

## Appendix A

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

**Product Name: Wireless Speaker**

**Trade Mark: billboard**

**Test Model: BB1478**

#### Environmental Conditions

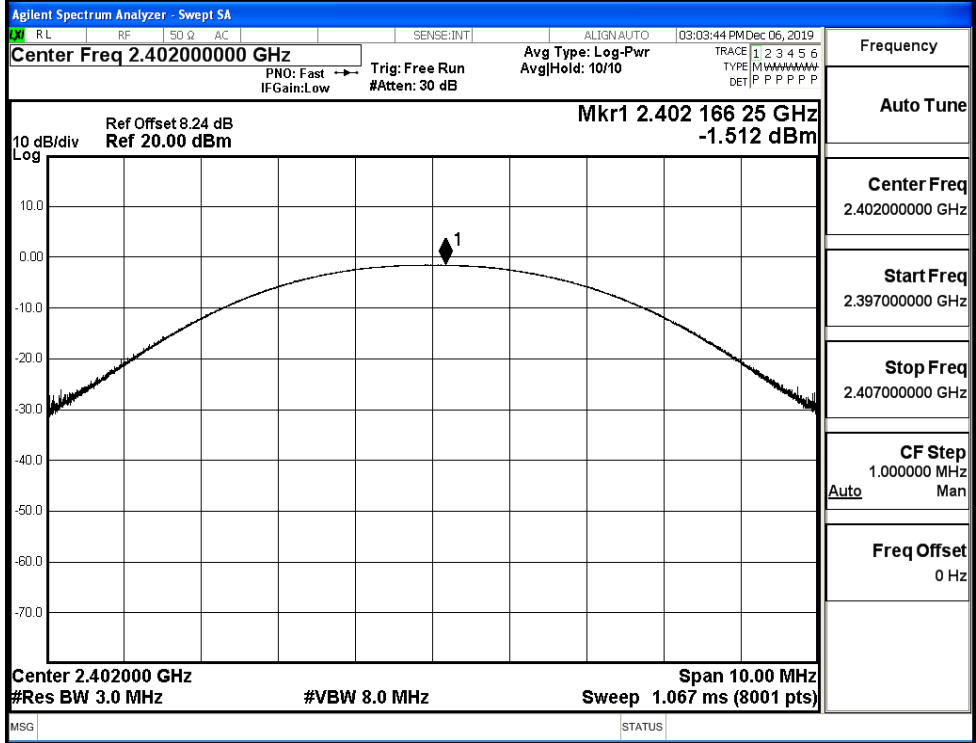
Temperature:	24.6 ° C
Relative Humidity:	52.8%
ATM Pressure:	100.0 kPa
Test Engineer:	Qu Xin
Supervised by:	Wang Chuang

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

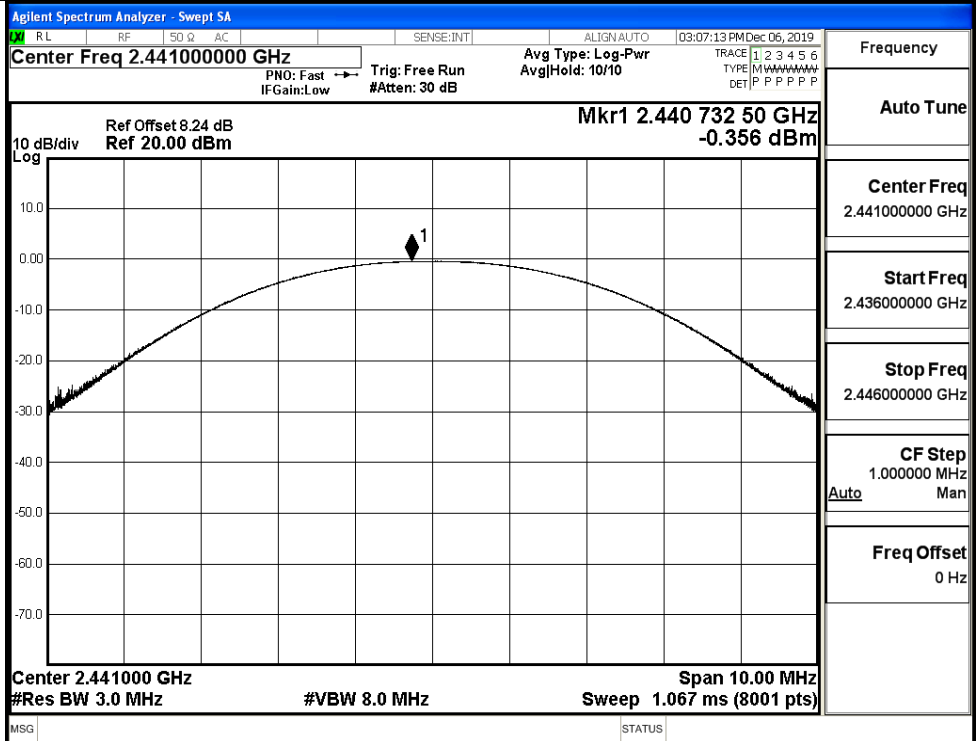
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.512	30	PASS
	MCH	-0.356	30	PASS
	HCH	-0.277	30	PASS
π/4DQPSK	LCH	-0.497	21	PASS
	MCH	0.643	21	PASS
	HCH	0.621	21	PASS
8DPSK	LCH	0.223	21	PASS
	MCH	1.379	21	PASS
	HCH	1.321	21	PASS

Test Graphs

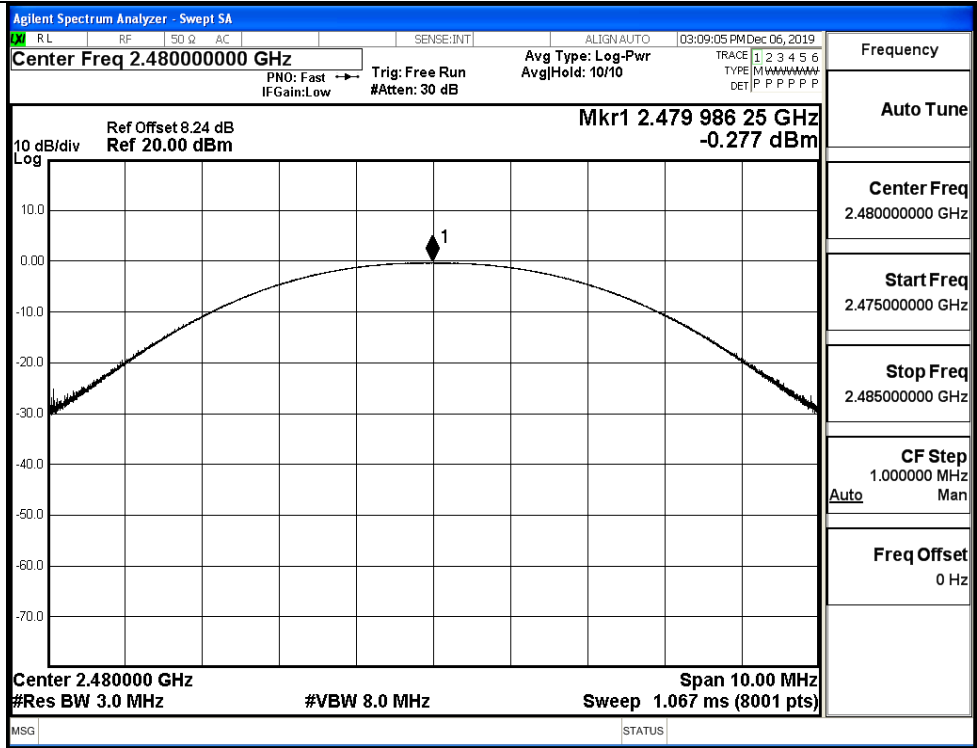
GFSK/LCH



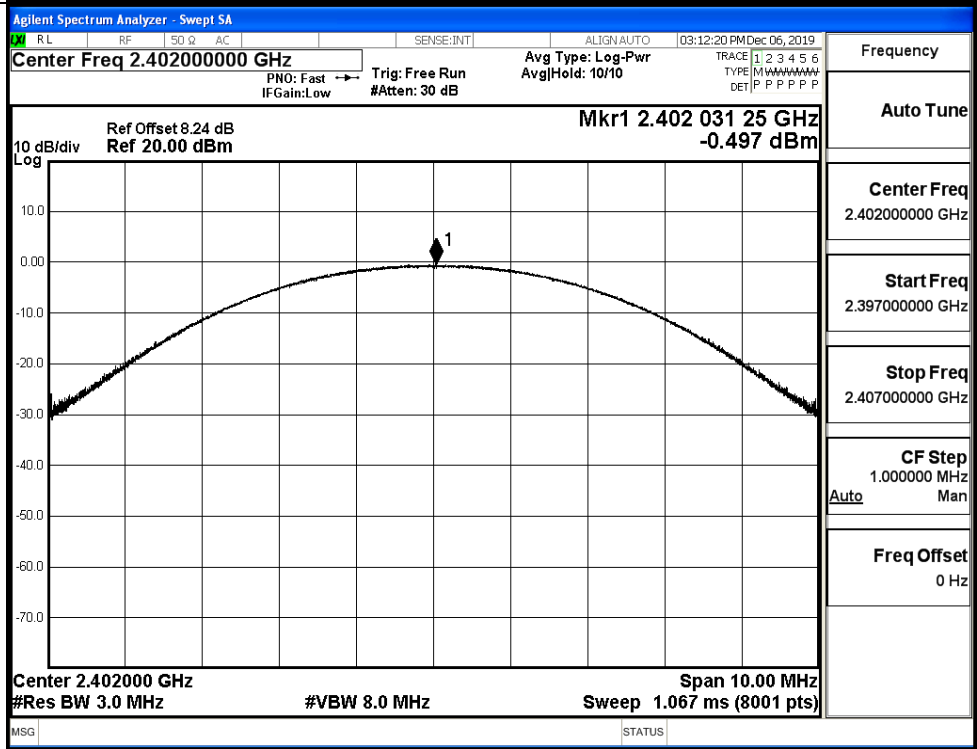
GFSK/MCH

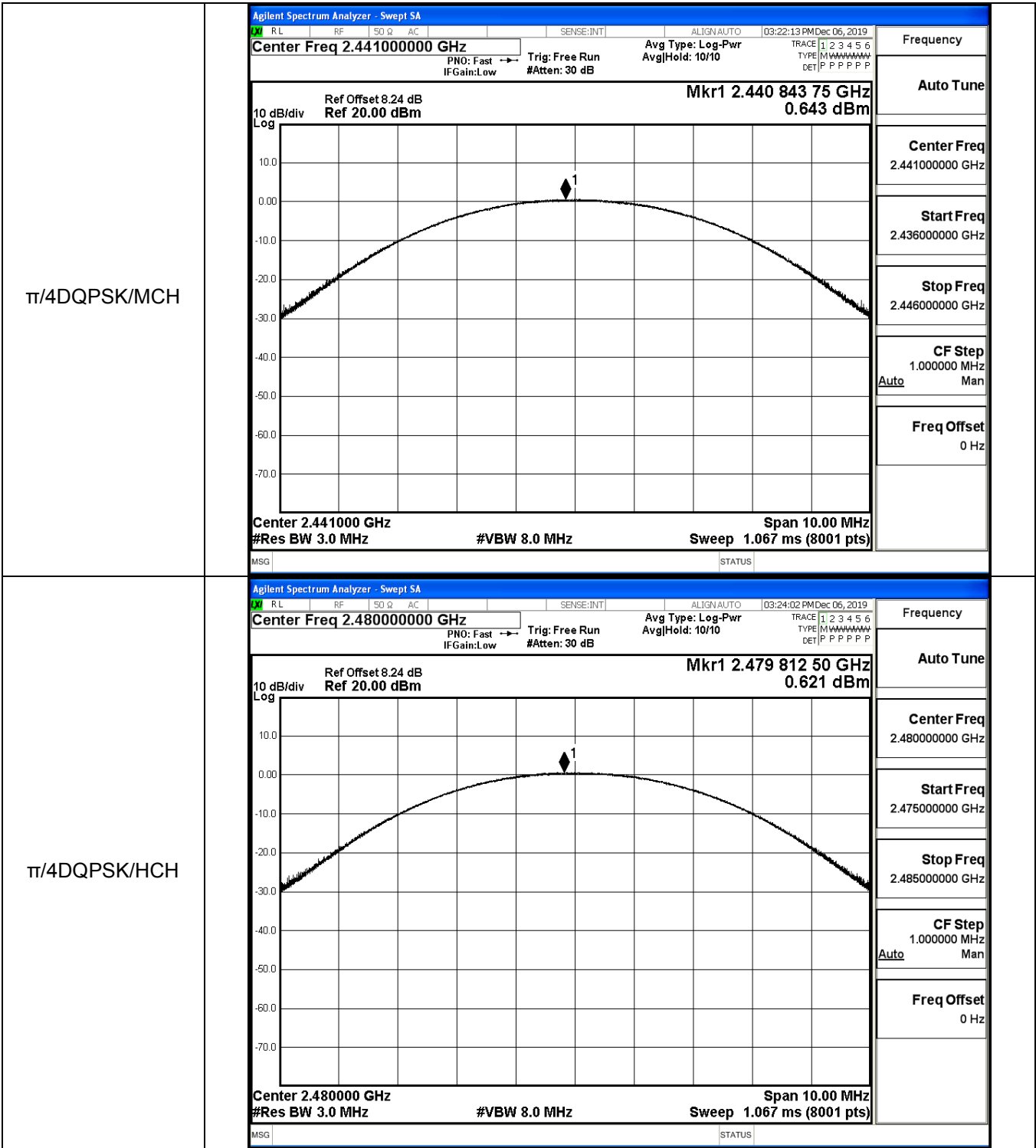


GFSK/HCH

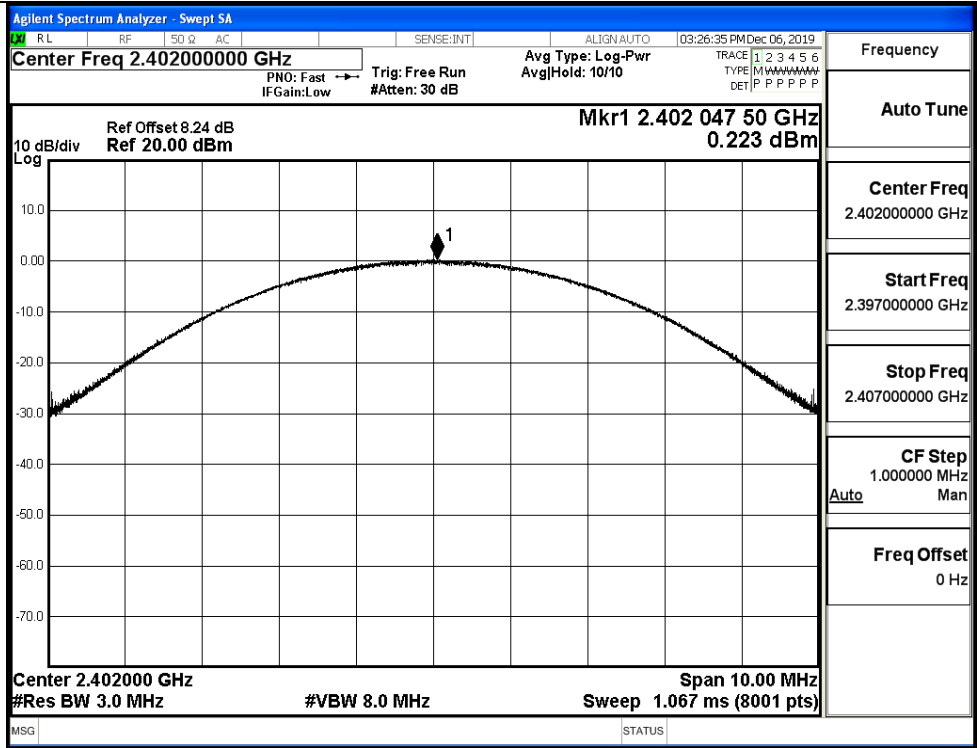


$\pi$ /4DQPSK/LCH

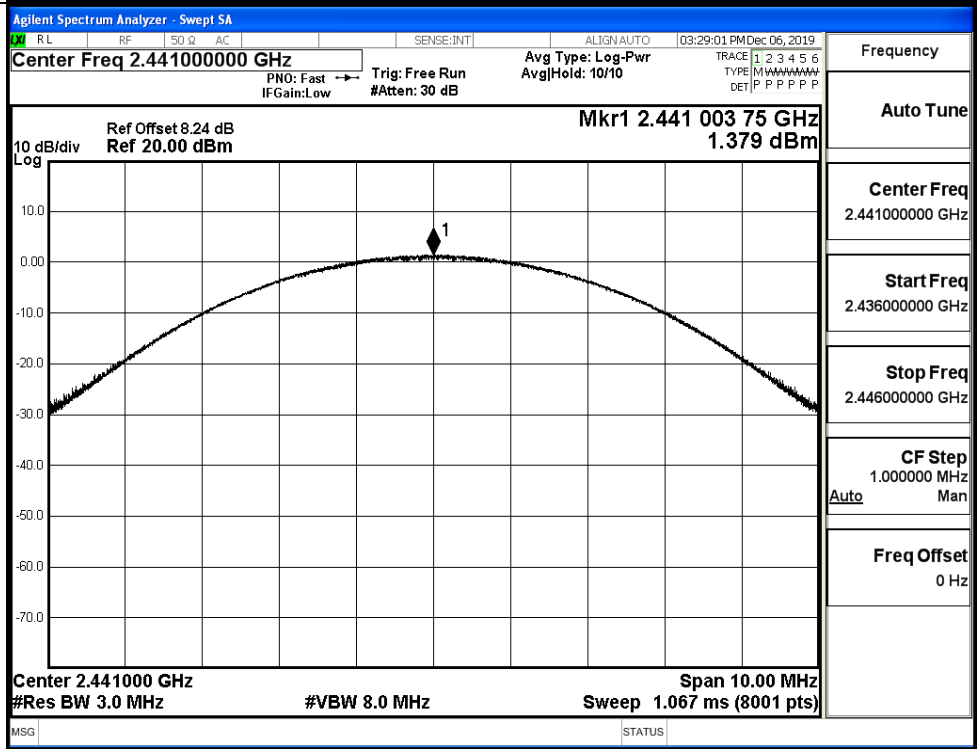




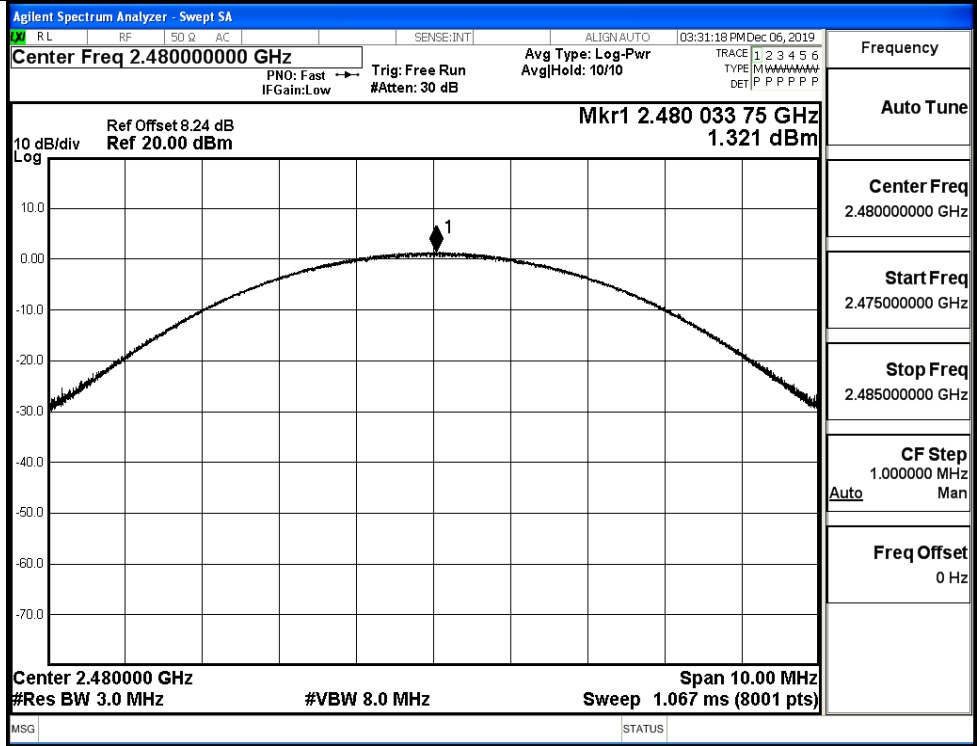
8DPSK/LCH



8DPSK/MCH

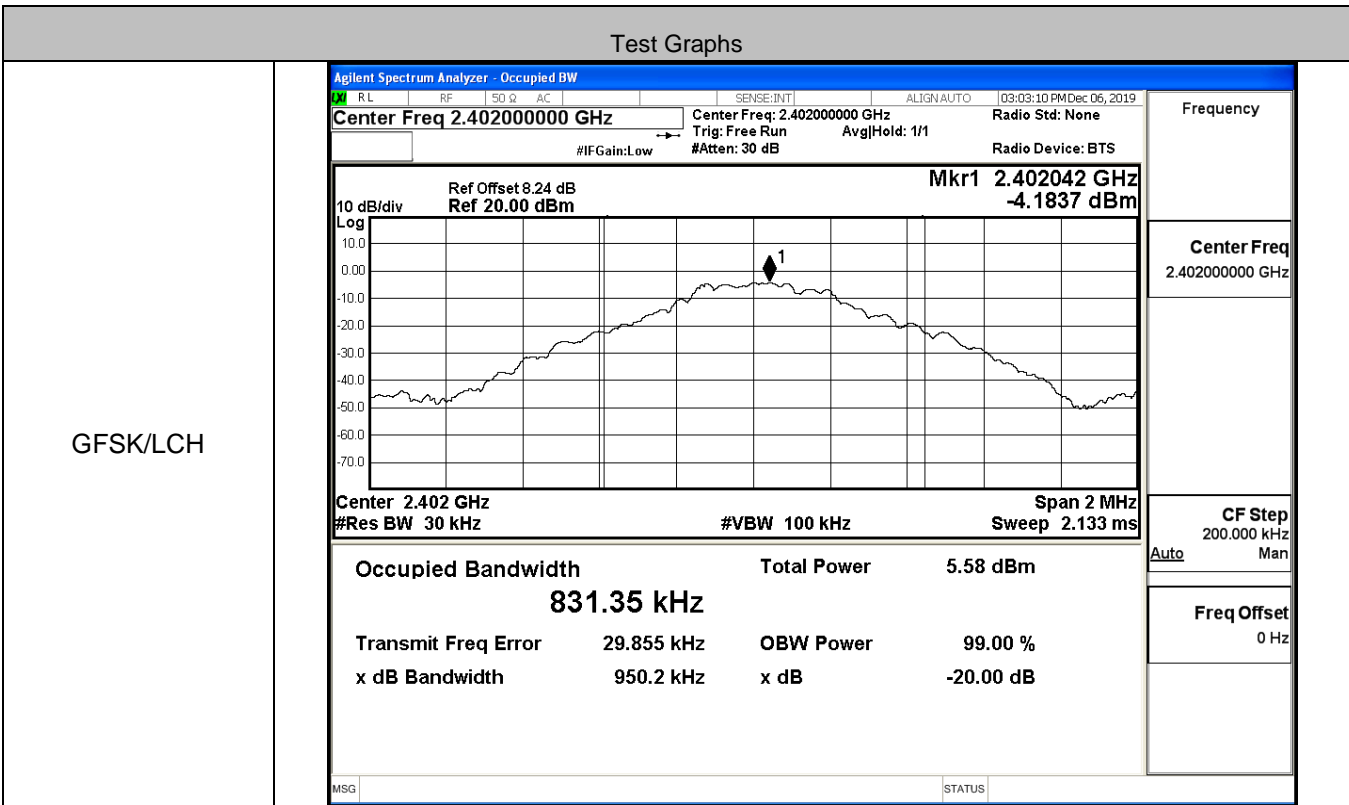


8DPSK/HCH

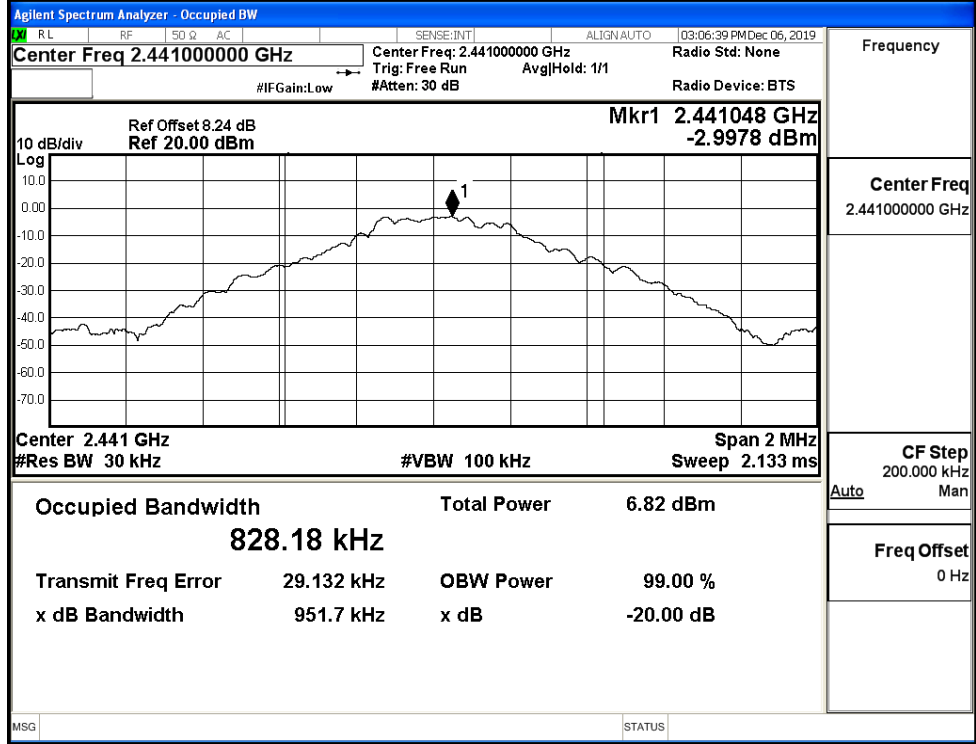


**A.2 20dB Bandwidth**

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9502	Not Specified	PASS
	MCH	0.9517	Not Specified	PASS
	HCH	0.9497	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.283	Not Specified	PASS
	MCH	1.282	Not Specified	PASS
	HCH	1.284	Not Specified	PASS
8DPSK	LCH	1.299	Not Specified	PASS
	MCH	1.296	Not Specified	PASS
	HCH	1.297	Not Specified	PASS

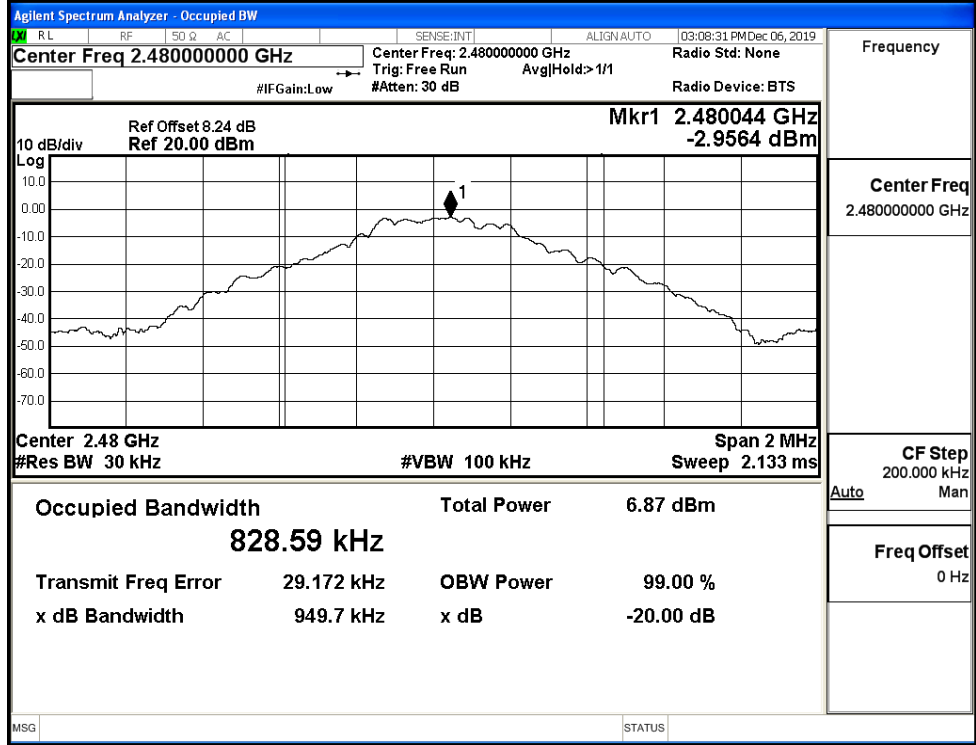


GFSK/MCH



Frequency	2.44100000 GHz
Center Freq	2.44100000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

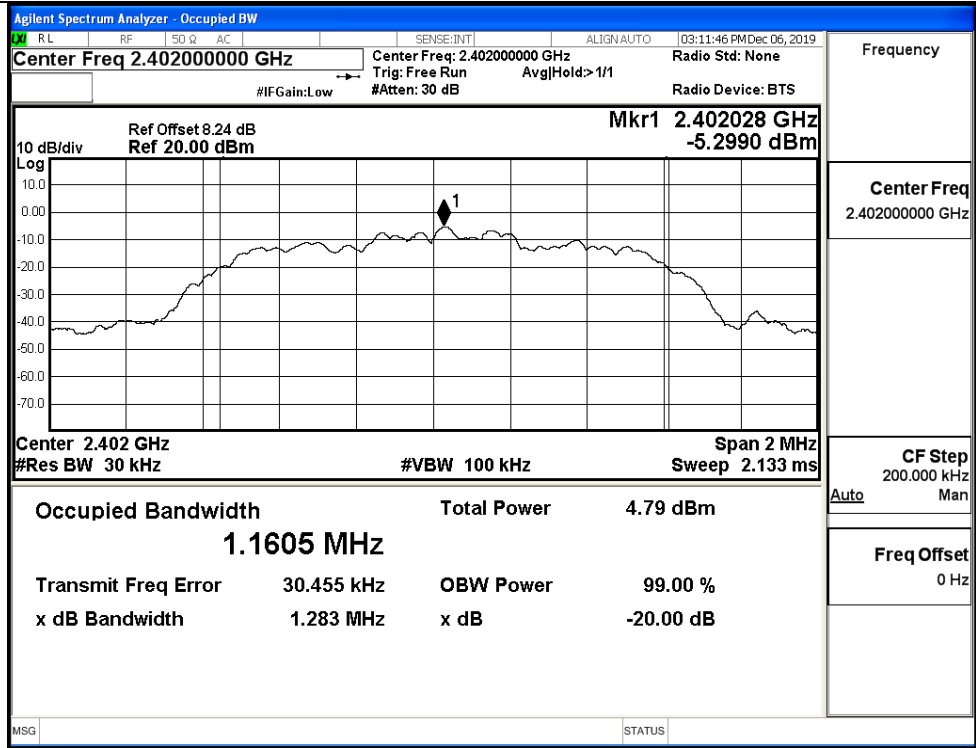
GFSK/HCH



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

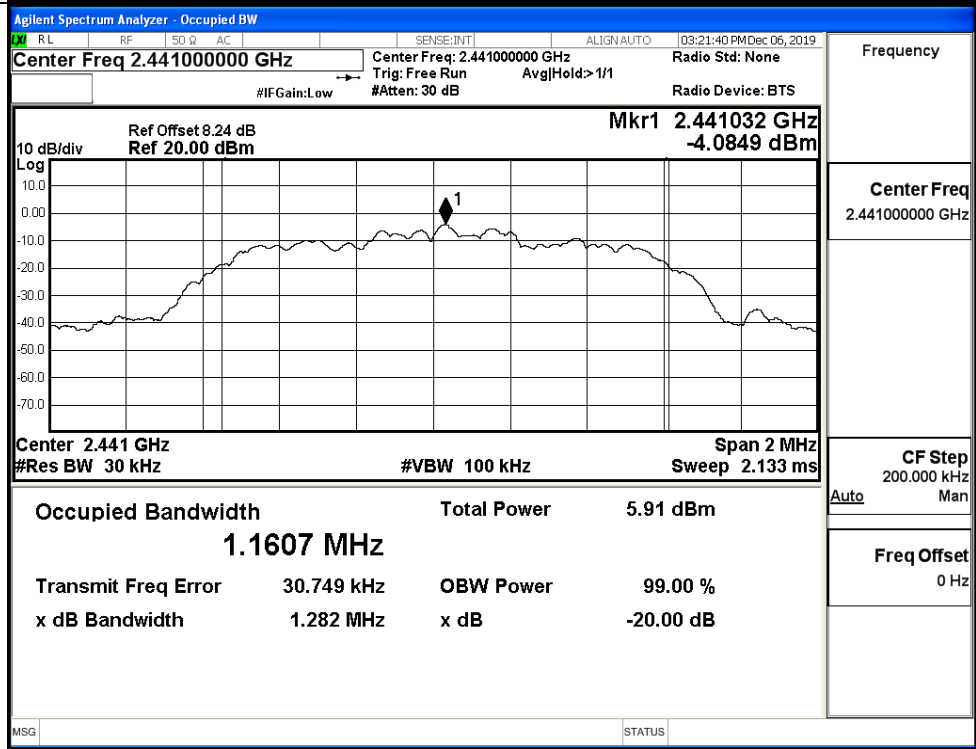


$\pi/4$ DQPSK/LCH



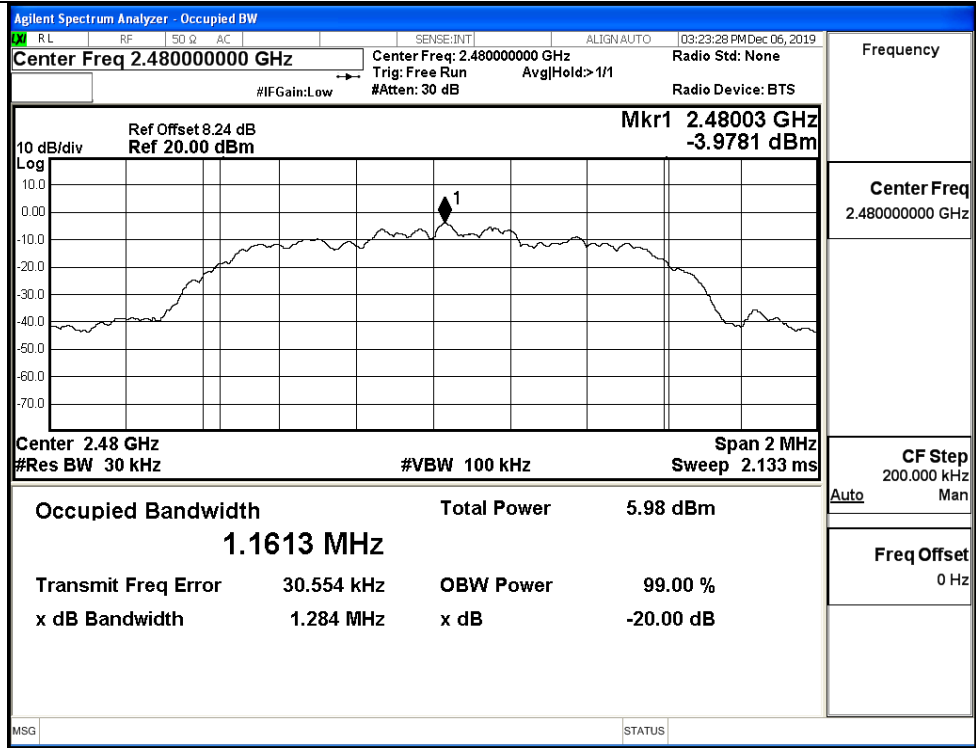
Frequency	2.40200000 GHz
Center Freq	2.40200000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK/MCH

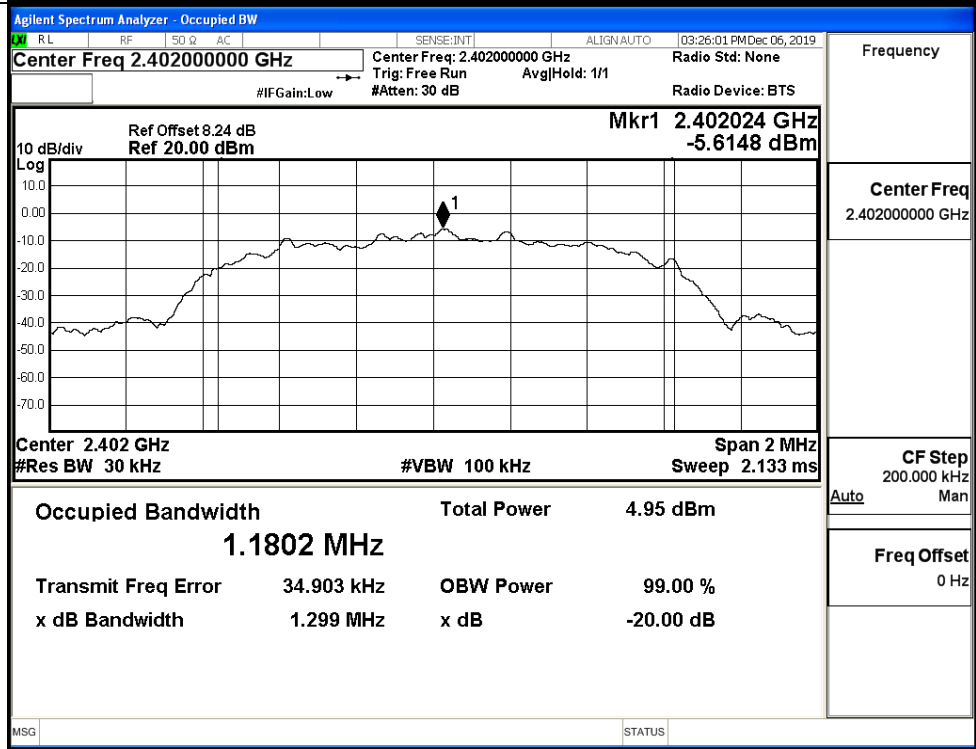


Frequency	2.44100000 GHz
Center Freq	2.44100000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

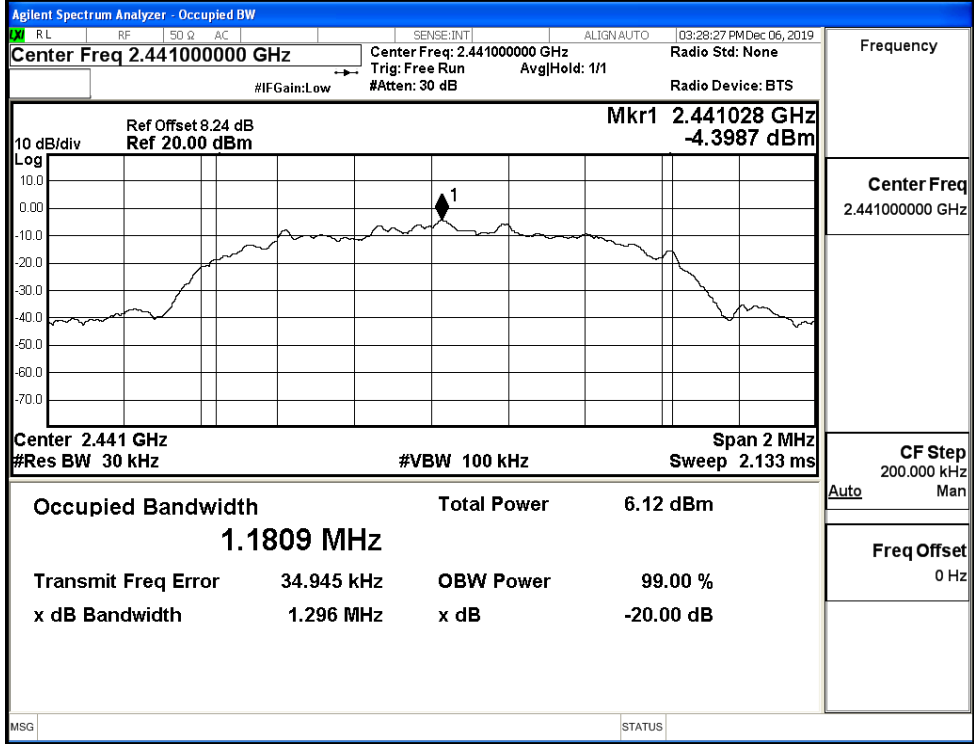
$\pi/4$ DQPSK/HCH



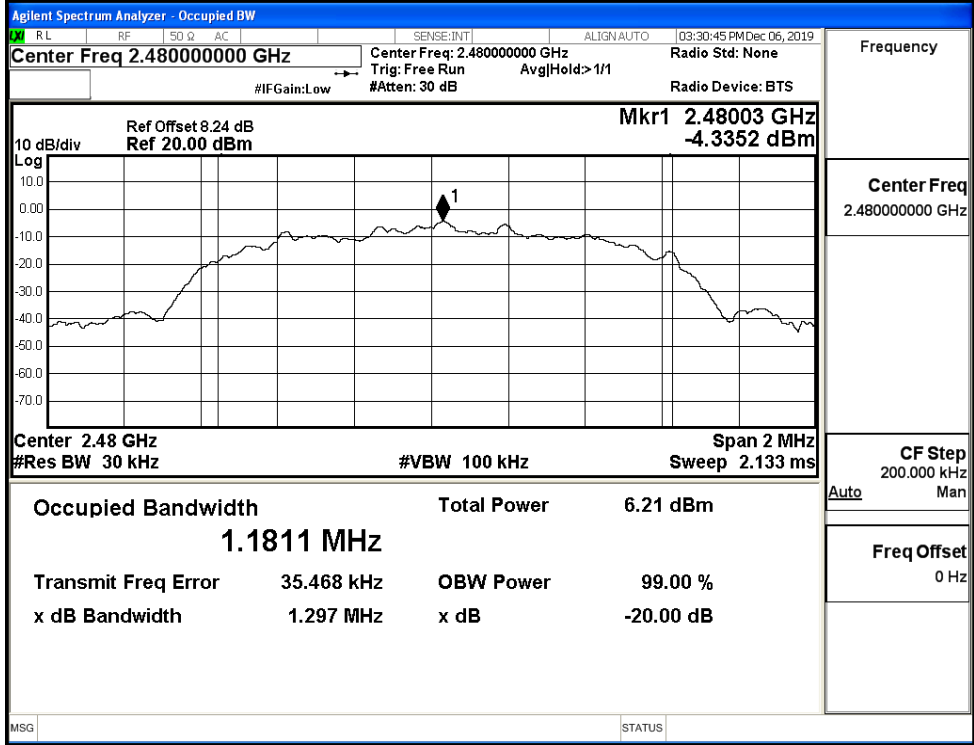
8DPSK/LCH



8DPSK/MCH

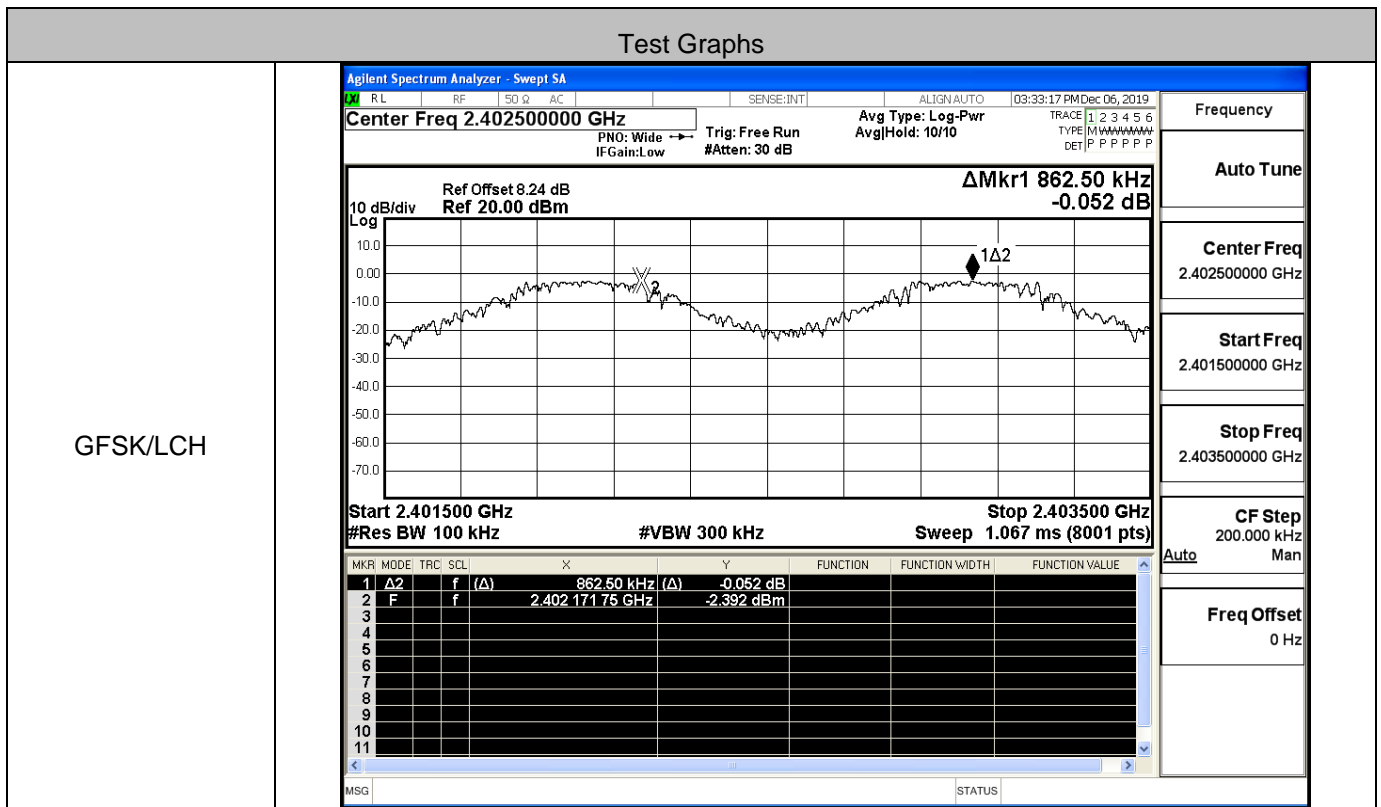


8DPSK/HCH

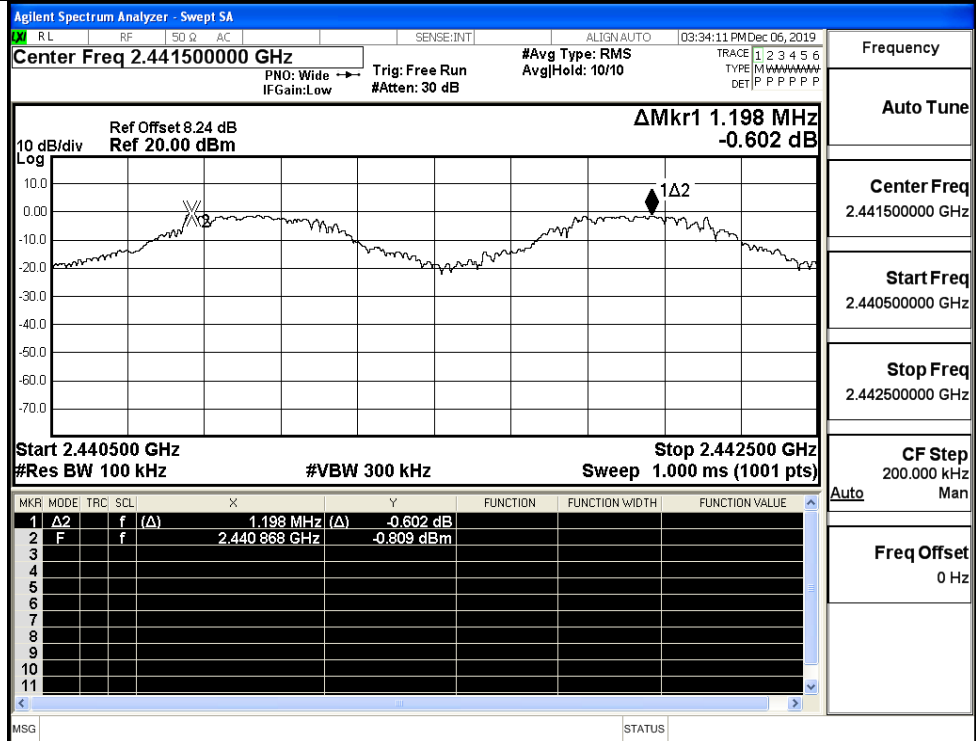


### A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.863	0.634	PASS
	MCH	1.198	0.634	PASS
	HCH	0.962	0.634	PASS
π/4DQPSK	LCH	0.986	0.856	PASS
	MCH	1.130	0.856	PASS
	HCH	1.038	0.856	PASS
8DPSK	LCH	1.056	0.866	PASS
	MCH	1.032	0.866	PASS
	HCH	1.062	0.866	PASS

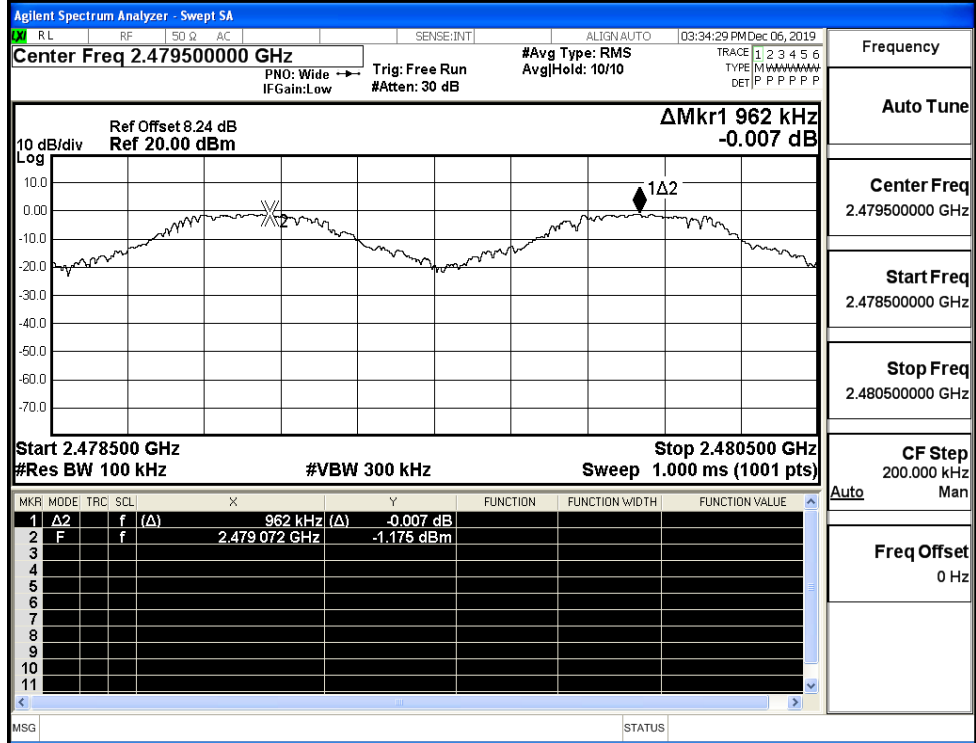


GFSK/MCH



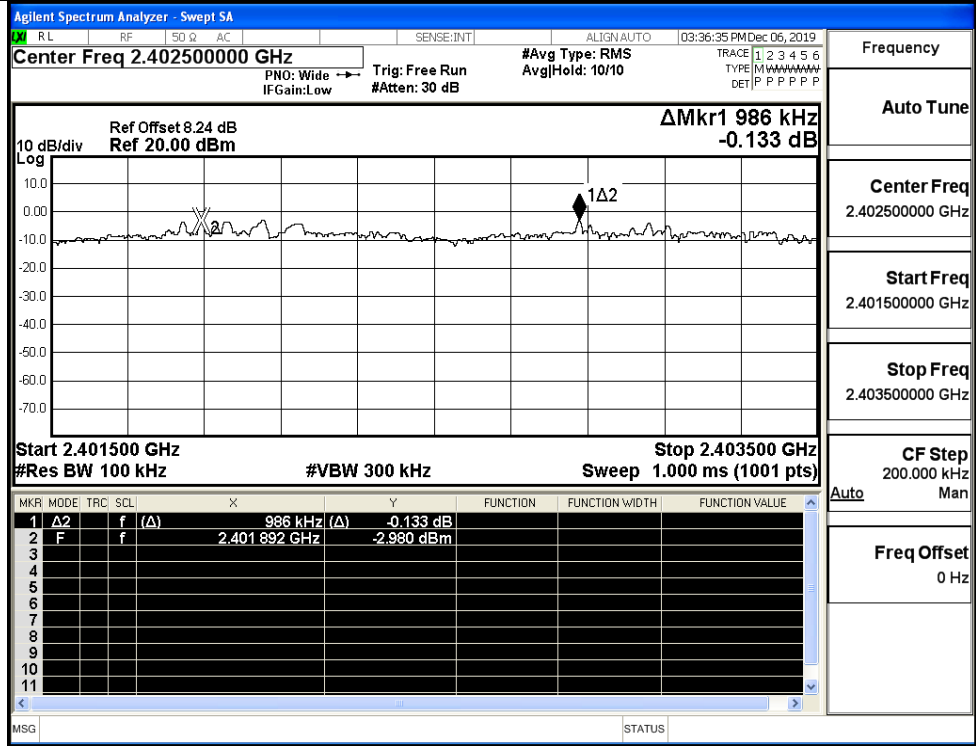
Frequency  
Auto Tune  
Center Freq  
2.441500000 GHz  
Start Freq  
2.440500000 GHz  
Stop Freq  
2.442500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

GFSK/HCH



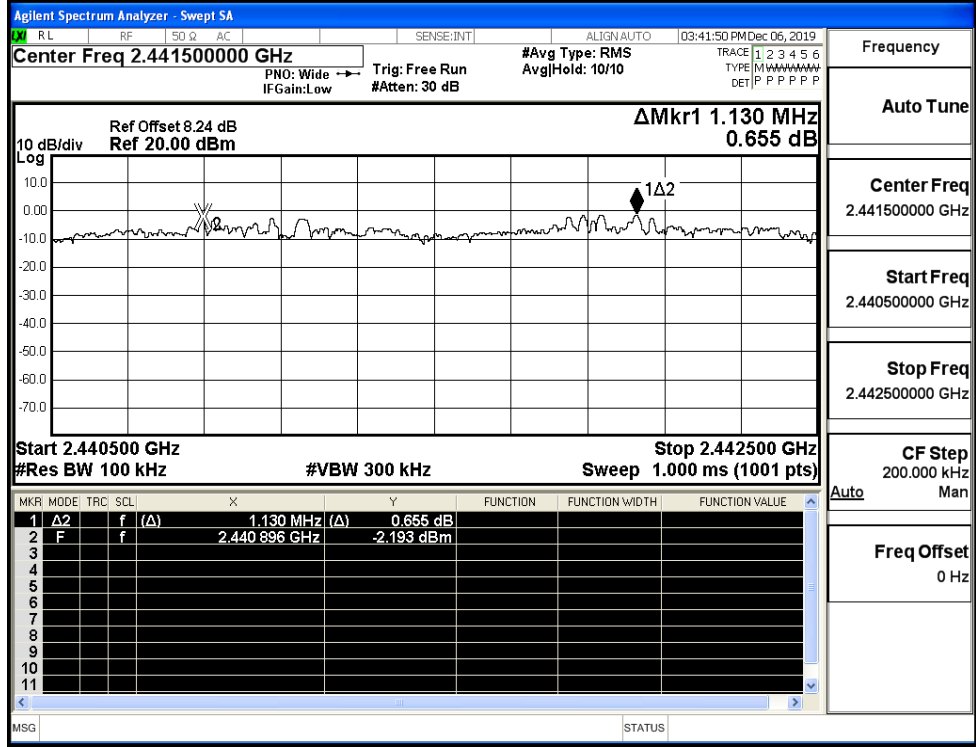
Frequency  
Auto Tune  
Center Freq  
2.479500000 GHz  
Start Freq  
2.478500000 GHz  
Stop Freq  
2.480500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

$\pi/4$ DQPSK/LCH



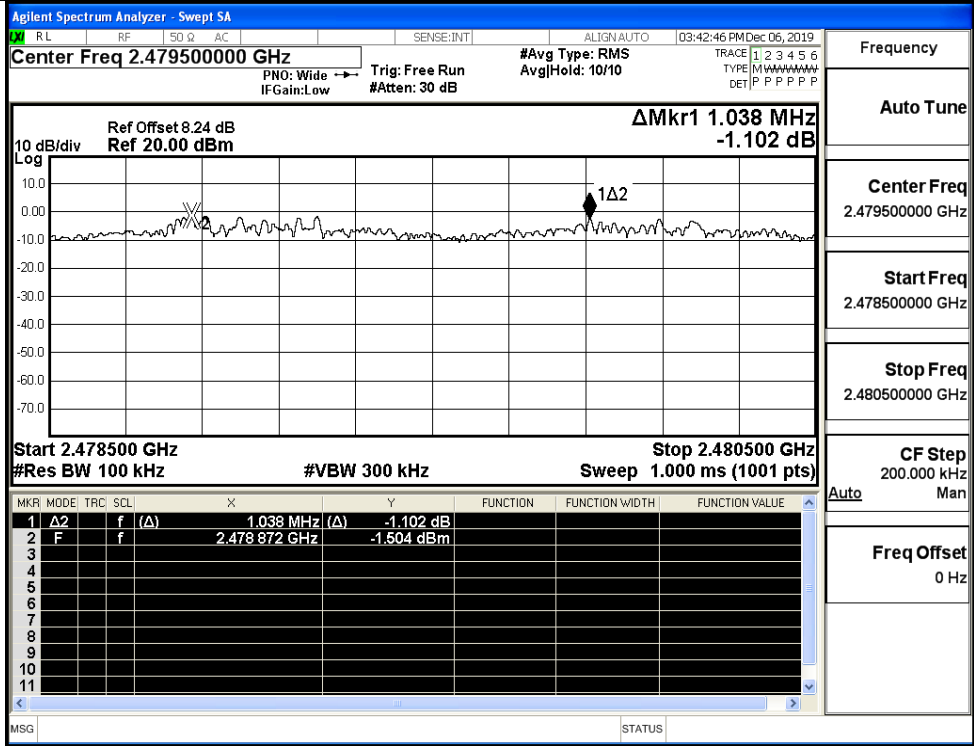
Frequency	2.402500000 GHz
Auto Tune	
Center Freq	2.402500000 GHz
Start Freq	2.401500000 GHz
Stop Freq	2.403500000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK/MCH



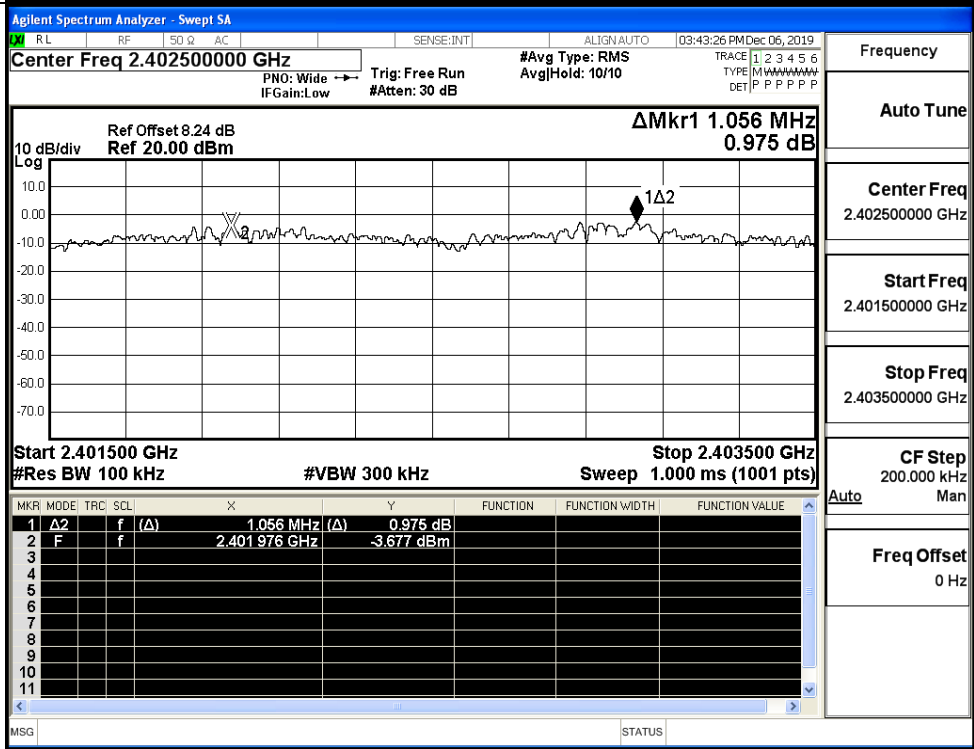
Frequency	2.441500000 GHz
Auto Tune	
Center Freq	2.441500000 GHz
Start Freq	2.440500000 GHz
Stop Freq	2.442500000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π/4DQPSK/HCH



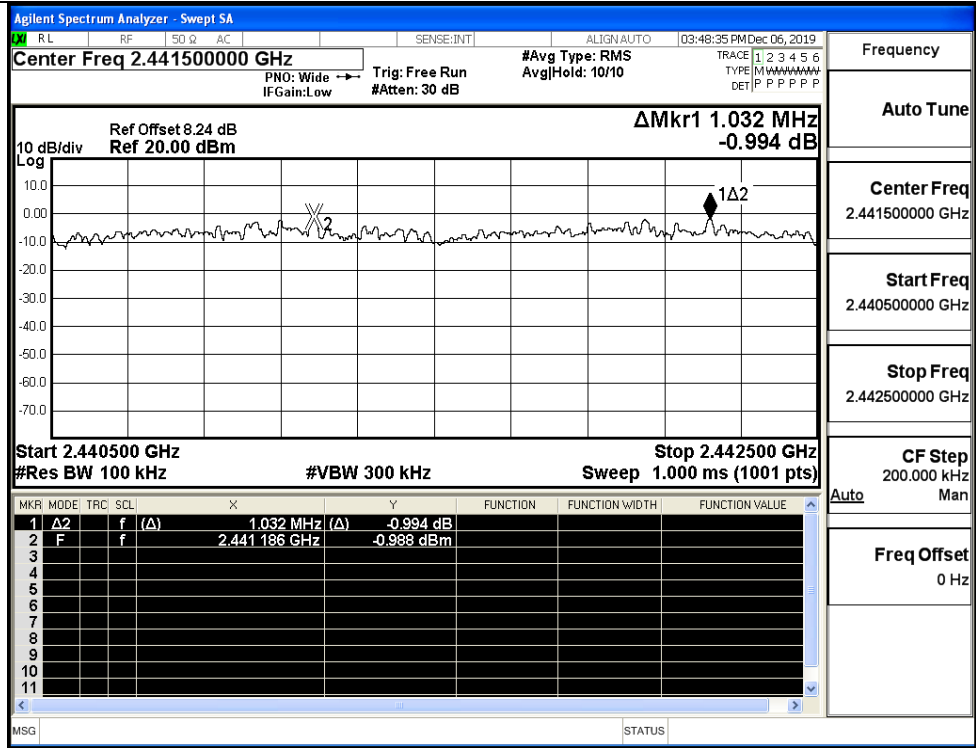
Frequency
Auto Tune
Center Freq 2.479500000 GHz
Start Freq 2.478500000 GHz
Stop Freq 2.480500000 GHz
CF Step 200.000 kHz
Auto
Freq Offset 0 Hz

8DPSK/LCH

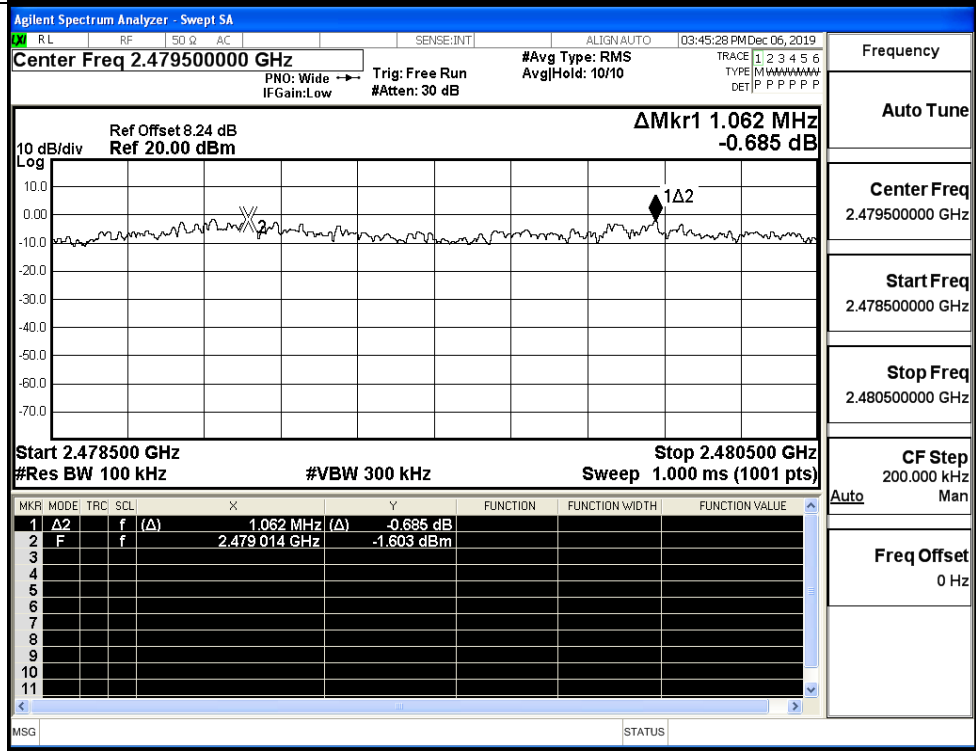


Frequency
Auto Tune
Center Freq 2.402500000 GHz
Start Freq 2.401500000 GHz
Stop Freq 2.403500000 GHz
CF Step 200.000 kHz
Auto
Freq Offset 0 Hz

8DPSK/MCH



8DPSK/HCH





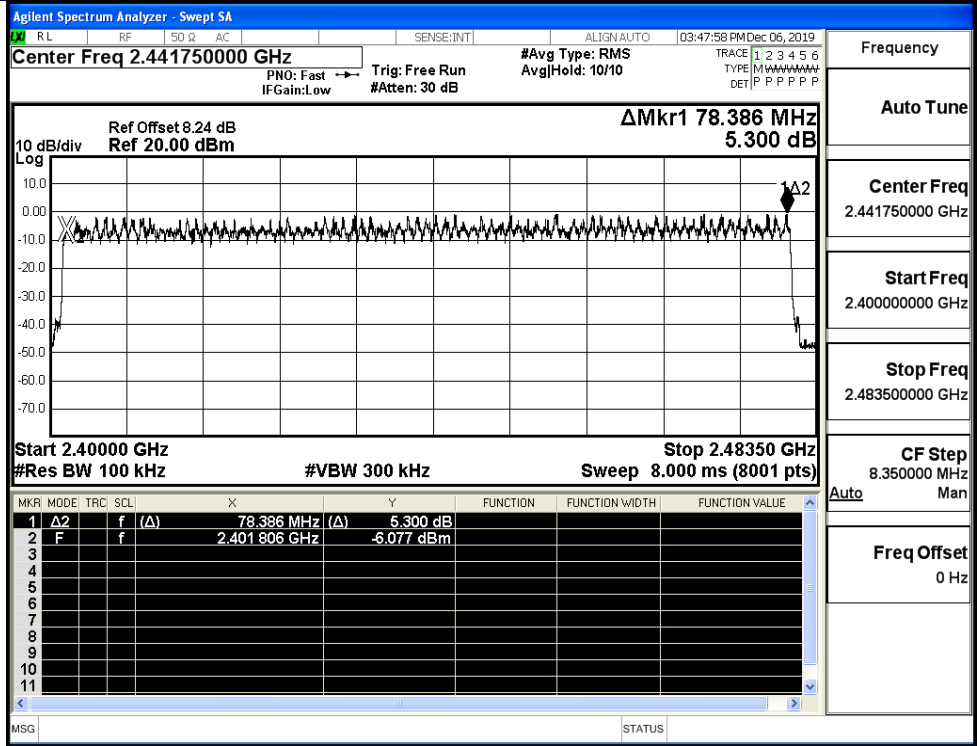
### A.4 Hopping Channel Number

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

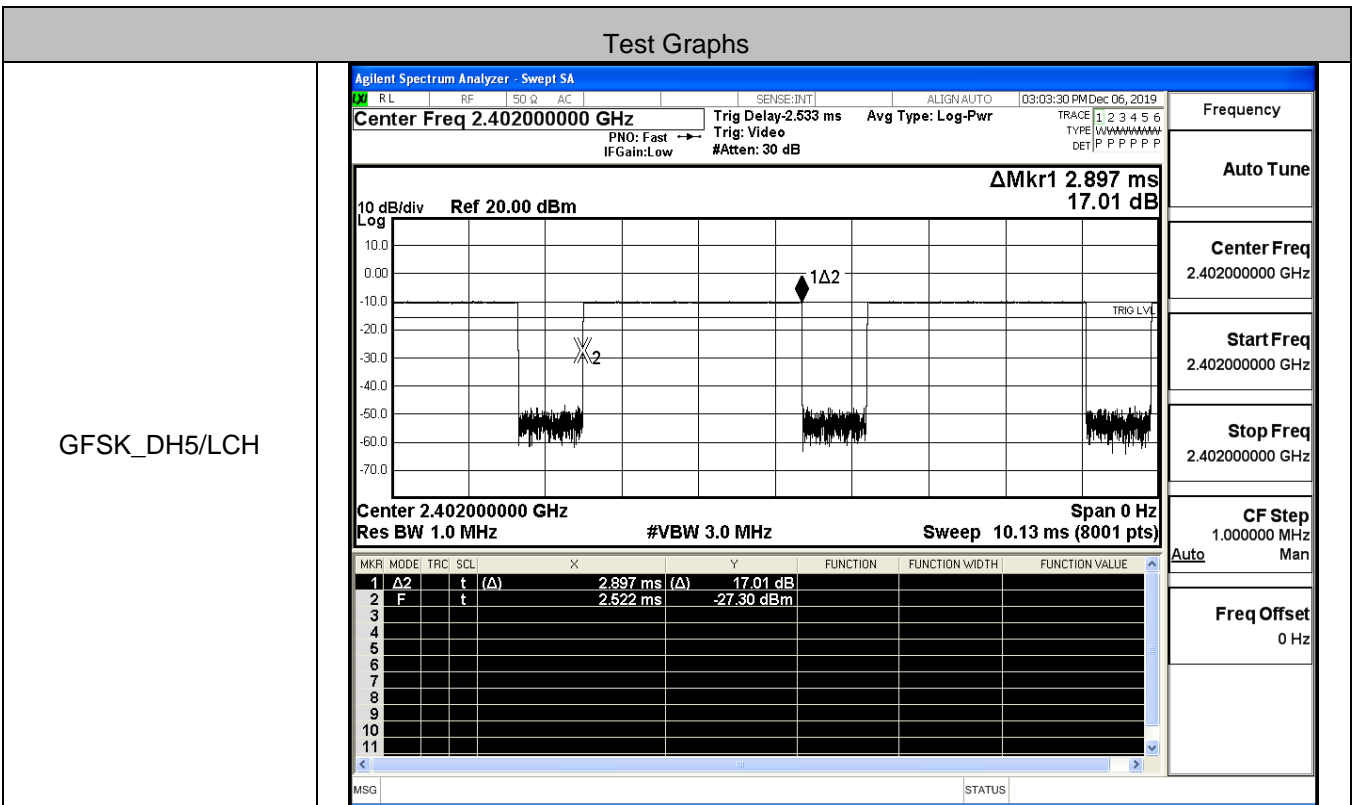
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA                  Center Freq 2.441750000 GHz                  Ref Offset 8.24 dB Ref 20.00 dBm                  ΔMkr1 78.208 MHz 1.031 dB                  Start 2.40000 GHz Stop 2.48350 GHz                  #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <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>78.208 MHz (Δ)</td> <td>1.031 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.401 983 GHz</td> <td>-2.204 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	78.208 MHz (Δ)	1.031 dB				2	F	f		2.401 983 GHz	-2.204 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	Δ2	f	(Δ)	78.208 MHz (Δ)	1.031 dB																							
2	F	f		2.401 983 GHz	-2.204 dBm																							
$\pi/4$ DQPSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA                  Center Freq 2.441750000 GHz                  Ref Offset 8.24 dB Ref 20.00 dBm                  ΔMkr1 77.937 MHz -2.217 dB                  Start 2.40000 GHz Stop 2.48350 GHz                  #Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts)</p> <table border="1" style="width: 100%; border-collapse: collapse; font-size: small;"> <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>77.937 MHz (Δ)</td> <td>-2.217 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402 171 GHz</td> <td>-2.776 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	77.937 MHz (Δ)	-2.217 dB				2	F	f		2.402 171 GHz	-2.776 dBm			
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																				
1	Δ2	f	(Δ)	77.937 MHz (Δ)	-2.217 dB																							
2	F	f		2.402 171 GHz	-2.776 dBm																							

8DPSK/Hop

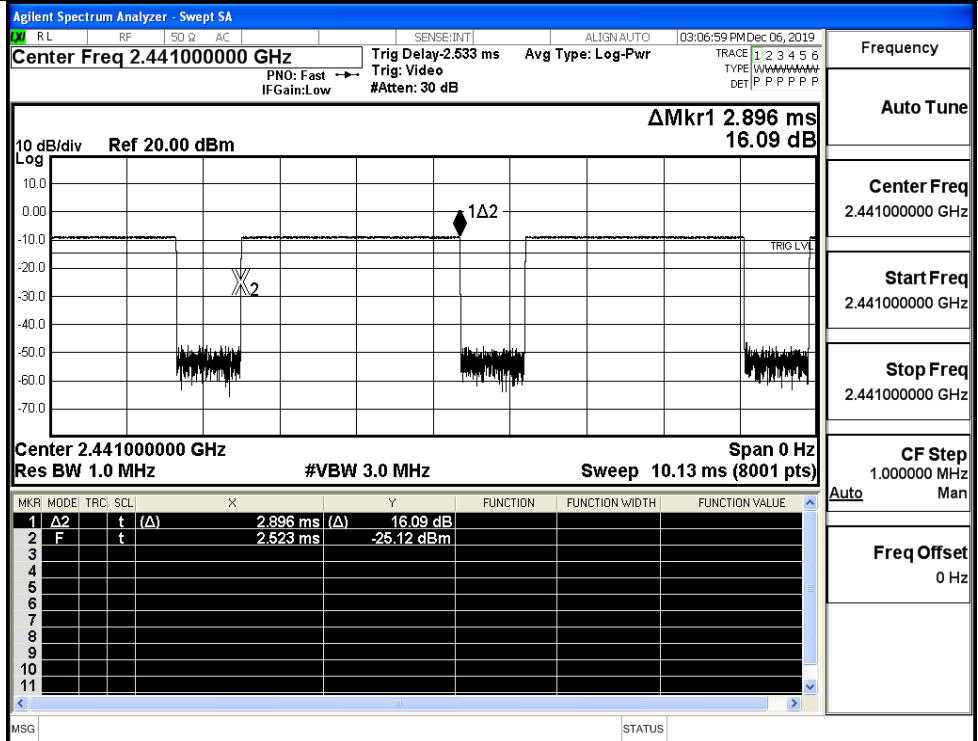


### A.5 Dwell Time

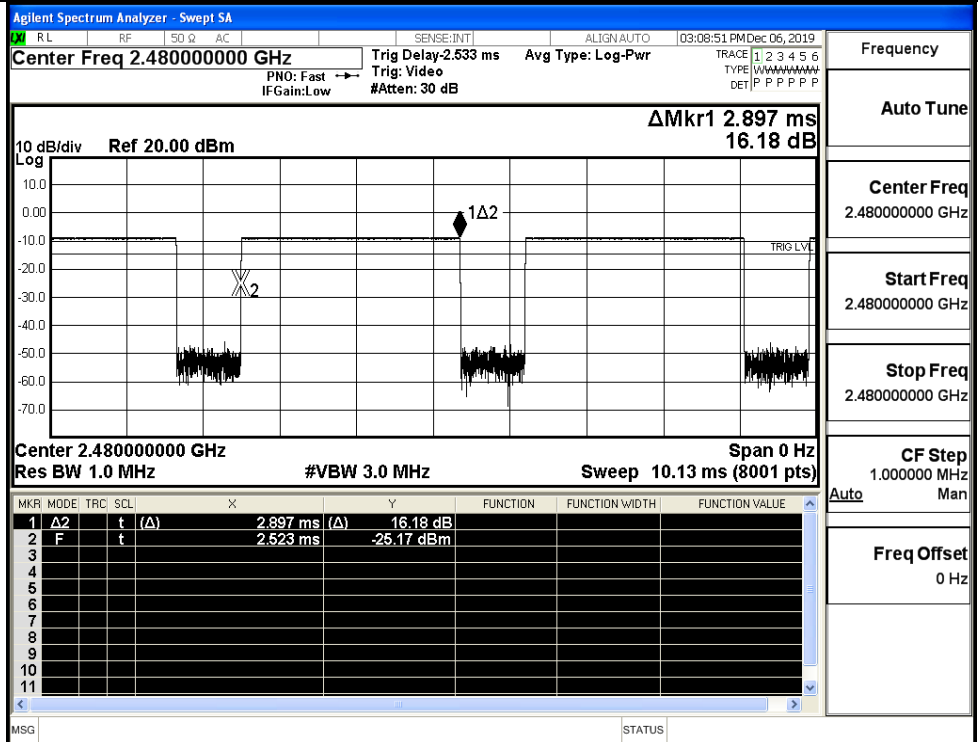
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
π/4DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7	0.309	0.4	PASS
8DPSK	3DH5	LCH	2.9	106.7	0.31	0.4	PASS
	3DH5	MCH	2.9	106.7	0.31	0.4	PASS
	3DH5	HCH	2.9	106.7	0.309	0.4	PASS



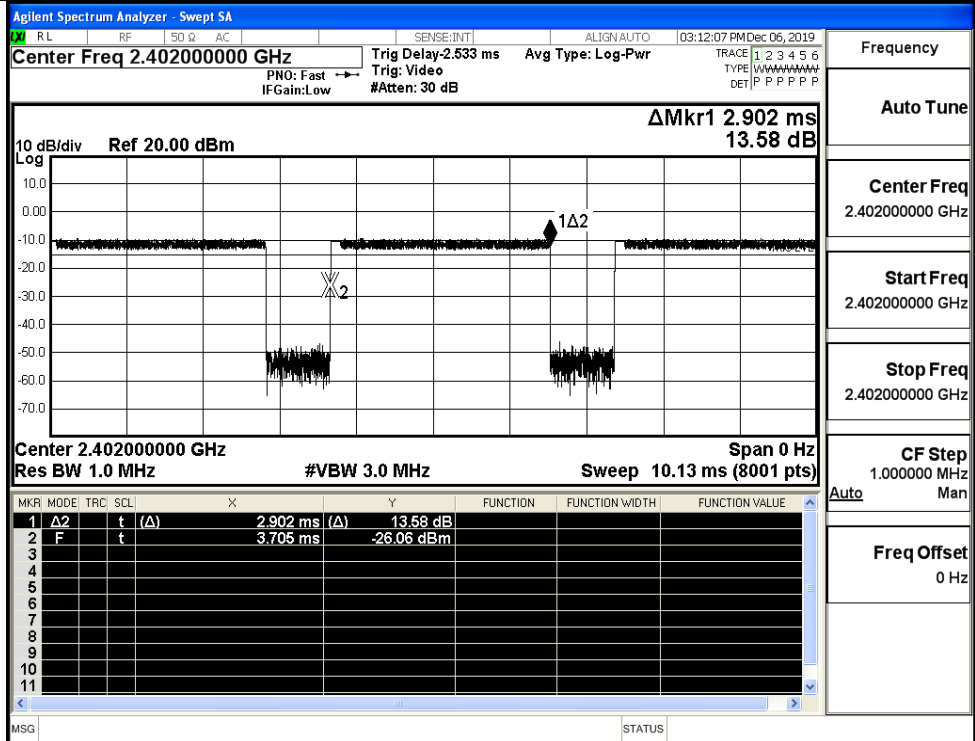
GFSK\_DH5/MCH



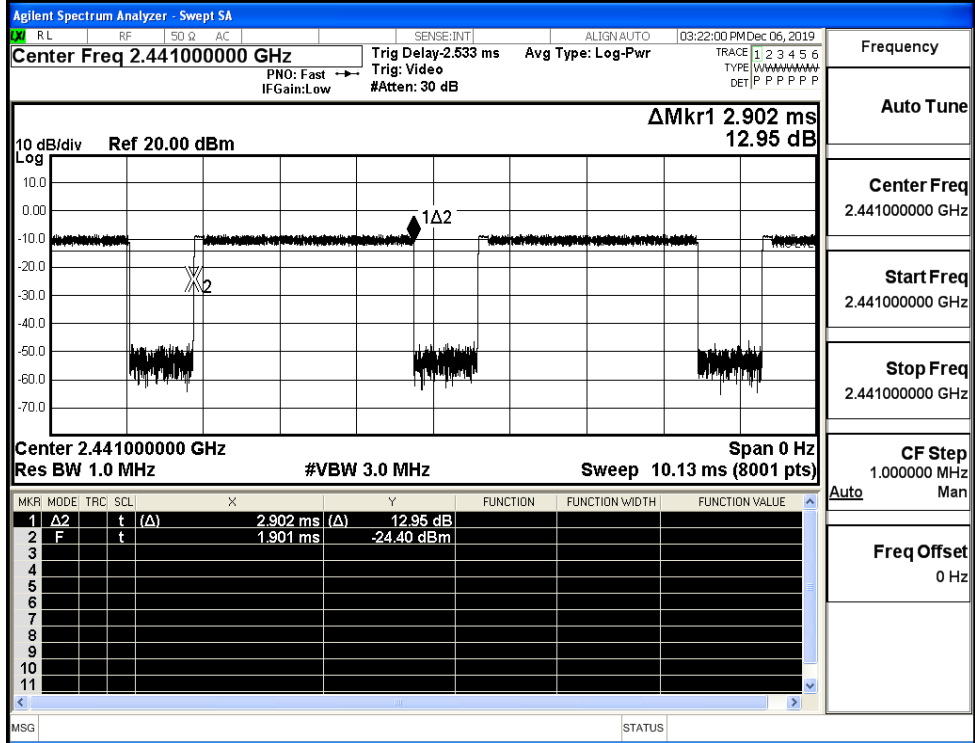
GFSK\_DH5/HCH



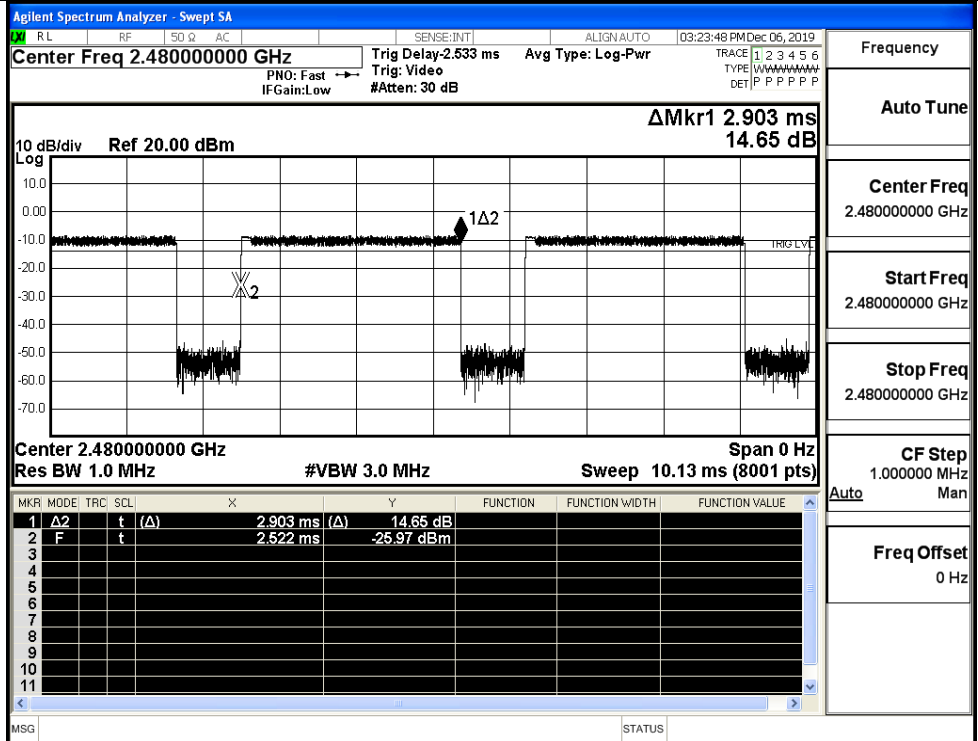
$\pi/4$ DQPSK  
\_2DH5/LCH



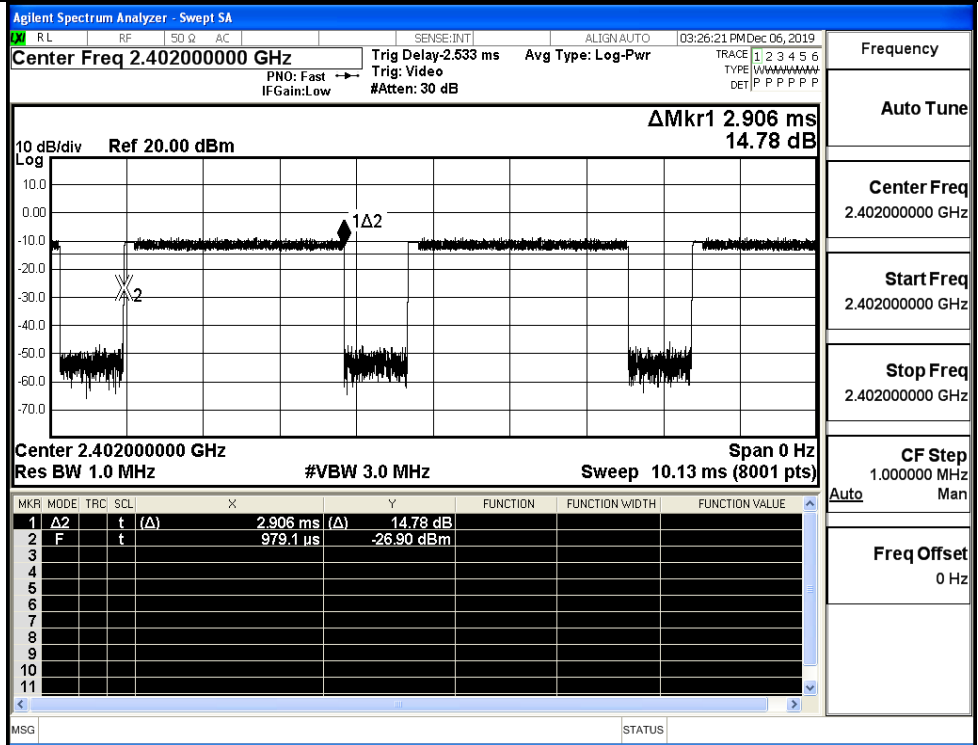
$\pi/4$ DQPSK  
\_2DH5/MCH



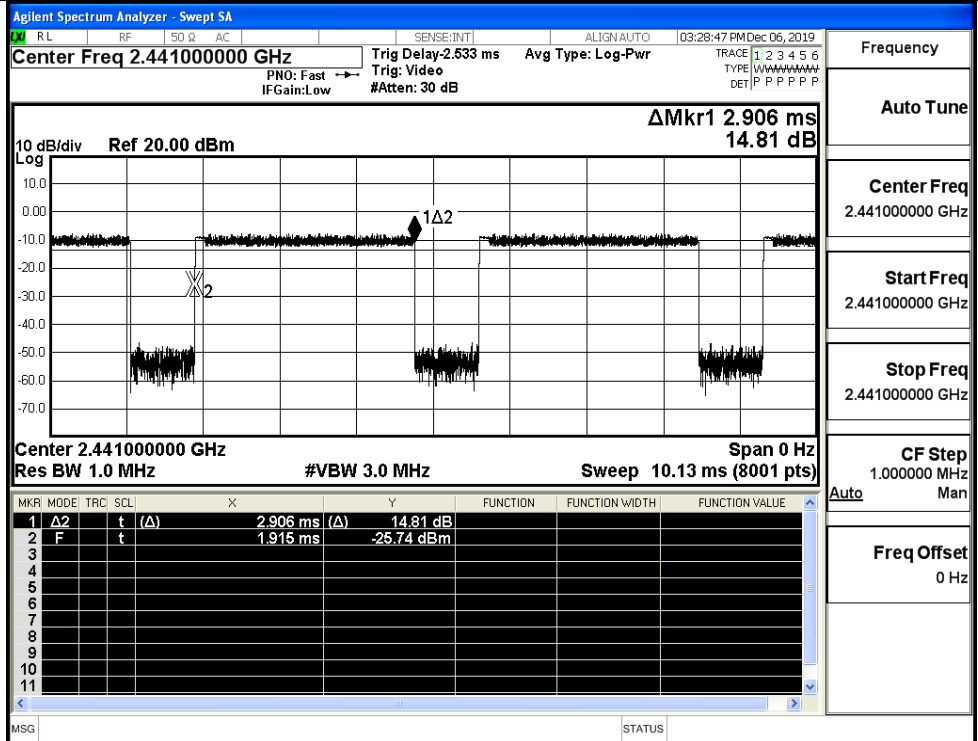
$\pi/4$ DQPSK  
\_2DH5/HCH



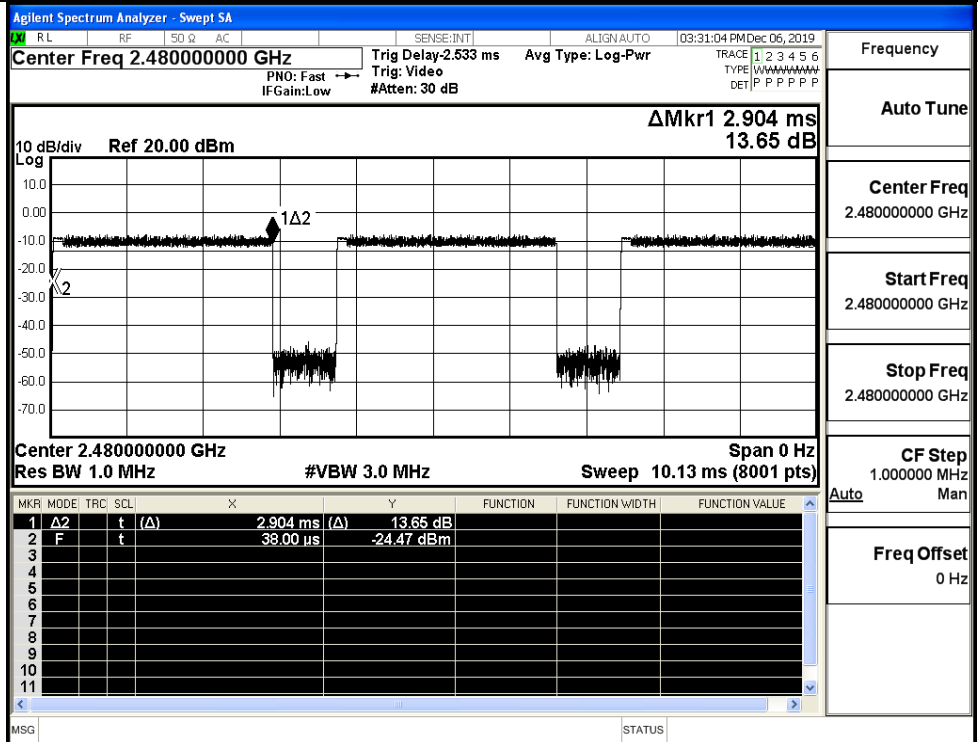
8DPSK\_3DH5/LCH



8DPSK\_3DH5/MCH

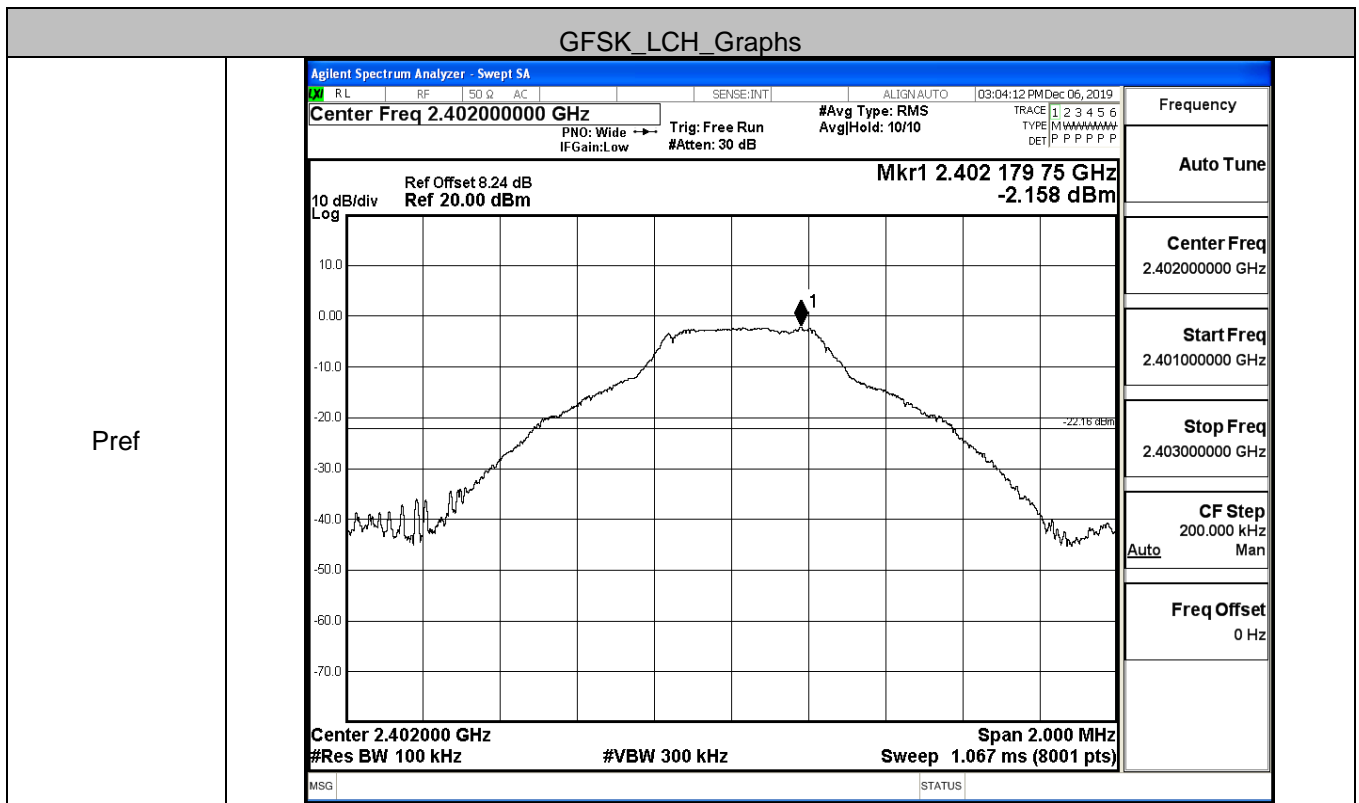


8DPSK\_3DH5/HCH

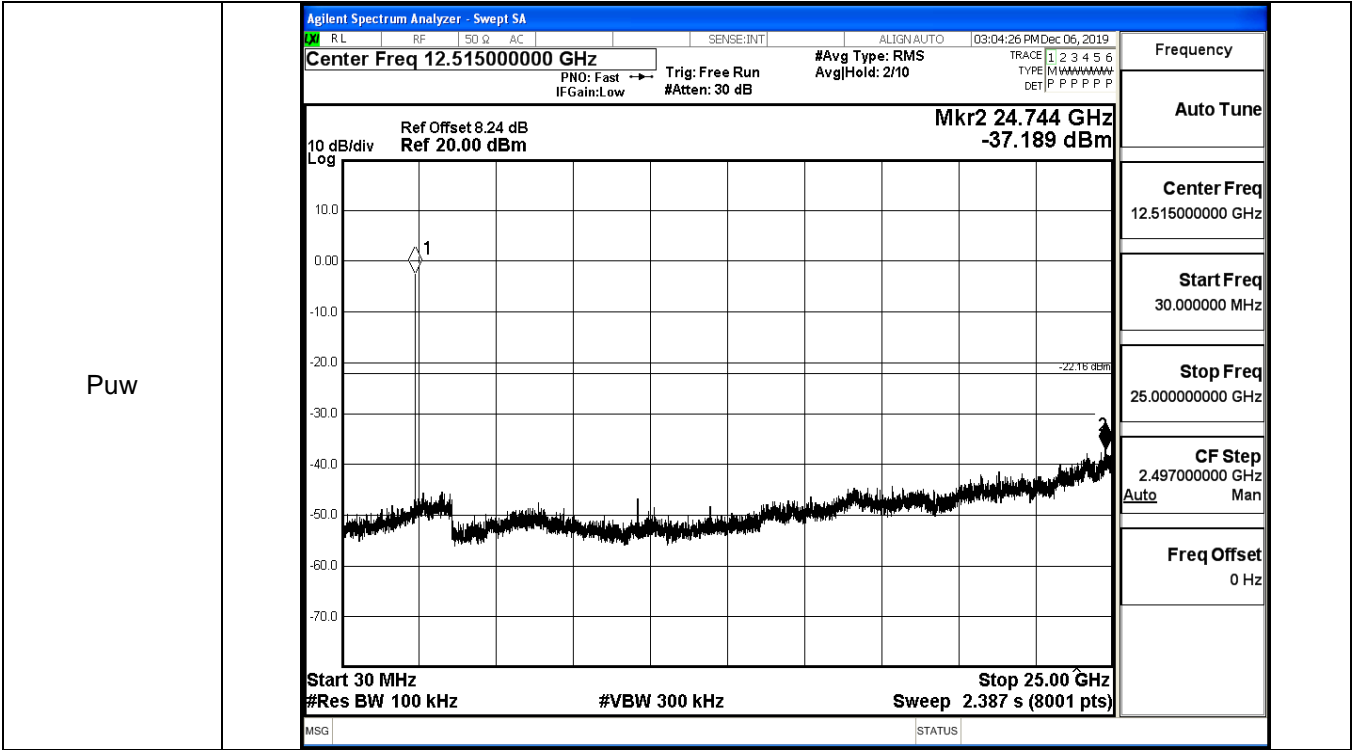


### A.6 RF Conducted Spurious Emissions

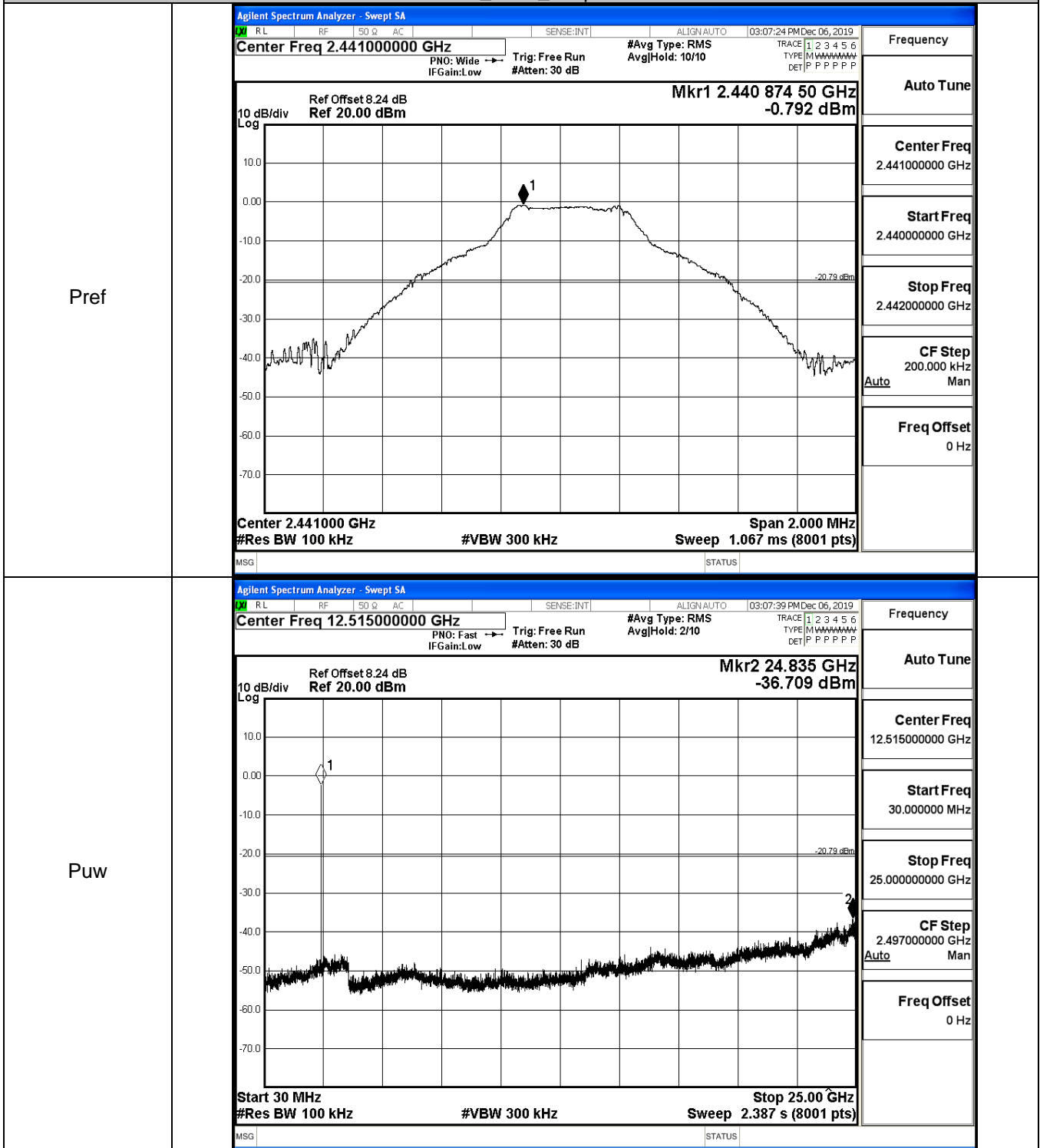
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.158	-37.189	-22.158	PASS
	MCH	-0.792	-36.709	-20.792	PASS
	HCH	-0.702	-37.254	-20.702	PASS
$\pi$ /4DQPSK	LCH	-2.624	-36.845	-22.624	PASS
	MCH	-1.502	-37.158	-21.502	PASS
	HCH	-1.42	-36.793	-21.420	PASS
8DPSK	LCH	-2.702	-37.299	-22.702	PASS
	MCH	-0.976	-36.408	-20.976	PASS
	HCH	-1.321	-37.481	-21.321	PASS



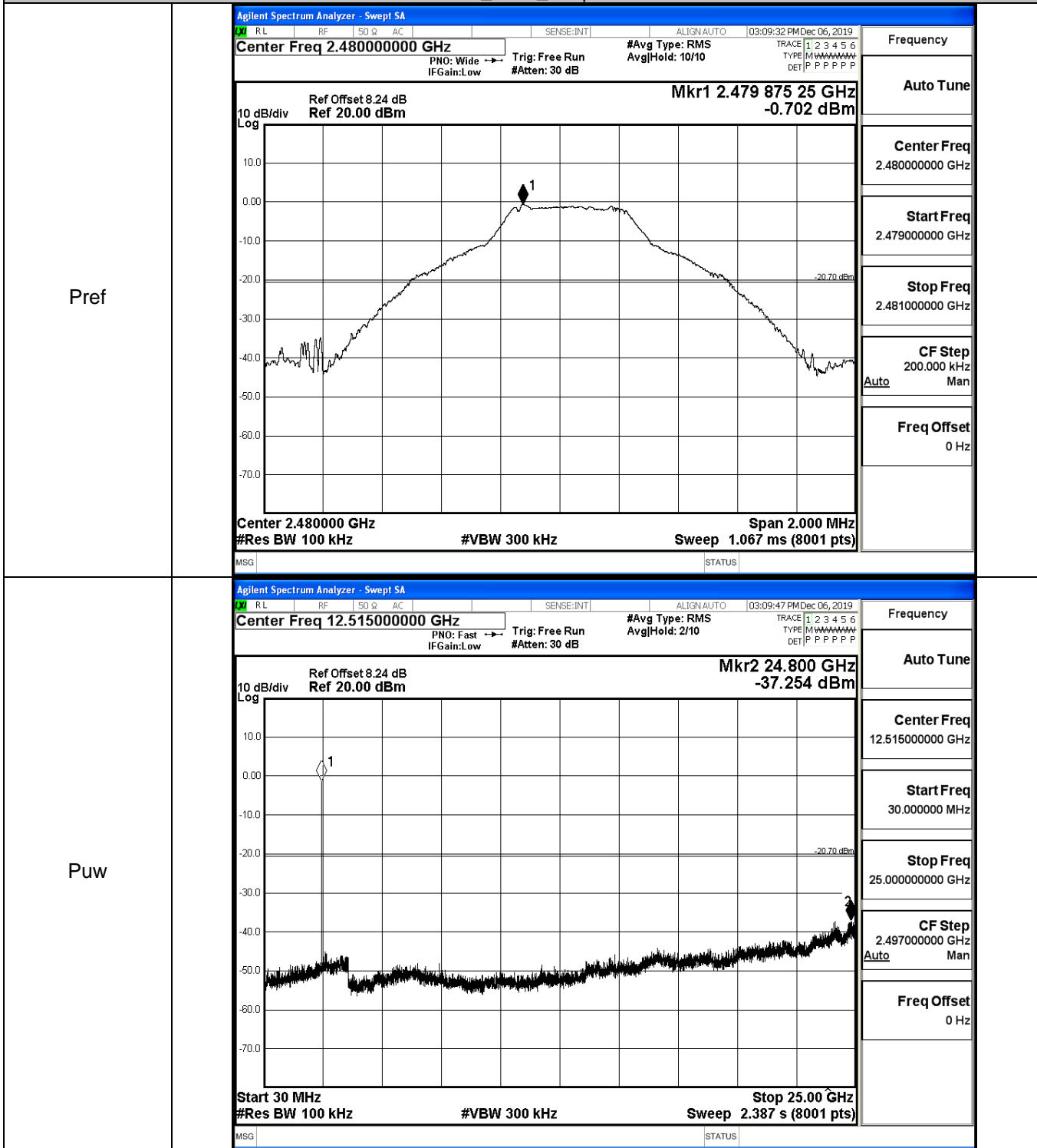




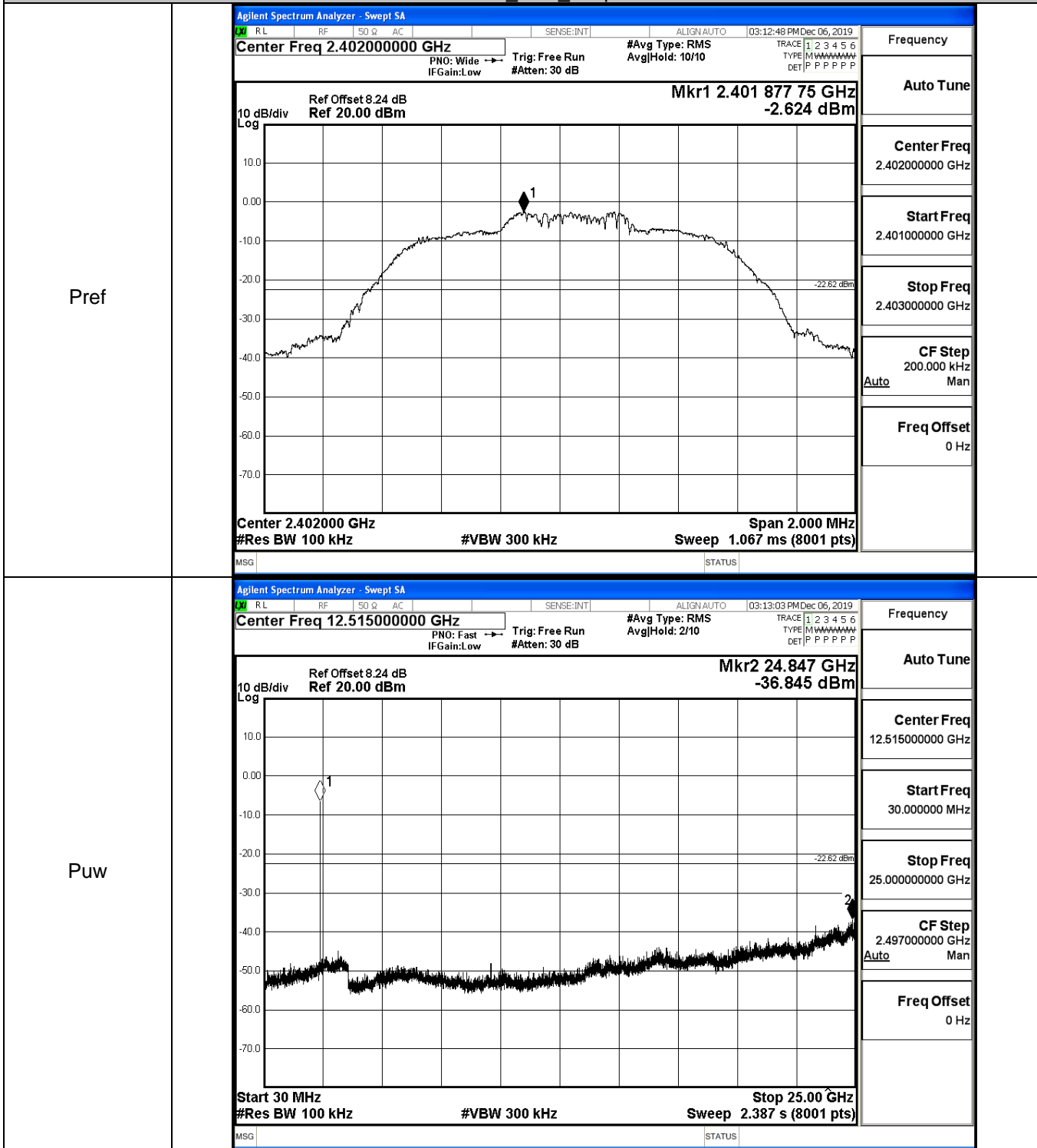
GFSK\_MCH\_Graphs



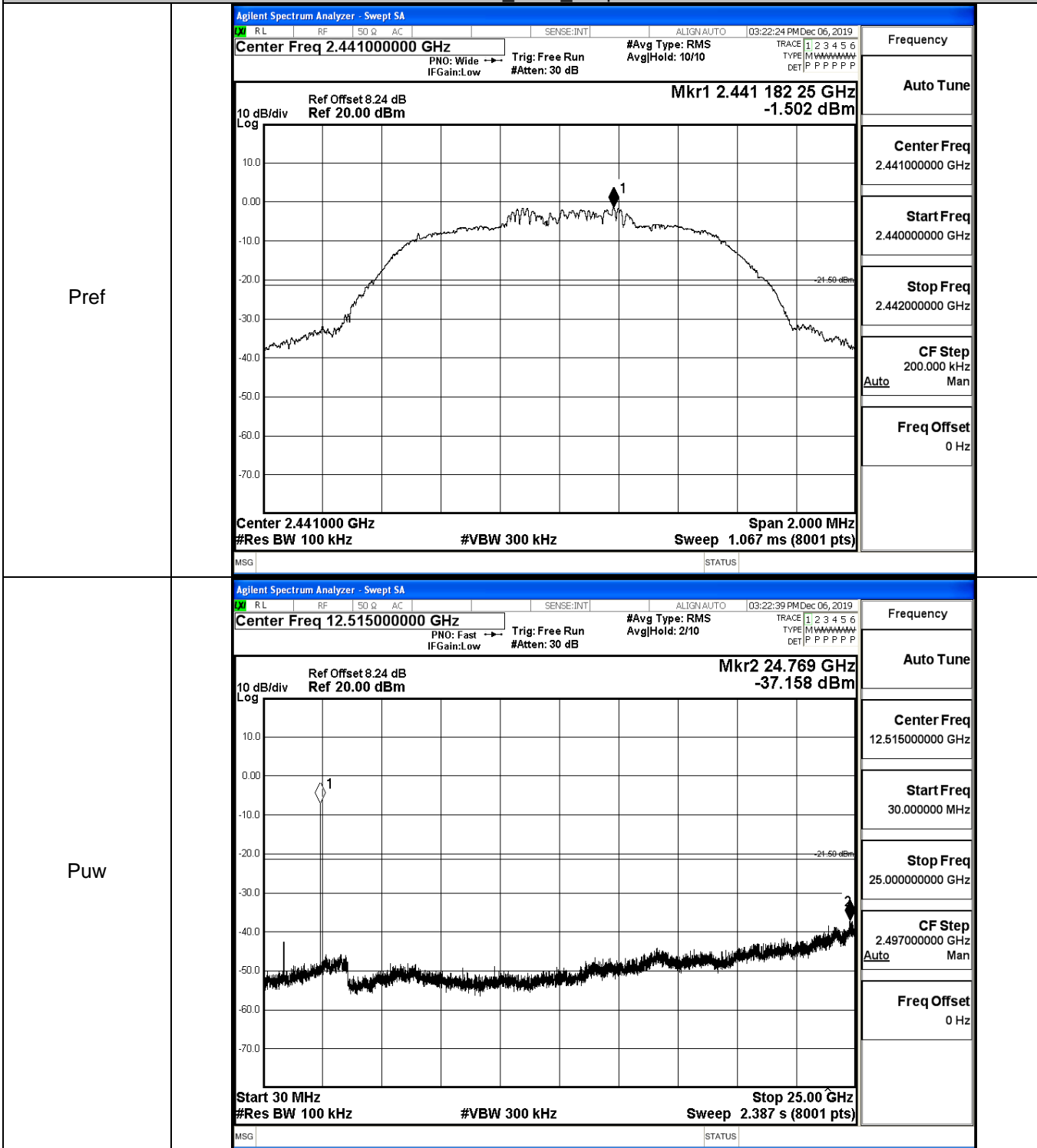
GFSK\_HCH\_Graphs



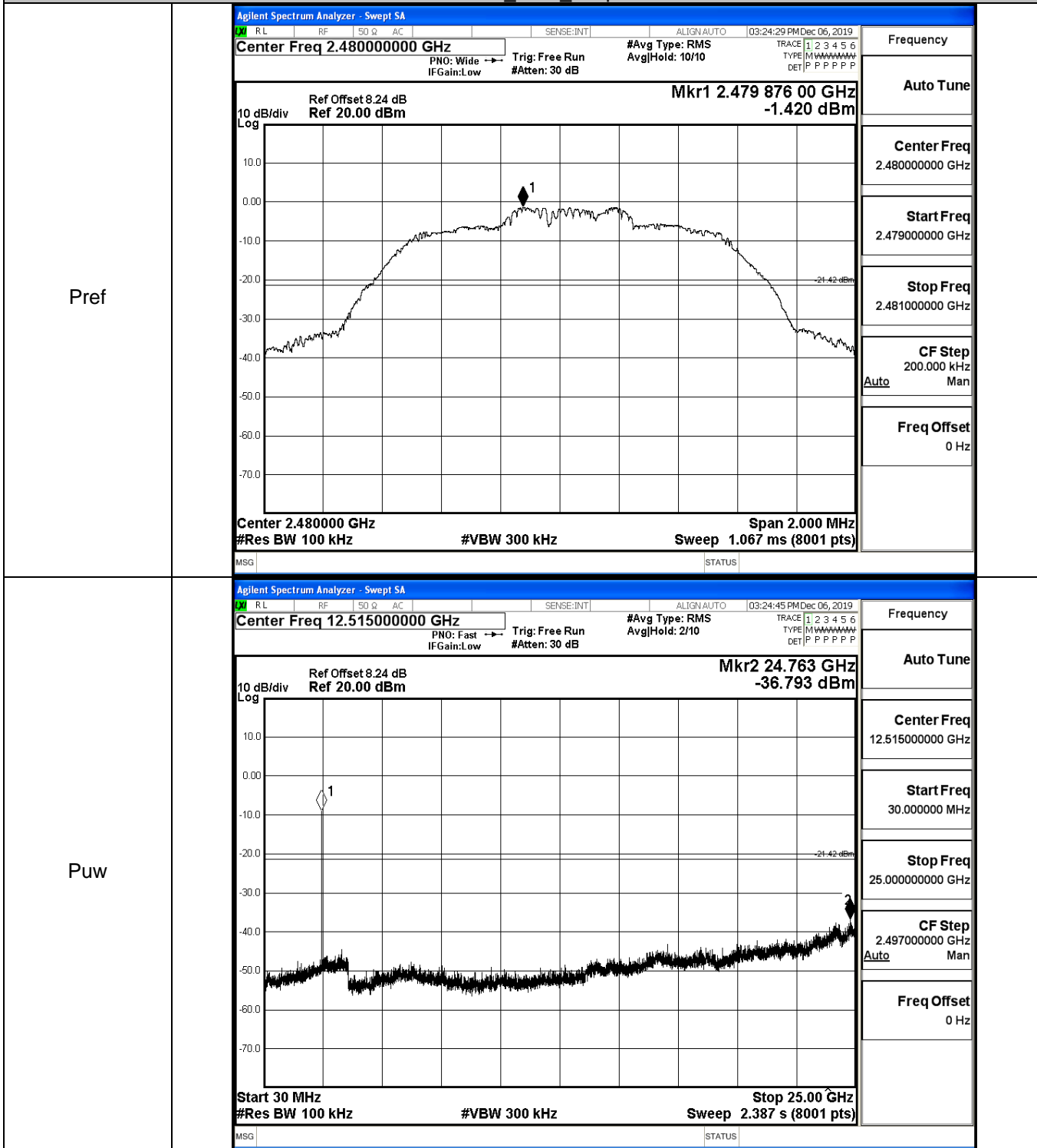
$\pi/4$ DQPSK\_LCH\_Graphs



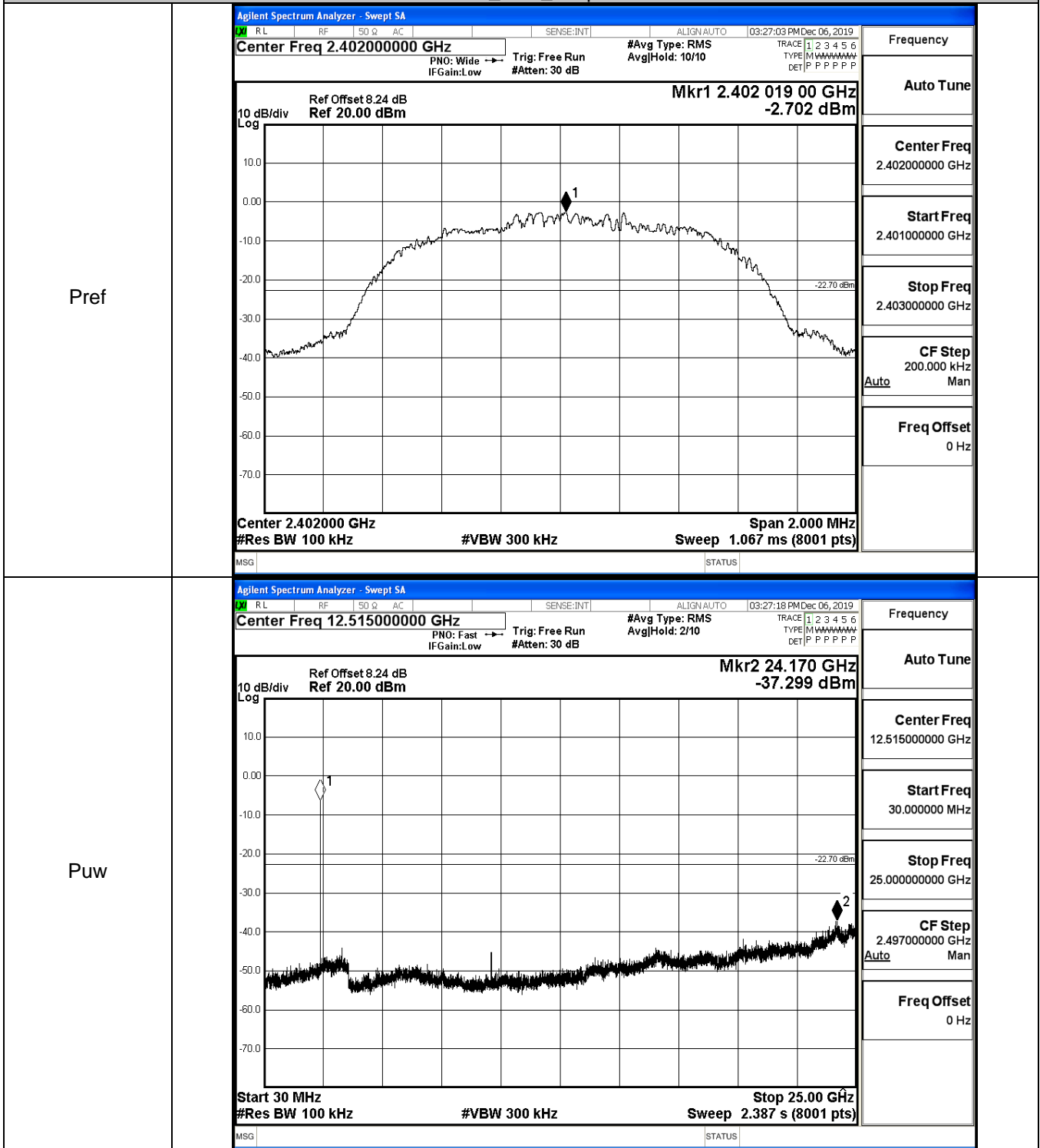
$\pi/4$ DQPSK\_MCH\_Graphs



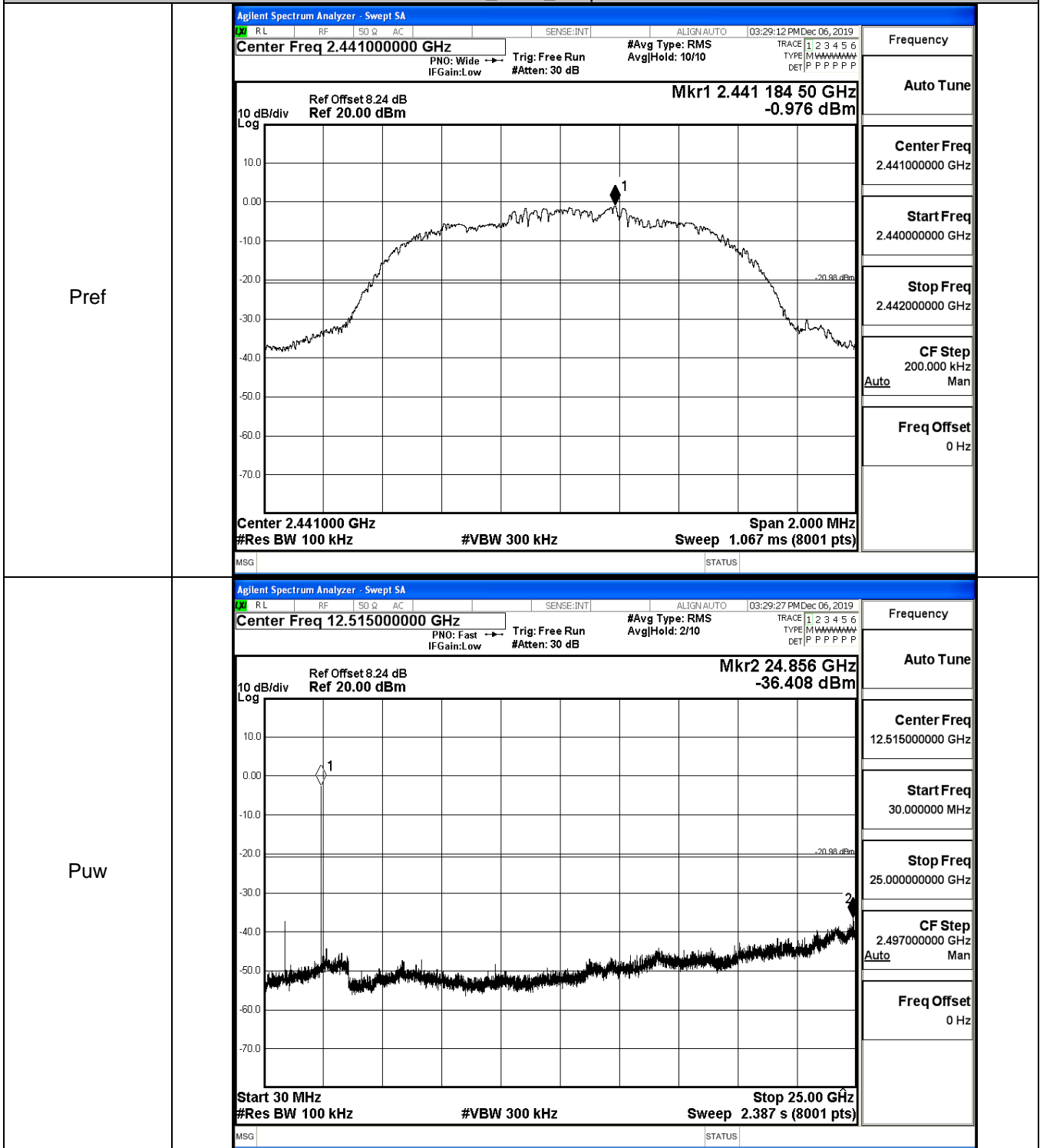
$\pi/4$ DQPSK\_HCH\_Graphs



8DPSK\_LCH\_Graphs

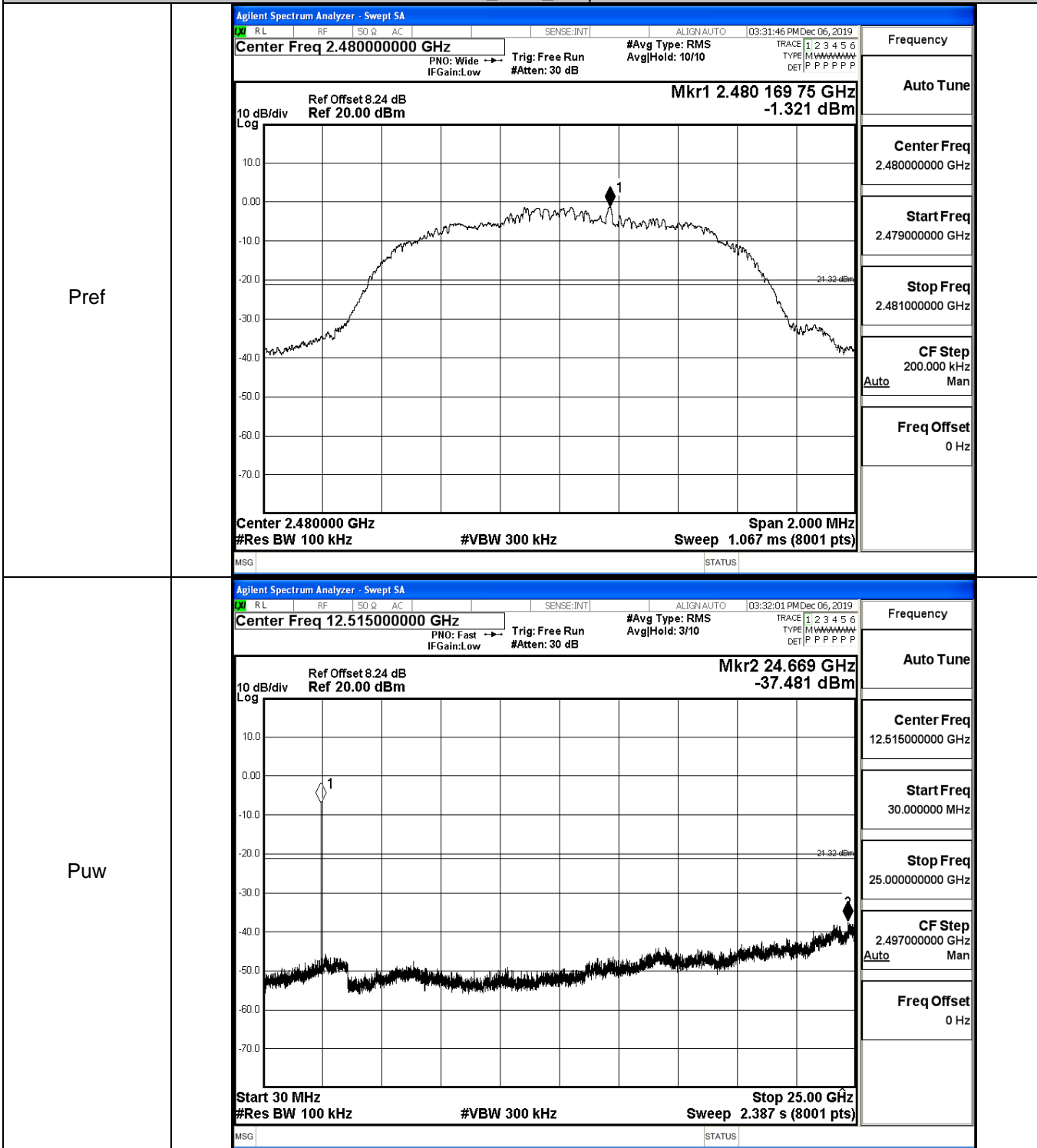


8DPSK\_MCH\_Graphs





8DPSK\_HCH\_Graphs

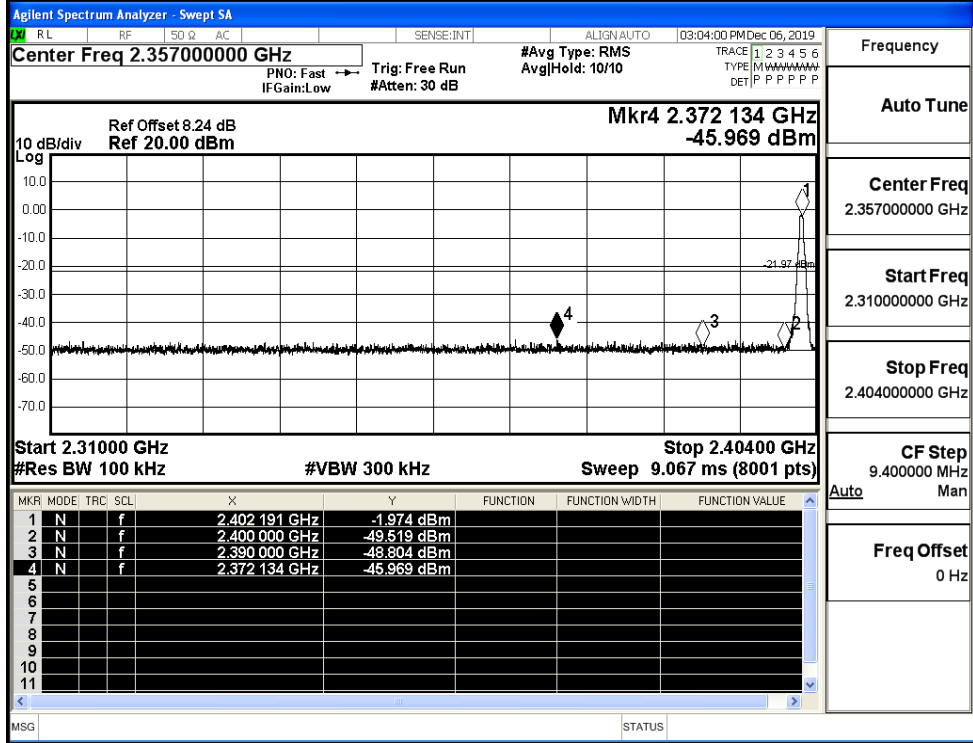


### A.7 Band-edge for RF Conducted Emissions

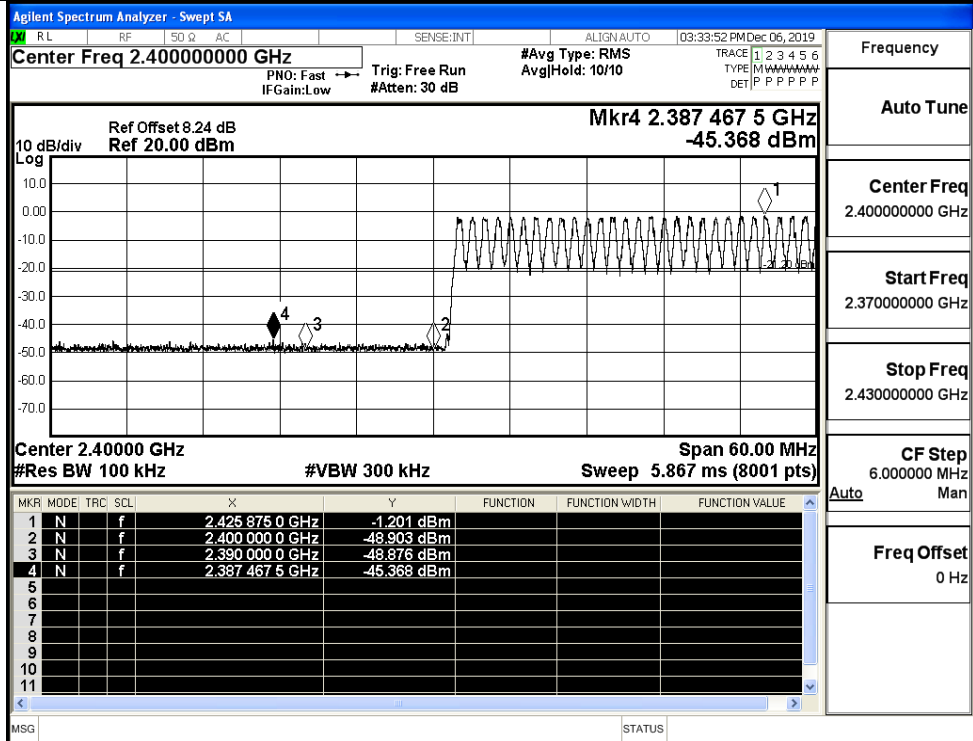
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.974	Off	-45.969	-21.97	PASS
			-1.201	On	-45.368	-21.2	PASS
	HCH	2480	-0.699	Off	-46.361	-20.7	PASS
			-0.666	On	-45.598	-20.67	PASS
$\pi/4$ DQPSK	LCH	2402	-4.669	Off	-45.844	-24.67	PASS
			-1.600	On	-45.253	-21.6	PASS
	HCH	2480	-1.380	Off	-45.348	-21.38	PASS
			-0.799	On	-45.192	-20.8	PASS
8DPSK	LCH	2402	-2.040	Off	-46.212	-22.04	PASS
			-1.947	On	-45.695	-21.95	PASS
	HCH	2480	-0.853	Off	-45.500	-20.85	PASS
			-0.741	On	-45.209	-20.74	PASS

Test Graphs

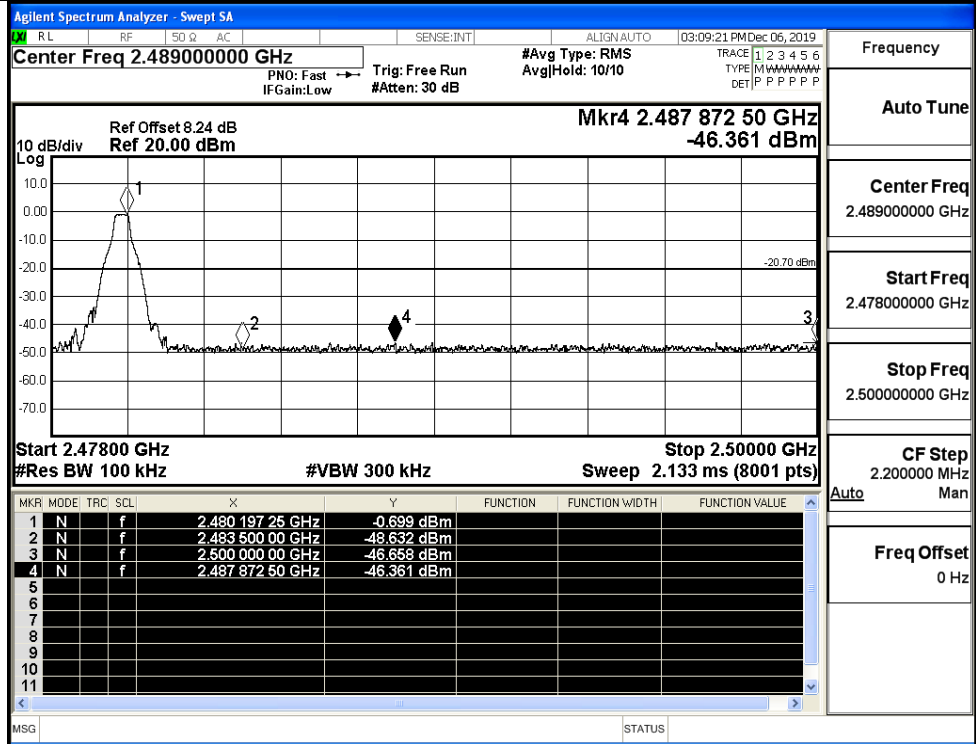
GFSK/LCH/No Hop



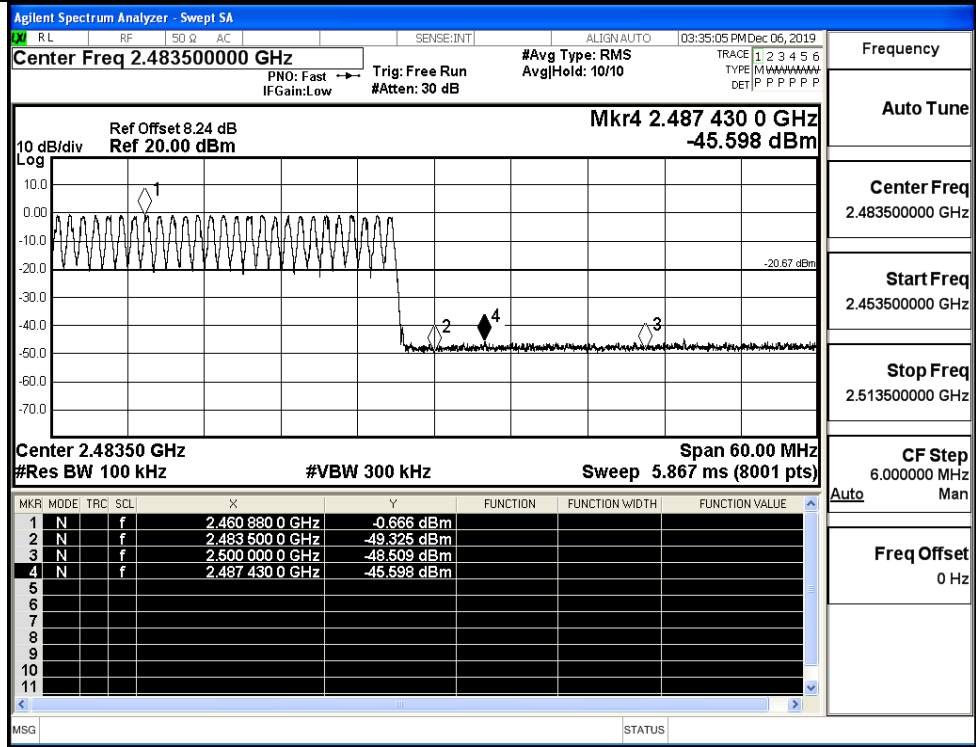
GFSK/LCH/Hop



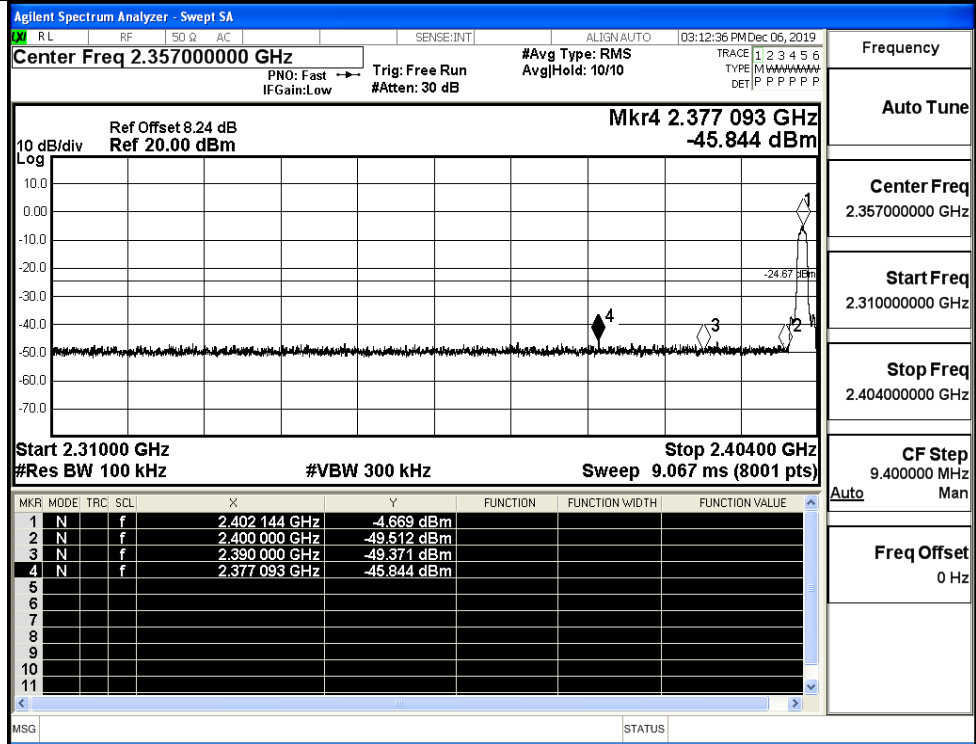
GFSK/HCH/No Hop



GFSK/HCH/Hop

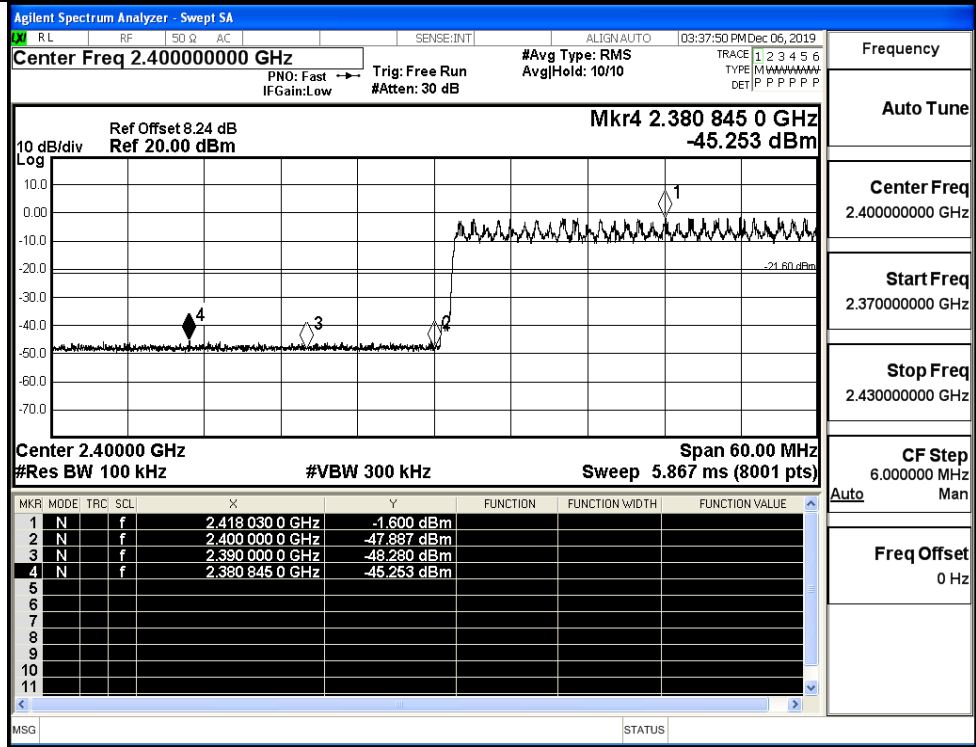


$\pi/4$ DQPSK/LCH/No  
Hop



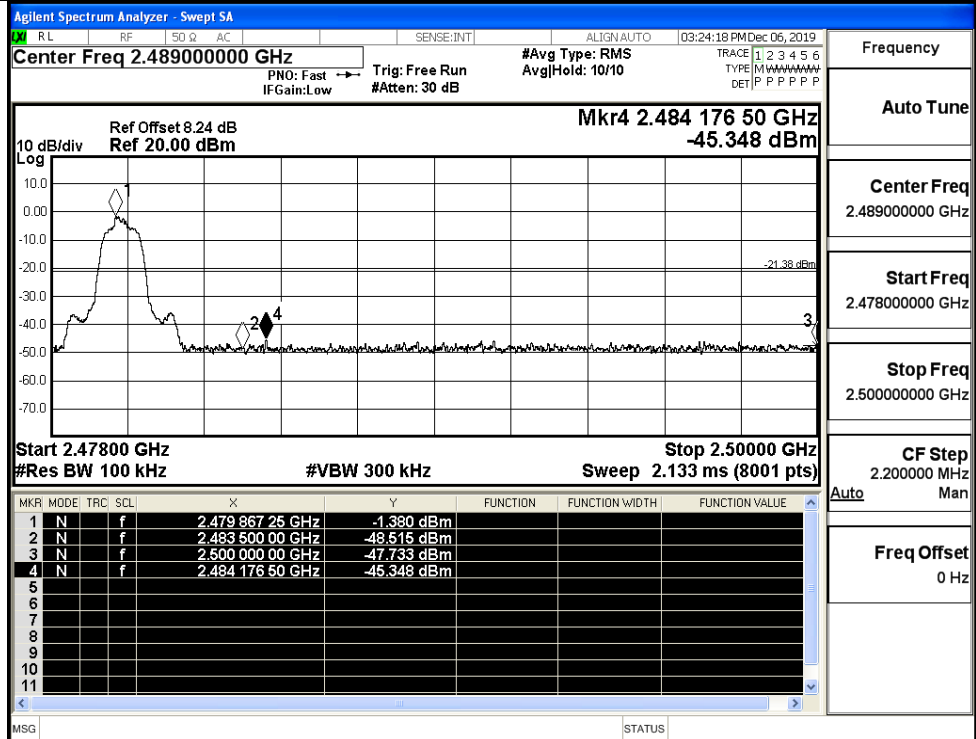
Frequency  
Auto Tune  
Center Freq  
2.357000000 GHz  
Start Freq  
2.310000000 GHz  
Stop Freq  
2.404000000 GHz  
CF Step  
9.400000 MHz  
Auto Man  
Freq Offset  
0 Hz

$\pi/4$ DQPSK/LCH/Hop



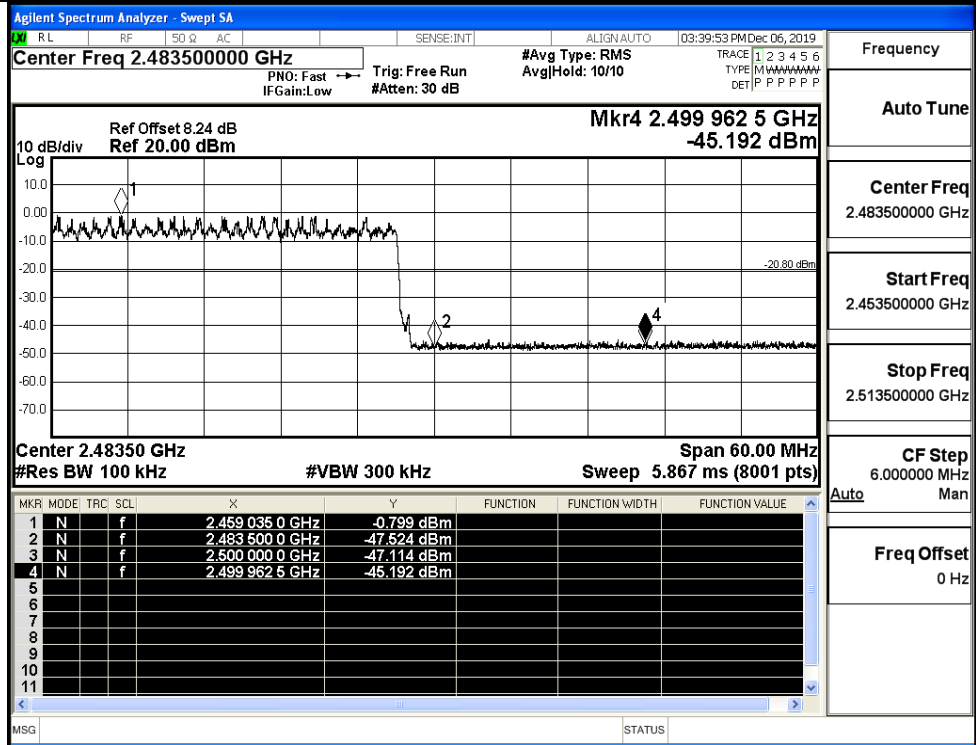
Frequency  
Auto Tune  
Center Freq  
2.400000000 GHz  
Start Freq  
2.370000000 GHz  
Stop Freq  
2.430000000 GHz  
CF Step  
6.000000 MHz  
Auto Man  
Freq Offset  
0 Hz

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



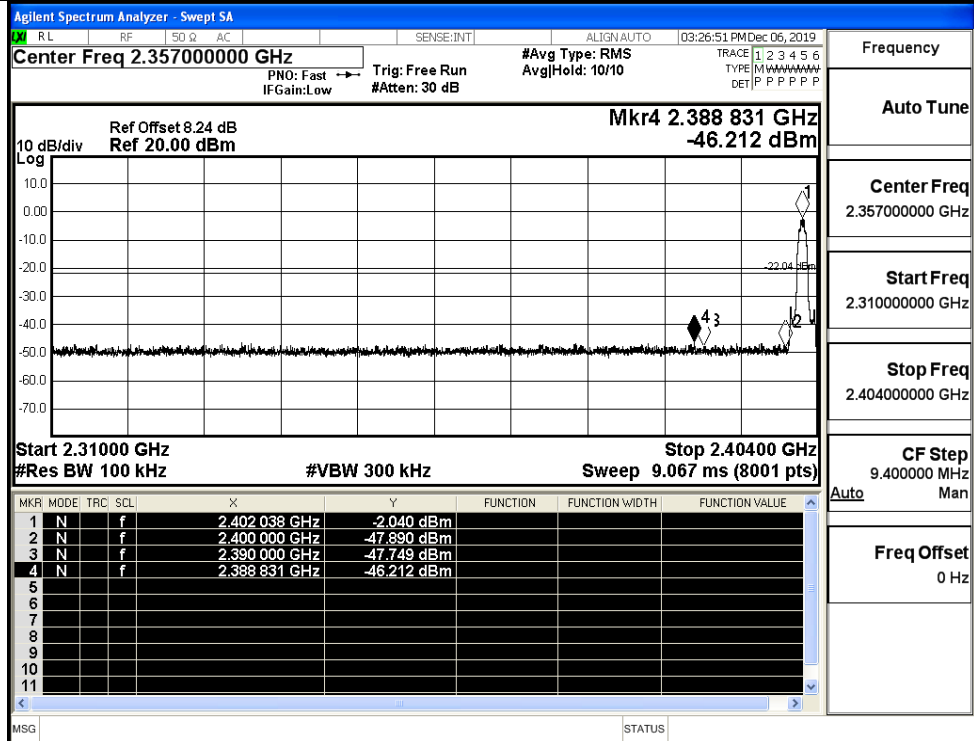
Frequency
Auto Tune
Center Freq 2.489000000 GHz
Start Freq 2.478000000 GHz
Stop Freq 2.500000000 GHz
CF Step 2.200000 MHz
Freq Offset 0 Hz

$\pi$ /4DQPSK/HCH/Hop



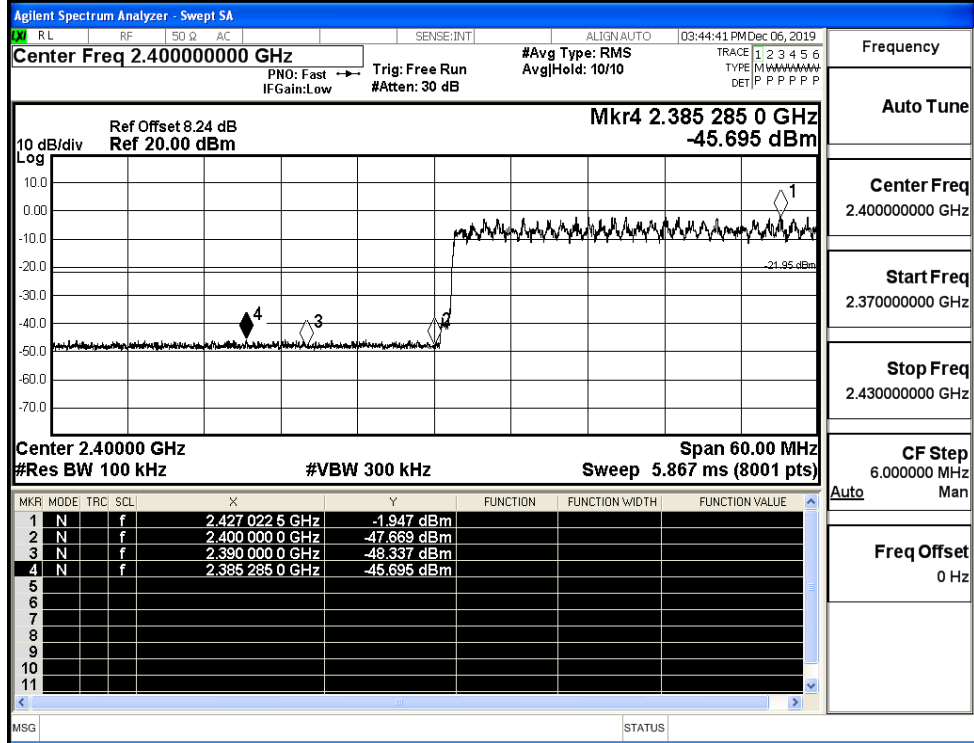
Frequency
Auto Tune
Center Freq 2.483500000 GHz
Start Freq 2.453500000 GHz
Stop Freq 2.513500000 GHz
CF Step 6.000000 MHz
Freq Offset 0 Hz

8DPSK/LCH/No Hop



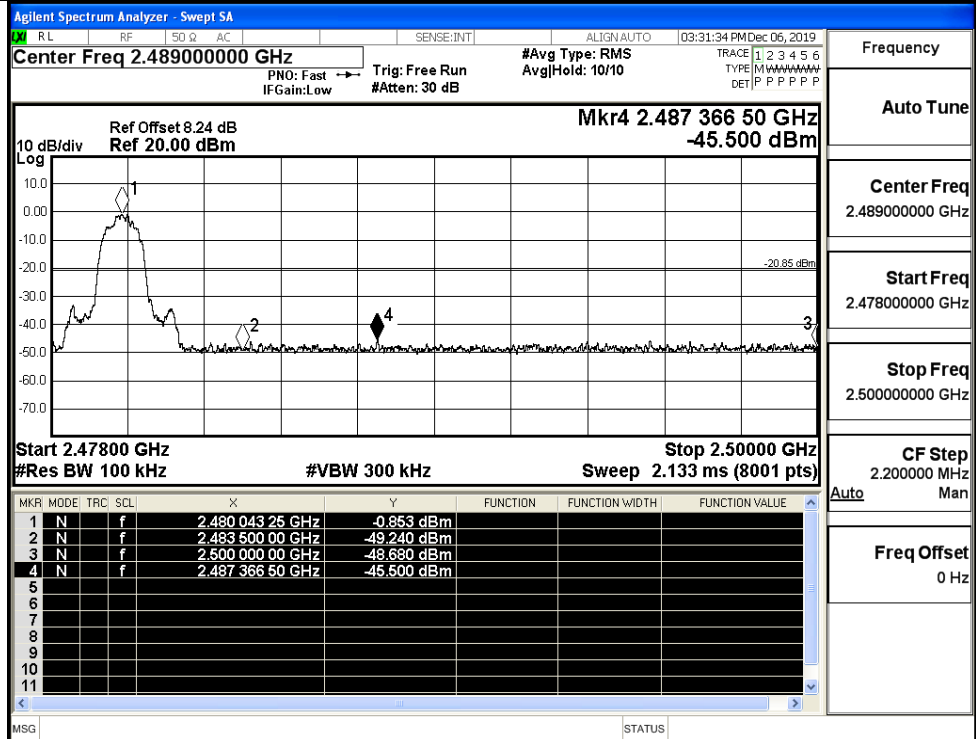
Frequency  
Auto Tune  
Center Freq  
2.357000000 GHz  
Start Freq  
2.310000000 GHz  
Stop Freq  
2.404000000 GHz  
CF Step  
9.400000 MHz  
Auto Man  
Freq Offset  
0 Hz

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  
Auto Man  
Freq Offset  
0 Hz

8DPSK/HCH/No Hop



Frequency

Auto Tune

Center Freq  
2.489000000 GHz

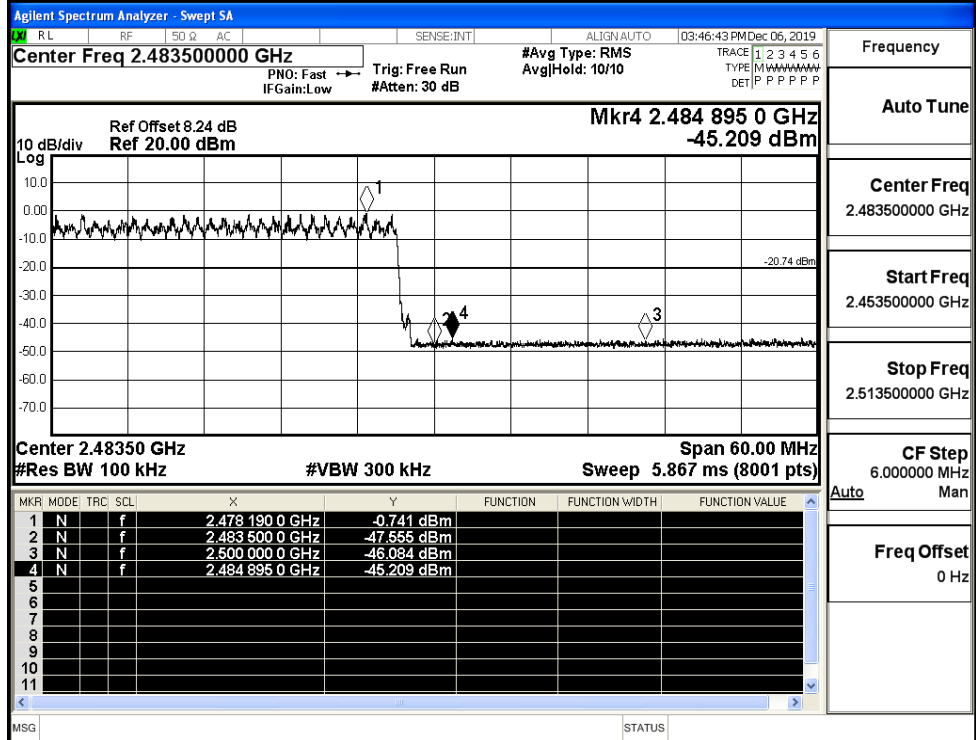
Start Freq  
2.478000000 GHz

Stop Freq  
2.500000000 GHz

CF Step  
2.200000 MHz

Freq Offset  
0 Hz

8DPSK/HCH/Hop



Frequency

Auto Tune

Center Freq  
2.483500000 GHz

Start Freq  
2.453500000 GHz

Stop Freq  
2.513500000 GHz

CF Step  
6.000000 MHz

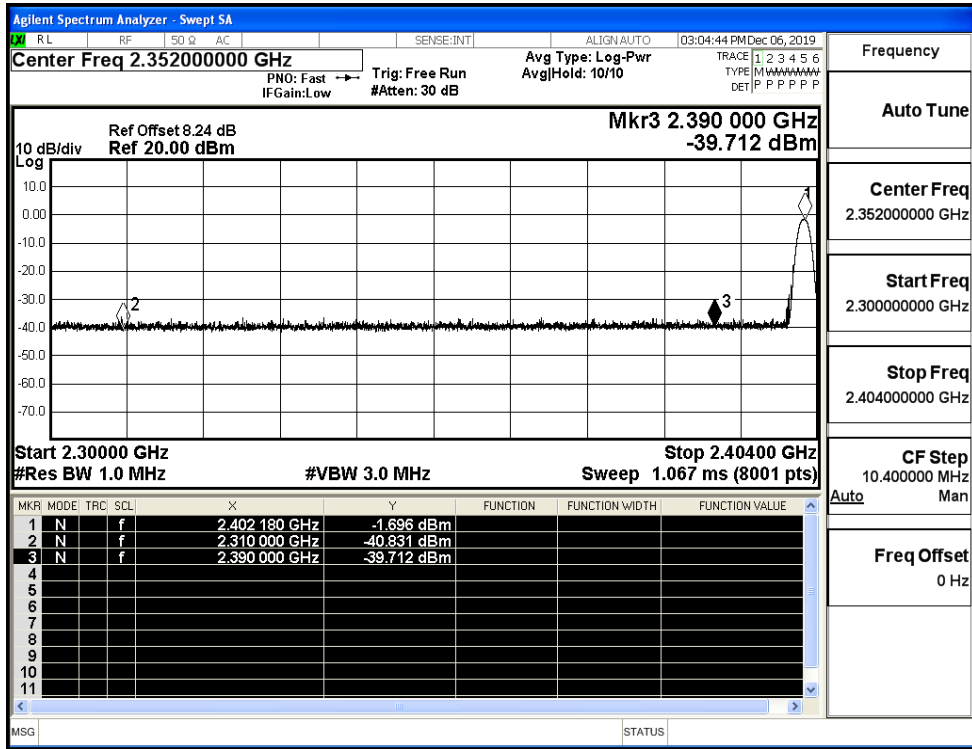
Freq Offset  
0 Hz



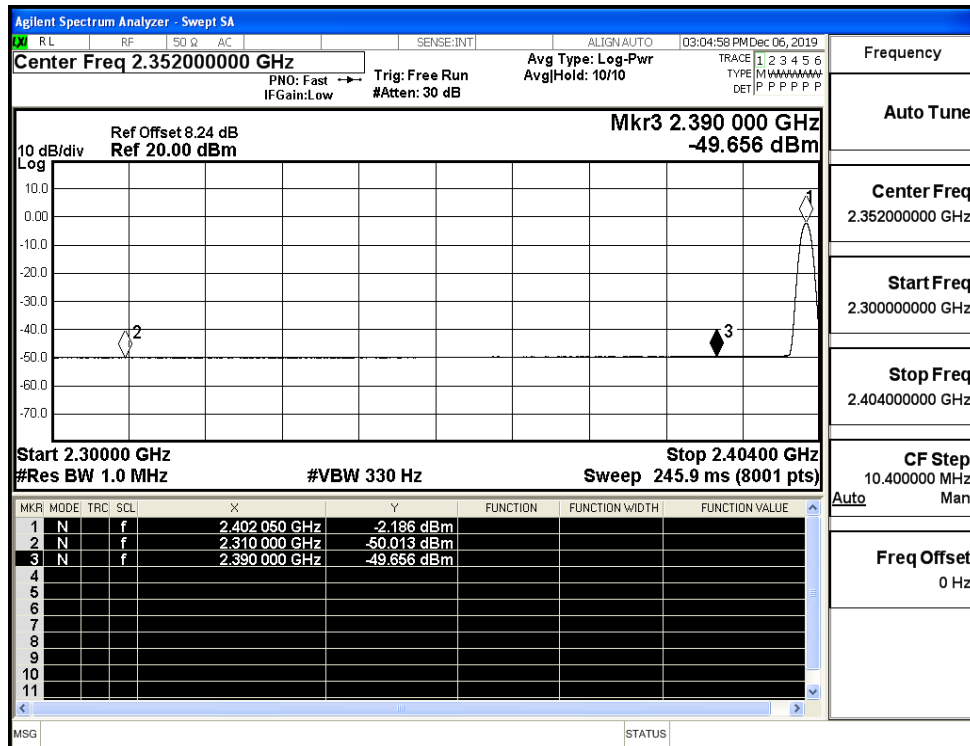
### A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-40.83	0	0	54.40	PEAK	74	PASS
	Off	2310.0	-50.01	0	0	45.22	AV	54	PASS
	Off	2390.0	-39.71	0	0	55.52	PEAK	74	PASS
	Off	2390.0	-49.66	0	0	45.57	AV	54	PASS
	Off	2483.5	-39.51	0	0	55.72	PEAK	74	PASS
	Off	2483.5	-49.18	0	0	46.05	AV	54	PASS
	Off	2500.0	-39.10	0	0	56.13	PEAK	74	PASS
	Off	2500.0	-49.00	0	0	46.23	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-39.57	0	0	55.66	PEAK	74	PASS
	Off	2310.0	-50.13	0	0	45.10	AV	54	PASS
	Off	2390.0	-38.79	0	0	56.44	PEAK	74	PASS
	Off	2390.0	-49.58	0	0	45.65	AV	54	PASS
	Off	2483.5	-38.14	0	0	57.09	PEAK	74	PASS
	Off	2483.5	-49.17	0	0	46.06	AV	54	PASS
	Off	2500.0	-38.63	0	0	56.60	PEAK	74	PASS
	Off	2500.0	-48.88	0	0	46.35	AV	54	PASS
8DPSK	Off	2310.0	-39.52	0	0	55.71	PEAK	74	PASS
	Off	2310.0	-50.01	0	0	45.22	AV	54	PASS
	Off	2390.0	-38.74	0	0	56.49	PEAK	74	PASS
	Off	2390.0	-49.42	0	0	45.81	AV	54	PASS
	Off	2483.5	-39.16	0	0	56.07	PEAK	74	PASS
	Off	2483.5	-49.20	0	0	46.03	AV	54	PASS
	Off	2500.0	-39.40	0	0	55.83	PEAK	74	PASS
	Off	2500.0	-49.09	0	0	46.14	AV	54	PASS

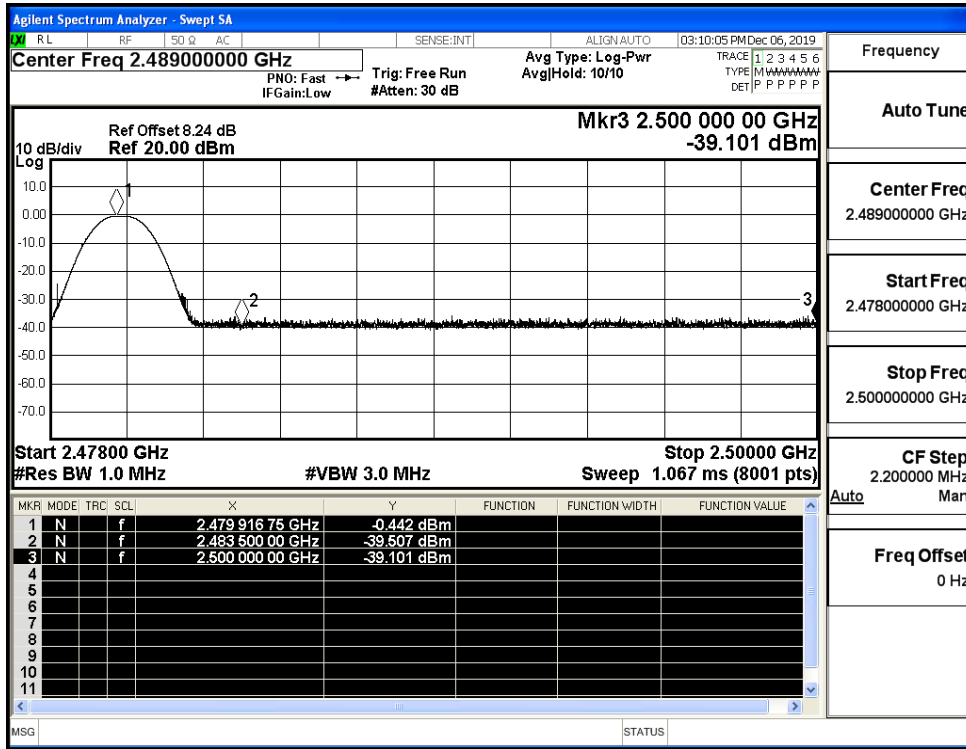
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



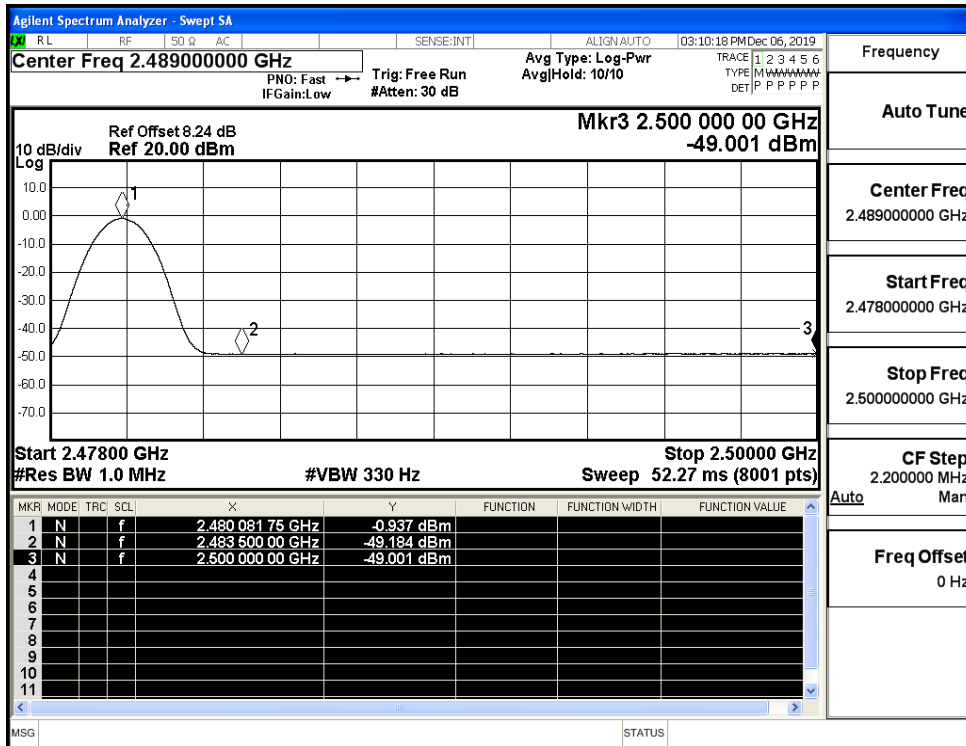
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



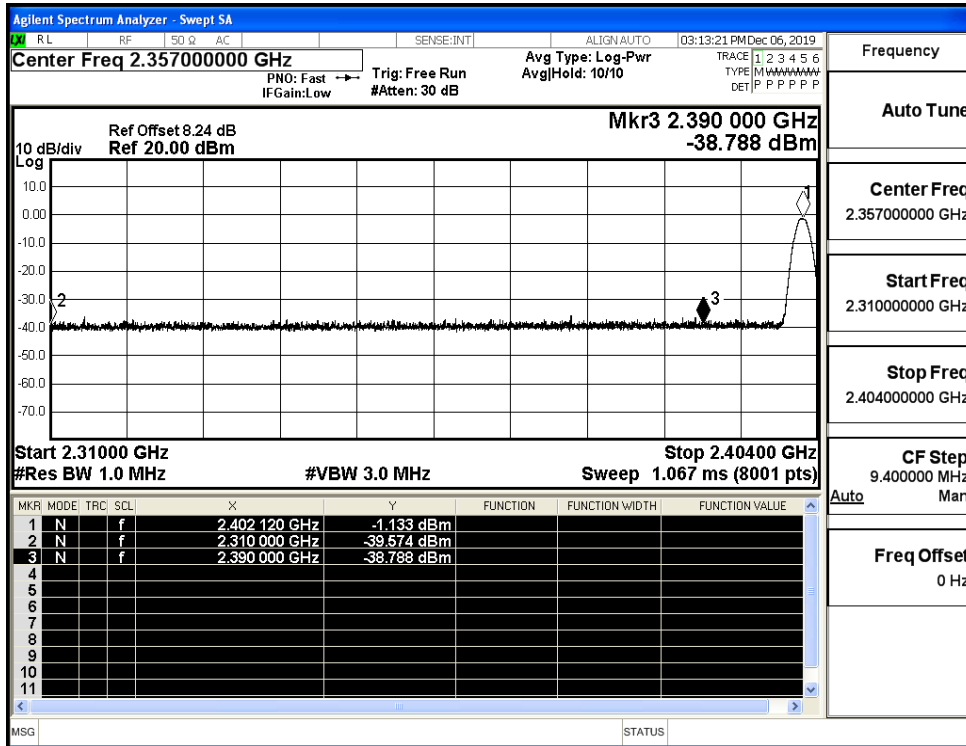
Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (High Channel)



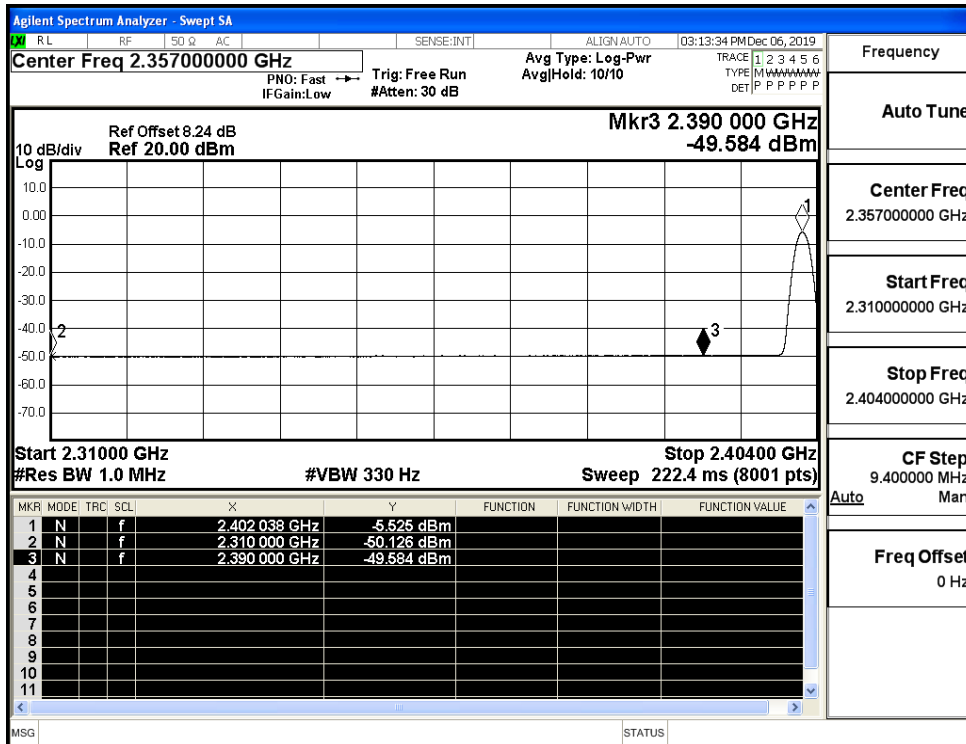
Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (High Channel)



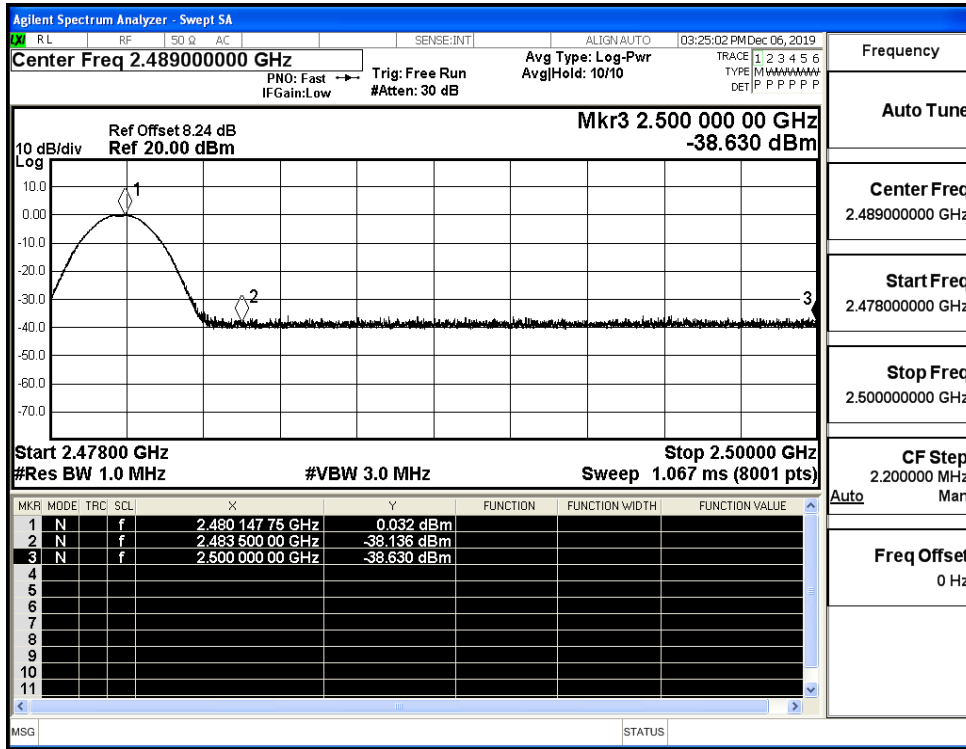
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)



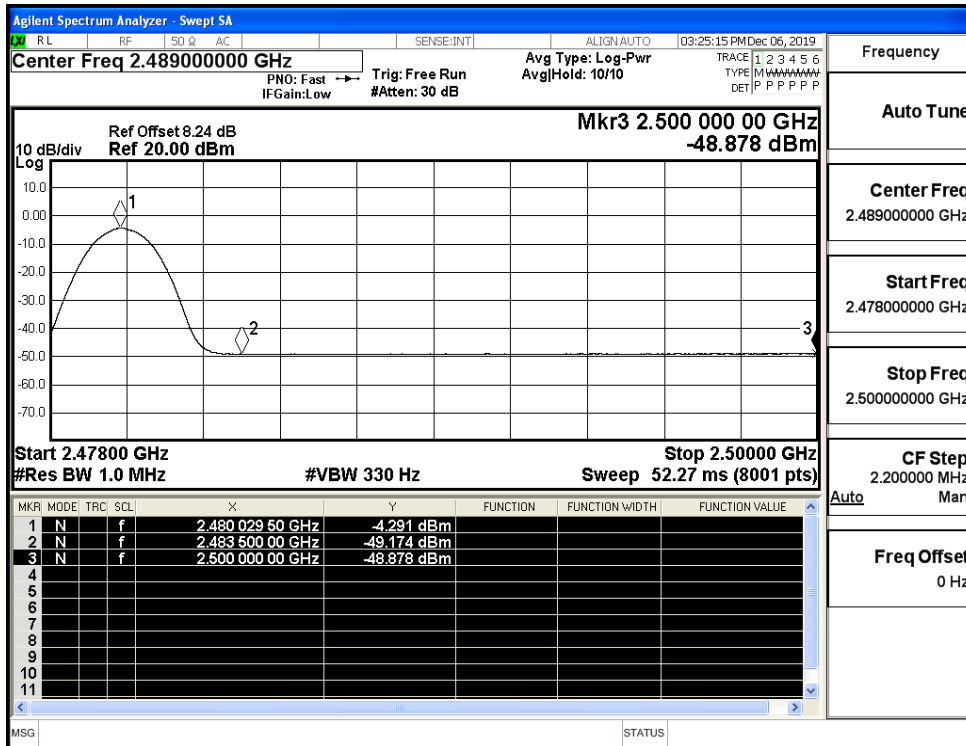
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)



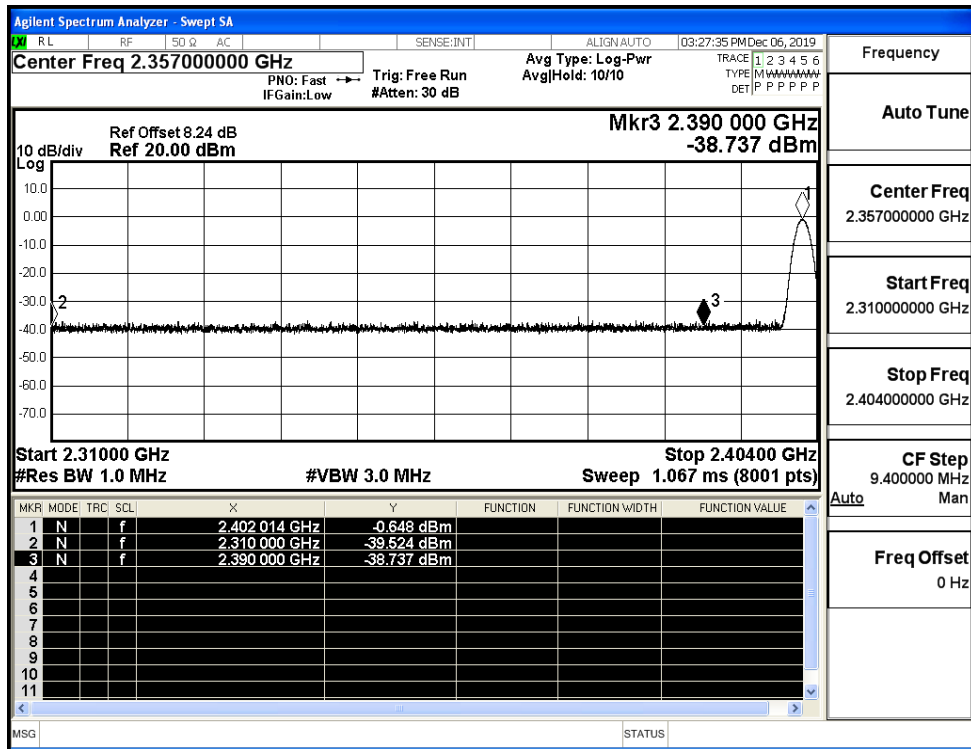
Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (High Channel)



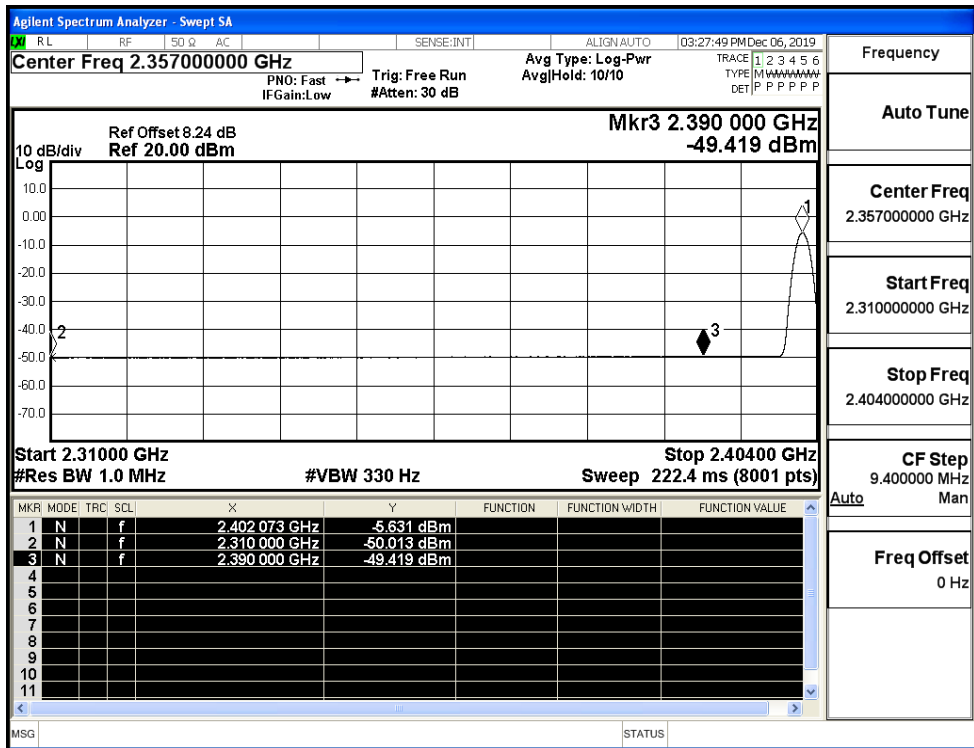
Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (High Channel)



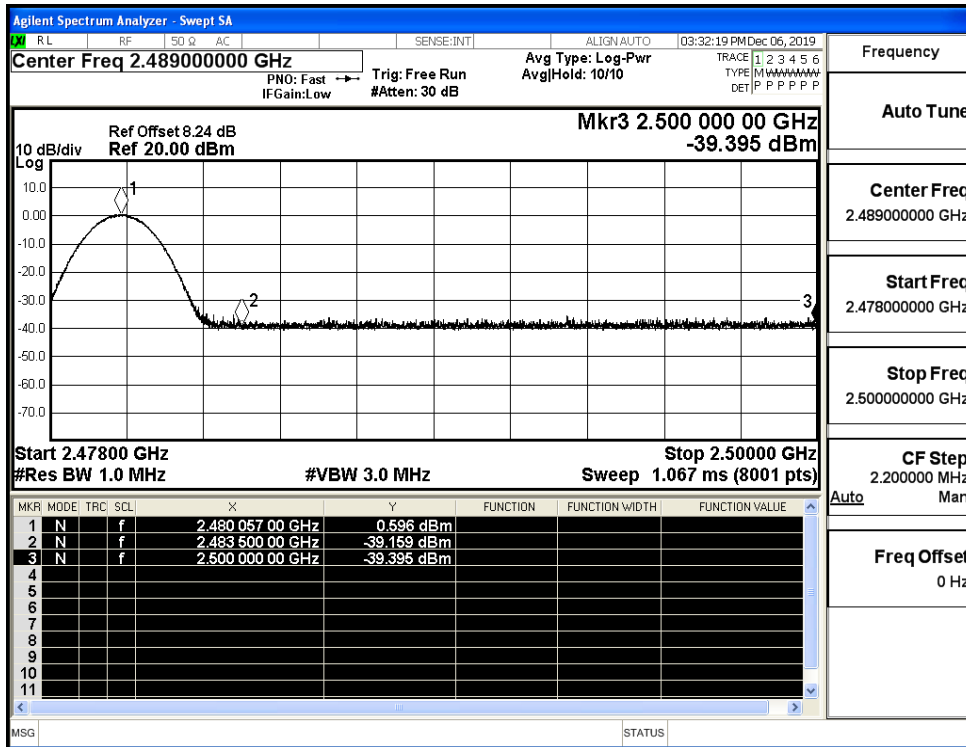
Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



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)

