

## Appendix A

### RF Test Data for BT V4.2(BDR/EDR) (Conducted Measurement)

Product Name: BLUETOOTH SPEAKER

Trade Mark: ALTEC

Test Model: ALP-XP400

#### Environmental Conditions

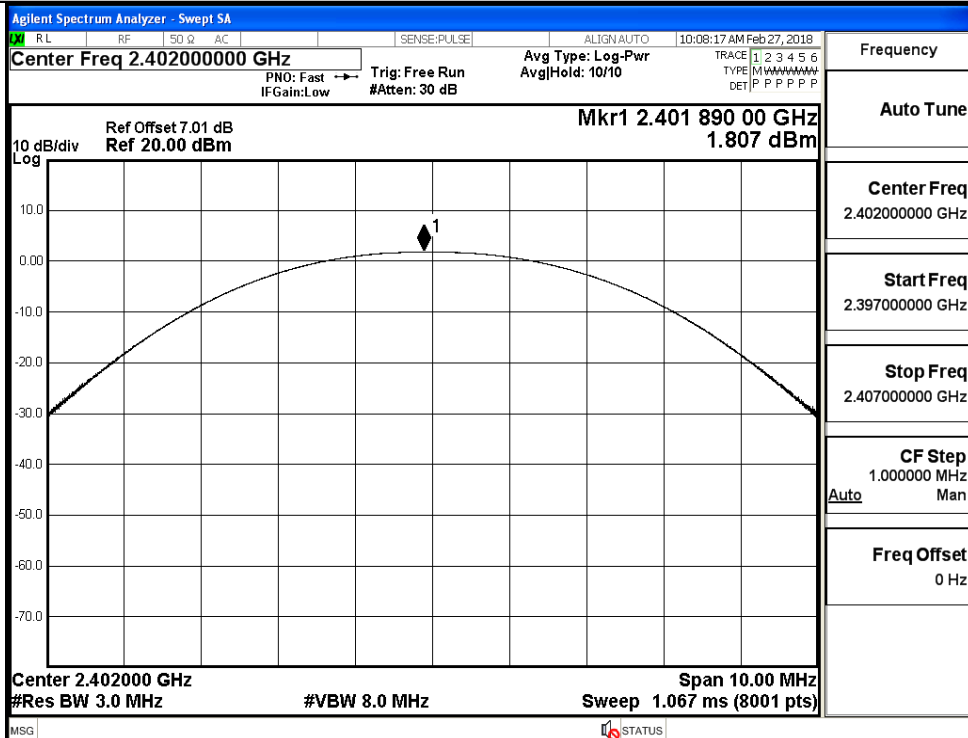
Temperature:	20.8 ° C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Tom Liu
Supervised by:	Jayden Zhuo

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

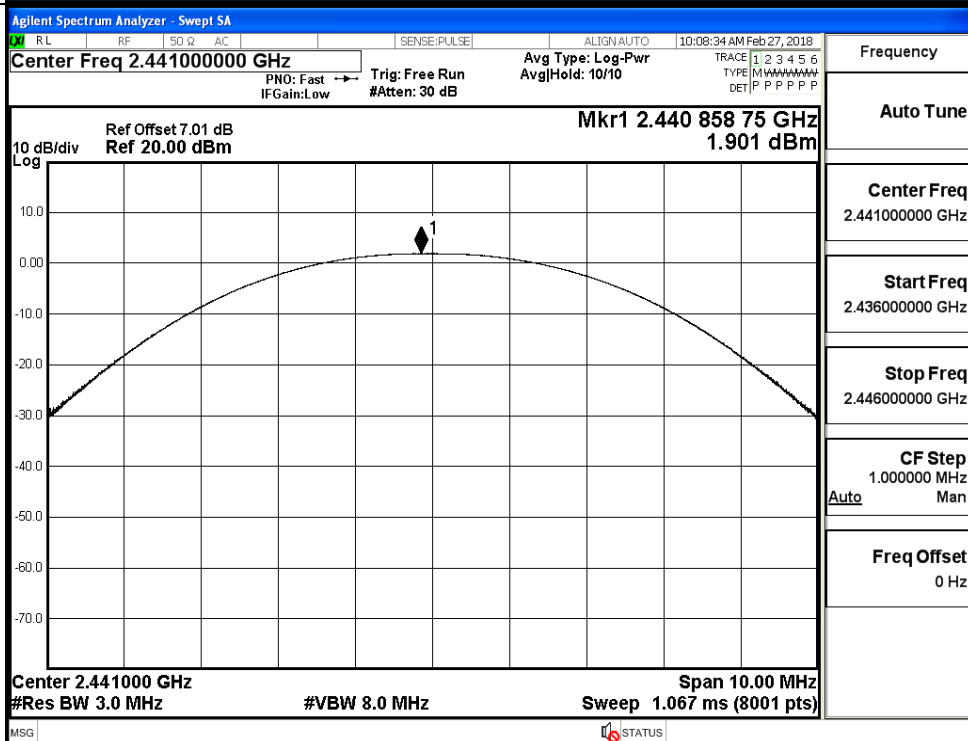
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.807	30	PASS
	MCH	1.901	30	PASS
	HCH	1.879	30	PASS
$\pi/4$ DQPSK	LCH	1.628	21	PASS
	MCH	1.754	21	PASS
	HCH	1.740	21	PASS
8DPSK	LCH	1.854	21	PASS
	MCH	1.971	21	PASS
	HCH	1.972	21	PASS

## Test Graphs

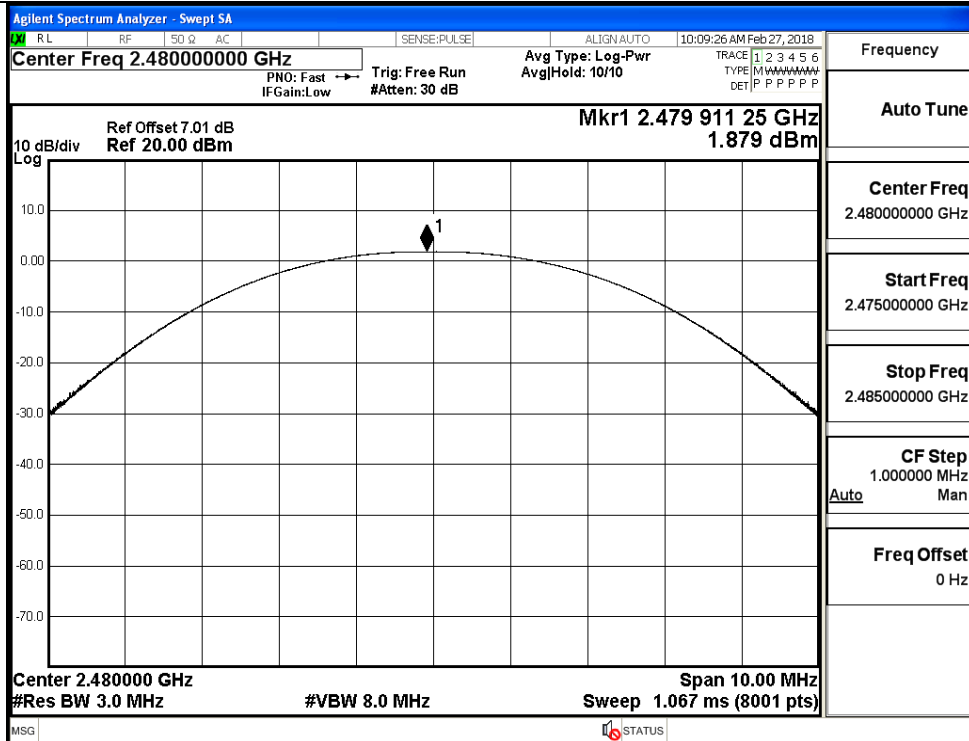
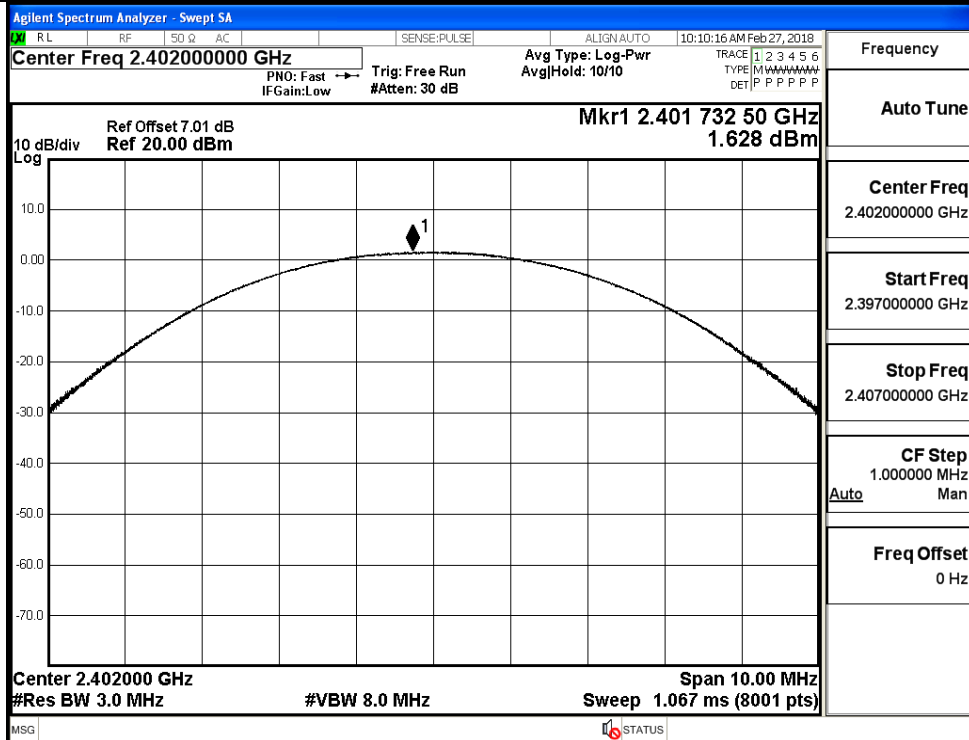
GFSK/LCH

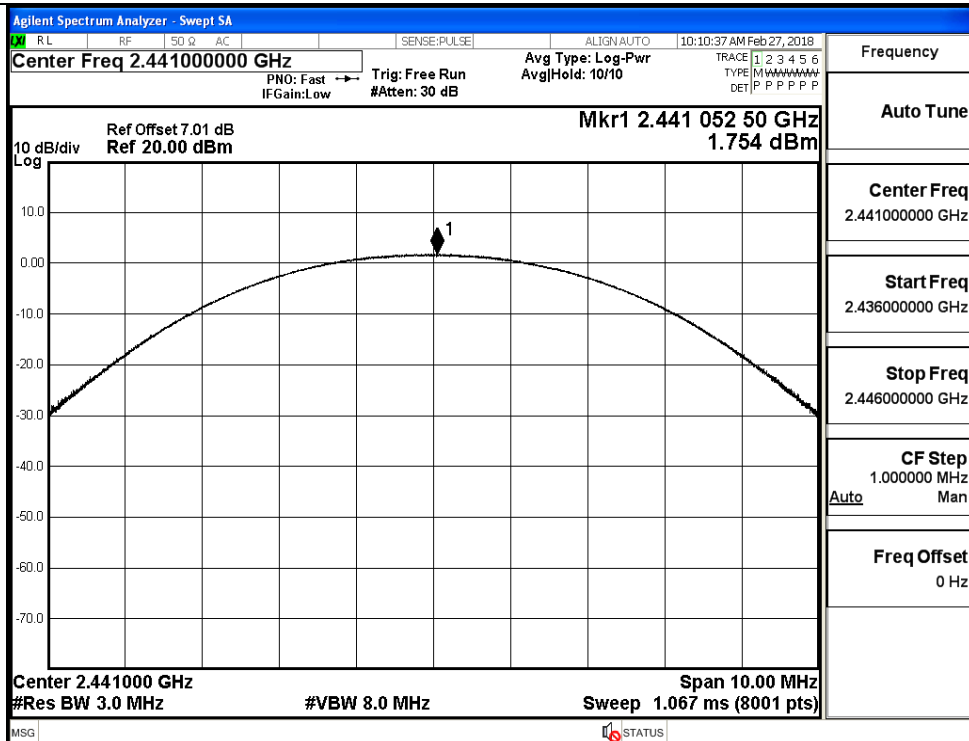
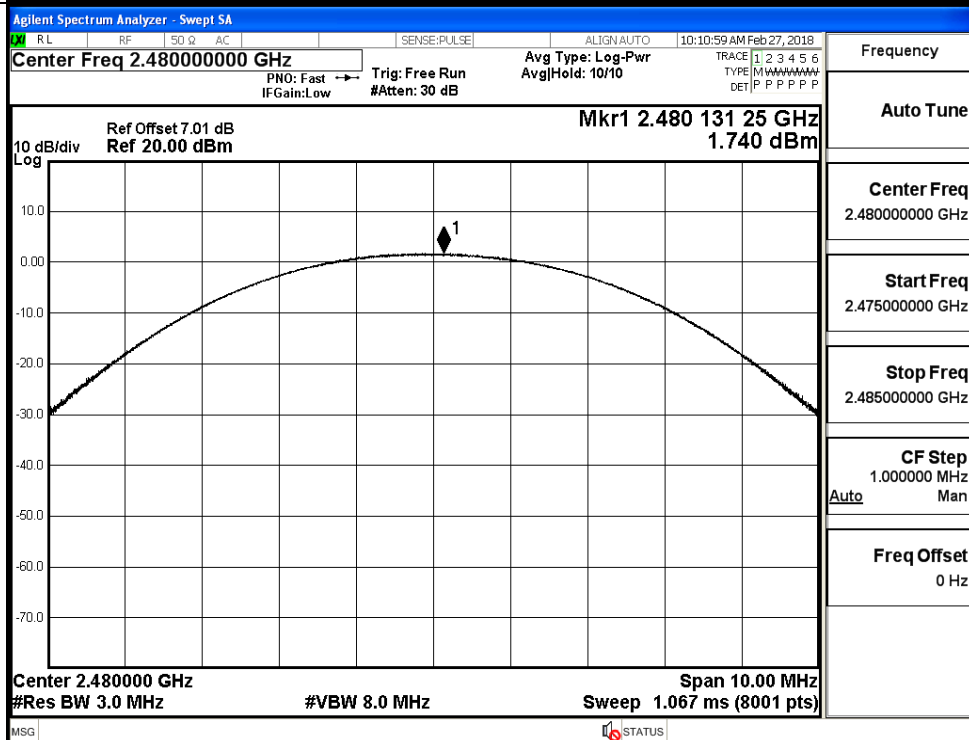


GFSK/MCH

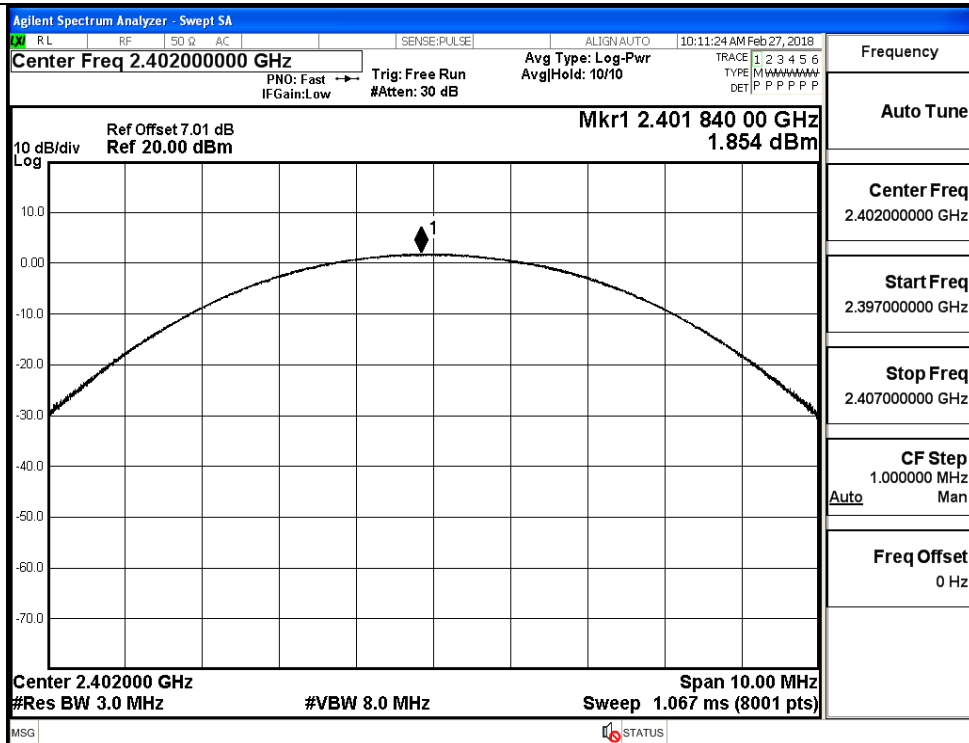


GFSK/HCH

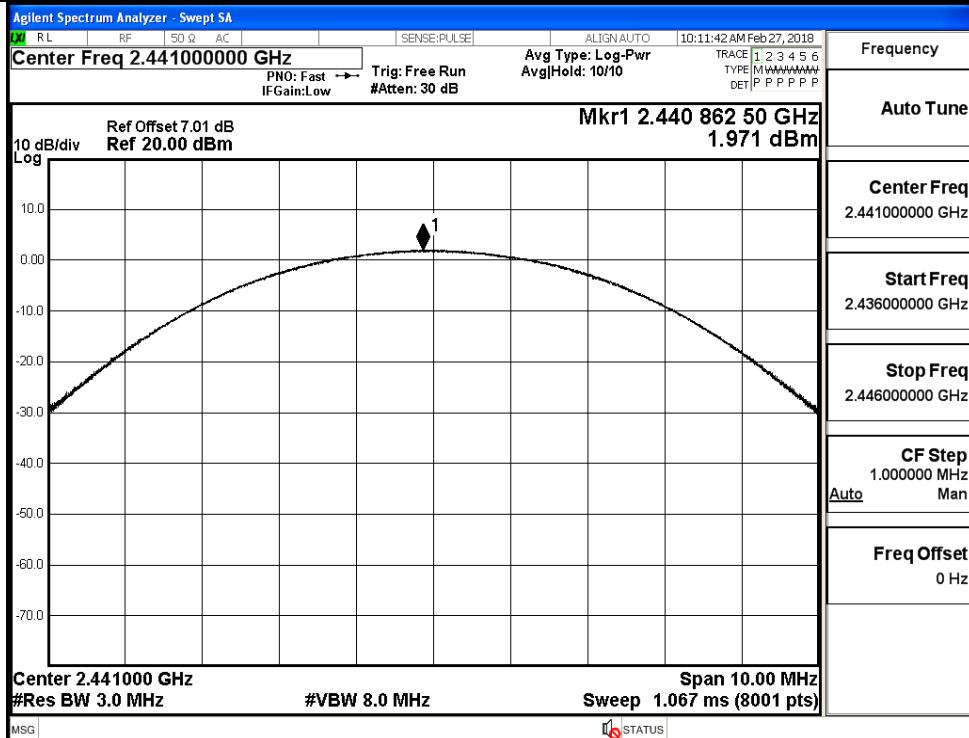
 $\pi/4$ DQPSK/LCH

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

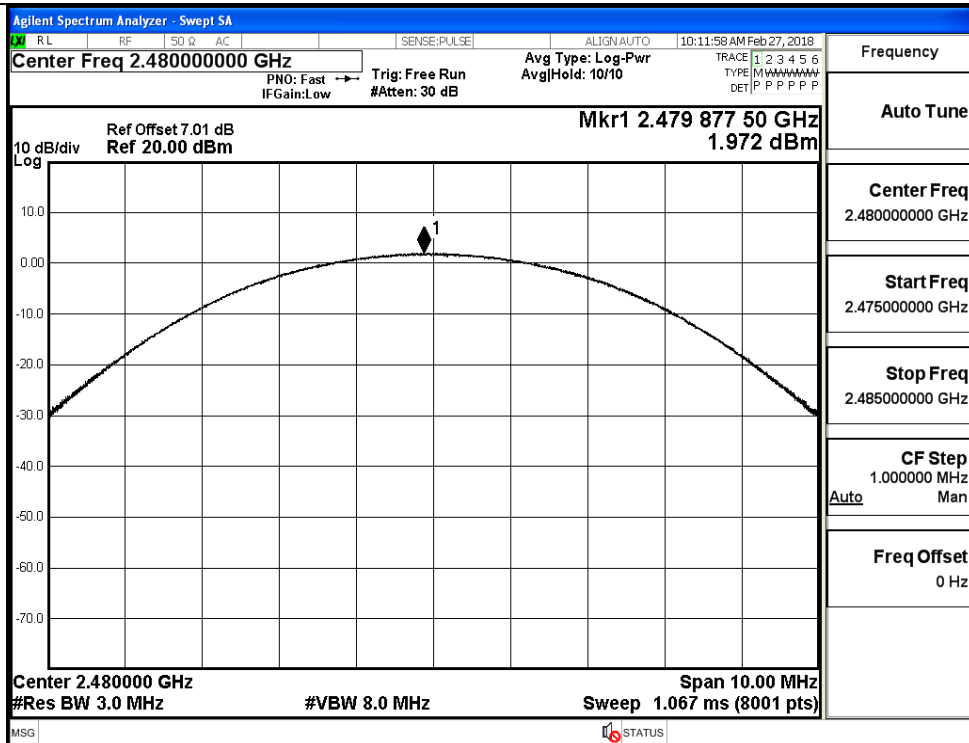
8DPSK/LCH



8DPSK/MCH



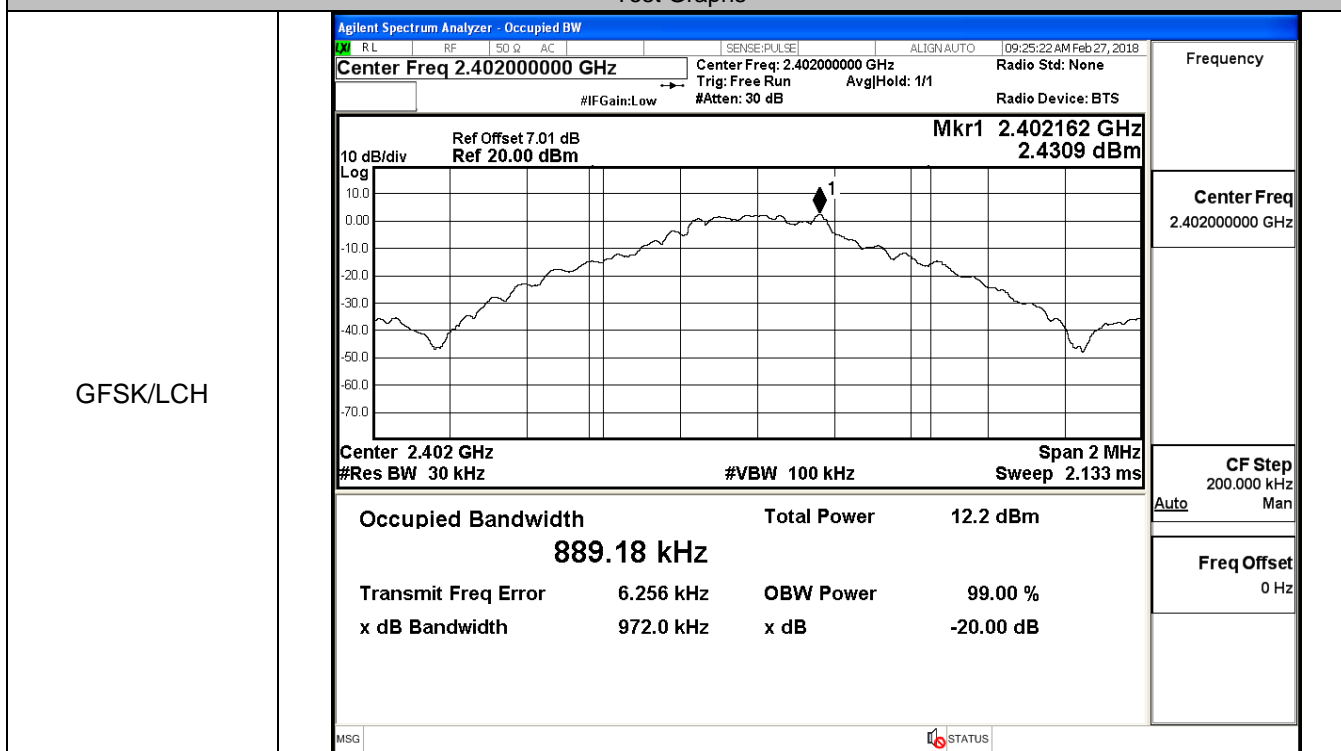
8DPSK/HCH



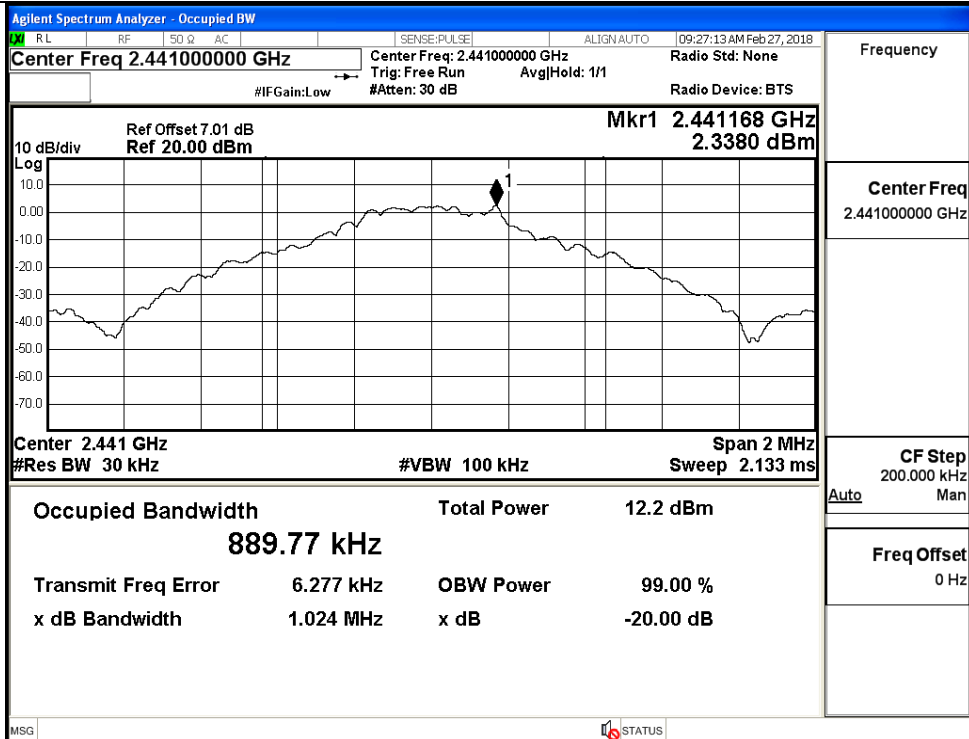
## A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9720	Not Specified	PASS
	MCH	1.024	Not Specified	PASS
	HCH	1.032	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.289	Not Specified	PASS
	MCH	1.293	Not Specified	PASS
	HCH	1.287	Not Specified	PASS
8DPSK	LCH	1.294	Not Specified	PASS
	MCH	1.292	Not Specified	PASS
	HCH	1.294	Not Specified	PASS

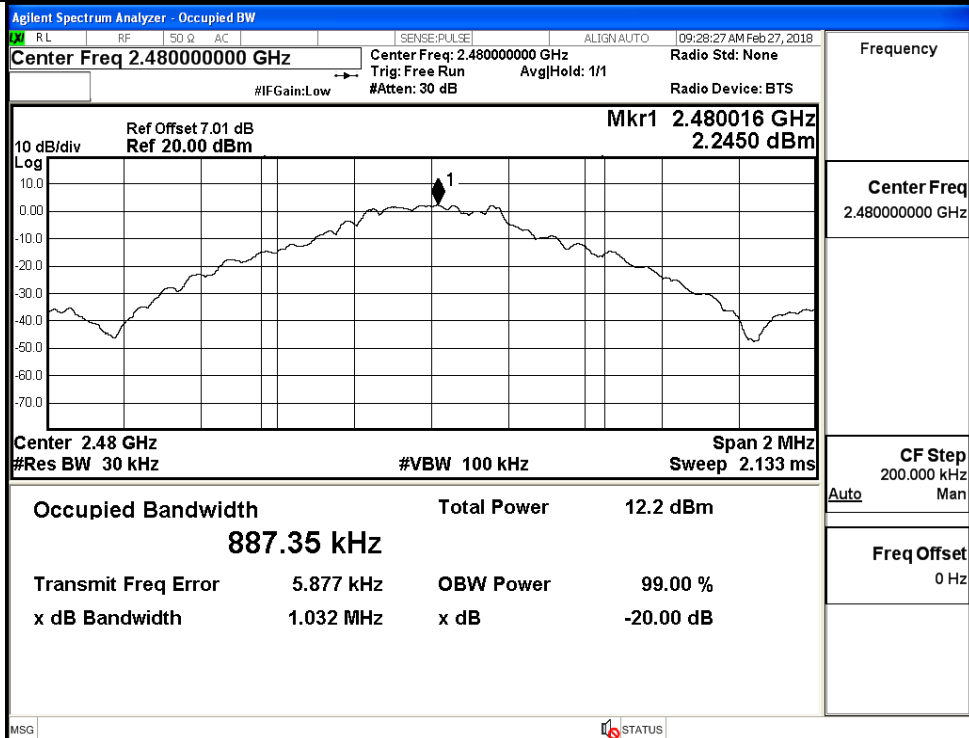
Test Graphs



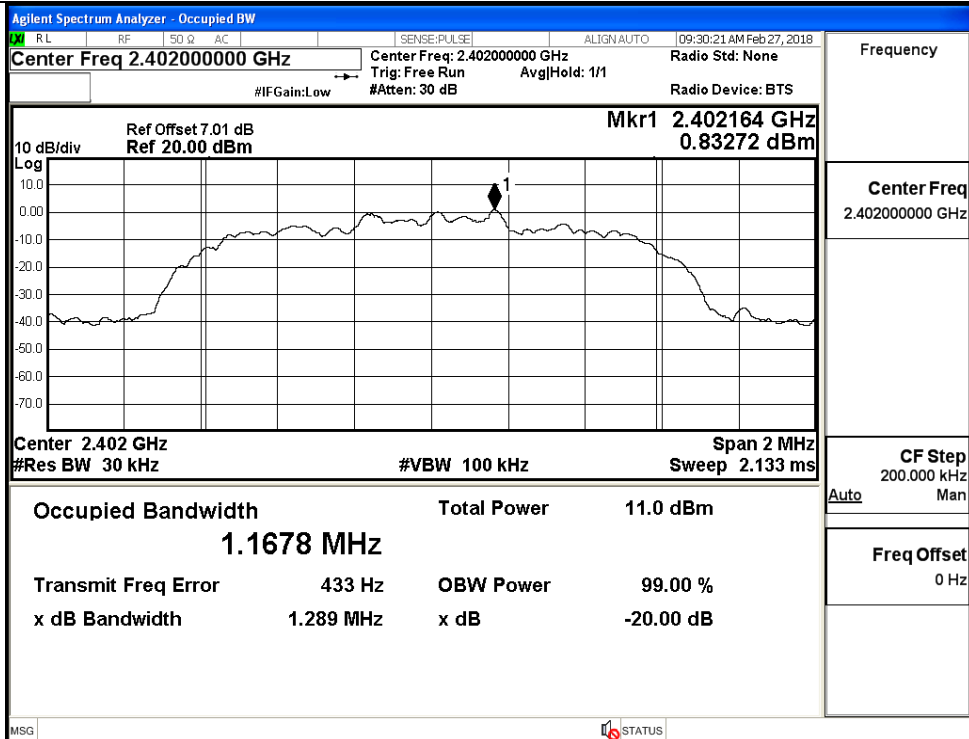
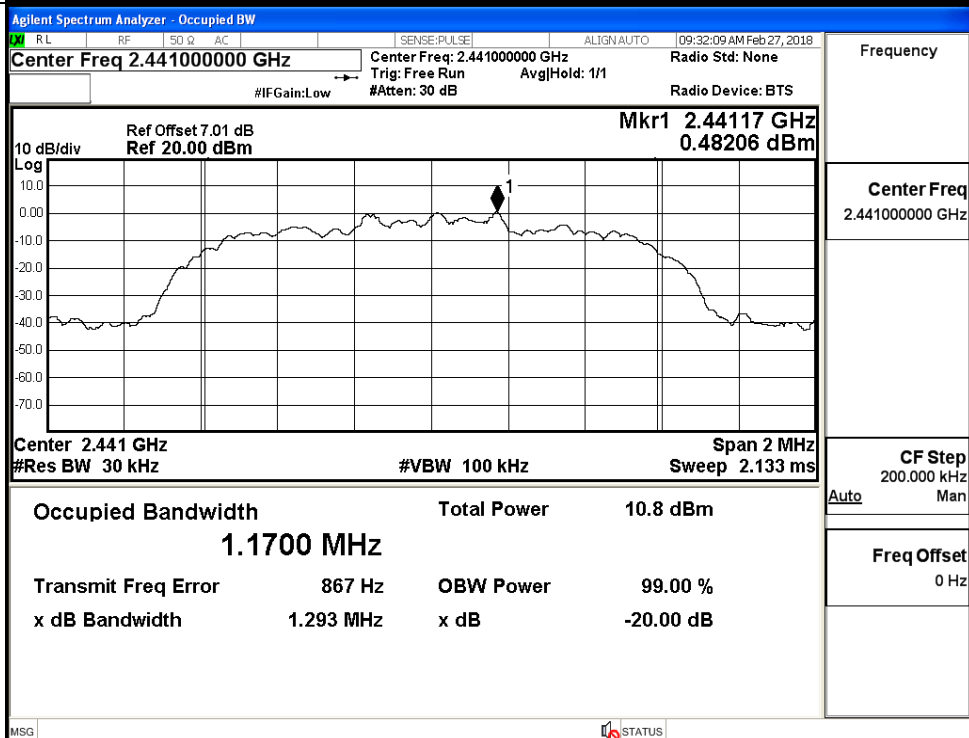
GFSK/MCH

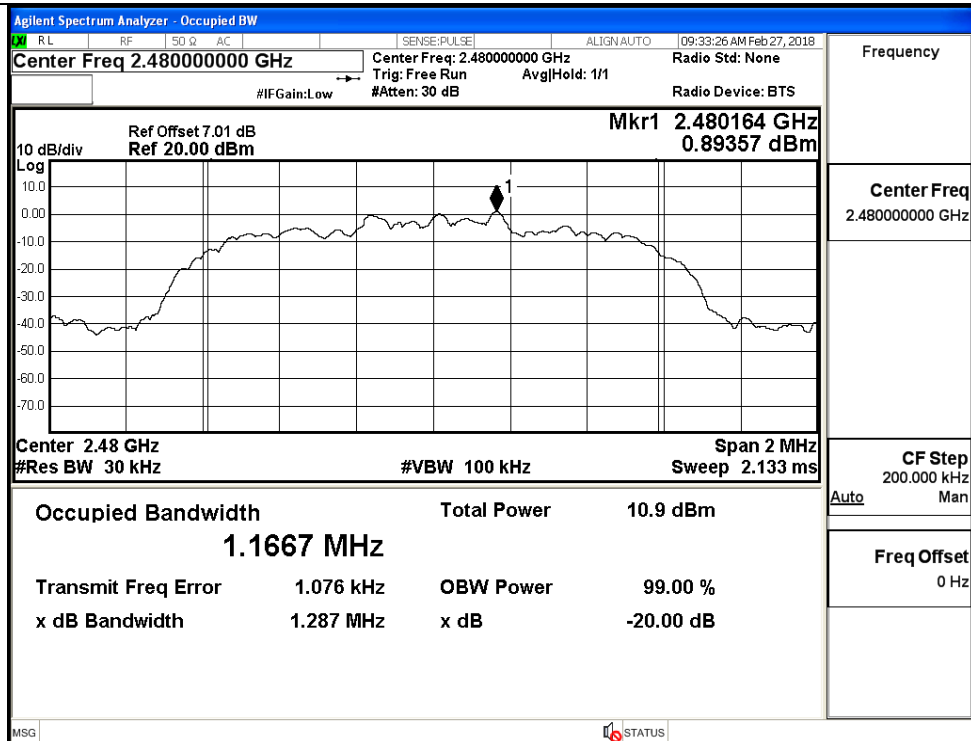


GFSK/HCH

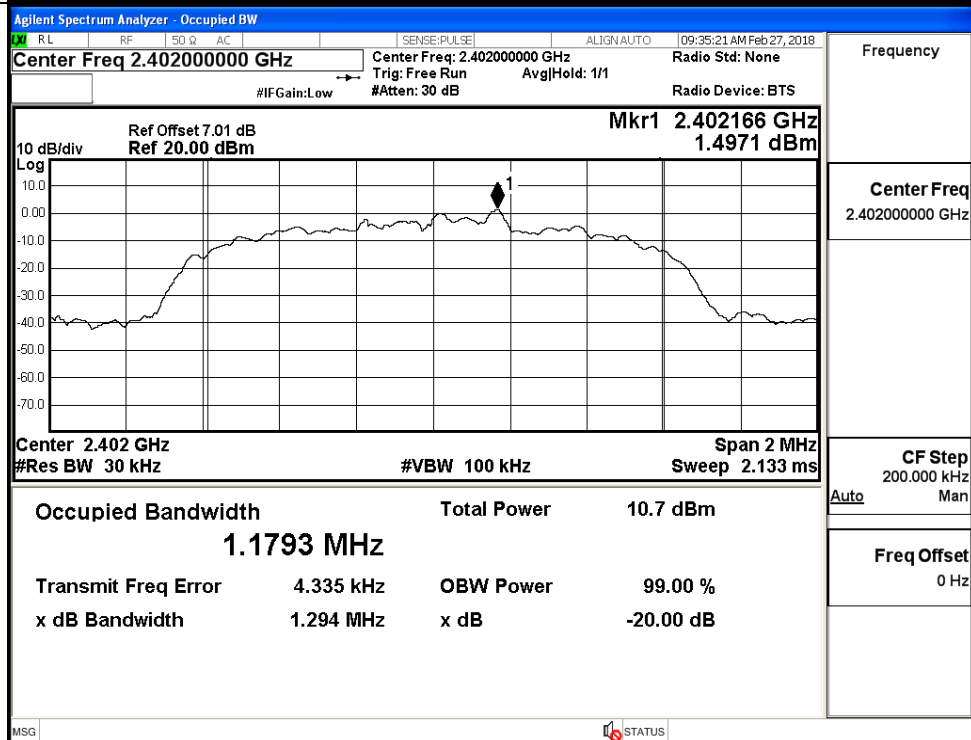




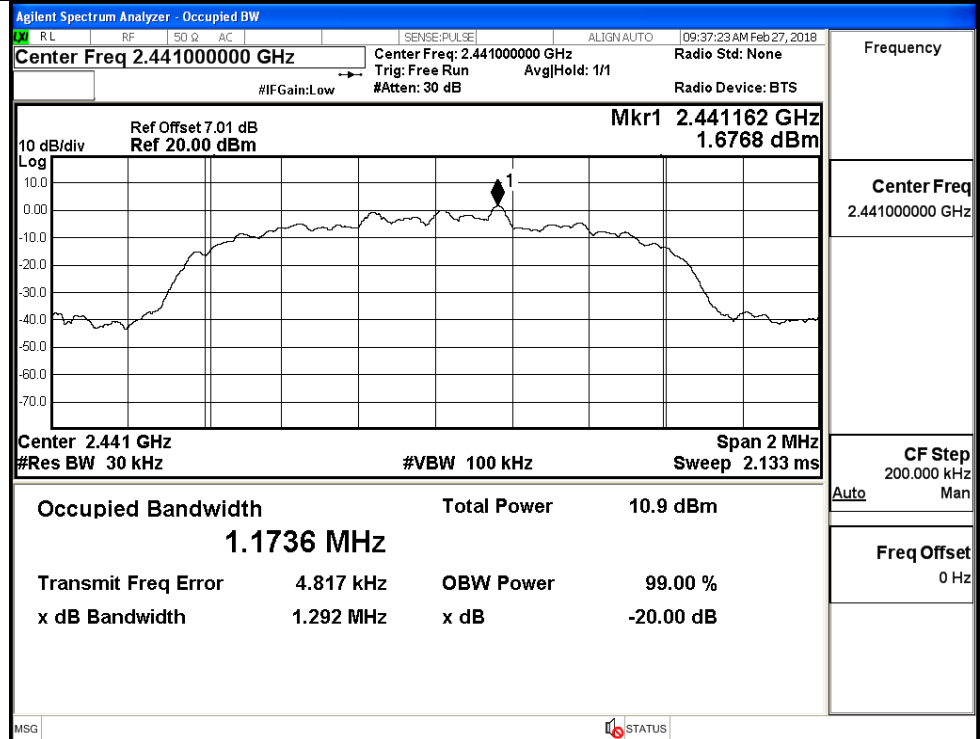
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

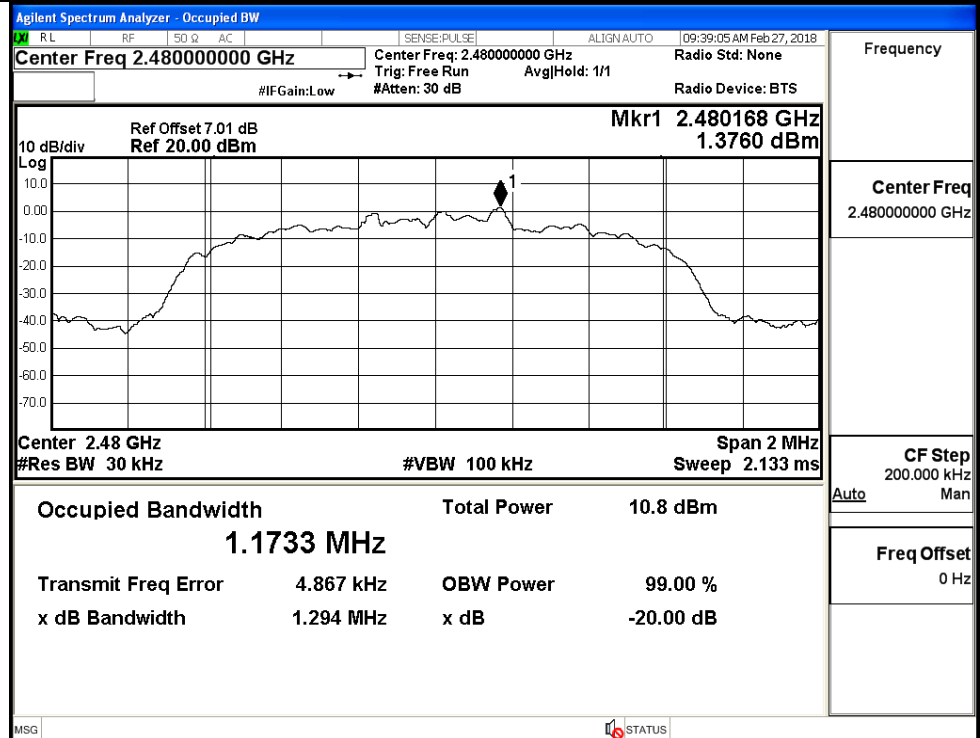
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

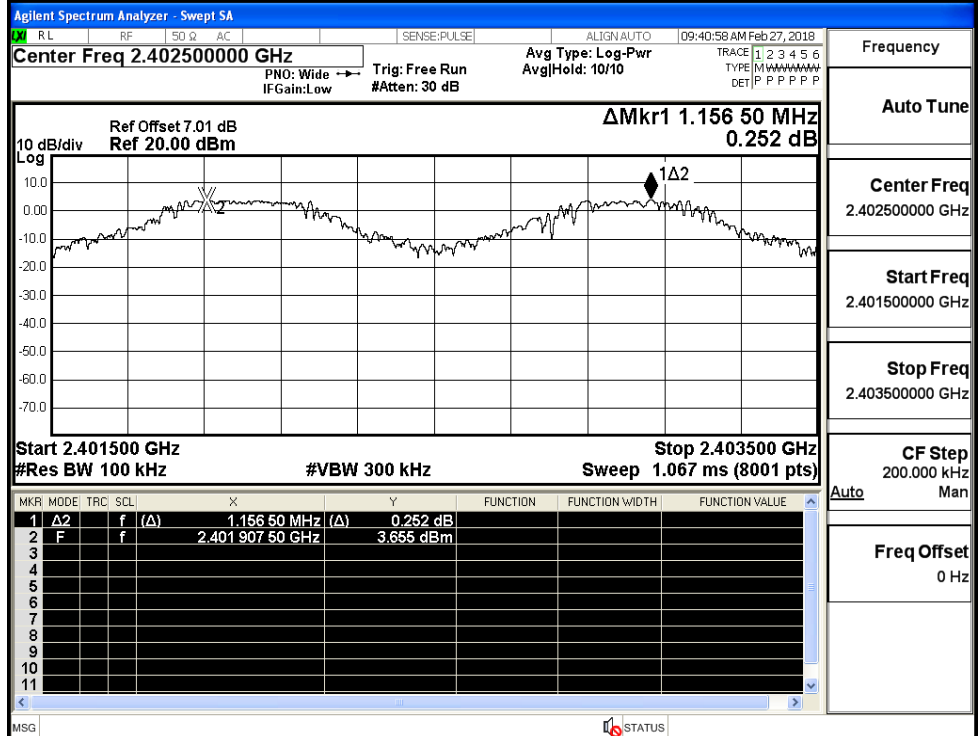


### A.3 Carrier Frequency Separation

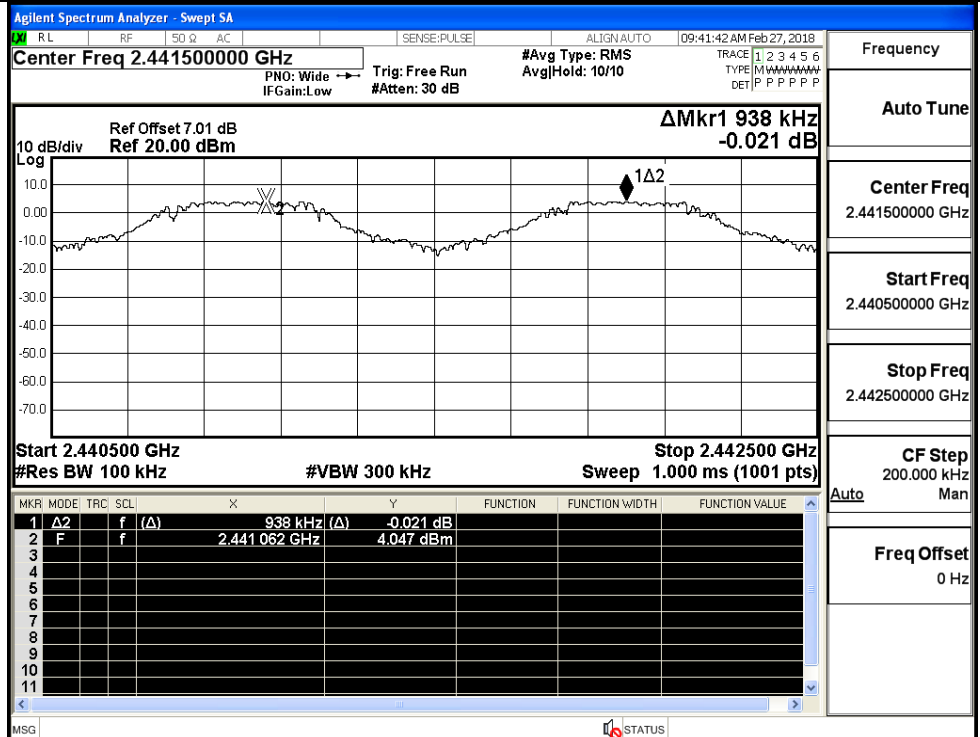
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.157	20dB Bandwidth or 2/3 of the 20dB Bandwidth	PASS
	MCH	0.938	20dB Bandwidth or 2/3 of the 20dB Bandwidth	PASS
	HCH	0.786	20dB Bandwidth or 2/3 of the 20dB Bandwidth	PASS
$\pi/4$ DQPSK	LCH	1.092	2/3 of the 20dB Bandwidth	PASS
	MCH	1.156	2/3 of the 20dB Bandwidth	PASS
	HCH	0.866	2/3 of the 20dB Bandwidth	PASS
8DPSK	LCH	1.002	2/3 of the 20dB Bandwidth	PASS
	MCH	0.862	2/3 of the 20dB Bandwidth	PASS
	HCH	0.986	2/3 of the 20dB Bandwidth	PASS

## Test Graphs

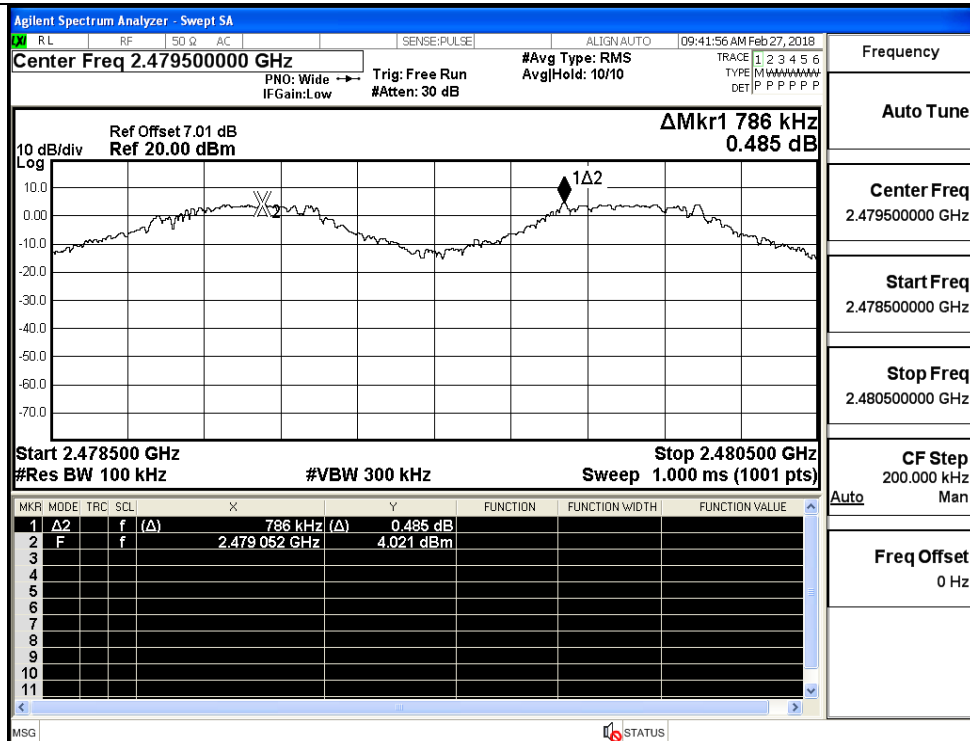
GFSK/LCH



GFSK/MCH



GFSK/HCH



Frequency

Auto Tune

Center Freq

2.479500000 GHz

Start Freq

2.478500000 GHz

Stop Freq

2.480500000 GHz

CF Step

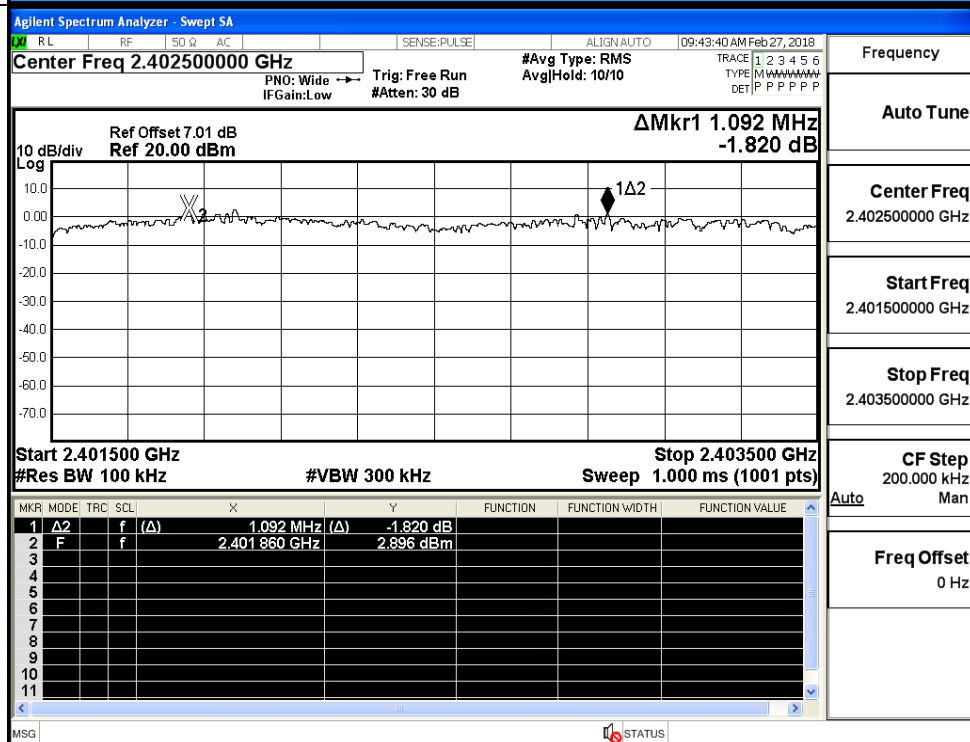
200.000 kHz

Man

Freq Offset

0 Hz

π/4DQPSK/LCH



Frequency

Auto Tune

Center Freq

2.402500000 GHz

Start Freq

2.401500000 GHz

Stop Freq

2.403500000 GHz

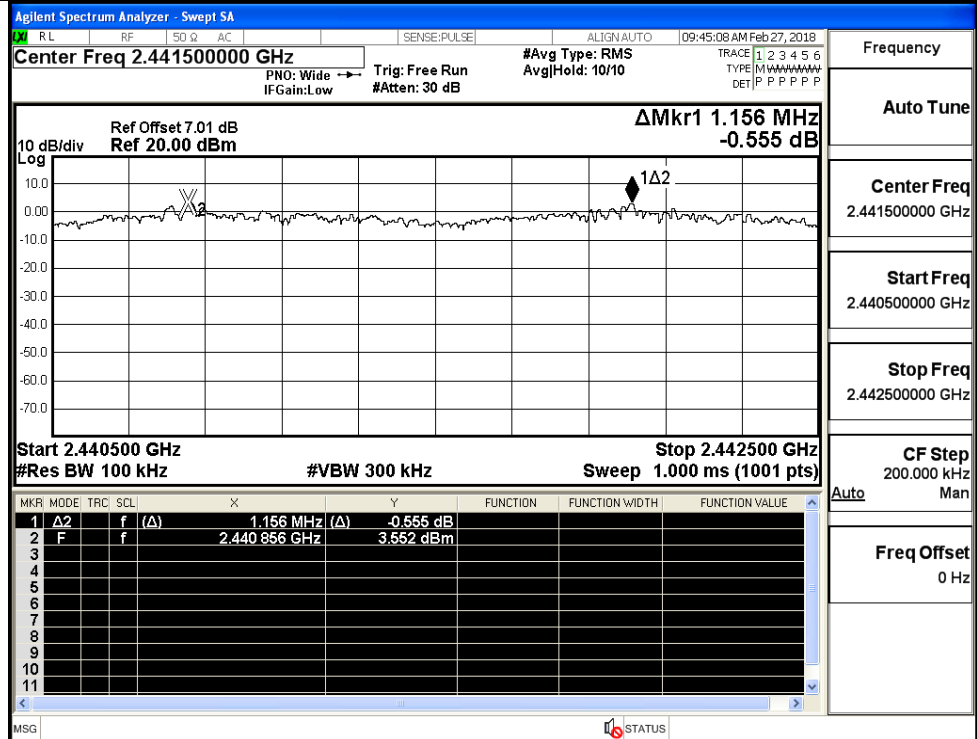
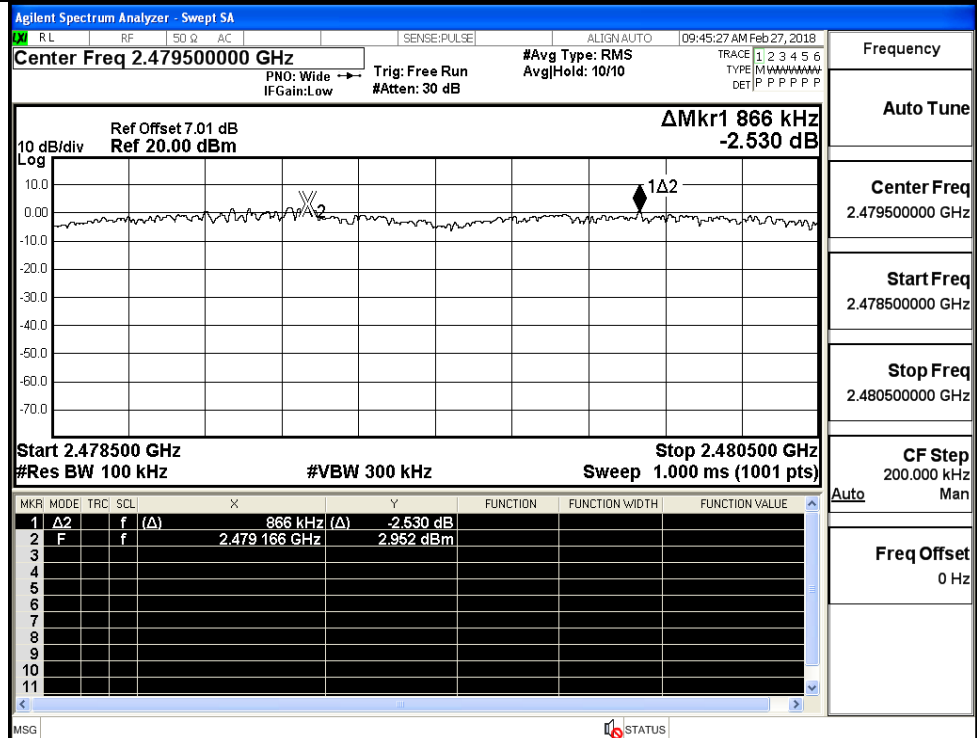
CF Step

200.000 kHz

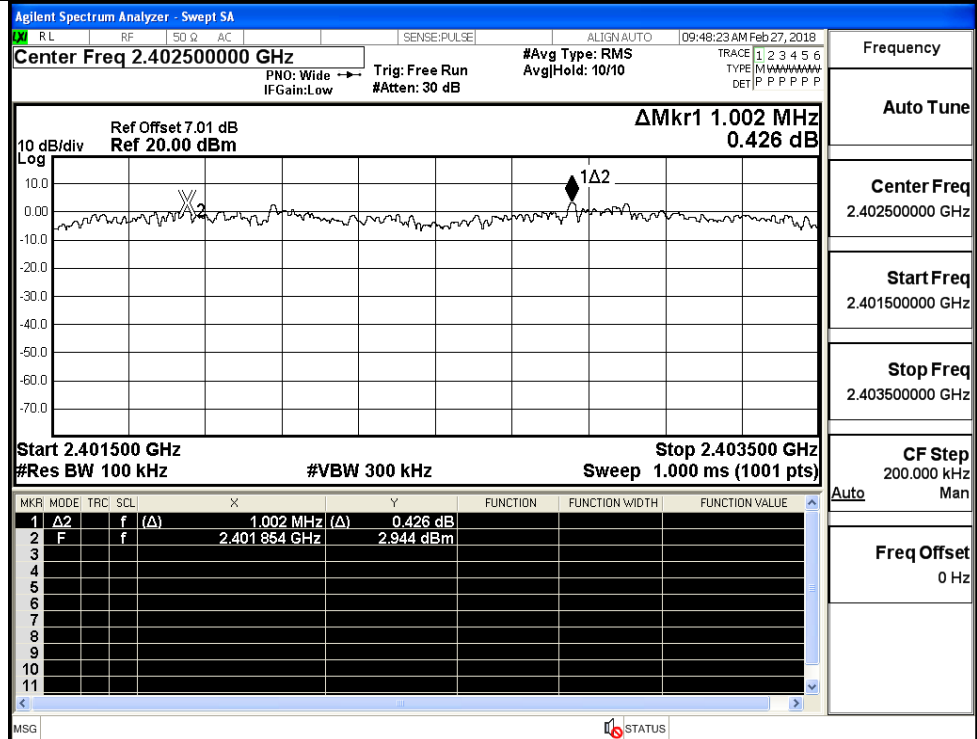
Man

Freq Offset

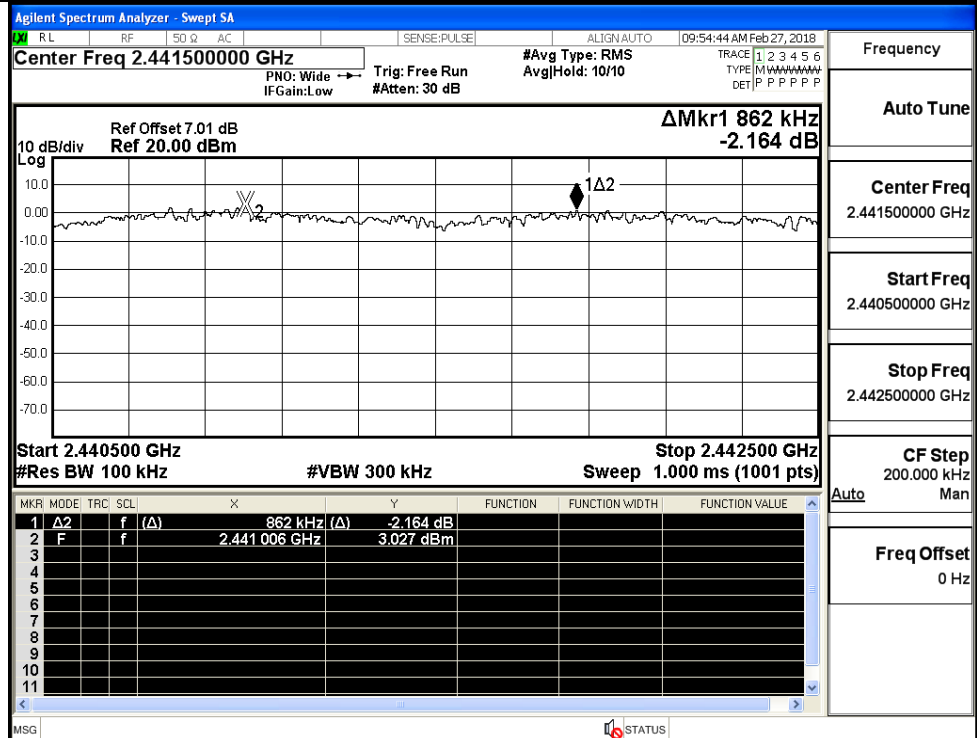
0 Hz

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

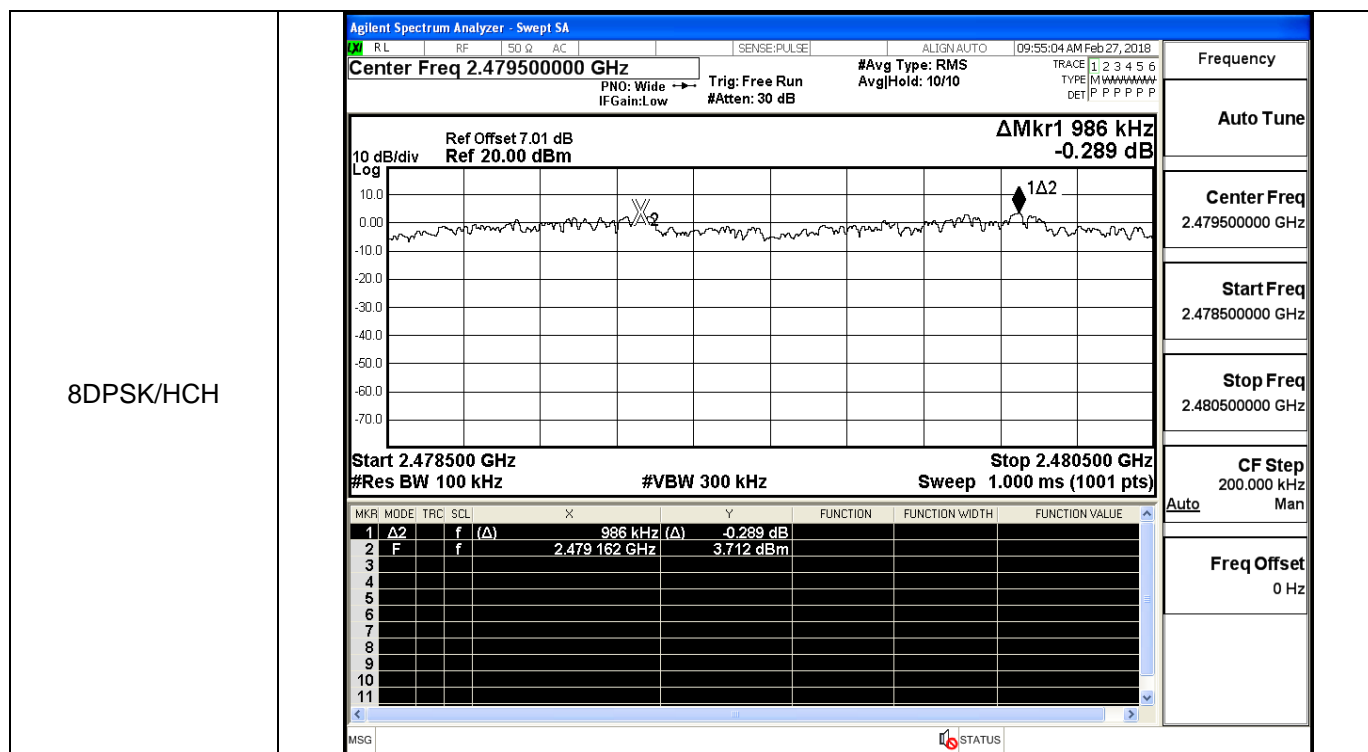
8DPSK/LCH



8DPSK/MCH





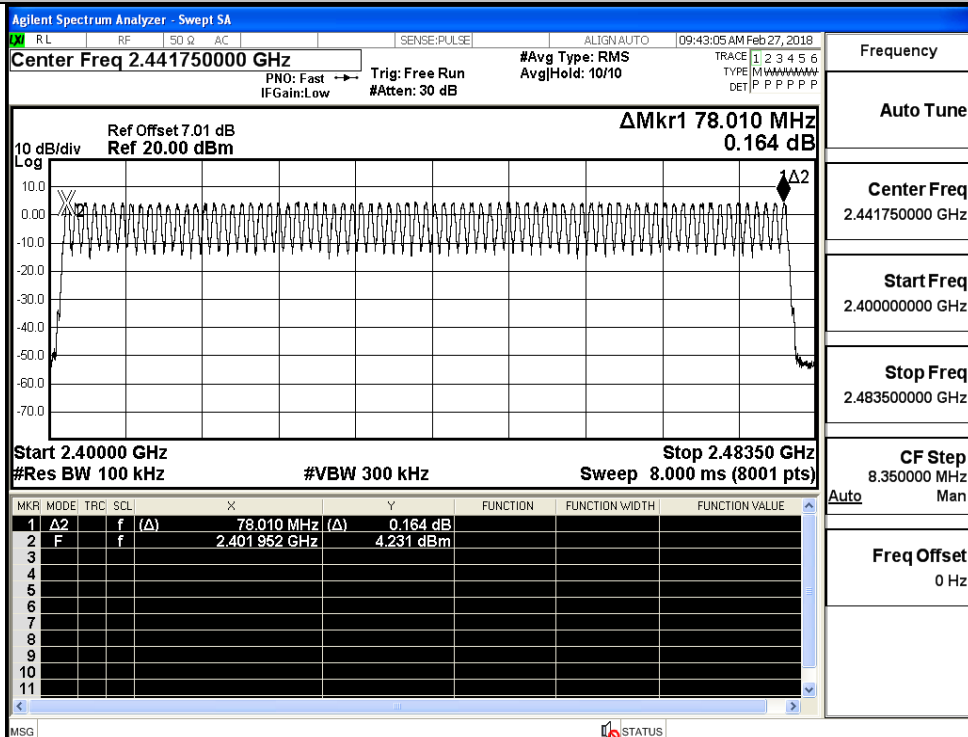
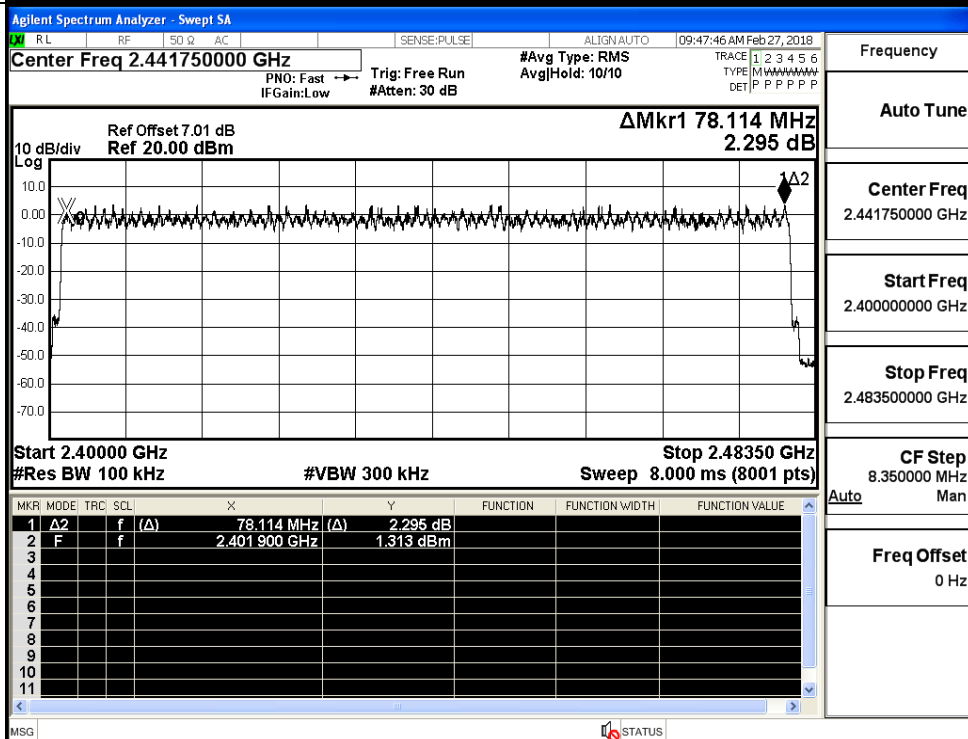


#### A.4 Hopping Channel Number

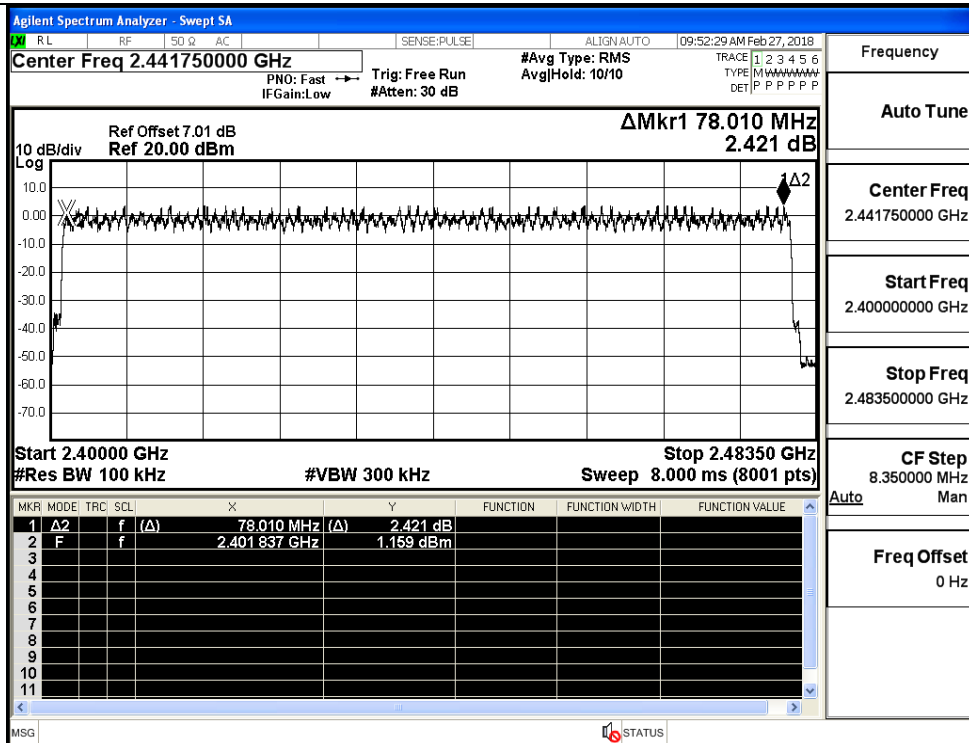
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	$\geq 15$	PASS
$\pi/4$ DQPSK	Hop	79	$\geq 15$	PASS
8DPSK	Hop	79	$\geq 15$	PASS

## Test Graphs

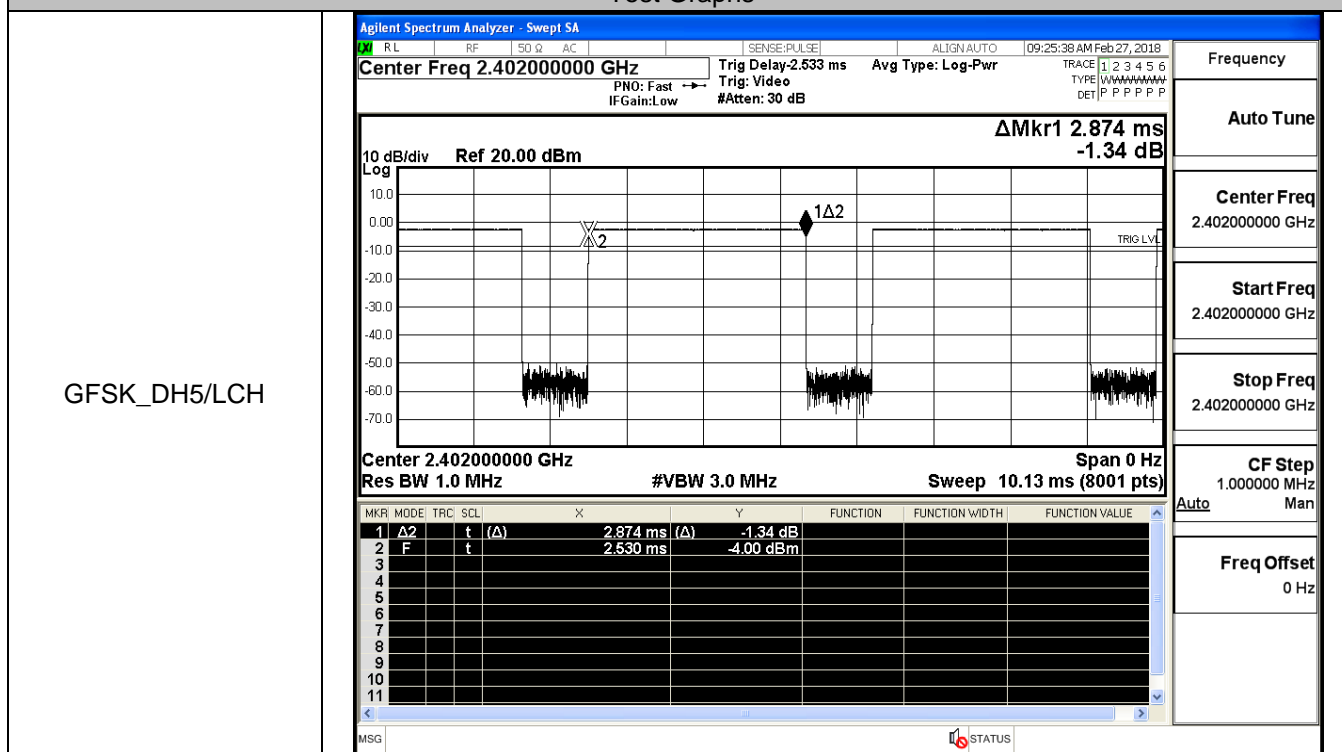
GFSK/Hop

 $\pi/4$ DQPSK/Hop

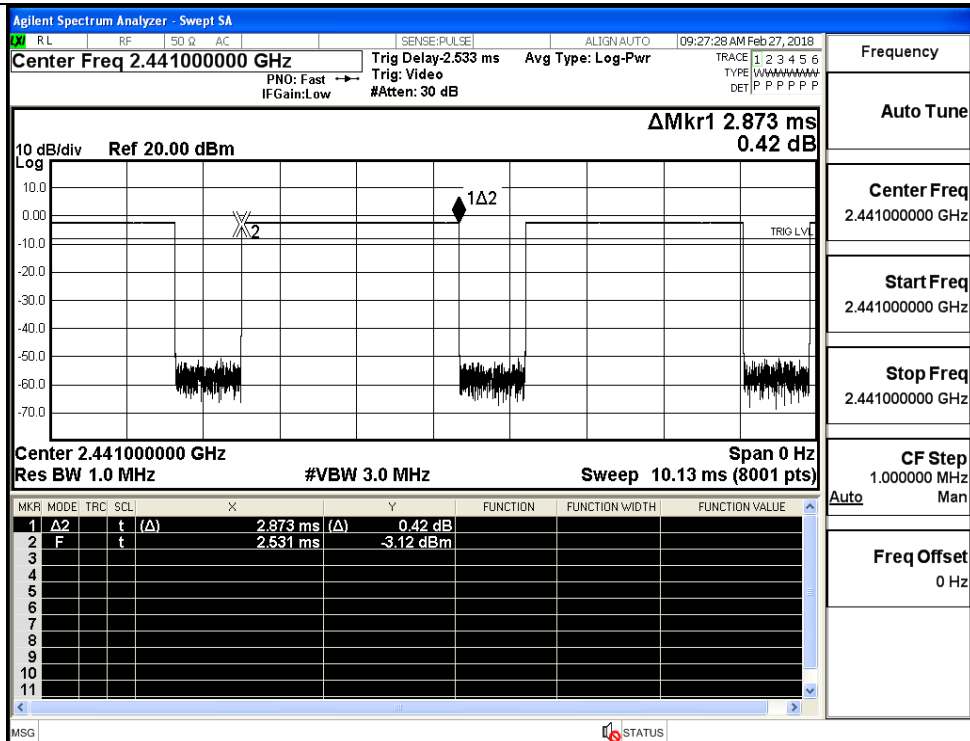
8DPSK/Hop



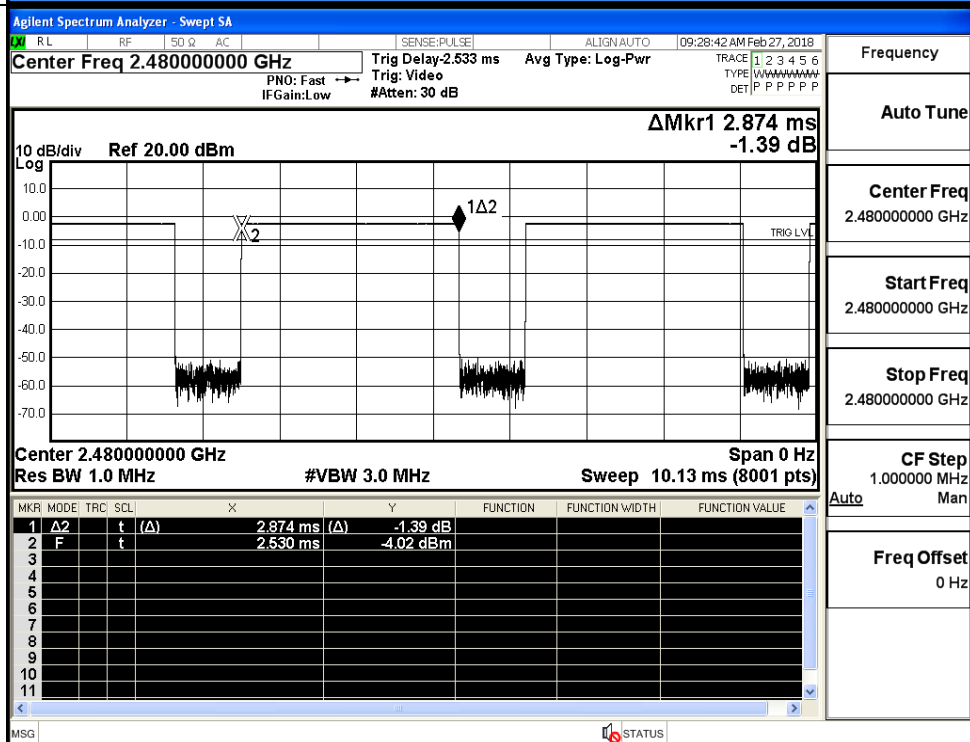
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
	2DH5	HCH	2.87	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.87	106.7	0.307	0.4	PASS
	3DH5	MCH	2.87	106.7	0.307	0.4	PASS
	3DH5	HCH	2.87	106.7	0.307	0.4	PASS



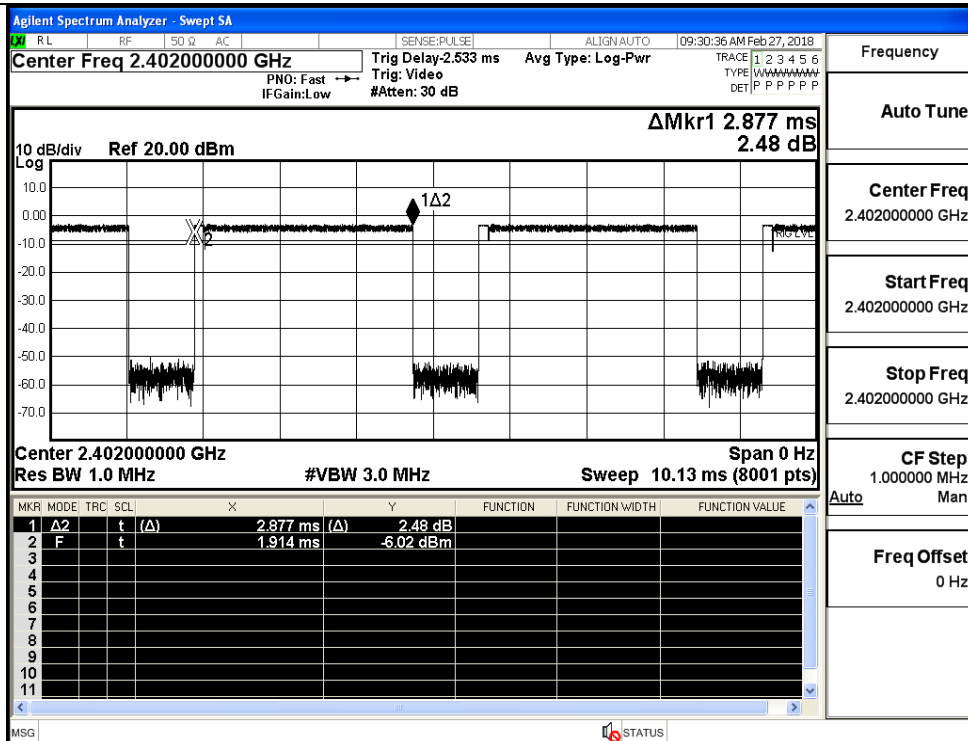
GFSK\_DH5/MCH



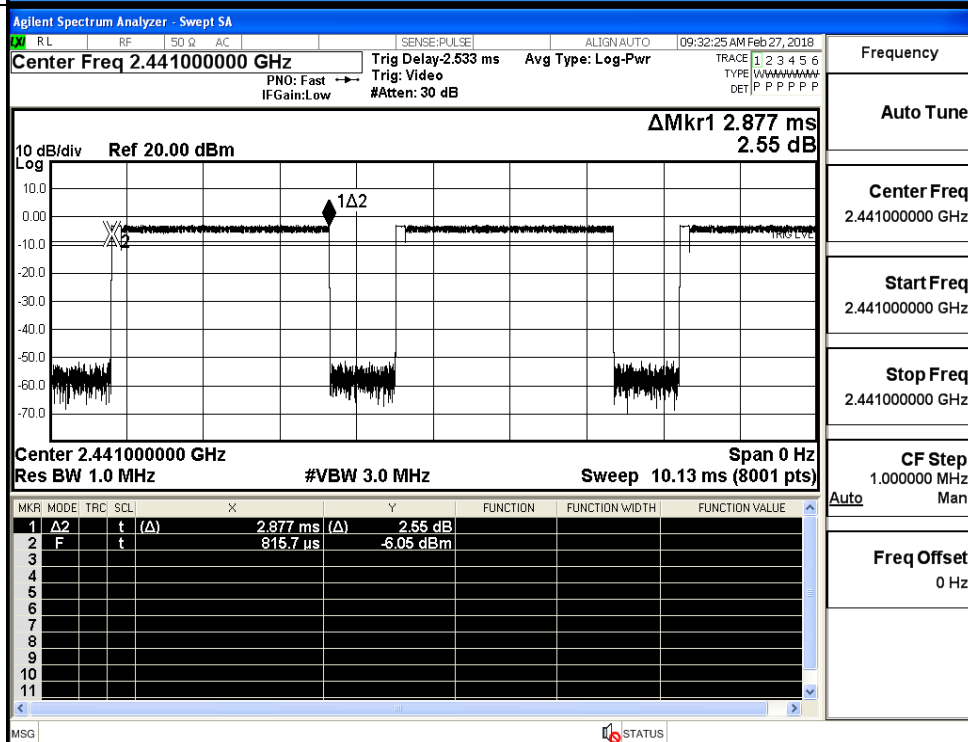
GFSK\_DH5/HCH



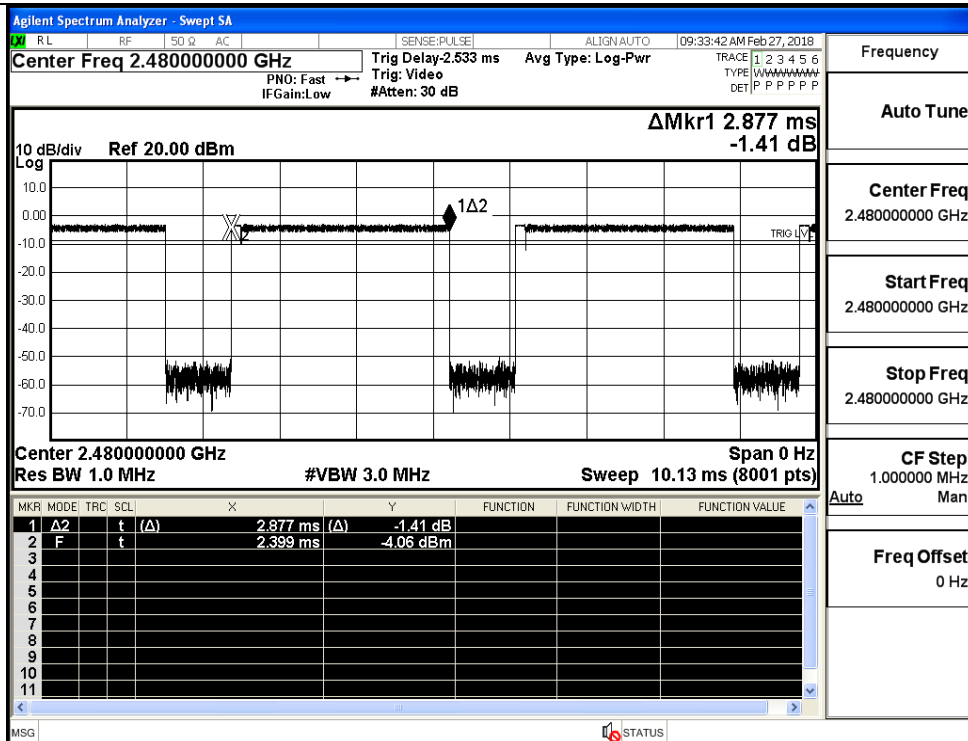
$\pi/4$ DQPSK  
\_2DH5/LCH



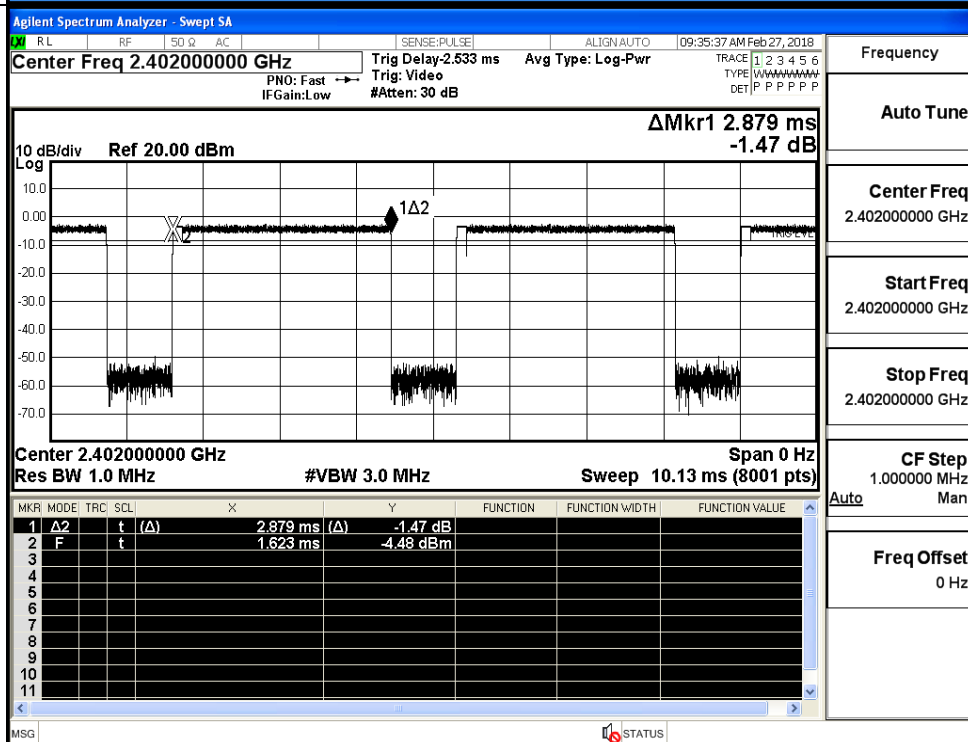
$\pi/4$ DQPSK  
\_2DH5/MCH



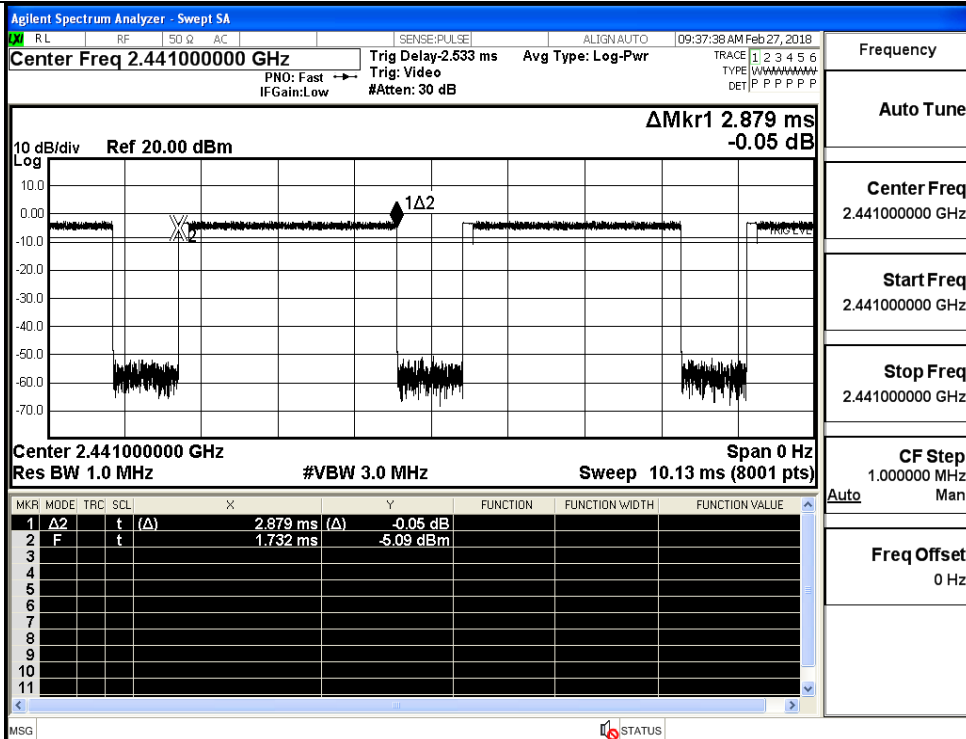
$\pi/4$ DQPSK  
\_2DH5/HCH



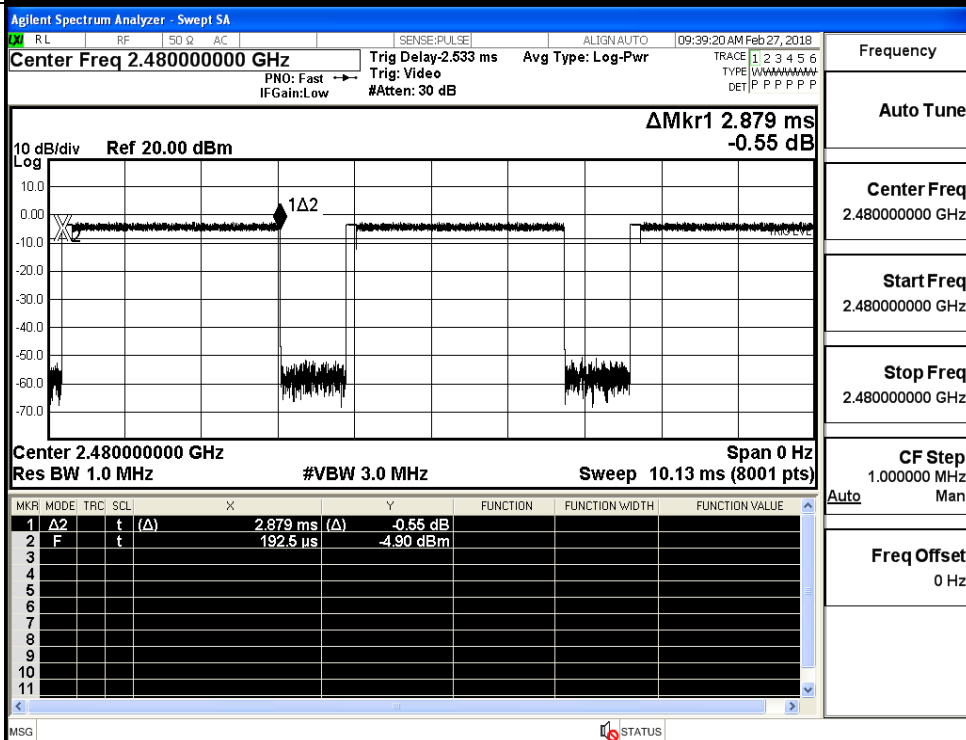
8DPSK \_3DH5/LCH



8DPSK\_3DH5/MCH



8DPSK\_3DH5/HCH

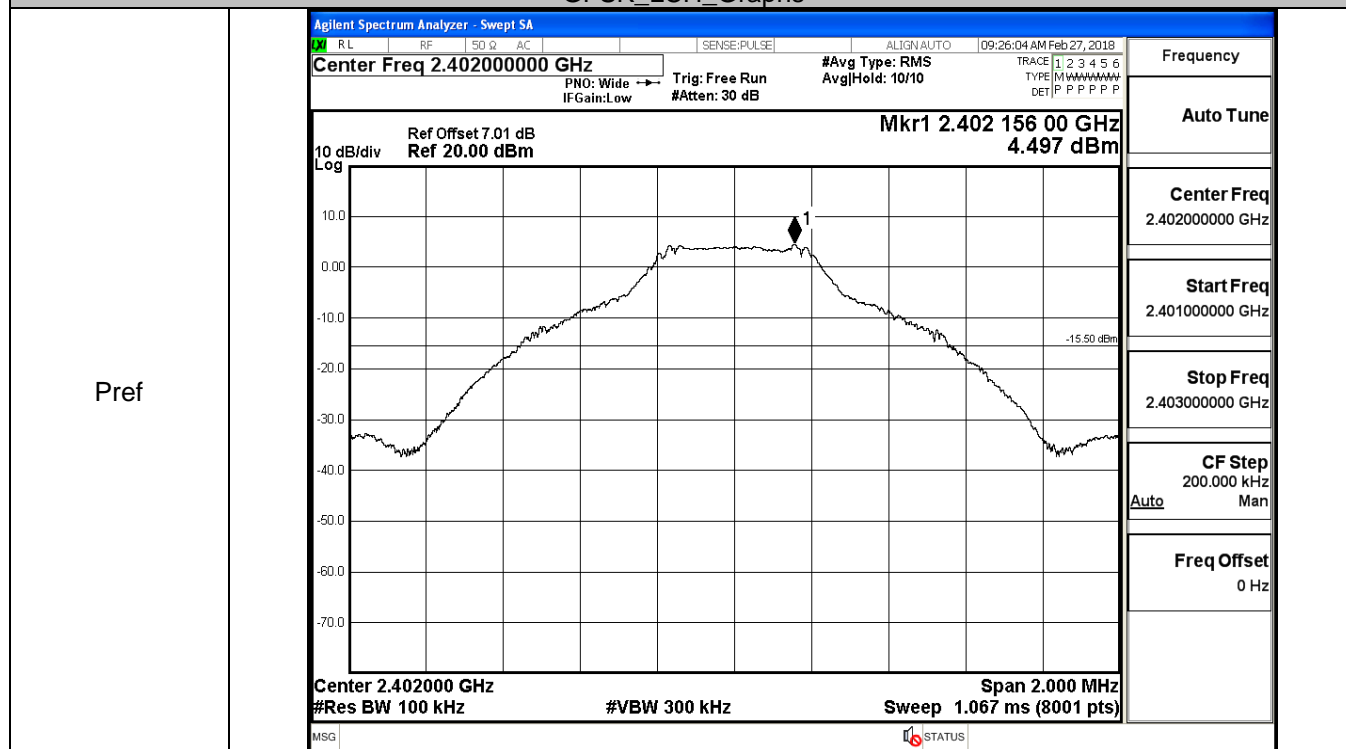




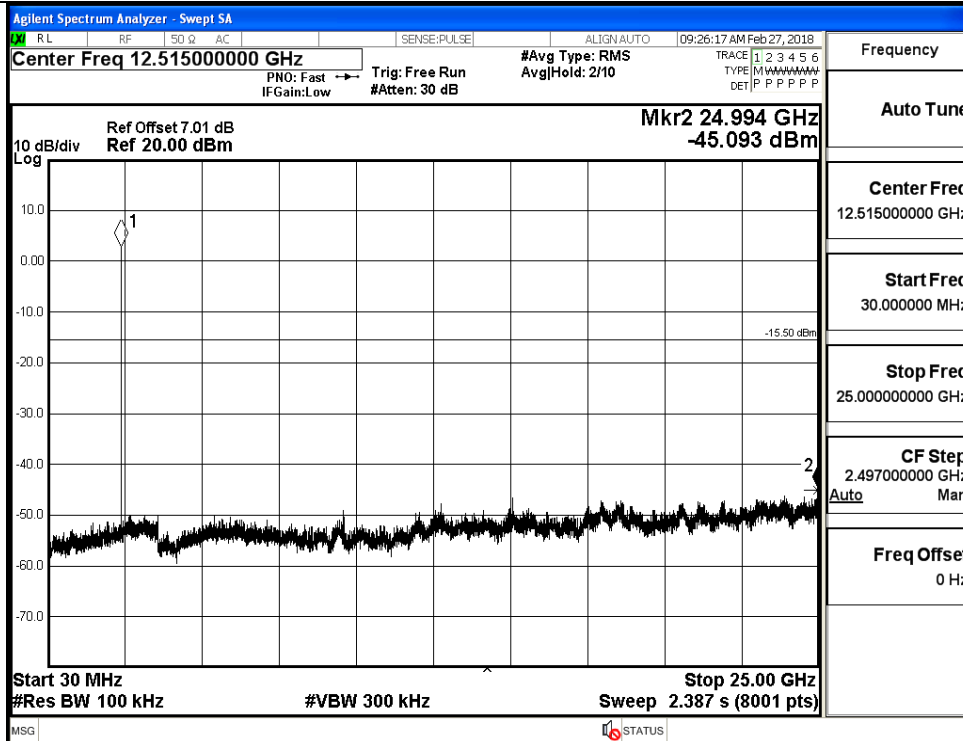
## A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.497	-45.095	<-15.503	PASS
	MCH	4.154	-45.468	<-15.846	PASS
	HCH	4.59	-45.600	<-15.410	PASS
$\pi/4$ DQPSK	LCH	3.588	-44.779	<-16.412	PASS
	MCH	3.656	-44.922	<-16.344	PASS
	HCH	3.722	-45.660	<-16.278	PASS
8DPSK	LCH	3.598	-46.008	<-16.402	PASS
	MCH	3.797	-45.979	<-16.203	PASS
	HCH	3.624	-46.205	<-16.376	PASS

GFSK\_LCH\_Graphs

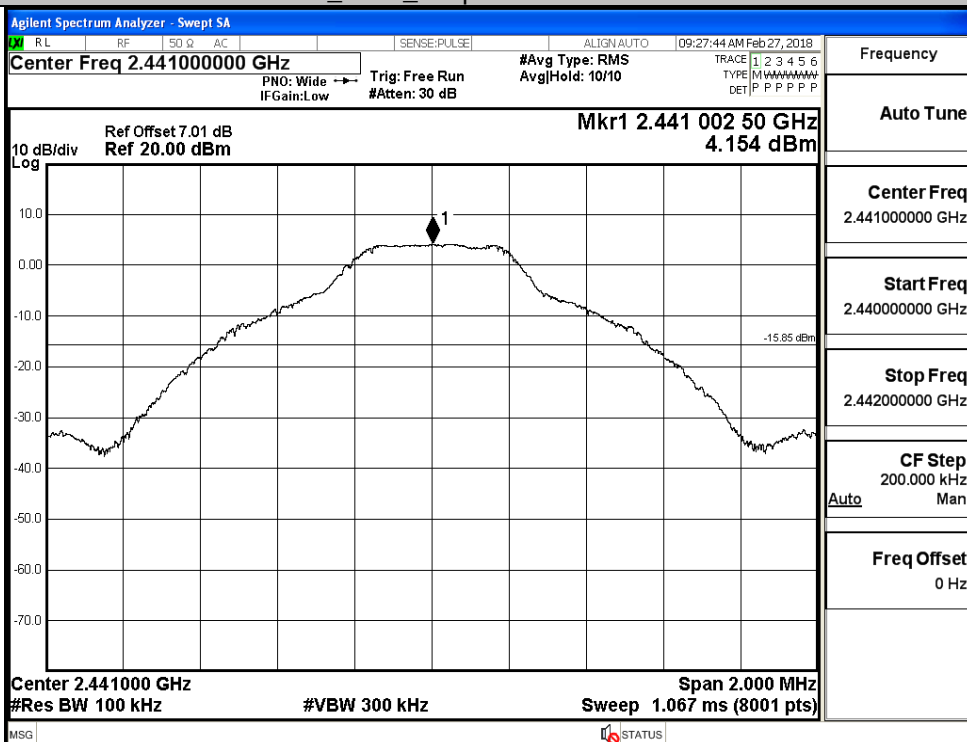


Puw

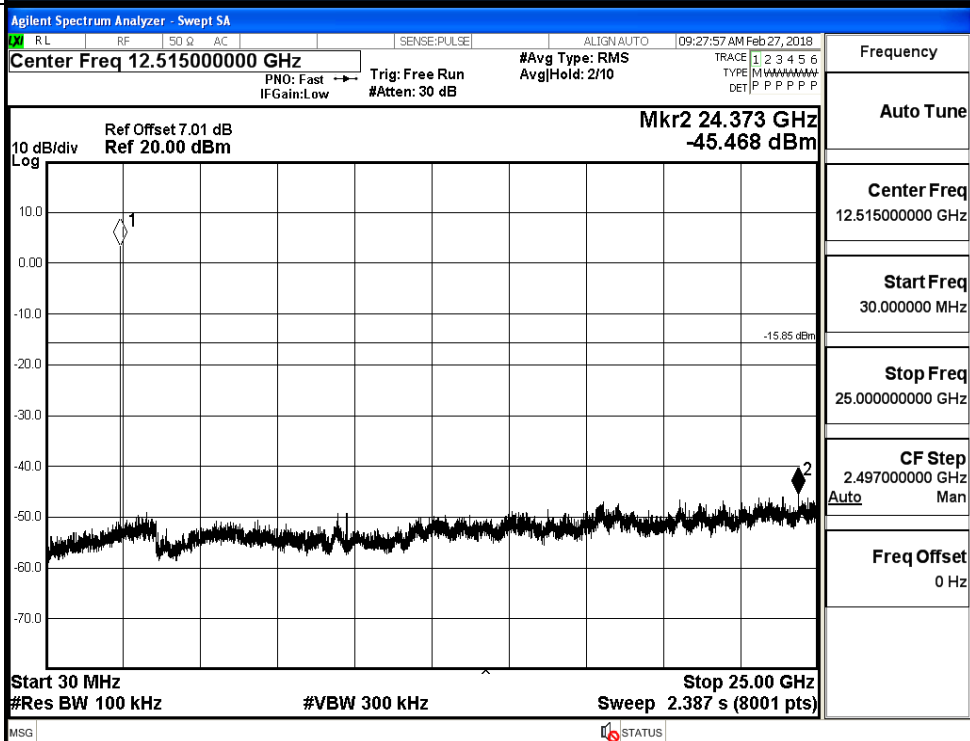


## GFSK\_MCH\_Graphs

Pref

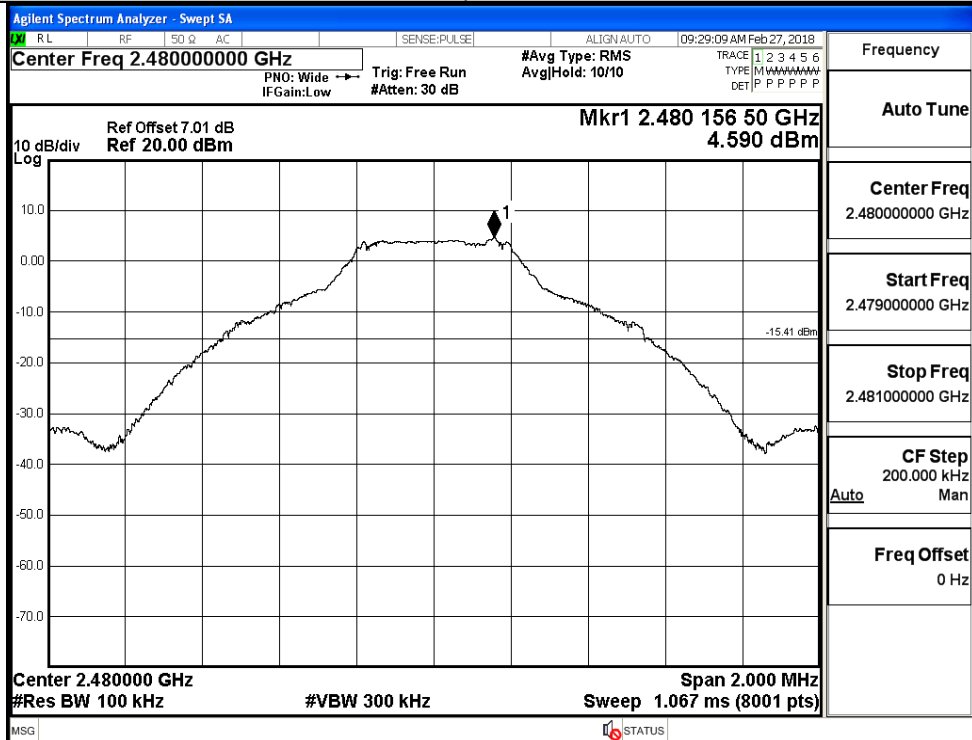


Puw

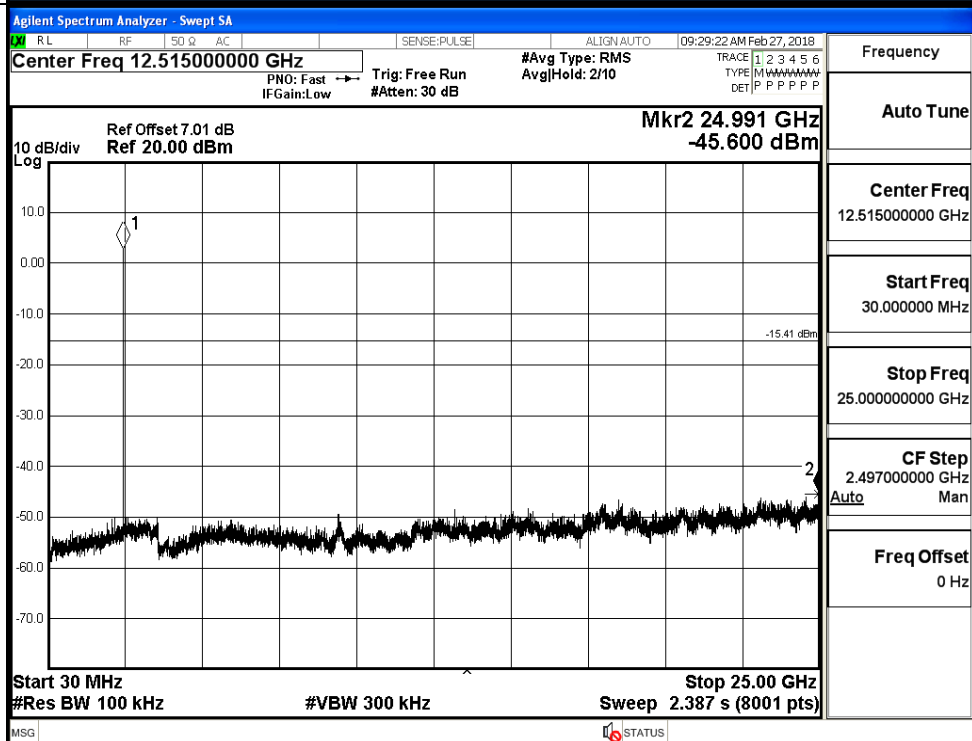


## GFSK\_HCH\_Graphs

Pref

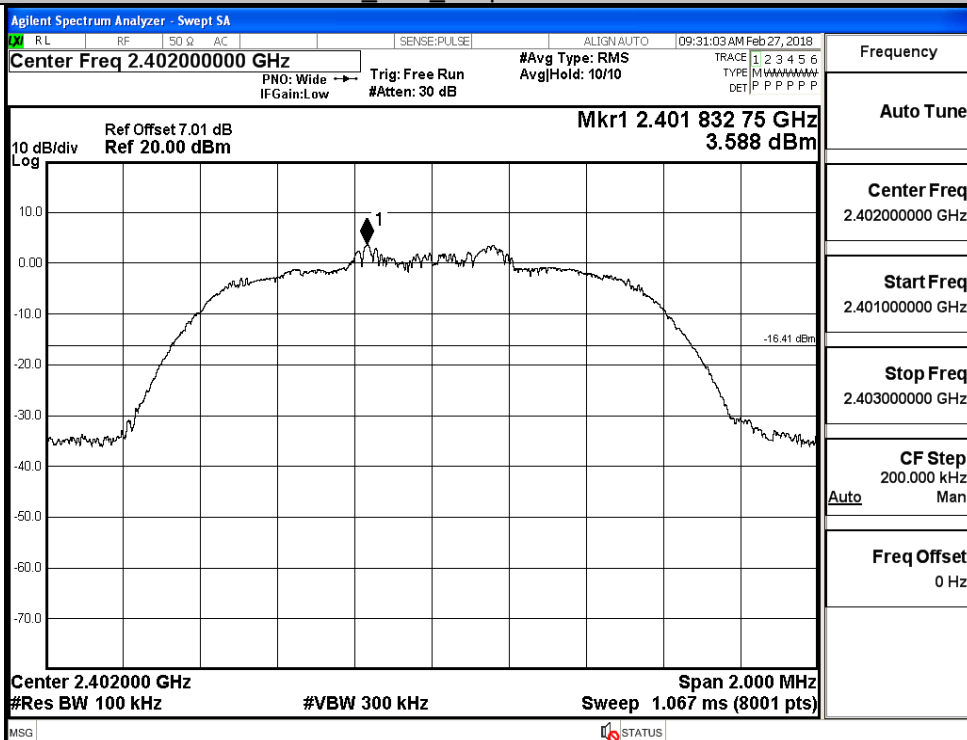


Puw

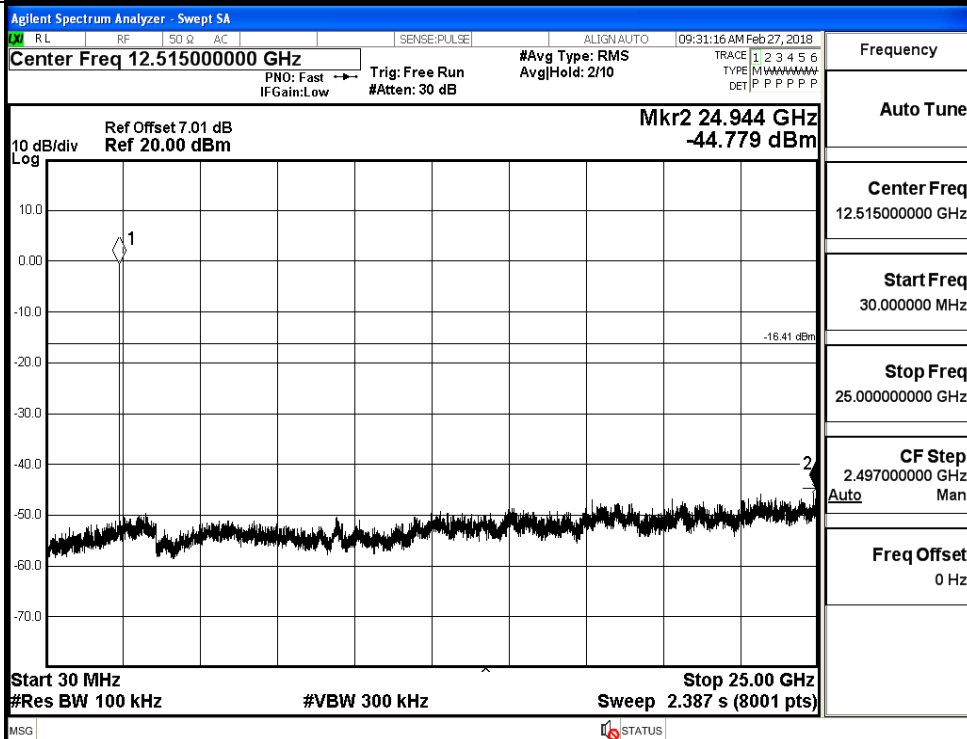


$\pi/4$ DQPSK\_LCH\_Graphs

Pref

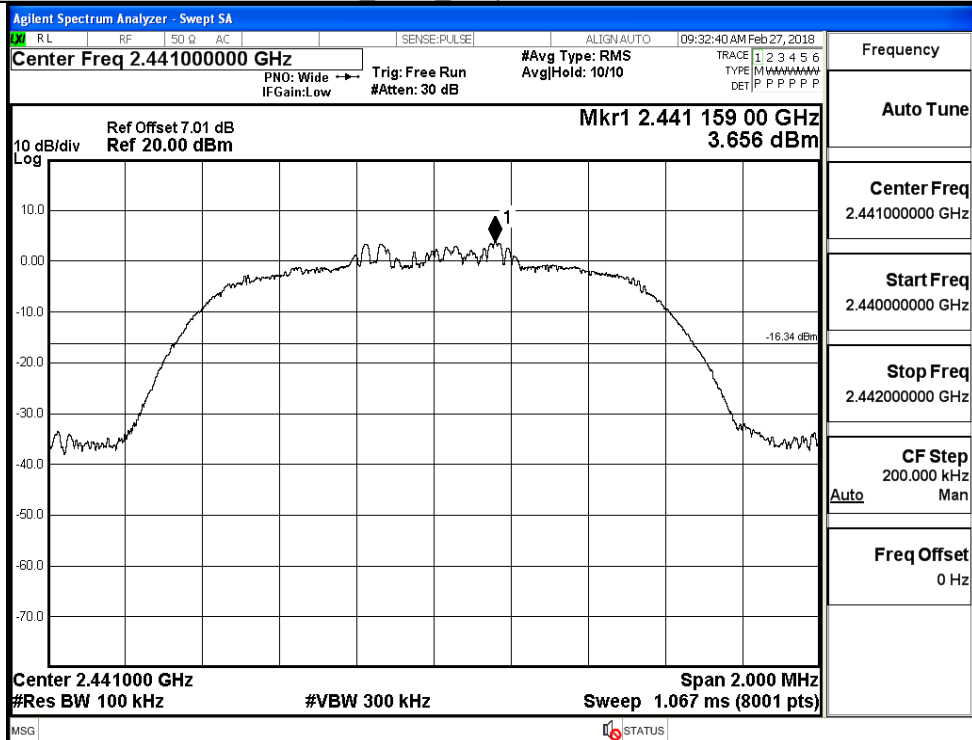


Puw

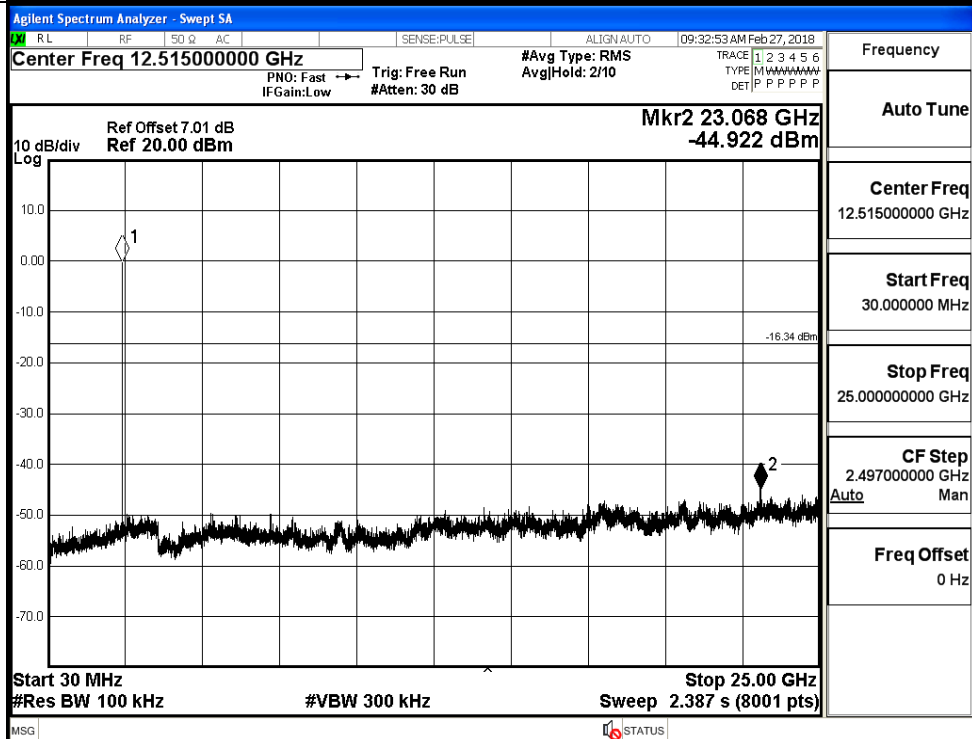


$\pi$ /4DQPSK\_MCH\_Graphs

Pref

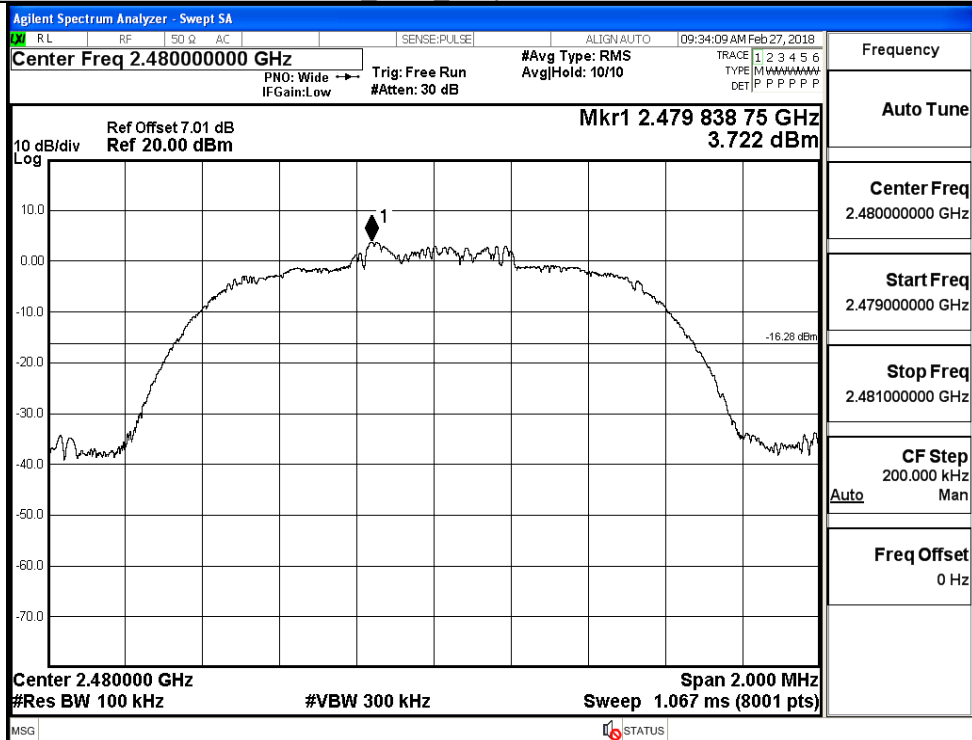


Puw

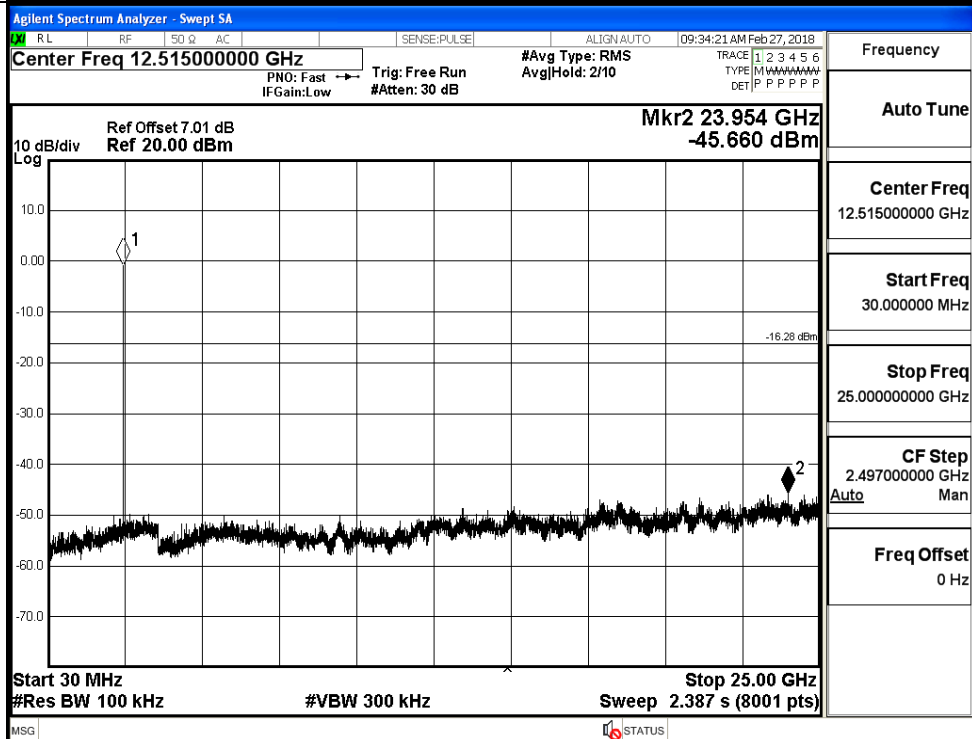


$\pi/4$ DQPSK\_HCH\_Graphs

Pref

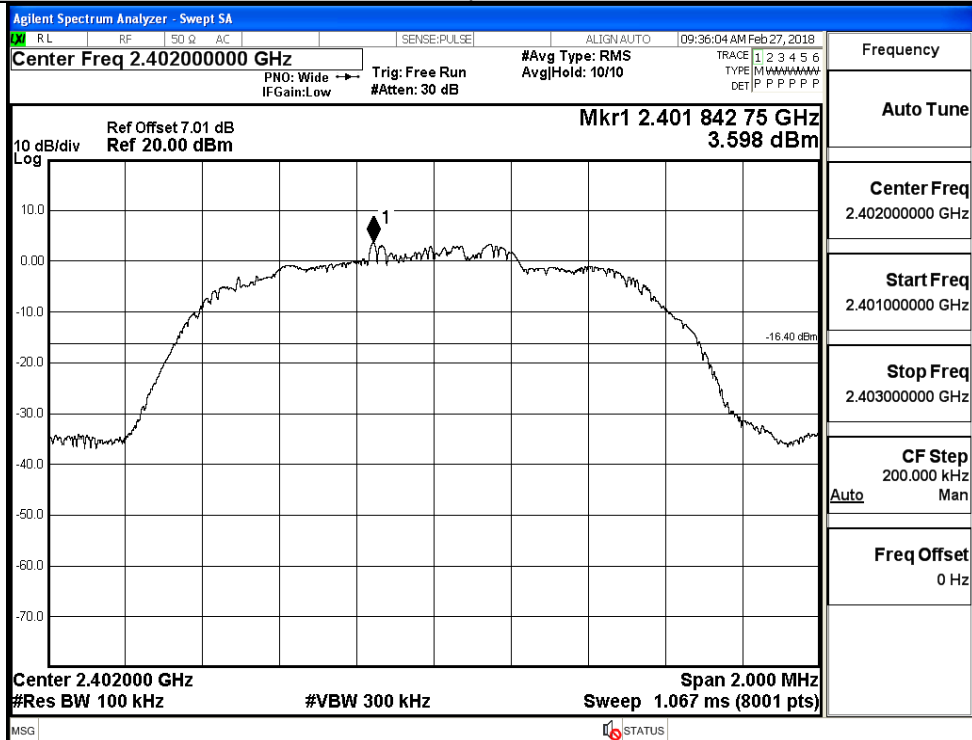


Puw

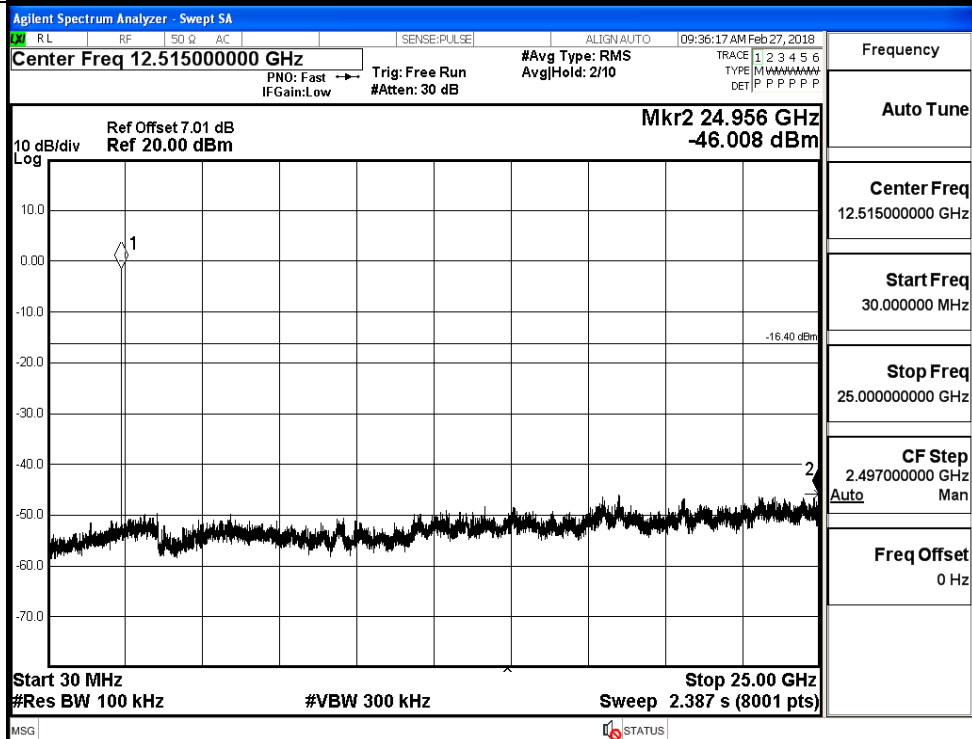


## 8DPSK\_LCH\_Graphs

Pref



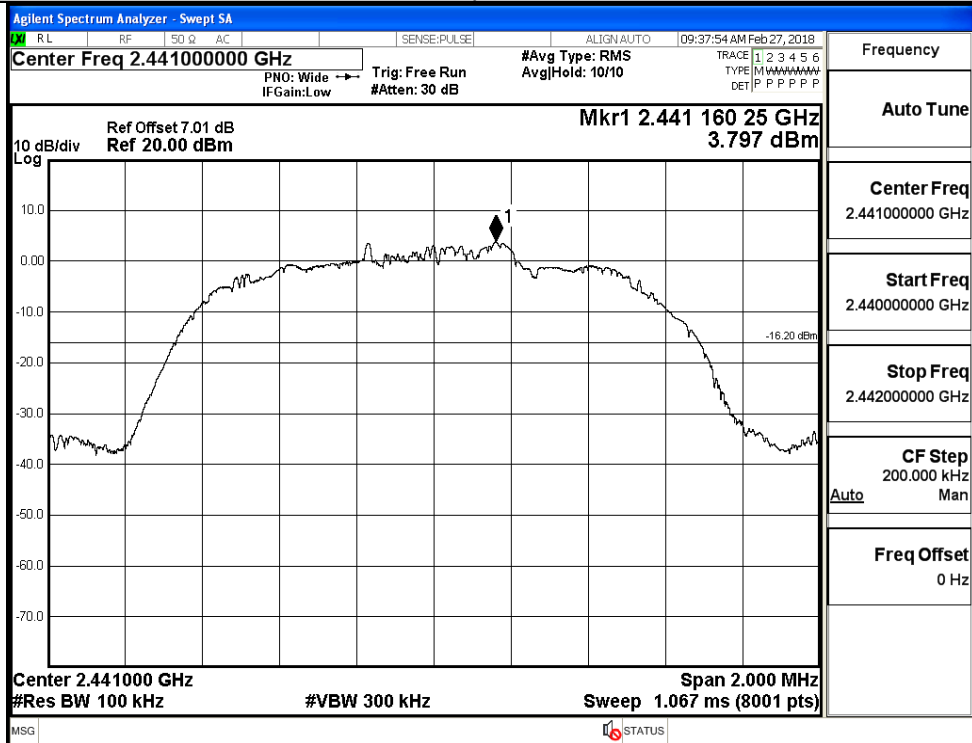
Puw



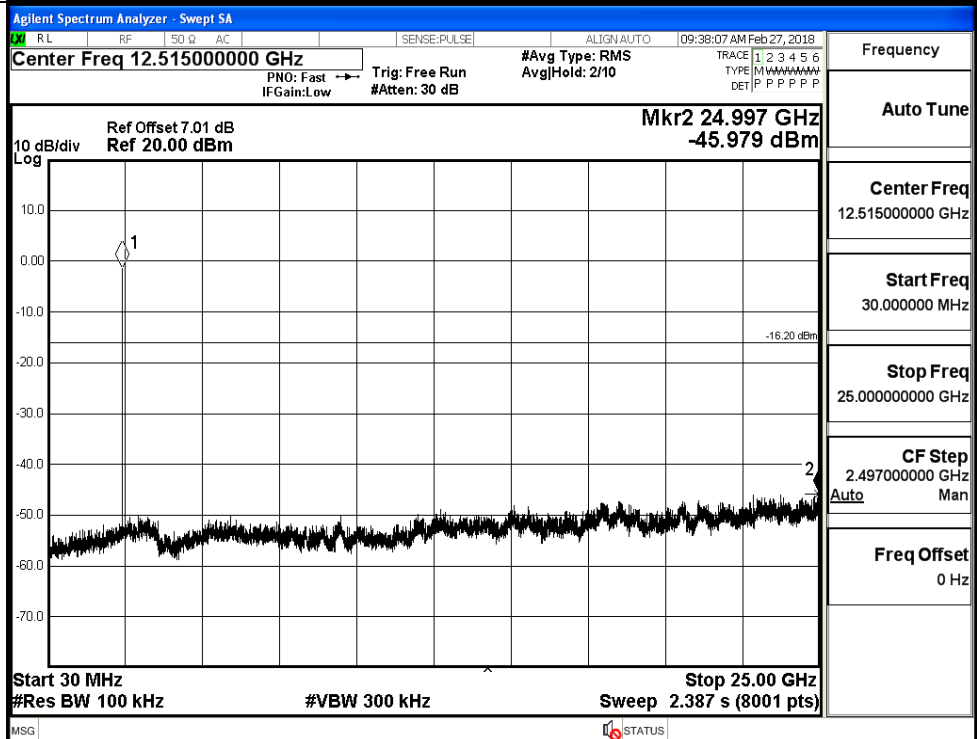


## 8DPSK\_MCH\_Graphs

Pref

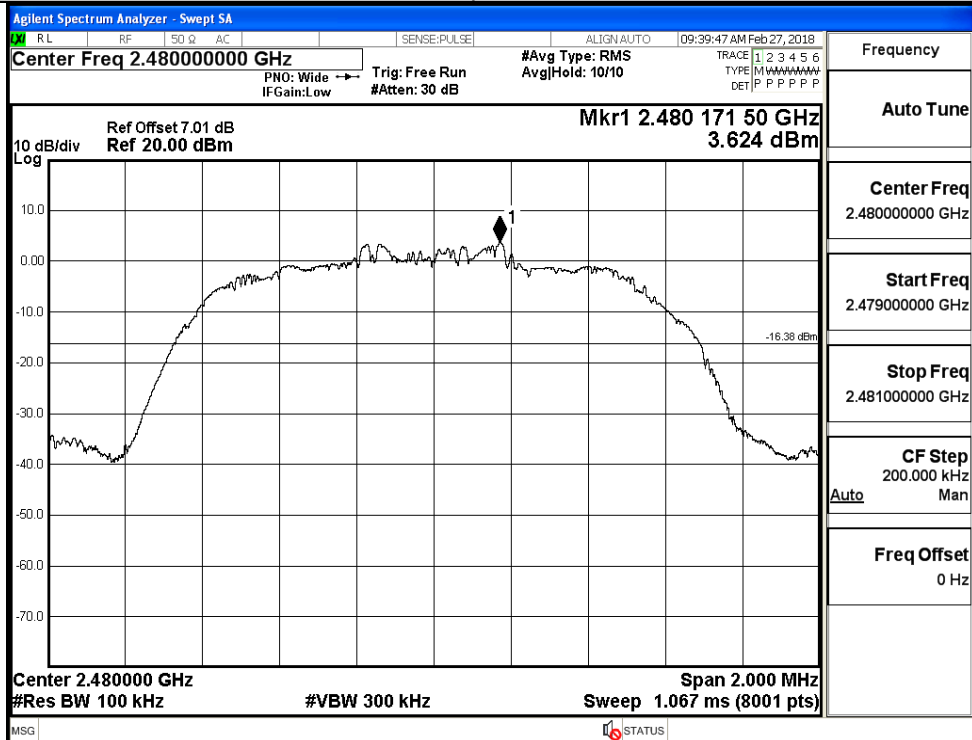


Puw

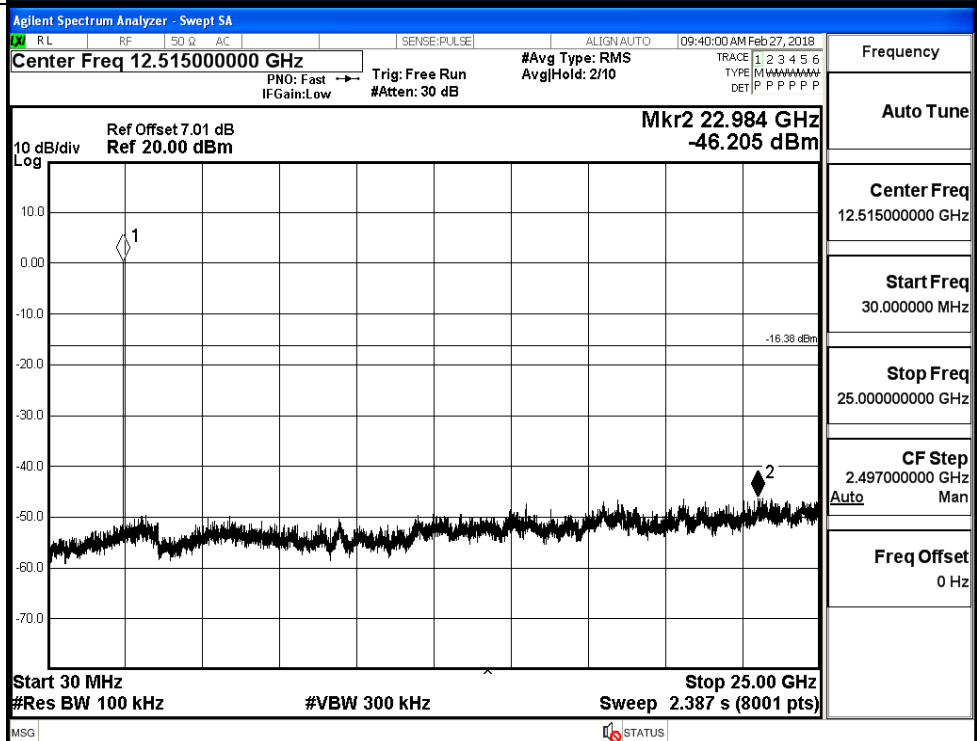


## 8DPSK\_HCH\_Graphs

Pref



Puw

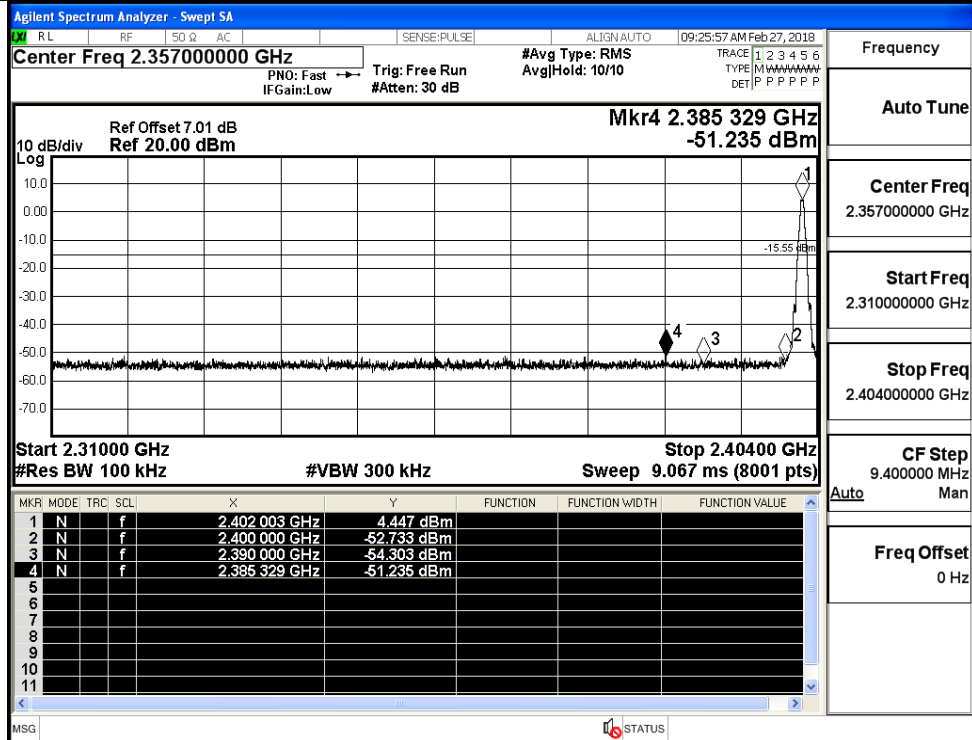


**A.7 Band-edge for RF Conducted Emissions**

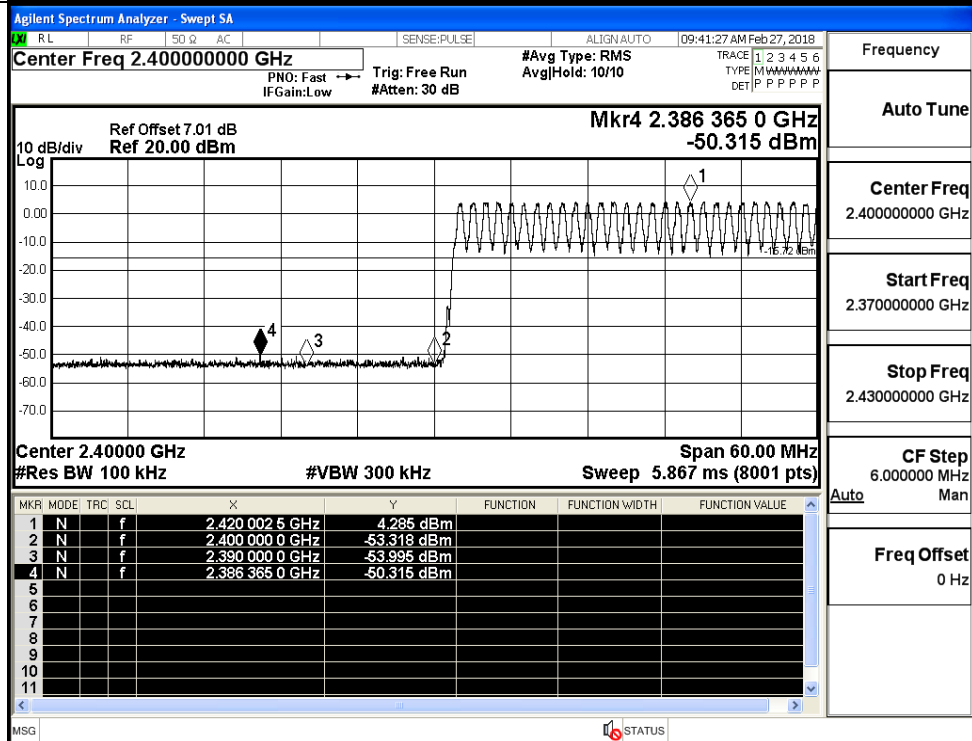
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.447	Off	-51.235	-15.55	PASS
			4.285	On	-50.315	-15.72	PASS
	HCH	2480	4.712	Off	-49.930	-15.29	PASS
			4.403	On	-50.732	-15.6	PASS
$\pi/4$ DQPSK	LCH	2402	1.825	Off	-51.131	-18.18	PASS
			3.681	On	-50.884	-16.32	PASS
	HCH	2480	3.633	Off	-51.087	-16.37	PASS
			3.739	On	-49.924	-16.26	PASS
8DPSK	LCH	2402	1.408	Off	-50.575	-18.59	PASS
			3.706	On	-50.278	-16.29	PASS
	HCH	2480	3.764	Off	-50.967	-16.24	PASS
			3.777	On	-50.339	-16.22	PASS

## Test Graphs

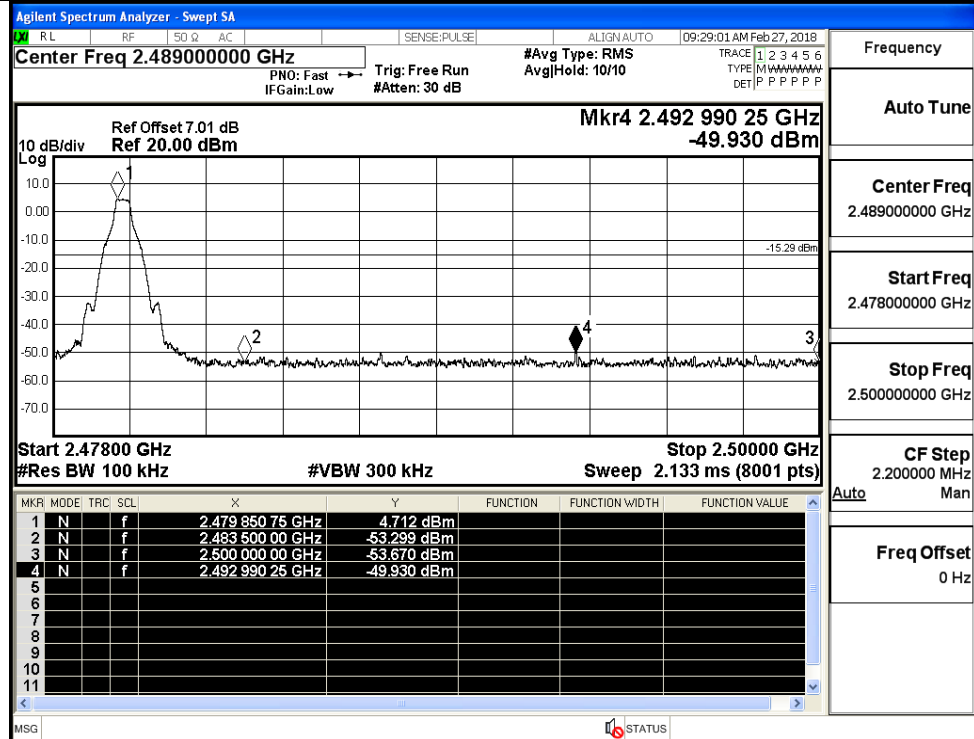
GFSK/LCH/No Hop



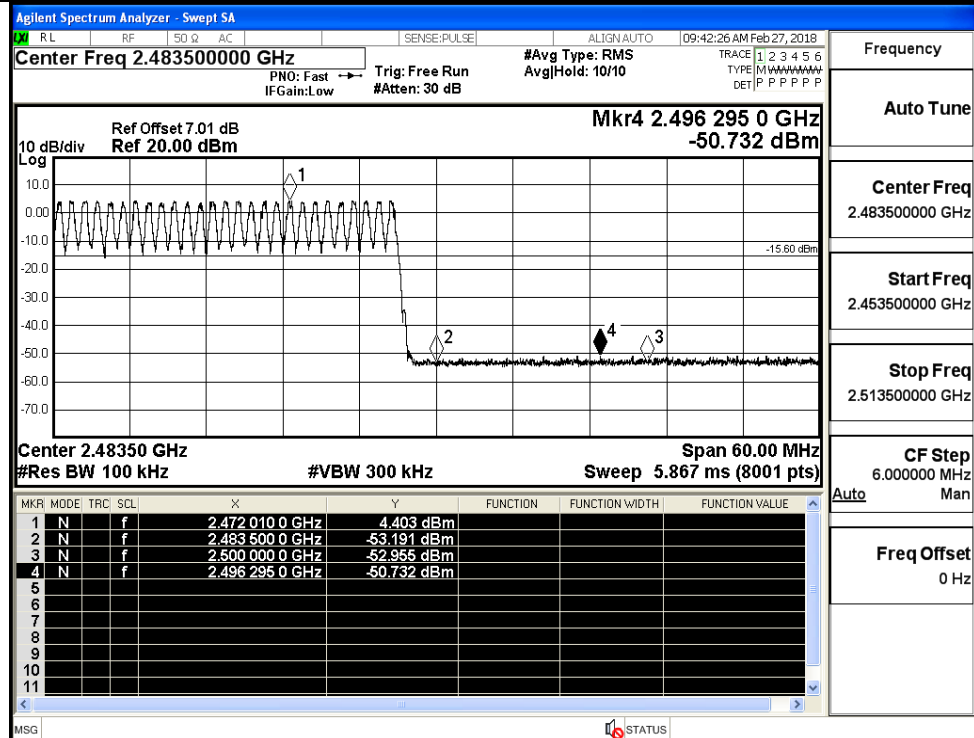
GFSK/LCH/Hop



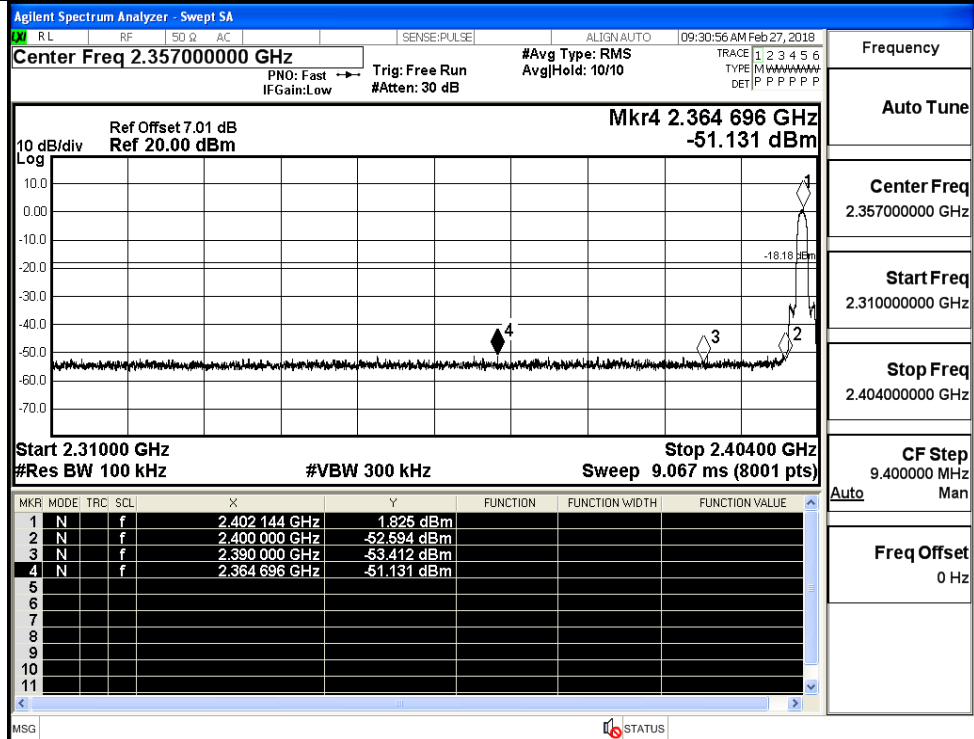
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq  
2.357000000 GHz

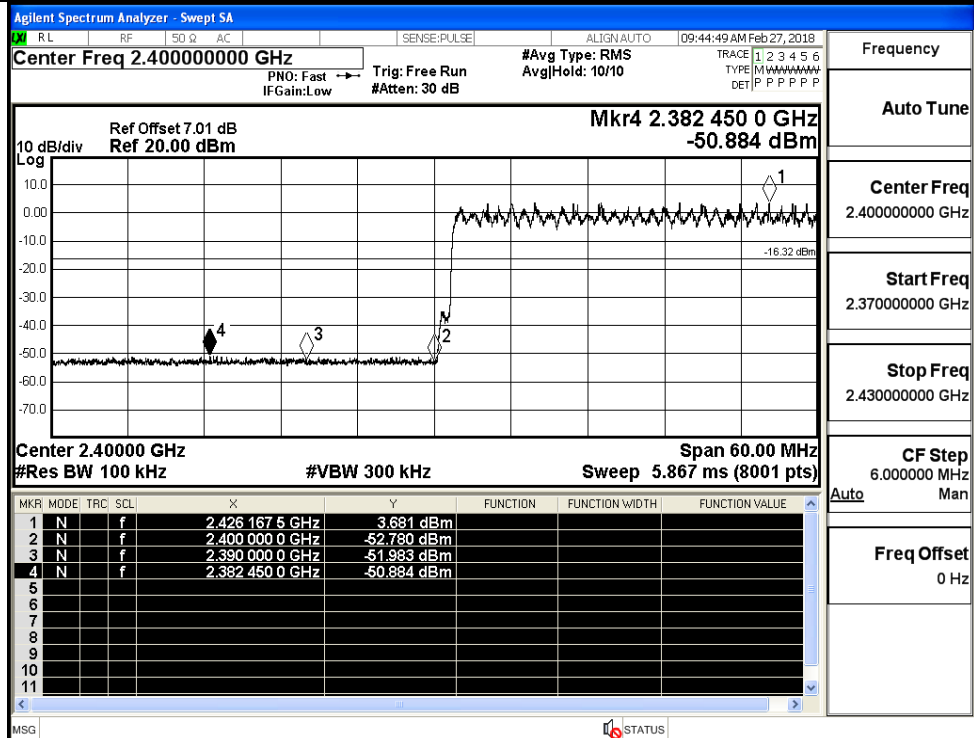
Start Freq  
2.310000000 GHz

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

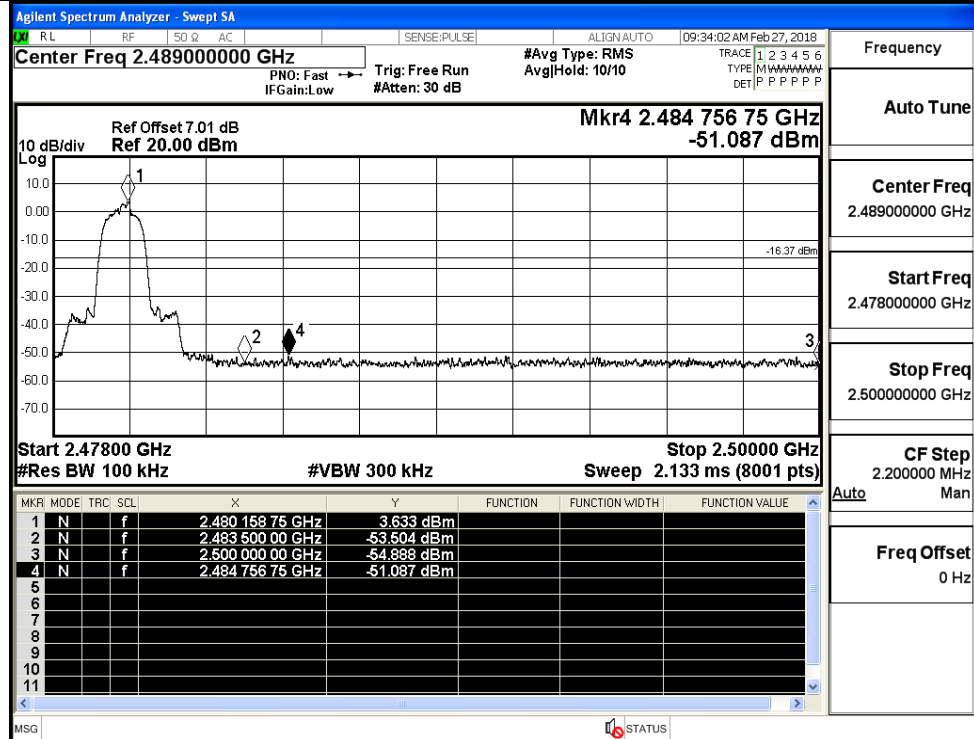
Start Freq  
2.370000000 GHz

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

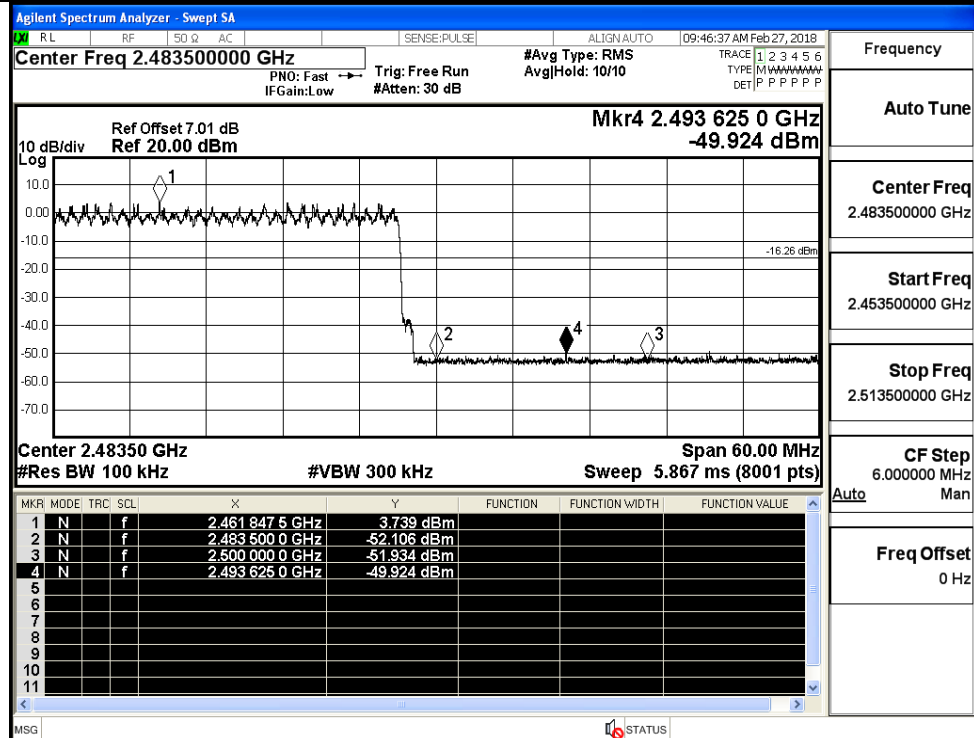
Stop Freq  
2.500000000 GHz

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  
2.453500000 GHz

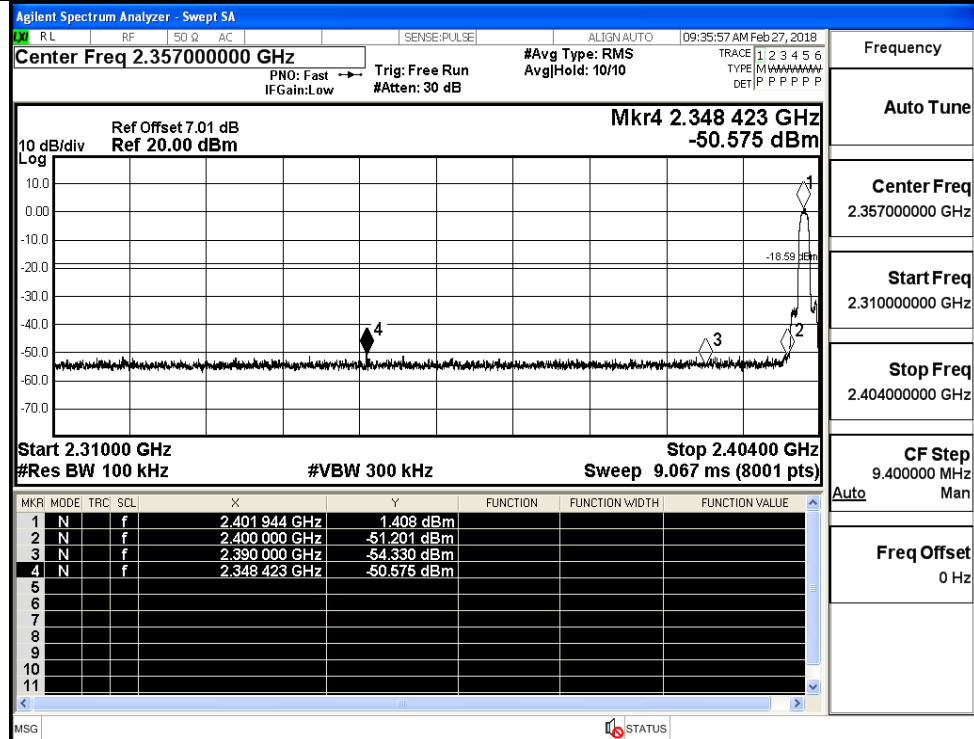
Stop Freq  
2.513500000 GHz

CF Step  
6.000000 MHz

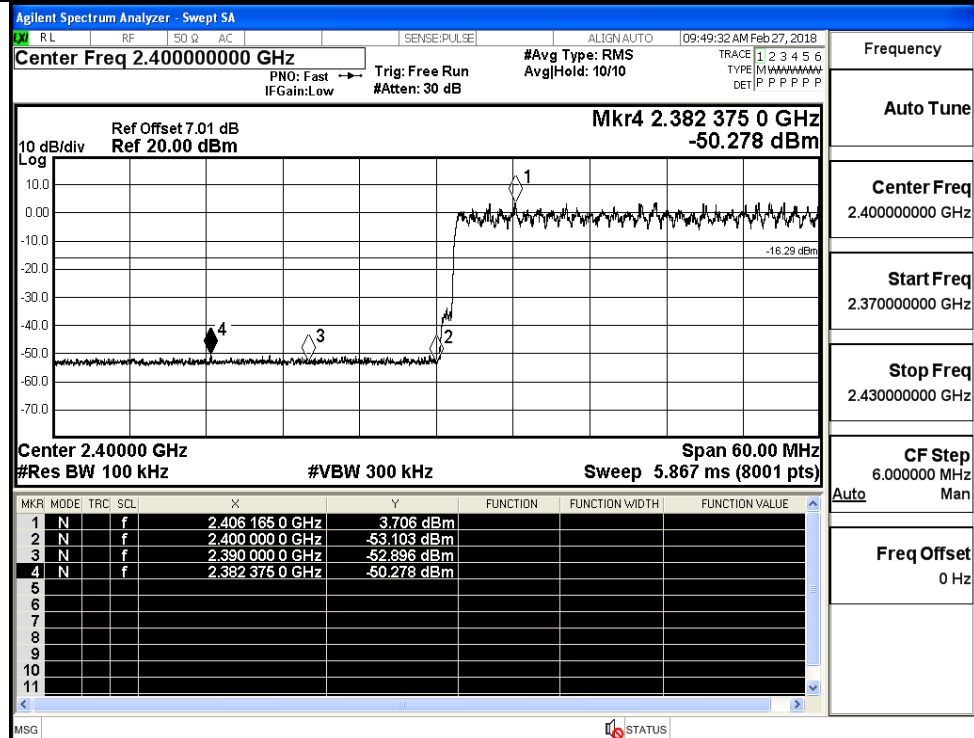
Auto Man

Freq Offset  
0 Hz

8DPSK/LCH/No Hop

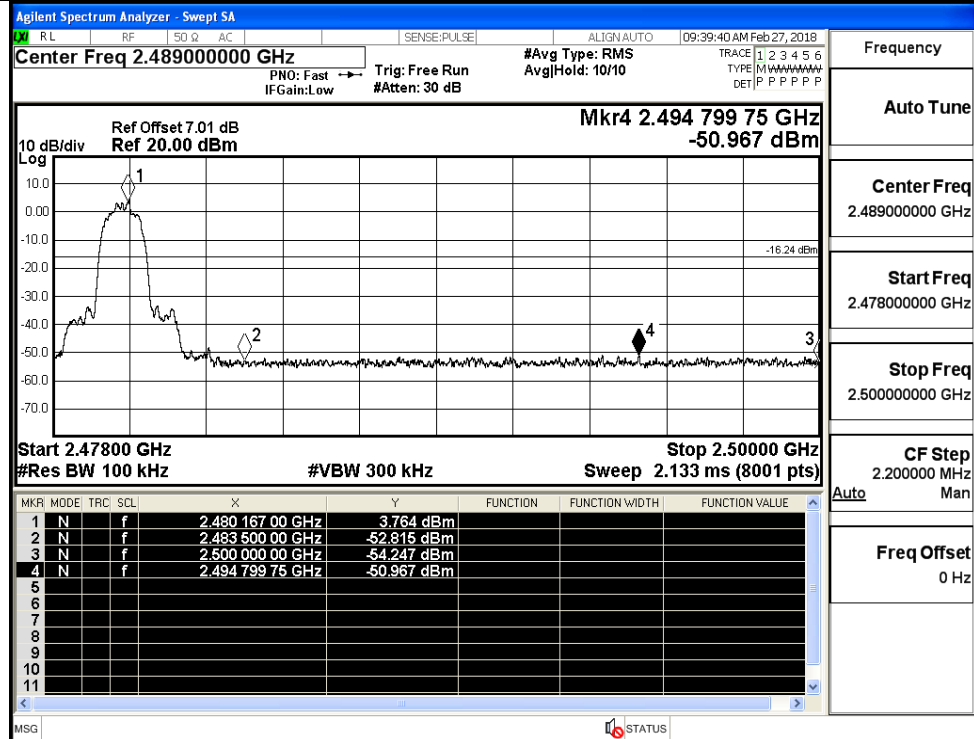


8DPSK/LCH/Hop

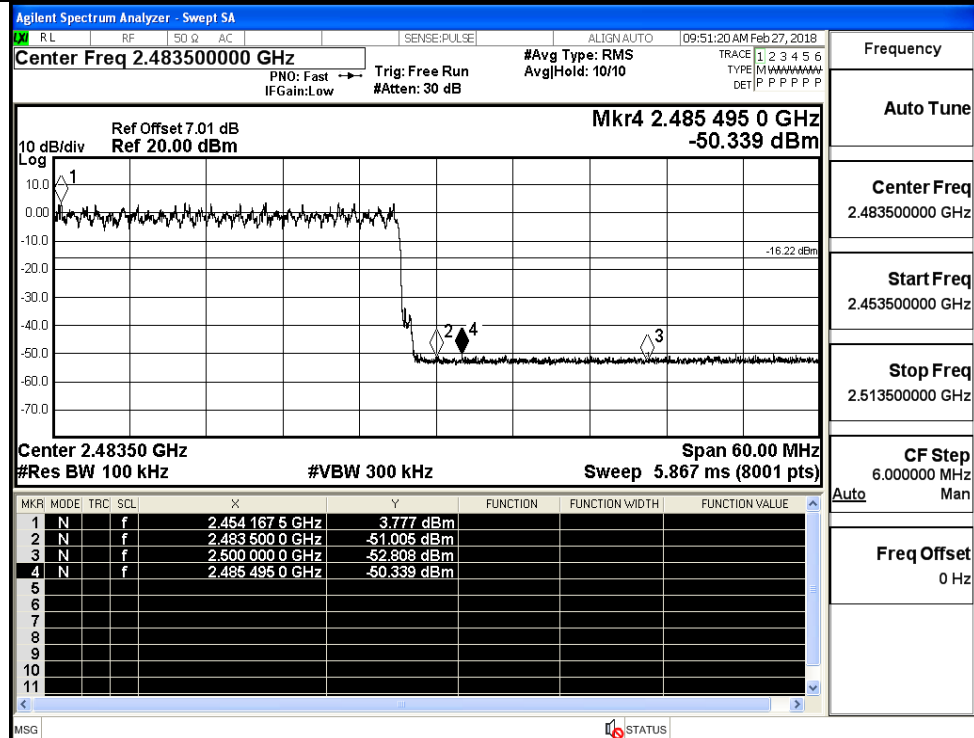




8DPSK/HCH/No Hop



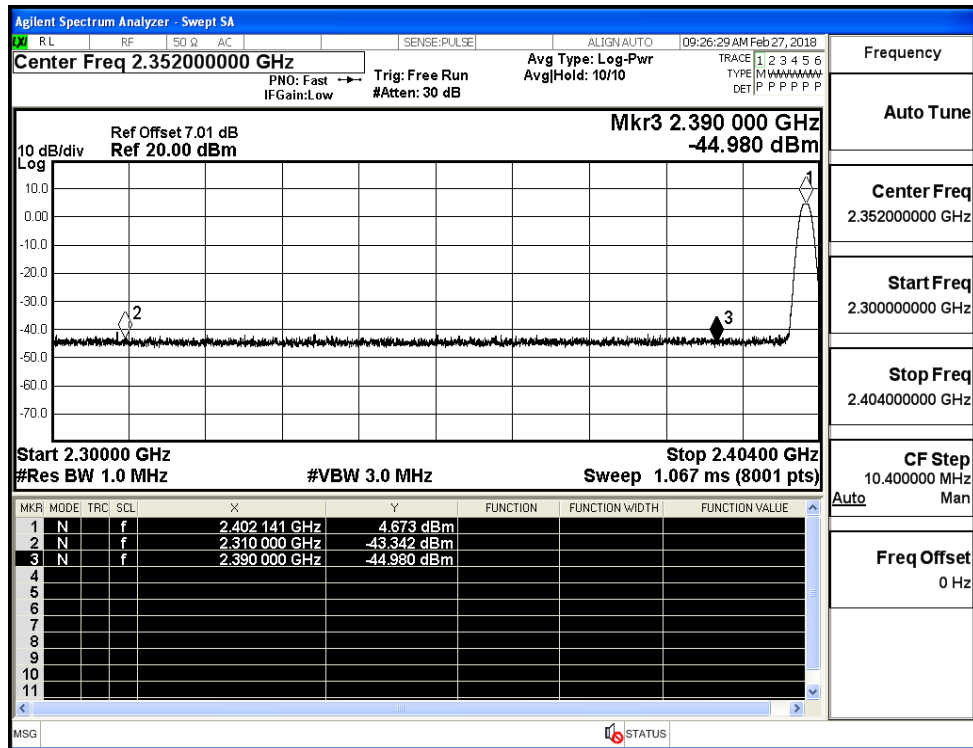
8DPSK/HCH/Hop



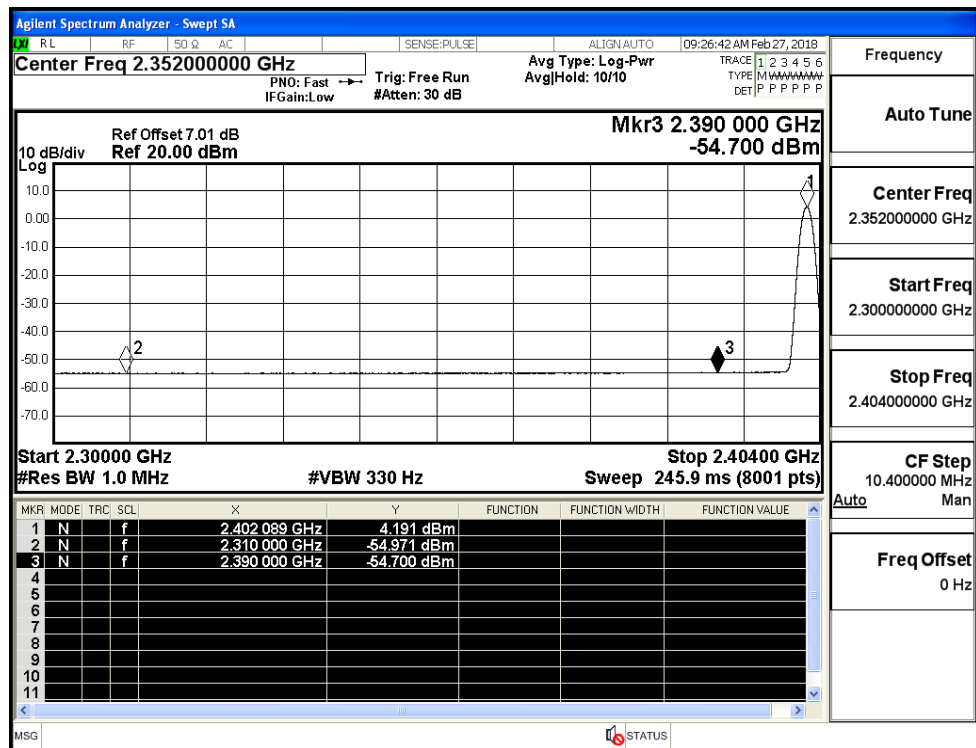
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.34	2.3	0	54.22	PEAK	74	PASS
	Off	2310.0	-54.97	2.3	0	42.59	AV	54	PASS
	Off	2390.0	-44.98	2.3	0	52.58	PEAK	74	PASS
	Off	2390.0	-54.70	2.3	0	42.86	AV	54	PASS
	Off	2483.5	-44.34	2.3	0	53.22	PEAK	74	PASS
	Off	2483.5	-54.15	2.3	0	43.41	AV	54	PASS
	Off	2500.0	-44.72	2.3	0	52.84	PEAK	74	PASS
	Off	2500.0	-54.27	2.3	0	43.29	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-44.85	2.3	0	52.71	PEAK	74	PASS
	Off	2310.0	-54.87	2.3	0	42.69	AV	54	PASS
	Off	2390.0	-43.46	2.3	0	54.10	PEAK	74	PASS
	Off	2390.0	-54.52	2.3	0	43.04	AV	54	PASS
	Off	2483.5	-44.86	2.3	0	52.70	PEAK	74	PASS
	Off	2483.5	-54.02	2.3	0	43.54	AV	54	PASS
	Off	2500.0	-43.90	2.3	0	53.66	PEAK	74	PASS
	Off	2500.0	-54.29	2.3	0	43.27	AV	54	PASS
8DPSK	Off	2310.0	-44.64	2.3	0	52.92	PEAK	74	PASS
	Off	2310.0	-54.94	2.3	0	42.62	AV	54	PASS
	Off	2390.0	-44.45	2.3	0	53.11	PEAK	74	PASS
	Off	2390.0	-54.69	2.3	0	42.87	AV	54	PASS
	Off	2483.5	-44.31	2.3	0	53.25	PEAK	74	PASS
	Off	2483.5	-54.08	2.3	0	43.48	AV	54	PASS
	Off	2500.0	-43.09	2.3	0	54.47	PEAK	74	PASS
	Off	2500.0	-54.17	2.3	0	43.39	AV	54	PASS

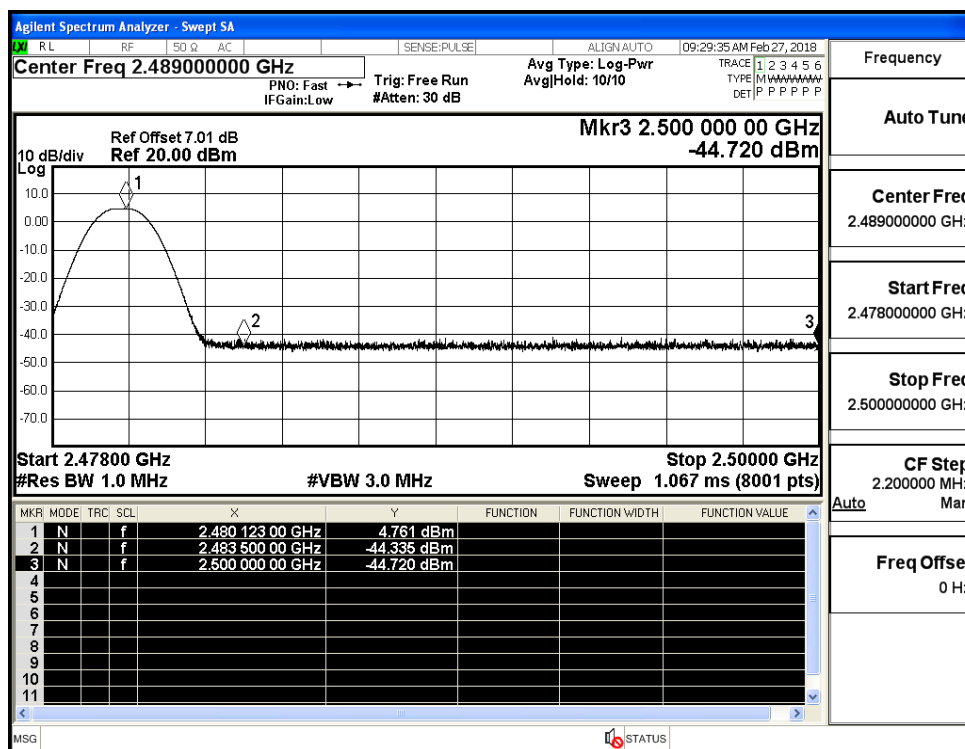
## Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



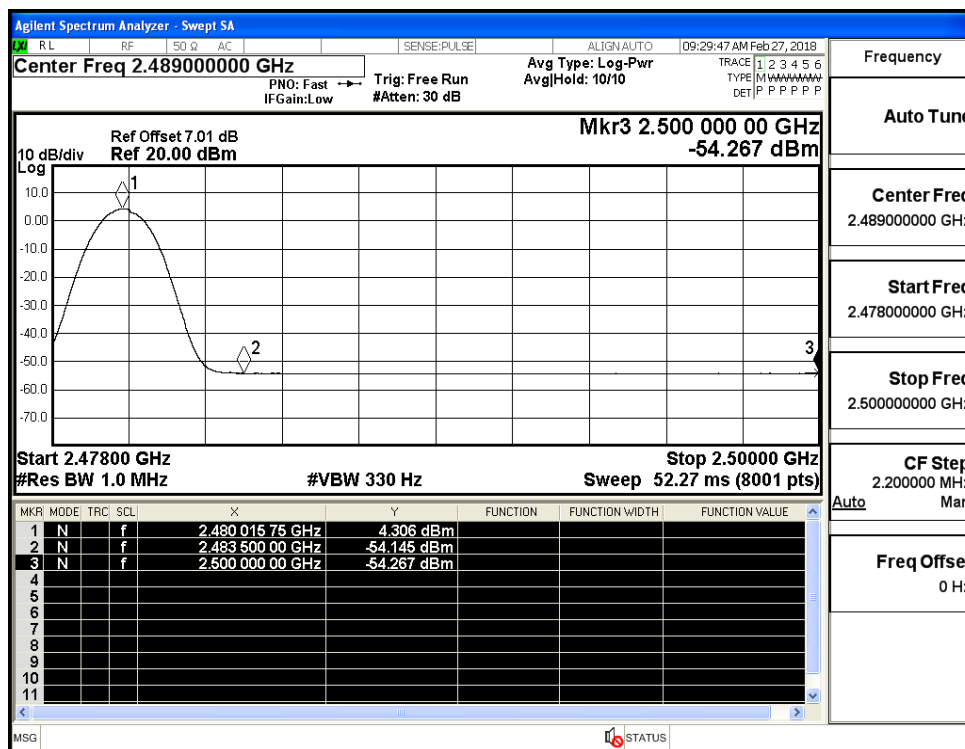
## Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)

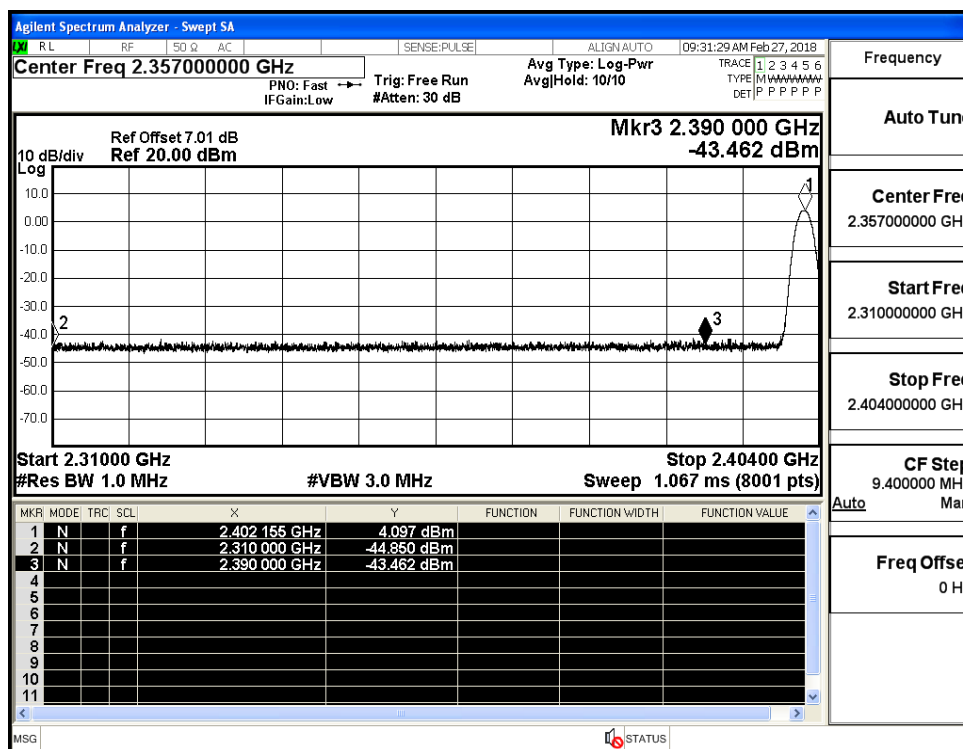
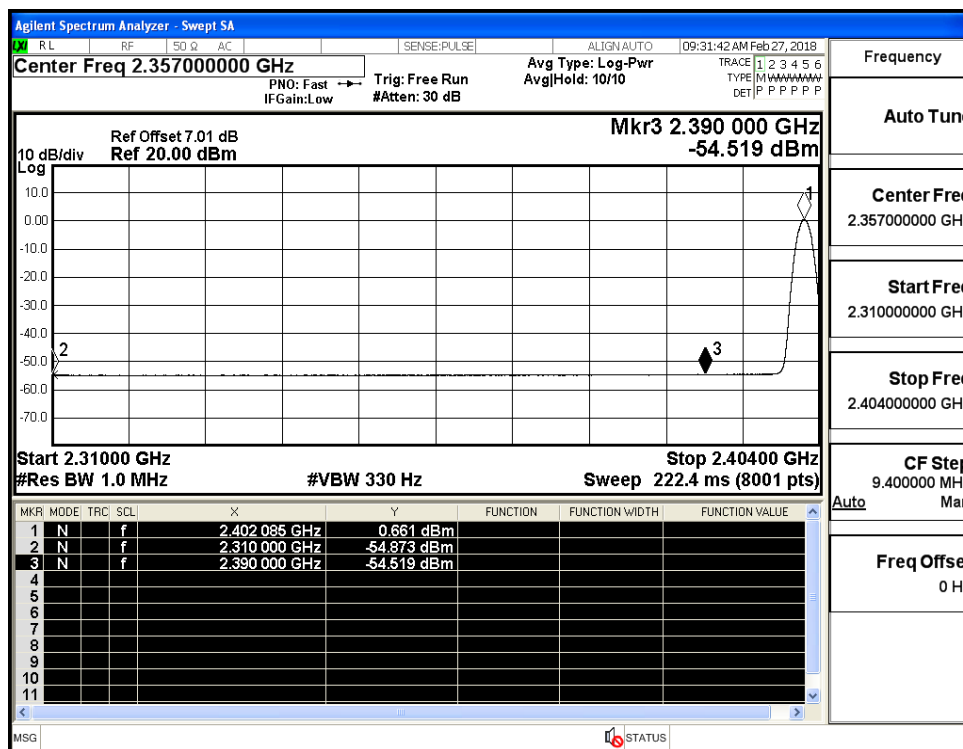


## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (High Channel)

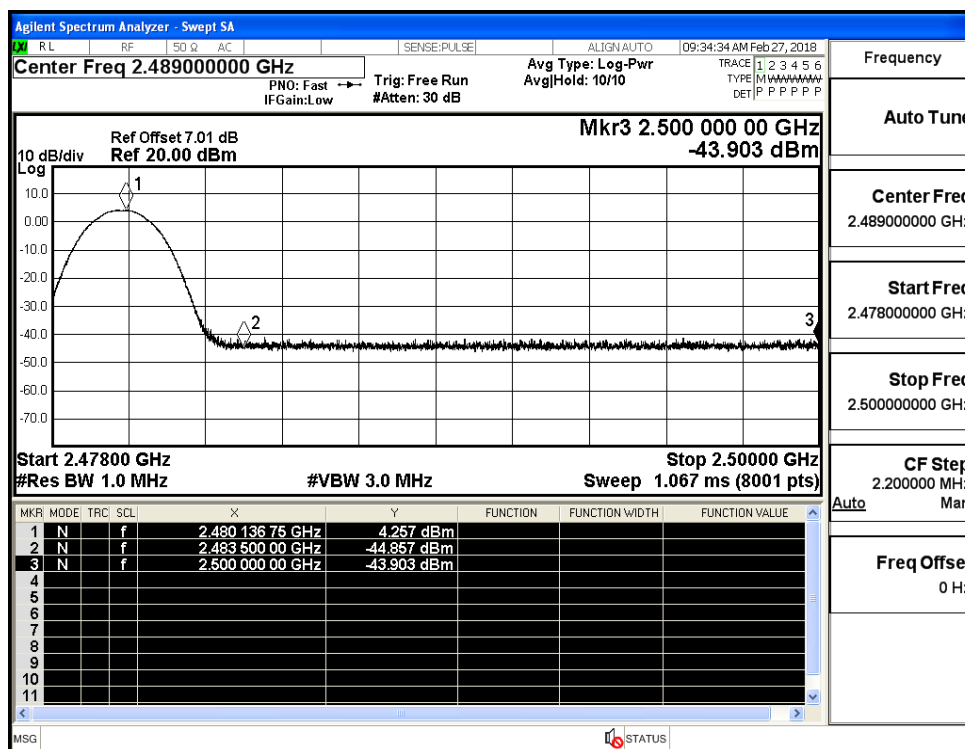


## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (High Channel)

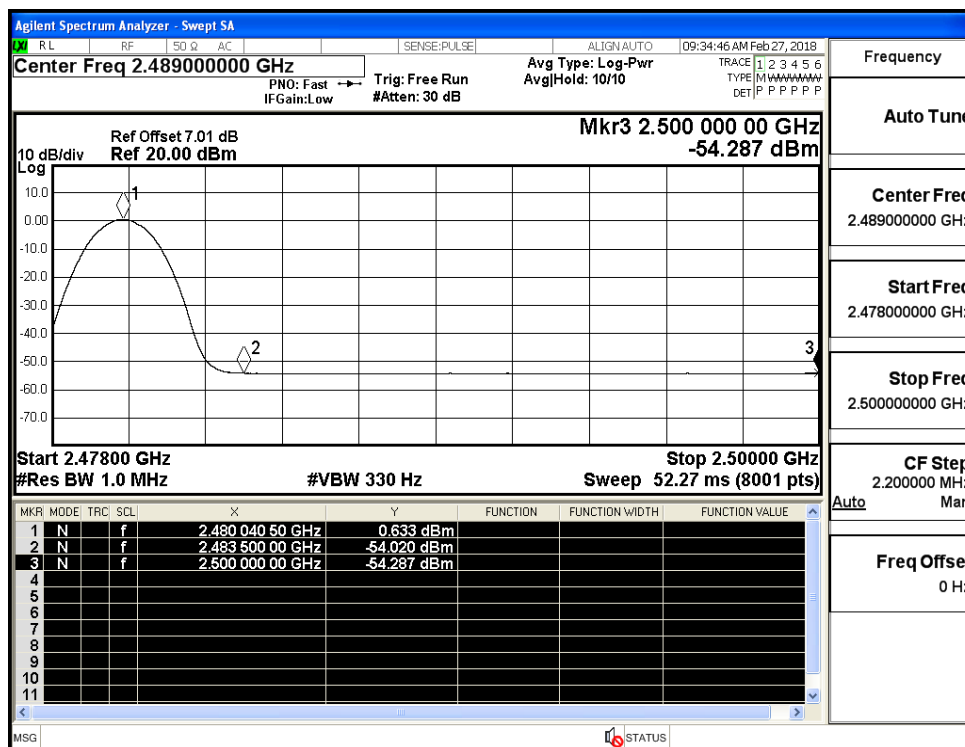


Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)

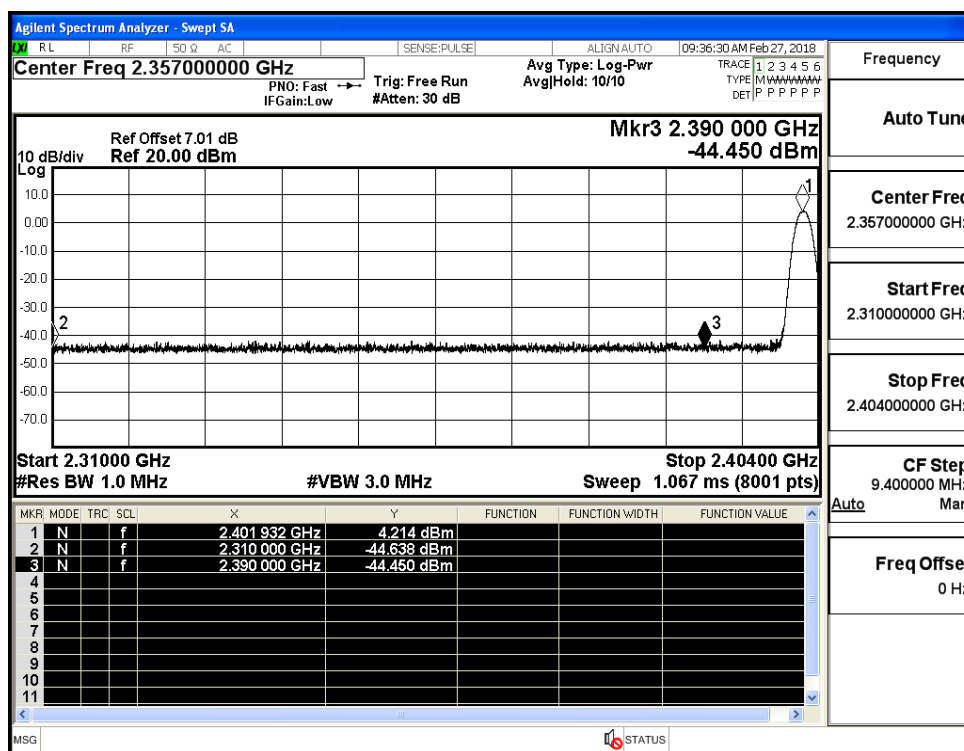
## Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (High Channel)



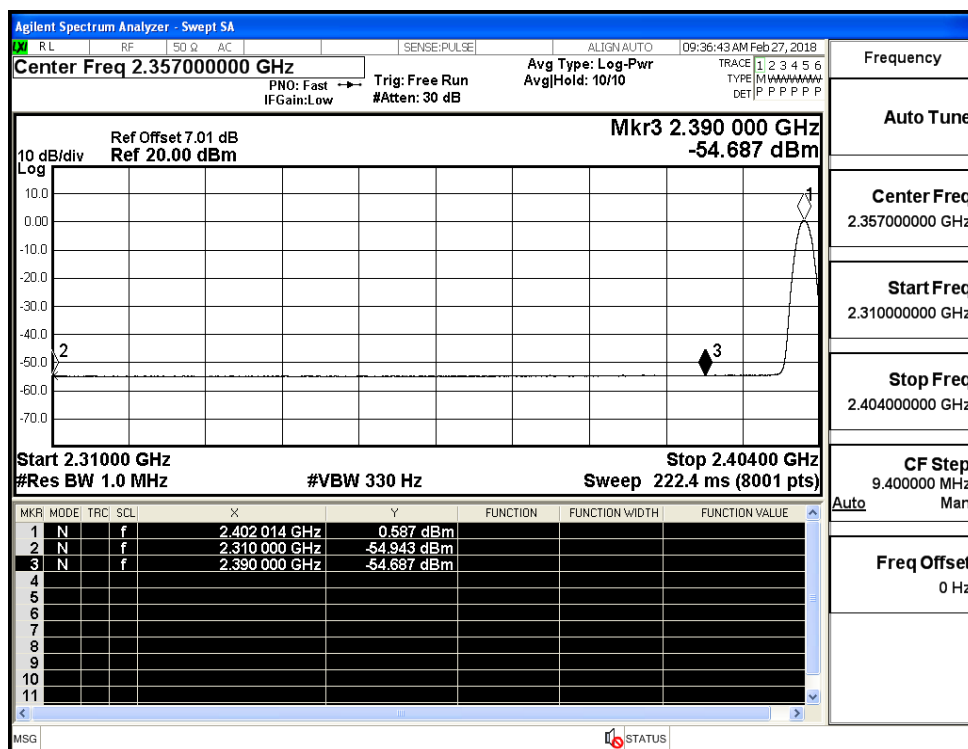
## Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (High Channel)



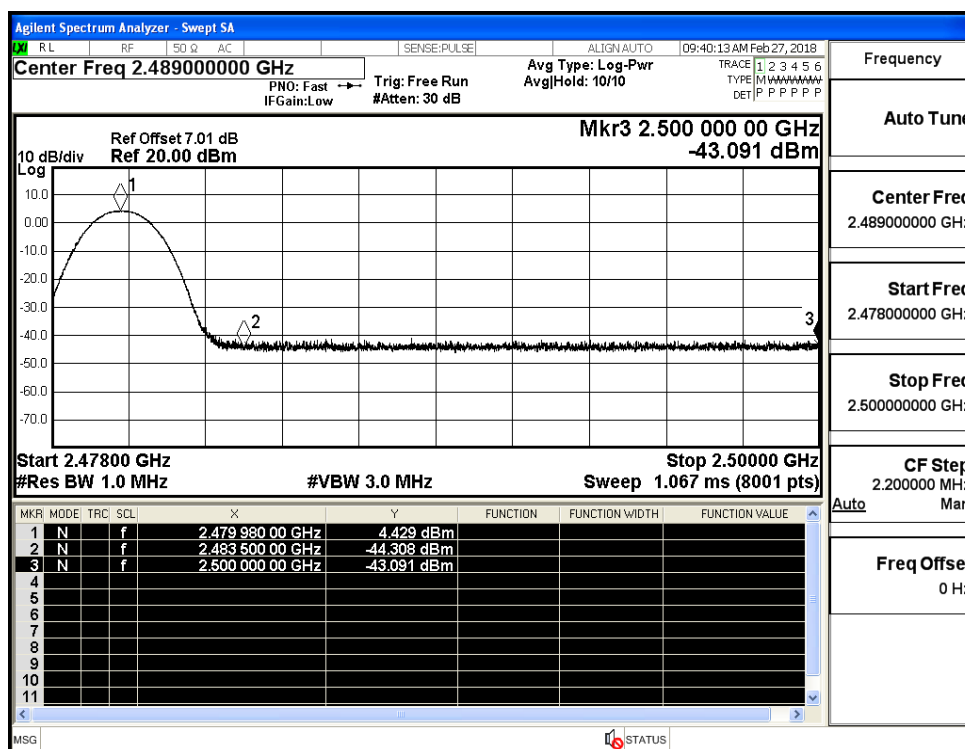
## Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



## 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)

