

Appendix A

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

Product Name: Halo Lighted Bluetooth® Headphones

Trade Mark: Gemline

Test Model: 100200-001B

Environmental Conditions

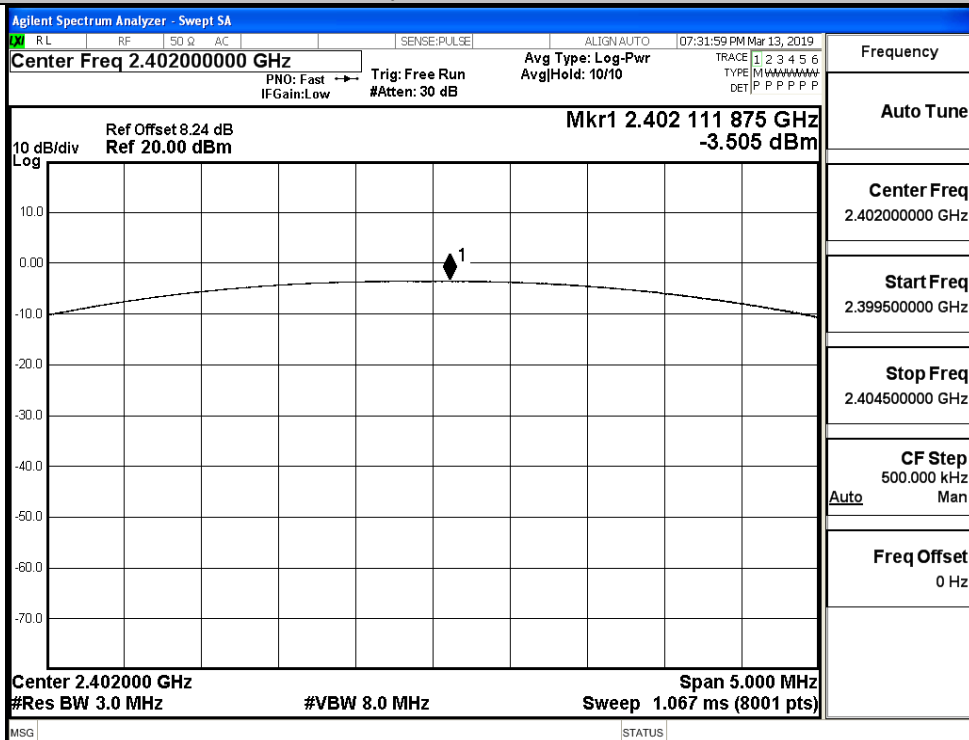
Temperature:	22.4 ° C
Relative Humidity:	53.7%
ATM Pressure:	100.0 kPa
Test Engineer:	SCENT HU
Supervised by:	Tom.Liu

A.1 Maximum Conducted Peak Output Power

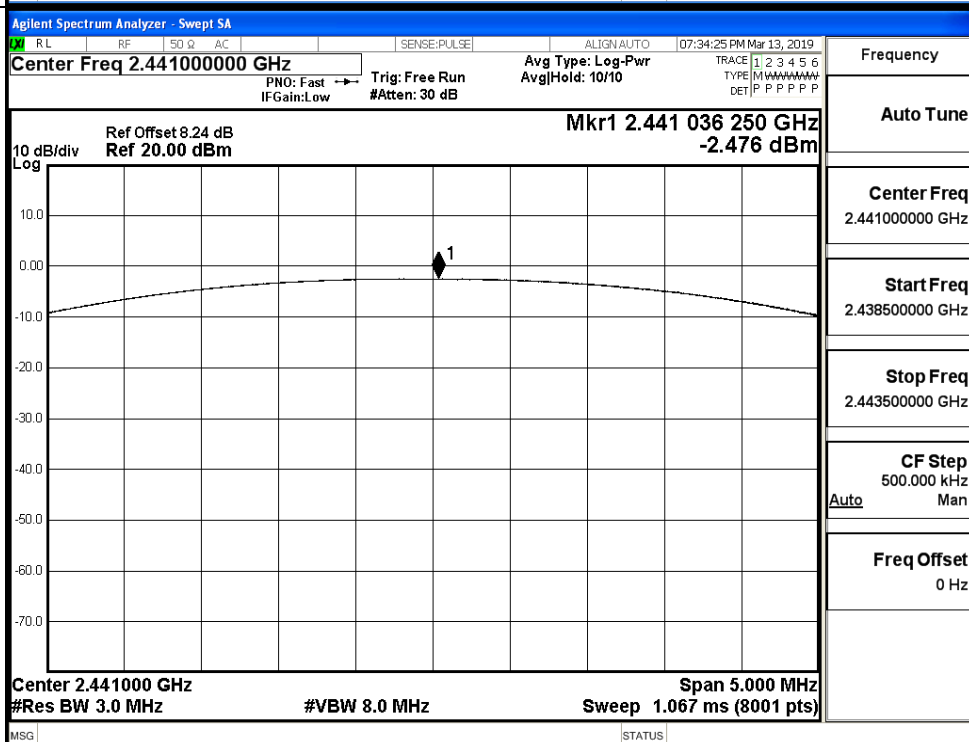
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.505	21	PASS
	MCH	-2.476	21	PASS
	HCH	-3.744	21	PASS
$\pi/4$ DQPSK	LCH	-4.389	21	PASS
	MCH	-3.386	21	PASS
	HCH	-4.706	21	PASS

Test Graphs

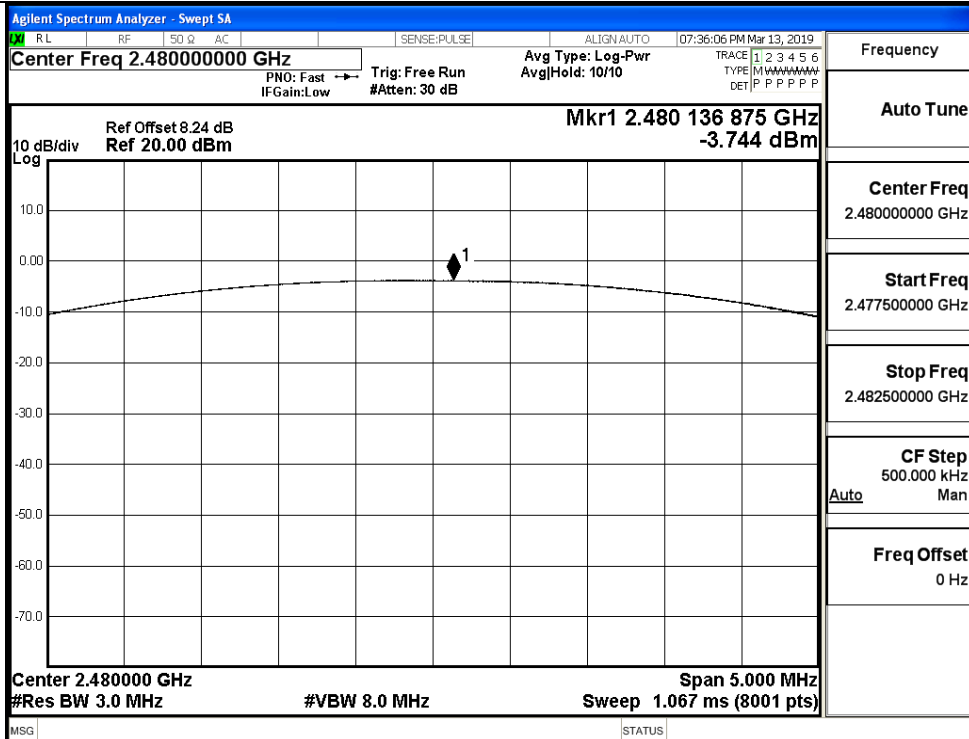
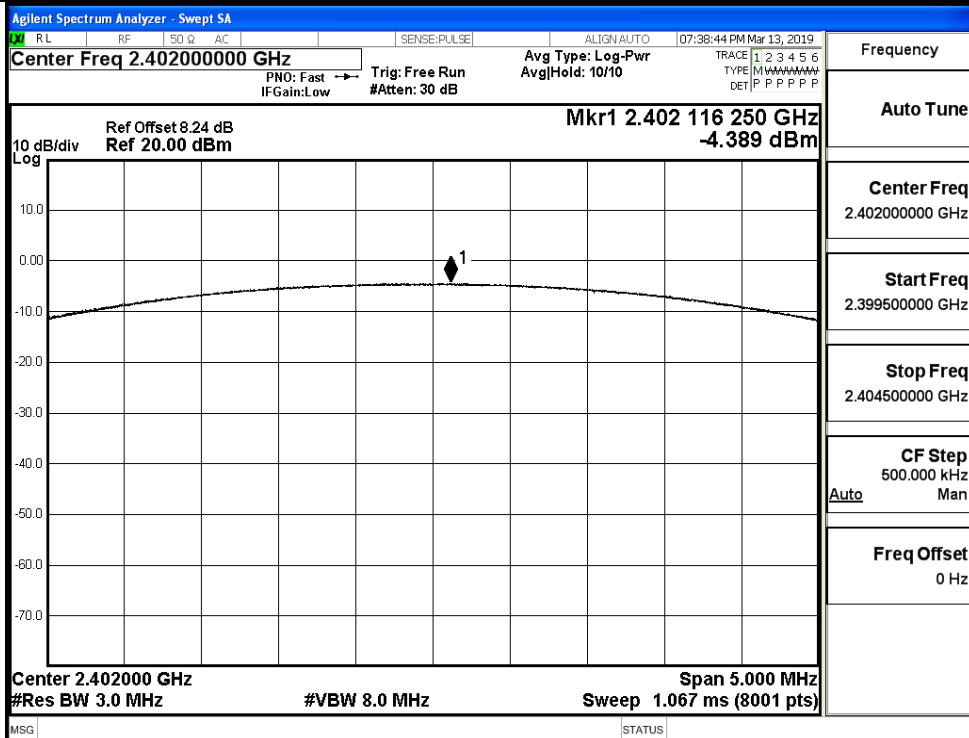
GFSK/LCH

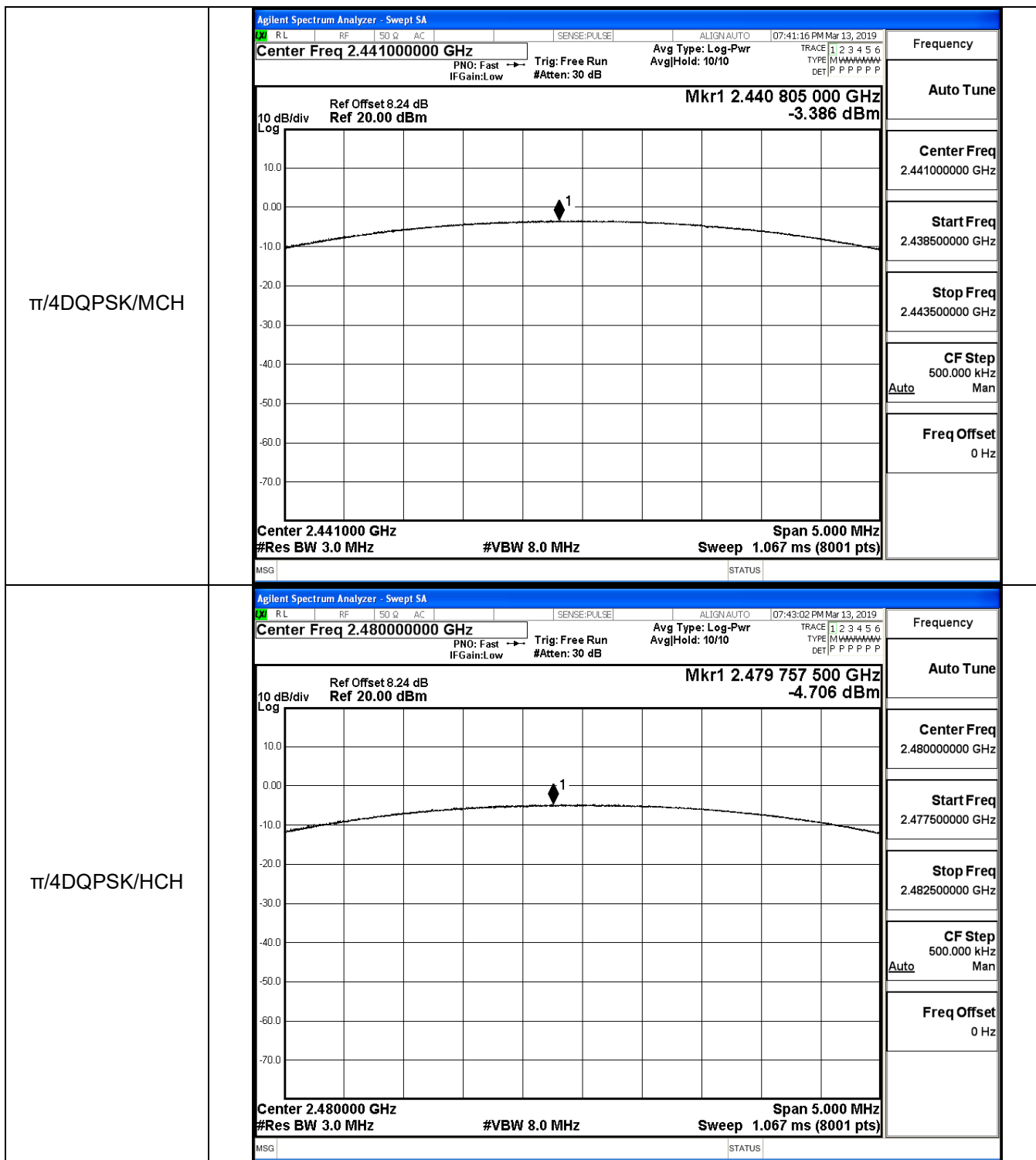


GFSK/MCH



GFSK/HCH

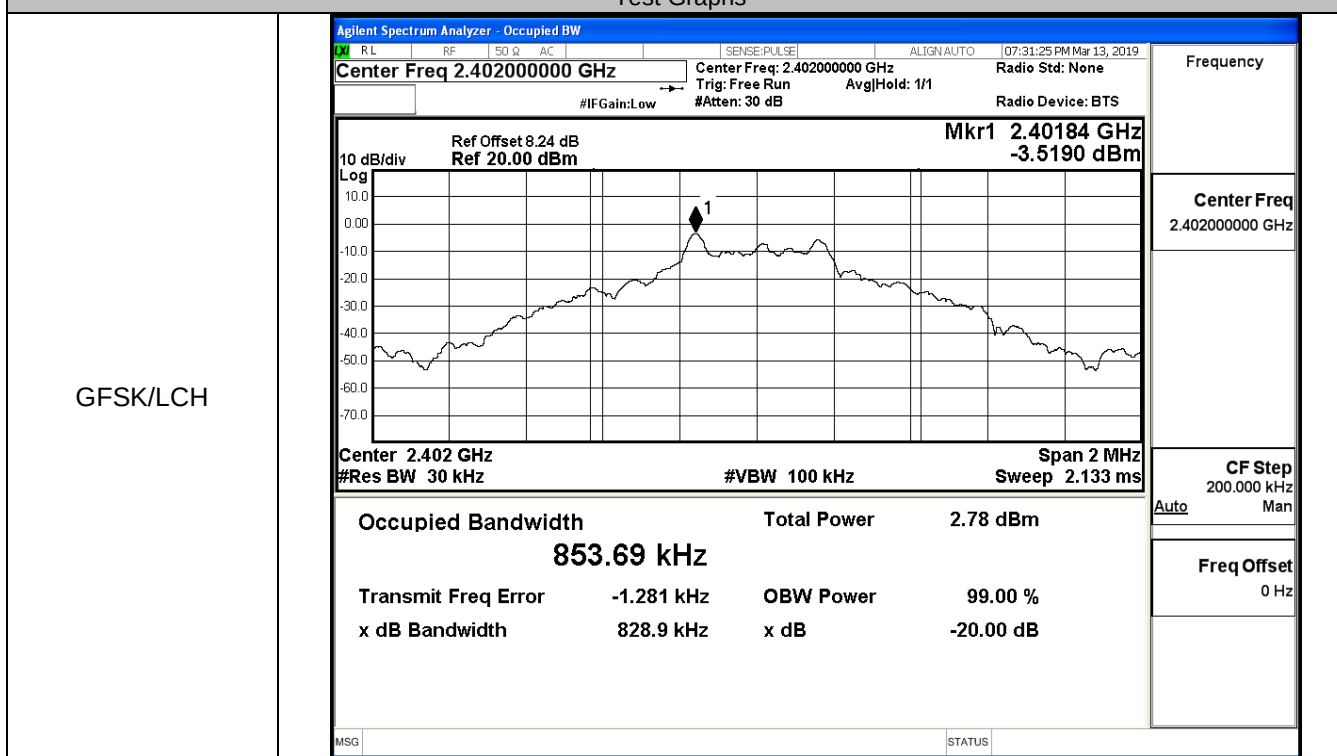
 π /4DQPSK/LCH



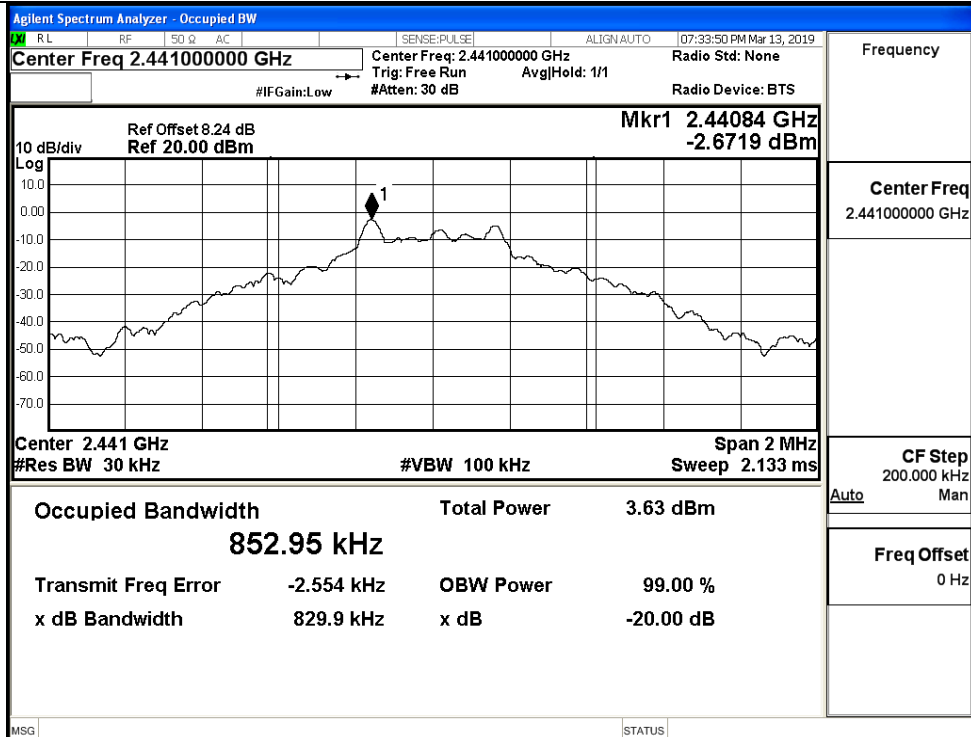
A.2 99% and 20dB Bandwidth

Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.85369	0.8289	Not Specified	PASS
	MCH	0.85295	0.8299	Not Specified	PASS
	HCH	0.85253	0.8319	Not Specified	PASS
π /4DQPSK	LCH	1.0712	1.119	Not Specified	PASS
	MCH	1.0716	1.117	Not Specified	PASS
	HCH	1.0714	1.111	Not Specified	PASS

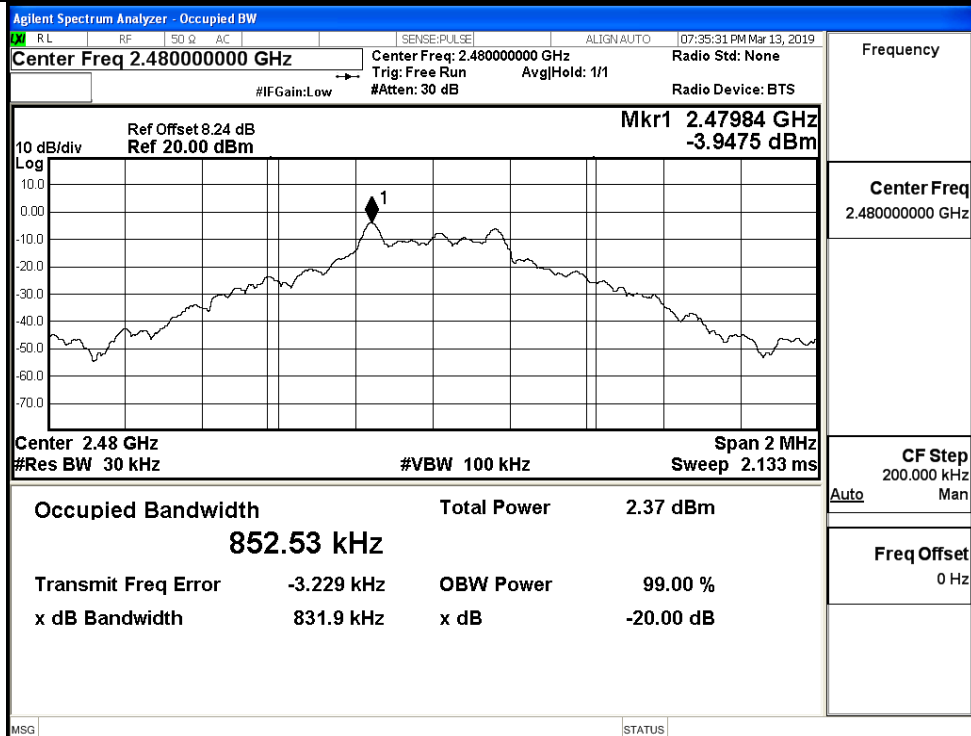
Test Graphs

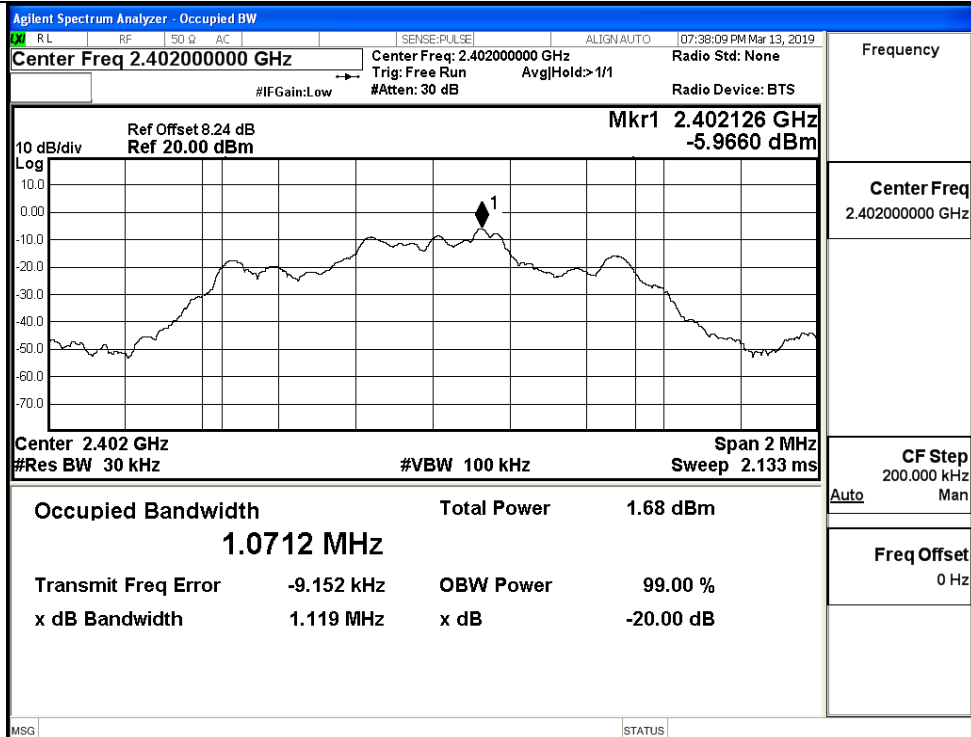
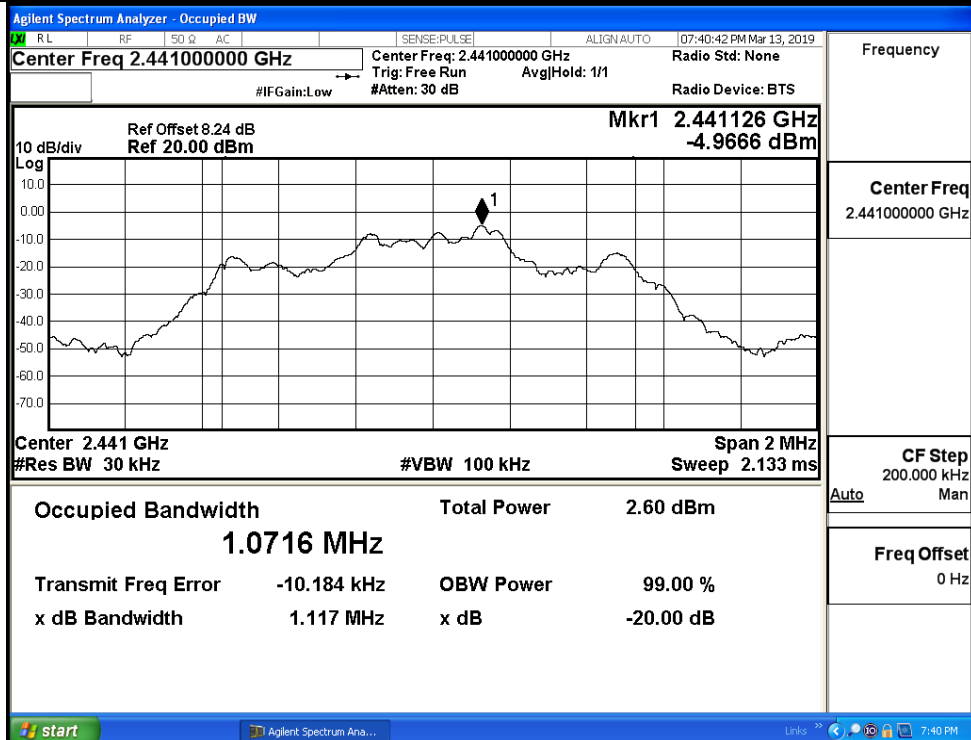


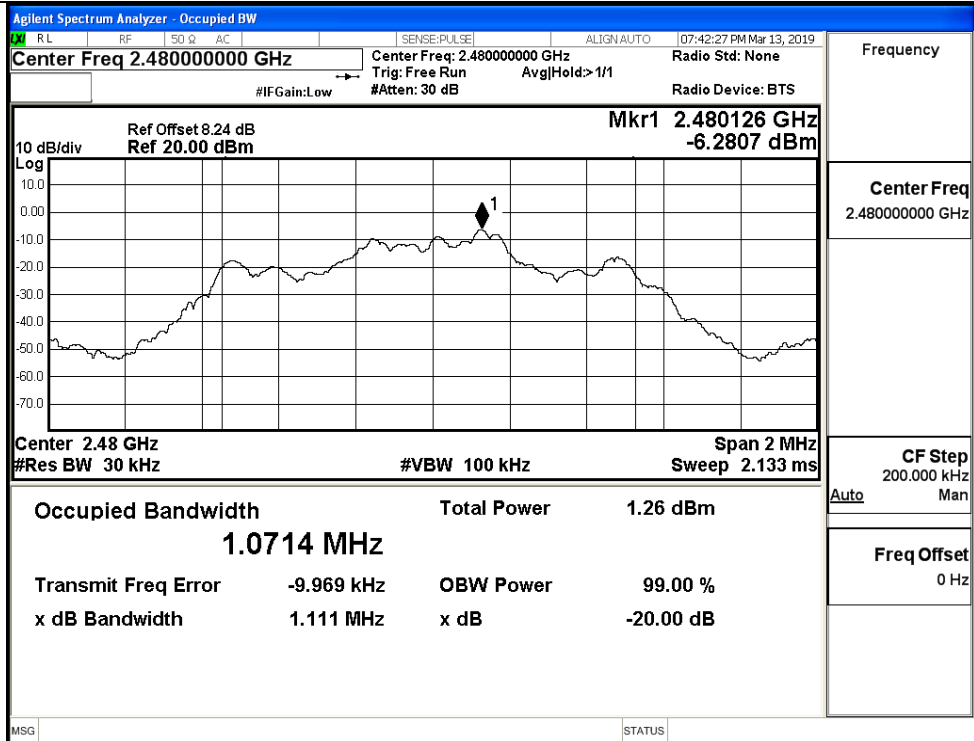
GFSK/MCH



GFSK/HCH



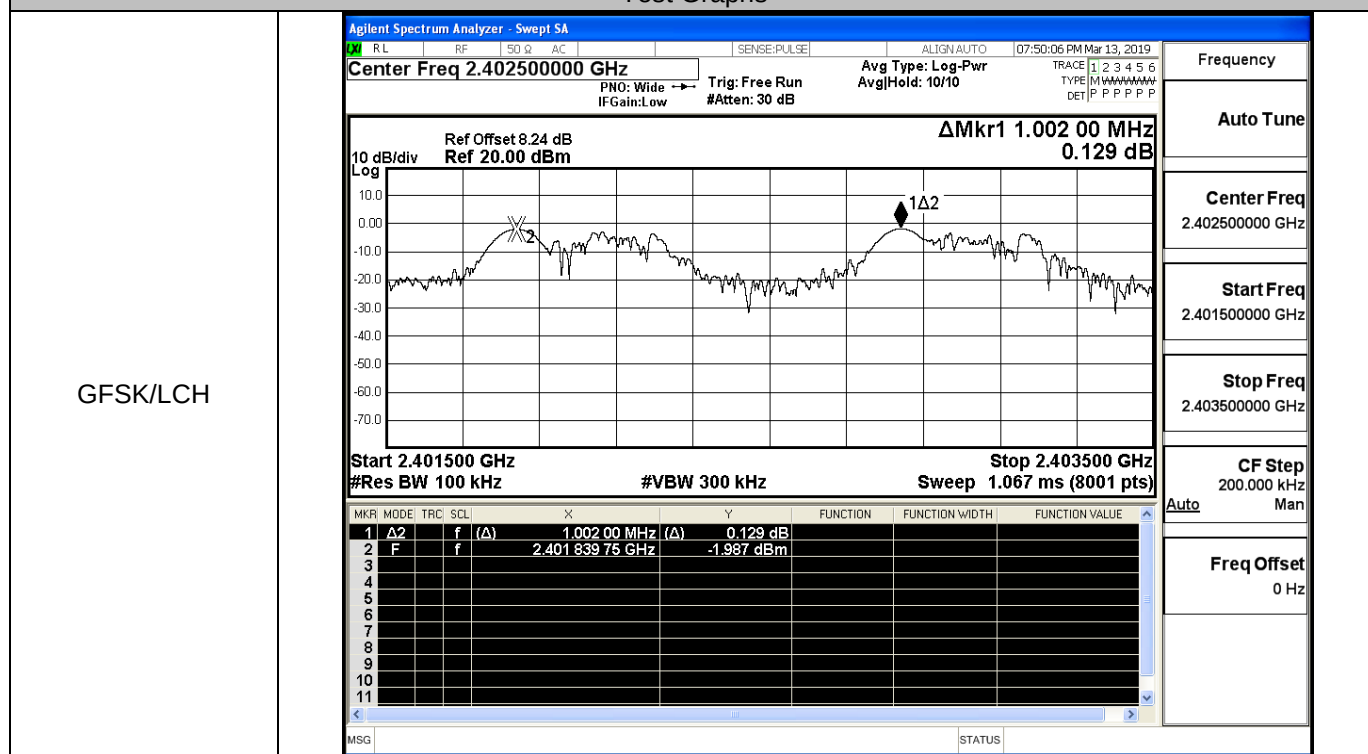
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

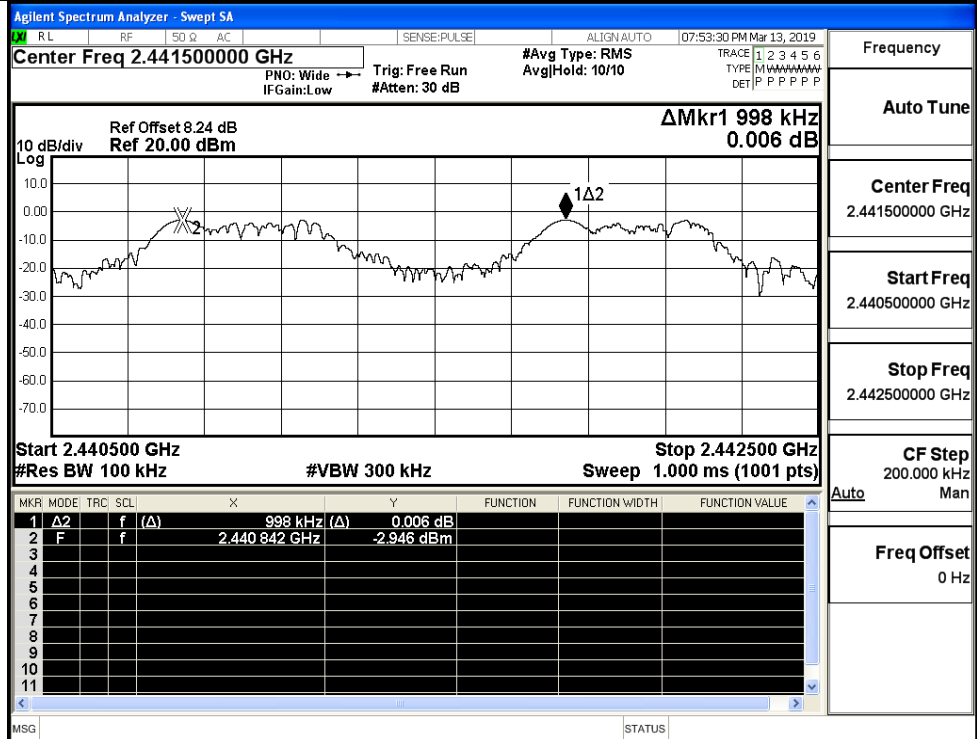
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.002	0.555	PASS
	MCH	0.998	0.555	PASS
	HCH	1.002	0.555	PASS
π /4DQPSK	LCH	1.306	0.746	PASS
	MCH	1.344	0.746	PASS
	HCH	0.986	0.746	PASS

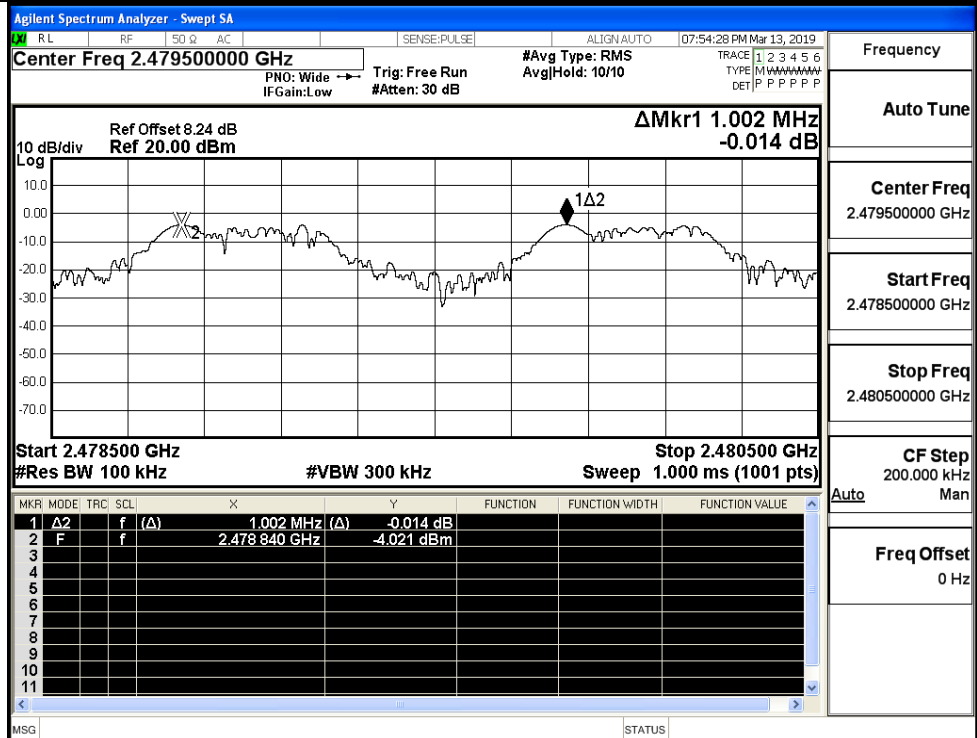
Test Graphs

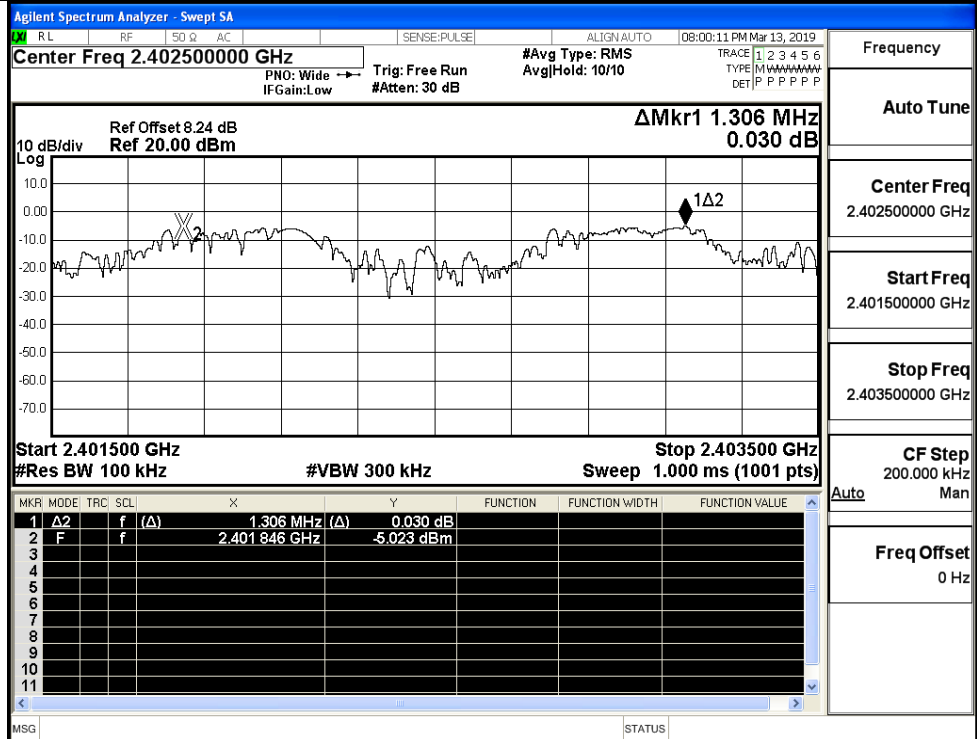
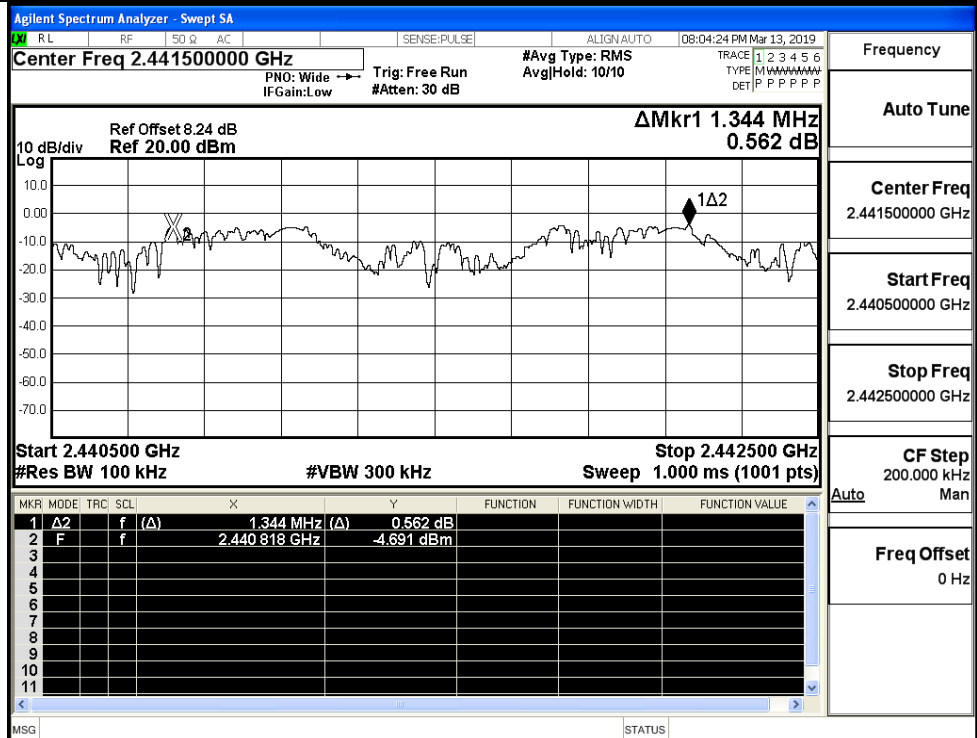


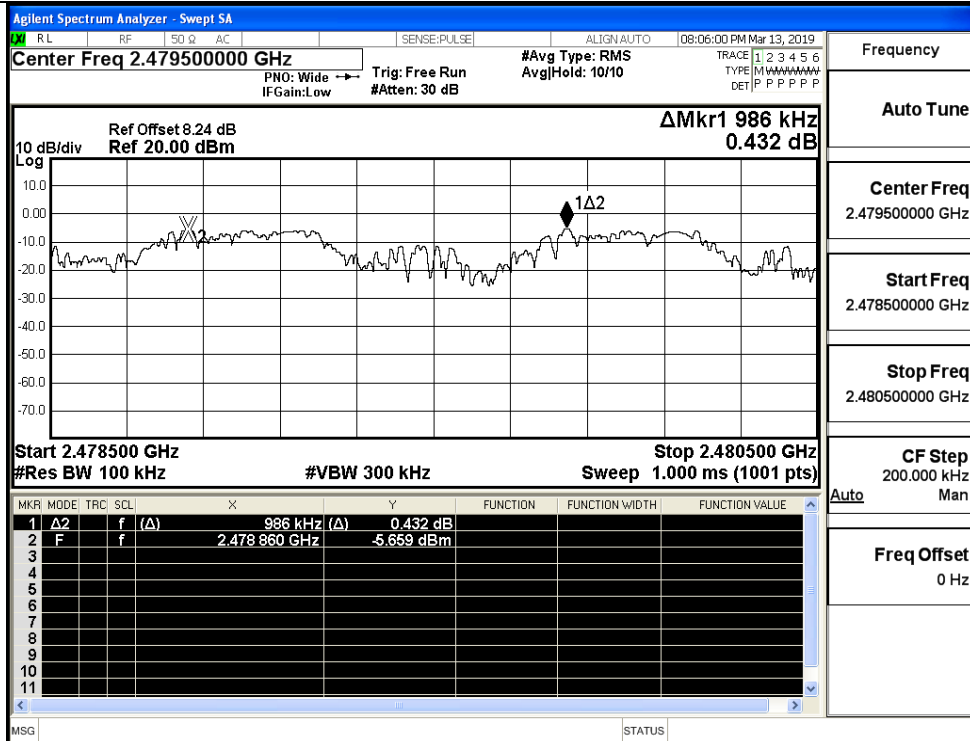
GFSK/MCH



GFSK/HCH



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

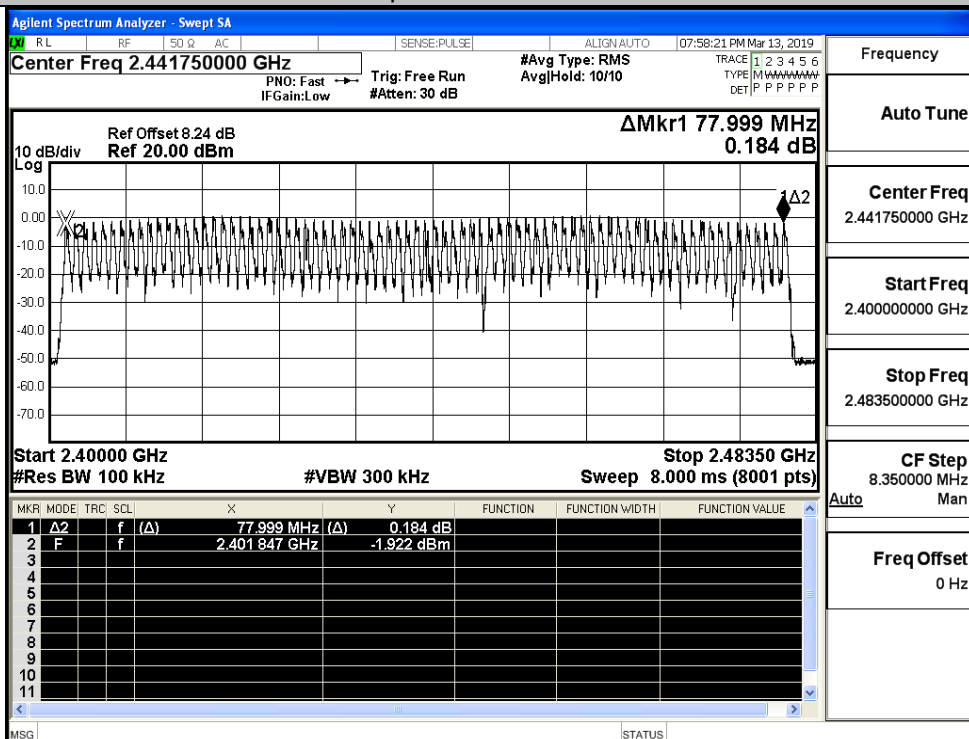
$\pi/4$ DQPSK/HCH

A.4 Hopping Channel Number

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

Test Graphs

GFSK/Hop



Frequency

Auto Tune

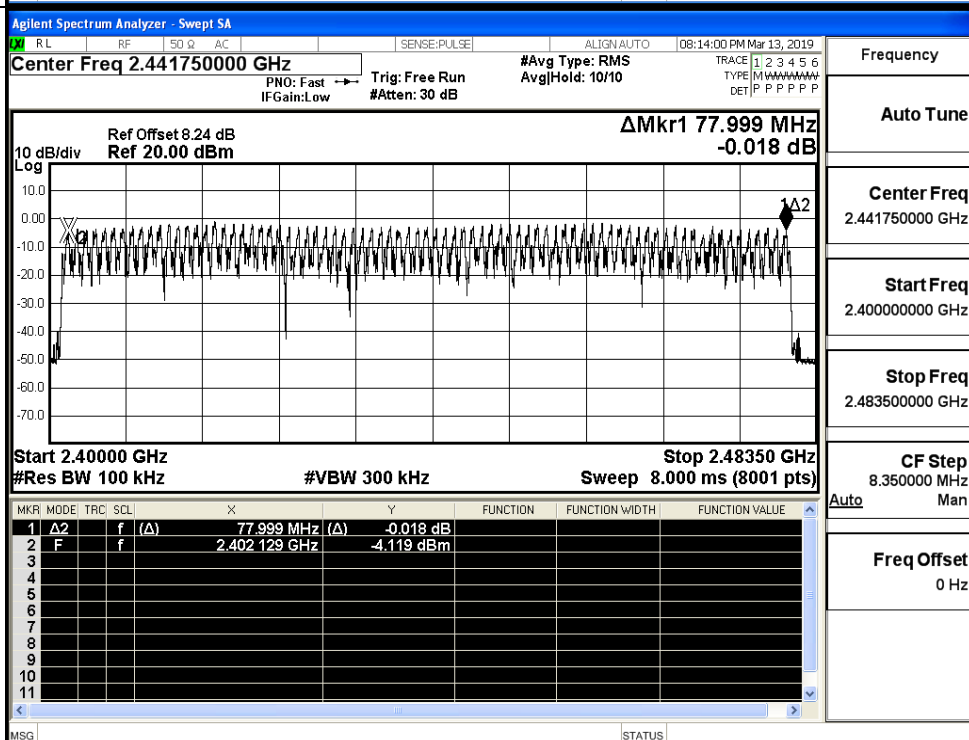
Center Freq
2.441750000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Man

Freq Offset
0 Hz

 $\pi/4$ DQPSK/Hop

Frequency

Auto Tune

Center Freq
2.441750000 GHz

Start Freq
2.400000000 GHz

Stop Freq
2.483500000 GHz

CF Step
8.350000 MHz
Man

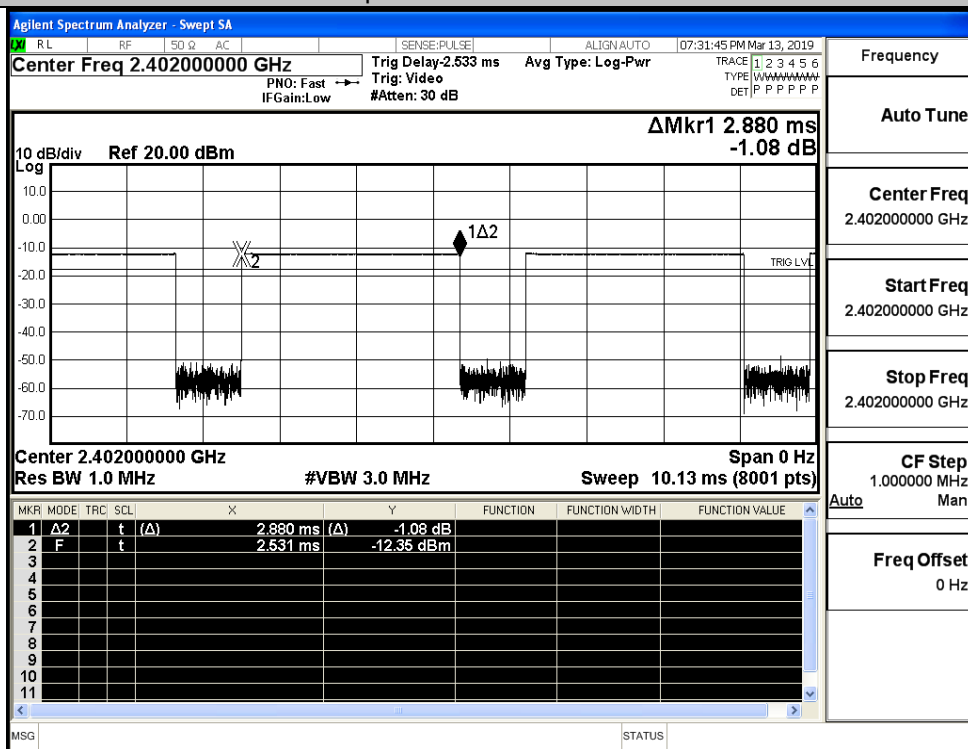
Freq Offset
0 Hz

A.5 Dwell Time

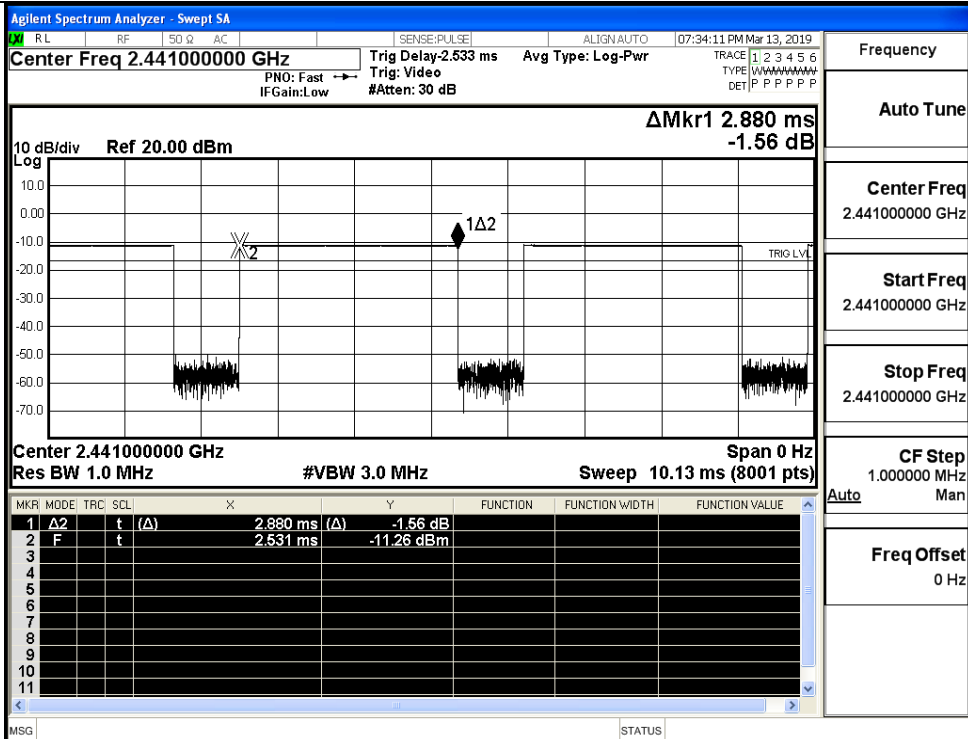
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88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

Test Graphs

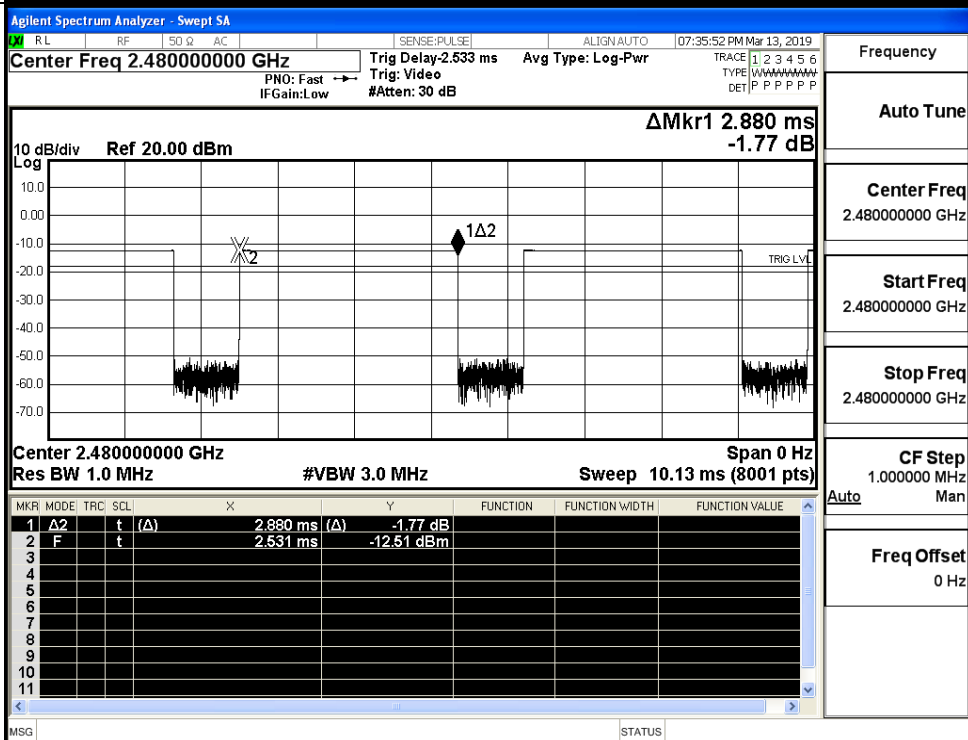
GFSK_DH5/LCH



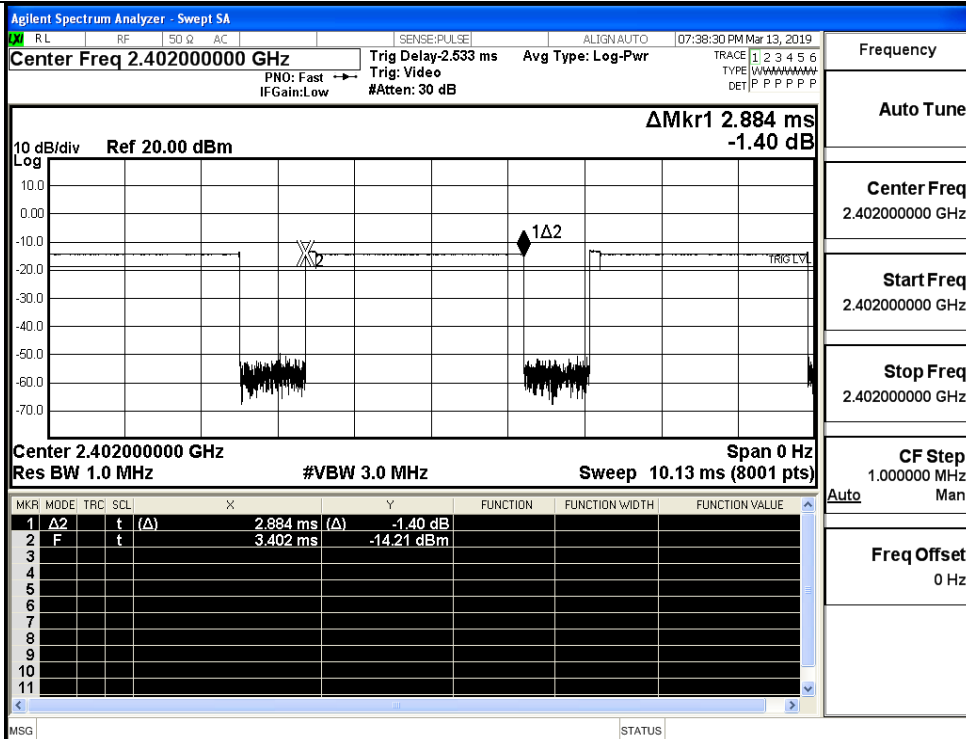
GFSK_DH5/MCH



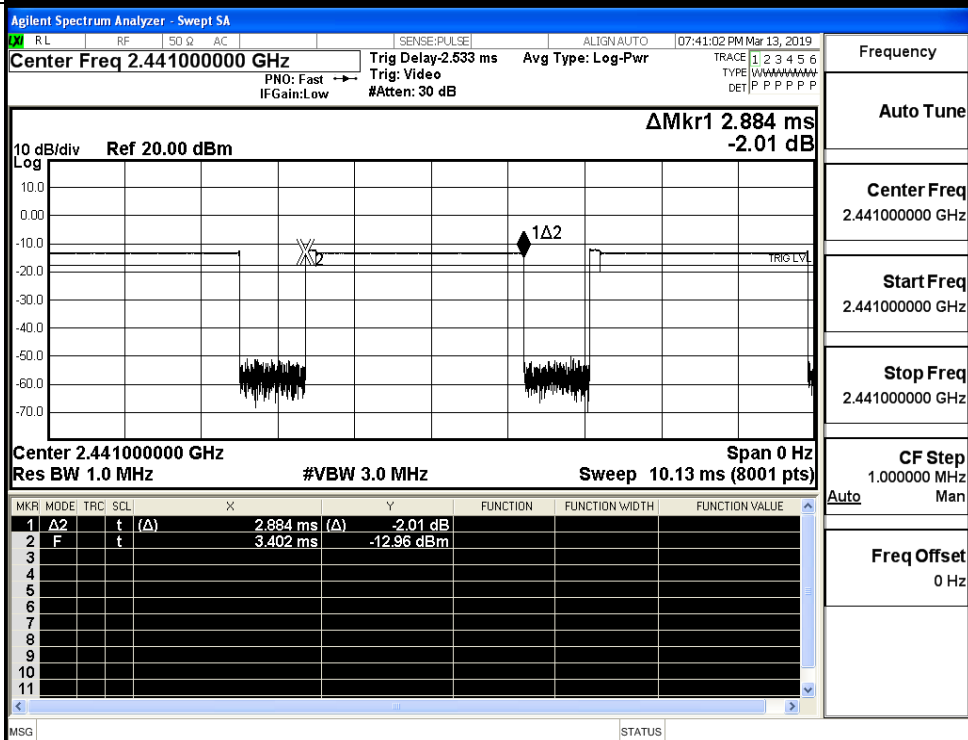
GFSK_DH5/HCH



$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH

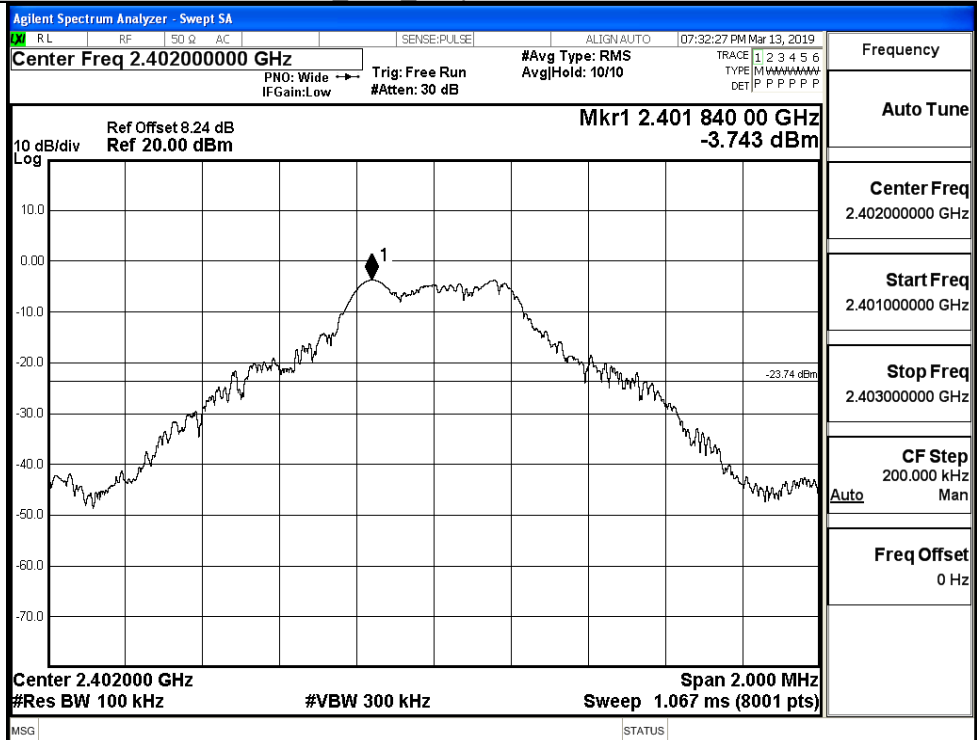


A.6 RF Conducted Spurious Emissions

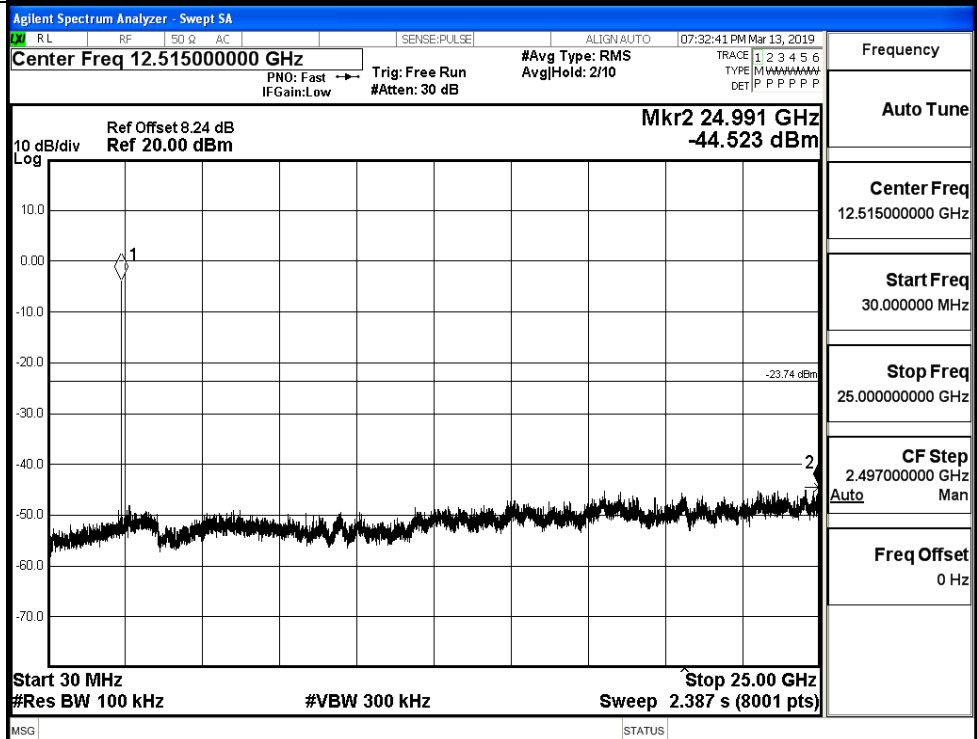
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-3.743	-44.523	-23.743	PASS
	MCH	-2.683	-44.913	-22.683	PASS
	HCH	-3.993	-44.690	-23.993	PASS
$\pi/4$ DQPSK	LCH	-5.001	-44.518	-25.001	PASS
	MCH	-3.949	-44.490	-23.949	PASS
	HCH	-5.26	-44.848	-25.260	PASS

GFSK LCH Graphs

Pref

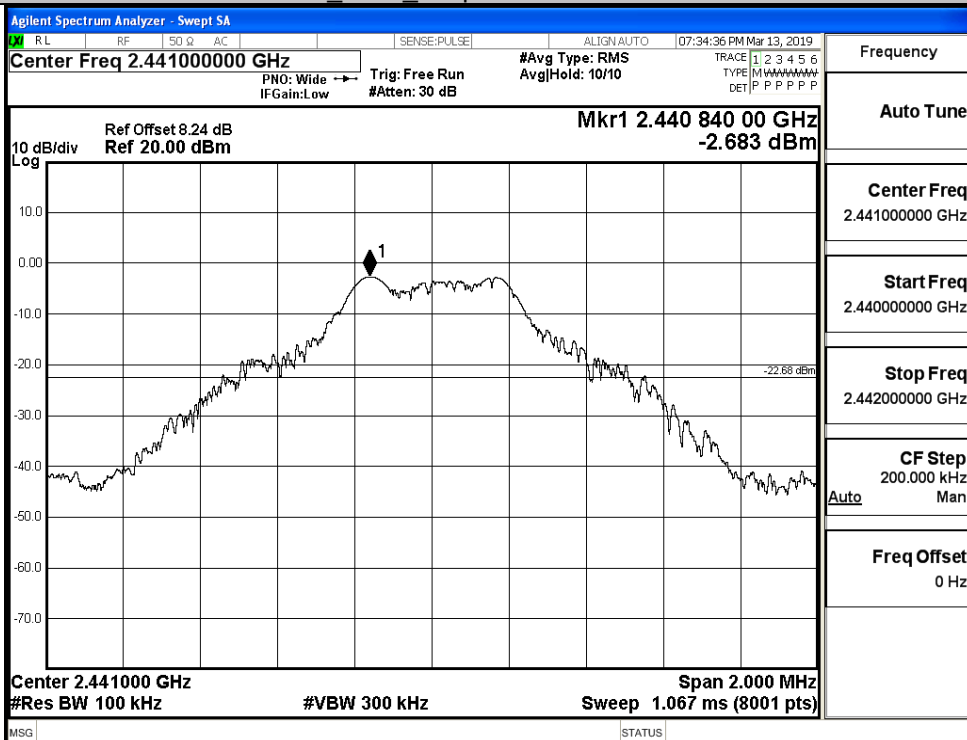


Puw

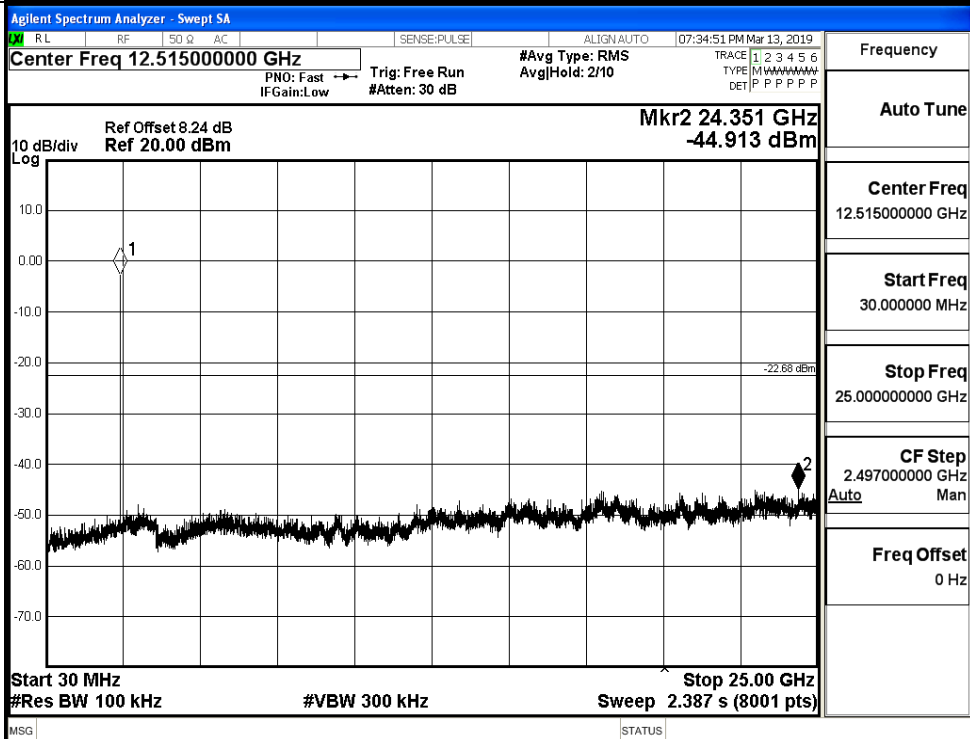


GFSK_MCH_Graphs

Pref

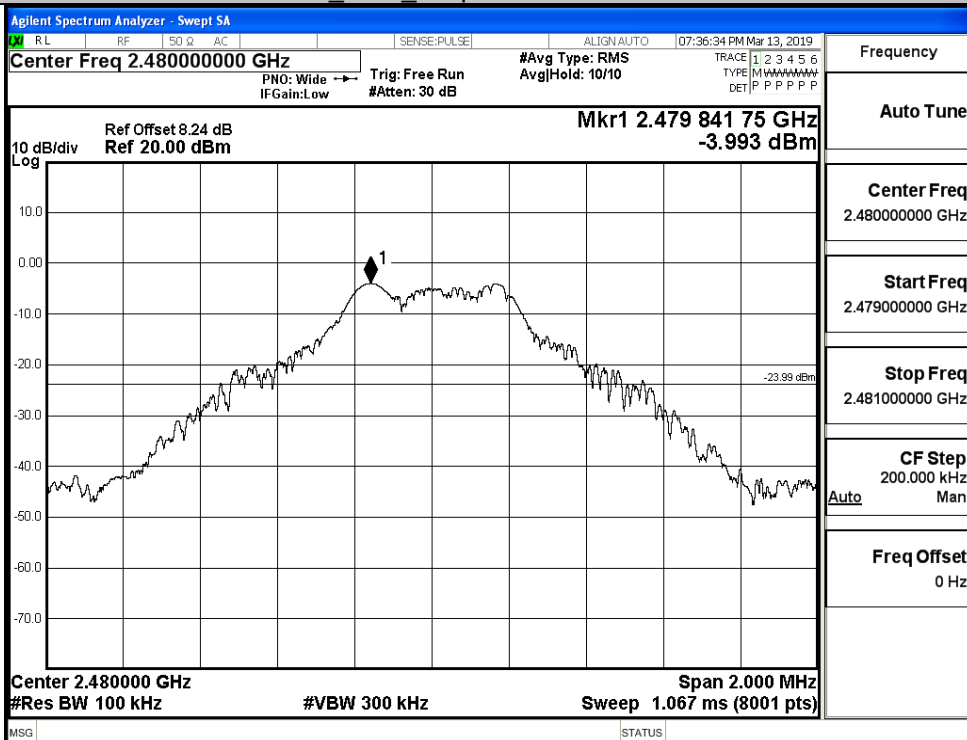


Puw

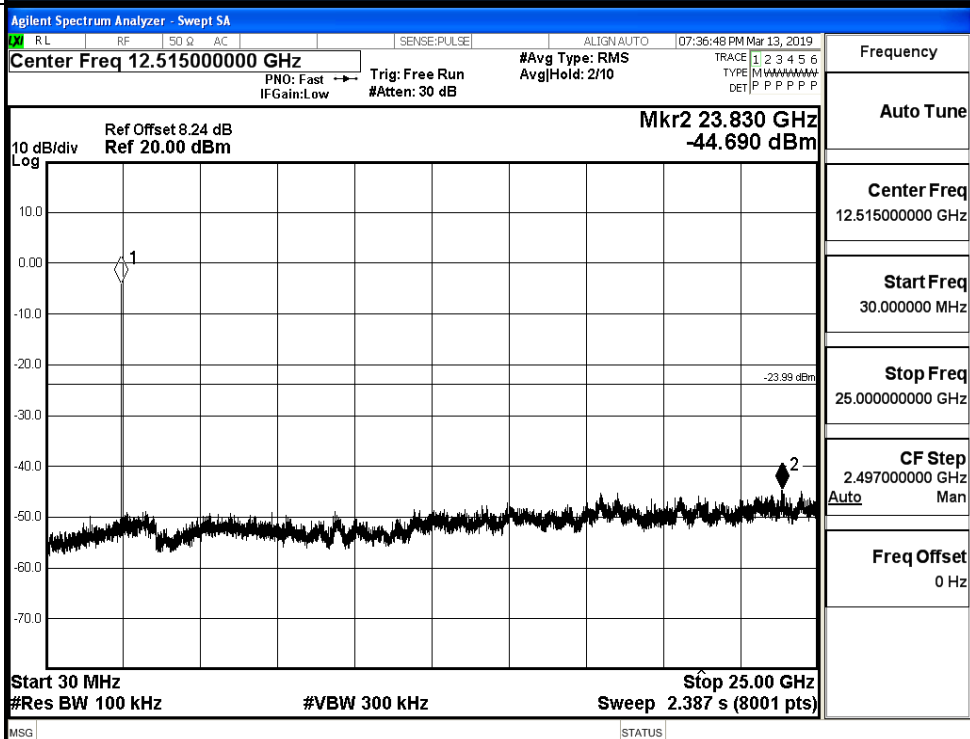


GFSK_HCH_Graphs

Pref

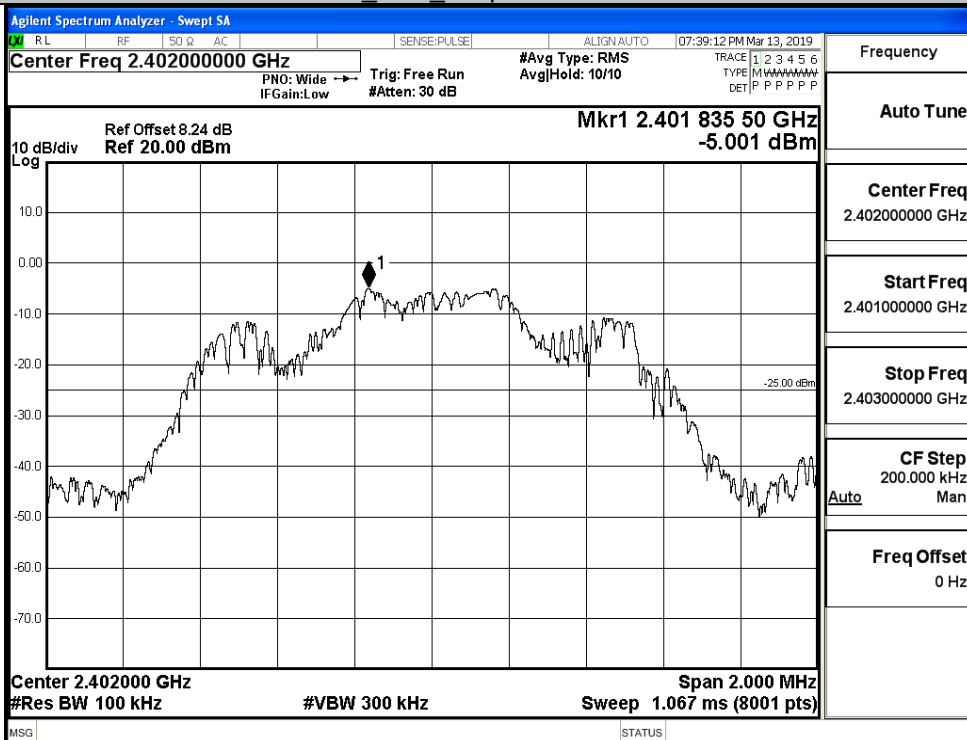


Puw

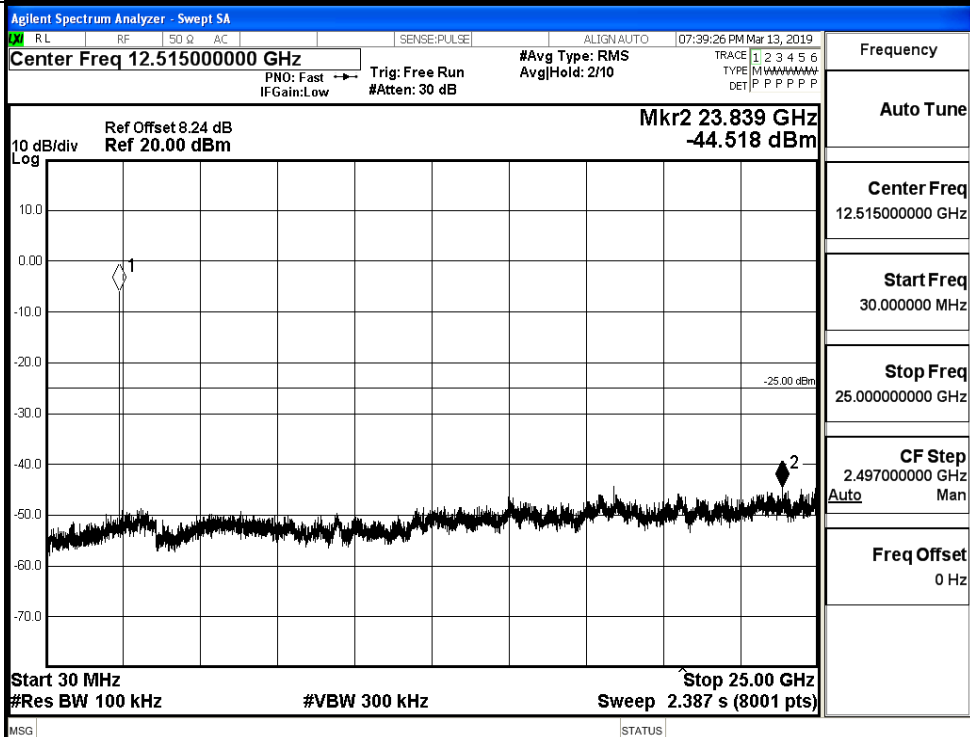


π /4DQPSK LCH_Graphs

Pref

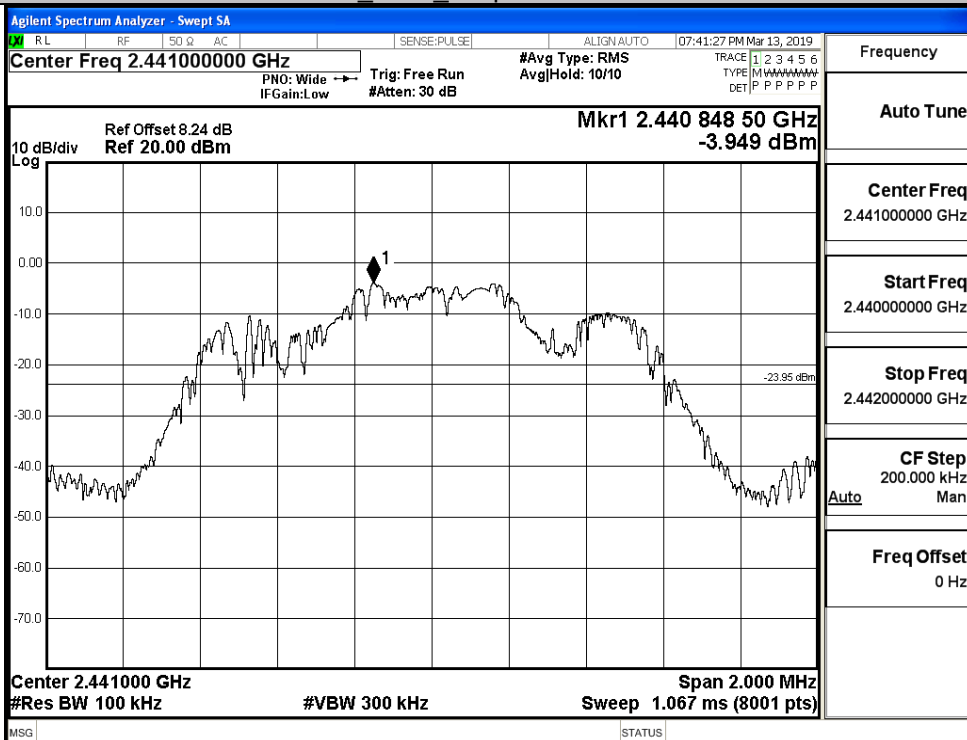


Puw

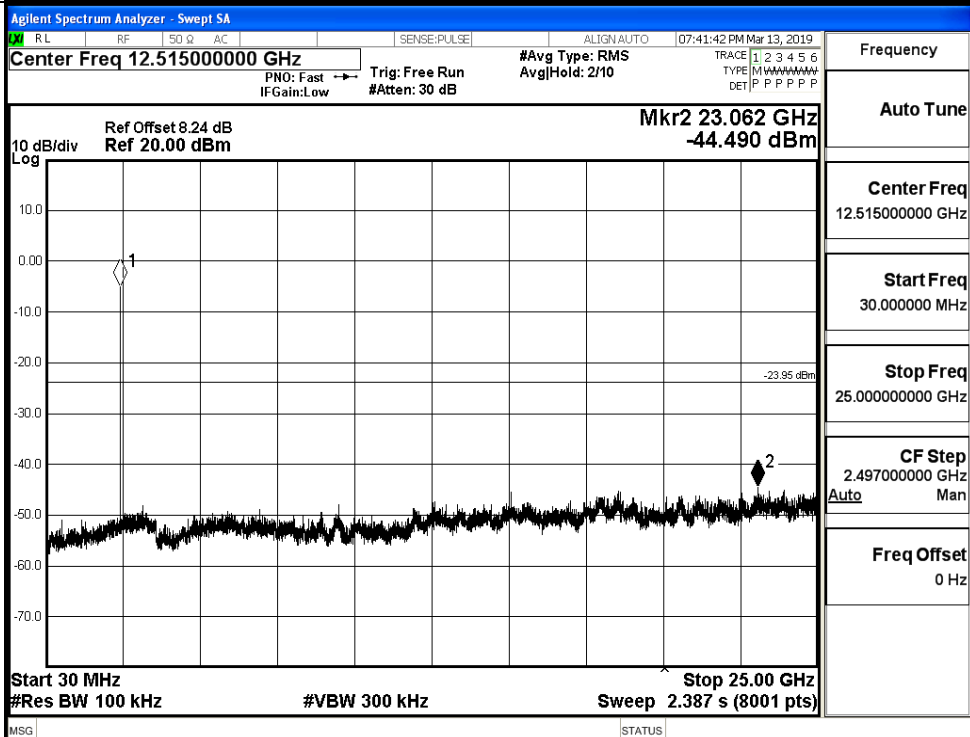


π /4DQPSK_MCH_Graphs

Pref

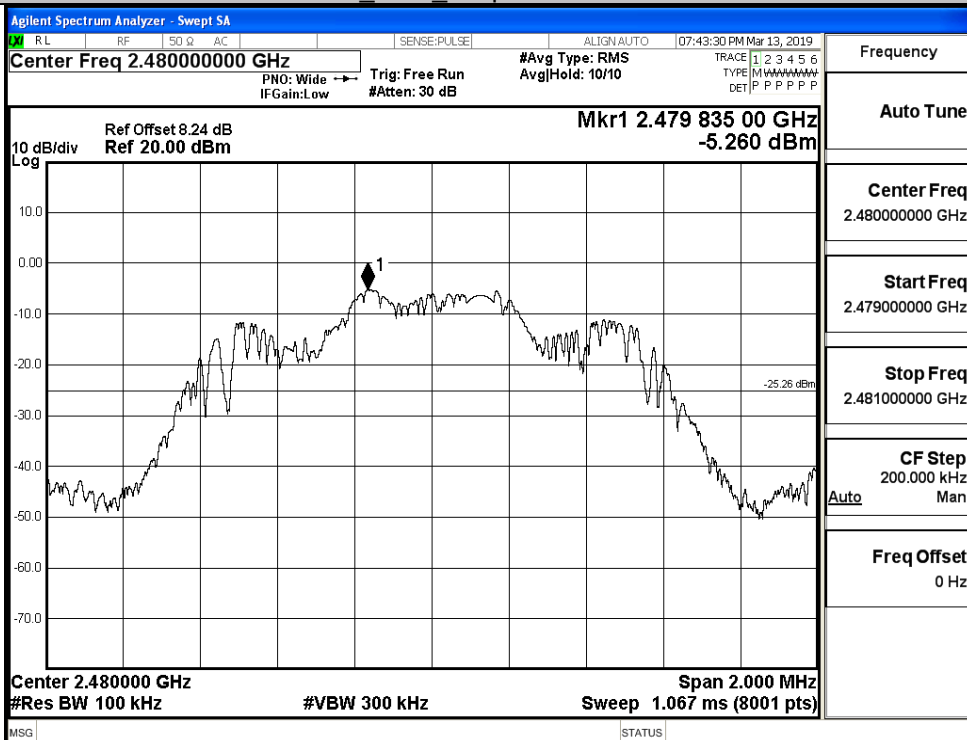


Puw

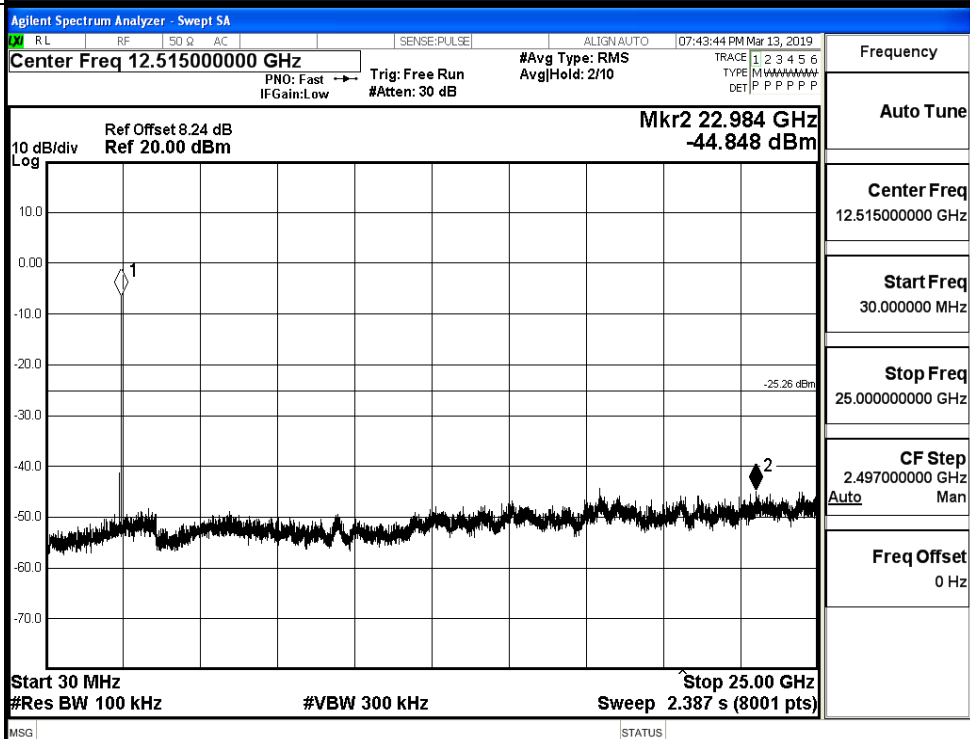


$\pi/4$ DQPSK_HCH_Graphs

Pref



Puw

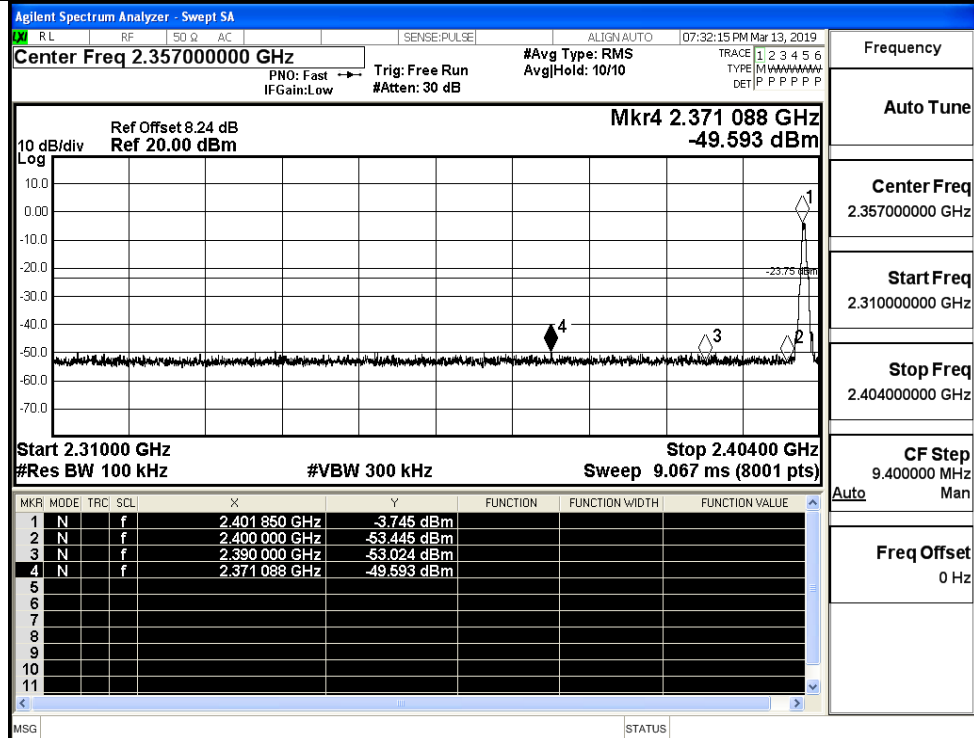


A.7 Band-edge for RF Conducted Emissions

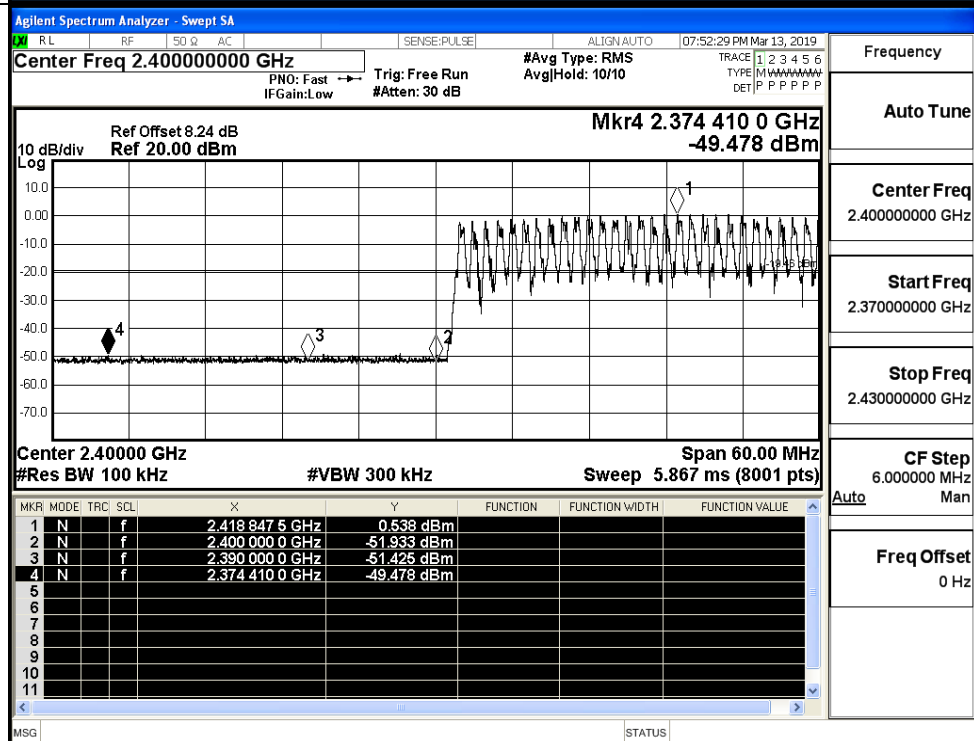
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-3.745	Off	-49.593	-23.75	PASS
			0.538	On	-49.478	-19.46	PASS
	HCH	2480	-3.970	Off	-48.686	-23.97	PASS
			-1.540	On	-48.471	-21.54	PASS
π /4DQPSK	LCH	2402	-4.897	Off	-50.303	-24.9	PASS
			-2.577	On	-49.410	-22.58	PASS
	HCH	2480	-5.294	Off	-49.929	-25.29	PASS
			-3.257	On	-48.753	-23.26	PASS

Test Graphs

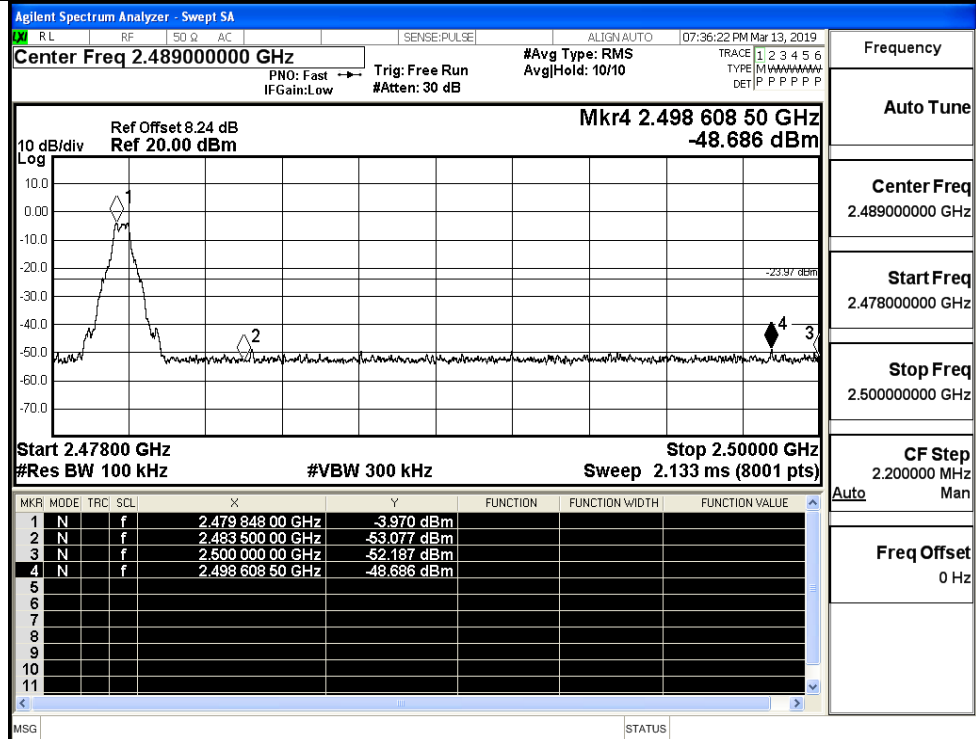
GFSK/LCH/No Hop



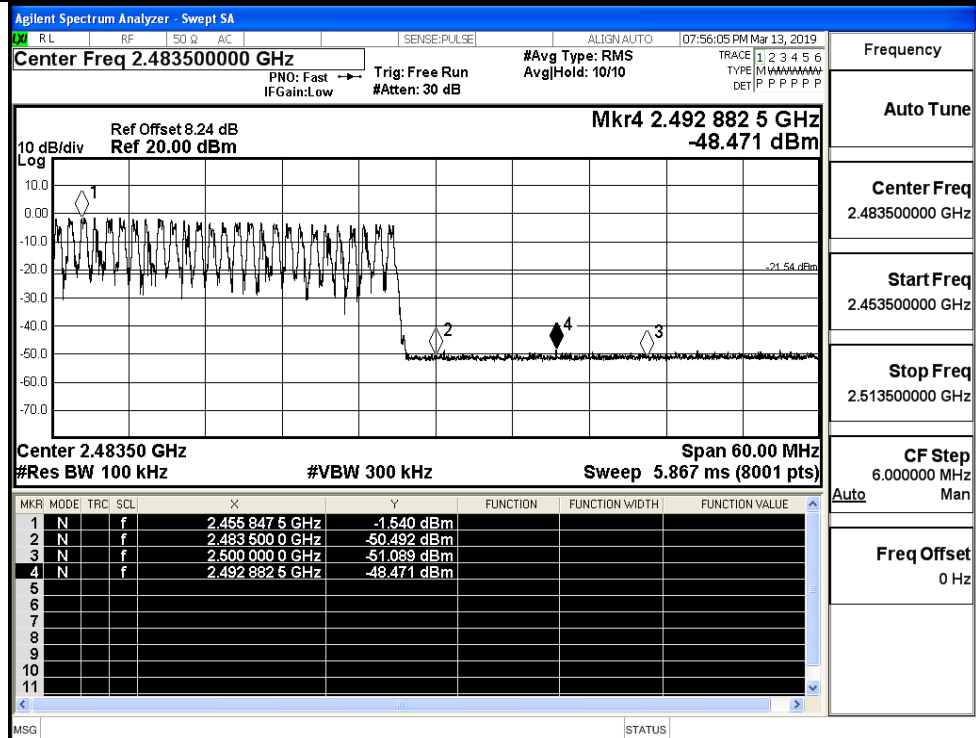
GFSK/LCH/Hop



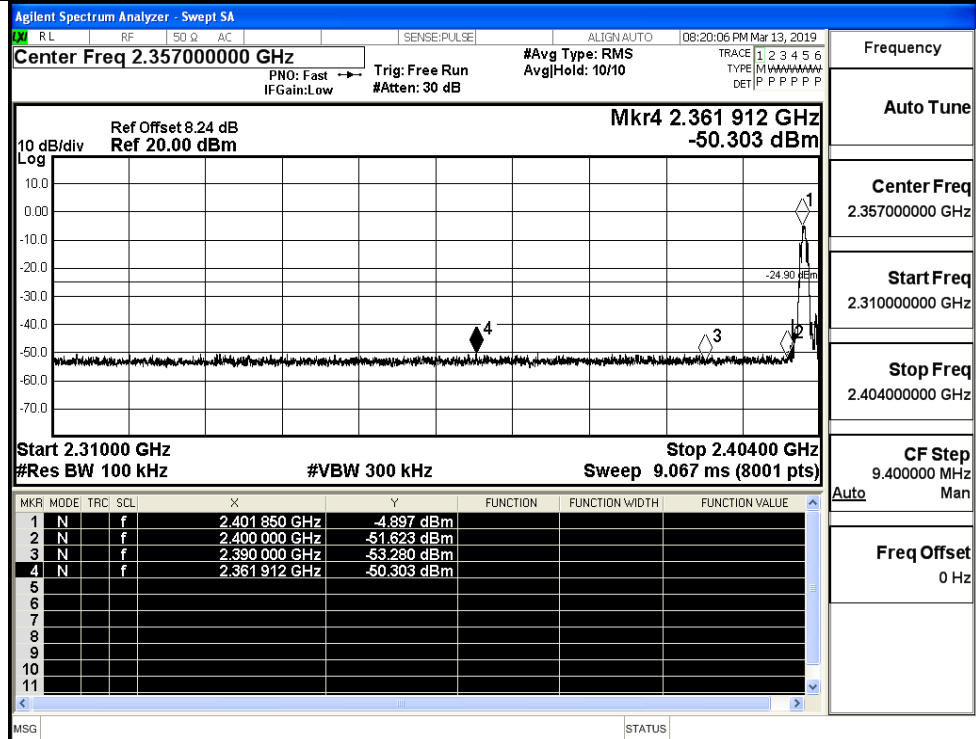
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

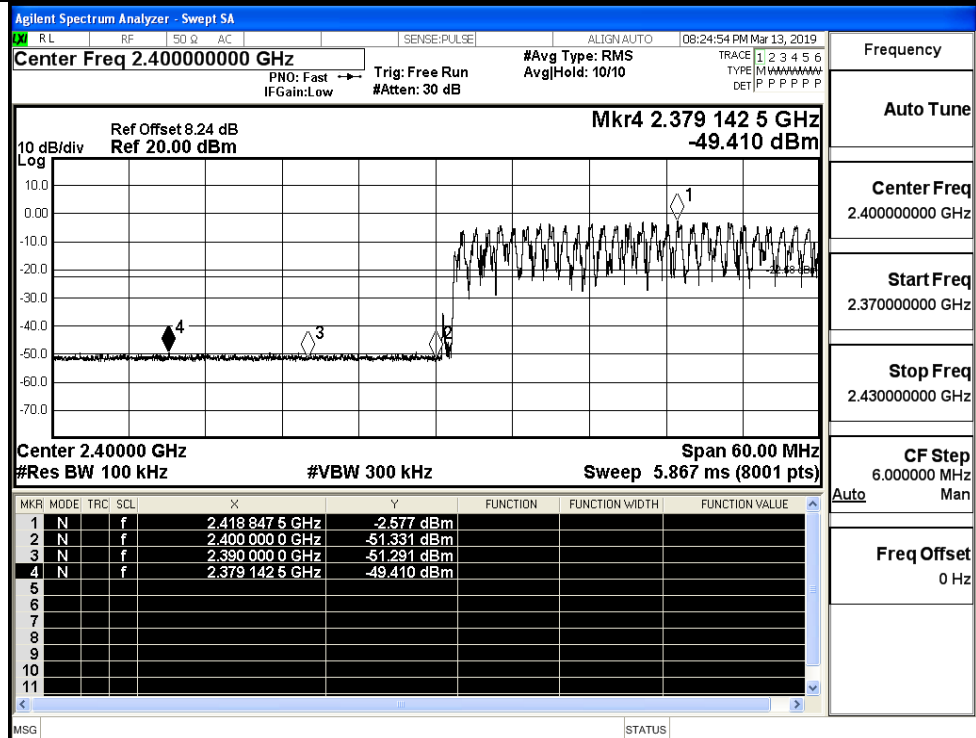
Start Freq
2.310000000 GHz

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

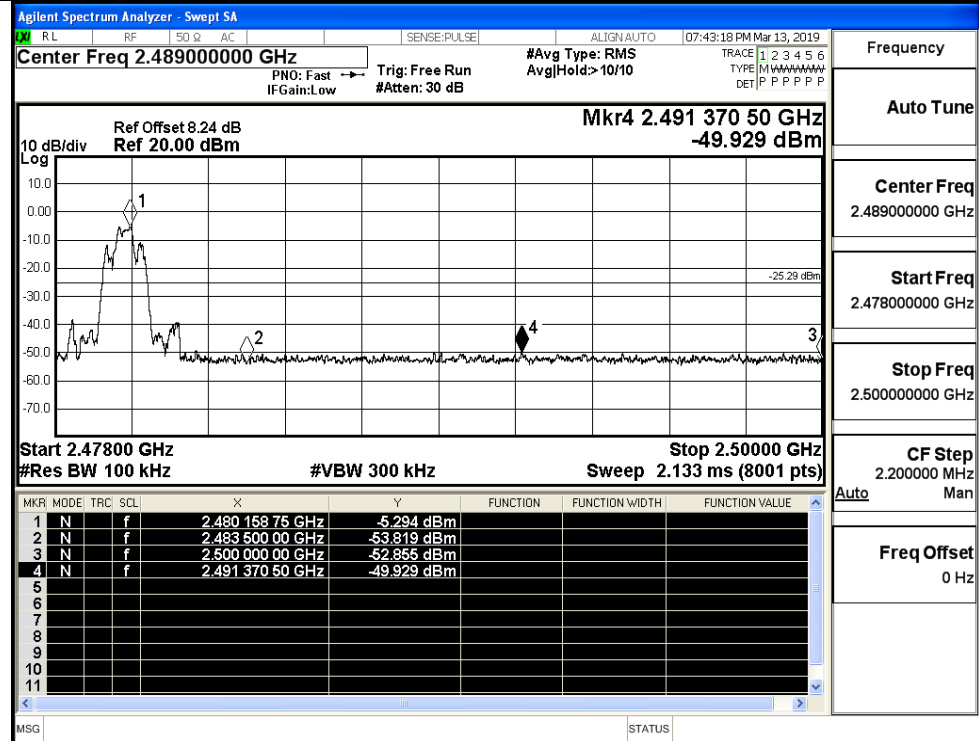
Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz

π /4DQPSK/HCH/No
Hop

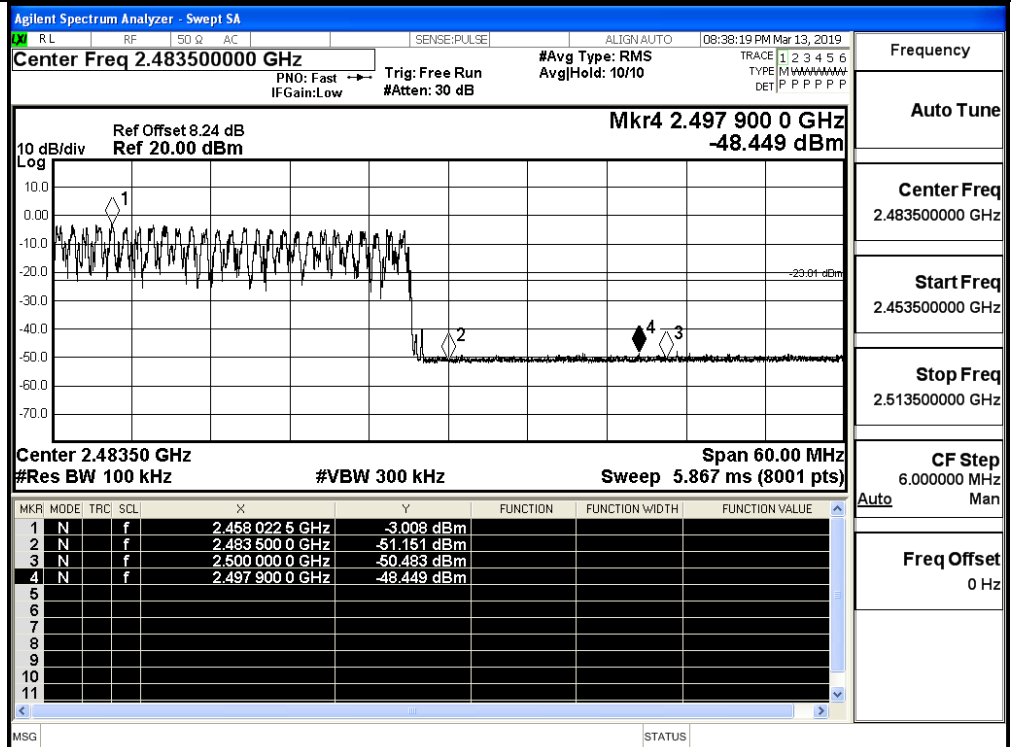


Frequency

Auto Tune

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

π /4DQPSK/HCH/Hop



Frequency

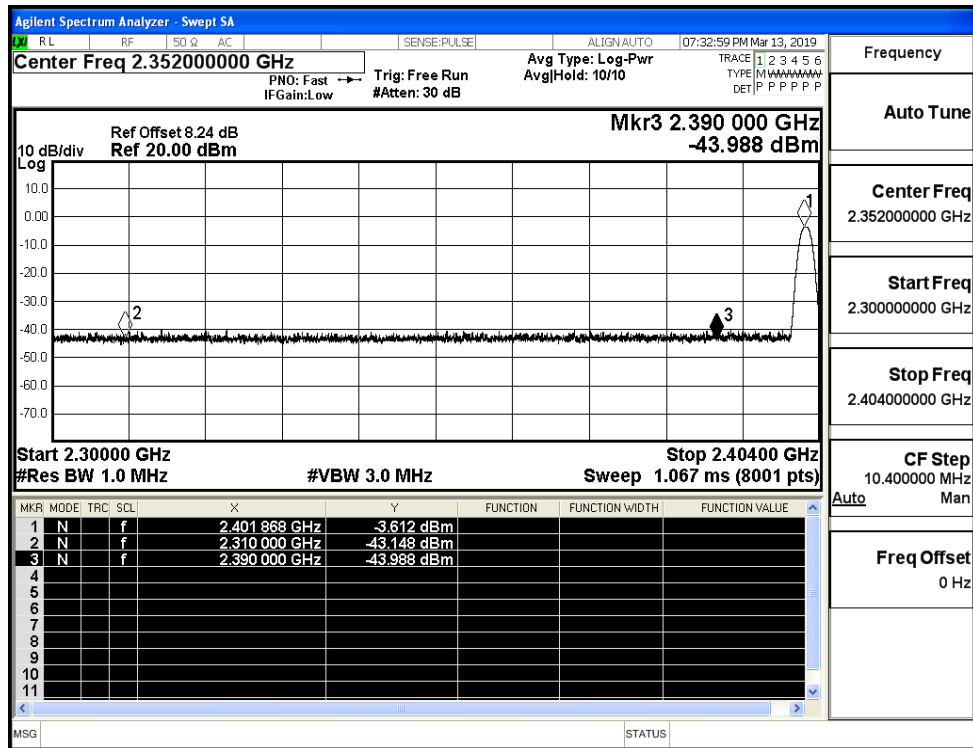
Auto Tune

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

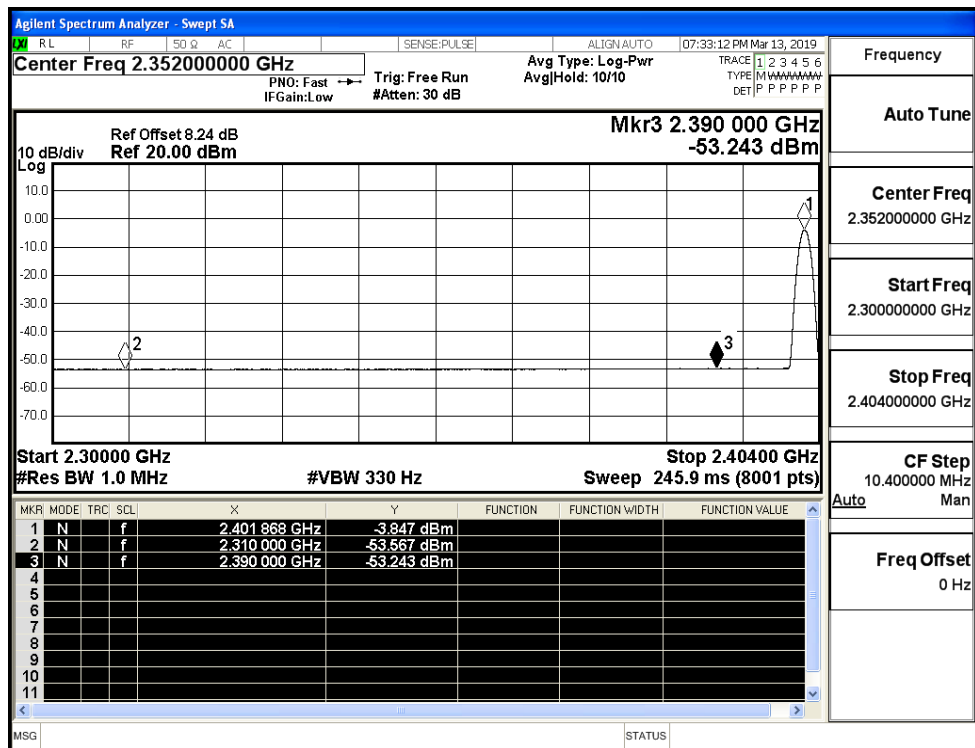
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.15	2.0	0	52.11	PEAK	74	PASS
	Off	2310.0	-53.57	2.0	0	41.69	AV	54	PASS
	Off	2390.0	-43.99	2.0	0	51.27	PEAK	74	PASS
	Off	2390.0	-53.24	2.0	0	42.01	AV	54	PASS
	Off	2483.5	-43.43	2.0	0	51.83	PEAK	74	PASS
	Off	2483.5	-52.97	2.0	0	42.28	AV	54	PASS
	Off	2500.0	-42.58	2.0	0	52.68	PEAK	74	PASS
	Off	2500.0	-52.72	2.0	0	42.53	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.70	2.0	0	51.56	PEAK	74	PASS
	Off	2310.0	-53.49	2.0	0	41.77	AV	54	PASS
	Off	2390.0	-43.28	2.0	0	51.98	PEAK	74	PASS
	Off	2390.0	-53.12	2.0	0	42.14	AV	54	PASS
	Off	2483.5	-42.82	2.0	0	52.44	PEAK	74	PASS
	Off	2483.5	-52.95	2.0	0	42.31	AV	54	PASS
	Off	2500.0	-41.29	2.0	0	53.97	PEAK	74	PASS
	Off	2500.0	-52.87	2.0	0	42.39	AV	54	PASS

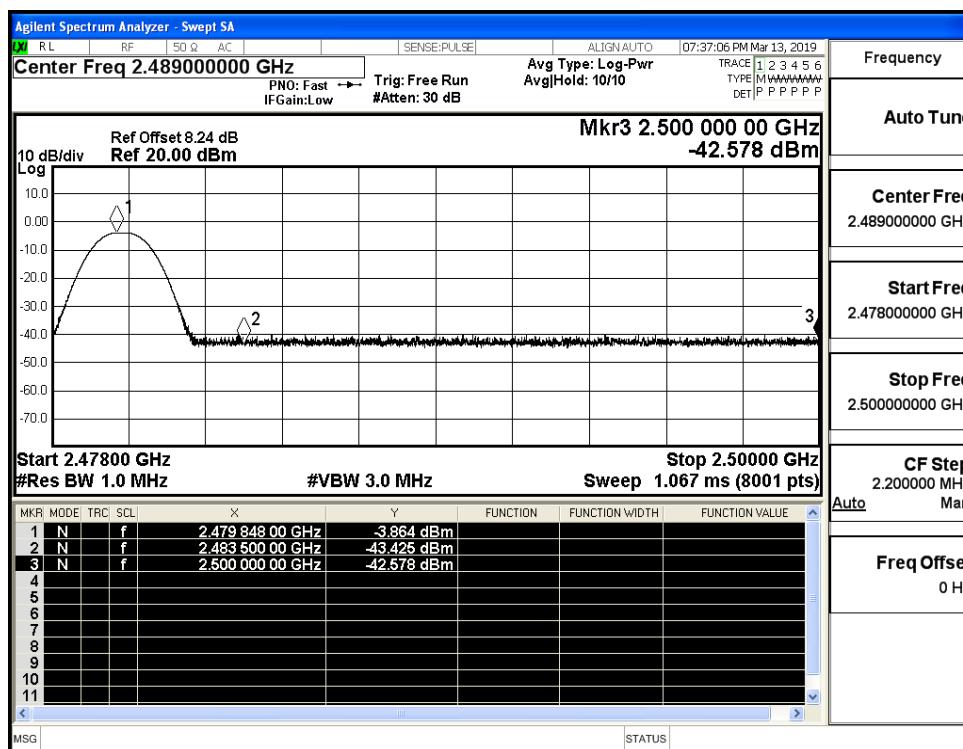
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



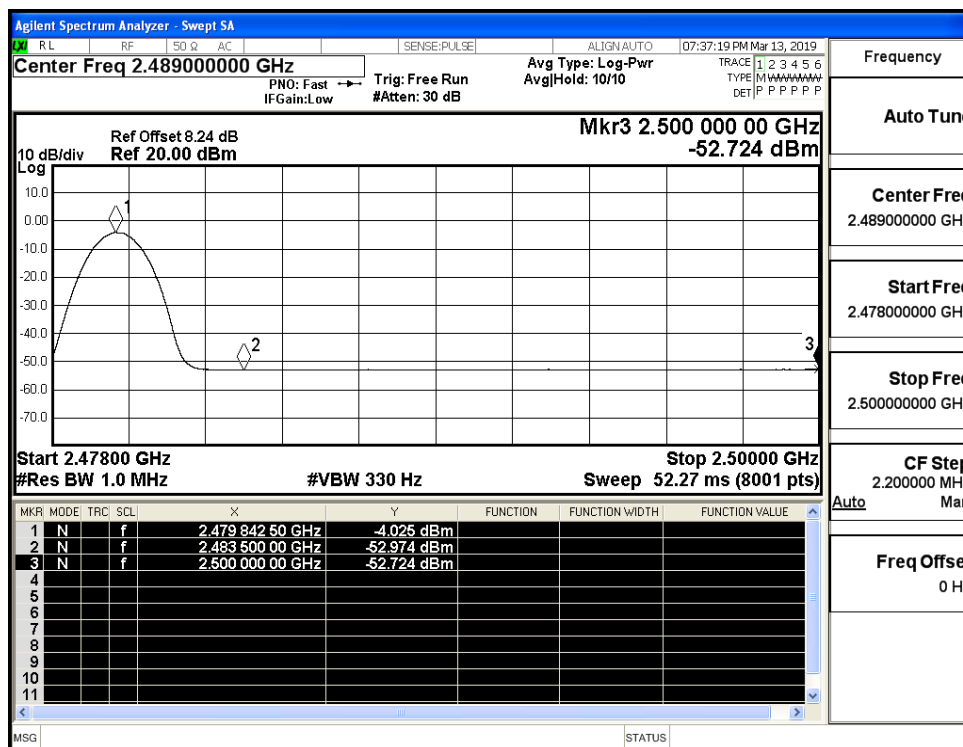
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

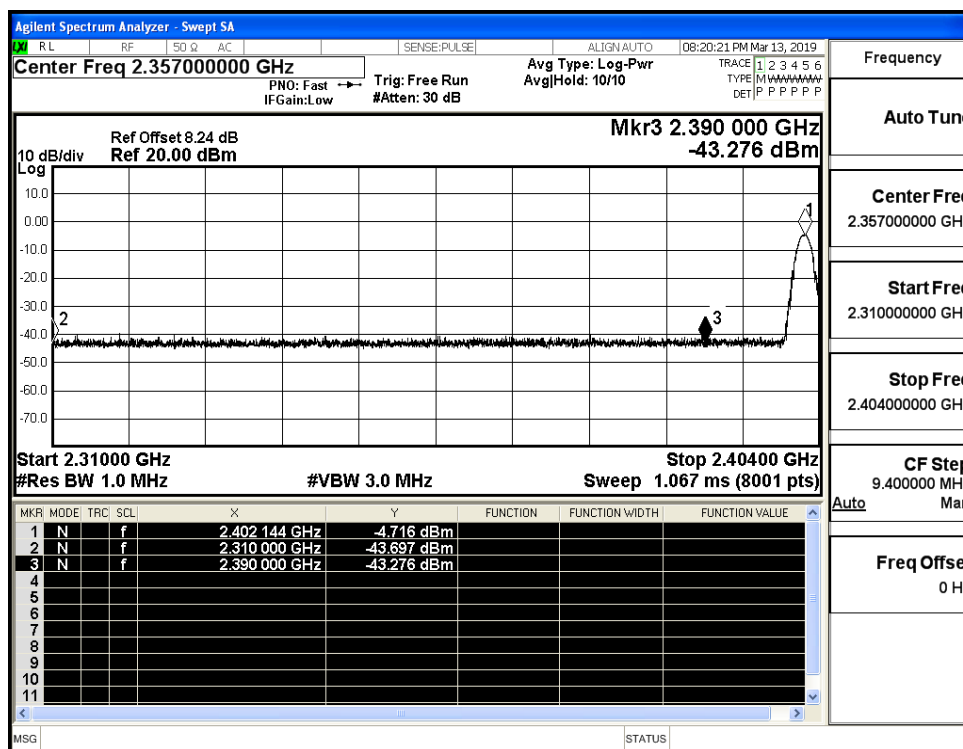
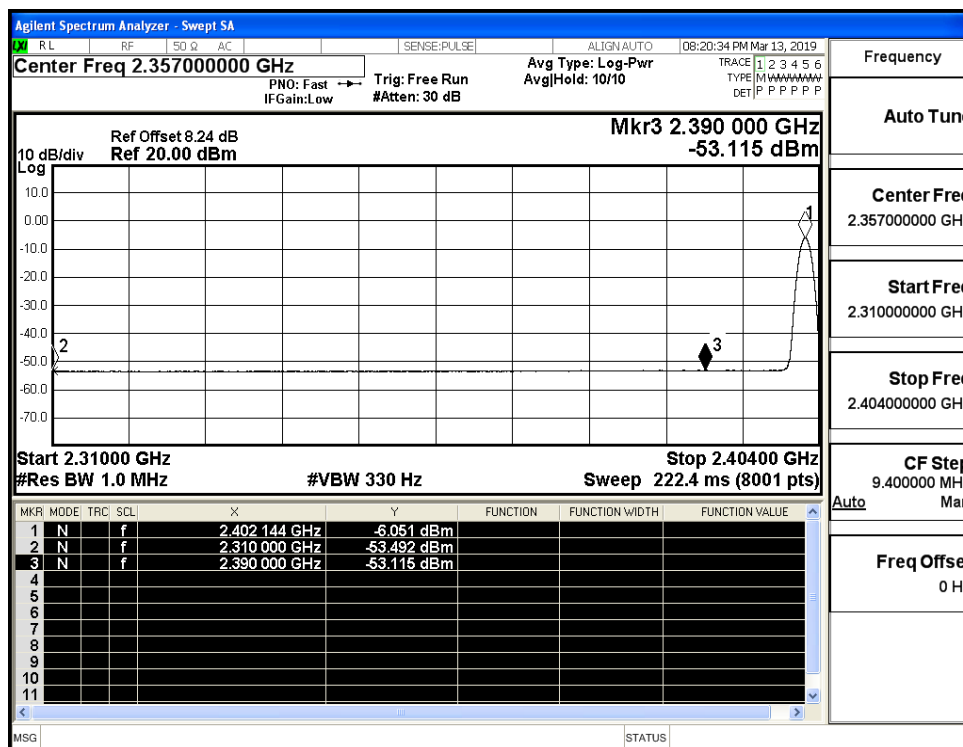


Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)

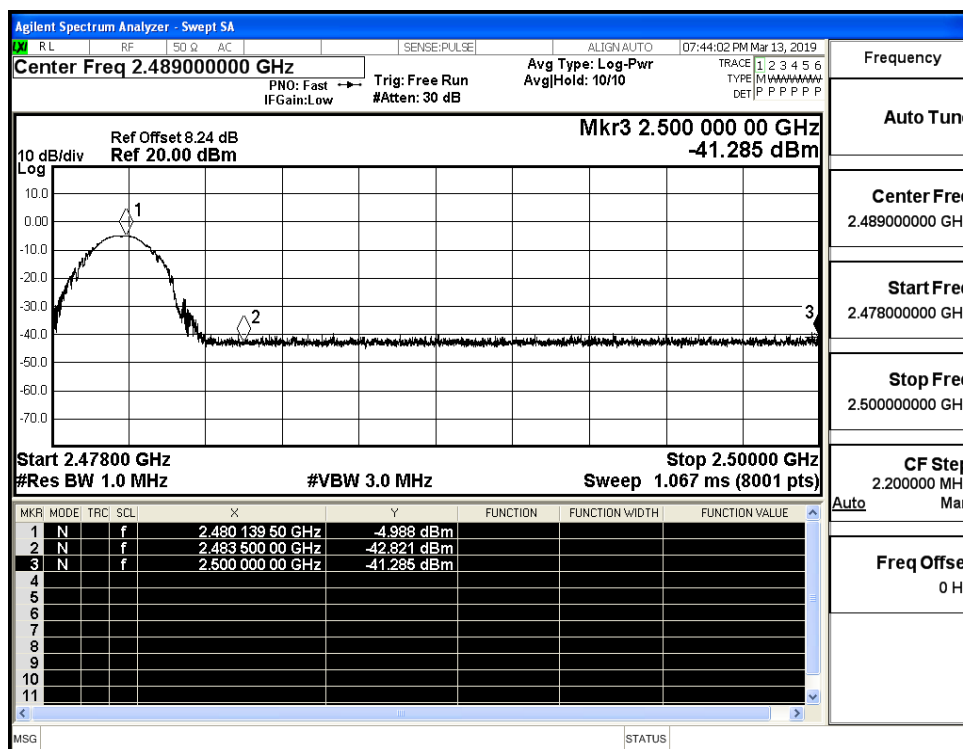


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



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)

