

Appendix A

RF Test Data for BT V2.1 (BDR/EDR) (Conducted Measurement)

Product Name: Bluetooth Speaker

Trade Mark: iHip

Test Model: FDJAMBAR

Environmental Conditions

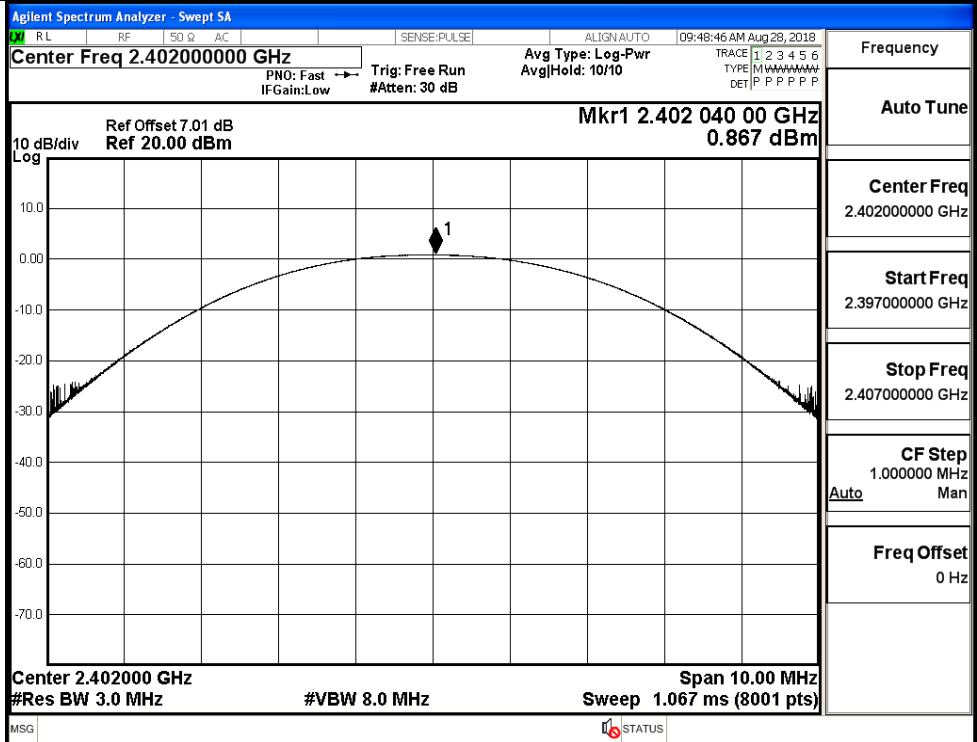
Temperature:	24.4 ° C
Relative Humidity:	52.8%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond Lu
Supervised by:	Jayden Zhuo

A.1 Maximum Conducted Peak Output Power

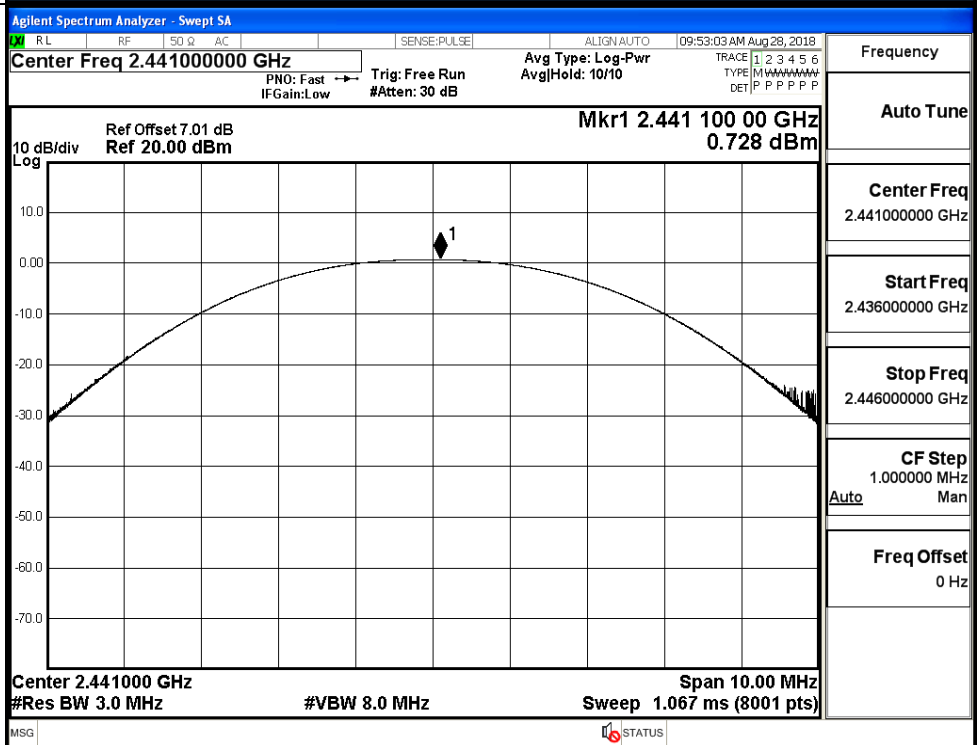
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.867	21	PASS
	MCH	0.728	21	PASS
	HCH	0.517	21	PASS
$\pi/4$ DQPSK	LCH	0.635	21	PASS
	MCH	0.541	21	PASS
	HCH	0.299	21	PASS

Test Graphs

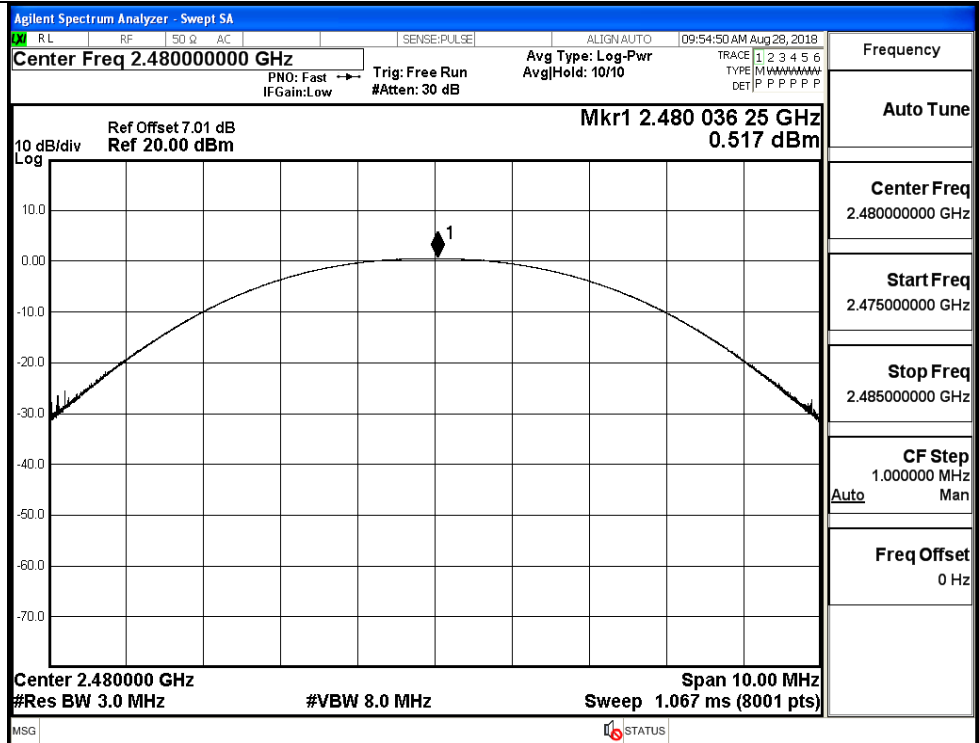
GFSK/LCH



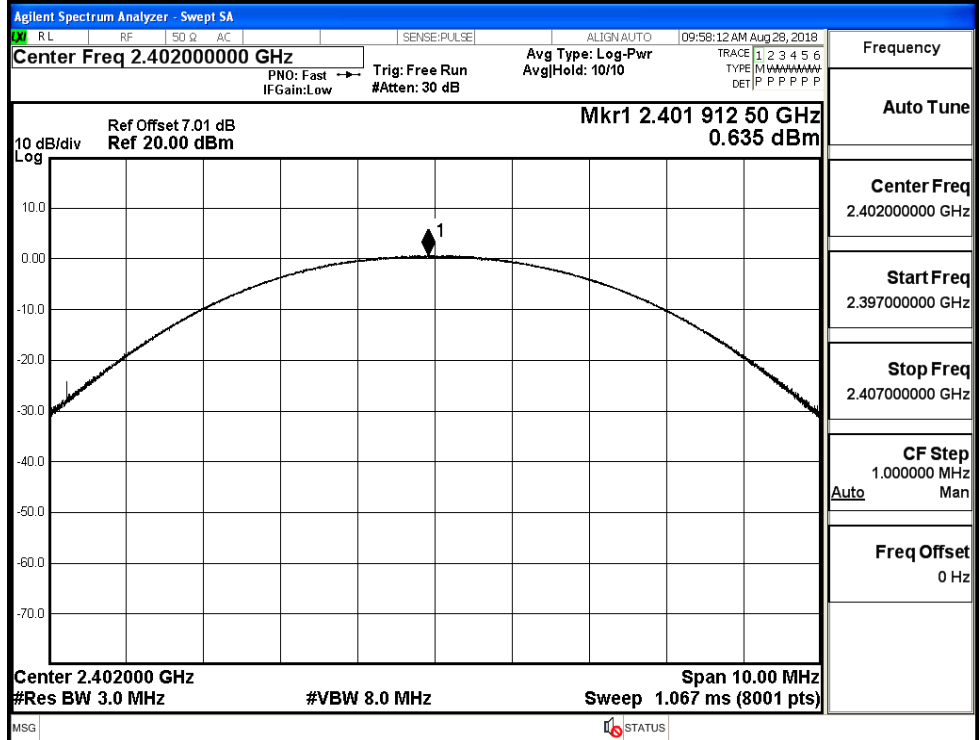
GFSK/MCH



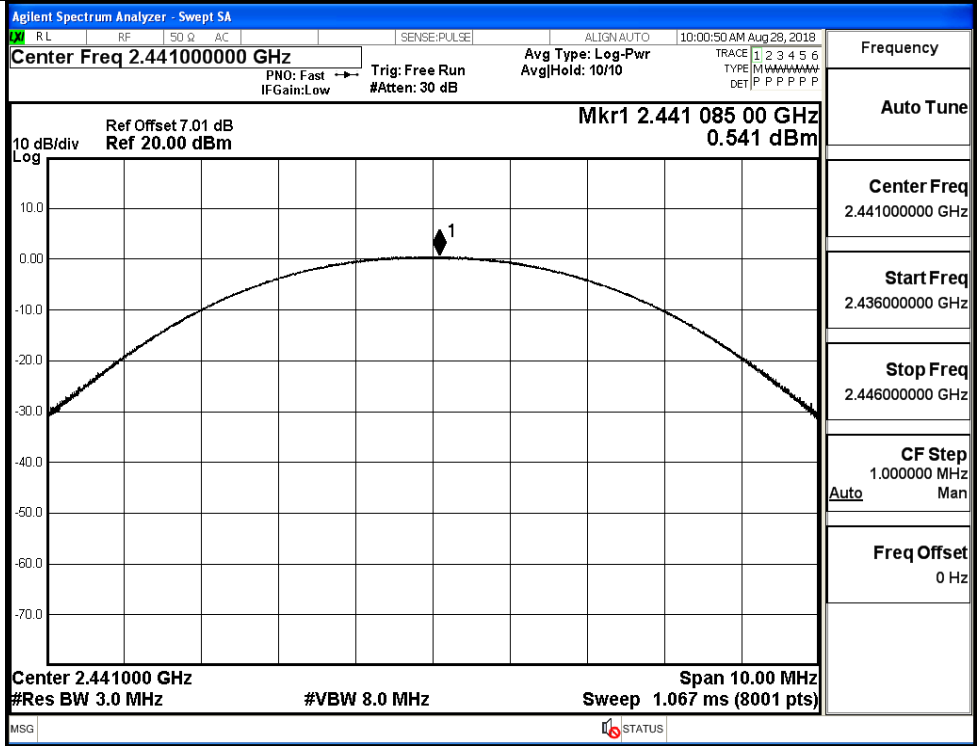
GFSK/HCH



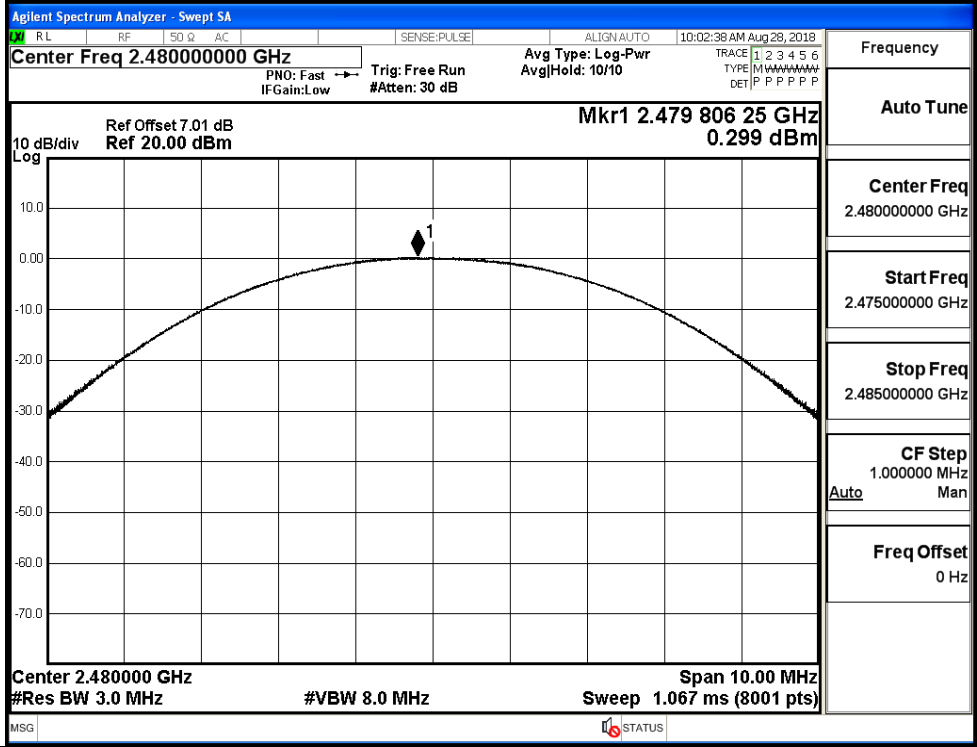
π /4DQPSK/LCH



π /4DQPSK/MCH

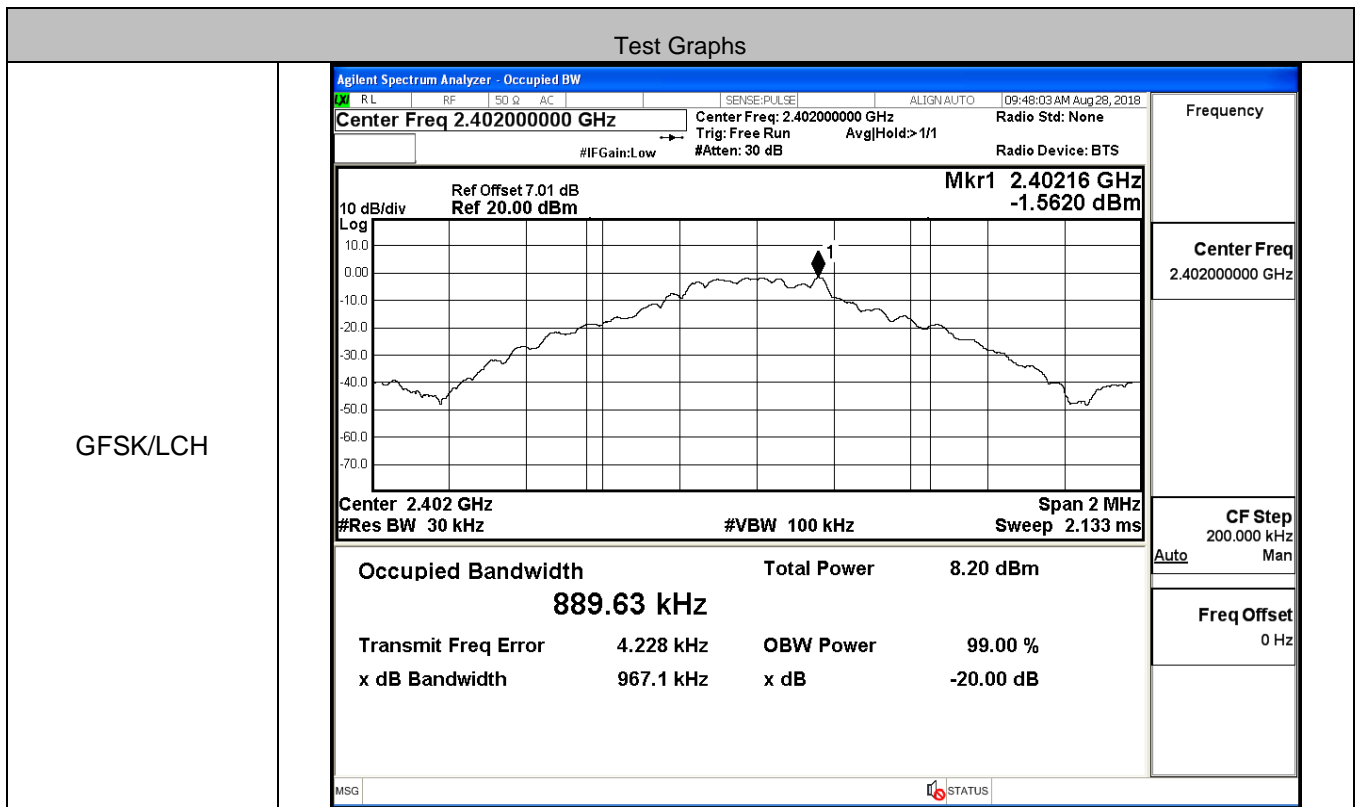


π /4DQPSK/HCH

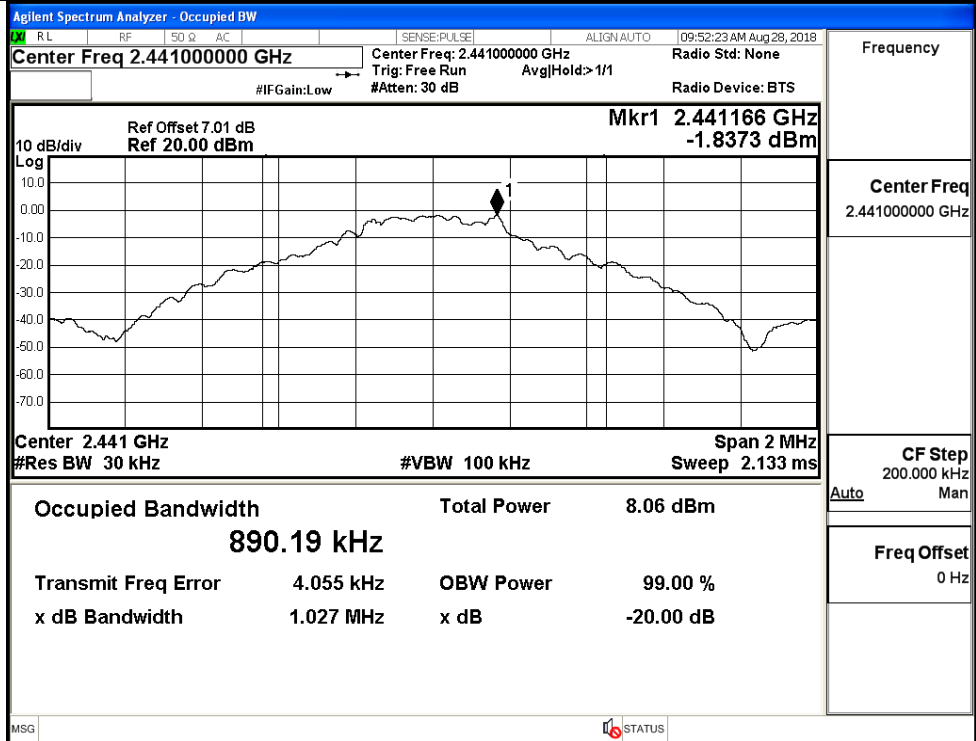


A.2 99% and 20dB Bandwidth

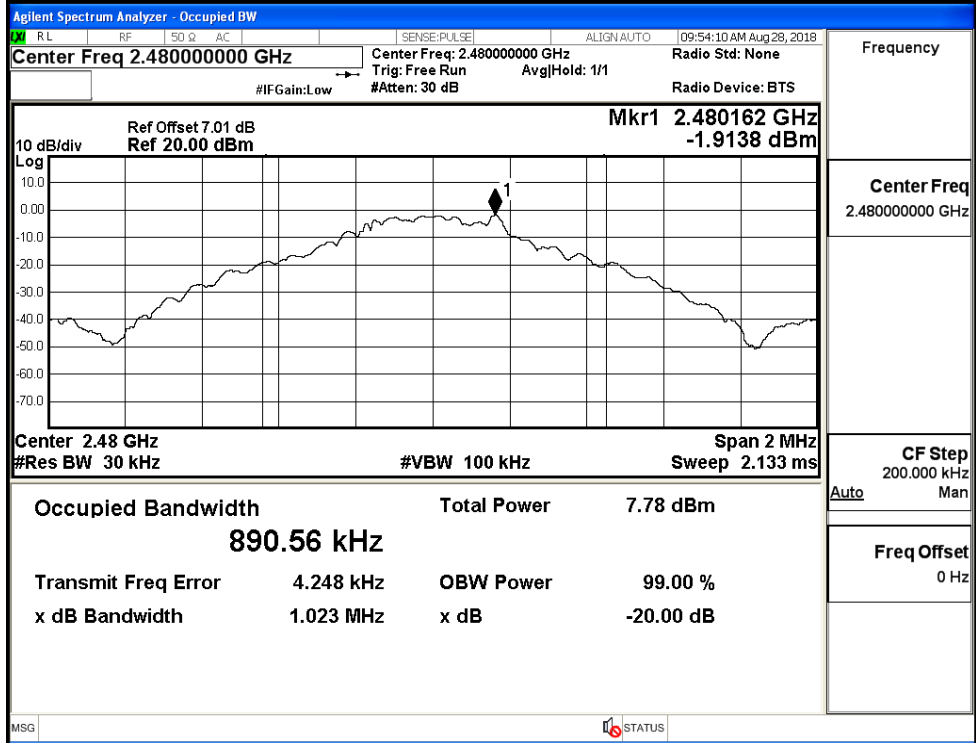
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.88963	0.9671	Not Specified	PASS
	MCH	0.89019	1.027	Not Specified	PASS
	HCH	0.89058	1.023	Not Specified	PASS
π/4DQPSK	LCH	1.1671	1.290	Not Specified	PASS
	MCH	1.1673	1.287	Not Specified	PASS
	HCH	1.1673	1.289	Not Specified	PASS



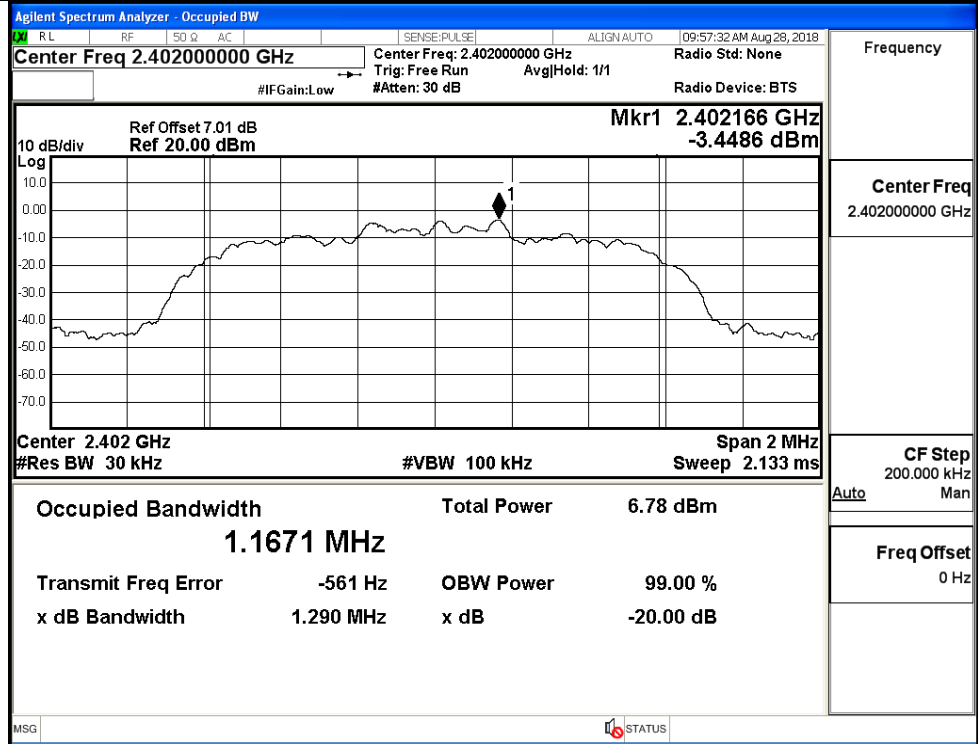
GFSK/MCH



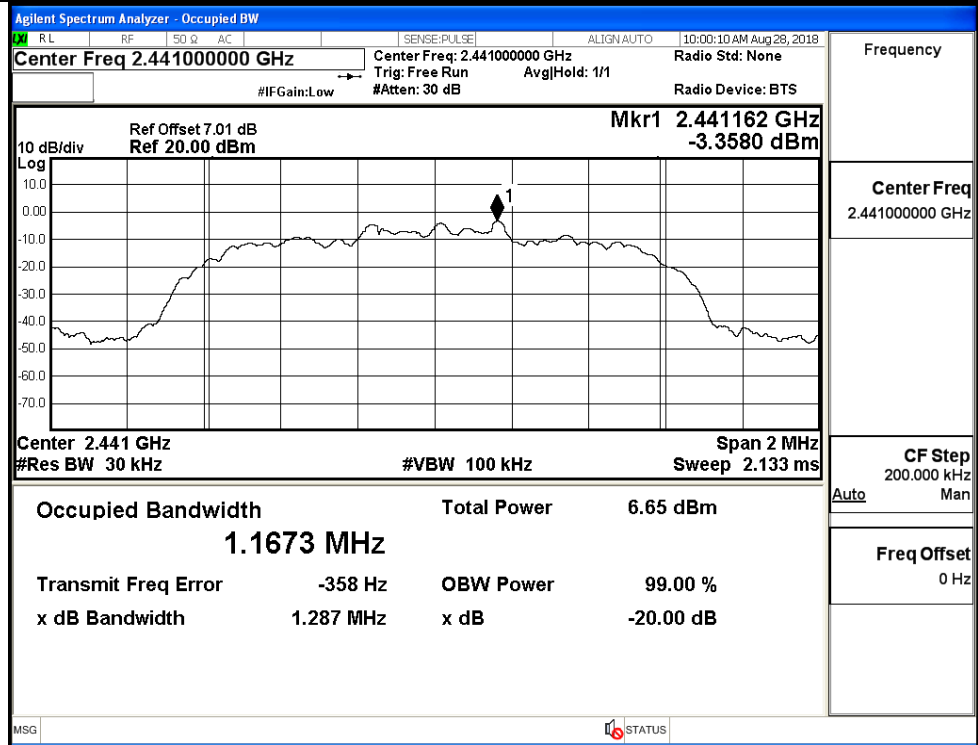
GFSK/HCH



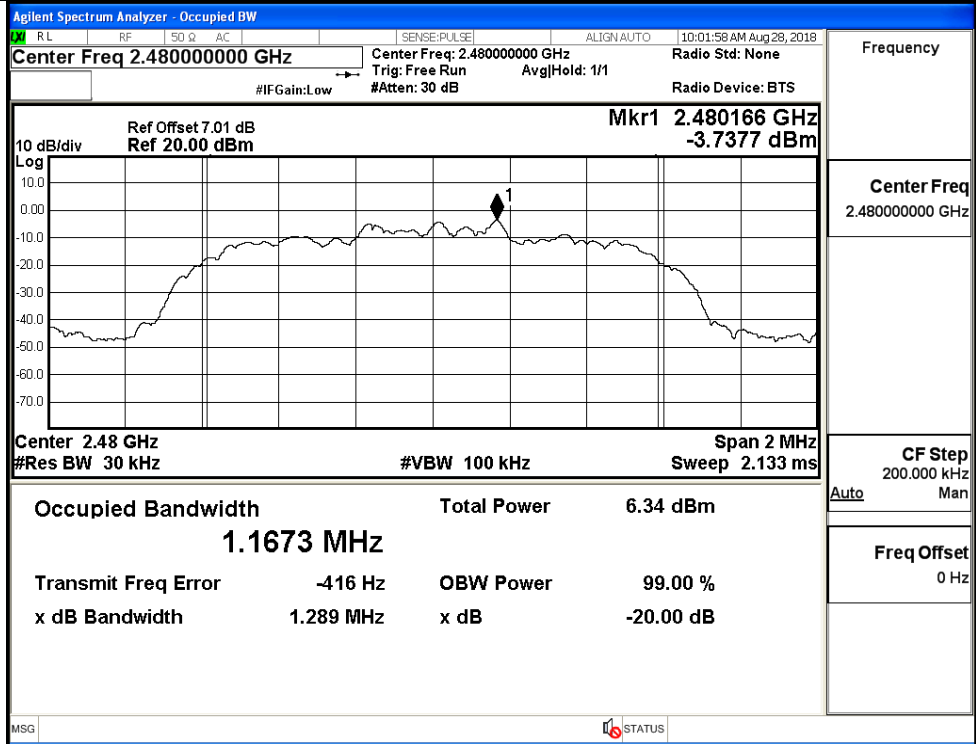
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH

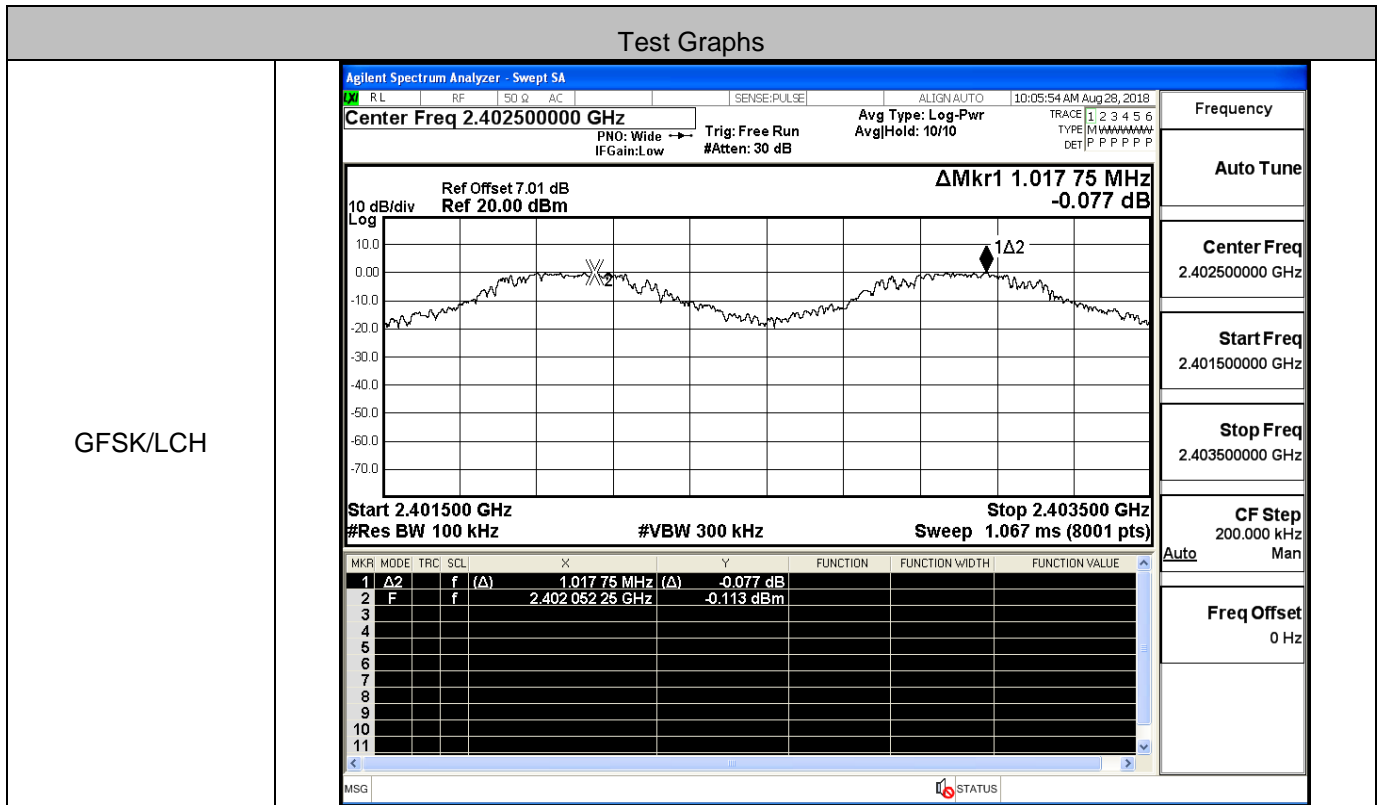


$\pi/4$ DQPSK/HCH

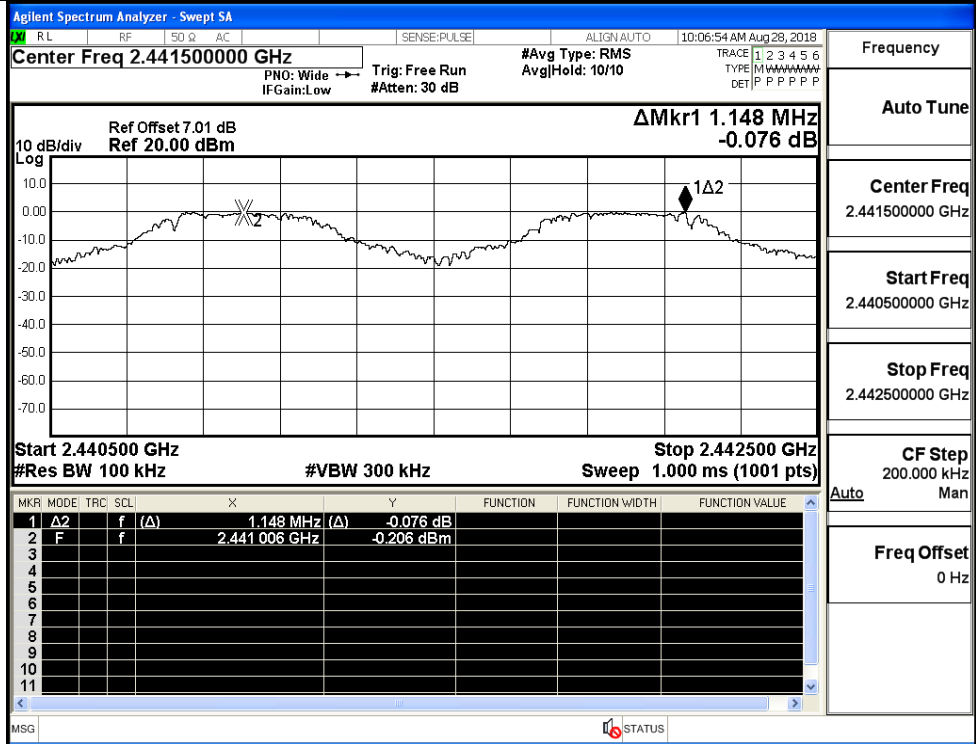


A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.018	0.685	PASS
	MCH	1.148	0.685	PASS
	HCH	0.974	0.685	PASS
π/4DQPSK	LCH	1.168	0.860	PASS
	MCH	1.112	0.860	PASS
	HCH	1.182	0.860	PASS



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

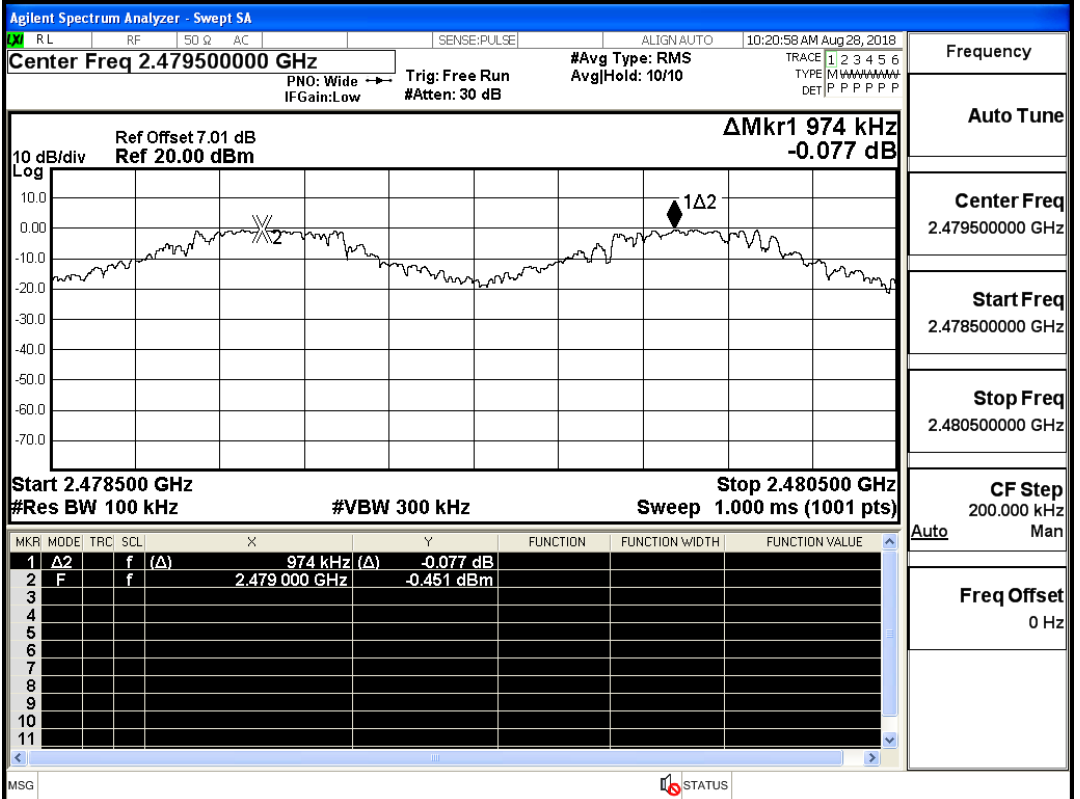
Start Freq
2.440500000 GHz

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

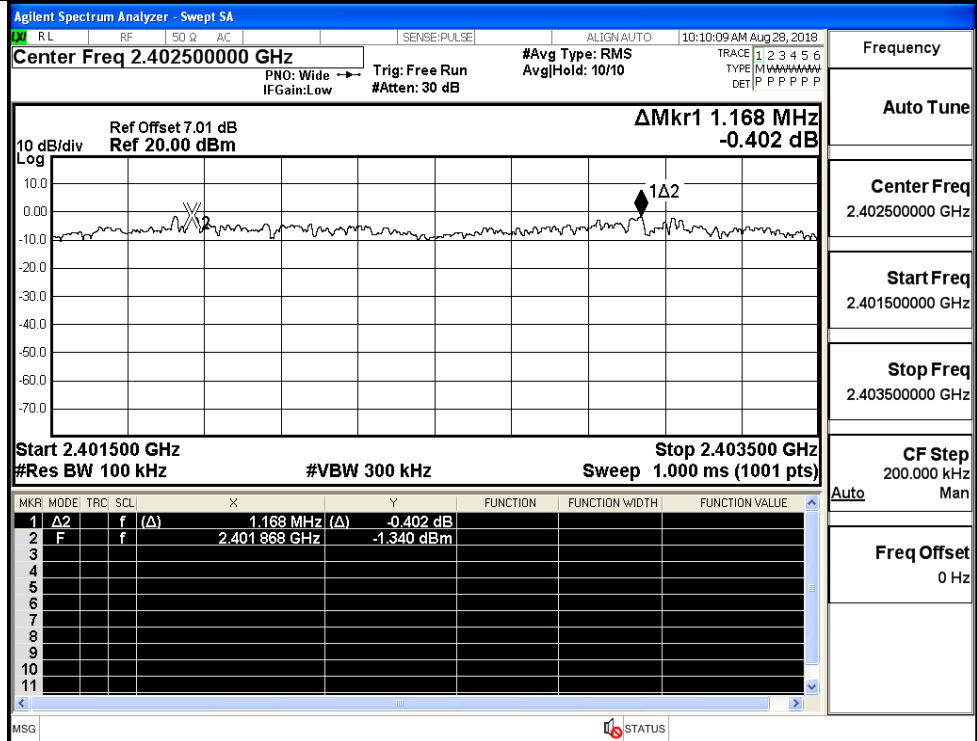
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

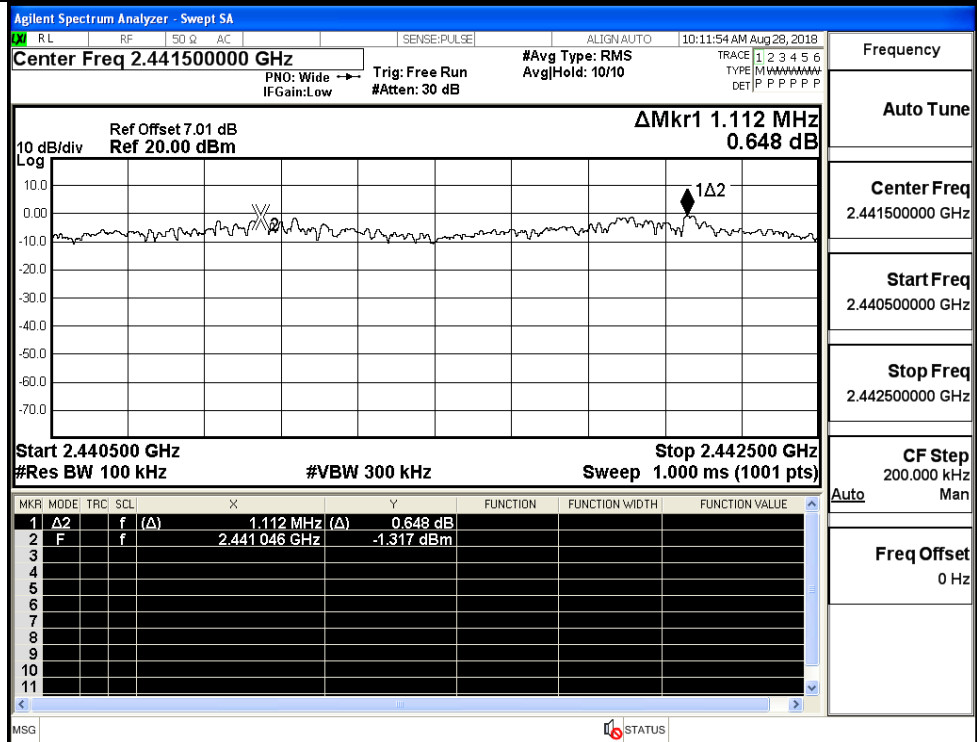
CF Step
200.000 kHz
Man

Freq Offset
0 Hz

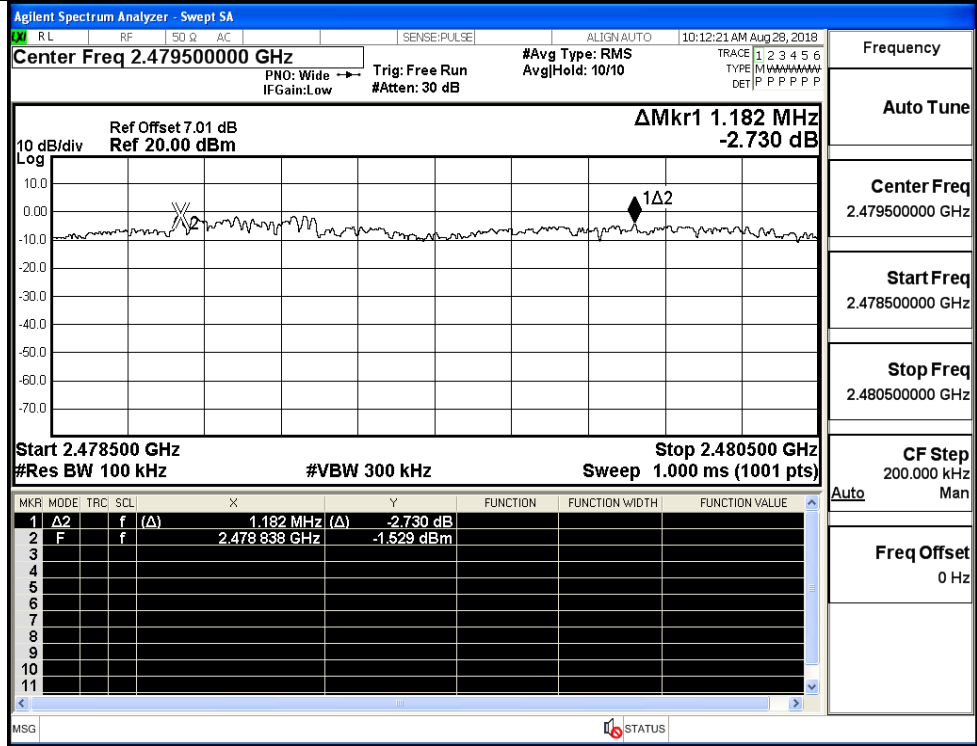
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH



A.4 Hopping Channel Number

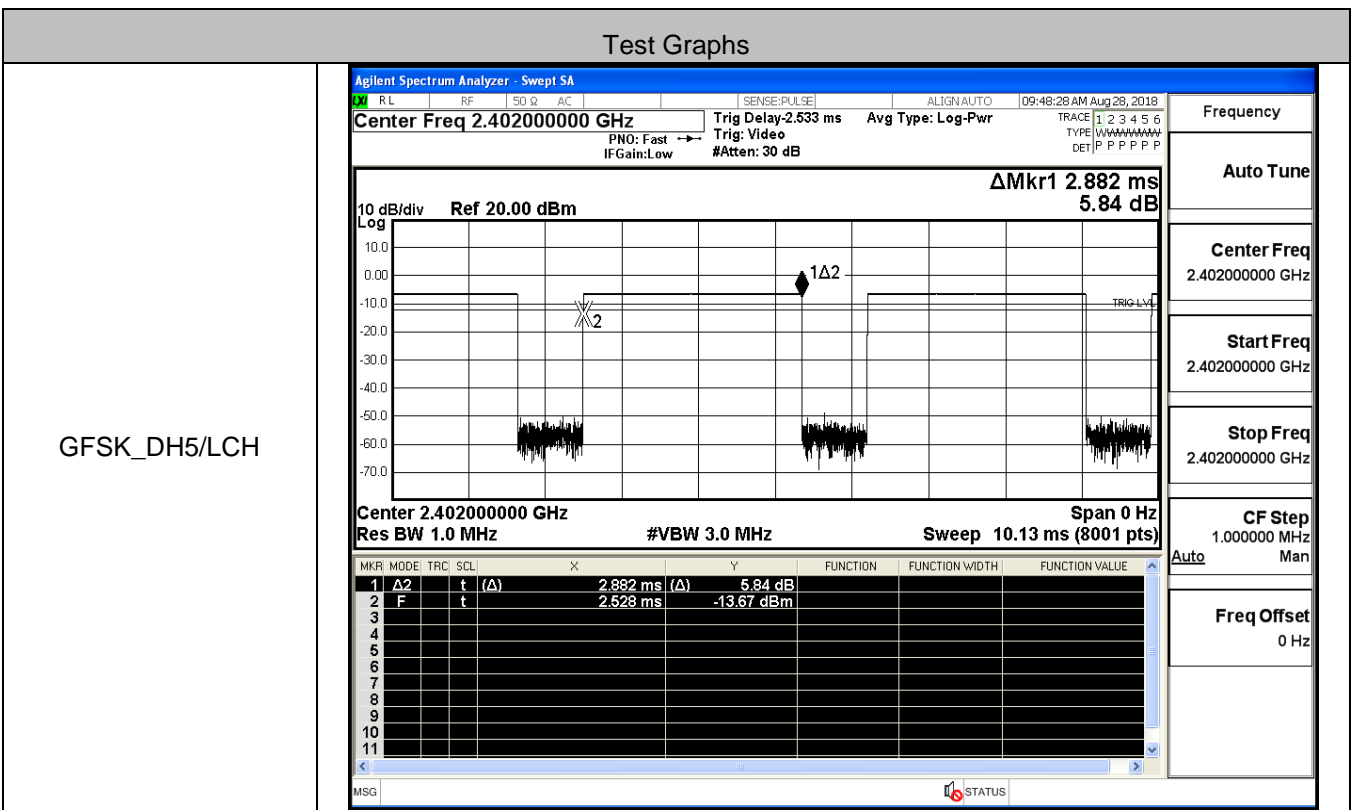
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS

Test Graphs

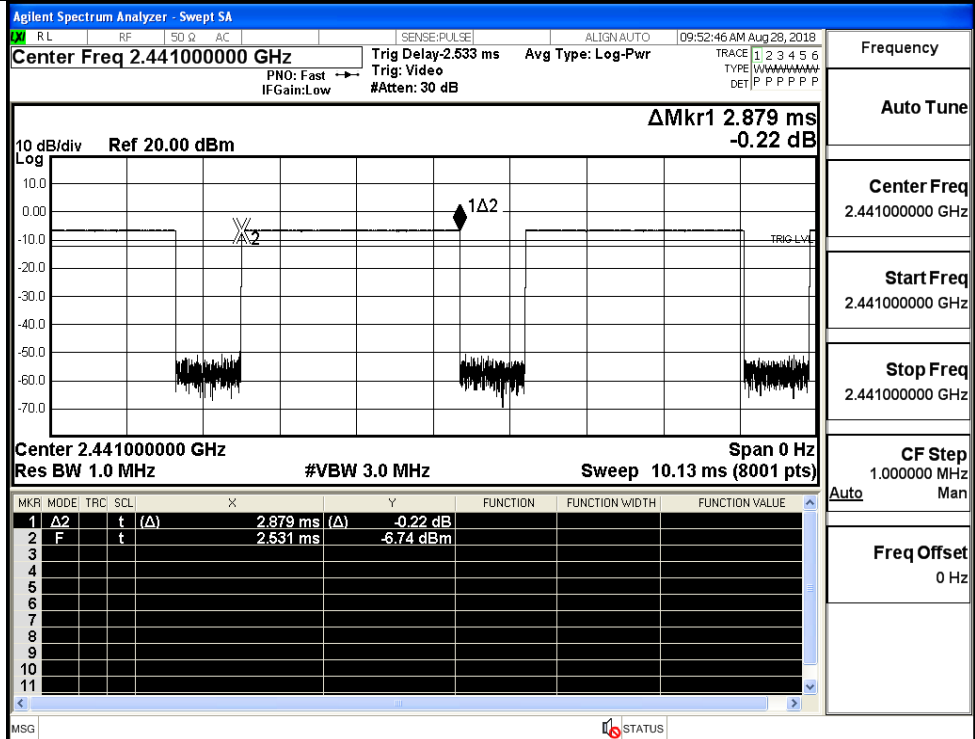
<p>GFSK/Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.441750000 GHz</p> <p>Ref Offset 7.01 dB</p> <p>Ref 20.00 dBm</p> <p>ΔMkr1 78.104 MHz</p> <p>-0.280 dB</p> <p>Start 2.40000 GHz</p> <p>Stop 2.48350 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>f</td> <td>(Δ)</td> <td>78.104 MHz (Δ)</td> <td>-0.280 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.401858 GHz</td> <td>0.172 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Frequency: 2.441750000 GHz</p> <p>Auto Tune</p> <p>Center Freq: 2.441750000 GHz</p> <p>Start Freq: 2.400000000 GHz</p> <p>Stop Freq: 2.483500000 GHz</p> <p>CF Step: 8.350000 MHz</p> <p>Auto</p> <p>Freq Offset: 0 Hz</p>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	78.104 MHz (Δ)	-0.280 dB				2	F	f		2.401858 GHz	0.172 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	Δ 2	f	(Δ)	78.104 MHz (Δ)	-0.280 dB																							
2	F	f		2.401858 GHz	0.172 dBm																							
<p>$\pi/4$DQPSK/Hop</p>	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.441750000 GHz</p> <p>Ref Offset 7.01 dB</p> <p>Ref 20.00 dBm</p> <p>ΔMkr1 77.989 MHz</p> <p>-4.051 dB</p> <p>Start 2.40000 GHz</p> <p>Stop 2.48350 GHz</p> <p>#Res BW 100 kHz</p> <p>#VBW 300 kHz</p> <p>Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>f</td> <td>(Δ)</td> <td>77.989 MHz (Δ)</td> <td>-4.051 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.401847 GHz</td> <td>-0.373 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Frequency: 2.441750000 GHz</p> <p>Auto Tune</p> <p>Center Freq: 2.441750000 GHz</p> <p>Start Freq: 2.400000000 GHz</p> <p>Stop Freq: 2.483500000 GHz</p> <p>CF Step: 8.350000 MHz</p> <p>Auto</p> <p>Freq Offset: 0 Hz</p>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.989 MHz (Δ)	-4.051 dB				2	F	f		2.401847 GHz	-0.373 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	Δ 2	f	(Δ)	77.989 MHz (Δ)	-4.051 dB																							
2	F	f		2.401847 GHz	-0.373 dBm																							

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
π/4DQPSK	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



GFSK_DH5/MCH



Frequency

Auto Tune

Center Freq 2.441000000 GHz

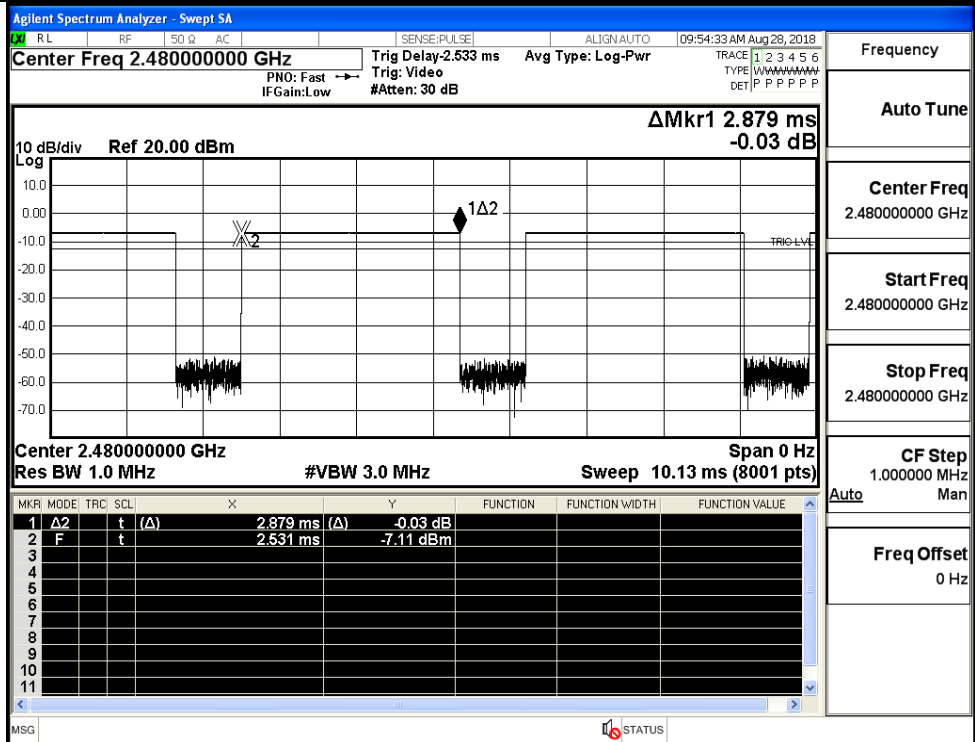
Start Freq 2.441000000 GHz

Stop Freq 2.441000000 GHz

CF Step 1.000000 MHz

Freq Offset 0 Hz

GFSK_DH5/HCH



Frequency

Auto Tune

Center Freq 2.480000000 GHz

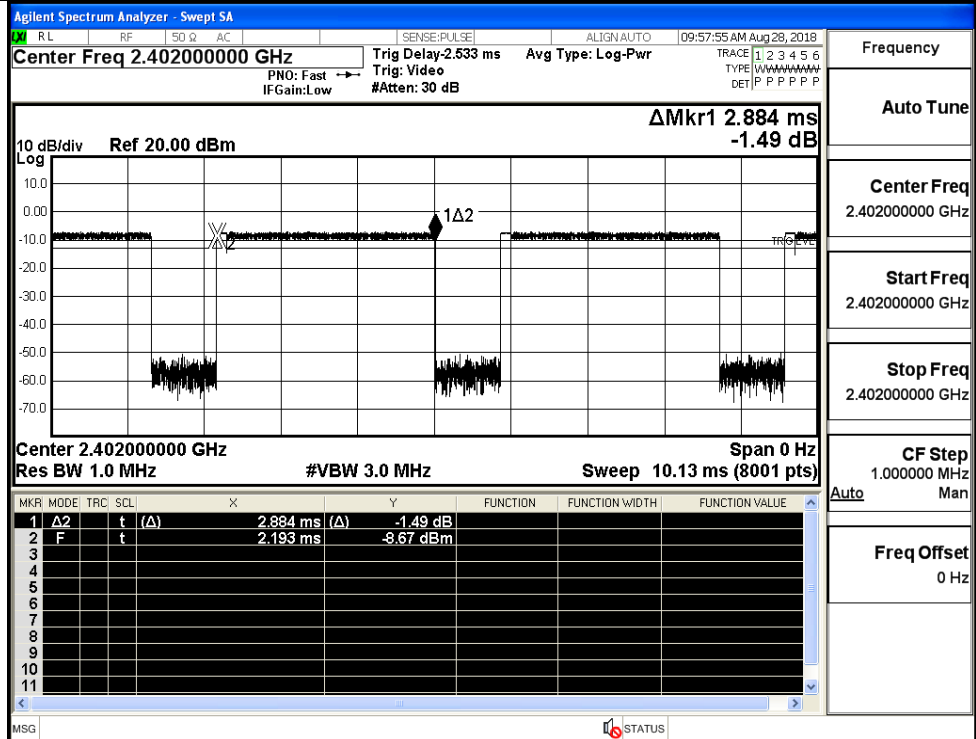
Start Freq 2.480000000 GHz

Stop Freq 2.480000000 GHz

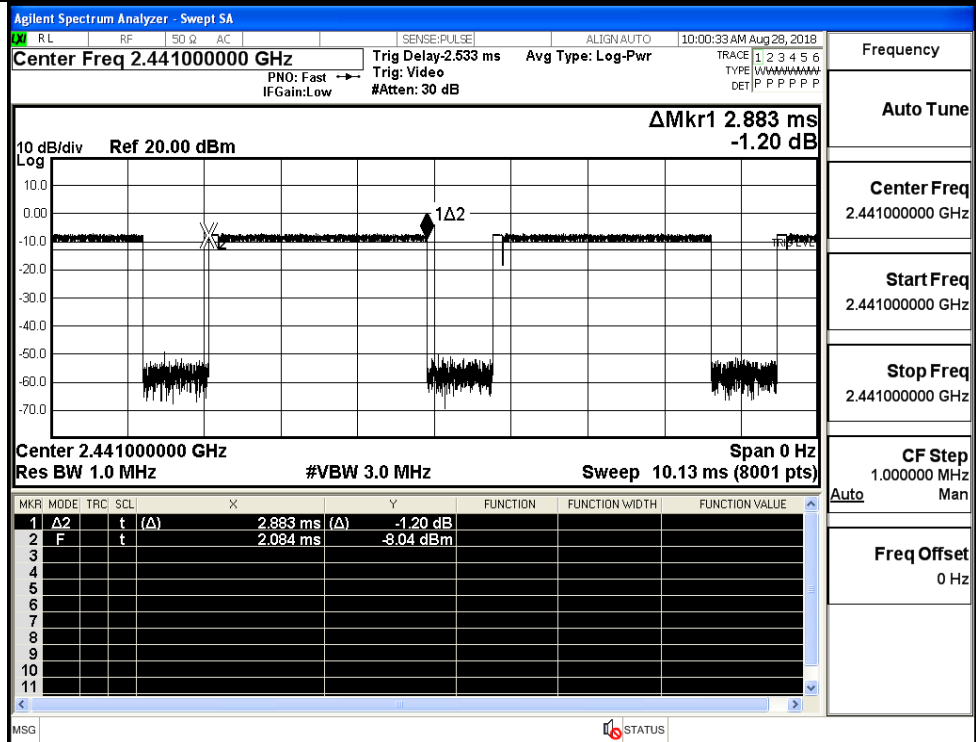
CF Step 1.000000 MHz

Freq Offset 0 Hz

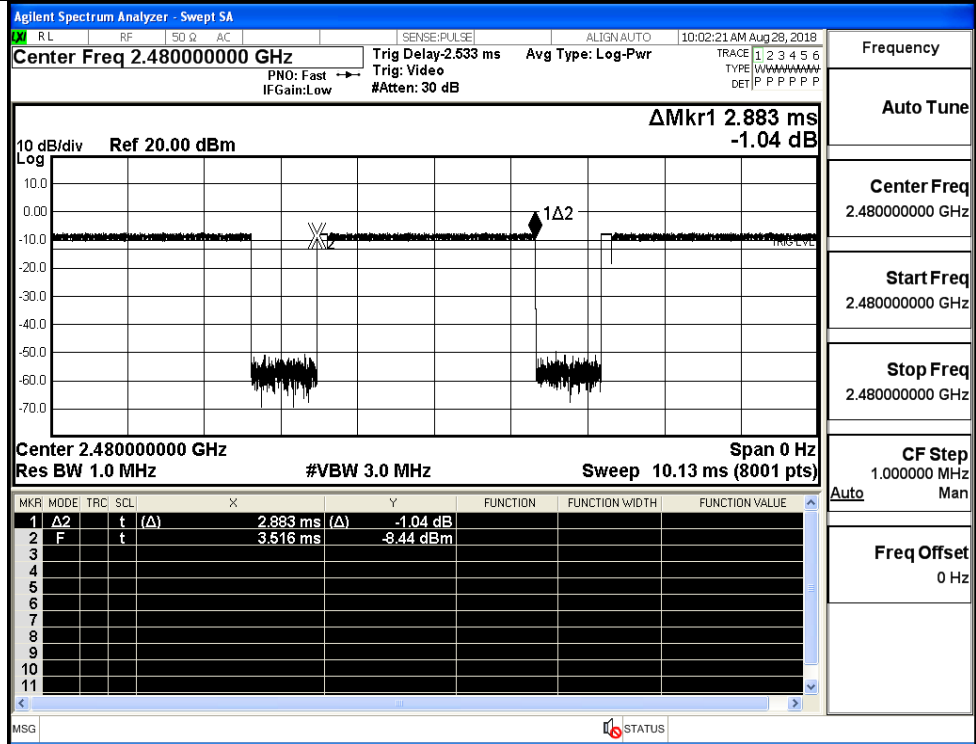
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



$\pi/4$ DQPSK
_2DH5/HCH

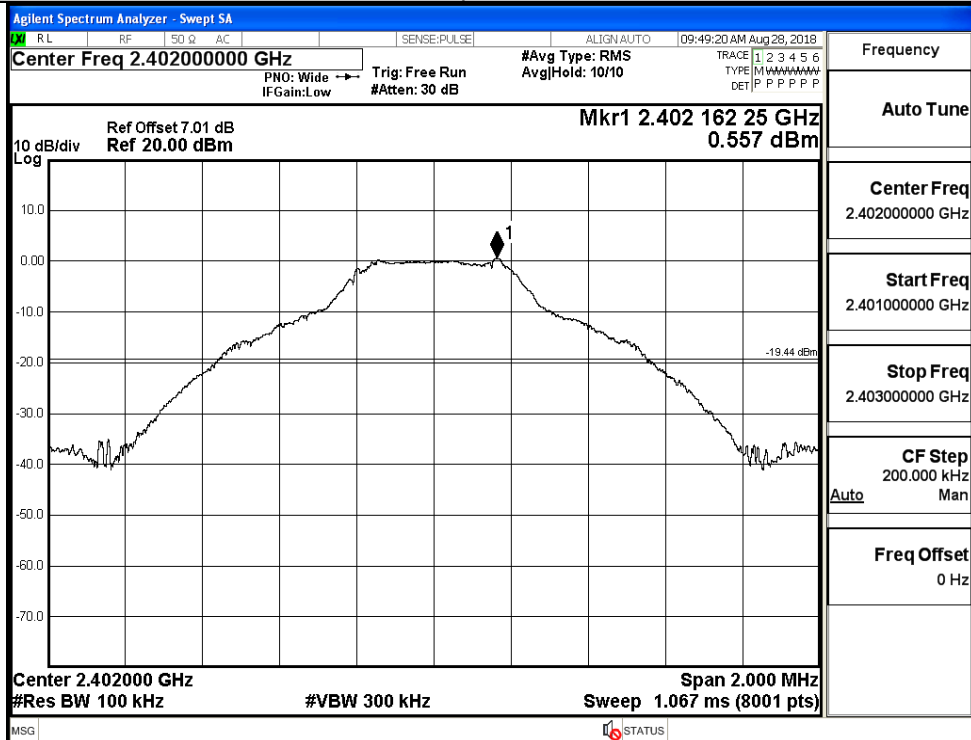


A.6 RF Conducted Spurious Emissions

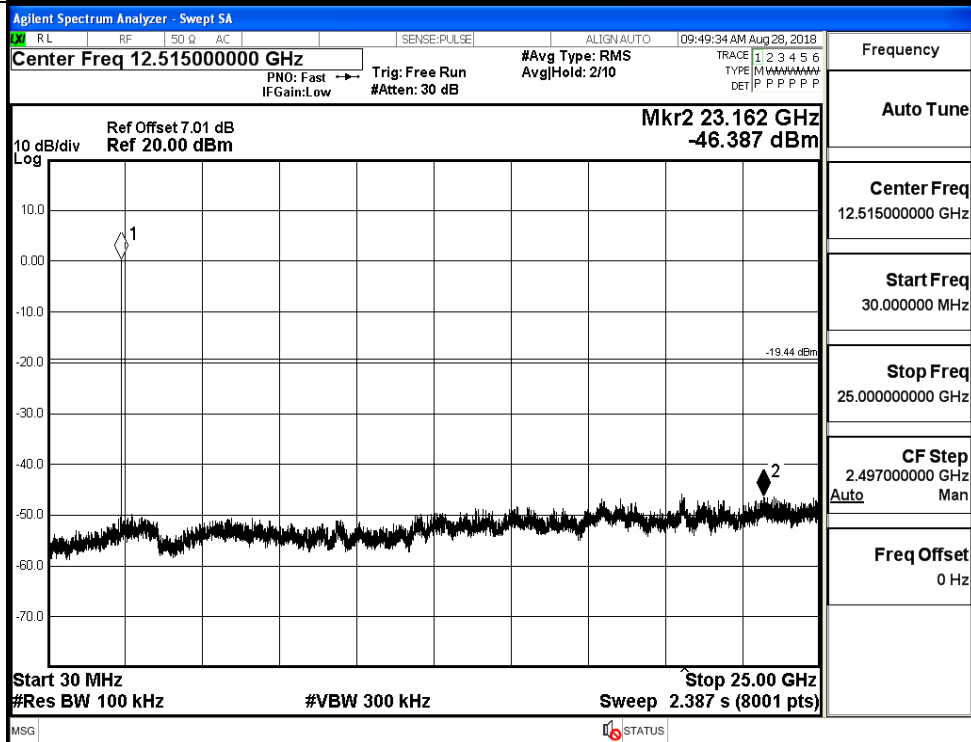
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.557	-46.387	-19.443	PASS
	MCH	0.374	-45.743	-19.626	PASS
	HCH	0.174	-45.856	-19.826	PASS
$\pi/4$ DQPSK	LCH	-0.571	-45.896	-20.571	PASS
	MCH	-0.716	-45.113	-20.716	PASS
	HCH	-0.898	-45.479	-20.898	PASS

GFSK_LCH_Graphs

Pref

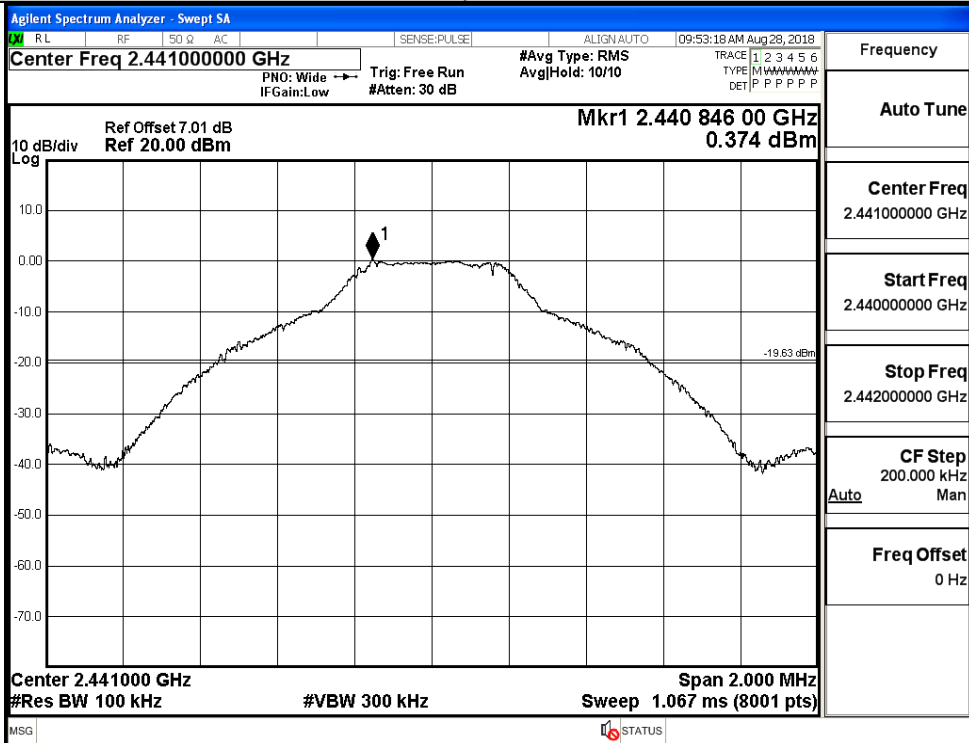


Puw

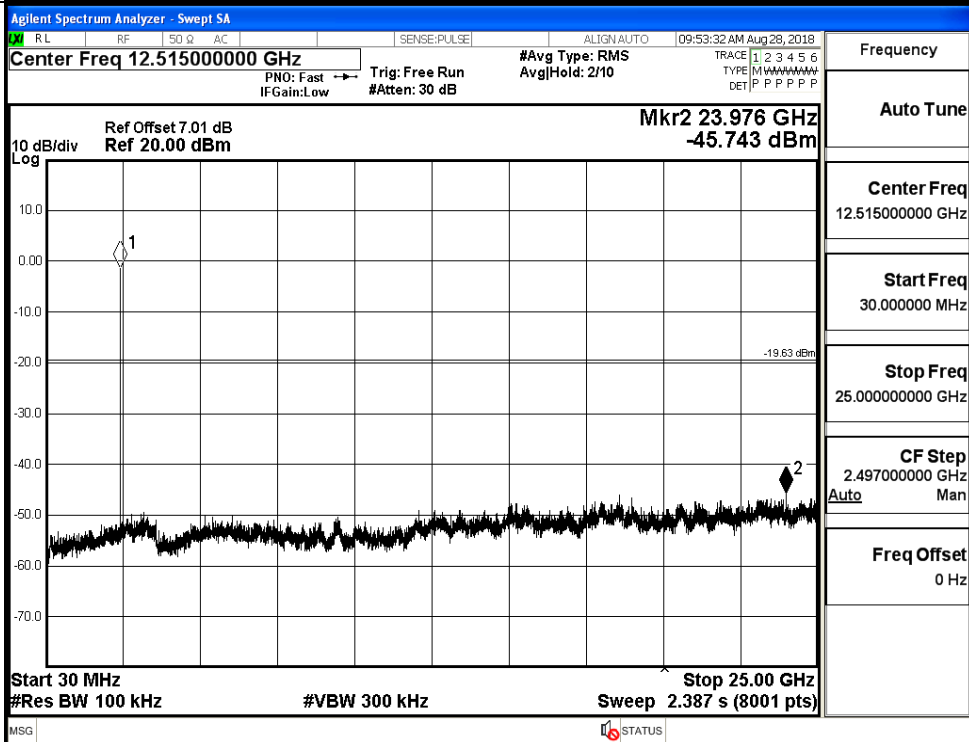


GFSK_MCH_Graphs

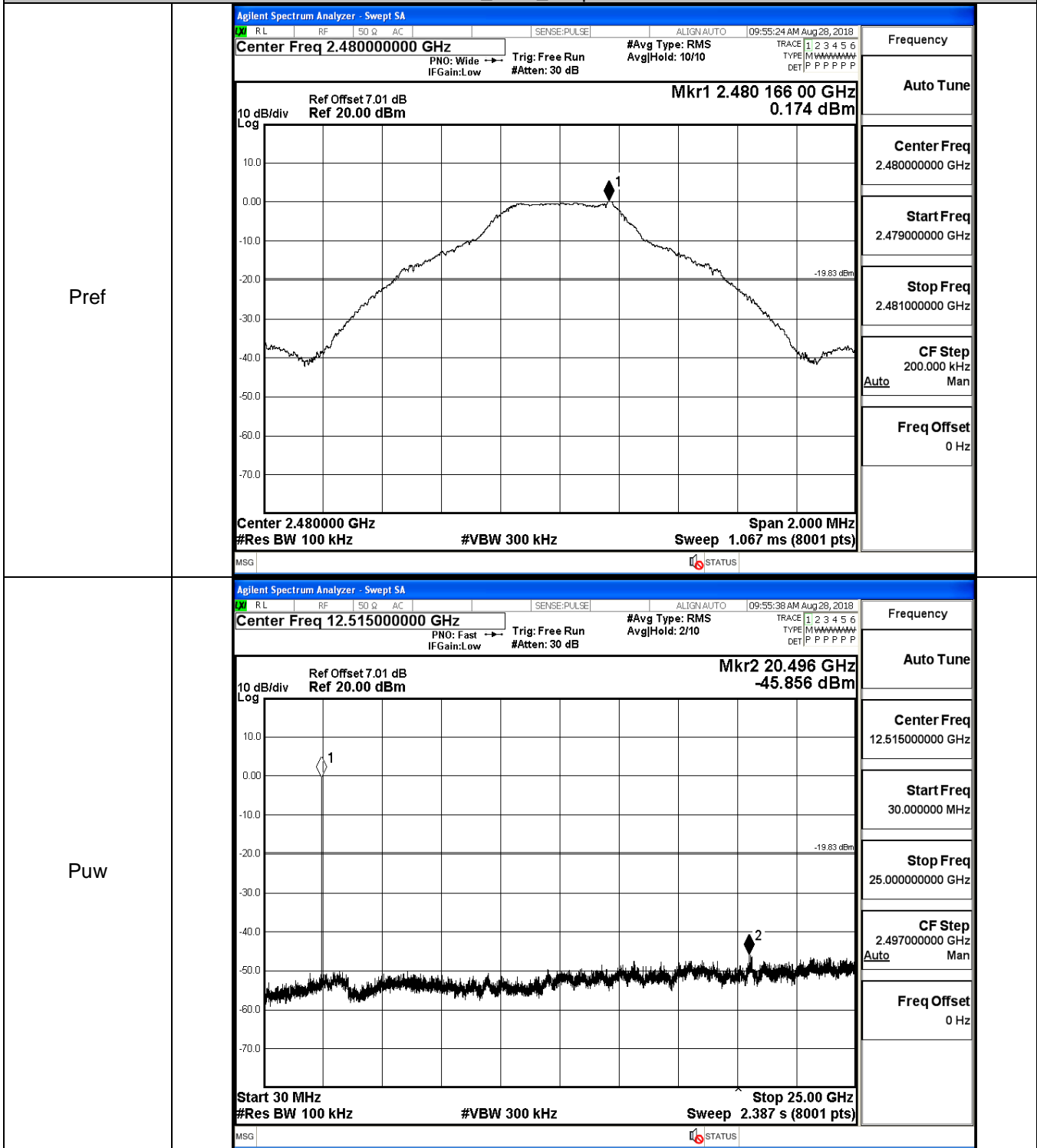
Pref



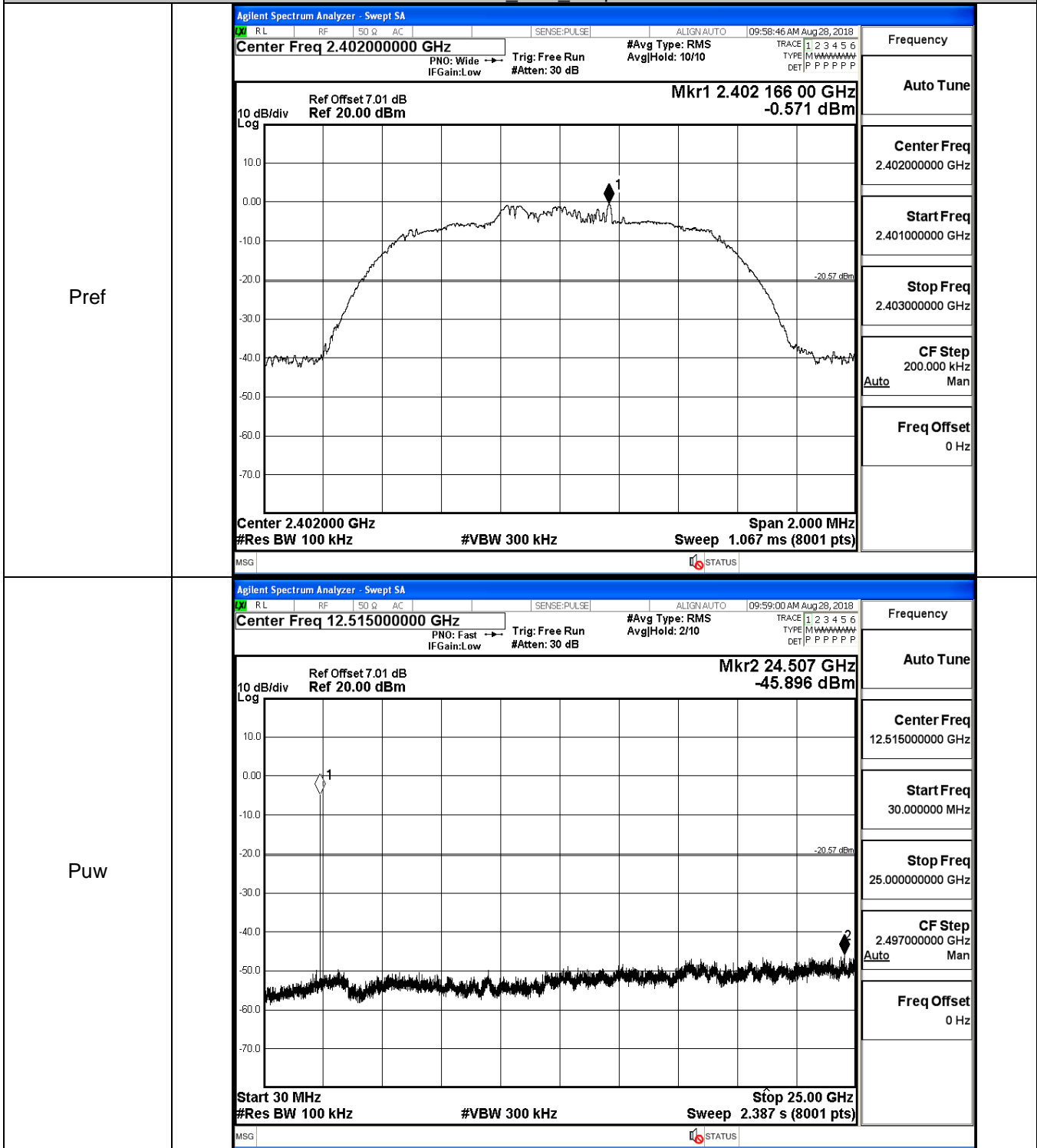
Puw



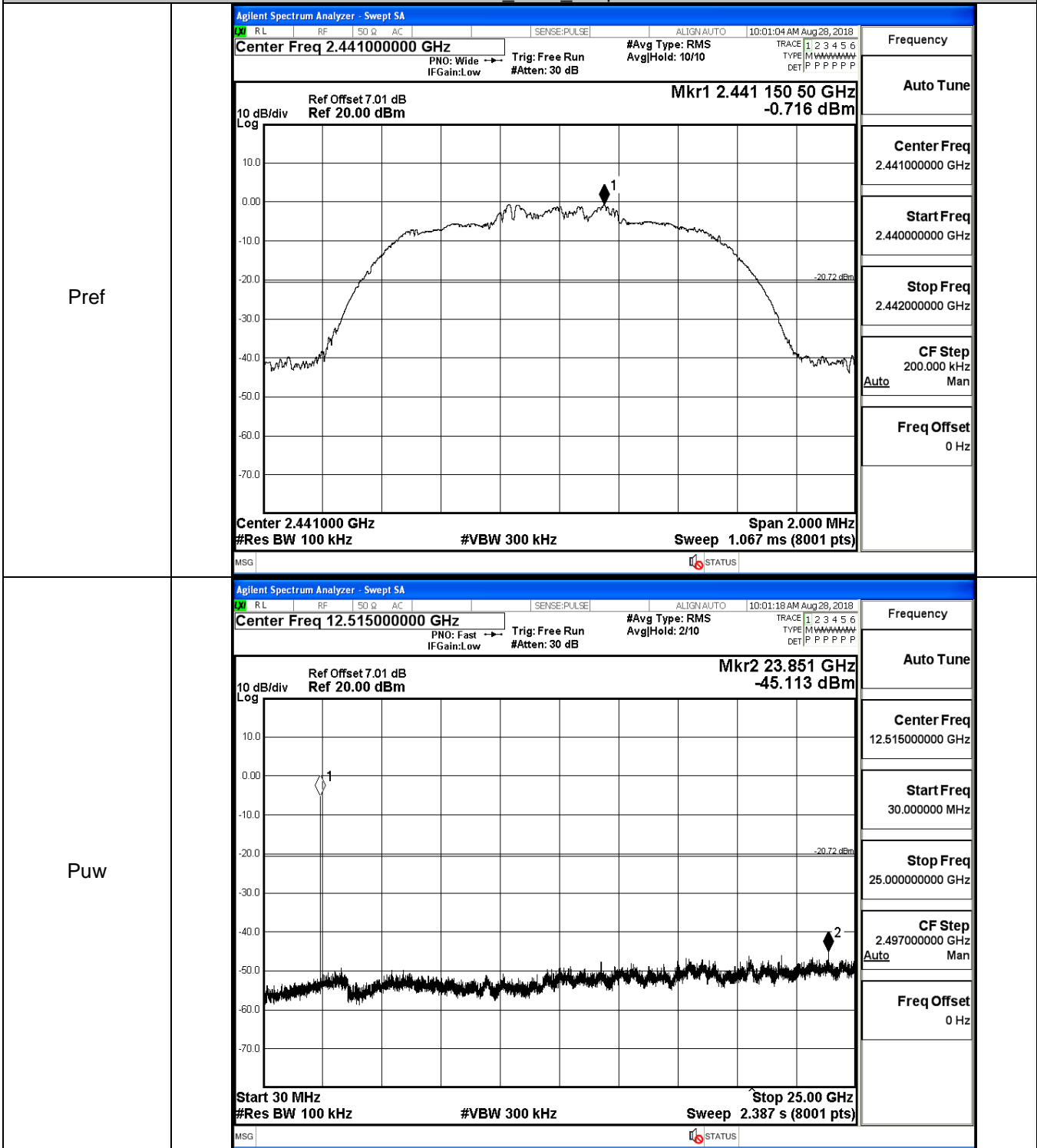
GFSK_HCH_Graphs



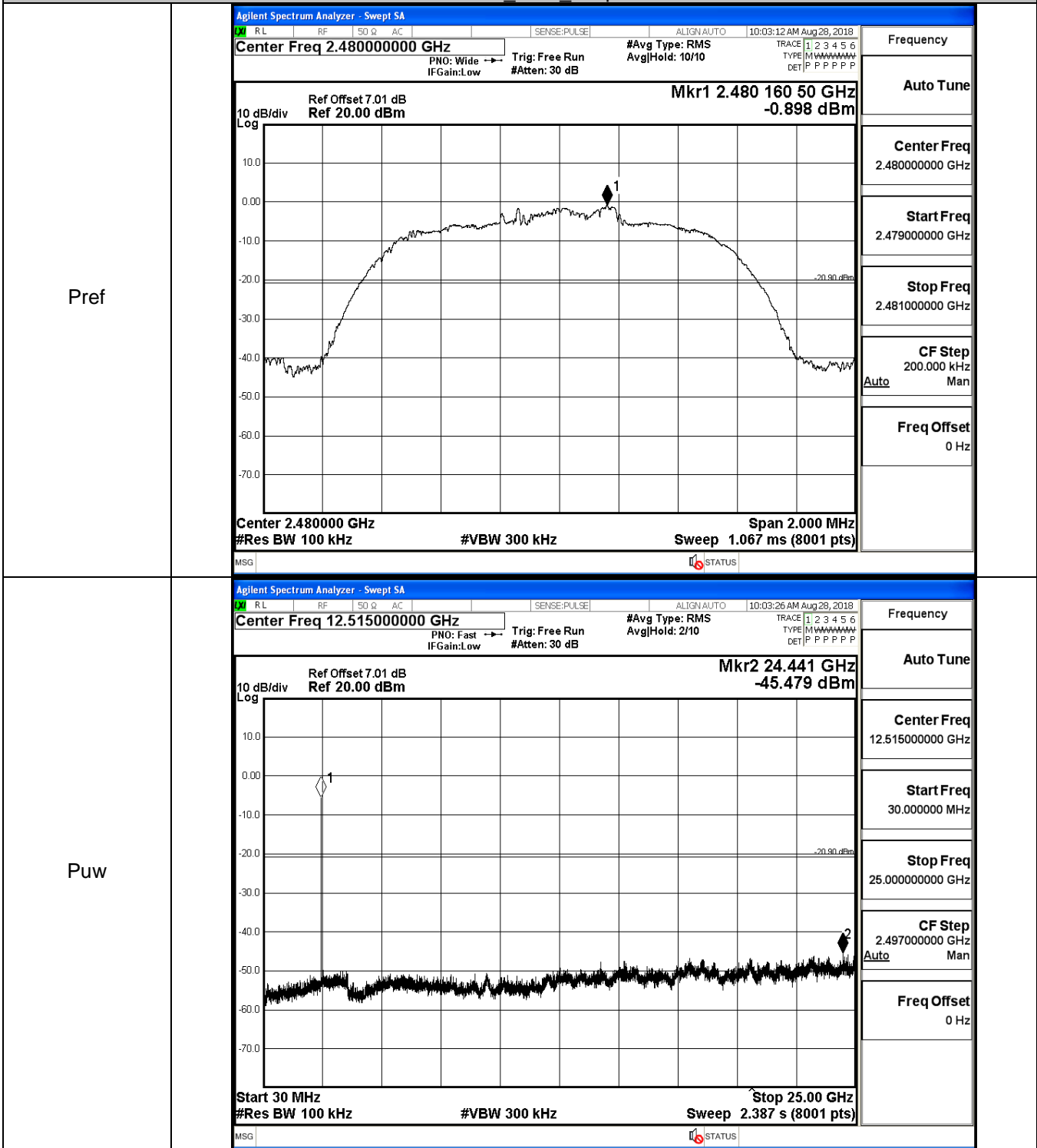
$\pi/4$ DQPSK LCH_Graphs



$\pi/4$ DQPSK_MCH_Graphs



$\pi/4$ DQPSK_HCH_Graphs

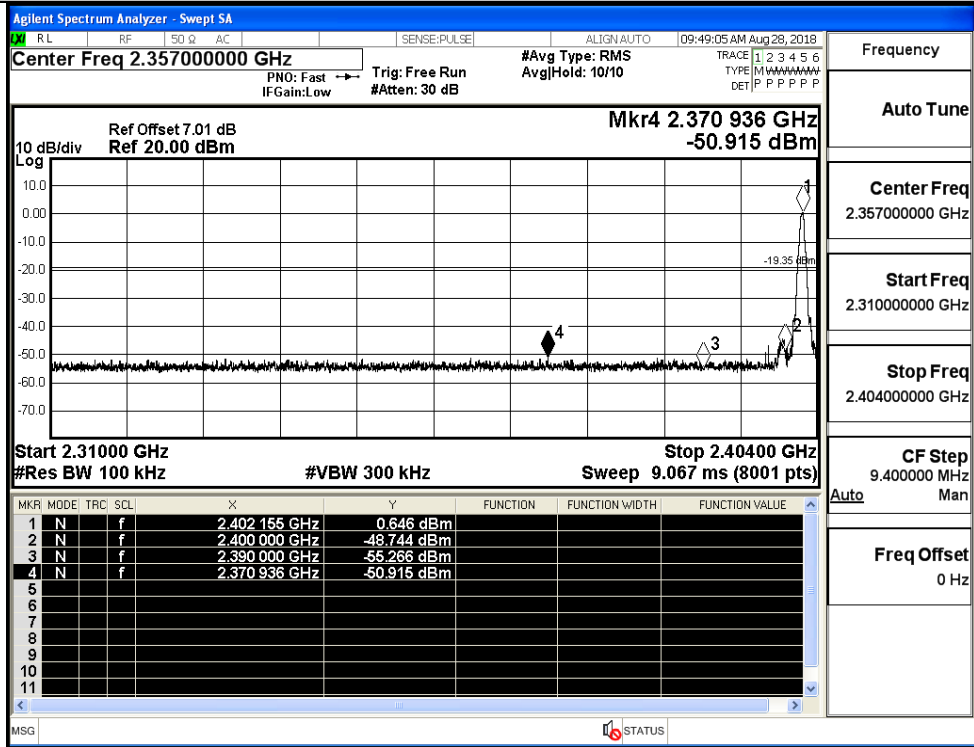


A.7 Band-edge for RF Conducted Emissions

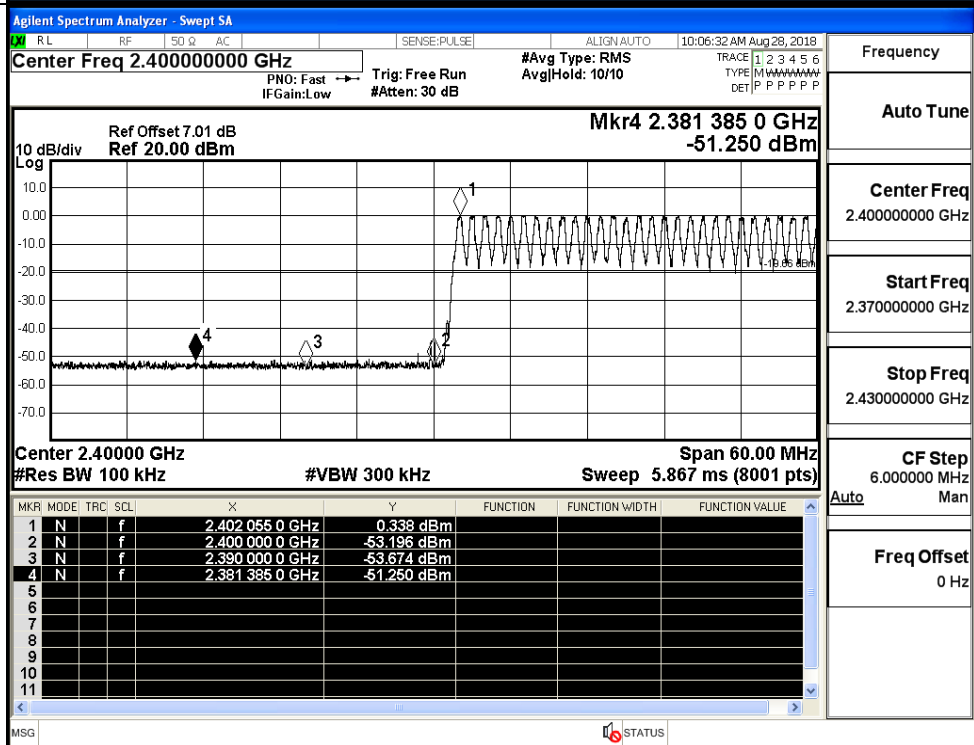
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.646	Off	-50.915	-19.35	PASS
			0.338	On	-51.250	-19.66	PASS
	HCH	2480	0.007	Off	-50.470	-19.99	PASS
			0.217	On	-50.903	-19.78	PASS
$\pi/4$ DQPSK	LCH	2402	-0.405	Off	-50.868	-20.41	PASS
			-0.511	On	-50.596	-20.51	PASS
	HCH	2480	-0.800	Off	-36.155	-20.8	PASS
			-0.830	On	-50.962	-18.78	PASS

Test Graphs

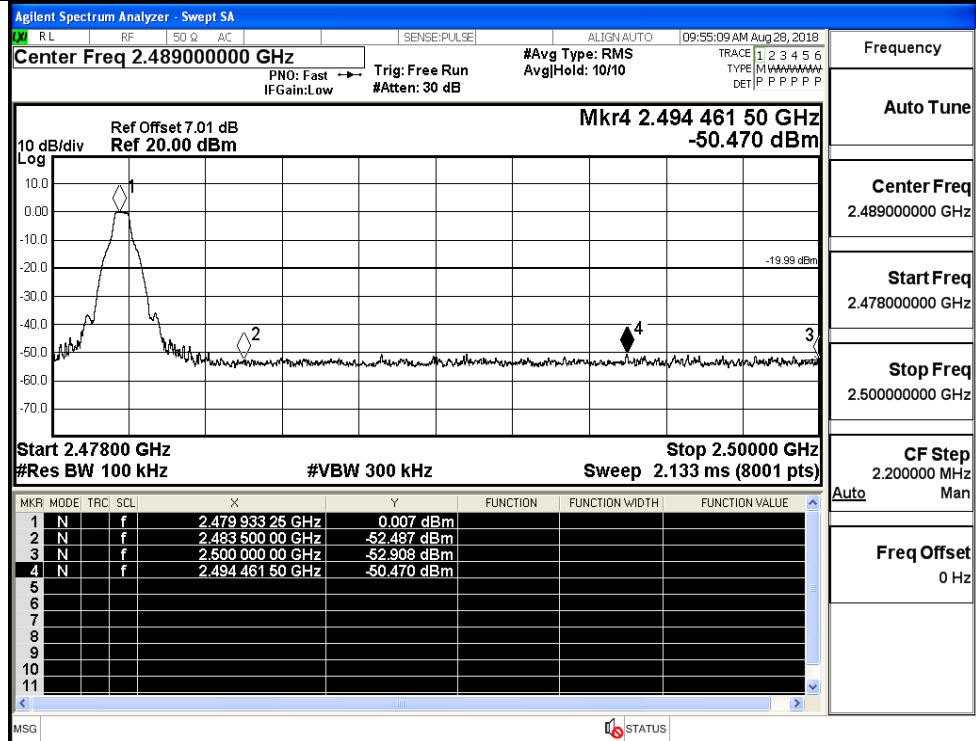
GFSK/LCH/No Hop



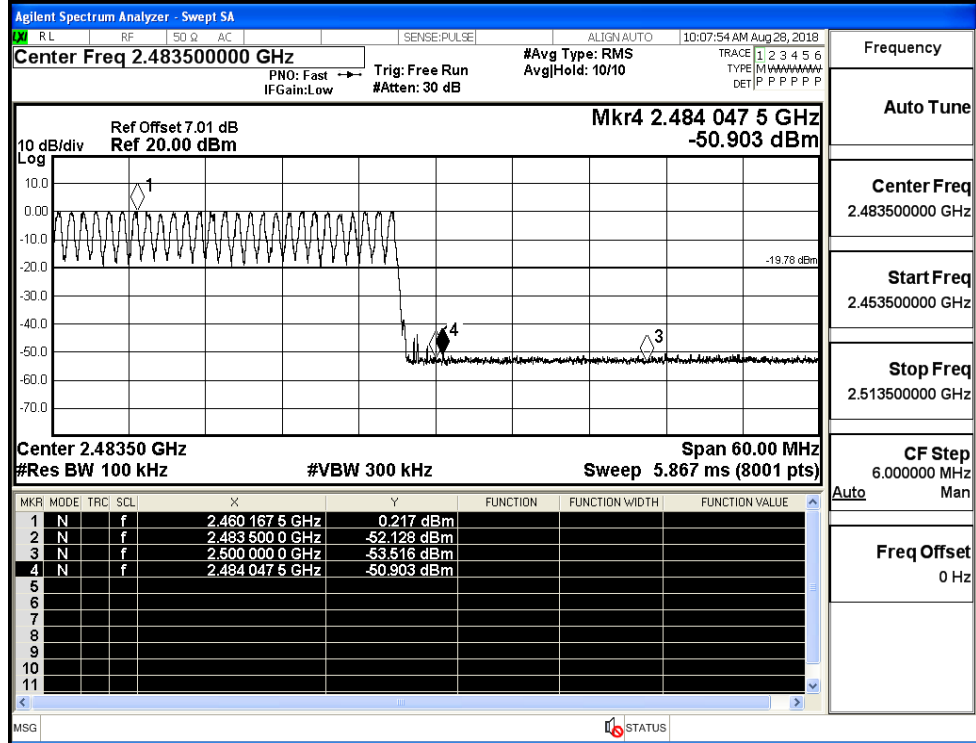
GFSK/LCH/Hop



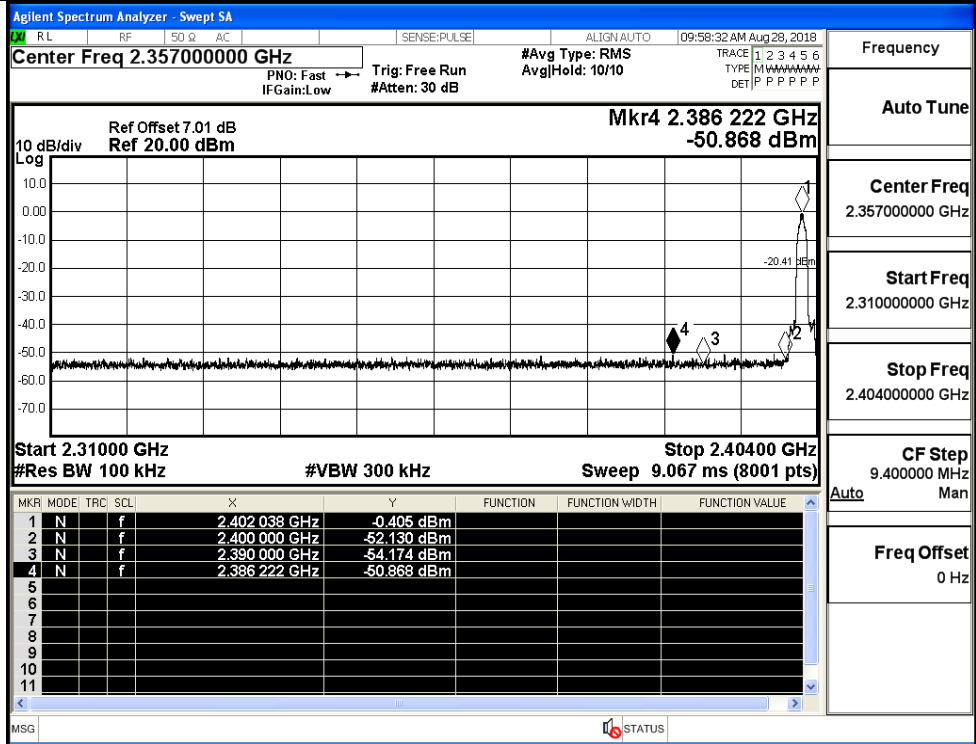
GFSK/HCH/No Hop



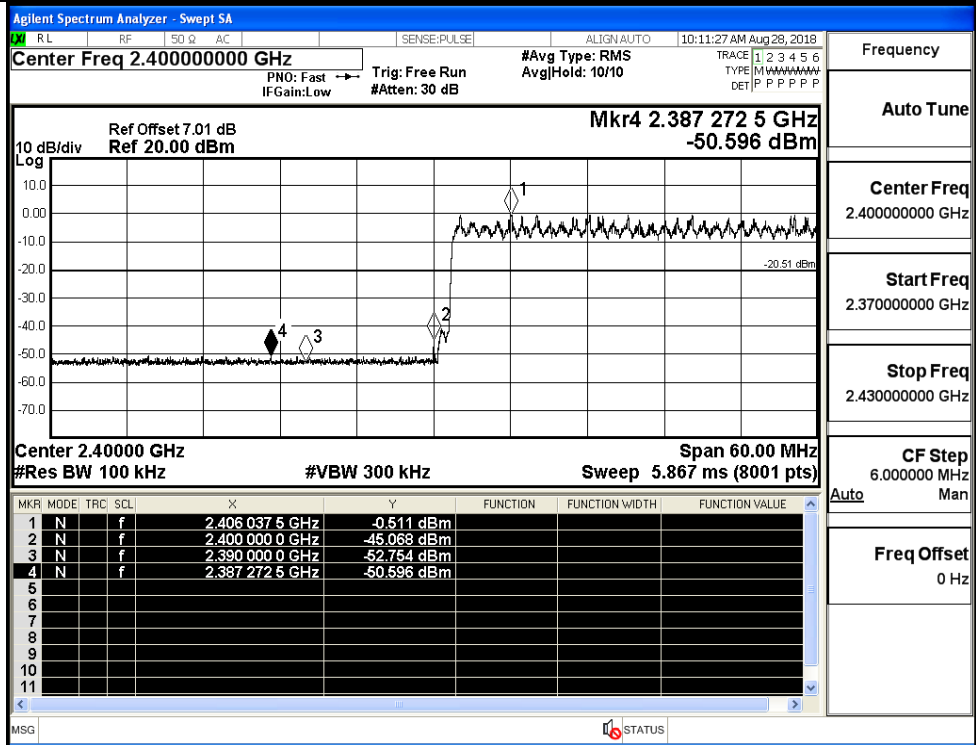
GFSK/HCH/Hop



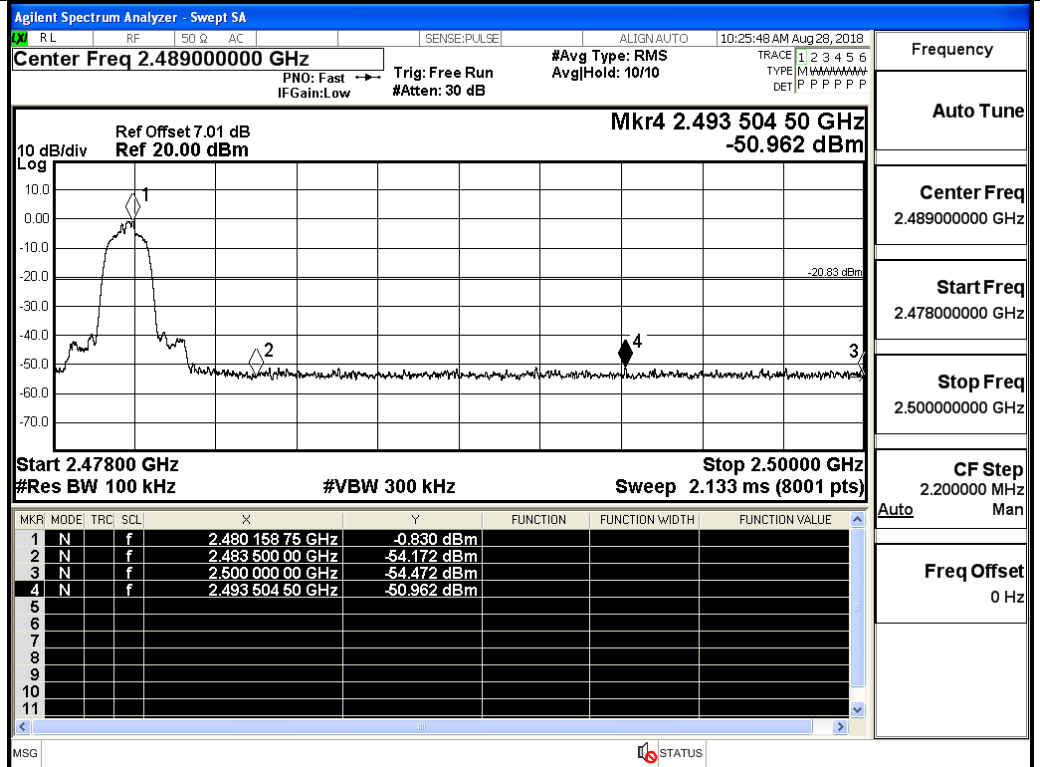
$\pi/4$ DQPSK/LCH/No
Hop



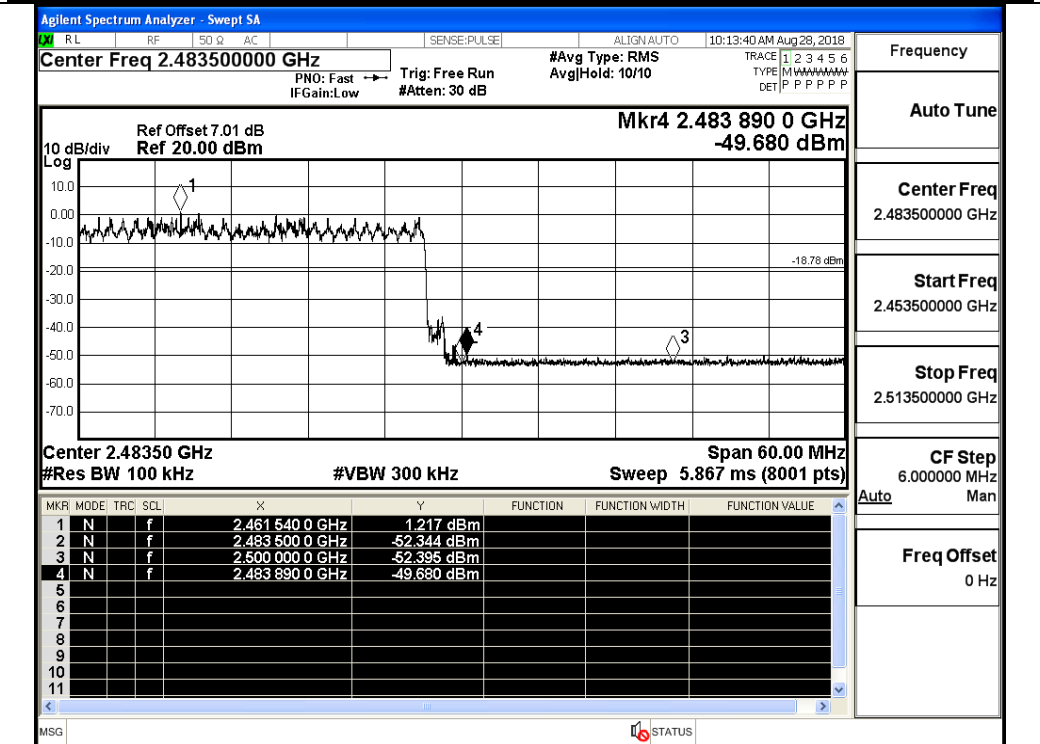
$\pi/4$ DQPSK/LCH/Hop



π /4DQPSK/HCH/No Hop



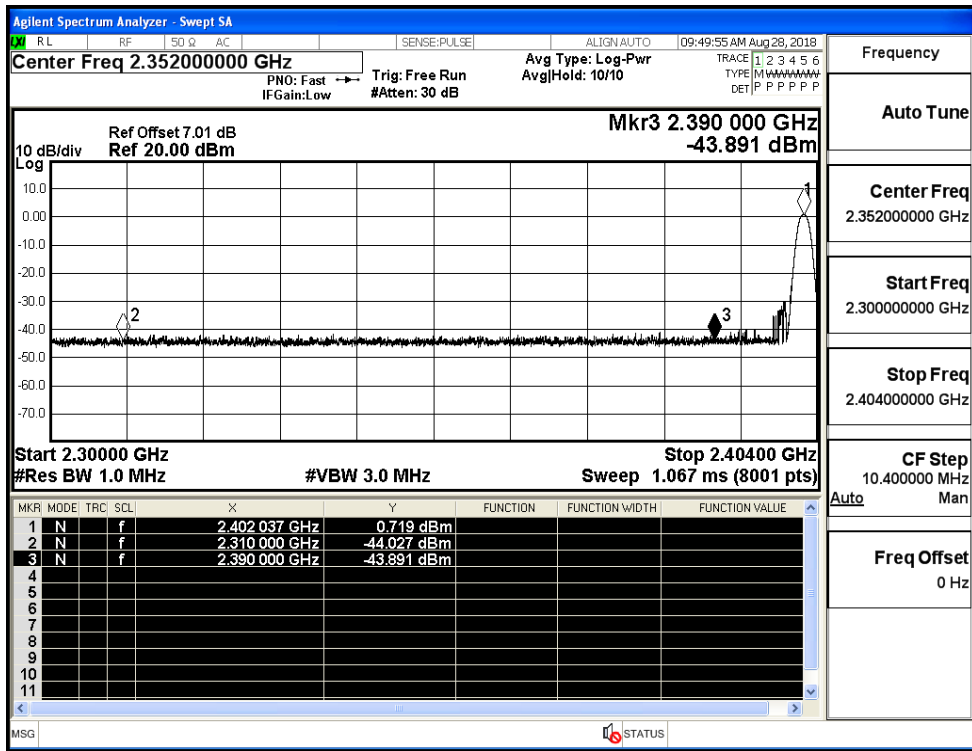
π /4DQPSK/HCH/Hop



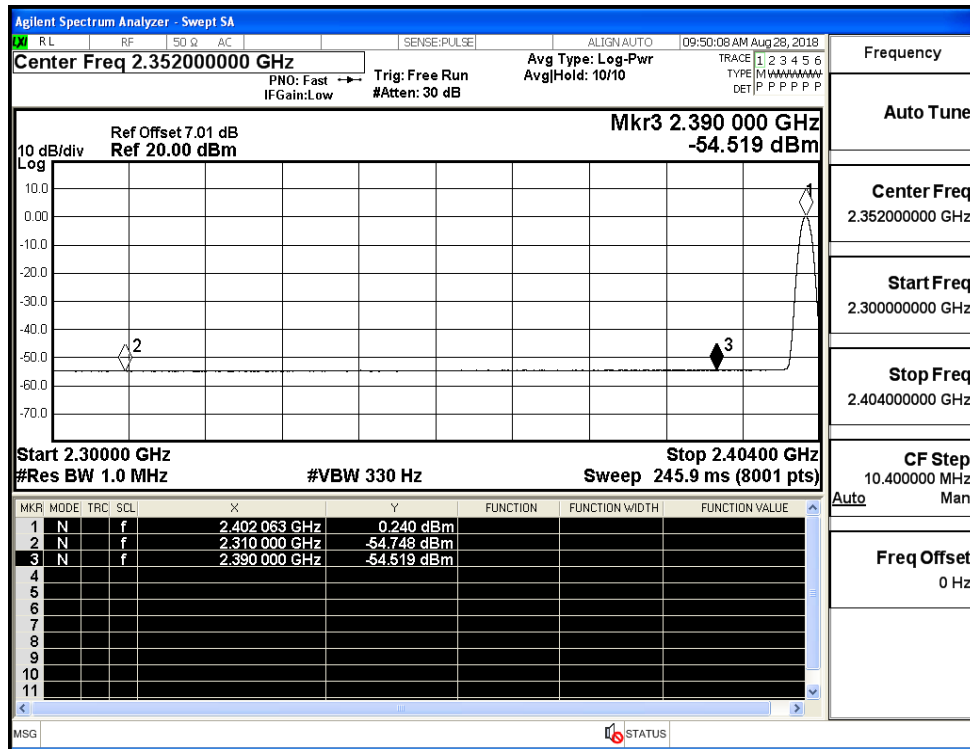
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.03	2.0	0	51.23	PEAK	74	PASS
	Off	2310.0	-54.75	2.0	0	40.51	AV	54	PASS
	Off	2390.0	-43.89	2.0	0	51.37	PEAK	74	PASS
	Off	2390.0	-54.52	2.0	0	40.74	AV	54	PASS
	Off	2483.5	-43.95	2.0	0	51.31	PEAK	74	PASS
	Off	2483.5	-54.15	2.0	0	41.10	AV	54	PASS
	Off	2500.0	-43.30	2.0	0	51.95	PEAK	74	PASS
	Off	2500.0	-53.97	2.0	0	41.29	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-44.19	2.0	0	51.07	PEAK	74	PASS
	Off	2310.0	-54.80	2.0	0	40.46	AV	54	PASS
	Off	2390.0	-42.17	2.0	0	53.09	PEAK	74	PASS
	Off	2390.0	-54.37	2.0	0	40.89	AV	54	PASS
	Off	2483.5	-44.13	2.0	0	51.13	PEAK	74	PASS
	Off	2483.5	-54.14	2.0	0	41.12	AV	54	PASS
	Off	2500.0	-44.07	2.0	0	51.19	PEAK	74	PASS
	Off	2500.0	-54.07	2.0	0	41.19	AV	54	PASS

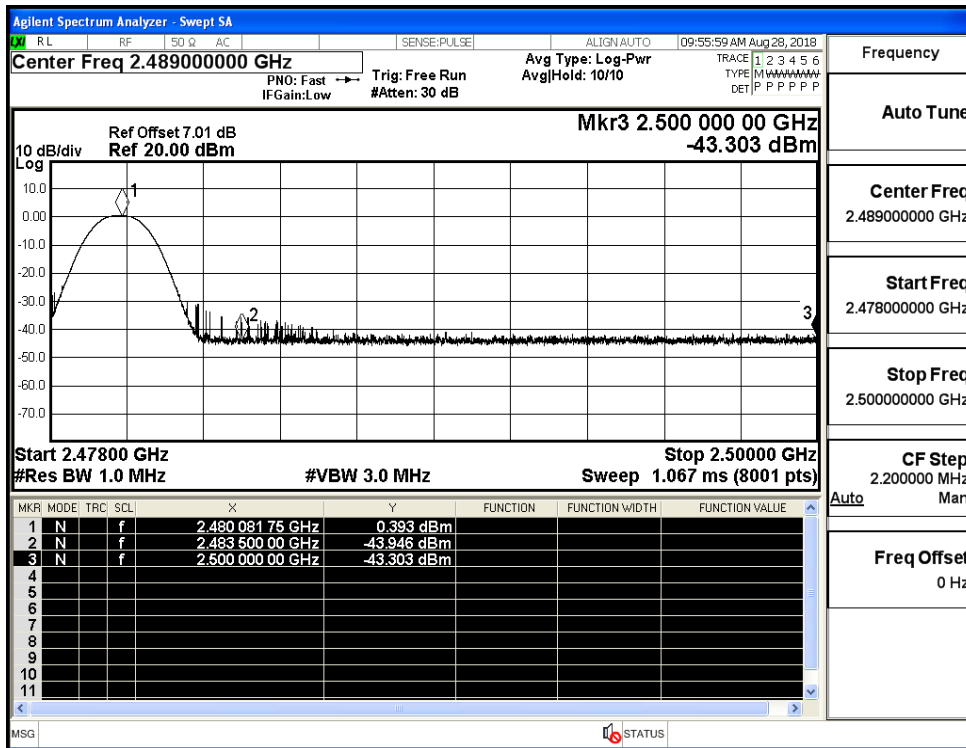
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



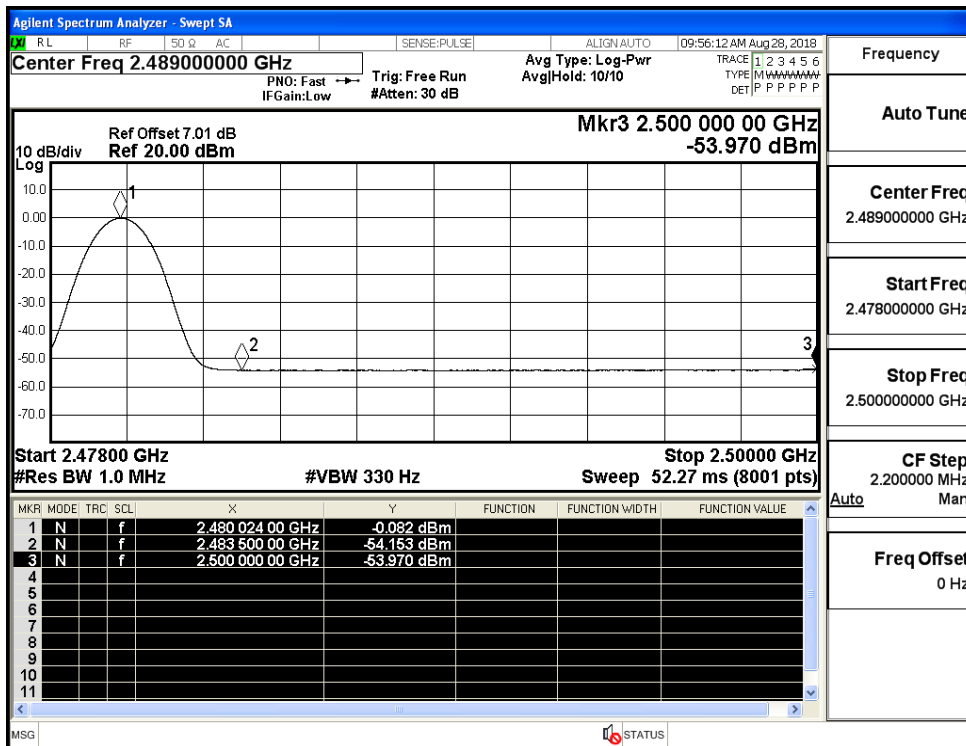
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



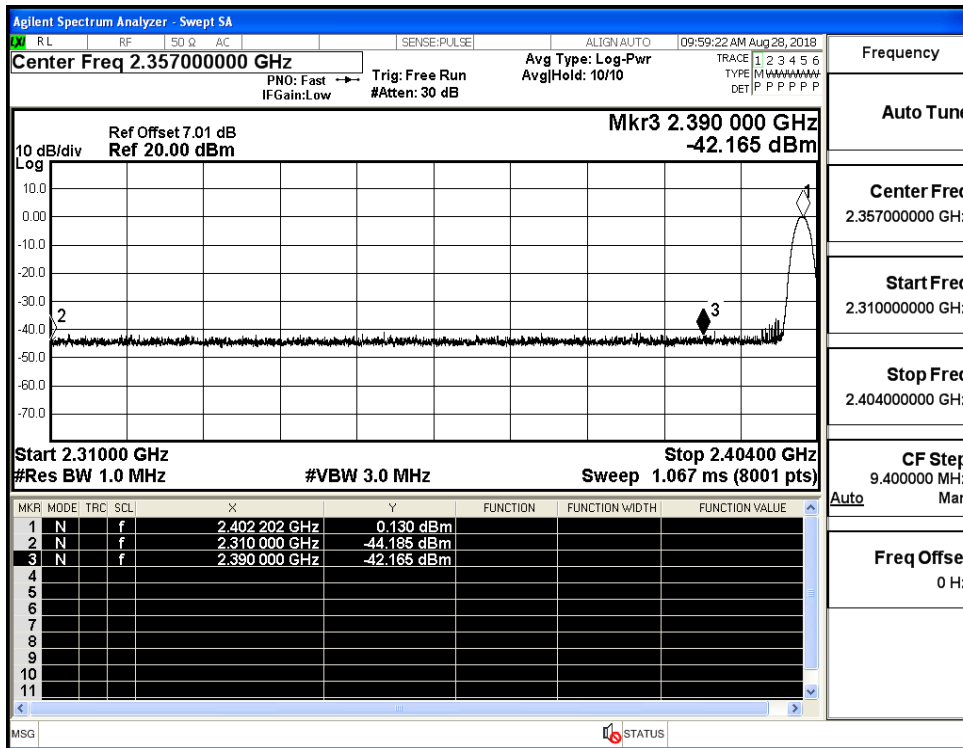
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



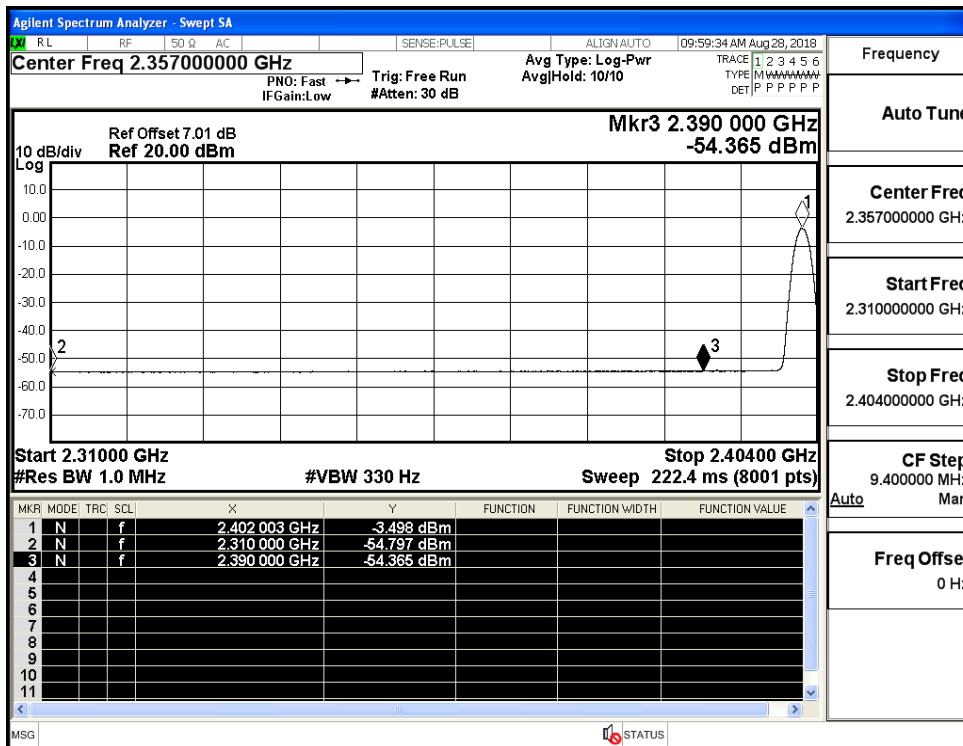
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



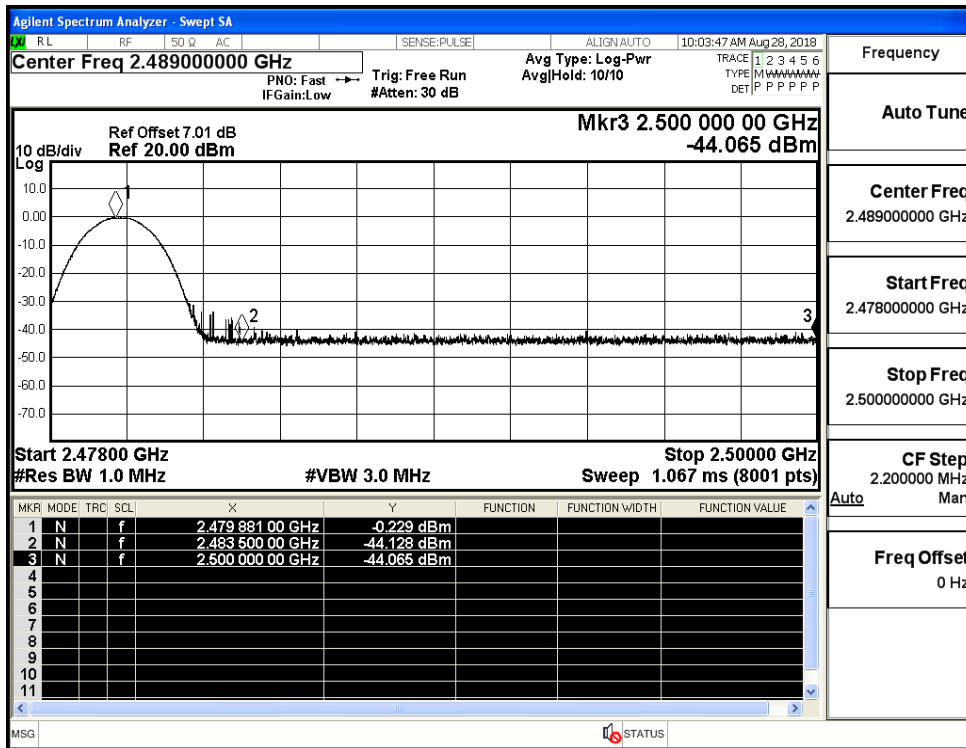
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)

