

Appendix A

RF Test Data for BT V4.0 (BDR/EDR) (Conducted Measurement)

Product Name: Wireless Speaker

Trade Mark: N/A

Test Model: MBZPA228

Environmental Conditions

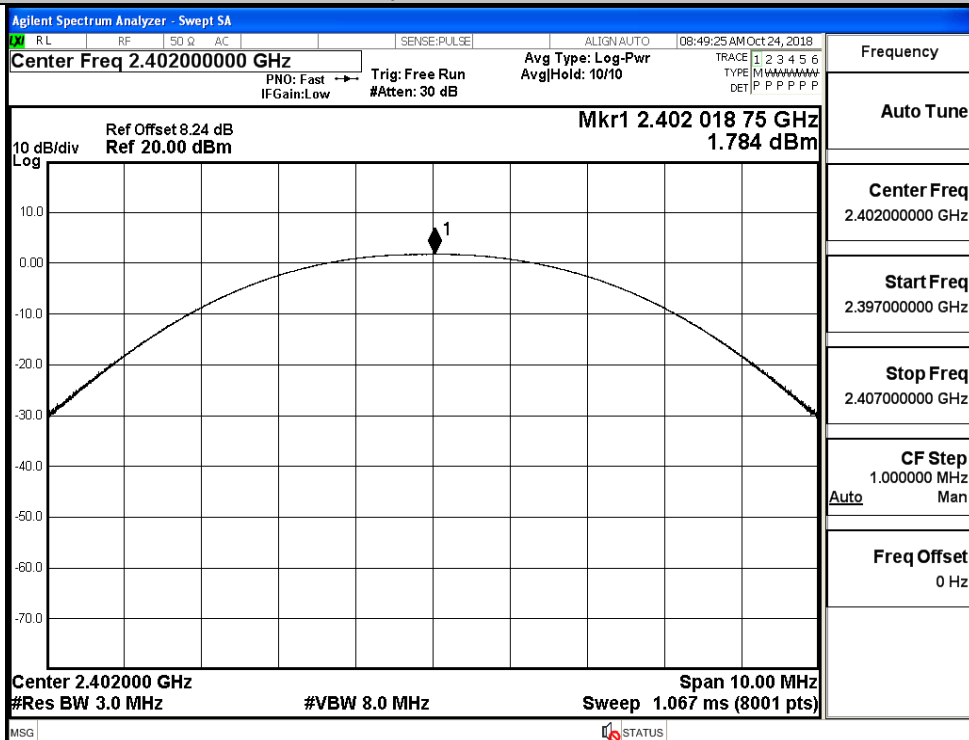
Temperature:	24.3 ° C
Relative Humidity:	52.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Diamond.Lu
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Peak Output Power

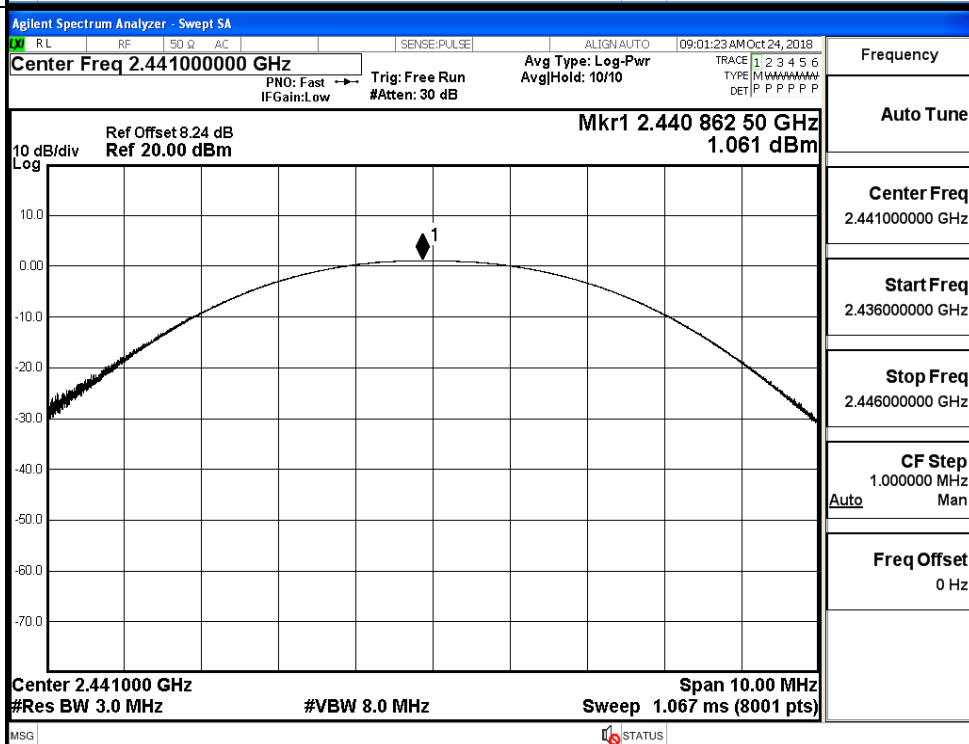
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.784	21	PASS
	MCH	1.061	21	PASS
	HCH	1.658	21	PASS
$\pi/4$ DQPSK	LCH	1.165	21	PASS
	MCH	0.948	21	PASS
	HCH	1.360	21	PASS

Test Graphs

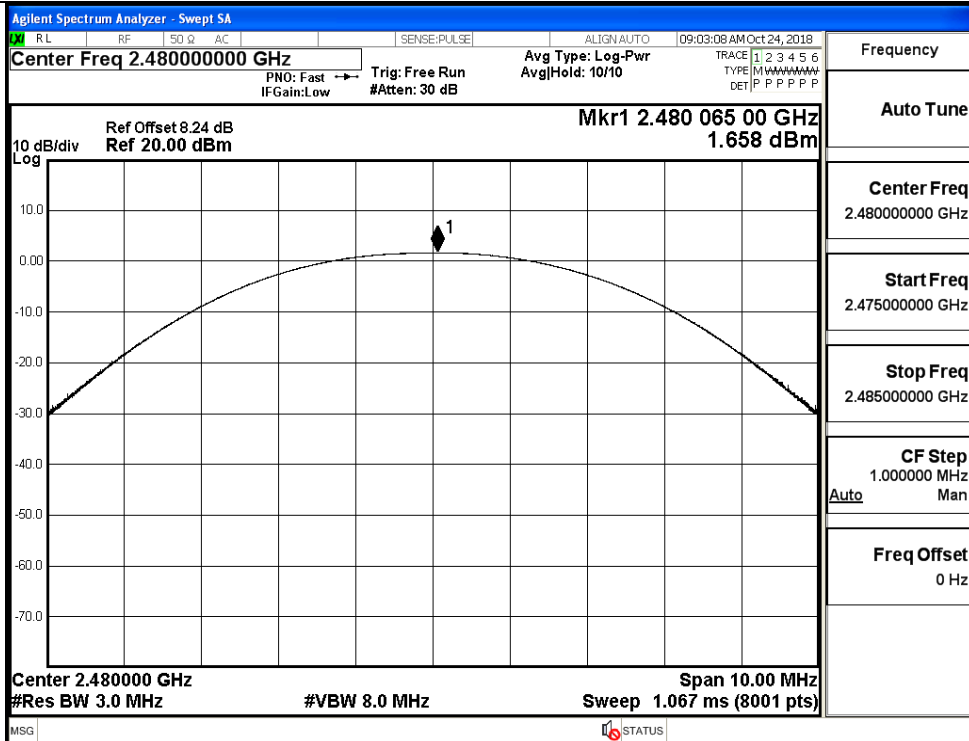
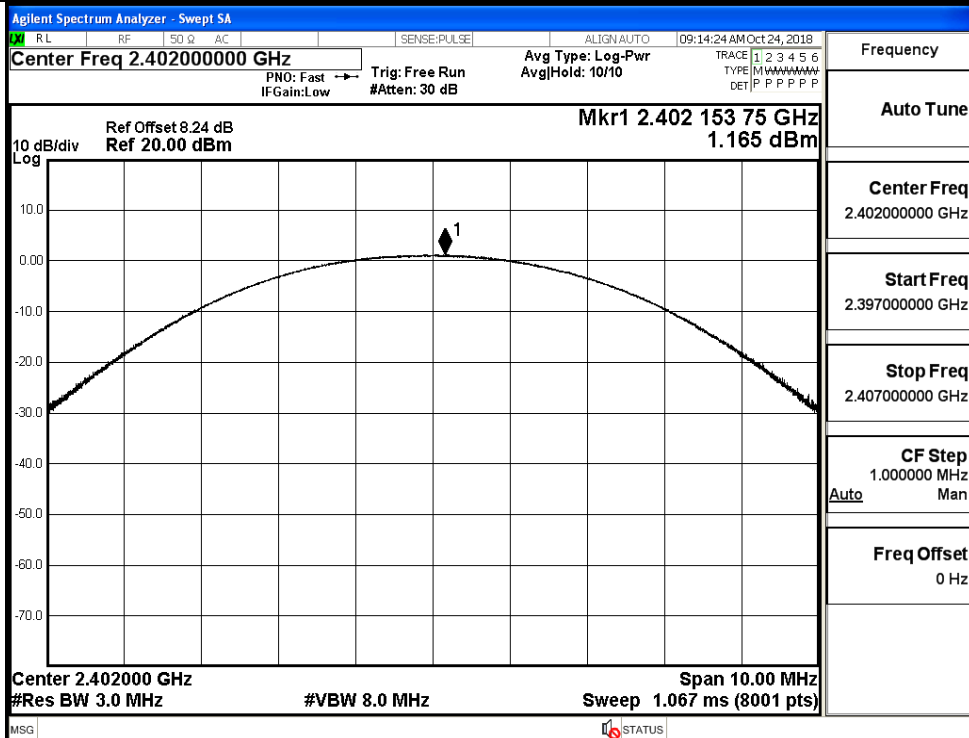
GFSK/LCH

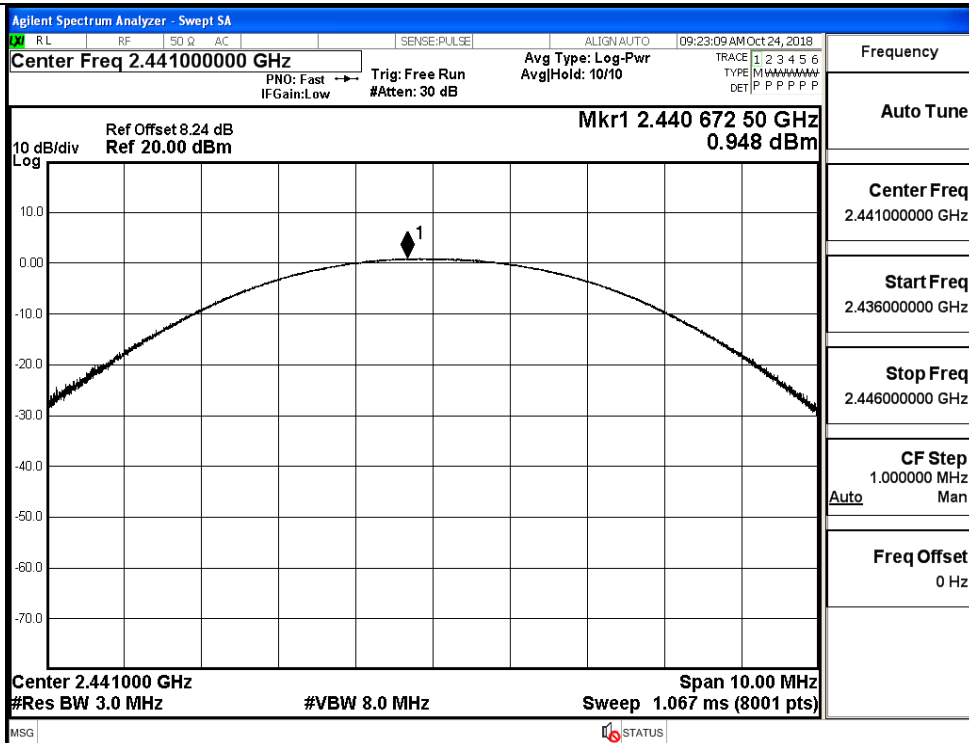
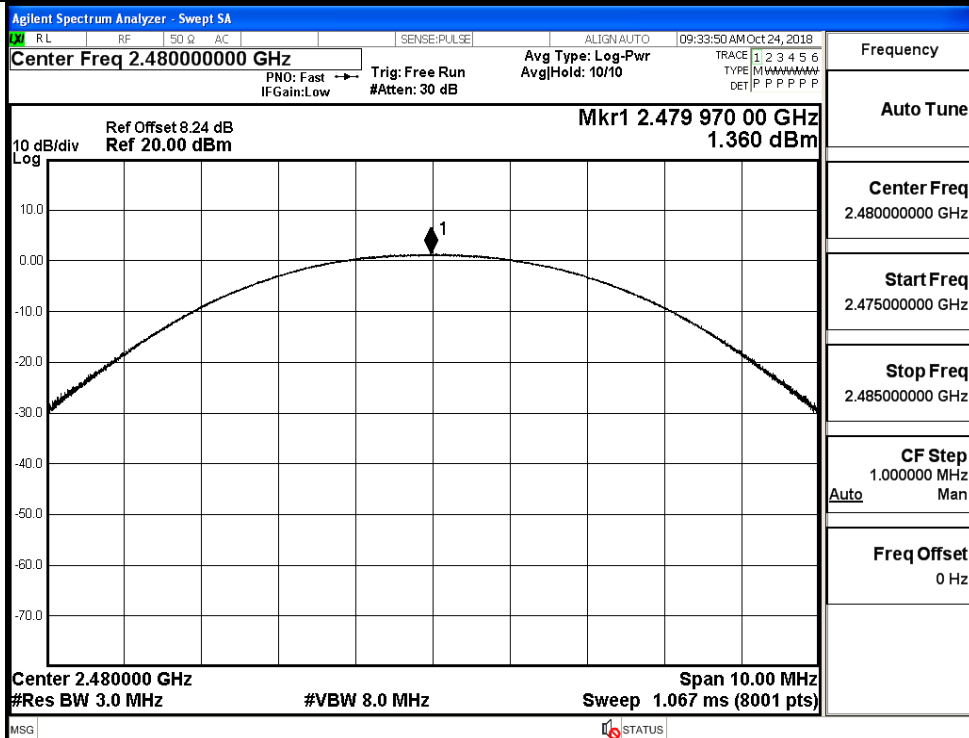


GFSK/MCH



GFSK/HCH

 π /4DQPSK/LCH

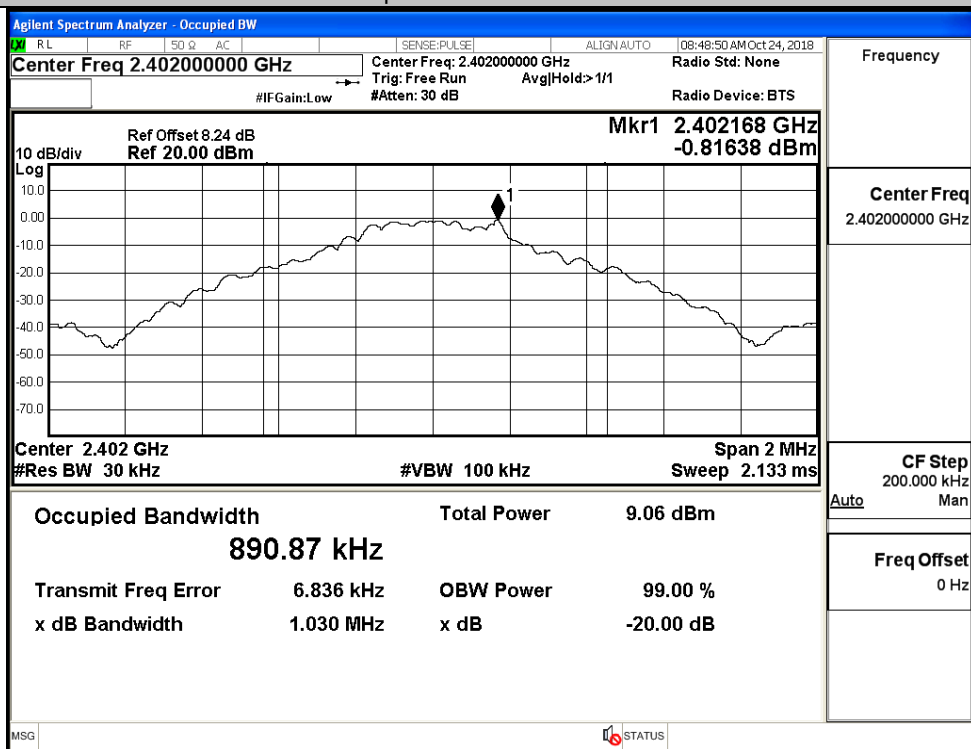
$\pi/4$ DQPSK/MCH $\pi/4$ DQPSK/HCH

A.2 99% and 20dB Bandwidth

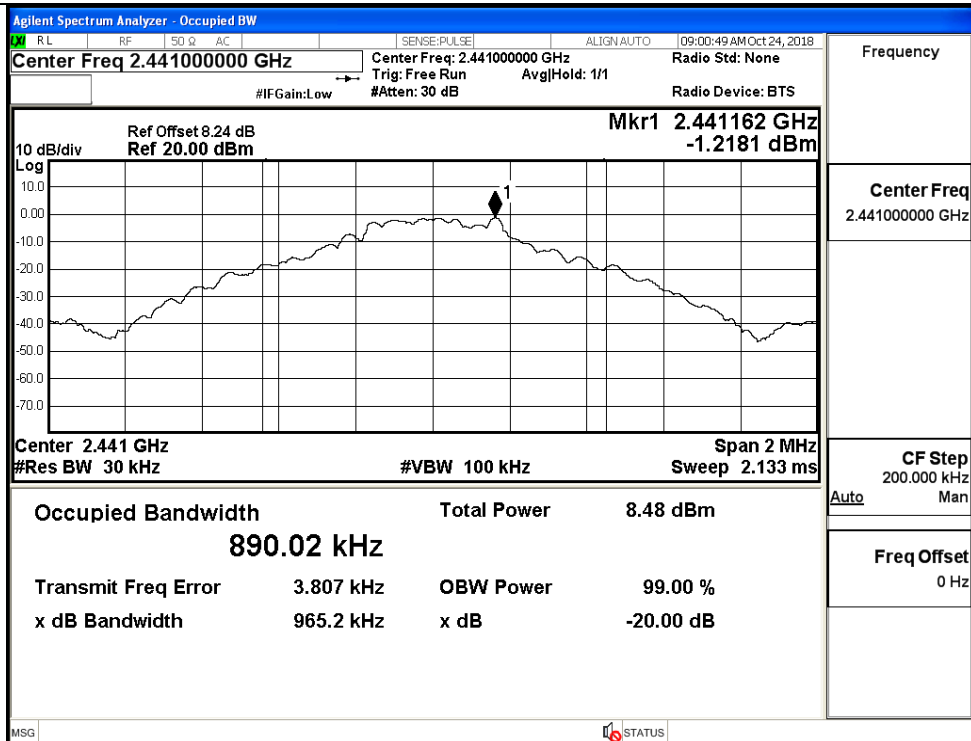
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.89087	1.030	Not Specified	PASS
	MCH	0.89002	0.9652	Not Specified	PASS
	HCH	0.89342	0.9659	Not Specified	PASS
π /4DQPSK	LCH	1.1718	1.290	Not Specified	PASS
	MCH	1.1769	1.312	Not Specified	PASS
	HCH	1.1697	1.289	Not Specified	PASS

Test Graphs

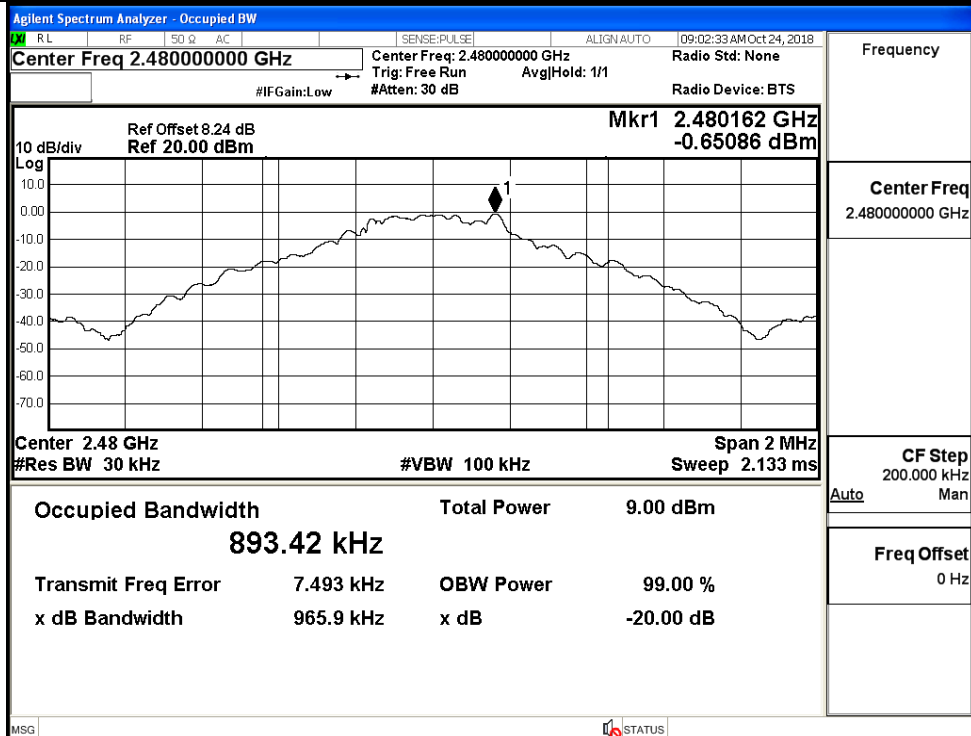
GFSK/LCH

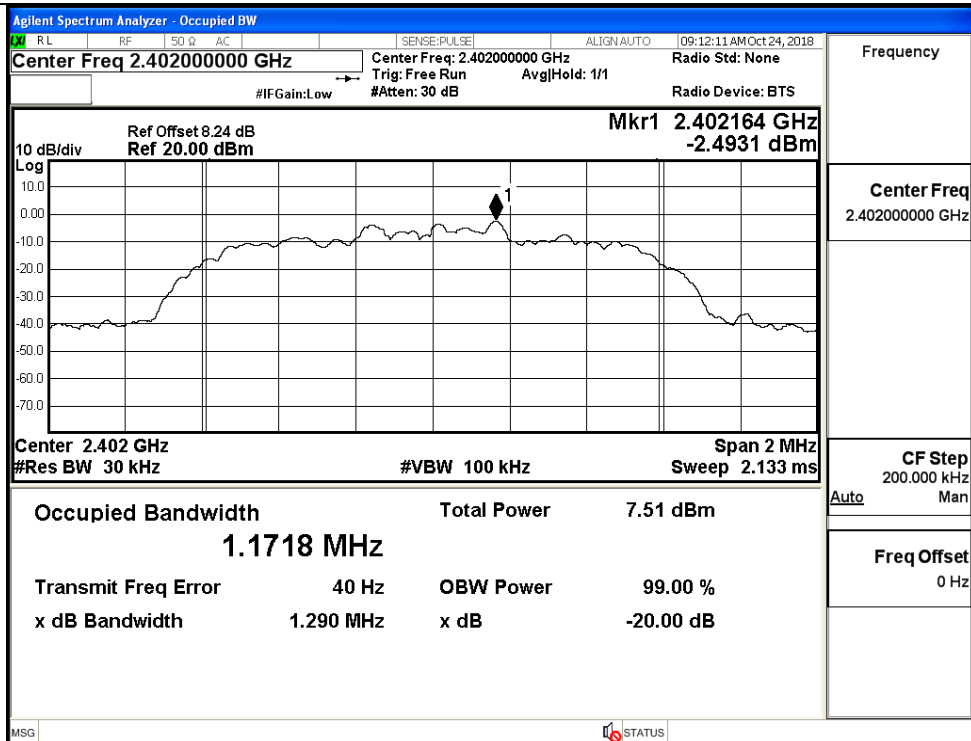
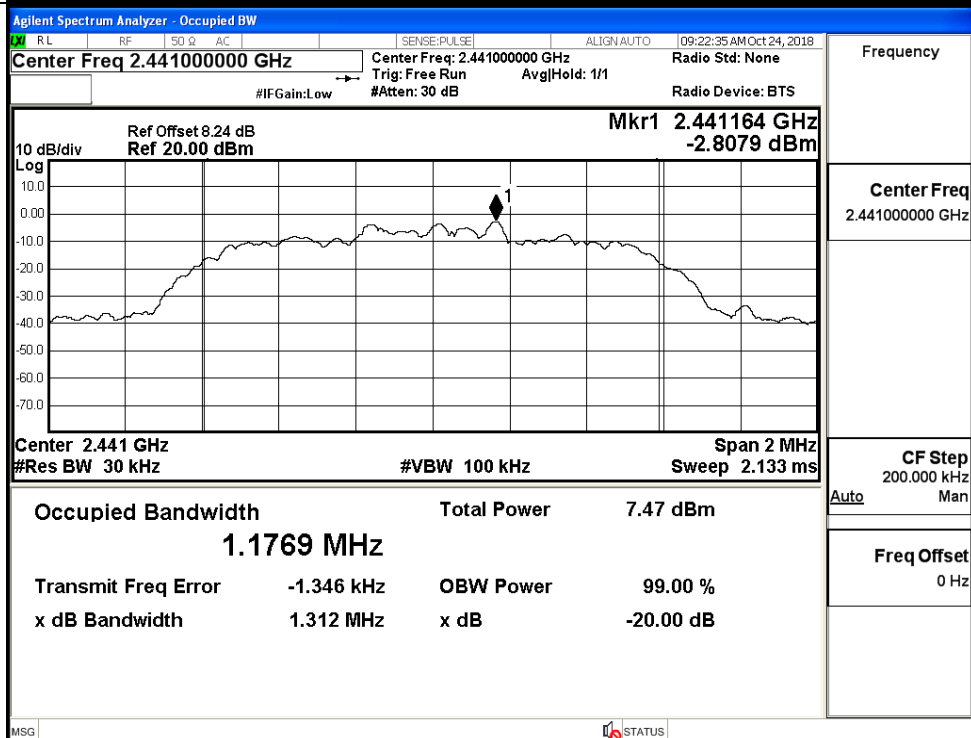


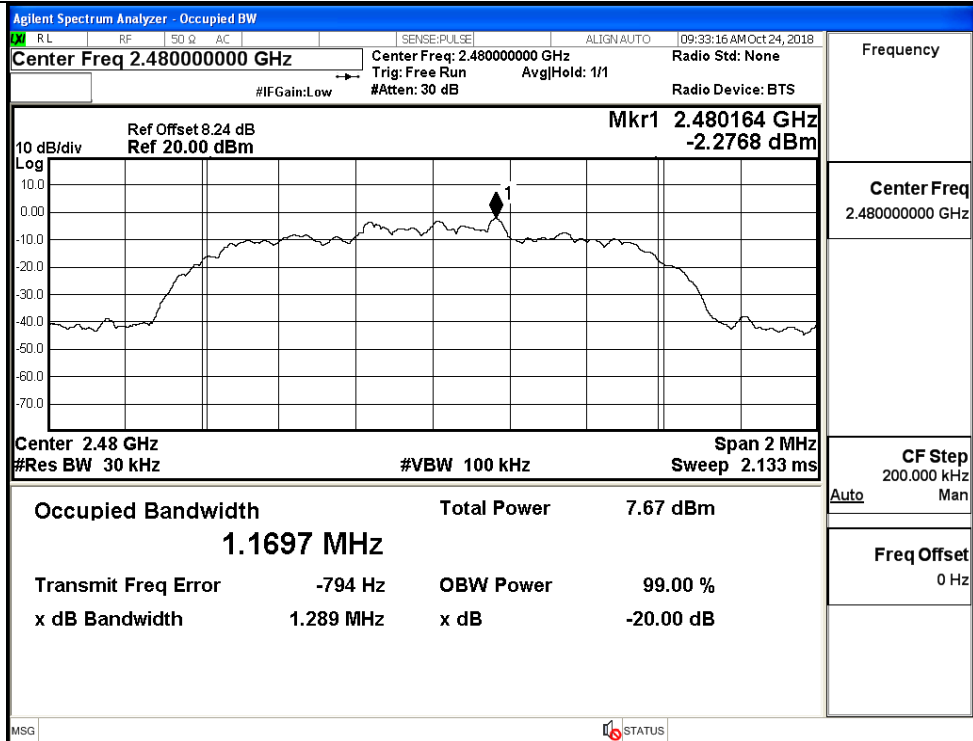
GFSK/MCH



GFSK/HCH



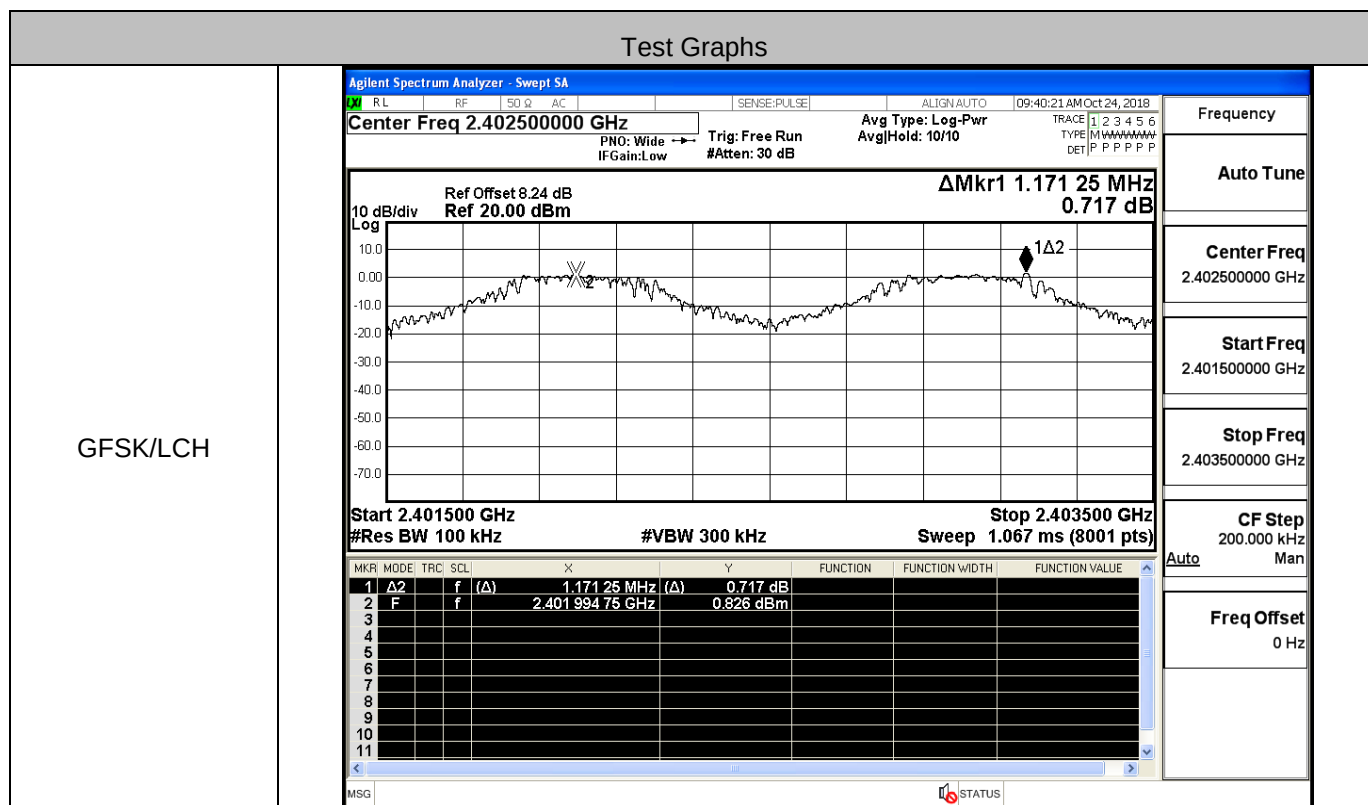
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

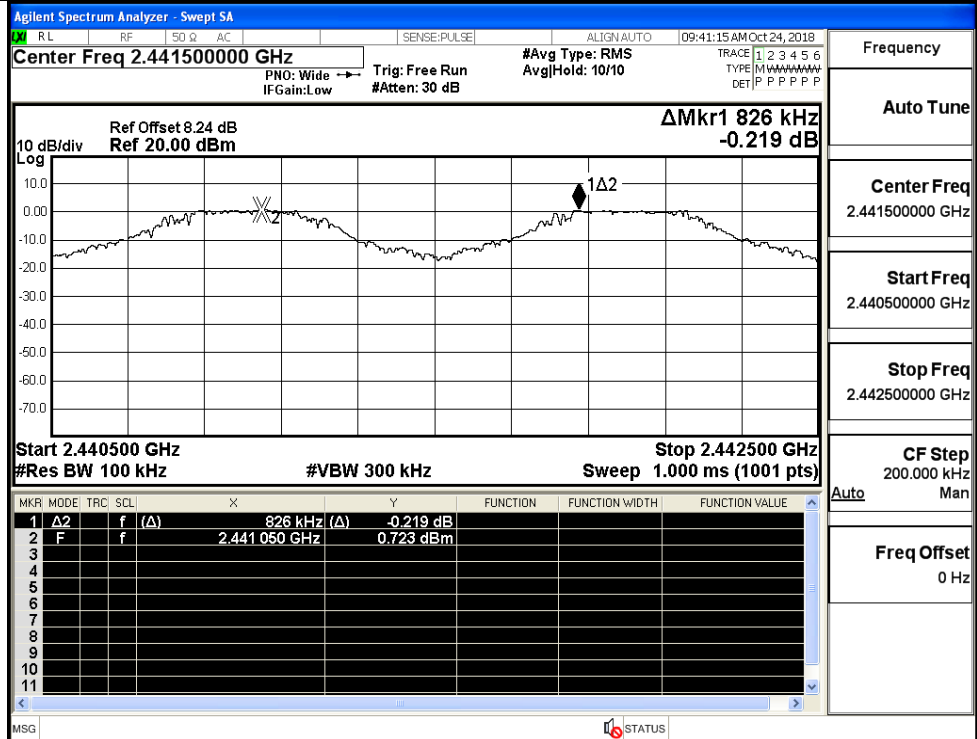
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.171	0.687	PASS
	MCH	0.826	0.687	PASS
	HCH	0.990	0.687	PASS
π /4DQPSK	LCH	0.996	0.875	PASS
	MCH	0.970	0.875	PASS
	HCH	1.034	0.875	PASS

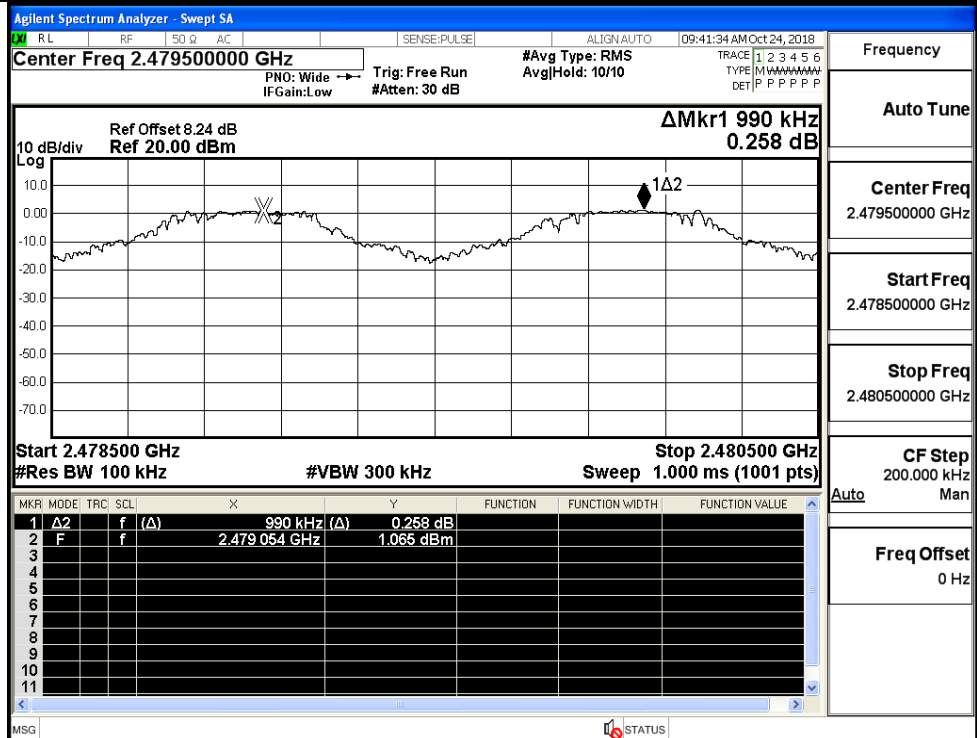
Test Graphs

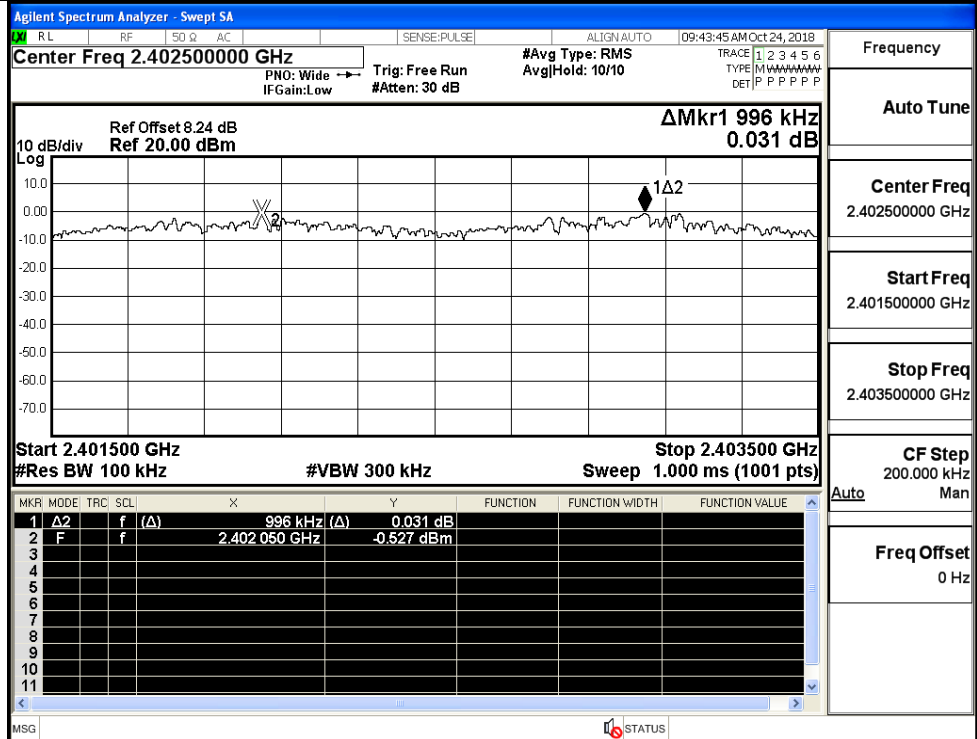
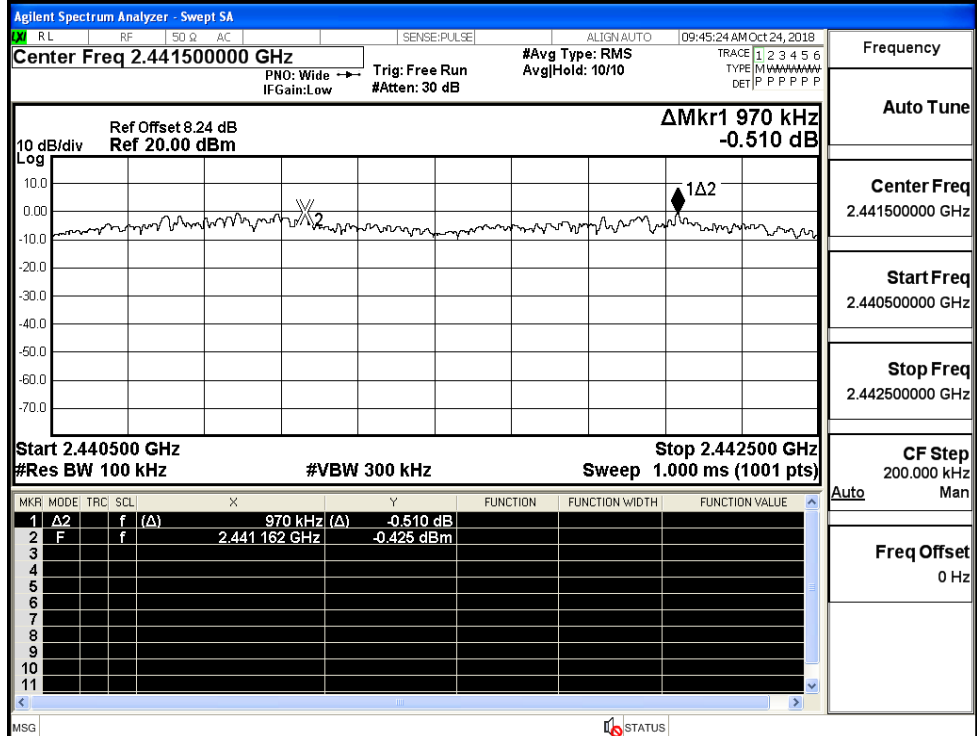


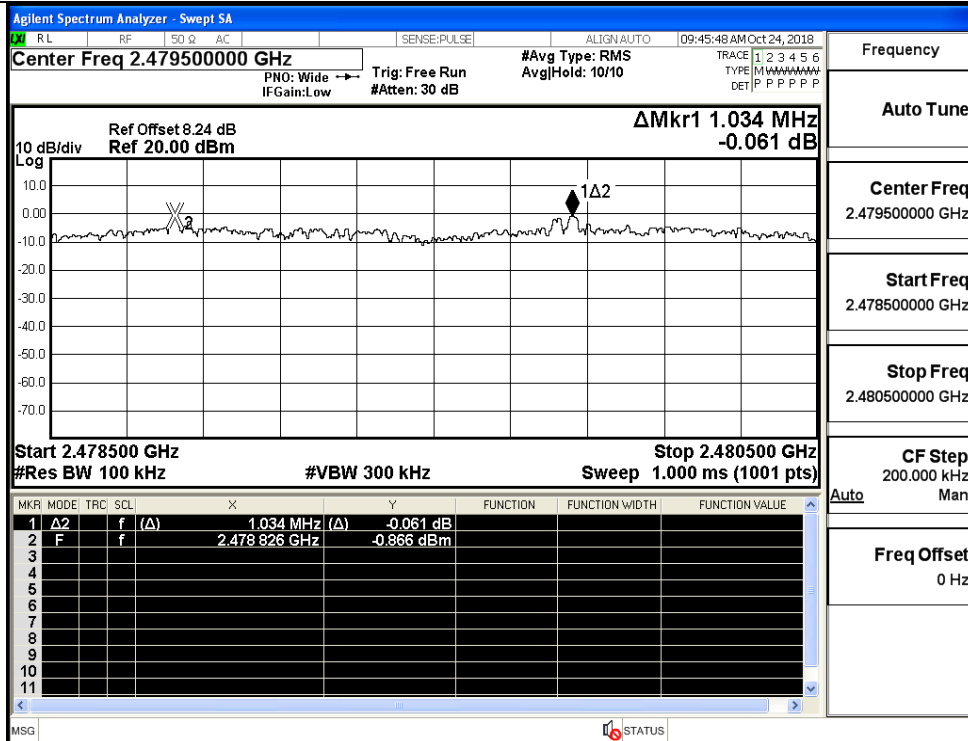
GFSK/MCH



GFSK/HCH



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

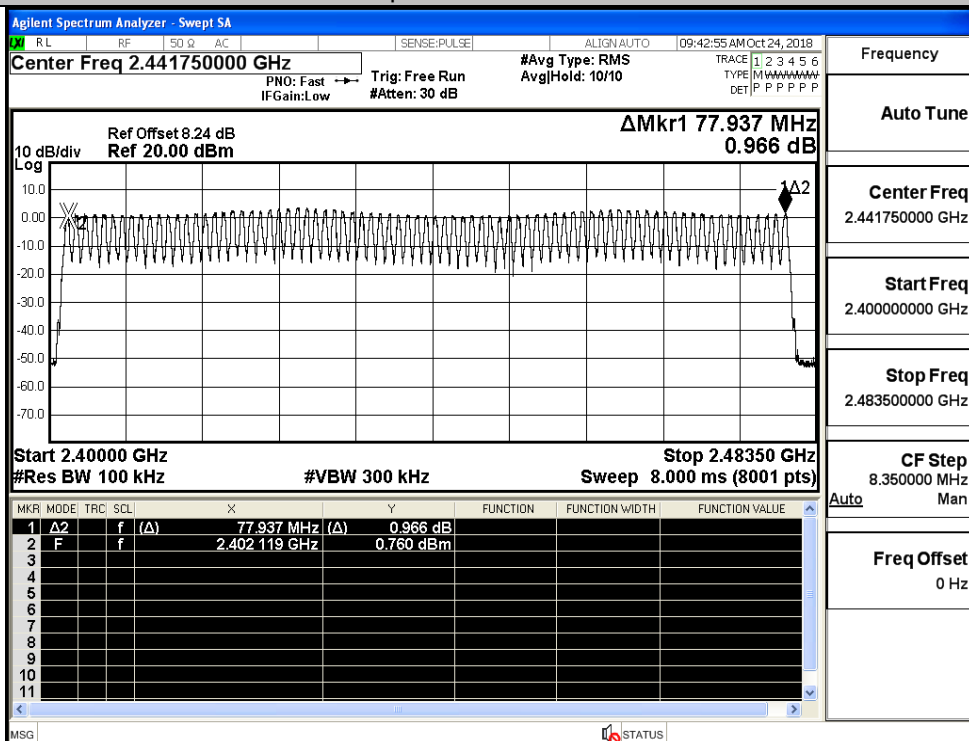
$\pi/4$ DQPSK/HCH

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



Frequency

Auto Tune

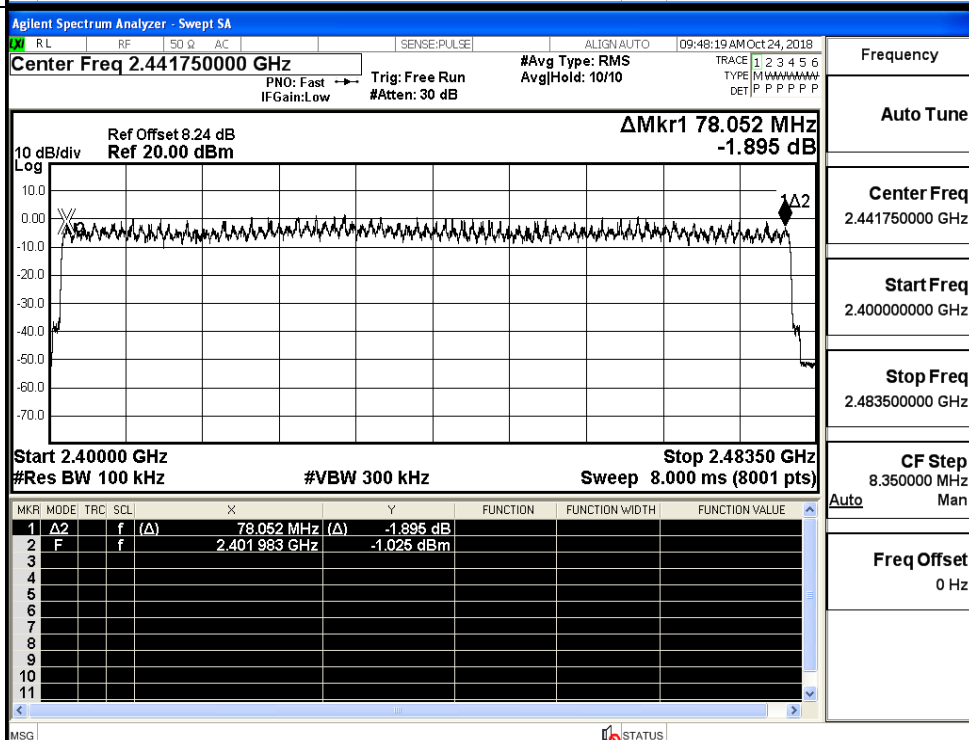
Center Freq
2.441750000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Man

Freq Offset
0 Hz

 $\pi/4$ DQPSK/Hop

Frequency

Auto Tune

Center Freq
2.441750000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Man

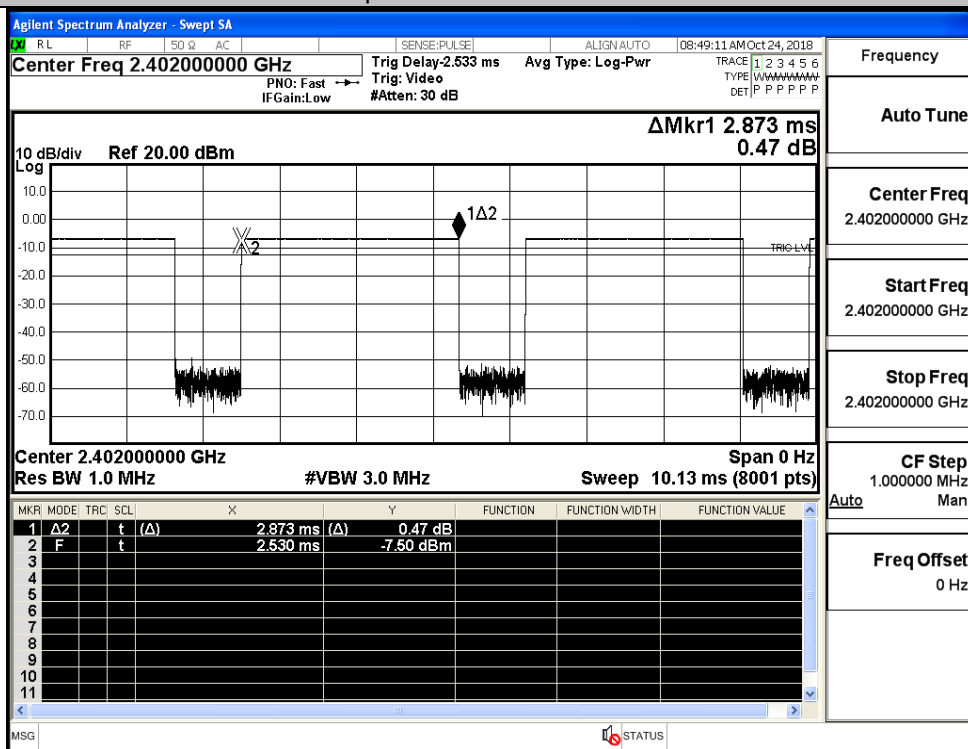
Freq Offset
0 Hz

A.5 Dwell Time

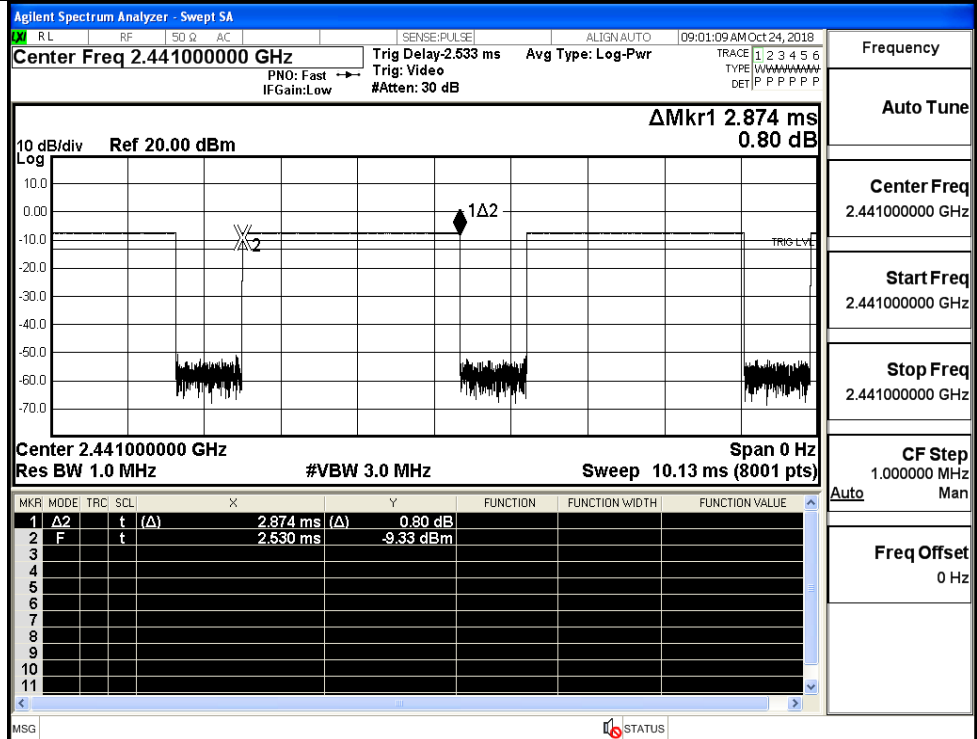
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS

Test Graphs

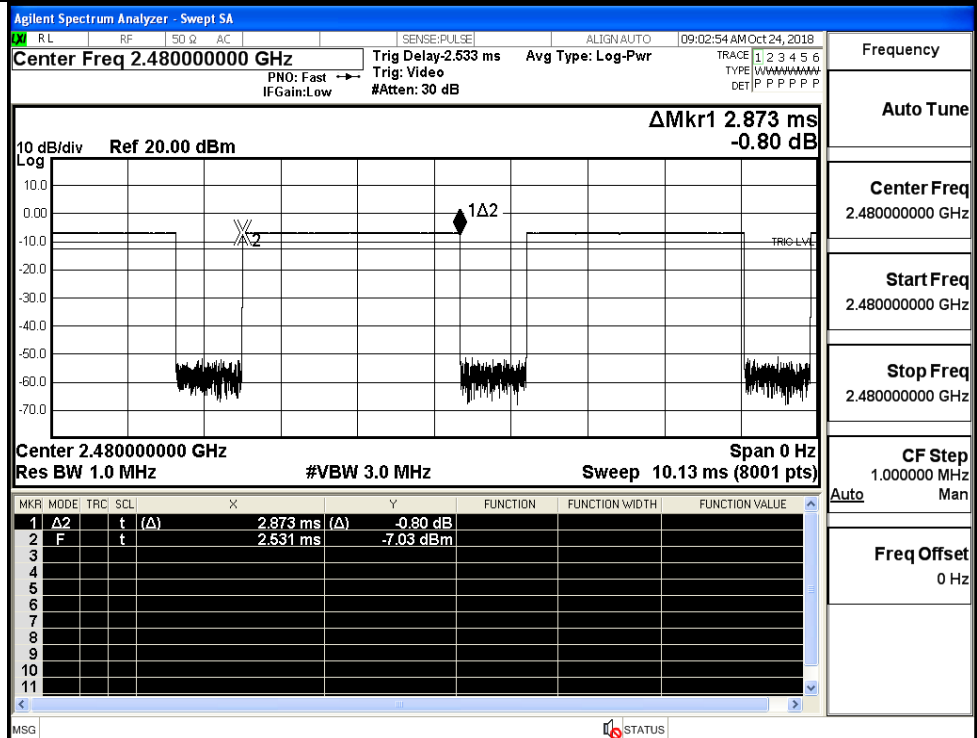
GFSK_DH5/LCH



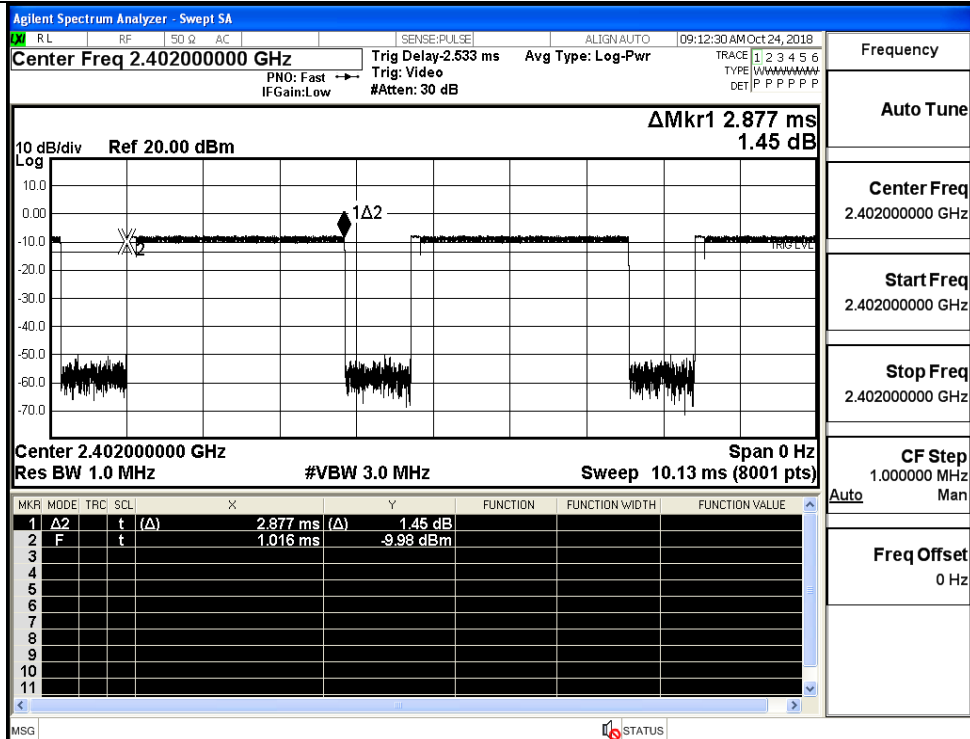
GFSK_DH5/MCH



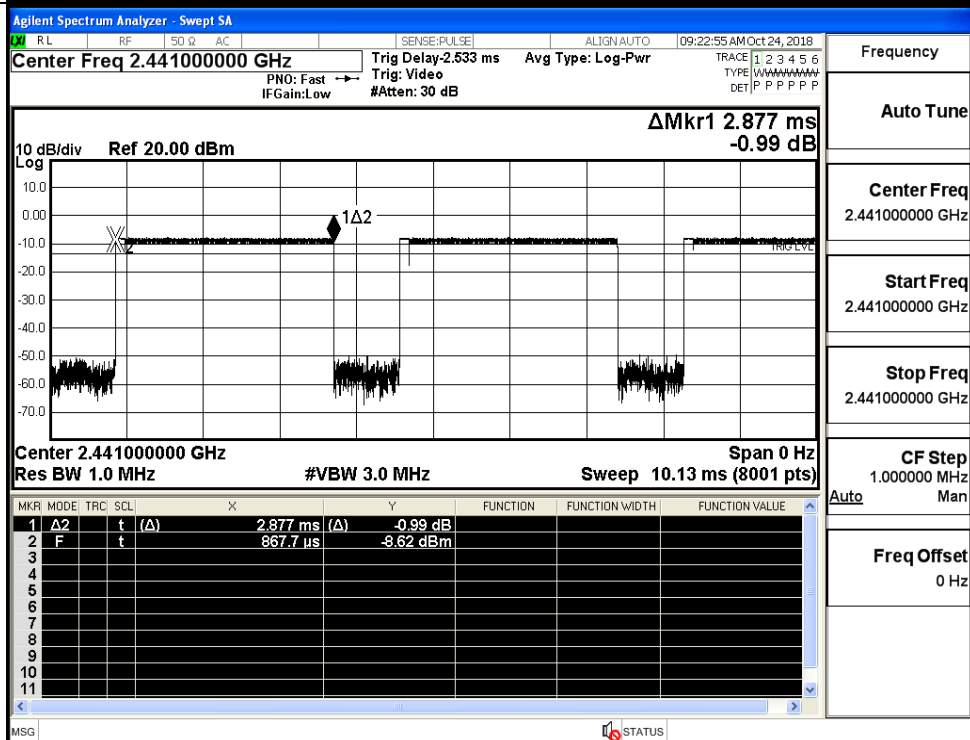
GFSK_DH5/HCH



$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



Agilent Spectrum Analyzer - Swept SA

RL RF SQ Q AC SENSE PULSE ALIGN AUTO 09:33:36 AM Oct 24, 2018

Center Freq 2.480000000 GHz Trig Delay: 2.533 ms Avg Type: Log-Pwr PNO: Fast IF Gain: Low Trig: Video #Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE W W W W W W W W DET P P P P P P P

10 dB/div Ref 20.00 dBm Δ Mkr1 2.877 ms 1.80 dB

Center Freq 2.480000000 GHz Res BW 1.0 MHz Span 0 Hz Sweep 10.13 ms (8001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ 2	t	(Δ)	2.877 ms	(Δ) 1.80 dB			
2	F	t		2.530 ms	-10.07 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency

Auto Tune

Center Freq 2.480000000 GHz

Start Freq 2.480000000 GHz

Stop Freq 2.480000000 GHz

CF Step 1.000000 MHz Man

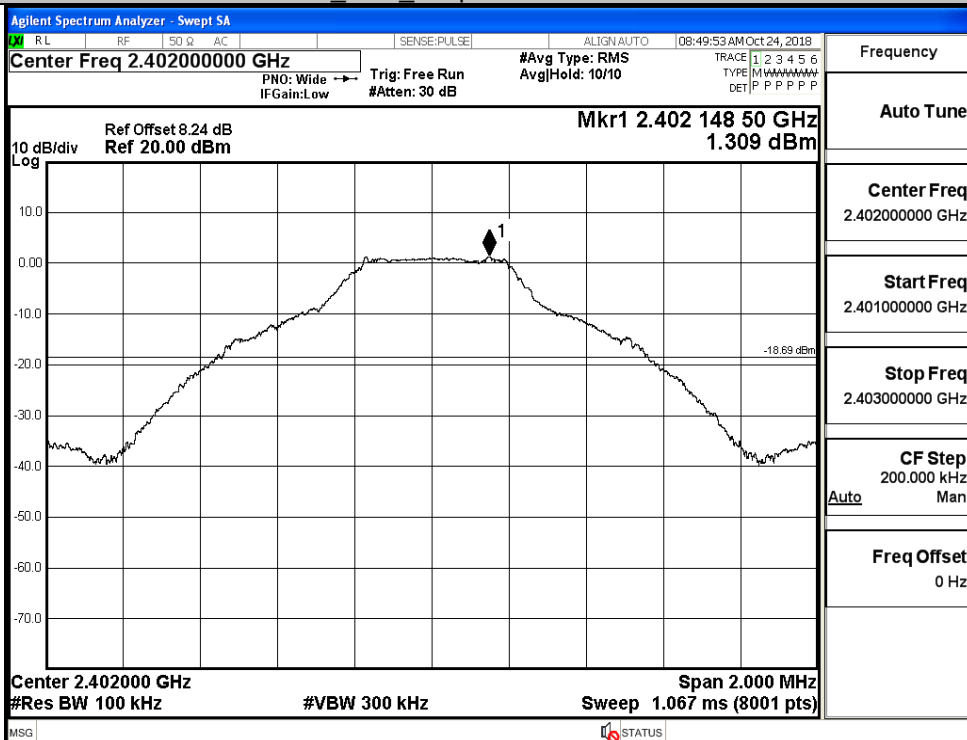
Freq Offset 0 Hz

A.6 RF Conducted Spurious Emissions

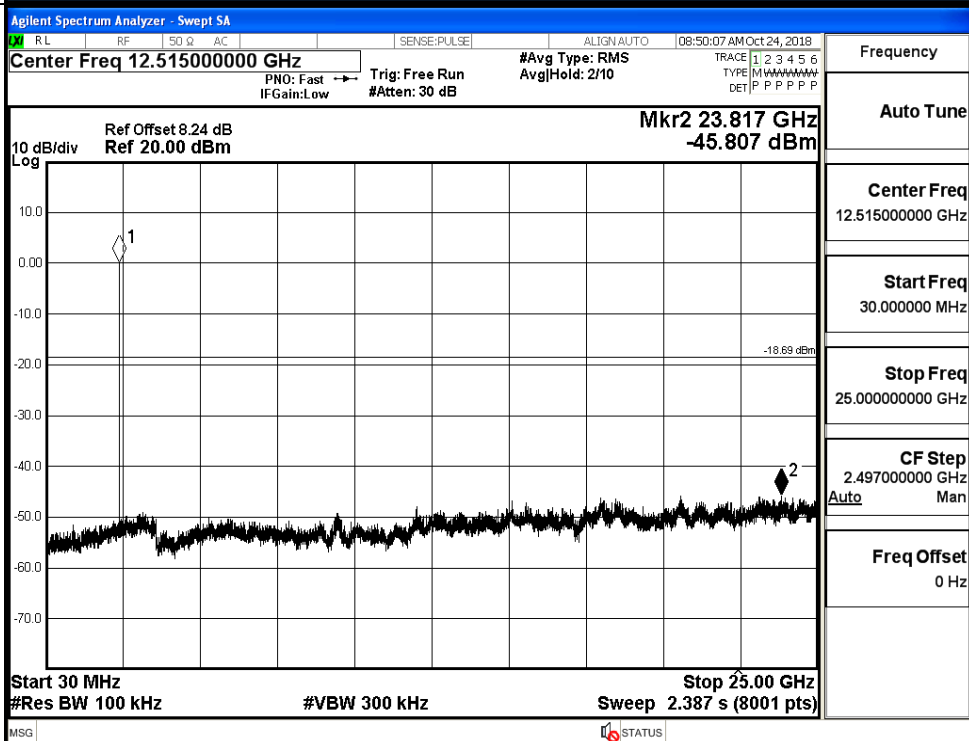
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.309	-45.807	-18.691	PASS
	MCH	0.806	-44.735	-19.194	PASS
	HCH	1.414	-44.975	-18.586	PASS
$\pi/4$ DQPSK	LCH	0.107	-44.679	-19.893	PASS
	MCH	0.061	-44.602	-19.939	PASS
	HCH	0.415	-44.025	-19.585	PASS

GFSK LCH Graphs

Pref

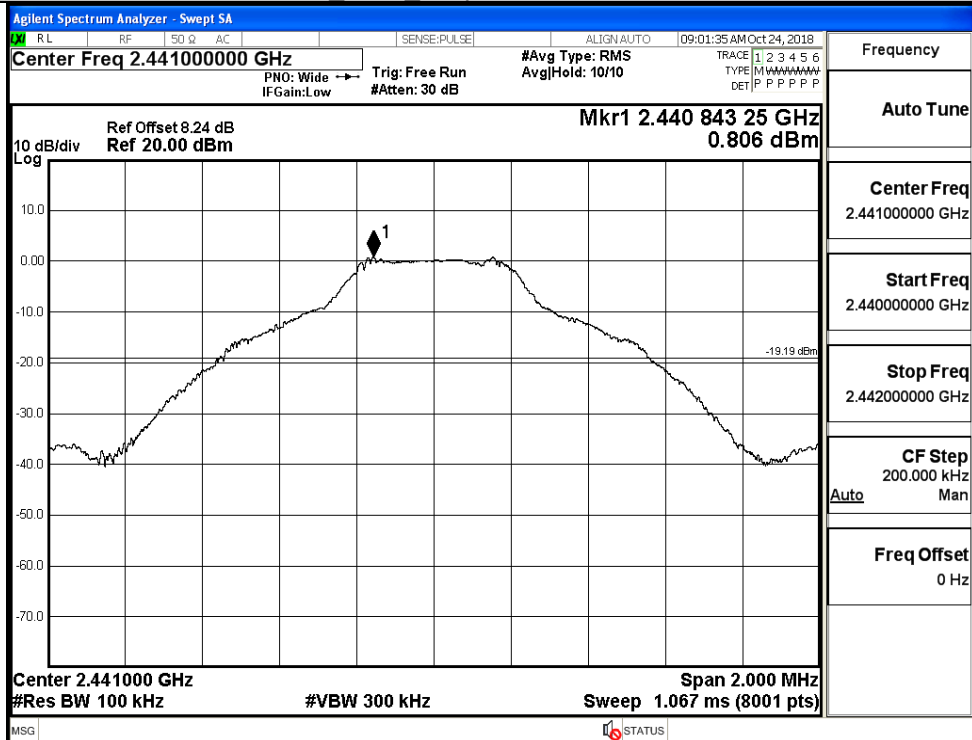


Puw

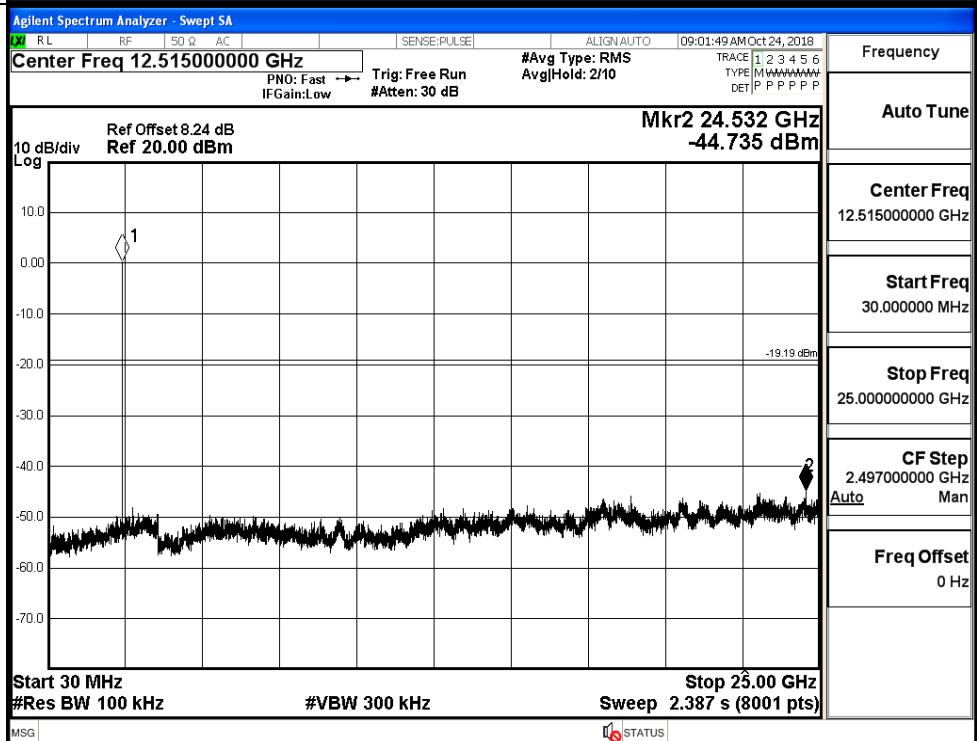


GFSK_MCH_Graphs

Pref

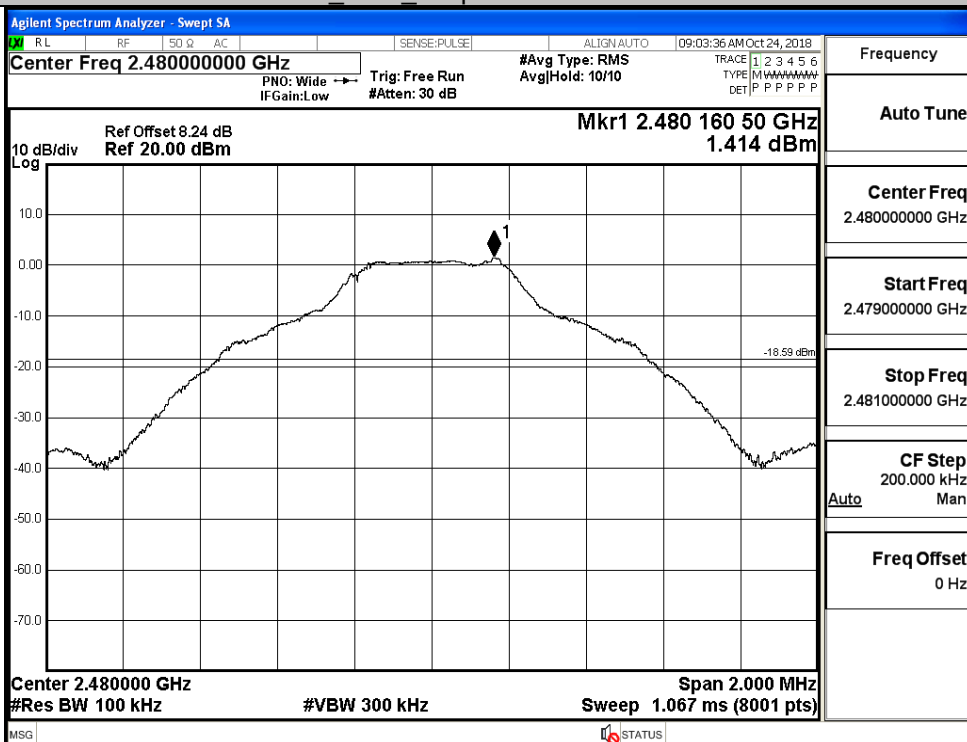


Puw

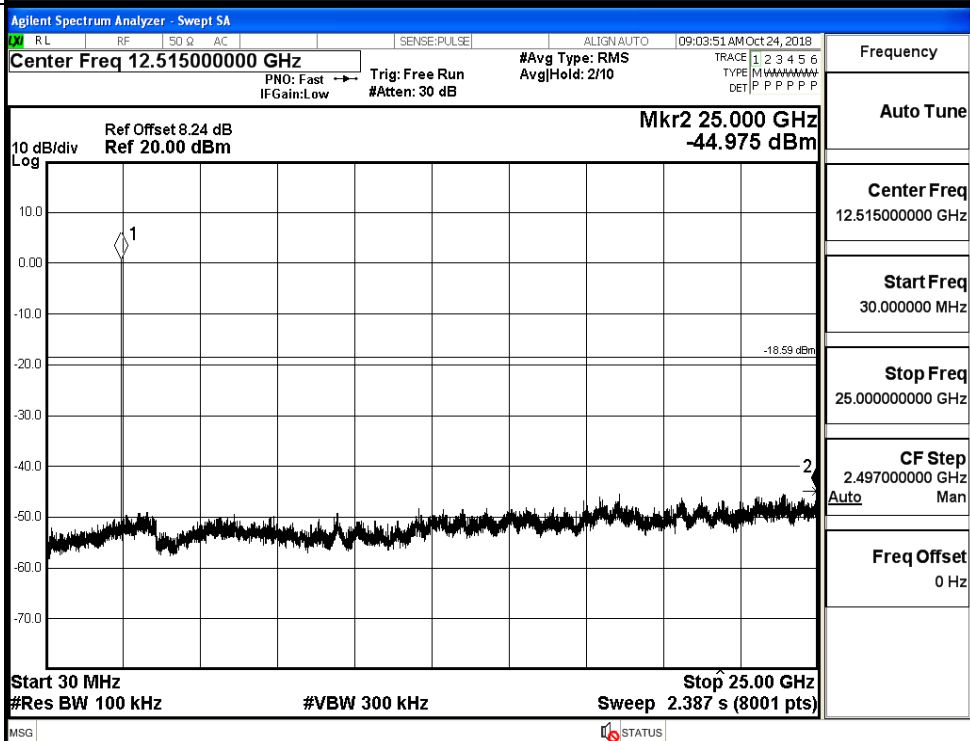


GFSK_HCH_Graphs

Pref

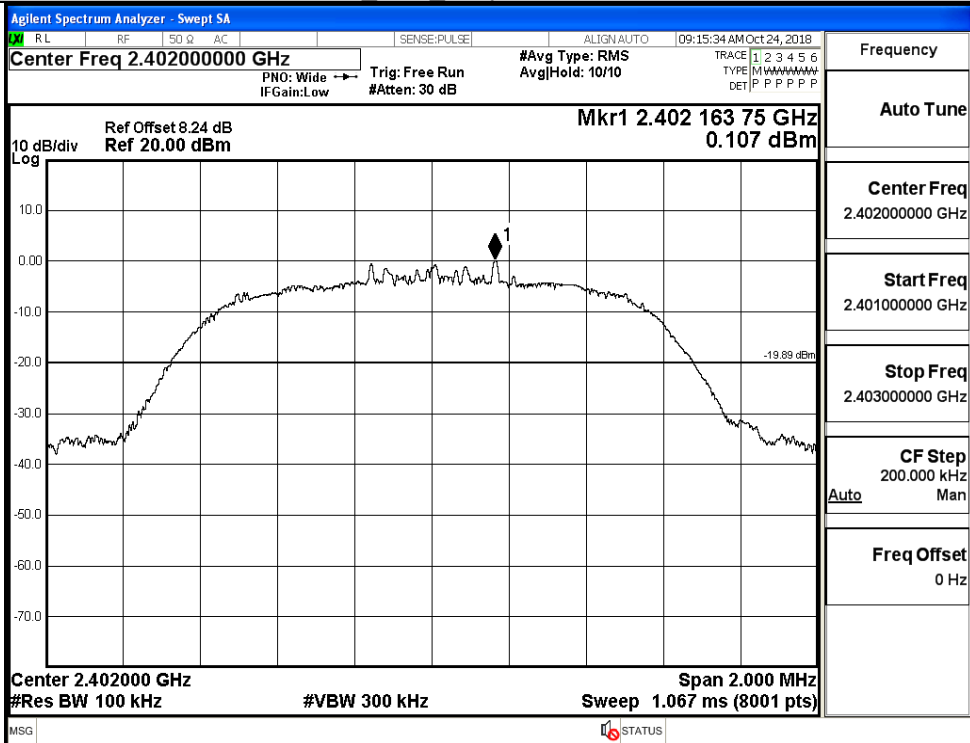


Puw

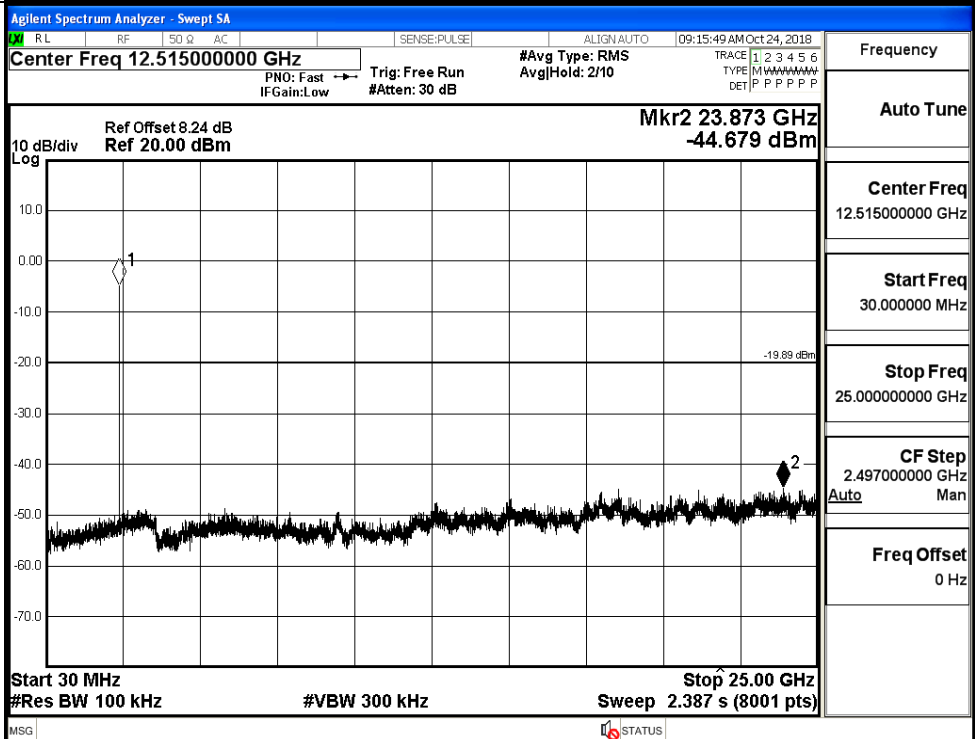


π /4DQPSK LCH_Graphs

Pref

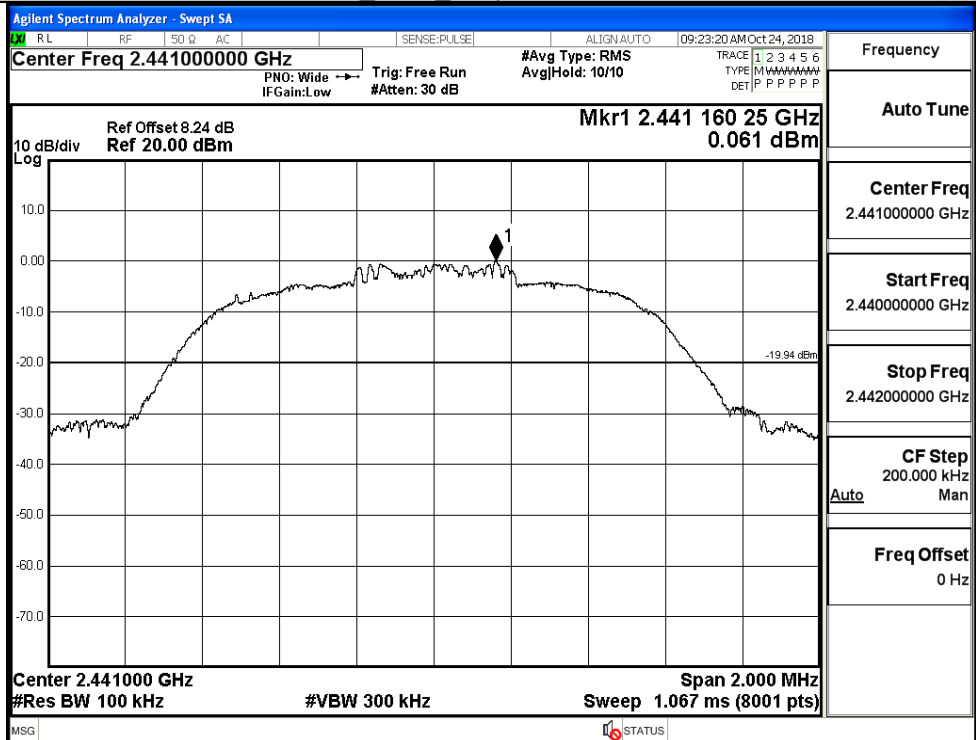


Puw

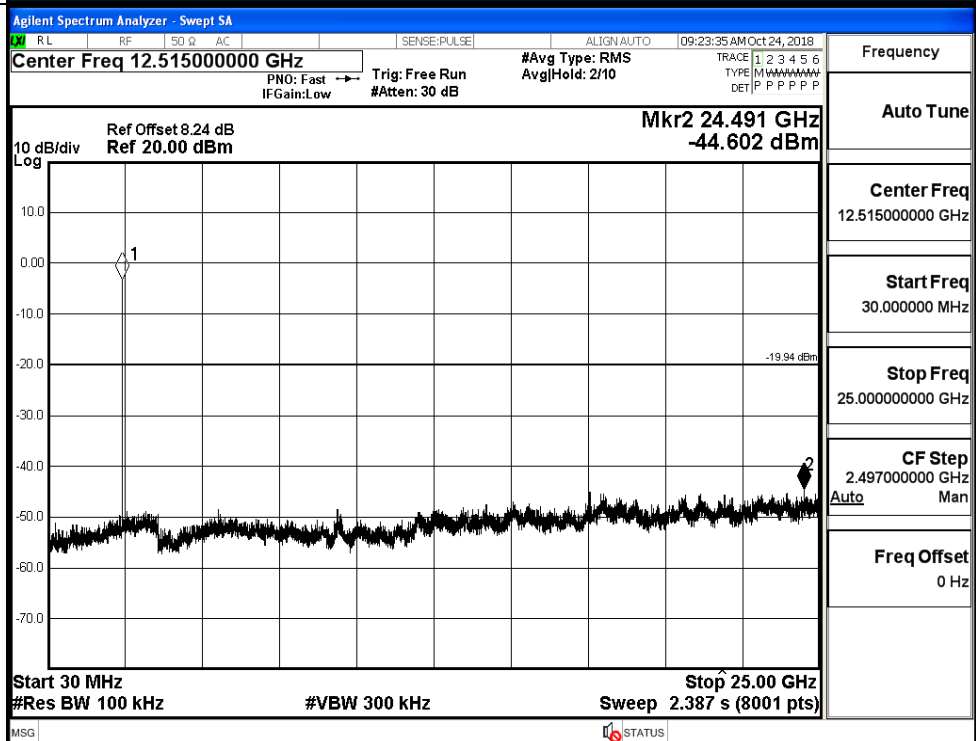


π /4DQPSK_MCH_Graphs

Pref

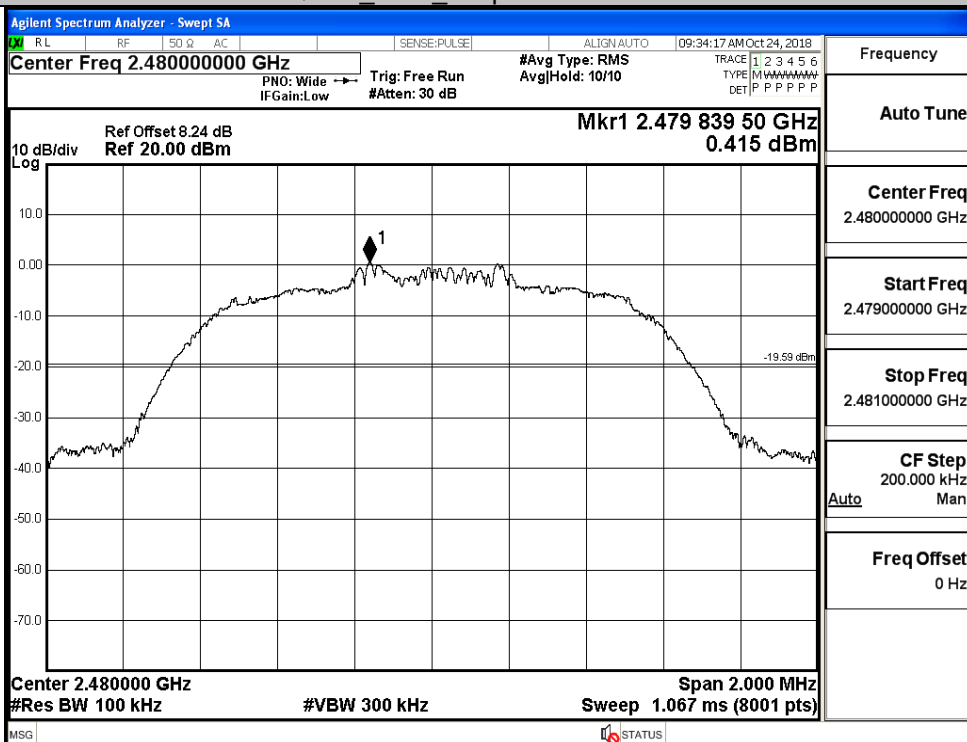


Puw

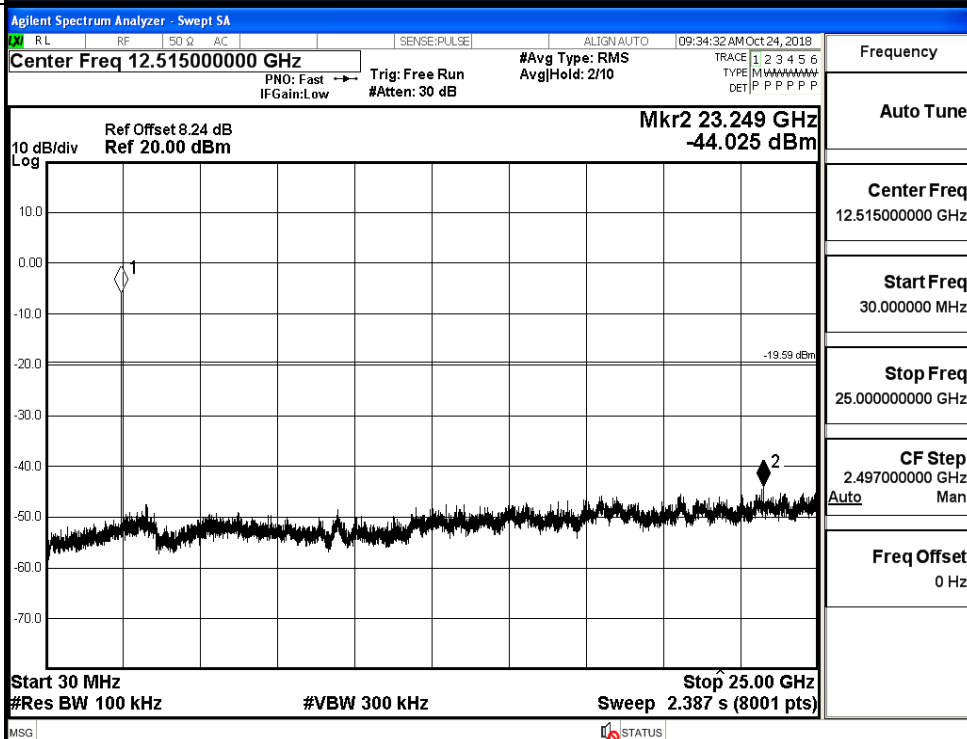


π /4DQPSK_HCH_Graphs

Pref



Puw

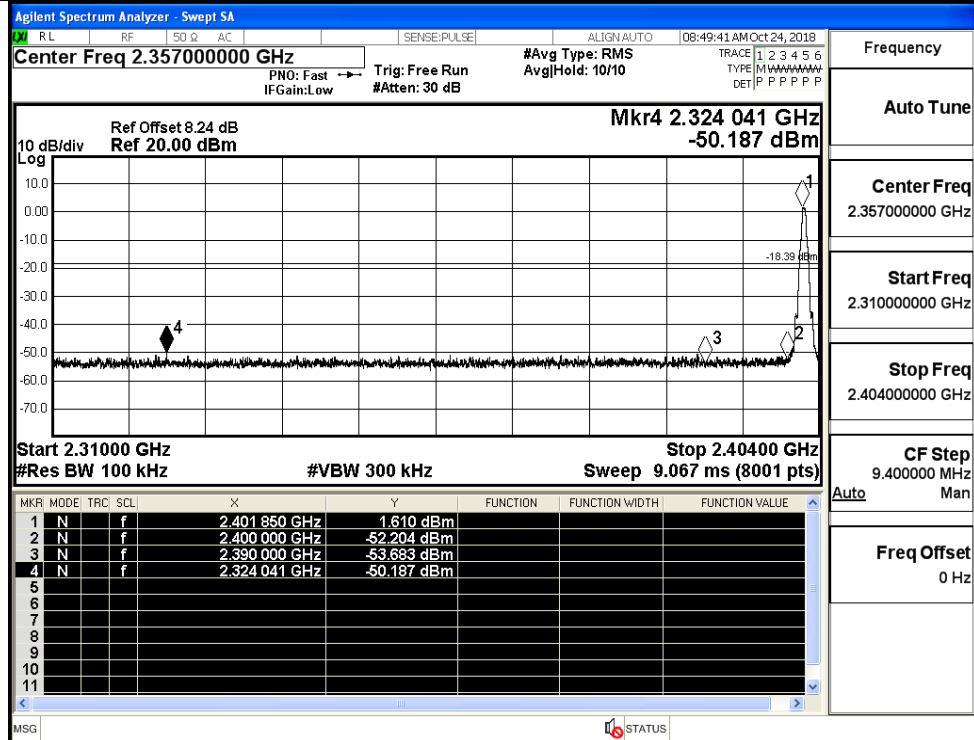


A.7 Band-edge for RF Conducted Emissions

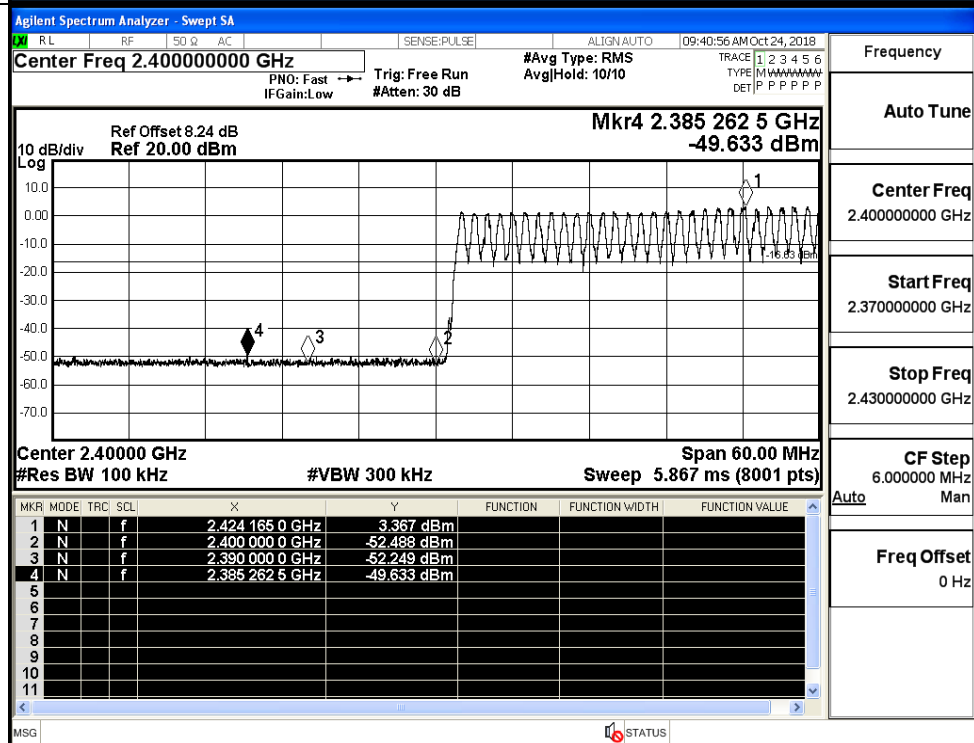
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.610	Off	-50.187	-18.39	PASS
			3.367	On	-49.633	-16.63	PASS
	HCH	2480	1.274	Off	-50.584	-18.73	PASS
			3.086	On	-49.804	-16.91	PASS
$\pi/4$ DQPSK	LCH	2402	-0.049	Off	-49.944	-20.05	PASS
			1.955	On	-49.428	-18.05	PASS
	HCH	2480	0.295	Off	-49.435	-19.71	PASS
			0.576	On	-48.511	-19.42	PASS

Test Graphs

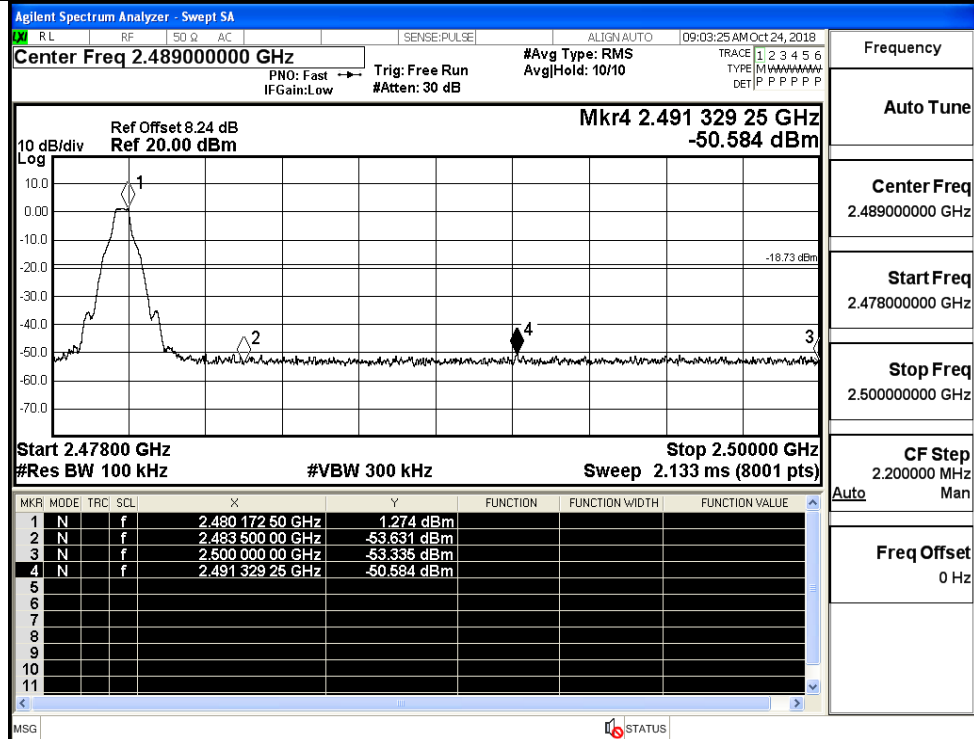
GFSK/LCH/No Hop



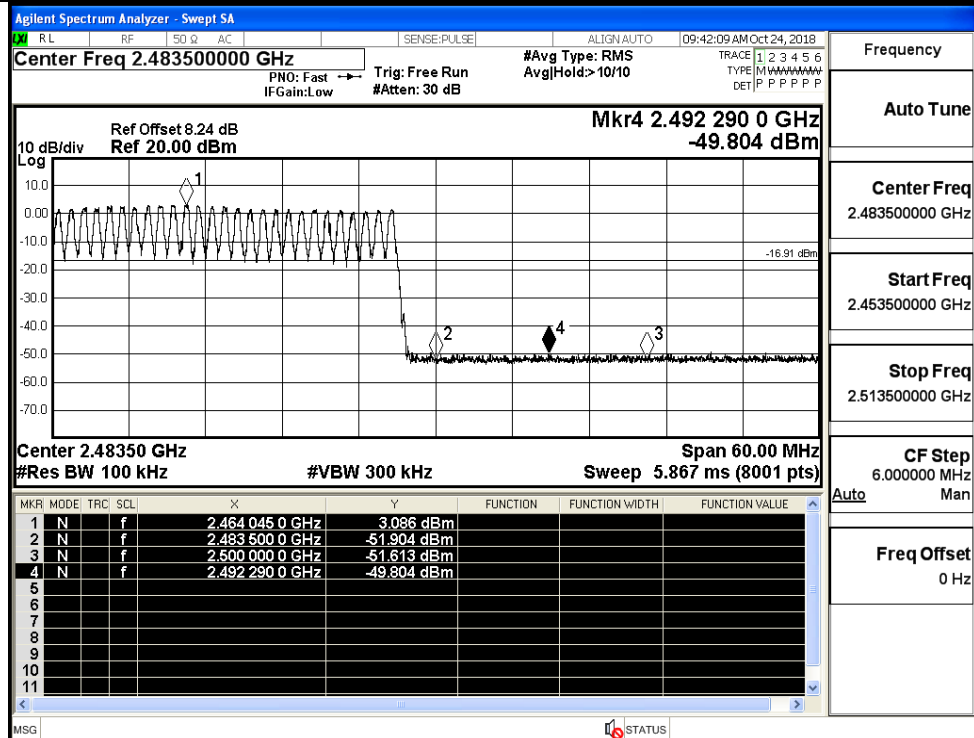
GFSK/LCH/Hop



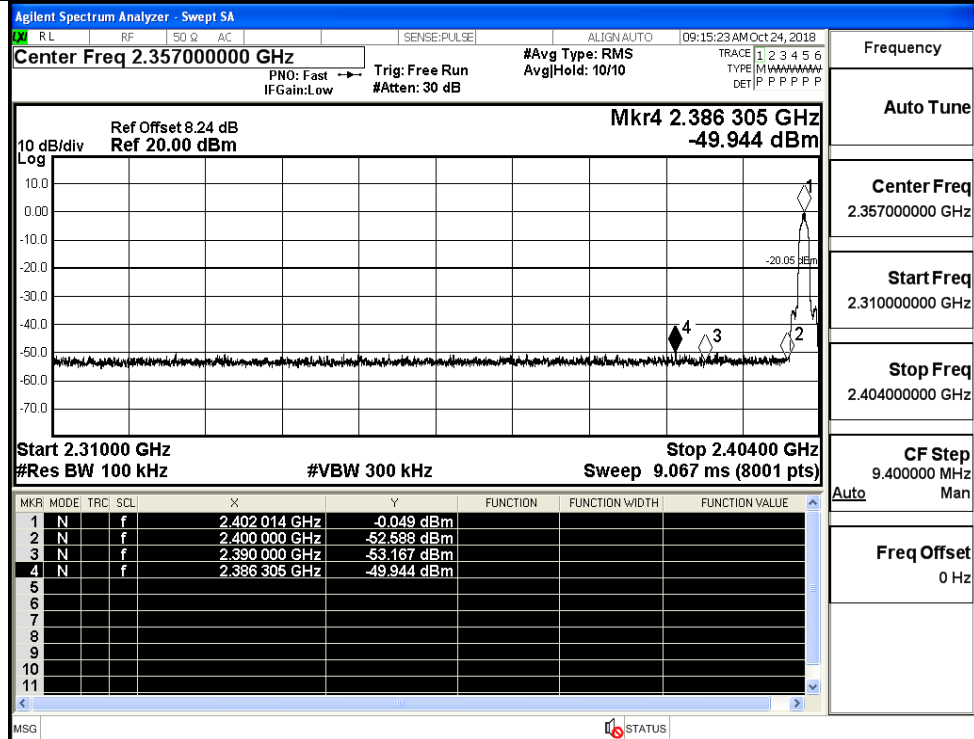
GFSK/HCH/No Hop



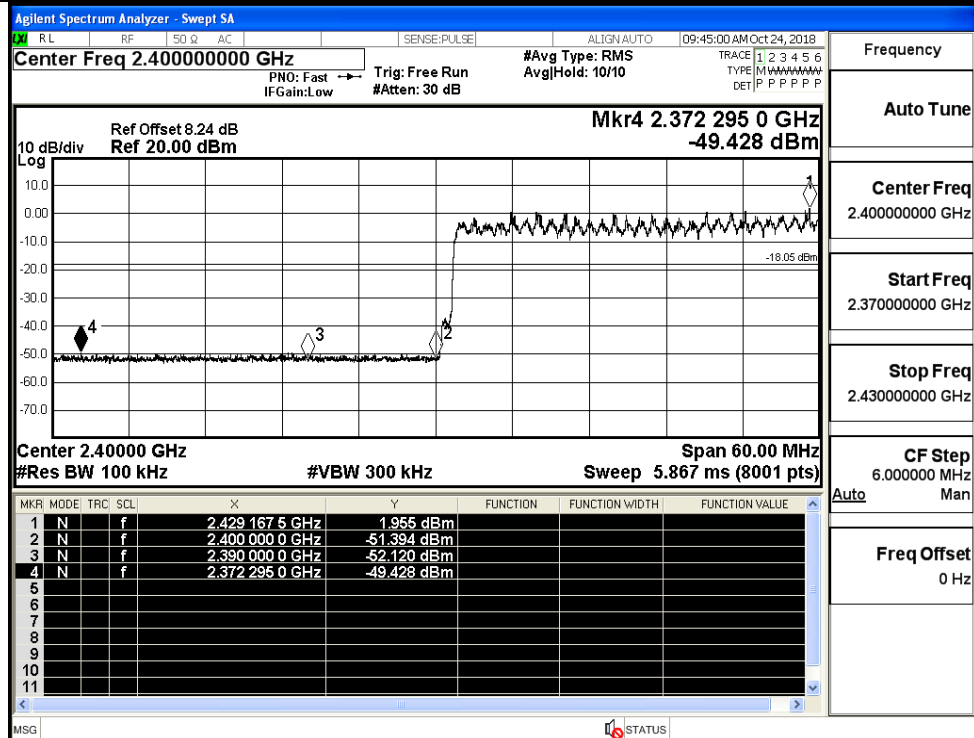
GFSK/HCH/Hop



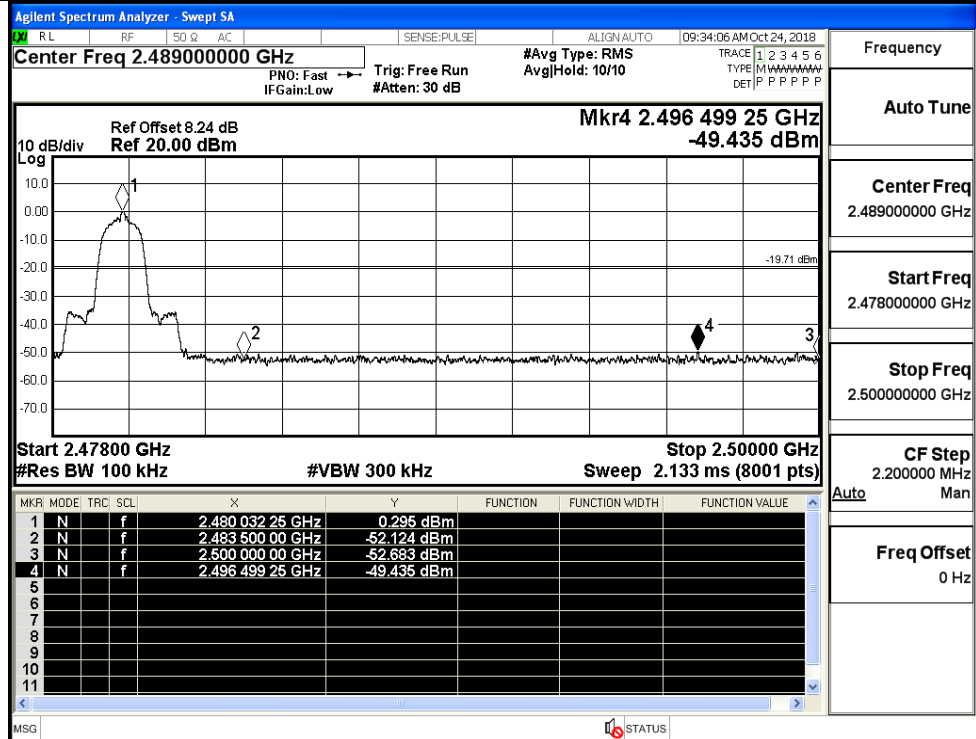
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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

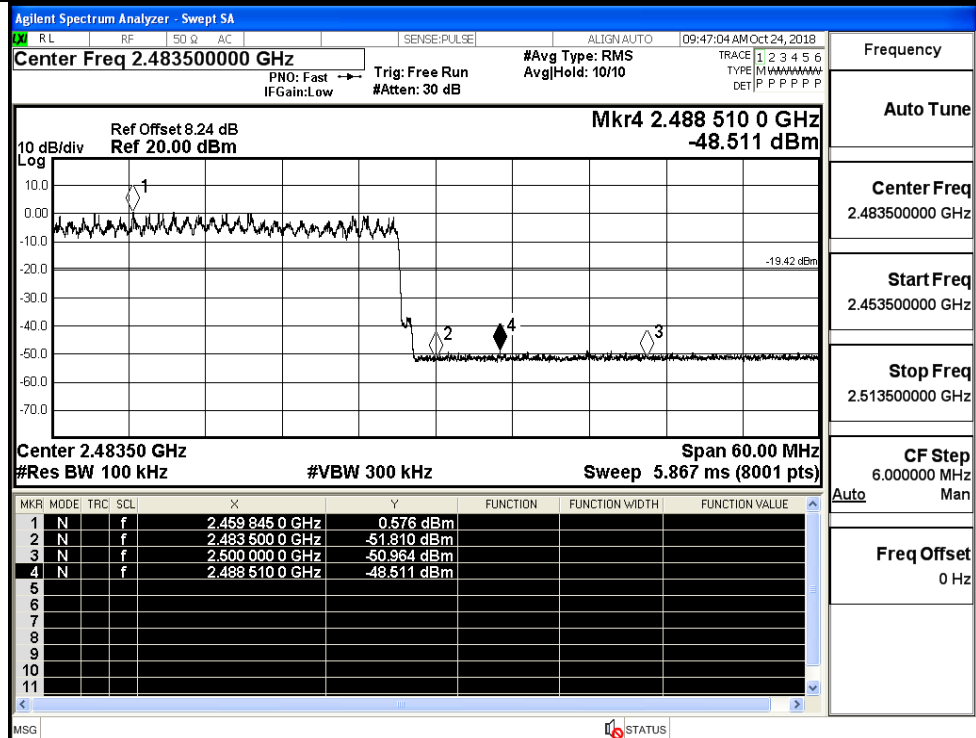


Frequency

Auto Tune

Center Freq
2.489000000 GHzStart Freq
2.478000000 GHzStop Freq
2.500000000 GHzCF Step
2.200000 MHz
Auto ManFreq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

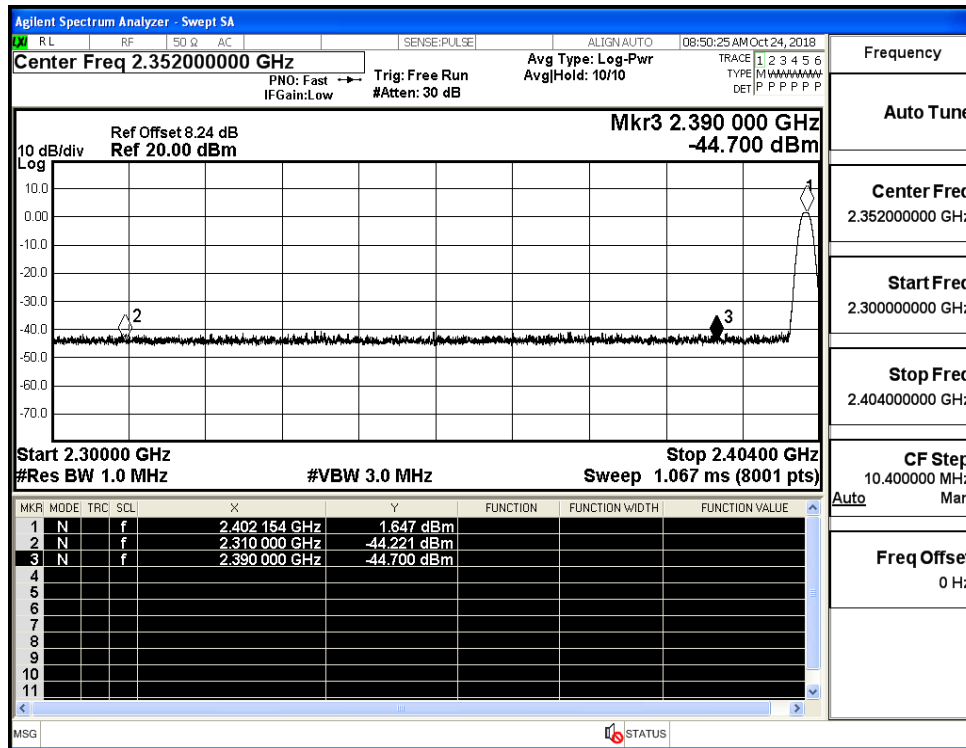
Auto Tune

Center Freq
2.483500000 GHzStart Freq
2.453500000 GHzStop Freq
2.513500000 GHzCF Step
6.000000 MHz
Auto ManFreq Offset
0 Hz

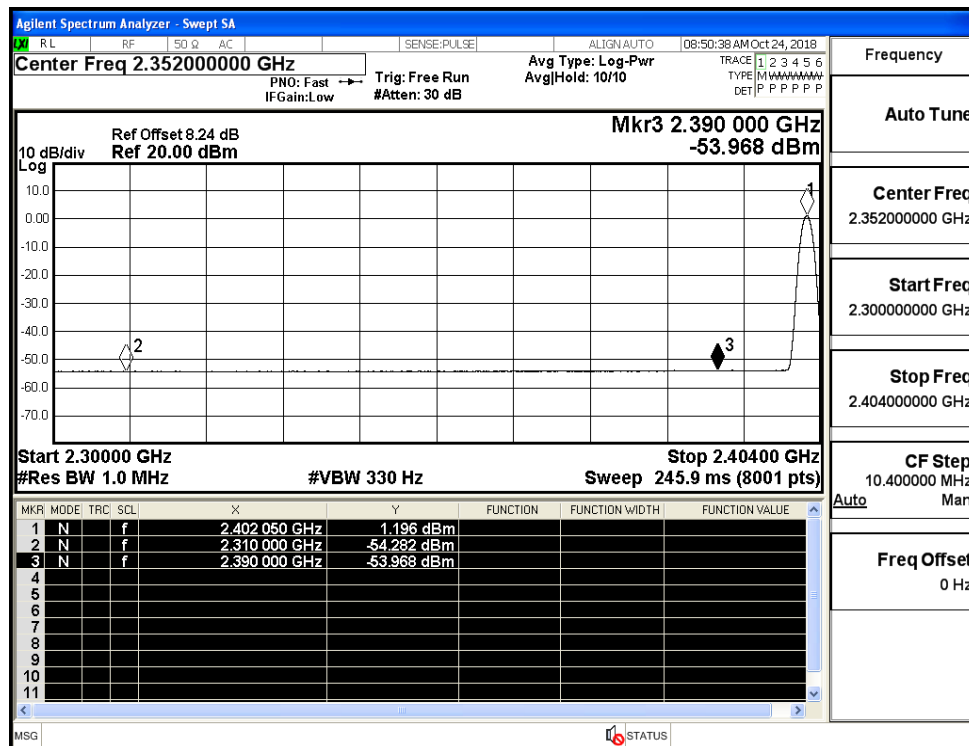
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.22	2.0	0	51.04	PEAK	74	PASS
	Off	2310.0	-54.28	2.0	0	40.98	AV	54	PASS
	Off	2390.0	-44.70	2.0	0	50.56	PEAK	74	PASS
	Off	2390.0	-53.97	2.0	0	41.29	AV	54	PASS
	Off	2483.5	-42.17	2.0	0	53.09	PEAK	74	PASS
	Off	2483.5	-53.60	2.0	0	41.66	AV	54	PASS
	Off	2500.0	-41.41	2.0	0	53.85	PEAK	74	PASS
	Off	2500.0	-53.52	2.0	0	41.74	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.60	2.0	0	51.66	PEAK	74	PASS
	Off	2310.0	-53.73	2.0	0	41.53	AV	54	PASS
	Off	2390.0	-43.44	2.0	0	51.82	PEAK	74	PASS
	Off	2390.0	-53.58	2.0	0	41.67	AV	54	PASS
	Off	2483.5	-43.25	2.0	0	52.01	PEAK	74	PASS
	Off	2483.5	-53.00	2.0	0	42.26	AV	54	PASS
	Off	2500.0	-44.78	2.0	0	50.47	PEAK	74	PASS
	Off	2500.0	-52.98	2.0	0	42.28	AV	54	PASS

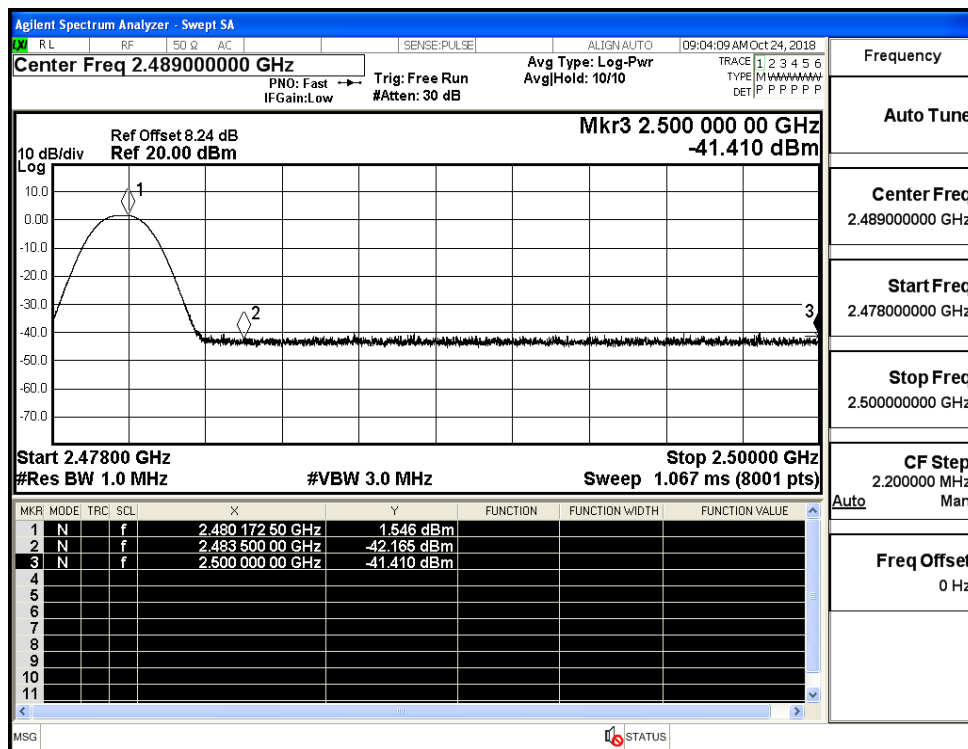
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



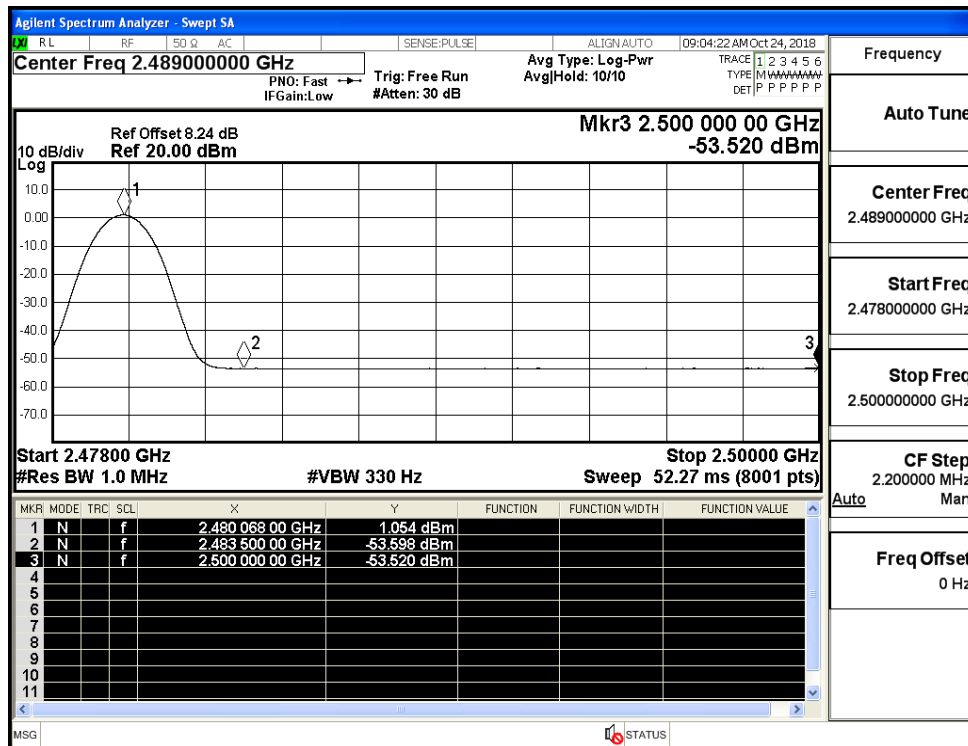
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

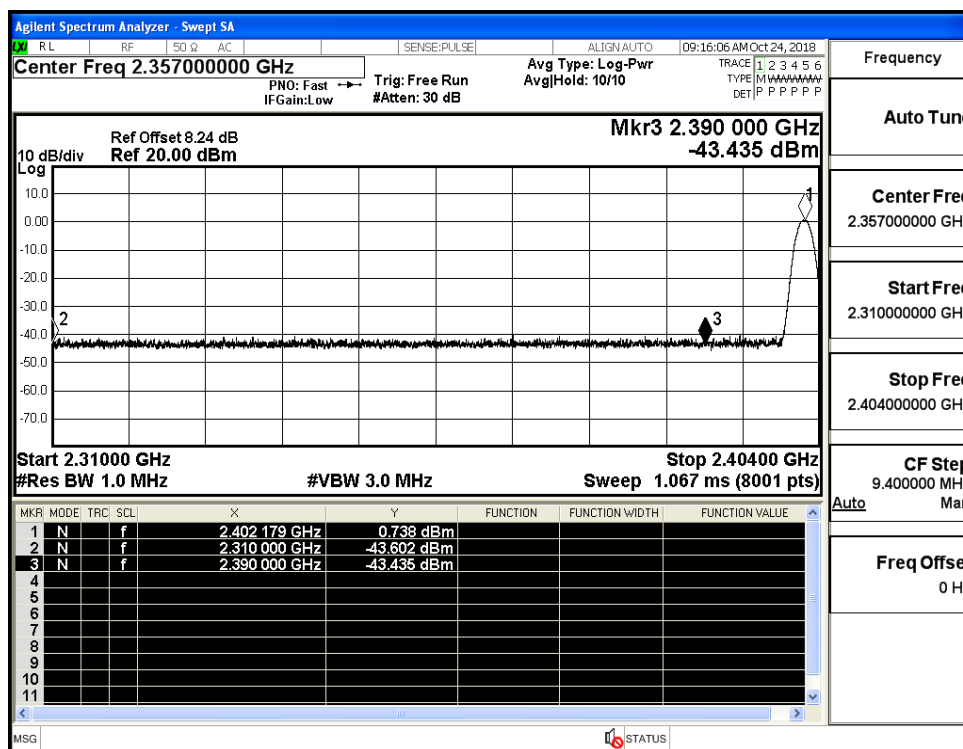
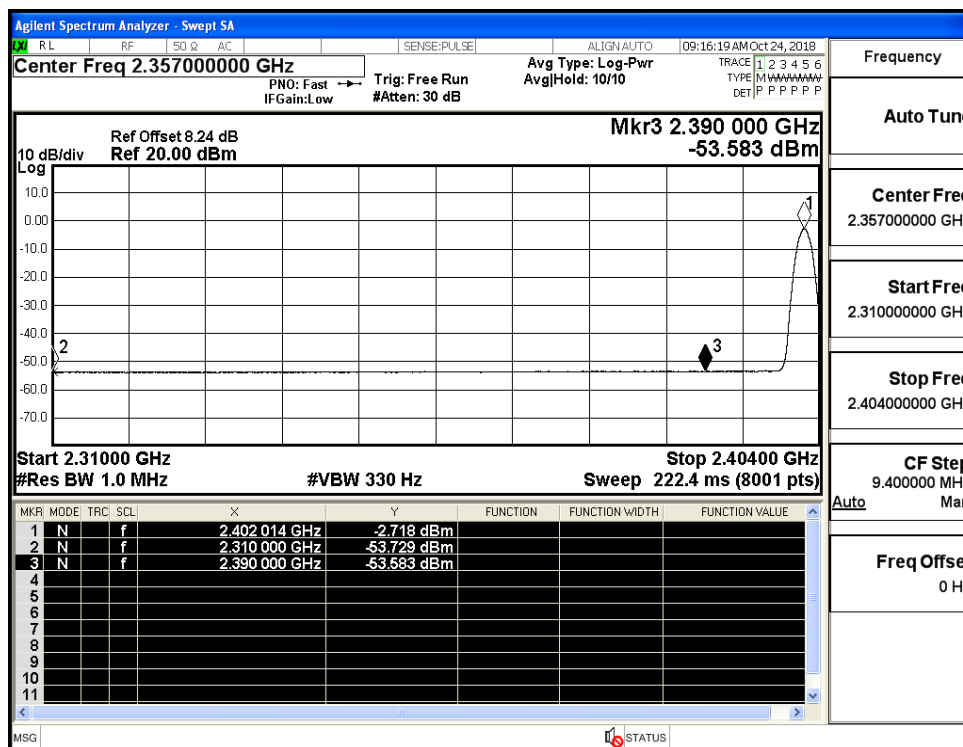


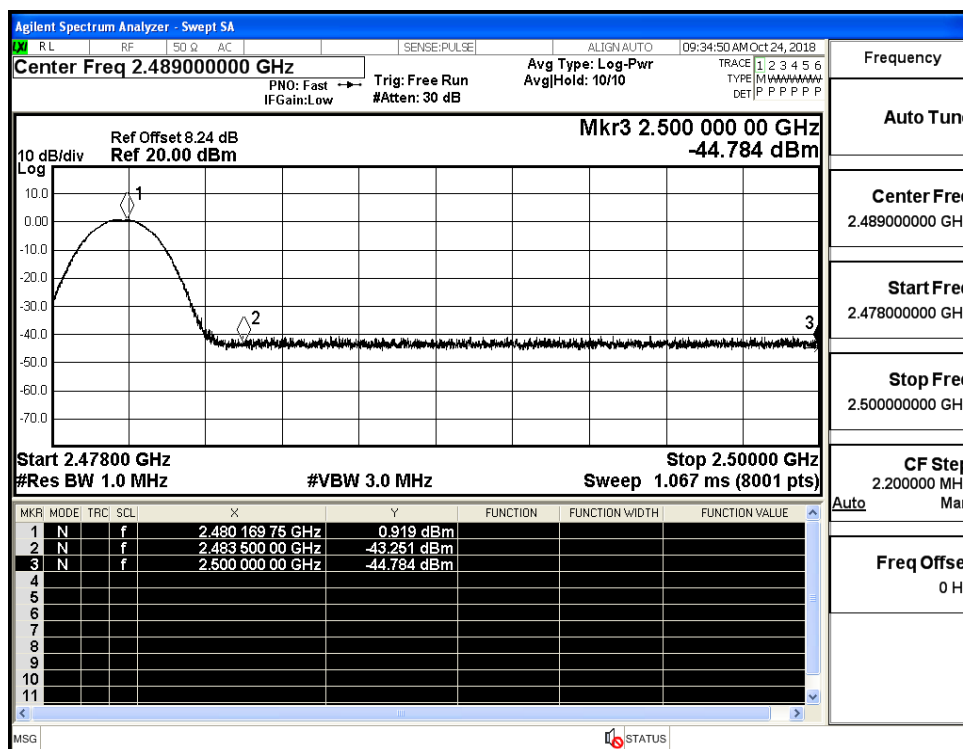
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



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)