

Appendix A

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

Product Name: TWS Sprt Tch ZipCase-BLK XT-33

Trade Mark: N/A

Test Model: HM-AU-BE-204-BK

Environmental Conditions

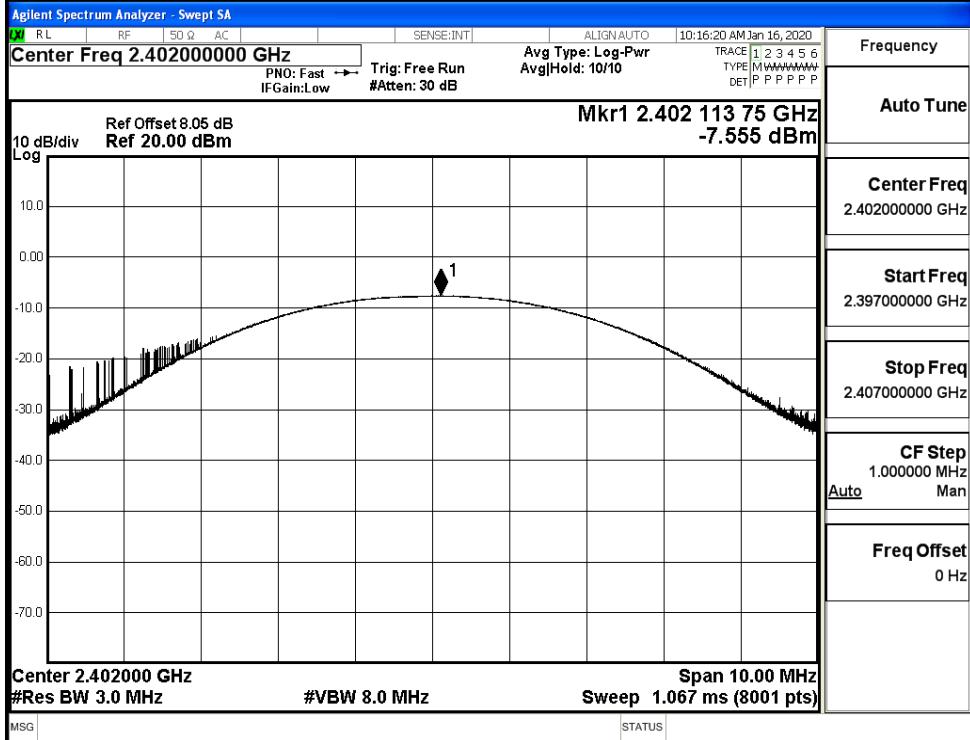
Temperature:	22.8 ° C
Relative Humidity:	53.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Tom.Liu

A.1 Maximum Conducted Peak Output Power

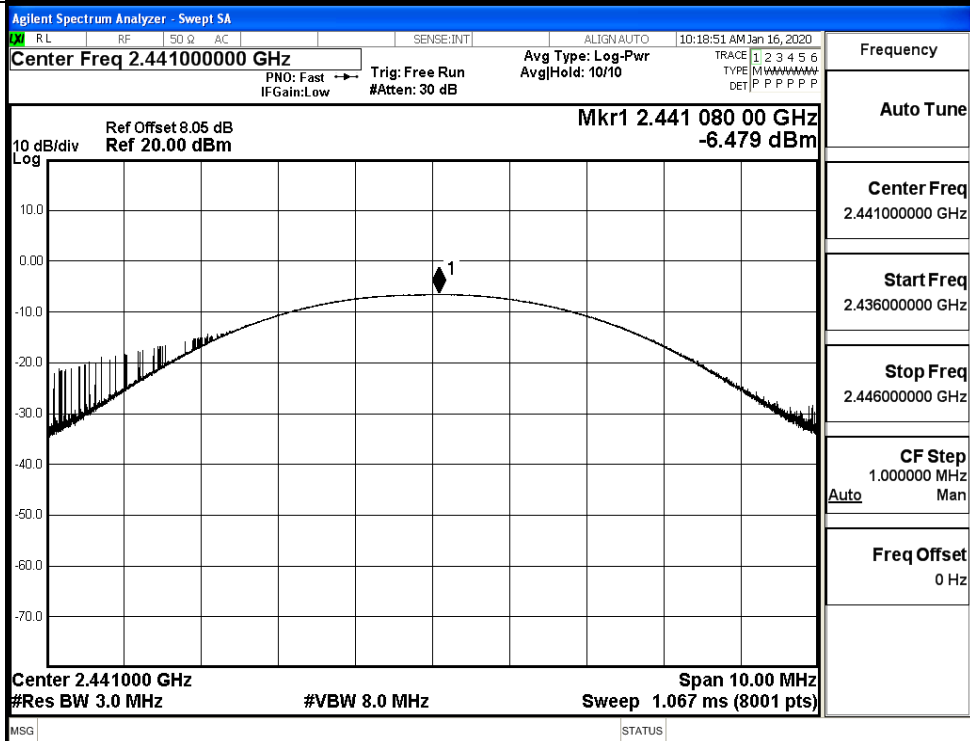
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-7.555	30	PASS
	MCH	-6.479	30	PASS
	HCH	-5.789	30	PASS
π/4DQPSK	LCH	-6.780	21	PASS
	MCH	-5.653	21	PASS
	HCH	-4.913	21	PASS

Test Graphs

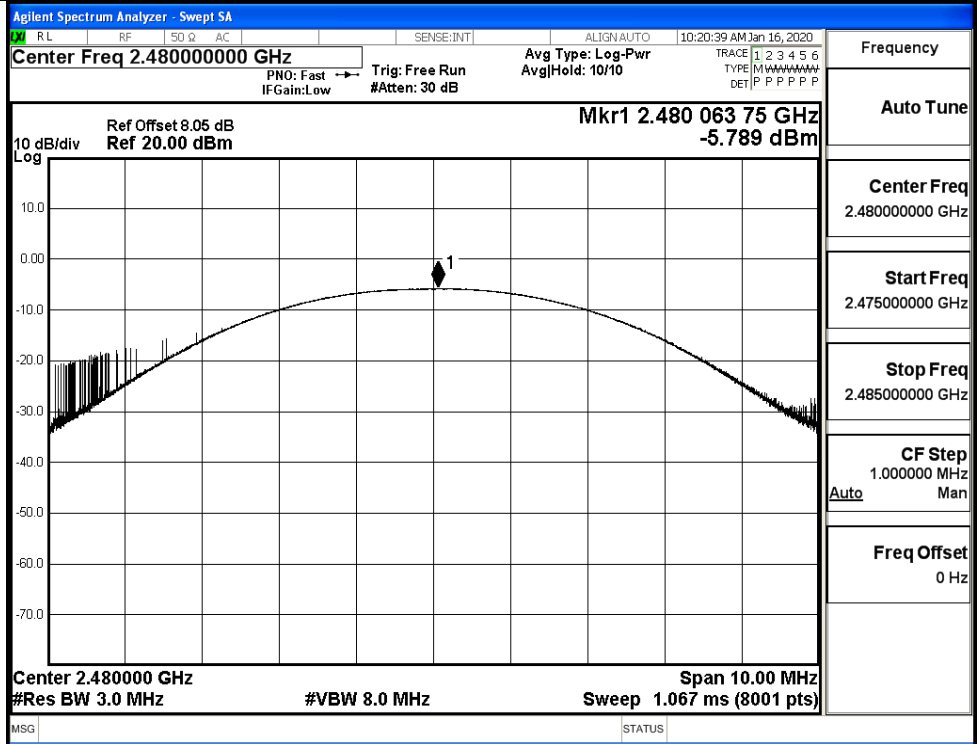
GFSK/LCH



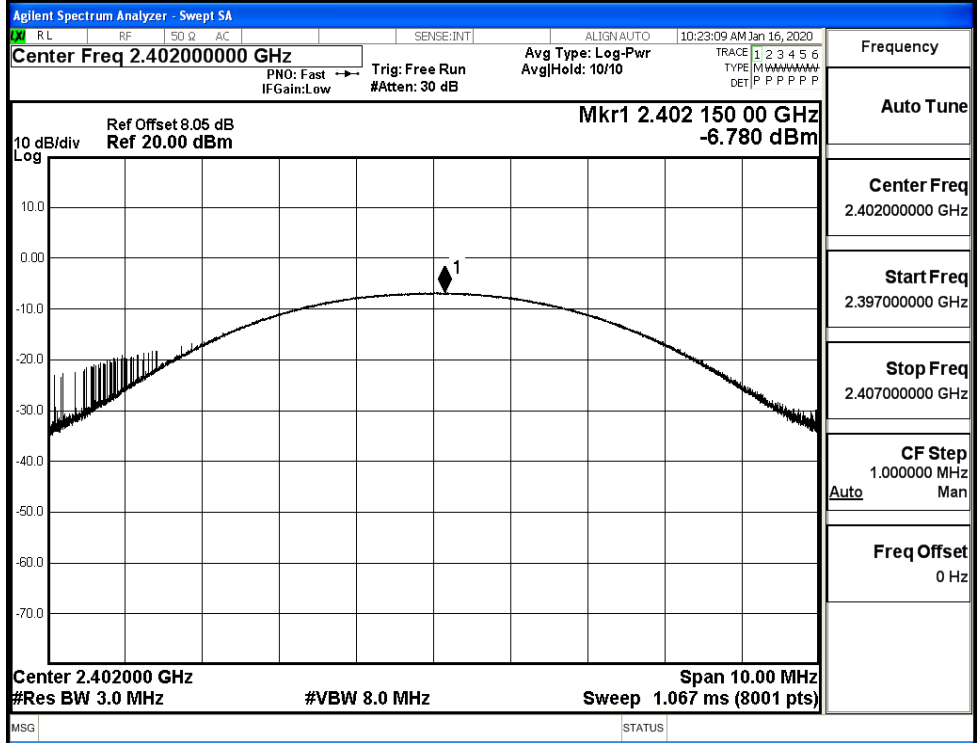
GFSK/MCH



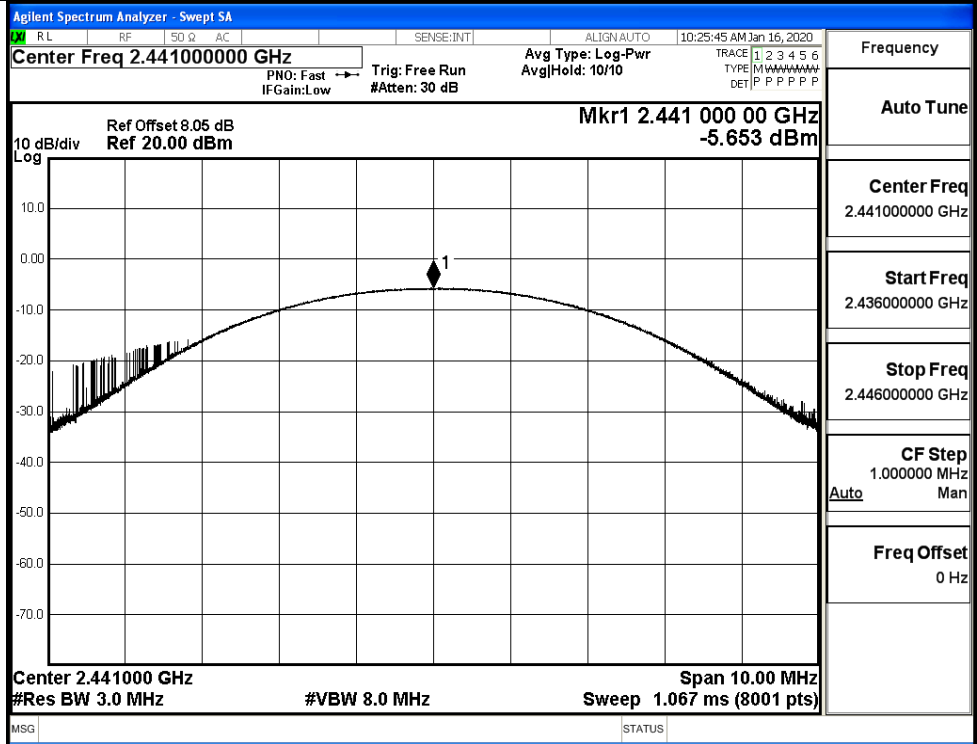
GFSK/HCH



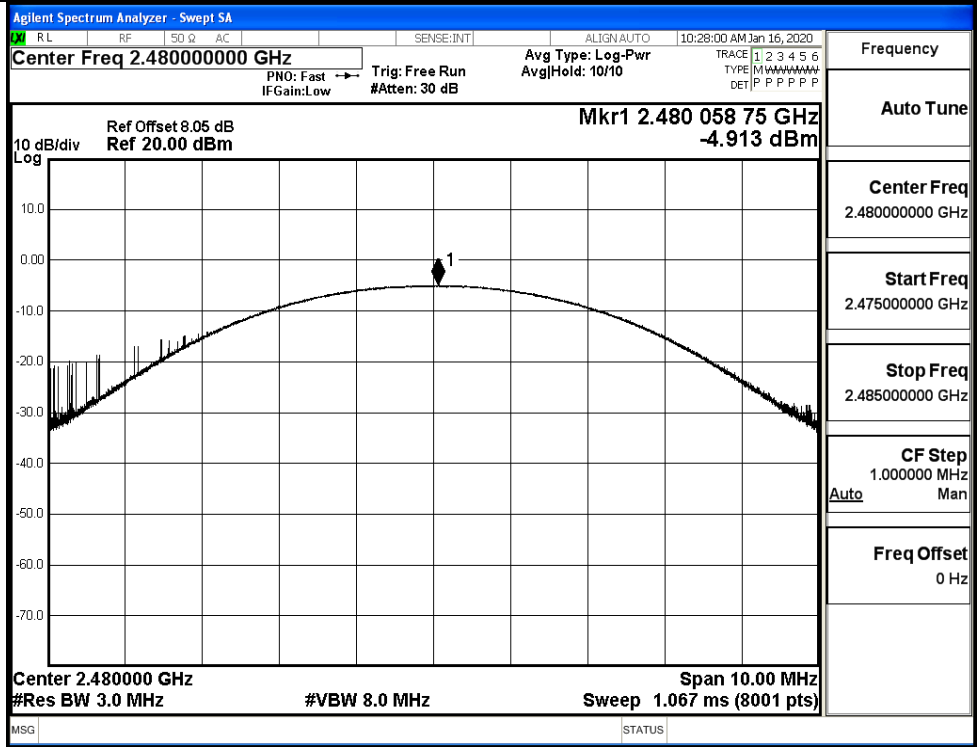
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH

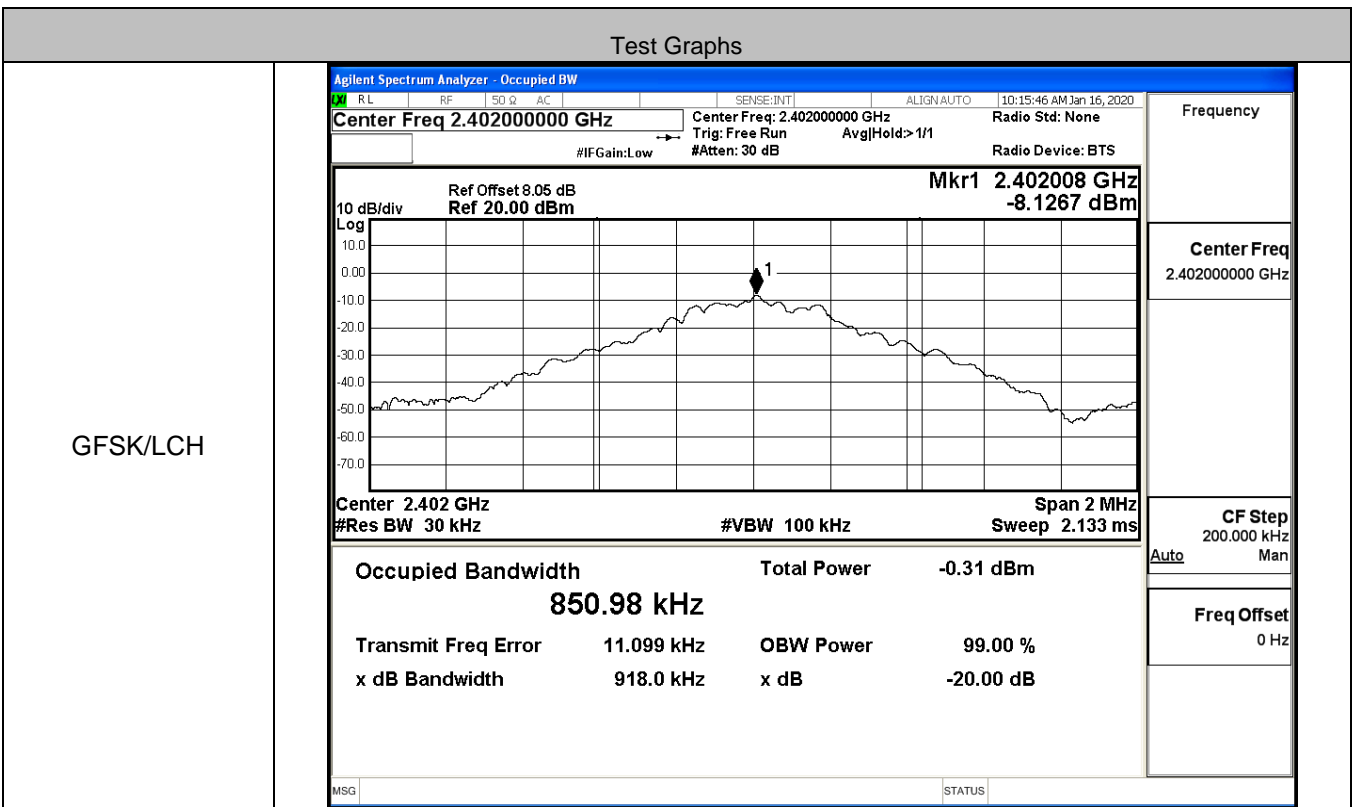


$\pi/4$ DQPSK/HCH

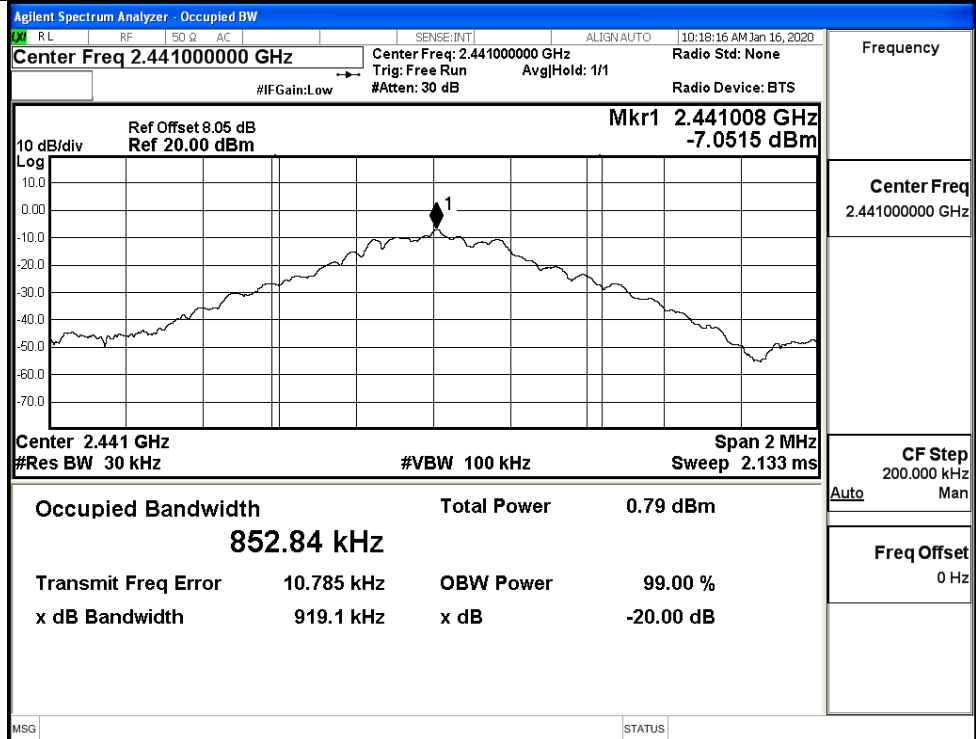


A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.918	Not Specified	PASS
	MCH	0.919	Not Specified	PASS
	HCH	0.921	Not Specified	PASS
π/4DQPSK	LCH	1.249	Not Specified	PASS
	MCH	1.250	Not Specified	PASS
	HCH	1.246	Not Specified	PASS

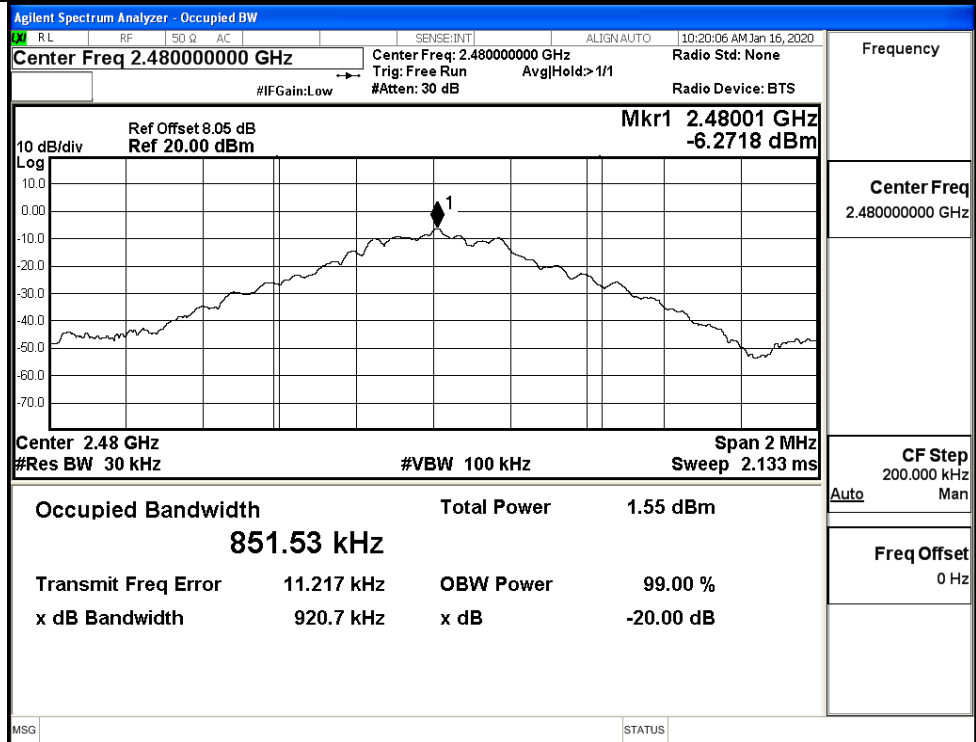


GFSK/MCH



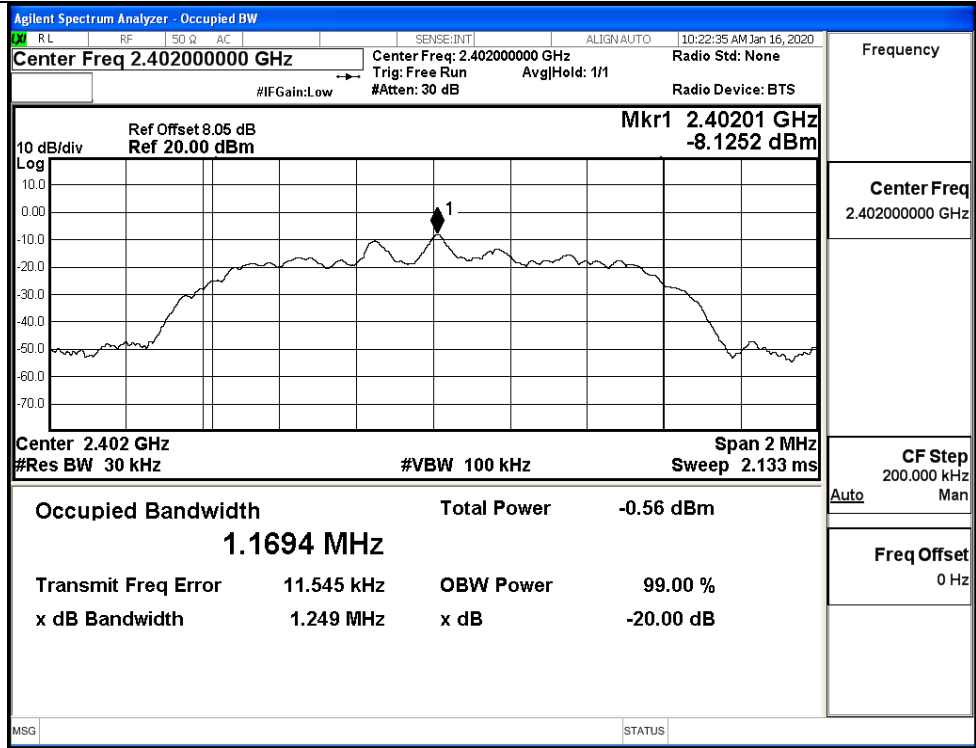
Frequency	2.441000000 GHz
Center Freq	2.441000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

GFSK/HCH



Frequency	2.480000000 GHz
Center Freq	2.480000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK/LCH



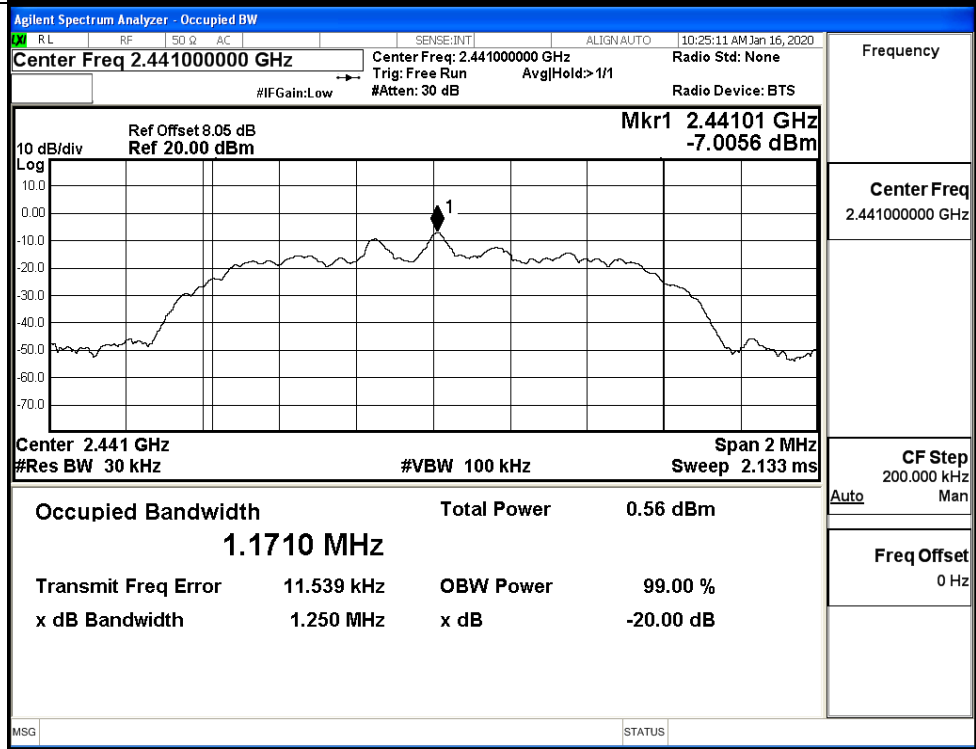
Frequency
2.40200000 GHz

Center Freq
2.40200000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/MCH



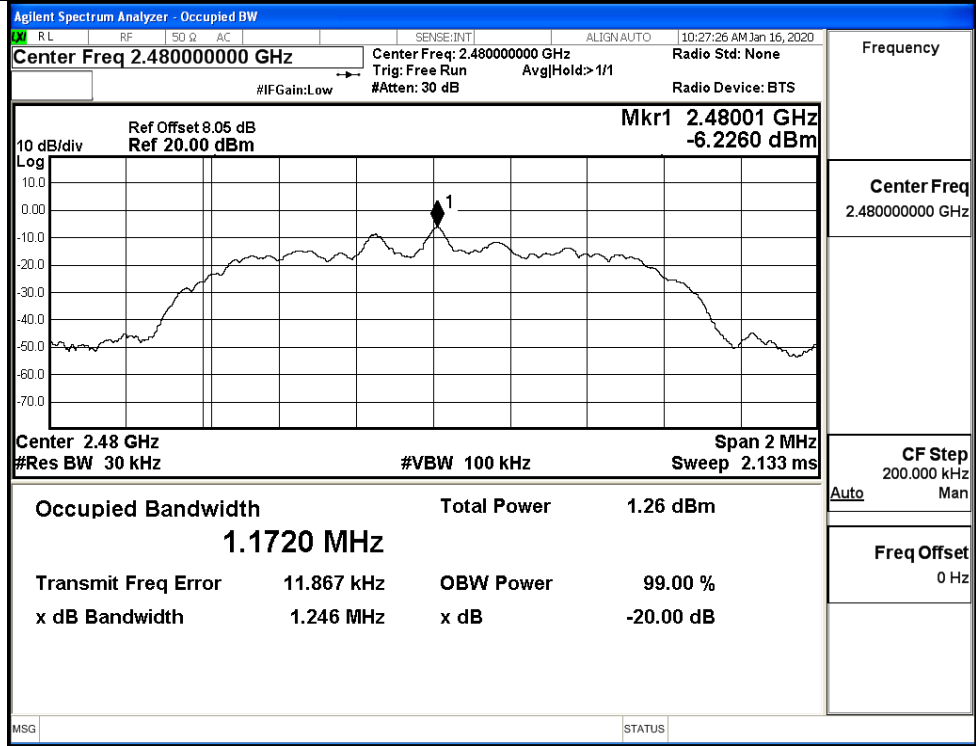
Frequency
2.44100000 GHz

Center Freq
2.44100000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

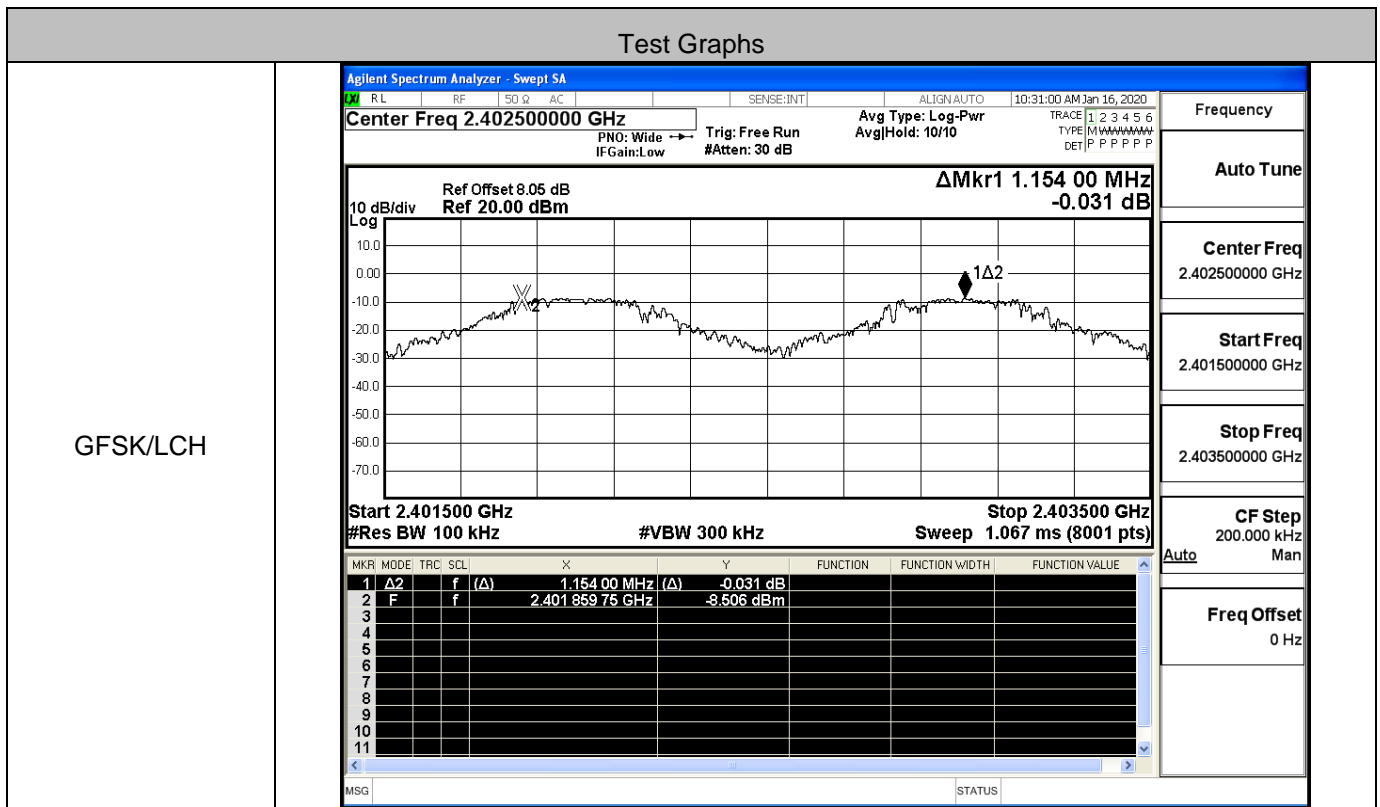
$\pi/4$ DQPSK/HCH



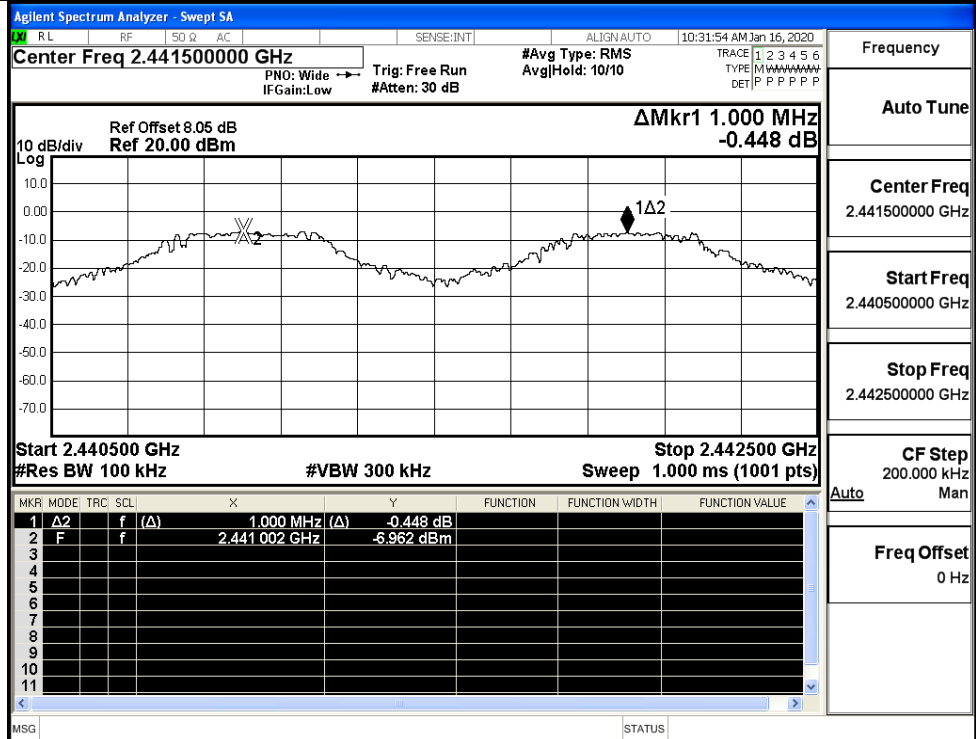
Frequency	2.48000000 GHz
Center Freq	2.48000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.154	0.9180	PASS
	MCH	1.000	0.9191	PASS
	HCH	1.000	0.9207	PASS
π/4DQPSK	LCH	0.852	0.833	PASS
	MCH	1.074	0.833	PASS
	HCH	0.998	0.831	PASS

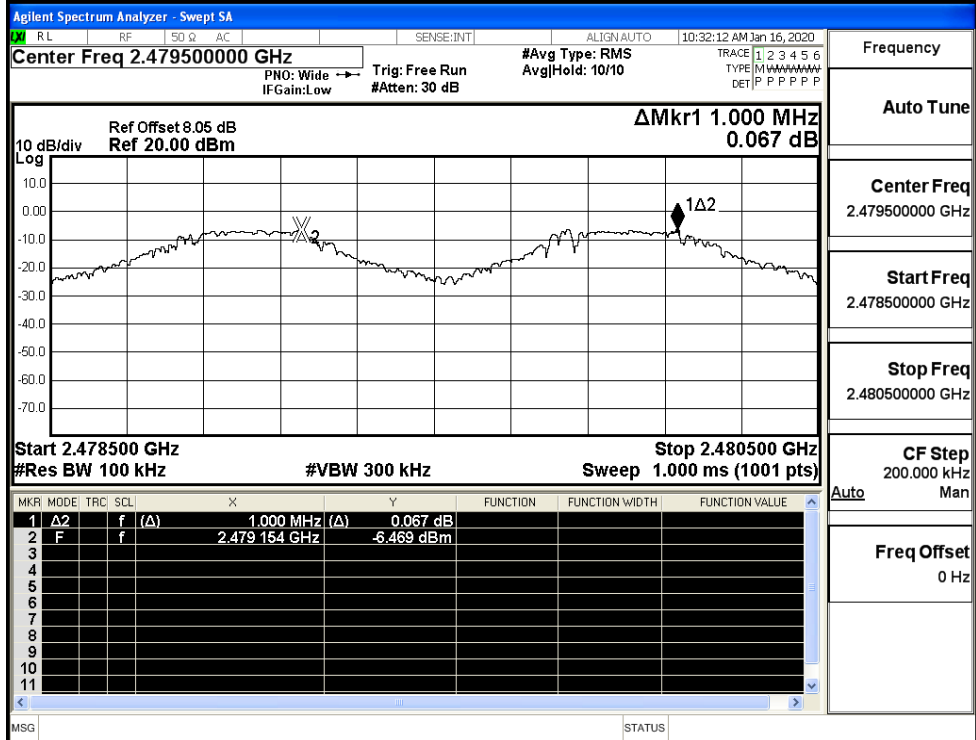


GFSK/MCH



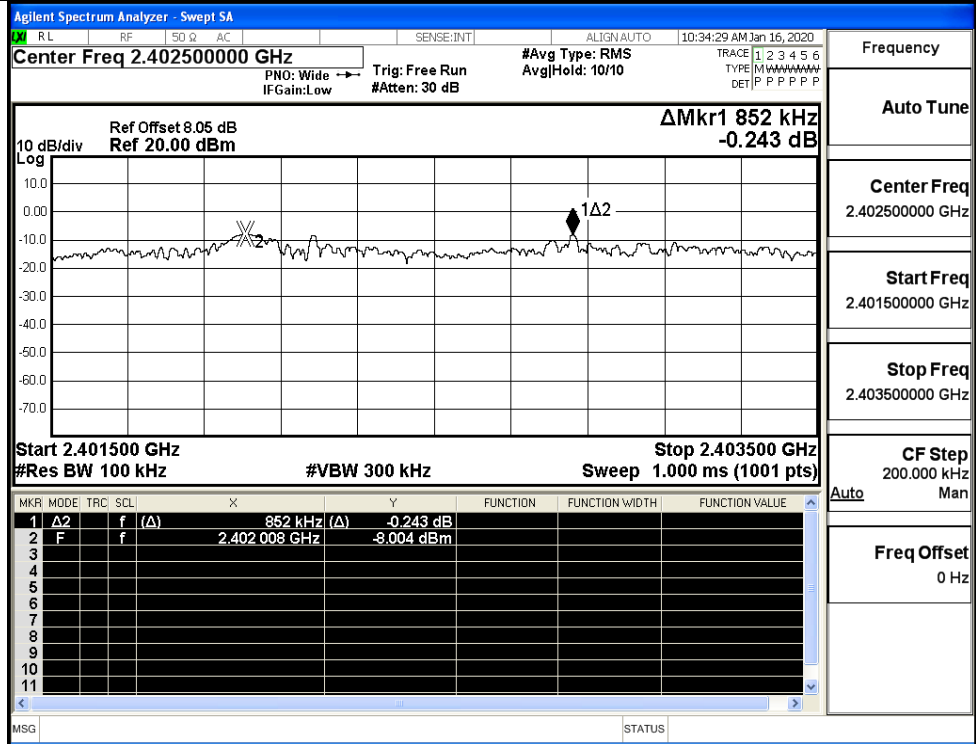
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

GFSK/HCH

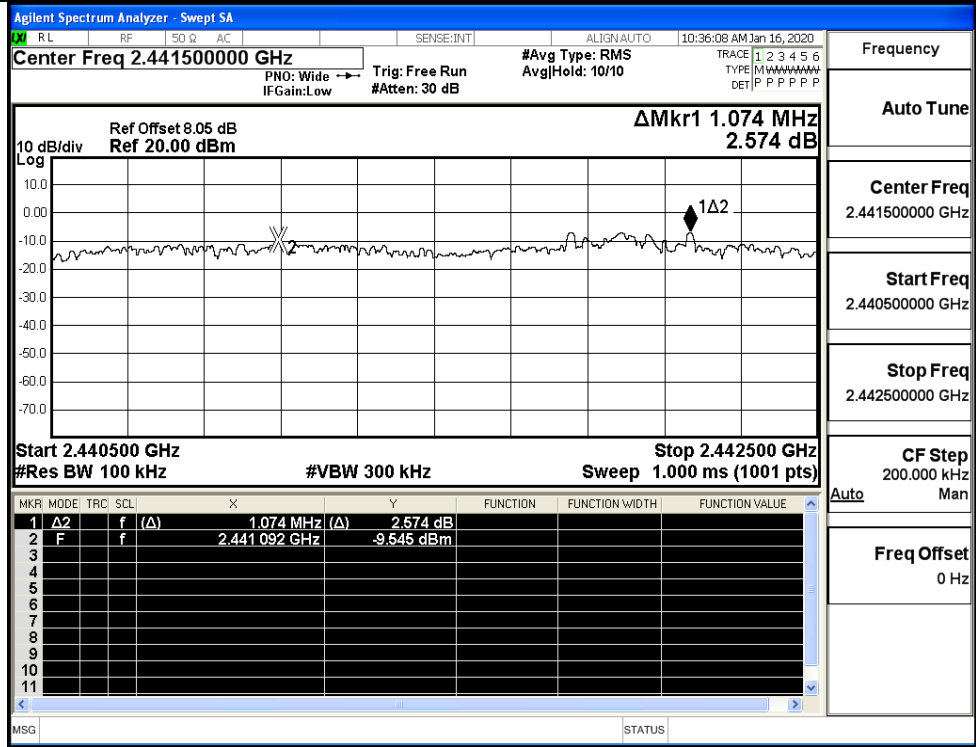


Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

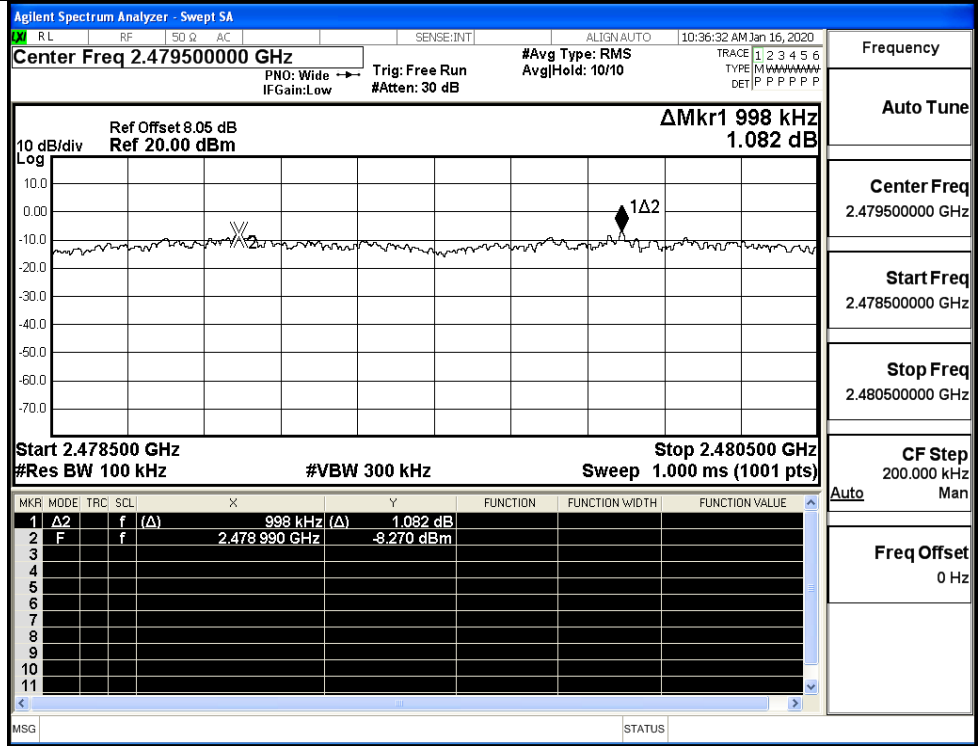
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



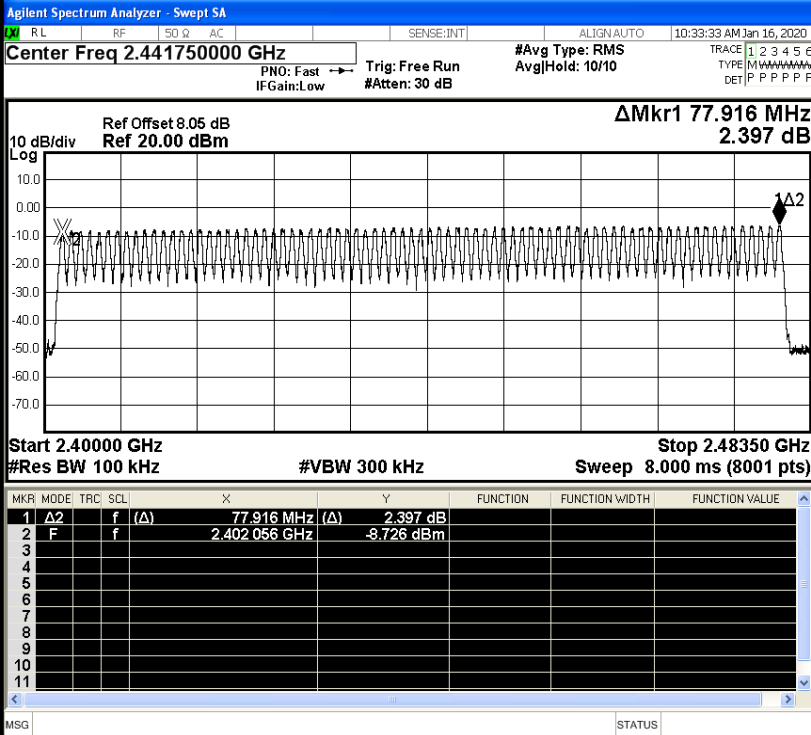
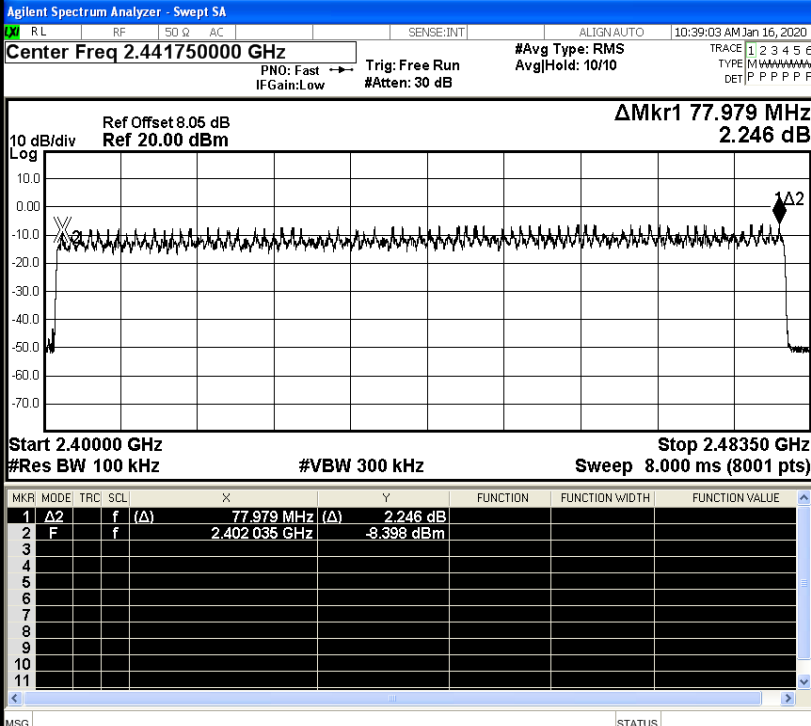
$\pi/4$ DQPSK/HCH



A.4 Hopping Channel Number

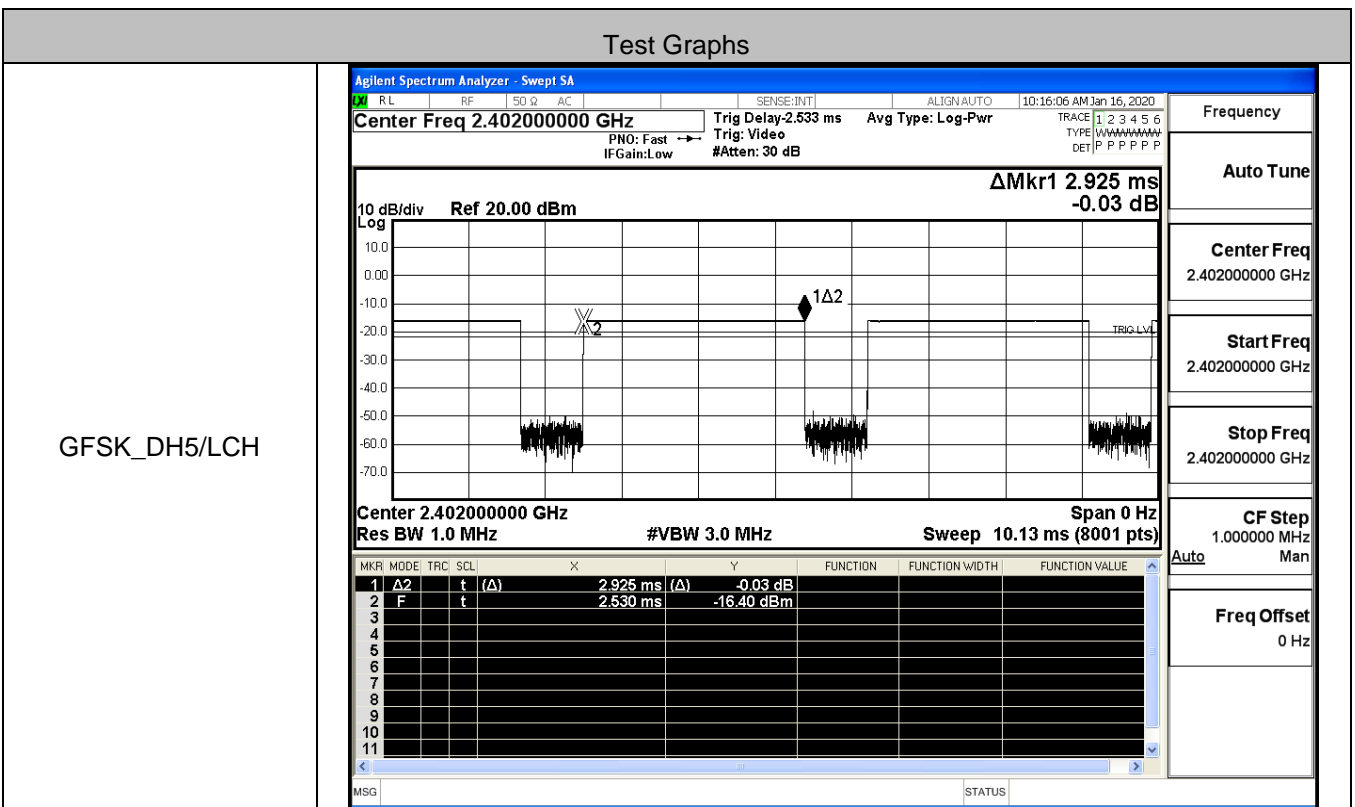
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS

Test Graphs

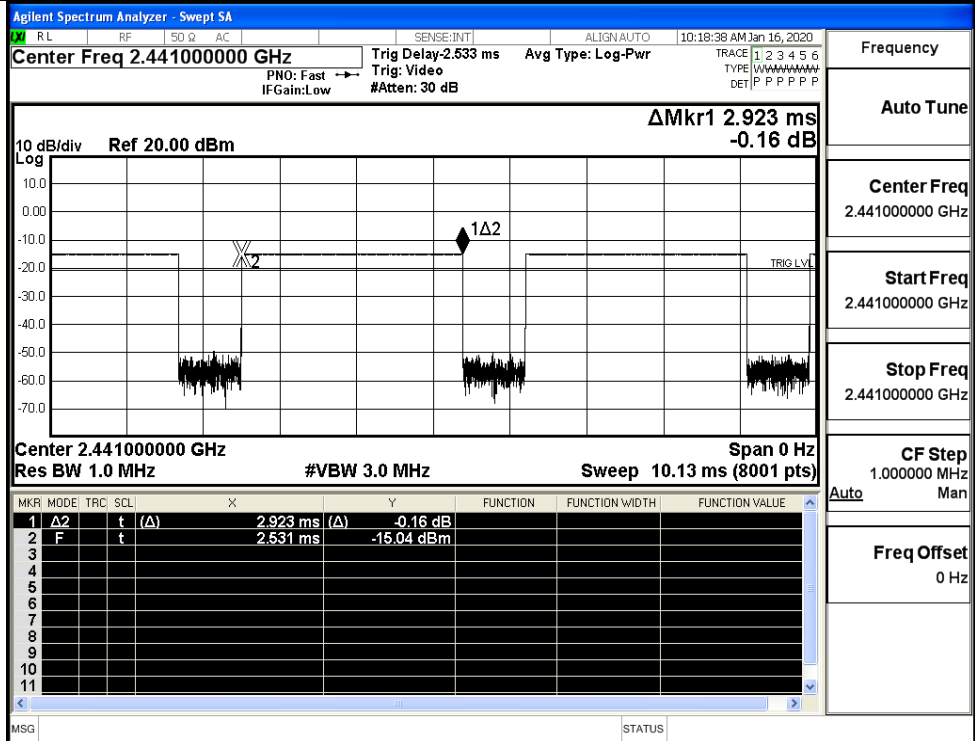
GFSK/Hop	 <p style="font-size: small;">Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 8.05 dB Ref 20.00 dBm #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts) Start 2.40000 GHz Stop 2.48350 GHz</p> <table border="1" style="font-size: x-small; width: 100%; border-collapse: collapse;"> <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>77.916 MHz</td> <td>(Δ)</td> <td>2.397 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402056 GHz</td> <td></td> <td>-3.726 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.916 MHz	(Δ)	2.397 dB			2	F	f		2.402056 GHz		-3.726 dBm			<p>Frequency</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>Freq Offset 0 Hz</p>
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.916 MHz	(Δ)	2.397 dB																							
2	F	f		2.402056 GHz		-3.726 dBm																							
$\pi/4$ DQPSK/Hop	 <p style="font-size: small;">Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 8.05 dB Ref 20.00 dBm #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts) Start 2.40000 GHz Stop 2.48350 GHz</p> <table border="1" style="font-size: x-small; width: 100%; border-collapse: collapse;"> <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>77.979 MHz</td> <td>(Δ)</td> <td>2.246 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402035 GHz</td> <td></td> <td>-3.398 dBm</td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.979 MHz	(Δ)	2.246 dB			2	F	f		2.402035 GHz		-3.398 dBm			<p>Frequency</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>Freq Offset 0 Hz</p>
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	Δ 2	f	(Δ)	77.979 MHz	(Δ)	2.246 dB																							
2	F	f		2.402035 GHz		-3.398 dBm																							

A.5 Dwell Time

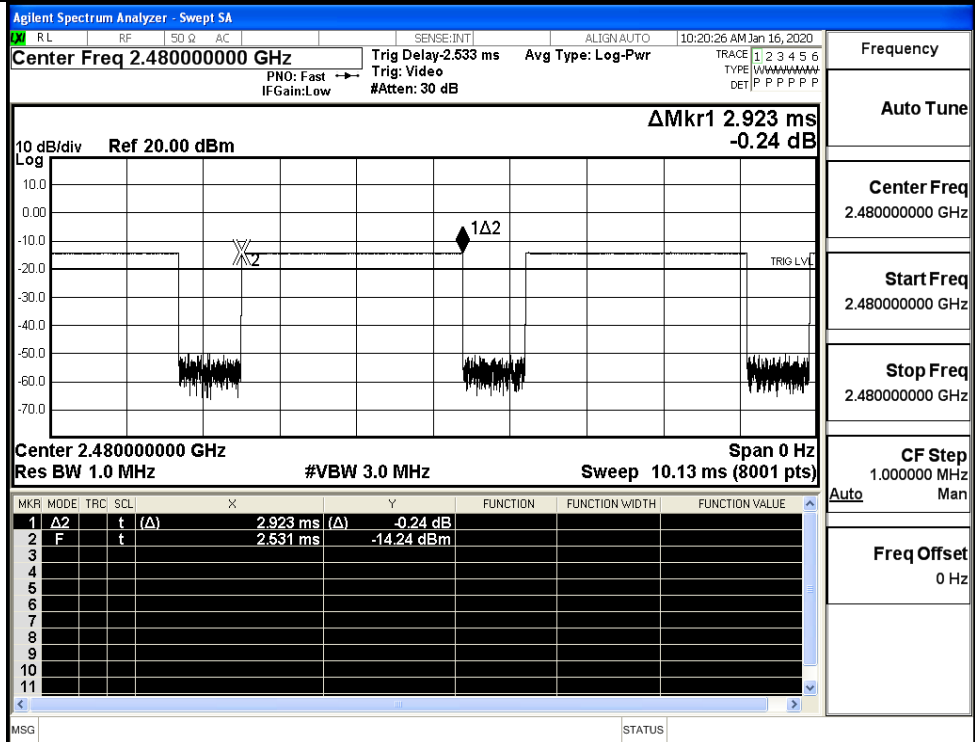
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.92	106.7	0.312	0.4	PASS
	DH5	MCH	2.92	106.7	0.312	0.4	PASS
	DH5	HCH	2.92	106.7	0.312	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.92	106.7	0.313	0.4	PASS
	2DH5	MCH	2.92	106.7	0.313	0.4	PASS
	2DH5	HCH	2.92	106.7	0.313	0.4	PASS



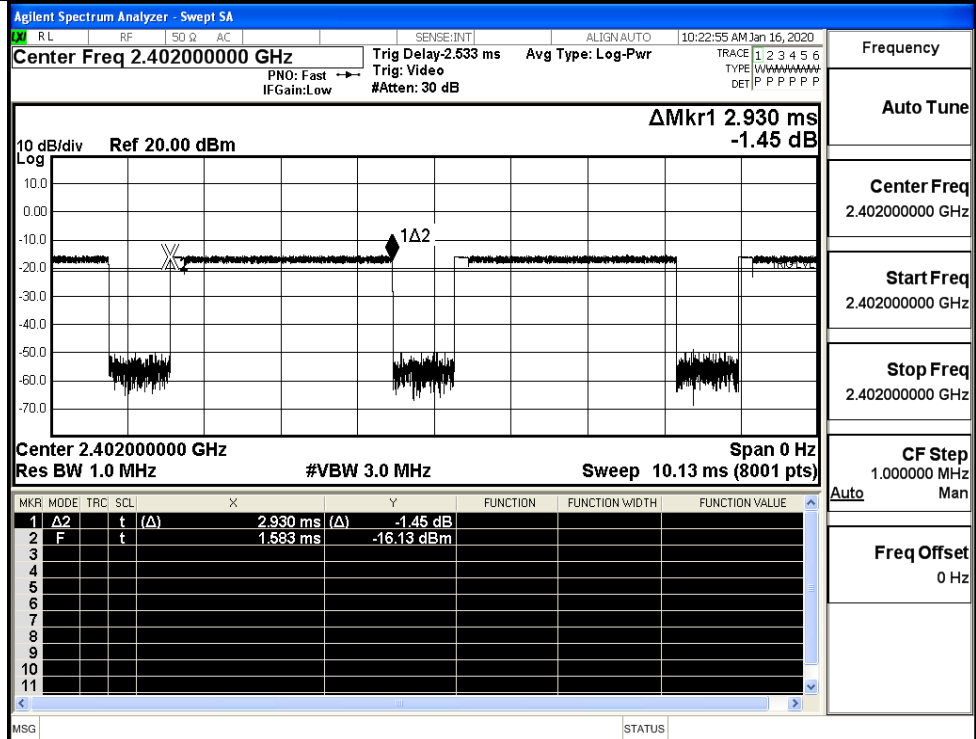
GFSK_DH5/MCH



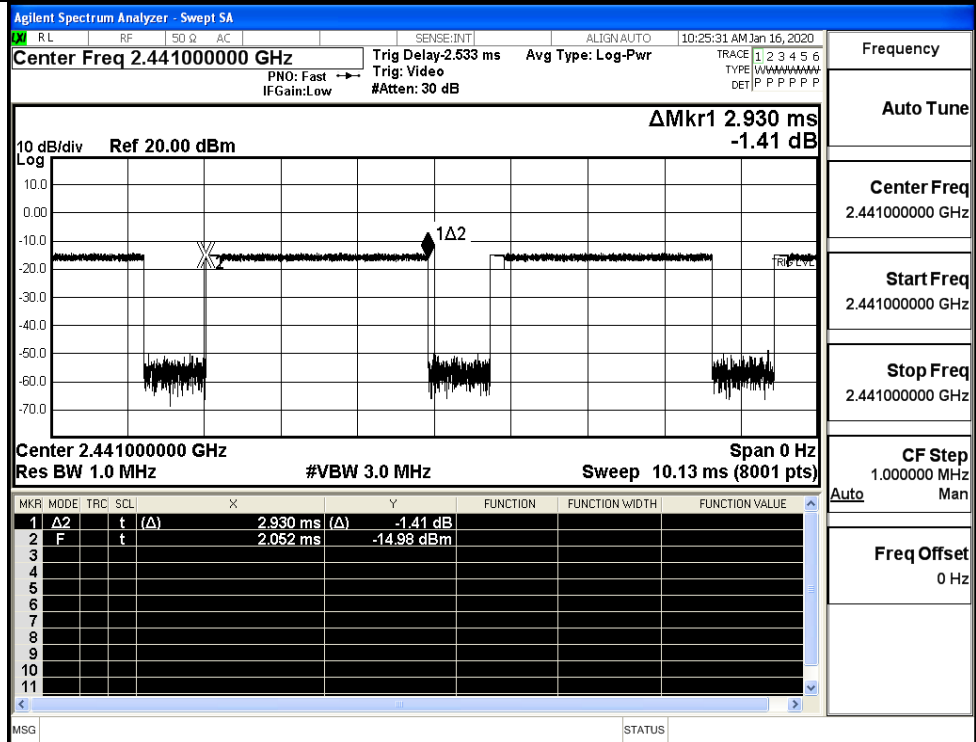
GFSK_DH5/HCH



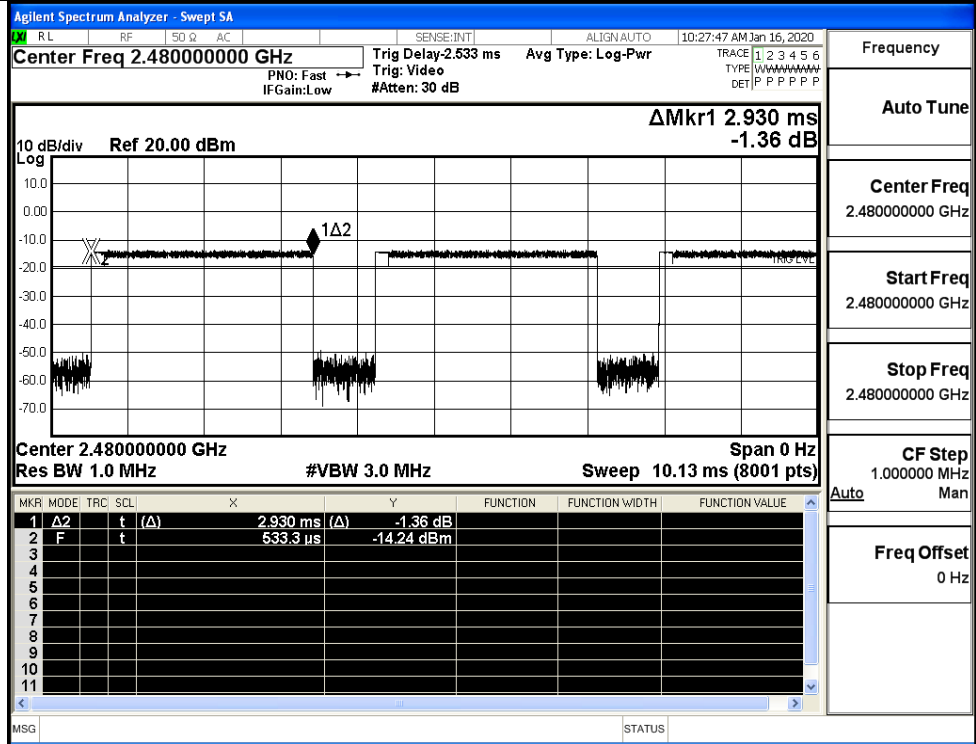
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH

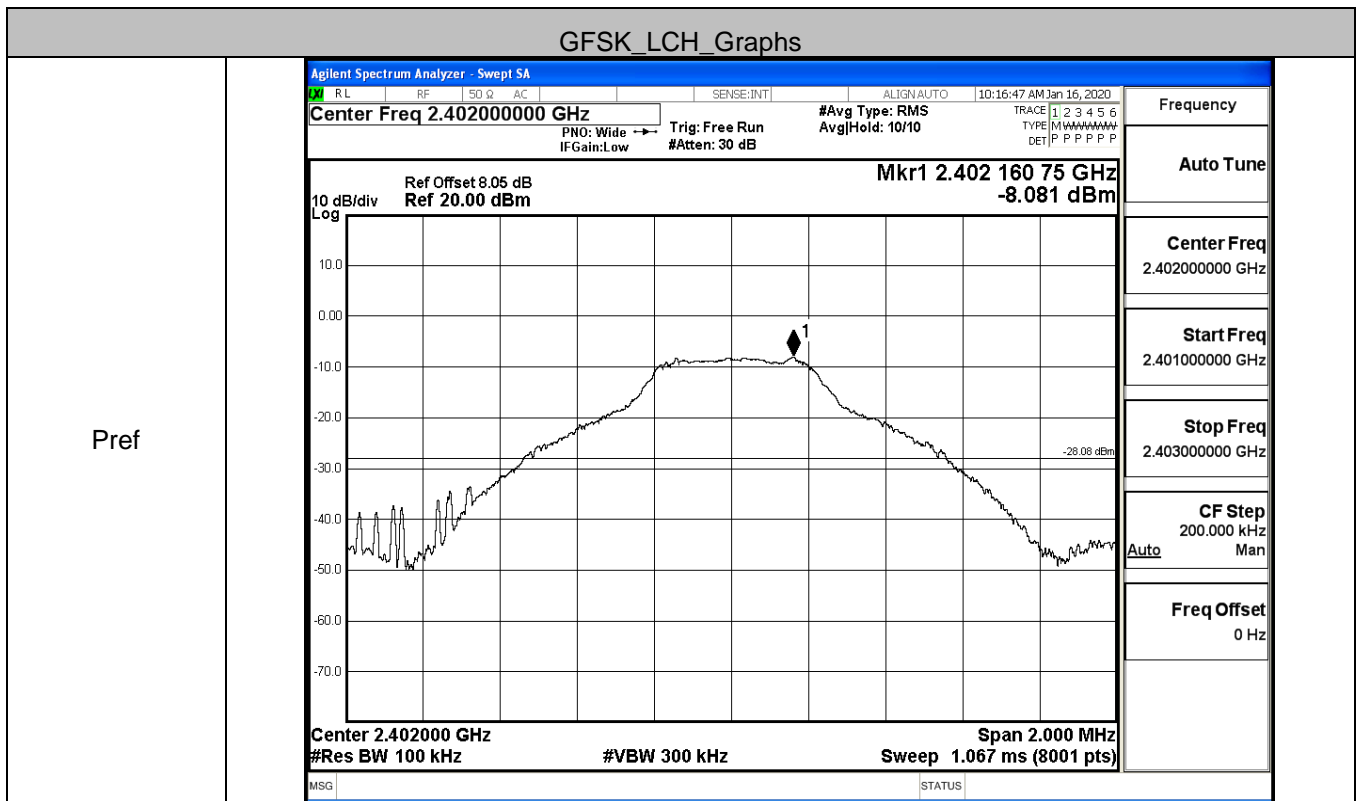


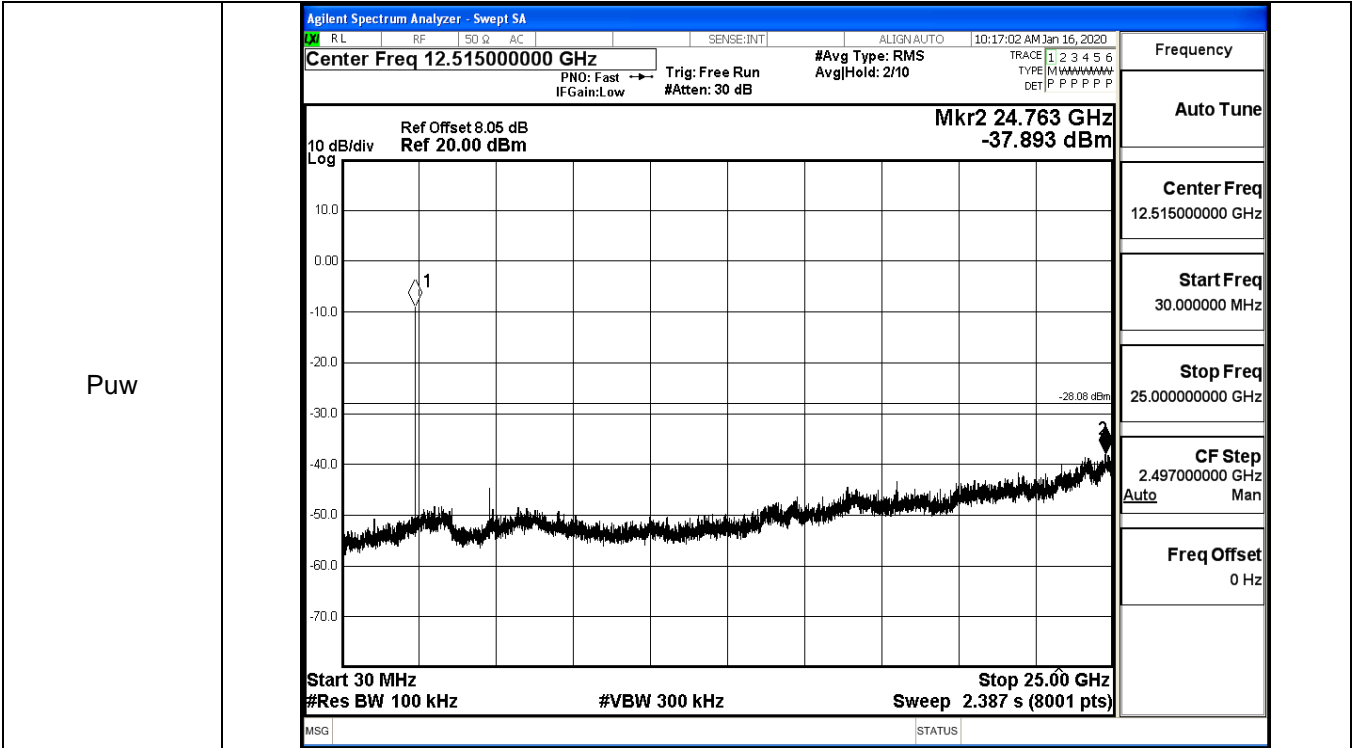
$\pi/4$ DQPSK
_2DH5/HCH



A.6 RF Conducted Spurious Emissions

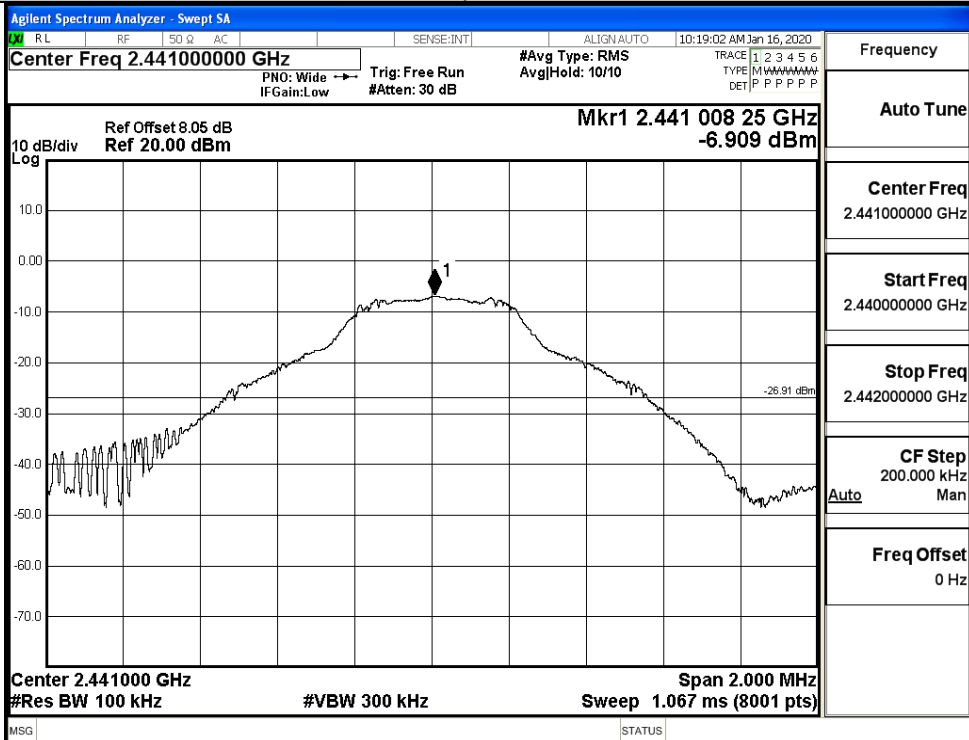
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-8.081	-37.893	-28.081	PASS
	MCH	-6.909	-38.115	-26.909	PASS
	HCH	-6.396	-36.385	-26.396	PASS
π/4DQPSK	LCH	-7.995	-37.260	-27.995	PASS
	MCH	-6.875	-37.381	-26.875	PASS
	HCH	-6.136	-37.204	-26.136	PASS



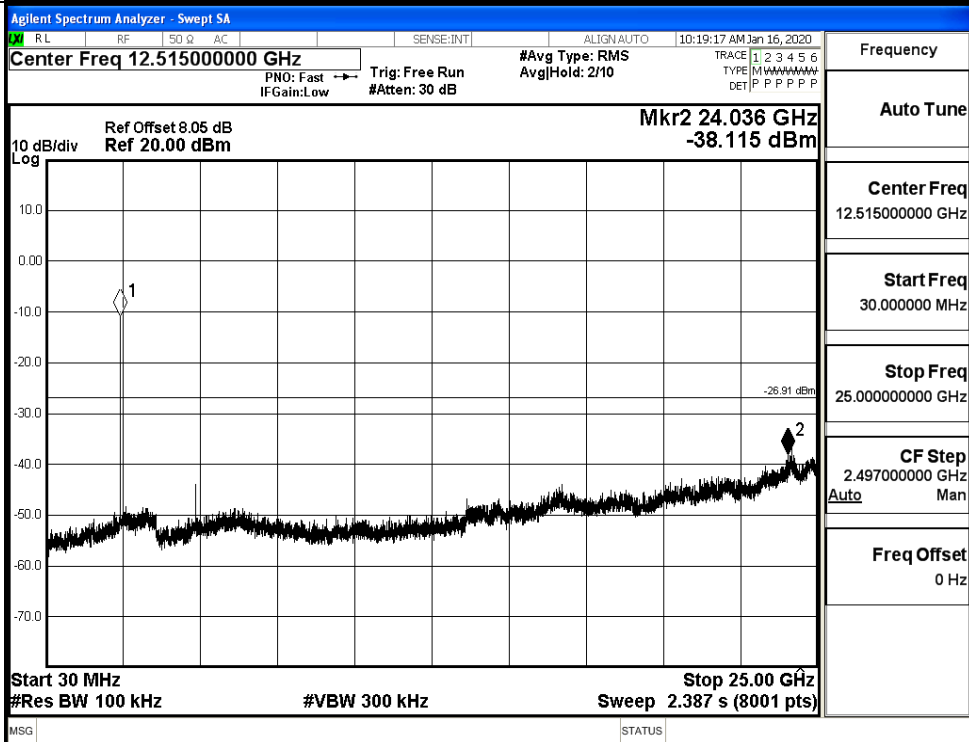


GFSK_MCH_Graphs

Pref

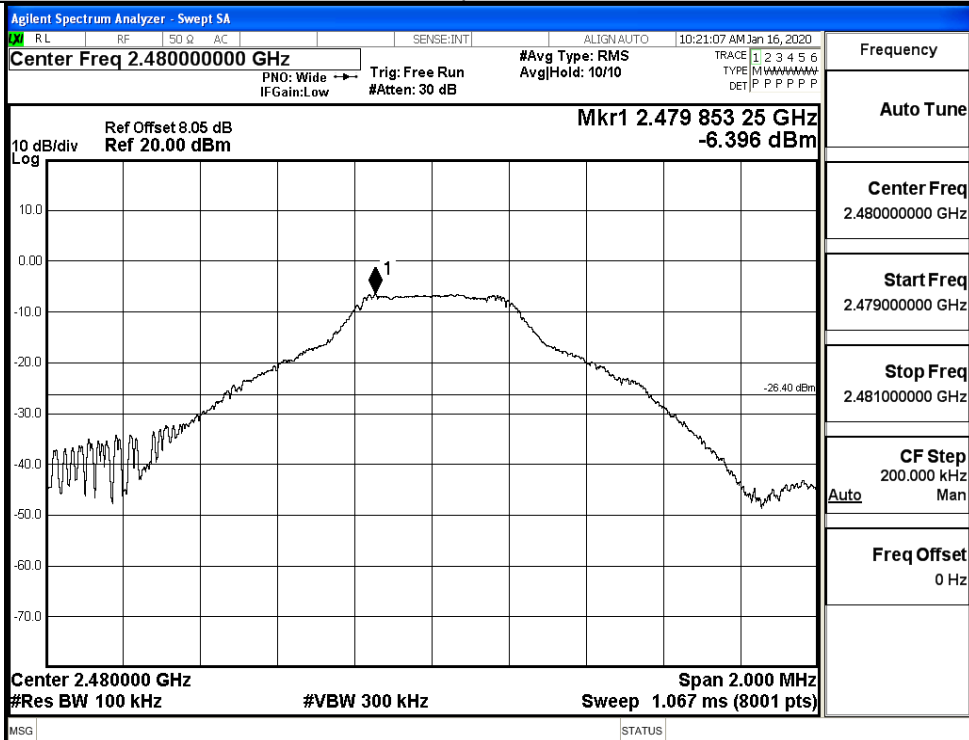


Puw

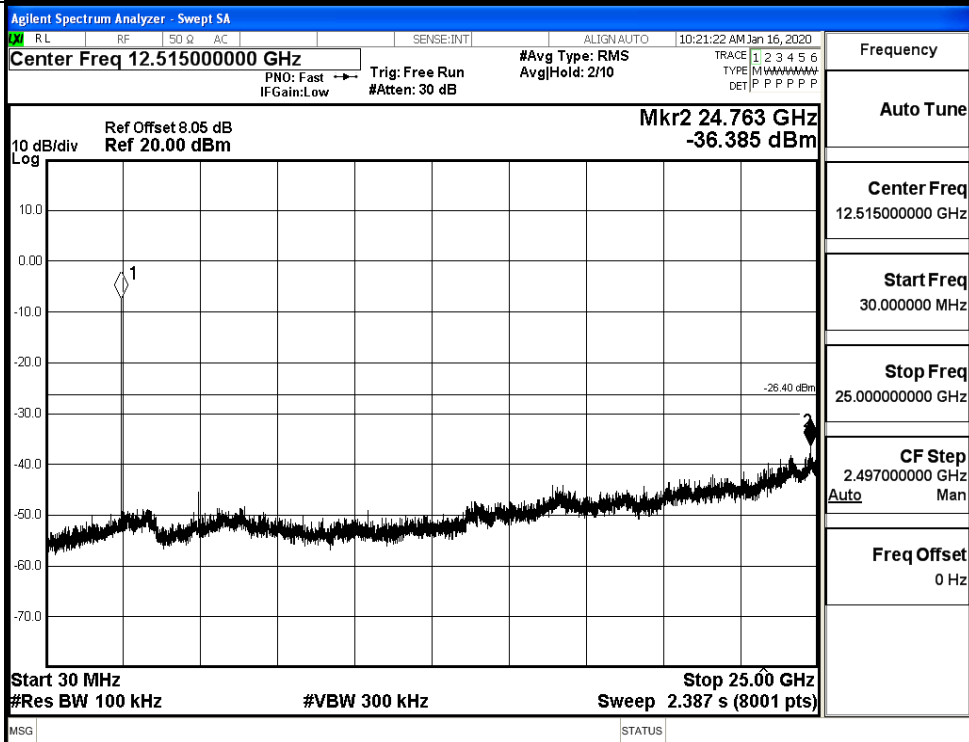


GFSK_HCH_Graphs

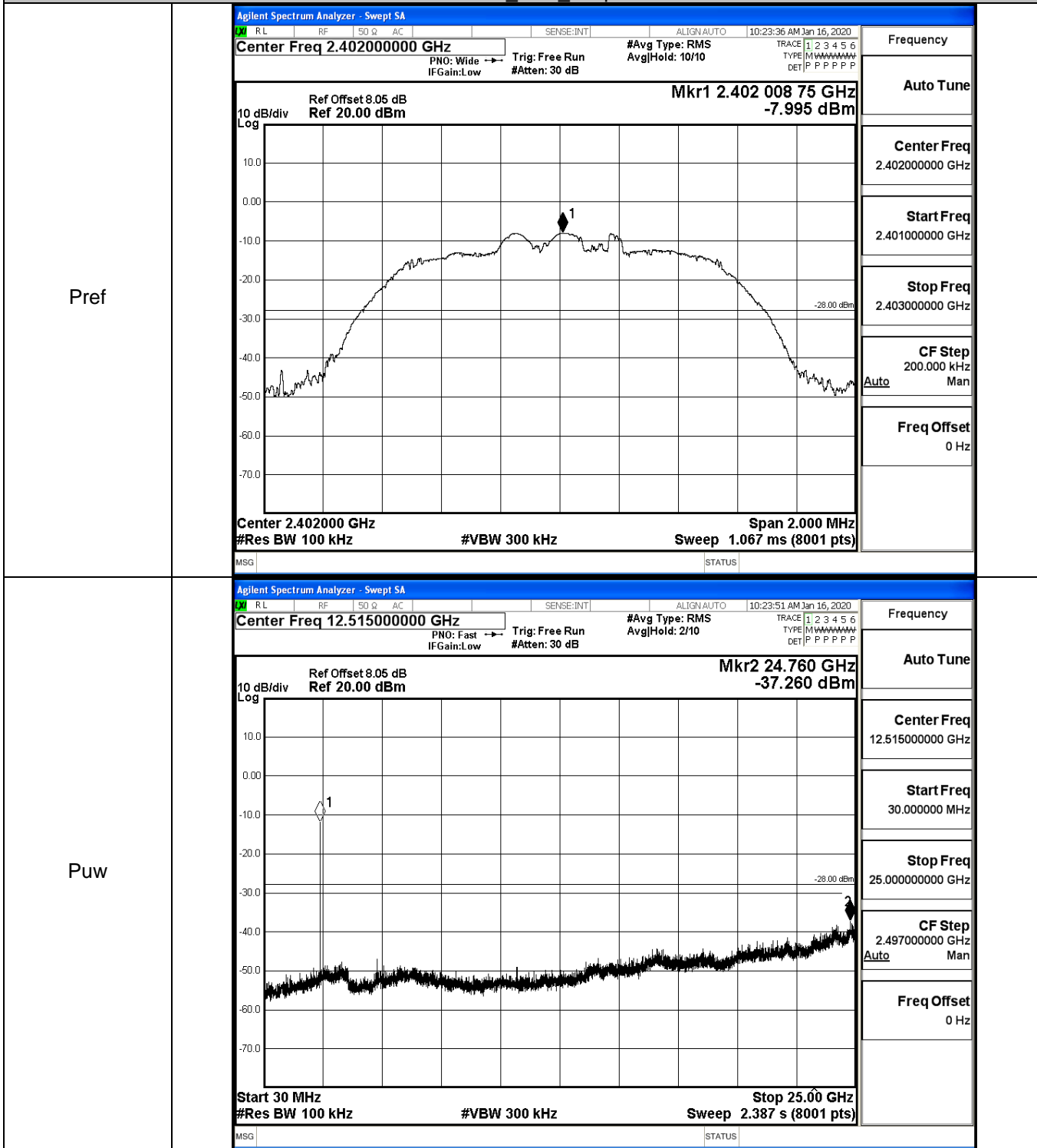
Pref



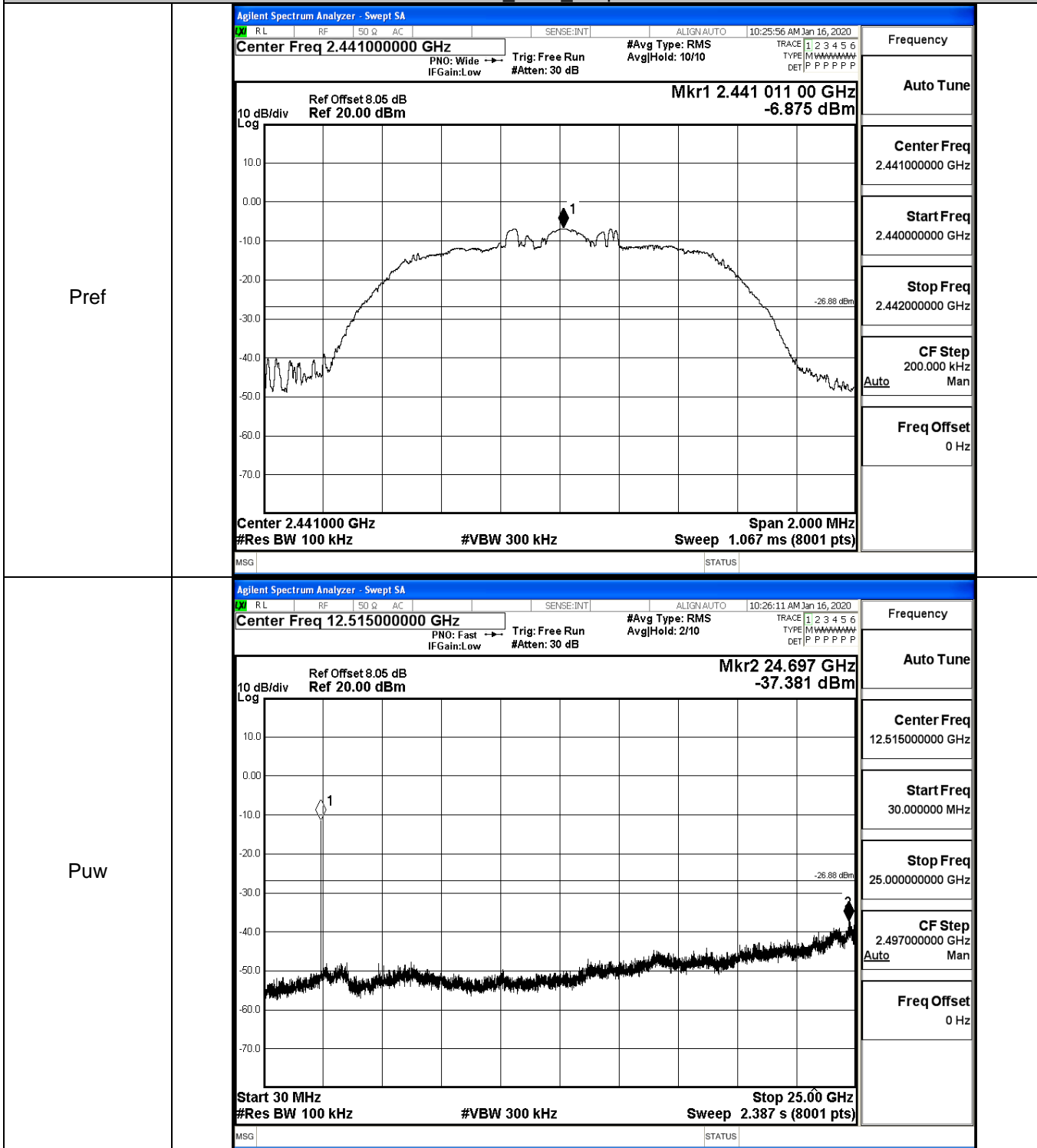
Puw



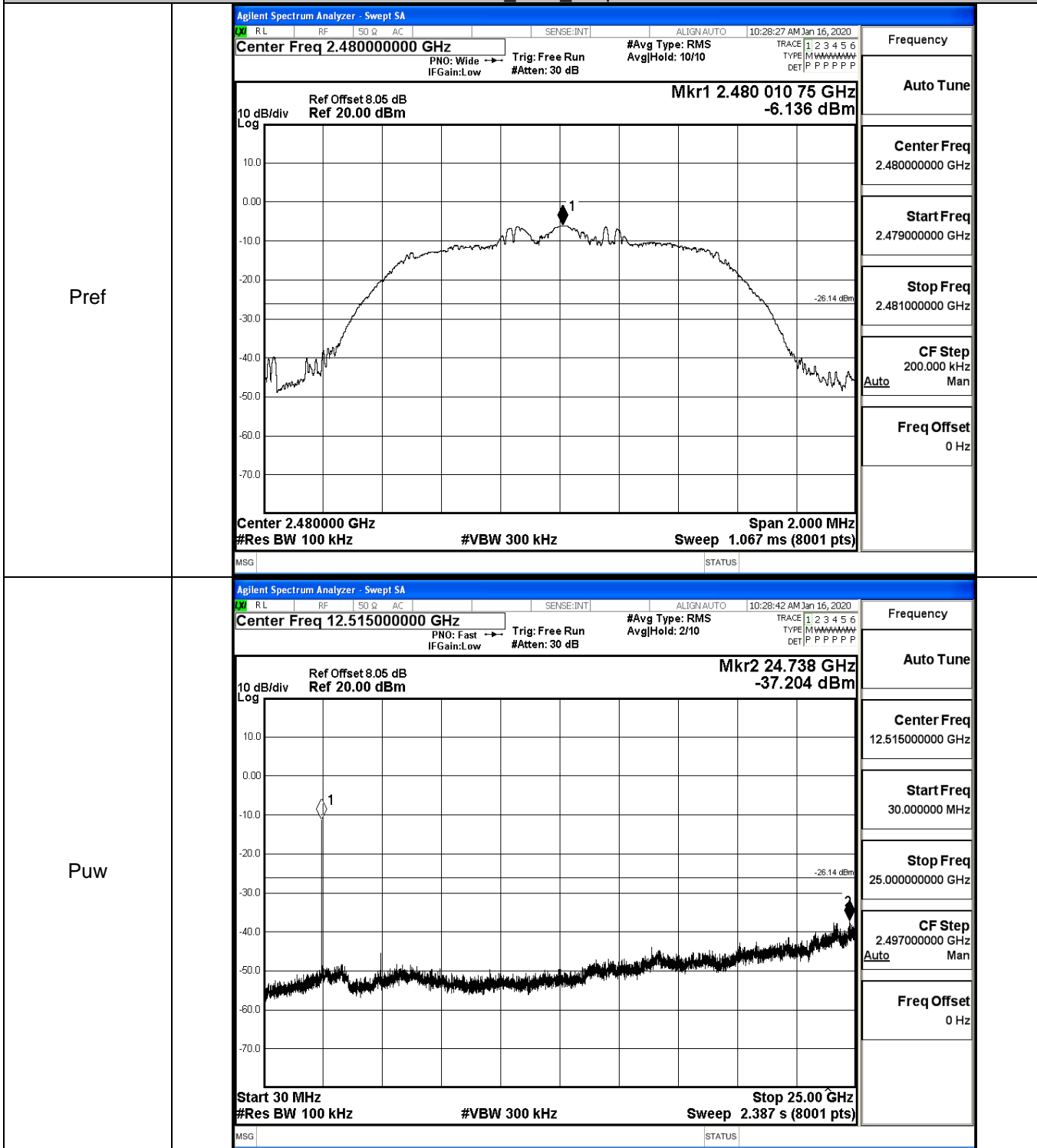
$\pi/4$ DQPSK_LCH_Graphs



$\pi/4$ DQPSK_MCH_Graphs



$\pi/4$ DQPSK_HCH_Graphs

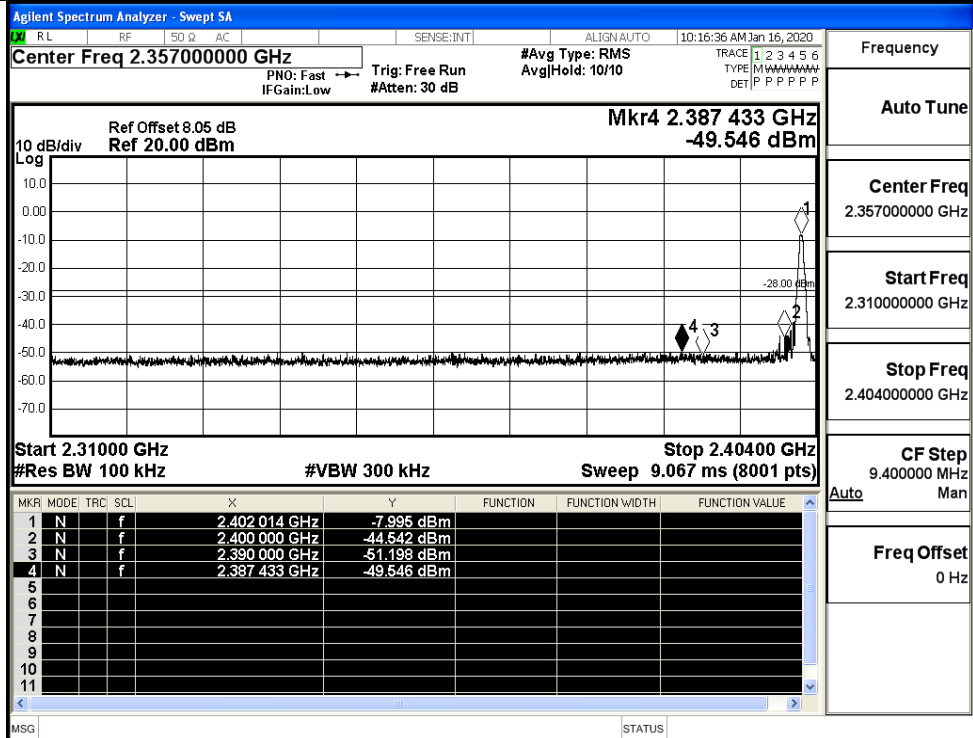


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-7.995	Off	-49.546	-28	PASS
			-7.266	On	-49.270	-27.27	PASS
	HCH	2480	-6.135	Off	-47.067	-26.14	PASS
			-6.300	On	-48.623	-26.3	PASS
$\pi/4$ DQPSK	LCH	2402	-7.944	Off	-49.660	-27.94	PASS
			-7.231	On	-49.222	-27.23	PASS
	HCH	2480	-6.116	Off	-47.789	-26.12	PASS
			-6.206	On	-47.989	-26.21	PASS

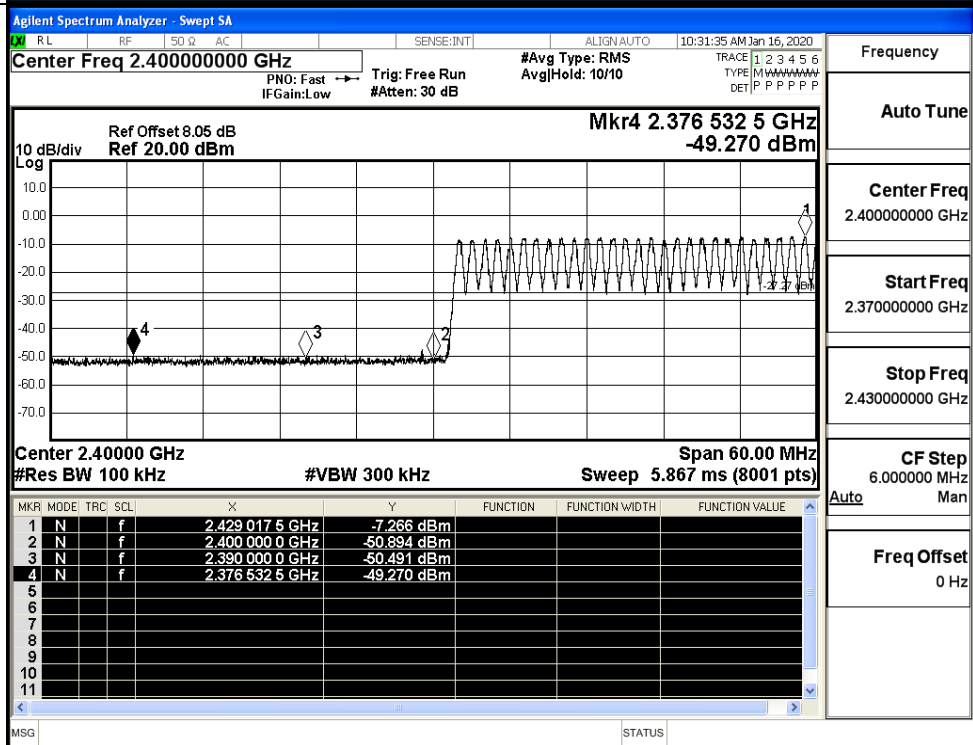
Test Graphs

GFSK/LCH/No Hop



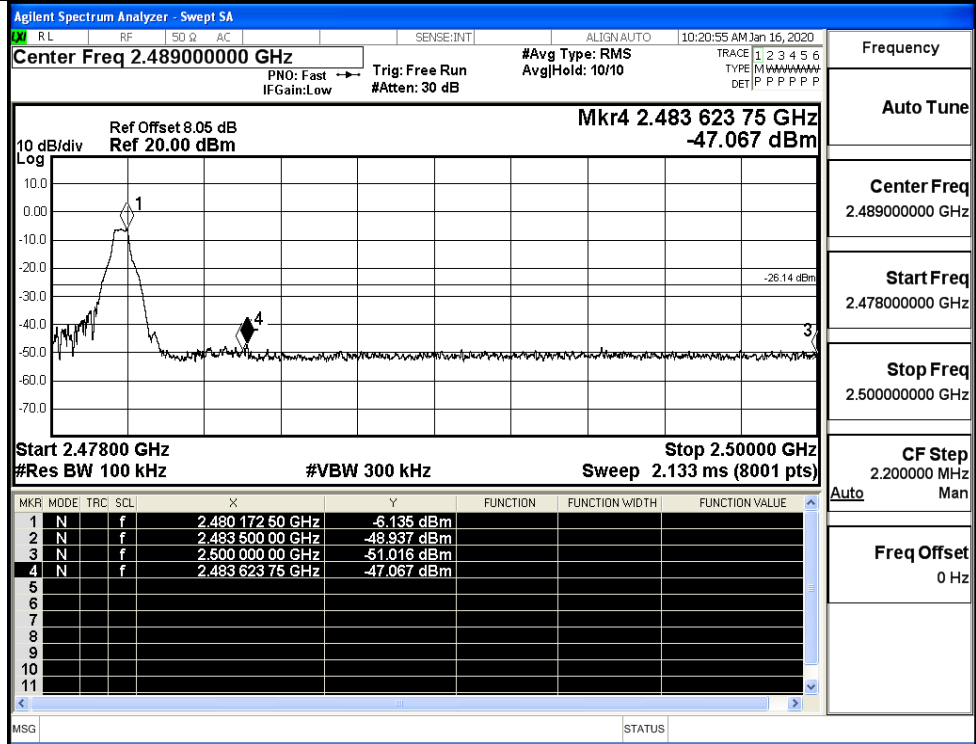
Frequency	Auto Tune
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz
Auto	Man
Freq Offset	0 Hz

GFSK/LCH/Hop

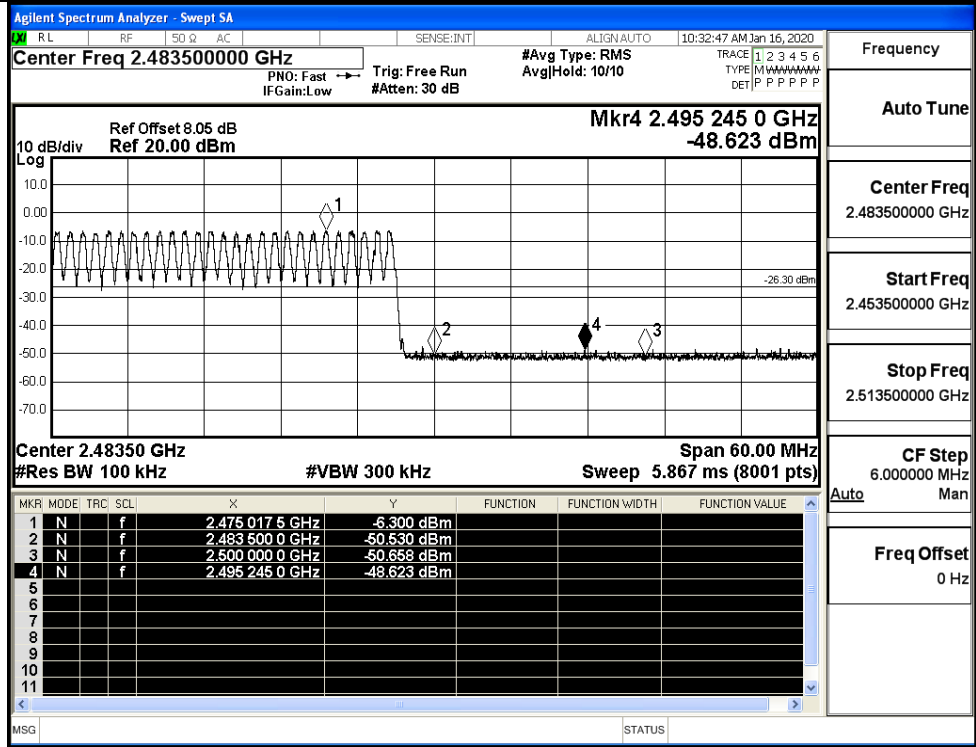


Frequency	Auto Tune
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Auto	Man
Freq Offset	0 Hz

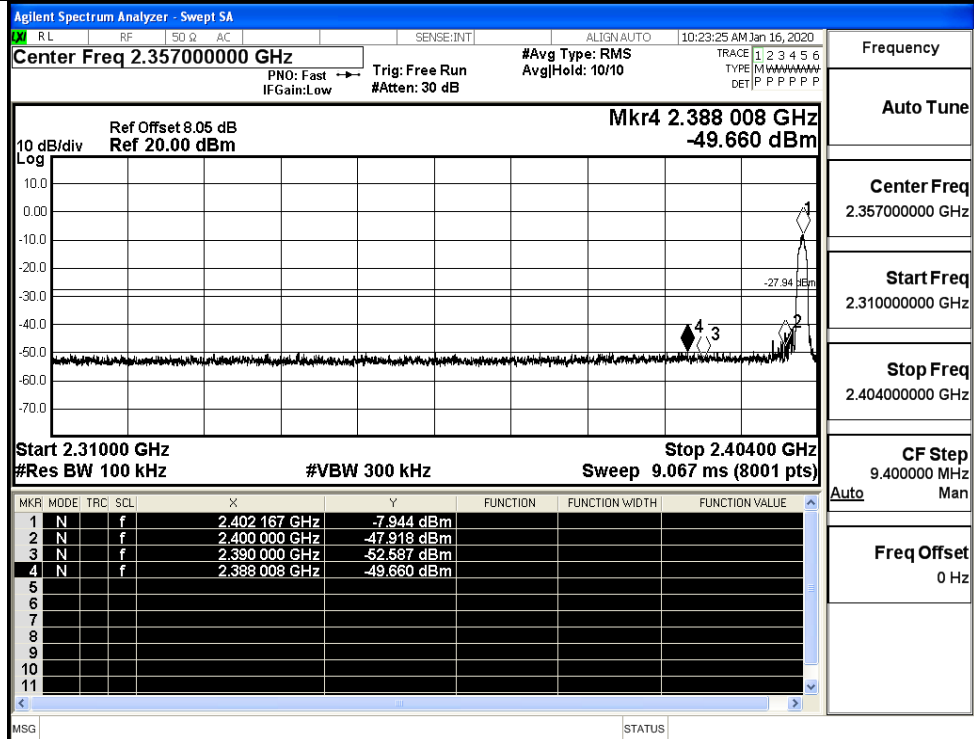
GFSK/HCH/No Hop



GFSK/HCH/Hop

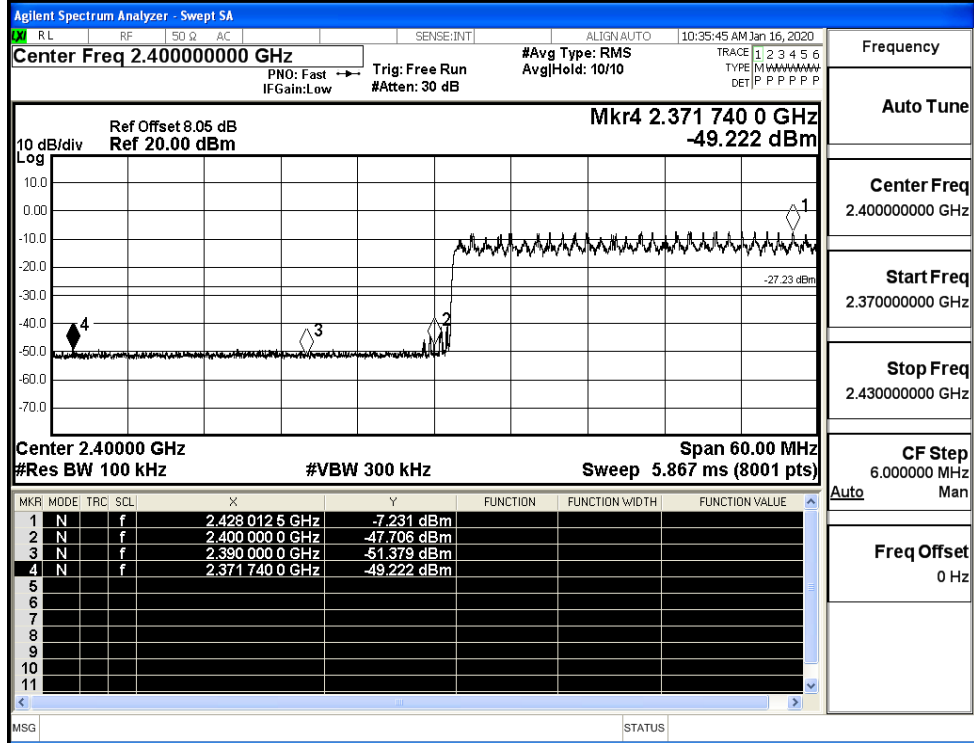


$\pi/4$ DQPSK/LCH/No Hop



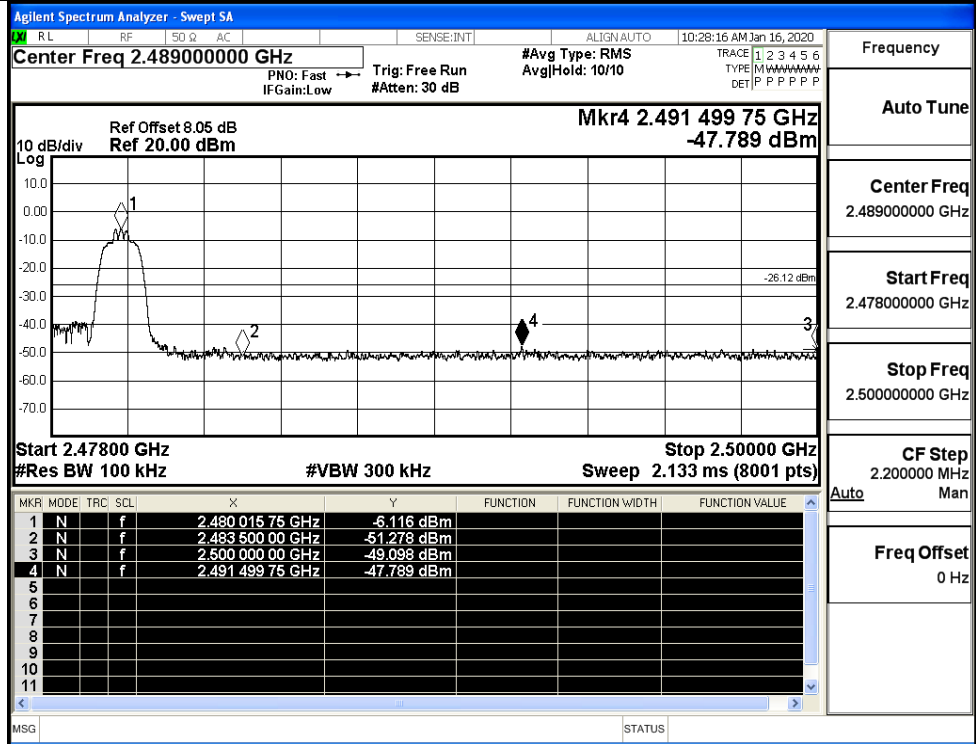
Frequency
Auto Tune
Center Freq
2.357000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.404000000 GHz
CF Step
9.400000 MHz
Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop

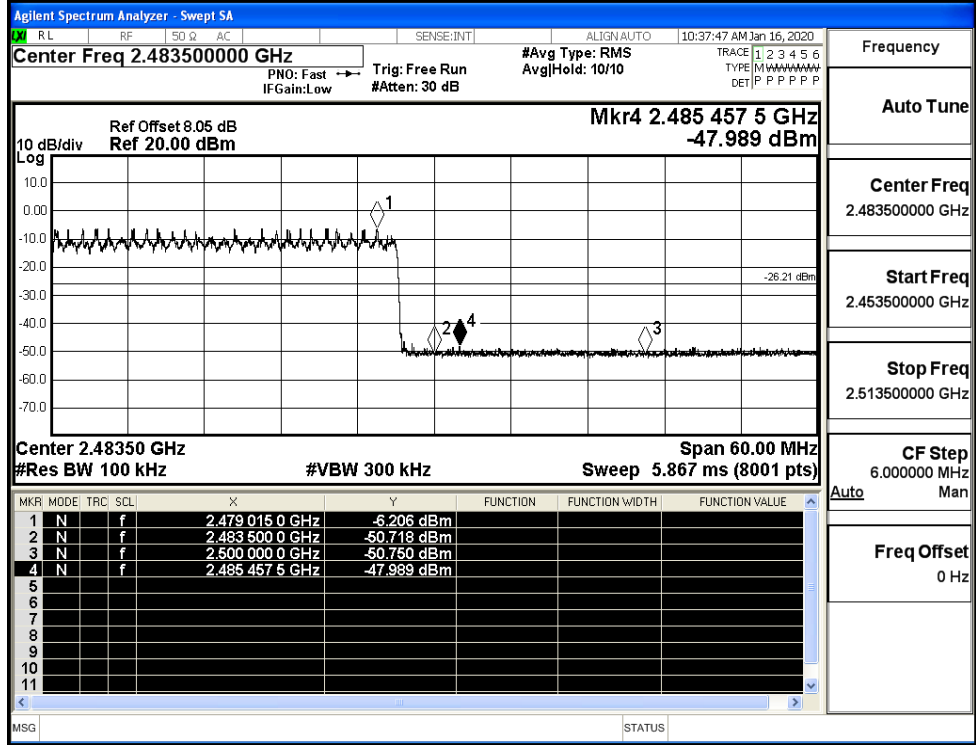


Frequency
Auto Tune
Center Freq
2.400000000 GHz
Start Freq
2.370000000 GHz
Stop Freq
2.430000000 GHz
CF Step
6.000000 MHz
Freq Offset
0 Hz

π /4DQPSK/HCH/No
Hop



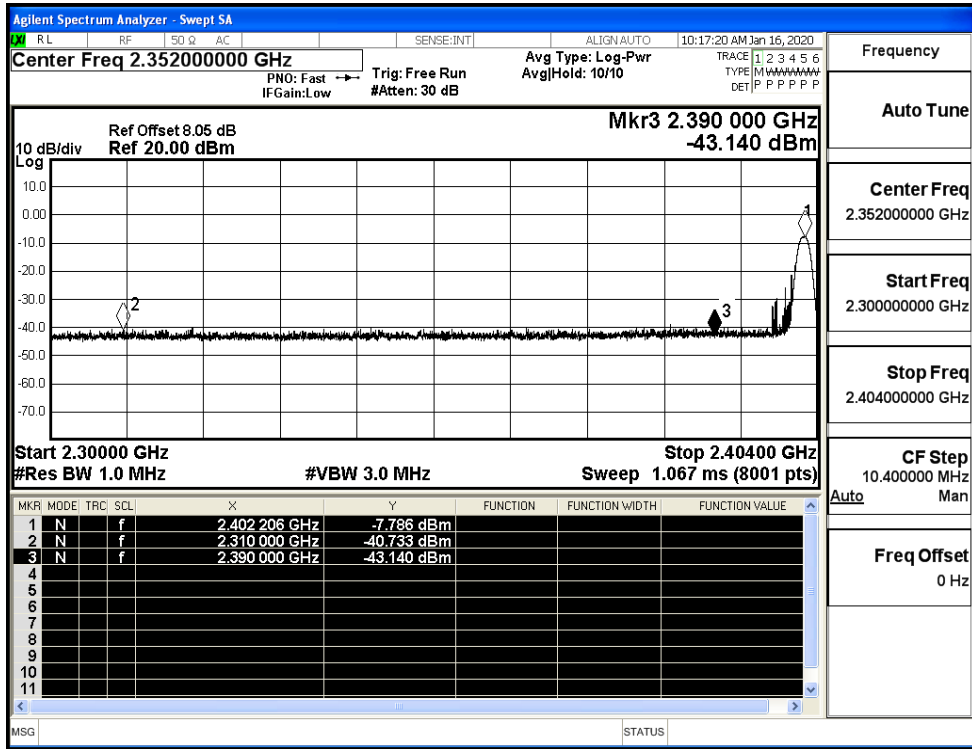
π /4DQPSK/HCH/Hop



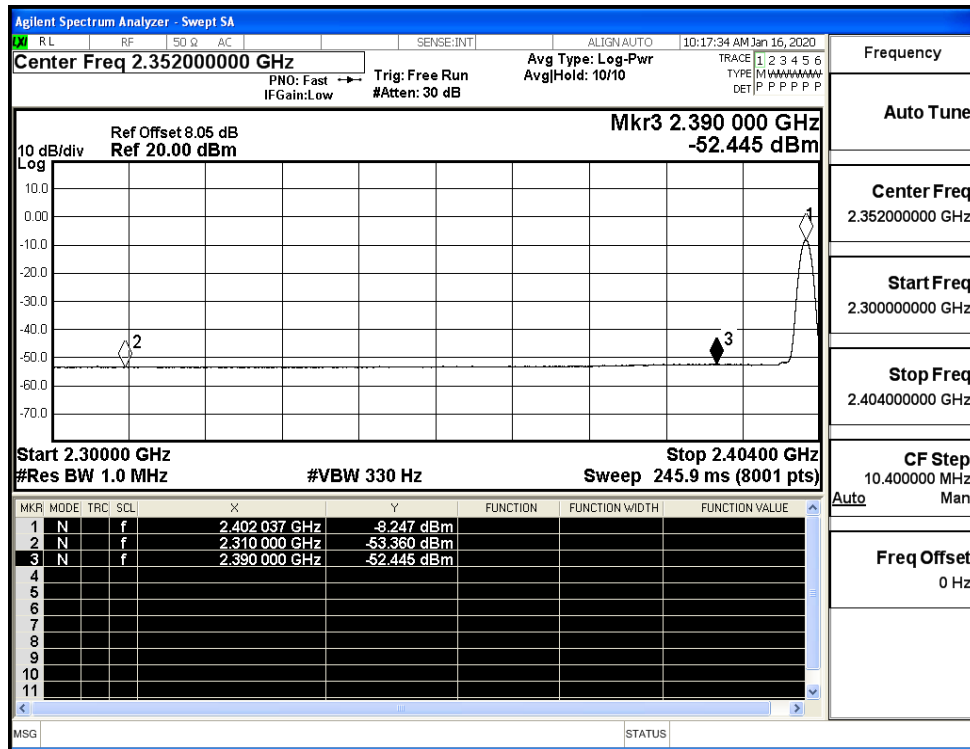
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-40.73	2.0	0	56.5	PEAK	74	PASS
	Off	2310.0	-53.36	2.0	0	43.87	AV	54	PASS
	Off	2390.0	-43.14	2.0	0	54.09	PEAK	74	PASS
	Off	2390.0	-52.45	2.0	0	44.78	AV	54	PASS
	Off	2483.5	-40.16	2.0	0	57.07	PEAK	74	PASS
	Off	2483.5	-51.10	2.0	0	46.13	AV	54	PASS
	Off	2500.0	-42.02	2.0	0	55.21	PEAK	74	PASS
	Off	2500.0	-51.76	2.0	0	45.47	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.84	2.0	0	53.39	PEAK	74	PASS
	Off	2310.0	-53.40	2.0	0	43.83	AV	54	PASS
	Off	2390.0	-41.64	2.0	0	55.59	PEAK	74	PASS
	Off	2390.0	-52.37	2.0	0	44.86	AV	54	PASS
	Off	2483.5	-40.34	2.0	0	56.89	PEAK	74	PASS
	Off	2483.5	-51.58	2.0	0	45.65	AV	54	PASS
	Off	2500.0	-41.60	2.0	0	55.63	PEAK	74	PASS
	Off	2500.0	-51.56	2.0	0	45.67	AV	54	PASS

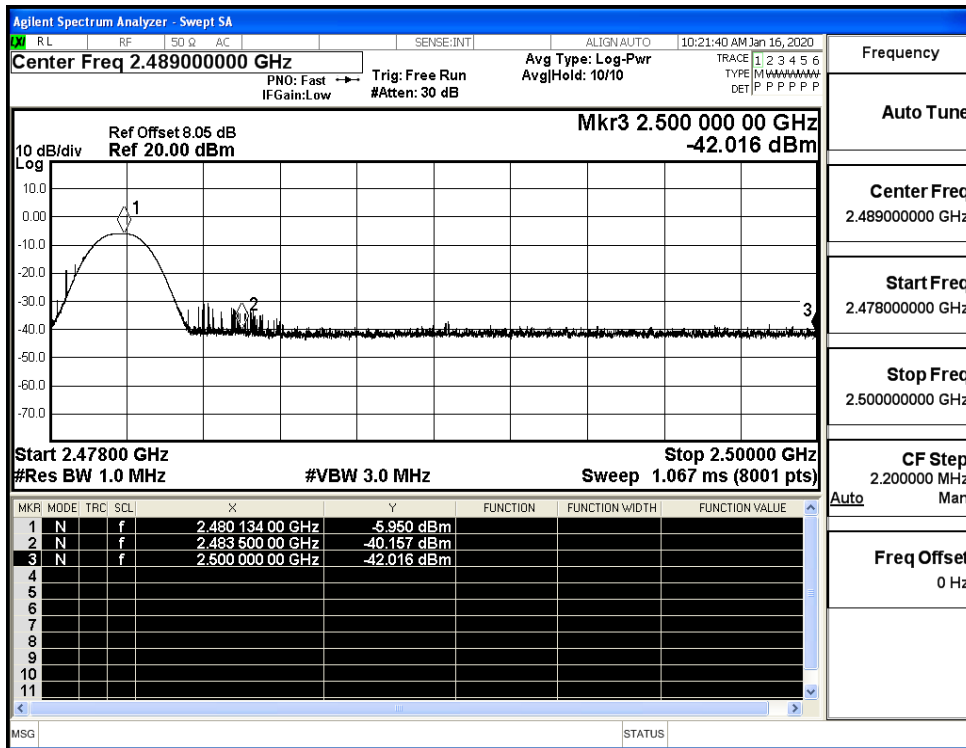
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



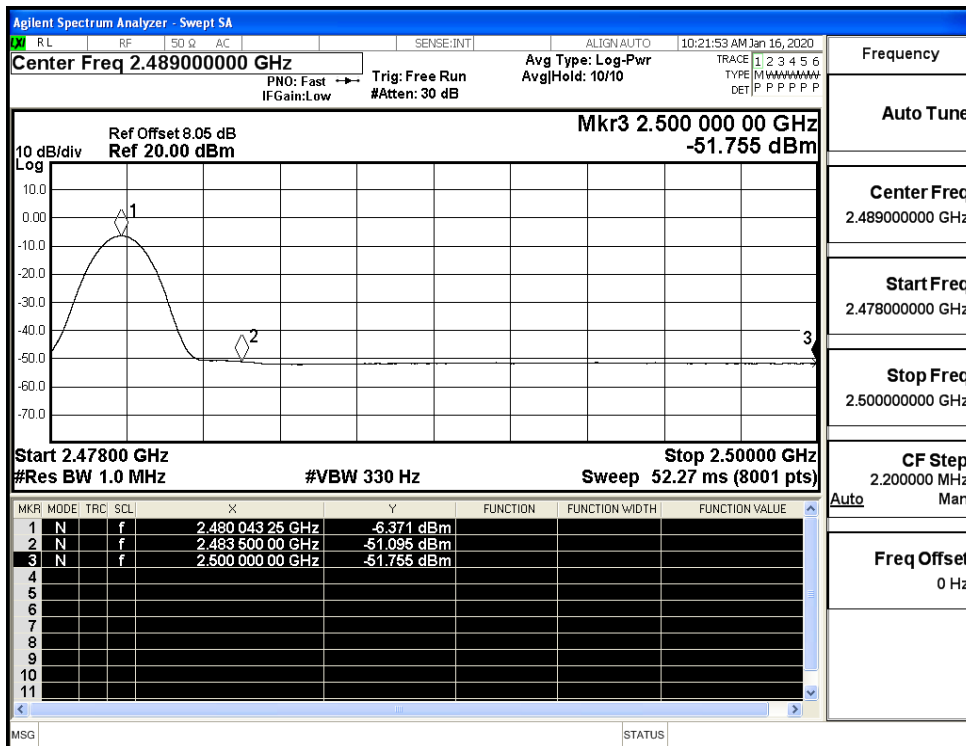
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



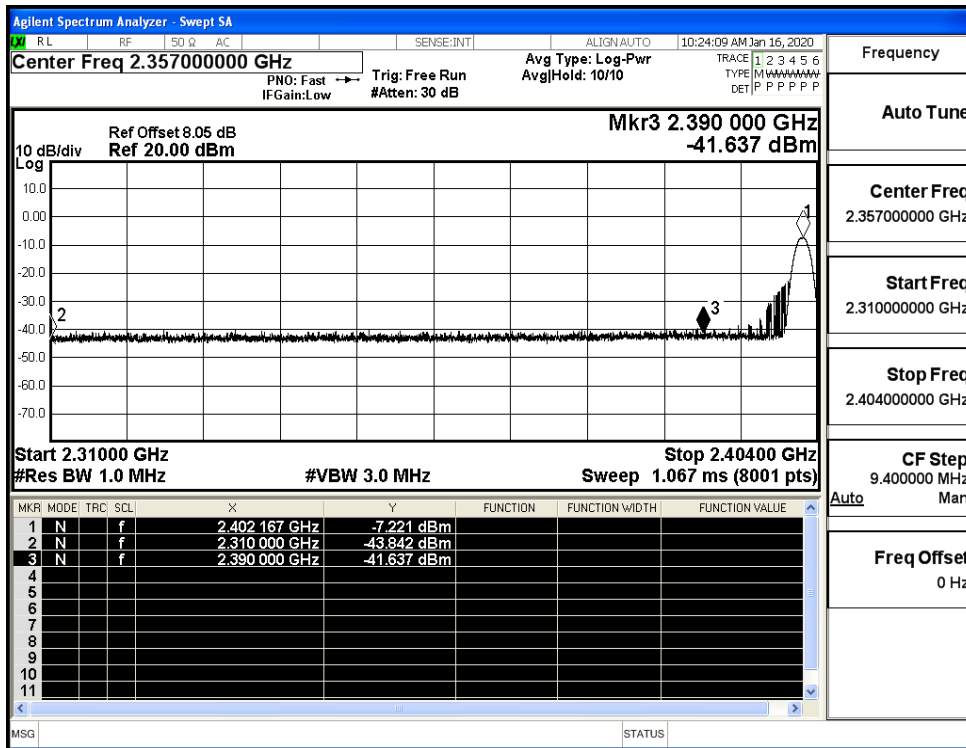
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



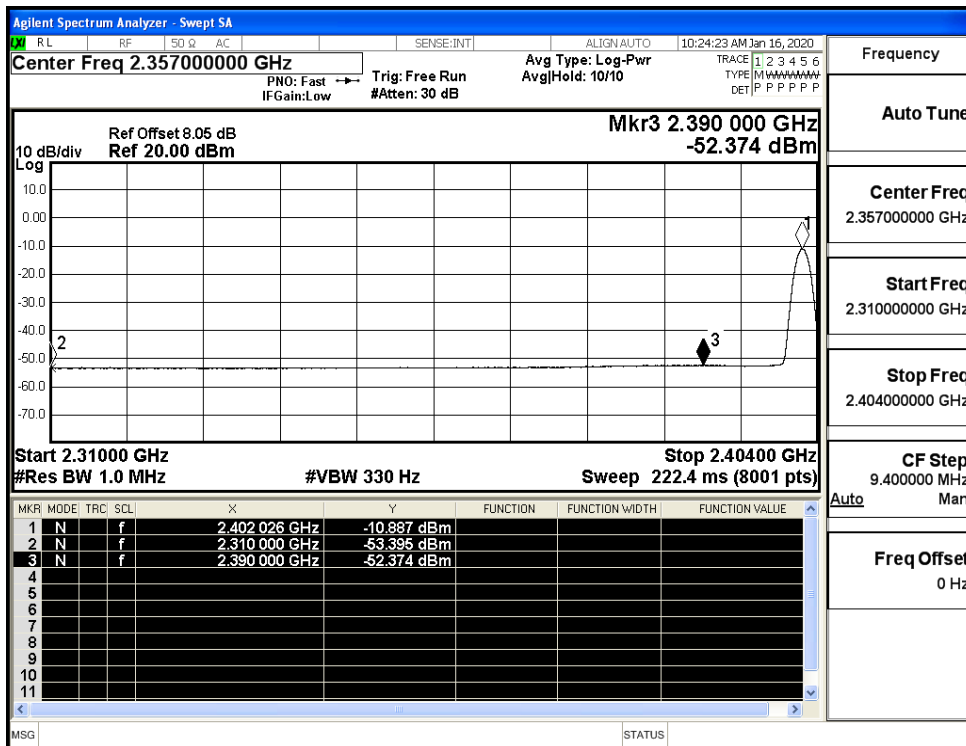
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



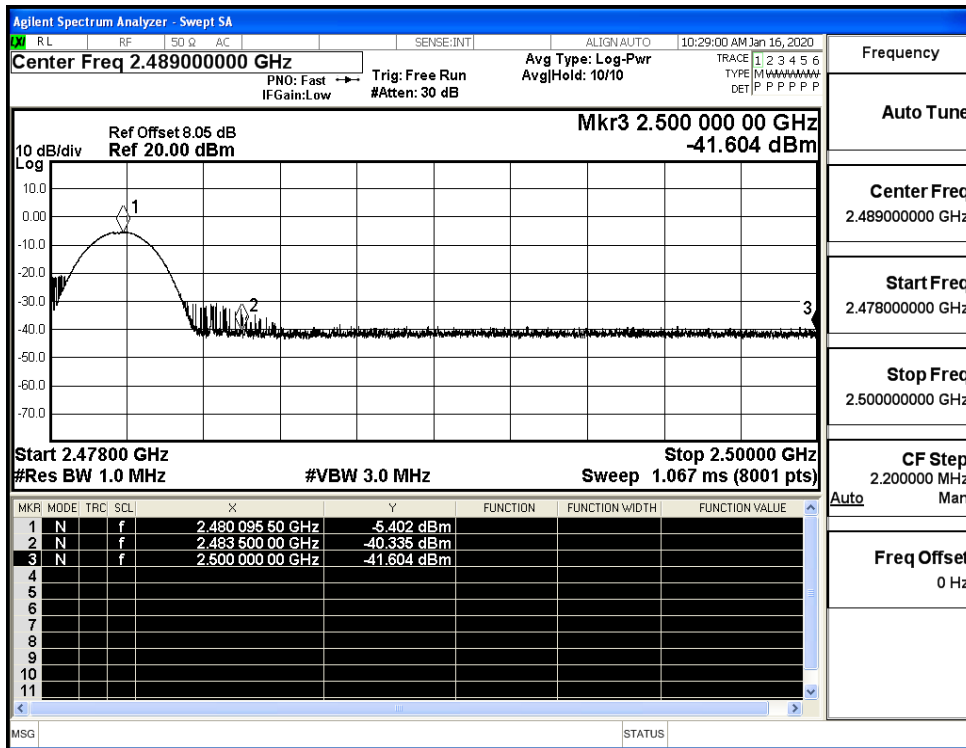
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)

