

Appendix A

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

Product Name: VIM3

Trade Mark: Khadas

Test Model: VIM3 Pro

Environmental Conditions

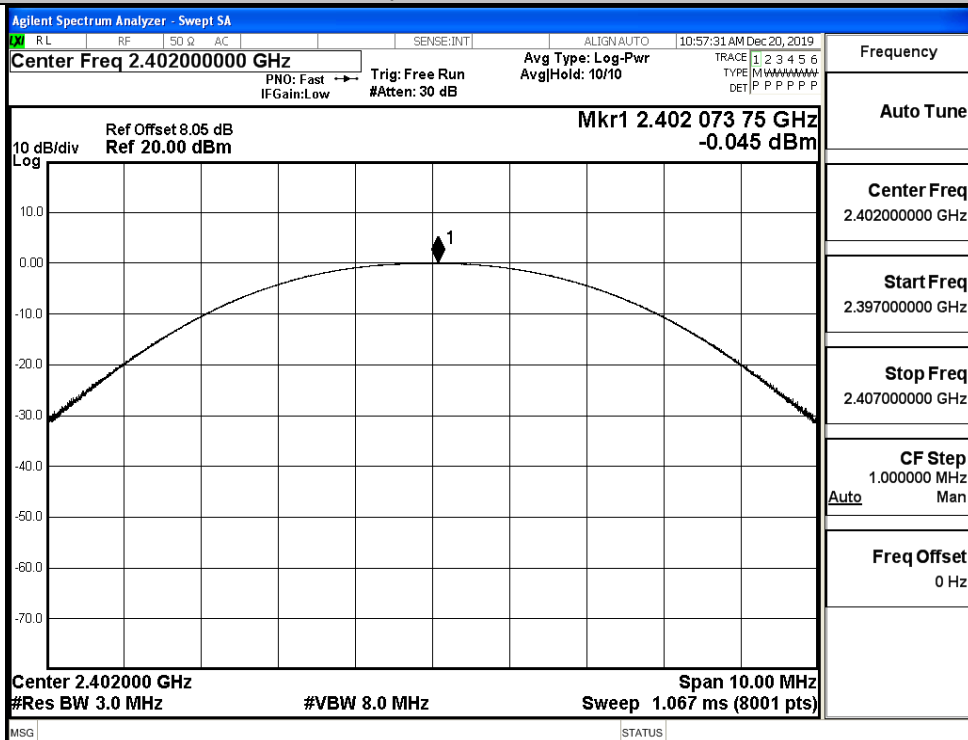
Temperature:	23.8 °C
Relative Humidity:	53.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Qu Xin
Supervised by:	Wang Chuang

A.1 Maxmum Conducted Peak Output Power

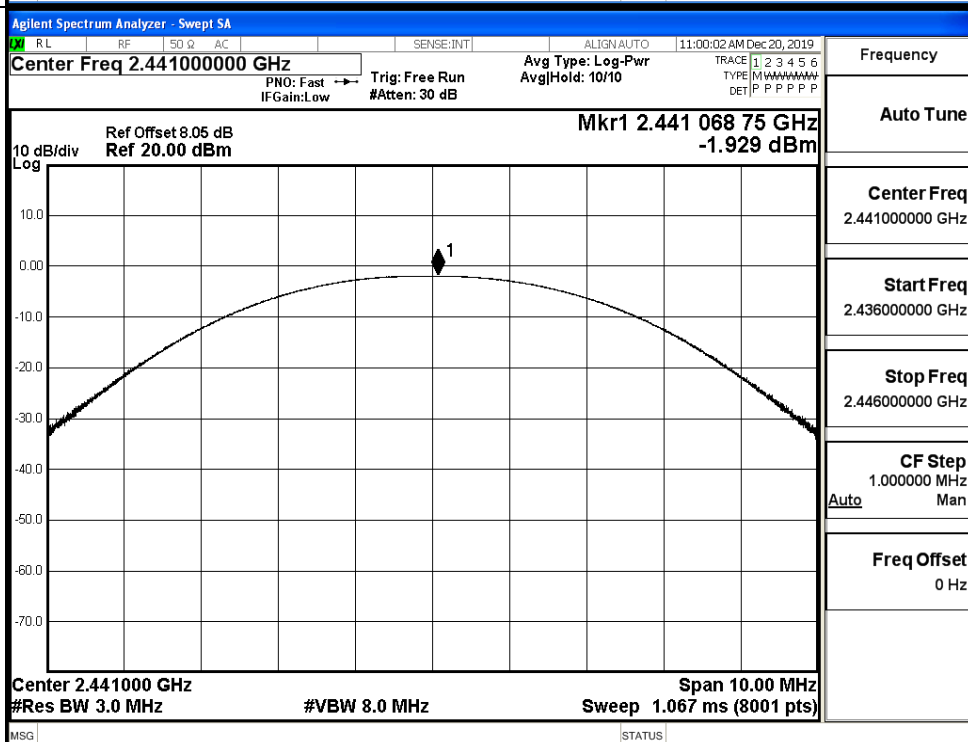
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.045	21	PASS
	MCH	-1.929	21	PASS
	HCH	-0.682	21	PASS
$\pi/4$ DQPSK	LCH	-0.770	21	PASS
	MCH	-2.578	21	PASS
	HCH	-1.437	21	PASS
8DPSK	LCH	-0.571	21	PASS
	MCH	-2.407	21	PASS
	HCH	-1.271	21	PASS

Test Graphs

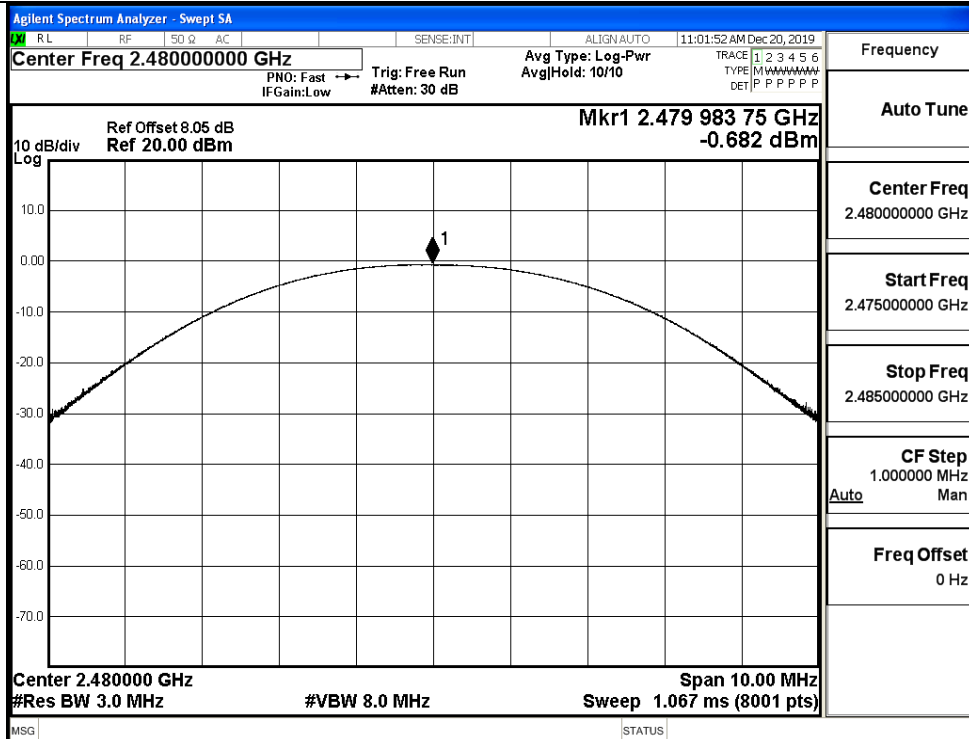
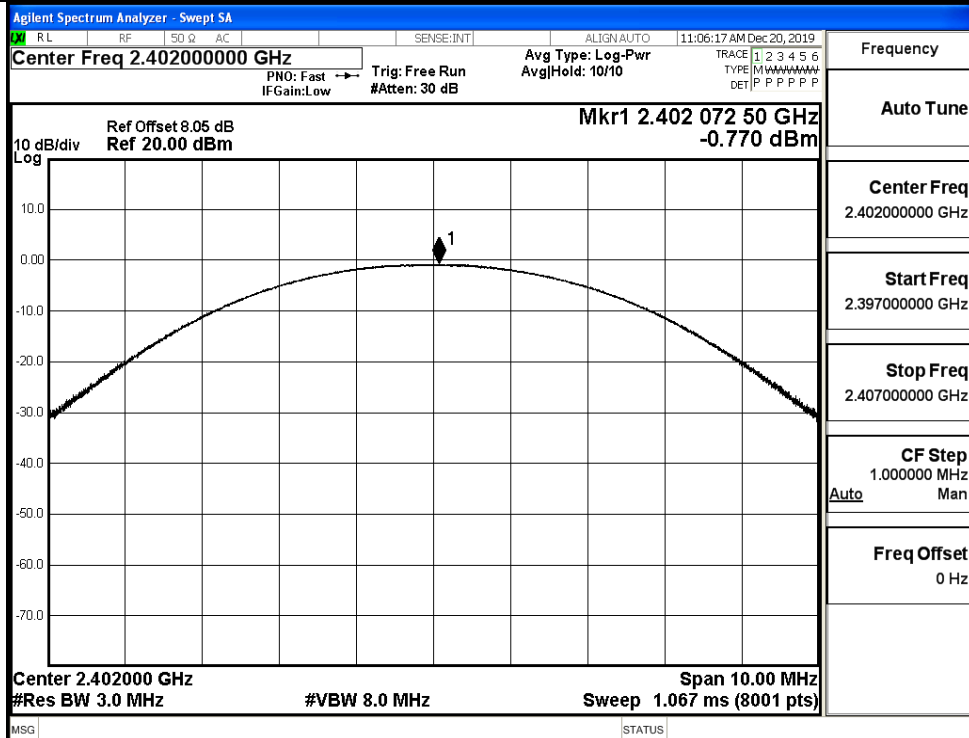
GFSK/LCH

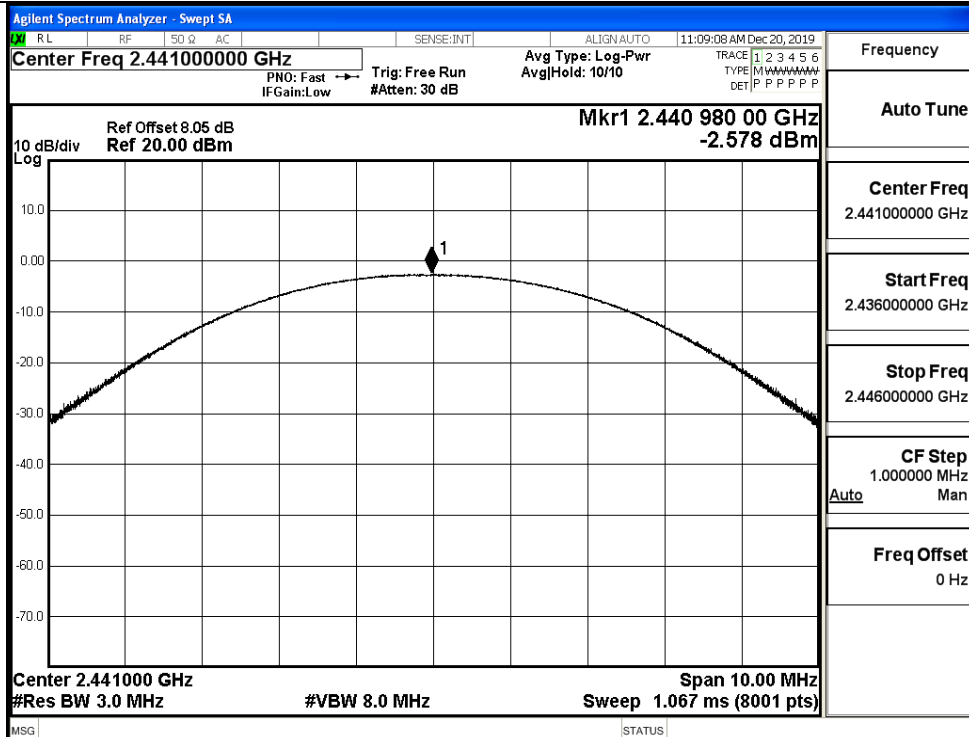
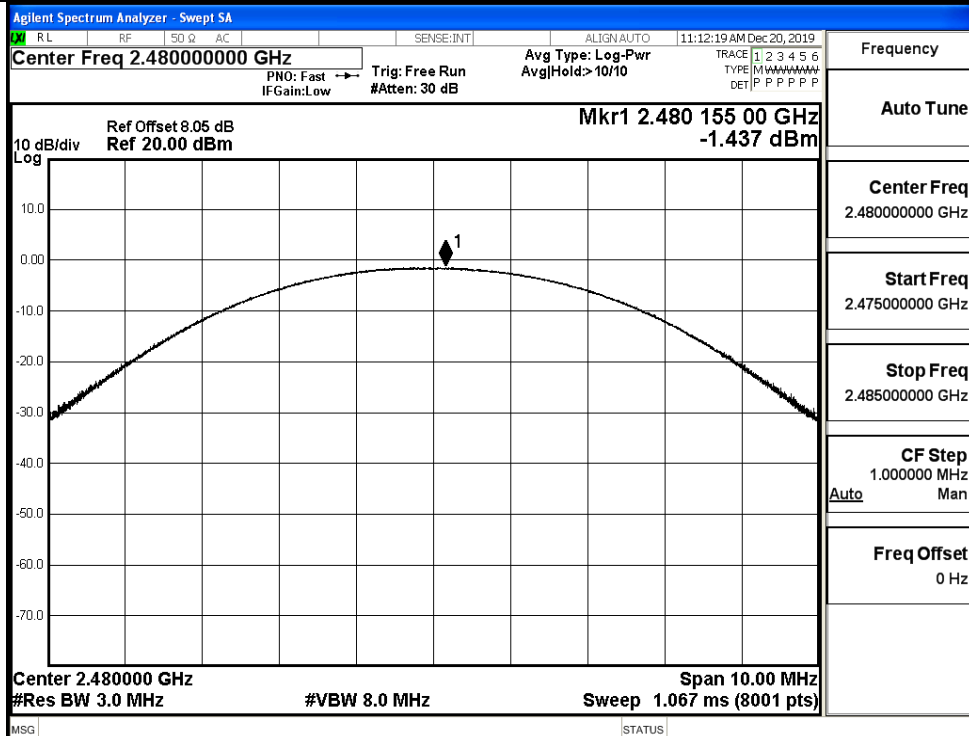


GFSK/MCH

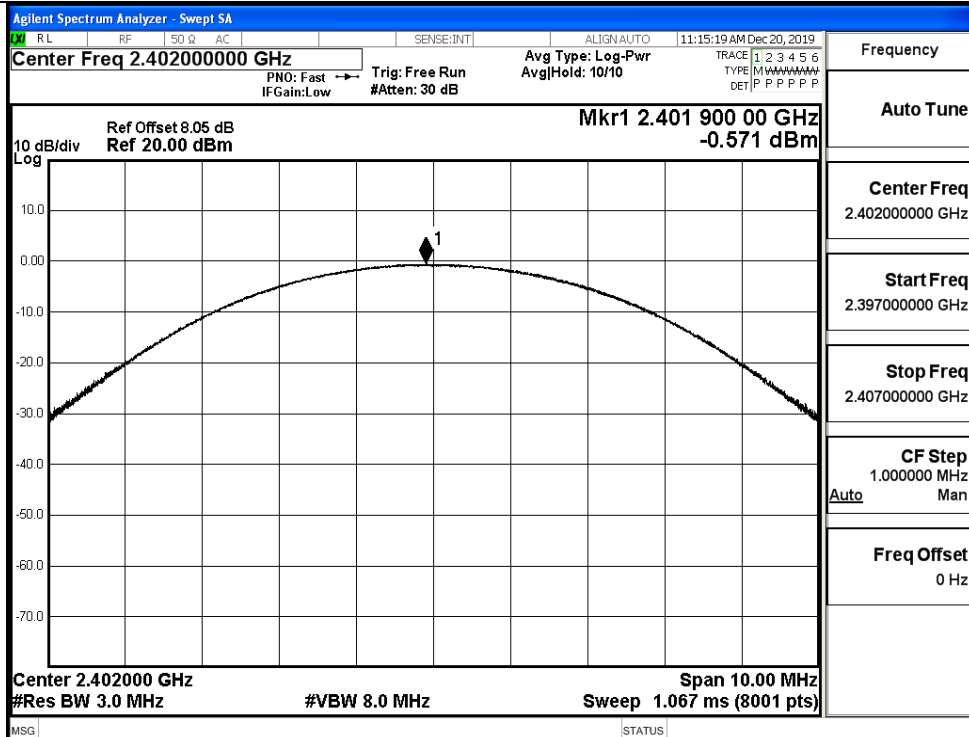


GFSK/HCH

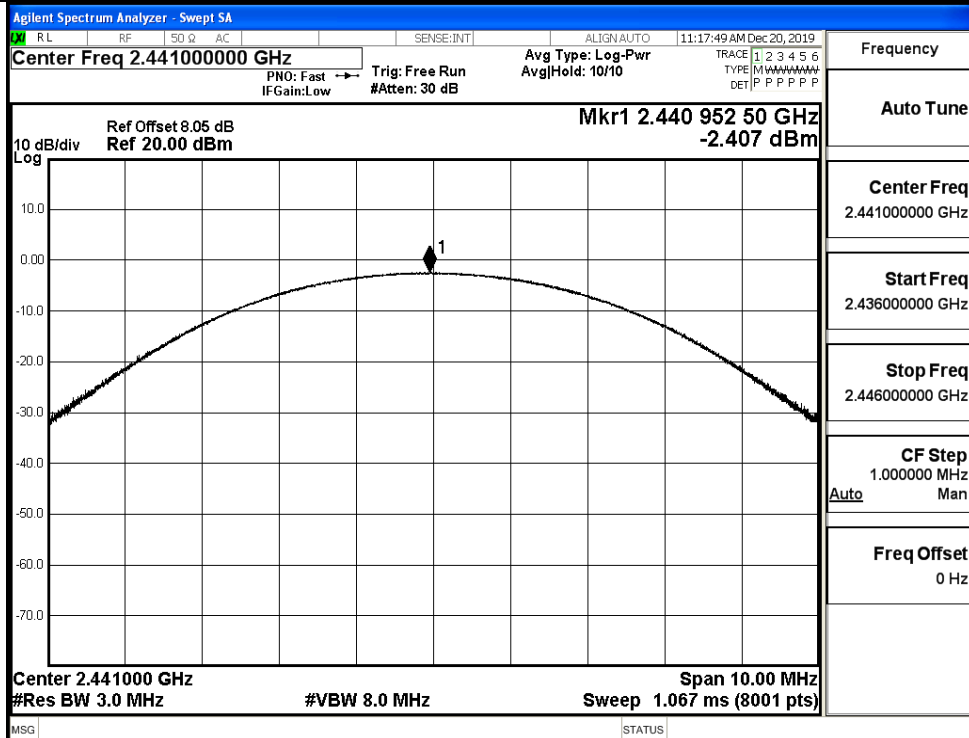
 $\pi/4$ DQPSK/LCH

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

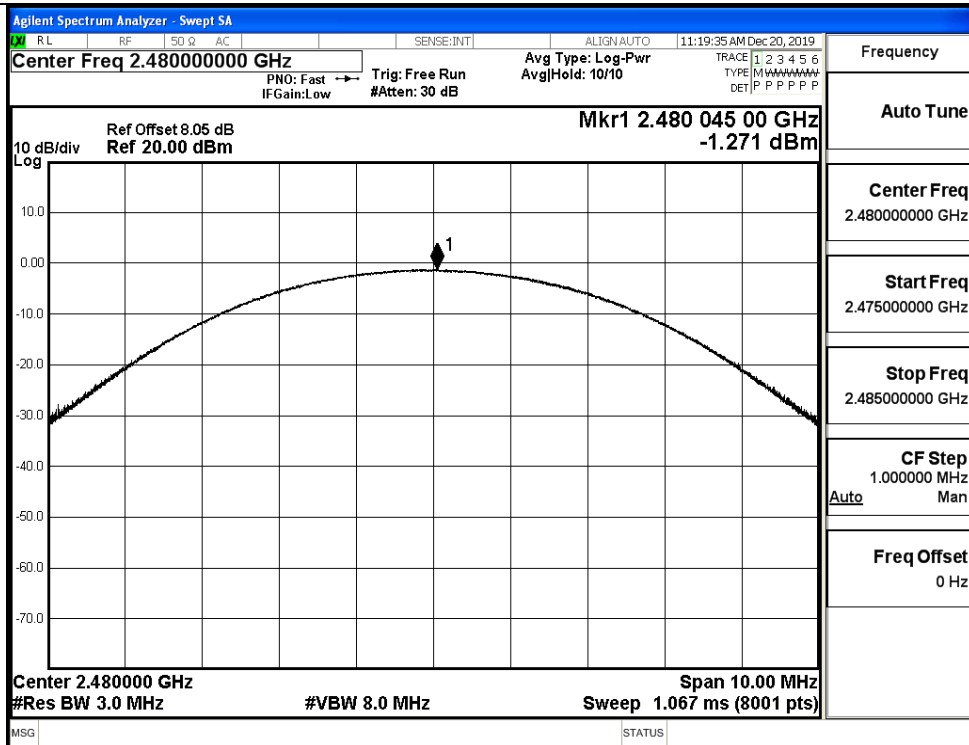
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

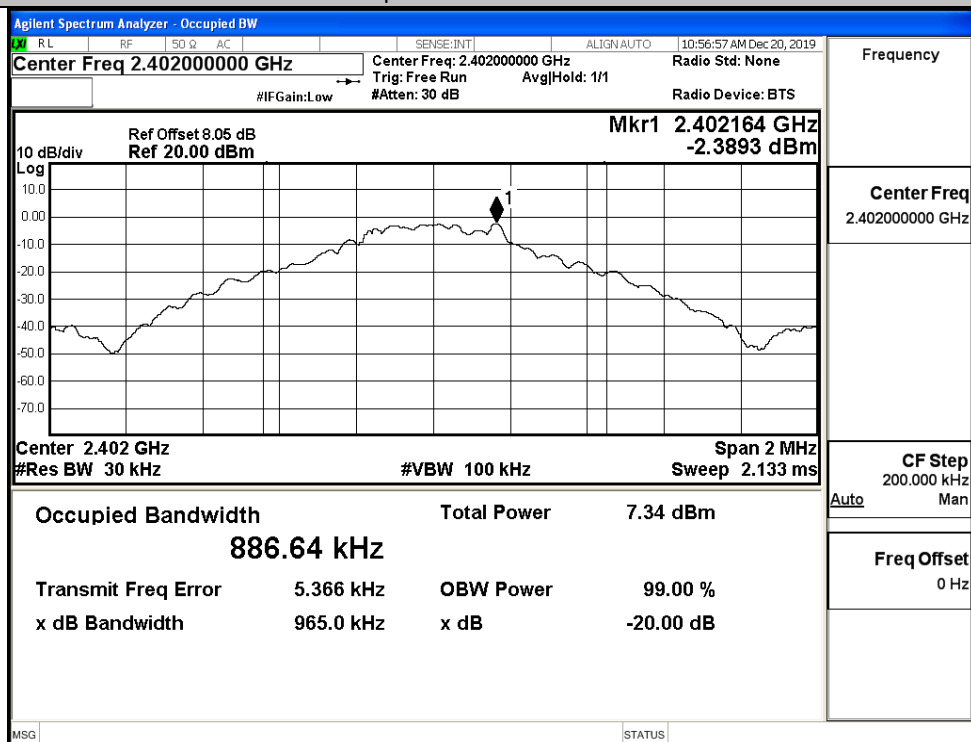


A.2 20dB Bandwidth

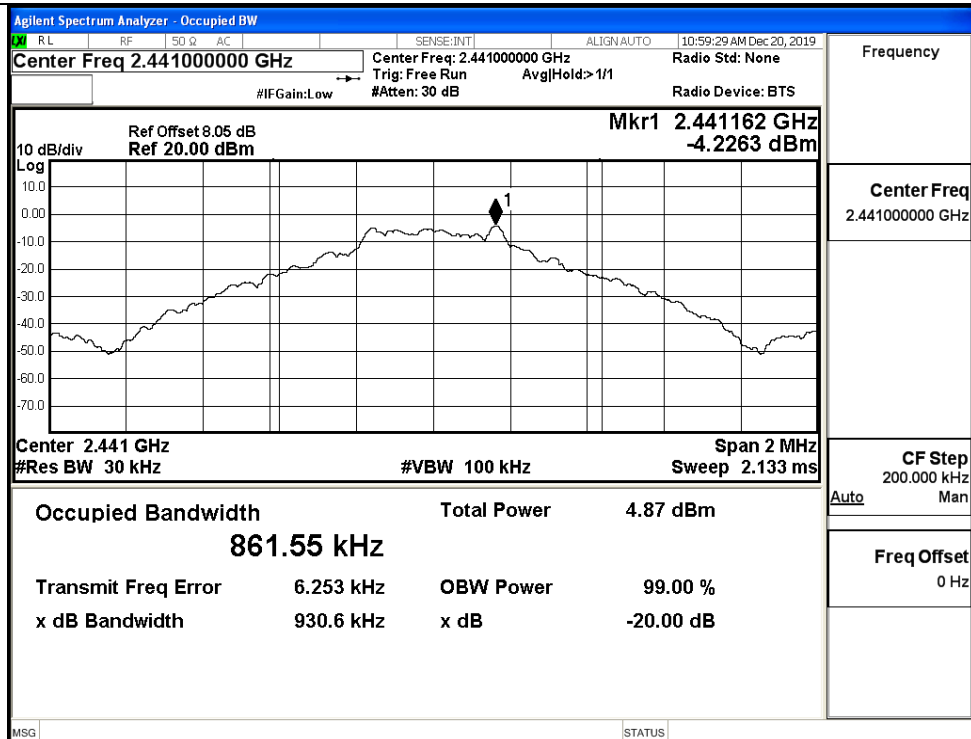
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9650	Not Specified	PASS
	MCH	0.9306	Not Specified	PASS
	HCH	1.034	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.289	Not Specified	PASS
	MCH	1.310	Not Specified	PASS
	HCH	1.290	Not Specified	PASS
8DPSK	LCH	1.292	Not Specified	PASS
	MCH	1.300	Not Specified	PASS
	HCH	1.294	Not Specified	PASS

Test Graphs

GFSK/LCH



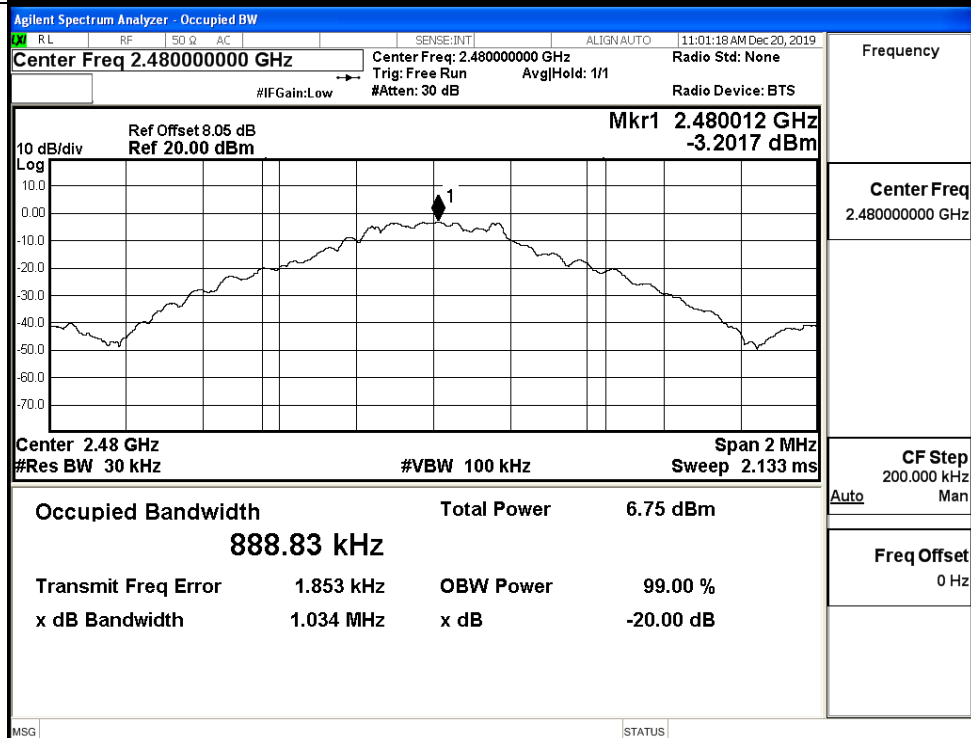
GFSK/MCH



Frequency

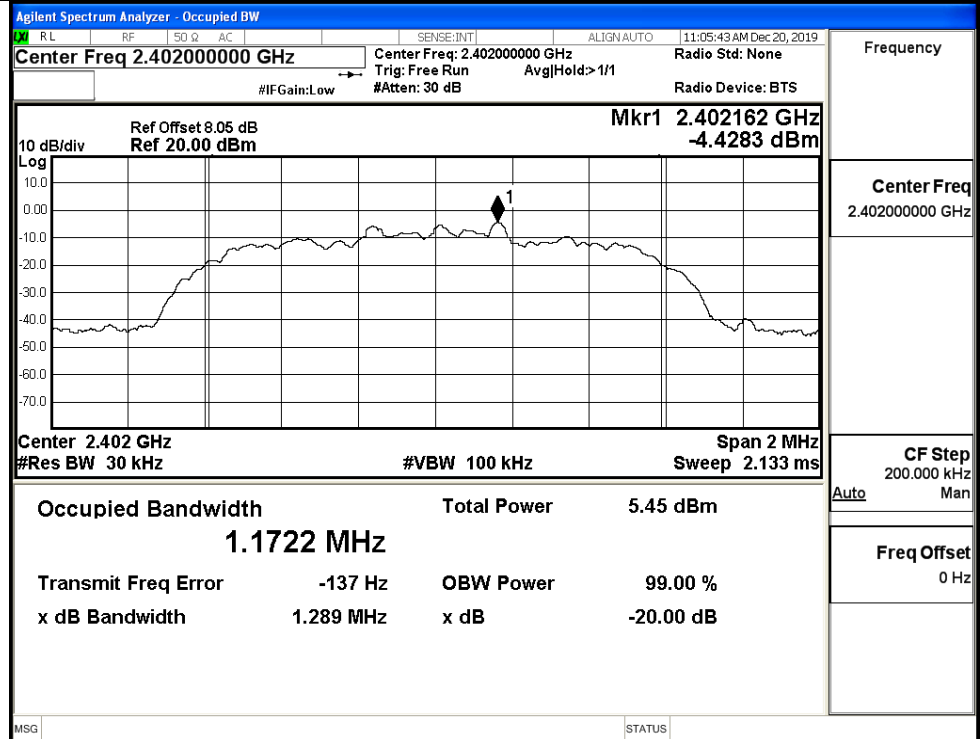
Center Freq
2.441000000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

GFSK/HCH



Frequency

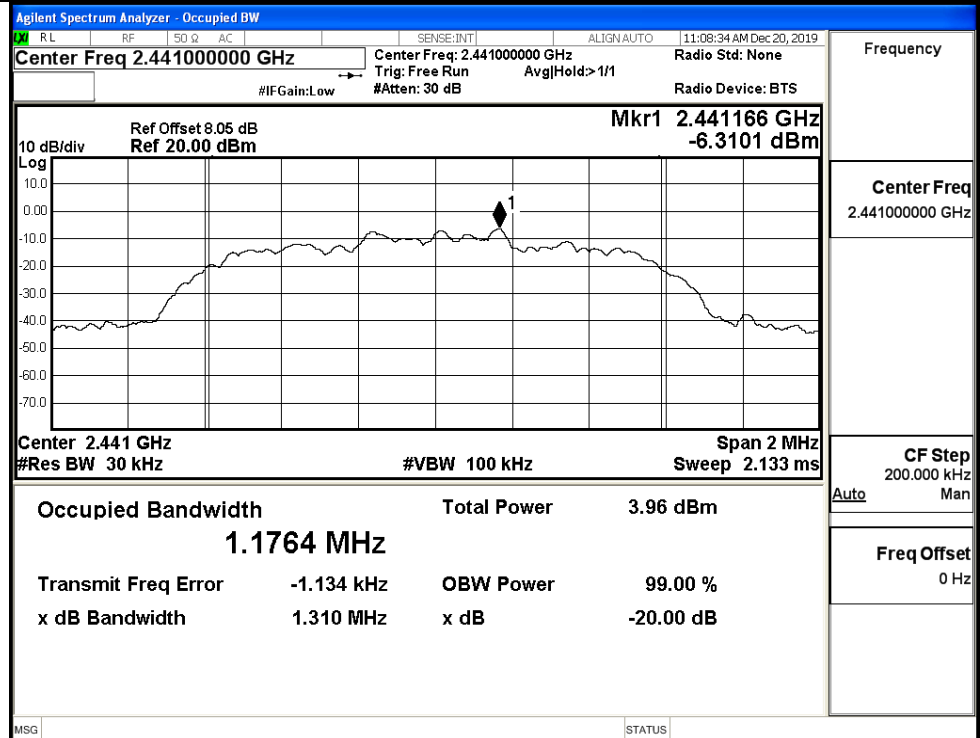
Center Freq
2.480000000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/LCH

Frequency

Center Freq
2.40200000 GHzCF Step
200.000 kHz

Auto

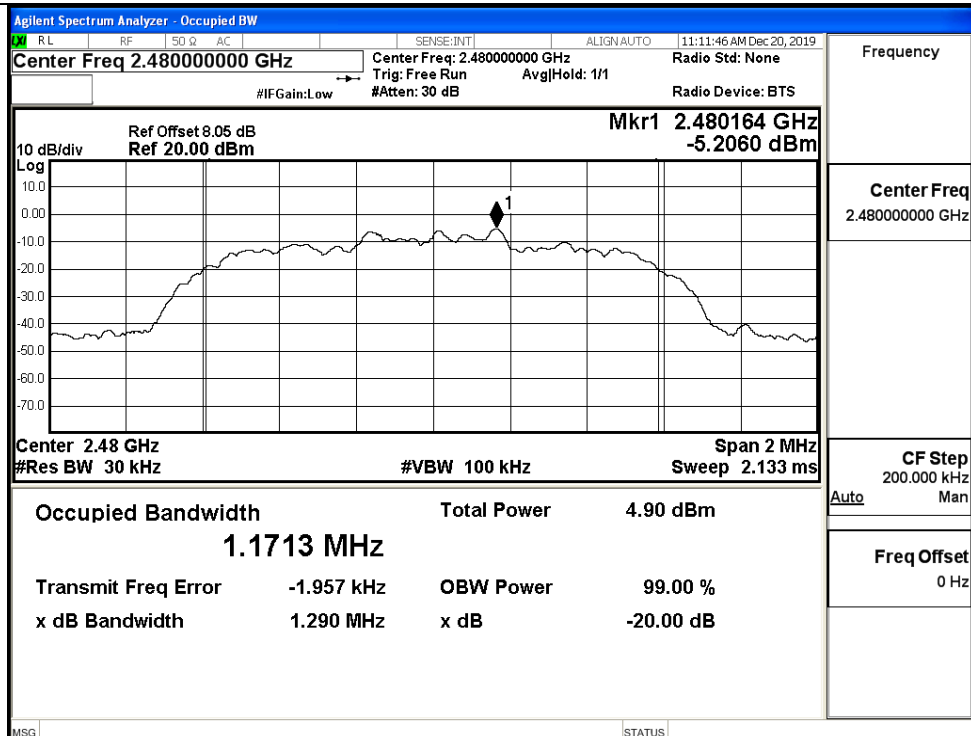
Freq Offset
0 Hz $\pi/4$ DQPSK/MCH

Frequency

Center Freq
2.44100000 GHzCF Step
200.000 kHz

Auto

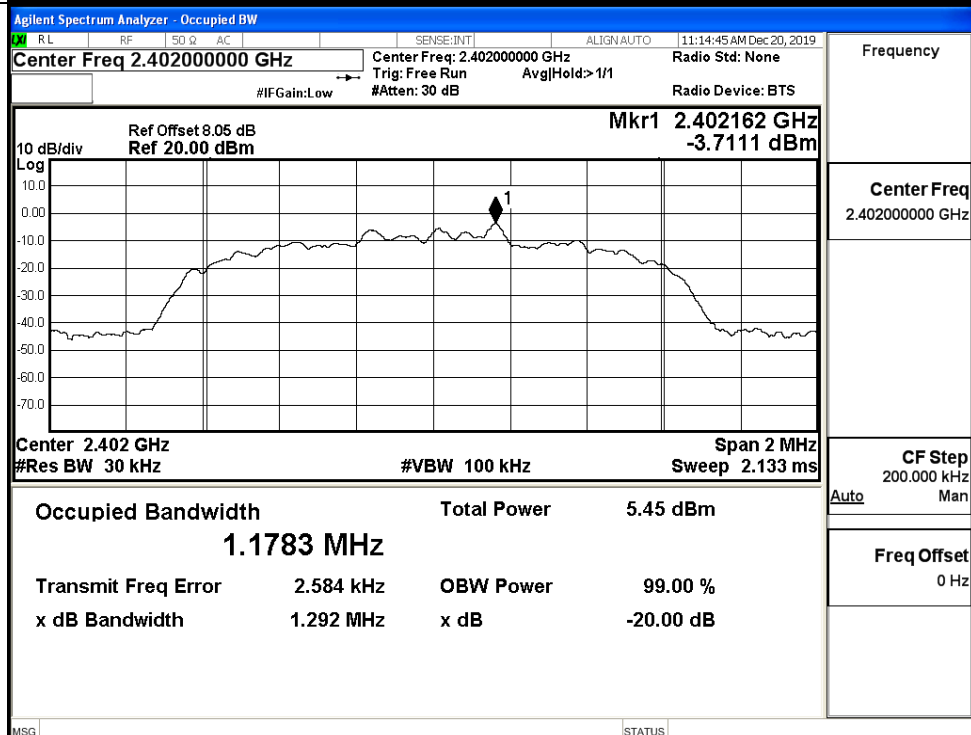
Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH

Frequency

Center Freq
2.480000000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

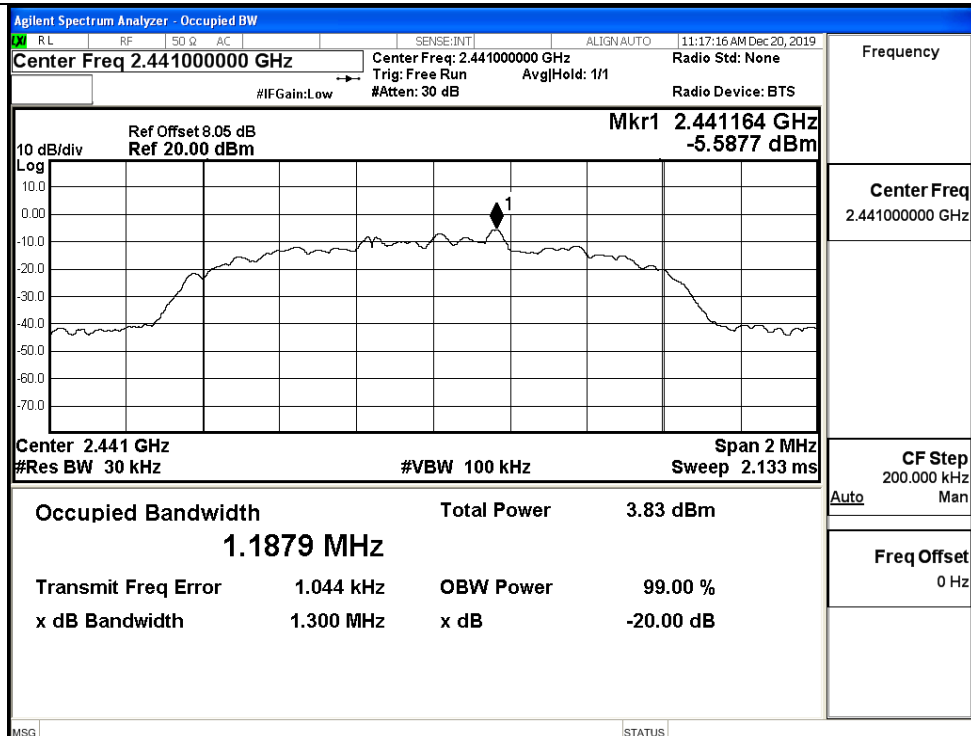
8DPSK/LCH



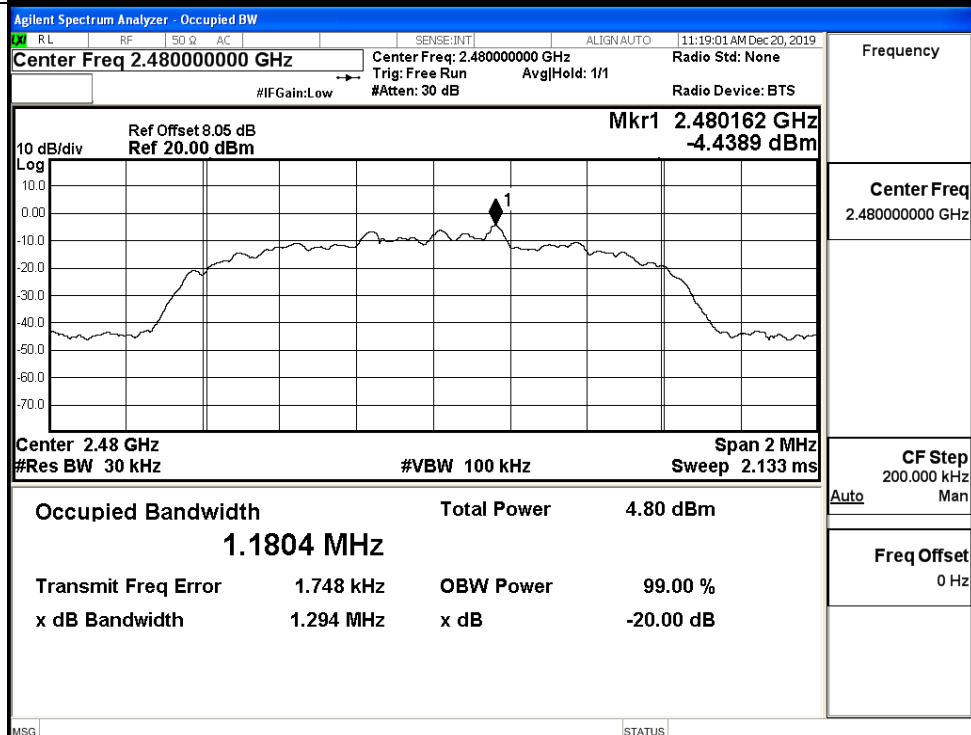
Frequency

Center Freq
2.402000000 GHzCF Step
200.000 kHz
Auto ManFreq Offset
0 Hz

8DPSK/MCH



8DPSK/HCH

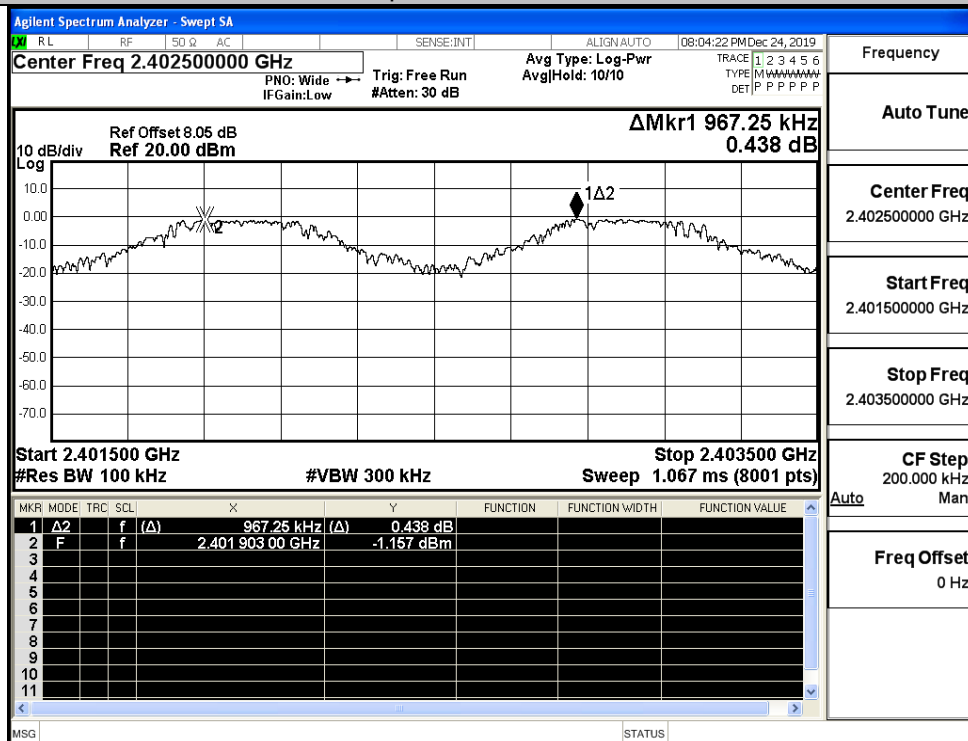


A.3 Carrier Frequency Separation

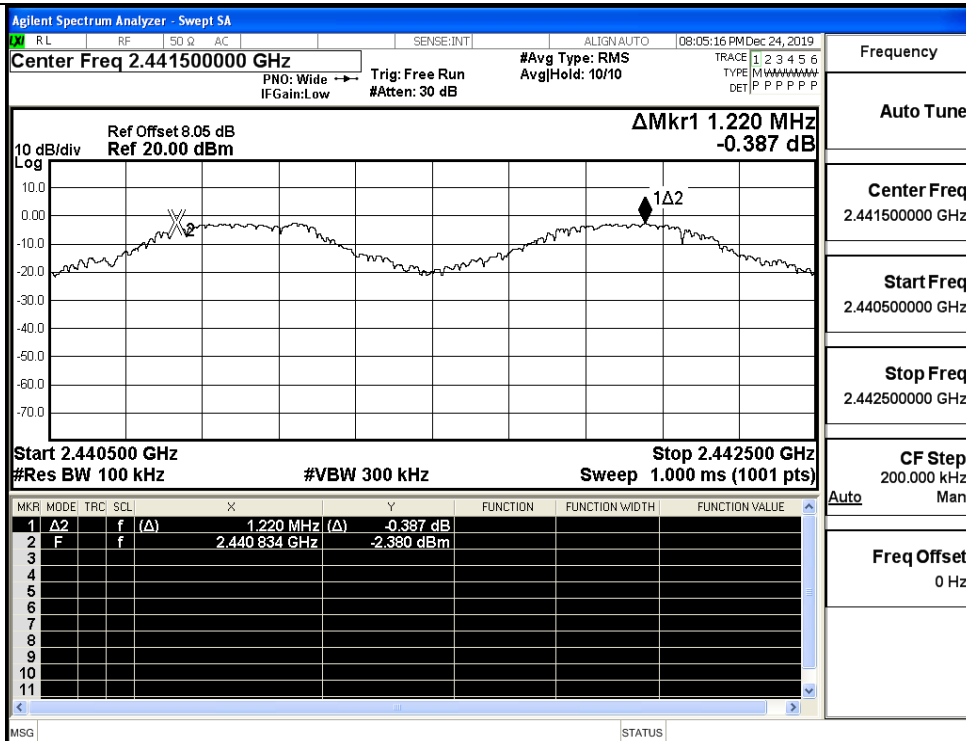
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.967	0.689	PASS
	MCH	1.220	0.689	PASS
	HCH	1.024	0.689	PASS
$\pi/4$ DQPSK	LCH	0.928	0.873	PASS
	MCH	1.628	0.873	PASS
	HCH	1.318	0.873	PASS
8DPSK	LCH	1.016	0.867	PASS
	MCH	0.946	0.867	PASS
	HCH	1.076	0.867	PASS

Test Graphs

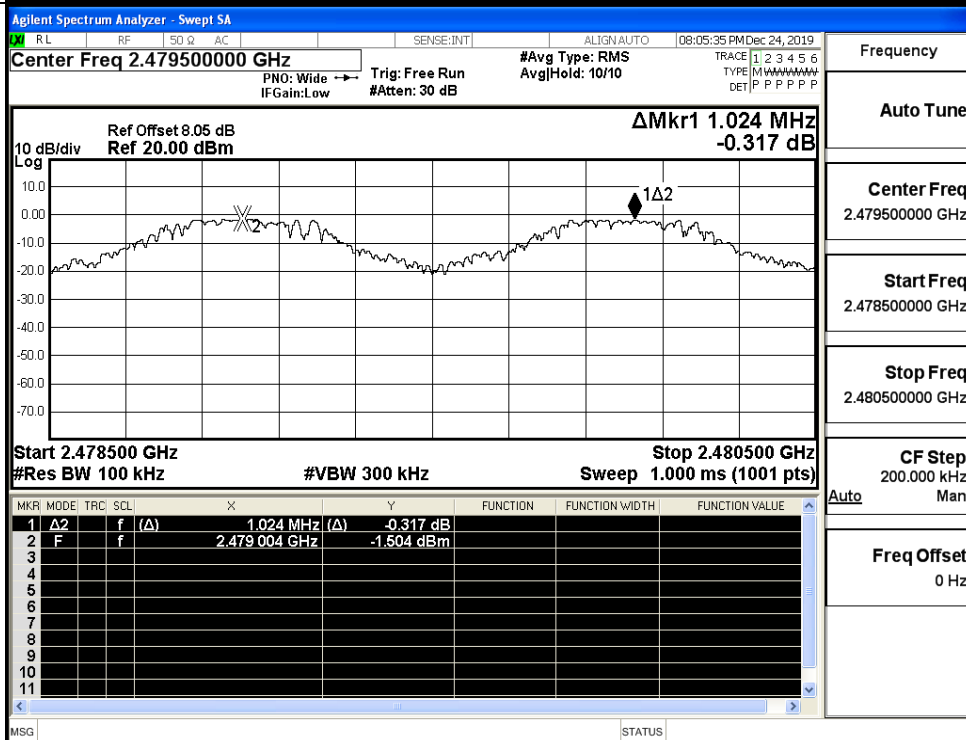
GFSK/LCH

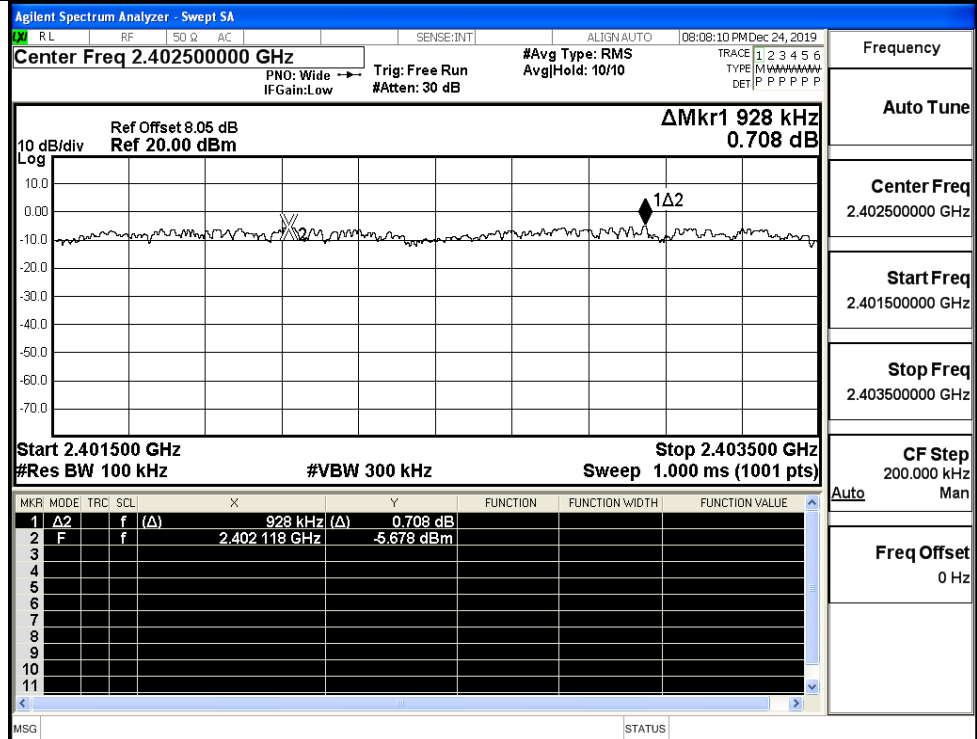
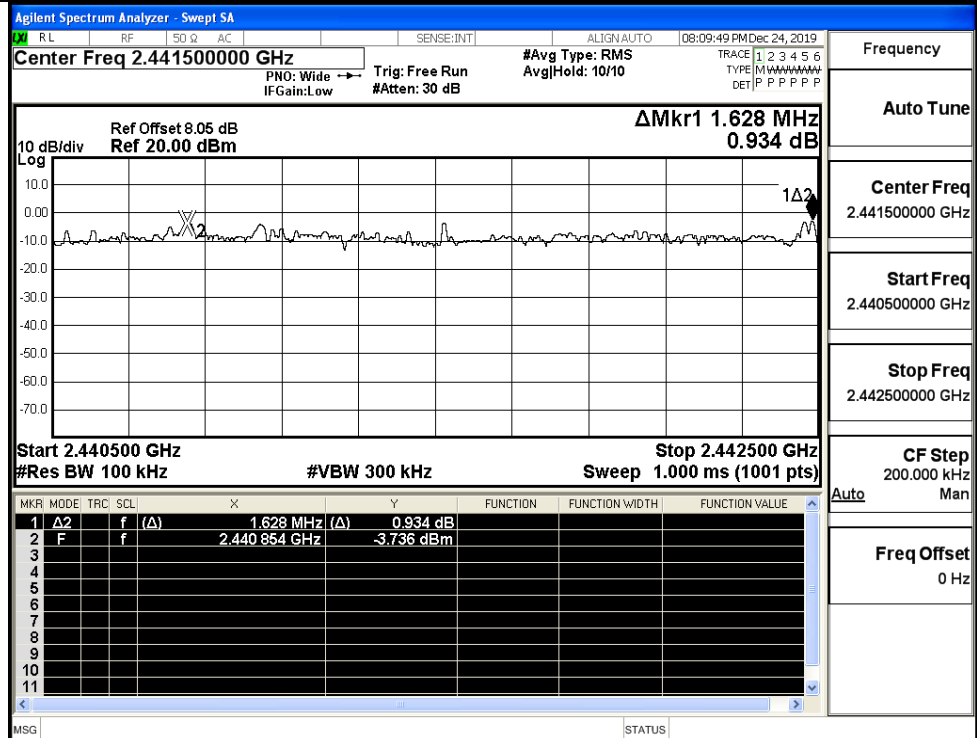


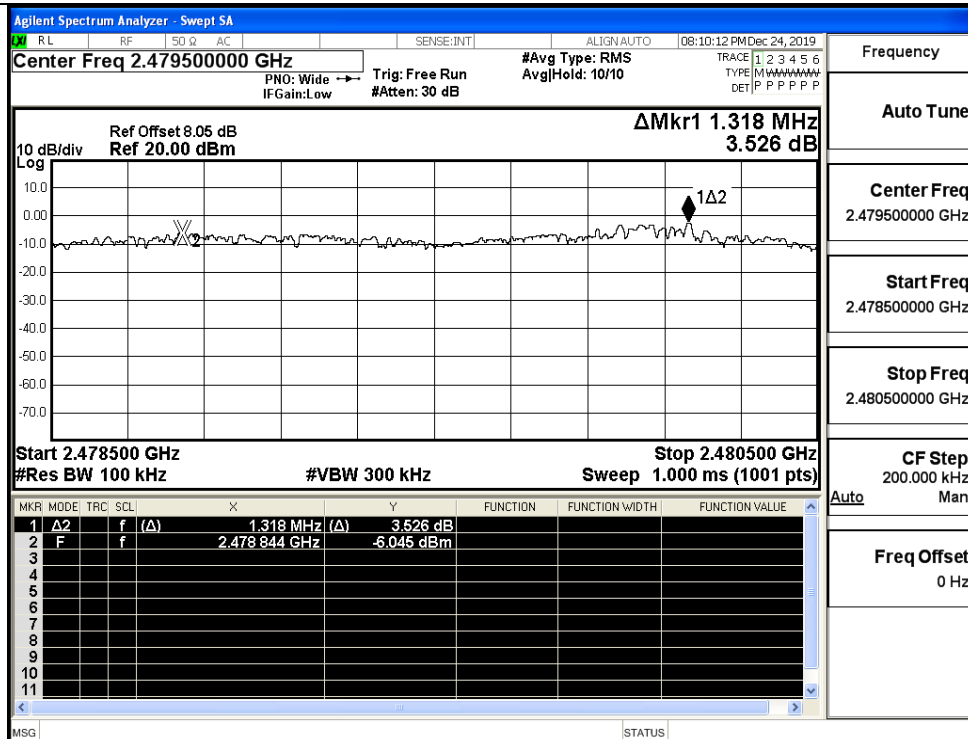
GFSK/MCH



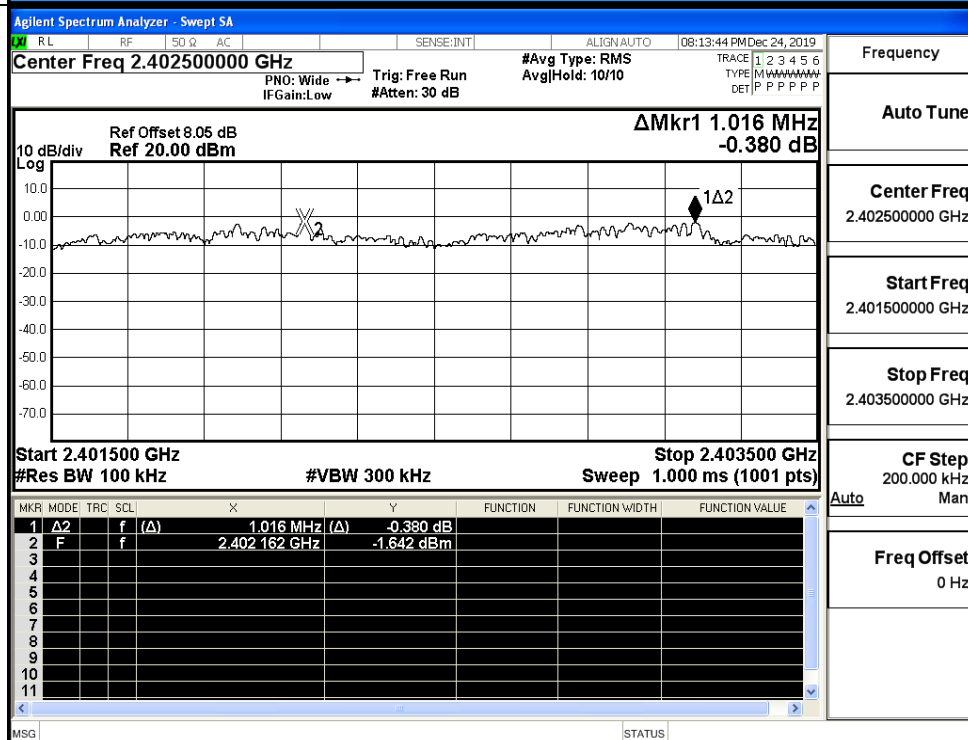
GFSK/HCH



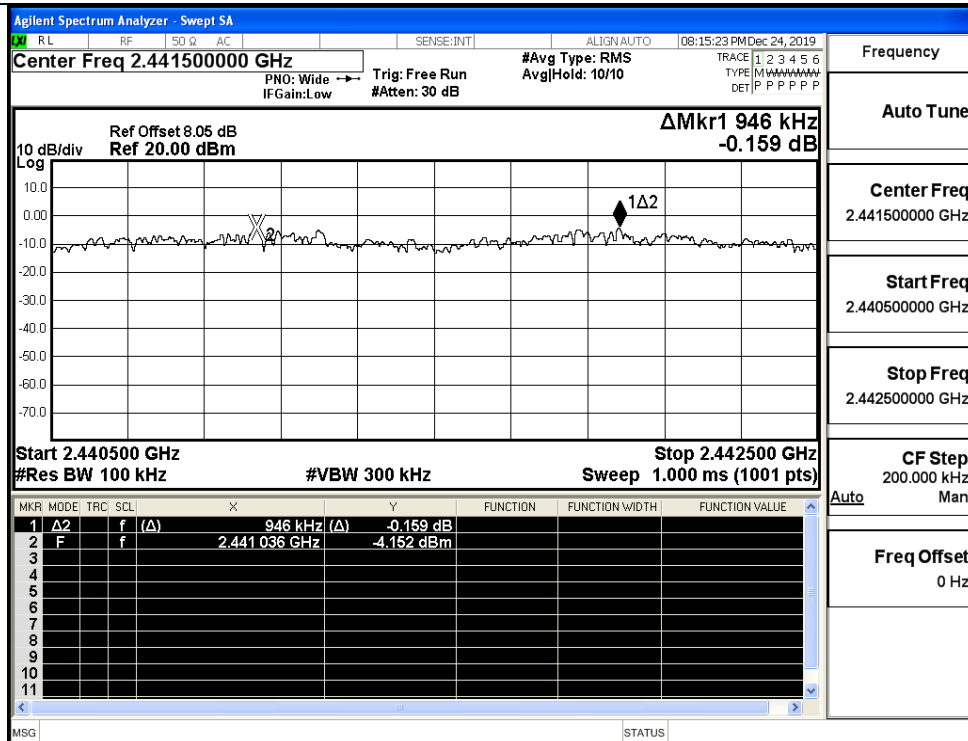
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

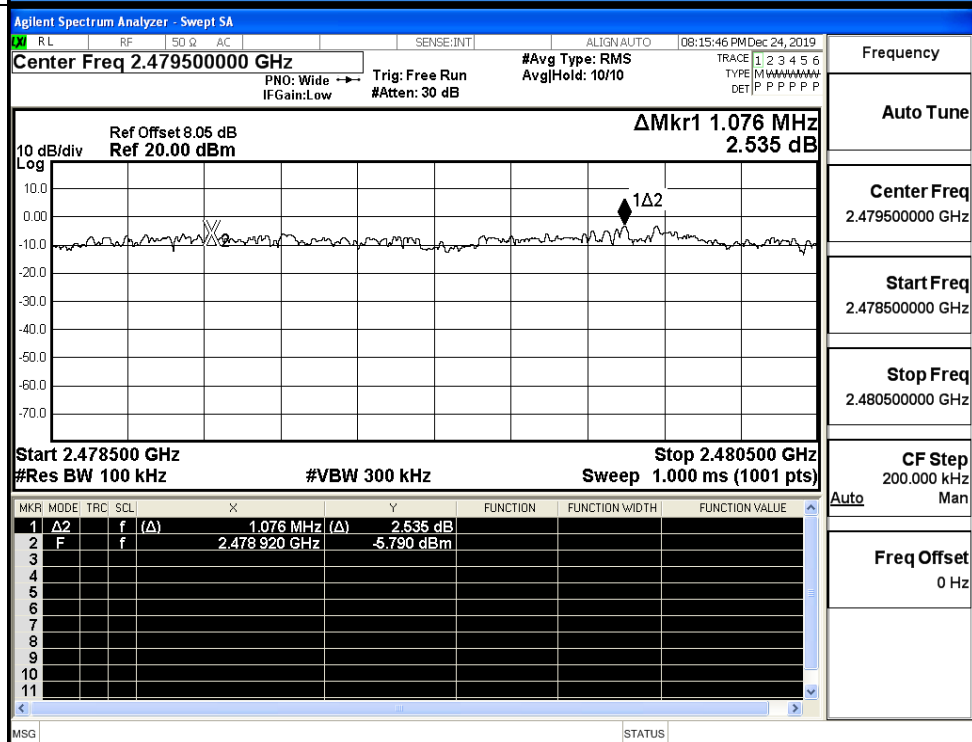
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

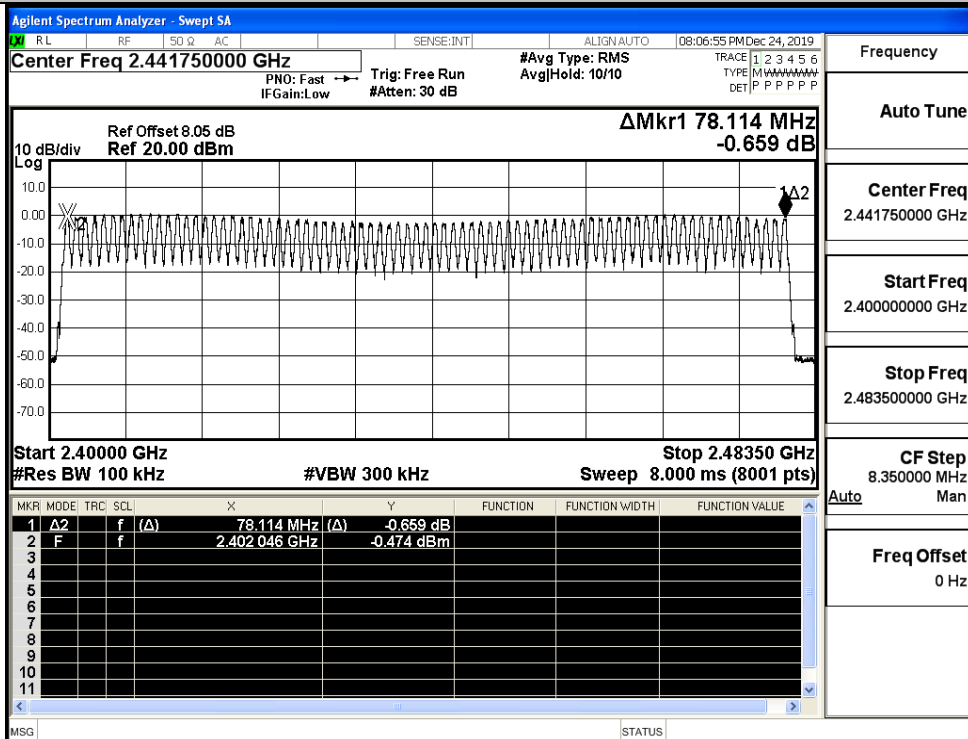
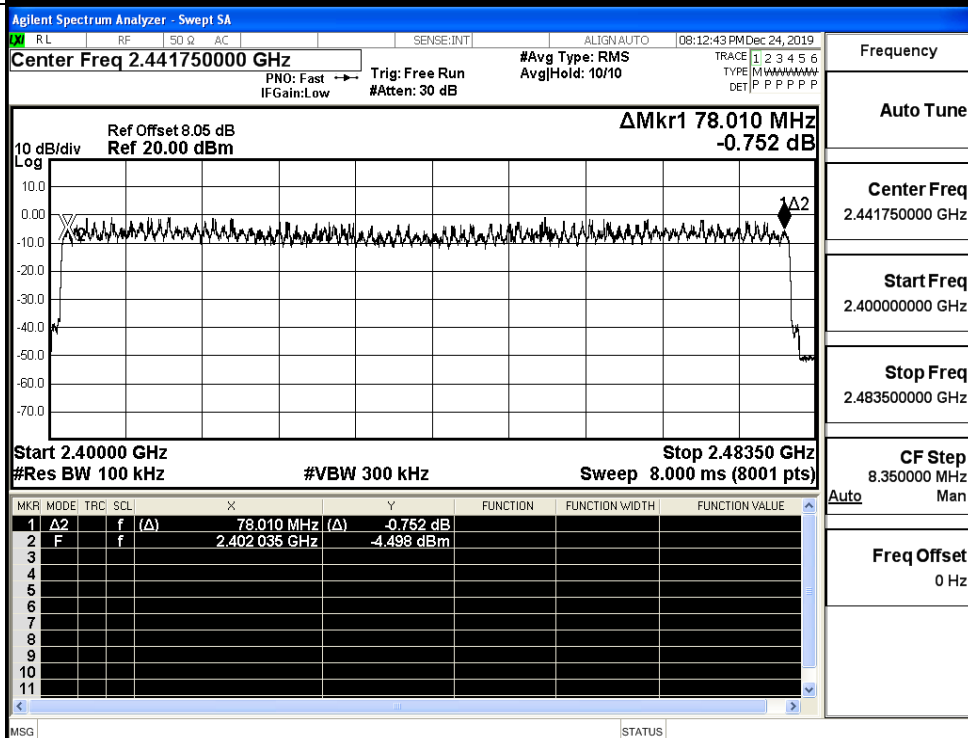


A.4 Hopping Channel Number

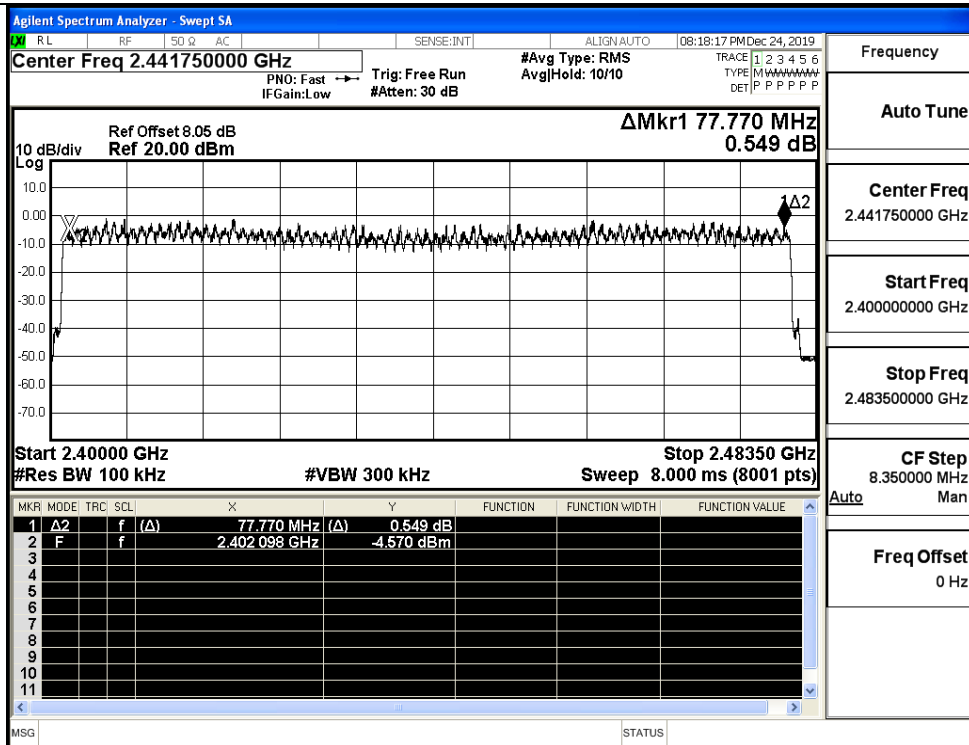
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

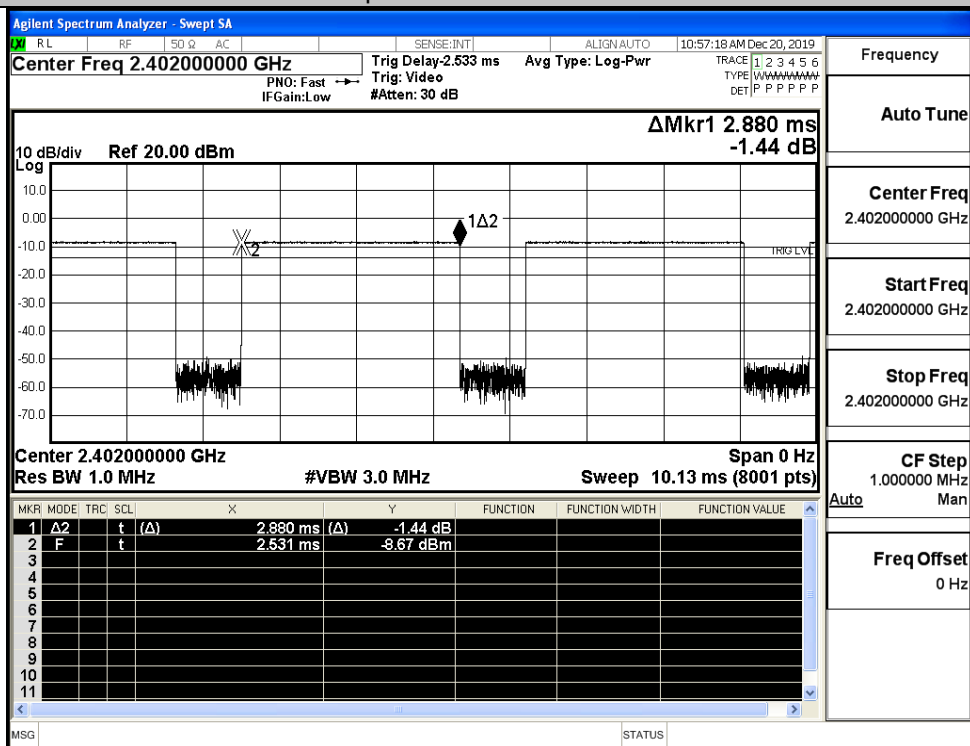


A.5 Dwell Time

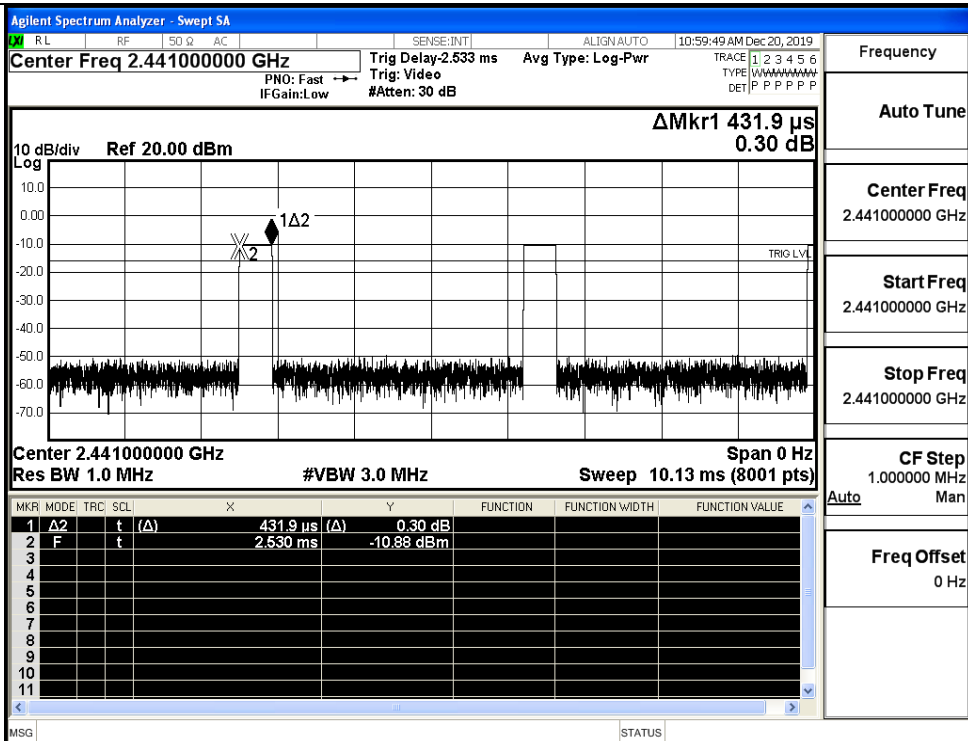
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	0.43	106.7	0.046	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	0.43	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.308	0.4	PASS
	3DH5	MCH	0.43	106.7	0.308	0.4	PASS
	3DH5	HCH	2.88	106.7	0.308	0.4	PASS

Test Graphs

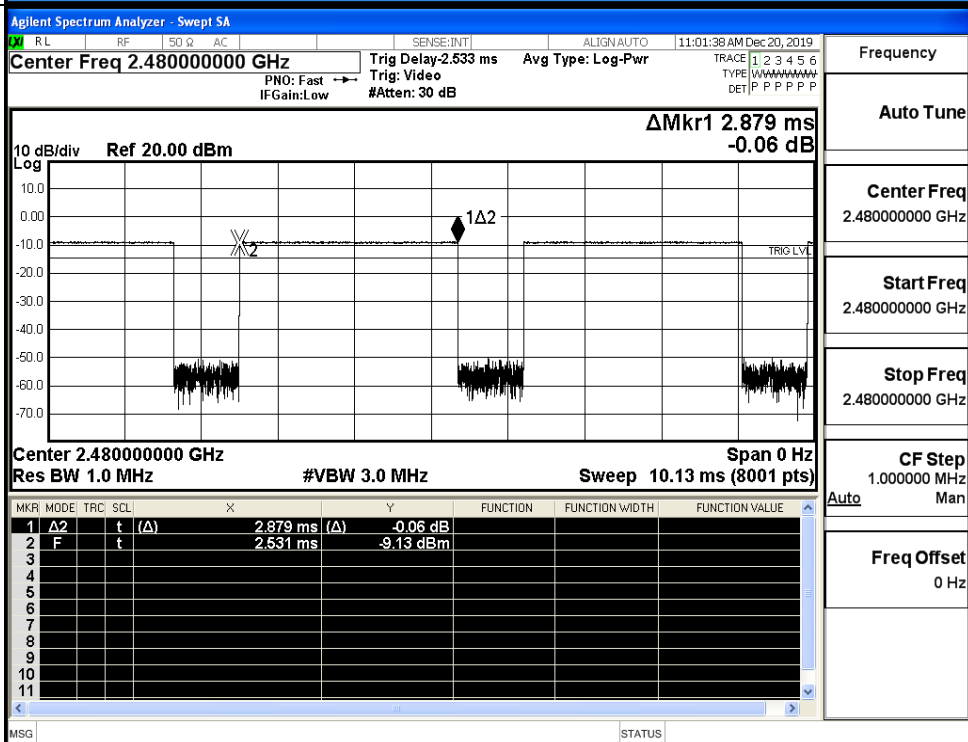
GFSK_DH5/LCH



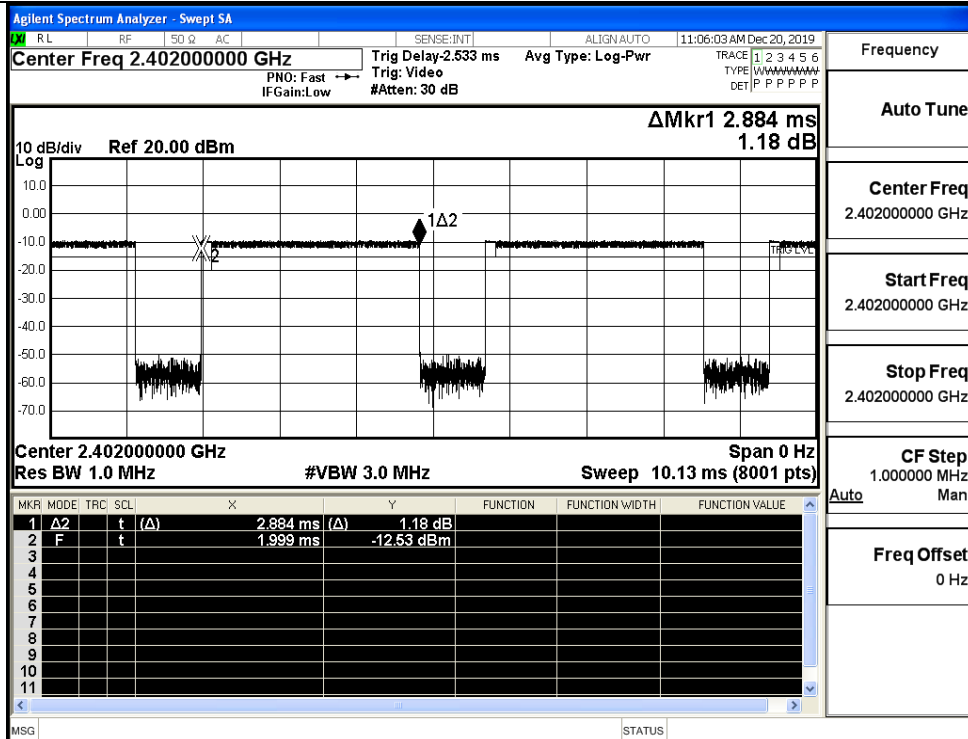
GFSK_DH5/MCH



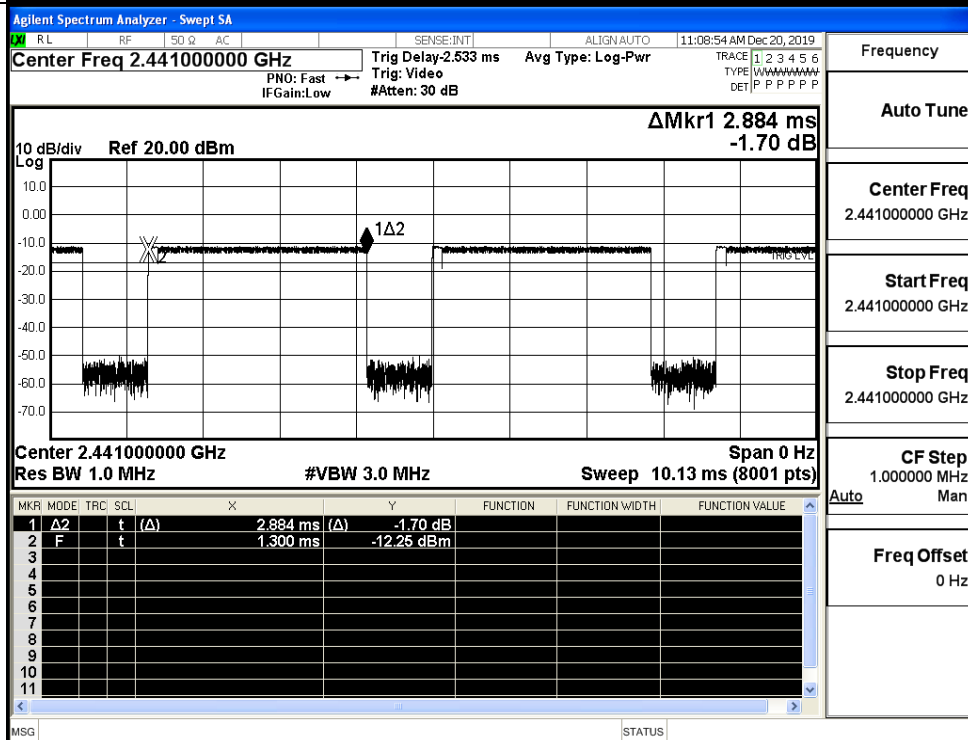
GFSK_DH5/HCH



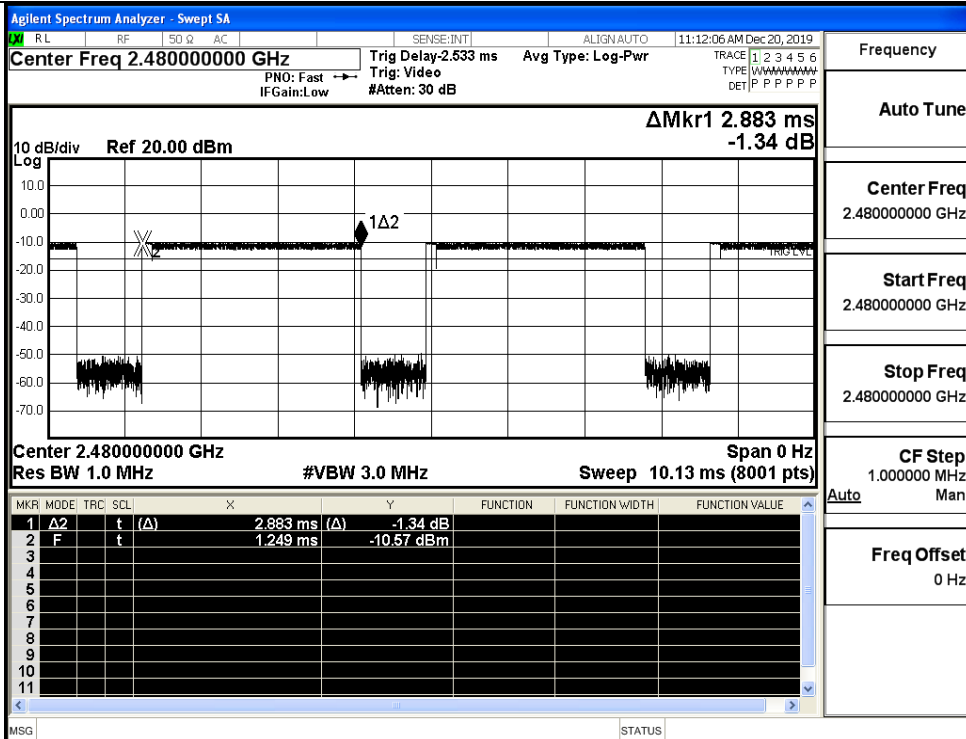
$\pi/4$ DQPSK
_2DH5/LCH



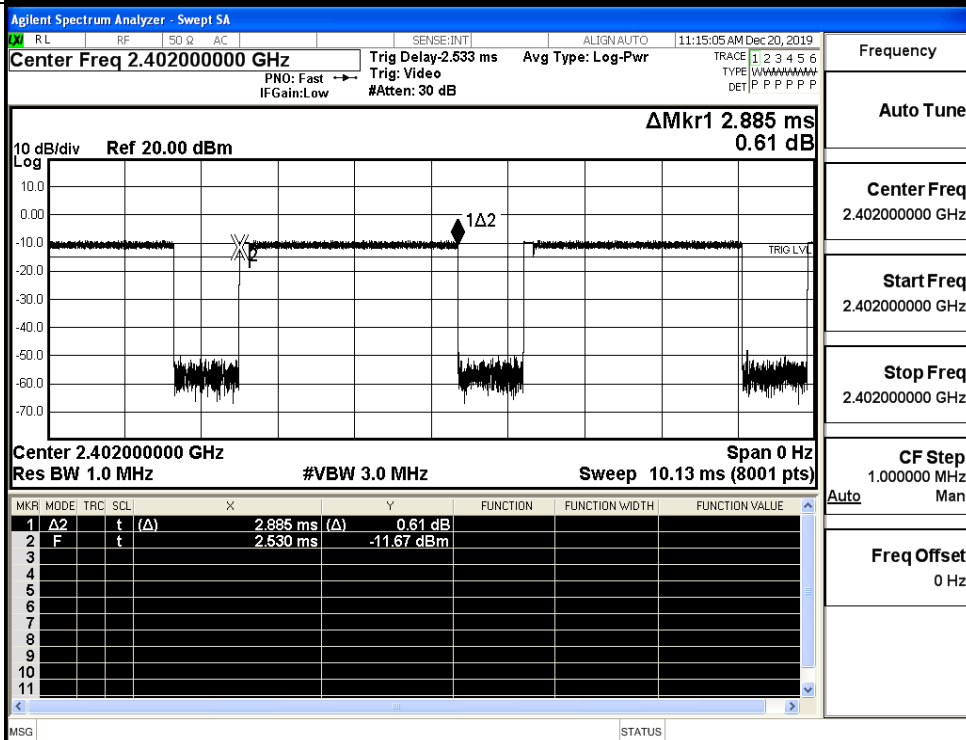
$\pi/4$ DQPSK
_2DH5/MCH



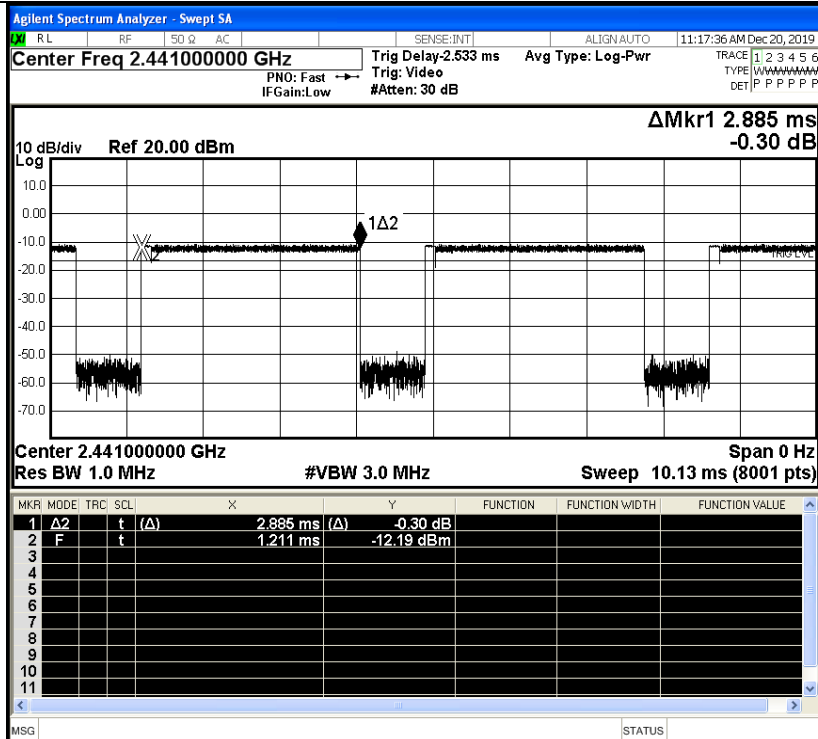
$\pi/4$ DQPSK
_2DH5/HCH



8DPSK _3DH5/LCH



8DPSK_3DH5/MCH

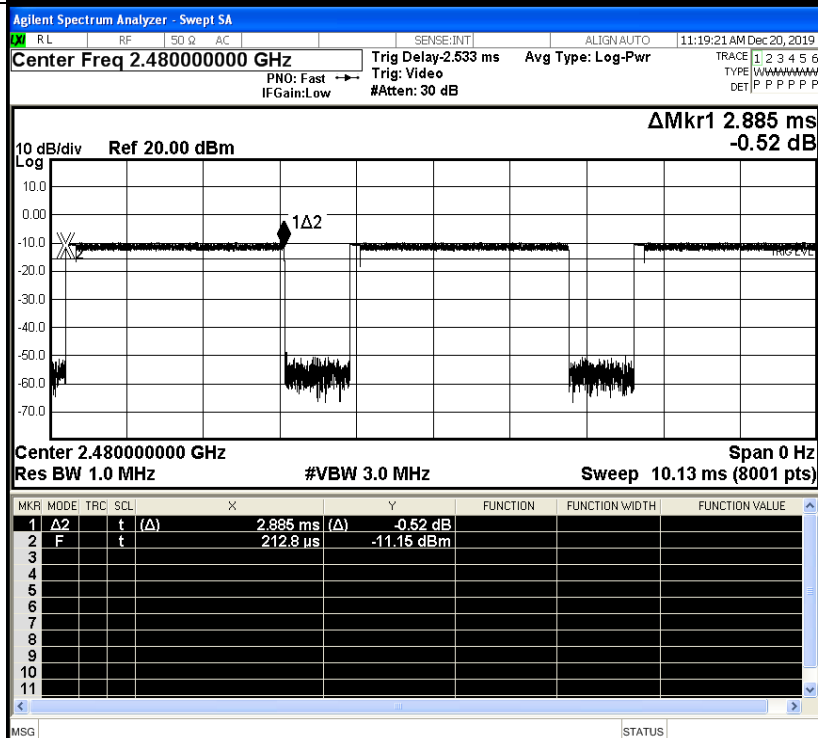


Frequency

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

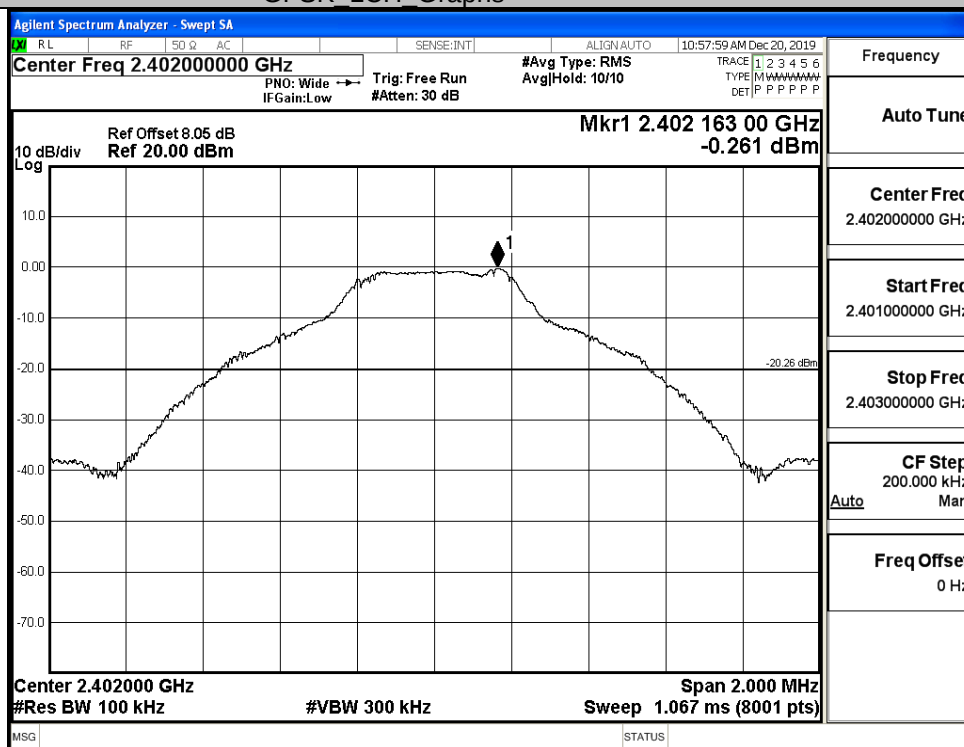
Center Freq
2.480000000 GHzStart Freq
2.480000000 GHzStop Freq
2.480000000 GHzCF Step
1.000000 MHz
Auto ManFreq Offset
0 Hz

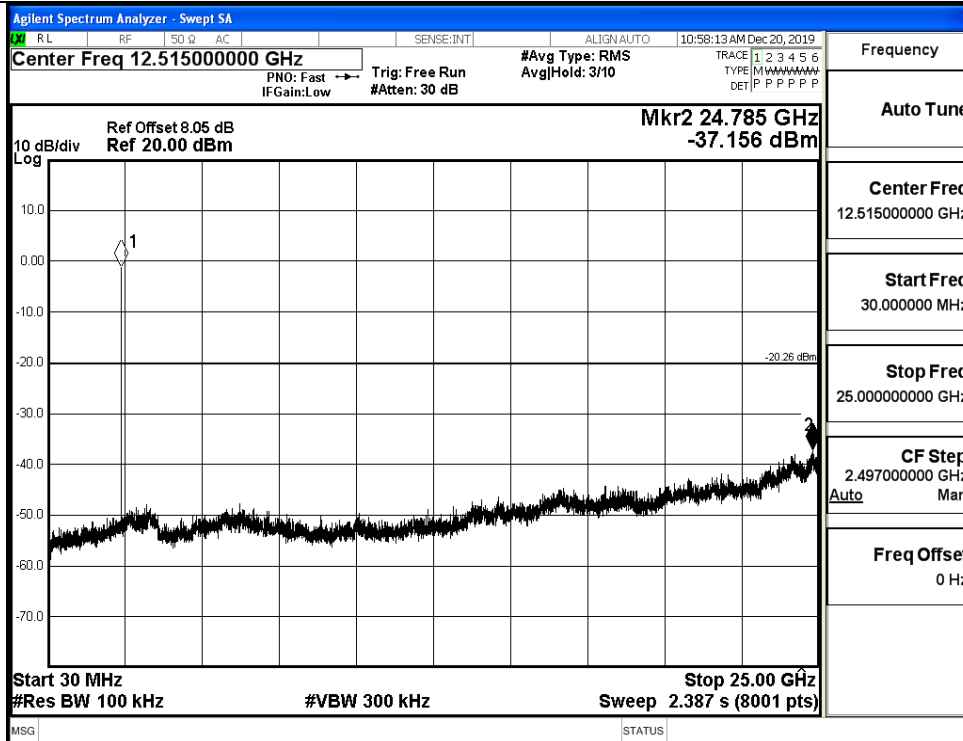
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.261	-37.156	-20.261	PASS
	MCH	-2.163	-37.278	-22.163	PASS
	HCH	-1.003	-37.549	-21.003	PASS
$\pi/4$ DQPSK	LCH	-1.694	-37.727	-21.694	PASS
	MCH	-3.365	-37.672	-23.365	PASS
	HCH	-2.573	-37.583	-22.573	PASS
8DPSK	LCH	-1.833	-37.872	-21.833	PASS
	MCH	-3.416	-37.183	-23.416	PASS
	HCH	-2.498	-37.561	-22.498	PASS

GFSK LCH Graphs

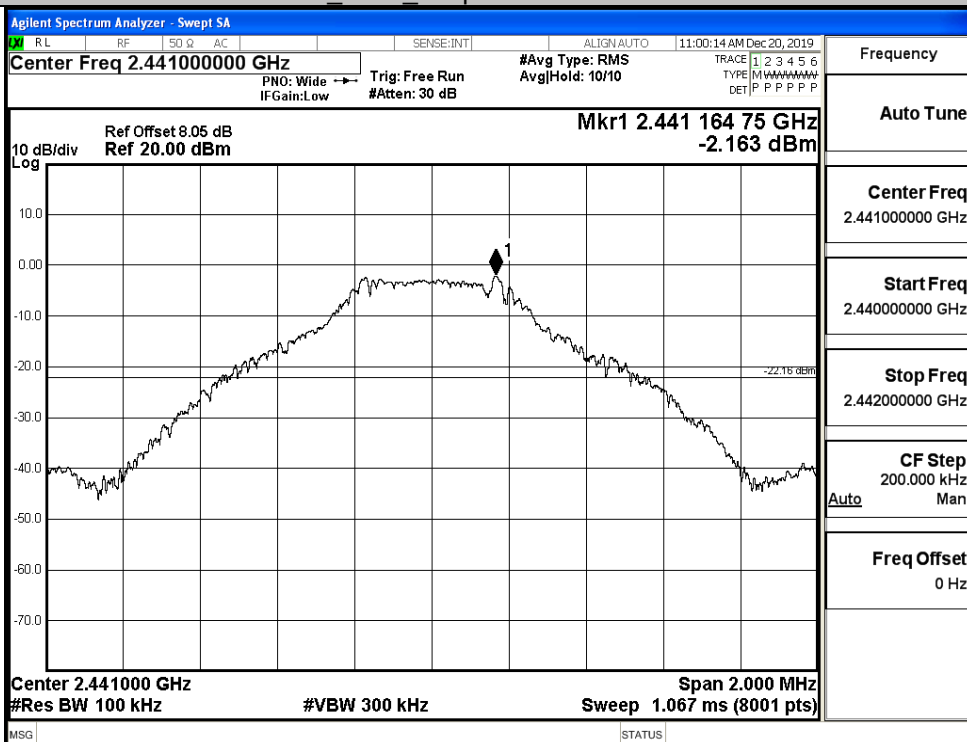
Pref



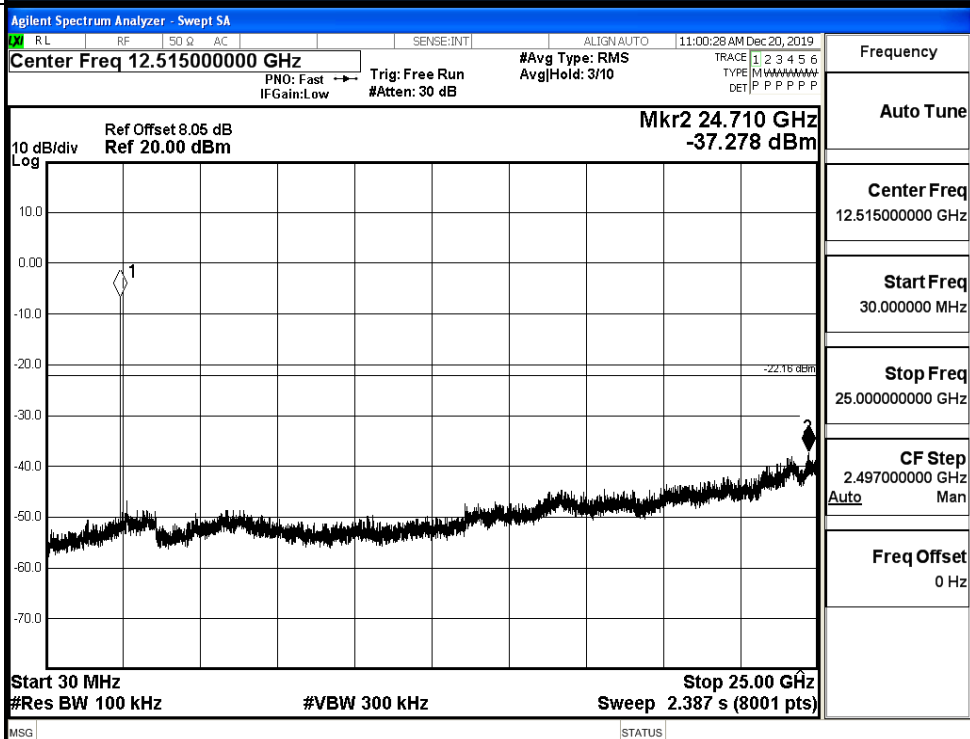
P_uw

GFSK_MCH_Graphs

Pref

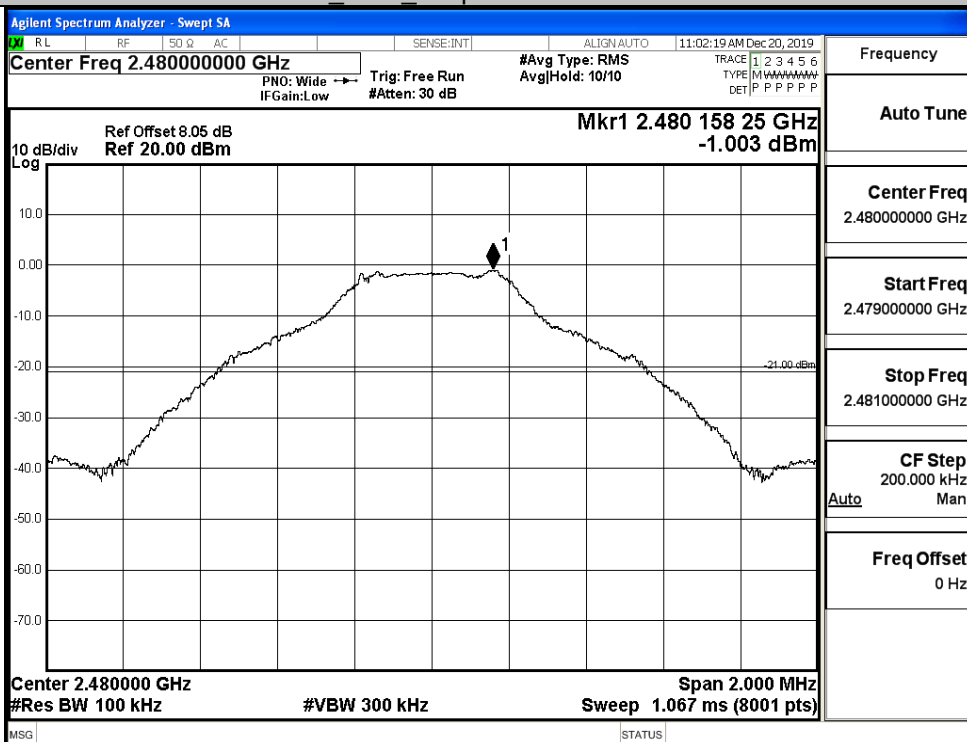


Puw

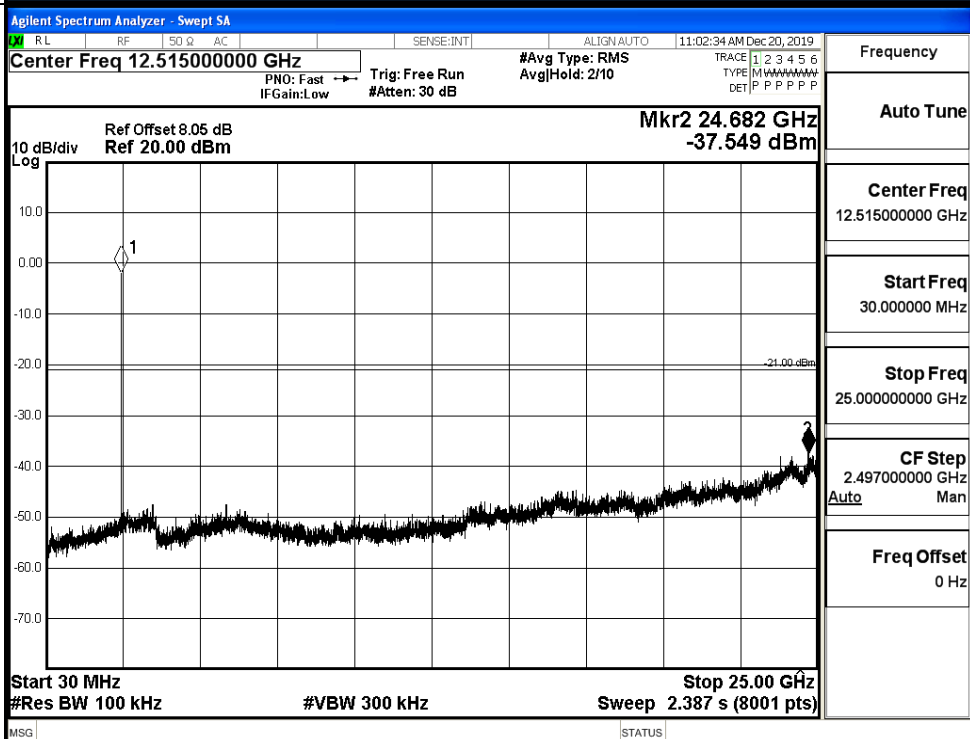


GFSK HCH Graphs

Pref

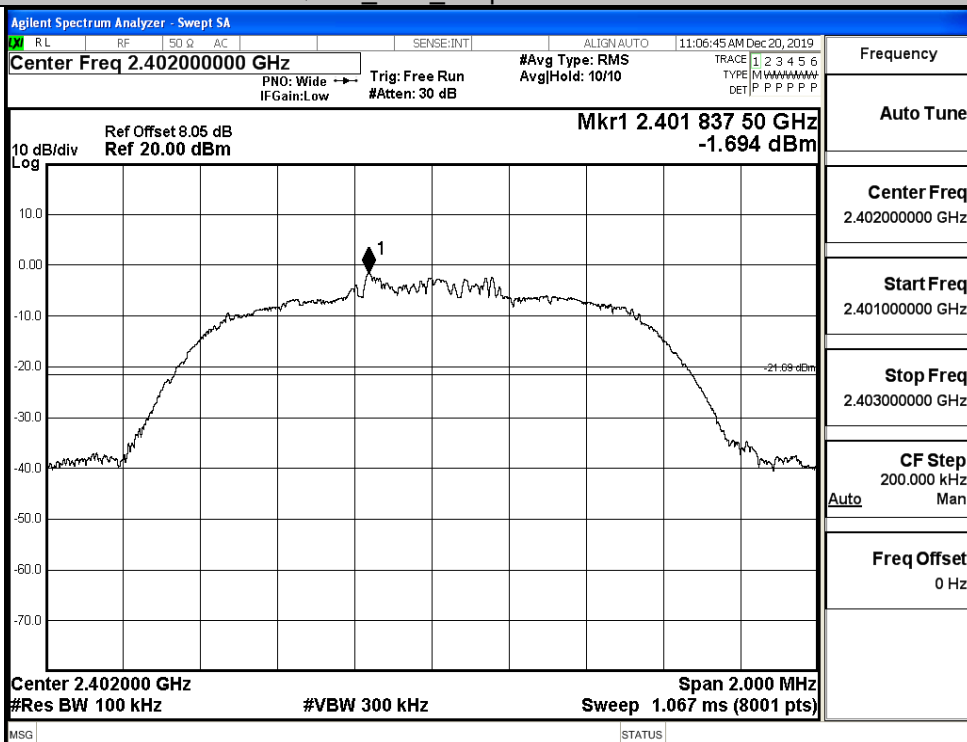


Puw

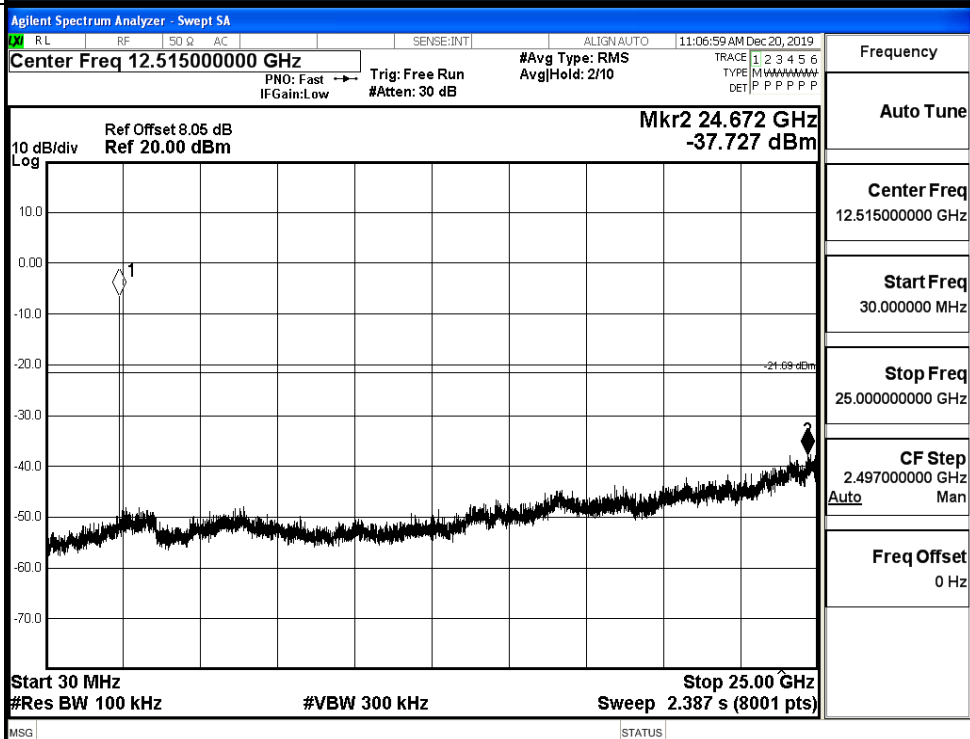


π /4DQPSK_LCH_Graphs

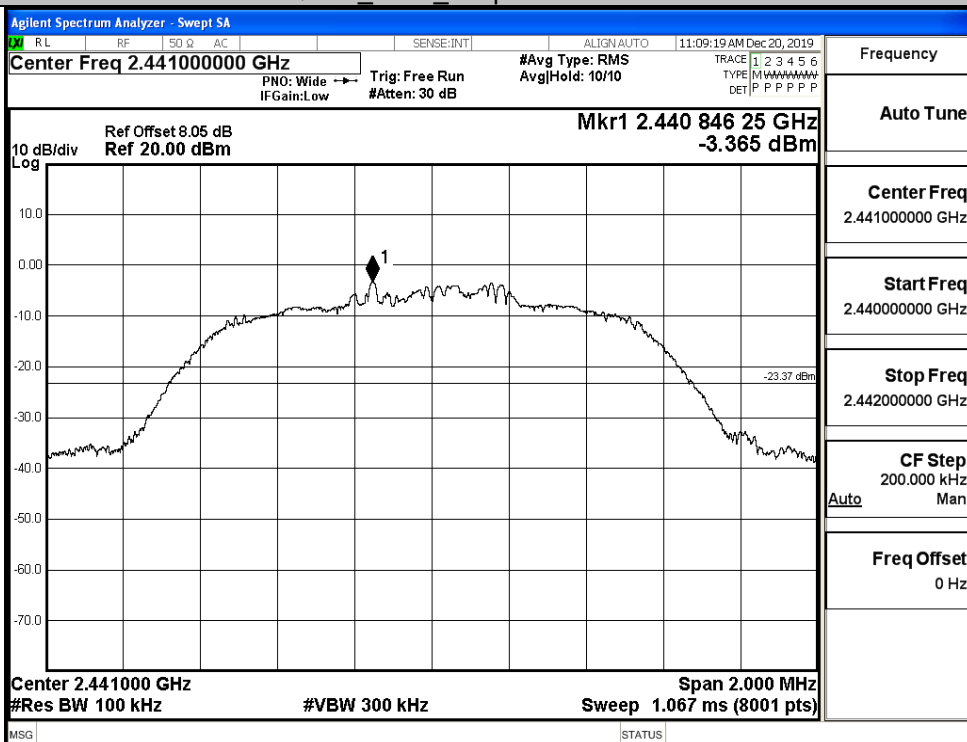
Pref



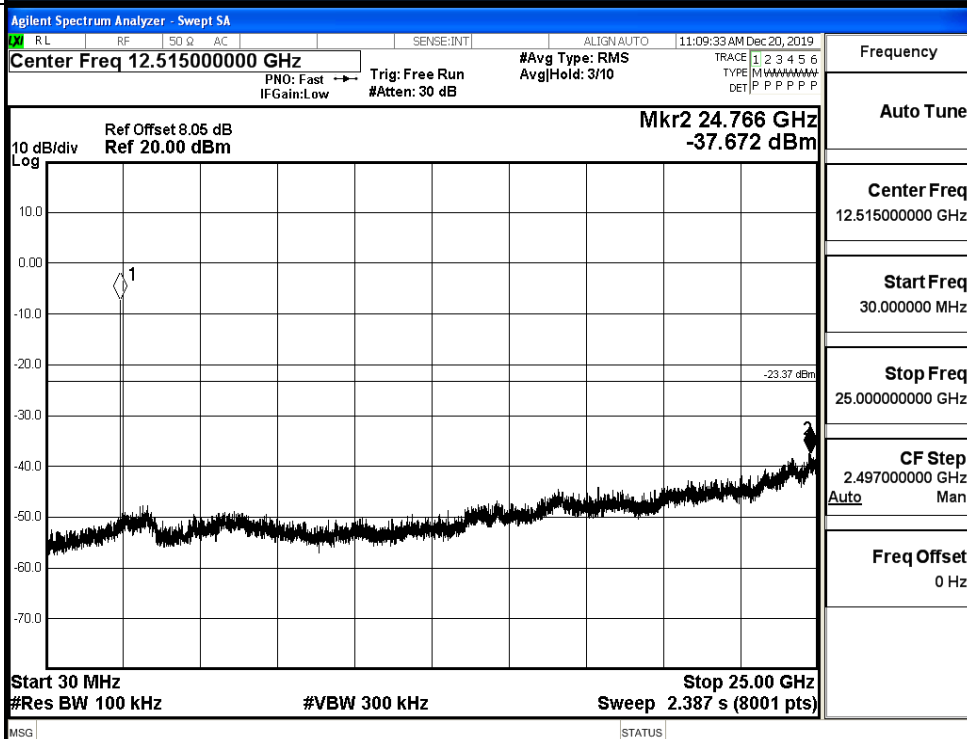
Puw



Pref

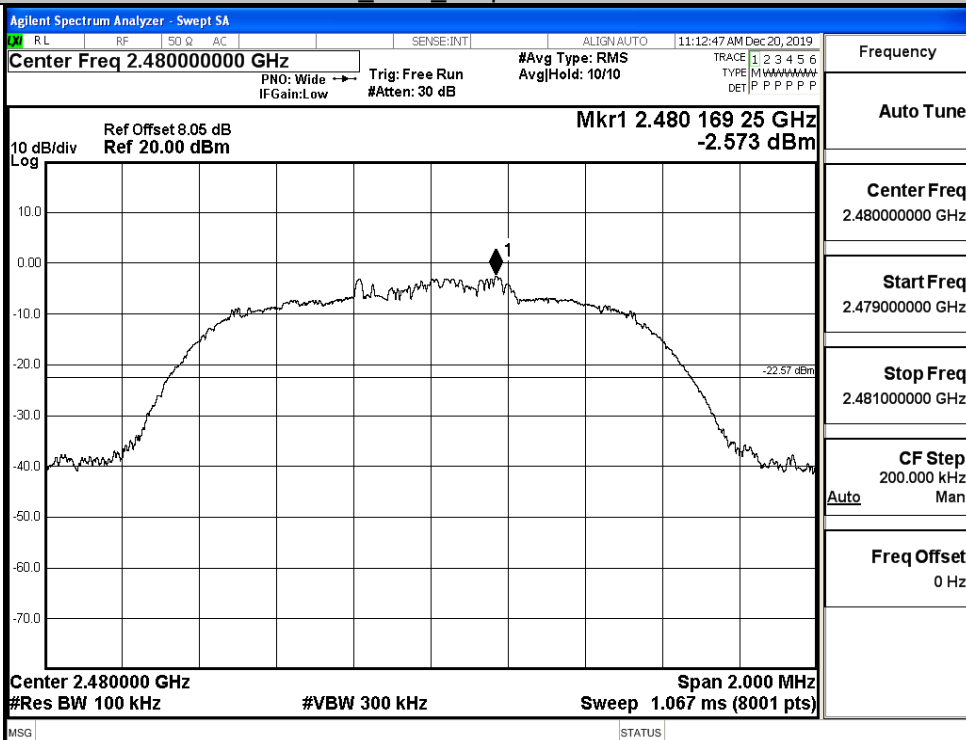


Puw

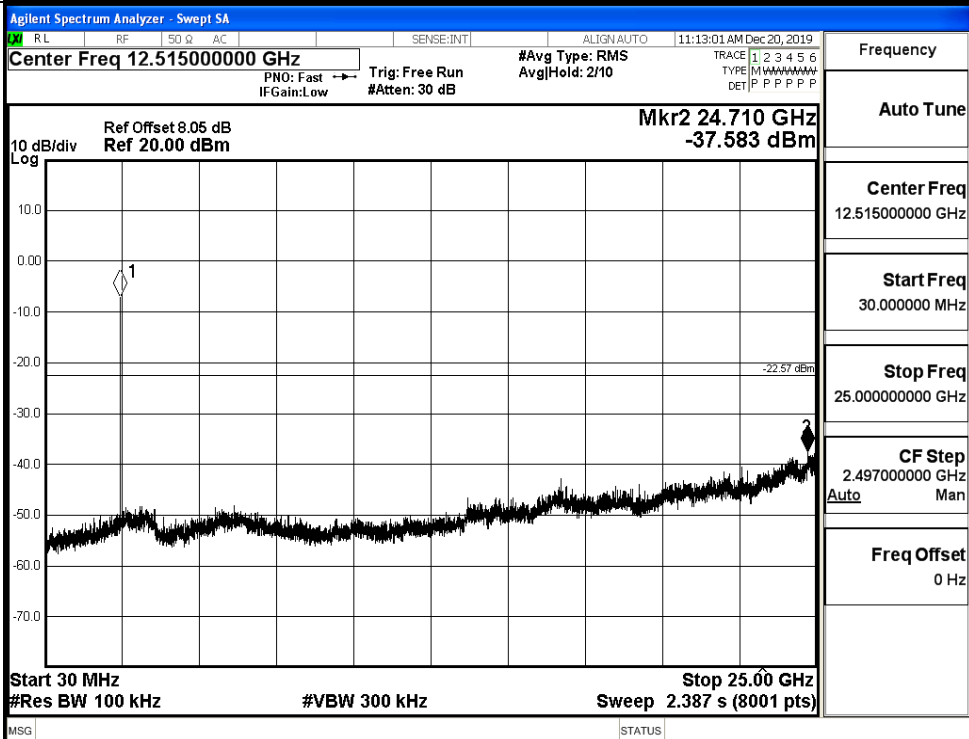


π /4DQPSK_HCH_Graphs

Pref

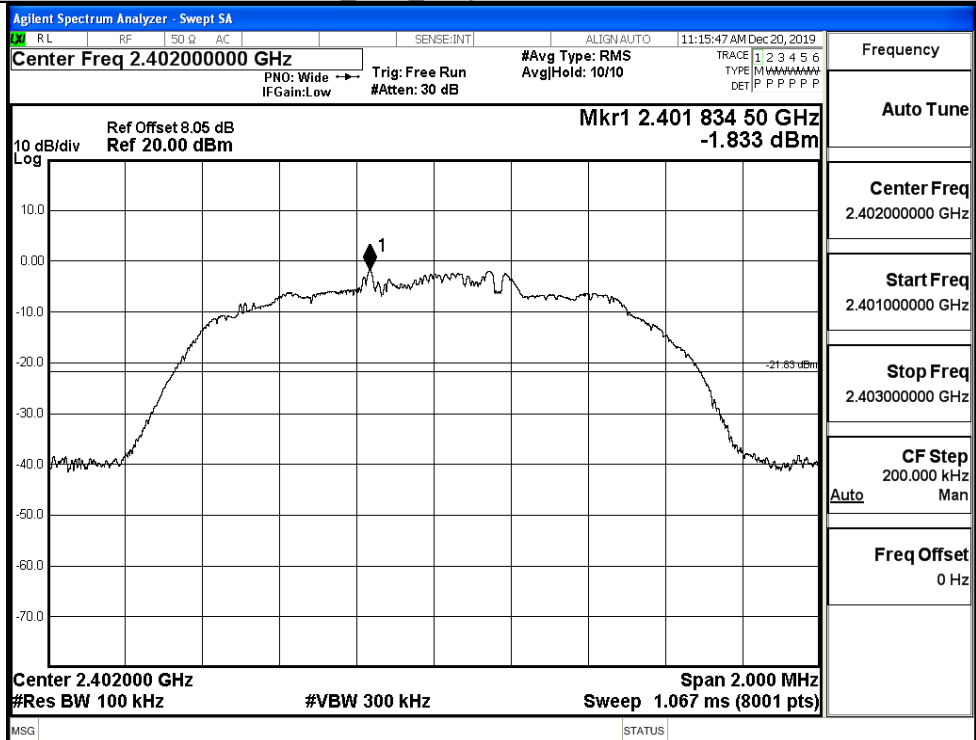


Puw



8DPSK_LCH_Graphs

Pref

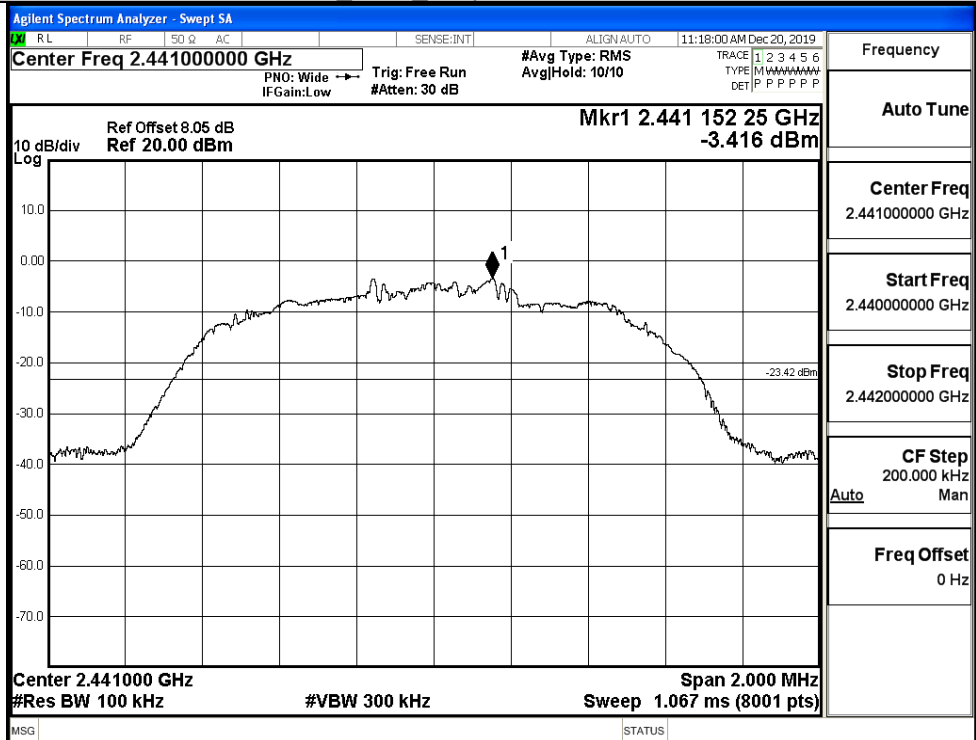


Puw

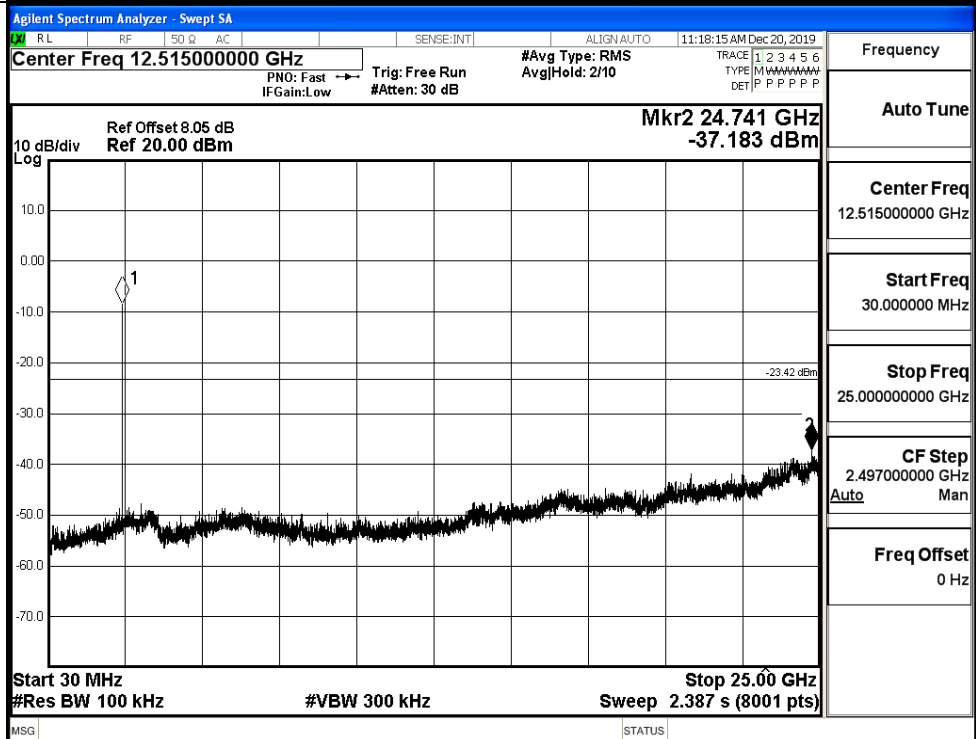


8DPSK_MCH_Graphs

Pref

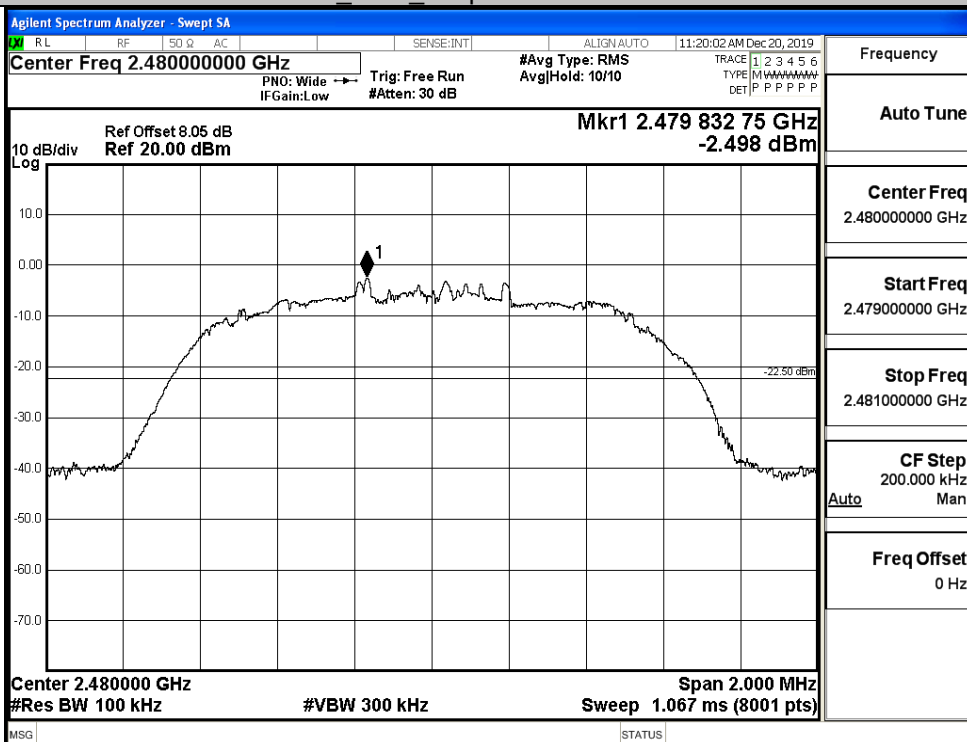


Puw

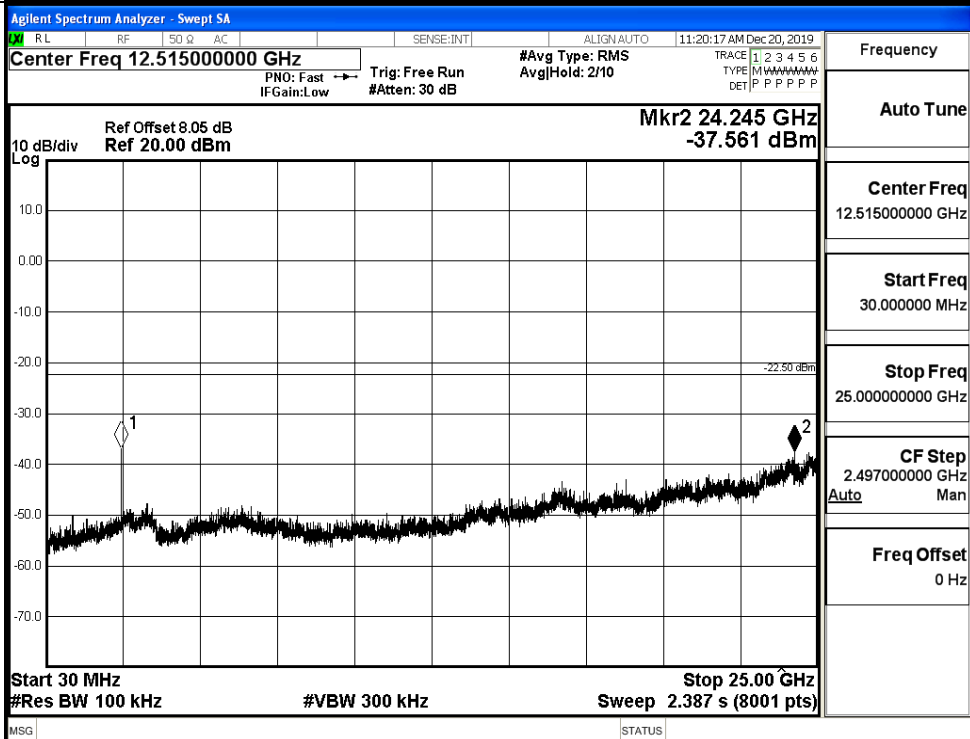


8DPSK_HCH_Graphs

Pref



Puw

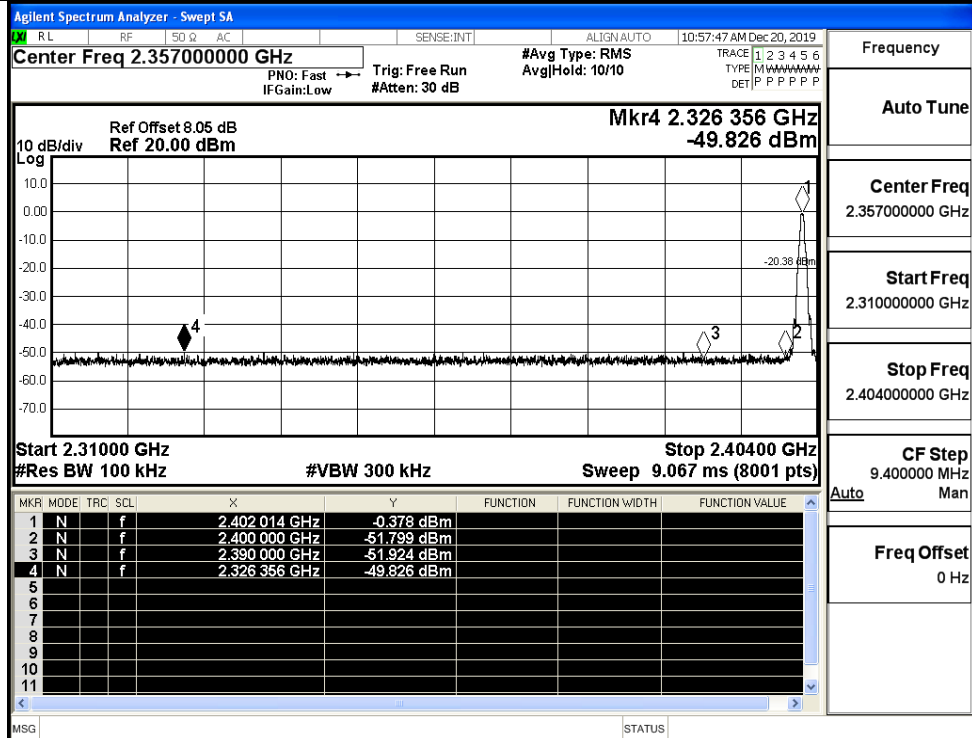


A.7 Band-edge for RF Conducted Emissions

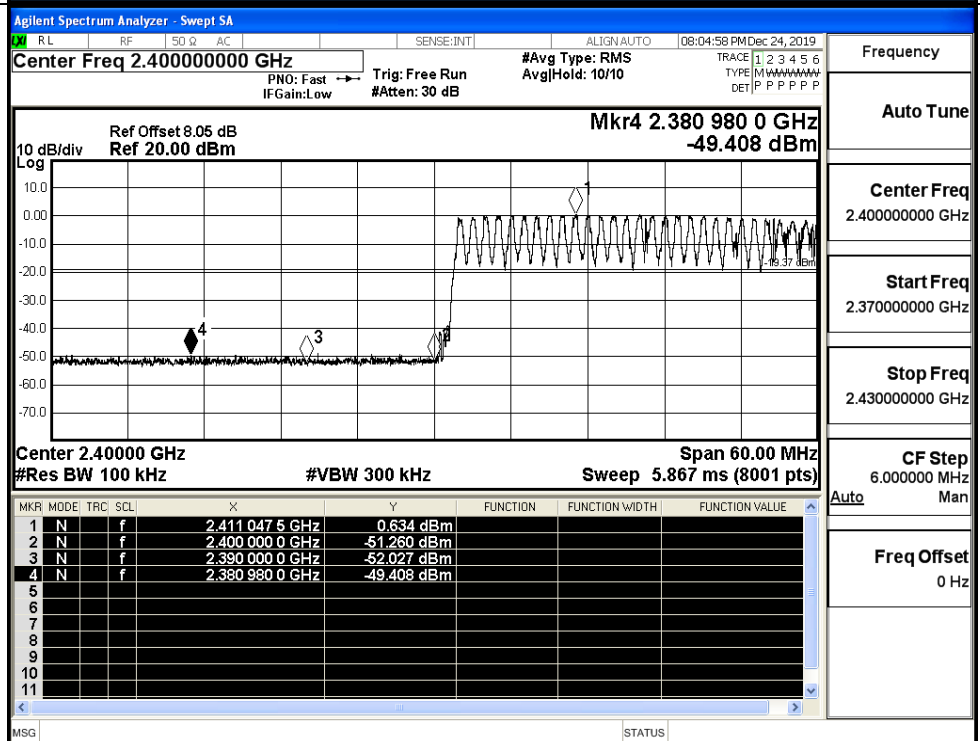
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.378	Off	-49.826	-20.38	PASS
			0.634	On	-49.408	-19.37	PASS
	HCH	2480	-1.039	Off	-49.235	-21.04	PASS
			0.840	On	-48.717	-19.16	PASS
$\pi/4$ DQPSK	LCH	2402	-2.945	Off	-49.841	-22.95	PASS
			-0.643	On	-47.986	-20.64	PASS
	HCH	2480	-2.227	Off	-49.318	-22.23	PASS
			1.929	On	-34.863	-18.07	PASS
8DPSK	LCH	2402	-2.046	Off	-49.188	-22.05	PASS
			-0.960	On	-48.498	-20.96	PASS
	HCH	2480	-2.355	Off	-48.068	-22.36	PASS
			-1.345	On	-48.003	-21.35	PASS

Test Graphs

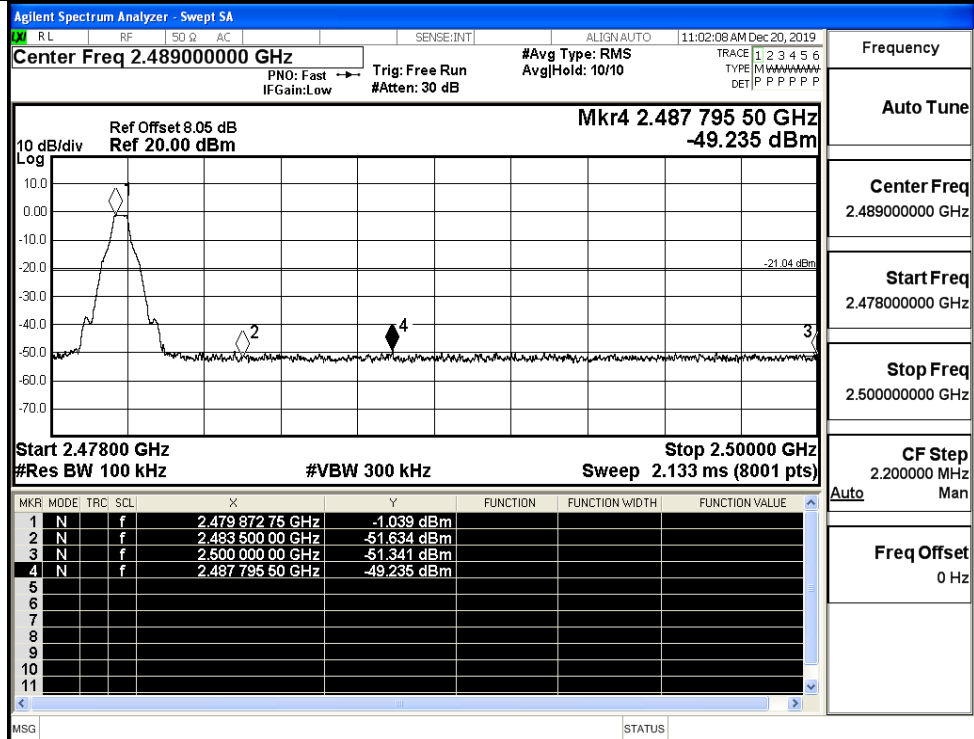
GFSK/LCH/No Hop



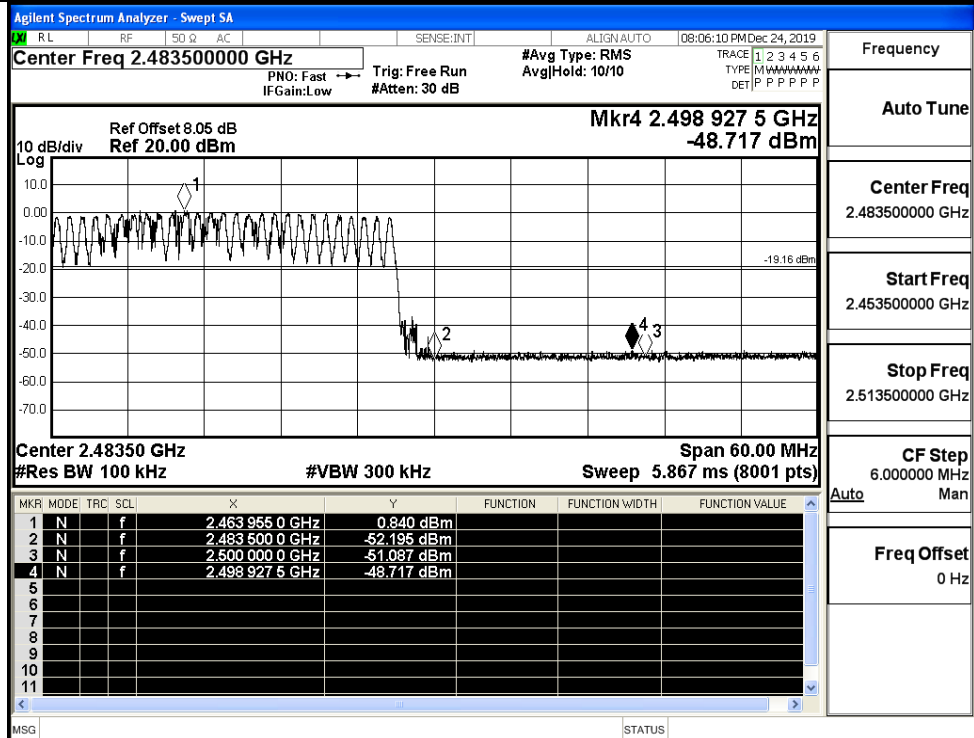
GFSK/LCH/Hop



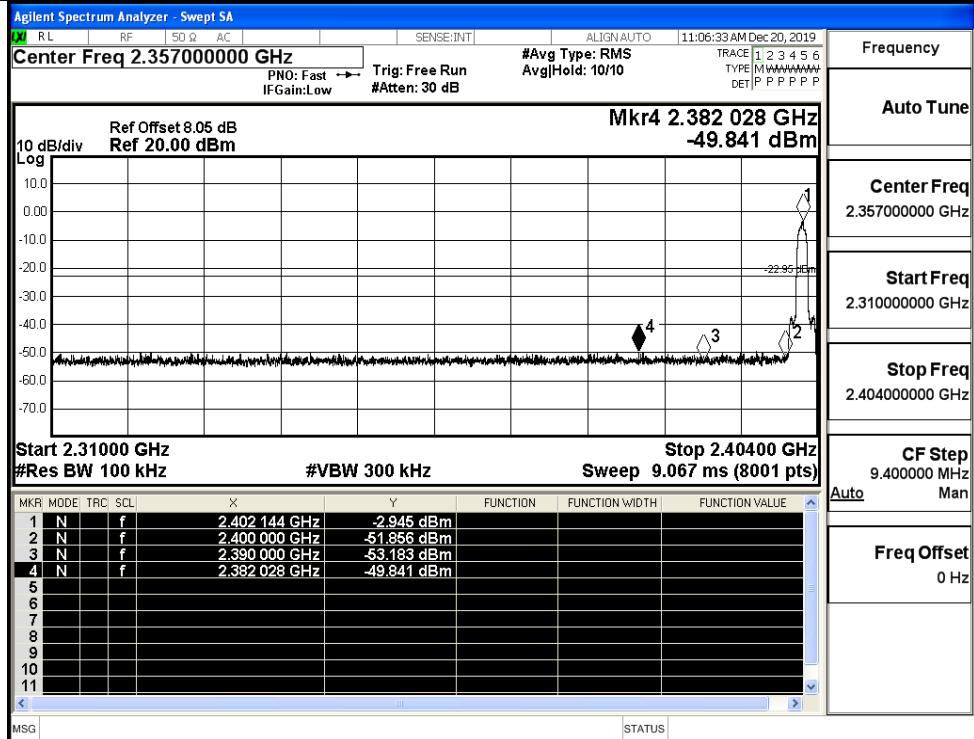
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

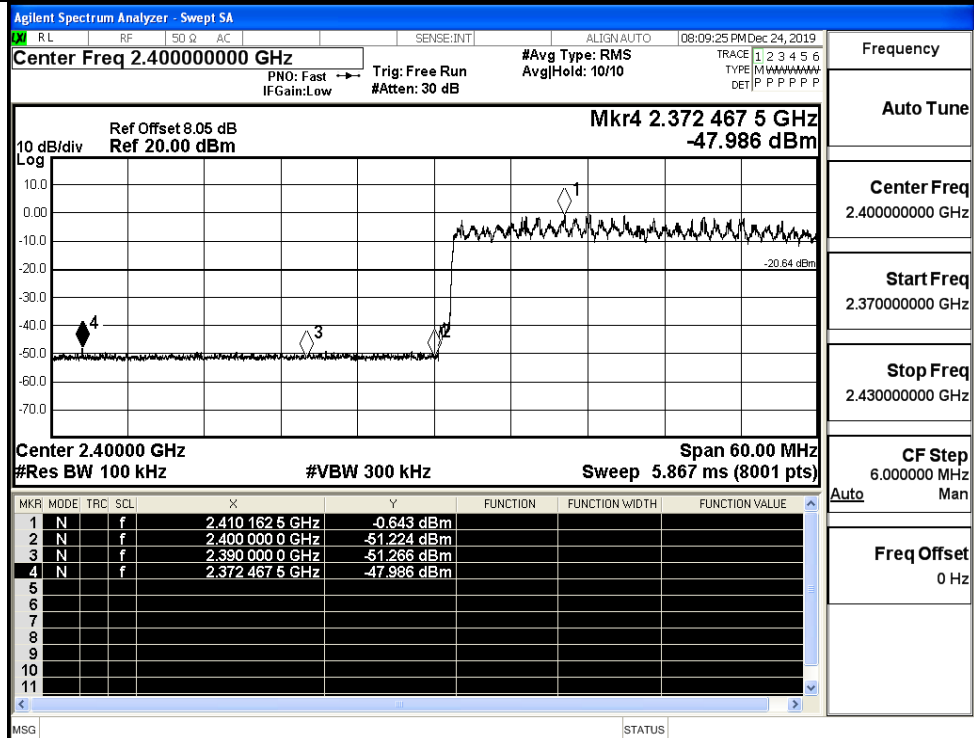
Start Freq
2.310000000 GHz

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

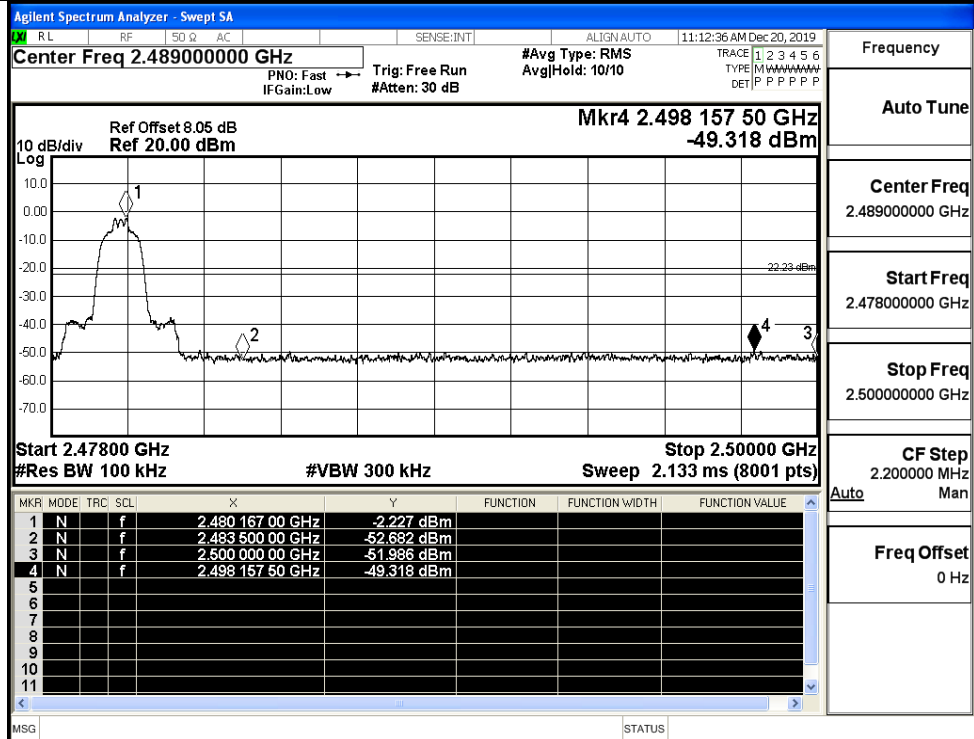
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

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

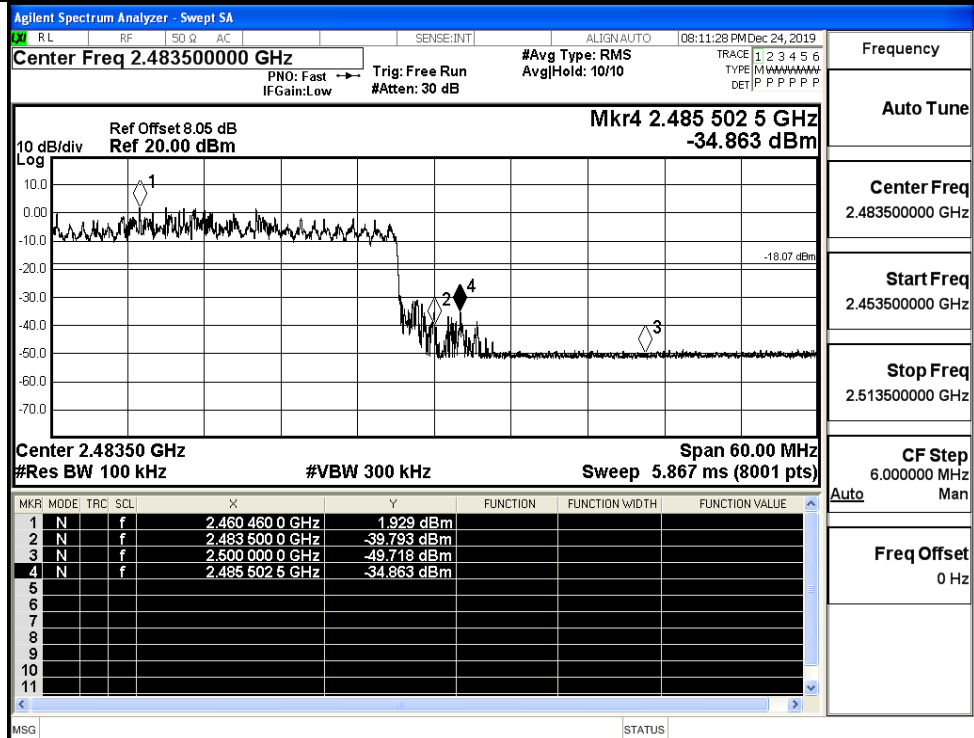


Frequency

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

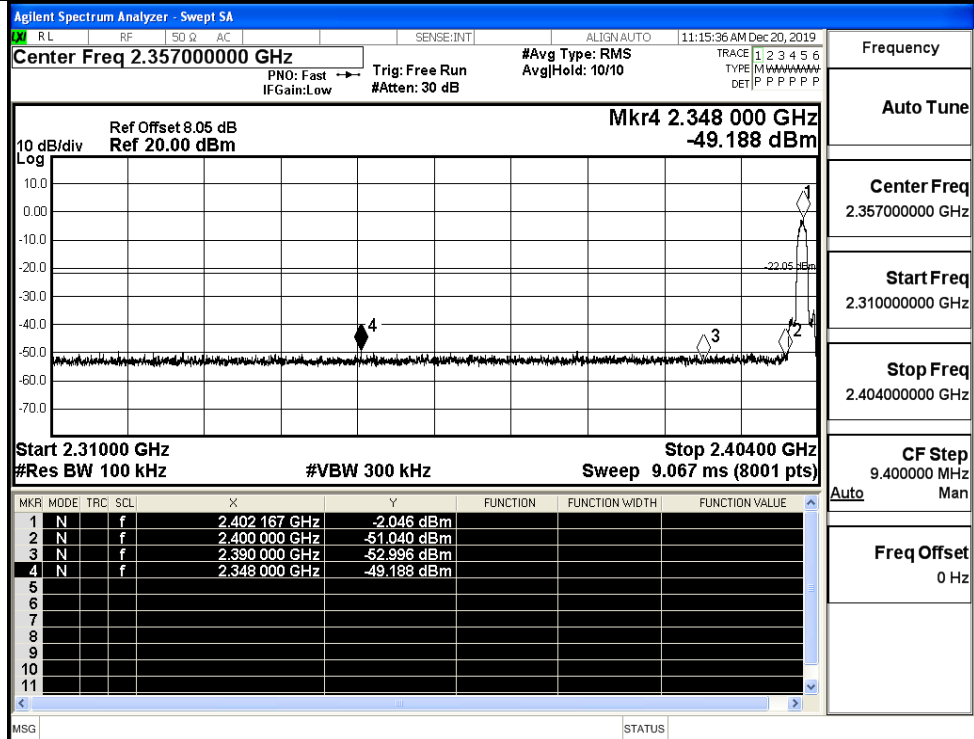


Frequency

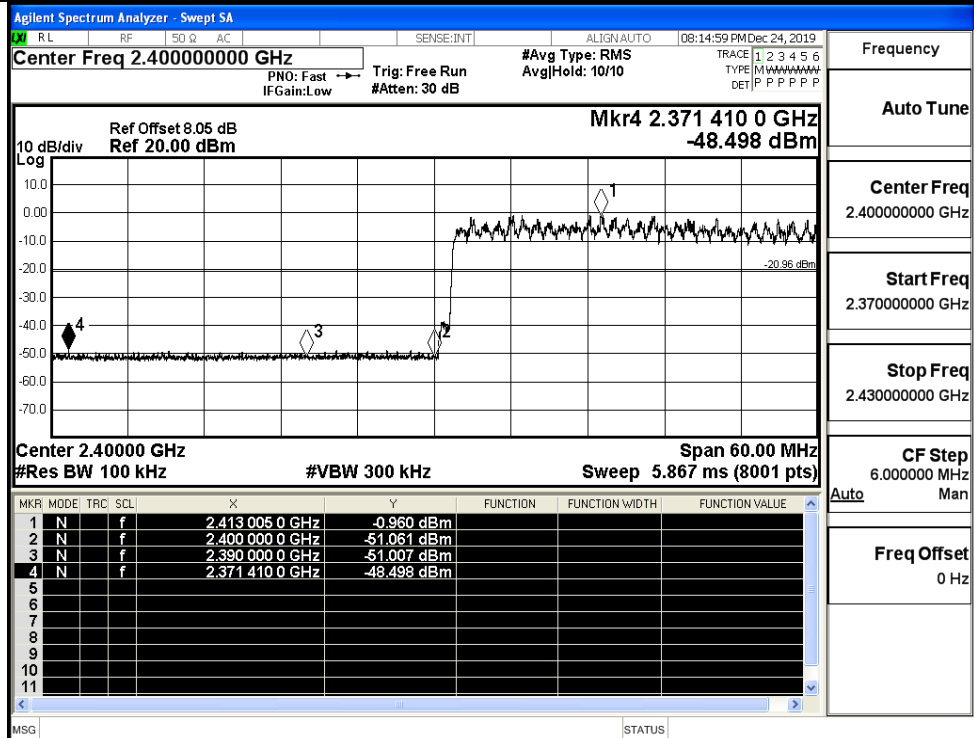
Auto Tune

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

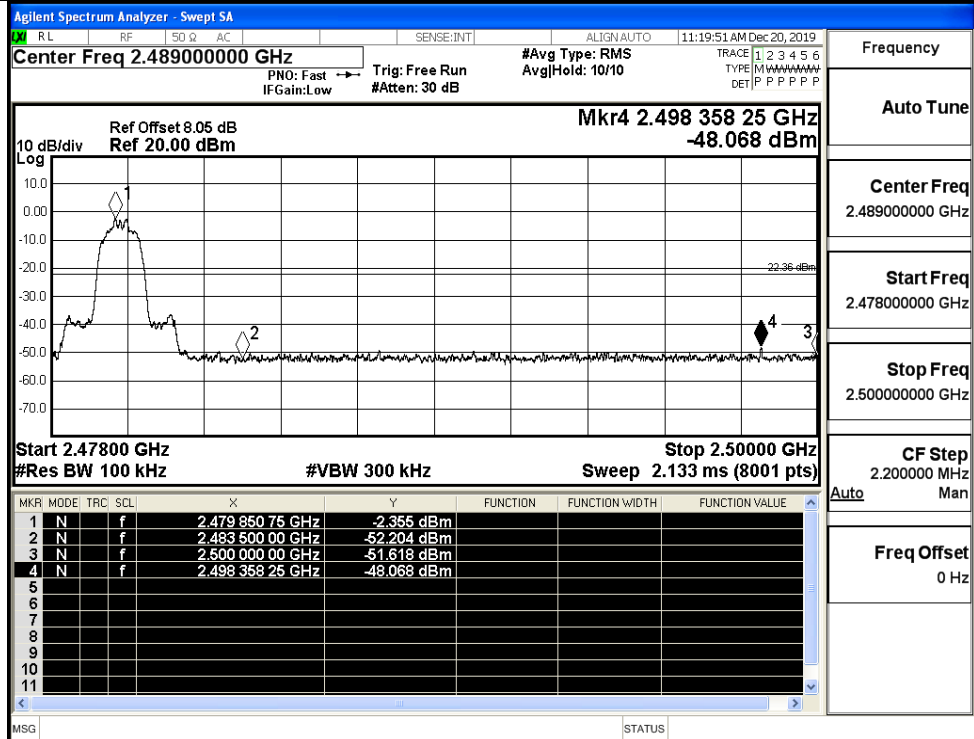
8DPSK/LCH/No Hop



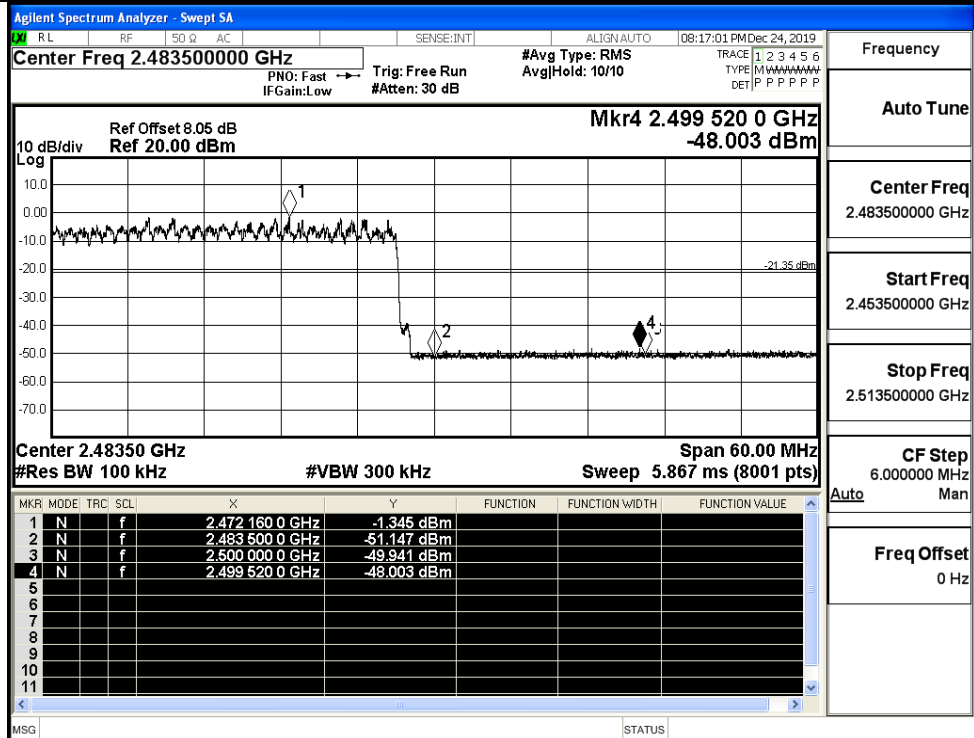
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



8DPSK/HCH/Hop



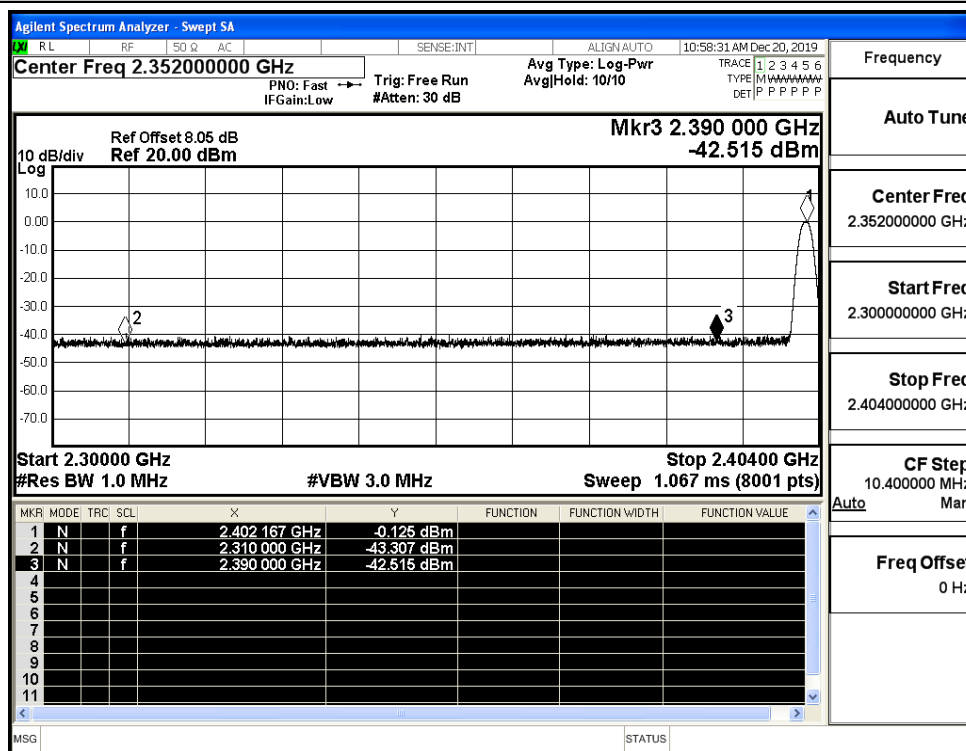
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.31	-3.7	0	53.95	PEAK	74	PASS
	Off	2310.0	-53.39	-3.7	0	43.87	AV	54	PASS
	Off	2390.0	-42.52	-3.7	0	54.74	PEAK	74	PASS
	Off	2390.0	-52.97	-3.7	0	44.29	AV	54	PASS
	Off	2483.5	-42.60	-3.7	0	54.66	PEAK	74	PASS
	Off	2483.5	-52.60	-3.7	0	44.66	AV	54	PASS
	Off	2500.0	-42.57	-3.7	0	54.69	PEAK	74	PASS
	Off	2500.0	-52.35	-3.7	0	44.91	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.45	-3.7	0	53.81	PEAK	74	PASS
	Off	2310.0	-53.42	-3.7	0	43.84	AV	54	PASS
	Off	2390.0	-43.51	-3.7	0	53.75	PEAK	74	PASS
	Off	2390.0	-53.11	-3.7	0	44.15	AV	54	PASS
	Off	2483.5	-42.77	-3.7	0	54.49	PEAK	74	PASS
	Off	2483.5	-52.60	-3.7	0	44.66	AV	54	PASS
	Off	2500.0	-42.80	-3.7	0	54.46	PEAK	74	PASS
	Off	2500.0	-52.42	-3.7	0	44.84	AV	54	PASS
8DPSK	Off	2310.0	-43.19	-3.7	0	54.07	PEAK	74	PASS
	Off	2310.0	-53.45	-3.7	0	43.81	AV	54	PASS
	Off	2390.0	-43.47	-3.7	0	53.79	PEAK	74	PASS
	Off	2390.0	-53.06	-3.7	0	44.20	AV	54	PASS
	Off	2483.5	-41.56	-3.7	0	55.70	PEAK	74	PASS
	Off	2483.5	-52.54	-3.7	0	44.72	AV	54	PASS
	Off	2500.0	-42.31	-3.7	0	54.95	PEAK	74	PASS
	Off	2500.0	-52.43	-3.7	0	44.83	AV	54	PASS

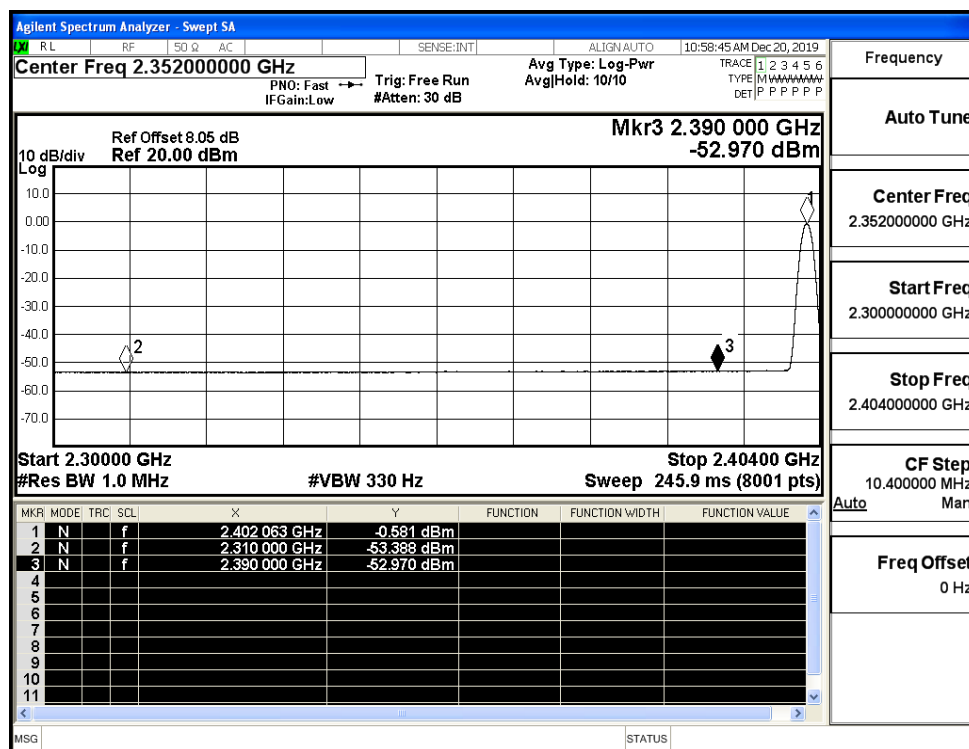
$E \text{ [dBuV/m]} = \text{Power [dBm]} + \text{Gain} + \text{Ground Factor} + 95.26$

The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater

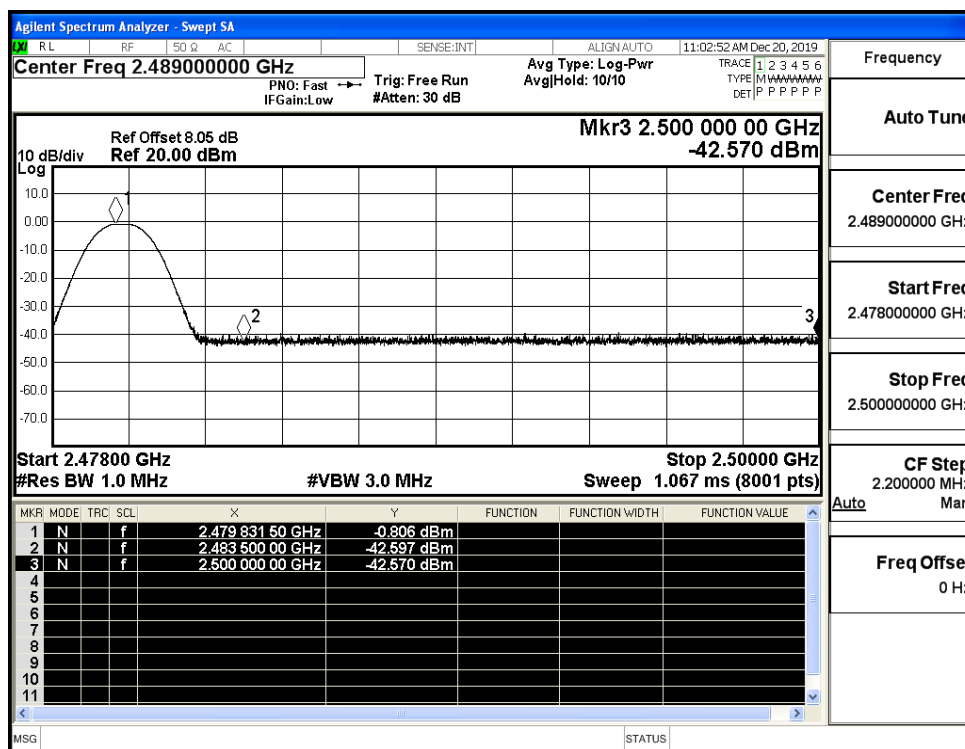
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



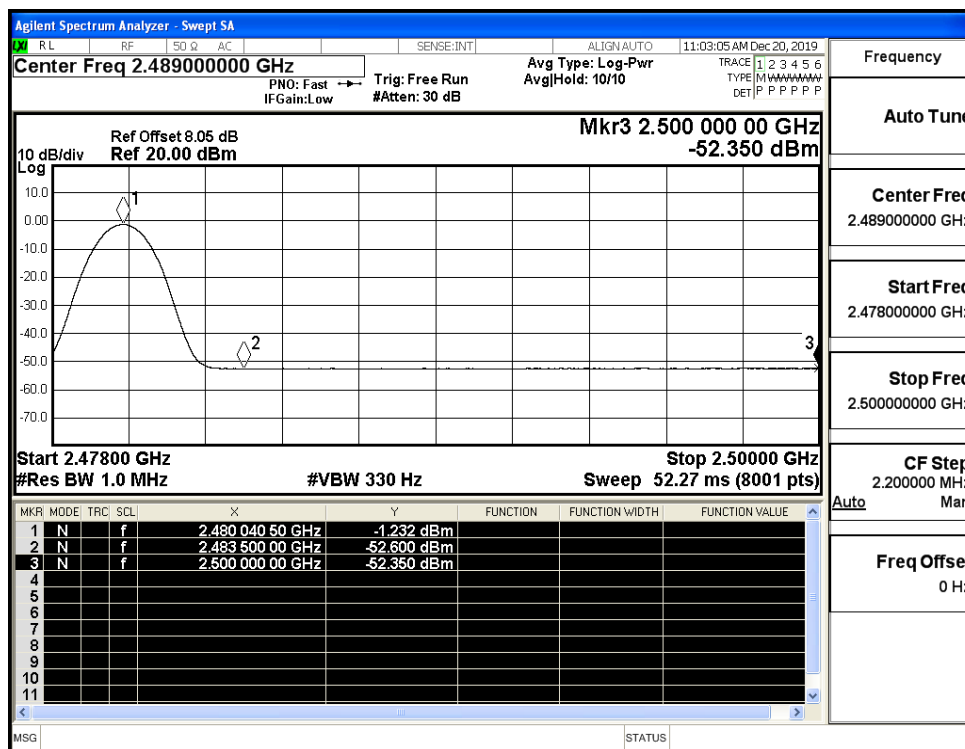
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

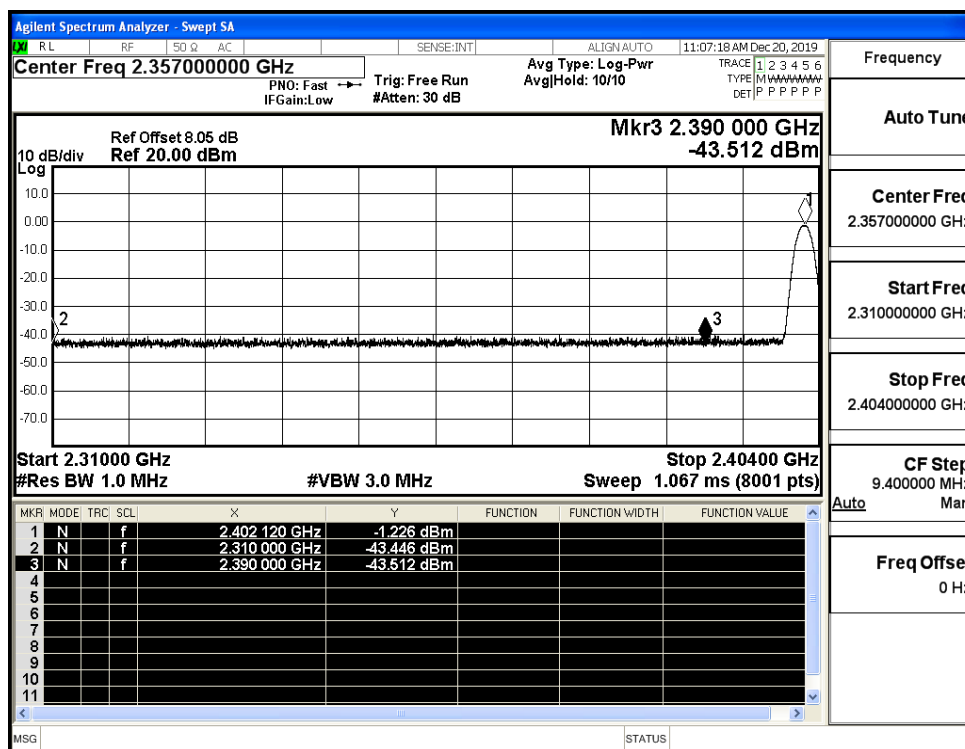
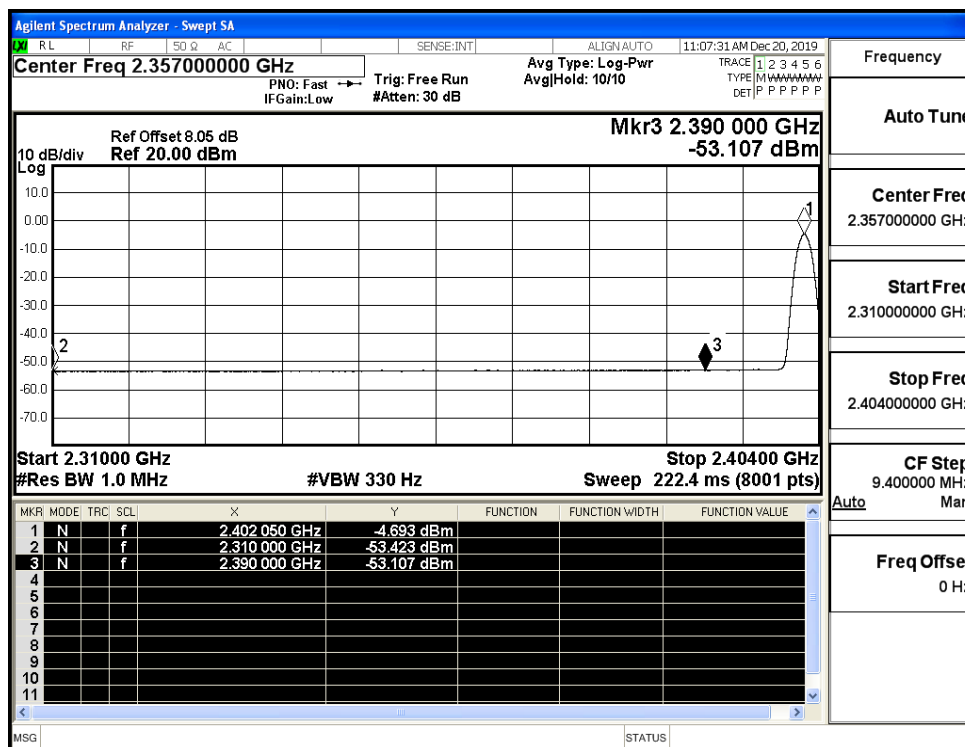


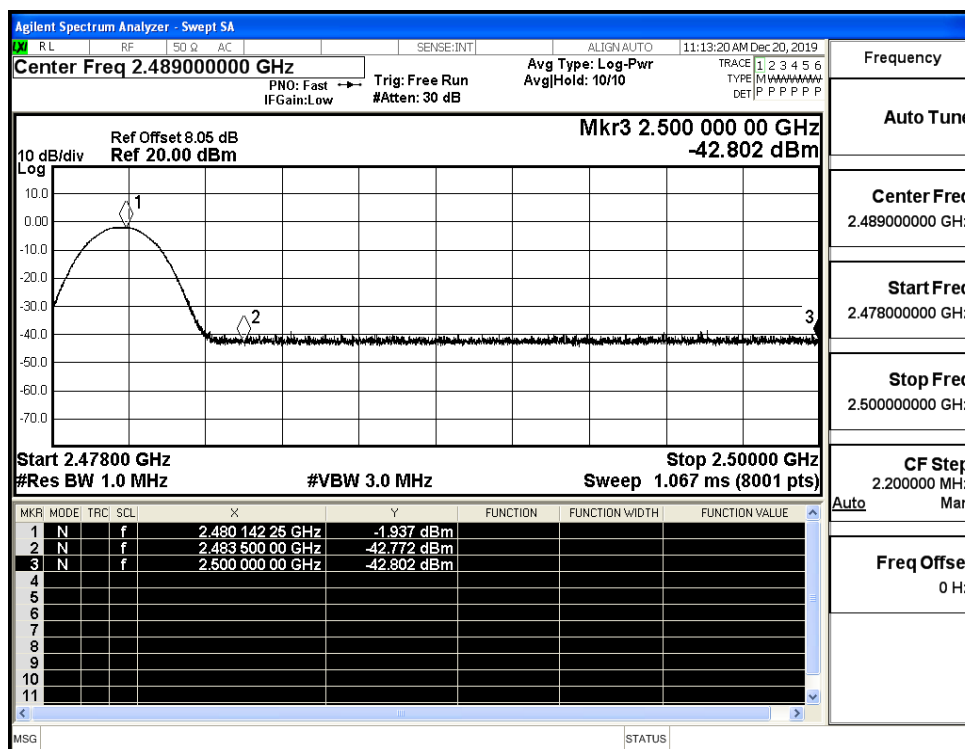
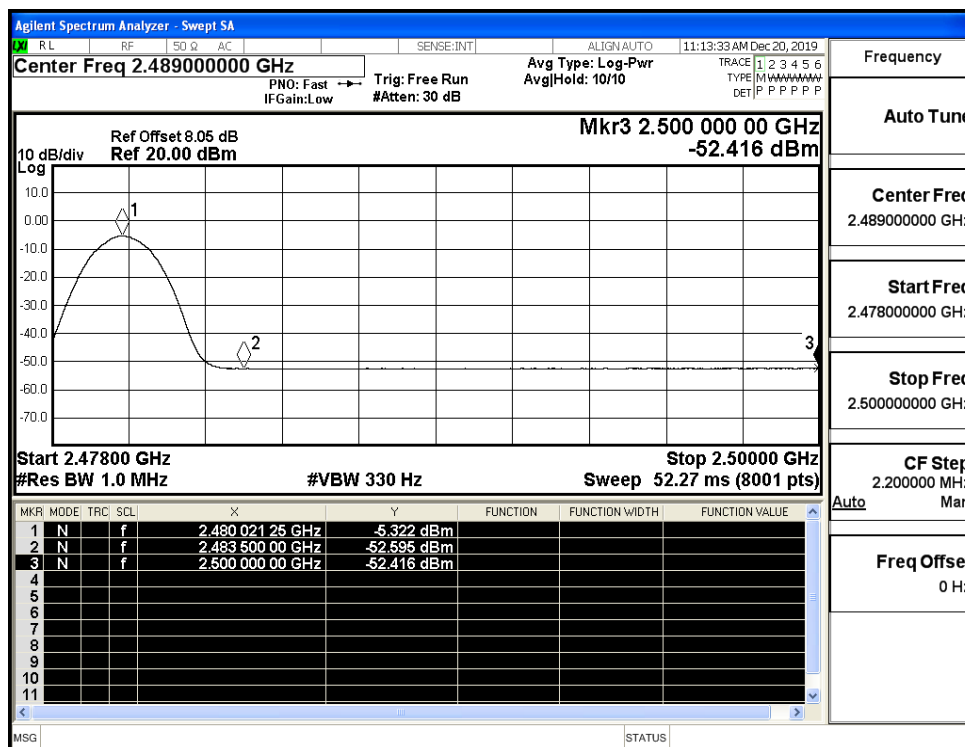
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



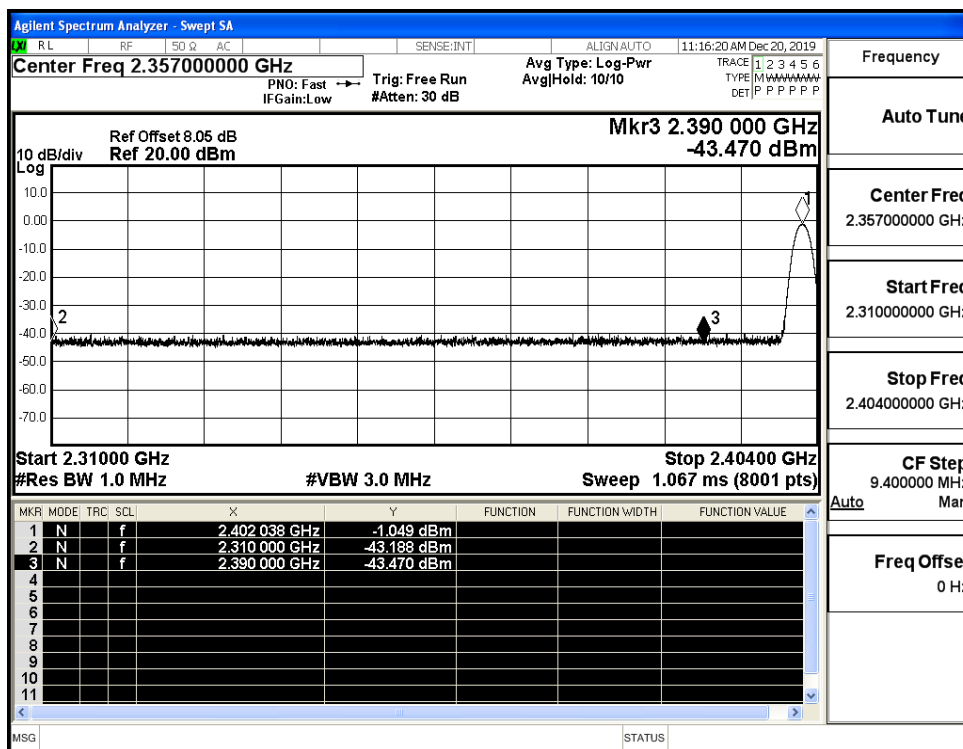
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



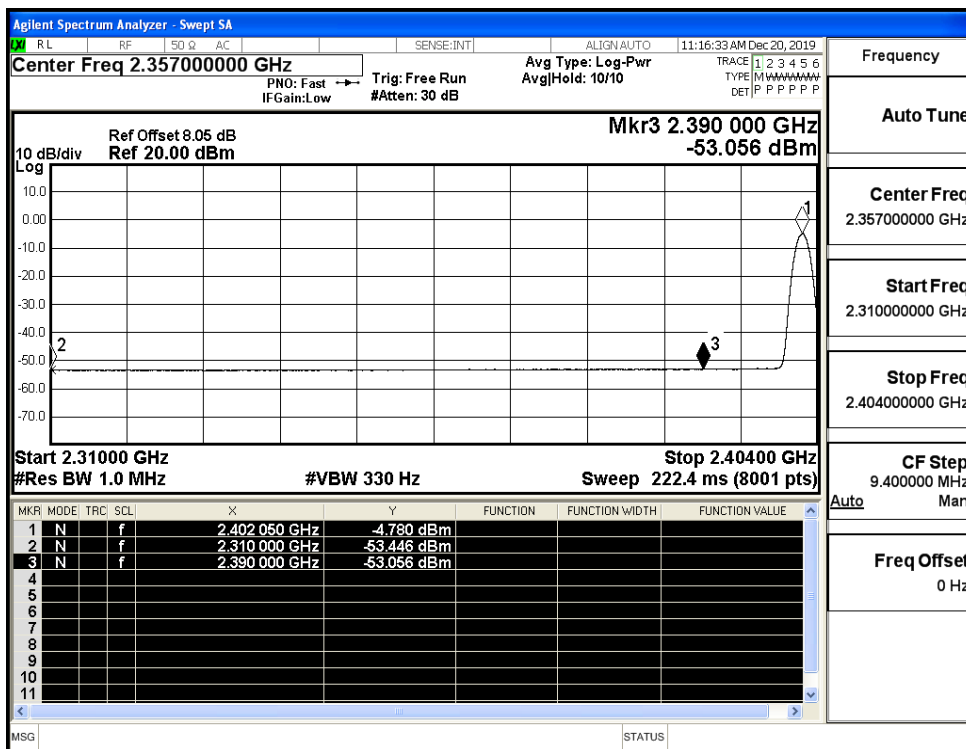
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

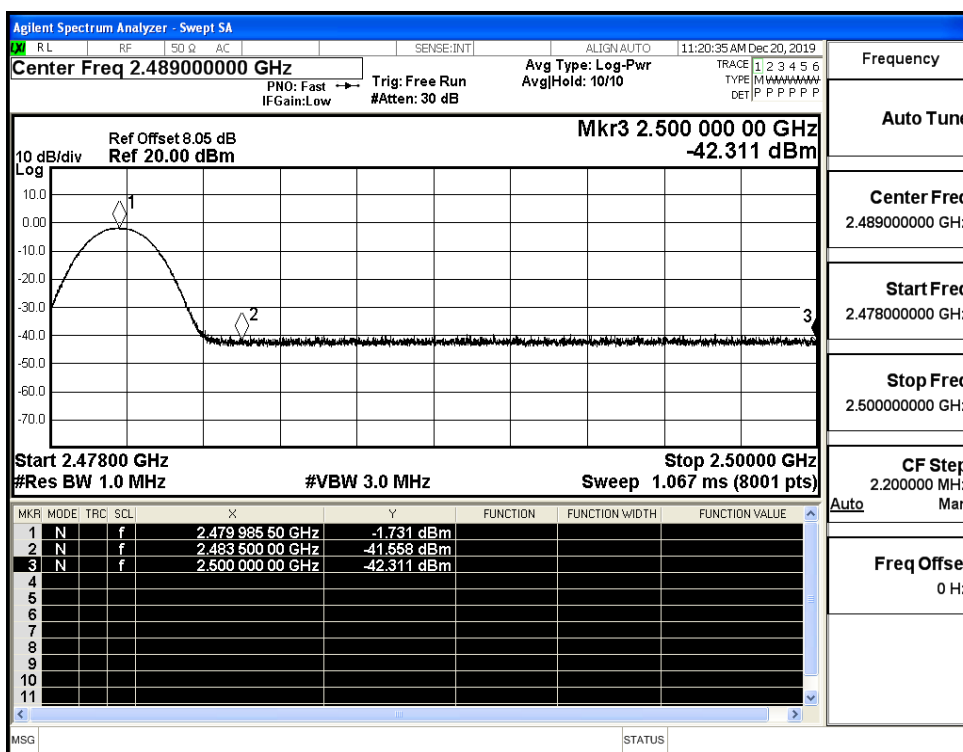
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

