

Appendix A

RF Test Data for BT V4.1(BDR/EDR) (Conducted Measurement)

Product Name: TRANSFORM WIRELESS - Active Performance On-Ear Headphones with Bluetooth

Trade Mark: SOUL

Test Model: ST32

Environmental Conditions

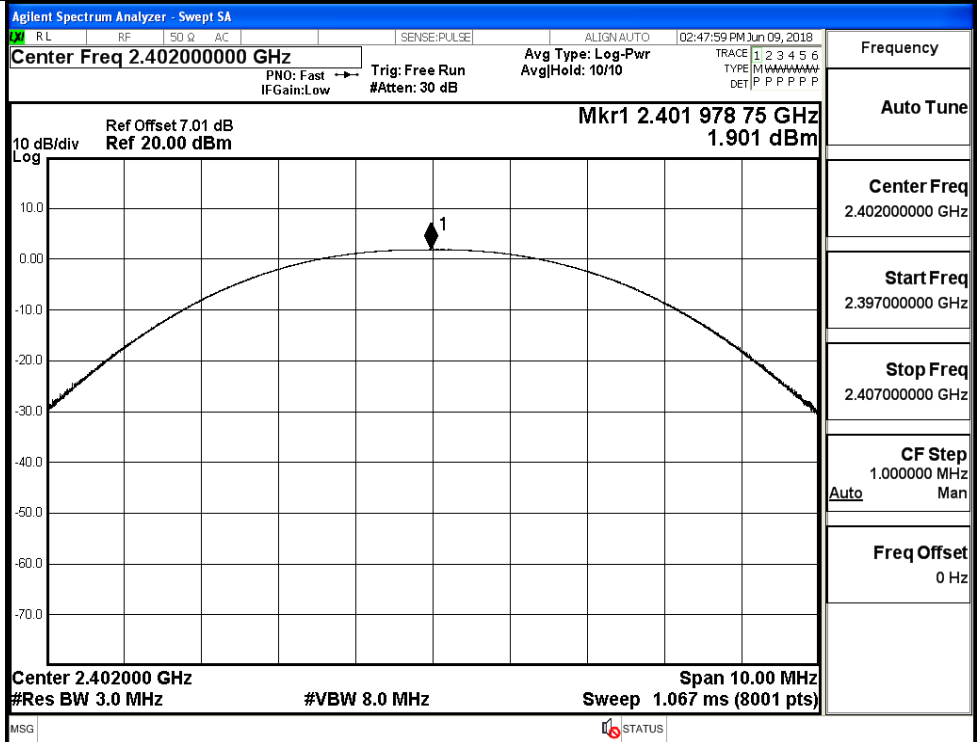
Temperature:	22.5 ° C
Relative Humidity:	54.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Tom.Liu
Supervised by:	Jayden.Zhuo

A.1 Maxmum Conducted Peak Output Power

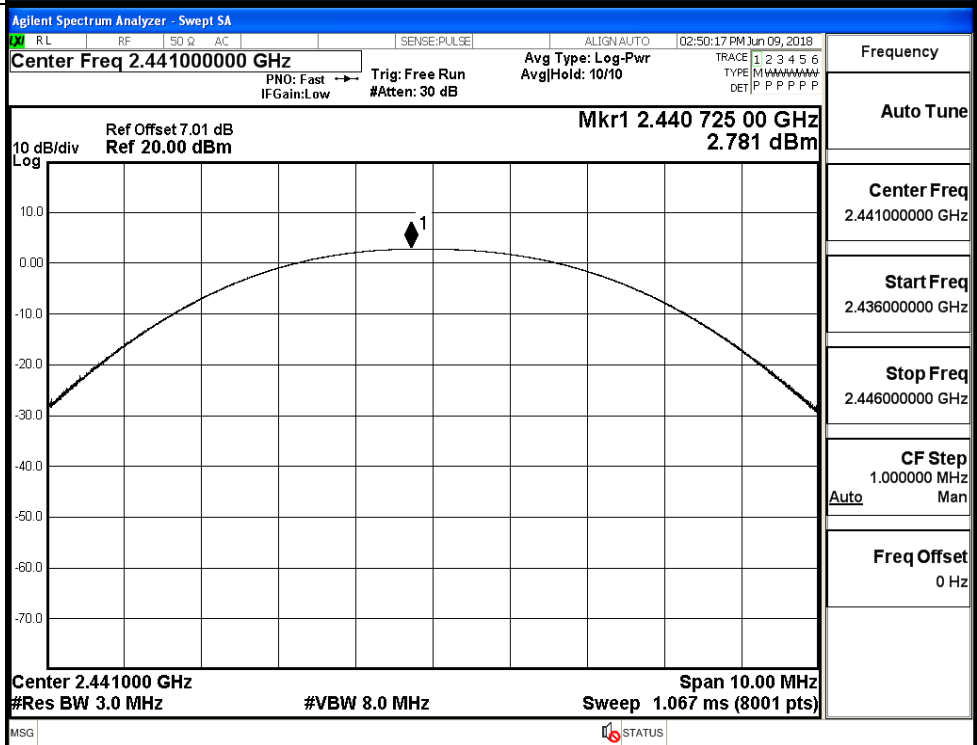
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.901	30	PASS
	MCH	2.781	30	PASS
	HCH	3.045	30	PASS
$\pi/4$ DQPSK	LCH	0.866	21	PASS
	MCH	2.216	21	PASS
	HCH	2.513	21	PASS
8DPSK	LCH	1.137	21	PASS
	MCH	2.341	21	PASS
	HCH	2.636	21	PASS

Test Graphs

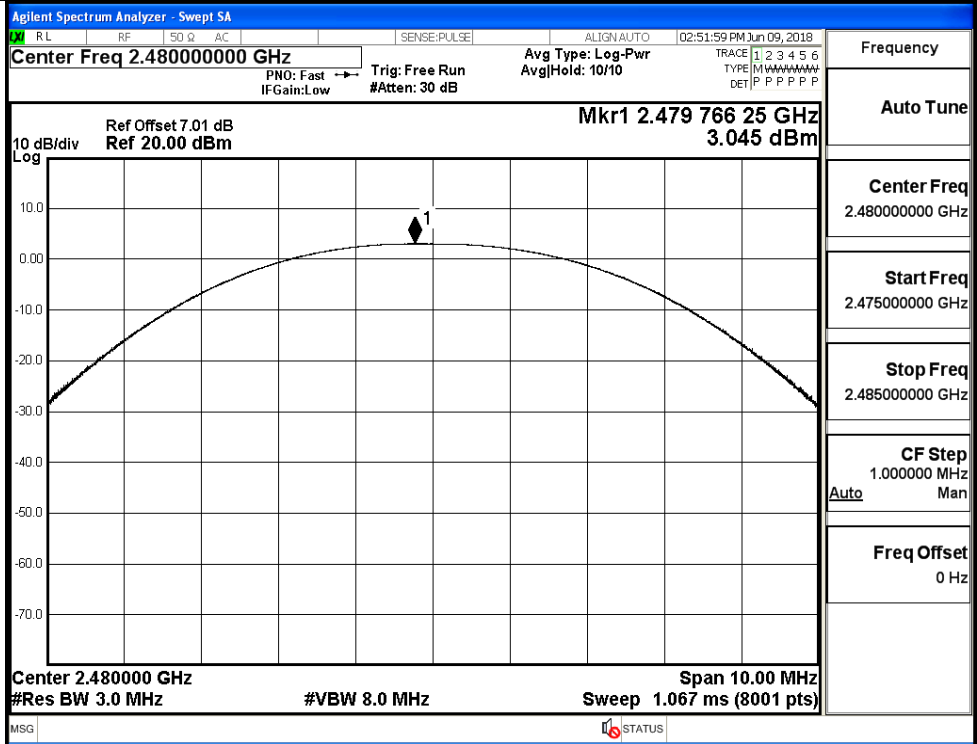
GFSK/LCH



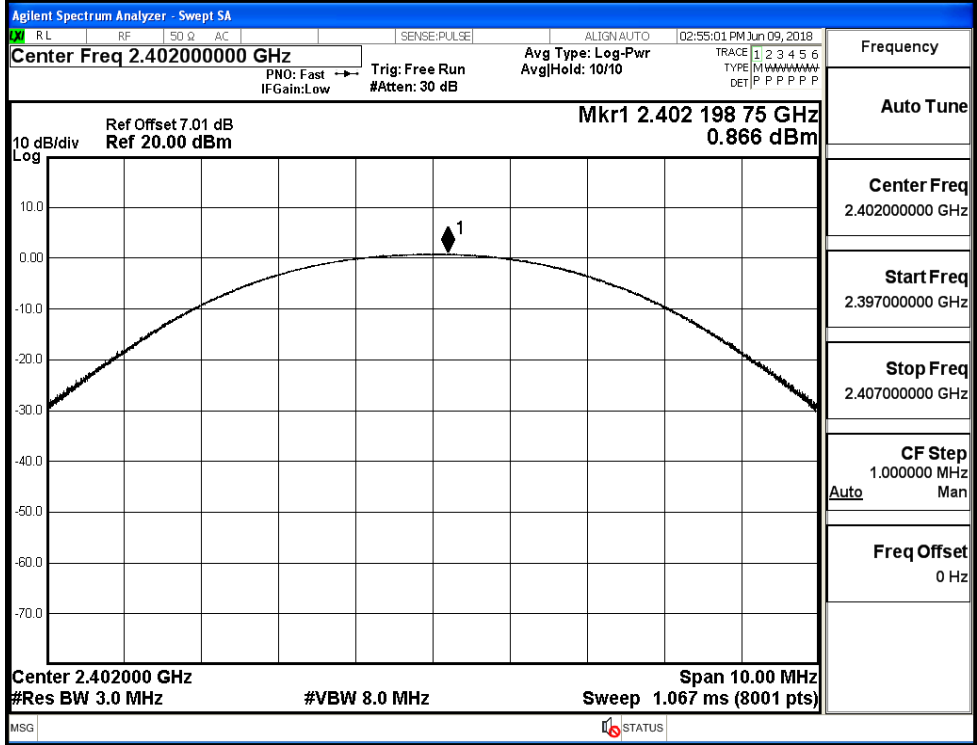
GFSK/MCH



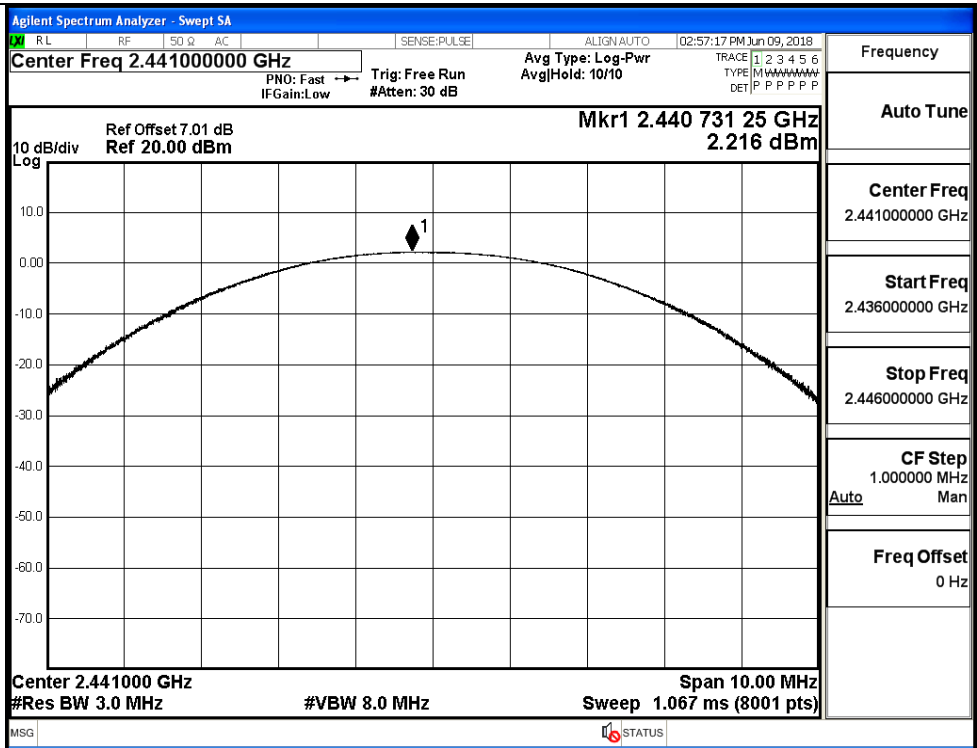
GFSK/HCH



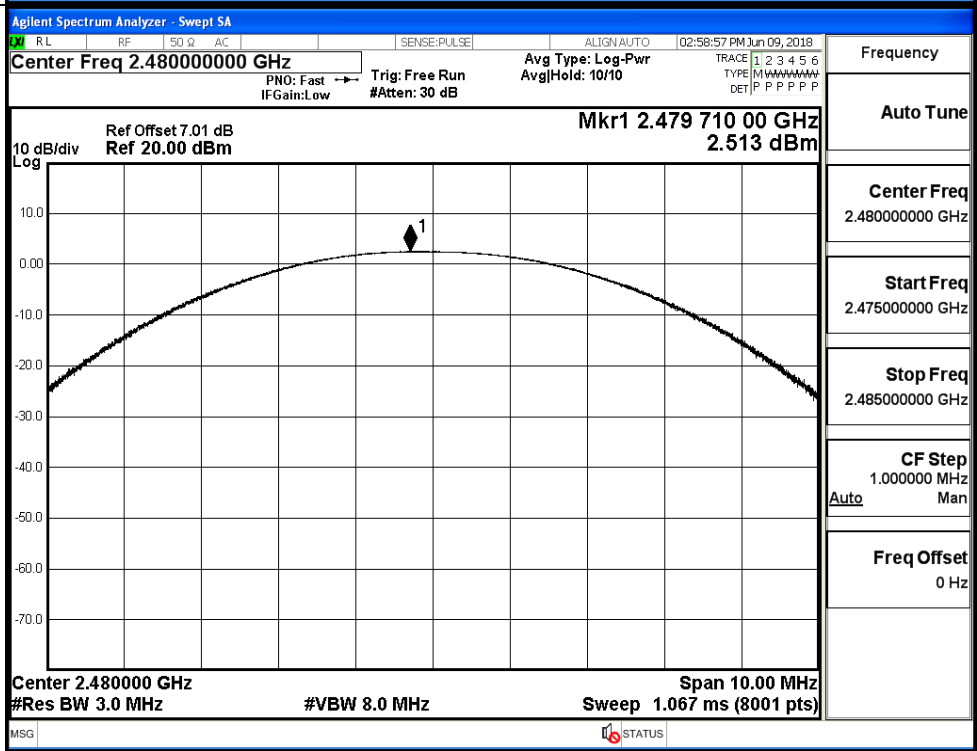
π /4DQPSK/LCH



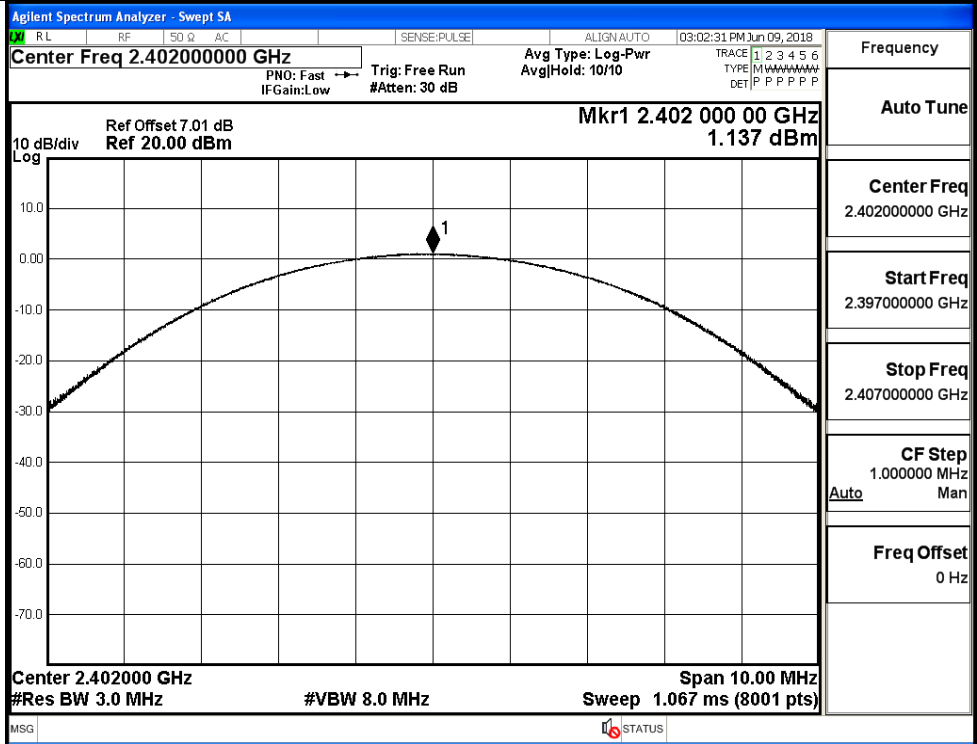
π /4DQPSK/MCH



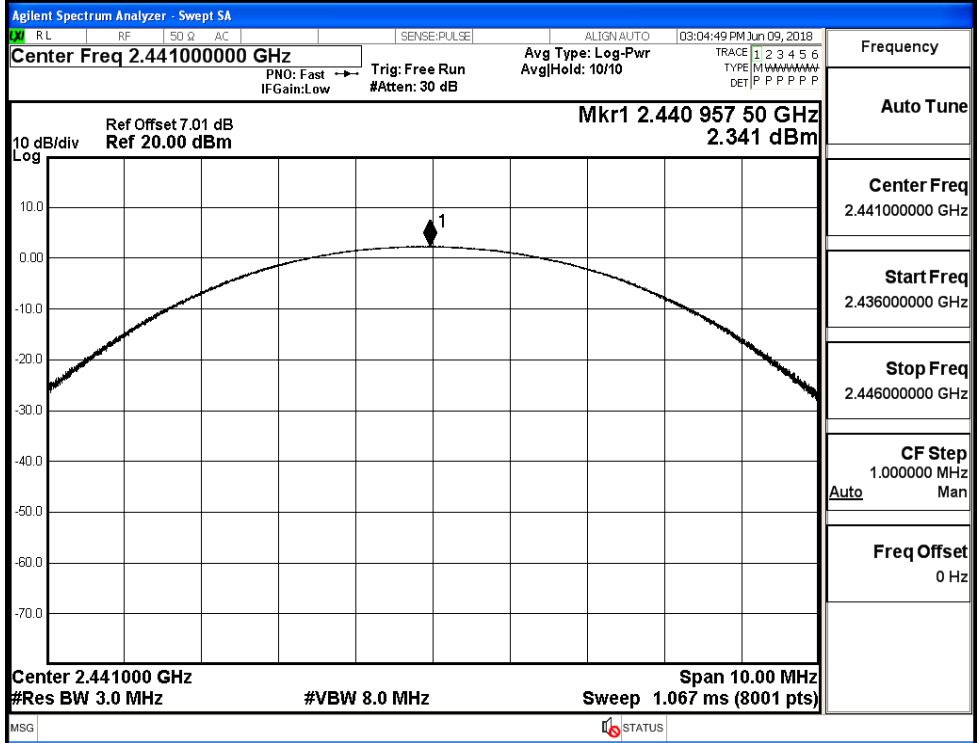
π /4DQPSK/HCH



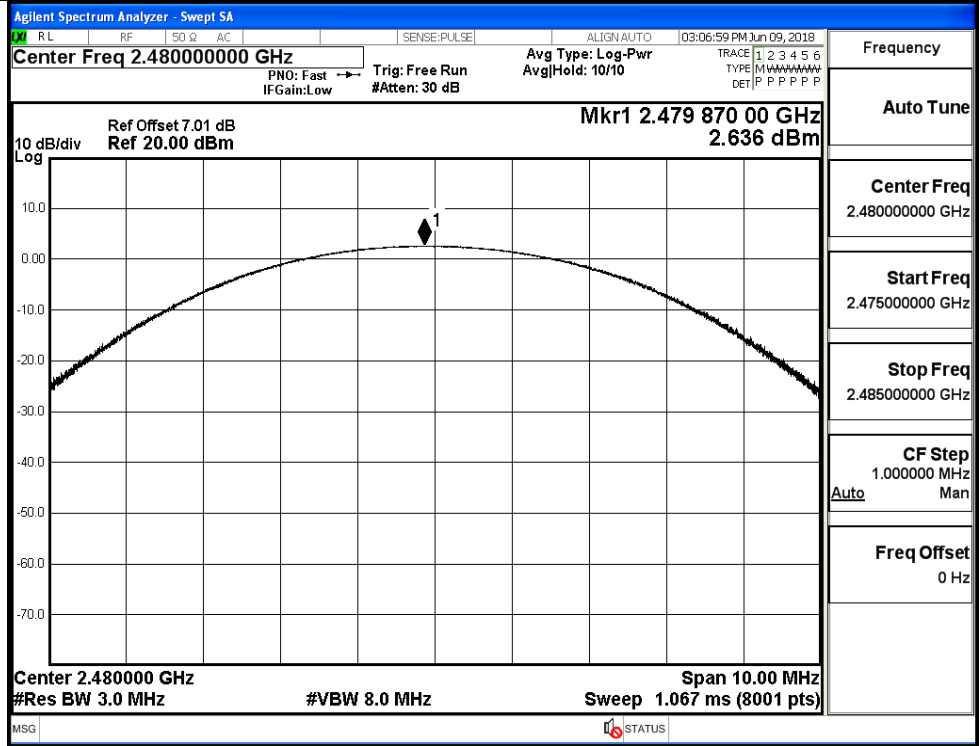
8DPSK/LCH



8DPSK/MCH

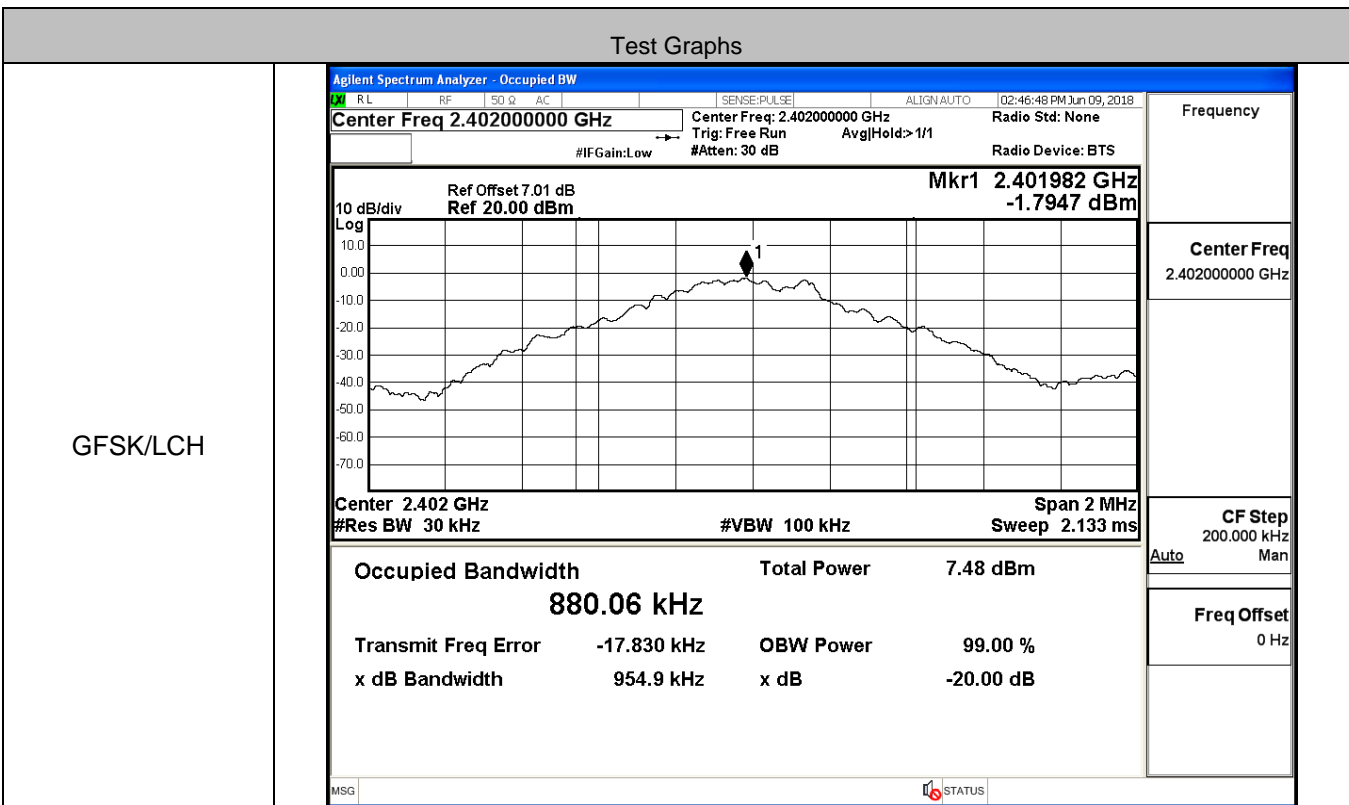


8DPSK/HCH

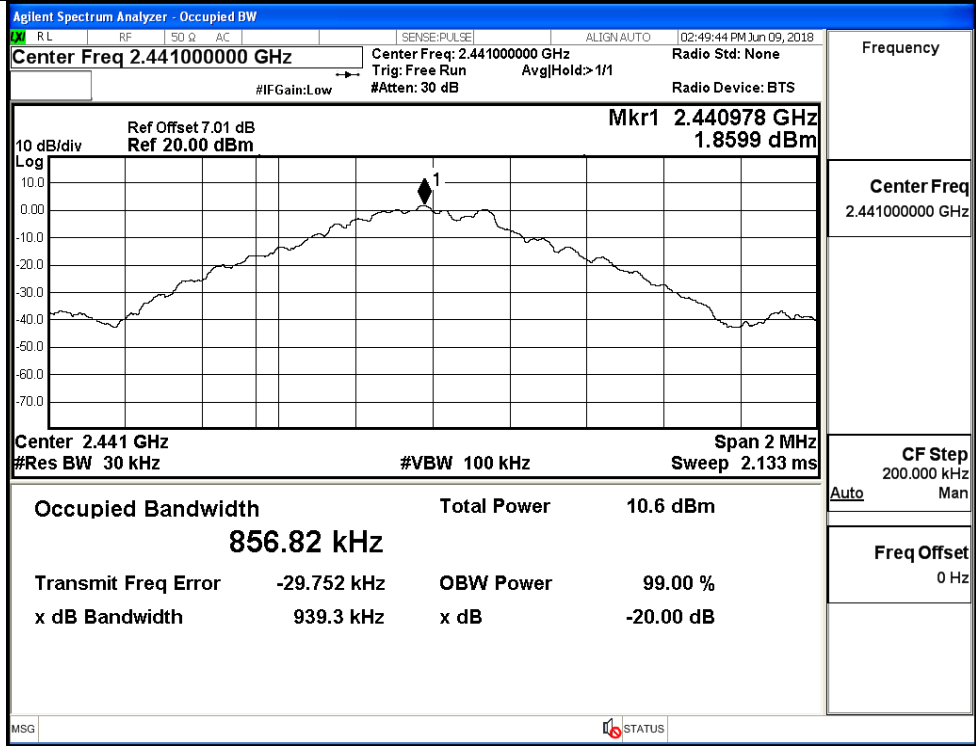


A.2 20dB Bandwidth

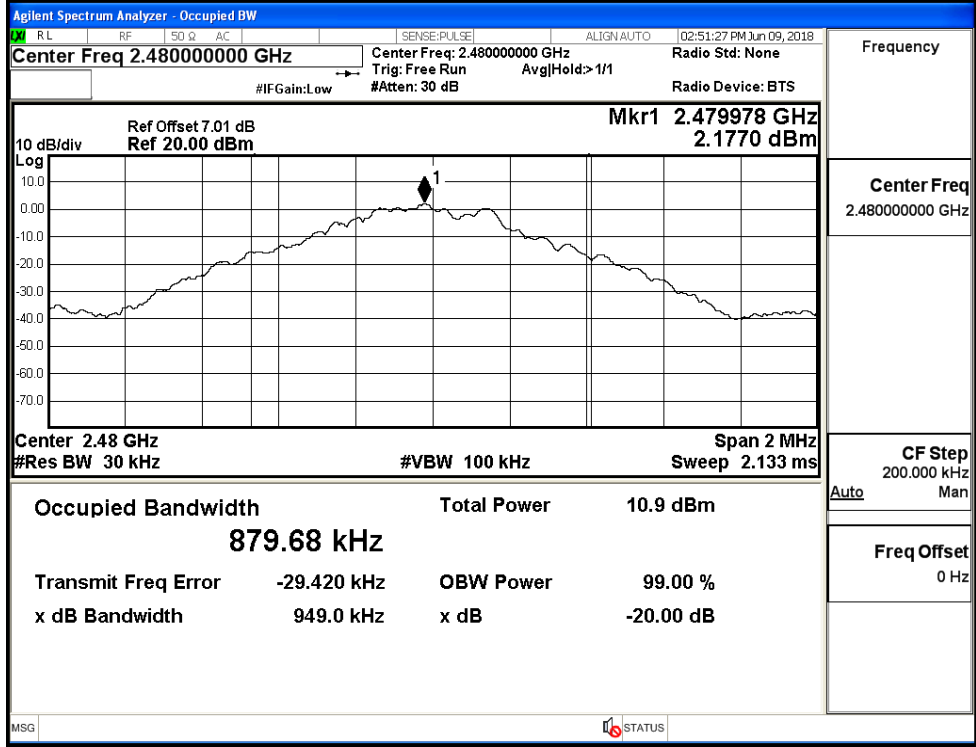
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9549	Not Specified	PASS
	MCH	0.9393	Not Specified	PASS
	HCH	0.9490	Not Specified	PASS
π/4DQPSK	LCH	1.274	Not Specified	PASS
	MCH	1.274	Not Specified	PASS
	HCH	1.310	Not Specified	PASS
8DPSK	LCH	1.289	Not Specified	PASS
	MCH	1.276	Not Specified	PASS
	HCH	1.293	Not Specified	PASS



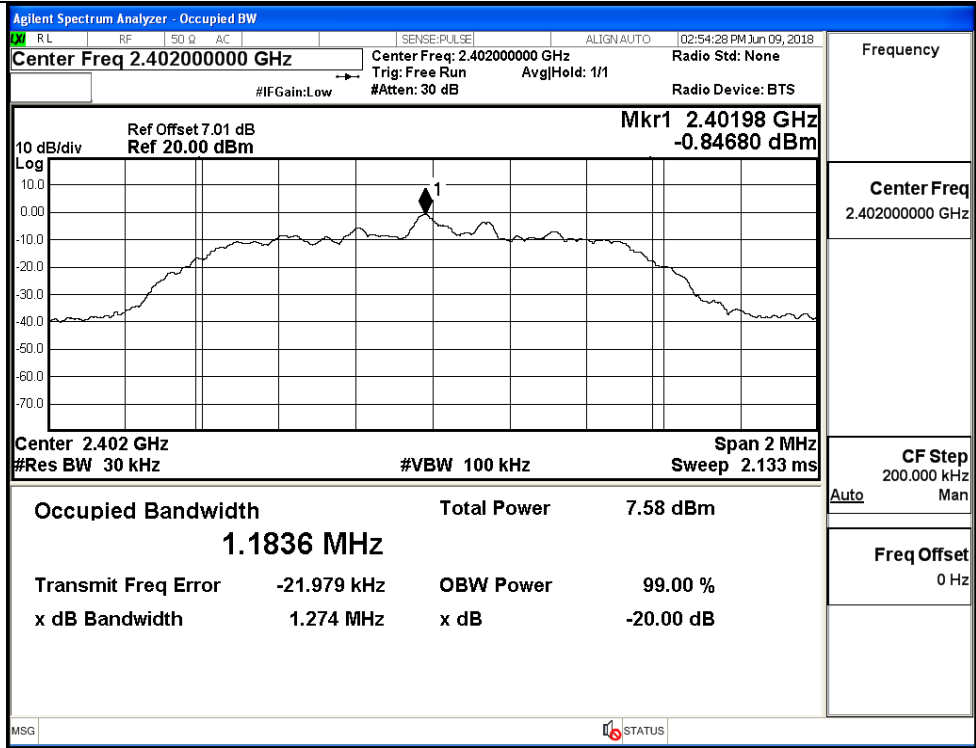
GFSK/MCH



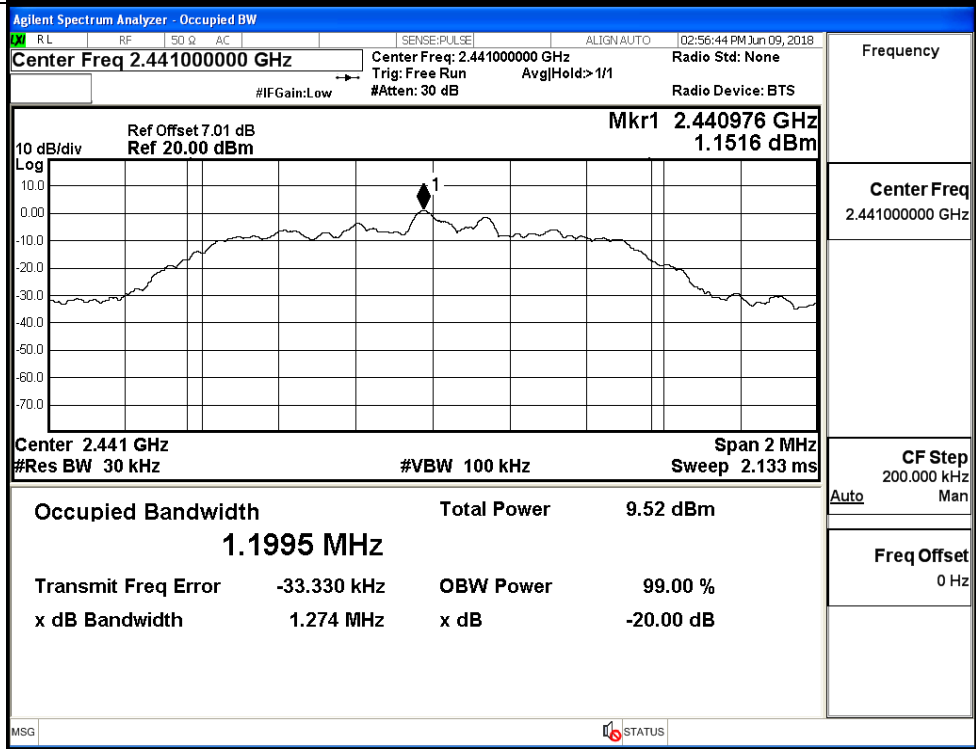
GFSK/HCH



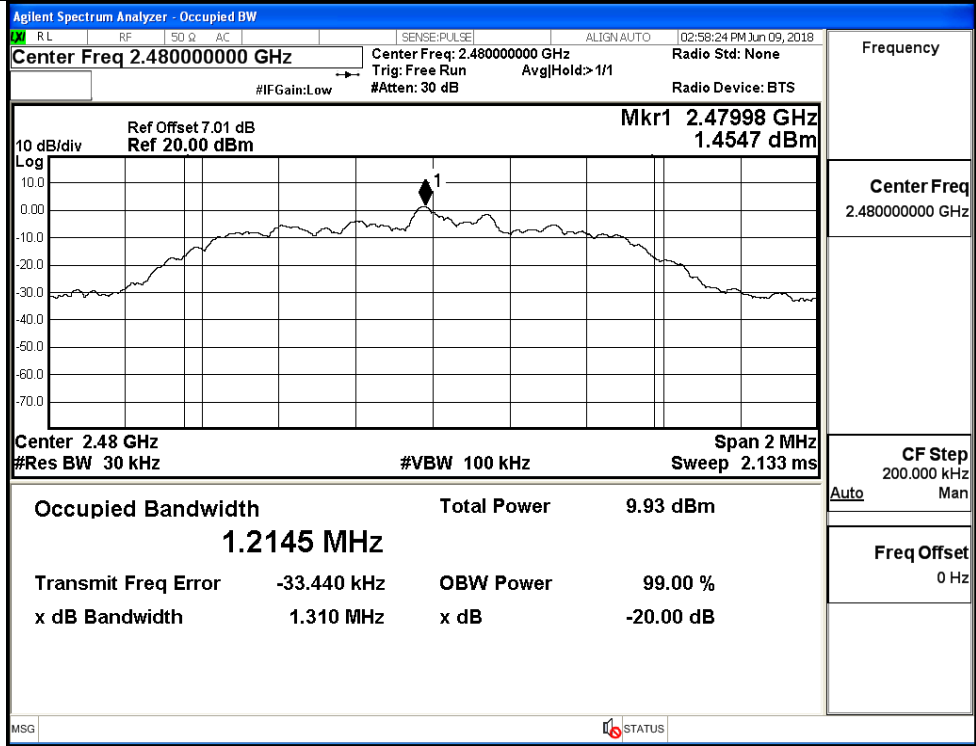
$\pi/4$ DQPSK/LCH



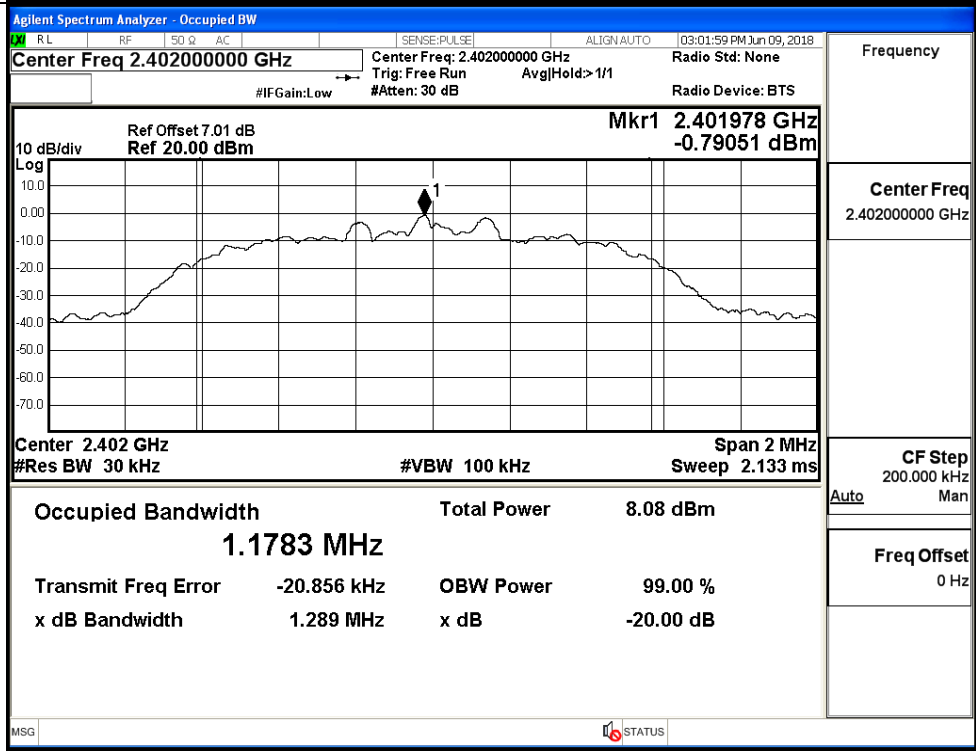
$\pi/4$ DQPSK/MCH



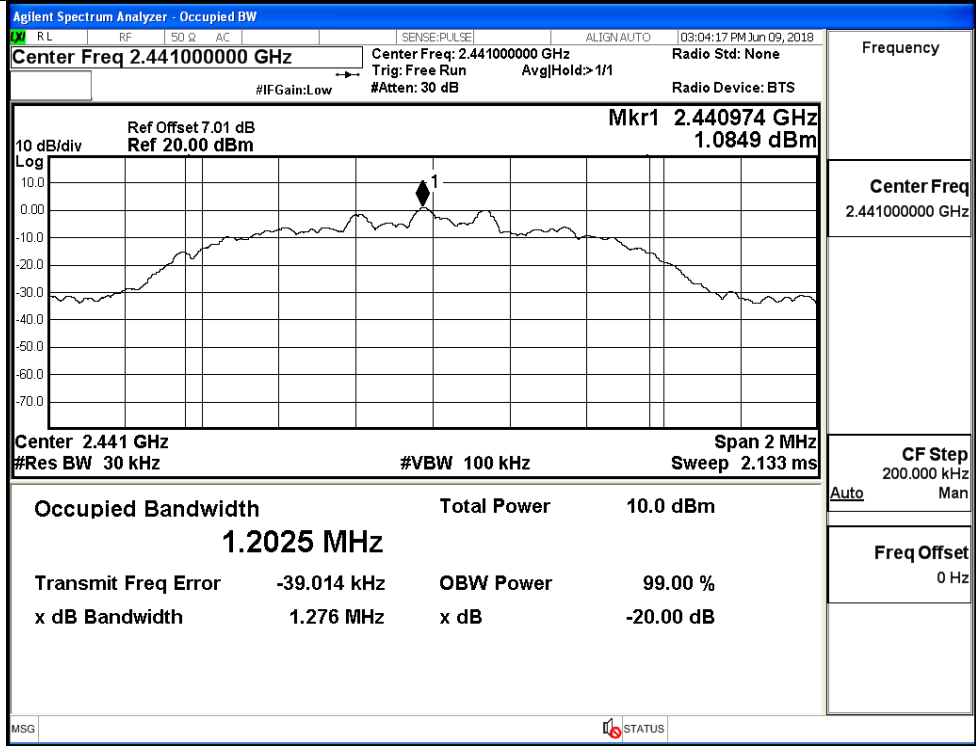
$\pi/4$ DQPSK/HCH



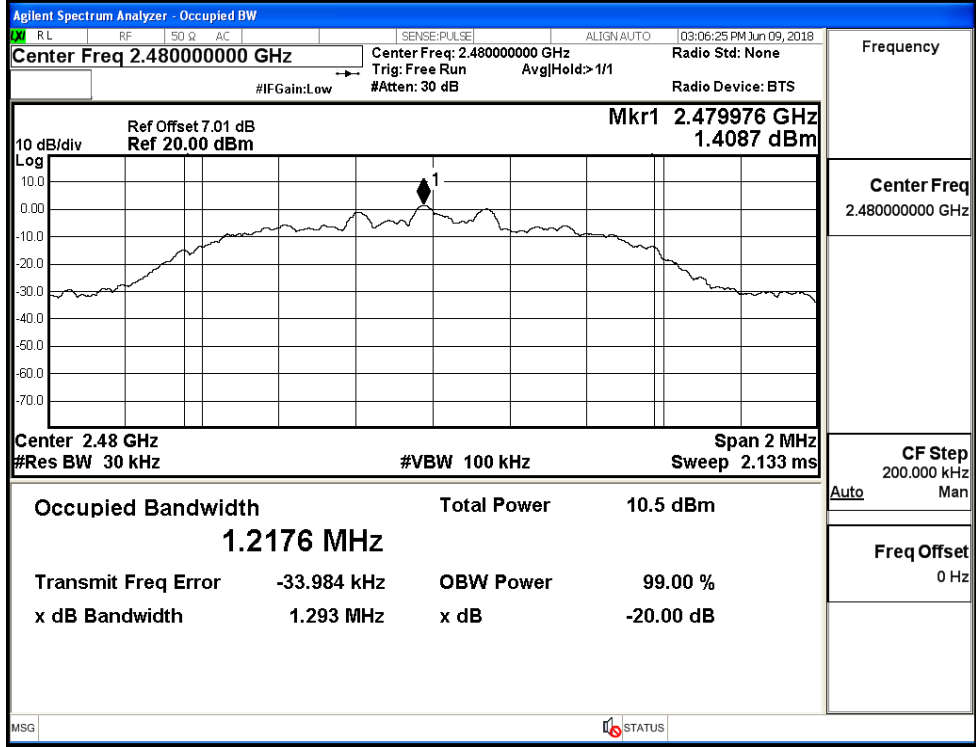
8DPSK/LCH



8DPSK/MCH

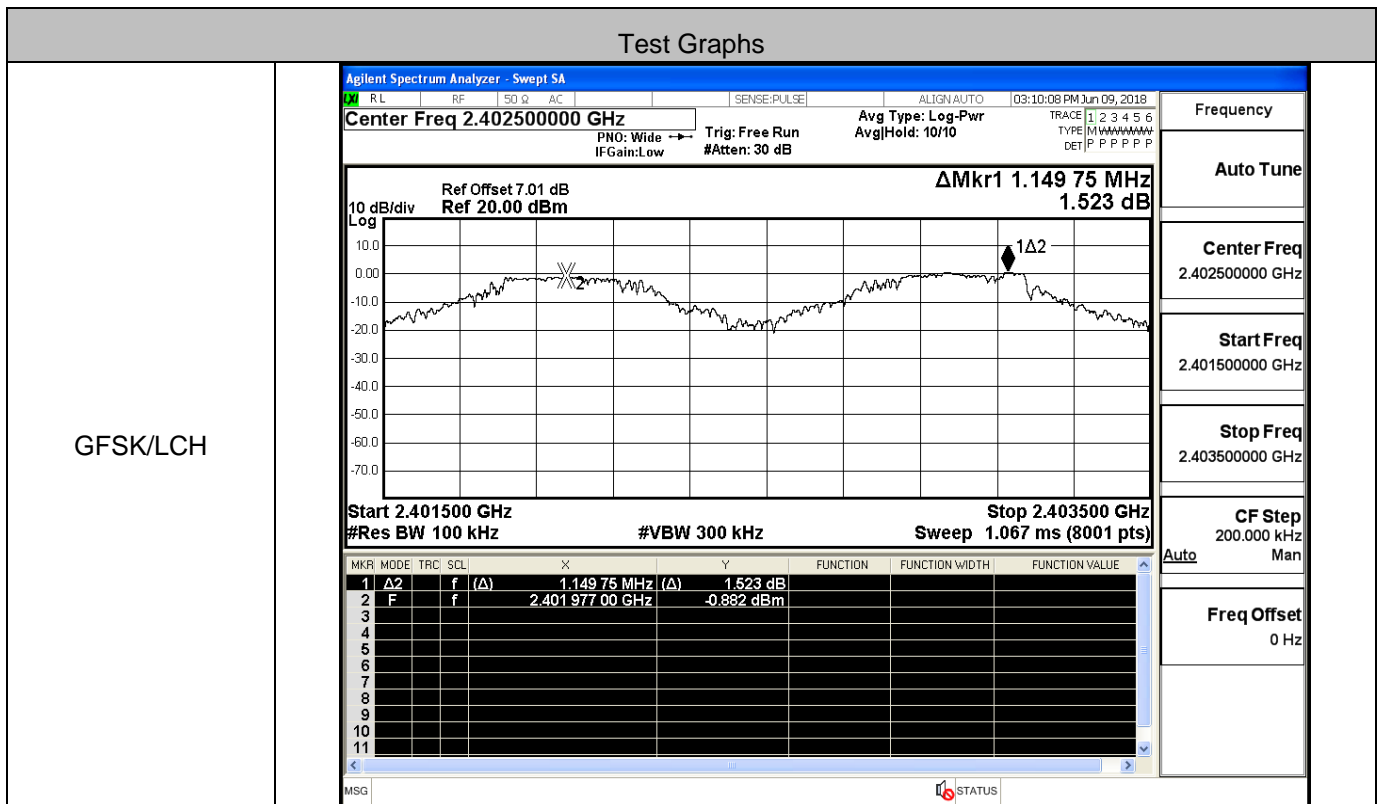


8DPSK/HCH

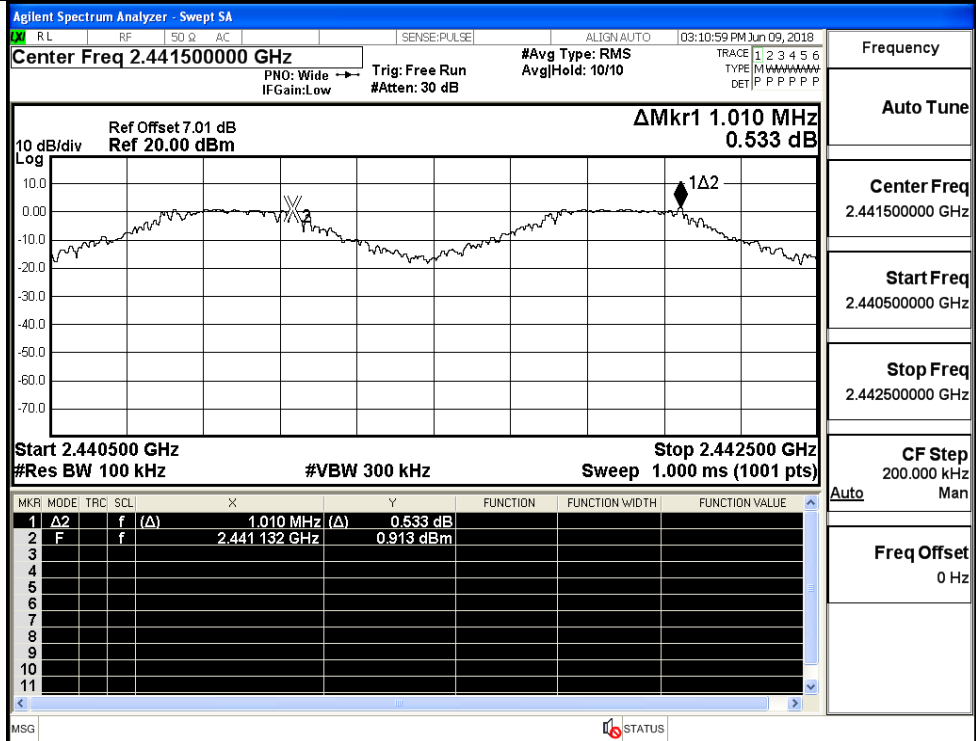


A.3 Carrier Frequency Separation

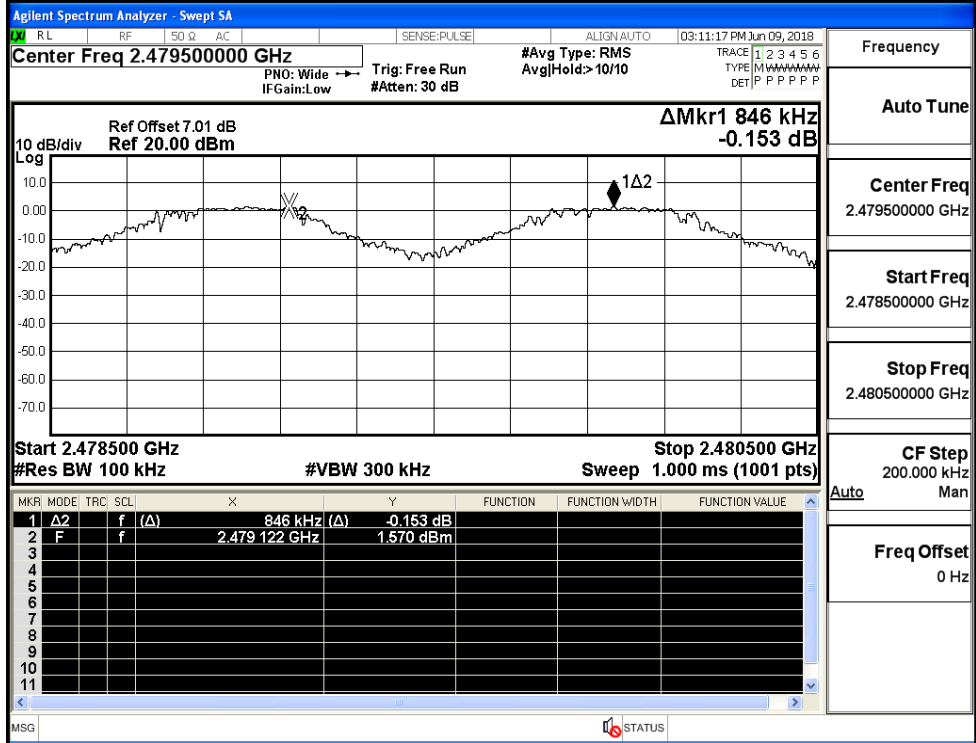
Mode	Channel	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.150	0.637	PASS
	MCH	1.010	0.637	PASS
	HCH	0.846	0.637	PASS
π/4DQPSK	LCH	1.006	0.873	PASS
	MCH	0.964	0.873	PASS
	HCH	1.006	0.873	PASS
8DPSK	LCH	0.934	0.862	PASS
	MCH	0.992	0.862	PASS
	HCH	1.084	0.862	PASS



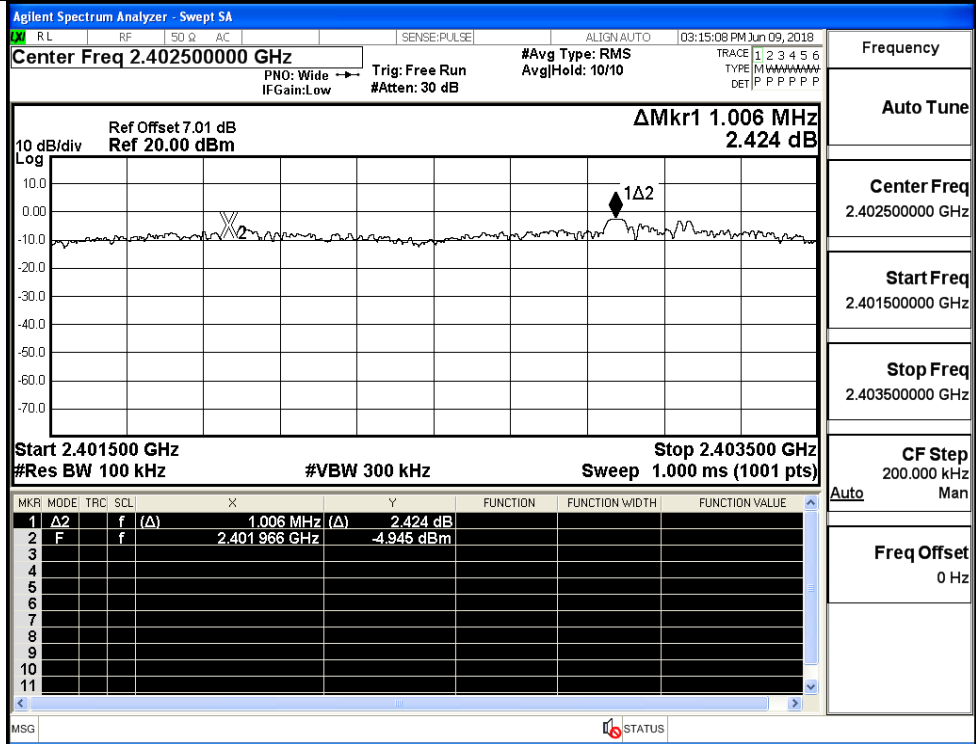
GFSK/MCH



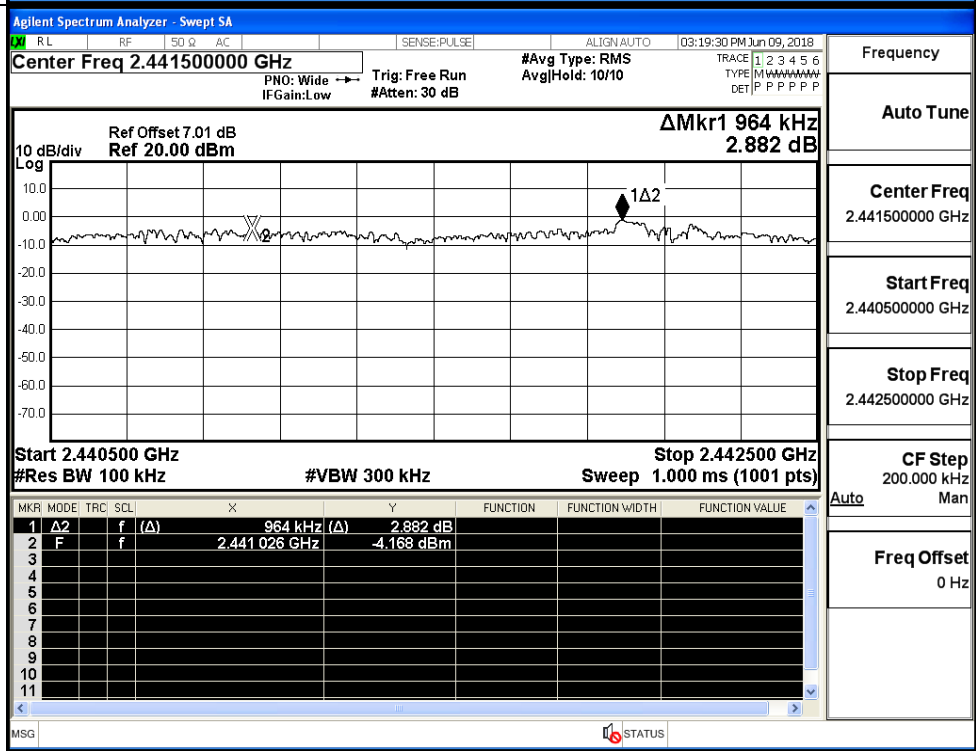
GFSK/HCH



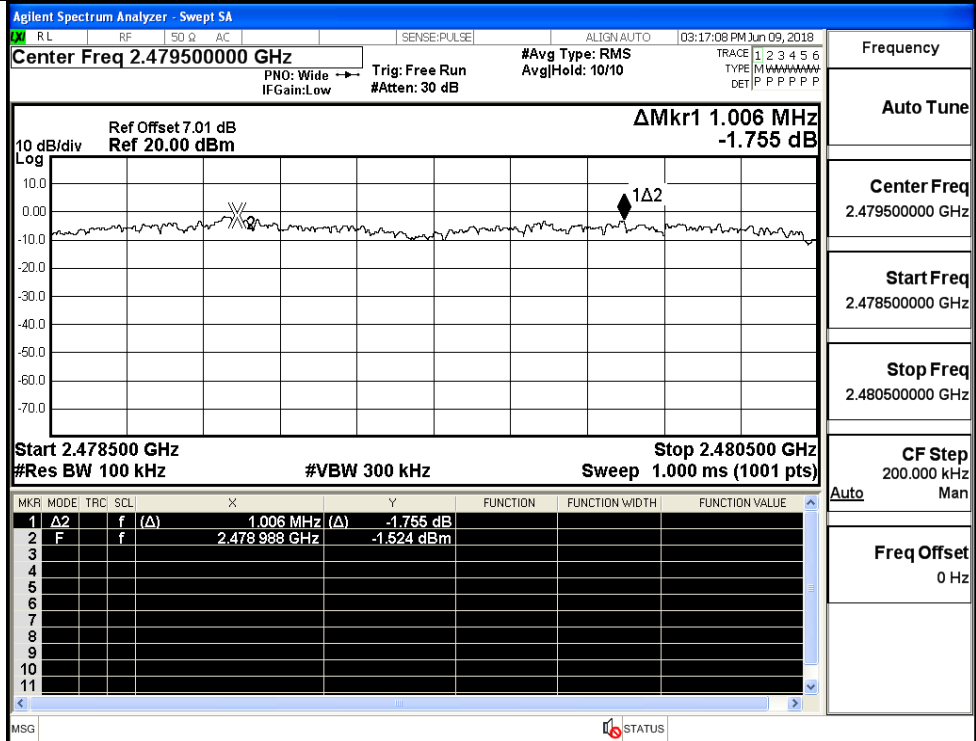
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



π/4DQPSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

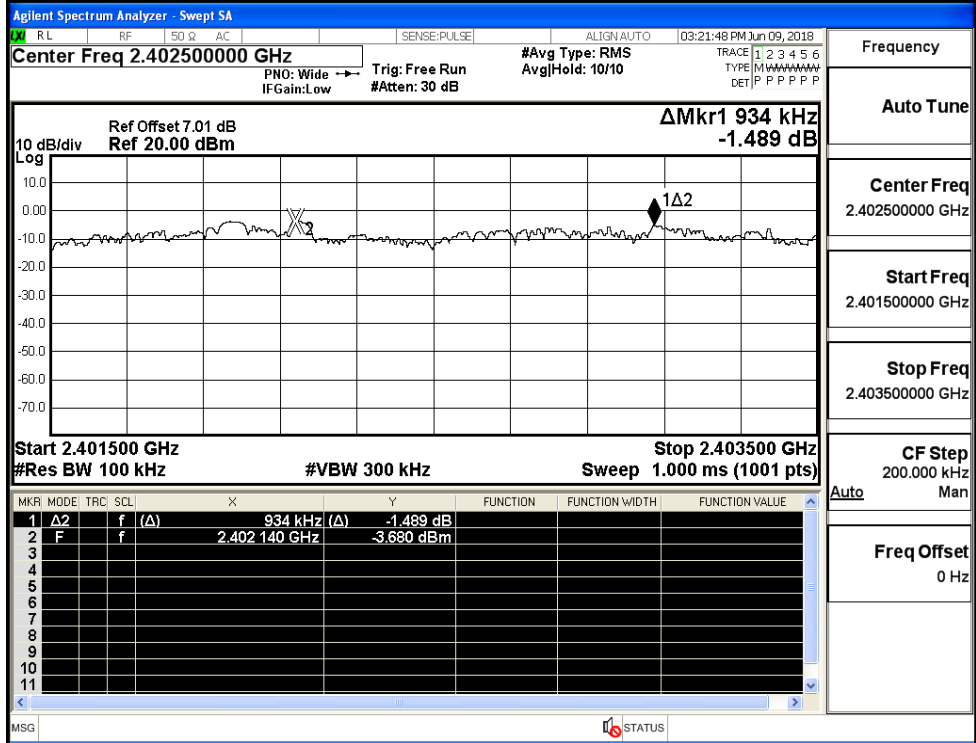
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

8DPSK/LCH



Frequency

Auto Tune

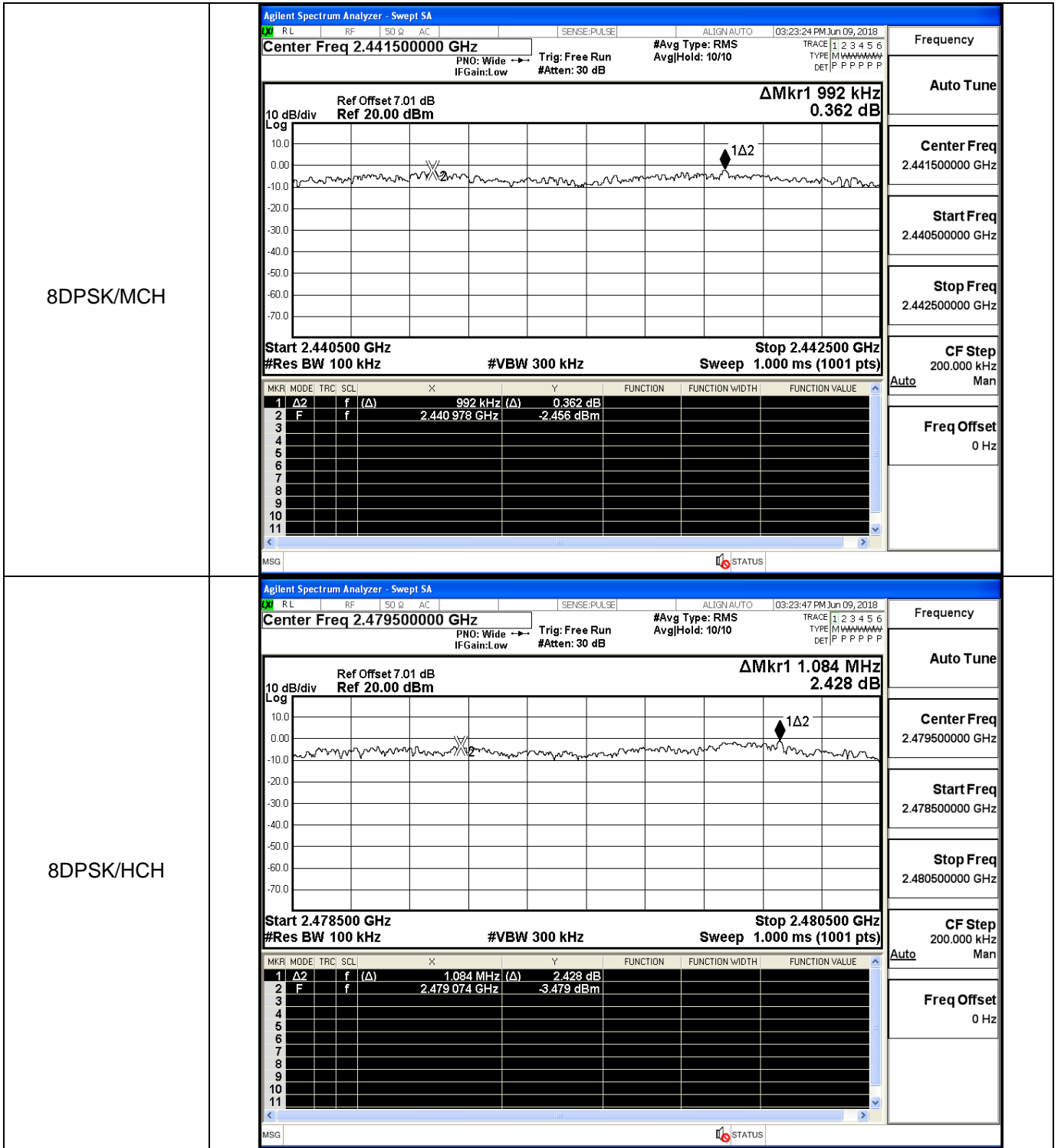
Center Freq
2.402500000 GHz

Start Freq
2.401500000 GHz

Stop Freq
2.403500000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

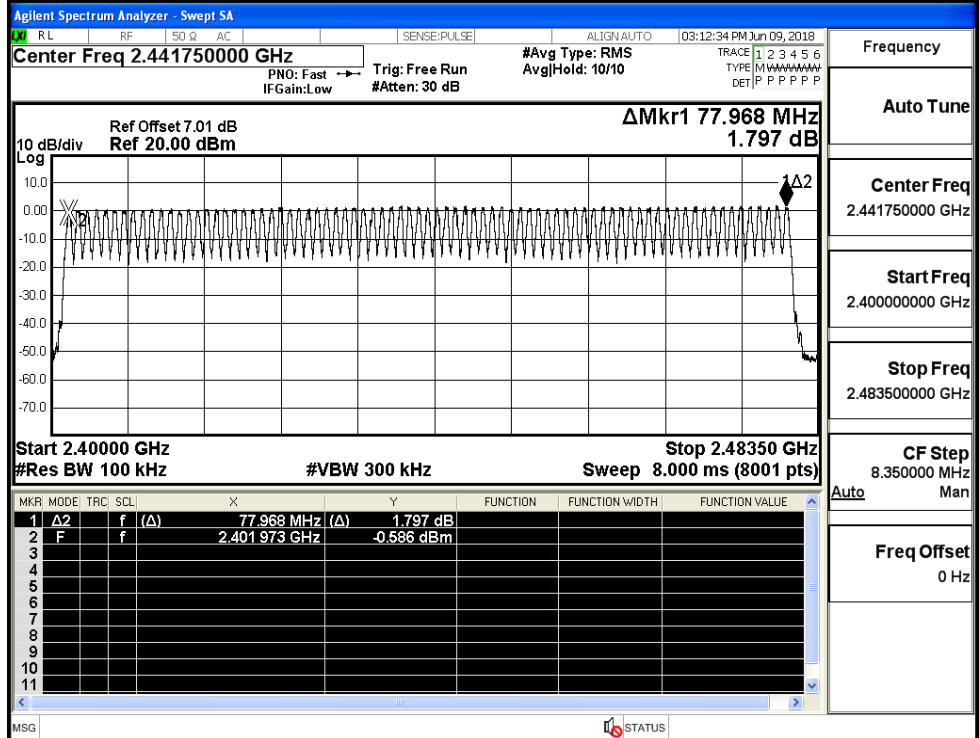


A.4 Hopping Channel Number

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

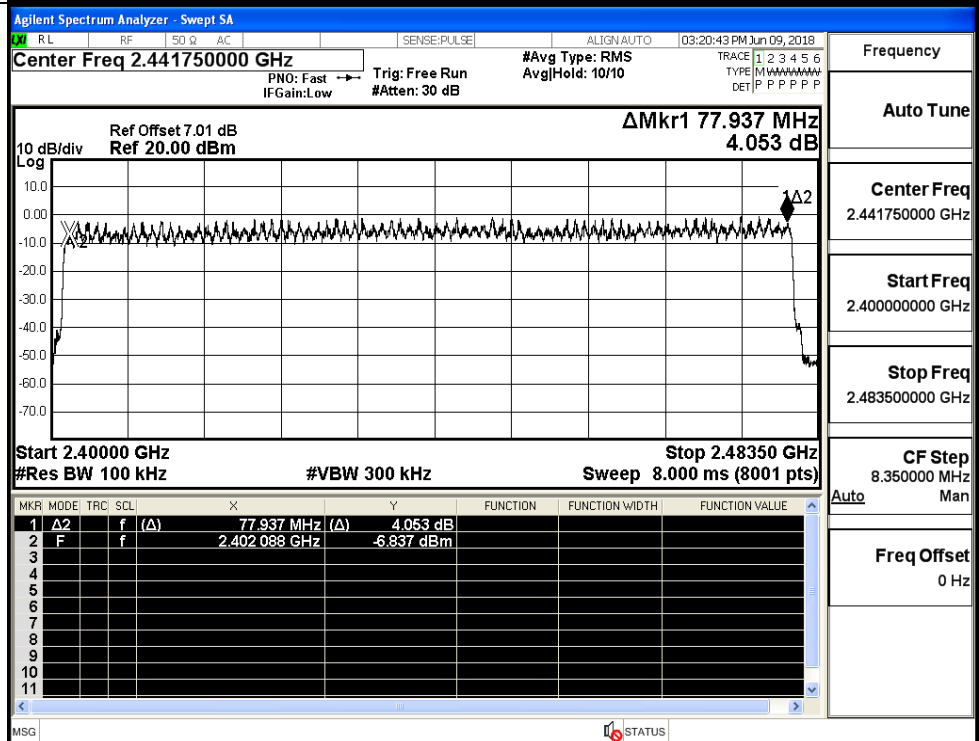
Test Graphs

GFSK/Hop



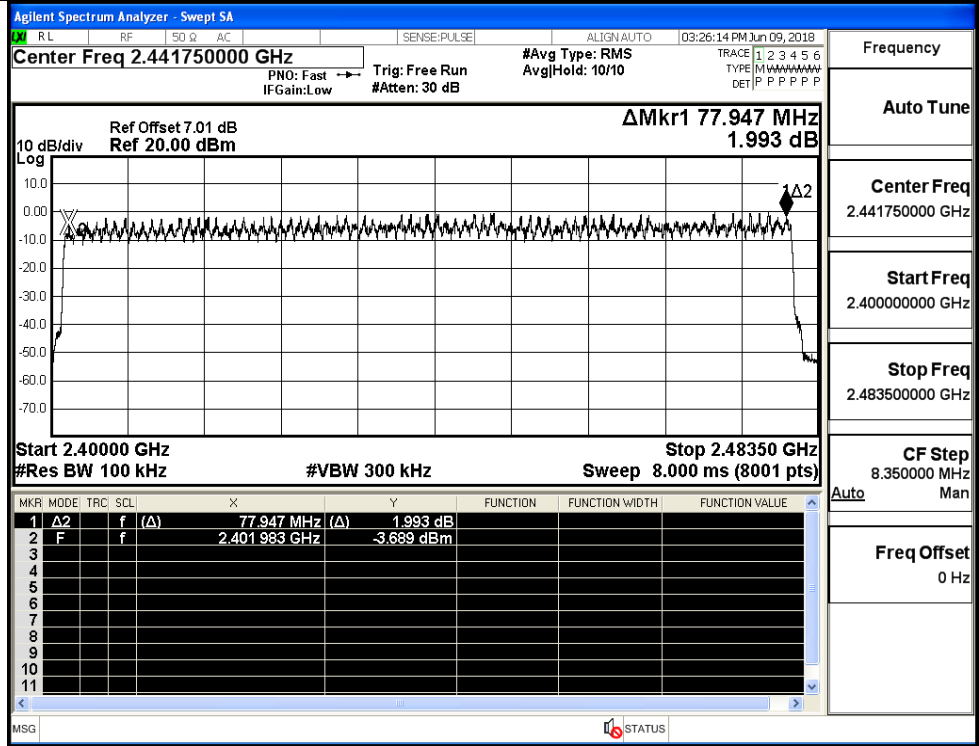
Frequency	Auto Tune
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Freq Offset	0 Hz

π/4DQPSK/Hop



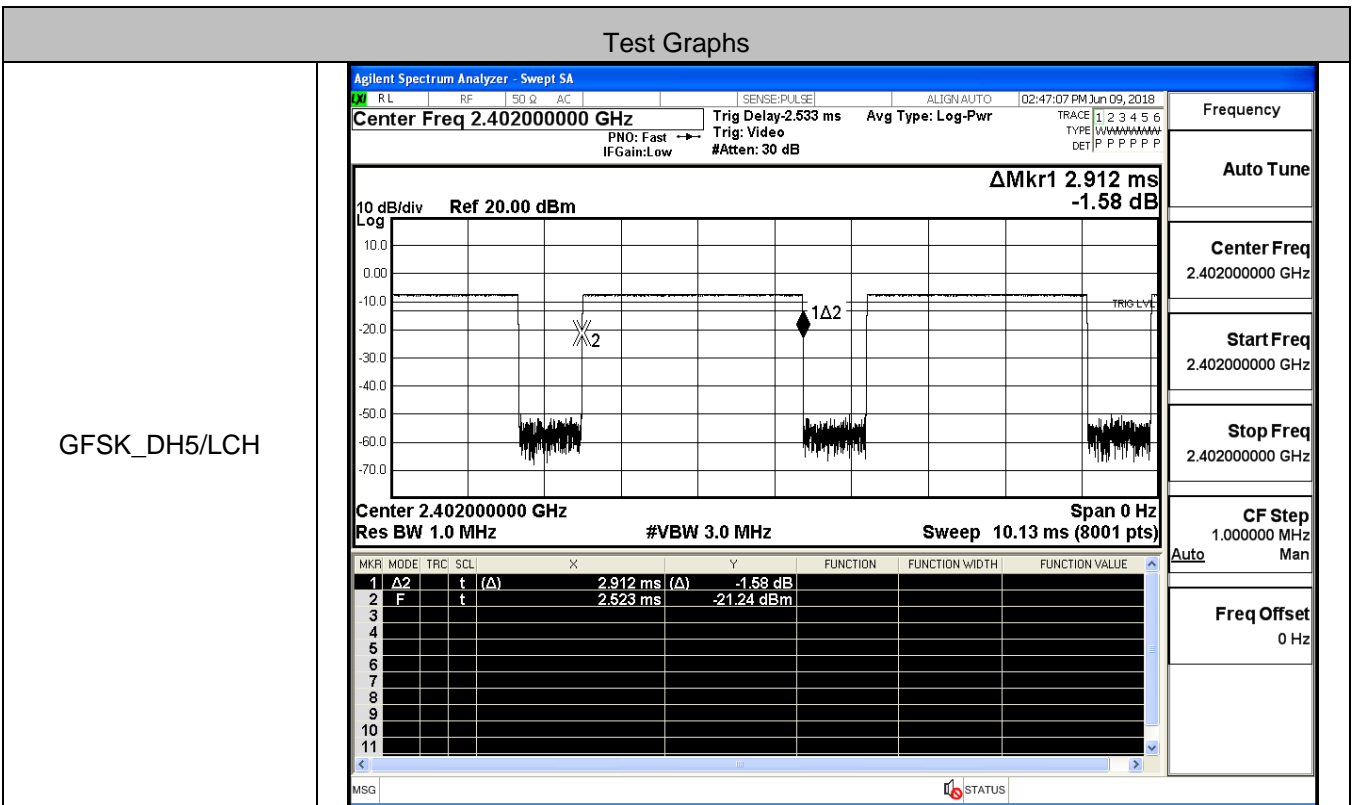
Frequency	Auto Tune
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Freq Offset	0 Hz

8DPSK/Hop

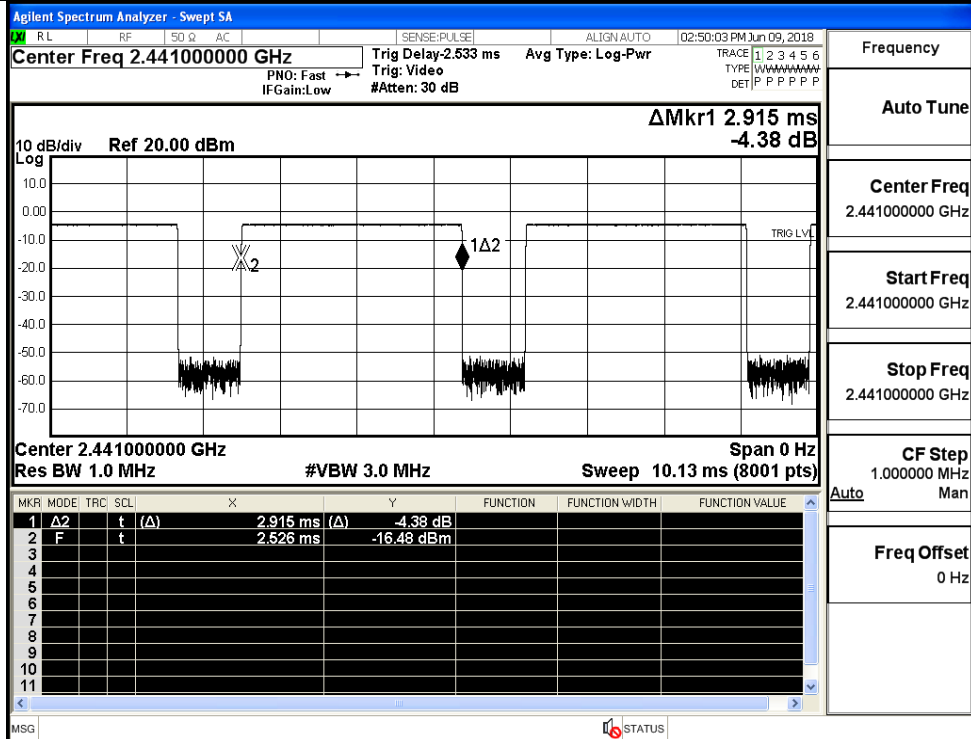


A.5 Dwell Time

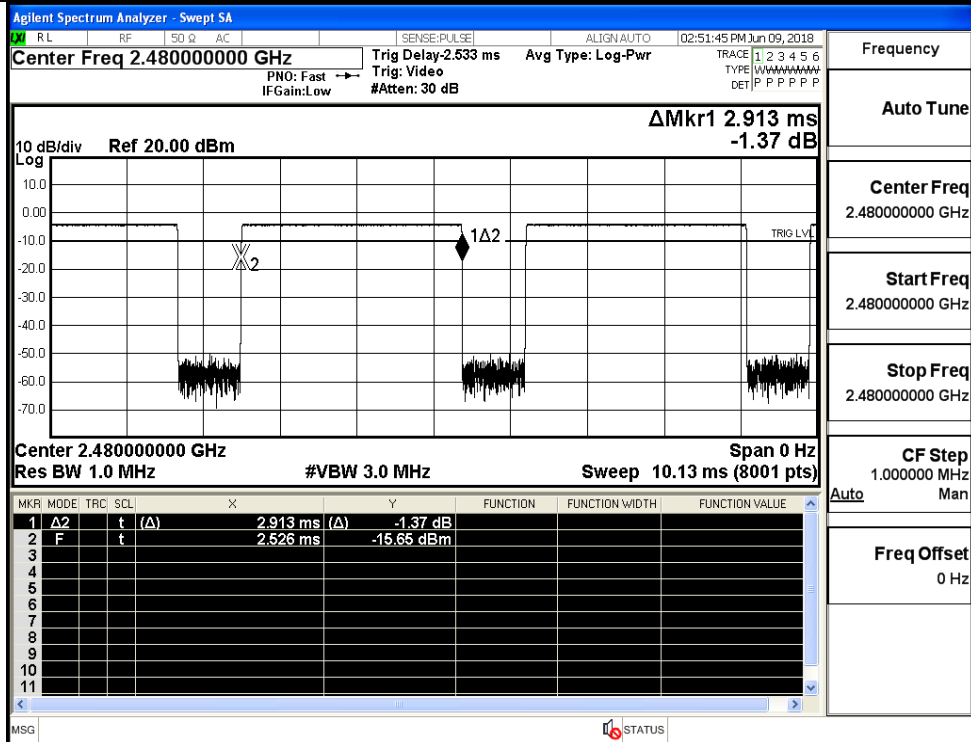
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.91	106.7	0.310	0.4	PASS
	DH5	MCH	2.91	106.7	0.310	0.4	PASS
	DH5	HCH	2.91	106.7	0.310	0.4	PASS
π/4DQPSK	2DH5	LCH	2.91	106.7	0.312	0.4	PASS
	2DH5	MCH	2.91	106.7	0.312	0.4	PASS
	2DH5	HCH	2.91	106.7	0.312	0.4	PASS
8DPSK	3DH5	LCH	2.91	106.7	0.312	0.4	PASS
	3DH5	MCH	2.91	106.7	0.312	0.4	PASS
	3DH5	HCH	2.91	106.7	0.312	0.4	PASS



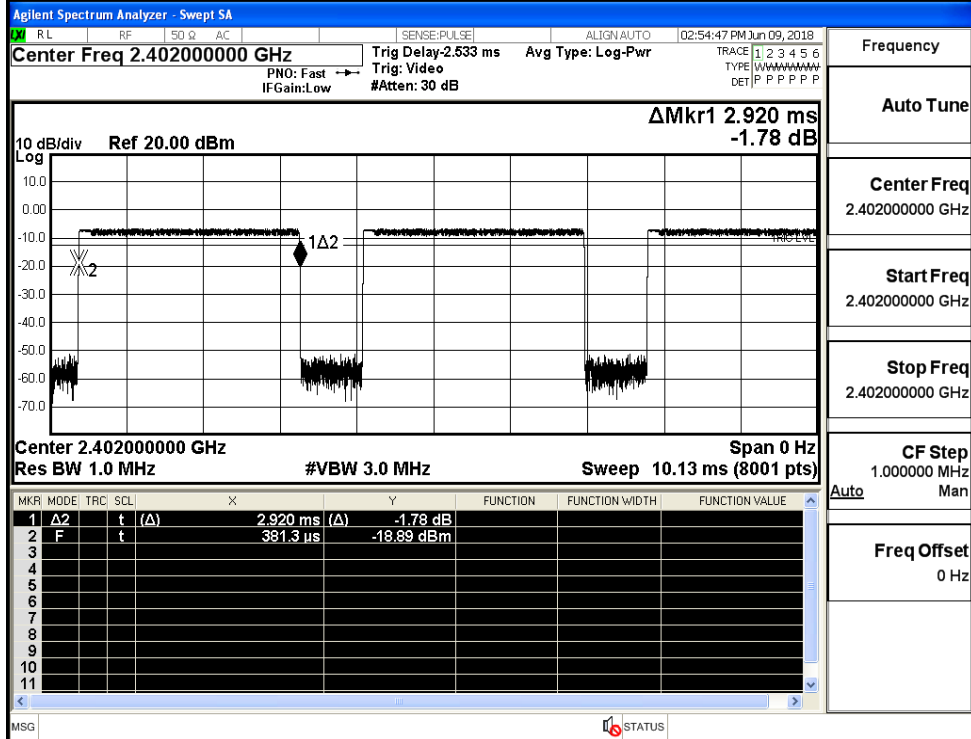
GFSK_DH5/MCH



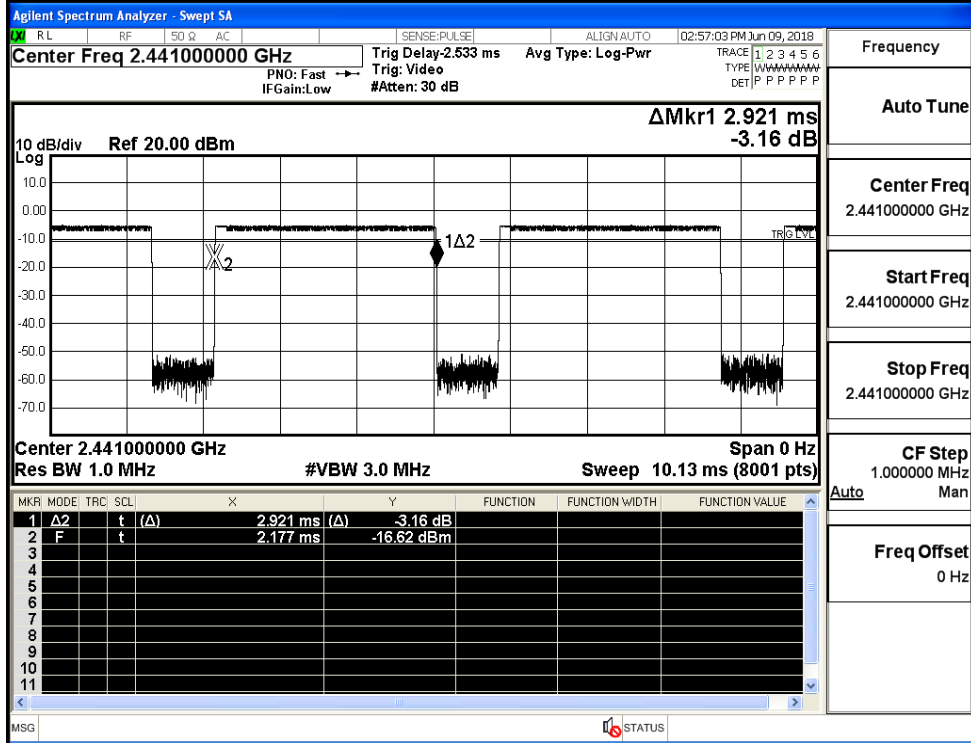
GFSK_DH5/HCH



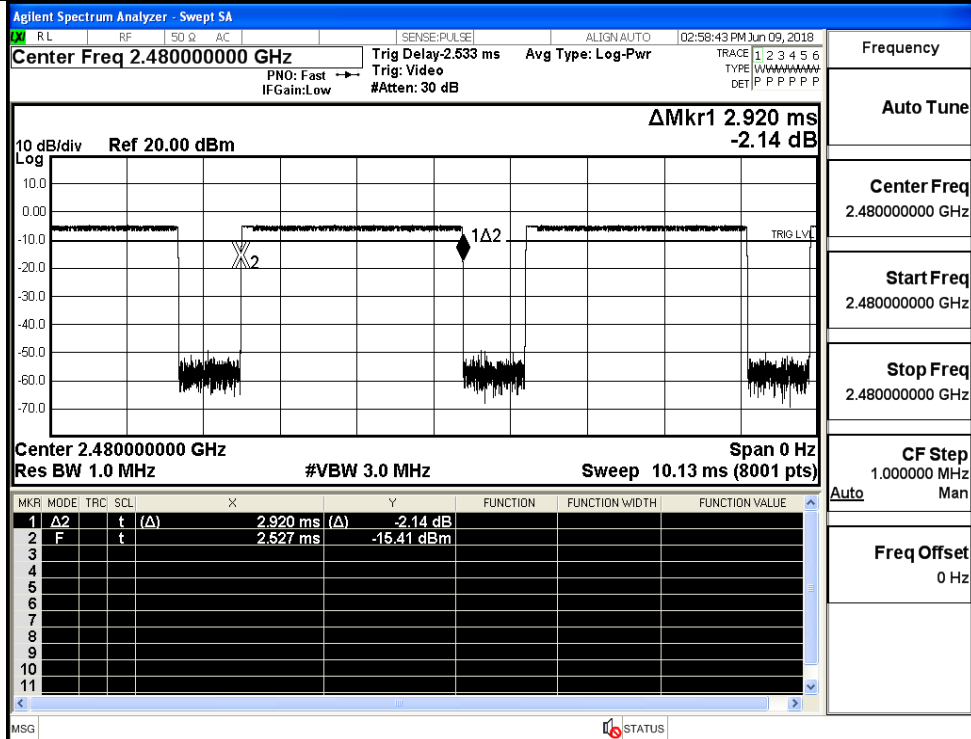
$\pi/4$ DQPSK
_2DH5/LCH



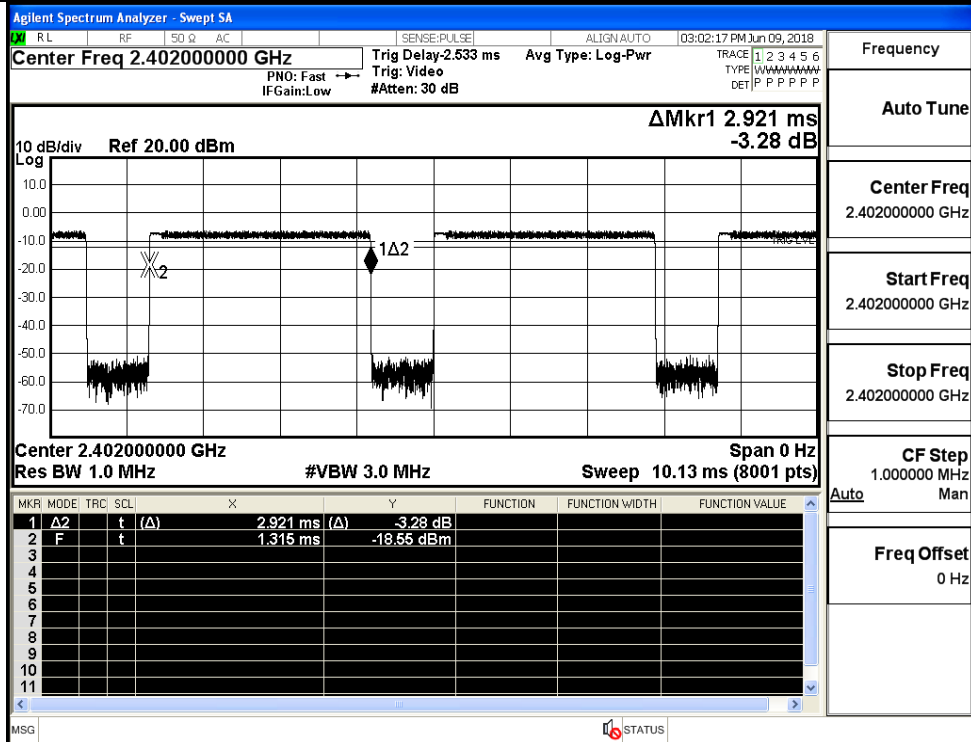
$\pi/4$ DQPSK
_2DH5/MCH



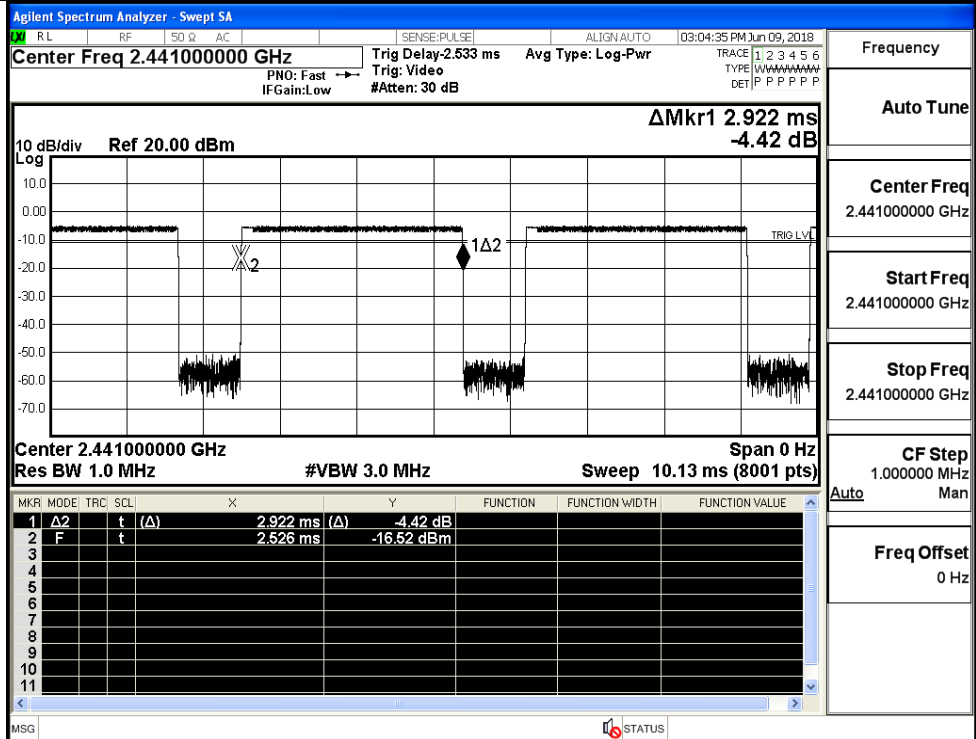
$\pi/4$ DQPSK
_2DH5/HCH



8DPSK_3DH5/LCH

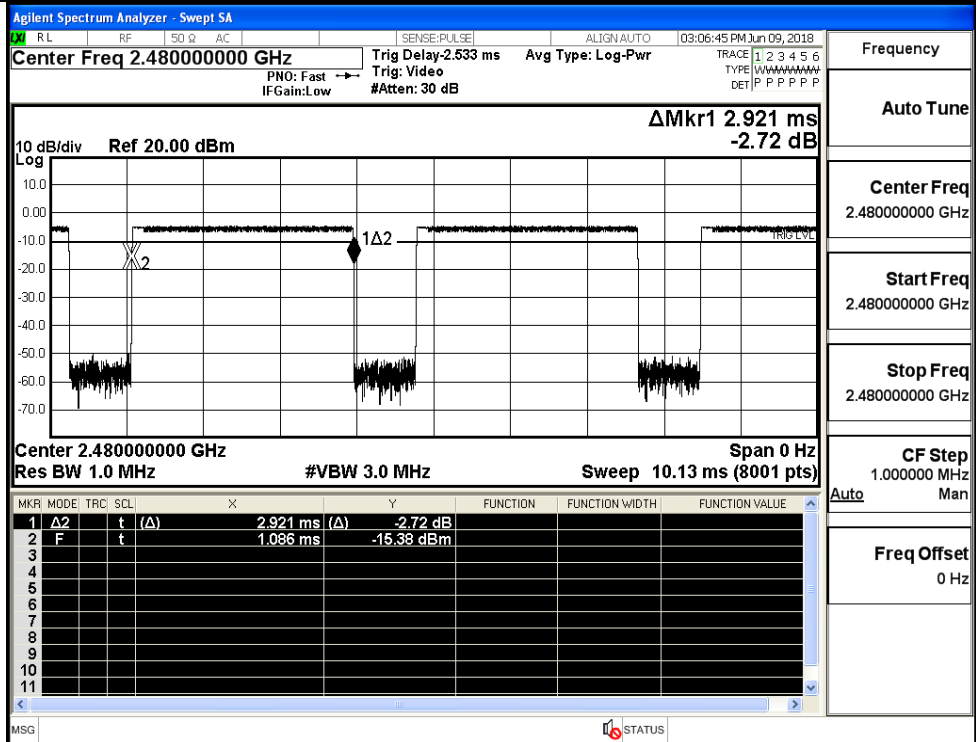


8DPSK_3DH5/MCH



Frequency	2.441000000 GHz
Auto Tune	
Center Freq	2.441000000 GHz
Start Freq	2.441000000 GHz
Stop Freq	2.441000000 GHz
CF Step	1.000000 MHz
Freq Offset	0 Hz

8DPSK_3DH5/HCH

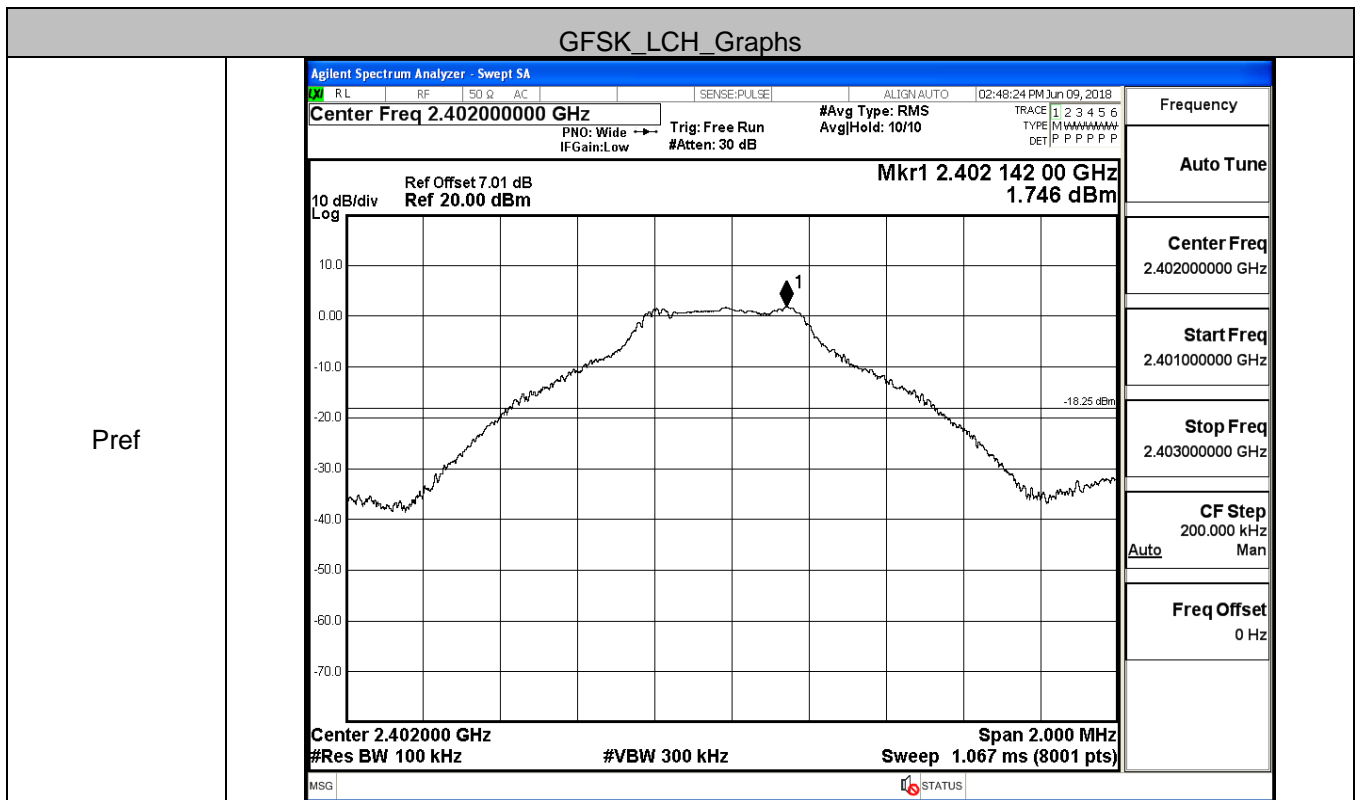


Frequency	2.480000000 GHz
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Freq Offset	0 Hz

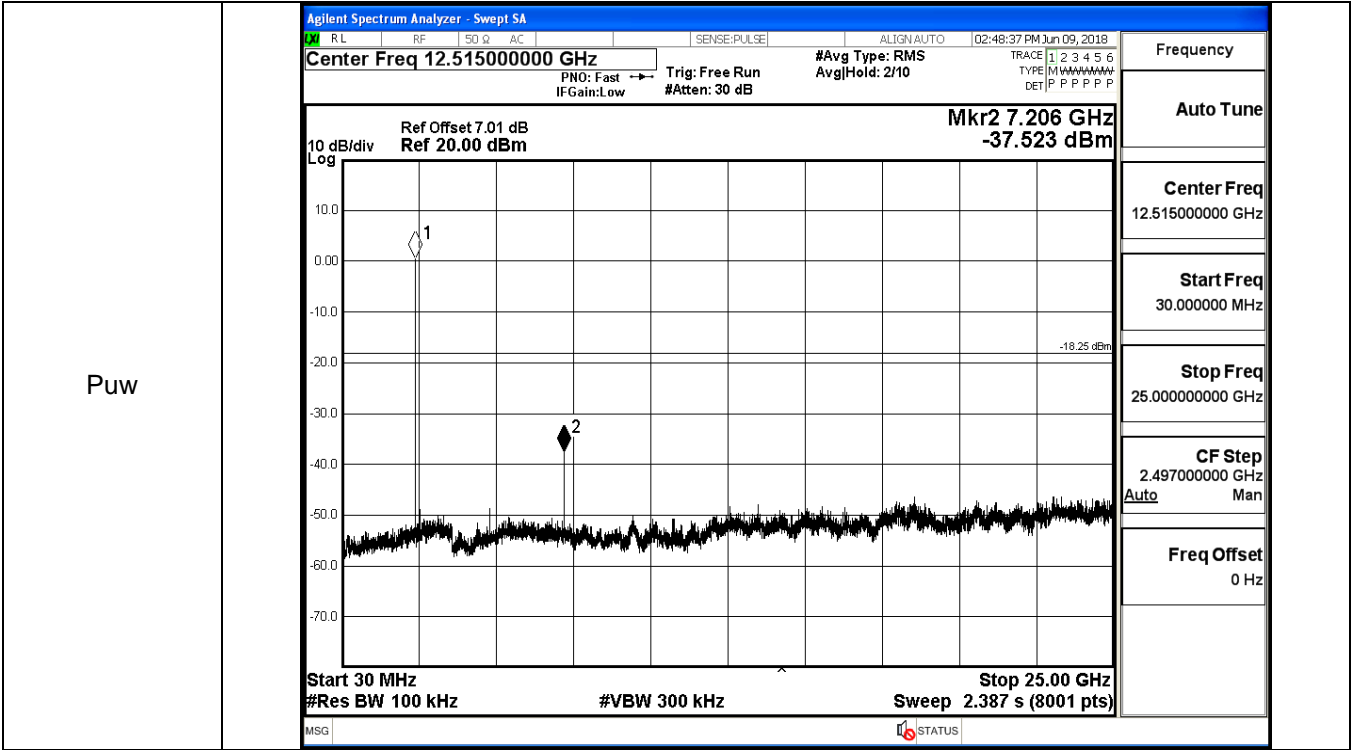
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.746	-37.523	-18.254	PASS
	MCH	2.587	-33.359	-17.413	PASS
	HCH	2.723	-32.315	-17.277	PASS
π /4DQPSK	LCH	-0.342	-44.331	-20.342	PASS
	MCH	1.111	-43.655	-18.889	PASS
	HCH	1.924	-41.583	-18.076	PASS
8DPSK	LCH	-0.11	-45.962	-20.110	PASS
	MCH	1.659	-38.437	-18.341	PASS
	HCH	1.992	-42.628	-18.008	PASS

GFSK_LCH_Graphs

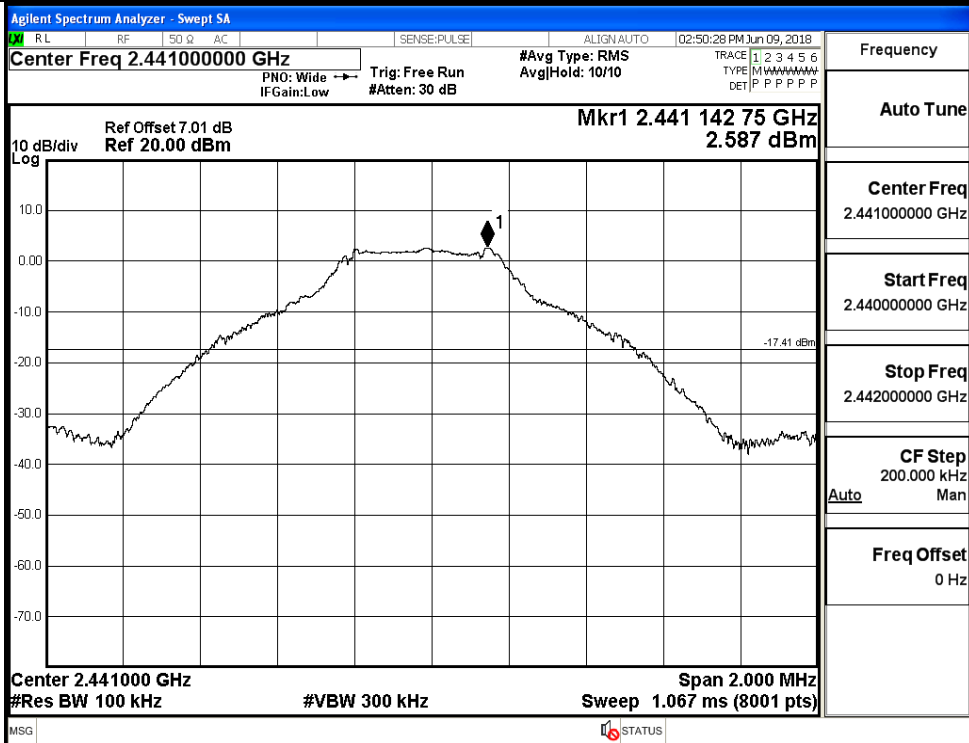


Pref

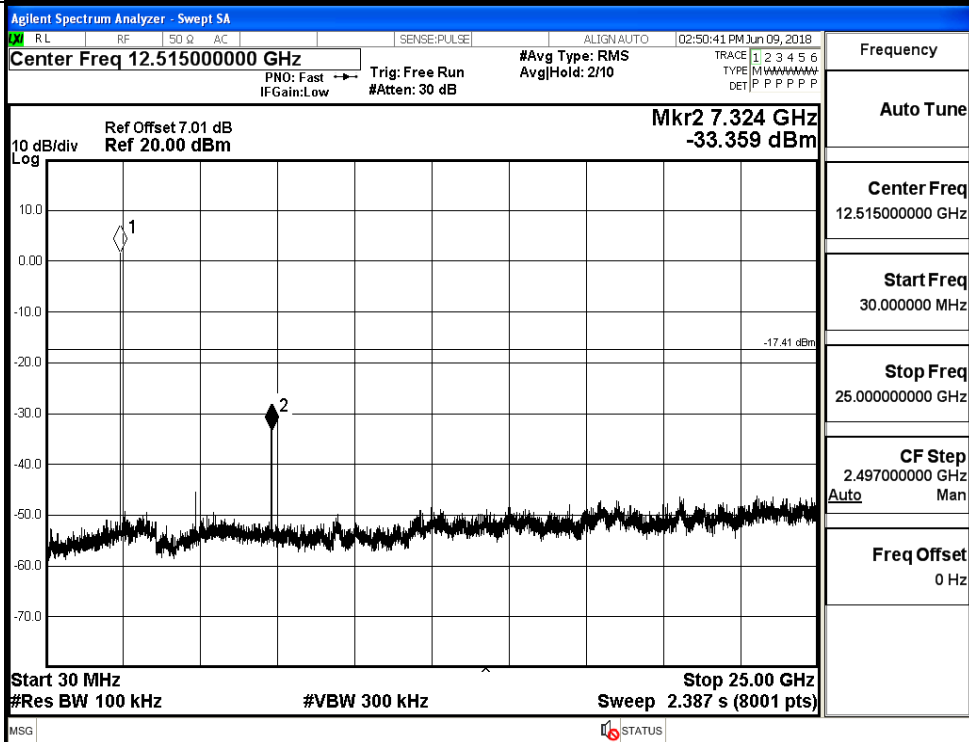


GFSK_MCH_Graphs

Pref

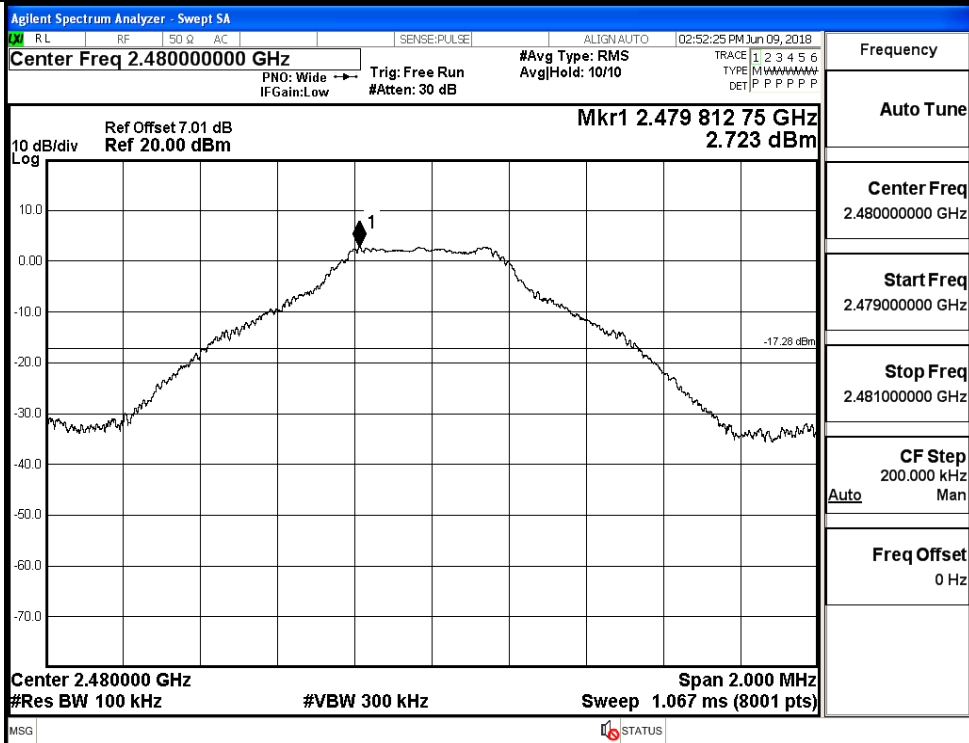


Puw

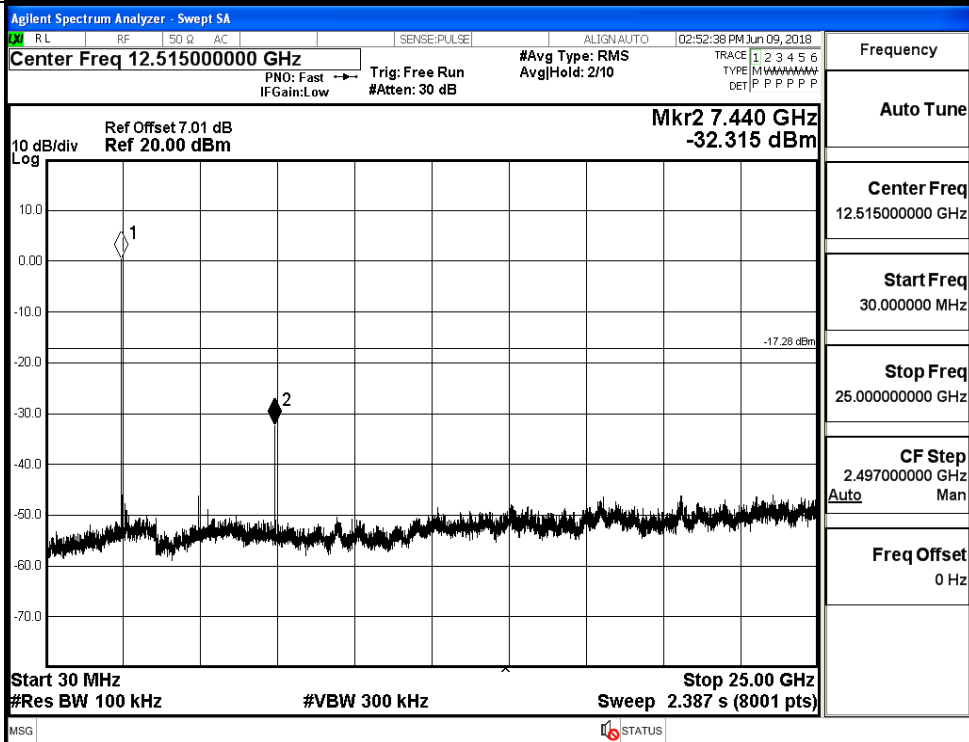


GFSK_HCH_Graphs

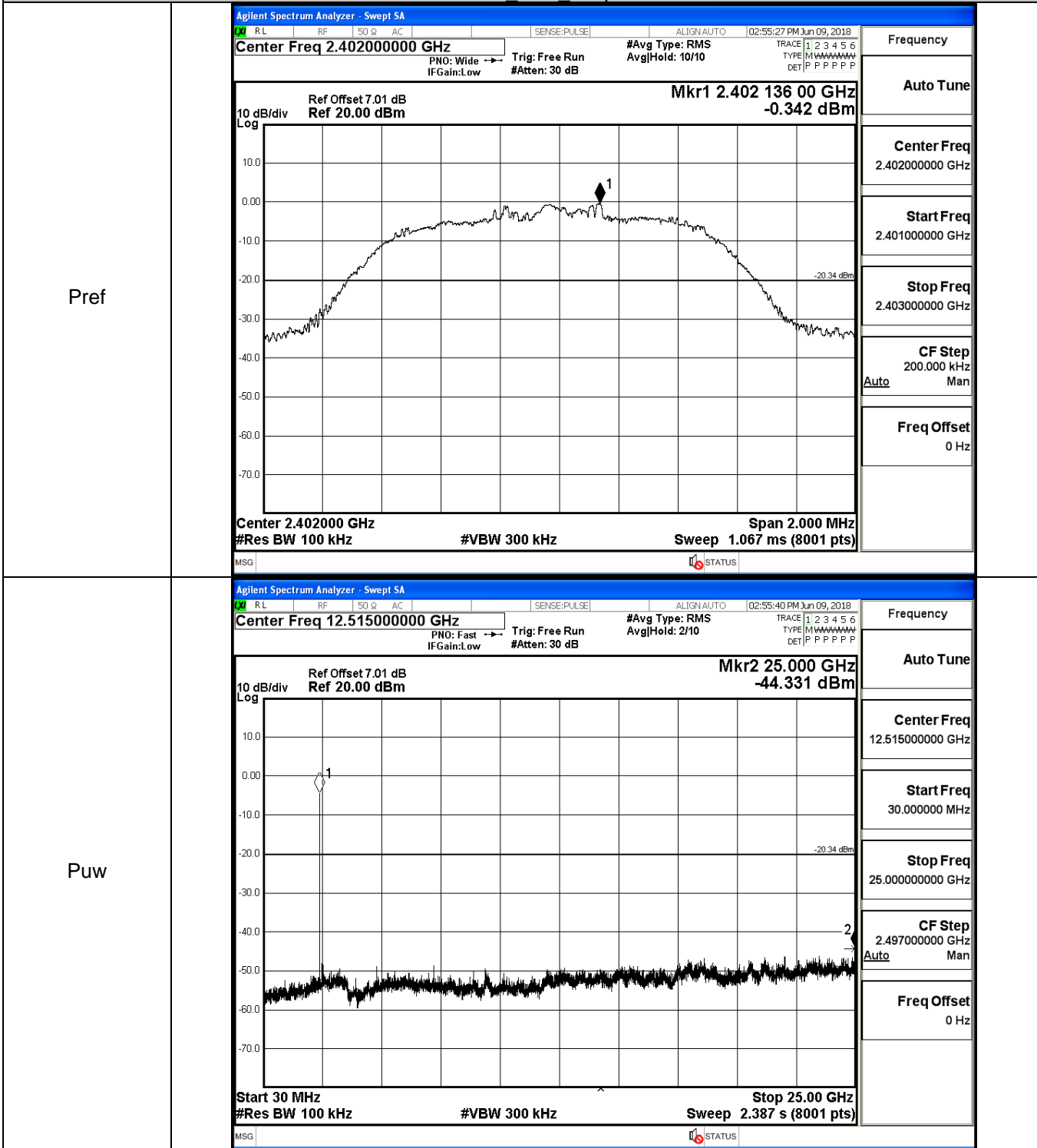
Pref



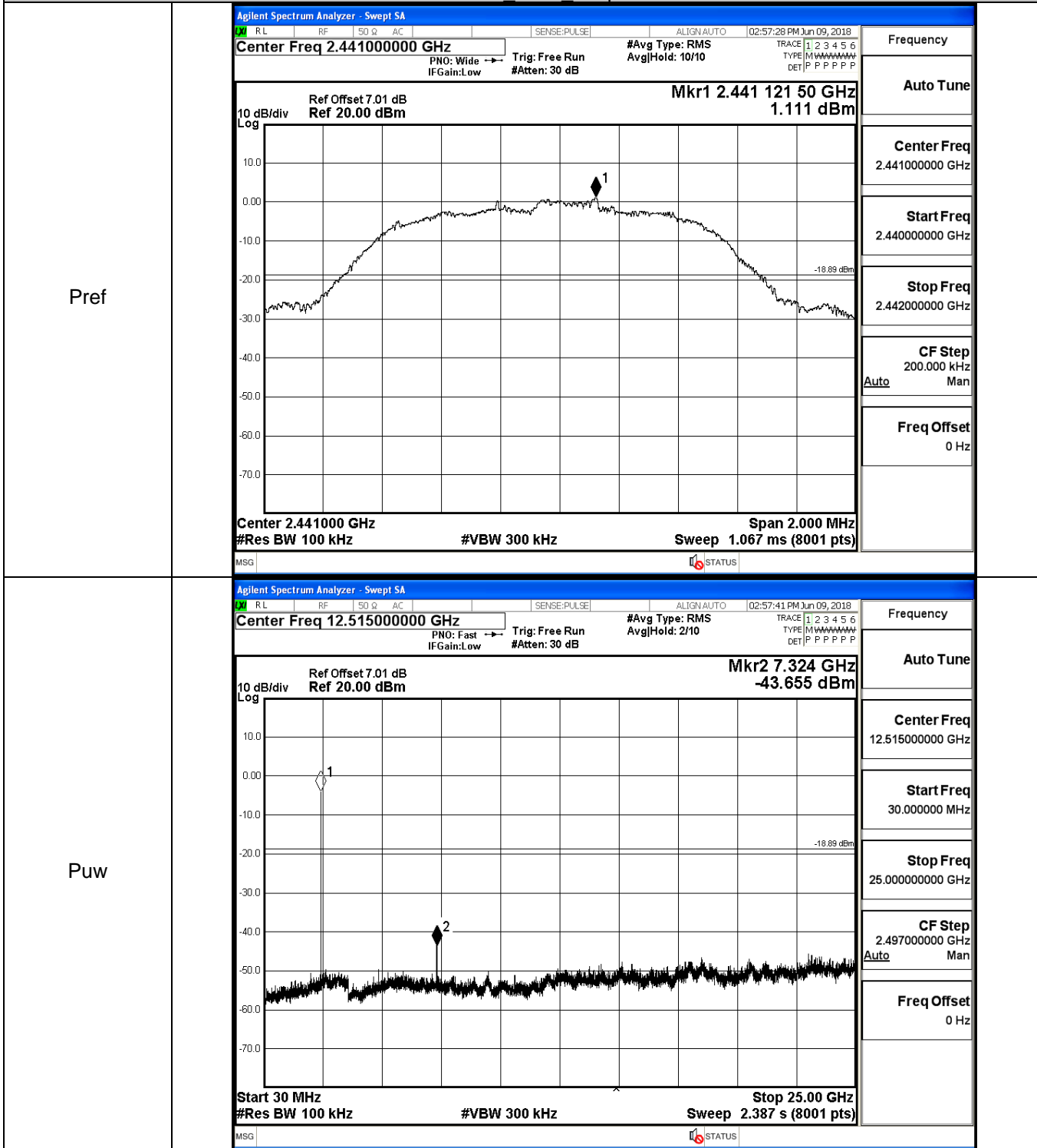
Puw



$\pi/4$ DQPSK LCH Graphs

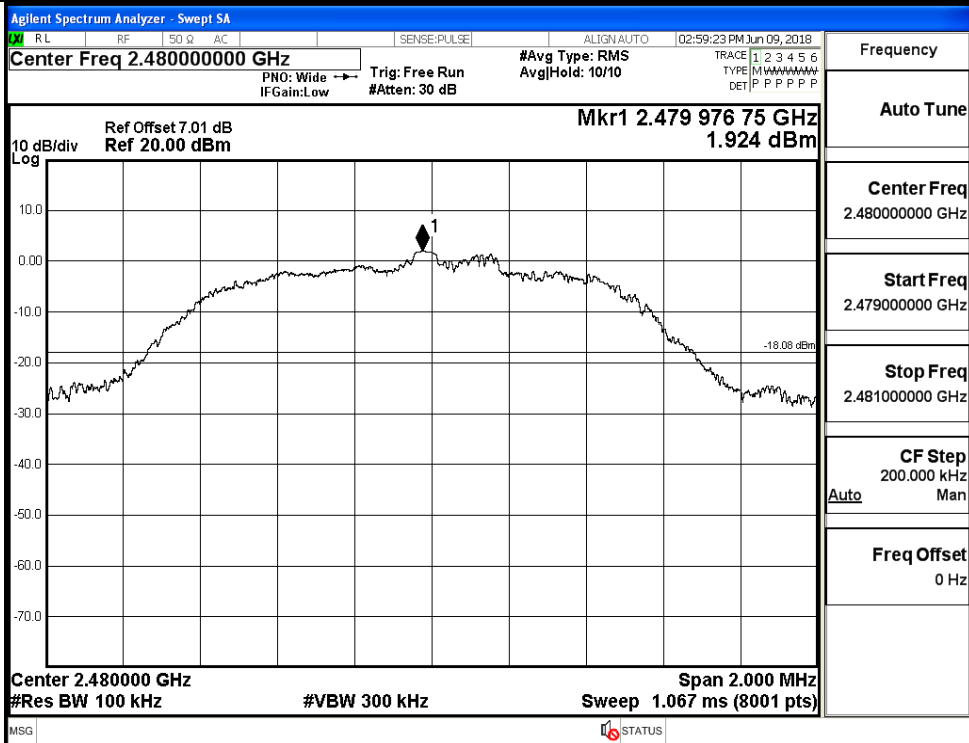


$\pi/4$ DQPSK MCH Graphs

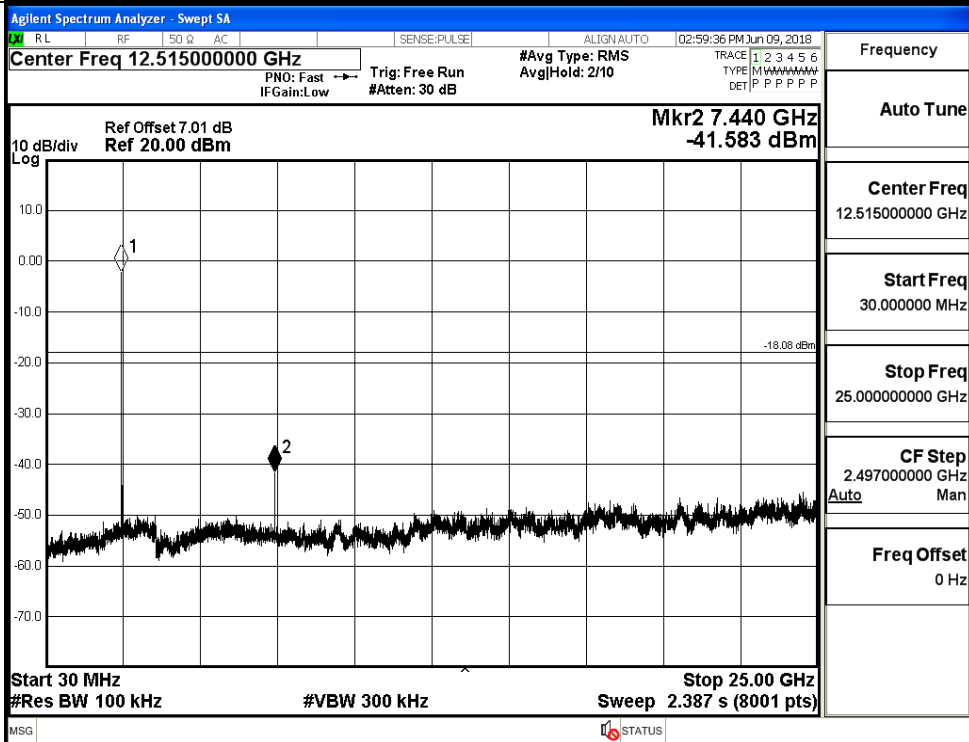


$\pi/4$ DQPSK HCH Graphs

Pref

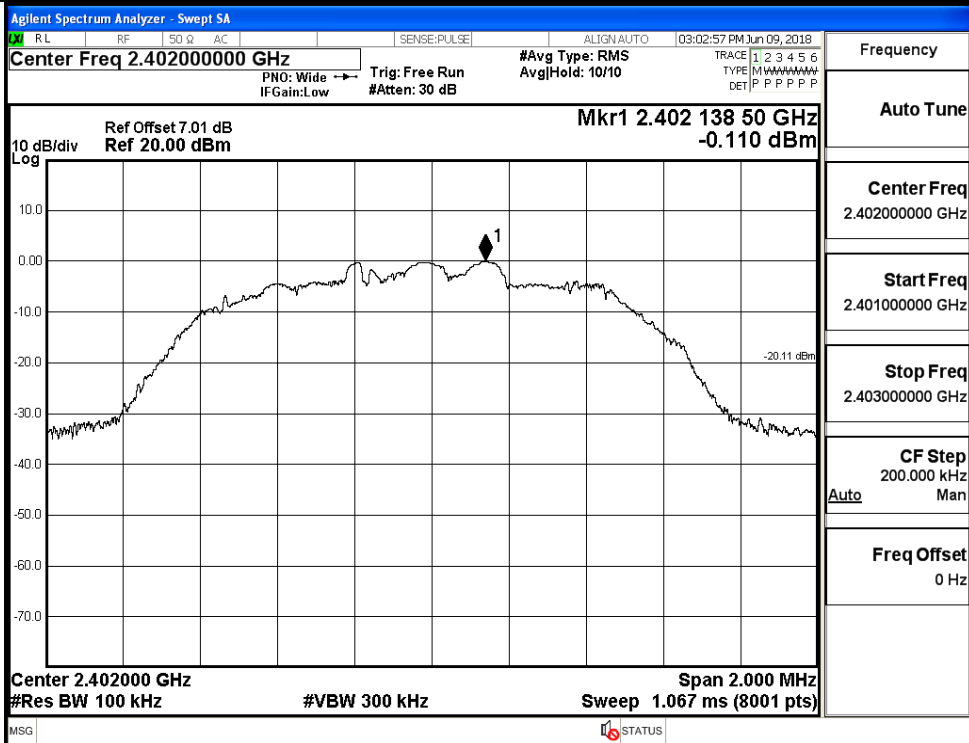


Puw

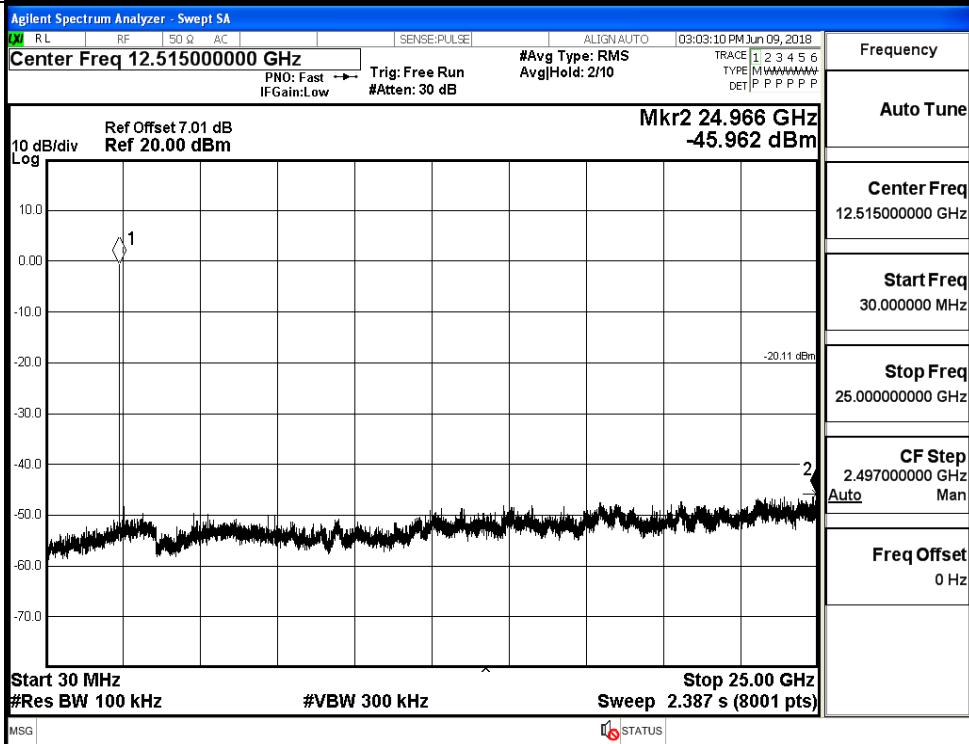


8DPSK_LCH_Graphs

Pref

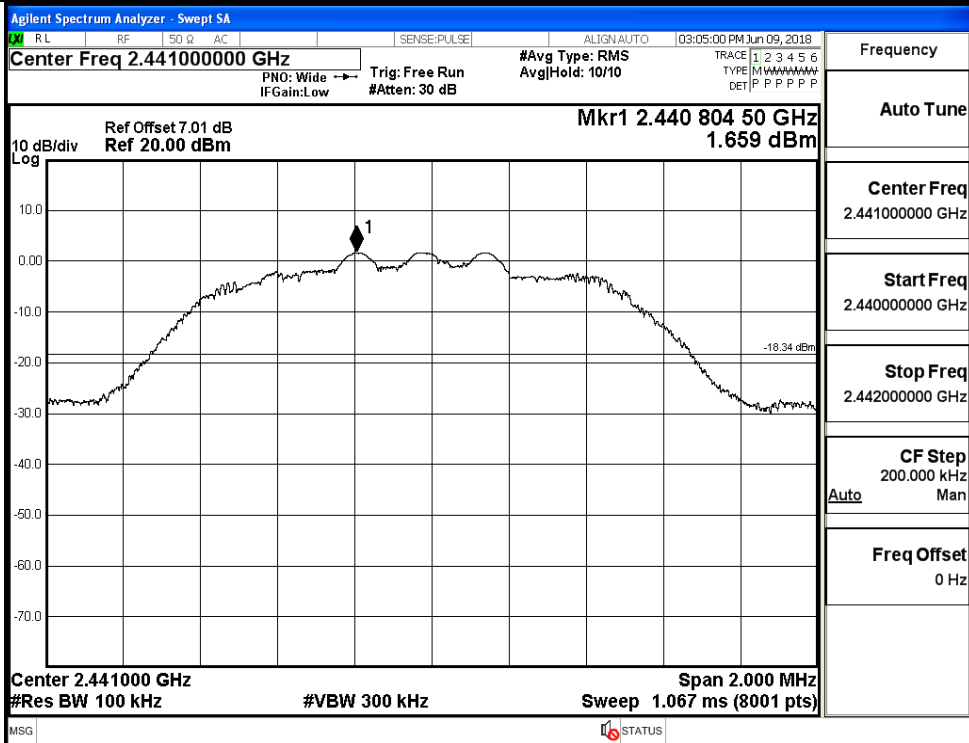


Puw

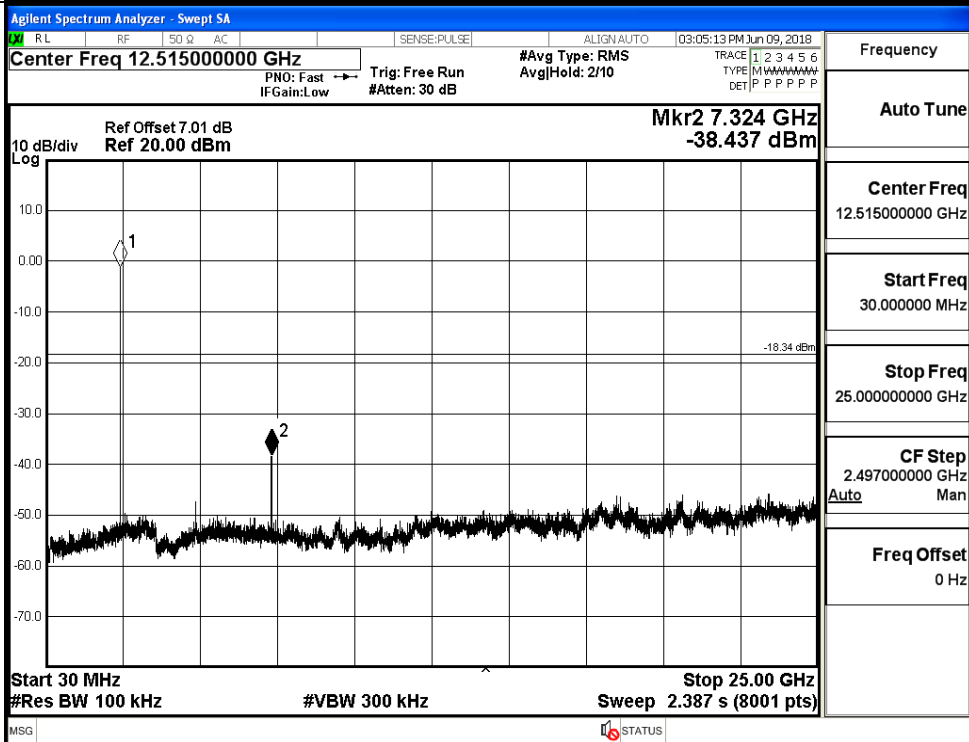


8DPSK_MCH_Graphs

Pref

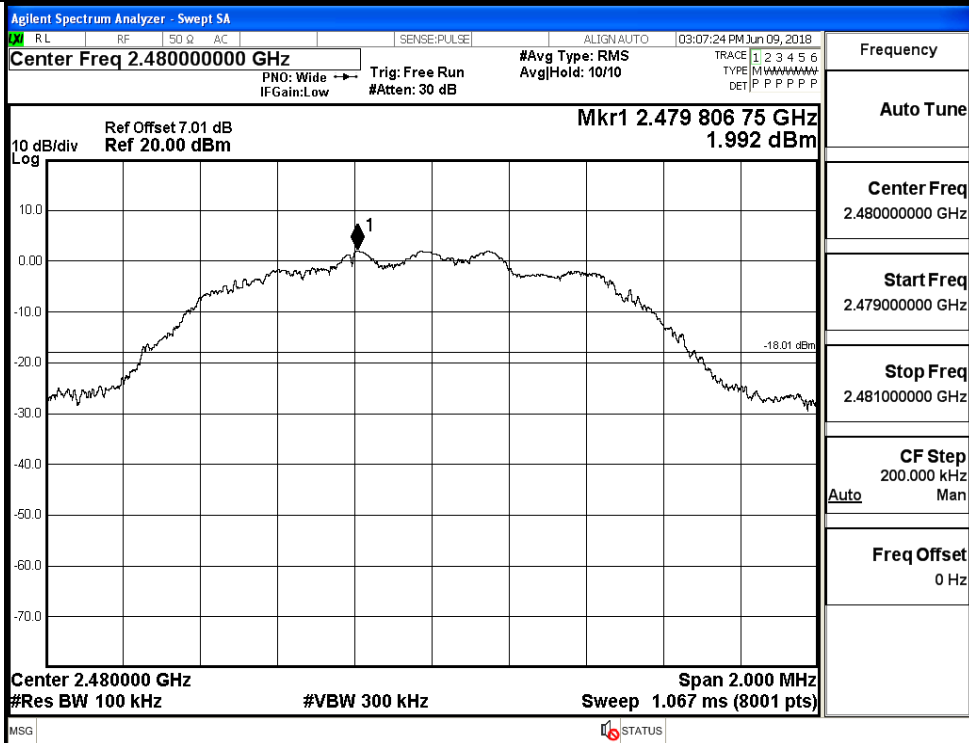


Puw

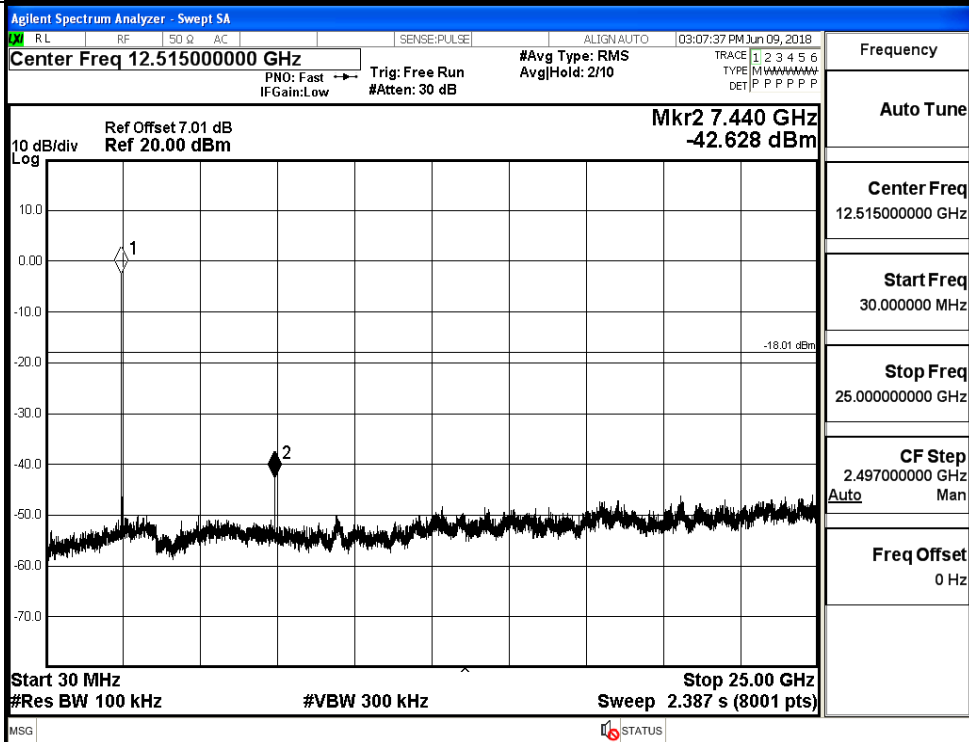


8DPSK_HCH_Graphs

Pref



Puw

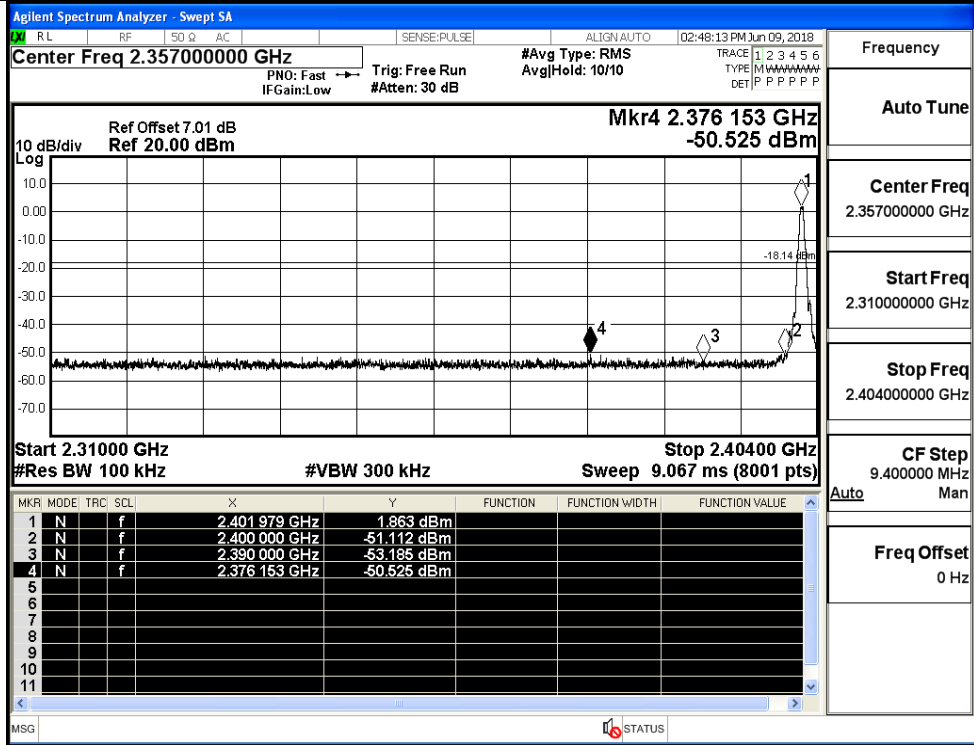


A.7 Band-edge for RF Conducted Emissions

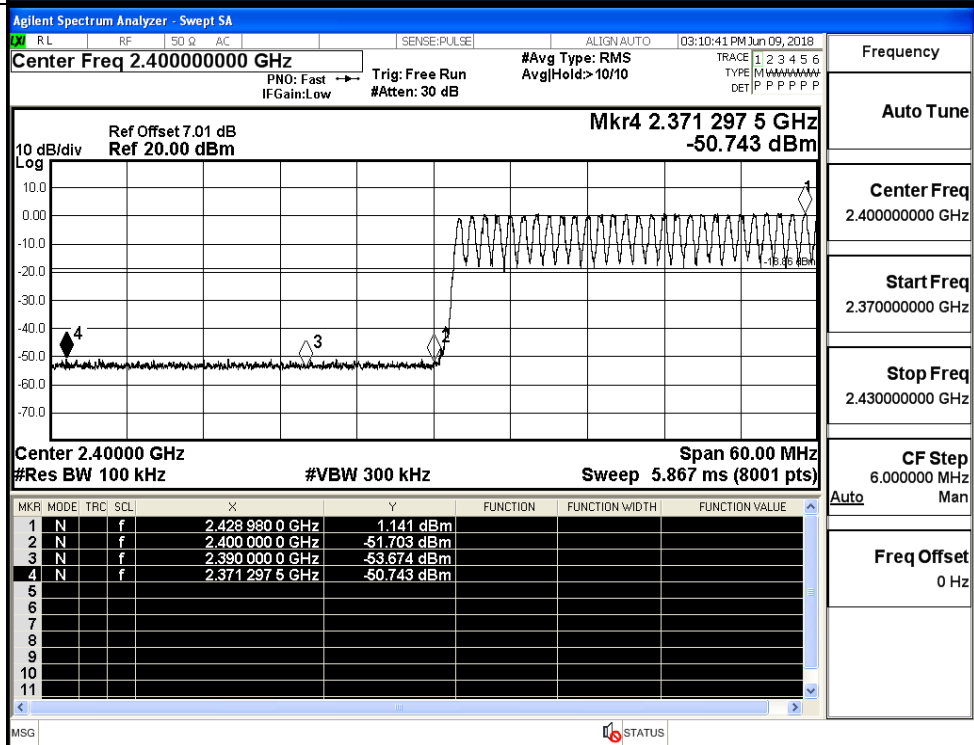
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.863	Off	-50.525	-18.14	PASS
			1.141	On	-50.743	-18.86	PASS
	HCH	2480	3.052	Off	-51.250	-16.95	PASS
			1.712	On	-50.540	-18.29	PASS
$\pi/4$ DQPSK	LCH	2402	-0.437	Off	-50.704	-20.44	PASS
			-1.434	On	-50.018	-21.43	PASS
	HCH	2480	1.801	Off	-51.006	-18.2	PASS
			-0.373	On	-49.954	-20.37	PASS
8DPSK	LCH	2402	-0.109	Off	-50.293	-20.11	PASS
			-1.191	On	-50.543	-21.19	PASS
	HCH	2480	2.126	Off	-50.925	-17.87	PASS
			-0.645	On	-50.410	-20.65	PASS

Test Graphs

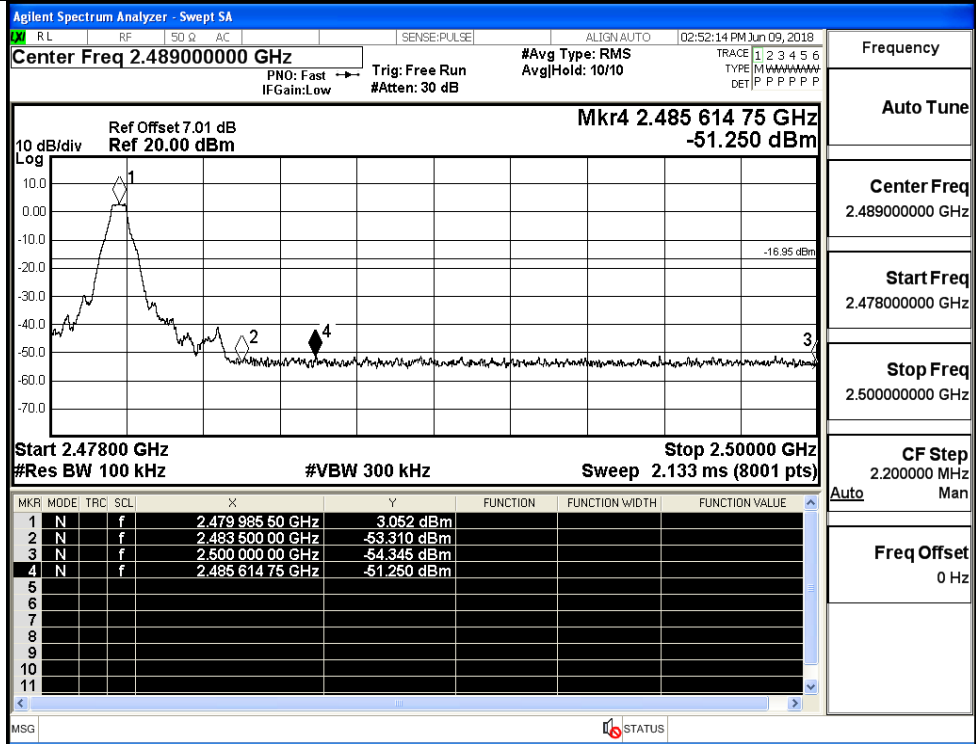
GFSK/LCH/No Hop



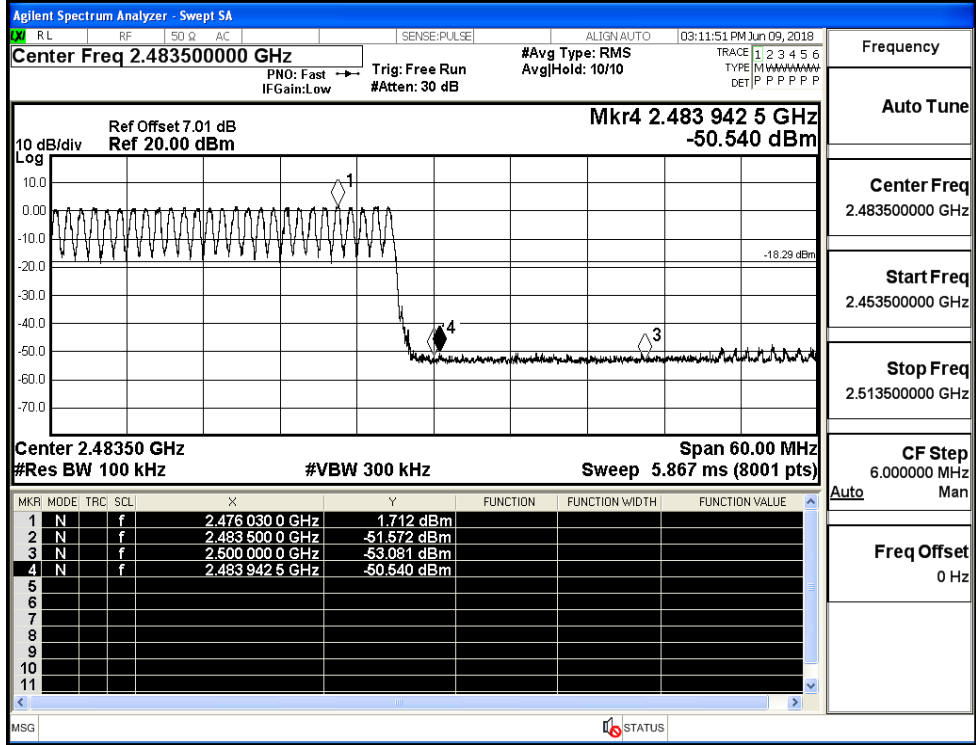
GFSK/LCH/Hop



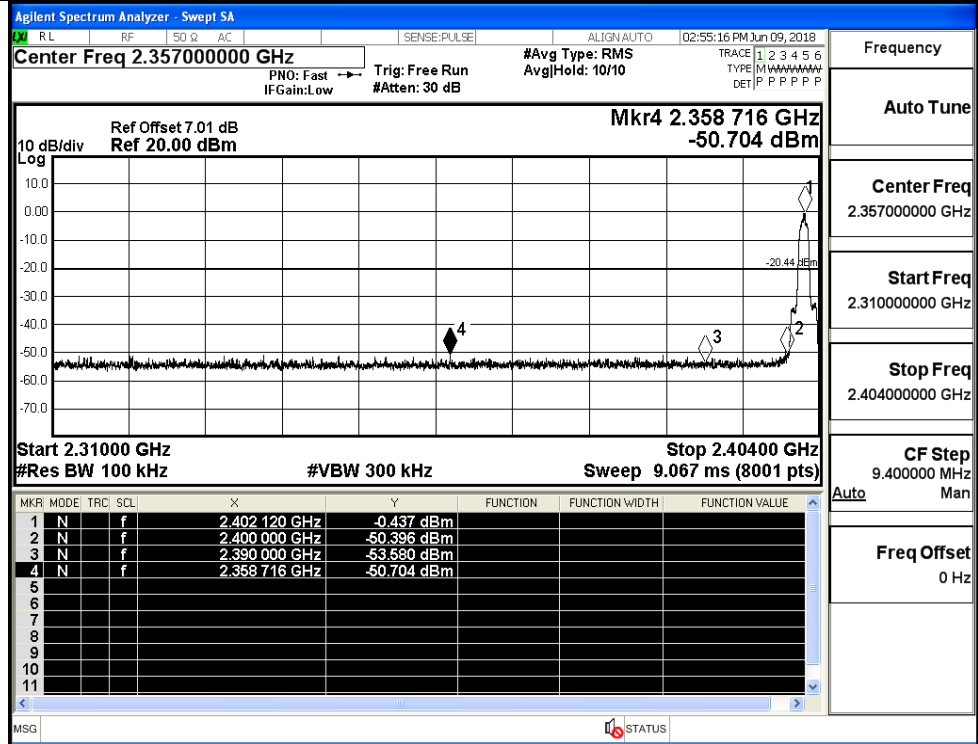
GFSK/HCH/No Hop



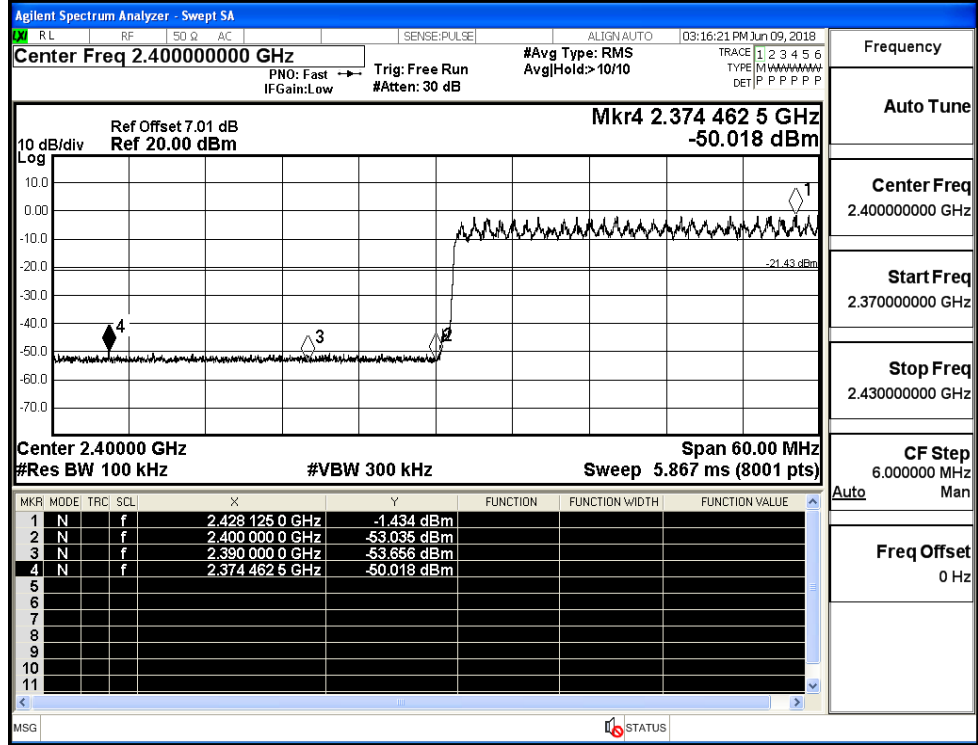
GFSK/HCH/Hop



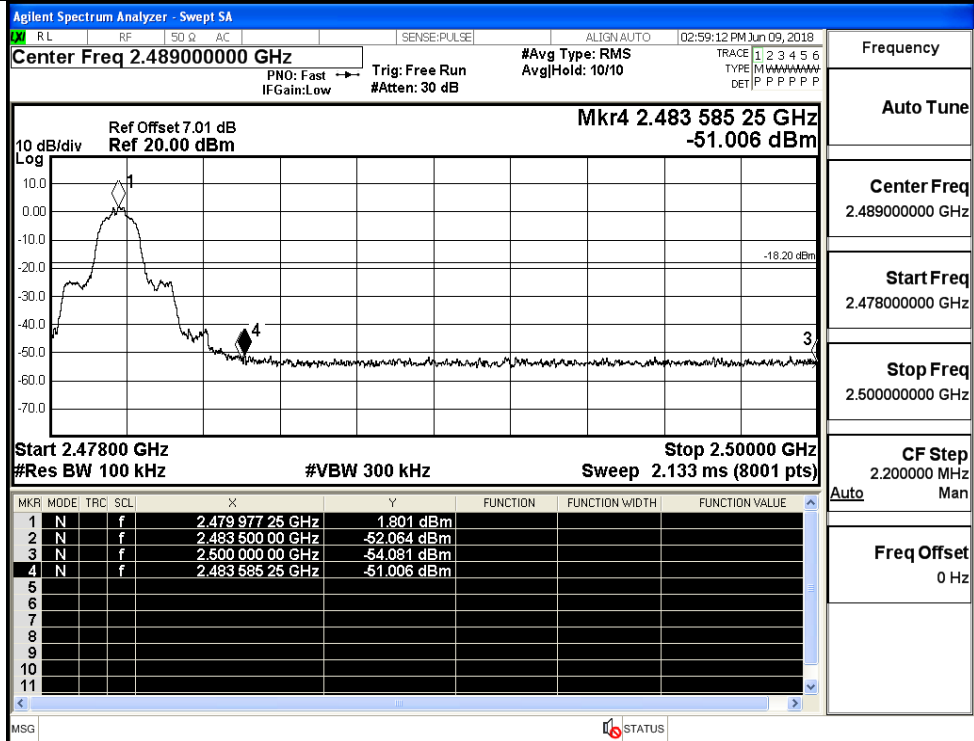
$\pi/4$ DQPSK/LCH/No Hop



$\pi/4$ DQPSK/LCH/Hop

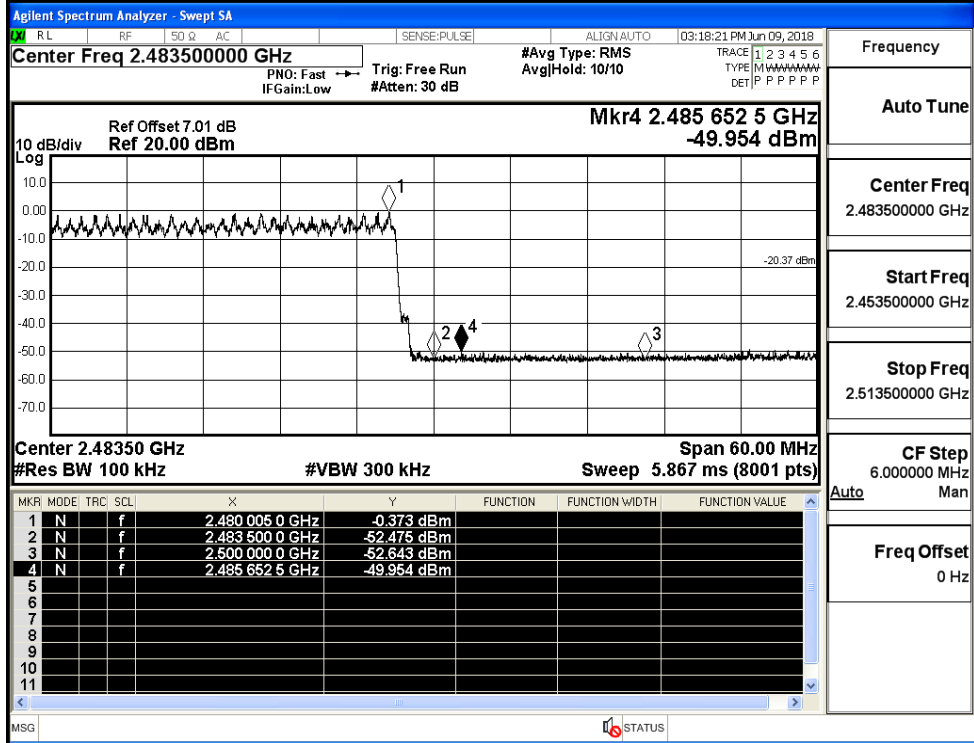


π /4DQPSK/HCH/No
Hop



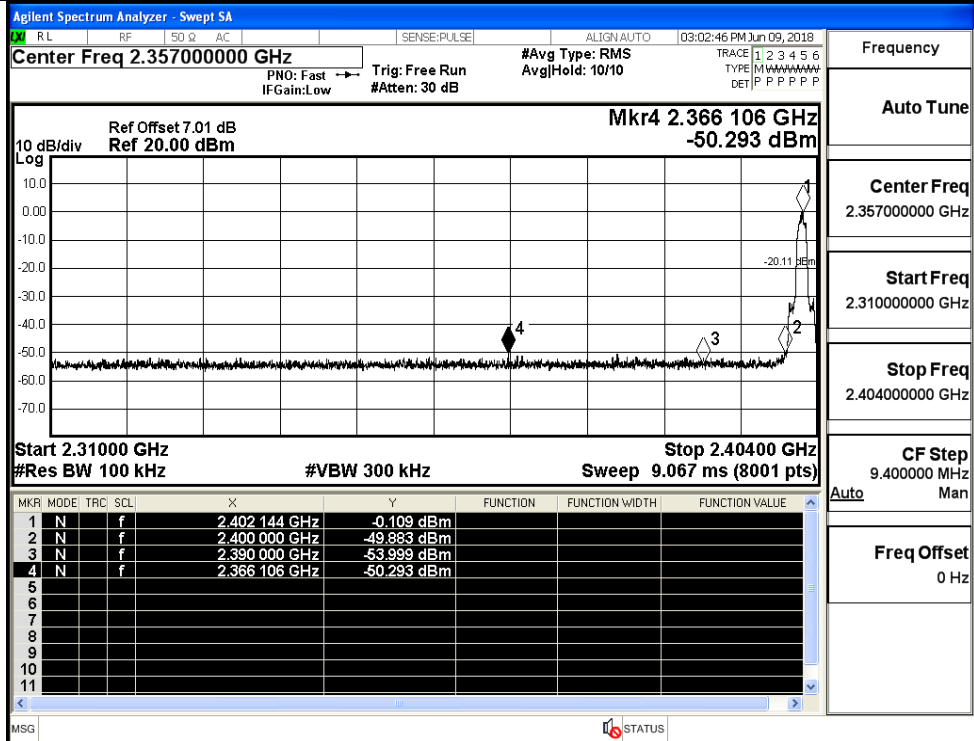
Frequency
Auto Tune
Center Freq 2.489000000 GHz
Start Freq 2.478000000 GHz
Stop Freq 2.500000000 GHz
CF Step 2.200000 MHz
Freq Offset 0 Hz

π /4DQPSK/HCH/Hop



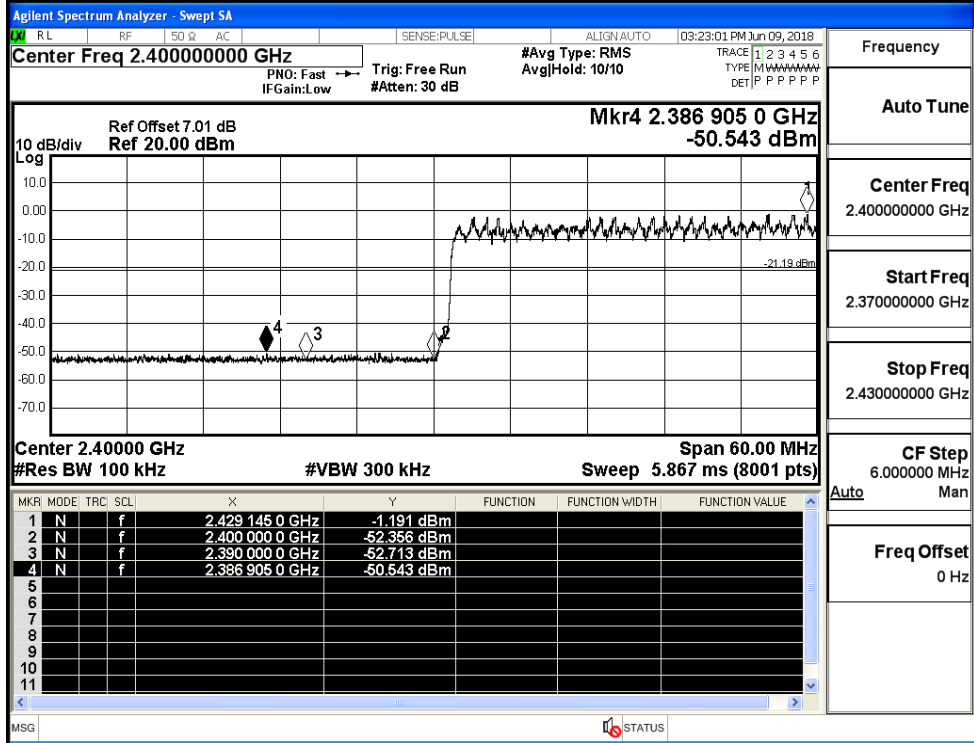
Frequency
Auto Tune
Center Freq 2.483500000 GHz
Start Freq 2.453500000 GHz
Stop Freq 2.513500000 GHz
CF Step 6.000000 MHz
Freq Offset 0 Hz

8DPSK/LCH/No Hop



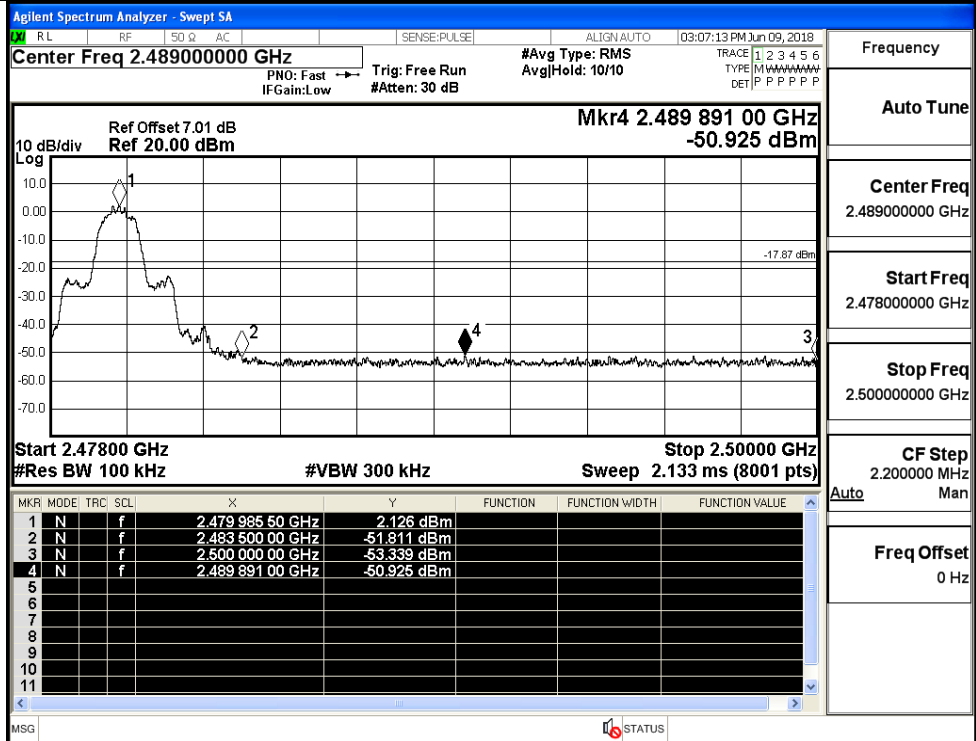
Frequency
Auto Tune
Center Freq
2.357000000 GHz
Start Freq
2.310000000 GHz
Stop Freq
2.404000000 GHz
CF Step
9.400000 MHz
Auto Man
Freq Offset
0 Hz

8DPSK/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

8DPSK/HCH/No Hop



Frequency

Auto Tune

Center Freq
2.489000000 GHz

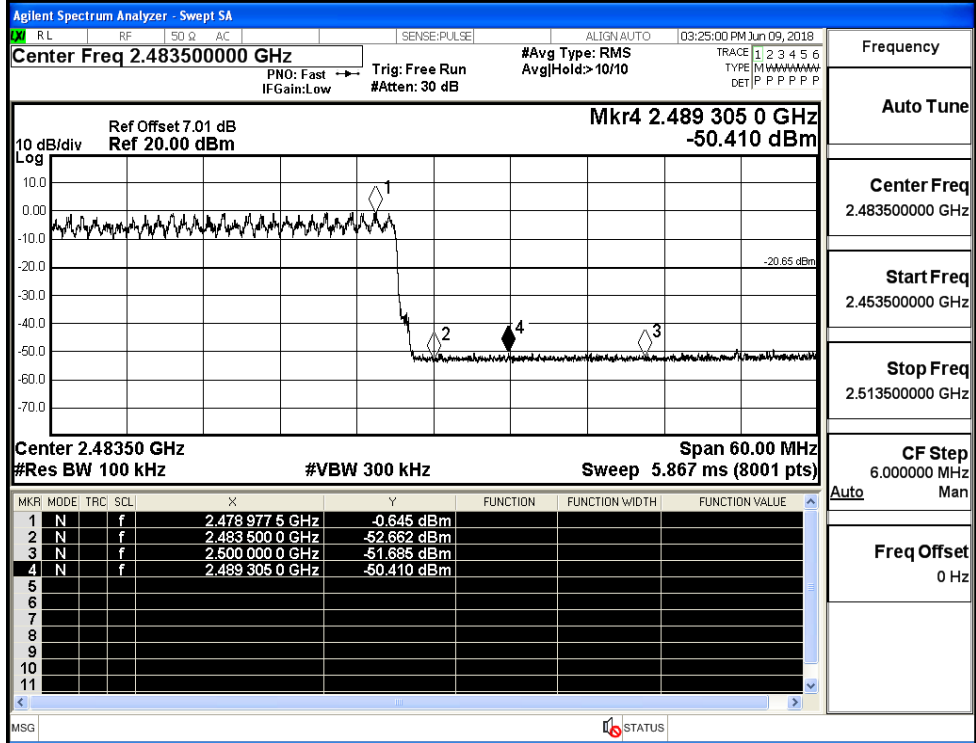
Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

CF Step
2.200000 MHz

Freq Offset
0 Hz

8DPSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

Start Freq
2.453500000 GHz

Stop Freq
2.513500000 GHz

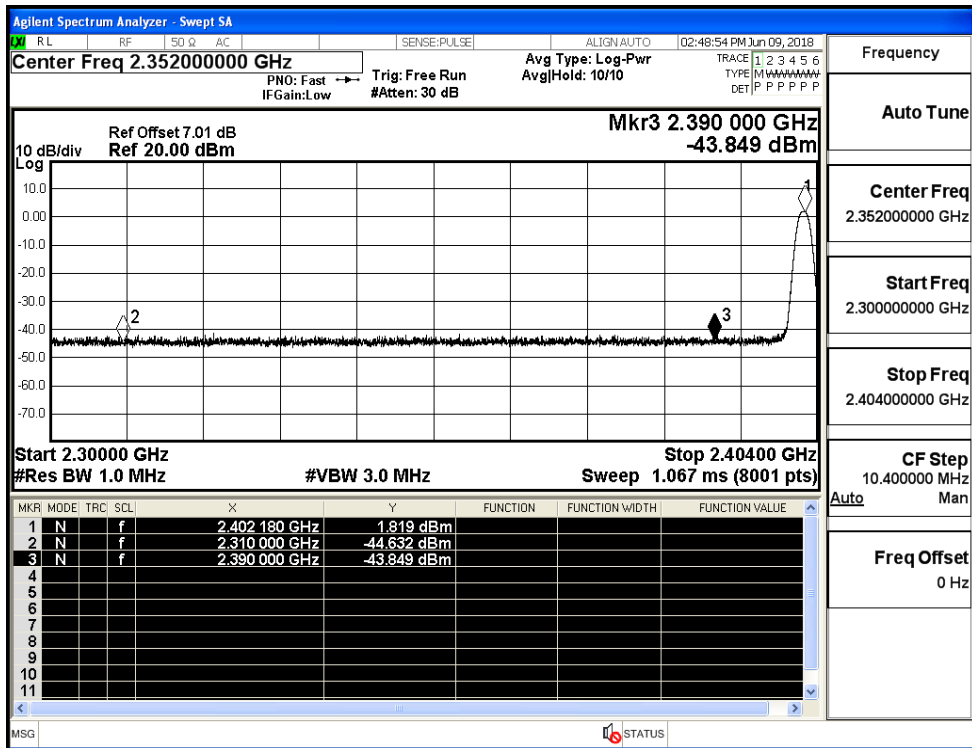
CF Step
6.000000 MHz

Freq Offset
0 Hz

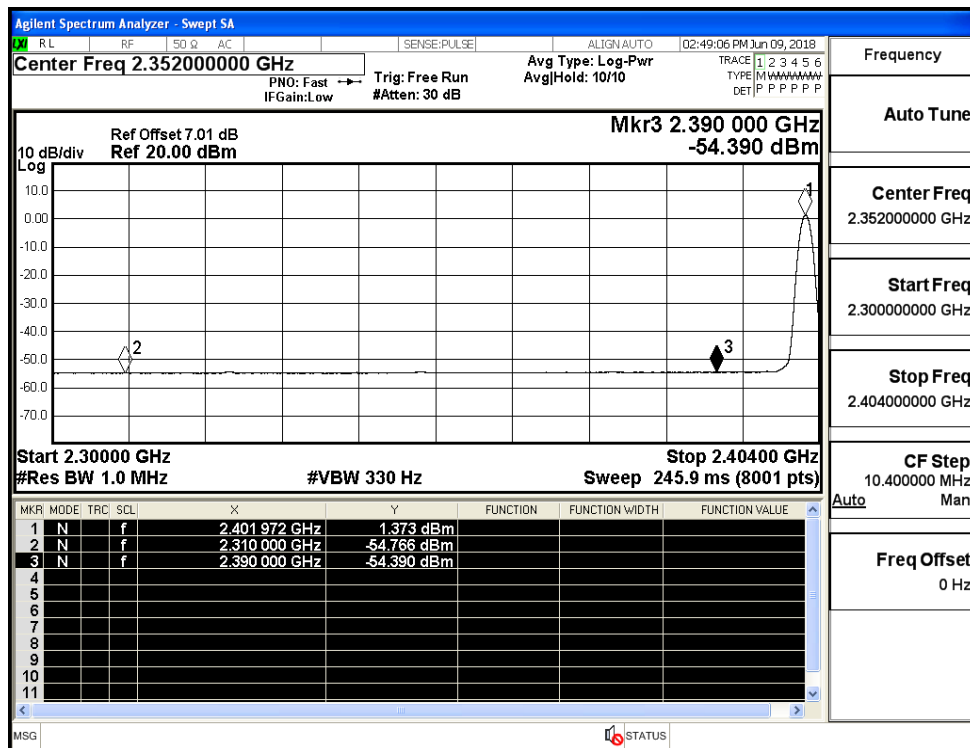
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-44.63	2.0	0	50.63	PEAK	74	PASS
	Off	2310.0	-54.77	2.0	0	40.49	AV	54	PASS
	Off	2390.0	-43.85	2.0	0	51.41	PEAK	74	PASS
	Off	2390.0	-54.39	2.0	0	40.87	AV	54	PASS
	Off	2483.5	-41.22	2.0	0	54.04	PEAK	74	PASS
	Off	2483.5	-51.47	2.0	0	43.78	AV	54	PASS
	Off	2500.0	-43.56	2.0	0	51.69	PEAK	74	PASS
	Off	2500.0	-54.01	2.0	0	41.25	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.64	2.0	0	51.62	PEAK	74	PASS
	Off	2310.0	-54.71	2.0	0	40.55	AV	54	PASS
	Off	2390.0	-44.10	2.0	0	51.16	PEAK	74	PASS
	Off	2390.0	-54.52	2.0	0	40.74	AV	54	PASS
	Off	2483.5	-40.73	2.0	0	54.52	PEAK	74	PASS
	Off	2483.5	-52.42	2.0	0	42.83	AV	54	PASS
	Off	2500.0	-43.90	2.0	0	51.36	PEAK	74	PASS
	Off	2500.0	-54.08	2.0	0	41.17	AV	54	PASS
8DPSK	Off	2310.0	-44.90	2.0	0	50.36	PEAK	74	PASS
	Off	2310.0	-54.82	2.0	0	40.44	AV	54	PASS
	Off	2390.0	-43.31	2.0	0	51.95	PEAK	74	PASS
	Off	2390.0	-54.45	2.0	0	40.81	AV	54	PASS
	Off	2483.5	-39.63	2.0	0	55.63	PEAK	74	PASS
	Off	2483.5	-52.27	2.0	0	42.99	AV	54	PASS
	Off	2500.0	-44.65	2.0	0	50.61	PEAK	74	PASS
	Off	2500.0	-54.10	2.0	0	41.16	AV	54	PASS

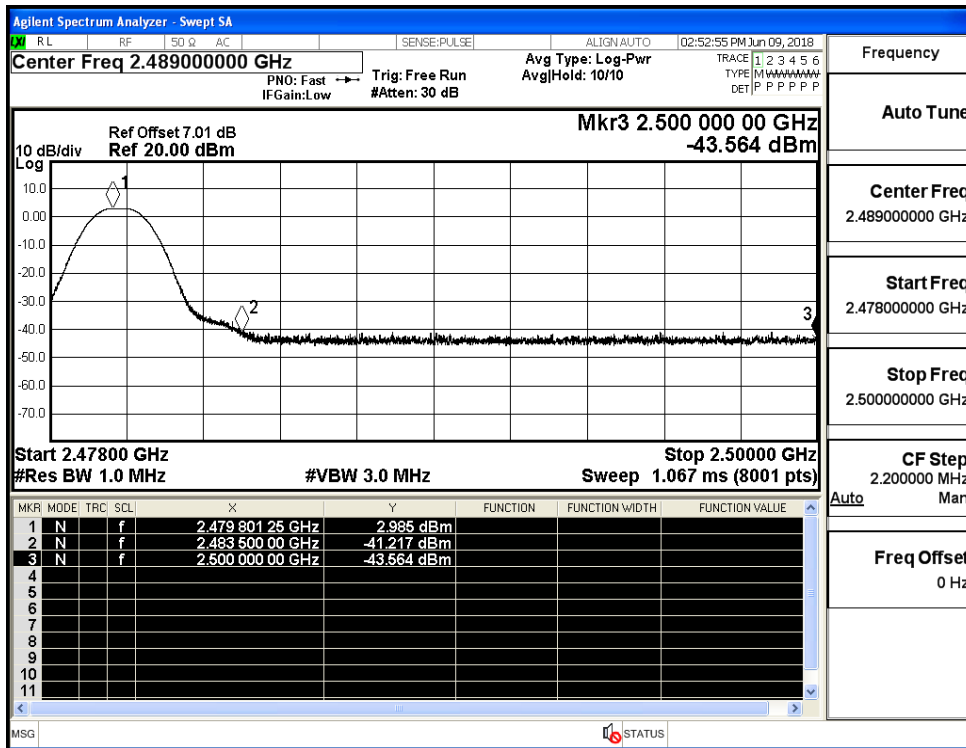
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



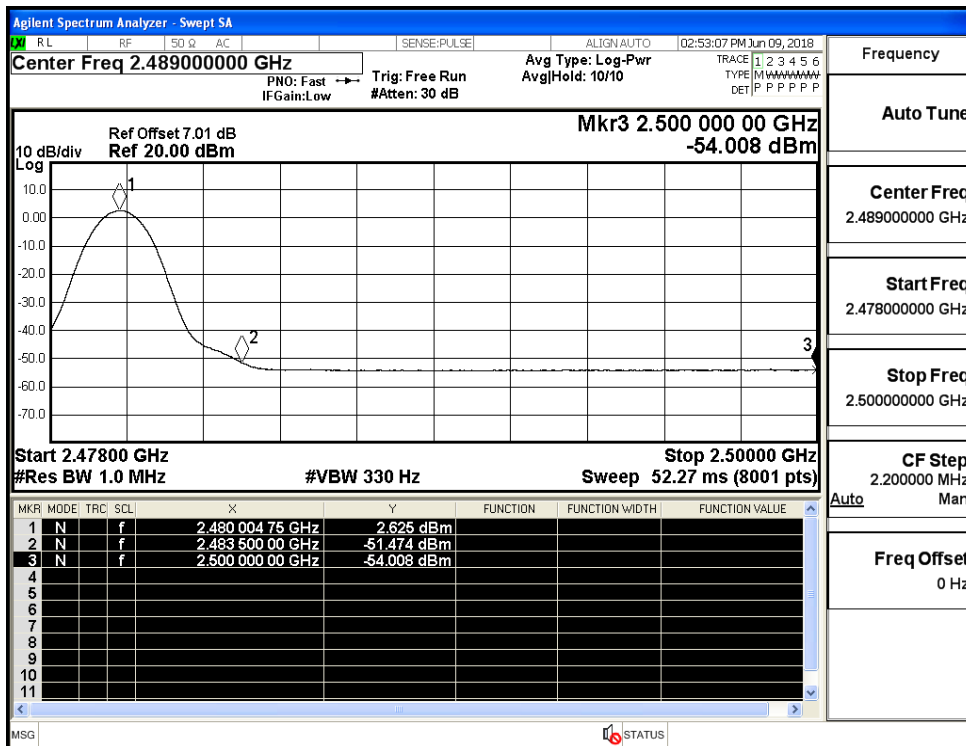
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



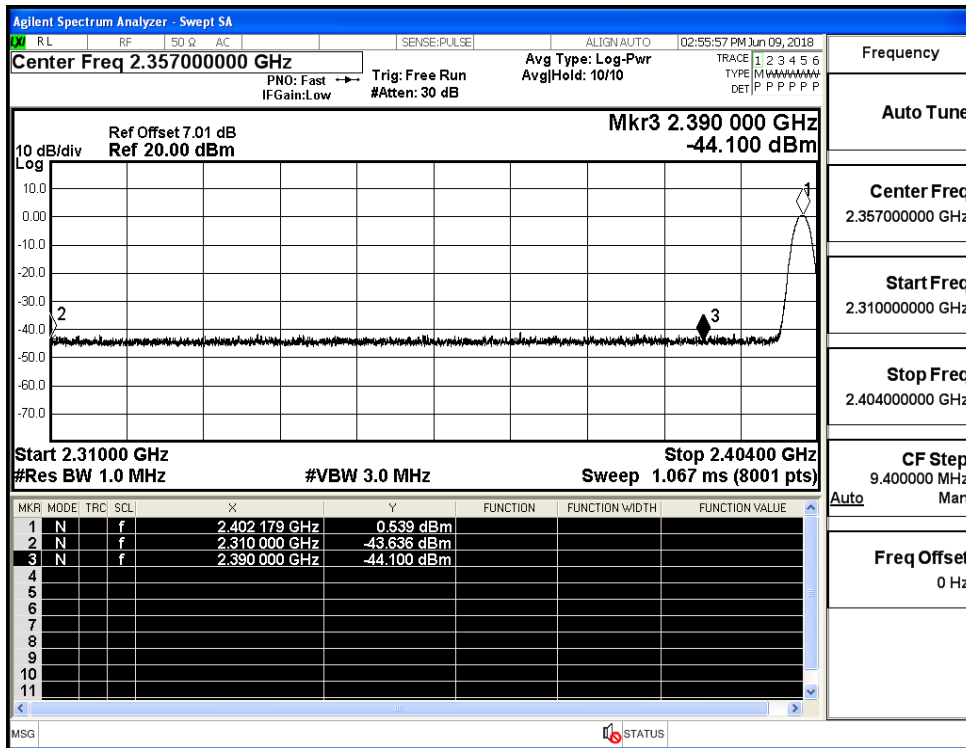
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



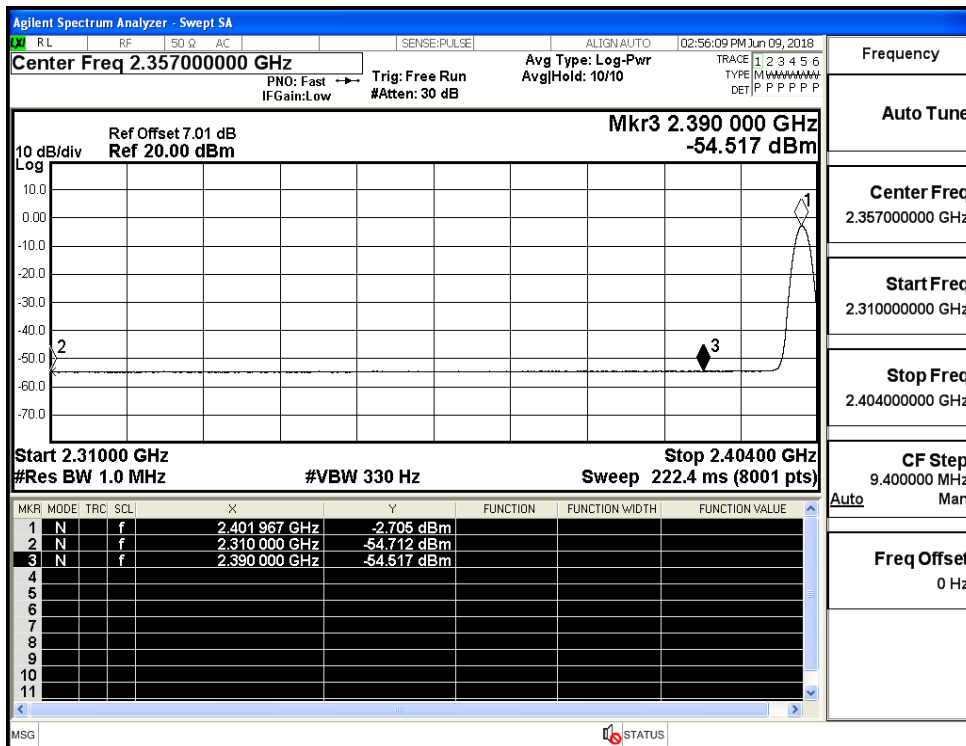
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



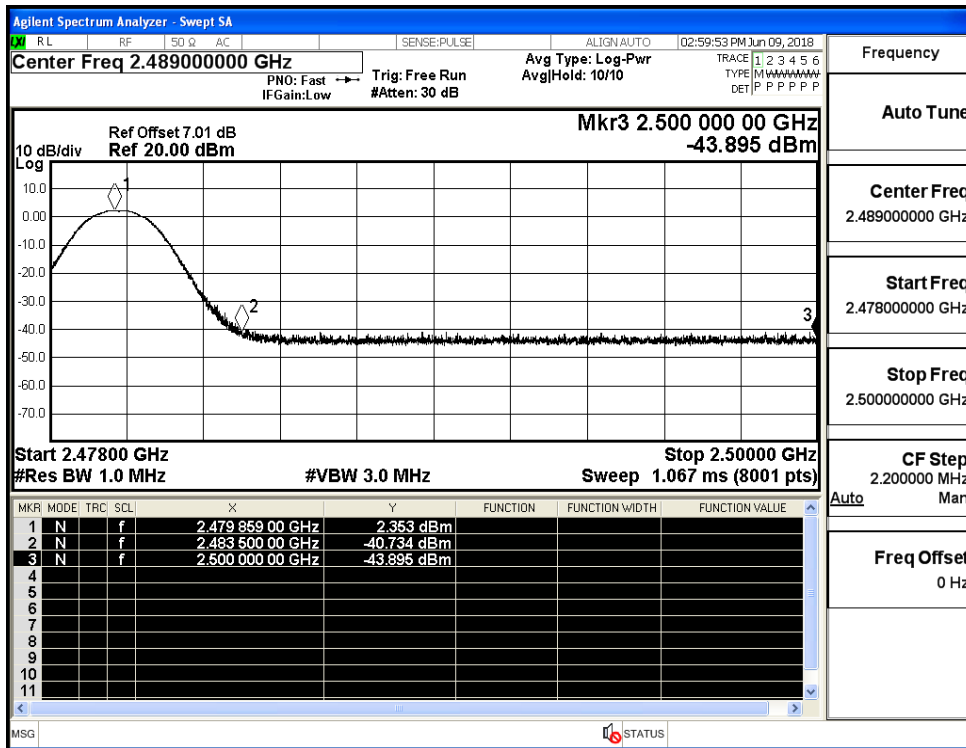
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



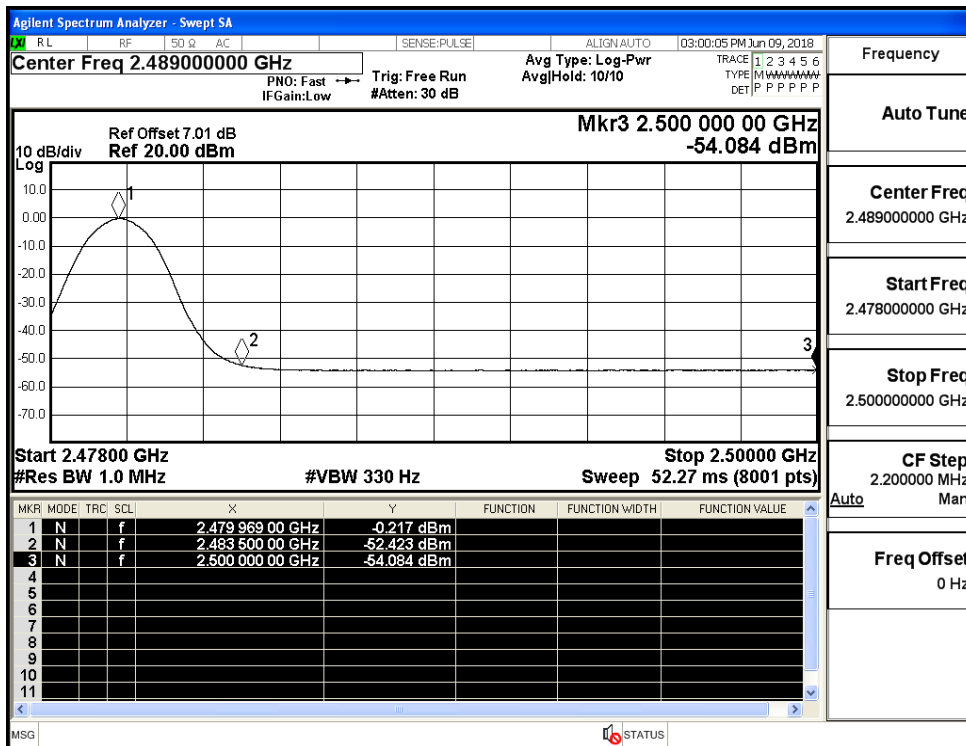
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)



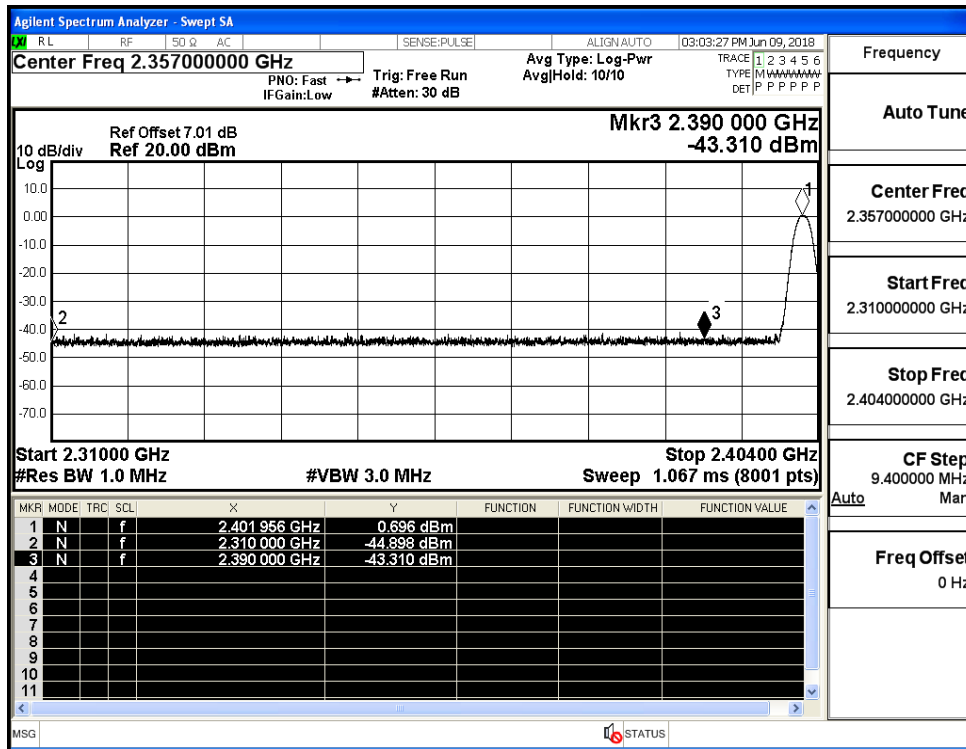
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



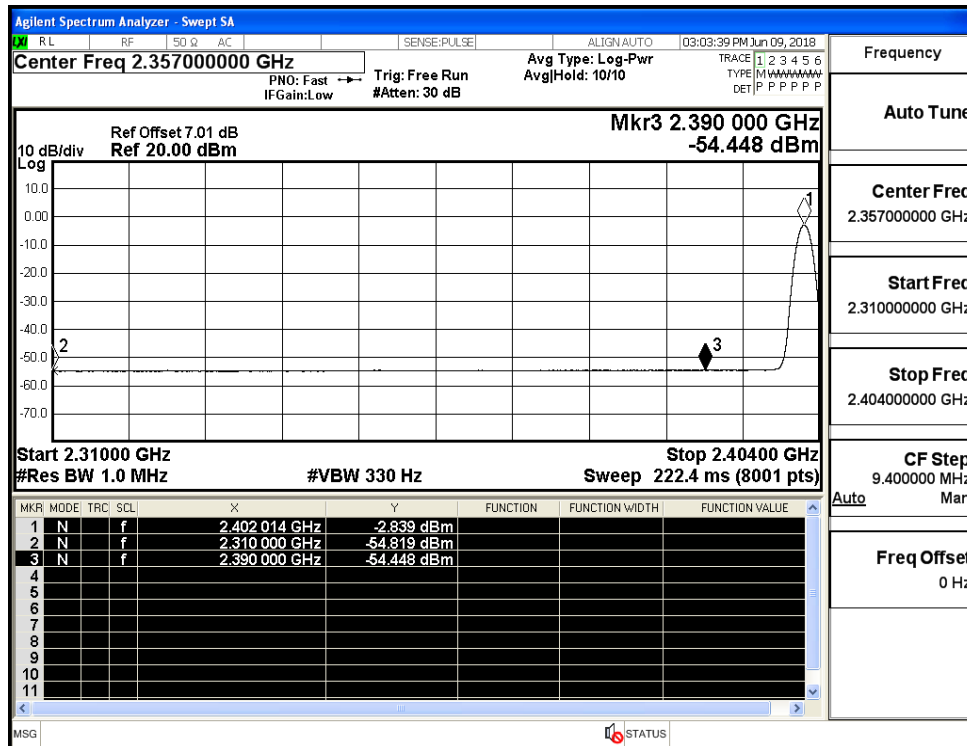
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



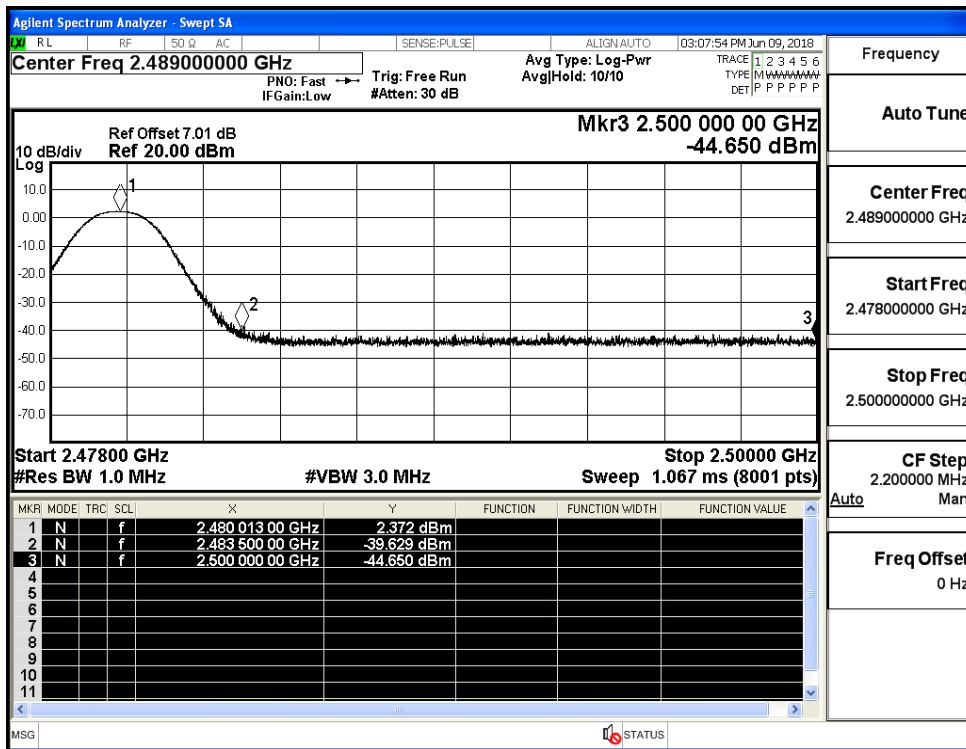
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

