

Appendix A

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

Product Name: mobile phone

Trade Mark: Purism

Test Model: Librem 5

Environmental Conditions

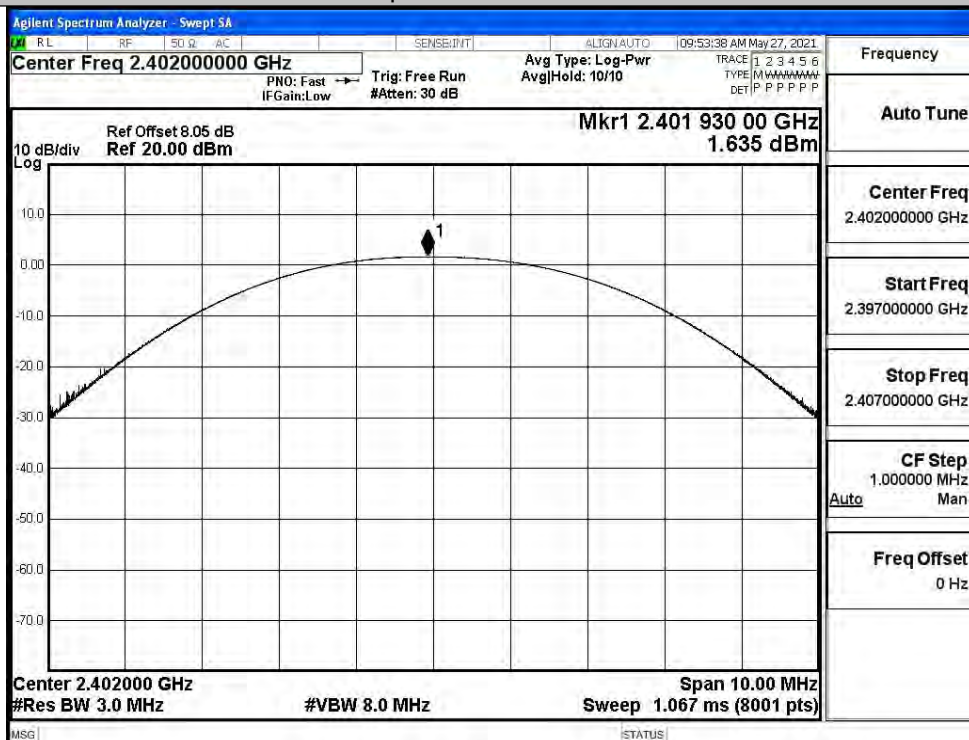
Temperature:	24.6 ° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Ken He
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

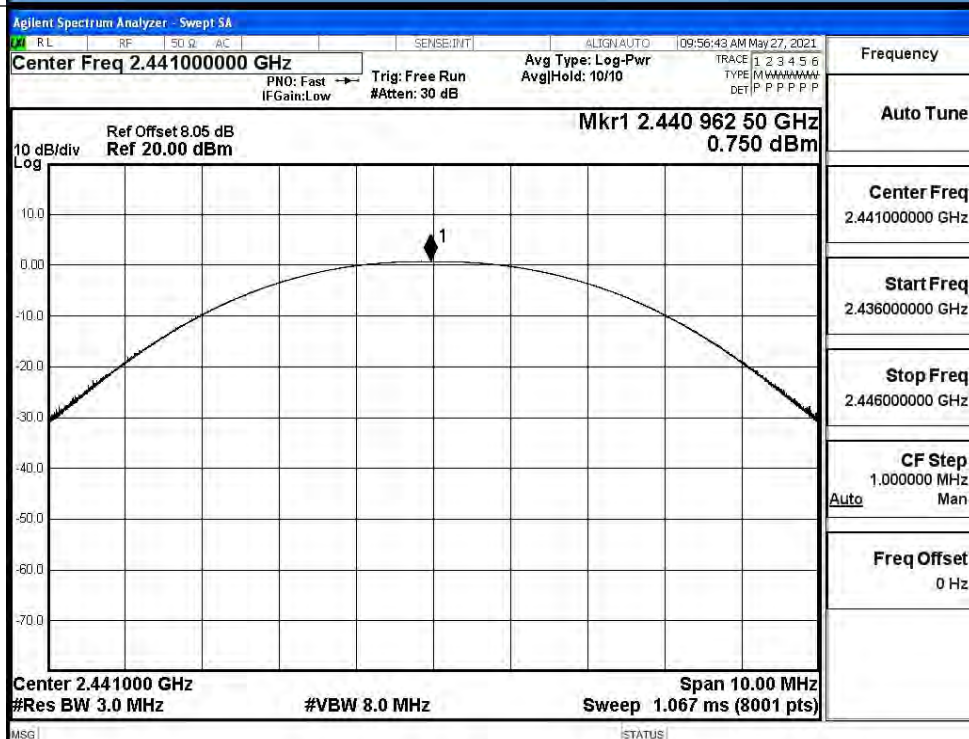
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.635	21	PASS
	MCH	0.750	21	PASS
	HCH	-0.419	21	PASS
$\pi/4$ DQPSK	LCH	3.920	21	PASS
	MCH	3.058	21	PASS
	HCH	1.845	21	PASS
8DPSK	LCH	4.452	21	PASS
	MCH	3.572	21	PASS
	HCH	2.400	21	PASS

Test Graphs

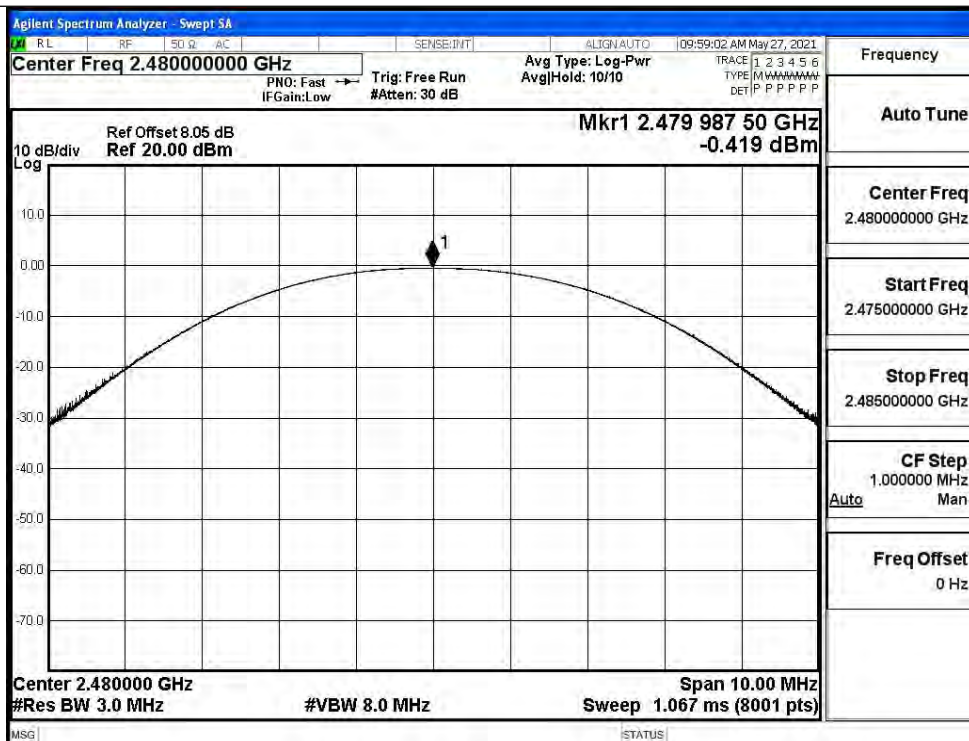
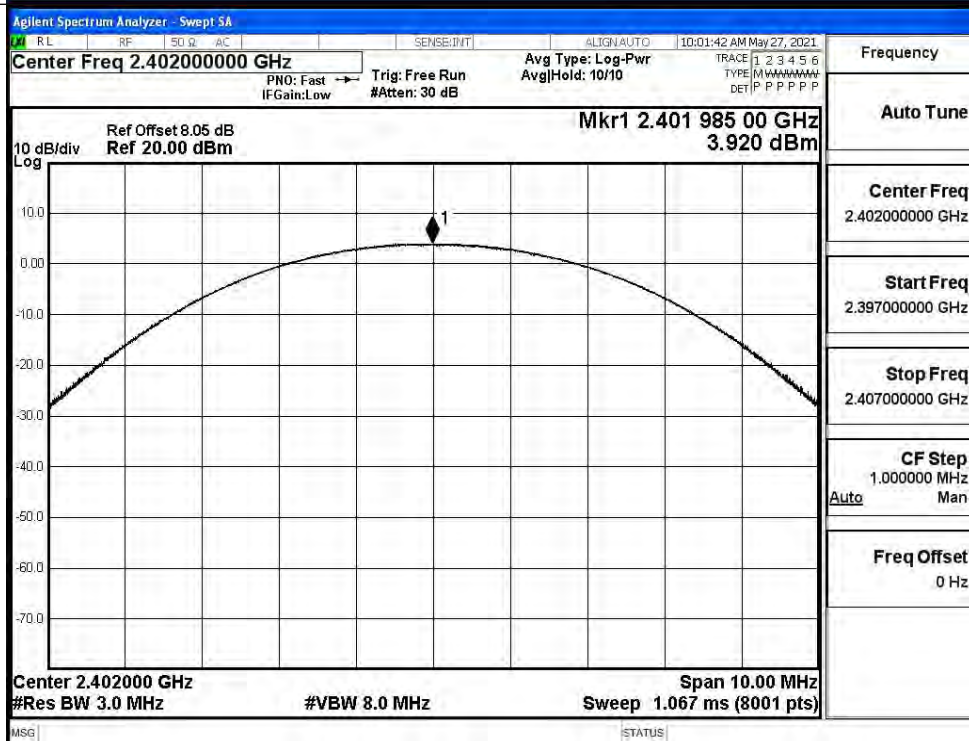
GFSK/LCH

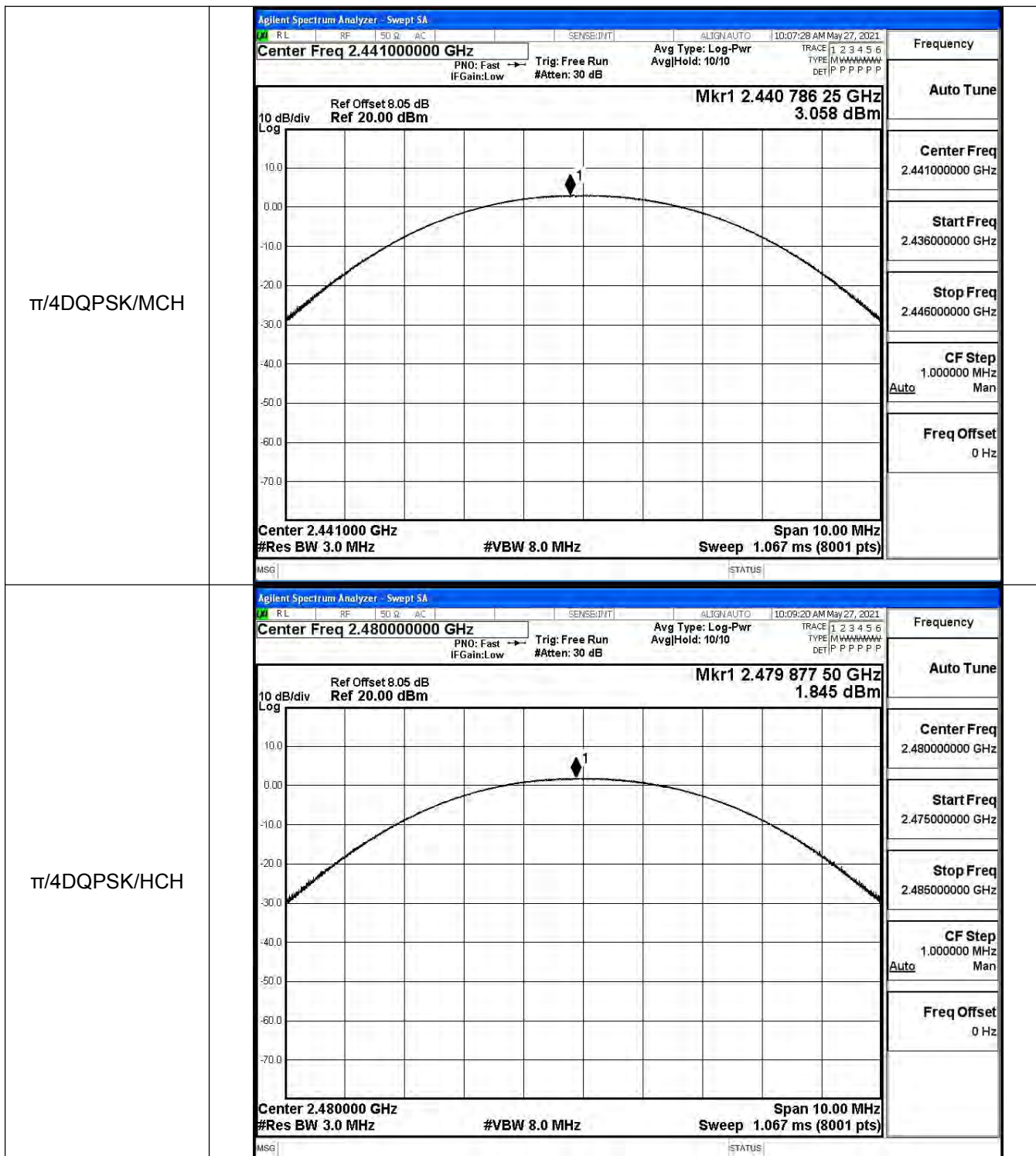


GFSK/MCH

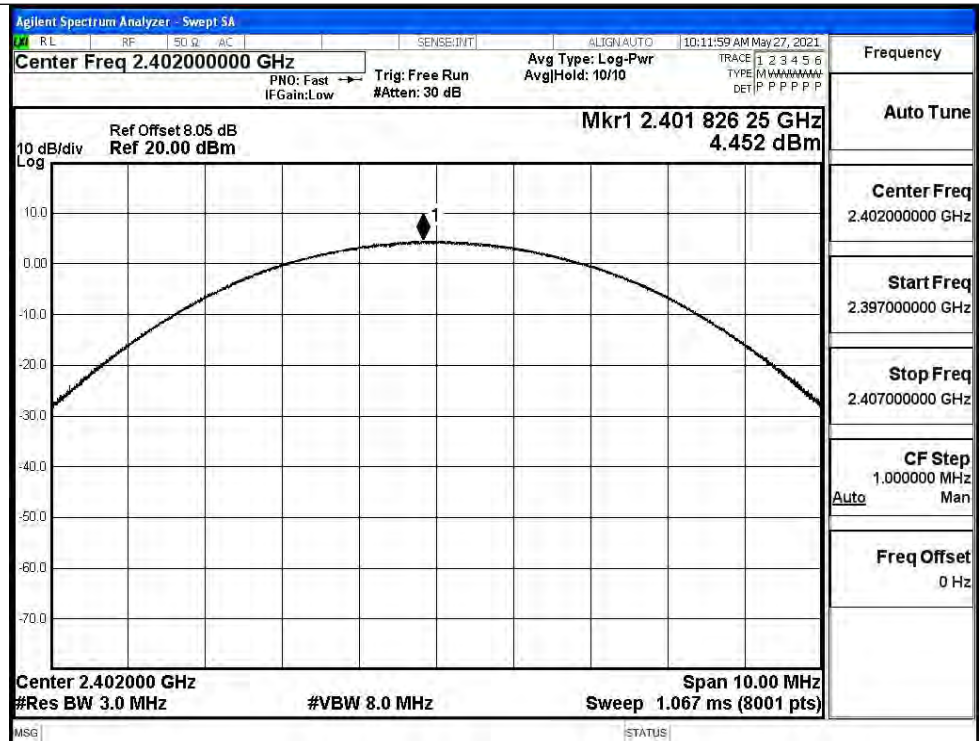


GFSK/HCH

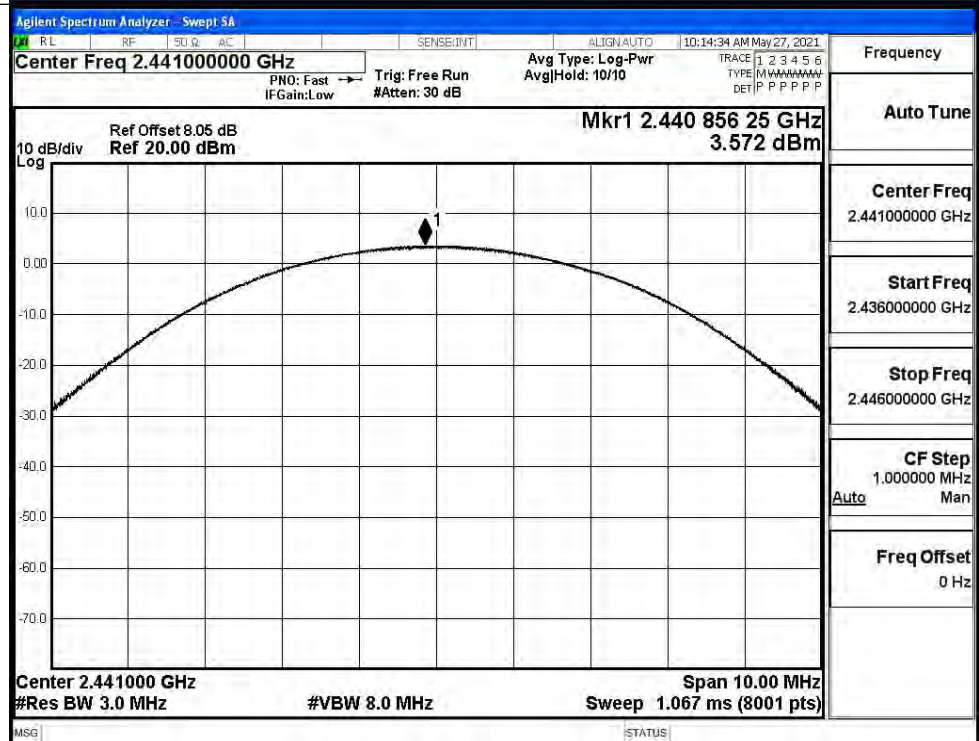
 $\pi/4$ DQPSK/LCH



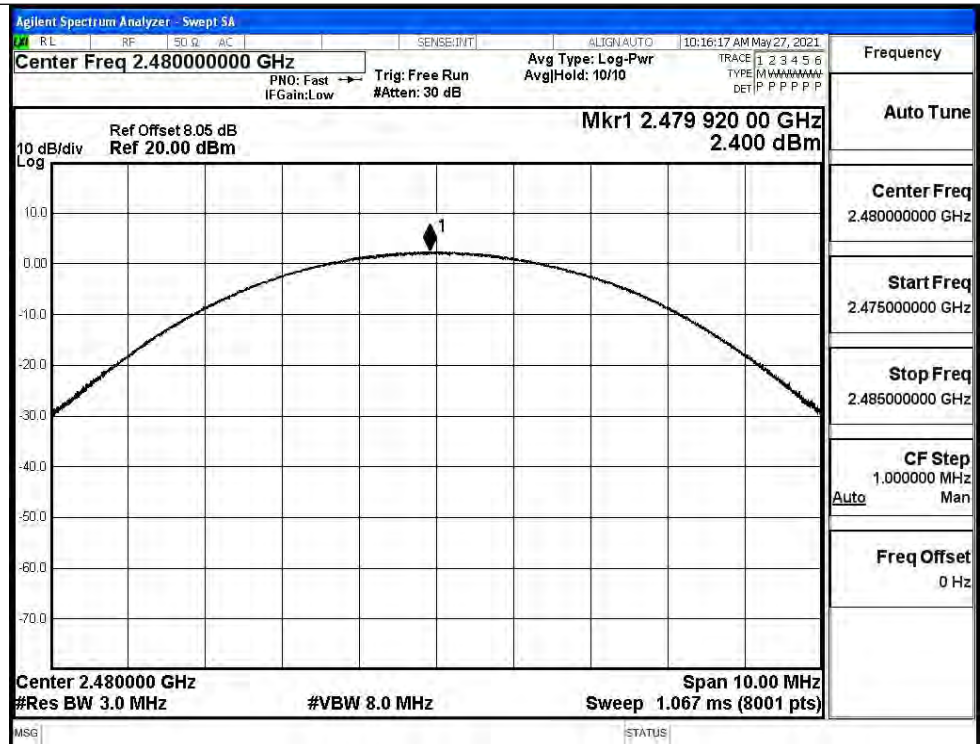
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

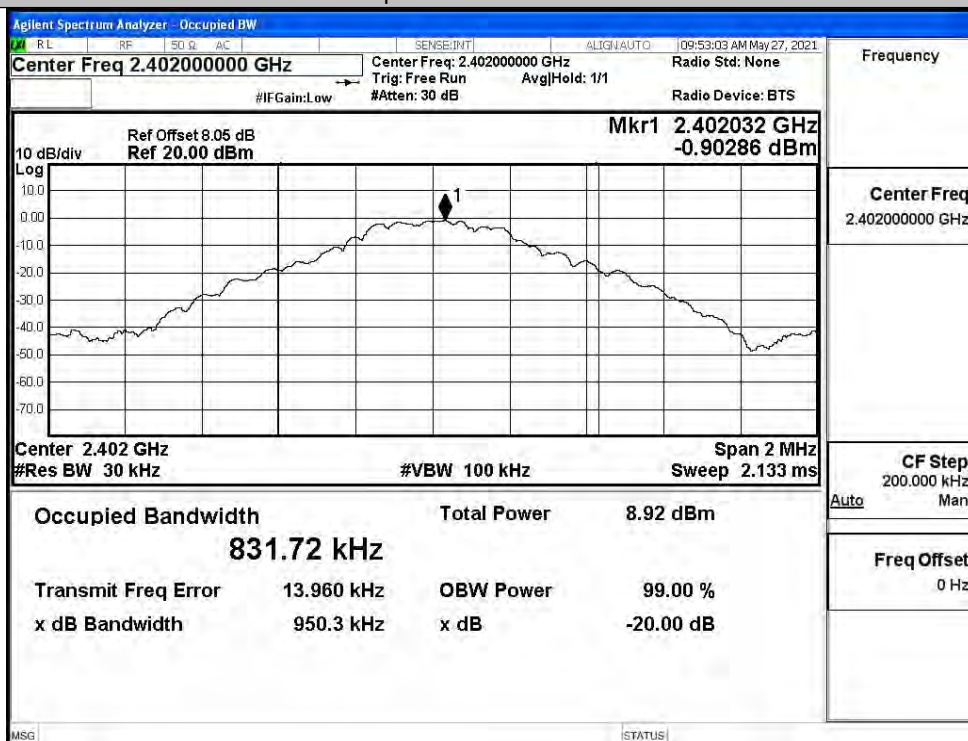


A.2 20dB Bandwidth

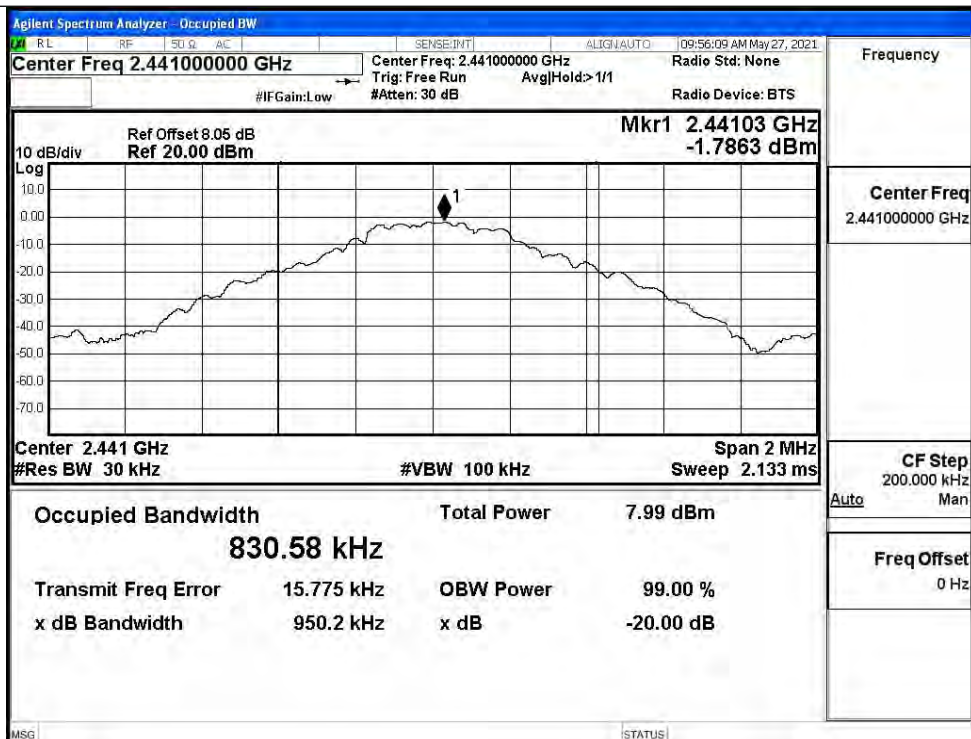
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9503	Not Specified	PASS
	MCH	0.9502	Not Specified	PASS
	HCH	0.9528	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.331	Not Specified	PASS
	MCH	1.331	Not Specified	PASS
	HCH	1.332	Not Specified	PASS
8DPSK	LCH	1.310	Not Specified	PASS
	MCH	1.309	Not Specified	PASS
	HCH	1.310	Not Specified	PASS

Test Graphs

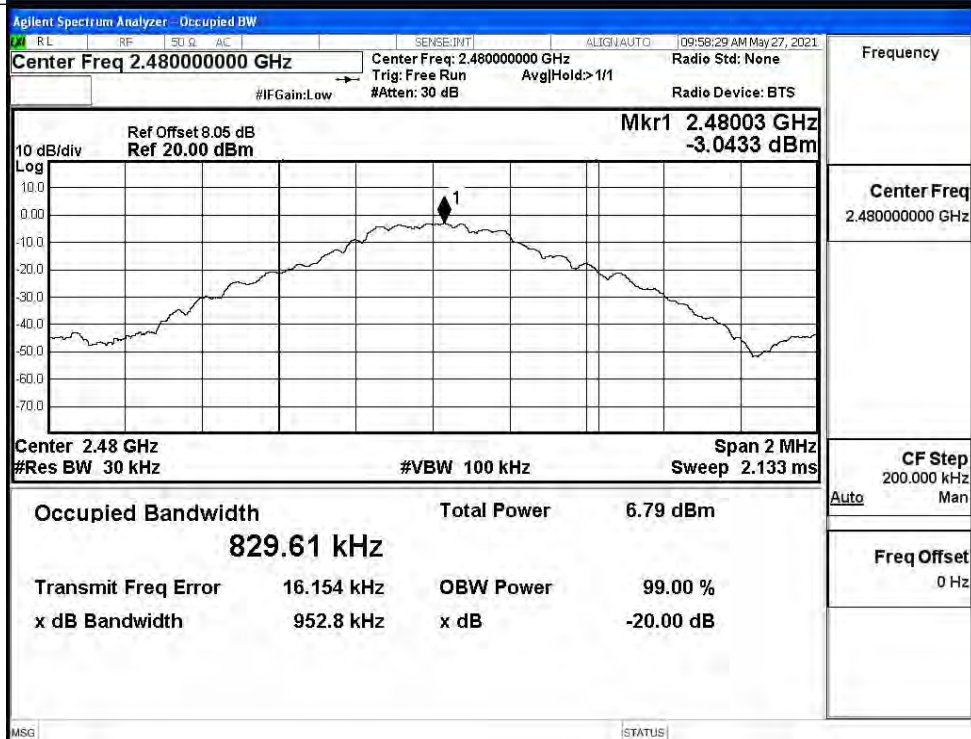
GFSK/LCH

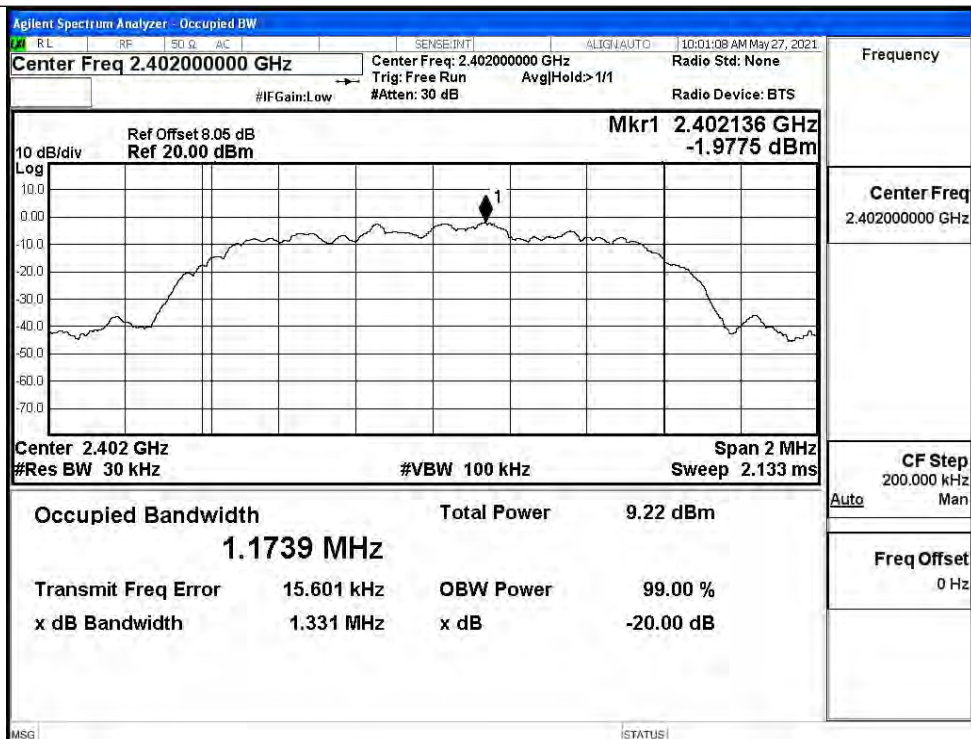
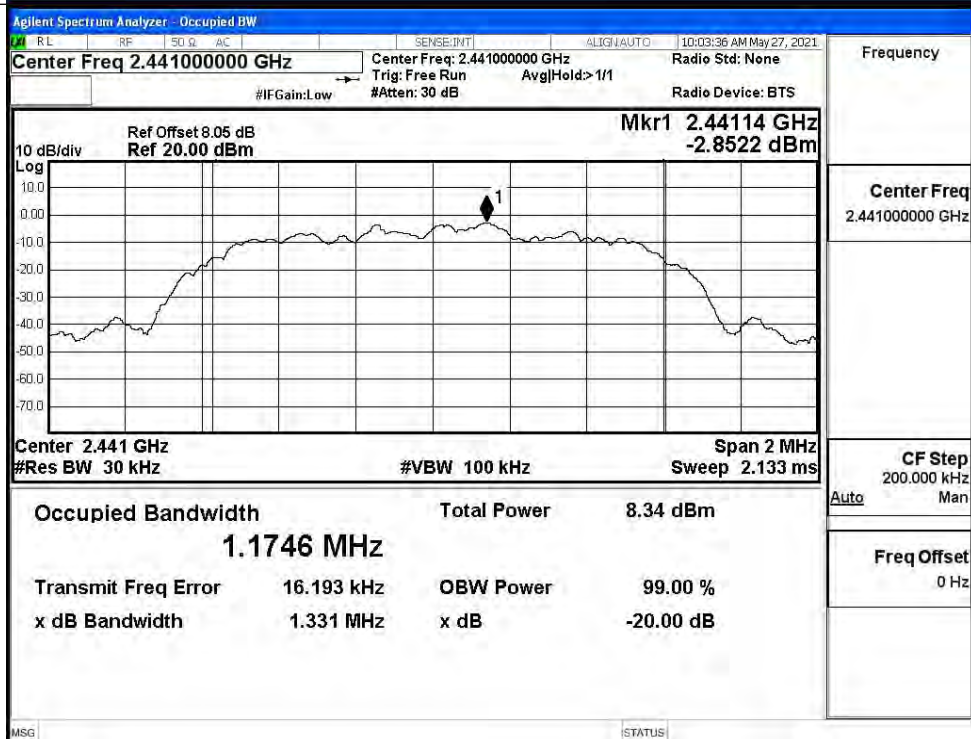


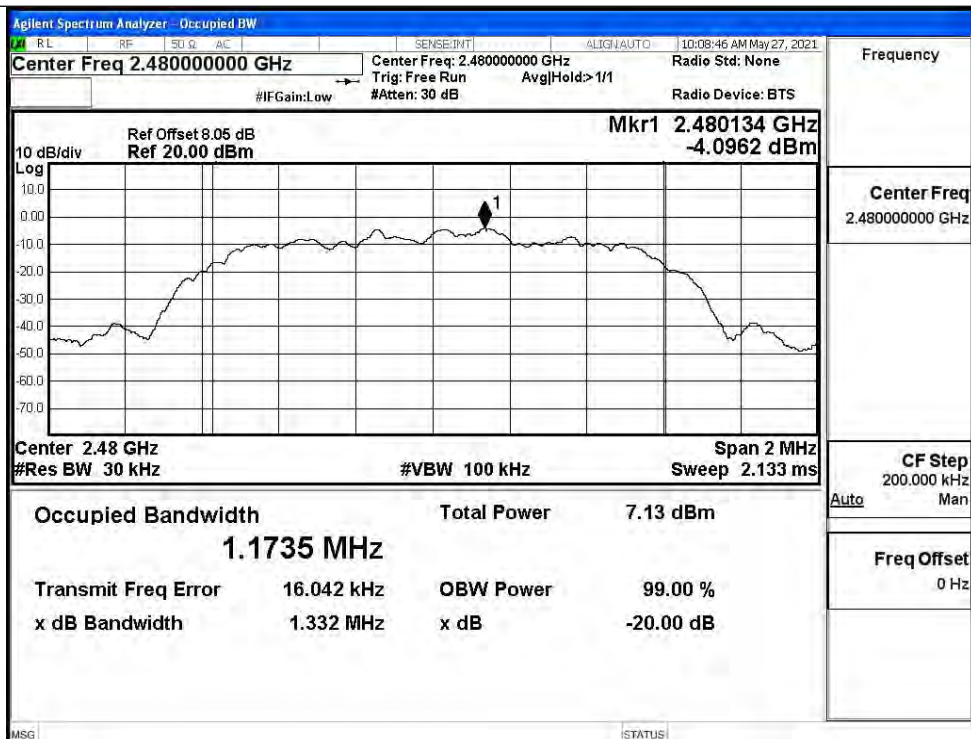
GFSK/MCH



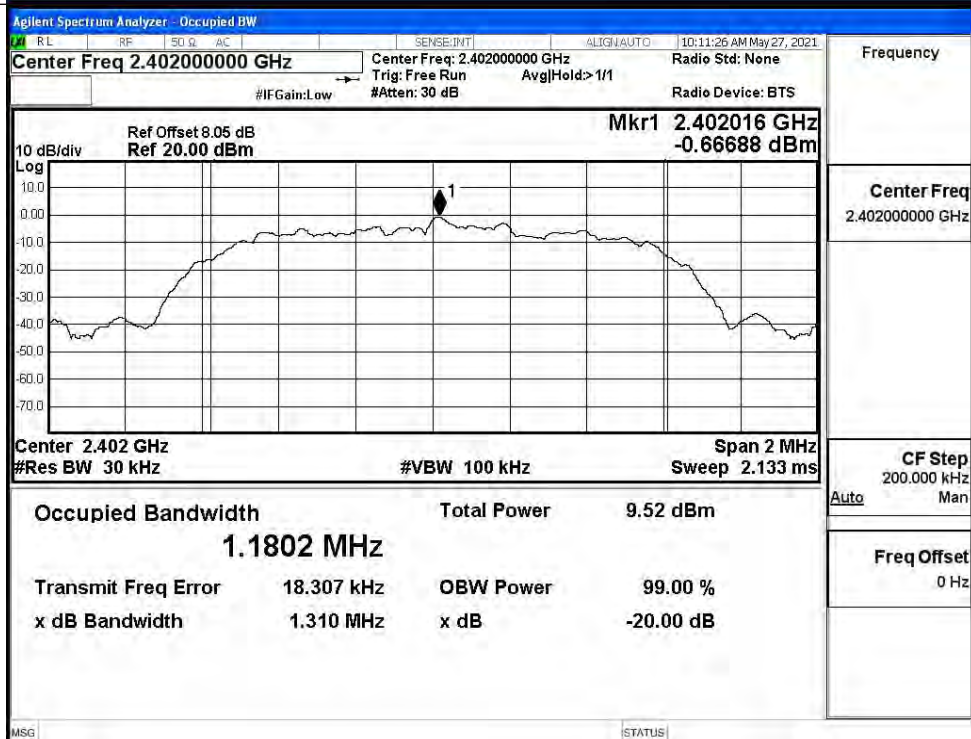
GFSK/HCH



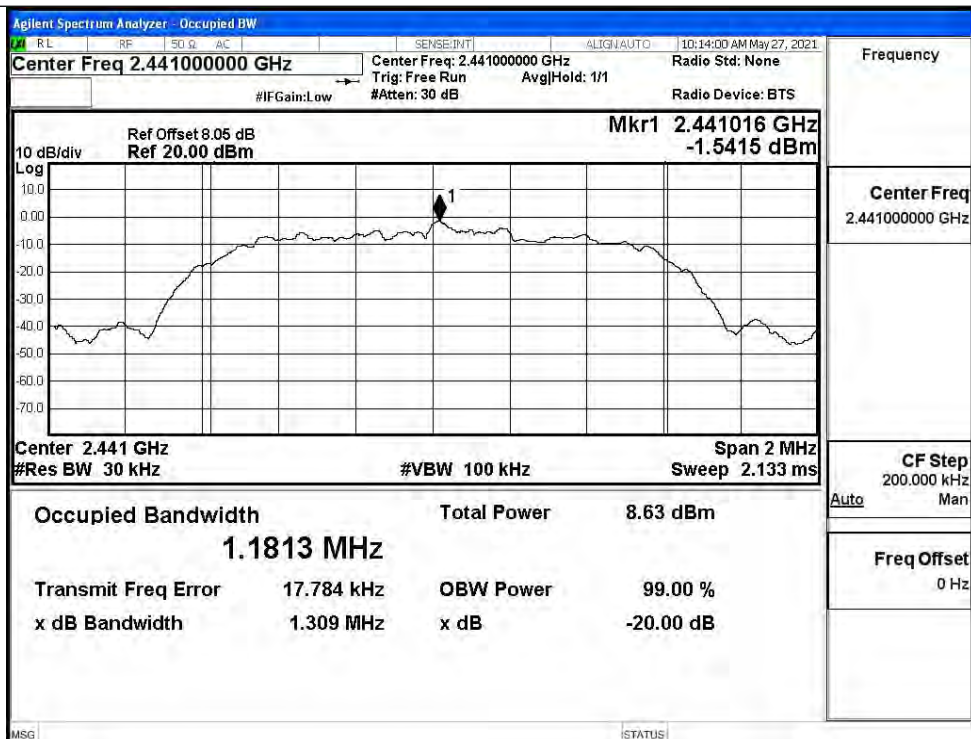
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

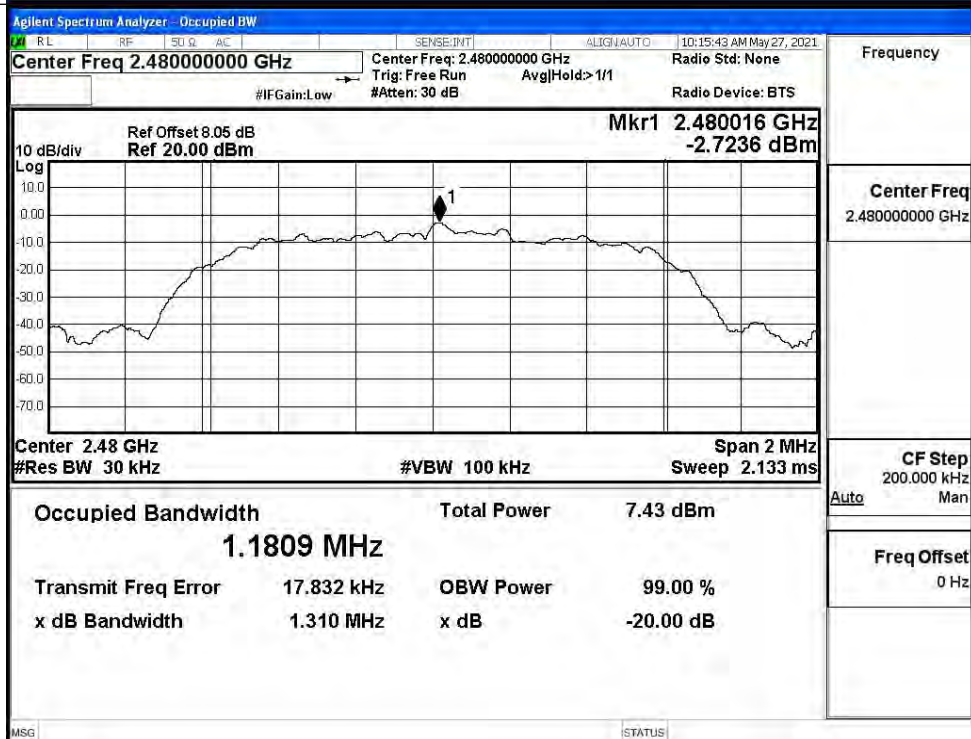
8DPSK/LCH



8DPSK/MCH



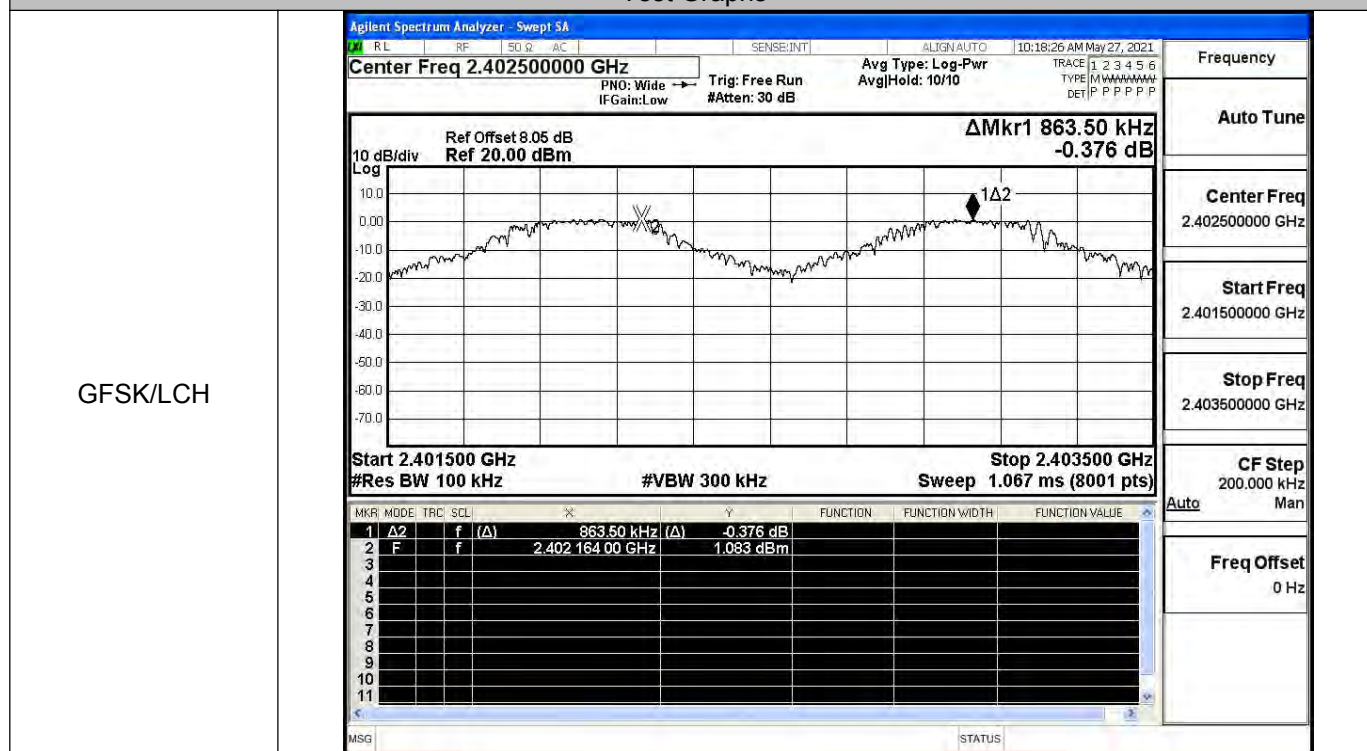
8DPSK/HCH



A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.863	0.634	PASS
	MCH	0.994	0.634	PASS
	HCH	1.180	0.635	PASS
$\pi/4$ DQPSK	LCH	1.216	0.887	PASS
	MCH	1.112	0.887	PASS
	HCH	1.056	0.888	PASS
8DPSK	LCH	0.948	0.873	PASS
	MCH	1.014	0.873	PASS
	HCH	1.014	0.873	PASS

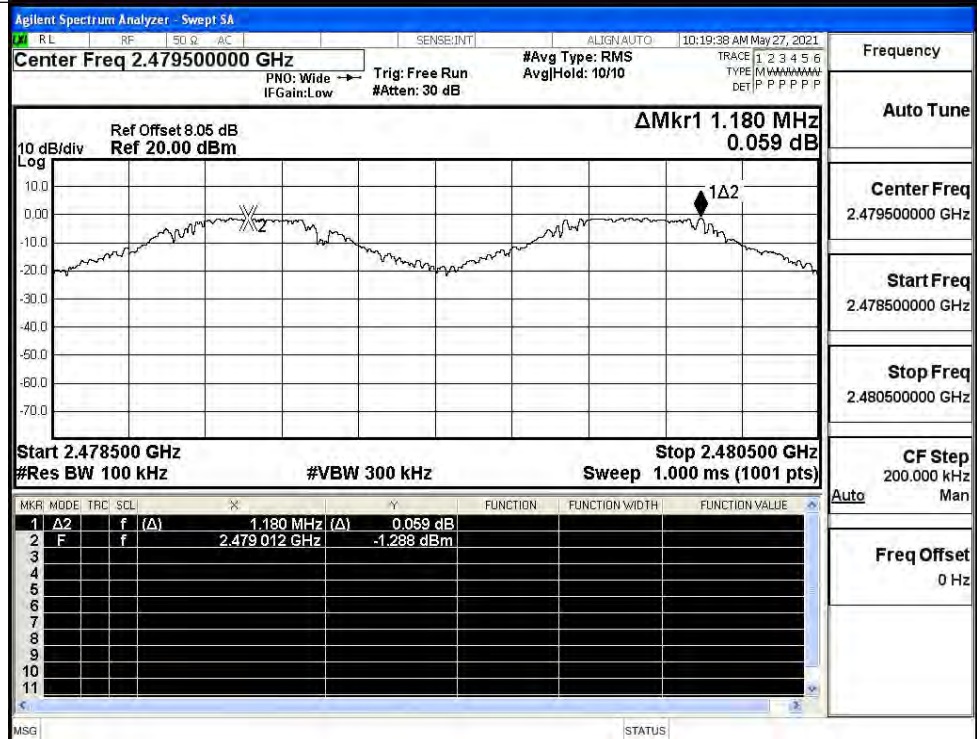
Test Graphs

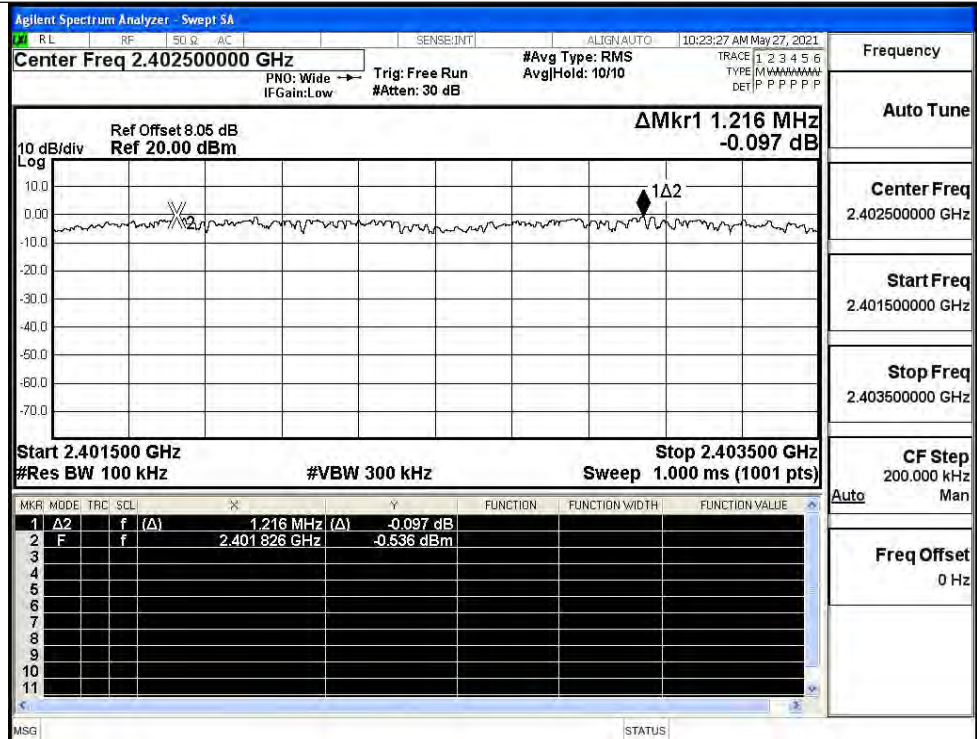
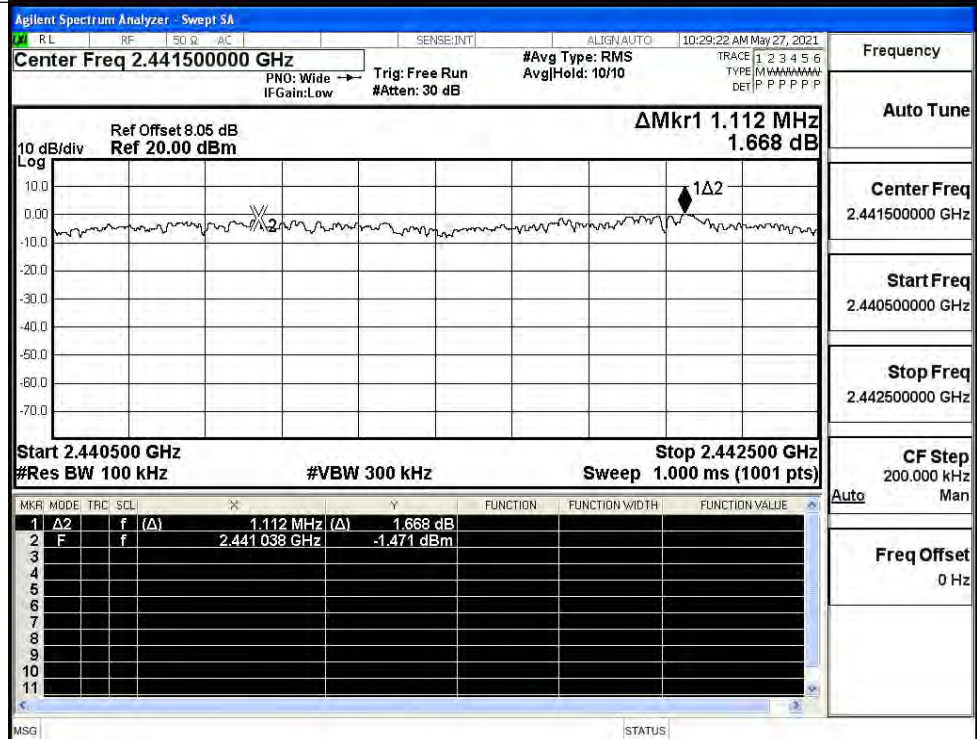


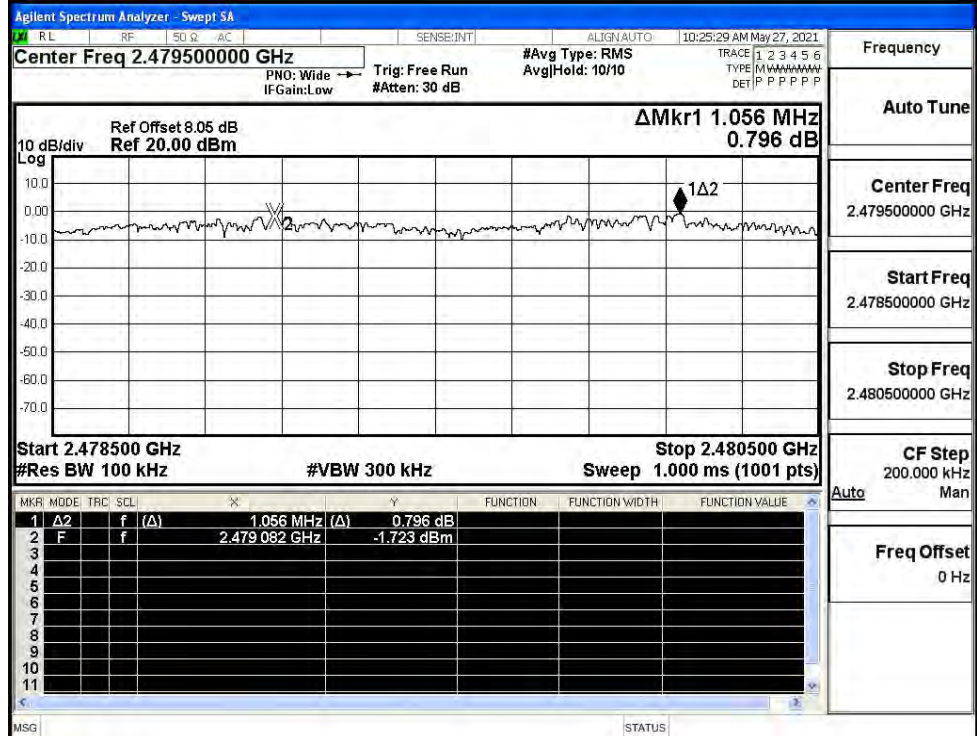
GFSK/MCH



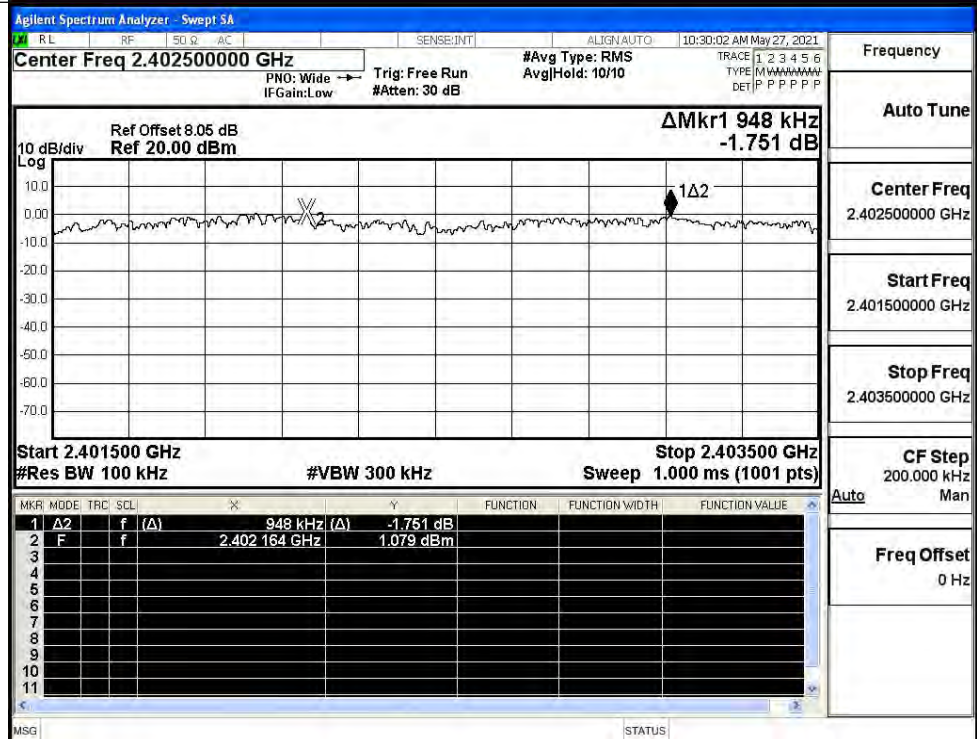
GFSK/HCH

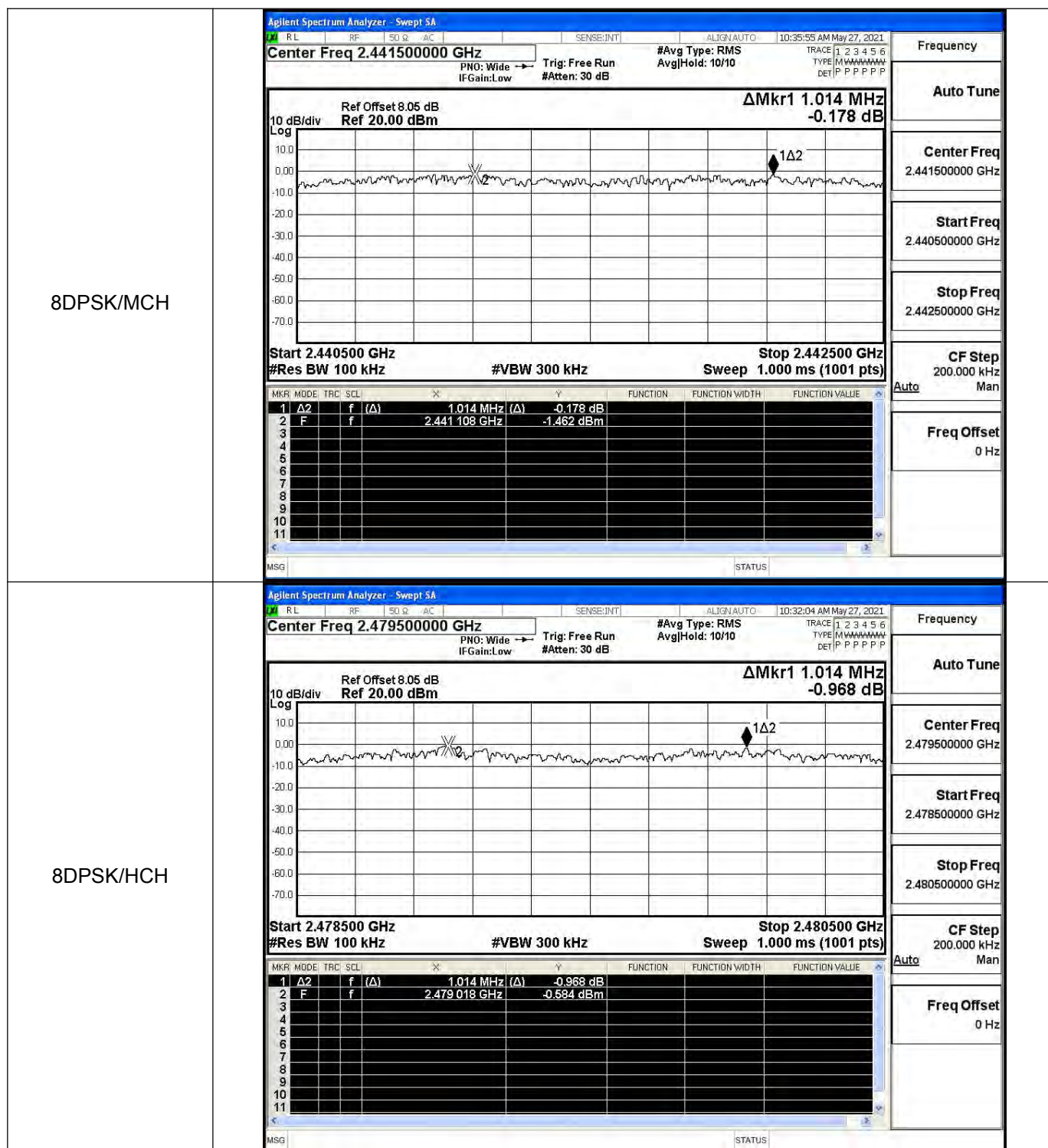


$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

8DPSK/LCH



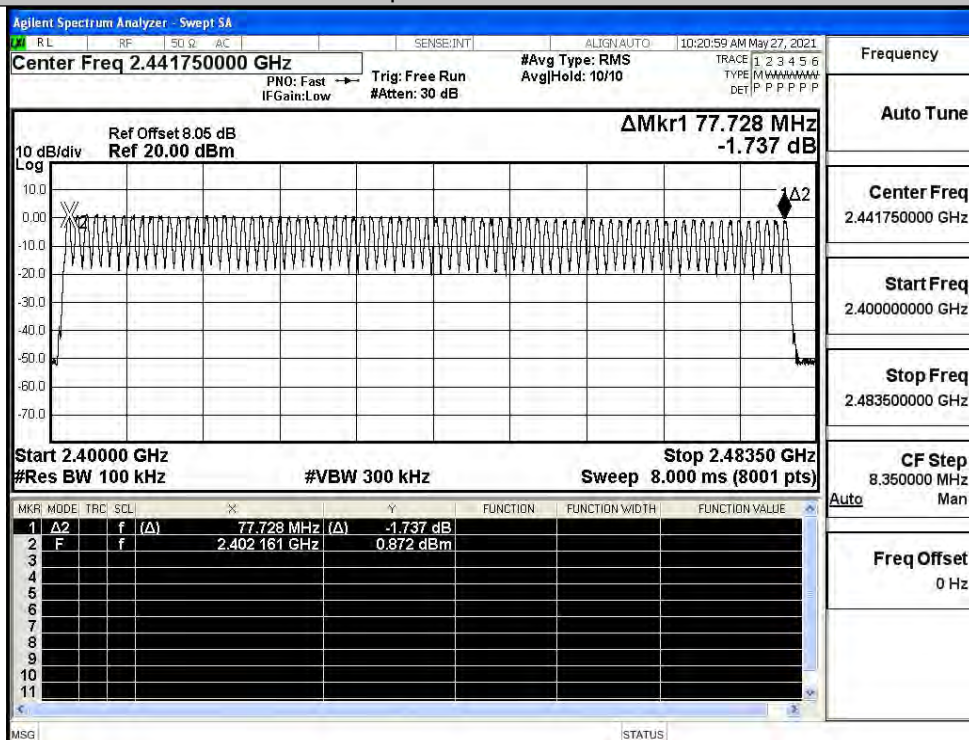


A.4 Hopping Channel Number

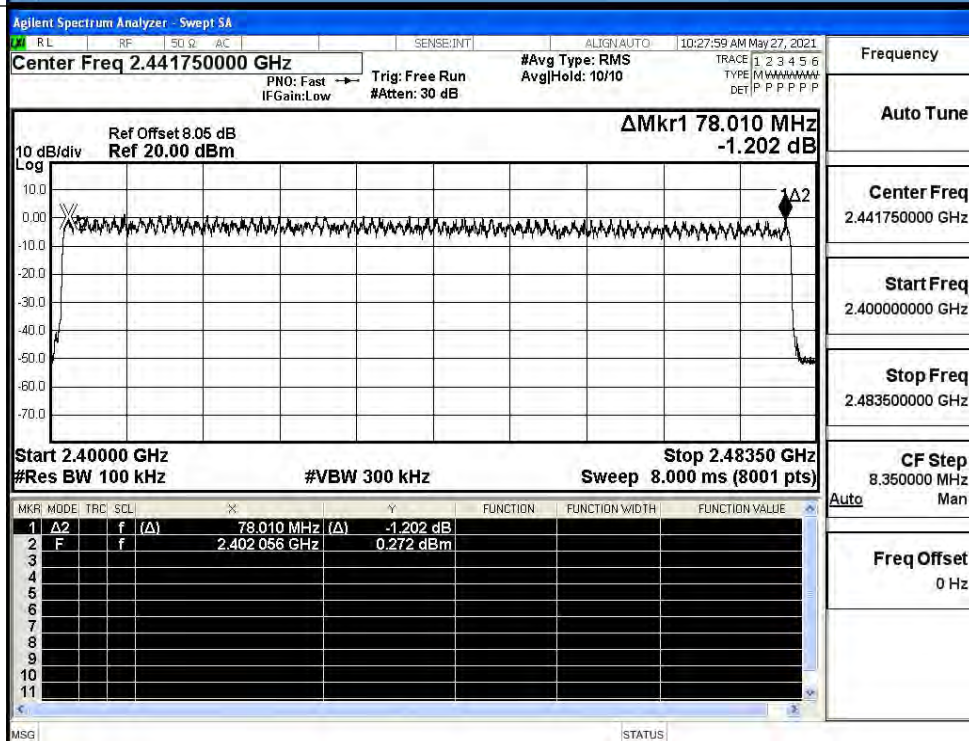
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

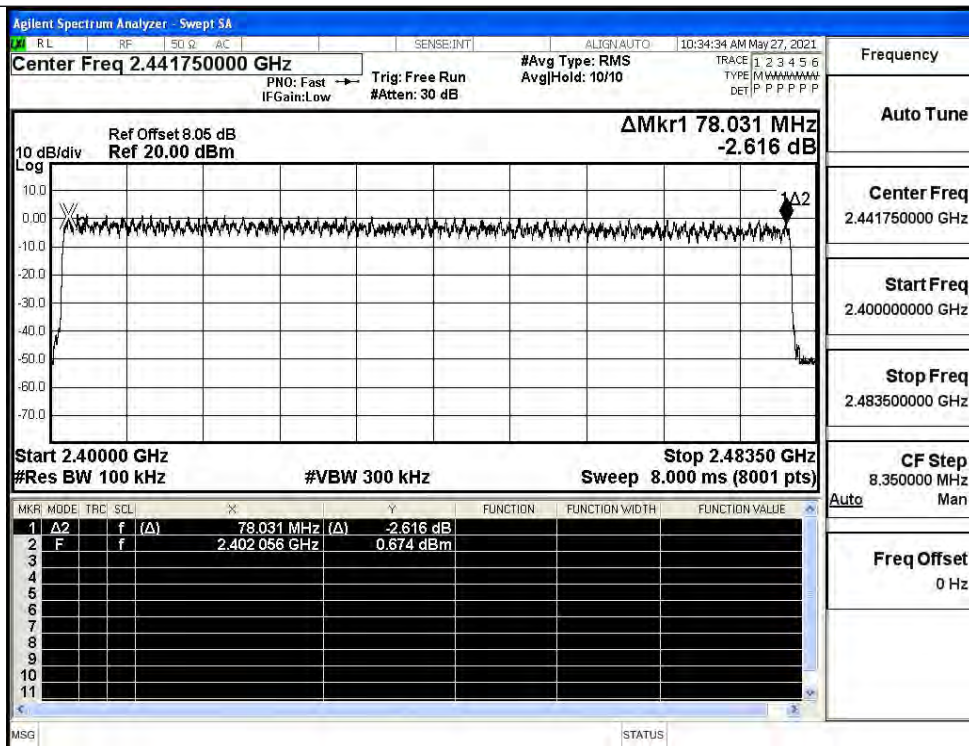
GFSK/Hop



π/4DQPSK/Hop



8DPSK/Hop

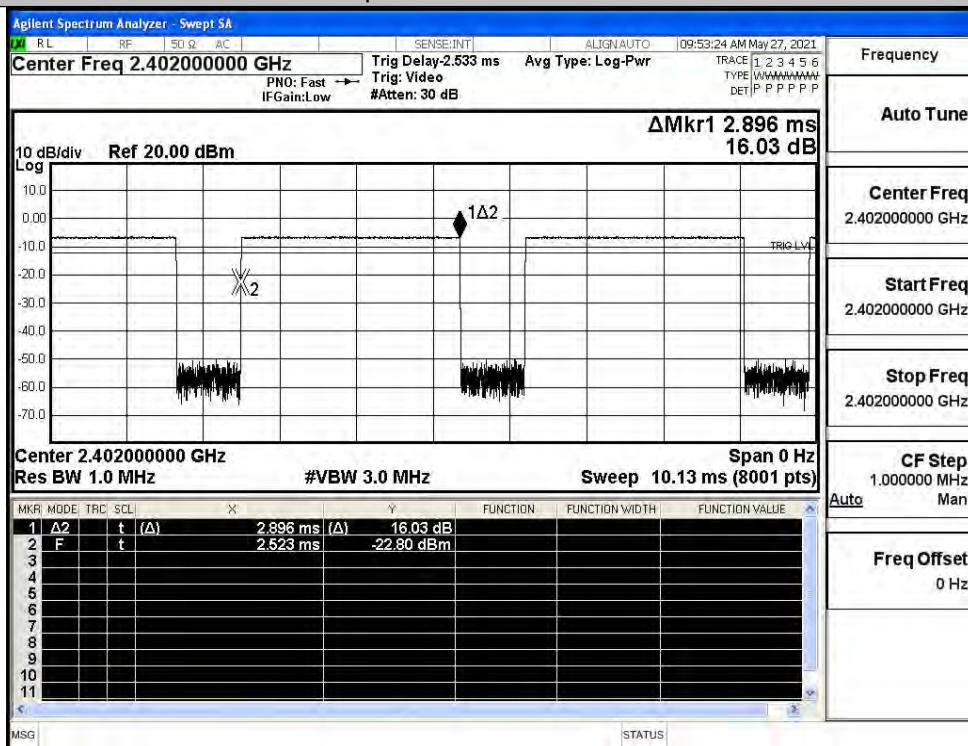


A.5 Dwell Time

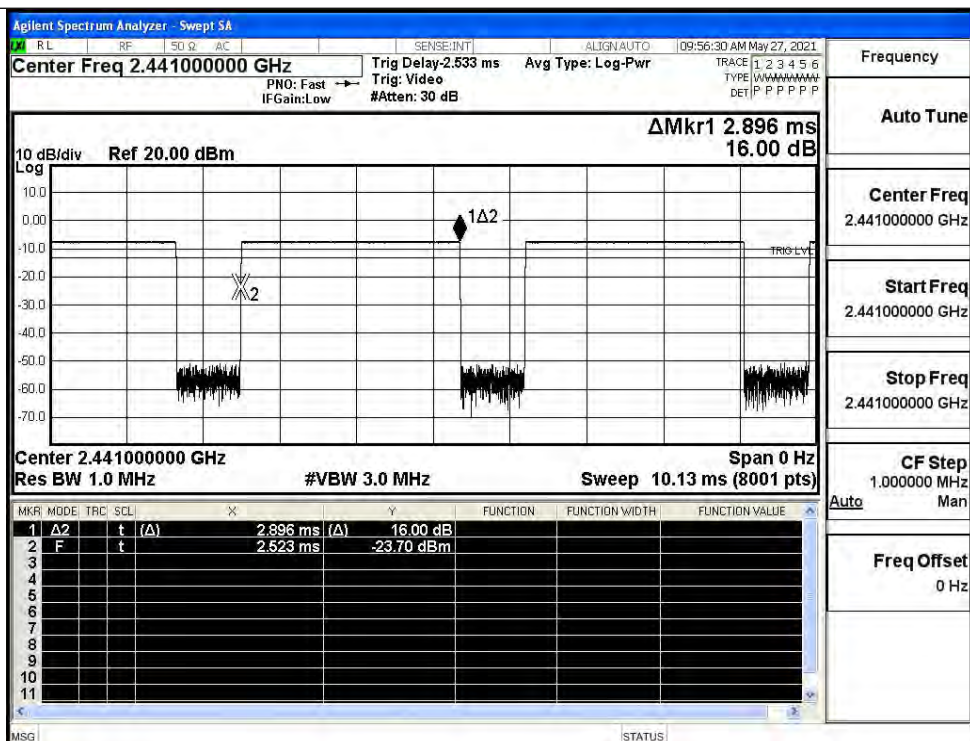
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7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

Test Graphs

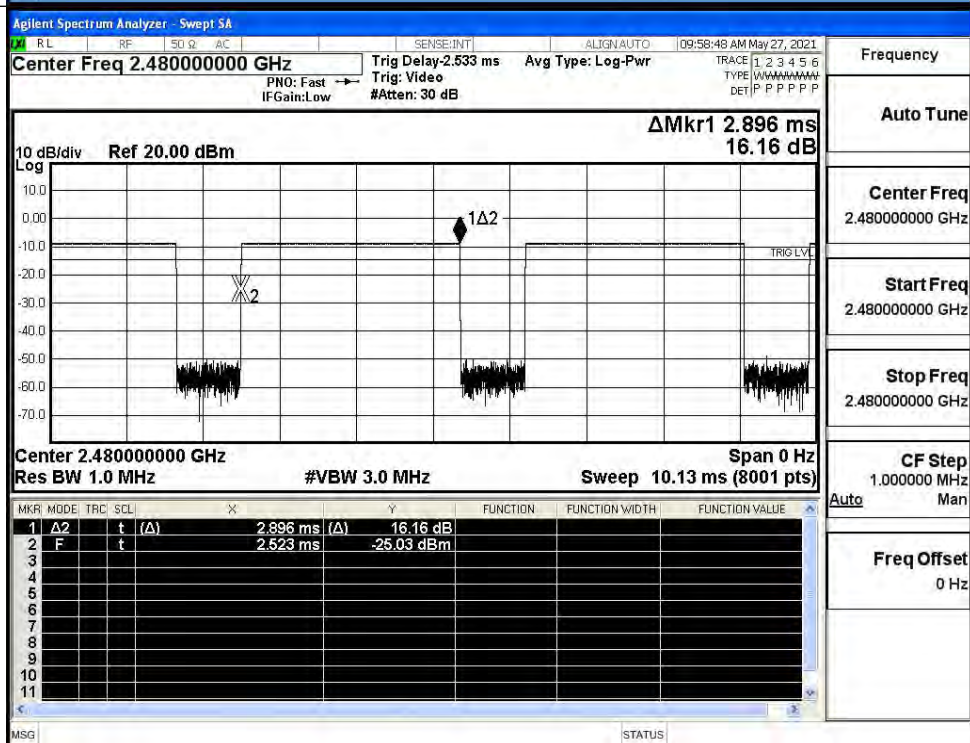
GFSK_DH5/LCH

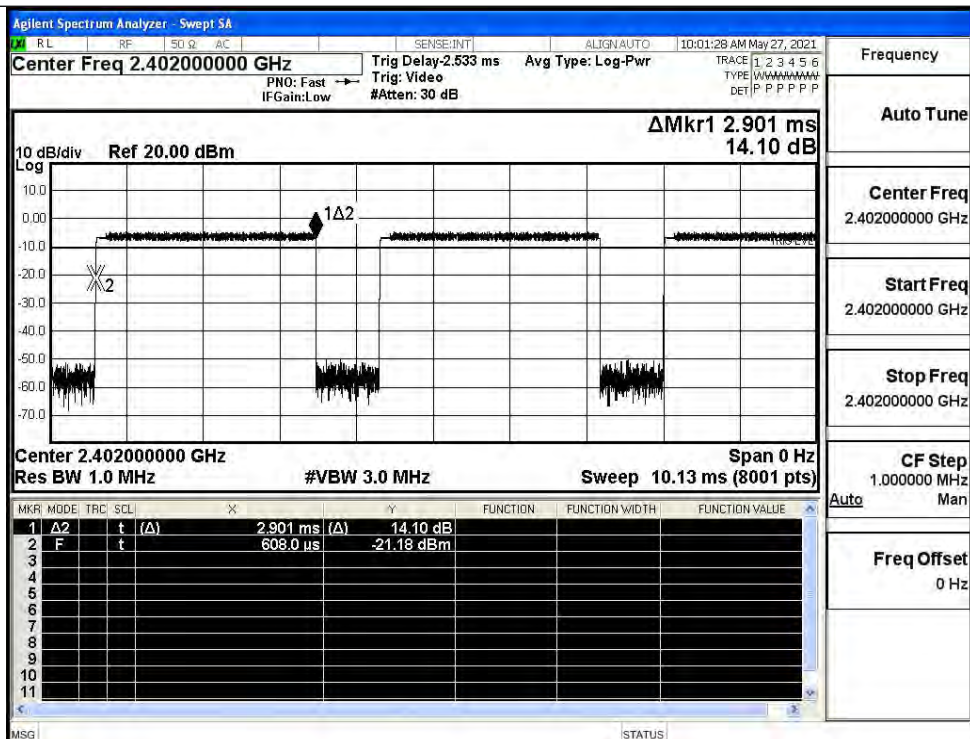
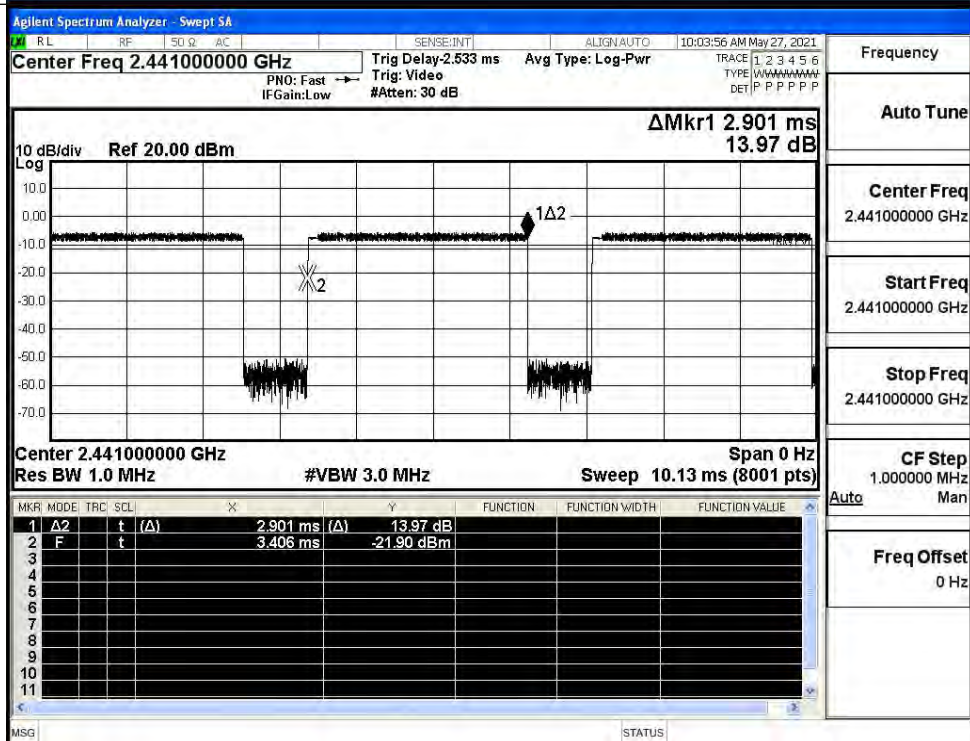


GFSK_DH5/MCH

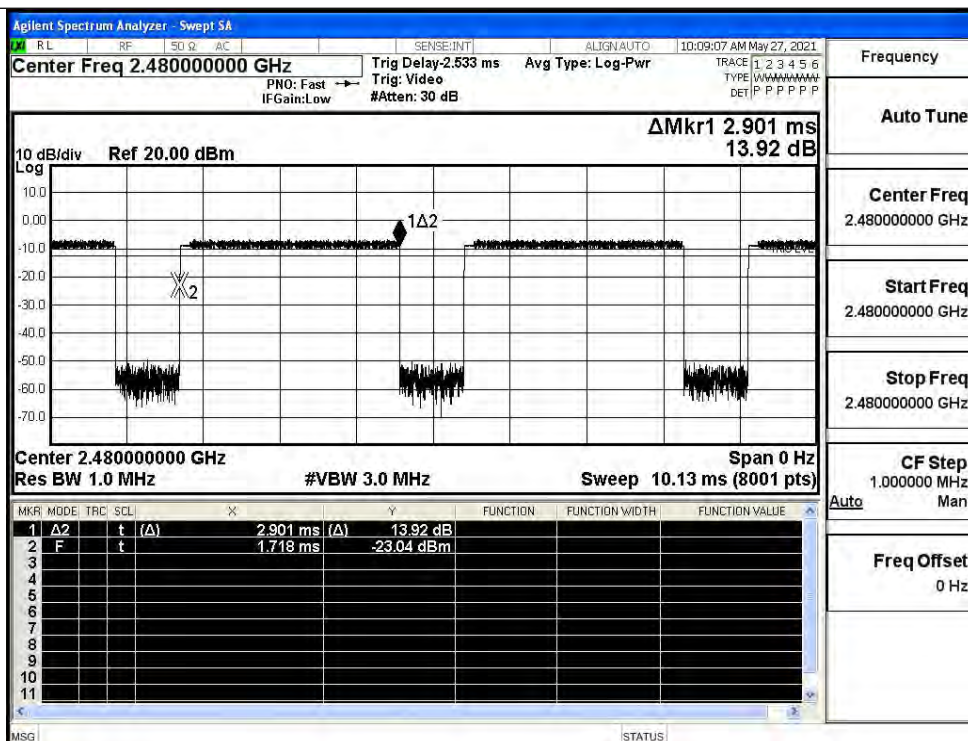


GFSK_DH5/HCH

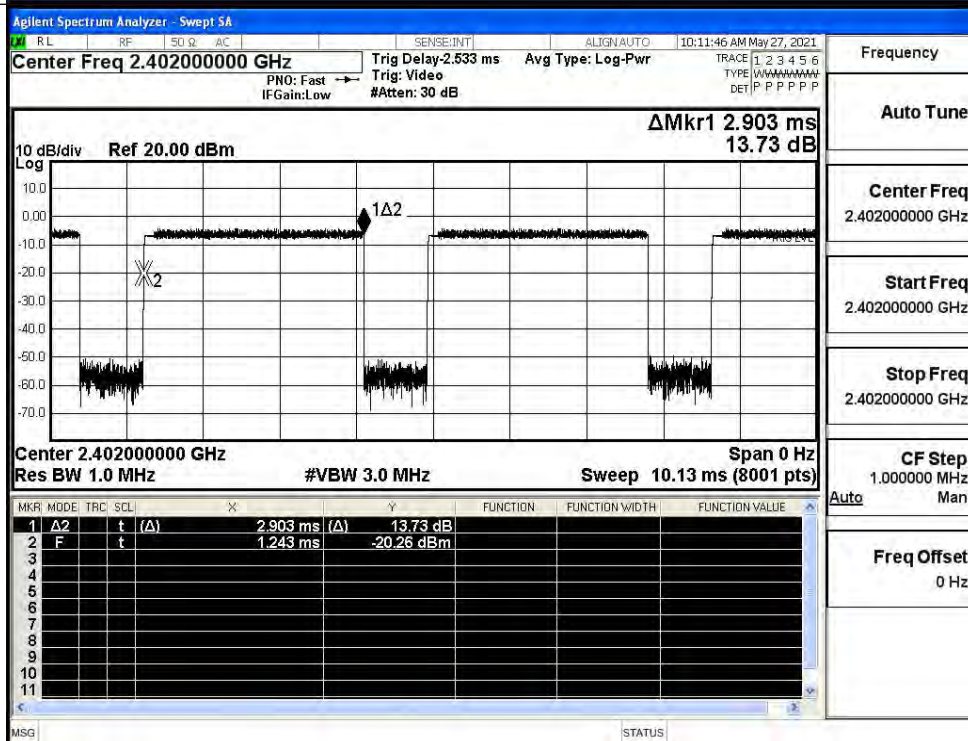


$\pi/4$ DQPSK
_2DH5/LCH $\pi/4$ DQPSK
_2DH5/MCH

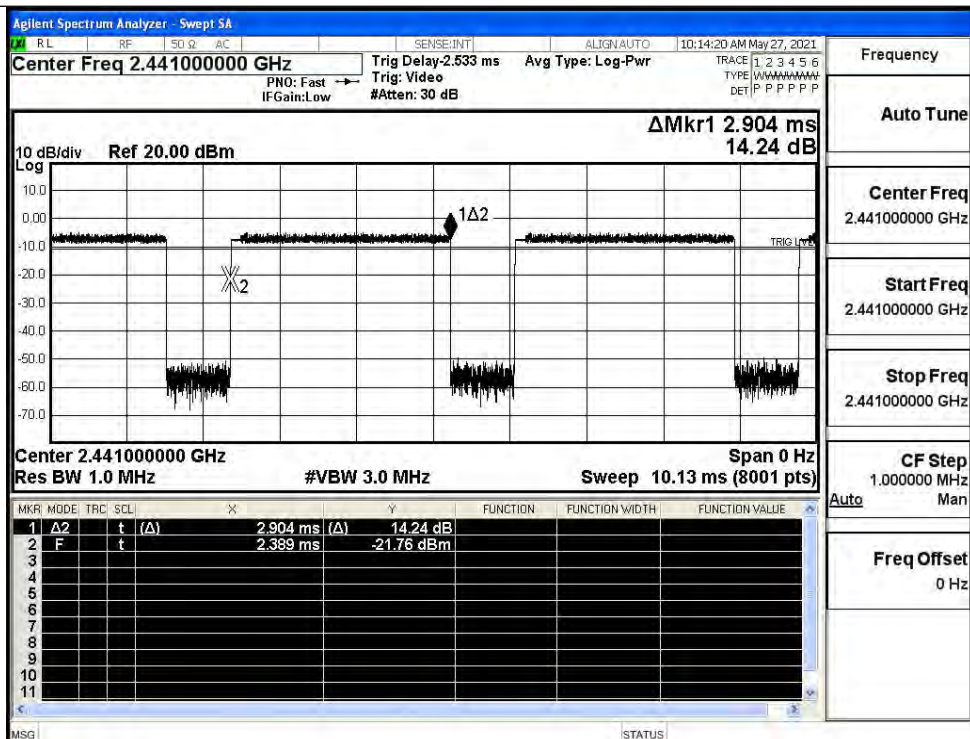
$\pi/4$ DQPSK
_2DH5/HCH



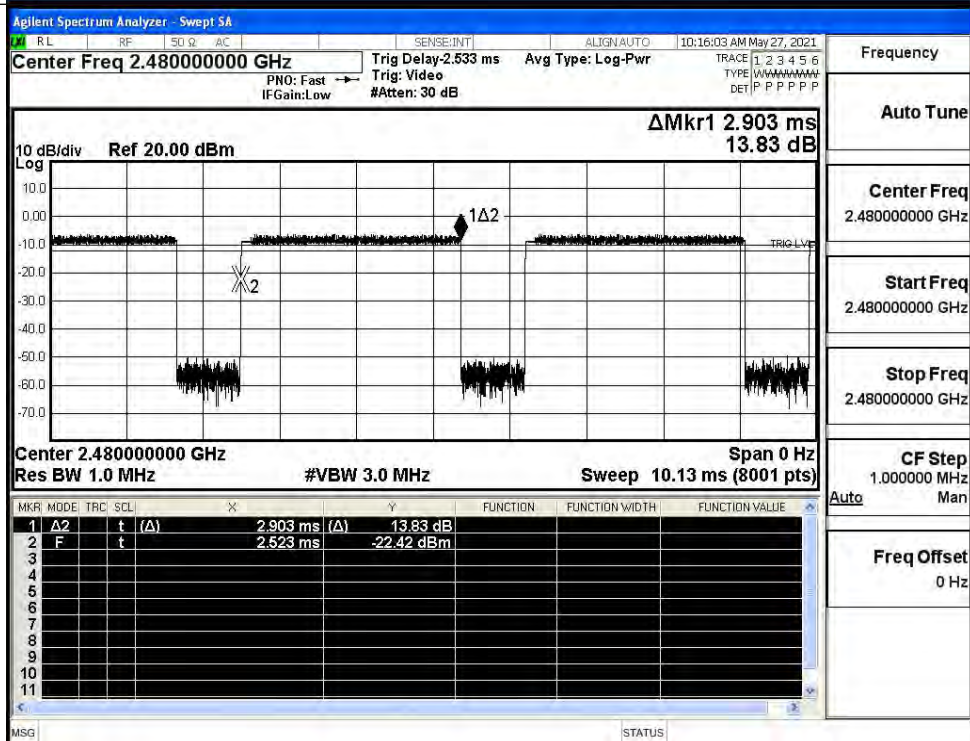
8DPSK_3DH5/LCH



8DPSK_3DH5/MCH



8DPSK_3DH5/HCH

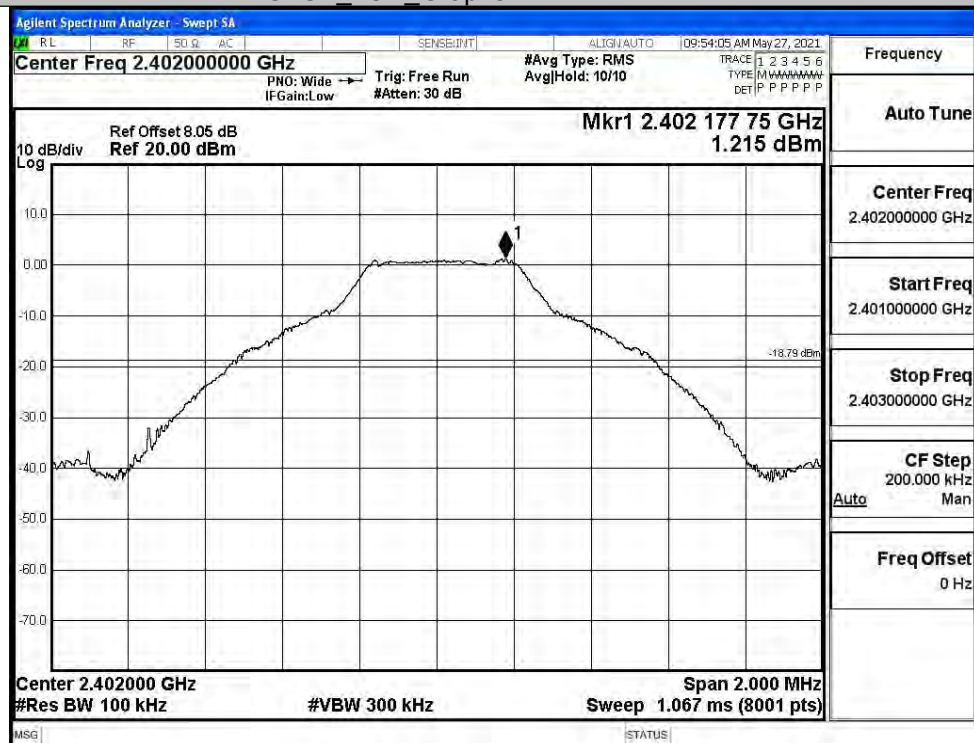


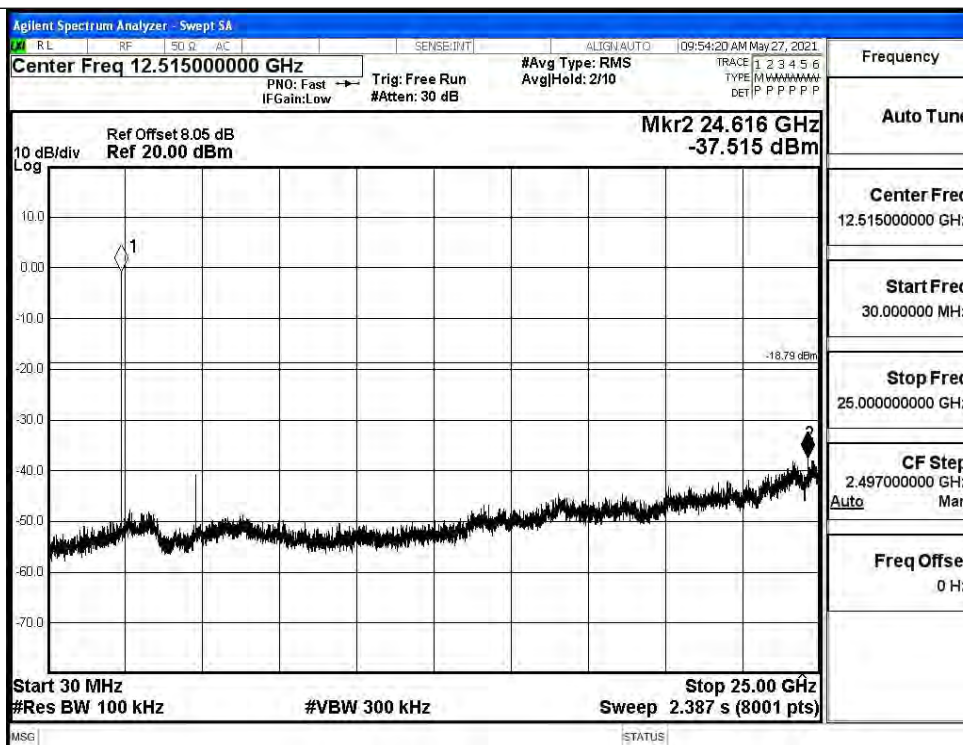
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.215	-37.515	-18.785	PASS
	MCH	0.337	-38.164	-19.663	PASS
	HCH	-0.877	-37.090	-20.877	PASS
$\pi/4$ DQPSK	LCH	0.578	-38.027	-19.422	PASS
	MCH	0.187	-37.567	-19.813	PASS
	HCH	-0.981	-38.358	-20.981	PASS
8DPSK	LCH	1.466	-37.871	-18.534	PASS
	MCH	0.59	-35.510	-19.410	PASS
	HCH	-0.598	-37.588	-20.598	PASS

GFSK LCH Graphs

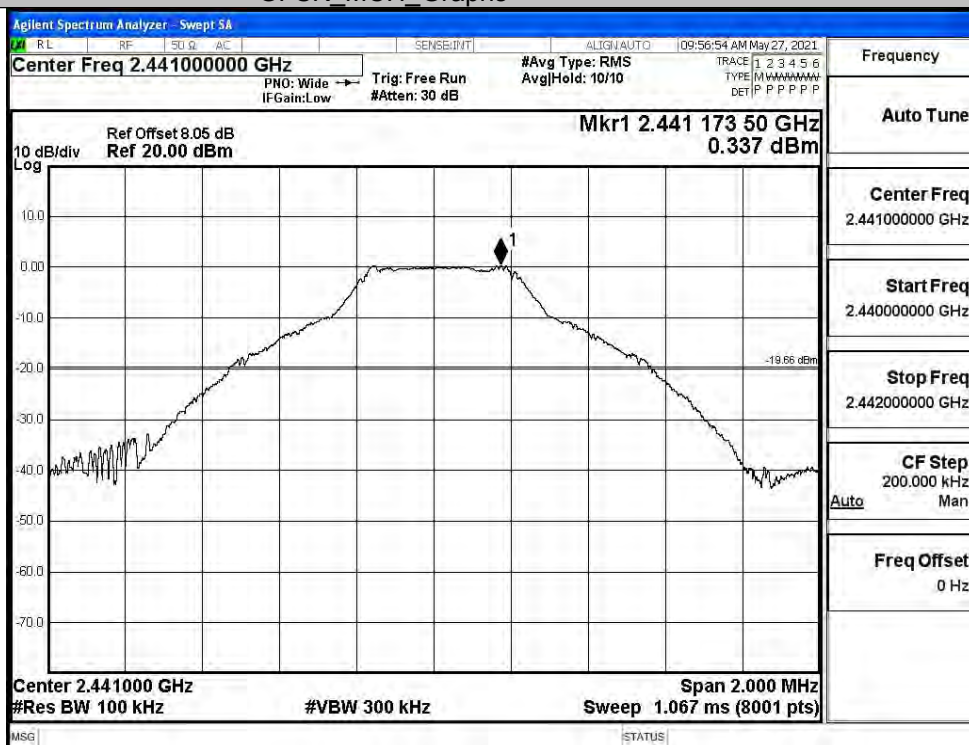
Pref



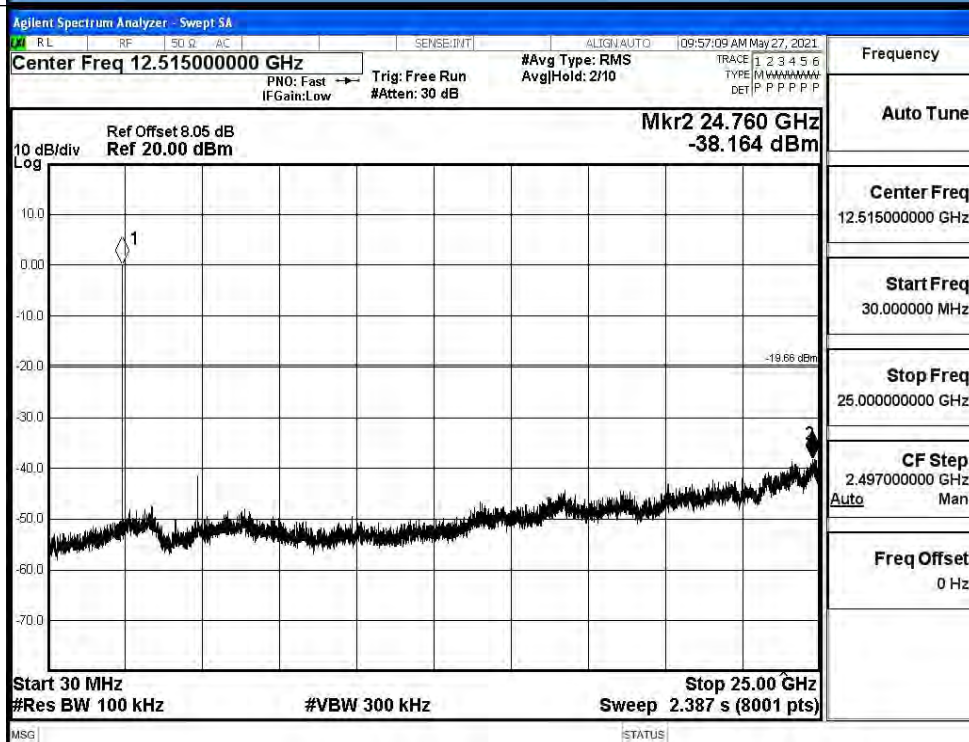
P_{uw}

GFSK MCH_Graphs

Pref

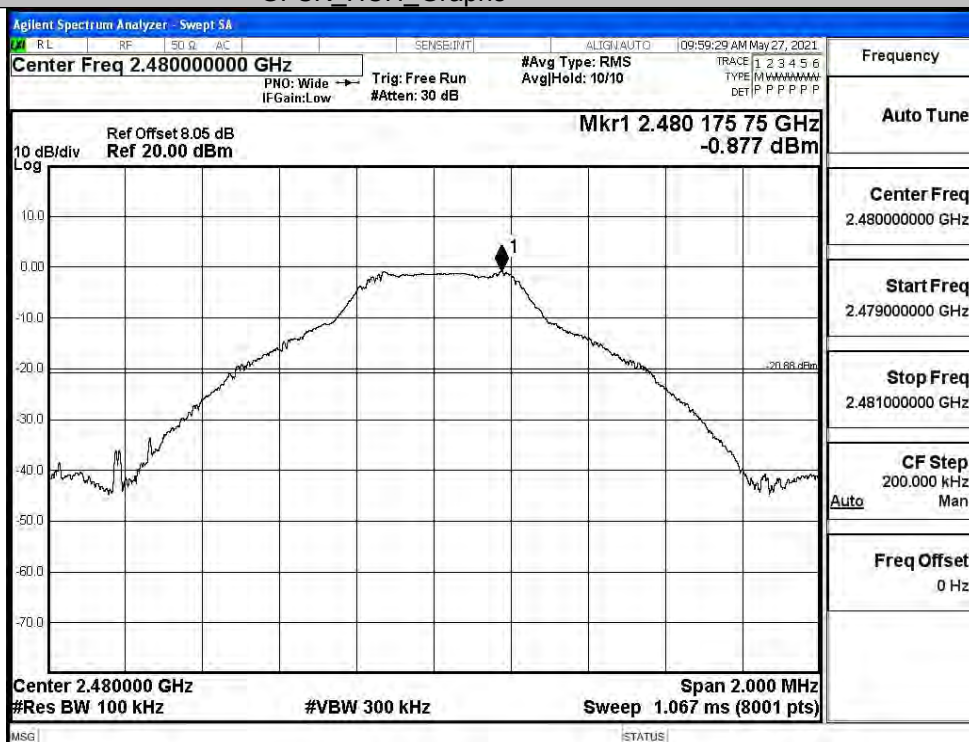


Puw

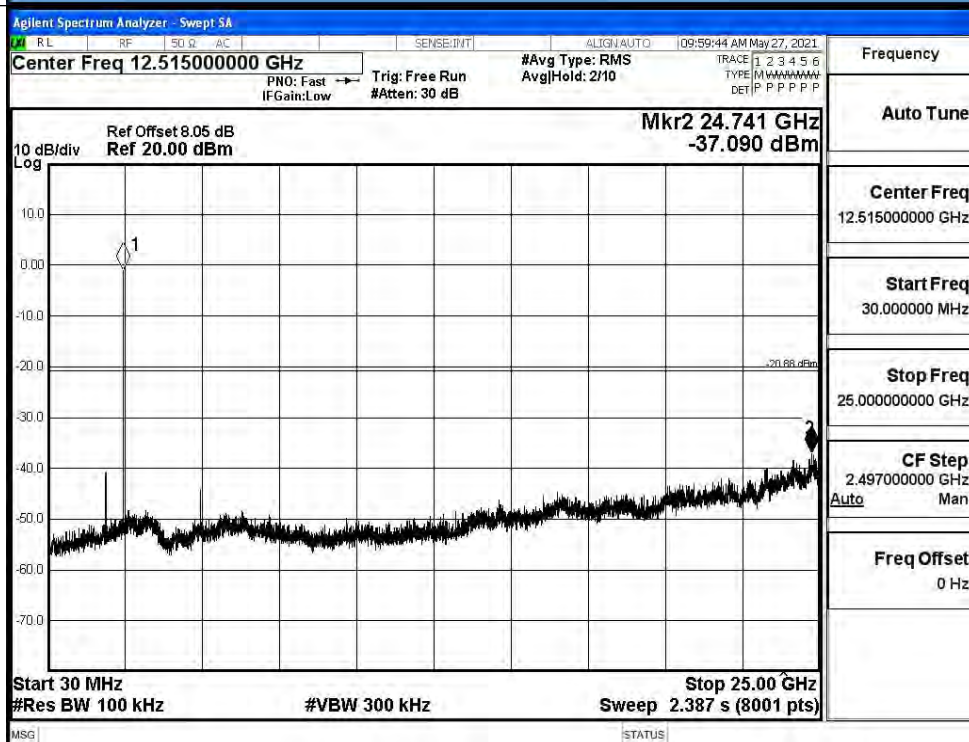


GFSK HCH_Graphs

Pref

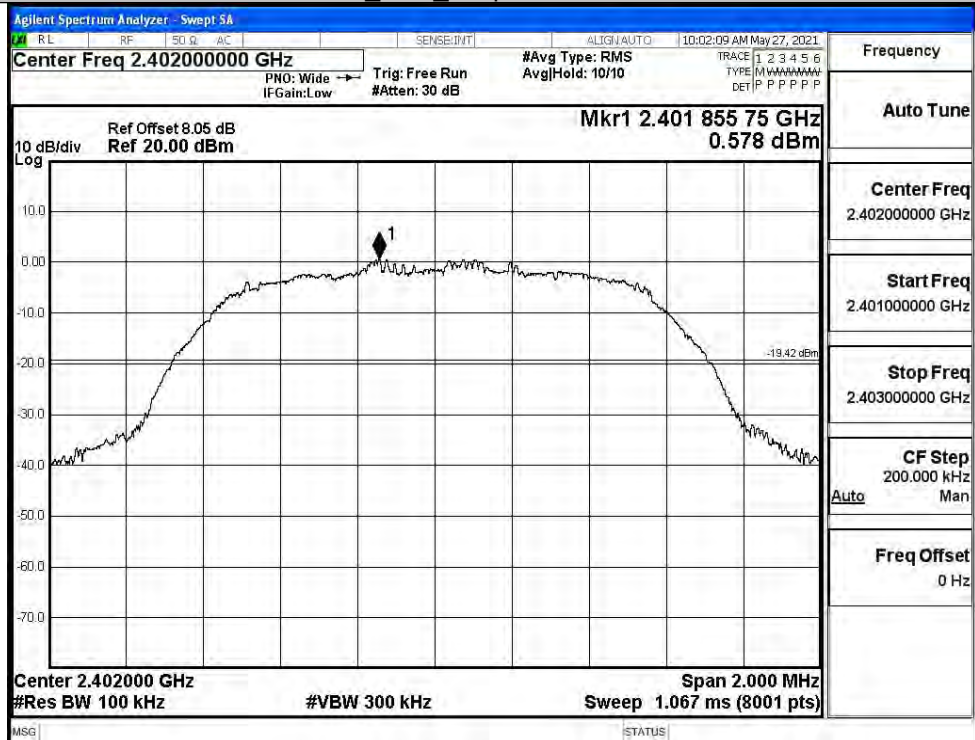


Puw

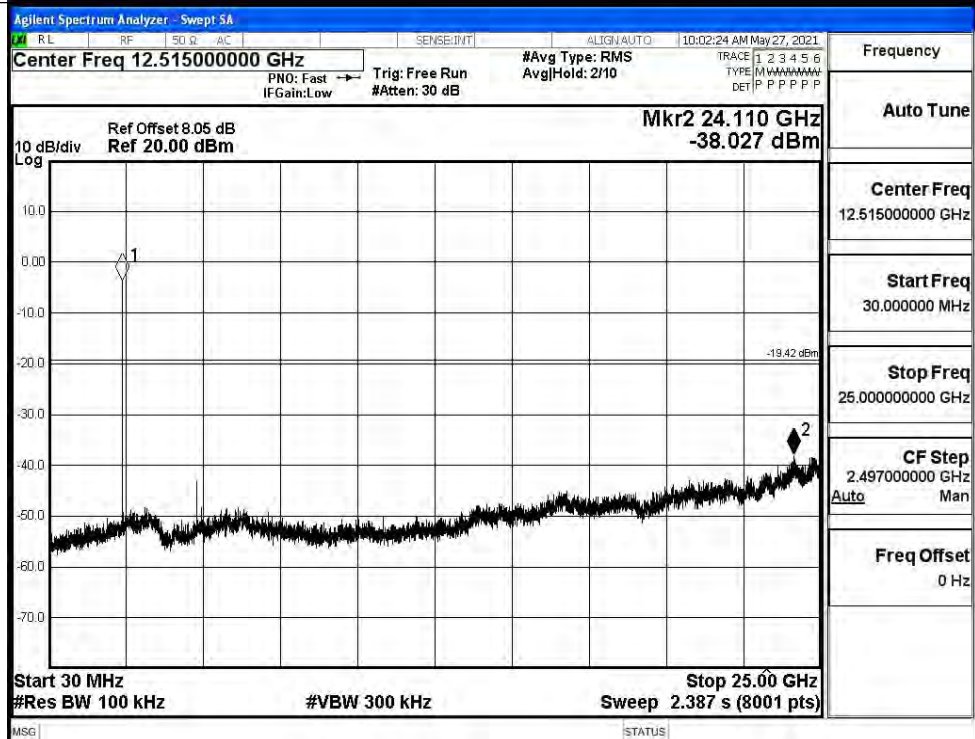


π /4DQPSK LCH_Graphs

Pref

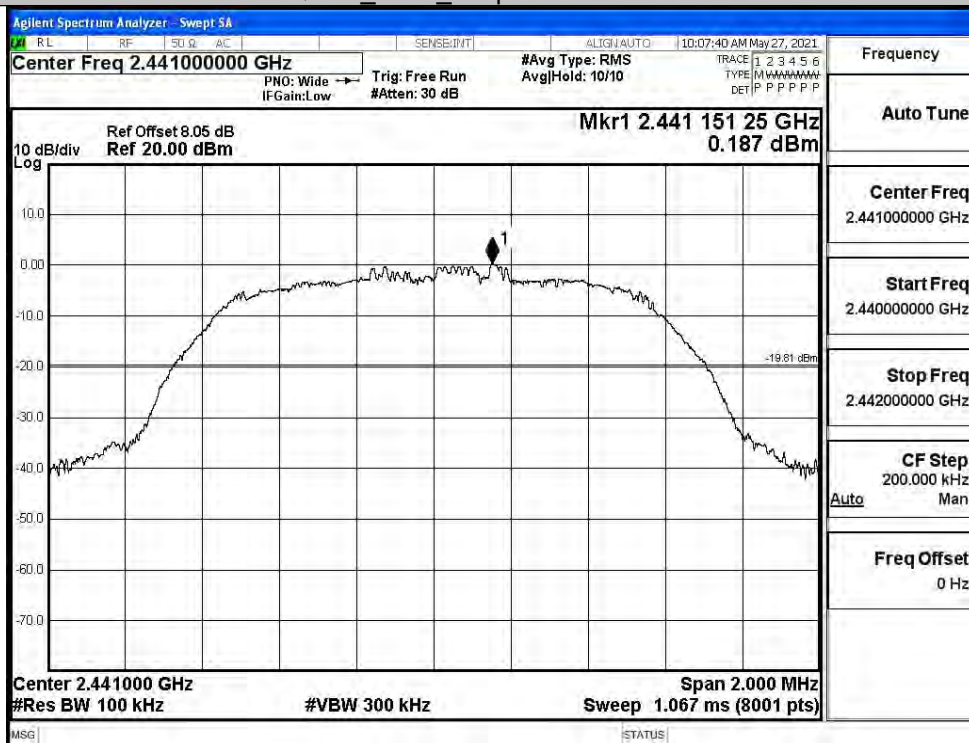


Puw

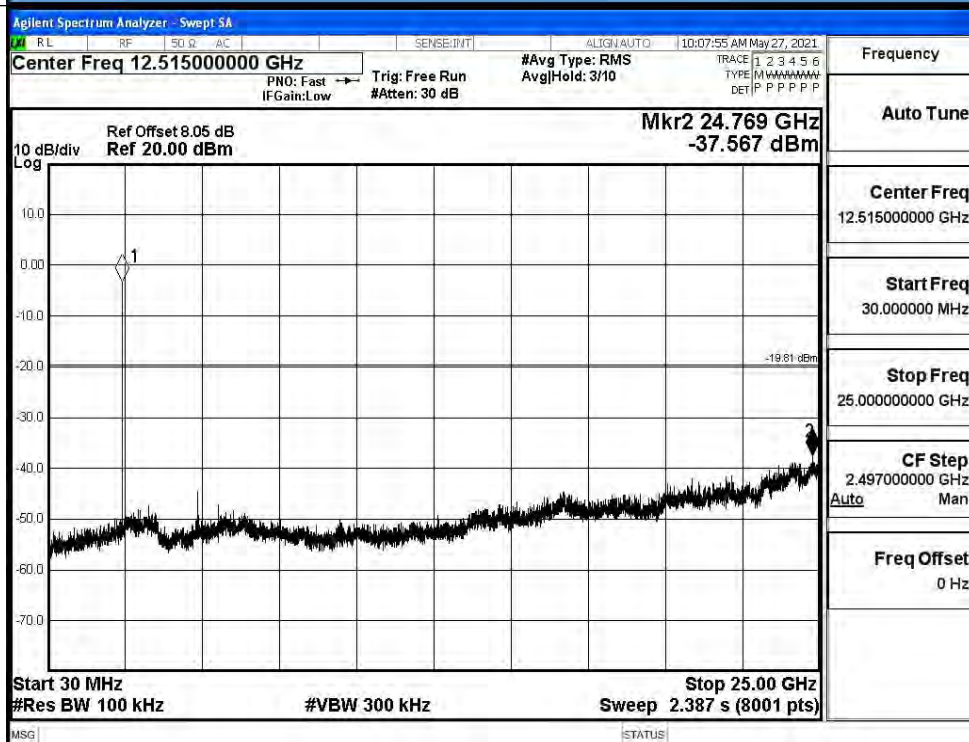


$\pi/4$ DQPSK_MCH_Graphs

Pref

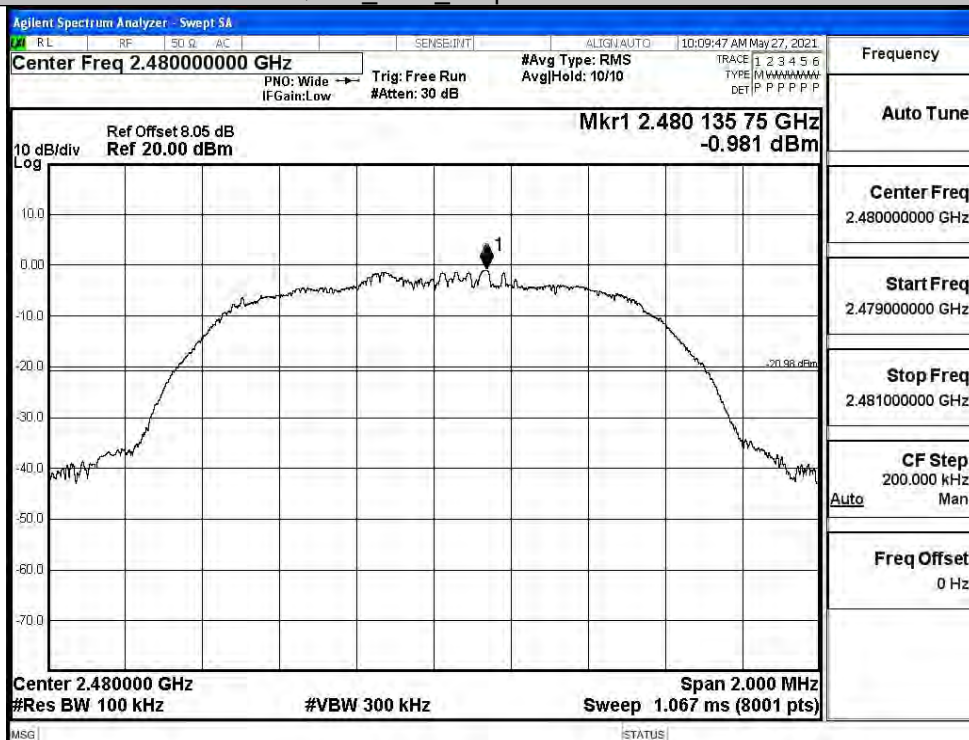


Puw

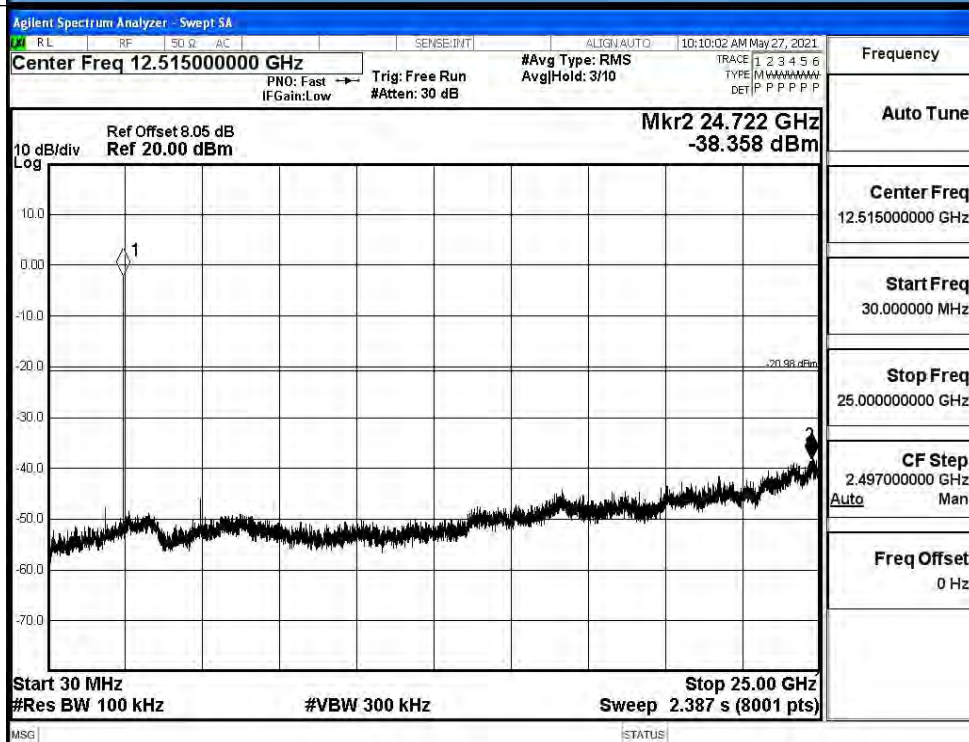


$\pi/4$ DQPSK HCH_Graphs

Pref

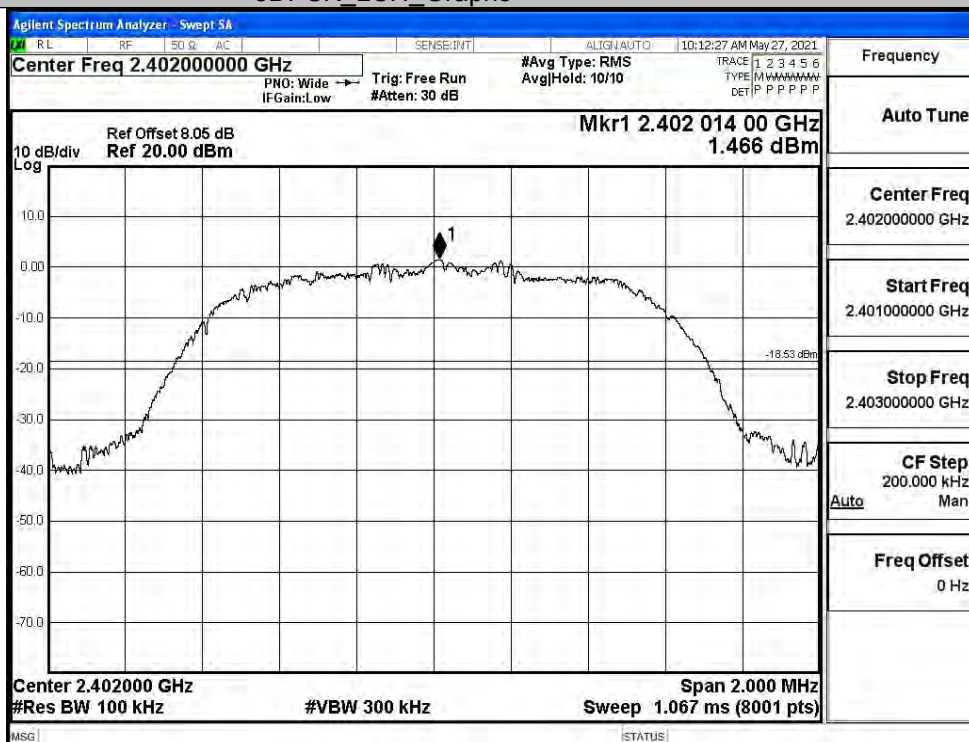


Puw

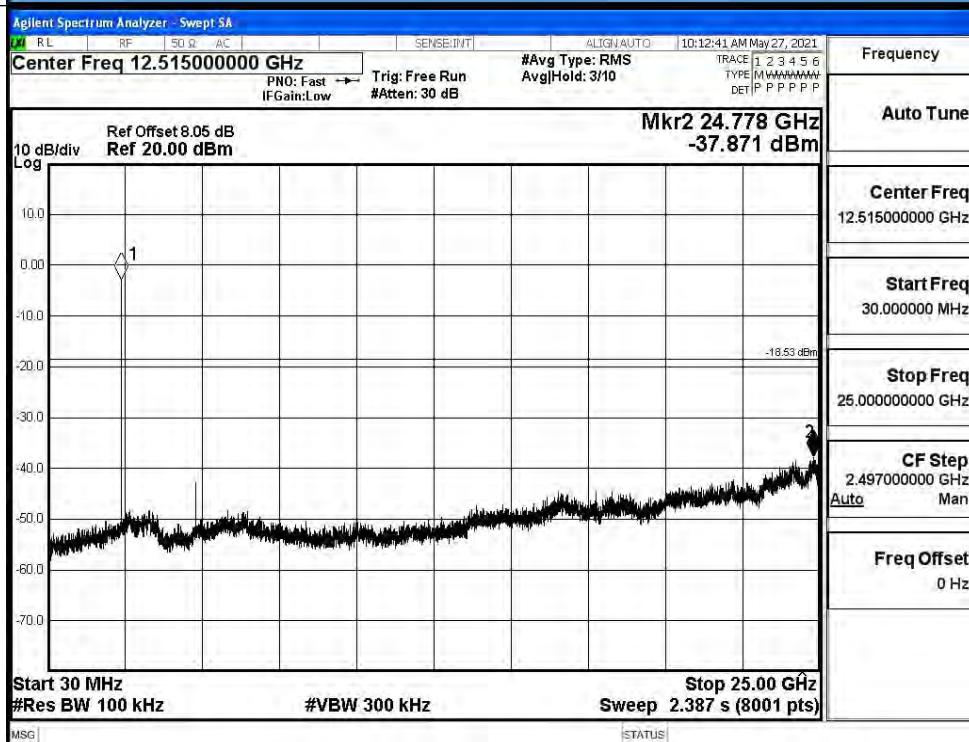


8DPSK_LCH_Graphs

Pref

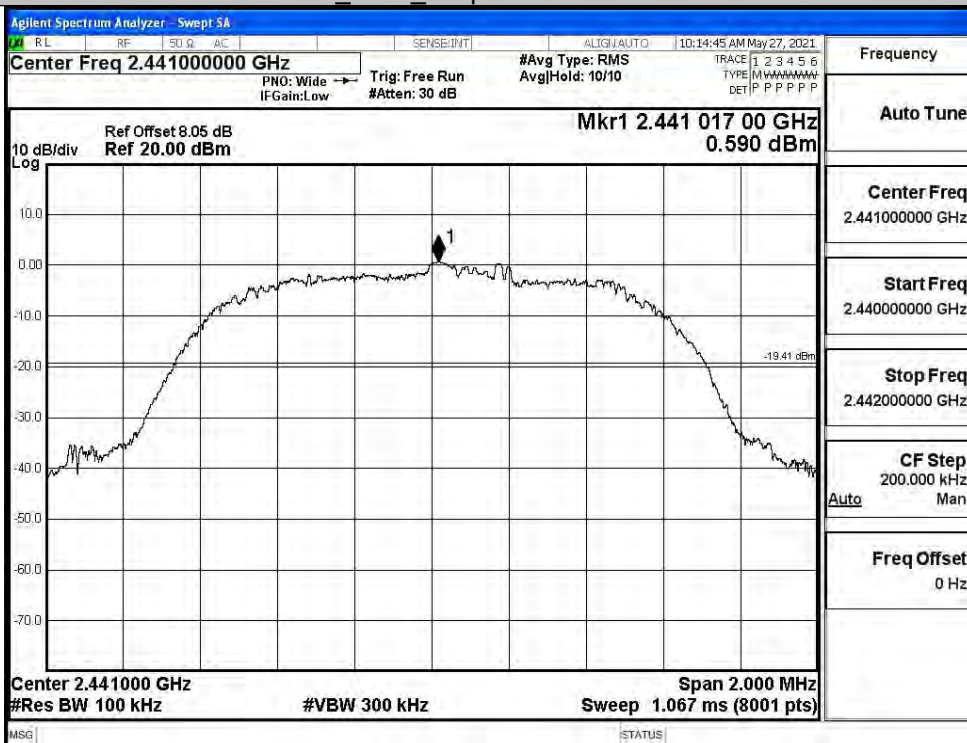


Puw



8DPSK MCH_Graphs

Pref

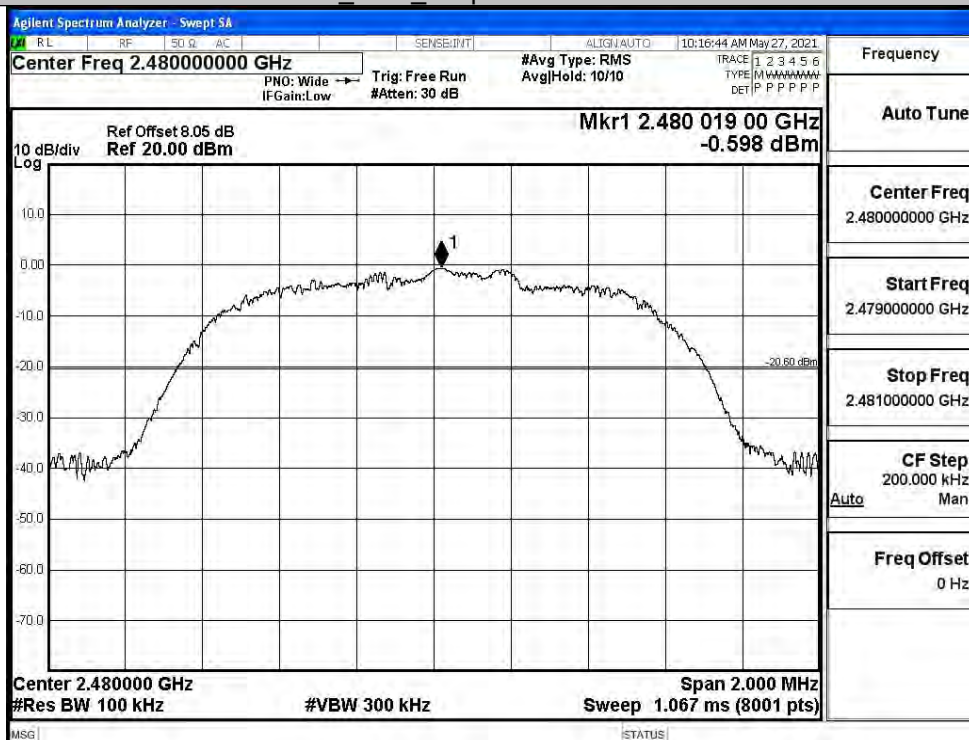


Puw



8DPSK_HCH_Graphs

Pref



Puw

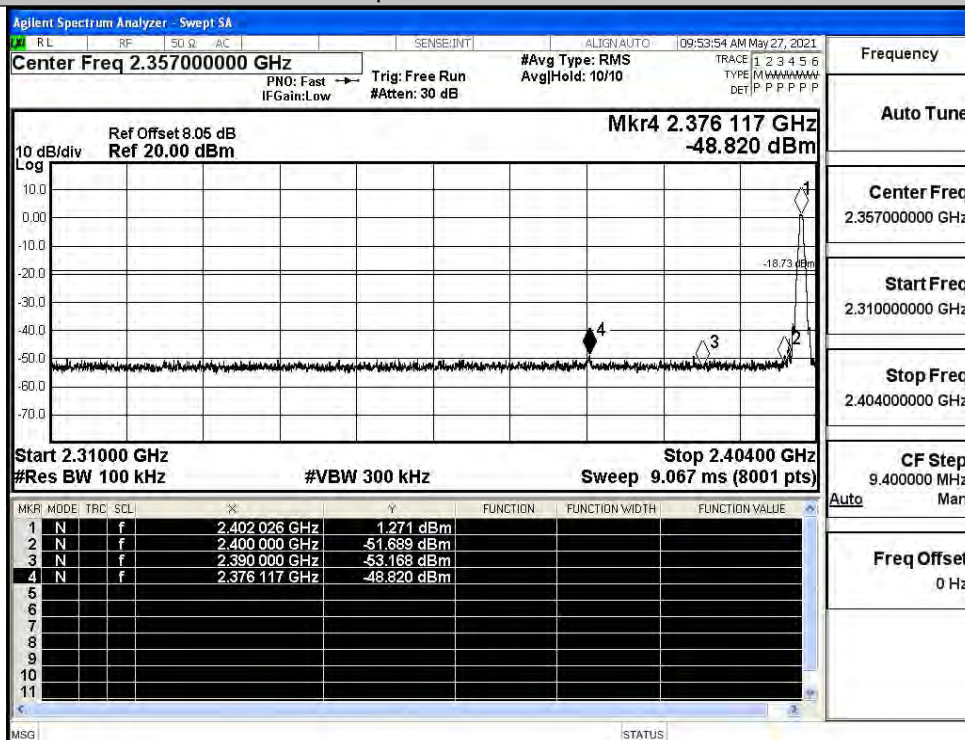


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.271	Off	-48.820	-18.73	PASS
			1.155	On	-49.049	-18.85	PASS
	HCH	2480	-0.671	Off	-48.713	-20.67	PASS
			-0.151	On	-48.240	-20.15	PASS
π /4DQPSK	LCH	2402	1.077	Off	-49.456	-18.92	PASS
			1.104	On	-48.292	-18.9	PASS
	HCH	2480	-0.871	Off	-49.278	-20.87	PASS
			-0.233	On	-48.284	-20.23	PASS
8DPSK	LCH	2402	1.519	Off	-48.328	-18.48	PASS
			1.406	On	-47.583	-18.59	PASS
	HCH	2480	-0.600	Off	-49.289	-20.6	PASS
			0.114	On	-48.195	-19.89	PASS

Test Graphs

GFSK/LCH/No Hop

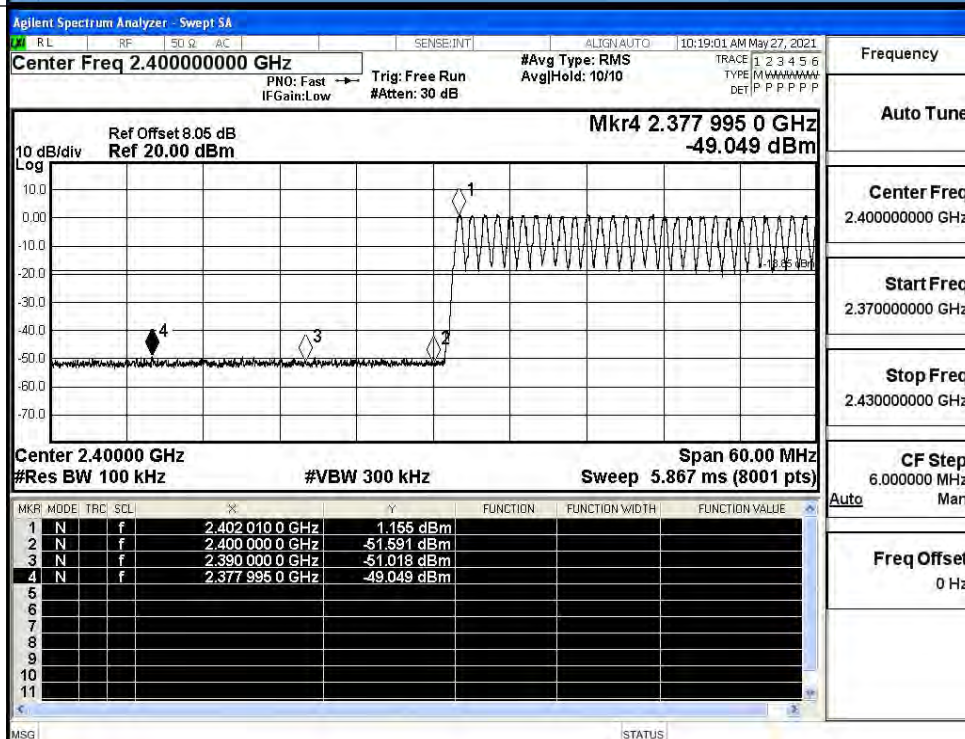


Frequency

Auto Tune

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

GFSK/LCH/Hop

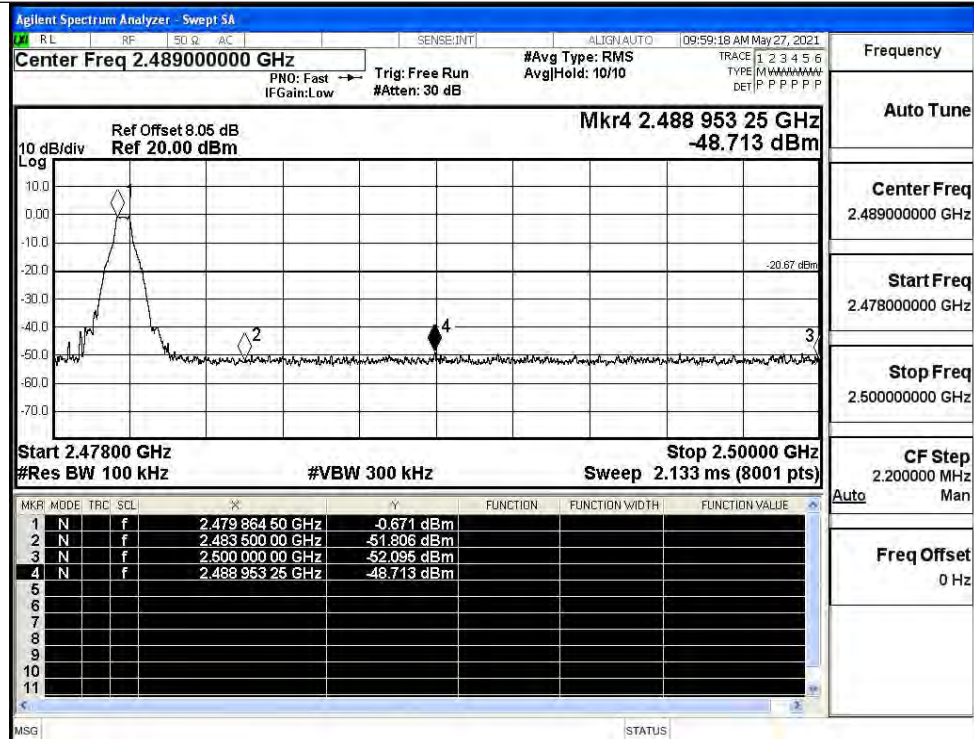


Frequency

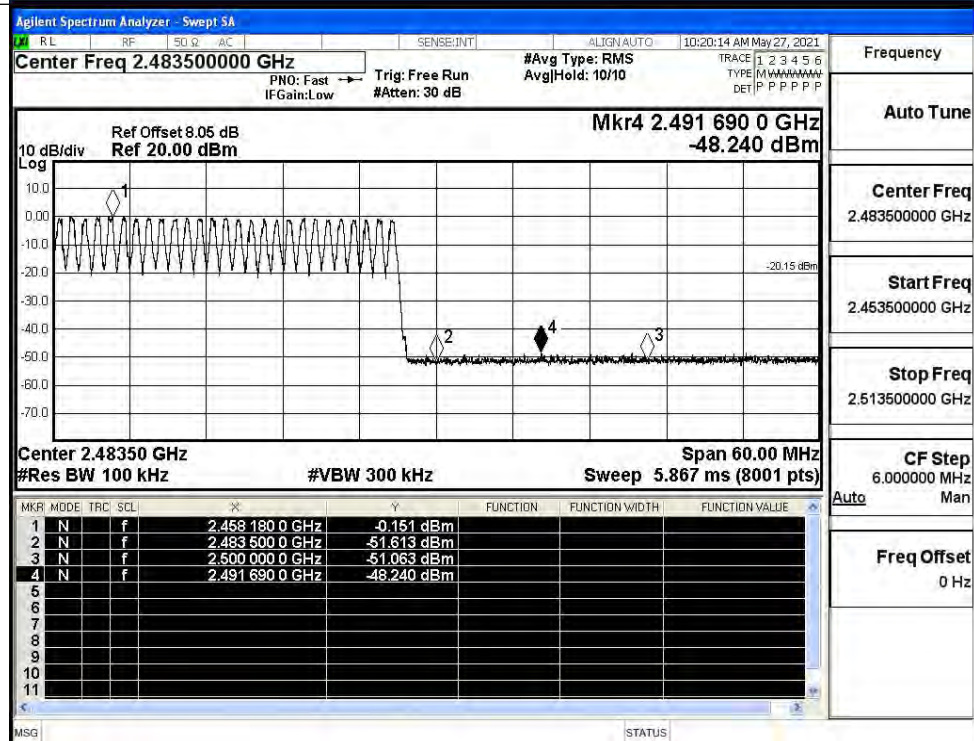
Auto Tune

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

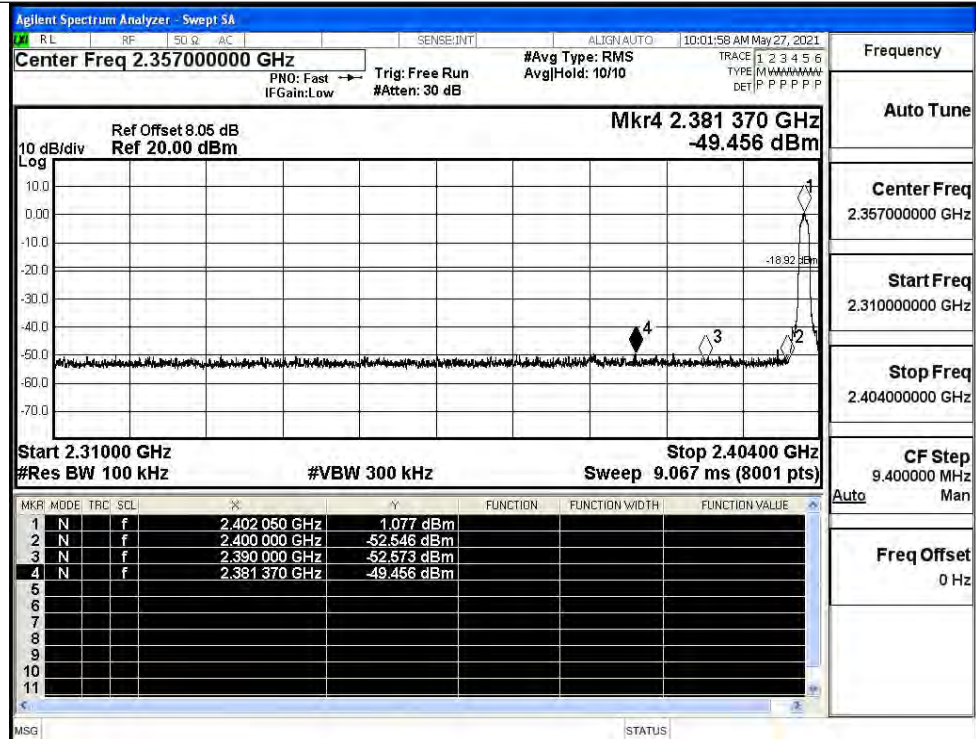
GFSK/HCH/No Hop



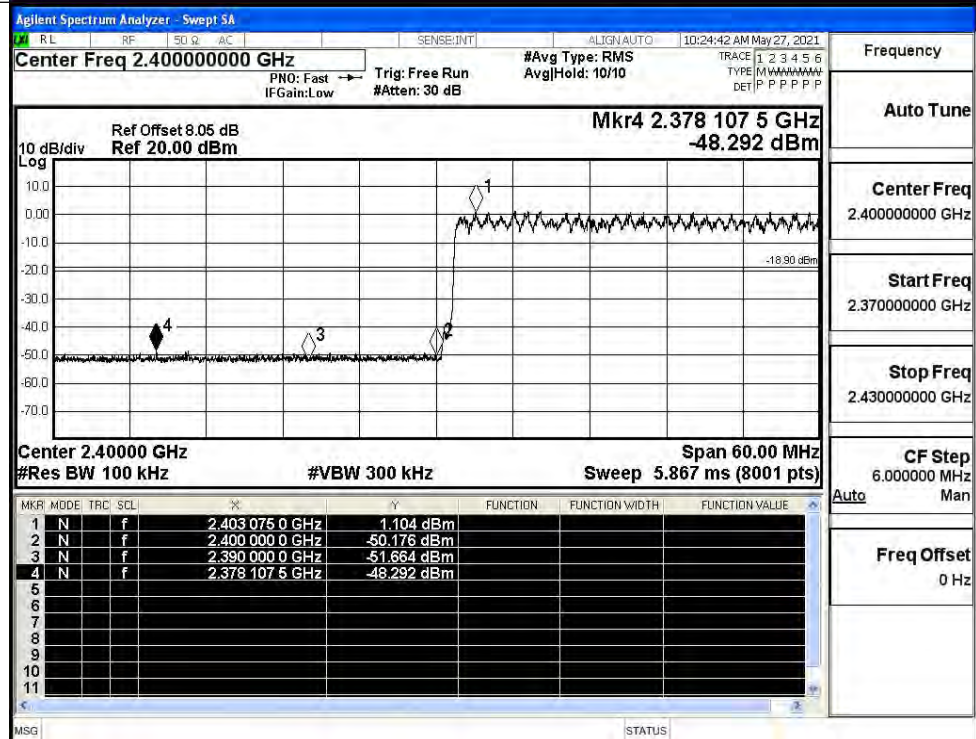
GFSK/HCH/Hop



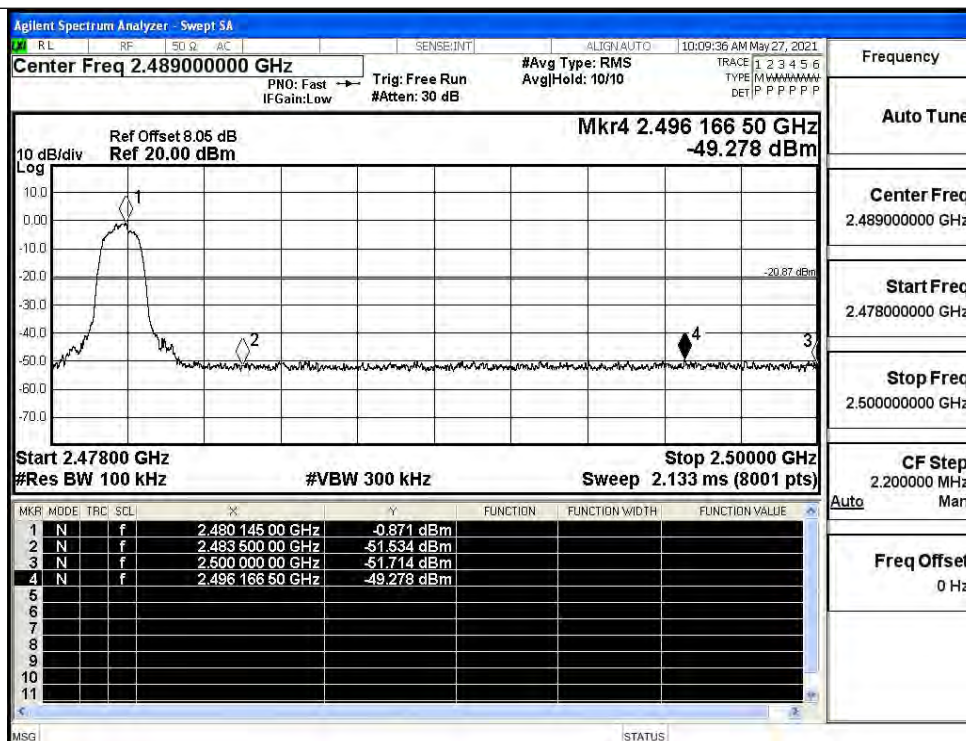
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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

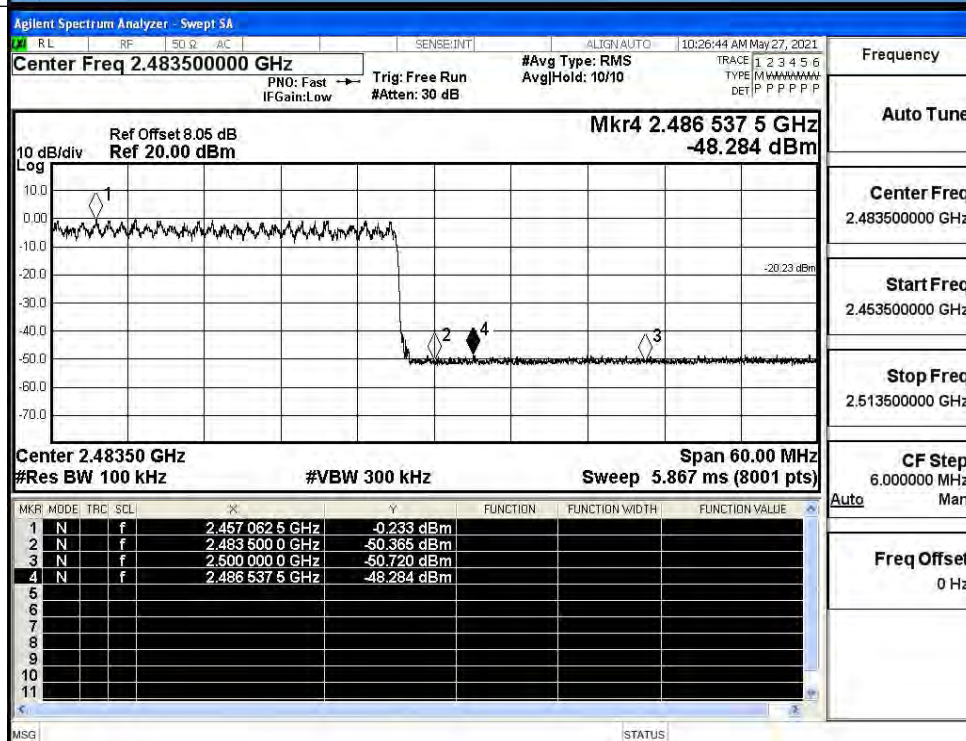


Frequency

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

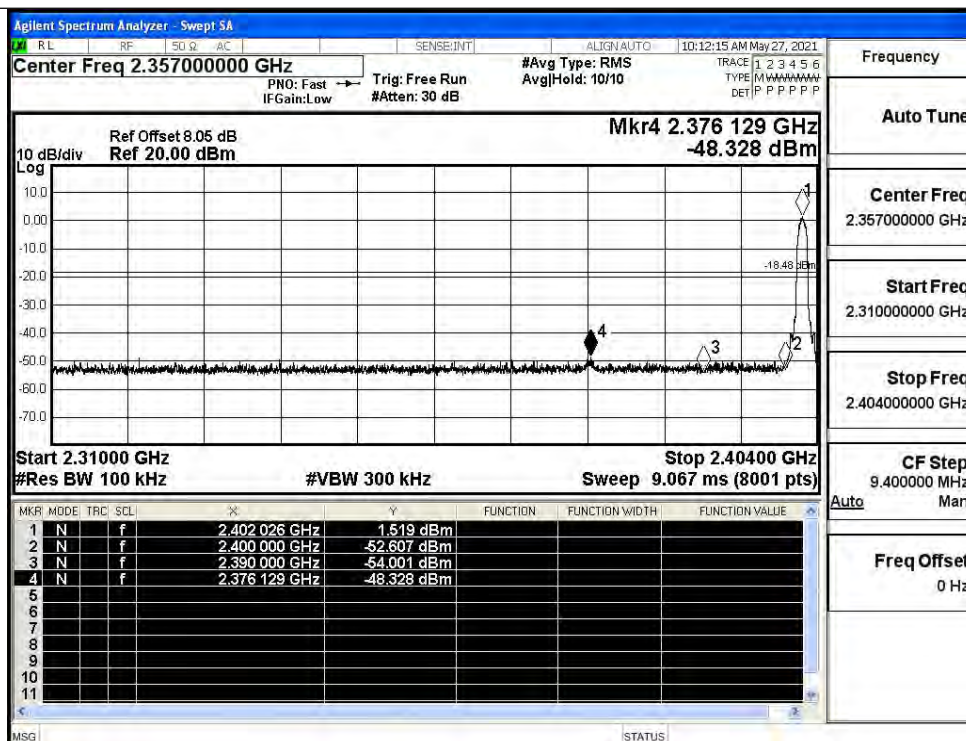


Frequency

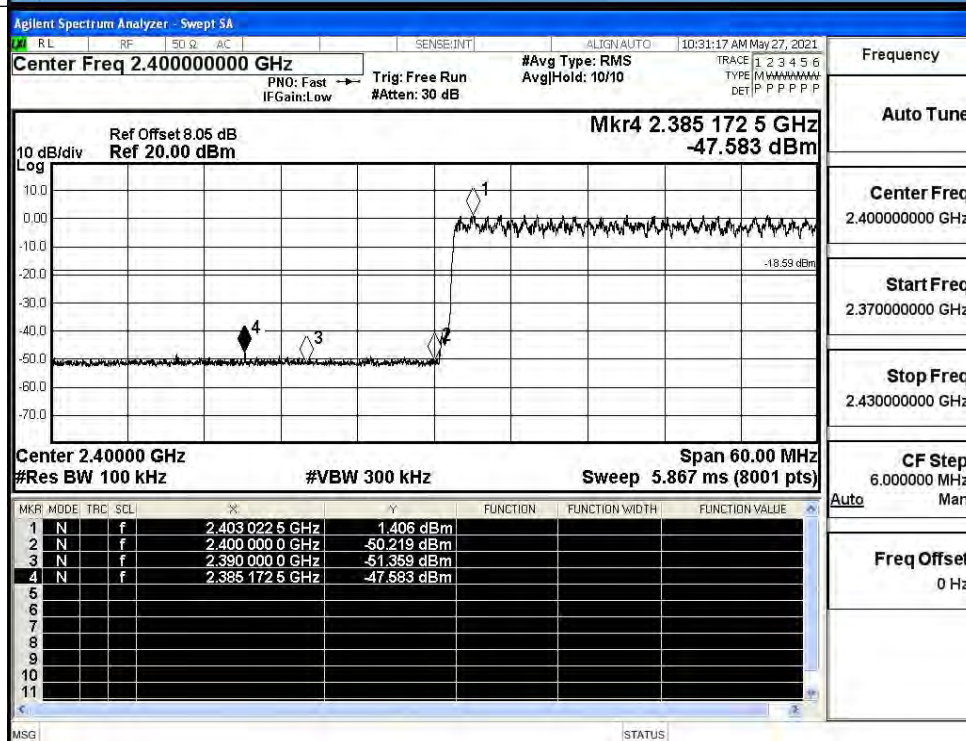
Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.463500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

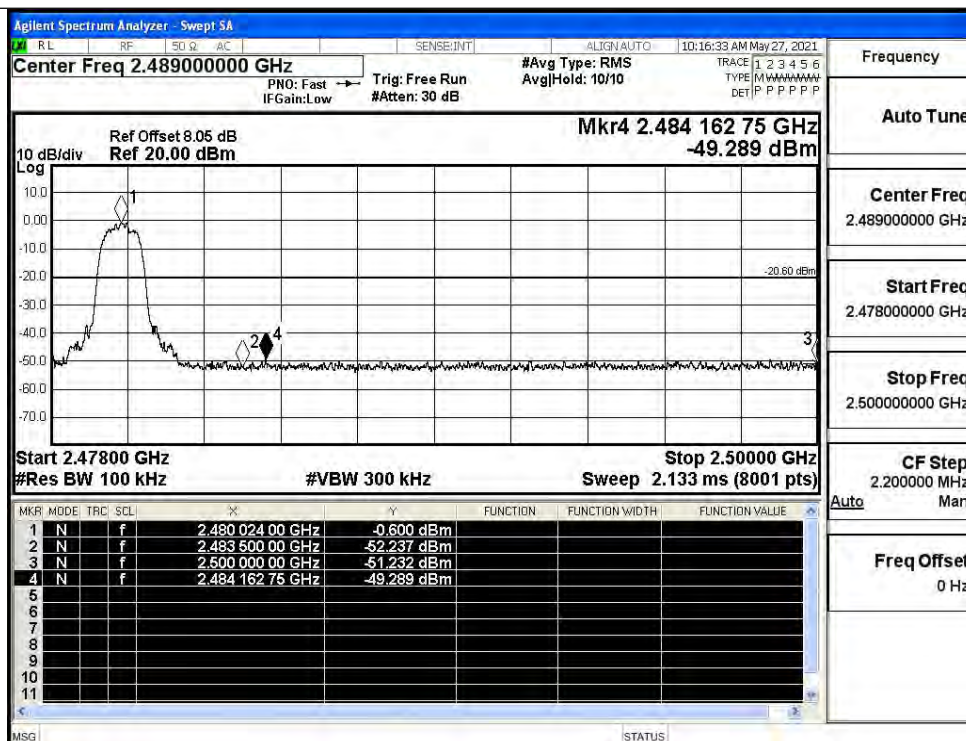
8DPSK/LCH/No Hop



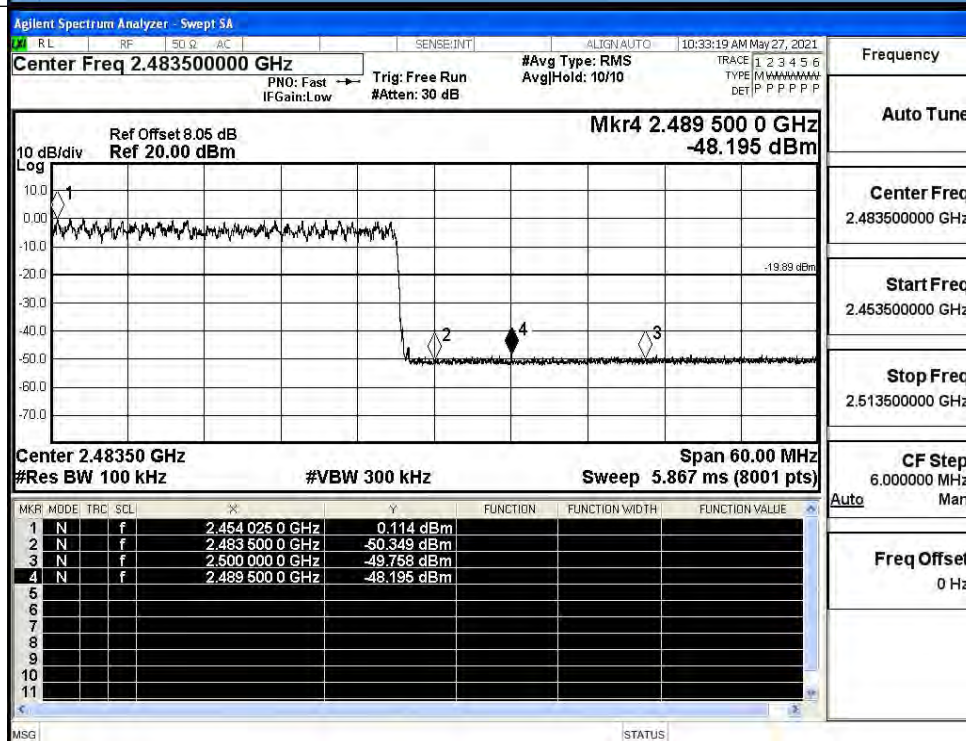
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



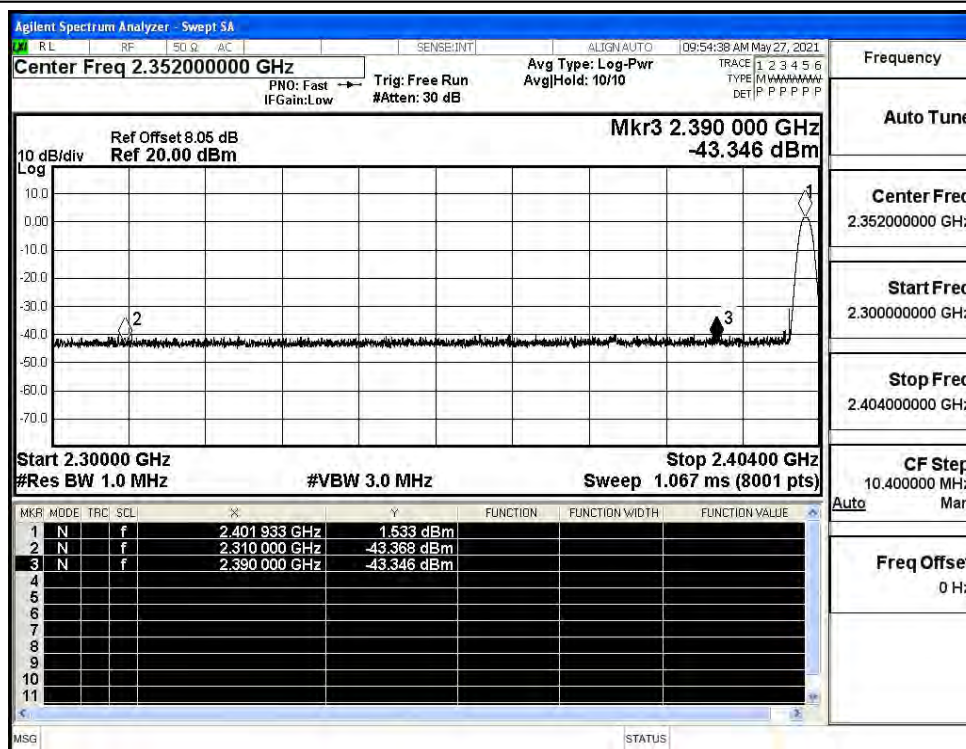
8DPSK/HCH/Hop



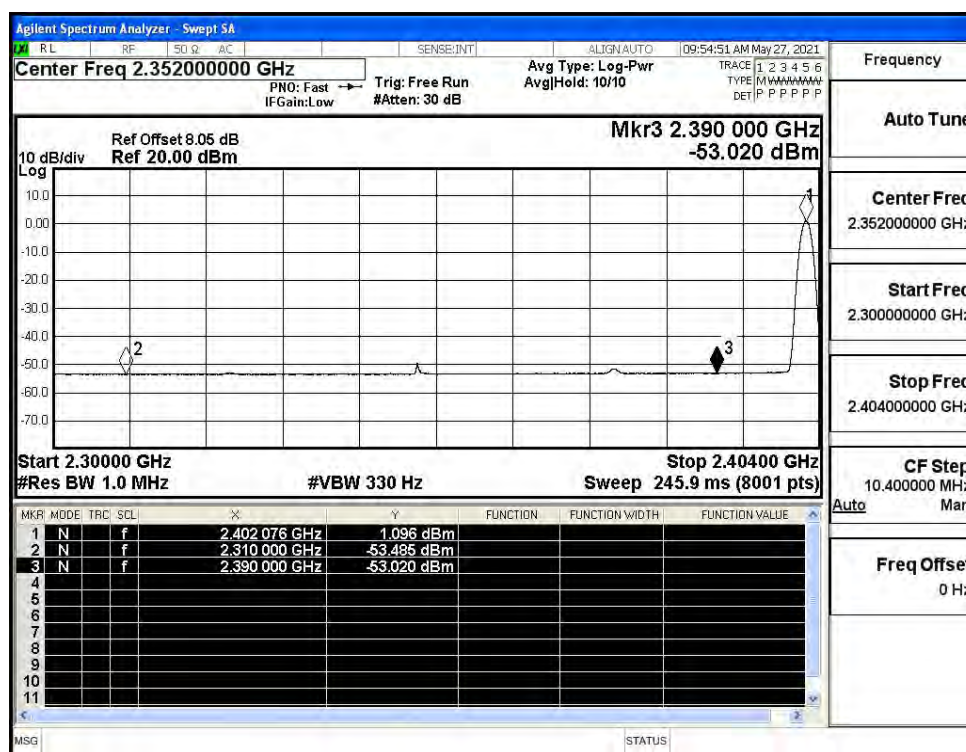
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.37	2.0	0	53.86	PEAK	74	PASS
	Off	2310.0	-53.49	2.0	0	43.74	AV	54	PASS
	Off	2390.0	-43.35	2.0	0	53.88	PEAK	74	PASS
	Off	2390.0	-53.02	2.0	0	44.21	AV	54	PASS
	Off	2483.5	-41.67	2.0	0	55.56	PEAK	74	PASS
	Off	2483.5	-52.52	2.0	0	44.71	AV	54	PASS
	Off	2500.0	-41.59	2.0	0	55.64	PEAK	74	PASS
	Off	2500.0	-52.48	2.0	0	44.75	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.16	2.0	0	54.07	PEAK	74	PASS
	Off	2310.0	-53.48	2.0	0	43.75	AV	54	PASS
	Off	2390.0	-43.37	2.0	0	53.86	PEAK	74	PASS
	Off	2390.0	-53.06	2.0	0	44.17	AV	54	PASS
	Off	2483.5	-42.91	2.0	0	54.32	PEAK	74	PASS
	Off	2483.5	-52.55	2.0	0	44.68	AV	54	PASS
	Off	2500.0	-42.56	2.0	0	54.67	PEAK	74	PASS
	Off	2500.0	-52.43	2.0	0	44.80	AV	54	PASS
8DPSK	Off	2310.0	-43.52	2.0	0	53.71	PEAK	74	PASS
	Off	2310.0	-53.33	2.0	0	43.90	AV	54	PASS
	Off	2390.0	-42.01	2.0	0	55.22	PEAK	74	PASS
	Off	2390.0	-53.09	2.0	0	44.14	AV	54	PASS
	Off	2483.5	-42.27	2.0	0	54.96	PEAK	74	PASS
	Off	2483.5	-52.43	2.0	0	44.80	AV	54	PASS
	Off	2500.0	-41.86	2.0	0	55.37	PEAK	74	PASS
	Off	2500.0	-52.40	2.0	0	44.83	AV	54	PASS

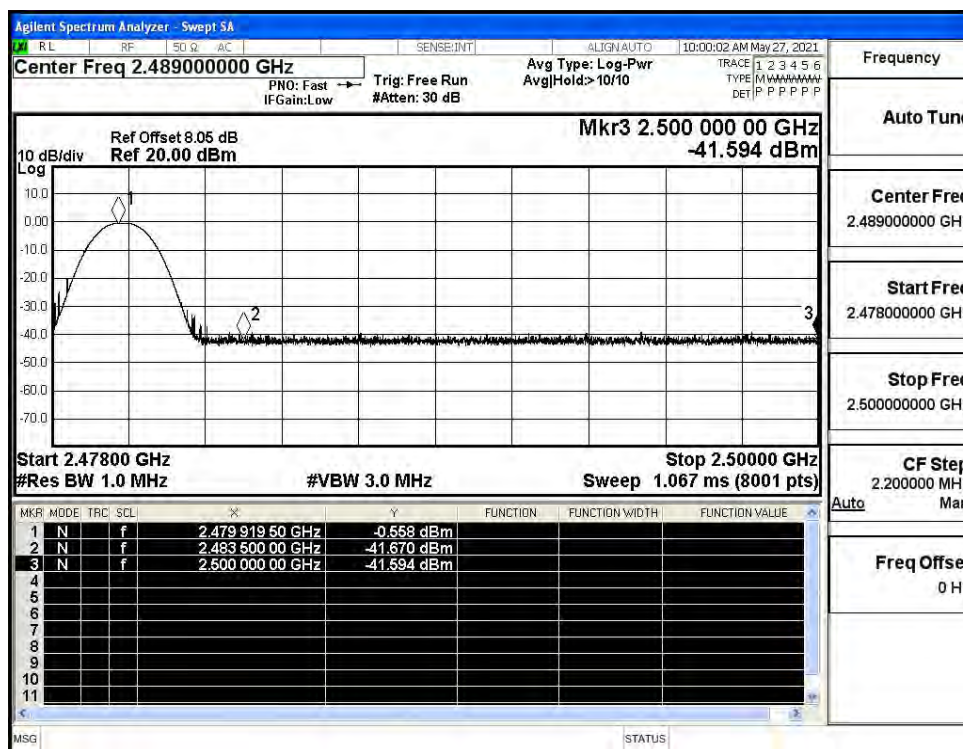
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



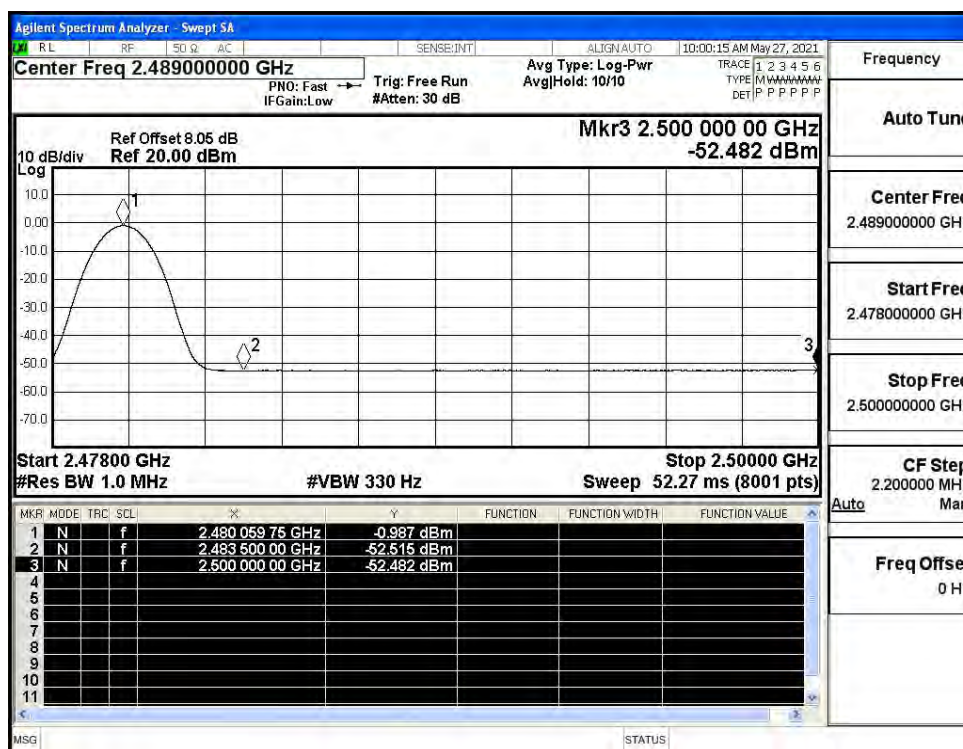
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)

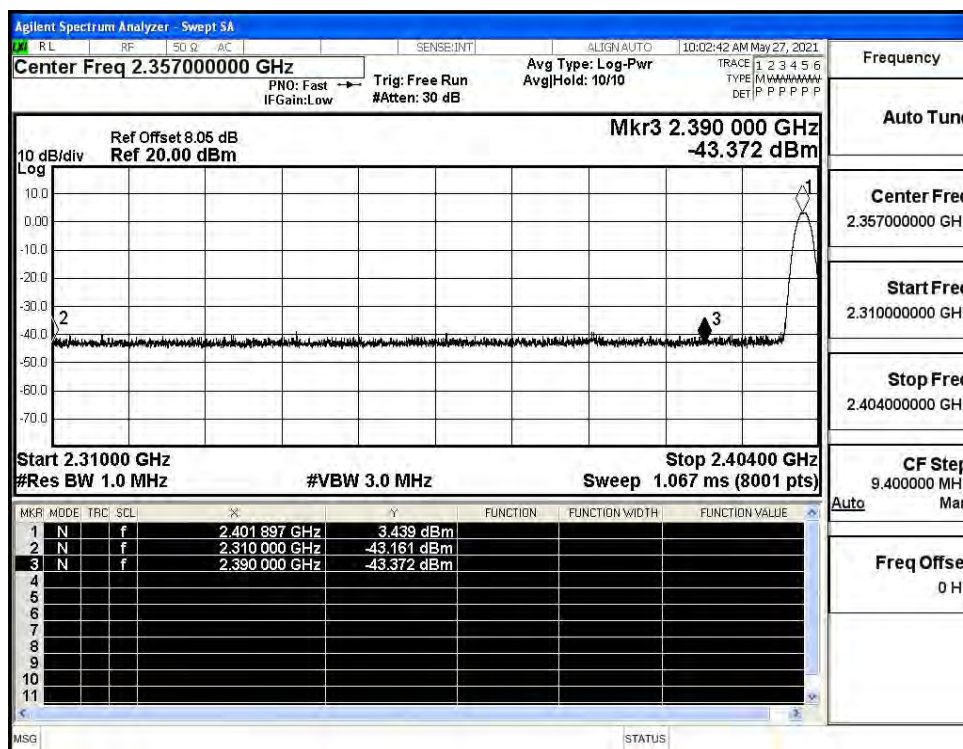
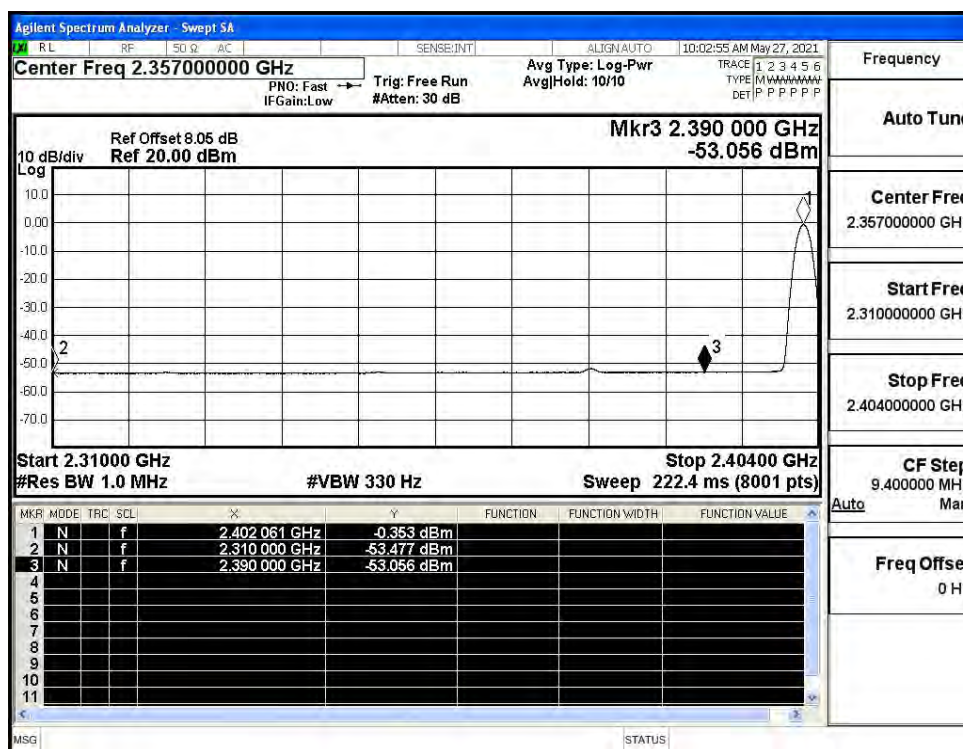


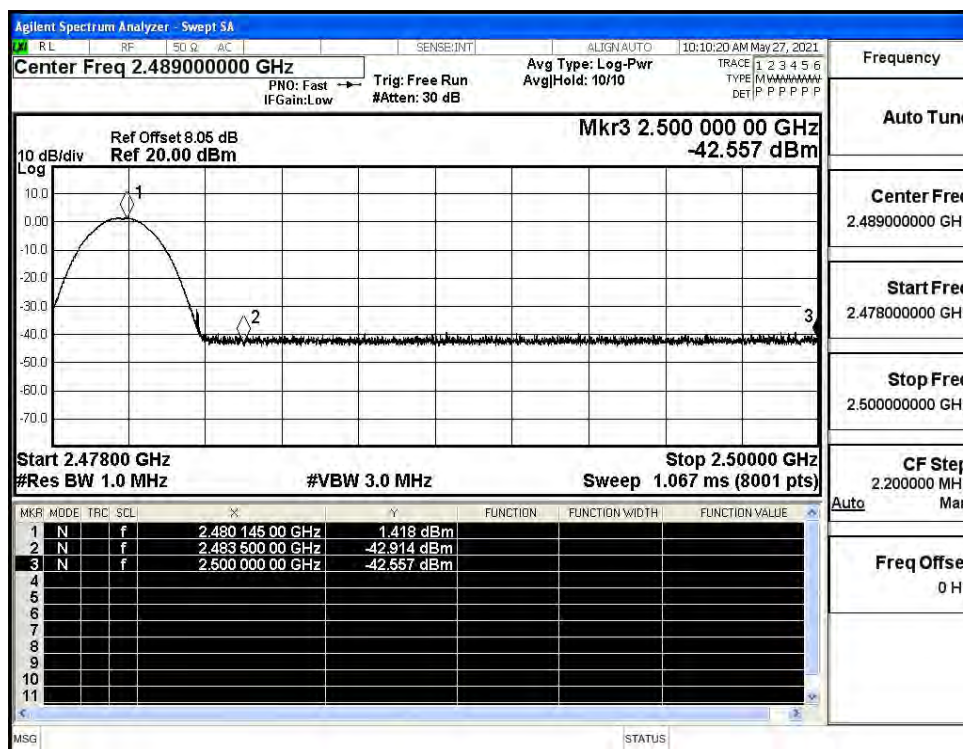
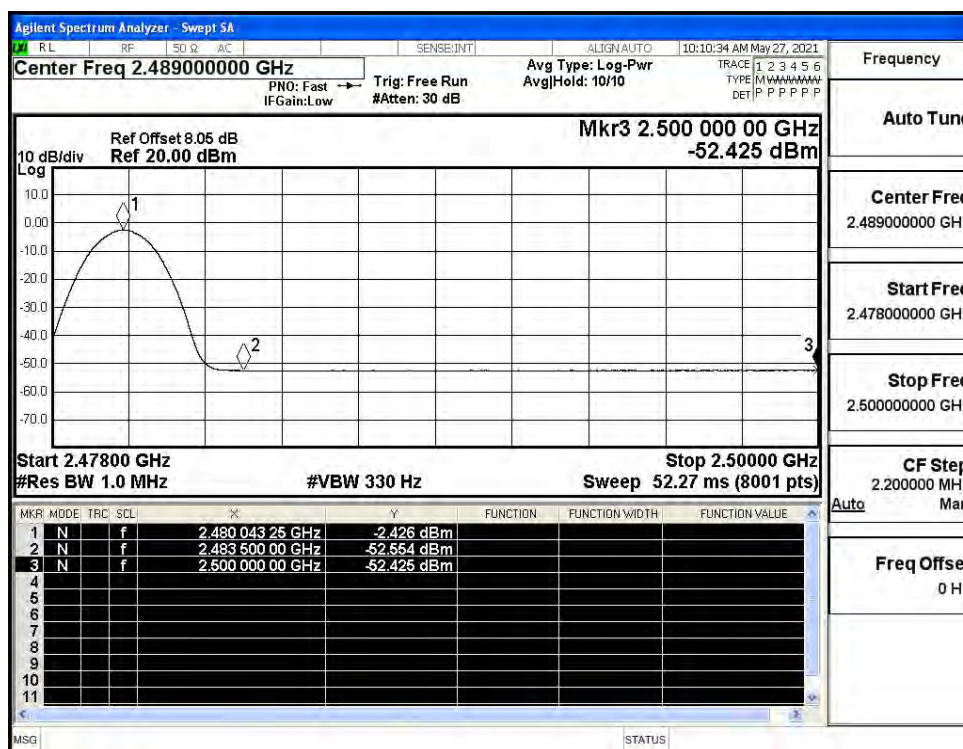
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



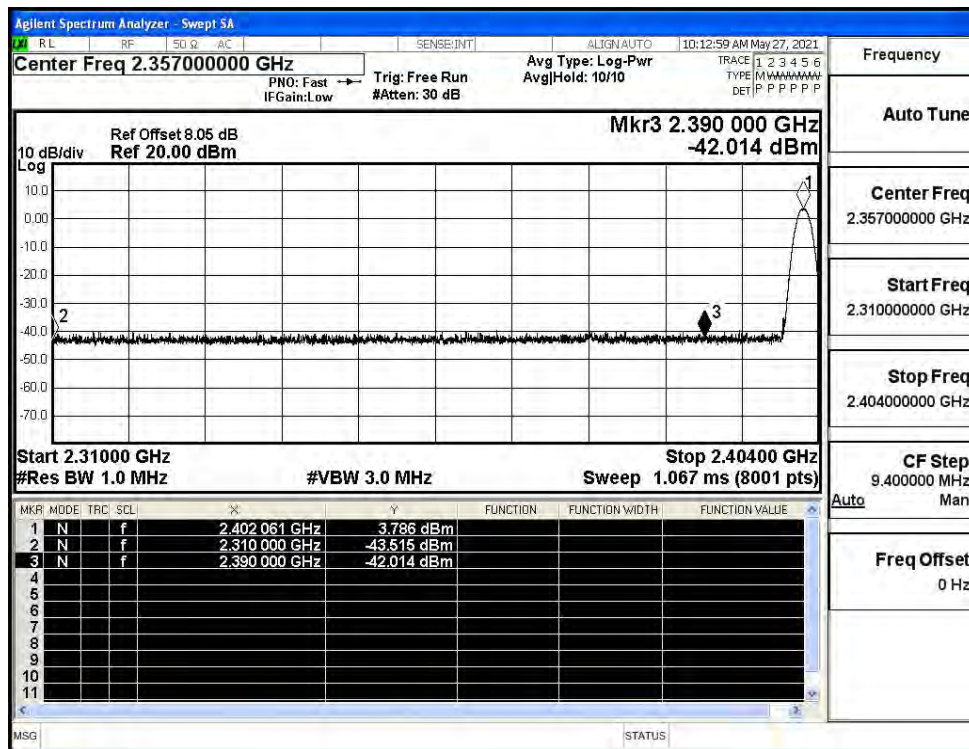
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



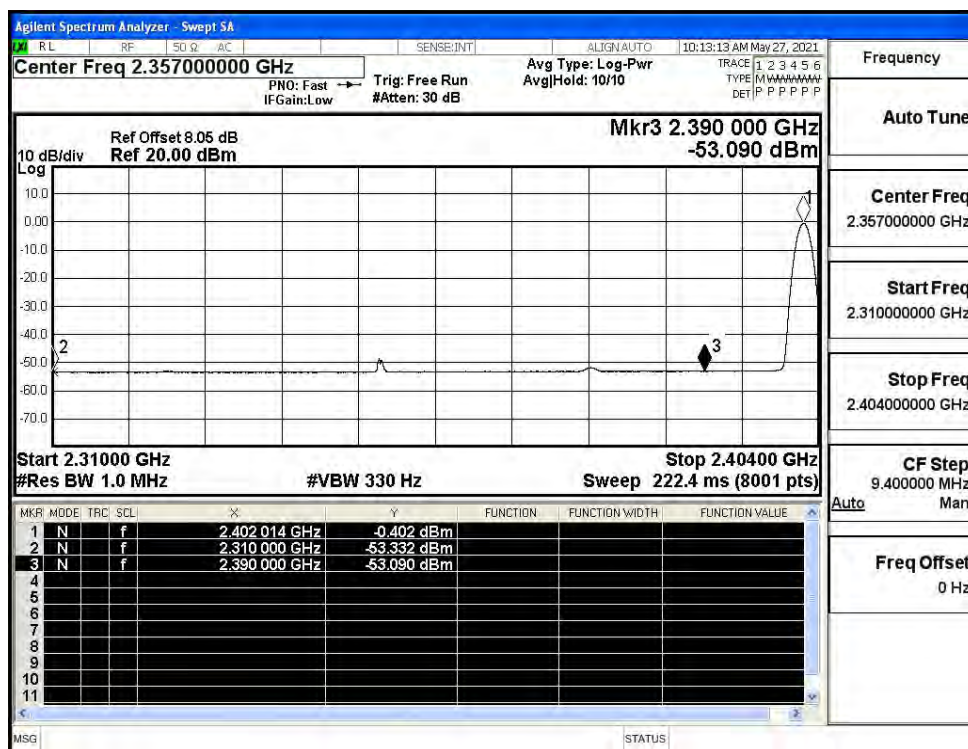
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

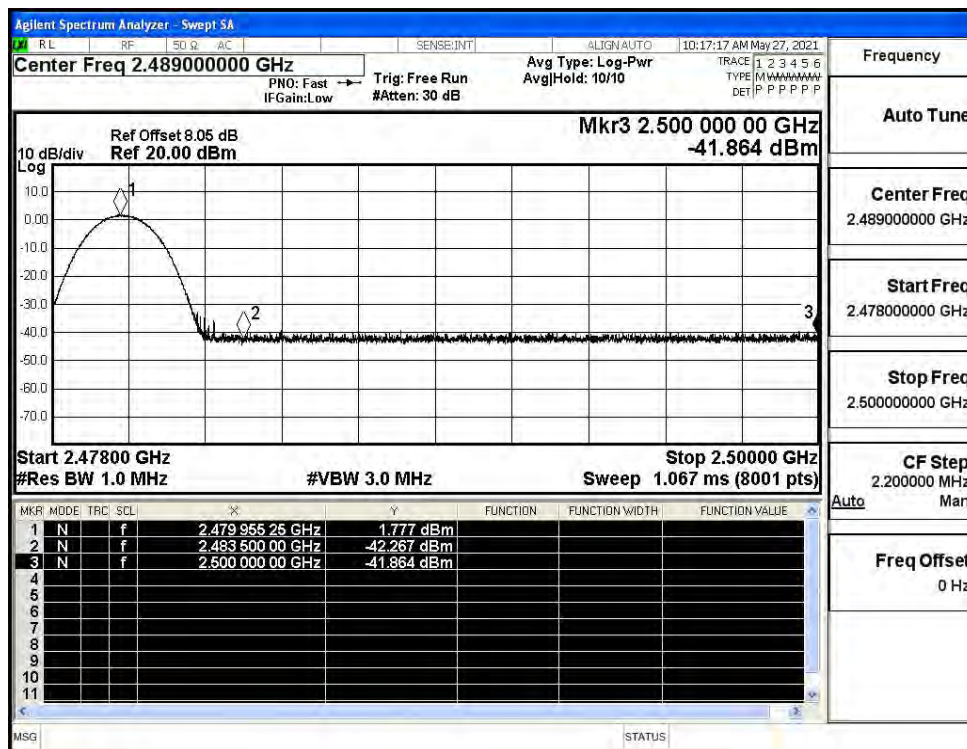
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

