

## Appendix A

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

Product Name: Sirius A

Trade Mark: OCKEL

Test Model: OCSA-0812

#### Environmental Conditions

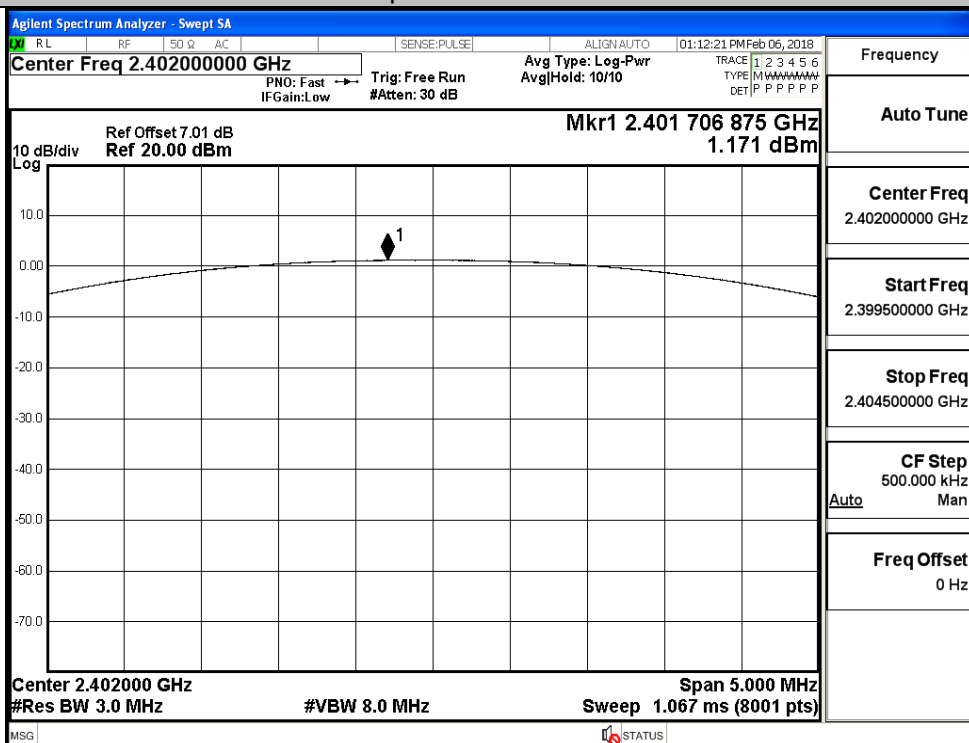
Temperature:	23.2 ° C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Ryan.Hu
Supervised by:	Jayden Zhuo

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

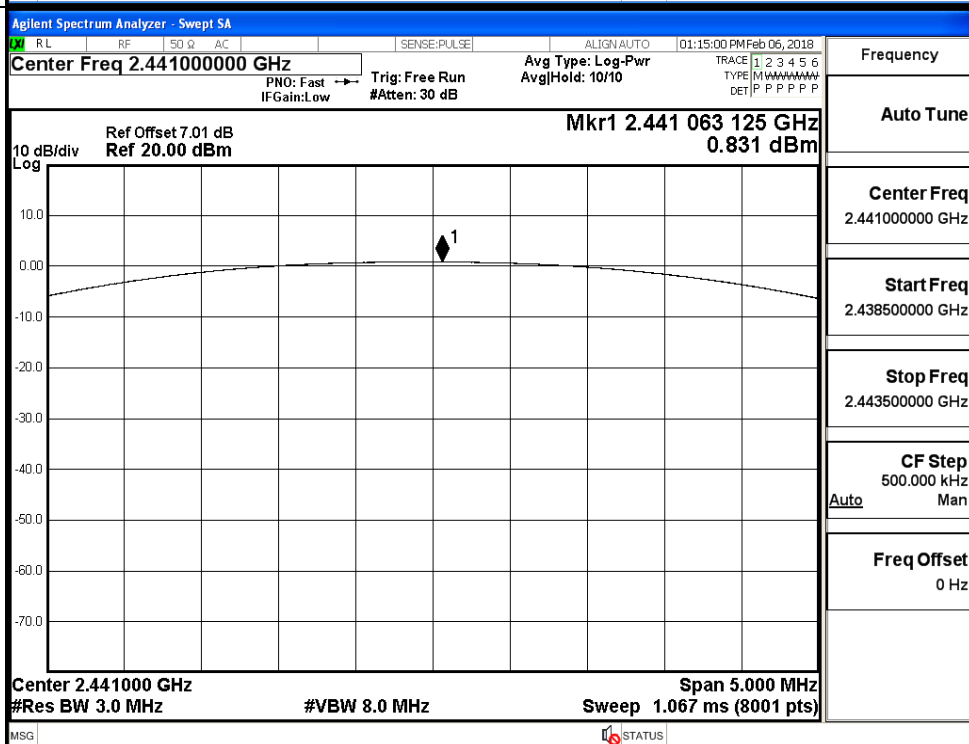
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.171	30	PASS
	MCH	0.831	30	PASS
	HCH	0.763	30	PASS
$\pi/4$ DQPSK	LCH	-1.180	21	PASS
	MCH	-1.326	21	PASS
	HCH	-1.613	21	PASS
8DPSK	LCH	-2.149	21	PASS
	MCH	-2.315	21	PASS
	HCH	-2.580	21	PASS

## Test Graphs

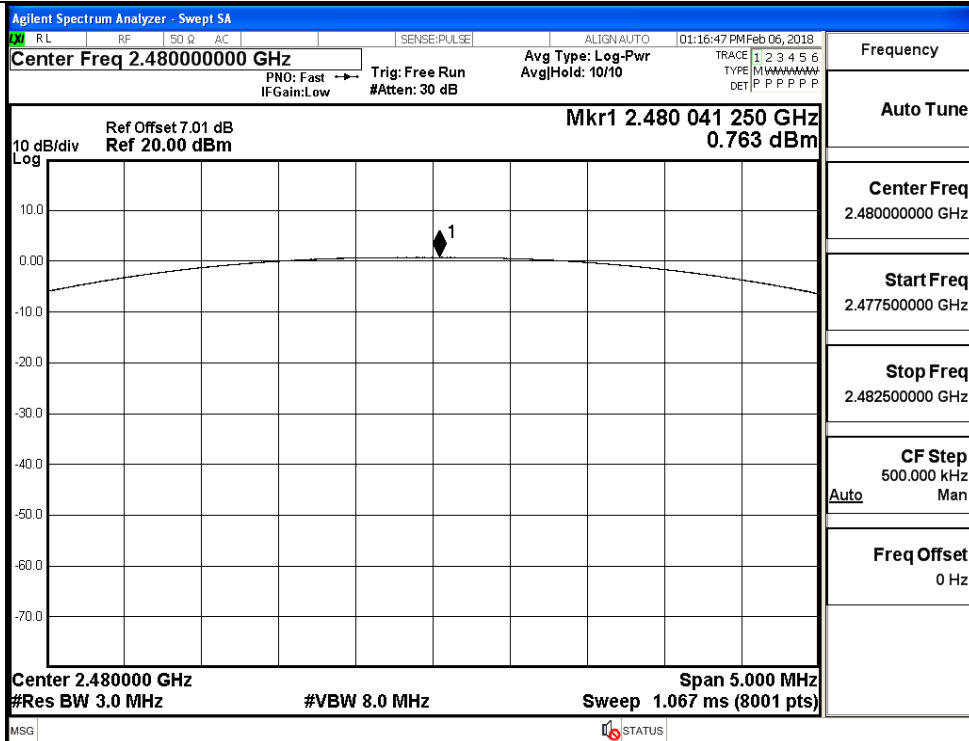
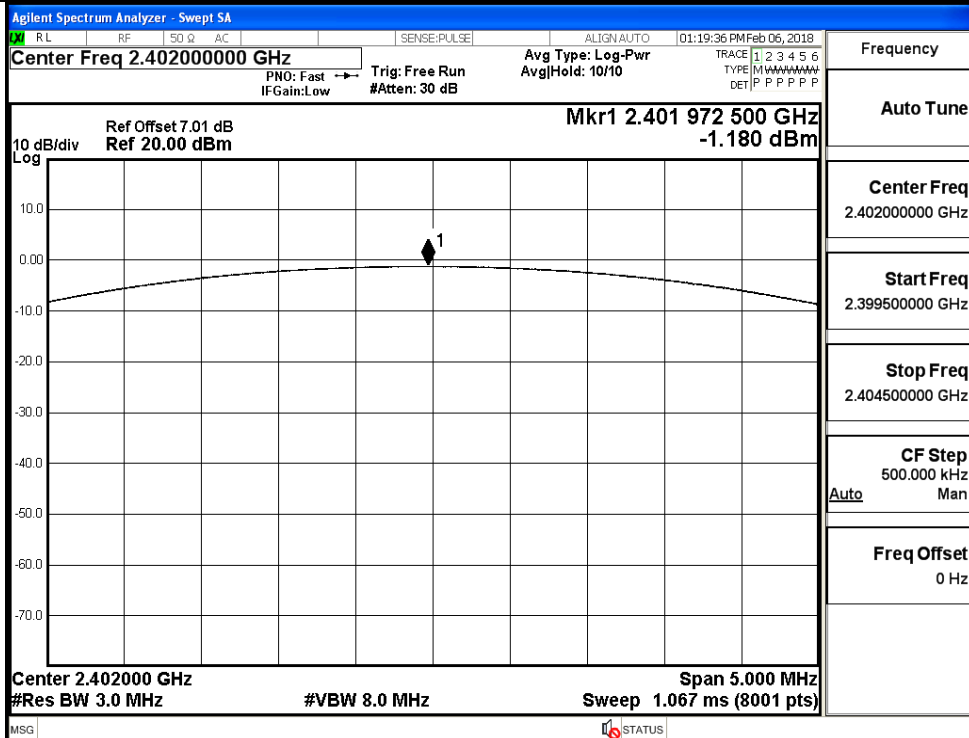
GFSK/LCH

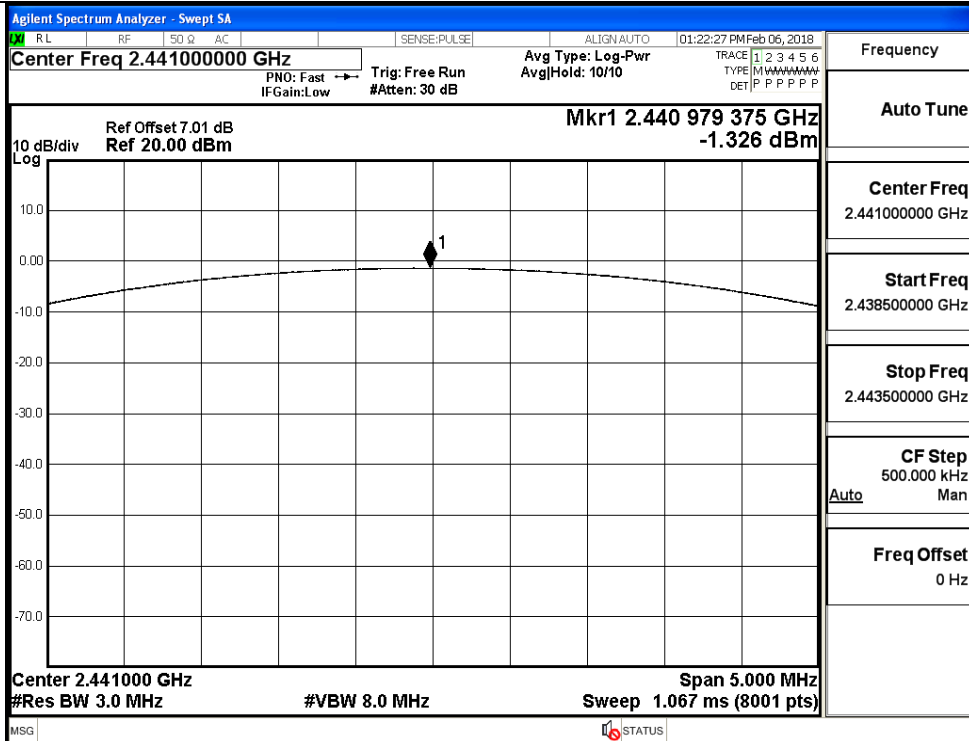
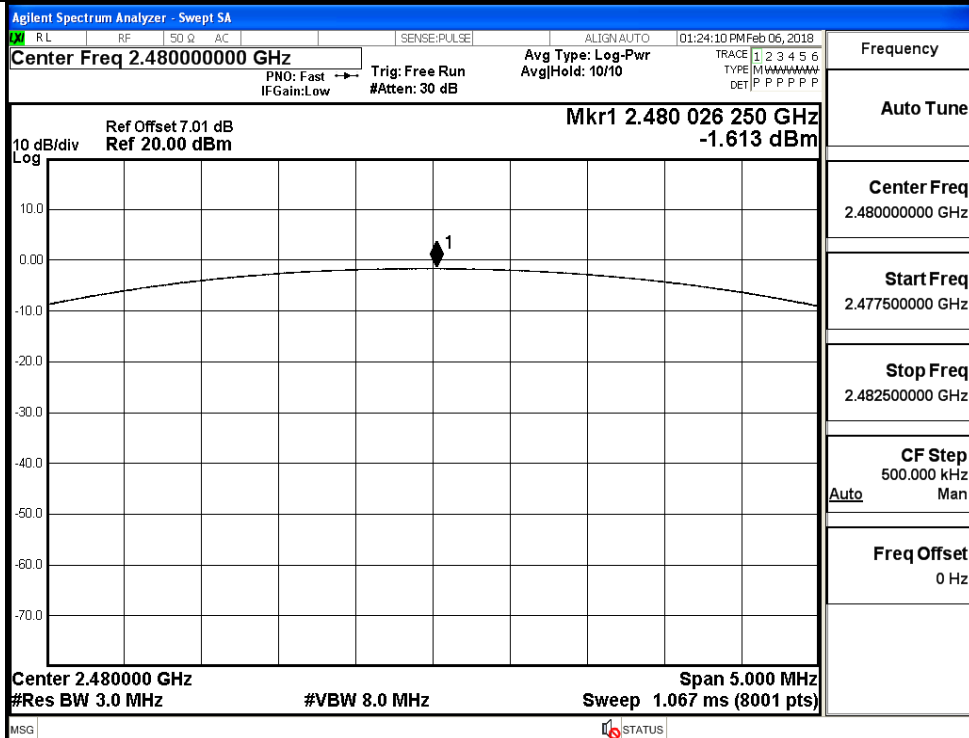


GFSK/MCH

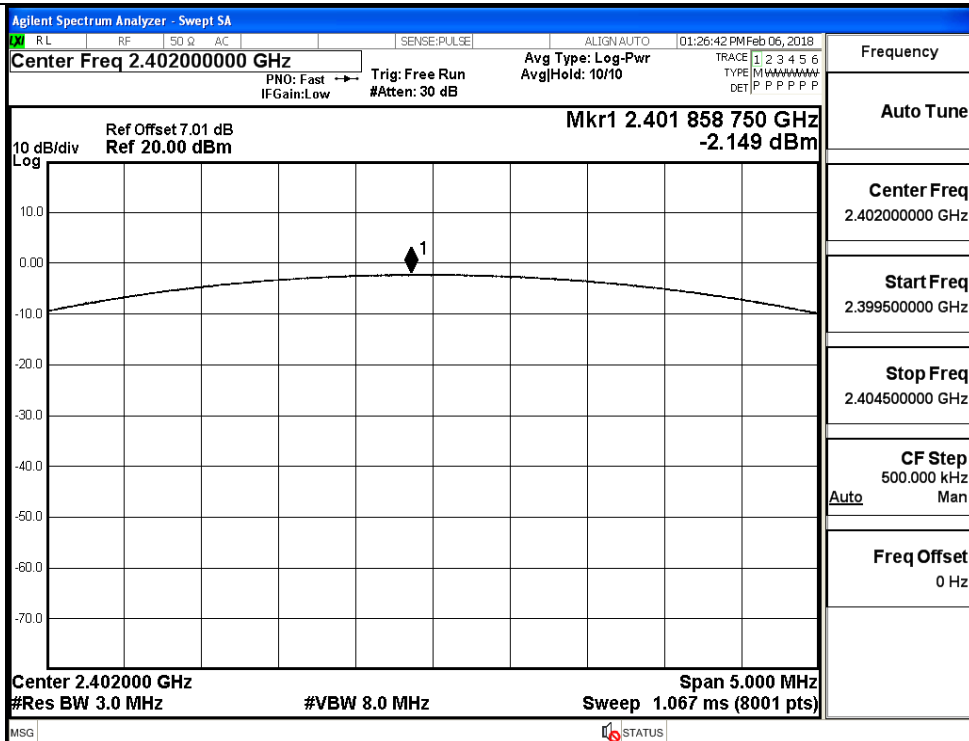


GFSK/HCH

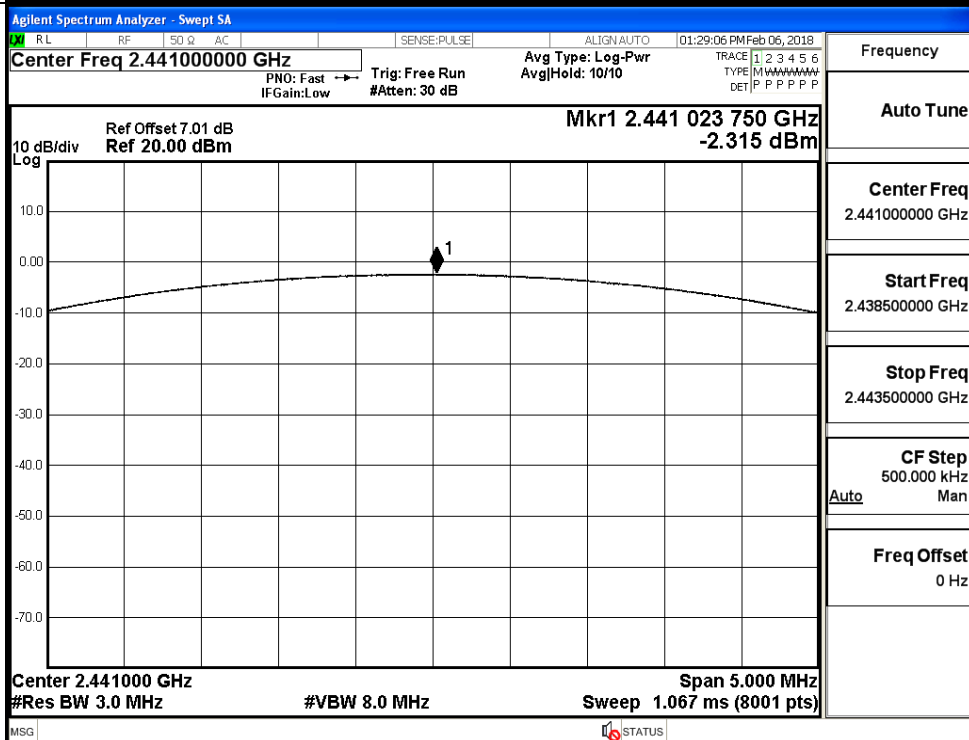
 $\pi/4$ DQPSK/LCH

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

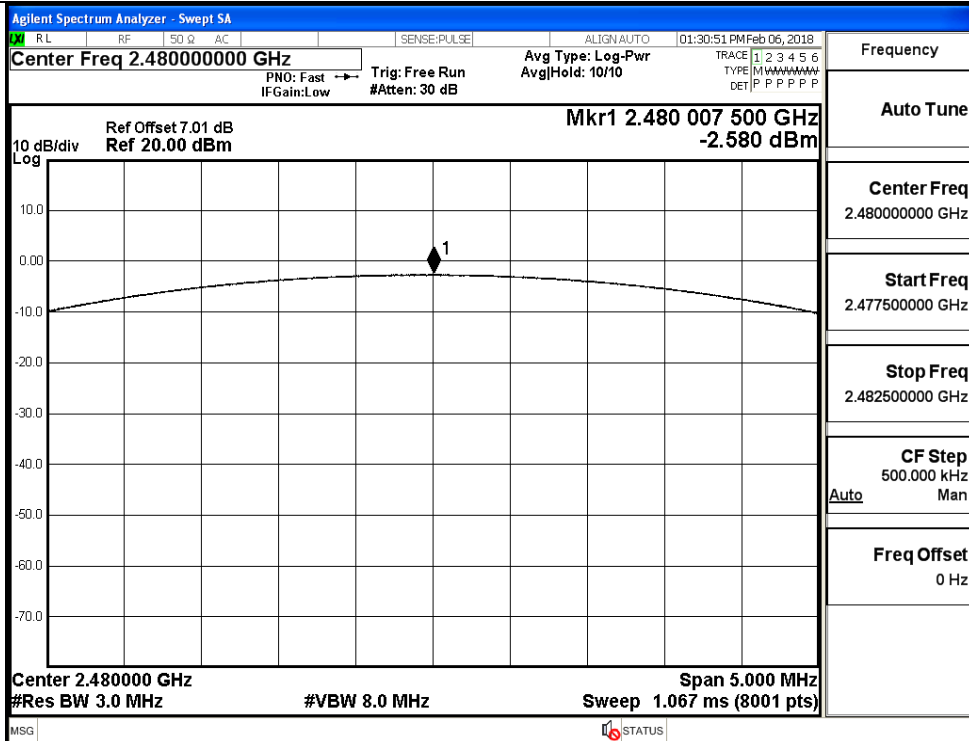
8DPSK/LCH



8DPSK/MCH



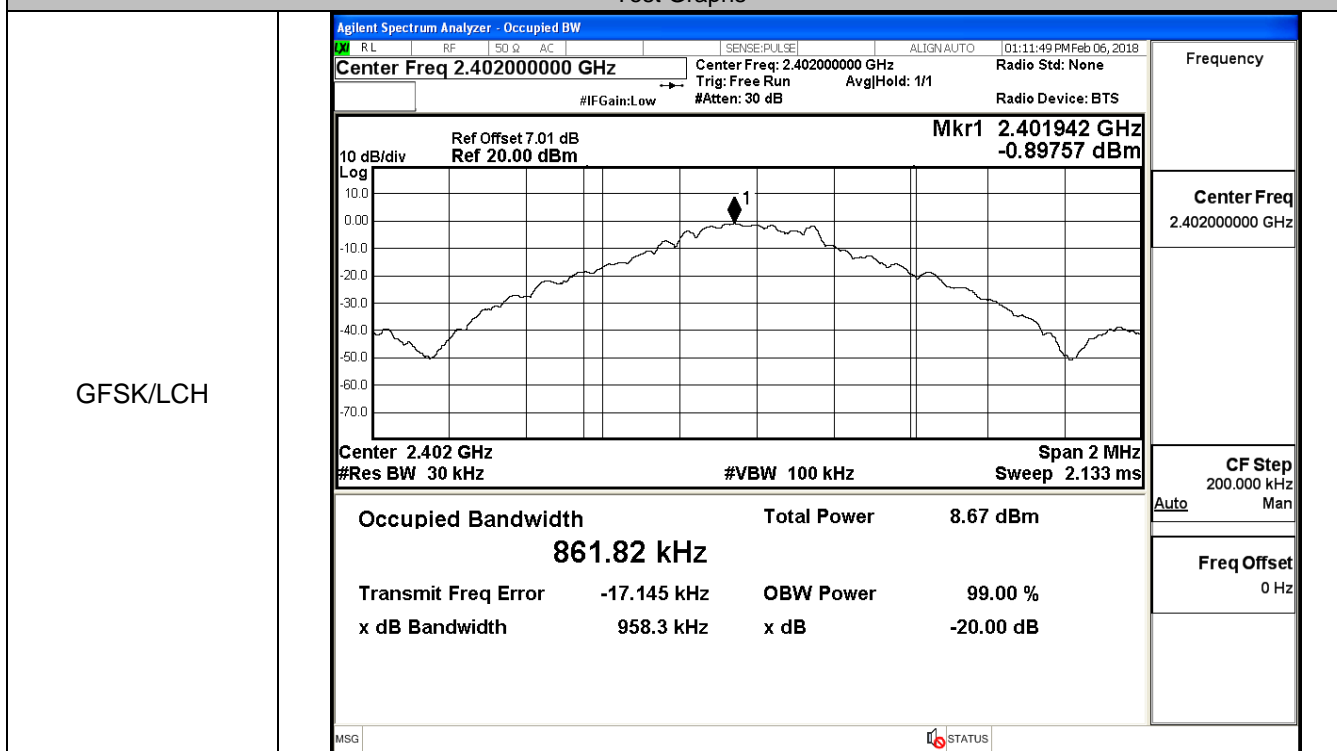
8DPSK/HCH



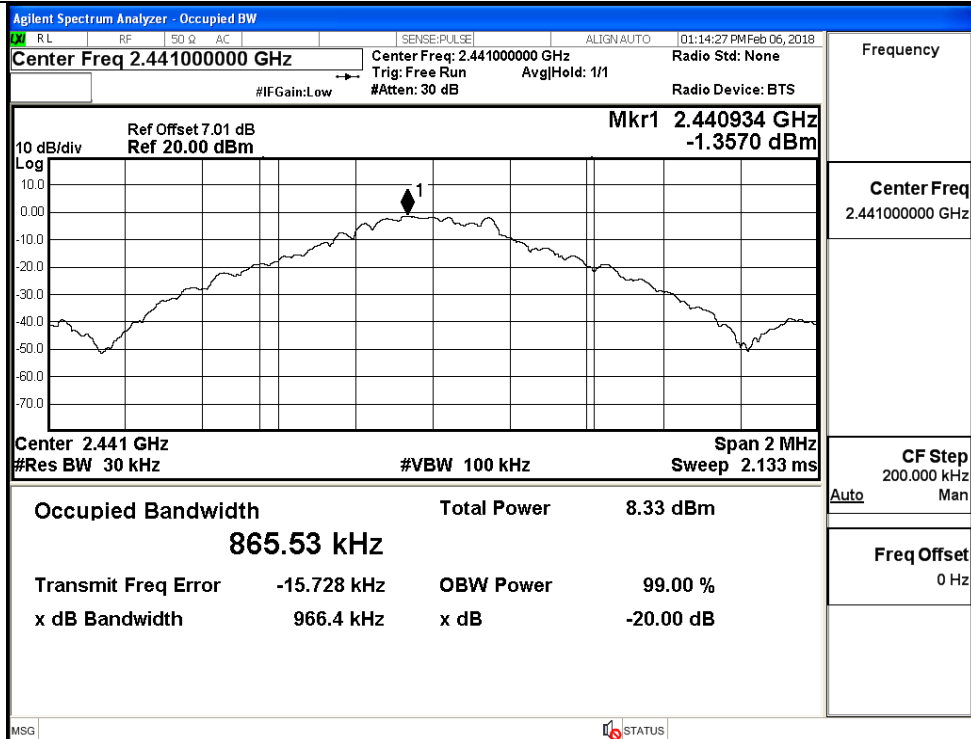
## A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9583	Not Specified	PASS
	MCH	0.9664	Not Specified	PASS
	HCH	0.9642	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.289	Not Specified	PASS
	MCH	1.440	Not Specified	PASS
	HCH	1.286	Not Specified	PASS
8DPSK	LCH	1.293	Not Specified	PASS
	MCH	1.292	Not Specified	PASS
	HCH	1.290	Not Specified	PASS

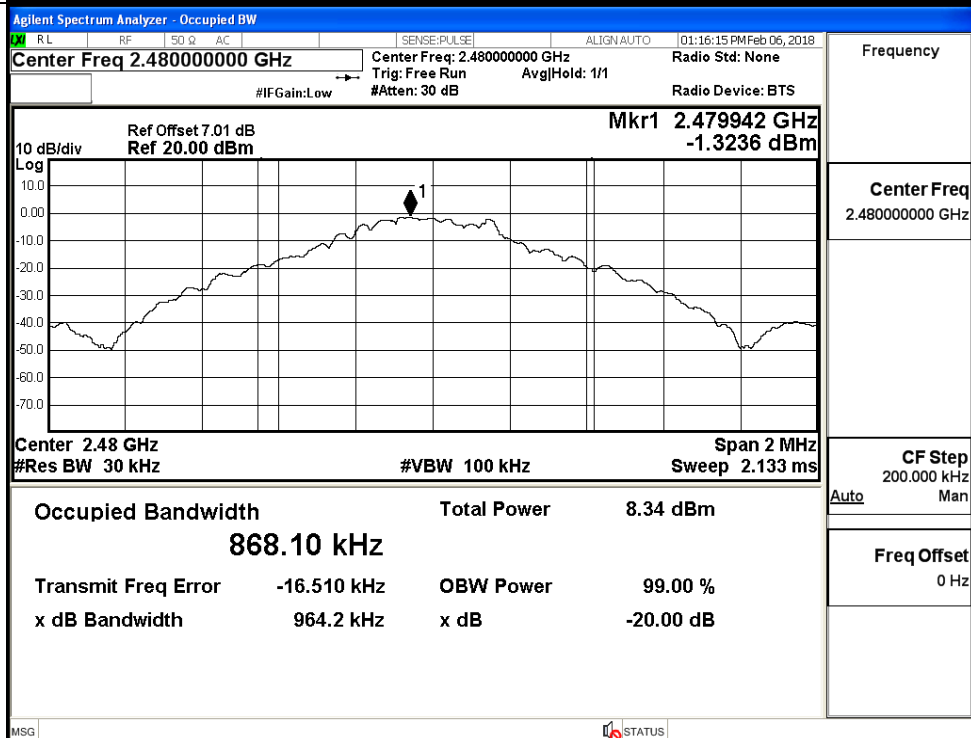
Test Graphs



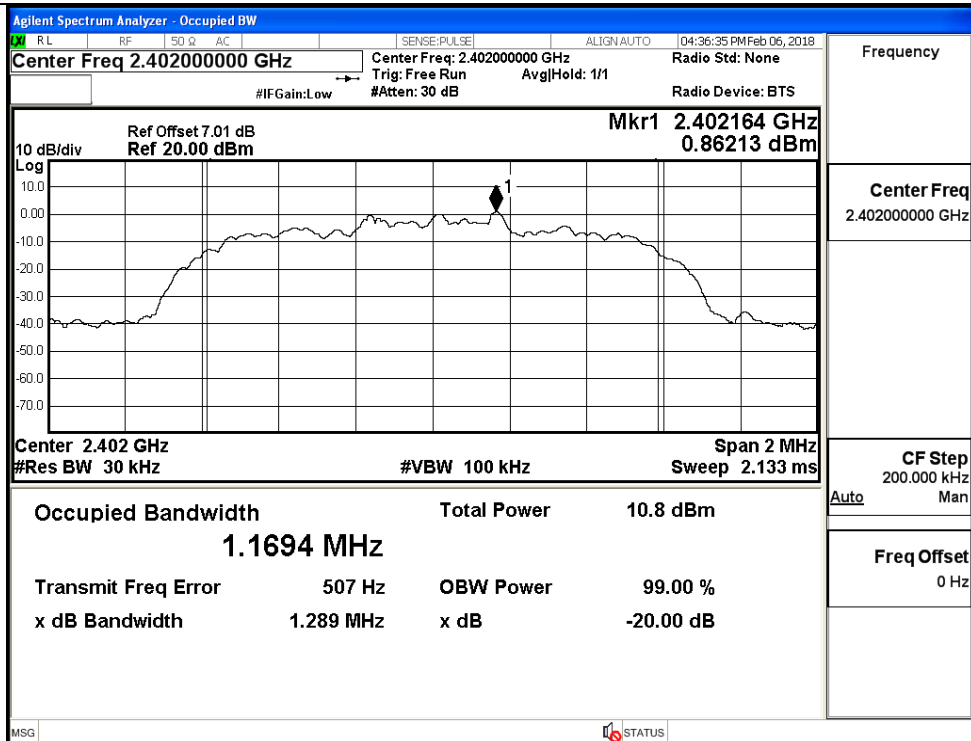
GFSK/MCH



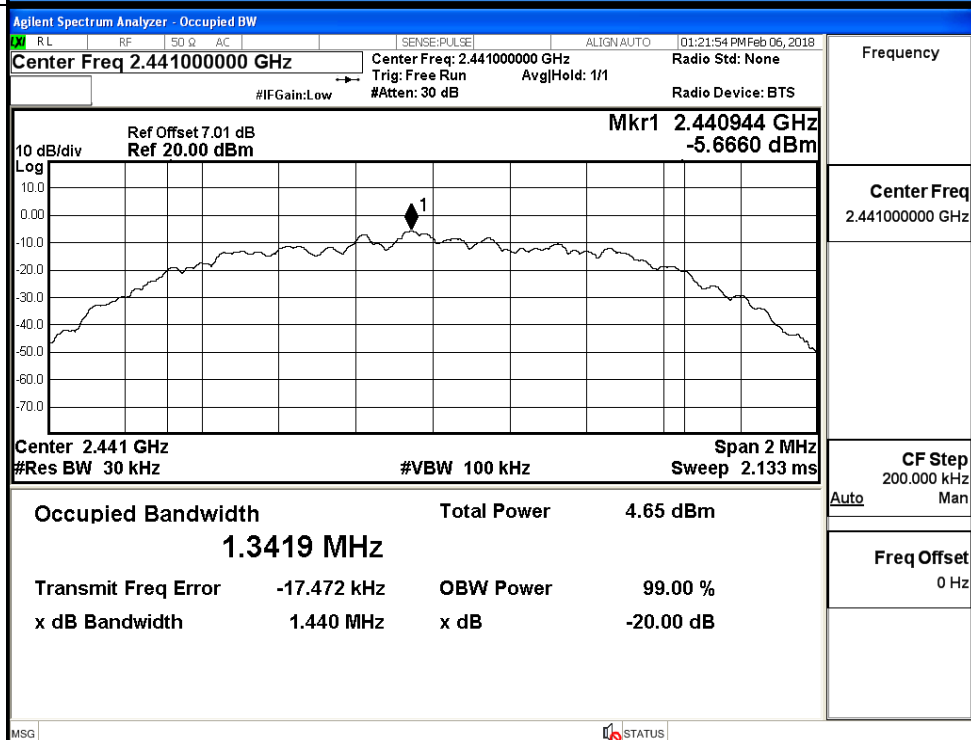
GFSK/HCH





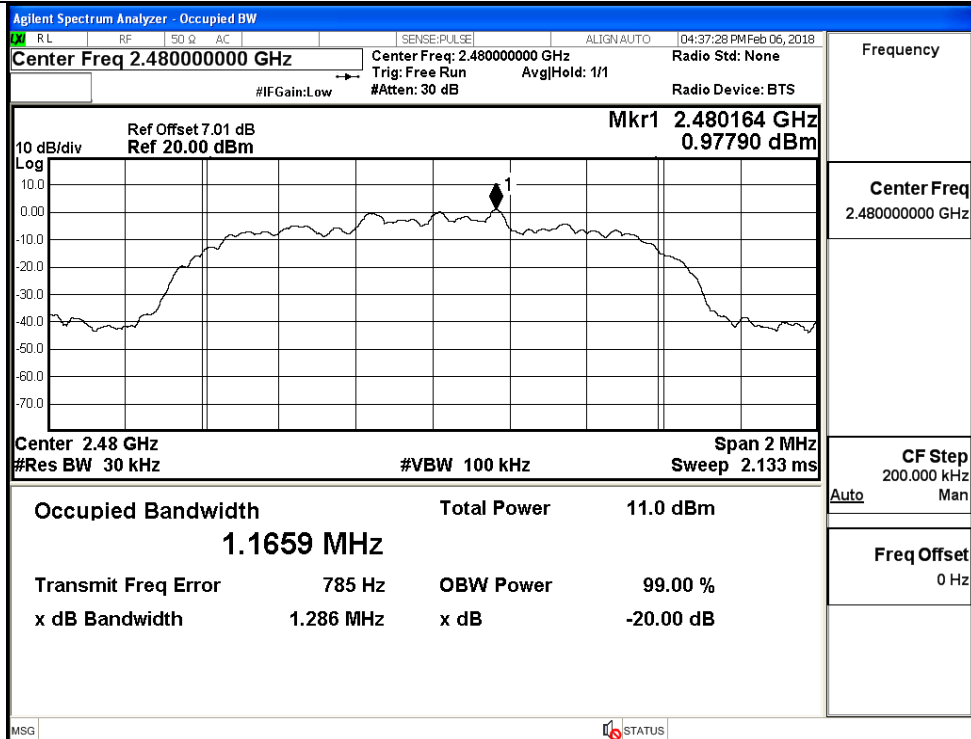
$\pi/4$ DQPSK/LCH

Frequency

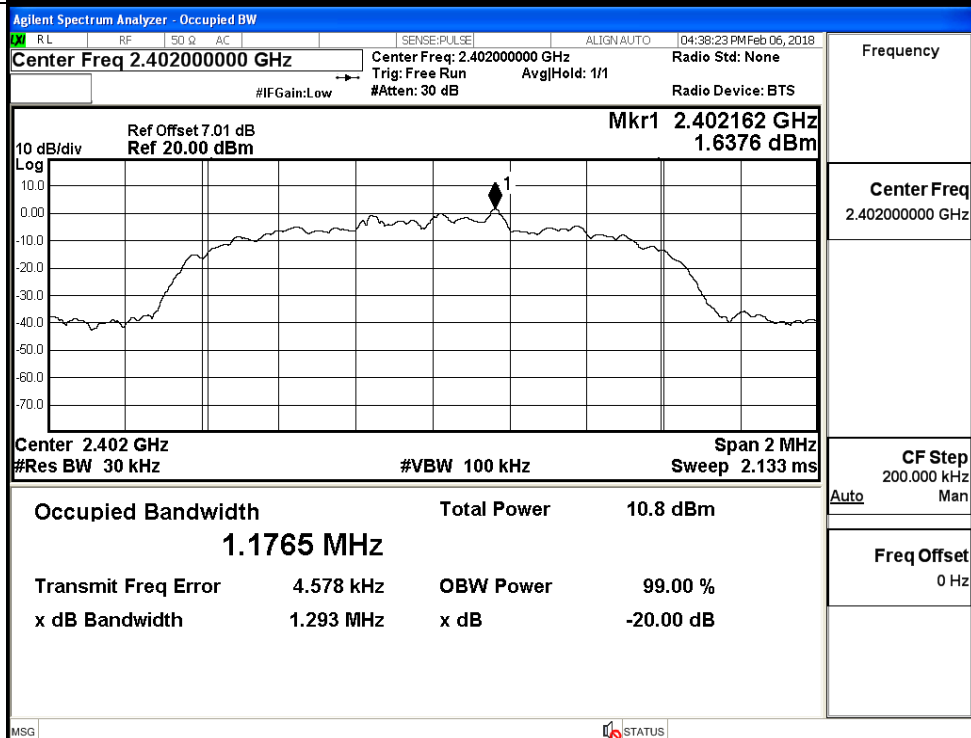
Center Freq  
2.402000000 GHzCF Step  
200.000 kHz  
ManFreq Offset  
0 Hz $\pi/4$ DQPSK/MCH

Frequency

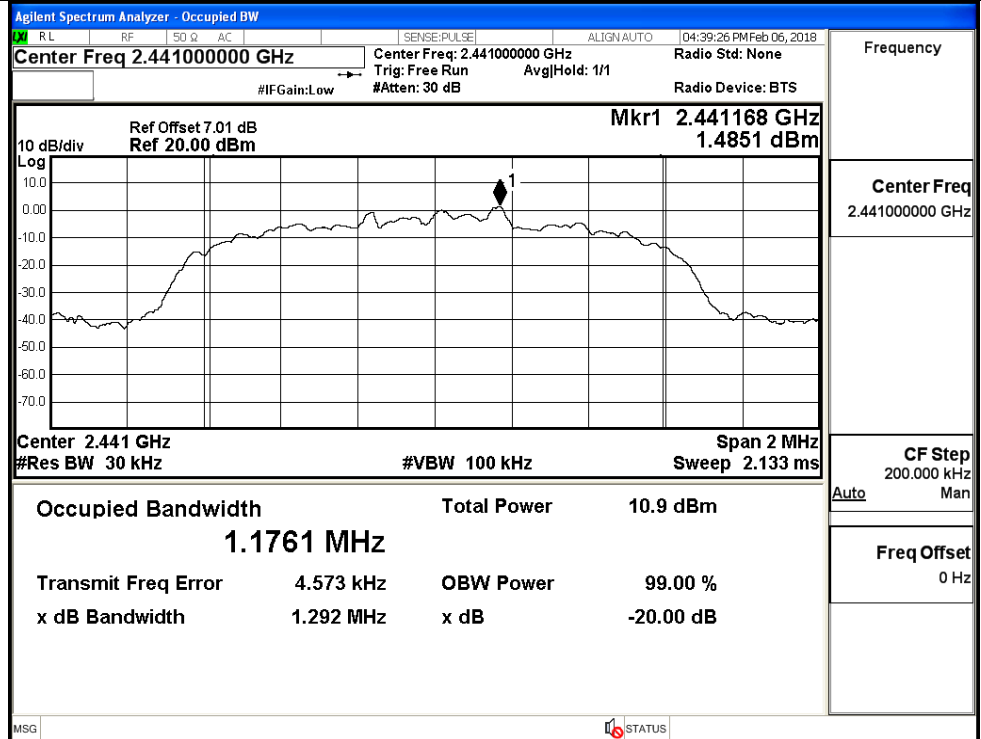
Center Freq  
2.441000000 GHzCF Step  
200.000 kHz  
ManFreq Offset  
0 Hz

$\pi/4$ DQPSK/HCH

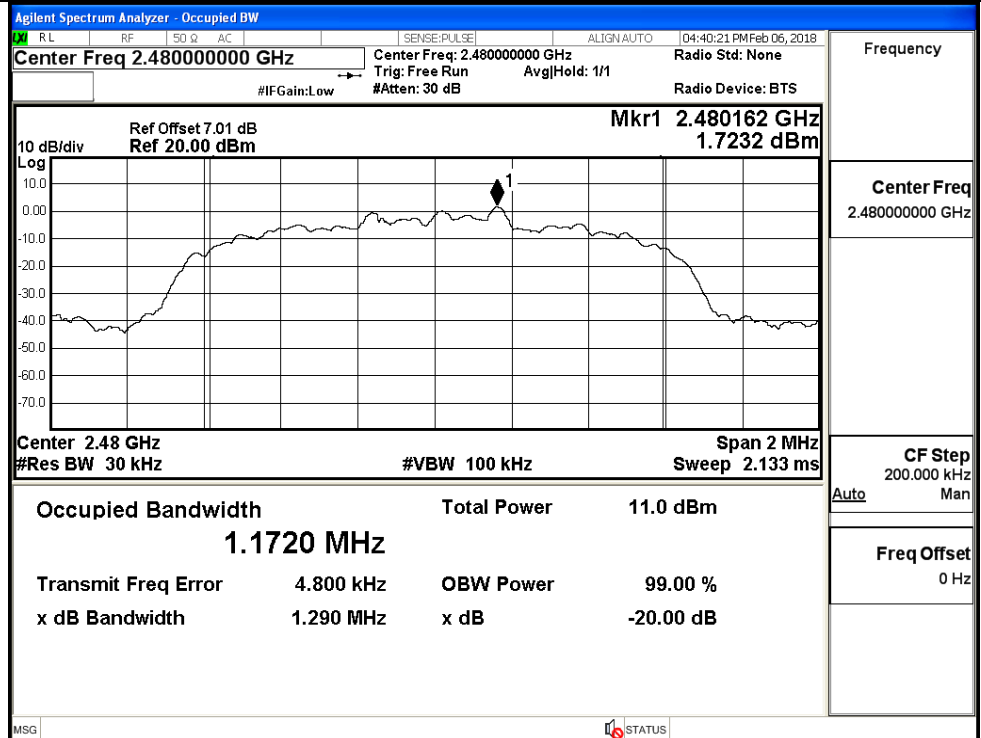
8DPSK/LCH



8DPSK/MCH



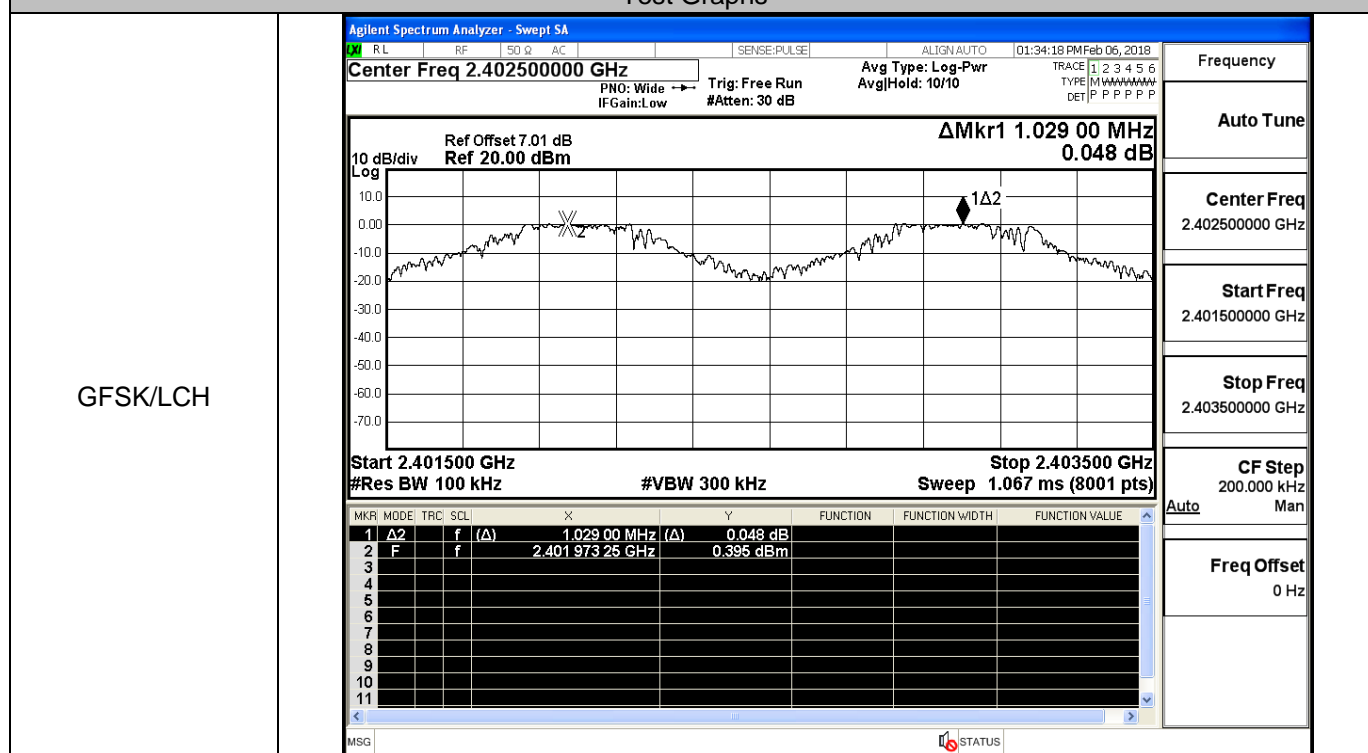
8DPSK/HCH



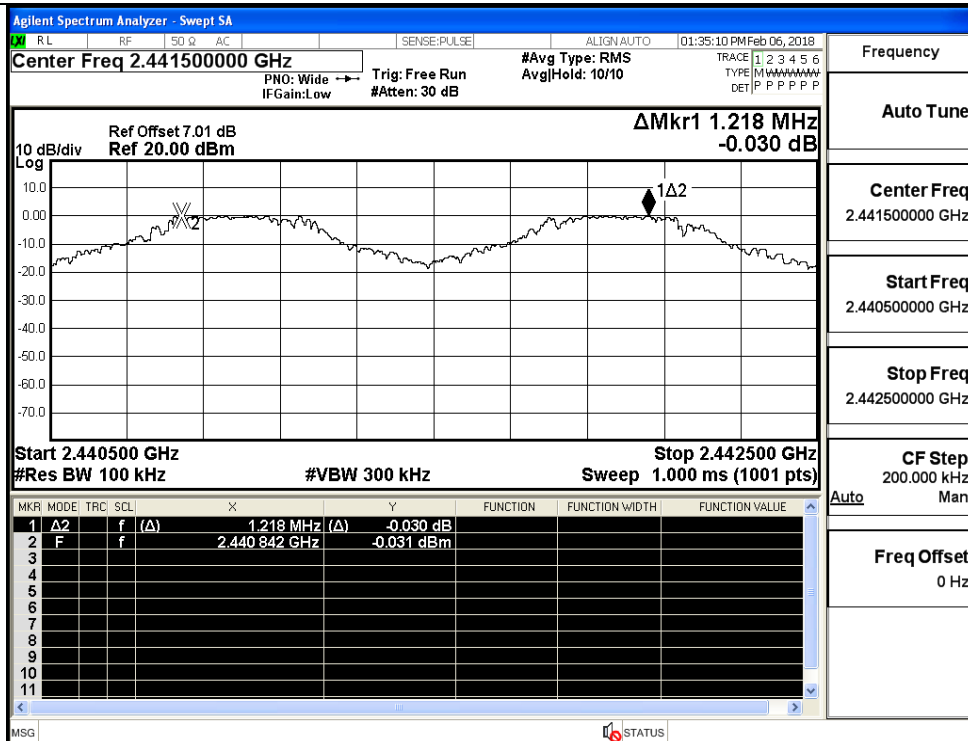
### A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.029	0.9583	PASS
	MCH	1.218	0.9664	PASS
	HCH	0.948	0.9642	PASS
$\pi/4$ DQPSK	LCH	1.126	0.859	PASS
	MCH	1.010	0.960	PASS
	HCH	1.190	0.857	PASS
8DPSK	LCH	1.300	0.862	PASS
	MCH	1.066	0.861	PASS
	HCH	0.998	0.860	PASS

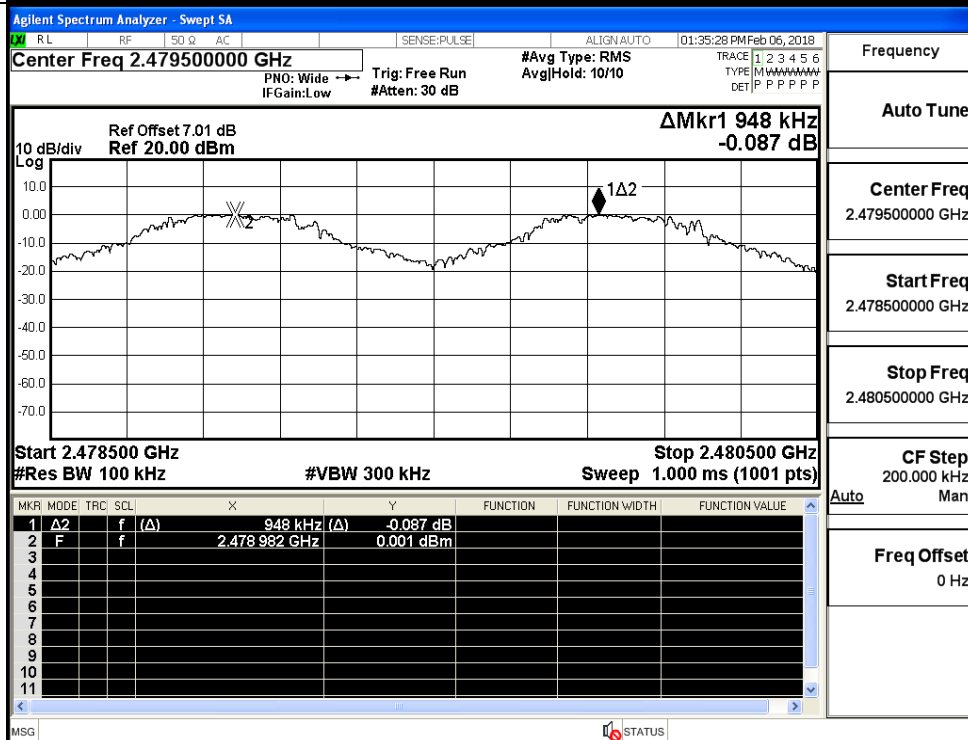
#### Test Graphs

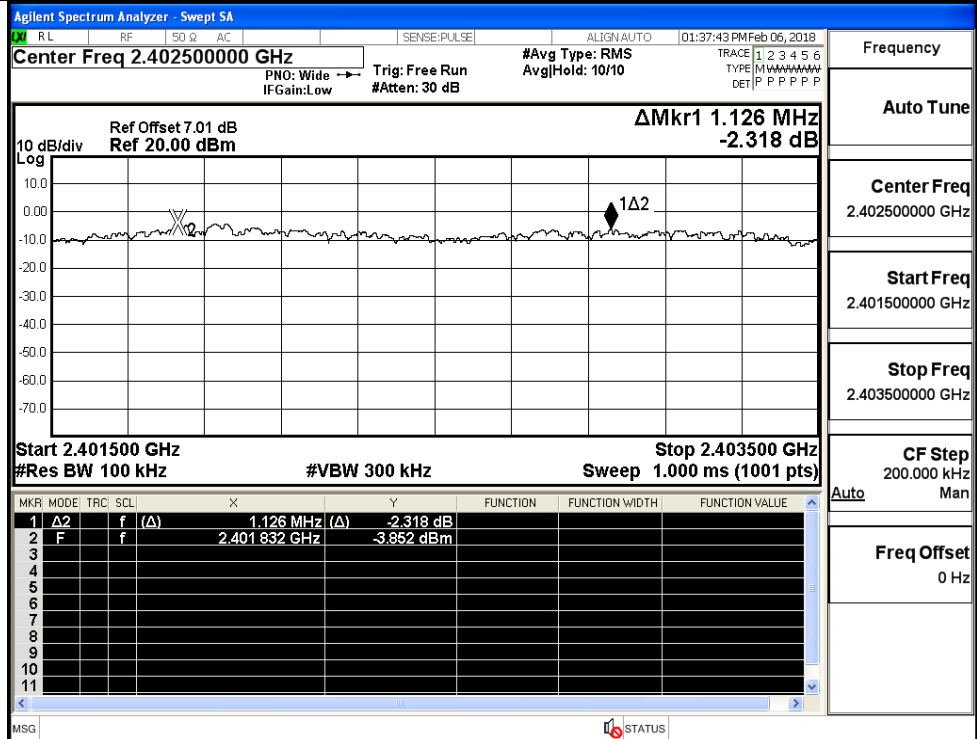
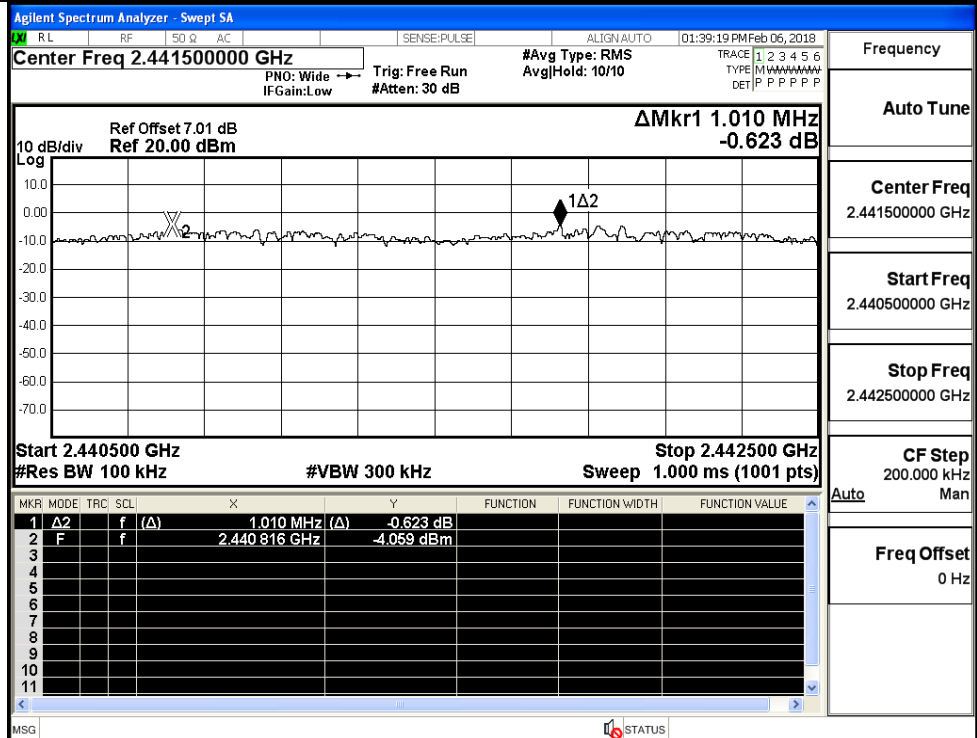


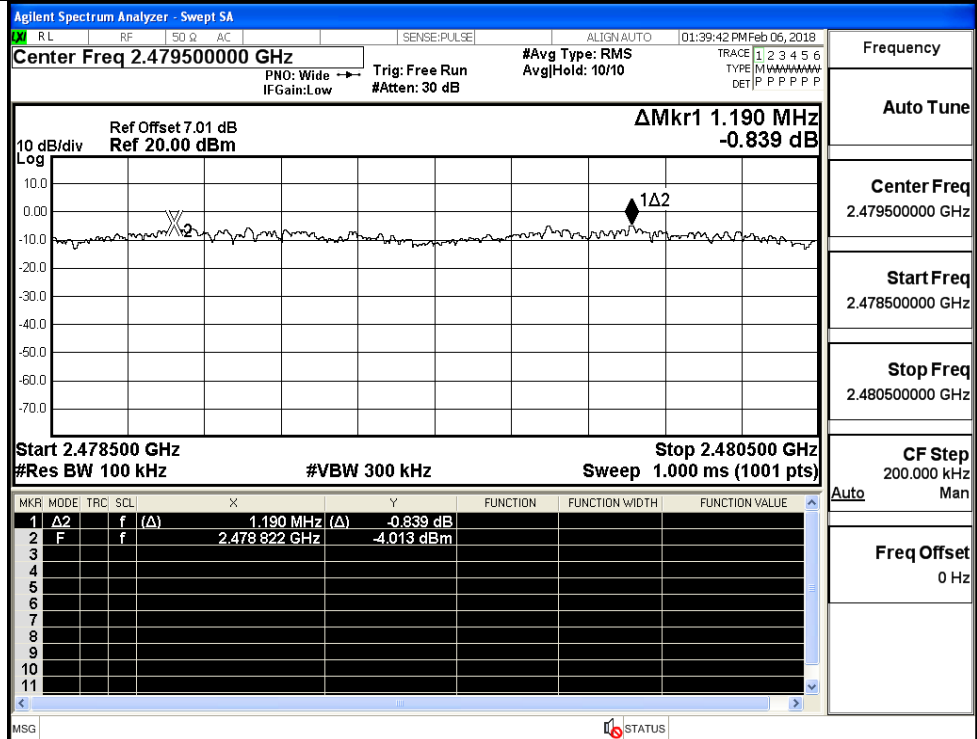
GFSK/MCH



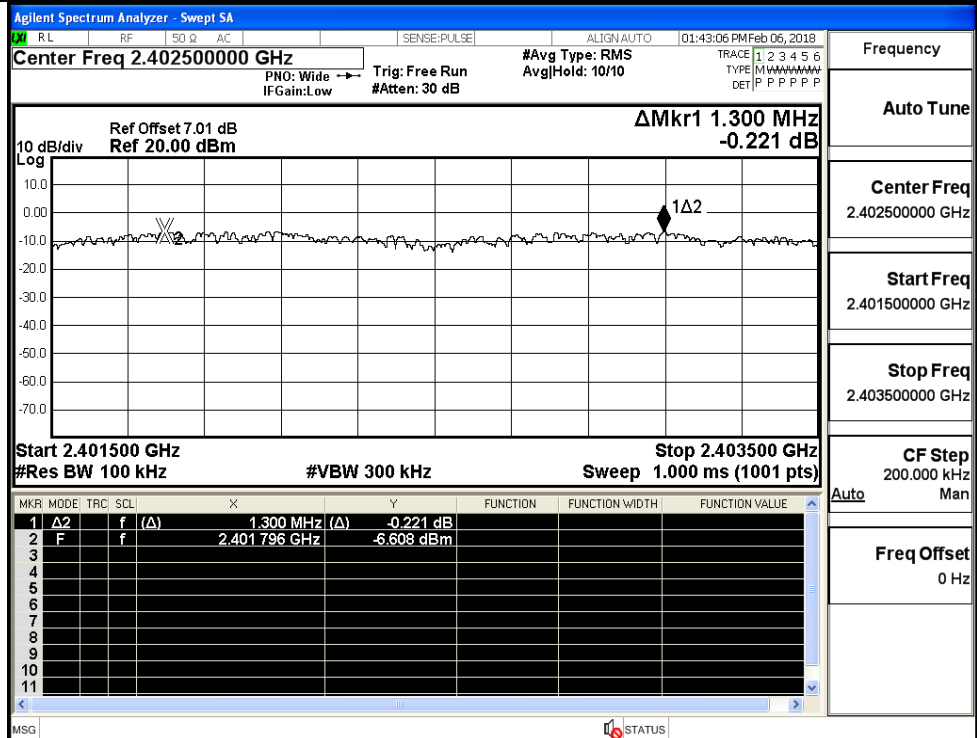
GFSK/HCH



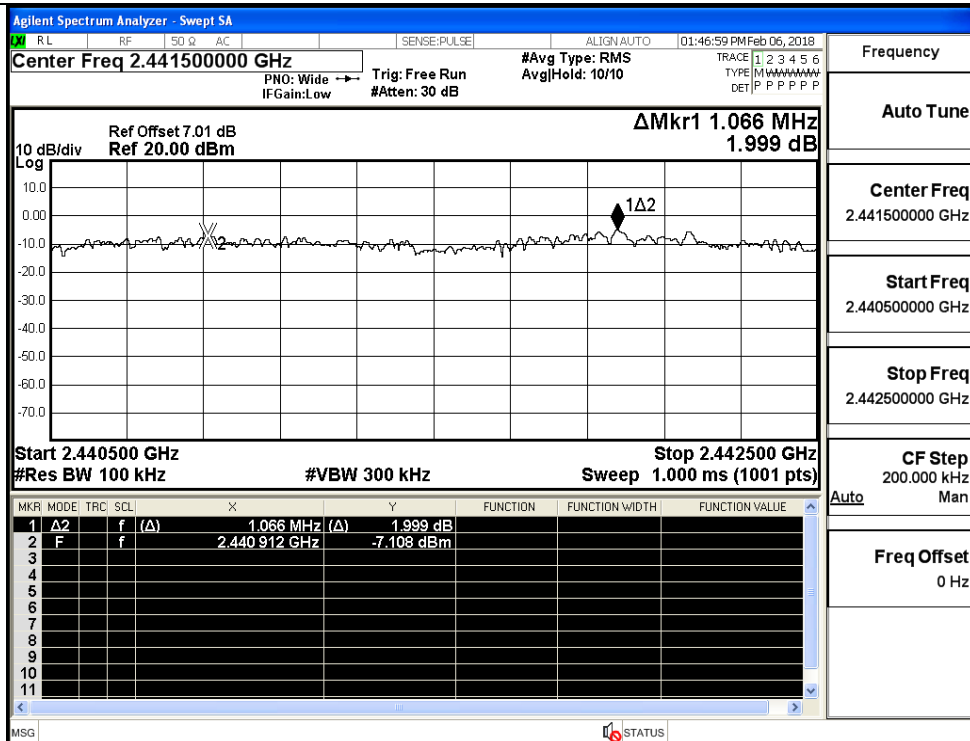
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

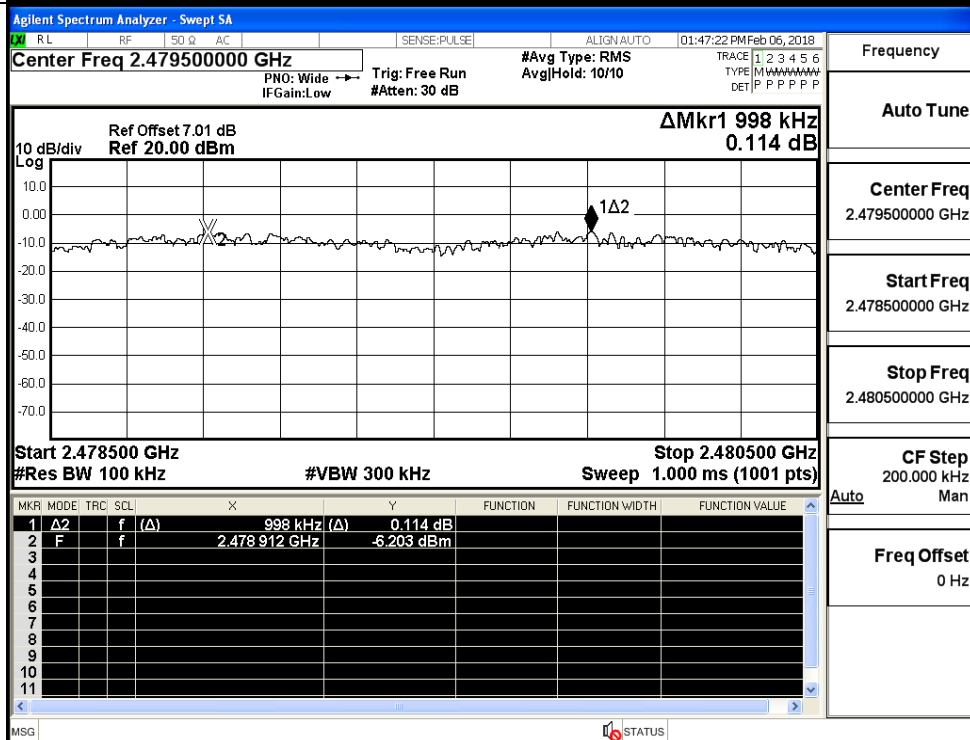
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH



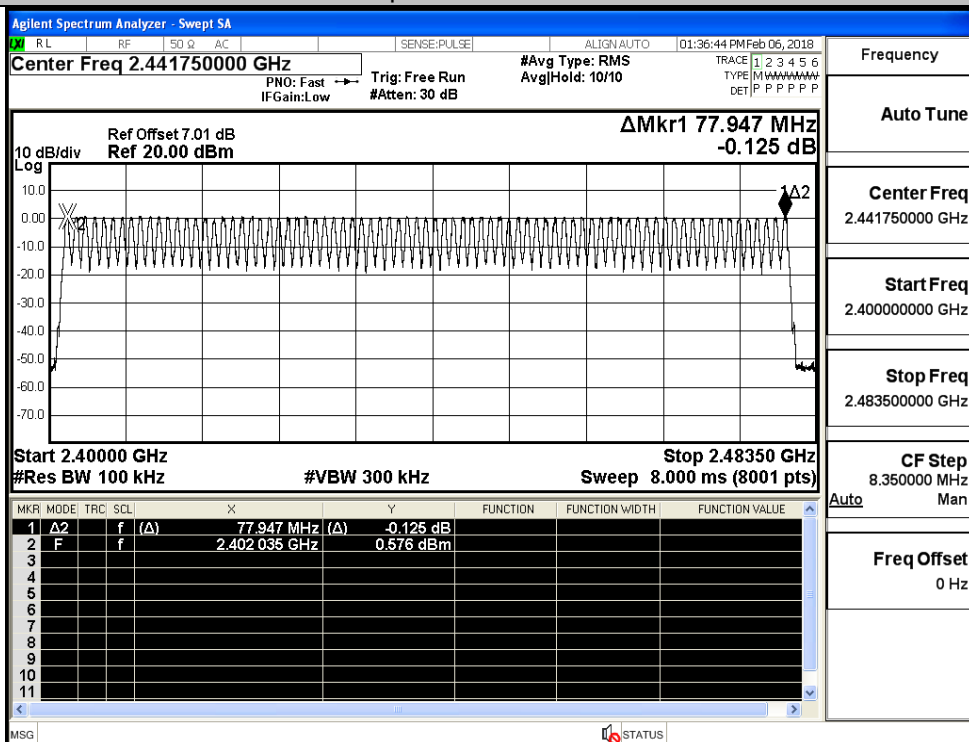
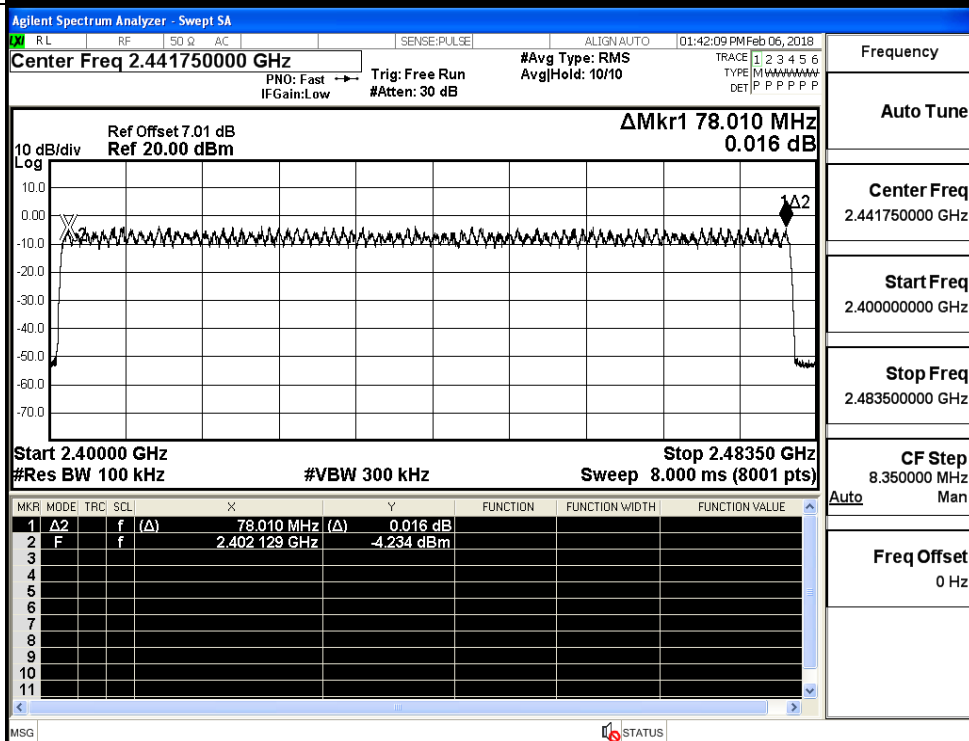


## A.4 Hopping Channel Number

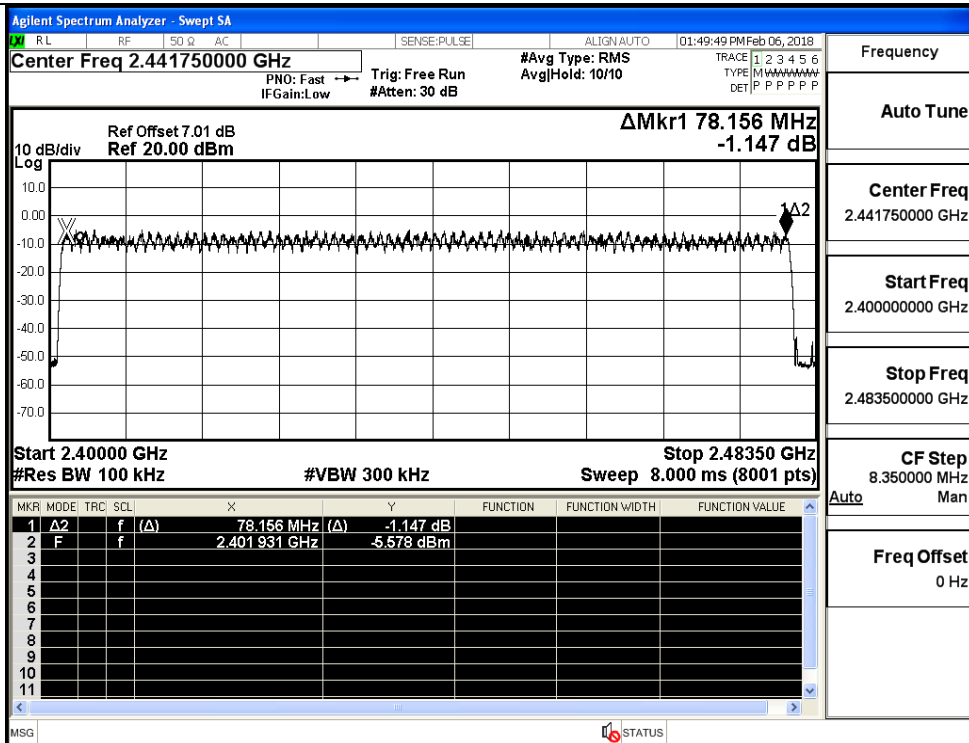
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	$\geq 15$	PASS
$\pi/4$ DQPSK	Hop	79	$\geq 15$	PASS
8DPSK	Hop	79	$\geq 15$	PASS

### Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

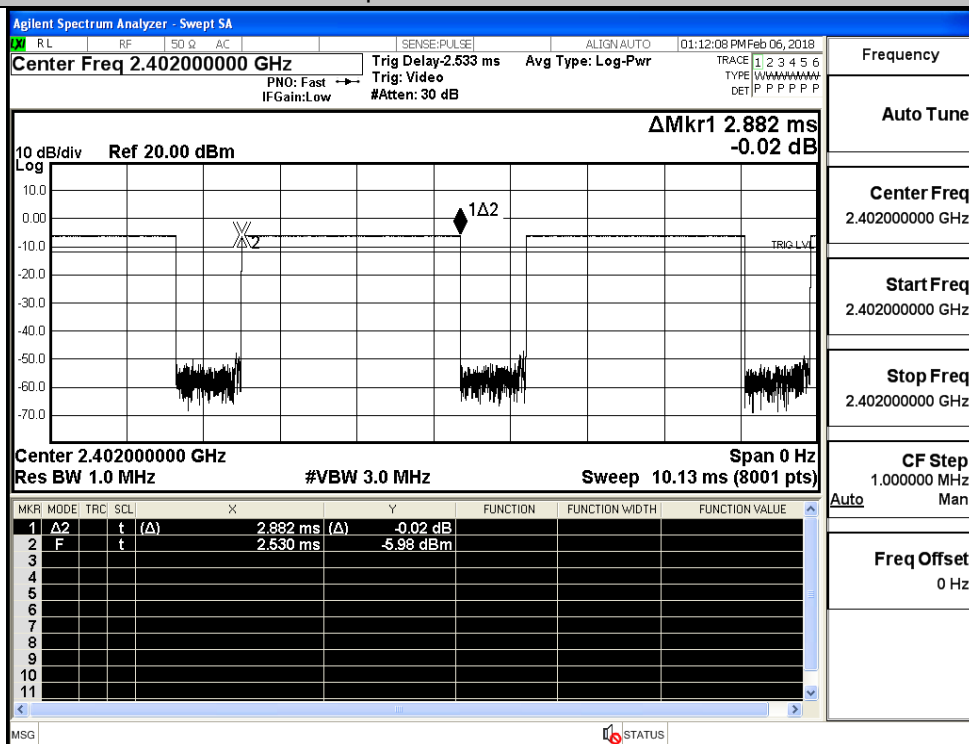


## A.5 Dwell Time

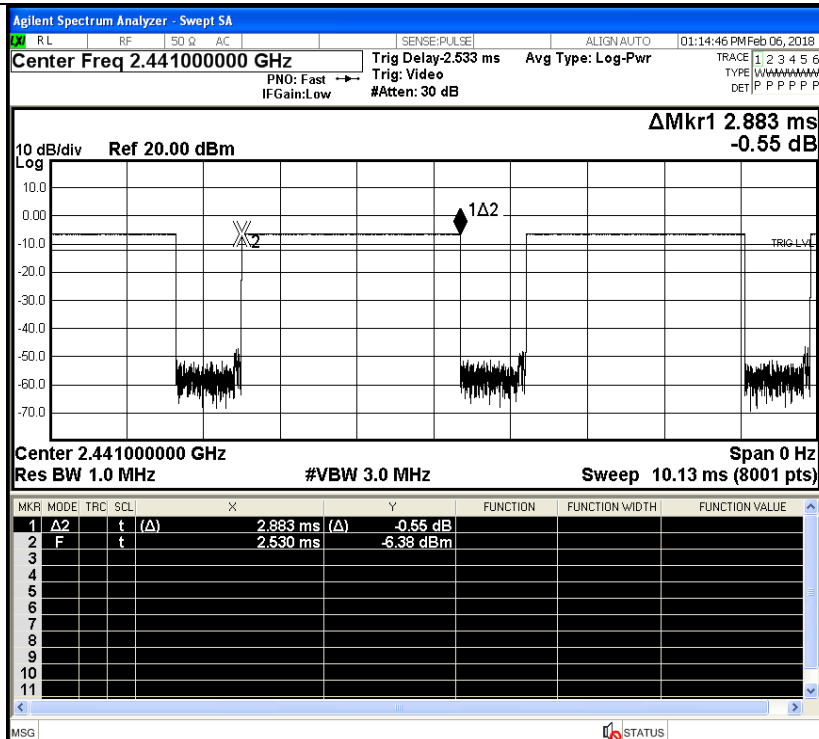
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.292	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.307	0.4	PASS
	3DH5	MCH	2.88	106.7	0.307	0.4	PASS
	3DH5	HCH	2.88	106.7	0.307	0.4	PASS

## Test Graphs

GFSK\_DH5/LCH



GFSK\_DH5/MCH

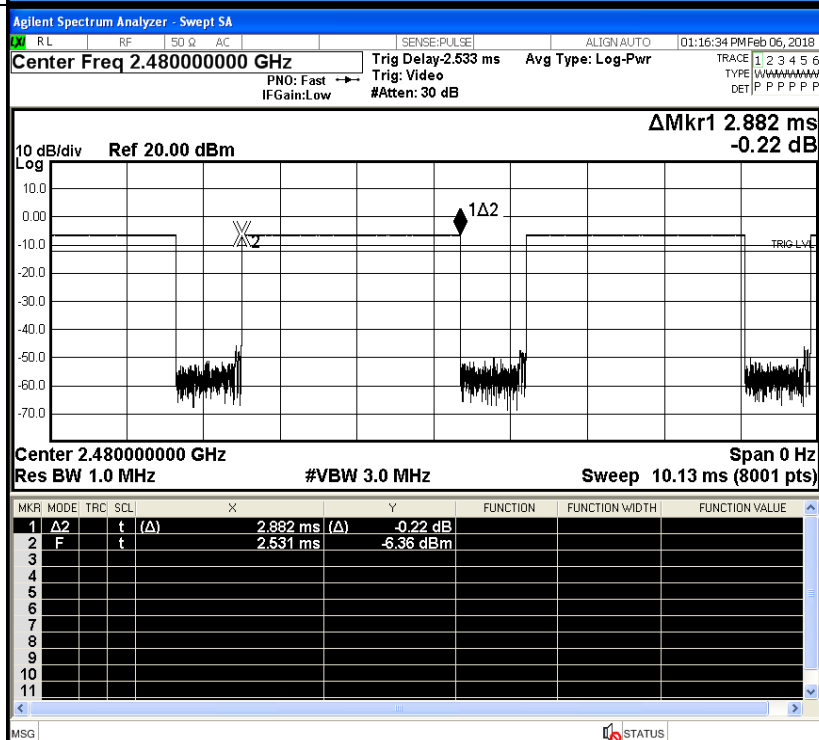


Frequency

Auto Tune

Center Freq  
2.441000000 GHzStart Freq  
2.441000000 GHzStop Freq  
2.441000000 GHzCF Step  
1.000000 MHz  
Auto ManFreq Offset  
0 Hz

GFSK\_DH5/HCH



Frequency

Auto Tune

Center Freq  
2.480000000 GHzStart Freq  
2.480000000 GHzStop Freq  
2.480000000 GHzCF Step  
1.000000 MHz  
Auto ManFreq Offset  
0 Hz

**Agilent Spectrum Analyzer - Swept SA**

RL RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 04:36:55 PM Feb 06, 2018  
**Center Freq 2.402000000 GHz** Trig Delay-2.533 ms Avg Type: Log-Pwr TRACE 1 2 3 4 5 6  
 PNO: Fast IF Gain: Low Trig: Video TYPE WWWWWWWW  
 #Atten: 30 dB DETP PPPPPP

**ΔMkr1 2.877 ms -0.77 dB**

10 dB/div Ref 20.00 dBm Log

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	2.877 ms	-0.77 dB			
2	F	t		1.013 ms	-4.26 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

**Center 2.402000000 GHz Span 0 Hz**  
**Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8001 pts)**

Frequency	
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

**Agilent Spectrum Analyzer - Swept SA**

RL RF 50 Ω AC SENSE:PULSE ALIGN:AUTO 01:22:13 PM Feb 06, 2018

**Center Freq 2.44100000 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

**ΔMkr1 2.744 ms 0.32 dB**

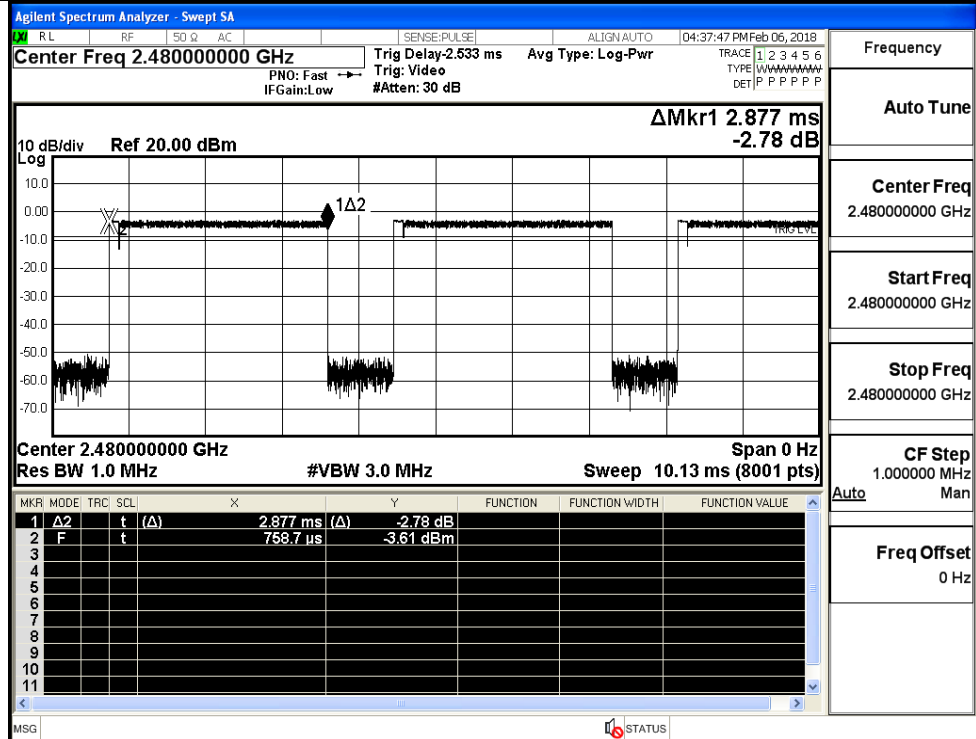
10 dB/div Ref 20.00 dBm

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δf2	t	(Δ)	2.744 ms	(Δ) 0.32 dB			
2	F	t		41.80 μs	-10.70 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

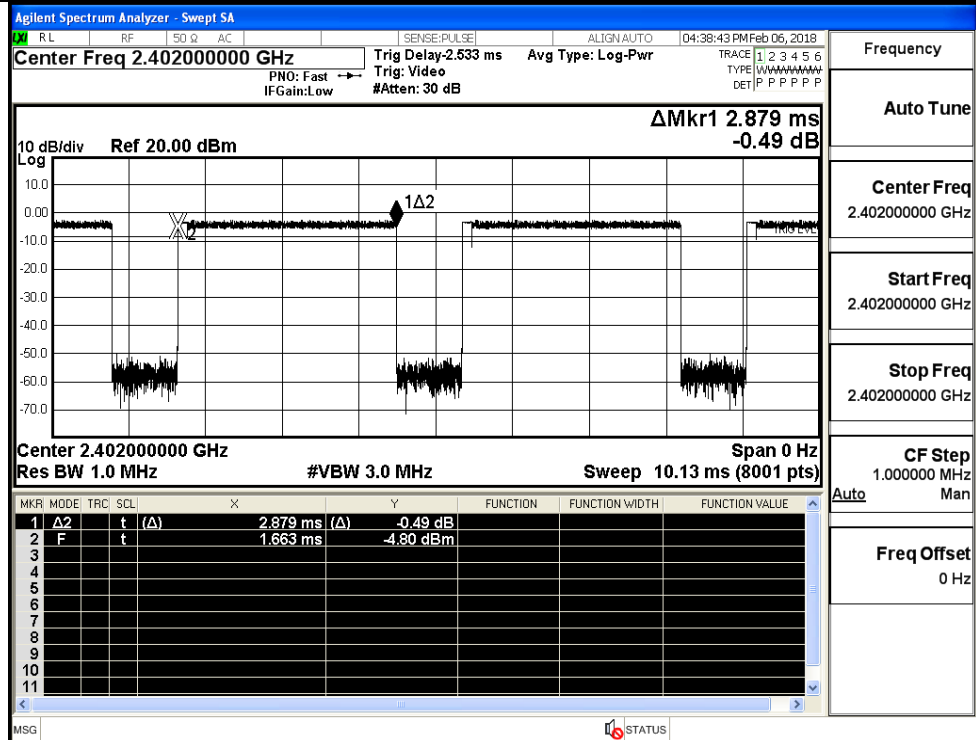
Center 2.44100000 GHz Span 0 Hz  
 Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8001 pts)

Frequency	
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

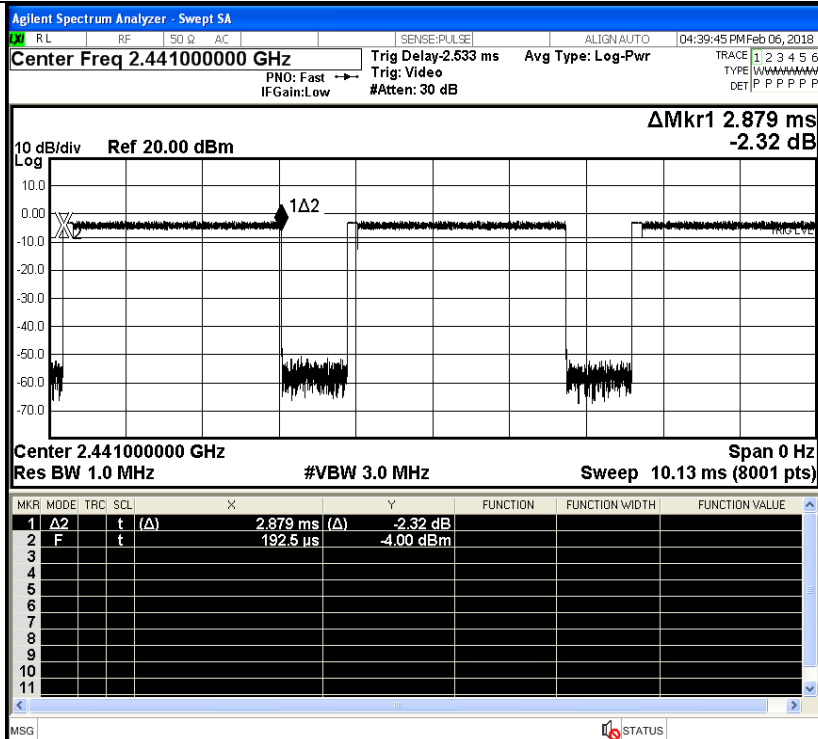
$\pi/4$ DQPSK  
\_2DH5/HCH



8DPSK \_3DH5/LCH



8DPSK\_3DH5/MCH

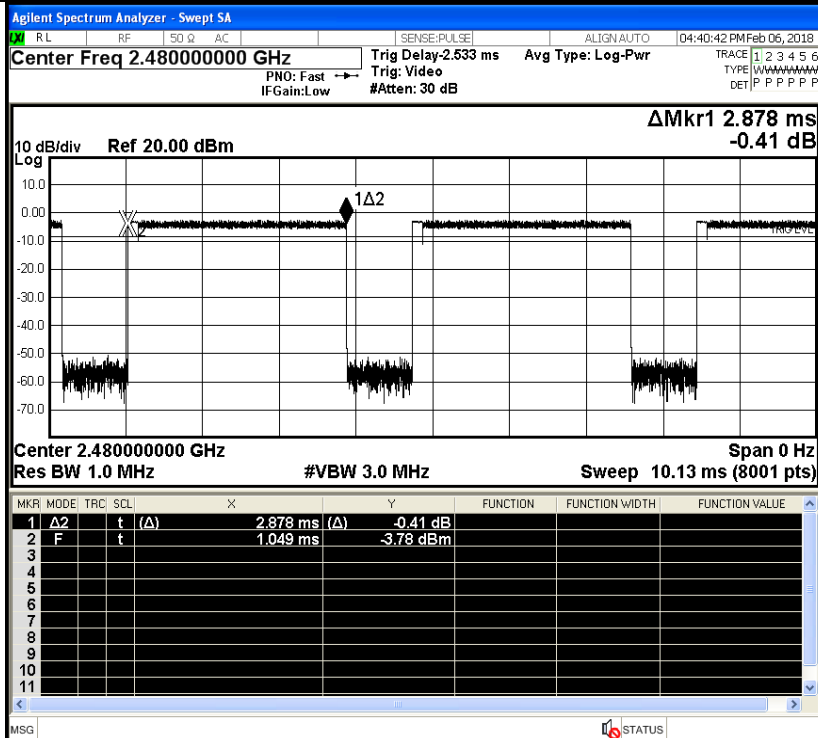


Frequency

Auto Tune

Center Freq  
2.441000000 GHzStart Freq  
2.441000000 GHzStop Freq  
2.441000000 GHzCF Step  
1.000000 MHz  
Auto ManFreq Offset  
0 Hz

8DPSK\_3DH5/HCH



Frequency

Auto Tune

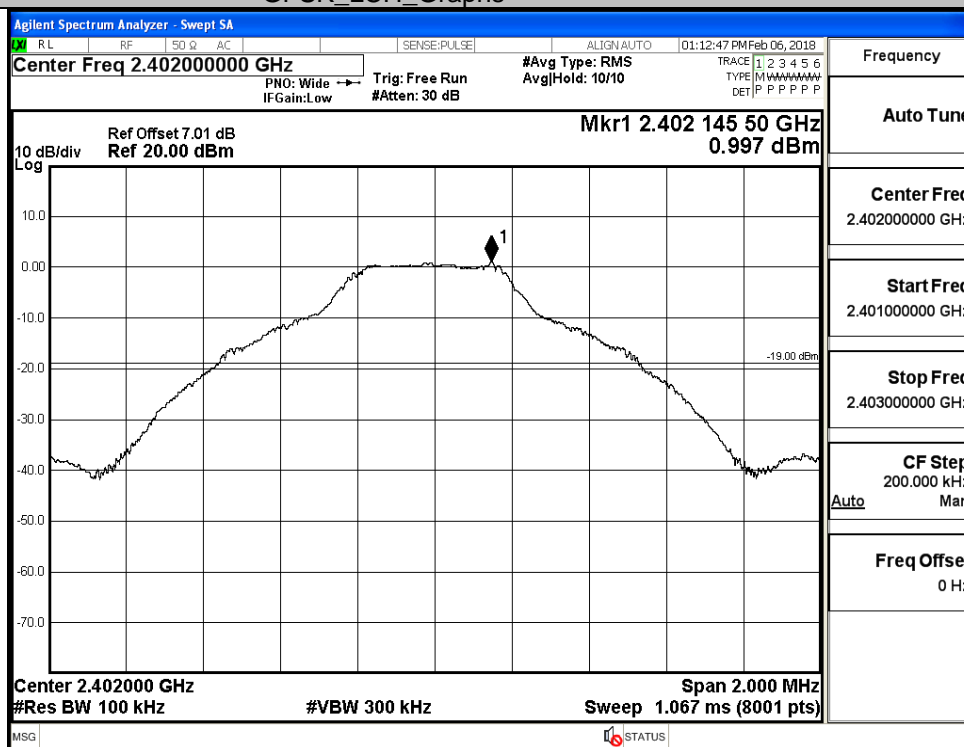
Center Freq  
2.480000000 GHzStart Freq  
2.480000000 GHzStop Freq  
2.480000000 GHzCF Step  
1.000000 MHz  
Auto ManFreq Offset  
0 Hz

## A.6 RF Conducted Spurious Emissions

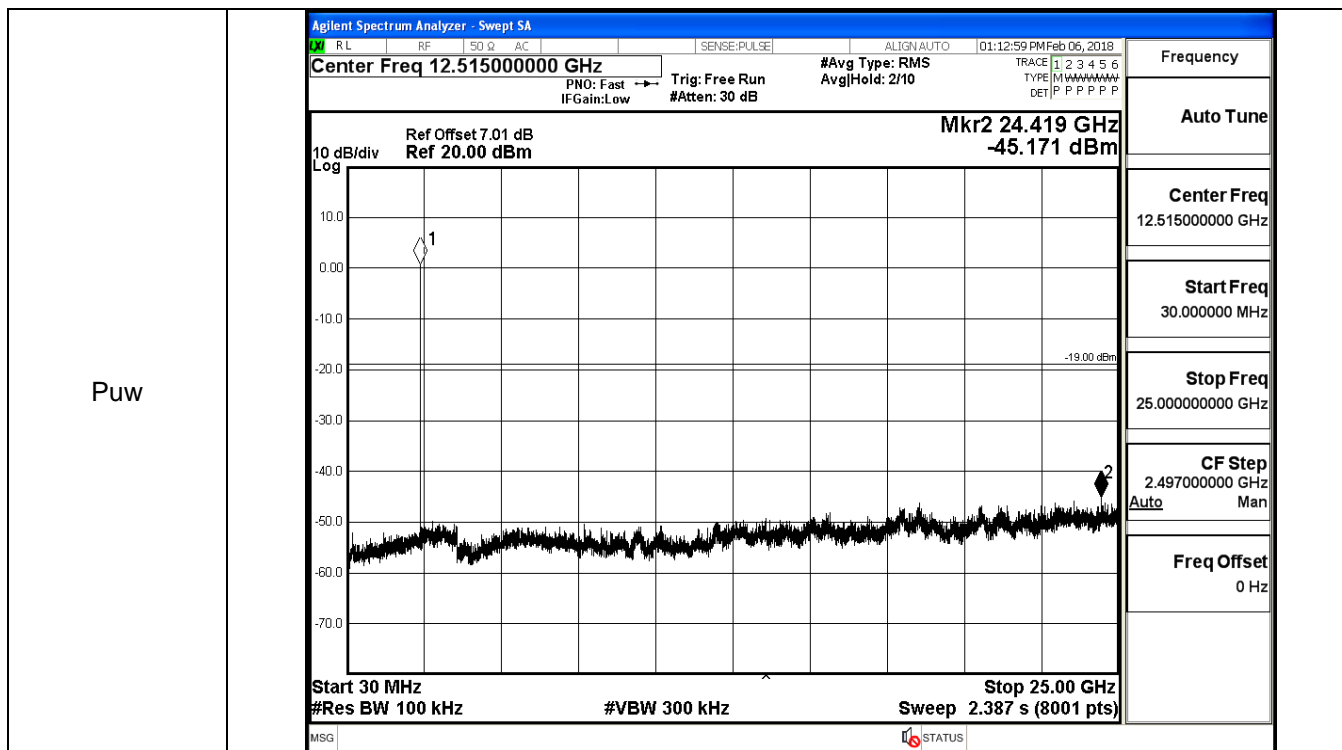
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	0.997	-45.171	-19.003	PASS
	MCH	0.605	-45.599	-19.395	PASS
	HCH	0.064	-46.114	-19.936	PASS
$\pi/4$ DQPSK	LCH	-3.728	-45.779	-23.728	PASS
	MCH	-3.941	-45.848	-23.941	PASS
	HCH	-4.094	-45.921	-24.094	PASS
8DPSK	LCH	-5.011	-45.476	-25.011	PASS
	MCH	-5.709	-45.498	-25.709	PASS
	HCH	-5.338	-46.214	-25.338	PASS

GFSK\_LCH\_Graphs

Pref

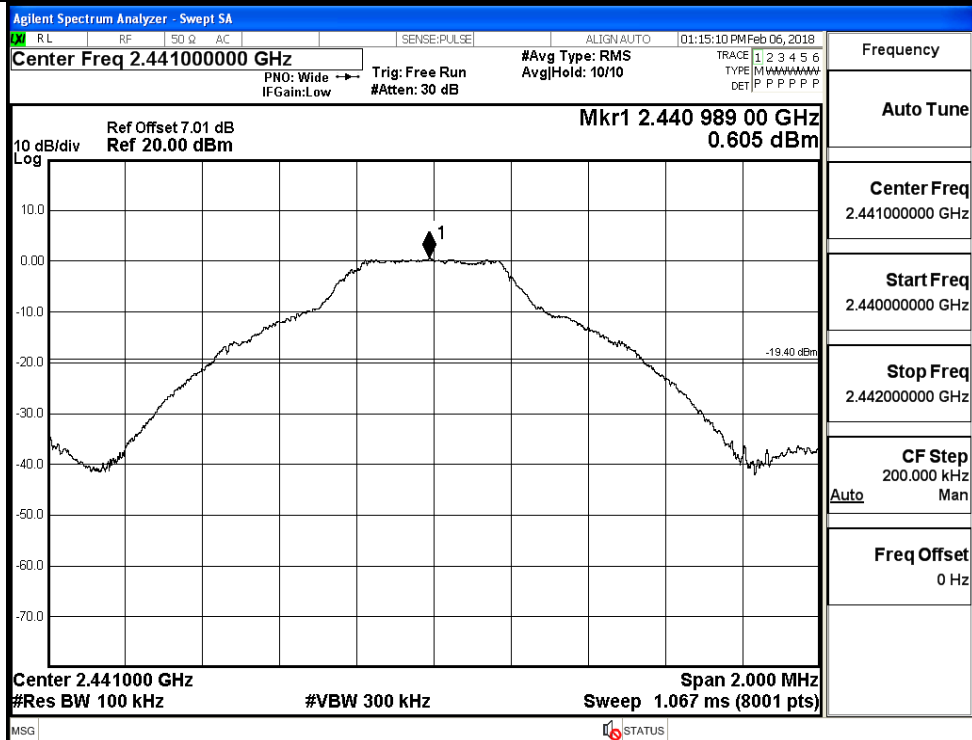




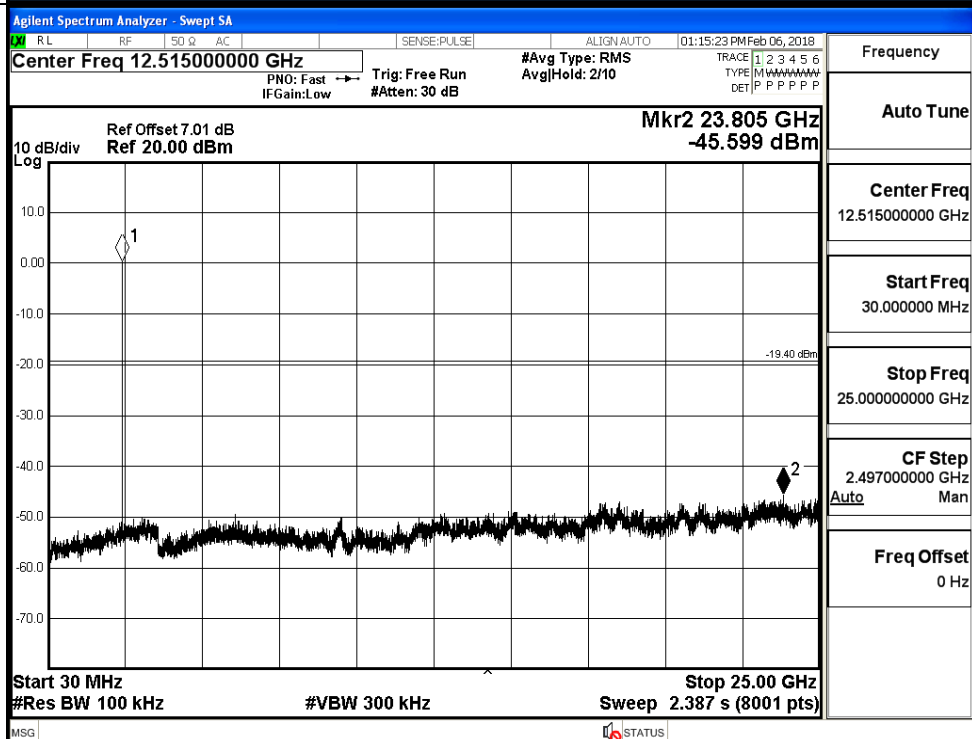


## GFSK\_MCH\_Graphs

Pref

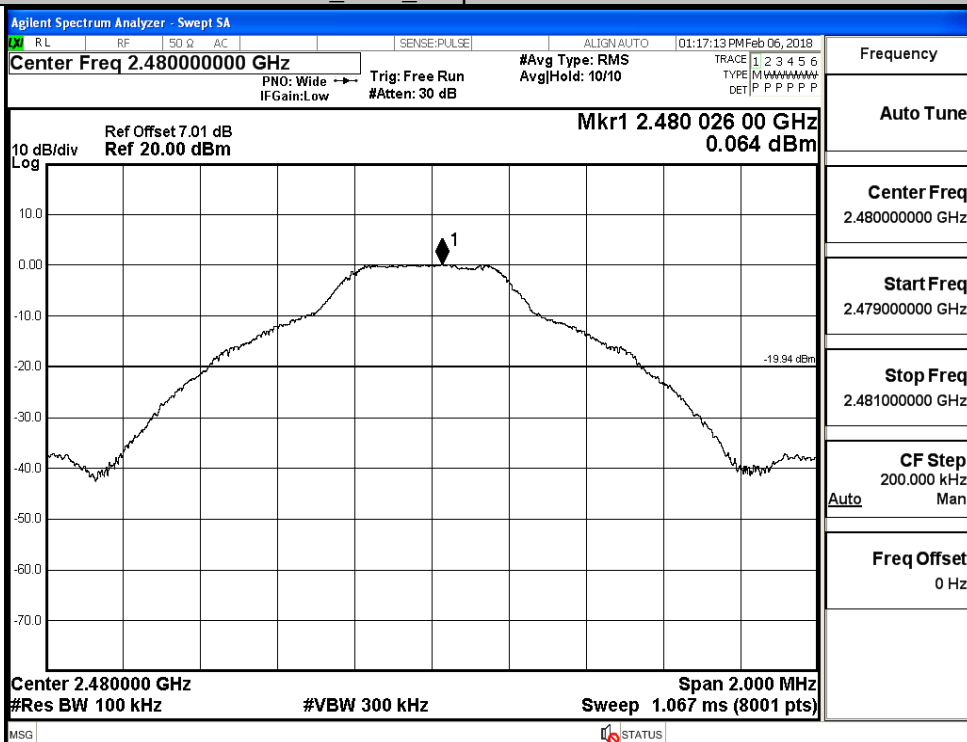


Puw

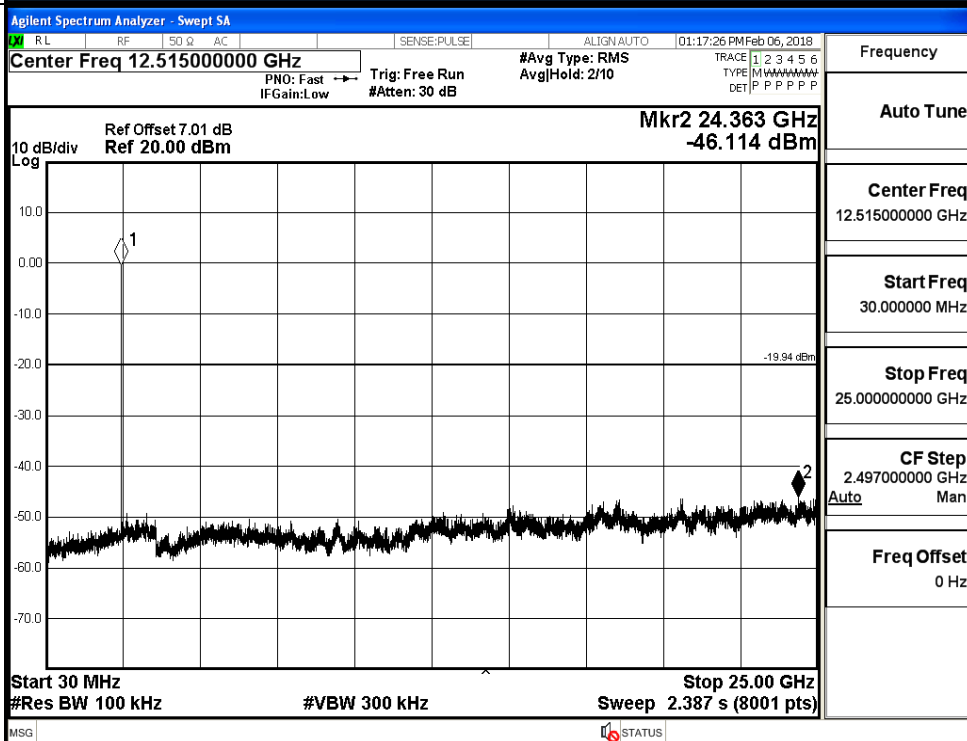


## GFSK\_HCH\_Graphs

Pref

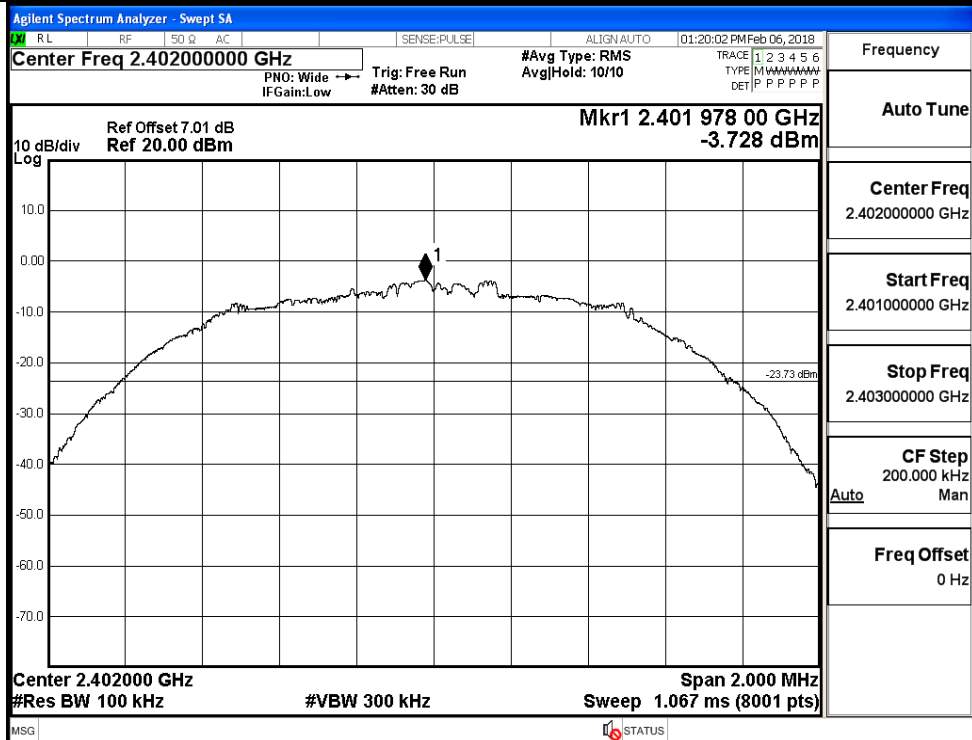


Puw

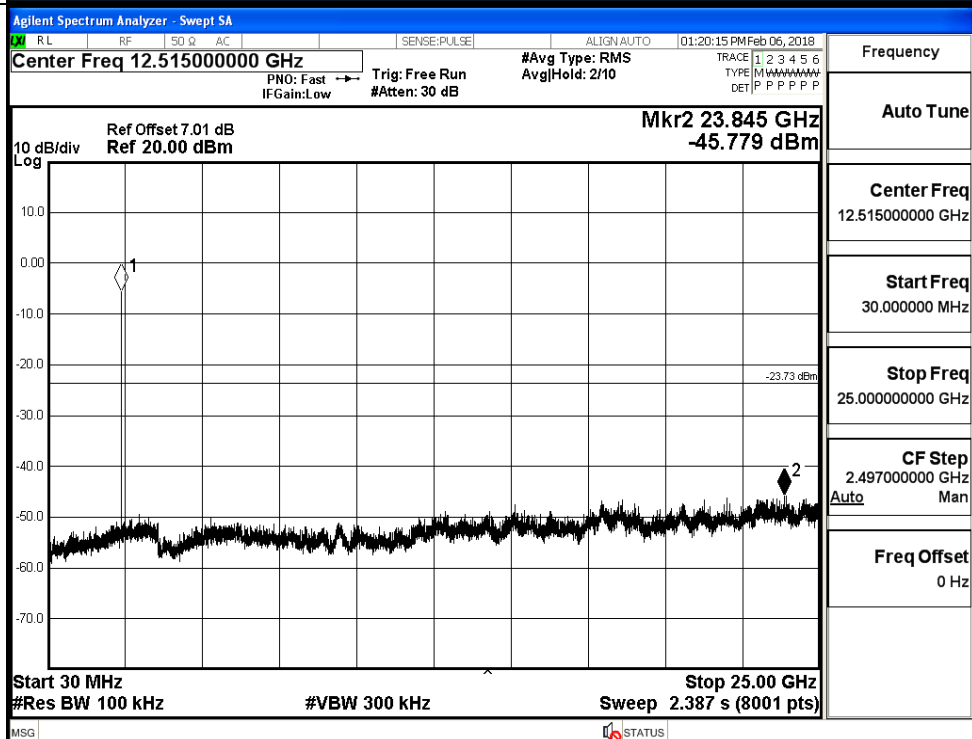


$\pi$ /4DQPSK LCH Graphs

Pref

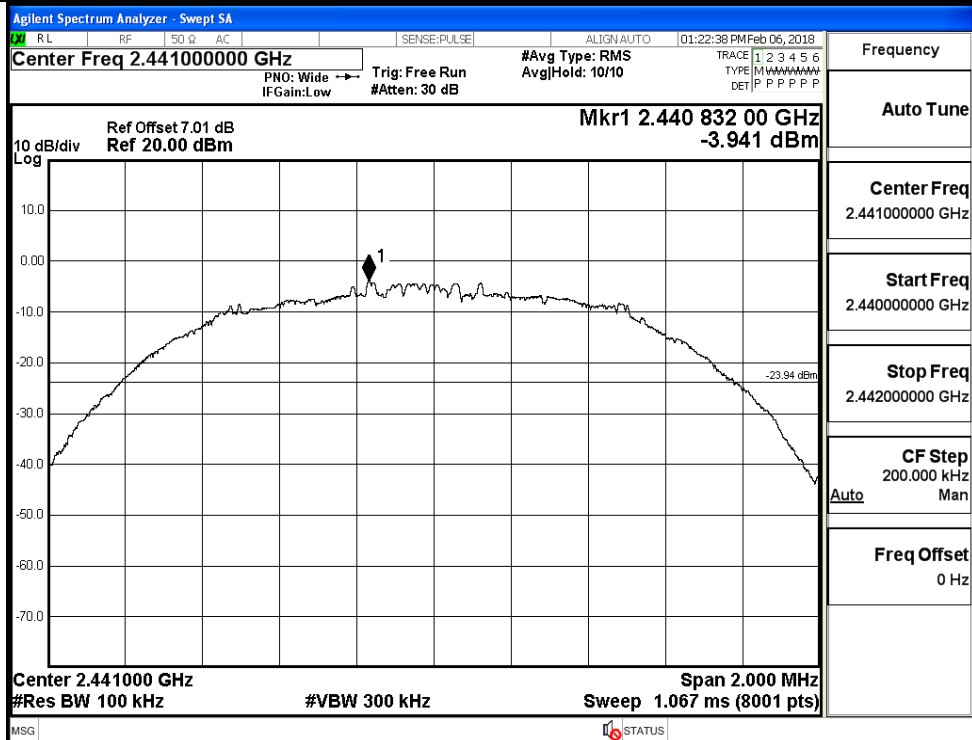


Puw

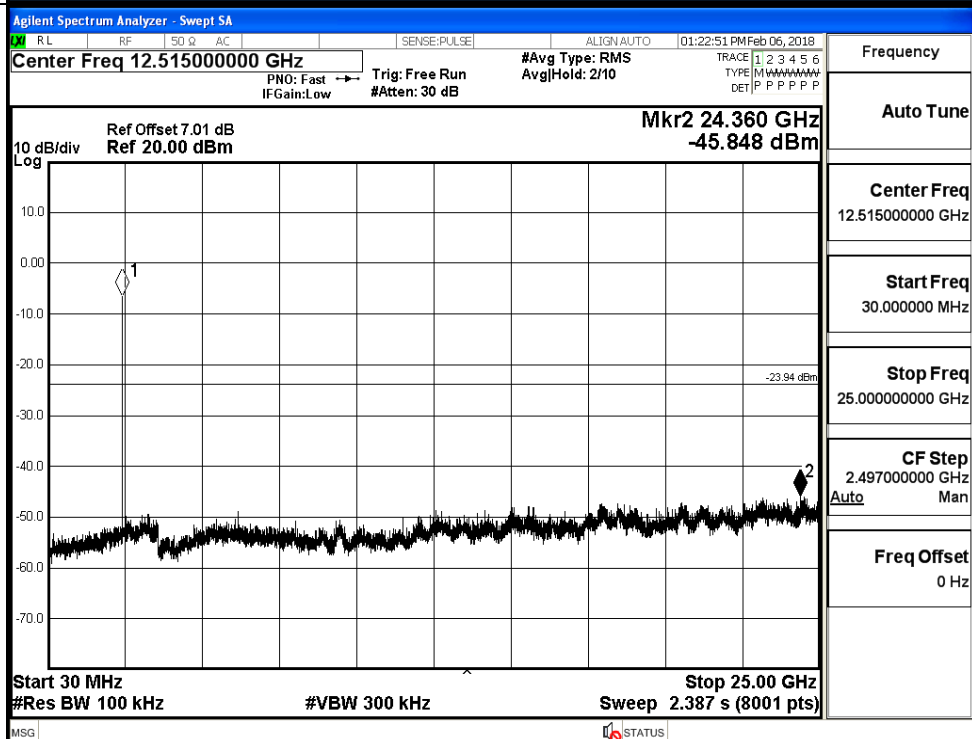


$\pi$ /4DQPSK MCH Graphs

Pref

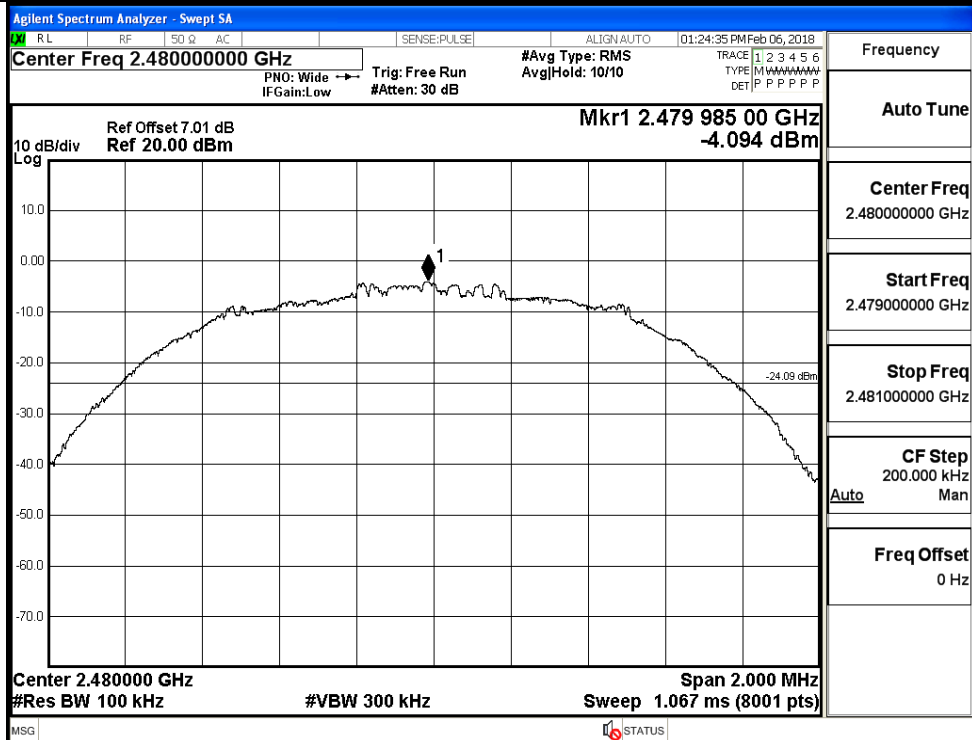


Puw

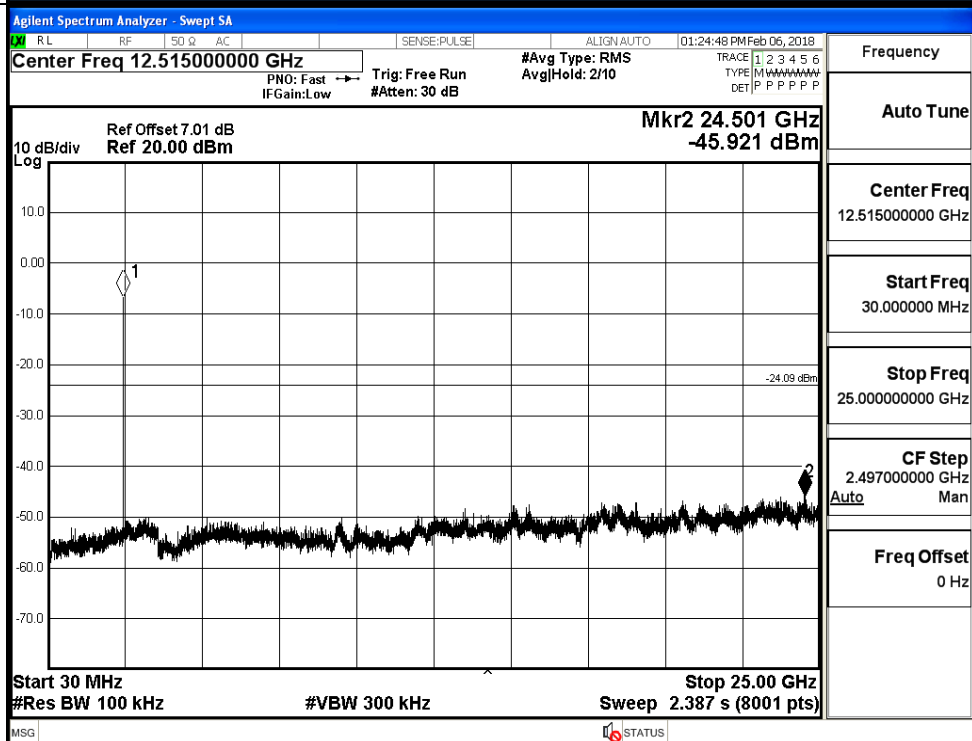


$\pi/4$ DQPSK HCH Graphs

Pref

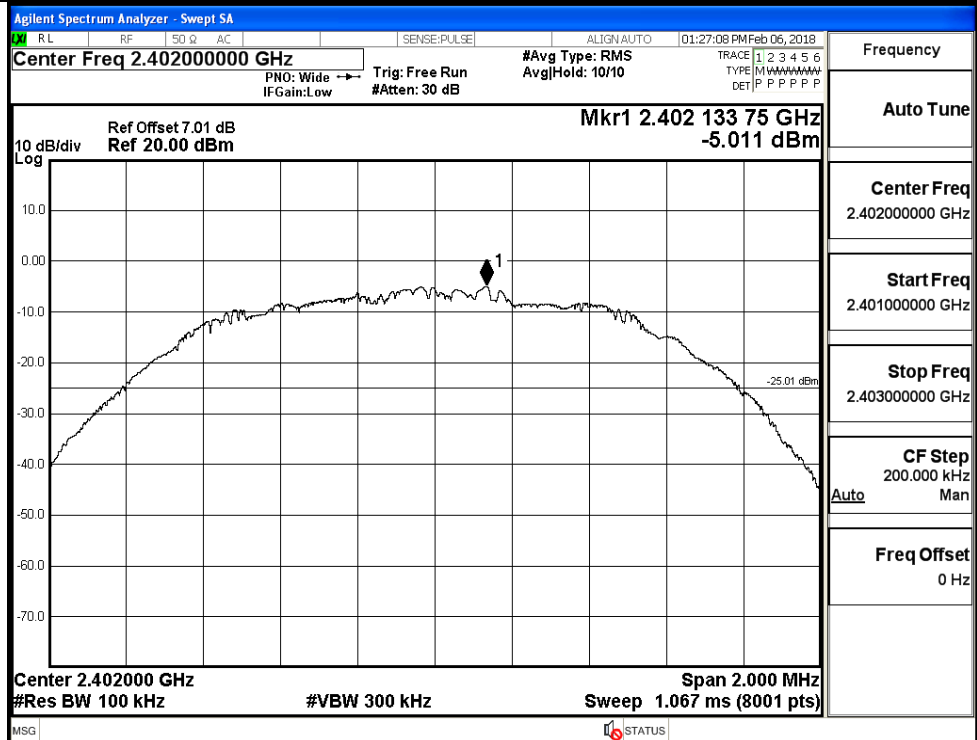


Puw

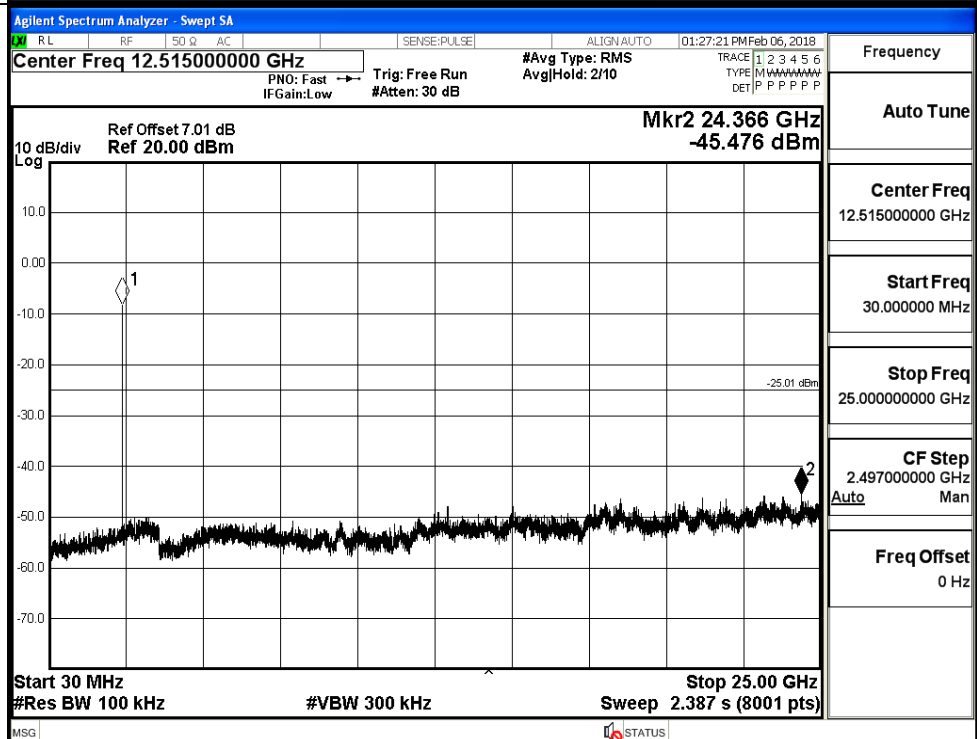


## 8DPSK\_LCH\_Graphs

Pref

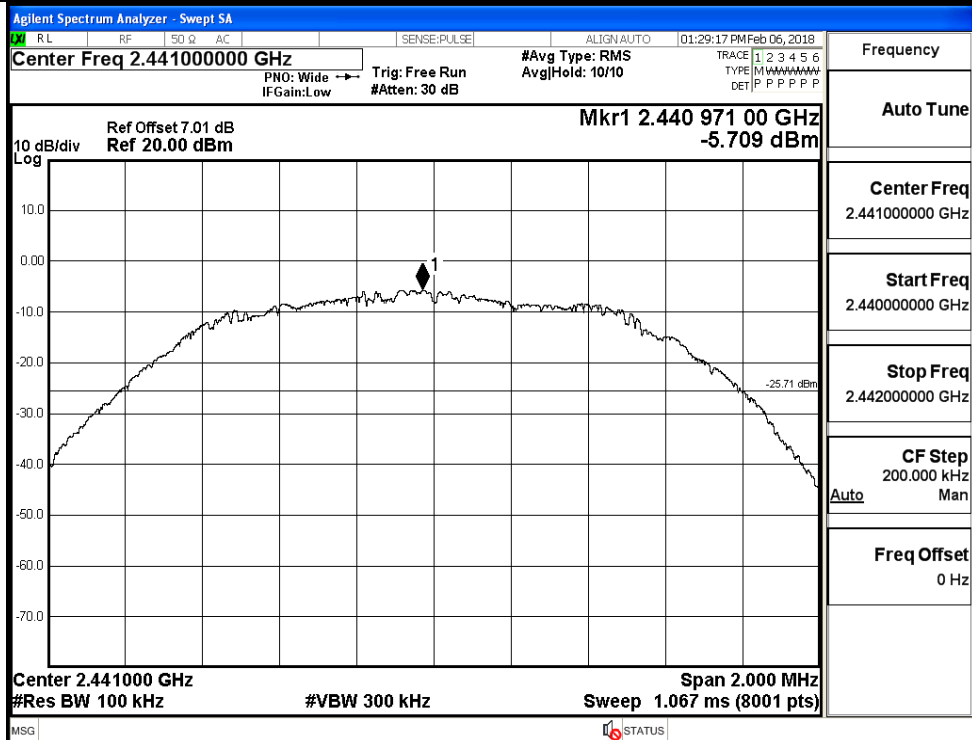


Puw

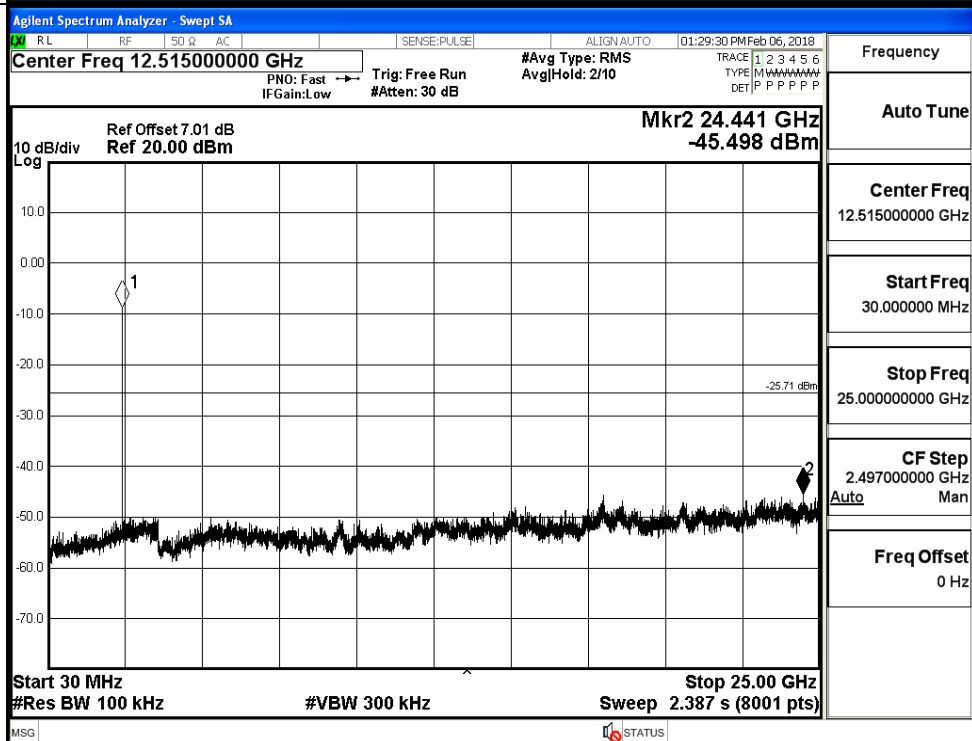


## 8DPSK\_MCH\_Graphs

Pref



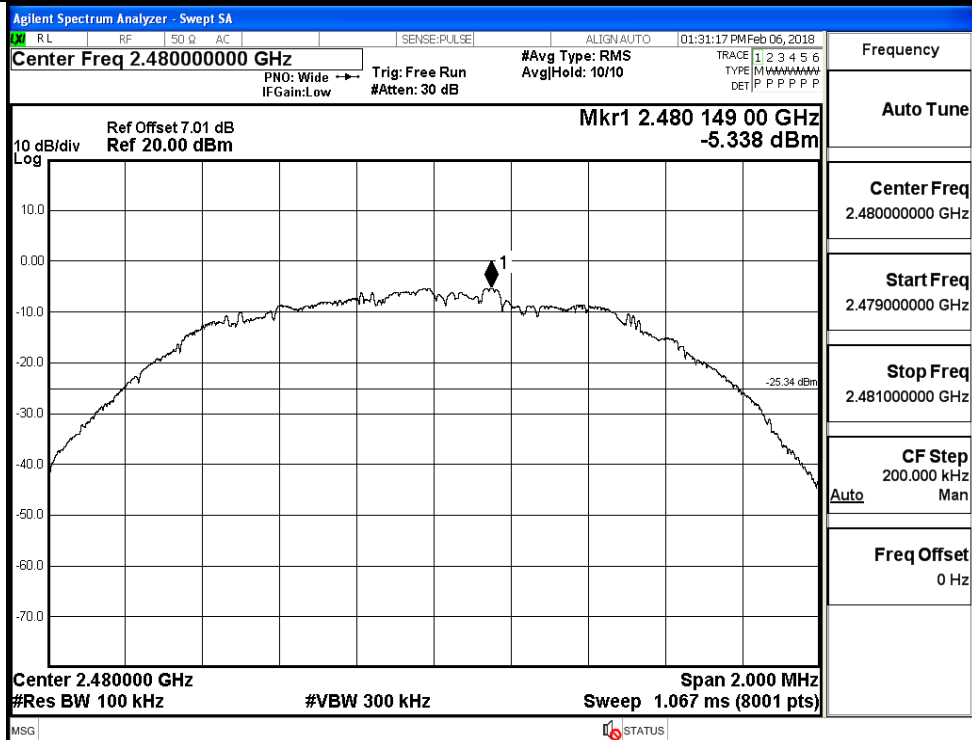
Puw



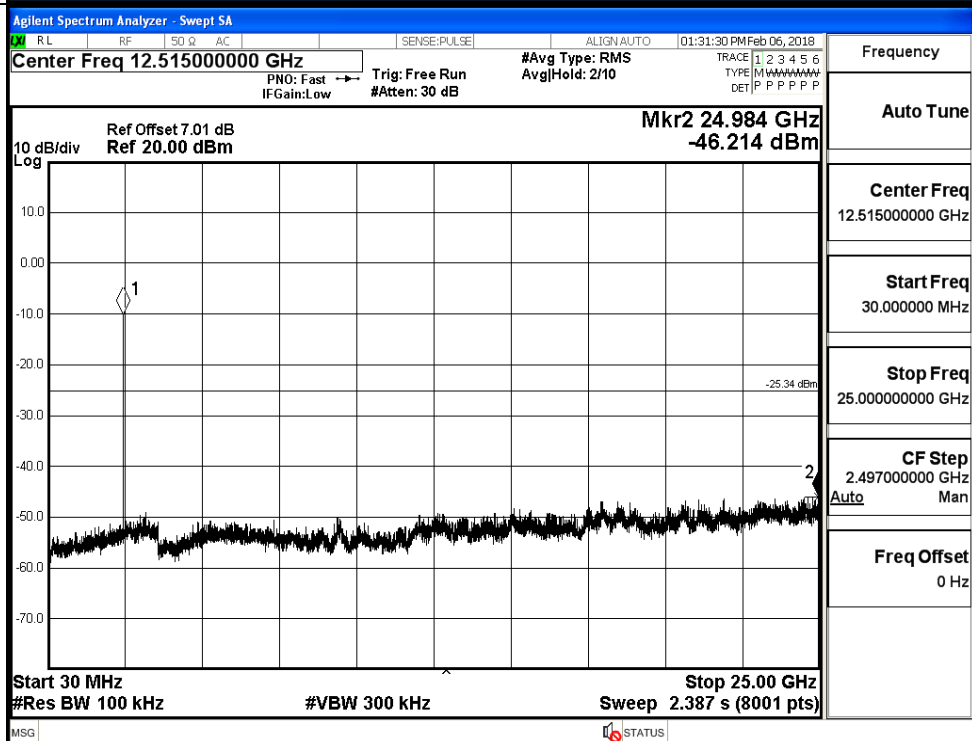


## 8DPSK\_HCH\_Graphs

Pref



Puw

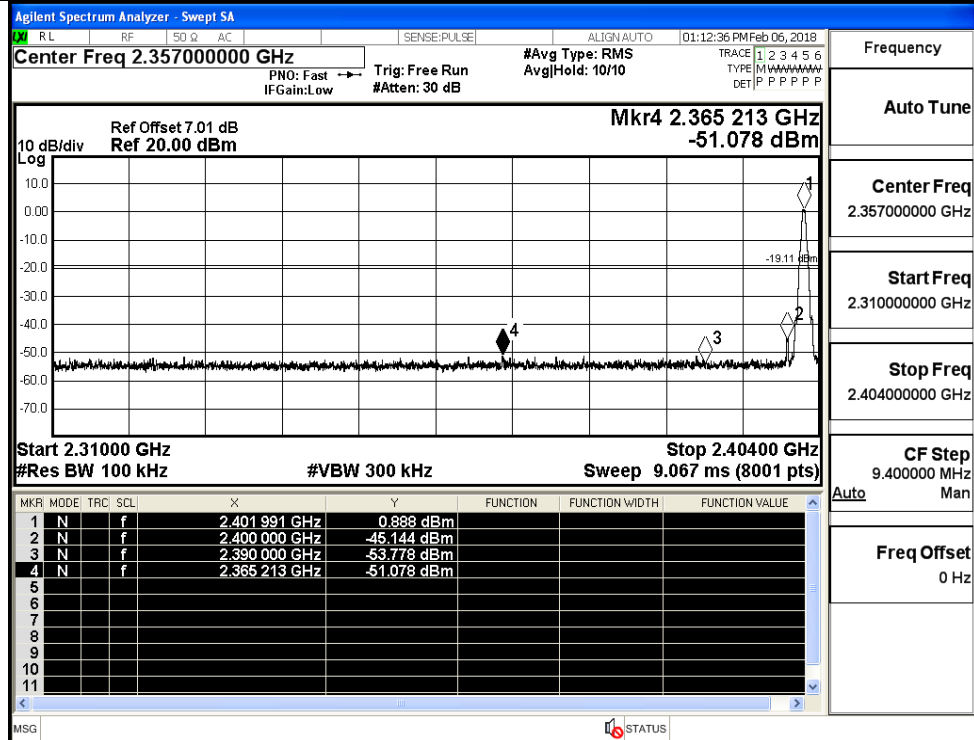


## A.7 Band-edge for RF Conducted Emissions

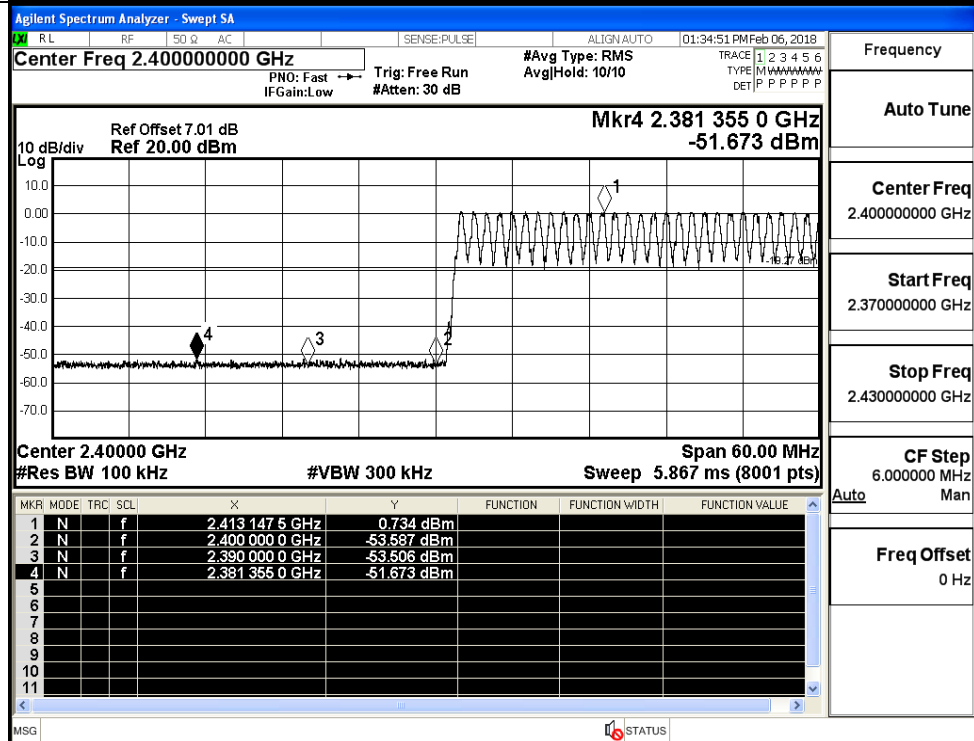
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	0.888	Off	-51.078	-19.112	PASS
			0.734	On	-51.673	-19.266	PASS
	HCH	2480	0.693	Off	-42.023	-19.307	PASS
			0.603	On	-46.772	-19.397	PASS
$\pi/4$ DQPSK	LCH	2402	-3.859	Off	-51.296	-23.859	PASS
			-3.815	On	-50.577	-23.815	PASS
	HCH	2480	-4.013	Off	-43.726	-24.013	PASS
			-3.923	On	-50.465	-23.923	PASS
8DPSK	LCH	2402	-5.783	Off	-51.033	-25.783	PASS
			-4.976	On	-50.437	-24.976	PASS
	HCH	2480	-5.356	Off	-42.584	-25.356	PASS
			-5.120	On	-50.286	-25.120	PASS

## Test Graphs

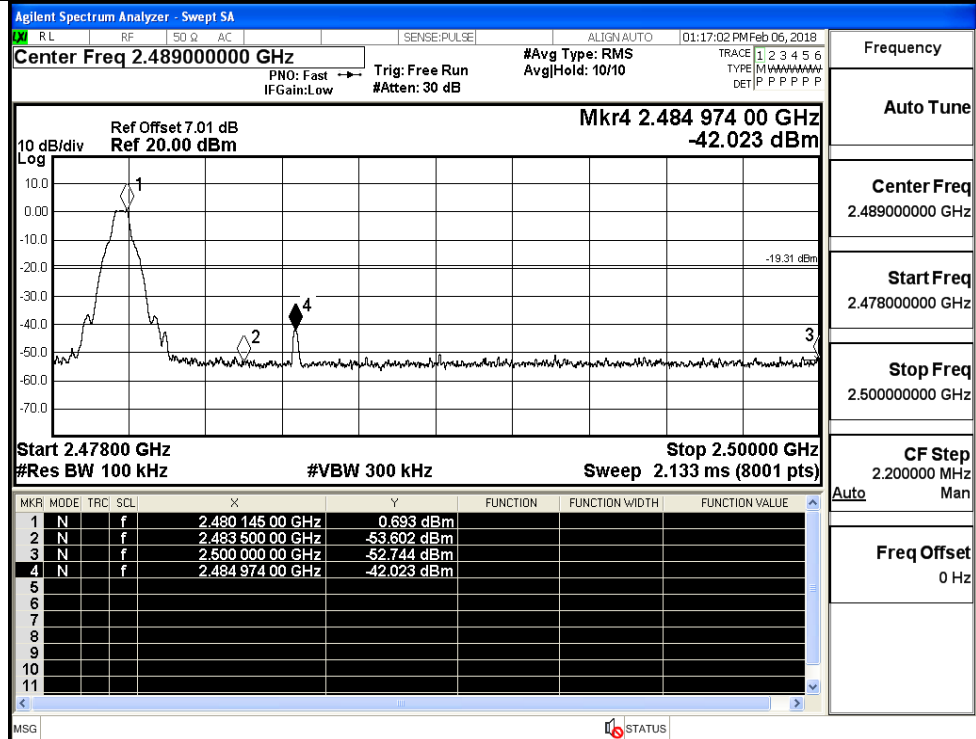
GFSK/LCH/No Hop



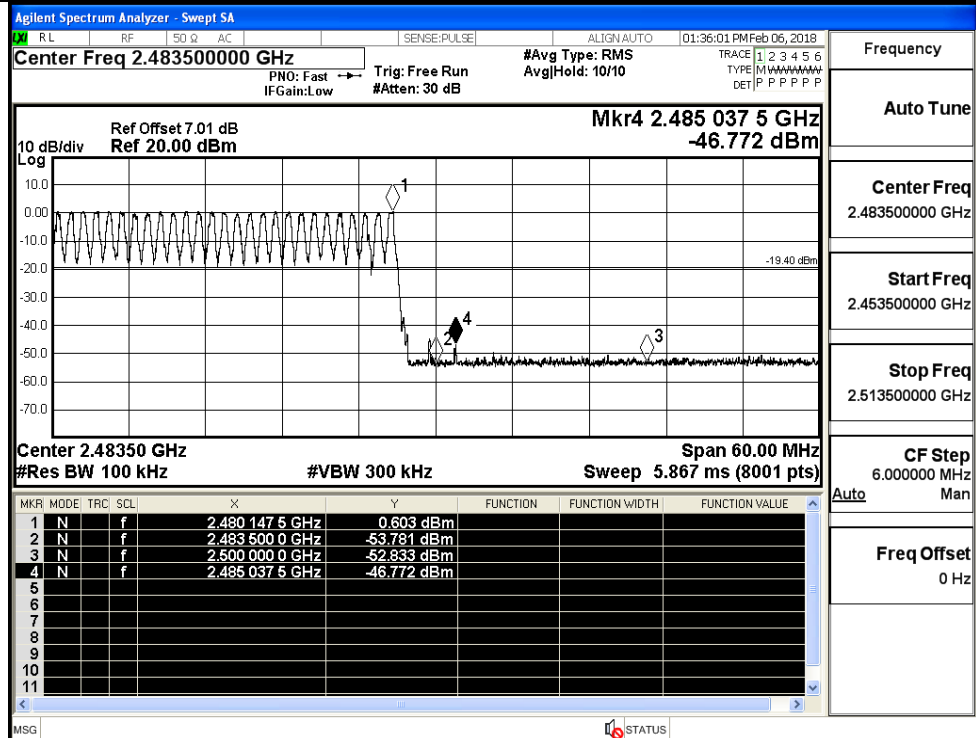
GFSK/LCH/Hop



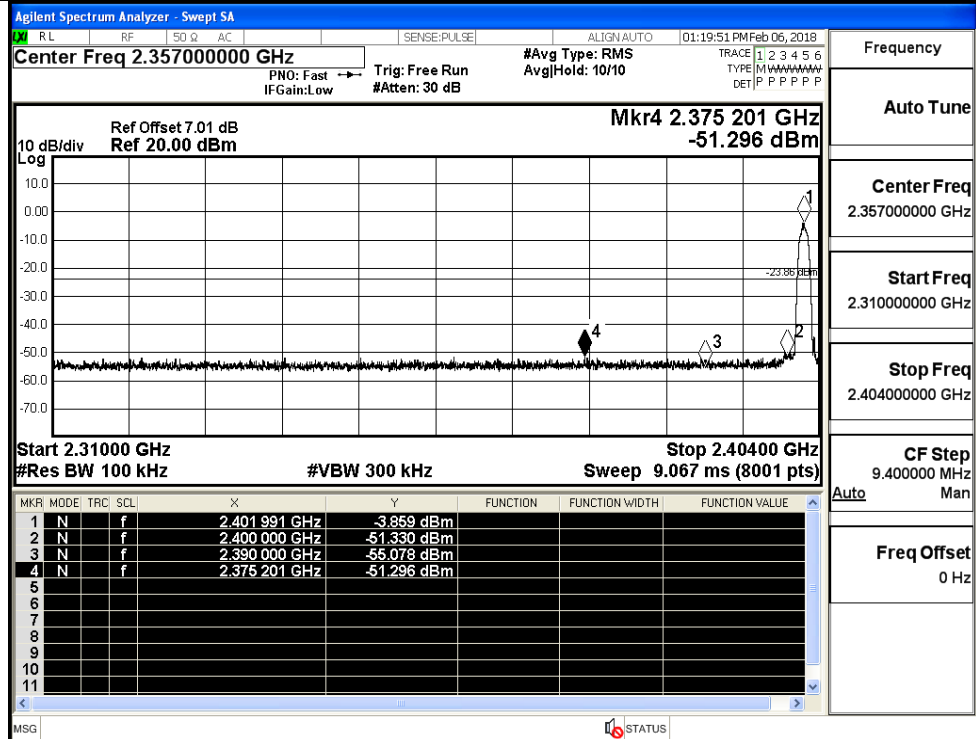
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq  
2.357000000 GHz

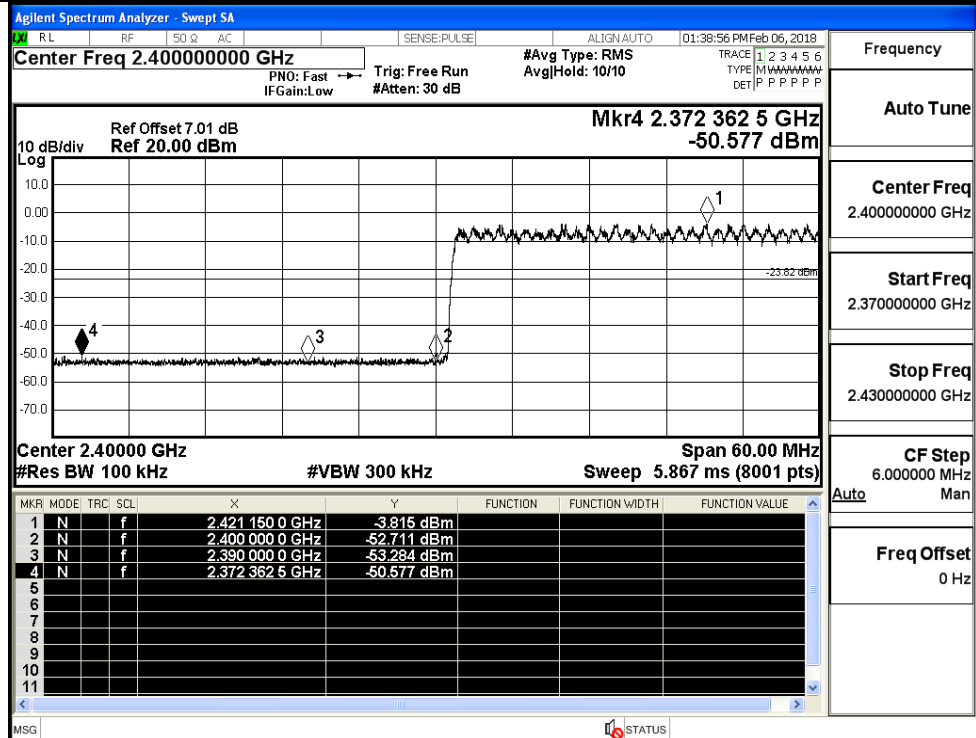
Start Freq  
2.310000000 GHz

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

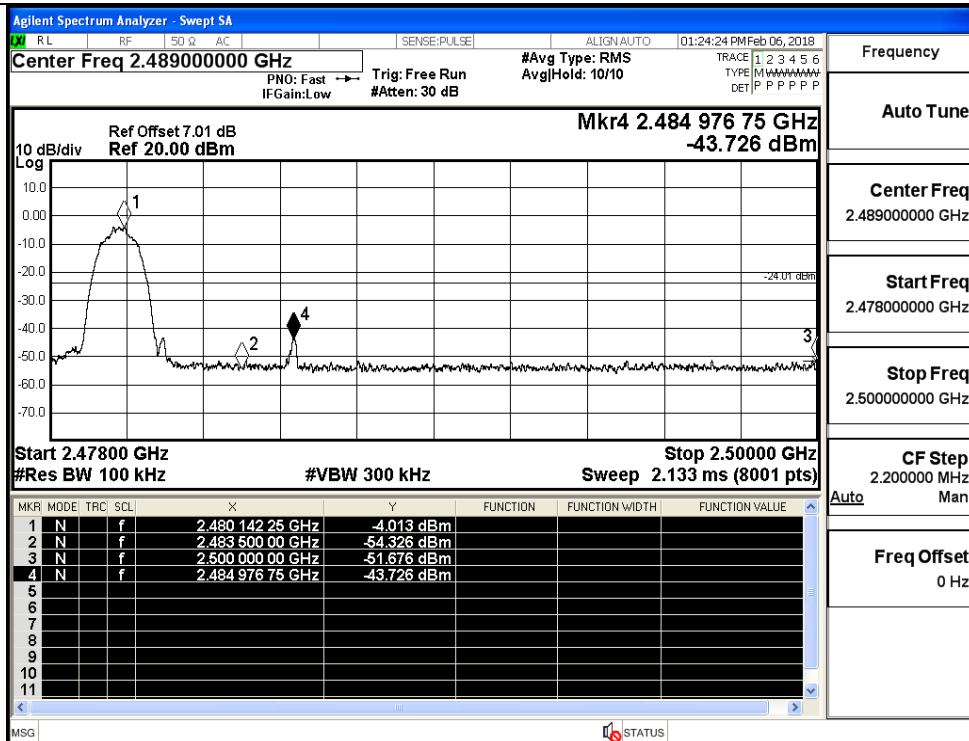
Start Freq  
2.370000000 GHz

Stop Freq  
2.430000000 GHz

CF Step  
6.000000 MHz  
Auto Man

Freq Offset  
0 Hz

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

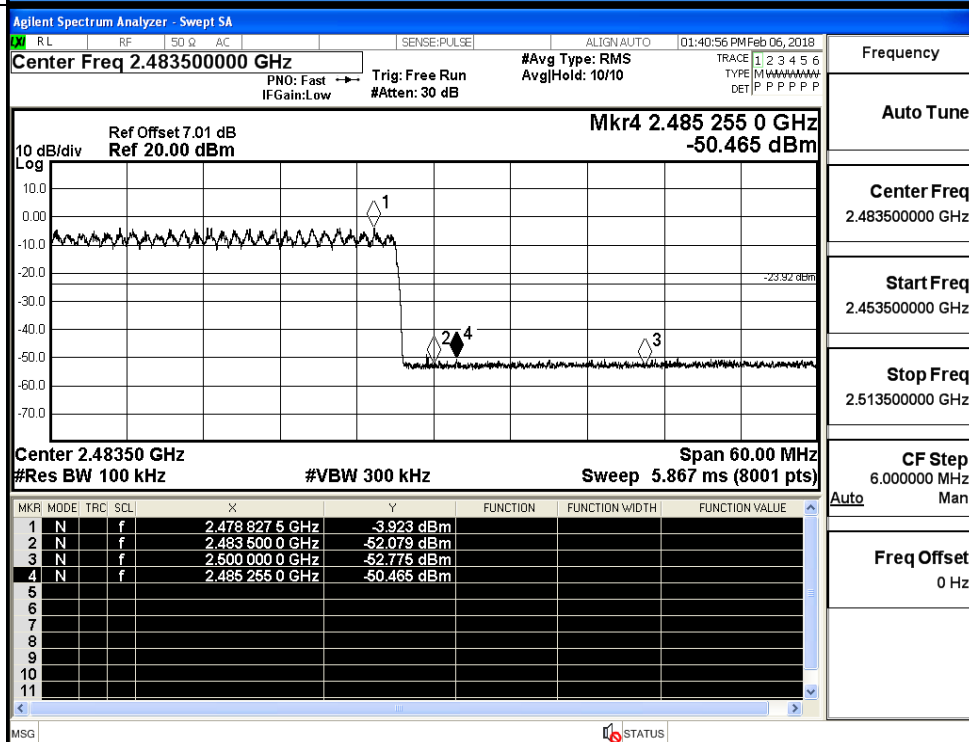


Frequency

Auto Tune

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

$\pi/4$ DQPSK/HCH/Hop

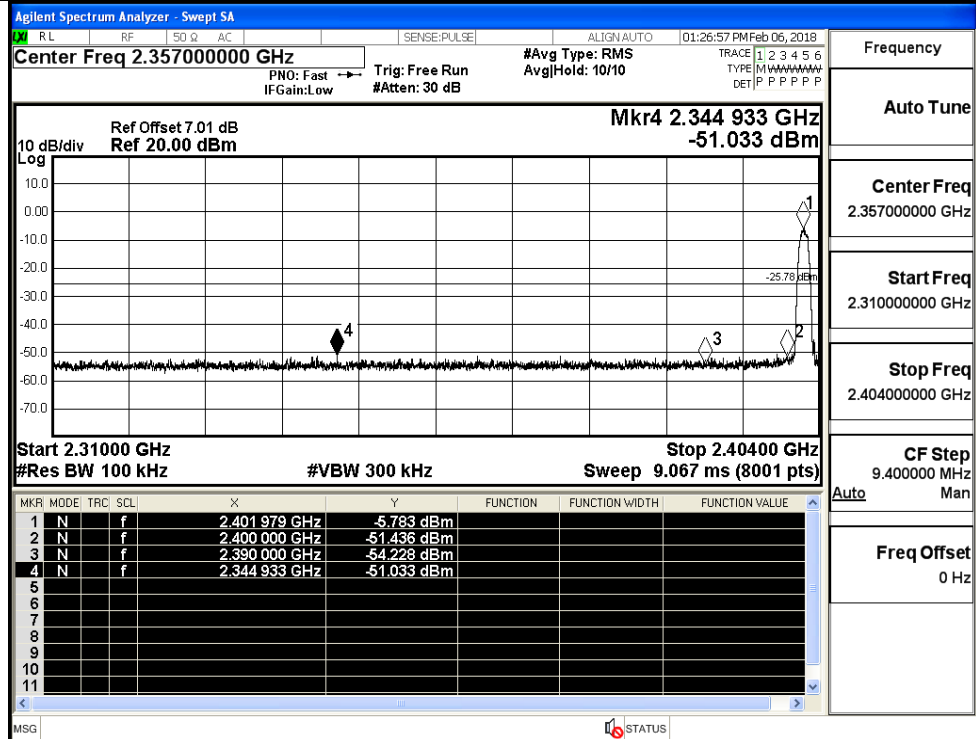


Frequency

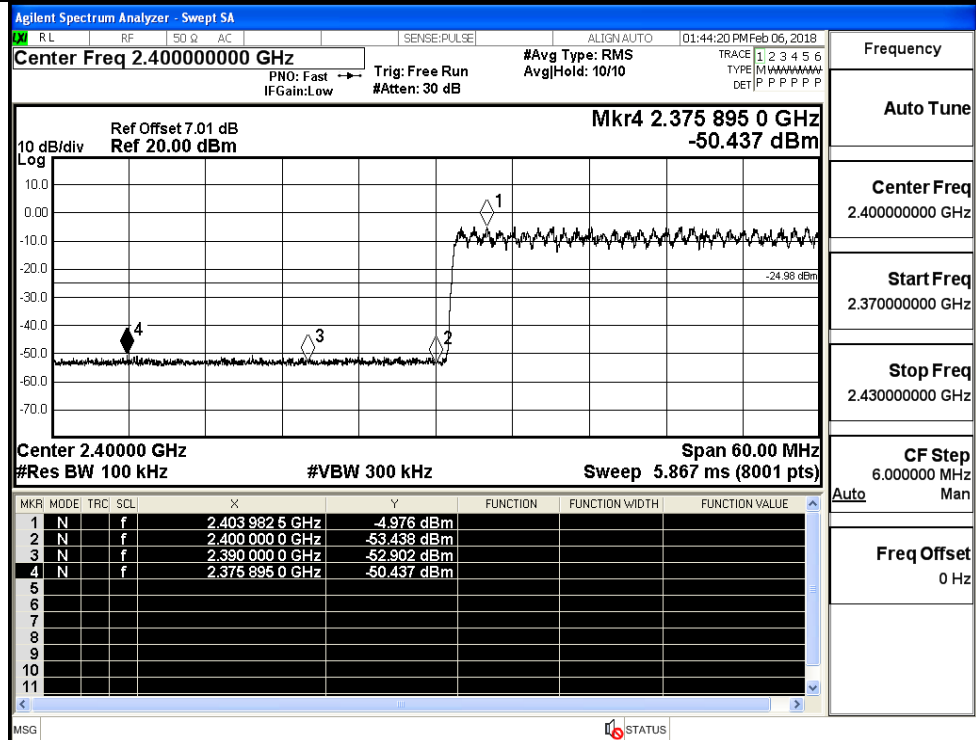
Auto Tune

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

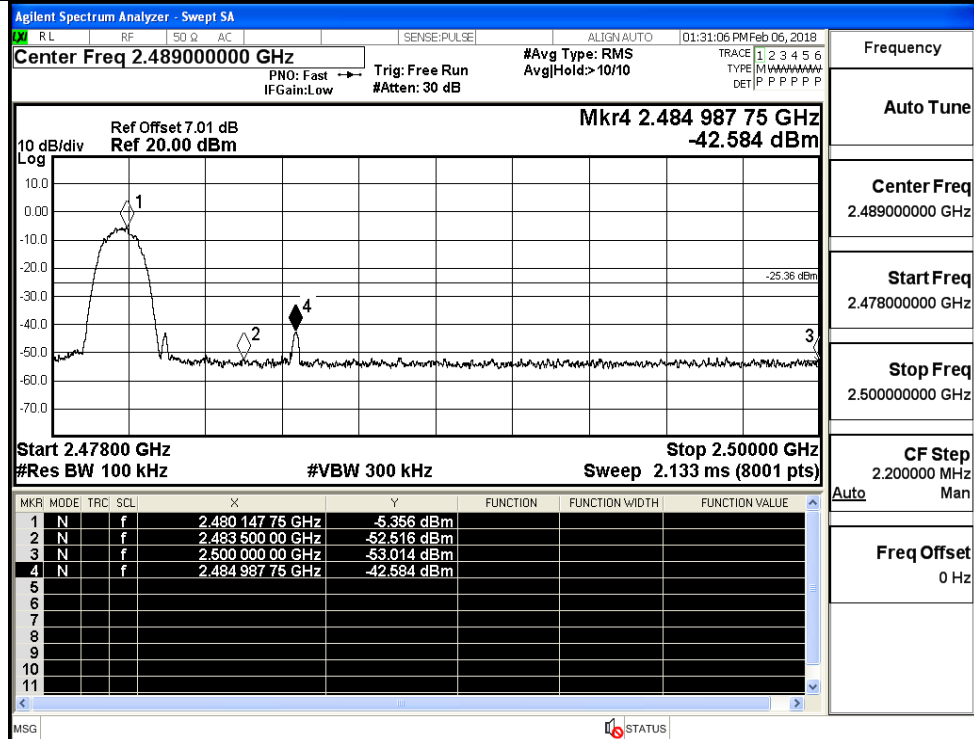
8DPSK/LCH/No Hop



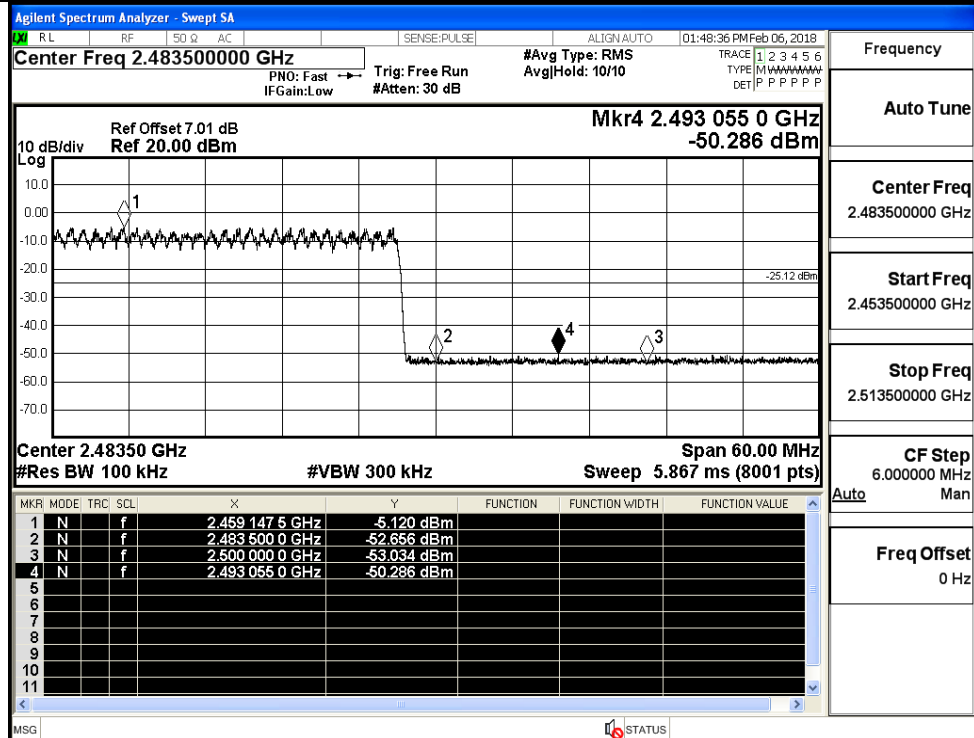
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



8DPSK/HCH/Hop

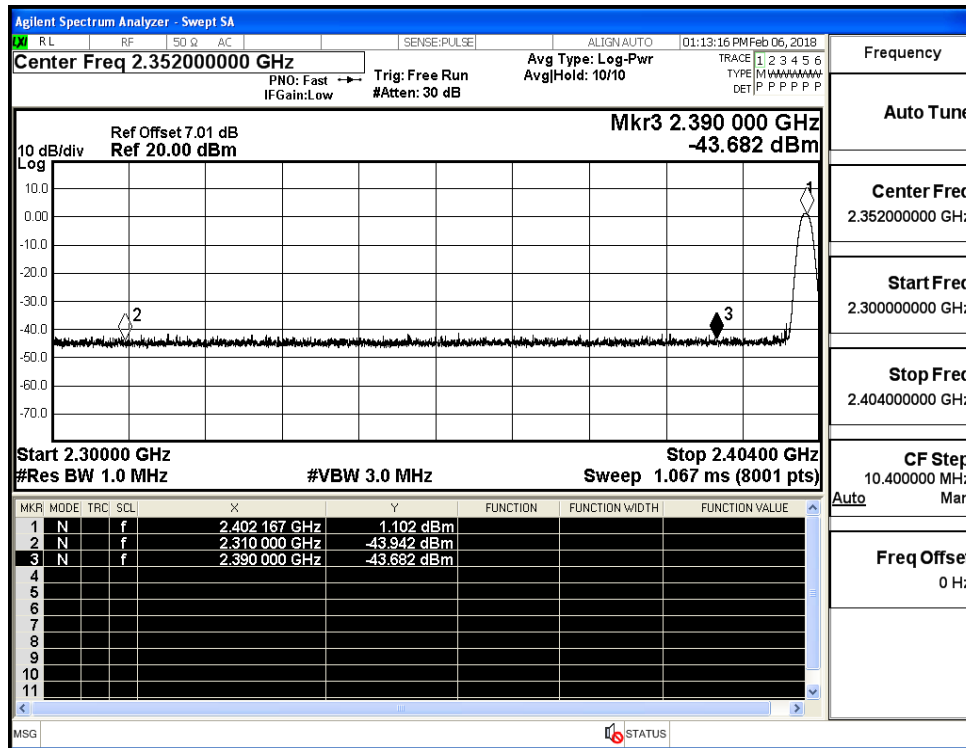




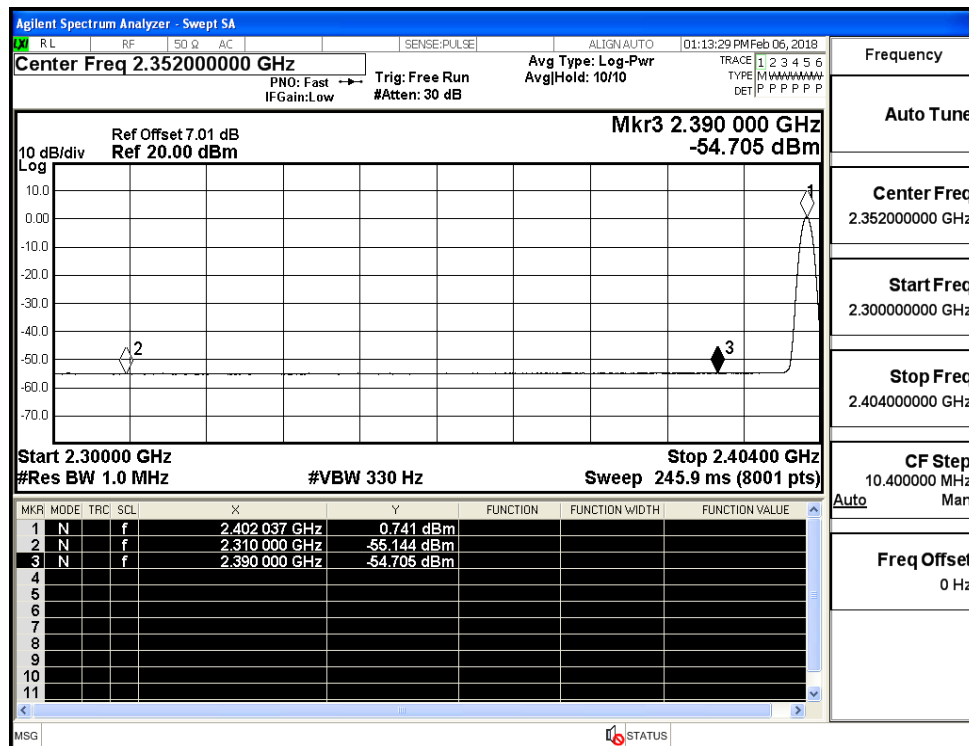
## A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.94	3.0	0	54.32	PEAK	74	PASS
	Off	2310.0	-55.14	3.0	0	43.12	AV	54	PASS
	Off	2390.0	-43.68	3.0	0	54.58	PEAK	74	PASS
	Off	2390.0	-54.71	3.0	0	43.55	AV	54	PASS
	Off	2483.5	-44.85	3.0	0	53.41	PEAK	74	PASS
	Off	2483.5	-54.39	3.0	0	43.87	AV	54	PASS
	Off	2500.0	-44.62	3.0	0	53.64	PEAK	74	PASS
	Off	2500.0	-54.29	3.0	0	43.97	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-44.38	3.0	0	53.88	PEAK	74	PASS
	Off	2310.0	-54.92	3.0	0	43.34	AV	54	PASS
	Off	2390.0	-45.09	3.0	0	53.17	PEAK	74	PASS
	Off	2390.0	-54.85	3.0	0	43.41	AV	54	PASS
	Off	2483.5	-43.60	3.0	0	54.66	PEAK	74	PASS
	Off	2483.5	-54.28	3.0	0	43.98	AV	54	PASS
	Off	2500.0	-43.16	3.0	0	55.10	PEAK	74	PASS
	Off	2500.0	-54.33	3.0	0	43.93	AV	54	PASS
8DPSK	Off	2310.0	-44.80	3.0	0	53.46	PEAK	74	PASS
	Off	2310.0	-55.02	3.0	0	43.24	AV	54	PASS
	Off	2390.0	-43.70	3.0	0	54.56	PEAK	74	PASS
	Off	2390.0	-54.70	3.0	0	43.56	AV	54	PASS
	Off	2483.5	-44.63	3.0	0	53.63	PEAK	74	PASS
	Off	2483.5	-54.23	3.0	0	44.03	AV	54	PASS
	Off	2500.0	-44.19	3.0	0	54.07	PEAK	74	PASS
	Off	2500.0	-54.32	3.0	0	43.94	AV	54	PASS

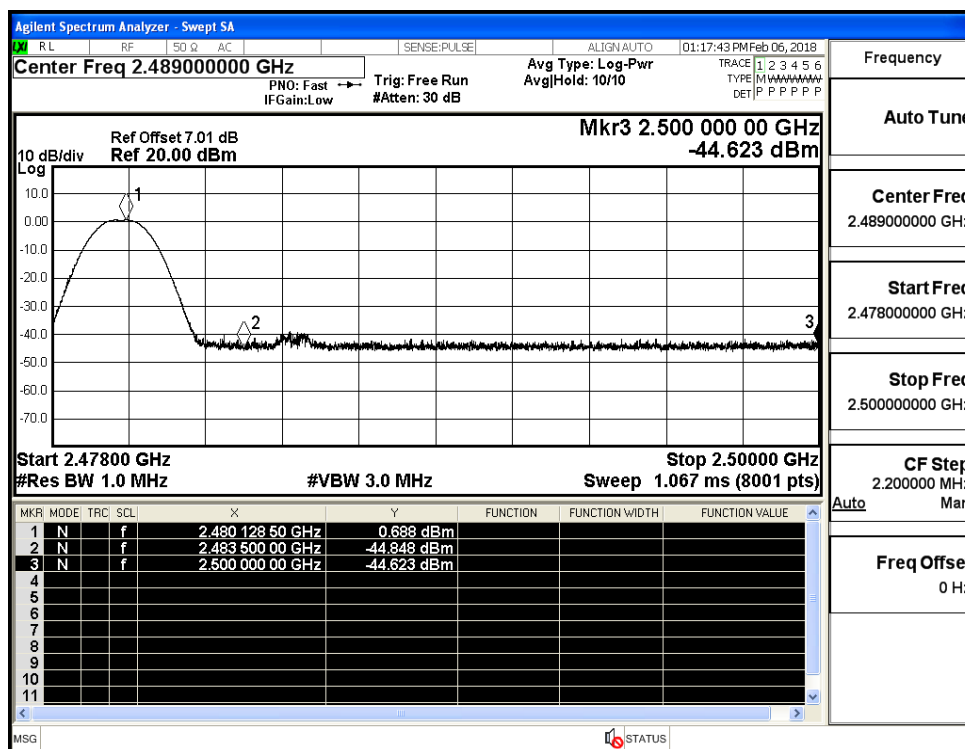
## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (Low Channel)



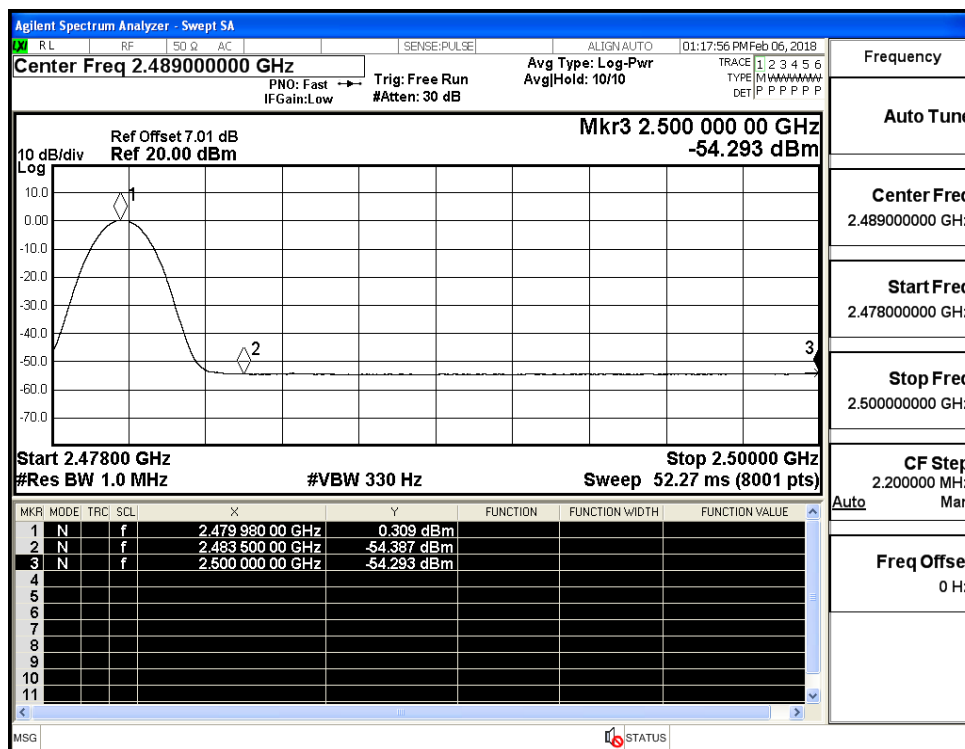
## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (Low Channel)

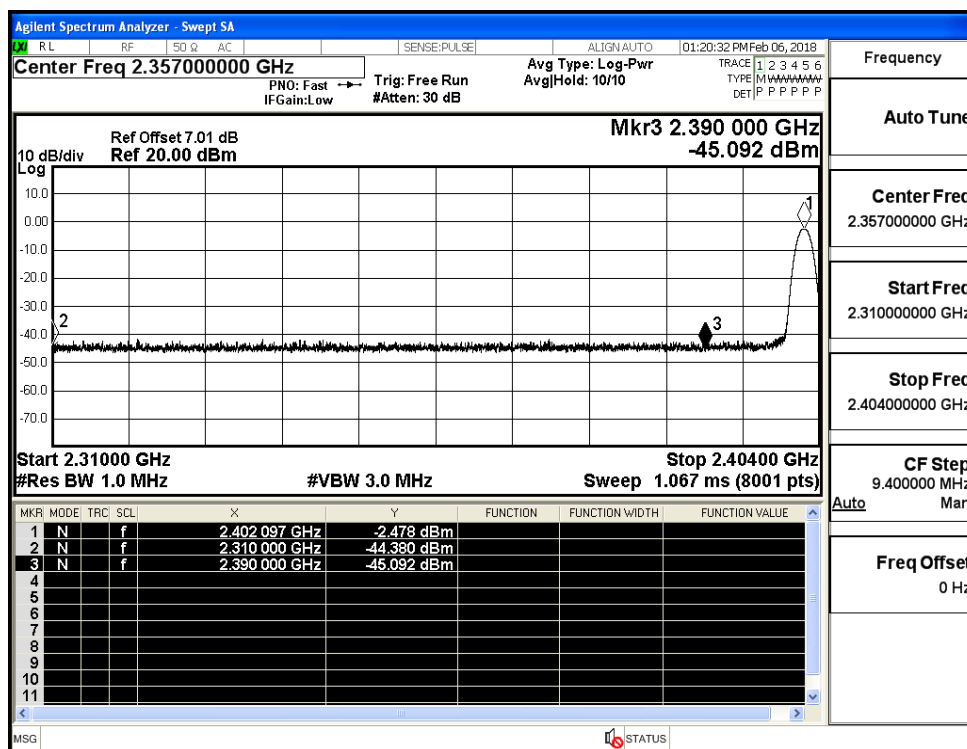
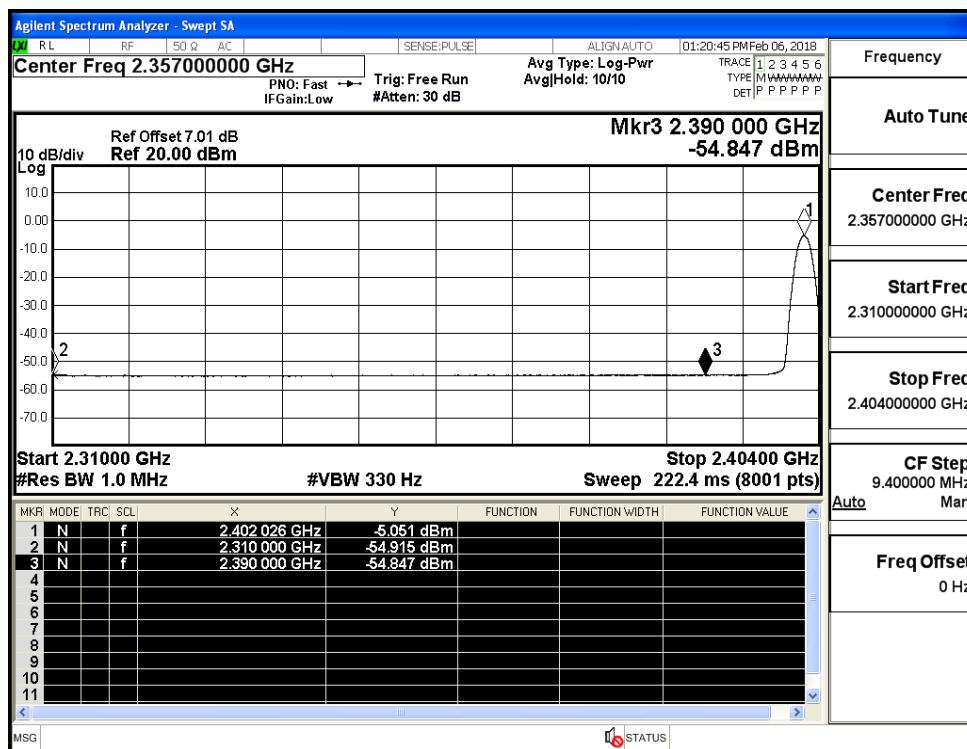


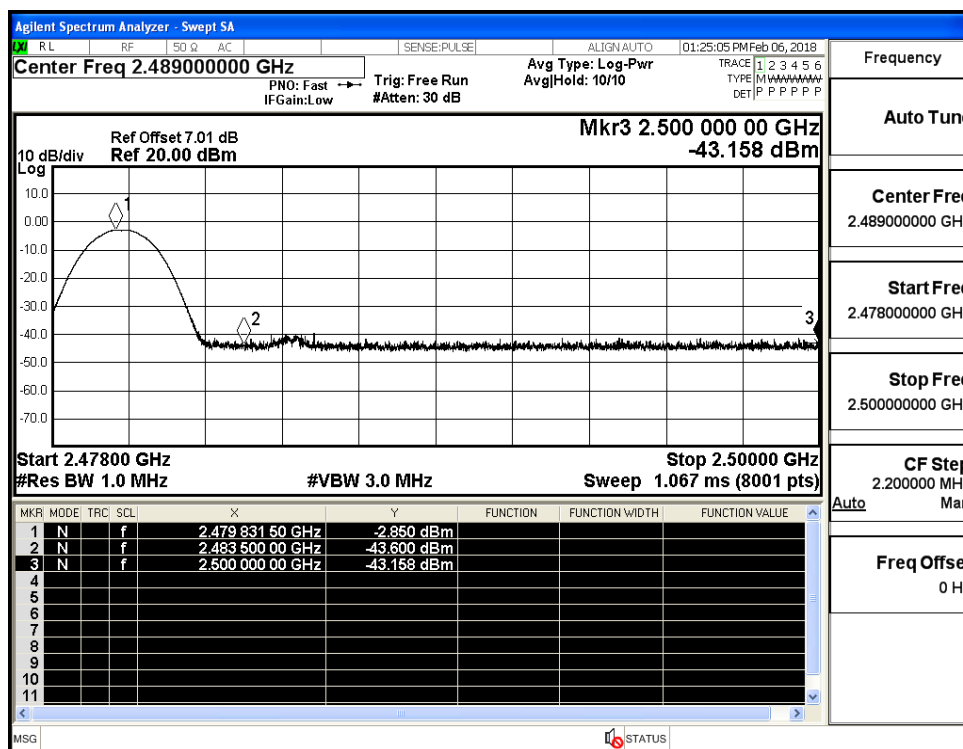
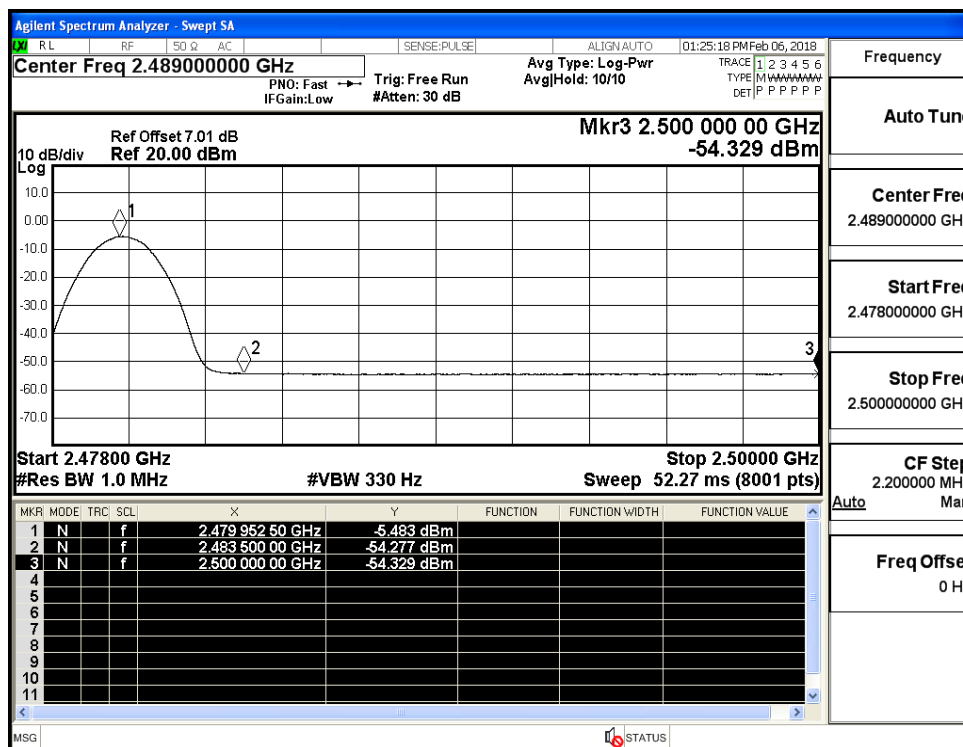
## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (High Channel)



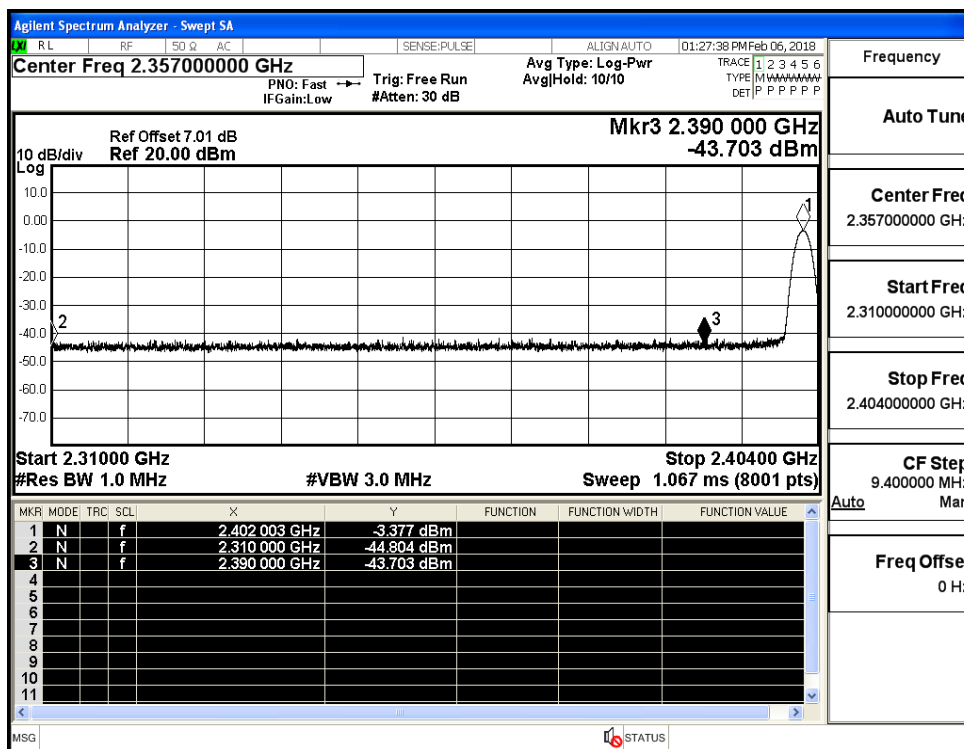
## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (High Channel)



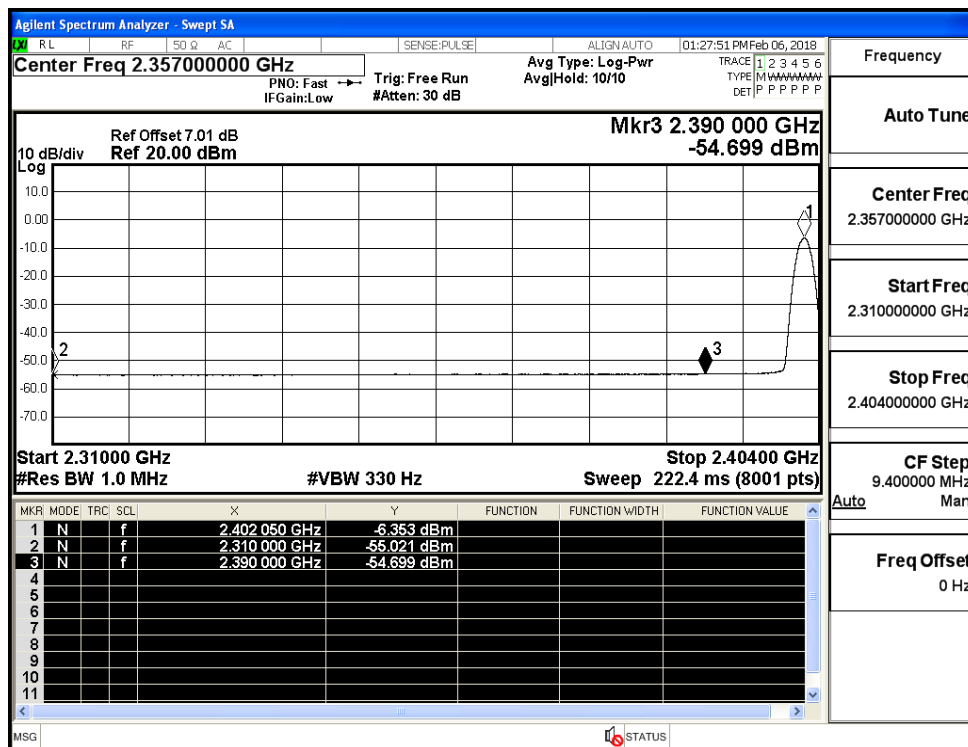
Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)

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)

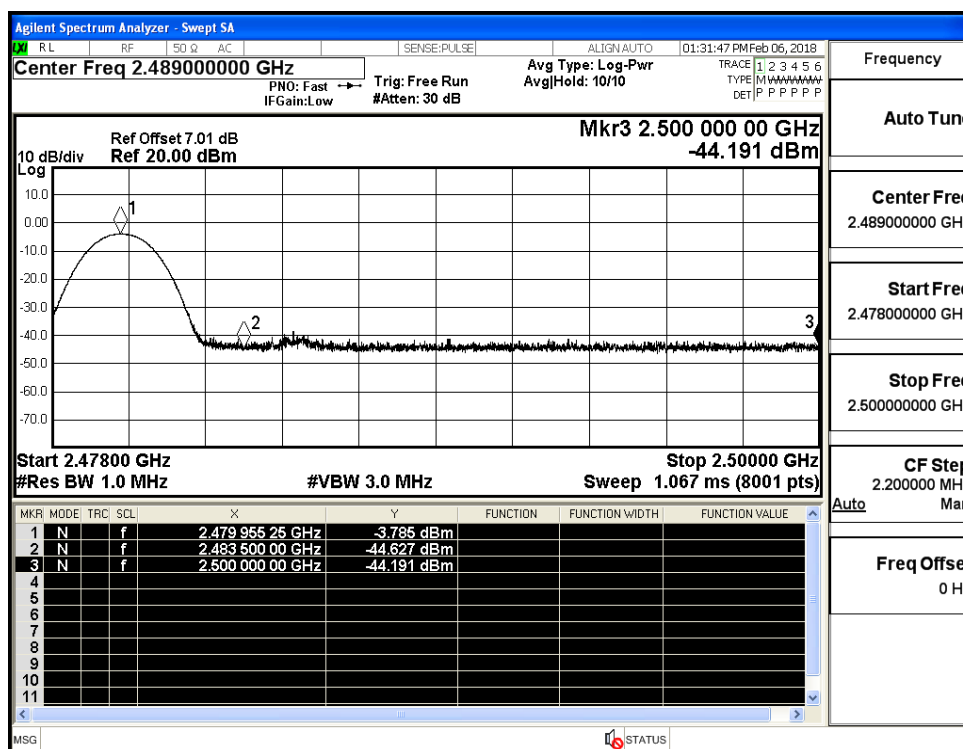
## Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



## 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)

