

Appendix A

RF Test Data for Bluetooth V3.0 (Conducted Measurement)

Product Name: Portable speaker

Trade Mark: Pyle

Test Model: PWMA325BT

Environmental Conditions

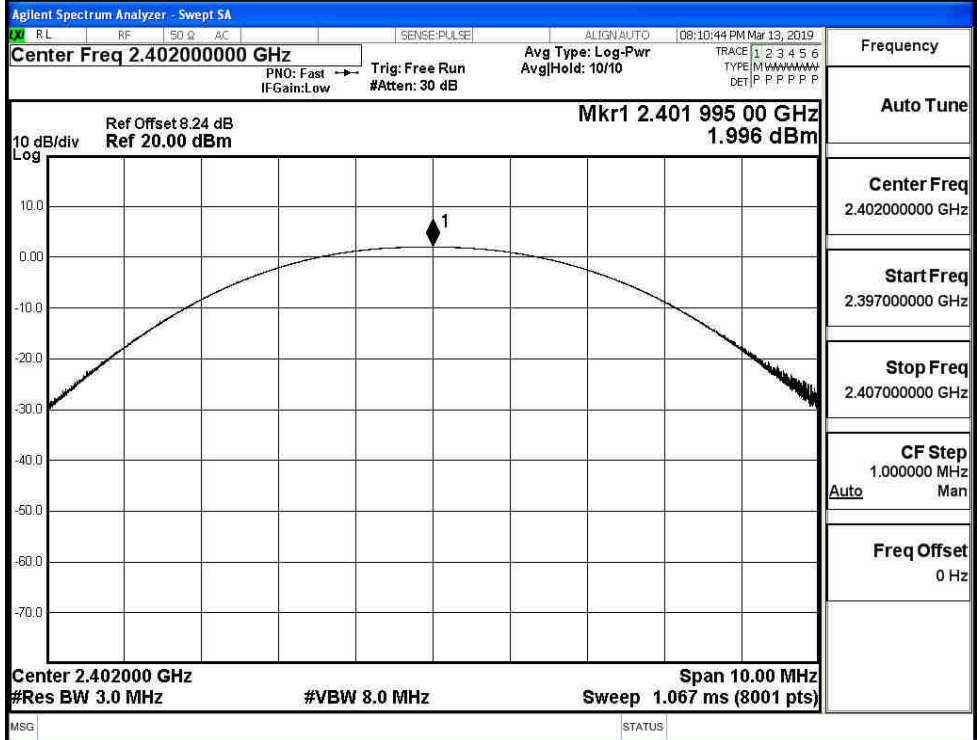
Temperature:	22.4 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Jerry.Zeng
Supervised by:	Tom.Liu

A.1 Maxmum Conducted Peak Output Power

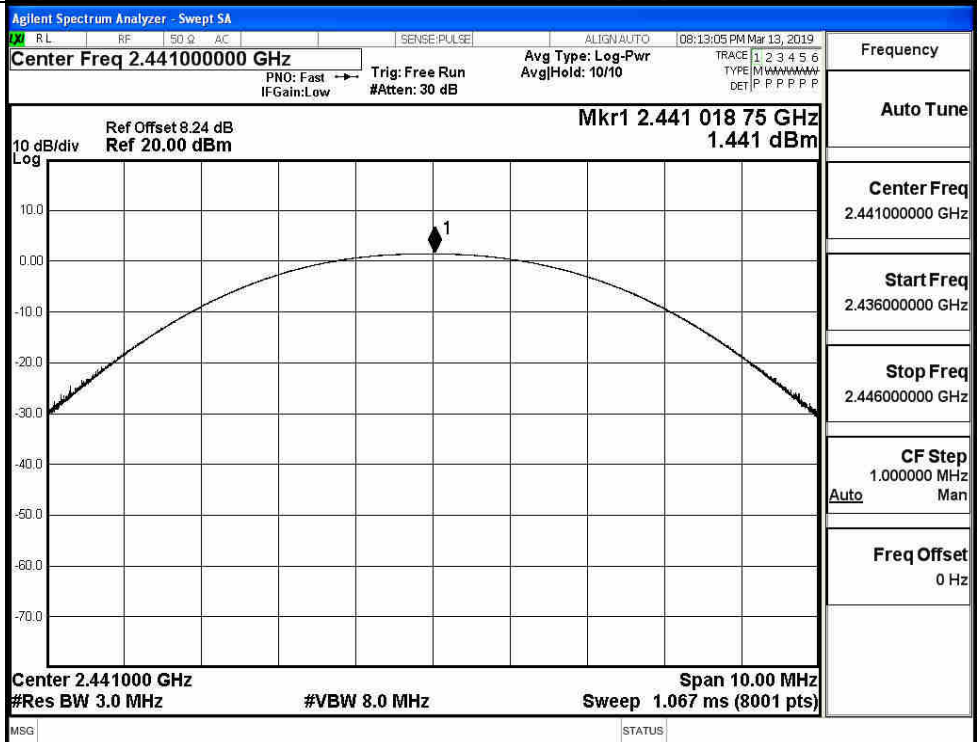
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.996	21	PASS
	MCH	1.441	21	PASS
	HCH	1.552	21	PASS
$\pi/4$ DQPSK	LCH	1.356	21	PASS
	MCH	0.808	21	PASS
	HCH	0.738	21	PASS

Test Graphs

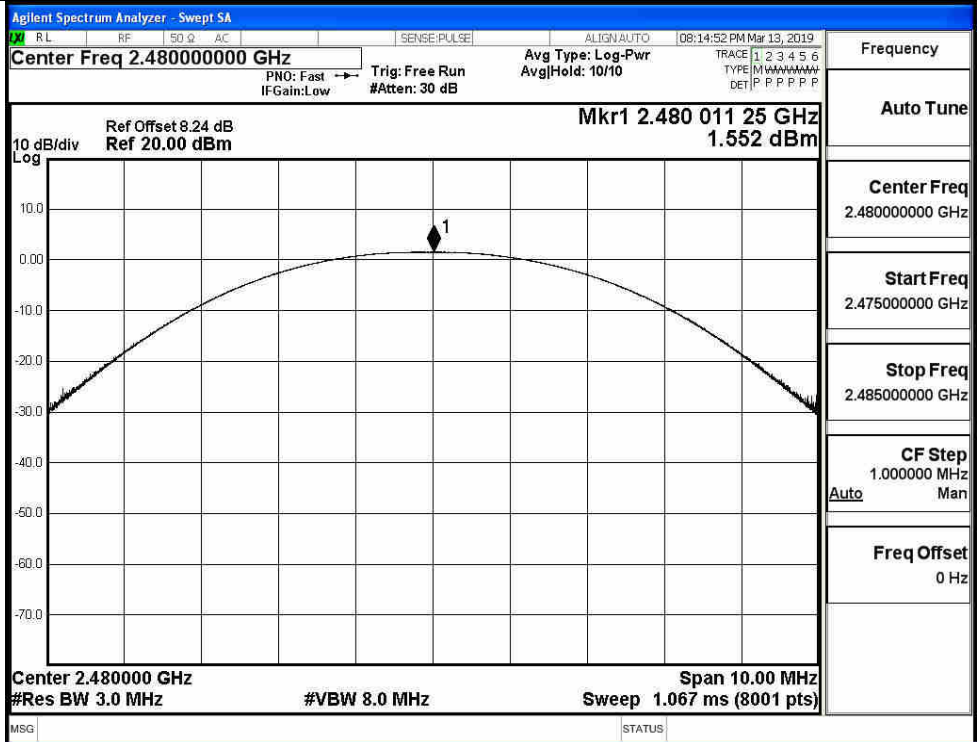
GFSK/LCH



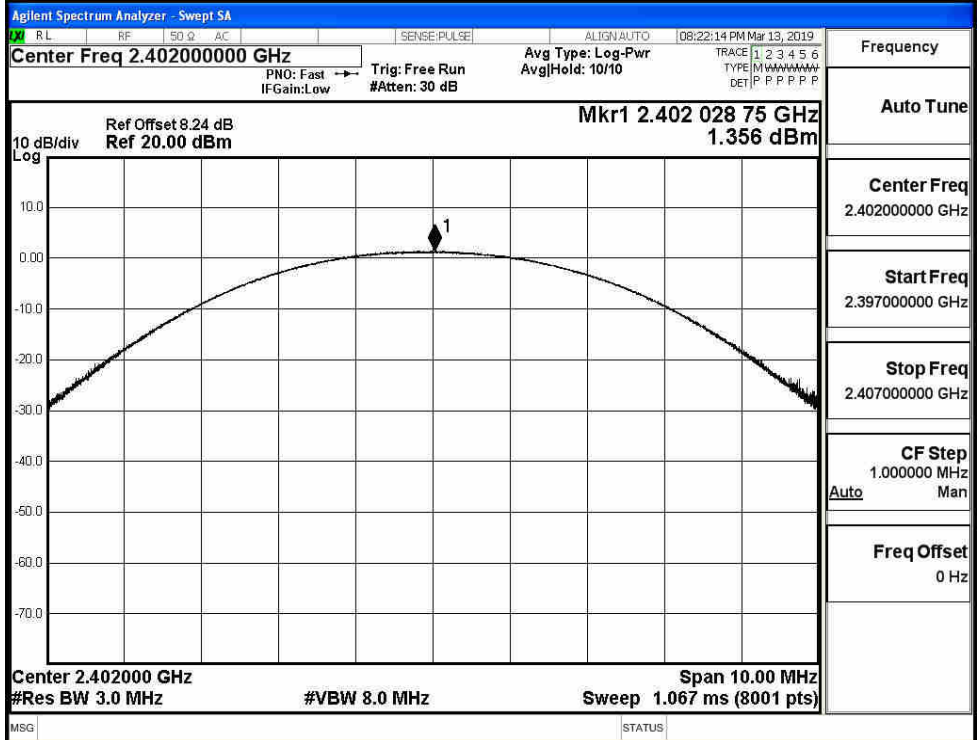
GFSK/MCH



GFSK/HCH



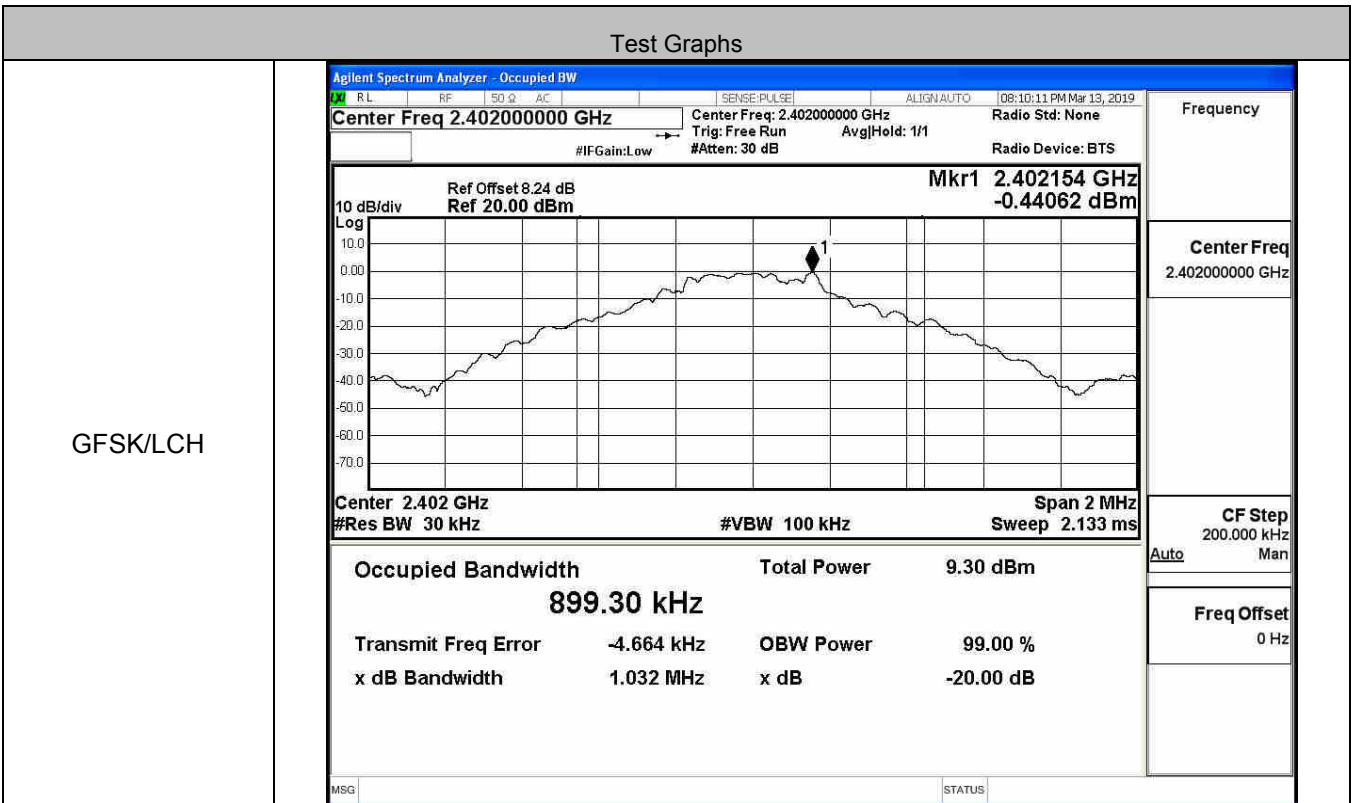
π /4DQPSK/LCH



<p>π/4DQPSK/MCH</p>	
<p>π/4DQPSK/HCH</p>	

A.2 20dB Bandwidth

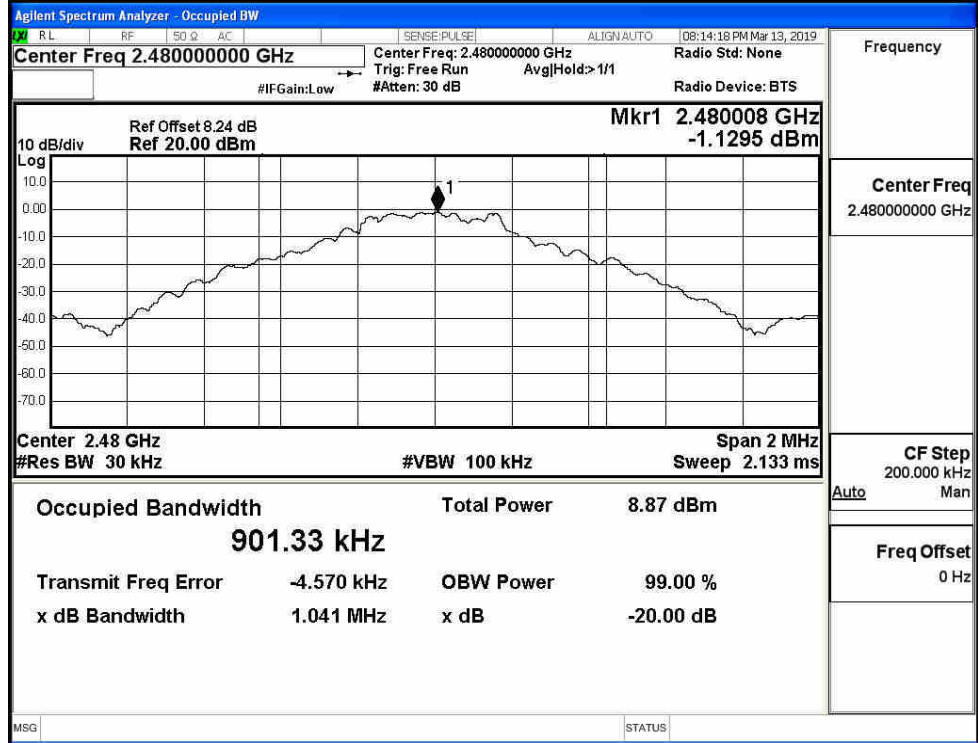
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.032	Not Specified	PASS
	MCH	1.041	Not Specified	PASS
	HCH	1.041	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.291	Not Specified	PASS
	MCH	1.289	Not Specified	PASS
	HCH	1.291	Not Specified	PASS



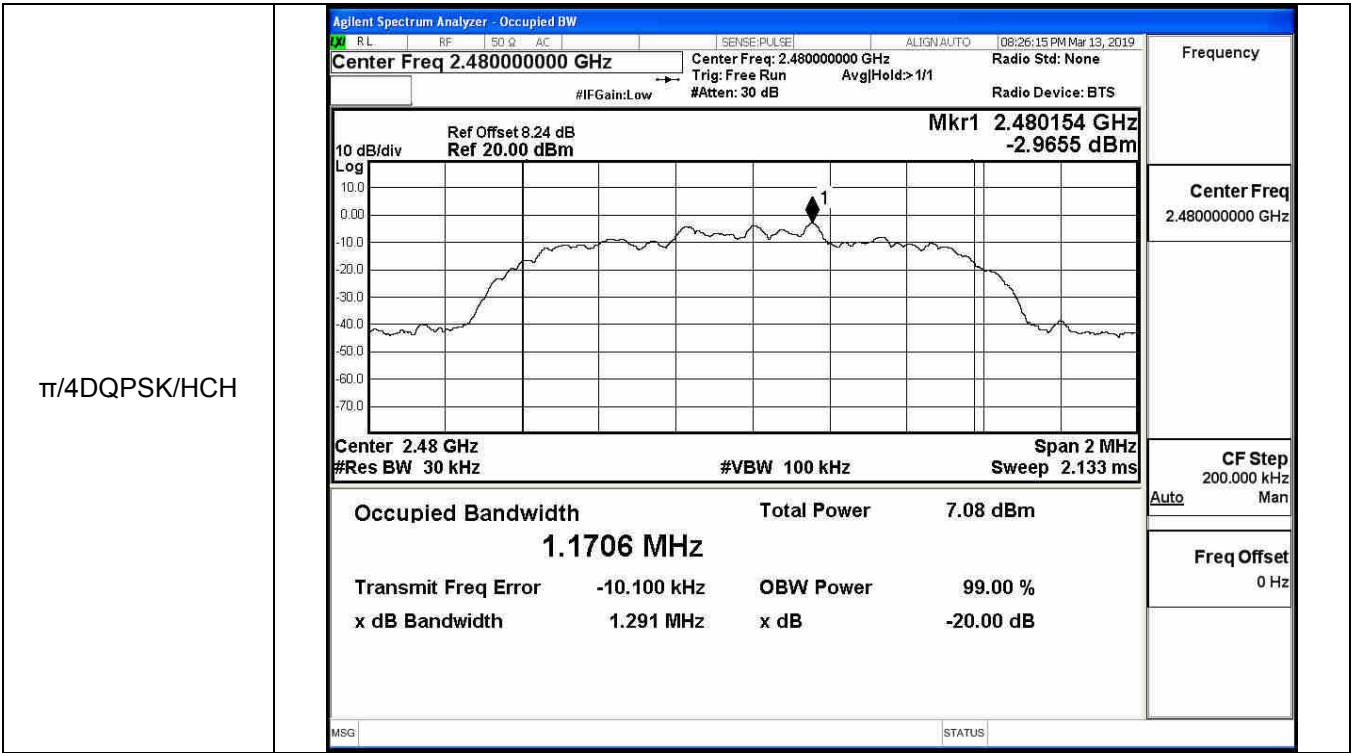
GFSK/MCH



GFSK/HCH



<p style="text-align: center;">π/4DQPSK/LCH</p>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.40200000 GHz</p> <p>Center Freq: 2.40200000 GHz Trig: Free Run AvgHold: 1/1</p> <p>Radio Std: None Radio Device: BTS</p> <p>Ref Offset 8.24 dB Ref 20.00 dBm</p> <p>Mkr1 2.402154 GHz -2.3185 dBm</p> <p>10 dB/div Log</p> <p>Center 2.402 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz Span 2 MHz Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.1727 MHz Total Power 7.67 dBm</p> <p>Transmit Freq Error -9.603 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.291 MHz x dB -20.00 dB</p>	<p>Frequency 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>	<p>Agilent Spectrum Analyzer - Occupied BW</p> <p>Center Freq 2.44100000 GHz</p> <p>Center Freq: 2.44100000 GHz Trig: Free Run AvgHold: 1/1</p> <p>Radio Std: None Radio Device: BTS</p> <p>Ref Offset 8.24 dB Ref 20.00 dBm</p> <p>Mkr1 2.441154 GHz -2.9347 dBm</p> <p>10 dB/div Log</p> <p>Center 2.441 GHz #Res BW 30 kHz</p> <p>#VBW 100 kHz Span 2 MHz Sweep 2.133 ms</p> <p>Occupied Bandwidth 1.1702 MHz Total Power 7.04 dBm</p> <p>Transmit Freq Error -10.843 kHz OBW Power 99.00 %</p> <p>x dB Bandwidth 1.289 MHz x dB -20.00 dB</p>

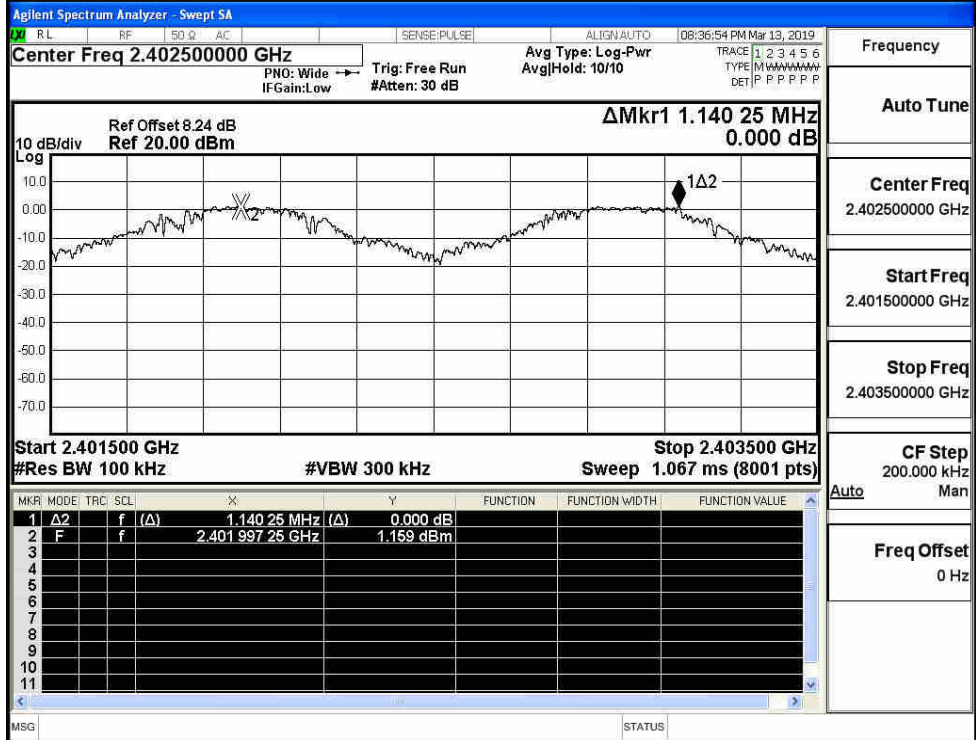


A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.140	0.694	PASS
	MCH	0.706	0.694	PASS
	HCH	0.982	0.694	PASS
$\pi/4$ DQPSK	LCH	0.892	0.861	PASS
	MCH	1.006	0.861	PASS
	HCH	0.960	0.861	PASS

Test Graphs

GFSK/LCH



Frequency

Auto Tune

Center Freq
2.402500000 GHz

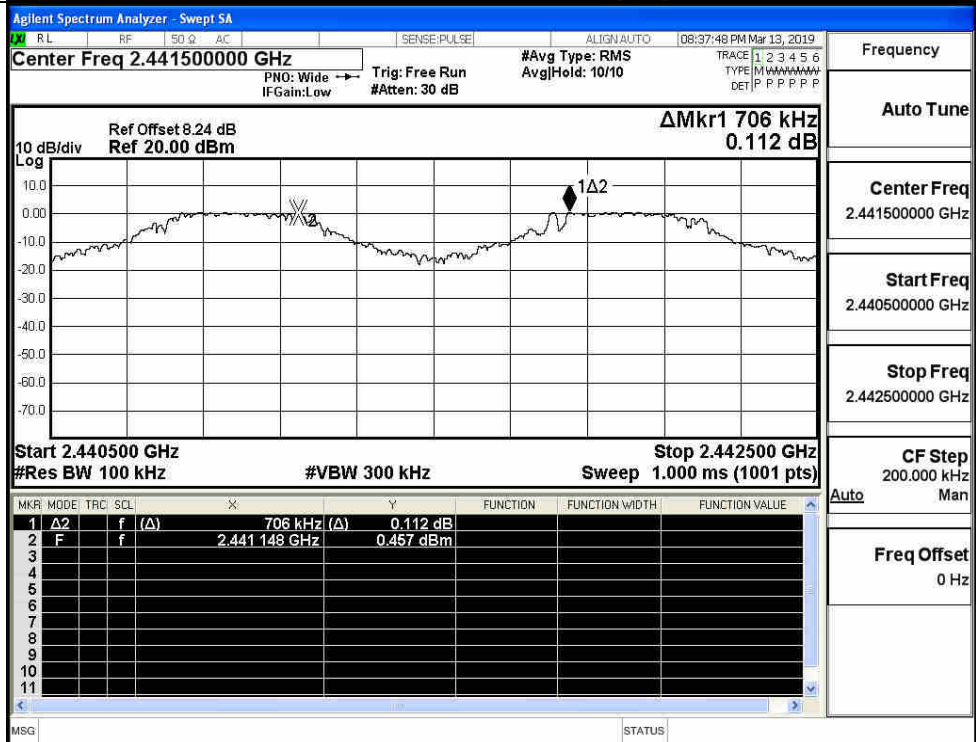
Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

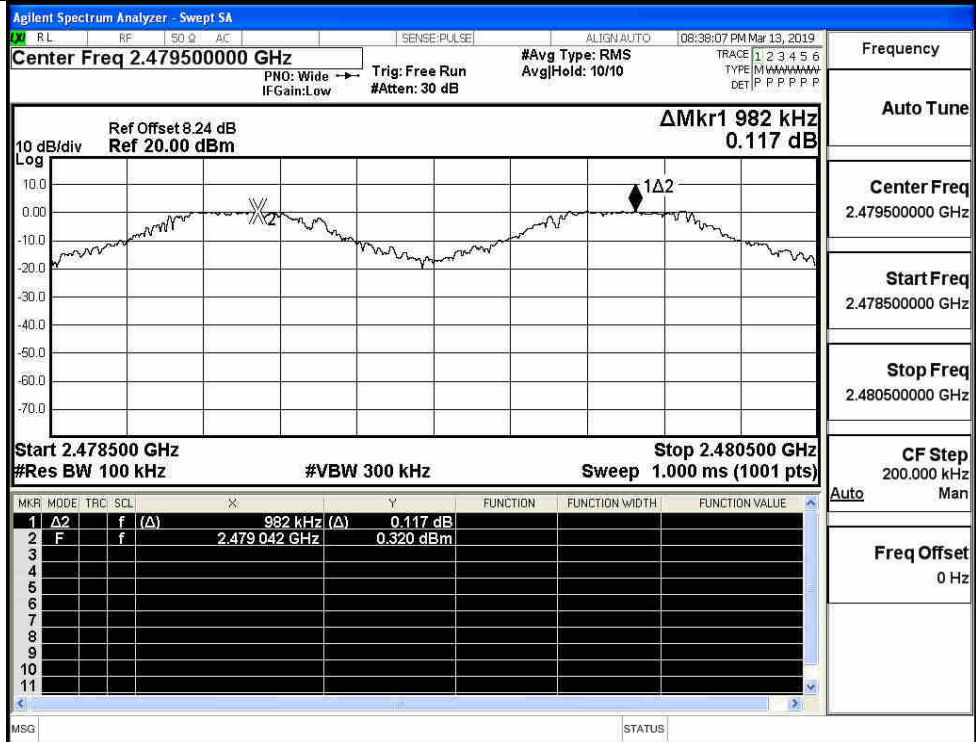
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

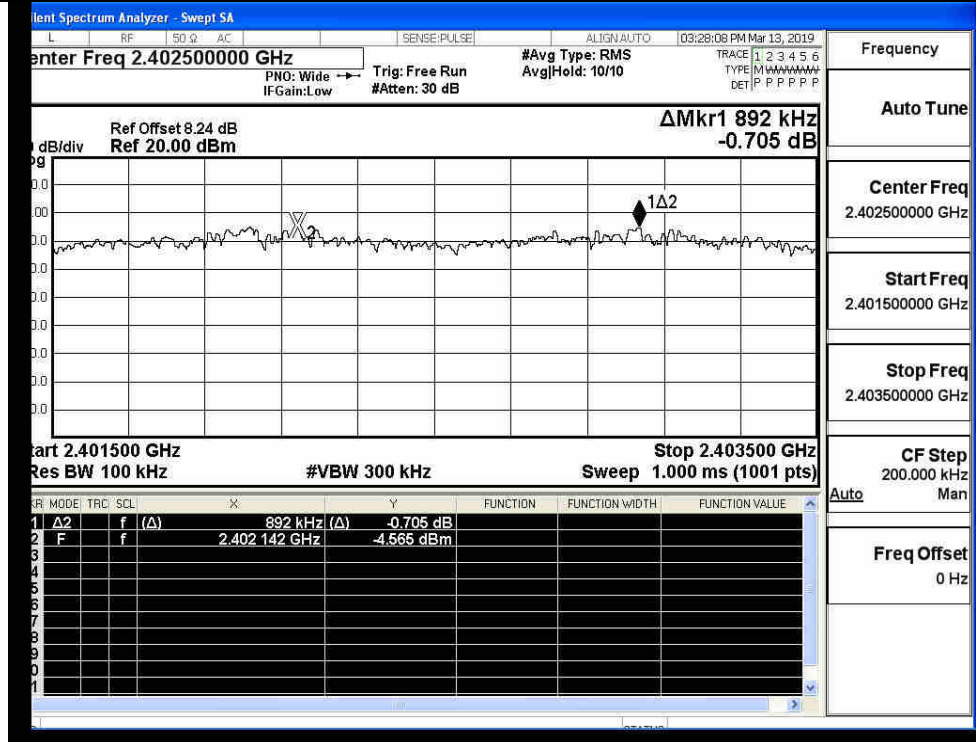
CF Step
200.000 kHz
Auto Man

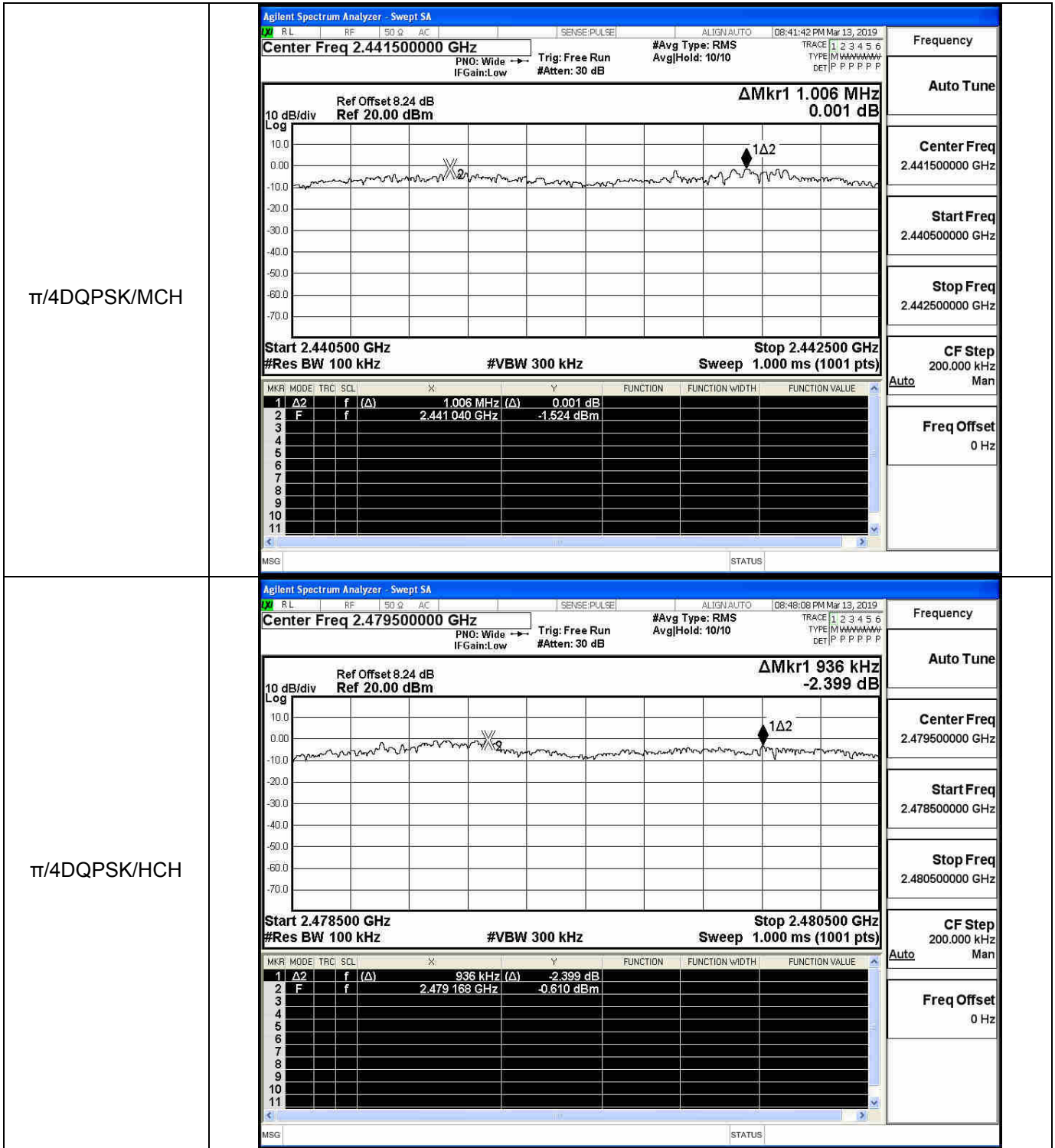
Freq Offset
0 Hz

GFSK/HCH



π/4DQPSK/LCH



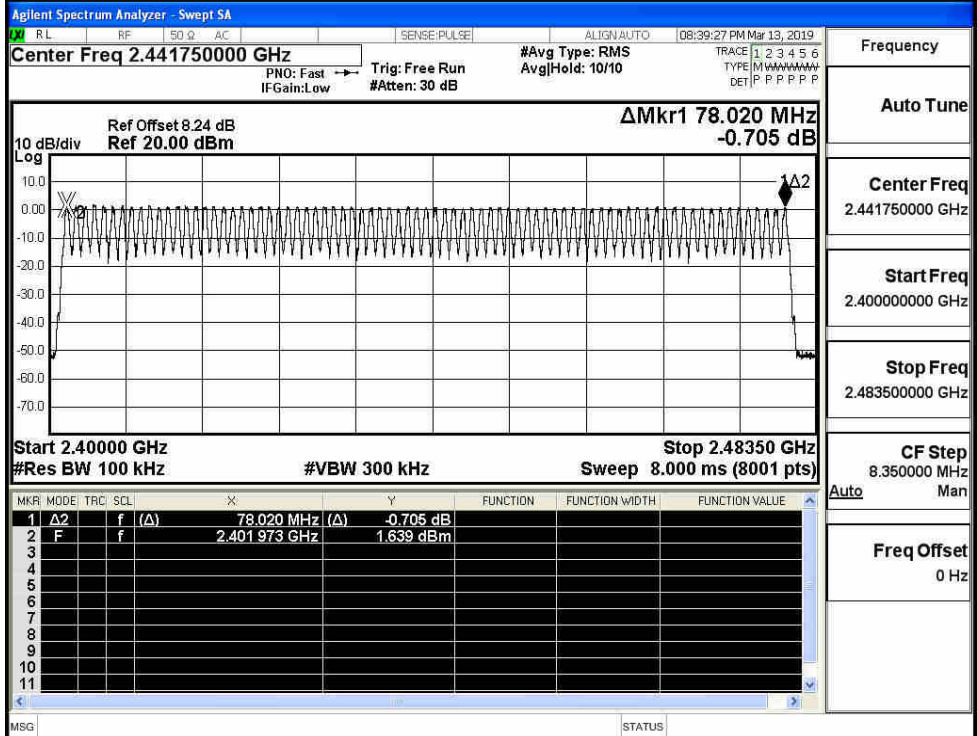


A.4 Hopping Channel Number

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

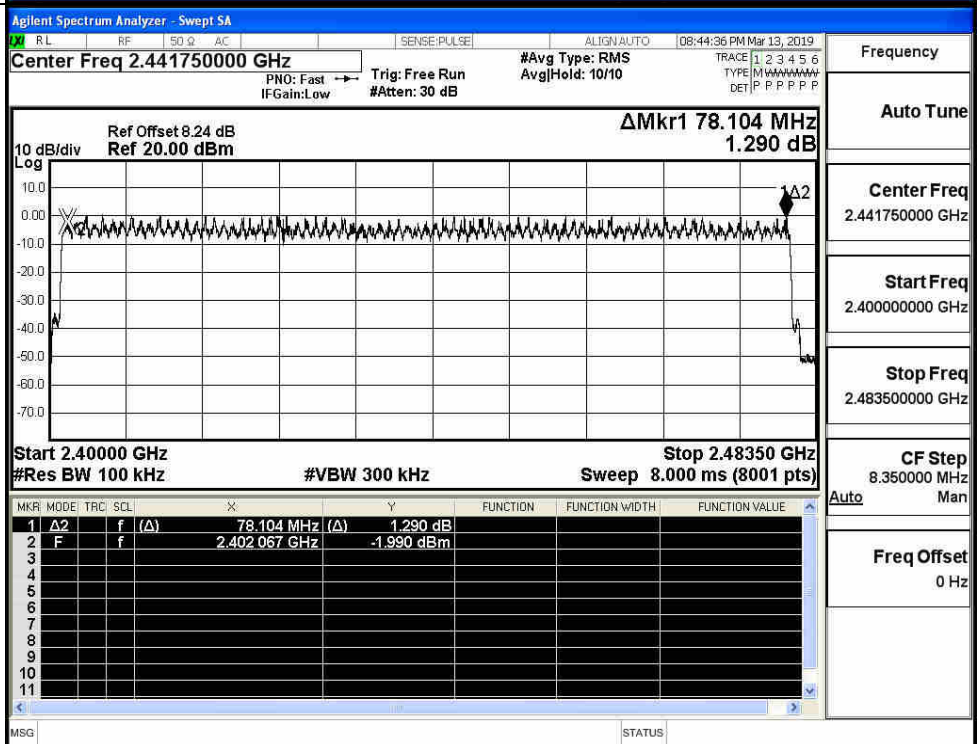
Test Graphs

GFSK/Hop



Frequency	2.441750000 GHz
Auto Tune	
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Freq Offset	0 Hz

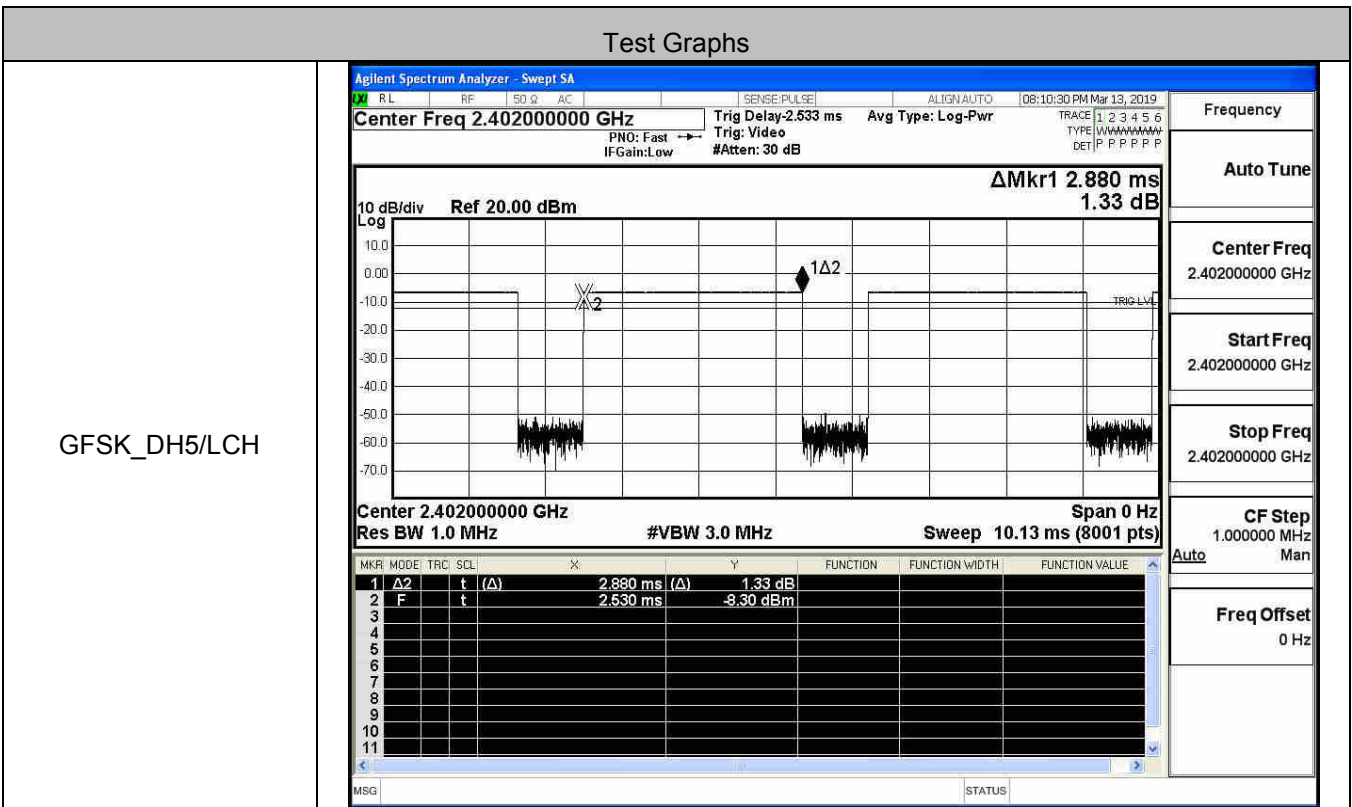
π/4DQPSK/Hop



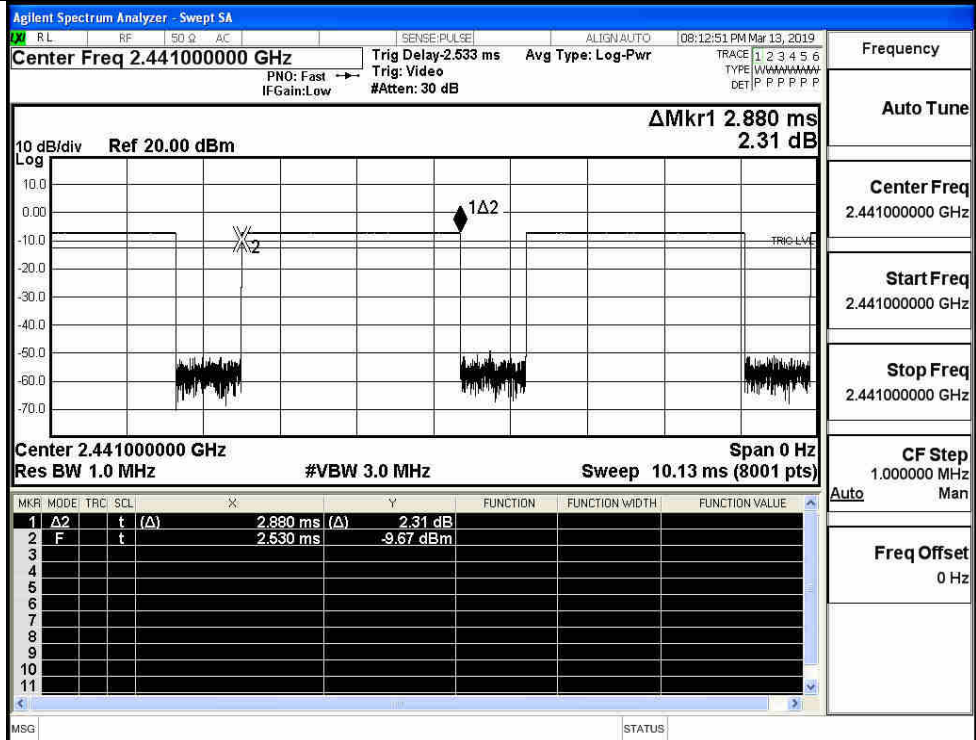
Frequency	2.441750000 GHz
Auto Tune	
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Freq Offset	0 Hz

A.5 Dwell Time

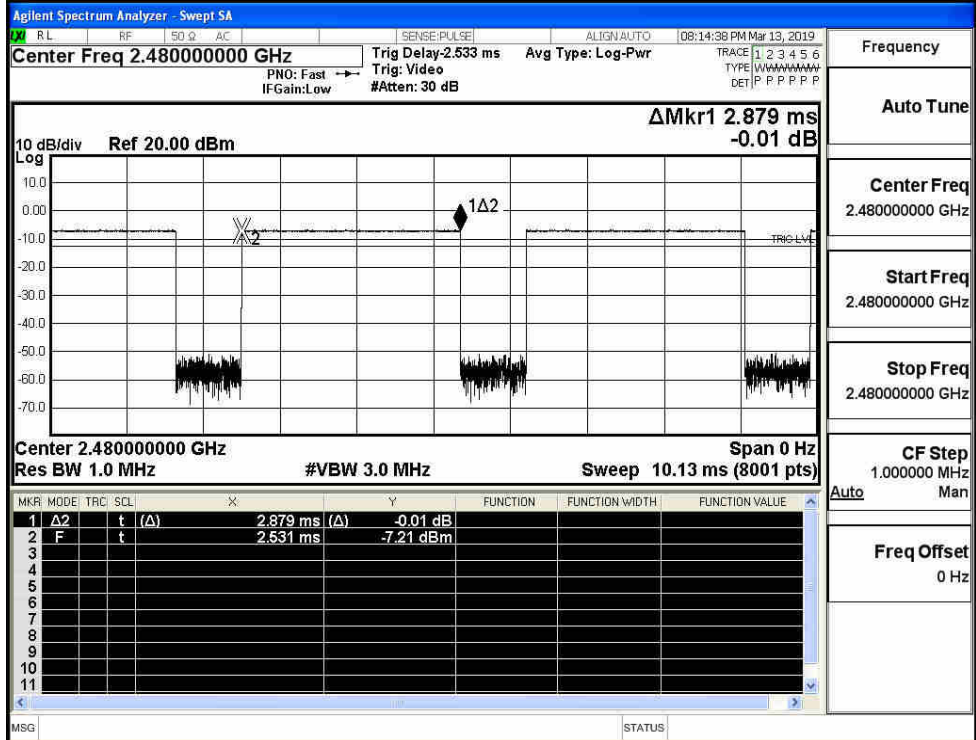
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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



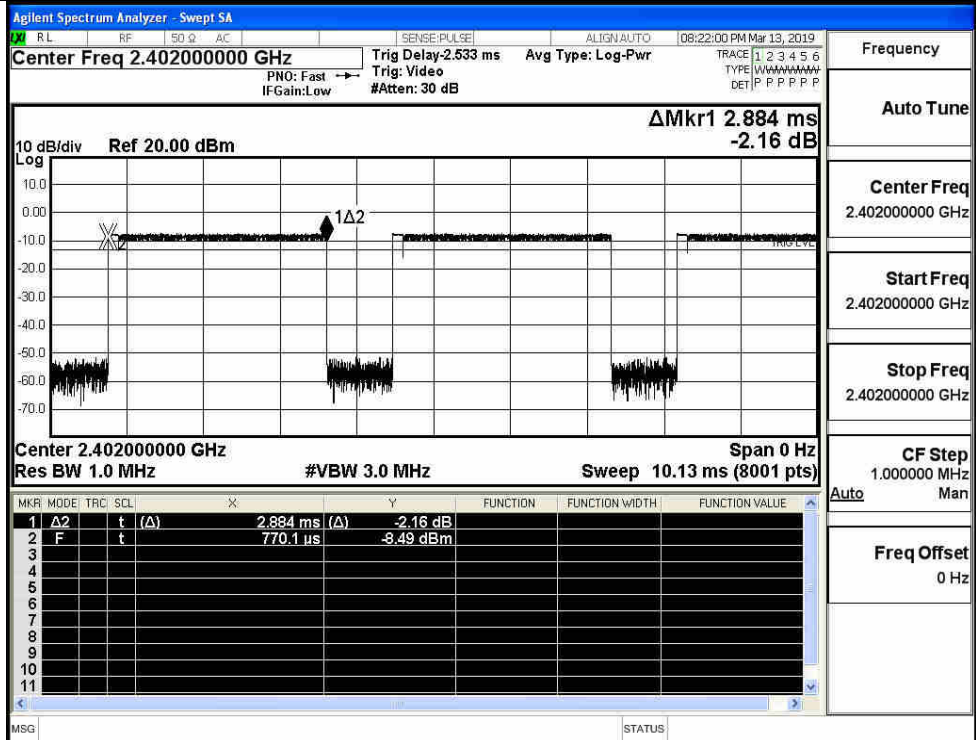
GFSK_DH5/MCH



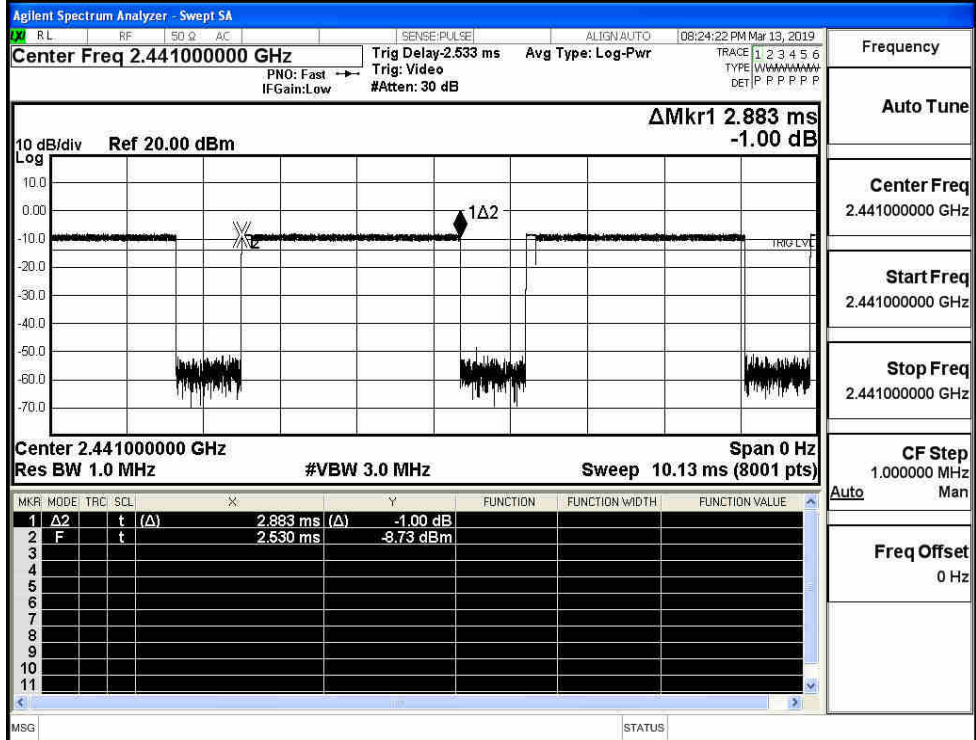
GFSK_DH5/HCH



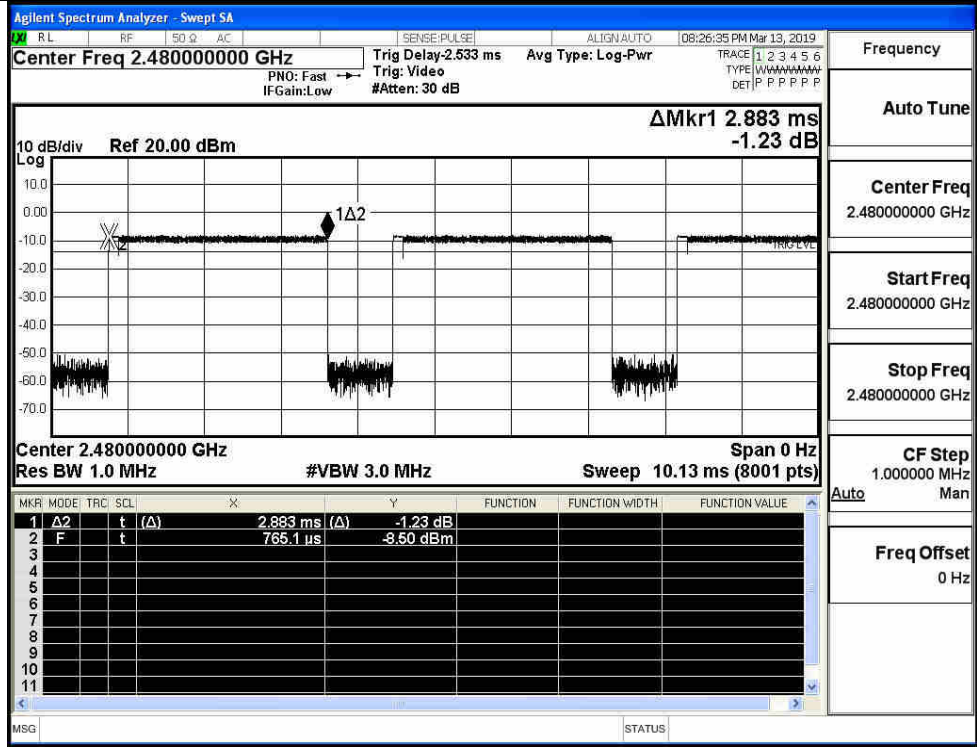
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



$\pi/4$ DQPSK
_2DH5/HCH

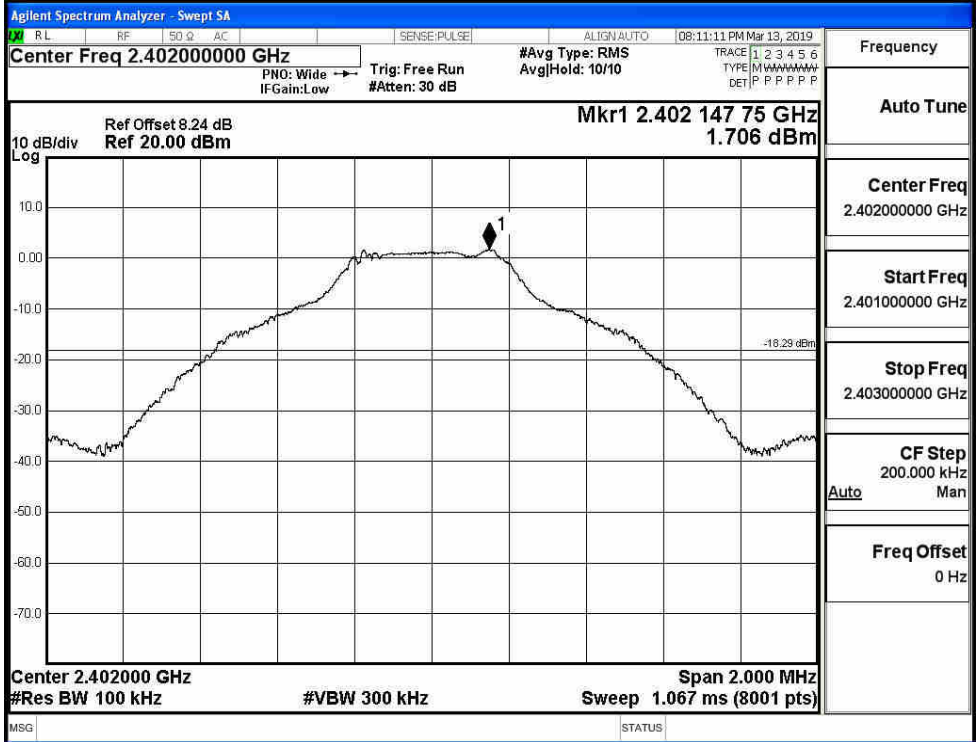


A.6 RF Conducted Spurious Emissions

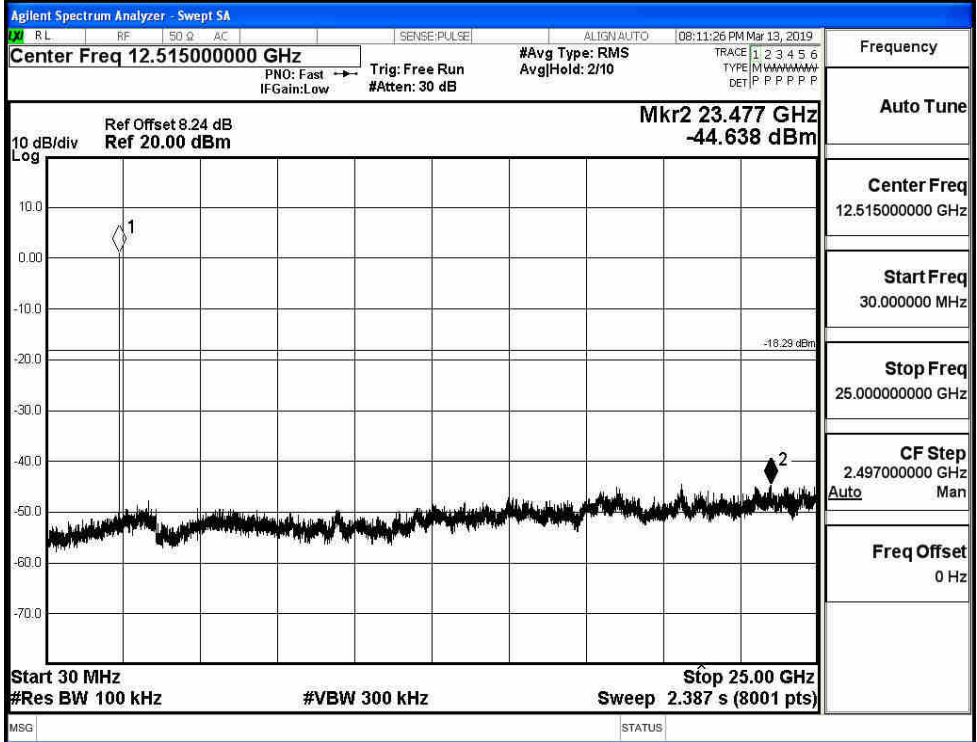
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.706	-44.638	-18.294	PASS
	MCH	1.125	-44.098	-18.875	PASS
	HCH	1.196	-43.656	-18.804	PASS
$\pi/4$ DQPSK	LCH	-0.091	-43.969	-20.091	PASS
	MCH	-0.117	-44.571	-20.117	PASS
	HCH	-0.345	-44.785	-20.345	PASS

GFSK_LCH_Graphs

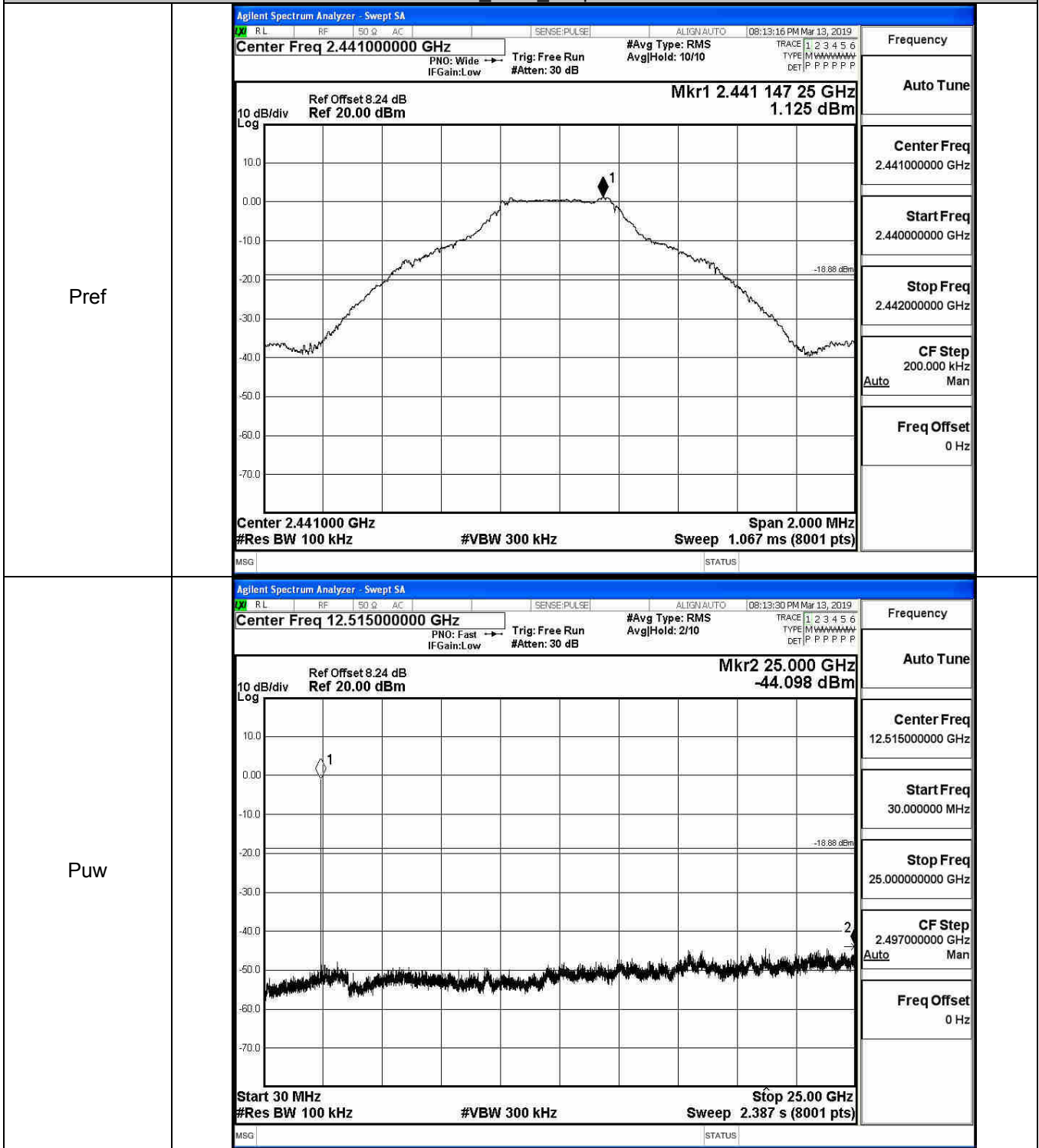
Pref



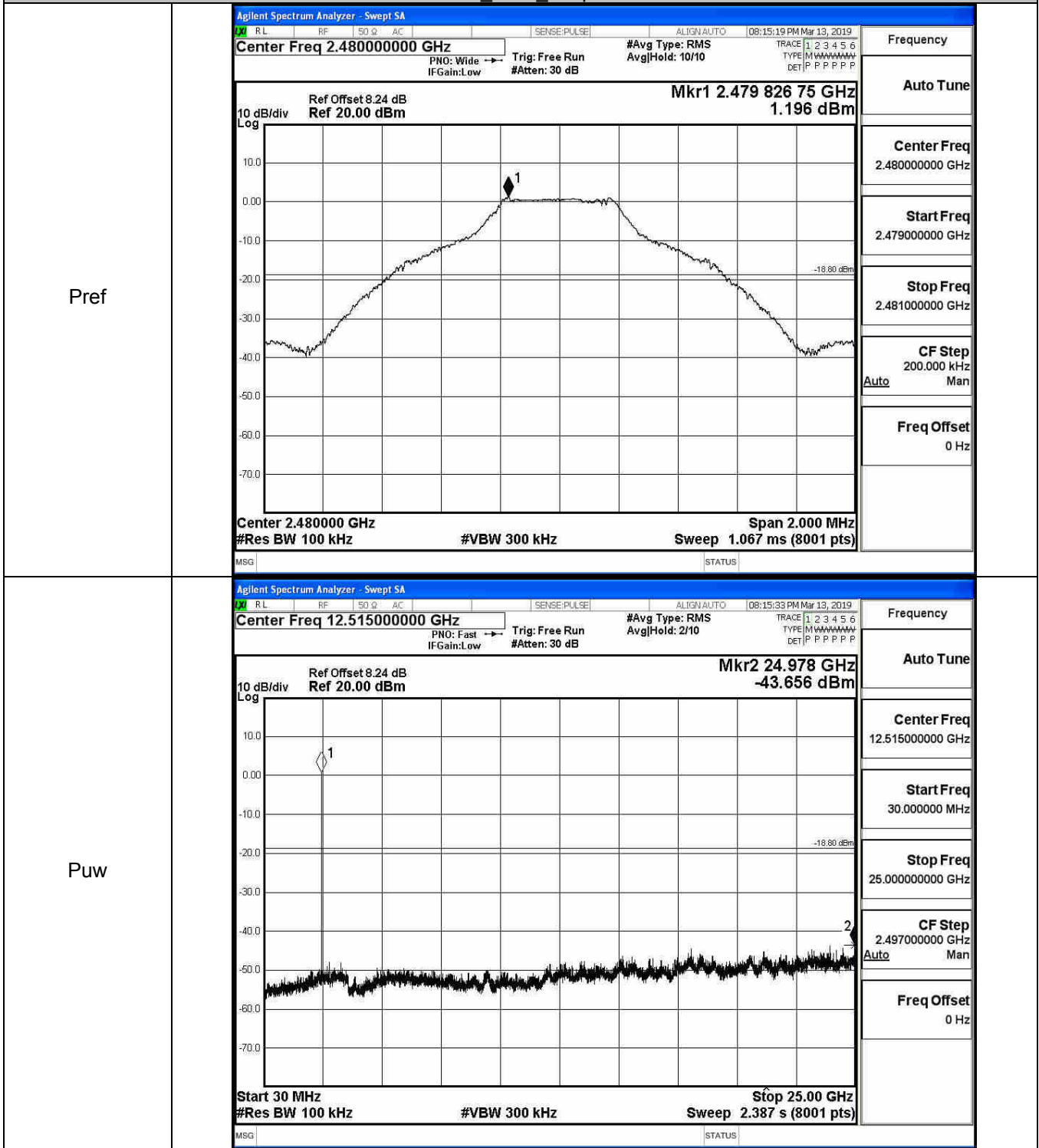
Puw



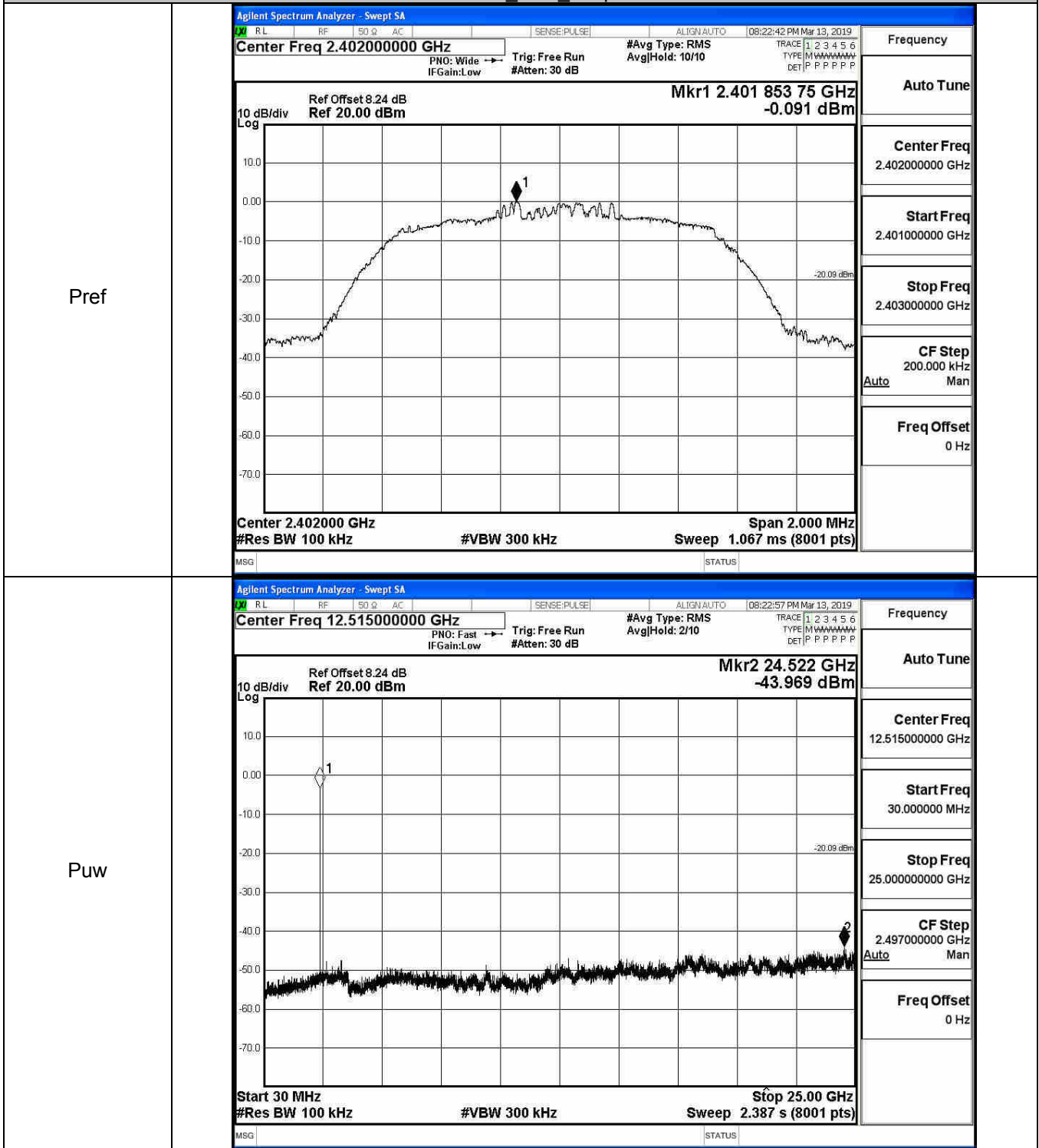
GFSK_MCH_Graphs



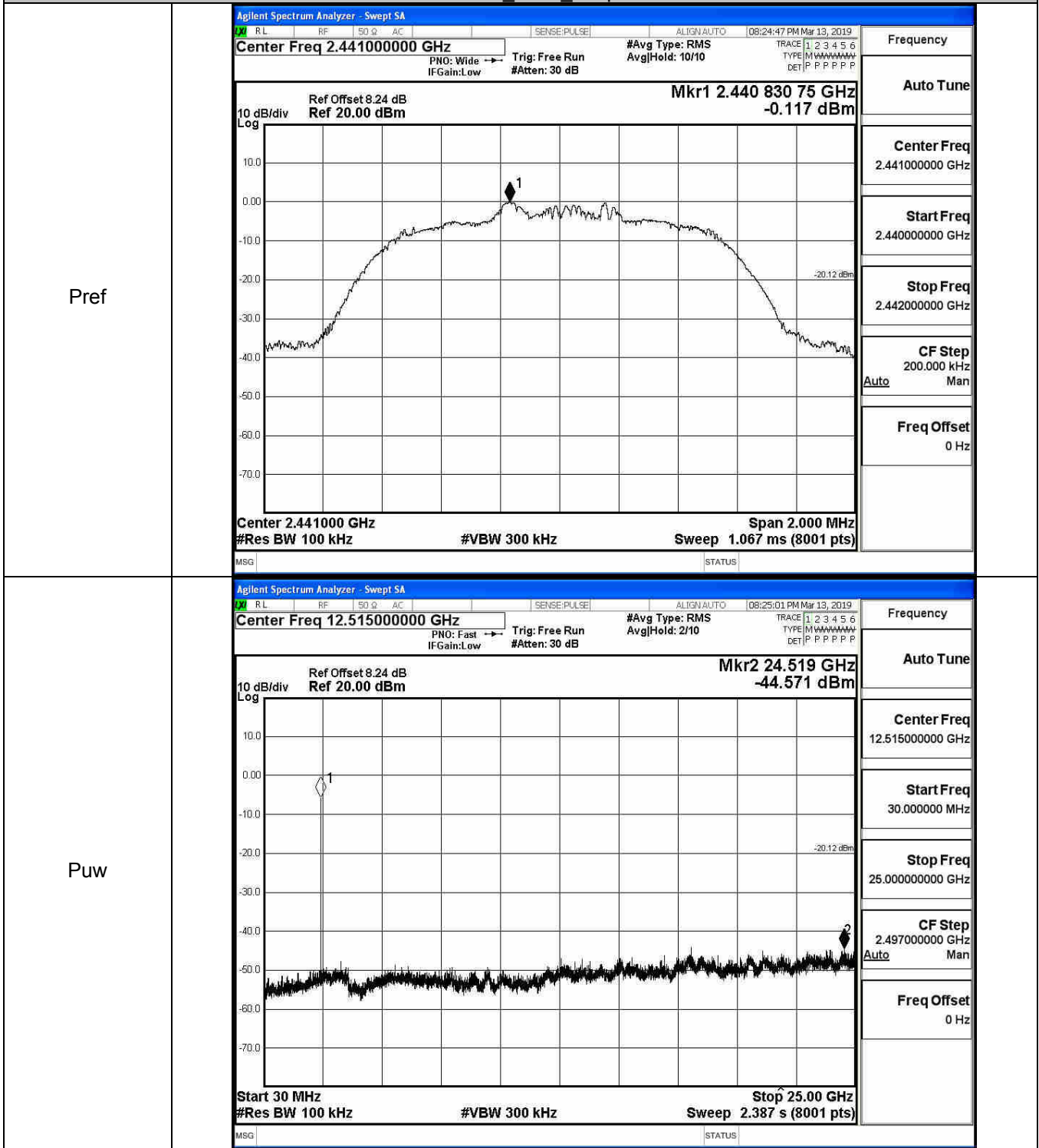
GFSK_HCH_Graphs



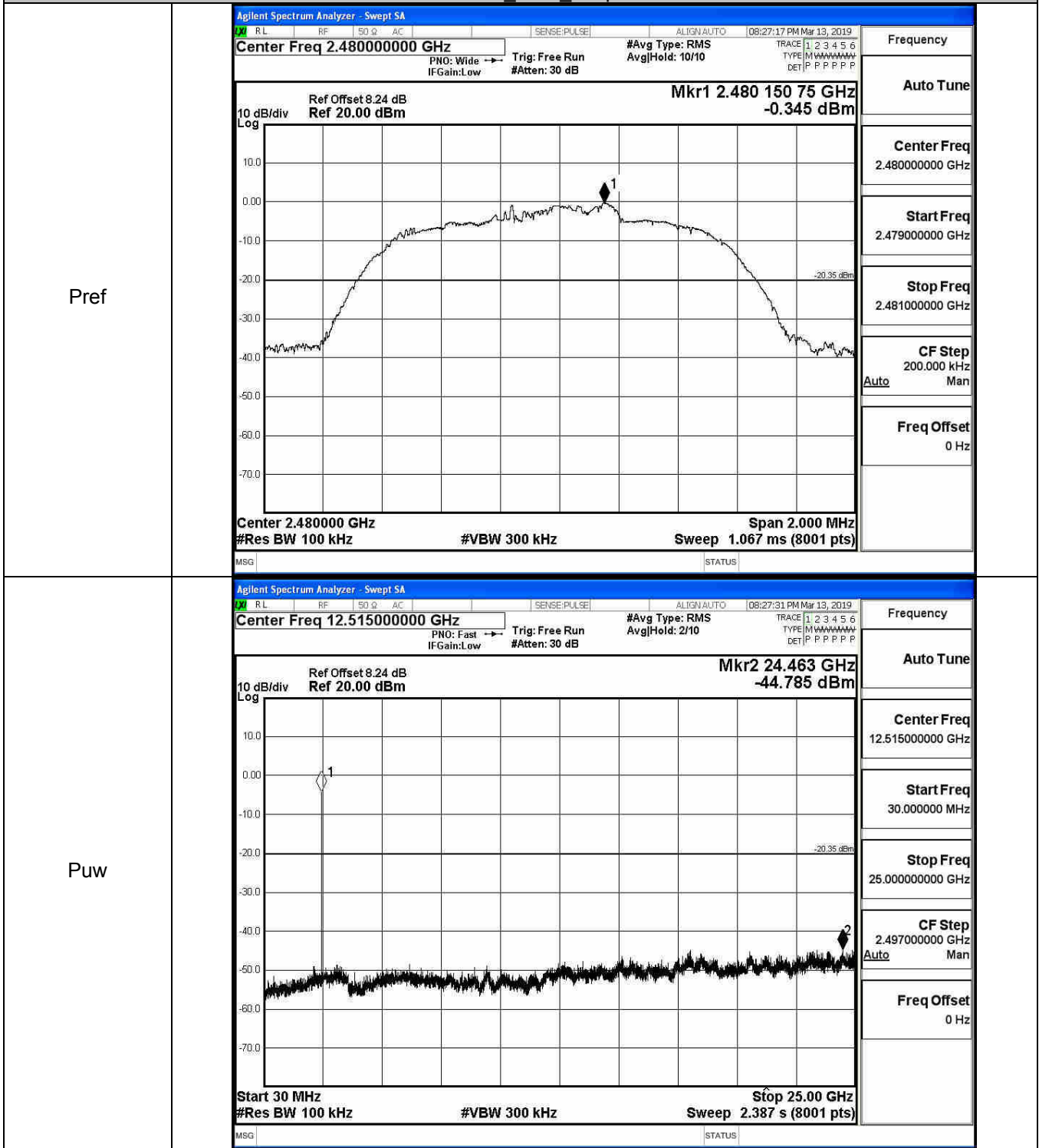
$\pi/4$ DQPSK_LCH_Graphs



$\pi/4$ 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	1.493	Off	-47.618	-18.51	PASS
			1.688	On	-49.195	-18.31	PASS
	HCH	2480	1.294	Off	-49.248	-18.71	PASS
			1.171	On	-48.158	-18.83	PASS
π/4DQPSK	LCH	2402	0.437	Off	-49.895	-19.56	PASS
			0.350	On	-49.360	-19.65	PASS
	HCH	2480	-0.161	Off	-49.759	-20.16	PASS
			-0.191	On	-39.029	-20.19	PASS

Test Graphs

GFSK/LCH/No Hop

MKR	MODE	TRIG	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.401932 GHz	1.493 dBm			
2	N	f		2.400000 GHz	-53.077 dBm			
3	N	f		2.390000 GHz	-52.594 dBm			
4	N	f		2.369984 GHz	-47.618 dBm			
5								
6								
7								
8								
9								
10								
11								

Frequency

Auto Tune

Center Freq
2.357000000 GHz

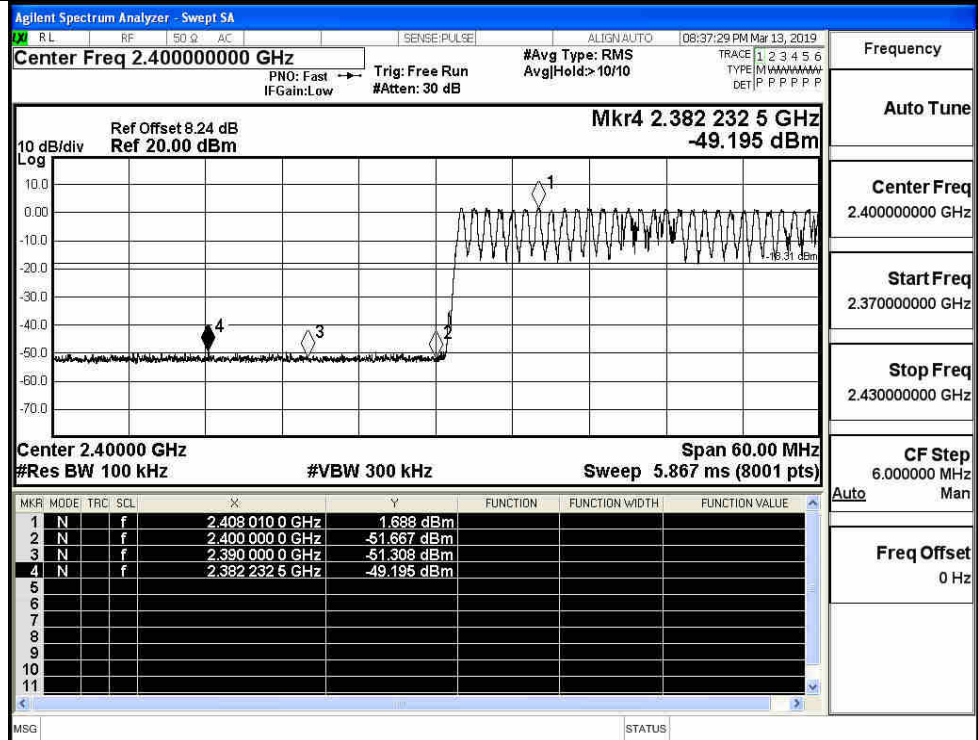
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz

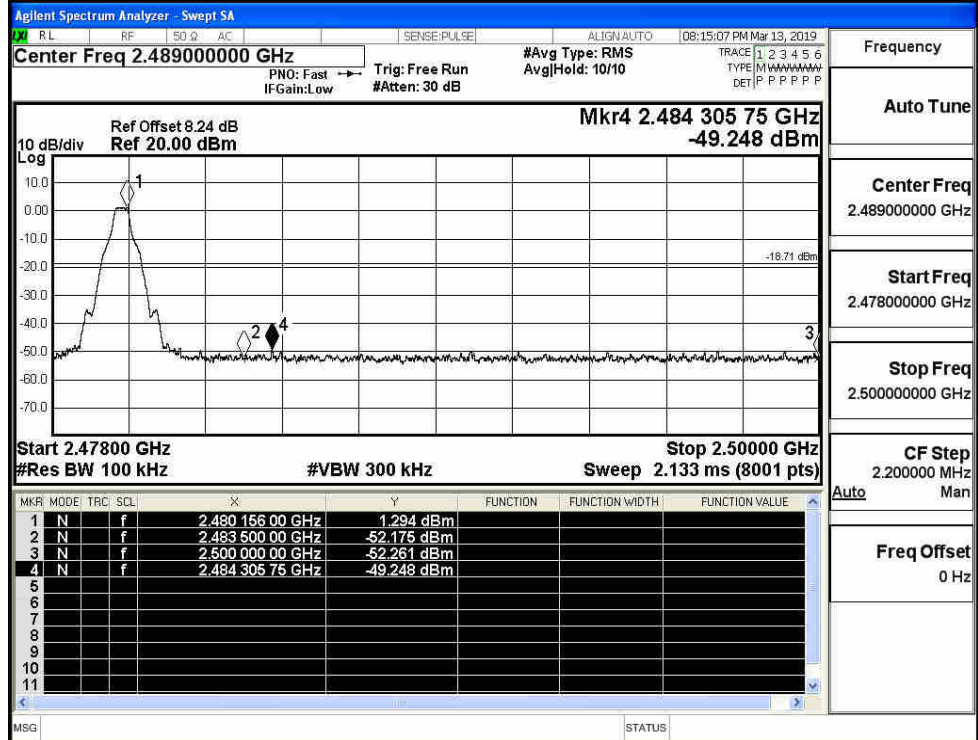
Freq Offset
0 Hz

GFSK/LCH/Hop



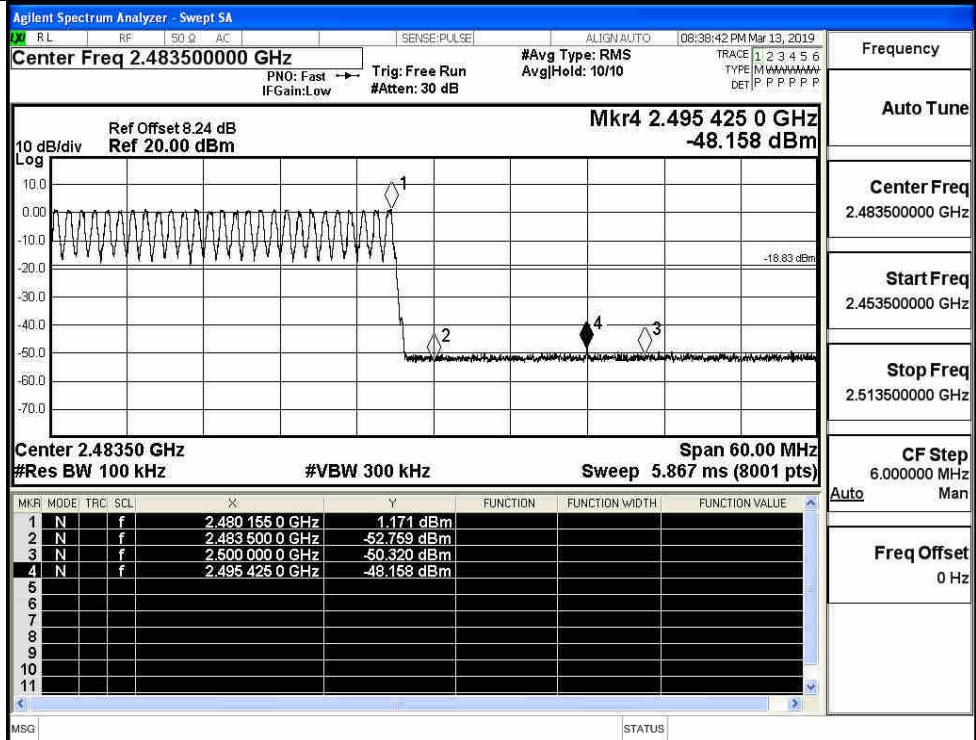
Frequency	2.400000000 GHz
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Freq Offset	0 Hz

GFSK/HCH/No Hop



Frequency	2.489000000 GHz
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

GFSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

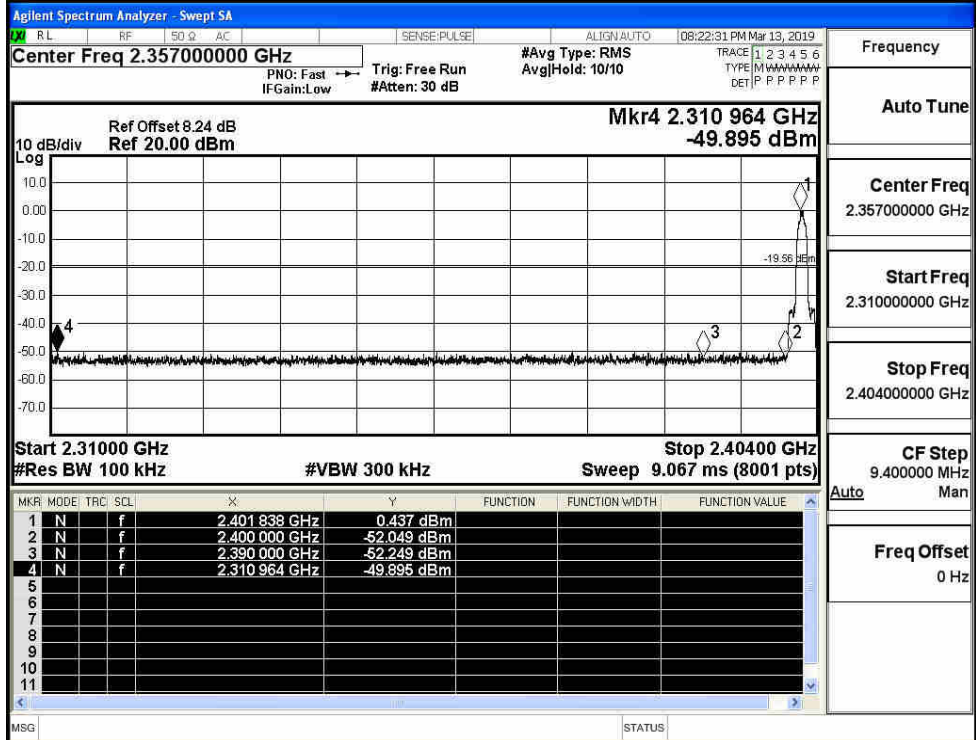
Start Freq
2.453500000 GHz

Stop Freq
2.513500000 GHz

CF Step
6.000000 MHz

Freq Offset
0 Hz

π/4DQPSK/LCH/No Hop



Frequency

Auto Tune

Center Freq
2.357000000 GHz

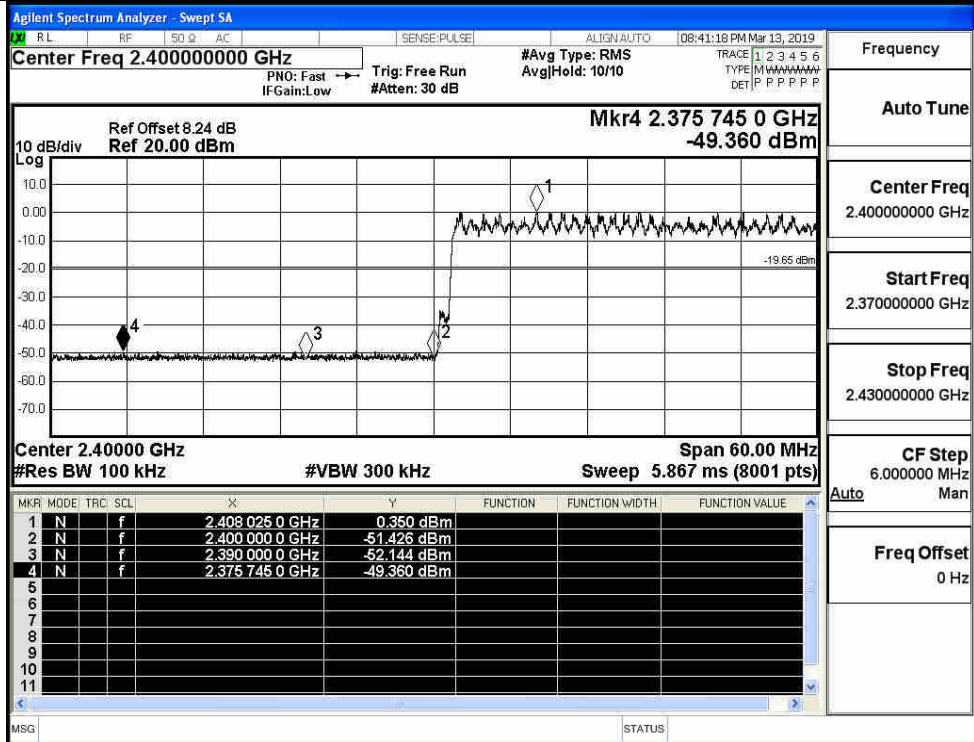
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz

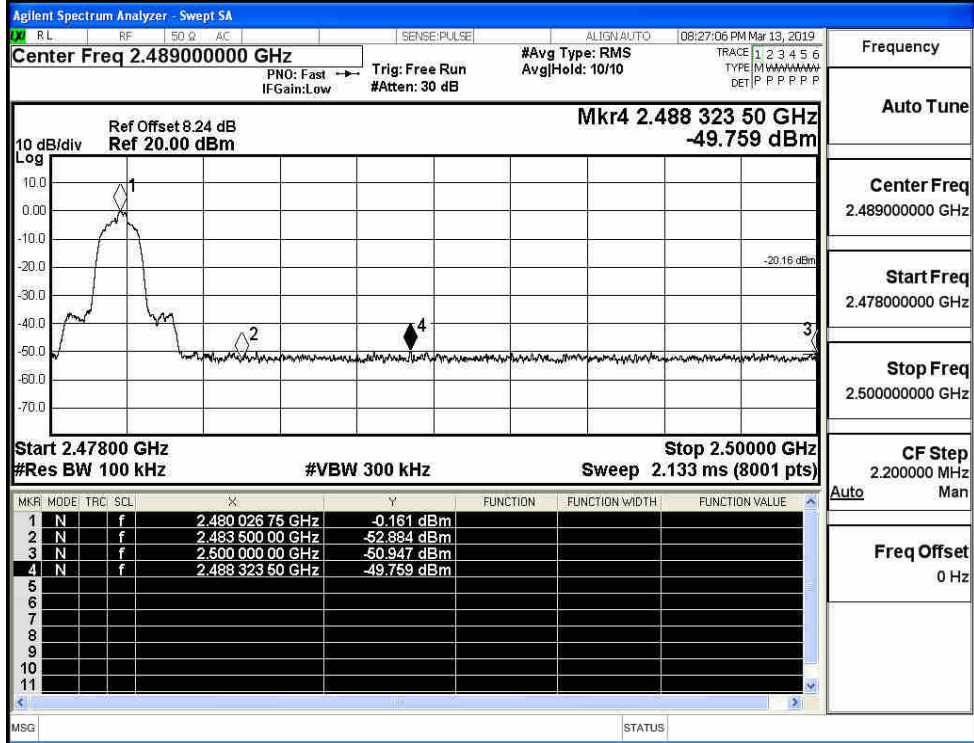
Freq Offset
0 Hz

π /4DQPSK/LCH/Hop



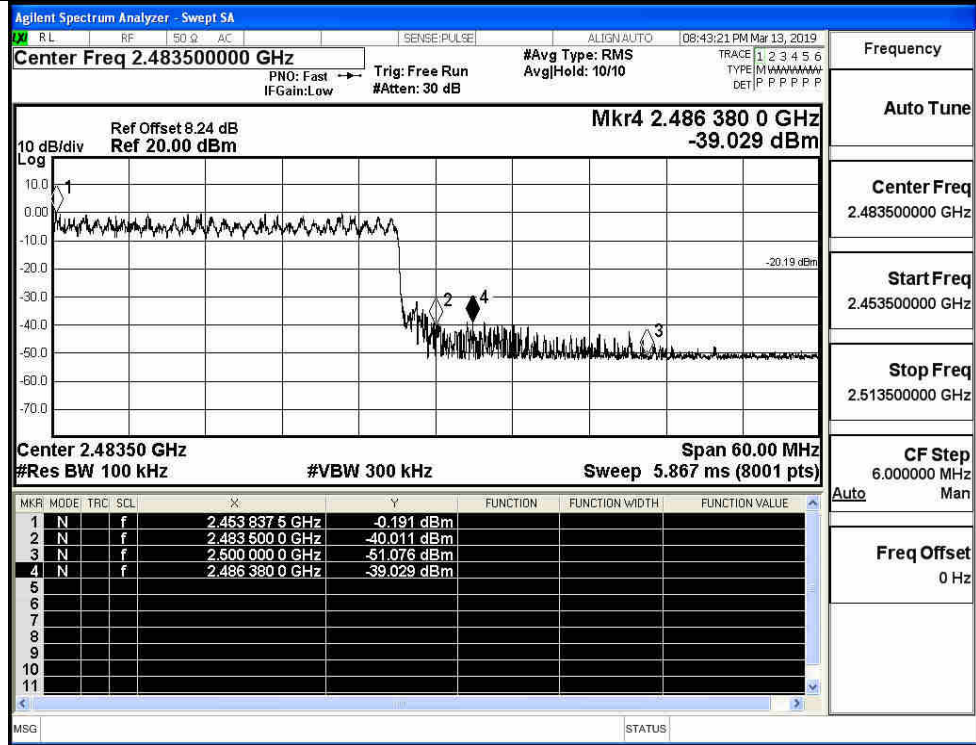
Frequency	
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/HCH/No Hop



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

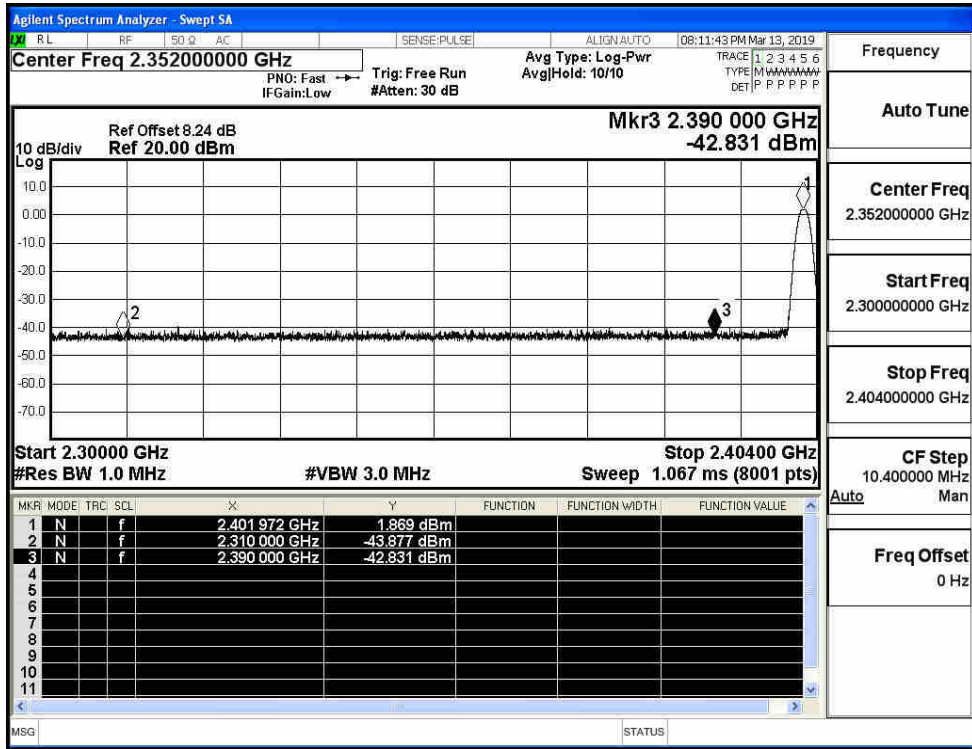
$\pi/4$ DQPSK/HCH/Hop



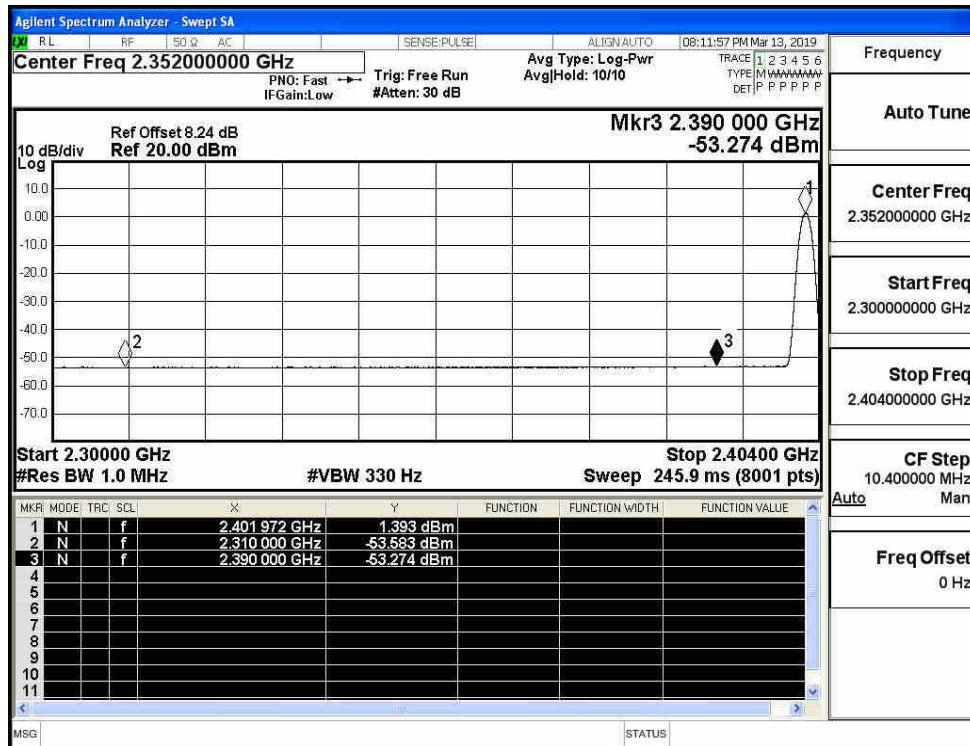
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.88	2.0	0	53.38	PEAK	74	PASS
	Off	2310.0	-53.58	2.0	0	43.67	AV	54	PASS
	Off	2390.0	-42.83	2.0	0	54.43	PEAK	74	PASS
	Off	2390.0	-53.27	2.0	0	43.98	AV	54	PASS
	Off	2483.5	-41.80	2.0	0	55.45	PEAK	74	PASS
	Off	2483.5	-52.86	2.0	0	44.40	AV	54	PASS
	Off	2500.0	-43.29	2.0	0	53.96	PEAK	74	PASS
	Off	2500.0	-52.92	2.0	0	44.33	AV	54	PASS
1/4DQPSK	Off	2310.0	-42.50	2.0	0	54.76	PEAK	74	PASS
	Off	2310.0	-53.56	2.0	0	43.70	AV	54	PASS
	Off	2390.0	-42.99	2.0	0	54.27	PEAK	74	PASS
	Off	2390.0	-53.33	2.0	0	43.93	AV	54	PASS
	Off	2483.5	-43.51	2.0	0	53.75	PEAK	74	PASS
	Off	2483.5	-52.87	2.0	0	44.38	AV	54	PASS
	Off	2500.0	-43.34	2.0	0	53.92	PEAK	74	PASS
	Off	2500.0	-52.95	2.0	0	44.31	AV	54	PASS

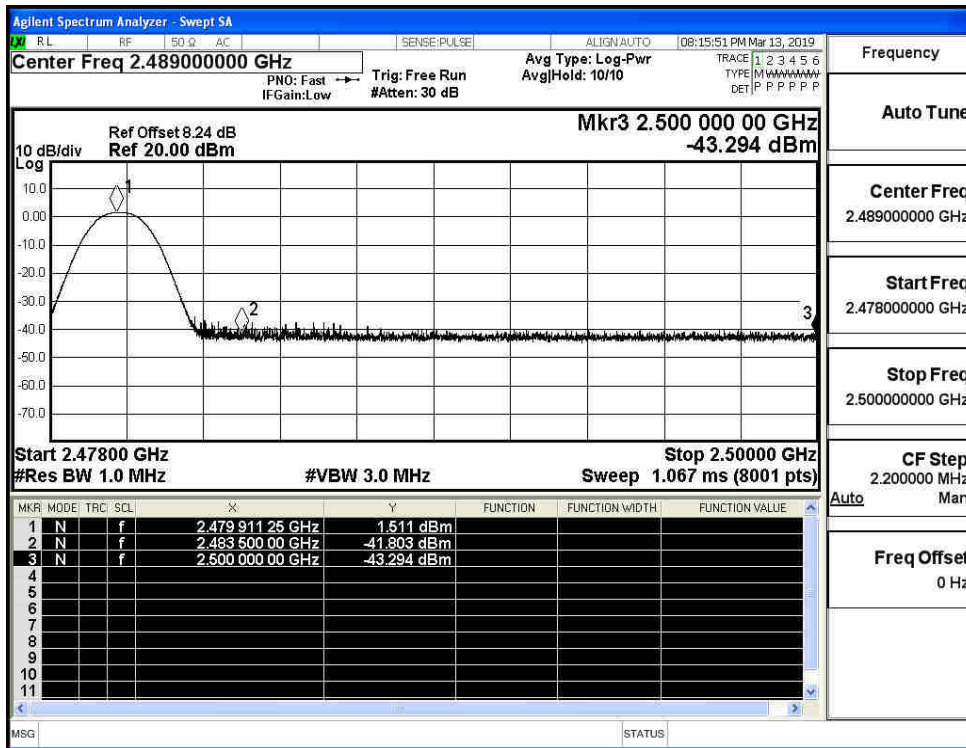
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



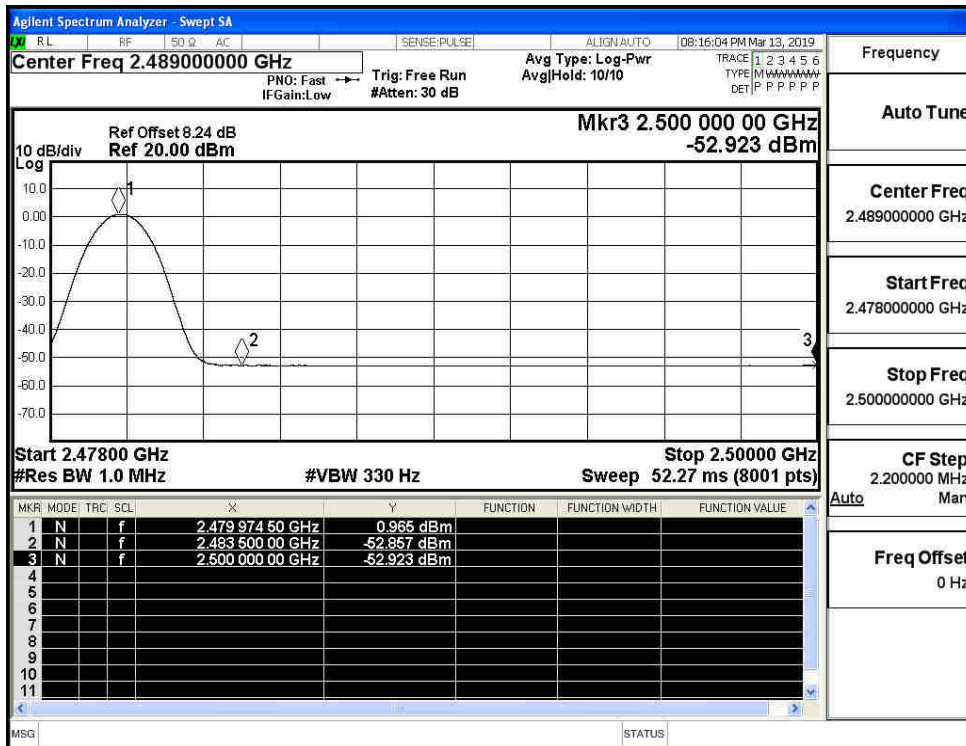
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



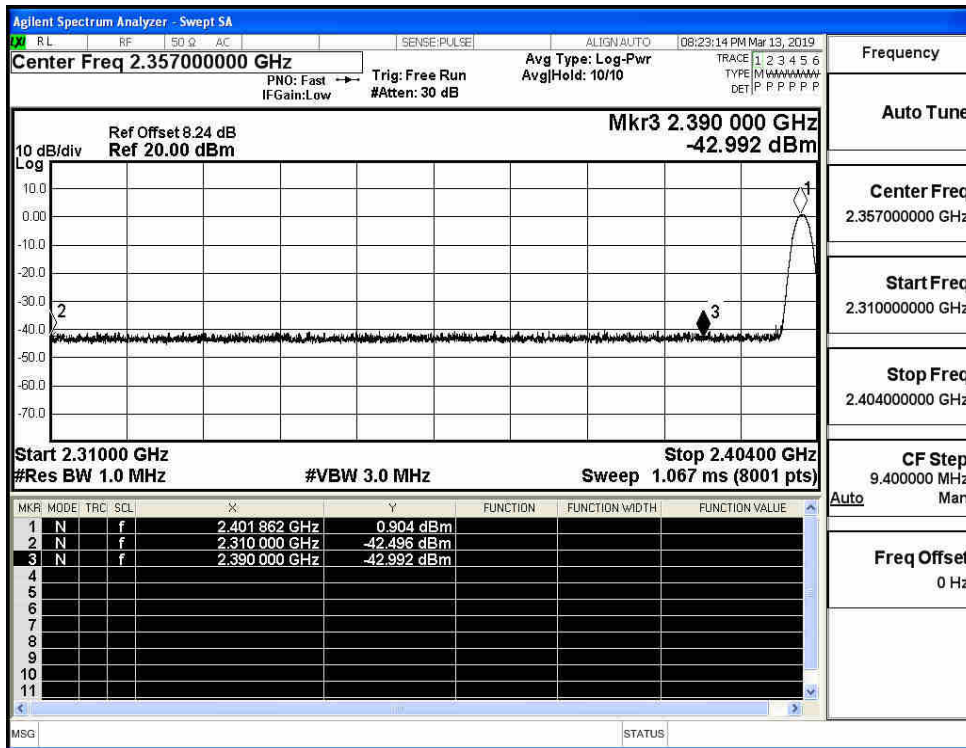
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



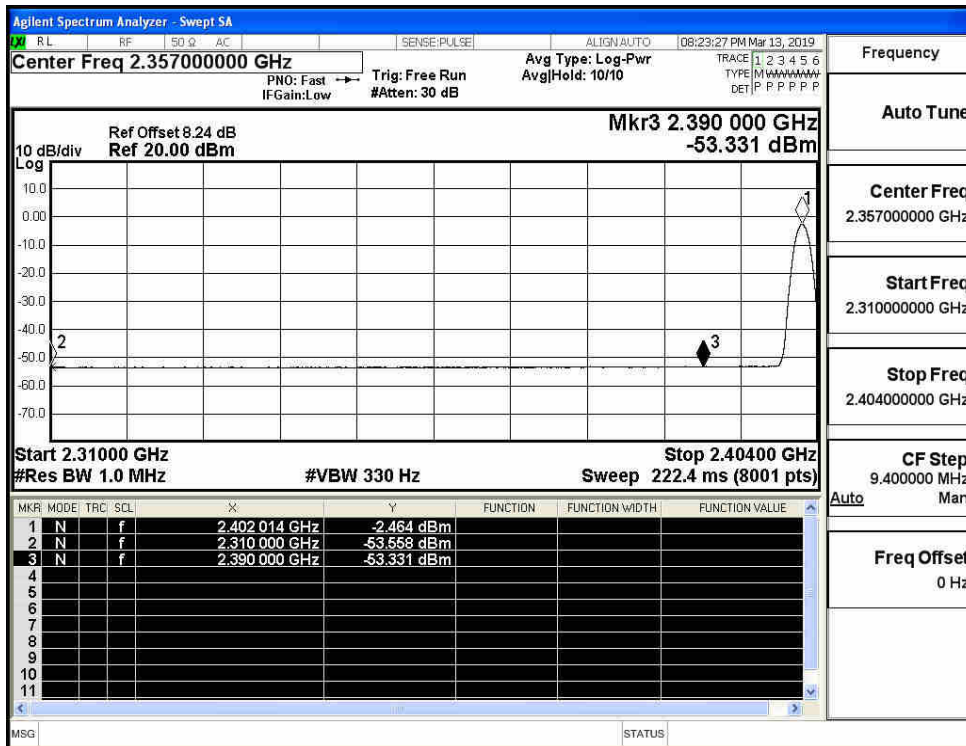
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



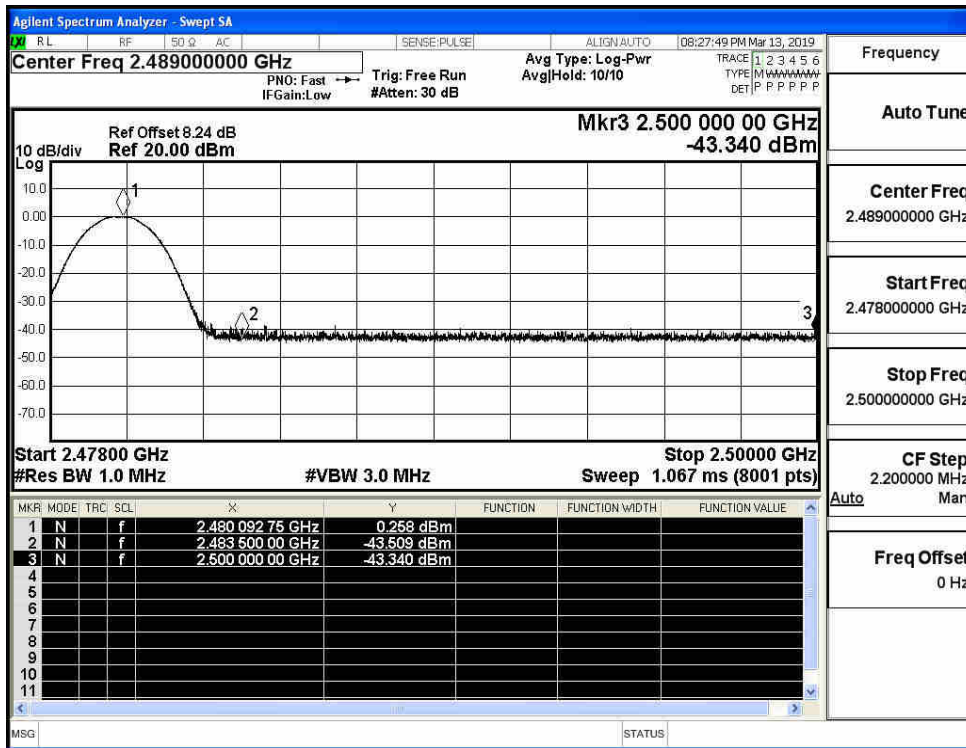
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)

