

Appendix A

RF Test Data for BT V4.2(BDR/EDR) (Conducted Measurement)

Product Name: Rugged Phone

Trade Mark: SNOPOW

Test Model: M10

Environmental Conditions

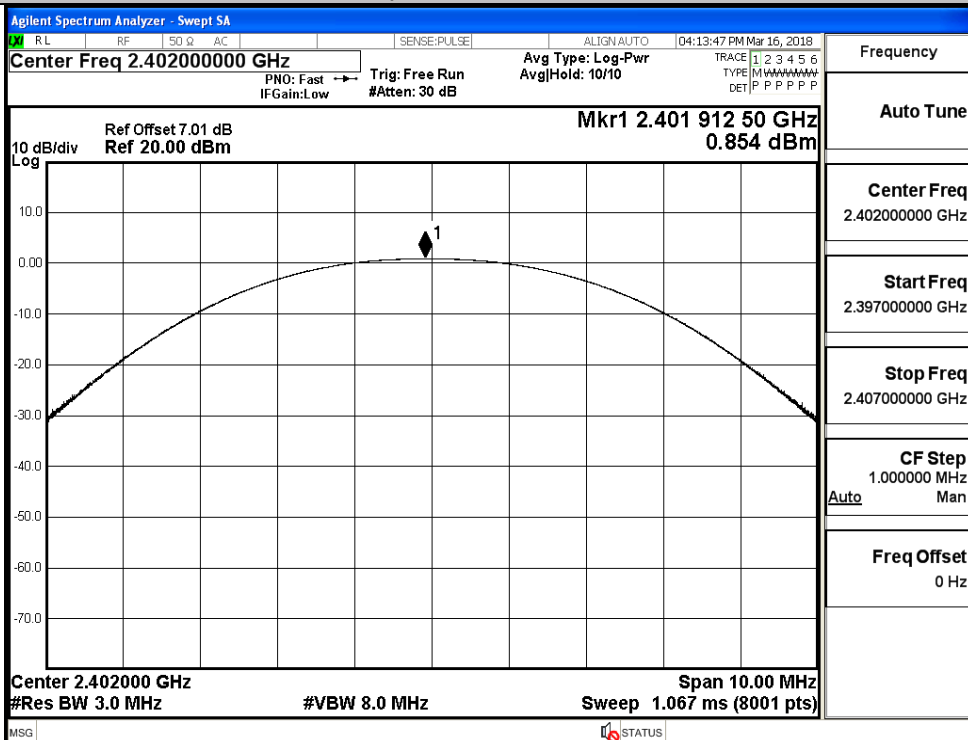
Temperature:	23.5 ° C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Jayden Zhuo
Supervised by:	Dick Su

A.1 Maximum Conducted Peak Output Power

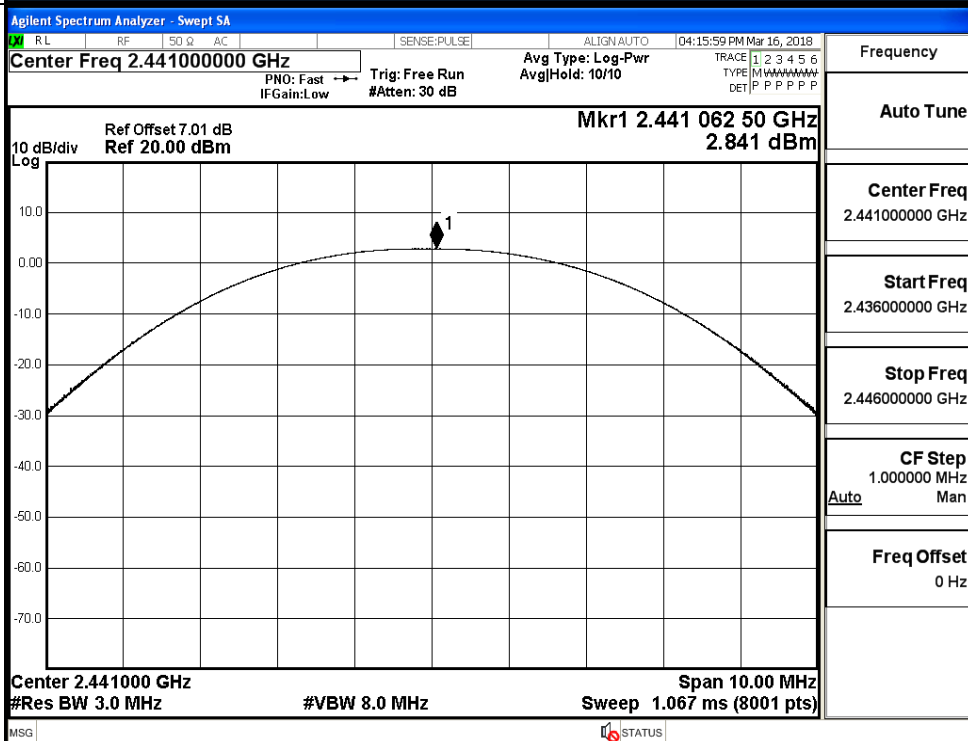
Mode	Channel.	Maximum Peak Output Power [dBm]	Maximum Average Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.854	0.725	21	PASS
	MCH	2.841	2.768	21	PASS
	HCH	0.708	0.653	21	PASS
$\pi/4$ DQPSK	LCH	0.192	0.084	21	PASS
	MCH	2.118	2.003	21	PASS
	HCH	-0.224	-0.349	21	PASS
8DPSK	LCH	0.283	0.157	21	PASS
	MCH	-0.955	-1.083	21	PASS
	HCH	-1.426	-1.593	21	PASS

Test Graphs

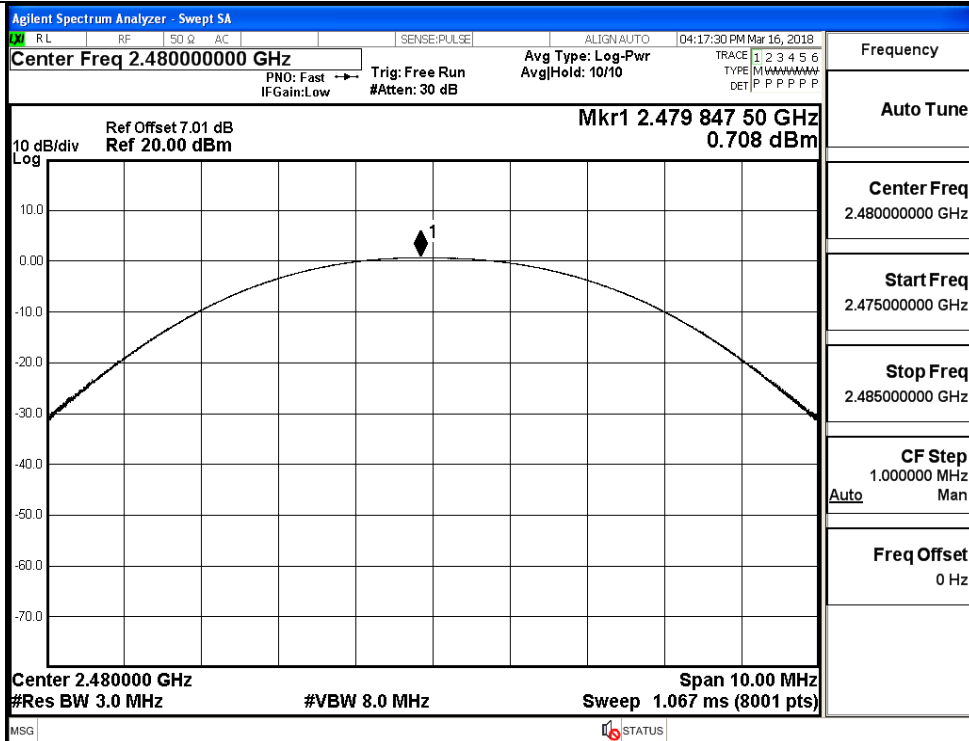
GFSK/LCH



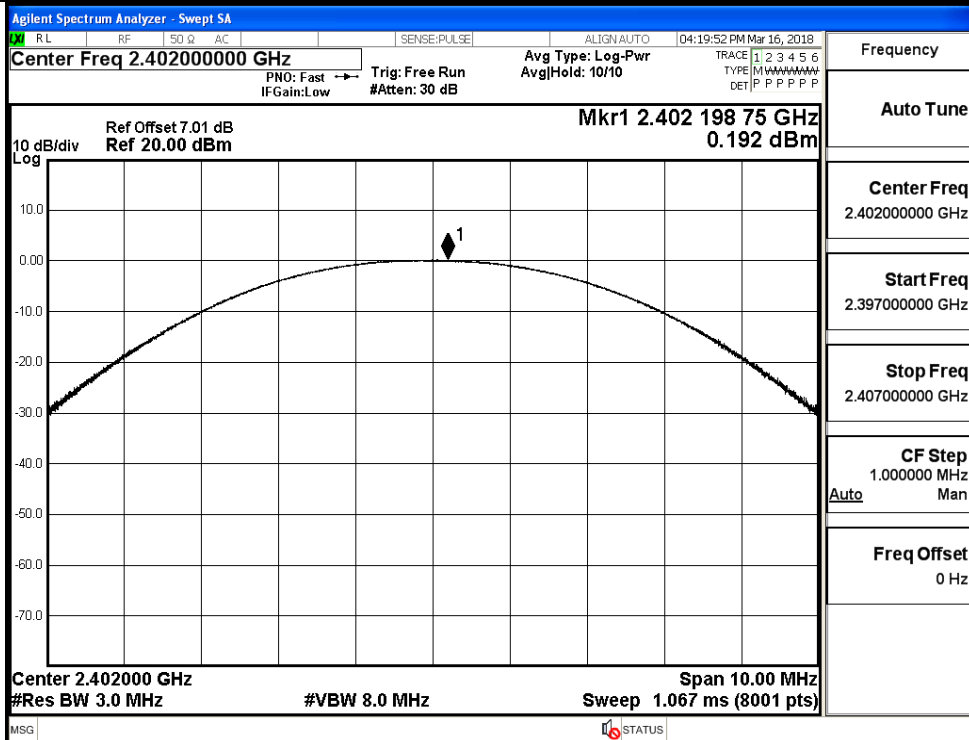
GFSK/MCH

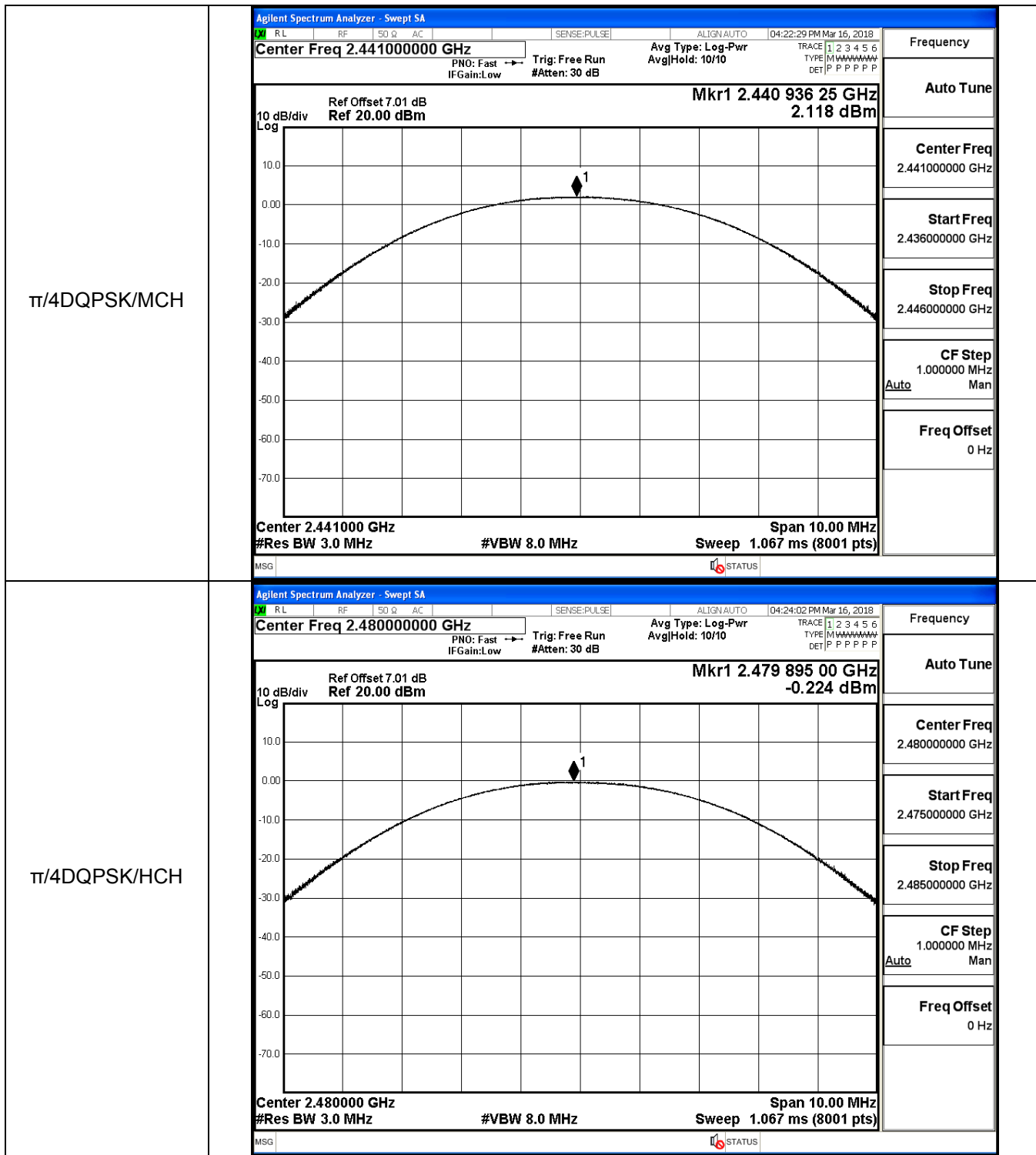


GFSK/HCH

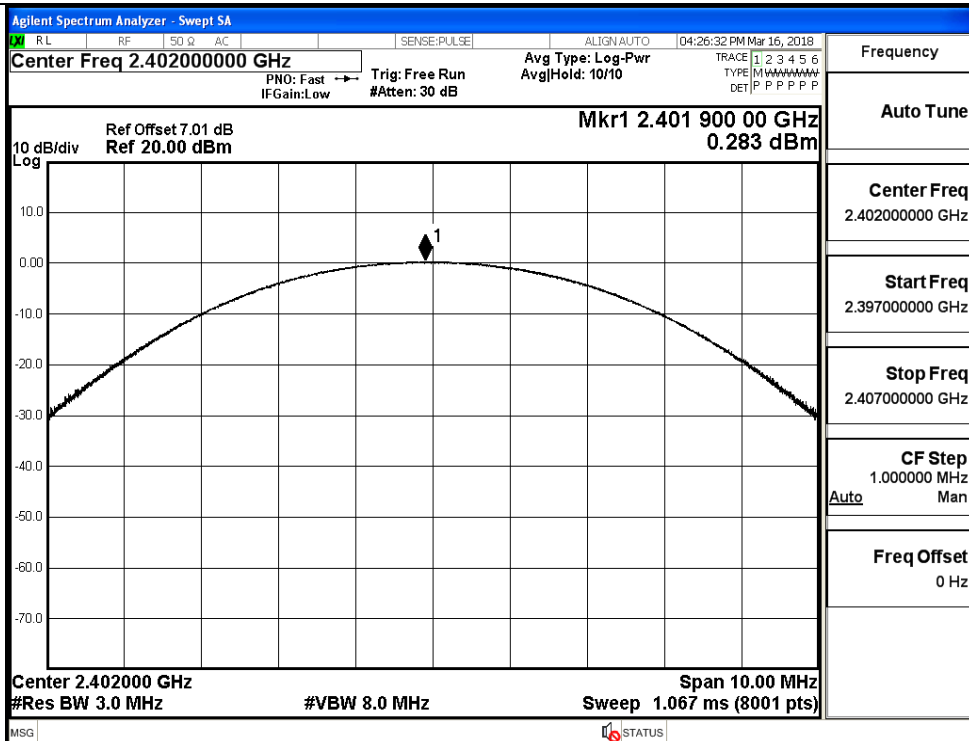


$\pi/4$ DQPSK/LCH

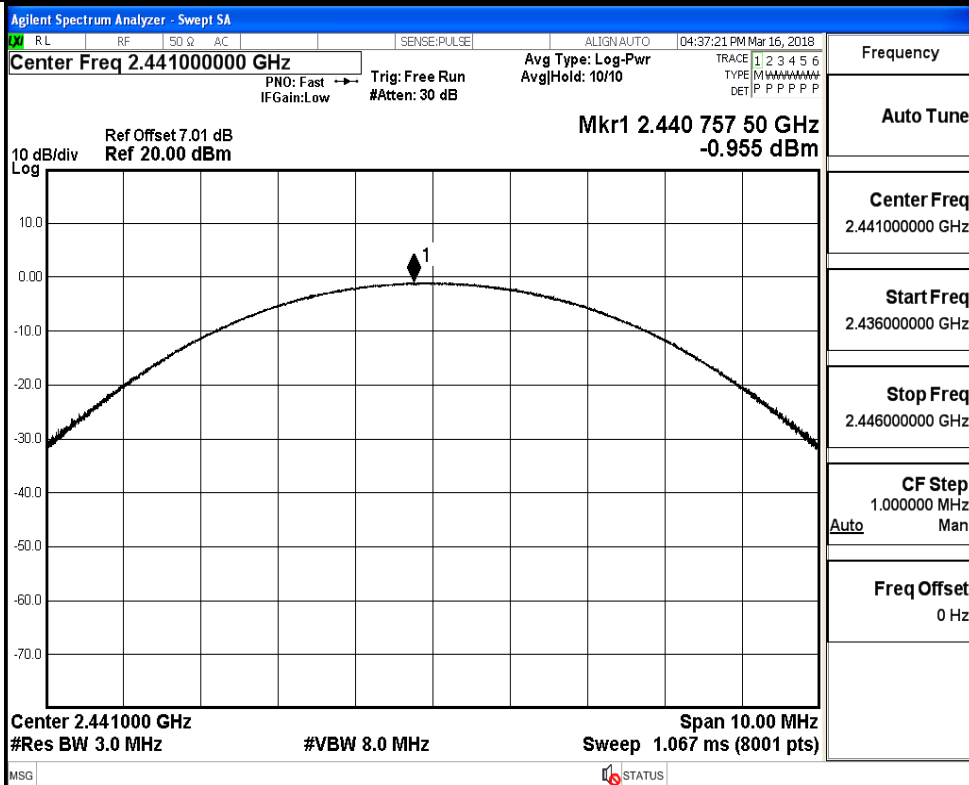




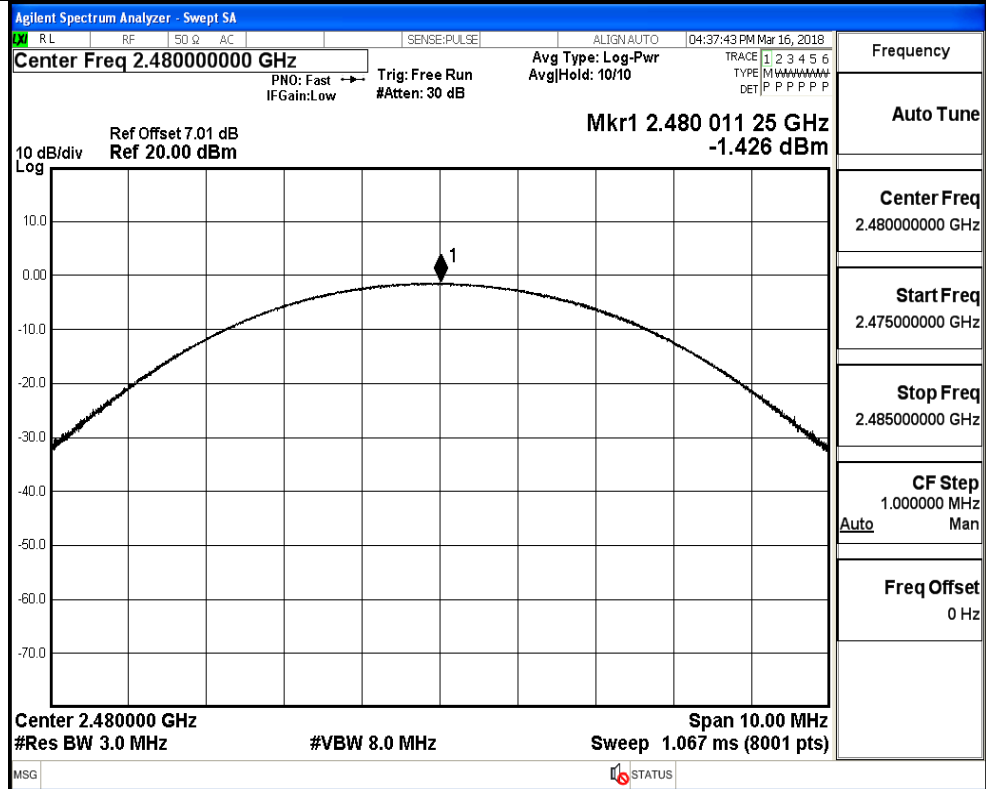
8DPSK/LCH



8DPSK/MCH



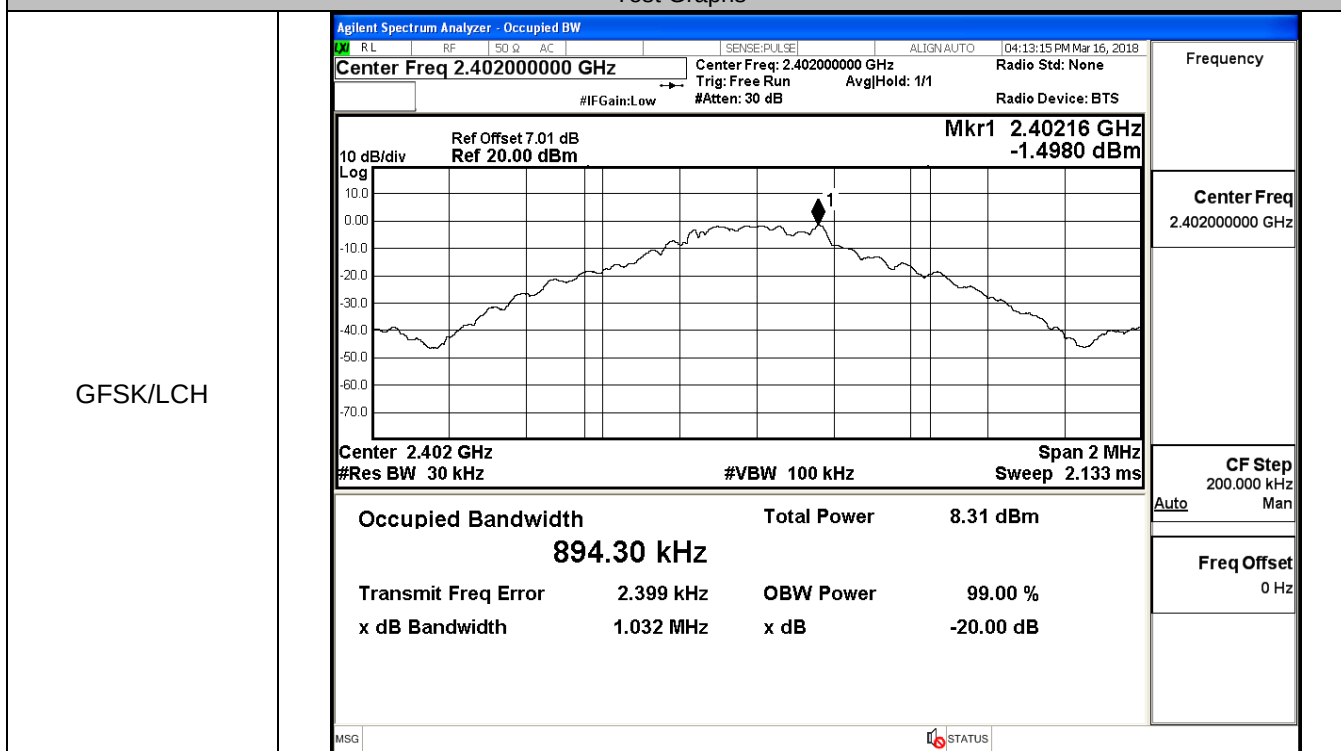
8DPSK/HCH



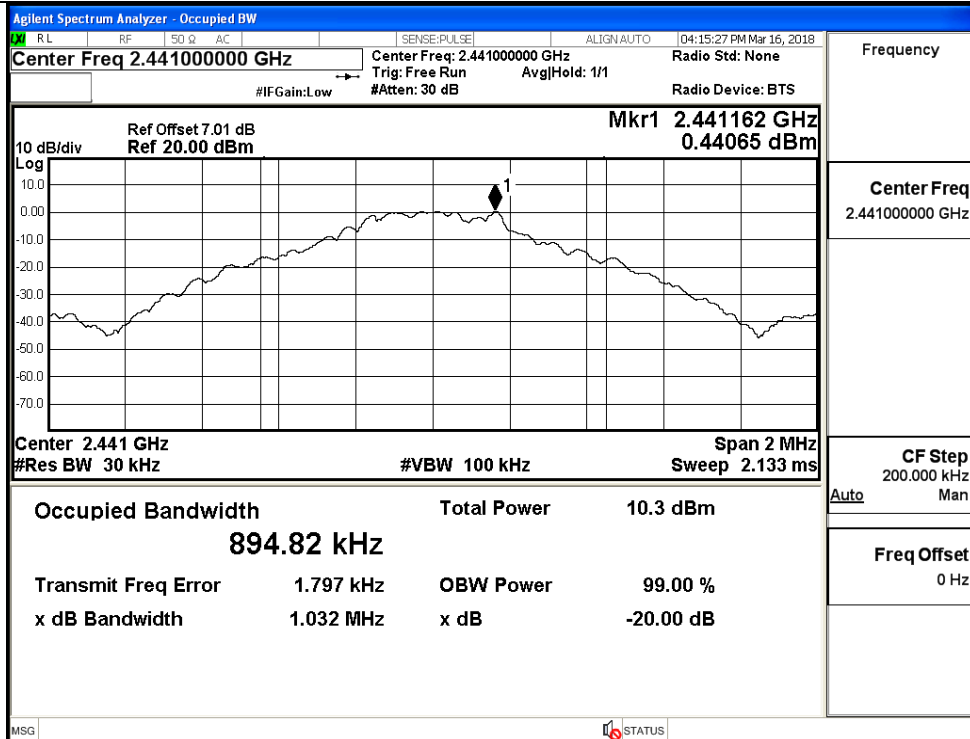
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.032	Not Specified	PASS
	MCH	1.032	Not Specified	PASS
	HCH	1.042	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.309	Not Specified	PASS
	MCH	1.292	Not Specified	PASS
	HCH	1.320	Not Specified	PASS
8DPSK	LCH	1.291	Not Specified	PASS
	MCH	1.294	Not Specified	PASS
	HCH	1.292	Not Specified	PASS

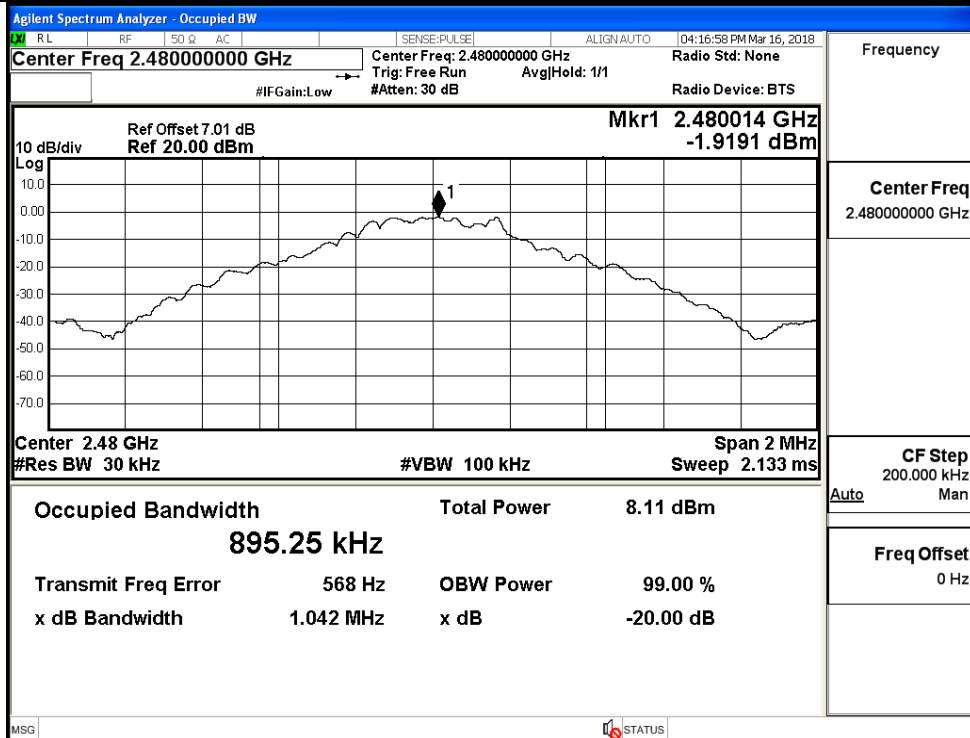
Test Graphs



GFSK/MCH

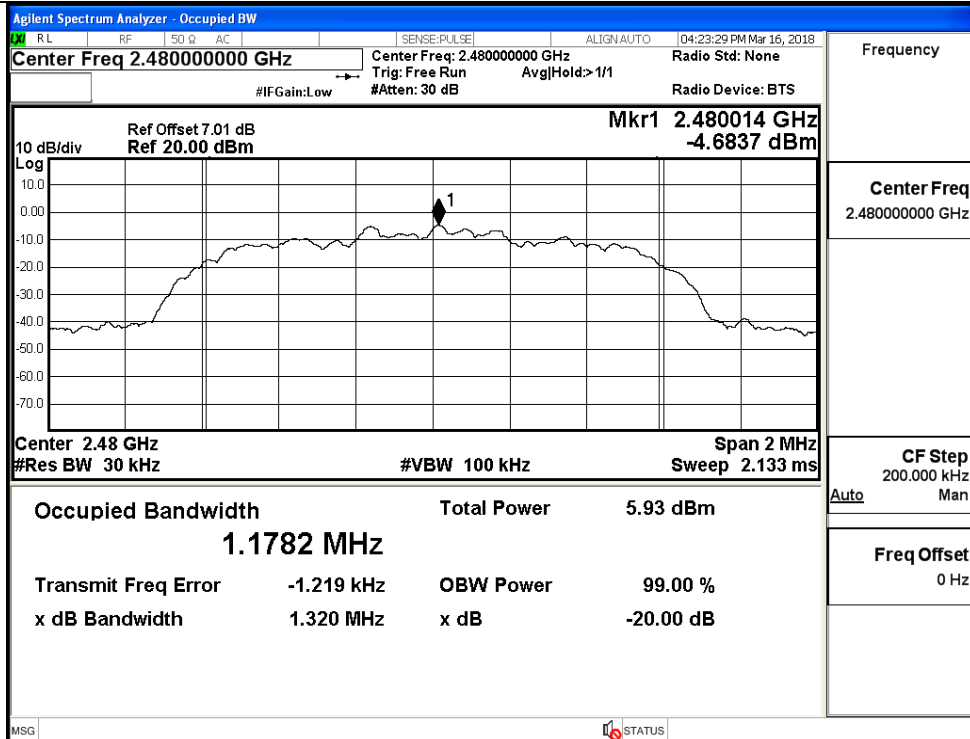


GFSK/HCH

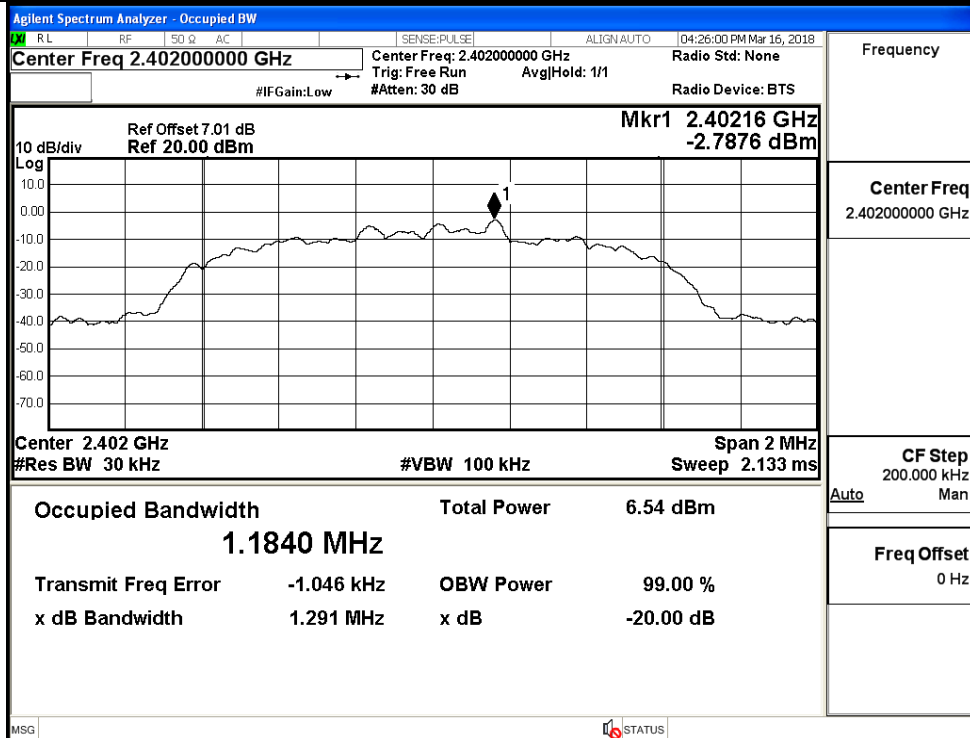


$\pi/4$DQPSK/LCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC SENSE-PULSE ALIGN AUTO 04:19:20 PM Mar 16, 2018 Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run Avg/Hold: 1/1 Radio Std: None #IFGain:Low #Atten: 30 dB Radio Device: BTS Ref Offset 7.01 dB Ref 20.00 dBm Mkr1 2.402164 GHz -3.3983 dBm Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.1791 MHz Total Power 6.72 dBm Transmit Freq Error 204 Hz OBW Power 99.00 % x dB Bandwidth 1.309 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.402000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
$\pi/4$DQPSK/MCH	Agilent Spectrum Analyzer - Occupied BW RL RF 50 Ω AC SENSE-PULSE ALIGN AUTO 04:21:56 PM Mar 16, 2018 Center Freq 2.441000000 GHz Center Freq: 2.441000000 GHz Trig: Free Run Avg/Hold: 1/1 Radio Std: None #IFGain:Low #Atten: 30 dB Radio Device: BTS Ref Offset 7.01 dB Ref 20.00 dBm Mkr1 2.441162 GHz -1.6482 dBm Center 2.441 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.1760 MHz Total Power 8.47 dBm Transmit Freq Error -232 Hz OBW Power 99.00 % x dB Bandwidth 1.292 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.441000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz

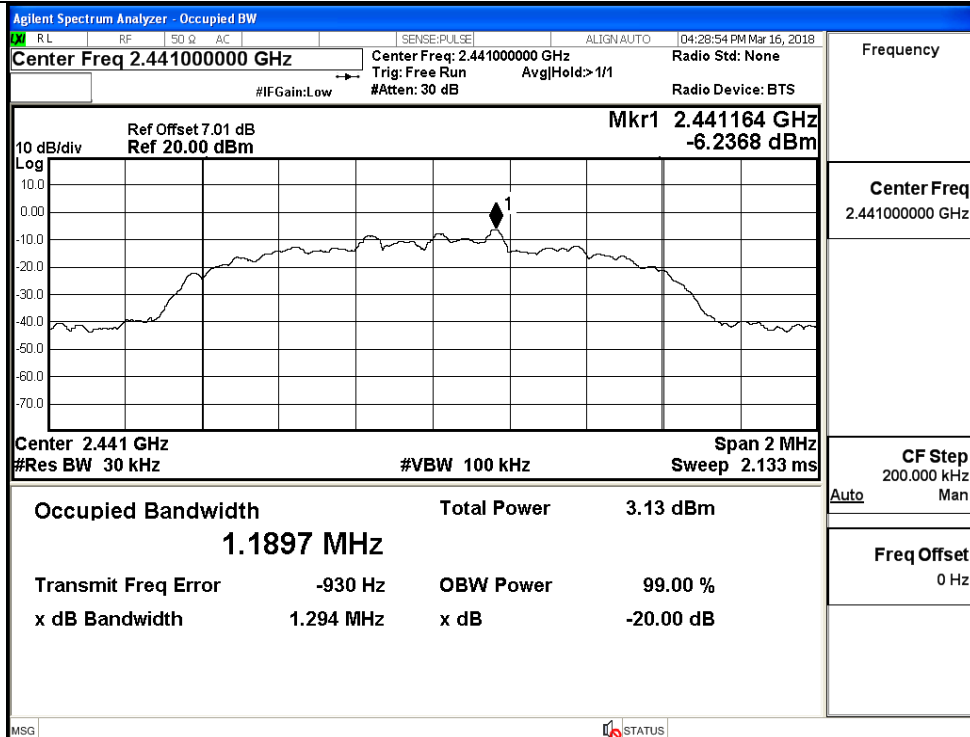
$\pi/4$ DQPSK/HCH



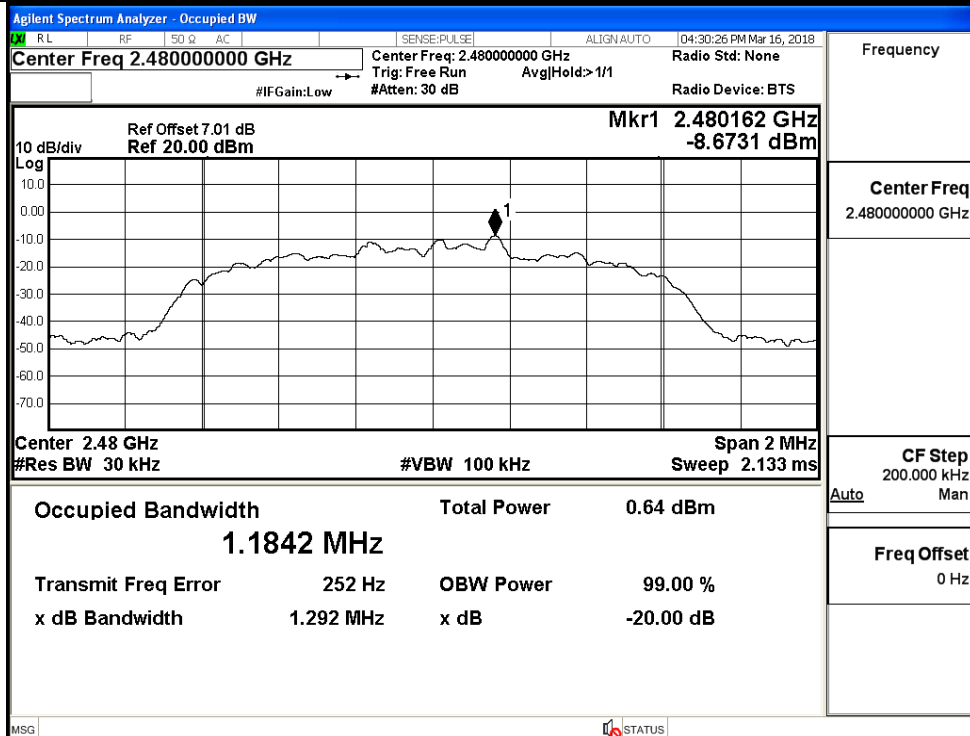
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

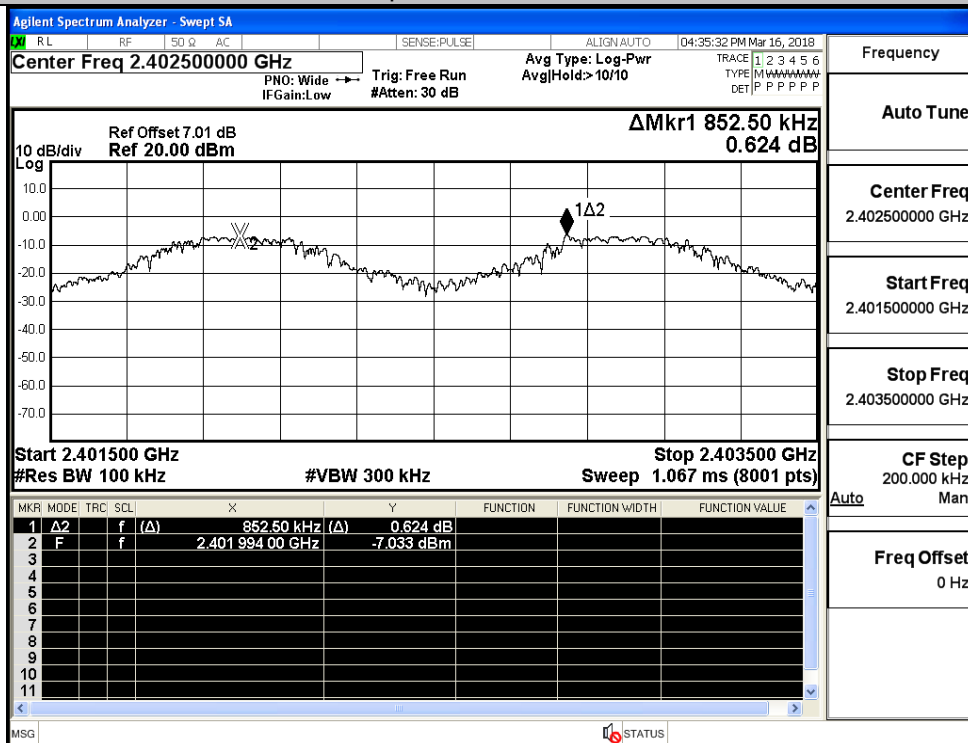


A.3 Carrier Frequency Separation

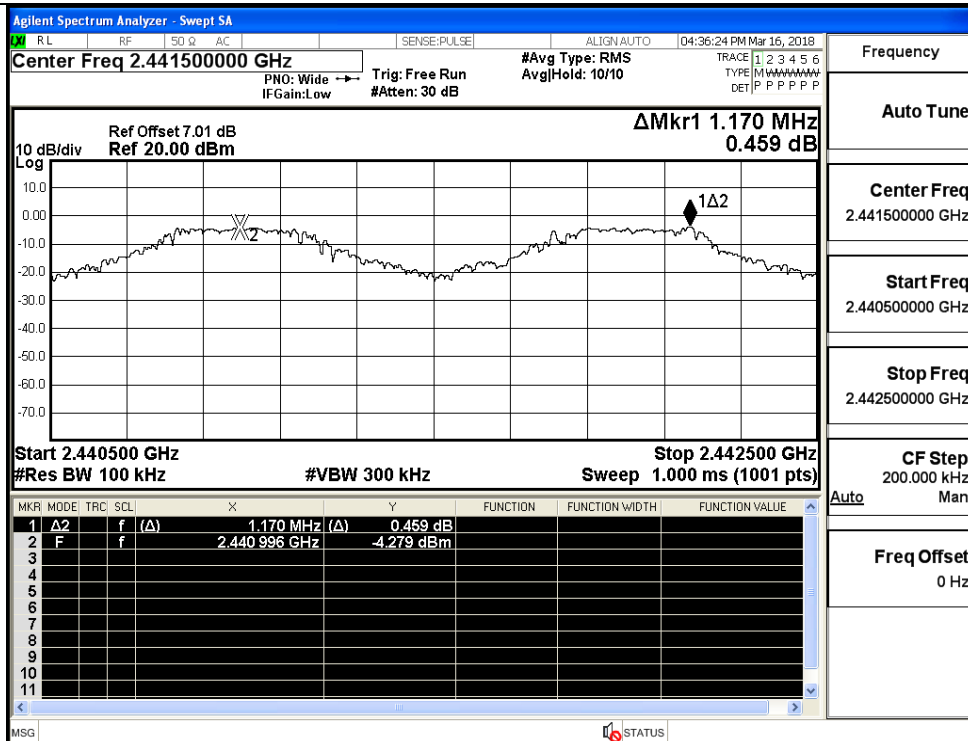
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.852	0.688	PASS
	MCH	1.170	0.688	PASS
	HCH	1.144	0.695	PASS
$\pi/4$ DQPSK	LCH	1.004	0.873	PASS
	MCH	1.004	0.861	PASS
	HCH	1.306	0.880	PASS
8DPSK	LCH	1.016	0.861	PASS
	MCH	0.890	0.863	PASS
	HCH	0.930	0.861	PASS

Test Graphs

GFSK/LCH



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

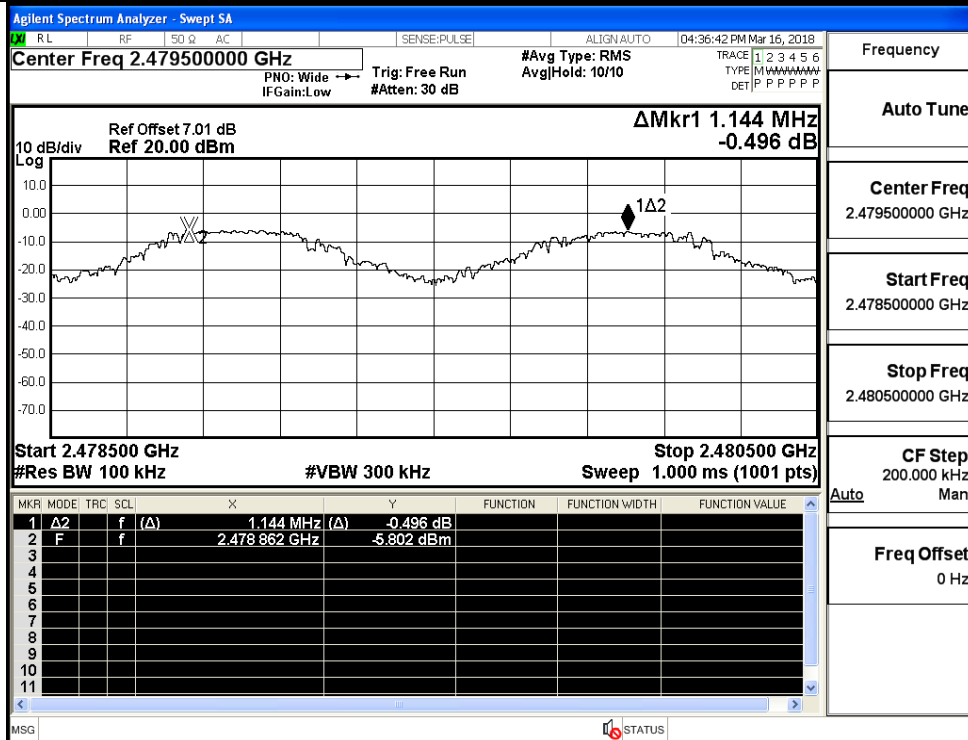
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

Start Freq
2.478500000 GHz

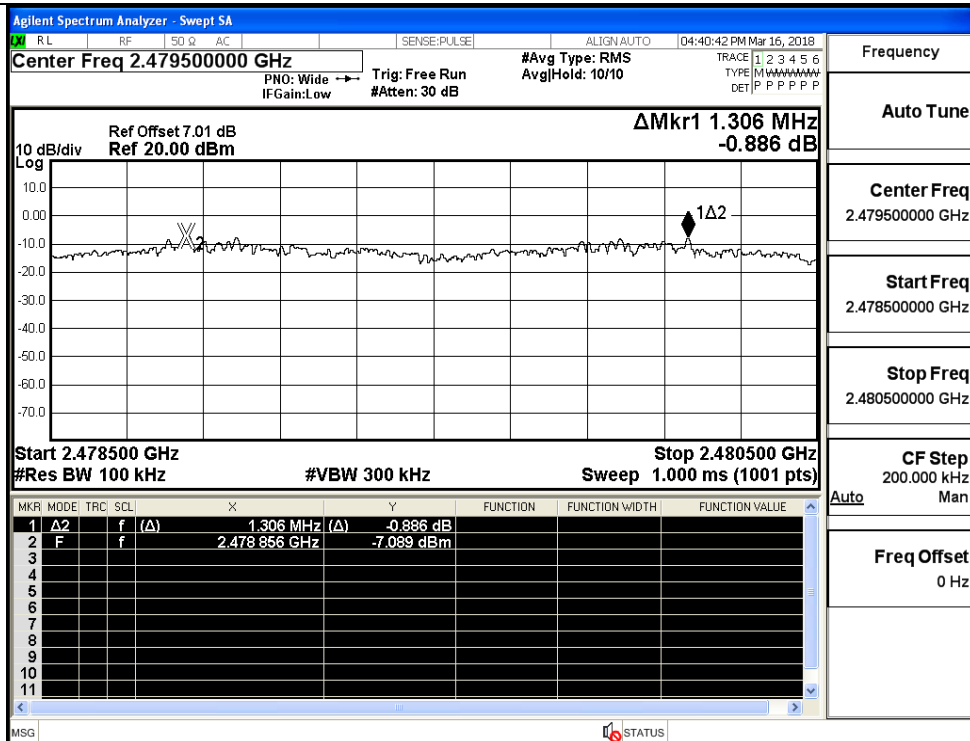
Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

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$\pi/4$ DQPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

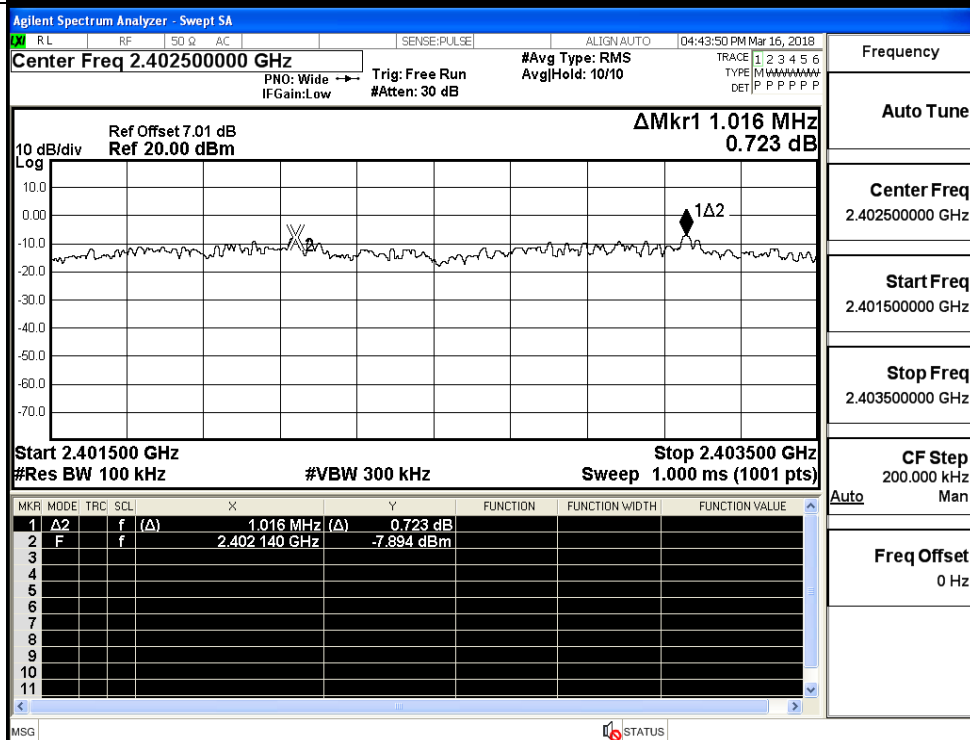
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/LCH



Frequency

Auto Tune

Center Freq
2.402500000 GHz

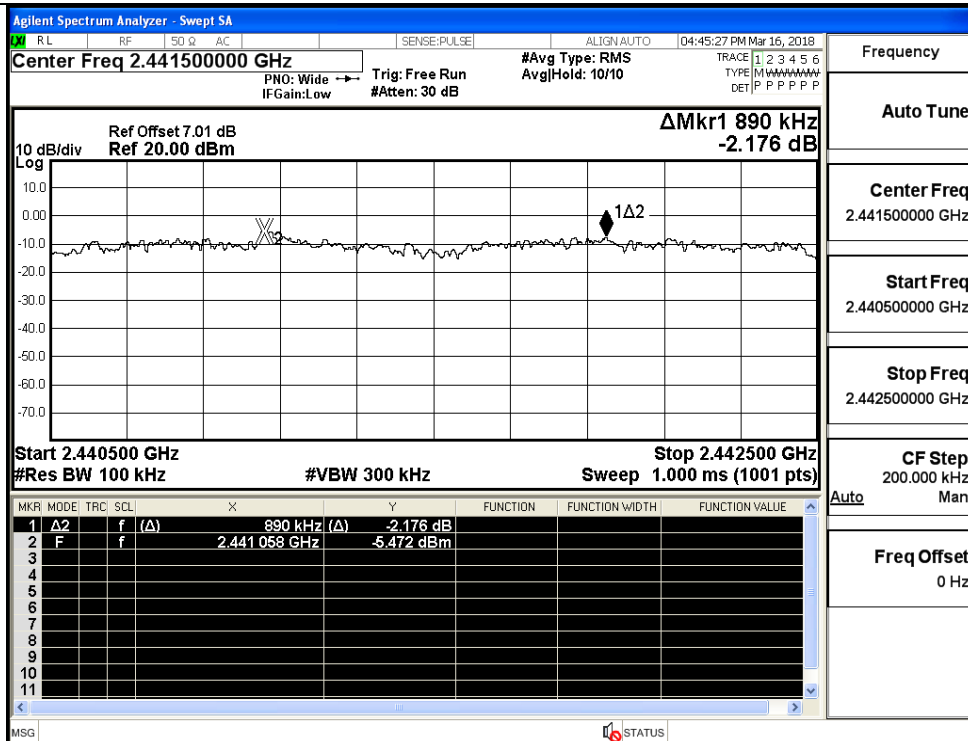
Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

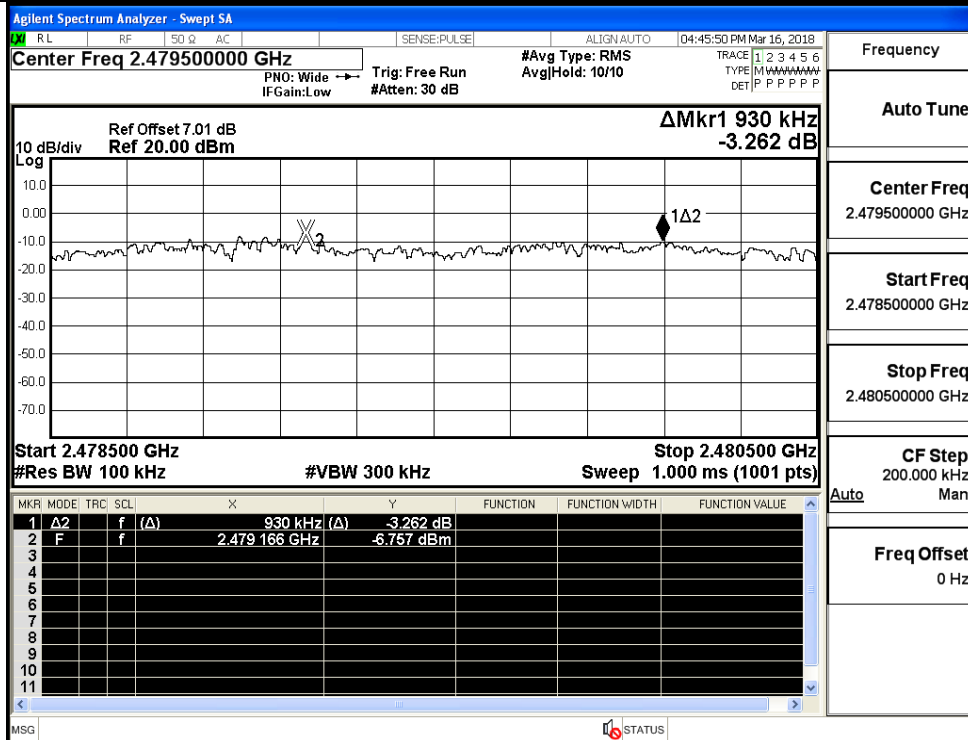
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

8DPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

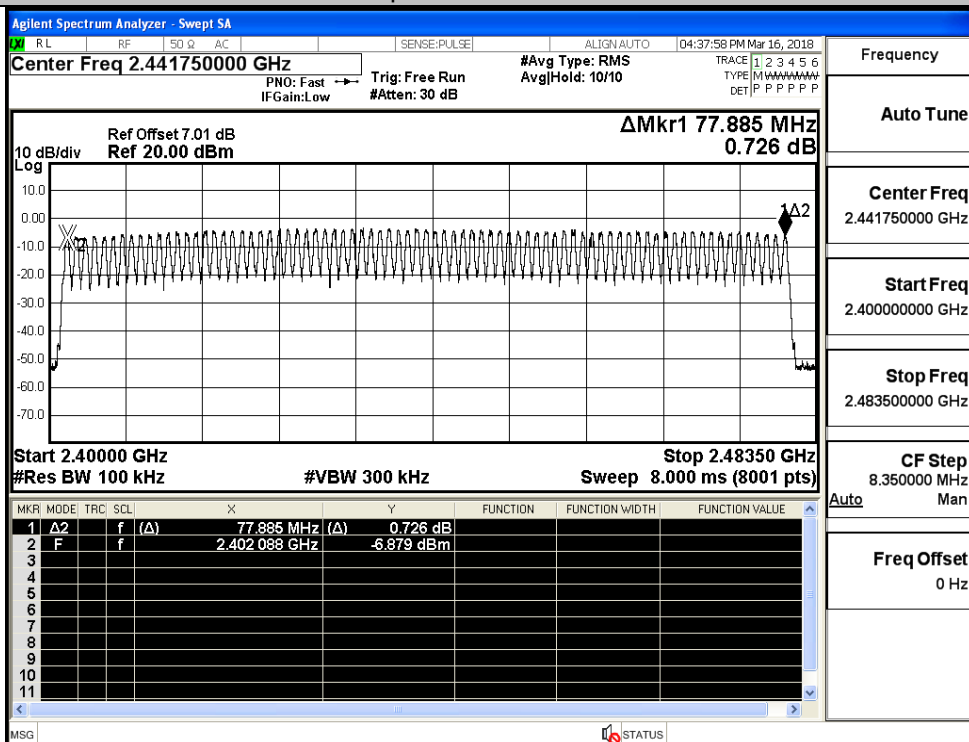
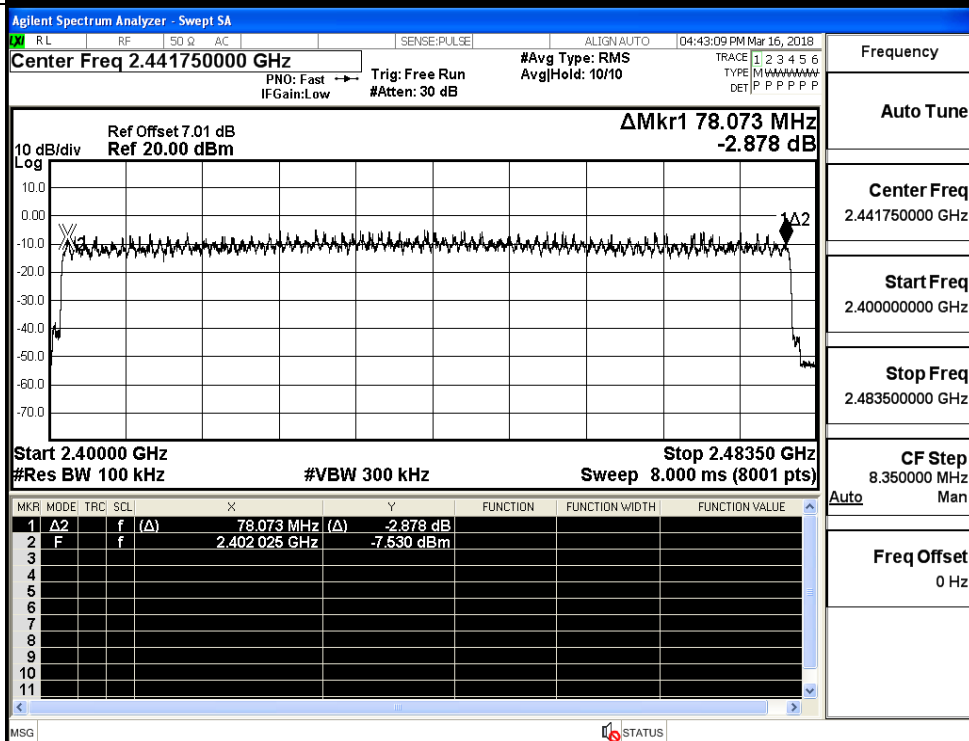
Freq Offset
0 Hz

A.4 Hopping Channel Number

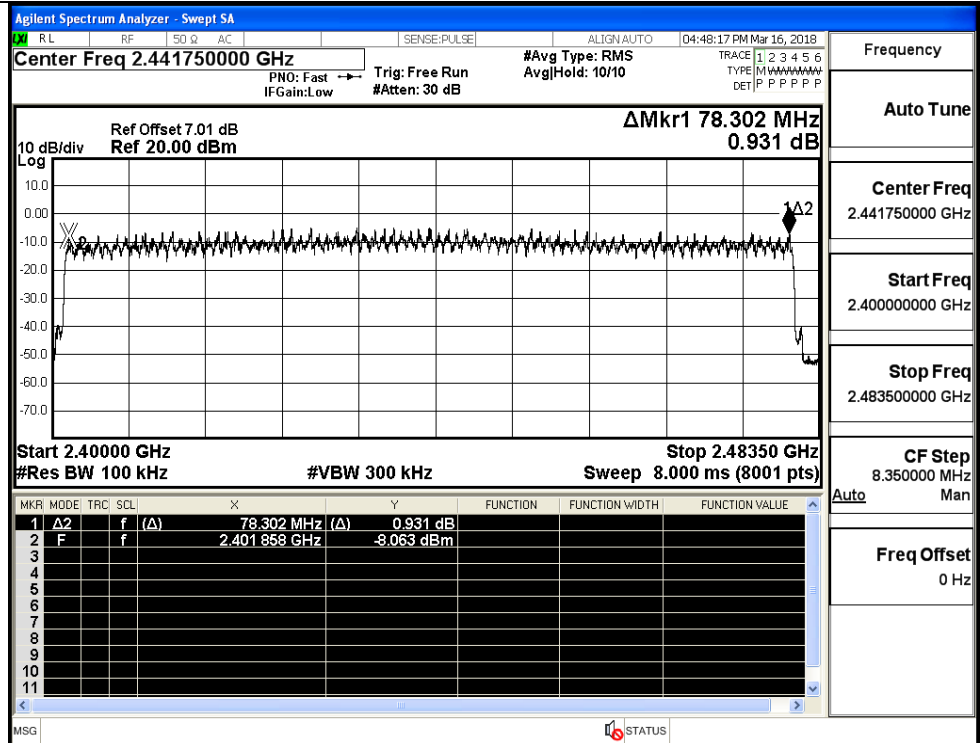
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	≥ 15	PASS
$\pi/4$ DQPSK	Hop	79	≥ 15	PASS
8DPSK	Hop	79	≥ 15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

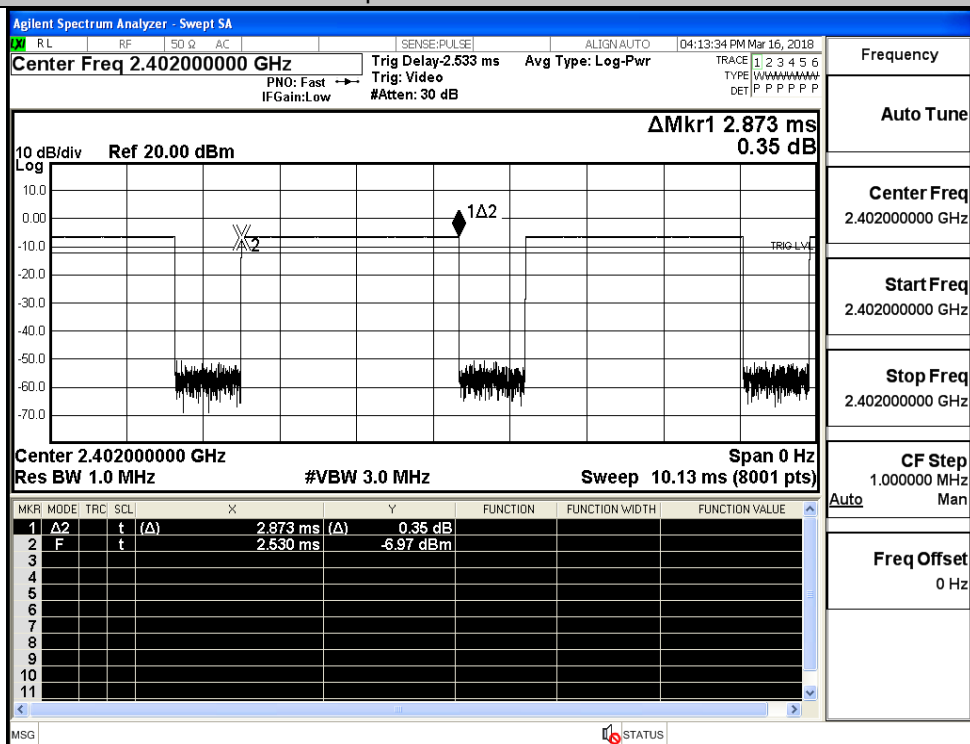


A.5 Dwell Time

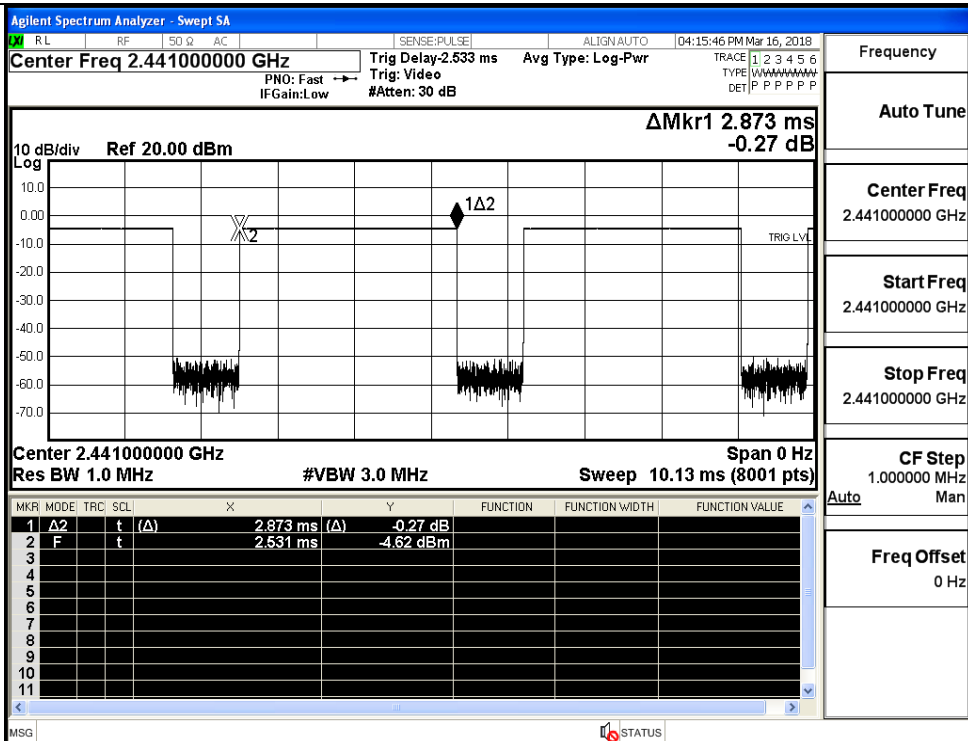
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
	2DH5	HCH	2.87	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.87	106.7	0.307	0.4	PASS
	3DH5	MCH	2.87	106.7	0.307	0.4	PASS
	3DH5	HCH	2.87	106.7	0.307	0.4	PASS

Test Graphs

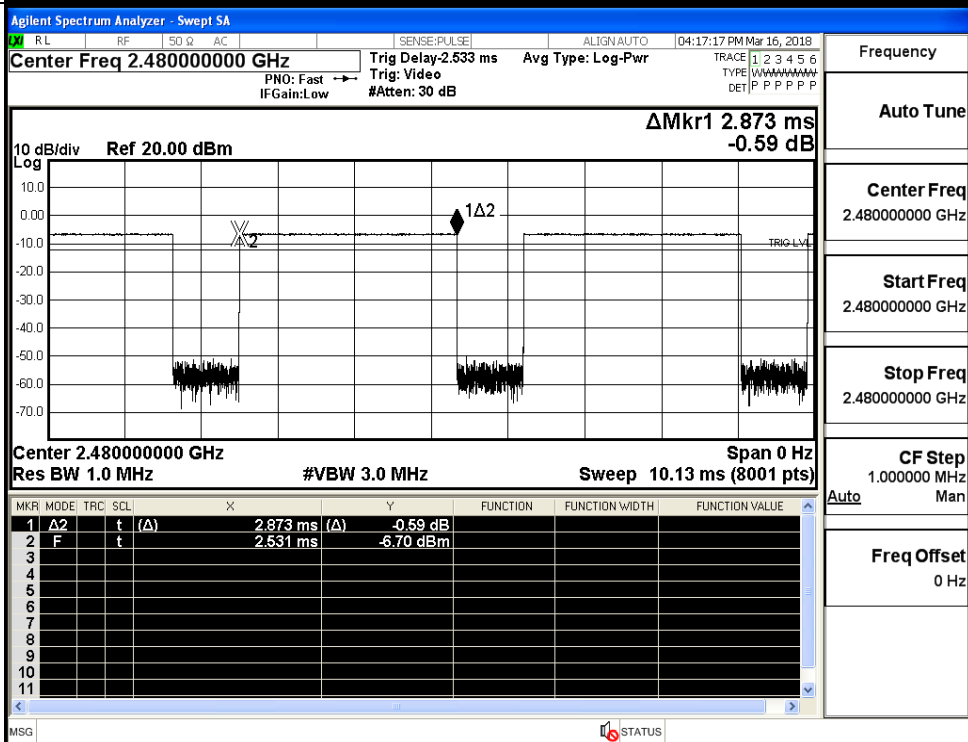
GFSK_DH5/LCH



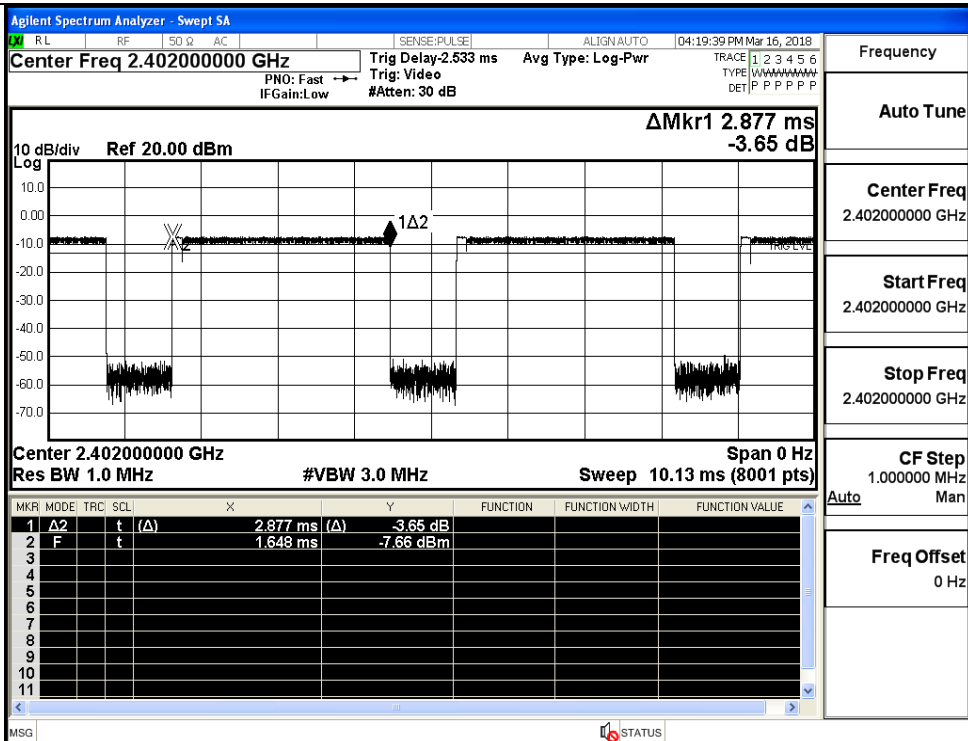
GFSK_DH5/MCH



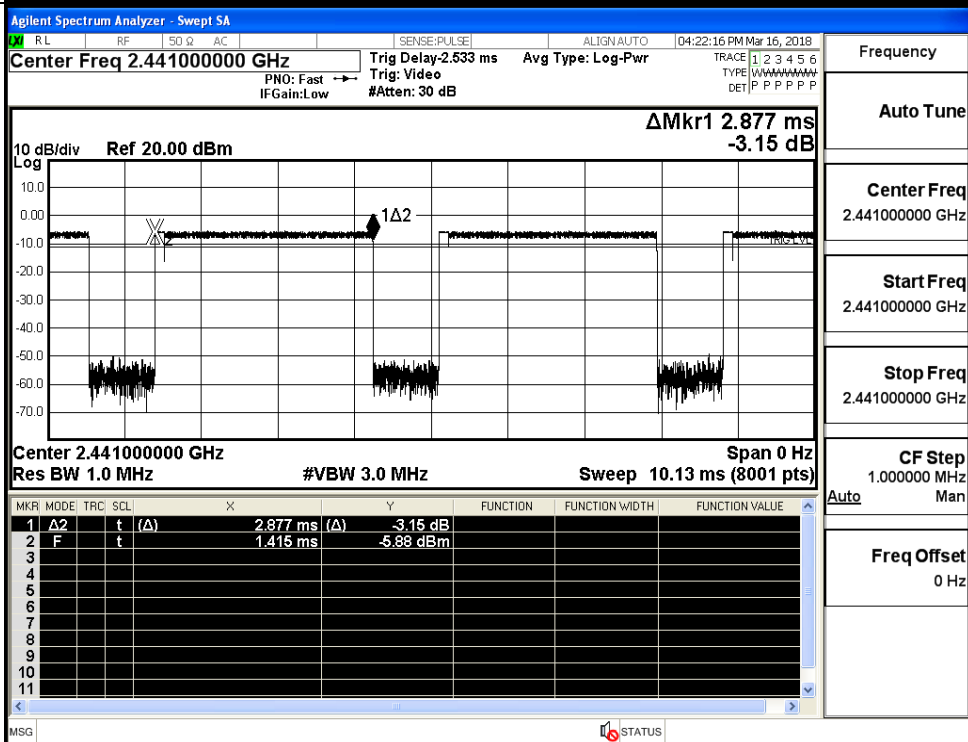
GFSK_DH5/HCH



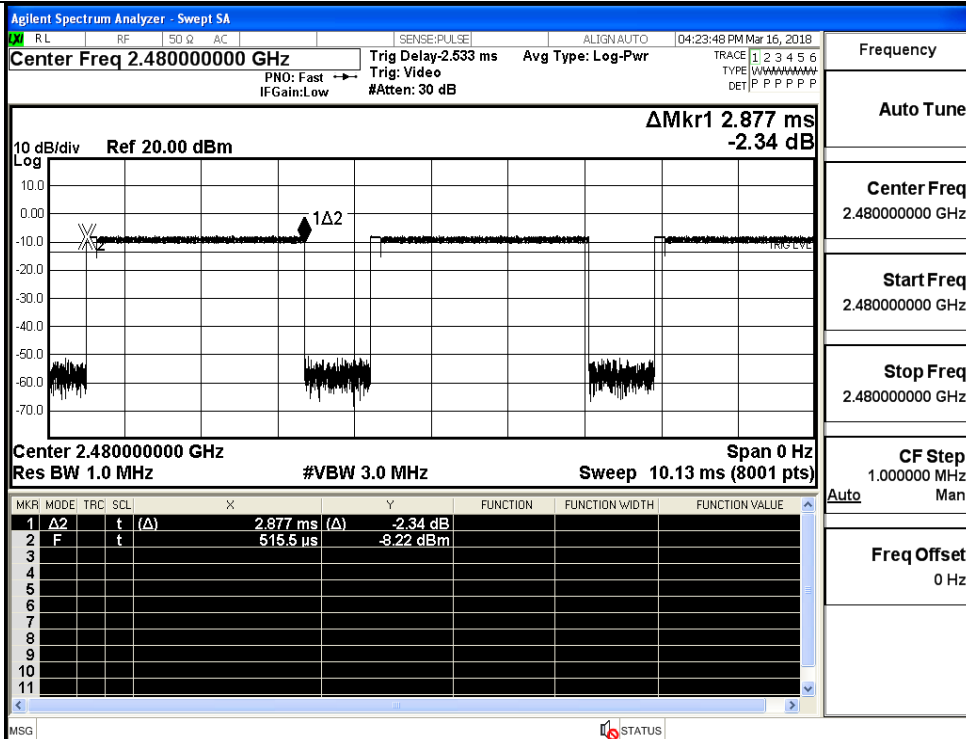
$\pi/4$ DQPSK
_2DH5/LCH



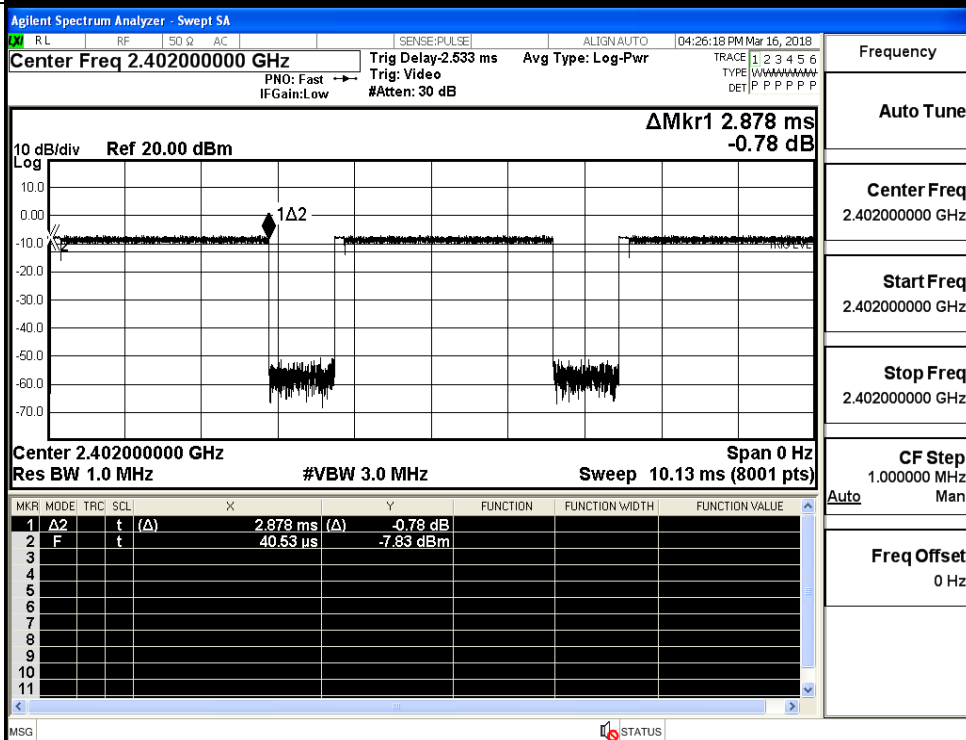
$\pi/4$ DQPSK
_2DH5/MCH



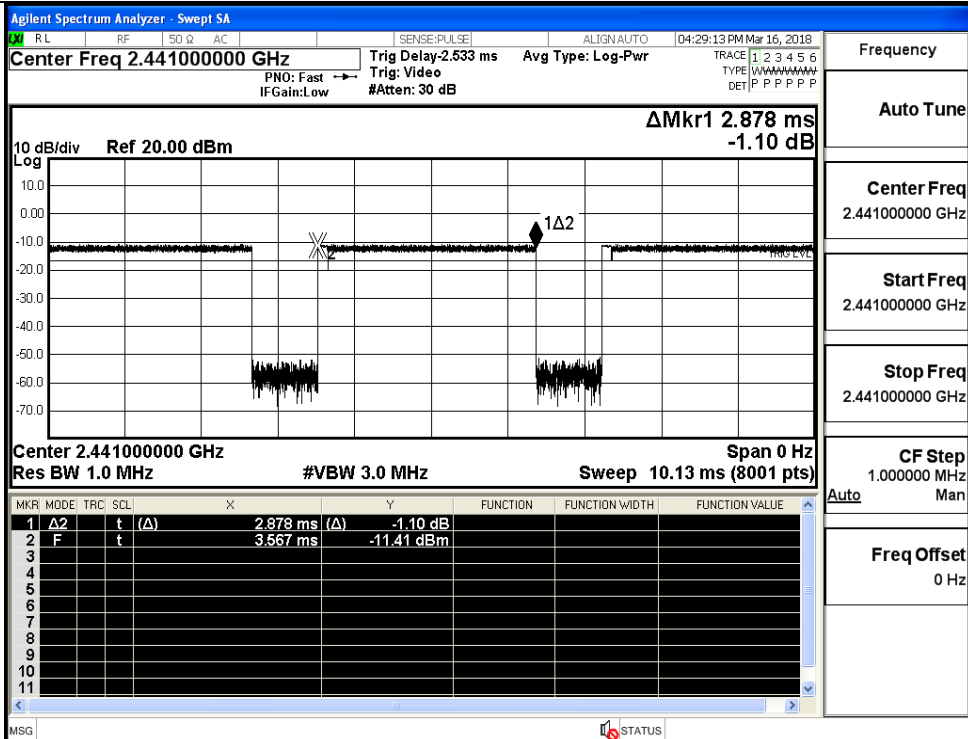
$\pi/4$ DQPSK
_2DH5/HCH



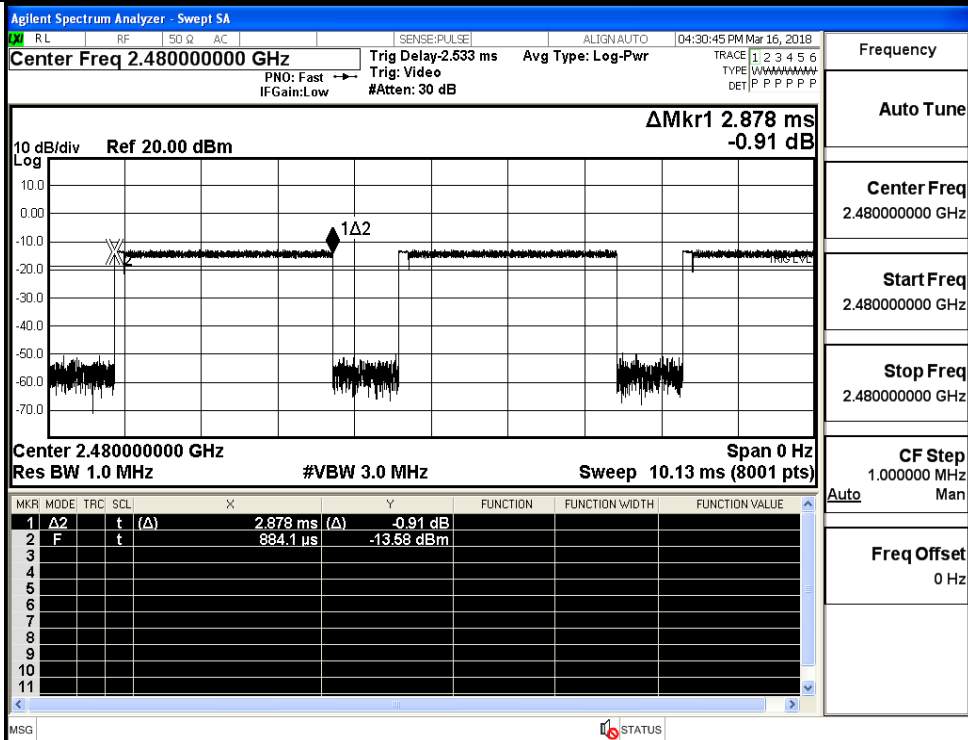
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH

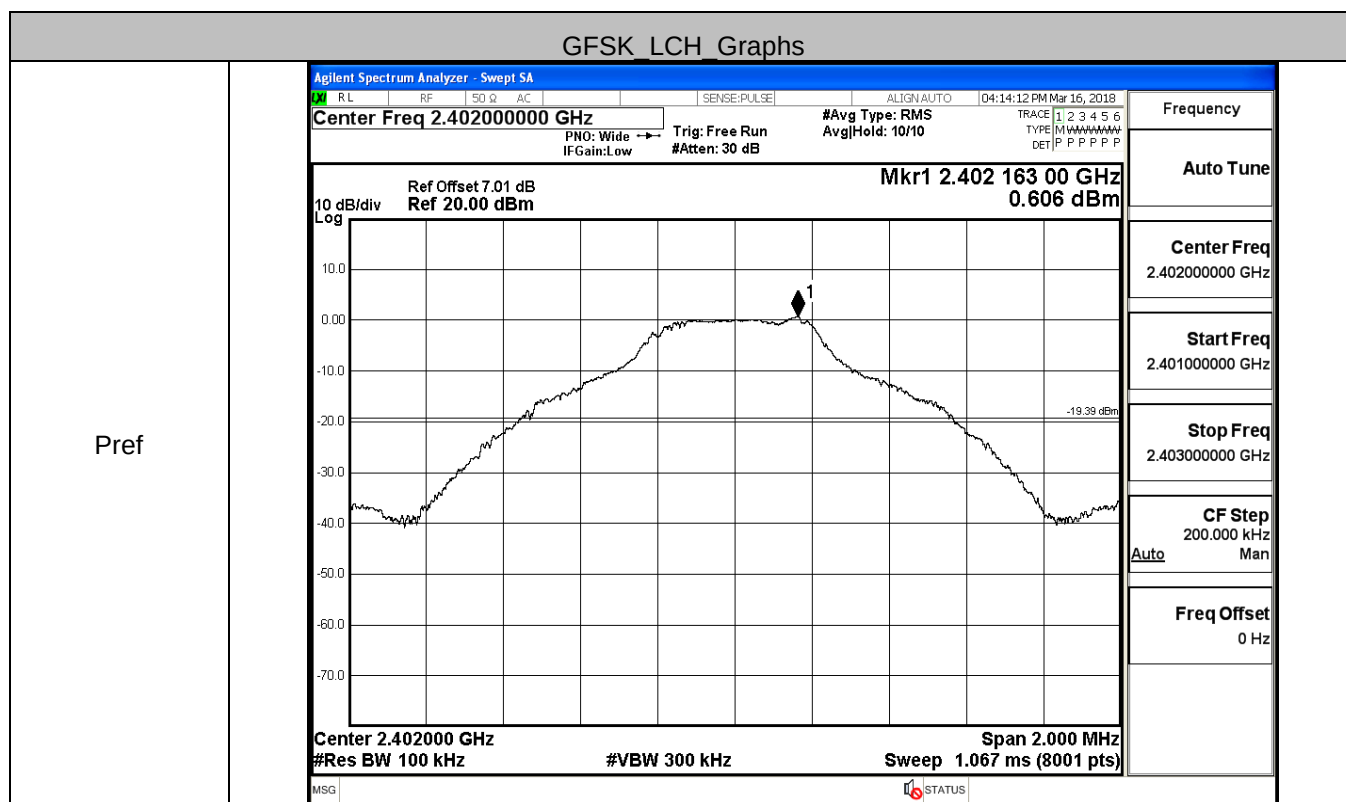


8DPSK_3DH5/HCH

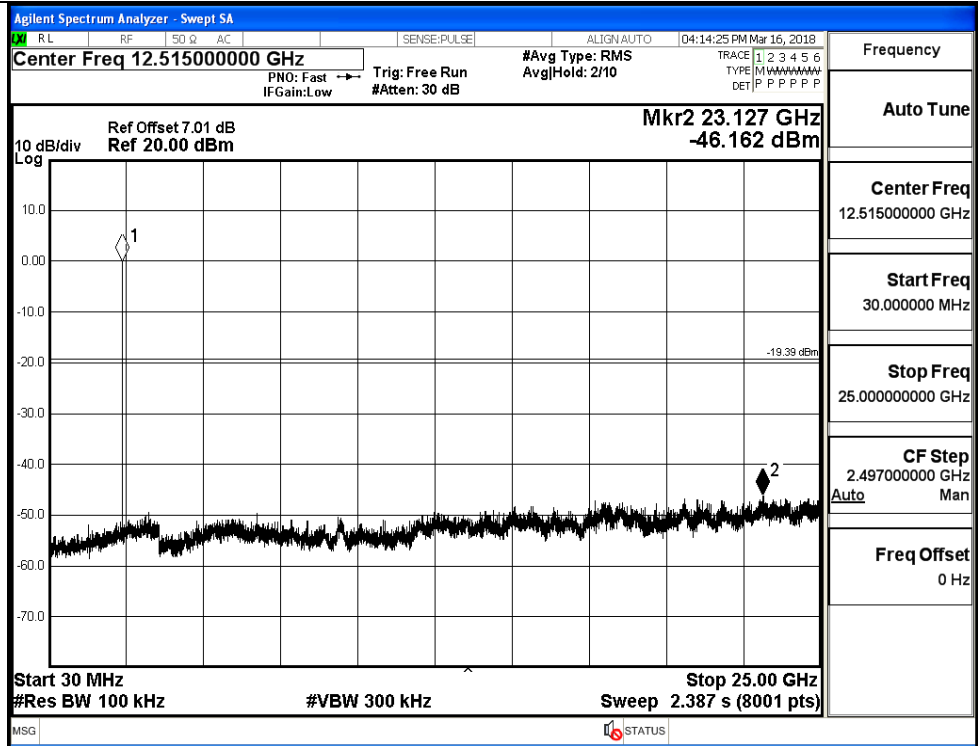


A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.606	-46.162	-19.394	PASS
	MCH	2.512	-45.730	-17.488	PASS
	HCH	0.343	-45.357	-19.657	PASS
$\pi/4$ DQPSK	LCH	-0.93	-45.409	-20.930	PASS
	MCH	1.075	-46.401	-18.925	PASS
	HCH	-1.278	-45.768	-21.278	PASS
8DPSK	LCH	-0.649	-45.716	-20.649	PASS
	MCH	-4.473	-46.054	-24.473	PASS
	HCH	-6.674	-45.591	-26.674	PASS

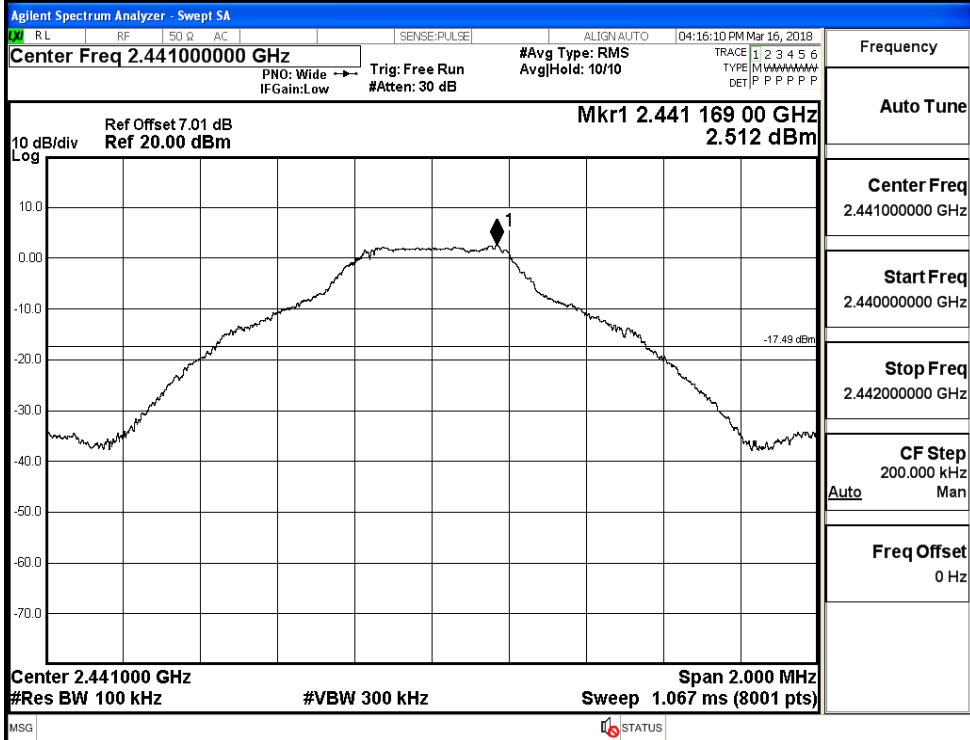


Puw

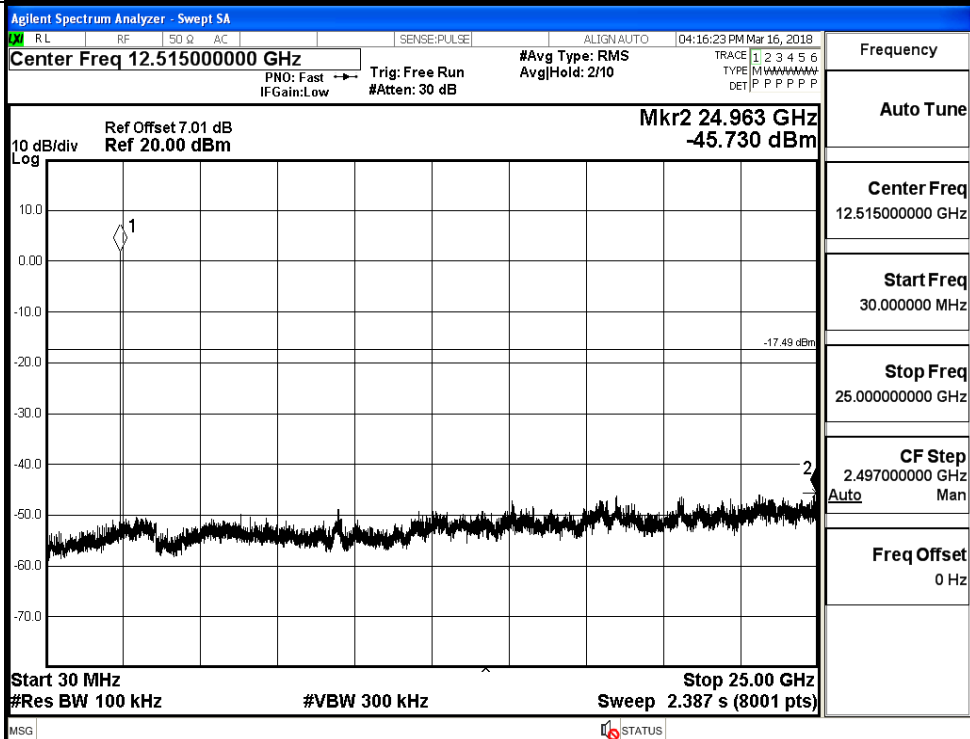


GFSK_MCH_Graphs

Pref

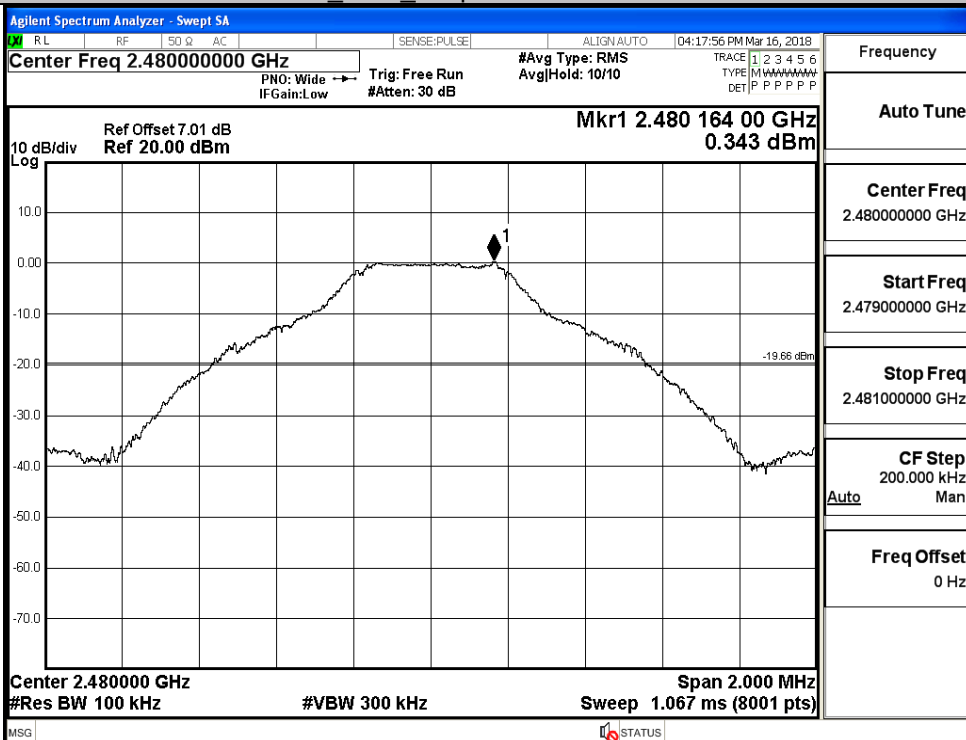


Puw

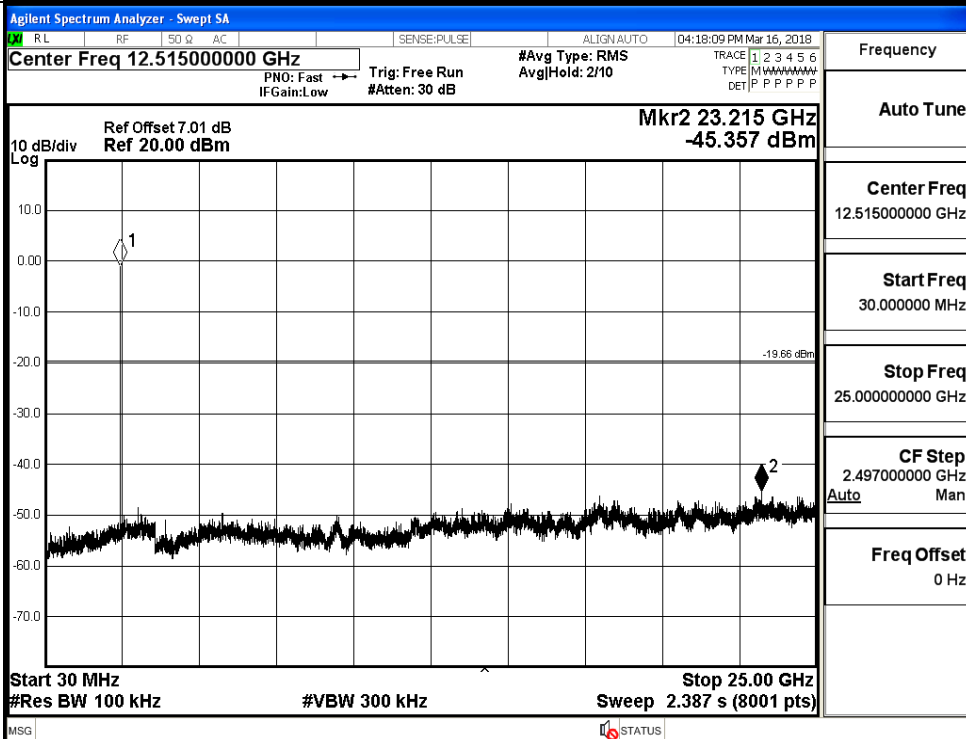


GFSK HCH Graphs

Pref

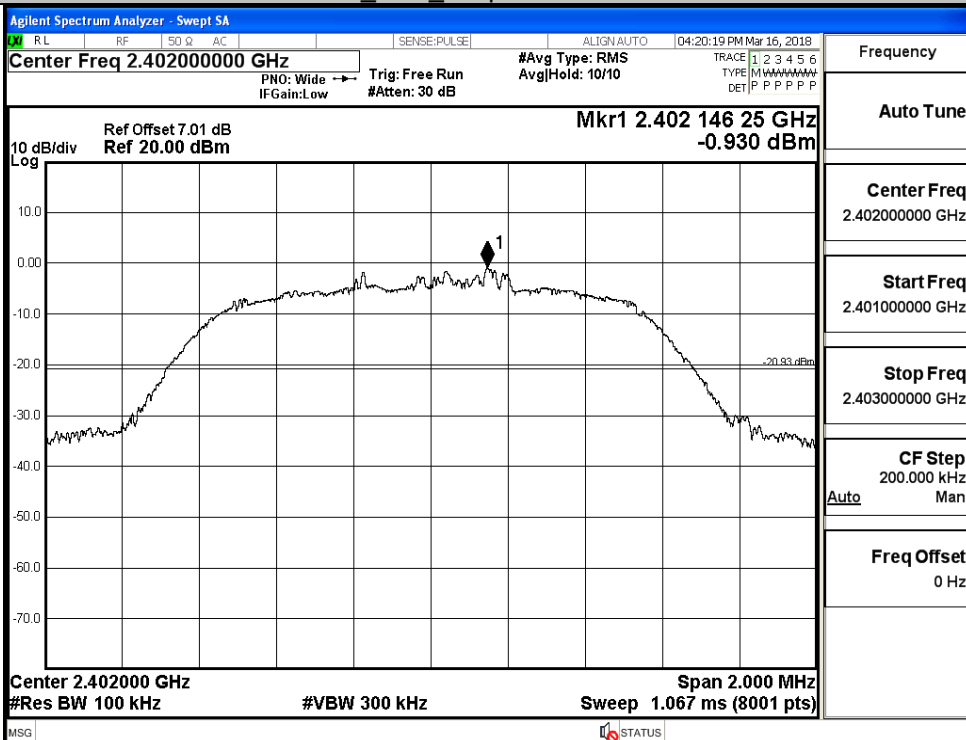


Puw

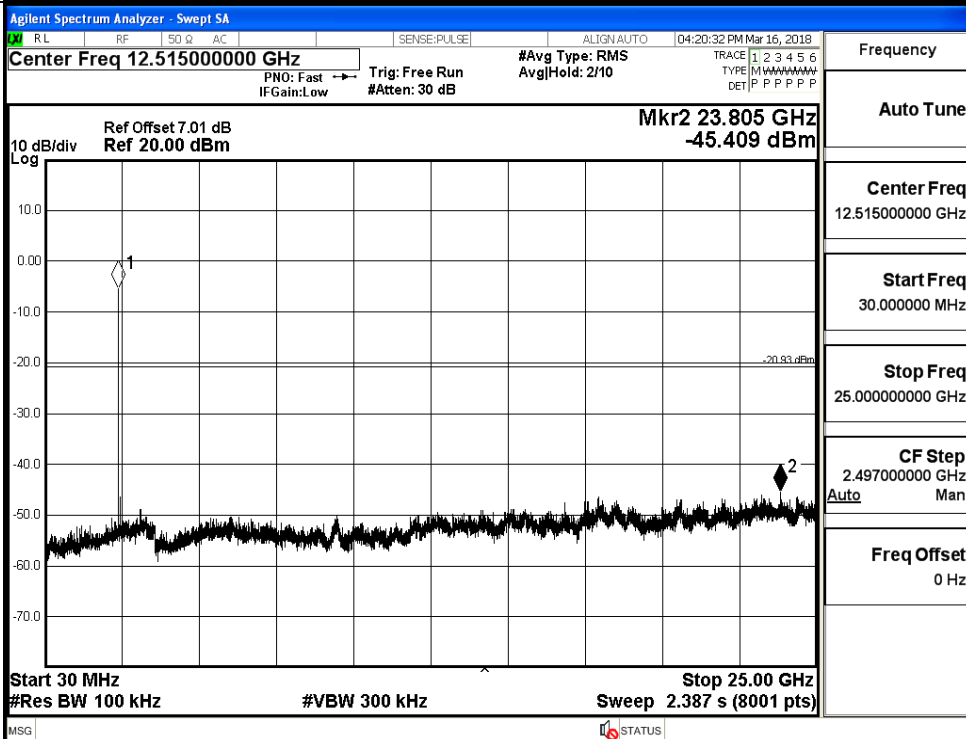


$\pi/4$ DQPSK_LCH_Graphs

Pref

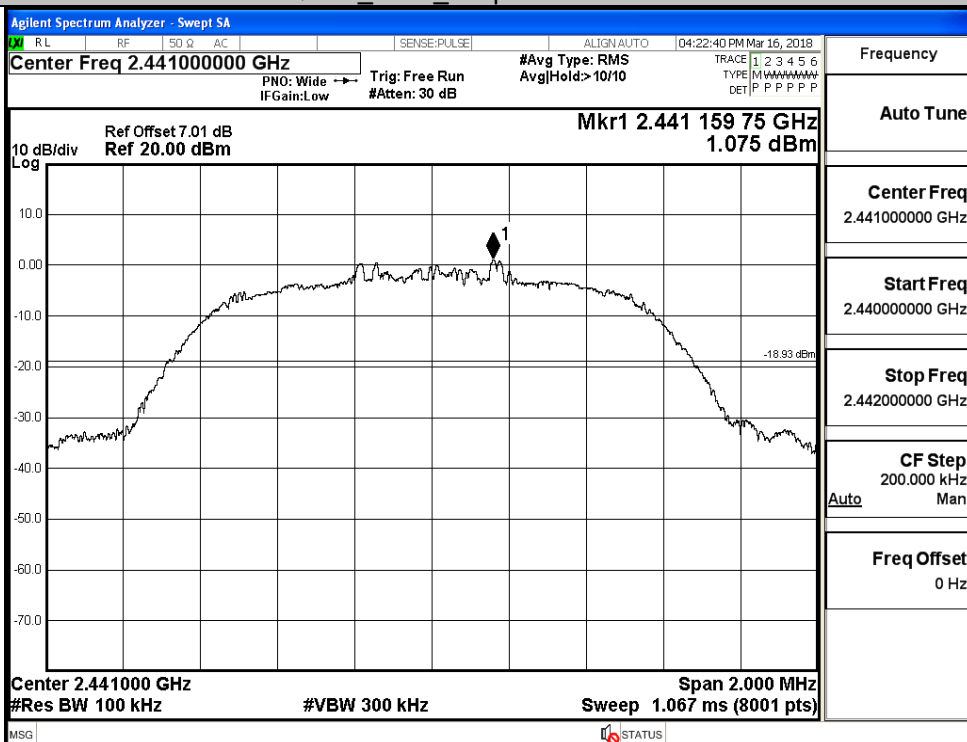


Puw

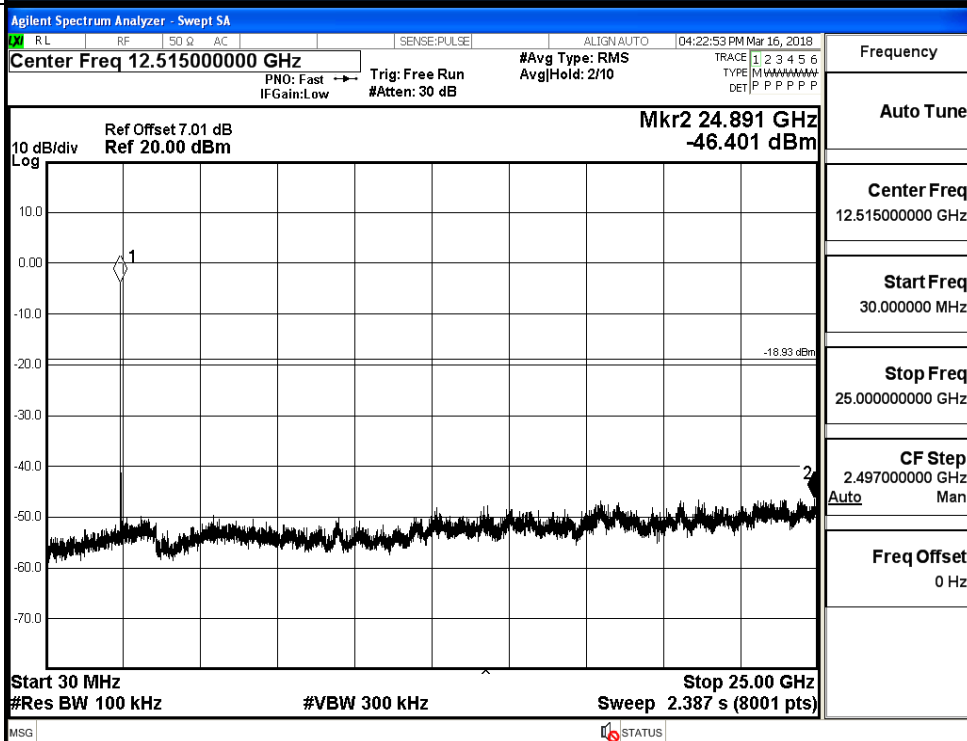


$\pi/4$ DQPSK_MCH_Graphs

Pref

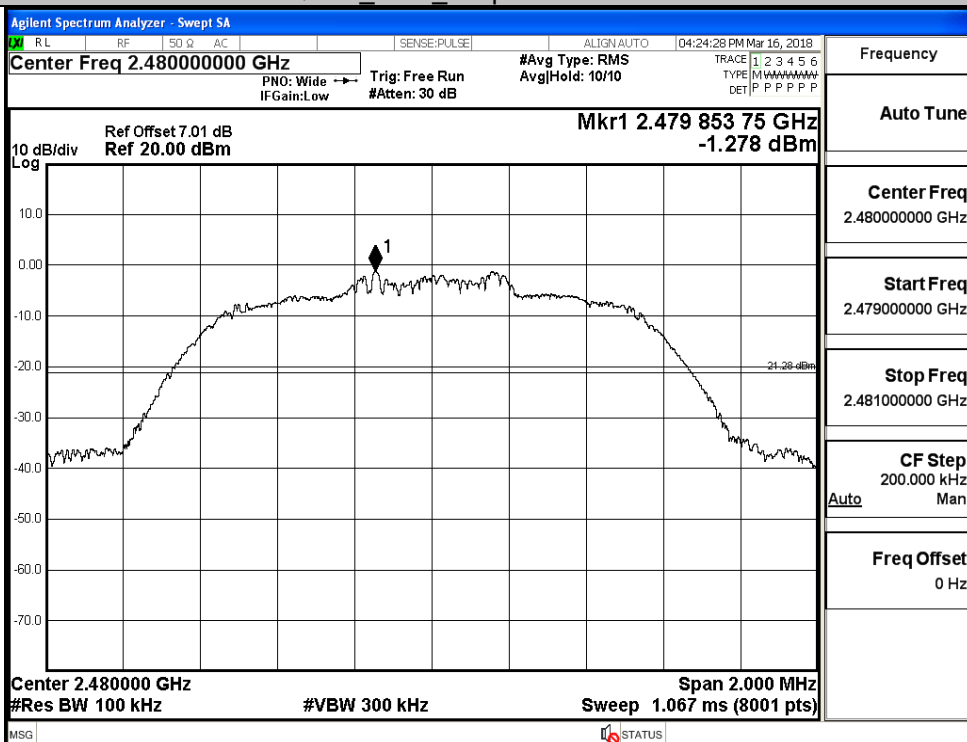


Puw

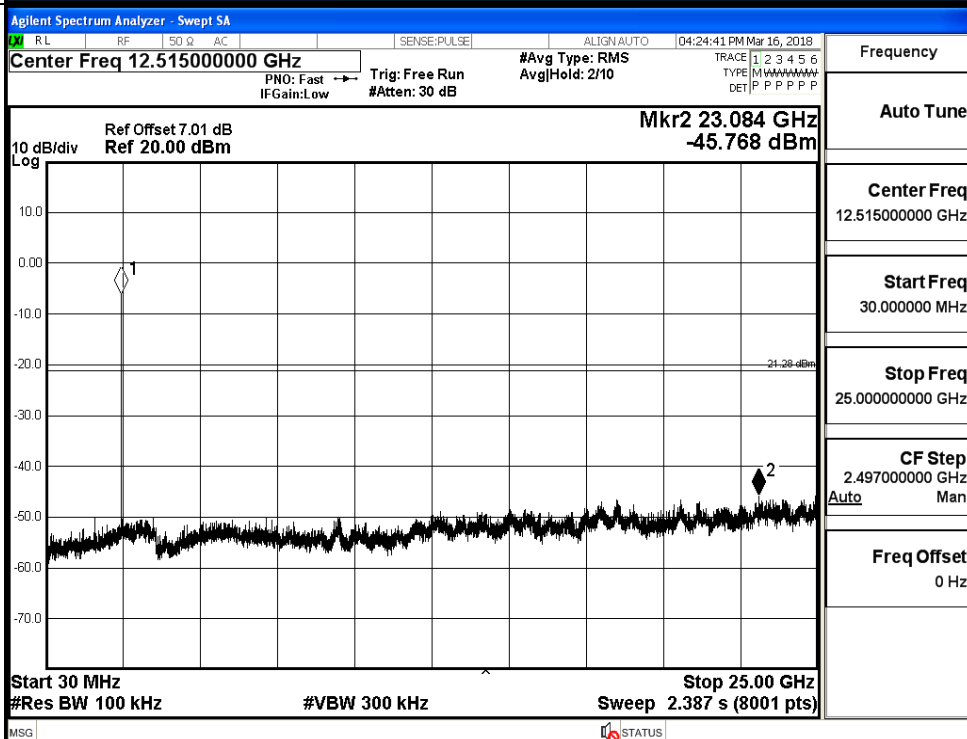


$\pi/4$ DQPSK_HCH_Graphs

Pref

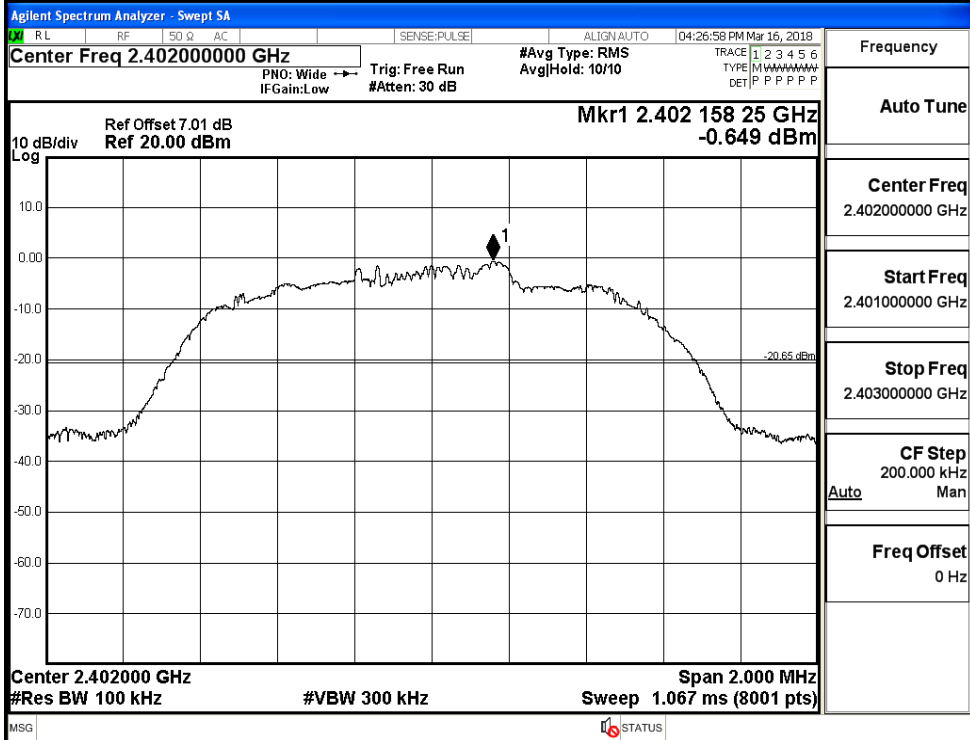


Puw

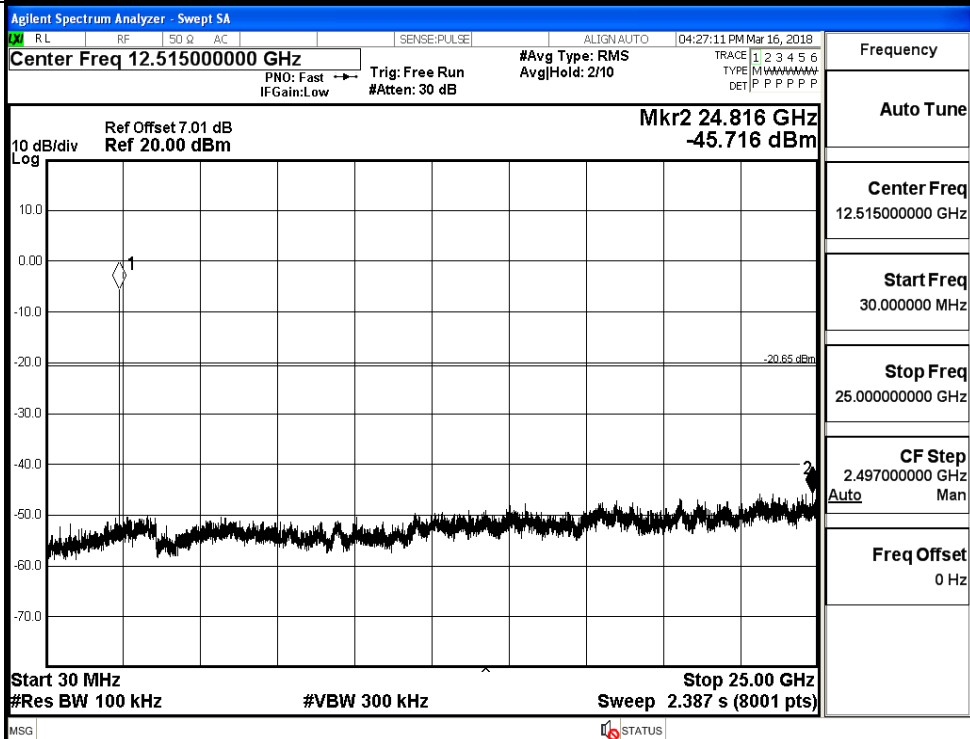


8DPSK_LCH_Graphs

Pref

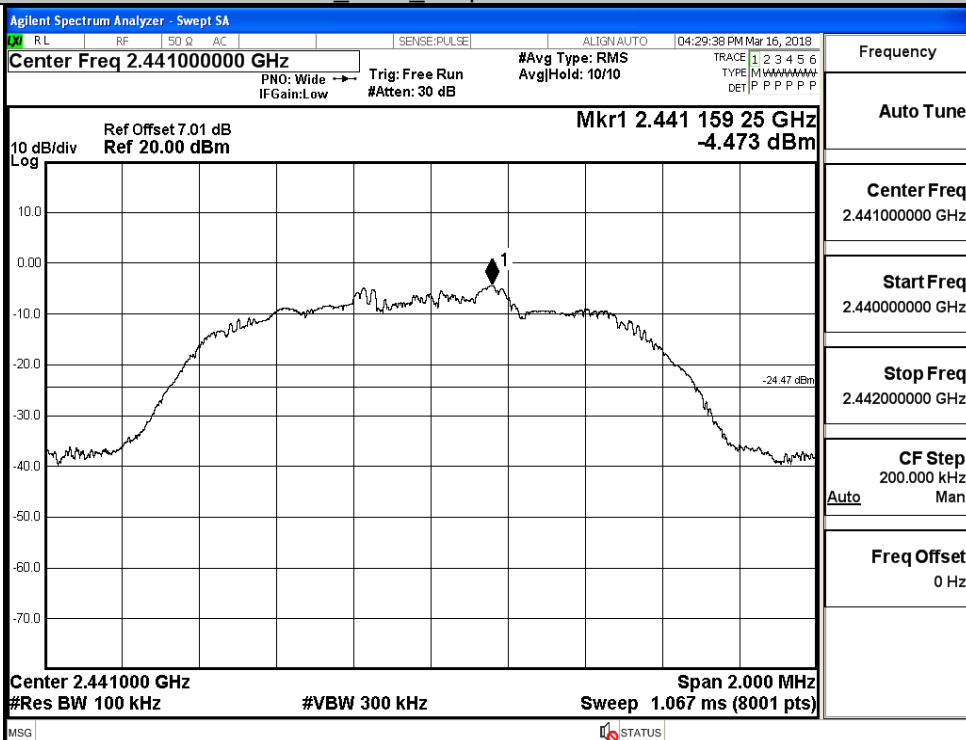


Puw

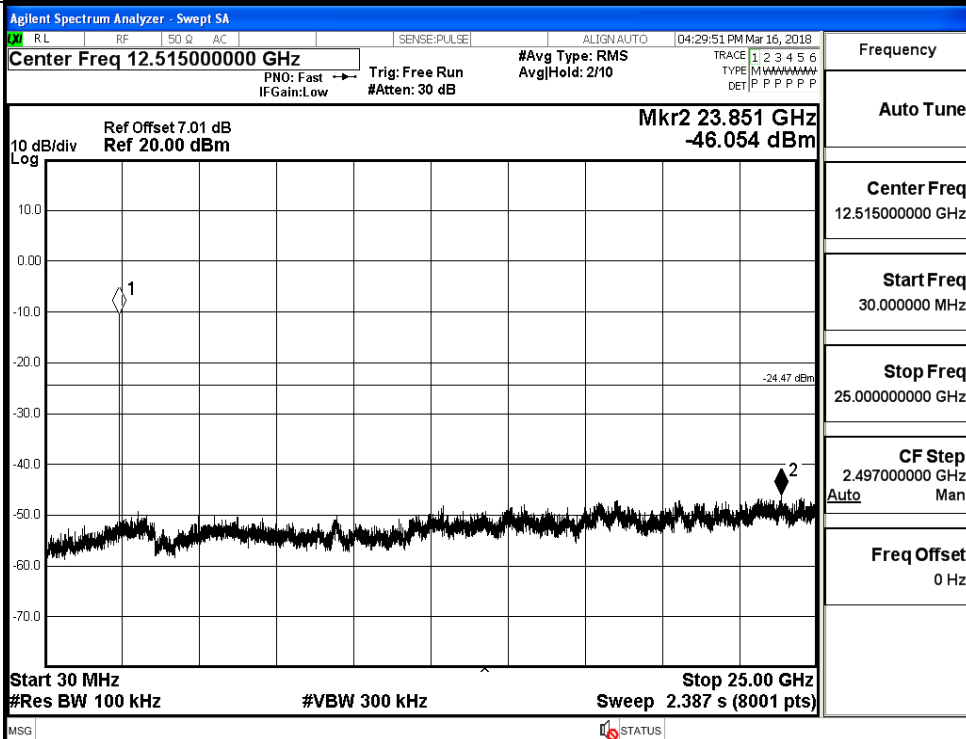


8DPSK_MCH_Graphs

Pref

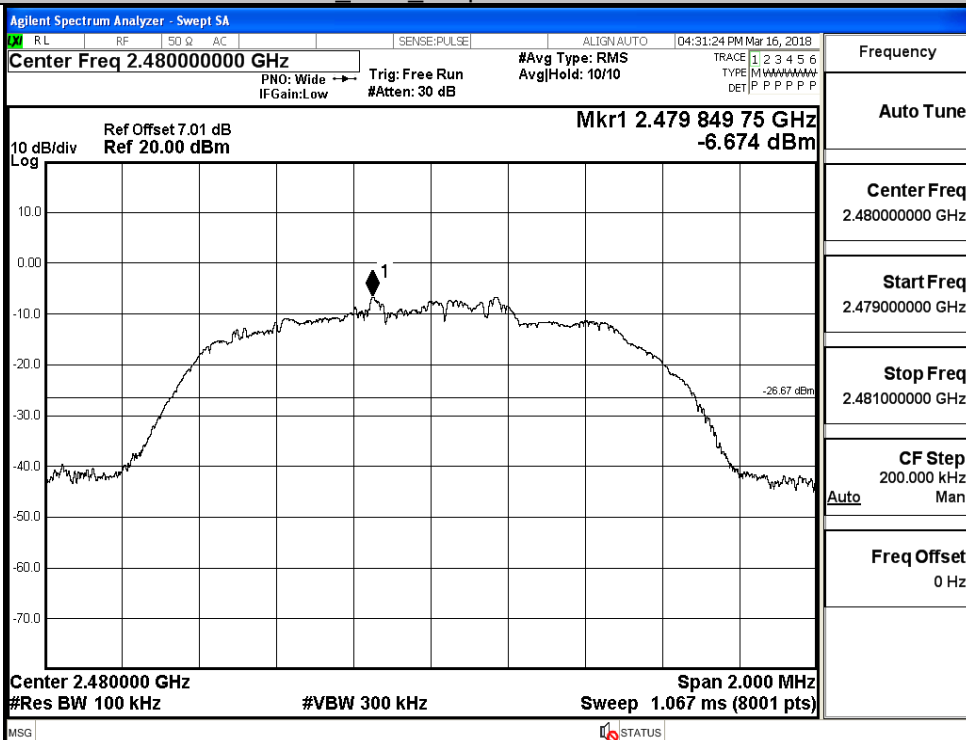


Puw

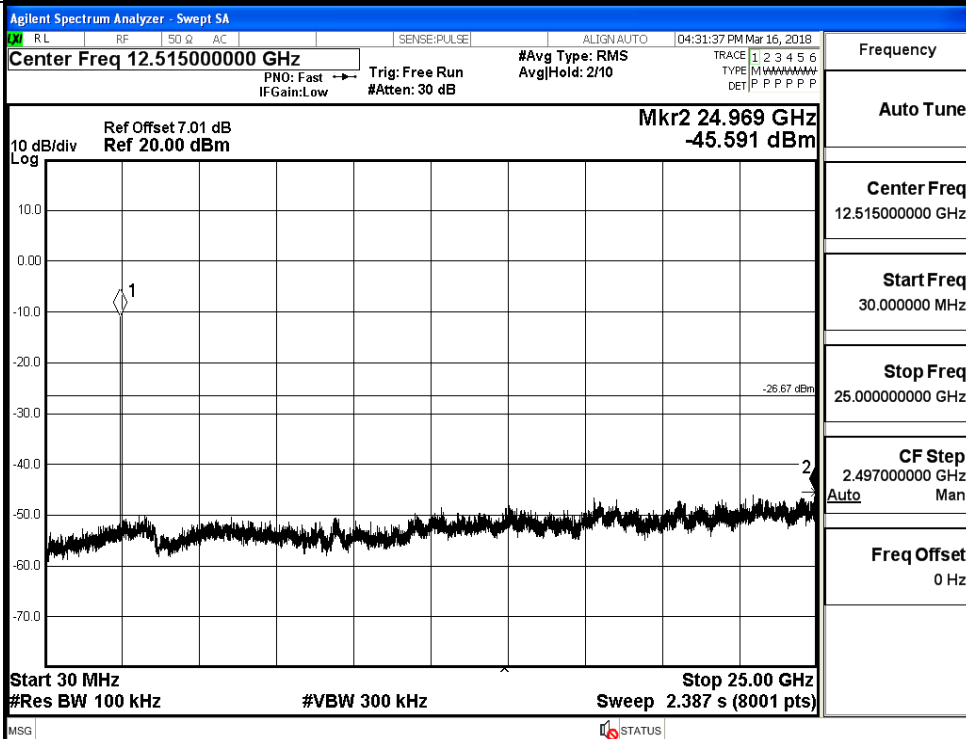


8DPSK_HCH_Graphs

Pref



Puw

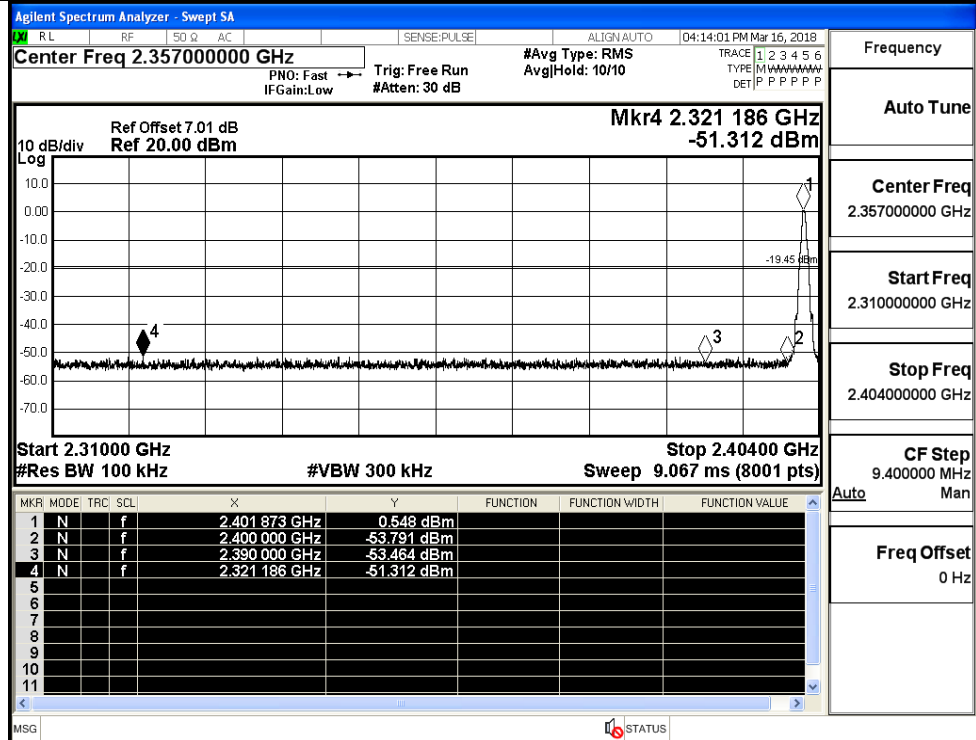


A.7 Band-edge for RF Conducted Emissions

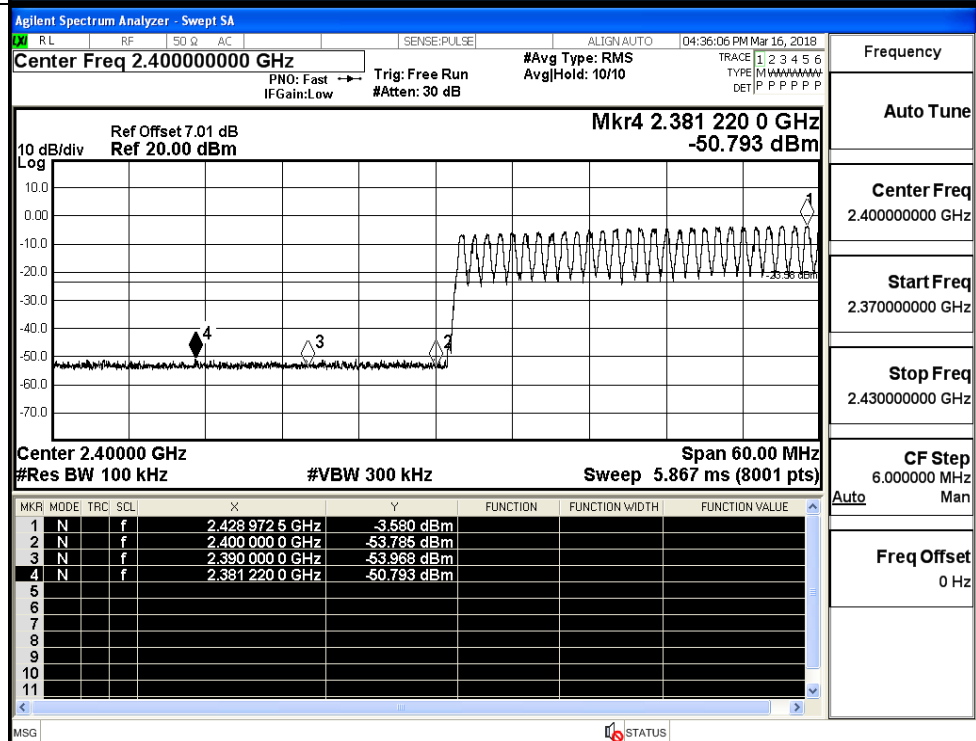
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.548	Off	-51.312	-19.452	PASS
			-3.580	On	-50.793	-23.580	PASS
	HCH	2480	0.412	Off	-49.955	-19.588	PASS
			-4.317	On	-49.405	-24.317	PASS
$\pi/4$ DQPSK	LCH	2402	-0.715	Off	-50.643	-20.715	PASS
			-5.244	On	-50.472	-25.244	PASS
	HCH	2480	-1.082	Off	-51.180	-21.082	PASS
			-5.630	On	-50.025	-25.630	PASS
8DPSK	LCH	2402	-0.472	Off	-51.105	-20.472	PASS
			-4.929	On	-49.610	-24.929	PASS
	HCH	2480	-6.617	Off	-50.310	-26.617	PASS
			-5.917	On	-50.259	-25.917	PASS

Test Graphs

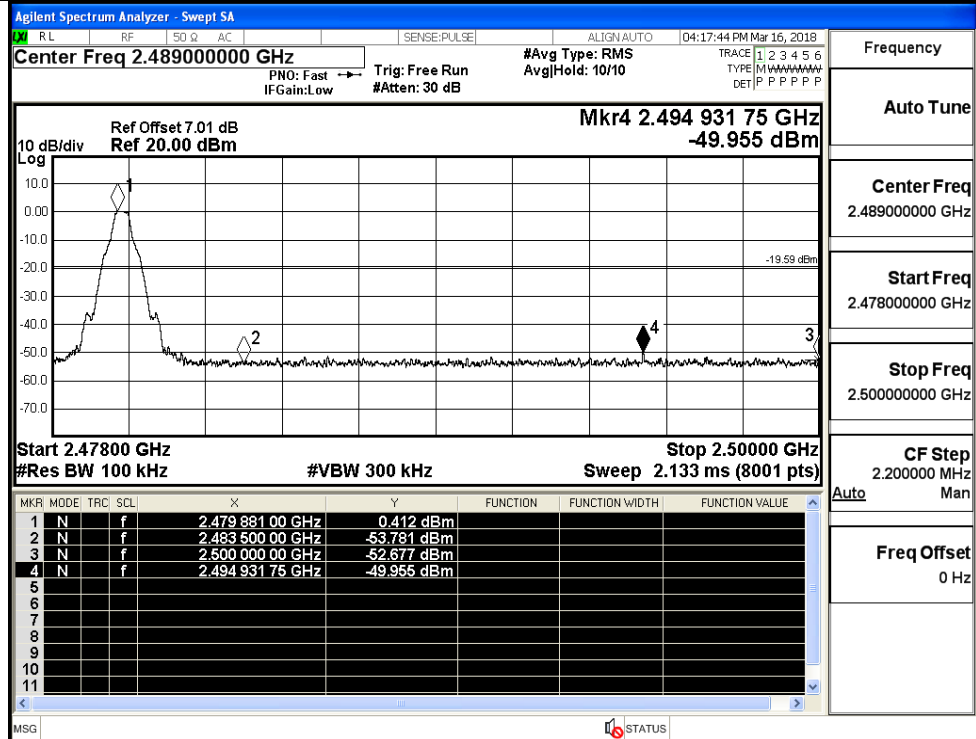
GFSK/LCH/No Hop



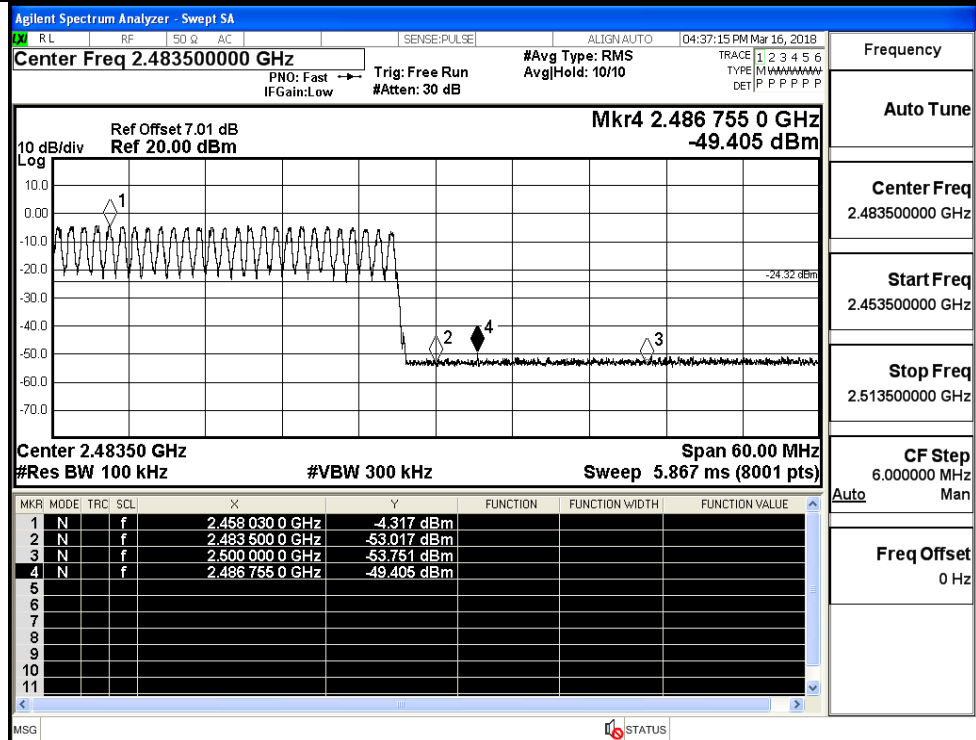
GFSK/LCH/Hop



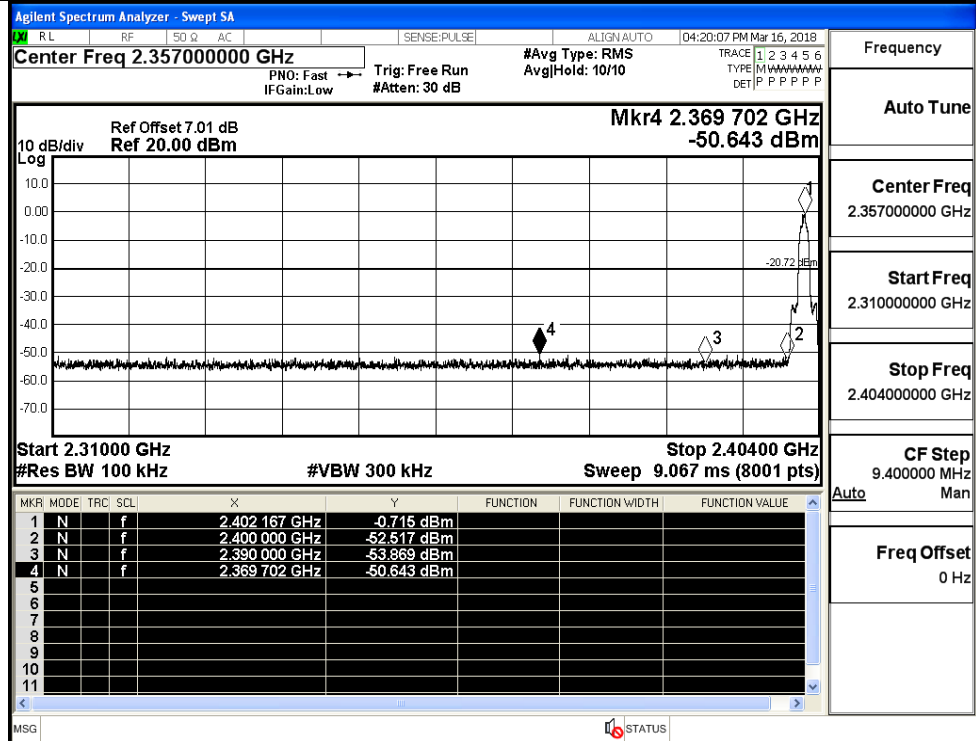
GFSK/HCH/No Hop



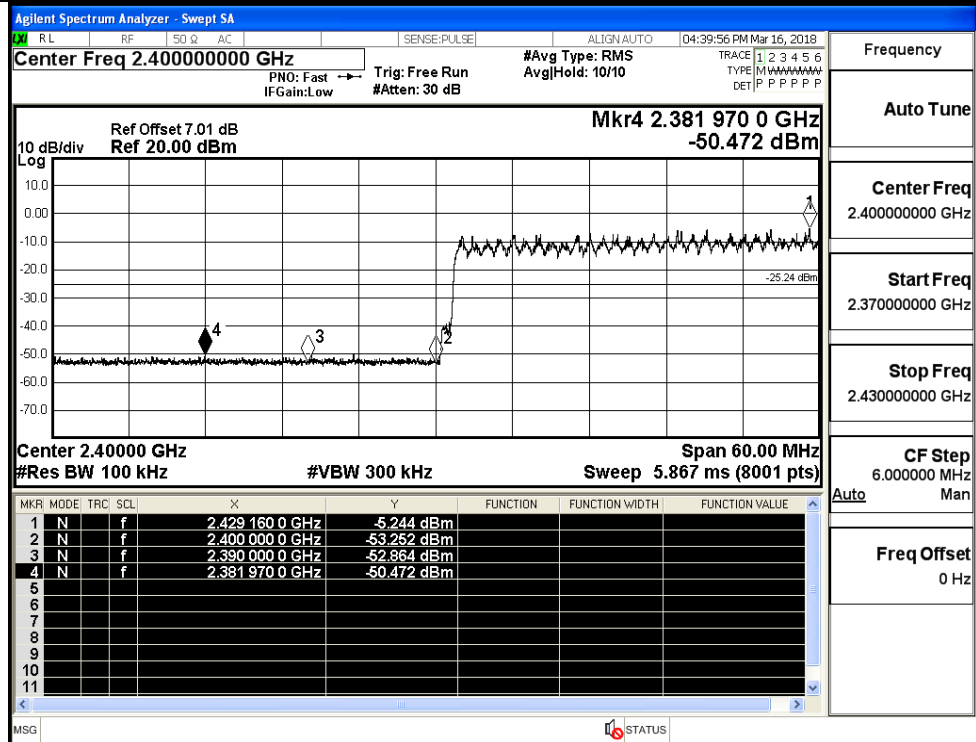
GFSK/HCH/Hop



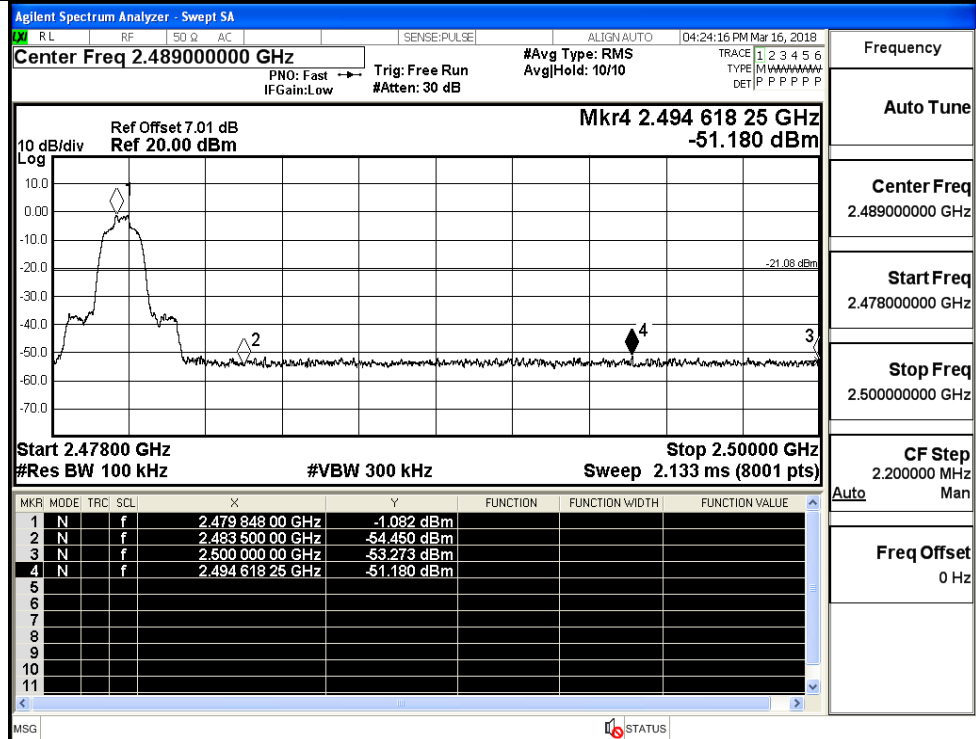
$\pi/4$ DQPSK/LCH/No
Hop



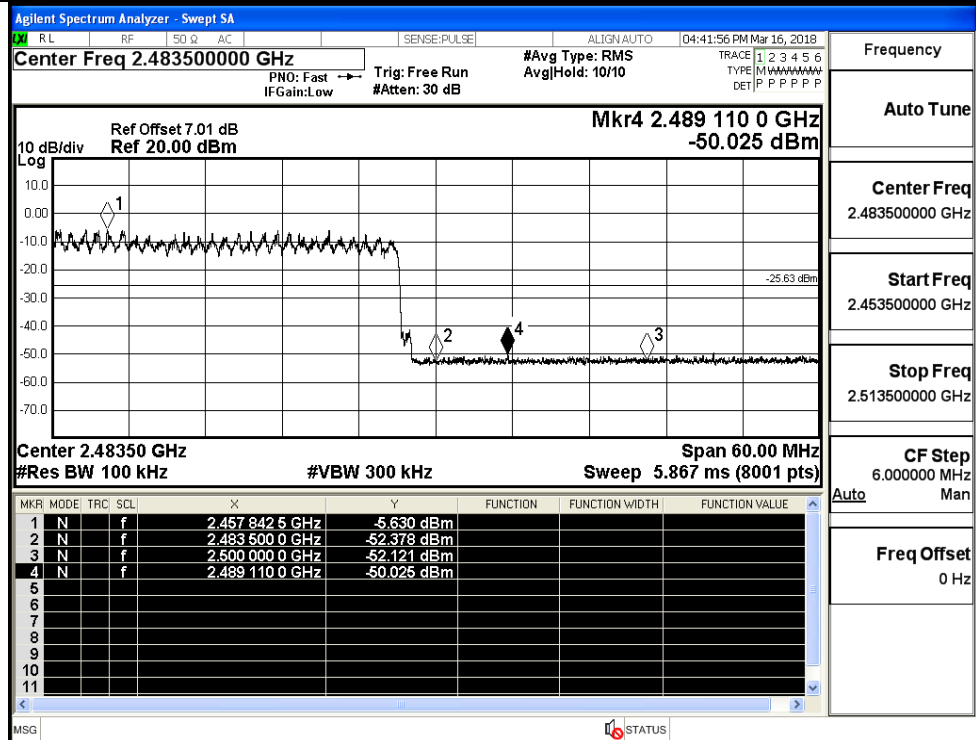
$\pi/4$ DQPSK/LCH/Hop



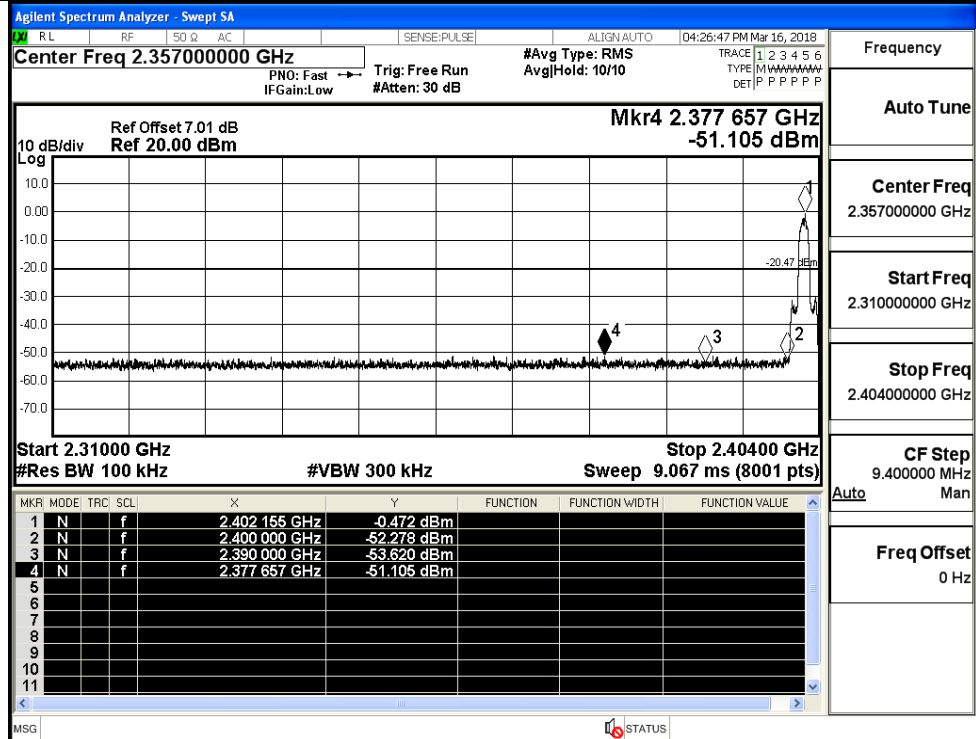
$\pi/4$ DQPSK/HCH/No
Hop



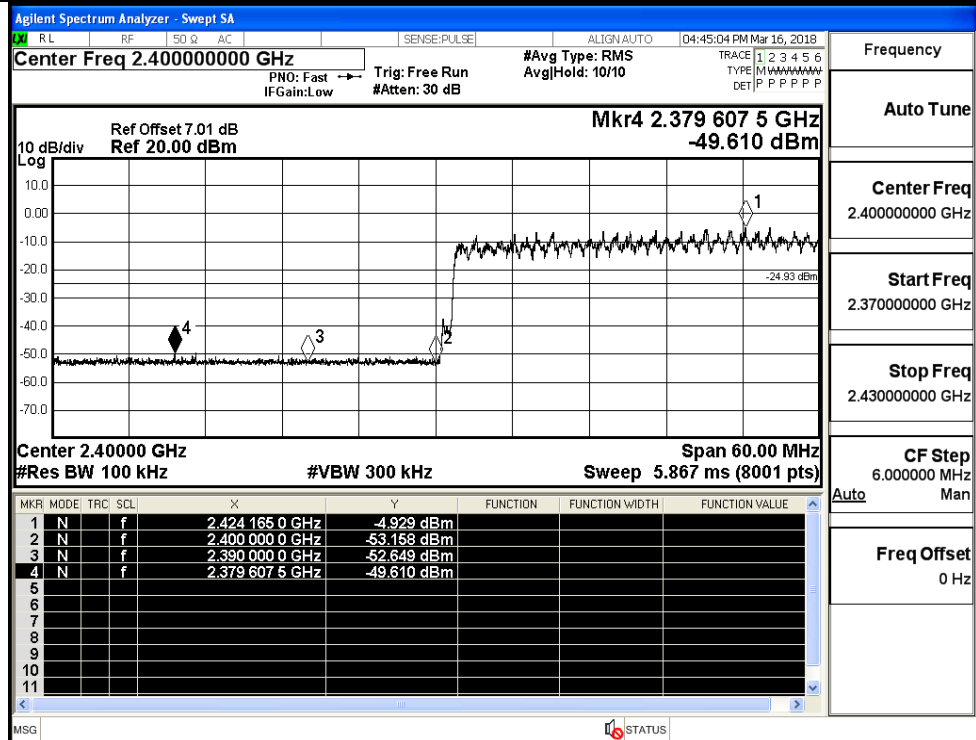
$\pi/4$ DQPSK/HCH/Hop



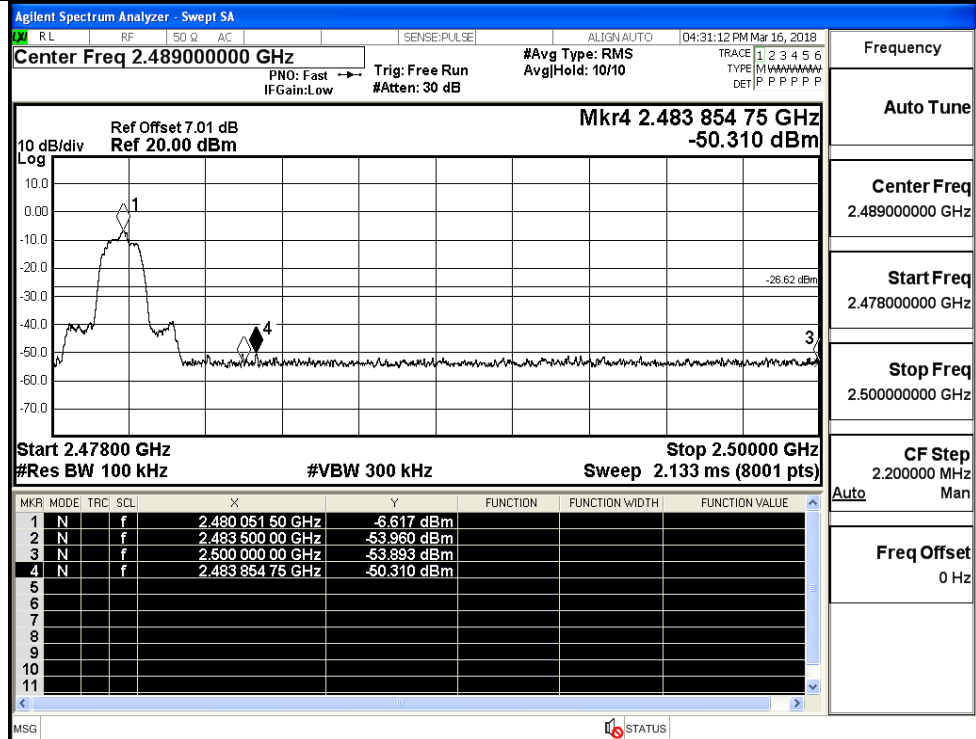
8DPSK/LCH/No Hop



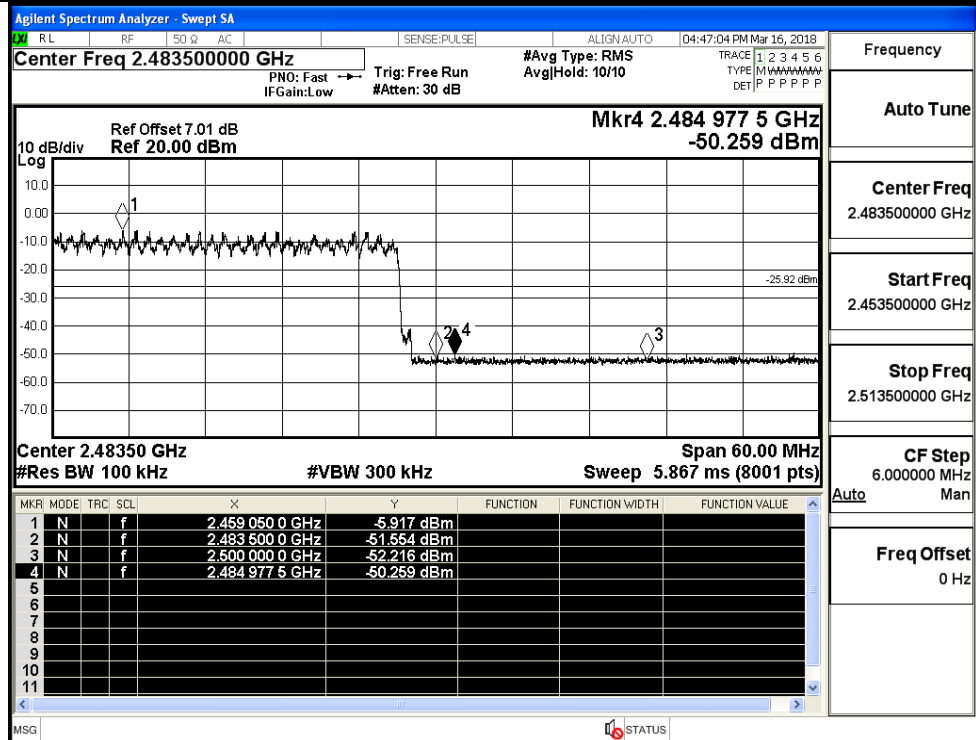
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



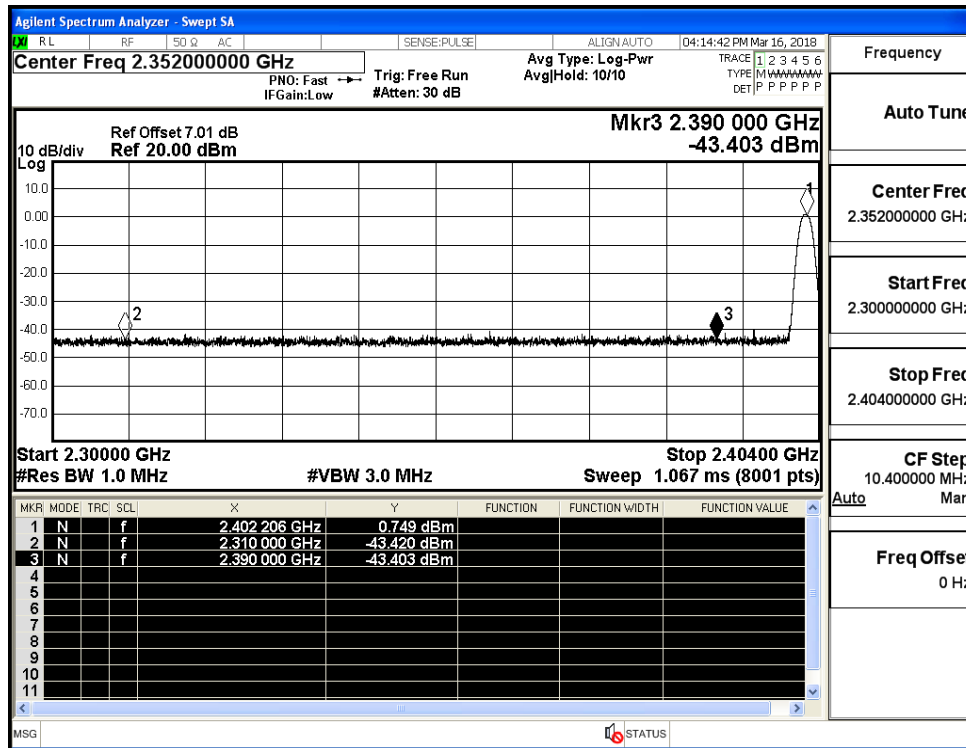
8DPSK/HCH/Hop



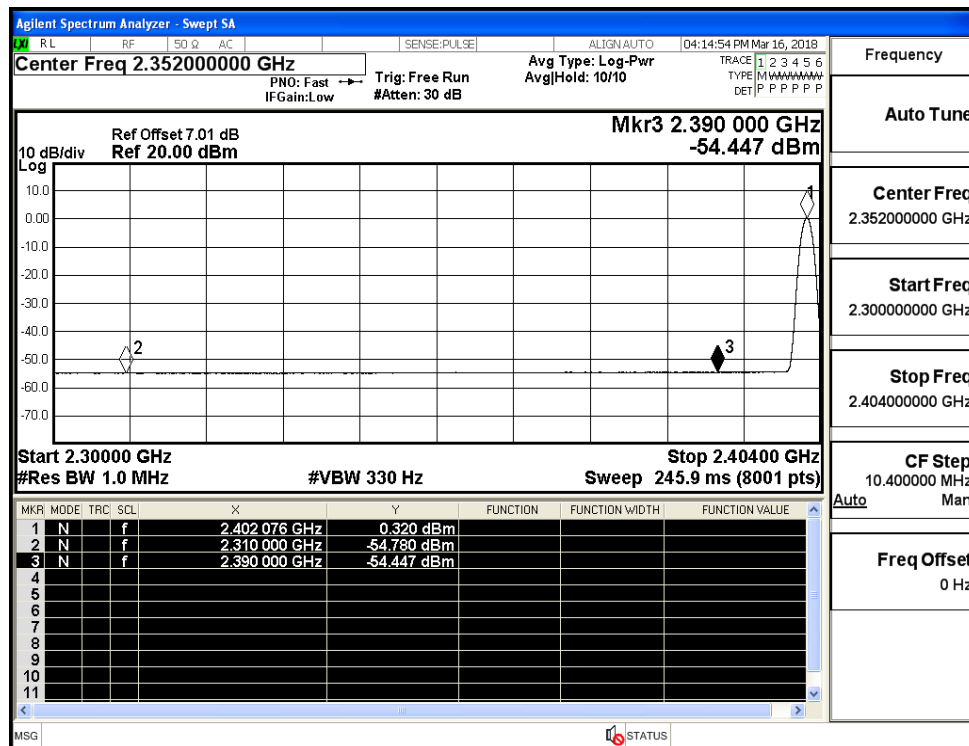
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.42	2.0	0	53.84	PEAK	74	PASS
	Off	2310.0	-54.78	2.0	0	42.48	AV	54	PASS
	Off	2390.0	-43.40	2.0	0	53.86	PEAK	74	PASS
	Off	2390.0	-54.45	2.0	0	42.81	AV	54	PASS
	Off	2483.5	-42.07	2.0	0	55.19	PEAK	74	PASS
	Off	2483.5	-54.16	2.0	0	43.10	AV	54	PASS
	Off	2500.0	-42.90	2.0	0	54.36	PEAK	74	PASS
	Off	2500.0	-54.11	2.0	0	43.15	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.60	2.0	0	53.66	PEAK	74	PASS
	Off	2310.0	-54.78	2.0	0	42.48	AV	54	PASS
	Off	2390.0	-45.30	2.0	0	51.96	PEAK	74	PASS
	Off	2390.0	-54.41	2.0	0	42.85	AV	54	PASS
	Off	2483.5	-45.03	2.0	0	52.23	PEAK	74	PASS
	Off	2483.5	-54.14	2.0	0	43.12	AV	54	PASS
	Off	2500.0	-43.30	2.0	0	53.96	PEAK	74	PASS
	Off	2500.0	-54.16	2.0	0	43.10	AV	54	PASS
8DPSK	Off	2310.0	-43.64	2.0	0	53.62	PEAK	74	PASS
	Off	2310.0	-54.77	2.0	0	42.49	AV	54	PASS
	Off	2390.0	-44.86	2.0	0	52.40	PEAK	74	PASS
	Off	2390.0	-54.41	2.0	0	42.85	AV	54	PASS
	Off	2483.5	-44.81	2.0	0	52.45	PEAK	74	PASS
	Off	2483.5	-54.18	2.0	0	43.08	AV	54	PASS
	Off	2500.0	-44.43	2.0	0	52.83	PEAK	74	PASS
	Off	2500.0	-54.14	2.0	0	43.12	AV	54	PASS

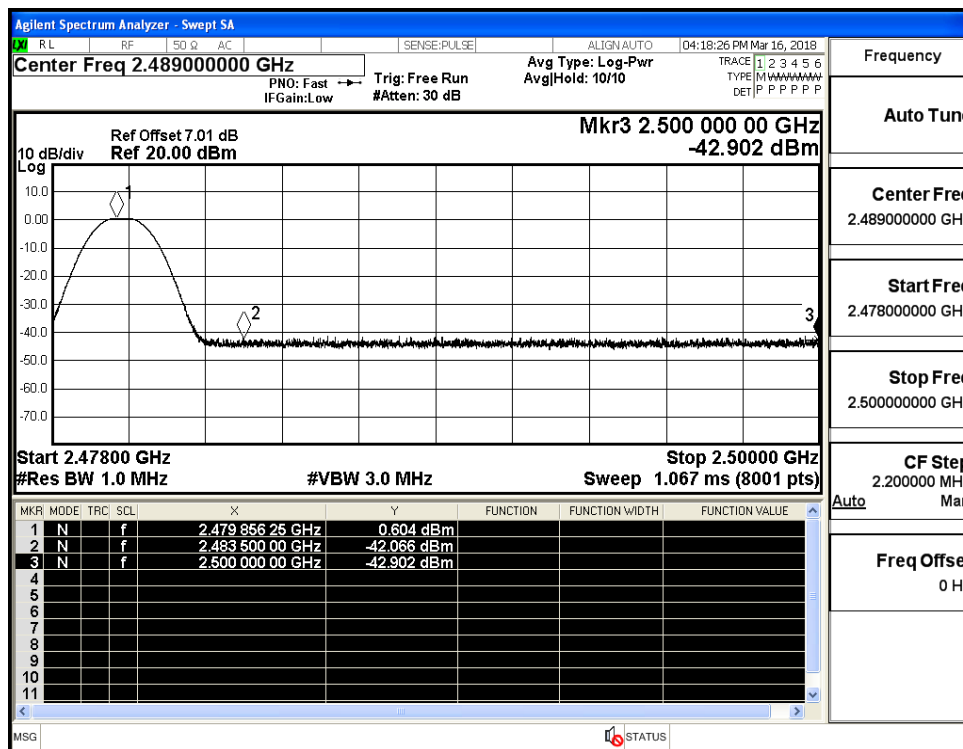
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



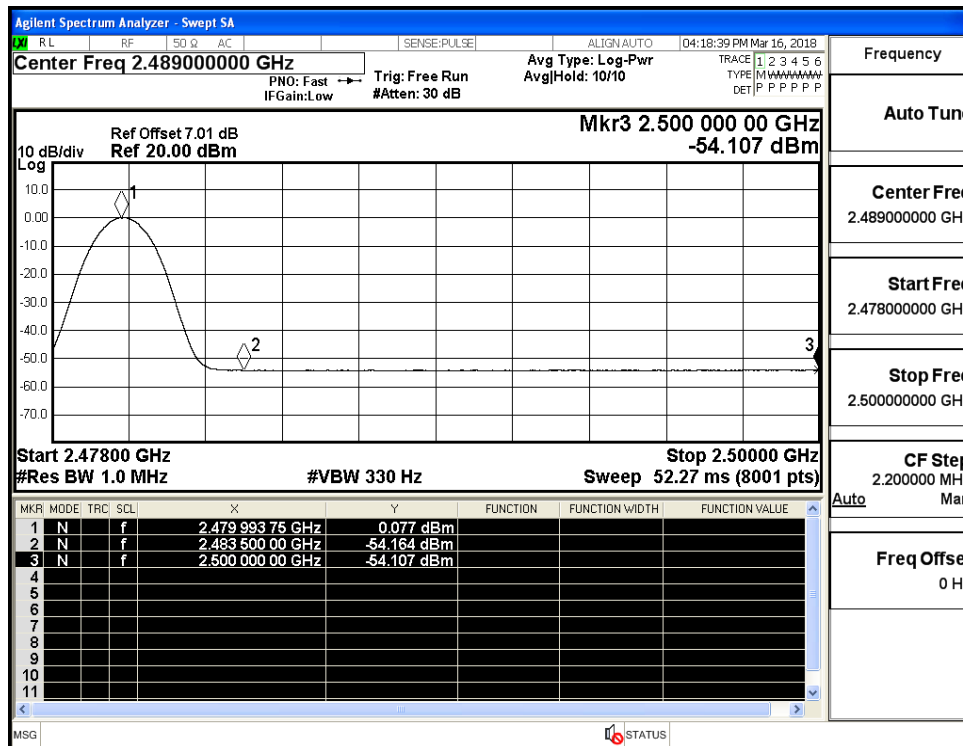
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



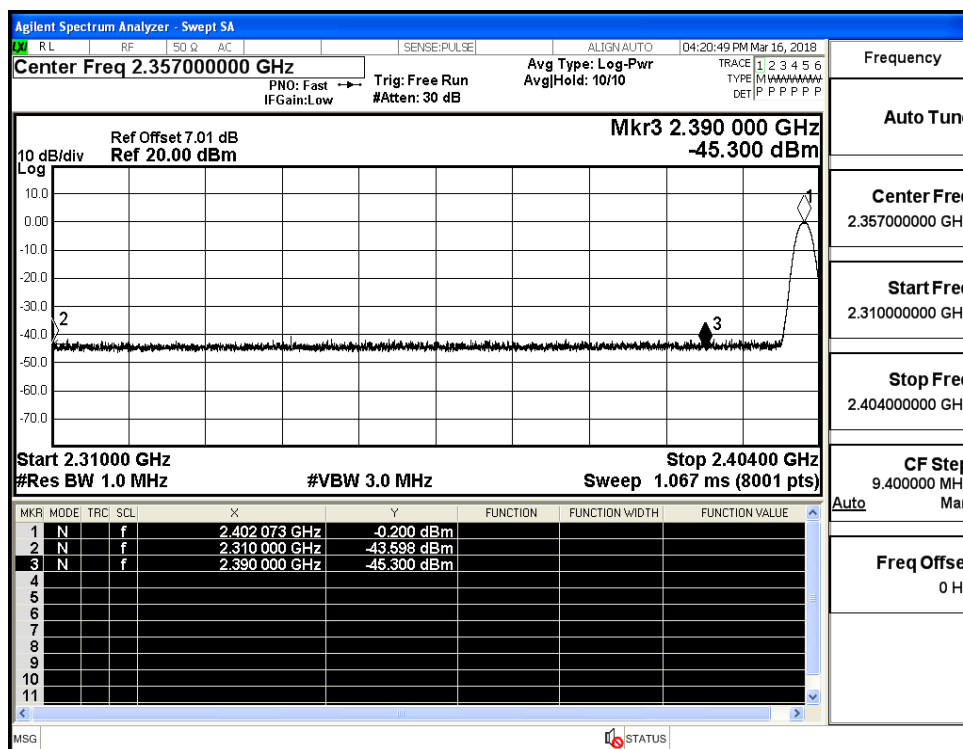
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



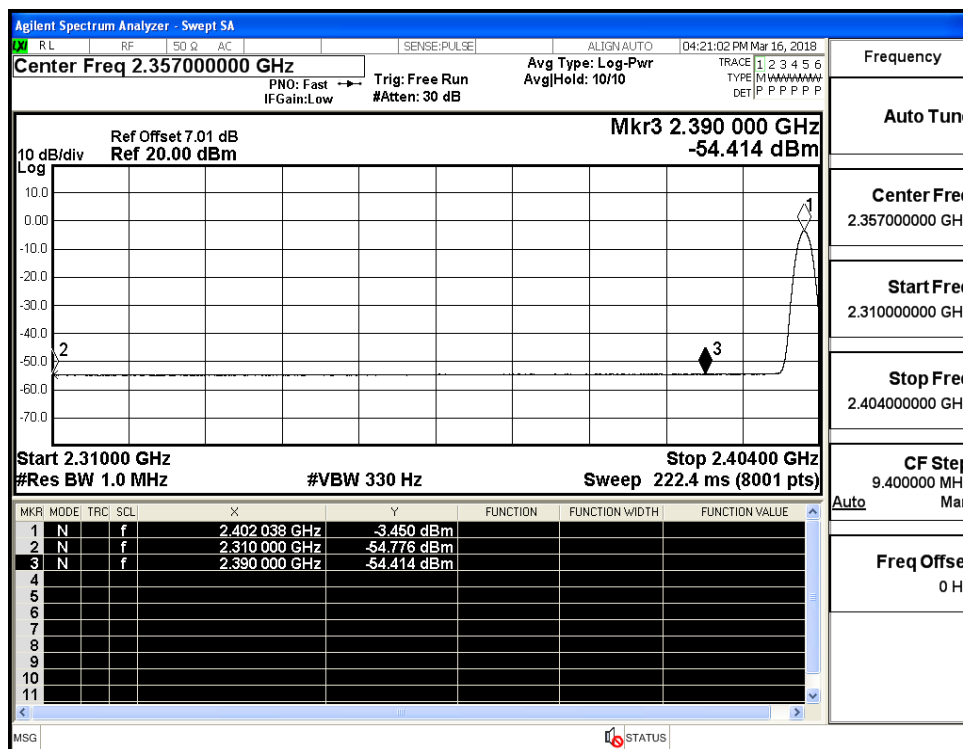
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



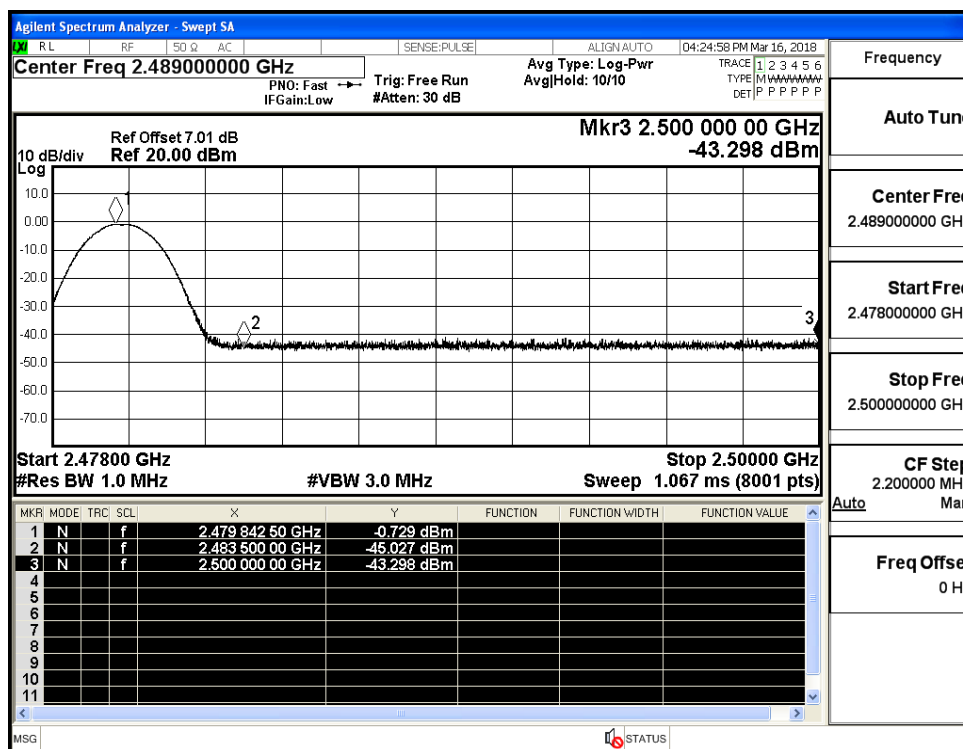
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



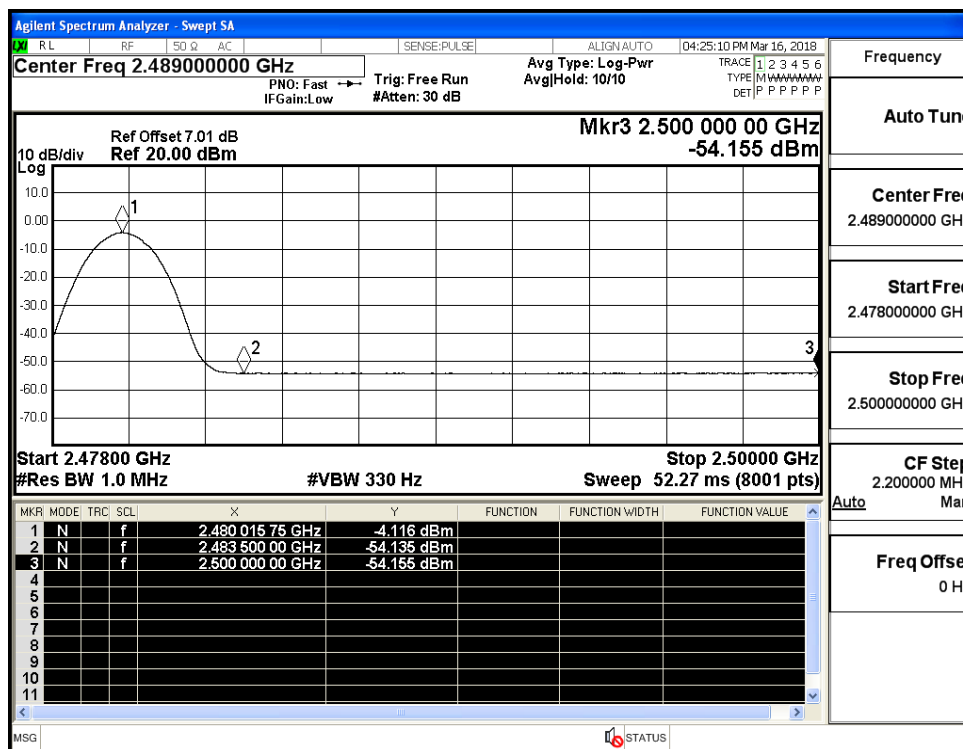
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



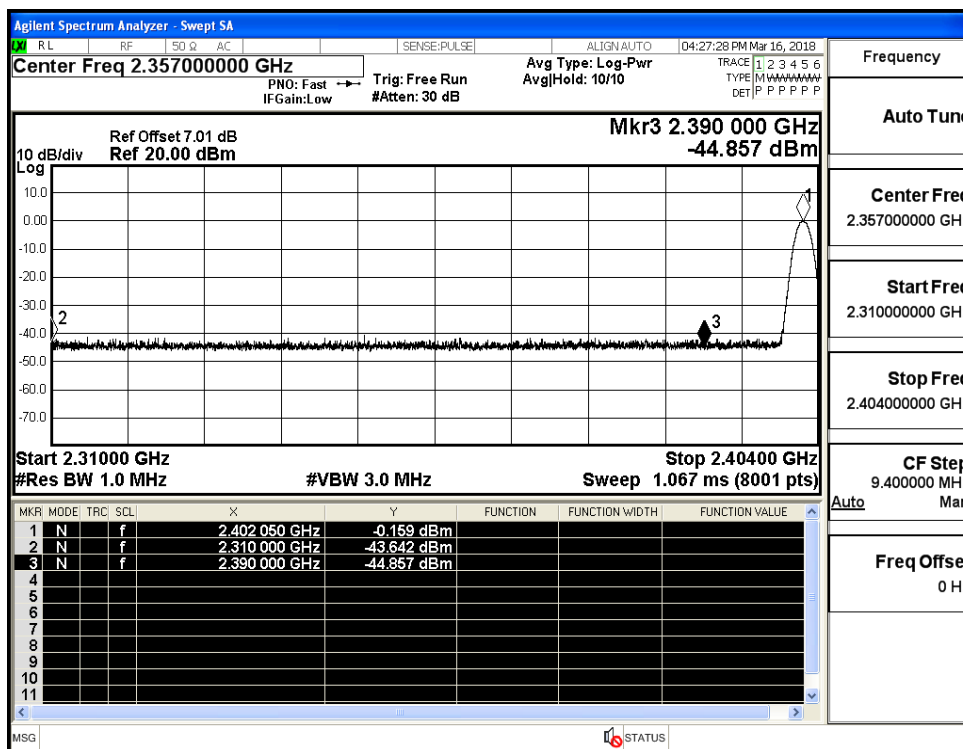
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



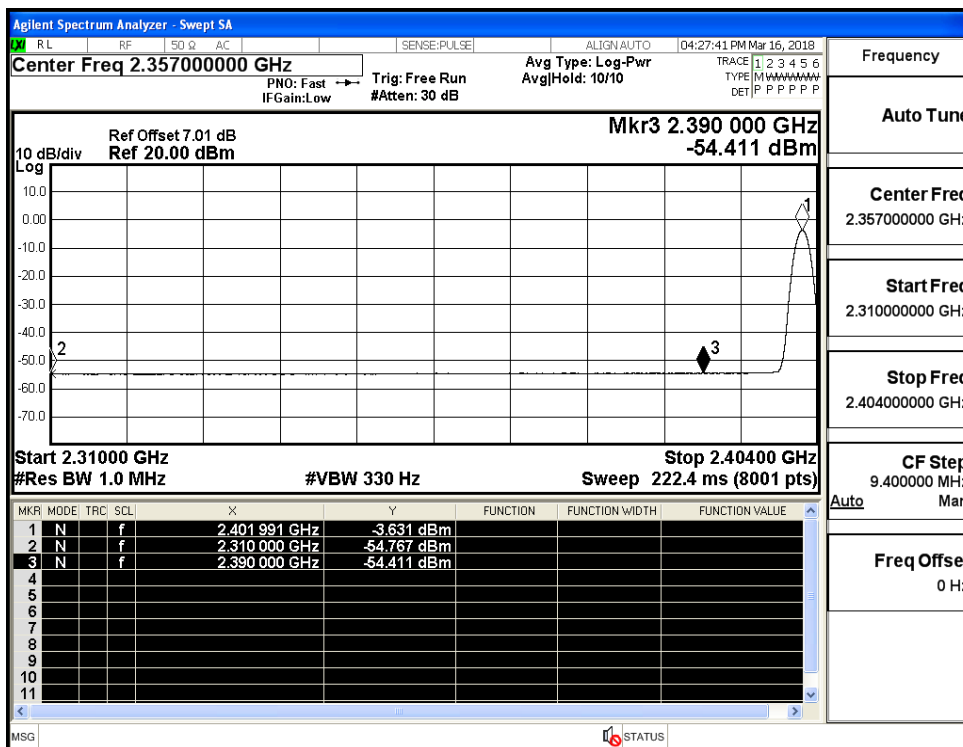
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



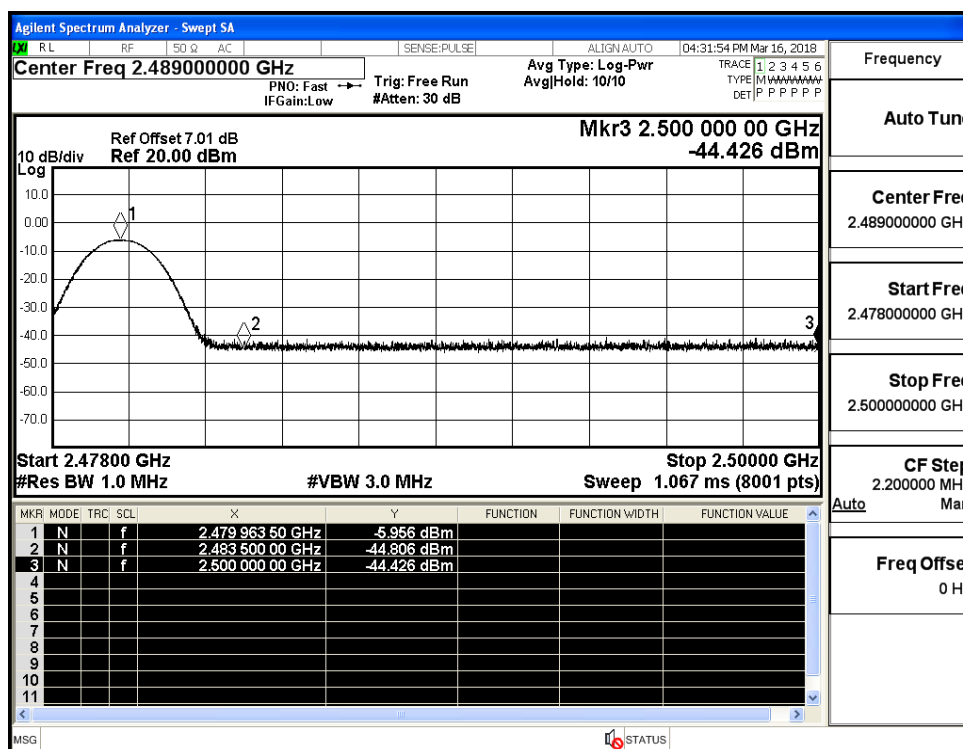
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

