

## Appendix A

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

Product Name: Bluetooth Speaker with Magnet and Hook

Trade Mark: Klein Tools

Test Model: AEPJS3

#### Environmental Conditions

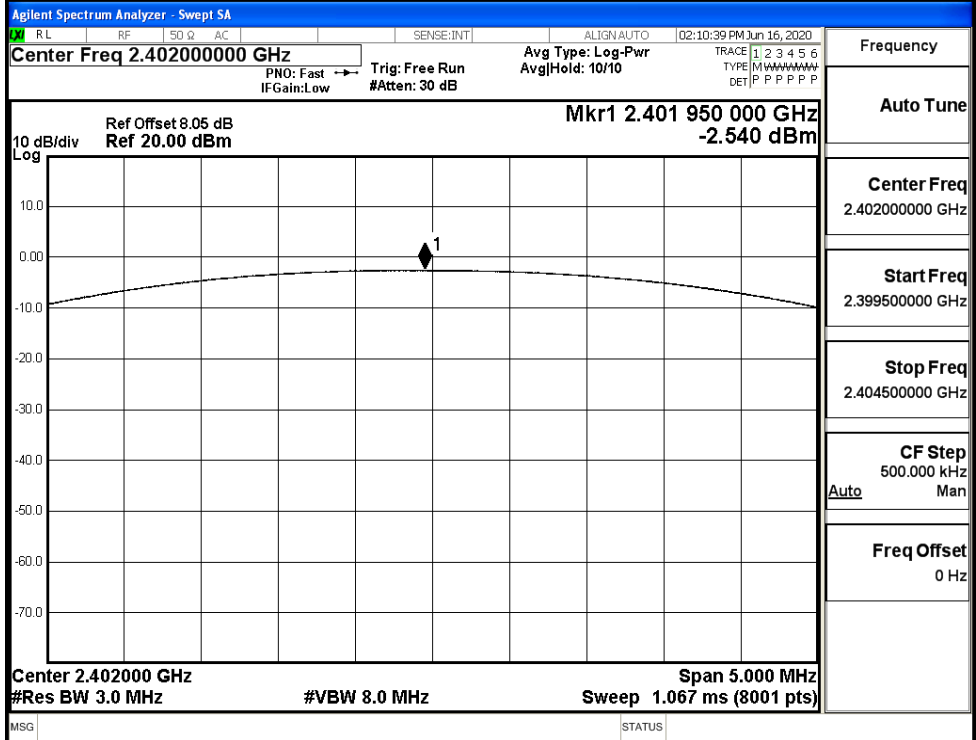
Temperature:	25.1 ° C
Relative Humidity:	53.4%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Li
Supervised by:	Li Huan

#### A.1 Maxmum Conducted Peak Output Power

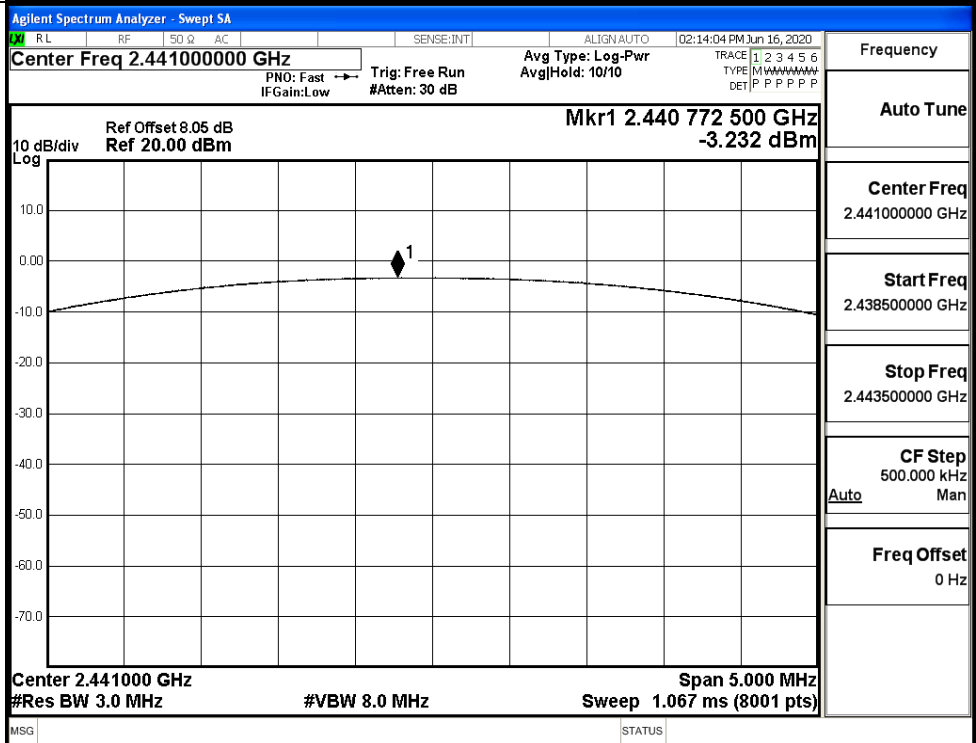
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.540	21	PASS
	MCH	-3.232	21	PASS
	HCH	-2.942	21	PASS
$\pi/4$ DQPSK	LCH	1.284	21	PASS
	MCH	0.409	21	PASS
	HCH	0.753	21	PASS
8DPSK	LCH	1.906	21	PASS
	MCH	-4.421	21	PASS
	HCH	-4.036	21	PASS

Test Graphs

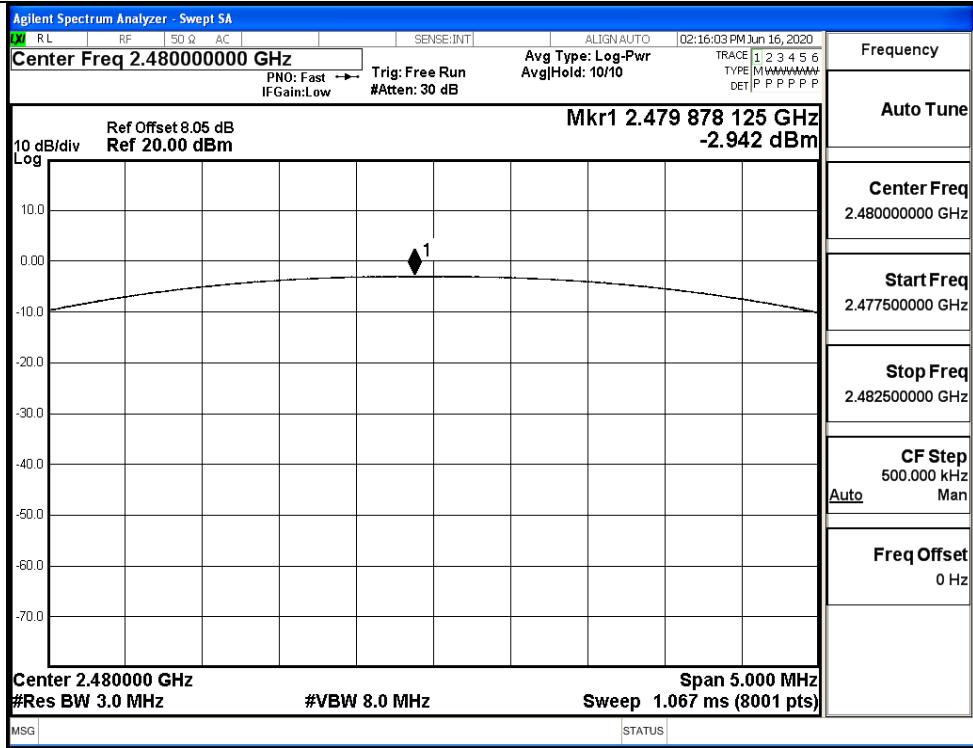
GFSK/LCH



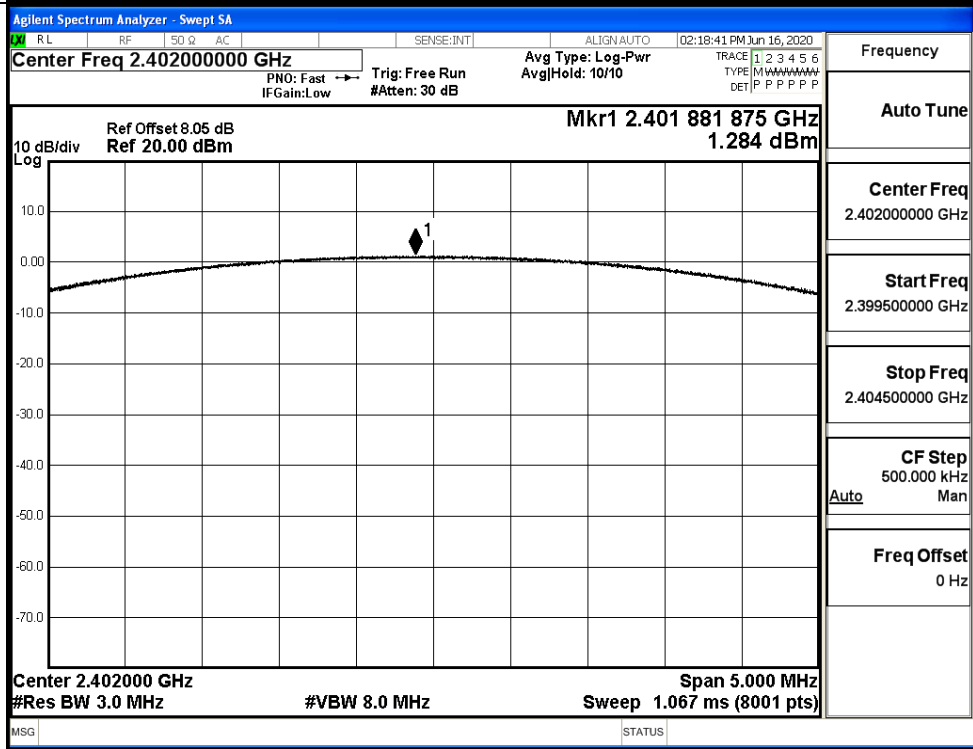
GFSK/MCH



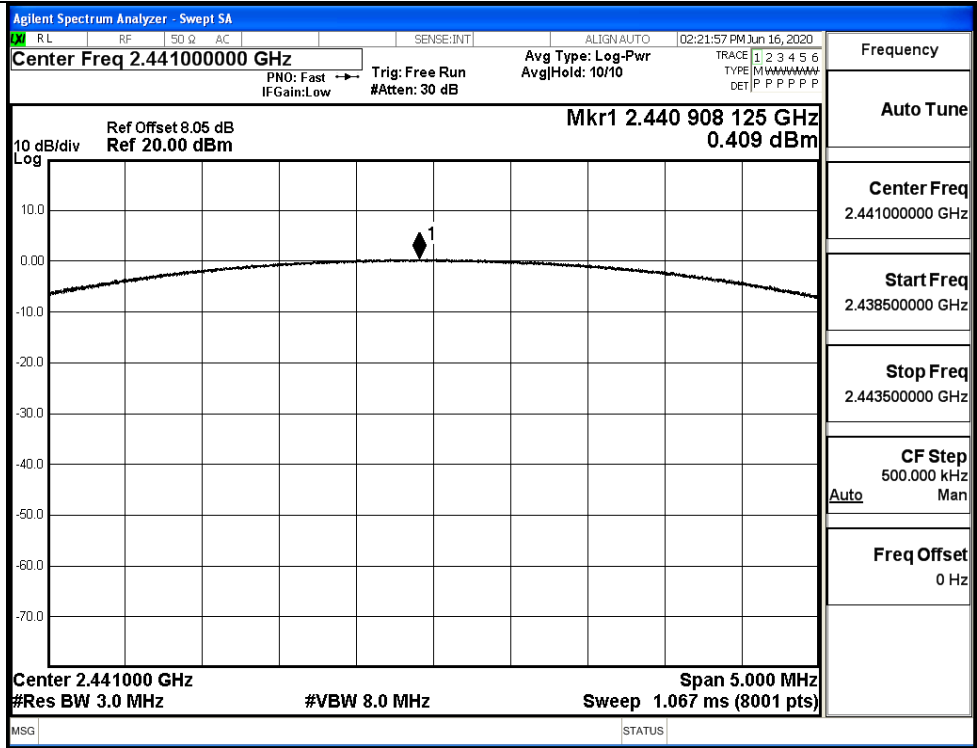
GFSK/HCH



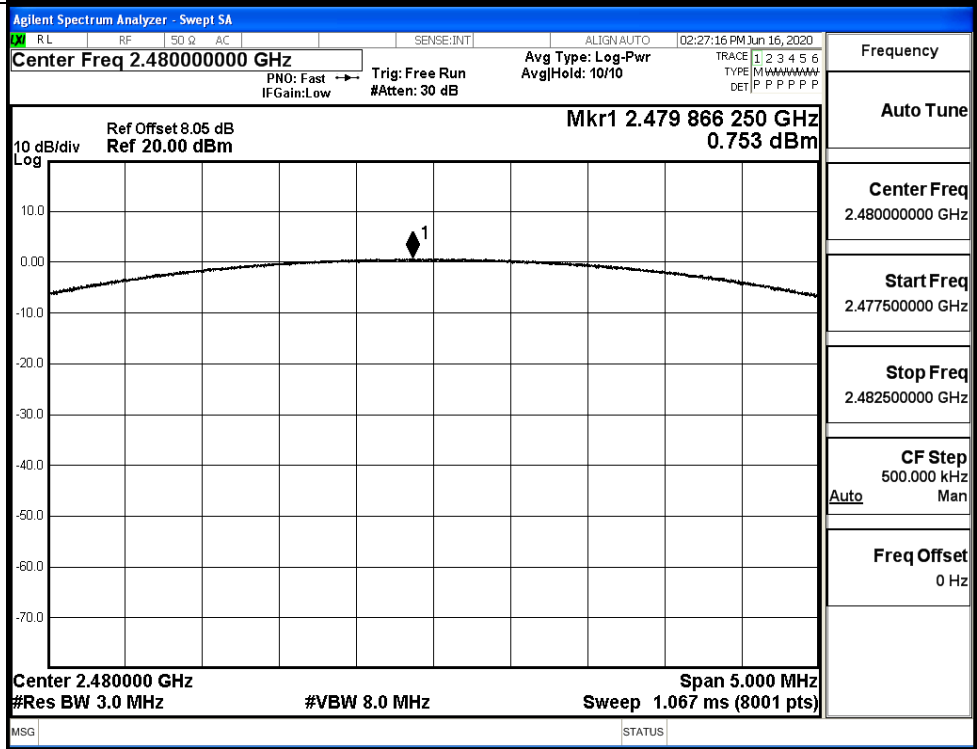
$\pi$ /4DQPSK/LCH



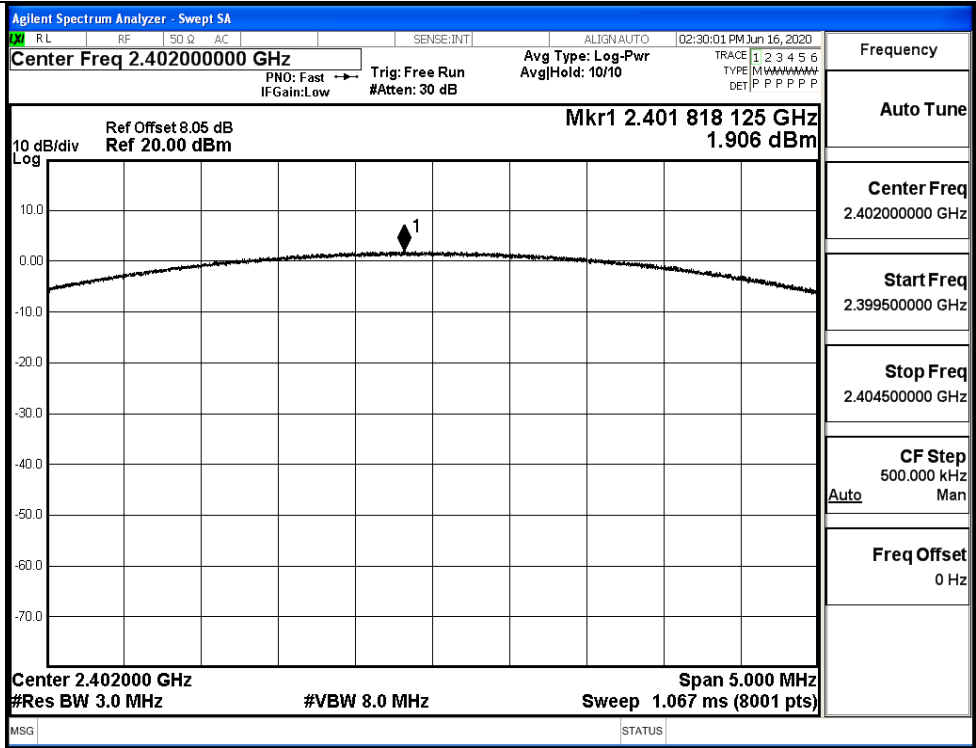
$\pi/4$ DQPSK/MCH



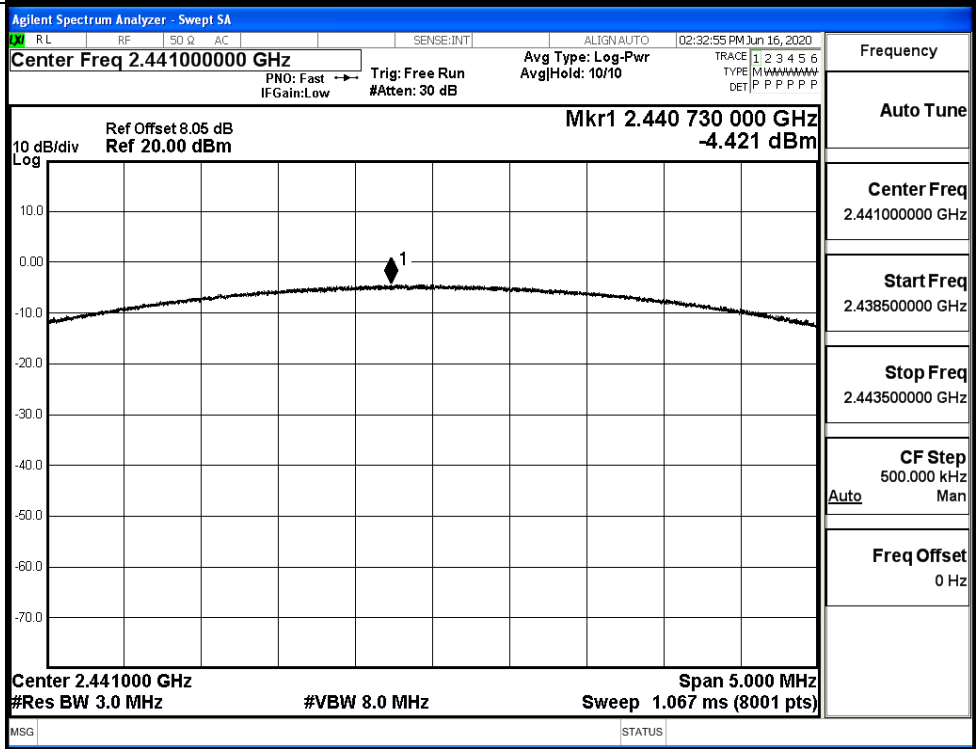
$\pi/4$ DQPSK/HCH



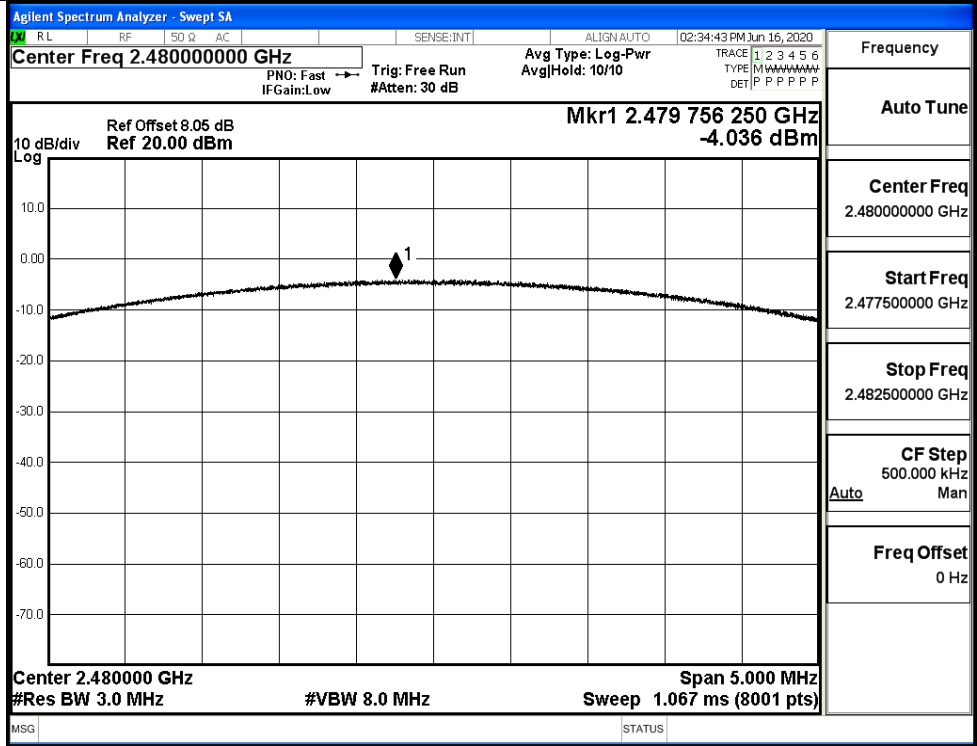
8DPSK/LCH



8DPSK/MCH

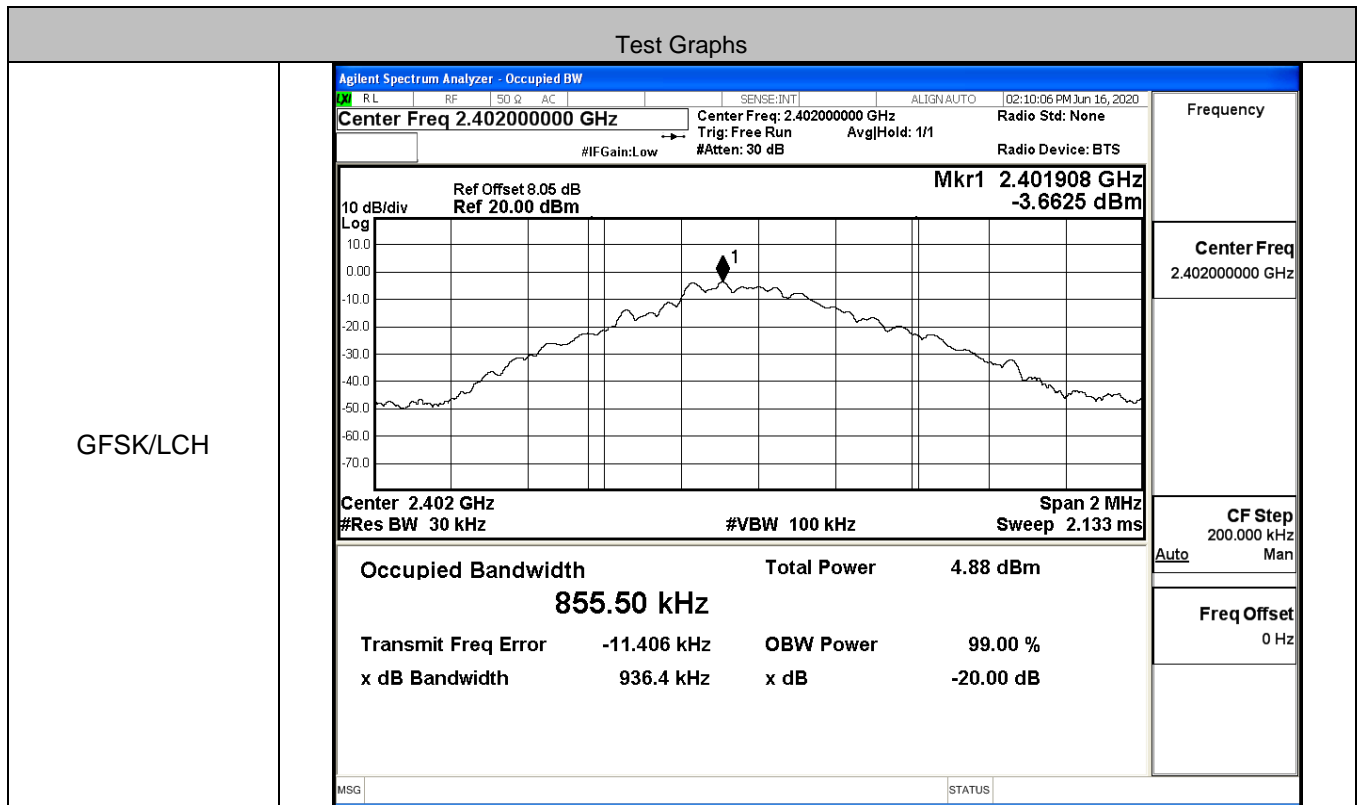


8DPSK/HCH

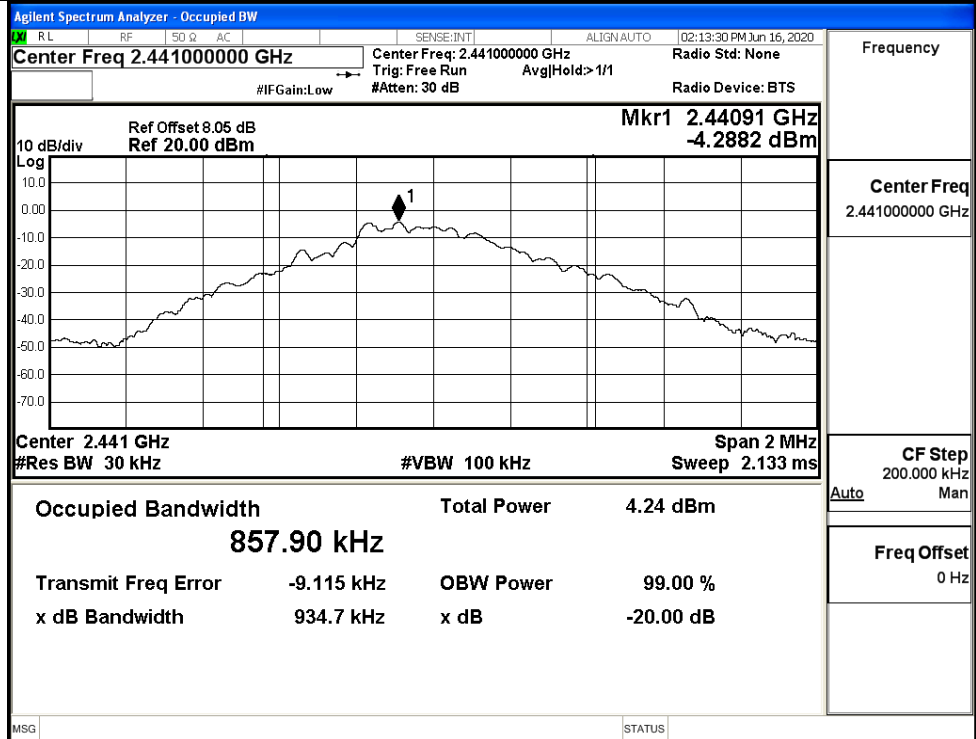


**A.2 20dB Bandwidth&99% Bandwidth**

Mode	Channel.	20dB Bandwidth [MHz]	99% Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9364	0.8555	Not Specified	PASS
	MCH	0.9347	0.8579	Not Specified	PASS
	HCH	0.9377	0.8575	Not Specified	PASS
π/4DQPSK	LCH	1.285	1.1944	Not Specified	PASS
	MCH	1.287	1.1926	Not Specified	PASS
	HCH	1.285	1.1918	Not Specified	PASS
8DPSK	LCH	1.294	1.1952	Not Specified	PASS
	MCH	1.295	1.1872	Not Specified	PASS
	HCH	1.294	1.1883	Not Specified	PASS

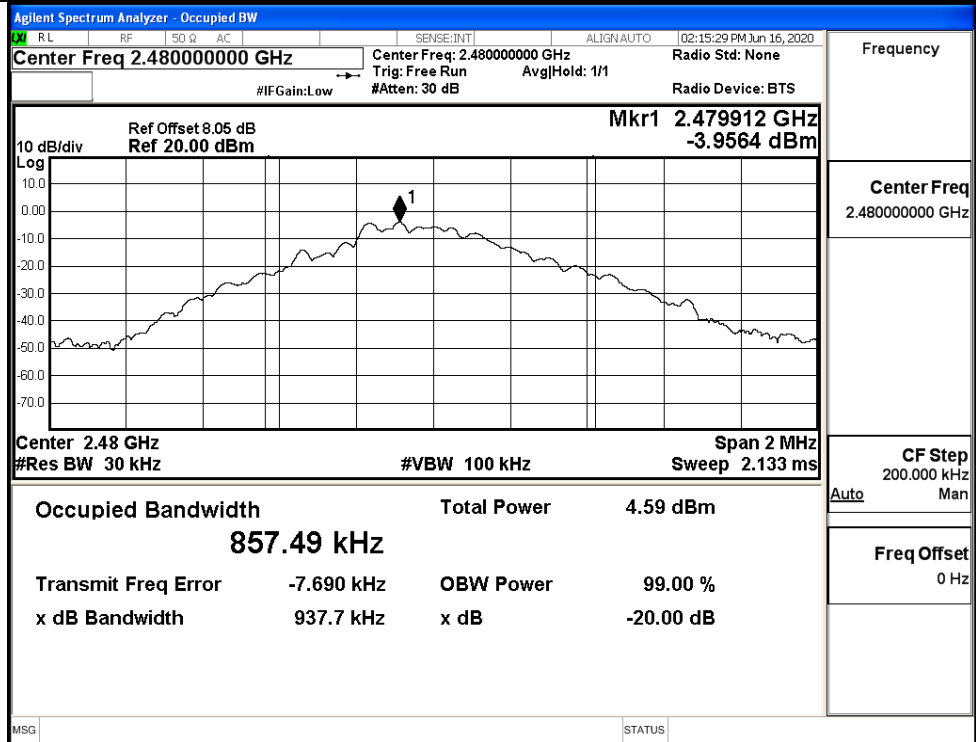


GFSK/MCH



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

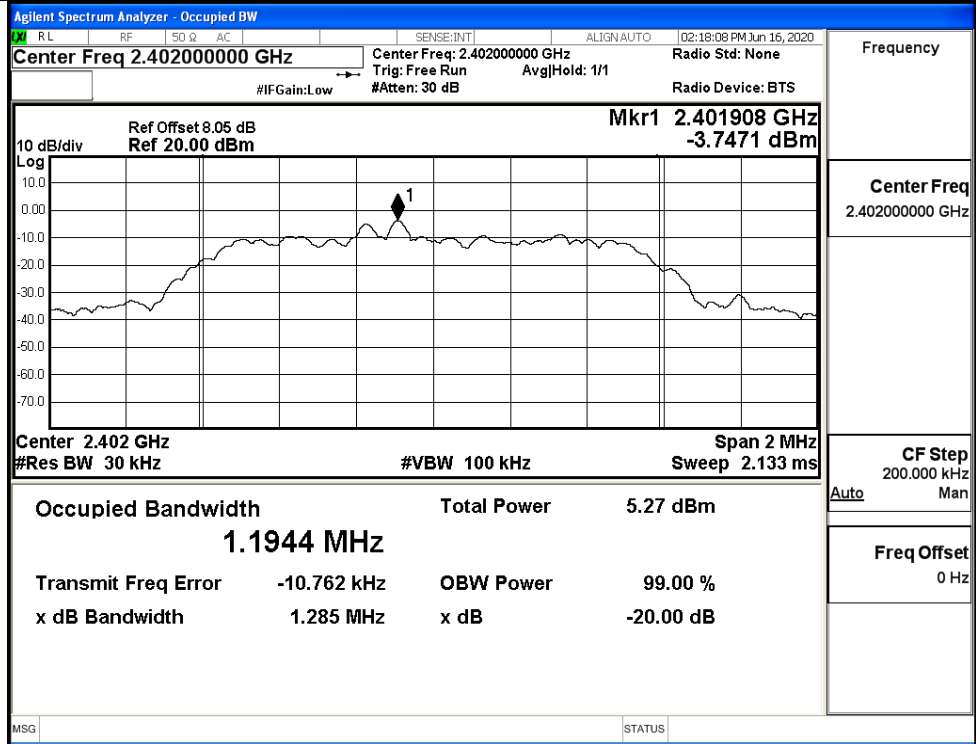
GFSK/HCH



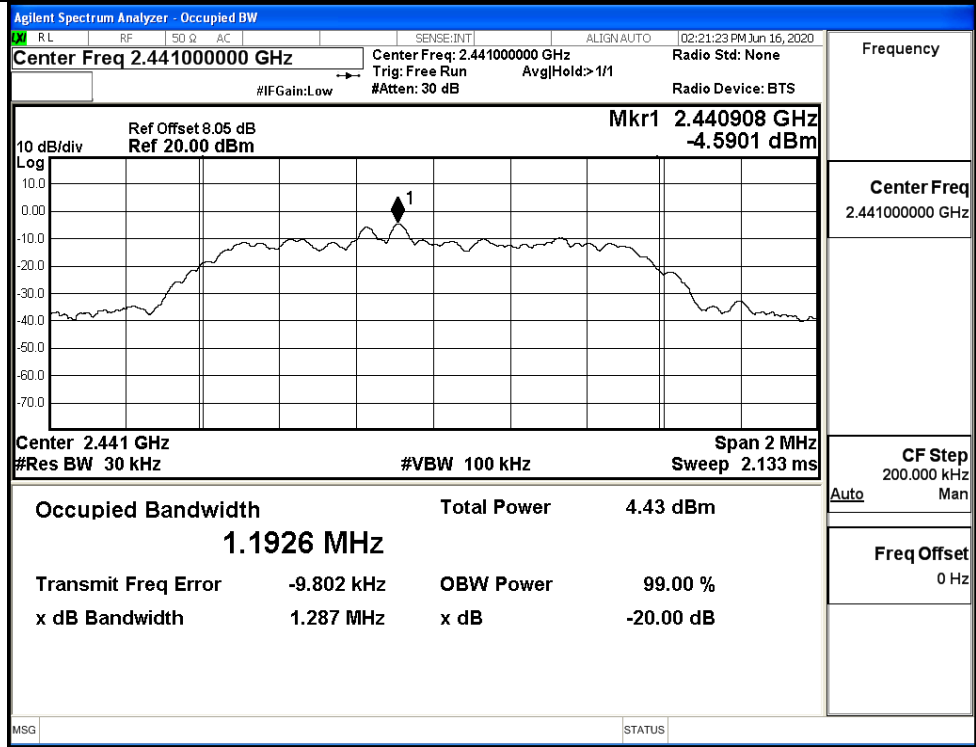
Frequency	2.480000000 GHz
Center Freq	2.480000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz



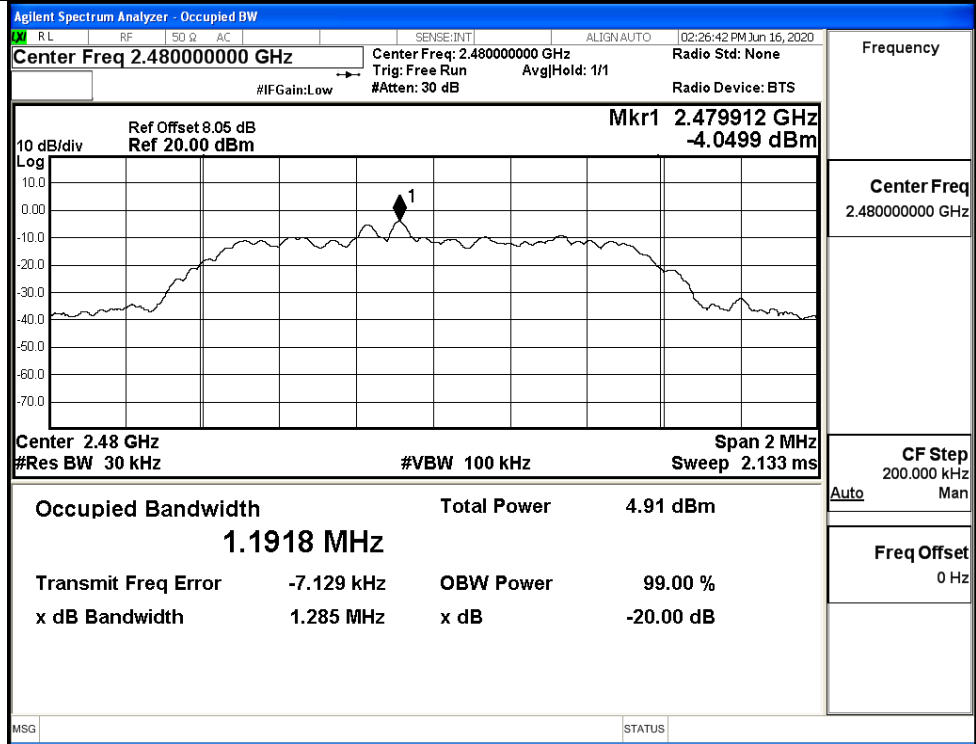
$\pi/4$ DQPSK/LCH



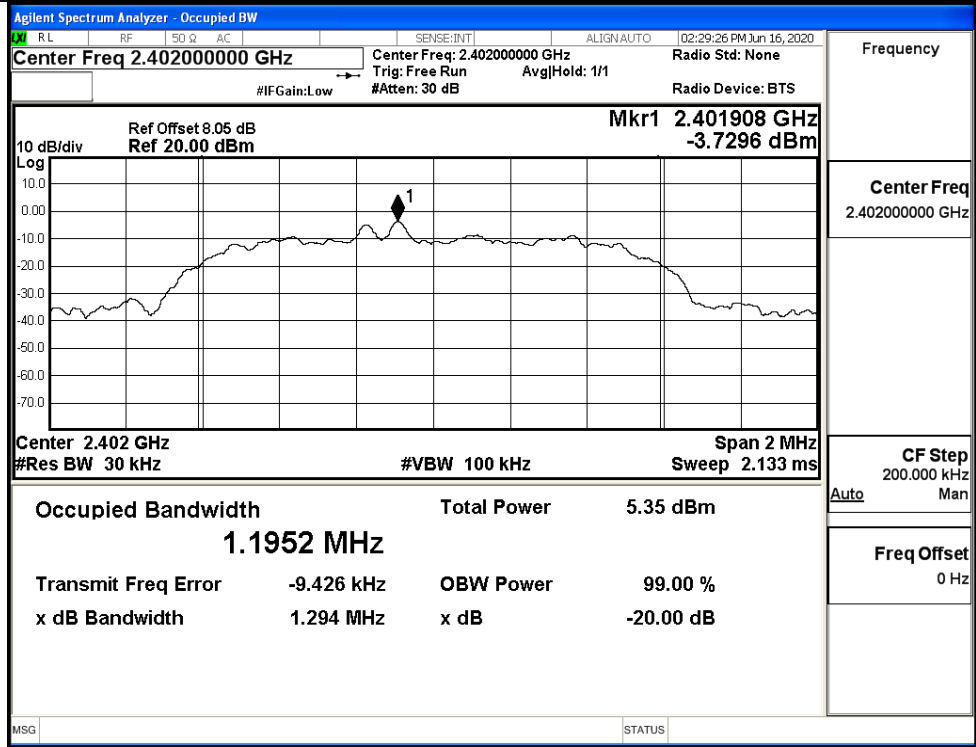
$\pi/4$ DQPSK/MCH



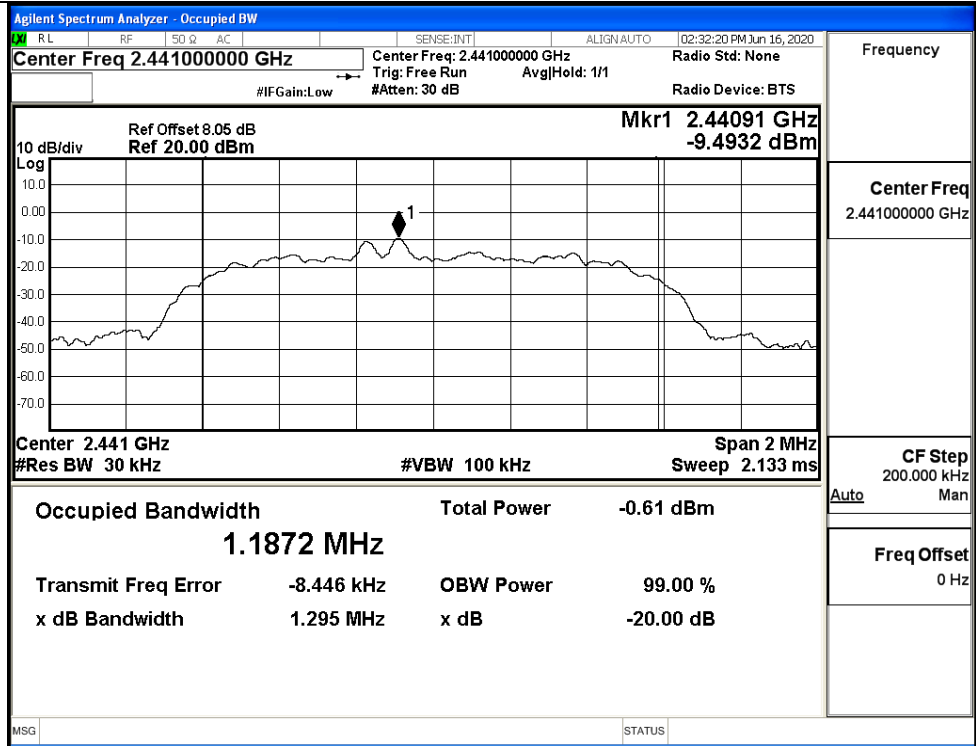
$\pi/4$ DQPSK/HCH



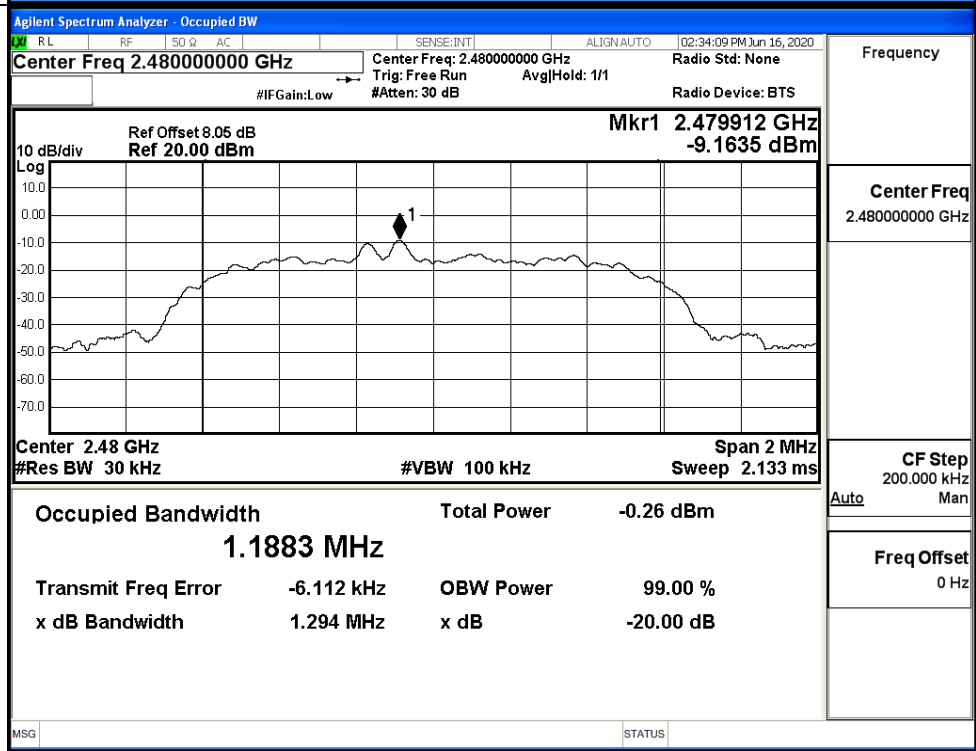
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH



### A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.147	0.625	PASS
	MCH	1.182	0.625	PASS
	HCH	1.002	0.625	PASS
π/4DQPSK	LCH	1.160	0.858	PASS
	MCH	0.998	0.858	PASS
	HCH	0.872	0.858	PASS
8DPSK	LCH	1.008	0.863	PASS
	MCH	0.878	0.863	PASS
	HCH	1.004	0.863	PASS

**Test Graphs**

GFSK/LCH

Frequency

Auto Tune

Center Freq  
2.402500000 GHz

Start Freq  
2.401500000 GHz

Stop Freq  
2.403500000 GHz

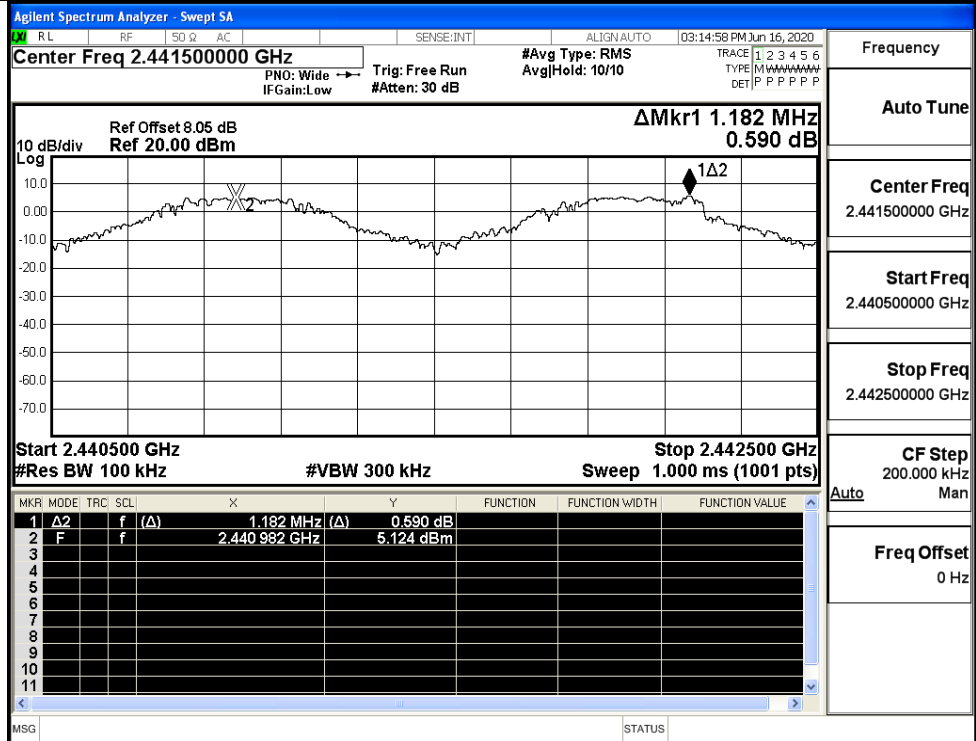
CF Step  
200.000 kHz

Auto Man

Freq Offset  
0 Hz

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	f	(Δ)	1.147 00 MHz (Δ)	-0.029 dB			
2	F	f		2.402 007 00 GHz	4.737 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

GFSK/MCH



Frequency

Auto Tune

Center Freq

2.441500000 GHz

Start Freq

2.440500000 GHz

Stop Freq

2.442500000 GHz

CF Step

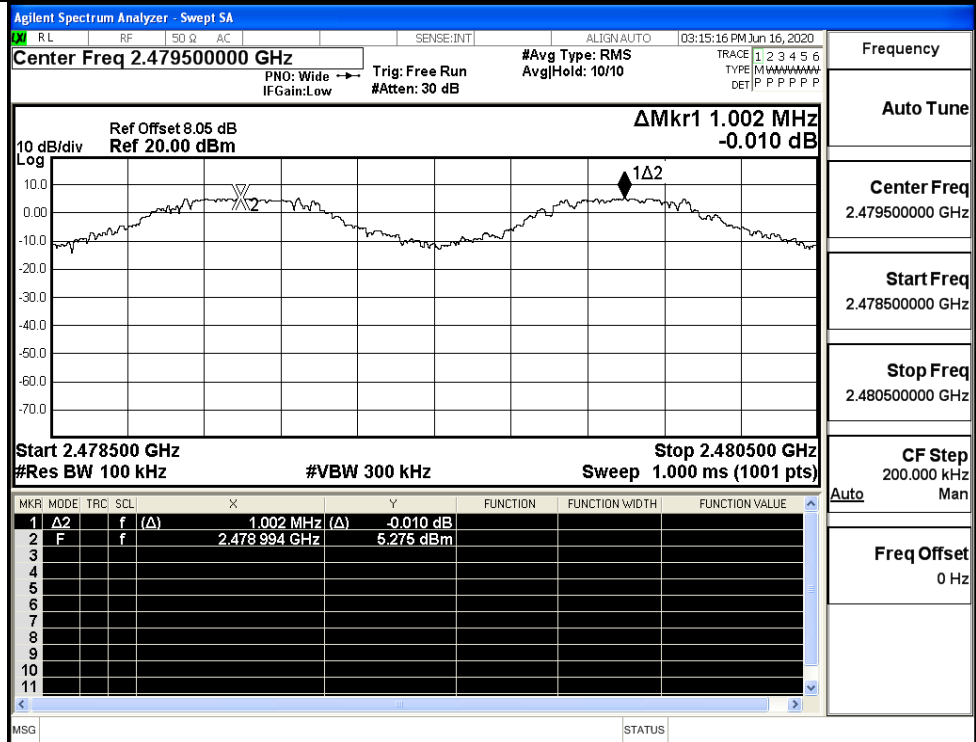
200.000 kHz

Auto

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

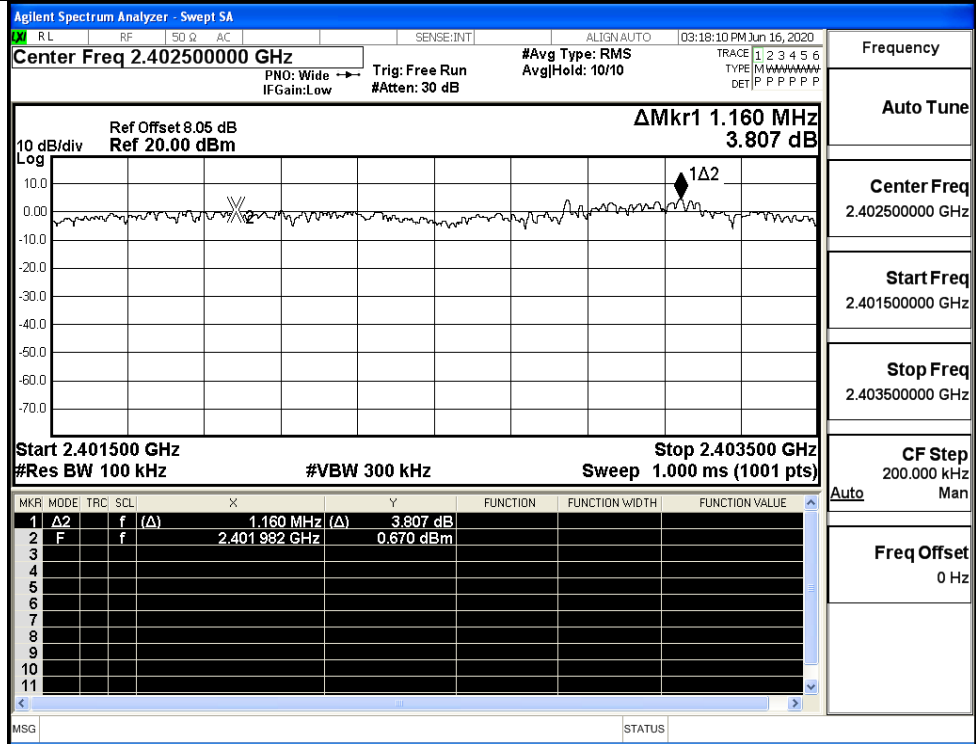
200.000 kHz

Auto

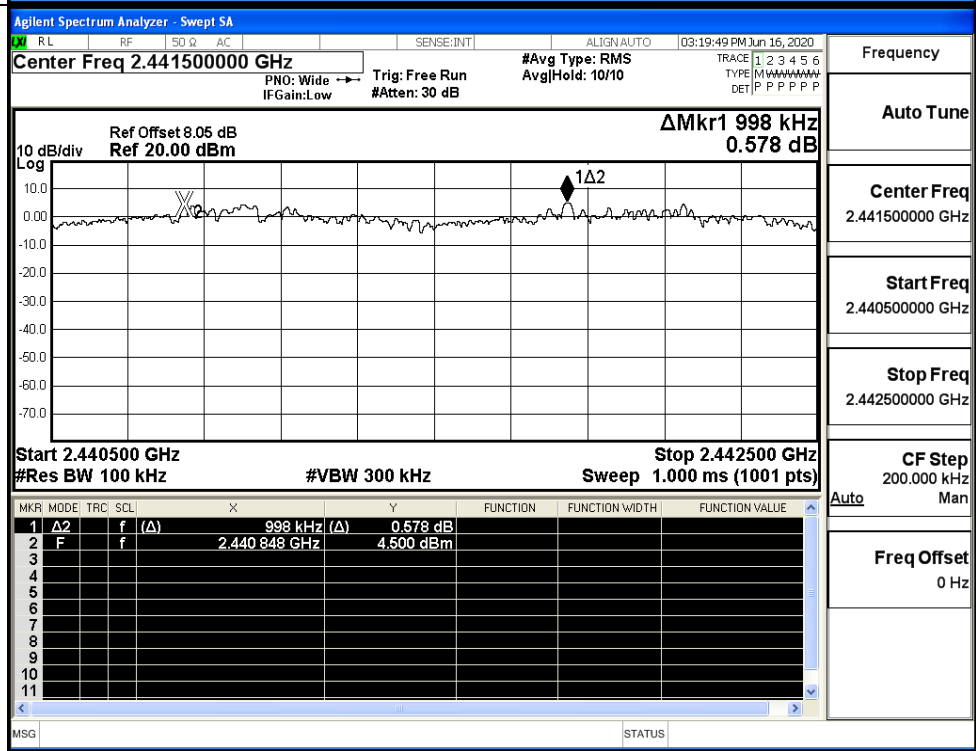
Freq Offset

0 Hz

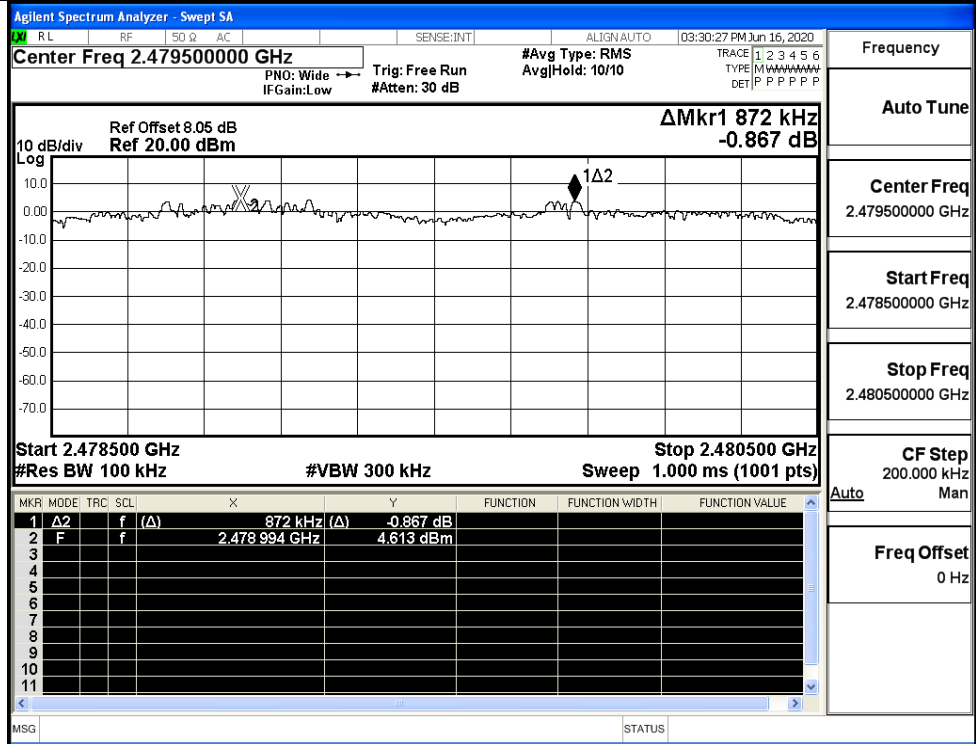
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



π/4DQPSK/HCH



Frequency

Auto Tune

Center Freq  
2.479500000 GHz

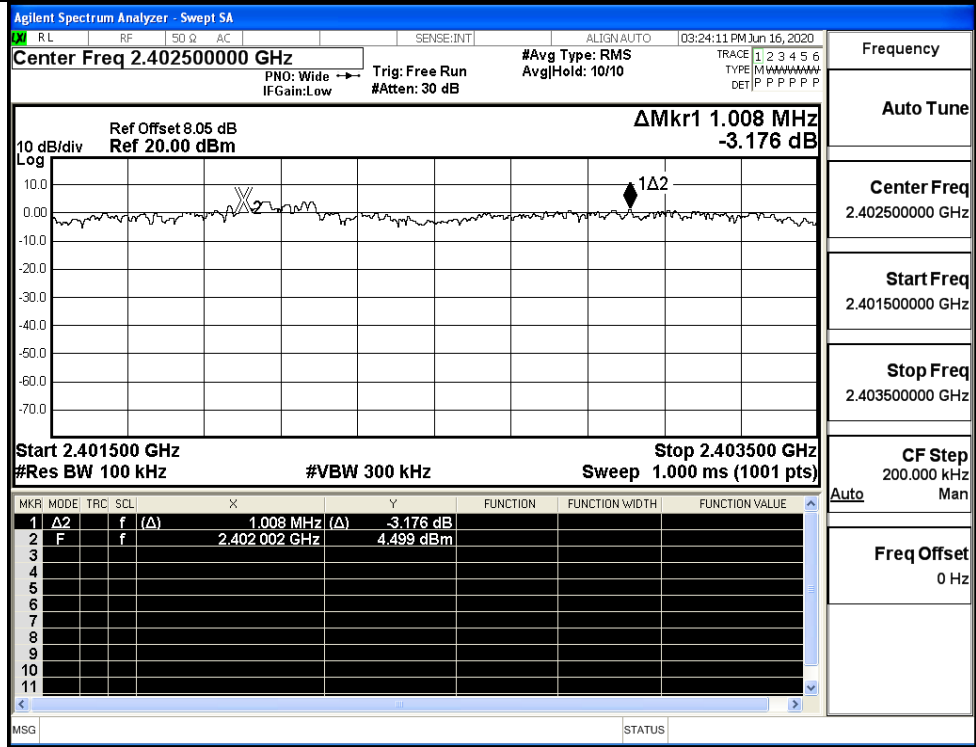
Start Freq  
2.478500000 GHz

Stop Freq  
2.480500000 GHz

CF Step  
200.000 kHz

Freq Offset  
0 Hz

8DPSK/LCH



Frequency

Auto Tune

Center Freq  
2.402500000 GHz

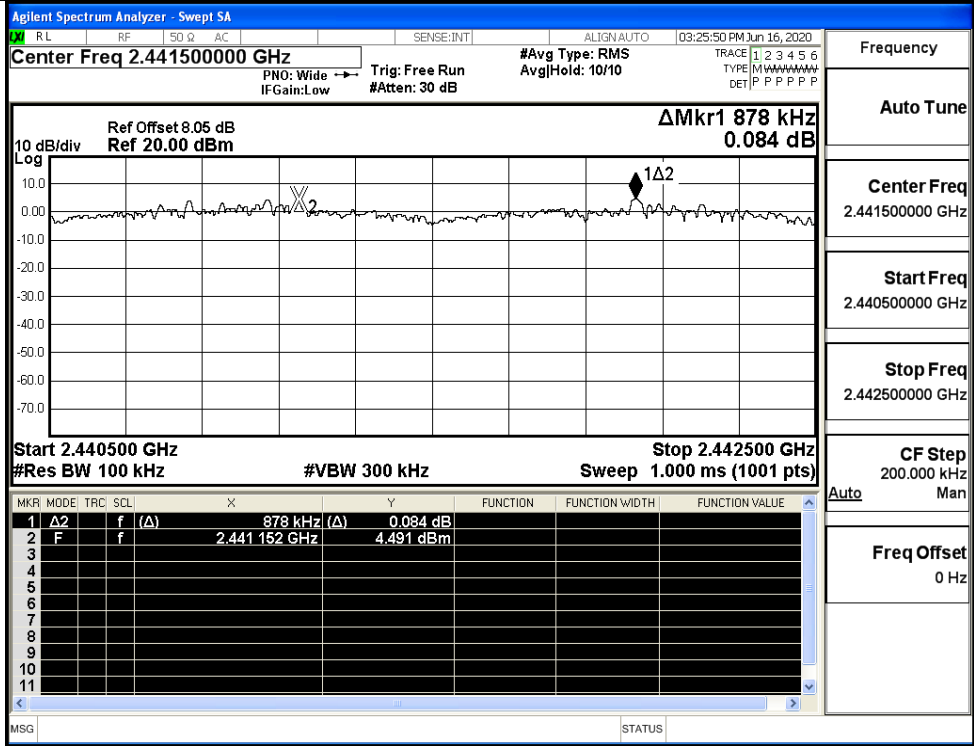
Start Freq  
2.401500000 GHz

Stop Freq  
2.403500000 GHz

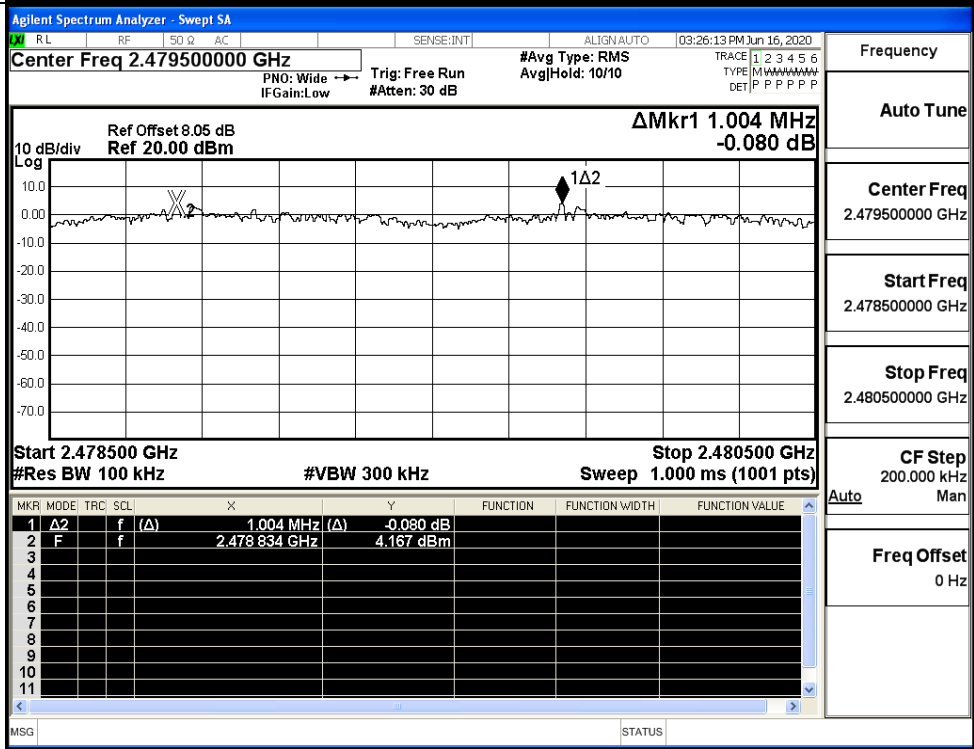
CF Step  
200.000 kHz

Freq Offset  
0 Hz

8DPSK/MCH



8DPSK/HCH





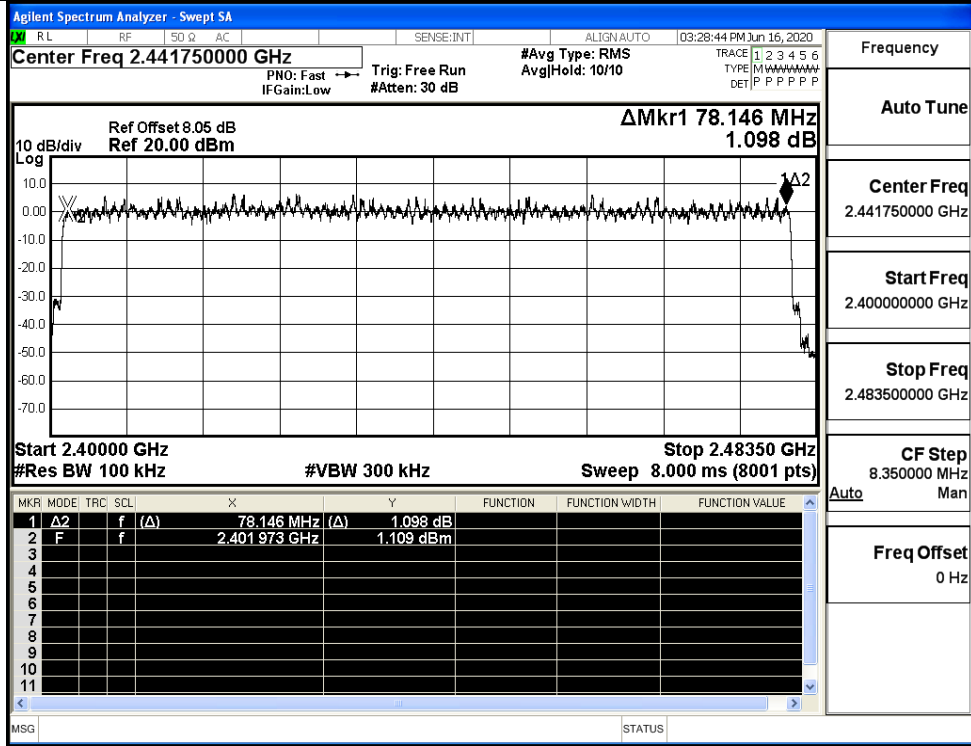
### A.4 Hopping Channel Number

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

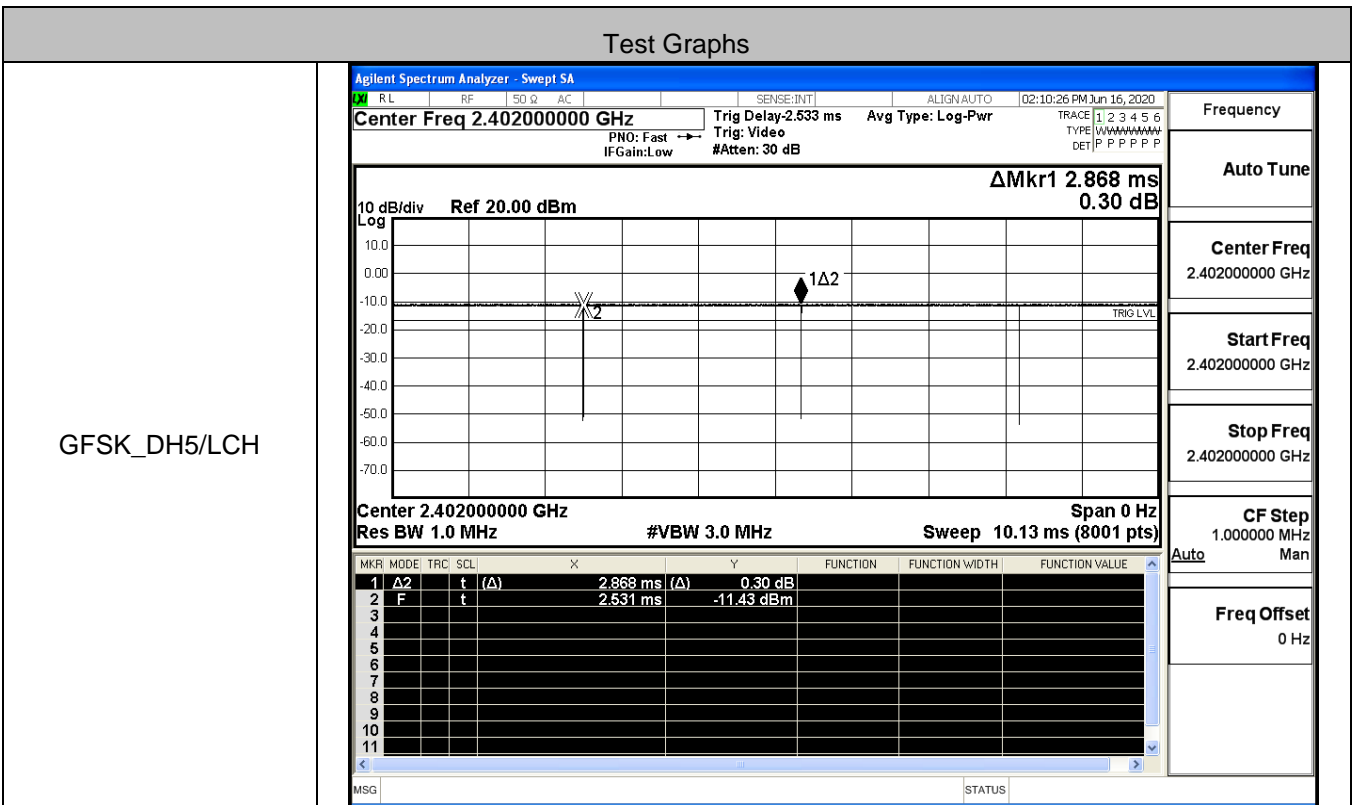
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.441750000 GHz          Ref Offset 8.05 dB          Ref 20.00 dBm  <math>\Delta</math>Mkr1 77.864 MHz          0.583 dB          Start 2.40000 GHz          #Res BW 100 kHz          #VBW 300 kHz          Stop 2.48350 GHz          Sweep 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><math>\Delta</math>2</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>77.864 MHz (<math>\Delta</math>)</td> <td>0.583 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402004 GHz</td> <td>4.917 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	$\Delta$ 2	f	( $\Delta$ )	77.864 MHz ( $\Delta$ )	0.583 dB				2	F	f		2.402004 GHz	4.917 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 Man</p> <p>Freq Offset 0 Hz</p>
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	$\Delta$ 2	f	( $\Delta$ )	77.864 MHz ( $\Delta$ )	0.583 dB																								
2	F	f		2.402004 GHz	4.917 dBm																								
$\pi/4$ DQPSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA          Center Freq 2.441750000 GHz          Ref Offset 8.05 dB          Ref 20.00 dBm  <math>\Delta</math>Mkr1 77.686 MHz          -0.158 dB          Start 2.40000 GHz          #Res BW 100 kHz          #VBW 300 kHz          Stop 2.48350 GHz          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><math>\Delta</math>2</td> <td>f</td> <td>(<math>\Delta</math>)</td> <td>77.686 MHz (<math>\Delta</math>)</td> <td>-0.158 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402171 GHz</td> <td>4.368 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	$\Delta$ 2	f	( $\Delta$ )	77.686 MHz ( $\Delta$ )	-0.158 dB				2	F	f		2.402171 GHz	4.368 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 Man</p> <p>Freq Offset 0 Hz</p>
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
1	$\Delta$ 2	f	( $\Delta$ )	77.686 MHz ( $\Delta$ )	-0.158 dB																								
2	F	f		2.402171 GHz	4.368 dBm																								

8DPSK/Hop

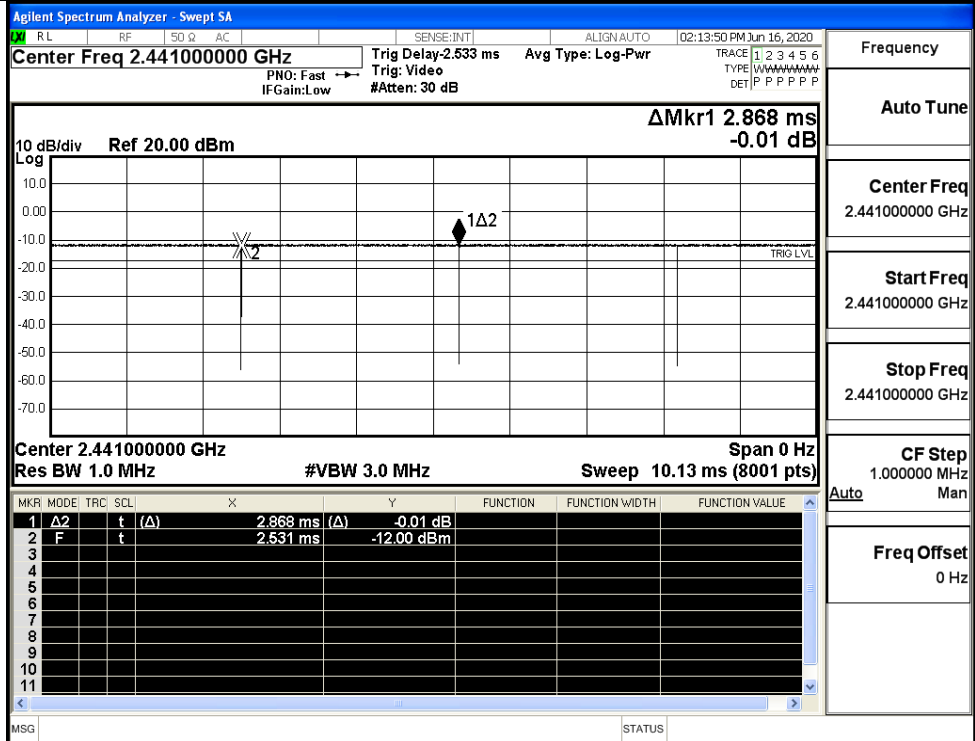


**A.5 Dwell Time**

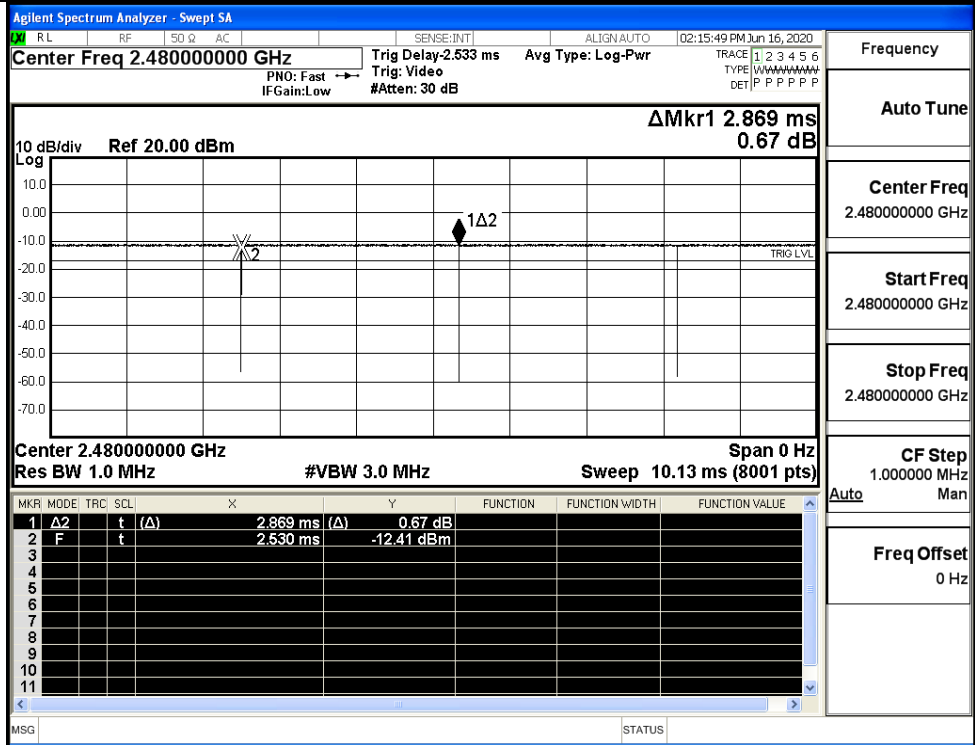
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
π/4DQPSK	2DH5	LCH	2.87	106.7	0.306	0.4	PASS
	2DH5	MCH	2.87	106.7	0.306	0.4	PASS
	2DH5	HCH	2.87	106.7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



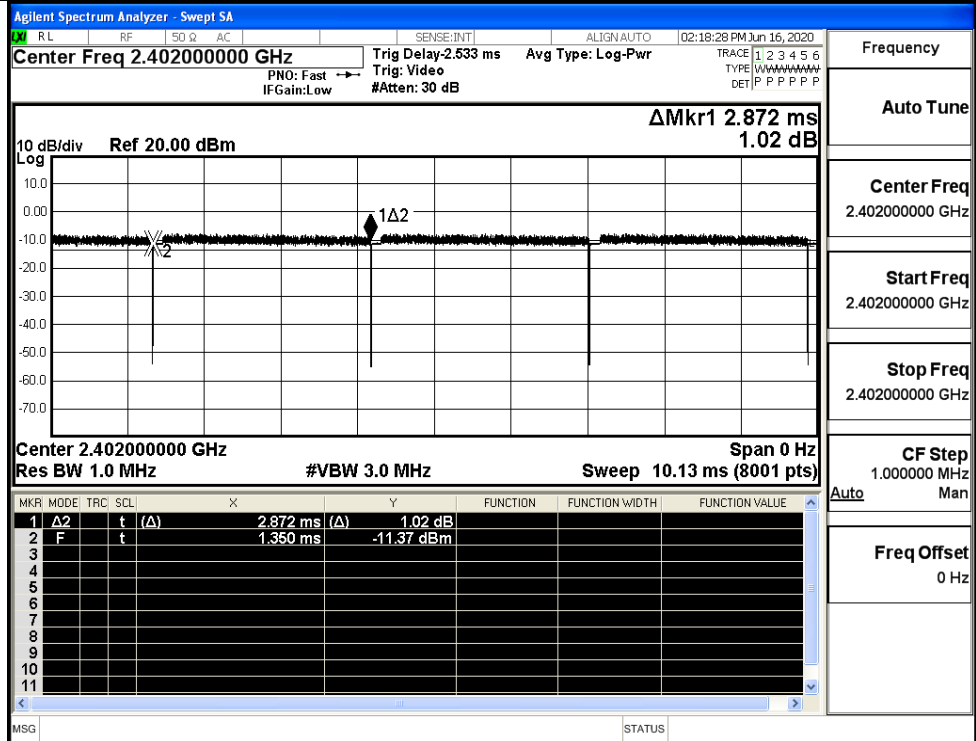
GFSK\_DH5/MCH



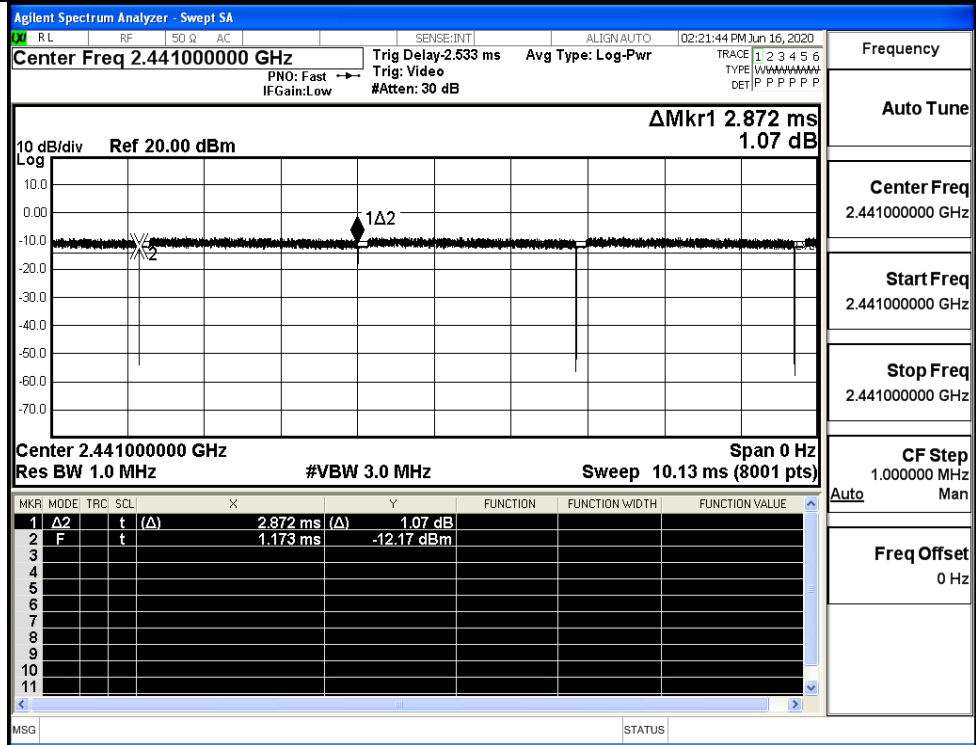
GFSK\_DH5/HCH



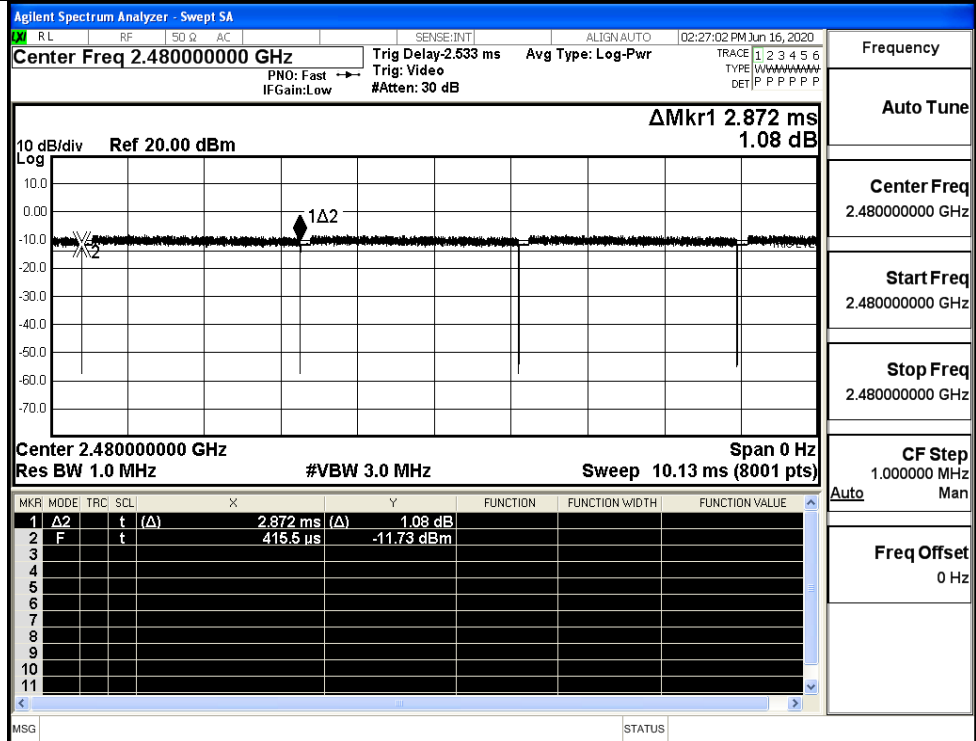
$\pi/4$ DQPSK  
\_2DH5/LCH



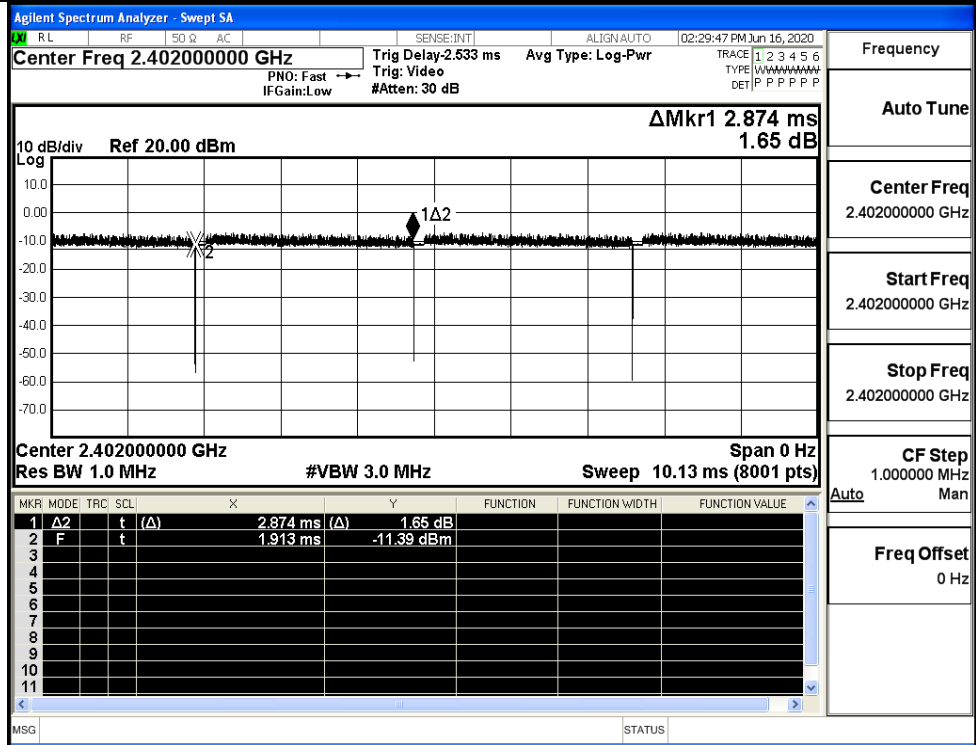
$\pi/4$ DQPSK  
\_2DH5/MCH



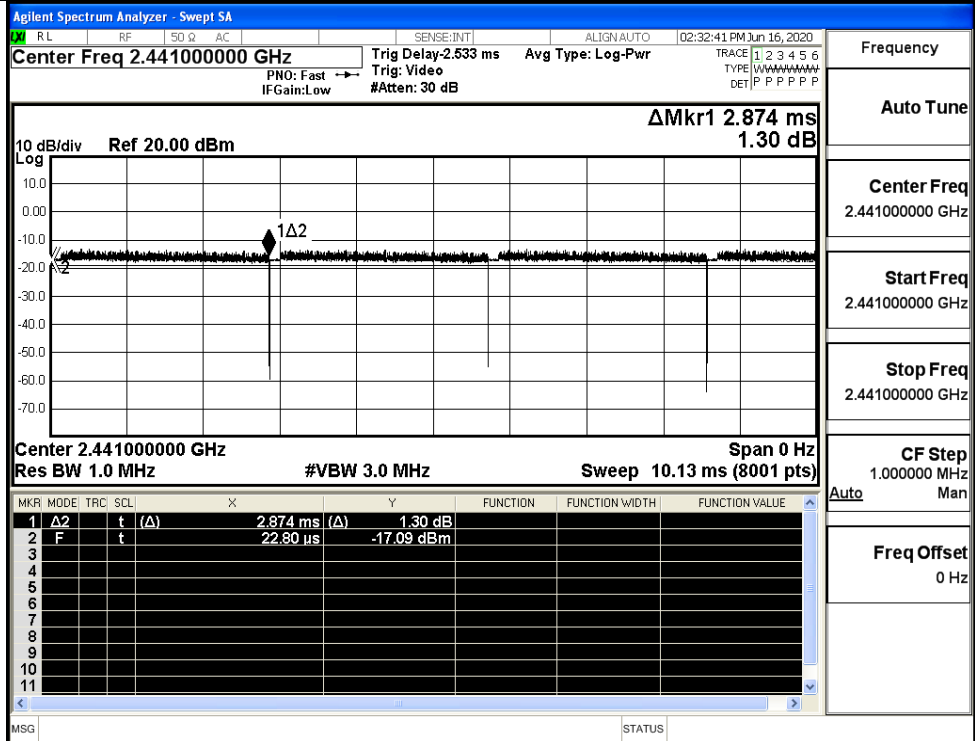
$\pi/4$ DQPSK  
\_2DH5/HCH



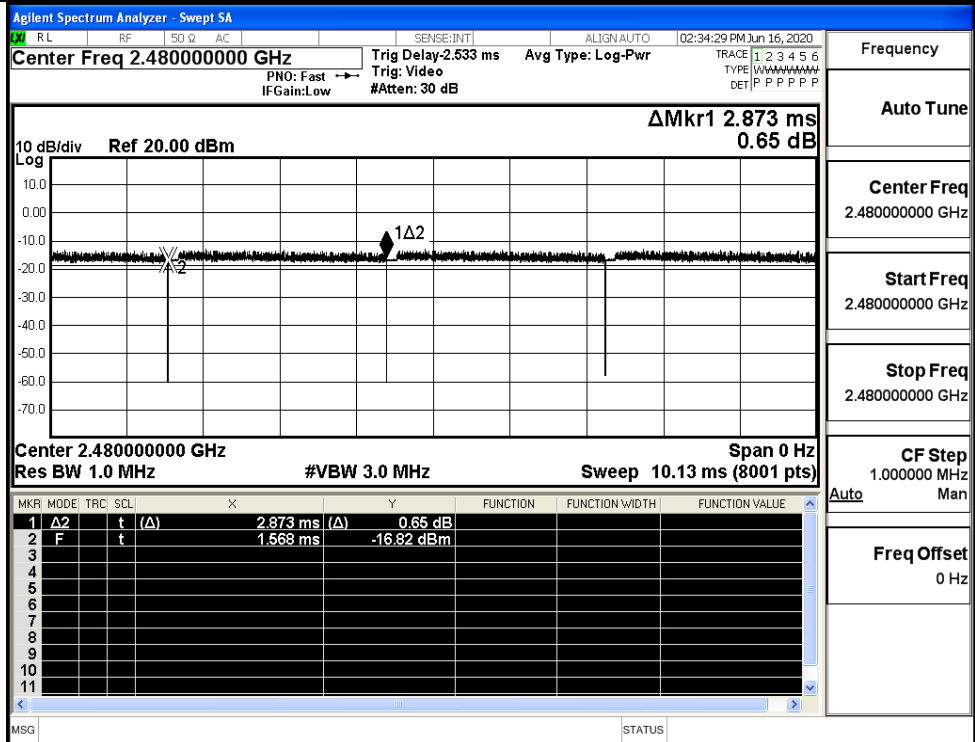
8DPSK \_3DH5/LCH



8DPSK\_3DH5/MCH

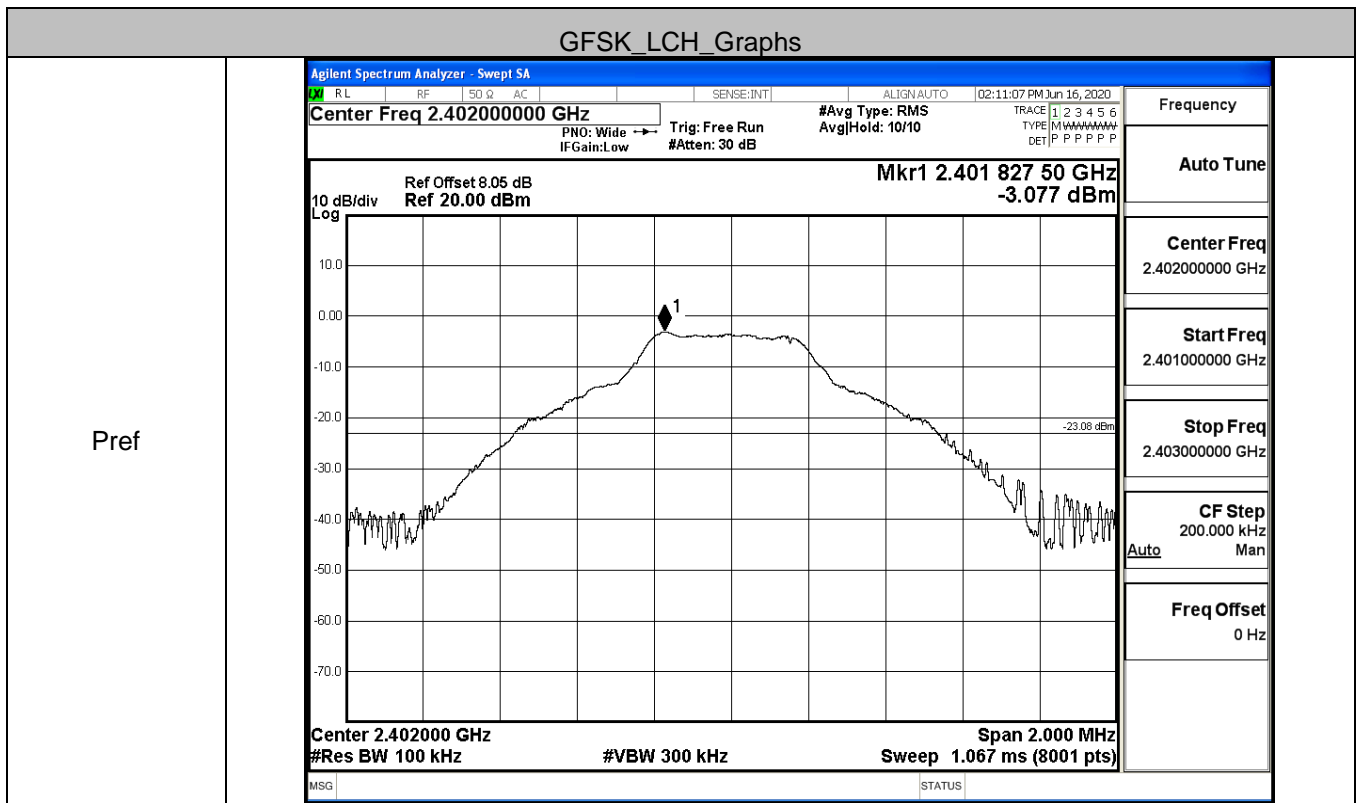


8DPSK\_3DH5/HCH

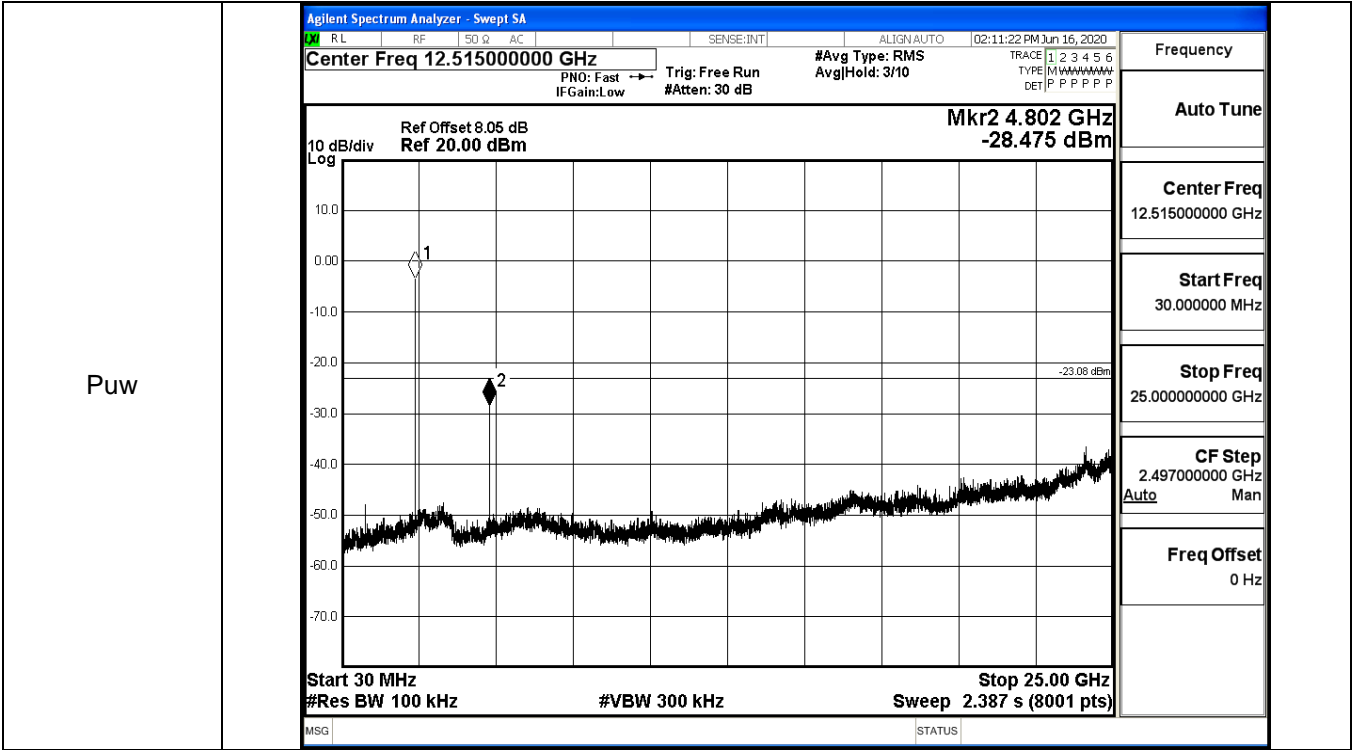


**A.6 RF Conducted Spurious Emissions**

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.077	-28.475	-23.077	PASS
	MCH	-3.895	-30.082	-23.895	PASS
	HCH	-3.351	-28.723	-23.351	PASS
$\pi$ /4DQPSK	LCH	-3.23	-28.381	-23.230	PASS
	MCH	-3.916	-28.712	-23.916	PASS
	HCH	-3.523	-28.213	-23.523	PASS
8DPSK	LCH	-3.123	-28.873	-23.123	PASS
	MCH	-8.957	-38.321	-28.957	PASS
	HCH	-8.521	-35.993	-28.521	PASS

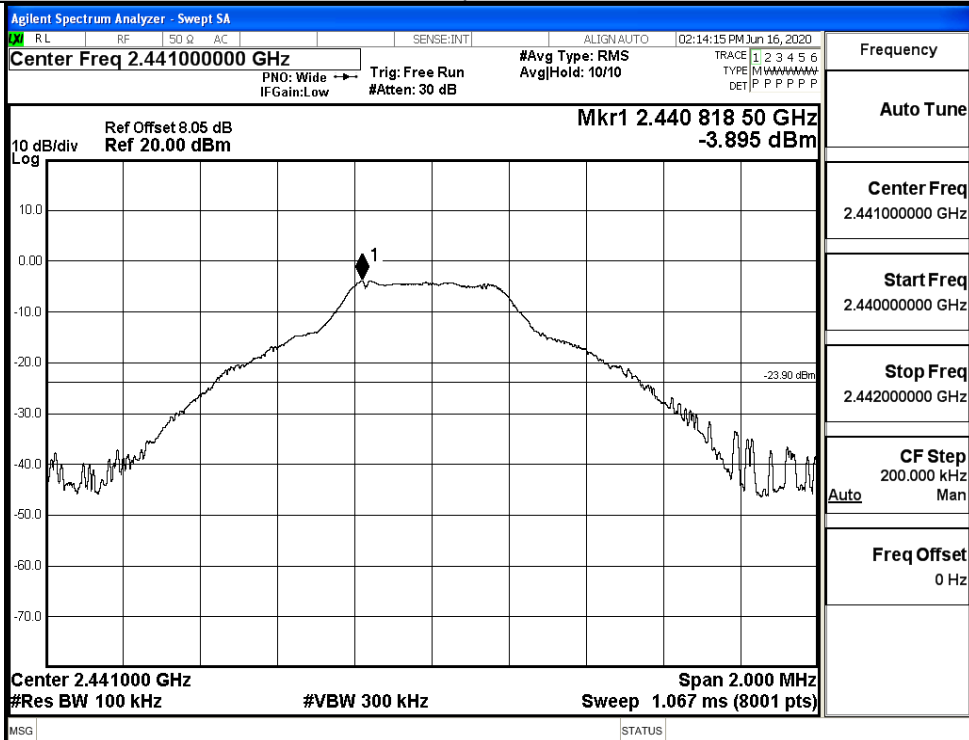




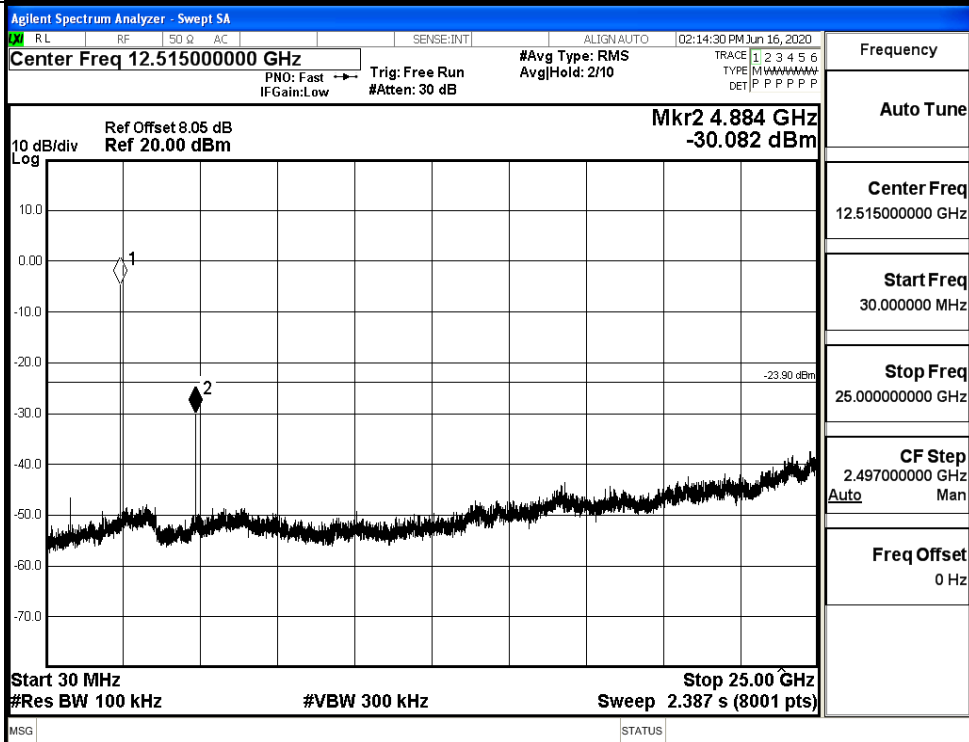


GFSK\_MCH\_Graphs

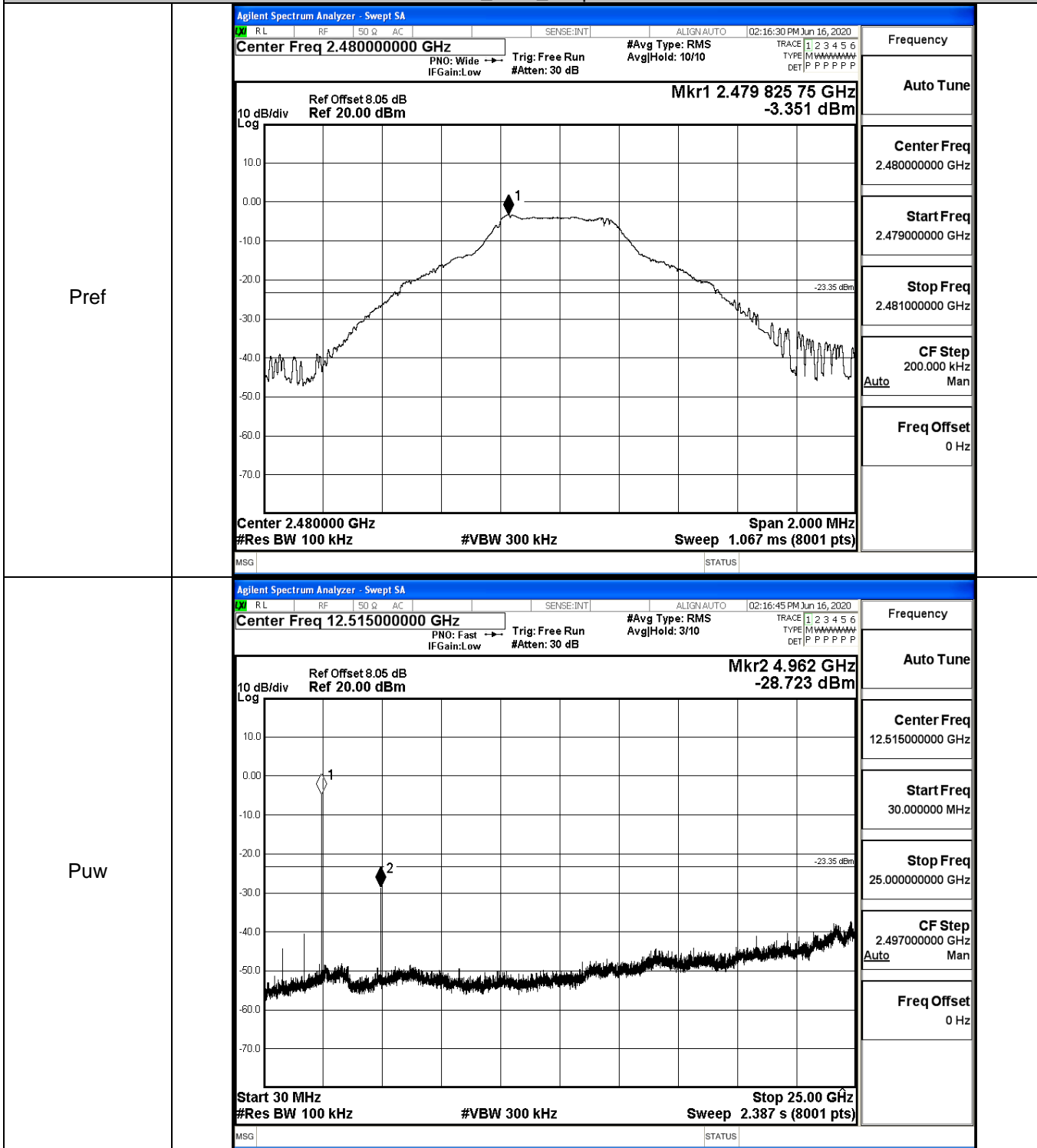
Pref



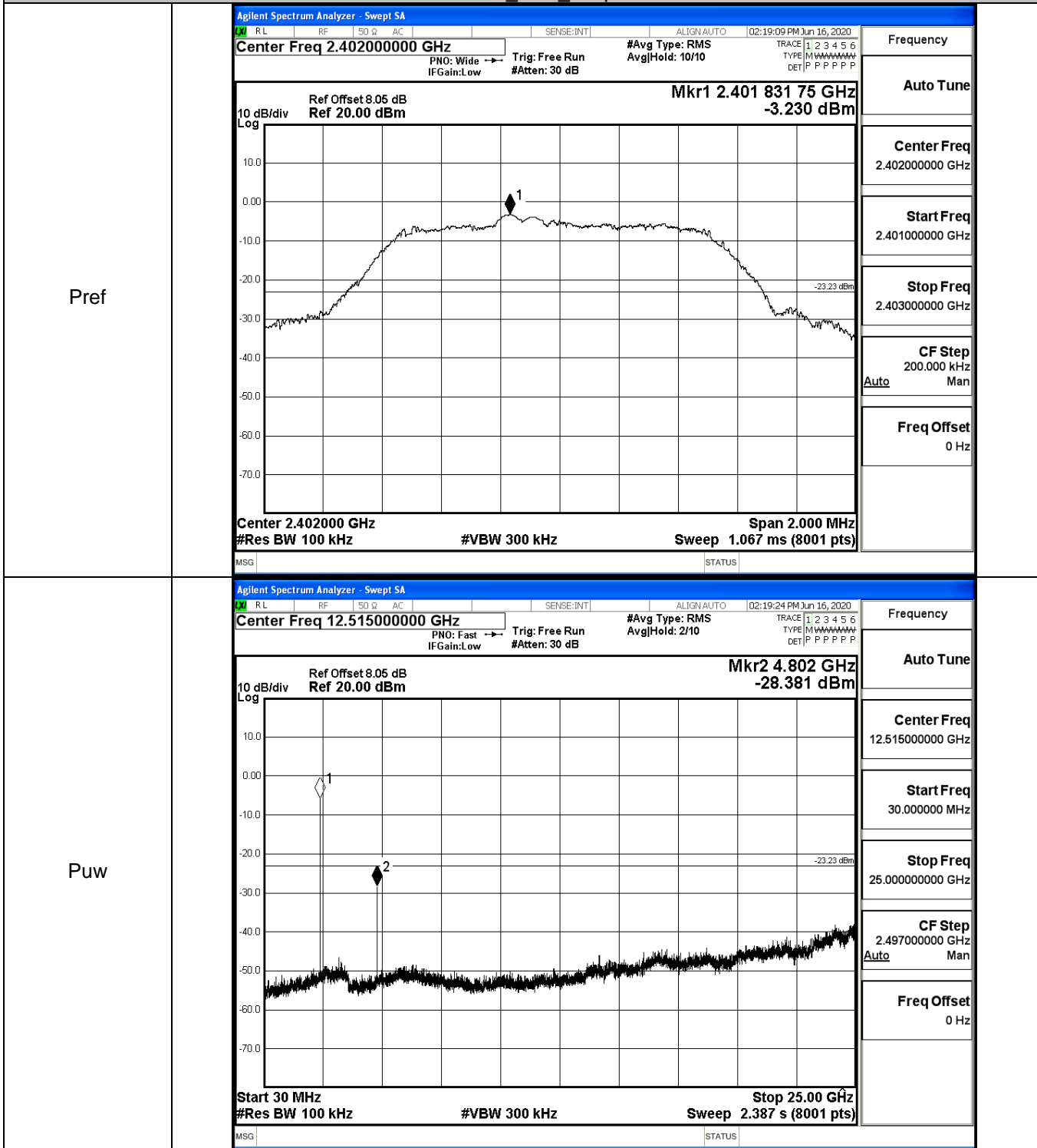
Puw



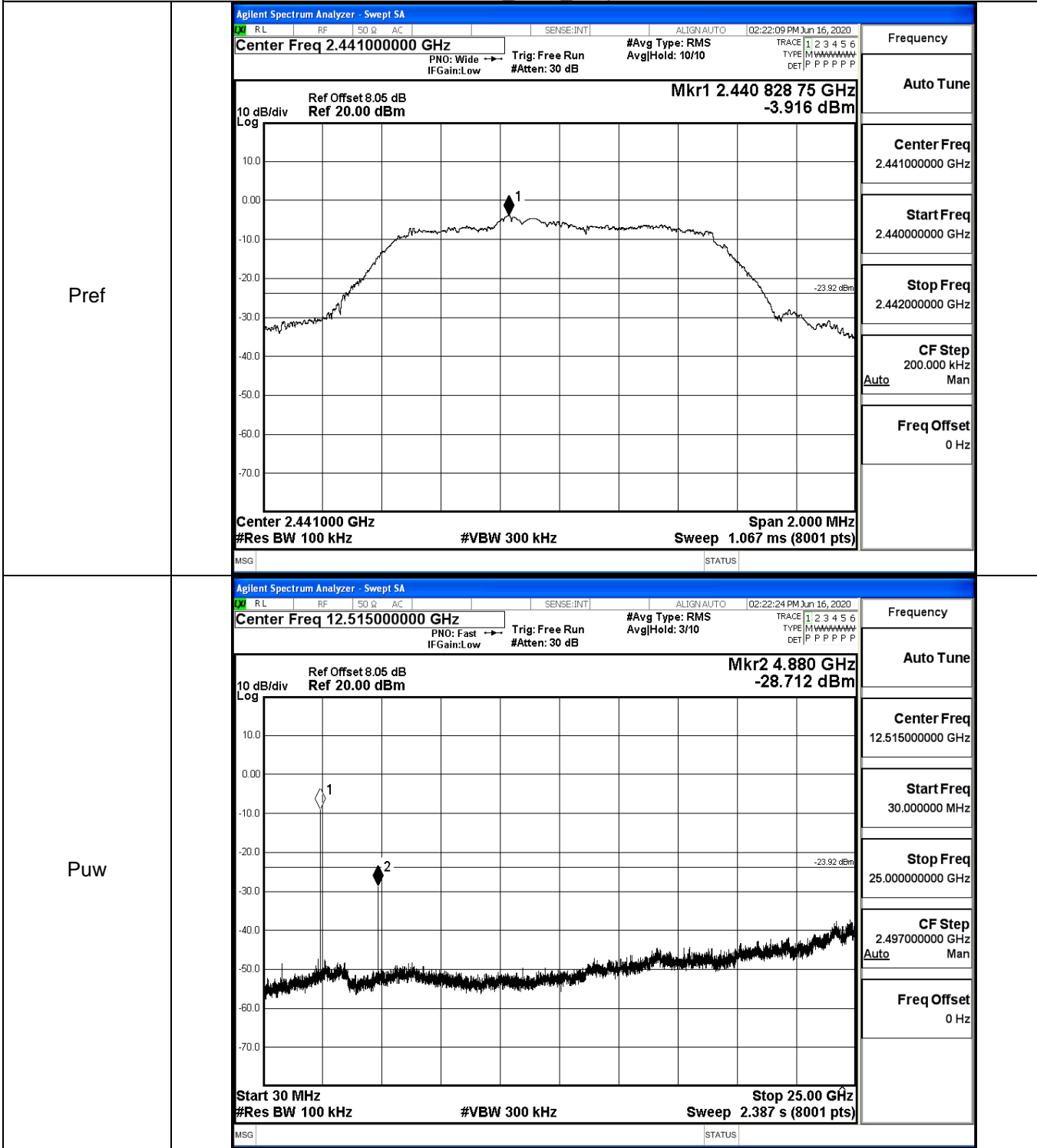
GFSK\_HCH\_Graphs



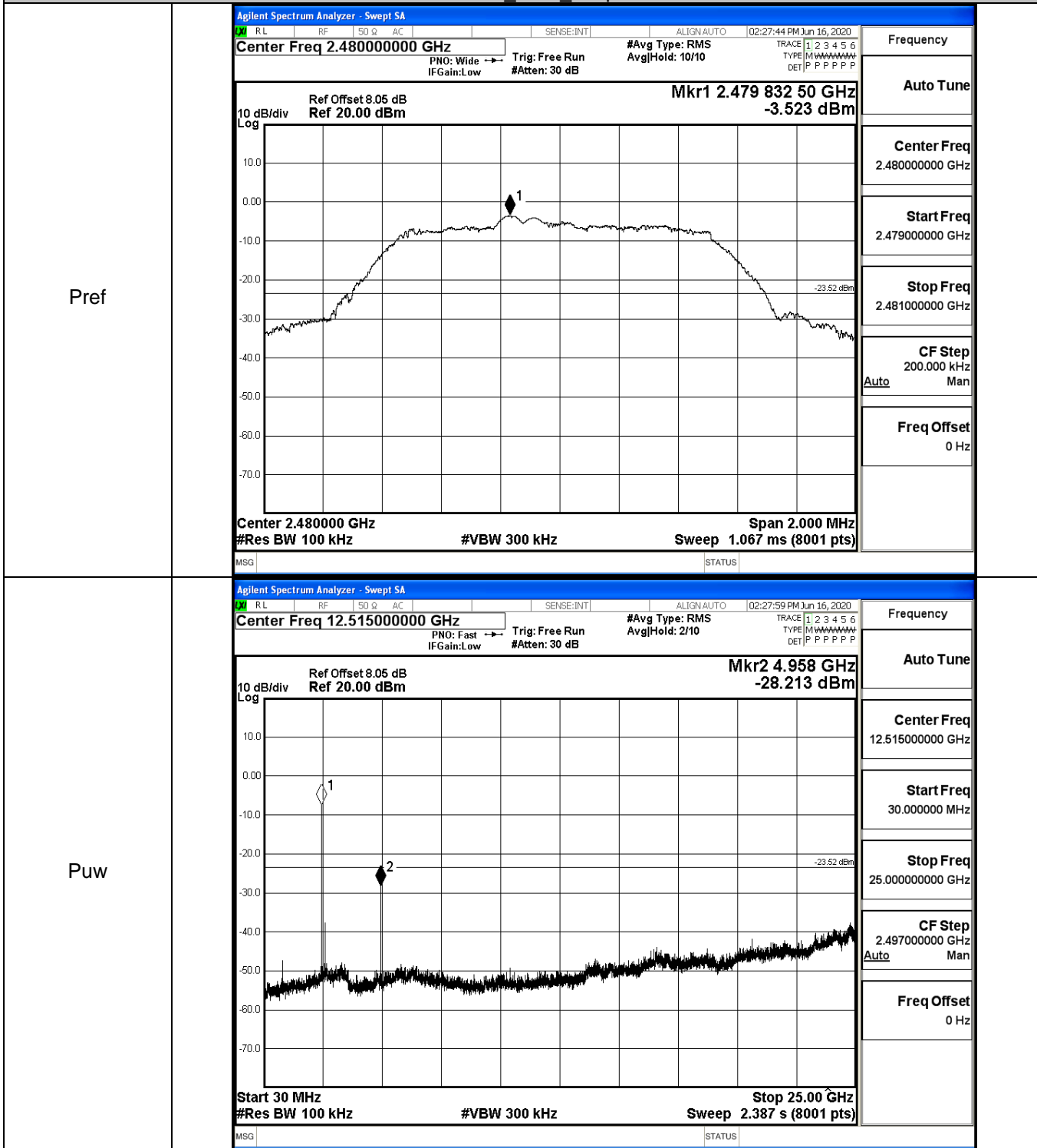
$\pi/4$ DQPSK\_LCH\_Graphs



$\pi/4$ DQPSK\_MCH\_Graphs

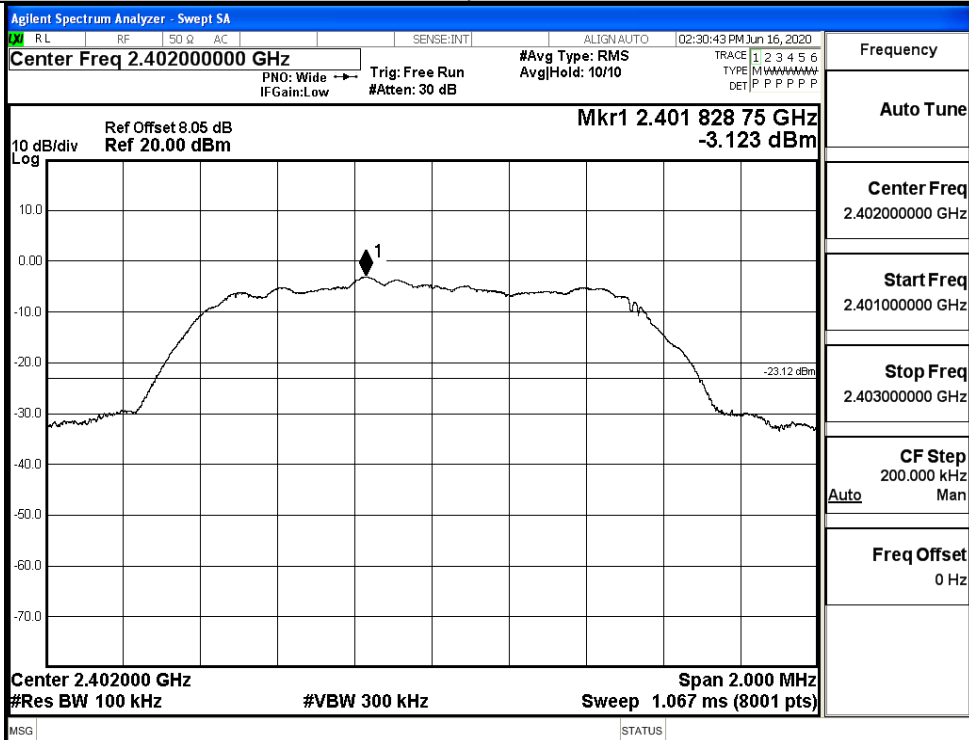


$\pi/4$ DQPSK\_HCH\_Graphs

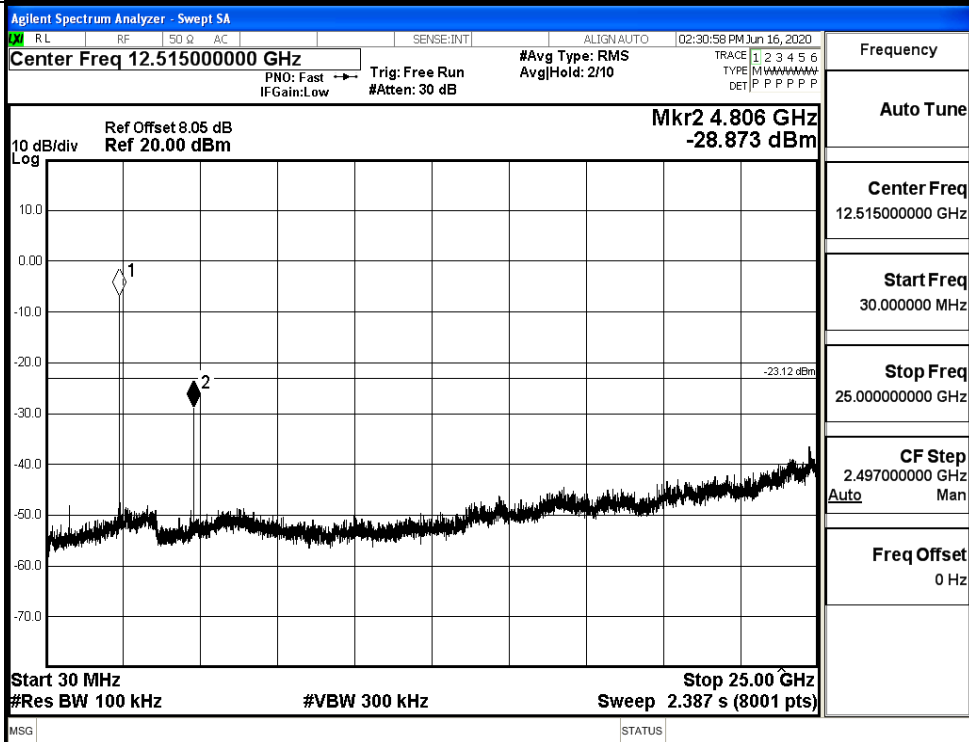


8DPSK\_LCH\_Graphs

Pref

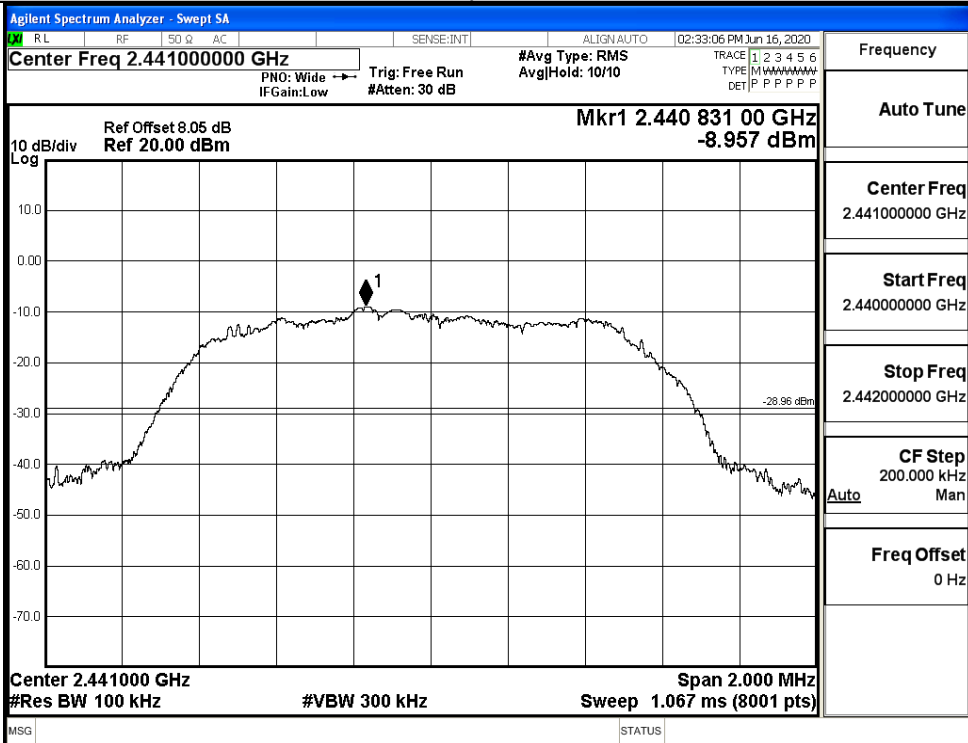


Puw

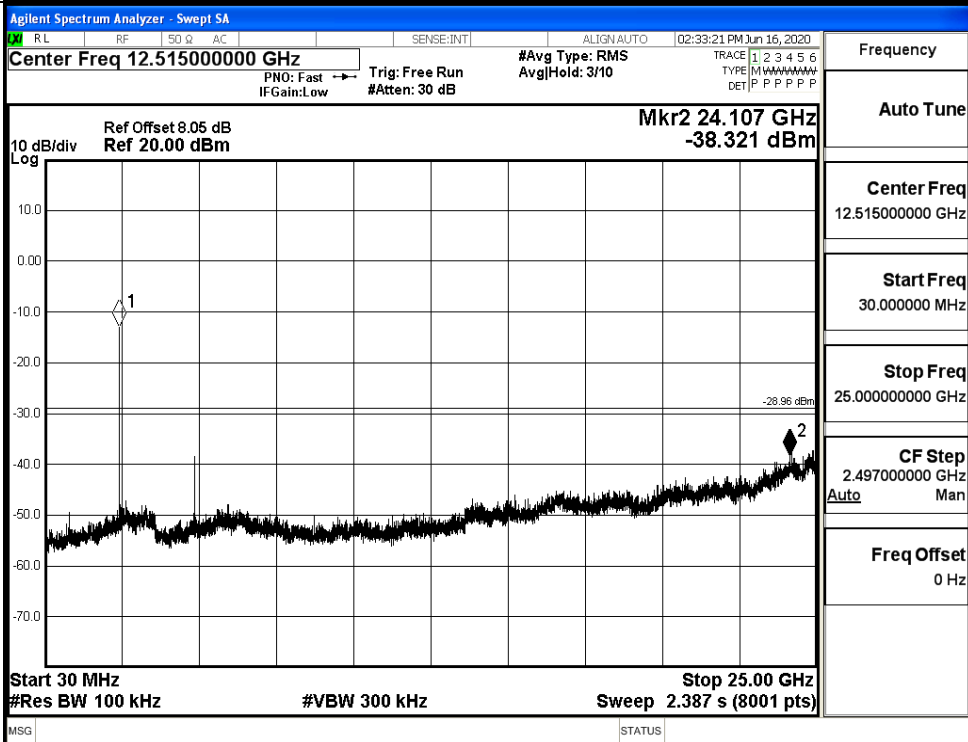


8DPSK\_MCH\_Graphs

Pref

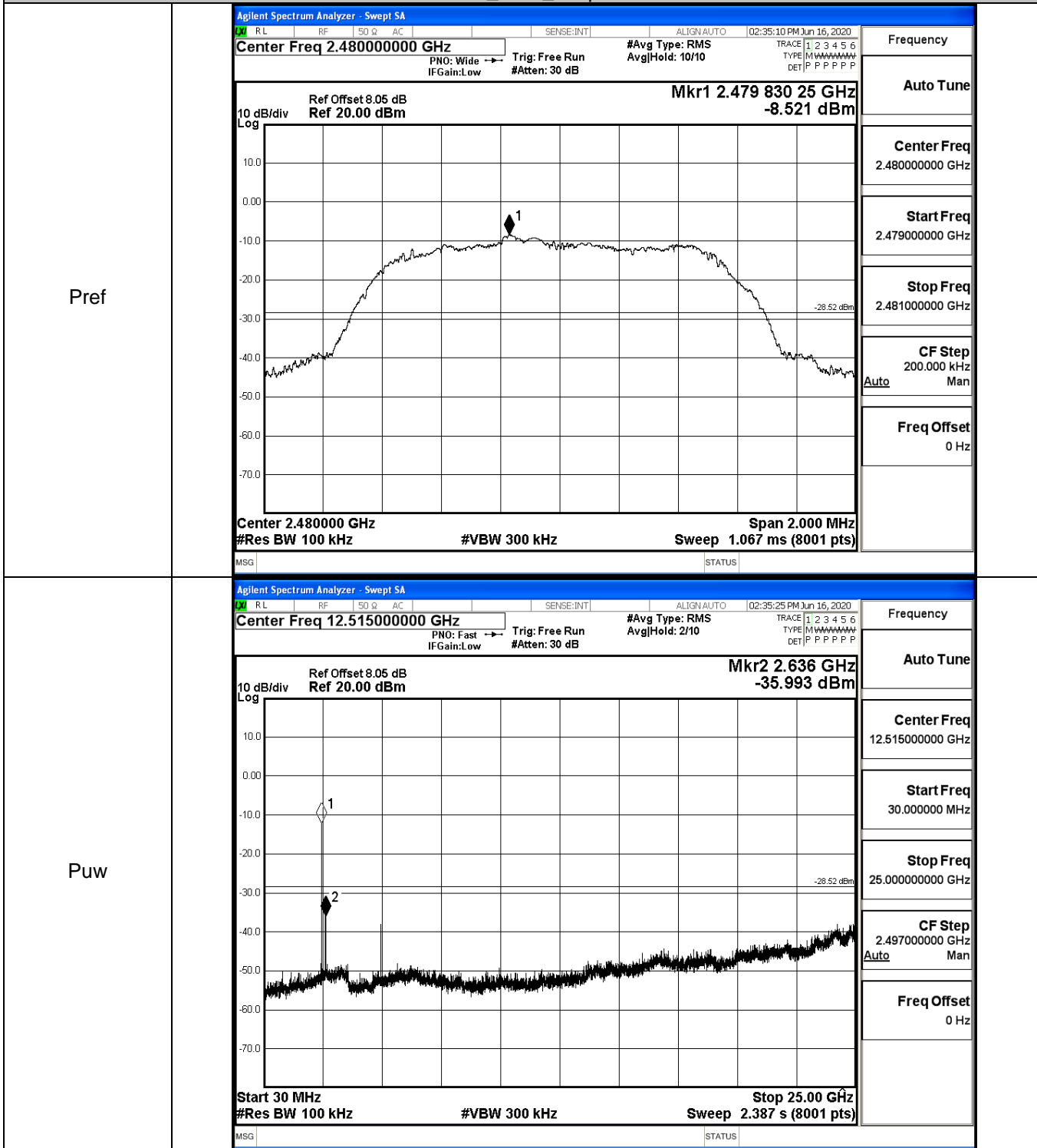


Puw





8DPSK\_HCH\_Graphs

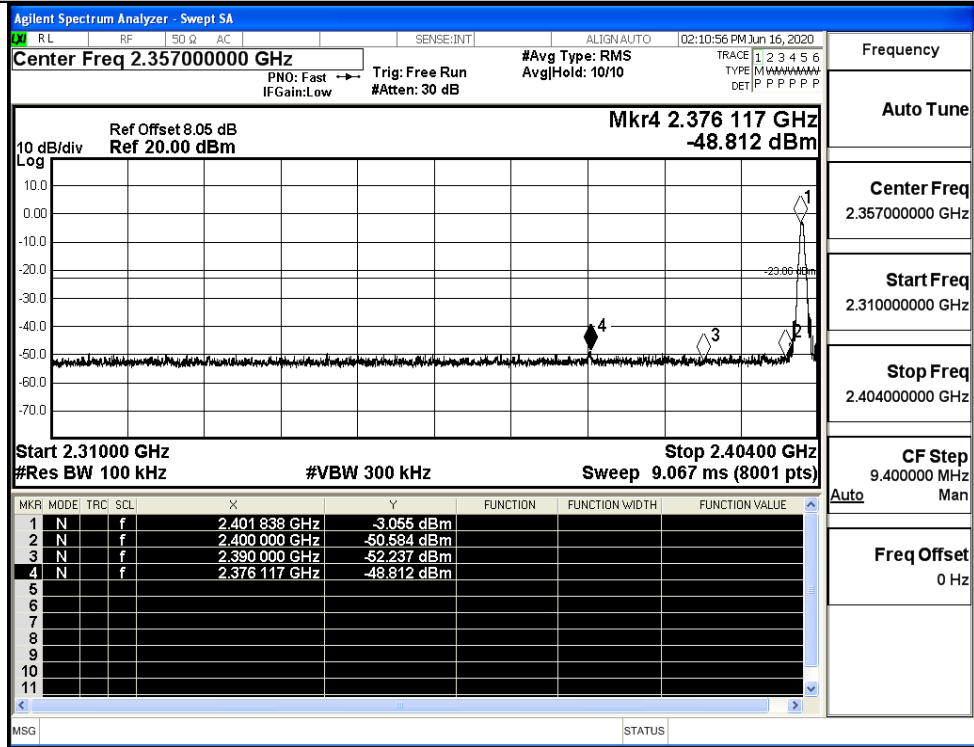


## A.7 Band-edge for RF Conducted Emissions

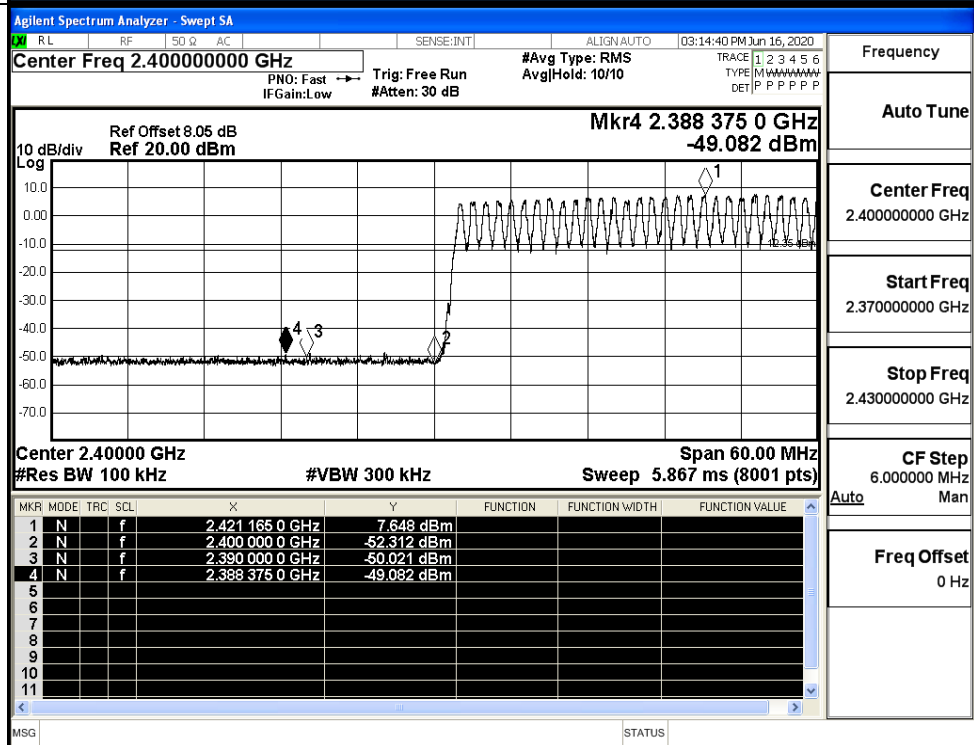
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-3.055	Off	-48.812	-23.06	PASS
			7.648	On	-49.082	-12.35	PASS
	HCH	2480	-3.293	Off	-48.447	-23.29	PASS
			7.054	On	-48.463	-12.95	PASS
$\pi/4$ DQPSK	LCH	2402	-3.119	Off	-48.946	-23.12	PASS
			6.654	On	-48.584	-13.35	PASS
	HCH	2480	-3.402	Off	-48.814	-23.4	PASS
			6.057	On	-48.251	-13.94	PASS
8DPSK	LCH	2402	-3.773	Off	-48.374	-23.77	PASS
			6.578	On	-48.398	-13.42	PASS
	HCH	2480	-8.464	Off	-48.725	-28.46	PASS
			5.806	On	-47.796	-14.19	PASS

Test Graphs

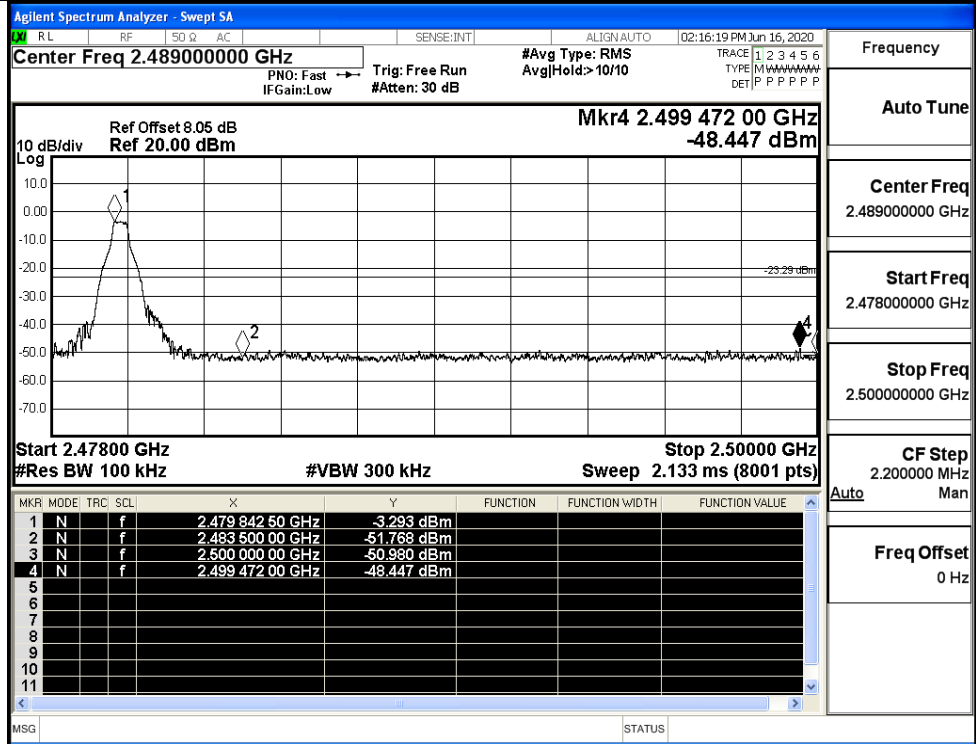
GFSK/LCH/No Hop



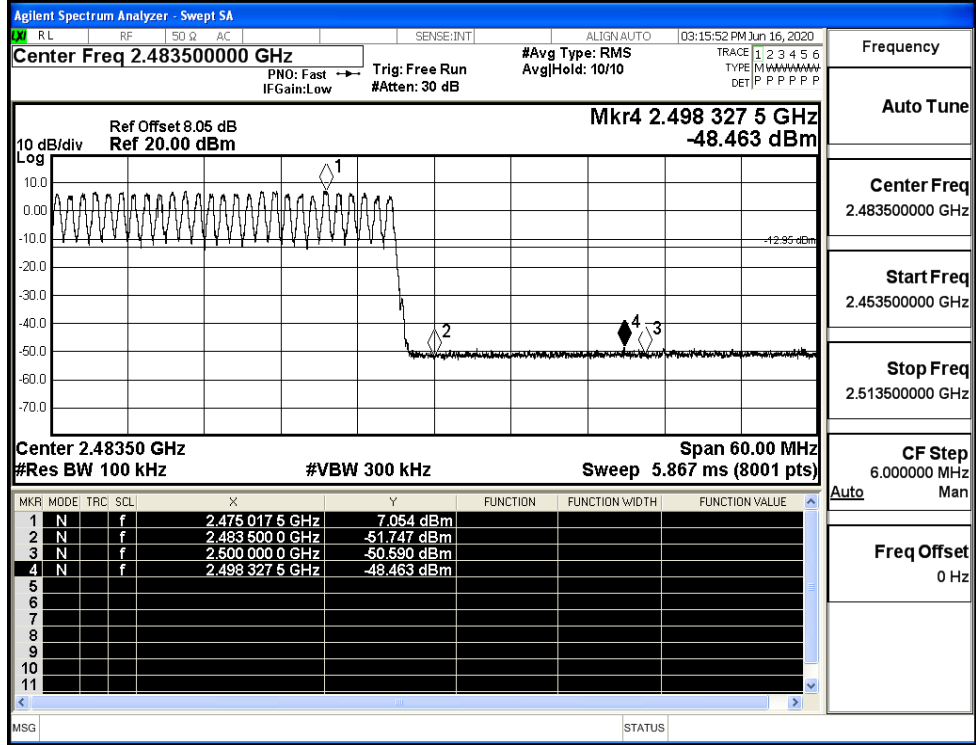
GFSK/LCH/Hop



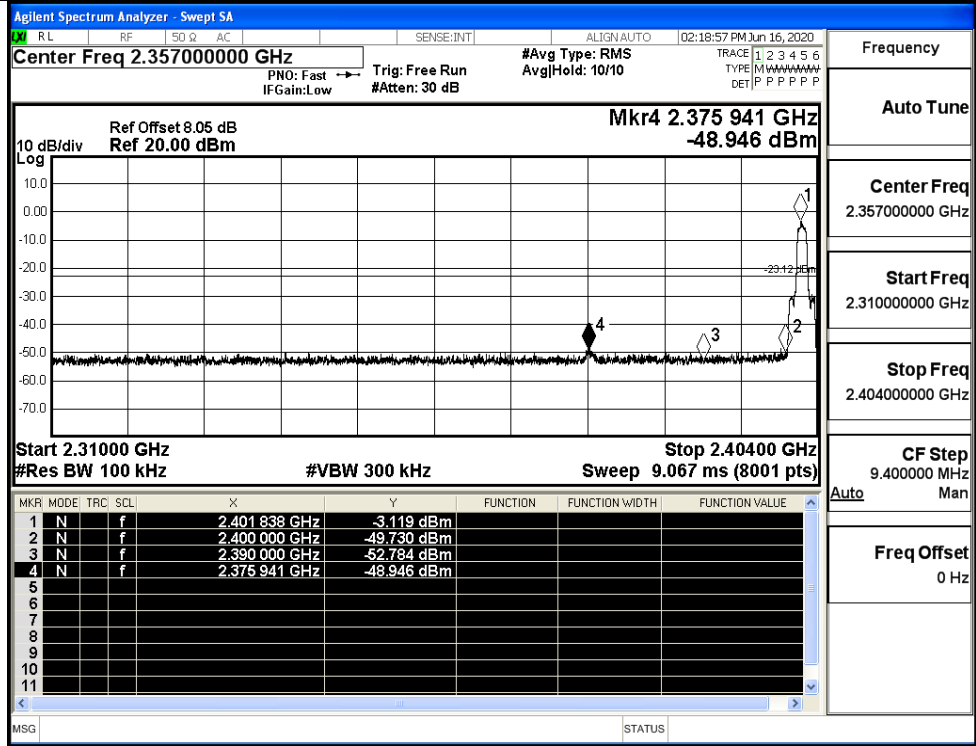
GFSK/HCH/No Hop



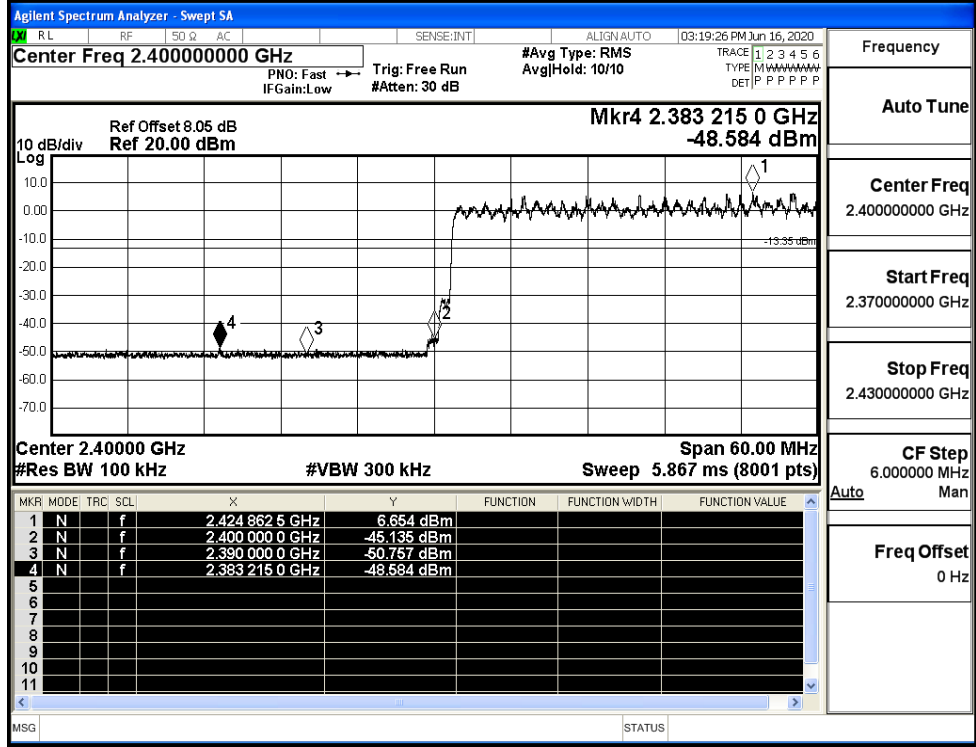
GFSK/HCH/Hop



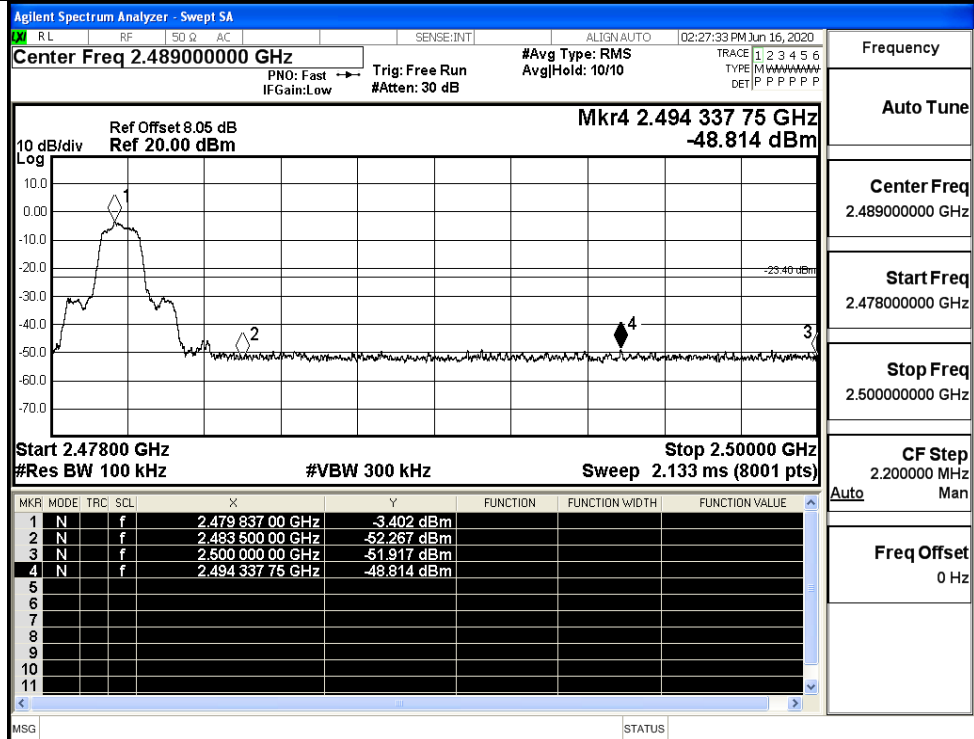
$\pi/4$ DQPSK/LCH/No  
Hop



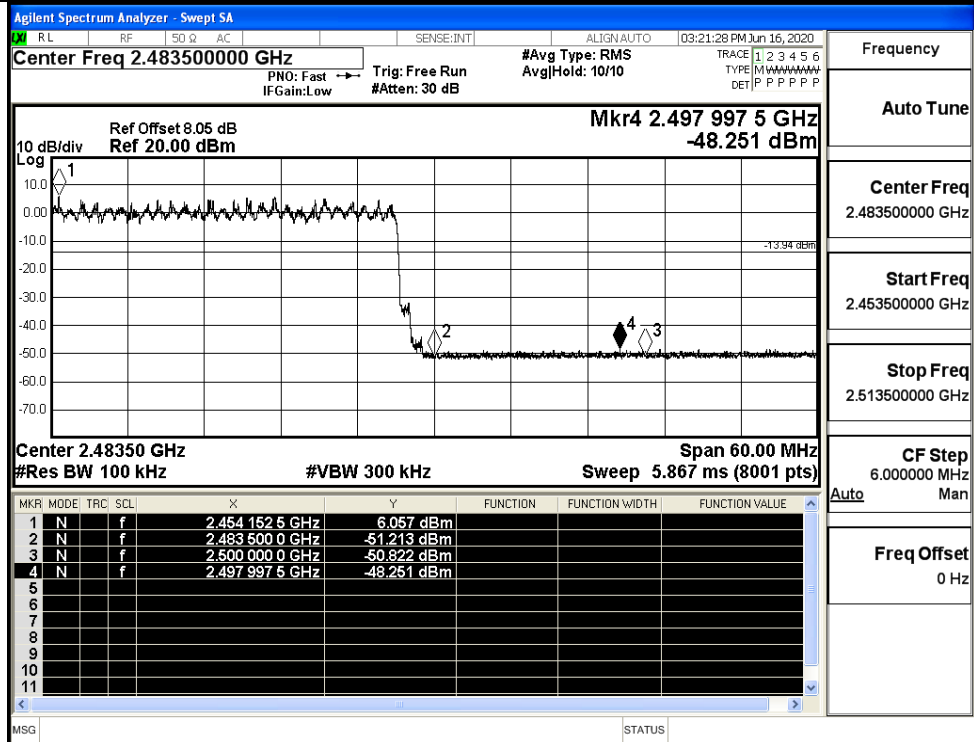
$\pi/4$ DQPSK/LCH/Hop



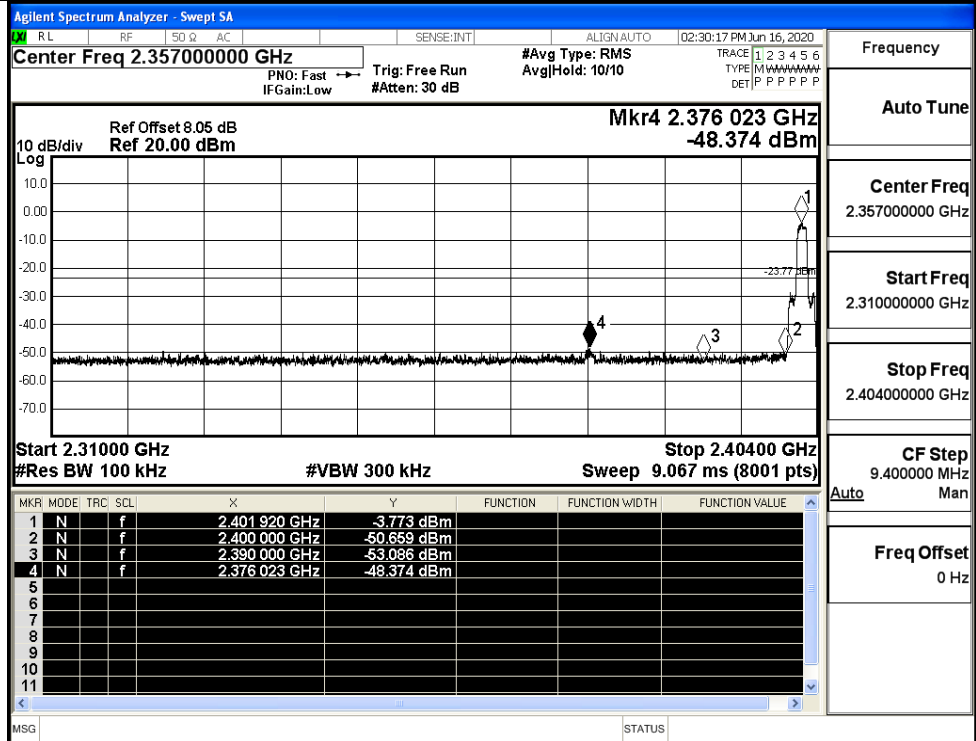
$\pi$ /4DQPSK/HCH/No  
Hop



$\pi$ /4DQPSK/HCH/Hop

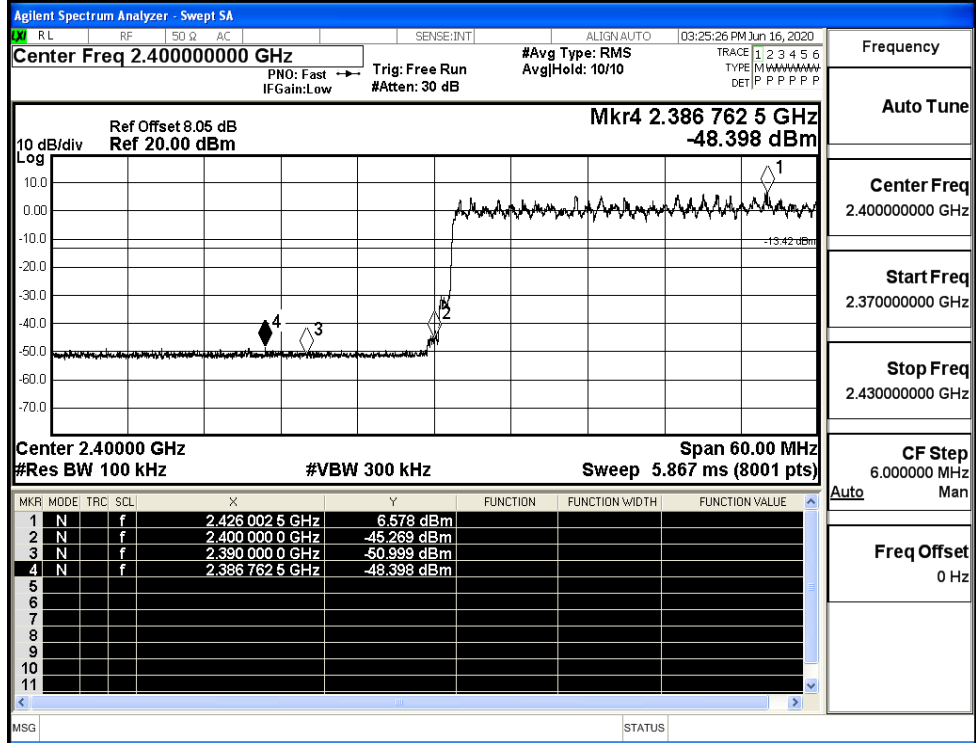


8DPSK/LCH/No Hop



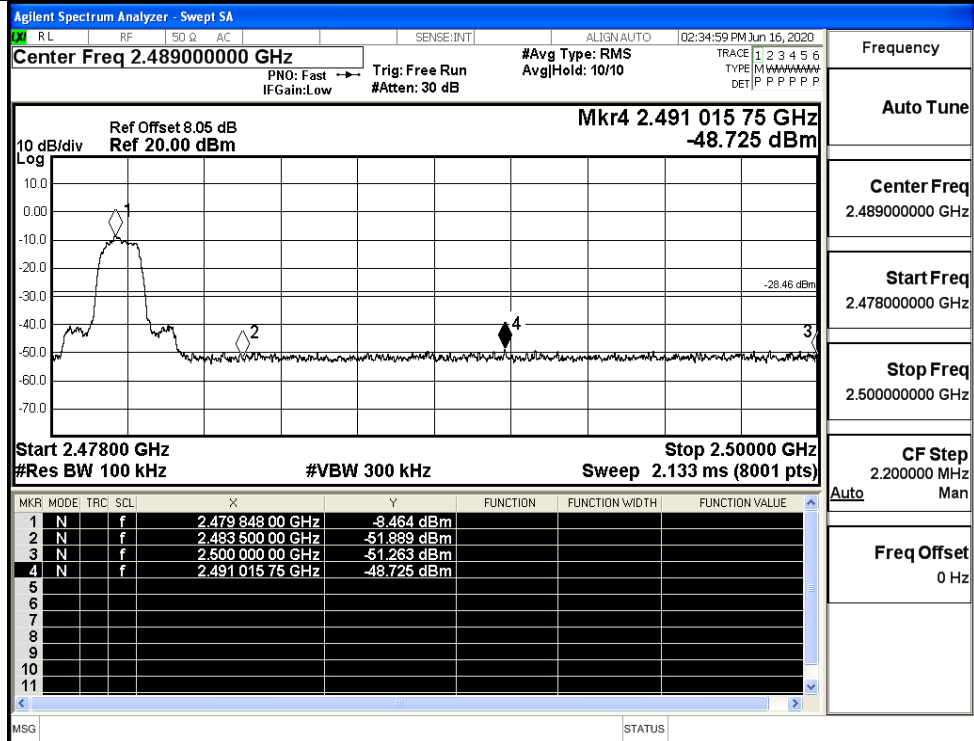
Frequency  
Auto Tune  
Center Freq  
2.357000000 GHz  
Start Freq  
2.310000000 GHz  
Stop Freq  
2.404000000 GHz  
CF Step  
9.400000 MHz  
Freq Offset  
0 Hz

8DPSK/LCH/Hop



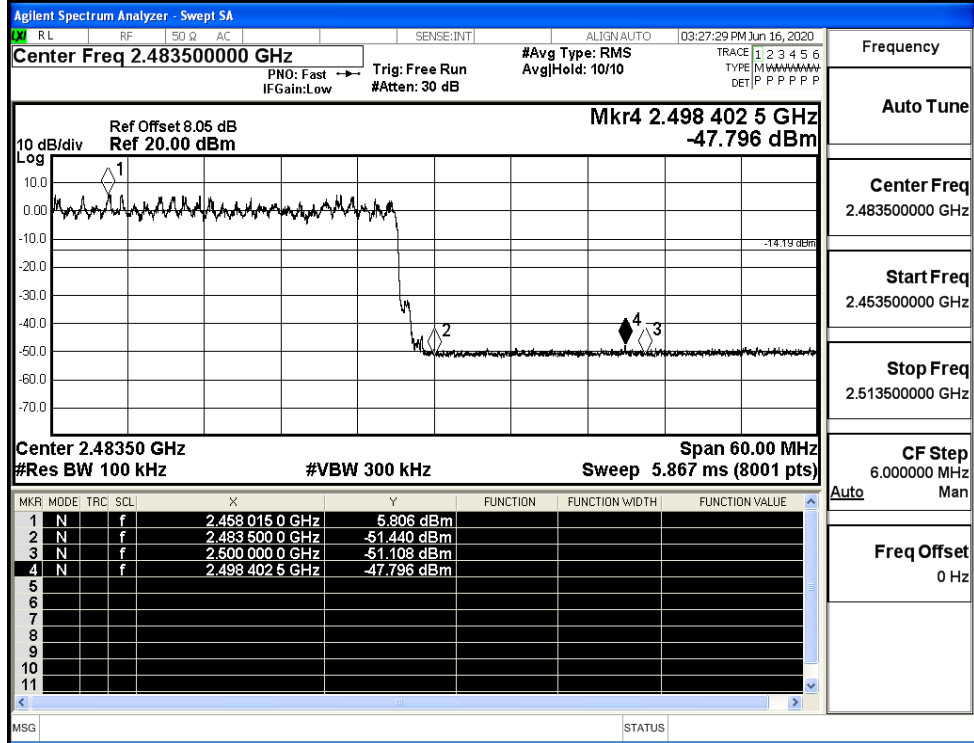
Frequency  
Auto Tune  
Center Freq  
2.400000000 GHz  
Start Freq  
2.370000000 GHz  
Stop Freq  
2.430000000 GHz  
CF Step  
6.000000 MHz  
Freq Offset  
0 Hz

8DPSK/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
Freq Offset	0 Hz

8DPSK/HCH/Hop



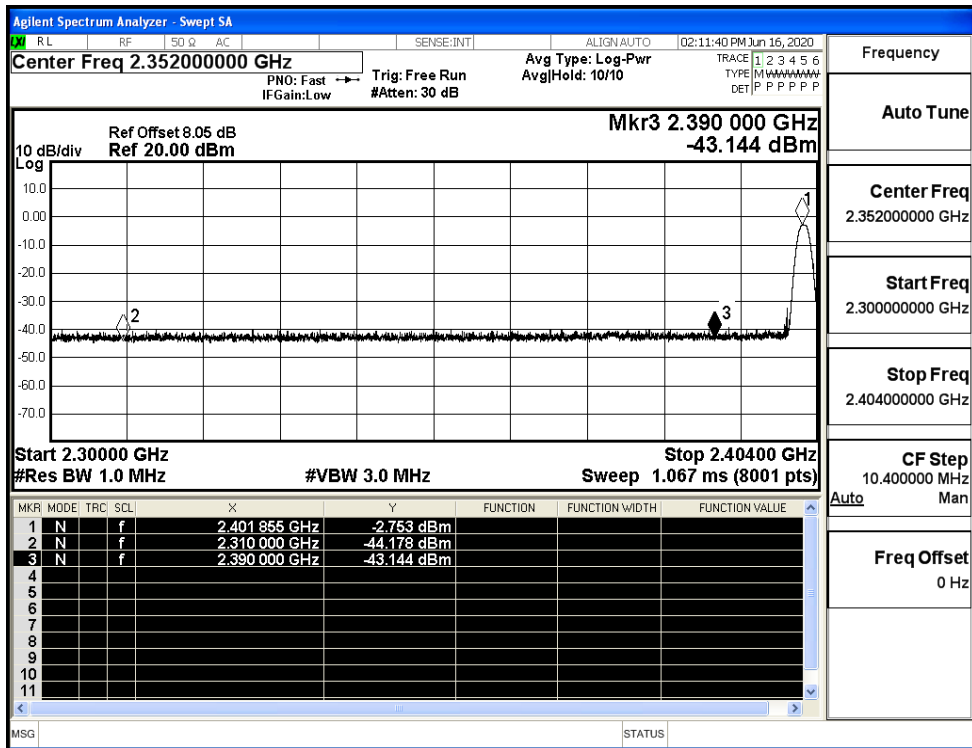
Frequency	
Auto Tune	
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Start Freq	2.453500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz



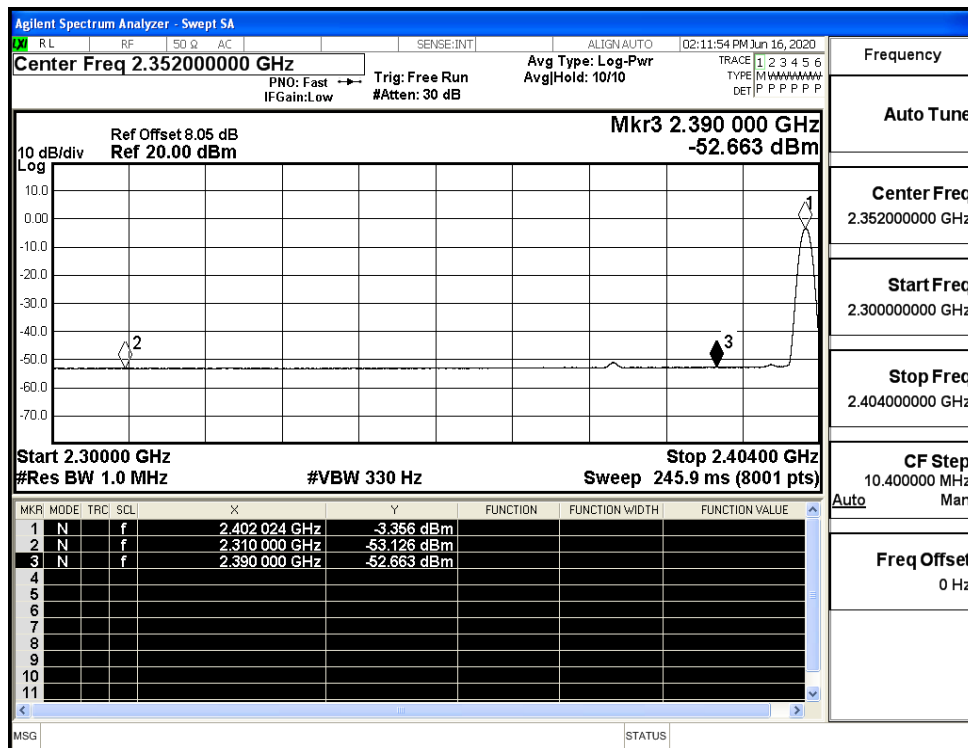
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.18	2.0	0	53.08	PEAK	74	PASS
	Off	2310.0	-53.13	2.0	0	44.13	AV	54	PASS
	Off	2390.0	-43.14	2.0	0	54.12	PEAK	74	PASS
	Off	2390.0	-52.66	2.0	0	44.60	AV	54	PASS
	Off	2483.5	-41.77	2.0	0	55.49	PEAK	74	PASS
	Off	2483.5	-52.35	2.0	0	44.91	AV	54	PASS
	Off	2500.0	-40.99	2.0	0	56.27	PEAK	74	PASS
	Off	2500.0	-52.25	2.0	0	45.01	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.34	2.0	0	54.92	PEAK	74	PASS
	Off	2310.0	-53.08	2.0	0	44.18	AV	54	PASS
	Off	2390.0	-42.37	2.0	0	54.89	PEAK	74	PASS
	Off	2390.0	-52.77	2.0	0	44.49	AV	54	PASS
	Off	2483.5	-41.69	2.0	0	55.57	PEAK	74	PASS
	Off	2483.5	-51.95	2.0	0	45.31	AV	54	PASS
	Off	2500.0	-40.57	2.0	0	56.69	PEAK	74	PASS
	Off	2500.0	-52.20	2.0	0	45.06	AV	54	PASS
8DPSK	Off	2310.0	-43.13	2.0	0	54.13	PEAK	74	PASS
	Off	2310.0	-53.26	2.0	0	44.00	AV	54	PASS
	Off	2390.0	-42.15	2.0	0	55.11	PEAK	74	PASS
	Off	2390.0	-52.88	2.0	0	44.38	AV	54	PASS
	Off	2483.5	-41.25	2.0	0	56.01	PEAK	74	PASS
	Off	2483.5	-52.24	2.0	0	45.02	AV	54	PASS
	Off	2500.0	-41.94	2.0	0	55.32	PEAK	74	PASS
	Off	2500.0	-52.28	2.0	0	44.98	AV	54	PASS

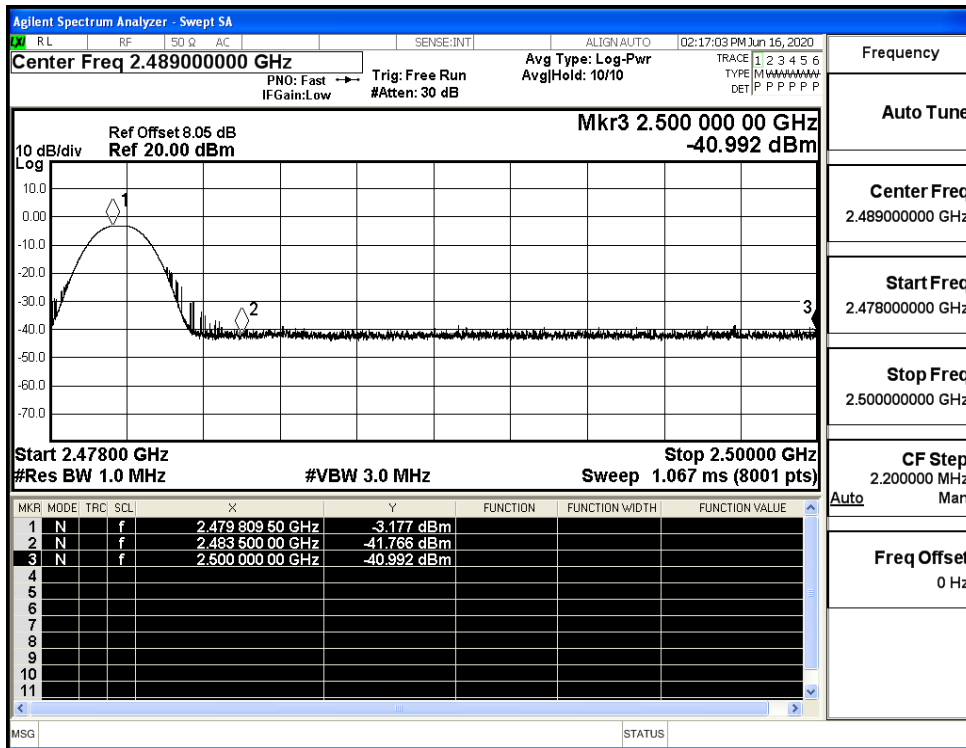
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



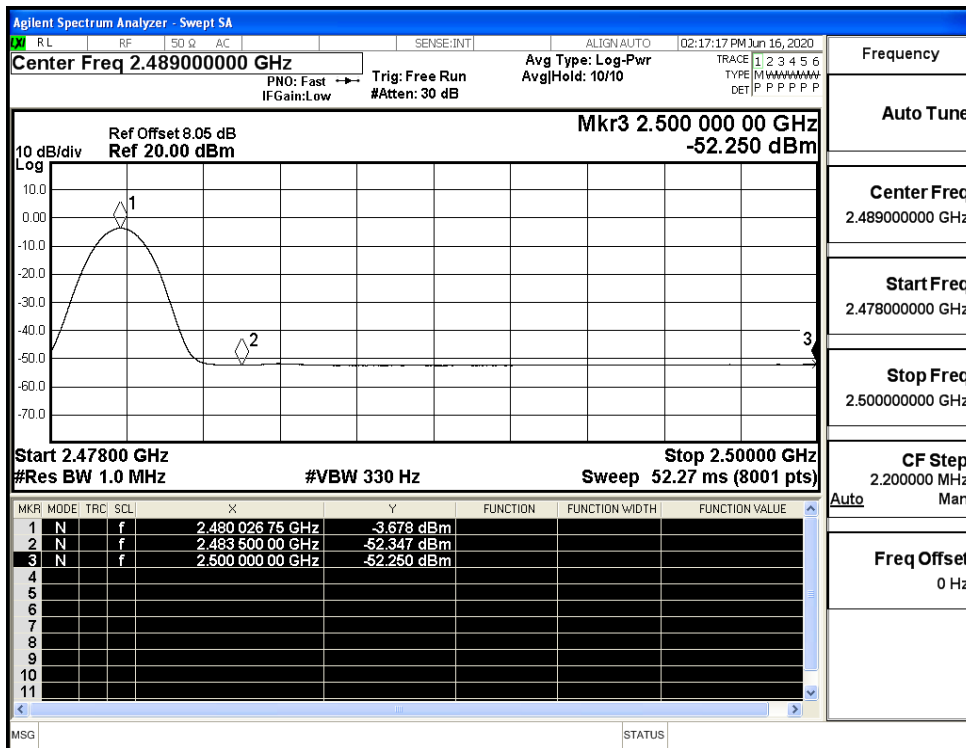
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



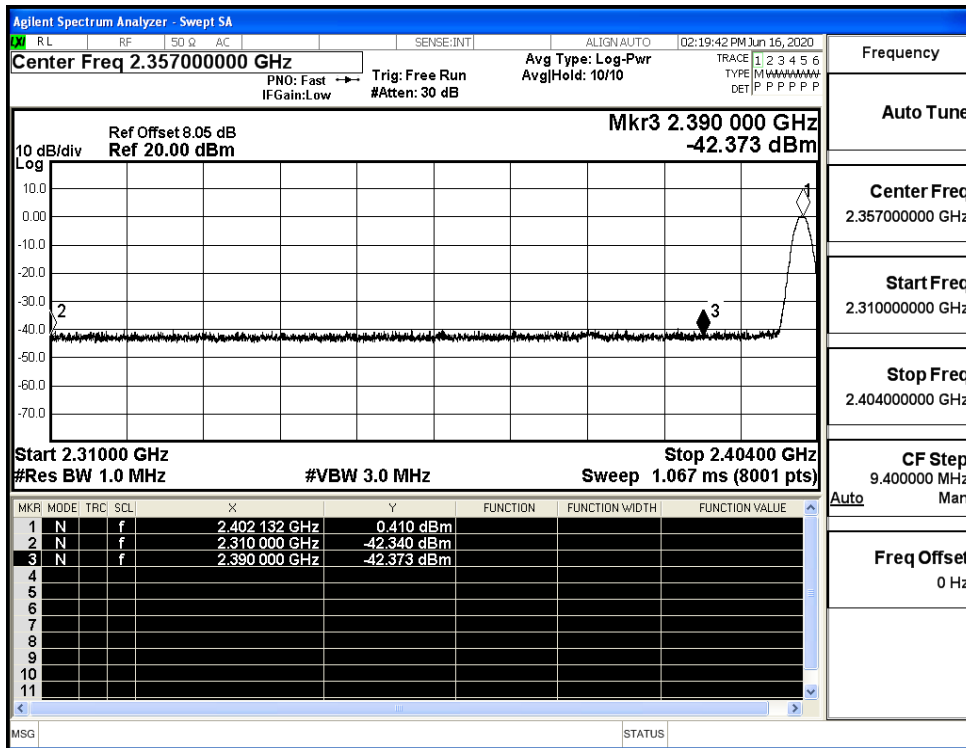
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)



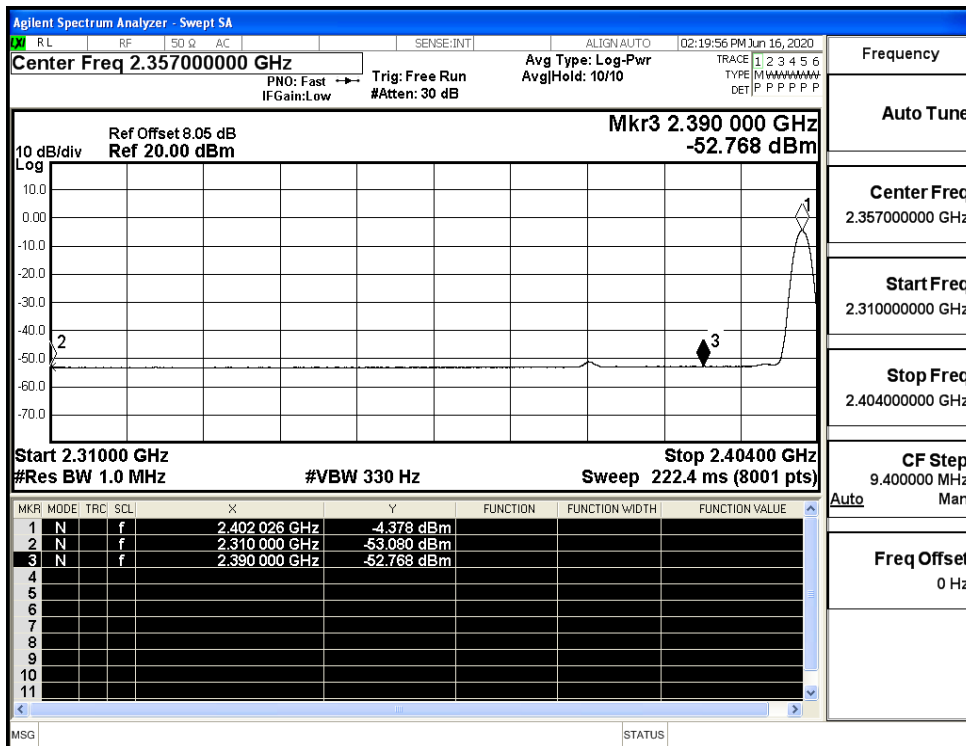
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)



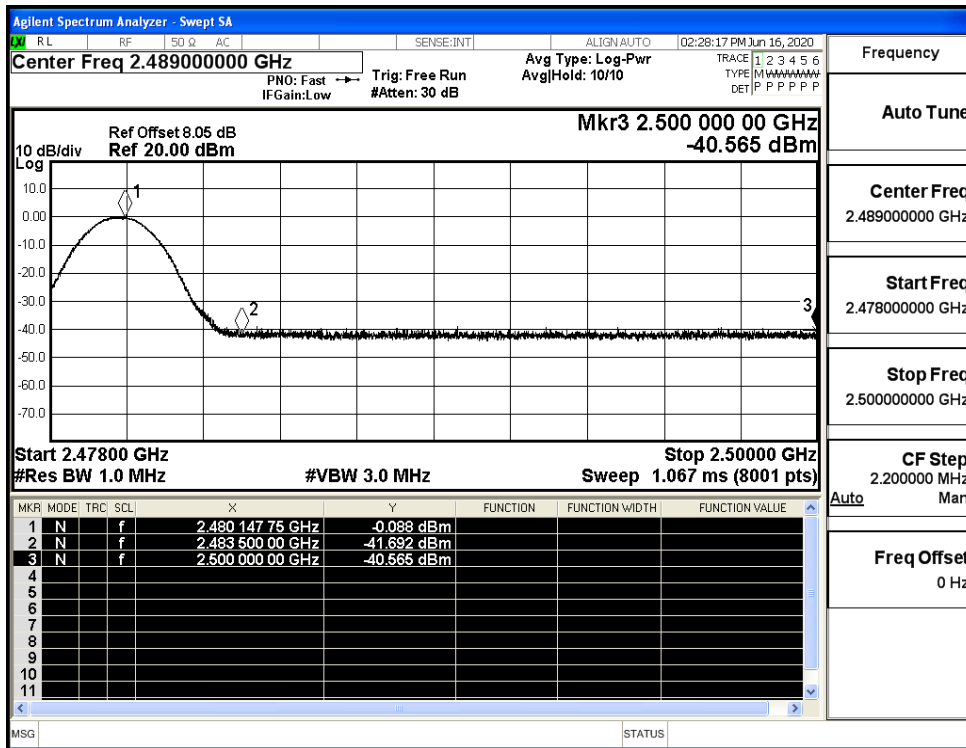
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)



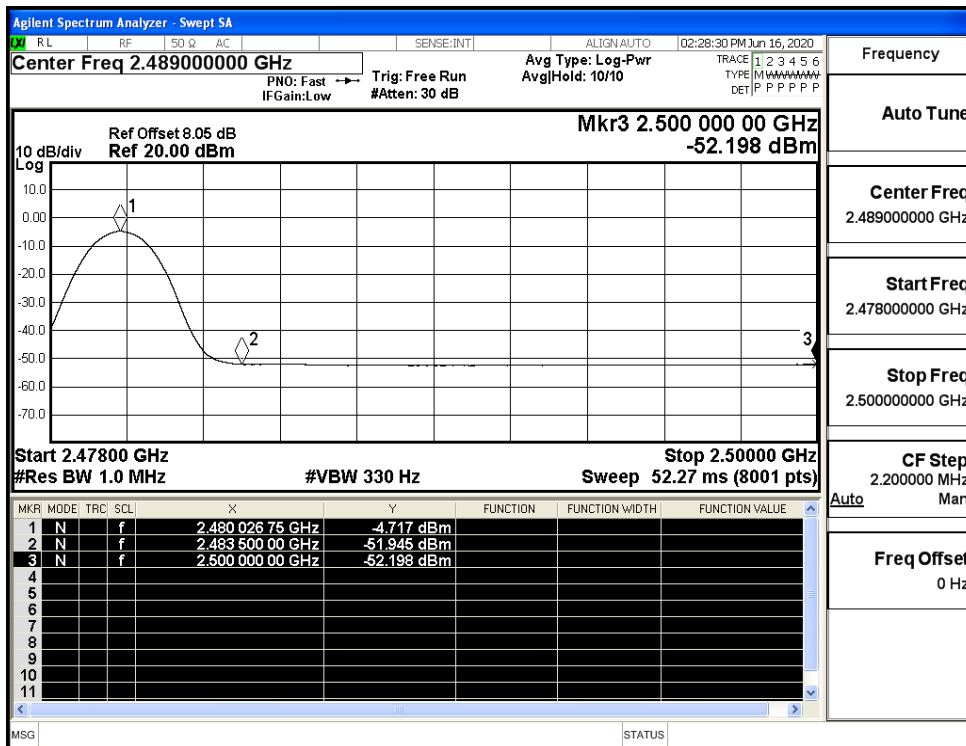
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)



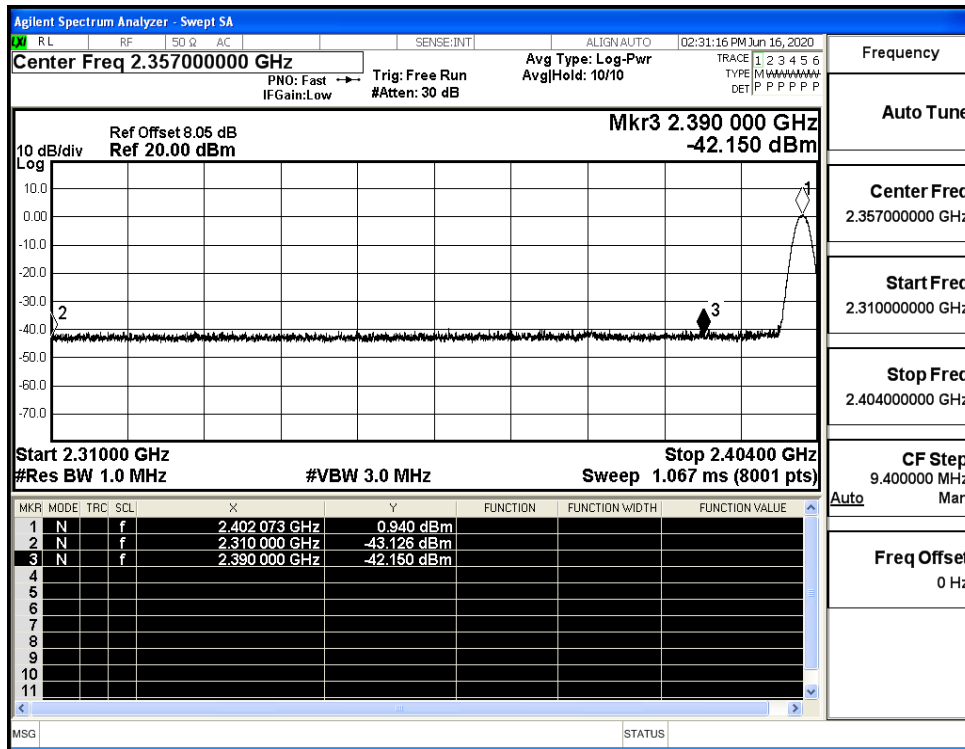
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (High Channel)



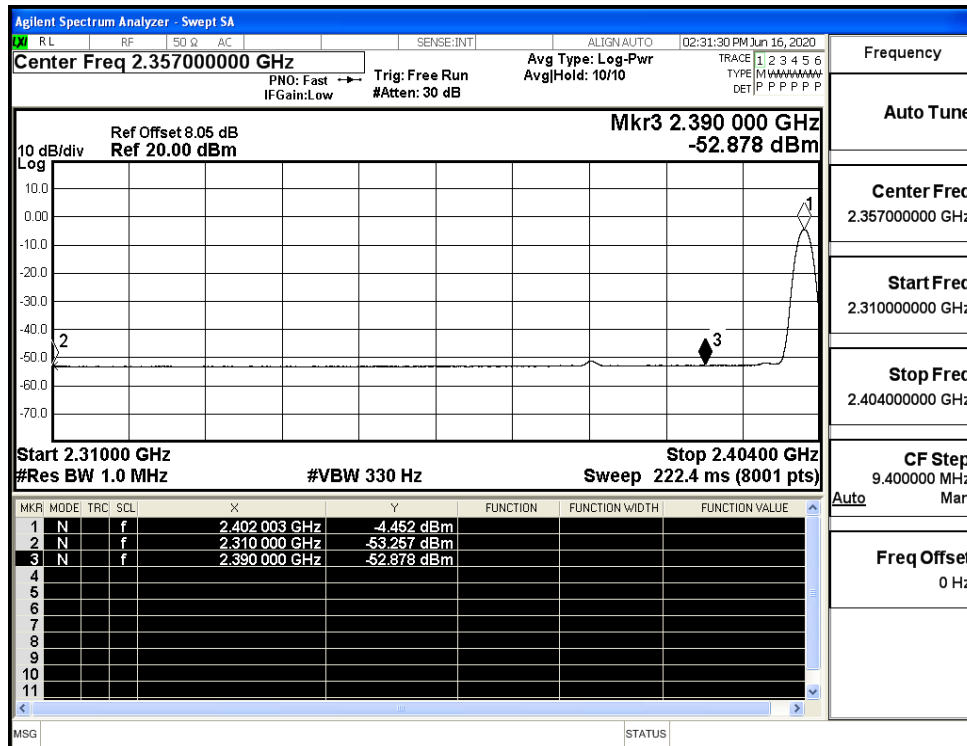
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (High Channel)



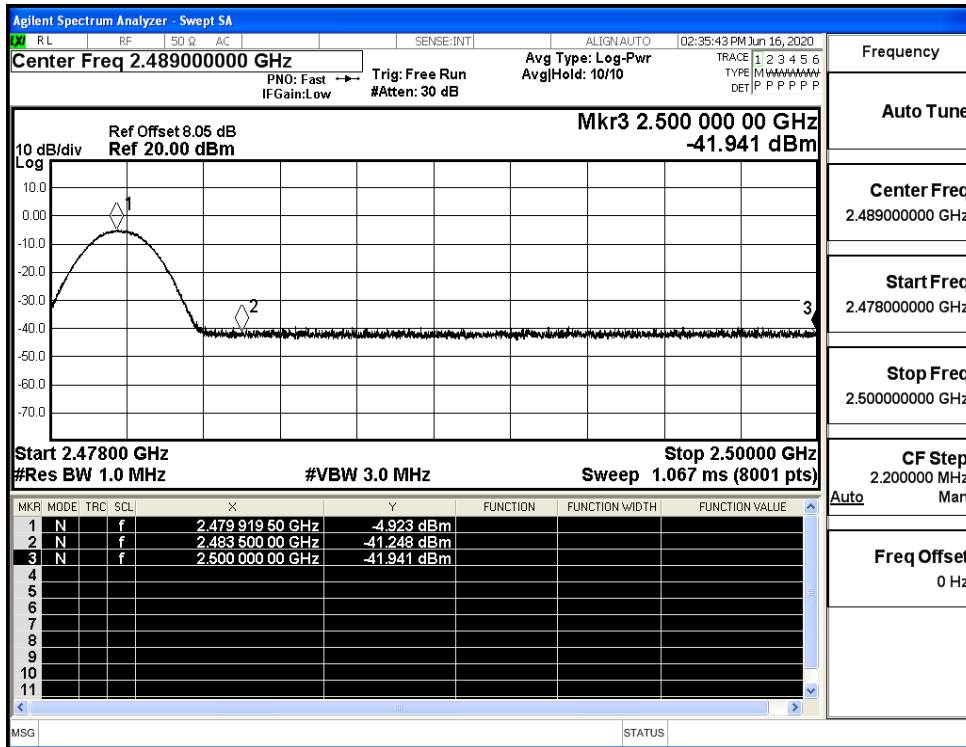
Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



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)

