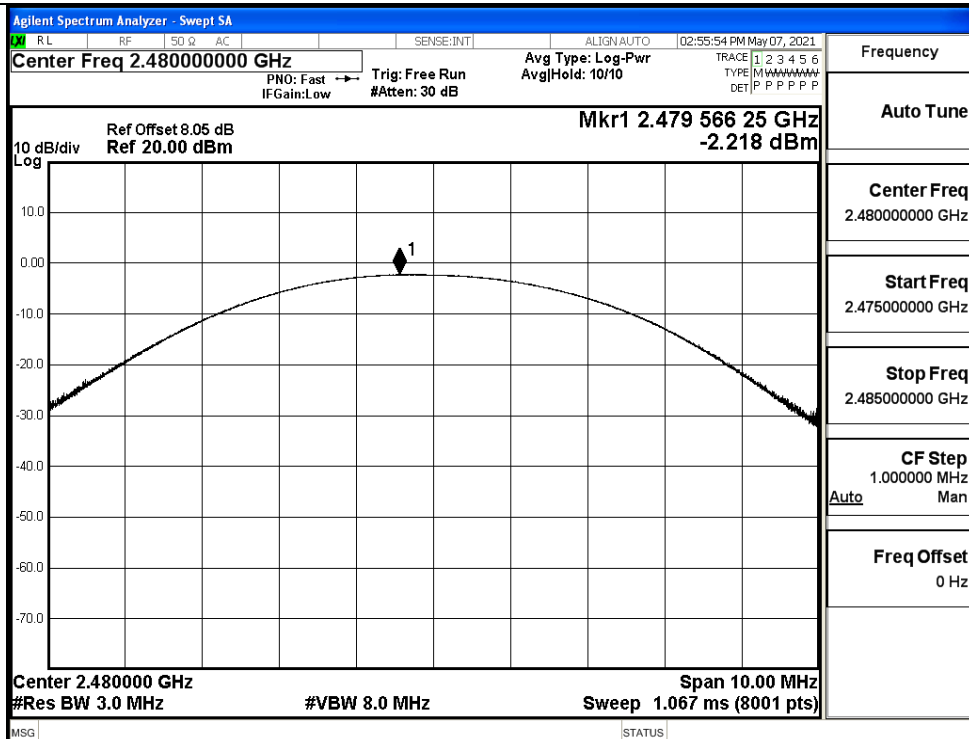
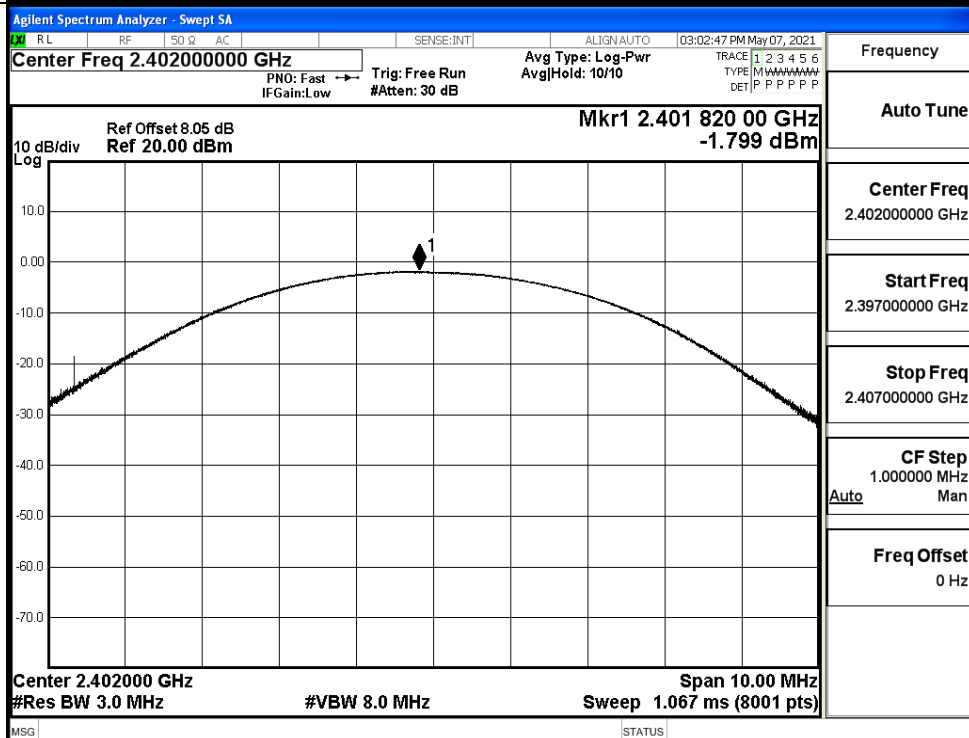
GFSK/LCH

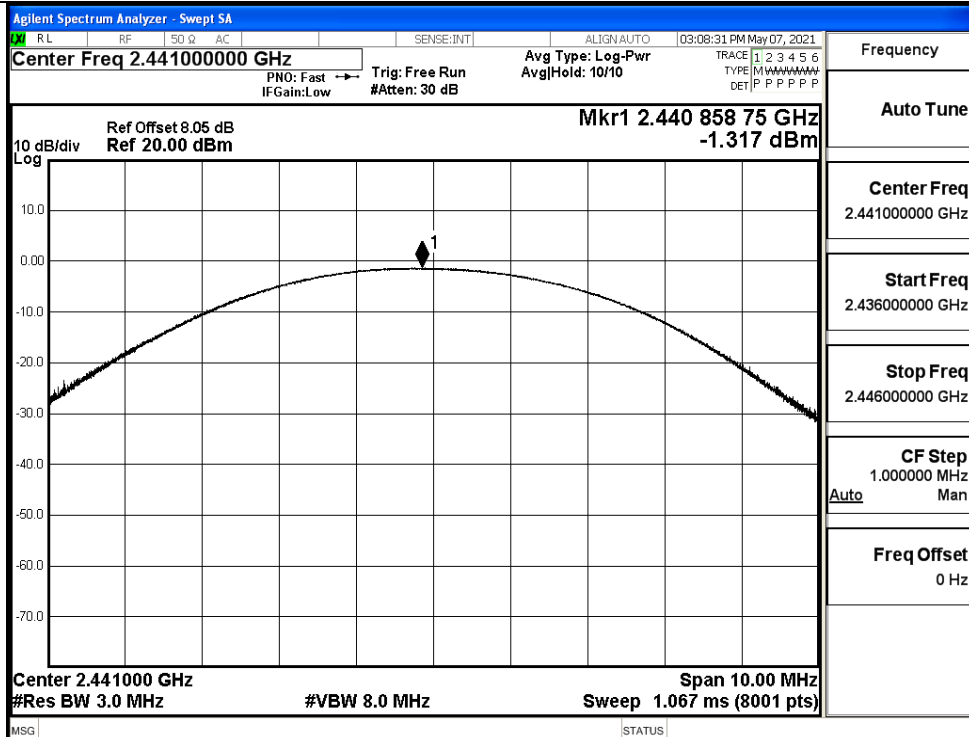
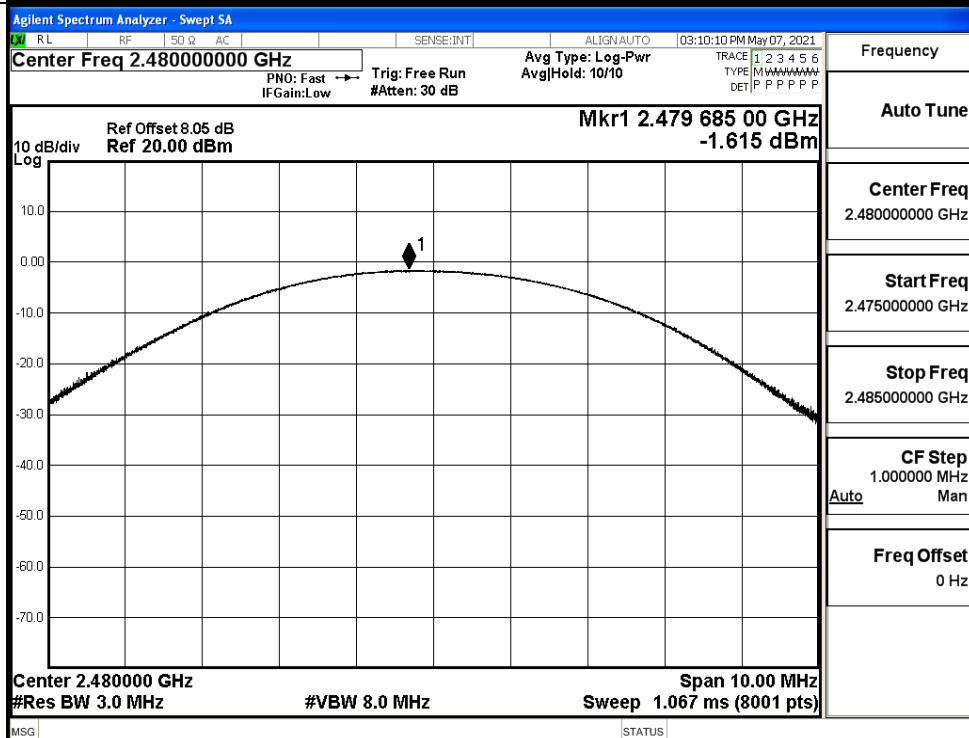


GFSK/MCH

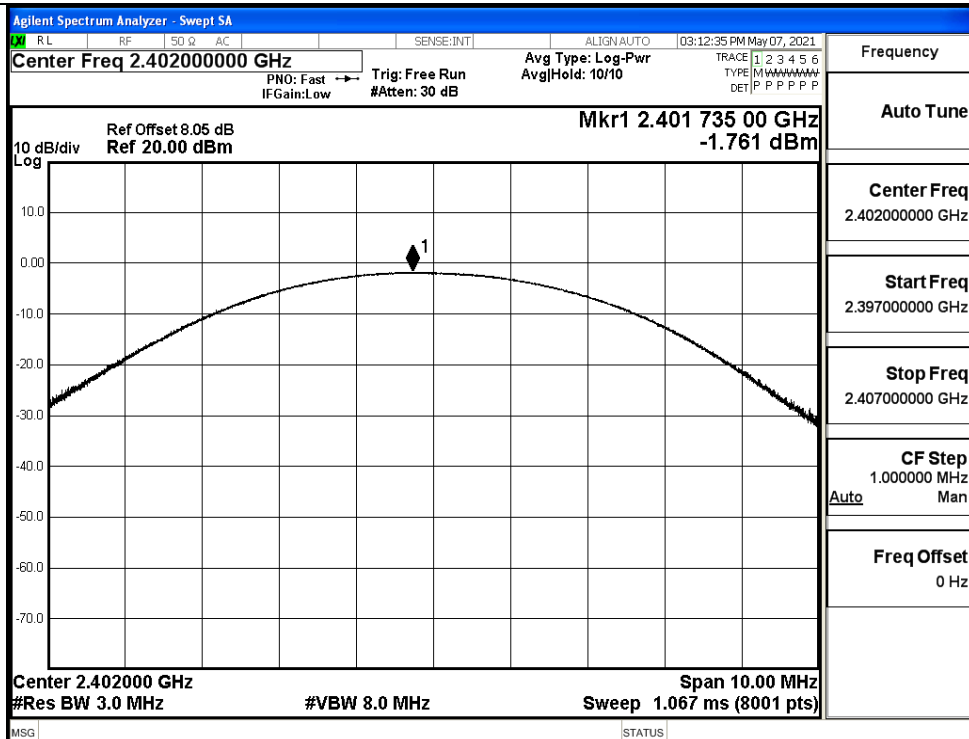


GFSK/HCH

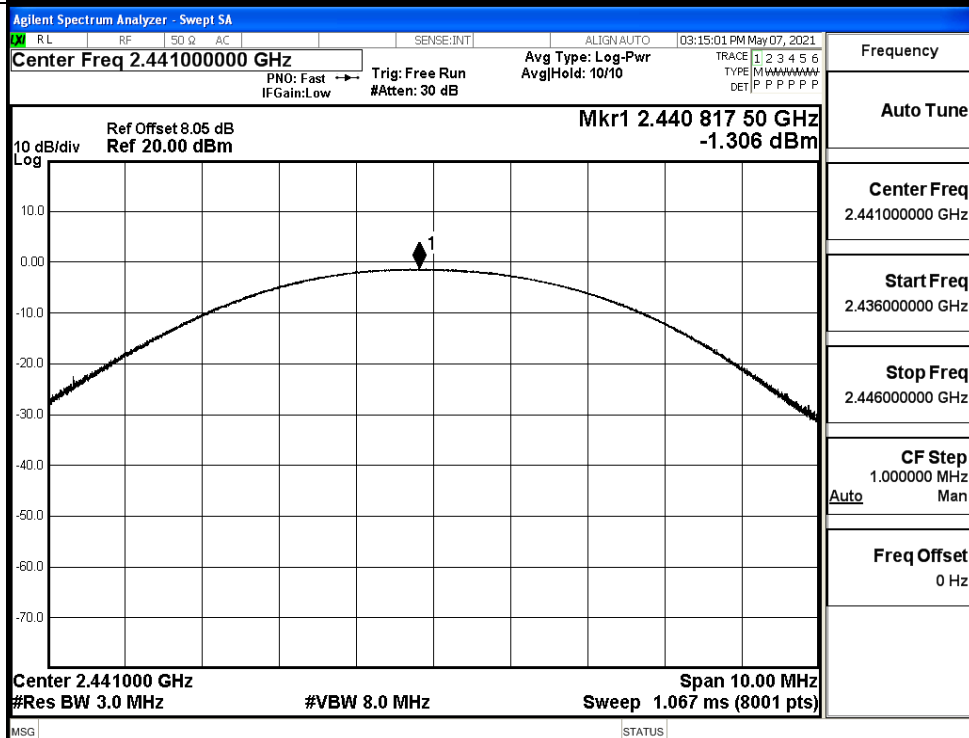
 $\pi/4$ DQPSK/LCH

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

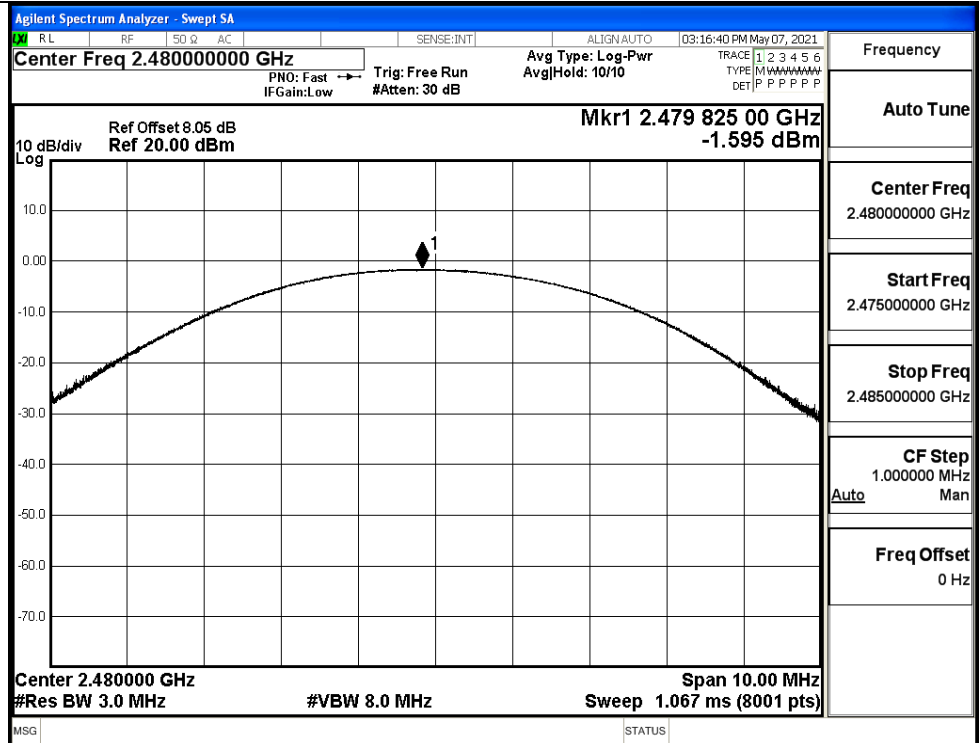
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

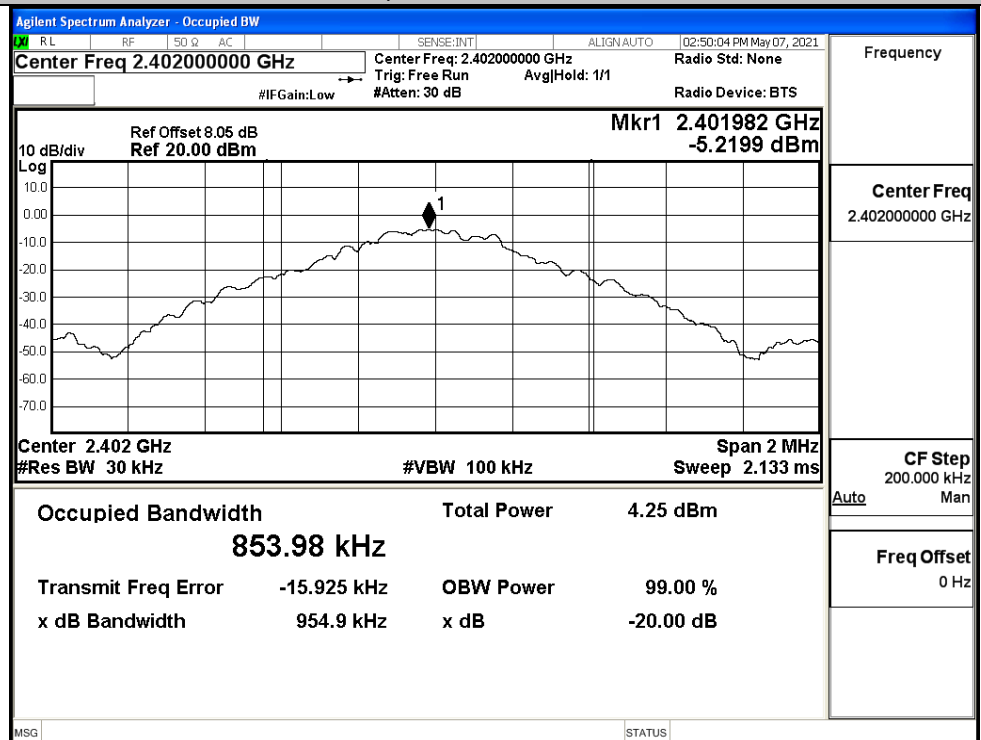


A.2 20dB Bandwidth

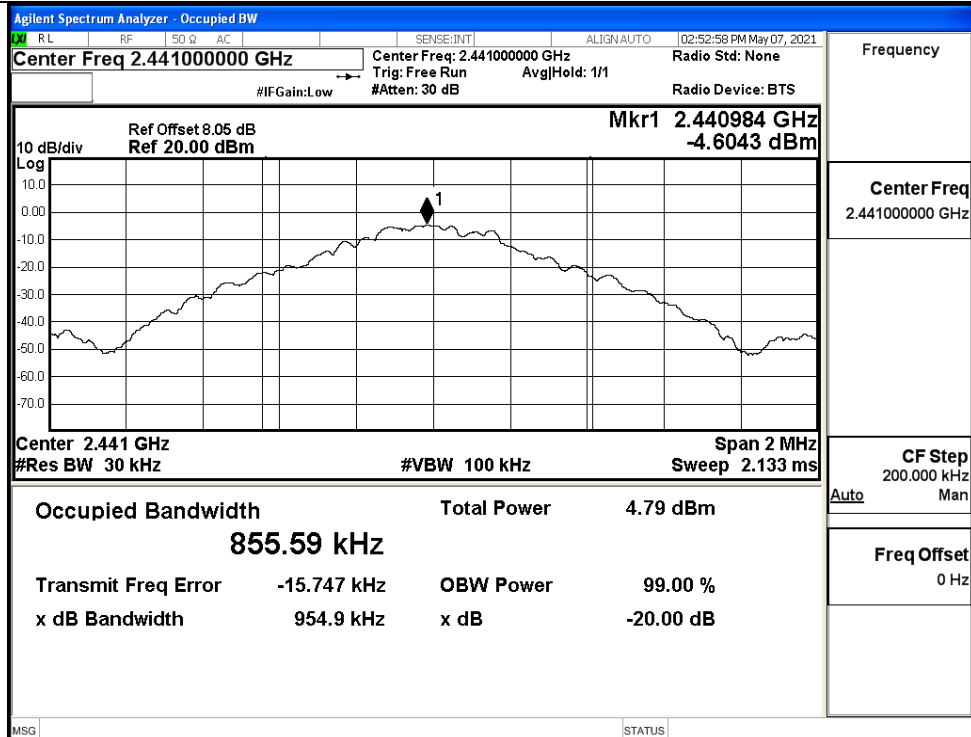
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9549	Not Specified	PASS
	MCH	0.9549	Not Specified	PASS
	HCH	0.9588	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.313	Not Specified	PASS
	MCH	1.313	Not Specified	PASS
	HCH	1.312	Not Specified	PASS
8DPSK	LCH	1.311	Not Specified	PASS
	MCH	1.312	Not Specified	PASS
	HCH	1.312	Not Specified	PASS

Test Graphs

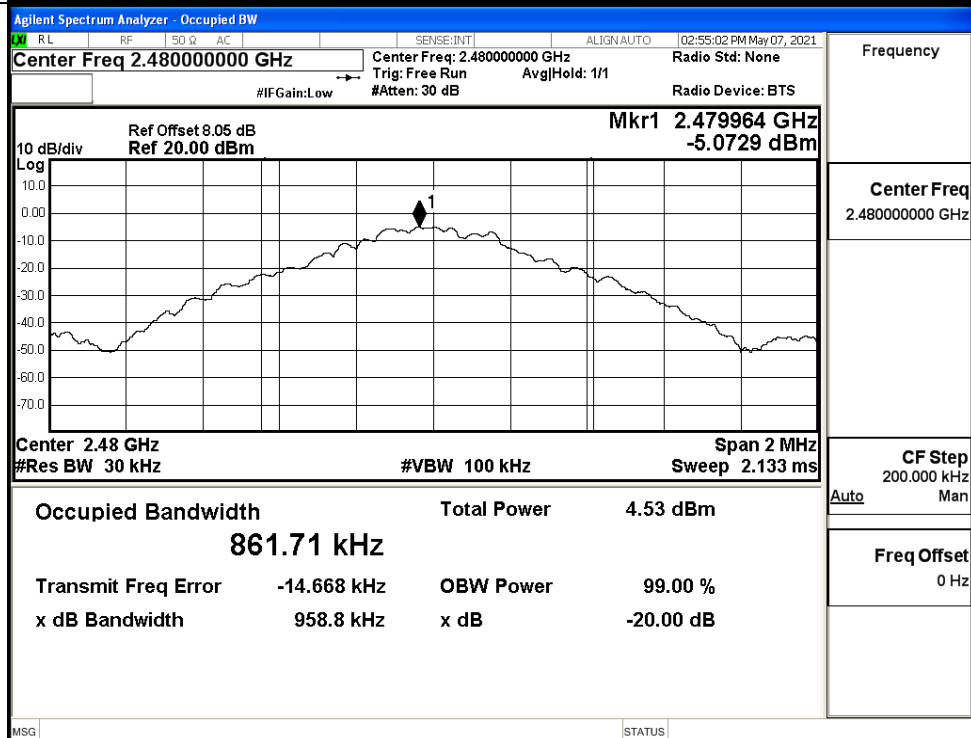
GFSK/LCH

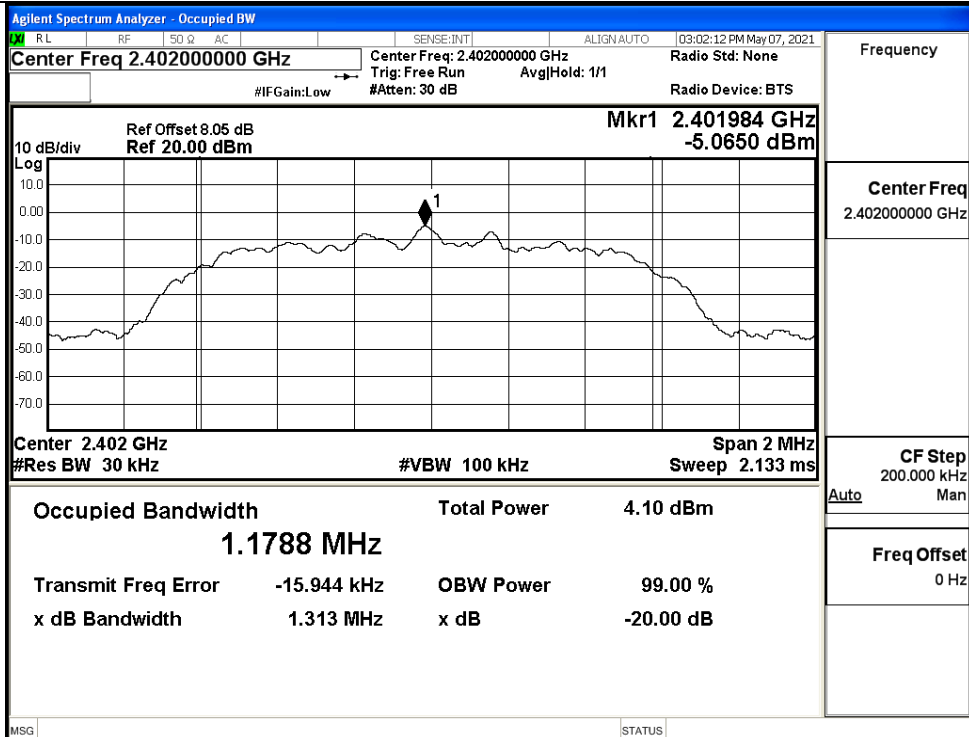


GFSK/MCH



GFSK/HCH

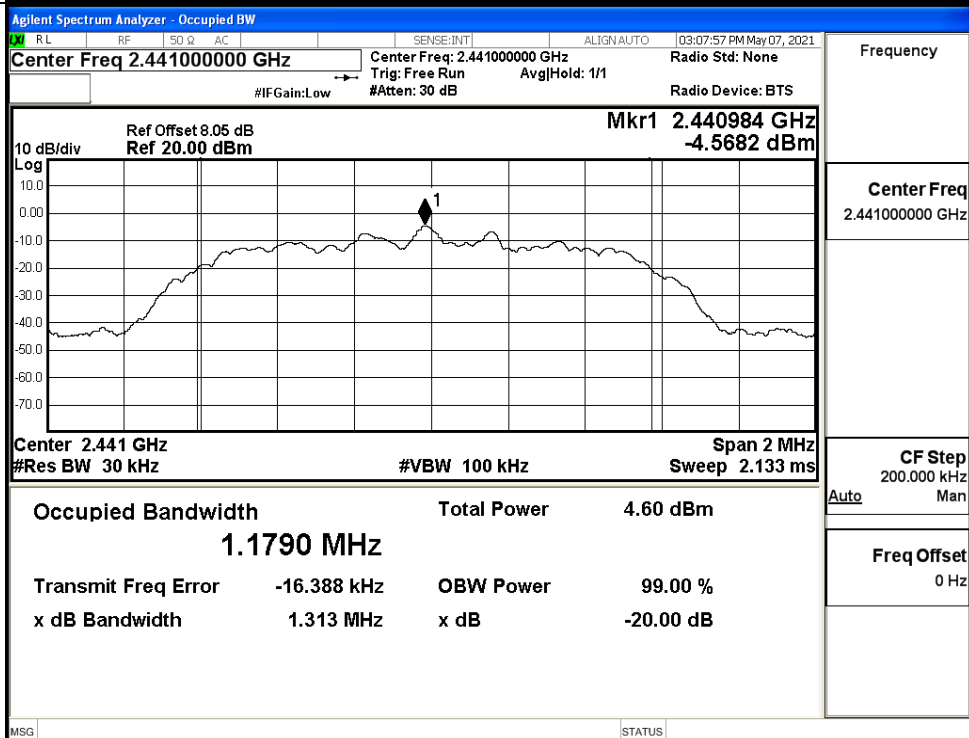


$\pi/4$ DQPSK/LCH

Frequency

Center Freq
2.40200000 GHzCF Step
200.000 kHz
Man

Auto

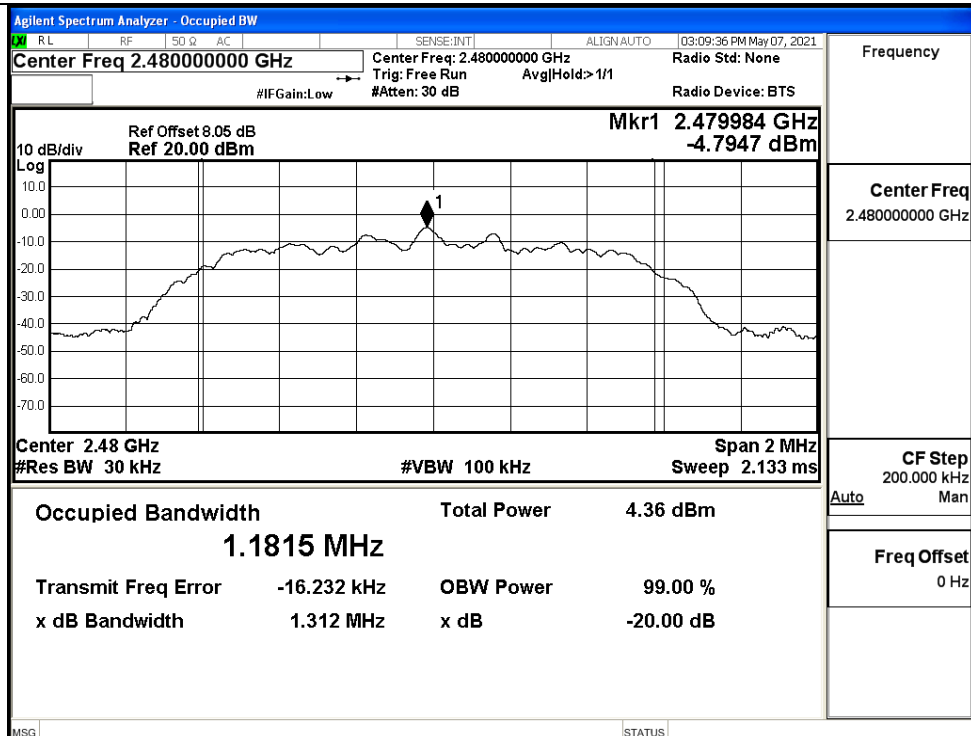
Freq Offset
0 Hz $\pi/4$ DQPSK/MCH

Frequency

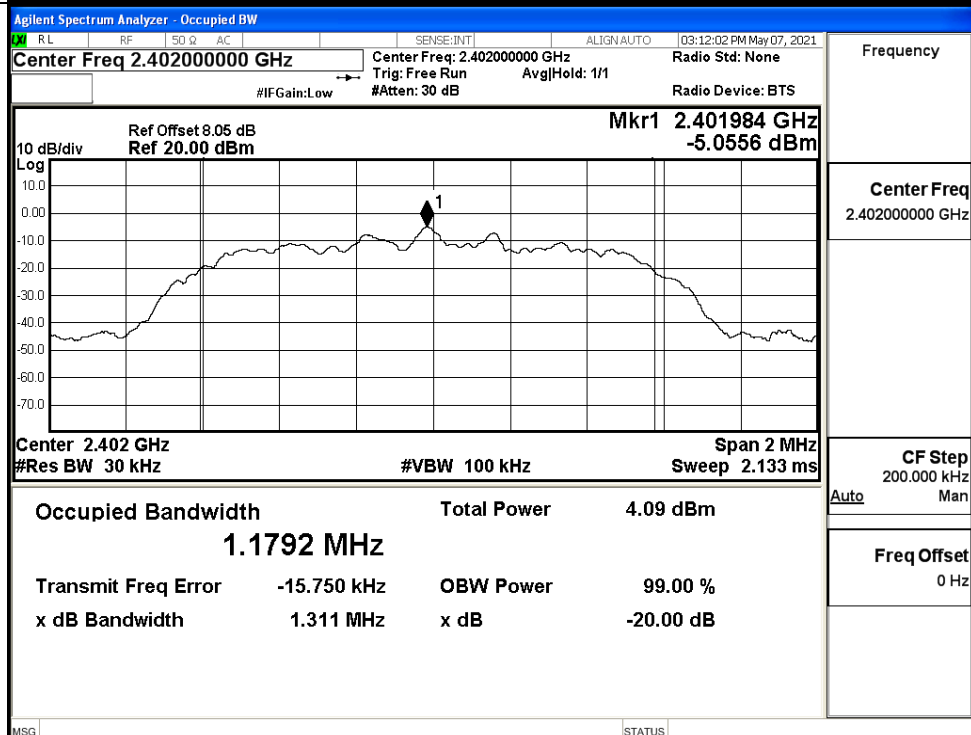
Center Freq
2.44100000 GHzCF Step
200.000 kHz
Man

Auto

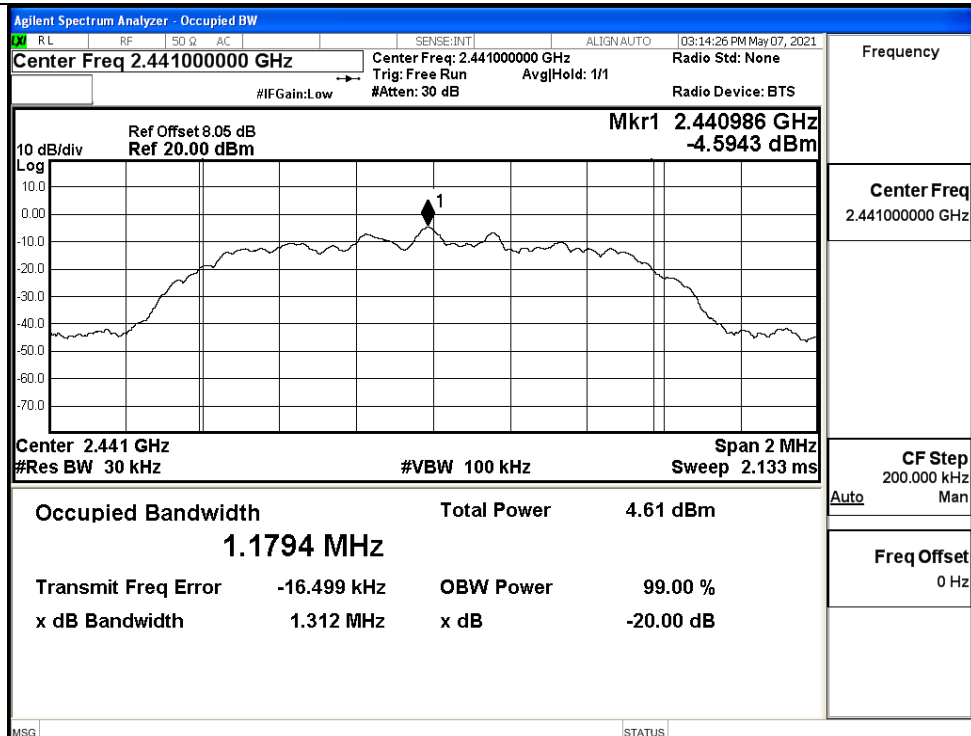
Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH

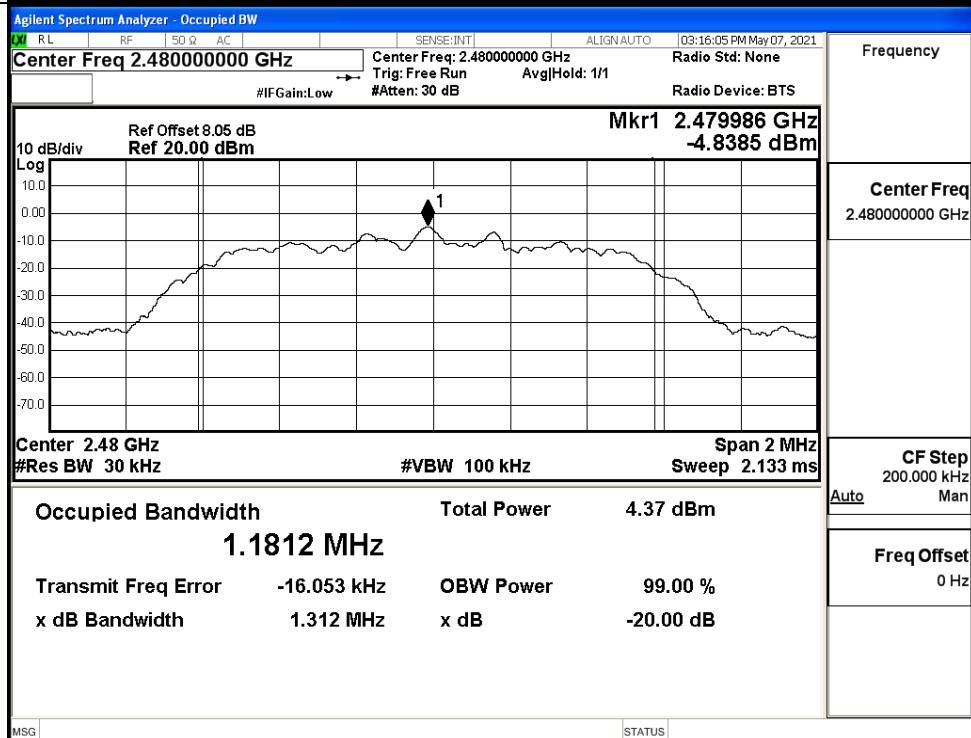
8DPSK/LCH



8DPSK/MCH



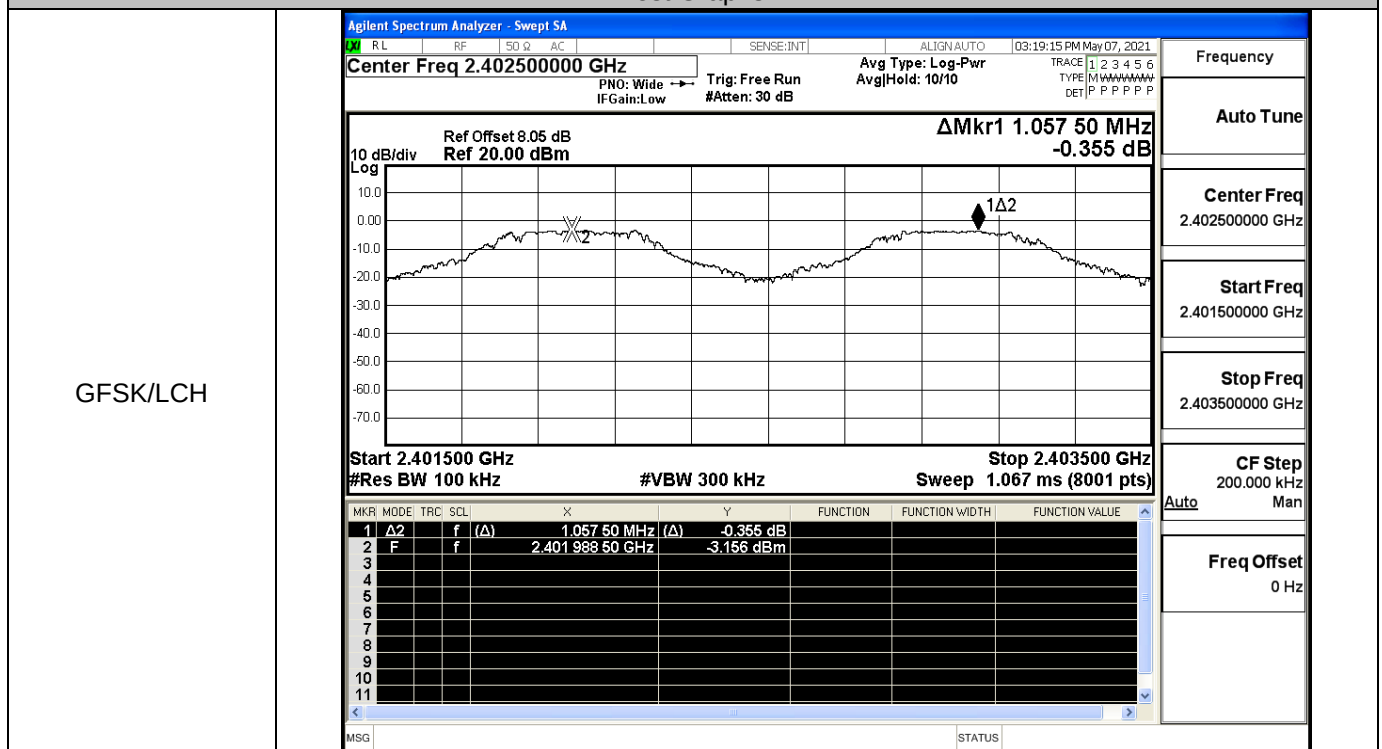
8DPSK/HCH



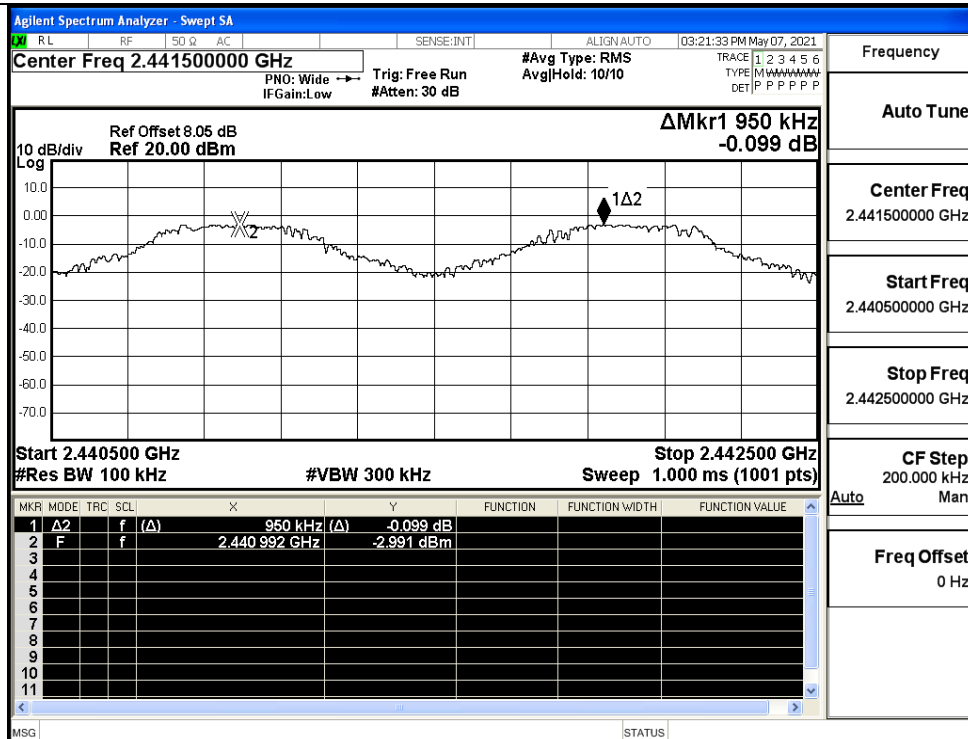
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.057	0.639	PASS
	MCH	0.950	0.639	PASS
	HCH	1.066	0.639	PASS
$\pi/4$ DQPSK	LCH	0.922	0.875	PASS
	MCH	0.886	0.875	PASS
	HCH	1.000	0.875	PASS
8DPSK	LCH	1.014	0.875	PASS
	MCH	0.884	0.875	PASS
	HCH	1.128	0.875	PASS

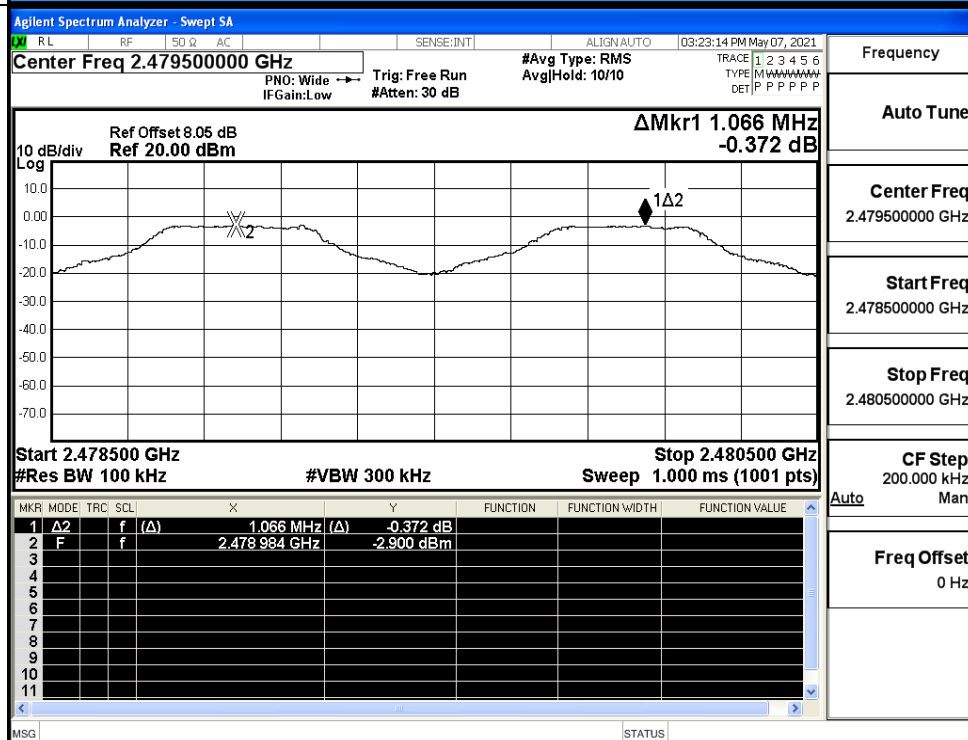
Test Graphs

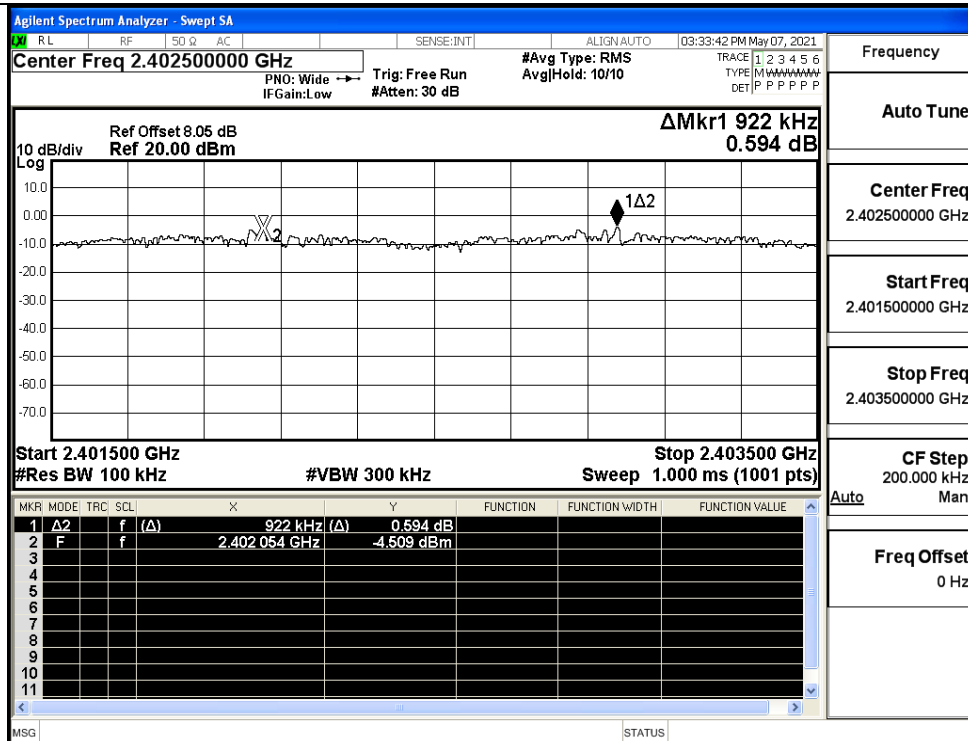


GFSK/MCH



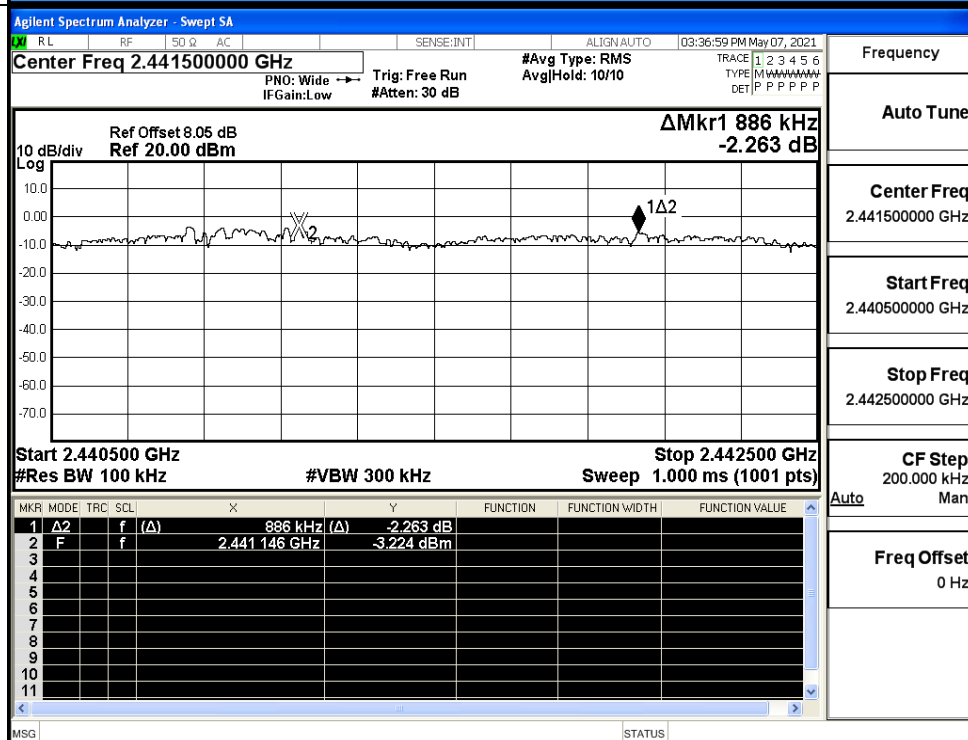
GFSK/HCH



$\pi/4$ DQPSK/LCH

Frequency

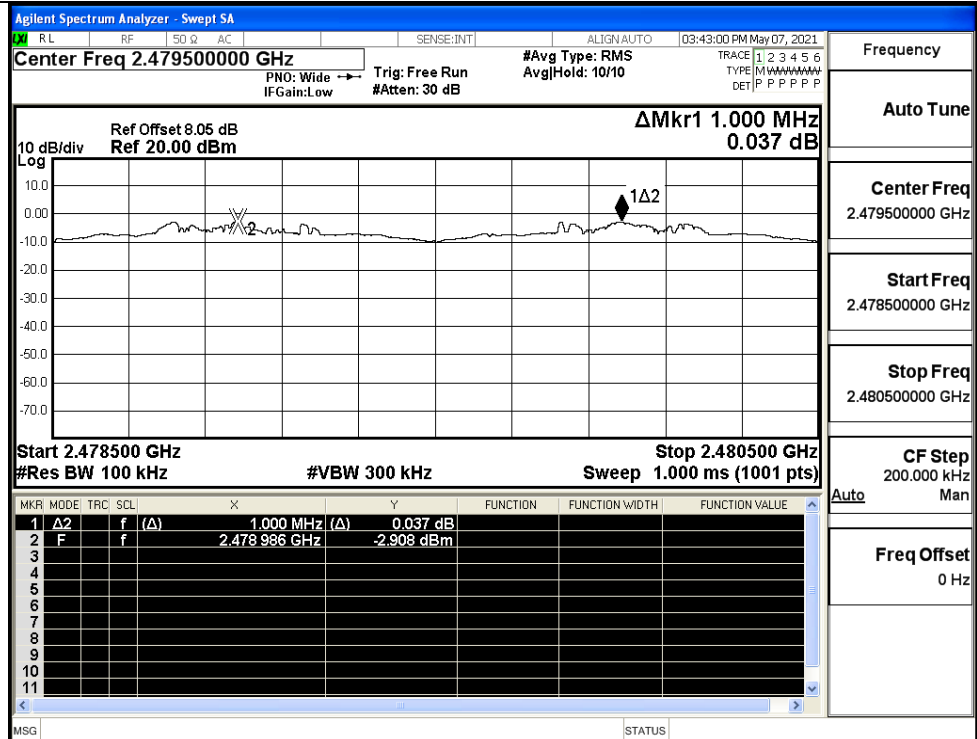
Auto Tune

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

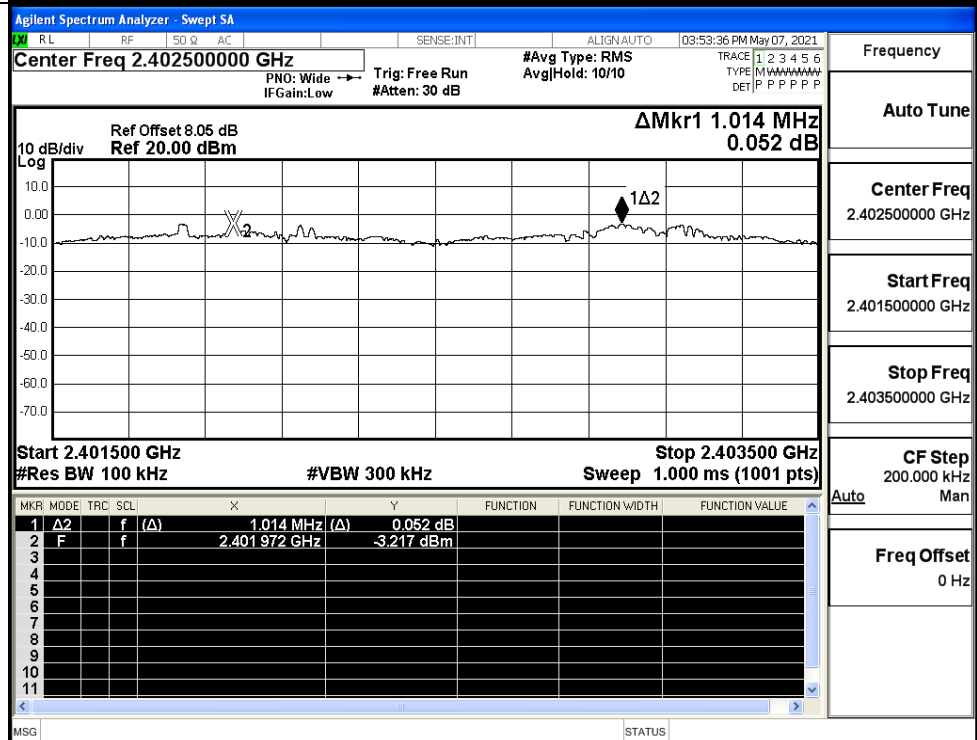
Frequency

Auto Tune

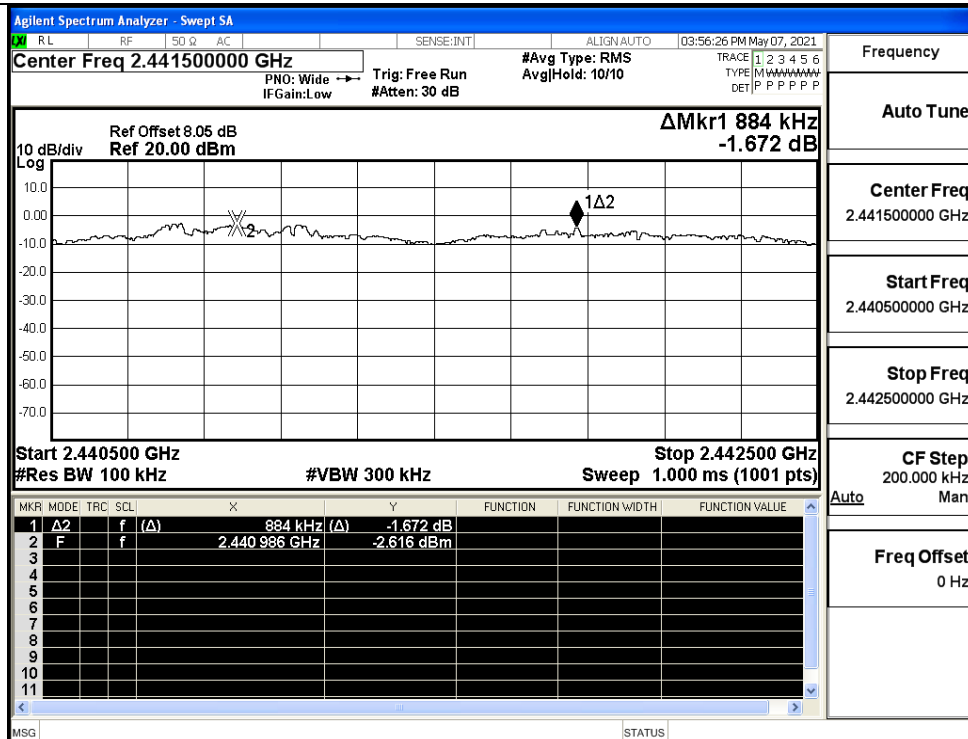
Center Freq
2.441500000 GHzStart Freq
2.440500000 GHzStop Freq
2.442500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH

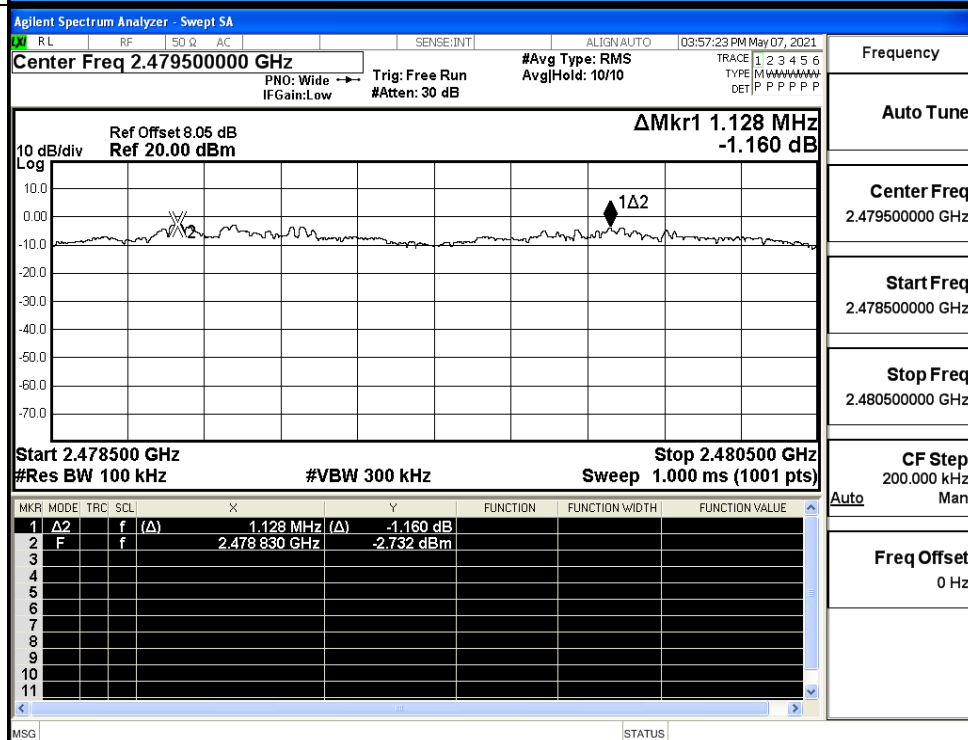
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

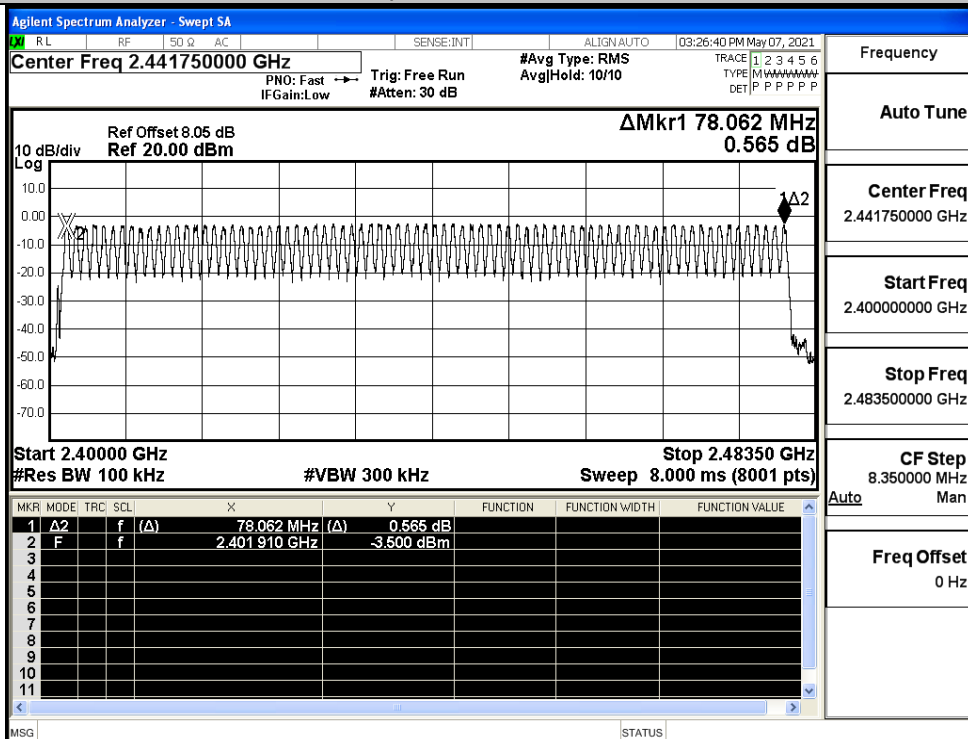


A.4 Hopping Channel Number

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

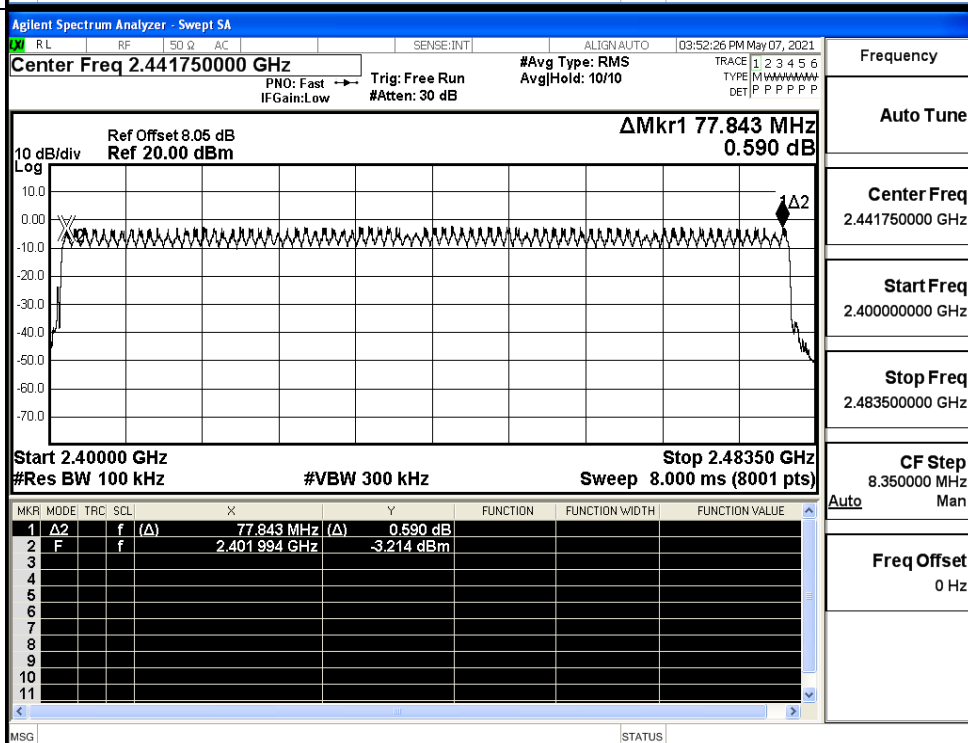
Test Graphs

GFSK/Hop



Frequency

Auto Tune

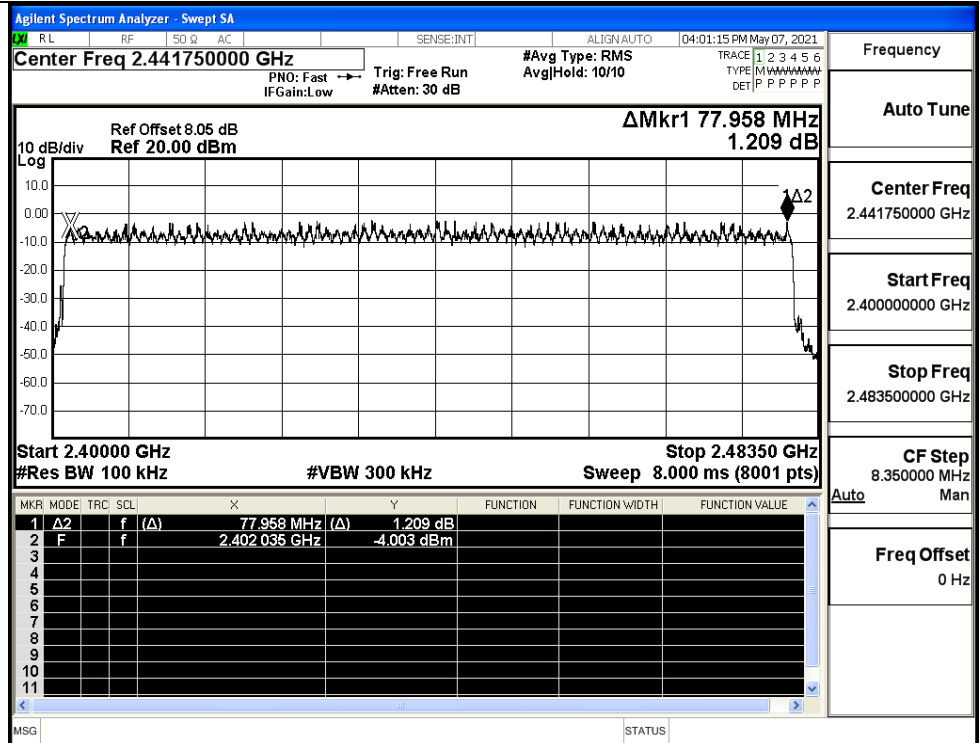
Center Freq
2.441750000 GHzStart Freq
2.400000000 GHzStop Freq
2.483500000 GHzCF Step
8.350000 MHz
ManFreq Offset
0 Hz $\pi/4$ DQPSK/Hop

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

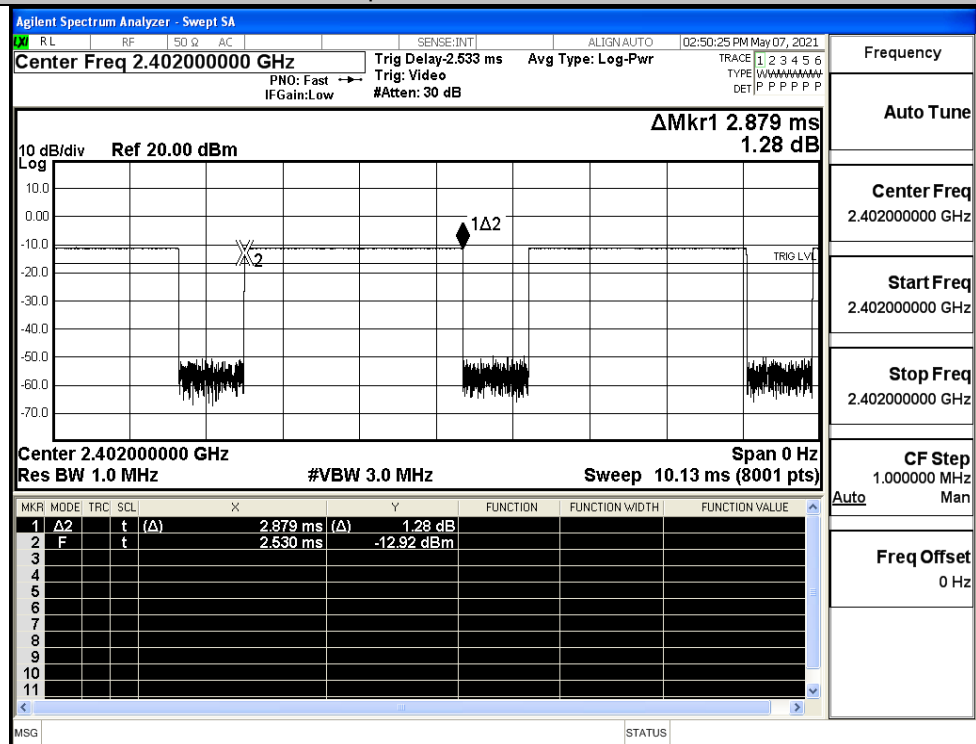


A.5 Dwell Time

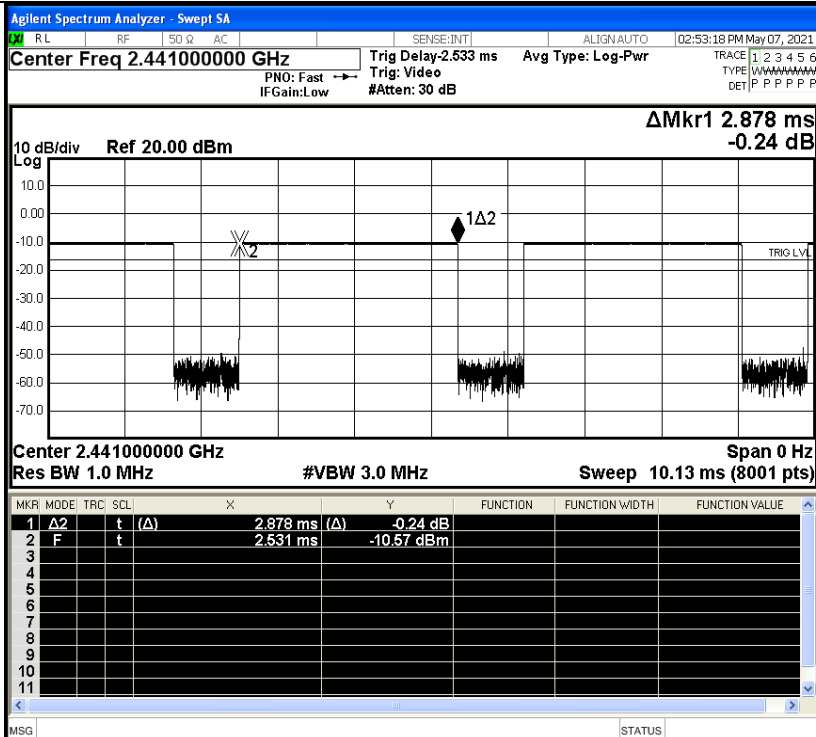
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.308	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.307	0.4	PASS
	3DH5	MCH	2.88	106.7	0.307	0.4	PASS
	3DH5	HCH	2.88	106.7	0.307	0.4	PASS

Test Graphs

GFSK_DH5/LCH



GFSK_DH5/MCH



Frequency

Auto Tune

Center Freq
2.441000000 GHz

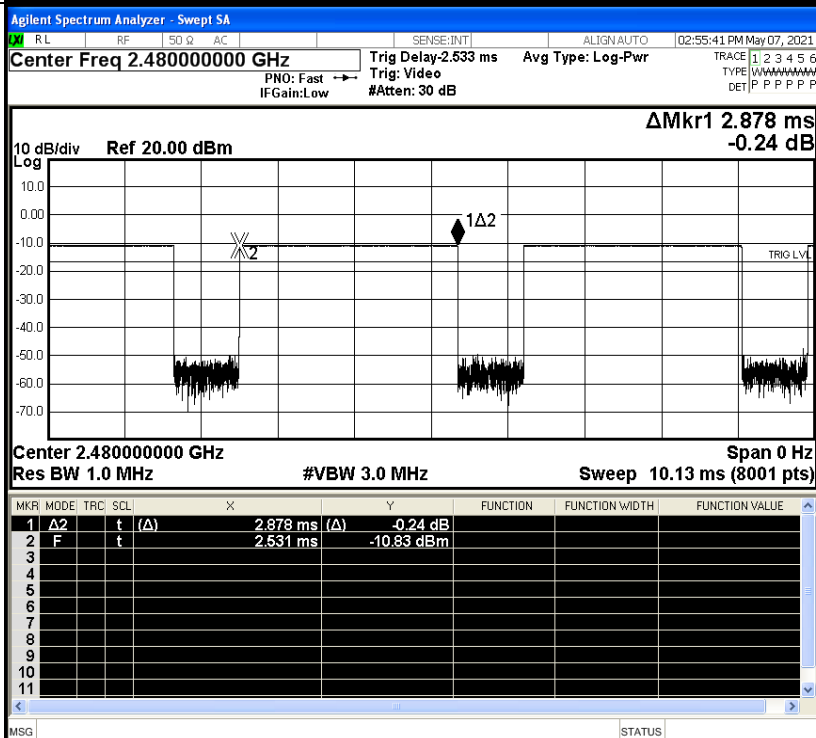
Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

GFSK_DH5/HCH



Frequency

Auto Tune

Center Freq
2.480000000 GHz

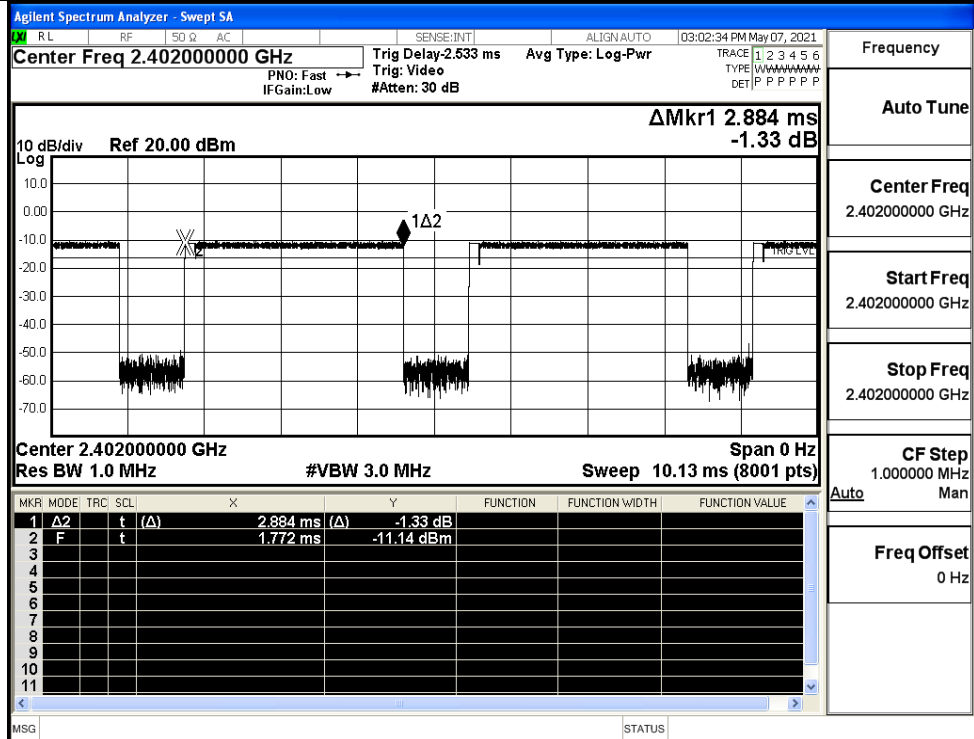
Start Freq
2.480000000 GHz

Stop Freq
2.480000000 GHz

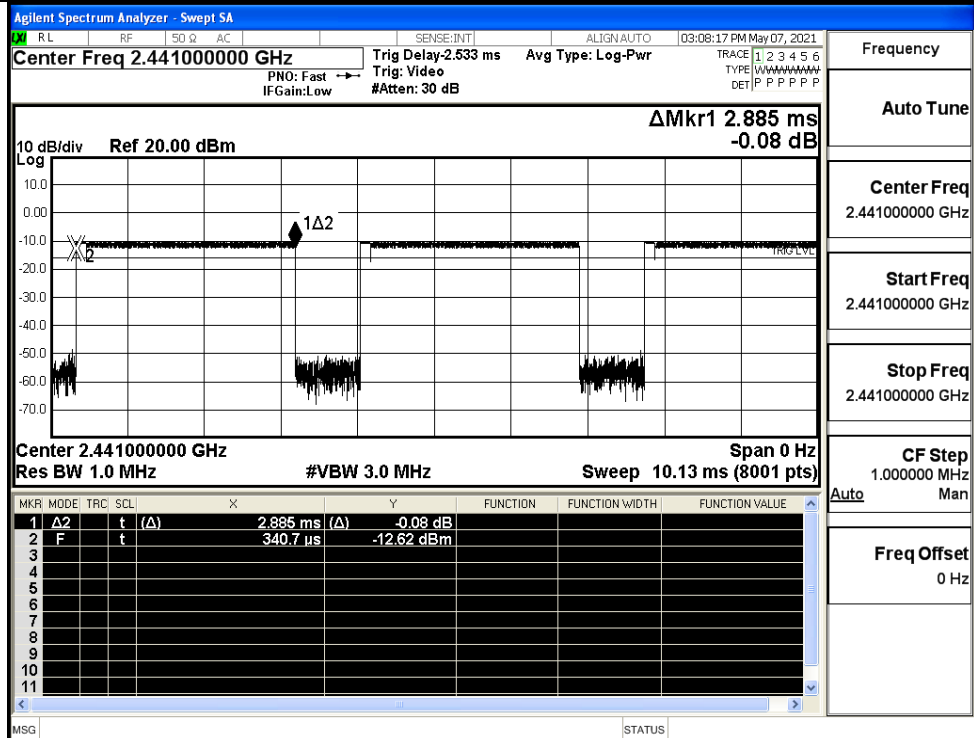
CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

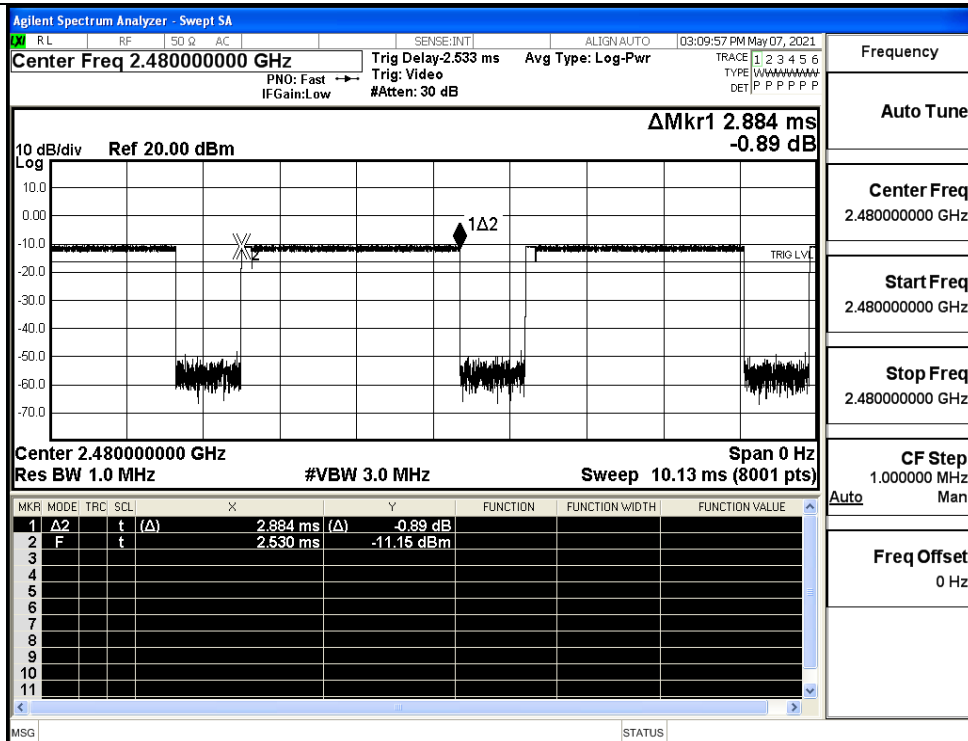
$\pi/4$ DQPSK
_2DH5/LCH



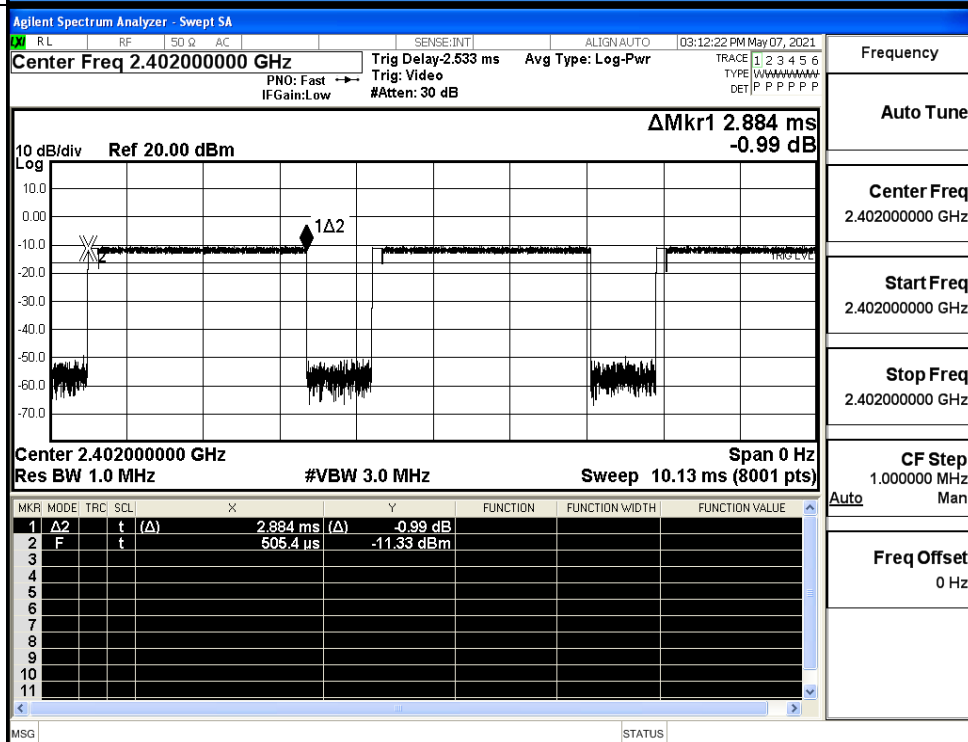
$\pi/4$ DQPSK
_2DH5/MCH



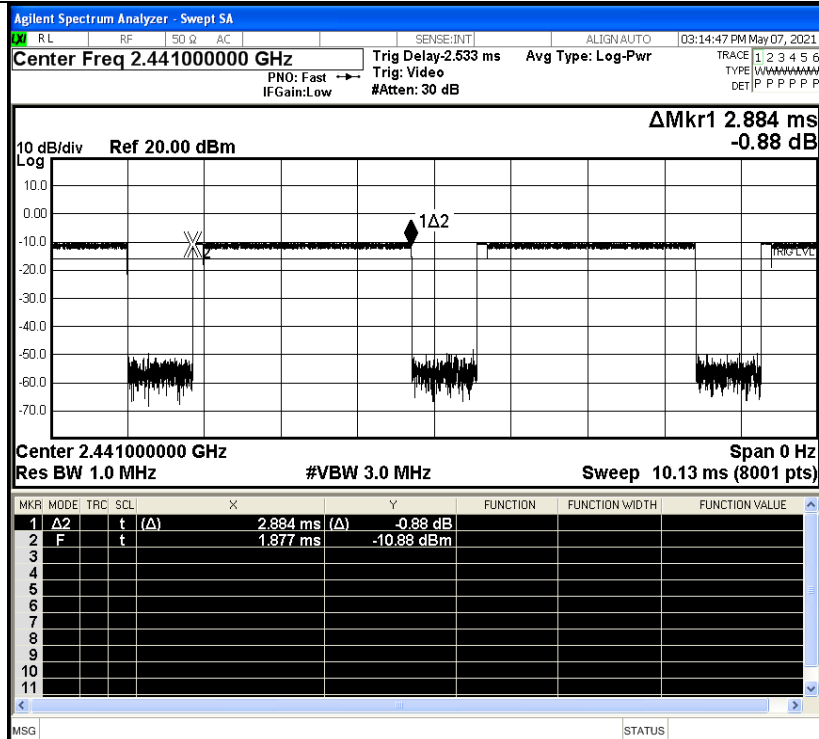
$\pi/4$ DQPSK
_2DH5/HCH



8DPSK _3DH5/LCH



8DPSK_3DH5/MCH

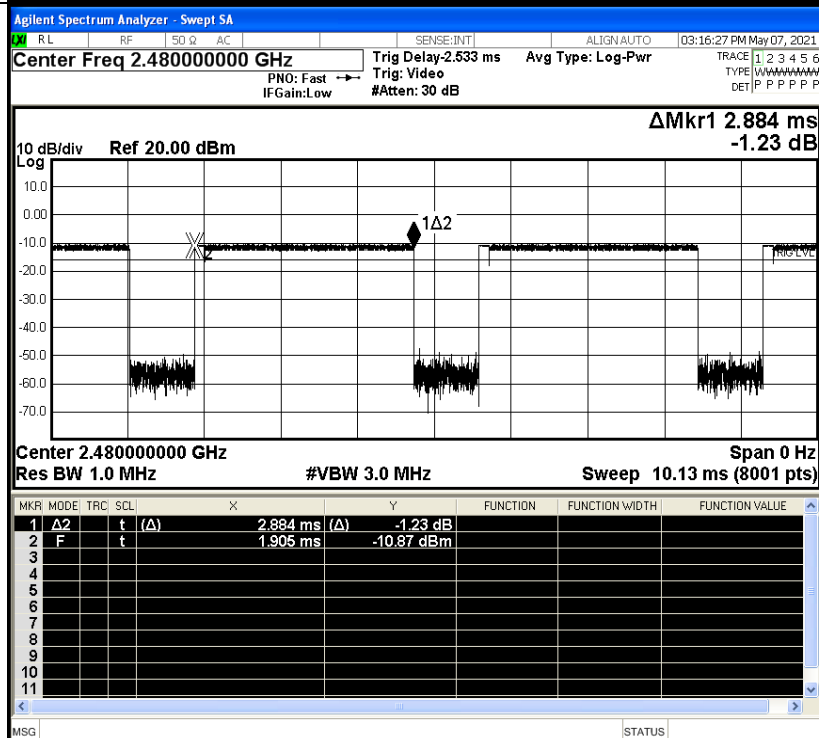


Frequency

Auto Tune

Center Freq
2.441000000 GHzStart Freq
2.441000000 GHzStop Freq
2.441000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

8DPSK_3DH5/HCH



Frequency

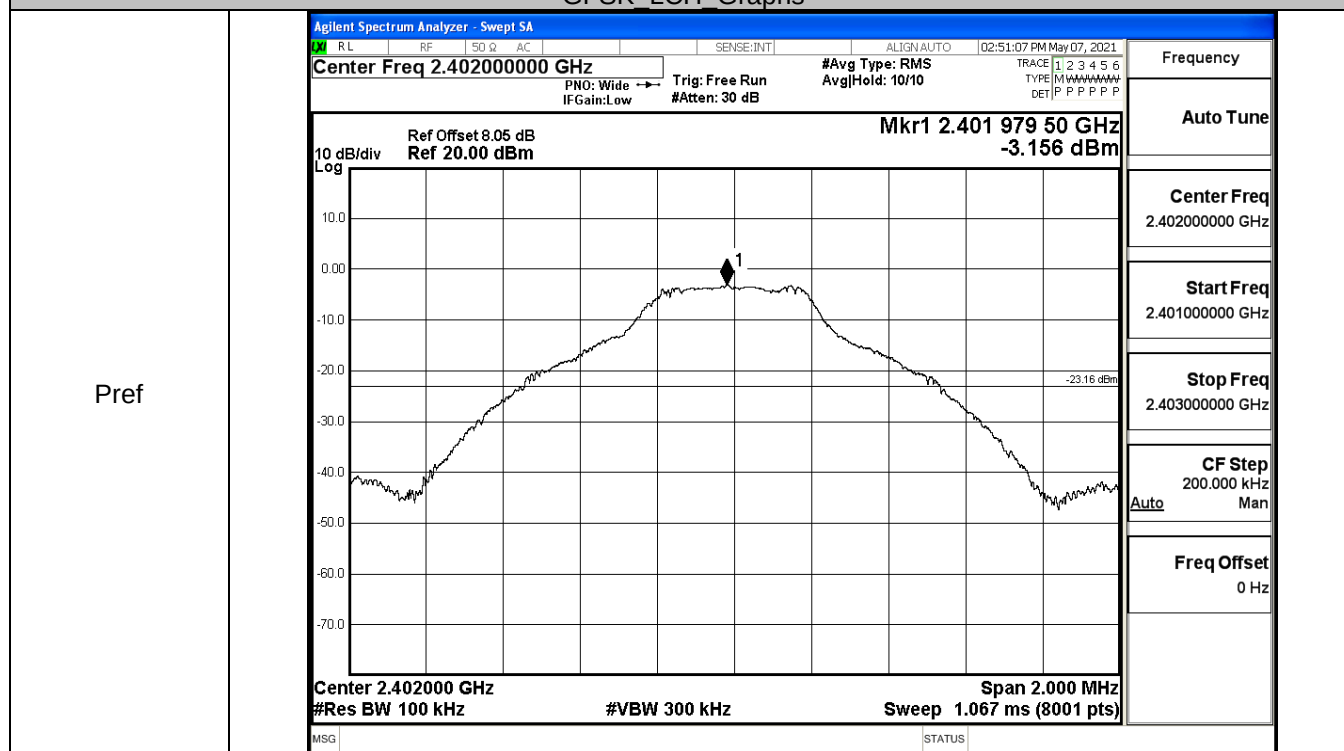
Auto Tune

Center Freq
2.480000000 GHzStart Freq
2.480000000 GHzStop Freq
2.480000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

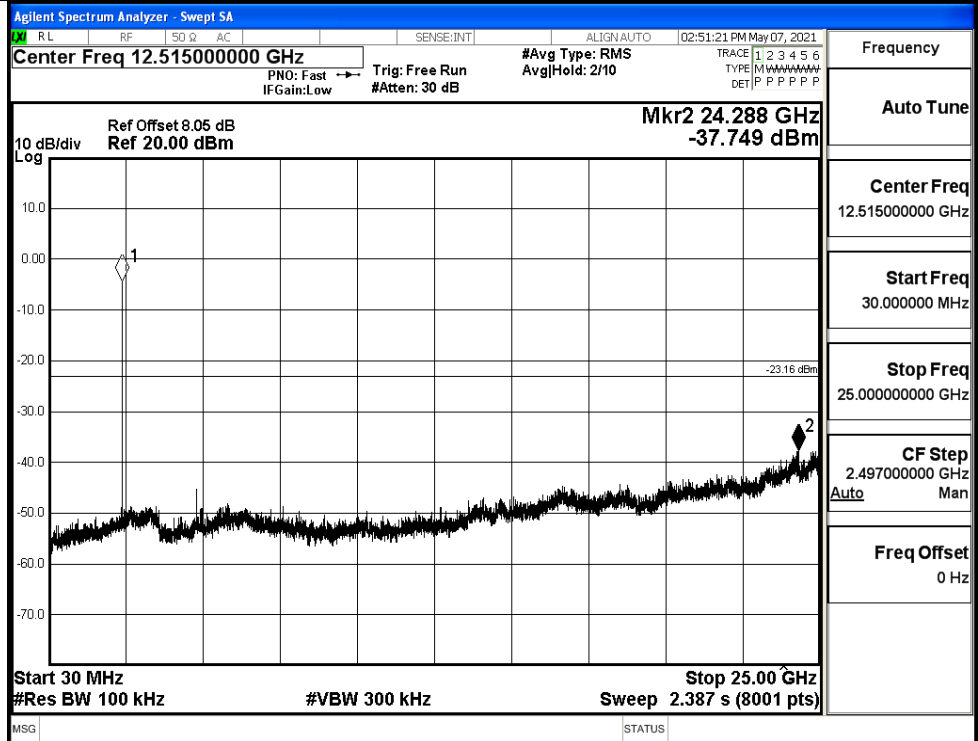
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.156	-37.749	-23.156	PASS
	MCH	-2.87	-37.940	-22.870	PASS
	HCH	-3.026	-37.207	-23.026	PASS
$\pi/4$ DQPSK	LCH	-2.973	-37.680	-22.973	PASS
	MCH	-2.523	-37.434	-22.523	PASS
	HCH	-2.743	-36.897	-22.743	PASS
8DPSK	LCH	-3.118	-38.129	-23.118	PASS
	MCH	-2.615	-37.234	-22.615	PASS
	HCH	-2.788	-37.425	-22.788	PASS

GFSK LCH Graphs

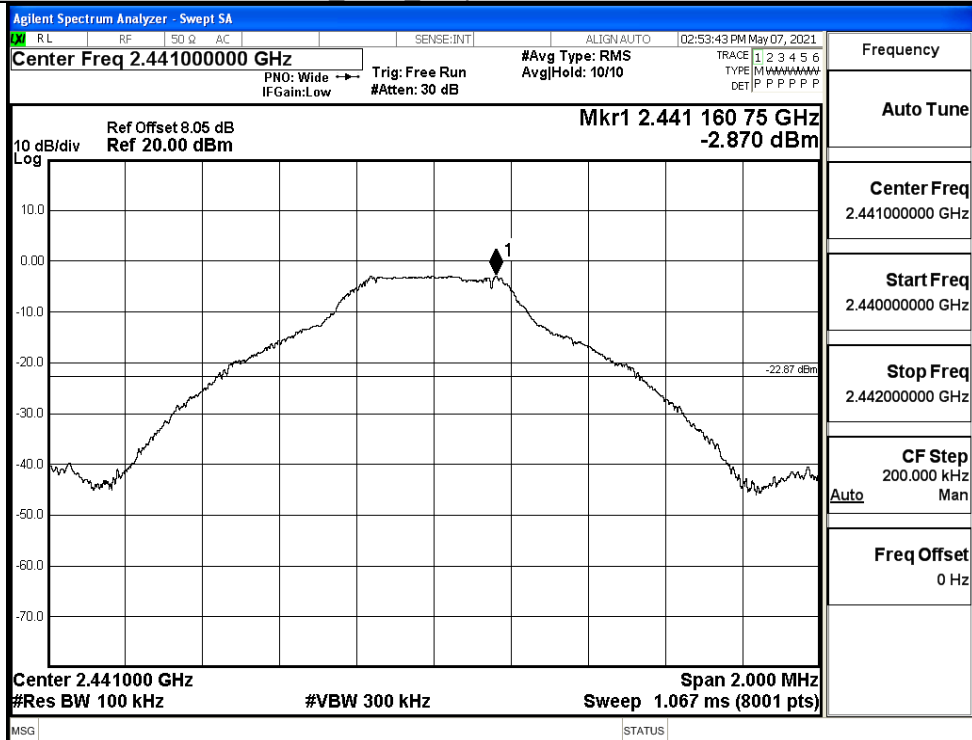


Puw

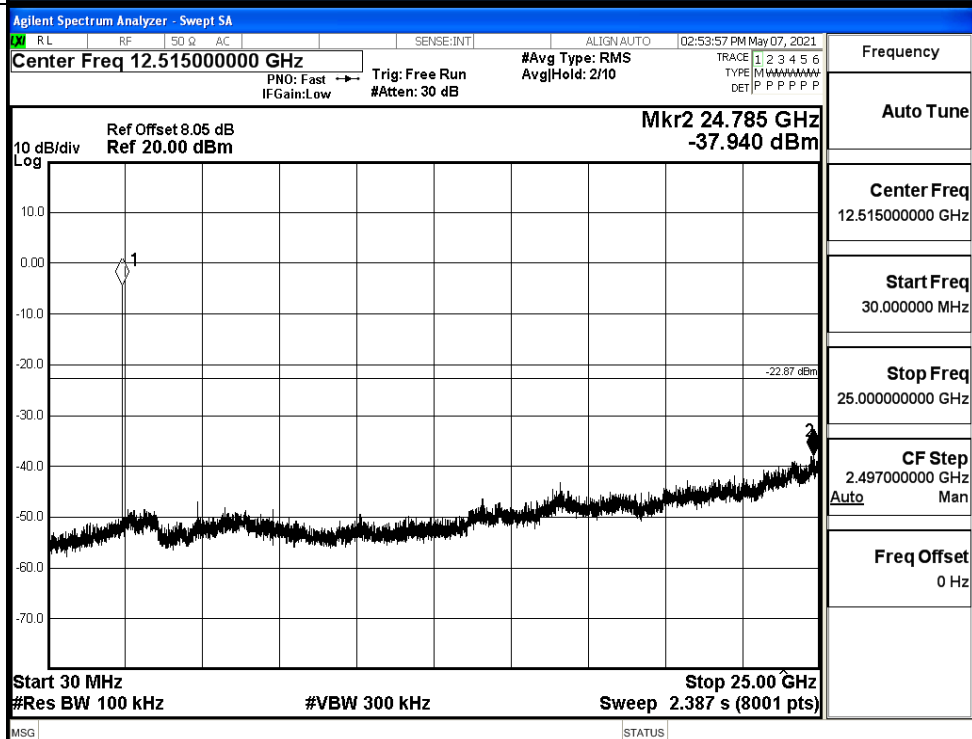


GFSK_MCH_Graphs

Pref

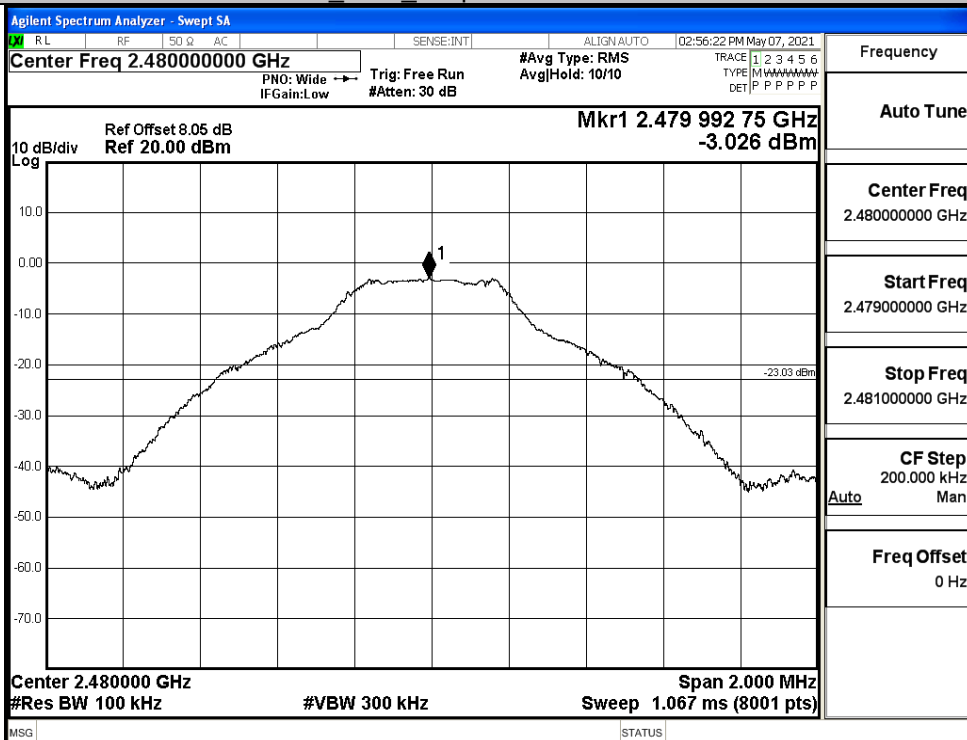


Puw

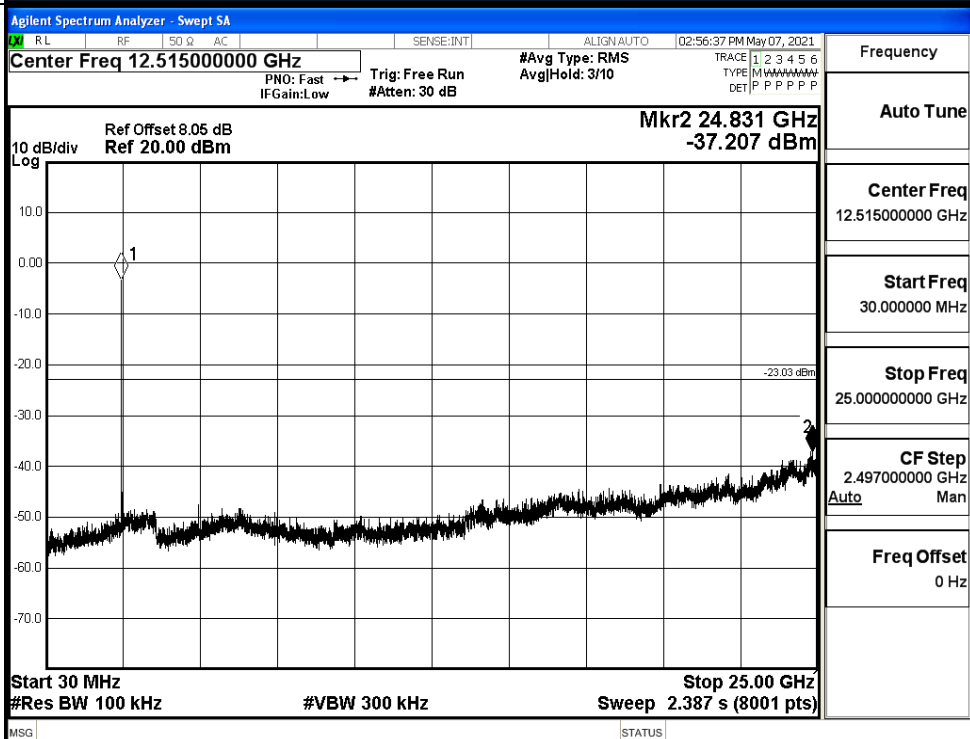


GFSK HCH_Graphs

Pref

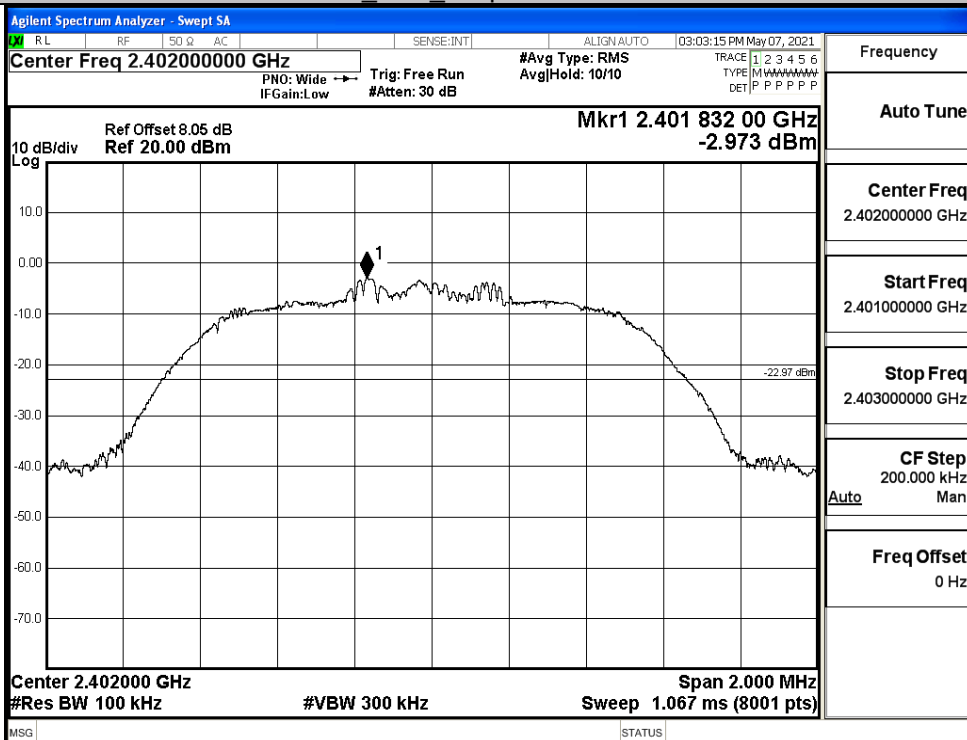


Puw

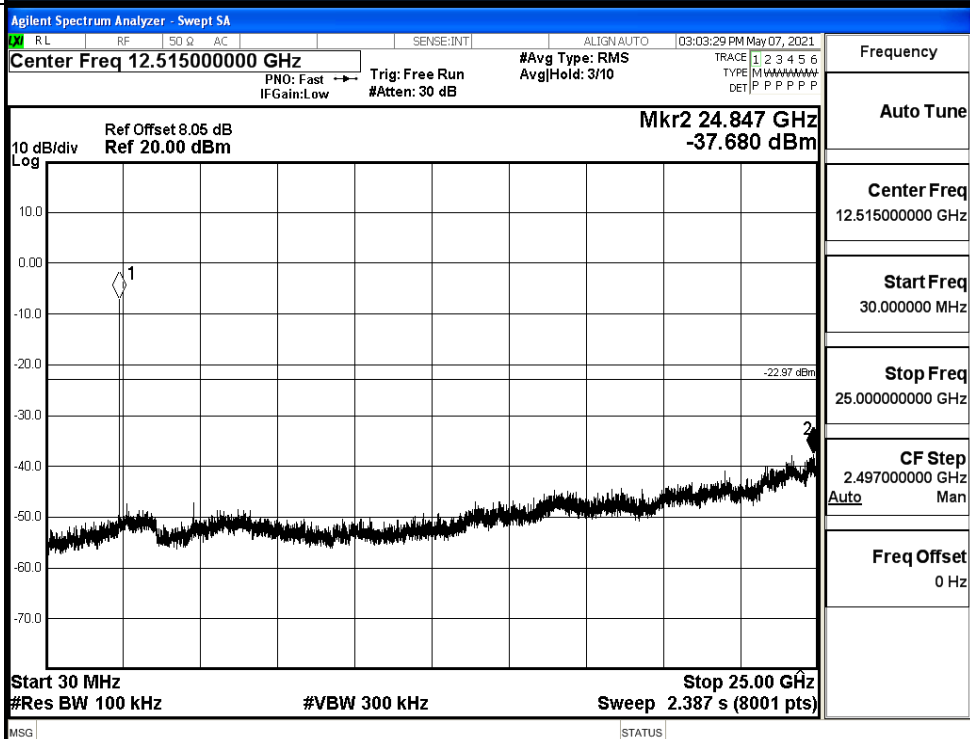


π /4DQPSK_LCH_Graphs

Pref

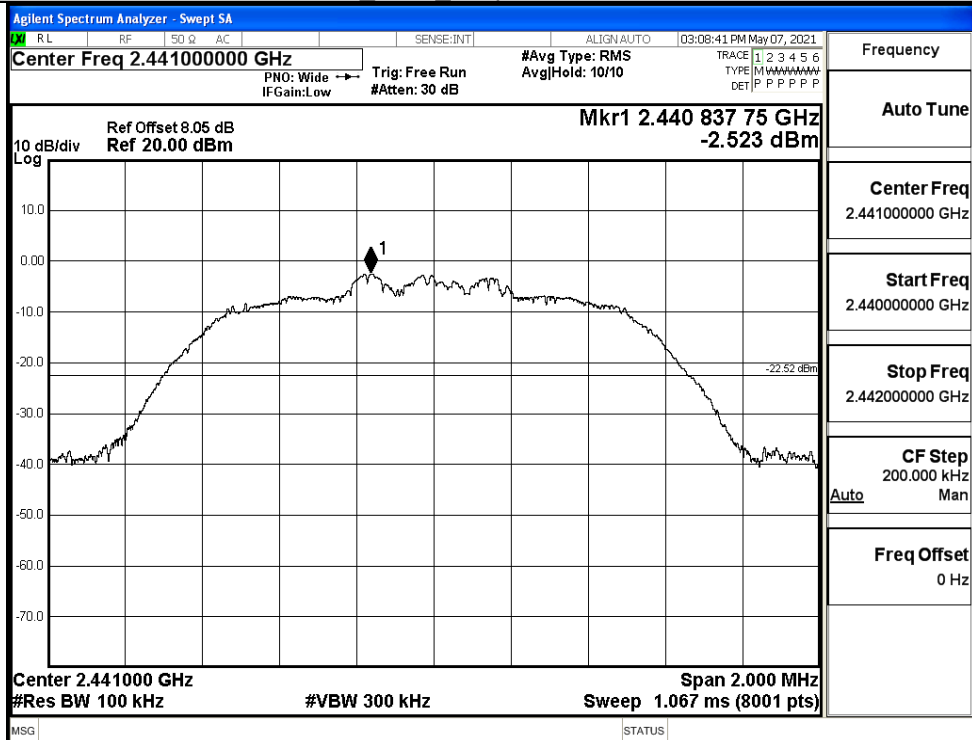


Puw

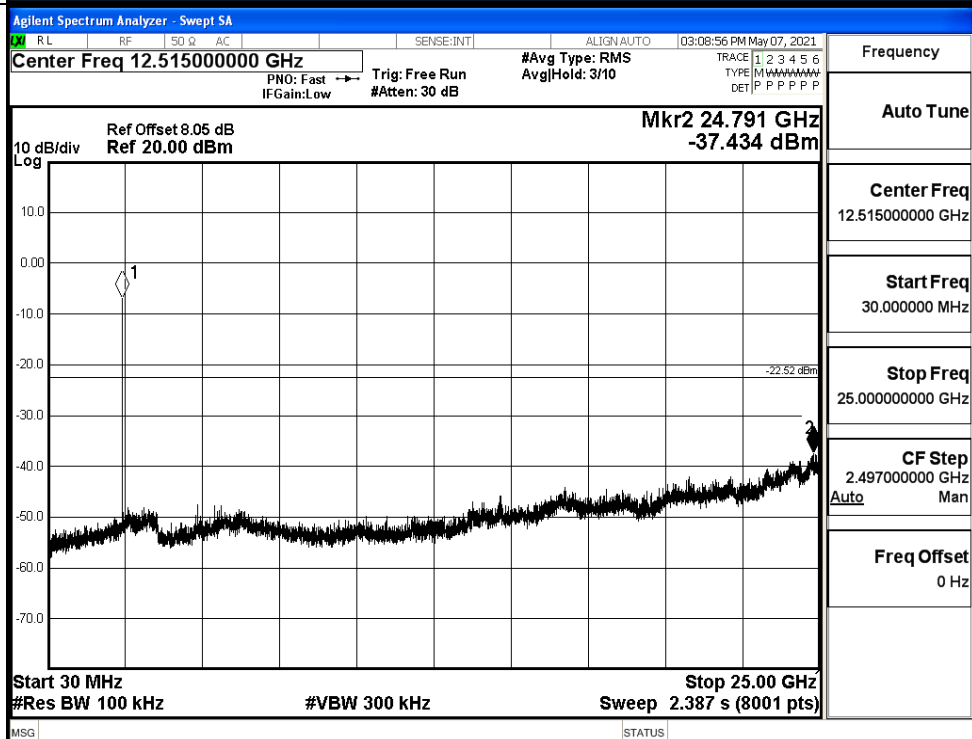


π /4DQPSK_MCH_Graphs

Pref

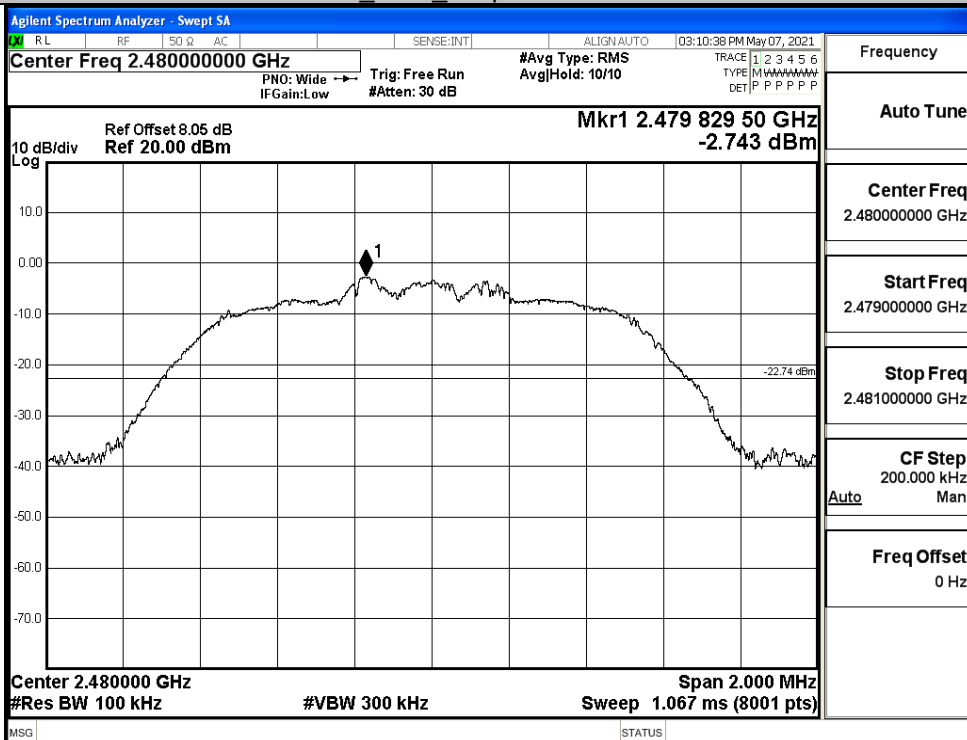


Puw

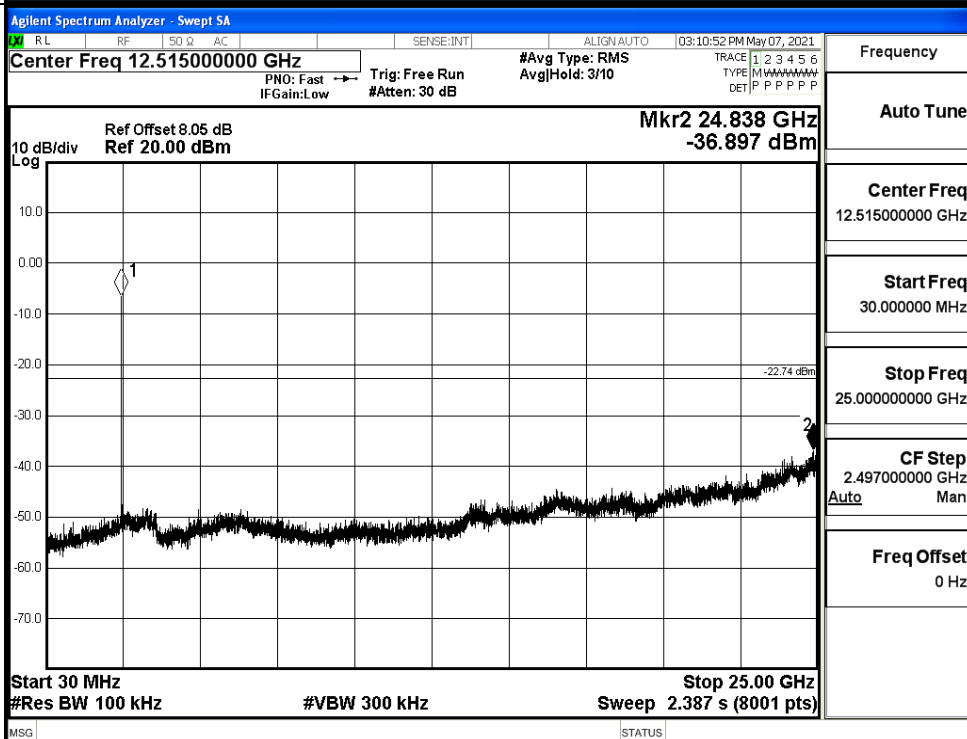


π /4DQPSK_HCH_Graphs

Pref

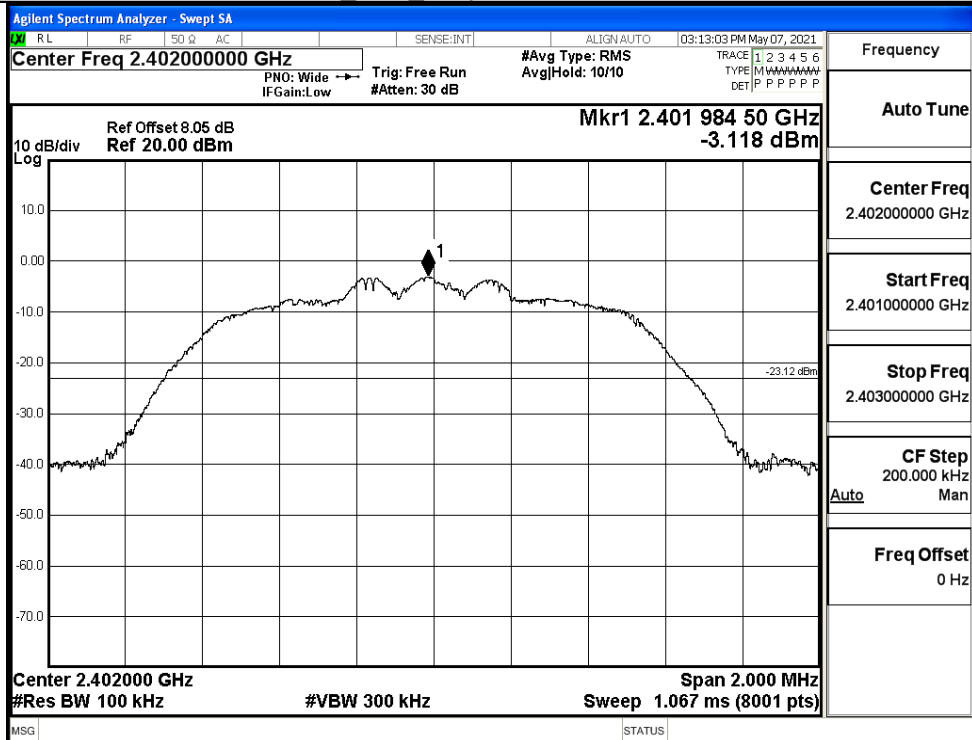


Puw

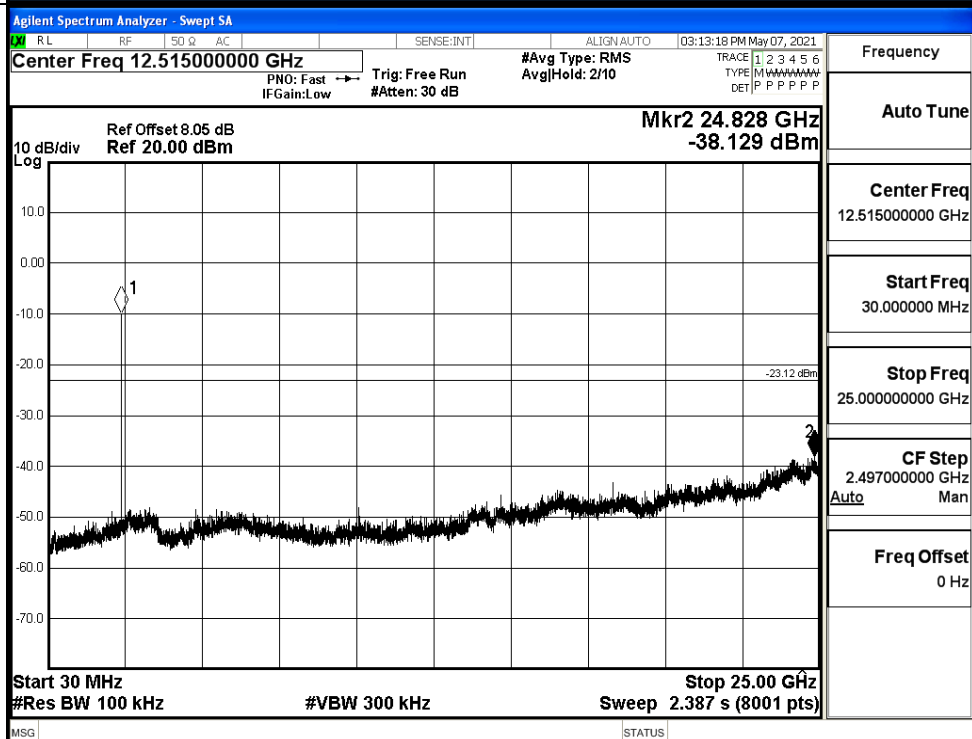


8DPSK_LCH_Graphs

Pref

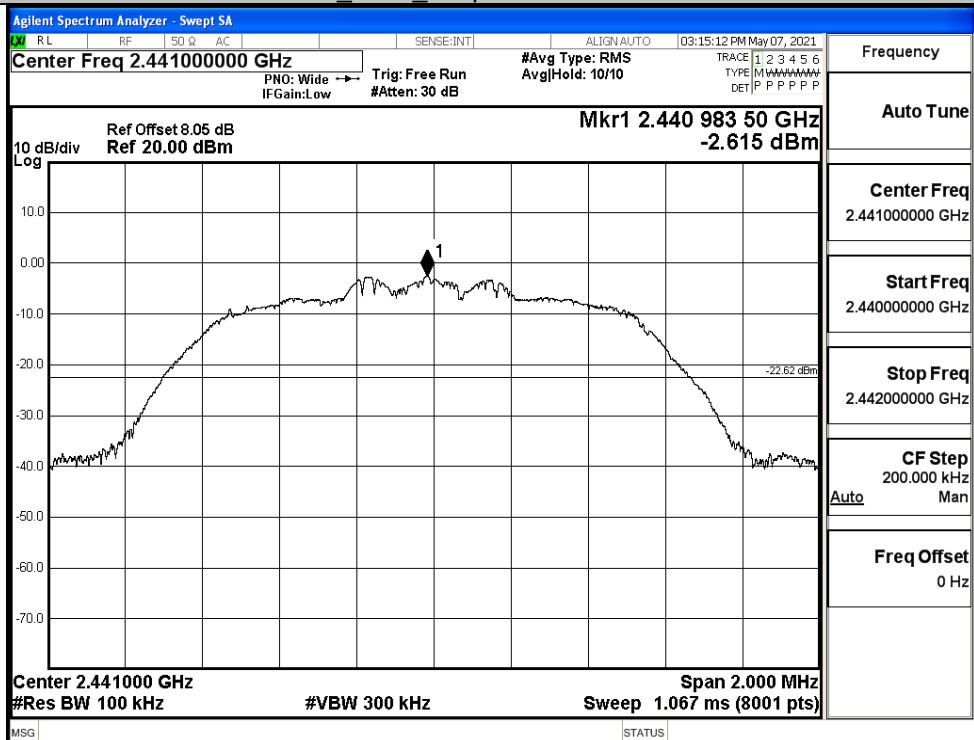


Puw

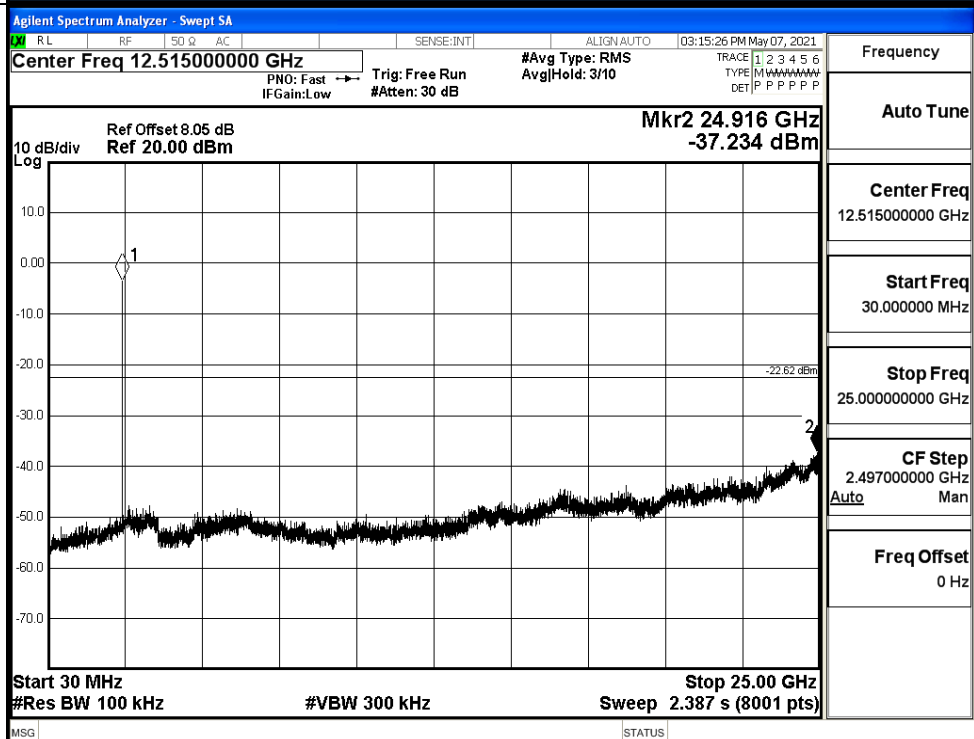


8DPSK_MCH_Graphs

Pref

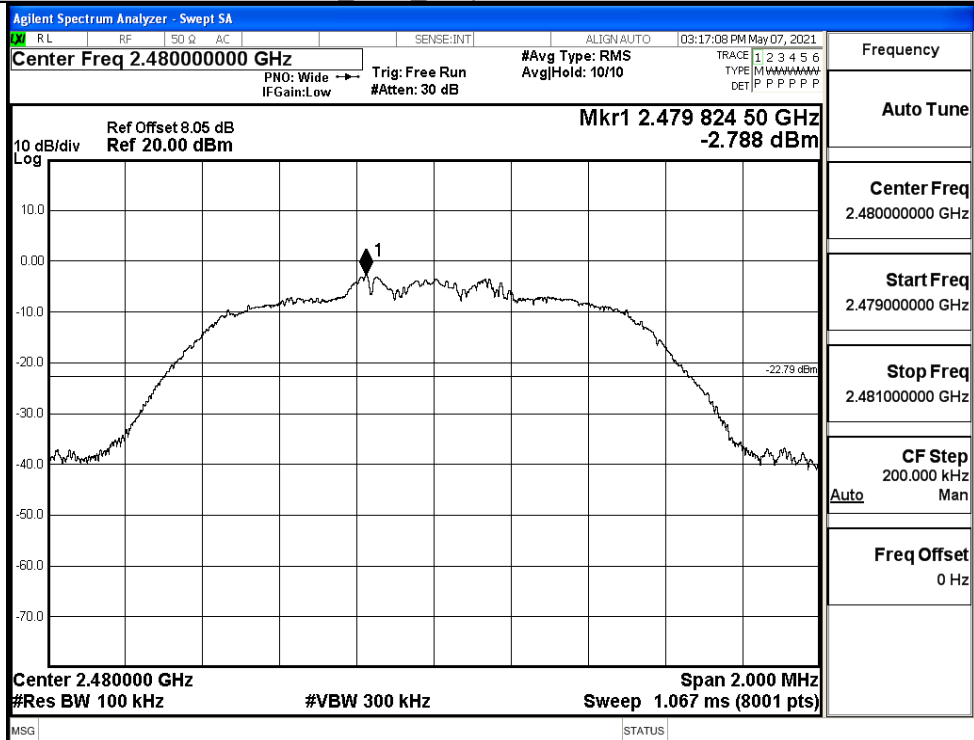


Puw

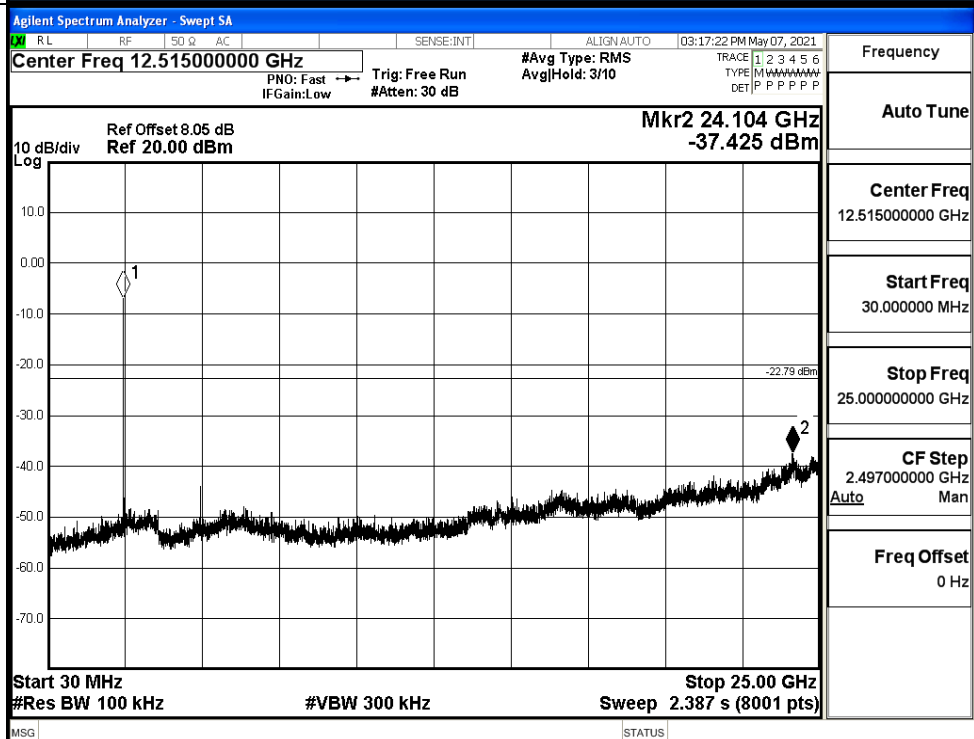


8DPSK_HCH_Graphs

Pref



Puw

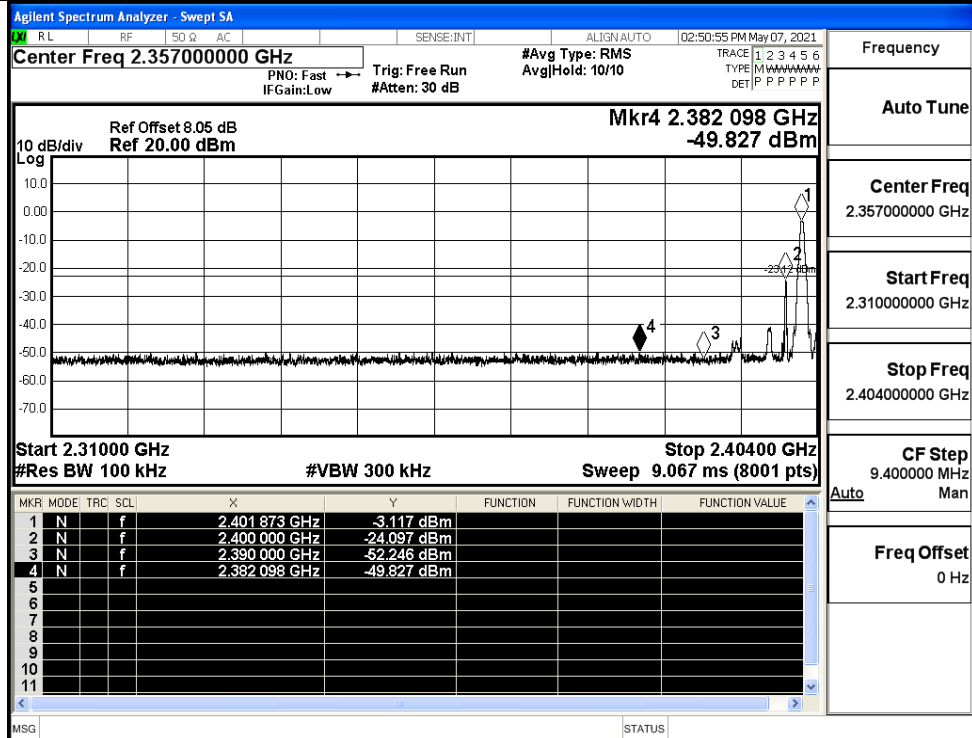


A.7 Band-edge for RF Conducted Emissions

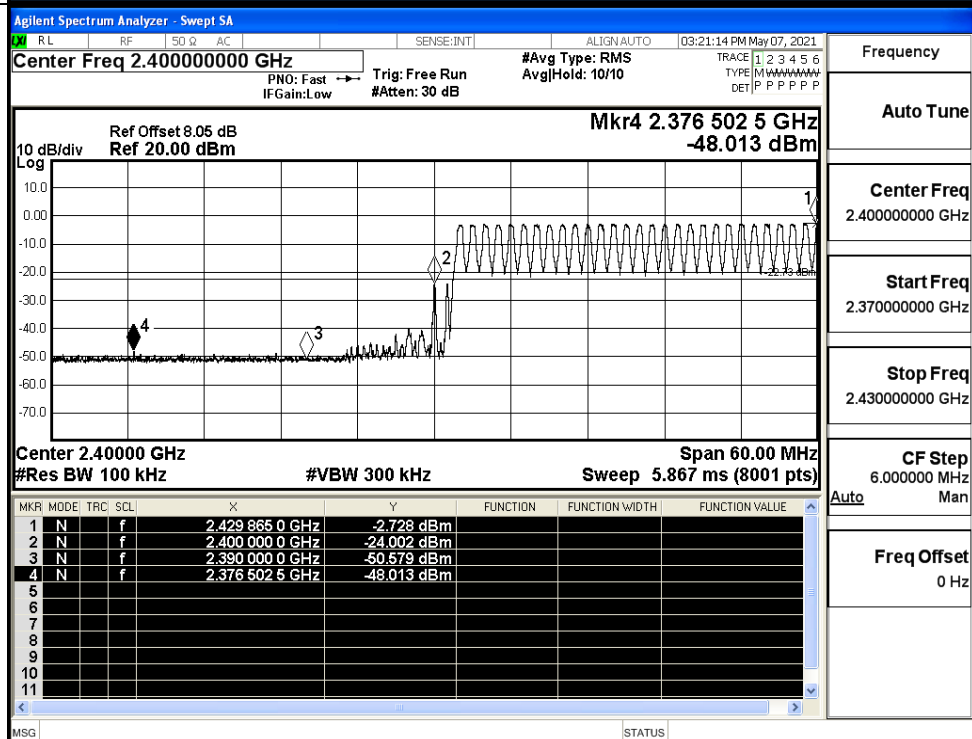
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-3.117	Off	-49.827	-23.12	PASS
			-2.728	On	-48.013	-22.73	PASS
	HCH	2480	-2.898	Off	-48.662	-22.9	PASS
			-2.800	On	-48.267	-22.8	PASS
$\pi/4$ DQPSK	LCH	2402	-2.893	Off	-49.304	-22.89	PASS
			-2.440	On	-48.946	-22.44	PASS
	HCH	2480	-2.836	Off	-48.790	-22.84	PASS
			-2.740	On	-48.471	-22.74	PASS
8DPSK	LCH	2402	-3.566	Off	-50.213	-23.57	PASS
			-2.731	On	-49.086	-22.73	PASS
	HCH	2480	-2.935	Off	-49.021	-22.94	PASS
			-2.675	On	-47.837	-22.68	PASS

Test Graphs

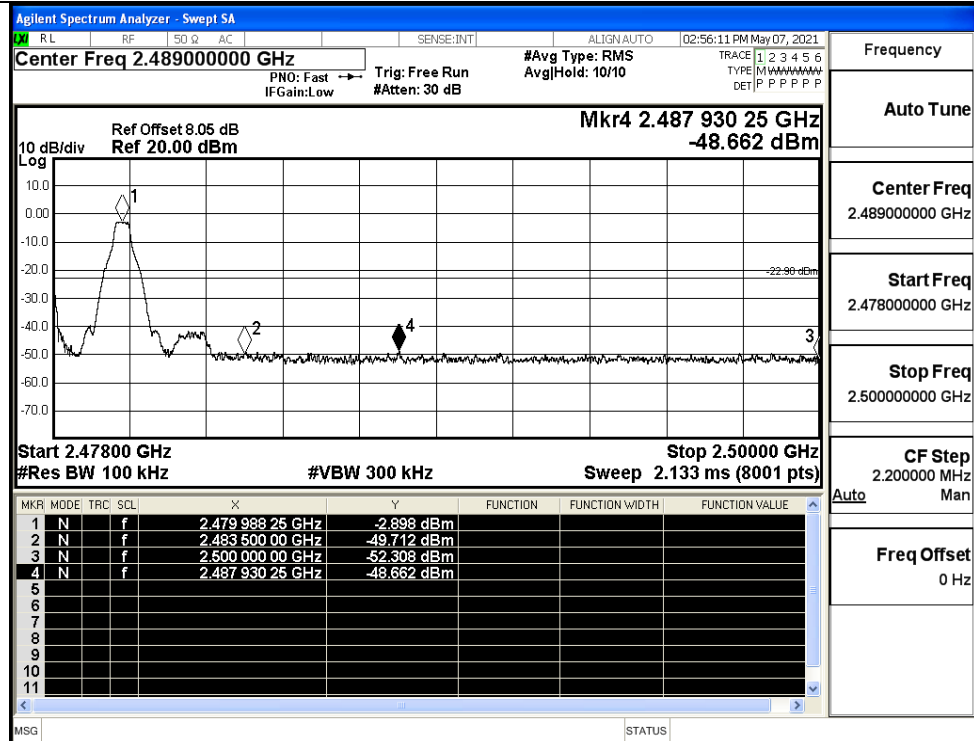
GFSK/LCH/No Hop



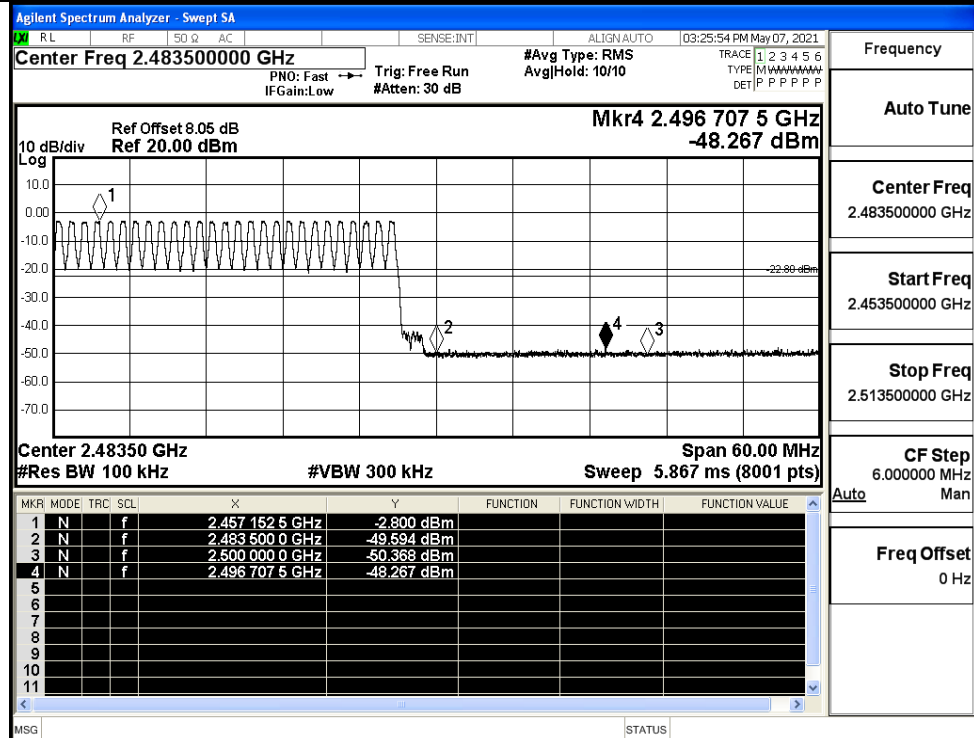
GFSK/LCH/Hop



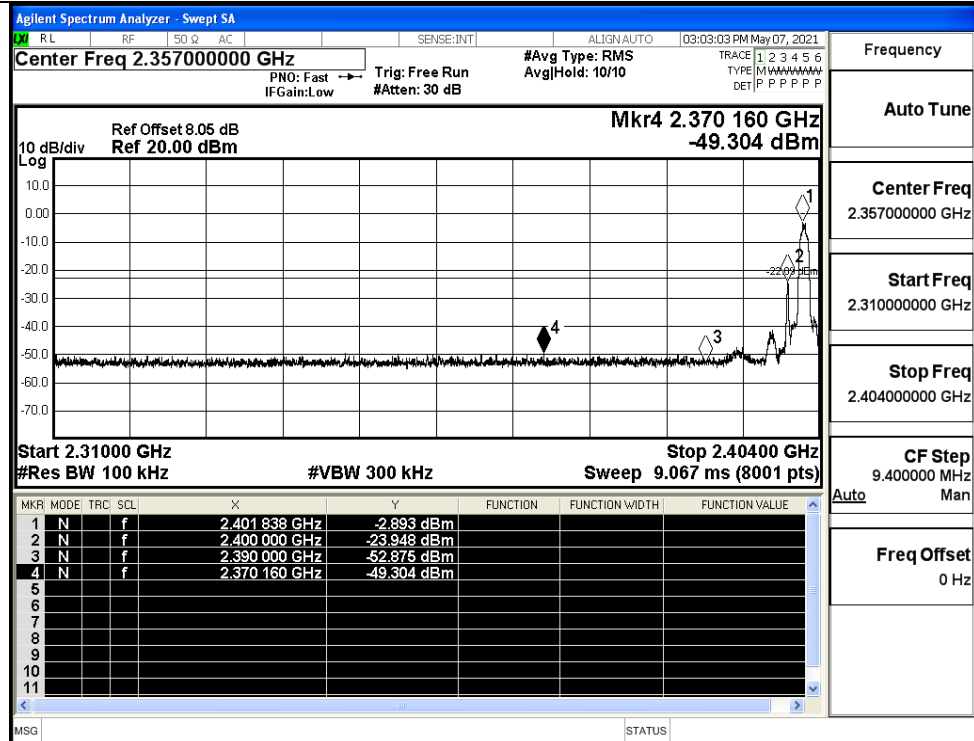
GFSK/HCH/No Hop



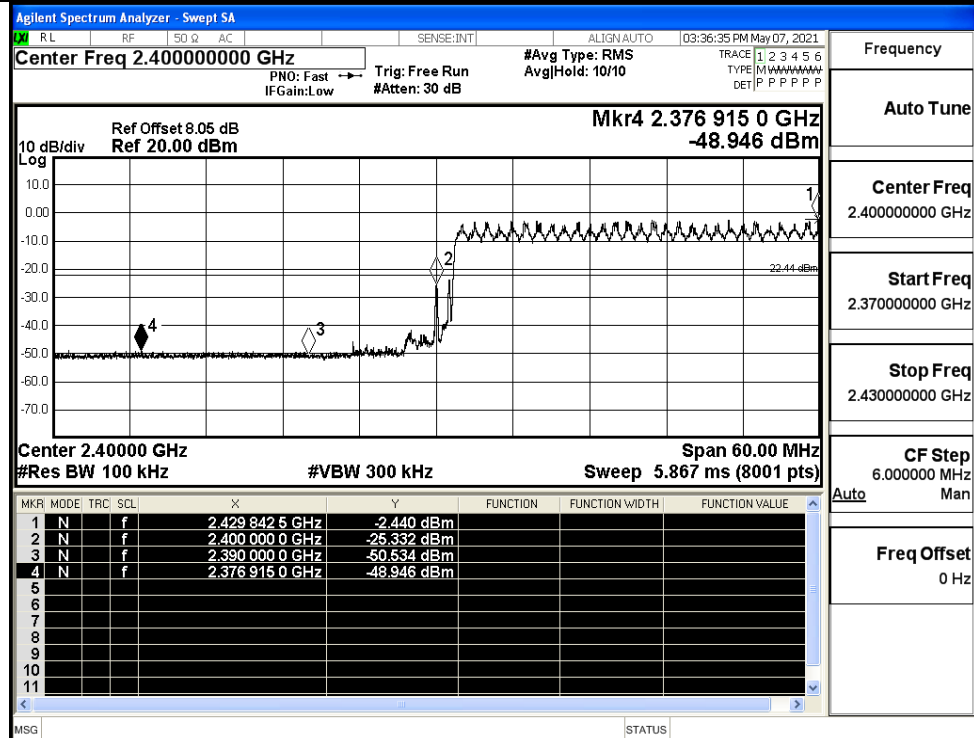
GFSK/HCH/Hop



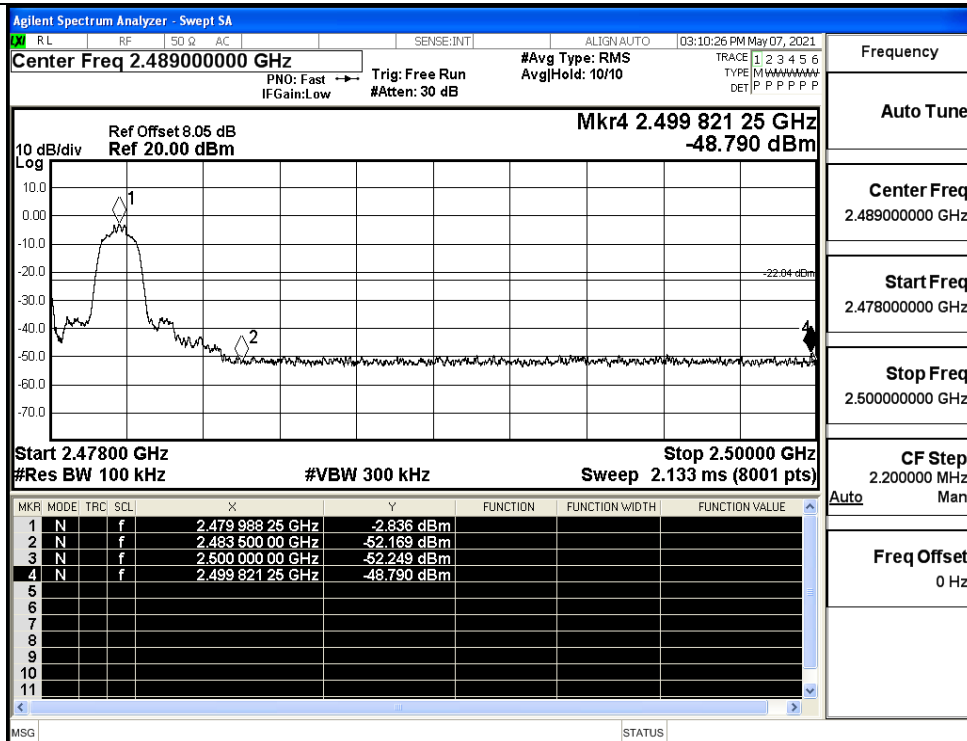
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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

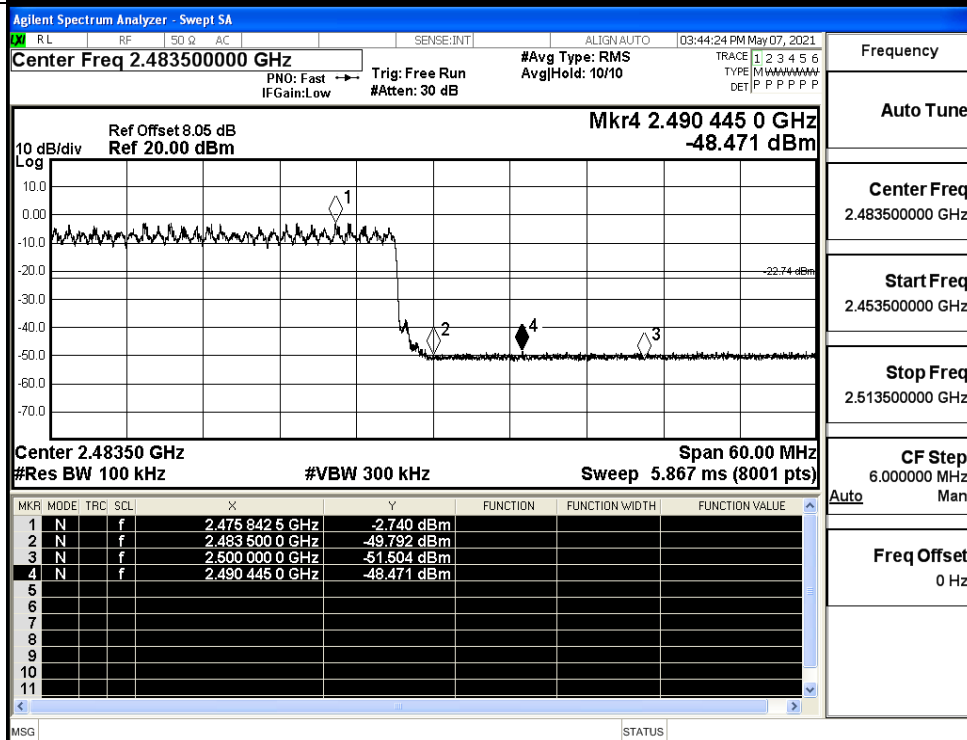


Frequency

Auto Tune

Center Freq
2.489000000 GHzStart Freq
2.478000000 GHzStop Freq
2.500000000 GHzCF Step
2.200000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop

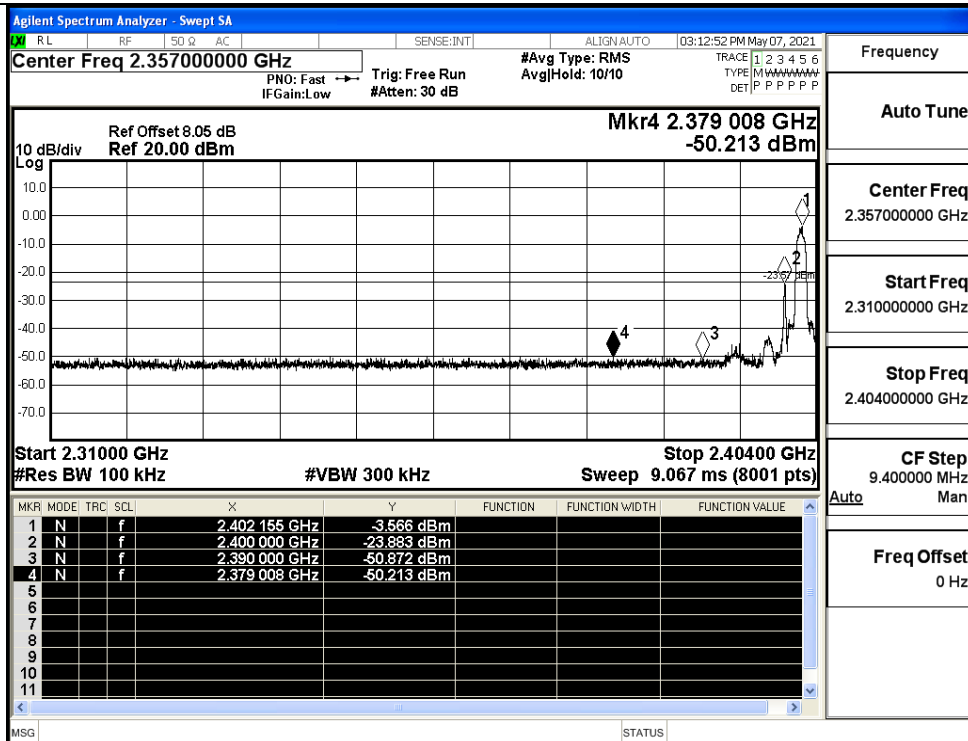


Frequency

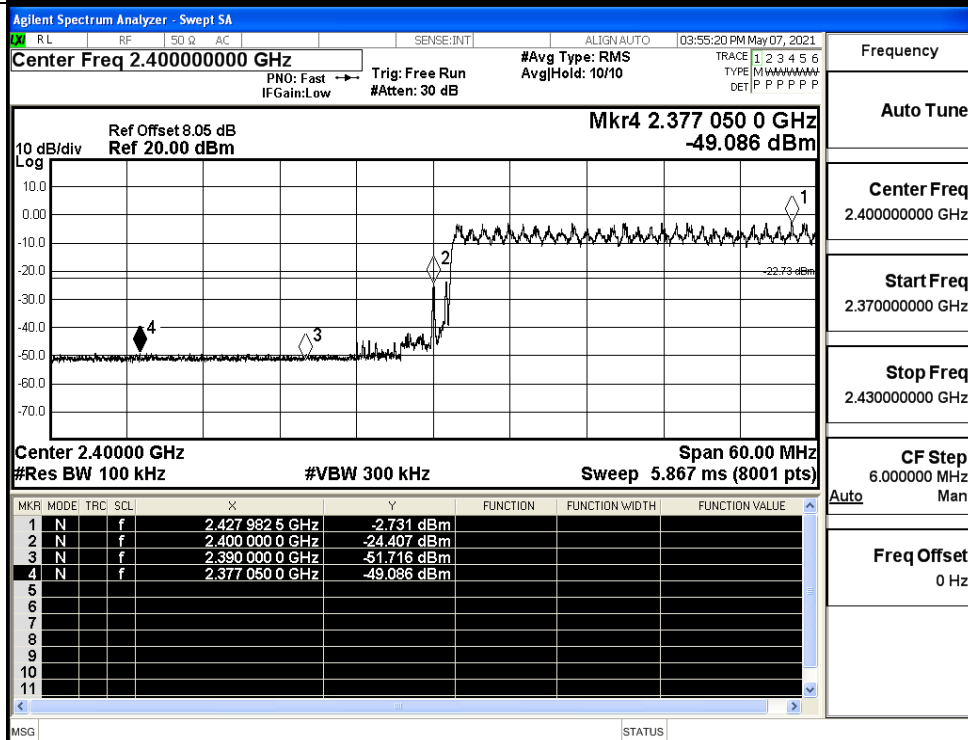
Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.453500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

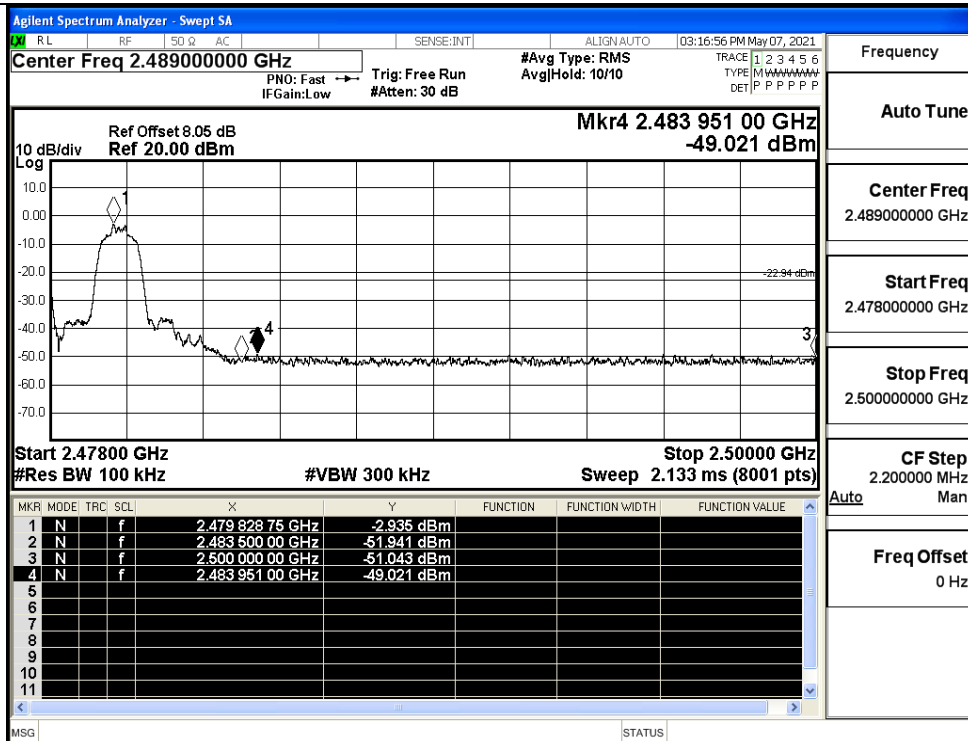
8DPSK/LCH/No Hop



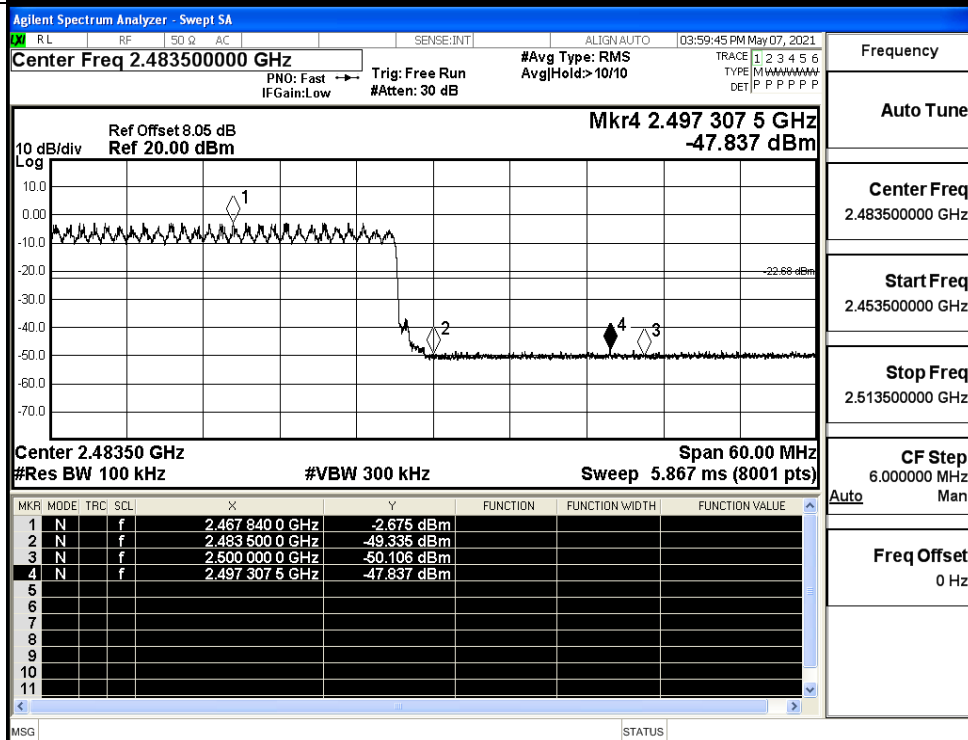
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



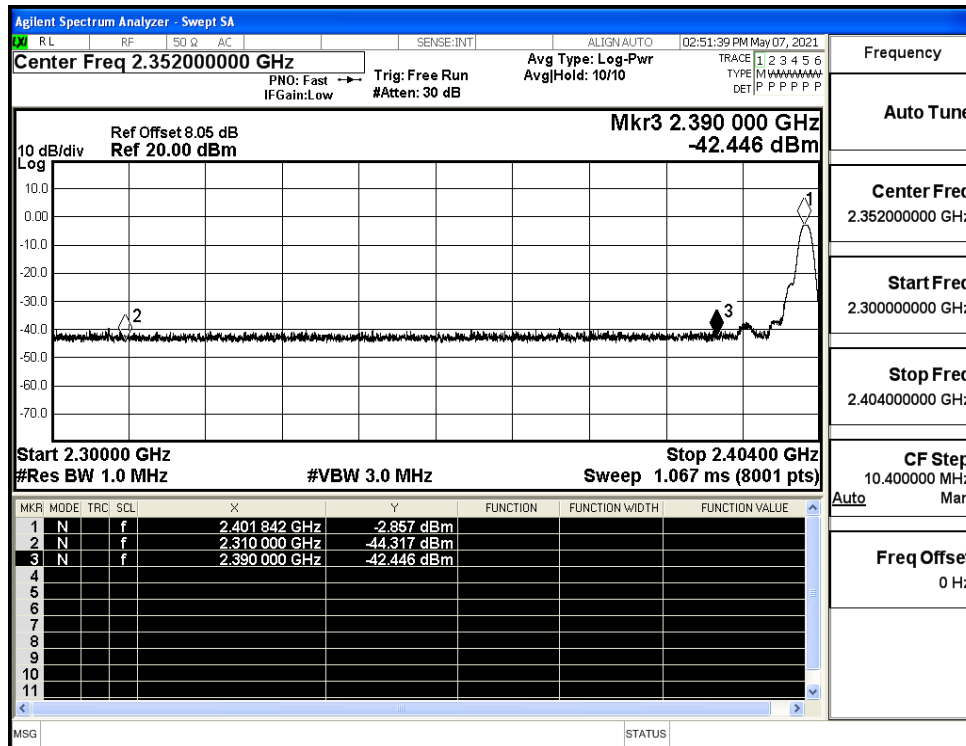
8DPSK/HCH/Hop



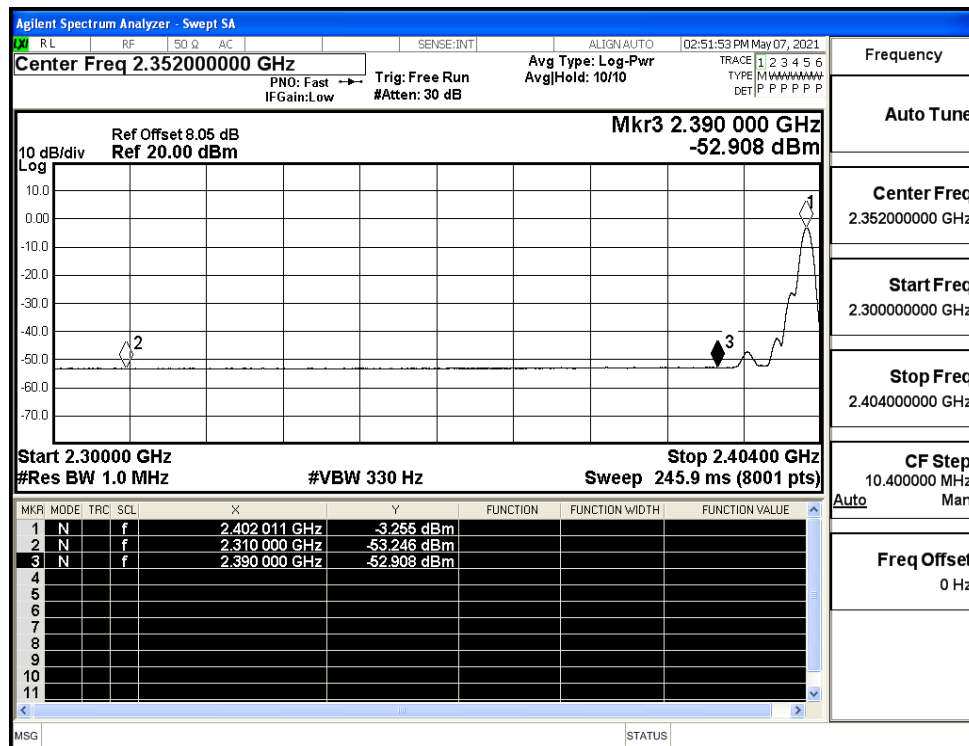
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.32	2.0	0	52.94	PEAK	74	PASS
	Off	2310.0	-53.25	2.0	0	44.01	AV	54	PASS
	Off	2390.0	-42.45	2.0	0	54.81	PEAK	74	PASS
	Off	2390.0	-52.91	2.0	0	44.35	AV	54	PASS
	Off	2483.5	-39.18	2.0	0	58.08	PEAK	74	PASS
	Off	2483.5	-50.97	2.0	0	46.29	AV	54	PASS
	Off	2500.0	-41.53	2.0	0	55.73	PEAK	74	PASS
	Off	2500.0	-52.26	2.0	0	45.00	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-41.10	2.0	0	56.16	PEAK	74	PASS
	Off	2310.0	-53.29	2.0	0	43.97	AV	54	PASS
	Off	2390.0	-42.64	2.0	0	54.62	PEAK	74	PASS
	Off	2390.0	-52.87	2.0	0	44.39	AV	54	PASS
	Off	2483.5	-41.16	2.0	0	56.10	PEAK	74	PASS
	Off	2483.5	-50.96	2.0	0	46.30	AV	54	PASS
	Off	2500.0	-42.47	2.0	0	54.79	PEAK	74	PASS
	Off	2500.0	-52.22	2.0	0	45.04	AV	54	PASS
8DPSK	Off	2310.0	-42.39	2.0	0	54.87	PEAK	74	PASS
	Off	2310.0	-53.23	2.0	0	44.03	AV	54	PASS
	Off	2390.0	-44.11	2.0	0	53.15	PEAK	74	PASS
	Off	2390.0	-52.91	2.0	0	44.35	AV	54	PASS
	Off	2483.5	-40.29	2.0	0	56.97	PEAK	74	PASS
	Off	2483.5	-51.08	2.0	0	46.18	AV	54	PASS
	Off	2500.0	-42.07	2.0	0	55.19	PEAK	74	PASS
	Off	2500.0	-52.25	2.0	0	45.01	AV	54	PASS

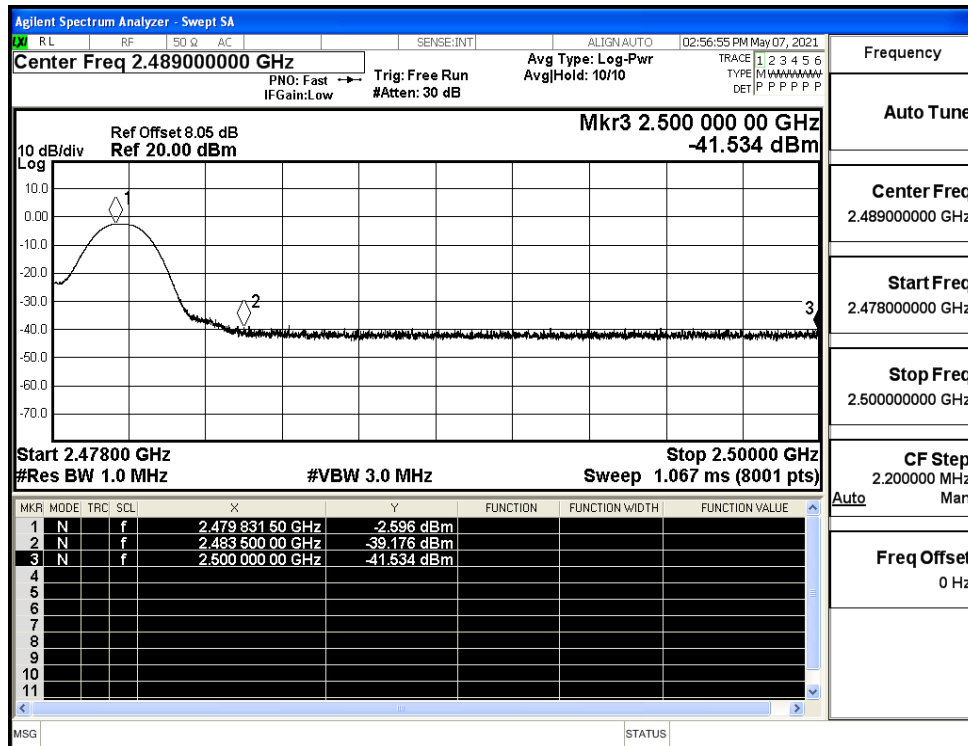
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



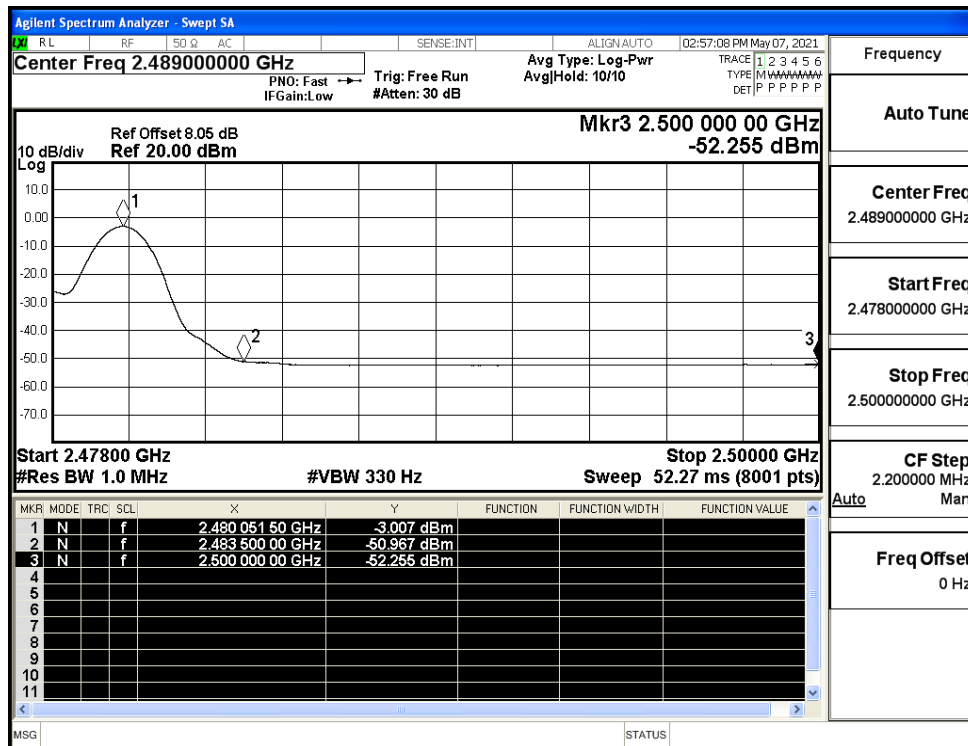
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

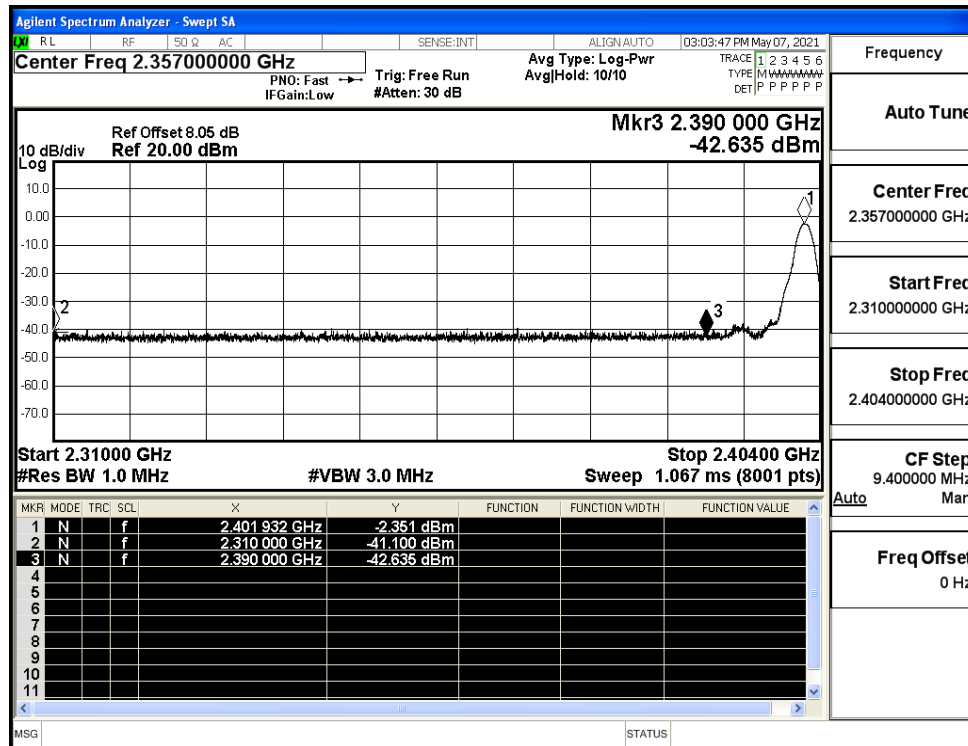
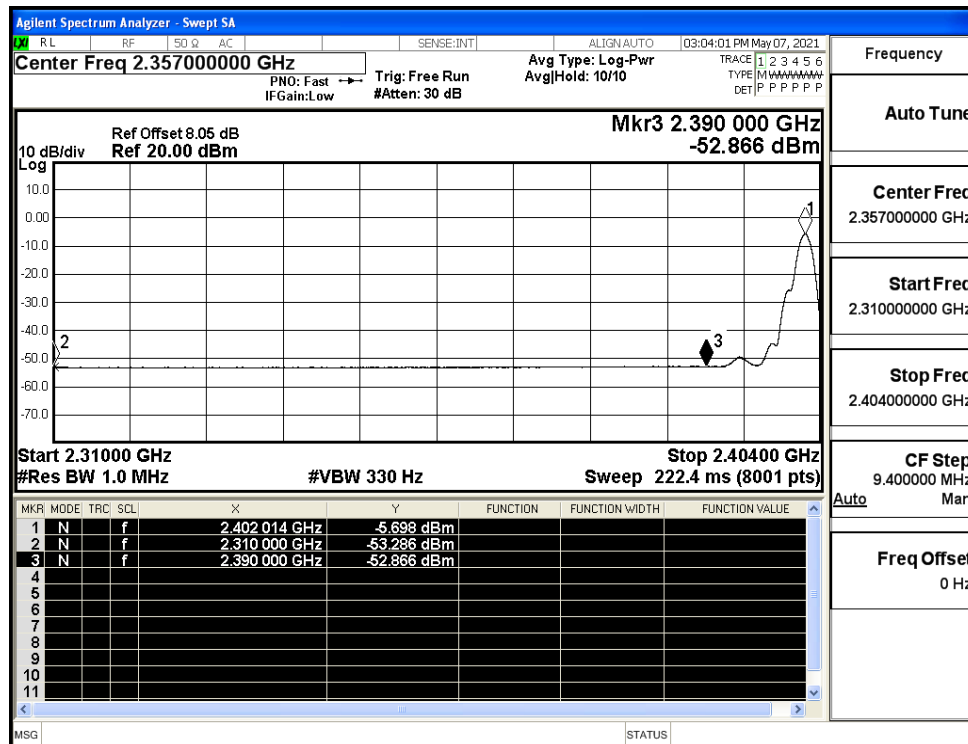


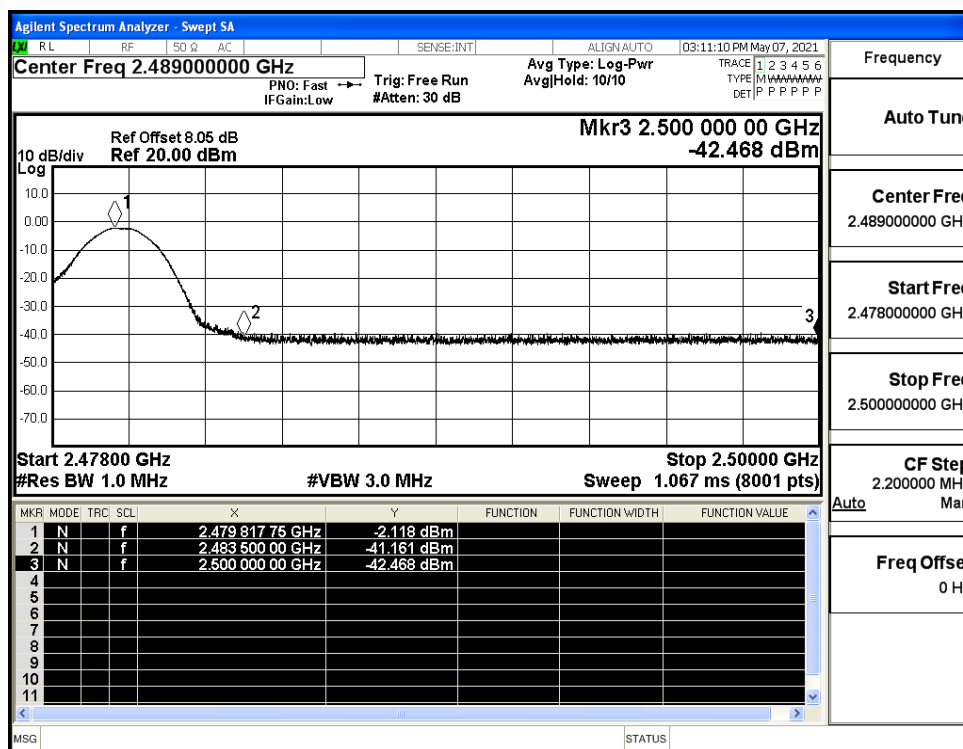
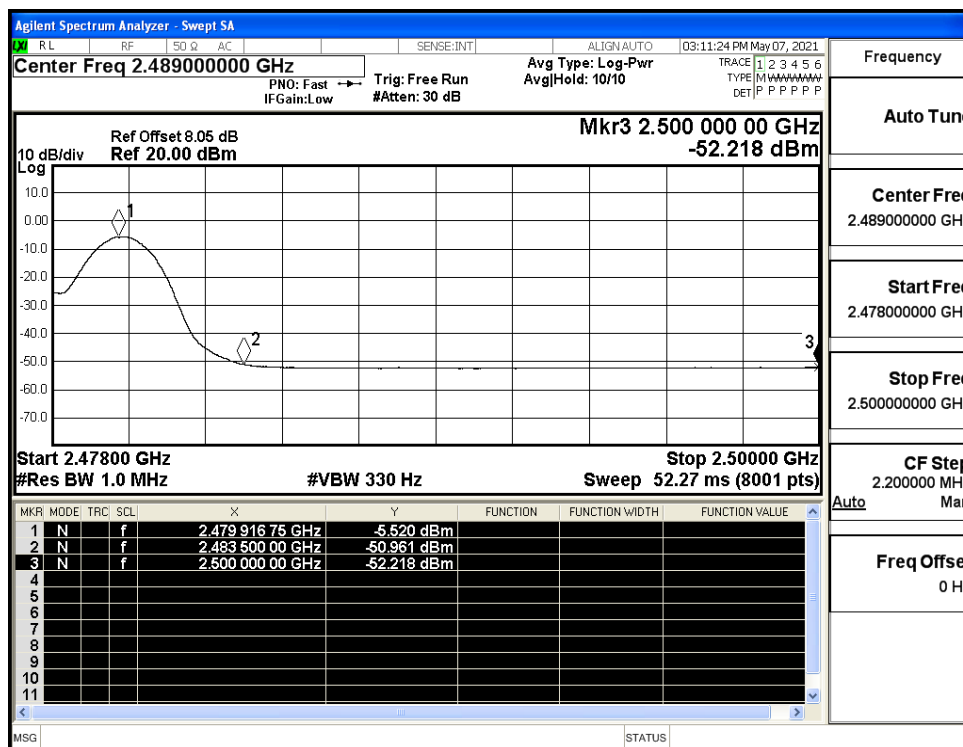
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



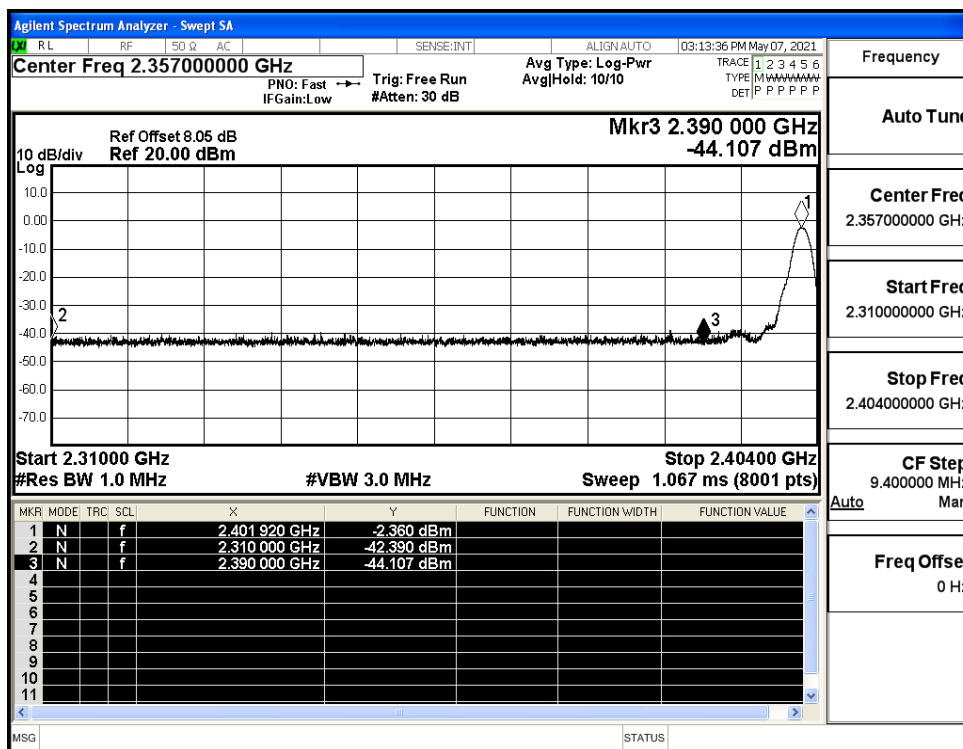
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



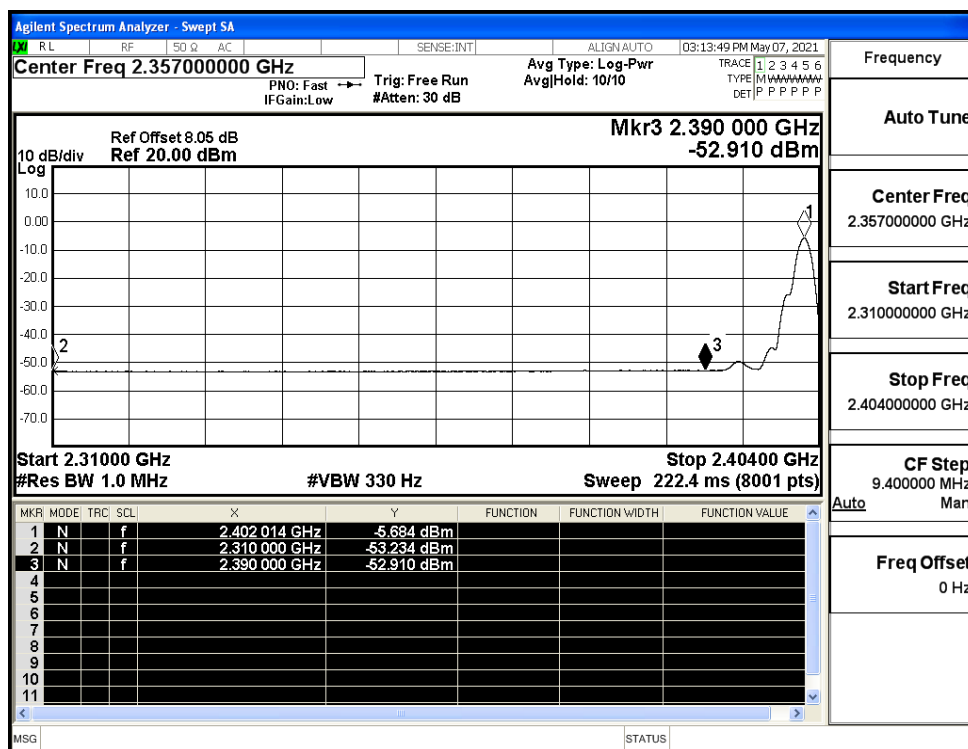
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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

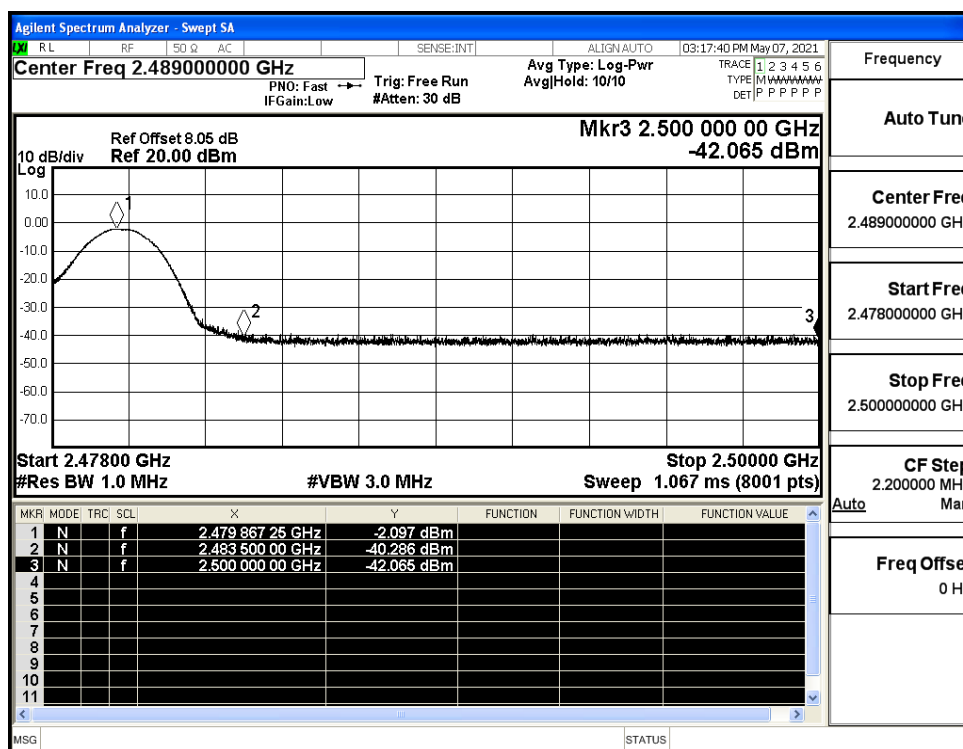
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

