

Appendix A

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

Product Name: Formuler Z8 pro

Trade Mark: FORMULER

Test Model: Z8 pro

Environmental Conditions

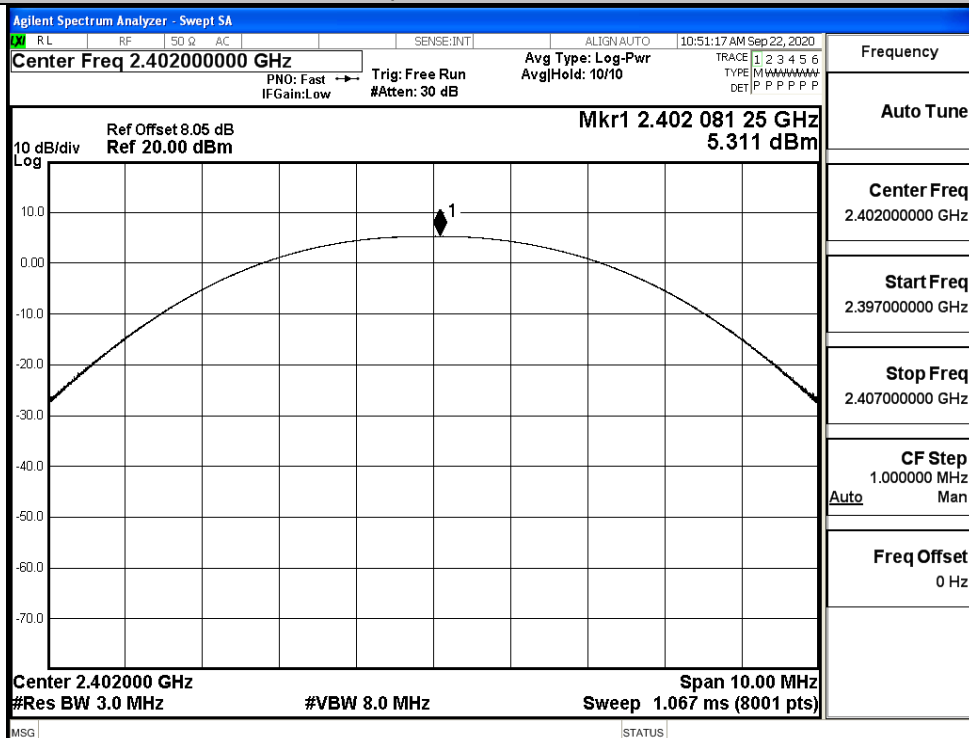
Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Li
Supervised by:	Li Huan

A.1 Maximum Conducted Peak Output Power

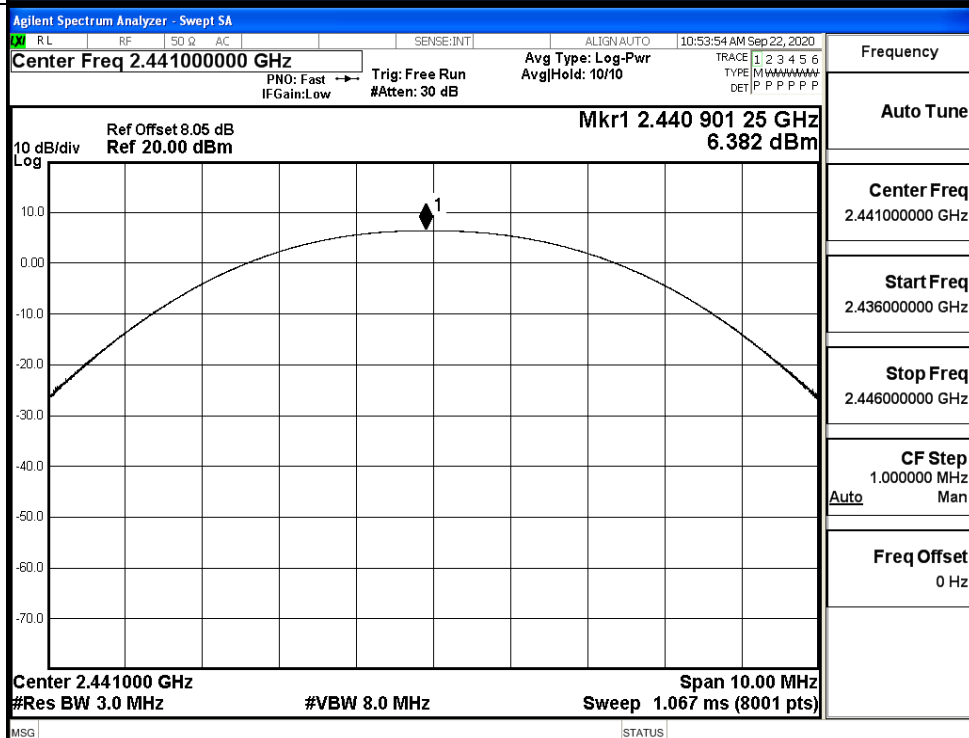
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	5.311	21	PASS
	MCH	6.382	21	PASS
	HCH	5.117	21	PASS
$\pi/4$ DQPSK	LCH	4.513	21	PASS
	MCH	5.578	21	PASS
	HCH	4.357	21	PASS
8DPSK	LCH	4.641	21	PASS
	MCH	5.707	21	PASS
	HCH	4.524	21	PASS

Test Graphs

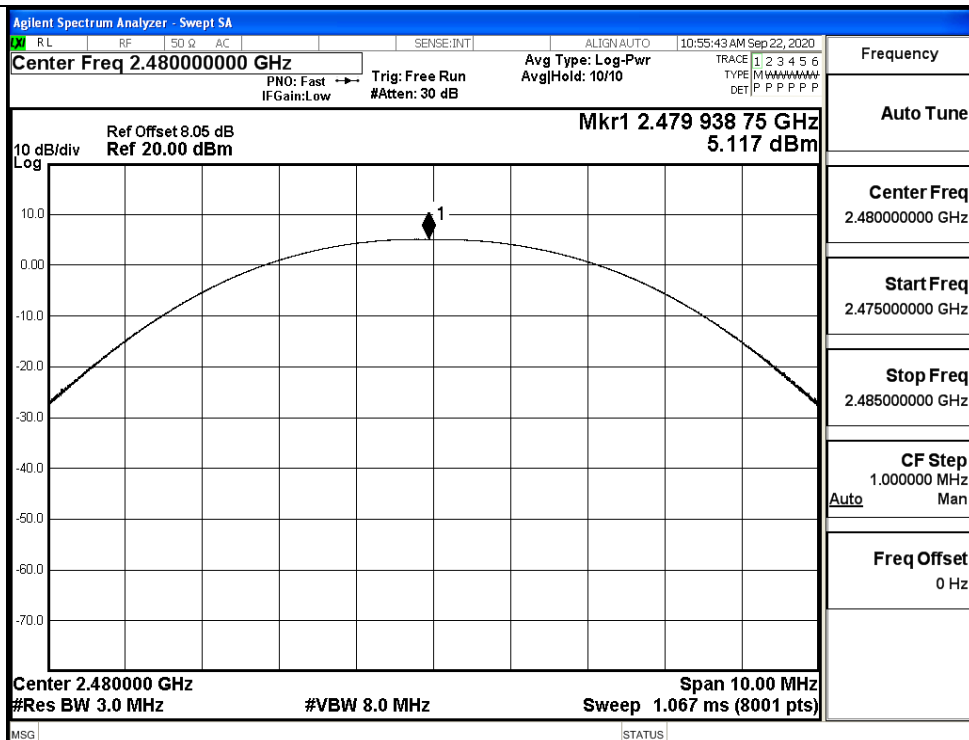
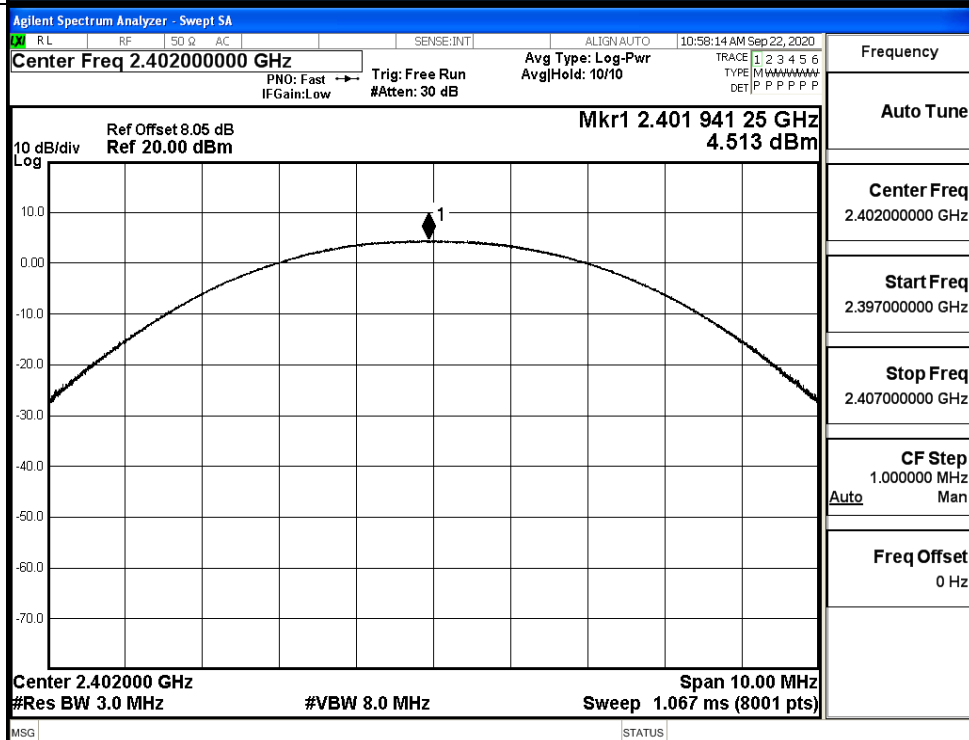
GFSK/LCH

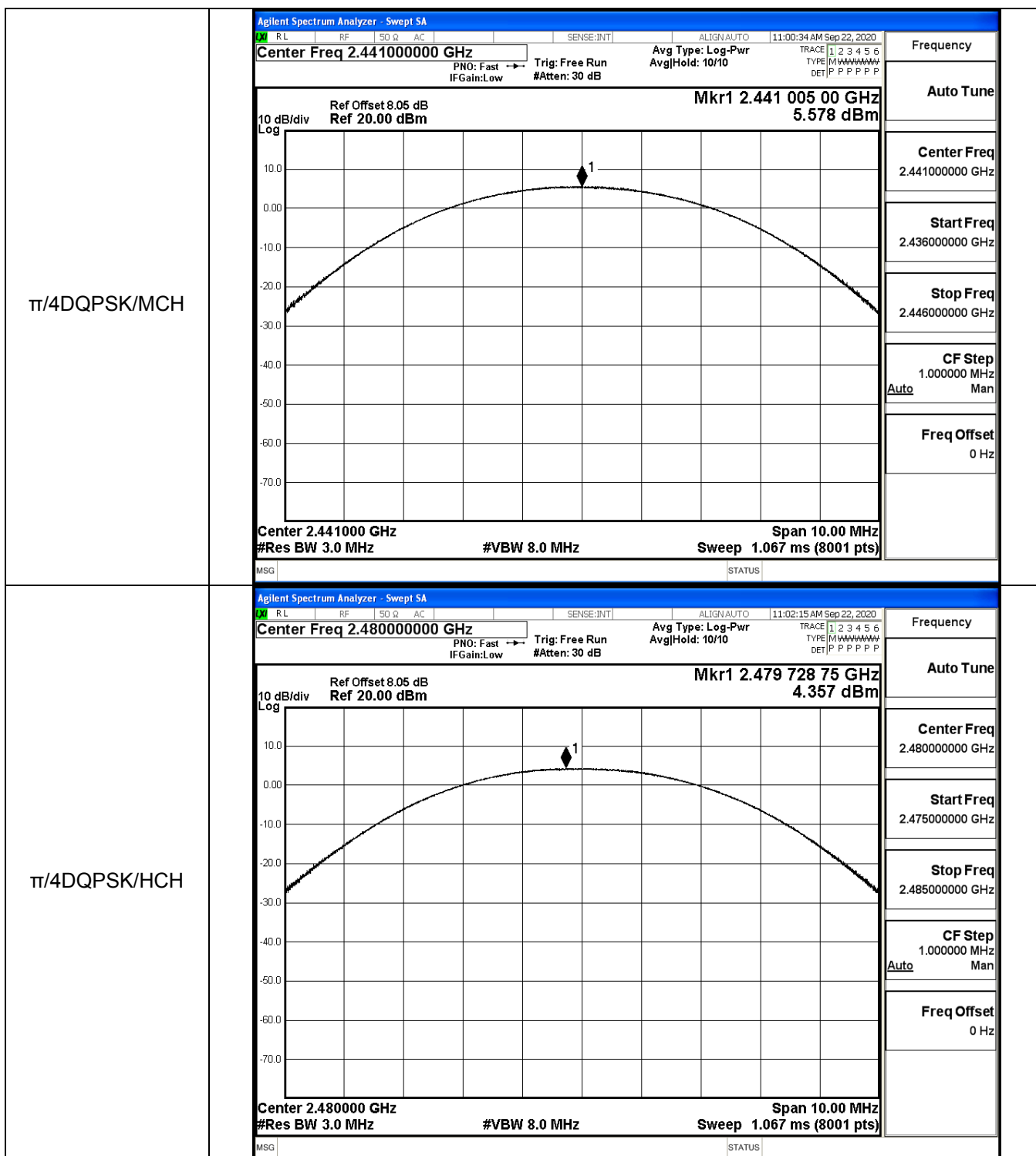


GFSK/MCH

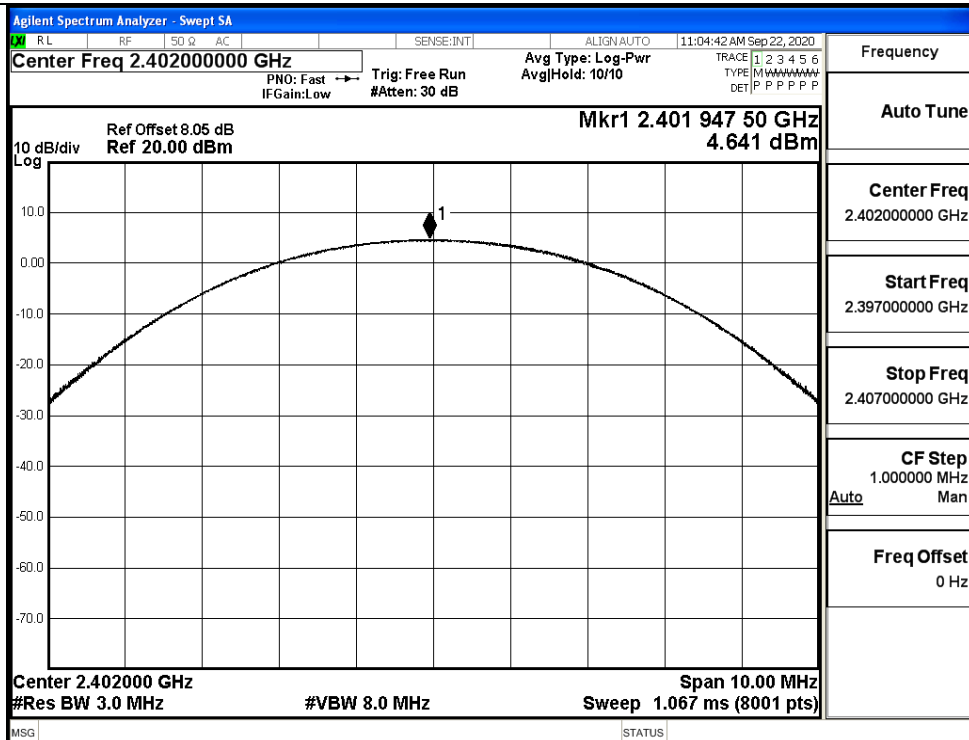


GFSK/HCH

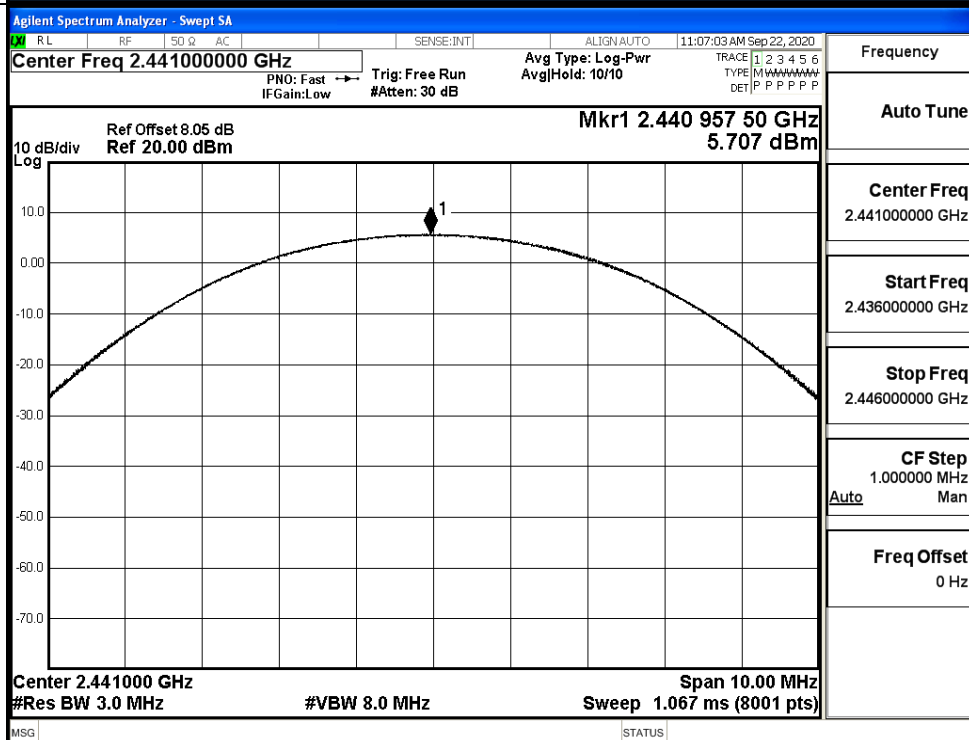
 π /4DQPSK/LCH



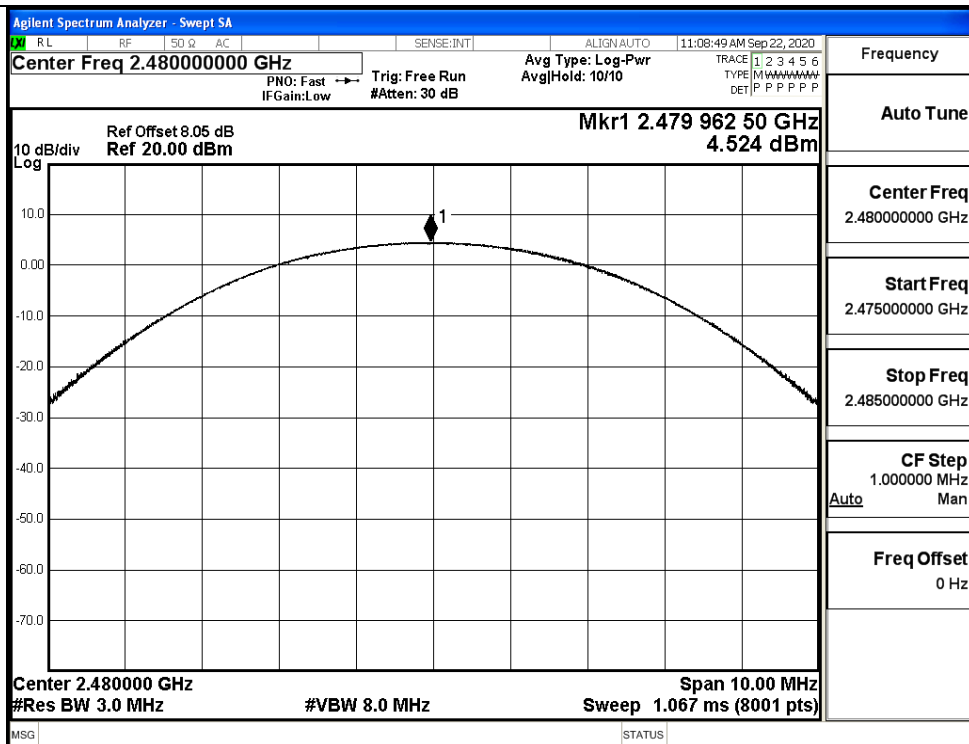
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

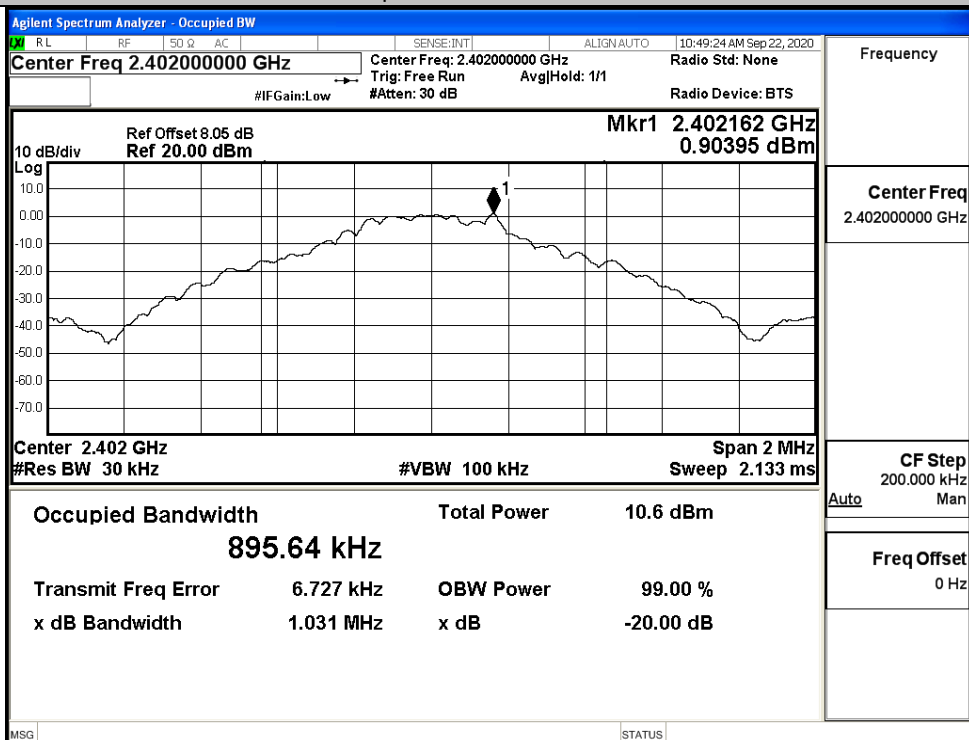


A.2 20dB Bandwidth

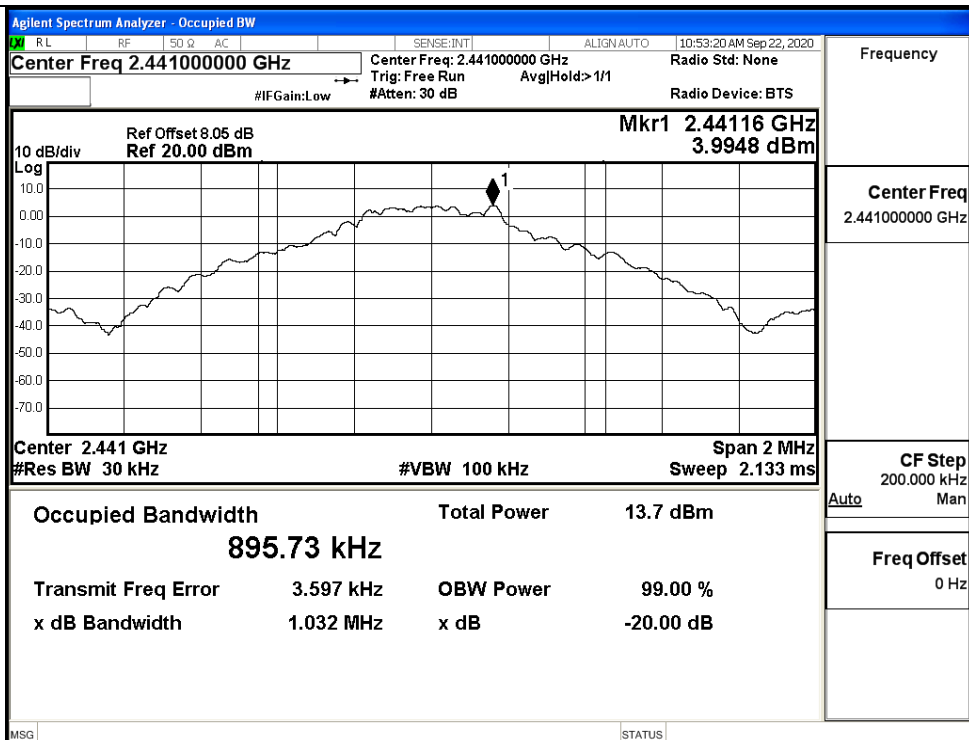
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.031	Not Specified	PASS
	MCH	1.032	Not Specified	PASS
	HCH	1.034	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.288	Not Specified	PASS
	MCH	1.287	Not Specified	PASS
	HCH	1.289	Not Specified	PASS
8DPSK	LCH	1.291	Not Specified	PASS
	MCH	1.291	Not Specified	PASS
	HCH	1.294	Not Specified	PASS

Test Graphs

GFSK/LCH



GFSK/MCH



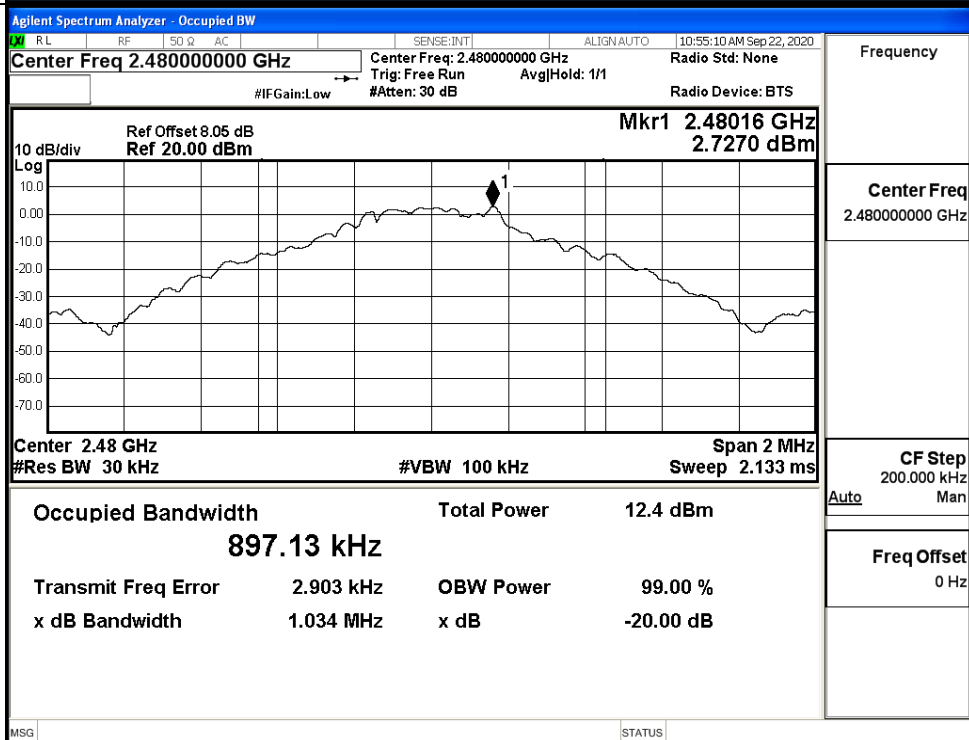
Frequency

Center Freq
2.441000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

GFSK/HCH

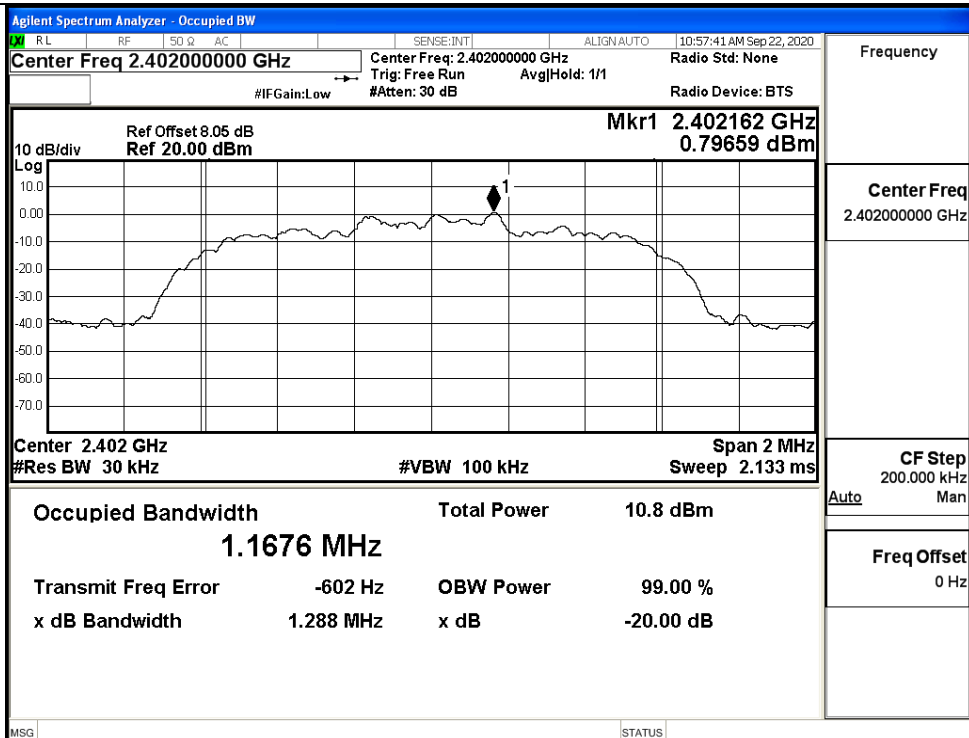


Frequency

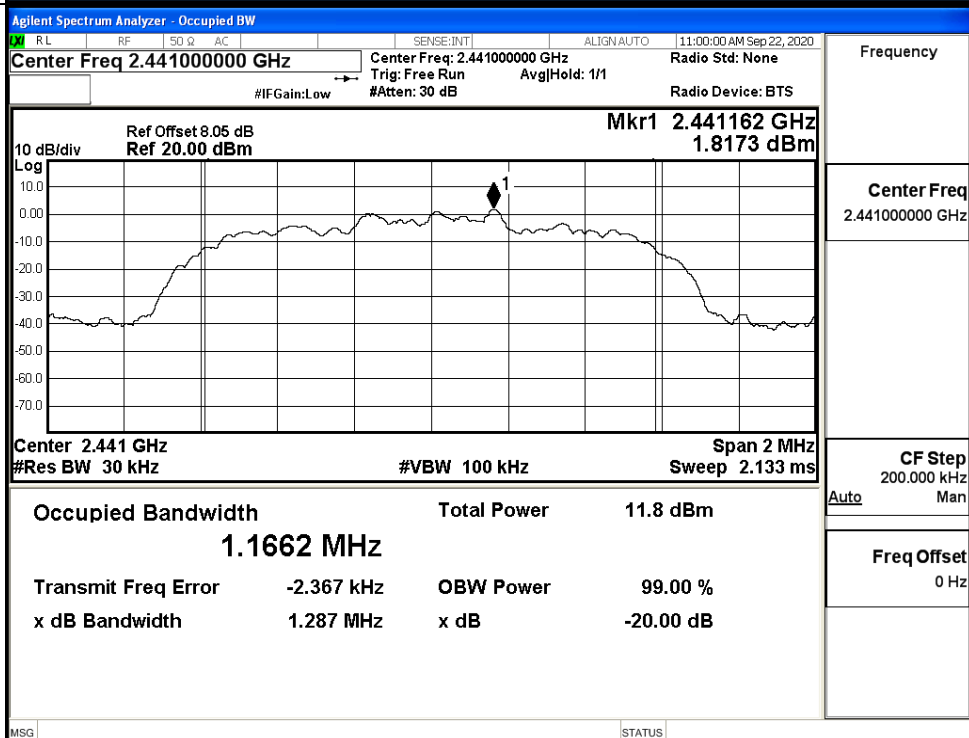
Center Freq
2.480000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

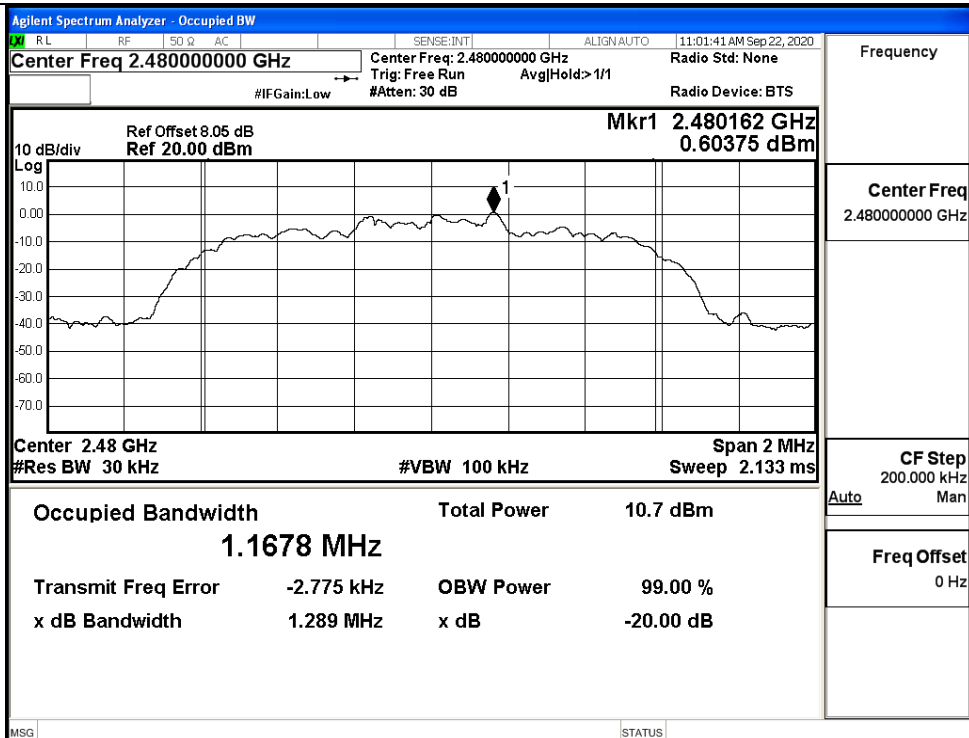
$\pi/4$ DQPSK/LCH

Frequency

Center Freq
2.402000000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz $\pi/4$ DQPSK/MCH

Frequency

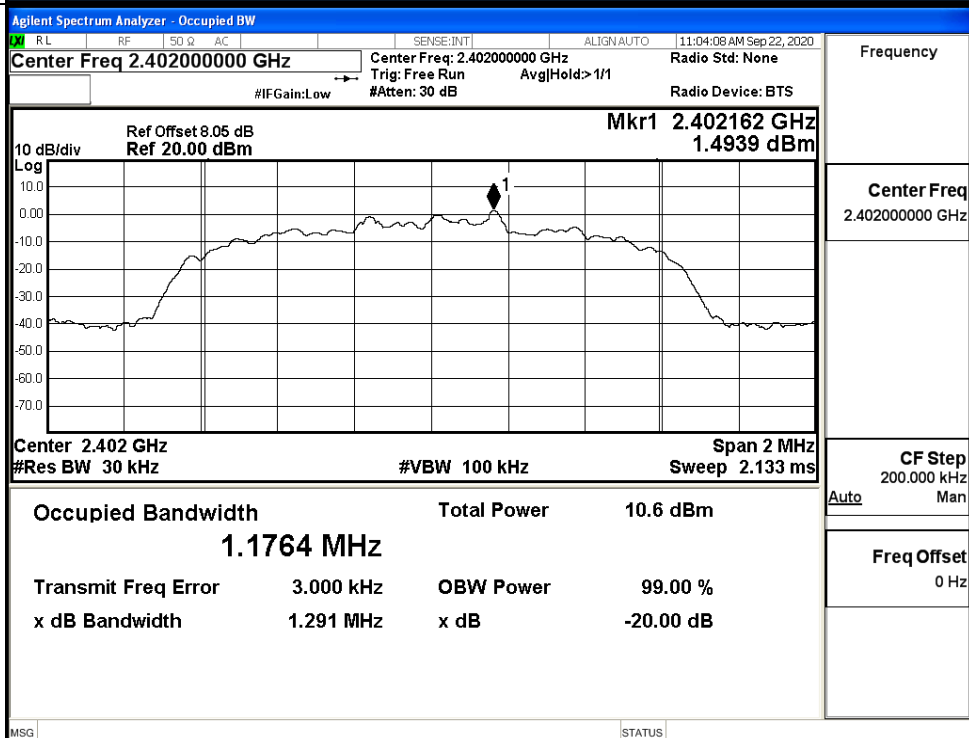
Center Freq
2.441000000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

π /4DQPSK/HCH

Frequency

Center Freq
2.480000000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

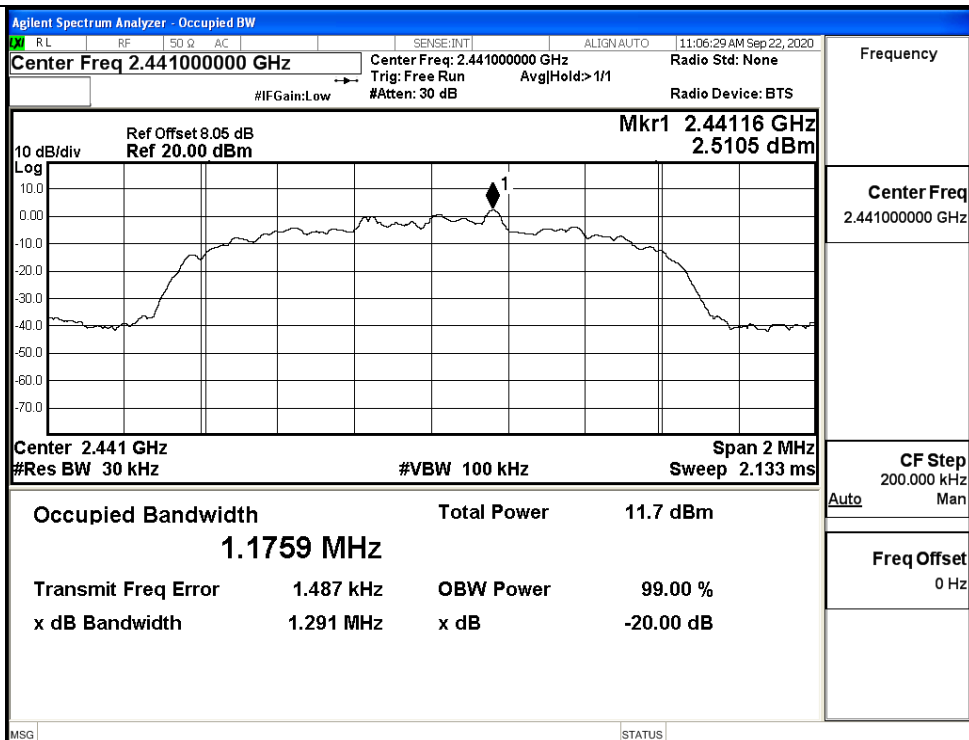
8DPSK/LCH



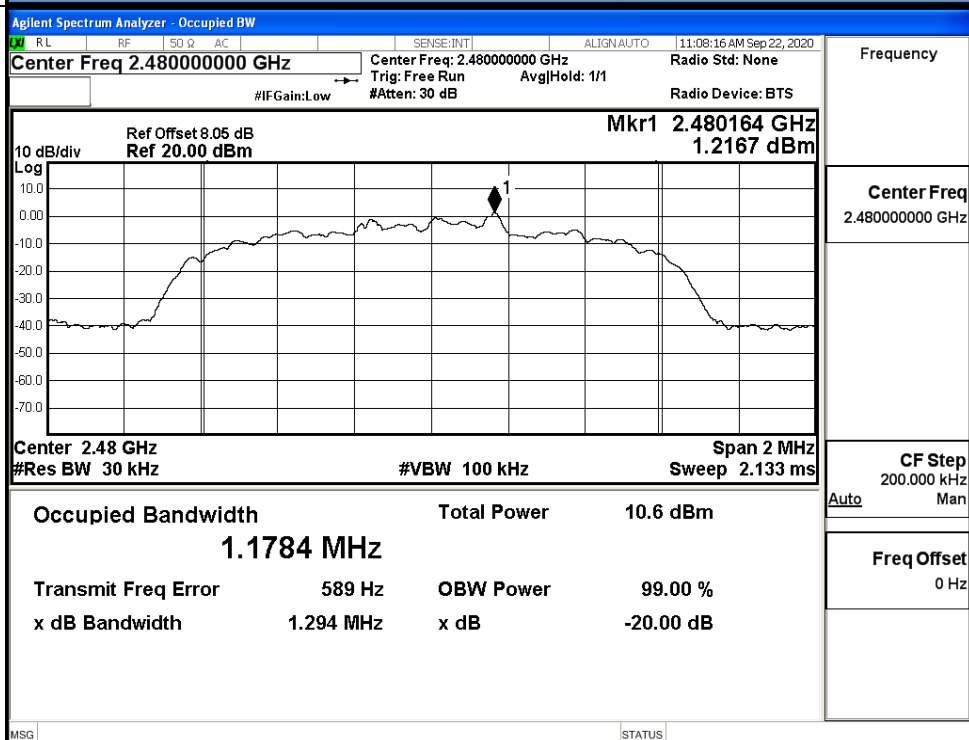
Frequency

Center Freq
2.402000000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

8DPSK/MCH



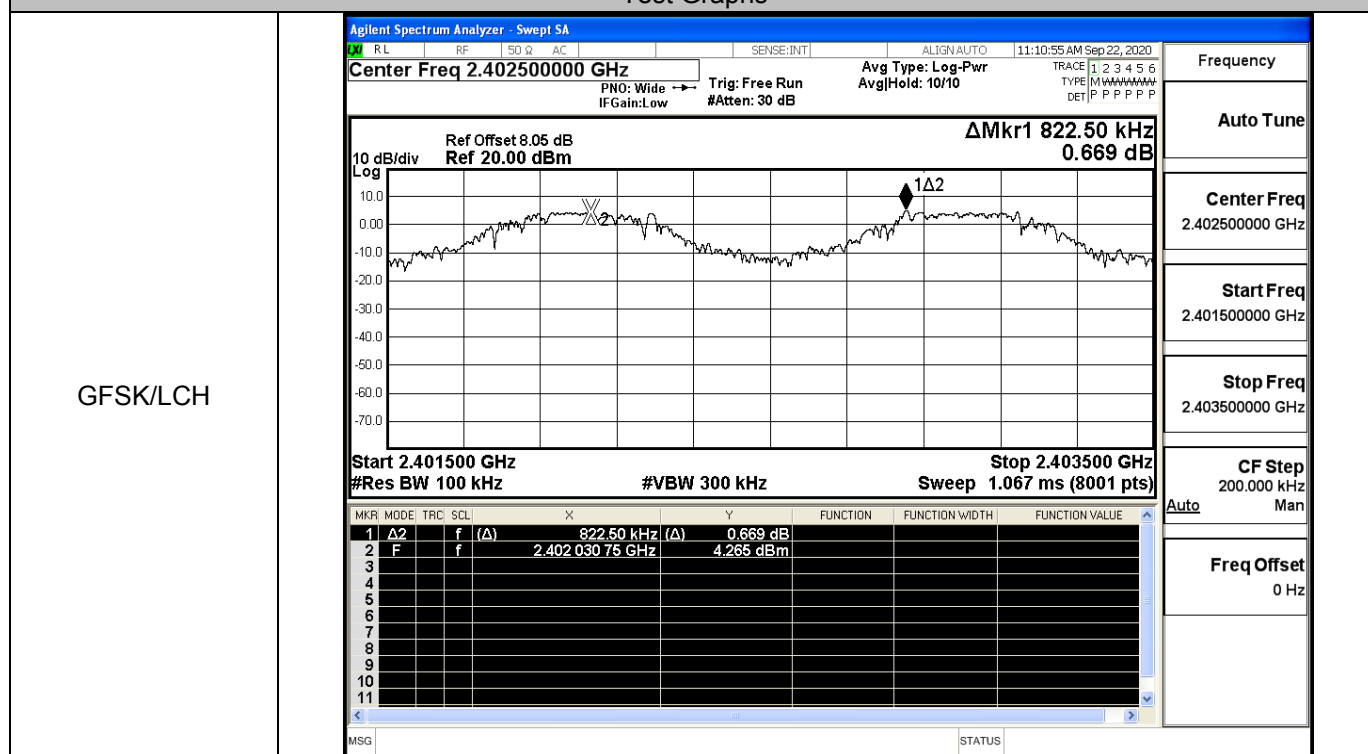
8DPSK/HCH



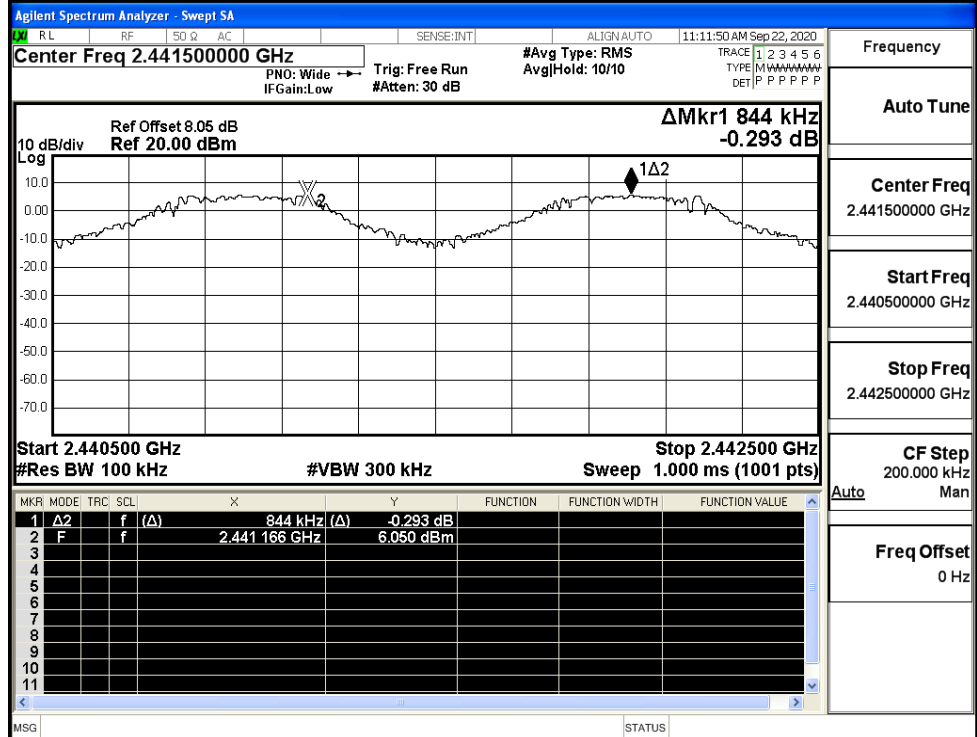
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.823	0.689	PASS
	MCH	0.844	0.689	PASS
	HCH	1.084	0.689	PASS
$\pi/4$ DQPSK	LCH	1.276	0.859	PASS
	MCH	0.956	0.859	PASS
	HCH	1.176	0.859	PASS
8DPSK	LCH	0.866	0.863	PASS
	MCH	0.980	0.863	PASS
	HCH	1.094	0.863	PASS

Test Graphs



GFSK/MCH

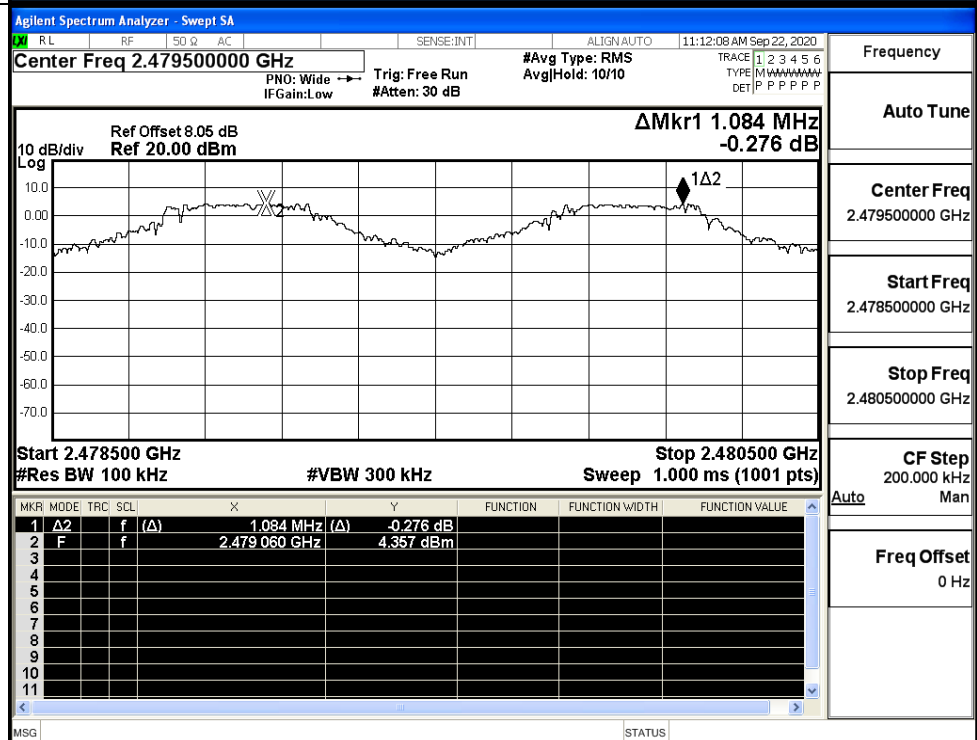


Frequency

Auto Tune

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

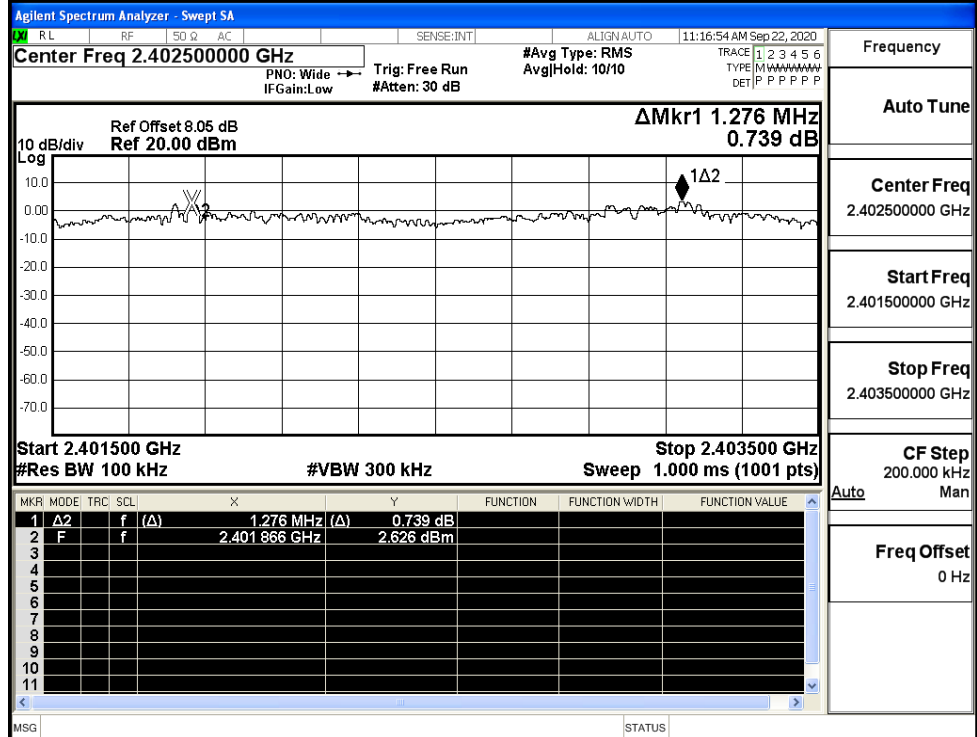
GFSK/HCH



Frequency

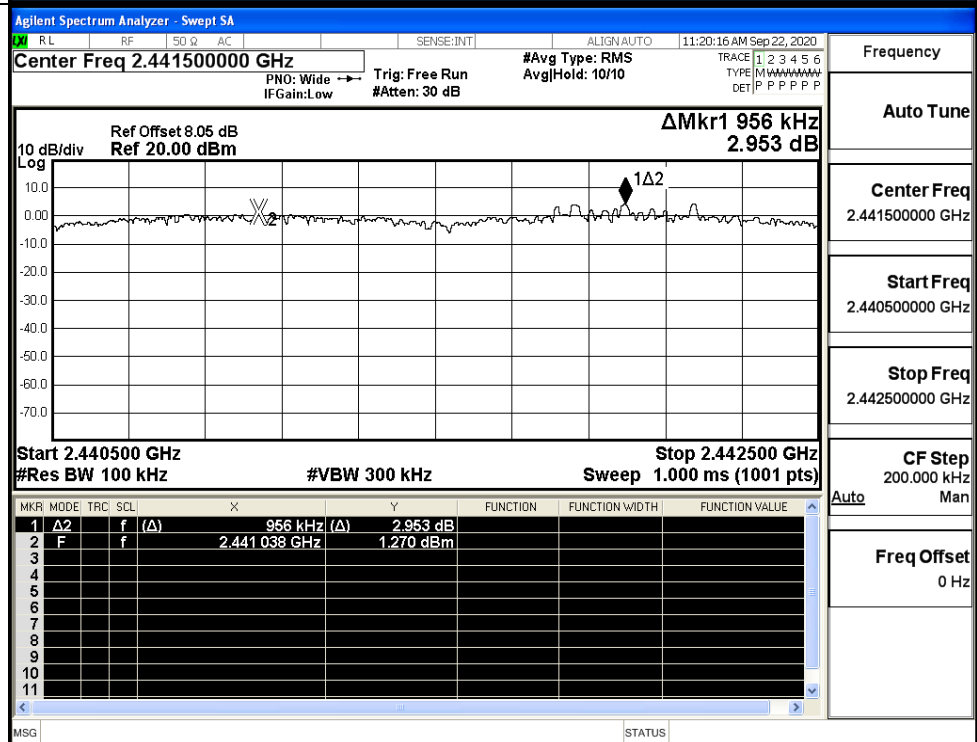
Auto Tune

Center Freq
2.479500000 GHzStart Freq
2.478500000 GHzStop Freq
2.480500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

$\pi/4$ DQPSK/LCH

Frequency

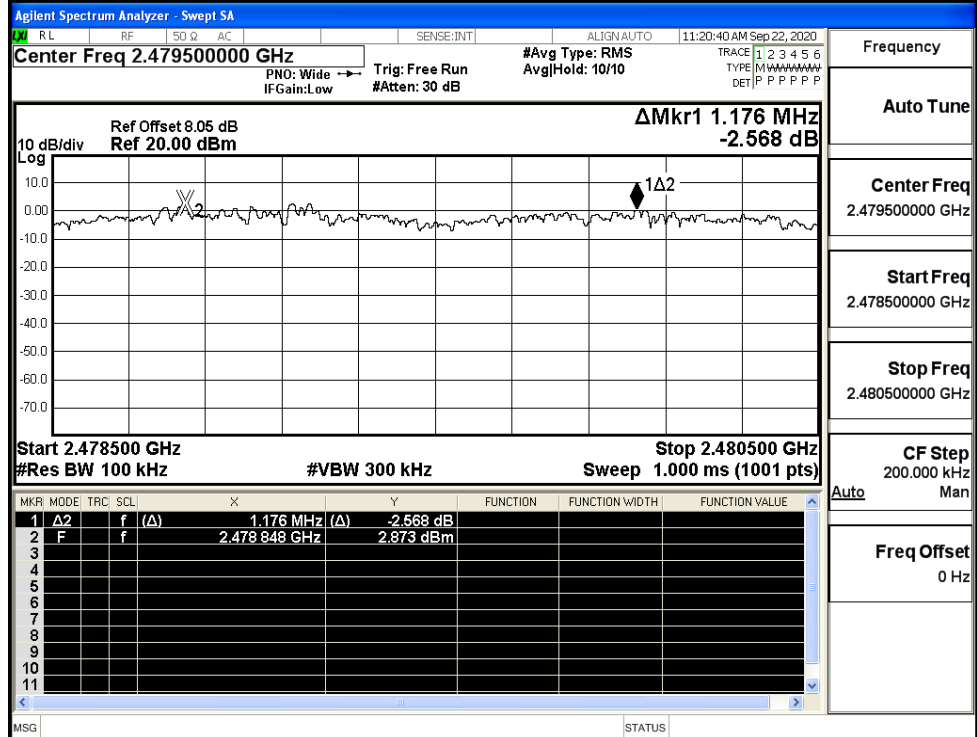
Auto Tune

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

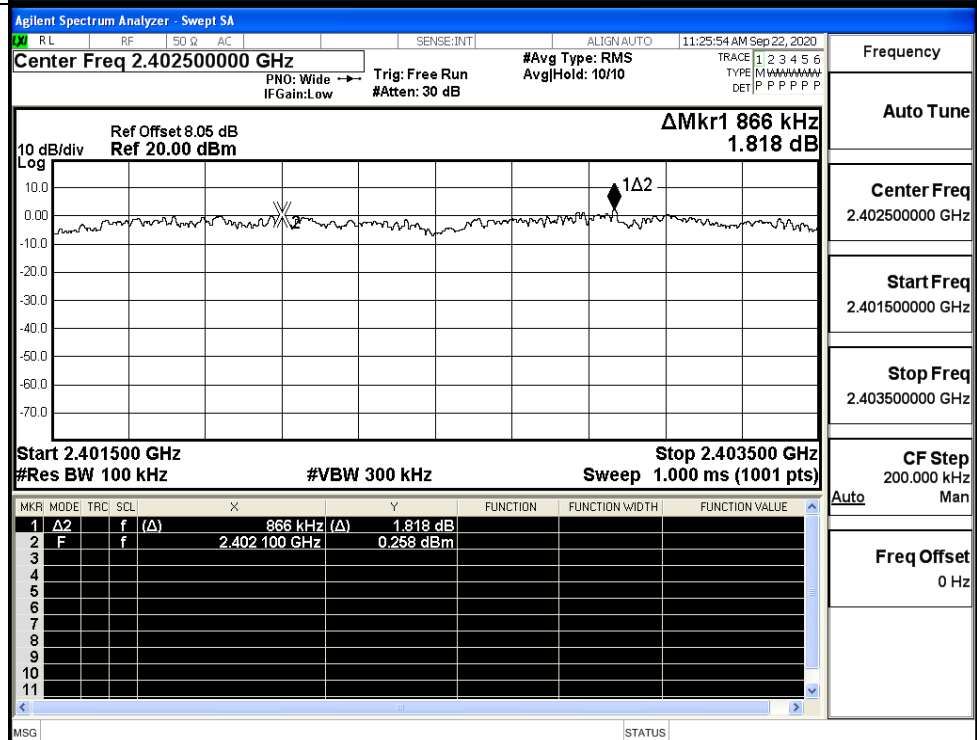
$\pi/4$ DQPSK/HCH

Frequency

Auto Tune

Center Freq
2.479500000 GHzStart Freq
2.478500000 GHzStop Freq
2.480500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

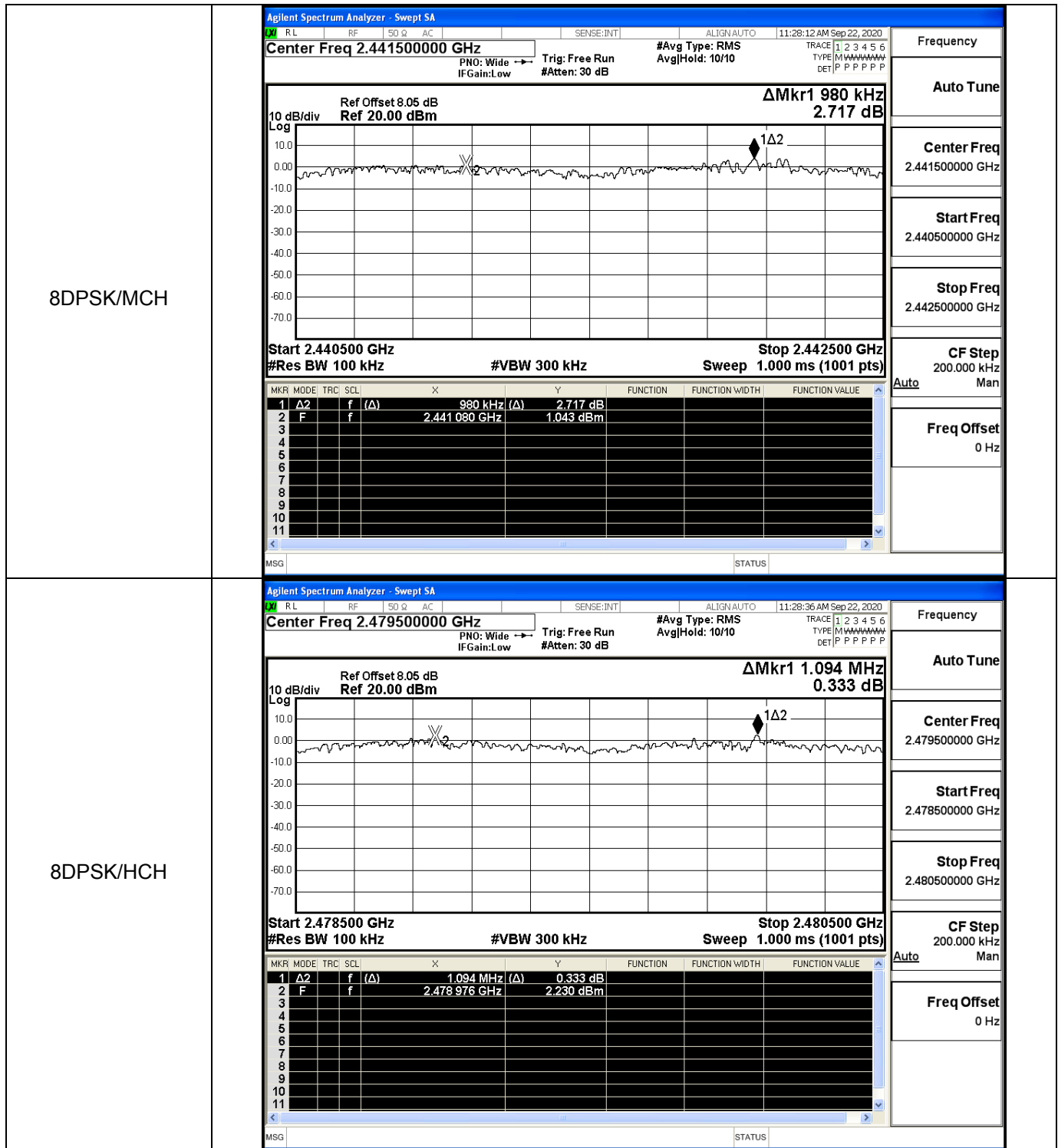
8DPSK/LCH



Frequency

Auto Tune

Center Freq
2.402500000 GHzStart Freq
2.401500000 GHzStop Freq
2.403500000 GHzCF Step
200.000 kHz
ManFreq Offset
0 Hz

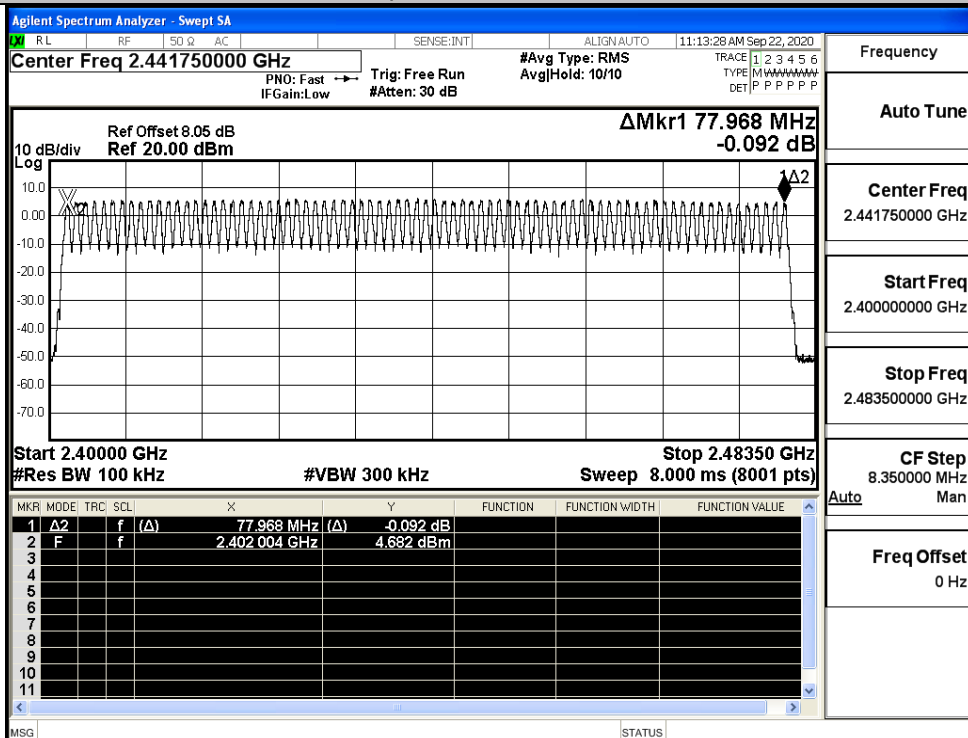


A.4 Hopping Channel Number

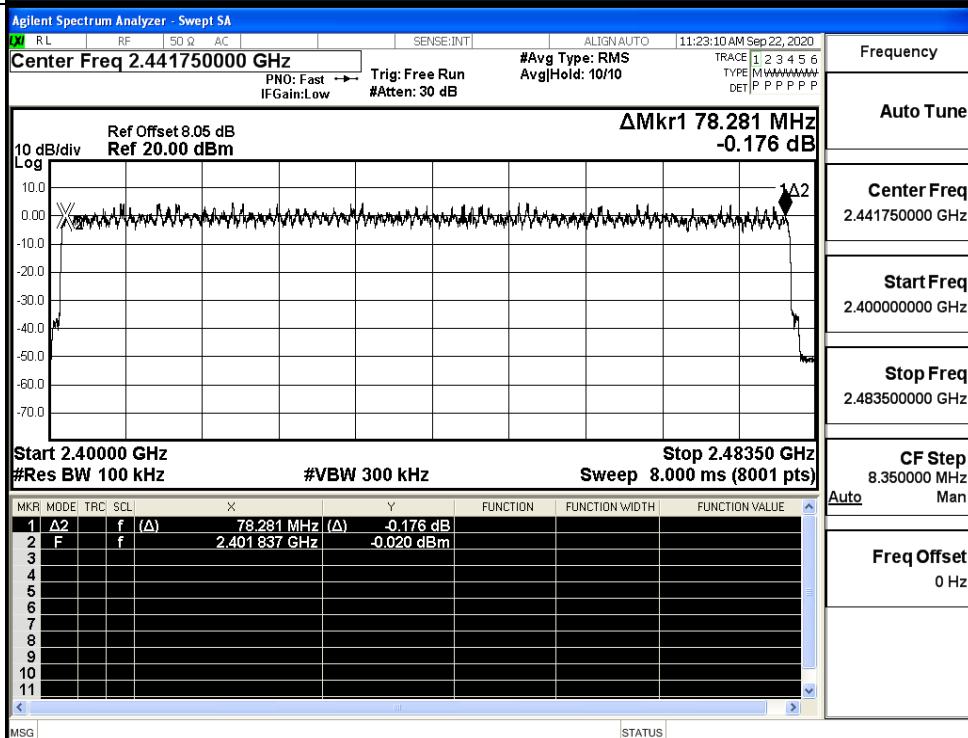
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

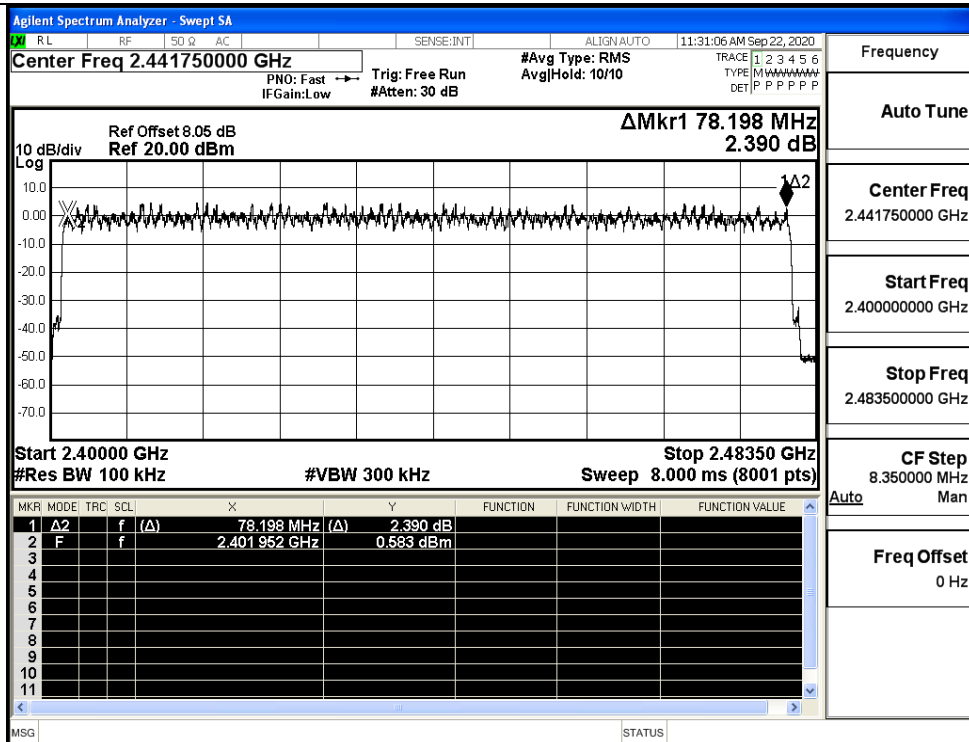
GFSK/Hop



π/4DQPSK/Hop



8DPSK/Hop

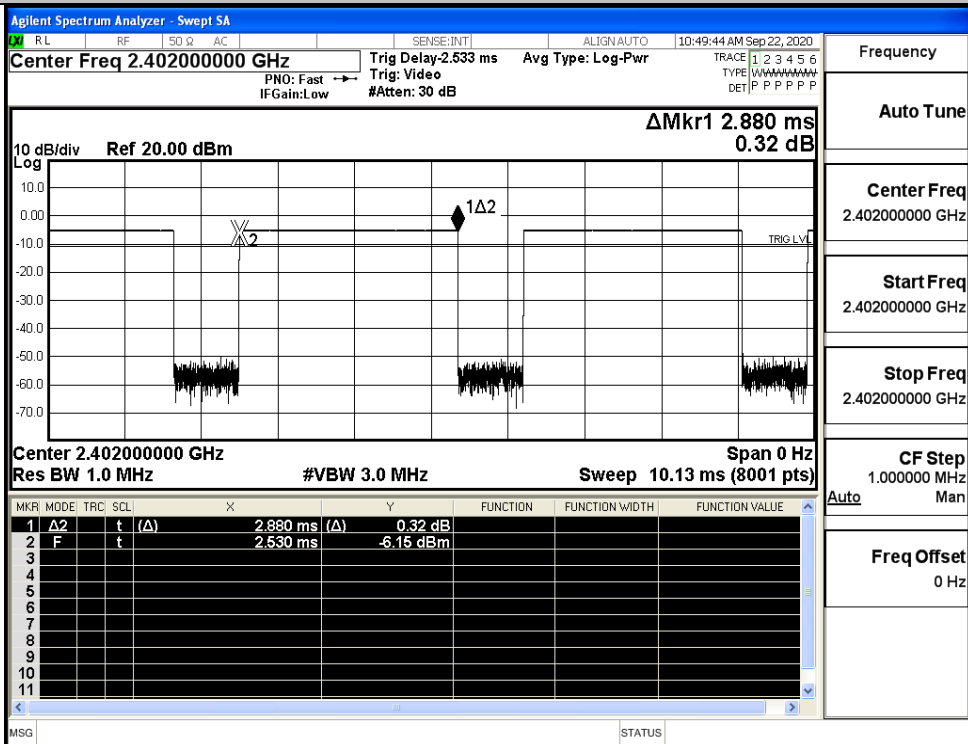


A.5 Dwell Time

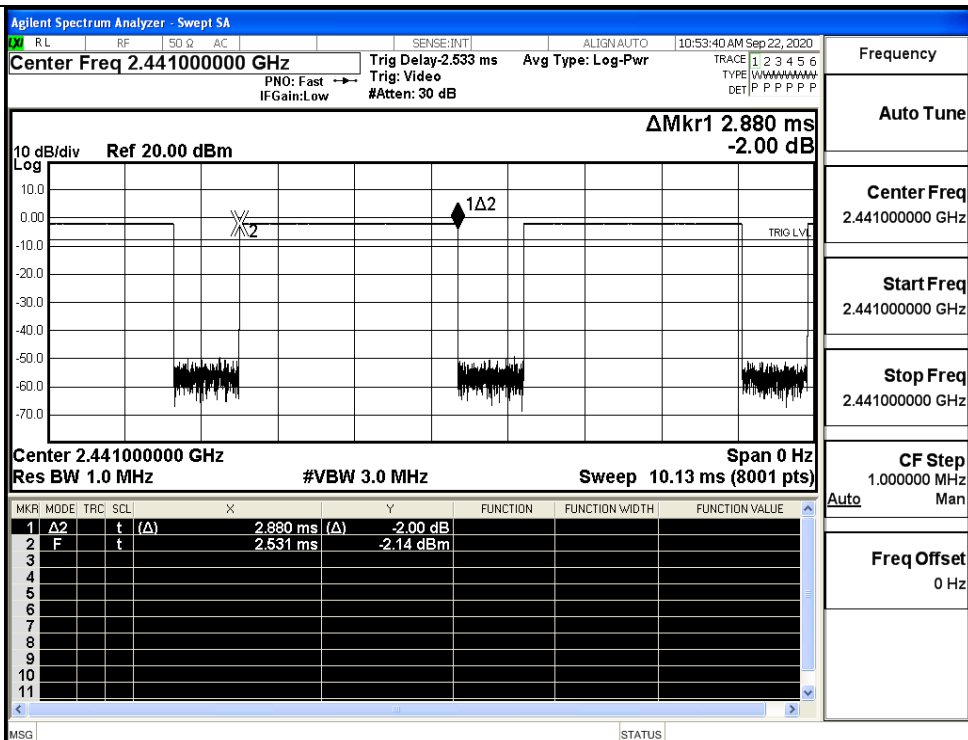
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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

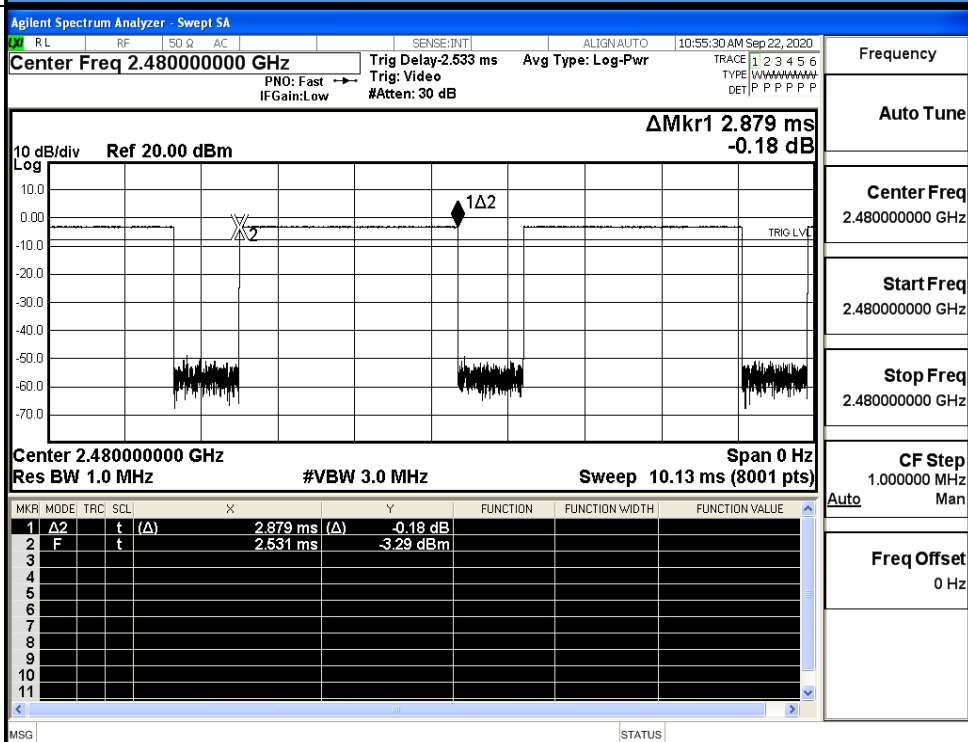
GFSK_DH5/LCH

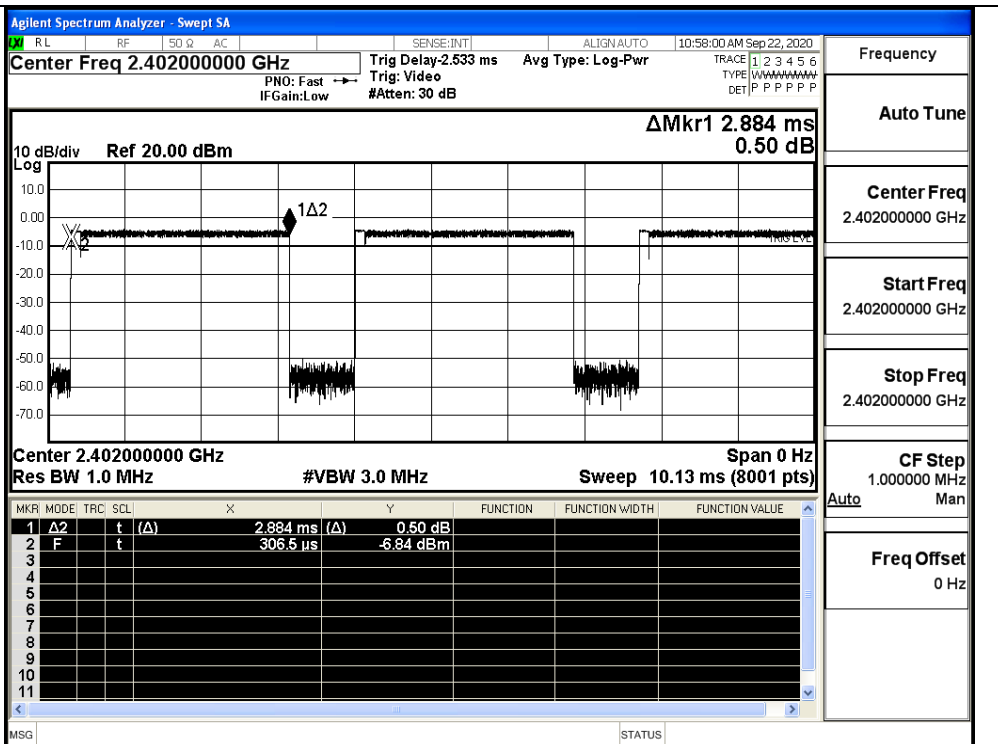
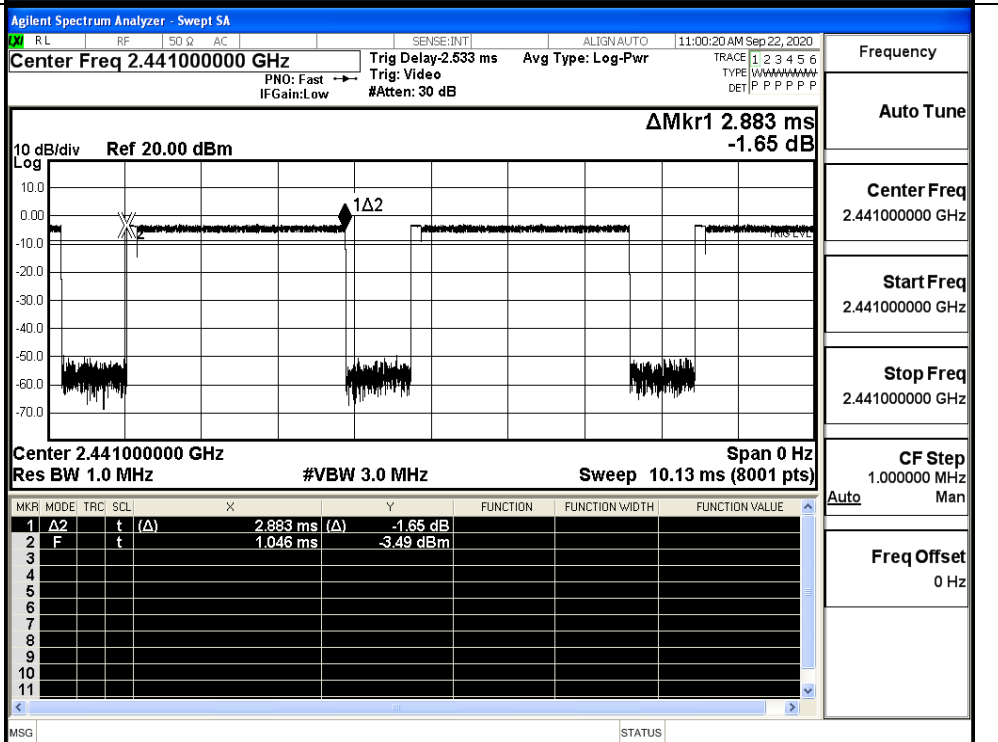


GFSK_DH5/MCH

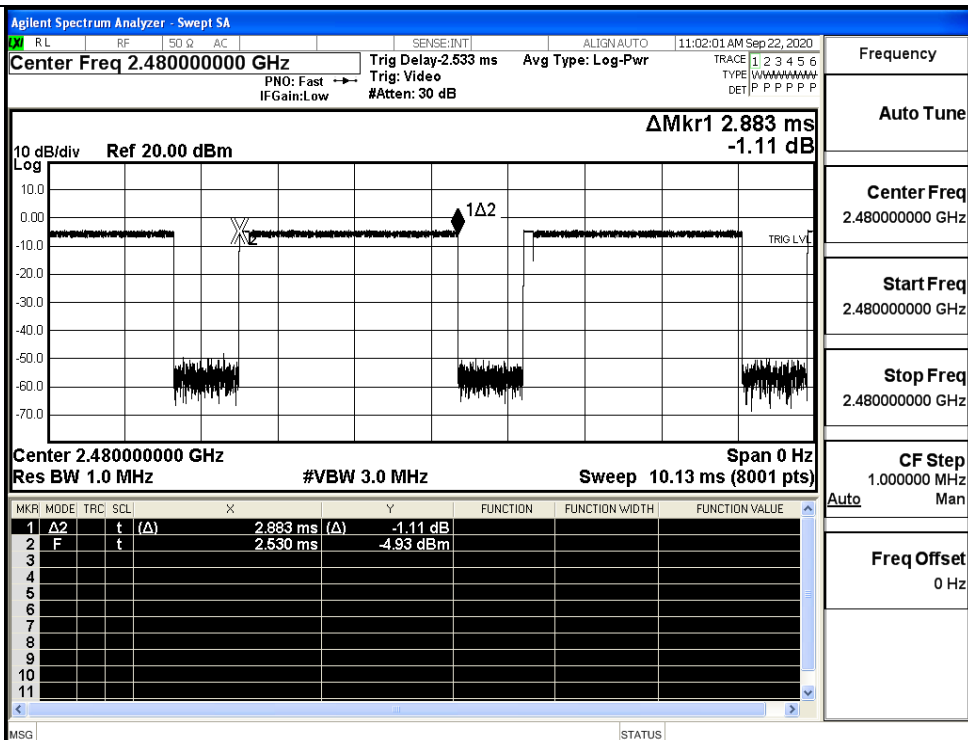


GFSK_DH5/HCH

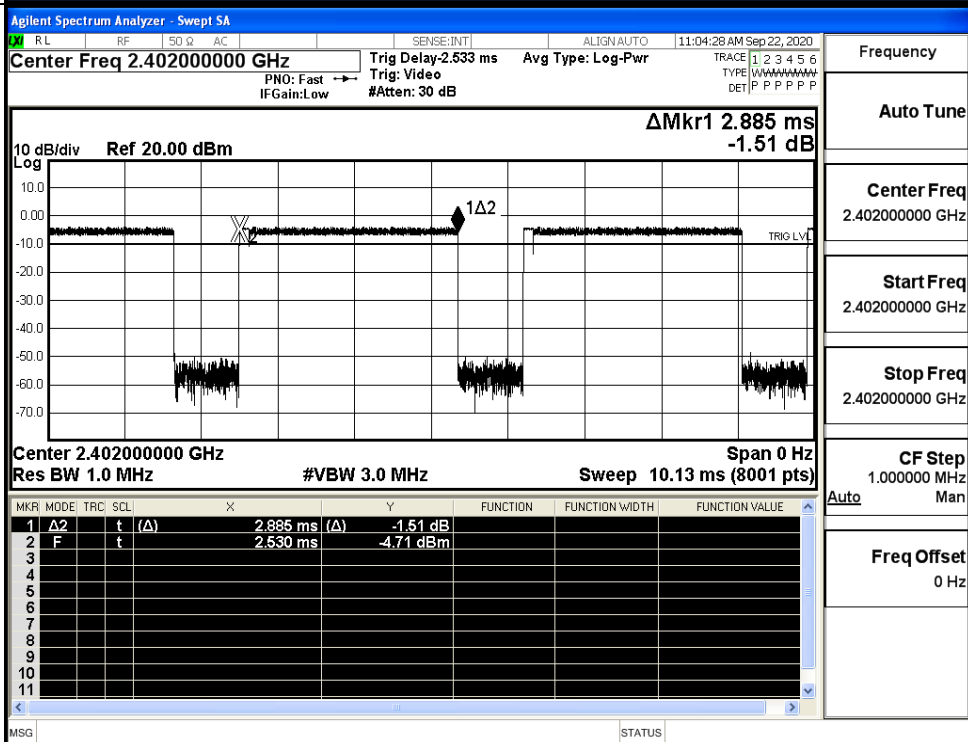


$\pi/4$ DQPSK
_2DH5/LCH $\pi/4$ DQPSK
_2DH5/MCH

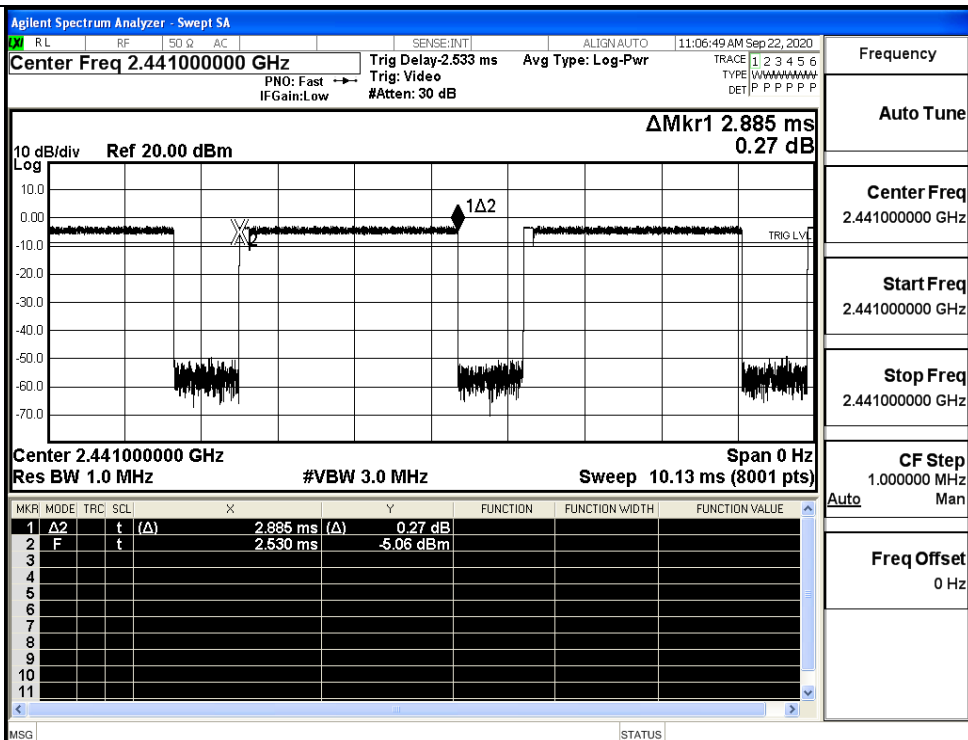
$\pi/4$ DQPSK
_2DH5/HCH



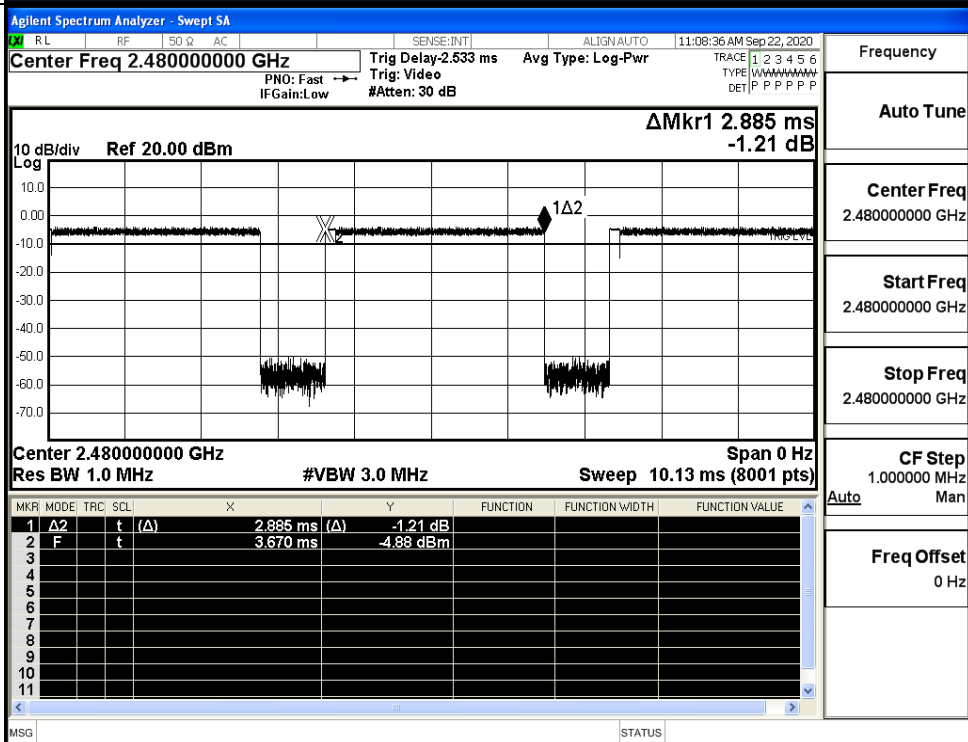
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



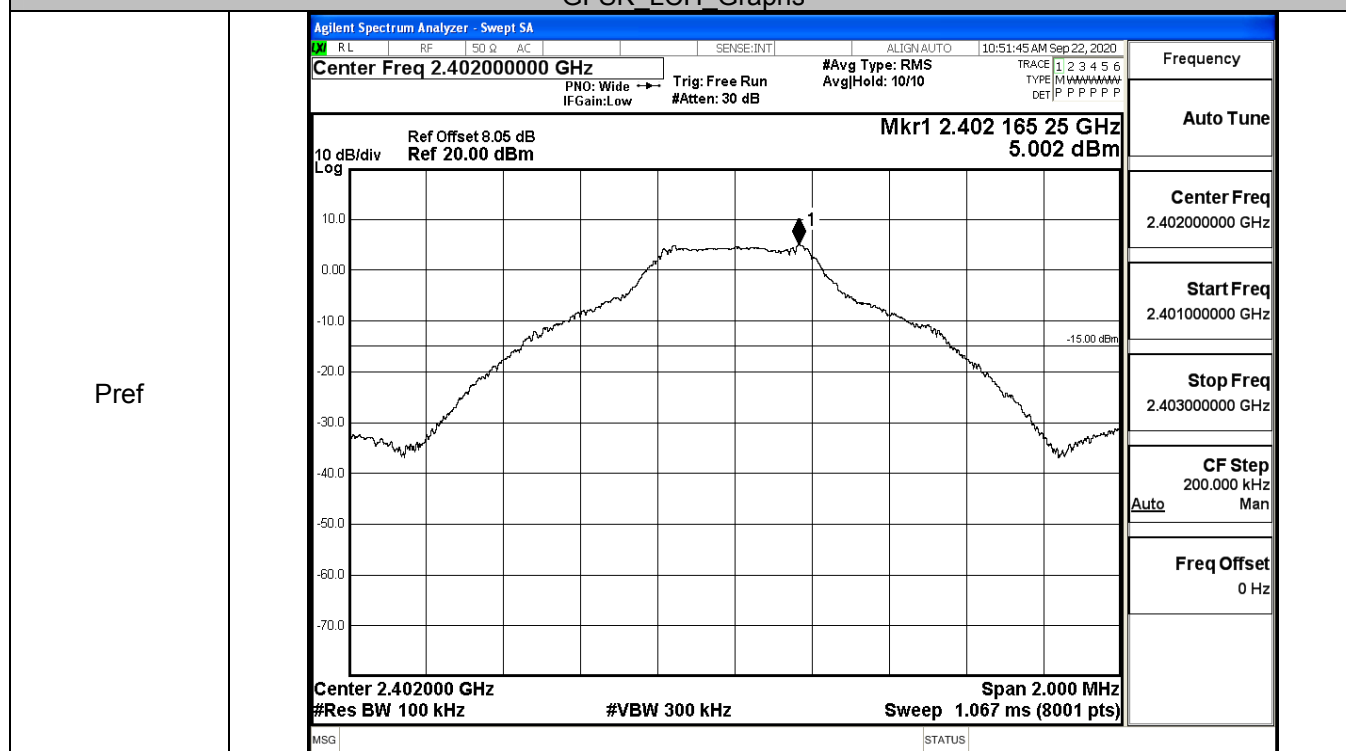
8DPSK_3DH5/HCH

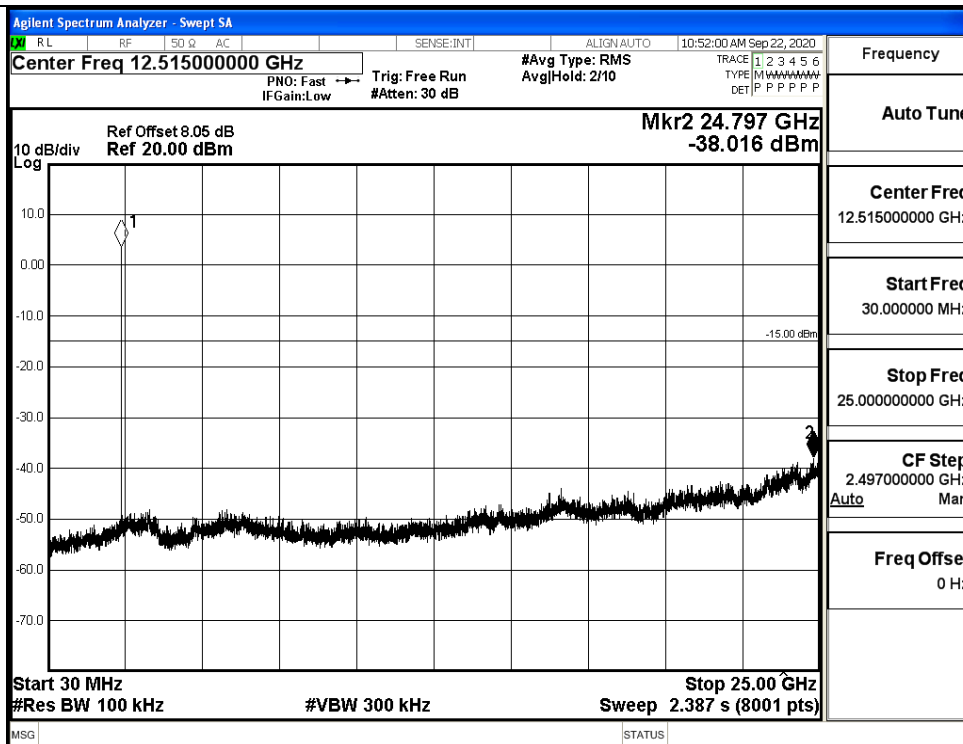


A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	5.002	-38.016	-14.998	PASS
	MCH	6.097	-38.344	-13.903	PASS
	HCH	4.851	-38.519	-15.149	PASS
$\pi/4$ DQPSK	LCH	2.792	-37.986	-17.208	PASS
	MCH	4.417	-37.537	-15.583	PASS
	HCH	3.223	-38.317	-16.777	PASS
8DPSK	LCH	2.902	-38.796	-17.098	PASS
	MCH	4.283	-38.454	-15.717	PASS
	HCH	3.379	-38.264	-16.621	PASS

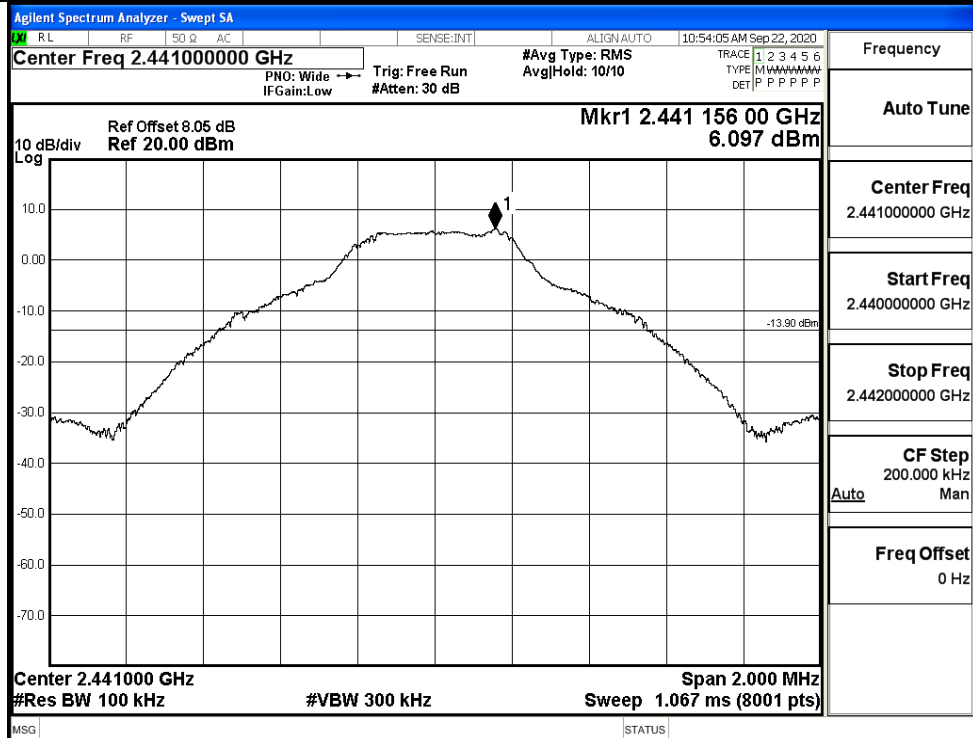
GFSK LCH Graphs



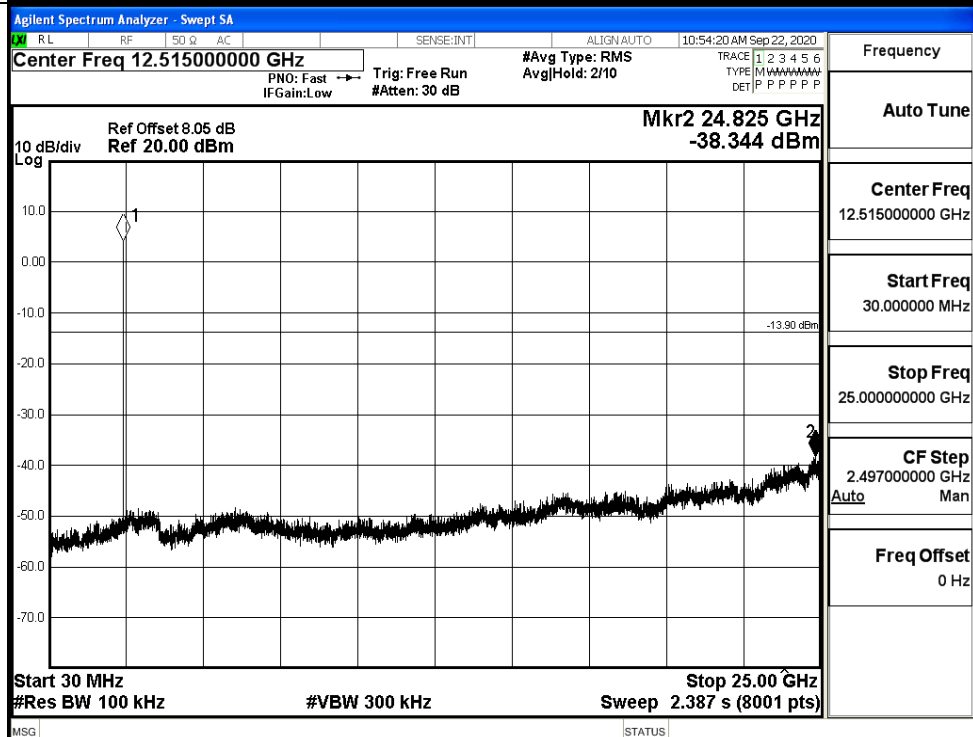
P_{uw}

GFSK_MCH_Graphs

Pref

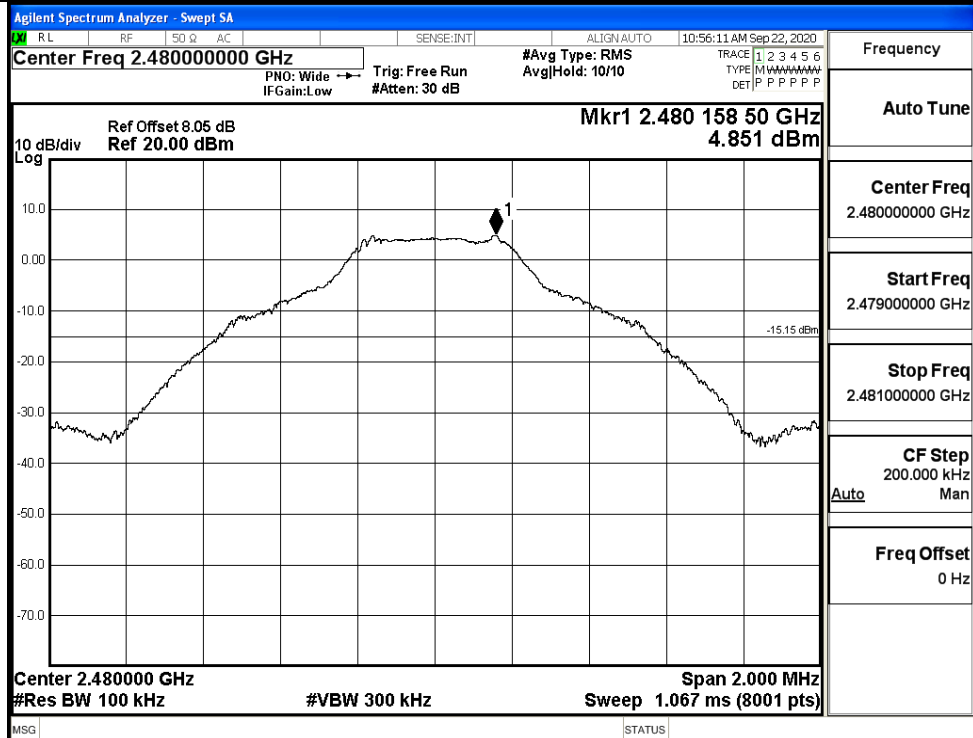


Puw

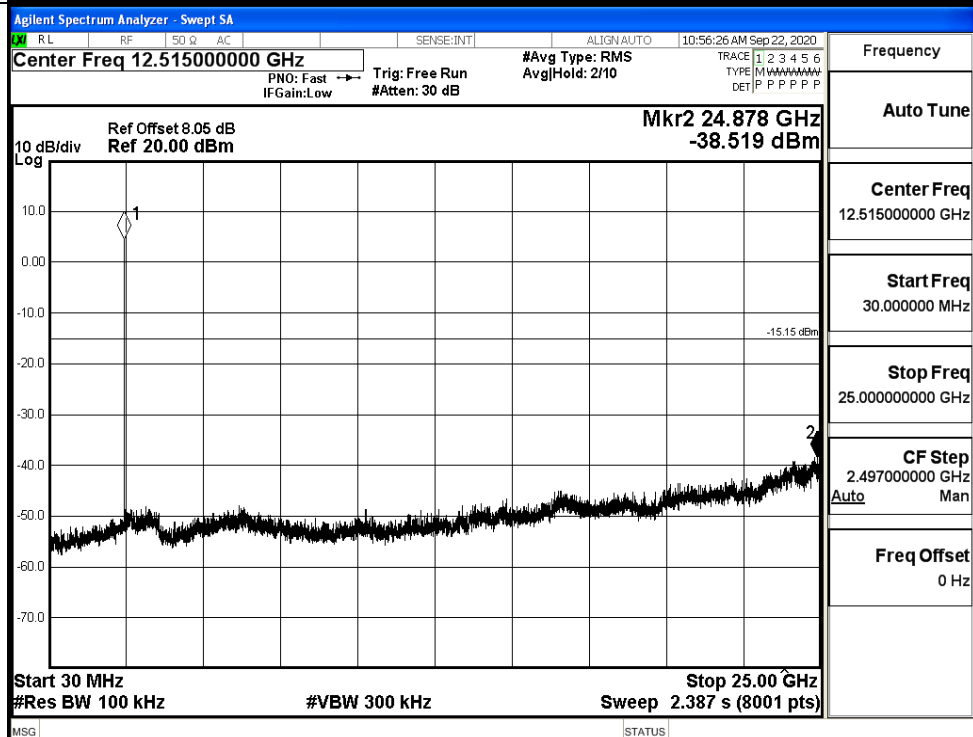


GFSK HCH_Graphs

Pref

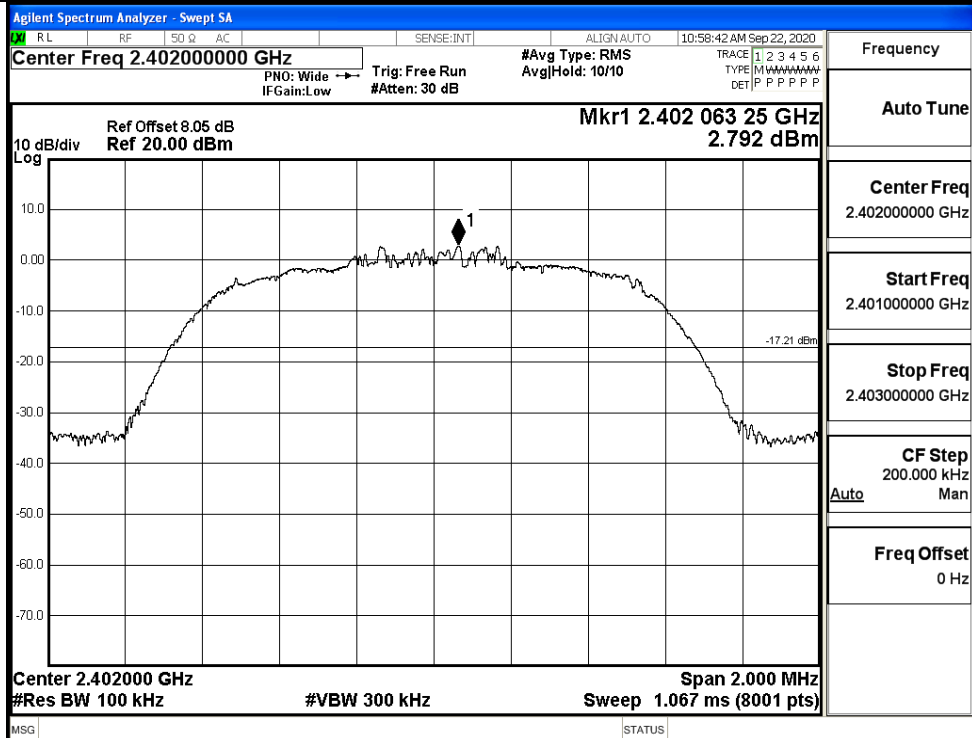


Puw

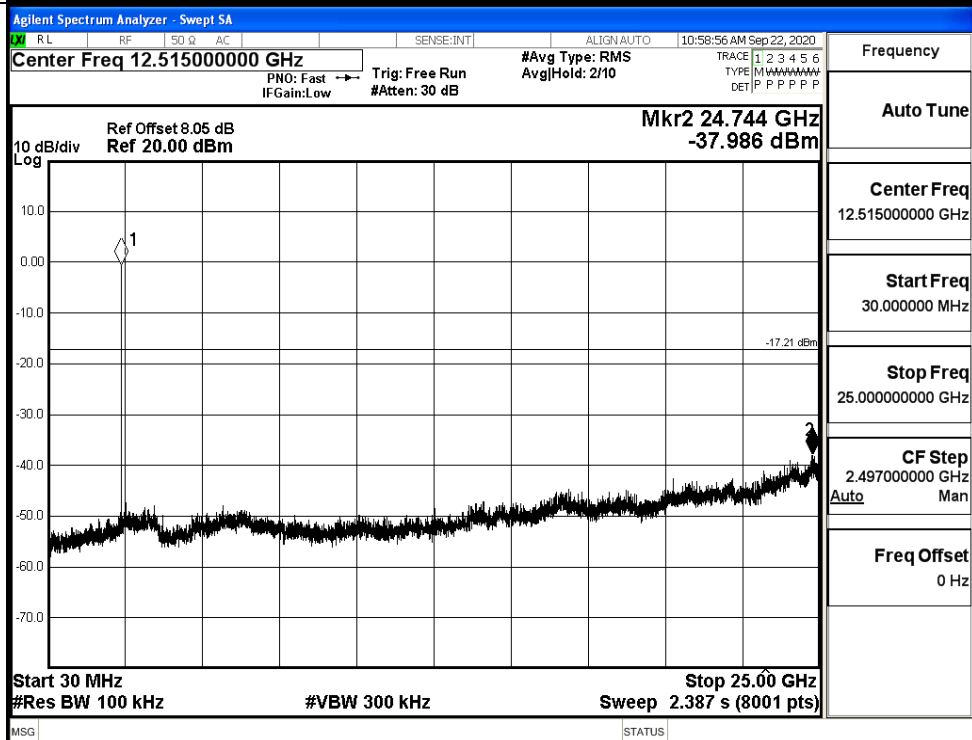


$\pi/4$ DQPSK LCH_Graphs

Pref

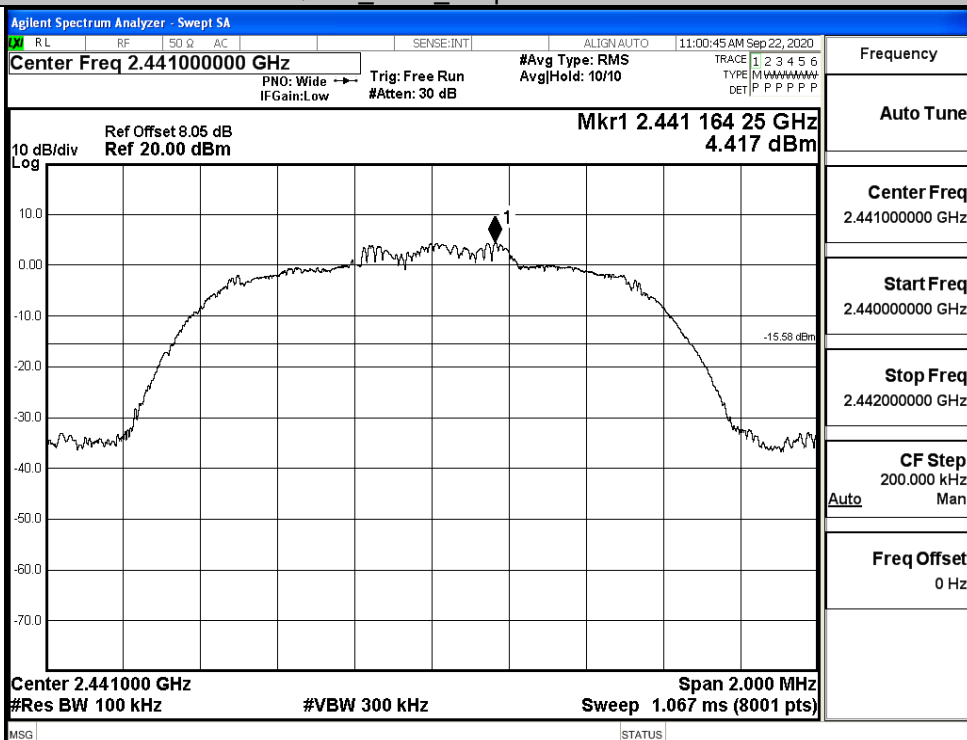


Puw

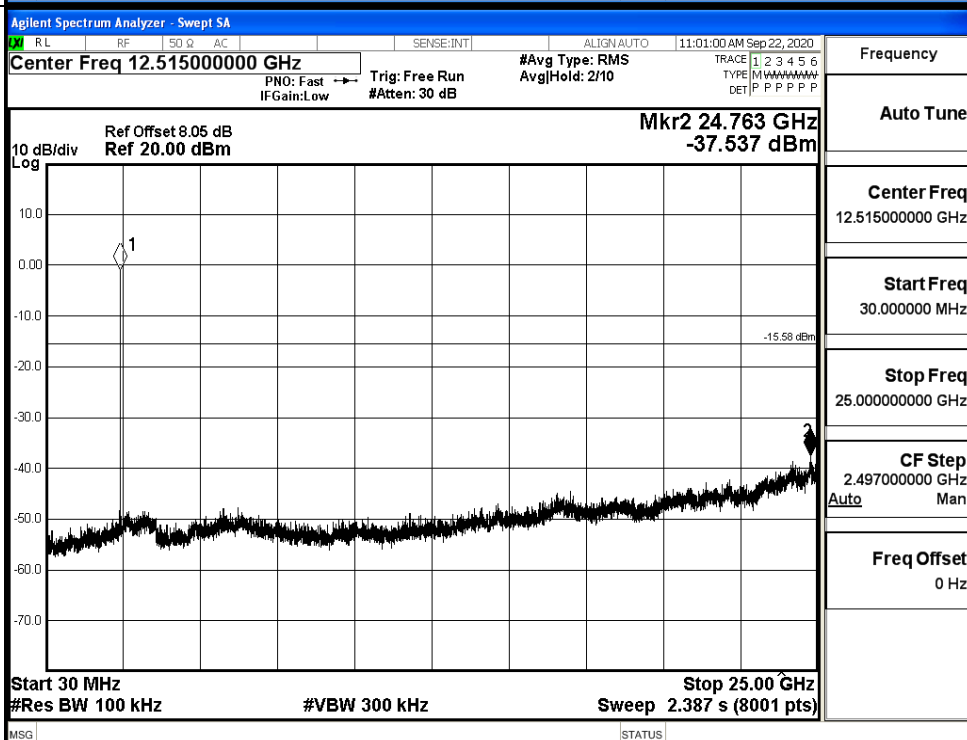


$\pi/4$ DQPSK_MCH_Graphs

Pref

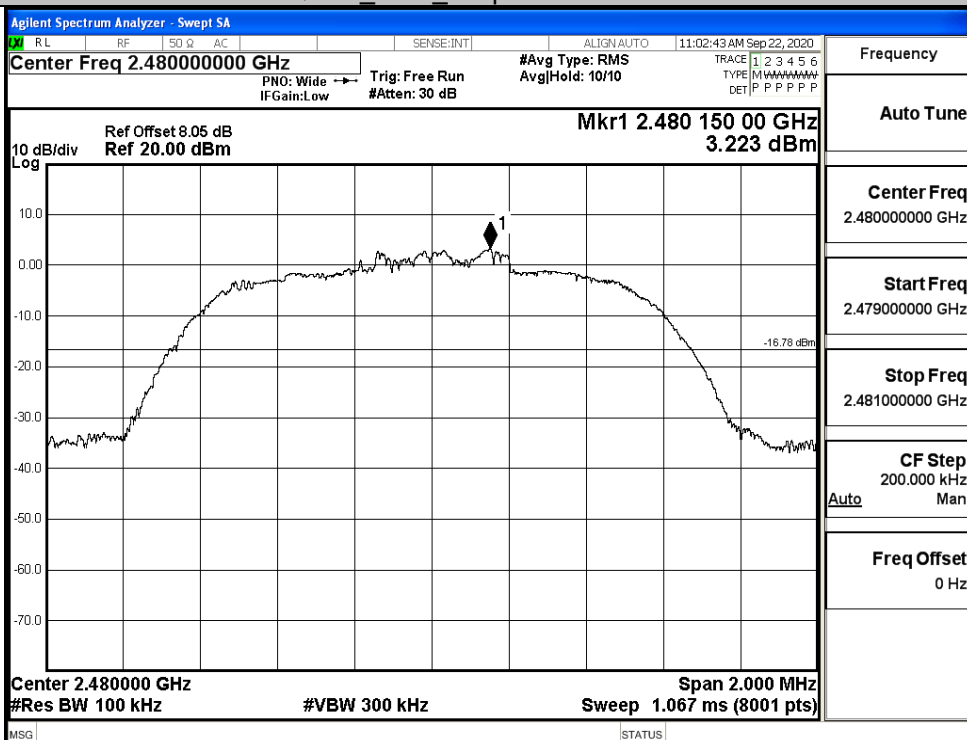


Puw

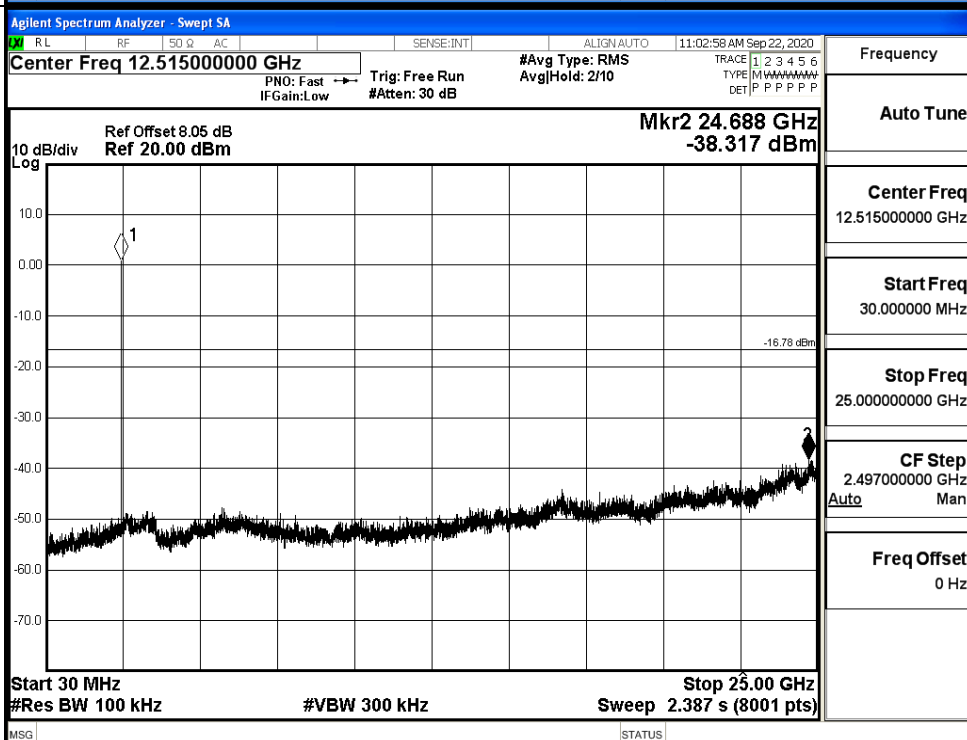


$\pi/4$ DQPSK_HCH_Graphs

Pref

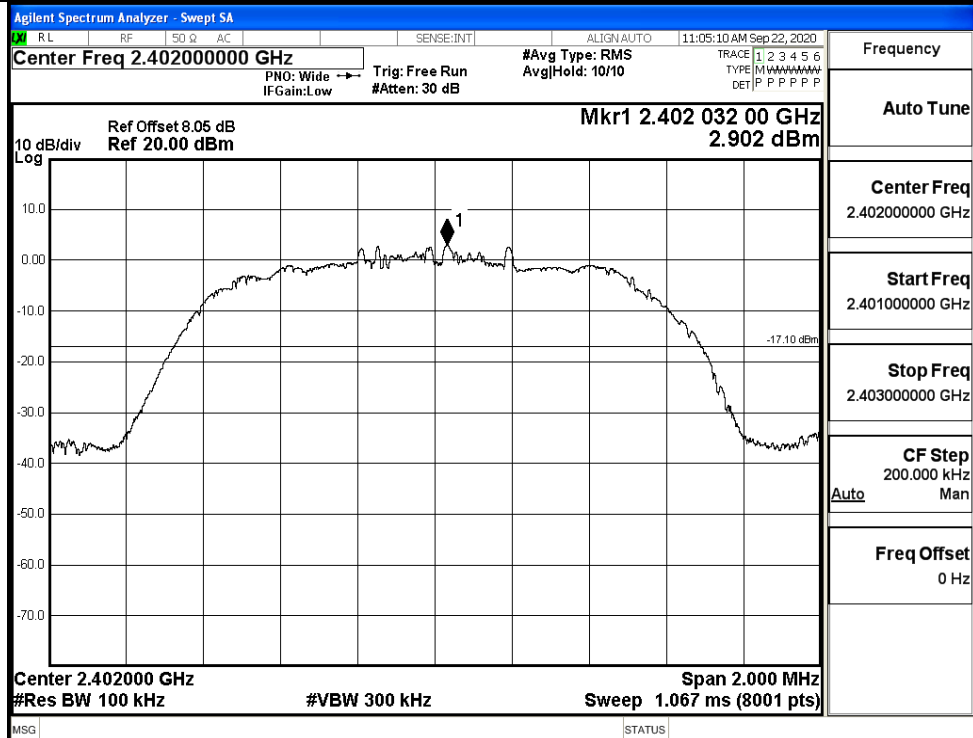


Puw

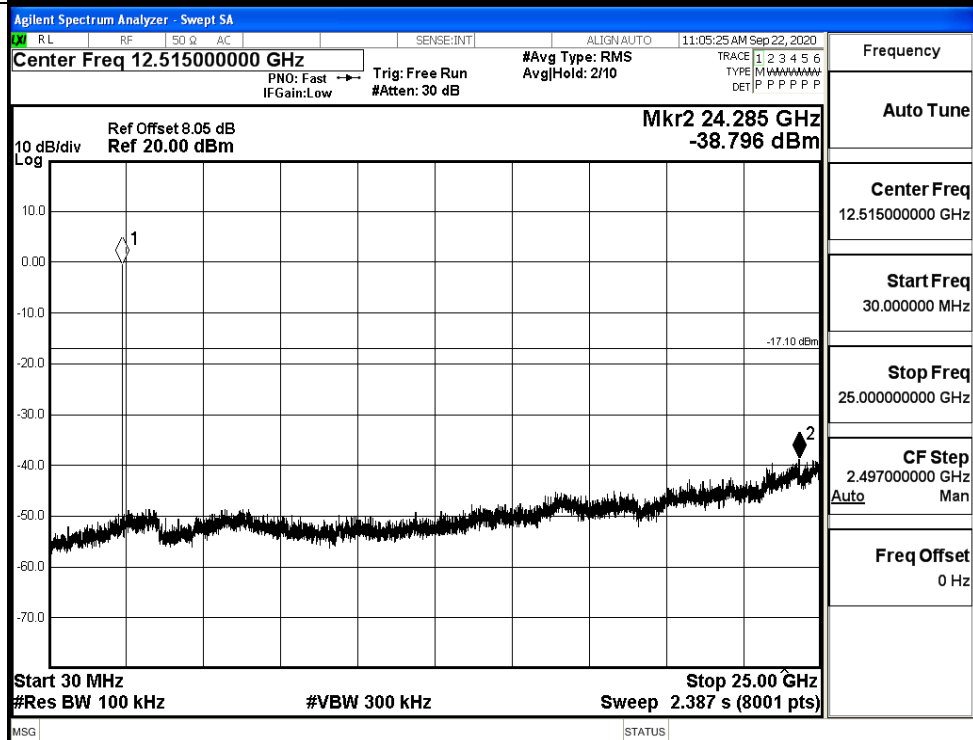


8DPSK_LCH_Graphs

Pref

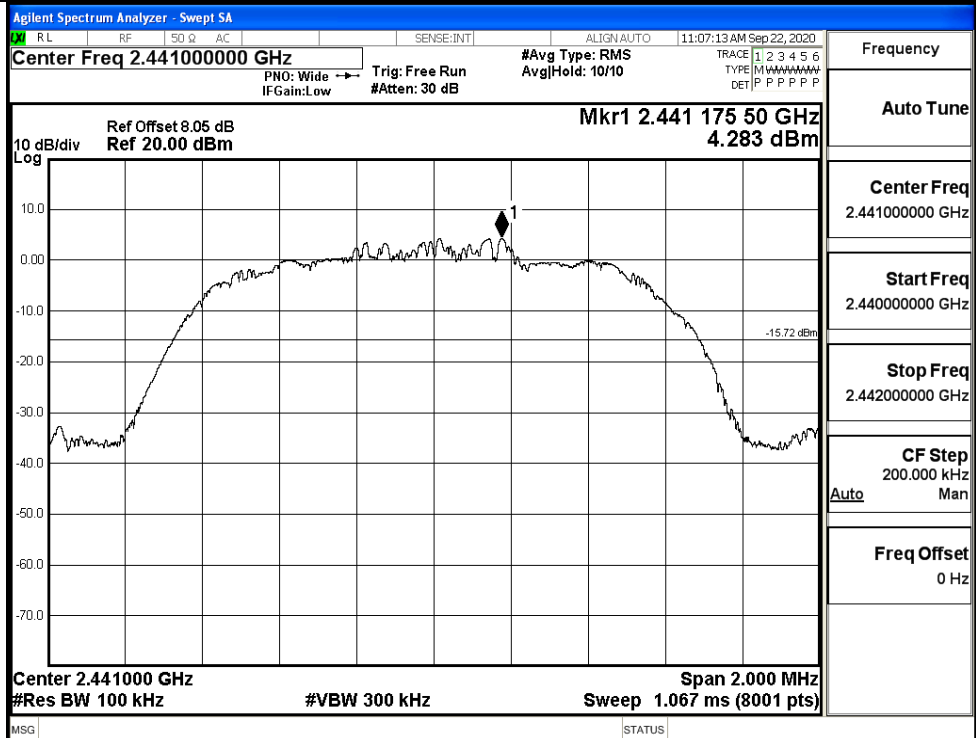


Puw

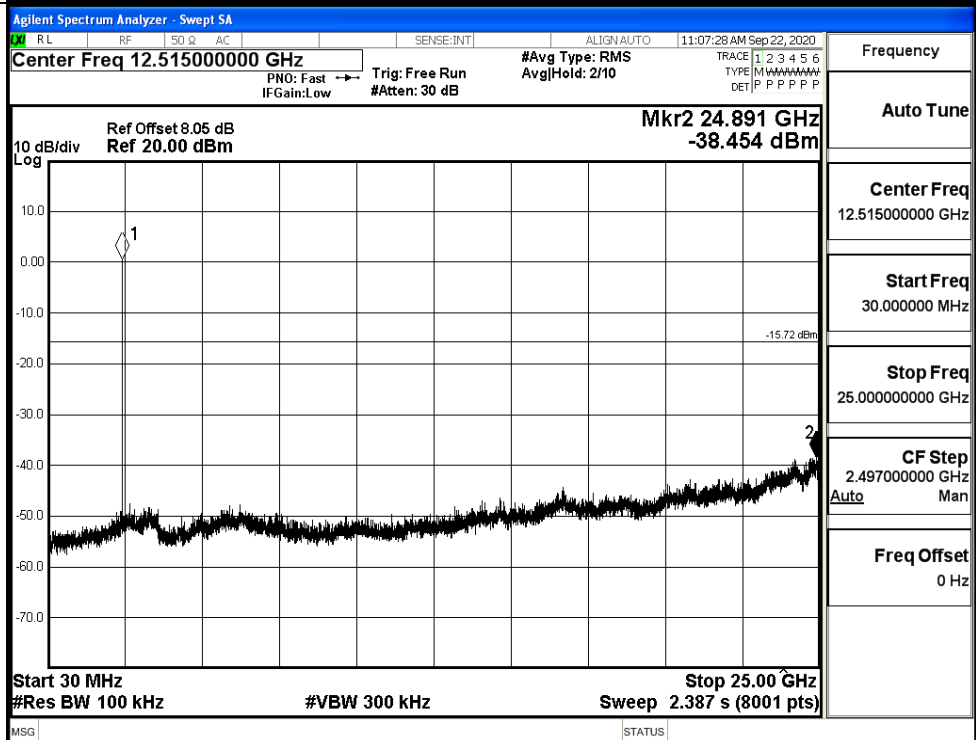


8DPSK MCH_Graphs

Pref

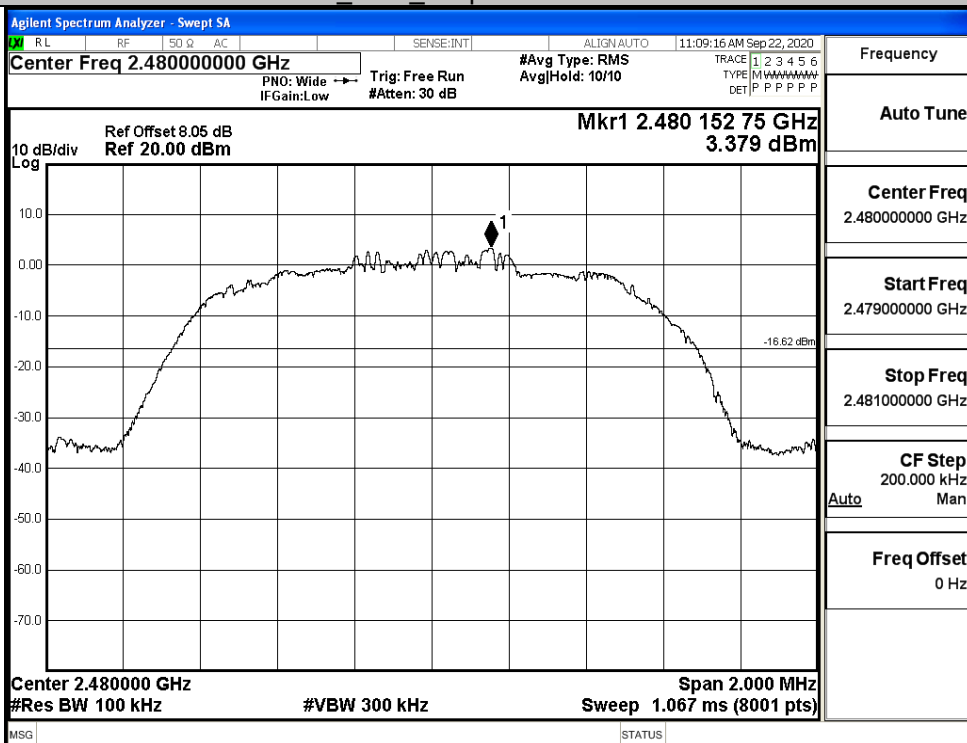


Puw

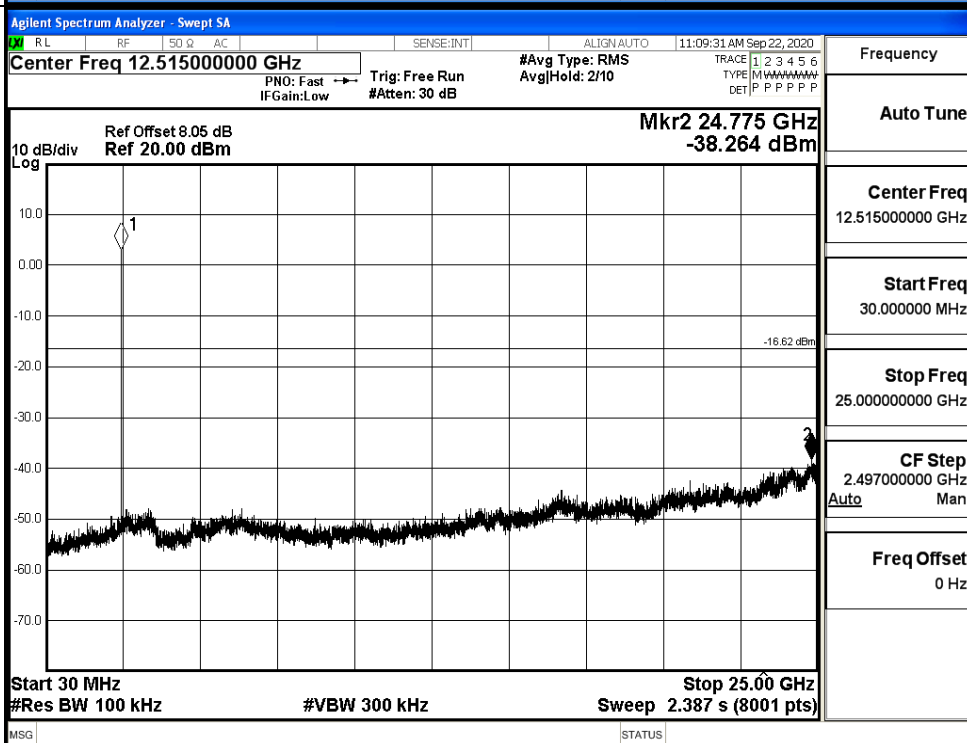


8DPSK_HCH_Graphs

Pref



Puw

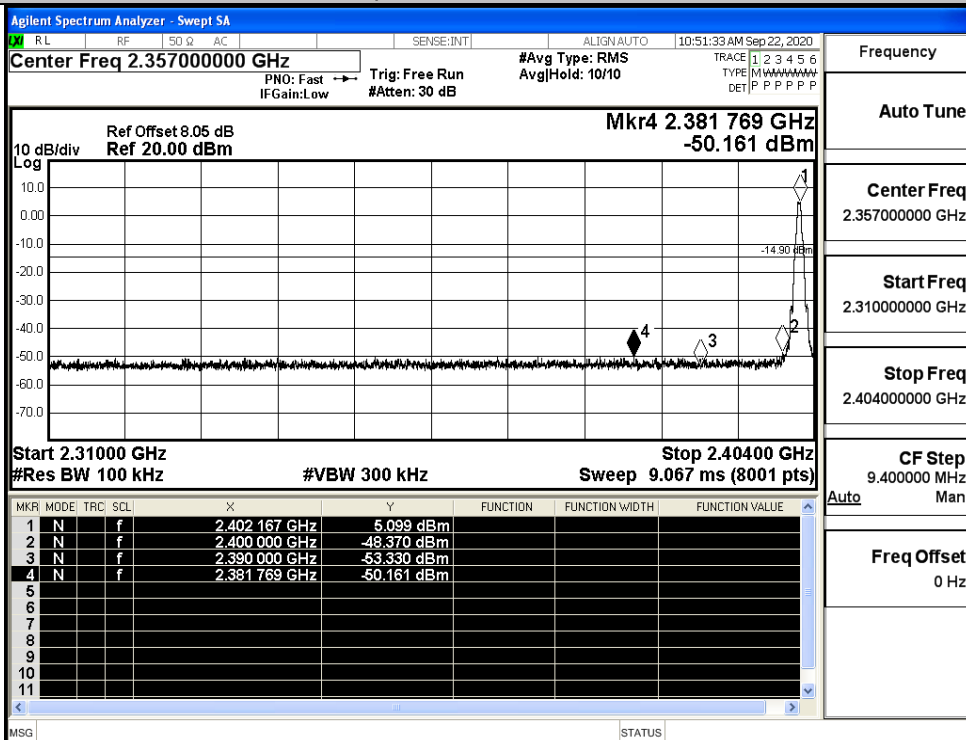


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	5.099	Off	-50.161	-14.9	PASS
			5.879	On	-49.286	-14.12	PASS
	HCH	2480	5.002	Off	-47.498	-15	PASS
			5.733	On	-47.981	-14.27	PASS
π /4DQPSK	LCH	2402	3.515	Off	-49.952	-16.49	PASS
			4.675	On	-49.177	-15.33	PASS
	HCH	2480	2.823	Off	-48.805	-17.18	PASS
			4.361	On	-48.783	-15.64	PASS
8DPSK	LCH	2402	3.625	Off	-49.682	-16.38	PASS
			4.647	On	-49.348	-15.35	PASS
	HCH	2480	3.502	Off	-48.821	-16.5	PASS
			4.243	On	-48.418	-15.76	PASS

Test Graphs

GFSK/LCH/No Hop

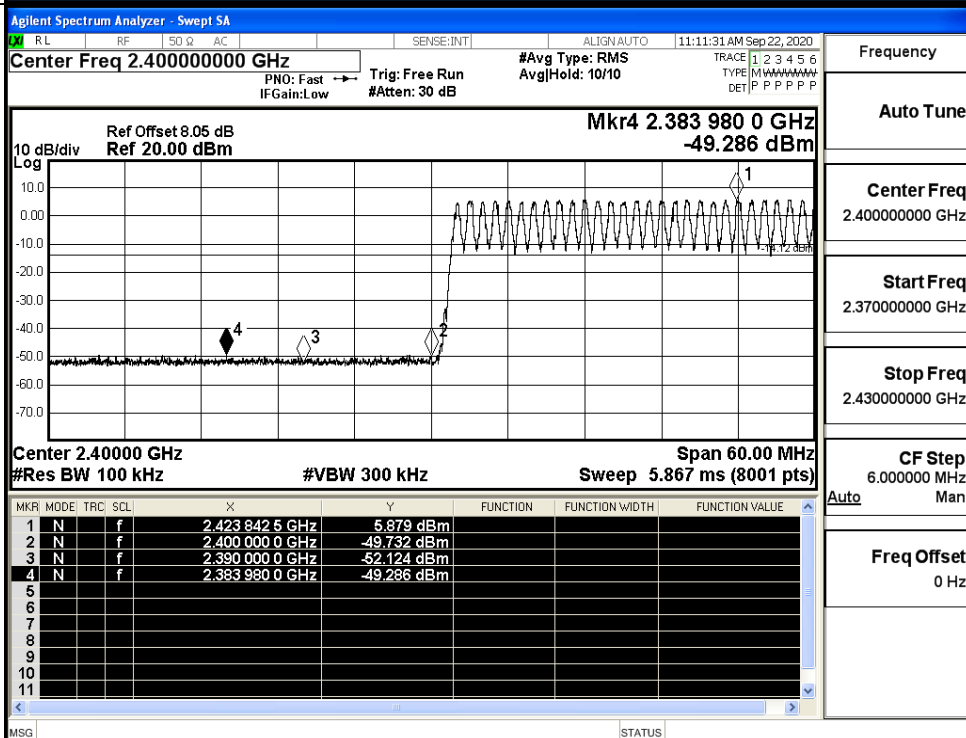


Frequency

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

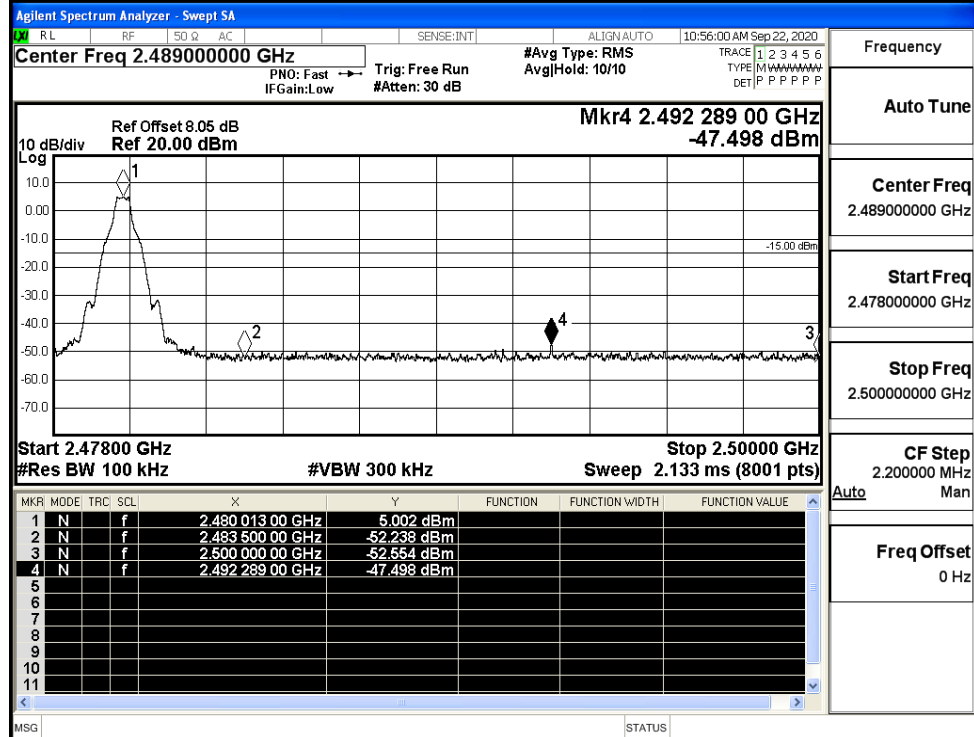


Frequency

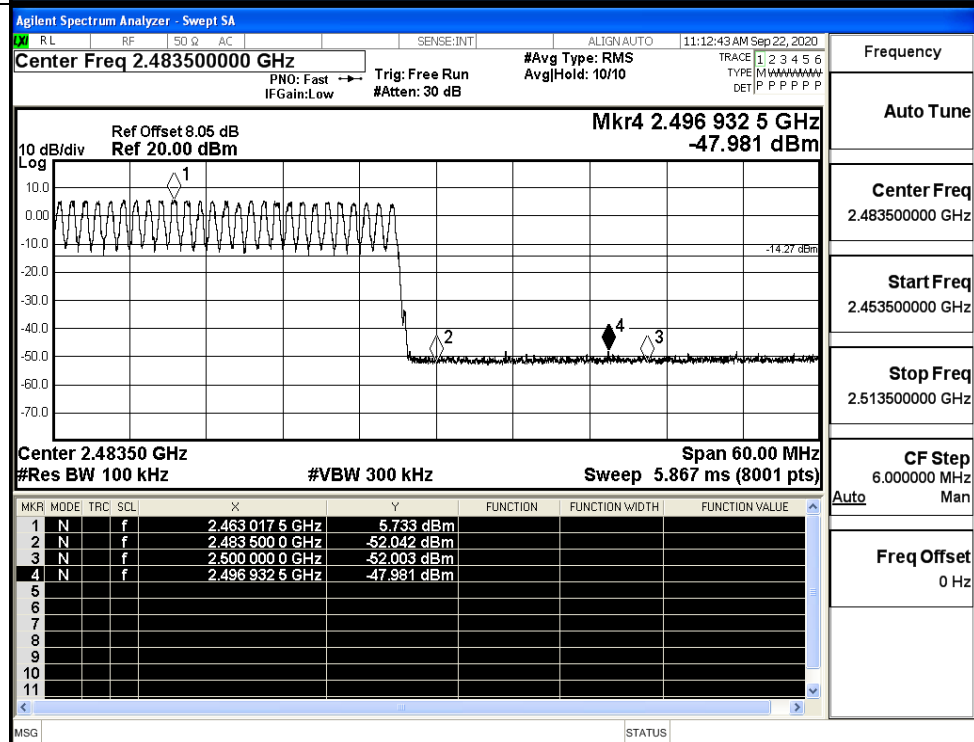
Auto Tune

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

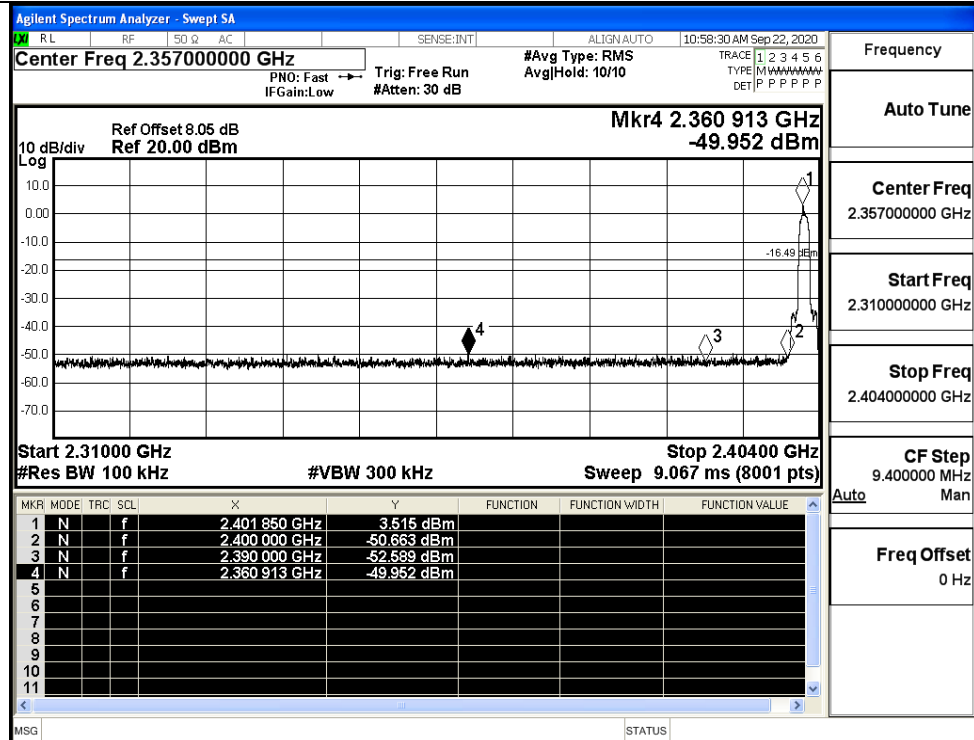
GFSK/HCH/No Hop



GFSK/HCH/Hop



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

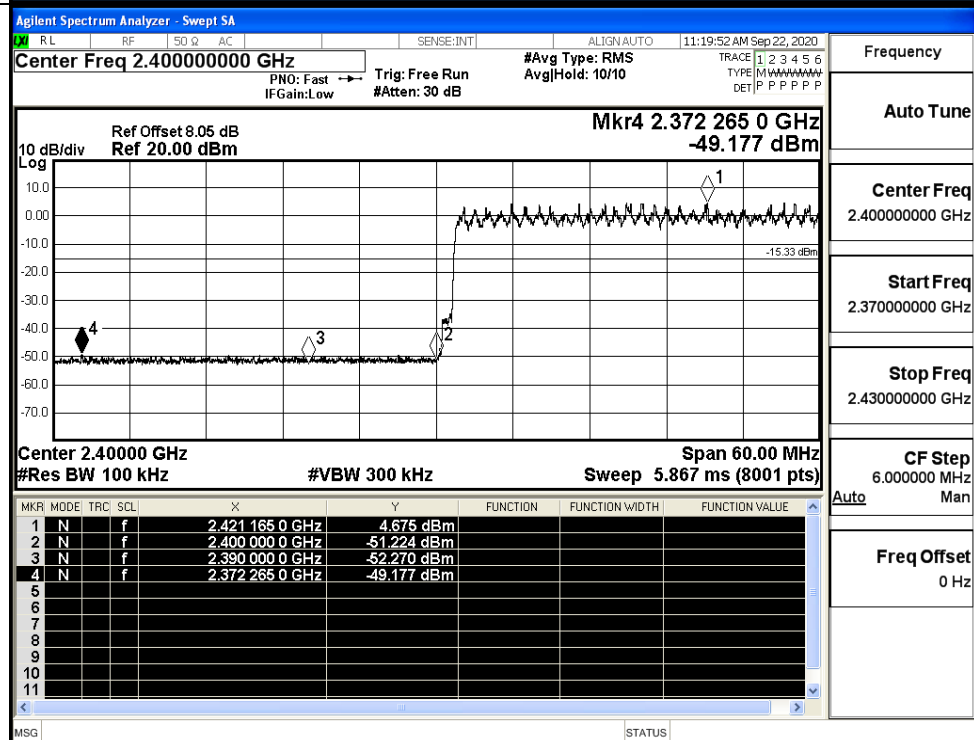


Frequency

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

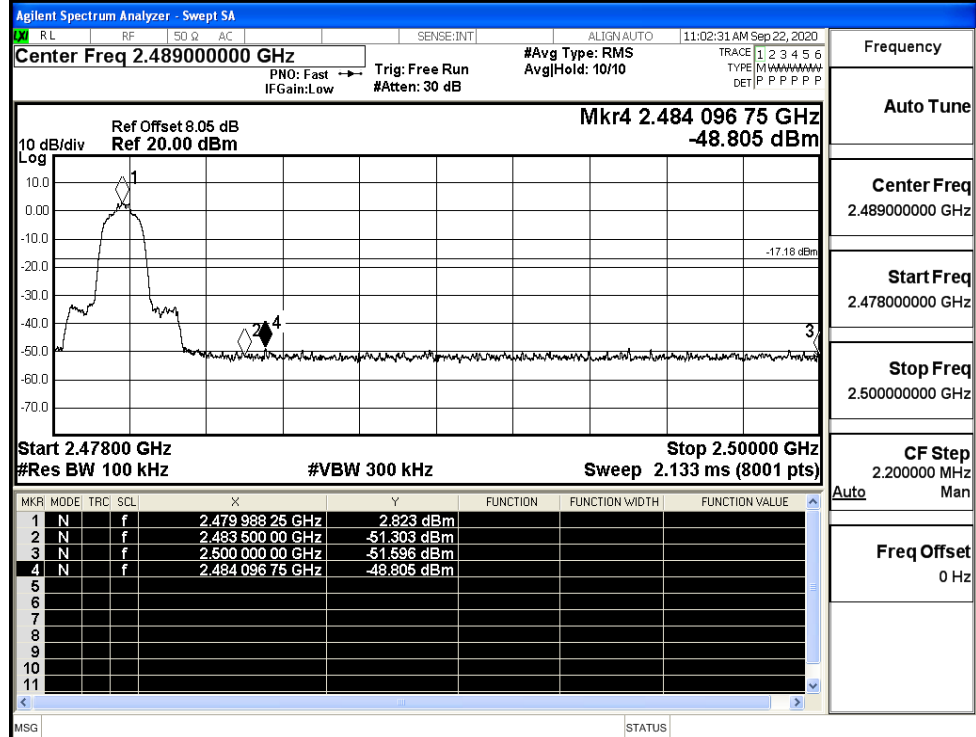


Frequency

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/No
Hop



Frequency

Auto Tune

Center Freq
2.489000000 GHz

Start Freq
2.478000000 GHz

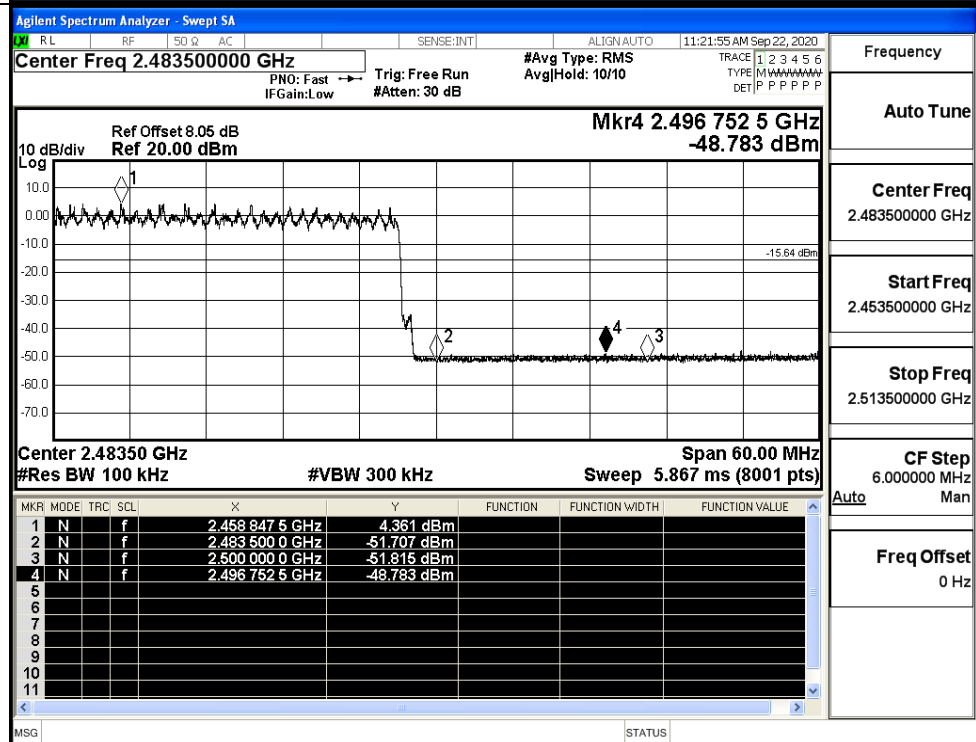
Stop Freq
2.500000000 GHz

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

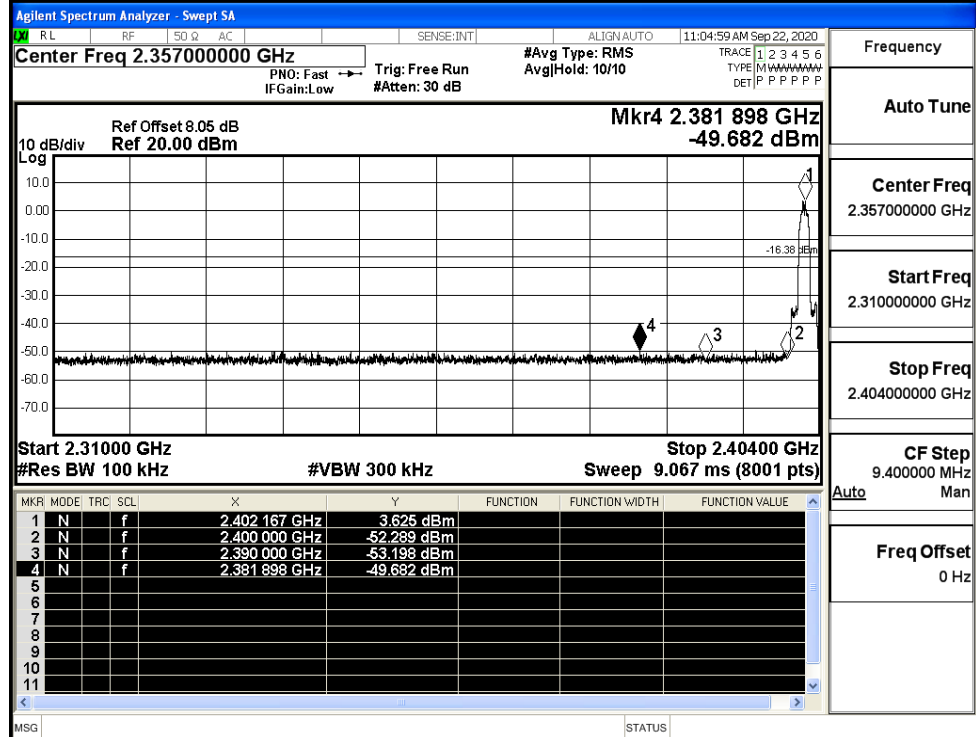
Stop Freq
2.513500000 GHz

CF Step
6.000000 MHz

Auto Man

Freq Offset
0 Hz

8DPSK/LCH/No Hop



Frequency

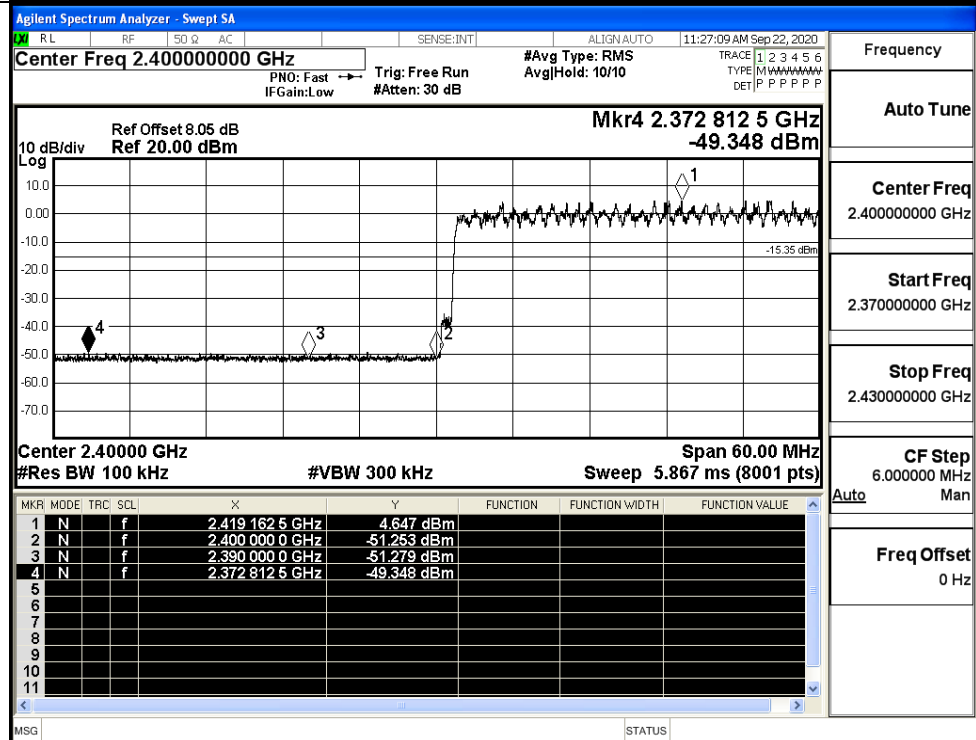
Auto Tune

Center Freq
2.357000000 GHzStart Freq
2.310000000 GHzStop Freq
2.404000000 GHzCF Step
9.400000 MHz

Auto

Freq Offset
0 Hz

8DPSK/LCH/Hop



Frequency

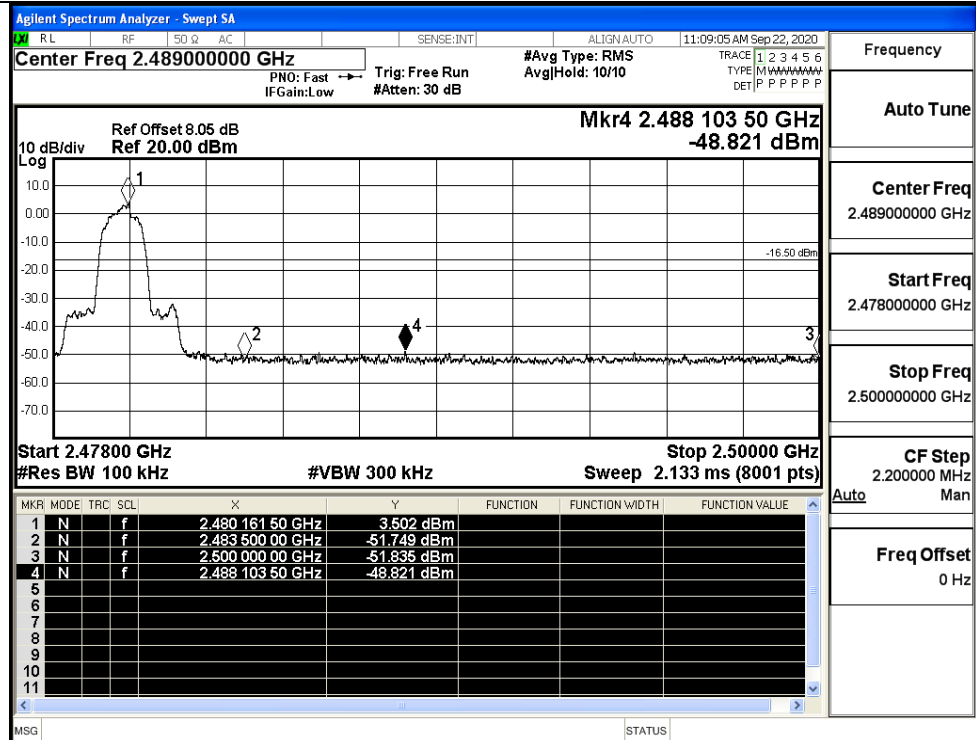
Auto Tune

Center Freq
2.400000000 GHzStart Freq
2.370000000 GHzStop Freq
2.430000000 GHzCF Step
6.000000 MHz

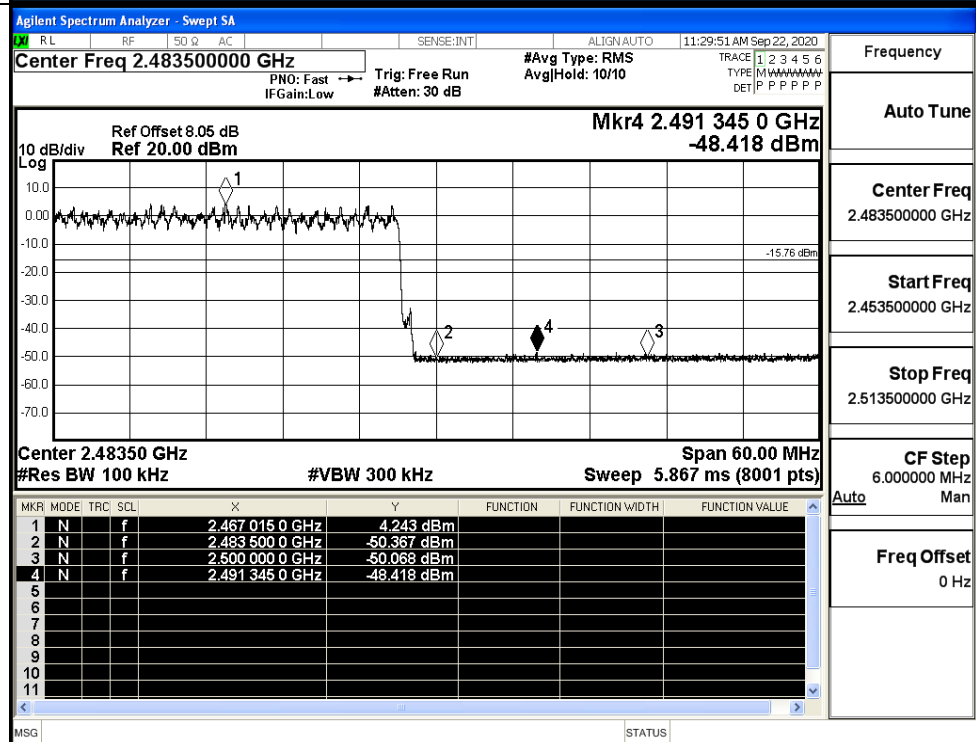
Auto

Freq Offset
0 Hz

8DPSK/HCH/No Hop



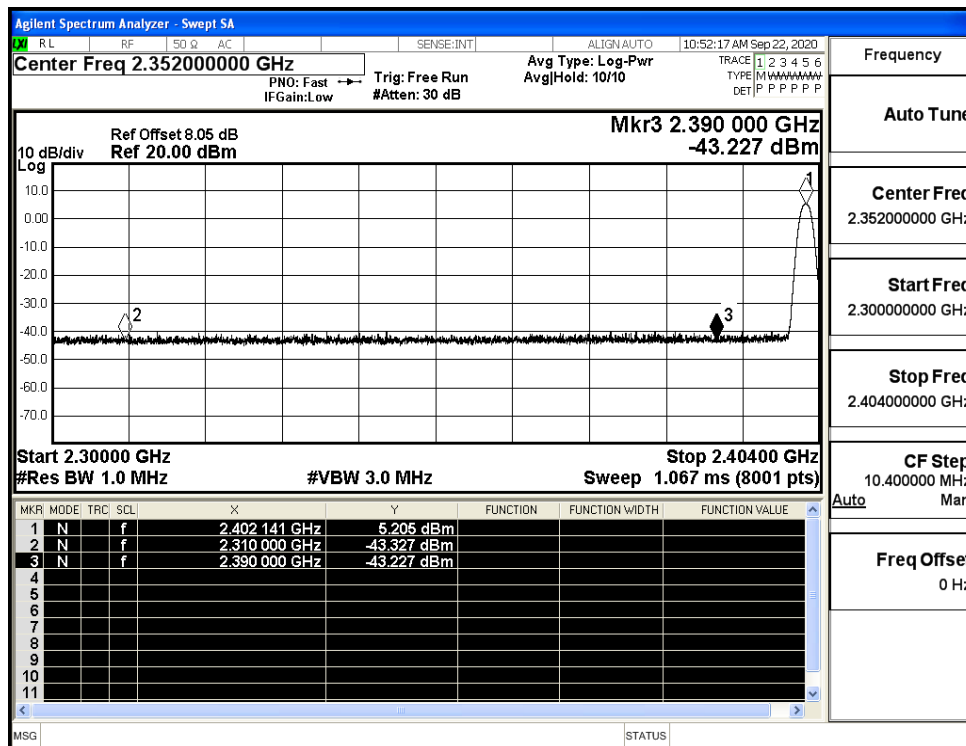
8DPSK/HCH/Hop



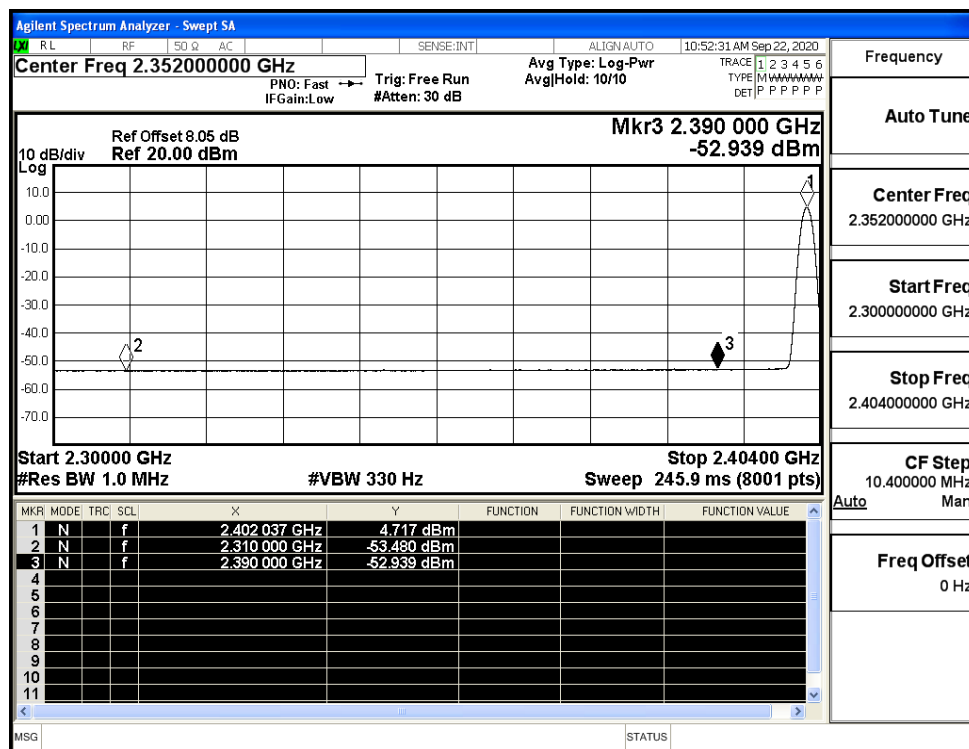
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.33	2.0	0	51.93	PEAK	74	PASS
	Off	2310.0	-53.48	2.0	0	41.78	AV	54	PASS
	Off	2390.0	-43.23	2.0	0	52.03	PEAK	74	PASS
	Off	2390.0	-52.94	2.0	0	42.32	AV	54	PASS
	Off	2483.5	-42.64	2.0	0	52.61	PEAK	74	PASS
	Off	2483.5	-52.34	2.0	0	42.92	AV	54	PASS
	Off	2500.0	-43.33	2.0	0	51.92	PEAK	74	PASS
	Off	2500.0	-52.40	2.0	0	42.86	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.50	2.0	0	51.75	PEAK	74	PASS
	Off	2310.0	-53.29	2.0	0	41.96	AV	54	PASS
	Off	2390.0	-42.86	2.0	0	52.40	PEAK	74	PASS
	Off	2390.0	-53.07	2.0	0	42.19	AV	54	PASS
	Off	2483.5	-41.46	2.0	0	53.79	PEAK	74	PASS
	Off	2483.5	-52.30	2.0	0	42.96	AV	54	PASS
	Off	2500.0	-42.96	2.0	0	52.30	PEAK	74	PASS
	Off	2500.0	-52.38	2.0	0	42.88	AV	54	PASS
8DPSK	Off	2310.0	-42.27	2.0	0	52.99	PEAK	74	PASS
	Off	2310.0	-53.36	2.0	0	41.90	AV	54	PASS
	Off	2390.0	-42.35	2.0	0	52.91	PEAK	74	PASS
	Off	2390.0	-52.91	2.0	0	42.35	AV	54	PASS
	Off	2483.5	-41.21	2.0	0	54.05	PEAK	74	PASS
	Off	2483.5	-52.29	2.0	0	42.97	AV	54	PASS
	Off	2500.0	-42.44	2.0	0	52.82	PEAK	74	PASS
	Off	2500.0	-52.39	2.0	0	42.87	AV	54	PASS

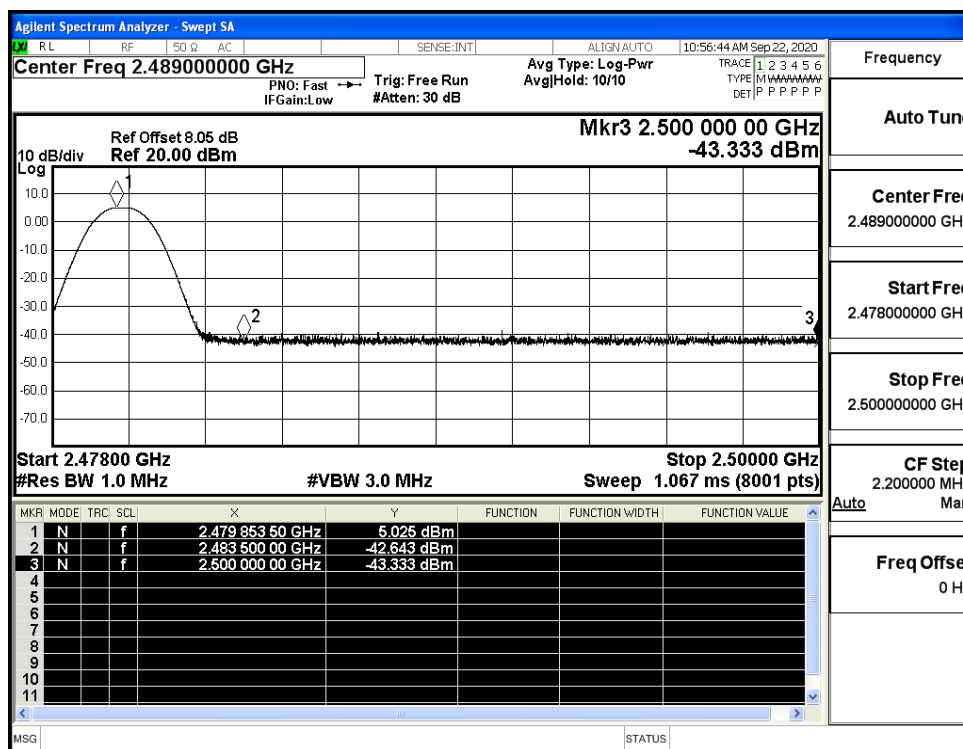
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



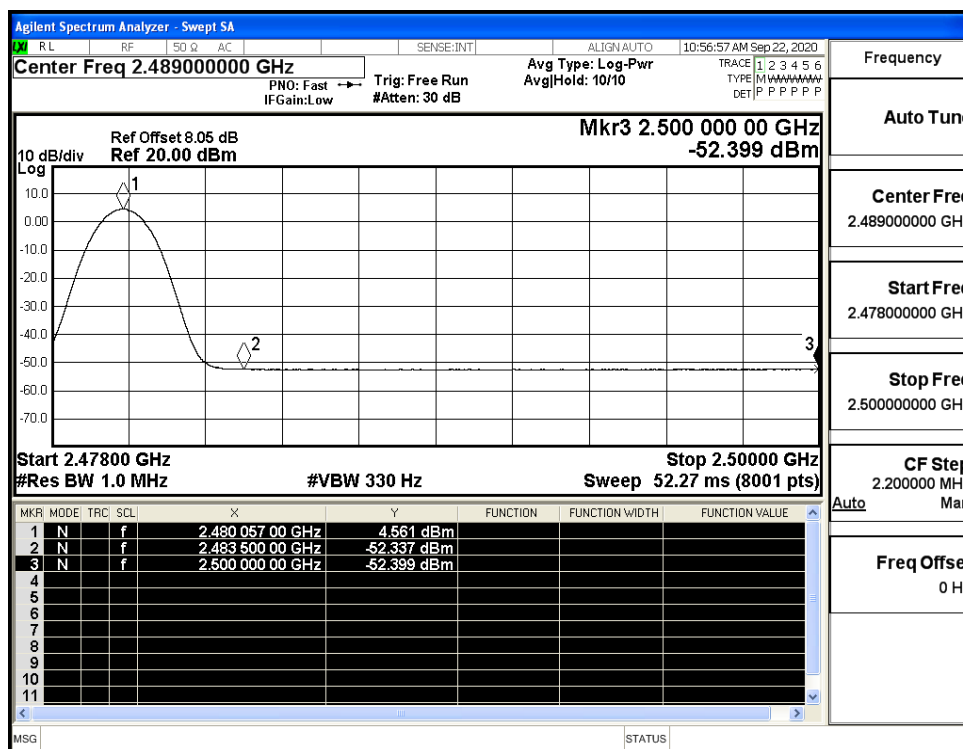
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

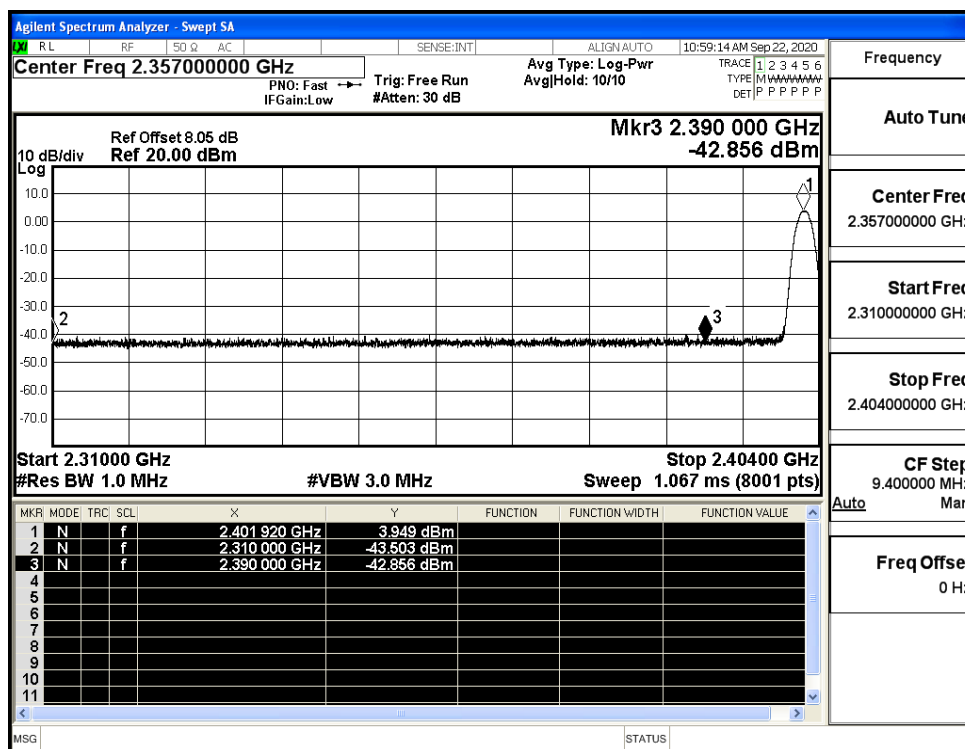
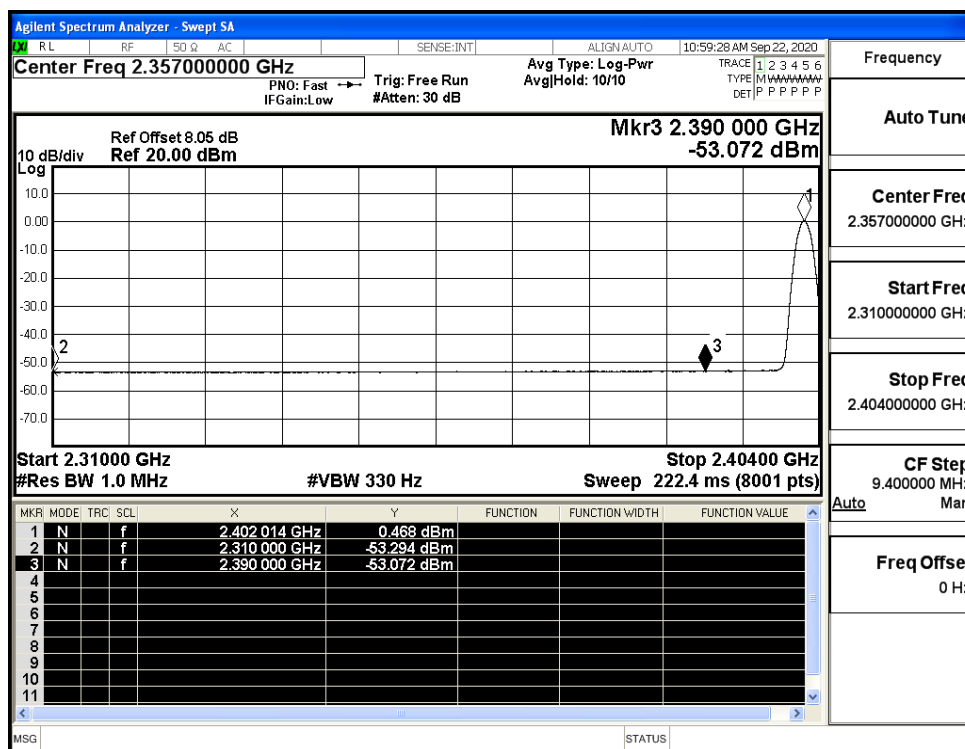


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

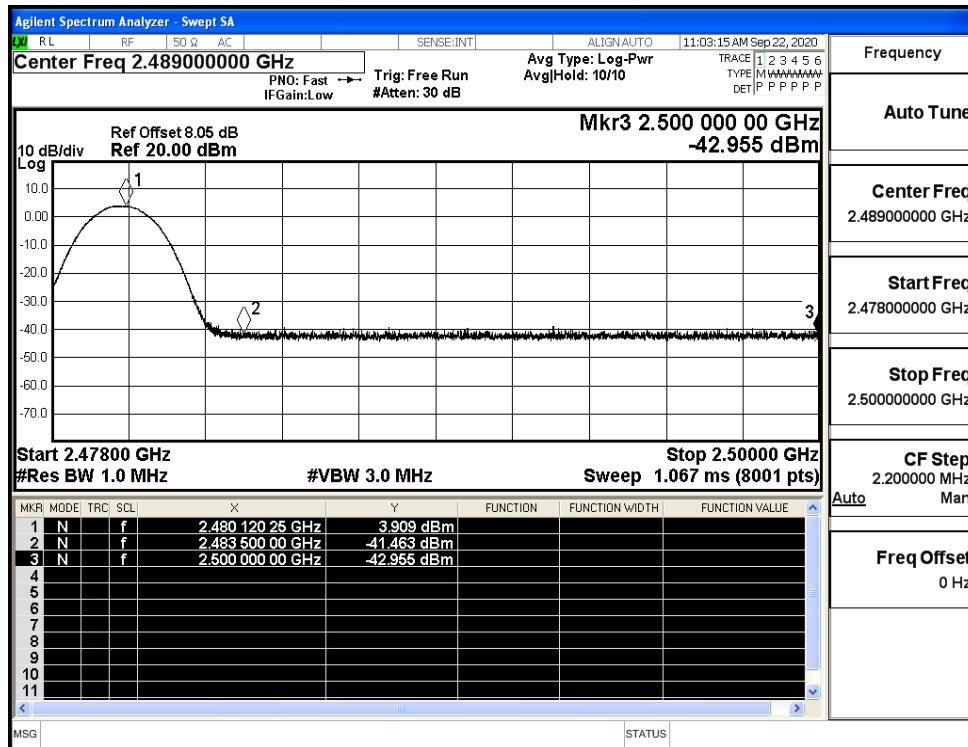


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

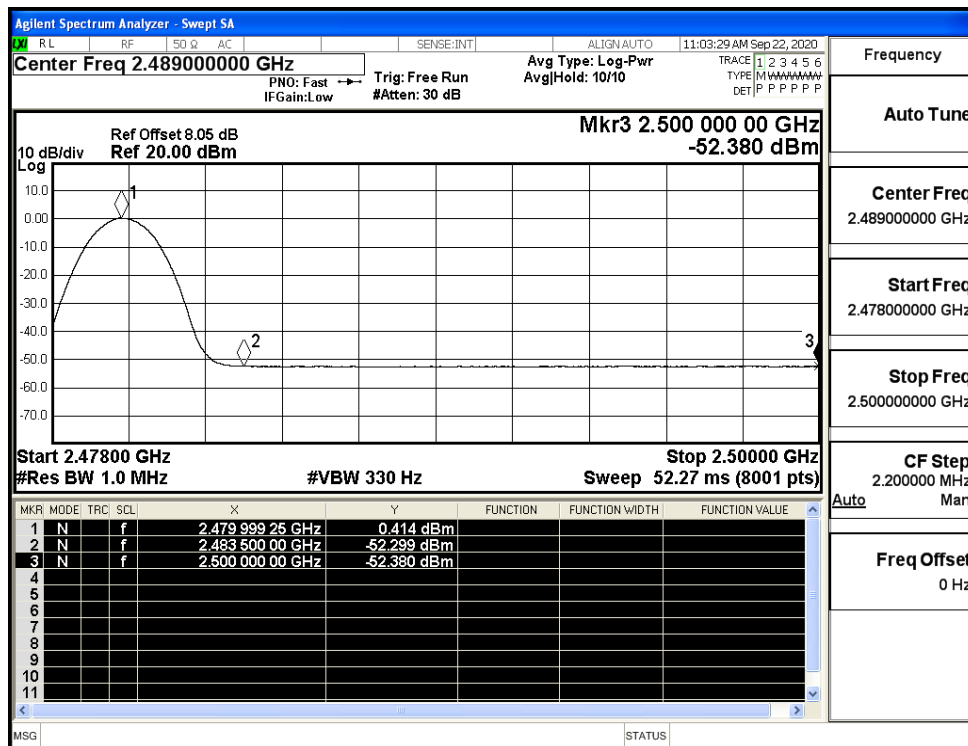


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

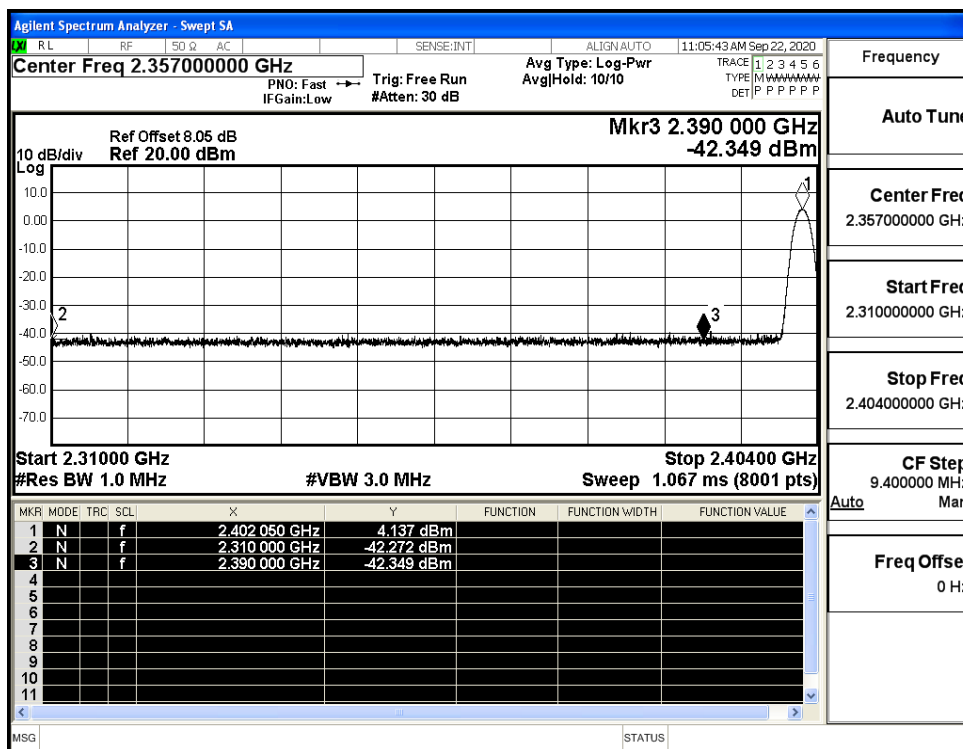
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



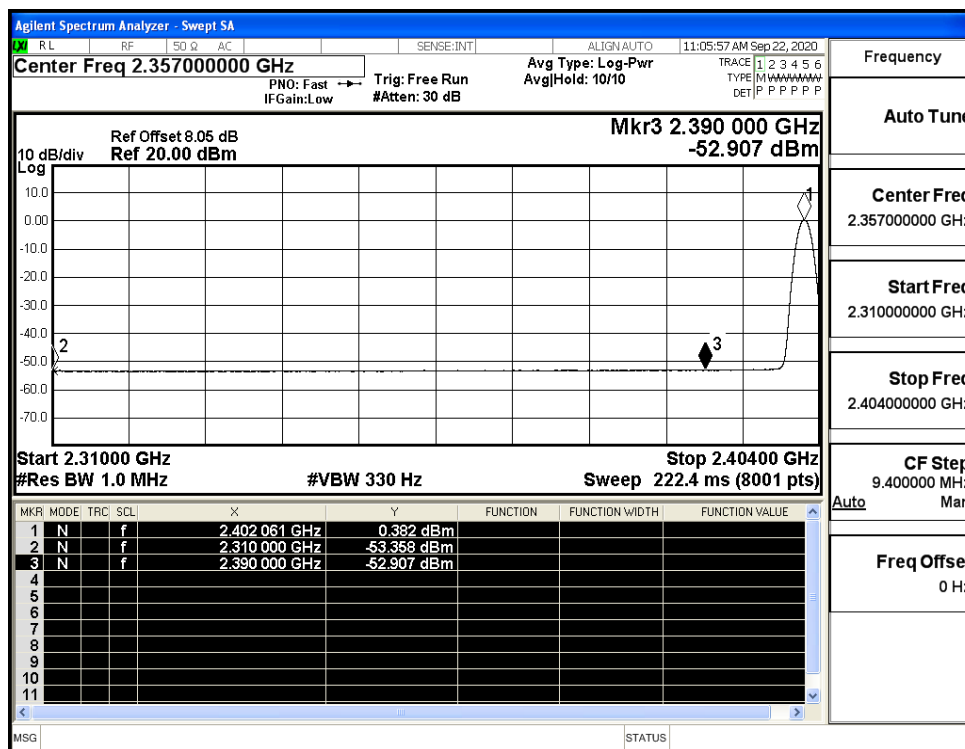
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



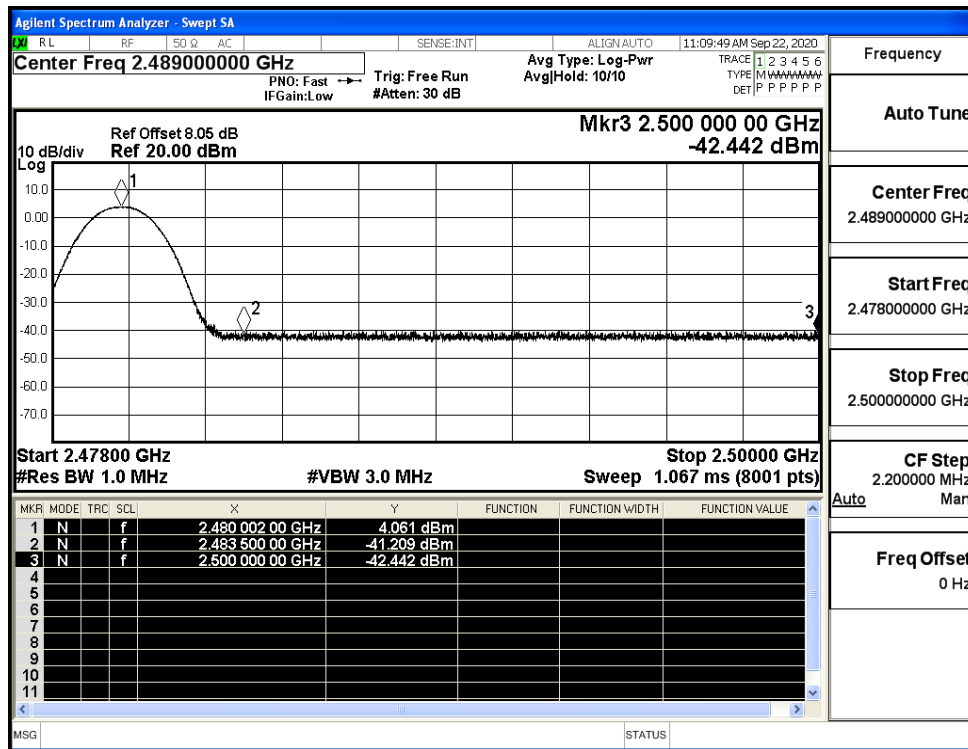
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

