

Appendix A

RF Test Data for BT V3.0(BDR/EDR) (Conducted Measurement)

Product Name: Portable Speaker

Trade Mark: zēnith

Test Model: ZT-12GX

Environmental Conditions

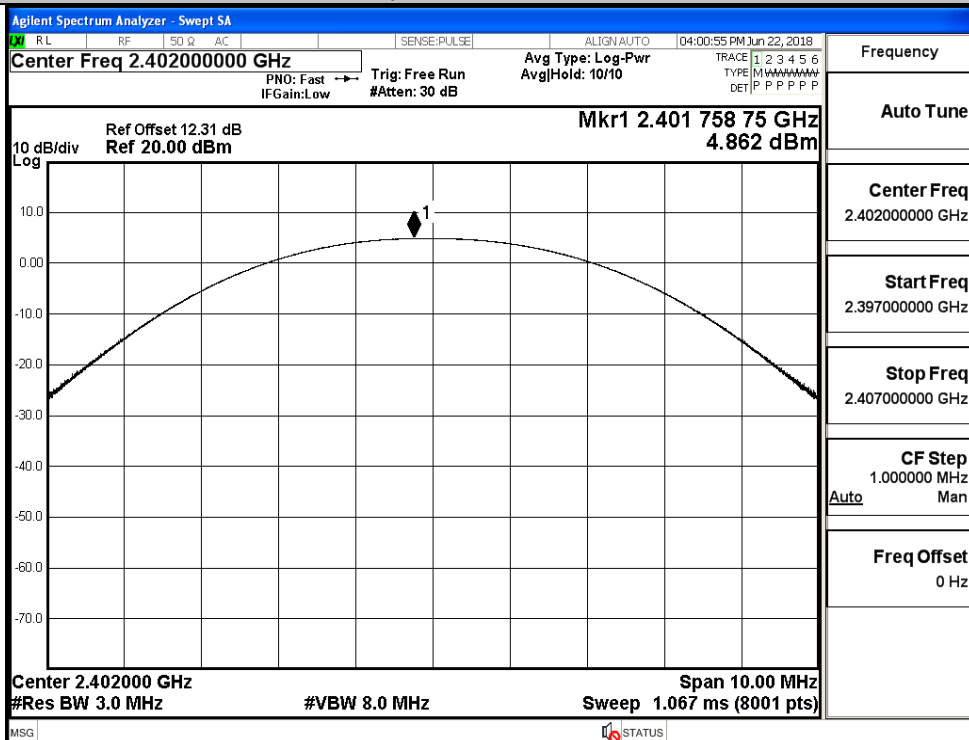
Temperature:	23.2 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Wilson hong
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Peak Output Power

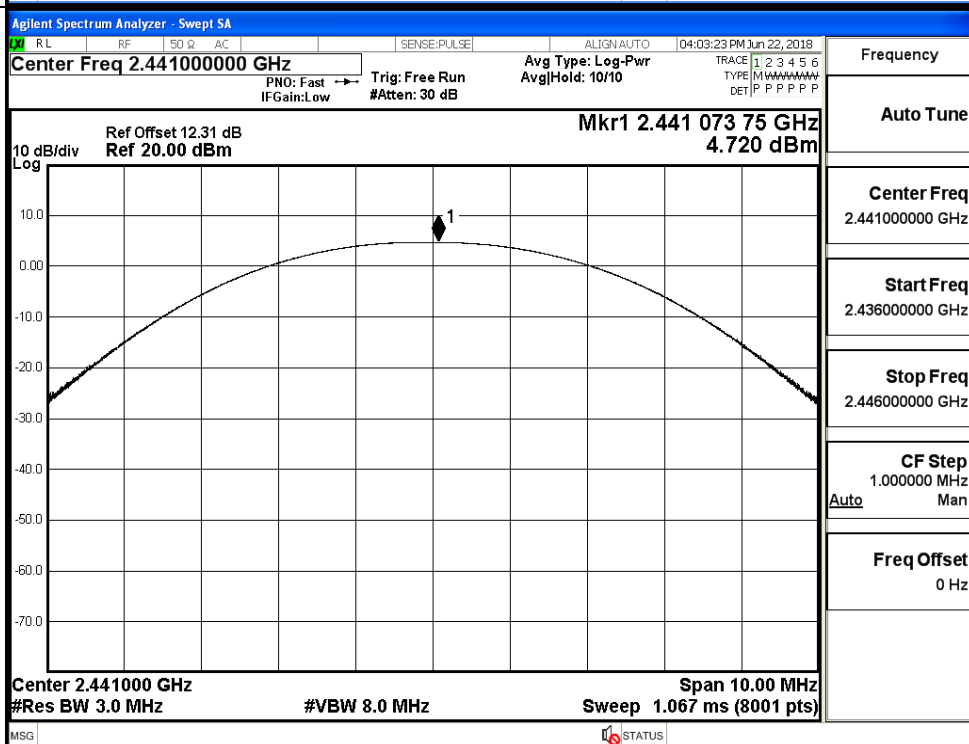
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.862	30	PASS
	MCH	4.720	30	PASS
	HCH	5.125	30	PASS
$\pi/4$ DQPSK	LCH	4.742	21	PASS
	MCH	4.646	21	PASS
	HCH	4.996	21	PASS
8DPSK	LCH	4.930	21	PASS
	MCH	4.815	21	PASS
	HCH	5.292	21	PASS

Test Graphs

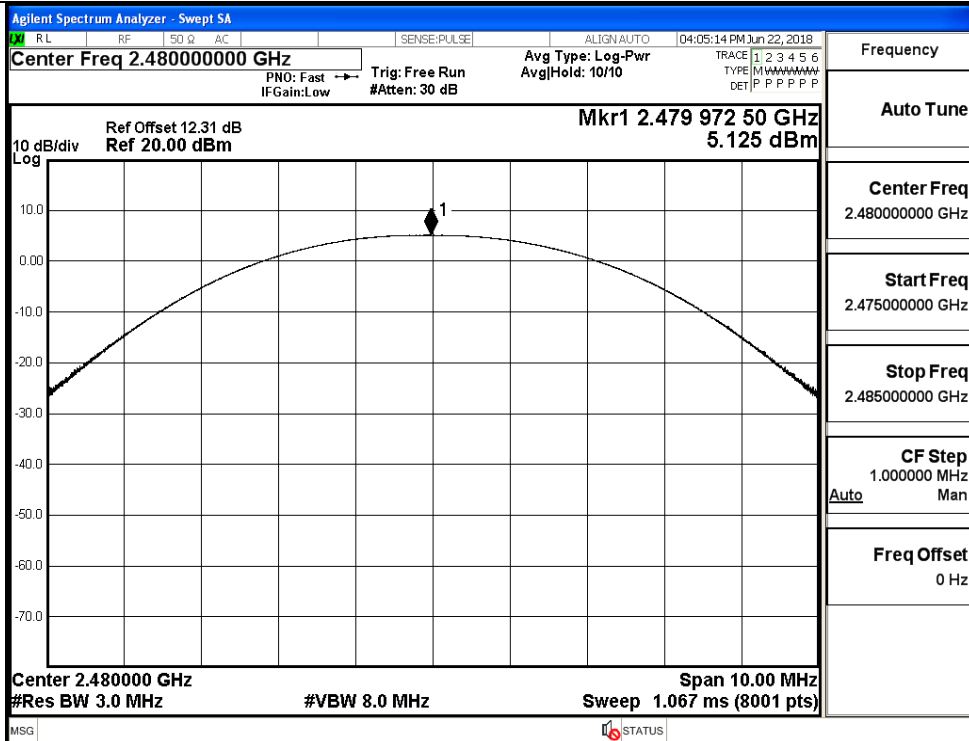
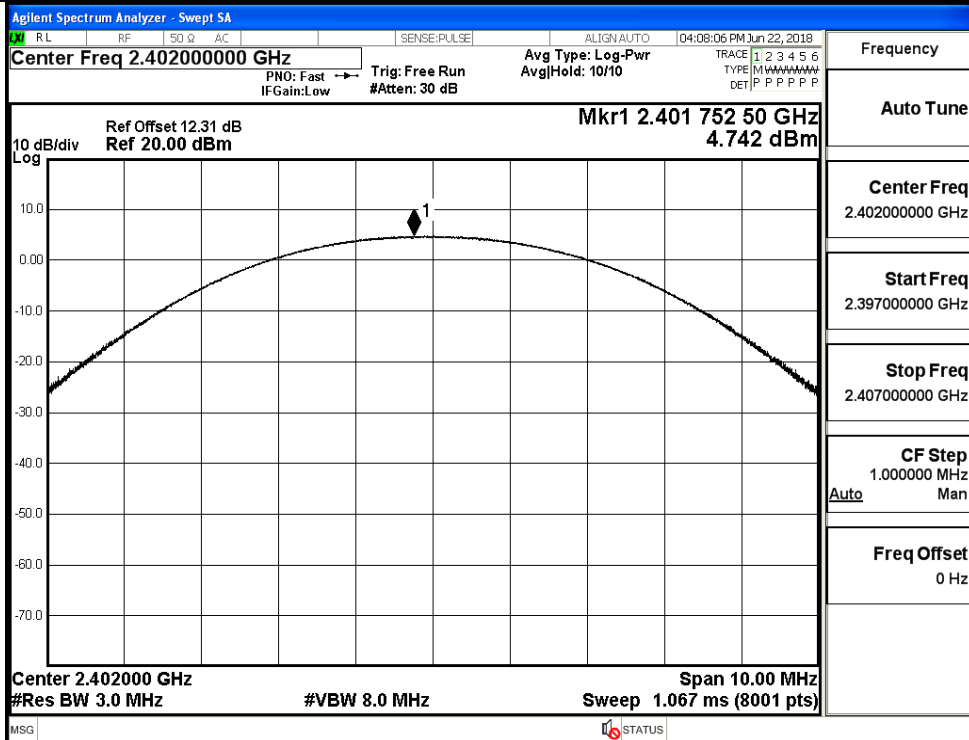
GFSK/LCH

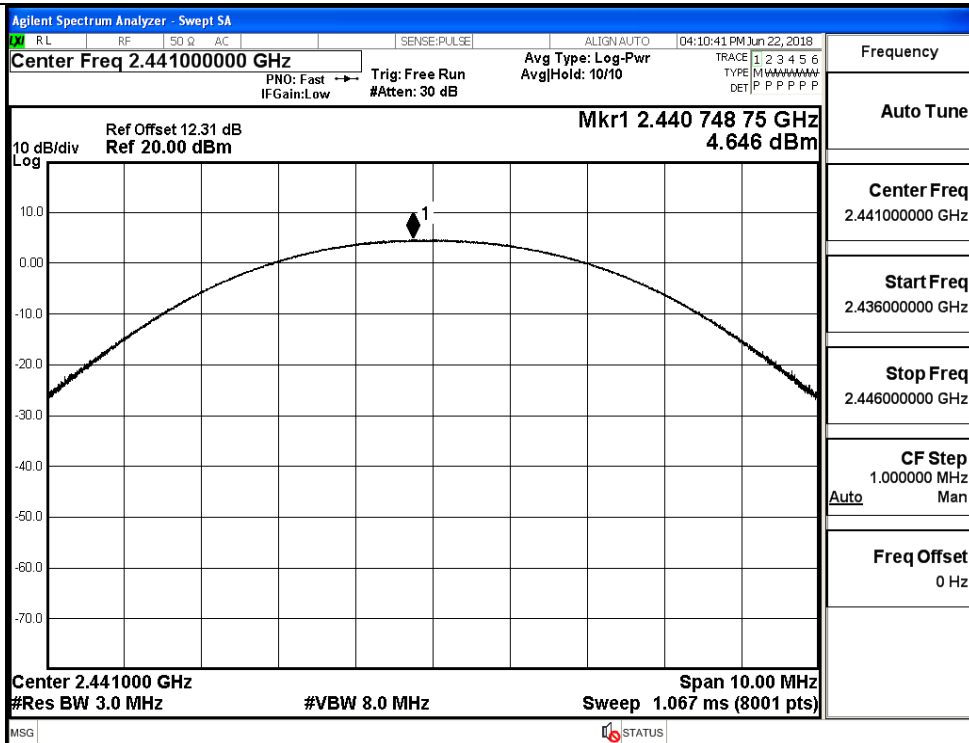
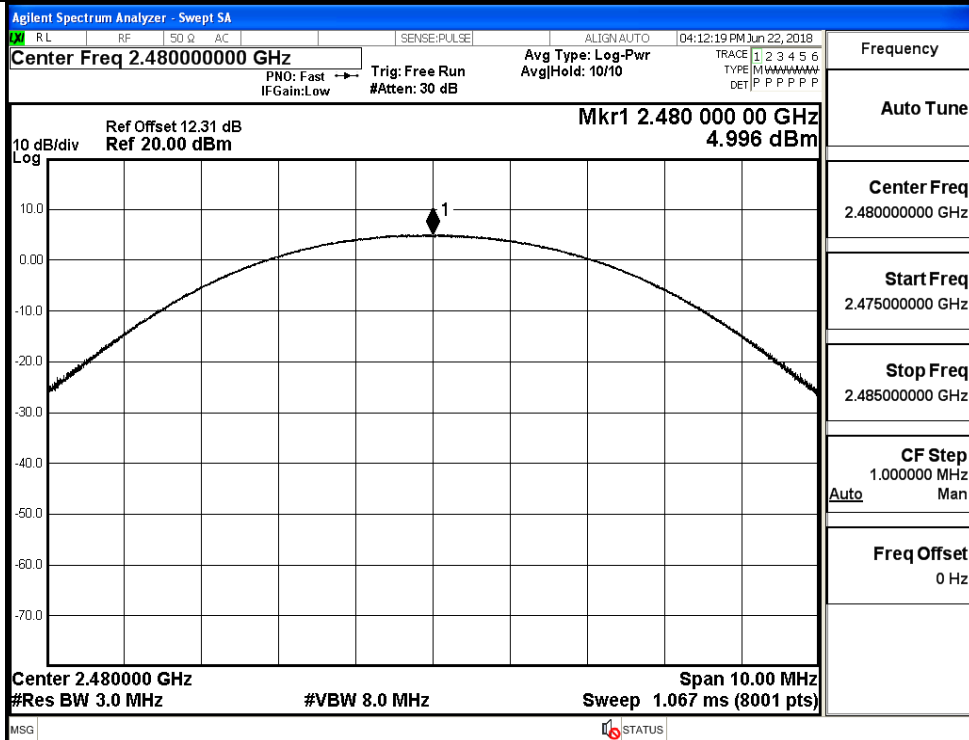


GFSK/MCH

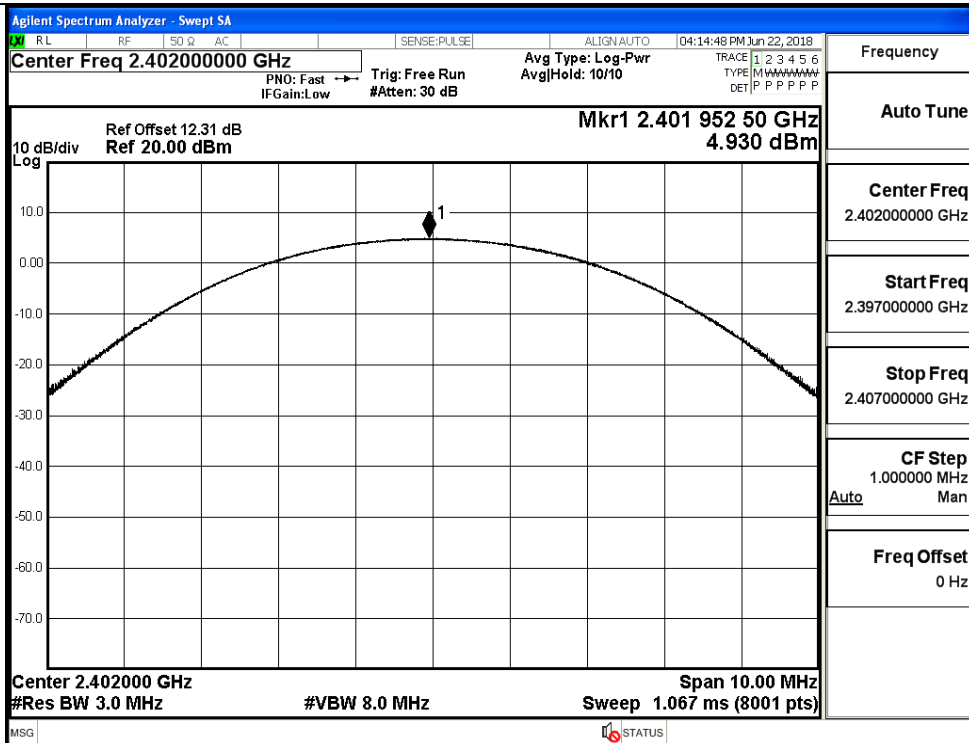


GFSK/HCH

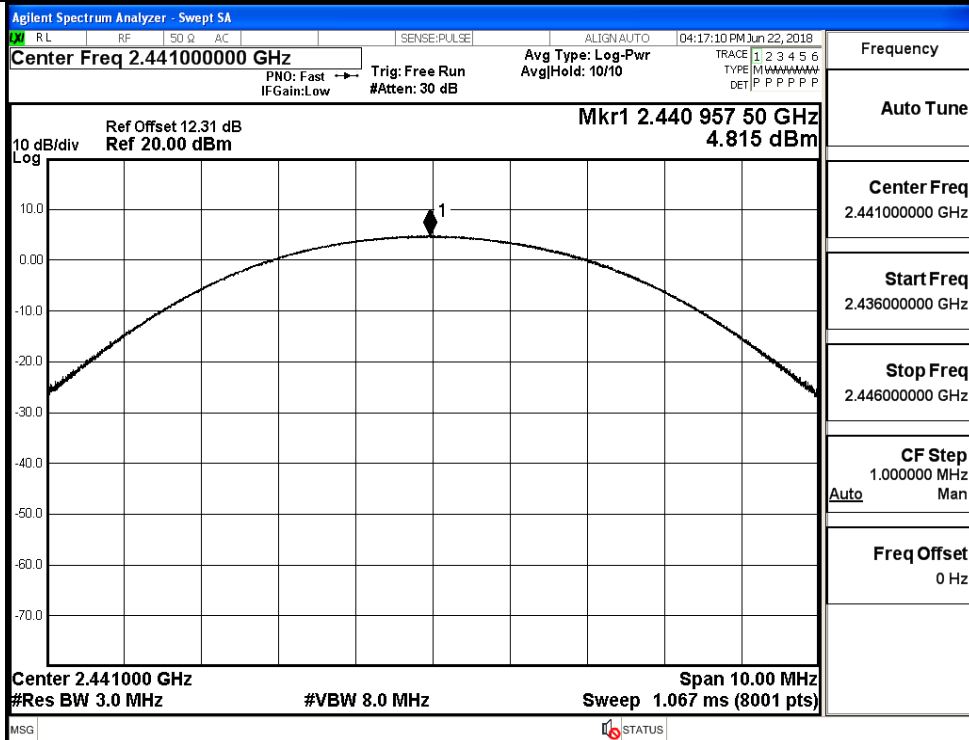
 π /4DQPSK/LCH

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

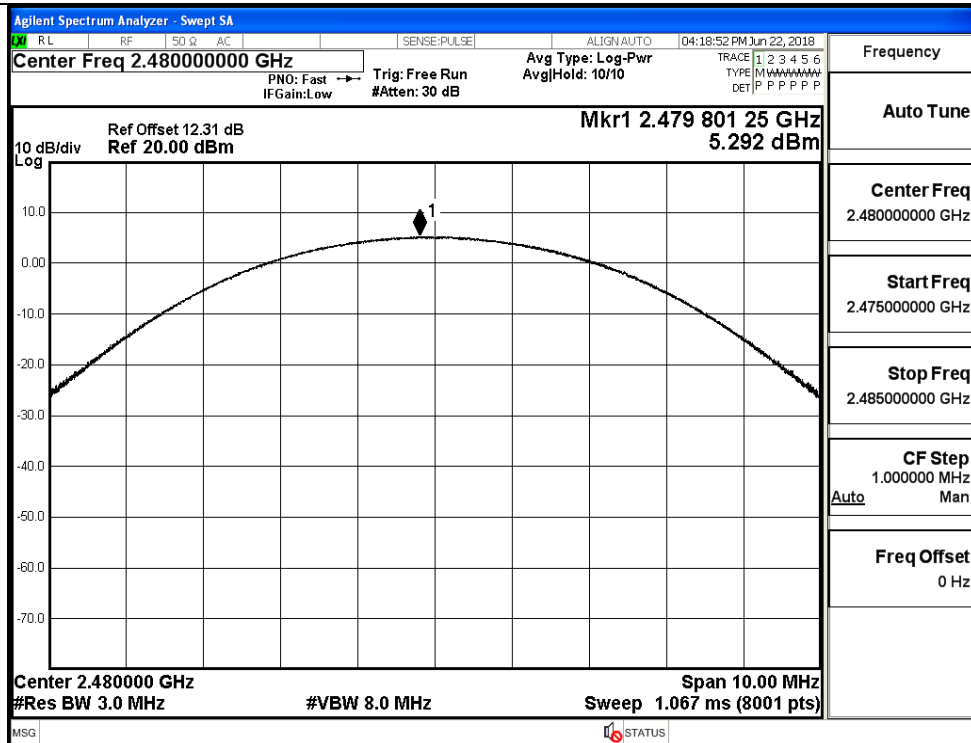
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

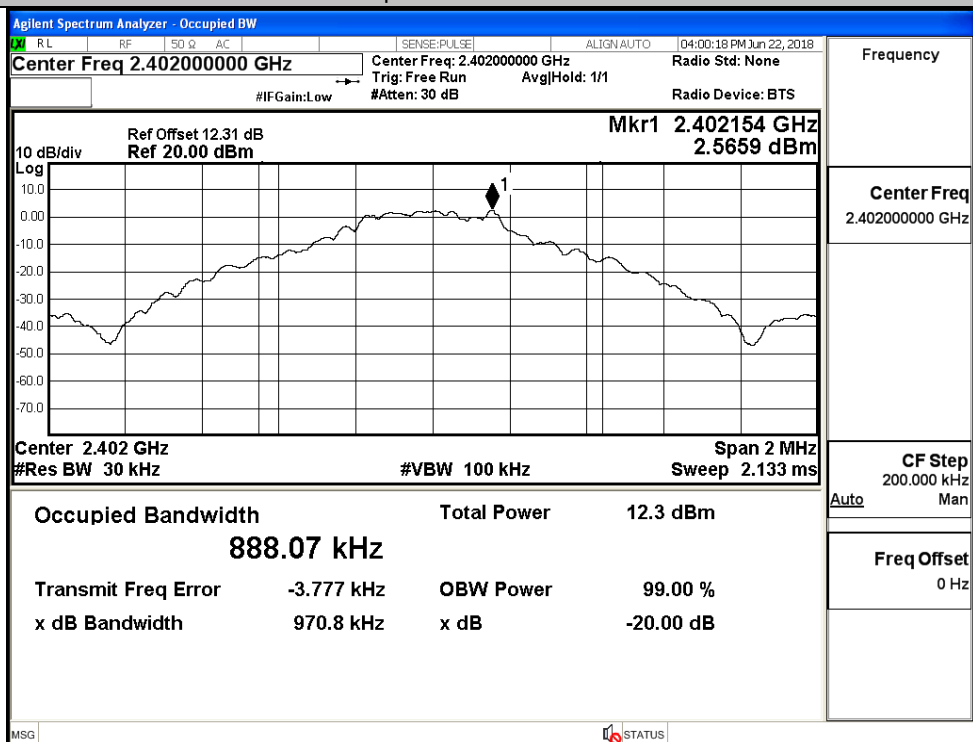


A.2 20dB Bandwidth

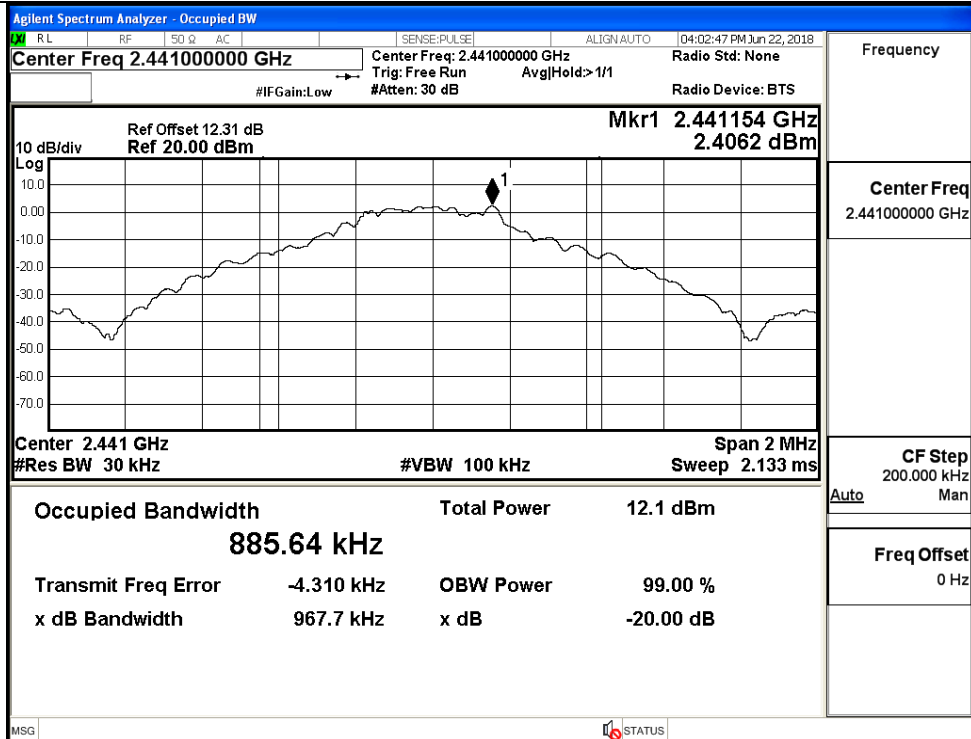
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9708	Not Specified	PASS
	MCH	0.9677	Not Specified	PASS
	HCH	1.034	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.288	Not Specified	PASS
	MCH	1.287	Not Specified	PASS
	HCH	1.286	Not Specified	PASS
8DPSK	LCH	1.291	Not Specified	PASS
	MCH	1.289	Not Specified	PASS
	HCH	1.292	Not Specified	PASS

Test Graphs

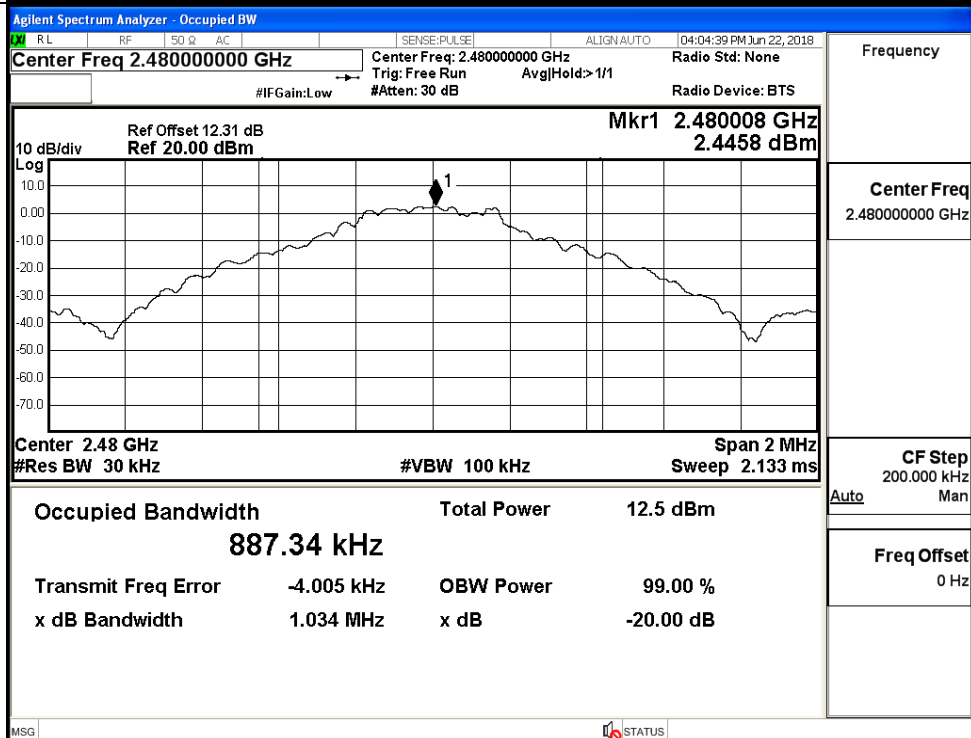
GFSK/LCH

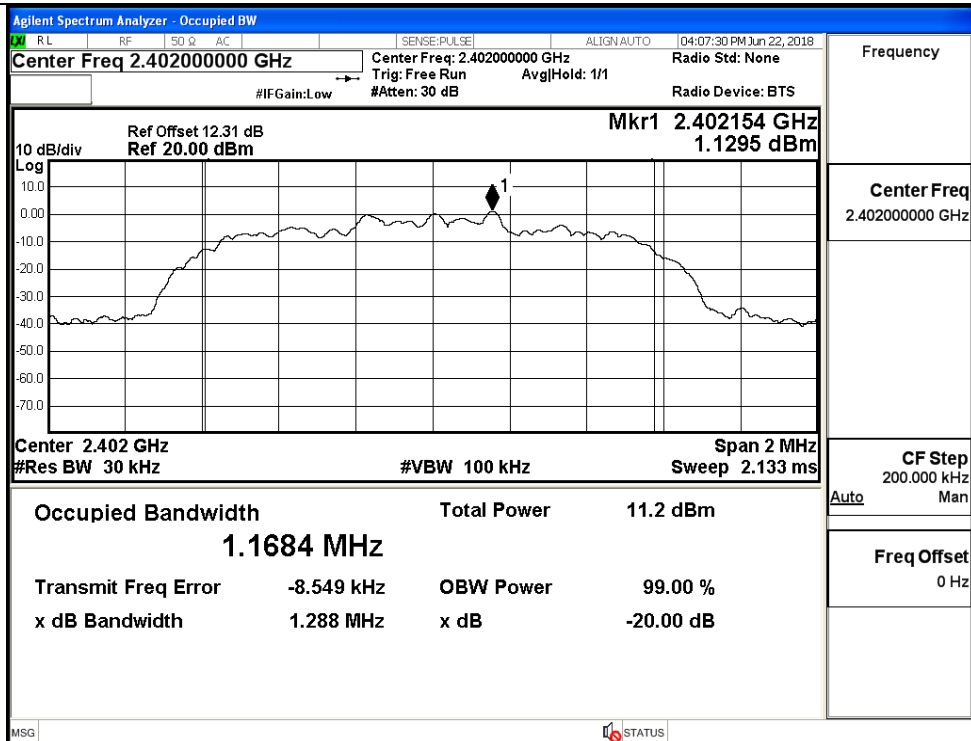
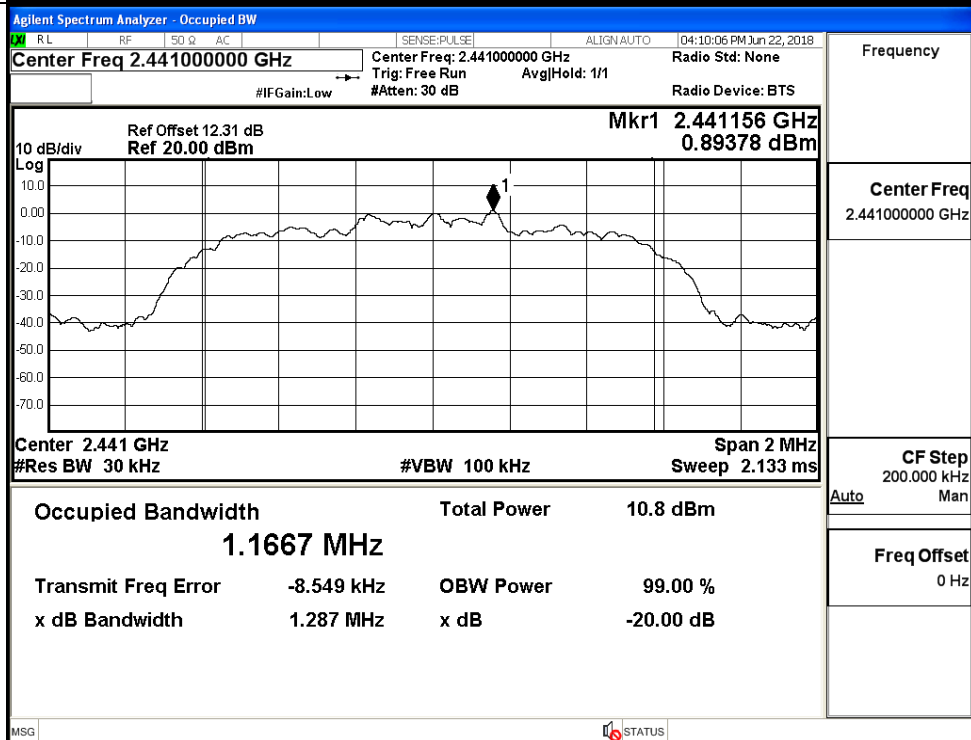


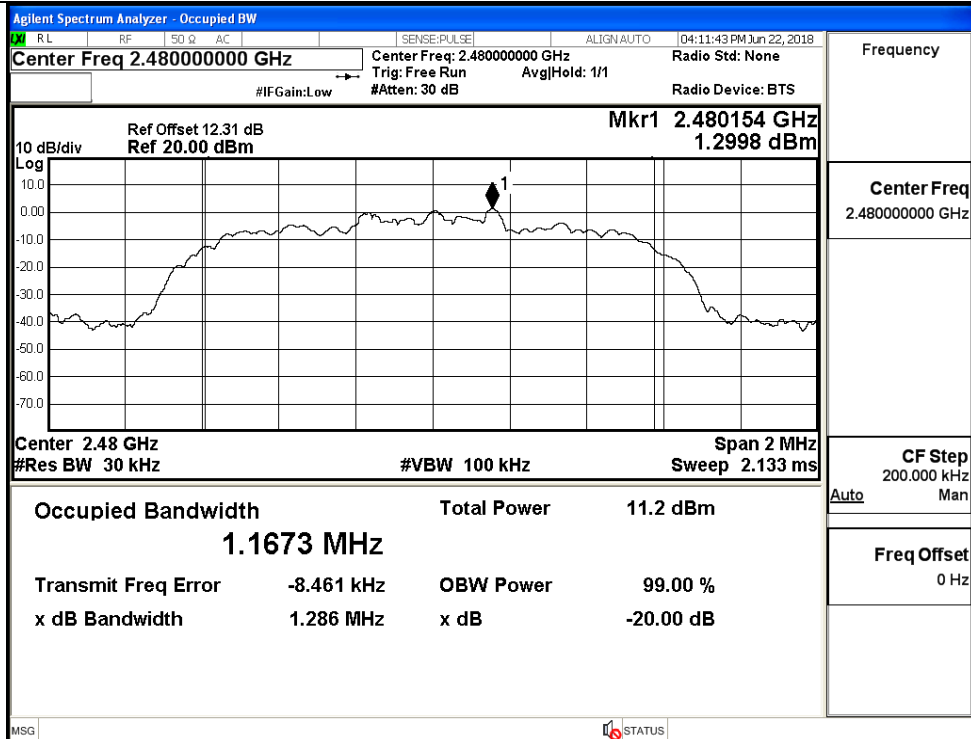
GFSK/MCH



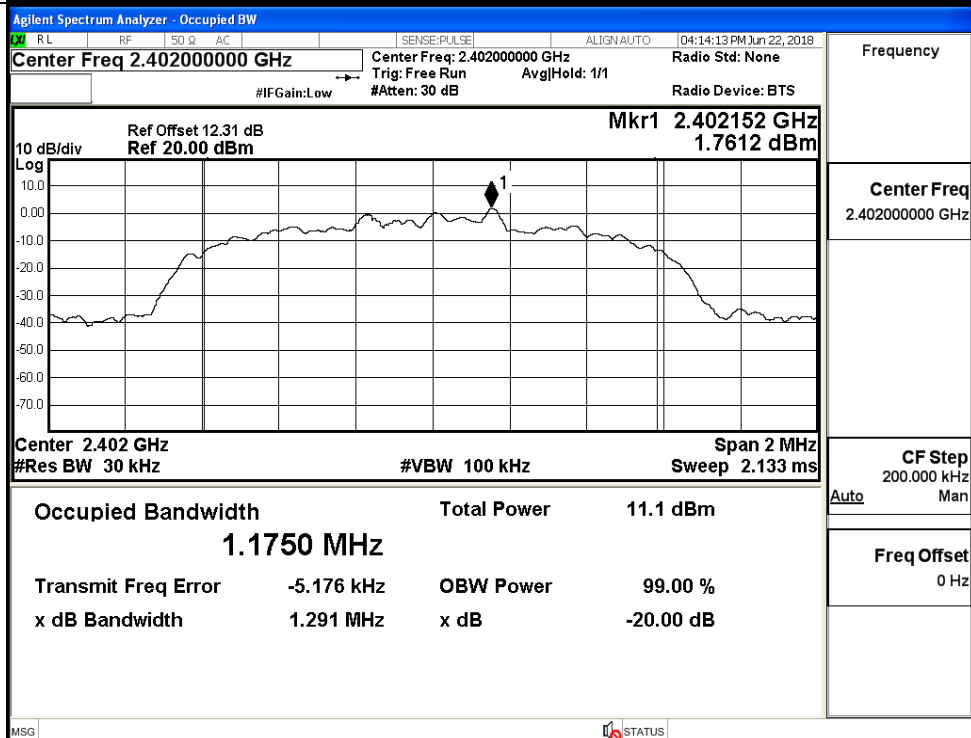
GFSK/HCH



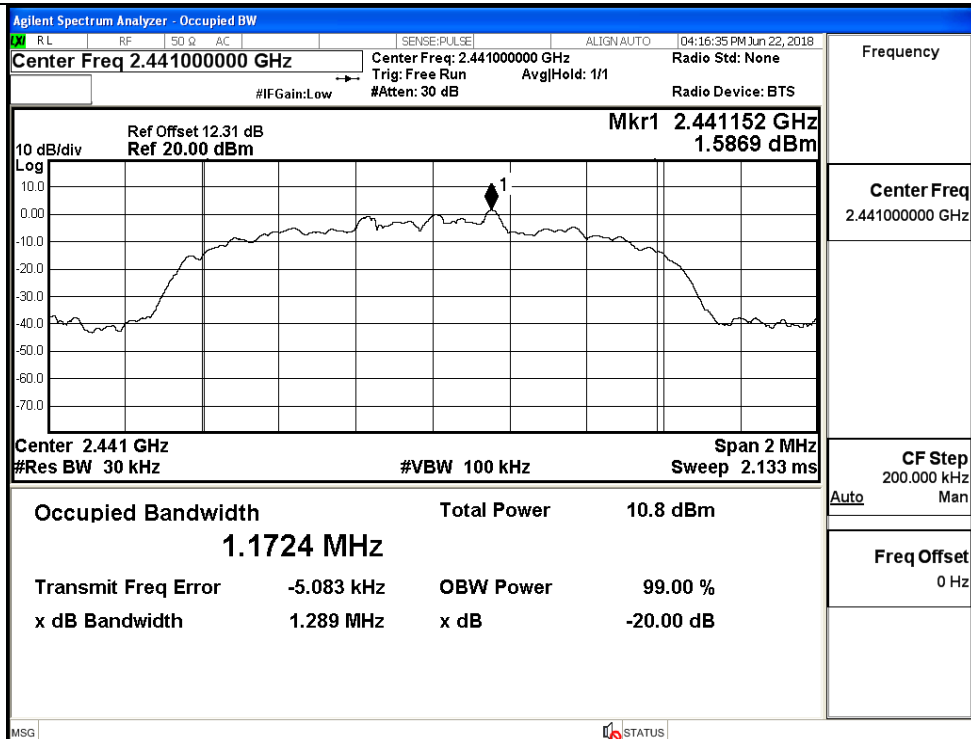
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

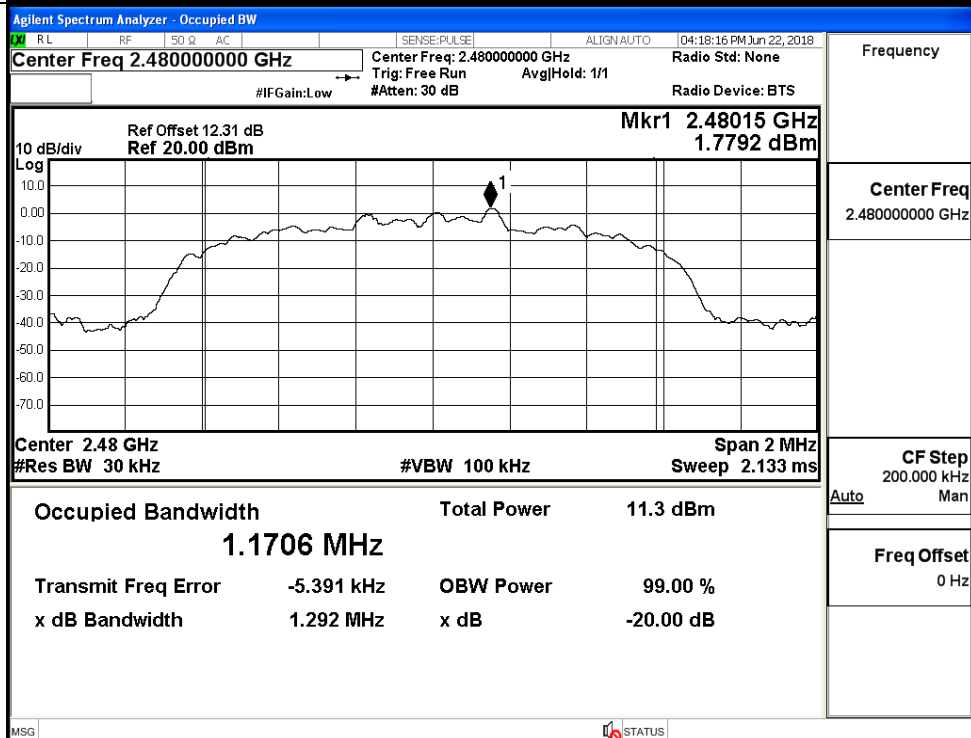
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

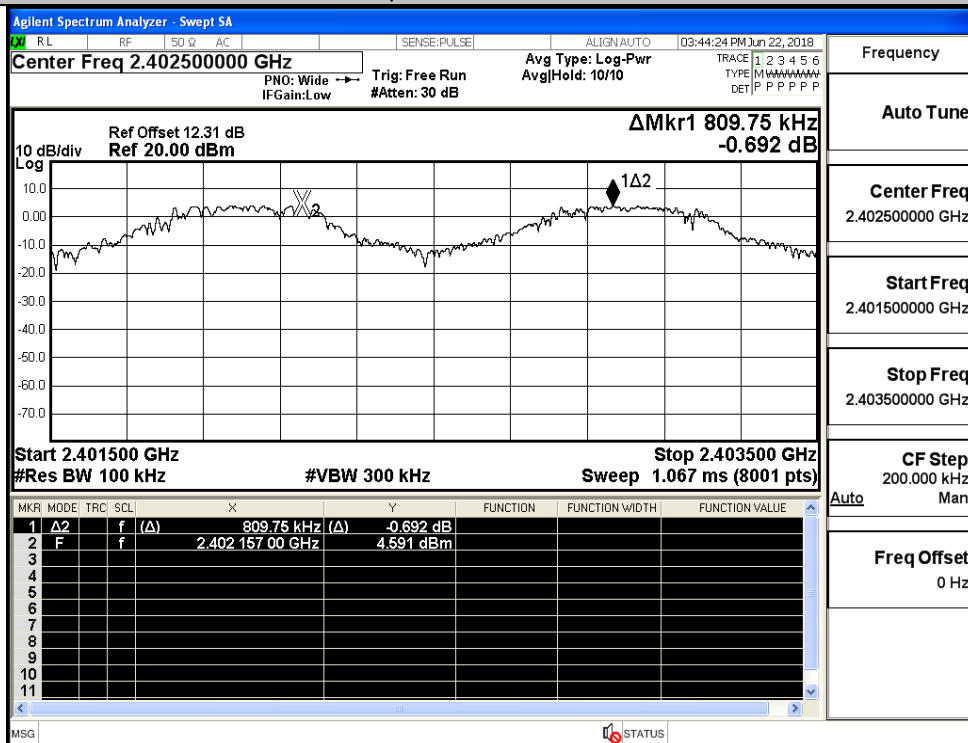


A.3 Carrier Frequency Separation

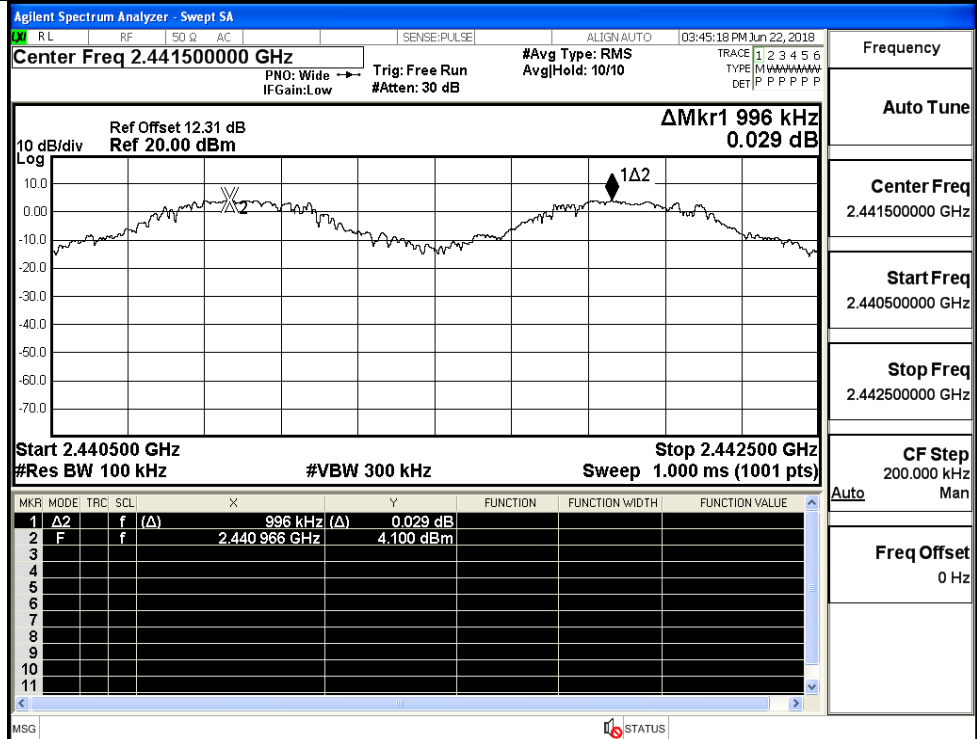
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.810	0.646	PASS
	MCH	0.996	0.646	PASS
	HCH	1.114	0.646	PASS
$\pi/4$ DQPSK	LCH	1.182	0.862	PASS
	MCH	1.340	0.862	PASS
	HCH	0.952	0.862	PASS
8DPSK	LCH	1.304	0.861	PASS
	MCH	1.284	0.861	PASS
	HCH	0.932	0.861	PASS

Test Graphs

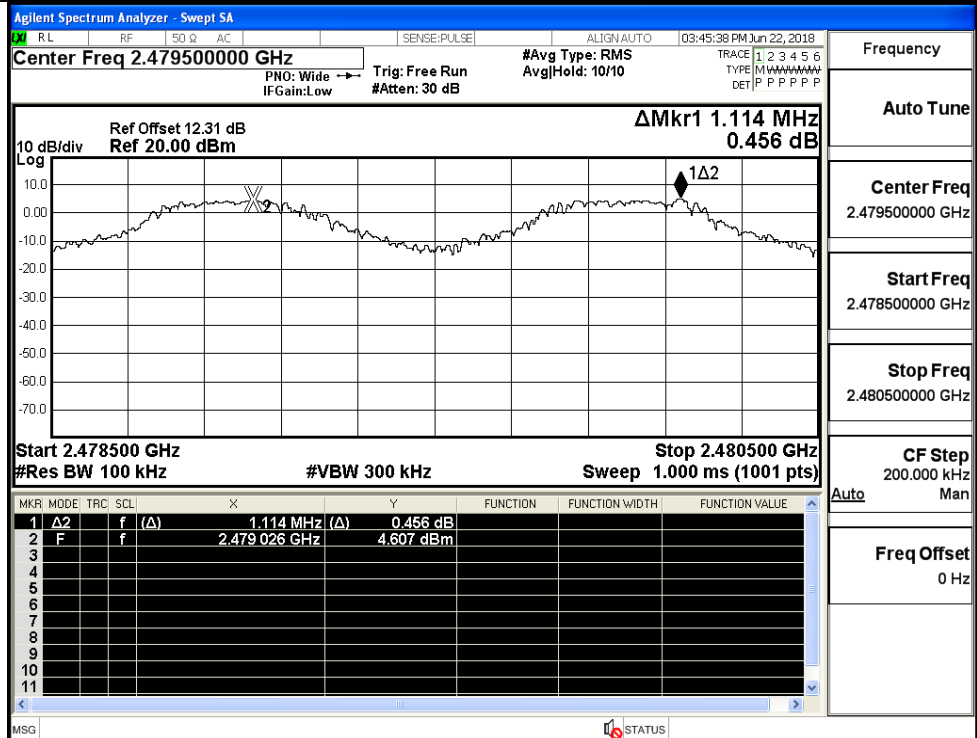
GFSK/LCH

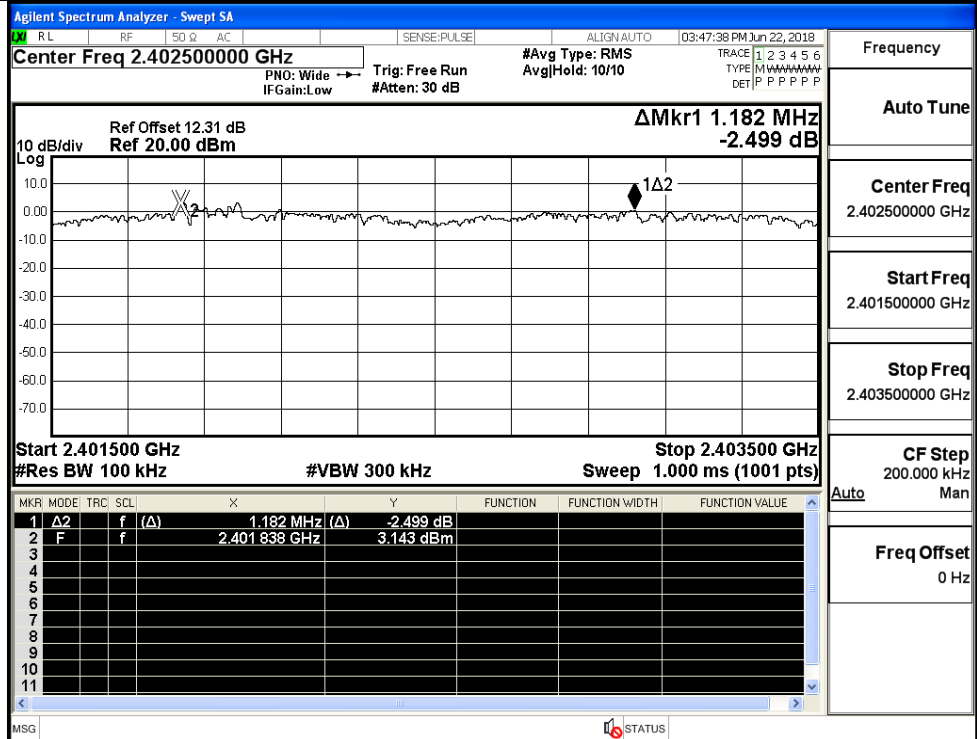
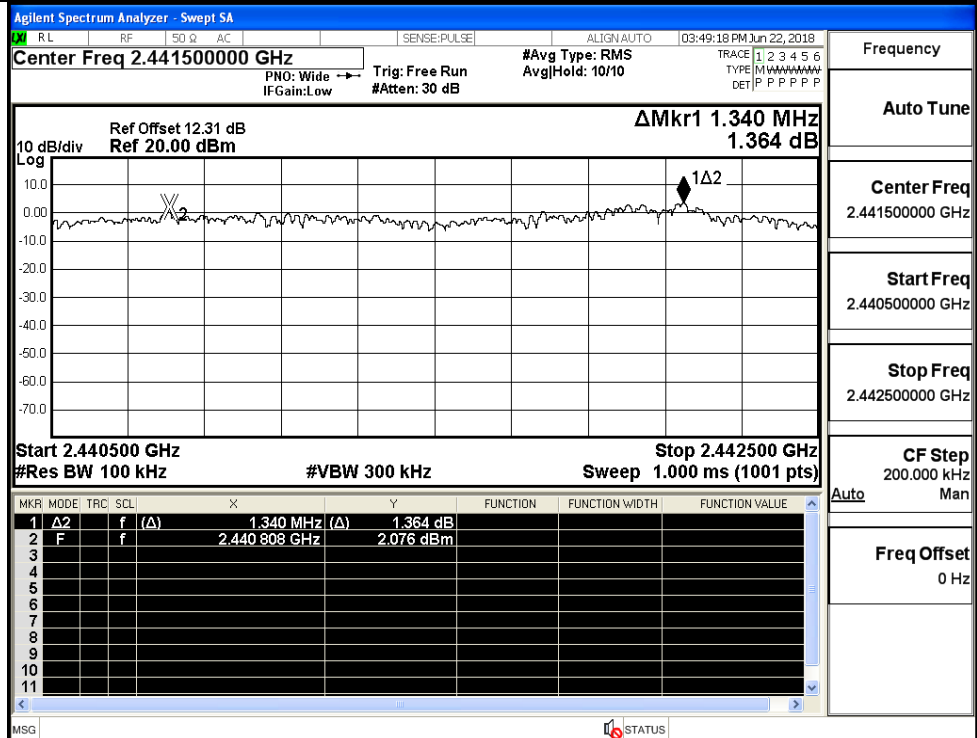


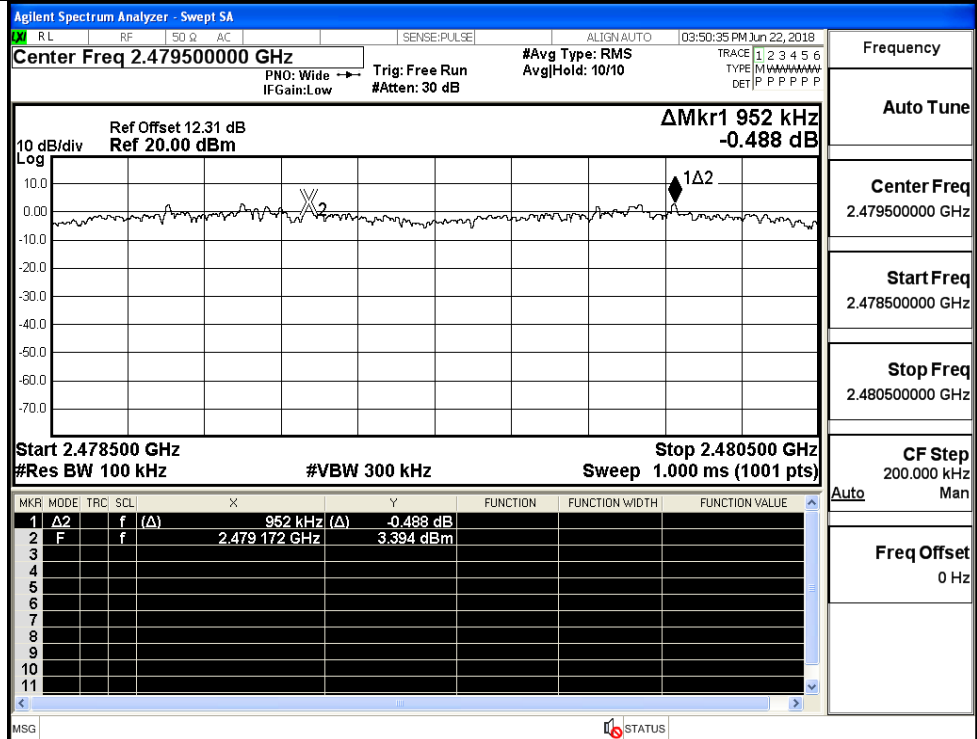
GFSK/MCH



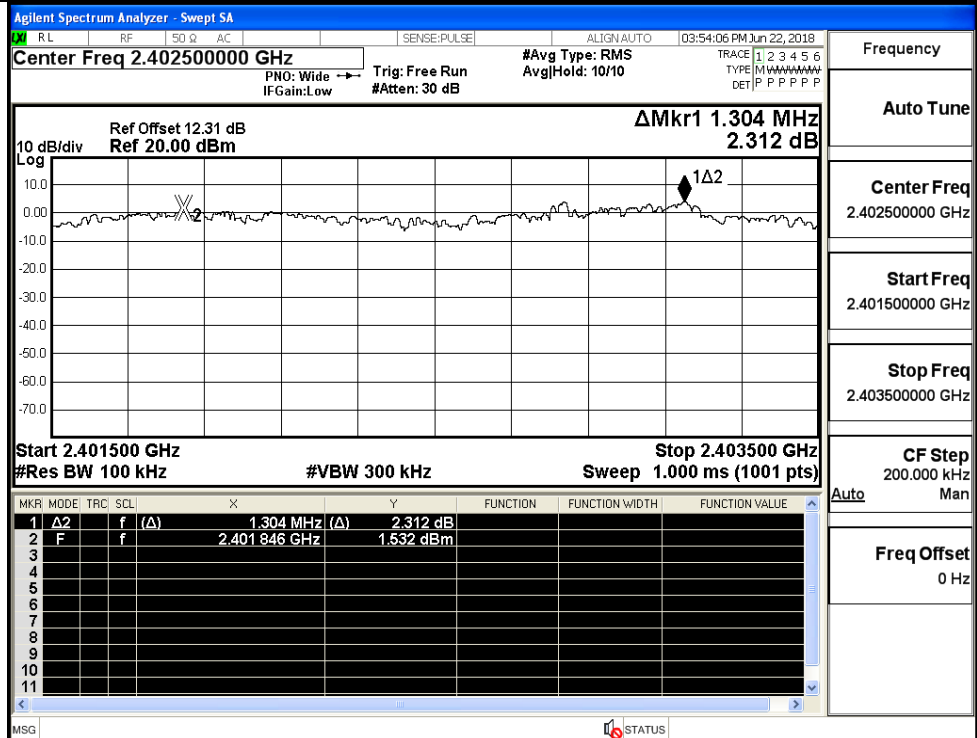
GFSK/HCH



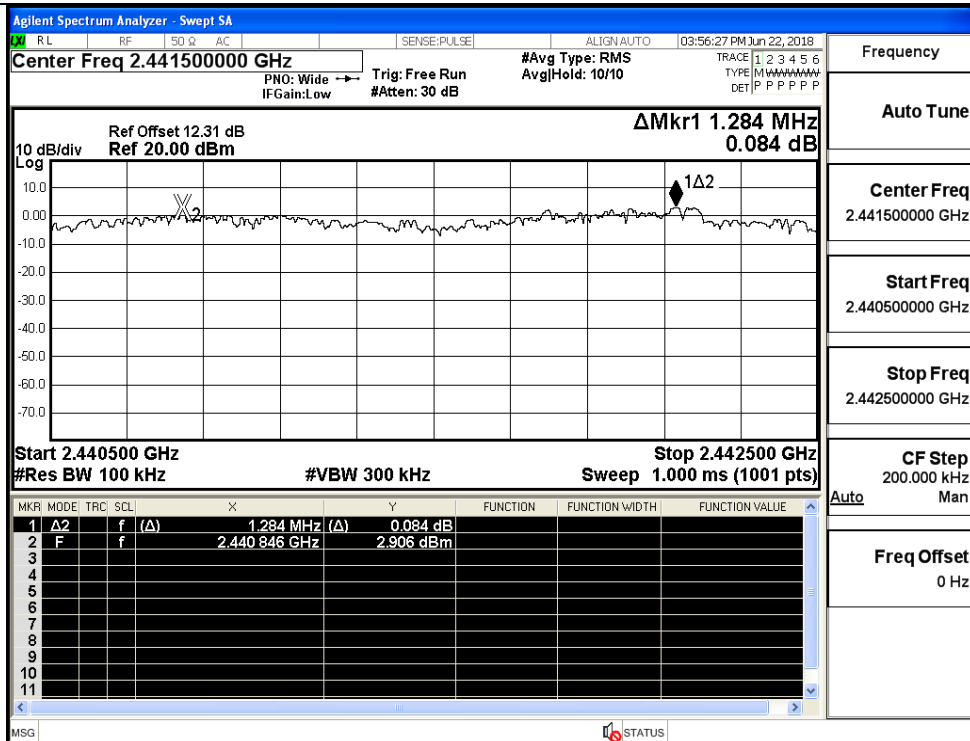
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

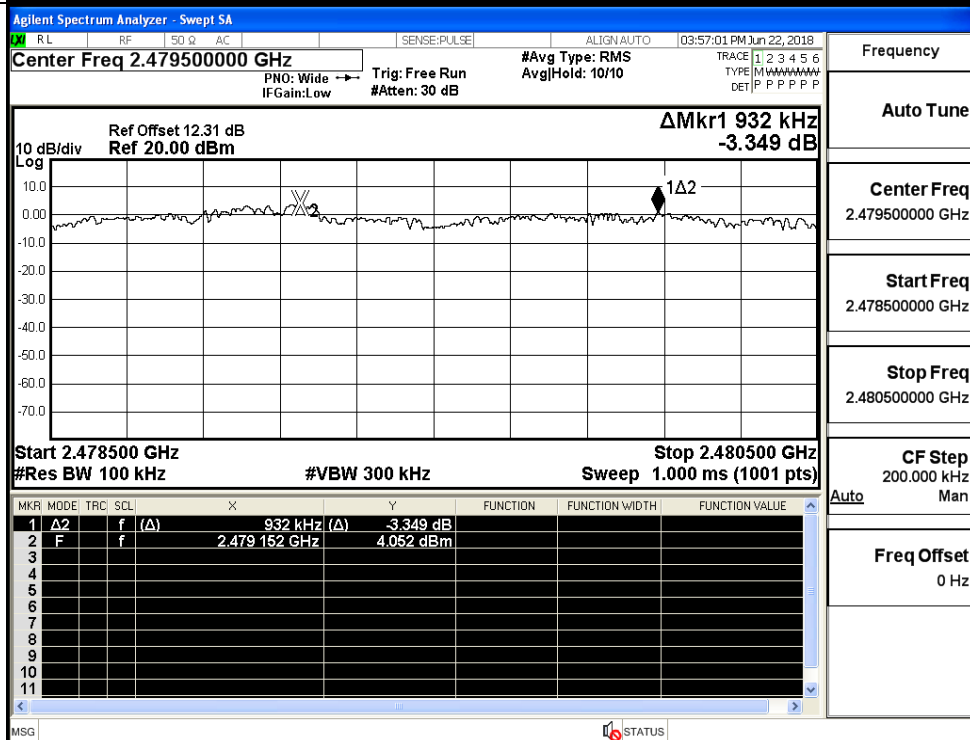
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

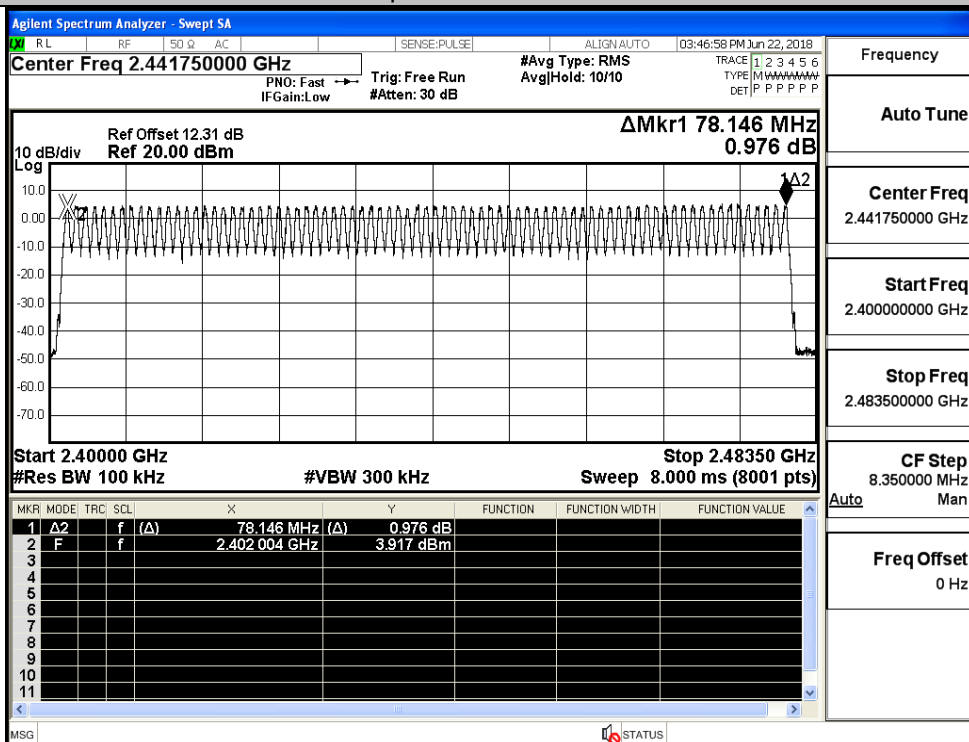
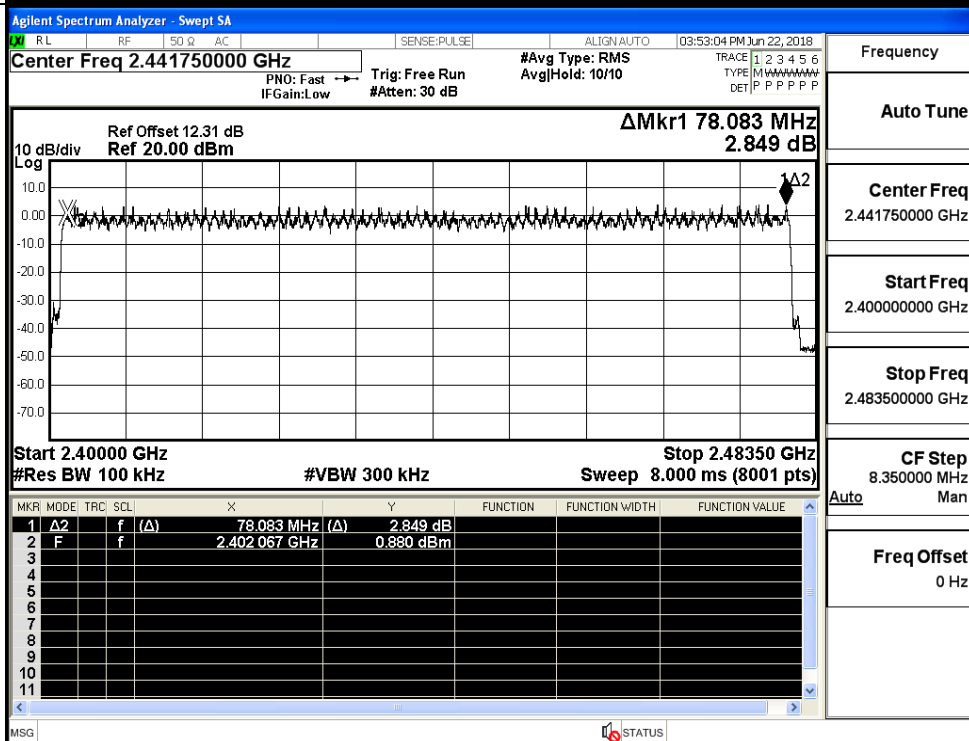


A.4 Hopping Channel Number

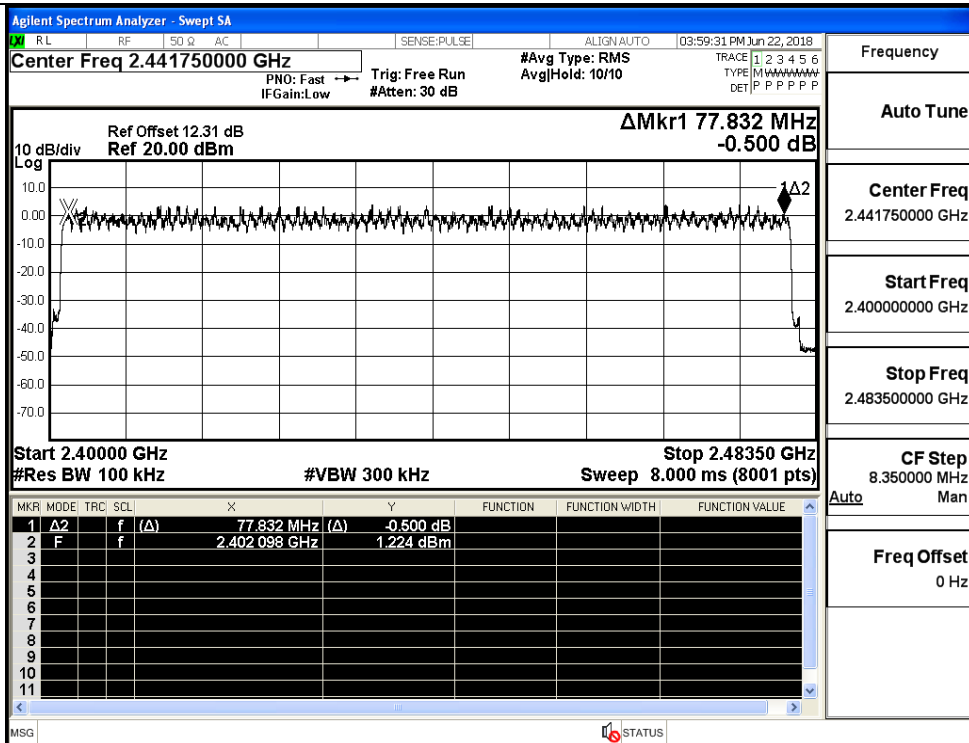
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
$\pi/4$ DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

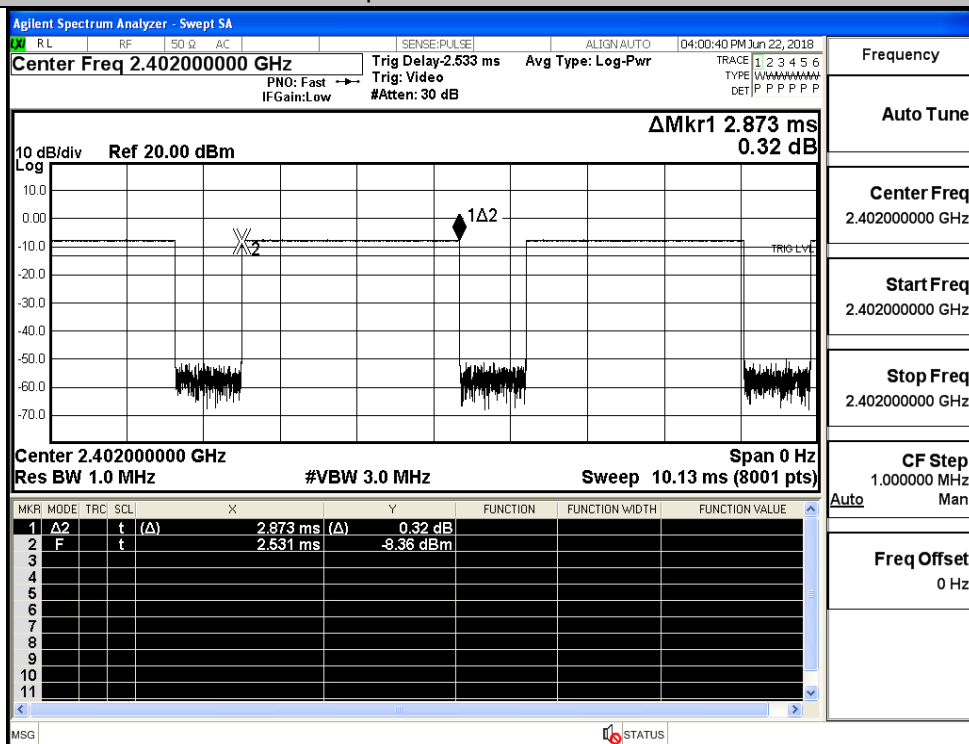


A.5 Dwell Time

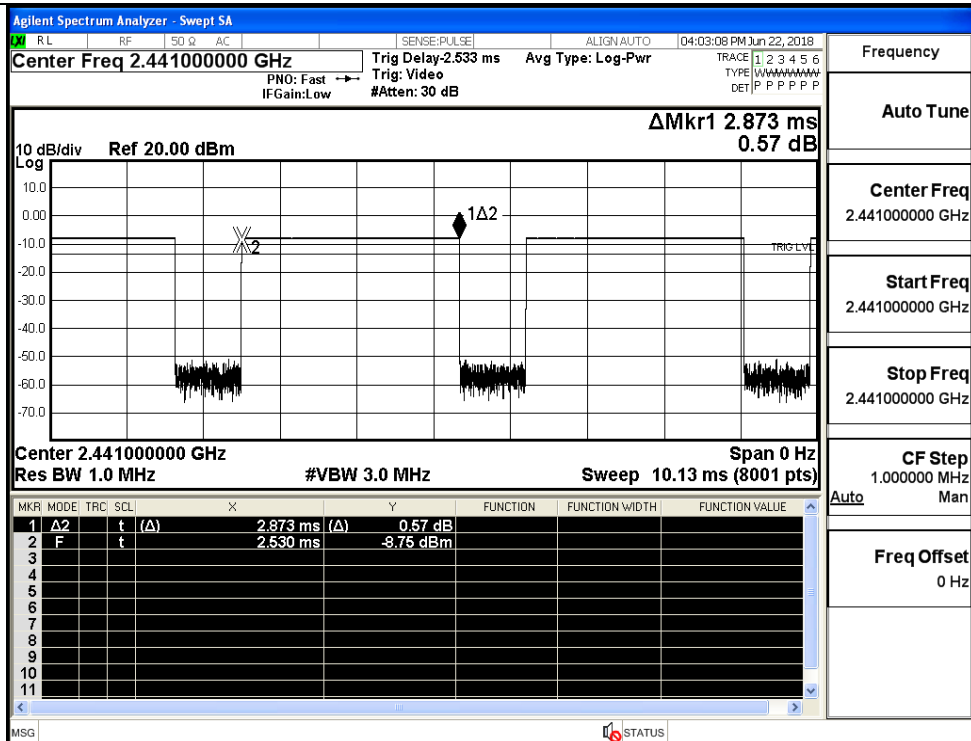
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
	DH5	MCH	2.87	106.7	0.306	0.4	PASS
	DH5	HCH	2.87	106.7	0.306	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
	2DH5	HCH	2.87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

Test Graphs

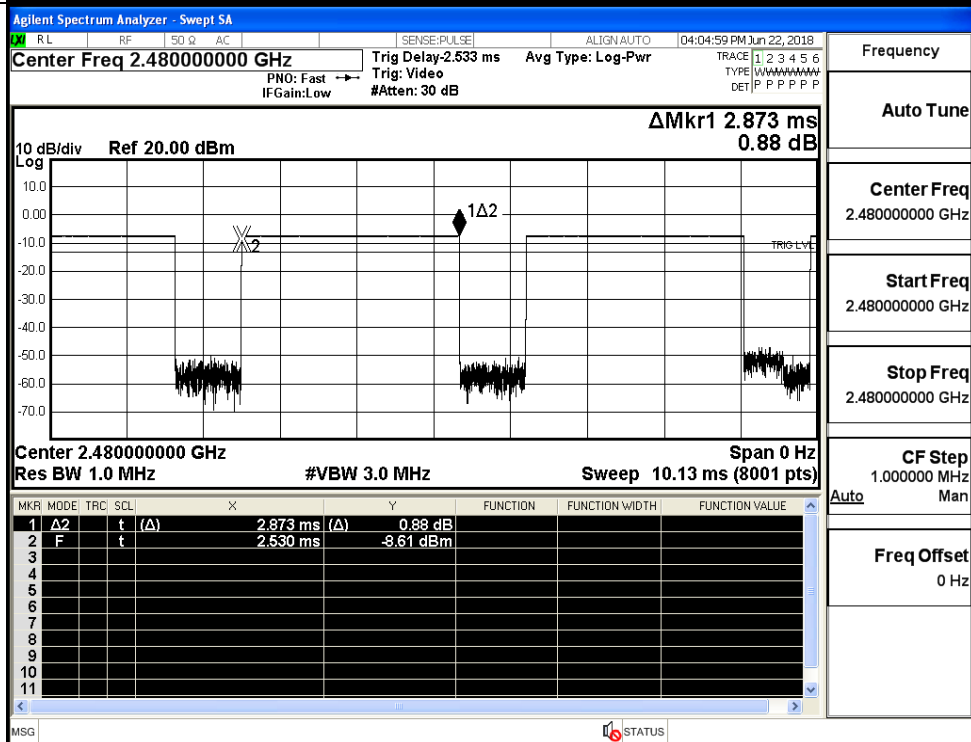
GFSK_DH5/LCH



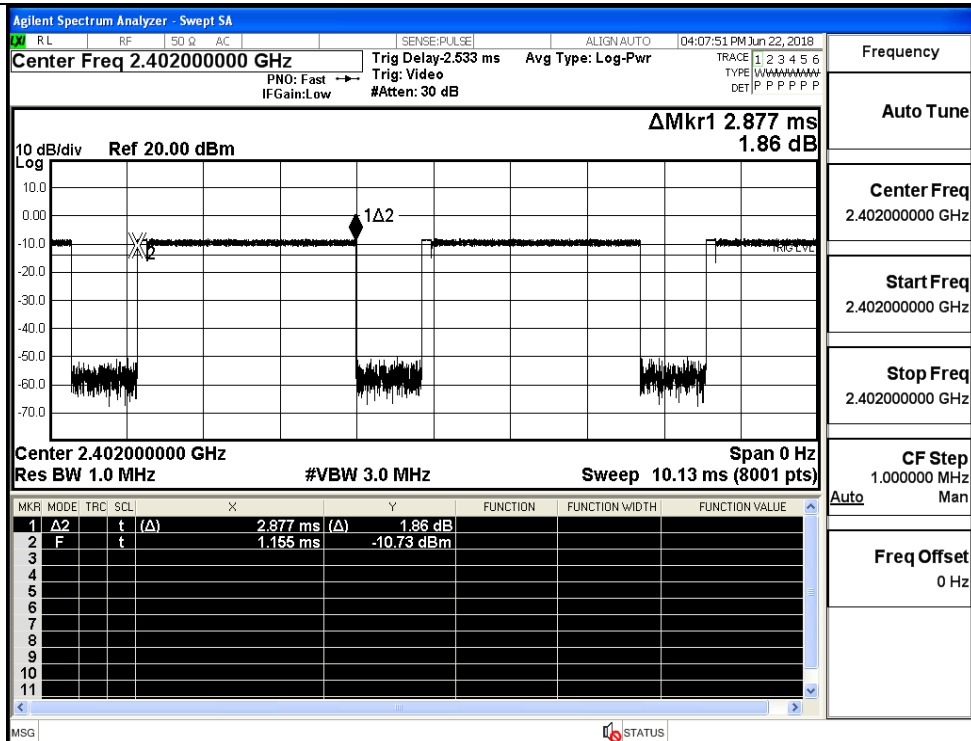
GFSK_DH5/MCH



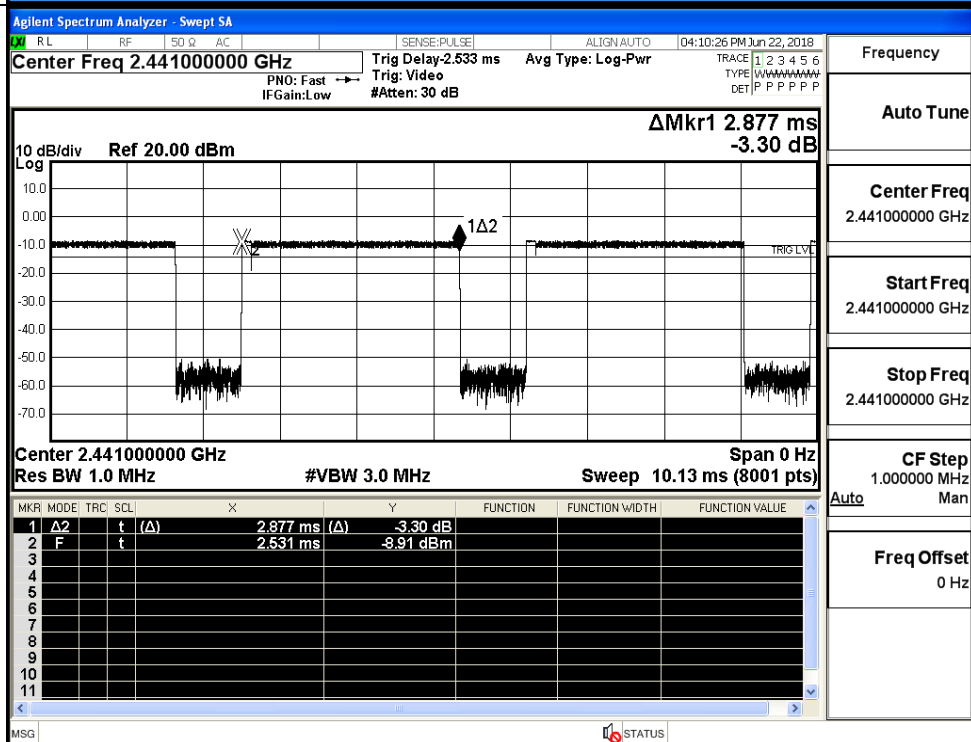
GFSK_DH5/HCH



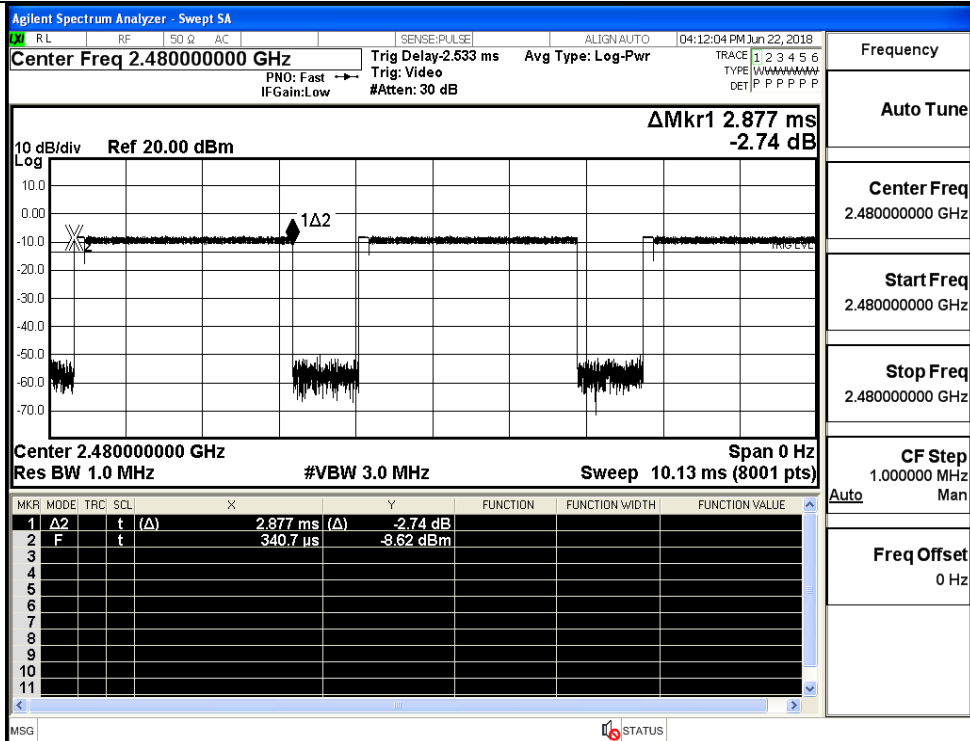
$\pi/4$ DQPSK
_2DH5/LCH



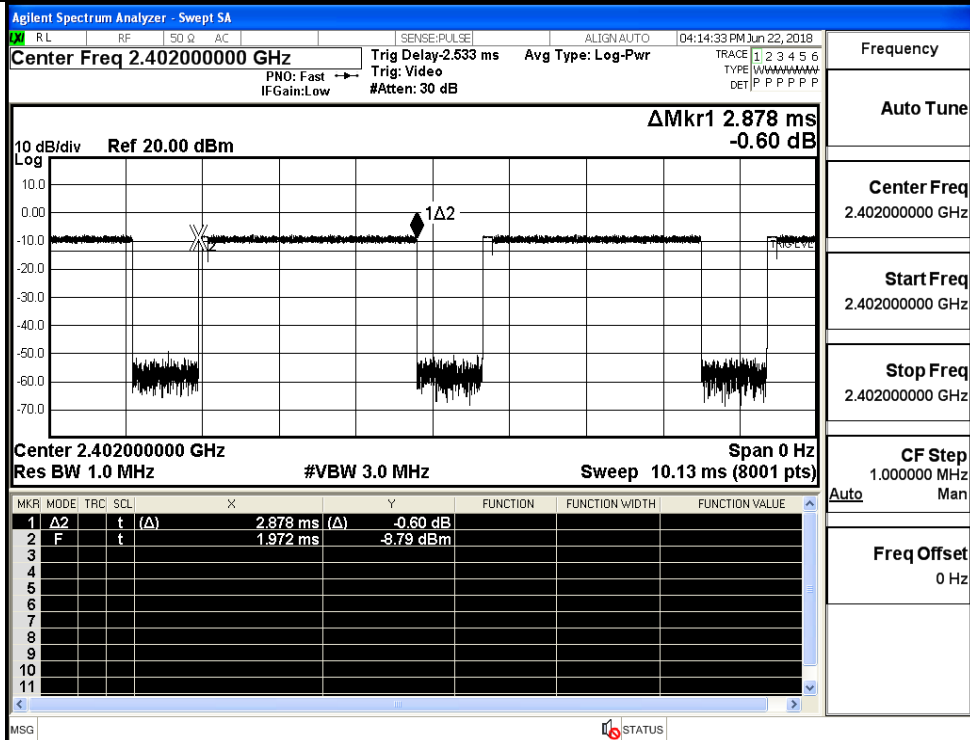
$\pi/4$ DQPSK
_2DH5/MCH



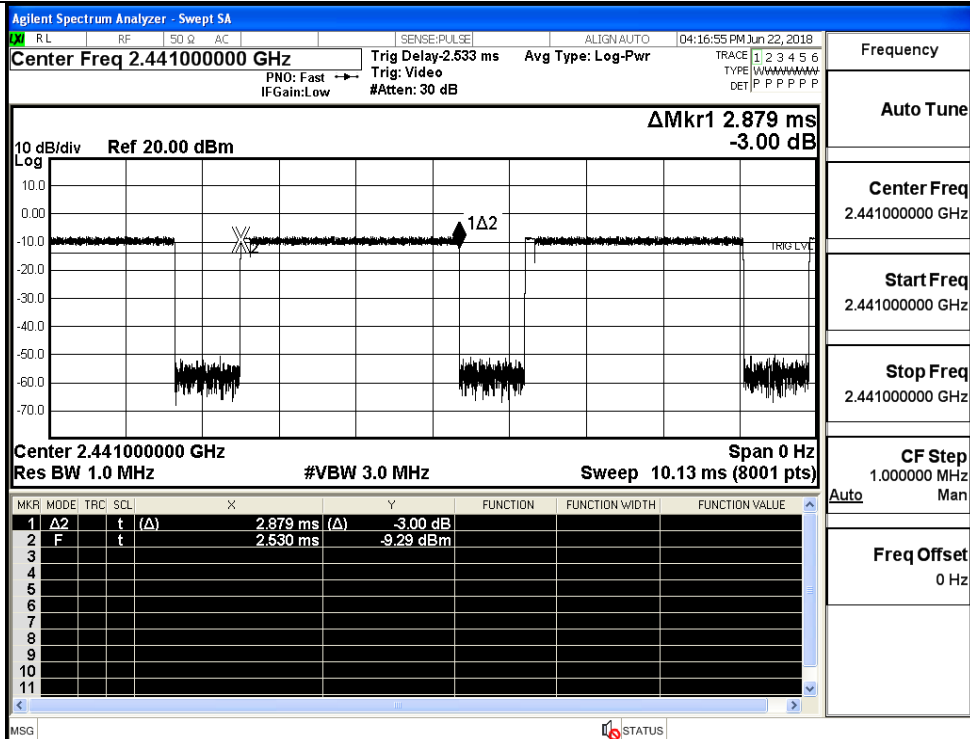
$\pi/4$ DQPSK
_2DH5/HCH



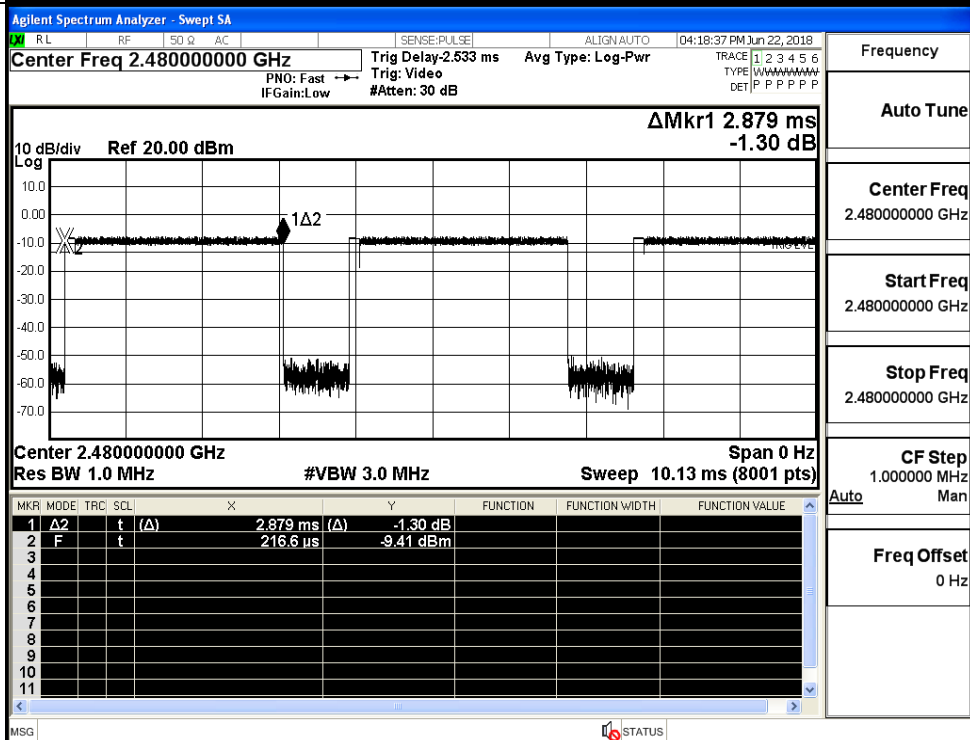
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



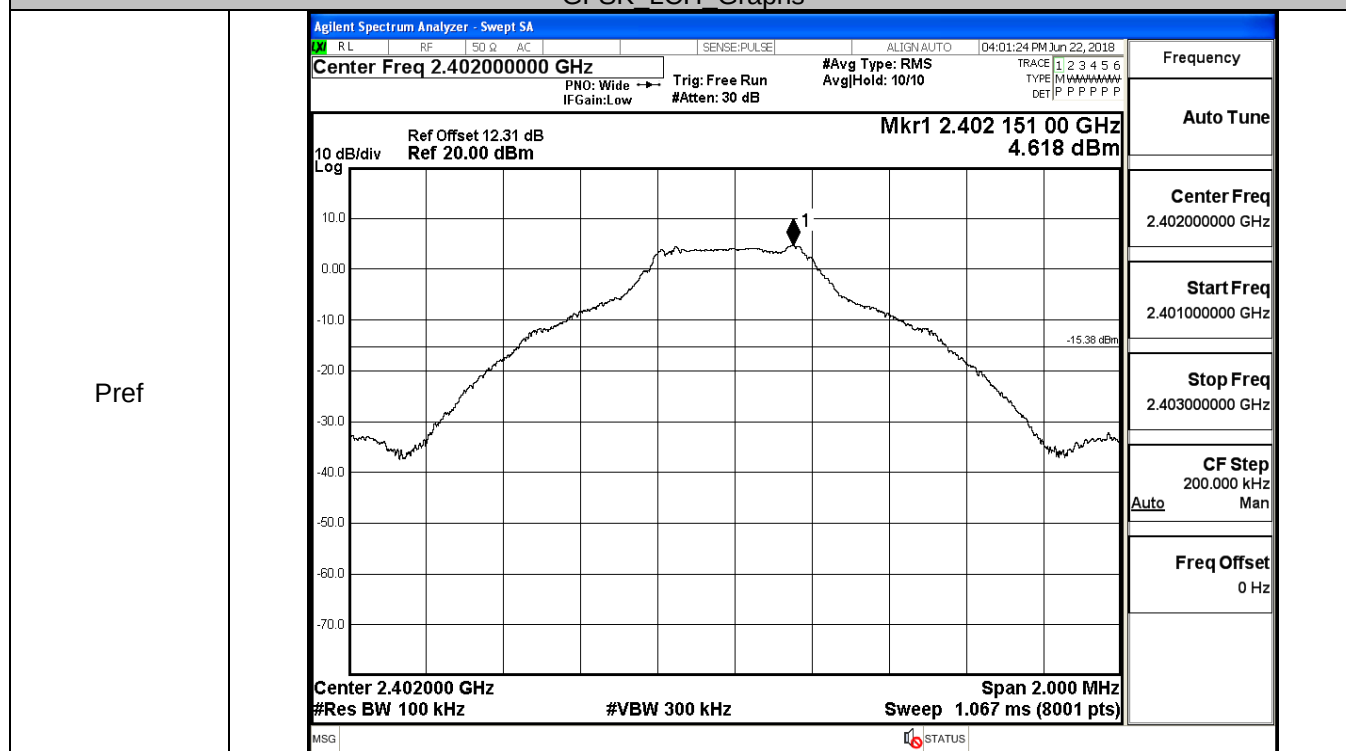
8DPSK_3DH5/HCH



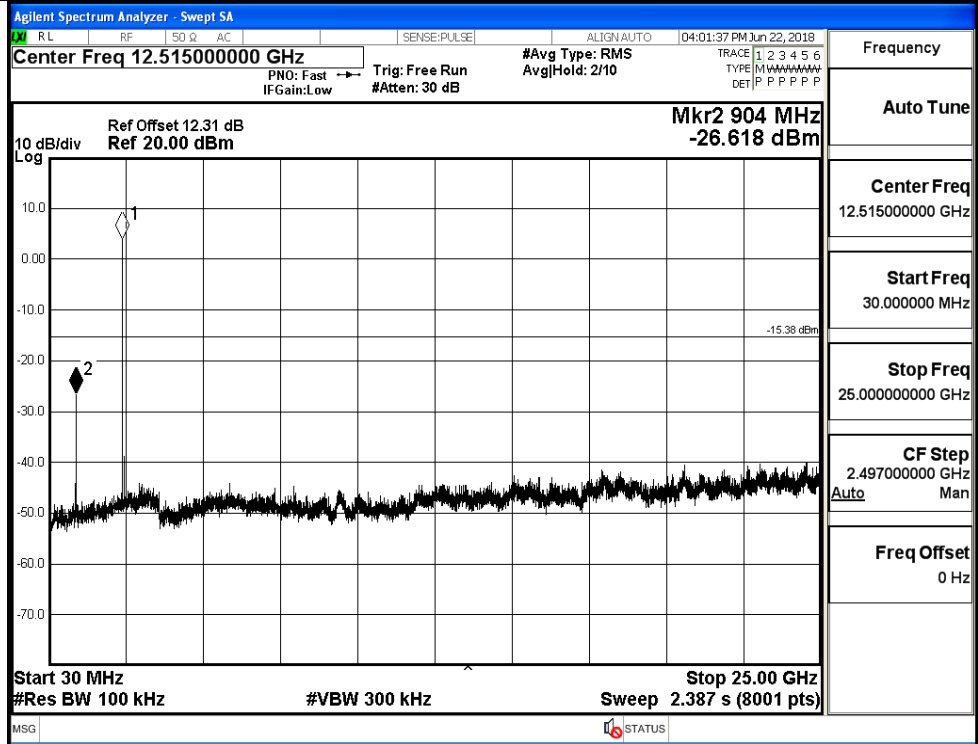
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.618	-26.618	-15.382	PASS
	MCH	4.447	-39.907	-15.553	PASS
	HCH	4.876	-39.138	-15.124	PASS
$\pi/4$ DQPSK	LCH	3.764	-40.241	-16.236	PASS
	MCH	3.686	-39.447	-16.314	PASS
	HCH	4.125	-40.583	-15.875	PASS
8DPSK	LCH	3.922	-40.303	-16.078	PASS
	MCH	3.599	-39.707	-16.401	PASS
	HCH	3.934	-29.779	-16.066	PASS

GFSK LCH Graphs

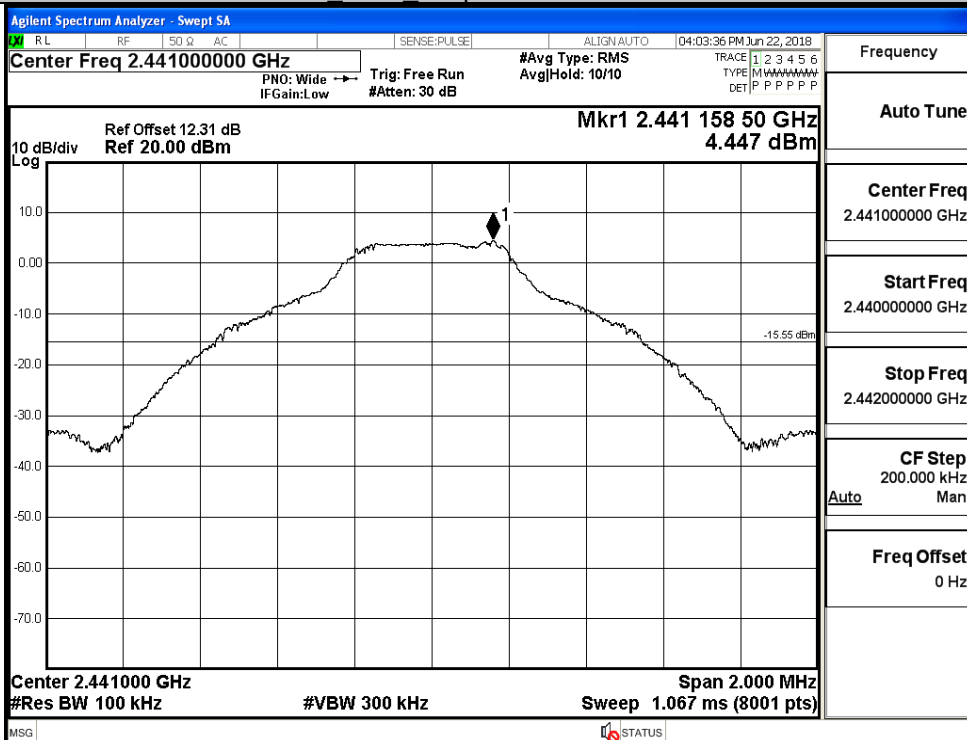


Puw

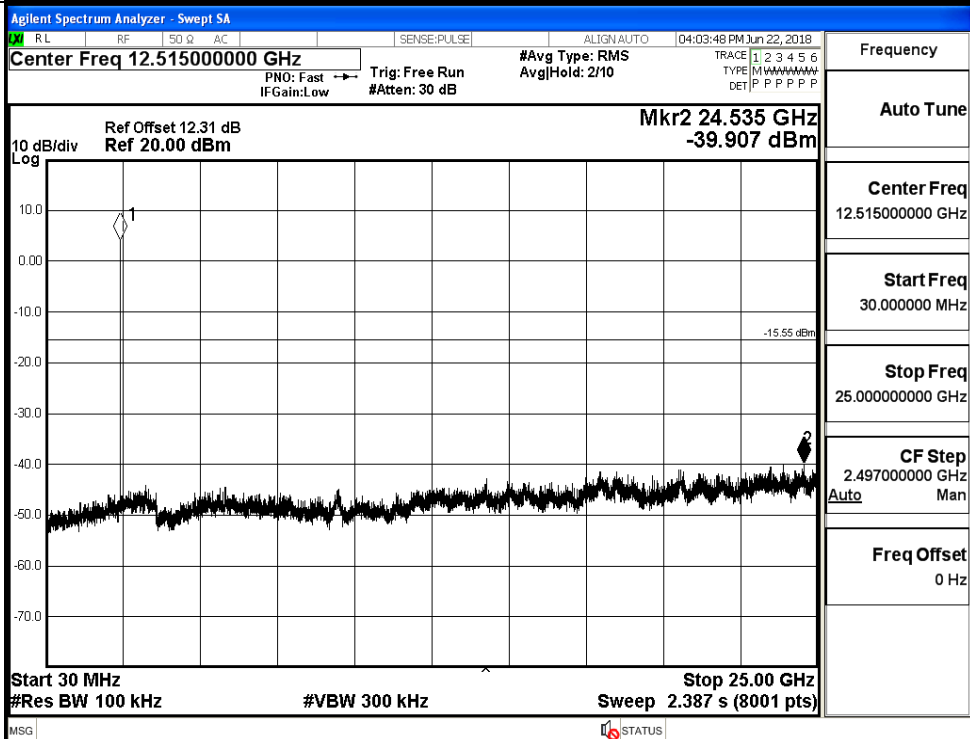


GFSK MCH Graphs

Pref

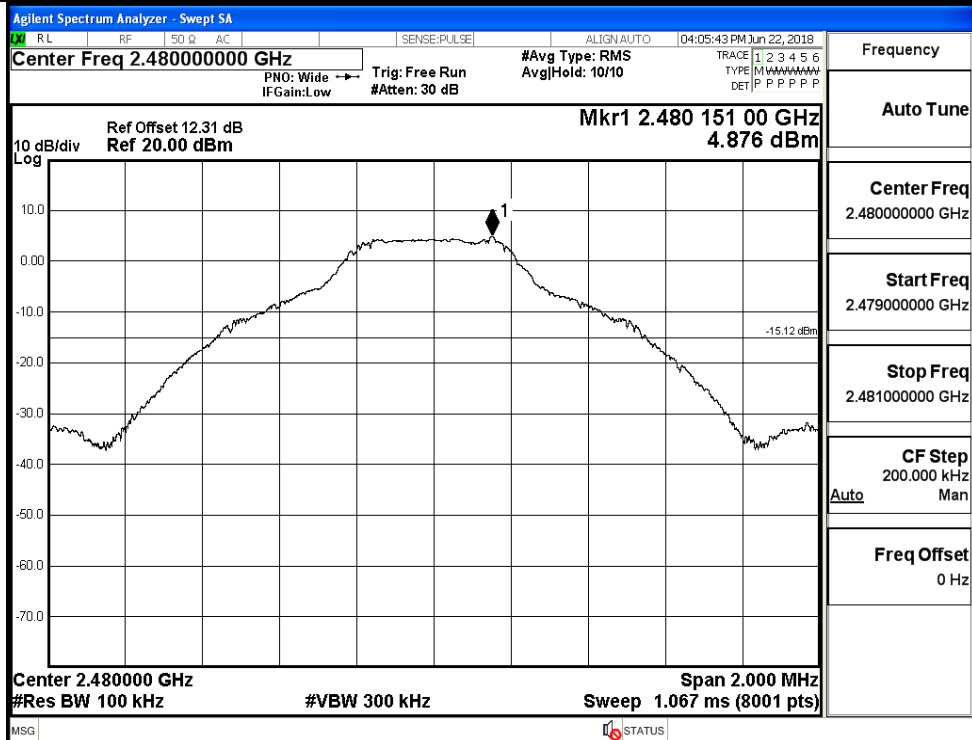


Puw

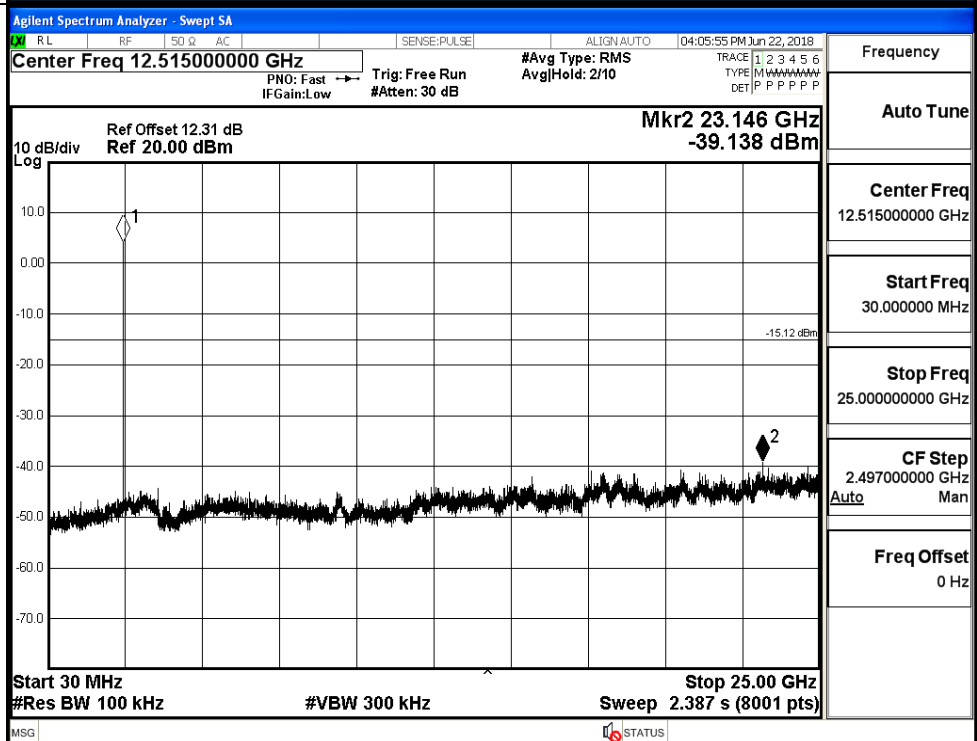


GFSK HCH Graphs

Pref

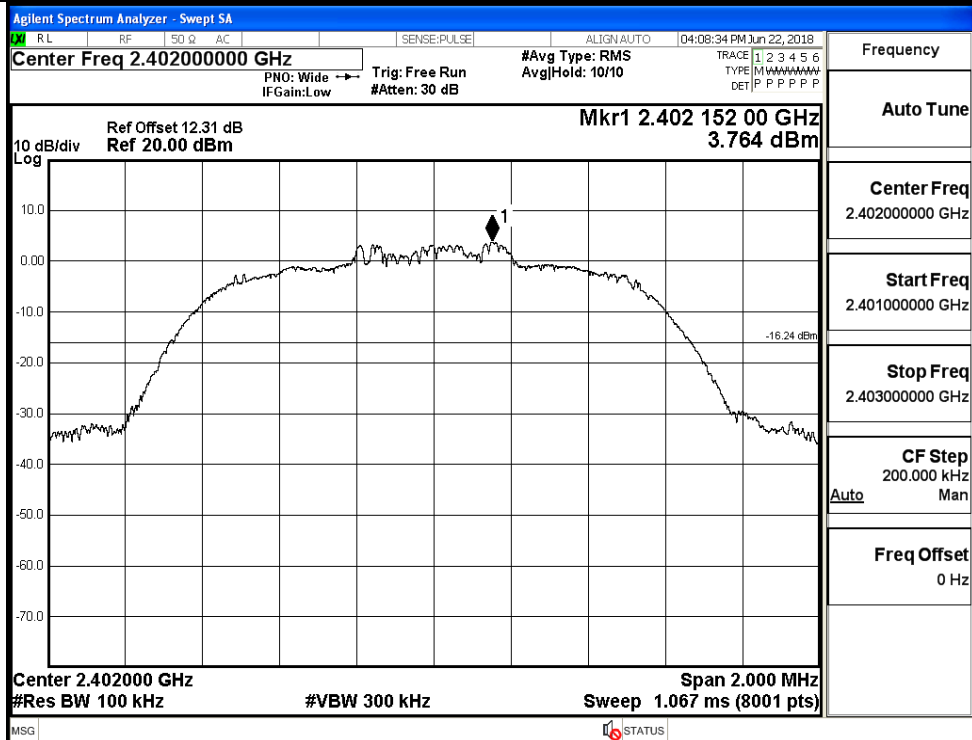


Puw

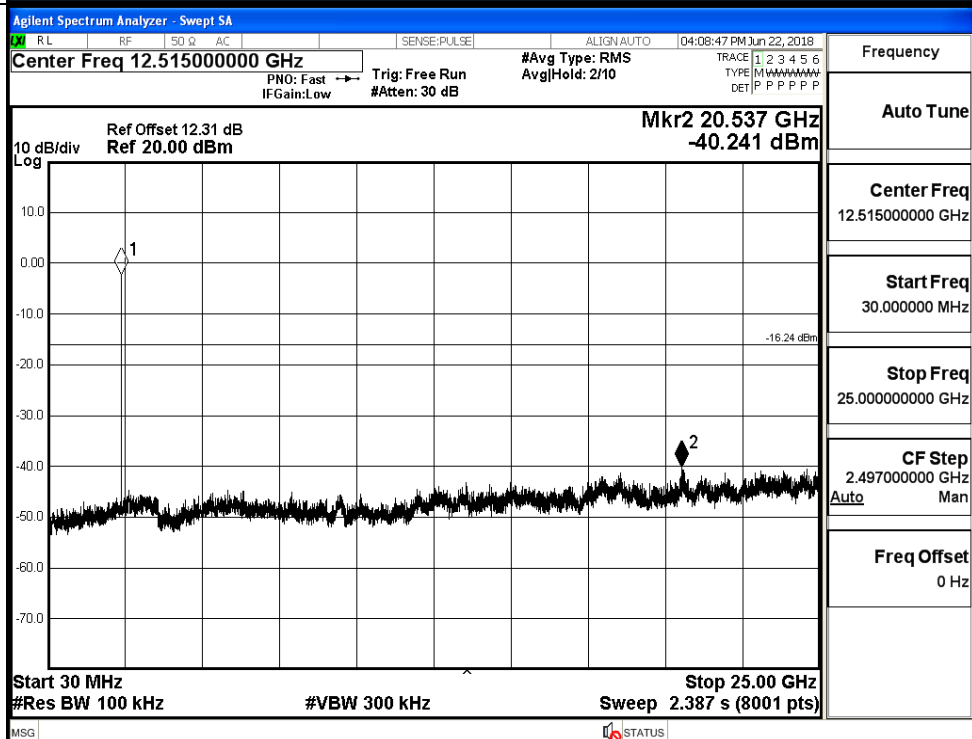


$\pi/4$ DQPSK LCH Graphs

Pref

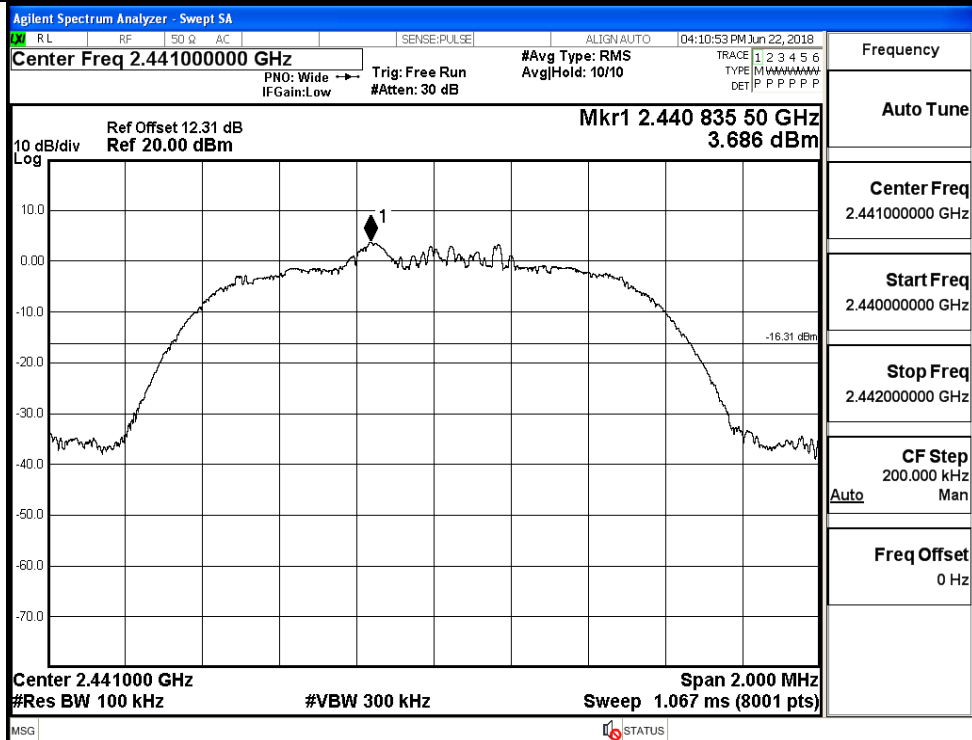


Puw

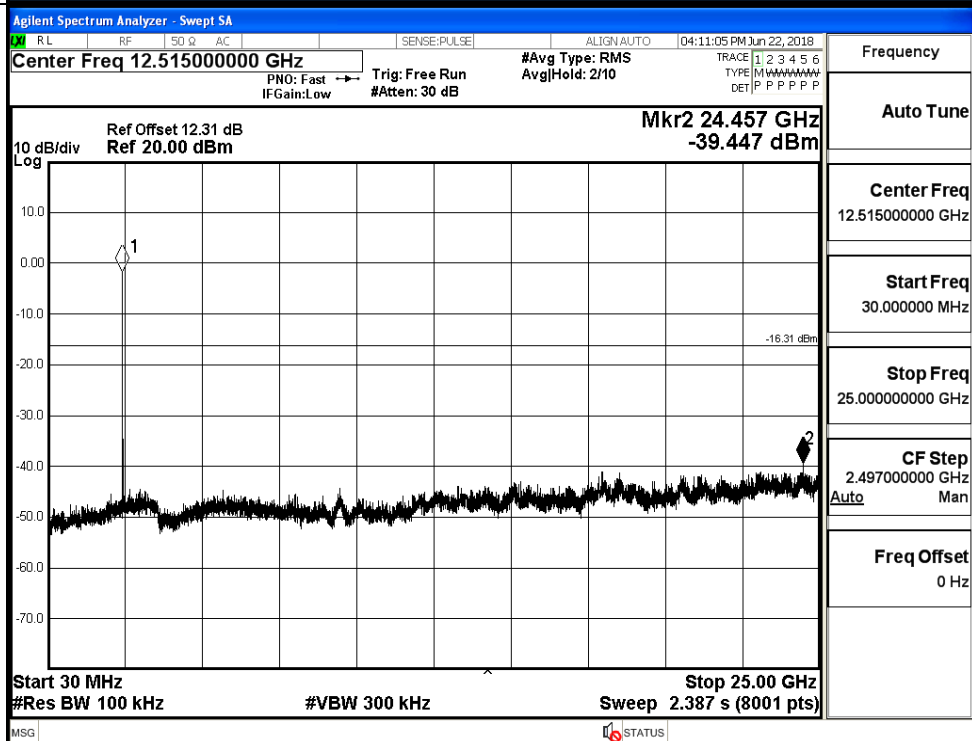


π /4DQPSK MCH Graphs

Pref

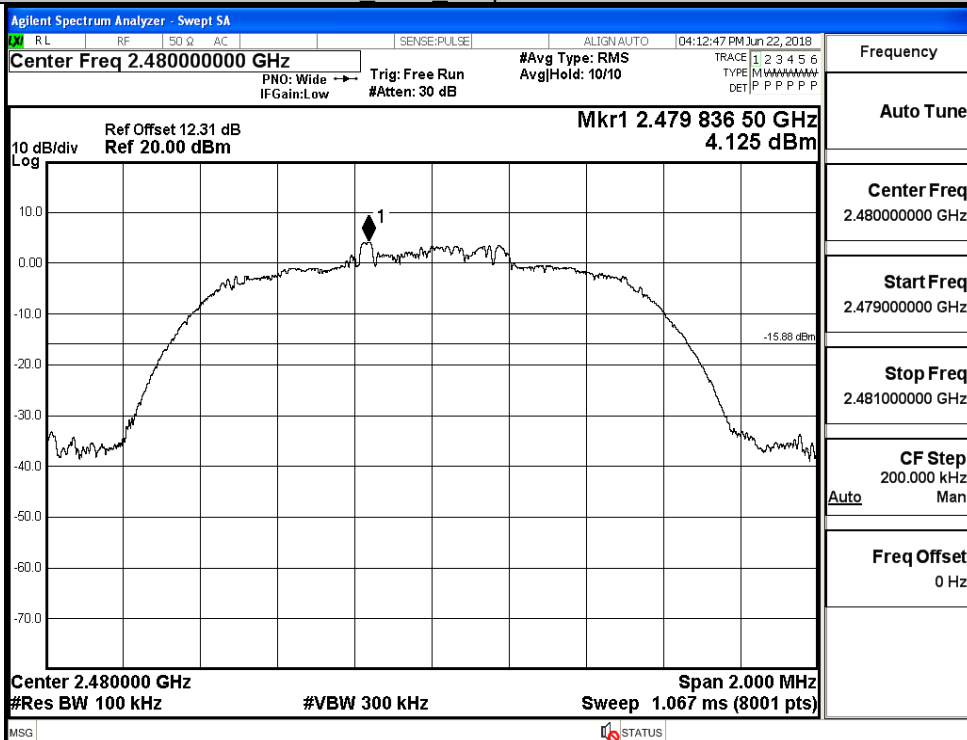


Puw

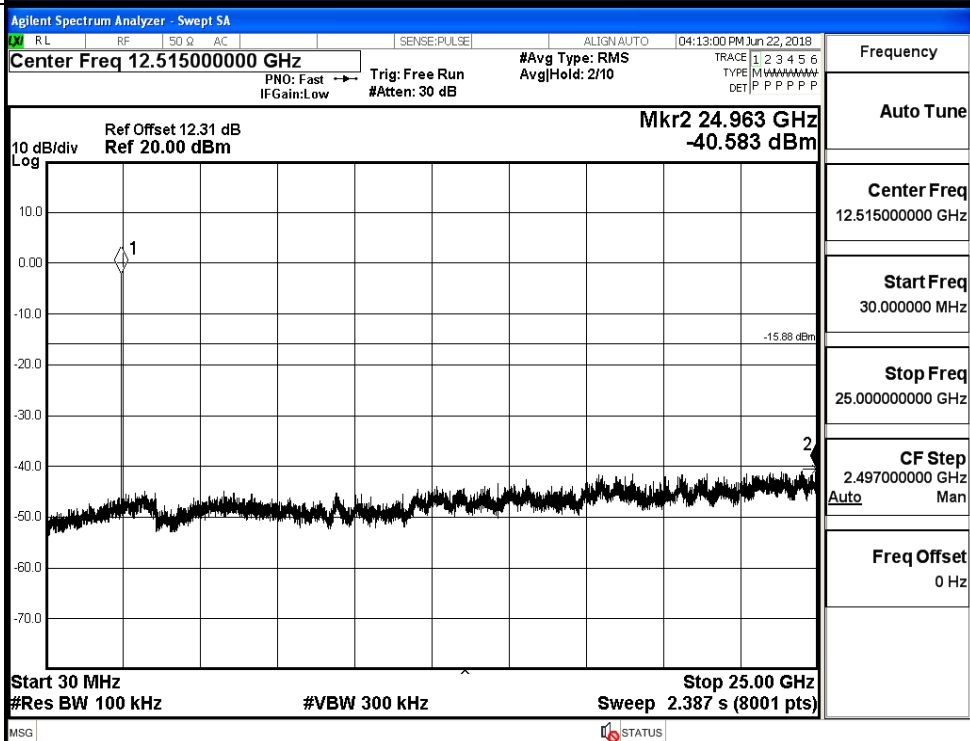


$\pi/4$ DQPSK HCH Graphs

Pref

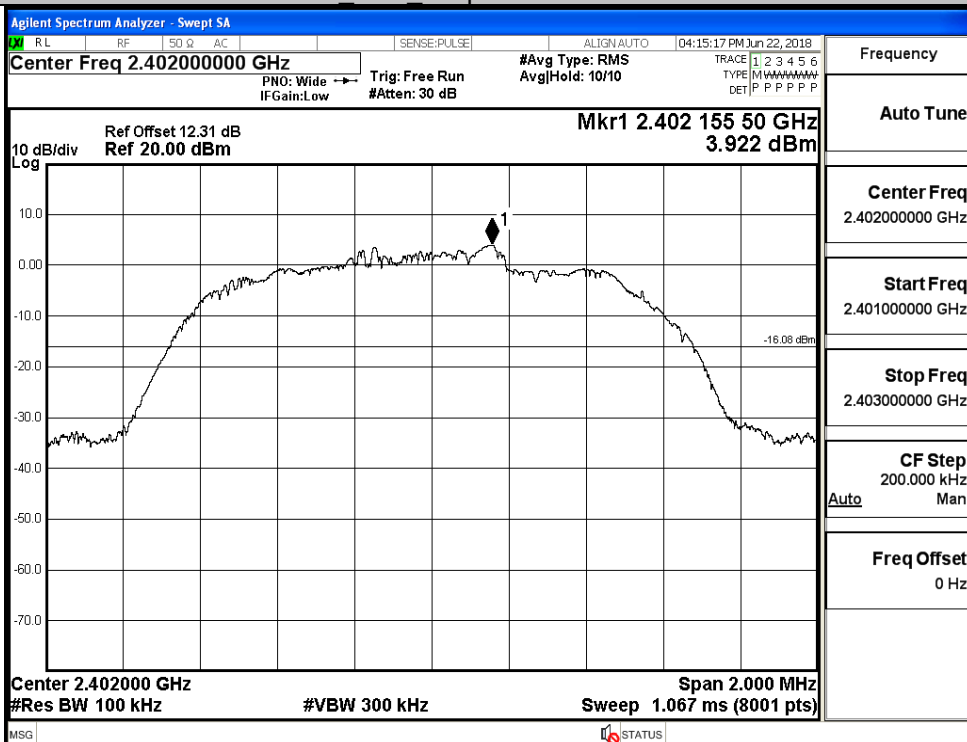


Puw

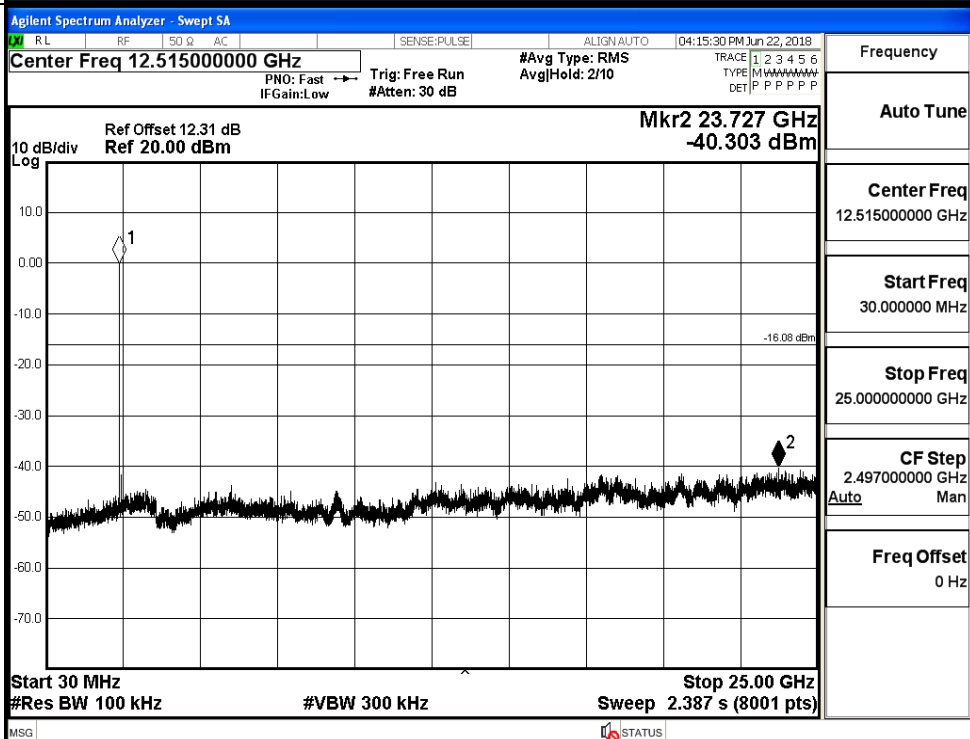


8DPSK_LCH_Graphs

Pref

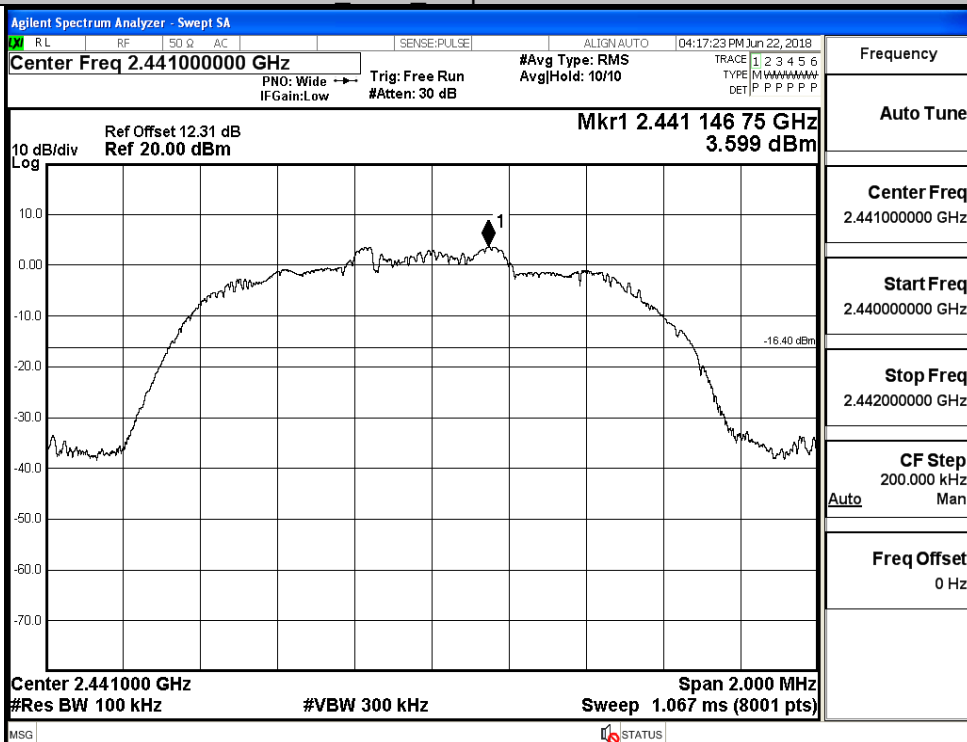


Puw

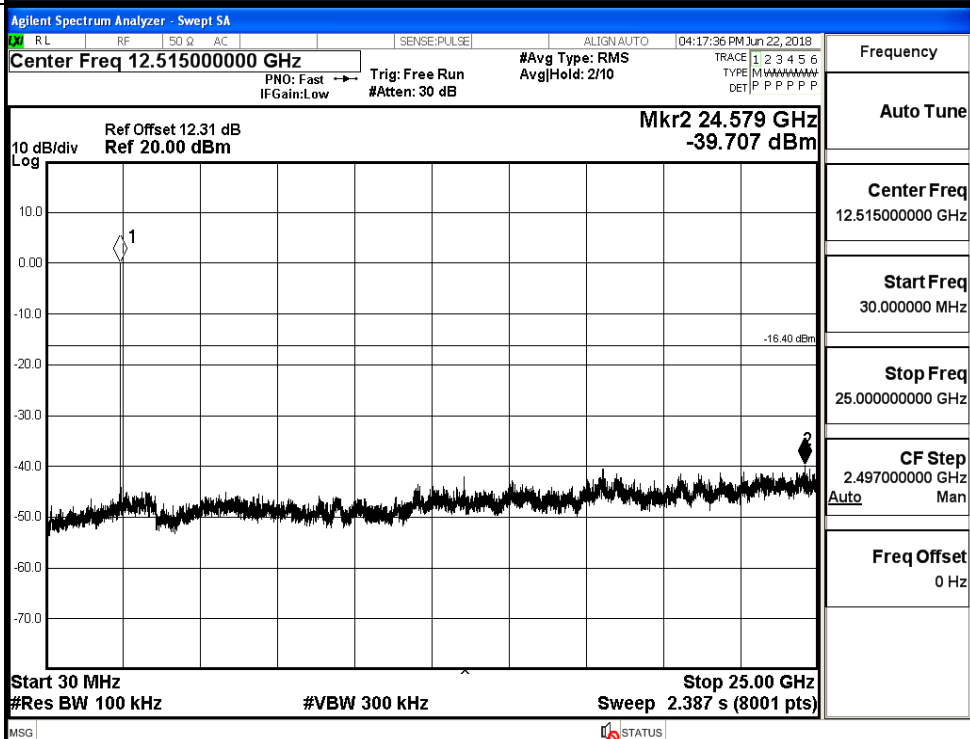


8DPSK MCH Graphs

Pref

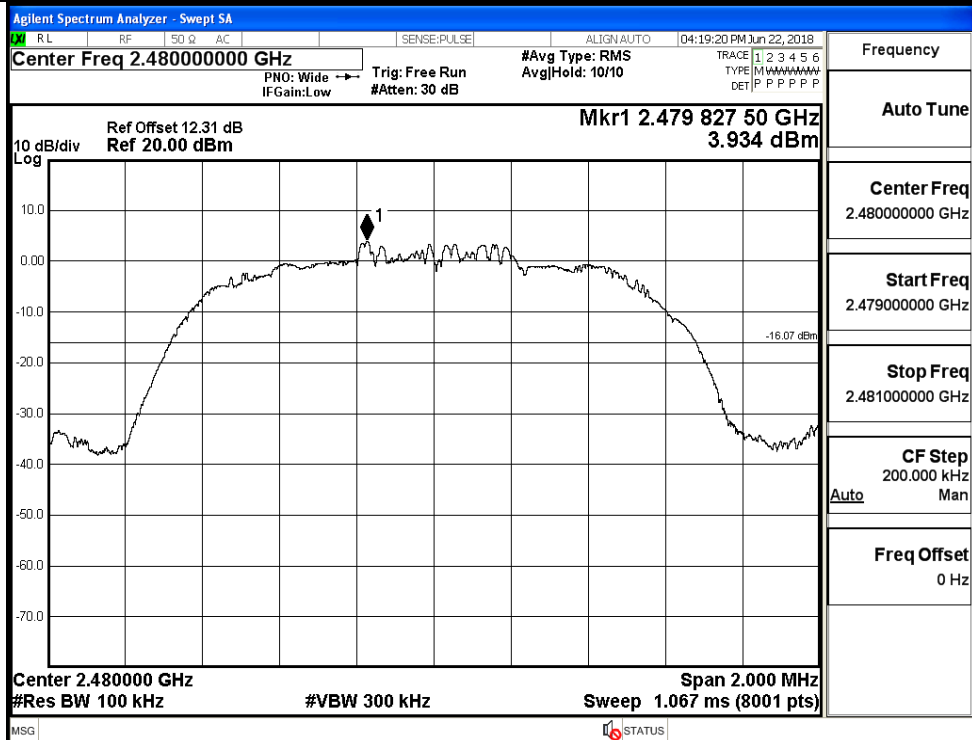


Puw

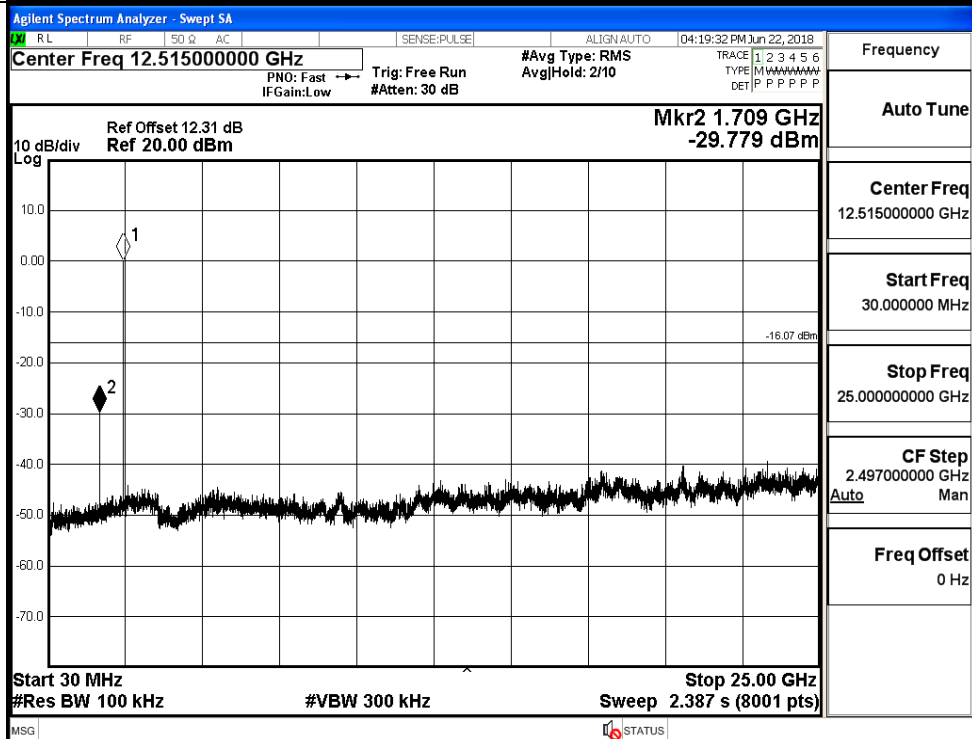


8DPSK_HCH Graphs

Pref



Puw

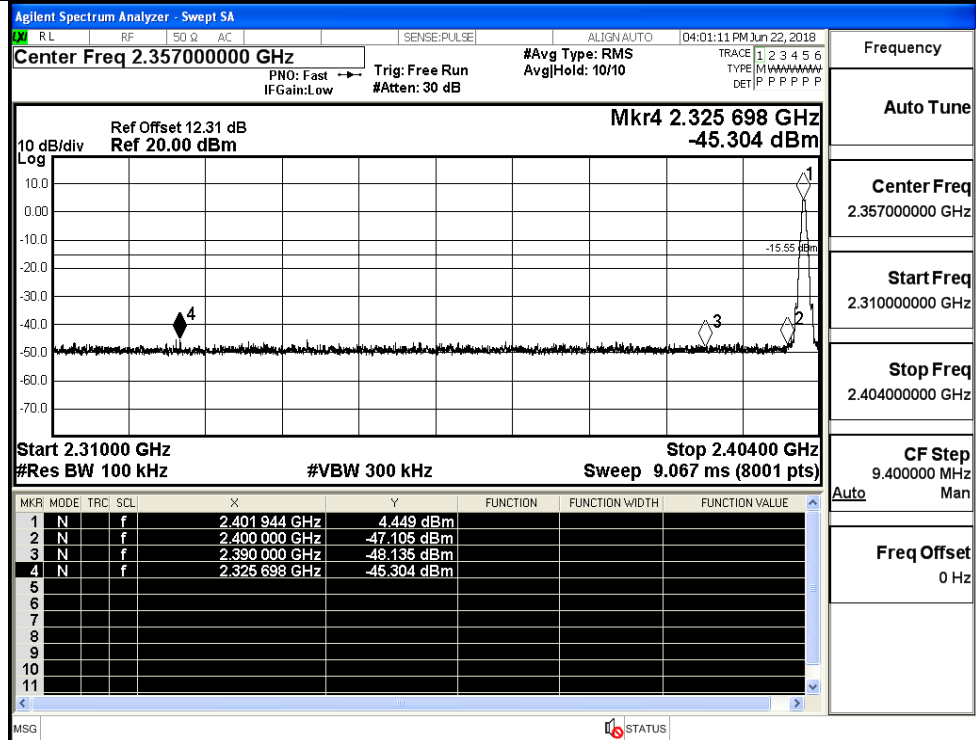


A.7 Band-edge for RF Conducted Emissions

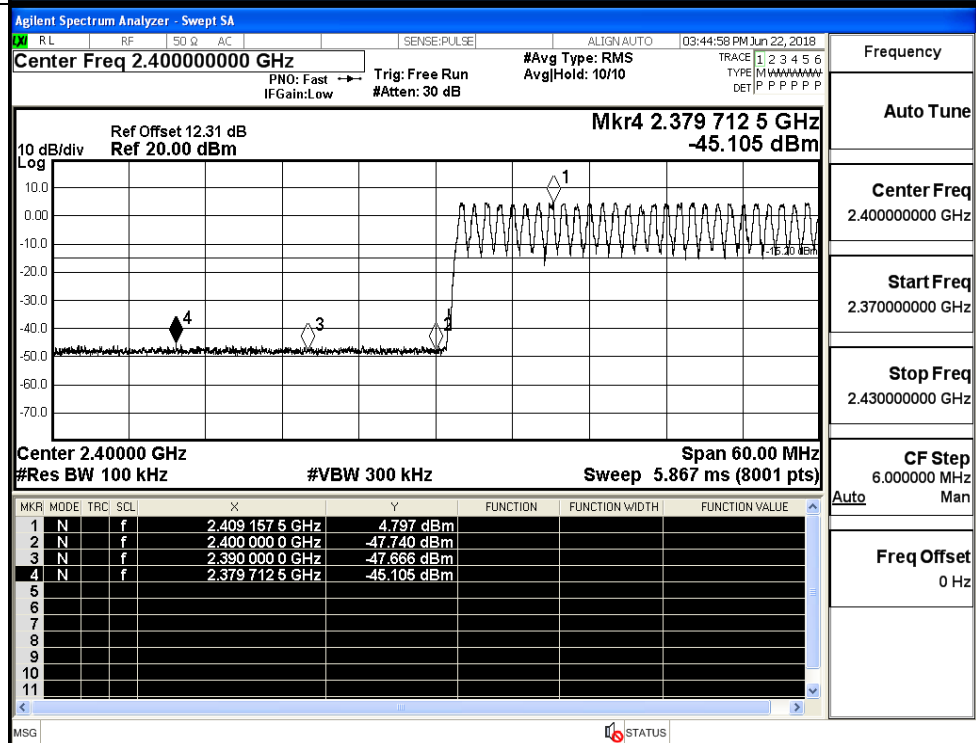
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.449	Off	-45.304	-15.55	PASS
			4.797	On	-45.105	-15.2	PASS
	HCH	2480	4.946	Off	-45.759	-15.05	PASS
			5.299	On	-44.821	-14.7	PASS
$\pi/4$ DQPSK	LCH	2402	3.393	Off	-46.035	-16.61	PASS
			3.611	On	-45.519	-16.39	PASS
	HCH	2480	3.783	Off	-44.872	-16.22	PASS
			3.889	On	-44.680	-16.11	PASS
8DPSK	LCH	2402	3.379	Off	-45.843	-16.62	PASS
			3.735	On	-45.226	-16.27	PASS
	HCH	2480	3.688	Off	-45.821	-16.31	PASS
			4.063	On	-44.450	-15.94	PASS

Test Graphs

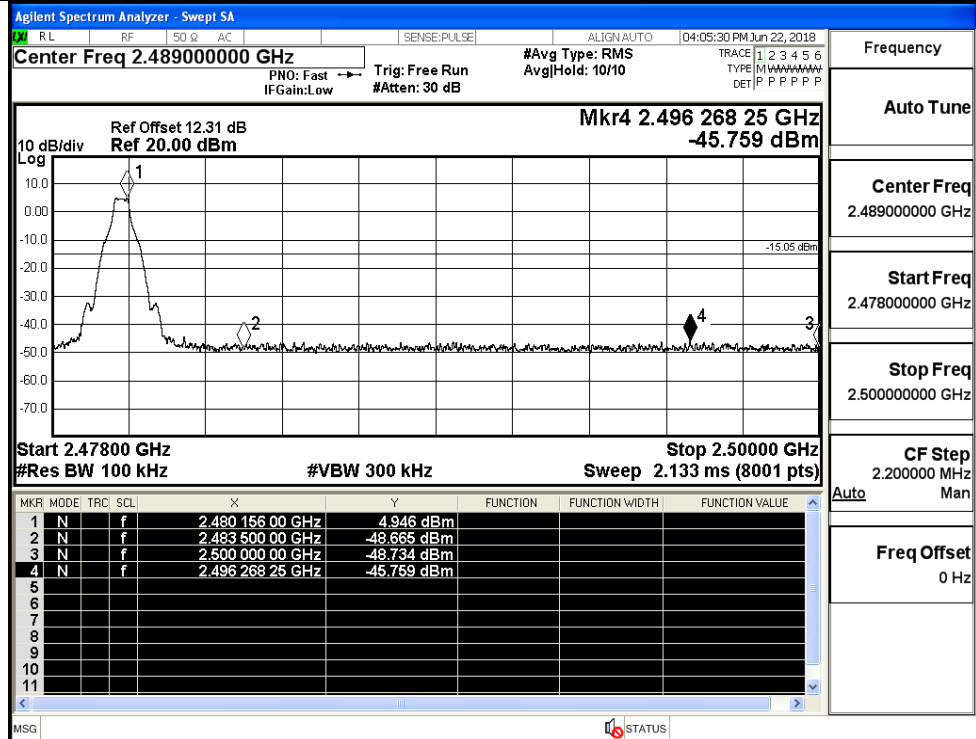
GFSK/LCH/No Hop



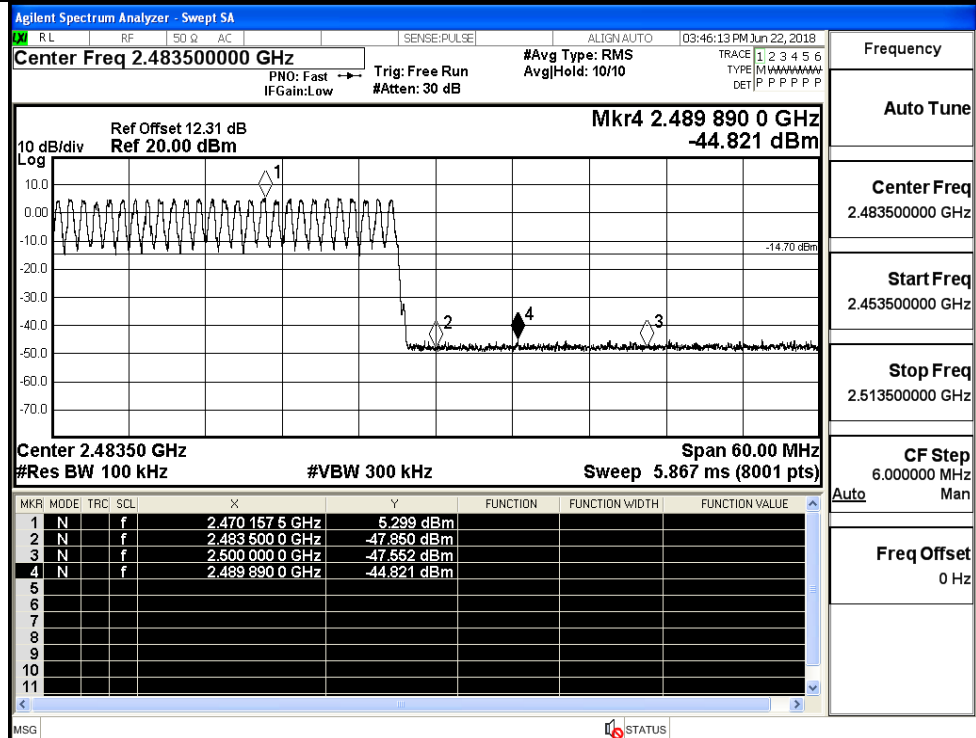
GFSK/LCH/Hop



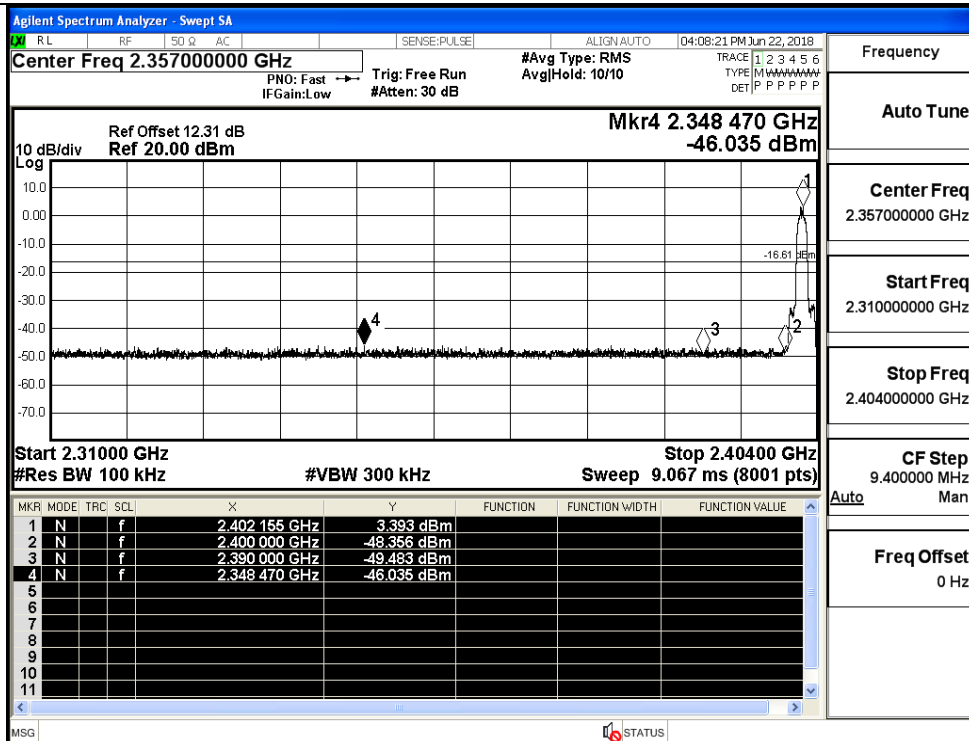
GFSK/HCH/No Hop



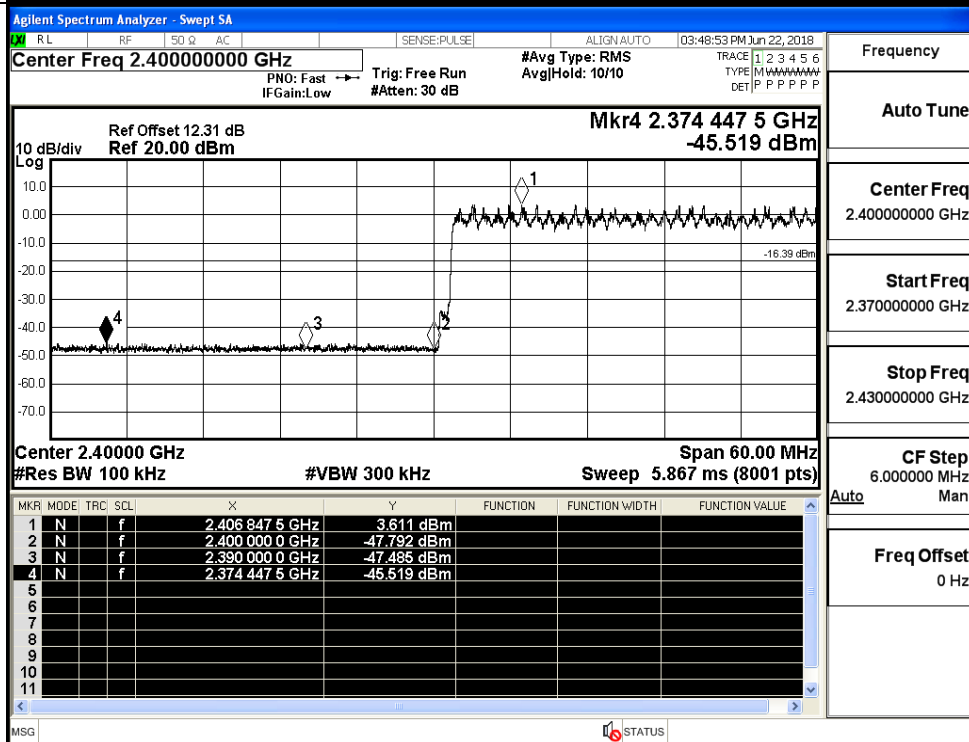
GFSK/HCH/Hop



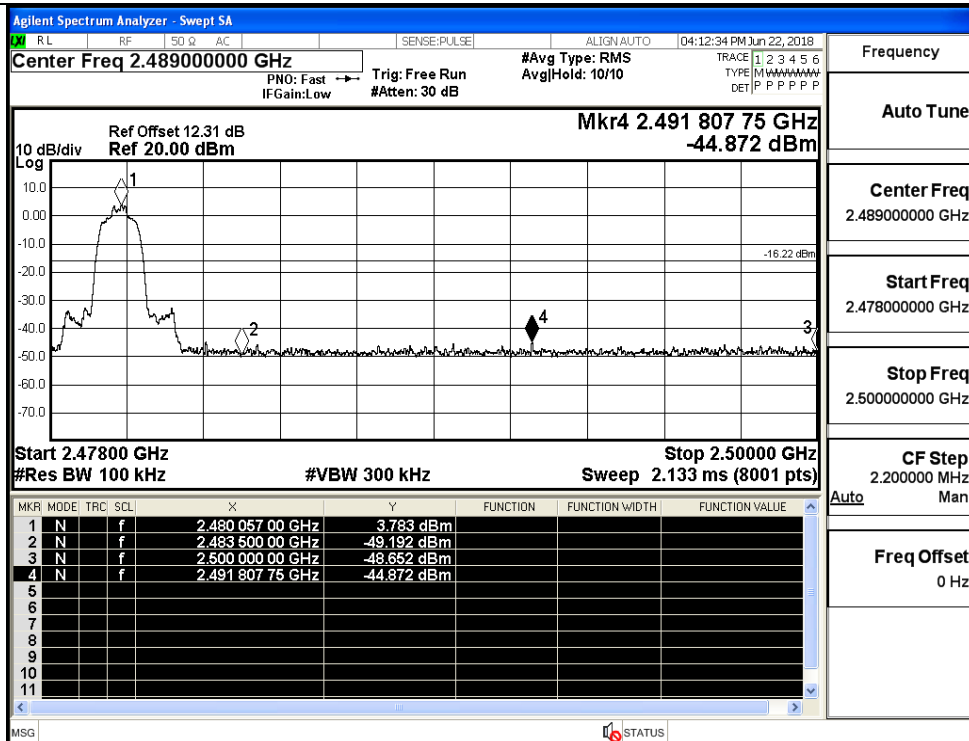
$\pi/4$ DQPSK/LCH/No
Hop



$\pi/4$ DQPSK/LCH/Hop



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

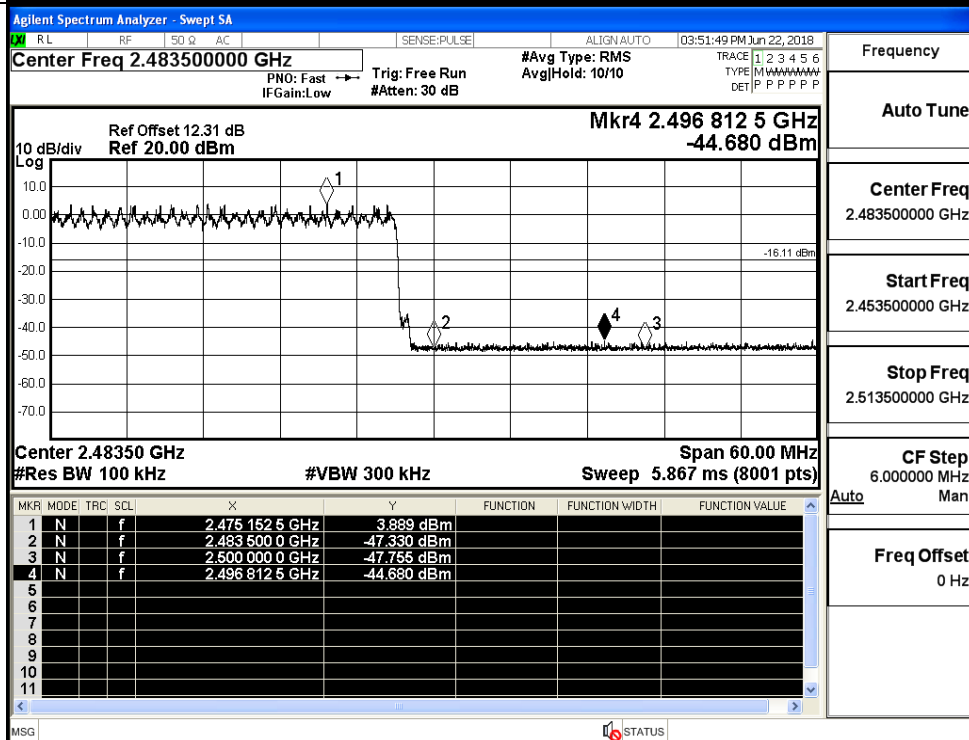


Frequency

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

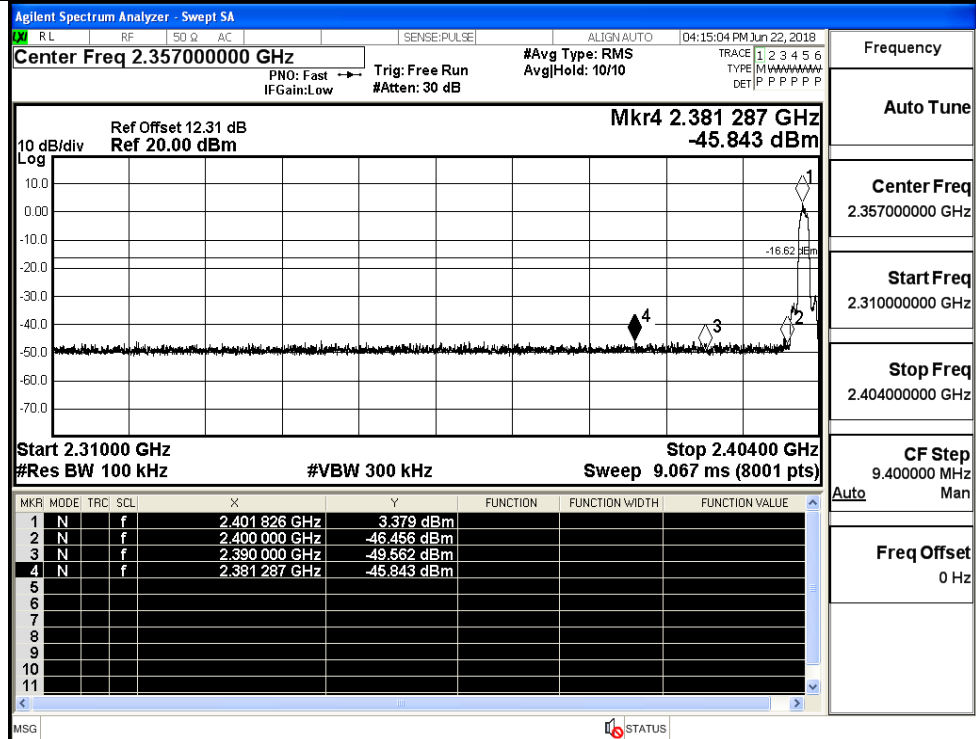


Frequency

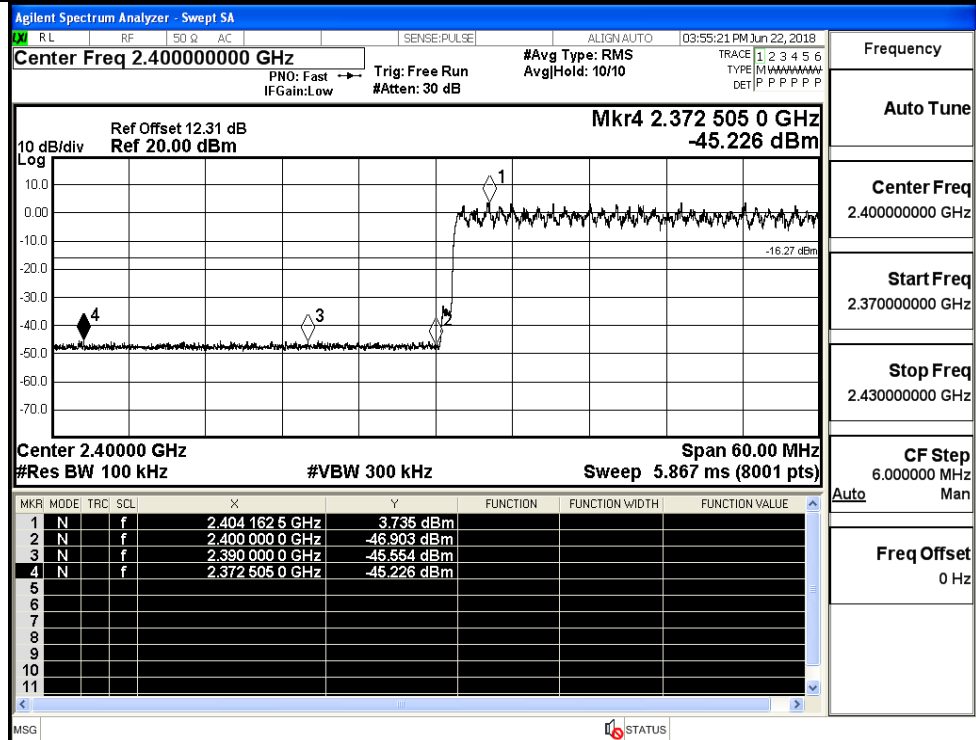
Auto Tune

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

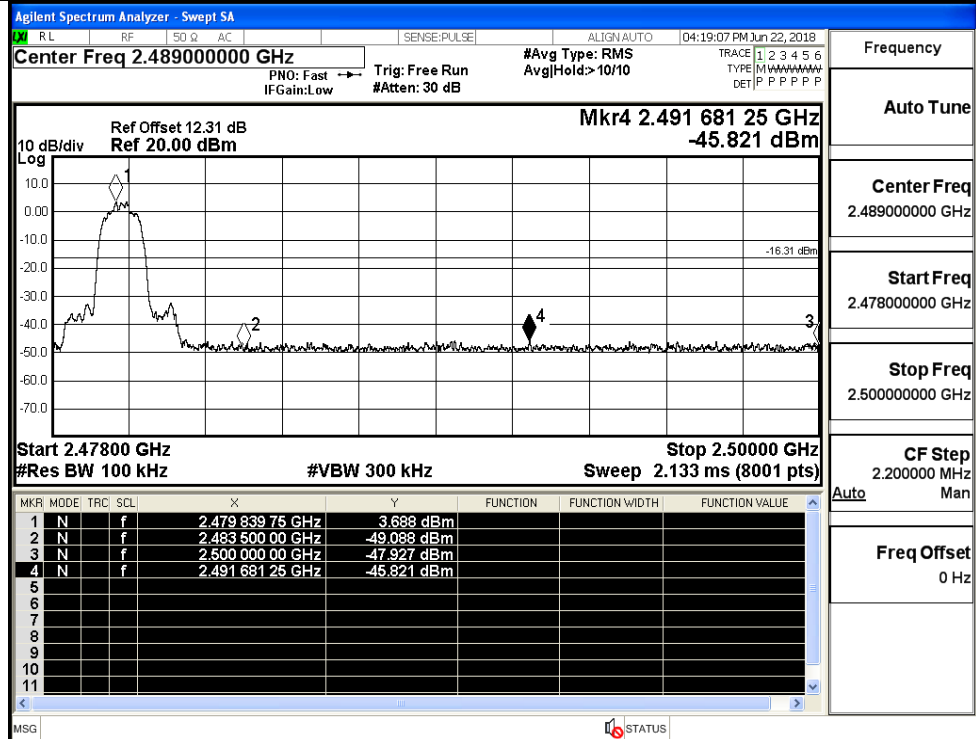
8DPSK/LCH/No Hop



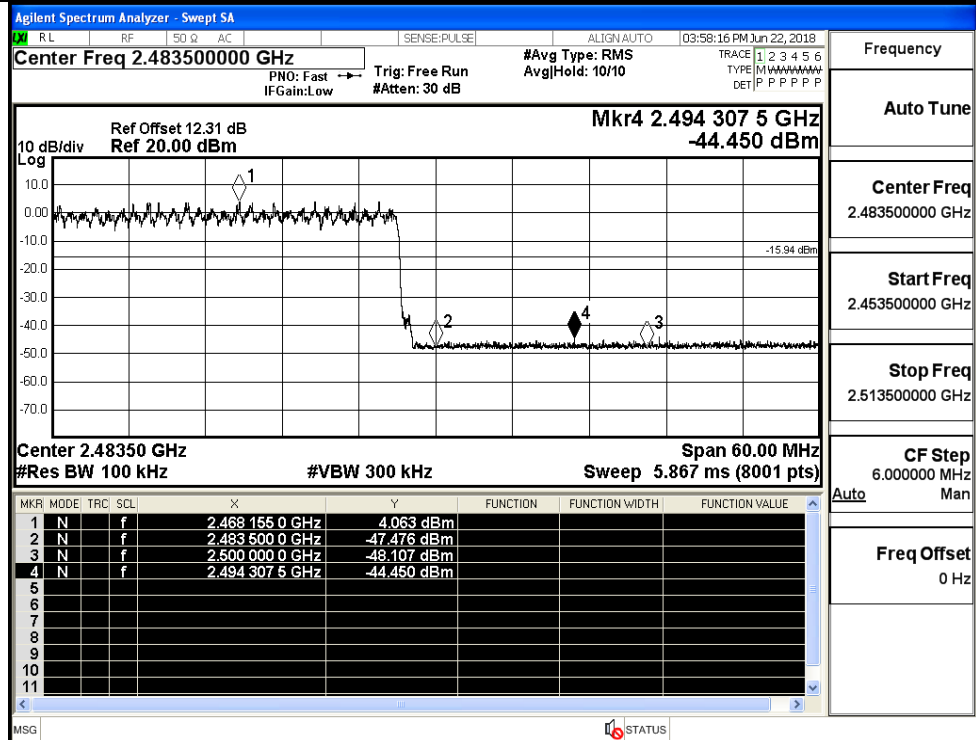
8DPSK/LCH/Hop



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	-39.62	2.0	0	57.63	PEAK	74	PASS
	Off	2310.0	-49.32	2.0	0	47.94	AV	54	PASS
	Off	2390.0	-39.69	2.0	0	57.57	PEAK	74	PASS
	Off	2390.0	-49.23	2.0	0	48.03	AV	54	PASS
	Off	2483.5	-39.03	2.0	0	58.23	PEAK	74	PASS
	Off	2483.5	-48.99	2.0	0	48.26	AV	54	PASS
	Off	2500.0	-39.38	2.0	0	57.88	PEAK	74	PASS
	Off	2500.0	-48.85	2.0	0	48.41	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-39.26	2.0	0	58.00	PEAK	74	PASS
	Off	2310.0	-49.44	2.0	0	47.82	AV	54	PASS
	Off	2390.0	-39.20	2.0	0	58.05	PEAK	74	PASS
	Off	2390.0	-49.17	2.0	0	48.09	AV	54	PASS
	Off	2483.5	-39.60	2.0	0	57.66	PEAK	74	PASS
	Off	2483.5	-48.92	2.0	0	48.34	AV	54	PASS
	Off	2500.0	-39.39	2.0	0	57.87	PEAK	74	PASS
	Off	2500.0	-48.85	2.0	0	48.41	AV	54	PASS
8DPSK	Off	2310.0	-39.59	2.0	0	57.66	PEAK	74	PASS
	Off	2310.0	-49.50	2.0	0	47.76	AV	54	PASS
	Off	2390.0	-38.30	2.0	0	58.96	PEAK	74	PASS
	Off	2390.0	-49.17	2.0	0	48.09	AV	54	PASS
	Off	2483.5	-37.93	2.0	0	59.33	PEAK	74	PASS
	Off	2483.5	-48.81	2.0	0	48.45	AV	54	PASS
	Off	2500.0	-39.29	2.0	0	57.97	PEAK	74	PASS
	Off	2500.0	-48.69	2.0	0	48.57	AV	54	PASS

Agilent Spectrum Analyzer - Swept SA

RL RF SO Ω AC SENSE:PULSE ALIGN: AUTO 04:01:55 PM Jun 22, 2018

Center Freq 2.35200000 GHz PNO: Fast Trig: Free Run Avg Type: Log-Pwr AvgHold: 10/10

IF Gain: Low #Atten: 30 dB

TRACE 1 2 3 4 5 6
TYPE N W W W W W W
DET P P P P P P

Ref Offset 12.31 dB Mkr3 2.390 000 GHz
Ref 20.00 dBm -39.692 dBm

10 dB/div Log

Start 2.30000 GHz Stop 2.40400 GHz
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 1.067 ms (8001 pts)

MRK	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.401 881 GHz	4.773 dBm			
2	N	f		2.310 000 GHz	-39.623 dBm			
3	N	f		2.390 000 GHz	-39.692 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

Auto

Frequency

Auto Tune

Center Freq
2.35200000 GHz

Start Freq
2.300000000 GHz

Stop Freq
2.404000000 GHz

CF Step
10.400000 MHz

Freq Offset
0 Hz

MSG STATUS

Agilent Spectrum Analyzer - Swept SA

RL RF SO Q AC SENSE:PULSE ALIGN:AUTO 04:02:07 PM Jun 22, 2018

Center Freq 2.35200000 GHz PNO: Fast Trig: Free Run Avg Type: Log-Pwr Avg/Hold: 10/10

IF Gain: Low #Atten: 30 dB

TRACE 1 2 3 4 5 6
TYPE M M M M M M M
DET P P P P P P P

Ref Offset 12.31 dB
Ref 20.00 dBm

Mkr3 2.390 000 GHz
-49.229 dBm

10 dB/div
Log

Start 2.30000 GHz
#Res BW 1.0 MHz

Stop 2.40400 GHz
Sweep 245.9 ms (8001 pts)

#VBW 330 Hz

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	f		2.402 050 GHz	4.331 dBm			
2	N	f		2.310 000 GHz	-49.319 dBm			
3	N	f		2.390 000 GHz	-49.229 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

Auto Tune

Center Freq 2.35200000 GHz

Start Freq 2.300000000 GHz

Stop Freq 2.404000000 GHz

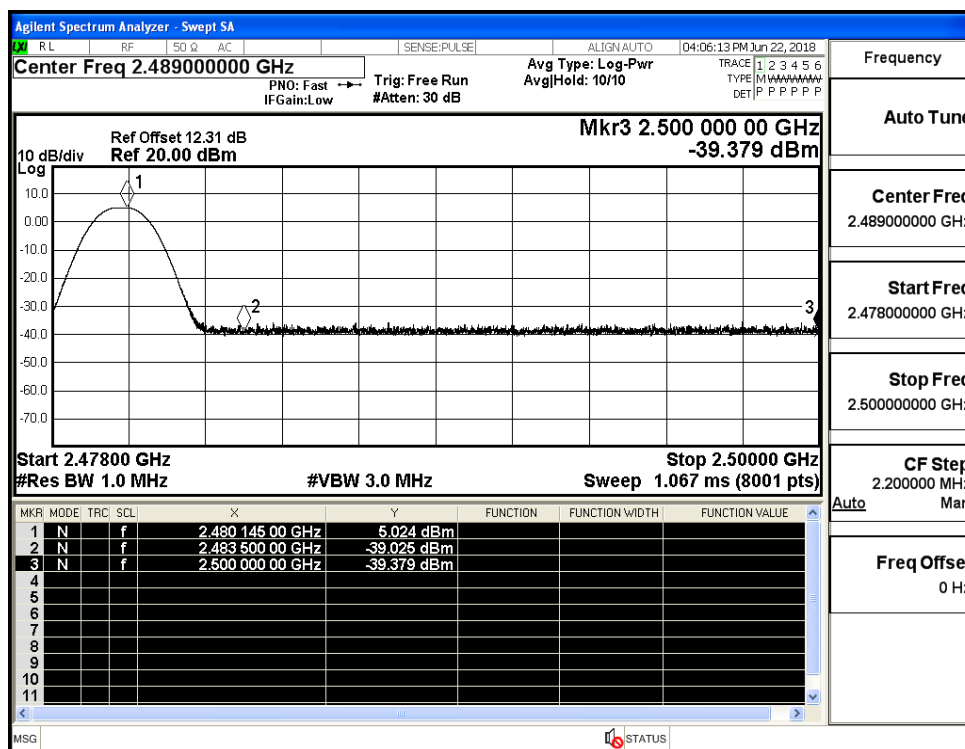
CF Step 10.400000 MHz

Auto Man

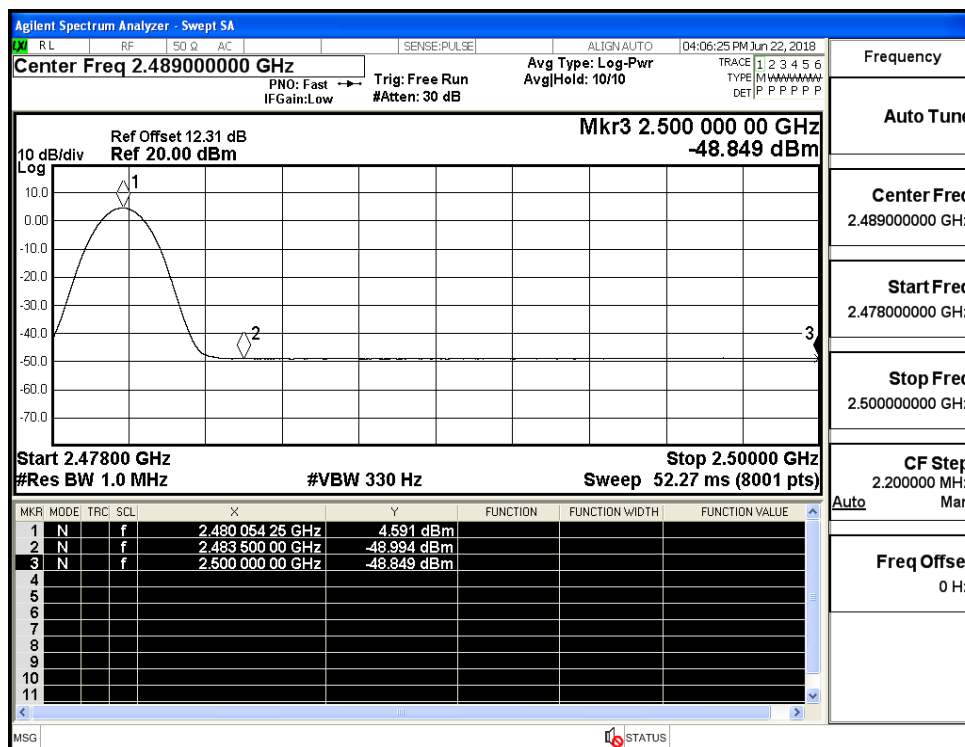
Freq Offset 0 Hz

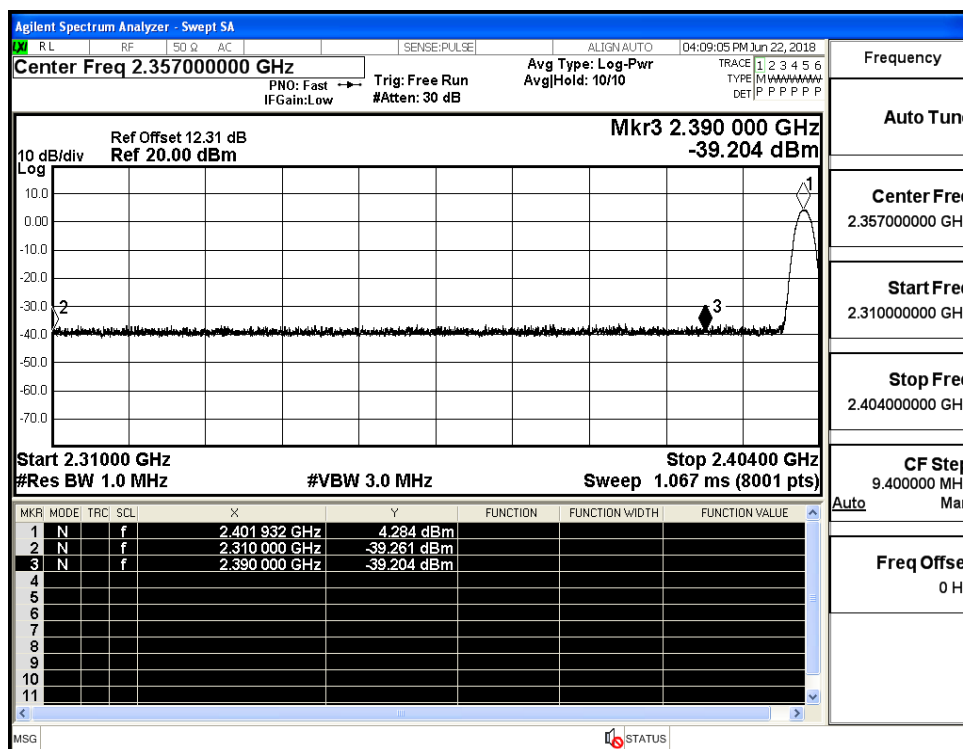
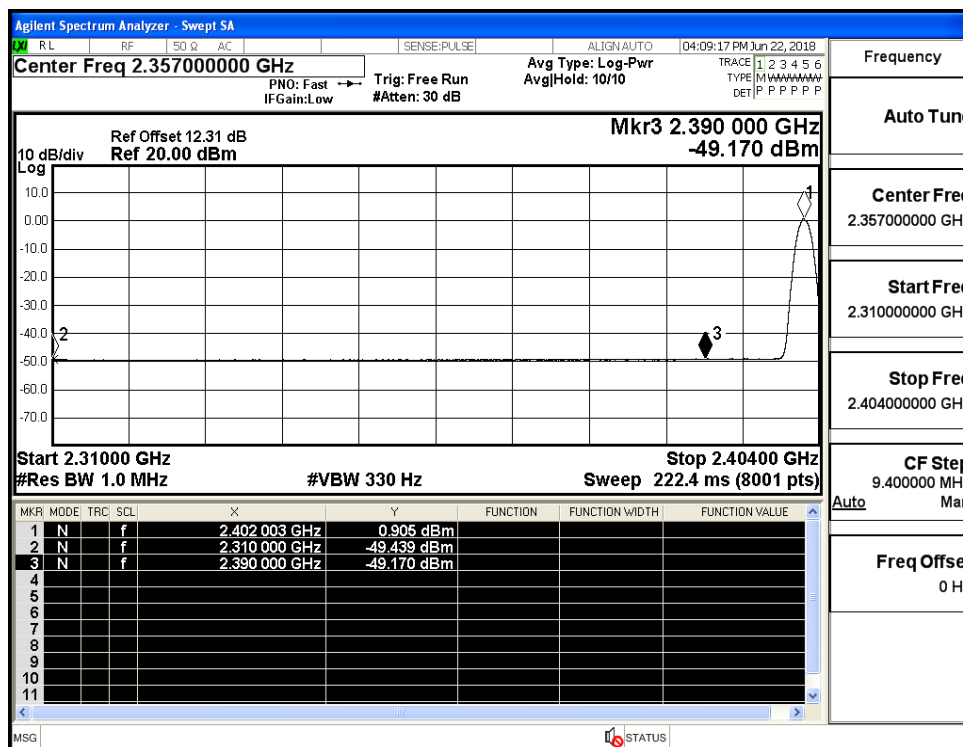
MSG STATUS

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

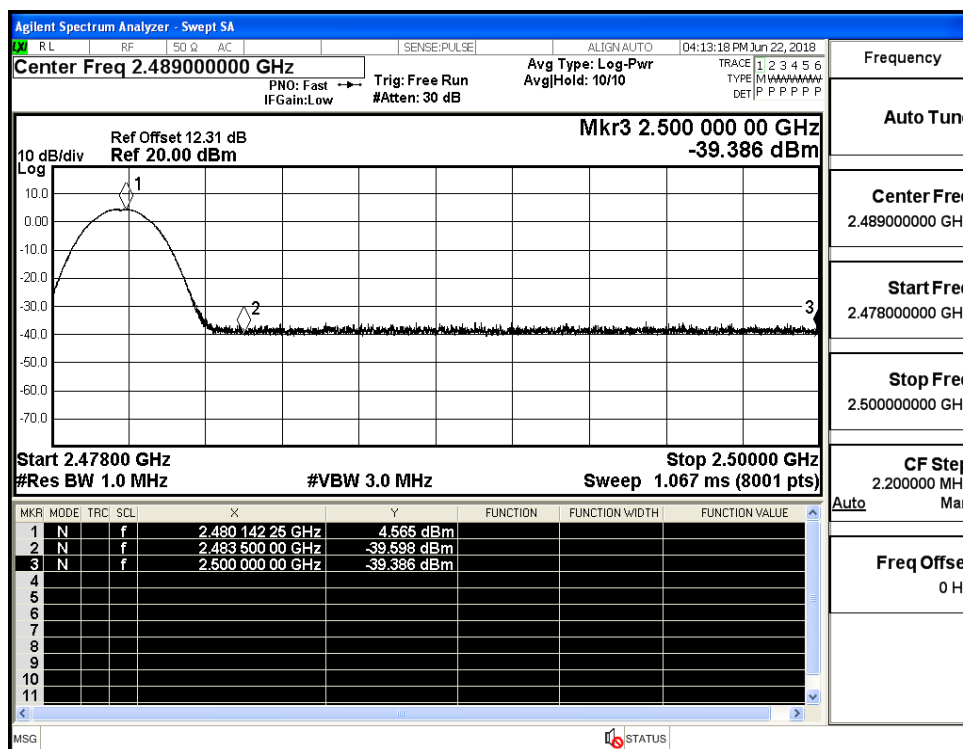


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)

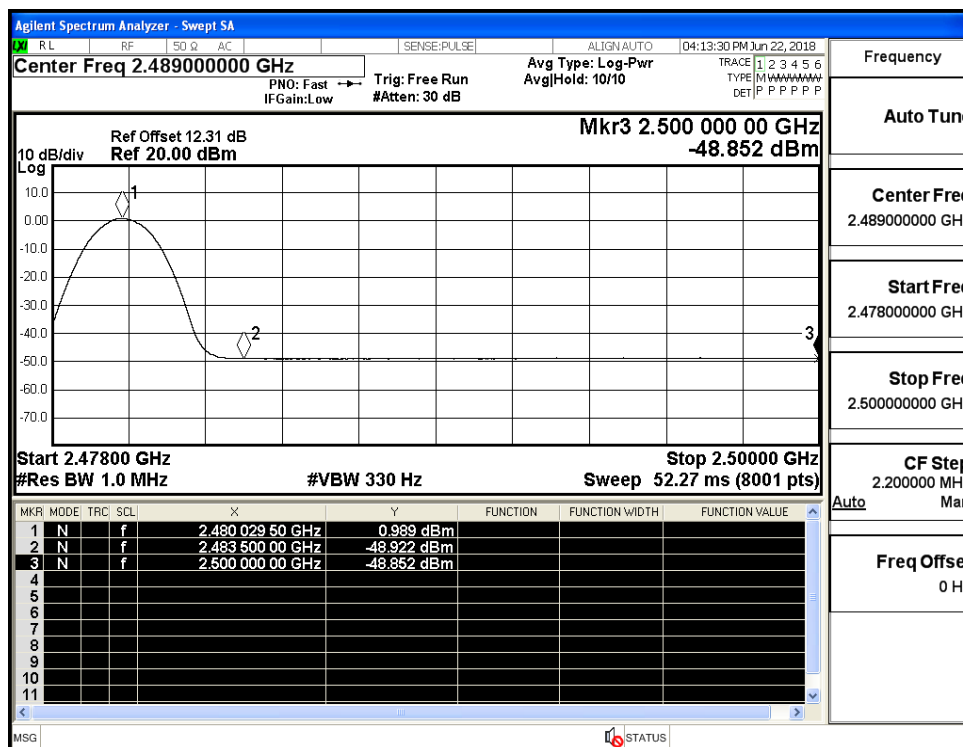


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

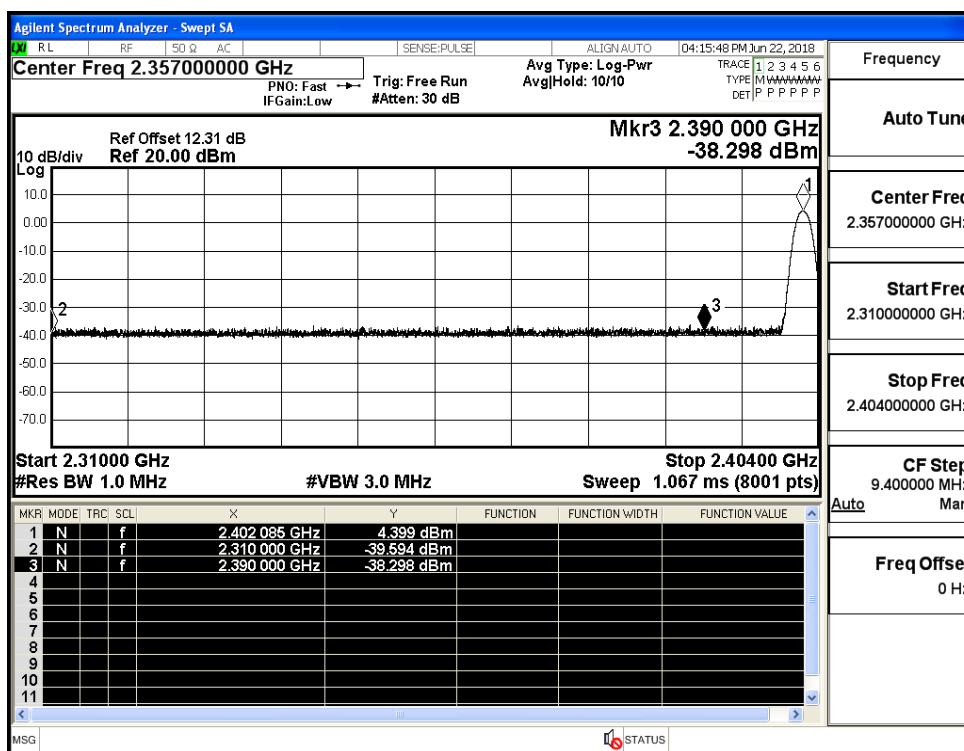
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



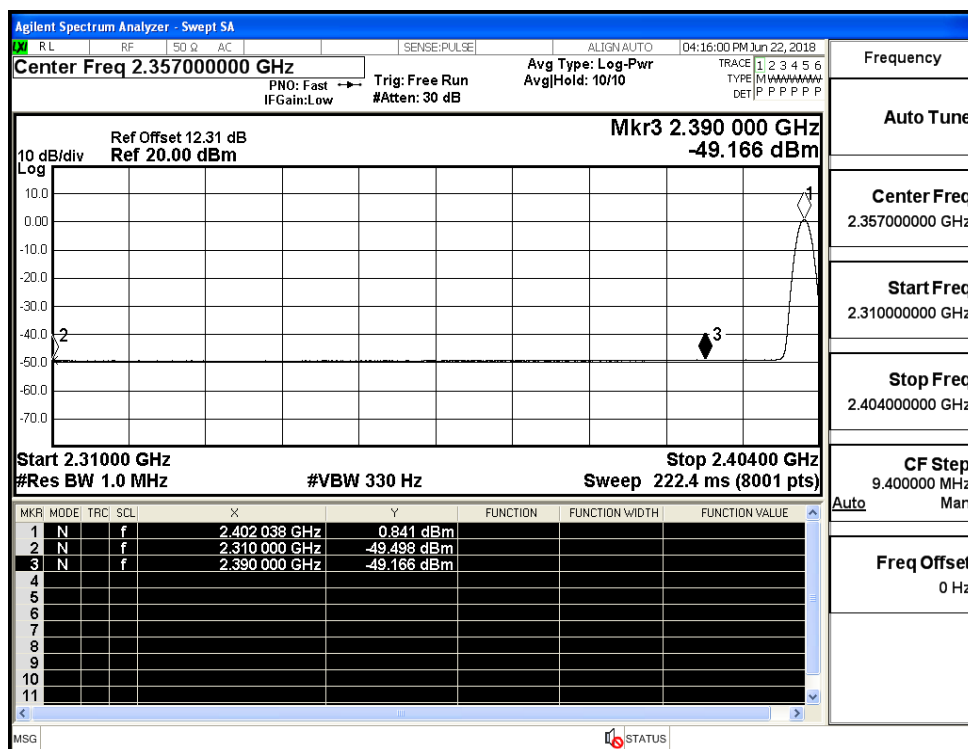
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



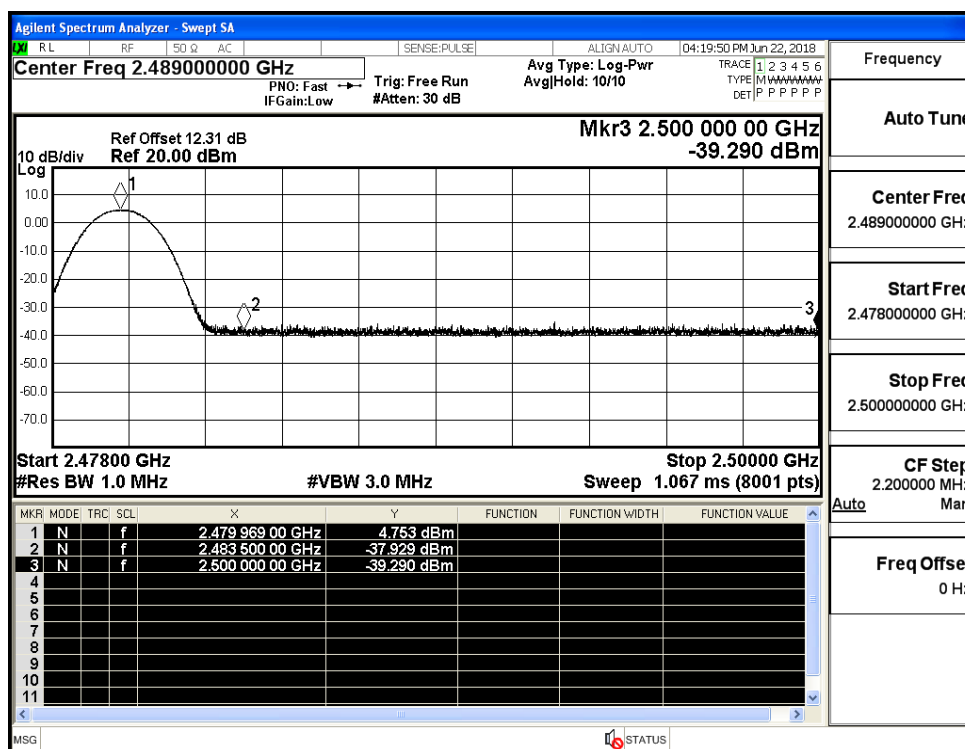
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

