

## Appendix A

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

**Product Name: Wireless Speaker**

**Trade Mark: billboard**

**Test Model: BB1001**

#### Environmental Conditions

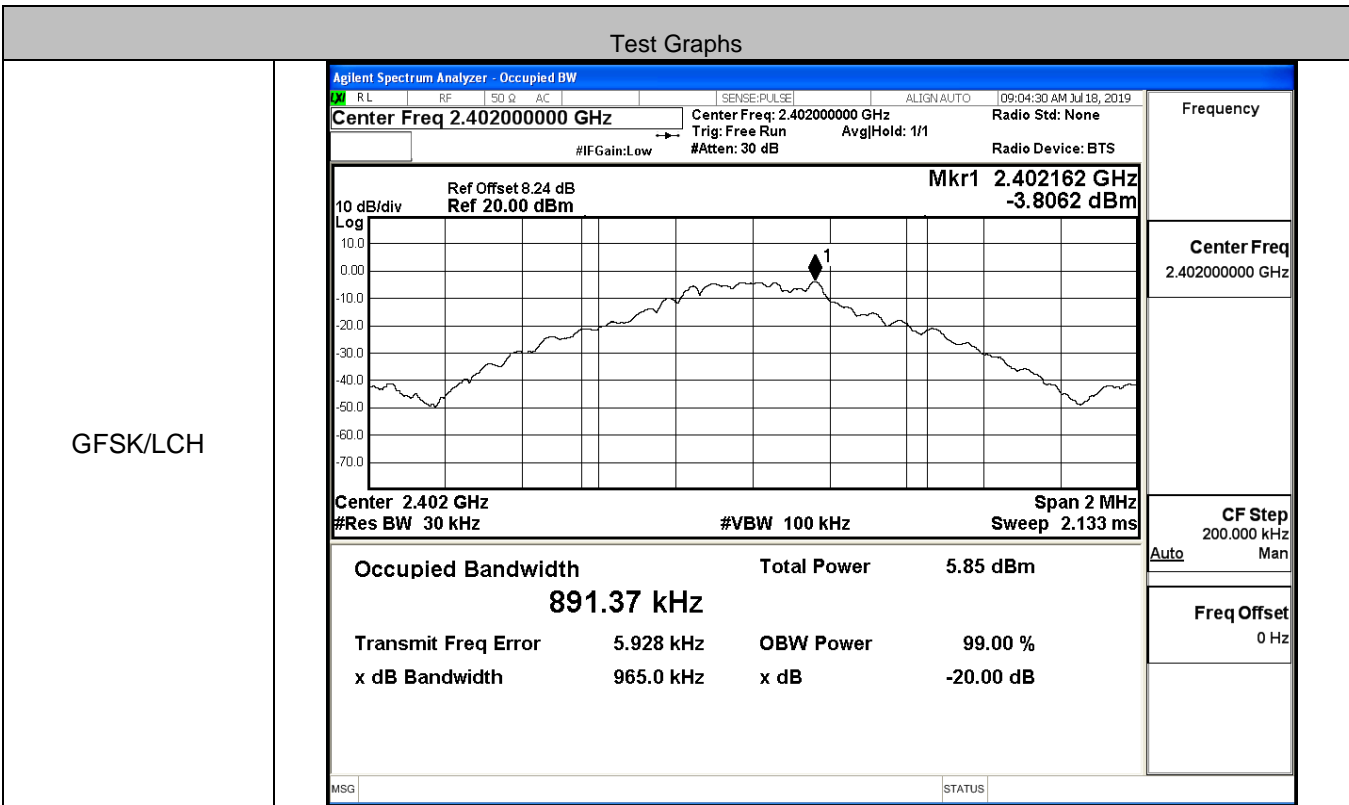
Temperature:	23.4 °C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	SCENT HU
Supervised by:	Wang.Chuang

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

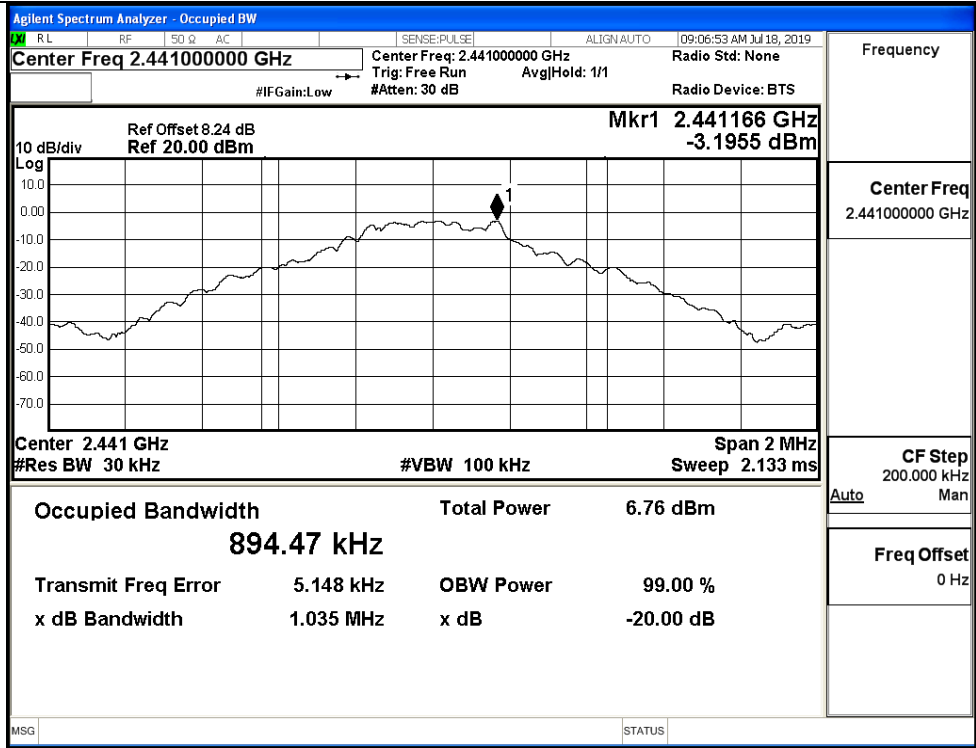
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.480	21	PASS
	MCH	-0.626	21	PASS
	HCH	-1.751	21	PASS
π/4DQPSK	LCH	-2.106	21	PASS
	MCH	-1.224	21	PASS
	HCH	-2.316	21	PASS

**A.2 20dB Bandwidth**

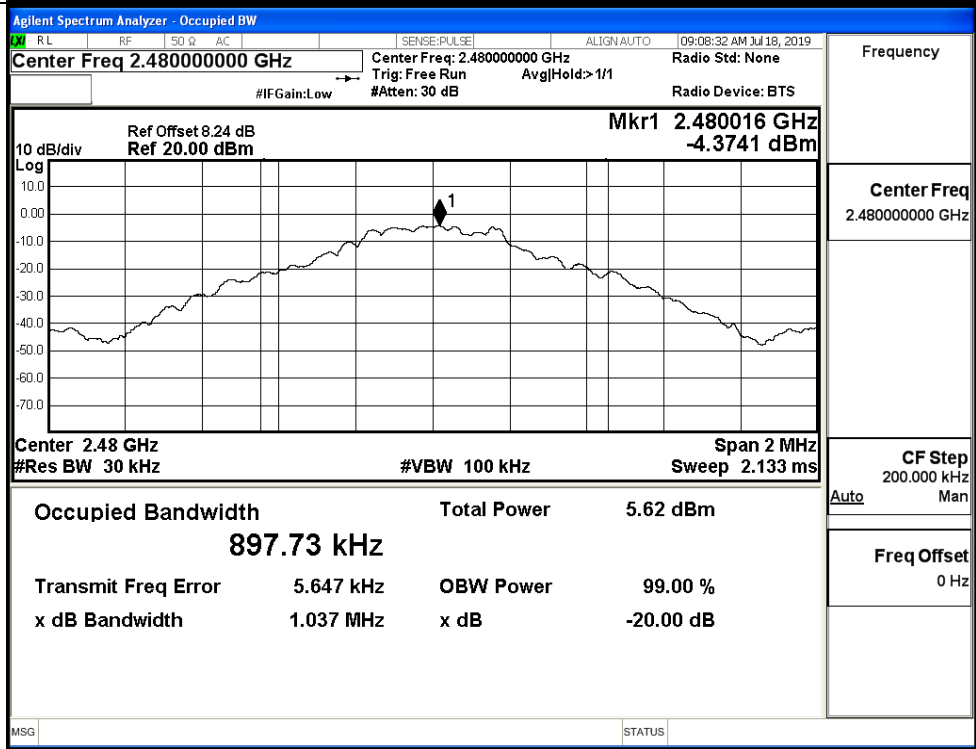
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9650	Not Specified	PASS
	MCH	1.035	Not Specified	PASS
	HCH	1.037	Not Specified	PASS
π/4DQPSK	LCH	1.292	Not Specified	PASS
	MCH	1.310	Not Specified	PASS
	HCH	1.291	Not Specified	PASS

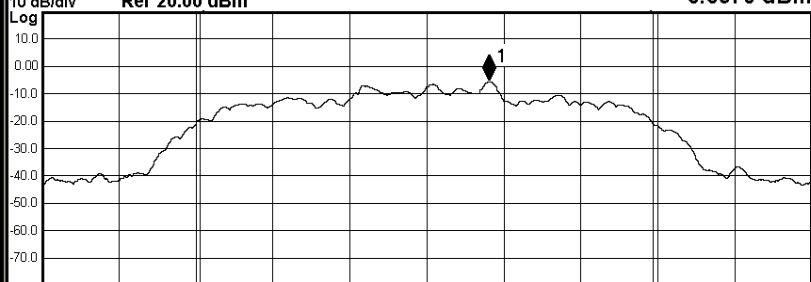
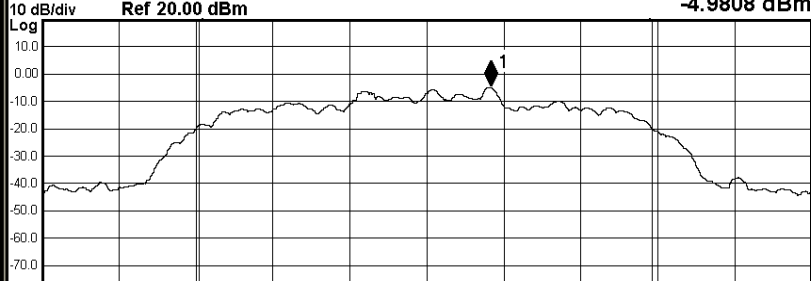


GFSK/MCH

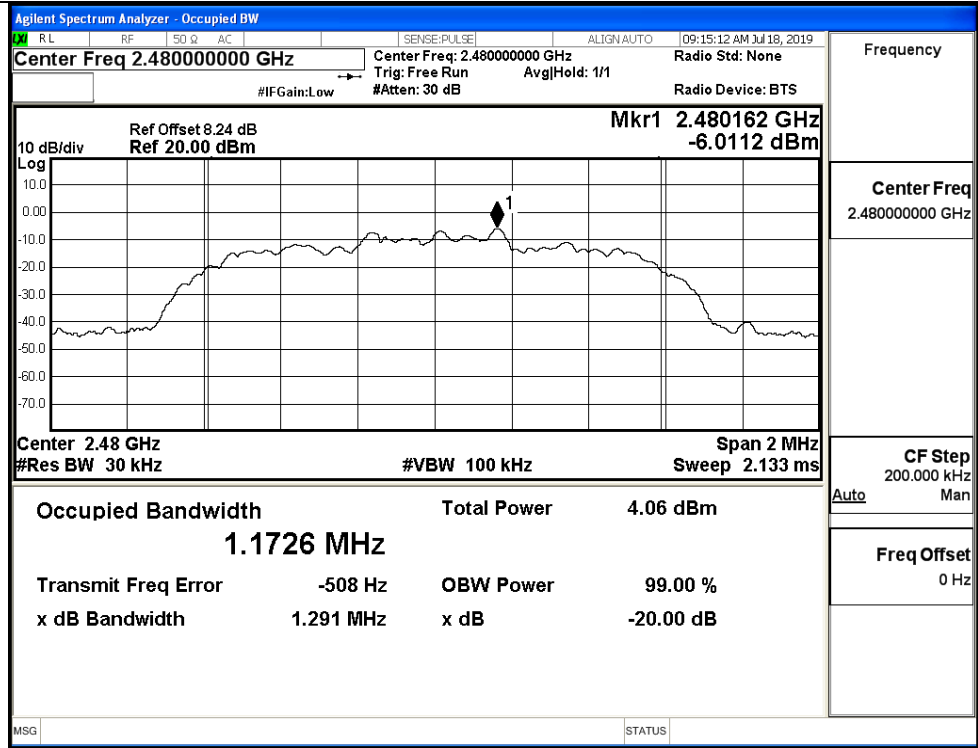


GFSK/HCH



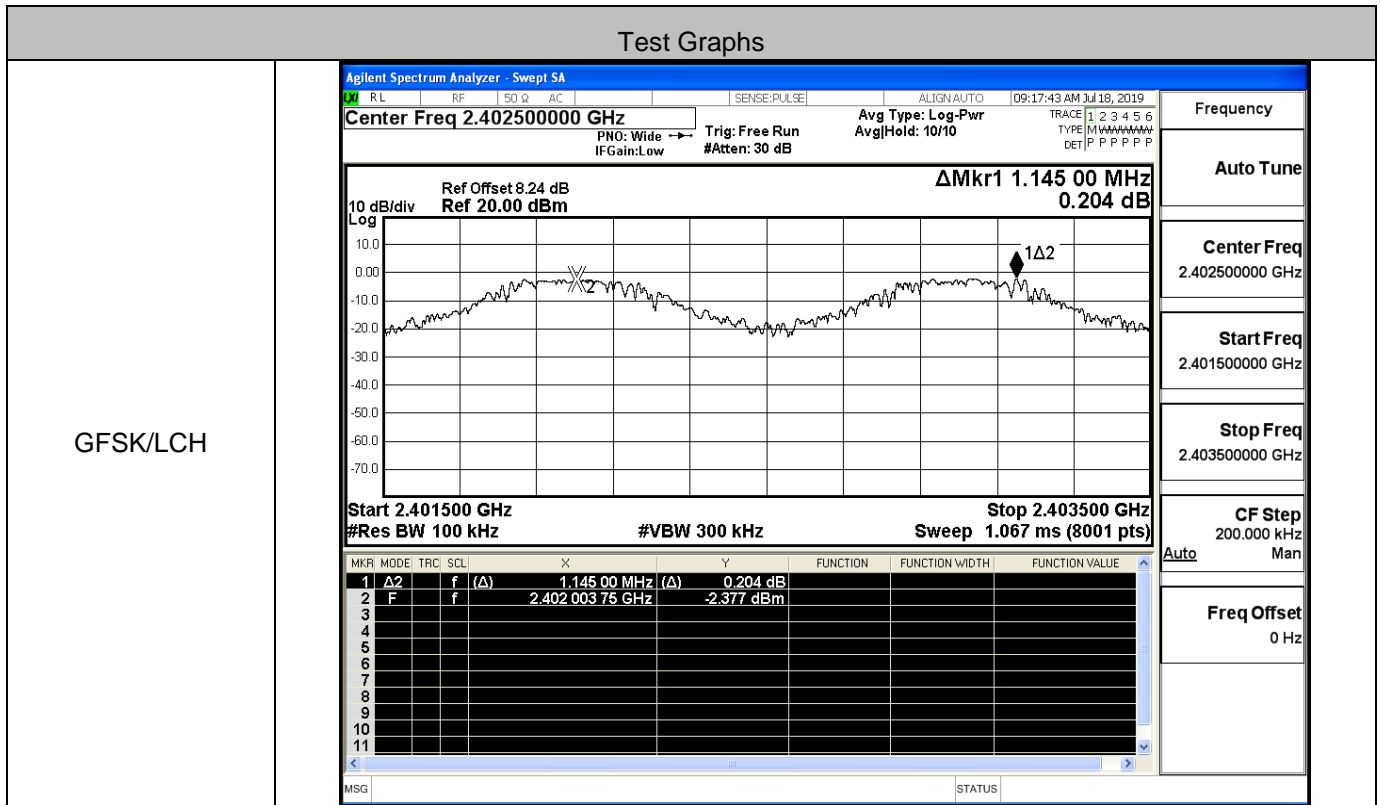
<p style="text-align: center;">π/4DQPSK/LCH</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq <b>2.40200000 GHz</b>      Center Freq: 2.40200000 GHz      Radio Std: None              Trig: Free Run      AvgHold: 1/1</p> <p>#IFGain: Low      #Atten: 30 dB      Radio Device: BTS</p> <hr/> <p>10 dB/div      Ref Offset 8.24 dB      Mkr1 <b>2.402162 GHz</b>              Ref 20.00 dBm      <b>-5.5970 dBm</b></p>  <p>Center <b>2.402 GHz</b>      Span <b>2 MHz</b>              #Res BW <b>30 kHz</b>      #VBW <b>100 kHz</b>      Sweep <b>2.133 ms</b></p> <p><b>Occupied Bandwidth</b>      Total Power      <b>4.45 dBm</b>  <b>1.1750 MHz</b></p> <p>Transmit Freq Error      <b>-222 Hz</b>      OBW Power      <b>99.00 %</b>              x dB Bandwidth      <b>1.292 MHz</b>      x dB      <b>-20.00 dB</b></p> <p>MSG      STATUS</p> </div>	<p>Frequency</p> <p>Center Freq 2.40200000 GHz</p> <p>CF Step 200.000 kHz Auto Man</p> <p>Freq Offset 0 Hz</p>
<p style="text-align: center;">π/4DQPSK/MCH</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq <b>2.44100000 GHz</b>      Center Freq: 2.44100000 GHz      Radio Std: None              Trig: Free Run      AvgHold: 1/1</p> <p>#IFGain: Low      #Atten: 30 dB      Radio Device: BTS</p> <hr/> <p>10 dB/div      Ref Offset 8.24 dB      Mkr1 <b>2.441166 GHz</b>              Ref 20.00 dBm      <b>-4.9808 dBm</b></p>  <p>Center <b>2.441 GHz</b>      Span <b>2 MHz</b>              #Res BW <b>30 kHz</b>      #VBW <b>100 kHz</b>      Sweep <b>2.133 ms</b></p> <p><b>Occupied Bandwidth</b>      Total Power      <b>5.20 dBm</b>  <b>1.1726 MHz</b></p> <p>Transmit Freq Error      <b>-1.527 kHz</b>      OBW Power      <b>99.00 %</b>              x dB Bandwidth      <b>1.310 MHz</b>      x dB      <b>-20.00 dB</b></p> <p>MSG      STATUS</p> </div>	<p>Frequency</p> <p>Center Freq 2.44100000 GHz</p> <p>CF Step 200.000 kHz Auto Man</p> <p>Freq Offset 0 Hz</p>

$\pi/4$ DQPSK/HCH

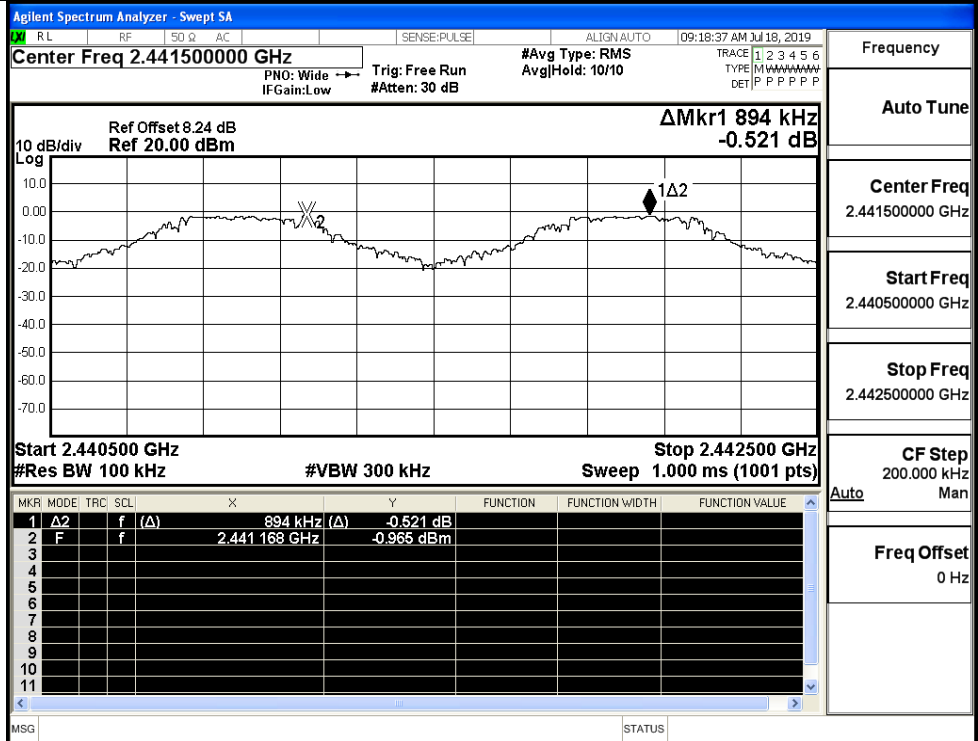


### A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.145	0.691	PASS
	MCH	0.894	0.691	PASS
	HCH	0.896	0.691	PASS
π/4DQPSK	LCH	1.028	0.873	PASS
	MCH	0.876	0.873	PASS
	HCH	1.304	0.873	PASS

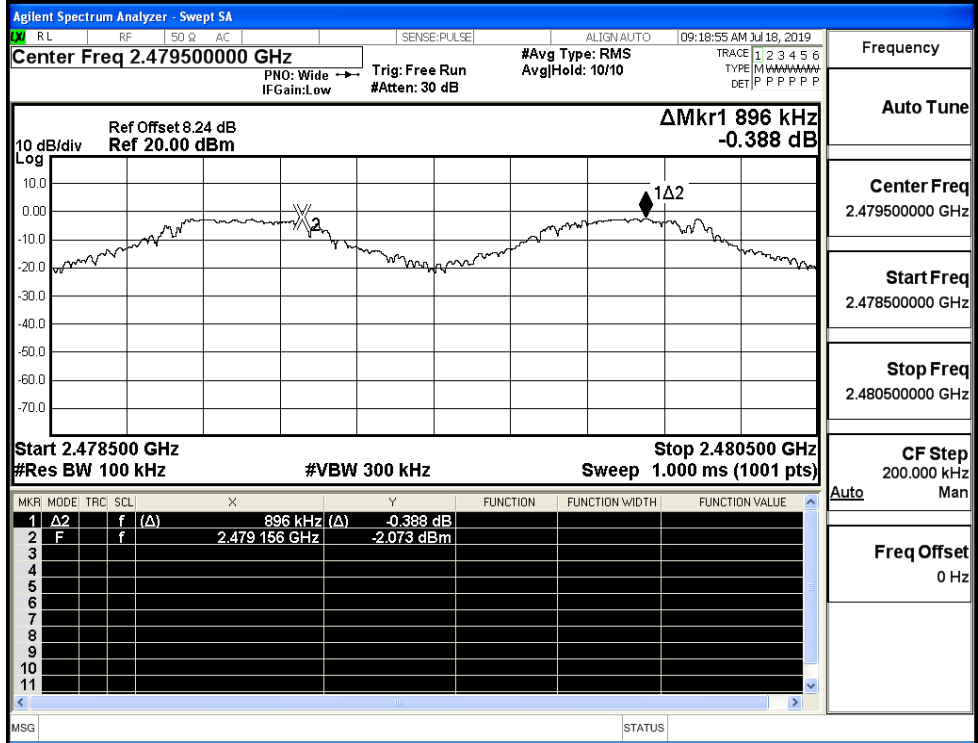


GFSK/MCH



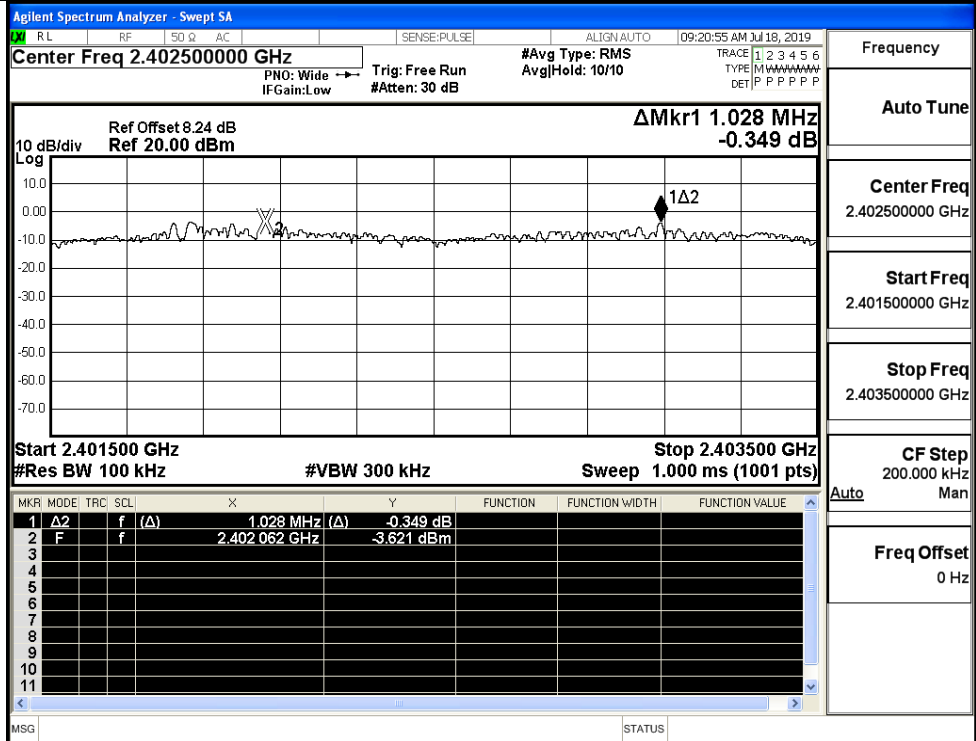
Frequency  
Auto Tune  
Center Freq  
2.441500000 GHz  
Start Freq  
2.440500000 GHz  
Stop Freq  
2.442500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

GFSK/HCH

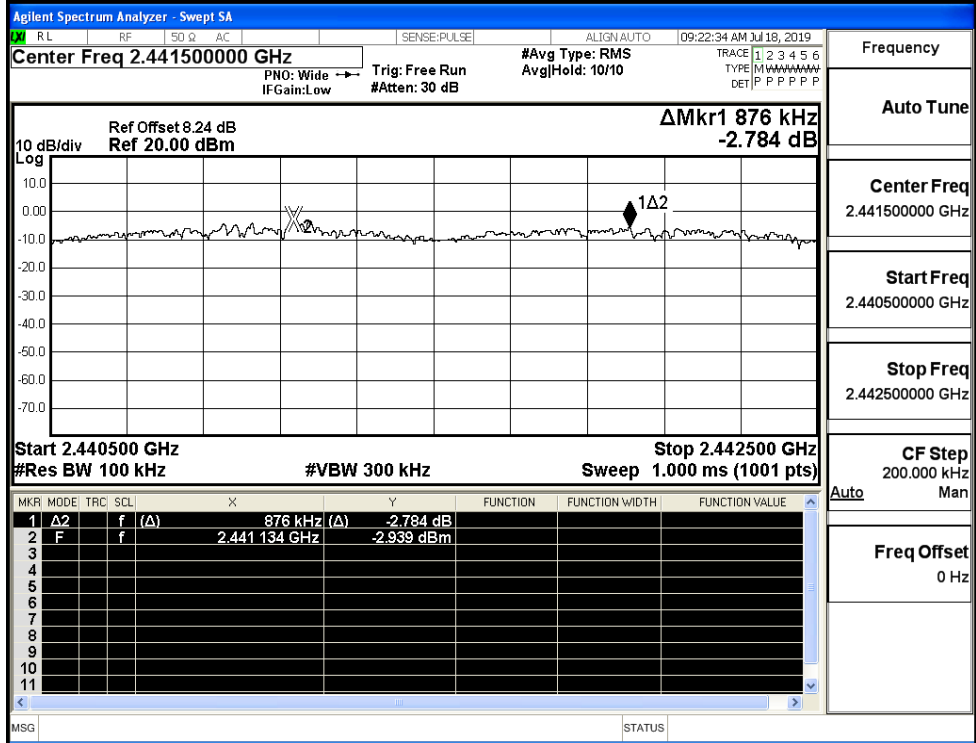


Frequency  
Auto Tune  
Center Freq  
2.479500000 GHz  
Start Freq  
2.478500000 GHz  
Stop Freq  
2.480500000 GHz  
CF Step  
200.000 kHz  
Auto  
Man  
Freq Offset  
0 Hz

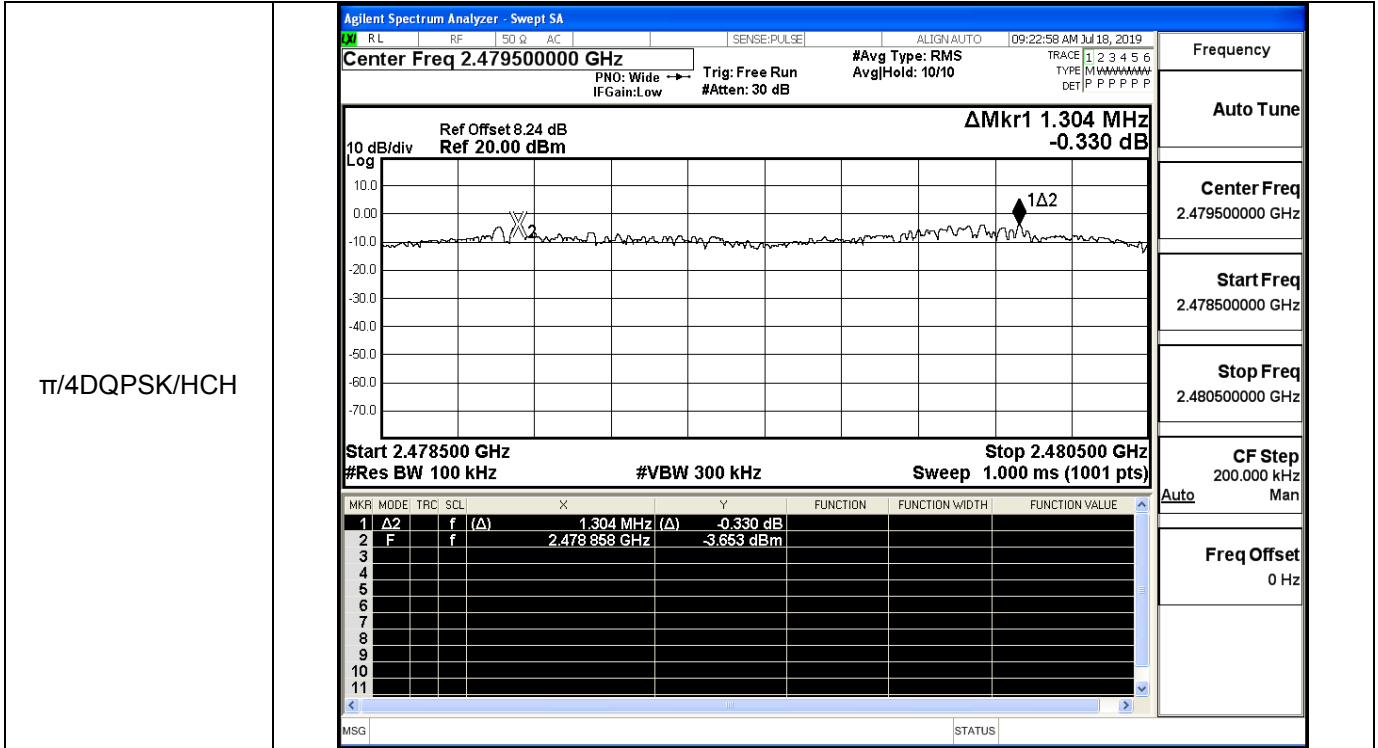
$\pi$ /4DQPSK/LCH



$\pi$ /4DQPSK/MCH

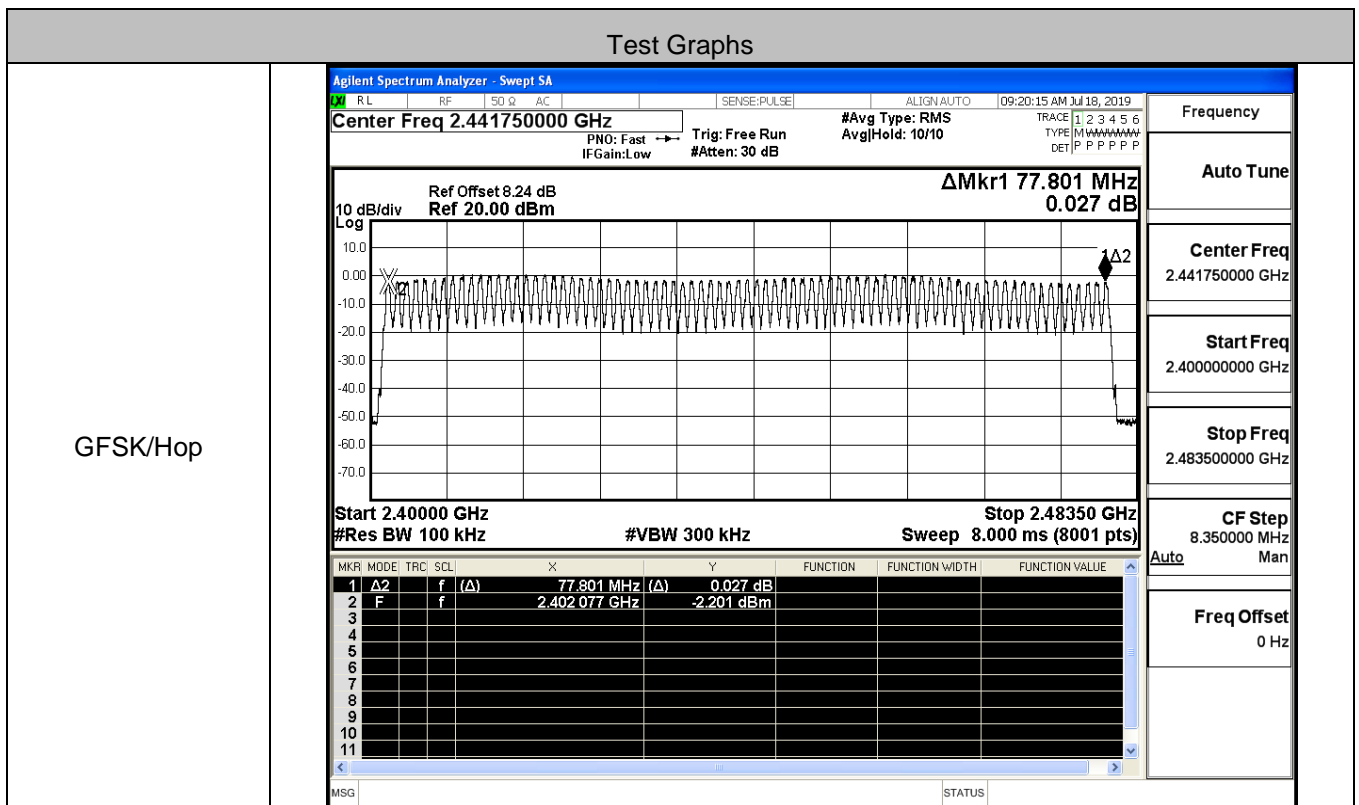


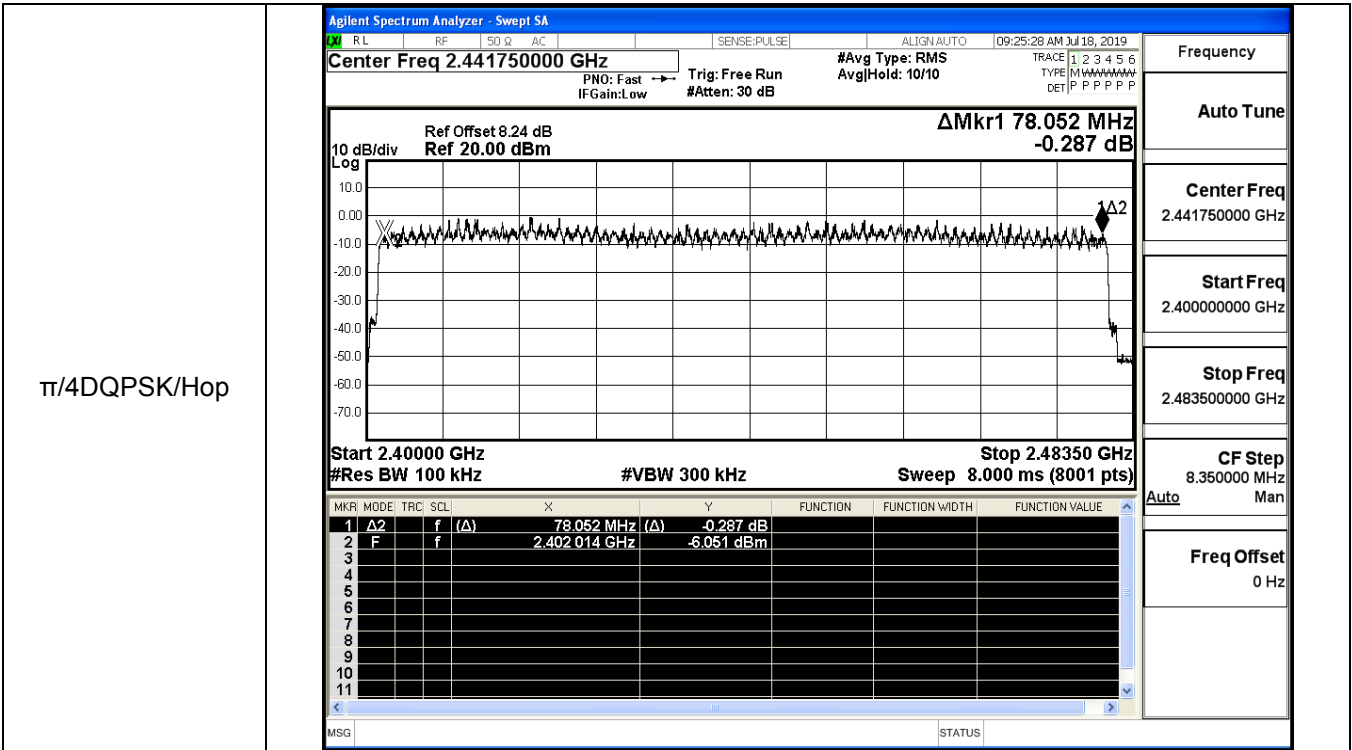




### A.4 Hopping Channel Number

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



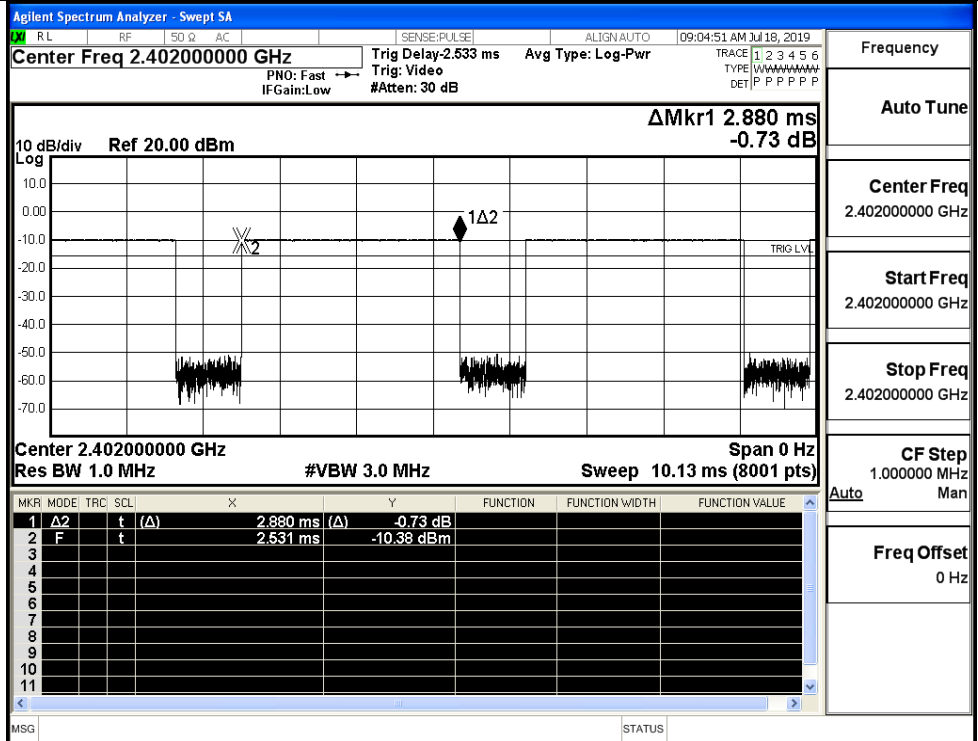


### A.5 Dwell Time

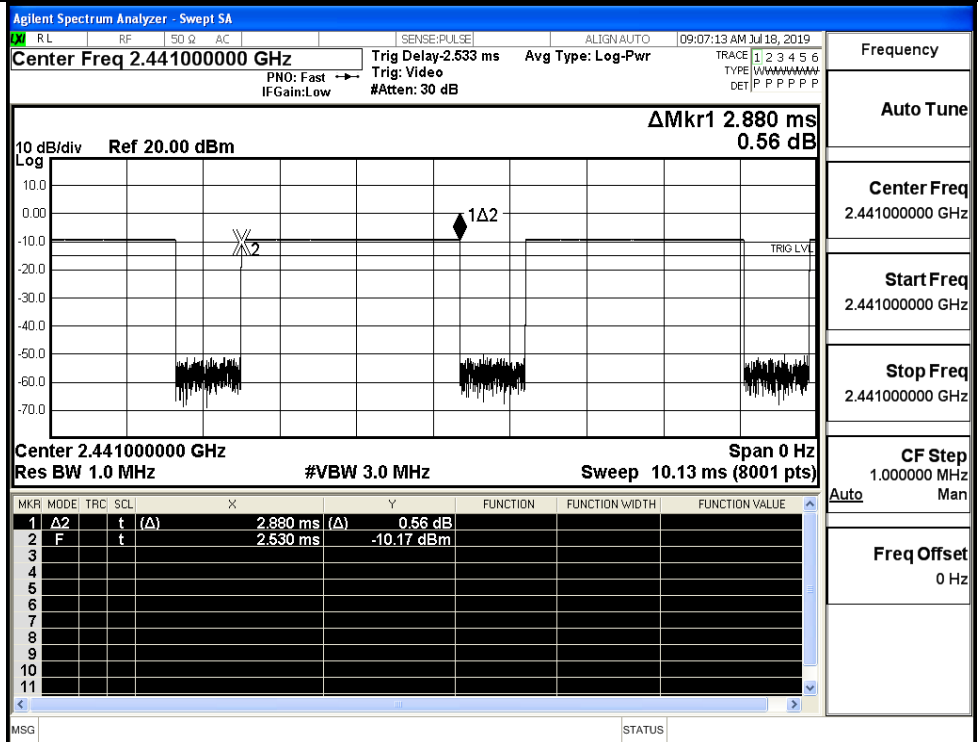
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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

Test Graphs

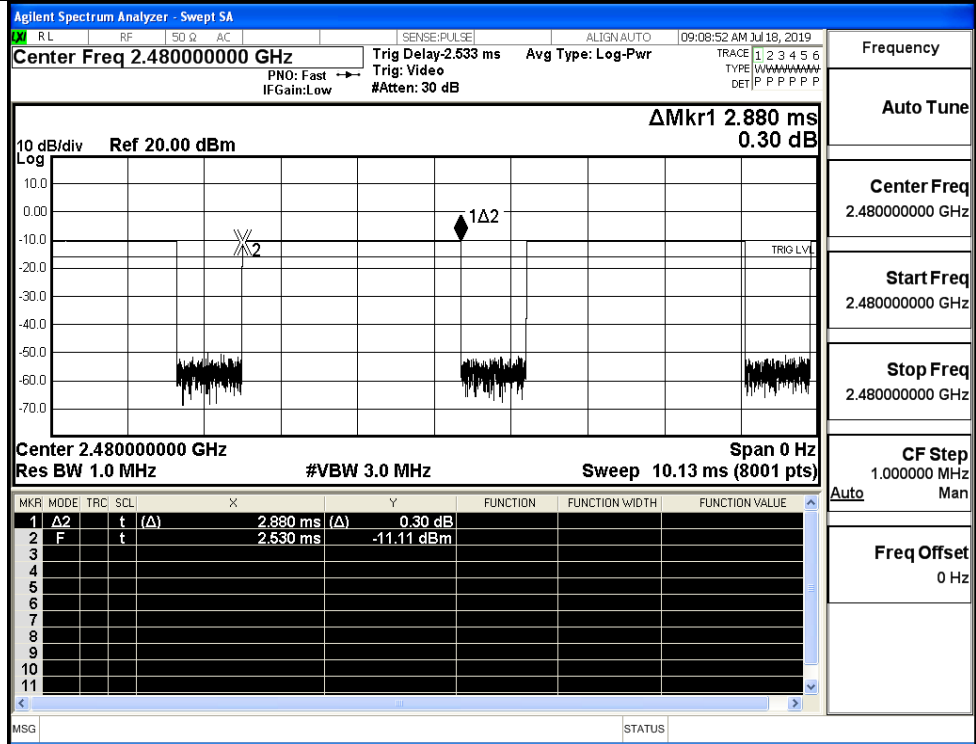
GFSK\_DH5/LCH



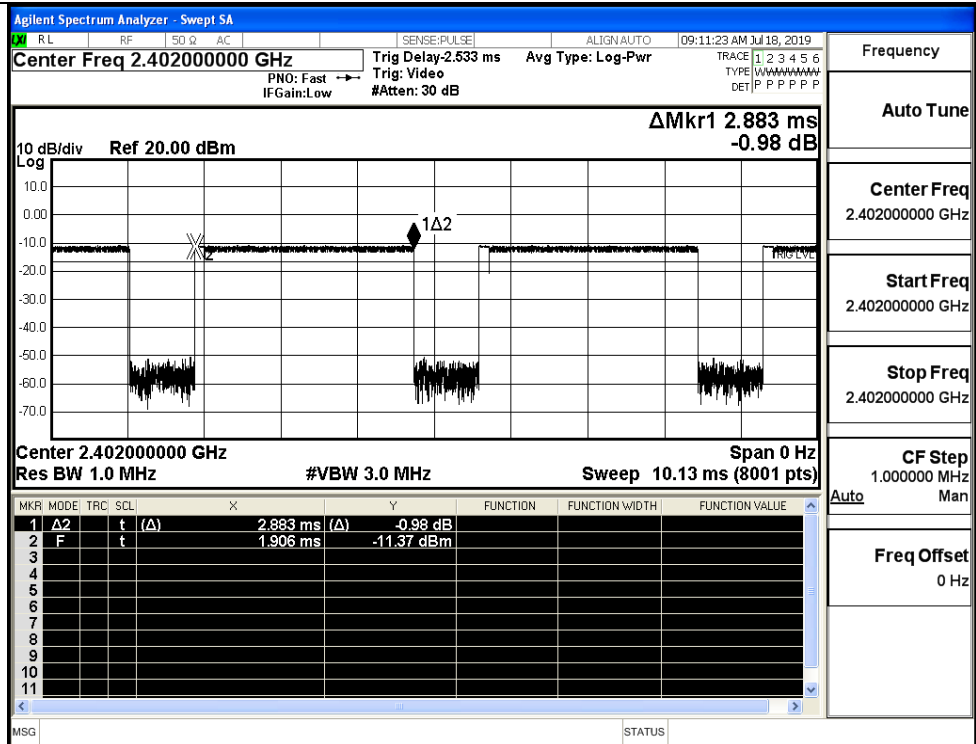
GFSK\_DH5/MCH



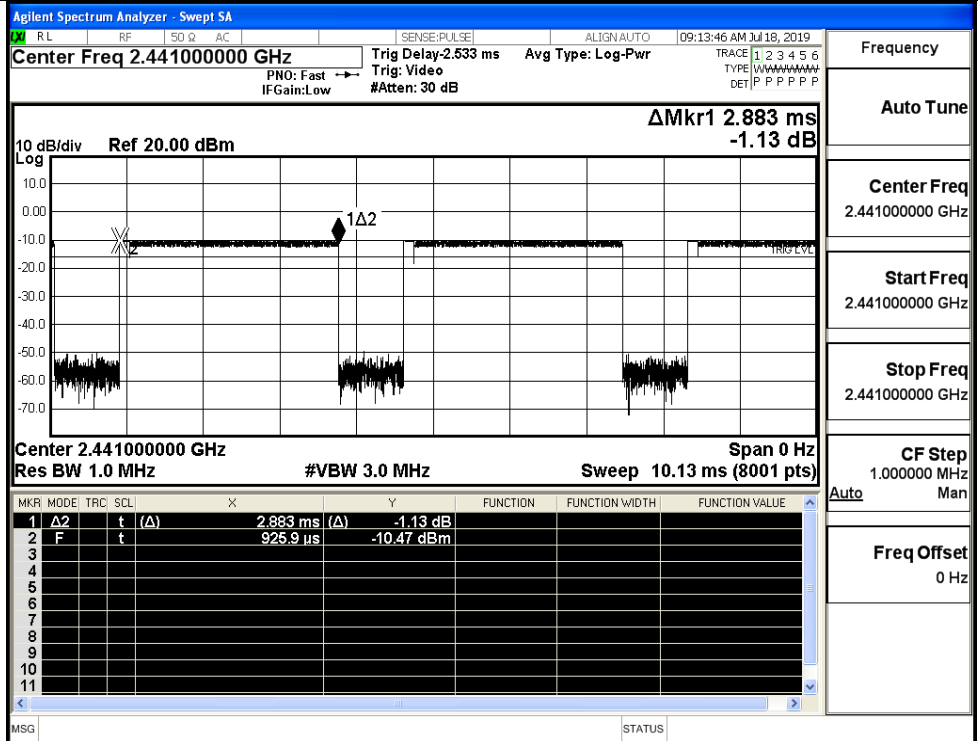
GFSK\_DH5/HCH



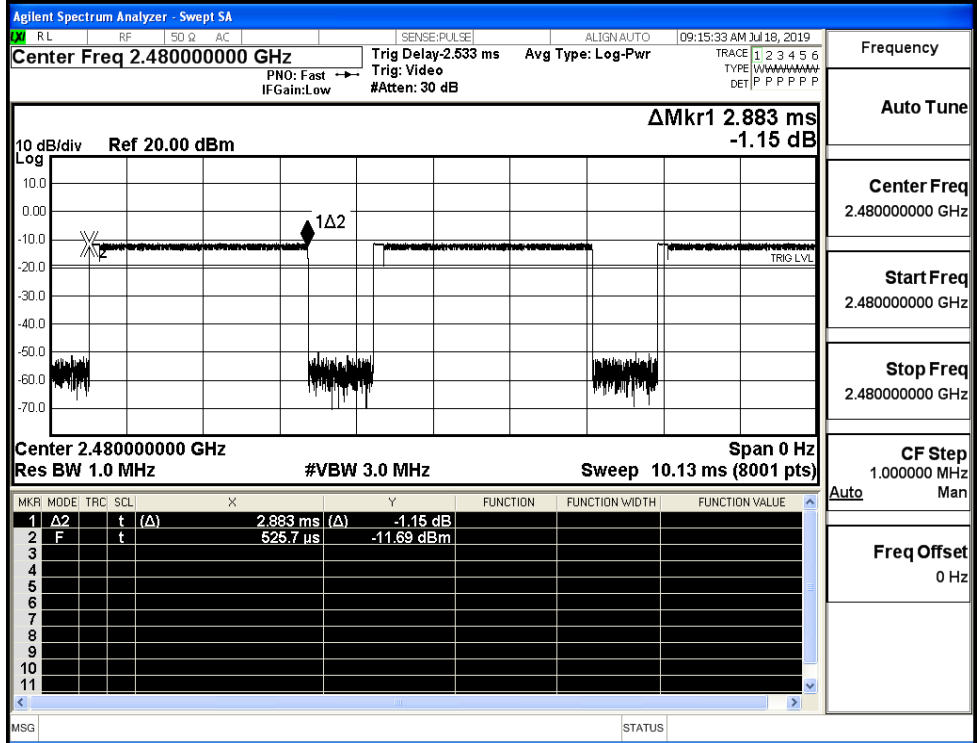
π/4DQPSK  
\_2DH5/LCH



$\pi/4$ DQPSK  
\_2DH5/MCH

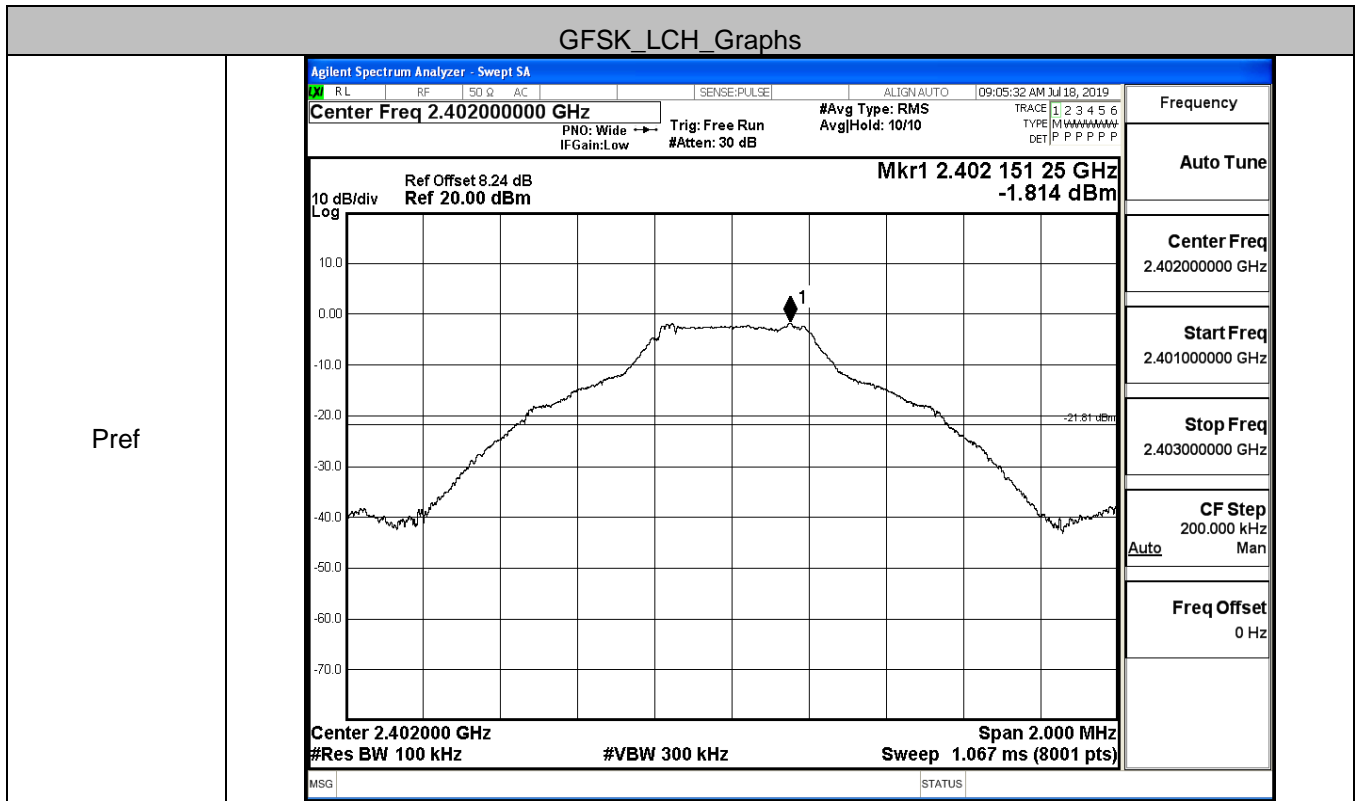


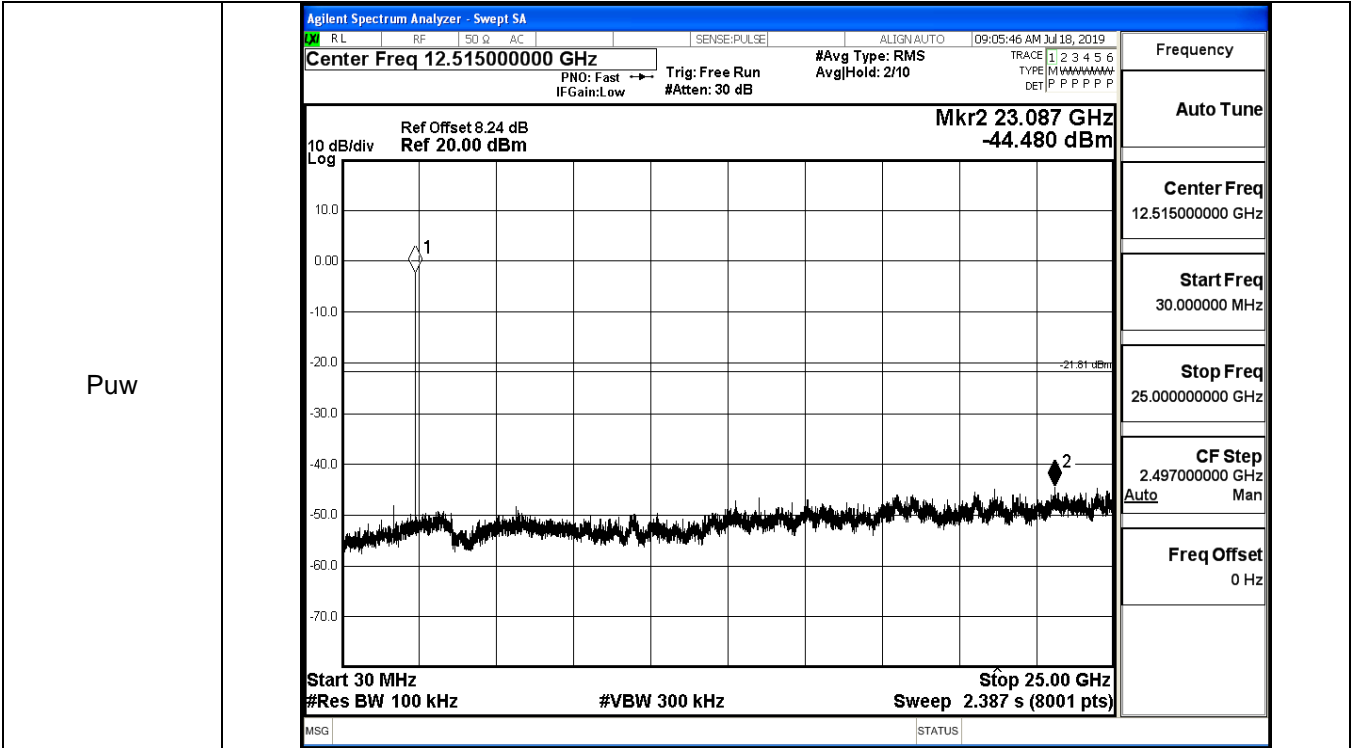
$\pi/4$ DQPSK  
\_2DH5/HCH



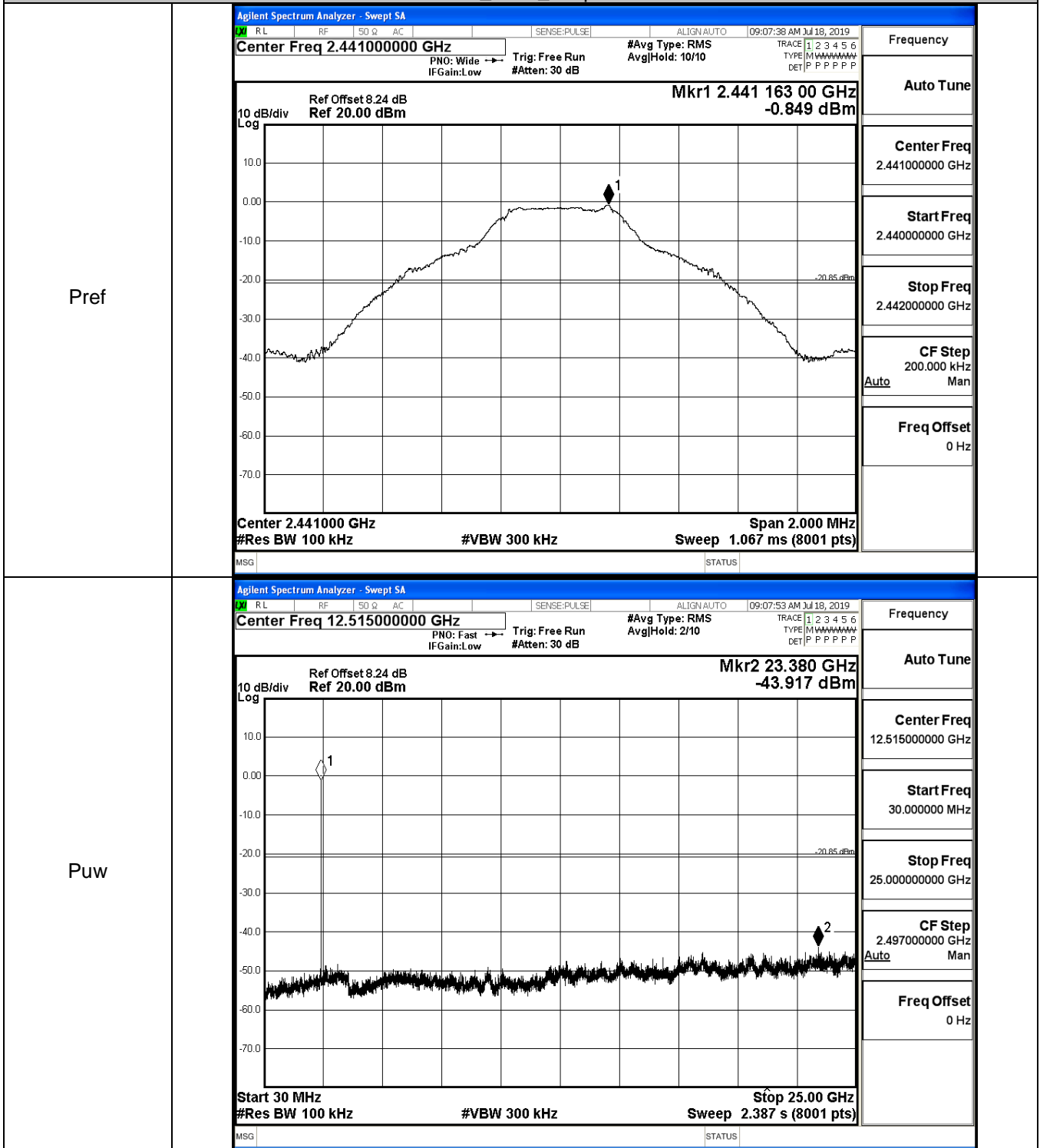
### A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.814	-44.480	-21.814	PASS
	MCH	-0.849	-43.917	-20.849	PASS
	HCH	-2.082	-42.713	-22.082	PASS
$\pi/4$ DQPSK	LCH	-2.966	-44.257	-22.966	PASS
	MCH	-2.241	-45.093	-22.241	PASS
	HCH	-3.338	-44.210	-23.338	PASS



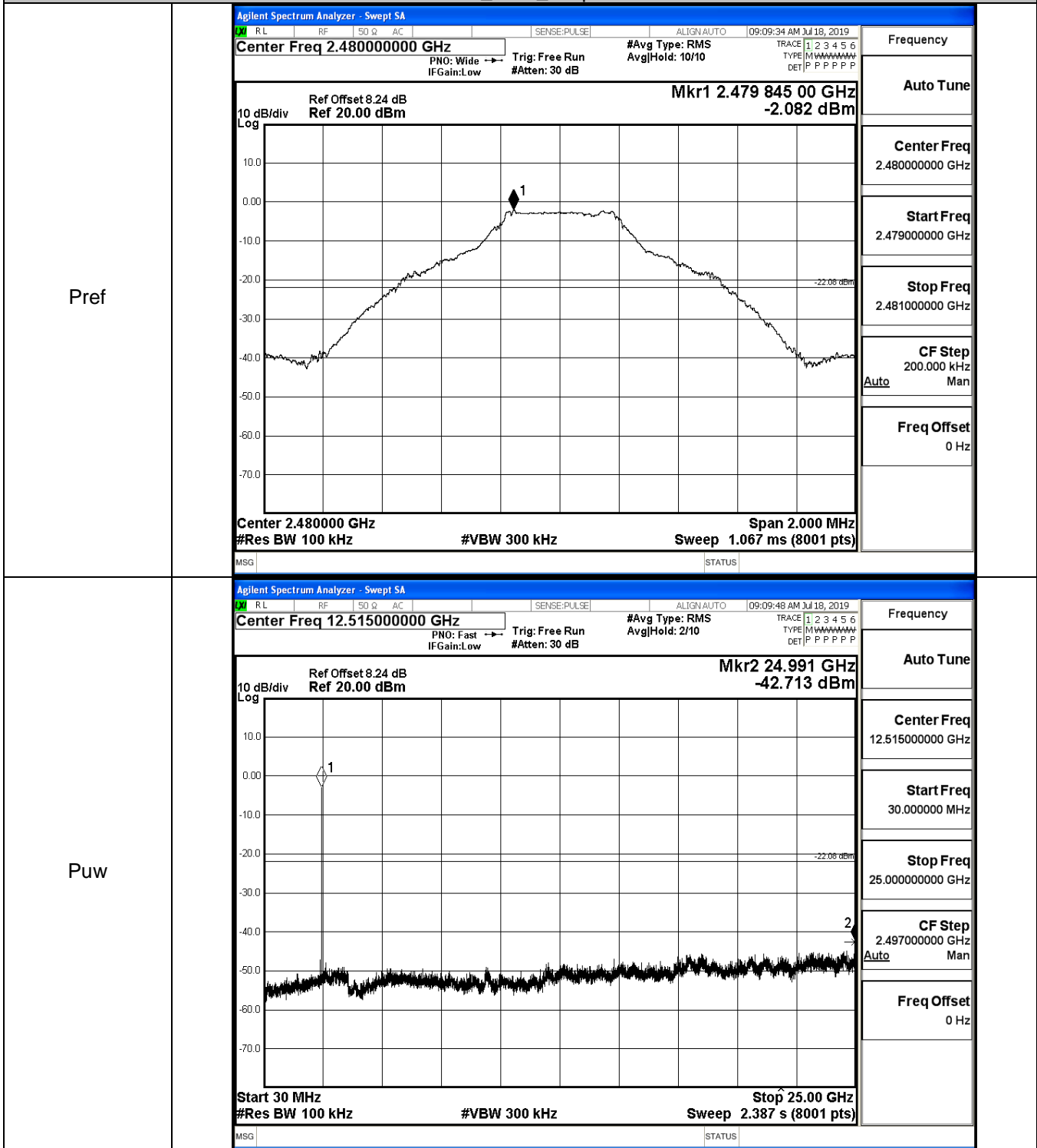


GFSK\_MCH\_Graphs

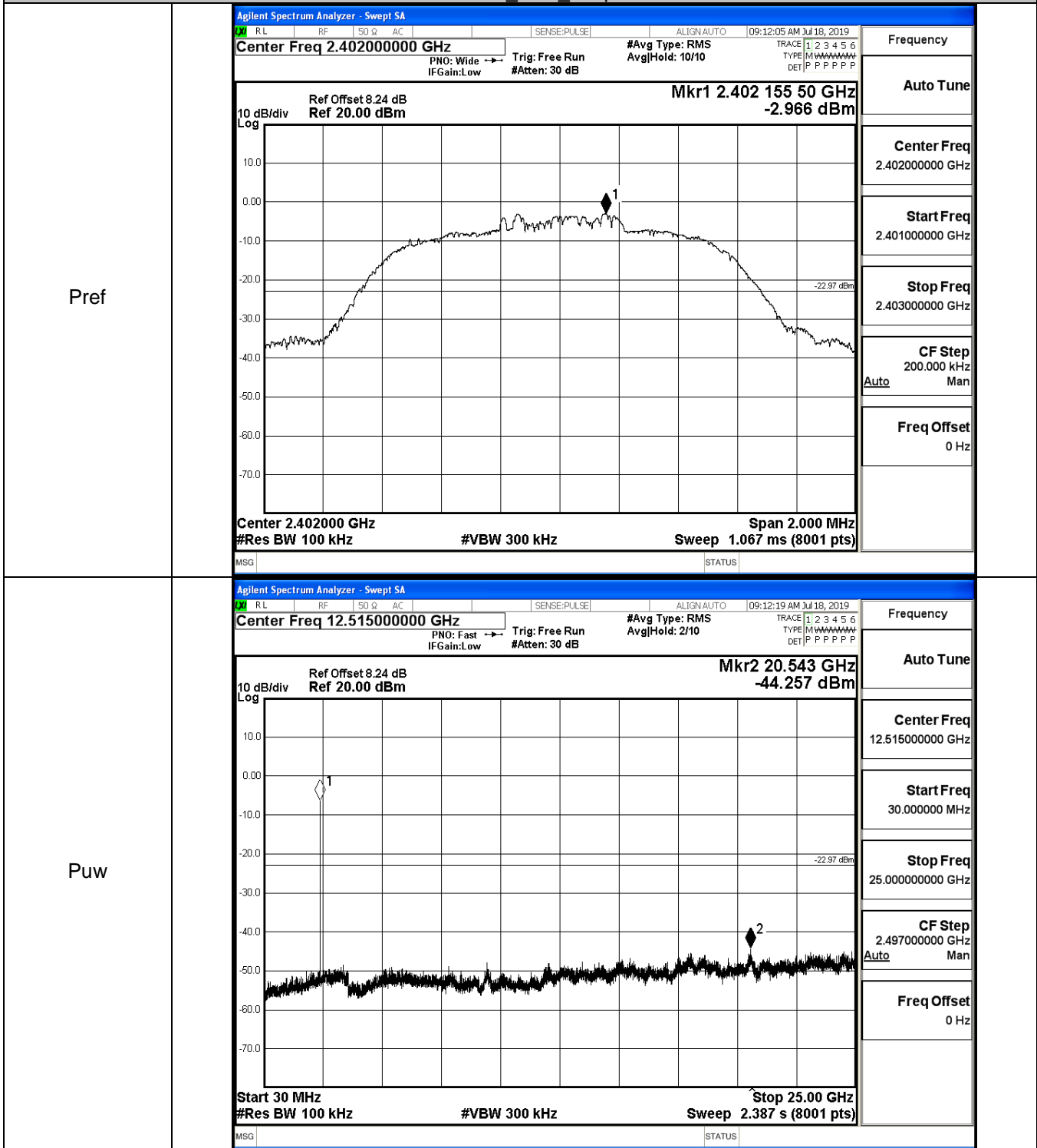




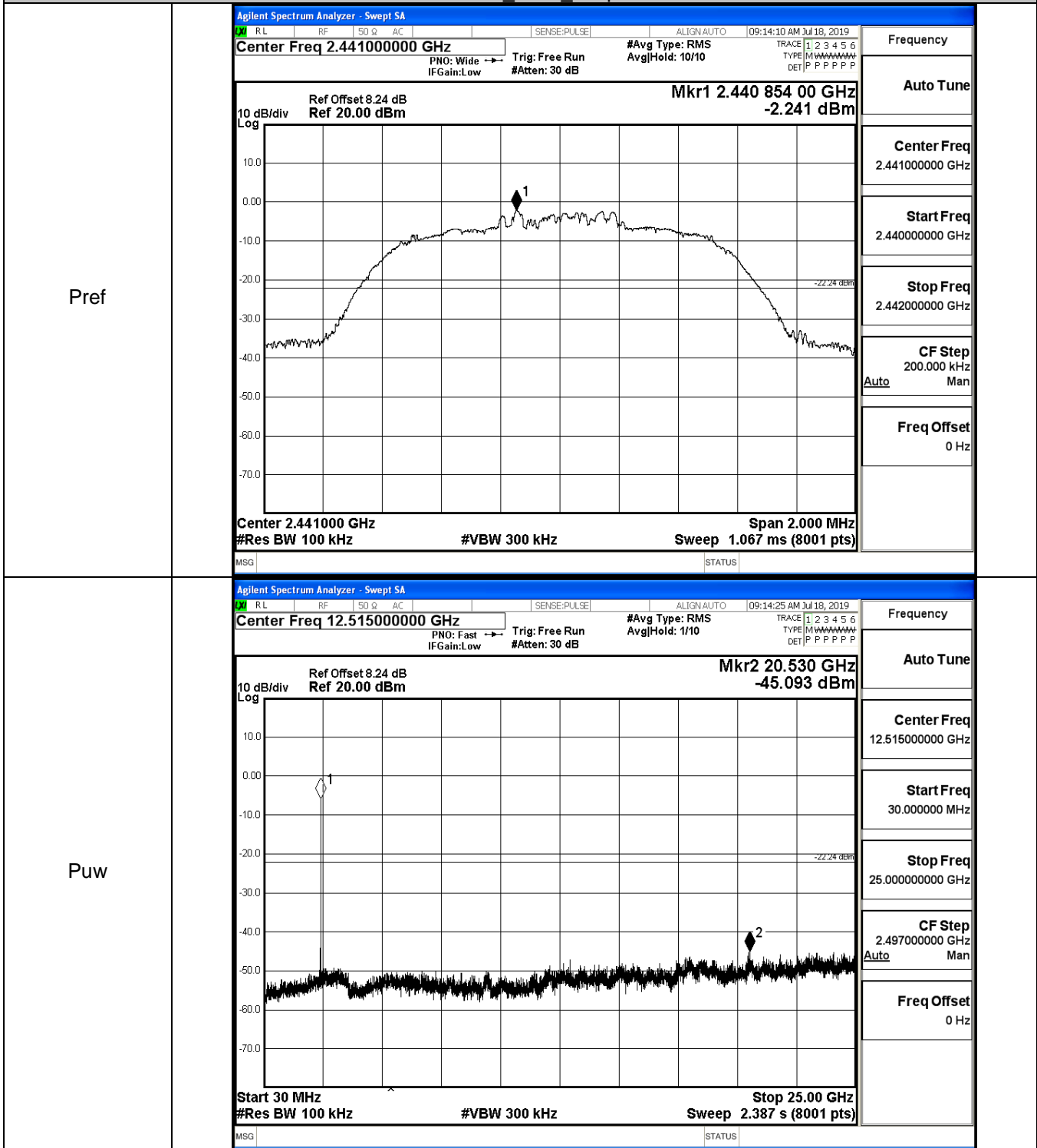
GFSK\_HCH\_Graphs



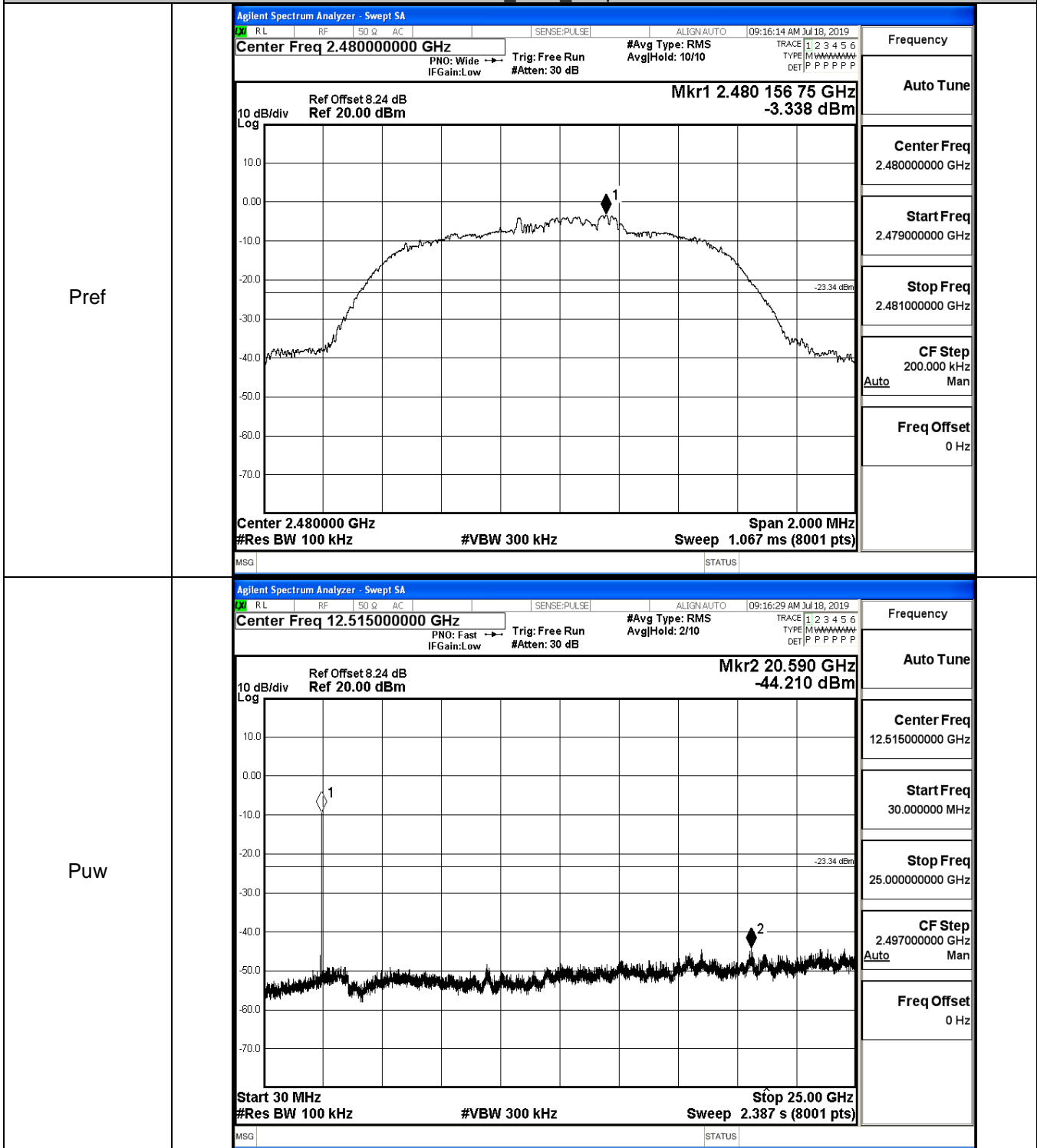
$\pi/4$ DQPSK\_LCH\_Graphs



$\pi/4$ DQPSK\_MCH\_Graphs



$\pi/4$ DQPSK\_HCH\_Graphs



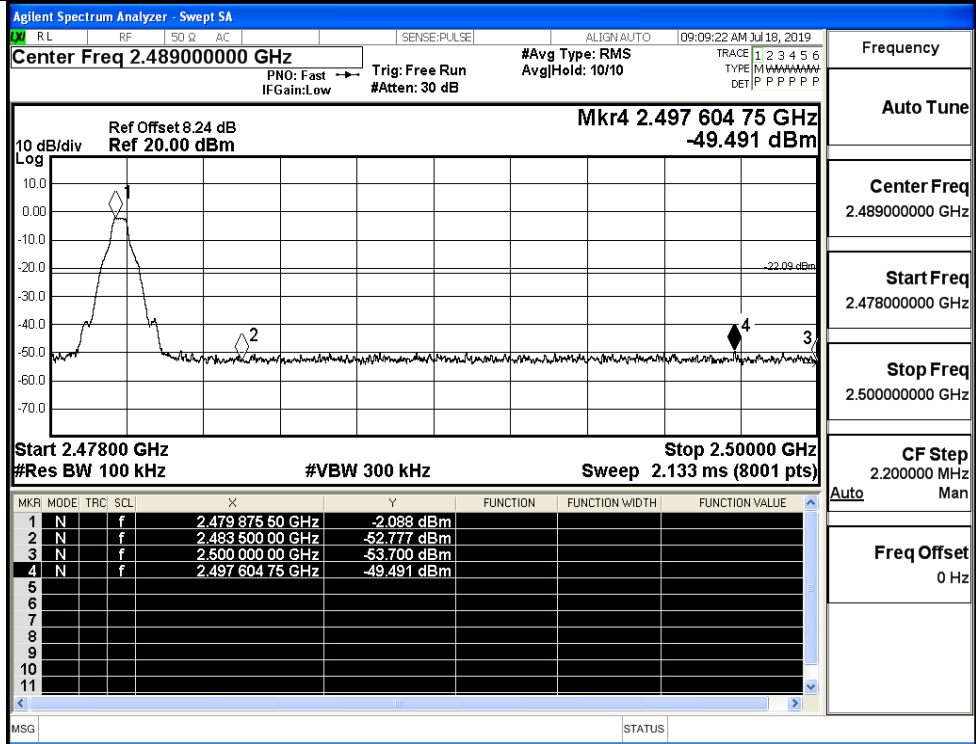
### A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-1.831	Off	-49.742	-21.83	PASS
			0.758	On	-49.662	-19.24	PASS
	HCH	2480	-2.088	Off	-49.491	-22.09	PASS
			0.525	On	-49.276	-19.48	PASS
$\pi/4$ DQPSK	LCH	2402	-2.801	Off	-49.737	-22.8	PASS
			-0.577	On	-48.723	-20.58	PASS
	HCH	2480	-3.288	Off	-49.385	-23.29	PASS
			-0.843	On	-48.895	-20.84	PASS

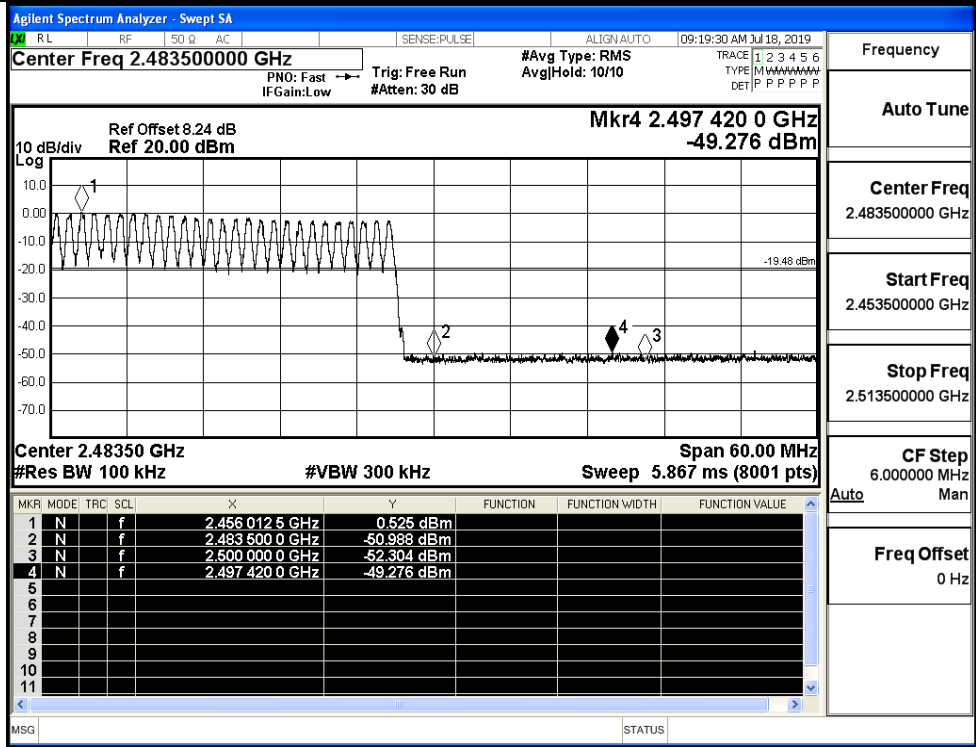
Test Graphs

GFSK/LCH/No Hop	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.35700000 GHz</p> <p>Ref Offset 8.24 dB Ref 20.00 dBm</p> <p>Mkr4 2.356 178 GHz -49.742 dBm</p> <p>Start 2.31000 GHz Stop 2.40400 GHz</p> <p>#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>2.402 038 GHz</td><td>-1.831 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>-53.452 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>-52.064 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.356 178 GHz</td><td>-49.742 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		2.402 038 GHz	-1.831 dBm				2	N	f		2.400 000 GHz	-53.452 dBm				3	N	f		2.390 000 GHz	-52.064 dBm				4	N	f		2.356 178 GHz	-49.742 dBm				<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.357000000 GHz</p> <p>Start Freq 2.310000000 GHz</p> <p>Stop Freq 2.404000000 GHz</p> <p>CF Step 9.400000 MHz</p> <p>Freq Offset 0 Hz</p>
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
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4	N	f		2.356 178 GHz	-49.742 dBm																																										
GFSK/LCH/Hop	<p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.40000000 GHz</p> <p>Ref Offset 8.24 dB Ref 20.00 dBm</p> <p>Mkr4 2.378 587 5 GHz -49.662 dBm</p> <p>Center 2.40000 GHz Span 60.00 MHz</p> <p>#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>2.418 165 0 GHz</td><td>0.758 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>-52.113 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>-52.441 dBm</td><td></td><td></td><td></td></tr> <tr><td>4</td><td>N</td><td>f</td><td></td><td>2.378 587 5 GHz</td><td>-49.662 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		2.418 165 0 GHz	0.758 dBm				2	N	f		2.400 000 0 GHz	-52.113 dBm				3	N	f		2.390 000 0 GHz	-52.441 dBm				4	N	f		2.378 587 5 GHz	-49.662 dBm				<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.400000000 GHz</p> <p>Start Freq 2.370000000 GHz</p> <p>Stop Freq 2.430000000 GHz</p> <p>CF Step 6.000000 MHz</p> <p>Freq Offset 0 Hz</p>
	MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE																																						
1	N	f		2.418 165 0 GHz	0.758 dBm																																										
2	N	f		2.400 000 0 GHz	-52.113 dBm																																										
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4	N	f		2.378 587 5 GHz	-49.662 dBm																																										

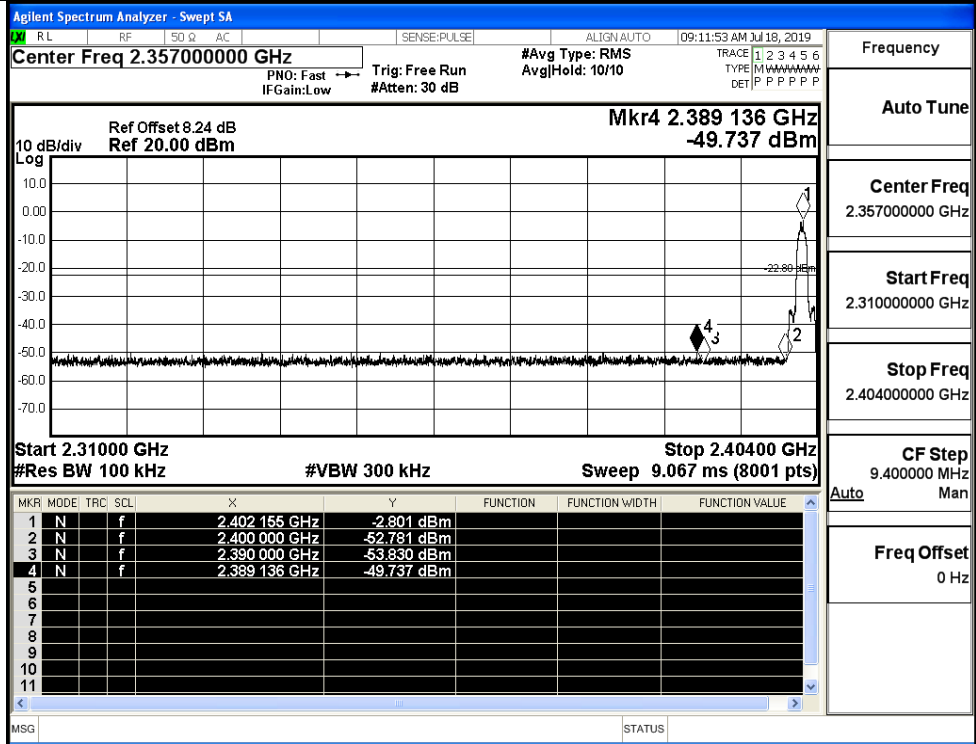
GFSK/HCH/No Hop



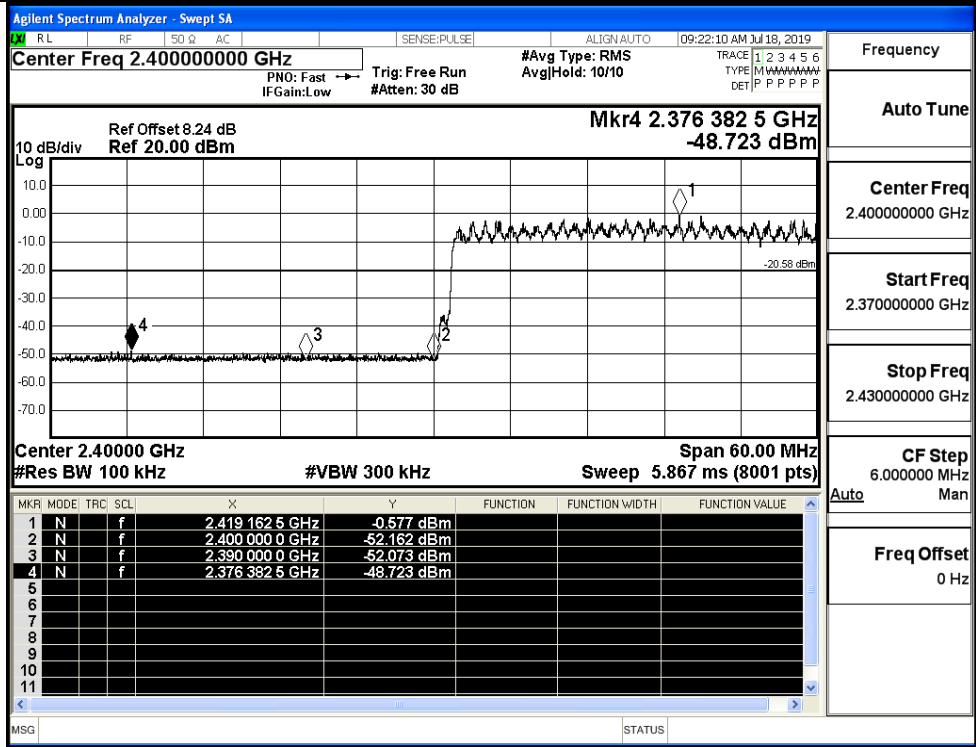
GFSK/HCH/Hop



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

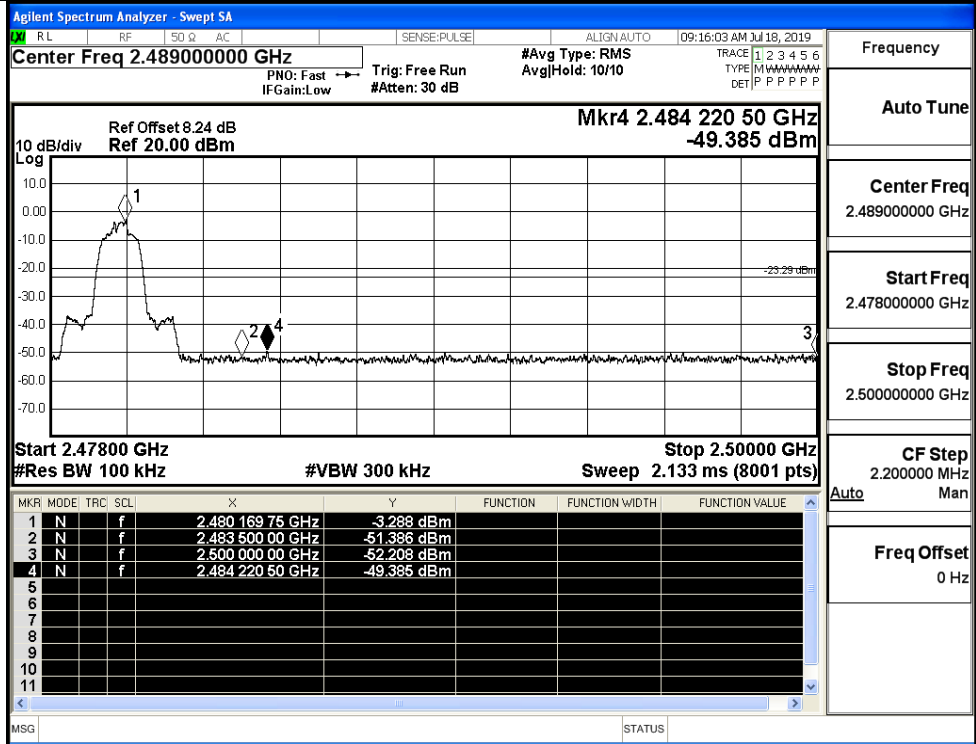


$\pi/4$ DQPSK/LCH/Hop

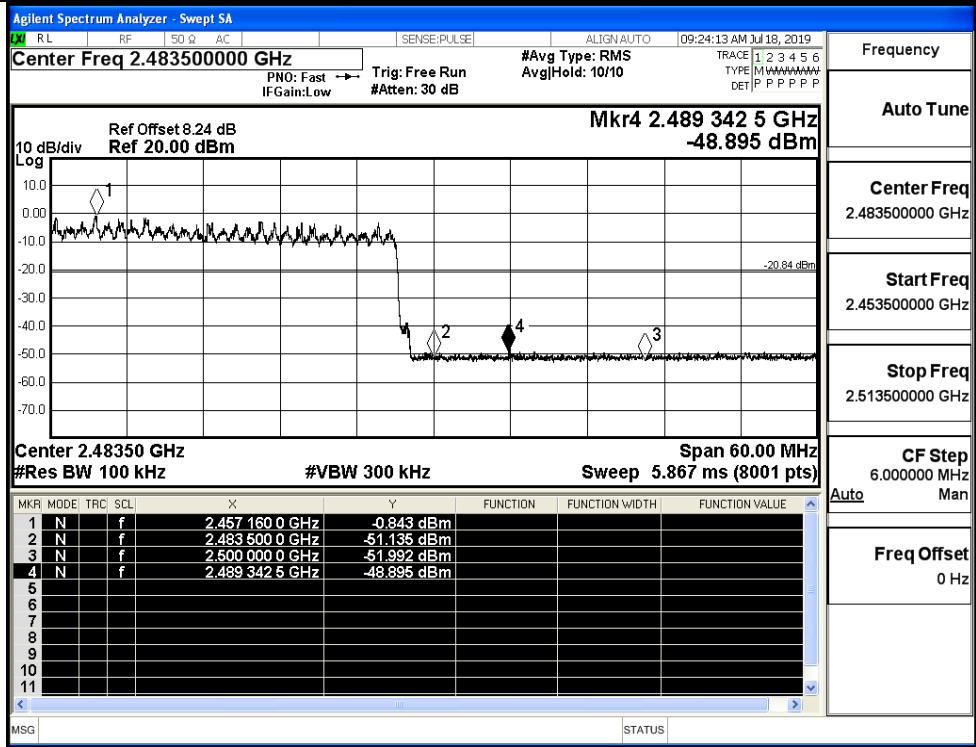




$\pi$ /4DQPSK/HCH/No Hop



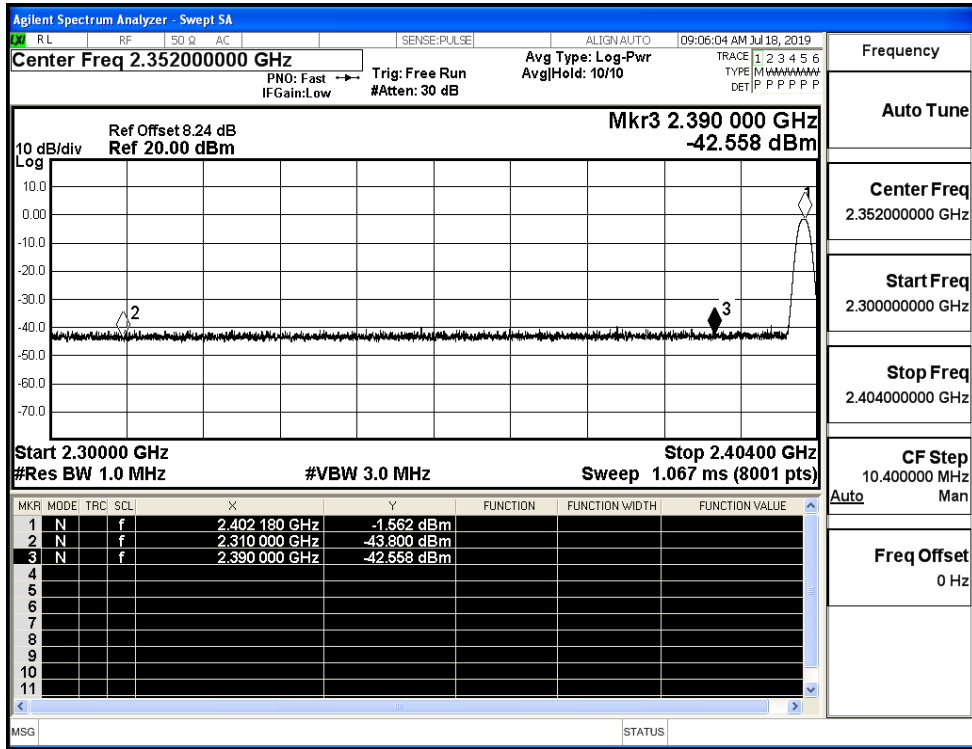
$\pi$ /4DQPSK/HCH/Hop



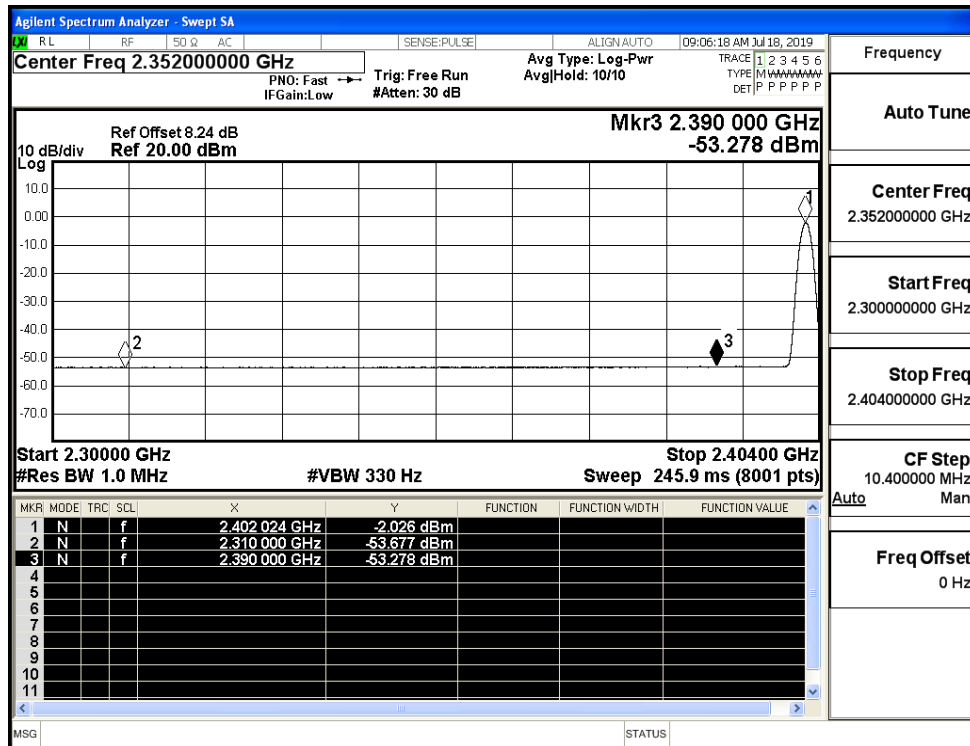
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.80	2.0	0	51.46	PEAK	74	PASS
	Off	2310.0	-53.68	2.0	0	41.58	AV	54	PASS
	Off	2390.0	-42.56	2.0	0	52.70	PEAK	74	PASS
	Off	2390.0	-53.28	2.0	0	41.98	AV	54	PASS
	Off	2483.5	-43.85	2.0	0	51.41	PEAK	74	PASS
	Off	2483.5	-53.08	2.0	0	42.18	AV	54	PASS
	Off	2500.0	-42.54	2.0	0	52.72	PEAK	74	PASS
	Off	2500.0	-52.73	2.0	0	42.53	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.88	2.0	0	52.37	PEAK	74	PASS
	Off	2310.0	-53.56	2.0	0	41.70	AV	54	PASS
	Off	2390.0	-42.60	2.0	0	52.66	PEAK	74	PASS
	Off	2390.0	-53.18	2.0	0	42.08	AV	54	PASS
	Off	2483.5	-43.52	2.0	0	51.74	PEAK	74	PASS
	Off	2483.5	-52.97	2.0	0	42.28	AV	54	PASS
	Off	2500.0	-41.86	2.0	0	53.40	PEAK	74	PASS
	Off	2500.0	-52.67	2.0	0	42.58	AV	54	PASS

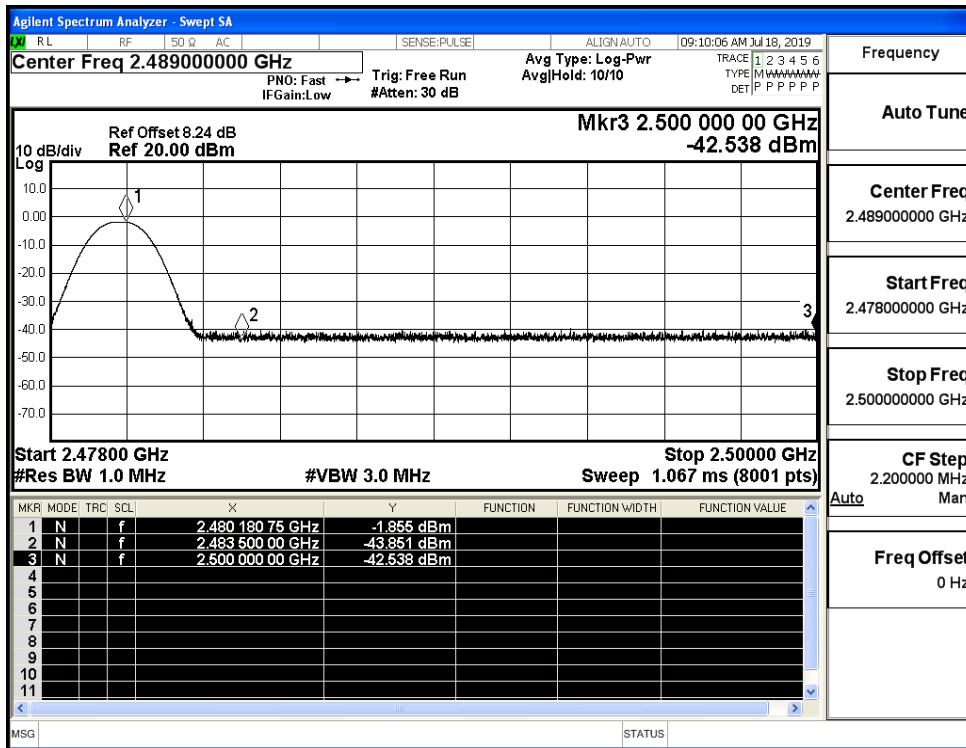
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



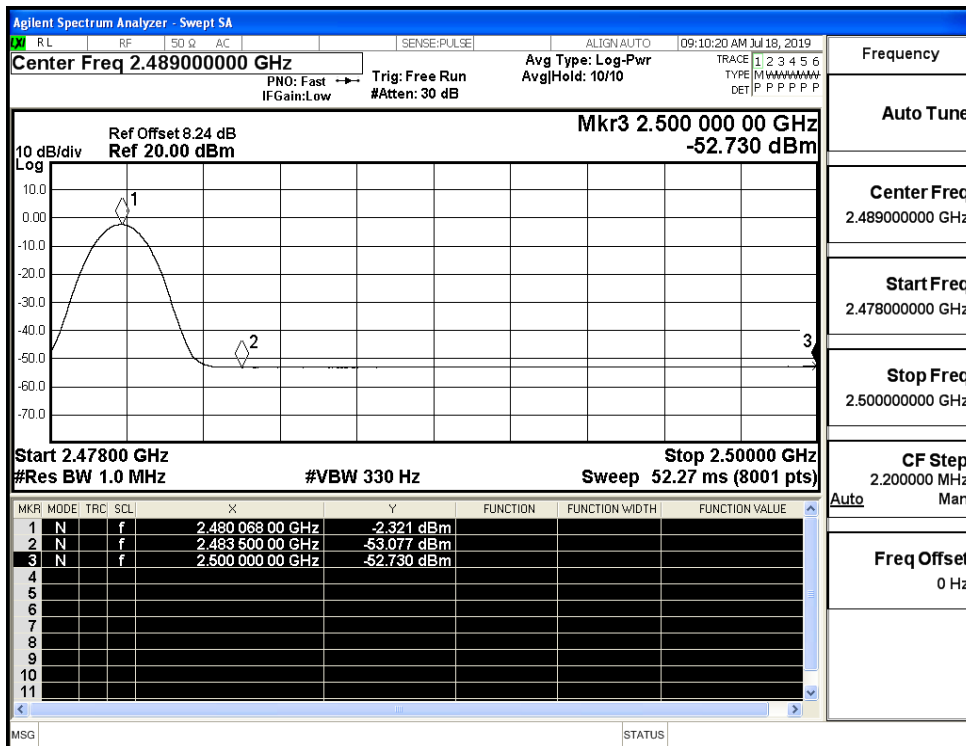
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



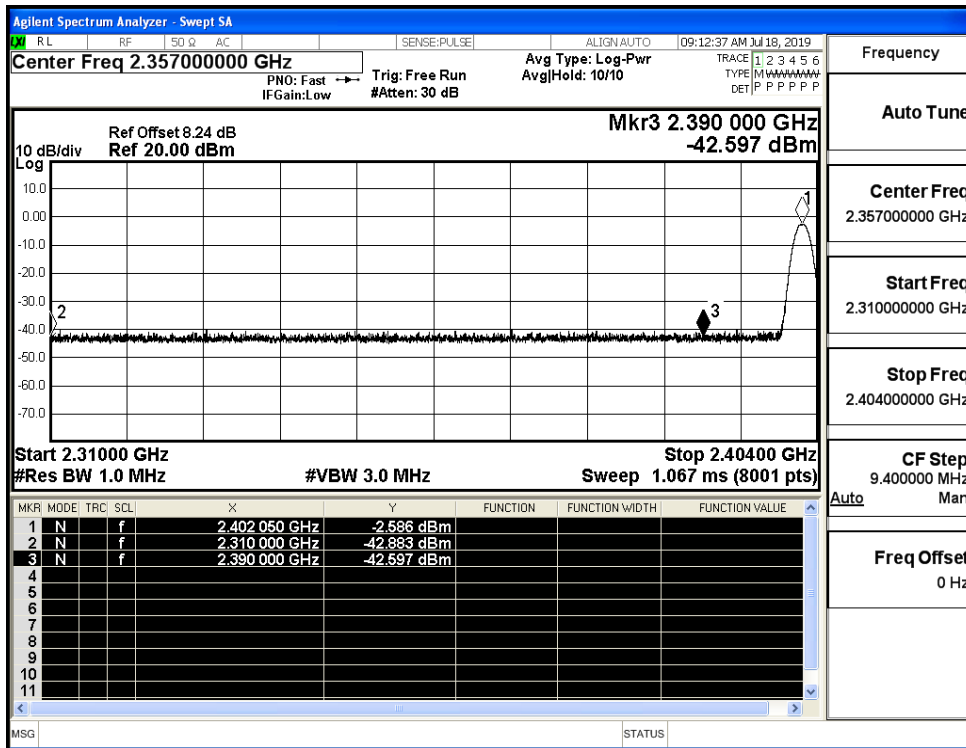
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)



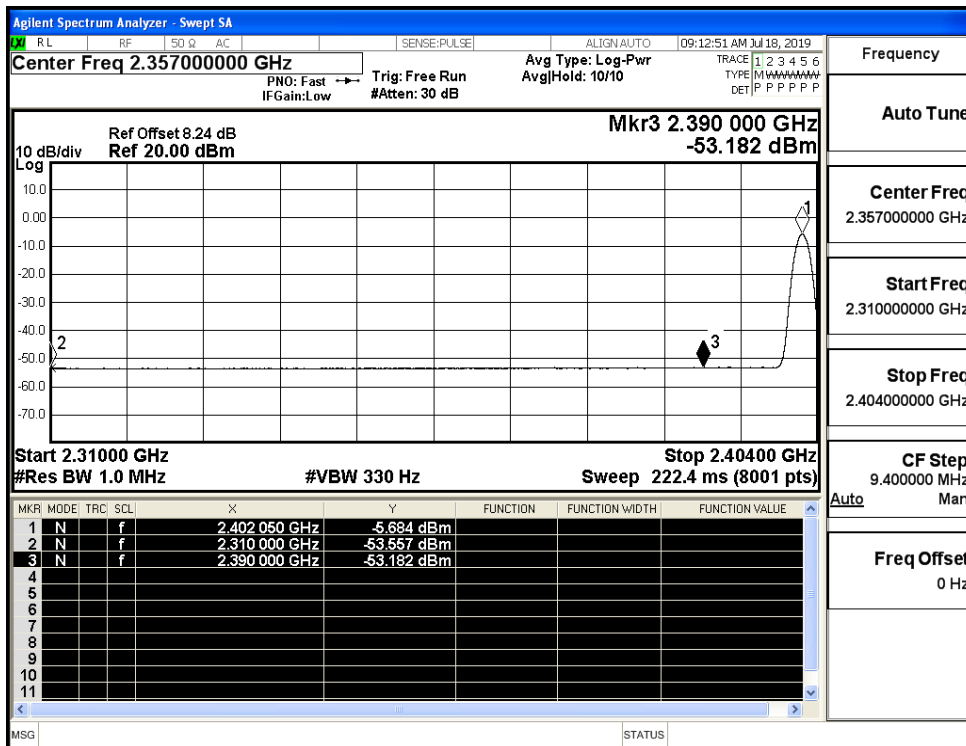
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)



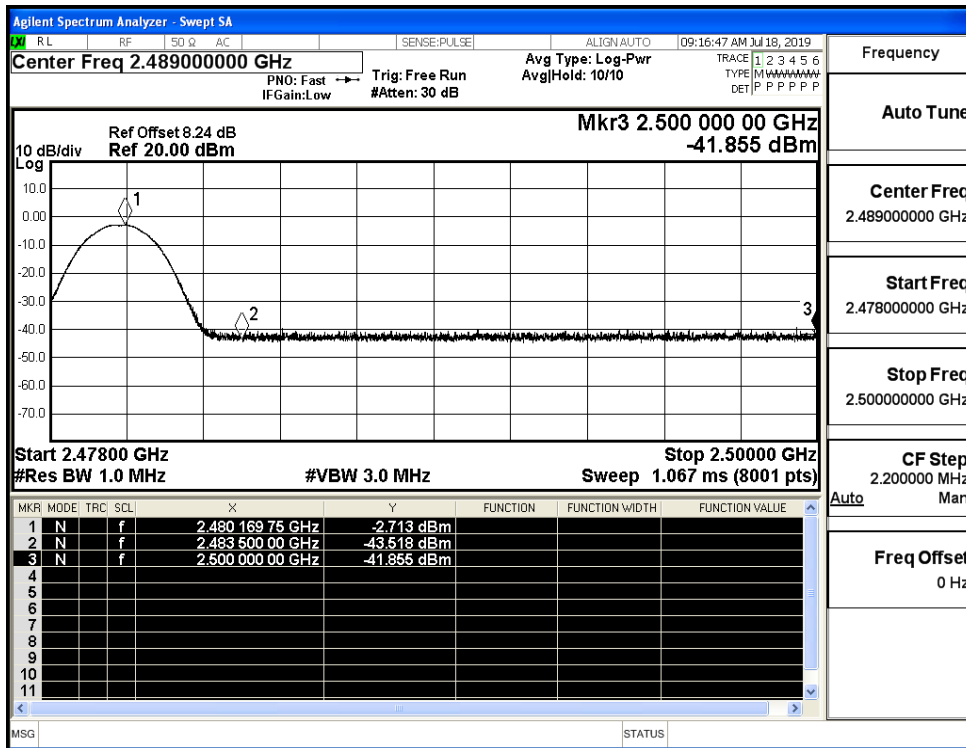
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)



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)

