

Appendix A

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

Product Name: Speaker
Trade Mark: Diablo
Test Model: DB--RUMBLE

Environmental Conditions

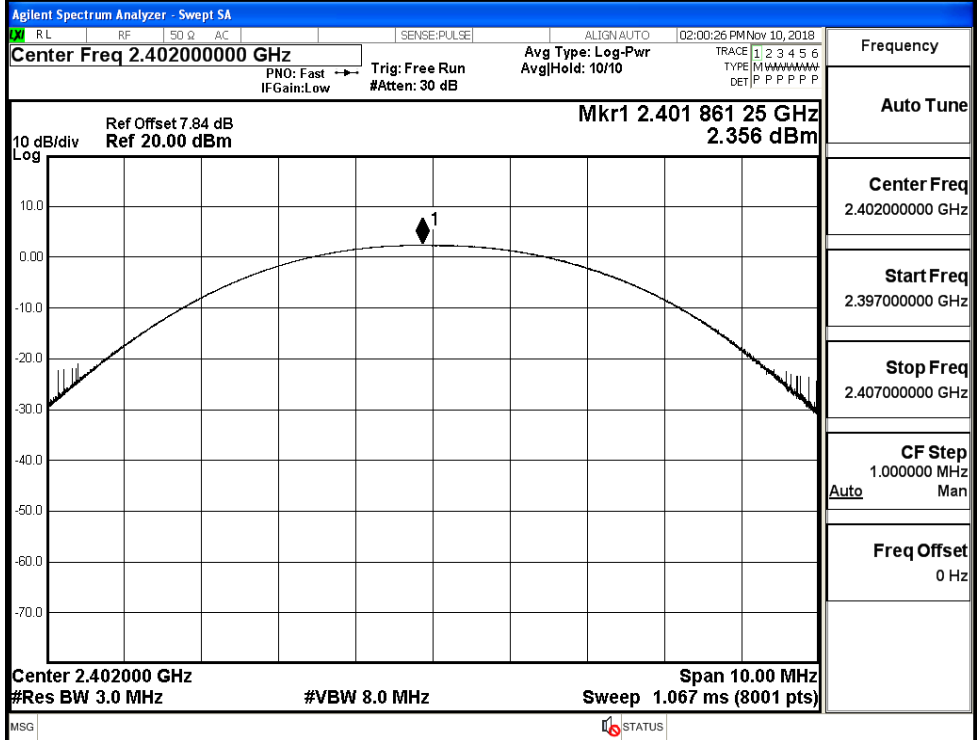
Temperature:	23.8 ° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Wang Chuang
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Peak Output Power

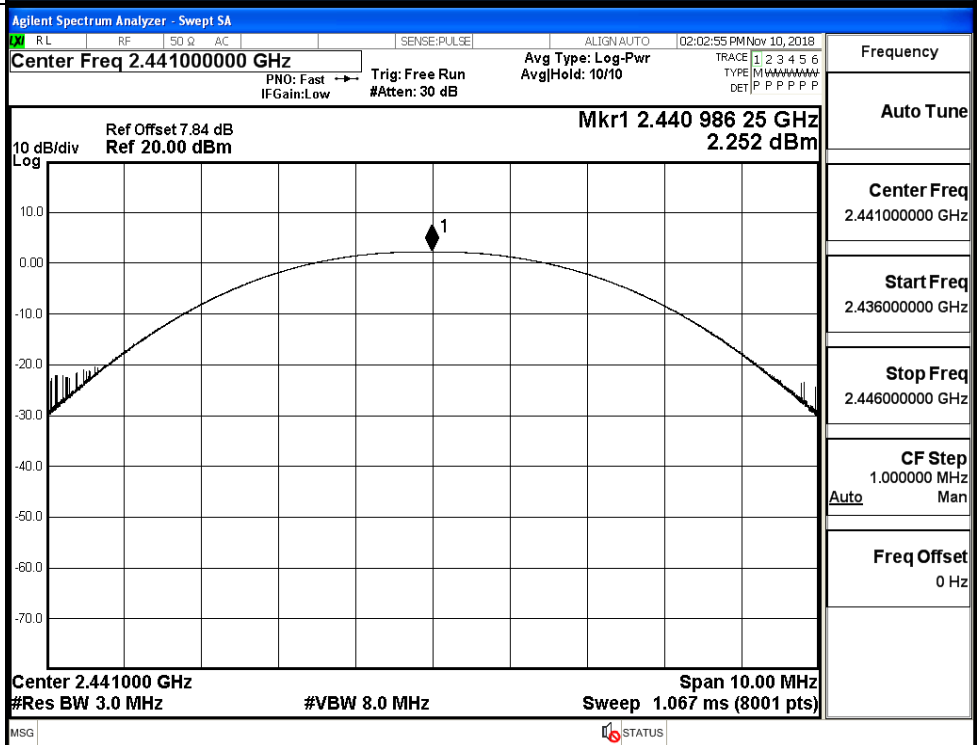
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.356	30	PASS
	MCH	2.252	30	PASS
	HCH	2.176	30	PASS
π/4DQPSK	LCH	1.586	21	PASS
	MCH	1.435	21	PASS
	HCH	1.270	21	PASS

Test Graphs

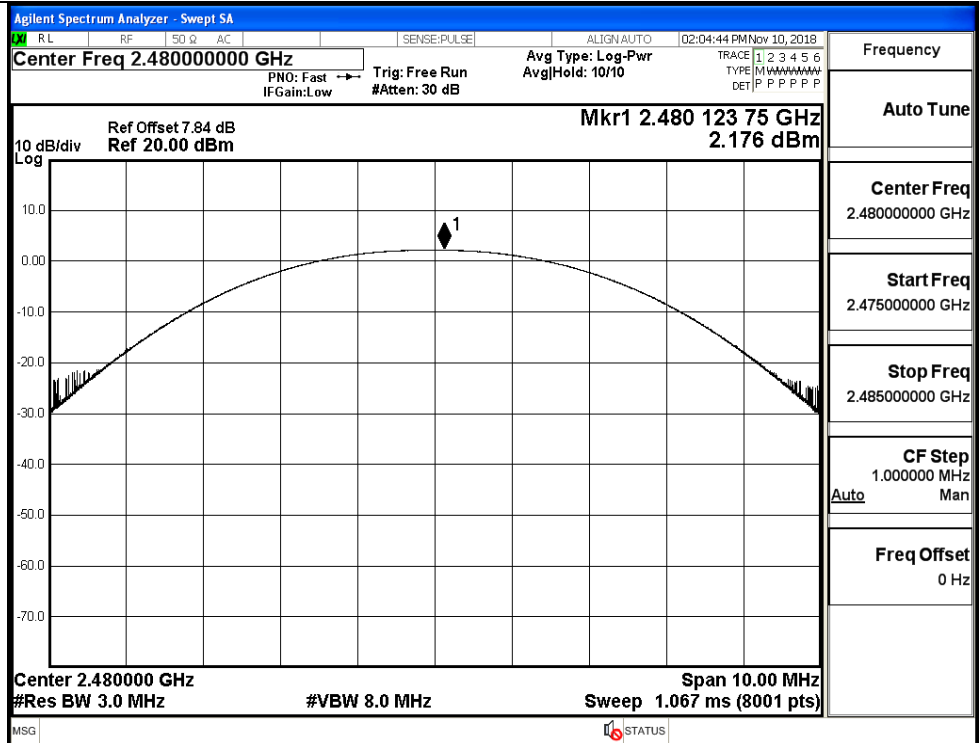
GFSK/LCH



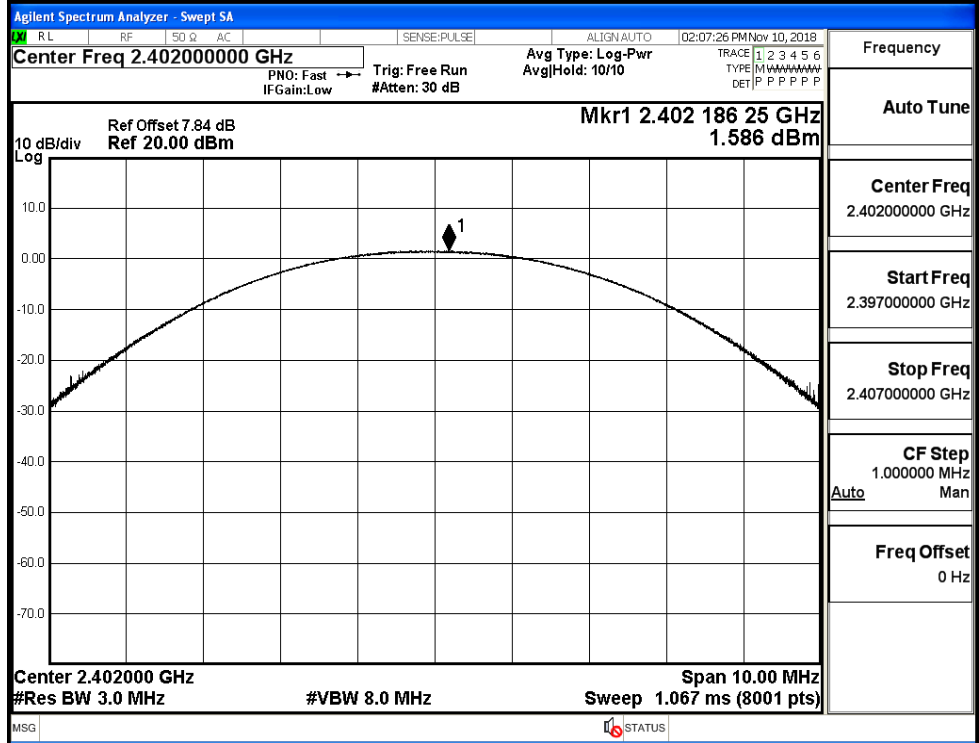
GFSK/MCH

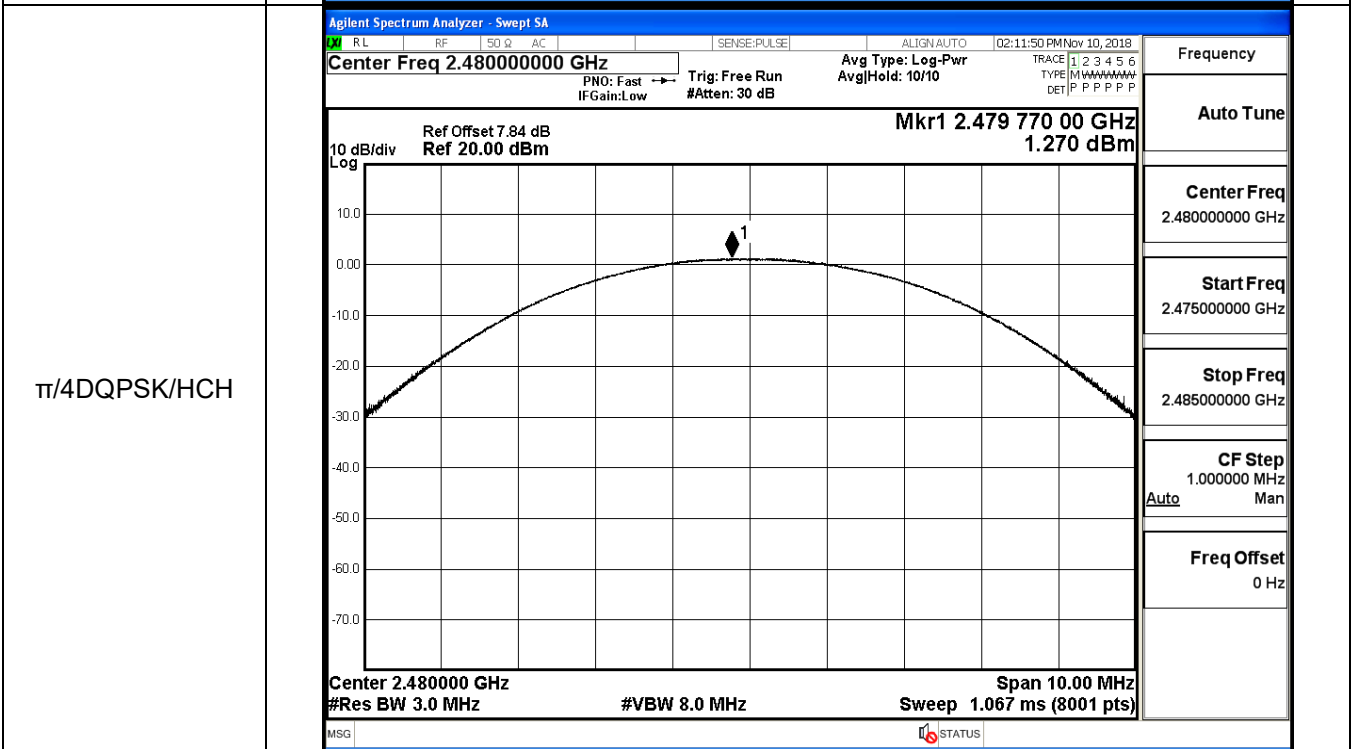
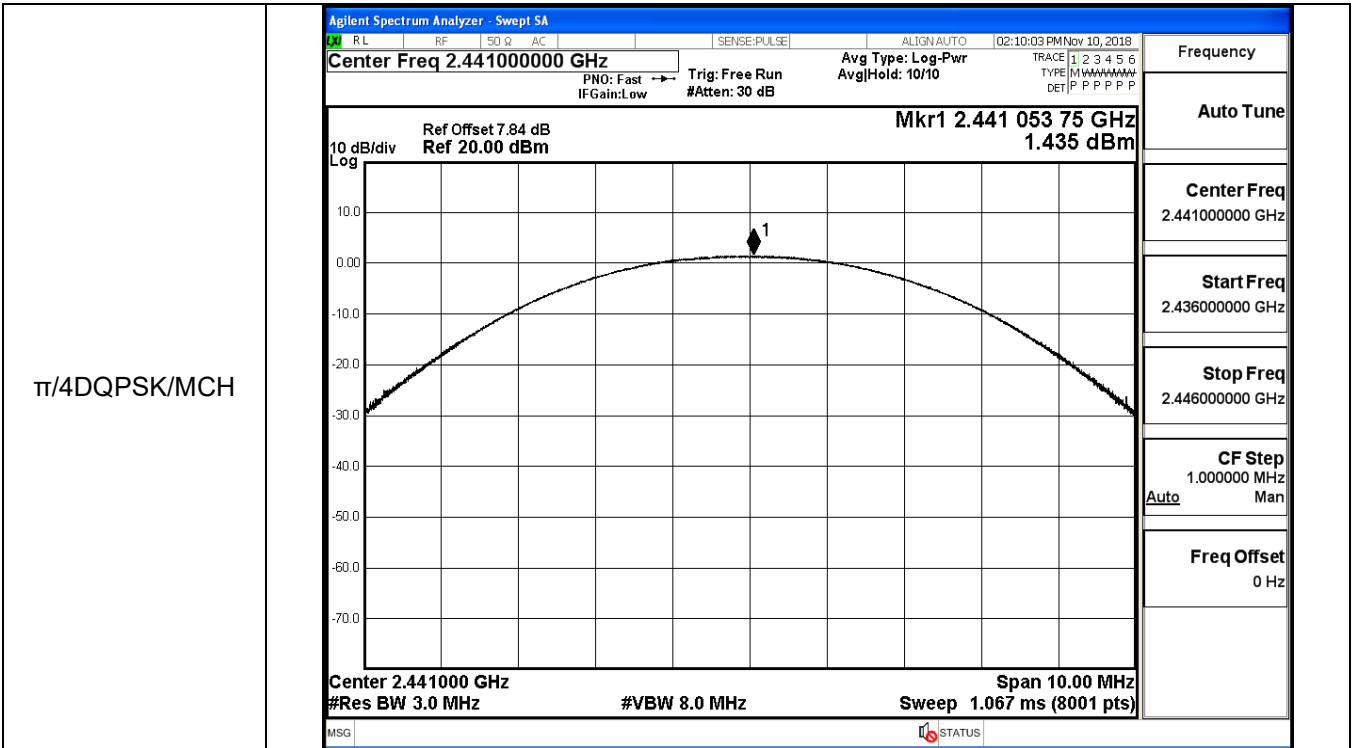


GFSK/HCH



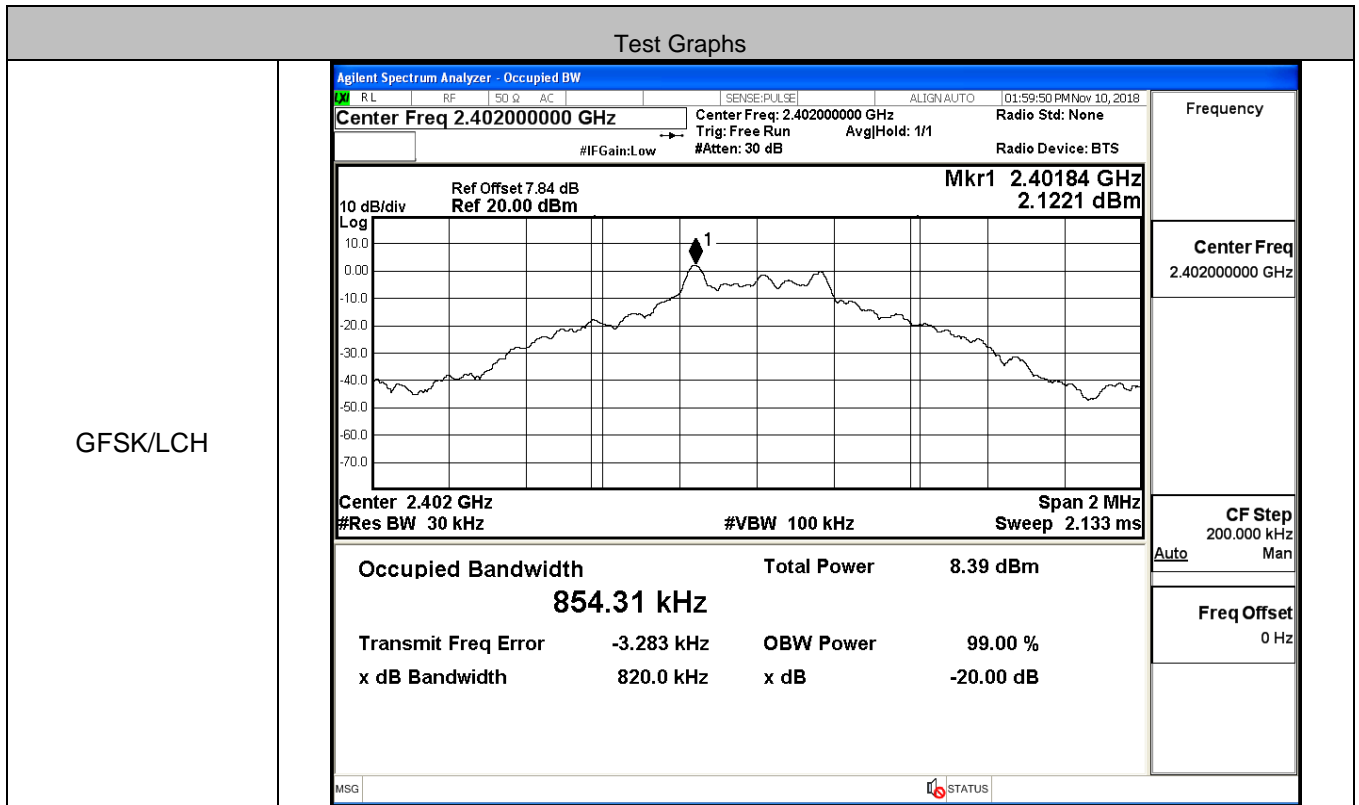
π /4DQPSK/LCH



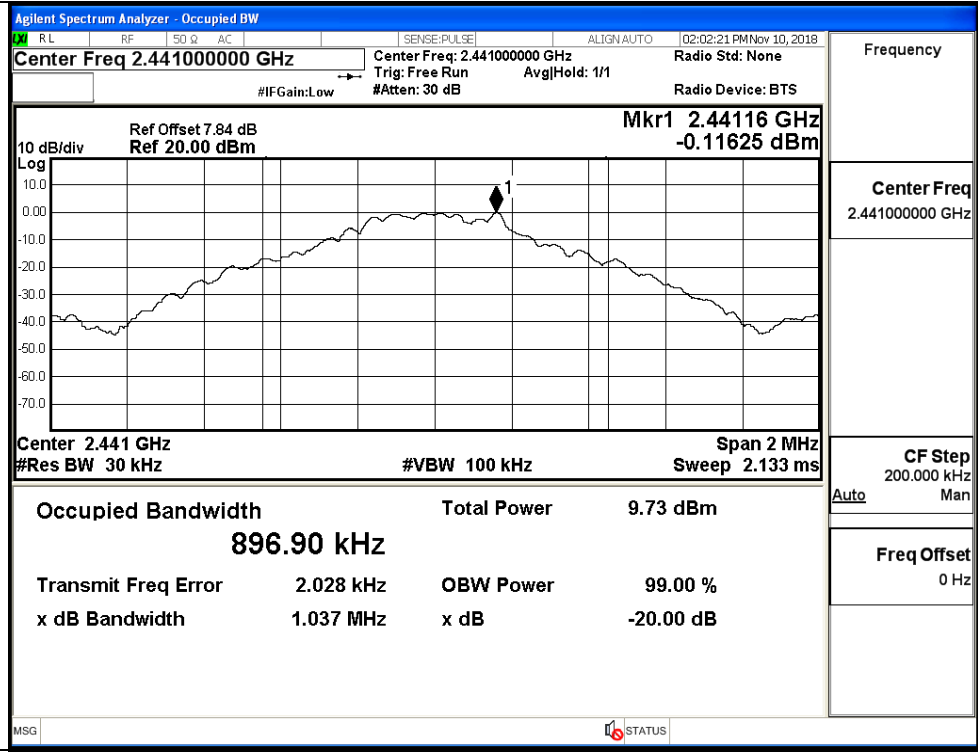


A.2 99% and 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.85431	0.8200	Not Specified	PASS
	MCH	0.89690	1.037	Not Specified	PASS
	HCH	0.89924	1.040	Not Specified	PASS
π/4DQPSK	LCH	1.1804	1.313	Not Specified	PASS
	MCH	1.1766	1.308	Not Specified	PASS
	HCH	1.1745	1.315	Not Specified	PASS

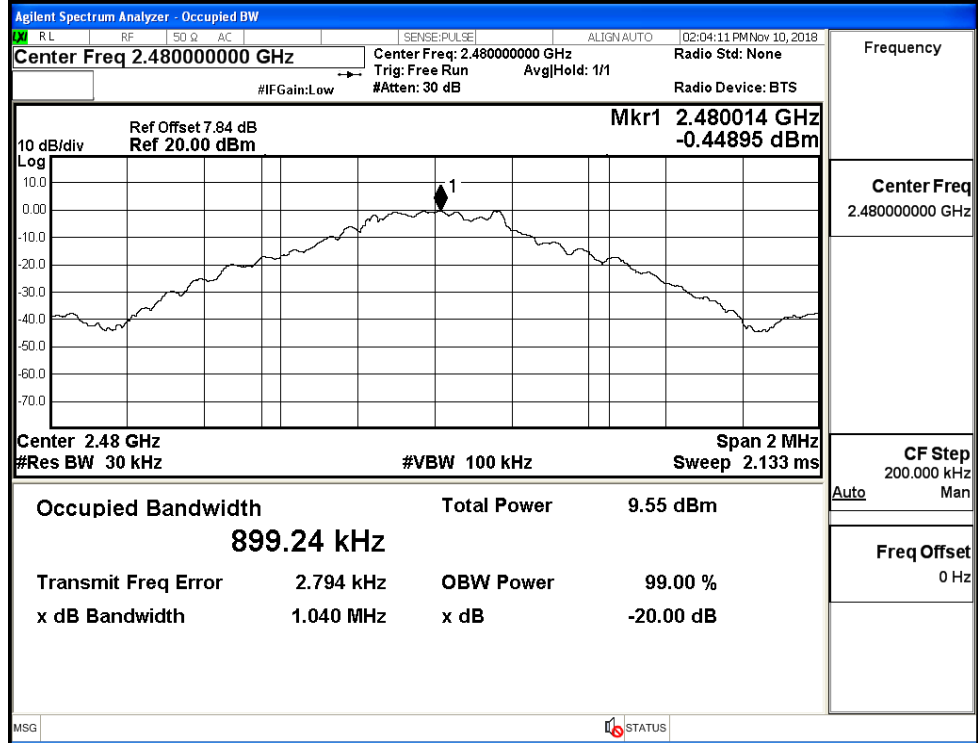


GFSK/MCH



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

<p style="text-align: center;">π/4DQPSK/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz</p> <p>Mkr1 2.402162 GHz -2.2260 dBm</p> <p>Occupied Bandwidth 1.1804 MHz</p> <p>Total Power 7.87 dBm</p> <p>Transmit Freq Error -1.663 kHz</p> <p>x dB Bandwidth 1.313 MHz</p>	<p>Frequency</p> <p>Center Freq 2.40200000 GHz</p> <p>CF Step 200.000 kHz</p> <p>Freq Offset 0 Hz</p>
<p style="text-align: center;">π/4DQPSK/MCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.44100000 GHz</p> <p>Mkr1 2.441162 GHz -2.2779 dBm</p> <p>Occupied Bandwidth 1.1766 MHz</p> <p>Total Power 7.73 dBm</p> <p>Transmit Freq Error -1.832 kHz</p> <p>x dB Bandwidth 1.308 MHz</p>	<p>Frequency</p> <p>Center Freq 2.44100000 GHz</p> <p>CF Step 200.000 kHz</p> <p>Freq Offset 0 Hz</p>

$\pi/4$ DQPSK/HCH

Agilent Spectrum Analyzer - Occupied BW

<input checked="" type="checkbox"/> RL	<input type="checkbox"/> RF	<input type="checkbox"/> SQ	<input type="checkbox"/> AC	<input type="checkbox"/> SENSE-PULSE	<input type="checkbox"/> ALIGN AUTO	02:11:16 PM Nov 10, 2018
Center Freq 2.48000000 GHz				Center Freq: 2.48000000 GHz	Radio Std: None	
				Trig: Free Run	Avg Hold: 1/1	
				#IFGain: Low	#Atten: 30 dB	
				Radio Device: BTS		

10 dB/div
Log

Mkr1 2.480166 GHz
-2.9630 dBm

Center 2.48 GHz
#Res BW 30 kHz

#VBW 100 kHz

Span 2 MHz
Sweep 2.133 ms

Occupied Bandwidth	Total Power	7.45 dBm
1.1745 MHz		
Transmit Freq Error	-1.956 kHz	OBW Power 99.00 %
x dB Bandwidth	1.315 MHz	x dB -20.00 dB

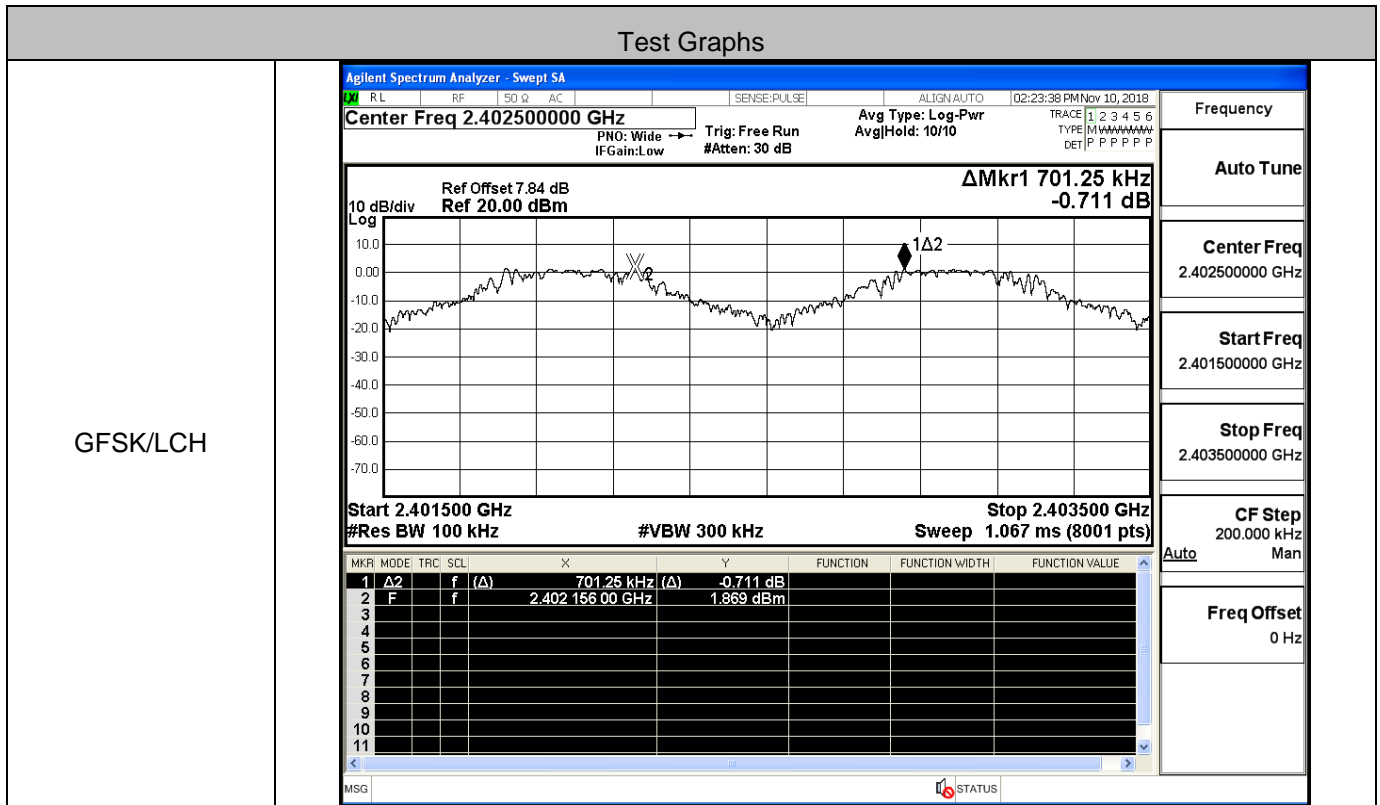
MSG

STATUS

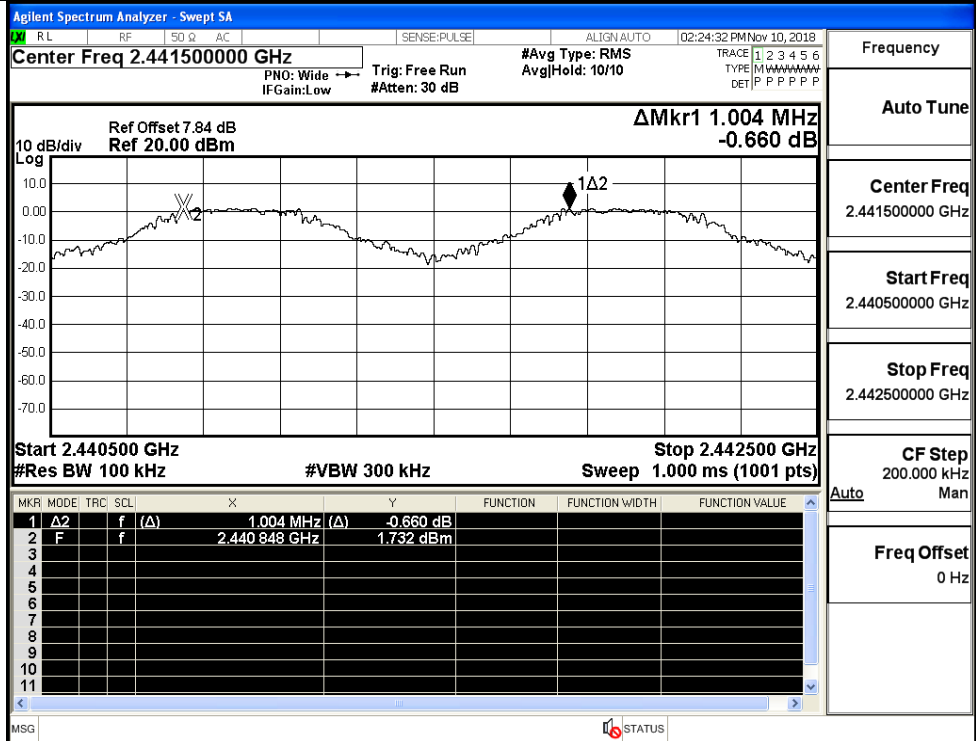
Frequency	2.48000000 GHz
Center Freq	2.48000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

A.3 Carrier Frequency Separation

Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.701	0.693	PASS
	MCH	1.004	0.693	PASS
	HCH	0.990	0.693	PASS
π/4DQPSK	LCH	0.998	0.877	PASS
	MCH	0.976	0.877	PASS
	HCH	1.004	0.877	PASS



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

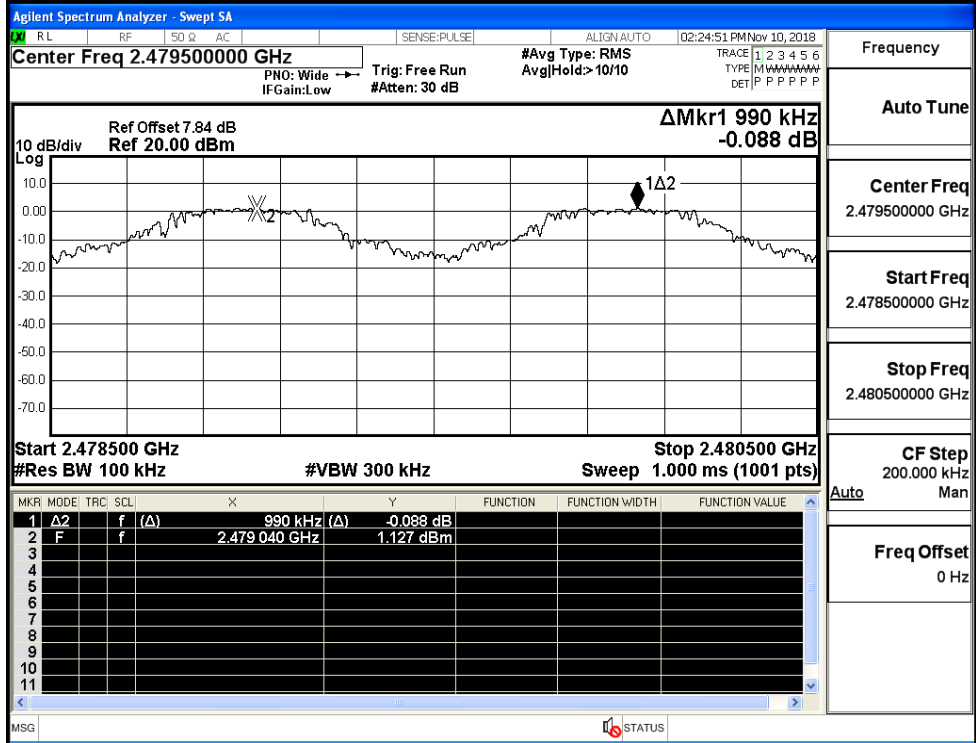
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

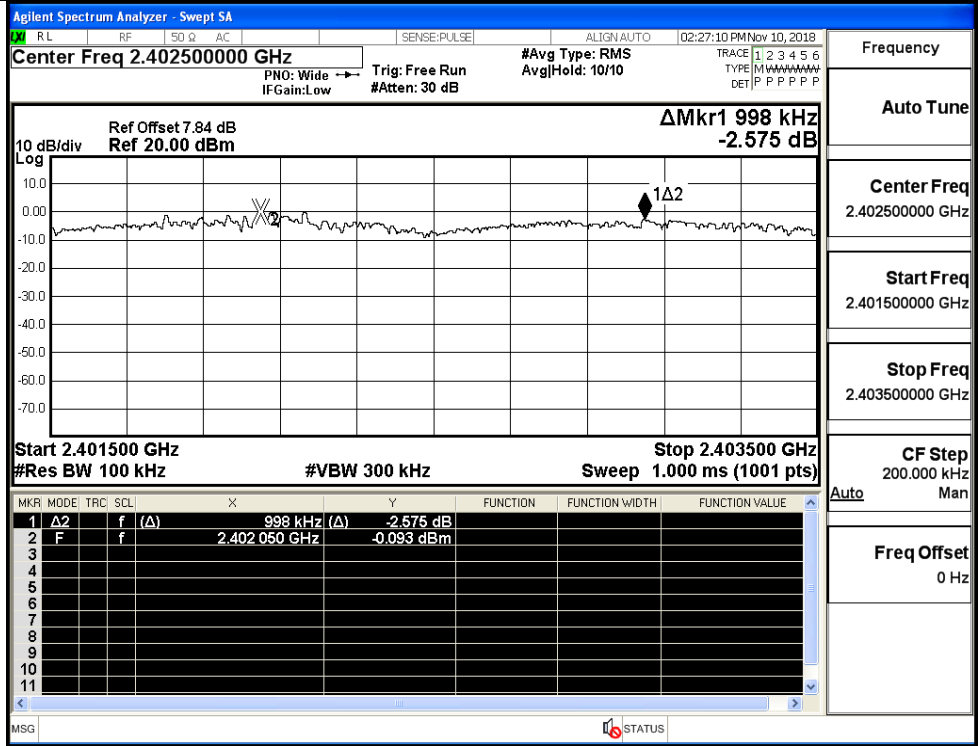
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

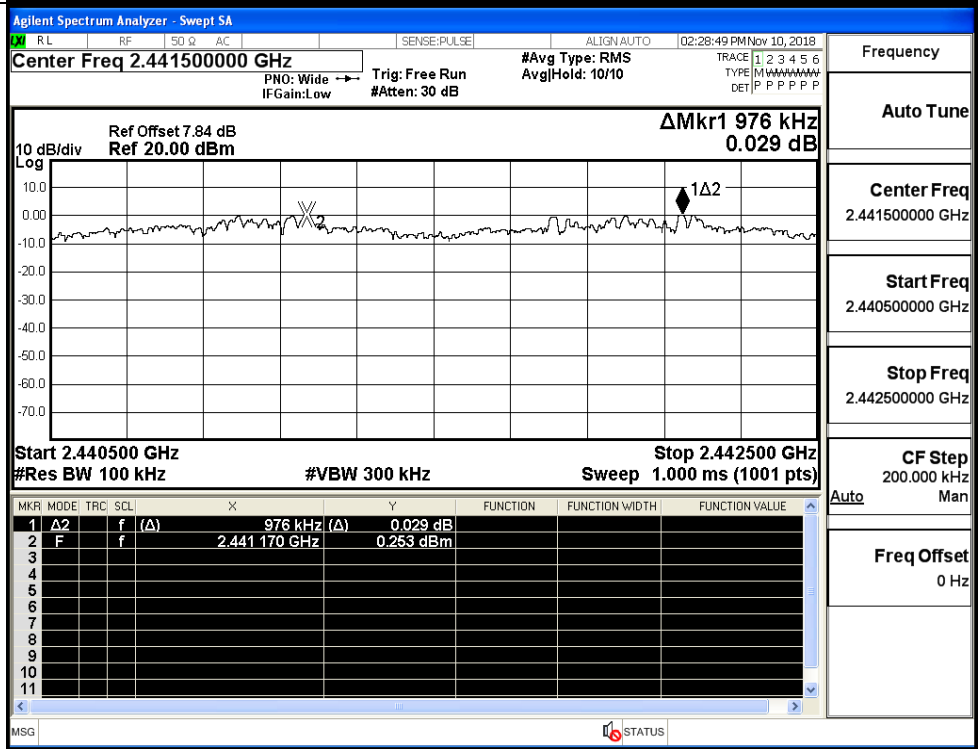
CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

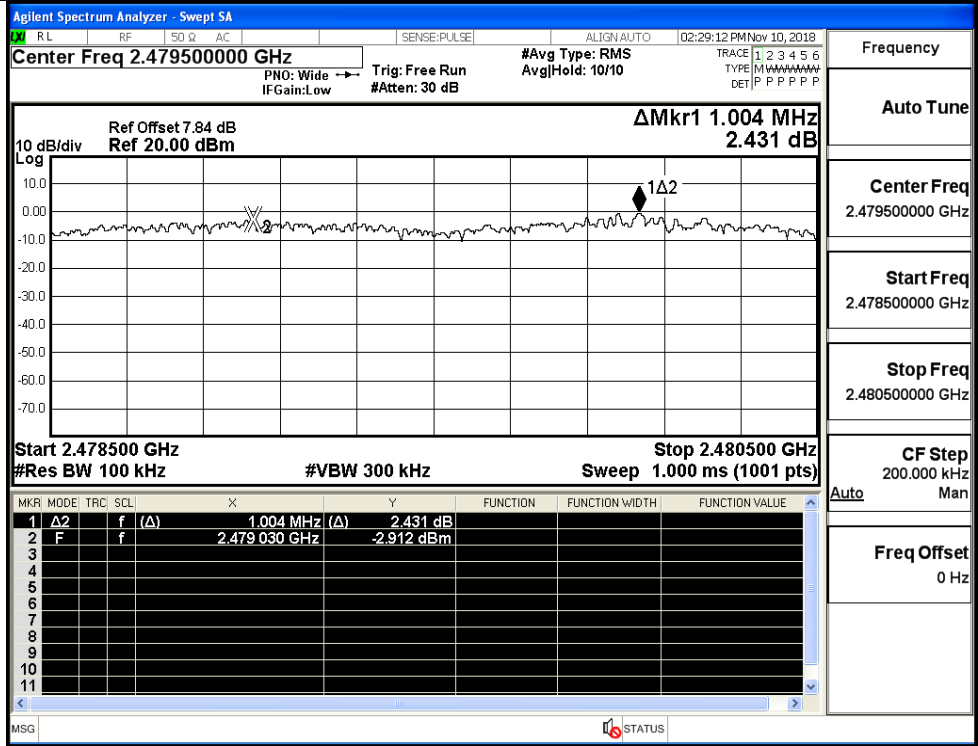
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH



A.4 Hopping Channel Number

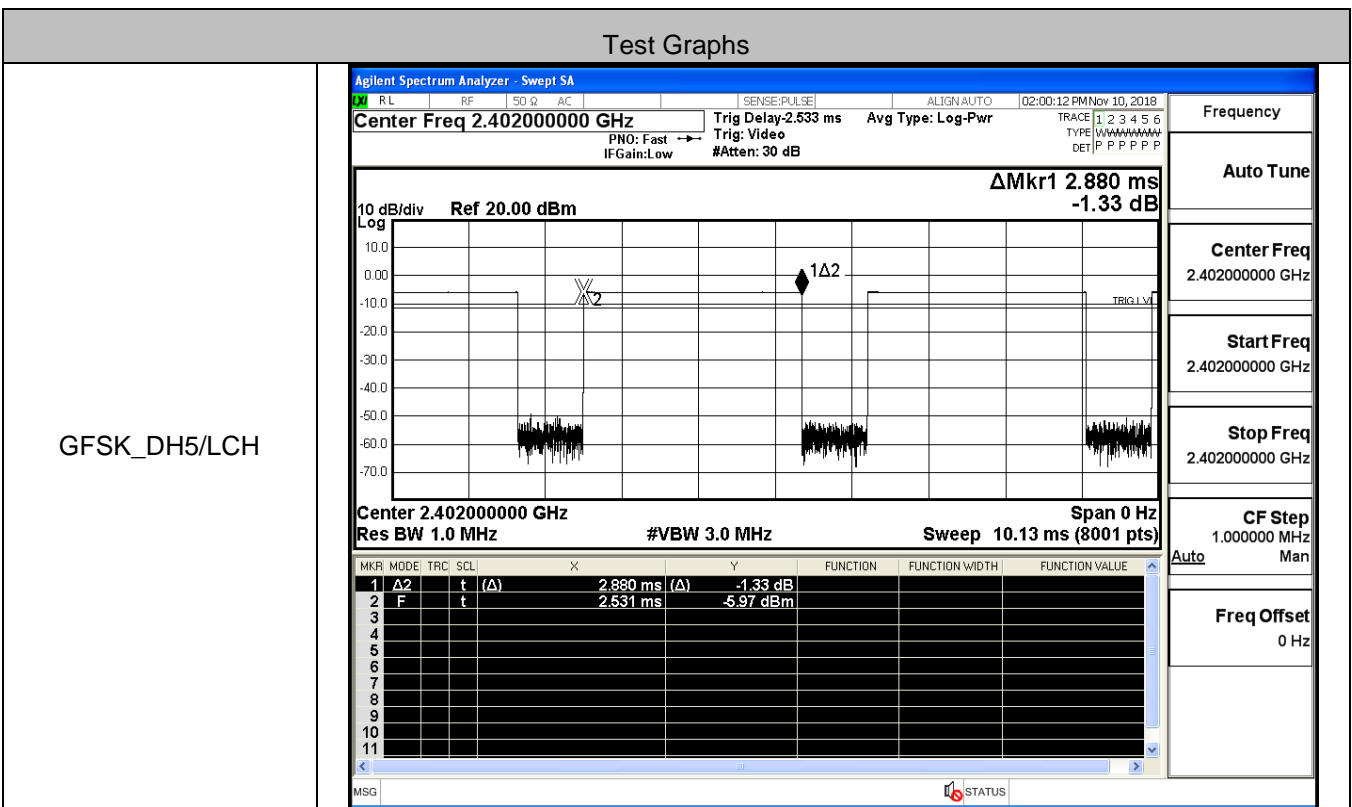
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS

Test Graphs

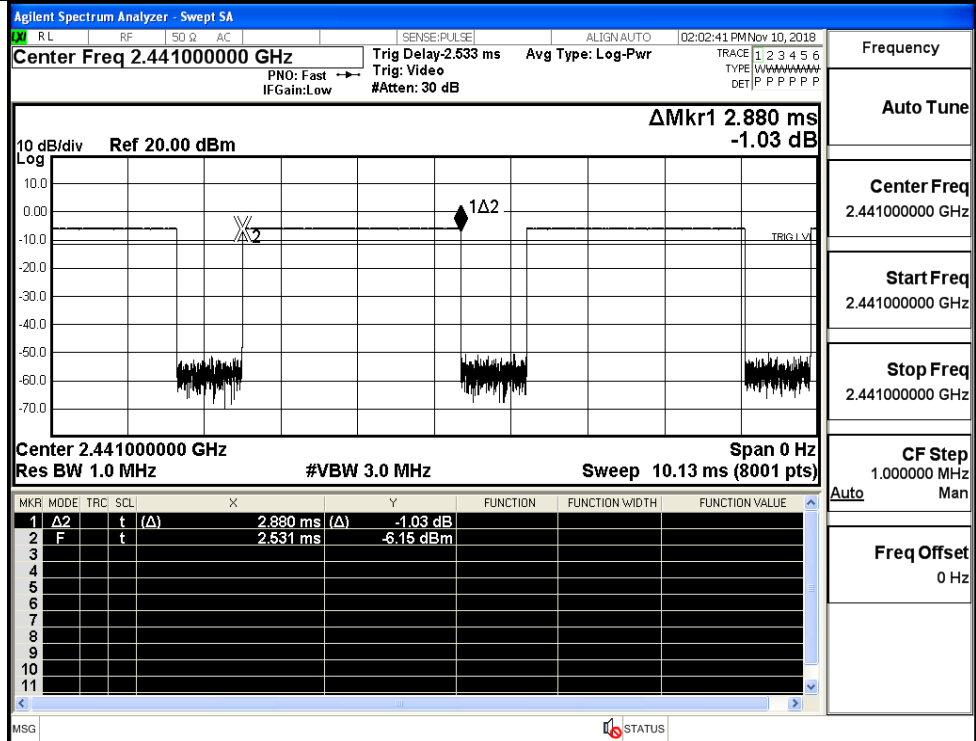
GFSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 7.84 dB Ref 20.00 dBm ΔMkr1 77.885 MHz 0.189 dB Start 2.40000 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.48350 GHz Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <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>77.885 MHz (Δ)</td> <td>0.189 dB</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>f</td> <td></td> <td>2.402108 GHz</td> <td>1.169 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.885 MHz (Δ)	0.189 dB				2	F	f		2.402108 GHz	1.169 dBm				Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Man Freq Offset 0 Hz
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																					
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2	F	f		2.402108 GHz	1.169 dBm																								
$\pi/4$ DQPSK/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.441750000 GHz Ref Offset 7.84 dB Ref 20.00 dBm ΔMkr1 77.885 MHz -1.471 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>77.885 MHz (Δ)</td> <td>-1.471 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>0.636 dBm</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	Δ 2	f	(Δ)	77.885 MHz (Δ)	-1.471 dB				2	F	f		2.402171 GHz	0.636 dBm				Frequency Auto Tune Center Freq 2.441750000 GHz Start Freq 2.400000000 GHz Stop Freq 2.483500000 GHz CF Step 8.350000 MHz Man Freq Offset 0 Hz
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1	Δ 2	f	(Δ)	77.885 MHz (Δ)	-1.471 dB																								
2	F	f		2.402171 GHz	0.636 dBm																								

A.5 Dwell Time

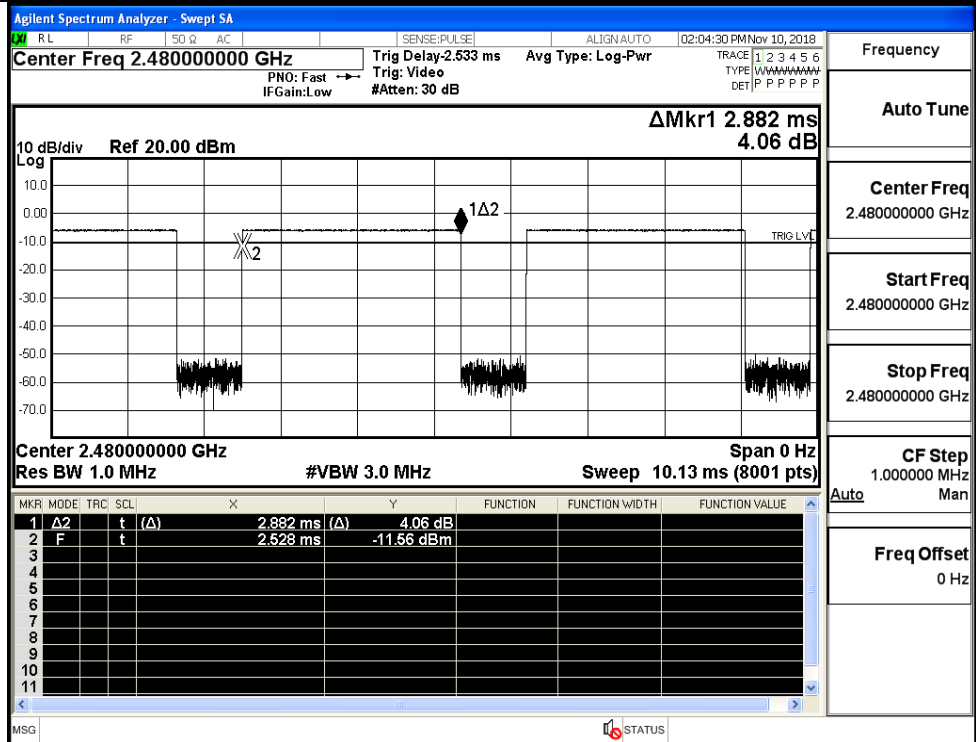
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.89	106.7	0.308	0.4	PASS



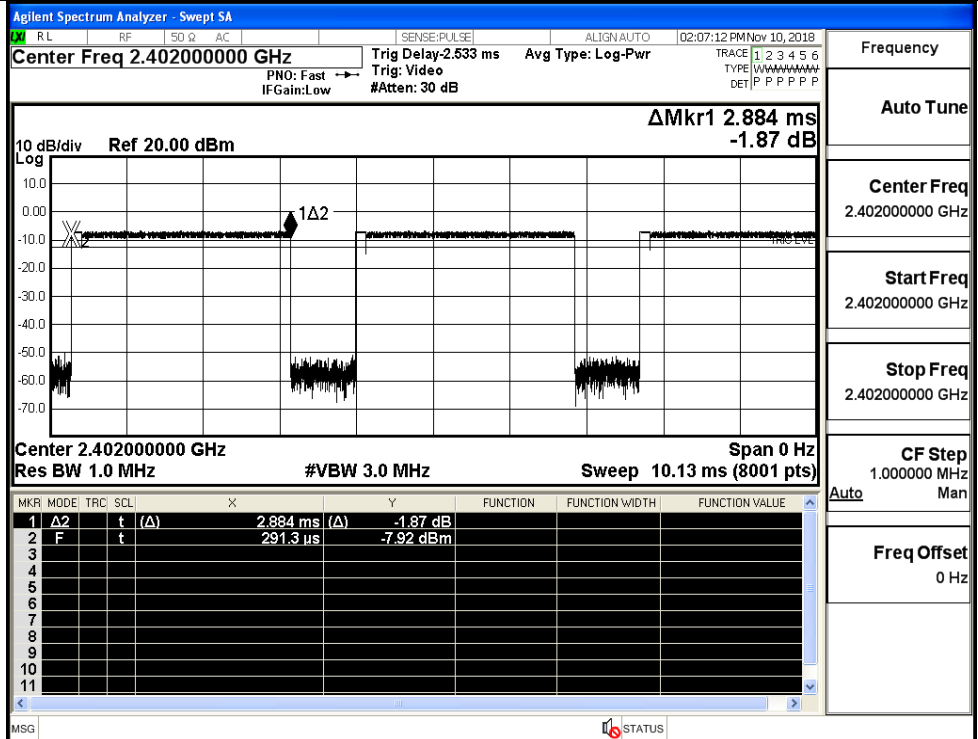
GFSK_DH5/MCH



GFSK_DH5/HCH

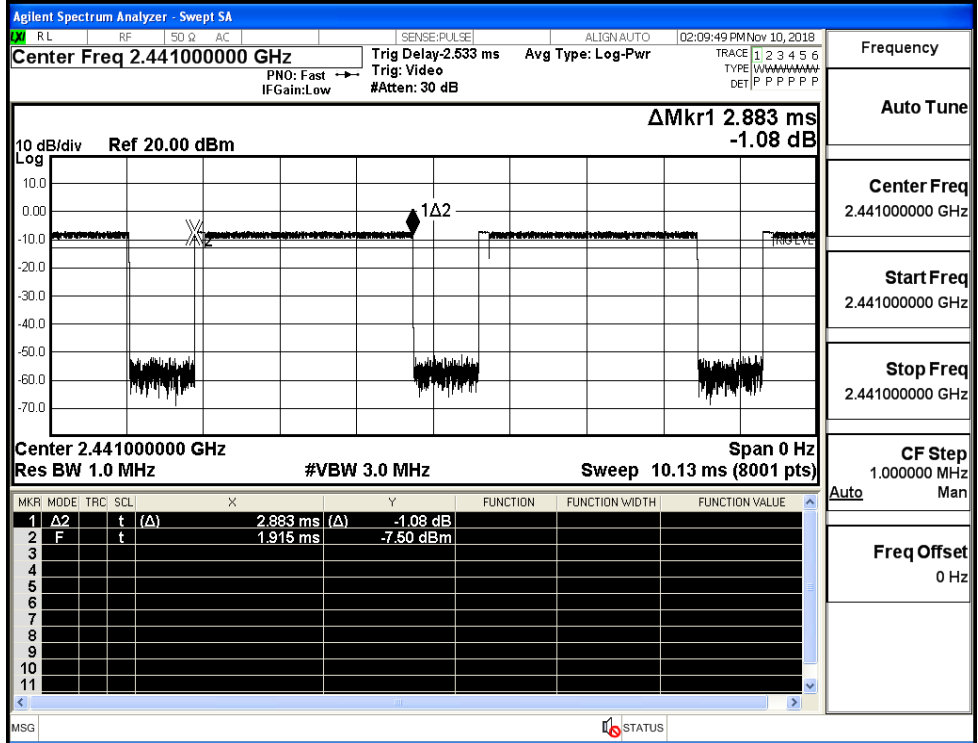


$\pi/4$ DQPSK
_2DH5/LCH



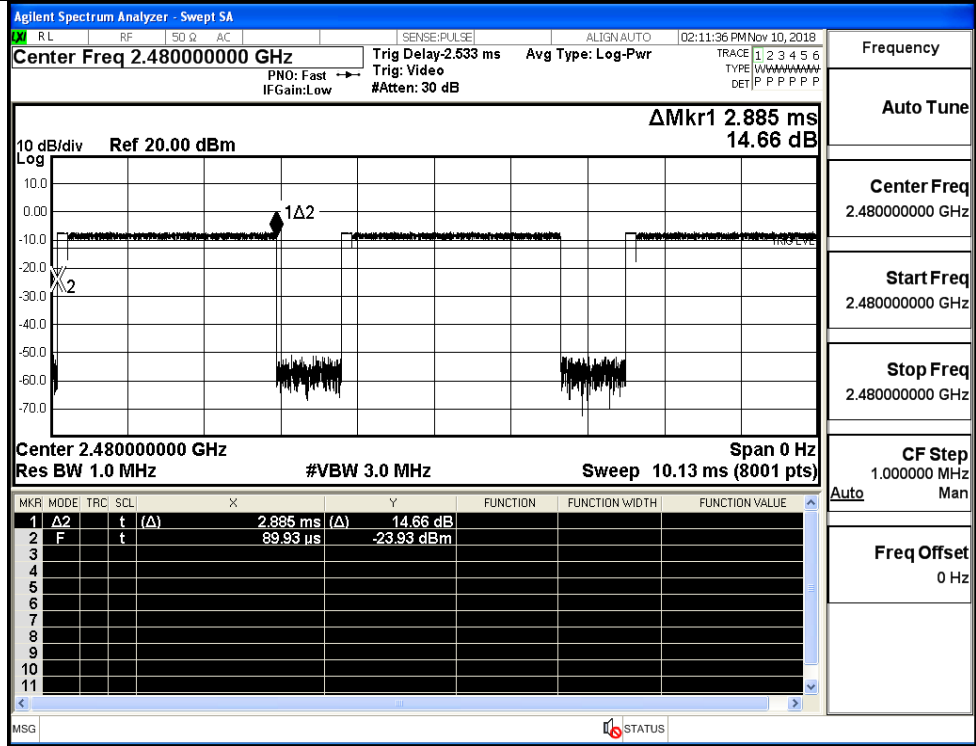
Frequency	2.402000000 GHz
Auto Tune	
Center Freq	2.402000000 GHz
Start Freq	2.402000000 GHz
Stop Freq	2.402000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

$\pi/4$ DQPSK
_2DH5/MCH



Frequency	2.441000000 GHz
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

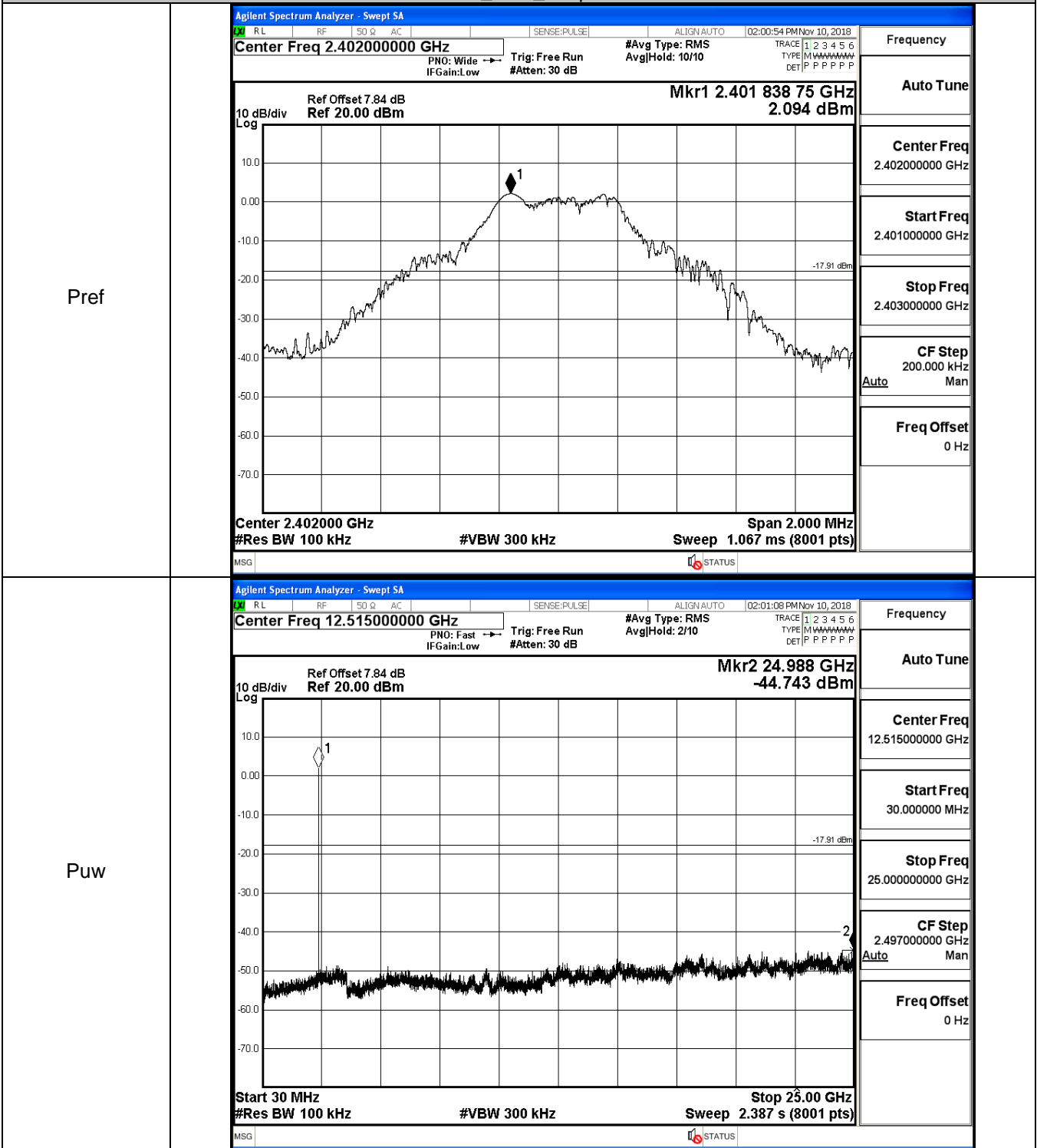
$\pi/4$ DQPSK
_2DH5/HCH



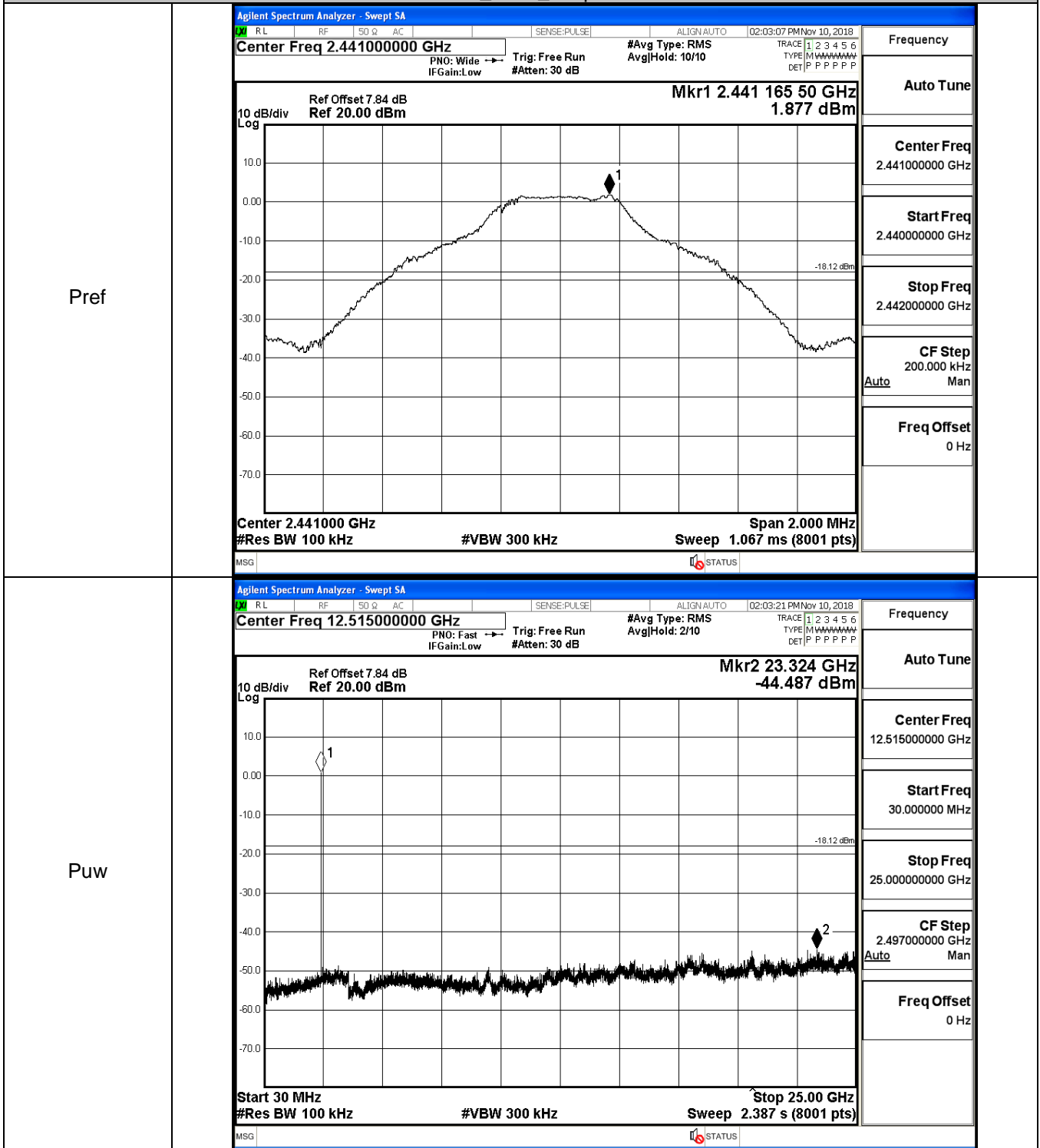
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.094	-44.743	-17.906	PASS
	MCH	1.877	-44.487	-18.123	PASS
	HCH	1.526	-42.464	-18.474	PASS
$\pi/4$ DQPSK	LCH	0.605	-45.148	-19.395	PASS
	MCH	0.473	-45.162	-19.527	PASS
	HCH	0.288	-44.325	-19.712	PASS

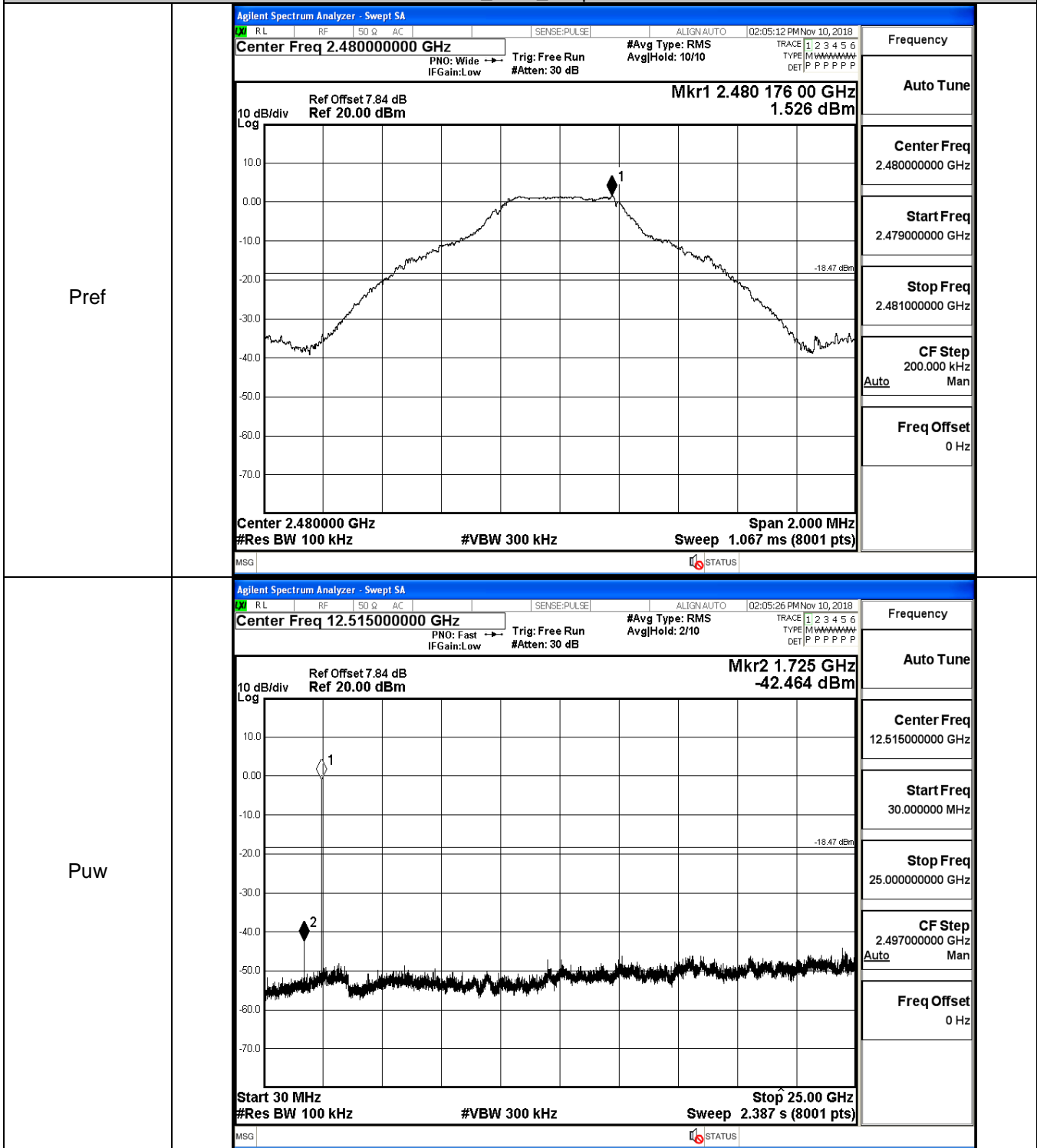
GFSK_LCH_Graphs



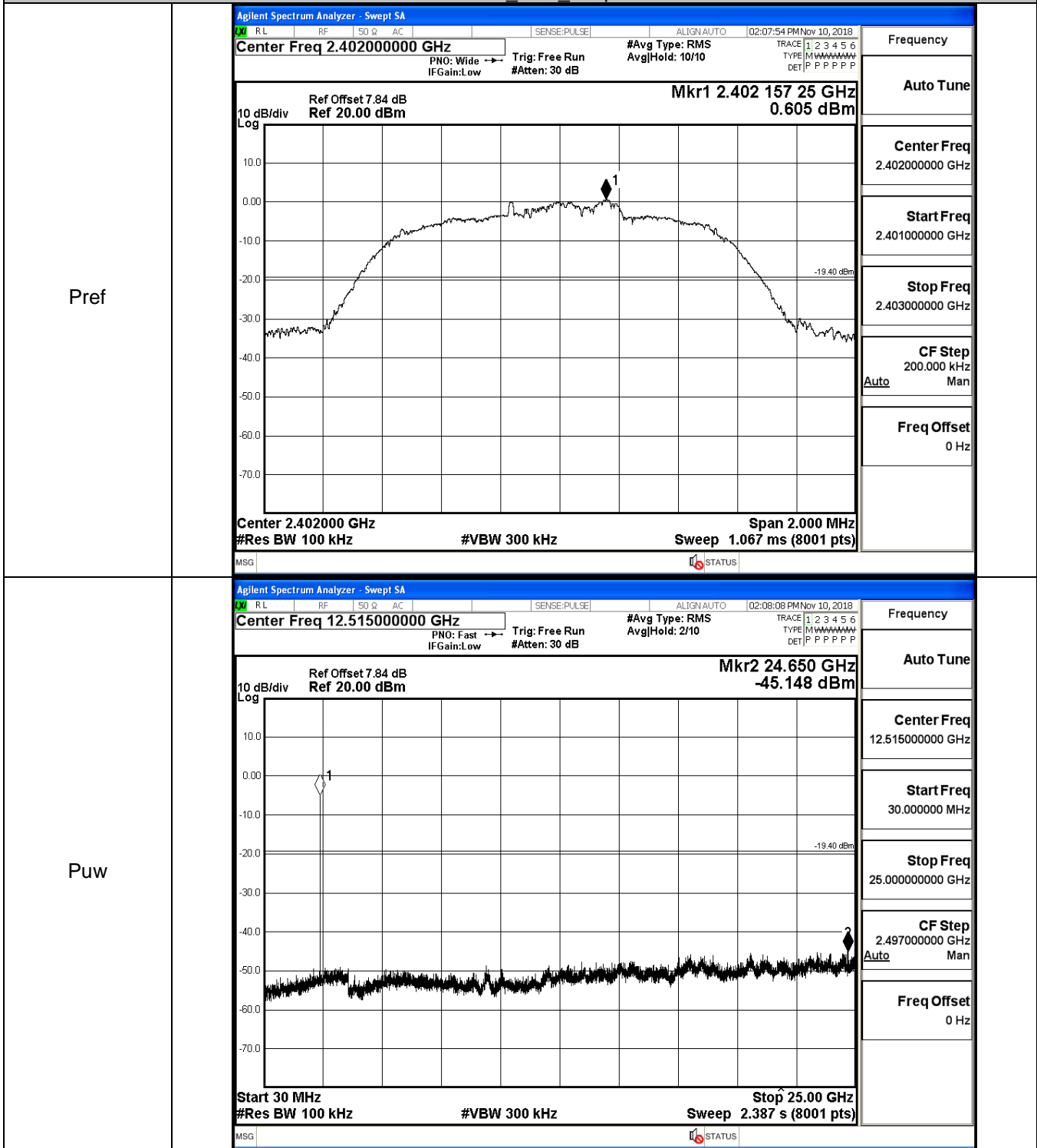
GFSK_MCH_Graphs



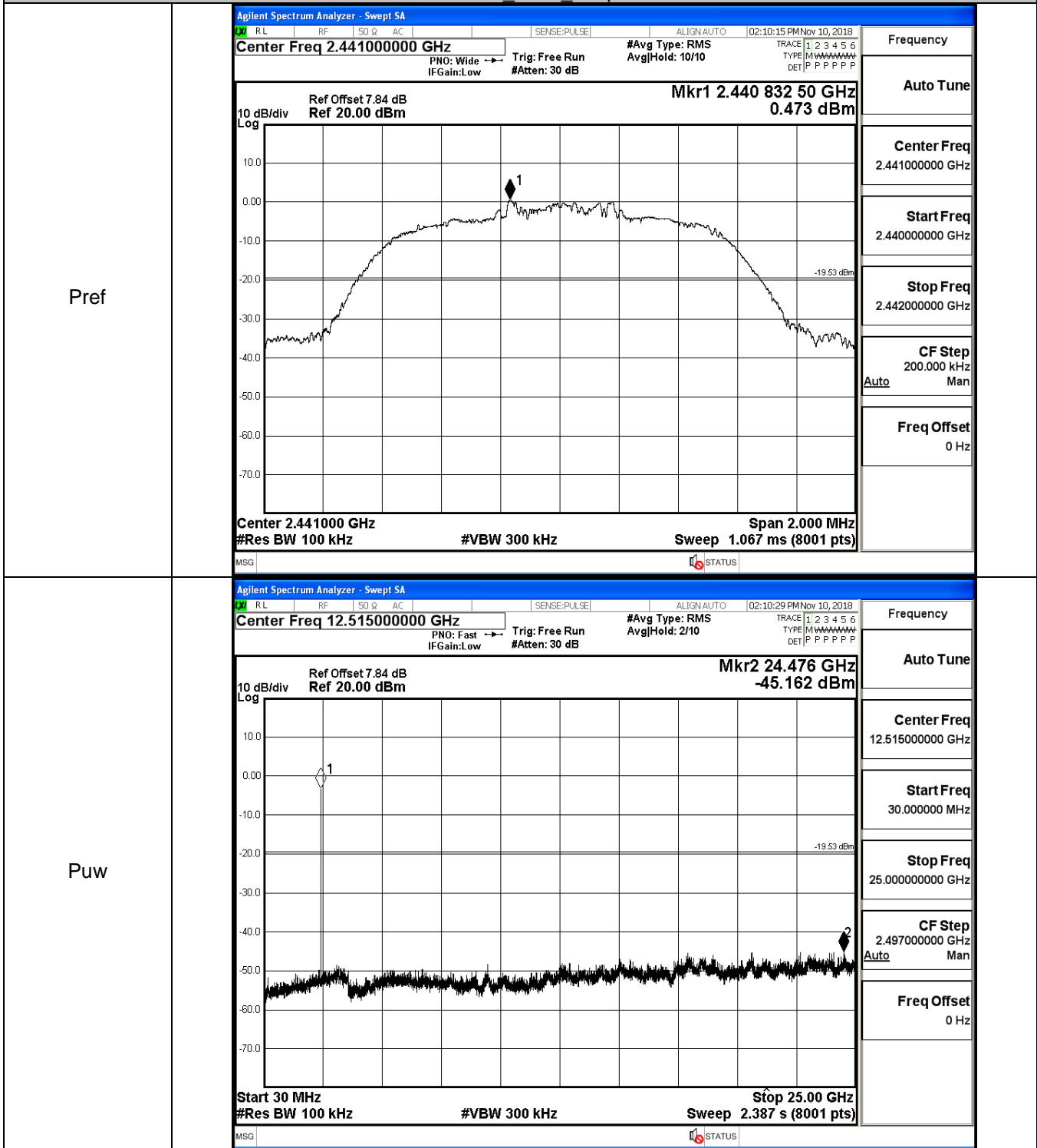
GFSK_HCH_Graphs



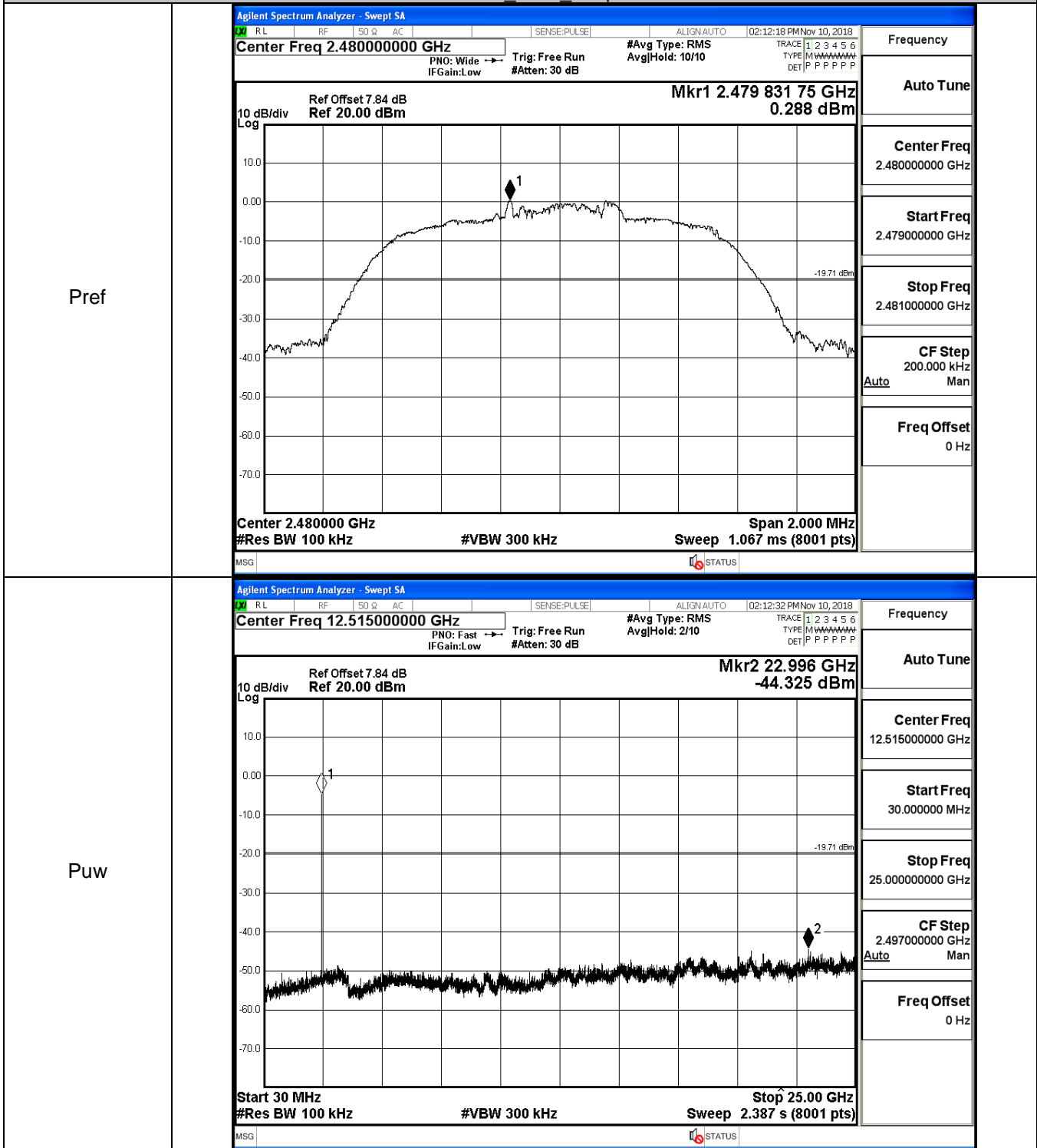
$\pi/4$ DQPSK LCH_Graphs



$\pi/4$ DQPSK_MCH_Graphs



$\pi/4$ DQPSK_HCH_Graphs



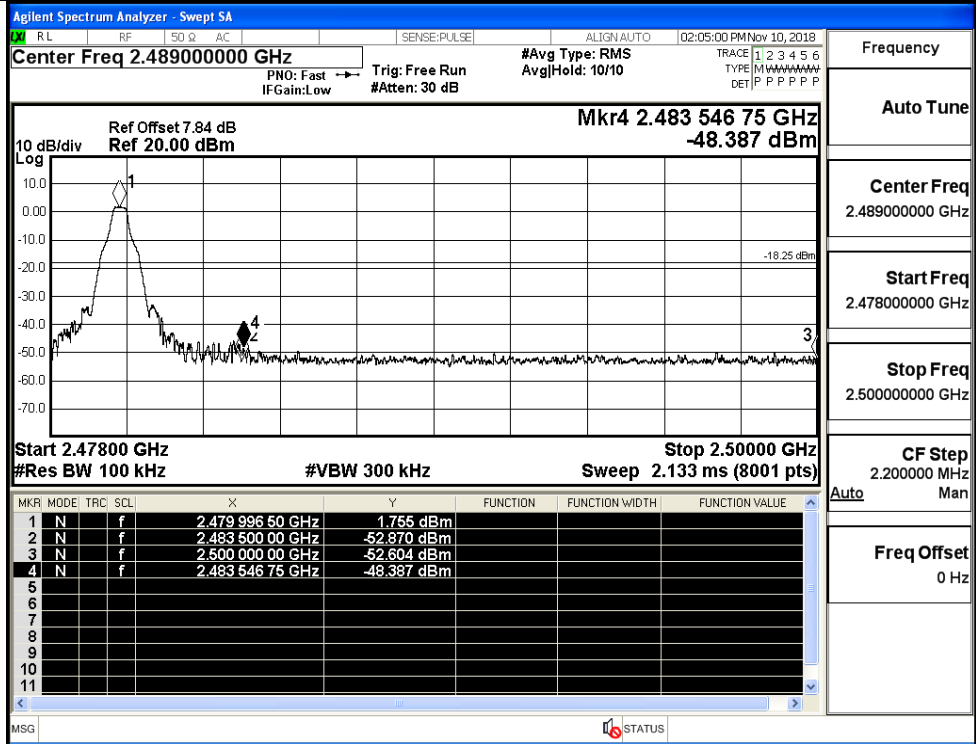
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	2.138	Off	-50.257	-17.86	PASS
			1.712	On	-49.548	-18.29	PASS
	HCH	2480	1.755	Off	-48.387	-18.25	PASS
			1.671	On	-49.772	-18.33	PASS
$\pi/4$ DQPSK	LCH	2402	0.739	Off	-50.333	-19.26	PASS
			0.601	On	-49.638	-19.4	PASS
	HCH	2480	-0.040	Off	-50.113	-20.04	PASS
			0.370	On	-48.628	-19.63	PASS

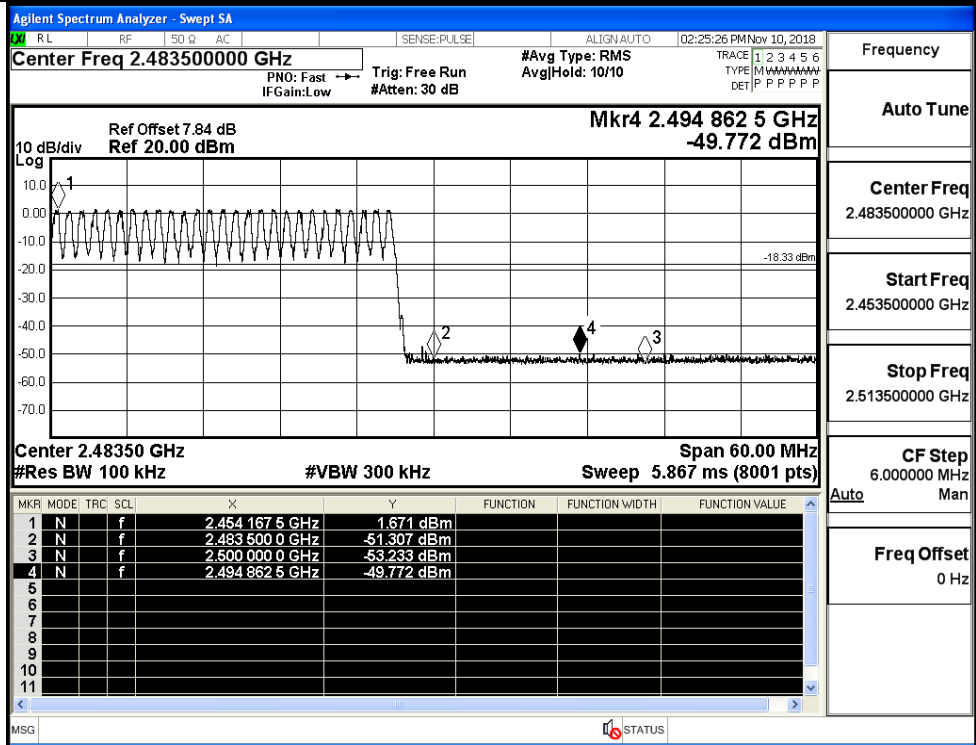
Test Graphs

GFSK/LCH/No Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.35700000 GHz Ref Offset 7.84 dB Ref 20.00 dBm Mkr4 2.319 412 GHz -50.257 dBm Start 2.31000 GHz Stop 2.40400 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 9.067 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>N</td><td>f</td><td></td><td>2.401 838 GHz</td><td>2.138 dBm</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>f</td><td></td><td>2.400 000 GHz</td><td>-51.847 dBm</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>f</td><td></td><td>2.390 000 GHz</td><td>-53.240 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.319 412 GHz</td><td>-50.257 dBm</td><td></td><td></td><td></td></tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	f		2.401 838 GHz	2.138 dBm				2	N	f		2.400 000 GHz	-51.847 dBm				3	N	f		2.390 000 GHz	-53.240 dBm				4	N	f		2.319 412 GHz	-50.257 dBm				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
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
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2	N	f		2.400 000 GHz	-51.847 dBm																																										
3	N	f		2.390 000 GHz	-53.240 dBm																																										
4	N	f		2.319 412 GHz	-50.257 dBm																																										
GFSK/LCH/Hop	<p>Agilent Spectrum Analyzer - Swept SA Center Freq 2.40000000 GHz Ref Offset 7.84 dB Ref 20.00 dBm Mkr4 2.380 042 5 GHz -49.548 dBm Center 2.40000 GHz Span 60.00 MHz #Res BW 100 kHz #VBW 300 kHz Sweep 5.867 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>N</td><td>f</td><td></td><td>2.404 980 0 GHz</td><td>1.712 dBm</td><td></td><td></td><td></td></tr> <tr><td>2</td><td>N</td><td>f</td><td></td><td>2.400 000 0 GHz</td><td>-52.410 dBm</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>N</td><td>f</td><td></td><td>2.390 000 0 GHz</td><td>-52.819 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.380 042 5 GHz</td><td>-49.548 dBm</td><td></td><td></td><td></td></tr> </tbody> </table>	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	1	N	f		2.404 980 0 GHz	1.712 dBm				2	N	f		2.400 000 0 GHz	-52.410 dBm				3	N	f		2.390 000 0 GHz	-52.819 dBm				4	N	f		2.380 042 5 GHz	-49.548 dBm				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
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	f		2.404 980 0 GHz	1.712 dBm																																										
2	N	f		2.400 000 0 GHz	-52.410 dBm																																										
3	N	f		2.390 000 0 GHz	-52.819 dBm																																										
4	N	f		2.380 042 5 GHz	-49.548 dBm																																										

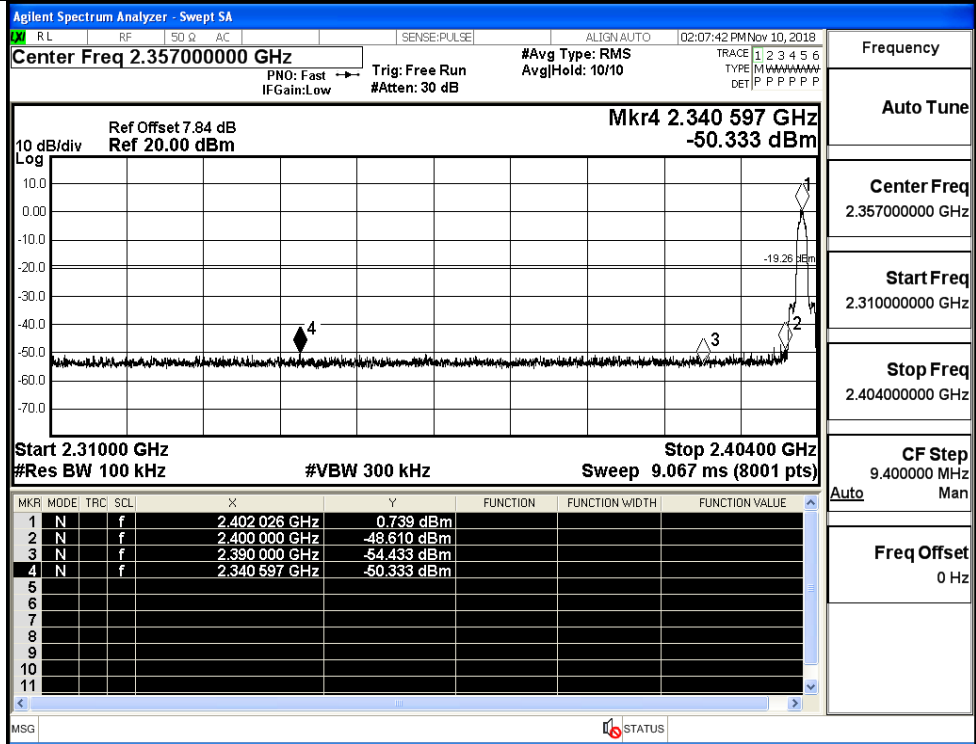
GFSK/HCH/No Hop



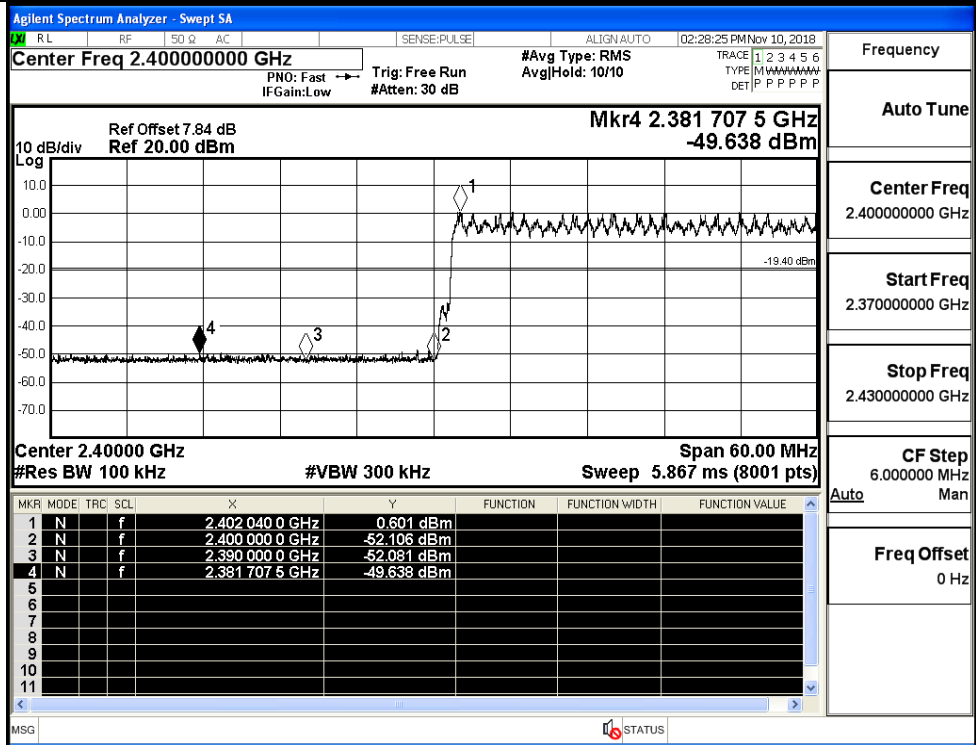
GFSK/HCH/Hop



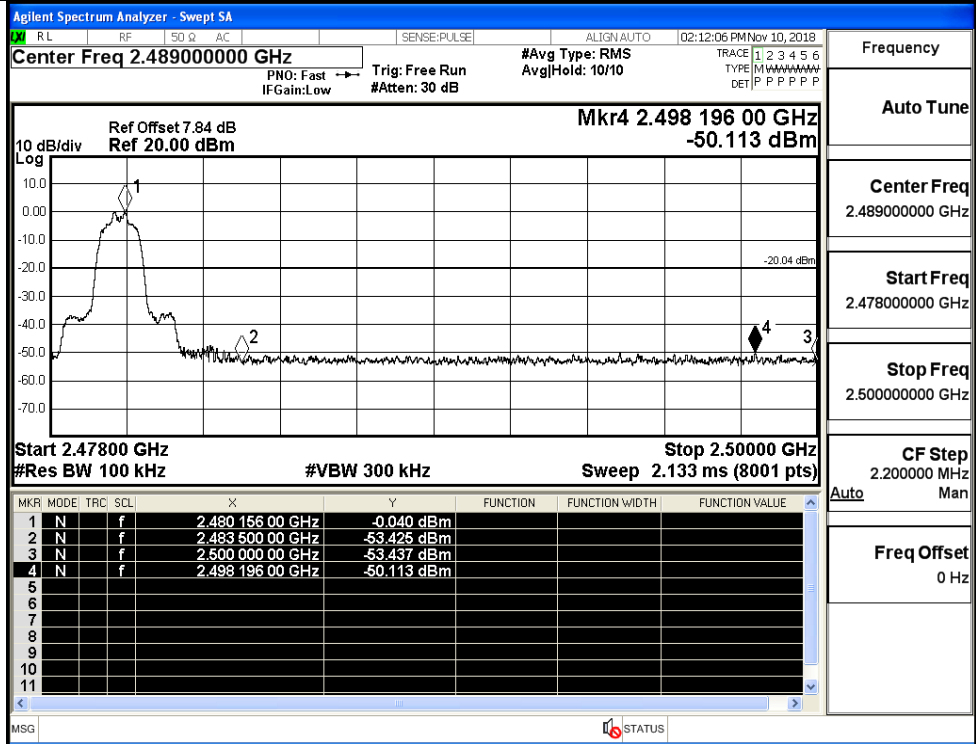
$\pi/4$ DQPSK/LCH/No Hop



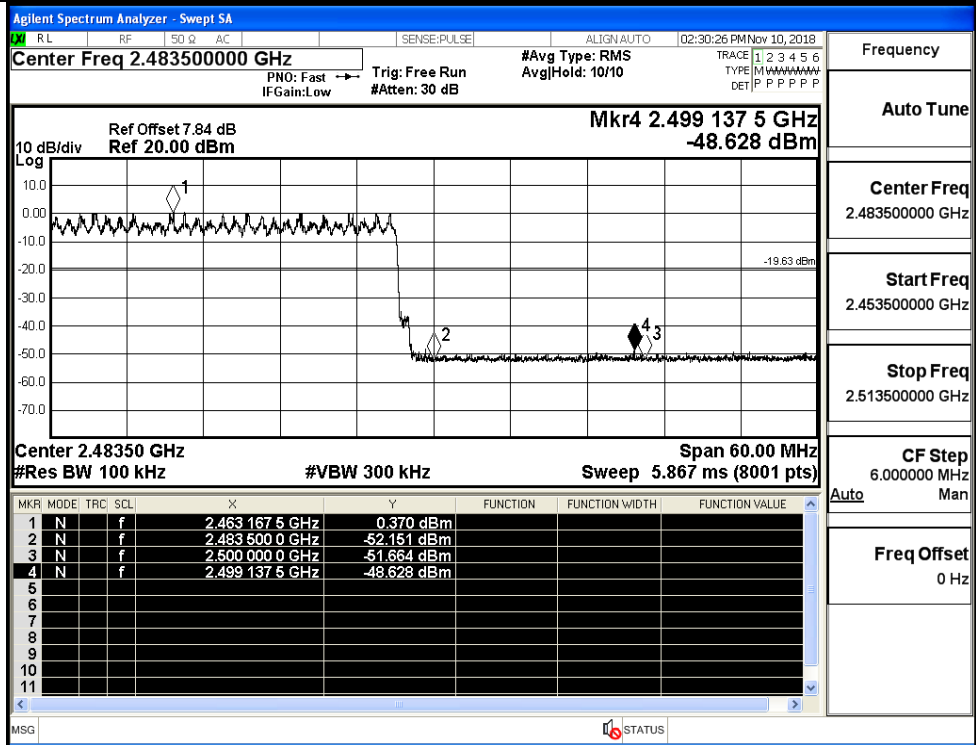
$\pi/4$ DQPSK/LCH/Hop

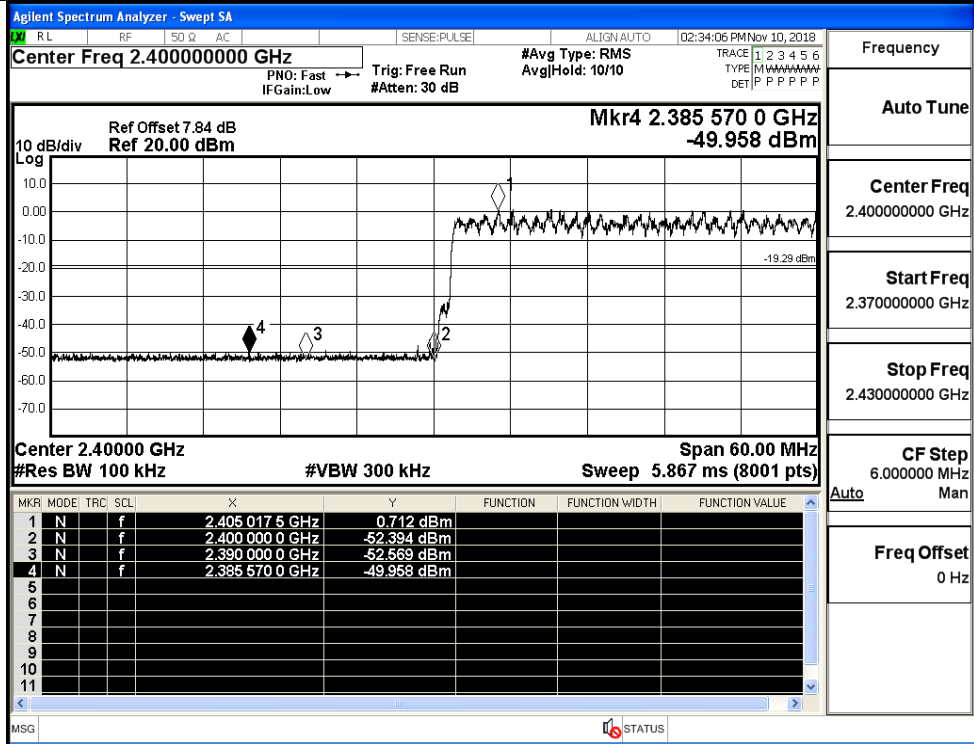


π /4DQPSK/HCH/No
Hop



π /4DQPSK/HCH/Hop

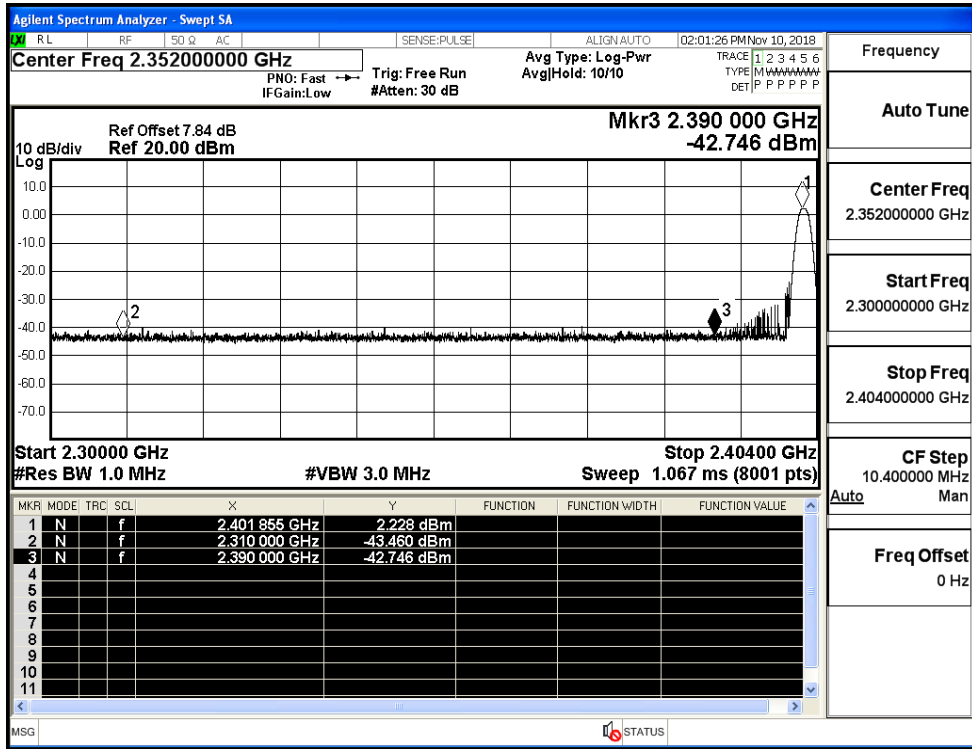




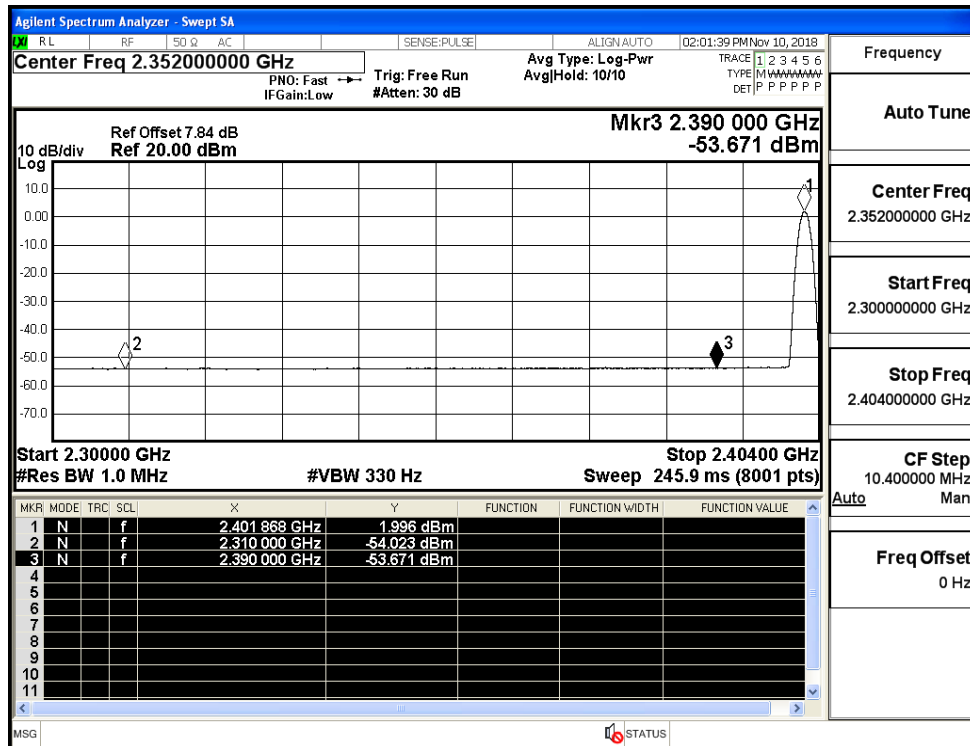
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.46	2.0	0	53.80	PEAK	74	PASS
	Off	2310.0	-54.02	2.0	0	43.23	AV	54	PASS
	Off	2390.0	-42.75	2.0	0	54.51	PEAK	74	PASS
	Off	2390.0	-53.67	2.0	0	43.59	AV	54	PASS
	Off	2483.5	-40.88	2.0	0	56.38	PEAK	74	PASS
	Off	2483.5	-53.19	2.0	0	44.07	AV	54	PASS
	Off	2500.0	-42.74	2.0	0	54.51	PEAK	74	PASS
	Off	2500.0	-53.28	2.0	0	43.98	AV	54	PASS
π/4DQPSK	Off	2310.0	-43.85	2.0	0	53.41	PEAK	74	PASS
	Off	2310.0	-53.99	2.0	0	43.27	AV	54	PASS
	Off	2390.0	-42.68	2.0	0	54.57	PEAK	74	PASS
	Off	2390.0	-53.75	2.0	0	43.51	AV	54	PASS
	Off	2483.5	-42.87	2.0	0	54.39	PEAK	74	PASS
	Off	2483.5	-53.31	2.0	0	43.95	AV	54	PASS
	Off	2500.0	-43.99	2.0	0	53.27	PEAK	74	PASS
	Off	2500.0	-53.28	2.0	0	43.98	AV	54	PASS

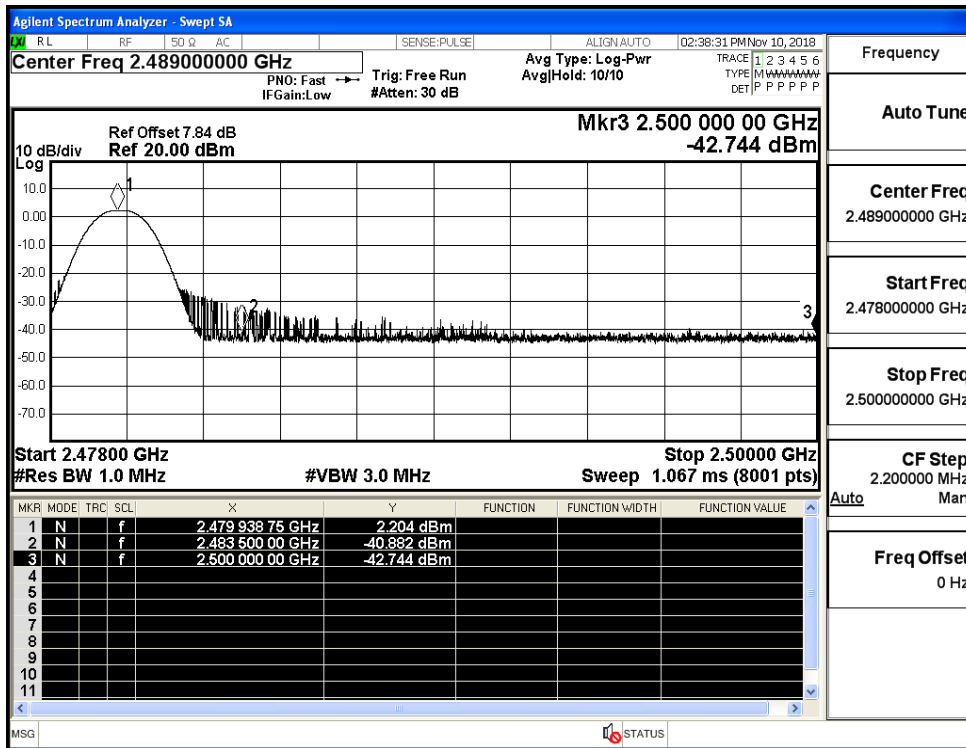
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



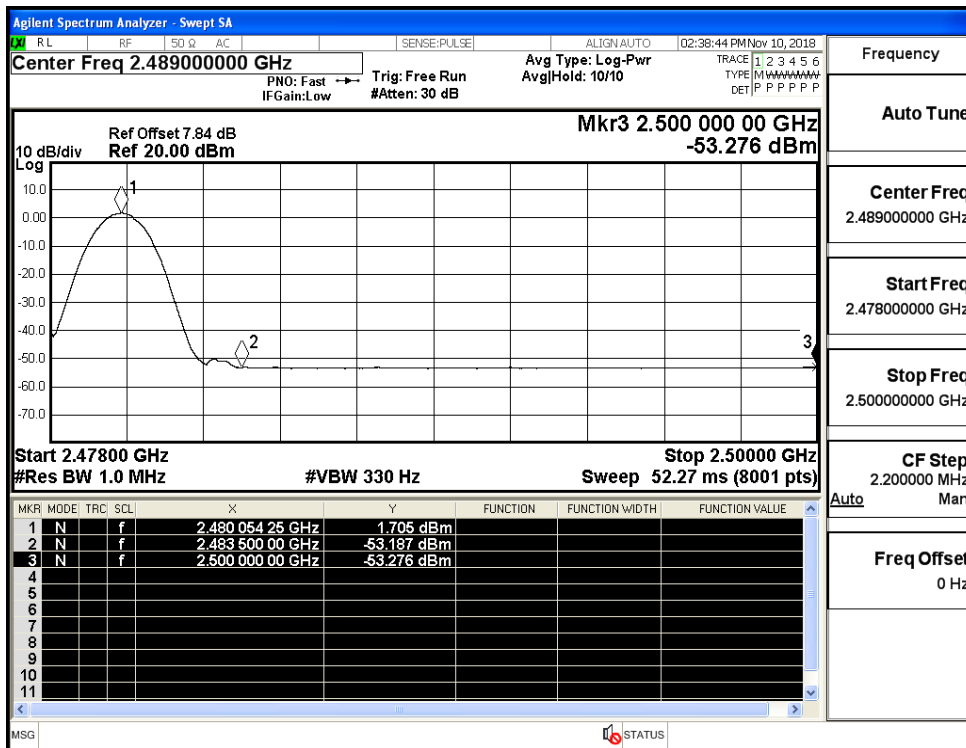
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



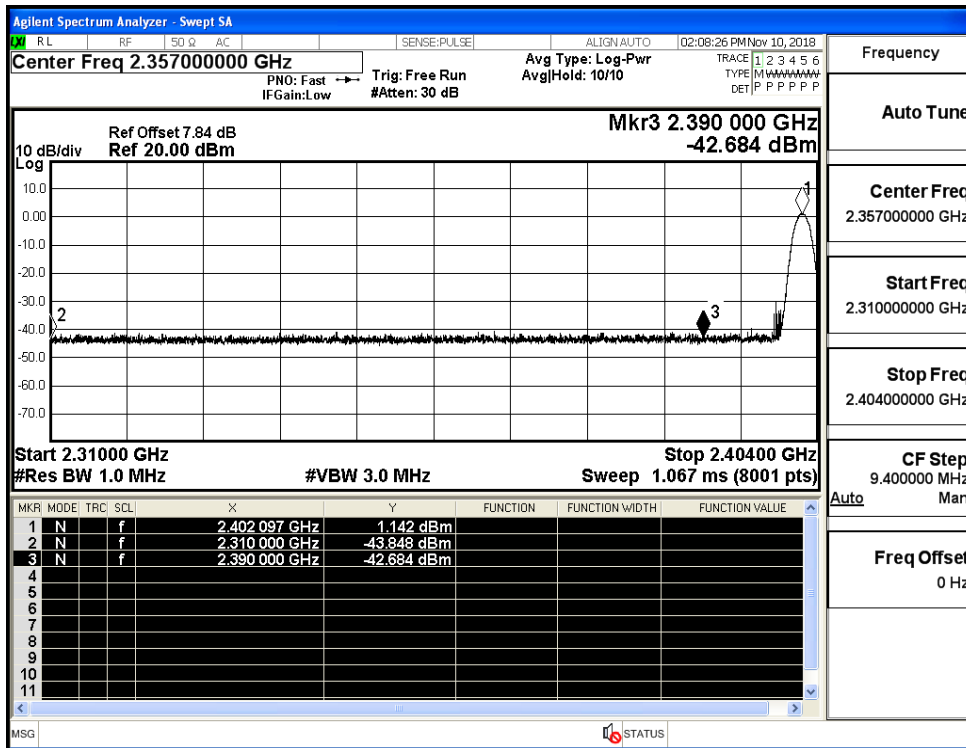
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



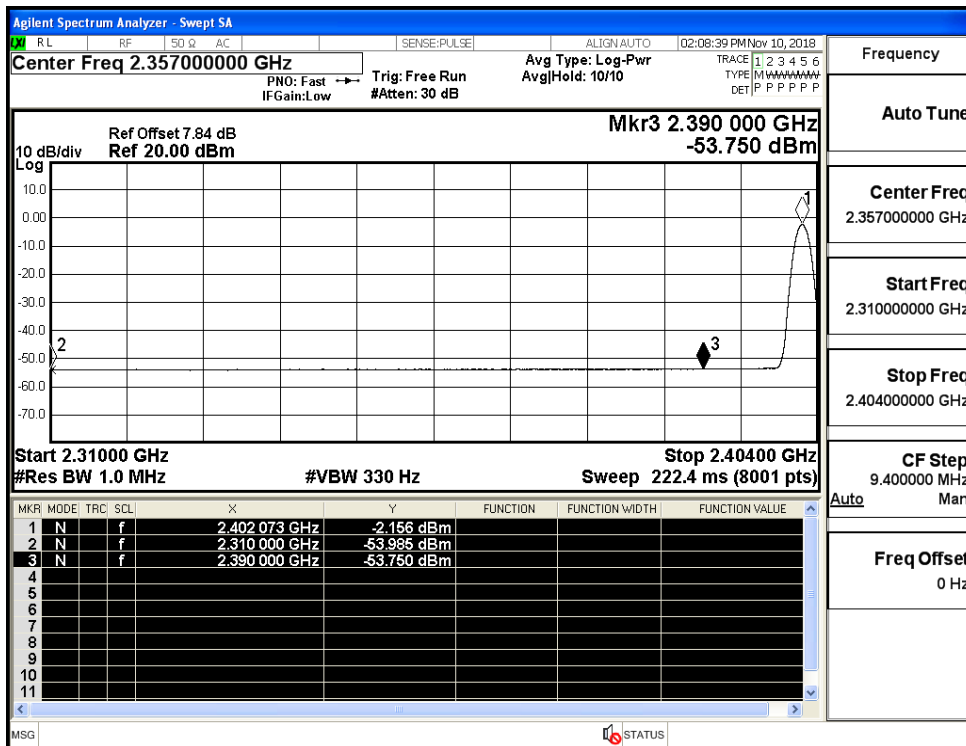
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



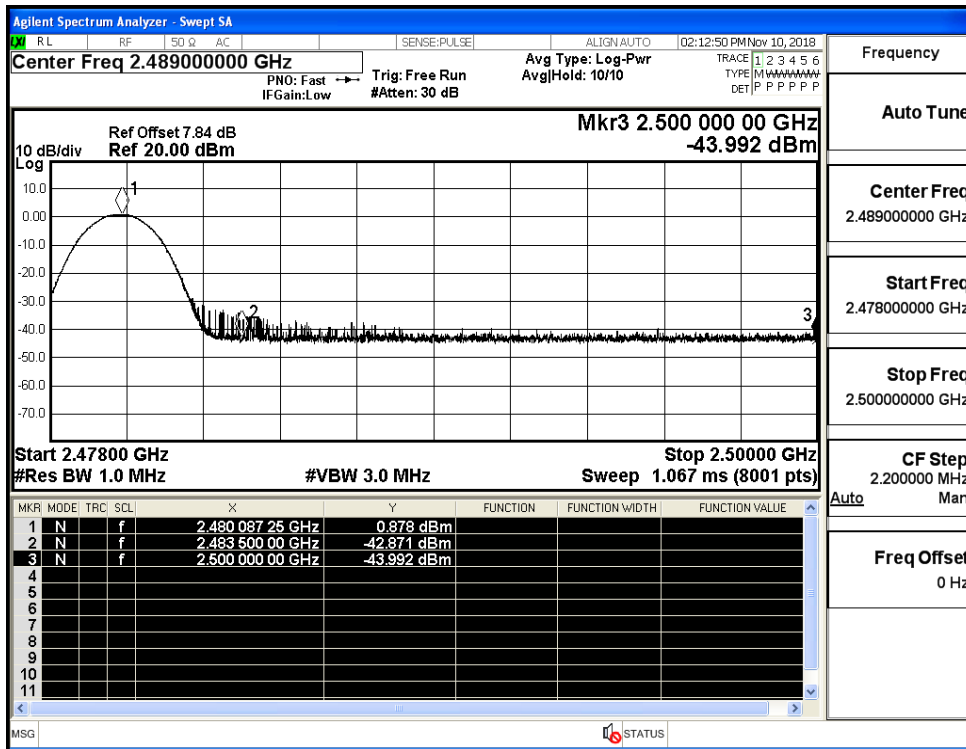
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)

