

Appendix A

RF Test Data for BT V4.1 (BDR/EDR) (Conducted Measurement)

Product Name: Move Waterproof Bluetooth Wireless Earphones IPX7

Trade Mark: Monoprice, IIIP

Test Model: 34440

Environmental Conditions

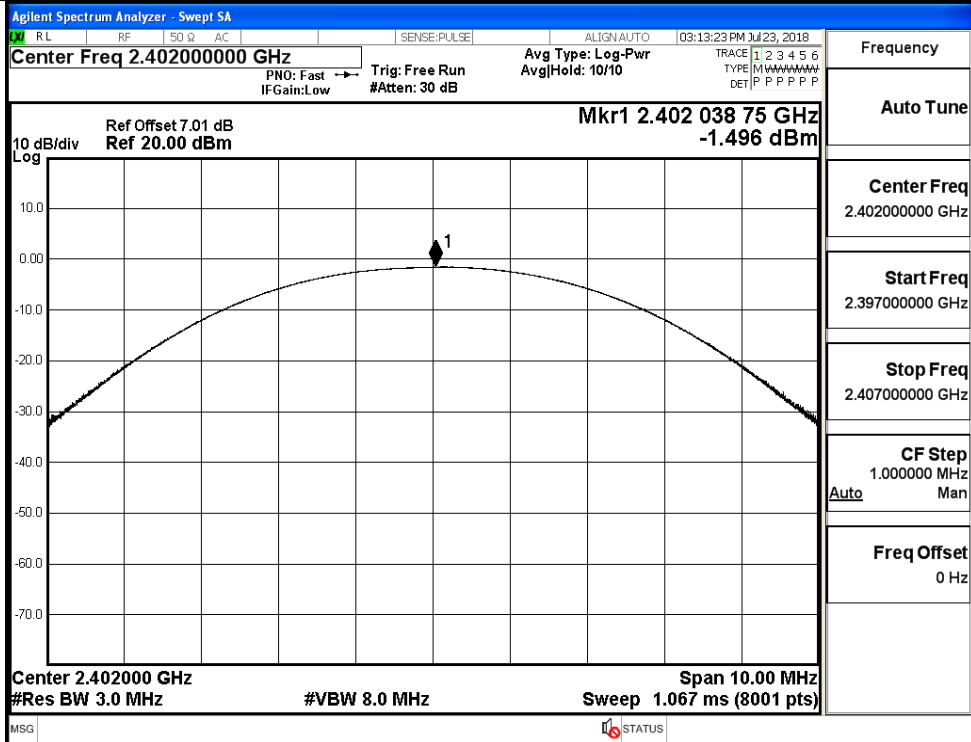
Temperature:	23.3 °C
Relative Humidity:	52.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Peak Output Power

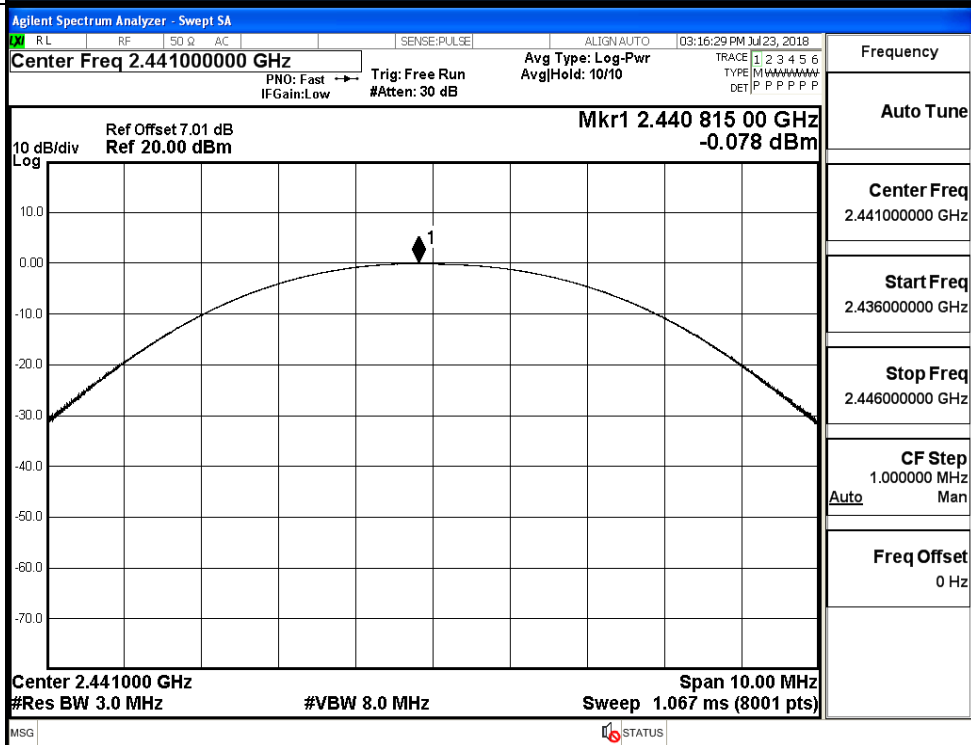
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.496	30	PASS
	MCH	-0.078	30	PASS
	HCH	0.326	30	PASS
π/4DQPSK	LCH	-3.678	21	PASS
	MCH	-1.727	21	PASS
	HCH	-1.526	21	PASS
8DPSK	LCH	-3.419	21	PASS
	MCH	-1.488	21	PASS
	HCH	-1.170	21	PASS

Test Graphs

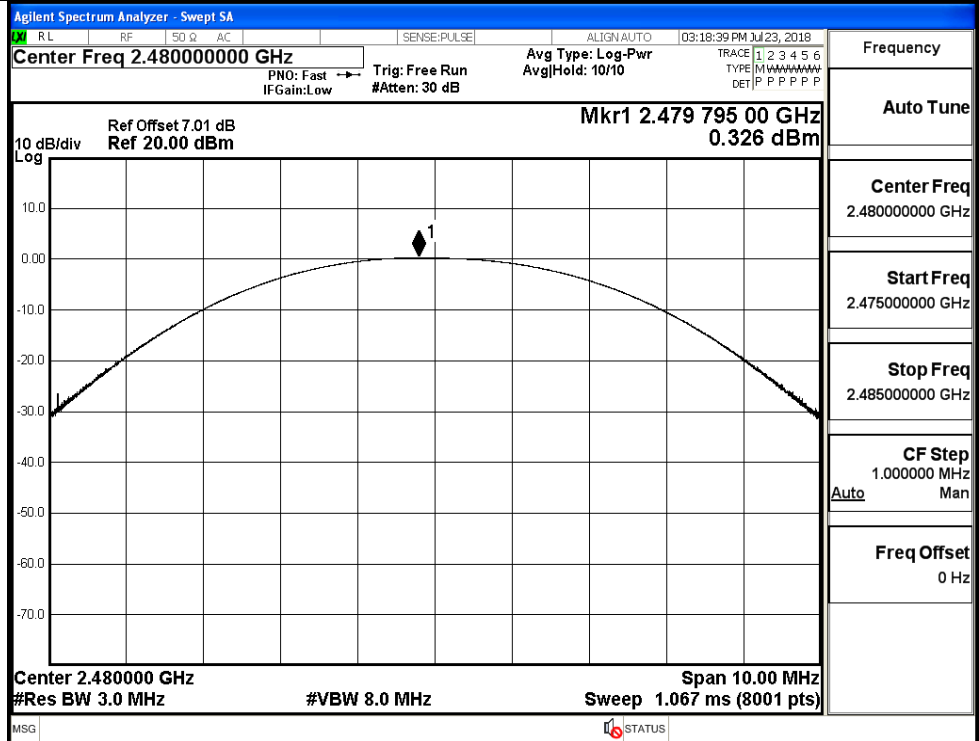
GFSK/LCH



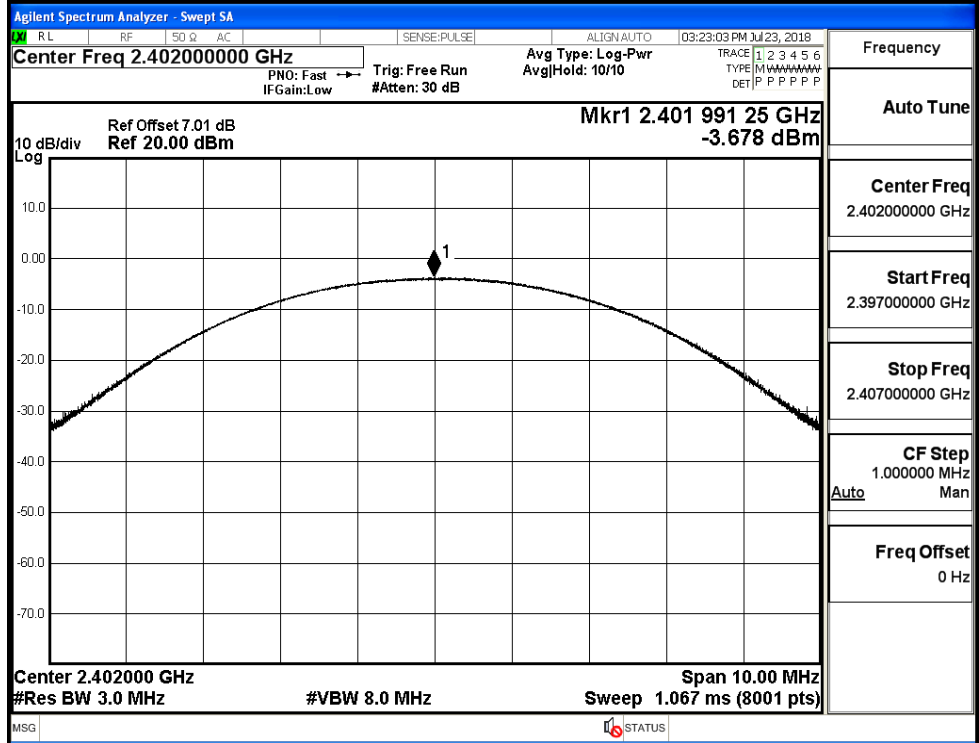
GFSK/MCH



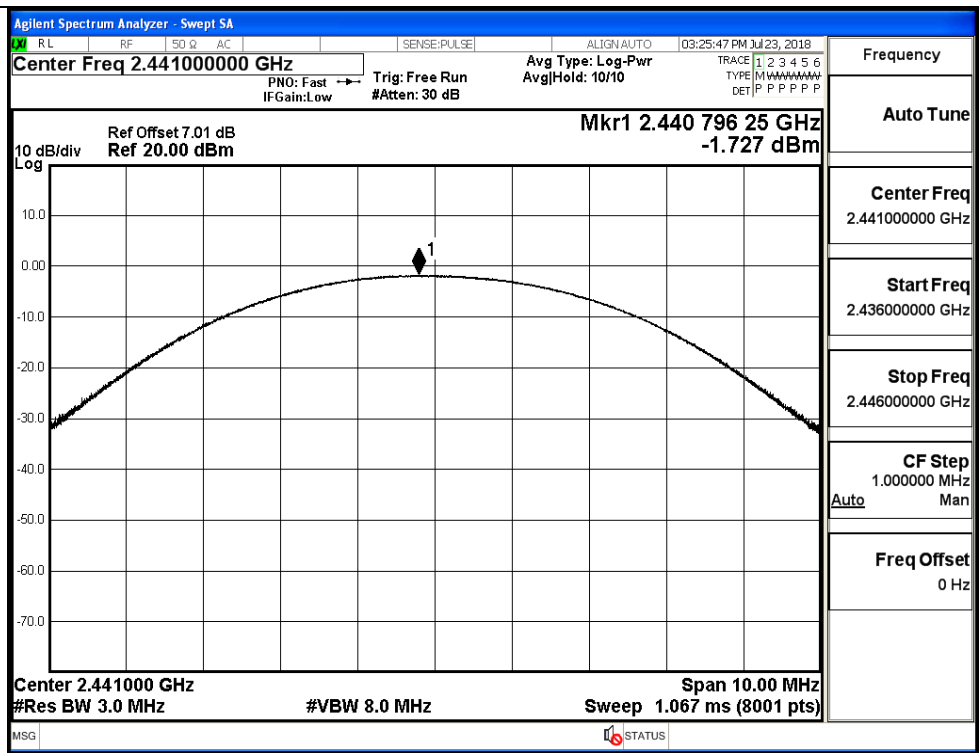
GFSK/HCH



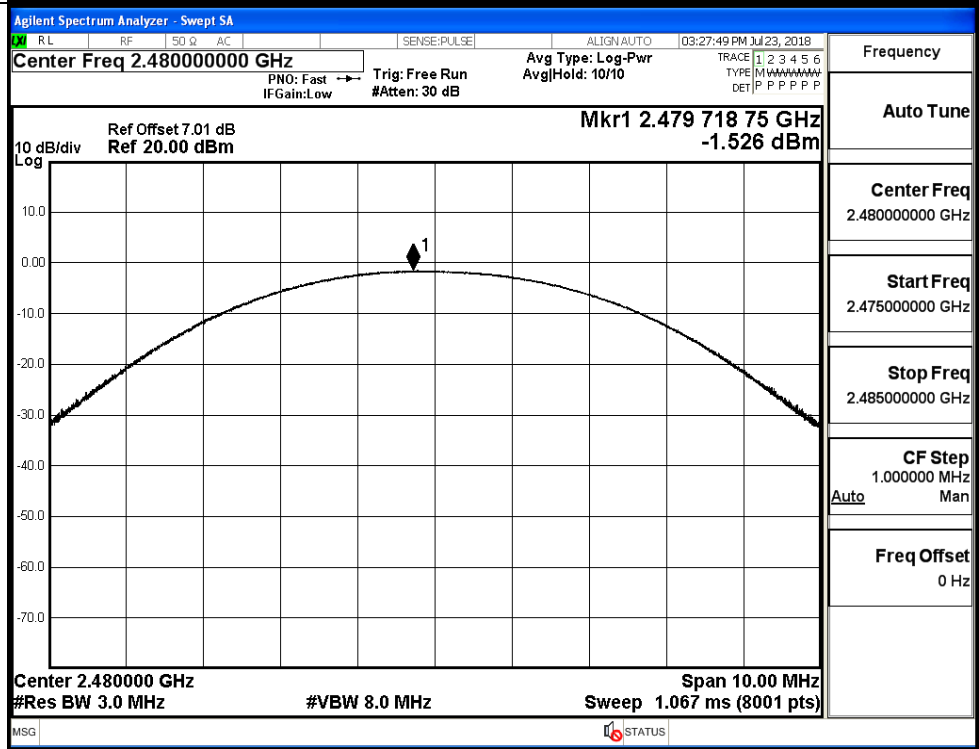
π /4DQPSK/LCH



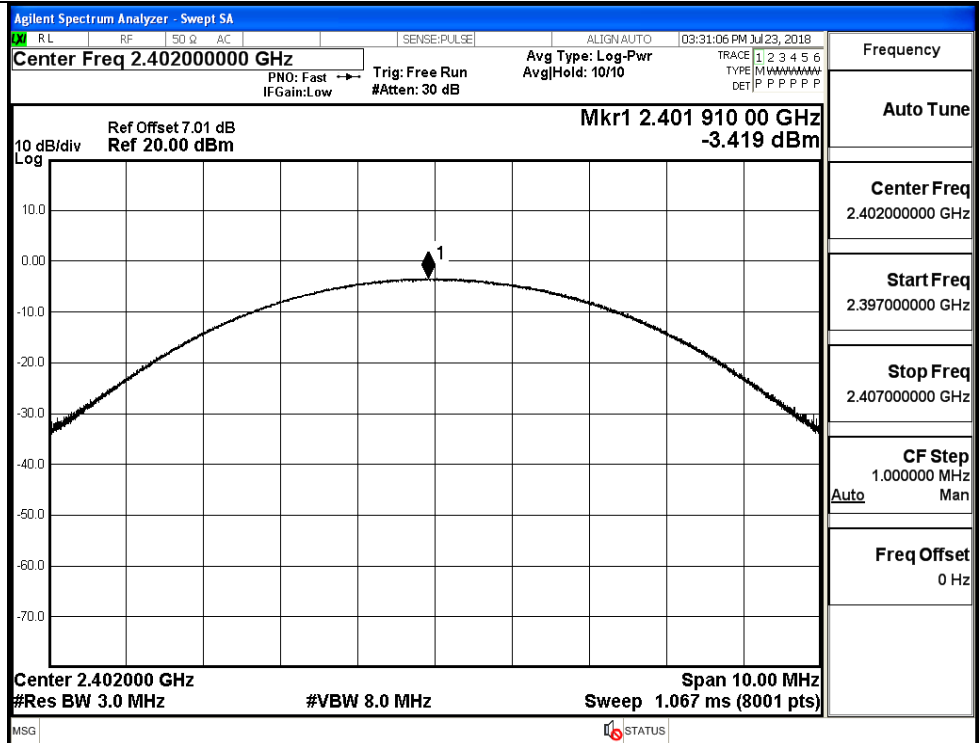
π /4DQPSK/MCH



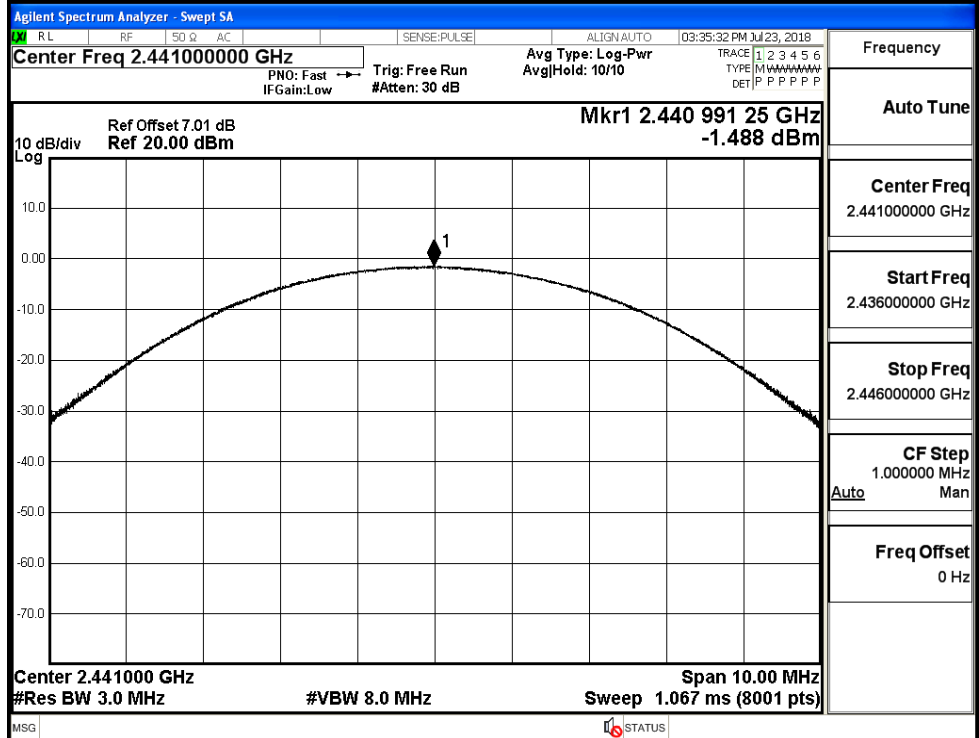
π /4DQPSK/HCH



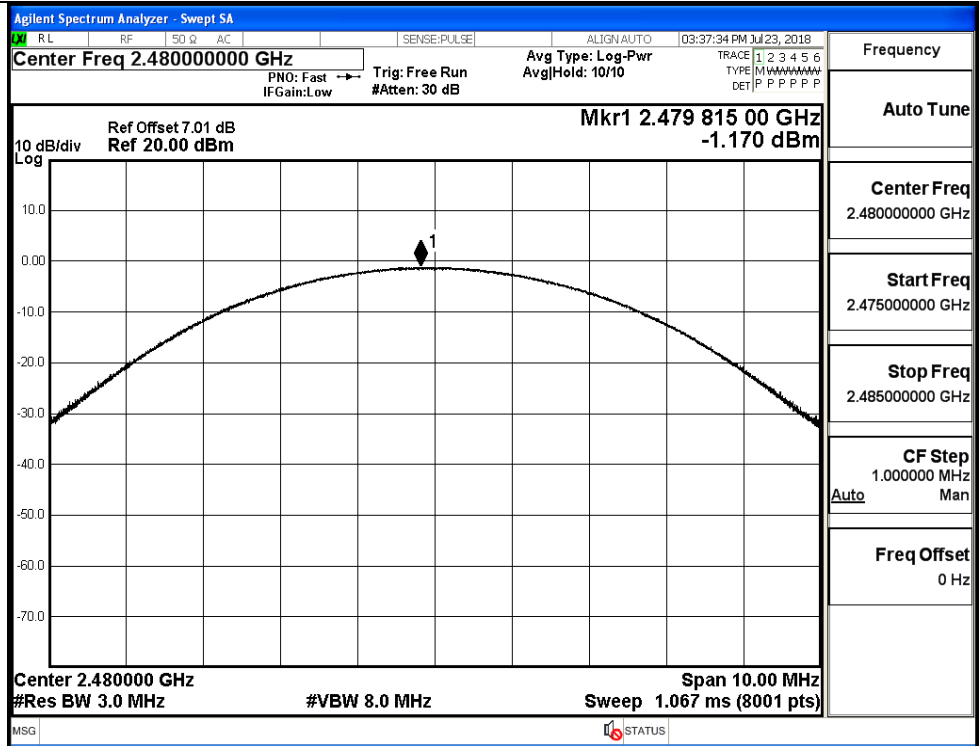
8DPSK/LCH



8DPSK/MCH

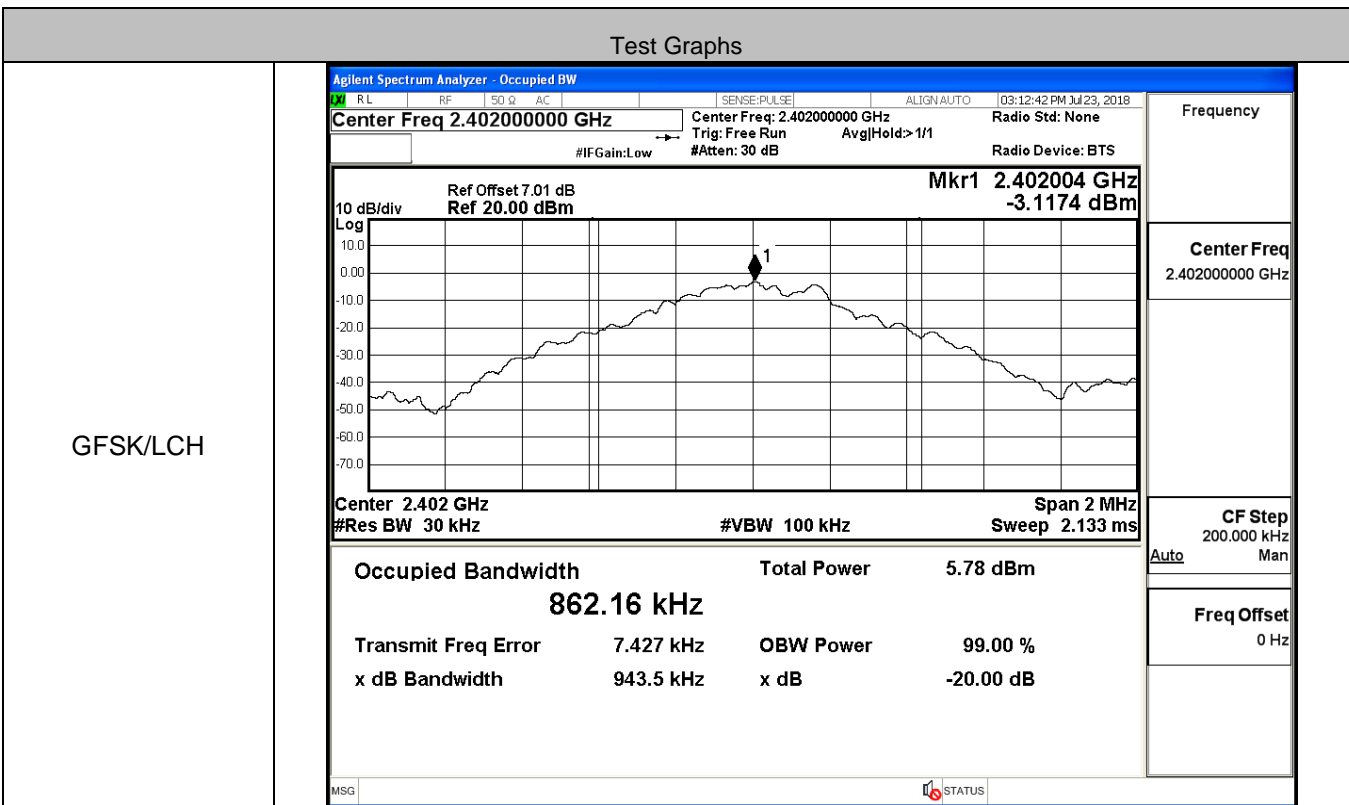


8DPSK/HCH

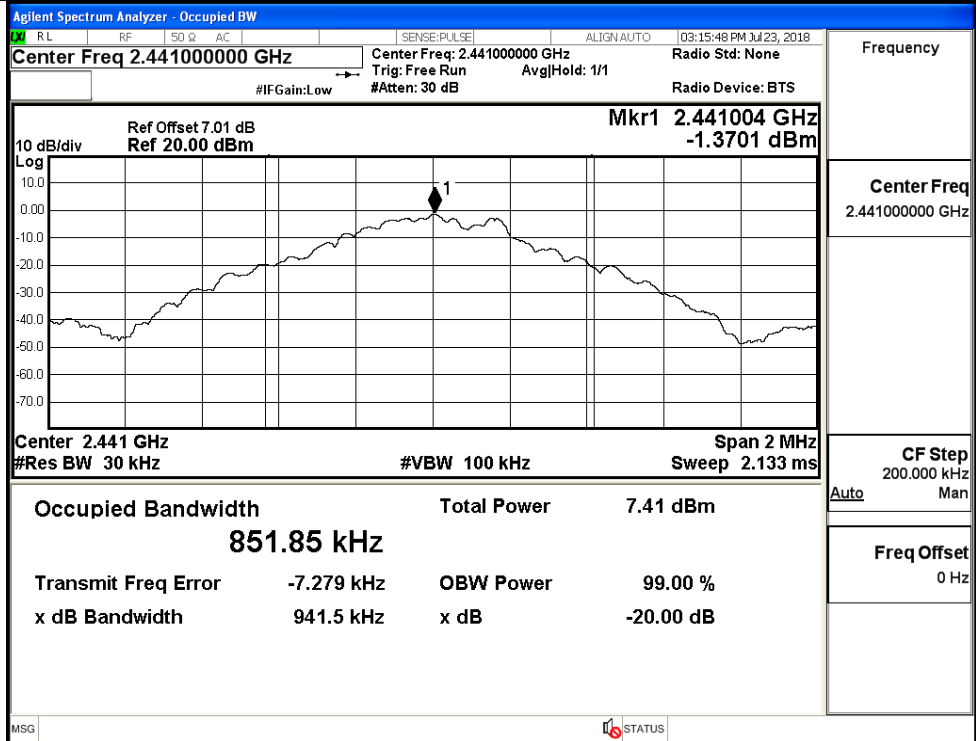


A.2 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.86216	0.9435	Not Specified	PASS
	MCH	0.85185	0.9415	Not Specified	PASS
	HCH	0.85401	0.9444	Not Specified	PASS
π/4DQPSK	LCH	1.1646	1.265	Not Specified	PASS
	MCH	1.1649	1.233	Not Specified	PASS
	HCH	1.1619	1.229	Not Specified	PASS
8DPSK	LCH	1.1591	1.277	Not Specified	PASS
	MCH	1.1566	1.263	Not Specified	PASS
	HCH	1.1566	1.261	Not Specified	PASS



GFSK/MCH



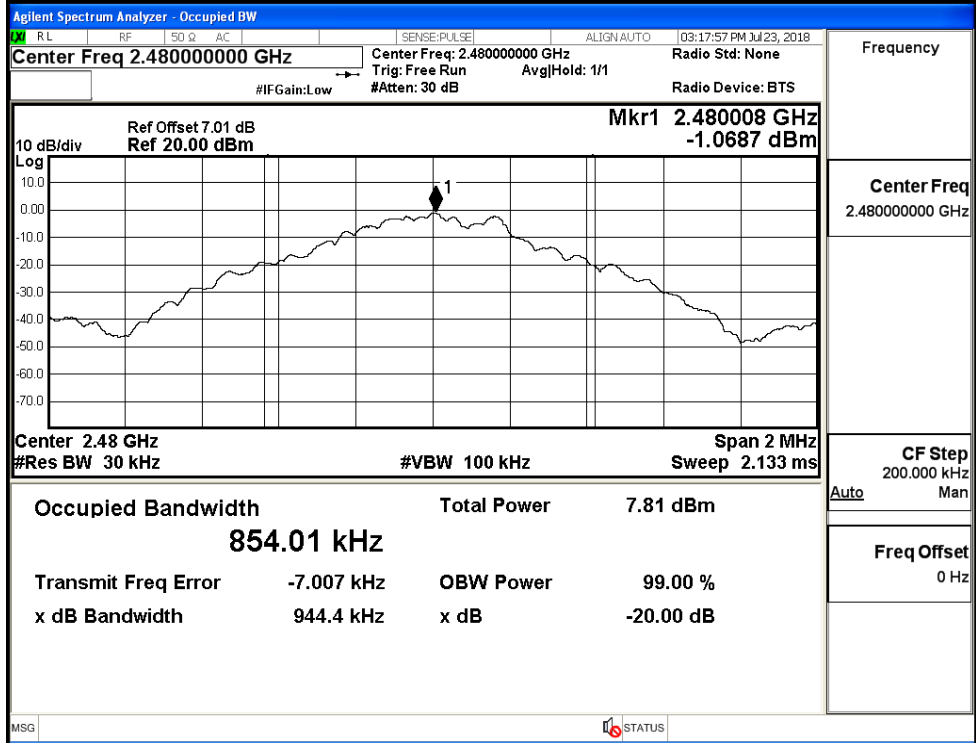
Frequency

Center Freq
2.441000000 GHz

CF Step
200.000 kHz

Freq Offset
0 Hz

GFSK/HCH



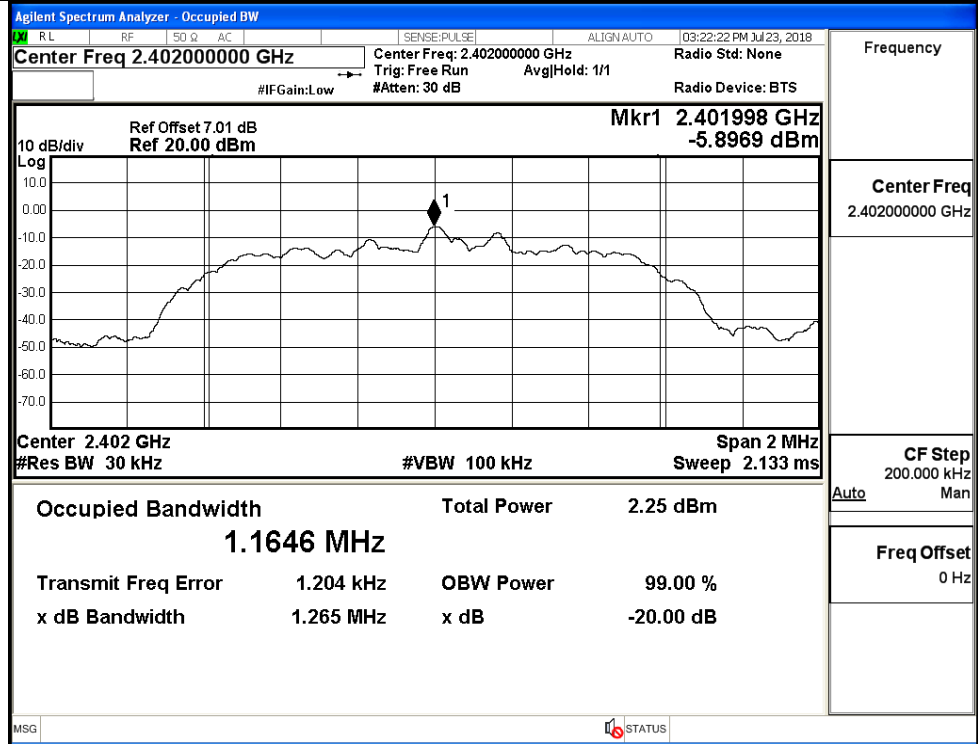
Frequency

Center Freq
2.480000000 GHz

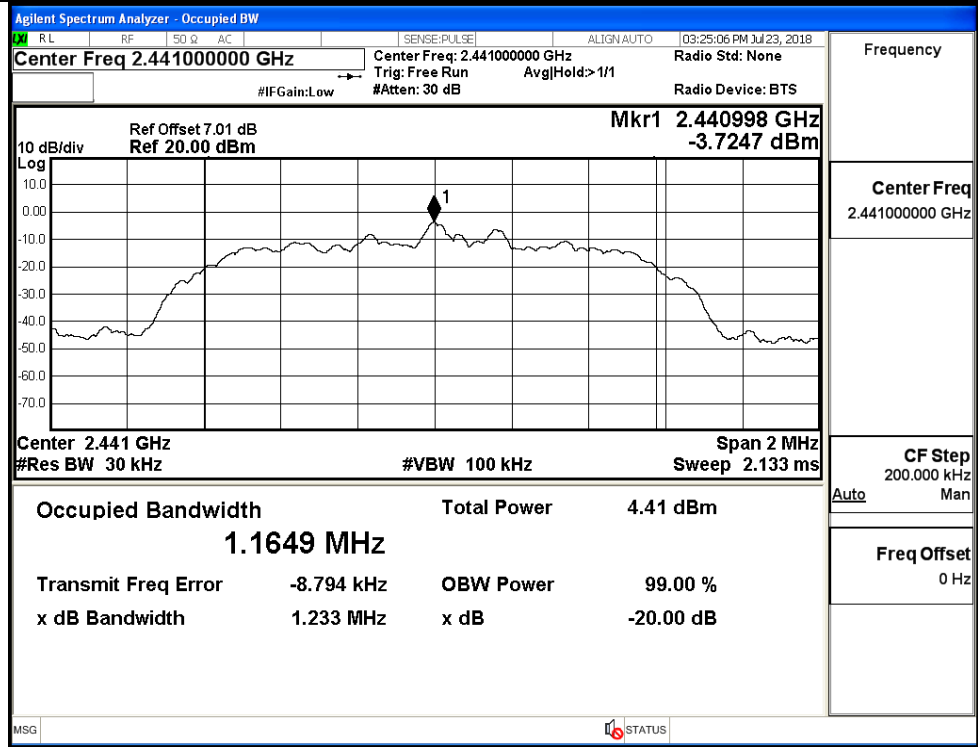
CF Step
200.000 kHz

Freq Offset
0 Hz

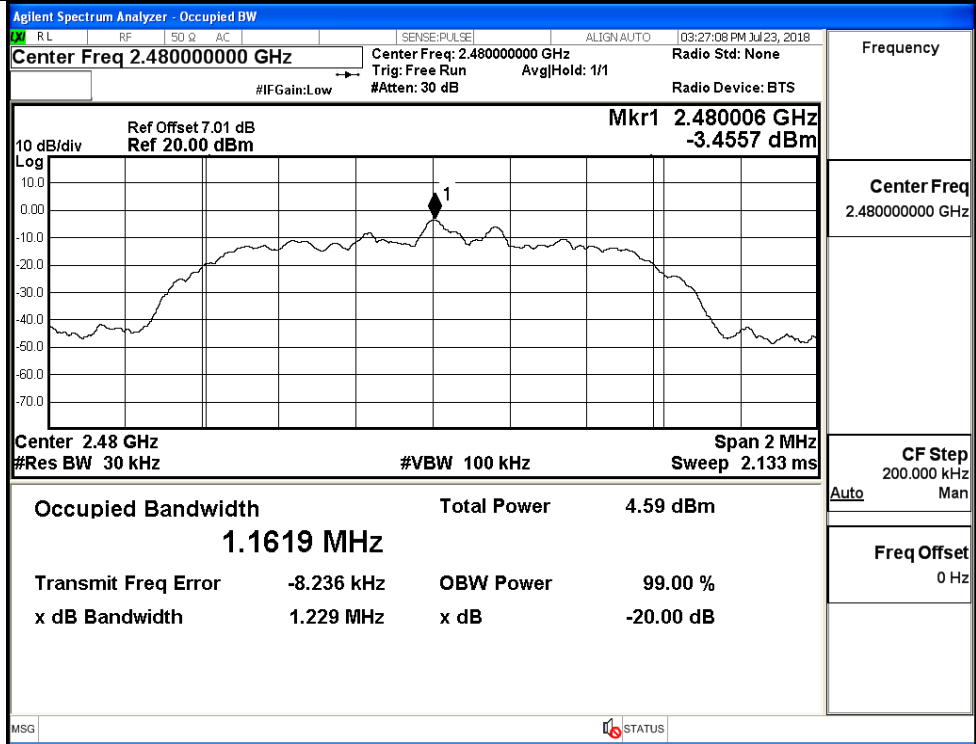
$\pi/4$ DQPSK/LCH



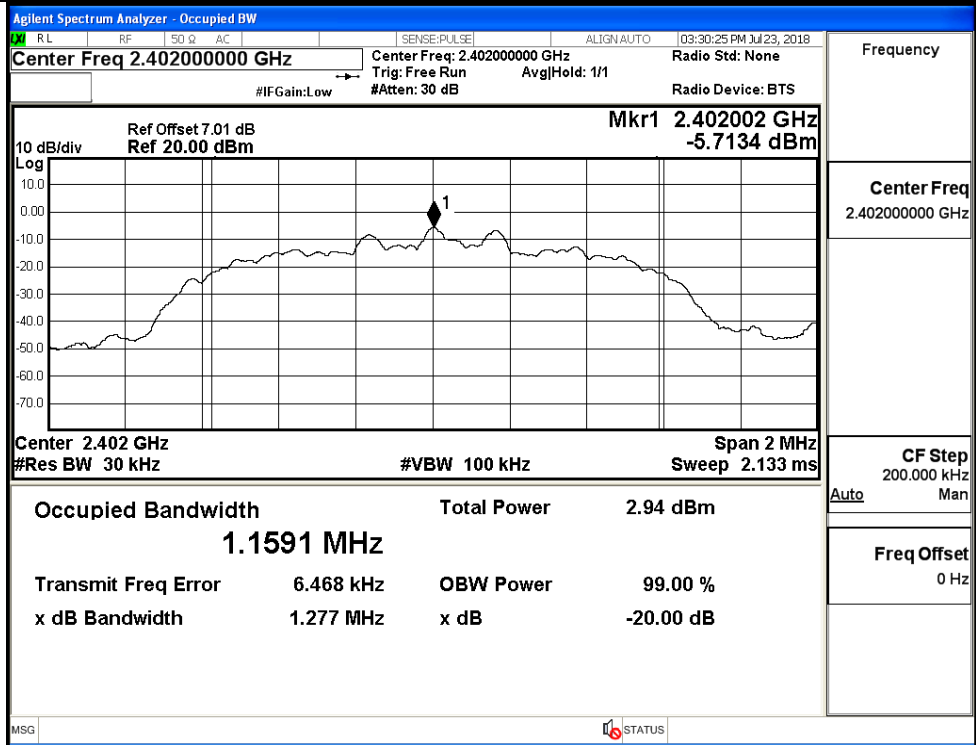
$\pi/4$ DQPSK/MCH



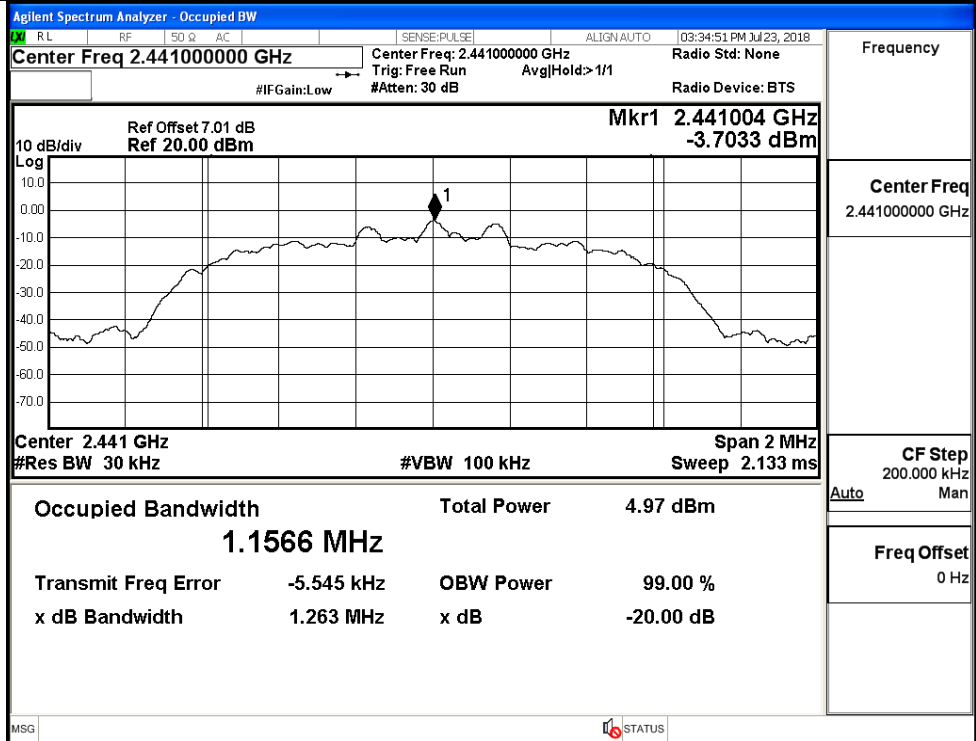
$\pi/4$ DQPSK/HCH



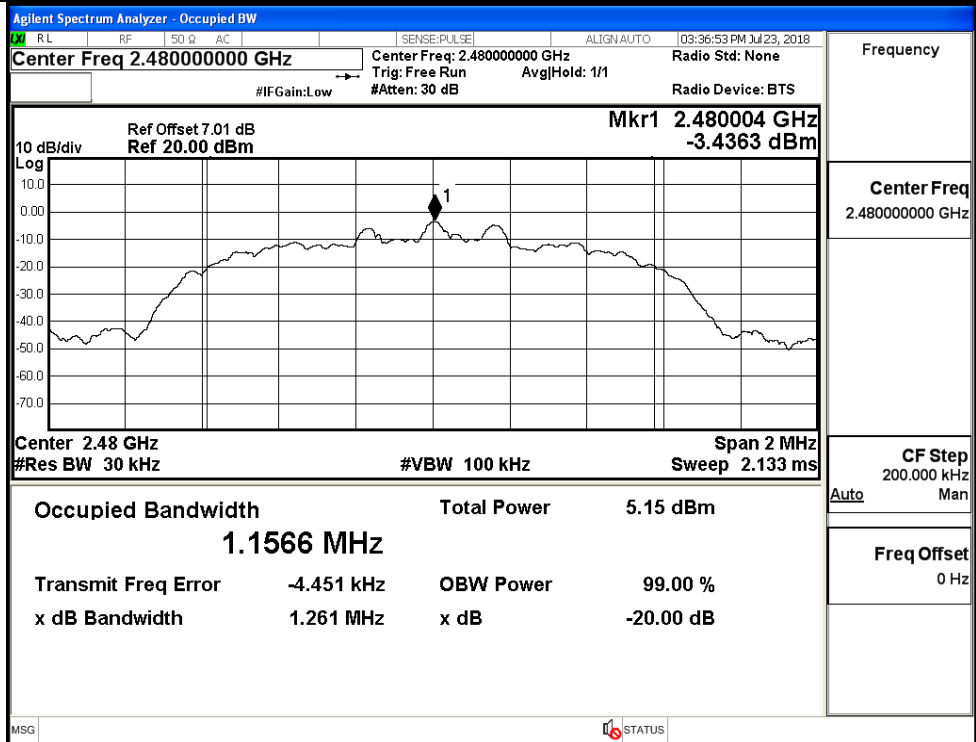
8DPSK/LCH



8DPSK/MCH

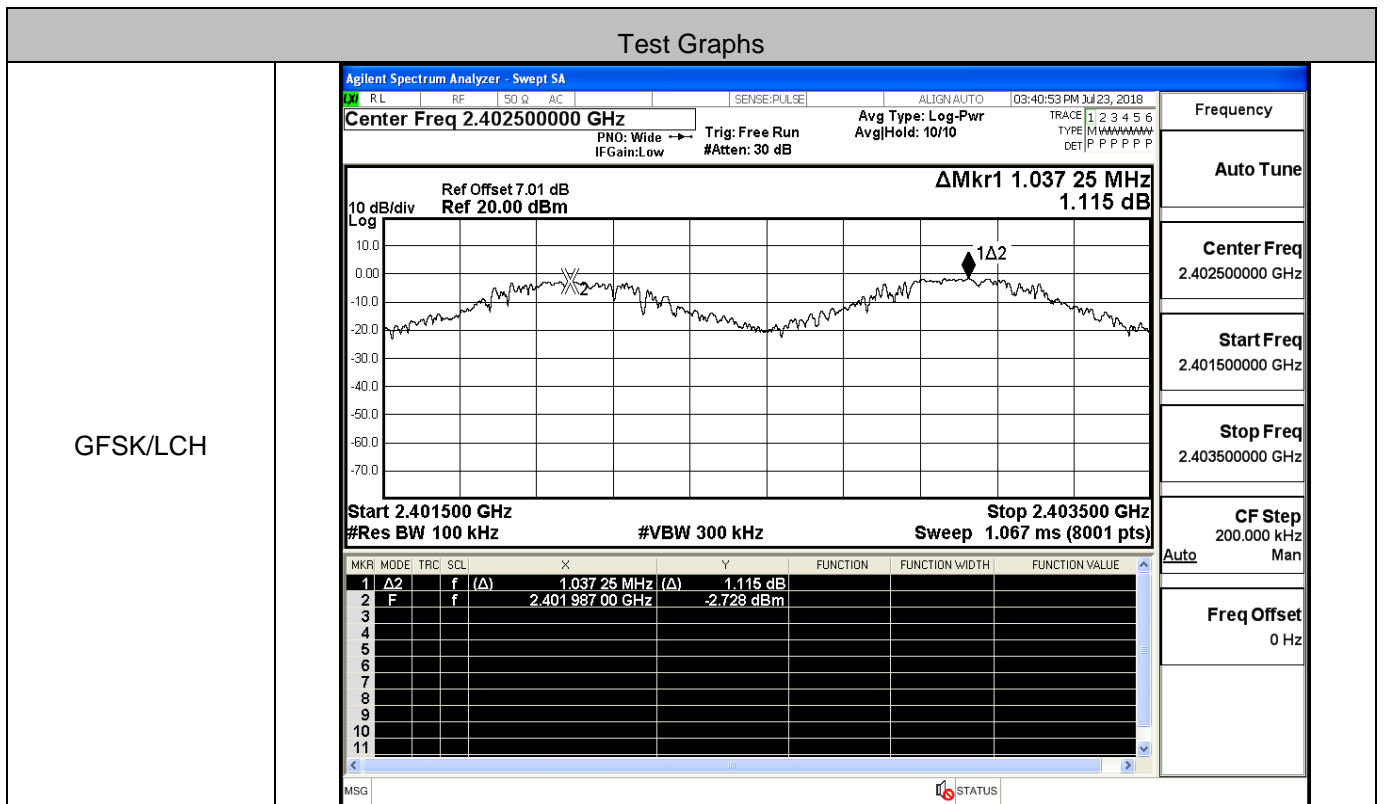


8DPSK/HCH

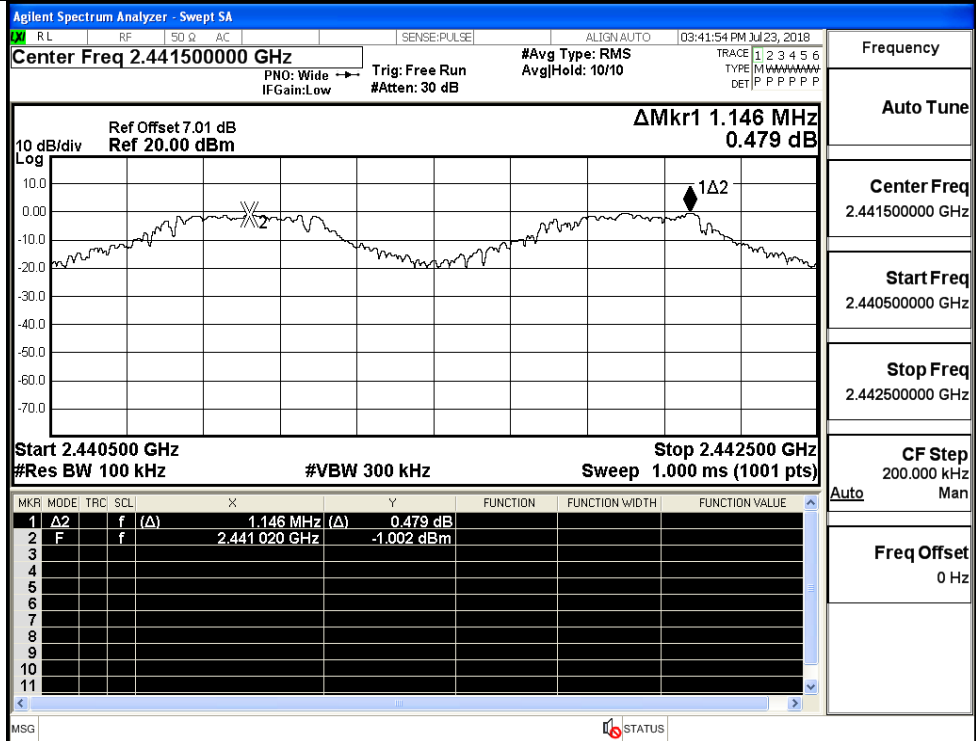


A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.037	0.630	PASS
	MCH	1.146	0.630	PASS
	HCH	0.984	0.630	PASS
π/4DQPSK	LCH	1.000	0.843	PASS
	MCH	0.980	0.843	PASS
	HCH	1.018	0.843	PASS
8DPSK	LCH	1.166	0.851	PASS
	MCH	1.126	0.851	PASS
	HCH	1.122	0.851	PASS

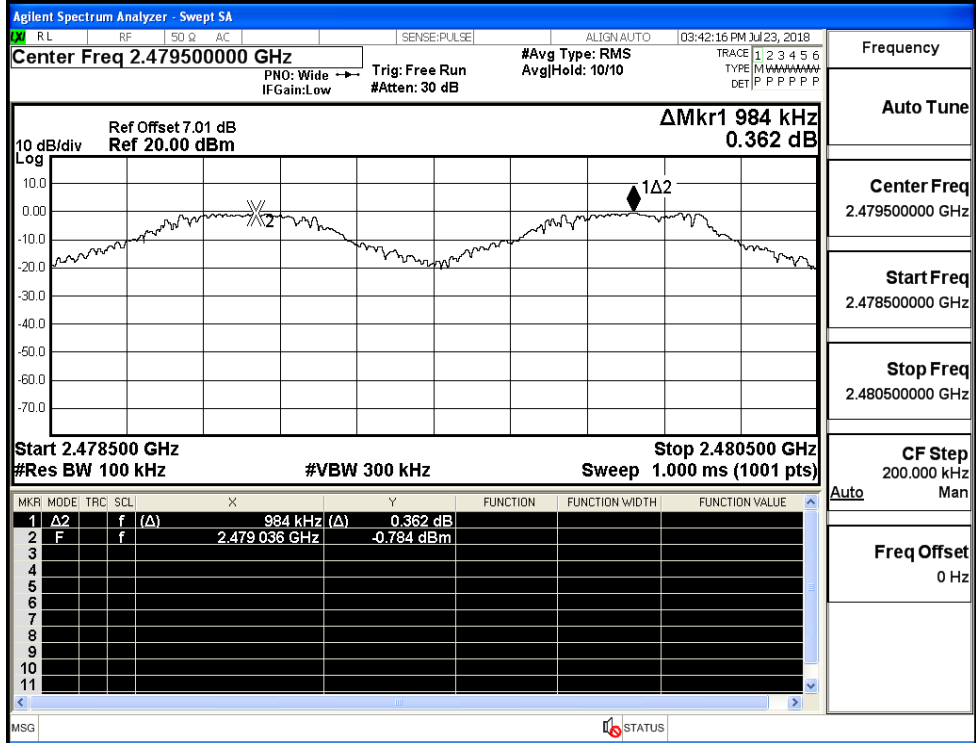


GFSK/MCH



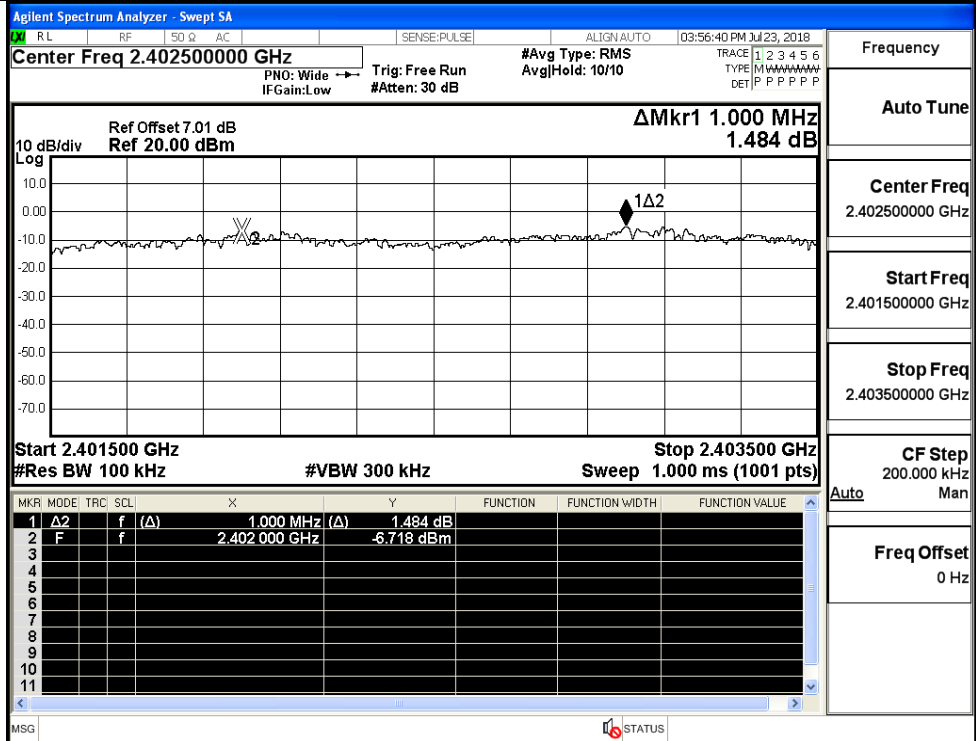
Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

GFSK/HCH

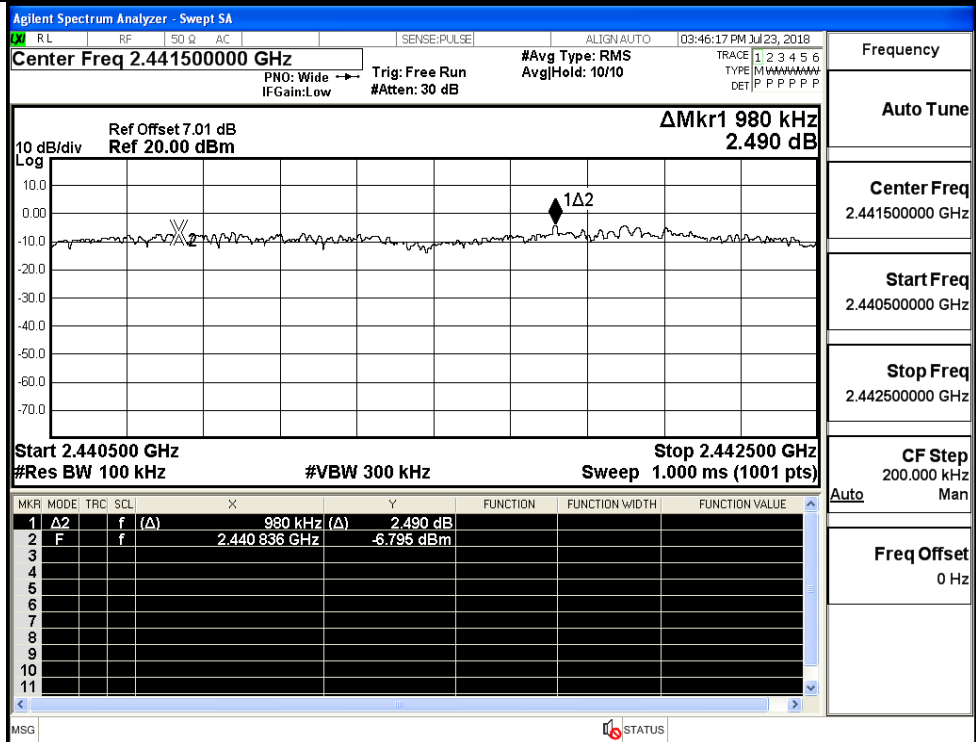


Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

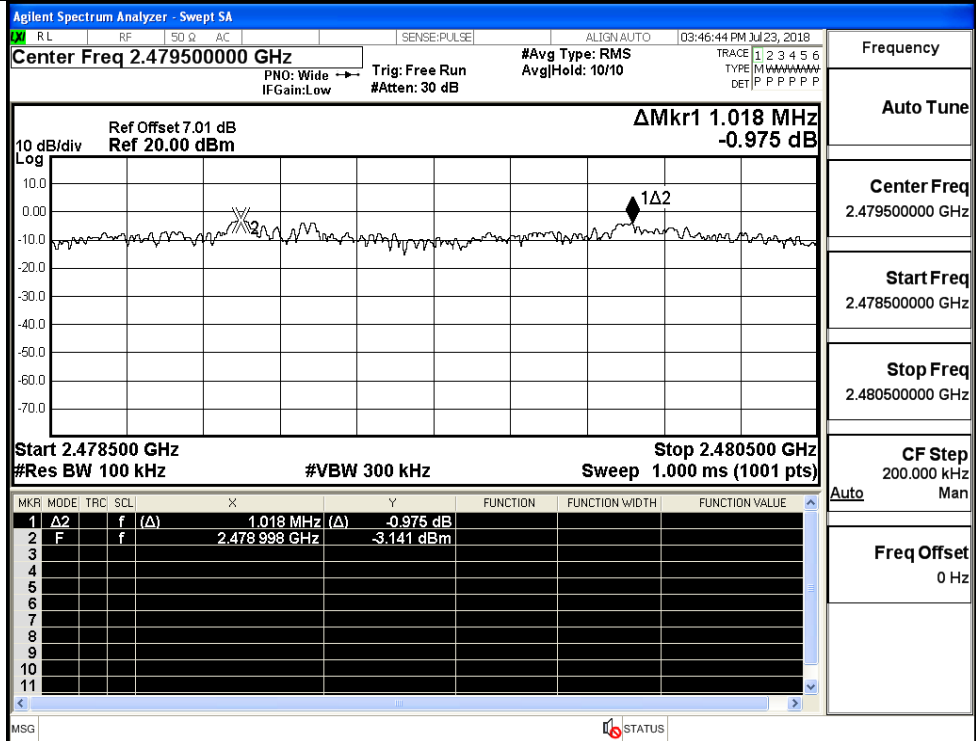
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH

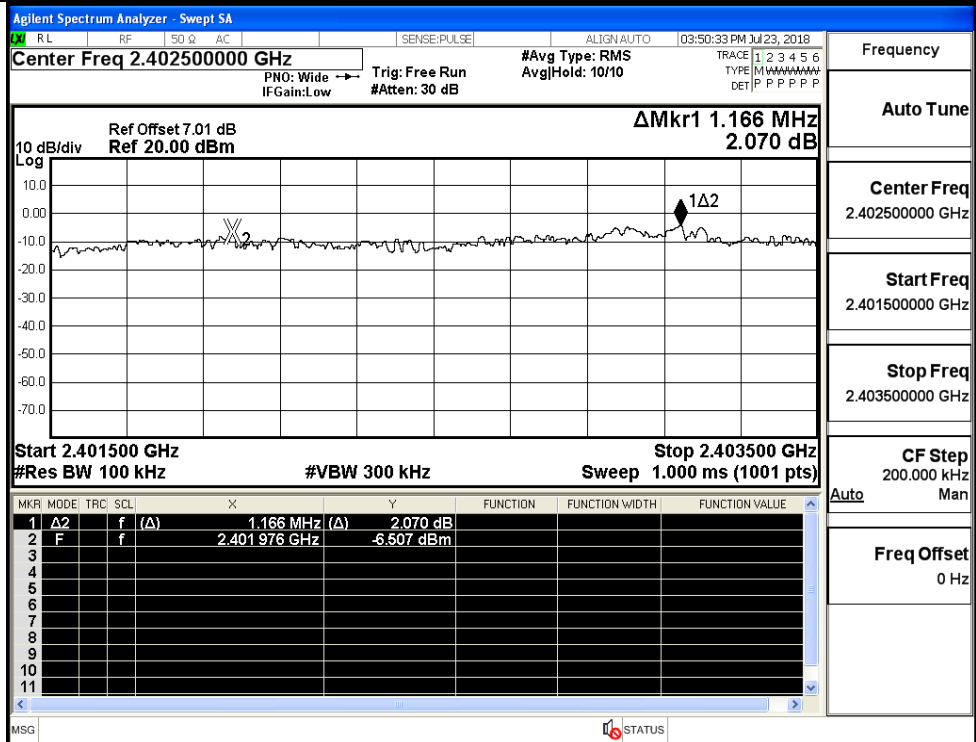


π/4DQPSK/HCH



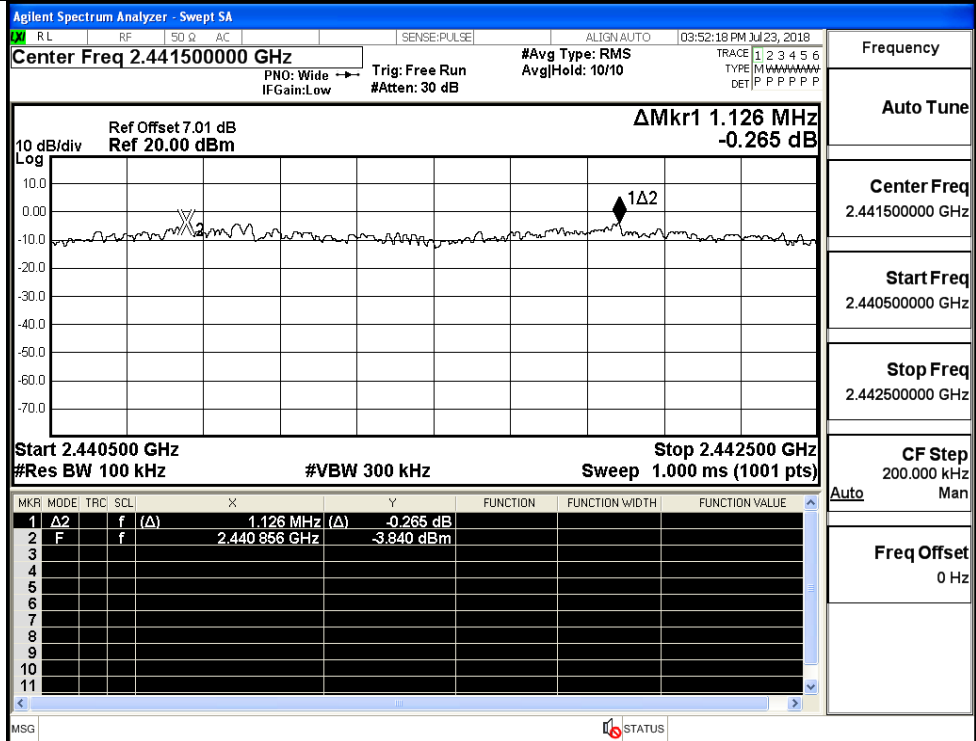
Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

8DPSK/LCH



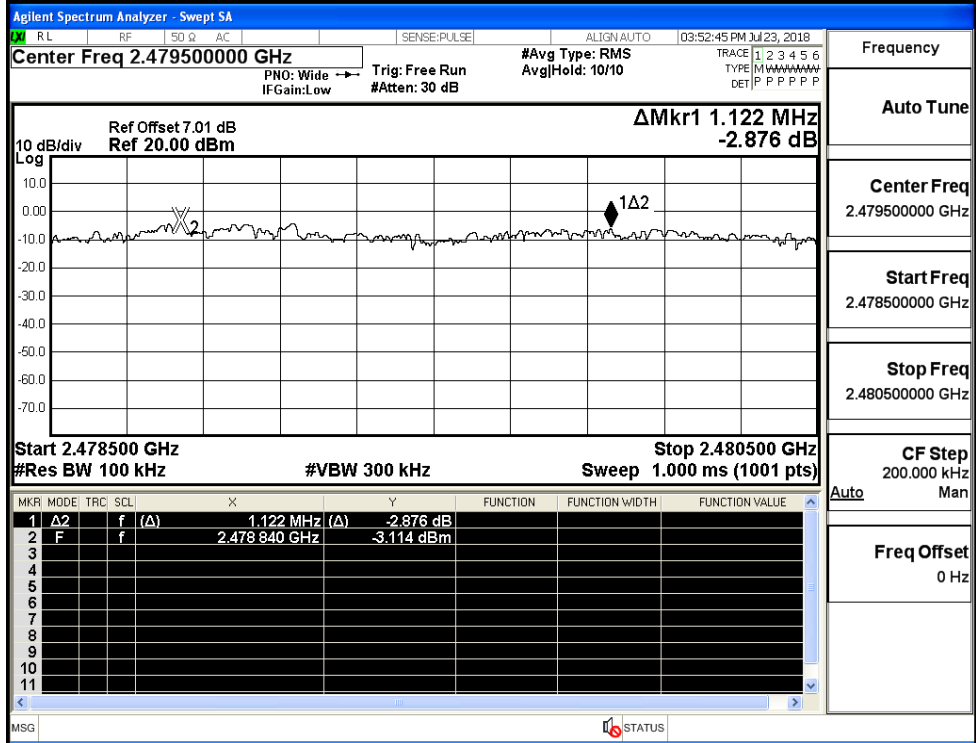
Frequency
Auto Tune
Center Freq
2.402500000 GHz
Start Freq
2.401500000 GHz
Stop Freq
2.403500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

8DPSK/MCH



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

8DPSK/HCH



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

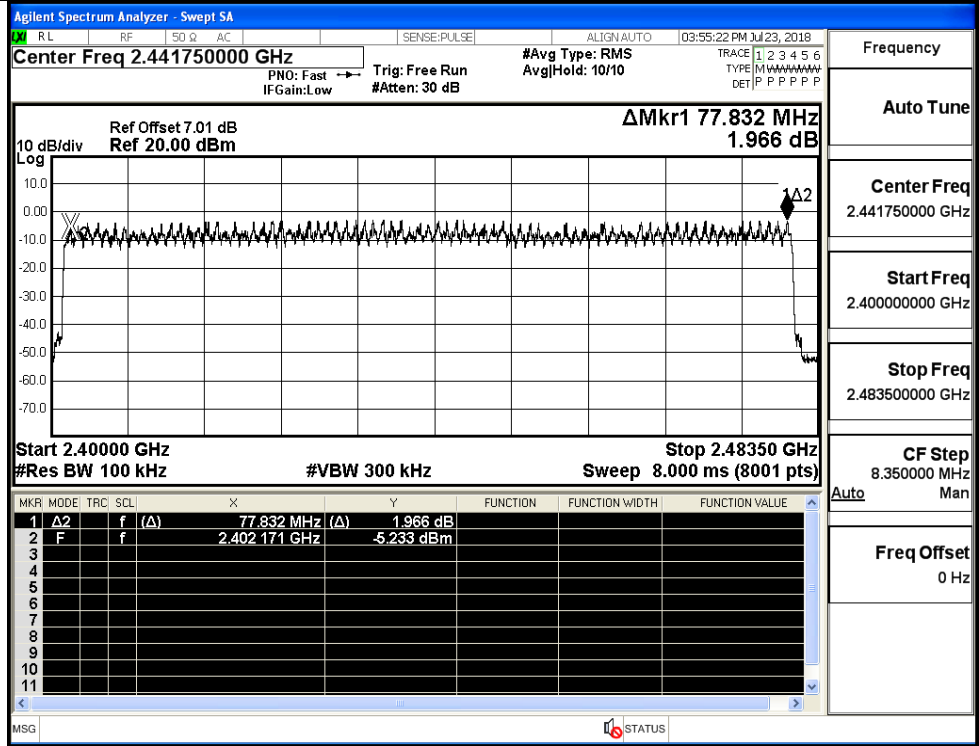
A.4 Hopping Channel Number

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

Test Graphs

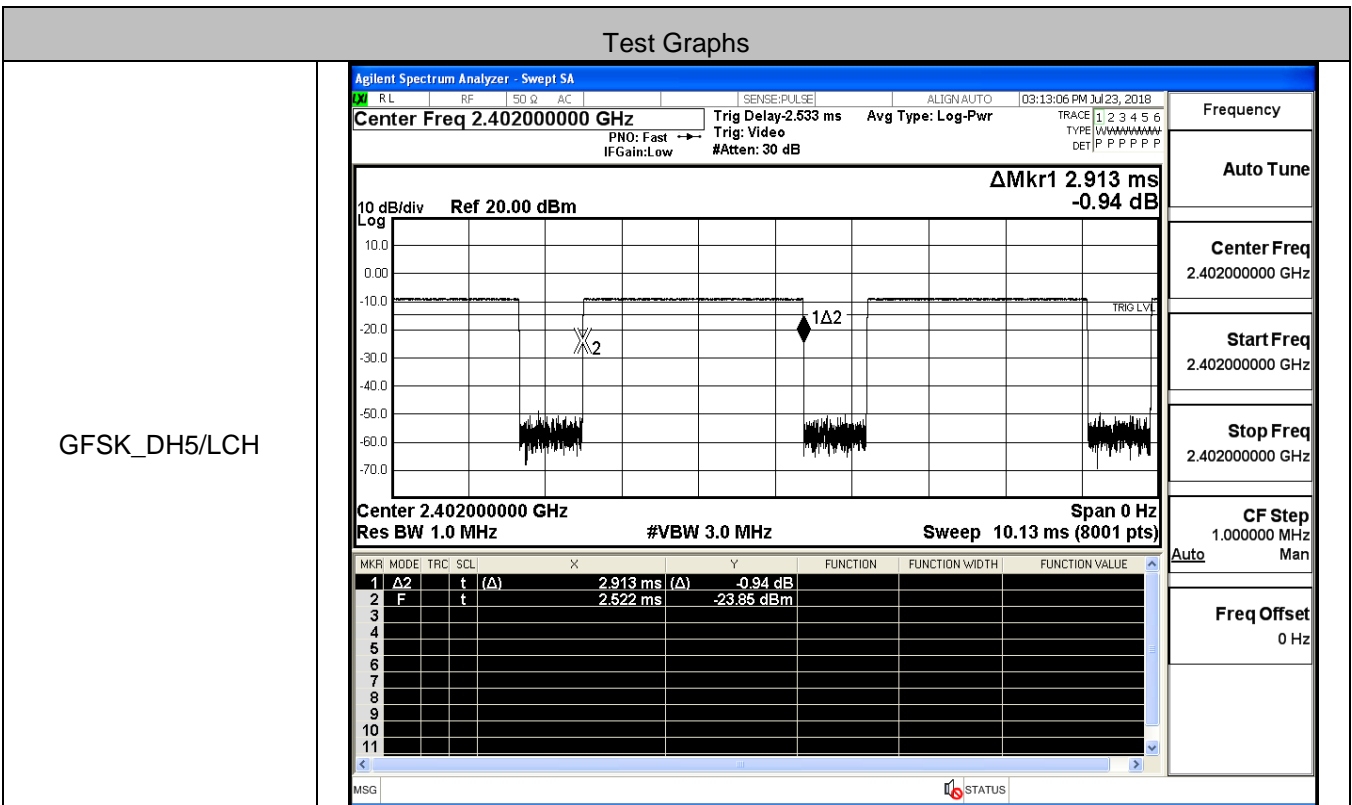
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 7.01 dB Ref 20.00 dBm ΔMkr1 77.979 MHz 2.337 dB Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <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>Δ2</td> <td>f</td> <td>(Δ)</td> <td>77.979 MHz</td> <td>(Δ)</td> <td>2.337 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402077 GHz</td> <td></td> <td>-2.800 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)	2.337 dB			2	F	f		2.402077 GHz		-2.800 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	Δ 2	f	(Δ)	77.979 MHz	(Δ)	2.337 dB																							
2	F	f		2.402077 GHz		-2.800 dBm																							
$\pi/4$ DQPSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 7.01 dB Ref 20.00 dBm ΔMkr1 78.041 MHz 3.404 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>Δ2</td> <td>f</td> <td>(Δ)</td> <td>78.041 MHz</td> <td>(Δ)</td> <td>3.404 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402025 GHz</td> <td></td> <td>-3.166 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)	78.041 MHz	(Δ)	3.404 dB			2	F	f		2.402025 GHz		-3.166 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	Δ 2	f	(Δ)	78.041 MHz	(Δ)	3.404 dB																							
2	F	f		2.402025 GHz		-3.166 dBm																							

8DPSK/Hop

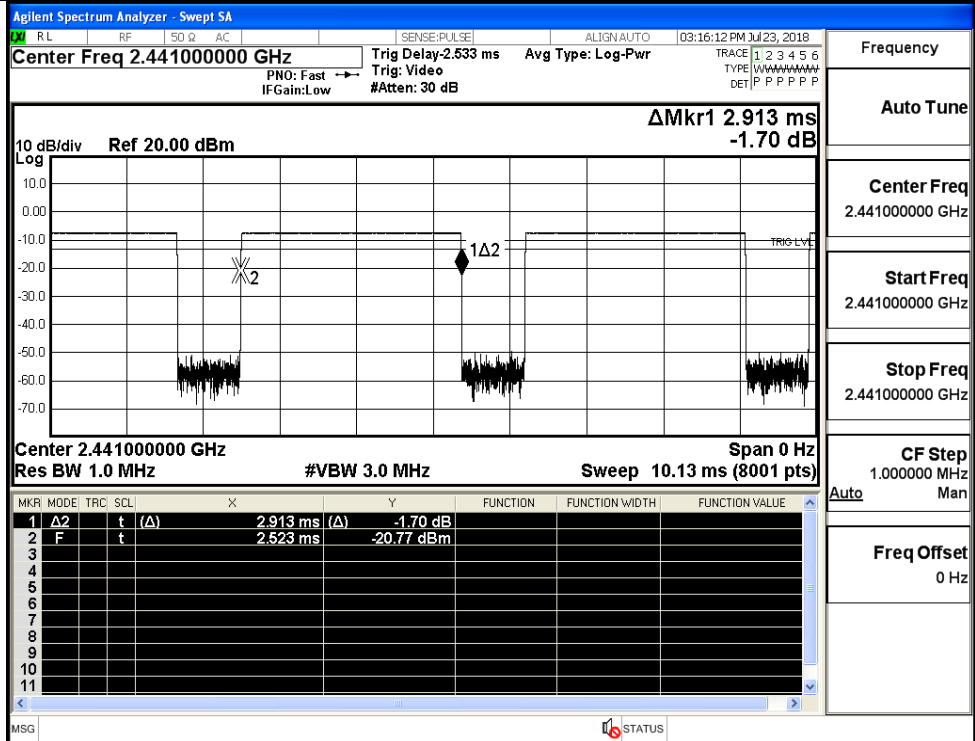


A.5 Dwell Time

Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.91	106.7	0.31	0.4	PASS
	DH5	MCH	2.91	106.7	0.31	0.4	PASS
	DH5	HCH	2.91	106.7	0.31	0.4	PASS
π/4DQPSK	2DH5	LCH	2.91	106.7	0.312	0.4	PASS
	2DH5	MCH	2.91	106.7	0.312	0.4	PASS
	2DH5	HCH	2.91	106.7	0.312	0.4	PASS
8DPSK	3DH5	LCH	2.91	106.7	0.312	0.4	PASS
	3DH5	MCH	2.91	106.7	0.312	0.4	PASS
	3DH5	HCH	2.91	106.7	0.312	0.4	PASS

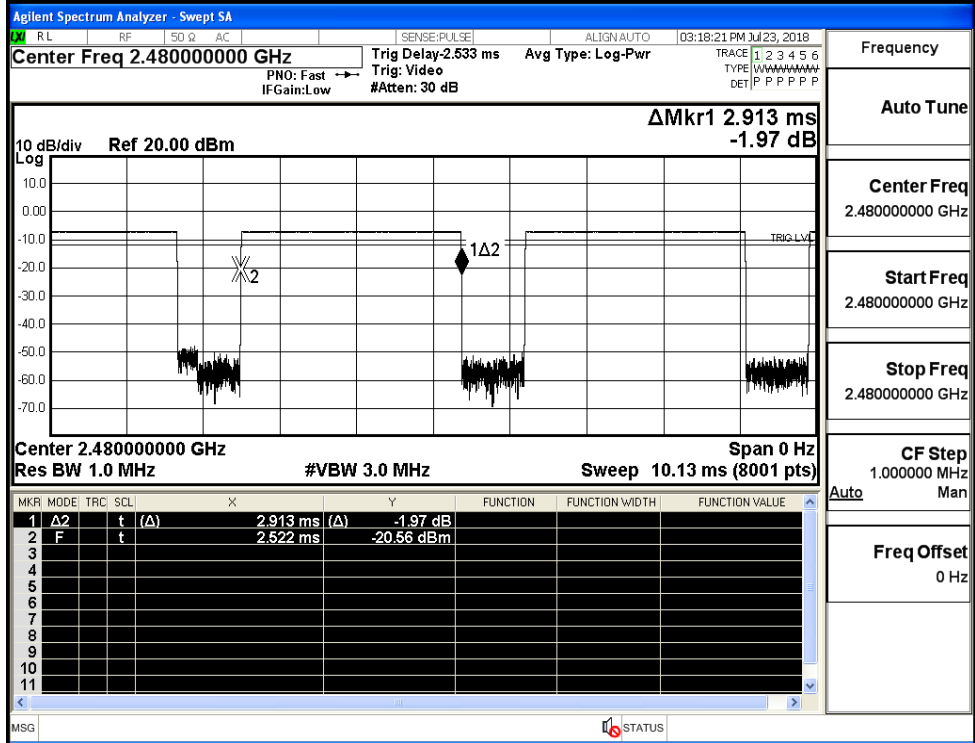


GFSK_DH5/MCH



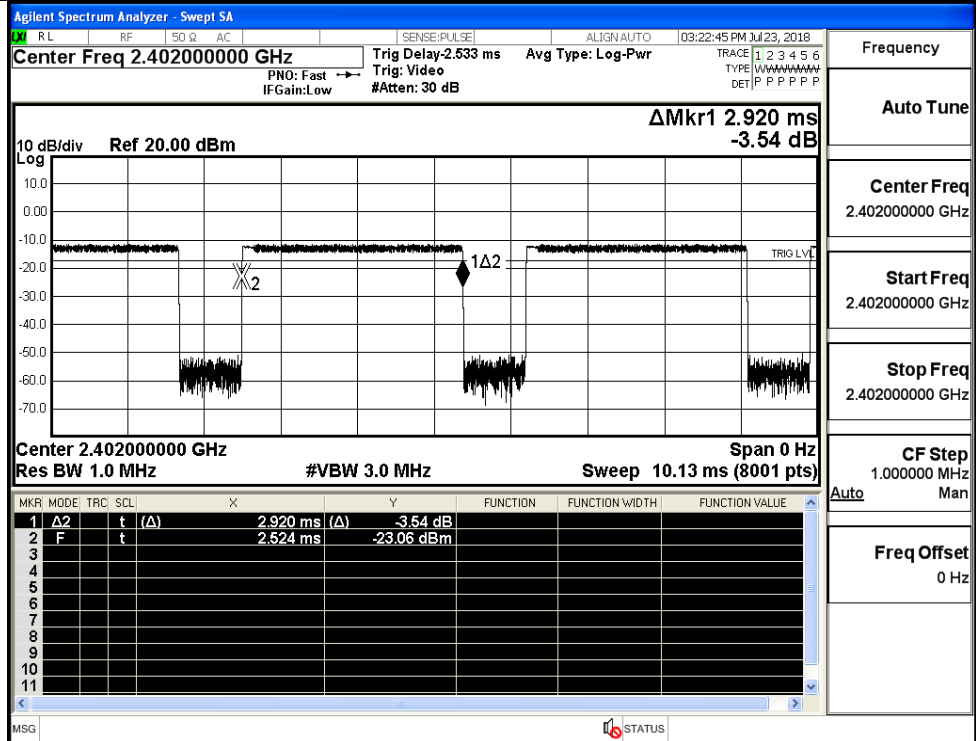
Frequency	
Auto Tune	
Center Freq	2.441000000 GHz
Start Freq	2.441000000 GHz
Stop Freq	2.441000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

GFSK_DH5/HCH

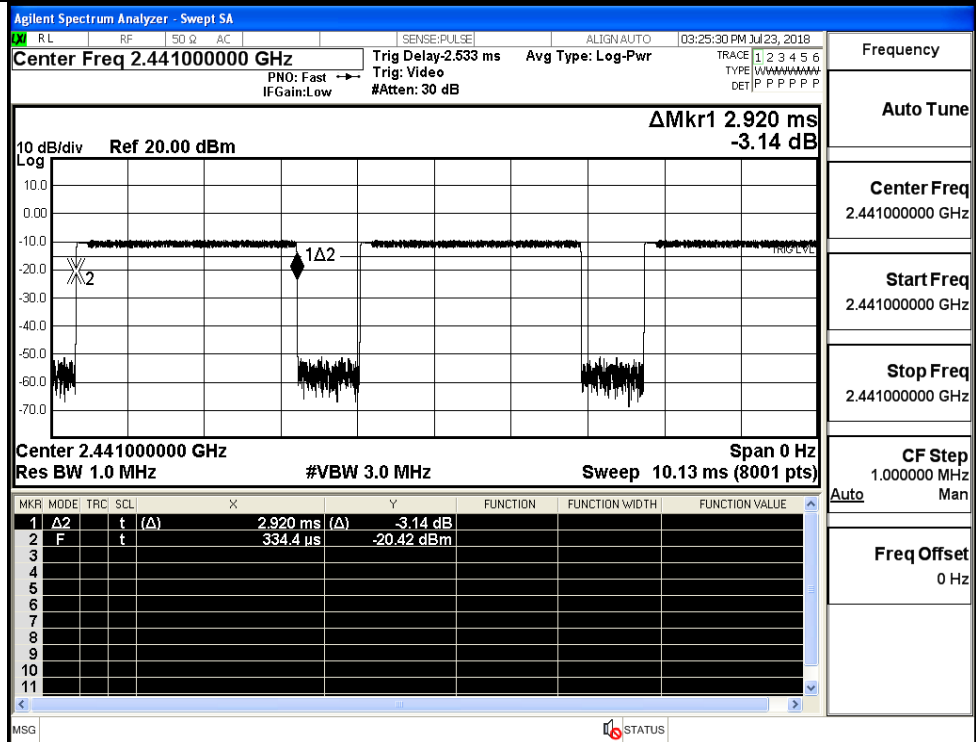


Frequency	
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

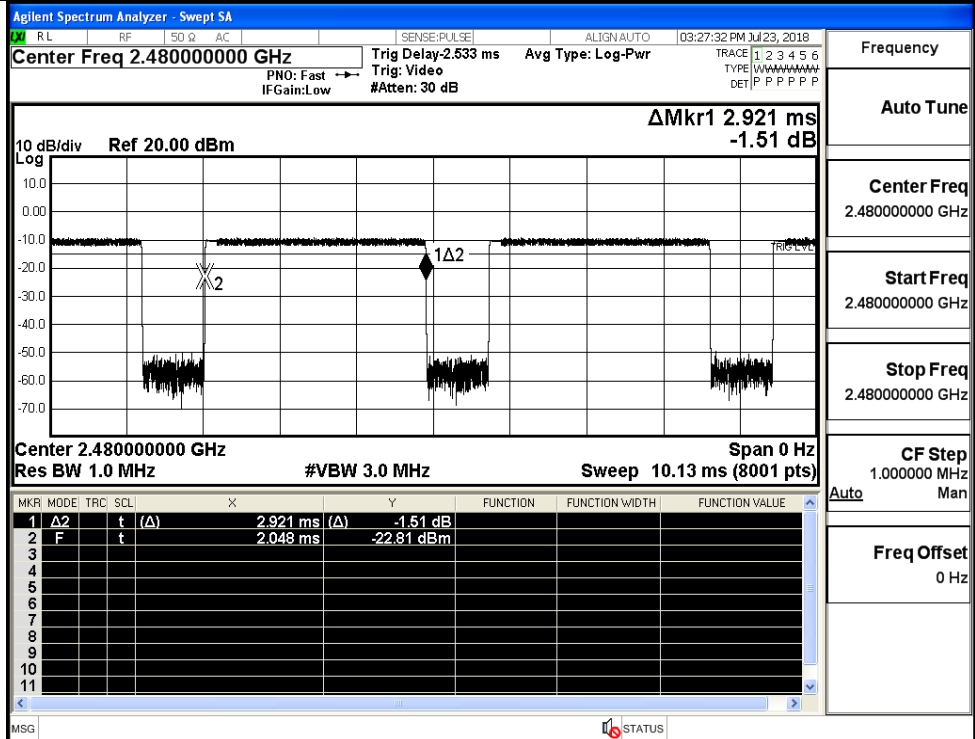
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



$\pi/4$ DQPSK
_2DH5/HCH



Frequency

Auto Tune

Center Freq
2.480000000 GHz

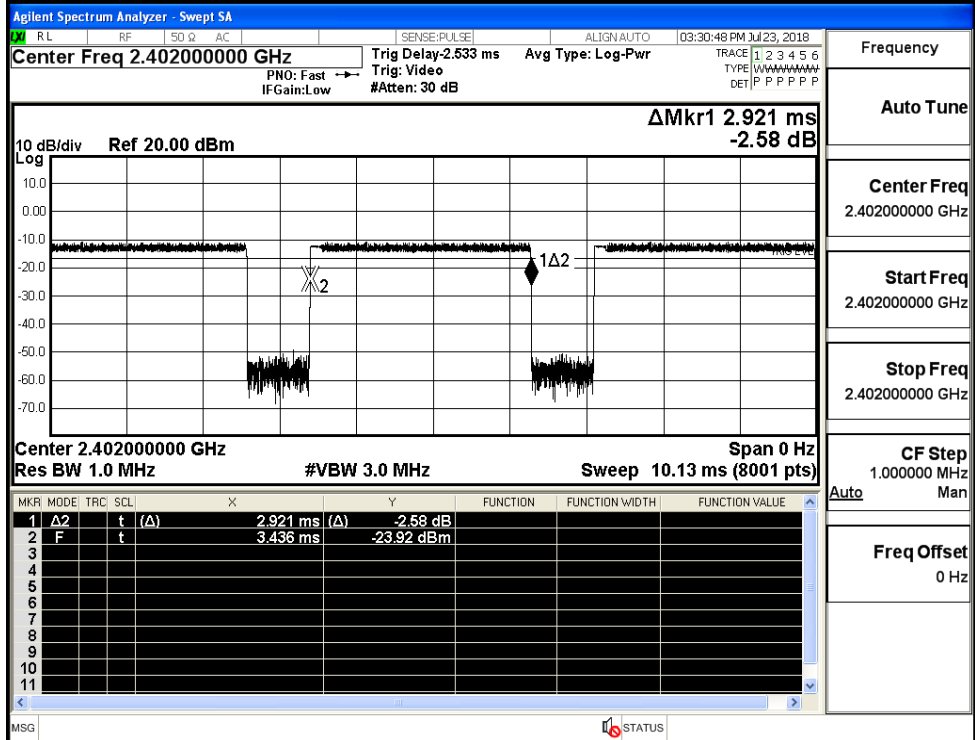
Start Freq
2.480000000 GHz

Stop Freq
2.480000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK_3DH5/LCH



Frequency

Auto Tune

Center Freq
2.402000000 GHz

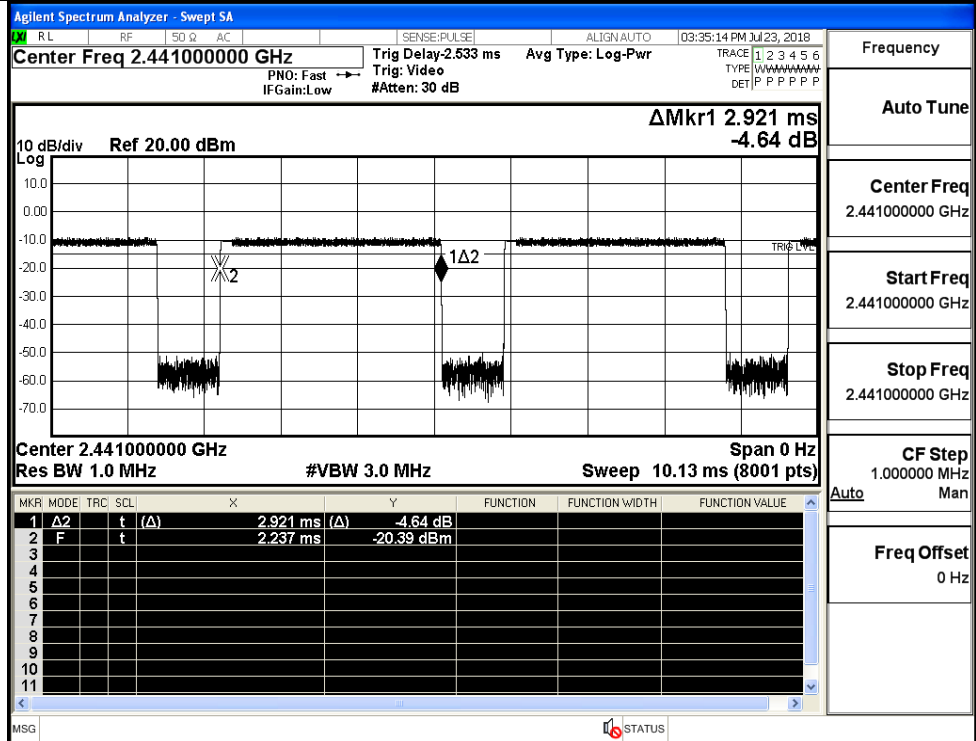
Start Freq
2.402000000 GHz

Stop Freq
2.402000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

8DPSK_3DH5/MCH



Frequency

Auto Tune

Center Freq 2.441000000 GHz

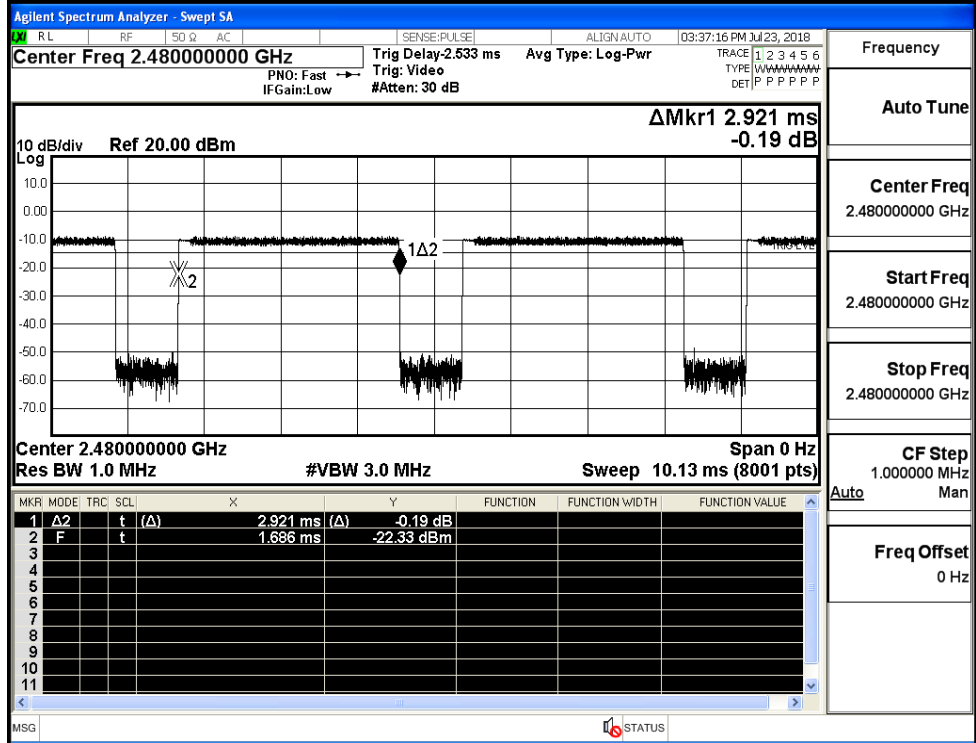
Start Freq 2.441000000 GHz

Stop Freq 2.441000000 GHz

CF Step 1.000000 MHz Auto Man

Freq Offset 0 Hz

8DPSK_3DH5/HCH



Frequency

Auto Tune

Center Freq 2.480000000 GHz

Start Freq 2.480000000 GHz

Stop Freq 2.480000000 GHz

CF Step 1.000000 MHz Auto Man

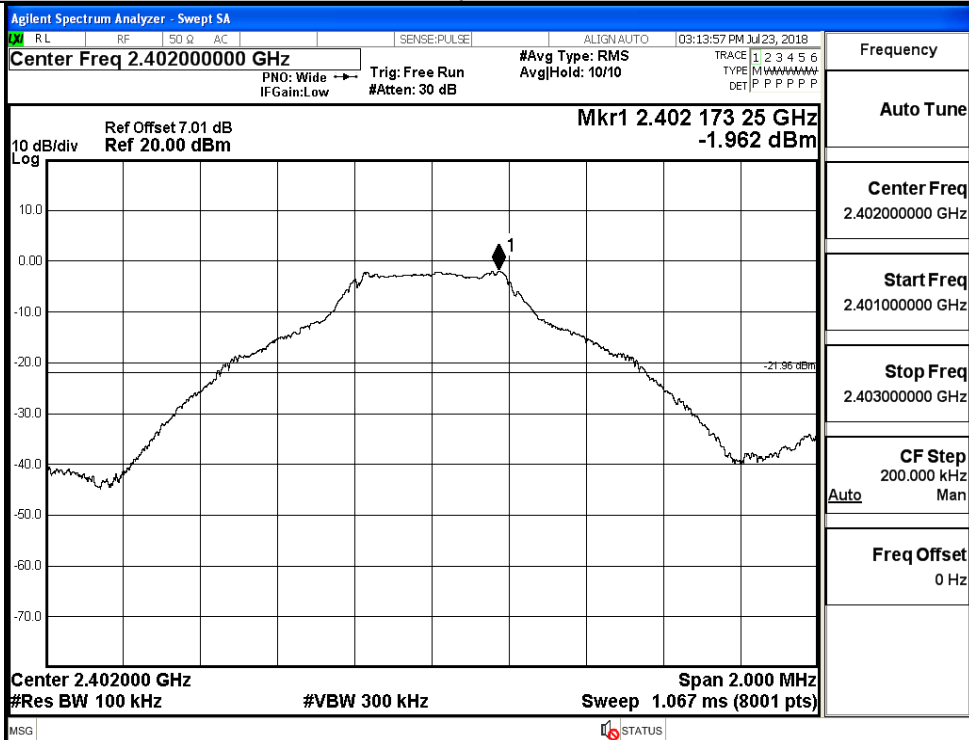
Freq Offset 0 Hz

A.6 RF Conducted Spurious Emissions

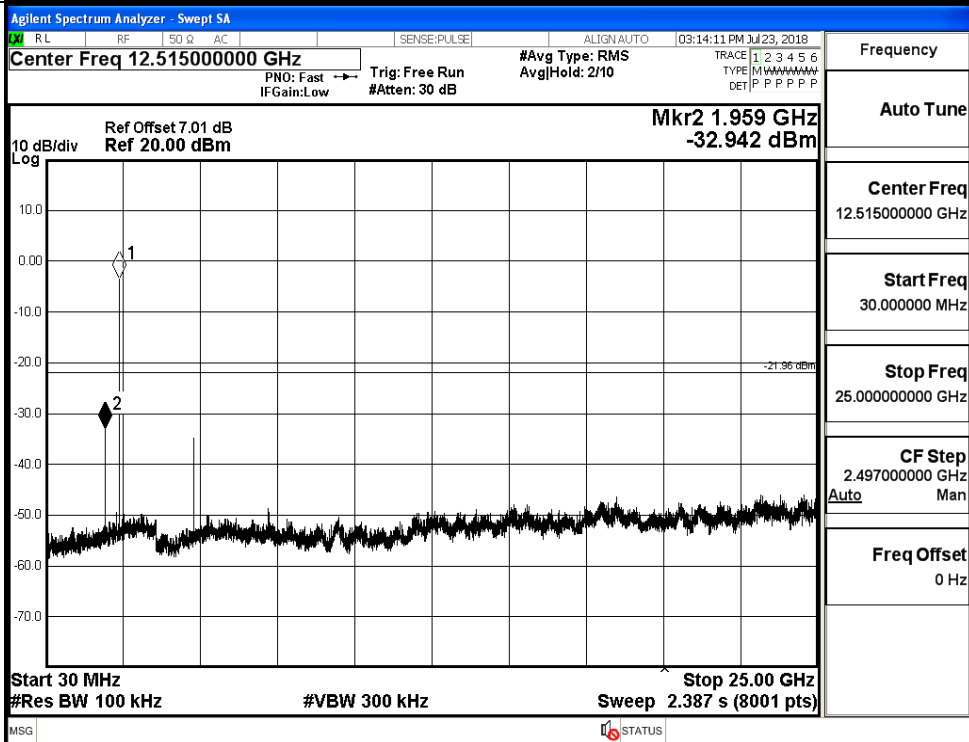
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.962	-32.942	-21.962	PASS
	MCH	-0.463	-36.024	-20.463	PASS
	HCH	-0.036	-32.880	-20.036	PASS
$\pi/4$ DQPSK	LCH	-5.408	-42.548	-25.408	PASS
	MCH	-3.218	-36.822	-23.218	PASS
	HCH	-3.802	-42.402	-23.802	PASS
8DPSK	LCH	-5.208	-43.110	-25.208	PASS
	MCH	-3.149	-39.773	-23.149	PASS
	HCH	-2.968	-43.589	-22.968	PASS

GFSK_LCH_Graphs

Pref

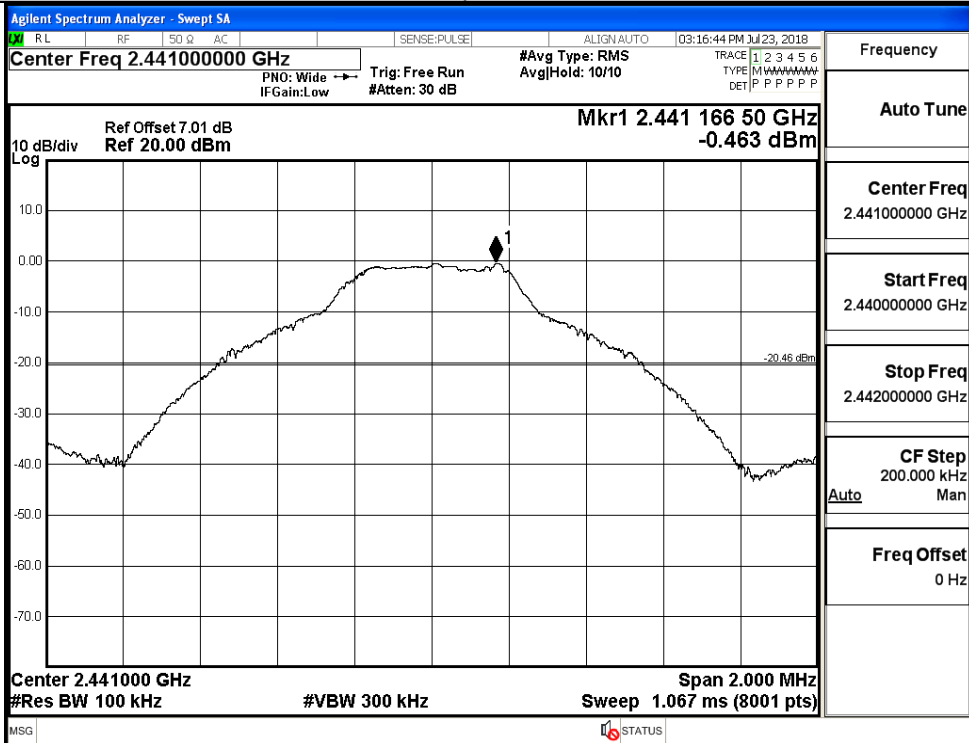


Puw

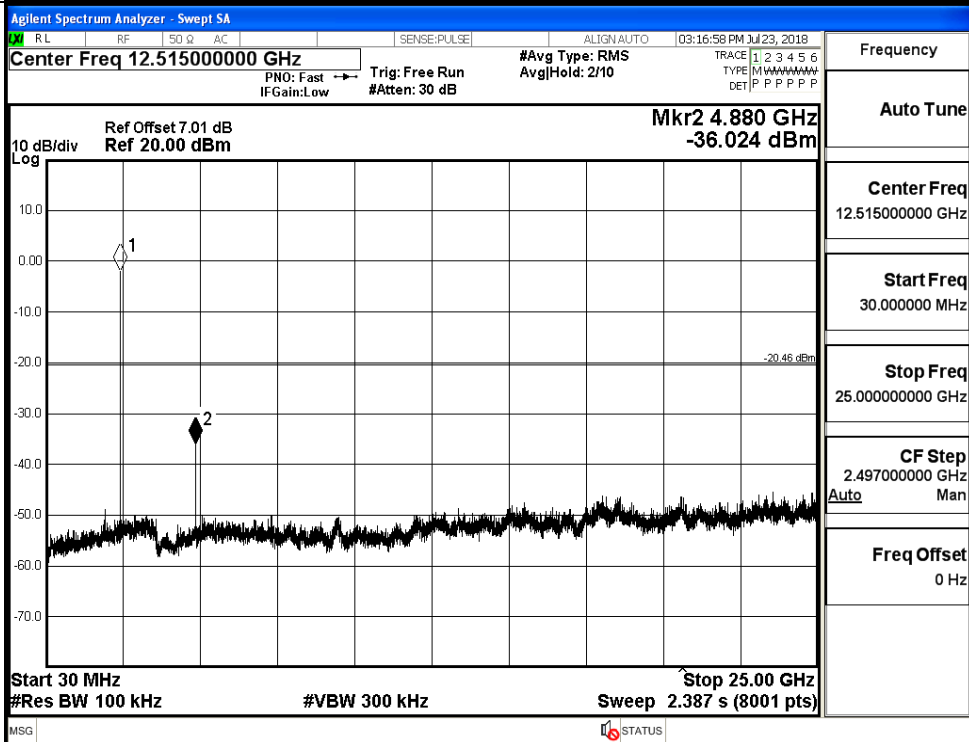


GFSK_MCH_Graphs

Pref

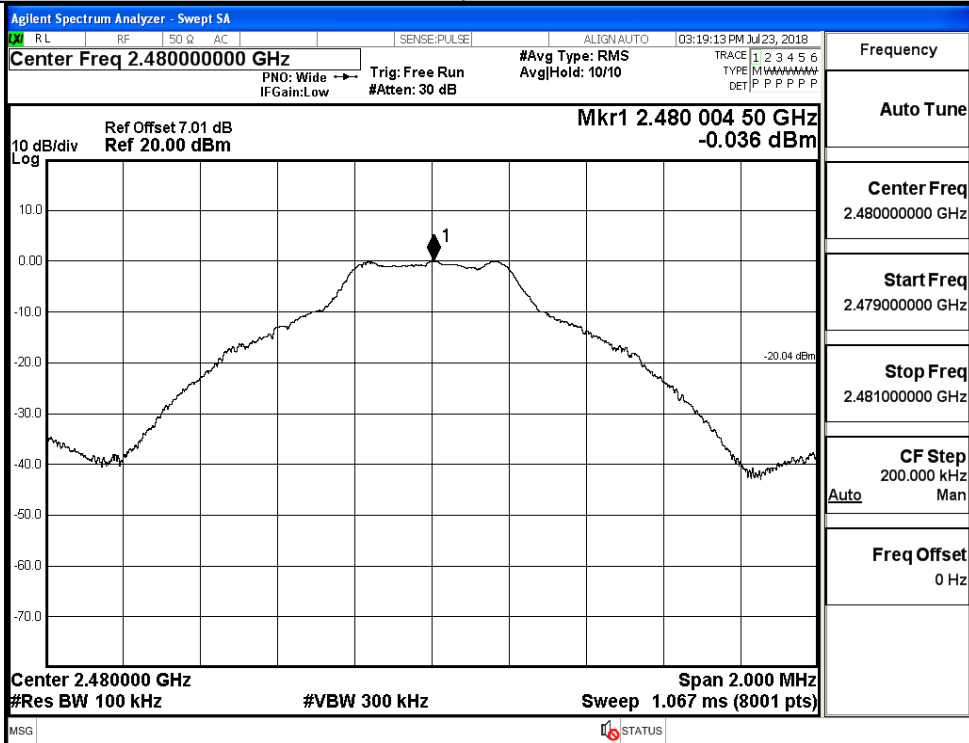


Puw

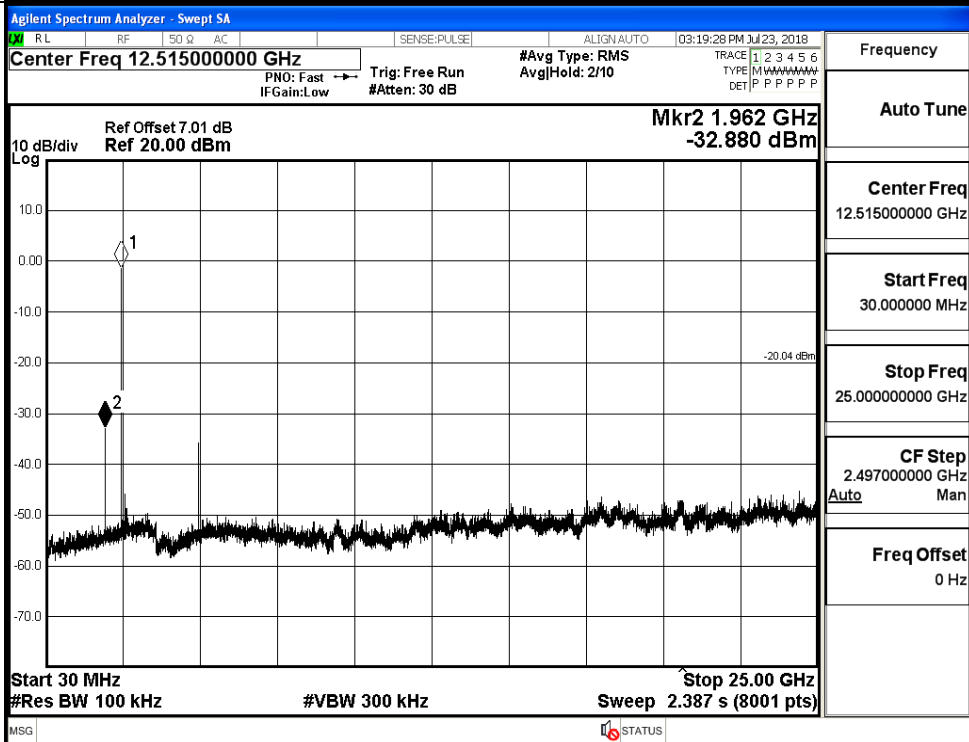


GFSK_HCH_Graphs

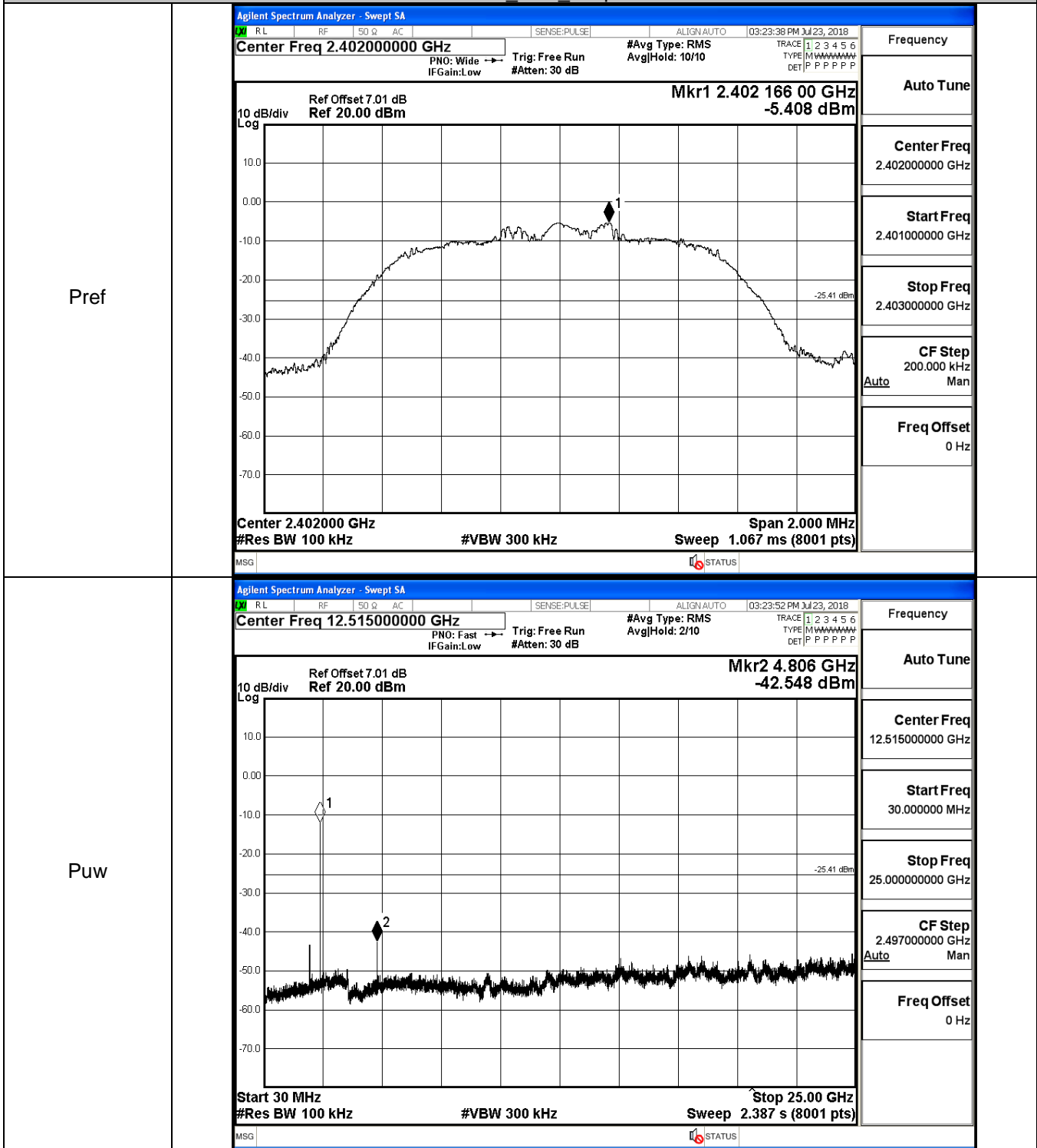
Pref



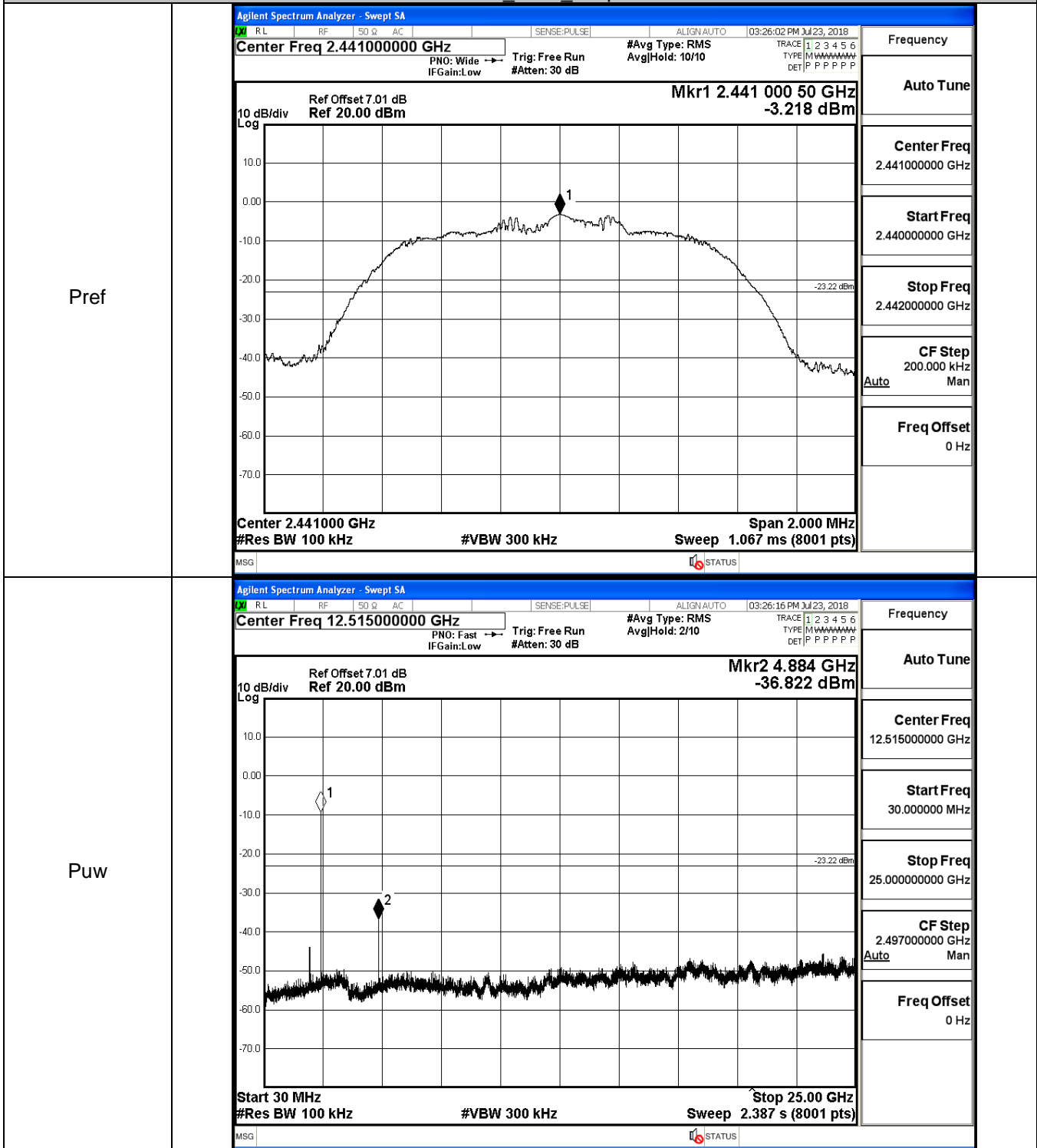
Puw



$\pi/4$ DQPSK LCH_Graphs

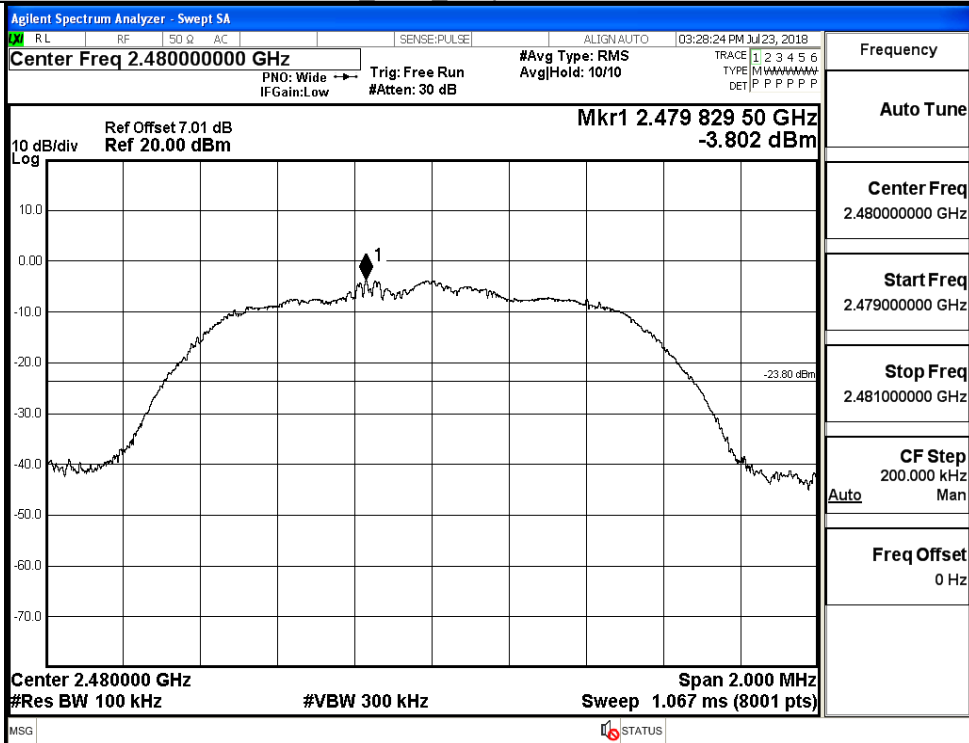


$\pi/4$ DQPSK_MCH_Graphs

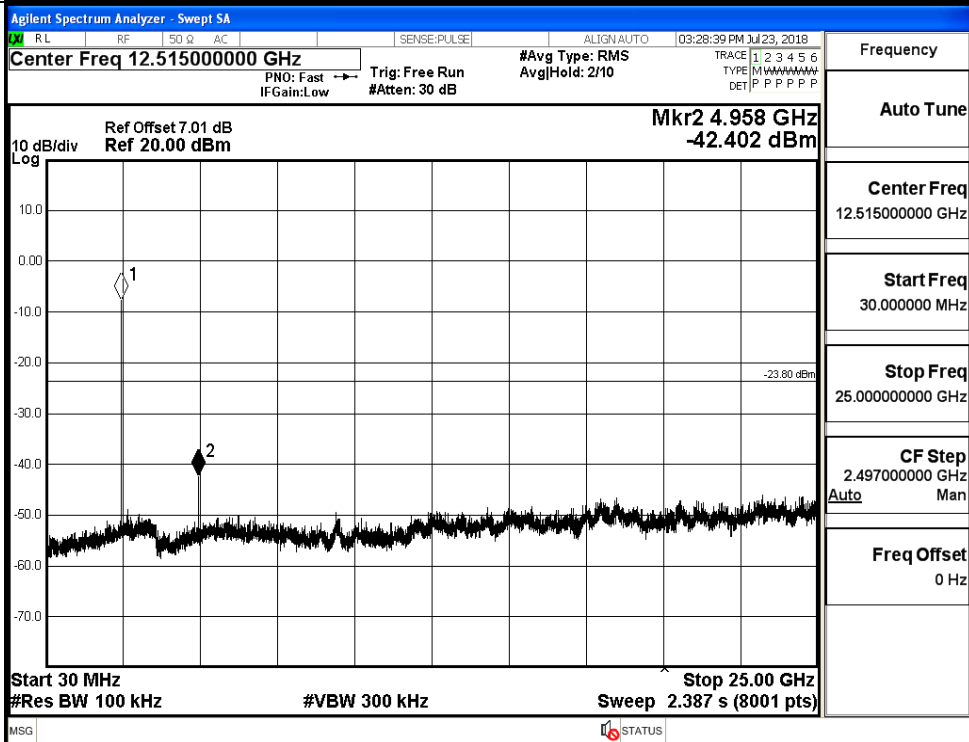


$\pi/4$ DQPSK_HCH_Graphs

Pref

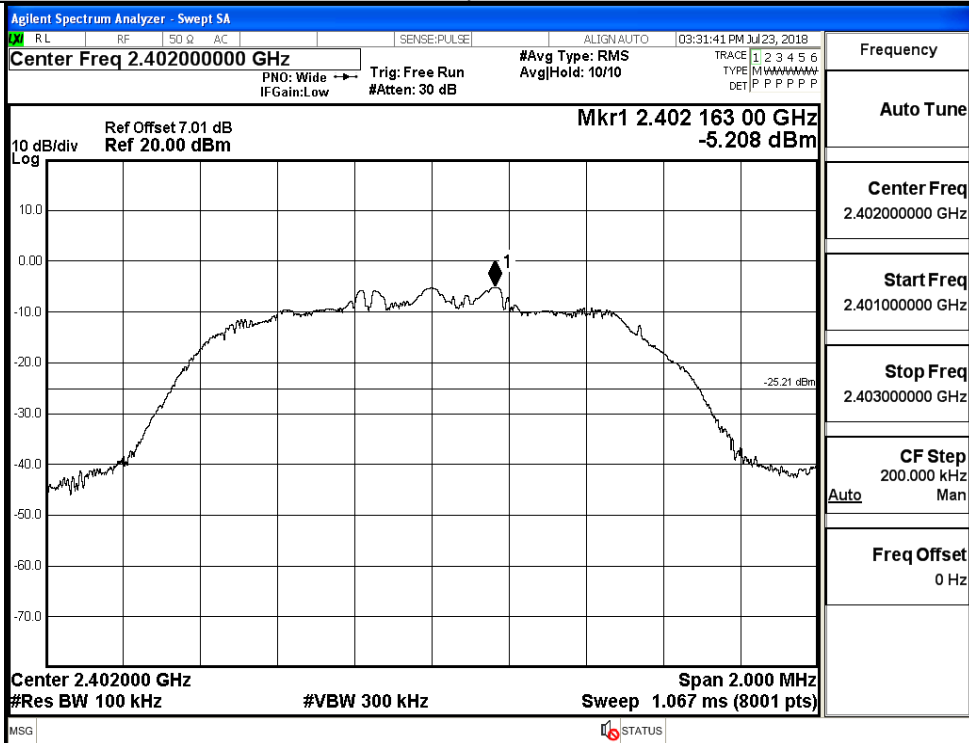


Puw

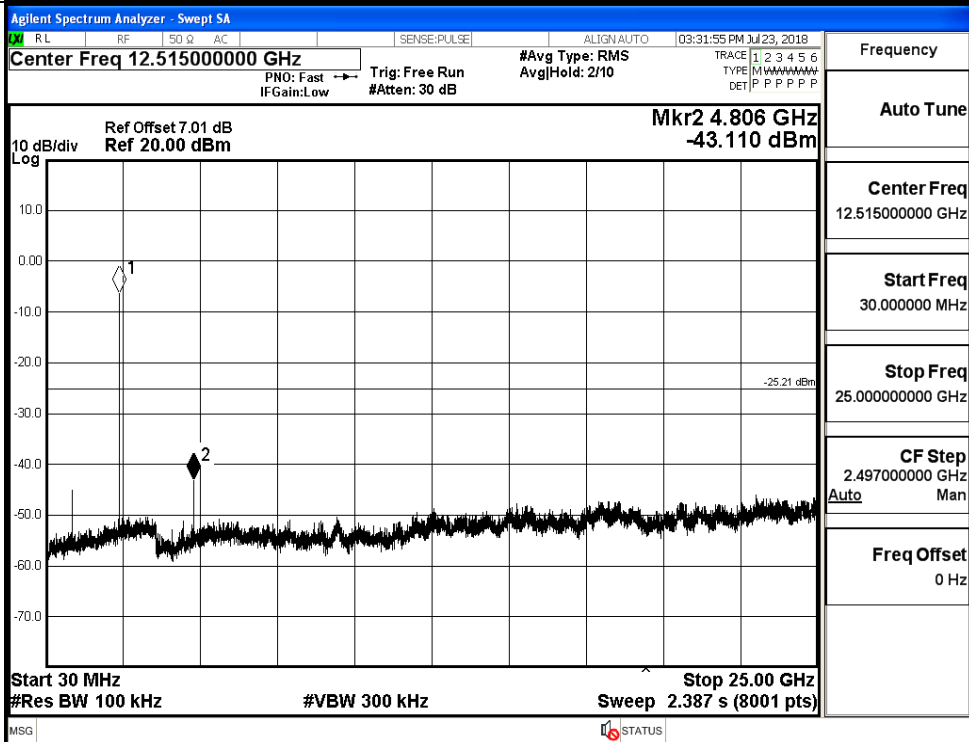


8DPSK_LCH_Graphs

Pref

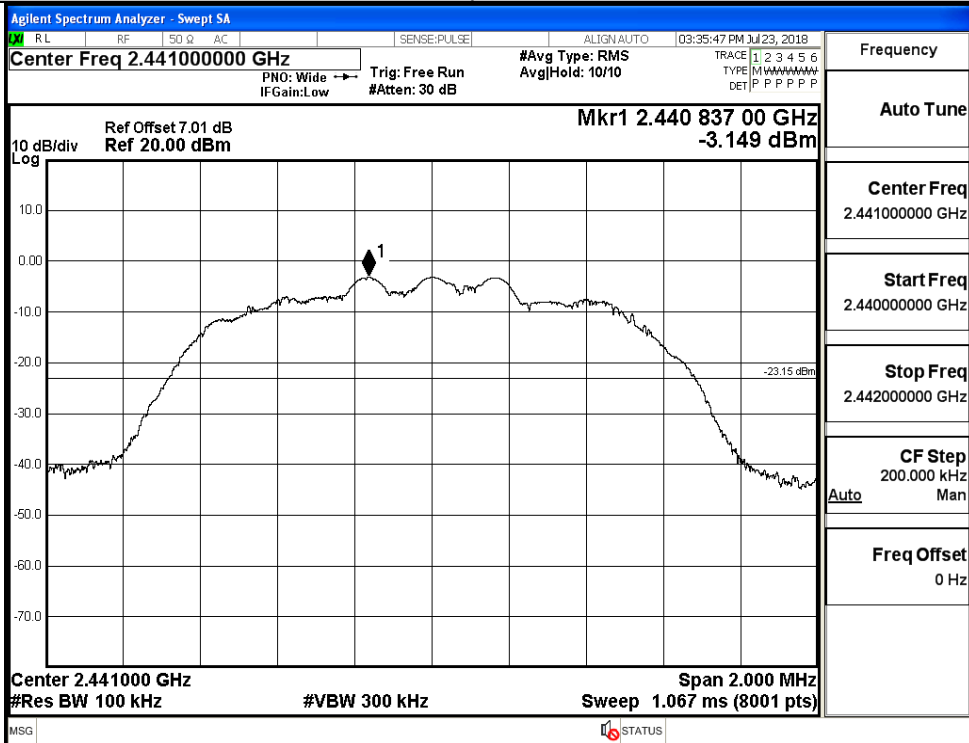


Puw

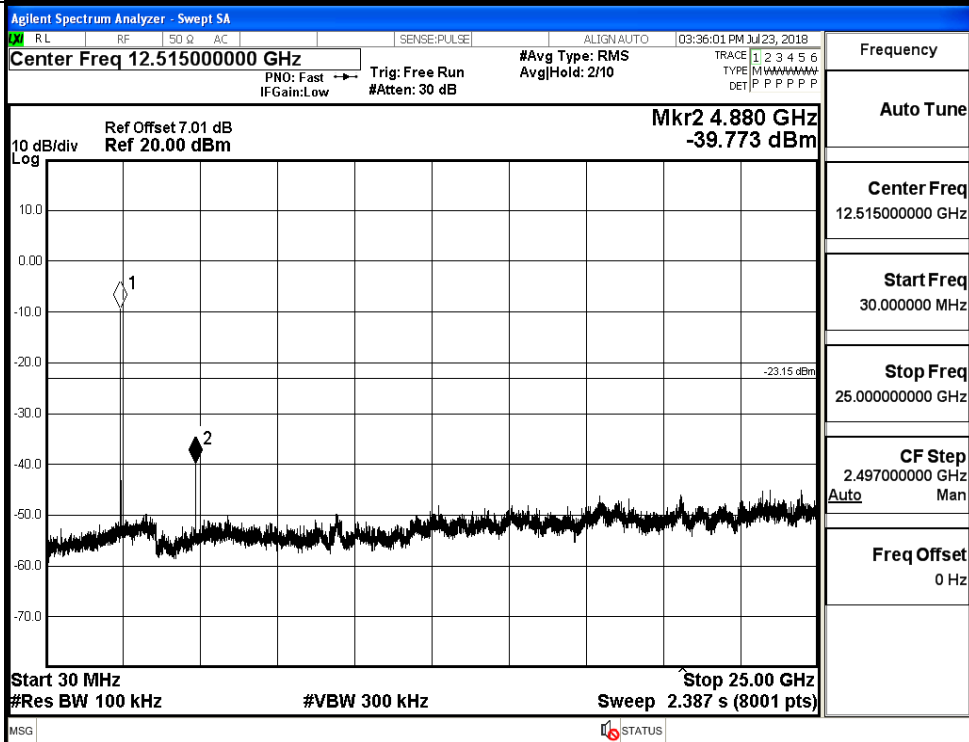


8DPSK_MCH_Graphs

Pref

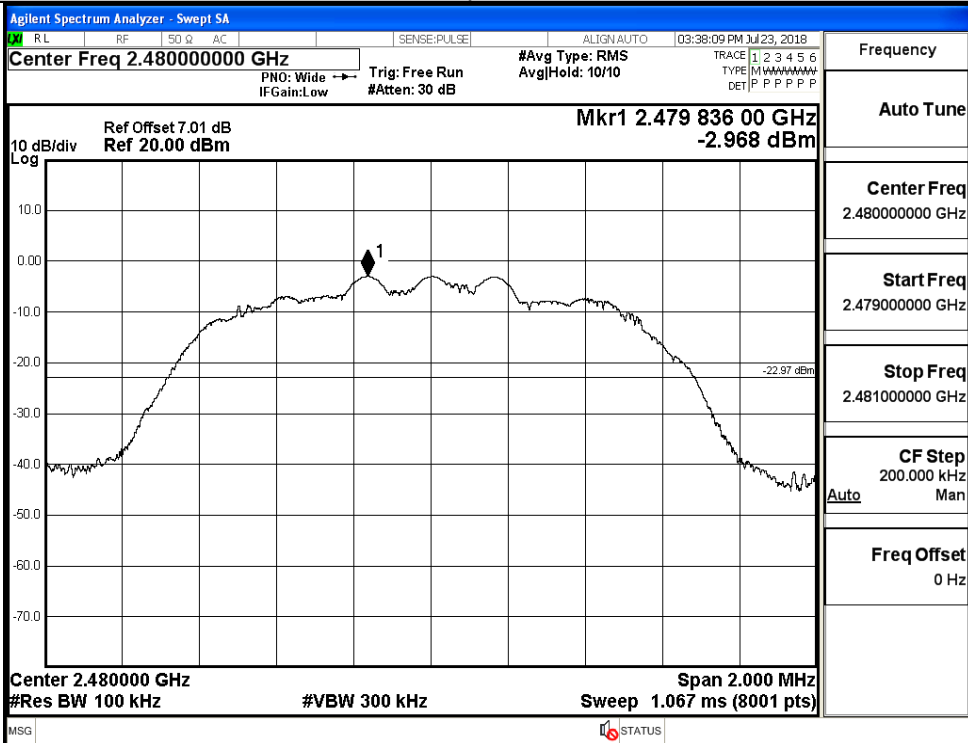


Puw

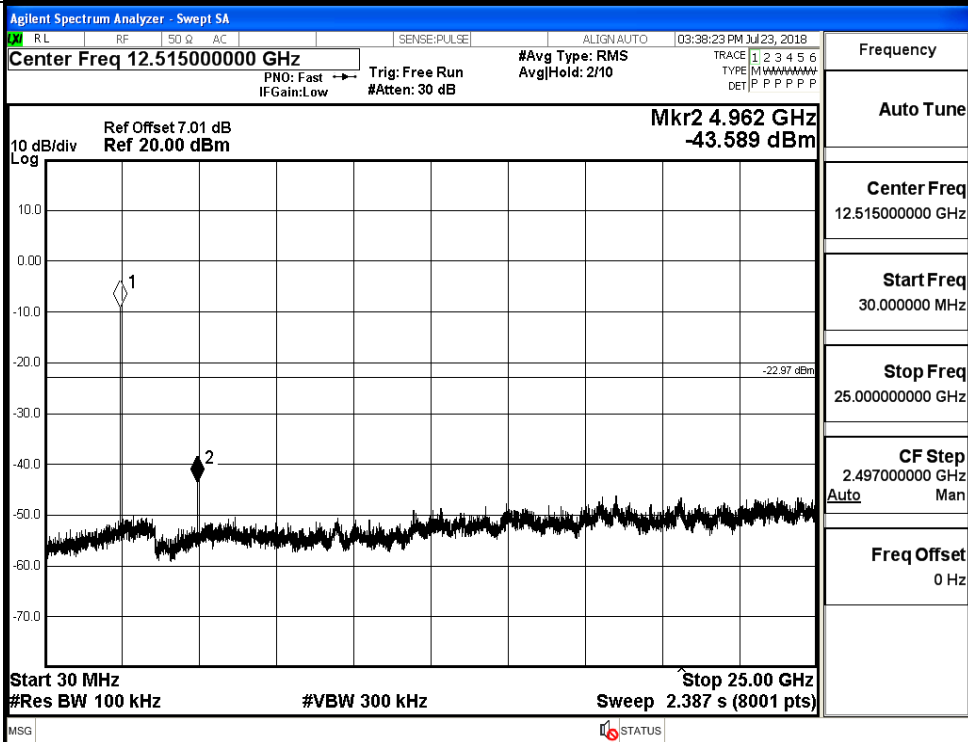


8DPSK_HCH_Graphs

Pref



Puw

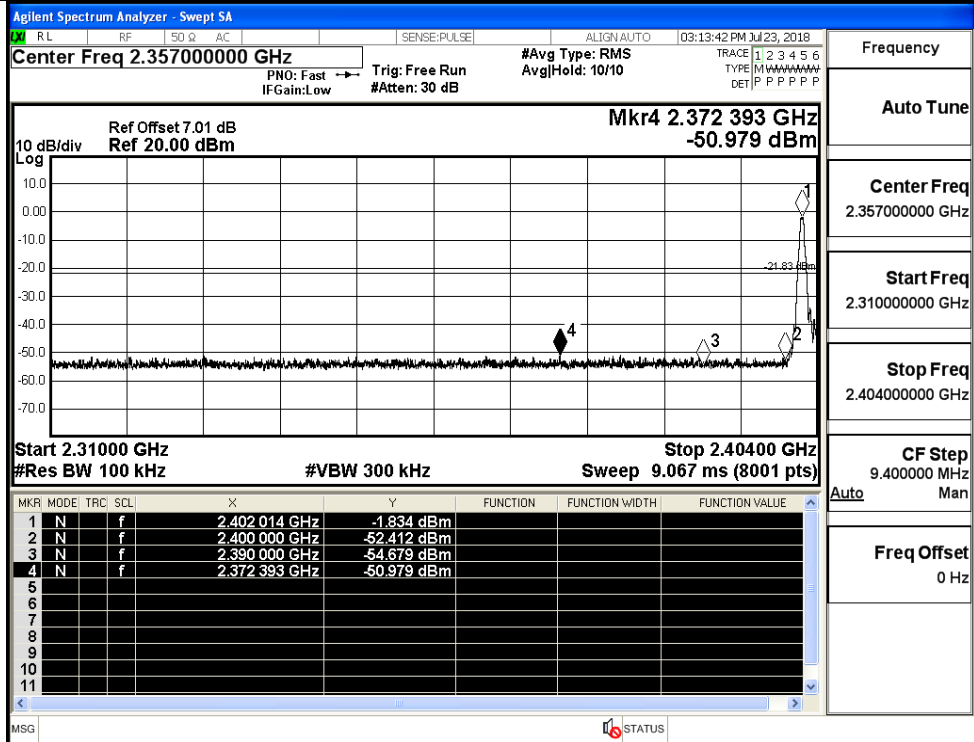


A.7 Band-edge for RF Conducted Emissions

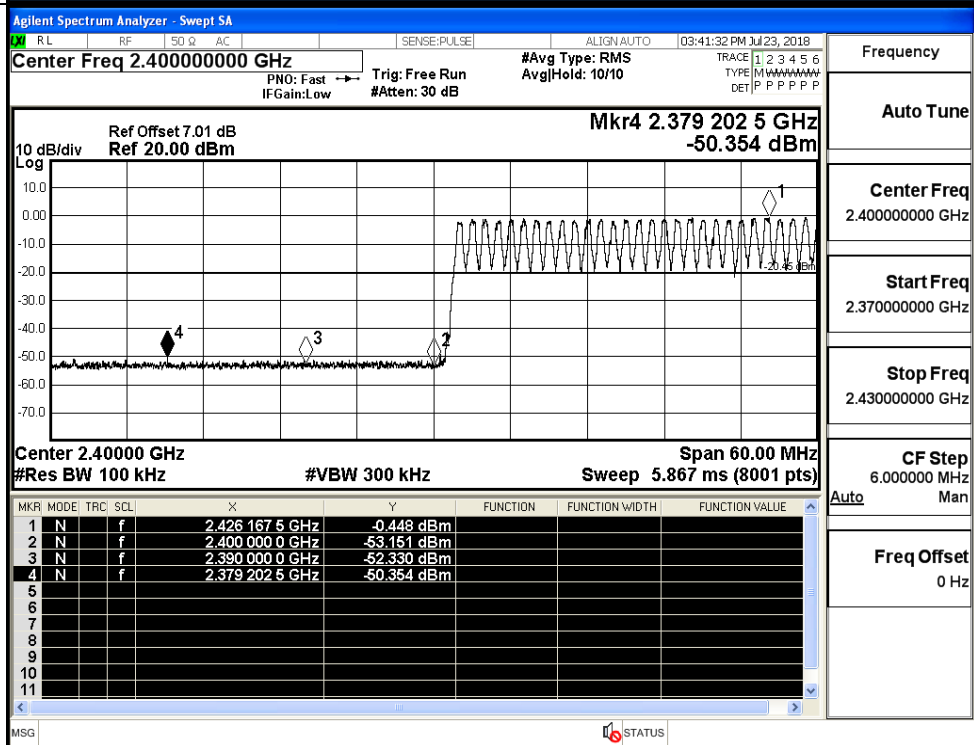
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.834	Off	-50.979	-21.83	PASS
			-0.448	On	-50.354	-20.45	PASS
	HCH	2480	0.033	Off	-51.022	-19.97	PASS
			-0.199	On	-49.223	-20.2	PASS
$\pi/4$ DQPSK	LCH	2402	-5.275	Off	-51.081	-25.28	PASS
			-3.332	On	-50.272	-23.33	PASS
	HCH	2480	-2.974	Off	-50.081	-22.97	PASS
			-3.030	On	-49.539	-23.03	PASS
8DPSK	LCH	2402	-5.152	Off	-50.007	-25.15	PASS
			-3.205	On	-50.341	-23.21	PASS
	HCH	2480	-2.926	Off	-50.162	-22.93	PASS
			-3.160	On	-50.356	-23.16	PASS

Test Graphs

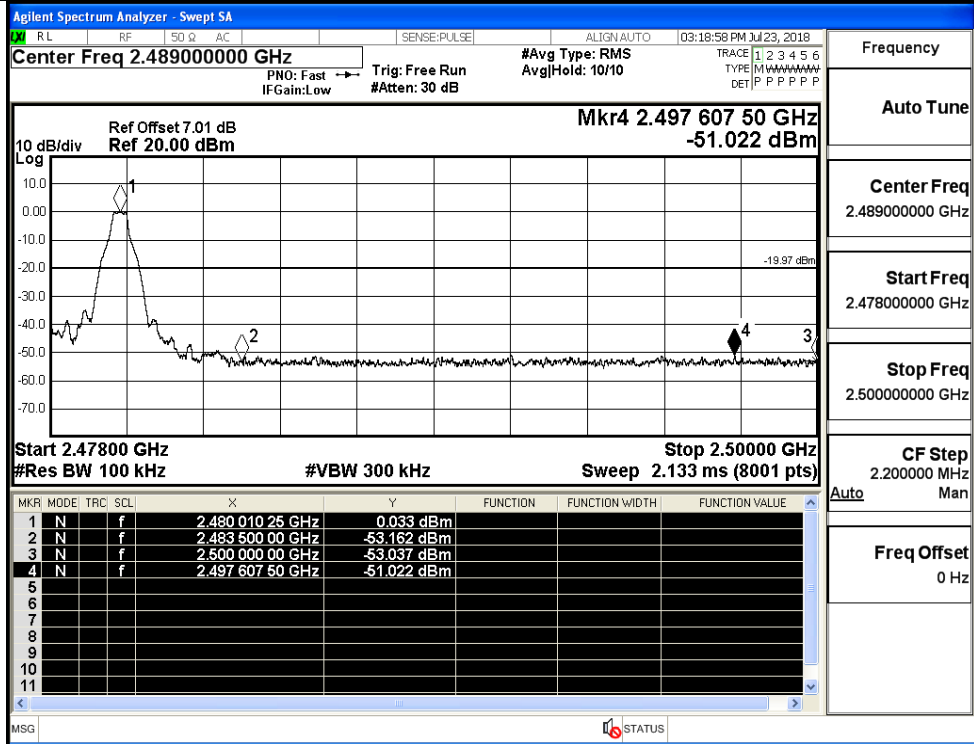
GFSK/LCH/No Hop



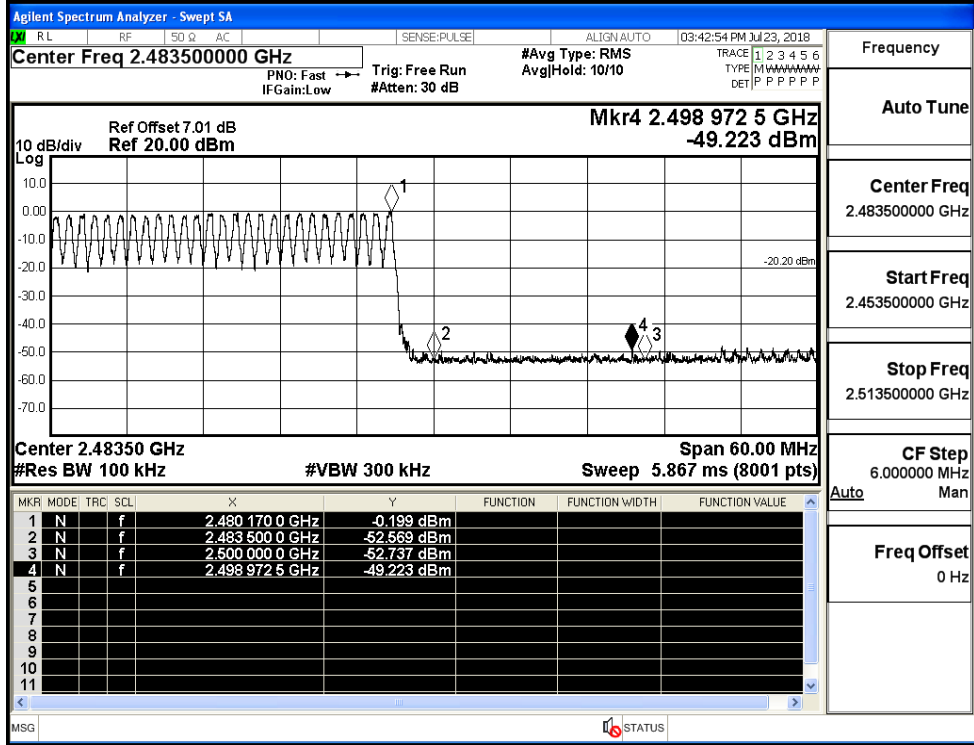
GFSK/LCH/Hop



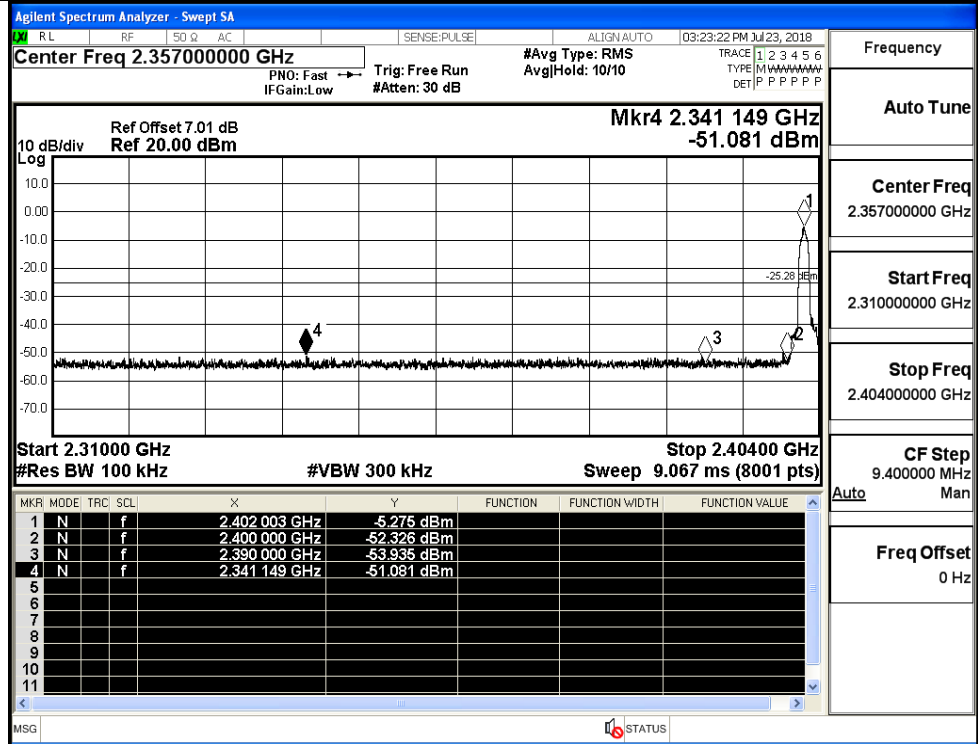
GFSK/HCH/No Hop



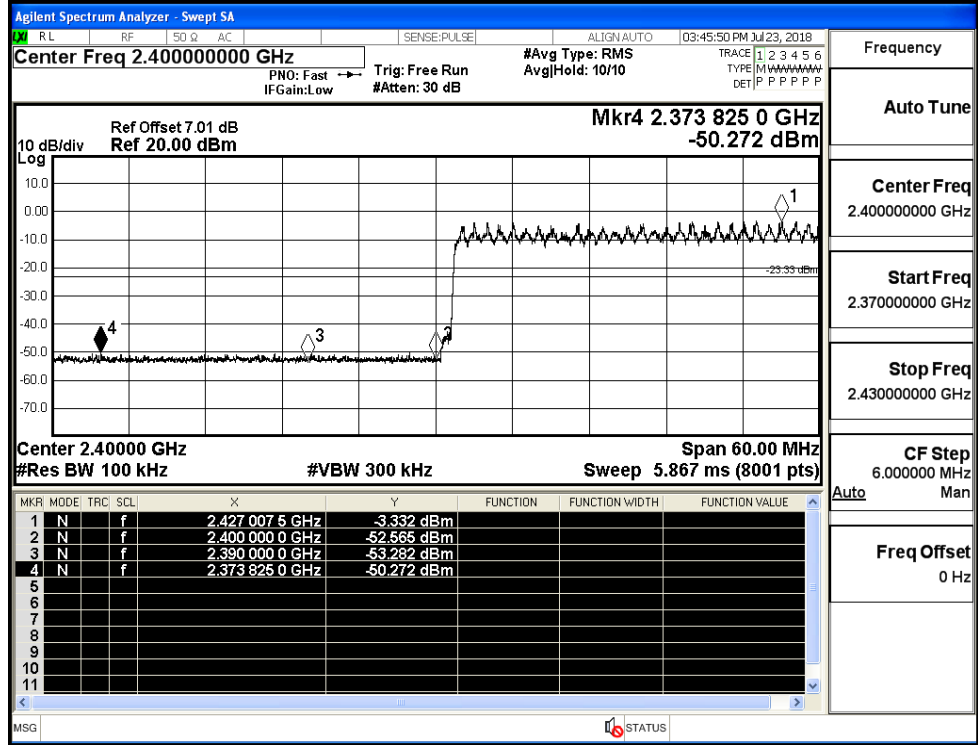
GFSK/HCH/Hop



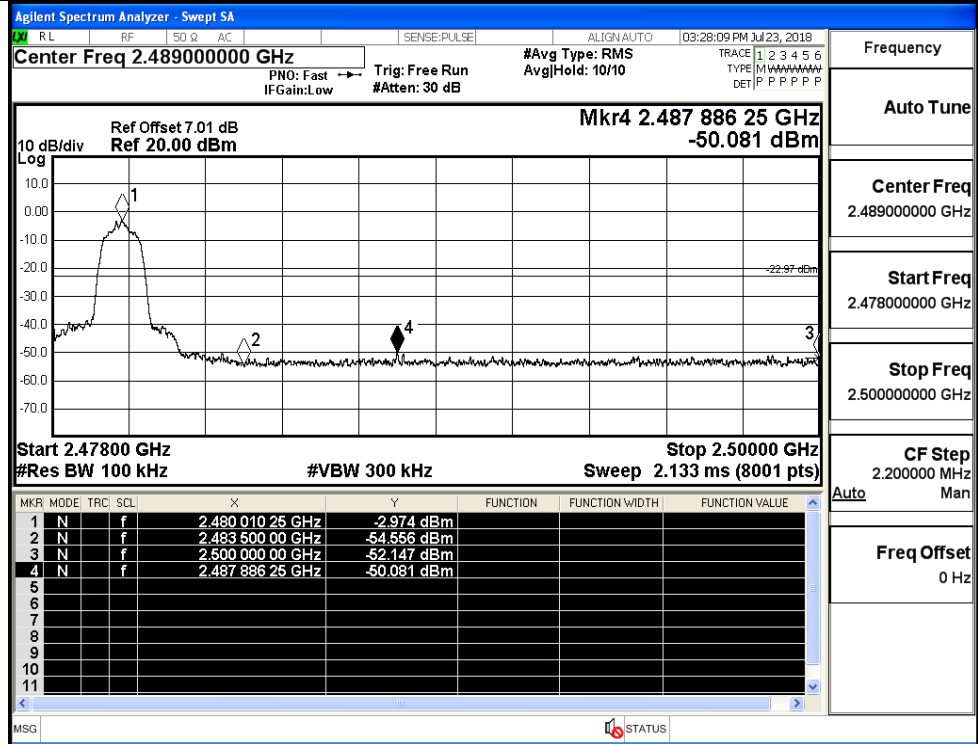
$\pi/4$ DQPSK/LCH/No Hop



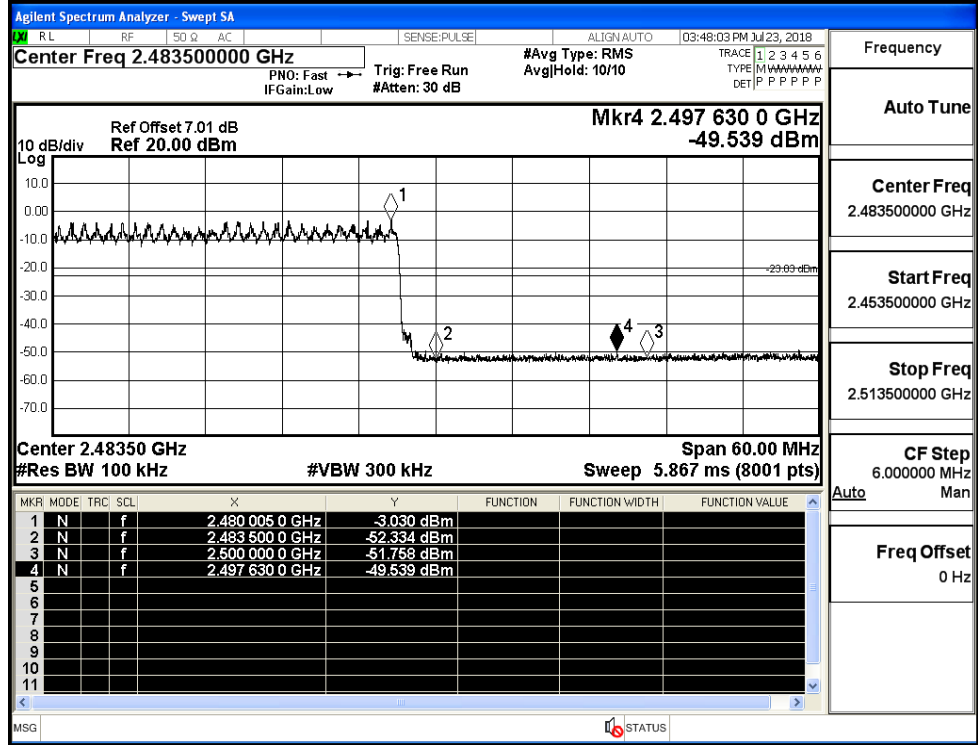
$\pi/4$ DQPSK/LCH/Hop



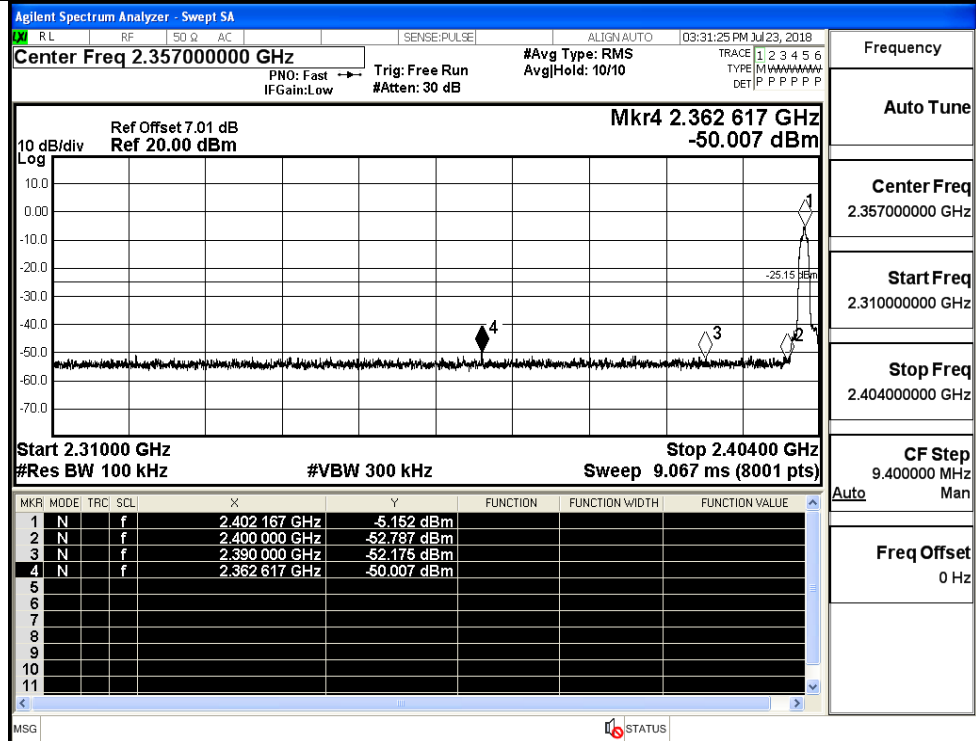
$\pi/4$ DQPSK/HCH/No Hop



$\pi/4$ DQPSK/HCH/Hop

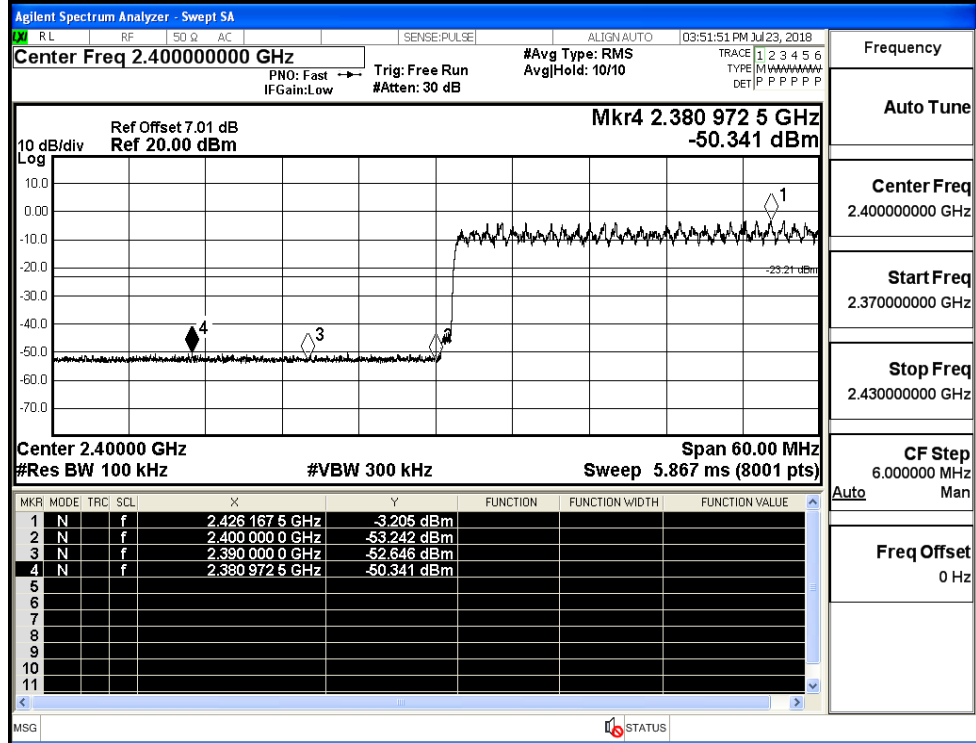


8DPSK/LCH/No Hop



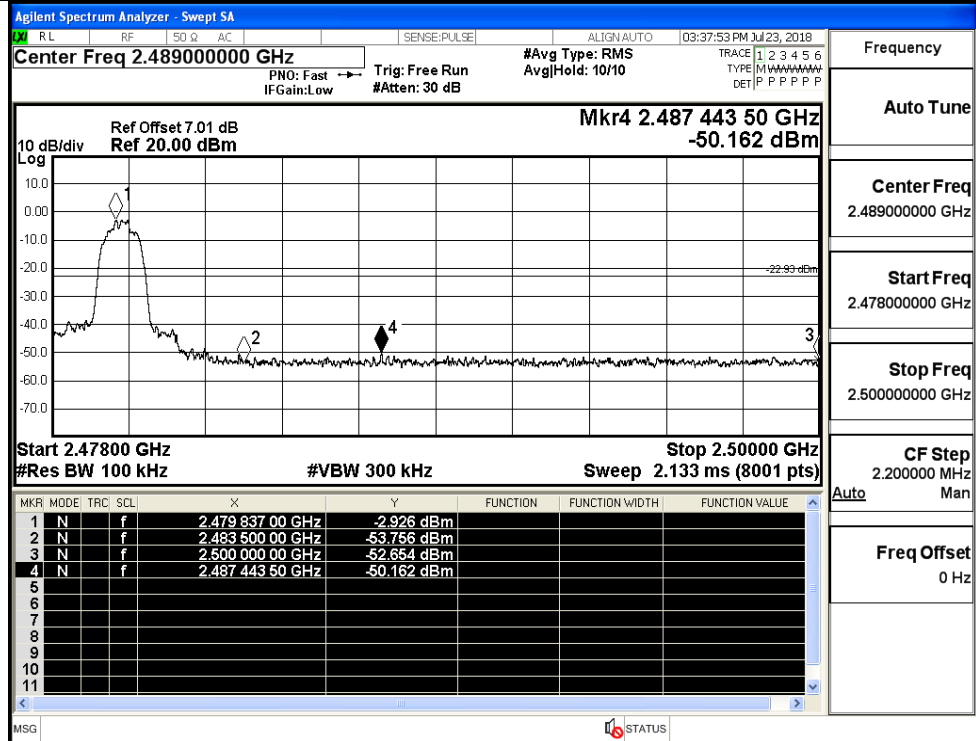
Frequency	
Auto Tune	
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz
Freq Offset	0 Hz

8DPSK/LCH/Hop



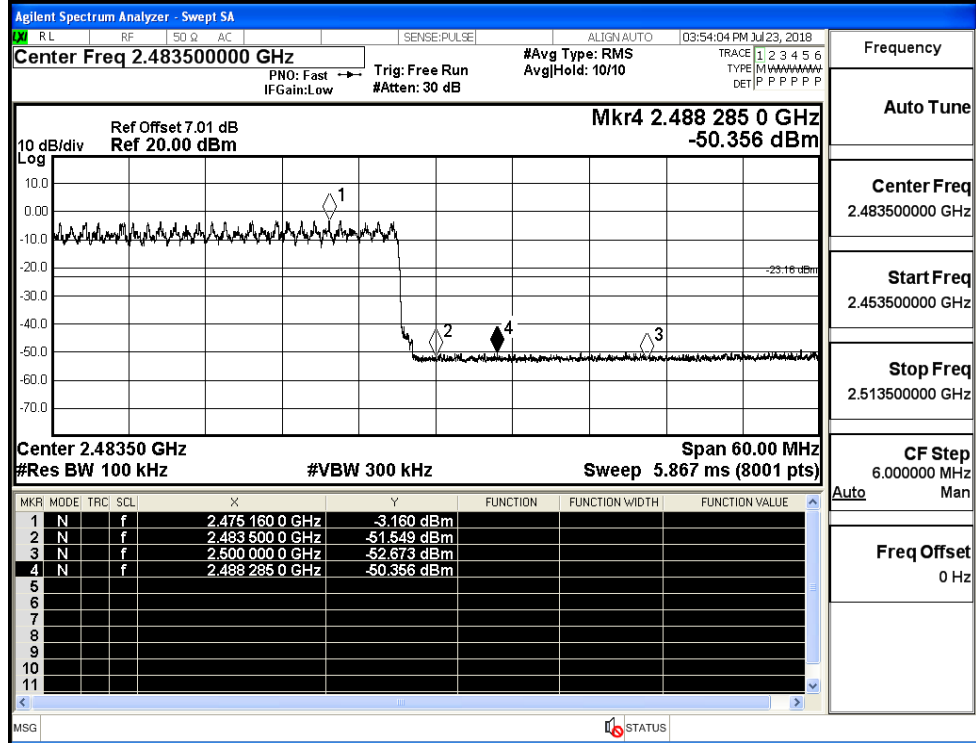
Frequency	
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

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

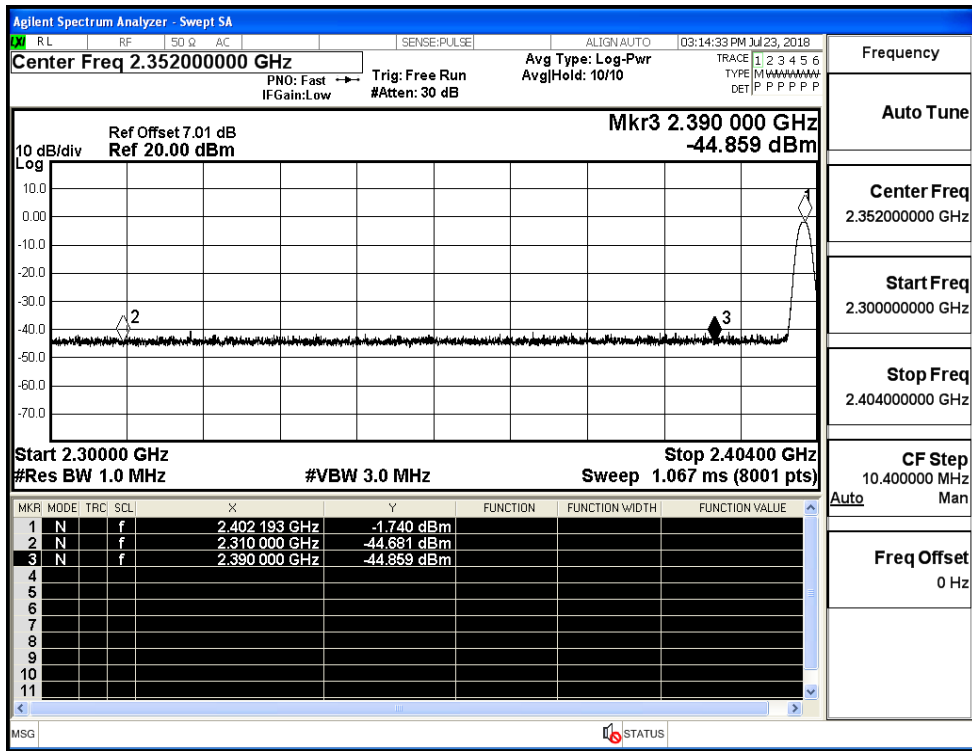


Frequency	
Auto Tune	
Center Freq	2.483500000 GHz
Start Freq	2.453500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

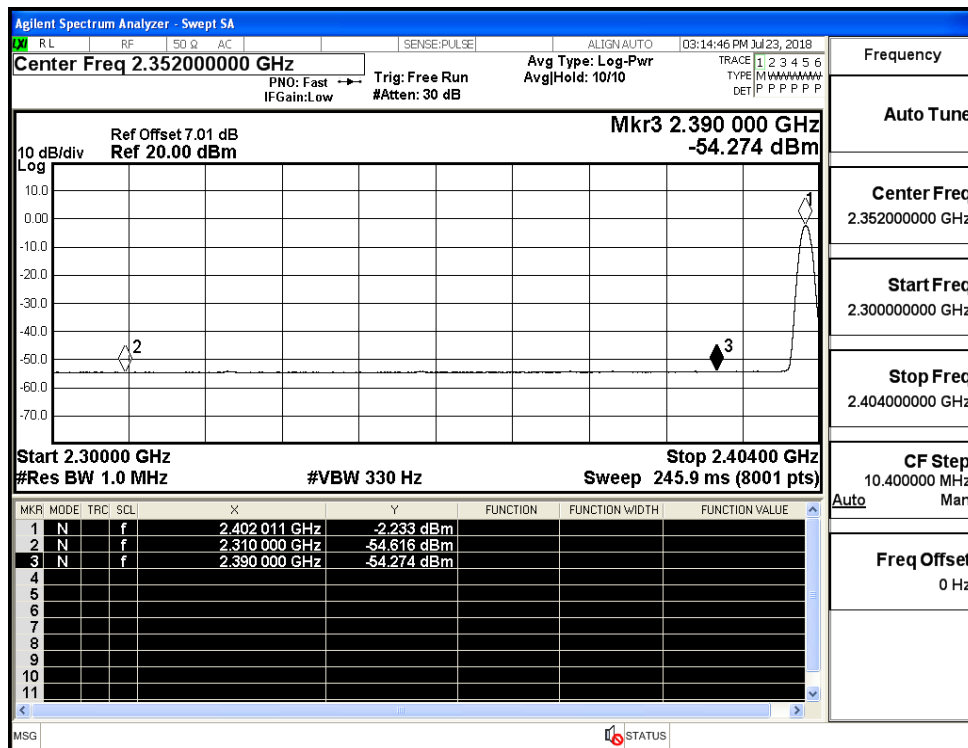
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.68	2.0	0	50.58	PEAK	74	PASS
	Off	2310.0	-54.62	2.0	0	40.64	AV	54	PASS
	Off	2390.0	-44.86	2.0	0	50.40	PEAK	74	PASS
	Off	2390.0	-54.27	2.0	0	40.98	AV	54	PASS
	Off	2483.5	-43.05	2.0	0	52.20	PEAK	74	PASS
	Off	2483.5	-53.39	2.0	0	41.87	AV	54	PASS
	Off	2500.0	-43.88	2.0	0	51.38	PEAK	74	PASS
	Off	2500.0	-53.87	2.0	0	41.39	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.91	2.0	0	51.35	PEAK	74	PASS
	Off	2310.0	-54.52	2.0	0	40.73	AV	54	PASS
	Off	2390.0	-43.62	2.0	0	51.64	PEAK	74	PASS
	Off	2390.0	-54.24	2.0	0	41.02	AV	54	PASS
	Off	2483.5	-41.78	2.0	0	53.48	PEAK	74	PASS
	Off	2483.5	-53.72	2.0	0	41.53	AV	54	PASS
	Off	2500.0	-42.89	2.0	0	52.37	PEAK	74	PASS
	Off	2500.0	-53.90	2.0	0	41.36	AV	54	PASS
8DPSK	Off	2310.0	-44.62	2.0	0	50.64	PEAK	74	PASS
	Off	2310.0	-54.67	2.0	0	40.58	AV	54	PASS
	Off	2390.0	-44.24	2.0	0	51.02	PEAK	74	PASS
	Off	2390.0	-54.39	2.0	0	40.87	AV	54	PASS
	Off	2483.5	-45.25	2.0	0	50.01	PEAK	74	PASS
	Off	2483.5	-53.82	2.0	0	41.43	AV	54	PASS
	Off	2500.0	-42.68	2.0	0	52.58	PEAK	74	PASS
	Off	2500.0	-54.01	2.0	0	41.25	AV	54	PASS

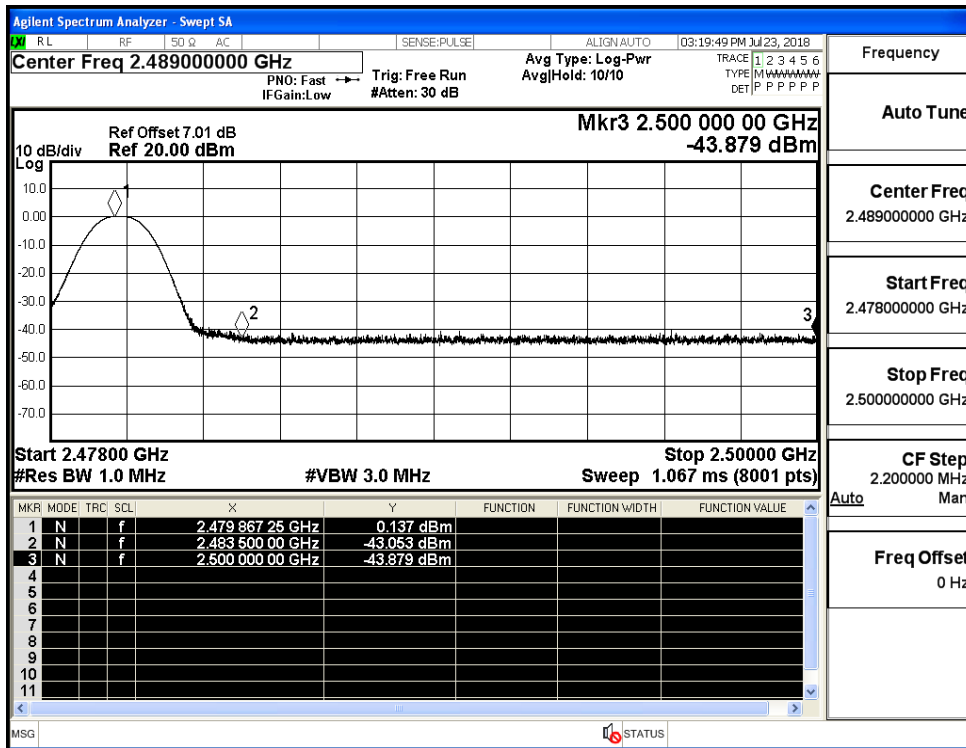
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



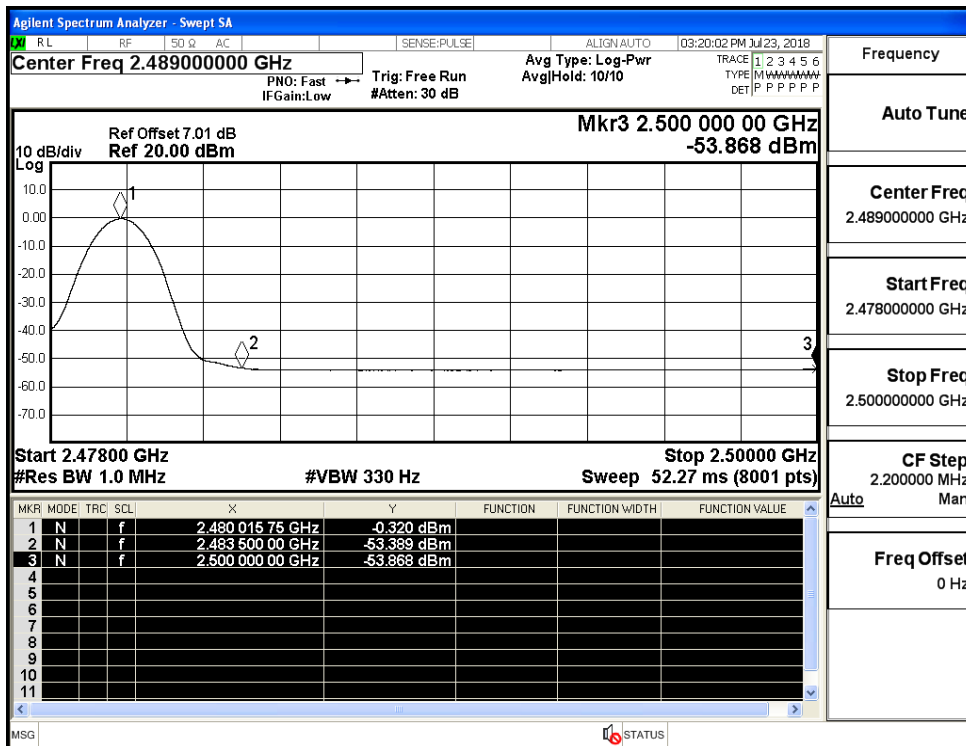
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



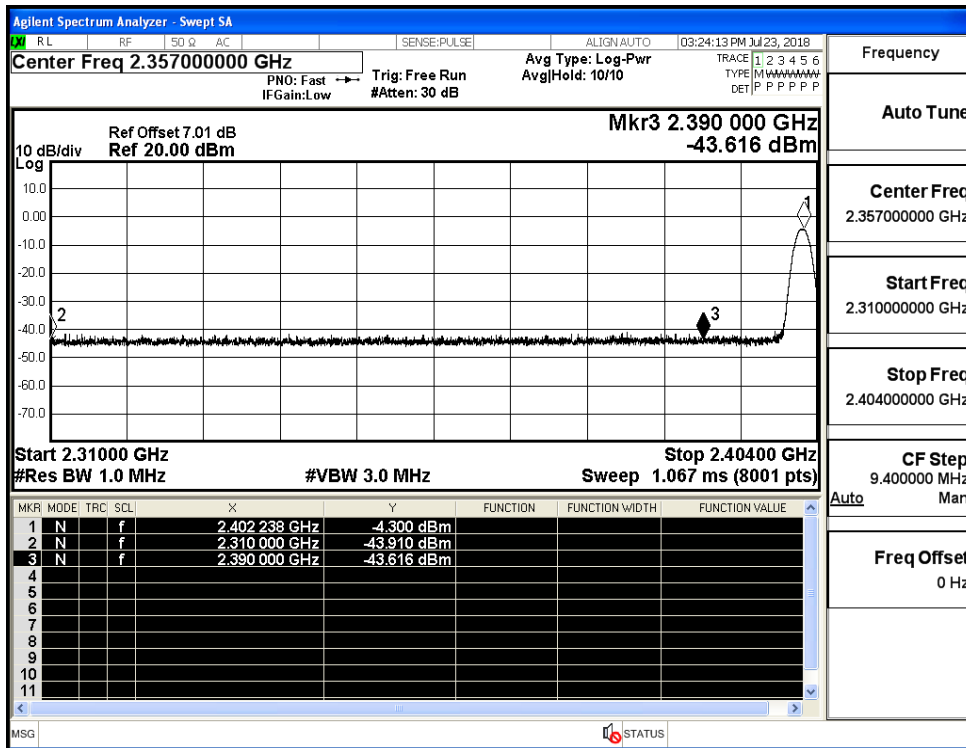
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



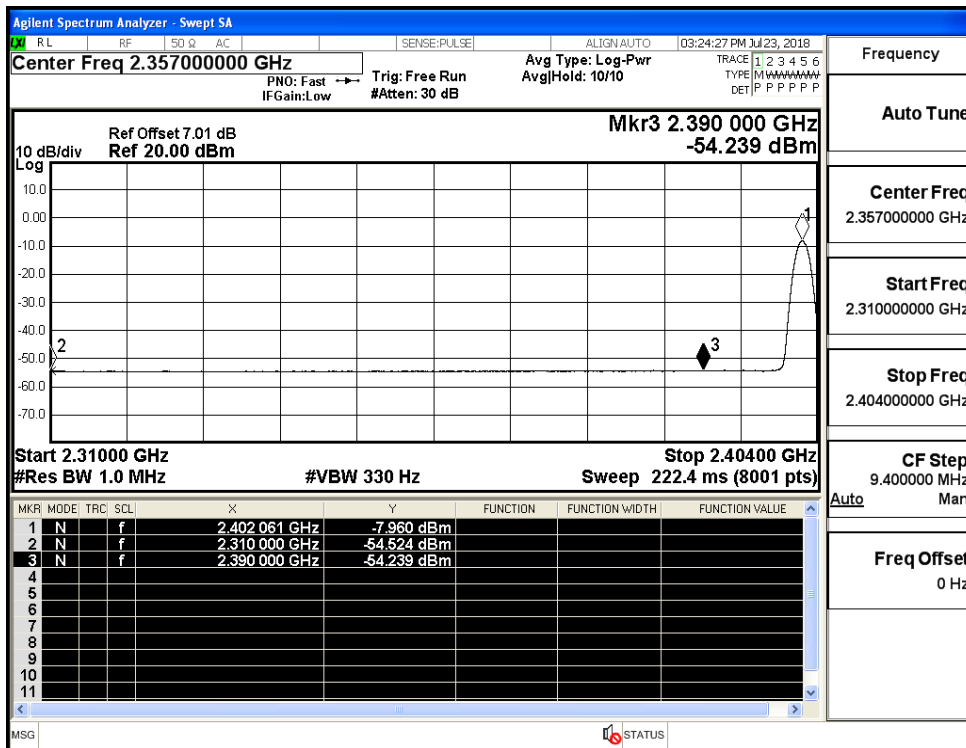
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



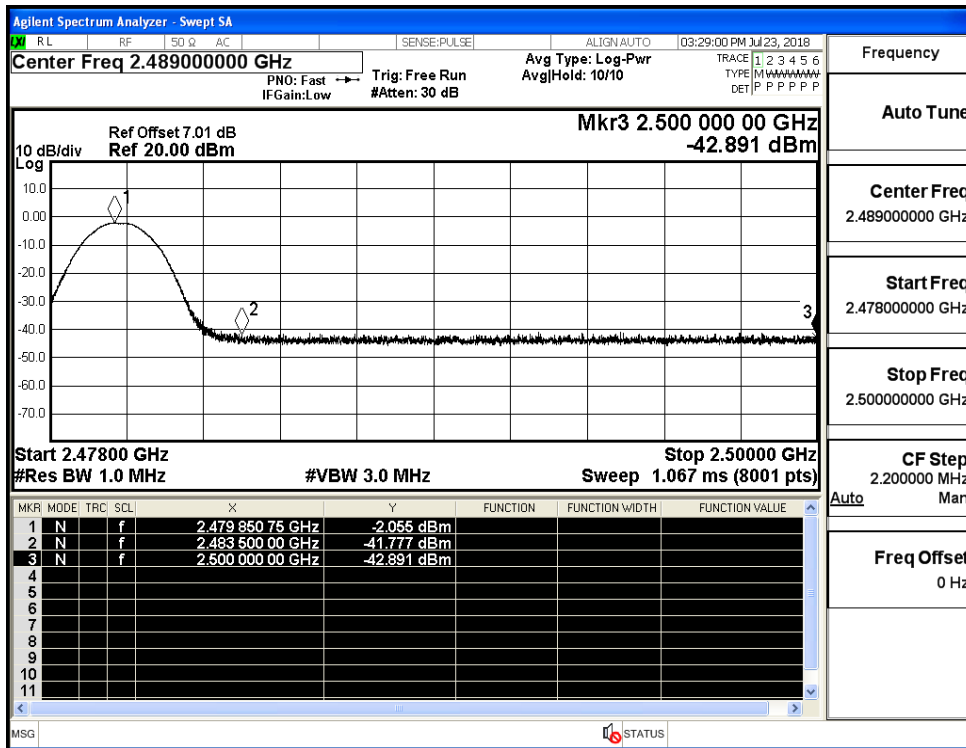
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



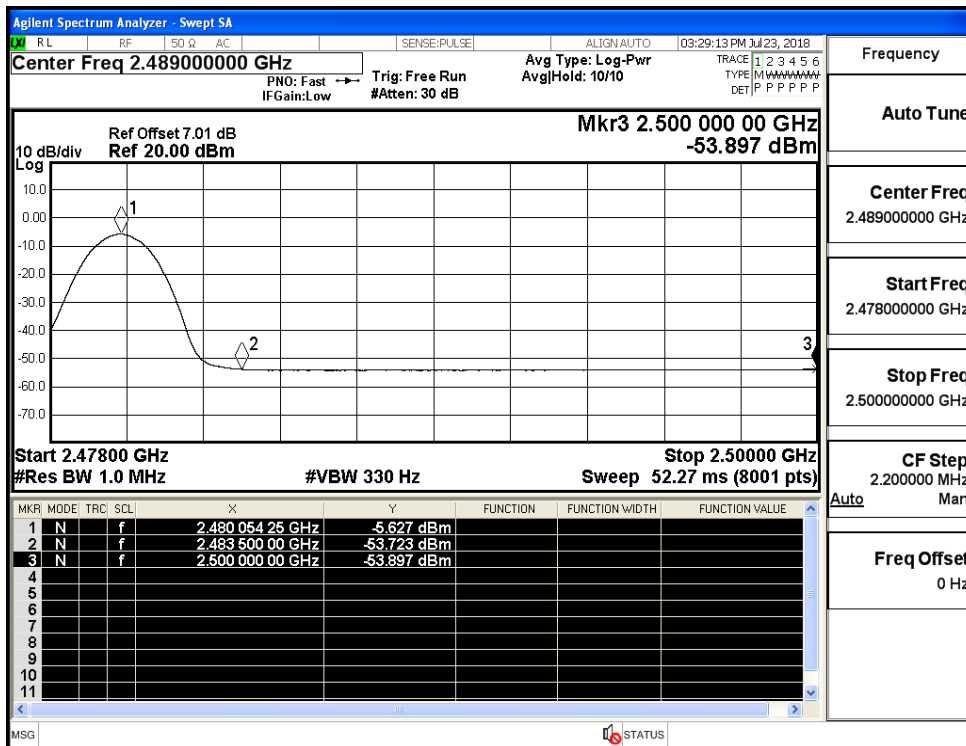
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



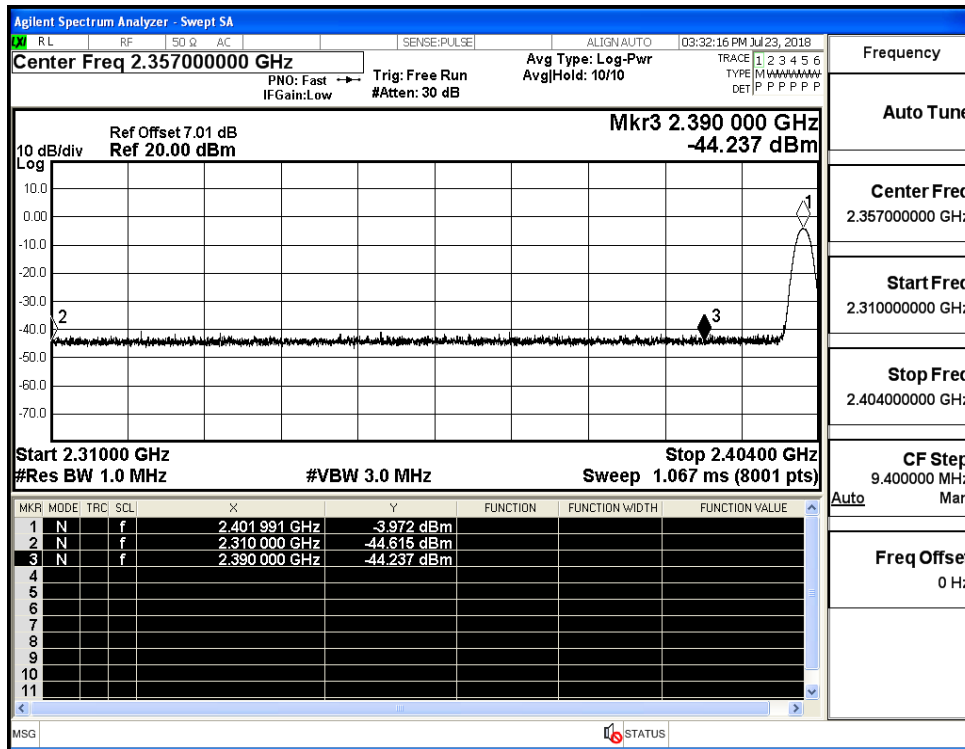
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (High Channel)



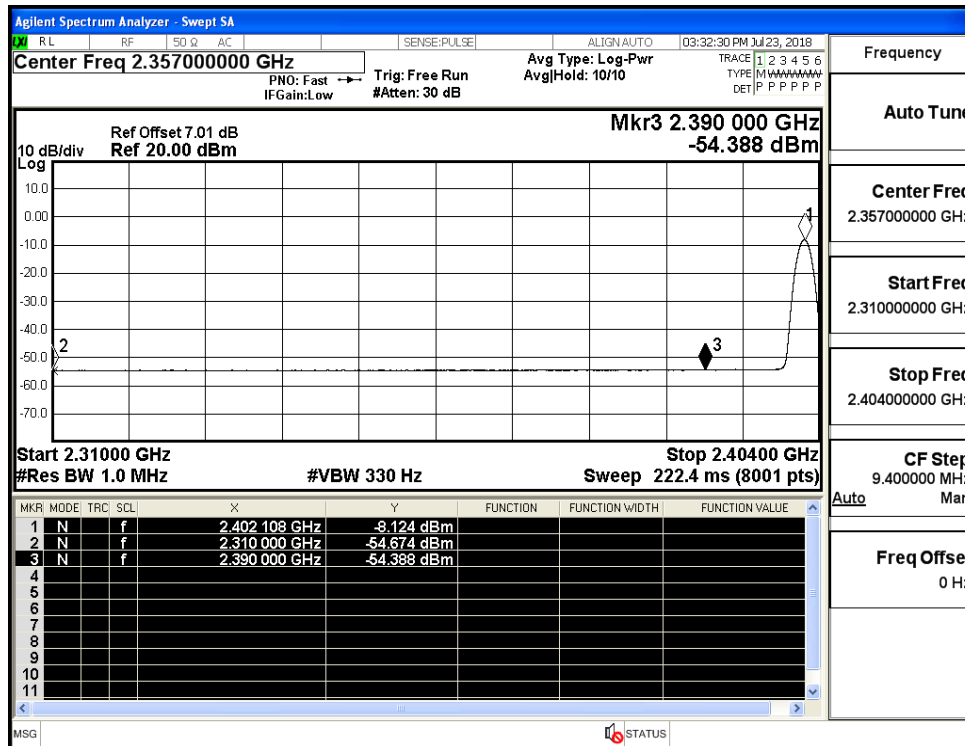
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (High Channel)



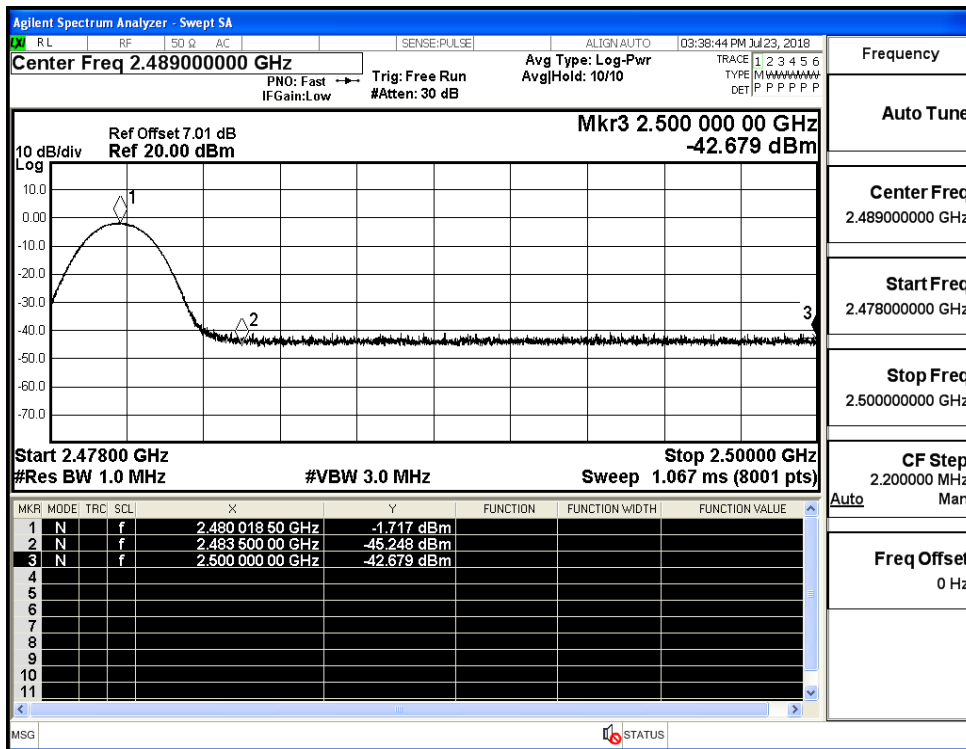
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

