

Appendix A
RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)
Product Name: ULTRA THIN TWS EARPHONE
Trade Mark: YOBYBO
Test Model: note 20

Environmental Conditions

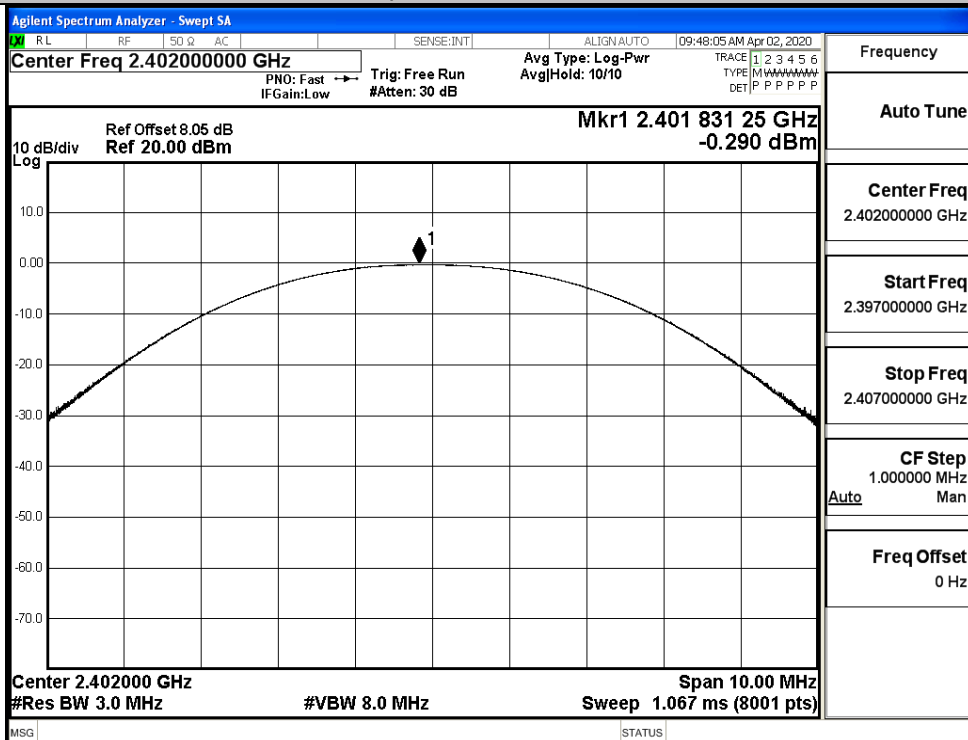
Temperature:	23.5 ° C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	David Luo
Supervised by:	Li Huan

A.1 Maxmum Conducted Peak Output Power

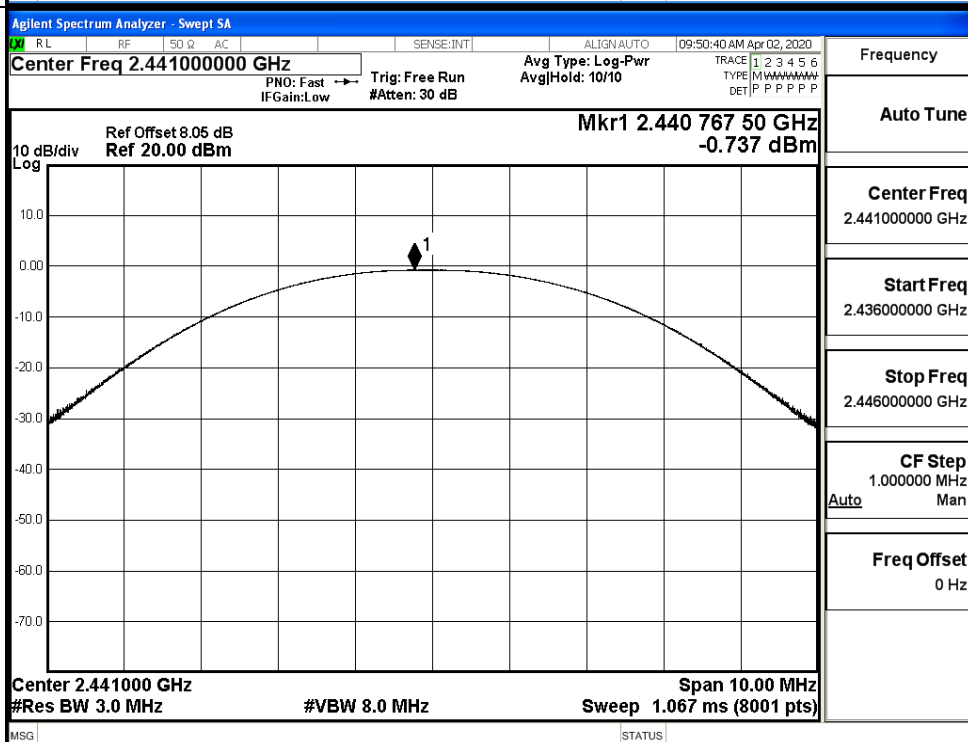
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.290	21	PASS
	MCH	-0.737	21	PASS
	HCH	-2.192	21	PASS
$\pi/4$ DQPSK	LCH	-1.515	21	PASS
	MCH	-1.836	21	PASS
	HCH	-3.446	21	PASS
8DPSK	LCH	-0.944	21	PASS
	MCH	-1.264	21	PASS
	HCH	-2.813	21	PASS

Test Graphs

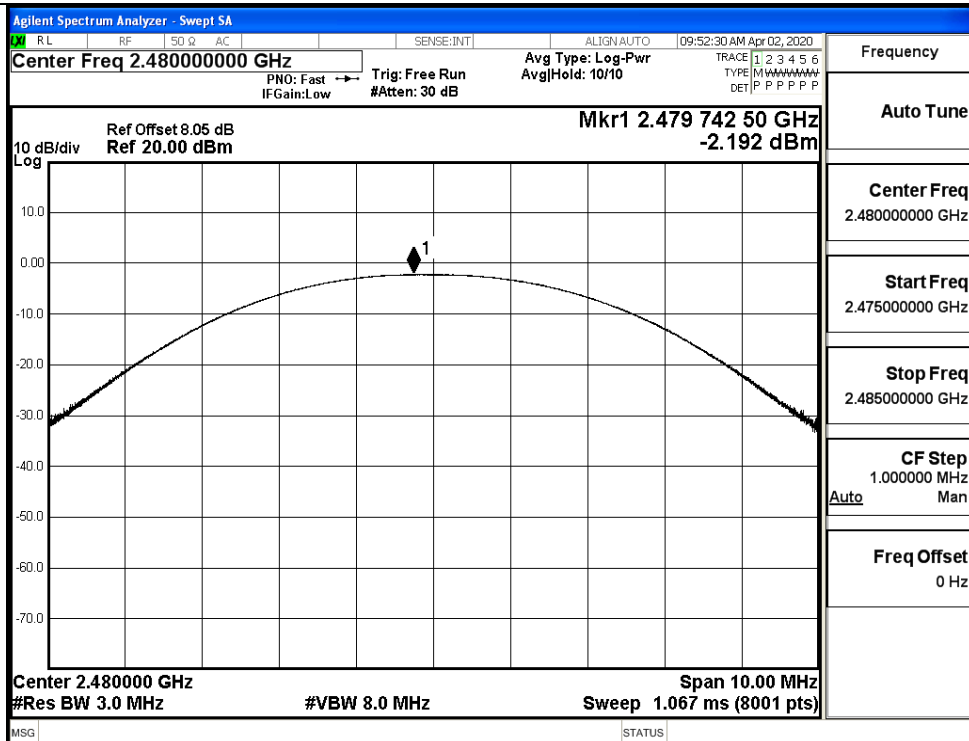
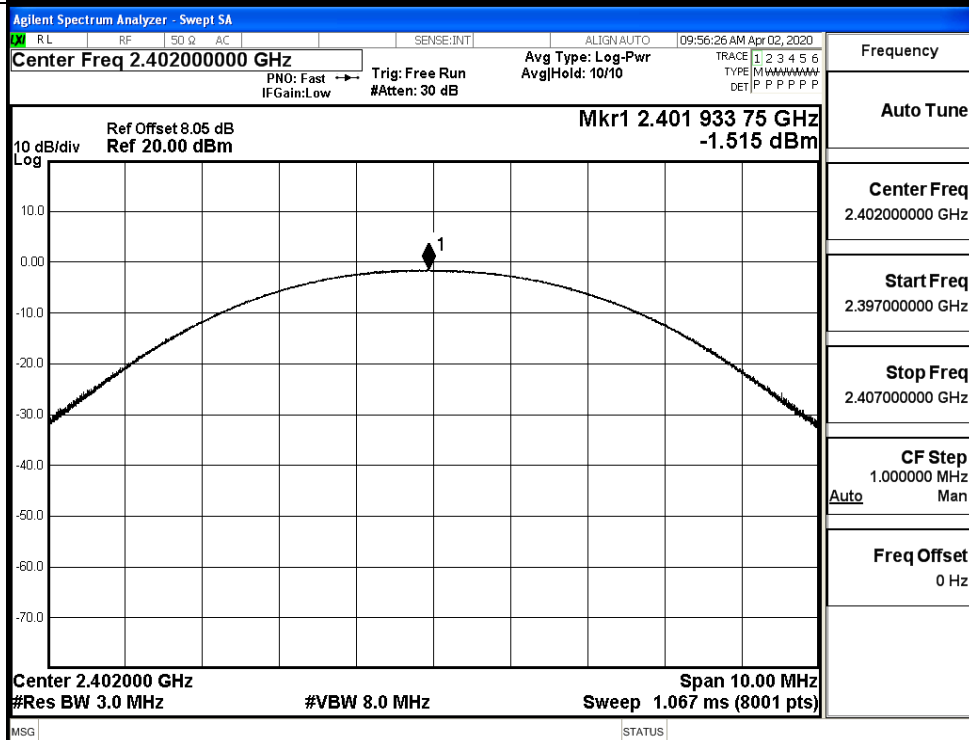
GFSK/LCH

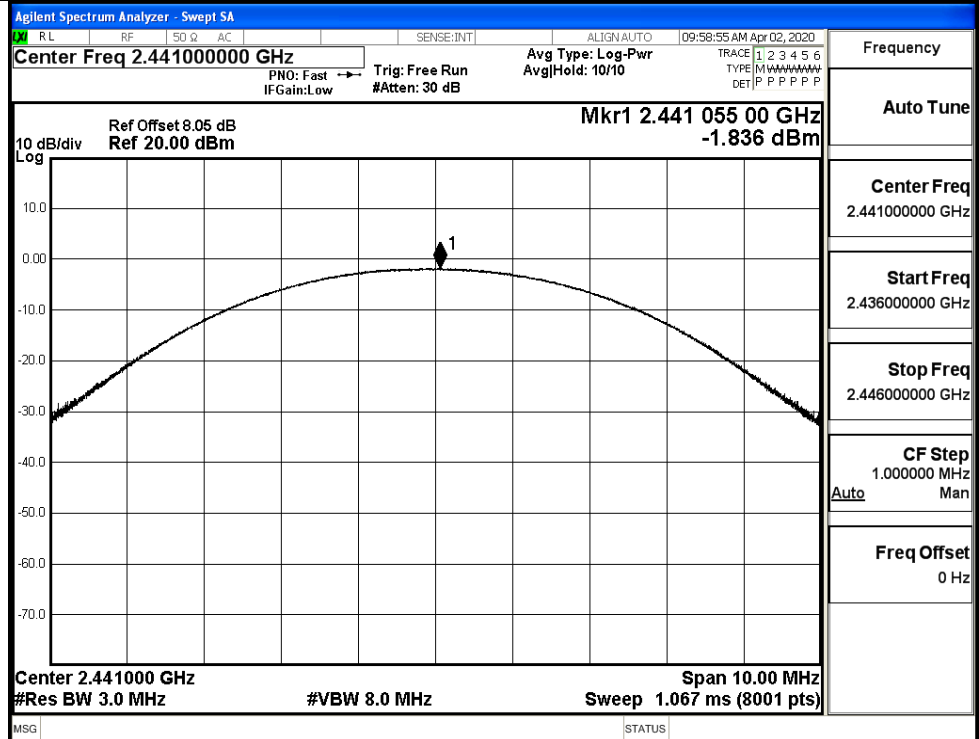
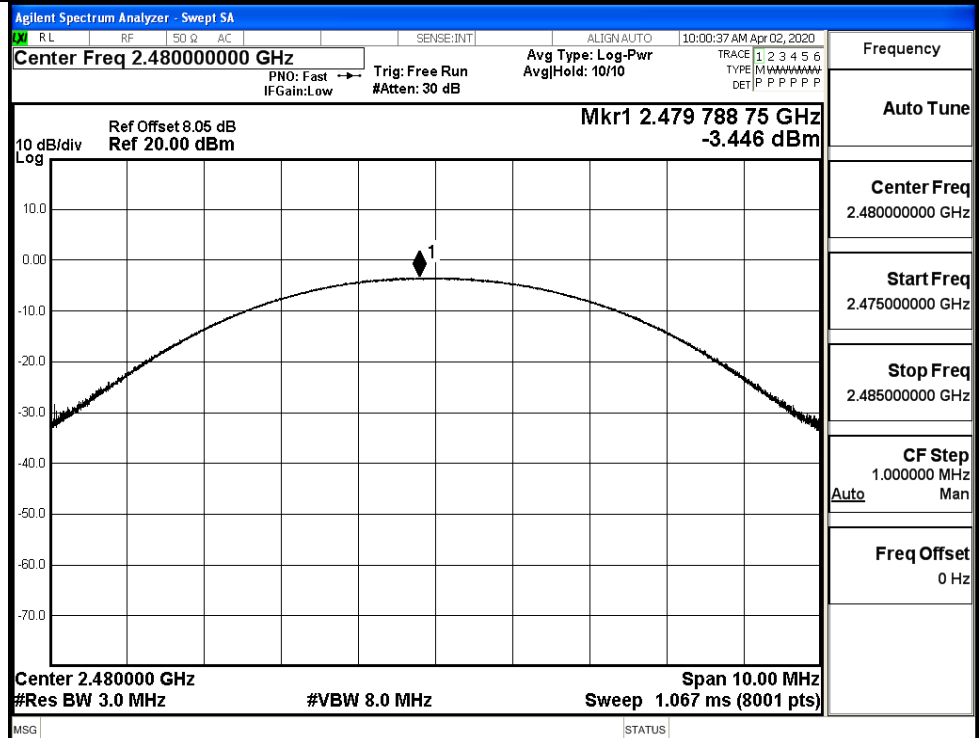


GFSK/MCH

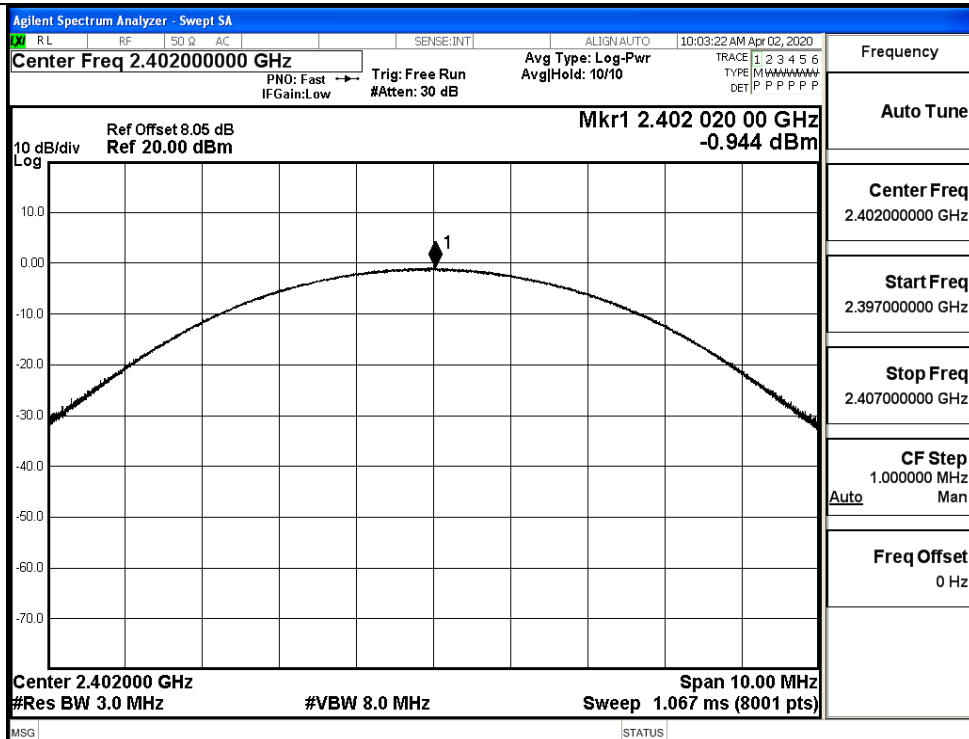


GFSK/HCH

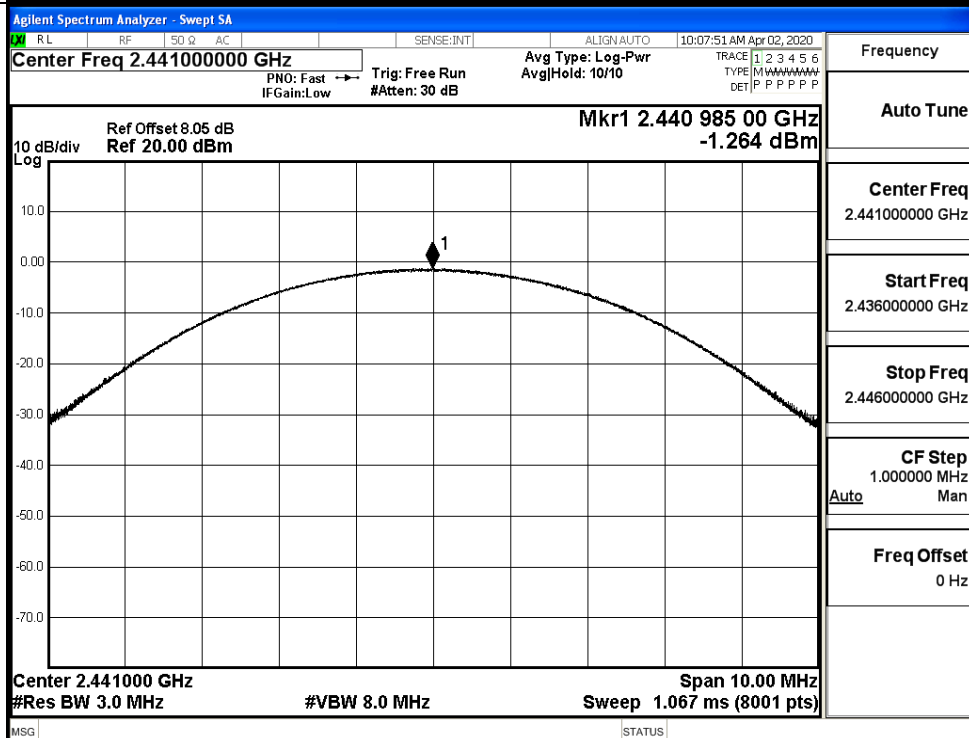
 $\pi/4$ DQPSK/LCH

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

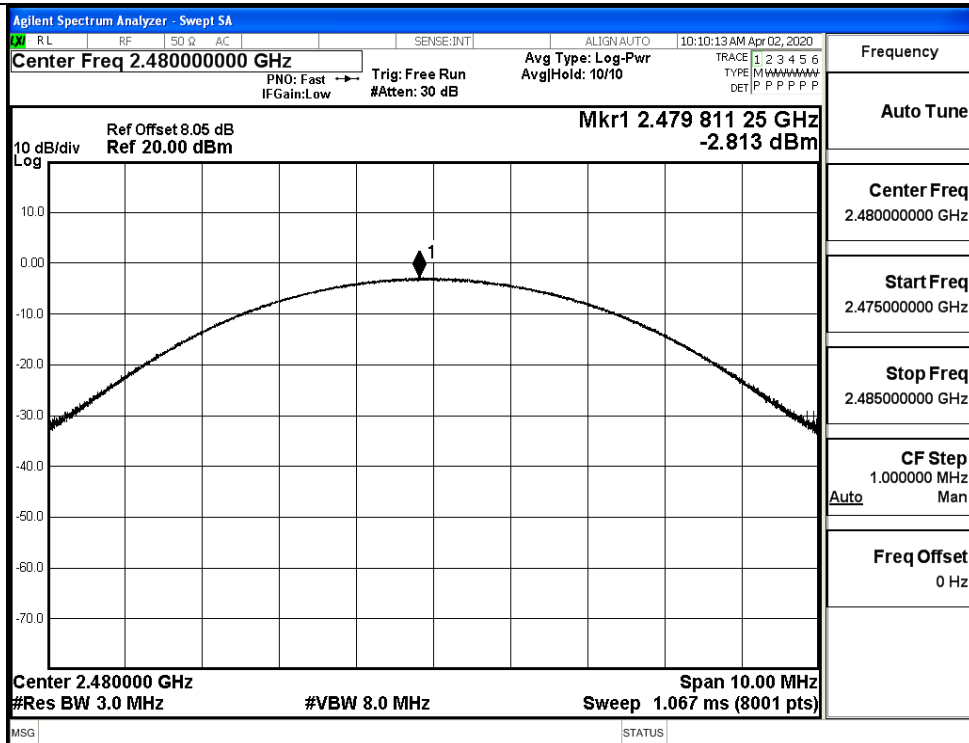
8DPSK/LCH



8DPSK/MCH



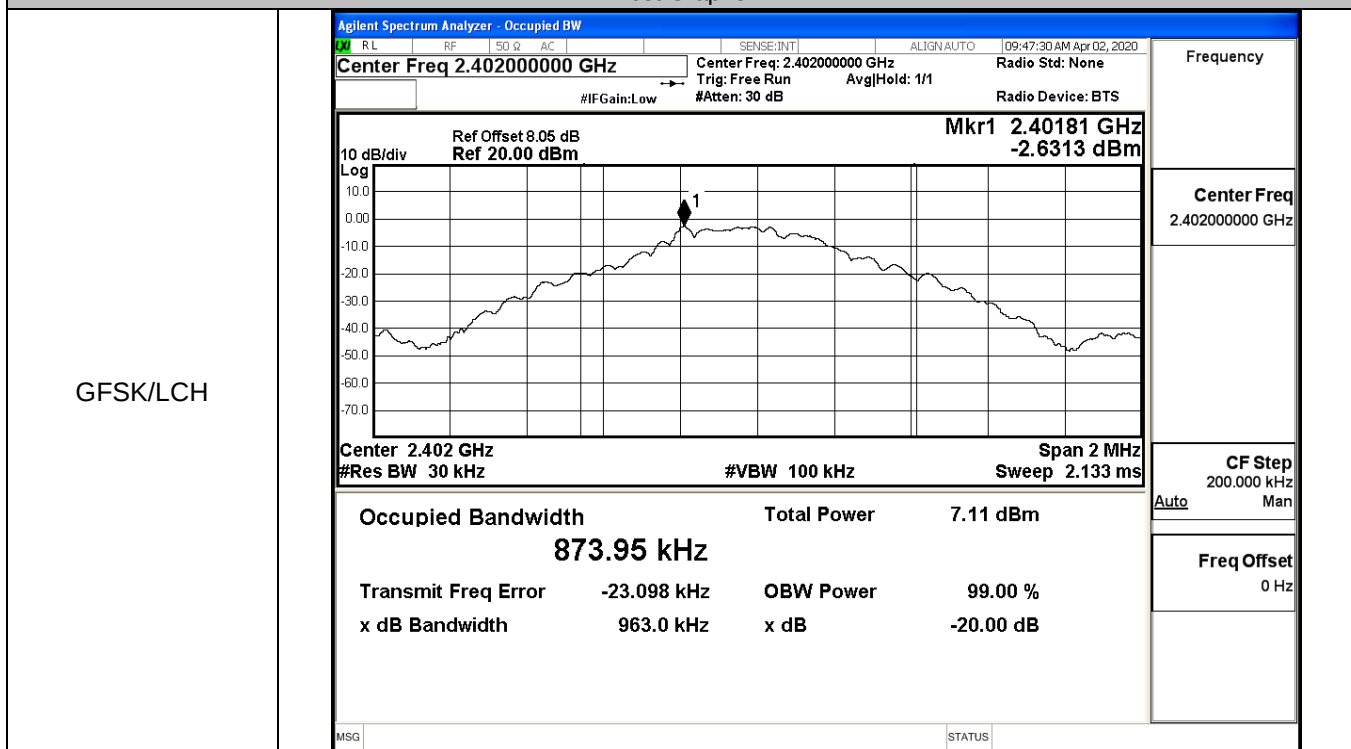
8DPSK/HCH



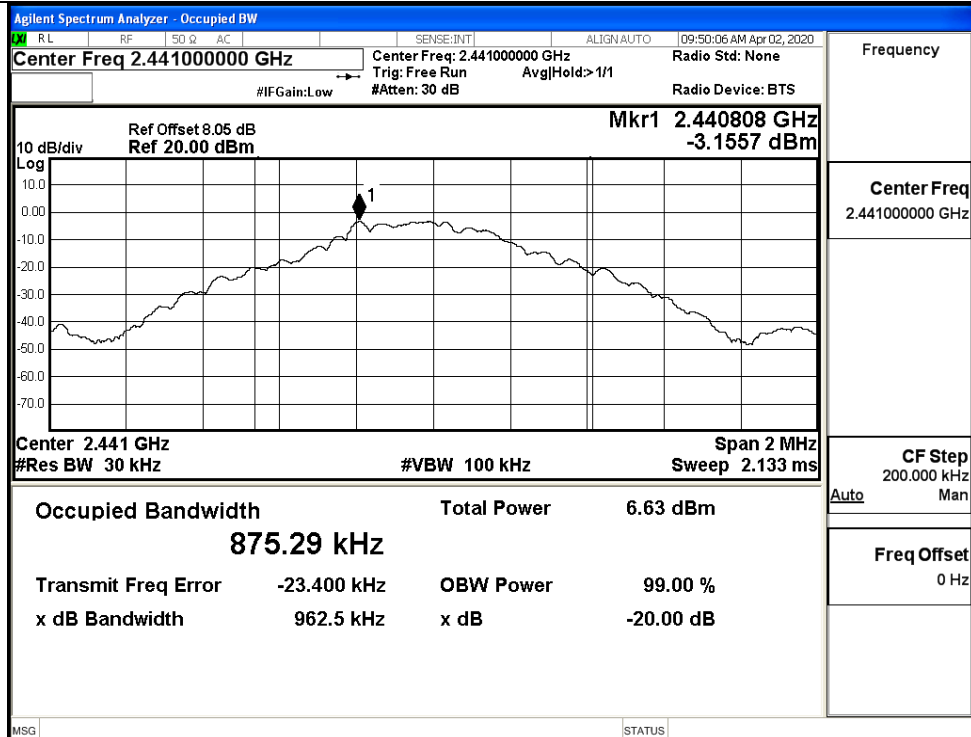
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9630	Not Specified	PASS
	MCH	0.9625	Not Specified	PASS
	HCH	0.9619	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.282	Not Specified	PASS
	MCH	1.284	Not Specified	PASS
	HCH	1.281	Not Specified	PASS
8DPSK	LCH	1.303	Not Specified	PASS
	MCH	1.301	Not Specified	PASS
	HCH	1.303	Not Specified	PASS

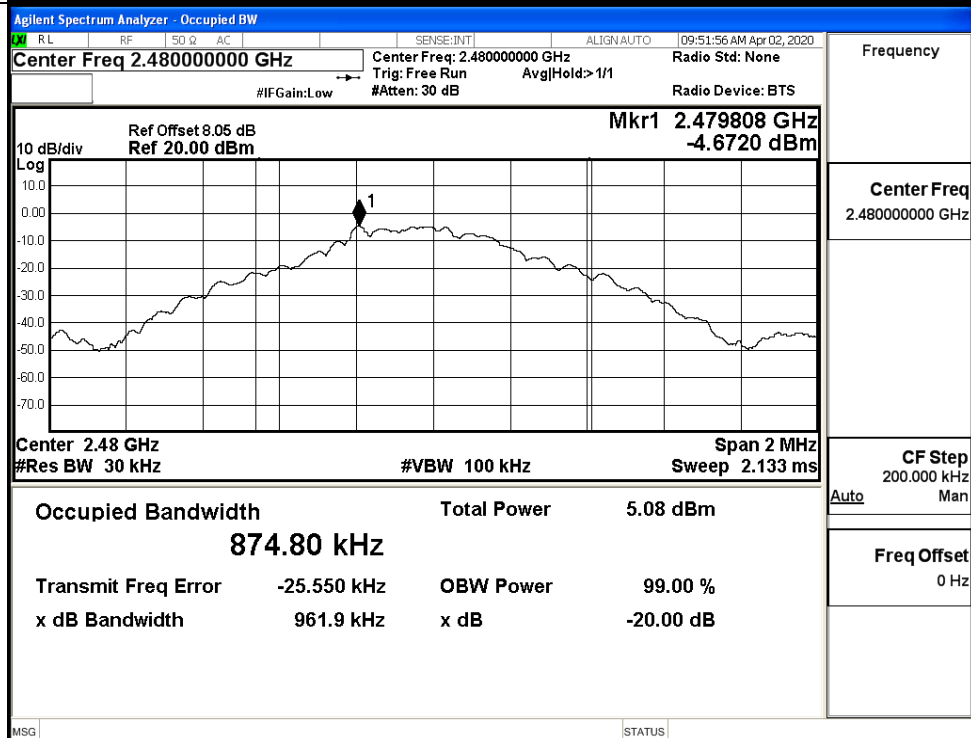
Test Graphs

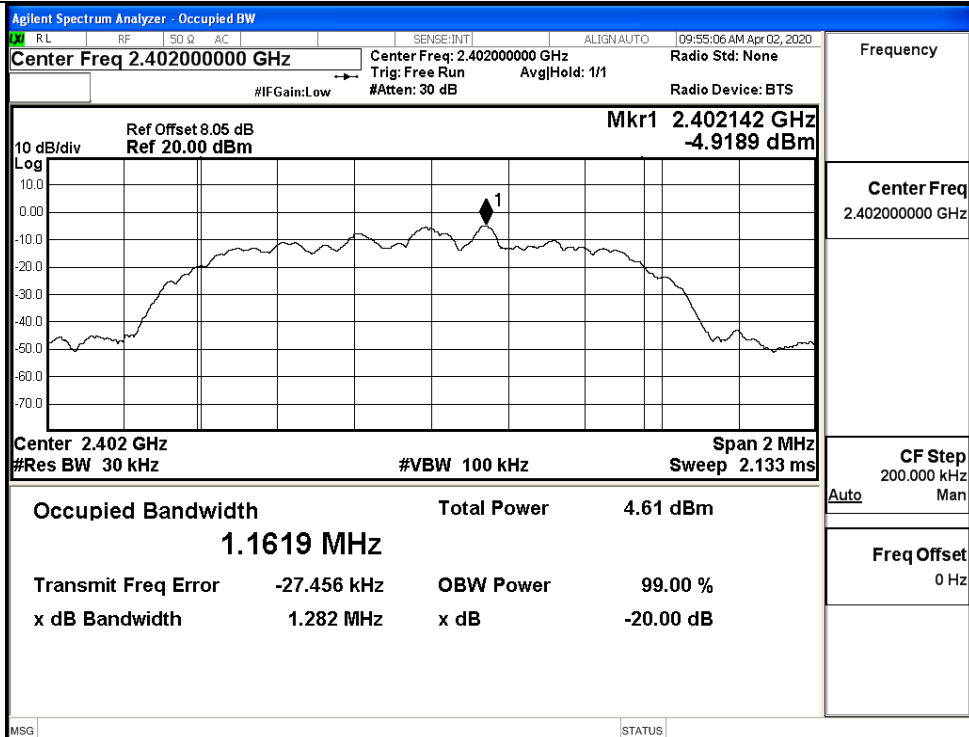
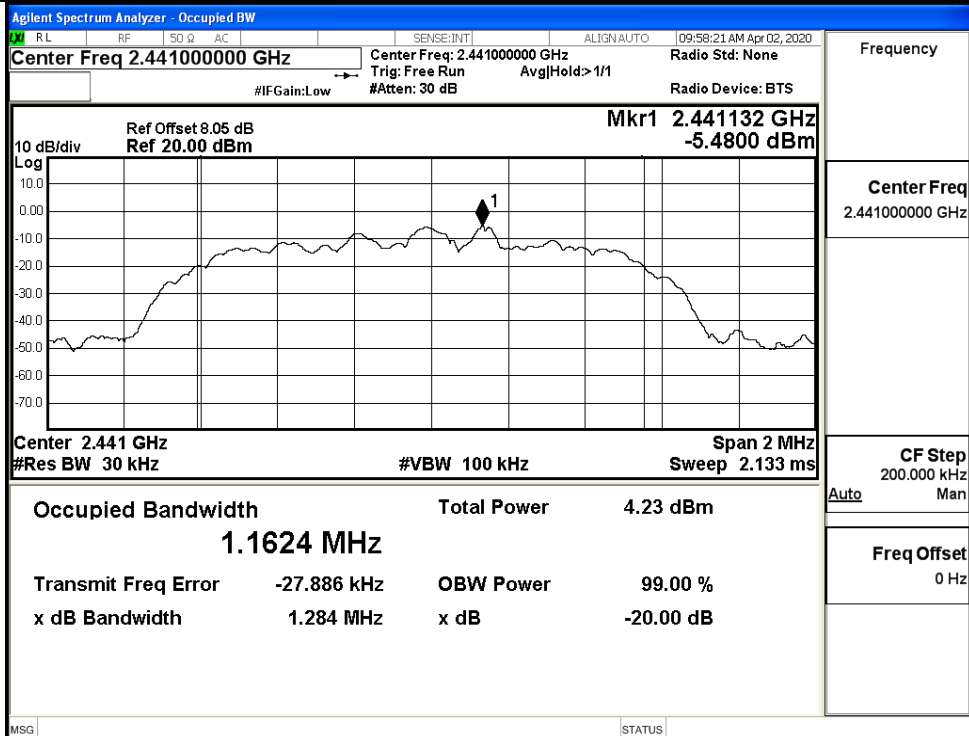


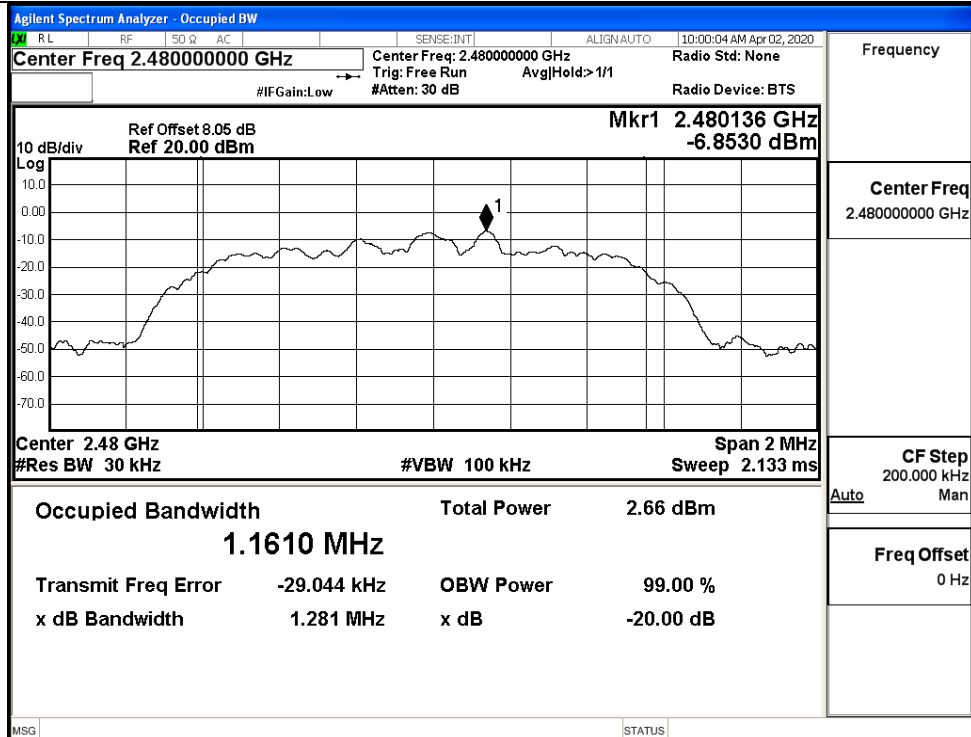
GFSK/MCH



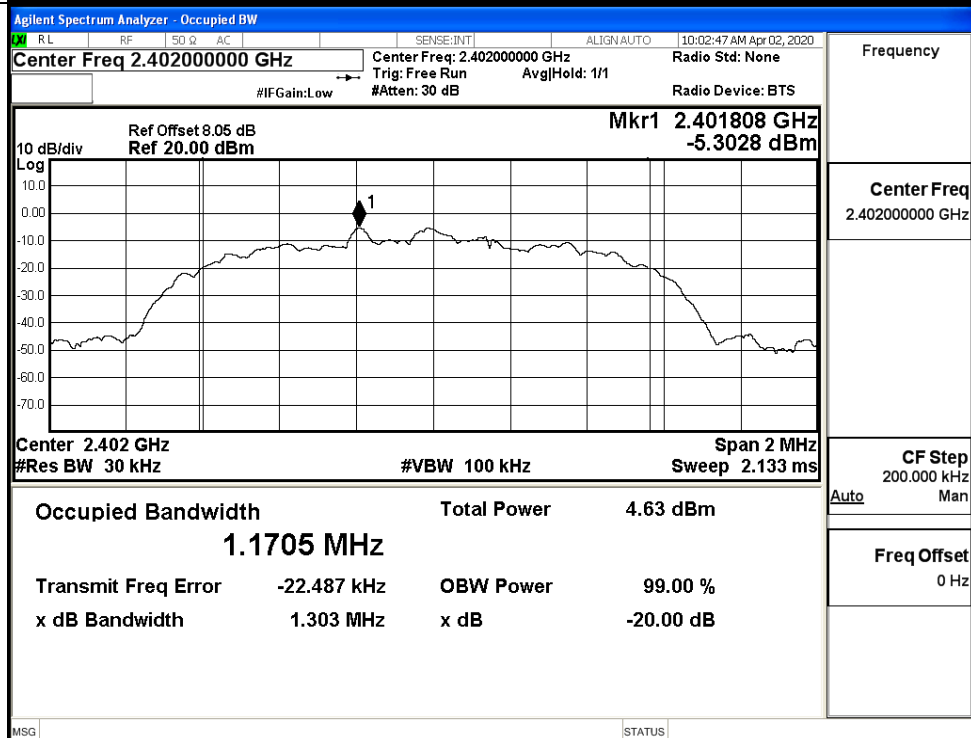
GFSK/HCH



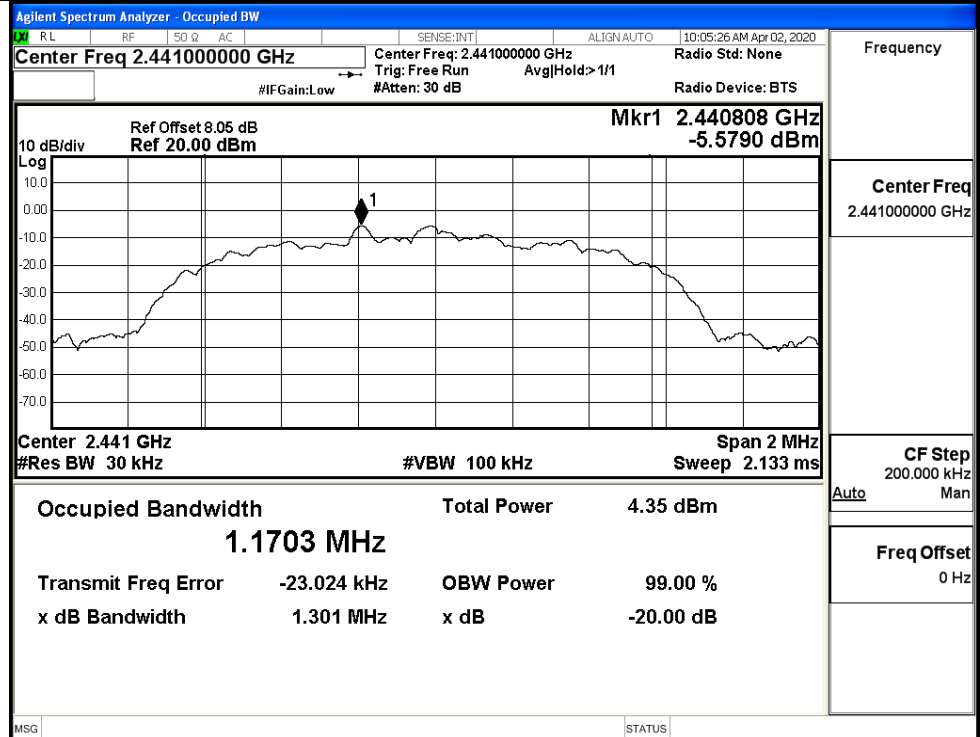
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

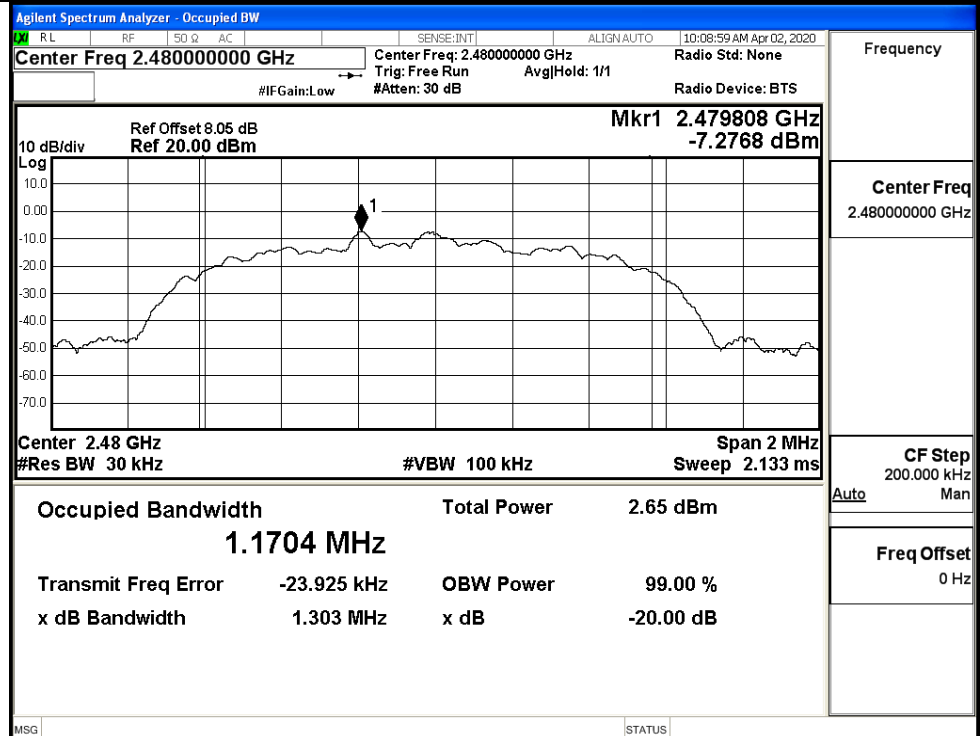
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

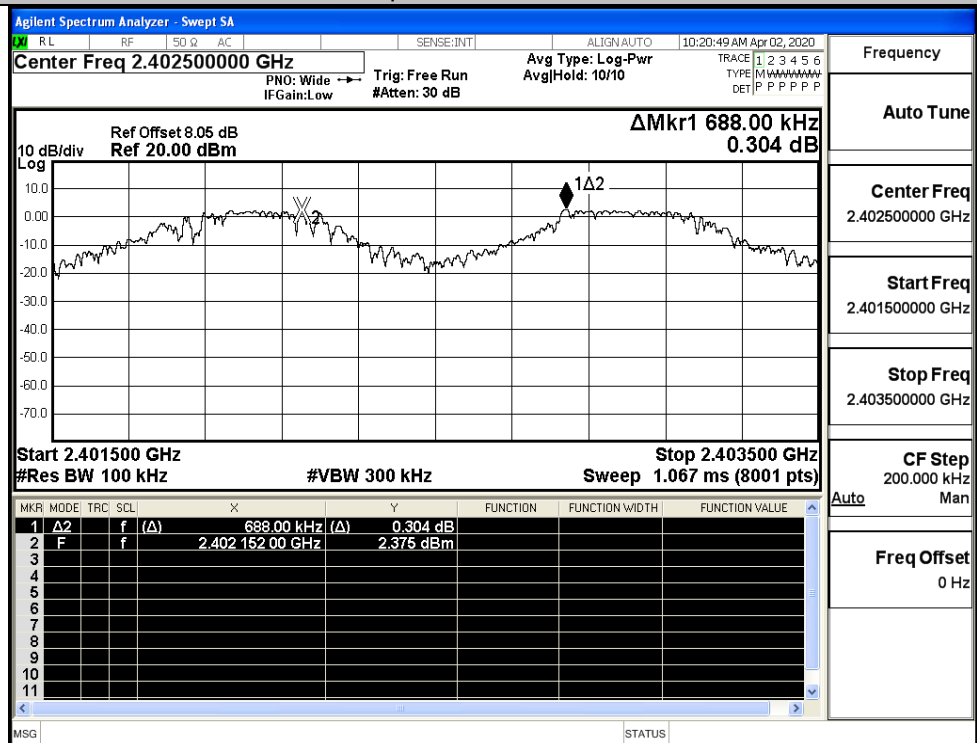


A.3 Carrier Frequency Separation

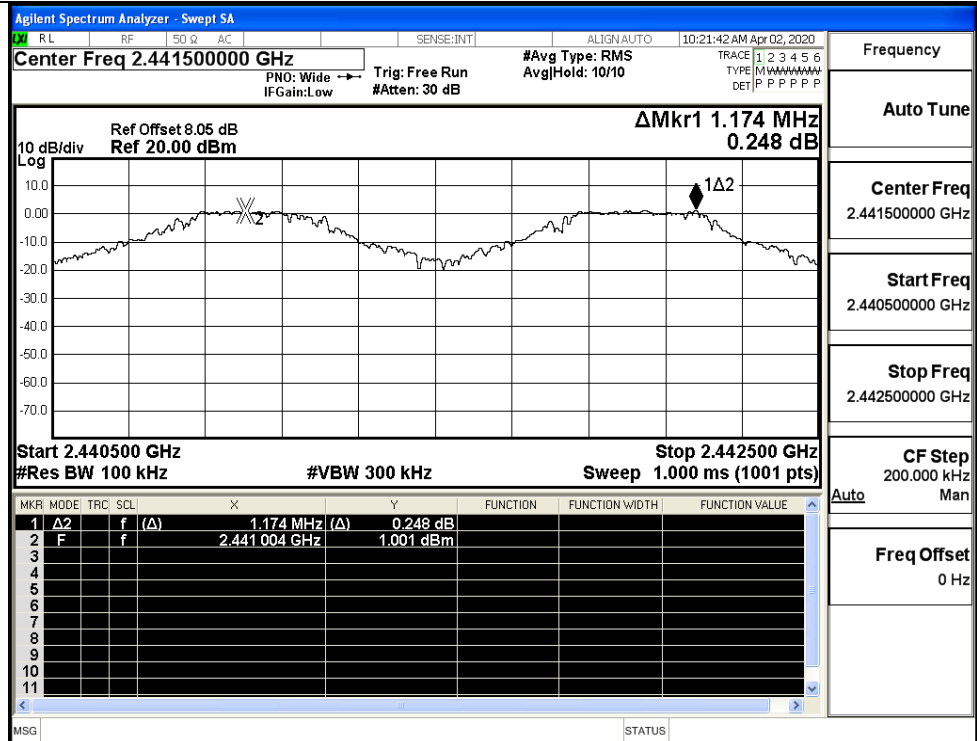
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.688	0.642	PASS
	MCH	1.174	0.642	PASS
	HCH	1.120	0.642	PASS
$\pi/4$ DQPSK	LCH	1.084	0.856	PASS
	MCH	0.984	0.856	PASS
	HCH	1.006	0.856	PASS
8DPSK	LCH	0.934	0.869	PASS
	MCH	1.154	0.869	PASS
	HCH	1.154	0.869	PASS

Test Graphs

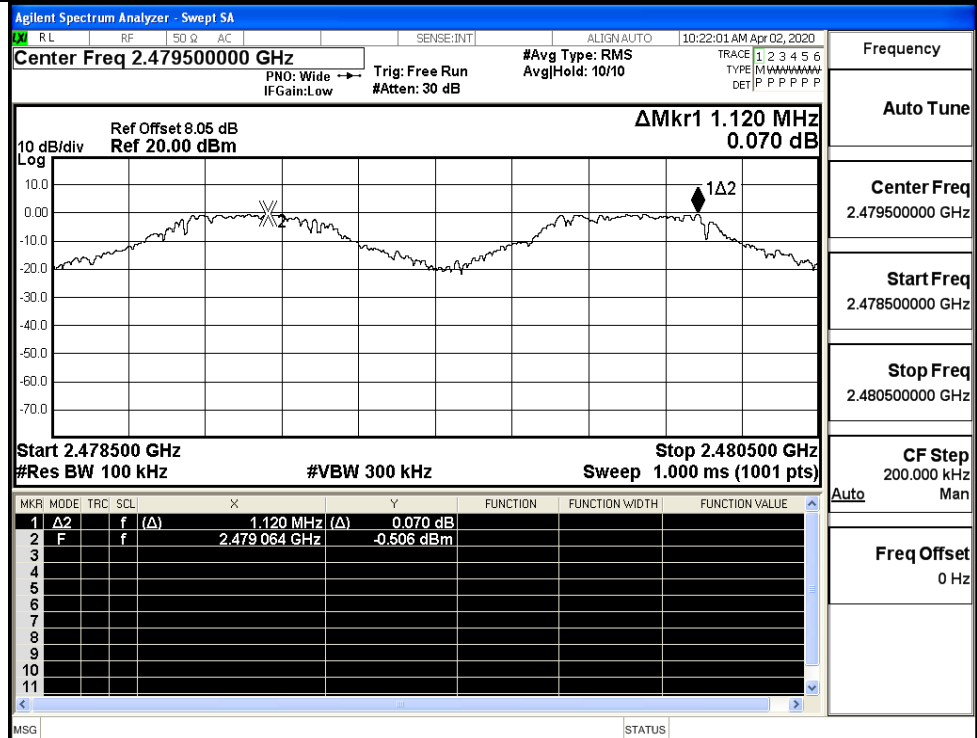
GFSK/LCH

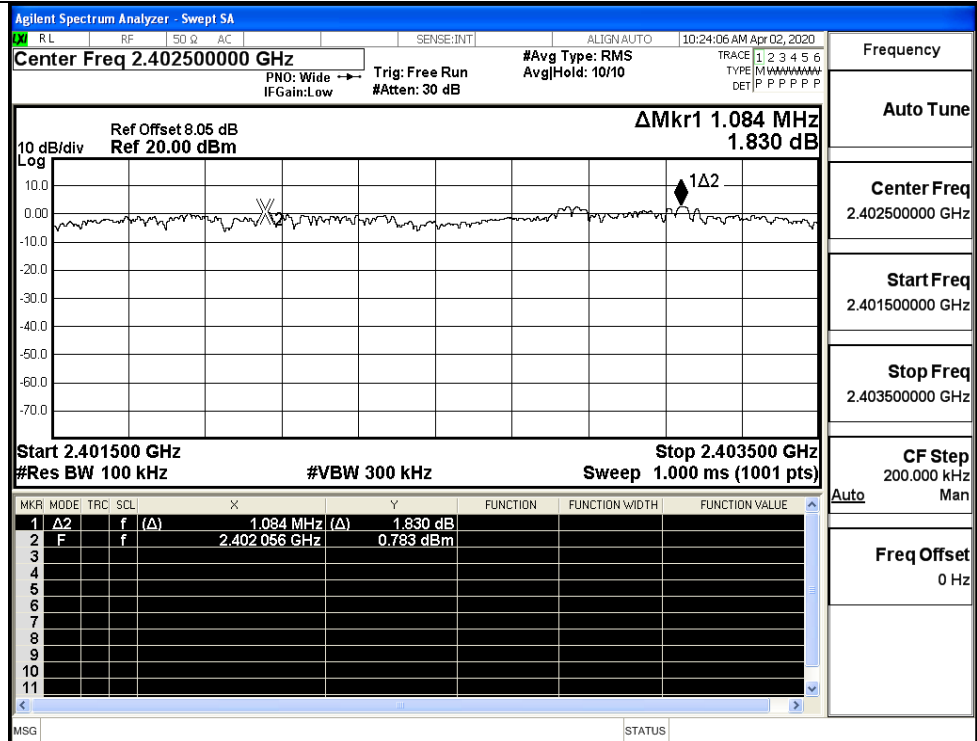
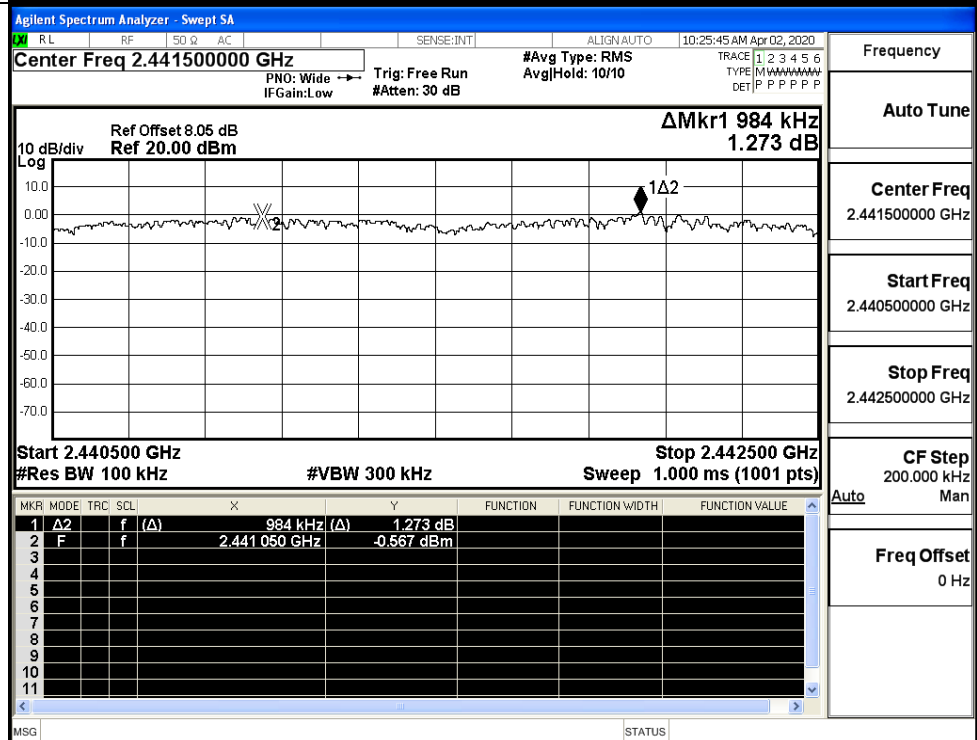


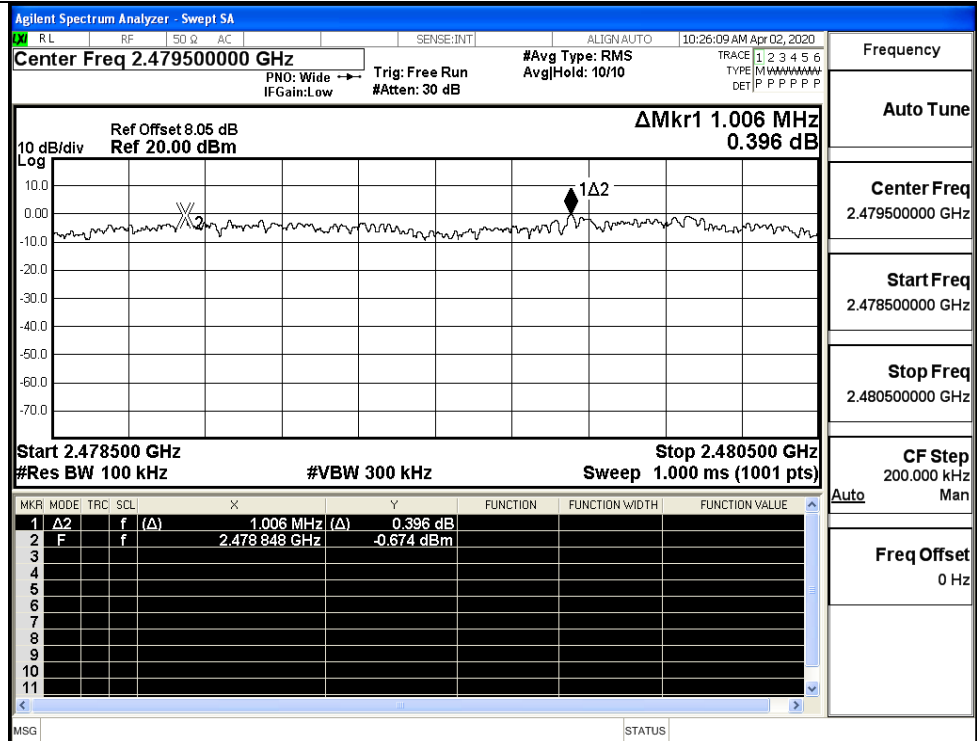
GFSK/MCH



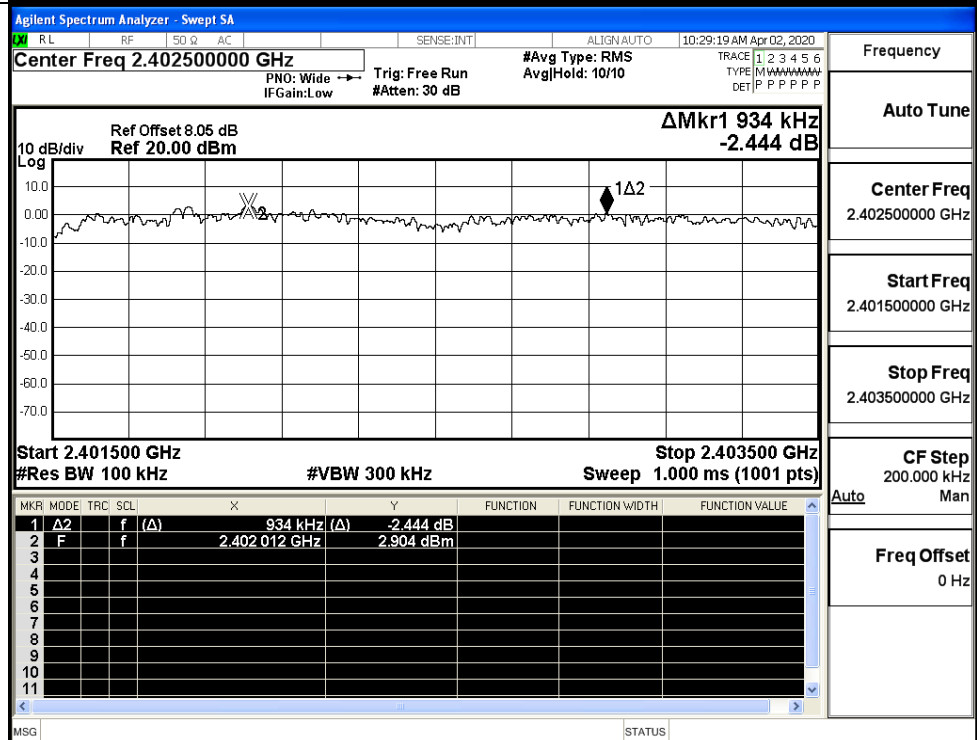
GFSK/HCH



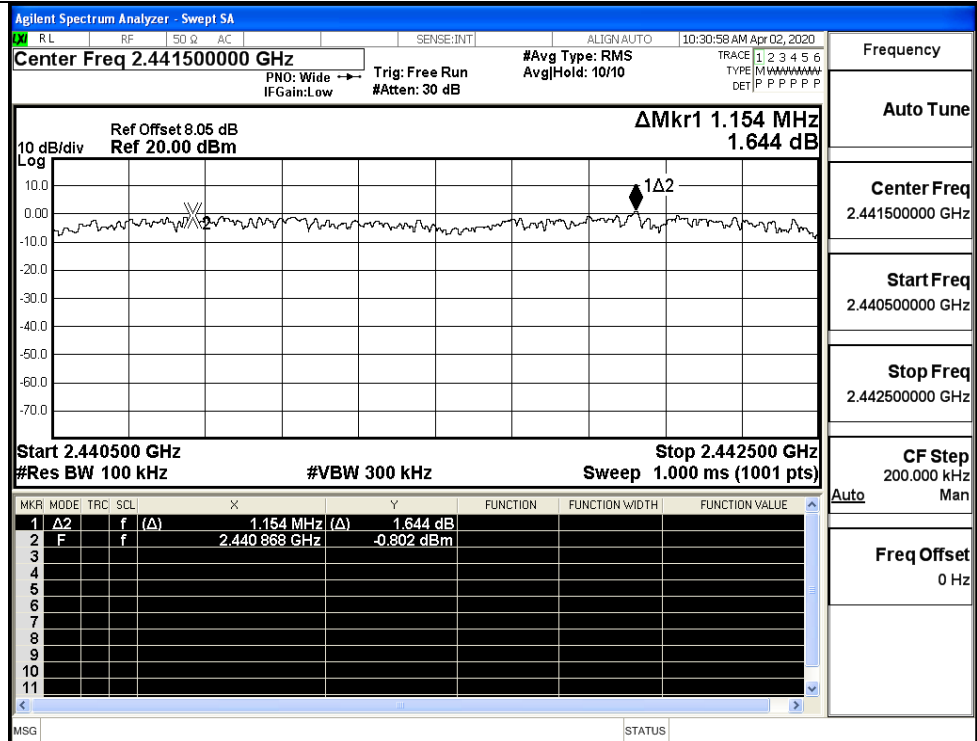
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

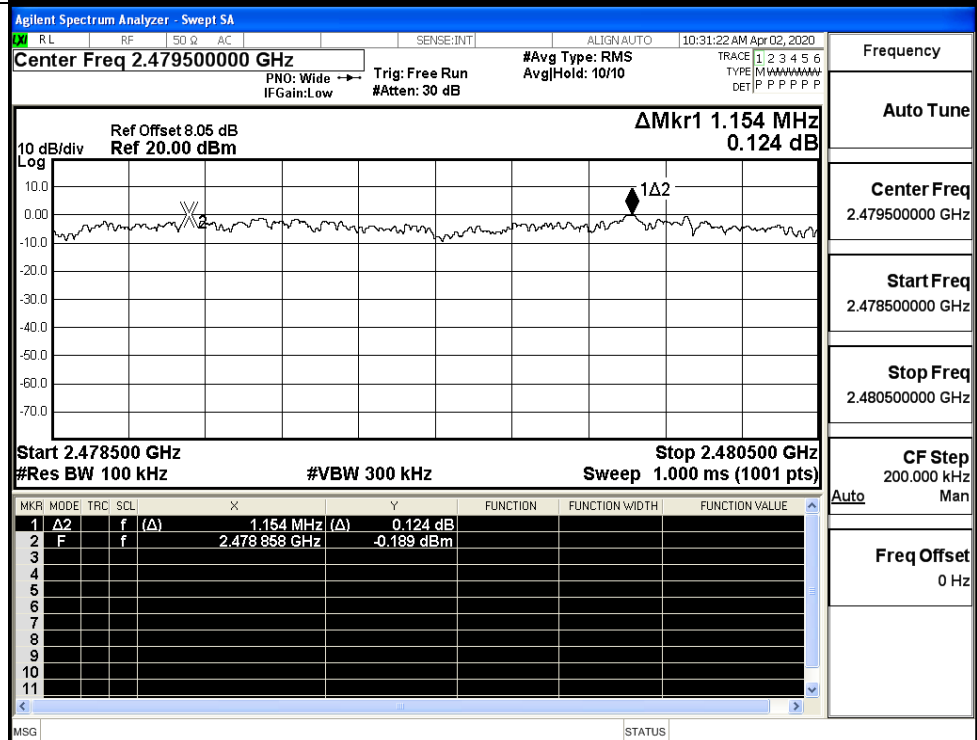
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

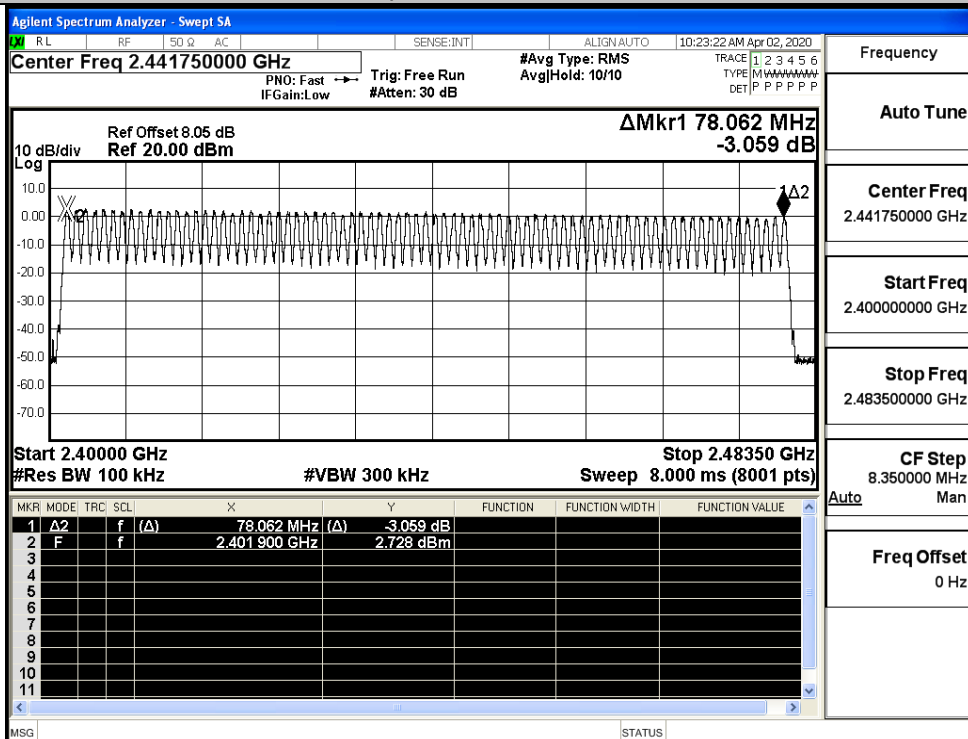


A.4 Hopping Channel Number

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 GHz

Start Freq

2.400000000 GHz

Stop Freq

2.483500000 GHz

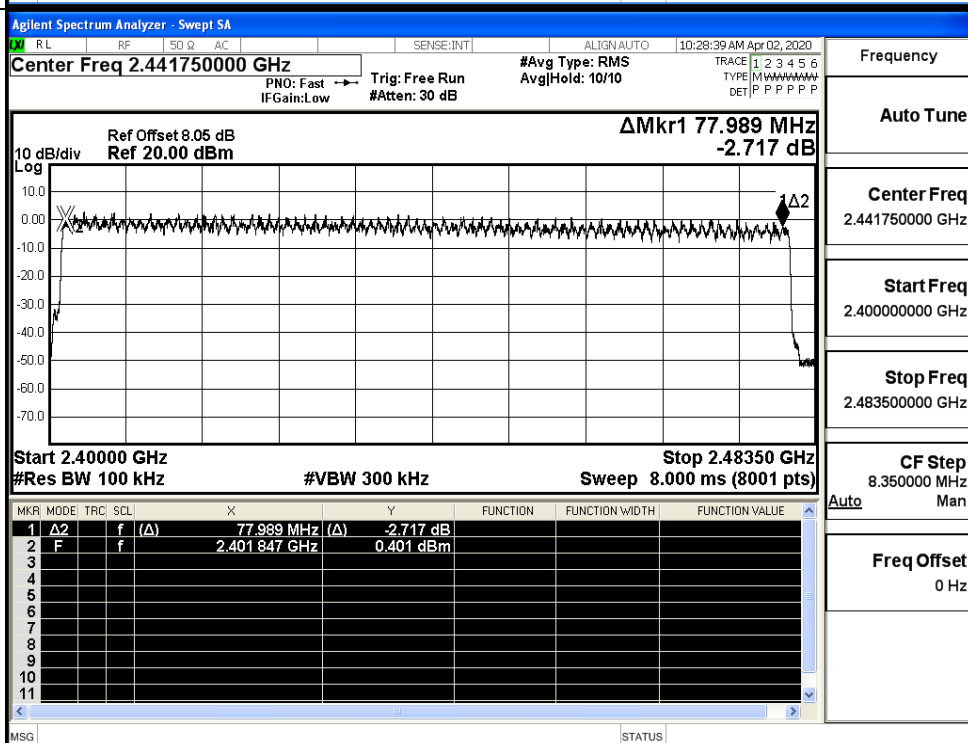
CF Step

8.350000 MHz

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

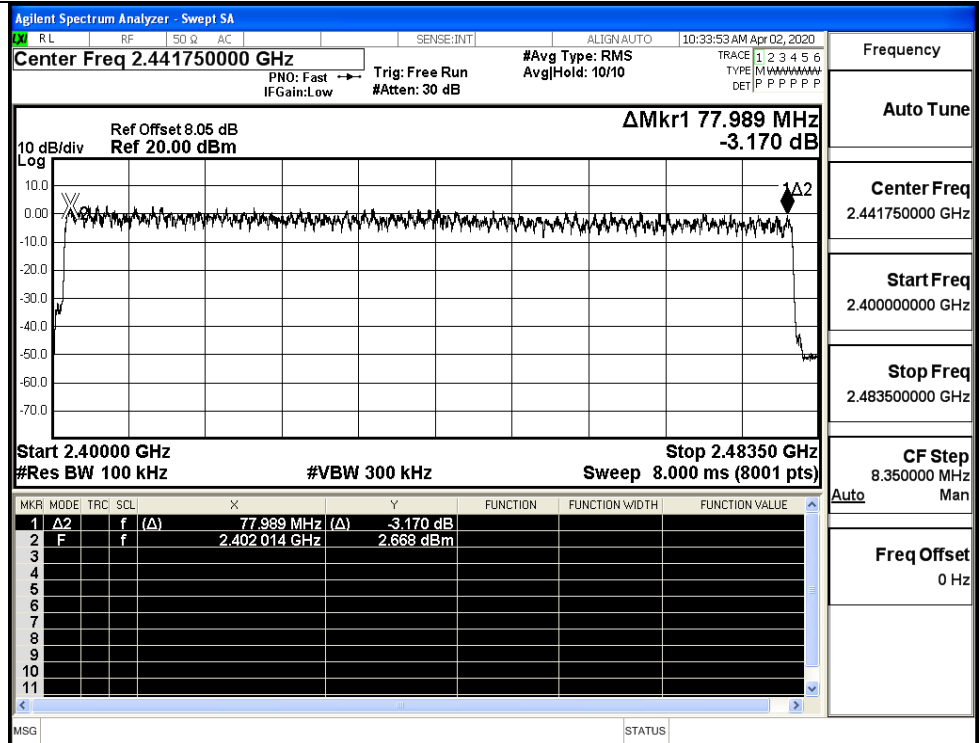
8.350000 MHz

Man

Freq Offset

0 Hz

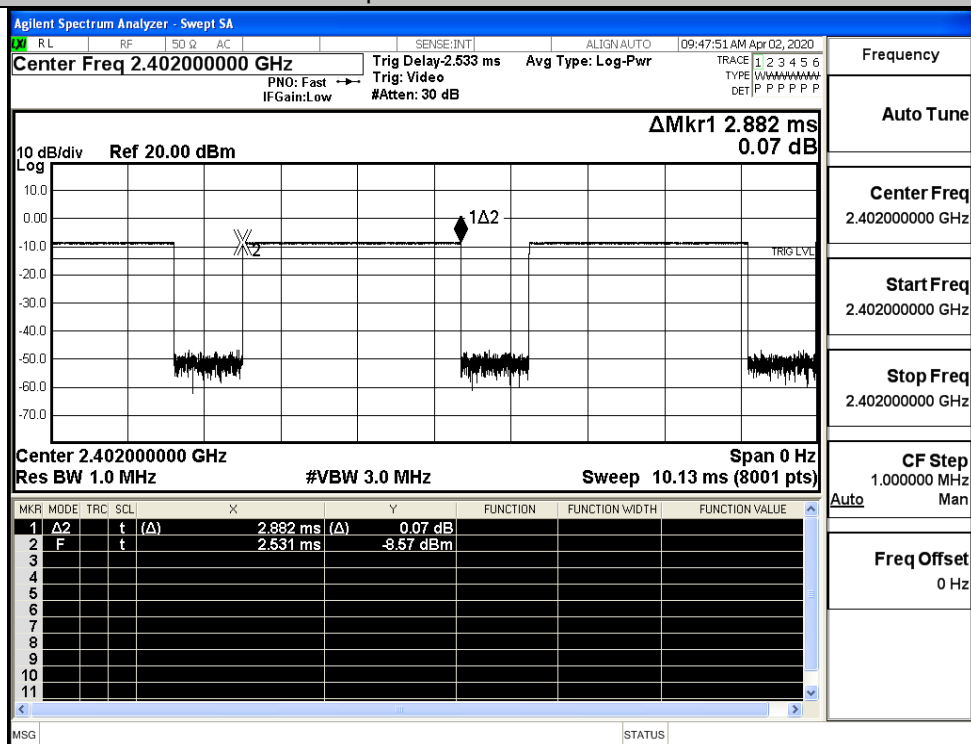
8DPSK/Hop



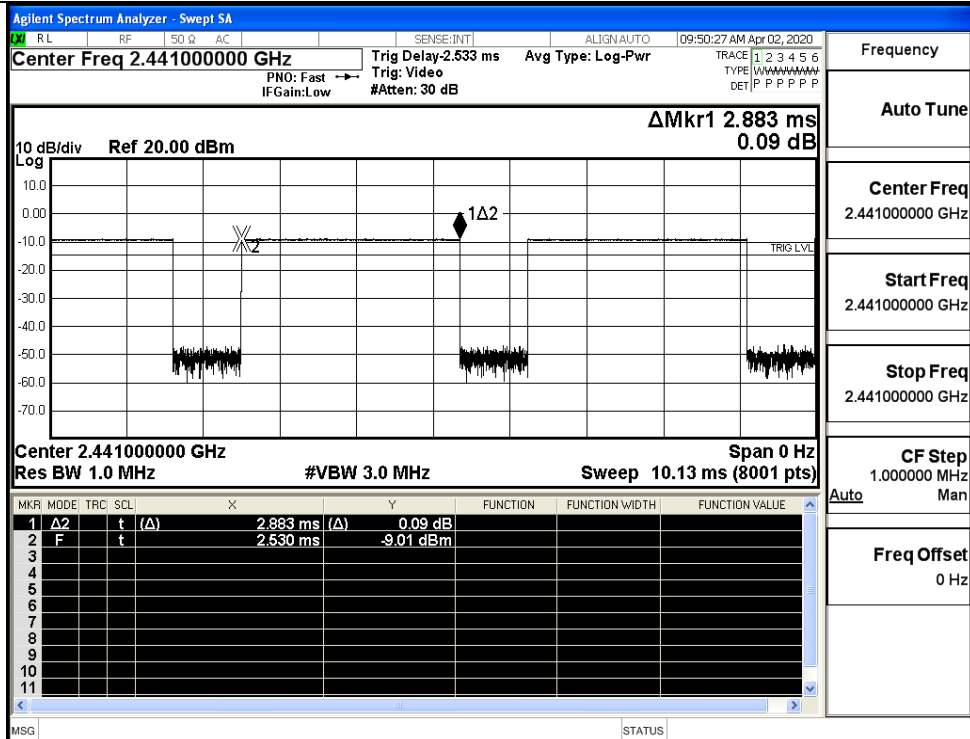
A.5 Dwell Time

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
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.308	0.4	PASS
	2DH5	MCH	2.88	106.7	0.308	0.4	PASS
	2DH5	HCH	2.88	106.7	0.308	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.308	0.4	PASS
	3DH5	MCH	2.88	106.7	0.308	0.4	PASS
	3DH5	HCH	2.88	106.7	0.308	0.4	PASS

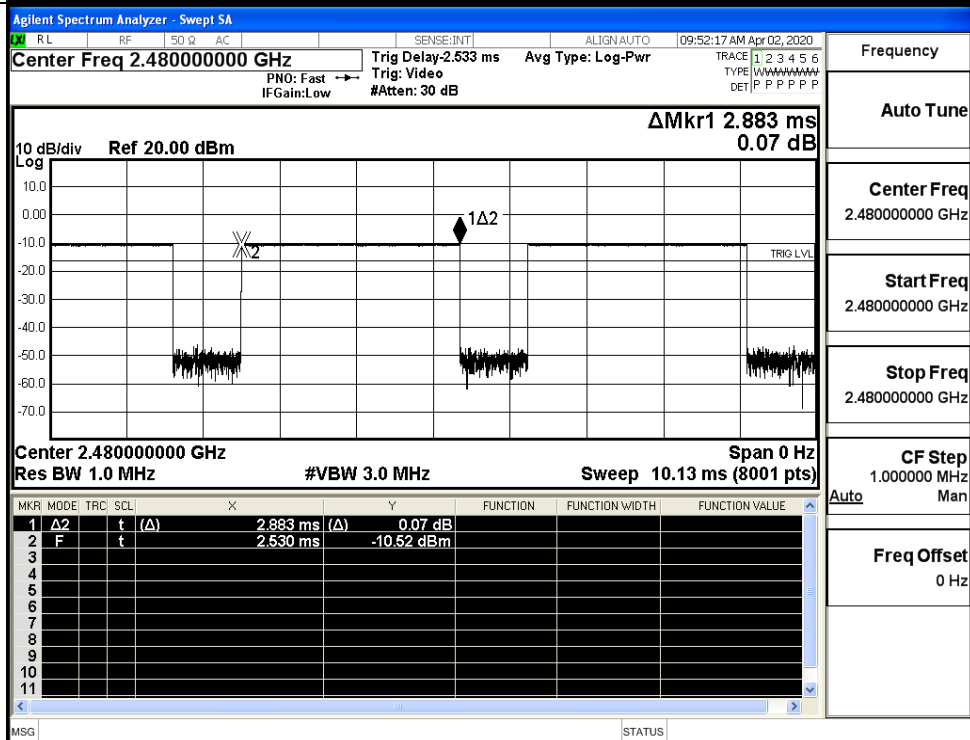
Test Graphs



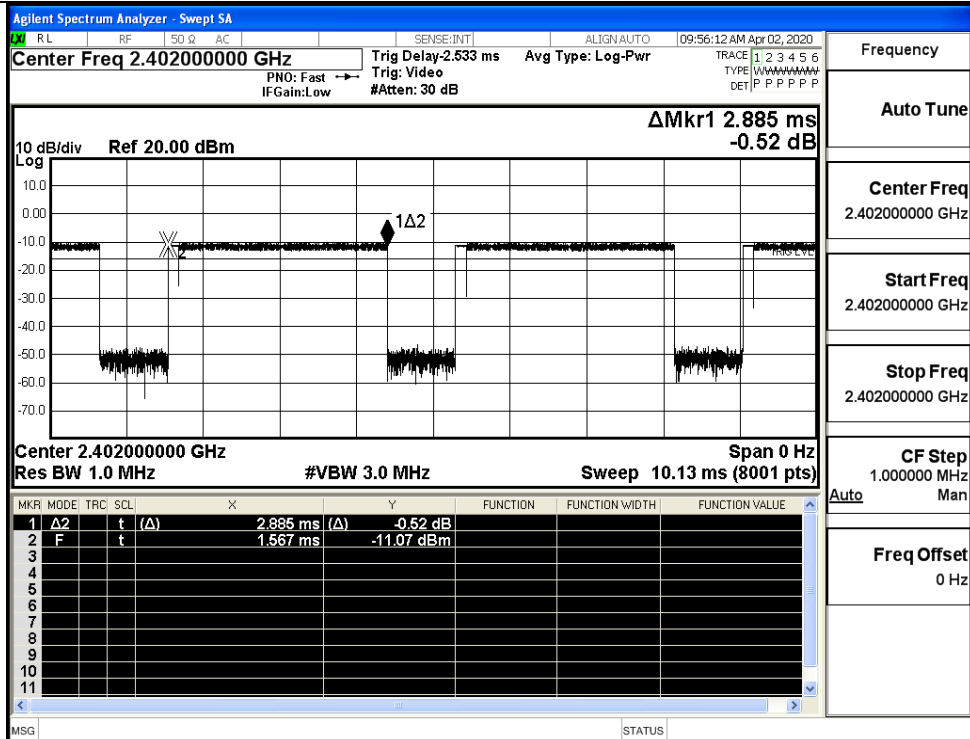
GFSK_DH5/MCH



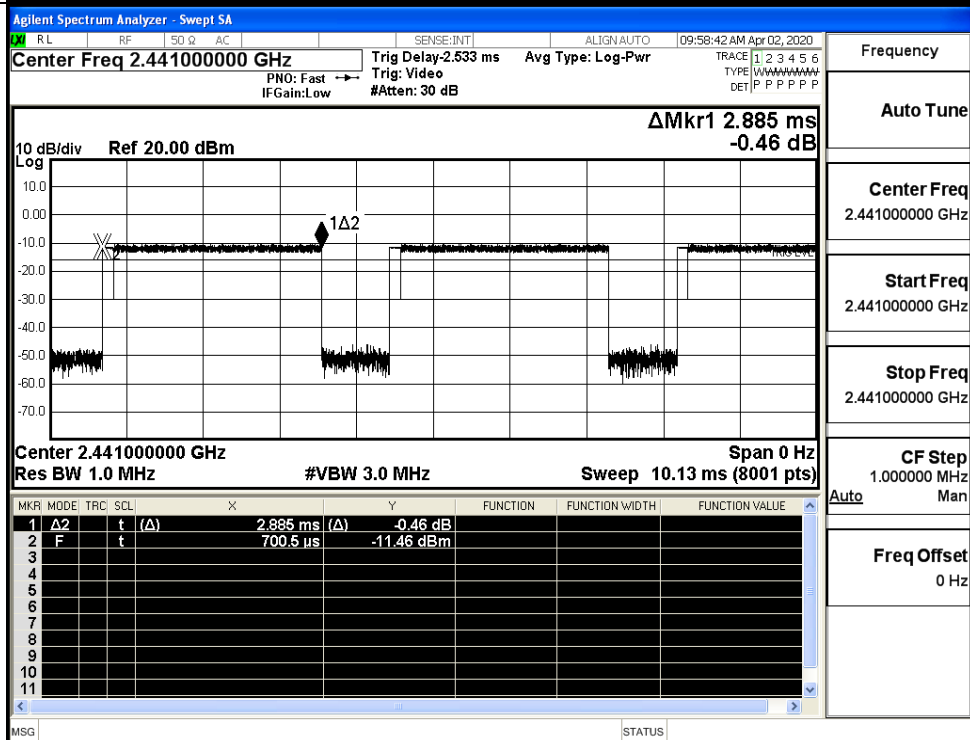
GFSK_DH5/HCH



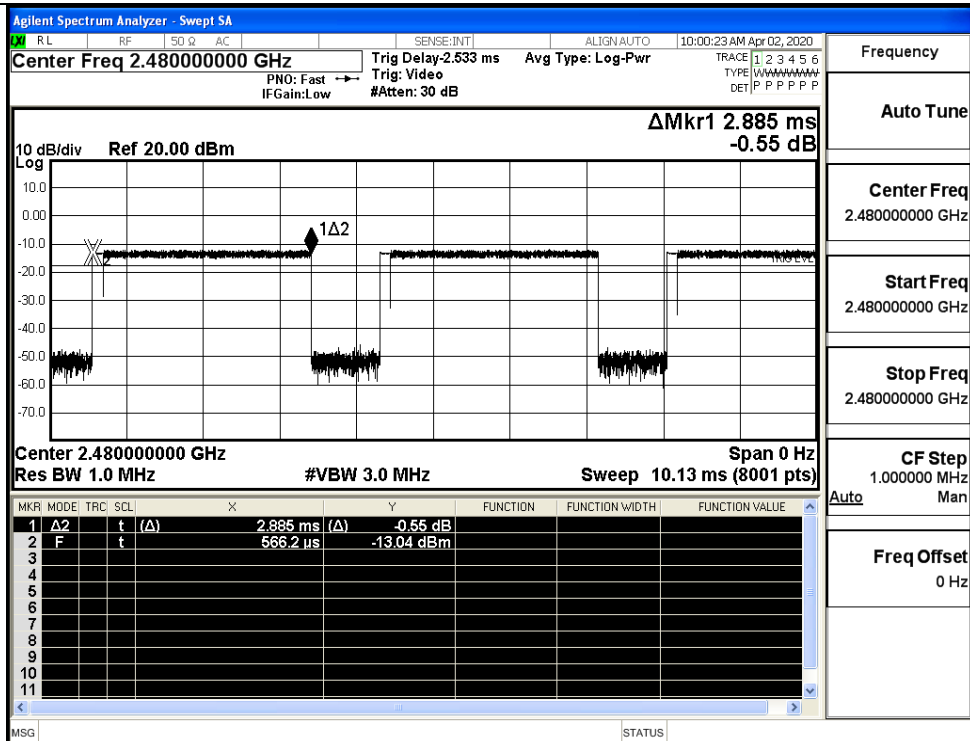
$\pi/4$ DQPSK
_2DH5/LCH



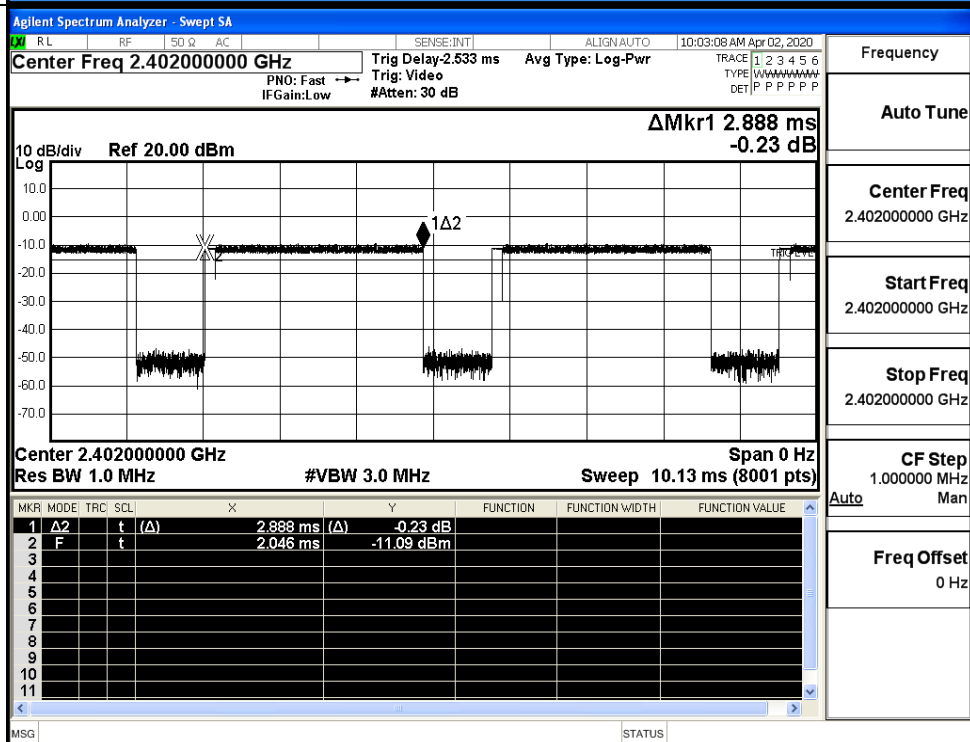
$\pi/4$ DQPSK
_2DH5/MCH



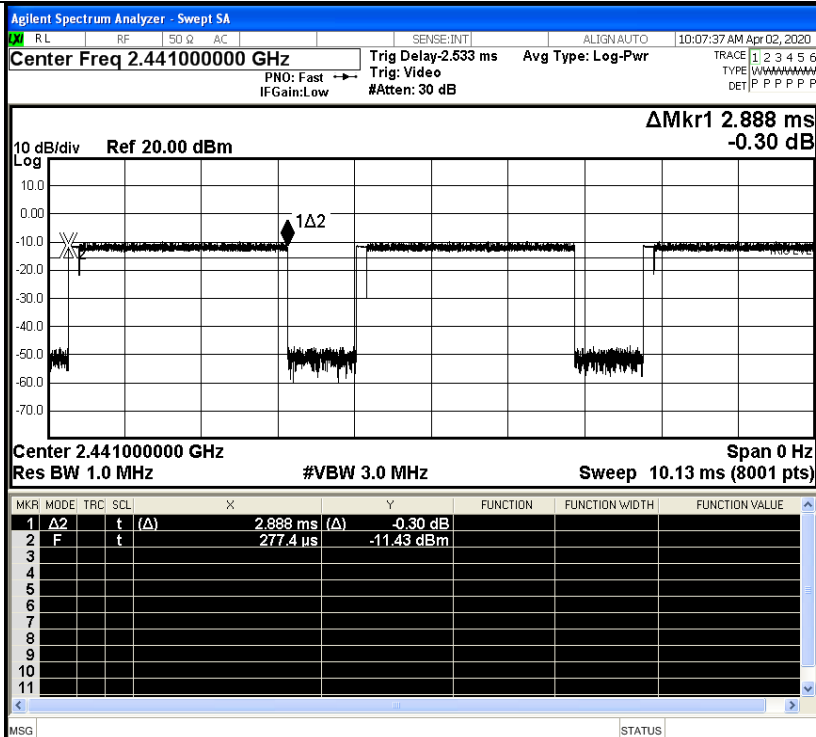
$\pi/4$ DQPSK
_2DH5/HCH



8DPSK _3DH5/LCH



8DPSK_3DH5/MCH

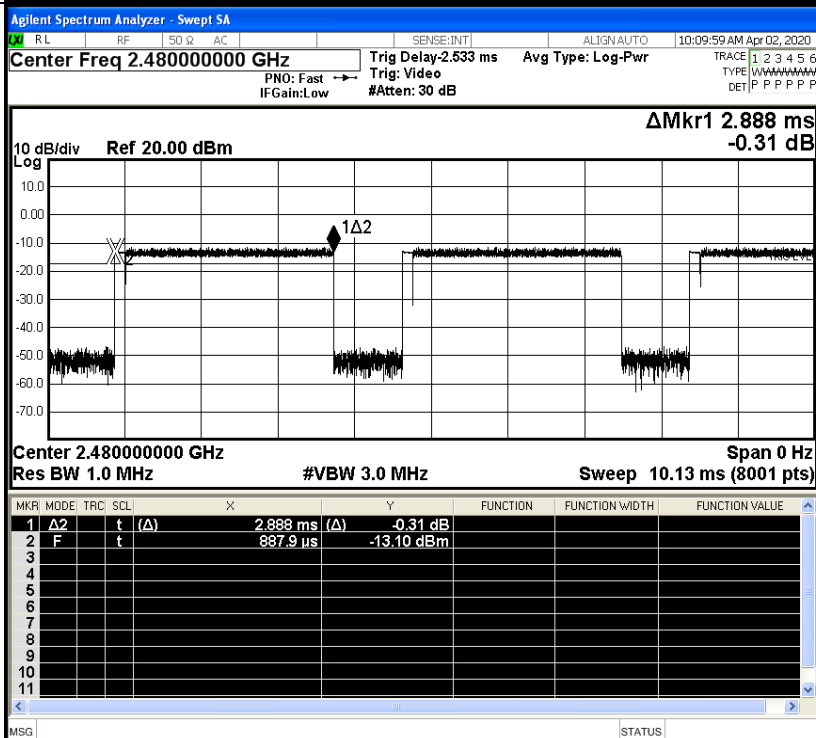


Frequency

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

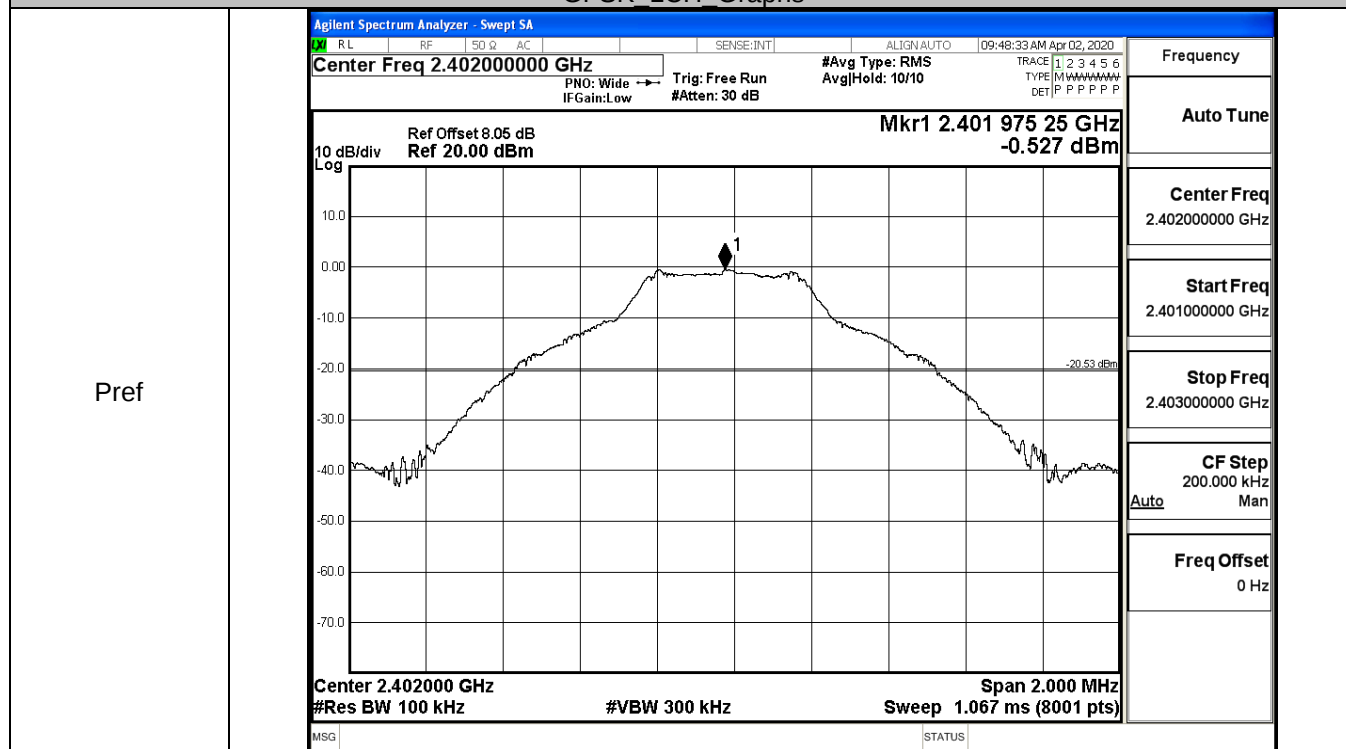
Auto Tune

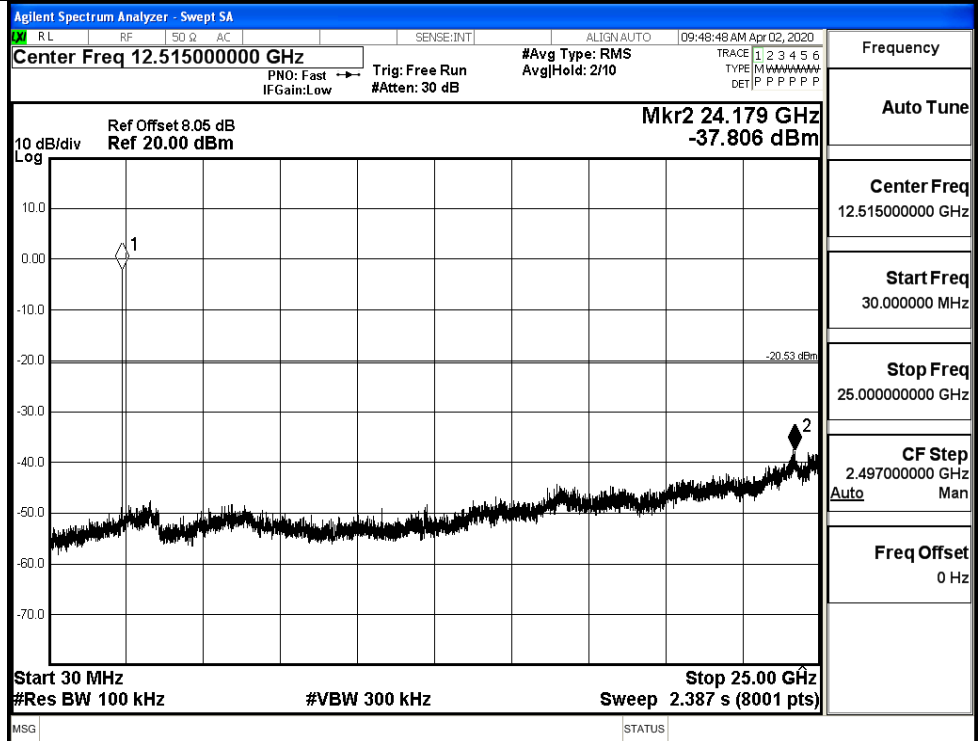
Center Freq
2.480000000 GHzStart Freq
2.480000000 GHzStop Freq
2.480000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.527	-37.806	-20.527	PASS
	MCH	-0.916	-37.402	-20.916	PASS
	HCH	-2.464	-36.816	-22.464	PASS
$\pi/4$ DQPSK	LCH	-3.141	-37.632	-23.141	PASS
	MCH	-3.414	-37.576	-23.414	PASS
	HCH	-5.065	-37.779	-25.065	PASS
8DPSK	LCH	-3.065	-37.501	-23.065	PASS
	MCH	-3.427	-37.868	-23.427	PASS
	HCH	-5.055	-37.967	-25.055	PASS

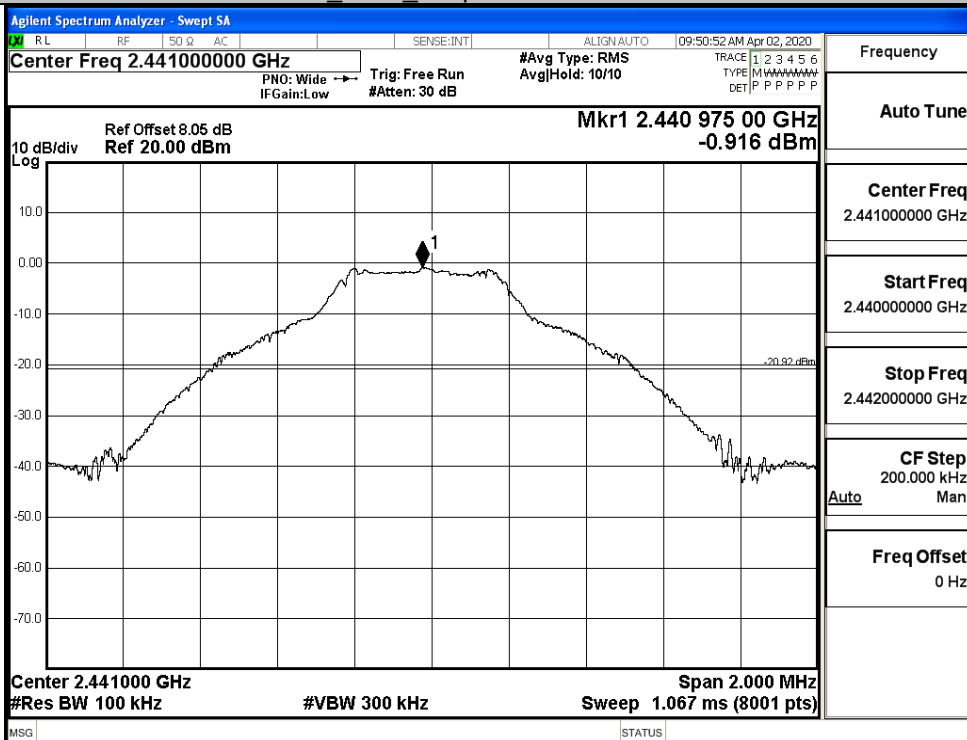
GFSK LCH Graphs



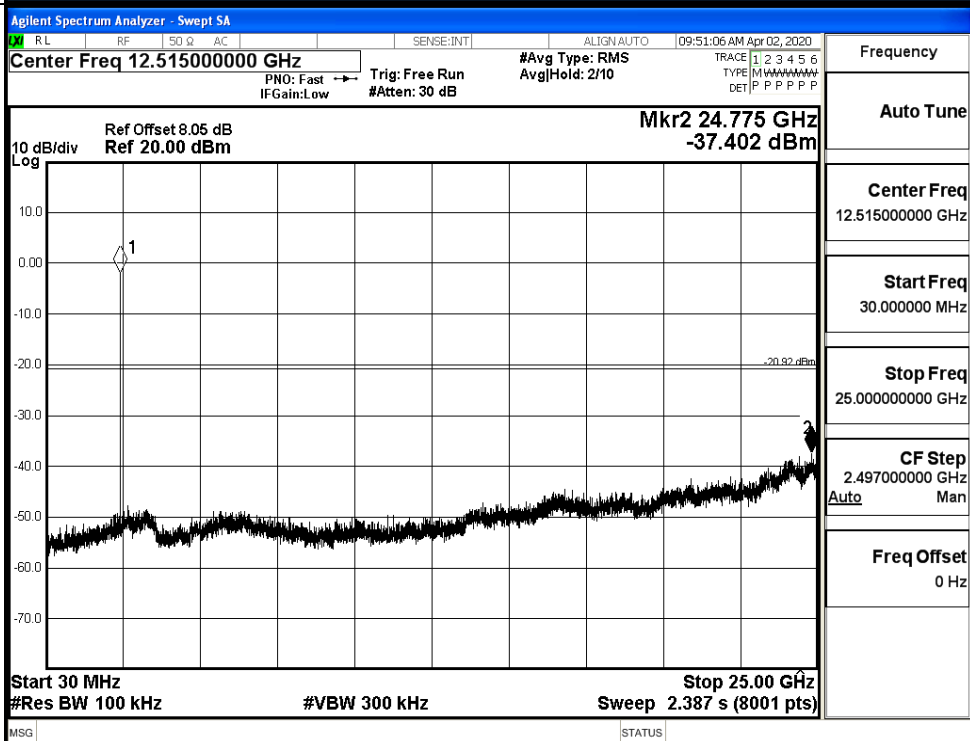
P_{uw}

GFSK_MCH_Graphs

Pref

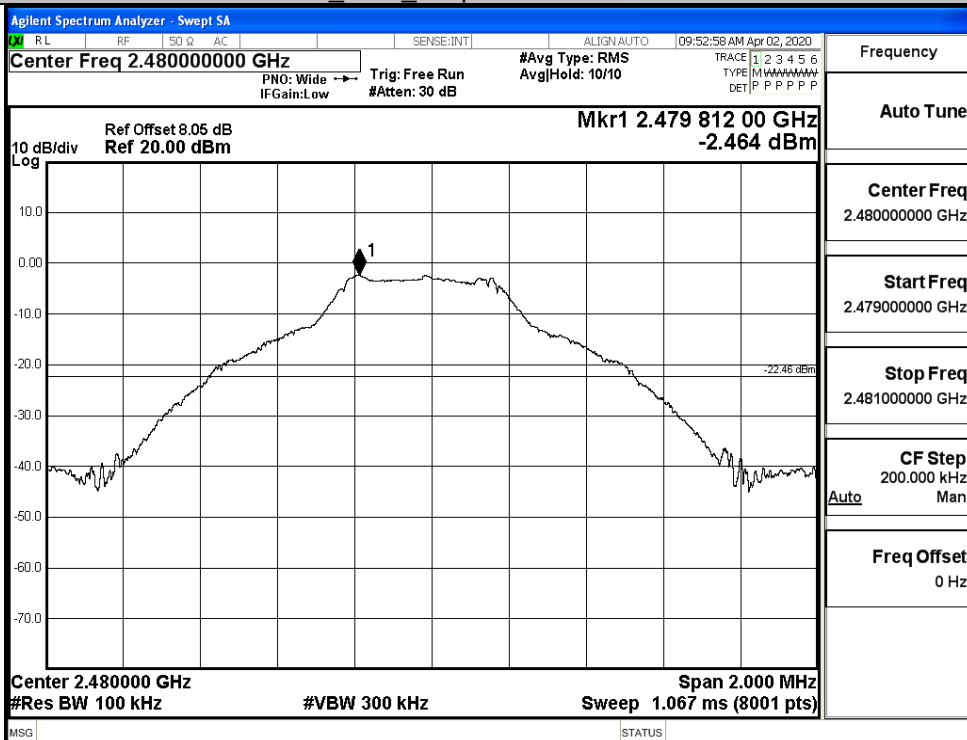


Puw

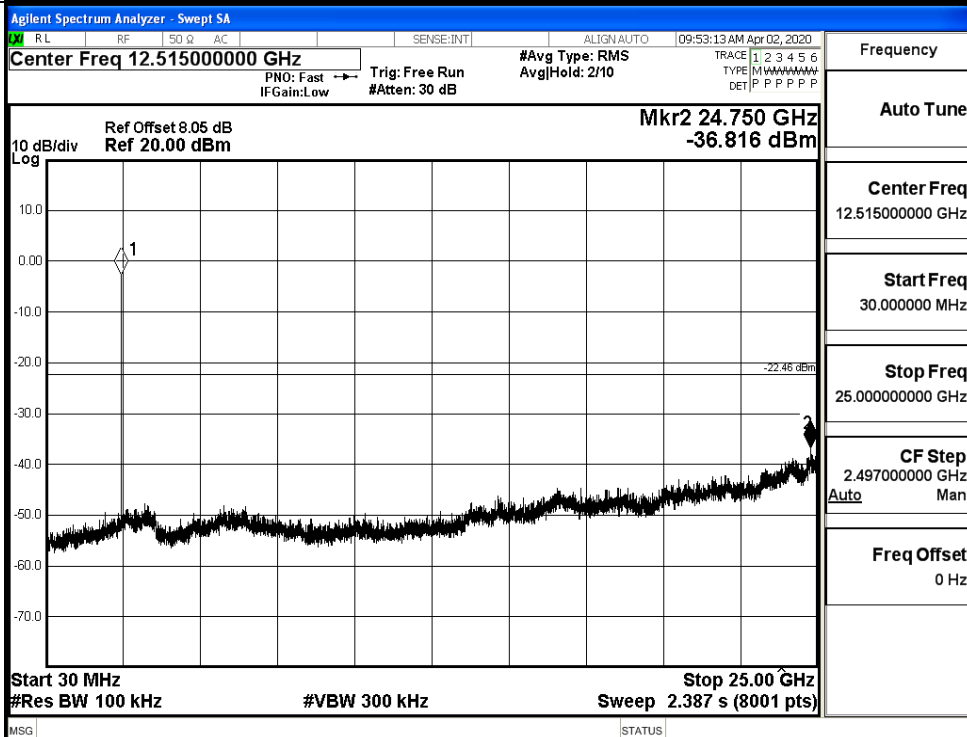


GFSK HCH Graphs

Pref

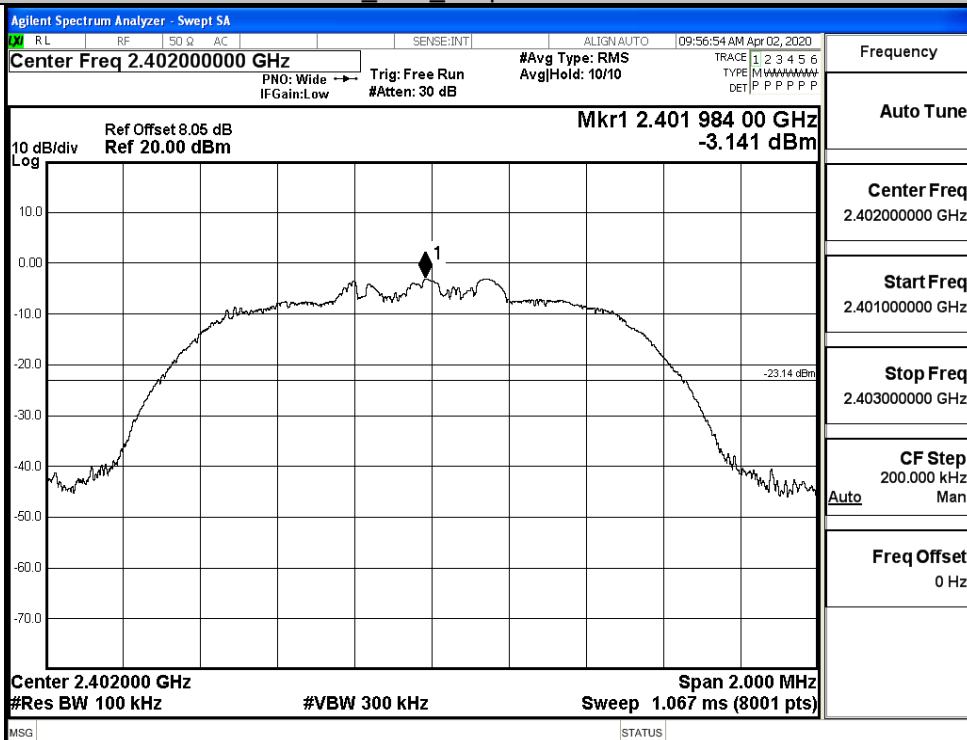


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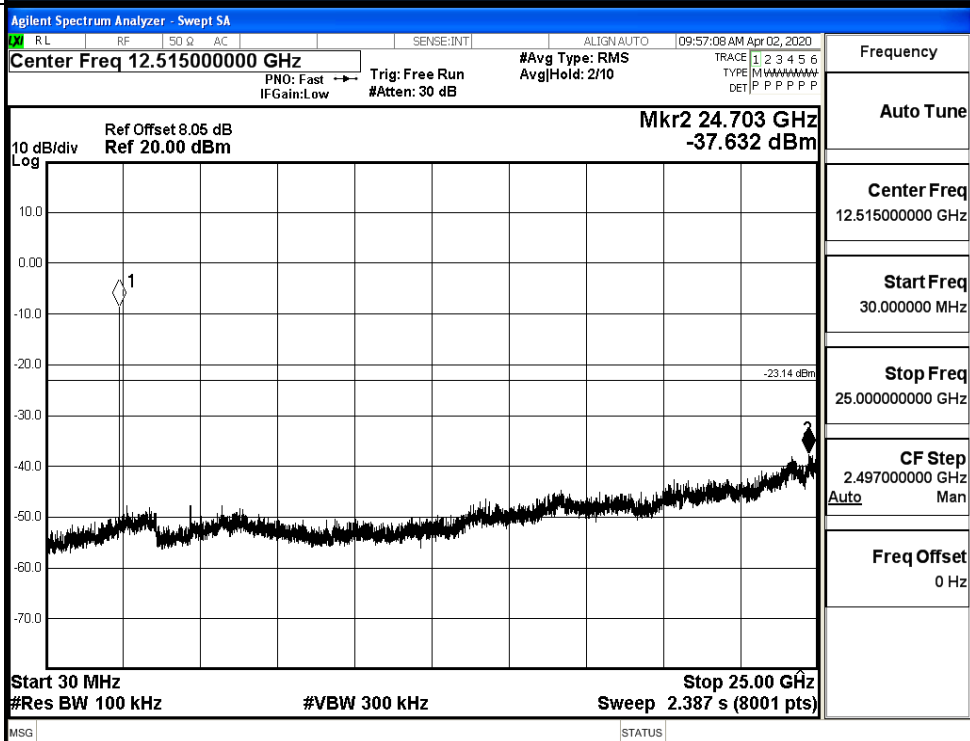


$\pi/4$ DQPSK_LCH_Graphs

Pref

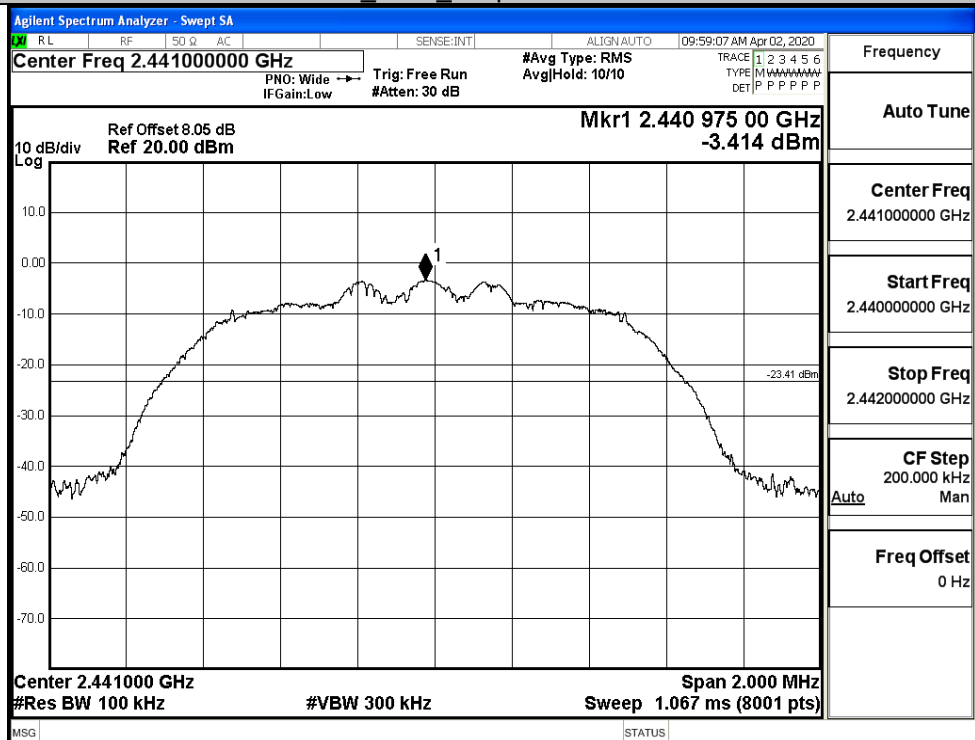


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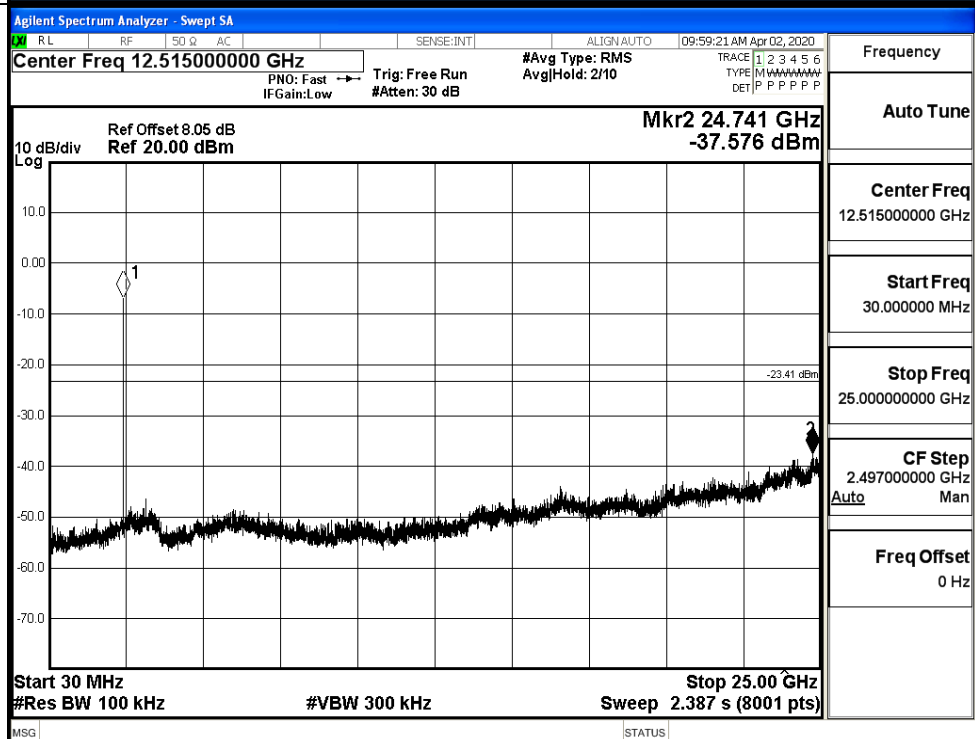


$\pi/4$ DQPSK_MCH_Graphs

Pref

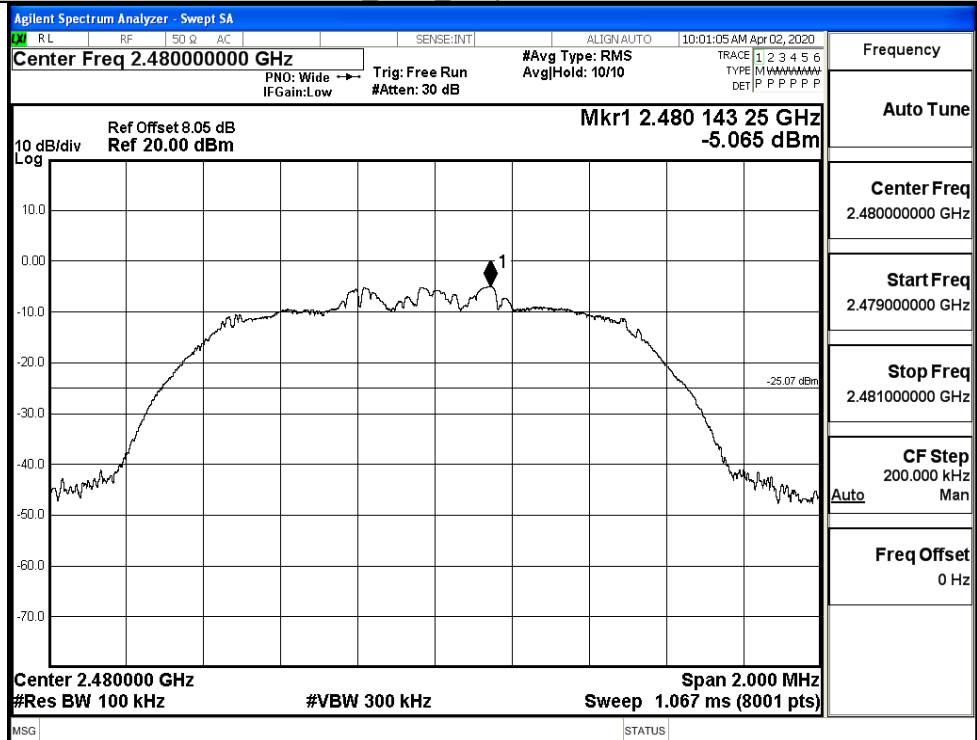


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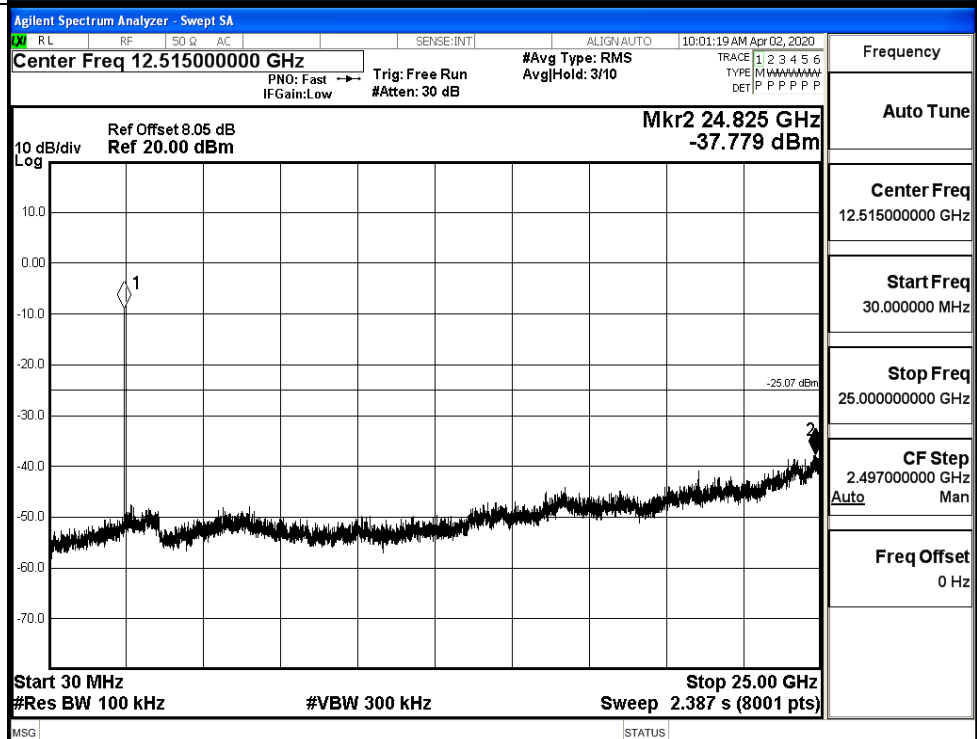


π /4DQPSK_HCH_Graphs

Pref

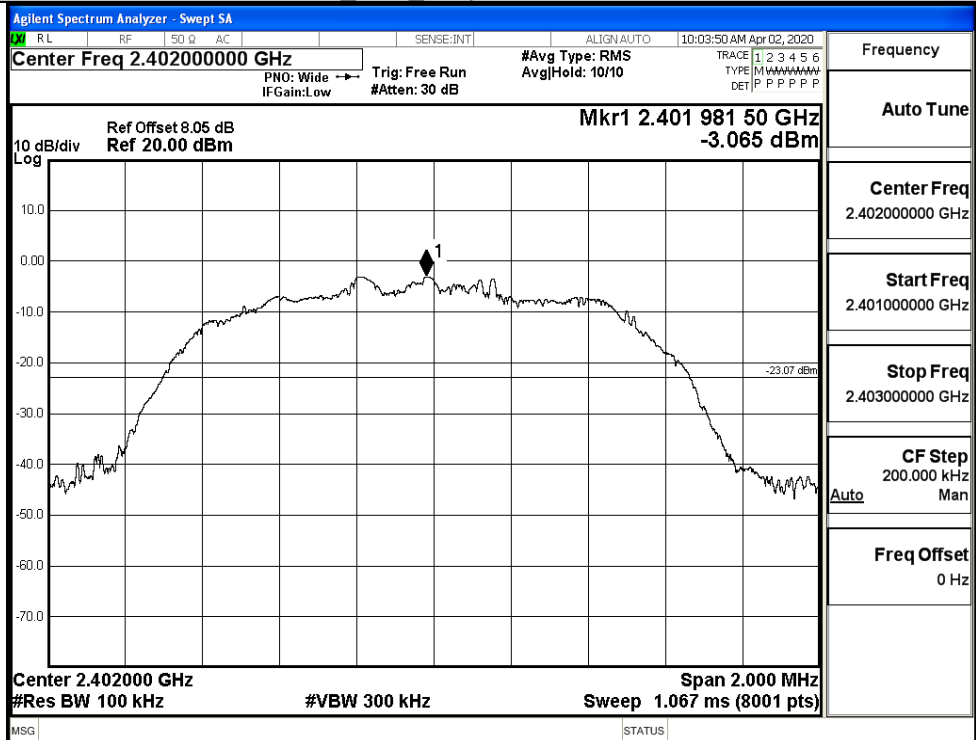


Puw

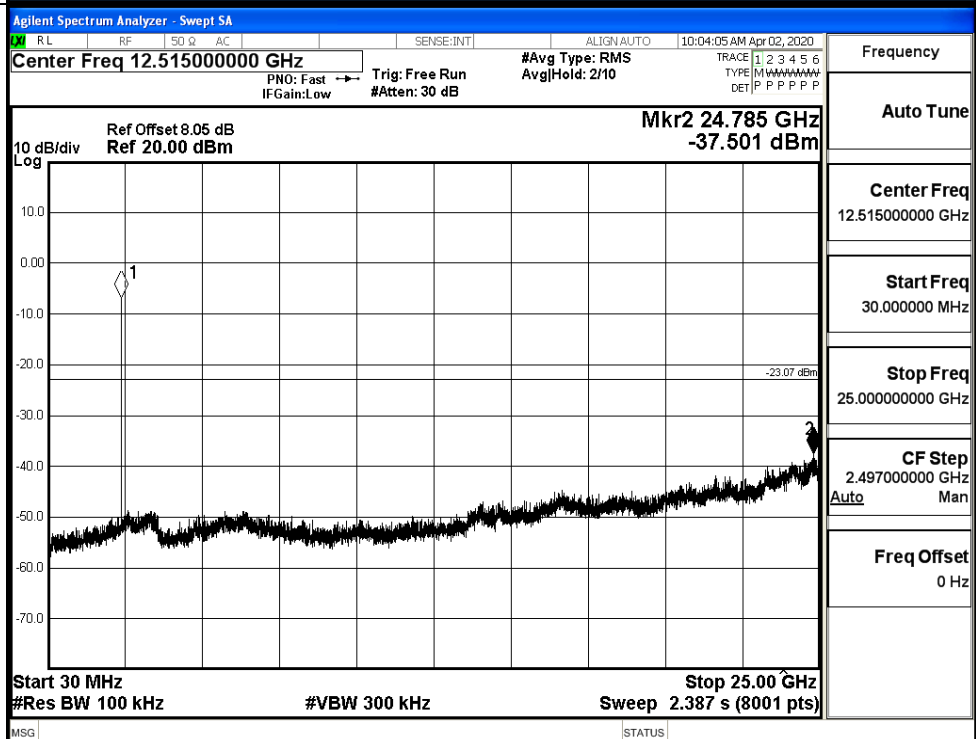


8DPSK_LCH_Graphs

Pref

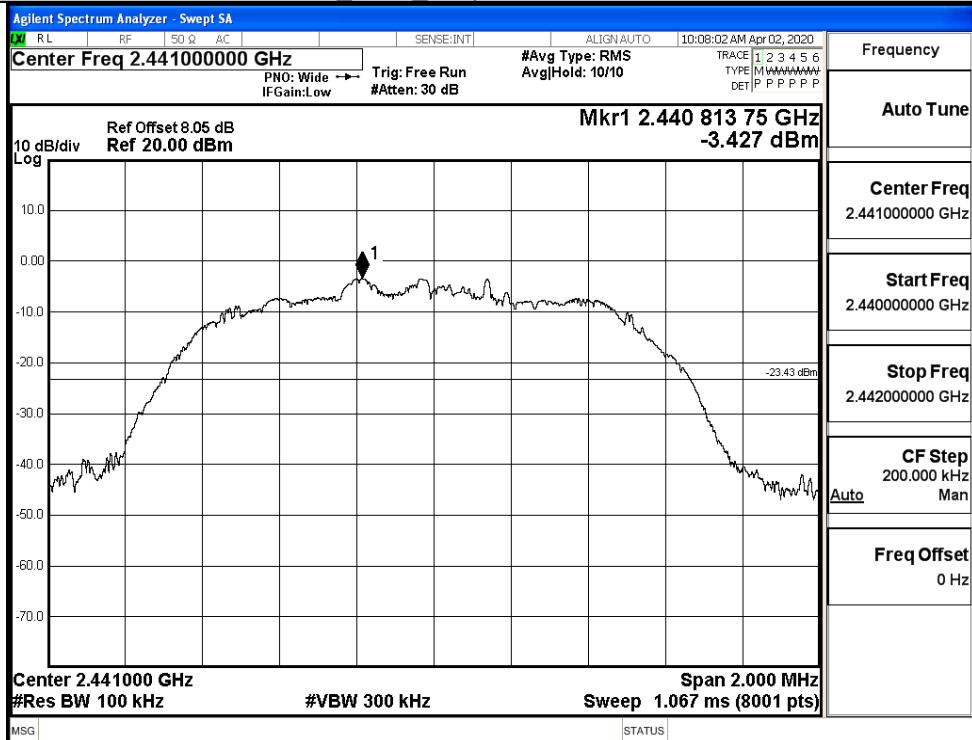


Puw

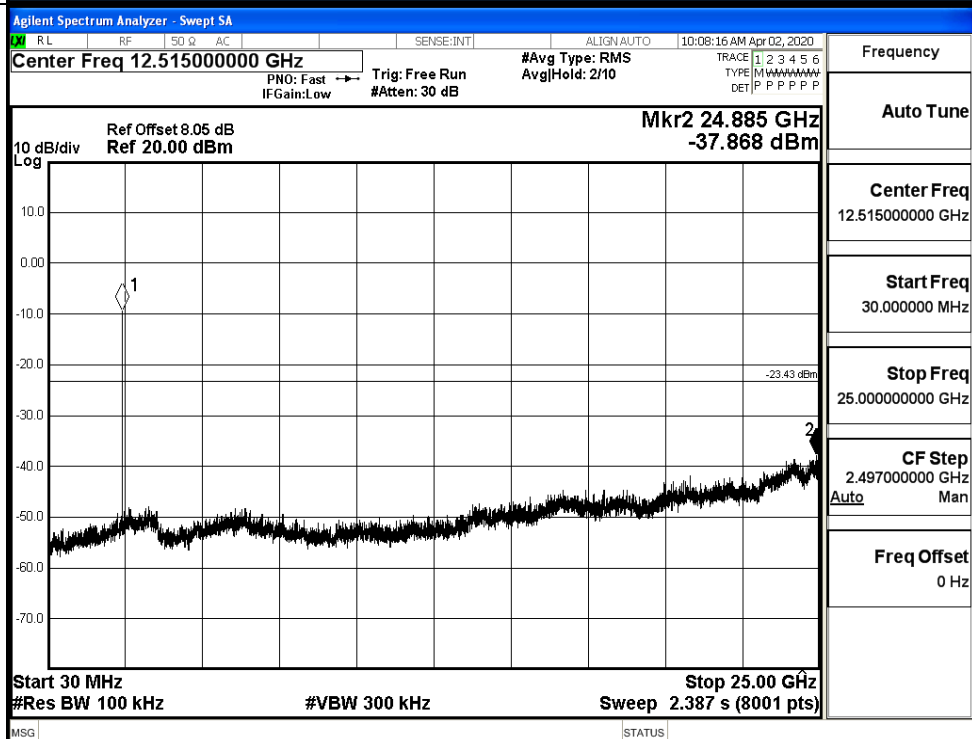


8DPSK_MCH_Graphs

Pref

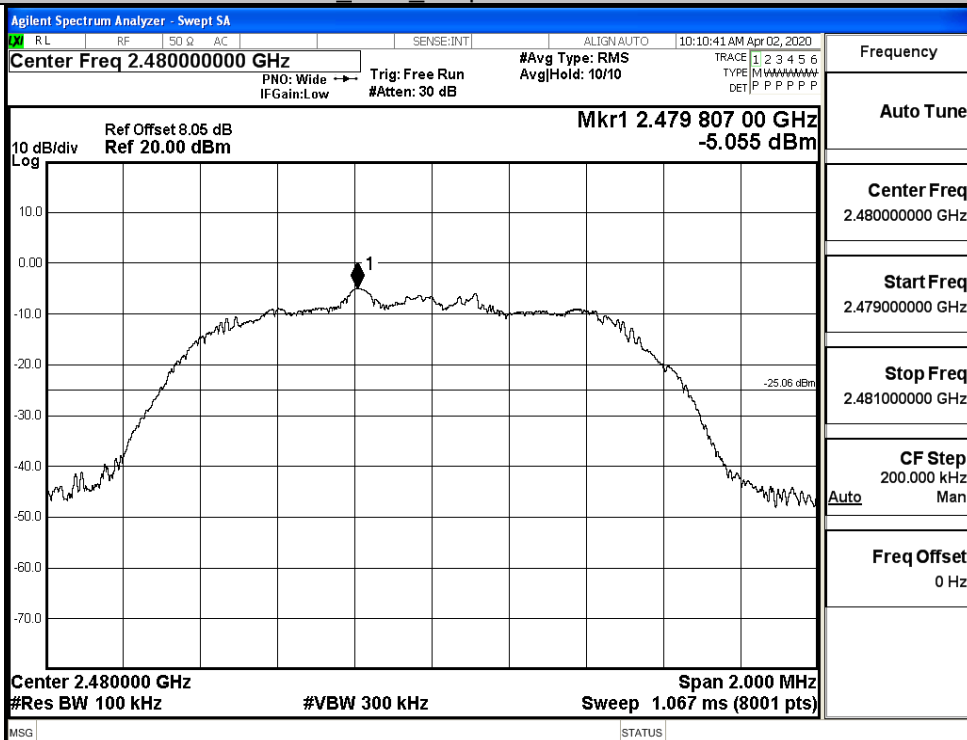


Puw

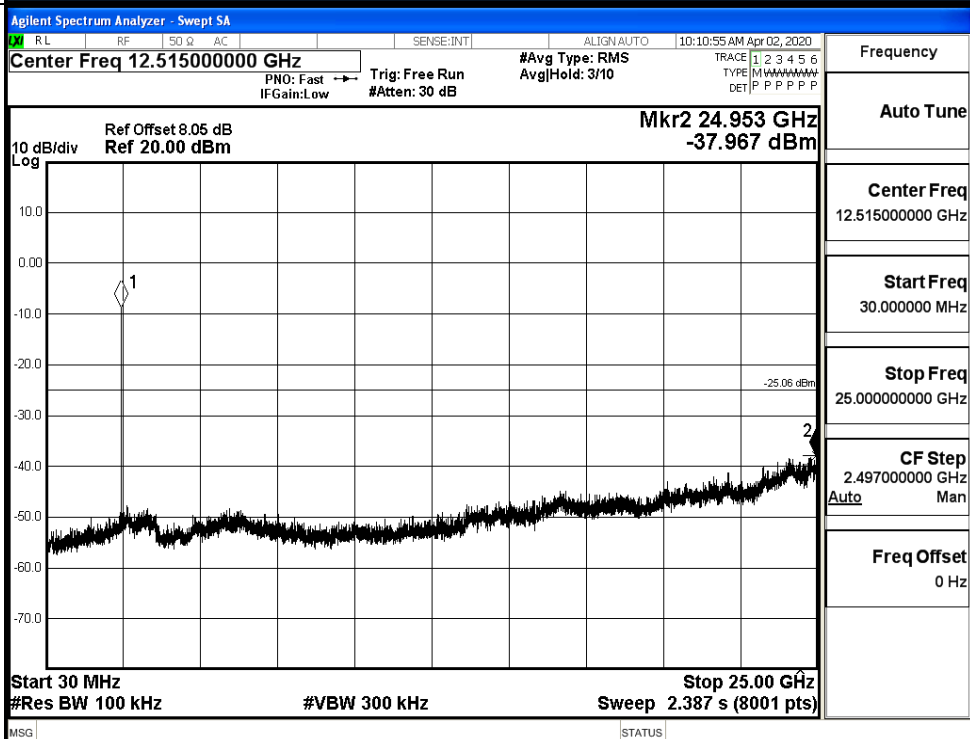


8DPSK_HCH_Graphs

Pref



Puw

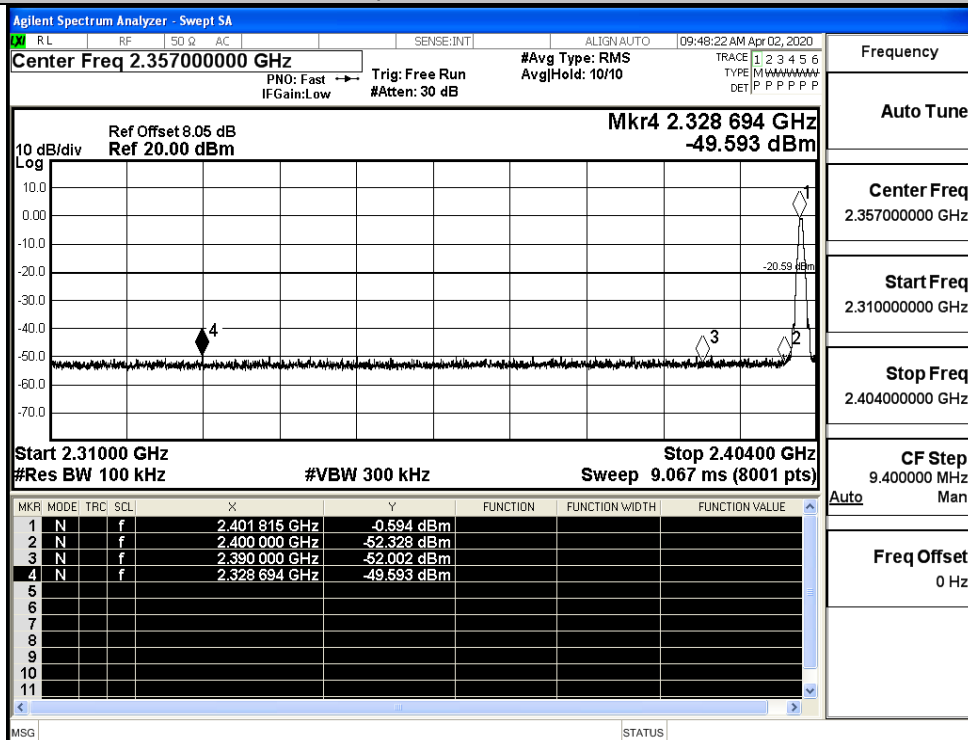


A.7 Band-edge for RF Conducted Emissions

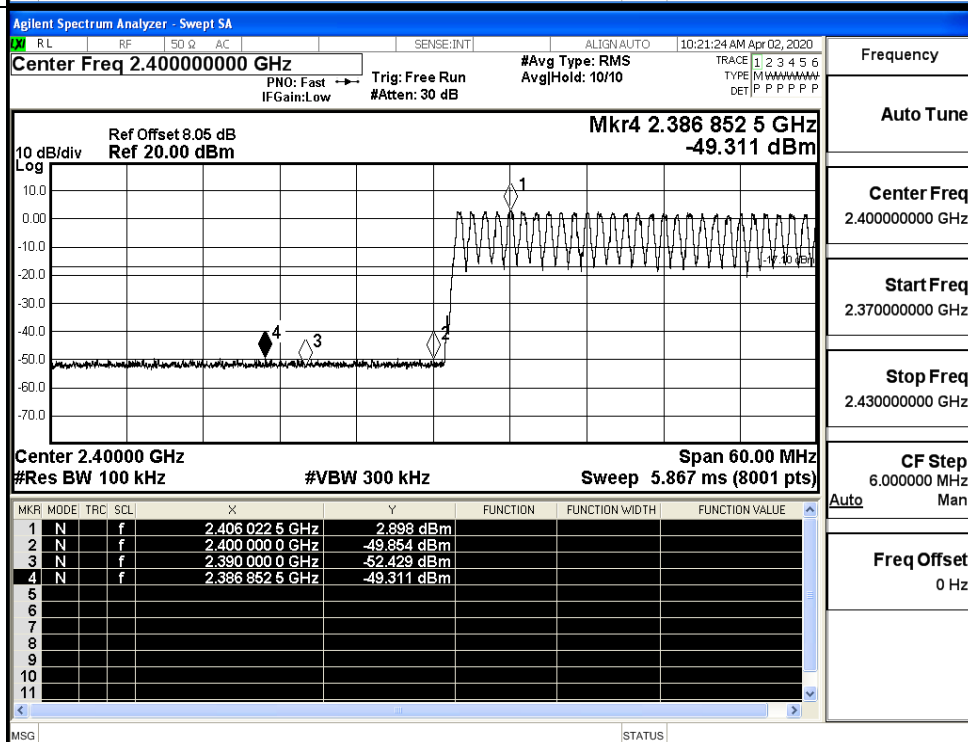
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.594	Off	-49.593	-20.59	PASS
			2.898	On	-49.311	-17.1	PASS
	HCH	2480	-2.301	Off	-48.585	-22.3	PASS
			0.871	On	-48.408	-19.13	PASS
$\pi/4$ DQPSK	LCH	2402	-3.132	Off	-49.233	-23.13	PASS
			2.580	On	-48.828	-17.42	PASS
	HCH	2480	-4.921	Off	-48.493	-24.92	PASS
			0.928	On	-48.468	-19.07	PASS
8DPSK	LCH	2402	-3.188	Off	-49.232	-23.19	PASS
			2.804	On	-48.967	-17.2	PASS
	HCH	2480	-5.029	Off	-49.132	-25.03	PASS
			0.883	On	-48.084	-19.12	PASS

Test Graphs

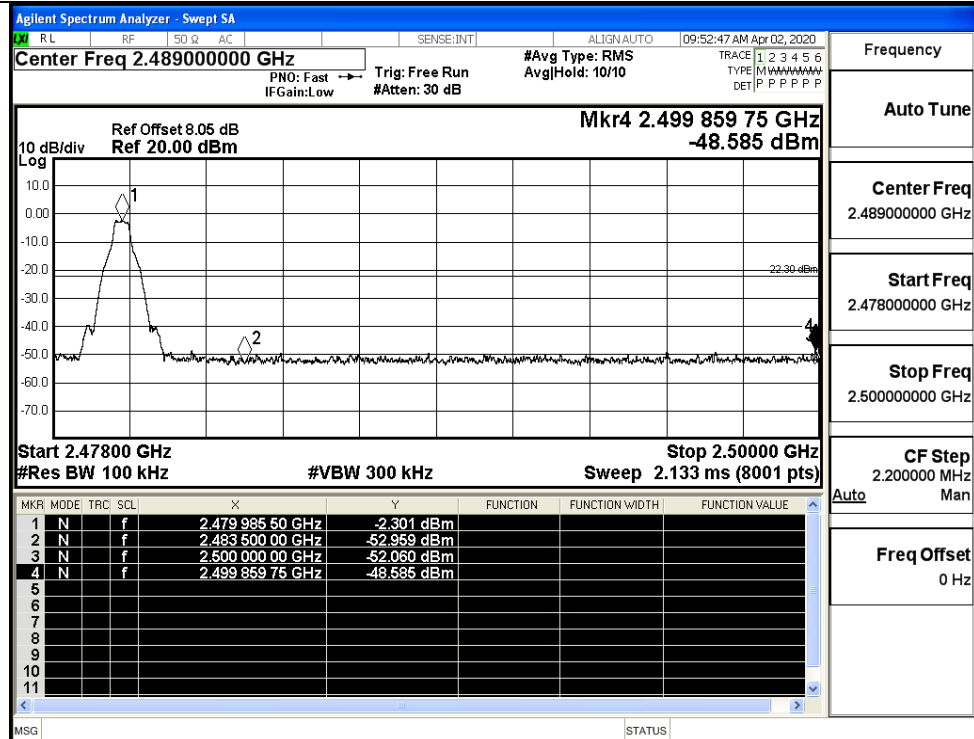
GFSK/LCH/No Hop



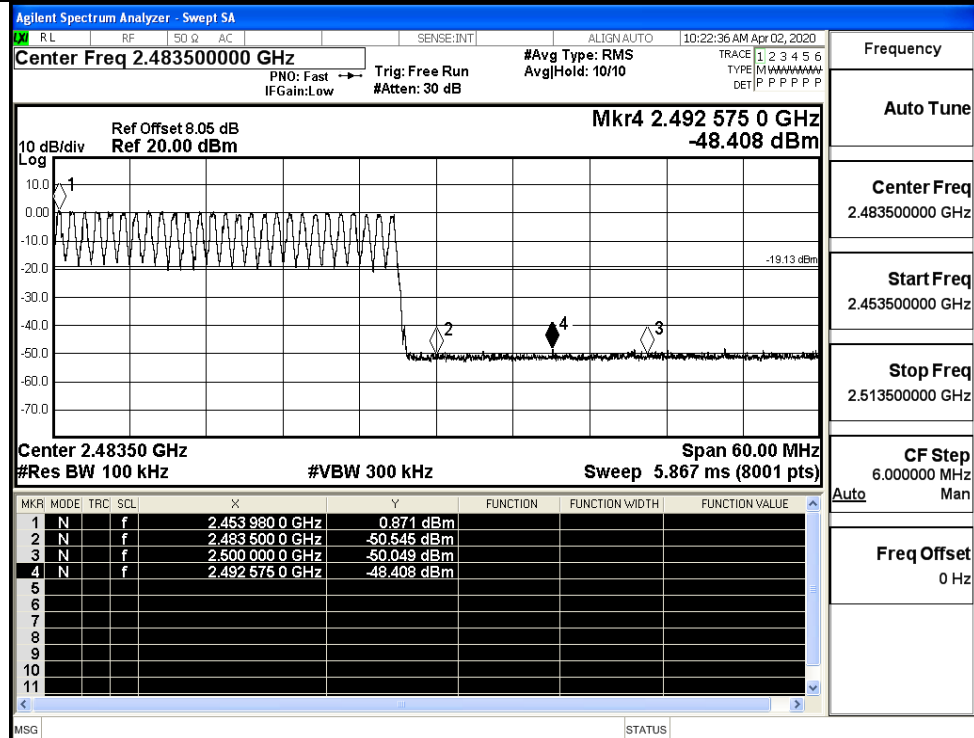
GFSK/LCH/Hop



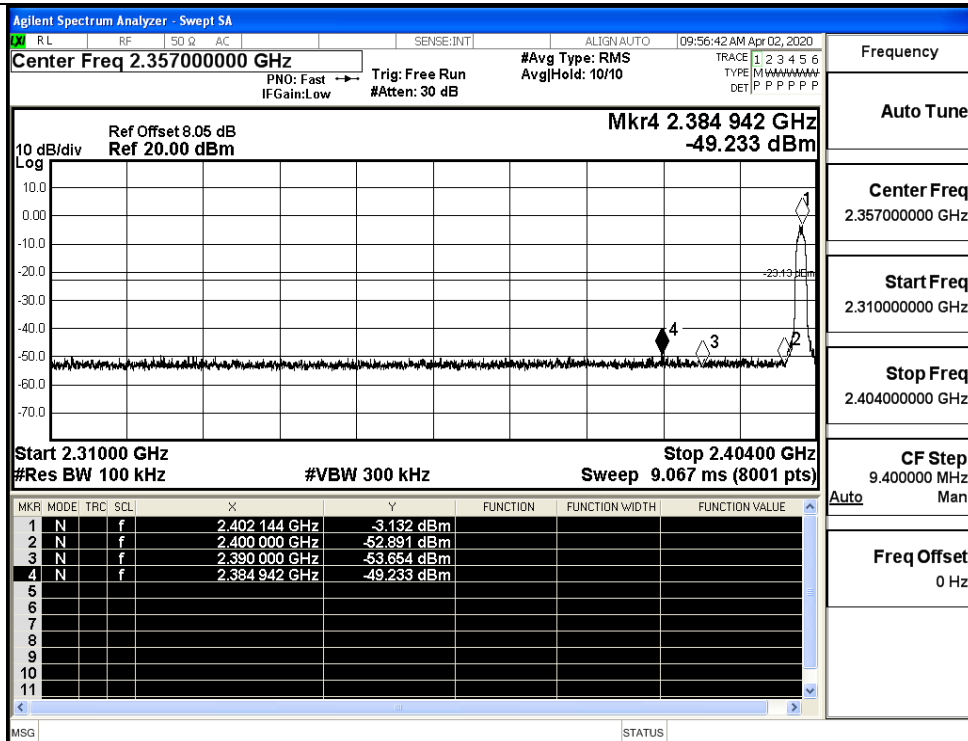
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

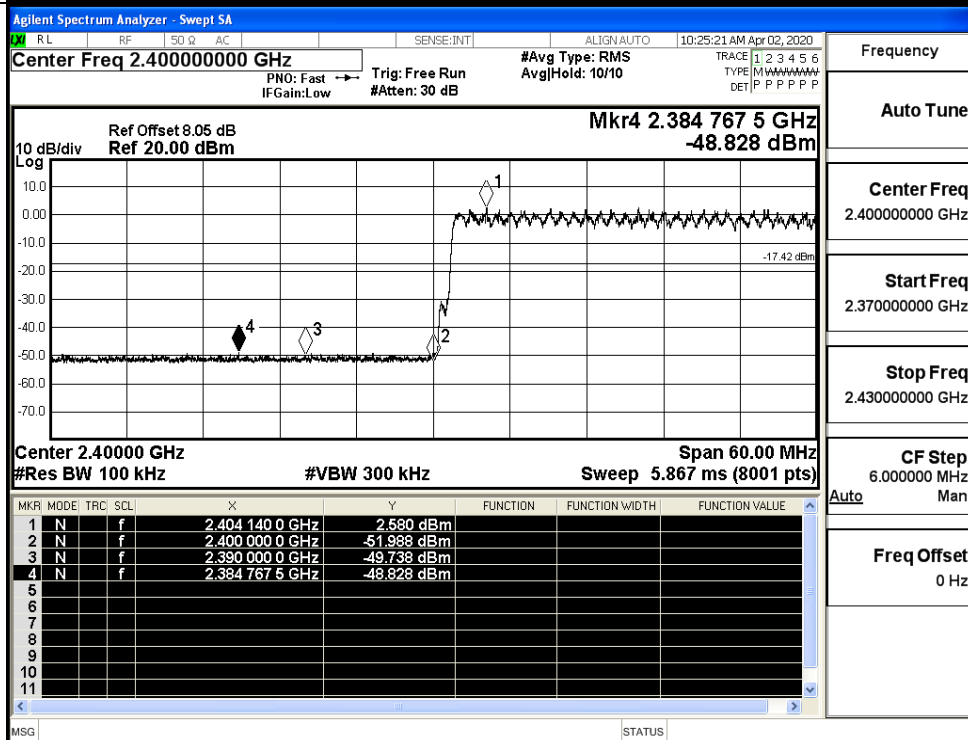
Start Freq
2.310000000 GHz

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

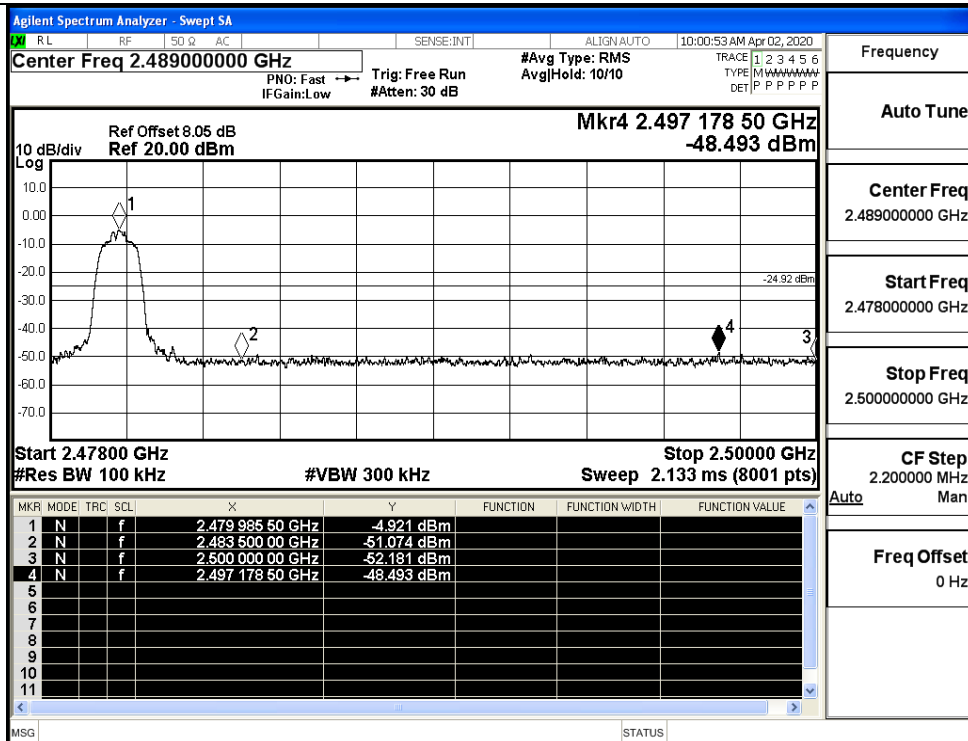
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

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

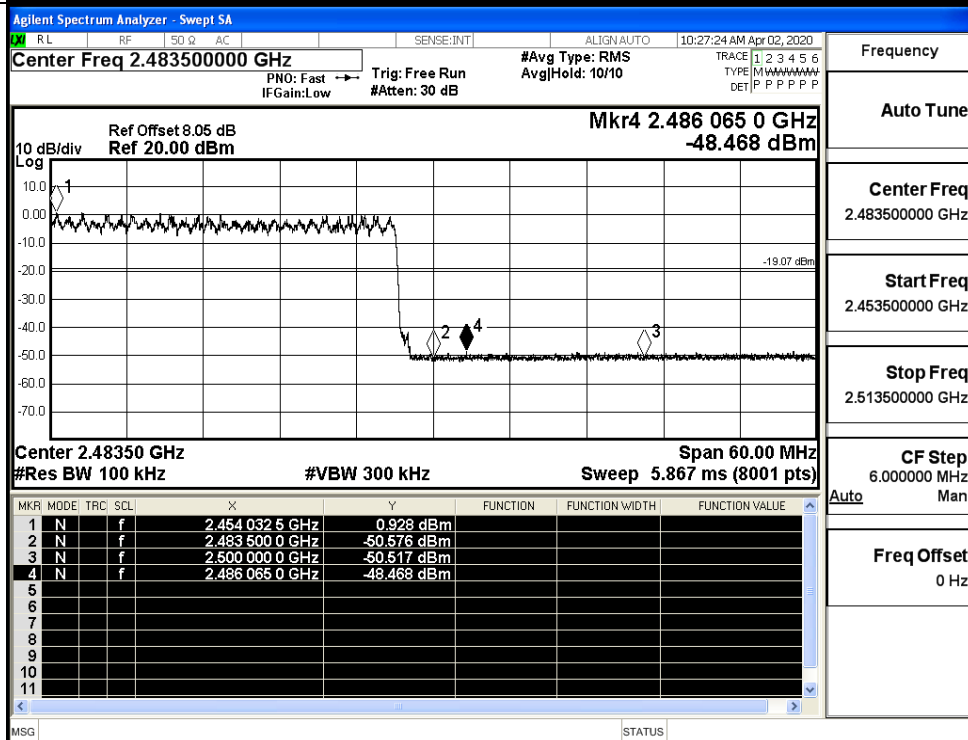


Frequency

Auto Tune

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

$\pi/4$ DQPSK/HCH/Hop

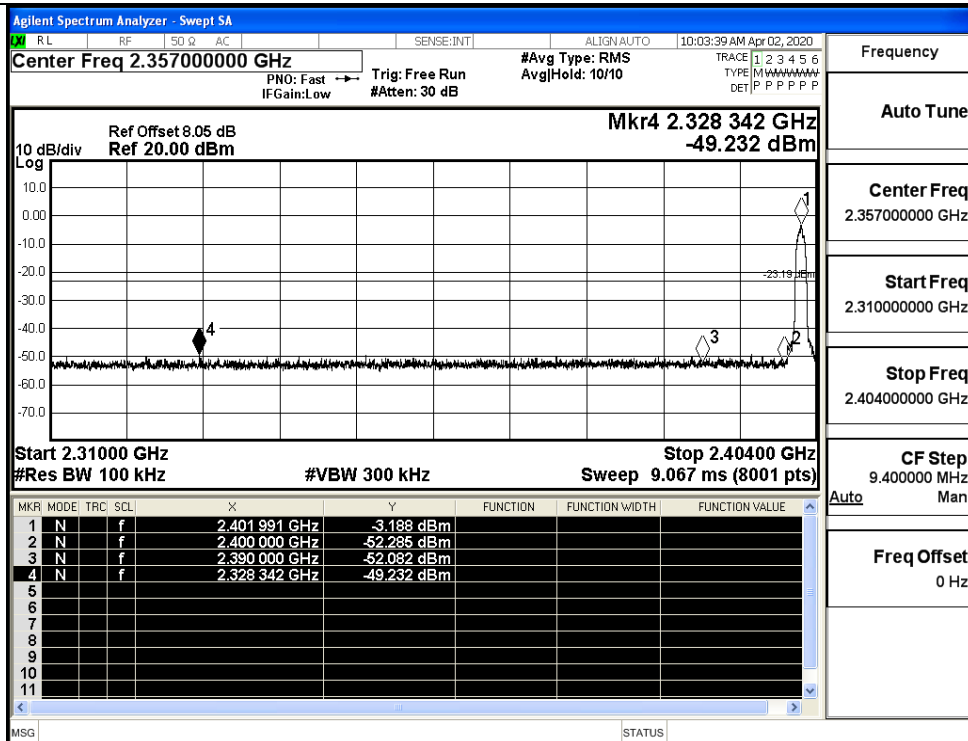


Frequency

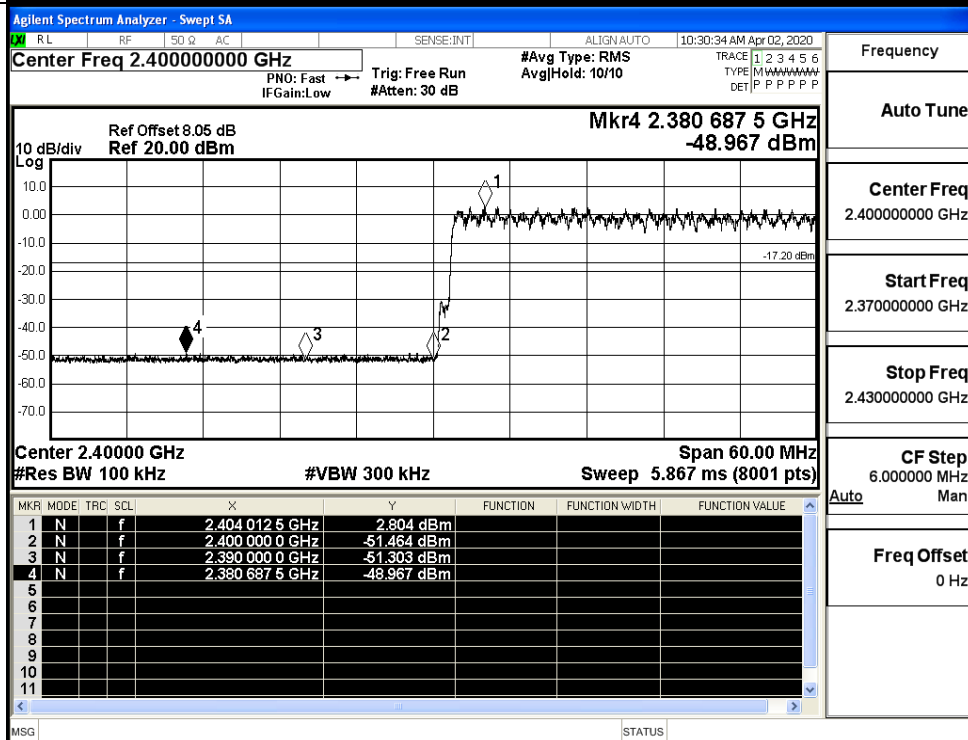
Auto Tune

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

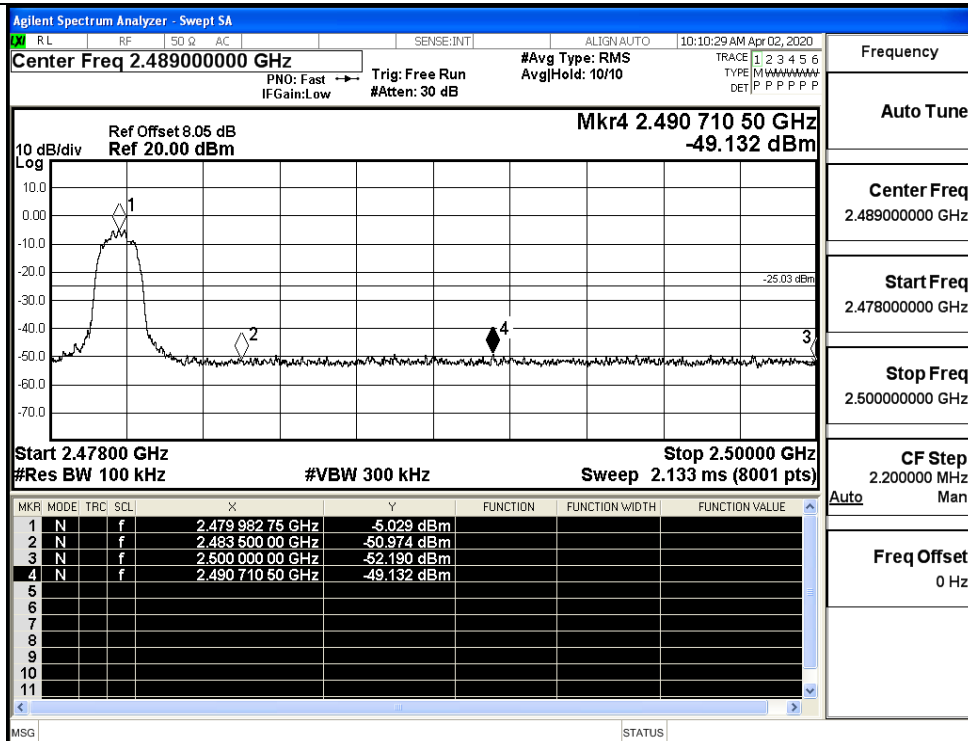
8DPSK/LCH/No Hop



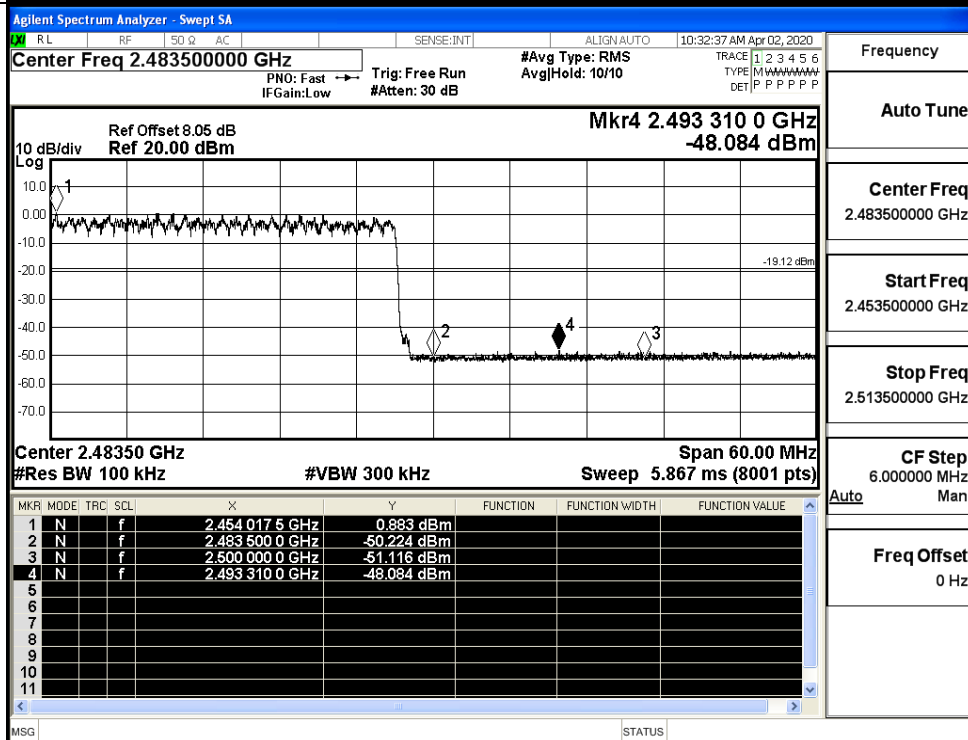
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



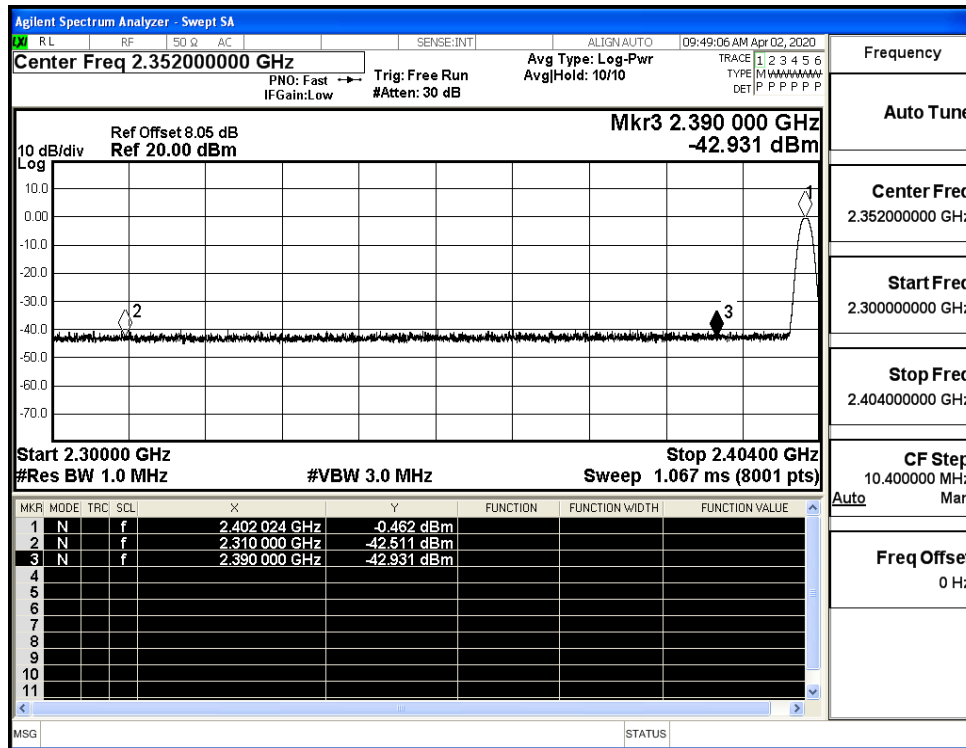
8DPSK/HCH/Hop



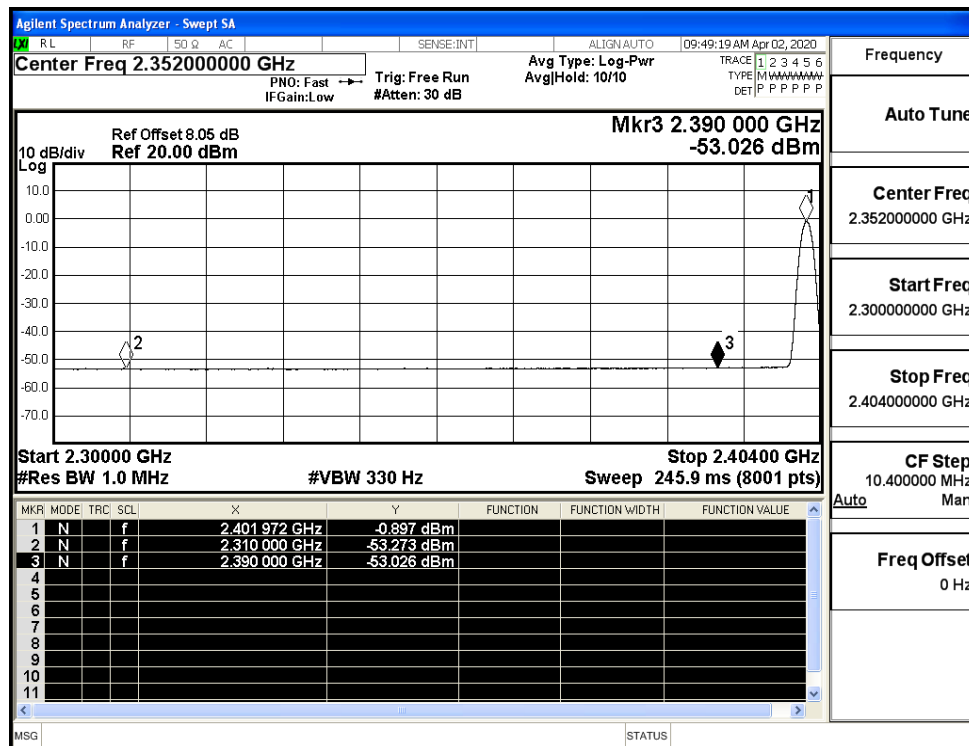
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.51	2.0	0	54.72	PEAK	74	PASS
	Off	2310.0	-53.27	2.0	0	43.96	AV	54	PASS
	Off	2390.0	-42.93	2.0	0	54.30	PEAK	74	PASS
	Off	2390.0	-53.03	2.0	0	44.20	AV	54	PASS
	Off	2483.5	-42.72	2.0	0	54.51	PEAK	74	PASS
	Off	2483.5	-52.48	2.0	0	44.75	AV	54	PASS
	Off	2500.0	-43.24	2.0	0	53.99	PEAK	74	PASS
	Off	2500.0	-52.36	2.0	0	44.87	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.69	2.0	0	53.54	PEAK	74	PASS
	Off	2310.0	-53.33	2.0	0	43.90	AV	54	PASS
	Off	2390.0	-42.37	2.0	0	54.86	PEAK	74	PASS
	Off	2390.0	-53.03	2.0	0	44.20	AV	54	PASS
	Off	2483.5	-42.39	2.0	0	54.84	PEAK	74	PASS
	Off	2483.5	-52.57	2.0	0	44.66	AV	54	PASS
	Off	2500.0	-39.62	2.0	0	57.61	PEAK	74	PASS
	Off	2500.0	-52.36	2.0	0	44.87	AV	54	PASS
8DPSK	Off	2310.0	-41.69	2.0	0	55.54	PEAK	74	PASS
	Off	2310.0	-53.32	2.0	0	43.91	AV	54	PASS
	Off	2390.0	-42.41	2.0	0	54.82	PEAK	74	PASS
	Off	2390.0	-53.01	2.0	0	44.22	AV	54	PASS
	Off	2483.5	-41.24	2.0	0	55.99	PEAK	74	PASS
	Off	2483.5	-52.50	2.0	0	44.73	AV	54	PASS
	Off	2500.0	-42.90	2.0	0	54.33	PEAK	74	PASS
	Off	2500.0	-52.36	2.0	0	44.87	AV	54	PASS

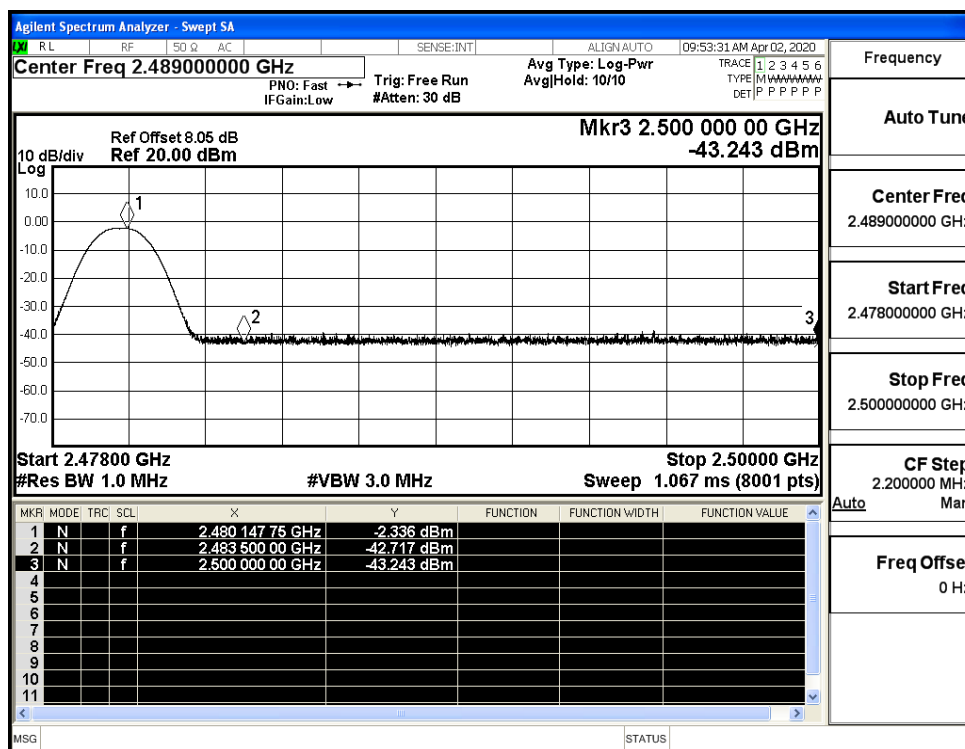
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



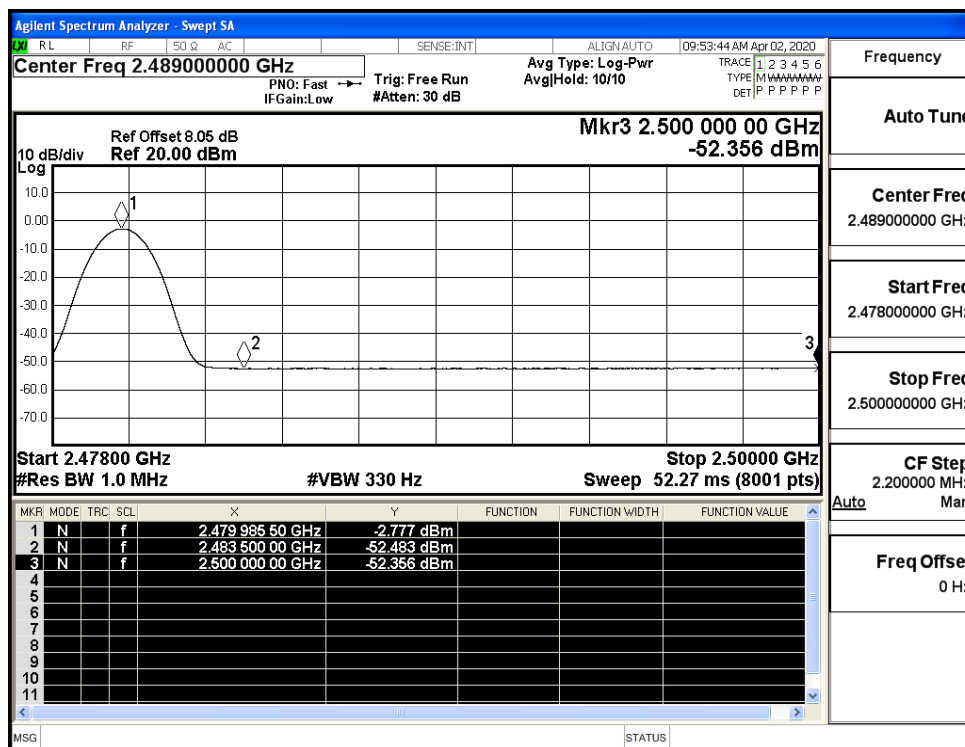
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

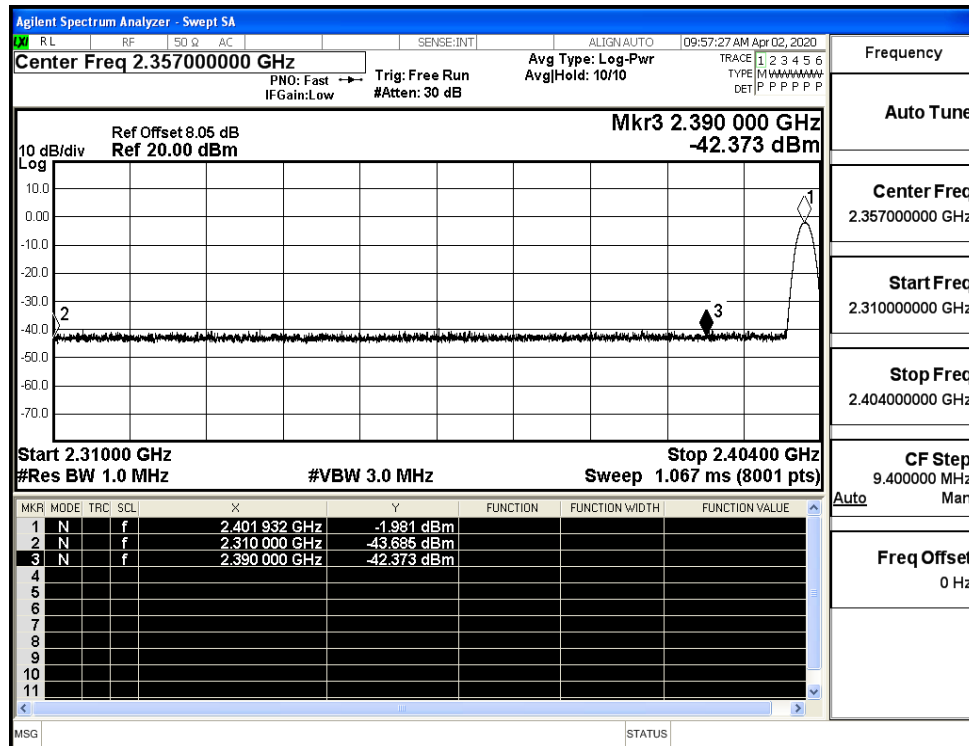
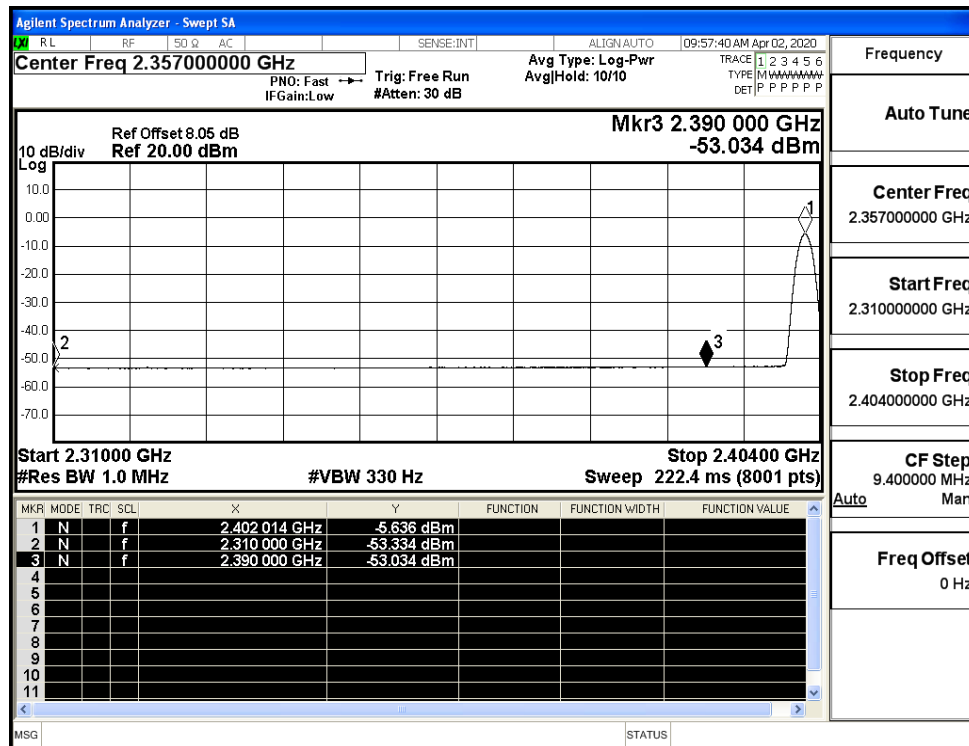


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

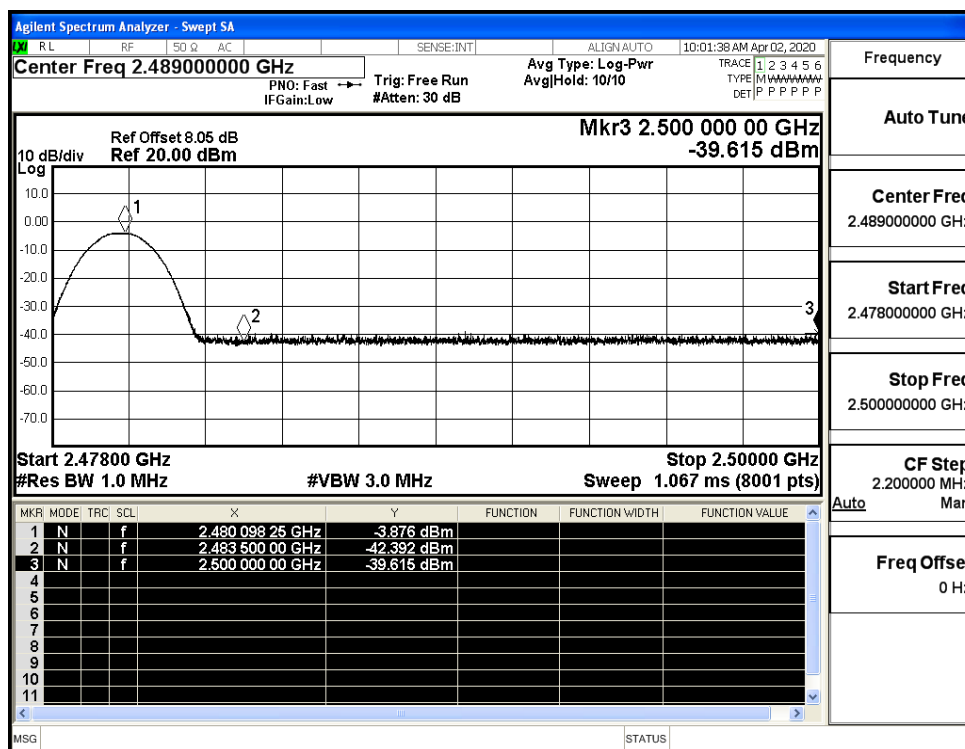


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

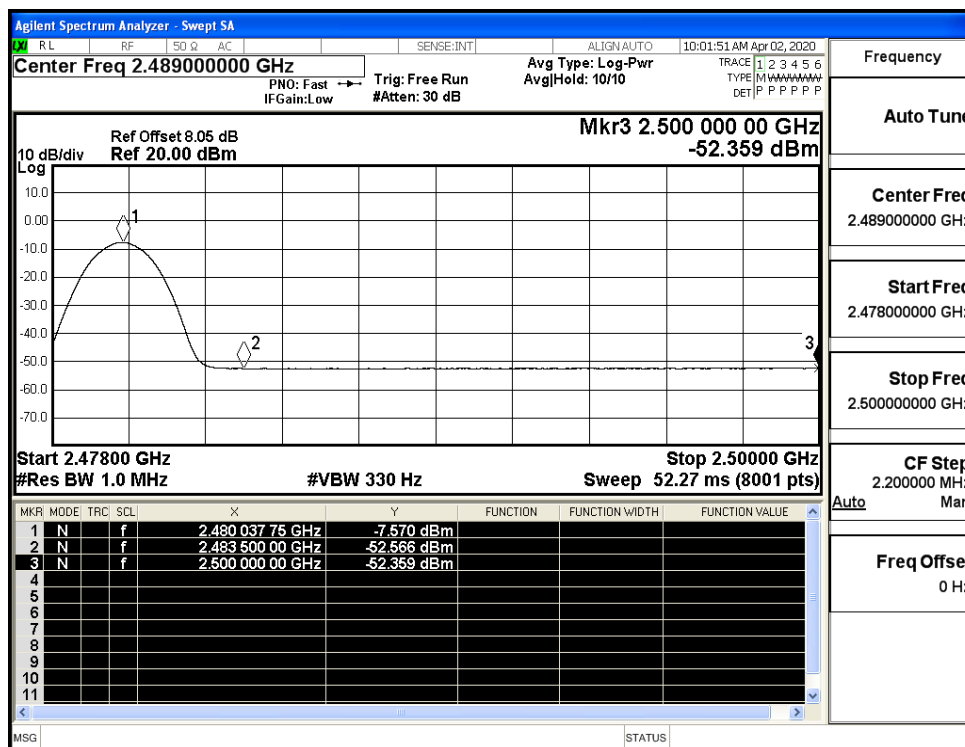


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

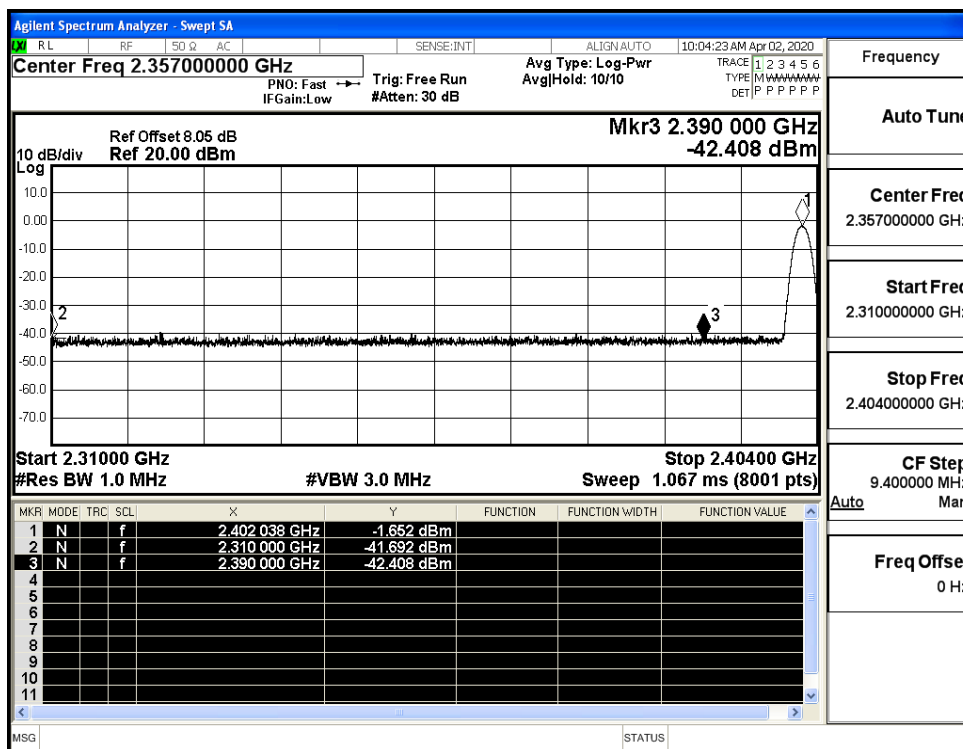
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



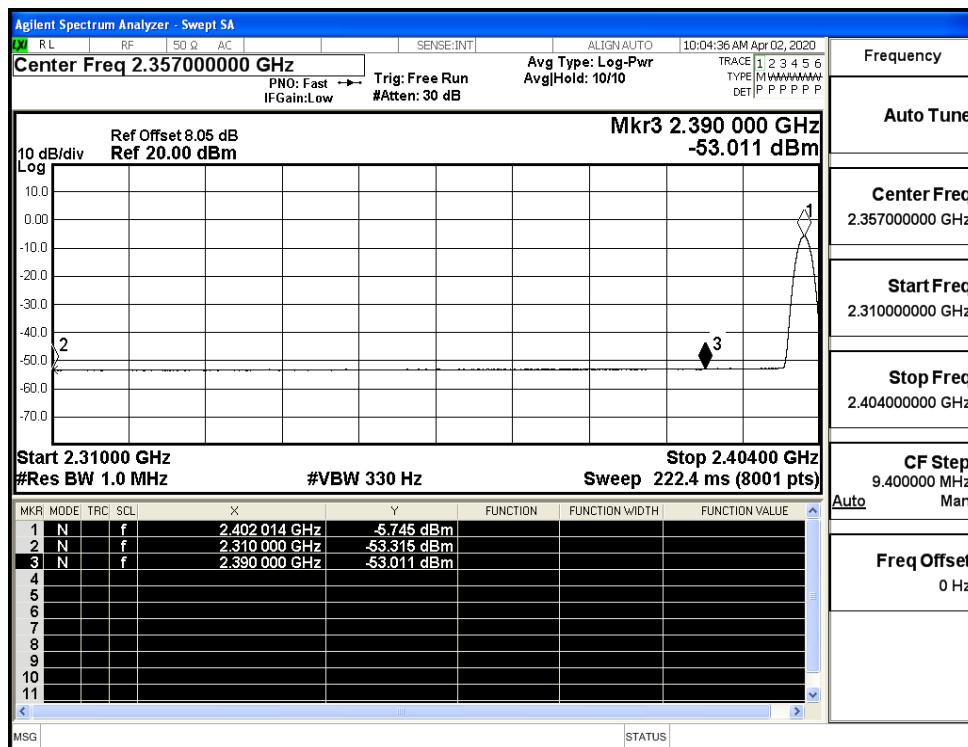
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



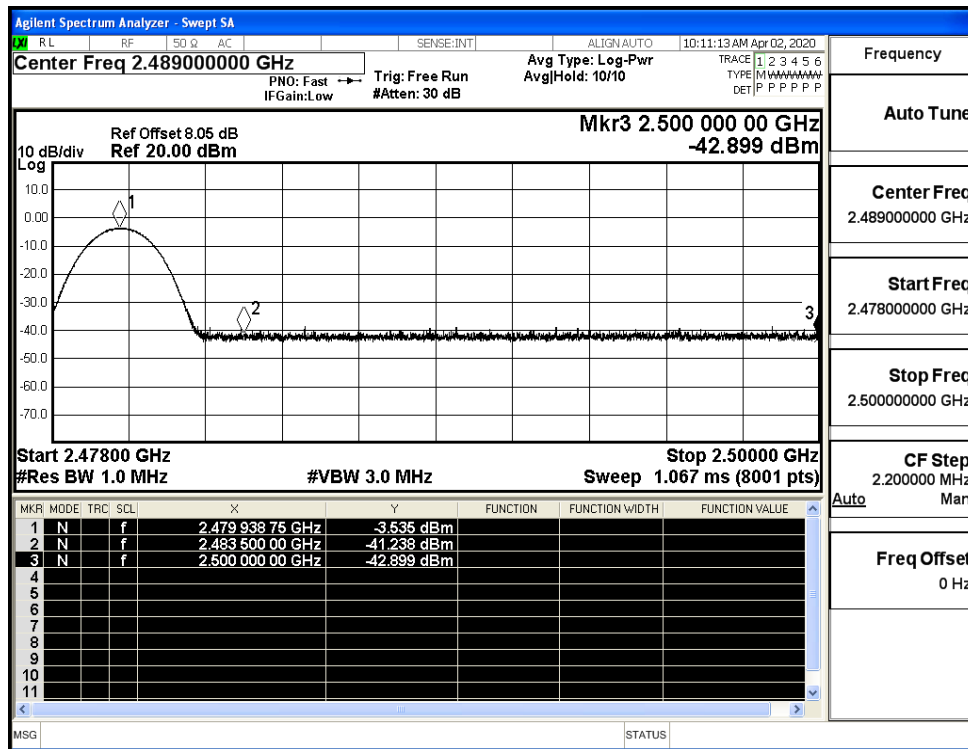
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

