

Appendix A

RF Test Data for BT V5.0 (BDR/EDR) (Conducted Measurement)

Product Name: Multi function projector

Trade Mark: PHILIPS

Test Model: NeoPix Prime

Environmental Conditions

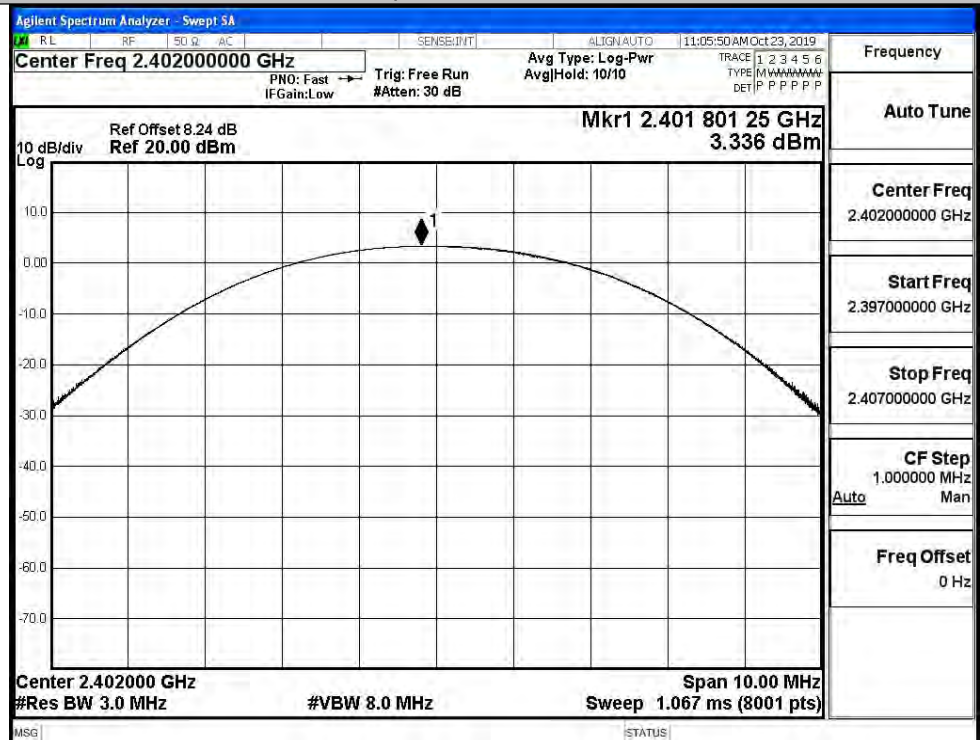
Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Wang.Chuang
Supervised by:	Wang.Chuang

A.1 Maximum Conducted Peak Output Power

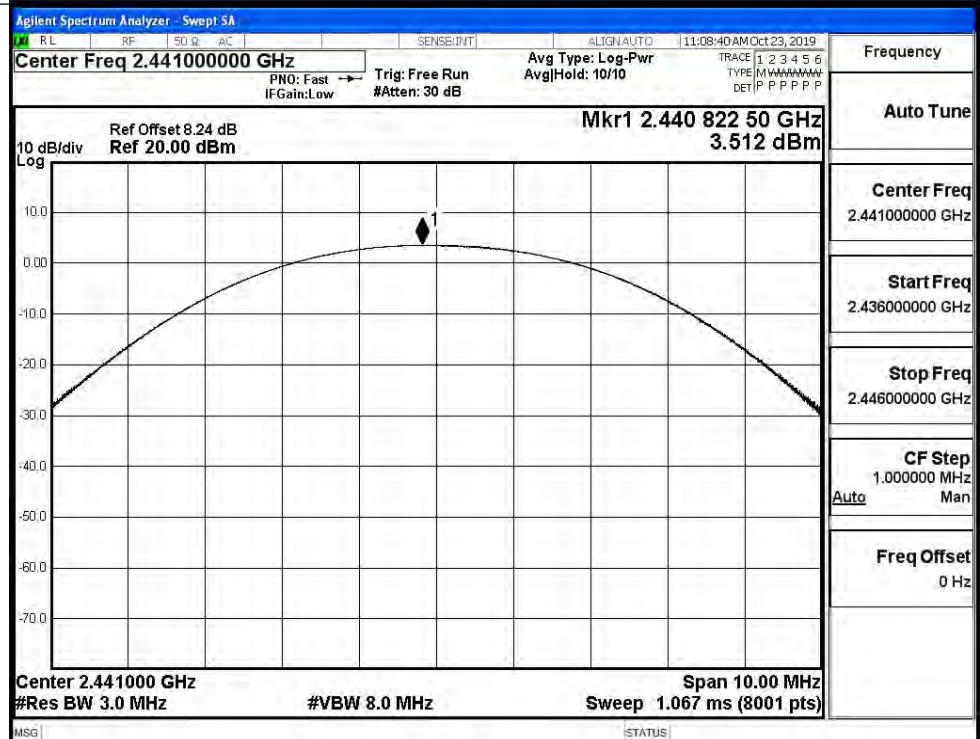
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.336	30	PASS
	MCH	3.512	30	PASS
	HCH	4.123	30	PASS
$\pi/4$ DQPSK	LCH	2.545	21	PASS
	MCH	2.730	21	PASS
	HCH	3.310	21	PASS
8DPSK	LCH	2.596	21	PASS
	MCH	2.812	21	PASS
	HCH	3.430	21	PASS

Test Graphs

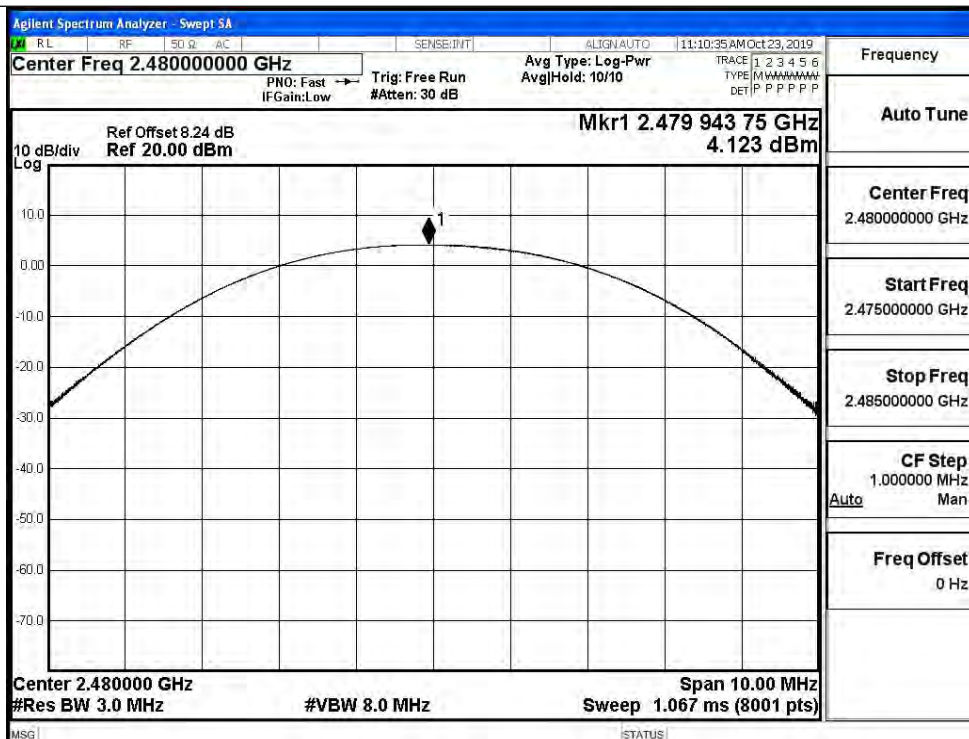
GFSK/LCH



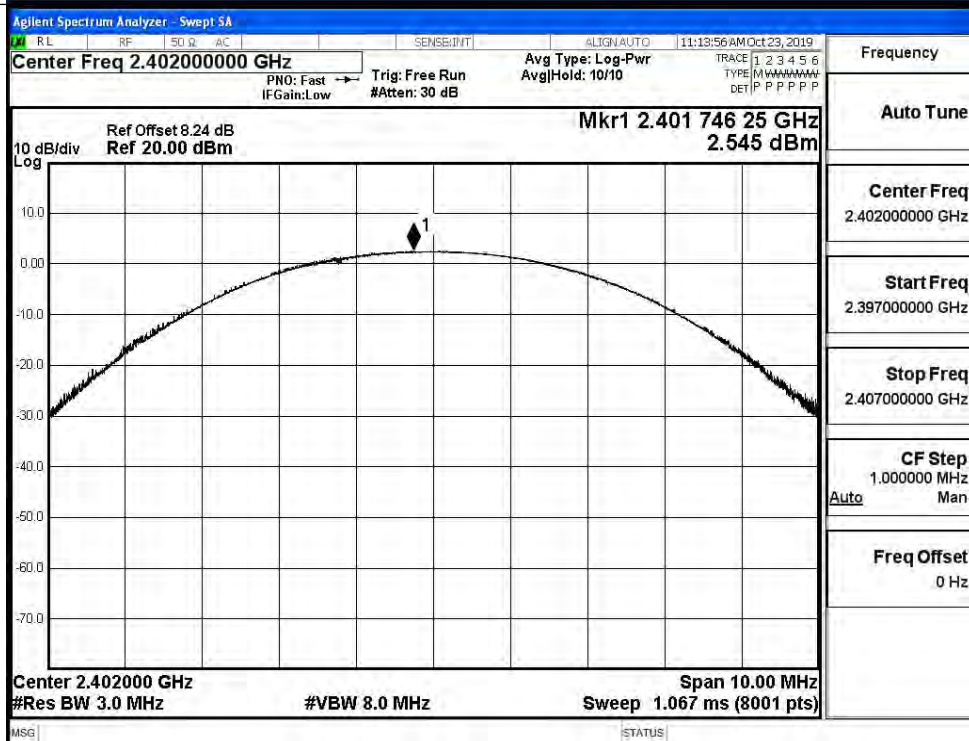
GFSK/MCH

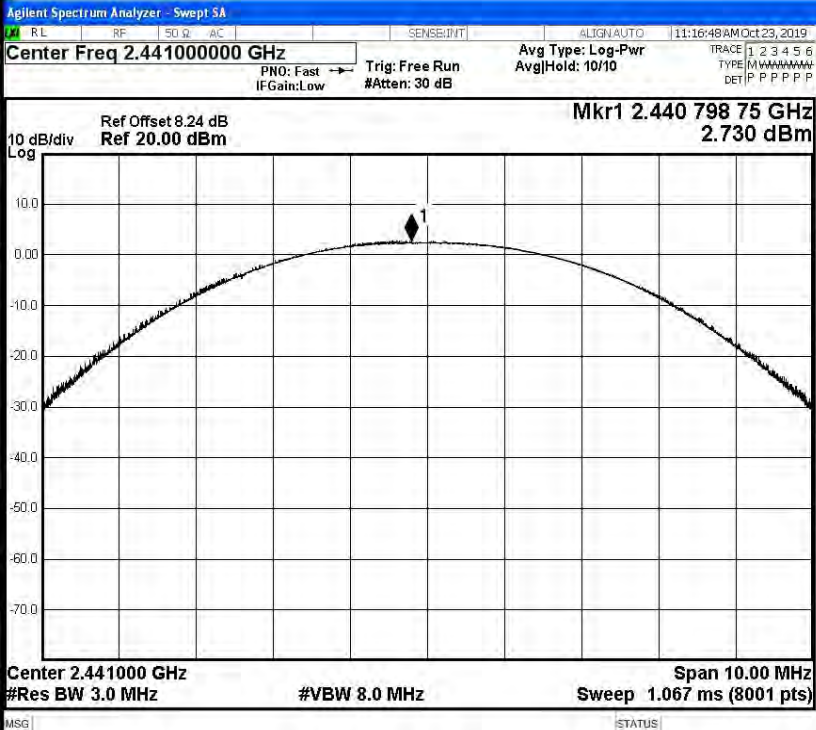
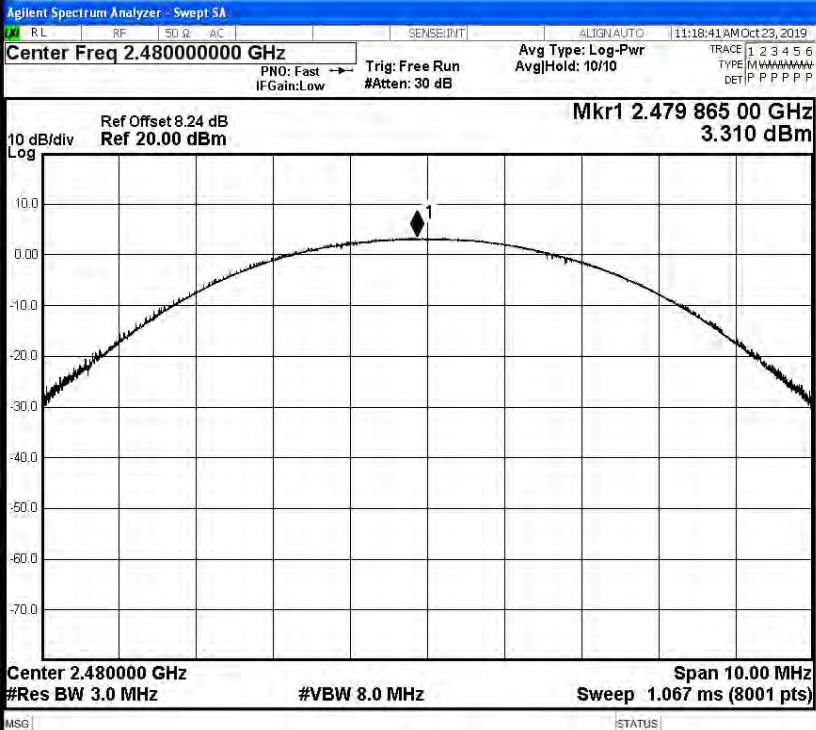


GFSK/HCH

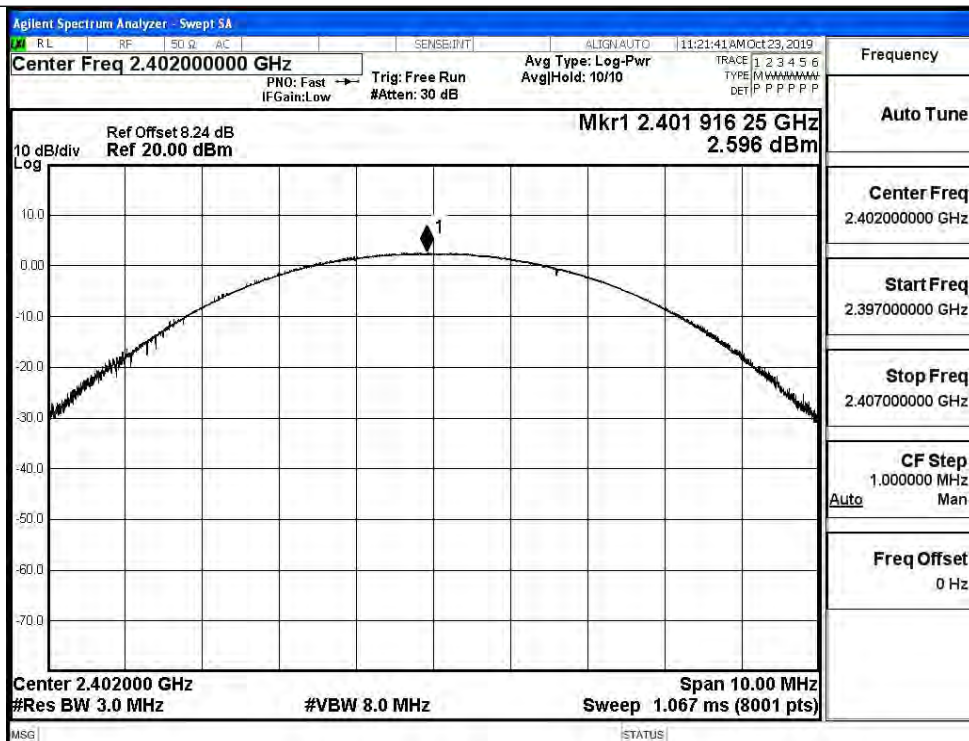


$\pi/4$ DQPSK/LCH

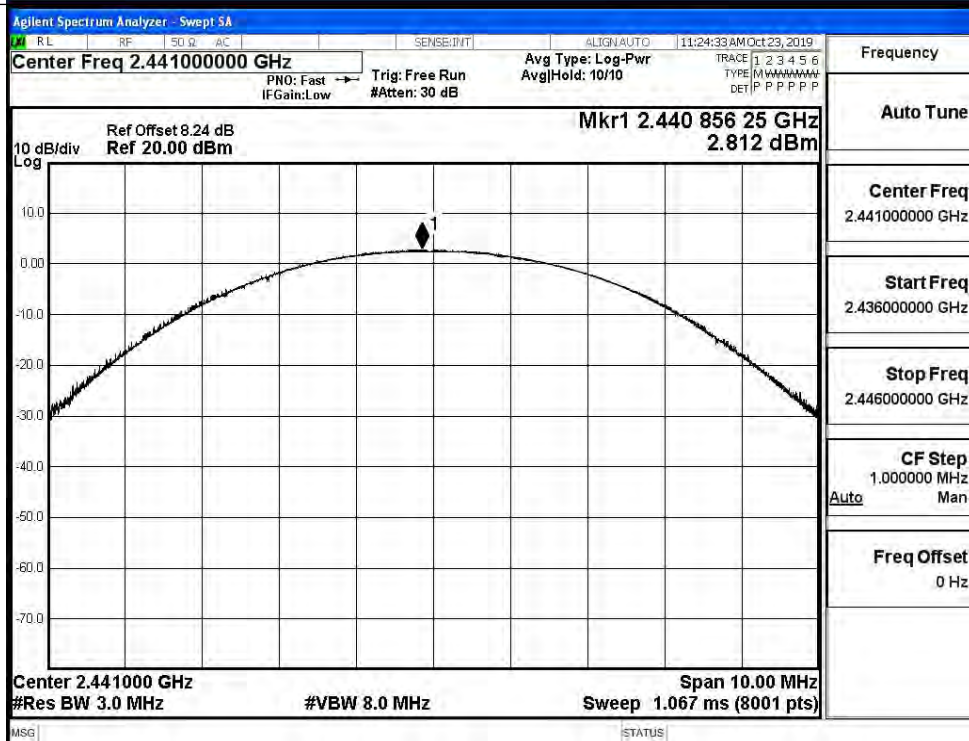


$\pi/4$DQPSK/MCH		Frequency Auto Tune Center Freq 2.441000000 GHz Start Freq 2.436000000 GHz Stop Freq 2.446000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz
$\pi/4$DQPSK/HCH		Frequency Auto Tune Center Freq 2.480000000 GHz Start Freq 2.475000000 GHz Stop Freq 2.485000000 GHz CF Step 1.000000 MHz Auto Man Freq Offset 0 Hz

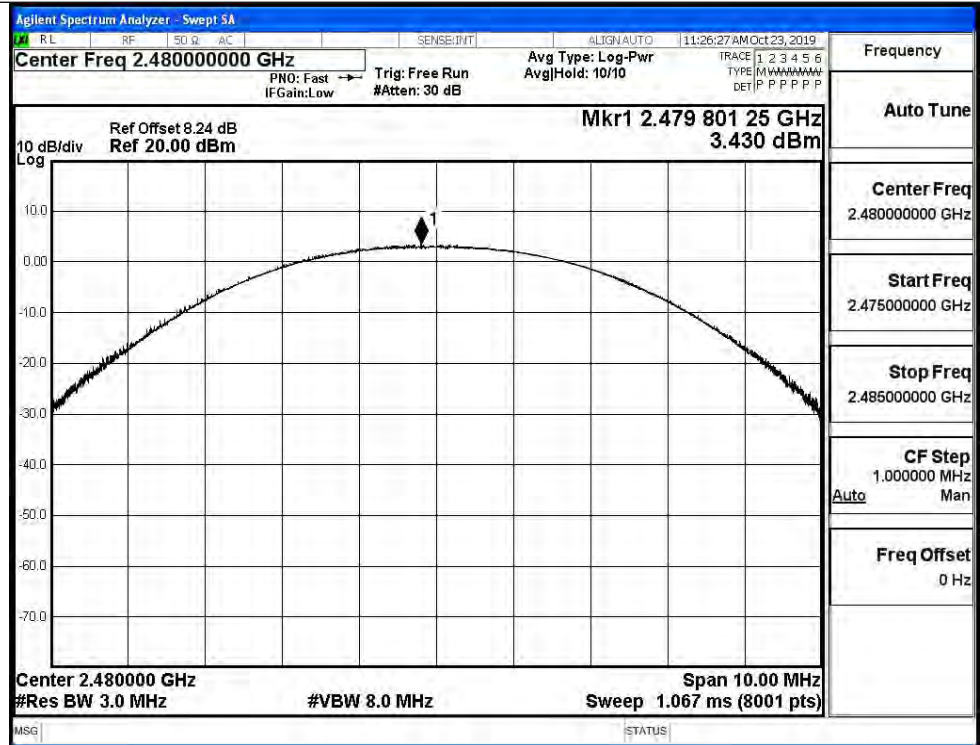
8DPSK/LCH



8DPSK/MCH



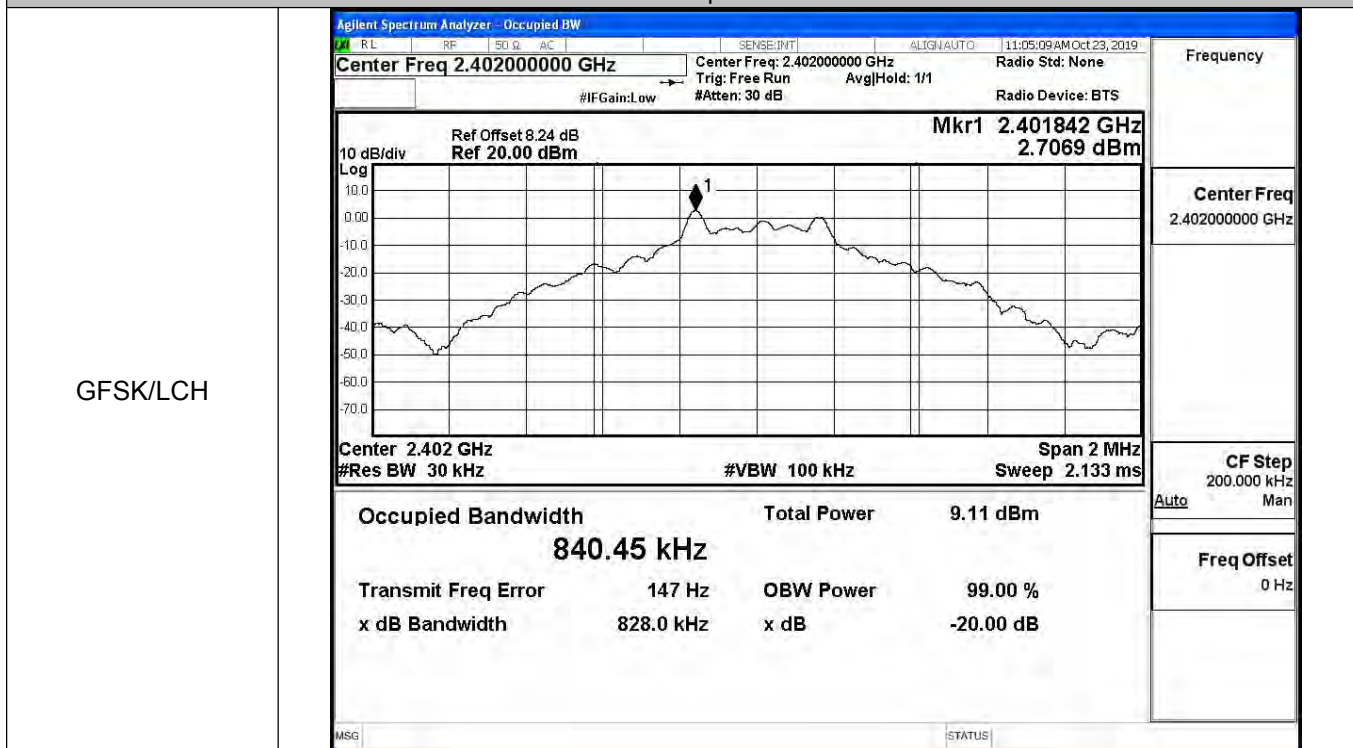
8DPSK/HCH



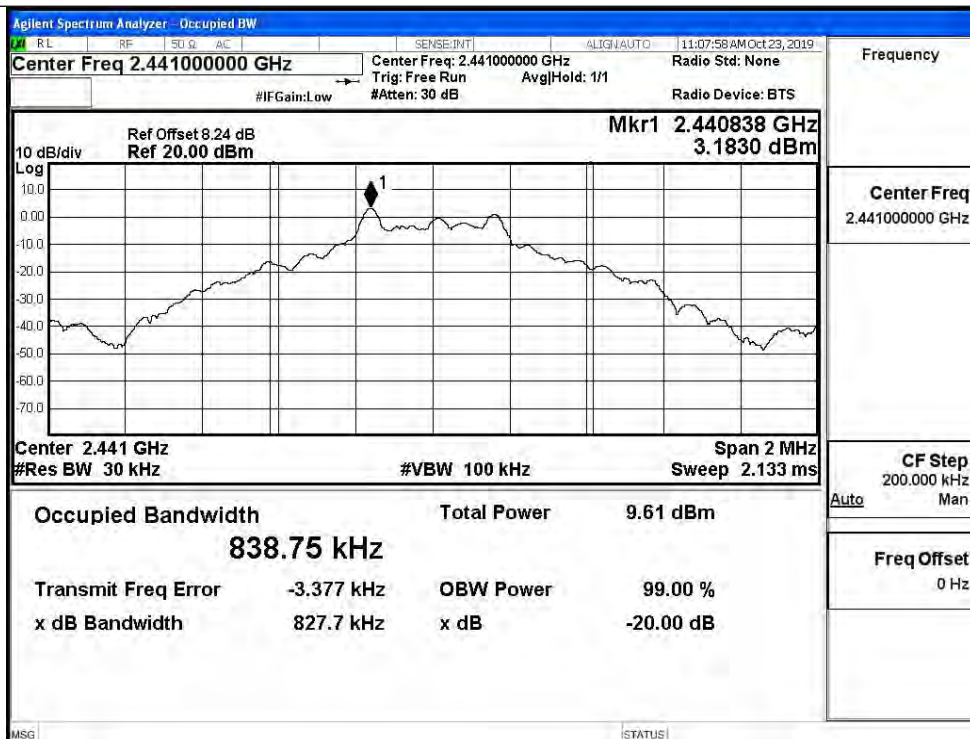
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.8280	Not Specified	PASS
	MCH	0.8277	Not Specified	PASS
	HCH	0.8314	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.121	Not Specified	PASS
	MCH	1.116	Not Specified	PASS
	HCH	1.128	Not Specified	PASS
8DPSK	LCH	1.144	Not Specified	PASS
	MCH	1.137	Not Specified	PASS
	HCH	1.137	Not Specified	PASS

Test Graphs



GFSK/MCH



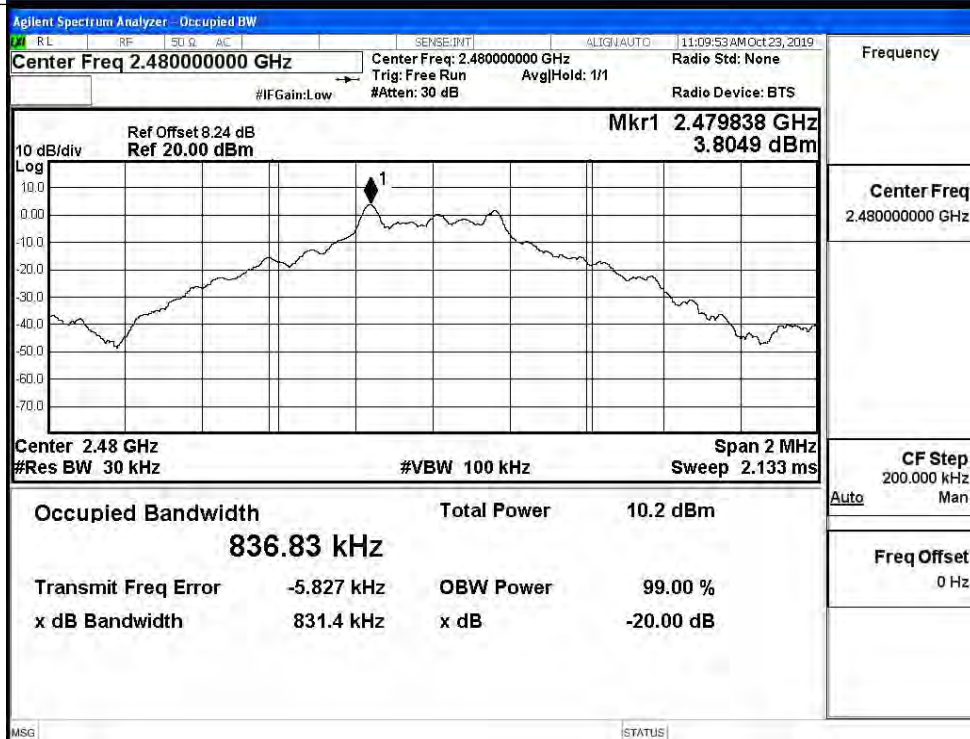
Frequency

Center Freq
2.441000000 GHz

CF Step
200.000 kHz

Freq Offset
0 Hz

GFSK/HCH

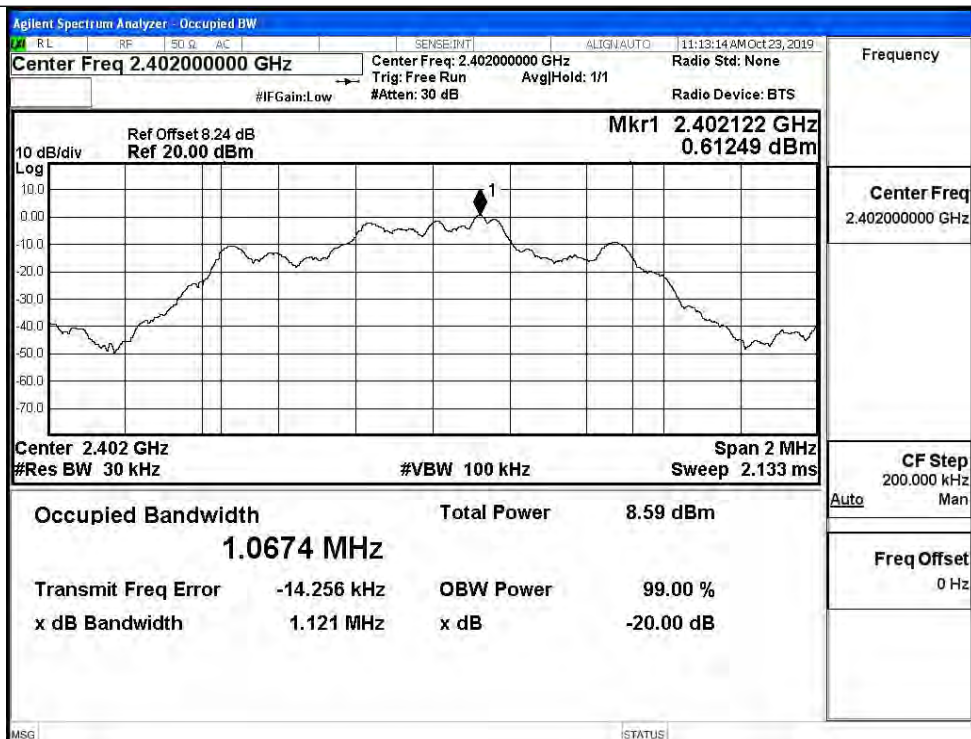
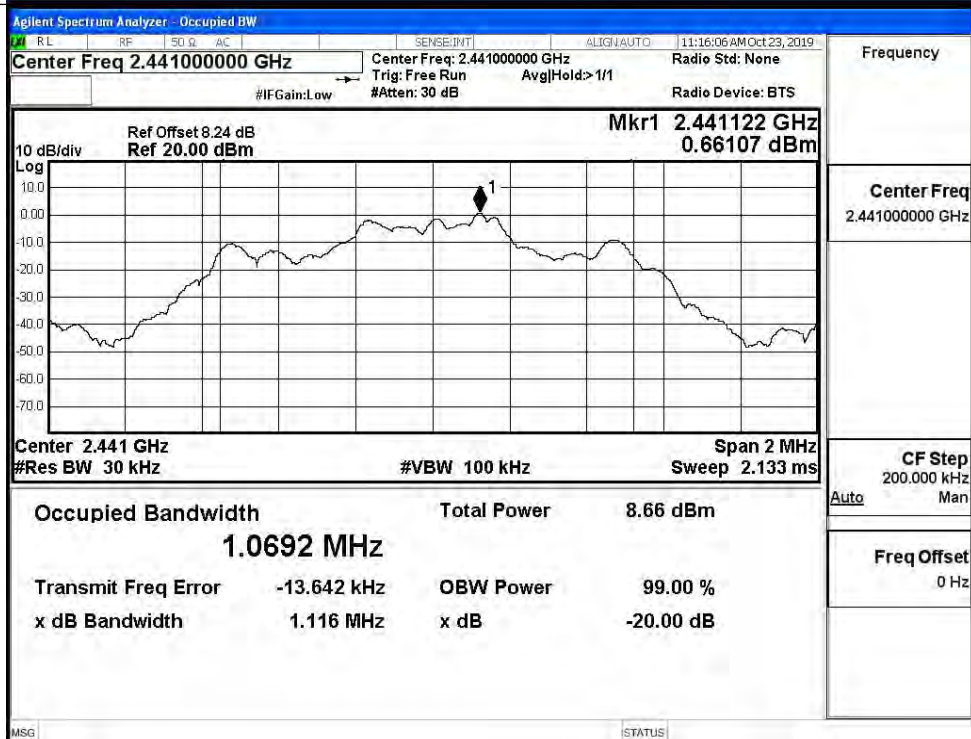


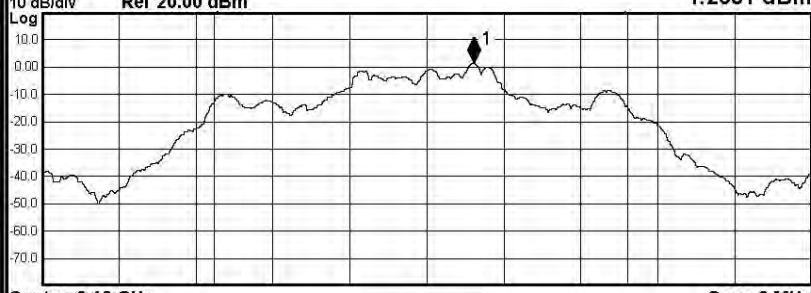
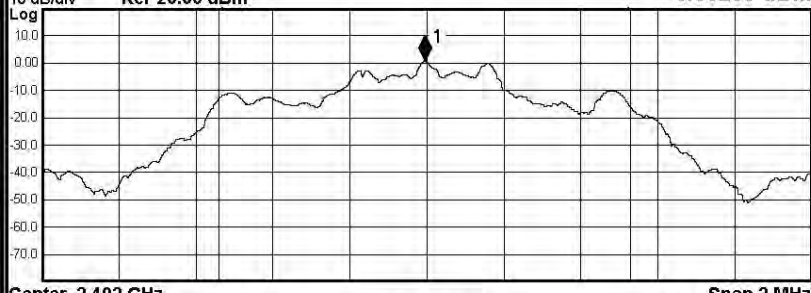
Frequency

Center Freq
2.480000000 GHz

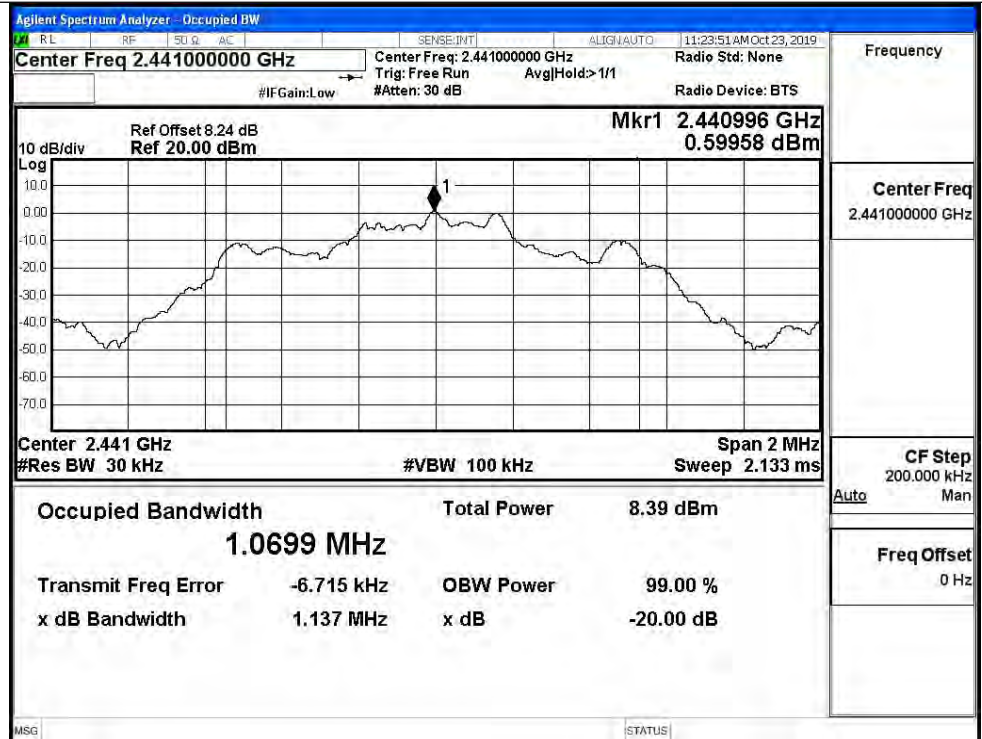
CF Step
200.000 kHz

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$DQPSK/HCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS Ref Offset 8.24 dB Ref 20.00 dBm Mkr1 2.480122 GHz 1.2381 dBm  Center 2.48 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.0713 MHz Total Power 9.18 dBm Transmit Freq Error -14.073 kHz OBW Power 99.00 % x dB Bandwidth 1.128 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.480000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
8DPSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.402000000 GHz Center Freq: 2.402000000 GHz Trig: Free Run #Atten: 30 dB Radio Std: None Radio Device: BTS Ref Offset 8.24 dB Ref 20.00 dBm Mkr1 2.401996 GHz 0.55205 dBm  Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 2 MHz Sweep 2.133 ms Occupied Bandwidth 1.0693 MHz Total Power 8.39 dBm Transmit Freq Error -5.851 kHz OBW Power 99.00 % x dB Bandwidth 1.144 MHz x dB -20.00 dB MSG STATUS	Frequency Center Freq 2.402000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz

8DPSK/MCH



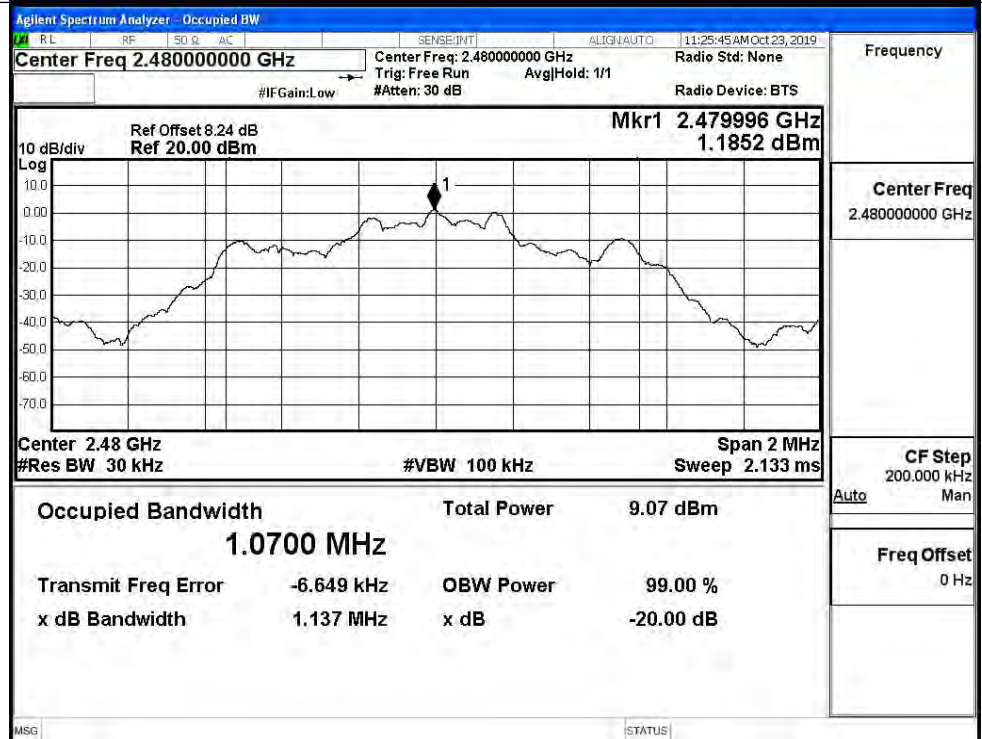
Frequency

Center Freq
2.441000000 GHz

CF Step
200.000 kHz

Freq Offset
0 Hz

8DPSK/HCH



Frequency

Center Freq
2.480000000 GHz

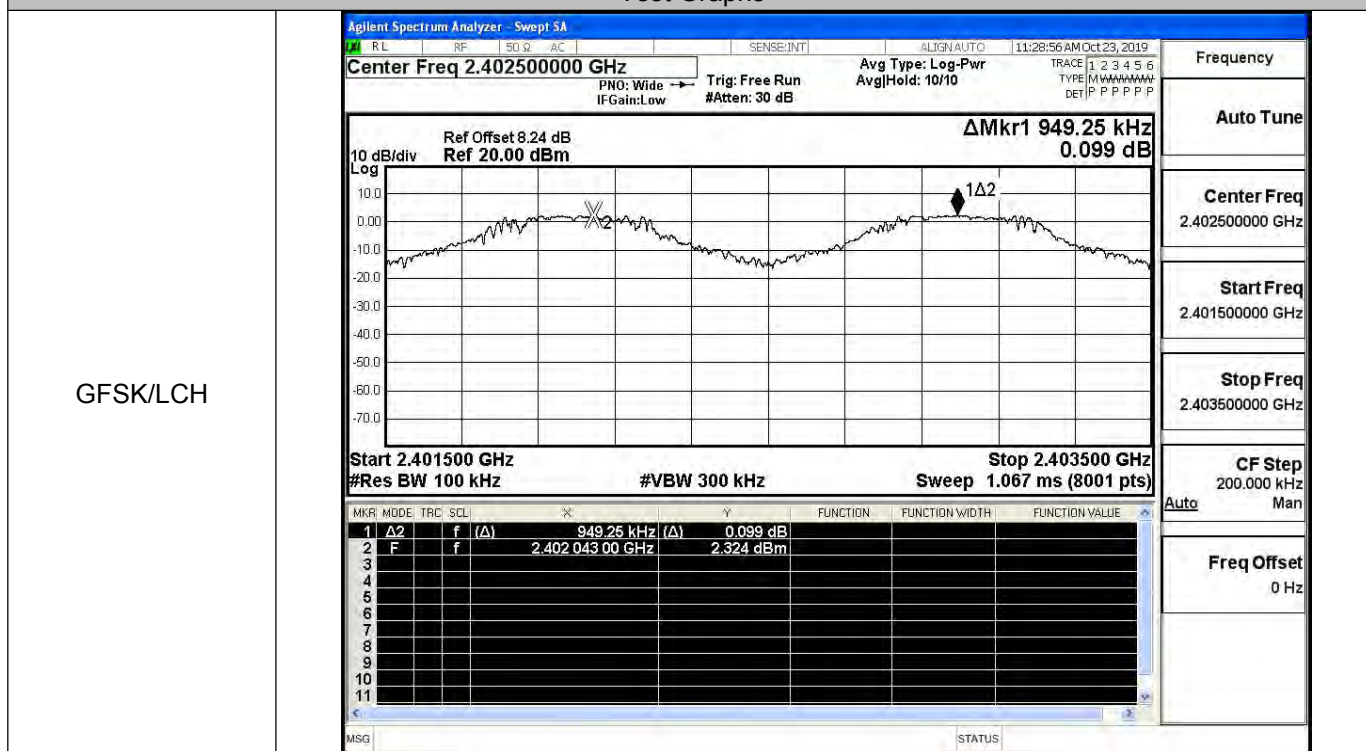
CF Step
200.000 kHz

Freq Offset
0 Hz

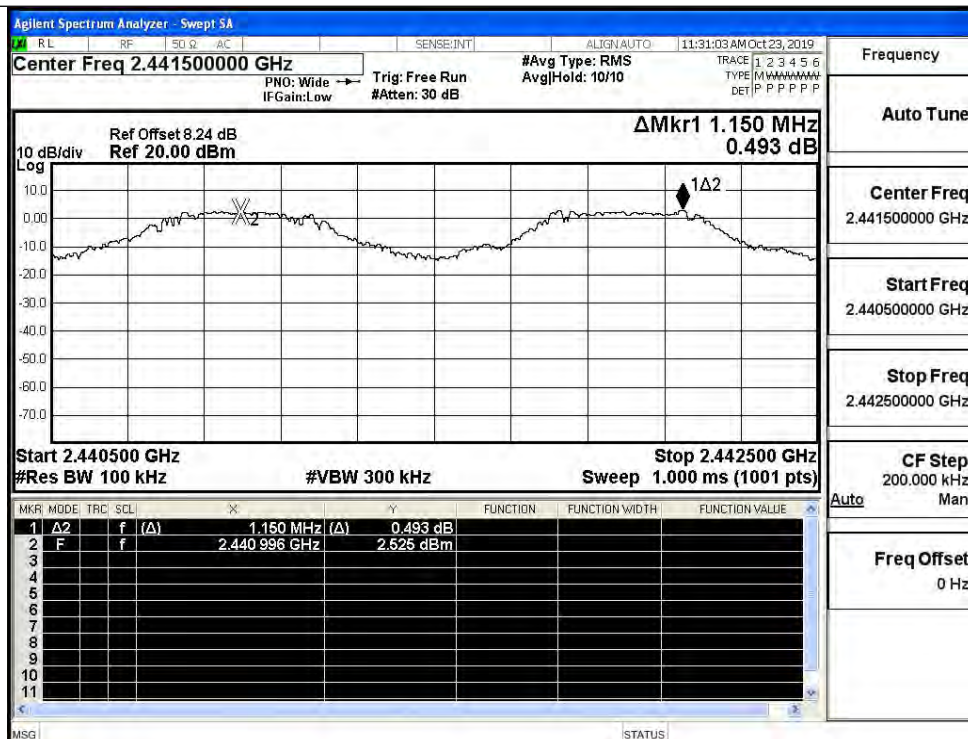
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.949	0.554	PASS
	MCH	1.150	0.554	PASS
	HCH	0.946	0.554	PASS
$\pi/4$ DQPSK	LCH	1.310	0.752	PASS
	MCH	0.816	0.752	PASS
	HCH	0.996	0.752	PASS
8DPSK	LCH	1.204	0.763	PASS
	MCH	1.040	0.763	PASS
	HCH	0.920	0.763	PASS

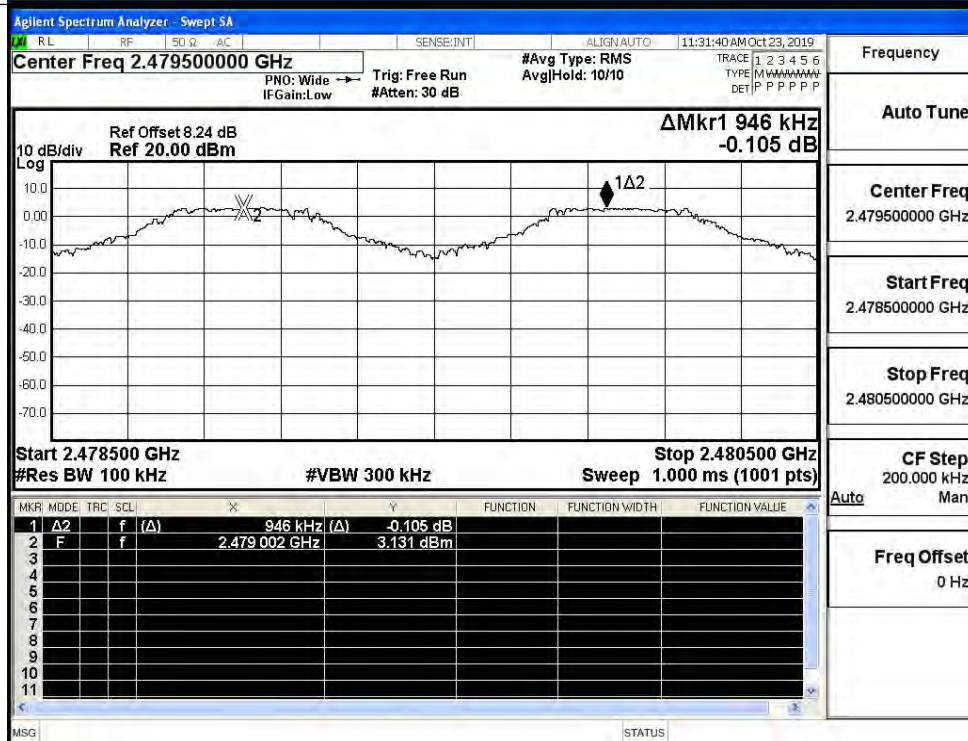
Test Graphs



GFSK/MCH

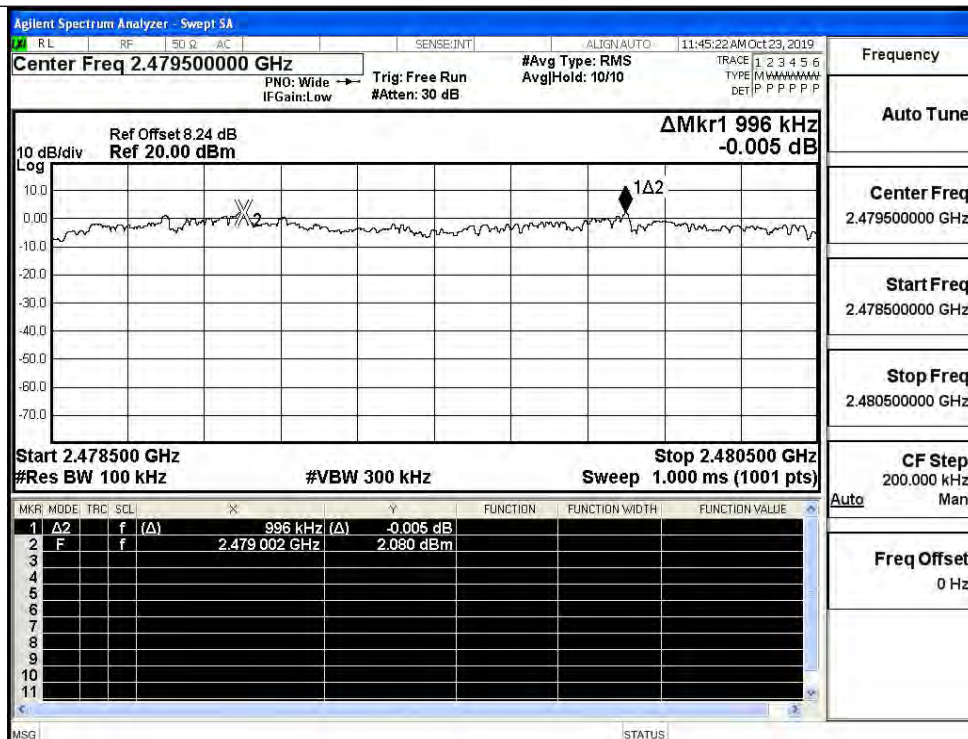


GFSK/HCH

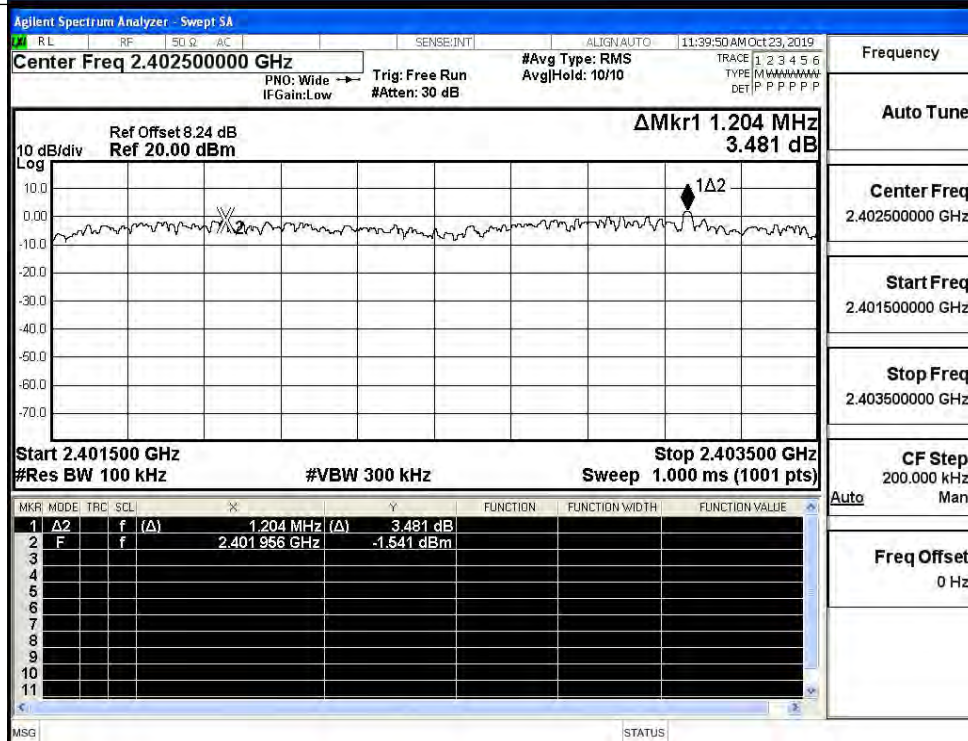


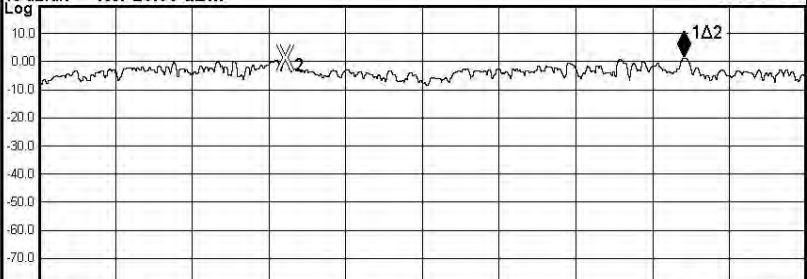
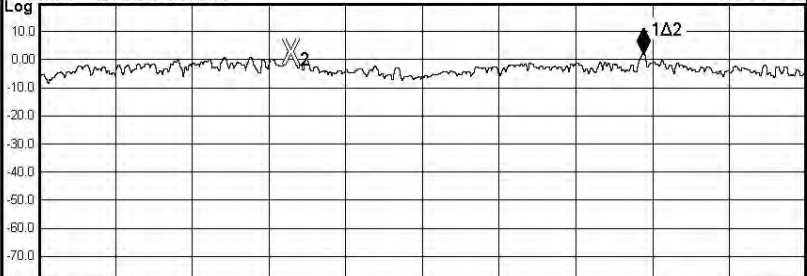
$\pi/4$ DQPSK/LCH	Agilent Spectrum Analyzer - Swept SA RL RF SQ AC SENSE:INT ALIGN: AUTO 11:34:11 AM Oct 23, 2019 Center Freq 2.402500000 GHz PNO: Wide IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P P P P P P P Ref Offset 8.24 dB Ref 20.00 dBm 10 dB/div Log
-------------------	---

$\pi/4$ DQPSK/HCH



8DPSK/LCH



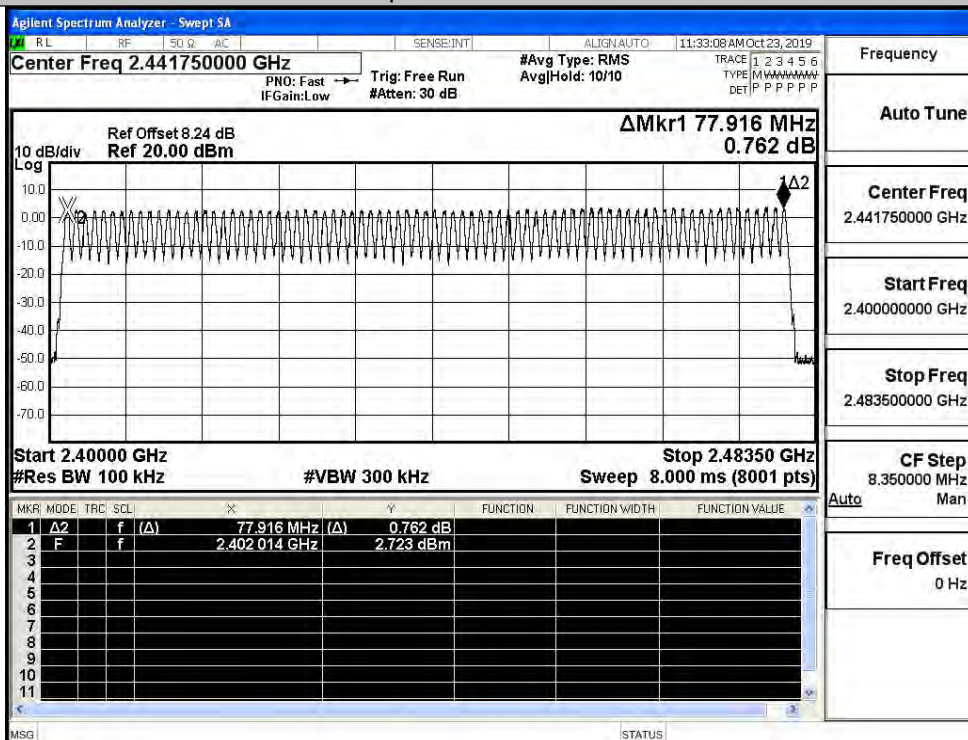
8DPSK/MCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 11:41:37 AM Oct 23, 2019 Center Freq 2.441500000 GHz PNO: Wide IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE [MMMMMMH] DET [P P P P P P] Ref Offset 8.24 dB Ref 20.00 dBm ΔMkr1 1.040 MHz -0.156 dB 10 dB/div Log  Start 2.440500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.442500 GHz Sweep 1.000 ms (1001 pts) <table><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><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>1.040 MHz</td><td>(Δ)</td><td>-0.156 dB</td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.441 142 GHz</td><td></td><td>1.393 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS 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	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	1.040 MHz	(Δ)	-0.156 dB			2	F	f		2.441 142 GHz		1.393 dBm			3									4									5									6									7									8									9									10									11									8DPSK/HCH	Agilent Spectrum Analyzer - Swept SA RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 11:42:05 AM Oct 23, 2019 Center Freq 2.479500000 GHz PNO: Wide IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS Avg/Hold: 10/10 TRACE 1 2 3 4 5 6 TYPE [MMMMMMH] DET [P P P P P P] Ref Offset 8.24 dB Ref 20.00 dBm ΔMkr1 920 kHz -0.916 dB 10 dB/div Log  Start 2.478500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.480500 GHz Sweep 1.000 ms (1001 pts) <table><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><tr><td>1</td><td>Δ2</td><td>f</td><td>(Δ)</td><td>920 kHz</td><td>(Δ)</td><td>-0.916 dB</td><td></td><td></td></tr><tr><td>2</td><td>F</td><td>f</td><td></td><td>2.479 156 GHz</td><td></td><td>2.742 dBm</td><td></td><td></td></tr><tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>11</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> MSG STATUS 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	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ2	f	(Δ)	920 kHz	(Δ)	-0.916 dB			2	F	f		2.479 156 GHz		2.742 dBm			3									4									5									6									7									8									9									10									11								
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																																																																																																																																																																																		
1	Δ2	f	(Δ)	1.040 MHz	(Δ)	-0.156 dB																																																																																																																																																																																																																					
2	F	f		2.441 142 GHz		1.393 dBm																																																																																																																																																																																																																					
3																																																																																																																																																																																																																											
4																																																																																																																																																																																																																											
5																																																																																																																																																																																																																											
6																																																																																																																																																																																																																											
7																																																																																																																																																																																																																											
8																																																																																																																																																																																																																											
9																																																																																																																																																																																																																											
10																																																																																																																																																																																																																											
11																																																																																																																																																																																																																											
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																																																																																																																																																																																																			
1	Δ2	f	(Δ)	920 kHz	(Δ)	-0.916 dB																																																																																																																																																																																																																					
2	F	f		2.479 156 GHz		2.742 dBm																																																																																																																																																																																																																					
3																																																																																																																																																																																																																											
4																																																																																																																																																																																																																											
5																																																																																																																																																																																																																											
6																																																																																																																																																																																																																											
7																																																																																																																																																																																																																											
8																																																																																																																																																																																																																											
9																																																																																																																																																																																																																											
10																																																																																																																																																																																																																											
11																																																																																																																																																																																																																											

A.4 Hopping Channel Number

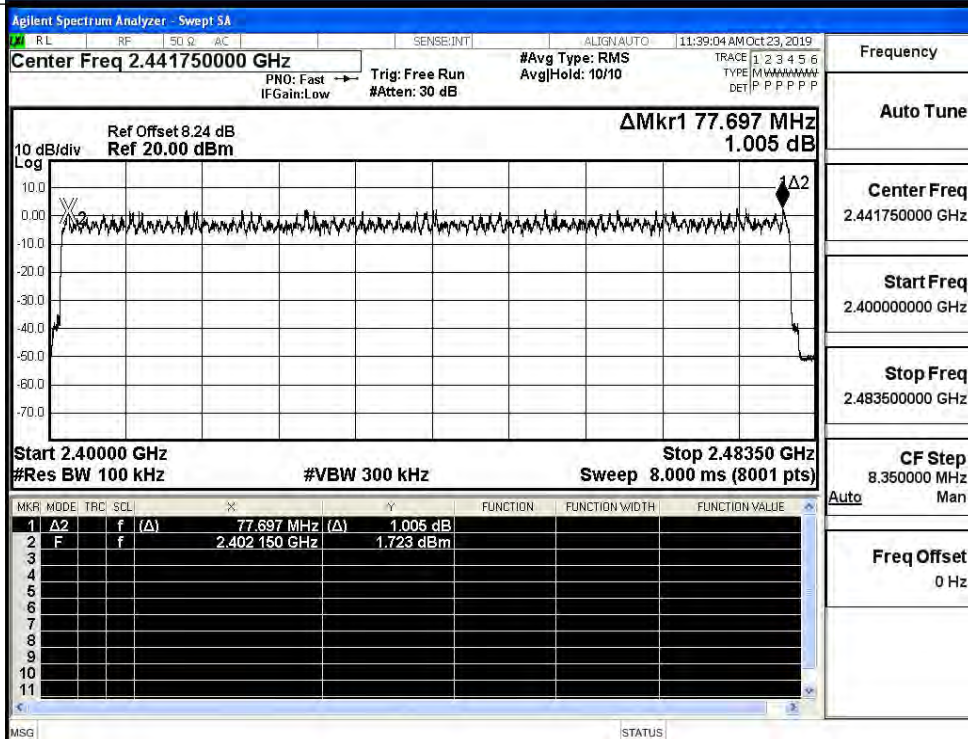
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

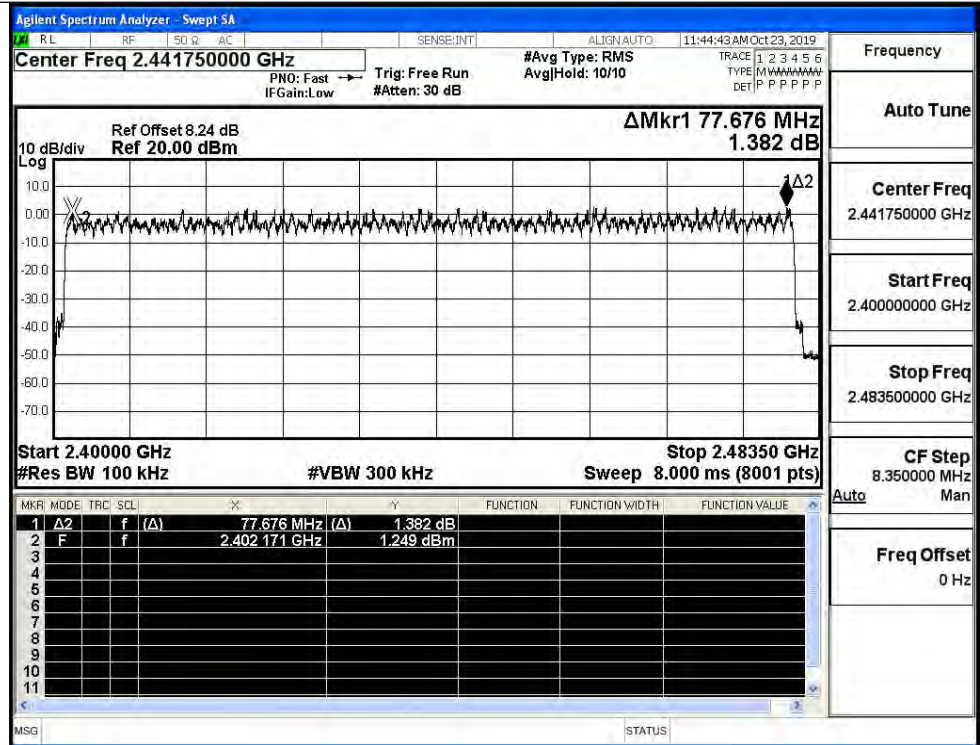
GFSK/Hop



π/4DQPSK/Hop



8DPSK/Hop

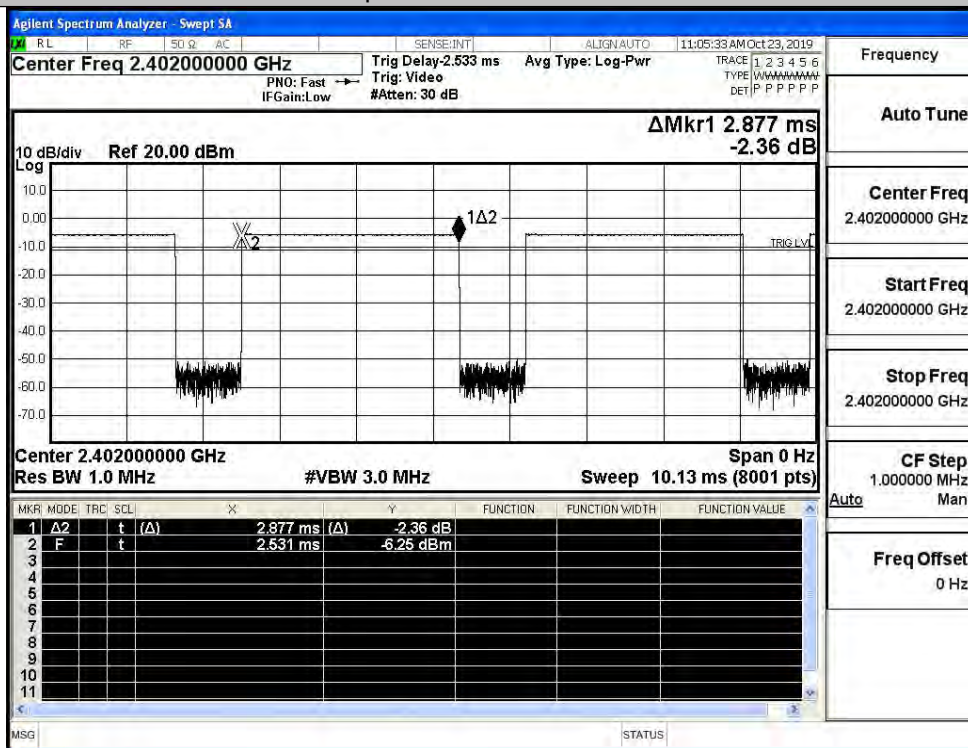


A.5 Dwell Time

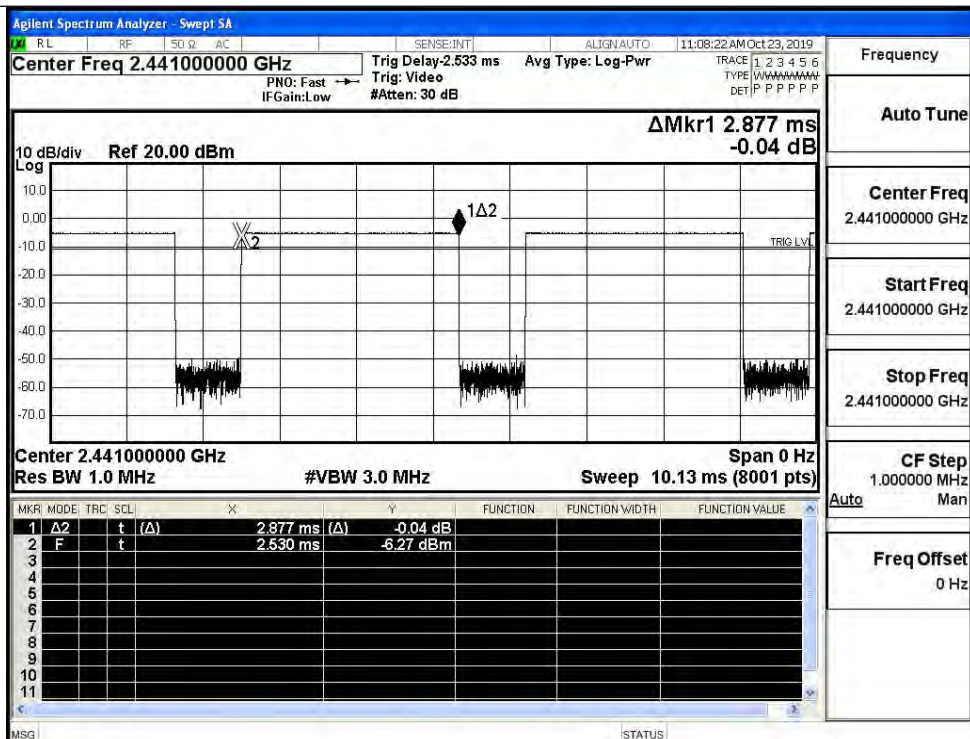
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.307	0.4	PASS
	3DH5	MCH	2.88	106.7	0.307	0.4	PASS
	3DH5	HCH	2.88	106.7	0.307	0.4	PASS

Test Graphs

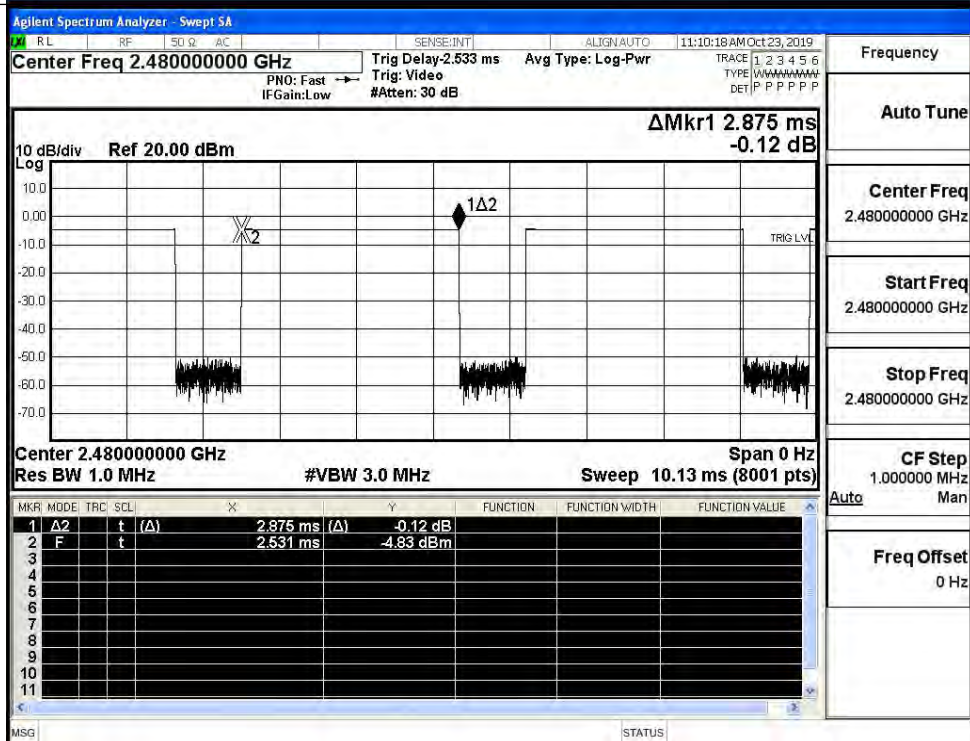
GFSK_DH5/LCH



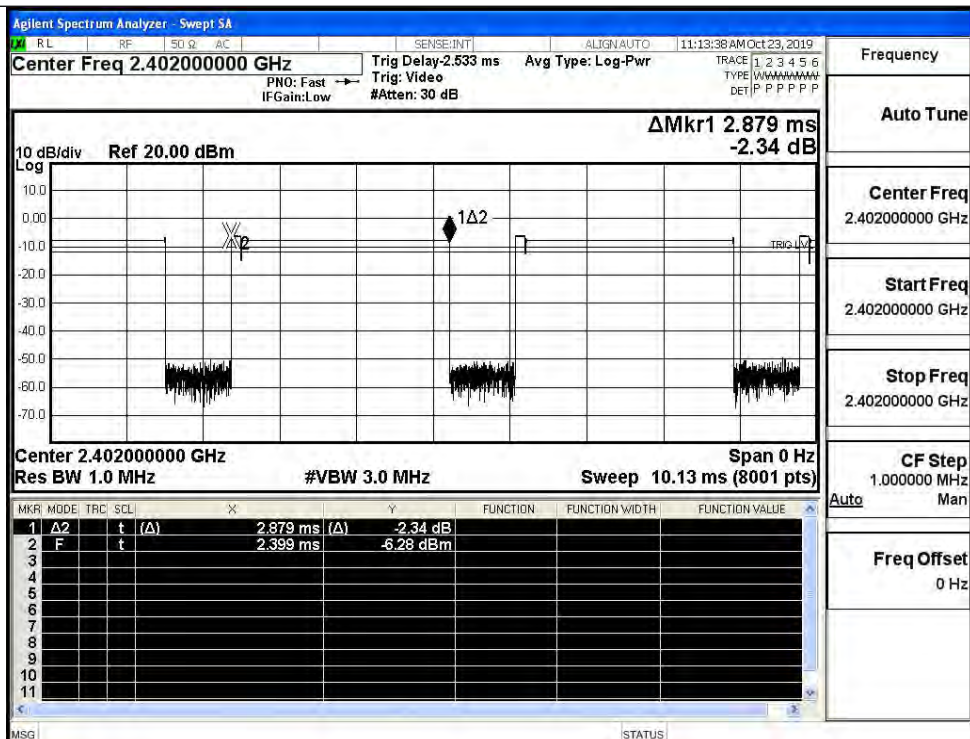
GFSK_DH5/MCH



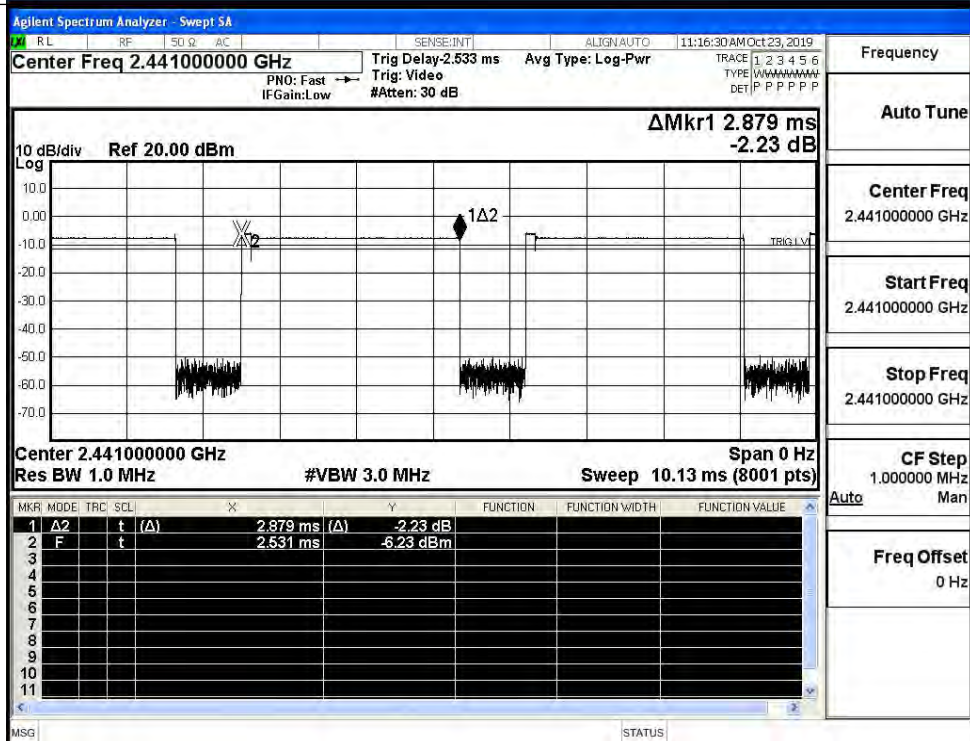
GFSK_DH5/HCH



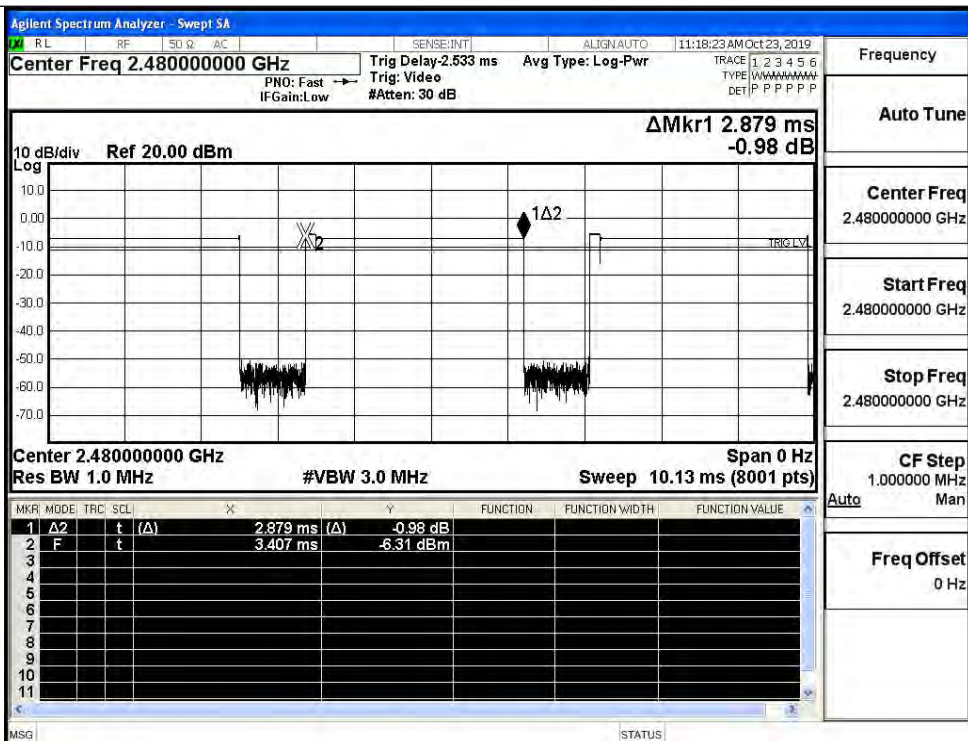
$\pi/4$ DQPSK
_2DH5/LCH



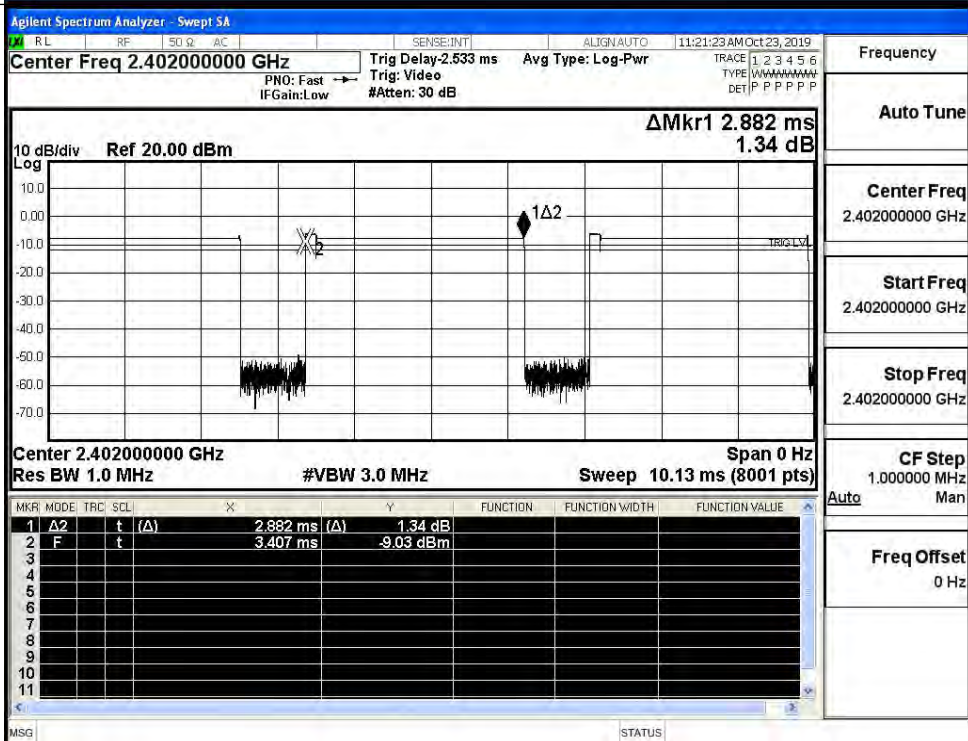
$\pi/4$ DQPSK
_2DH5/MCH



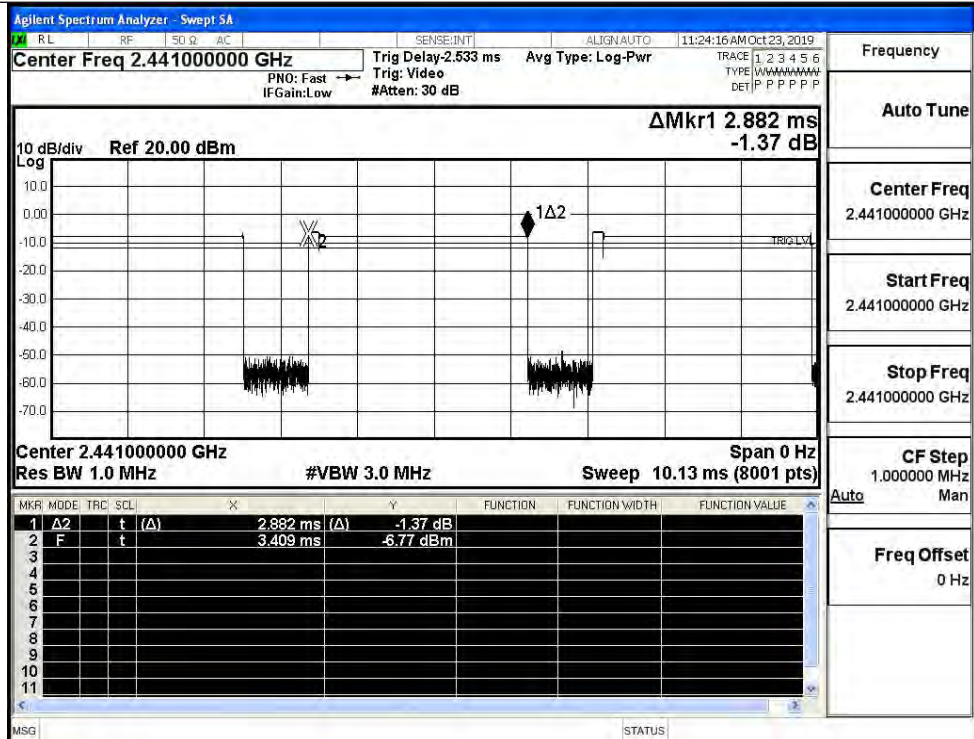
$\pi/4$ DQPSK
_2DH5/HCH



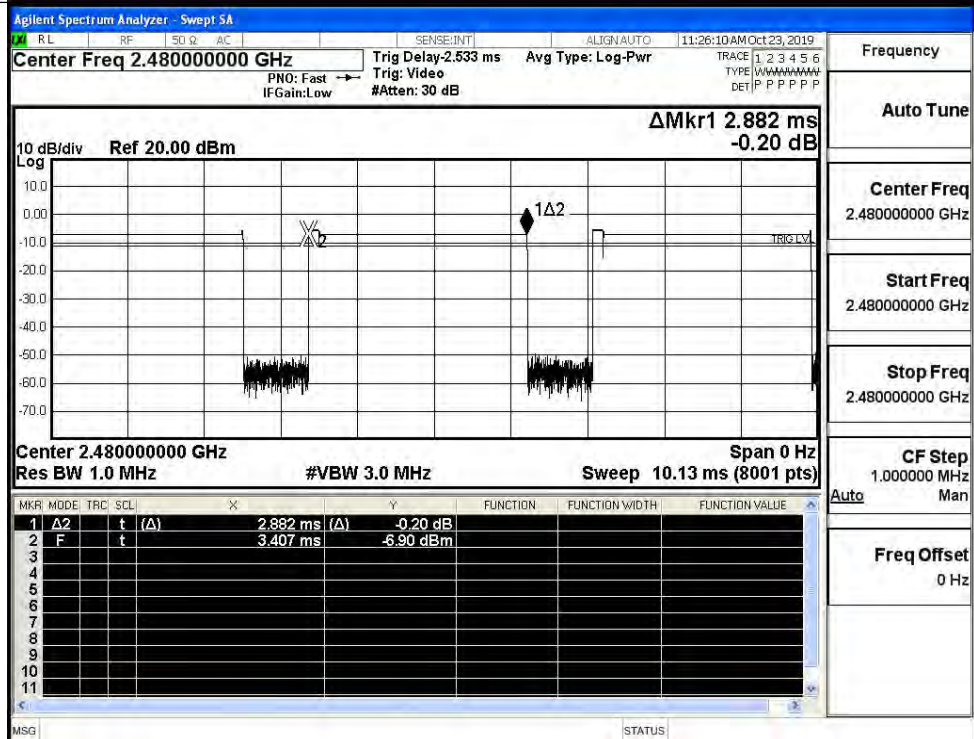
8DPSK_3DH5/LCH



8DPSK_3DH5/MCH



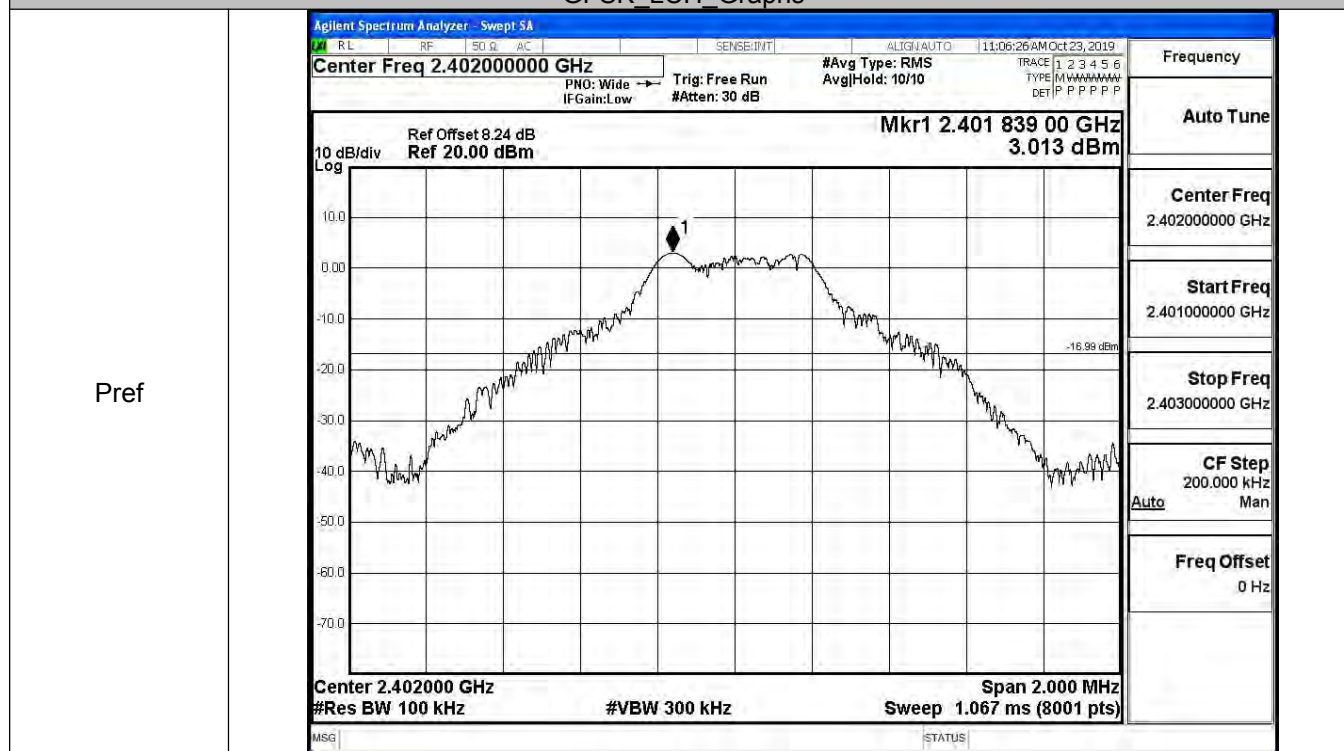
8DPSK_3DH5/HCH



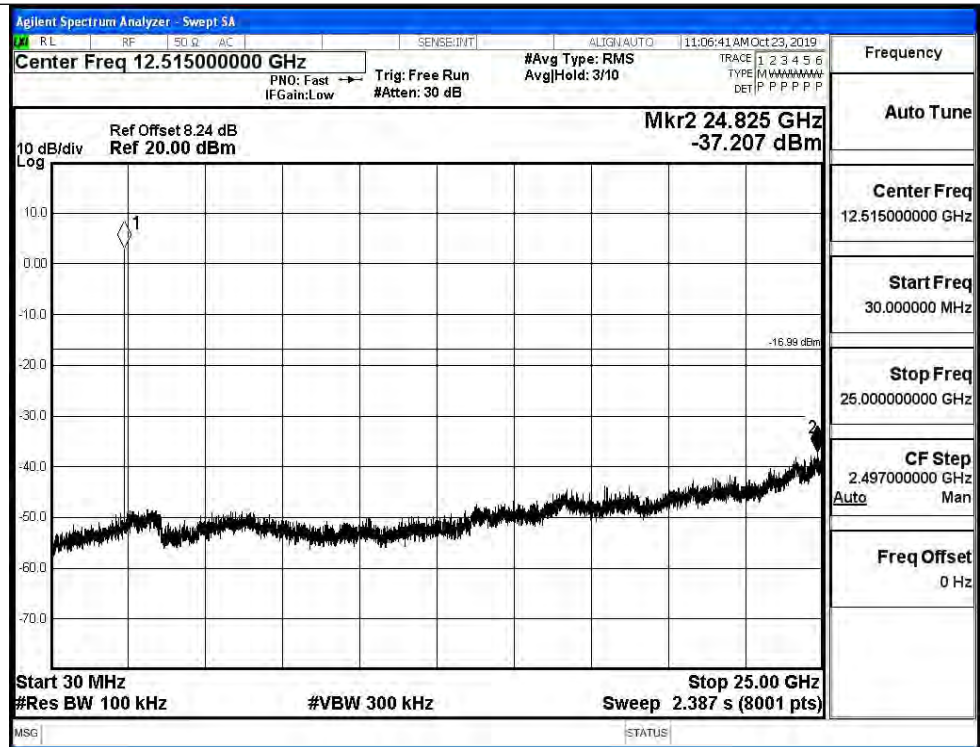
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.013	-37.207	-16.987	PASS
	MCH	3.191	-37.599	-16.809	PASS
	HCH	3.796	-37.541	-16.204	PASS
$\pi/4$ DQPSK	LCH	2.028	-37.560	-17.972	PASS
	MCH	2.009	-36.929	-17.991	PASS
	HCH	2.603	-37.830	-17.397	PASS
8DPSK	LCH	1.875	-36.727	-18.125	PASS
	MCH	1.961	-37.228	-18.039	PASS
	HCH	2.734	-36.660	-17.266	PASS

GFSK LCH Graphs

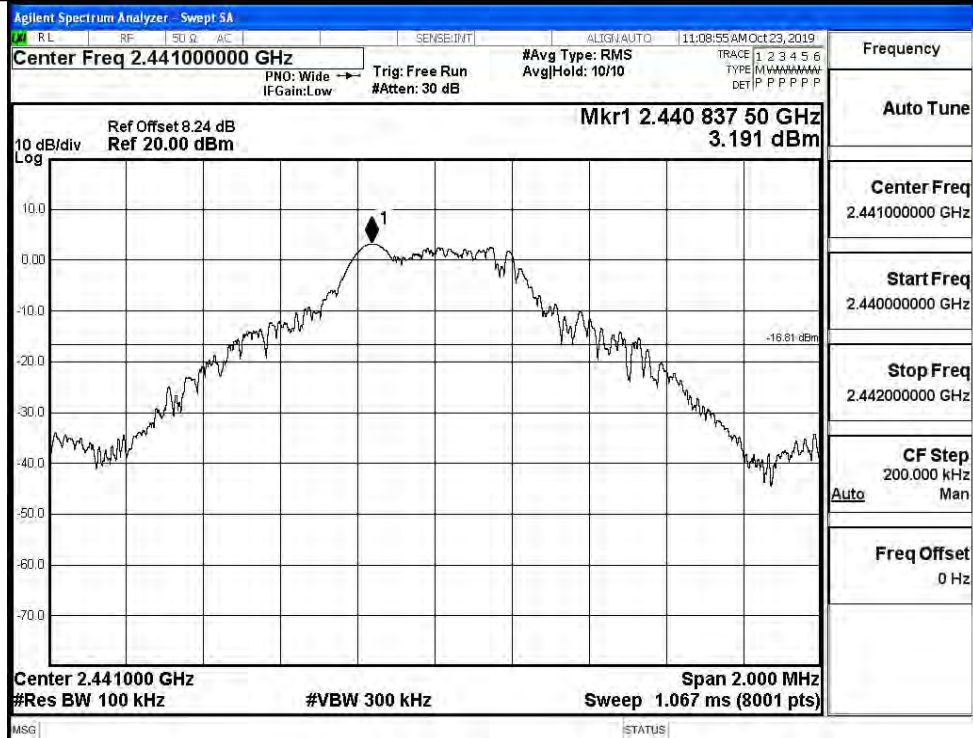


Puw

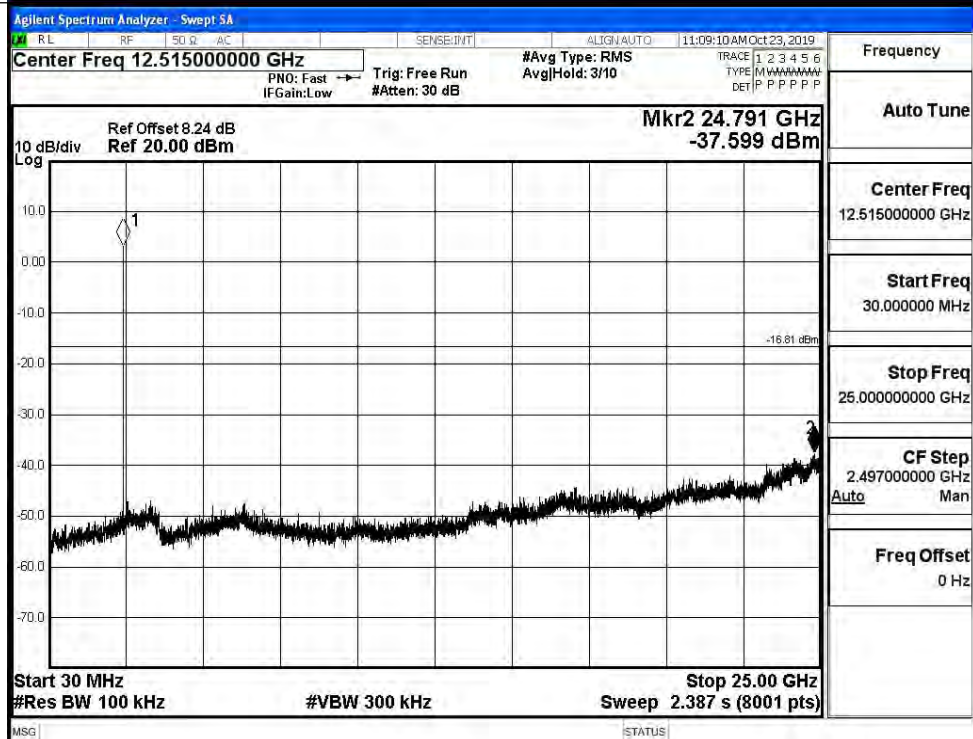


GFSK MCH_Graphs

Pref

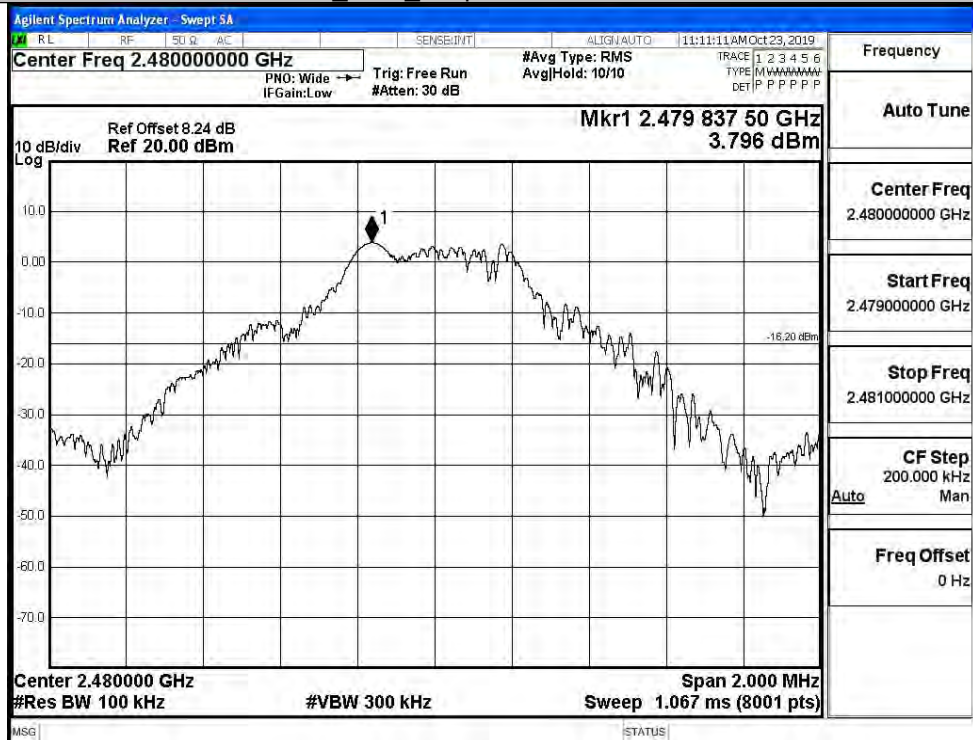


Puw

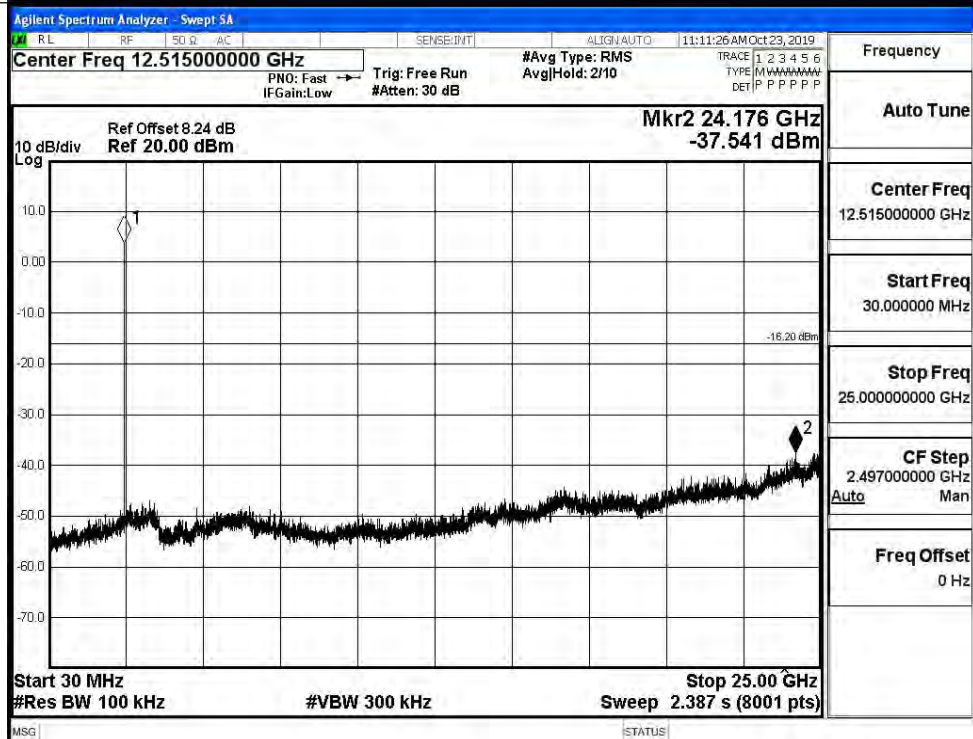


GFSK HCH Graphs

Pref

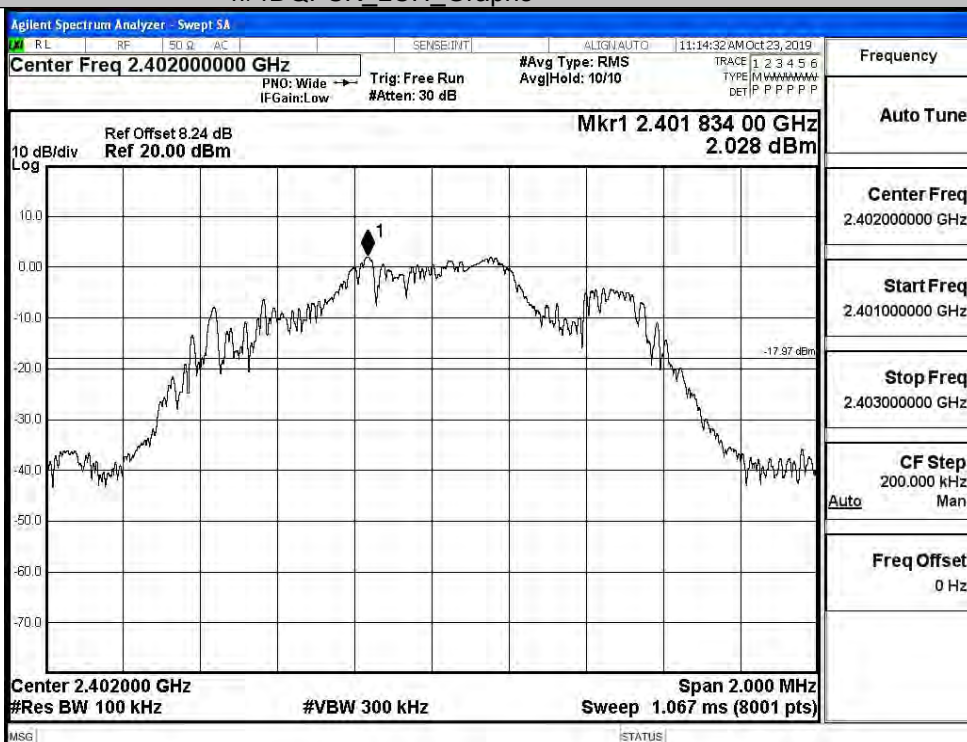


Puw



$\pi/4$ DQPSK LCH_Graphs

Pref

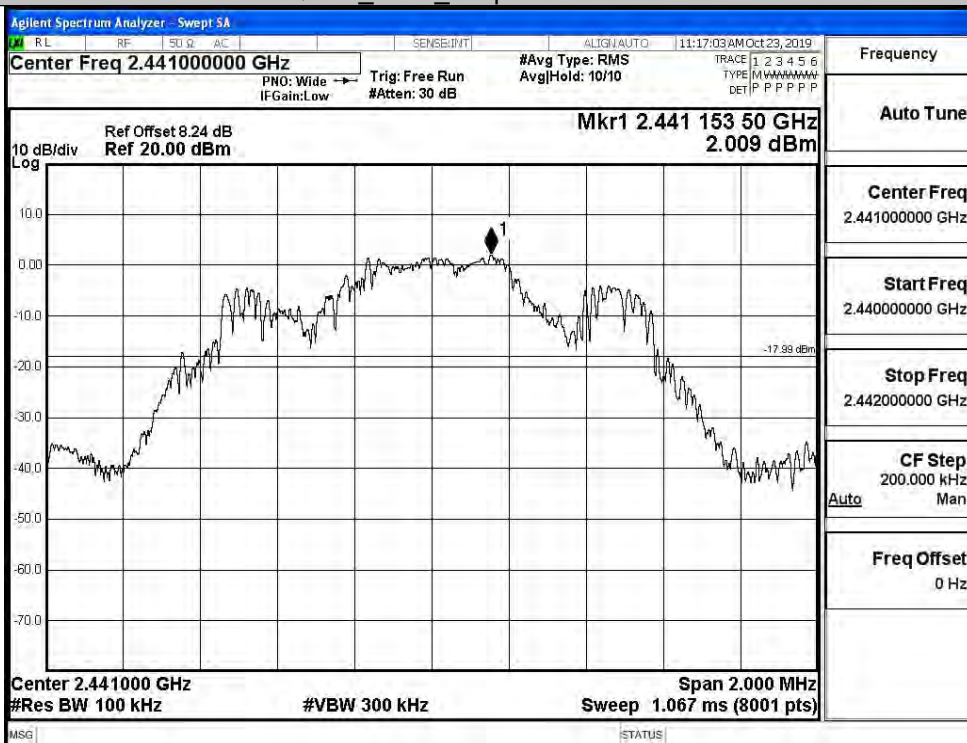


Puw

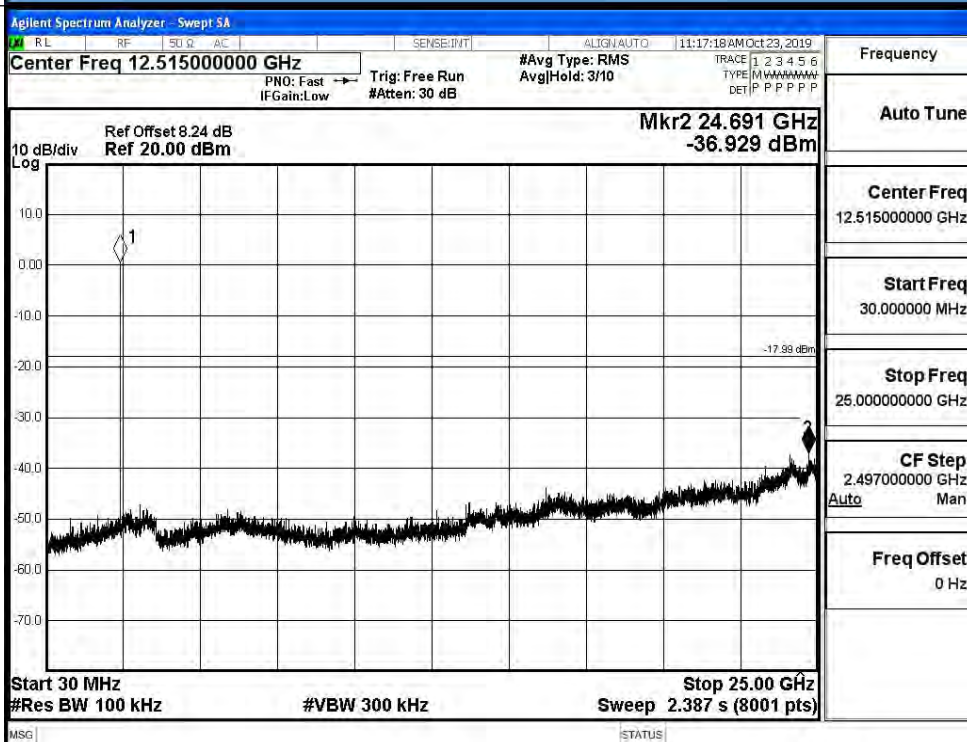


$\pi/4$ DQPSK_MCH_Graphs

Pref

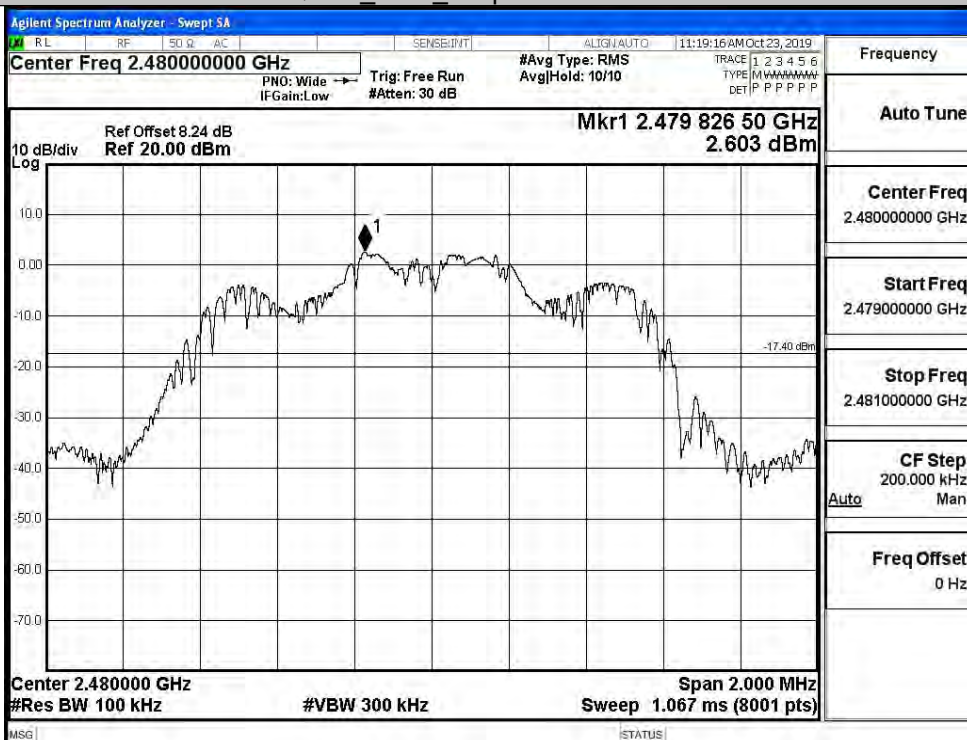


Puw

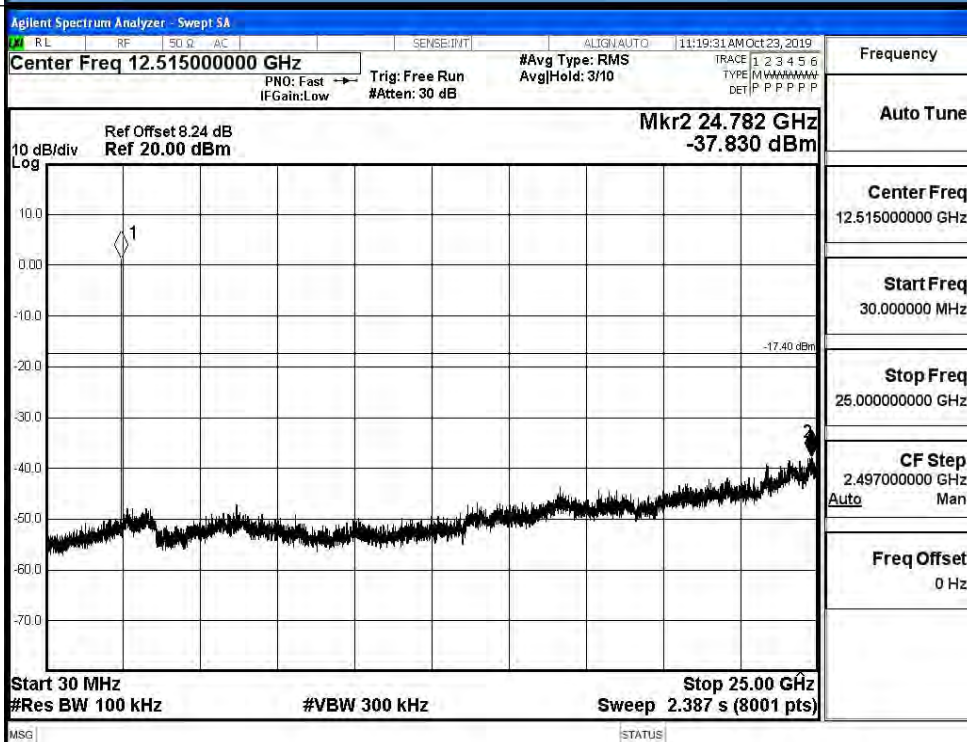


$\pi/4$ DQPSK HCH_Graphs

Pref

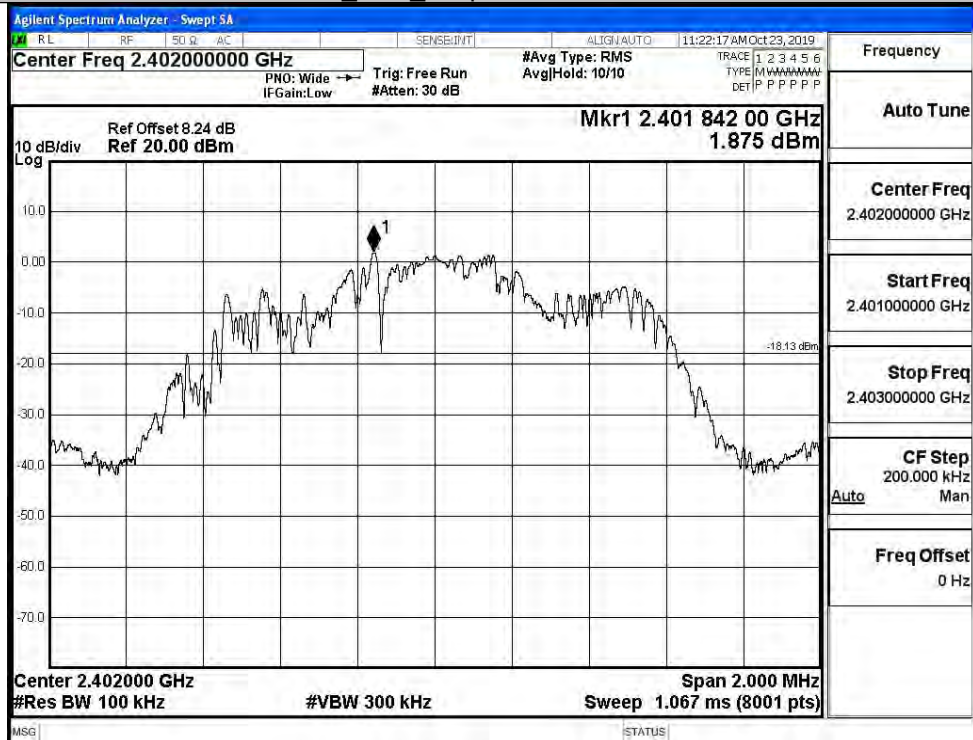


Puw



8DPSK_LCH_Graphs

Pref

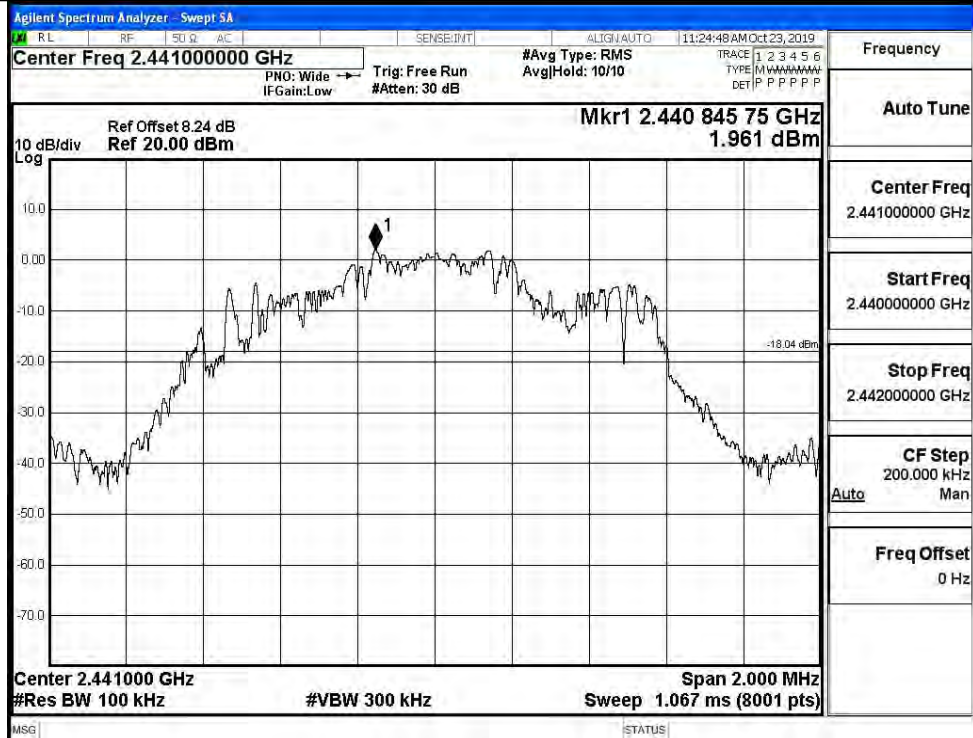


Puw

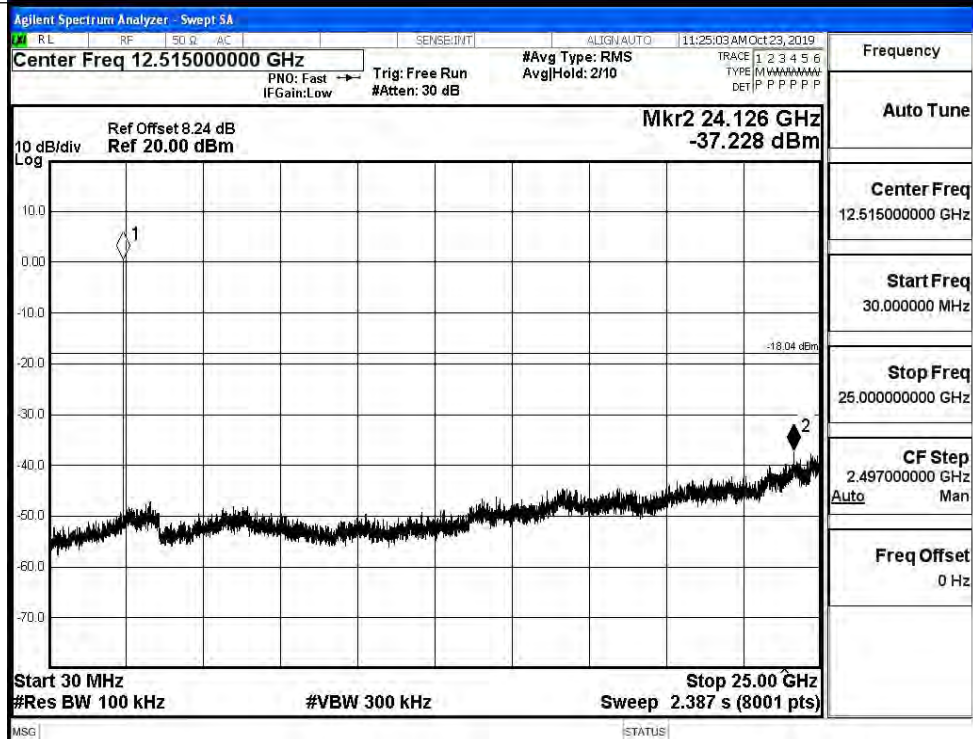


8DPSK MCH_Graphs

Pref

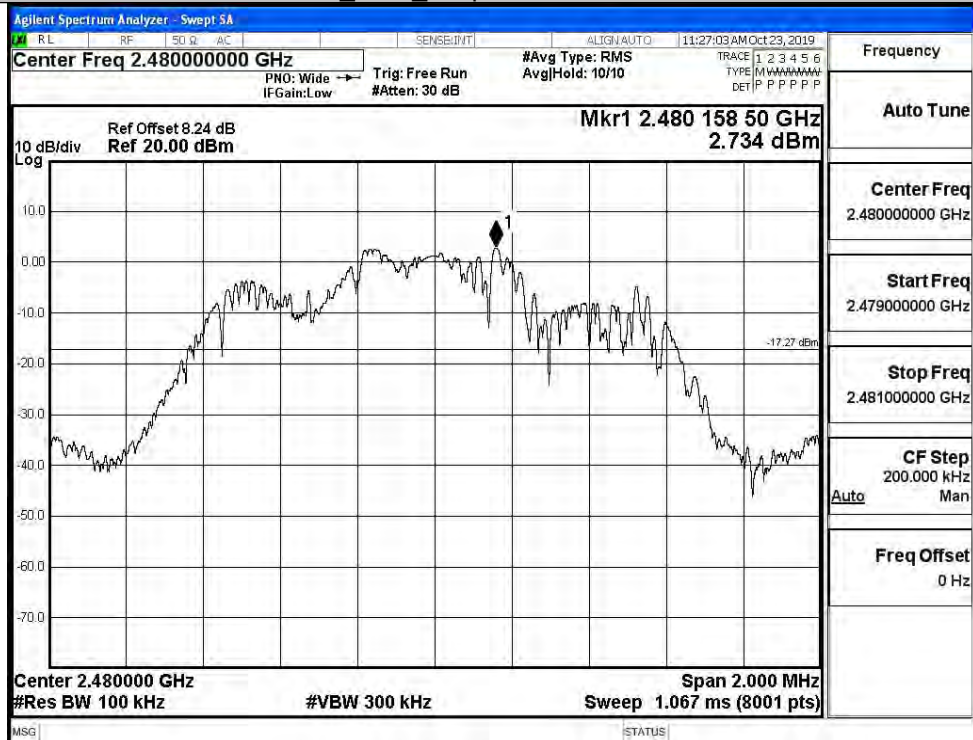


Puw

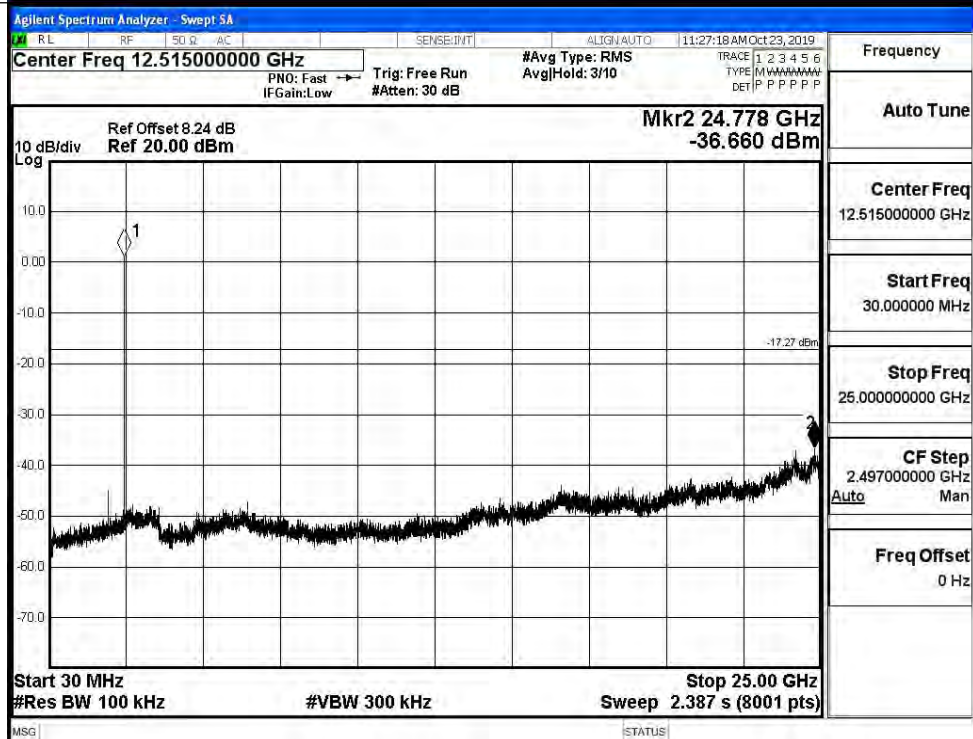


8DPSK_HCH_Graphs

Pref



Puw

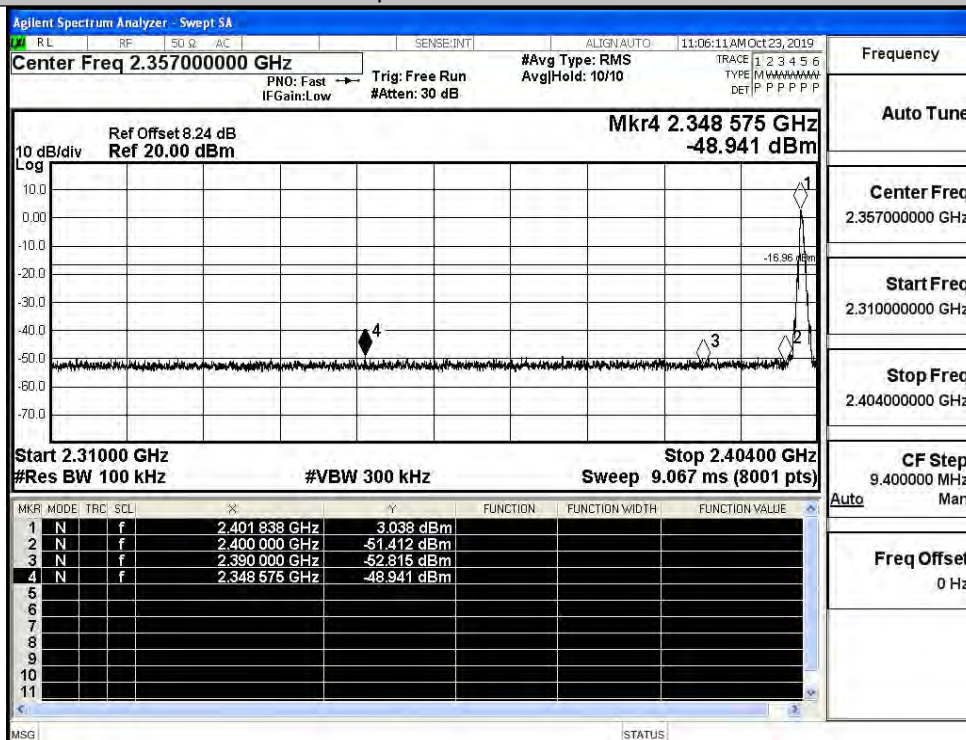


A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	3.038	Off	-48.941	-16.96	PASS
			3.126	On	-48.693	-16.87	PASS
	HCH	2480	3.821	Off	-48.077	-16.18	PASS
			3.664	On	-48.056	-16.34	PASS
π /4DQPSK	LCH	2402	1.720	Off	-48.811	-18.28	PASS
			1.979	On	-48.076	-18.02	PASS
	HCH	2480	2.786	Off	-48.133	-17.21	PASS
			2.627	On	-47.936	-17.37	PASS
8DPSK	LCH	2402	1.952	Off	-48.538	-18.05	PASS
			2.063	On	-48.608	-17.94	PASS
	HCH	2480	2.729	Off	-48.886	-17.27	PASS
			2.814	On	-48.315	-17.19	PASS

Test Graphs

GFSK/LCH/No Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

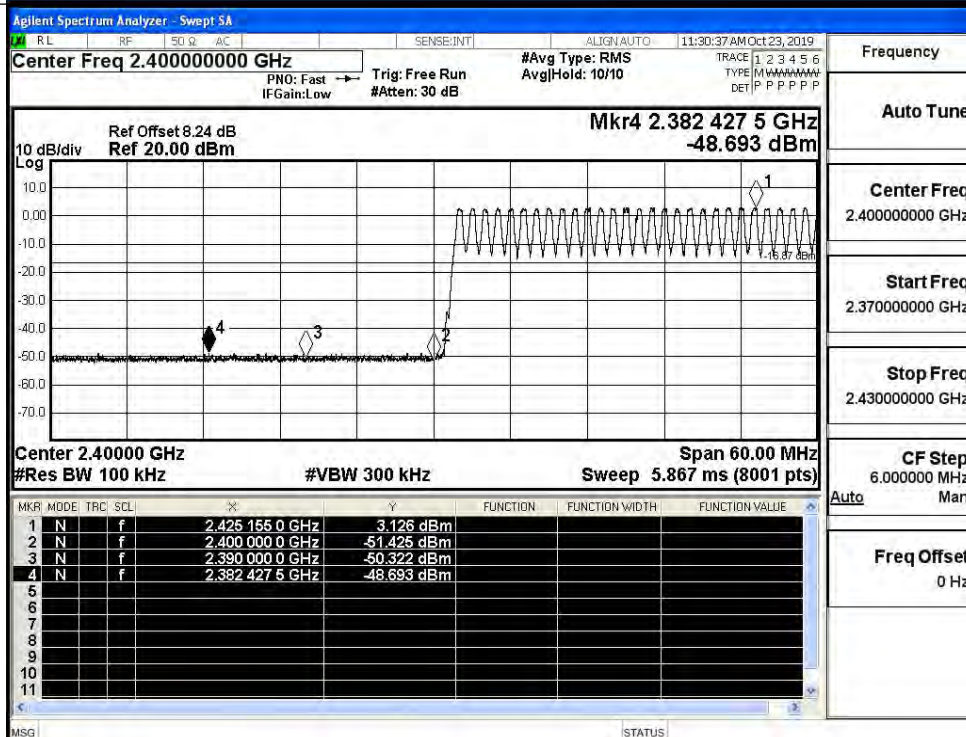
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Man

Freq Offset
0 Hz

GFSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

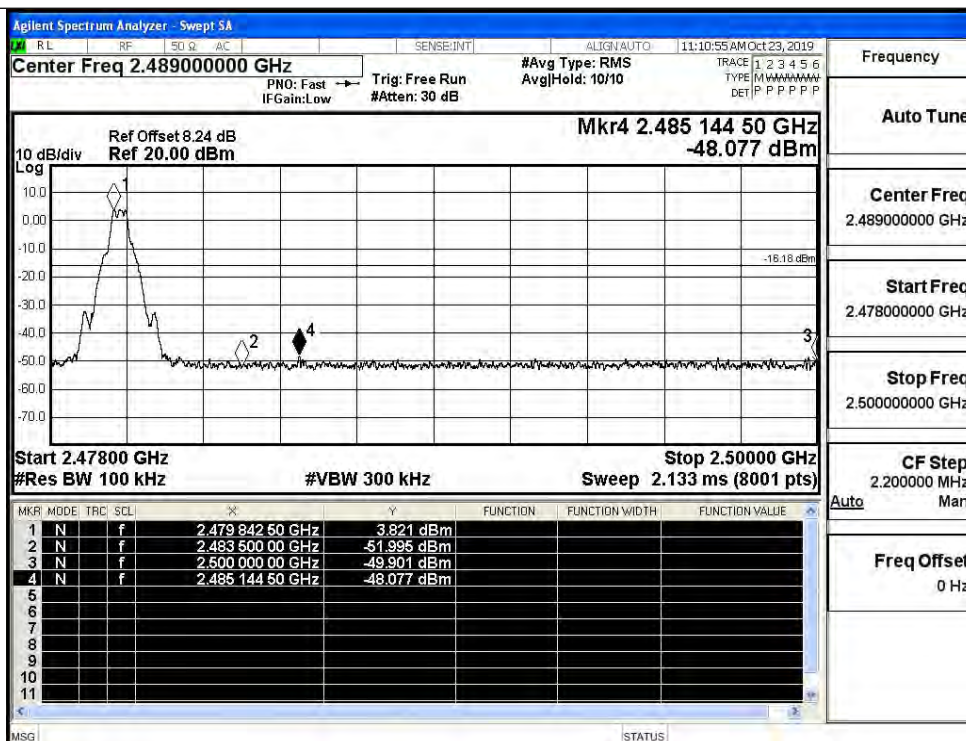
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

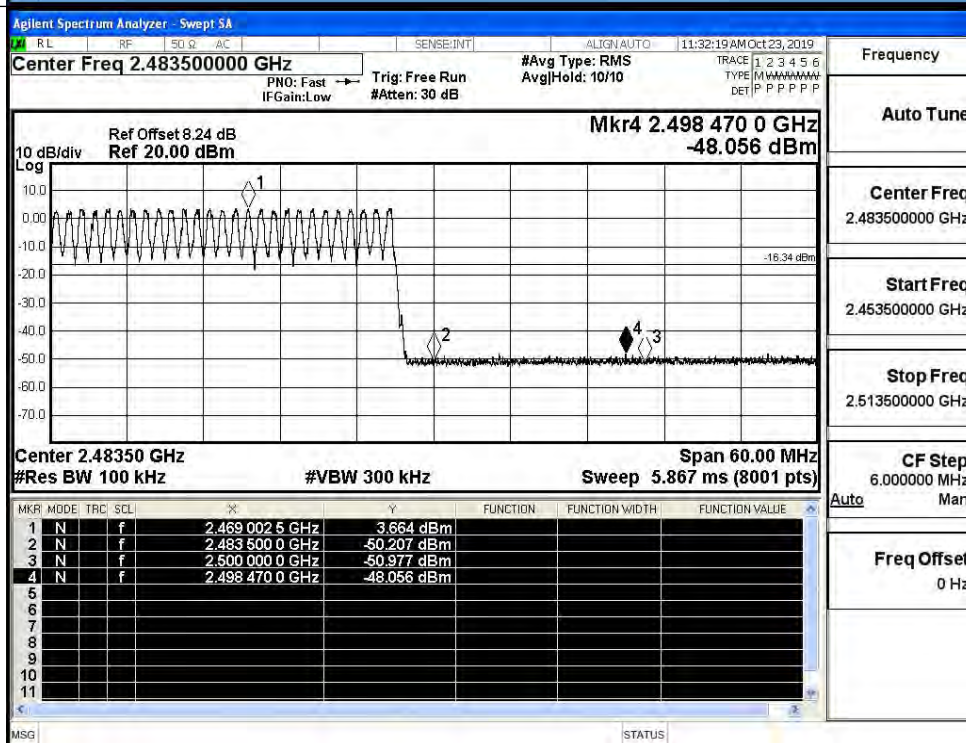
CF Step
6.000000 MHz
Man

Freq Offset
0 Hz

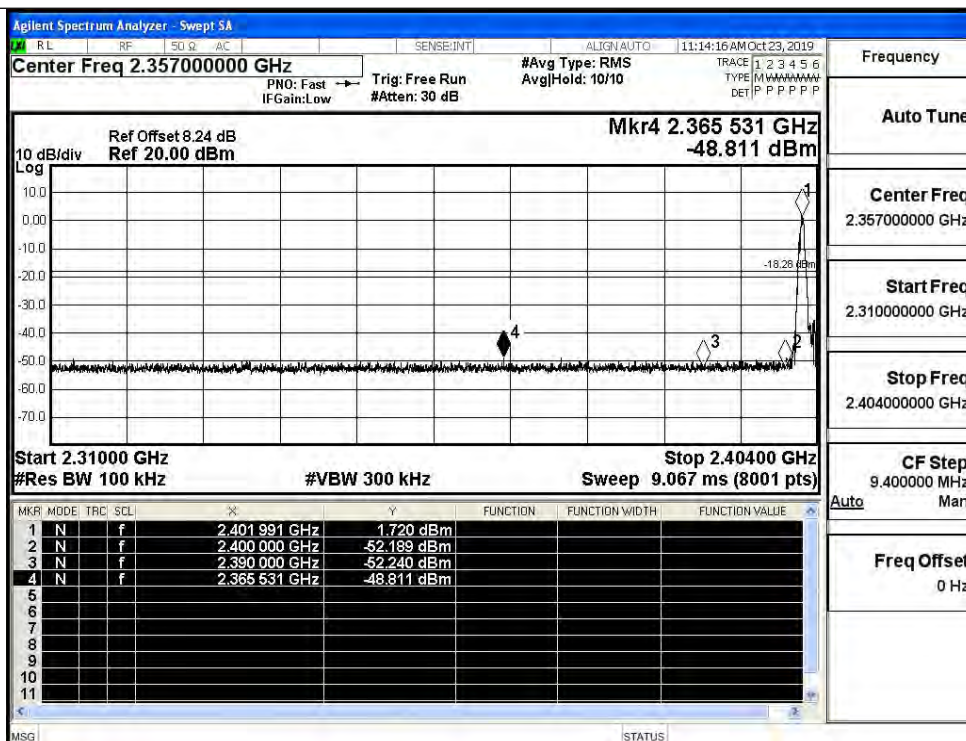
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

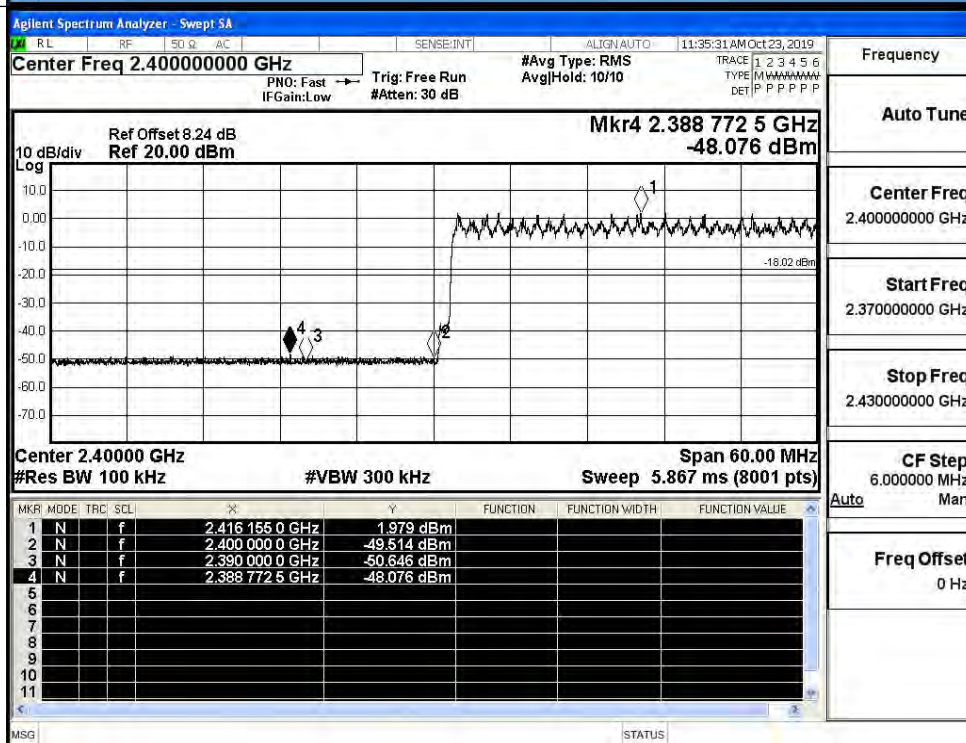
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq
2.400000000 GHz

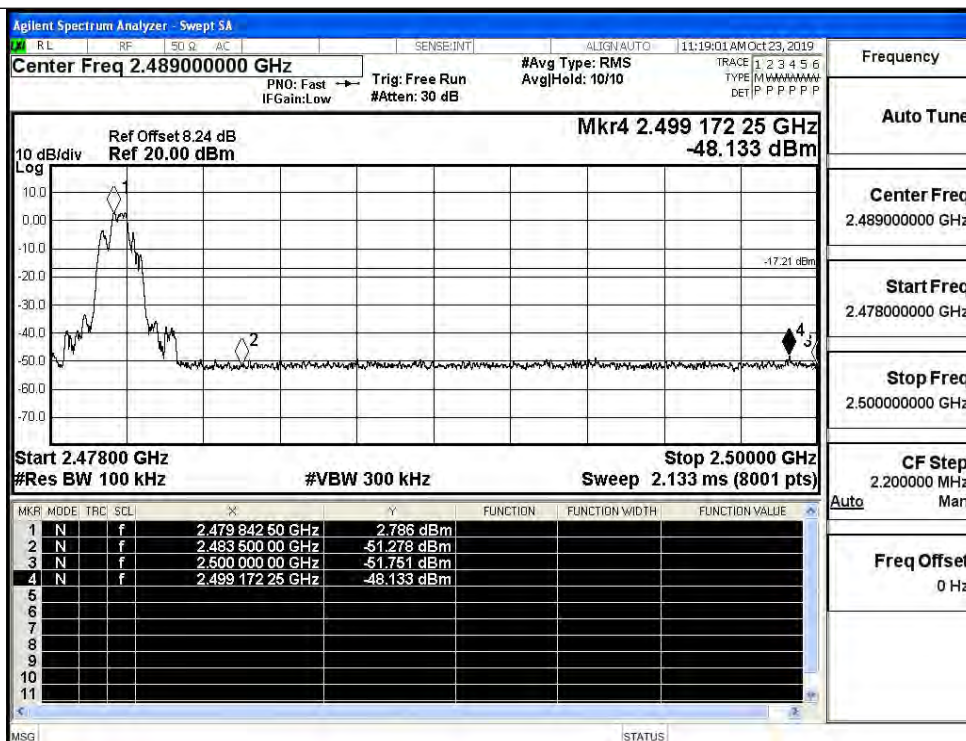
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

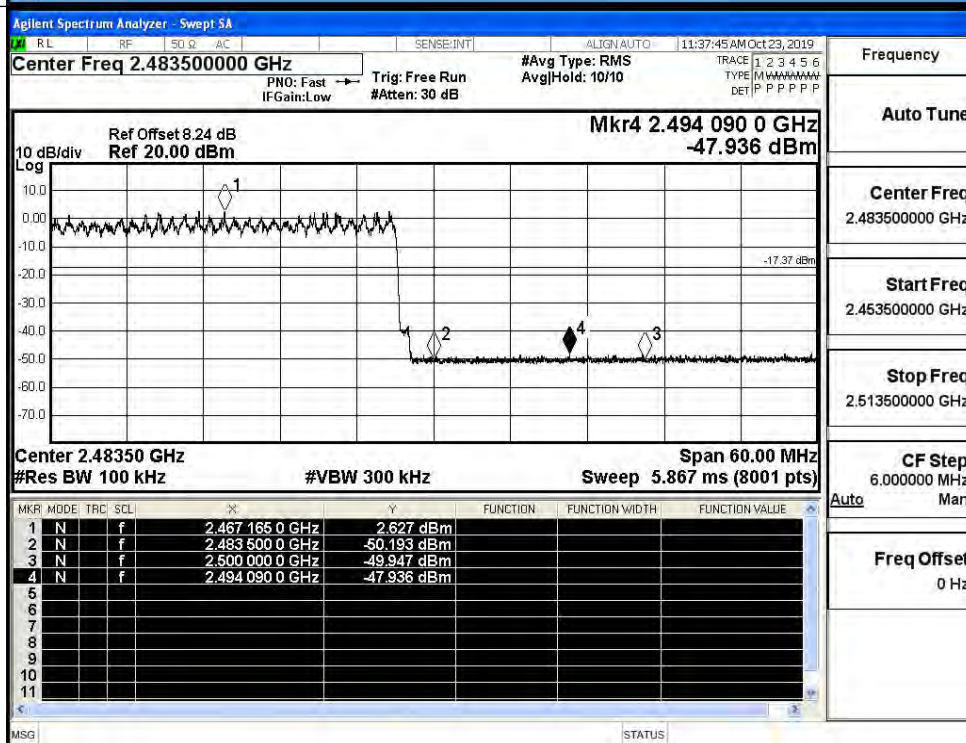
Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

CF Step
2.200000 MHz
Auto Man

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

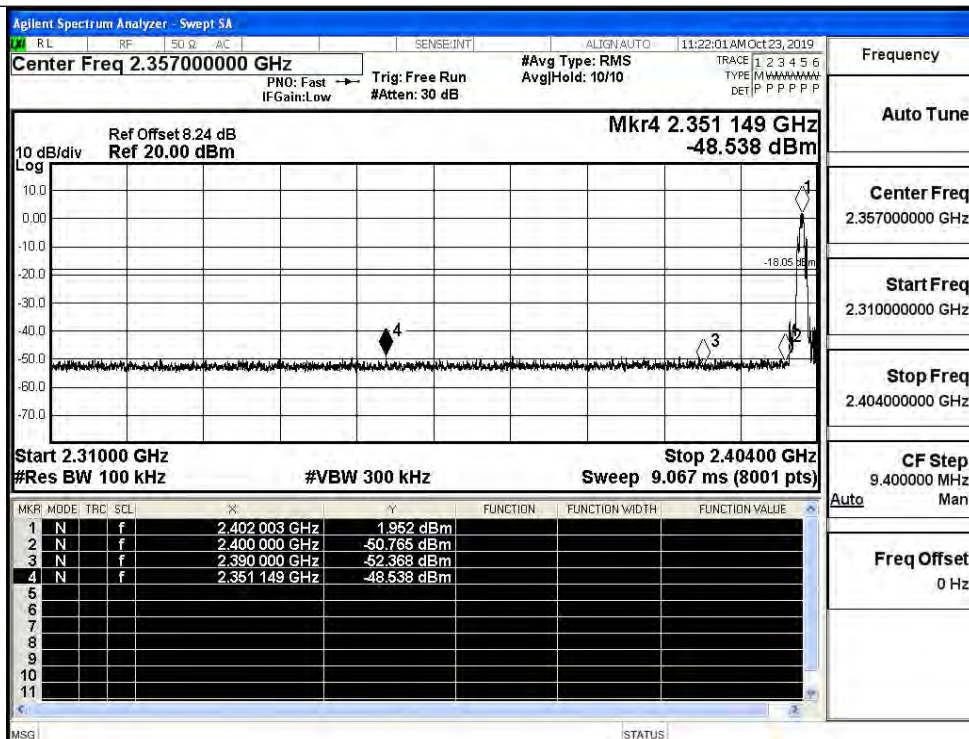
Start Freq
2.463500000 GHz

Stop Freq
2.513500000 GHz

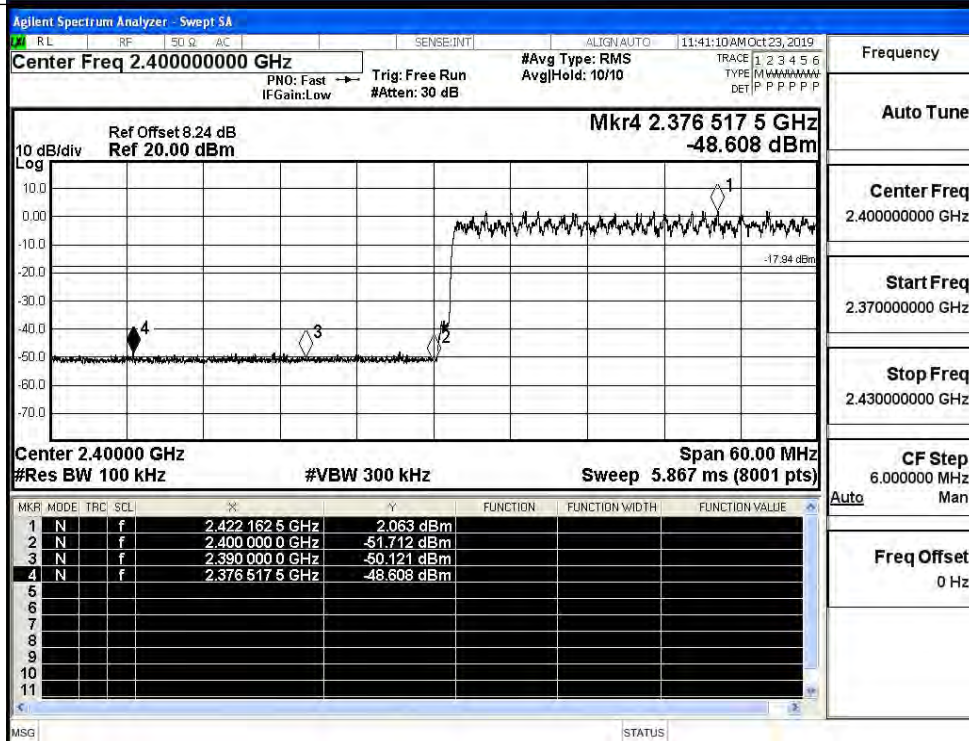
CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

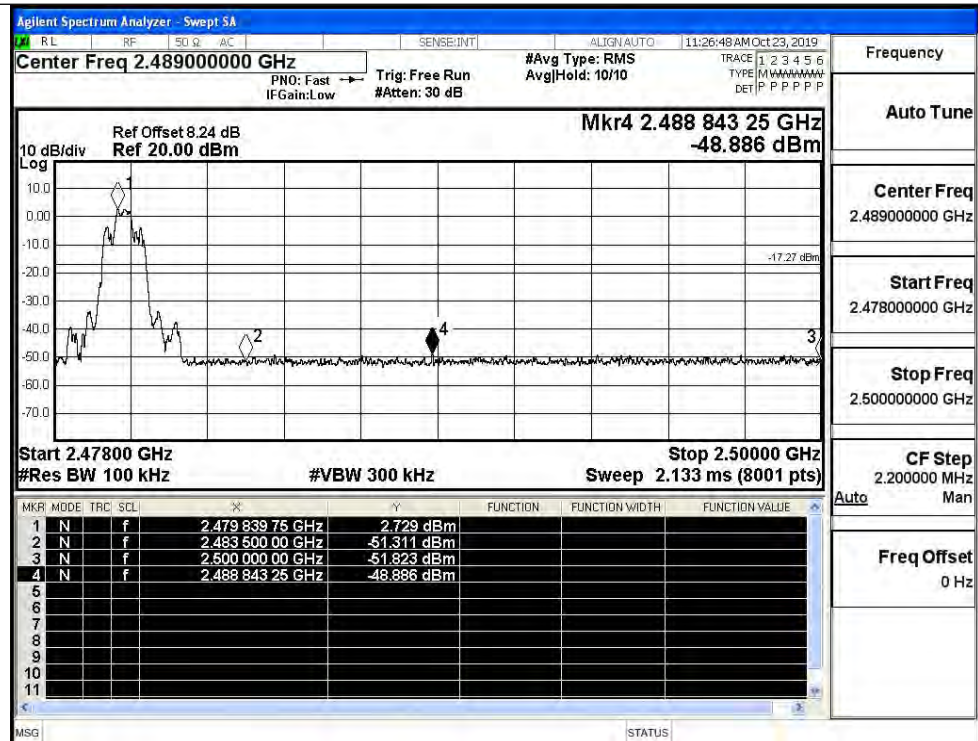
8DPSK/LCH/No Hop



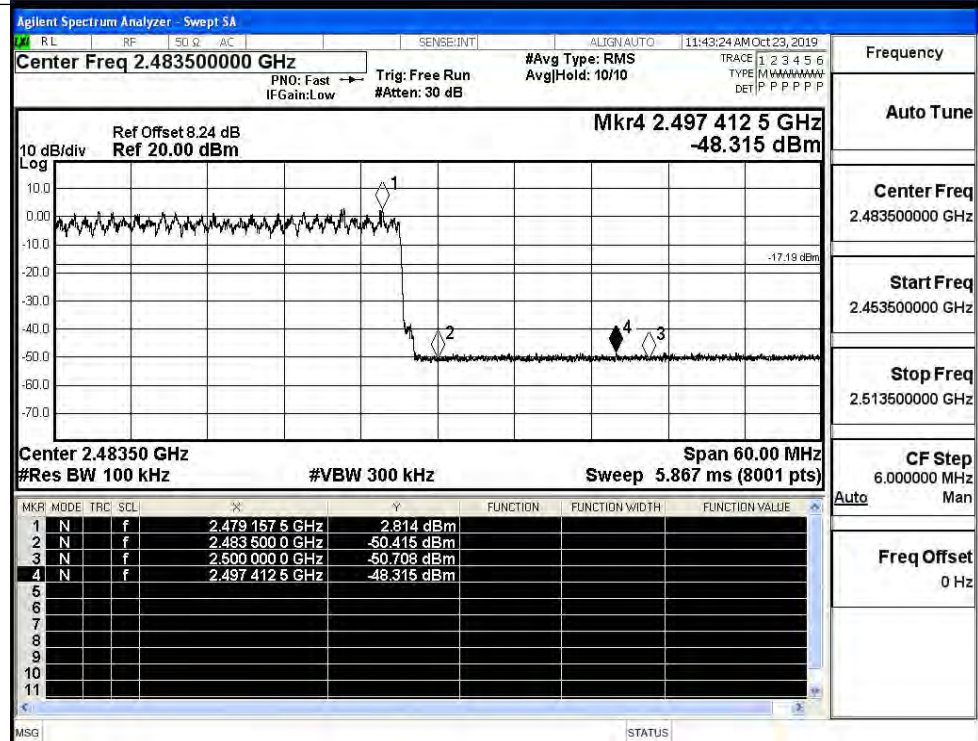
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



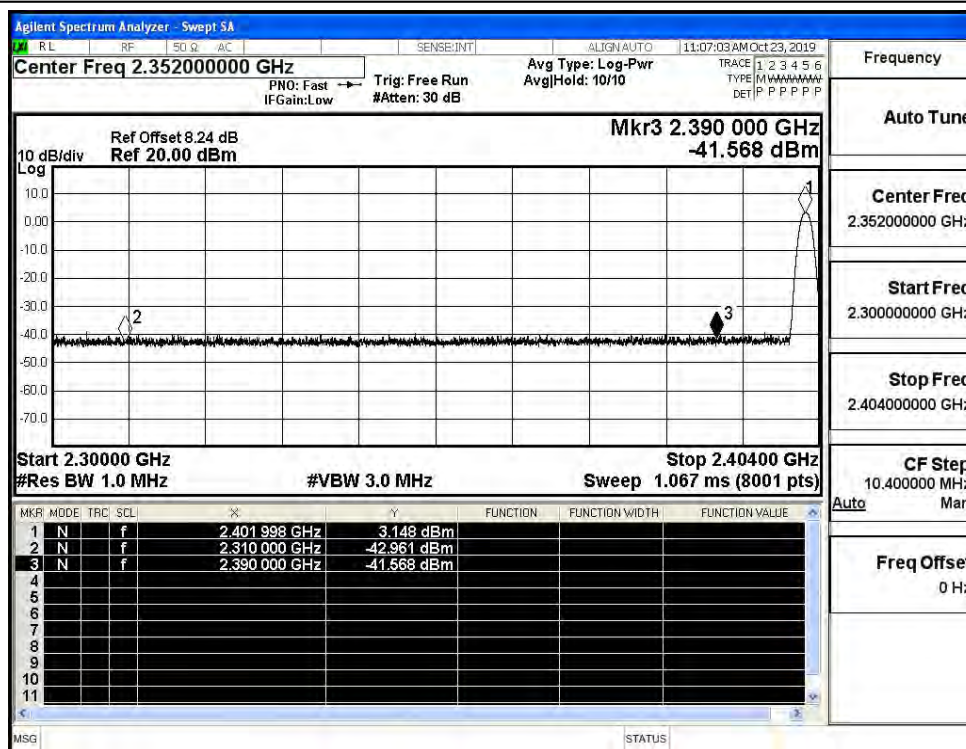
8DPSK/HCH/Hop



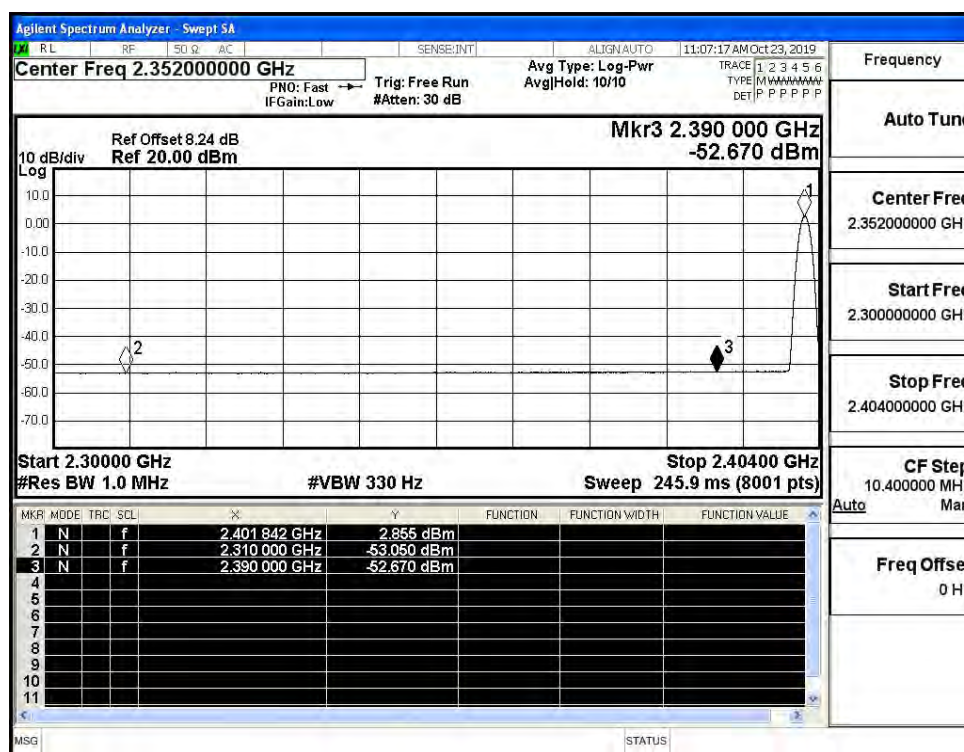
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.96	2.0	0	52.30	PEAK	74	PASS
	Off	2310.0	-53.05	2.0	0	42.21	AV	54	PASS
	Off	2390.0	-41.57	2.0	0	53.69	PEAK	74	PASS
	Off	2390.0	-52.67	2.0	0	42.59	AV	54	PASS
	Off	2483.5	-41.34	2.0	0	53.92	PEAK	74	PASS
	Off	2483.5	-52.08	2.0	0	43.18	AV	54	PASS
	Off	2500.0	-41.65	2.0	0	53.60	PEAK	74	PASS
	Off	2500.0	-51.97	2.0	0	43.29	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.09	2.0	0	53.17	PEAK	74	PASS
	Off	2310.0	-52.96	2.0	0	42.30	AV	54	PASS
	Off	2390.0	-43.03	2.0	0	52.23	PEAK	74	PASS
	Off	2390.0	-52.71	2.0	0	42.55	AV	54	PASS
	Off	2483.5	-42.46	2.0	0	52.80	PEAK	74	PASS
	Off	2483.5	-52.14	2.0	0	43.12	AV	54	PASS
	Off	2500.0	-40.42	2.0	0	54.84	PEAK	74	PASS
	Off	2500.0	-51.99	2.0	0	43.27	AV	54	PASS
8DPSK	Off	2310.0	-43.61	2.0	0	51.65	PEAK	74	PASS
	Off	2310.0	-53.06	2.0	0	42.20	AV	54	PASS
	Off	2390.0	-42.38	2.0	0	52.88	PEAK	74	PASS
	Off	2390.0	-52.66	2.0	0	42.60	AV	54	PASS
	Off	2483.5	-41.80	2.0	0	53.46	PEAK	74	PASS
	Off	2483.5	-52.16	2.0	0	43.10	AV	54	PASS
	Off	2500.0	-41.49	2.0	0	53.77	PEAK	74	PASS
	Off	2500.0	-51.90	2.0	0	43.35	AV	54	PASS

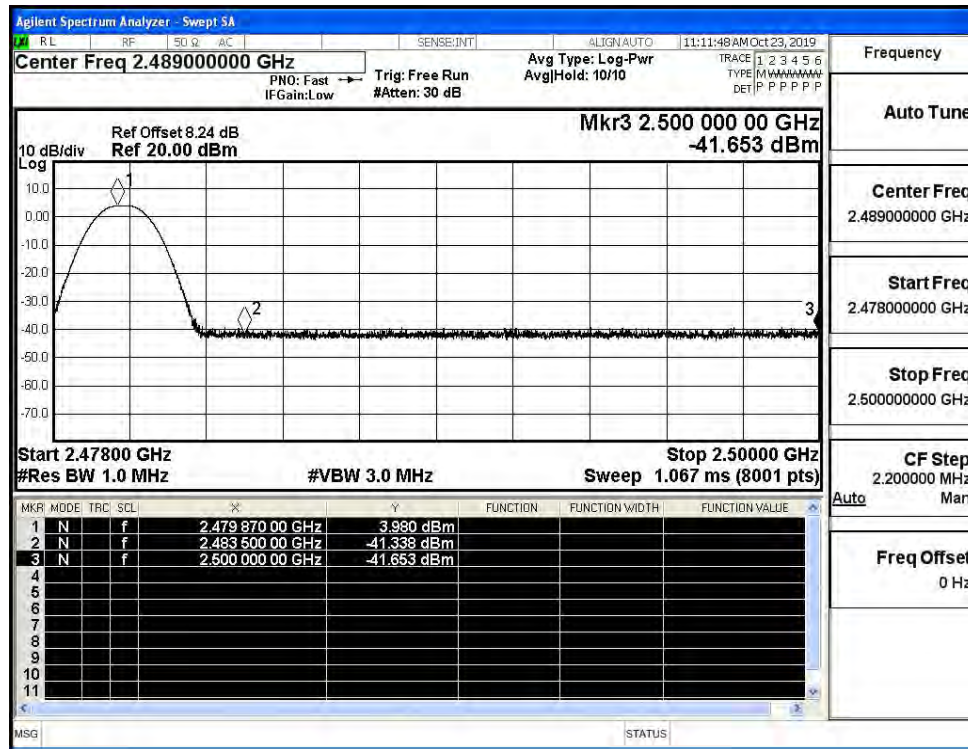
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



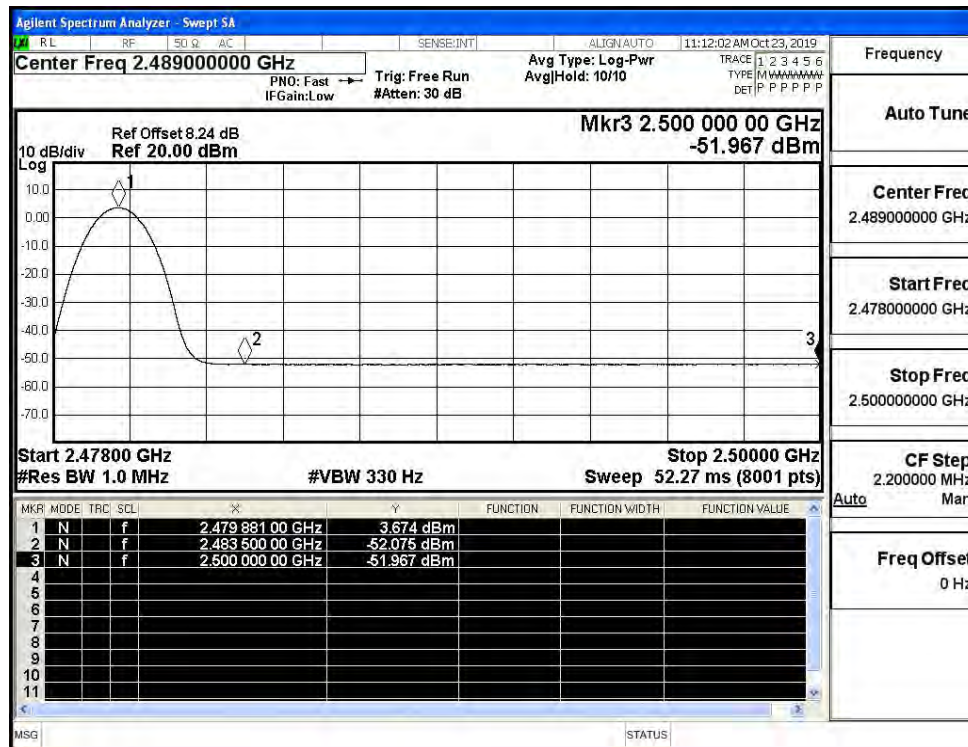
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



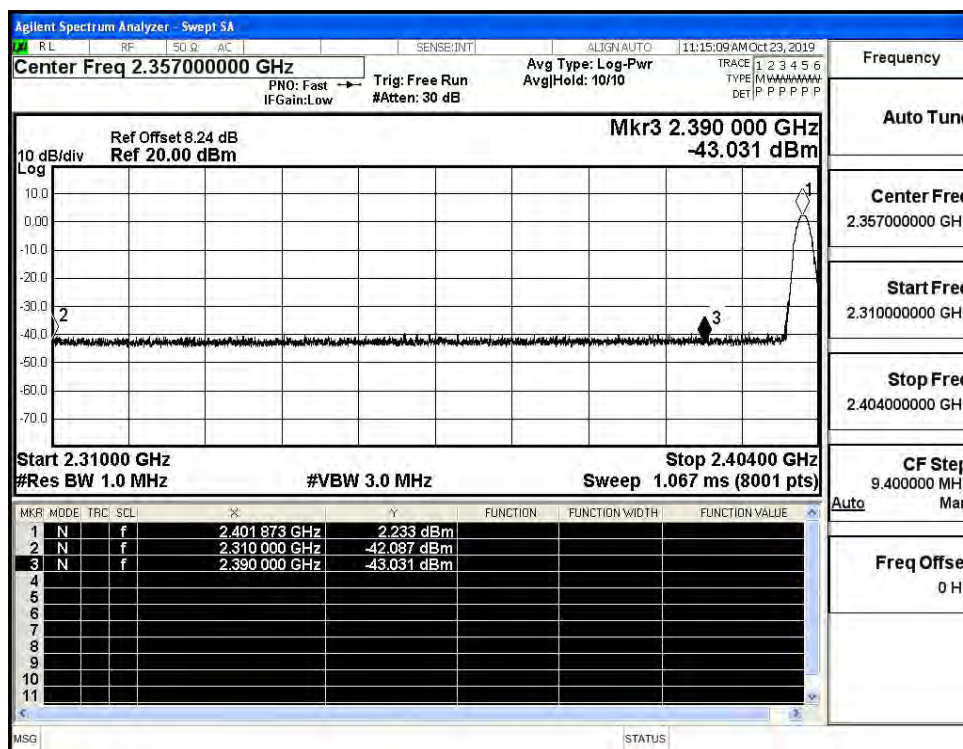
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



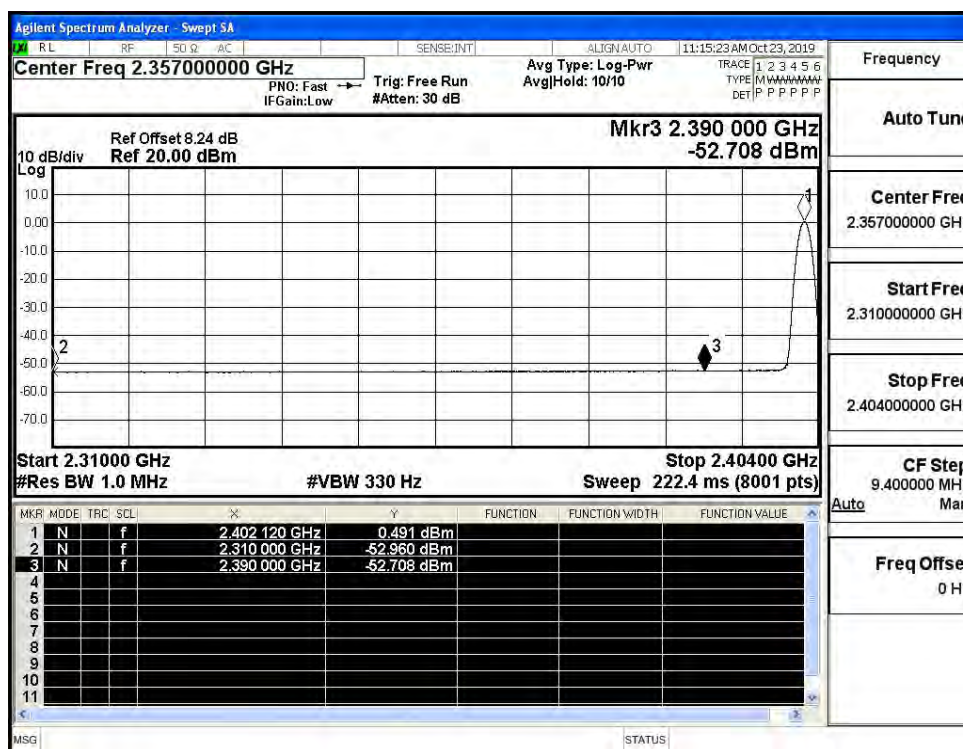
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



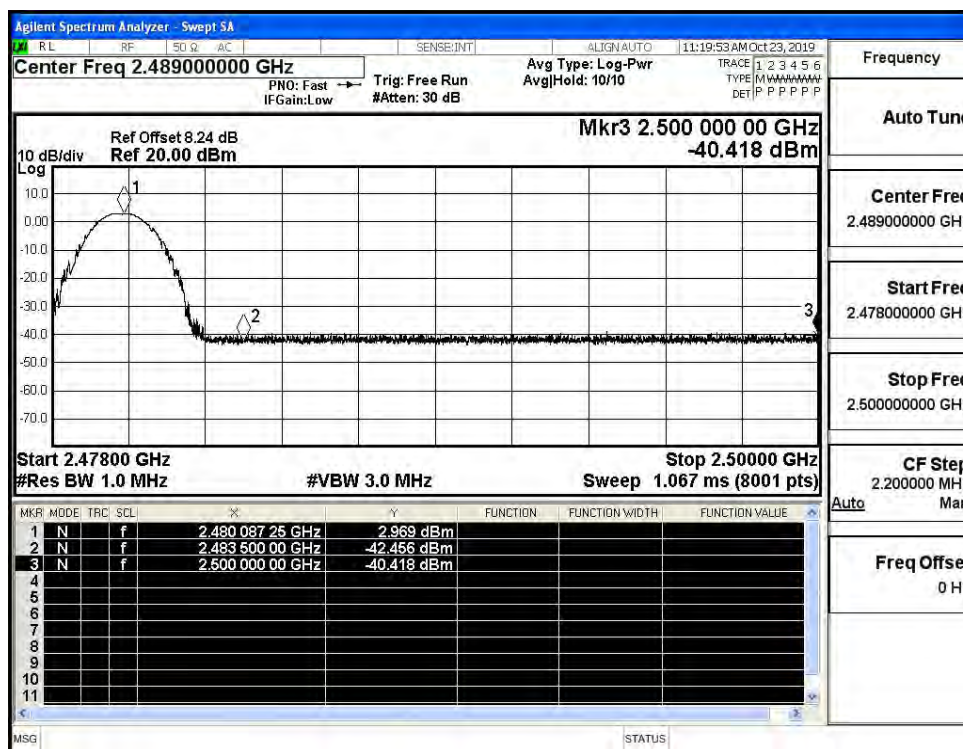
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



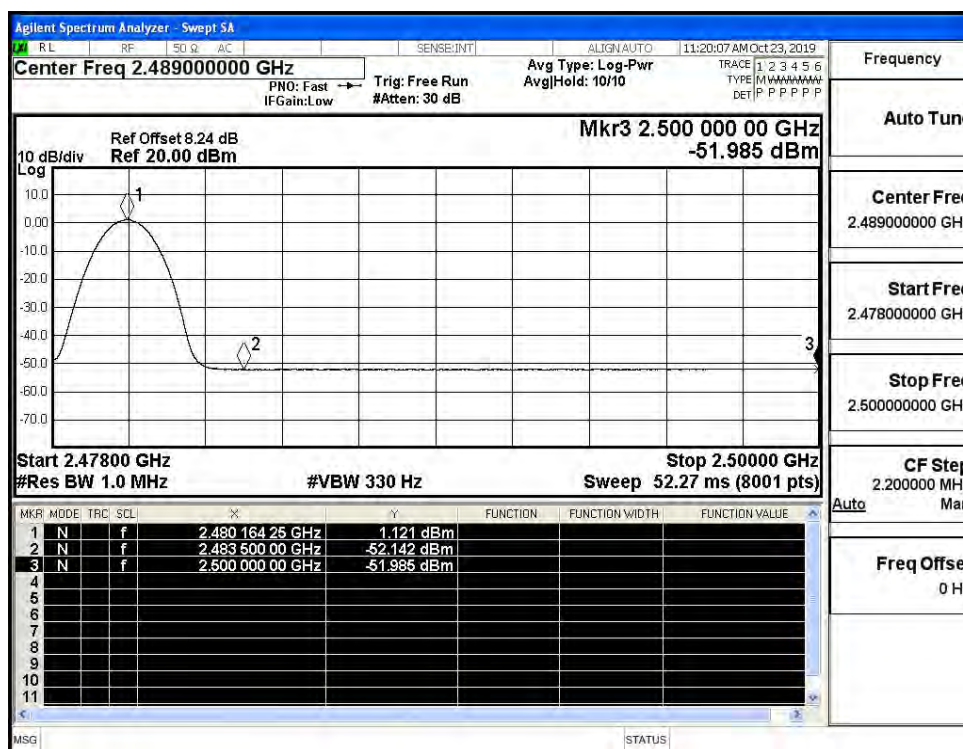
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



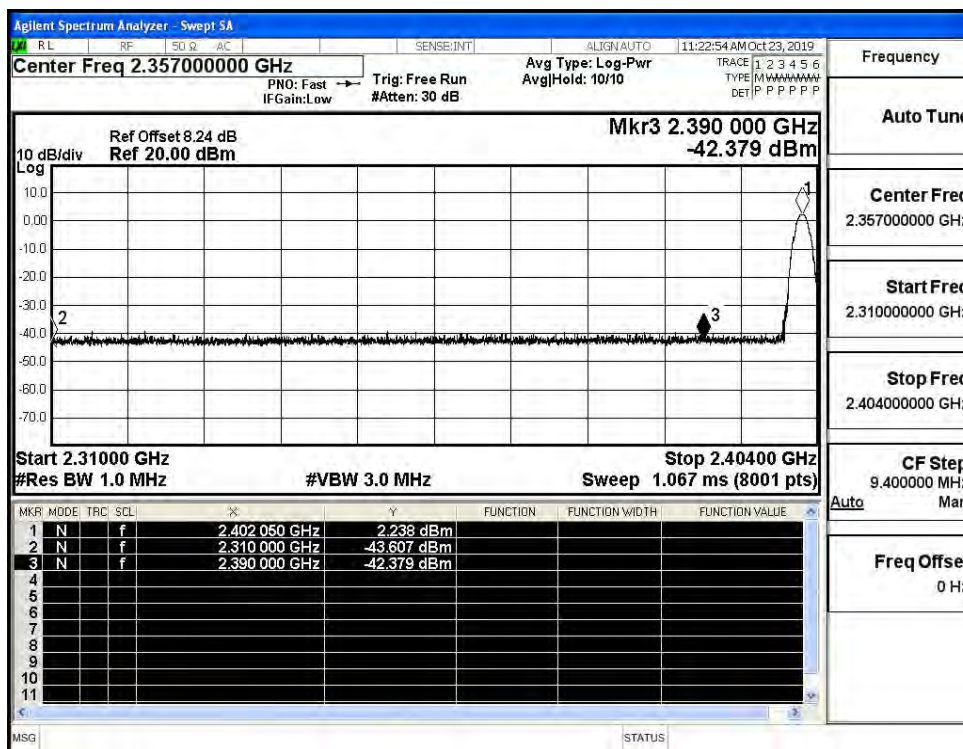
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



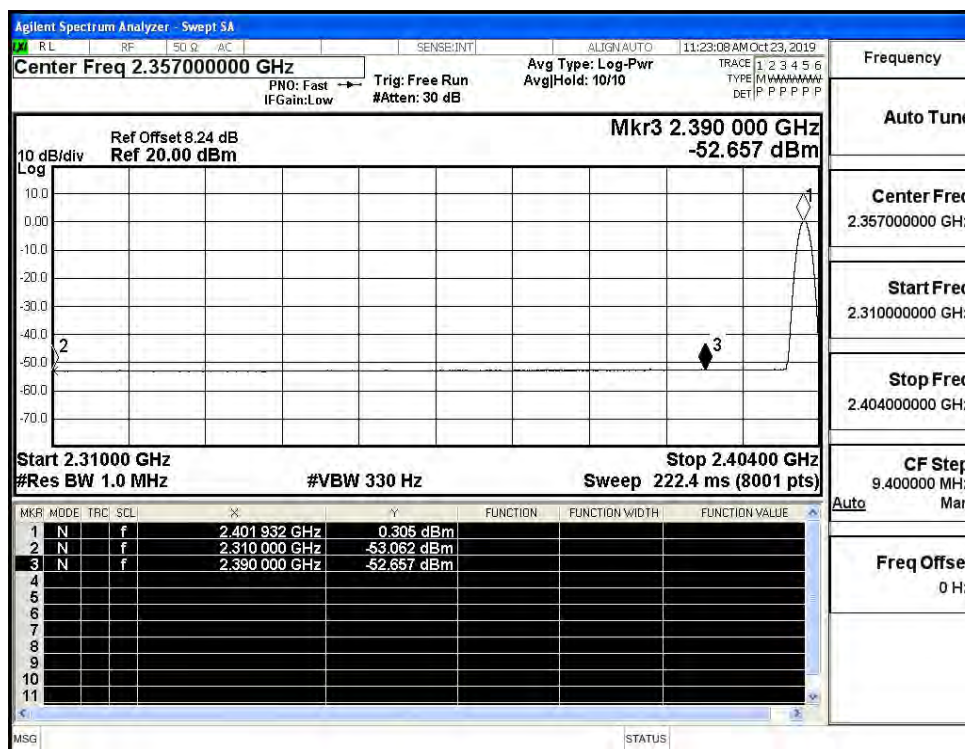
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



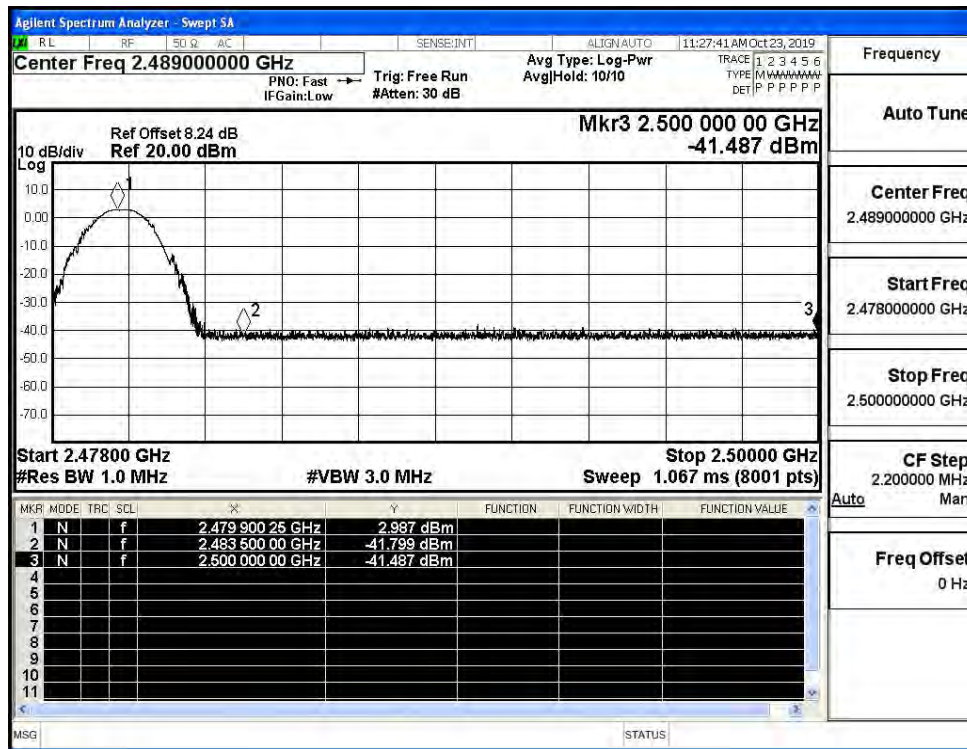
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

