

Appendix A

RF Test Data for BT V5.0(BDR/EDR) (Conducted Measurement)

Product Name: Showerhead Speaker

Trade Mark: atomi

Test Model: AT1393

Environmental Conditions

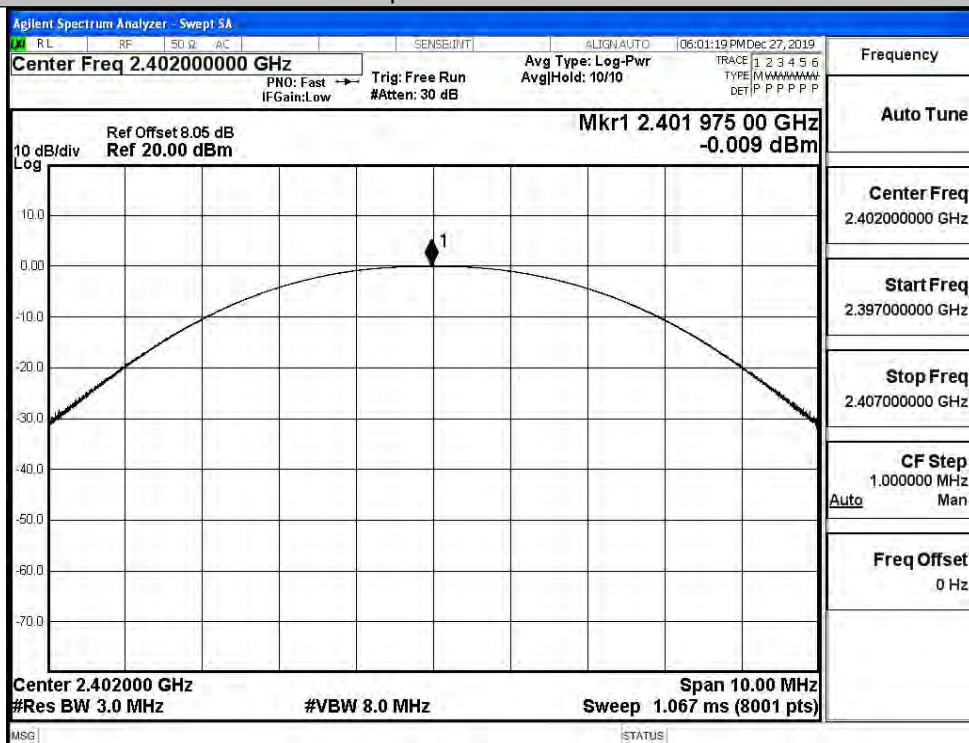
Temperature:	24.3 ° C
Relative Humidity:	53.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Qu Xin
Supervised by:	Wang Chuang

A.1 Maximum Conducted Peak Output Power

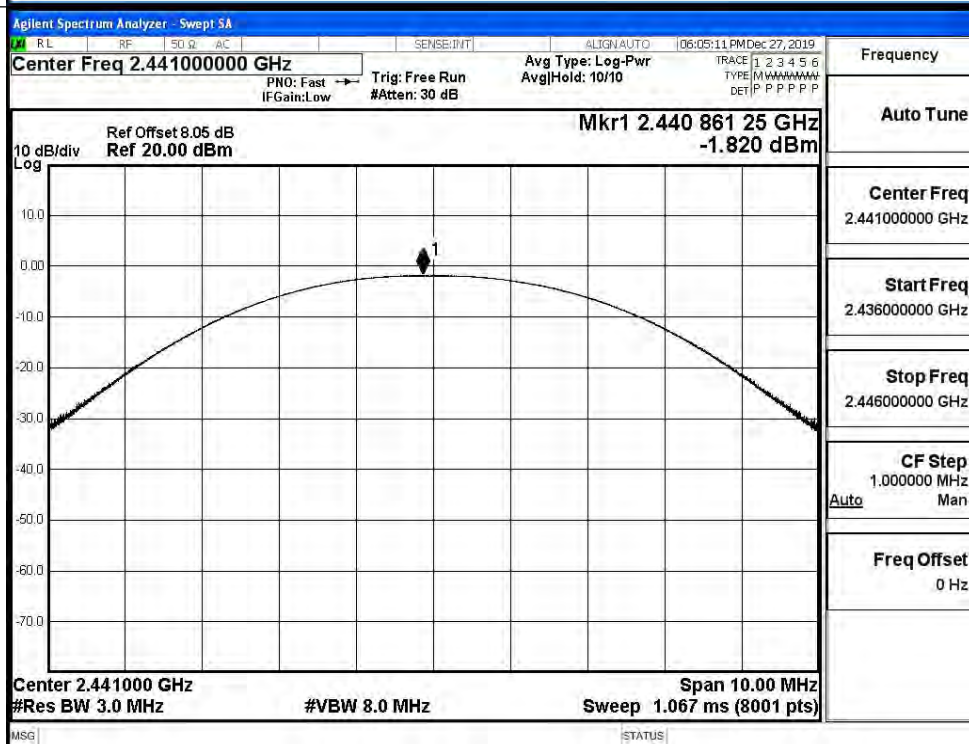
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.009	30	PASS
	MCH	-1.820	30	PASS
	HCH	-0.630	30	PASS
$\pi/4$ DQPSK	LCH	-0.788	21	PASS
	MCH	-2.543	21	PASS
	HCH	-1.447	21	PASS
8DPSK	LCH	-0.611	21	PASS
	MCH	-2.335	21	PASS
	HCH	-1.231	21	PASS

Test Graphs

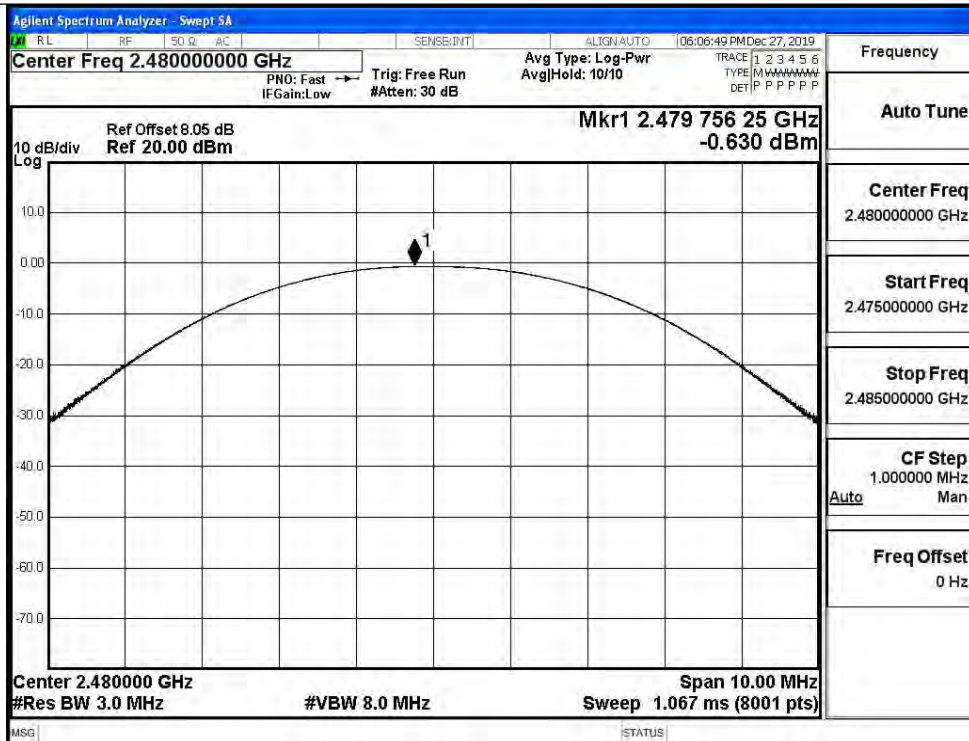
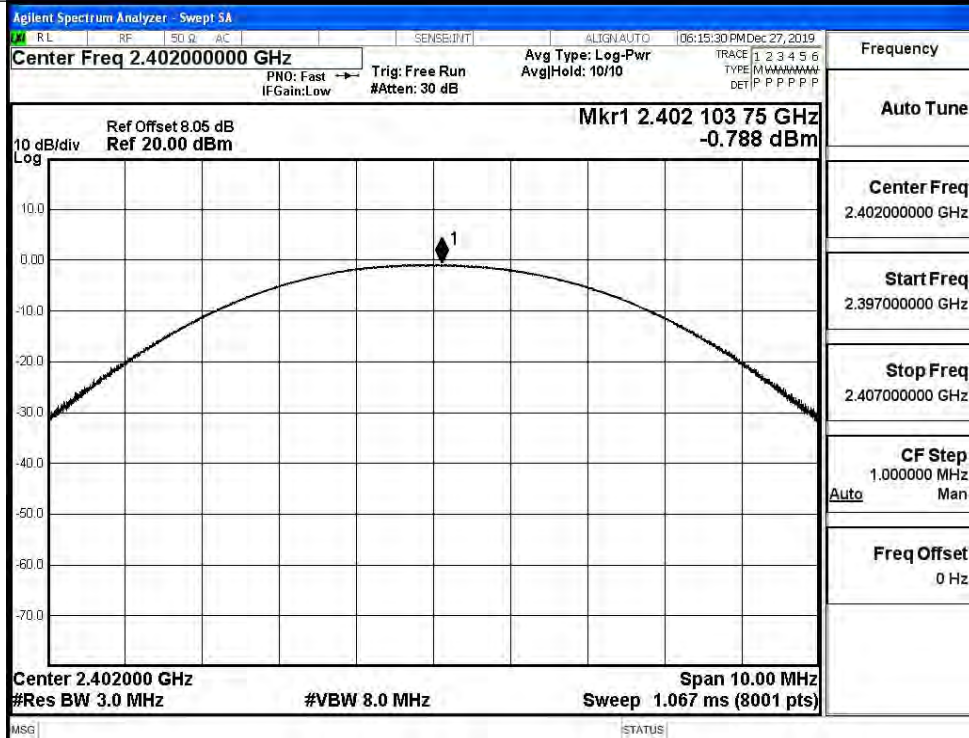
GFSK/LCH

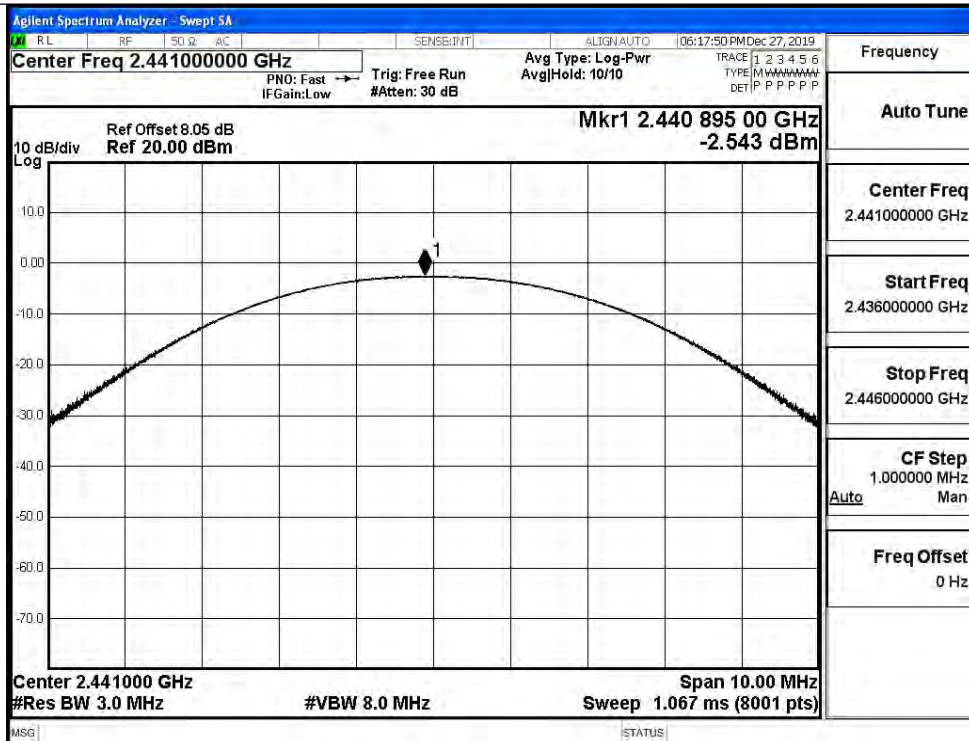
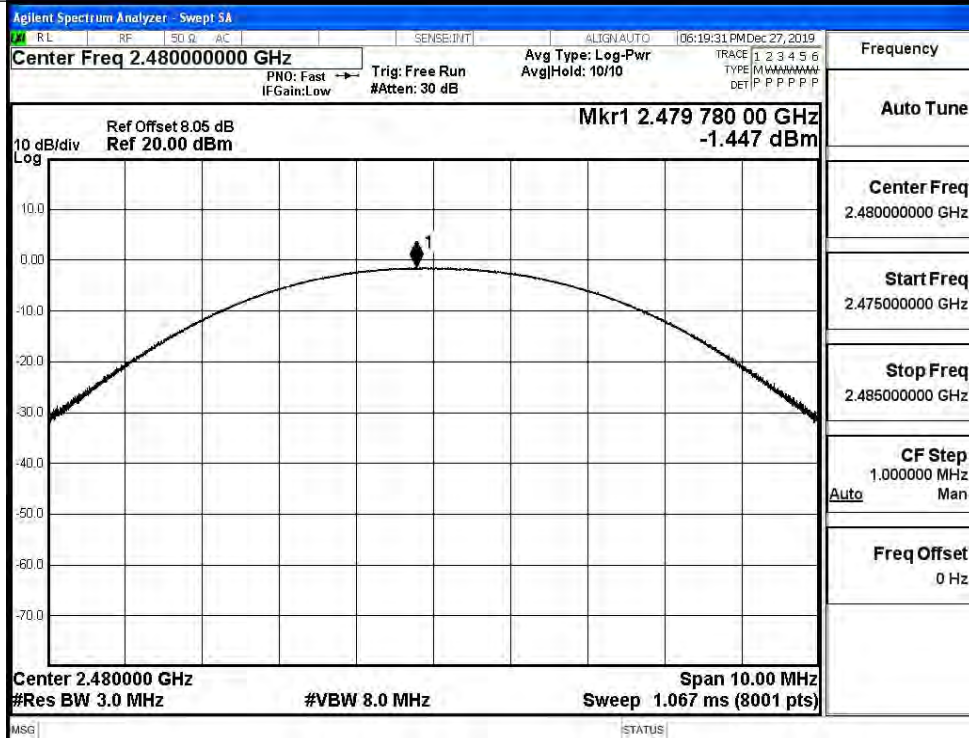


GFSK/MCH

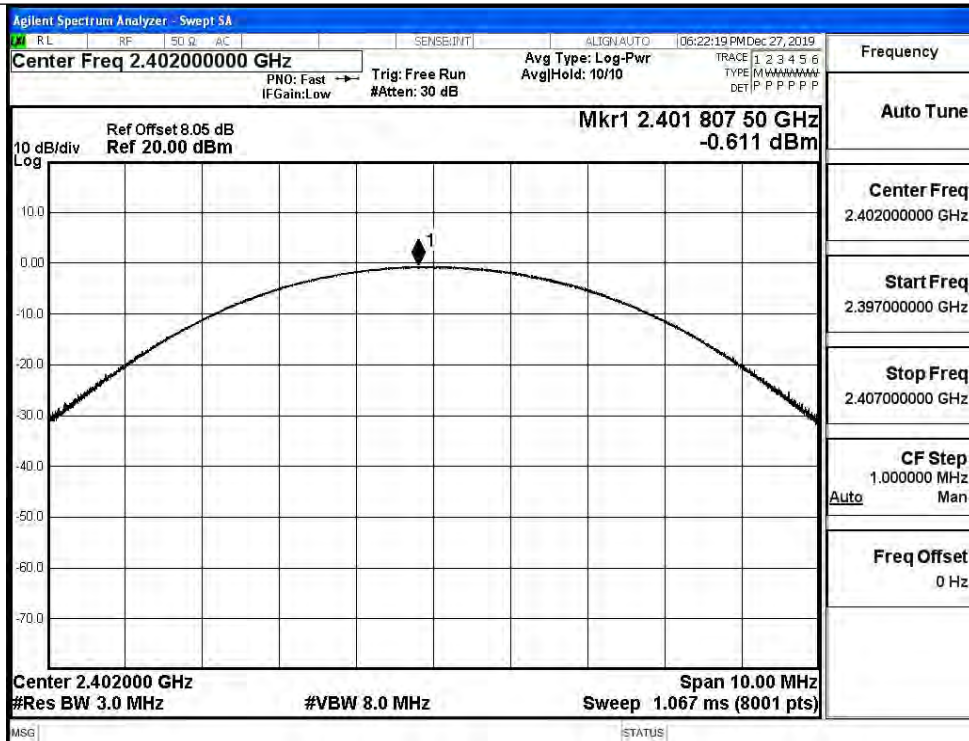


GFSK/HCH

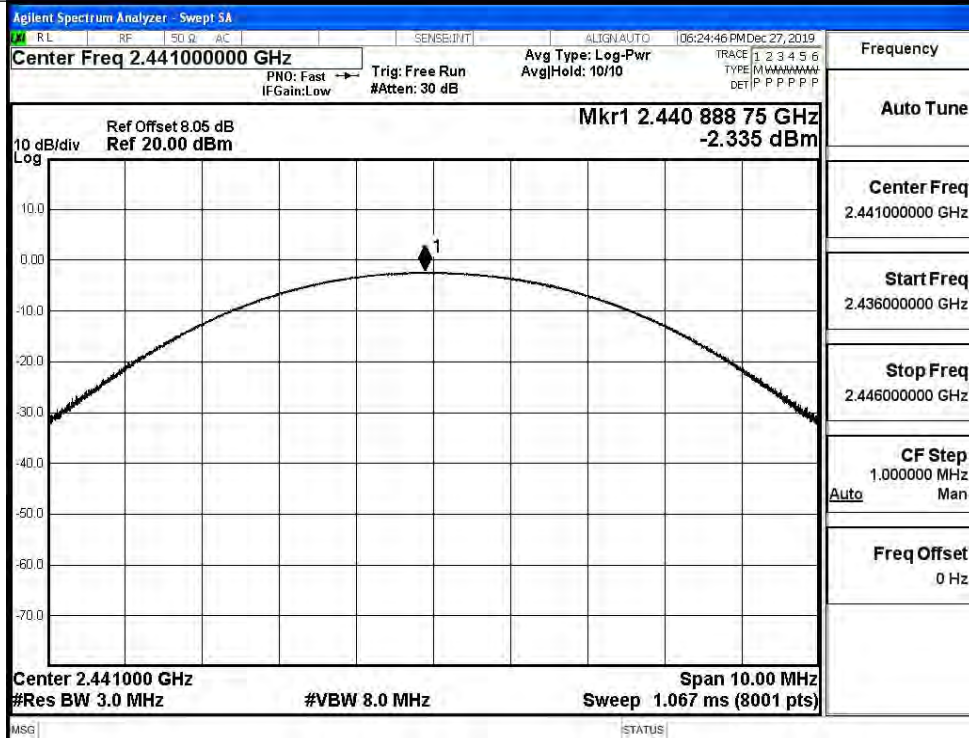
 π /4DQPSK/LCH

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

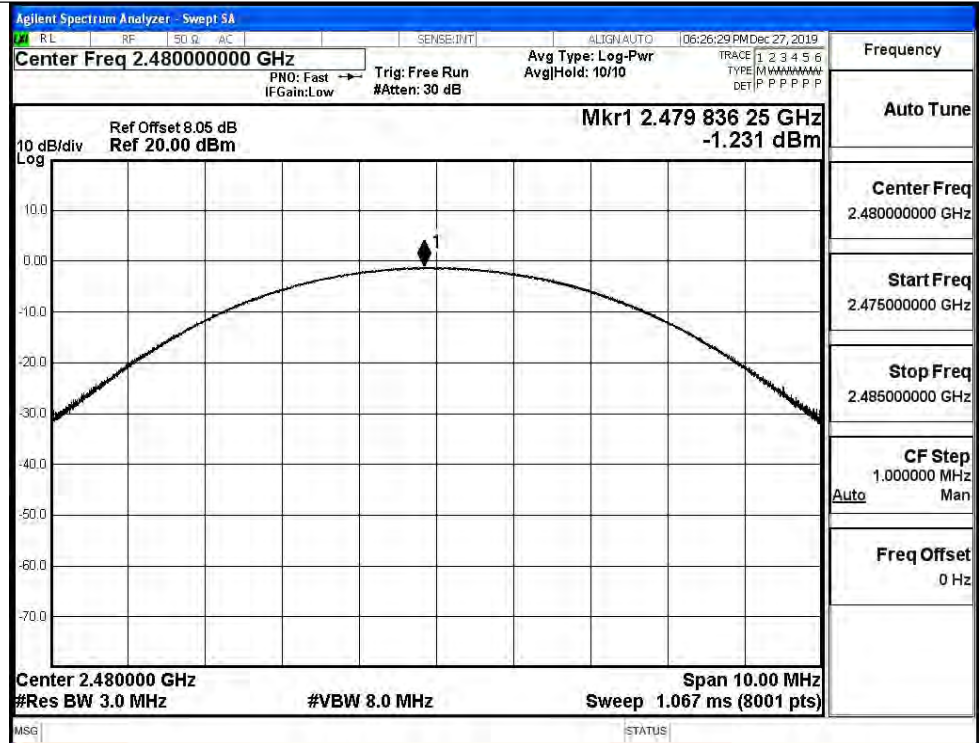
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

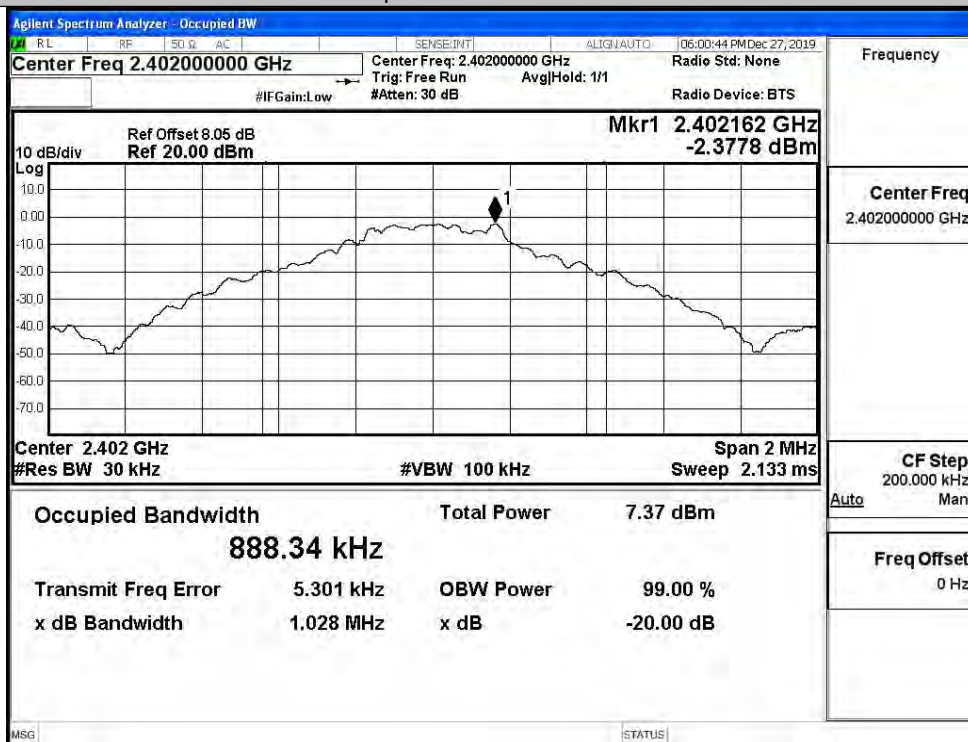


A.2 20dB Bandwidth

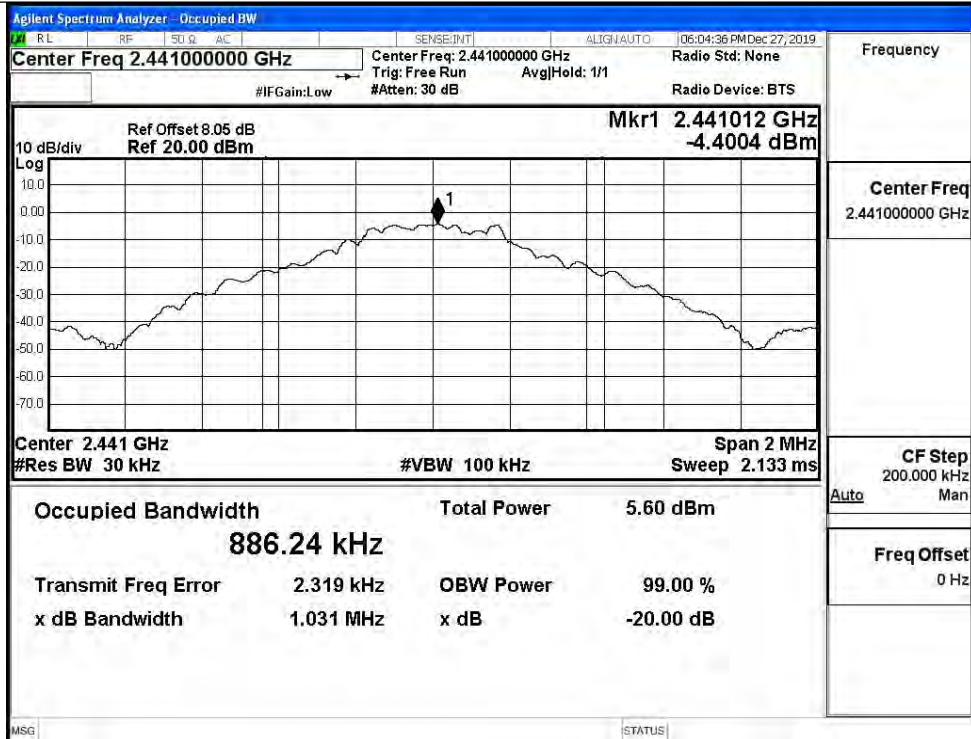
Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.028	Not Specified	PASS
	MCH	1.031	Not Specified	PASS
	HCH	1.031	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.287	Not Specified	PASS
	MCH	1.310	Not Specified	PASS
	HCH	1.289	Not Specified	PASS
8DPSK	LCH	1.292	Not Specified	PASS
	MCH	1.297	Not Specified	PASS
	HCH	1.294	Not Specified	PASS

Test Graphs

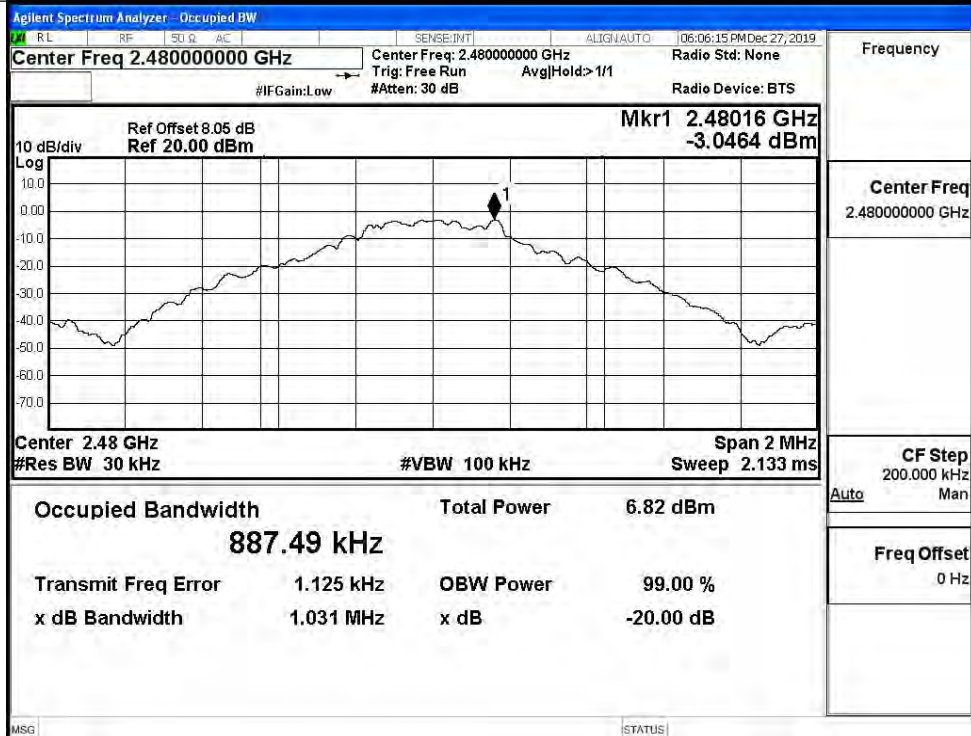
GFSK/LCH

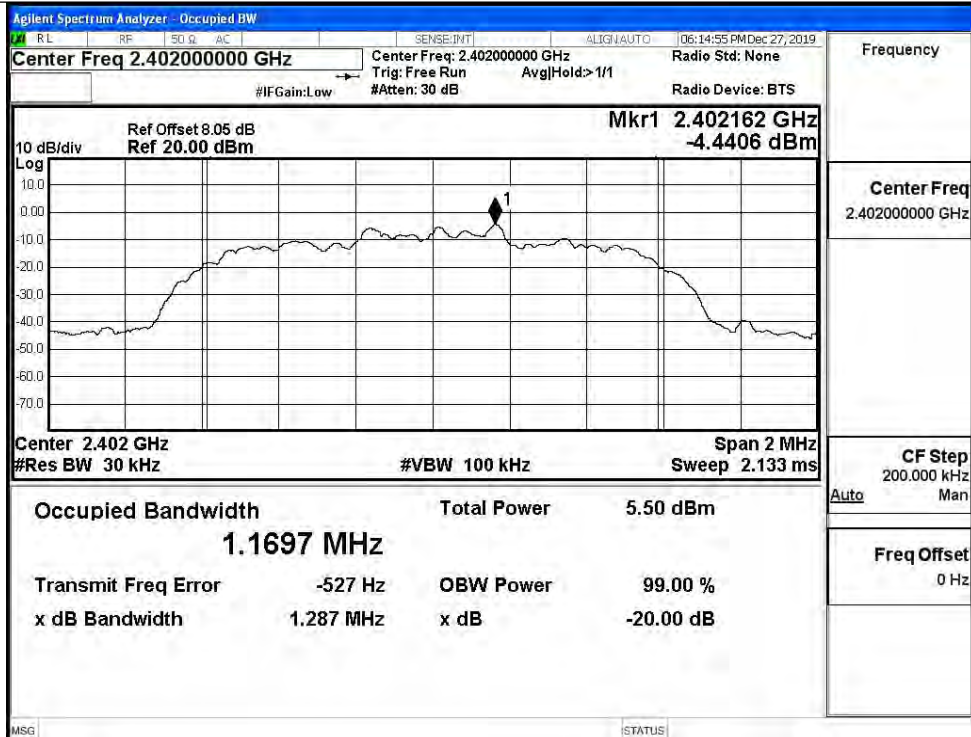
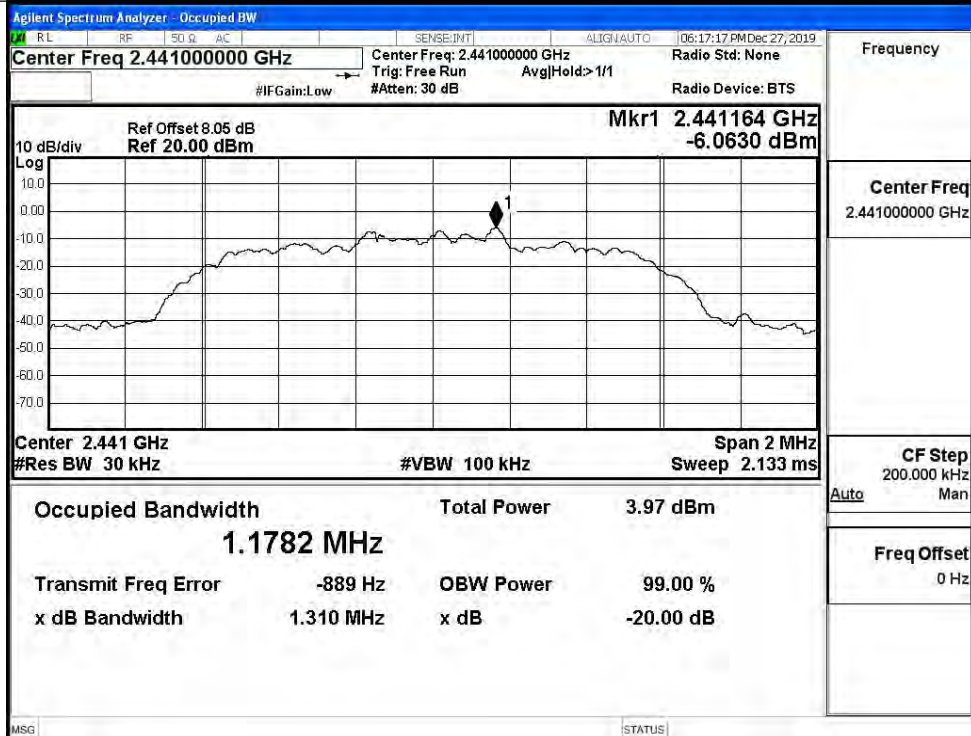


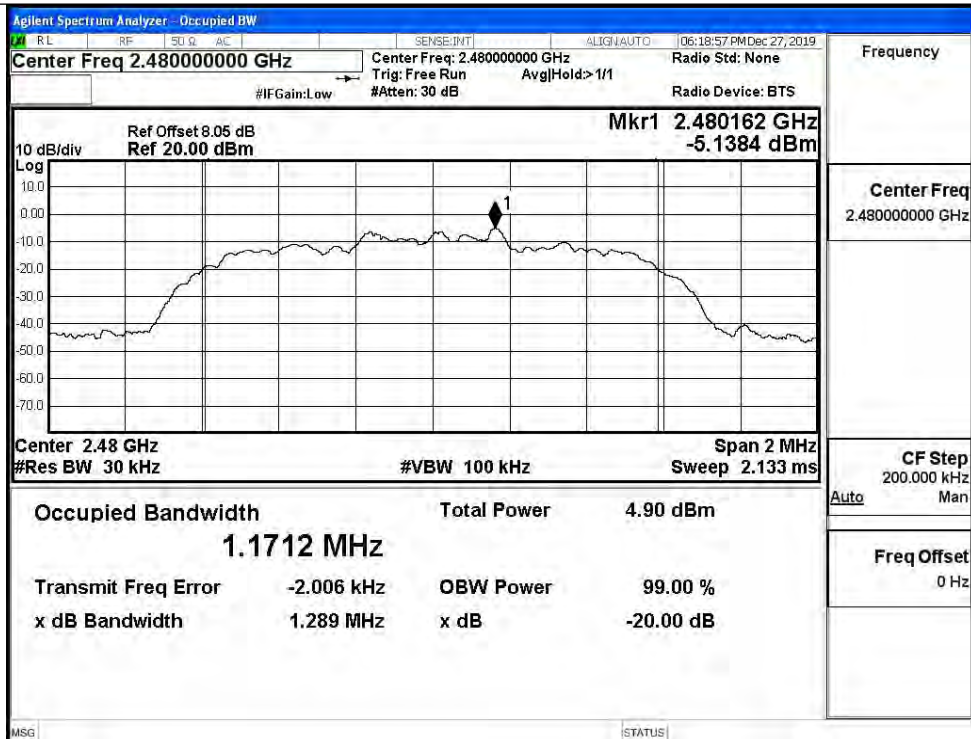
GFSK/MCH



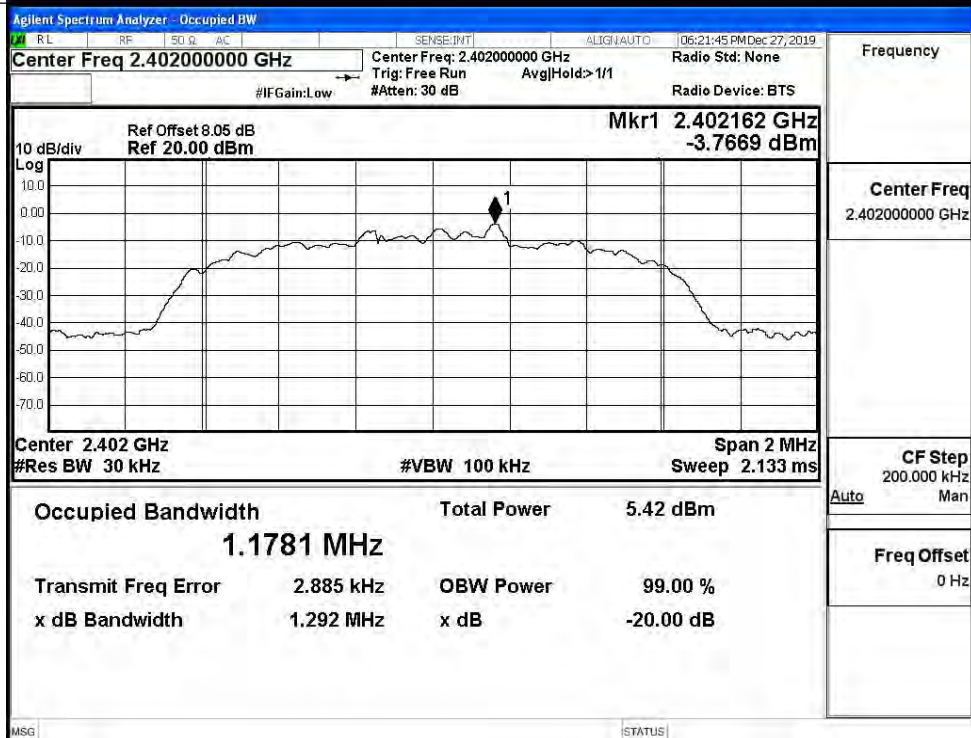
GFSK/HCH



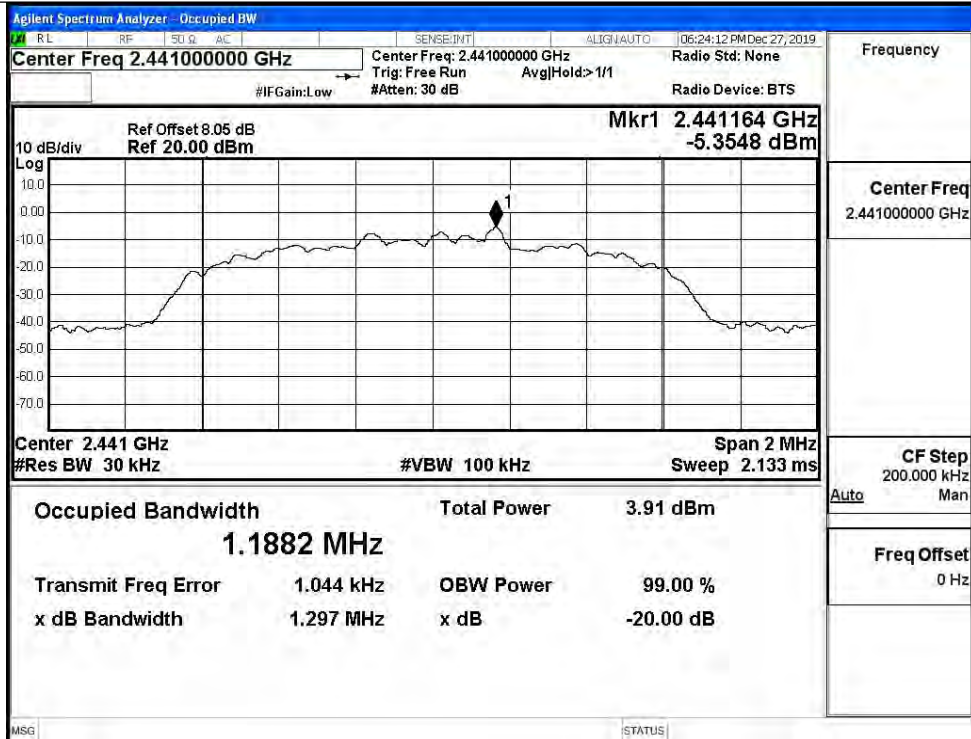
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

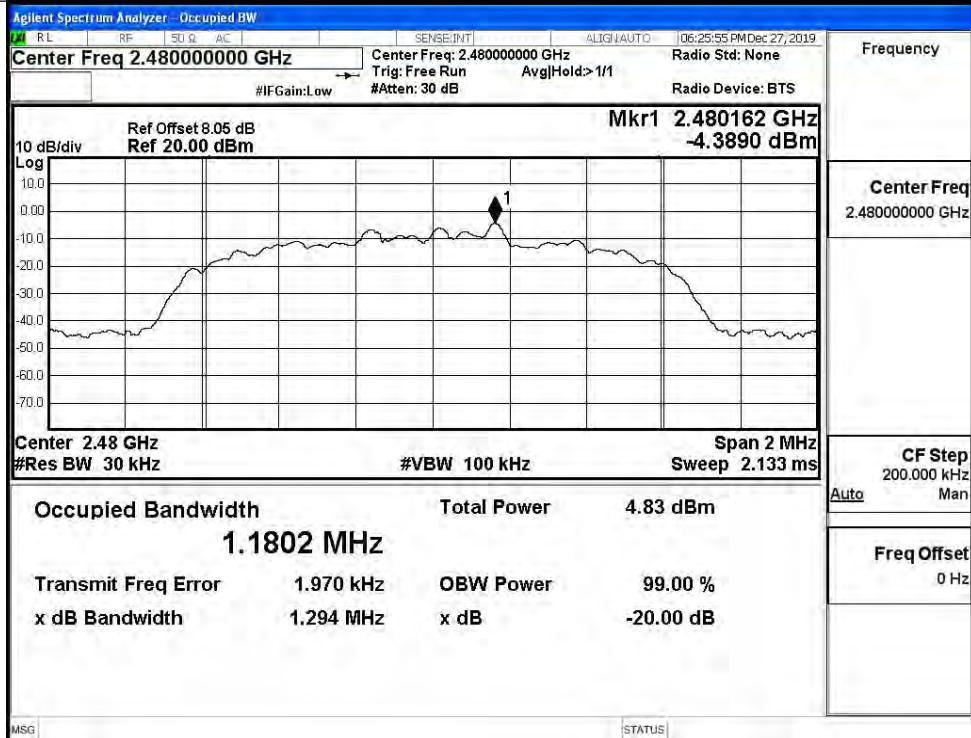
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

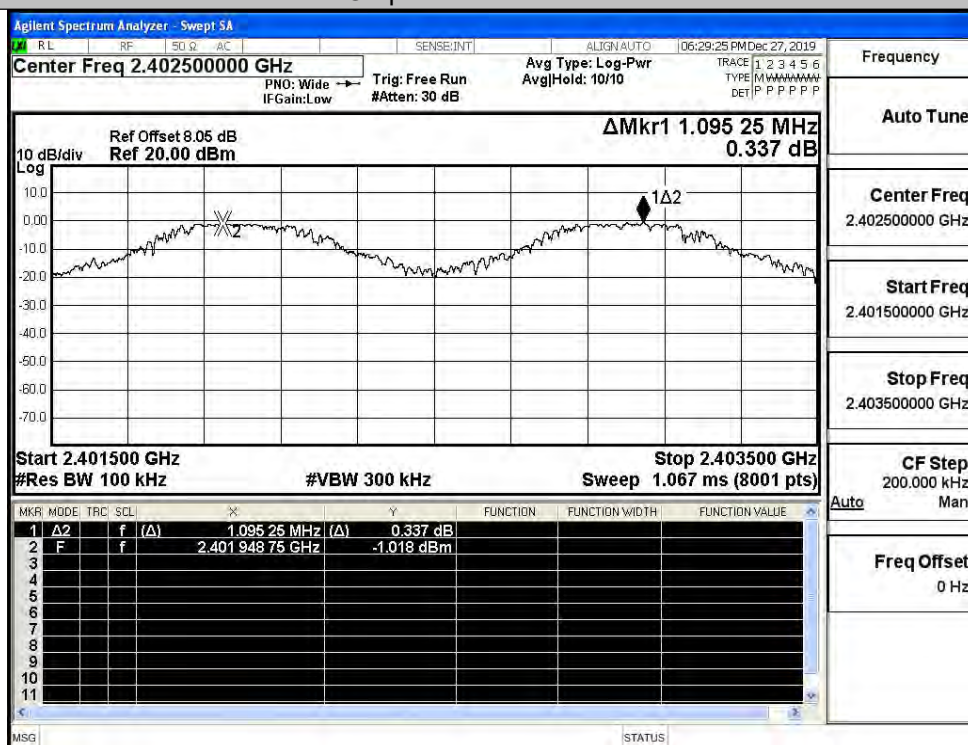


A.3 Carrier Frequency Separation

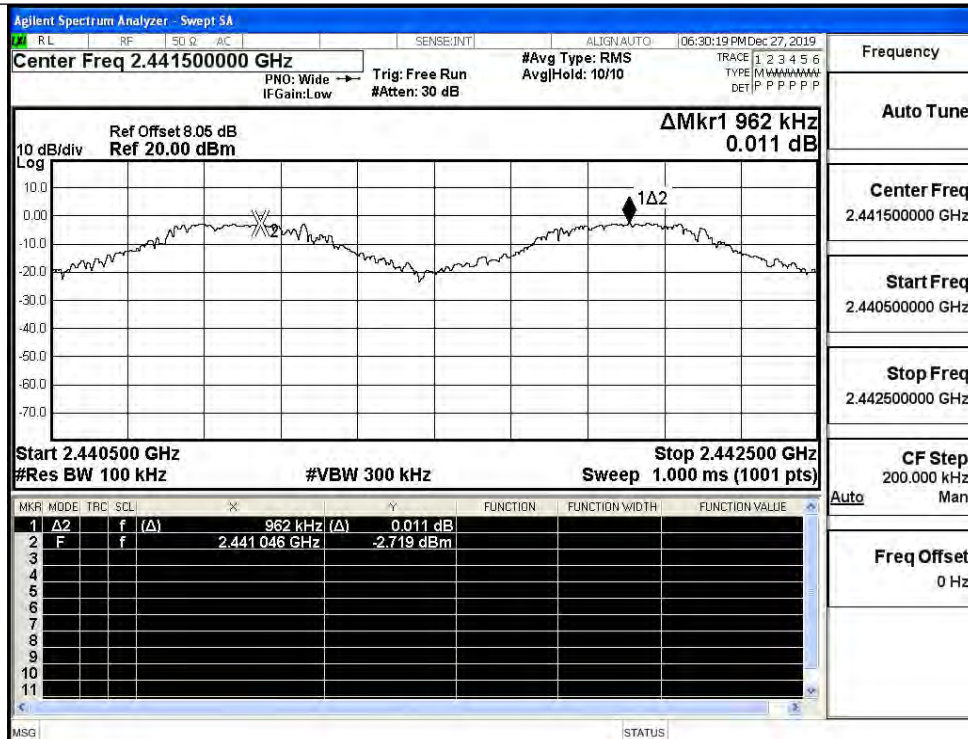
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.095	0.687	PASS
	MCH	0.962	0.687	PASS
	HCH	0.900	0.687	PASS
$\pi/4$ DQPSK	LCH	0.998	0.873	PASS
	MCH	0.650	0.873	PASS
	HCH	0.694	0.873	PASS
8DPSK	LCH	0.992	0.865	PASS
	MCH	1.054	0.865	PASS
	HCH	0.962	0.865	PASS

Test Graphs

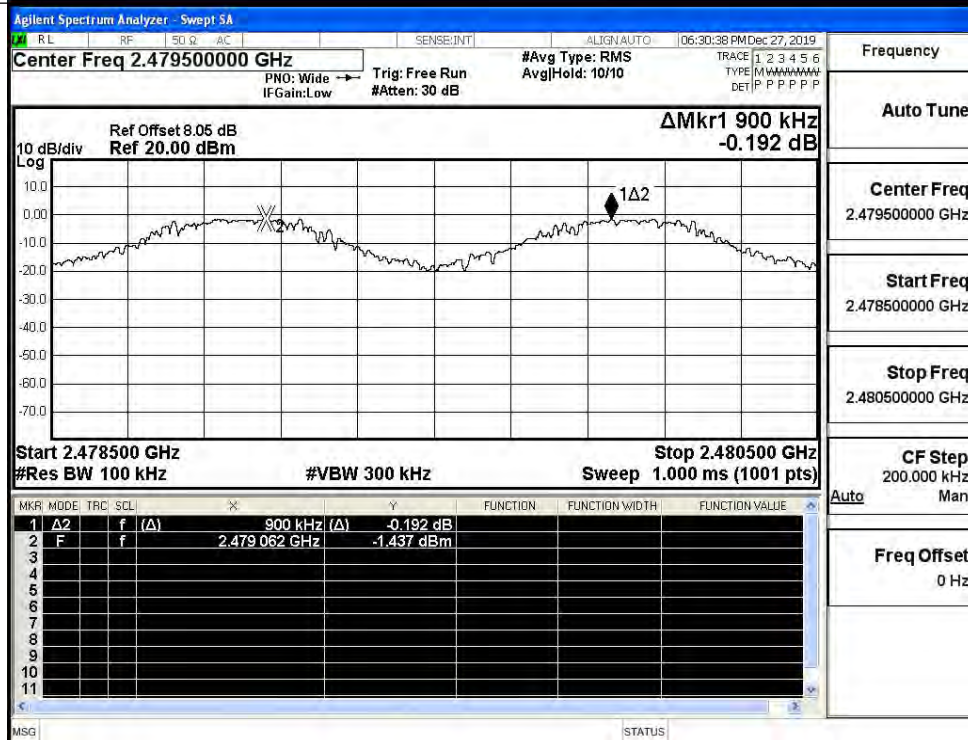
GFSK/LCH

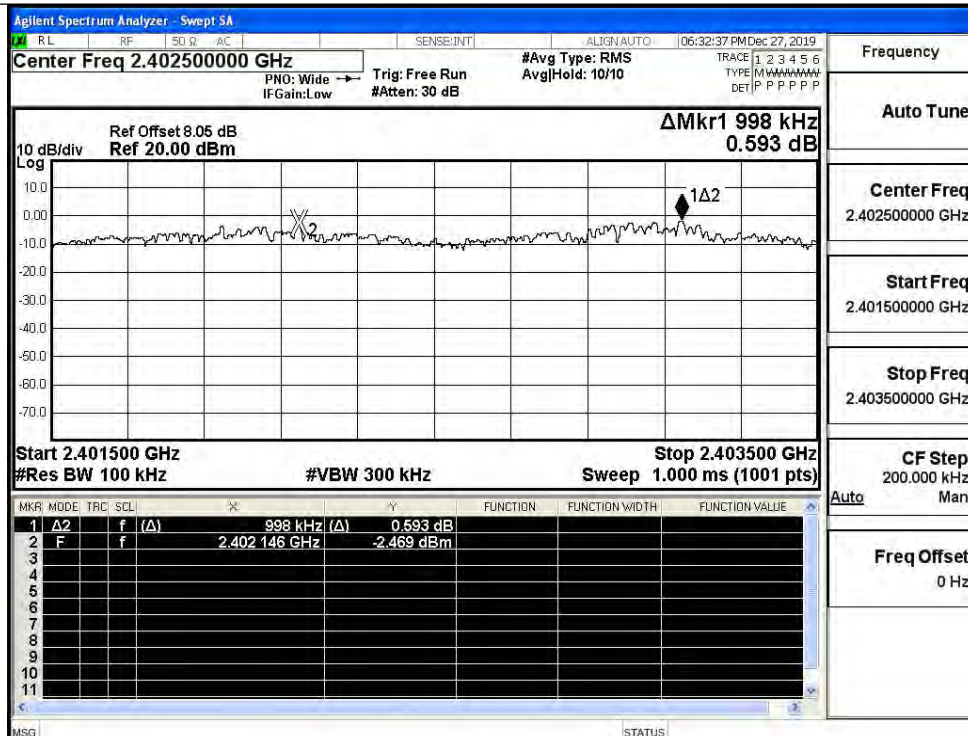
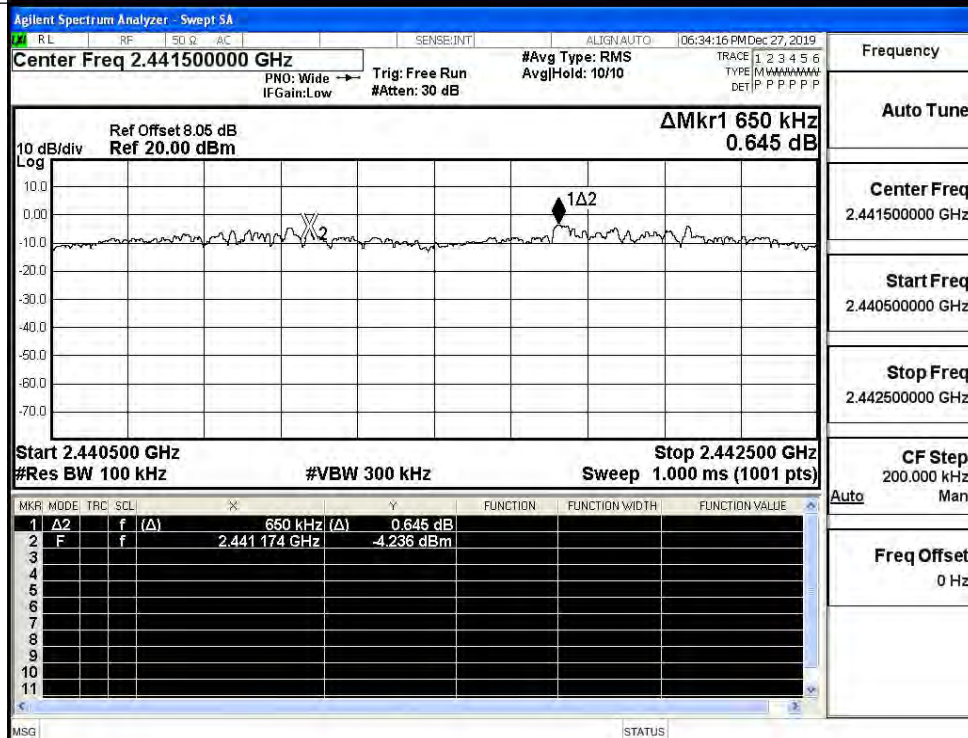


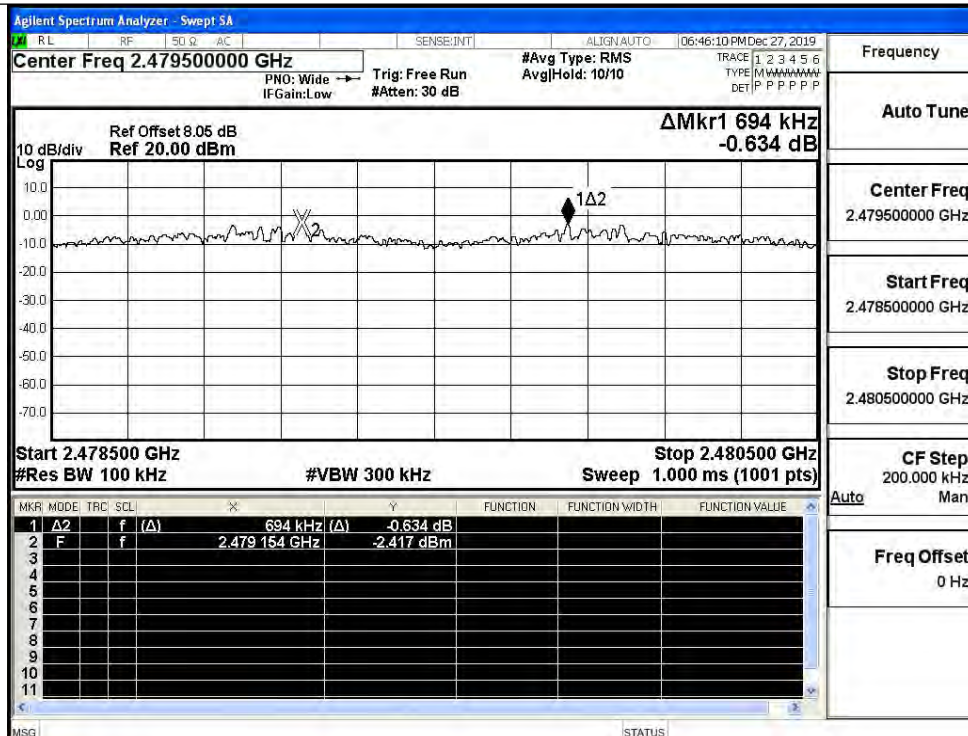
GFSK/MCH



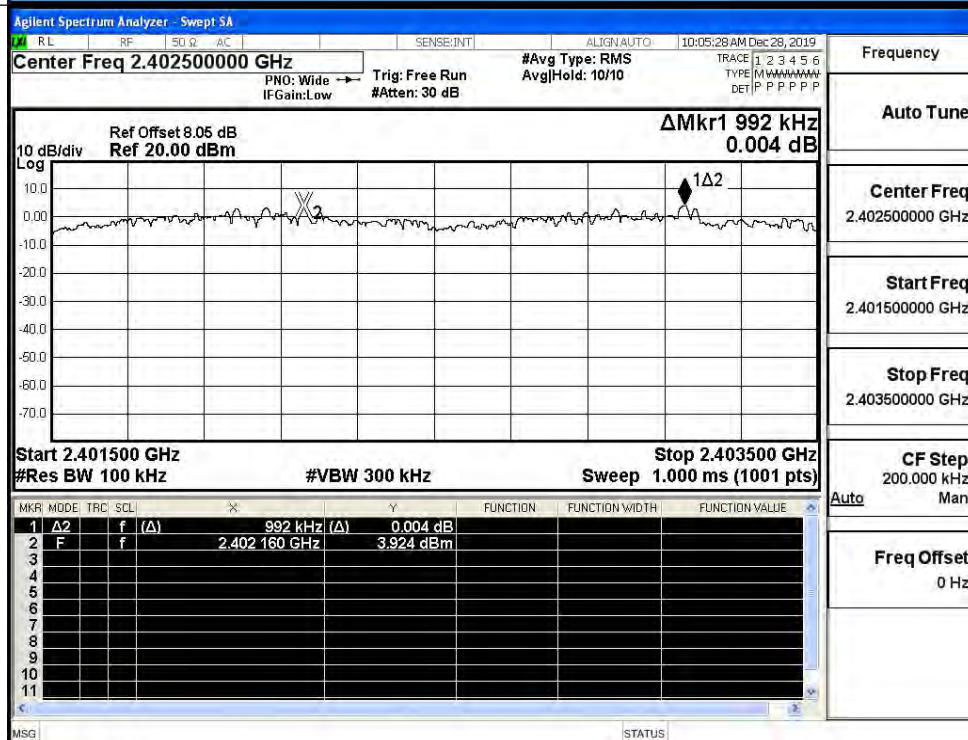
GFSK/HCH



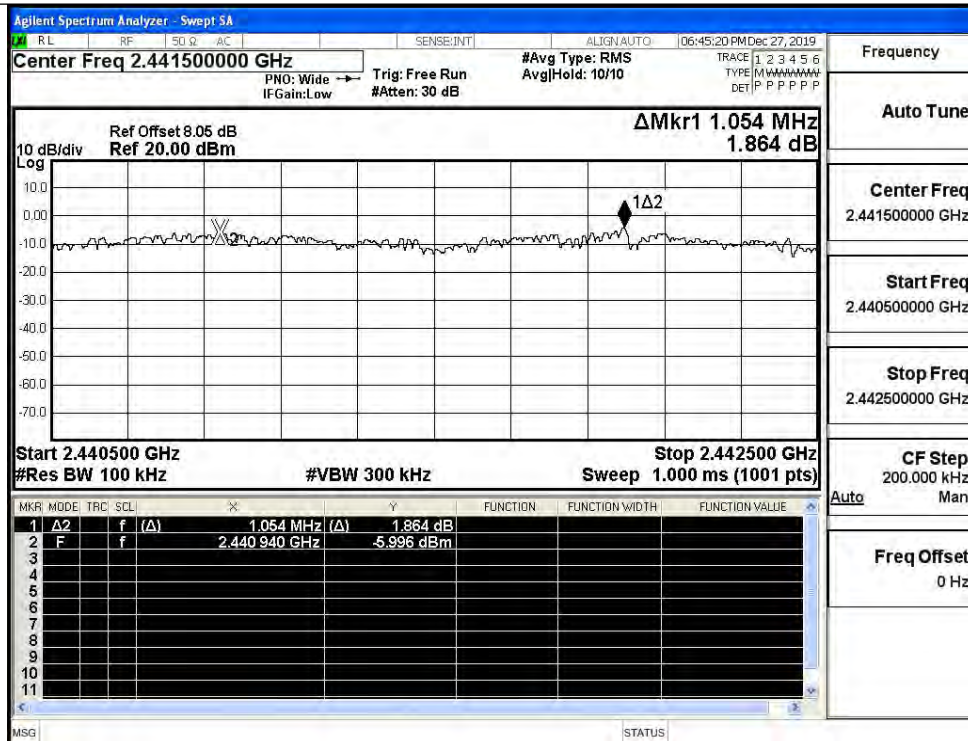
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

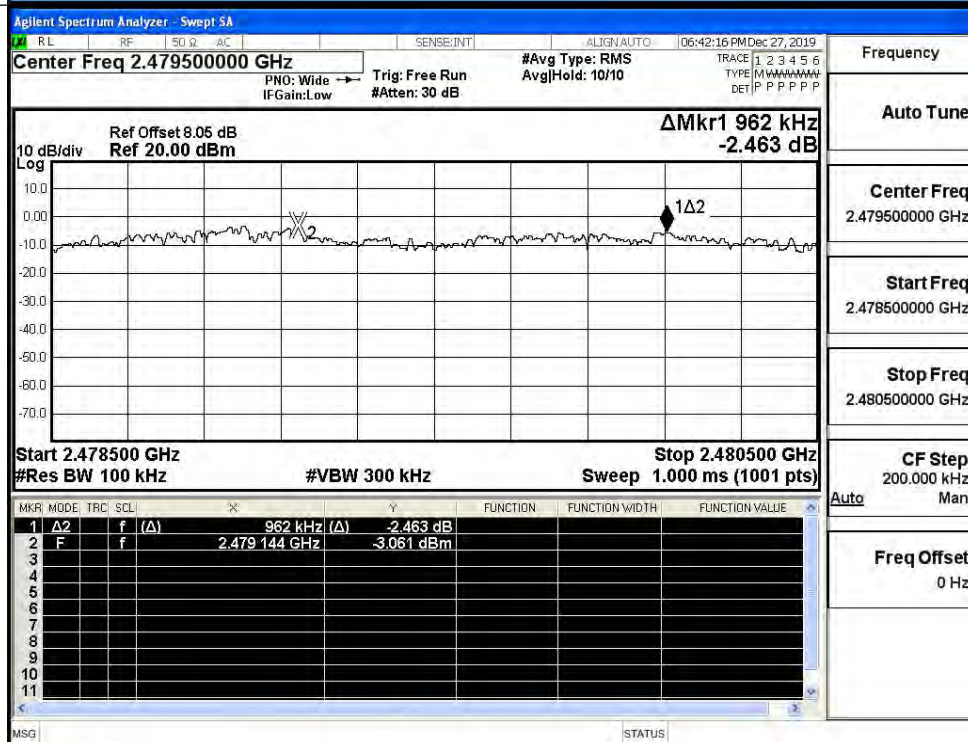
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

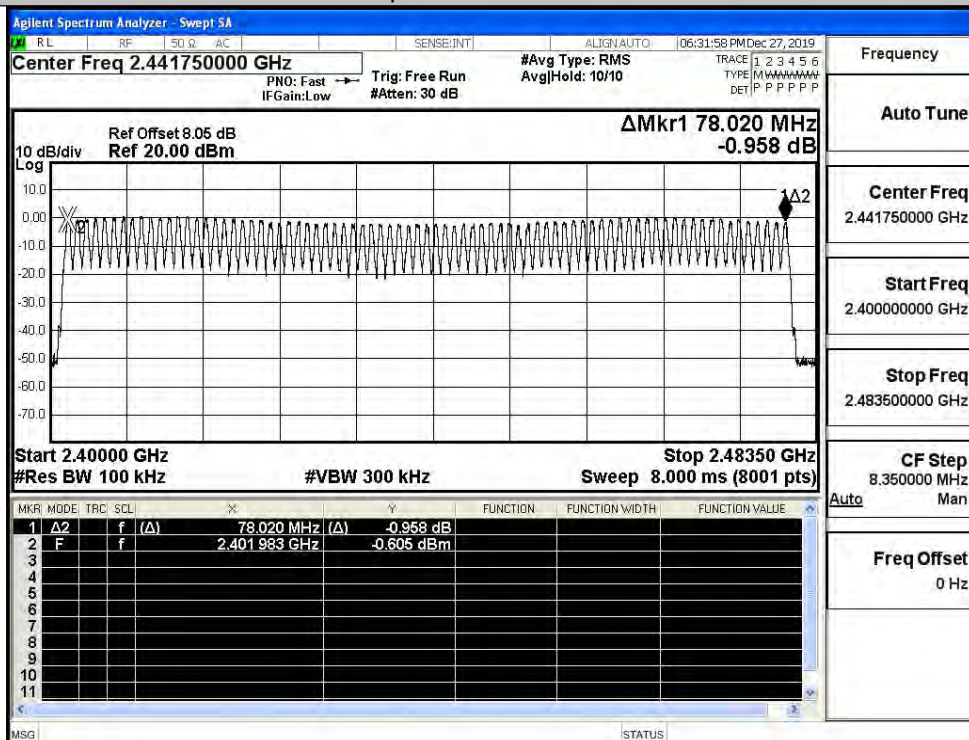
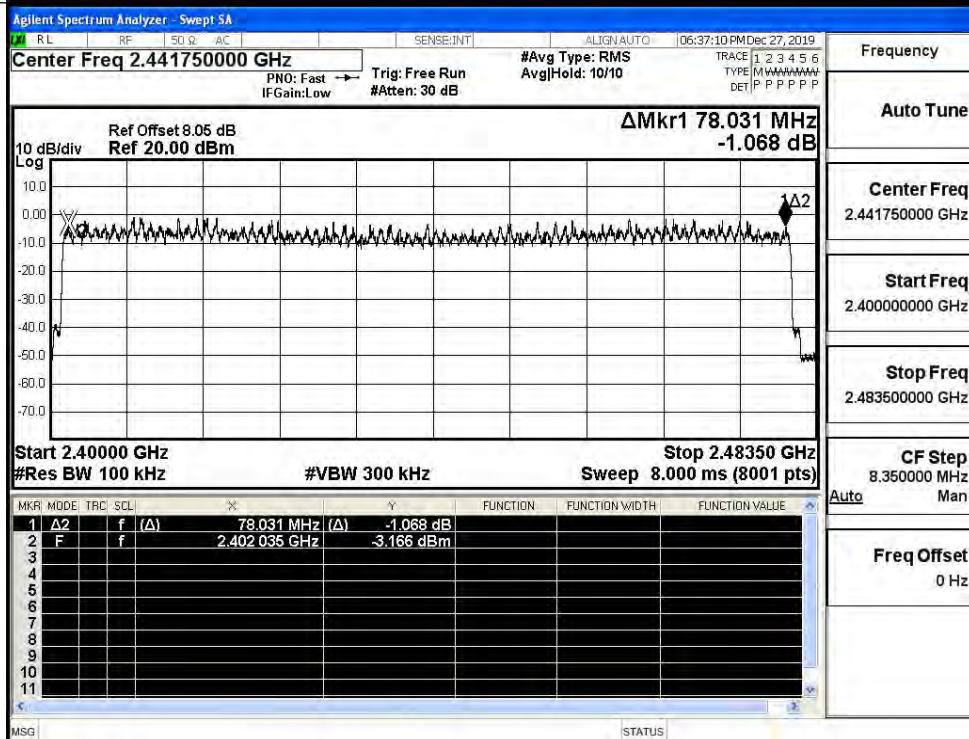


A.4 Hopping Channel Number

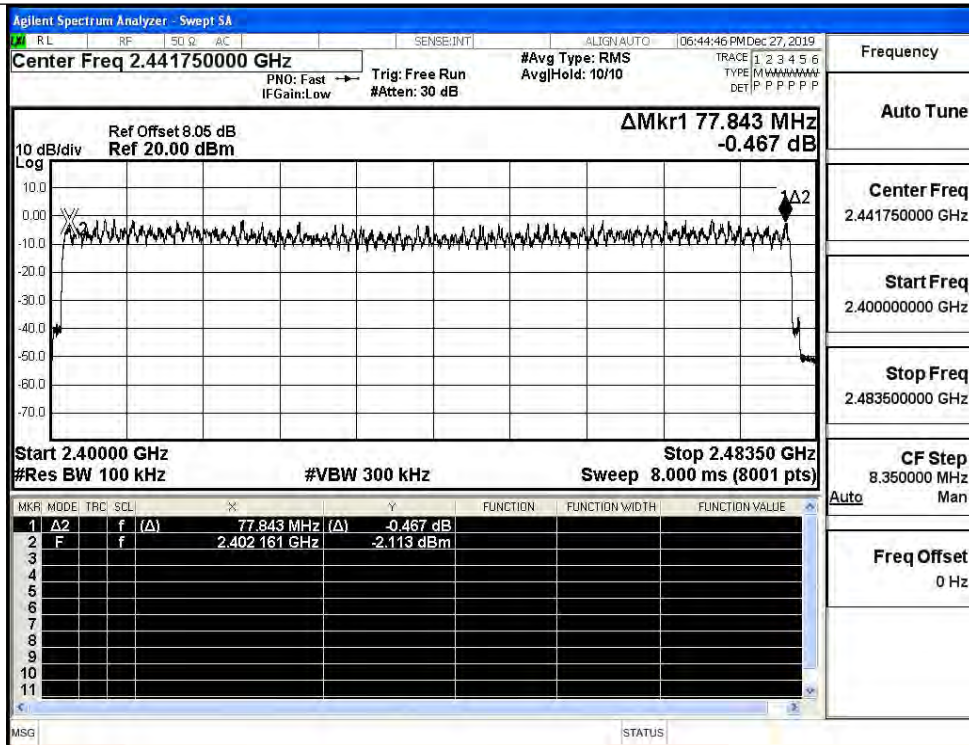
Mode	Channel.	Number of Hopping Channel [N]	Limit [N]	Verdict
GFSK	Hop	79	>=15	PASS
π/4DQPSK	Hop	79	>=15	PASS
8DPSK	Hop	79	>=15	PASS

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

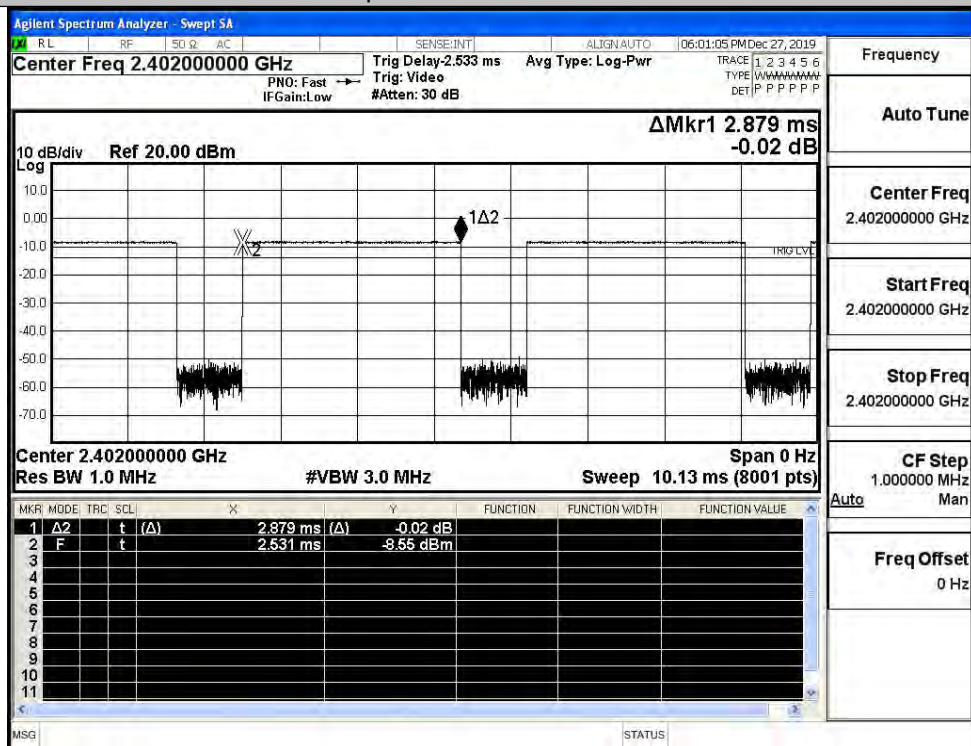


A.5 Dwell Time

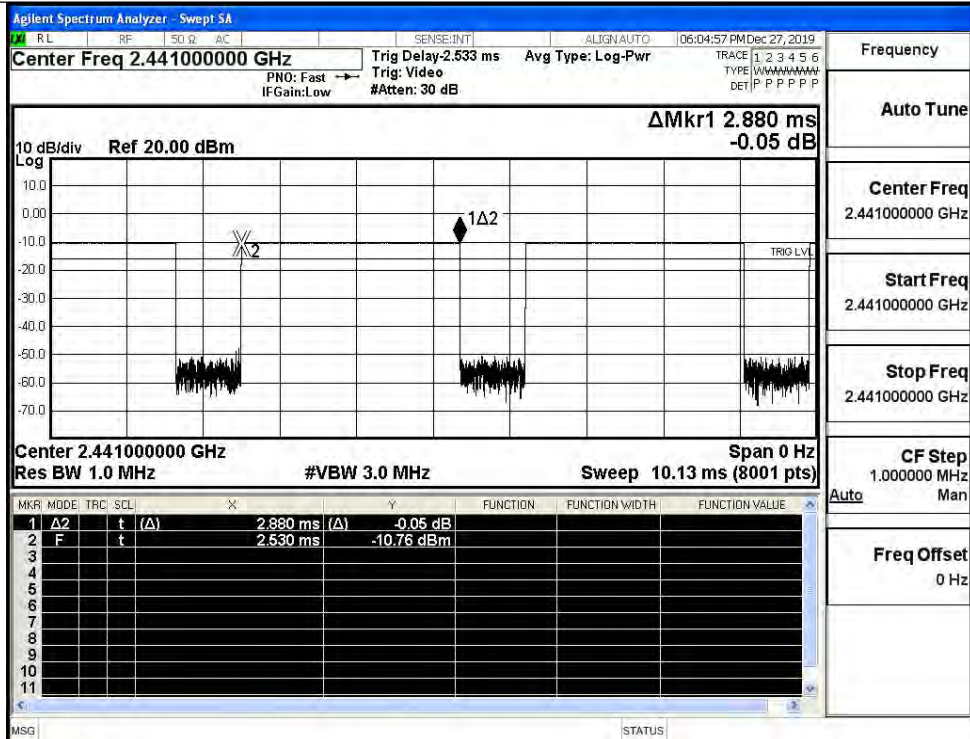
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.88	106.7	0.307	0.4	PASS
	DH5	MCH	2.88	106.7	0.307	0.4	PASS
	DH5	HCH	2.88	106.7	0.307	0.4	PASS
$\pi/4$ DQPSK	2DH5	LCH	2.88	106.7	0.307	0.4	PASS
	2DH5	MCH	2.88	106.7	0.307	0.4	PASS
	2DH5	HCH	2.88	106.7	0.307	0.4	PASS
8DPSK	3DH5	LCH	2.88	106.7	0.308	0.4	PASS
	3DH5	MCH	2.88	106.7	0.308	0.4	PASS
	3DH5	HCH	2.88	106.7	0.308	0.4	PASS

Test Graphs

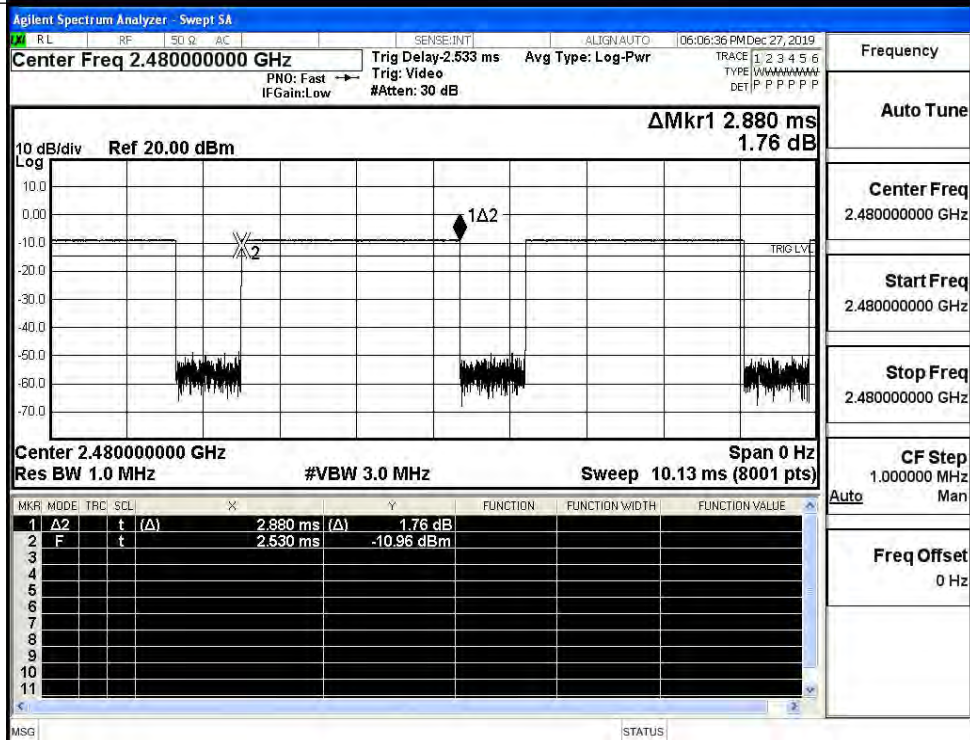
GFSK_DH5/LCH



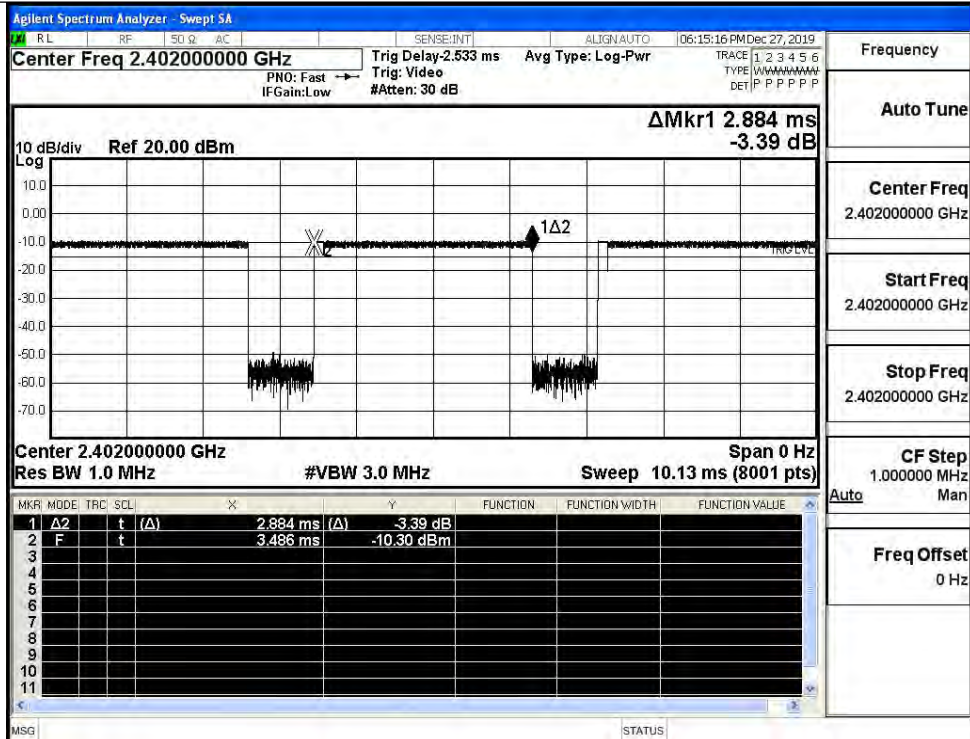
GFSK_DH5/MCH



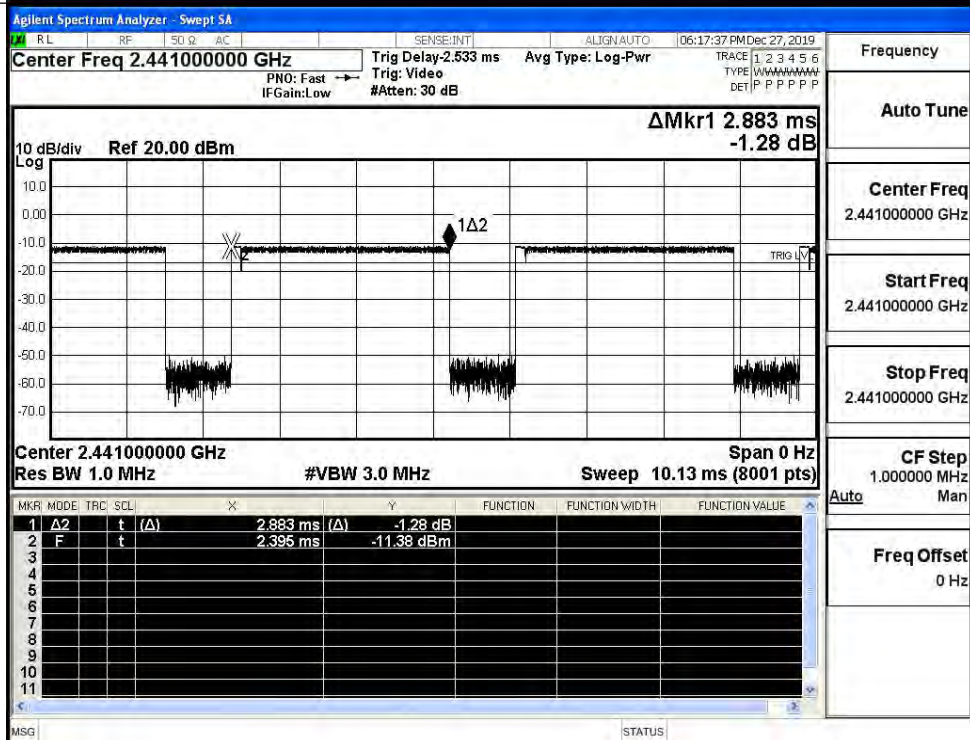
GFSK_DH5/HCH



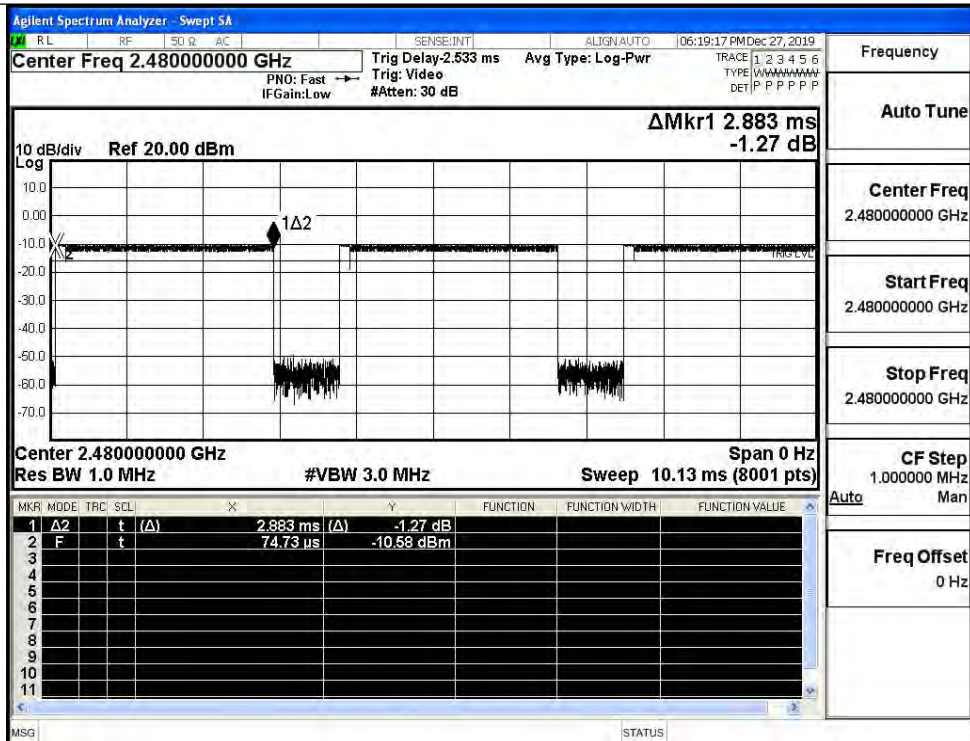
$\pi/4$ DQPSK
_2DH5/LCH



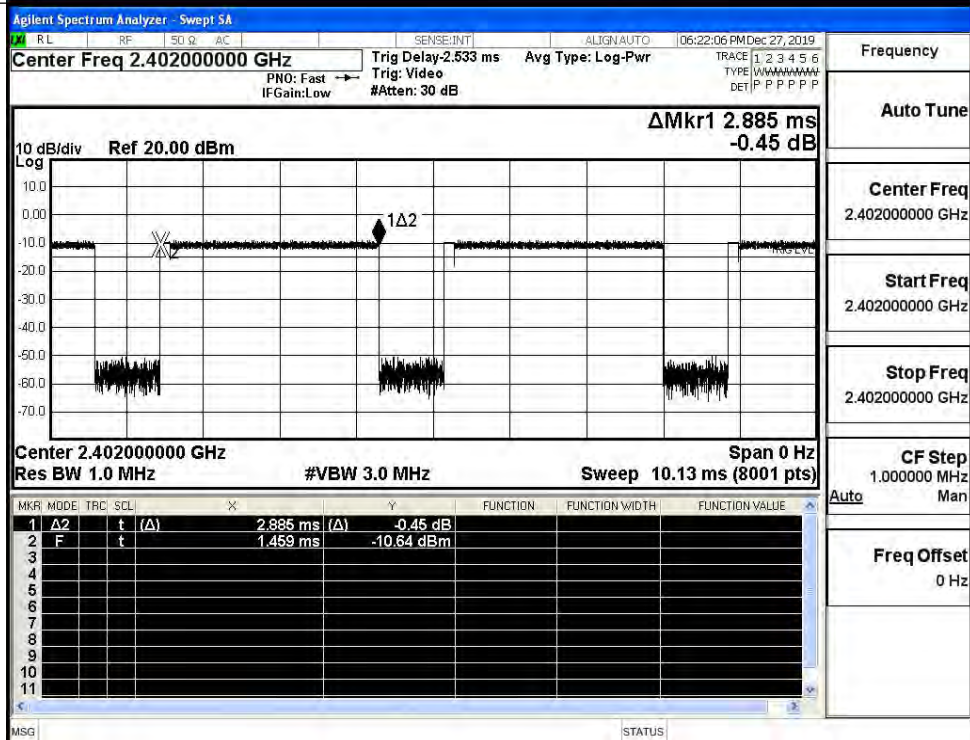
$\pi/4$ DQPSK
_2DH5/MCH



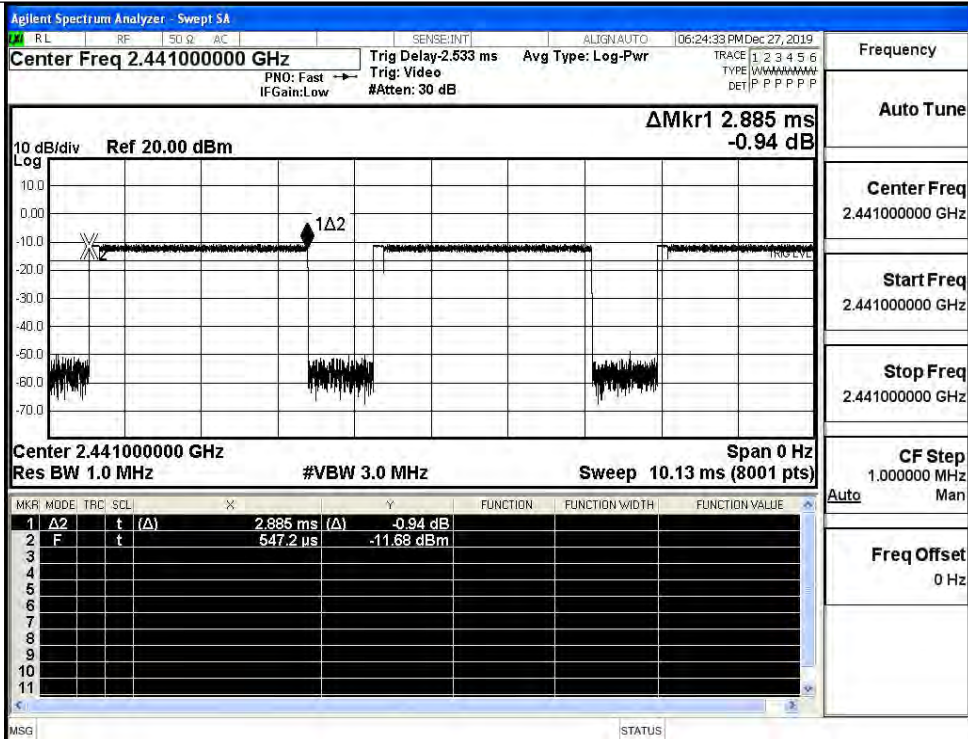
$\pi/4$ DQPSK
_2DH5/HCH



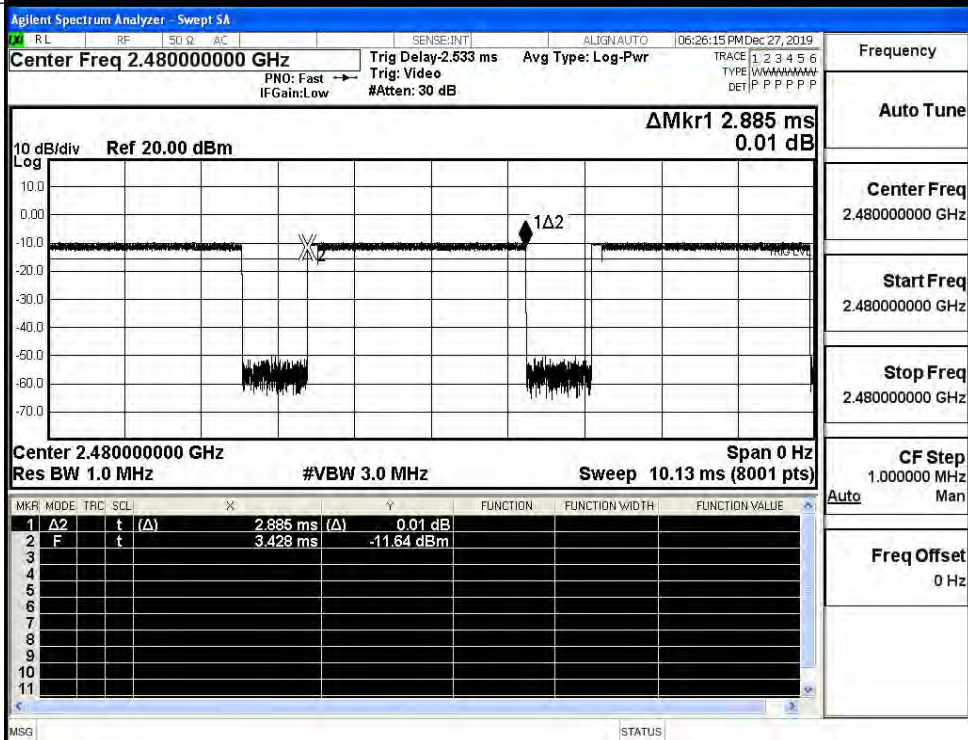
8DPSK _3DH5/LCH



8DPSK_3DH5/MCH



8DPSK_3DH5/HCH

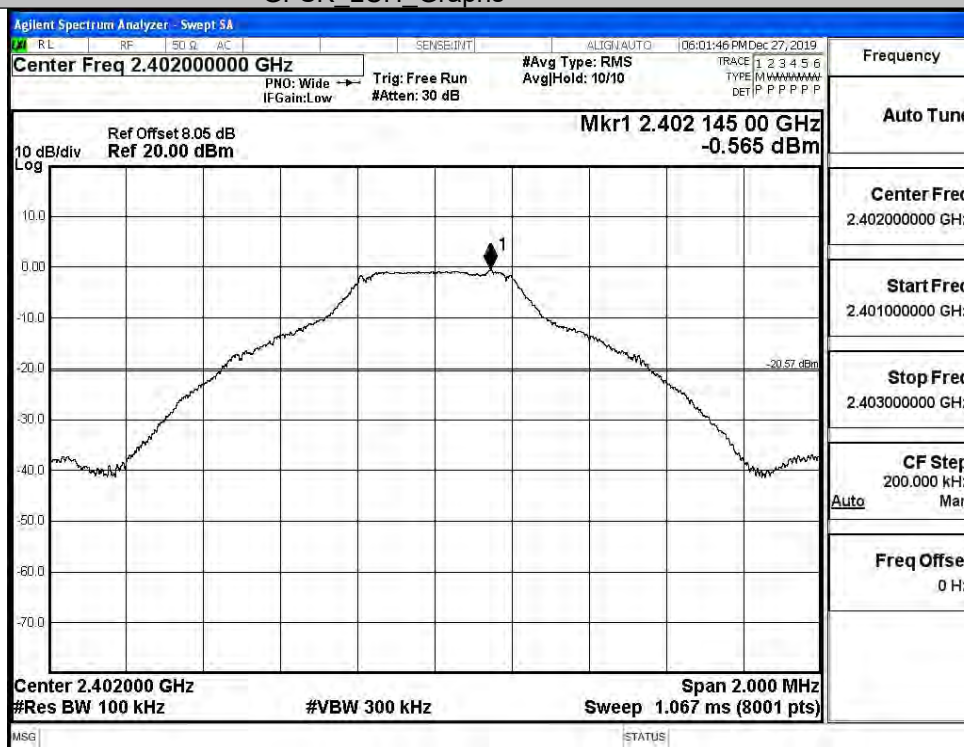


A.6 RF Conducted Spurious Emissions

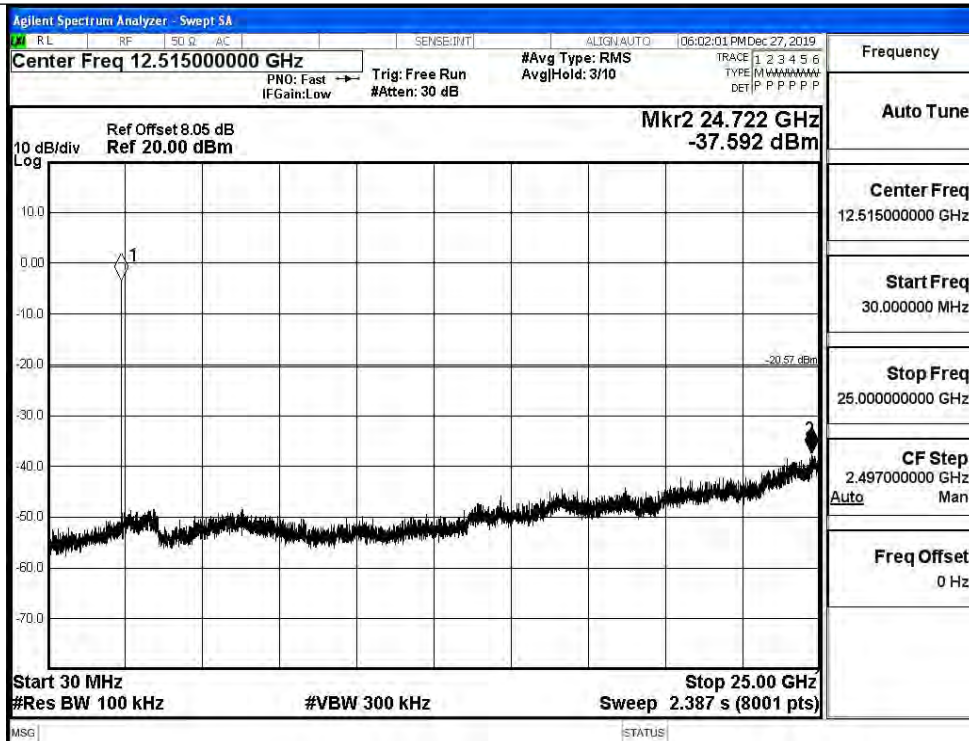
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.565	-37.592	-20.565	PASS
	MCH	-2.178	-37.559	-22.178	PASS
	HCH	-1.232	-37.725	-21.232	PASS
$\pi/4$ DQPSK	LCH	-1.913	-37.207	-21.913	PASS
	MCH	-3.391	-38.137	-23.391	PASS
	HCH	-2.695	-37.699	-22.695	PASS
8DPSK	LCH	-1.818	-36.749	-21.818	PASS
	MCH	-3.361	-37.146	-23.361	PASS
	HCH	-2.32	-36.323	-22.320	PASS

GFSK LCH Graphs

Pref

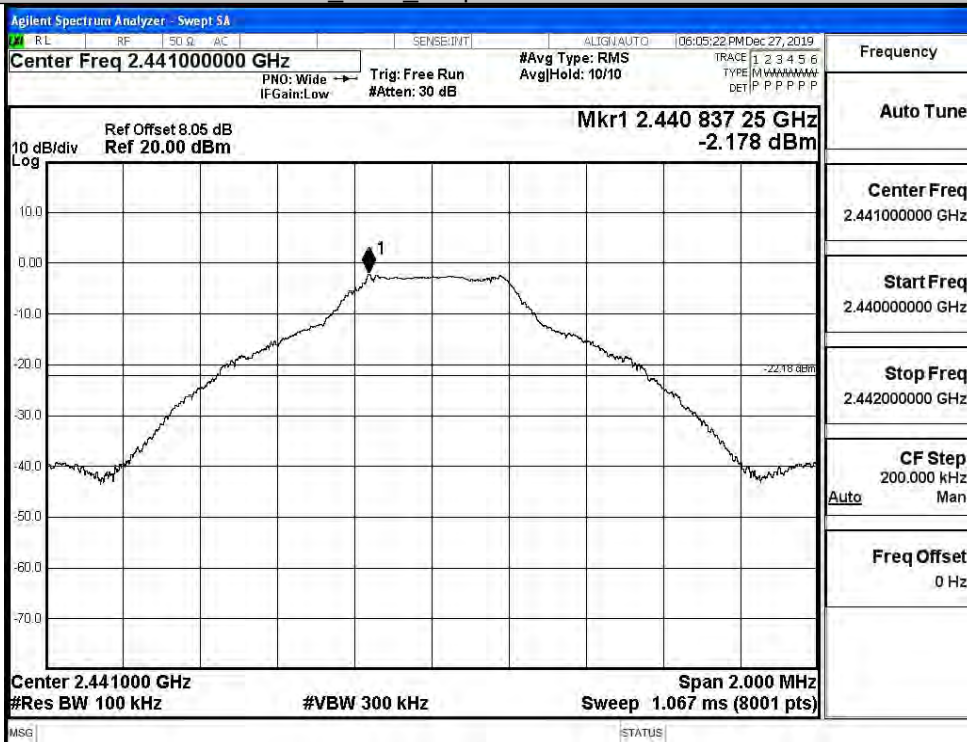


Puw

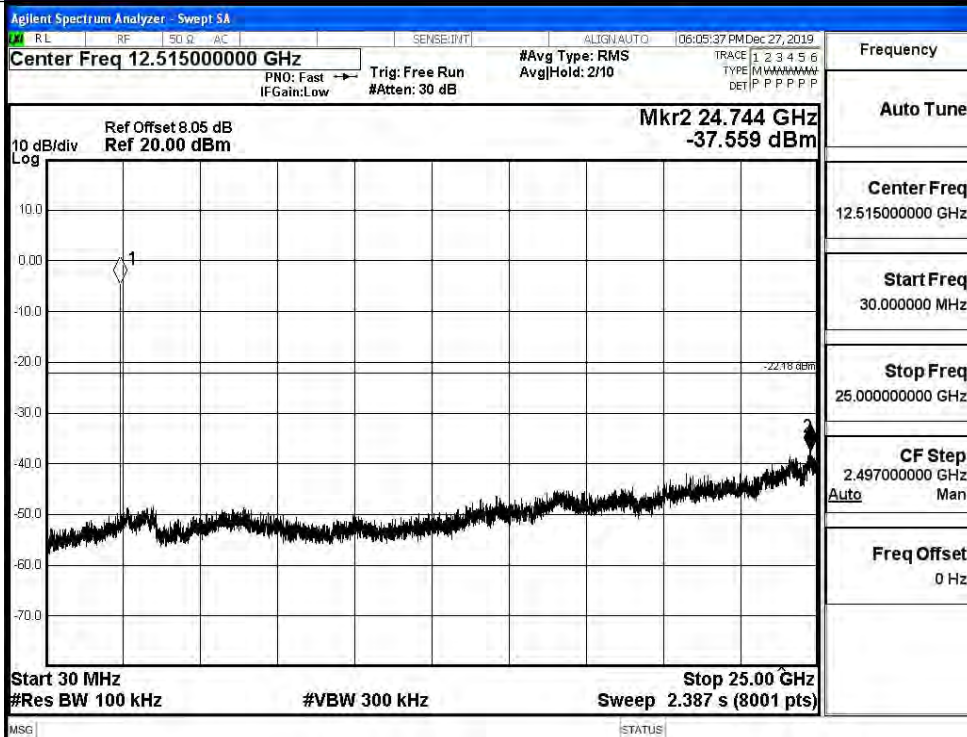


GFSK MCH_Graphs

Pref

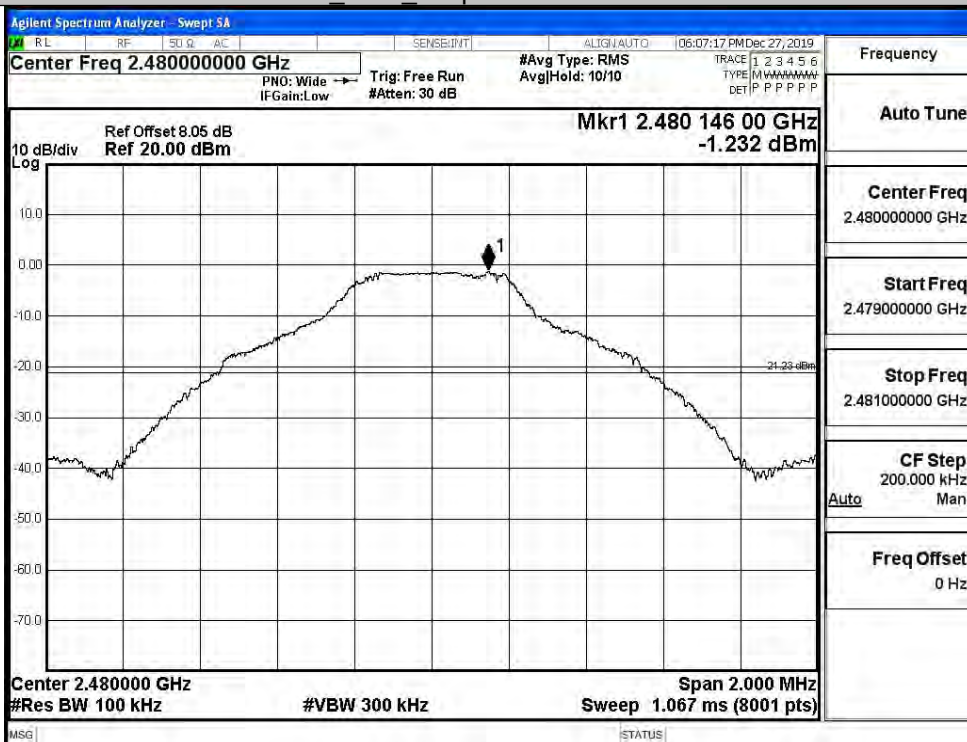


Puw

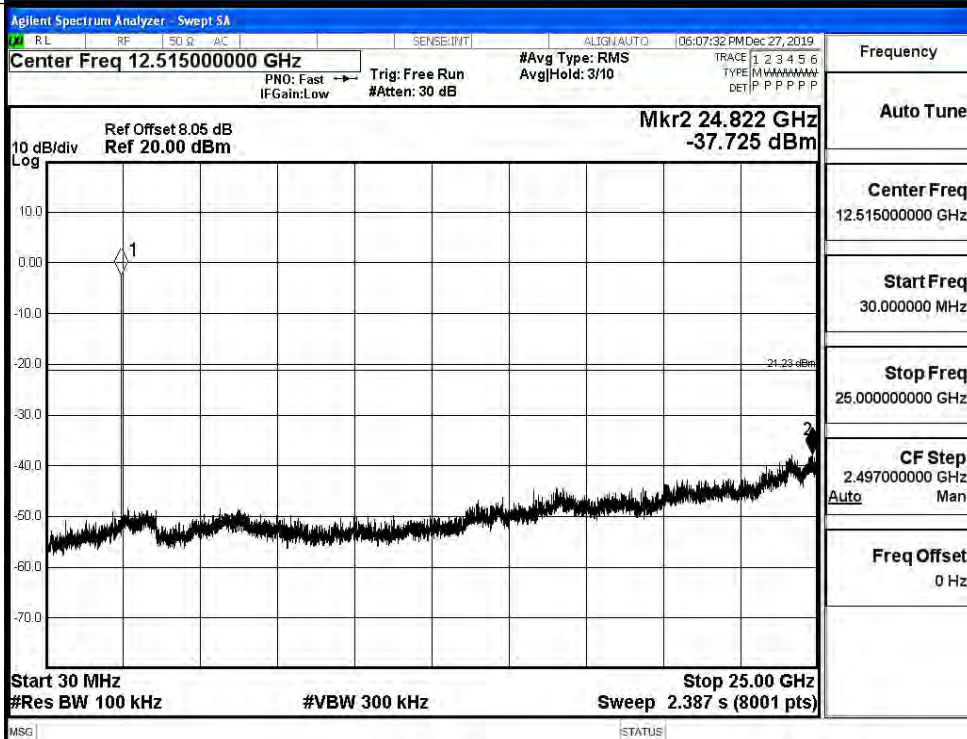


GFSK HCH_Graphs

Pref

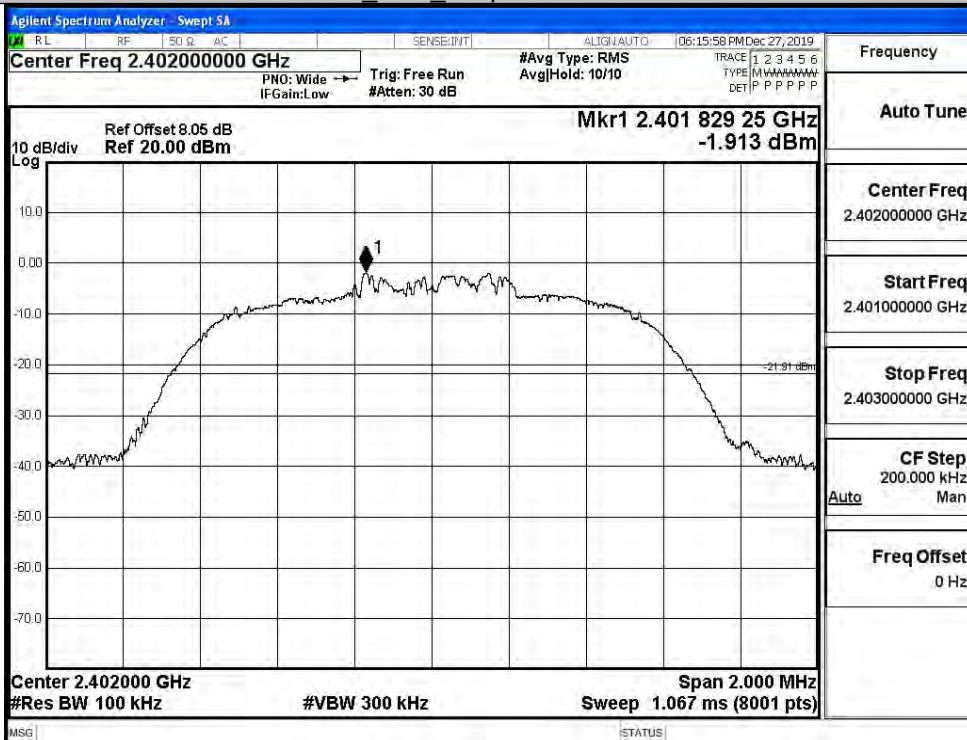


Puw

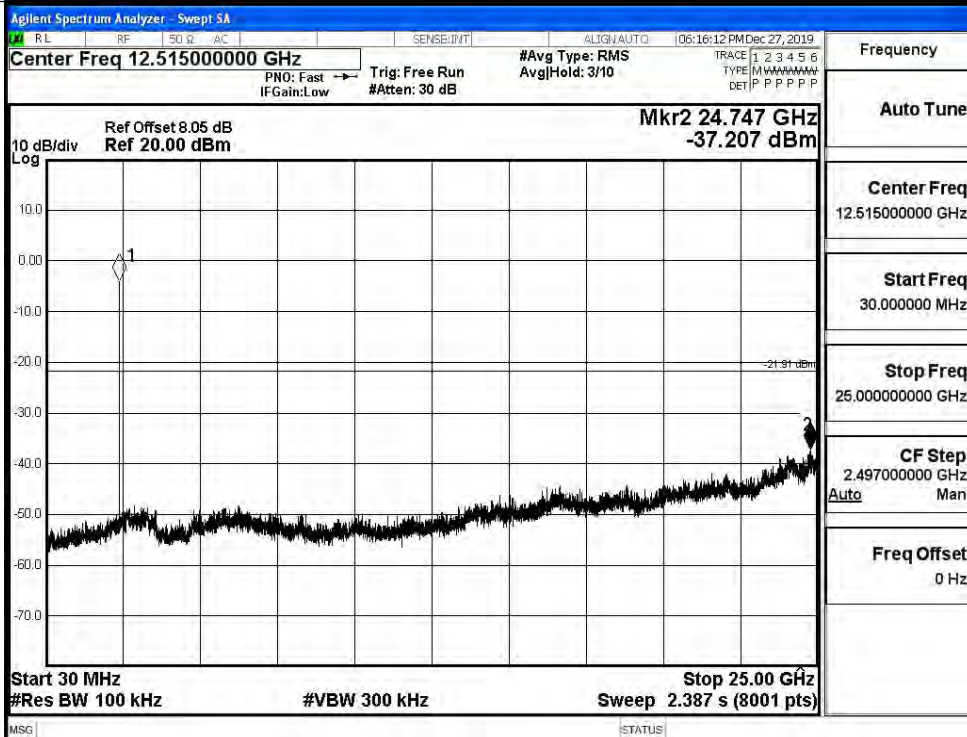


π /4DQPSK LCH_Graphs

Pref

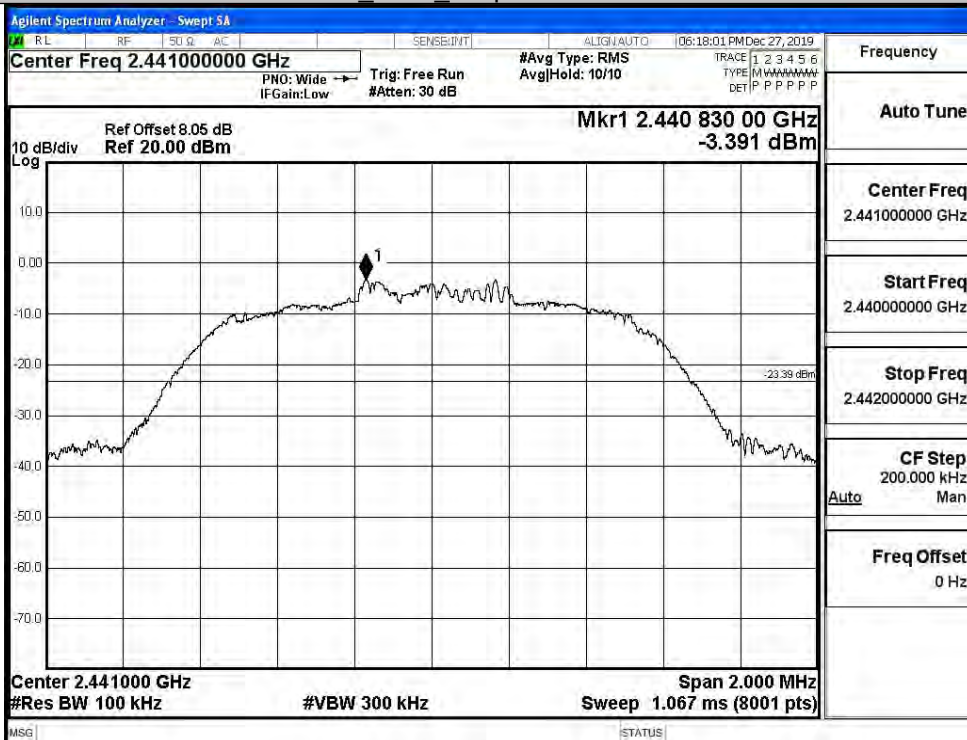


Puw

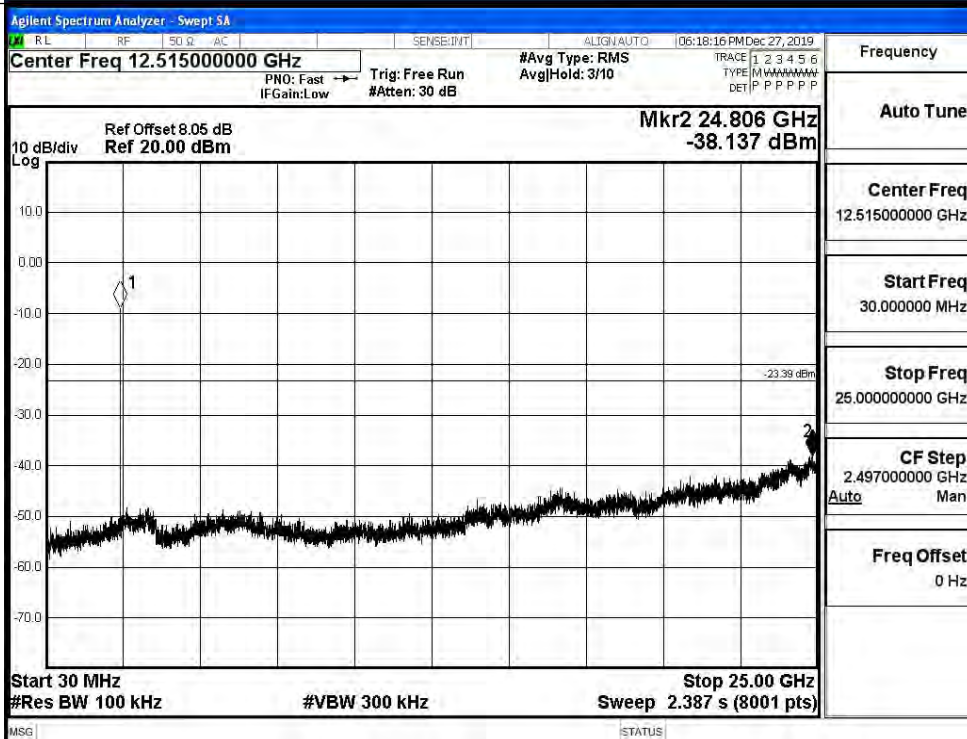


π /4DQPSK_MCH_Graphs

Pref

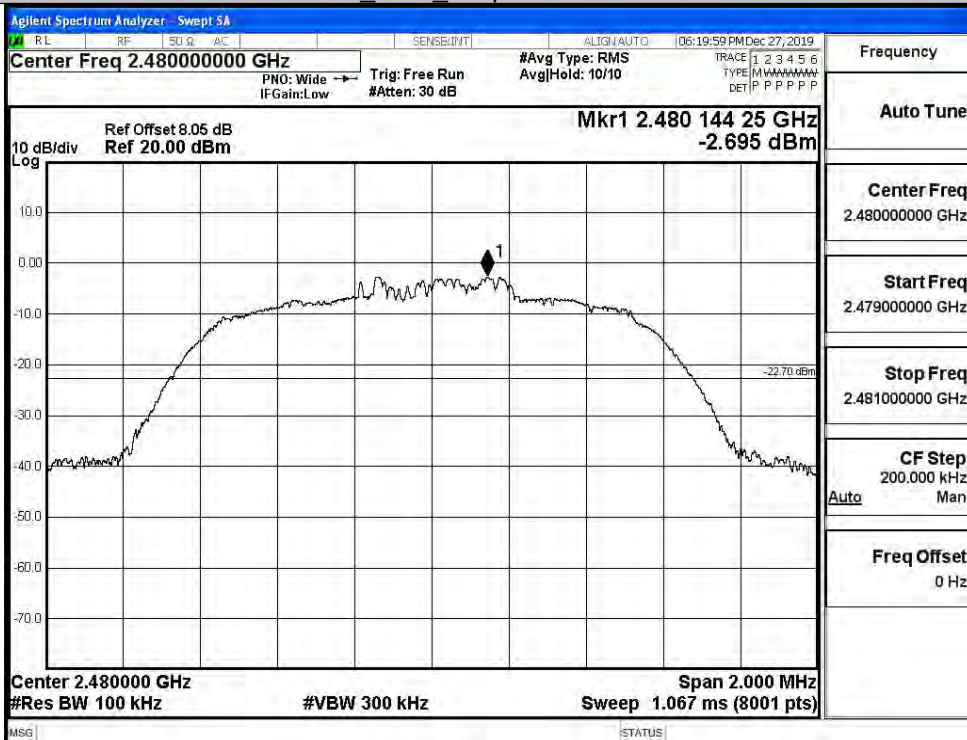


Puw



π /4DQPSK HCH_Graphs

Pref

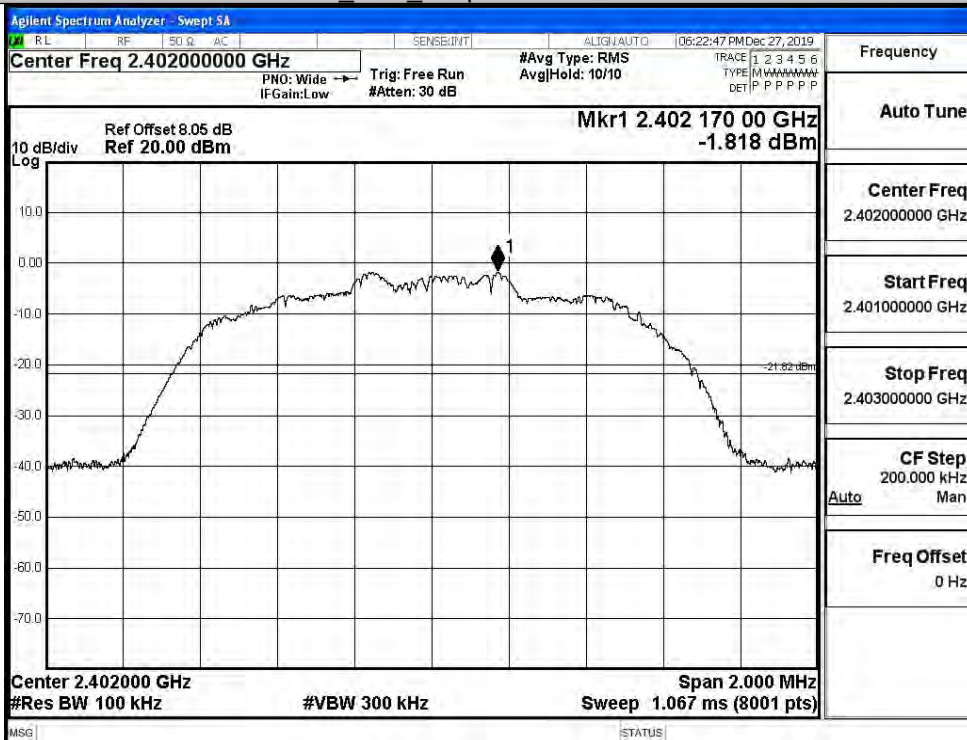


Puw

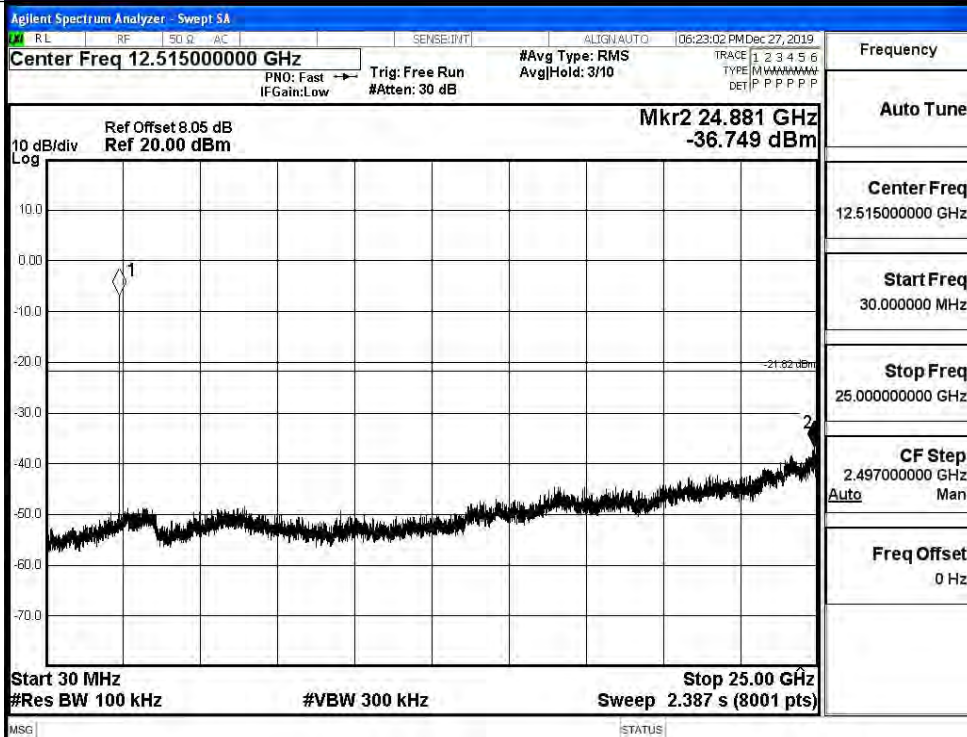


8DPSK_LCH_Graphs

Pref

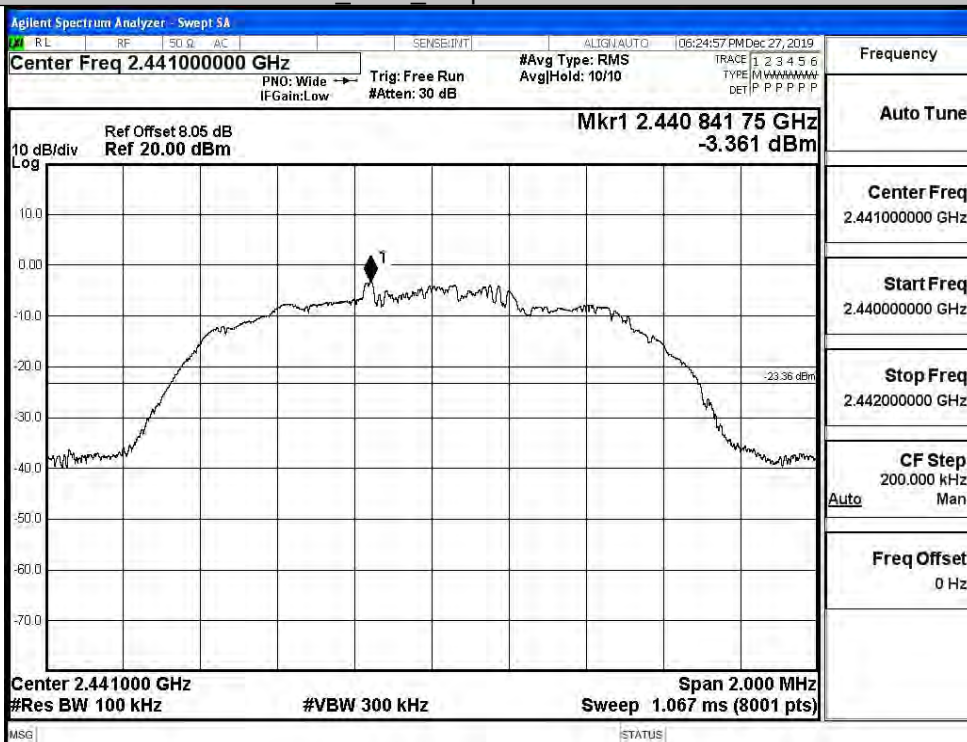


Puw

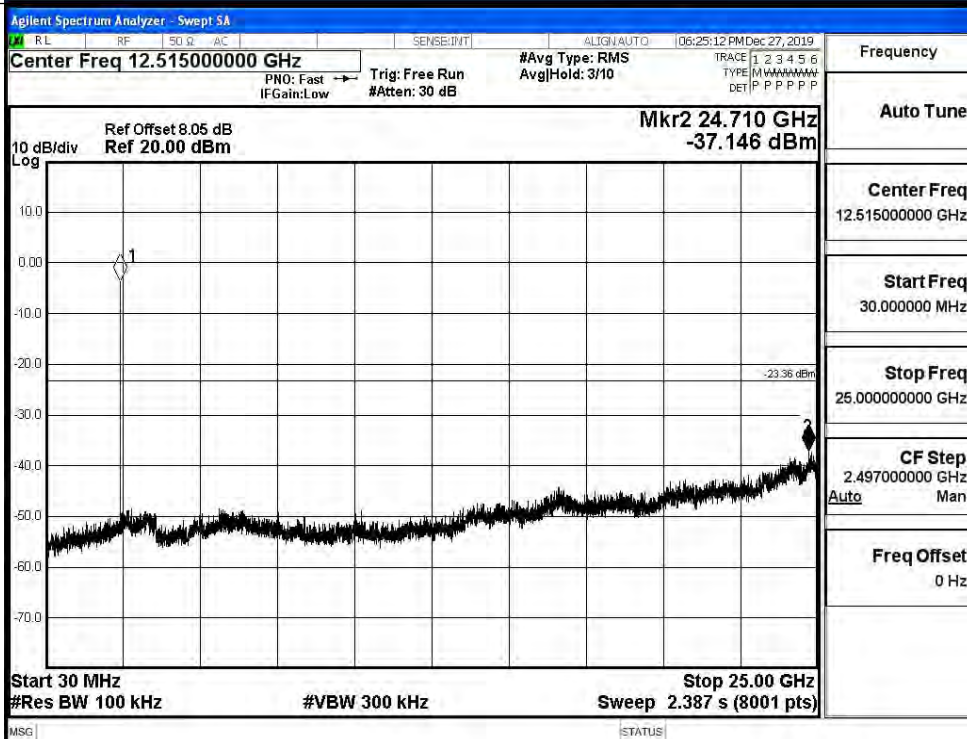


8DPSK_MCH_Graphs

Pref

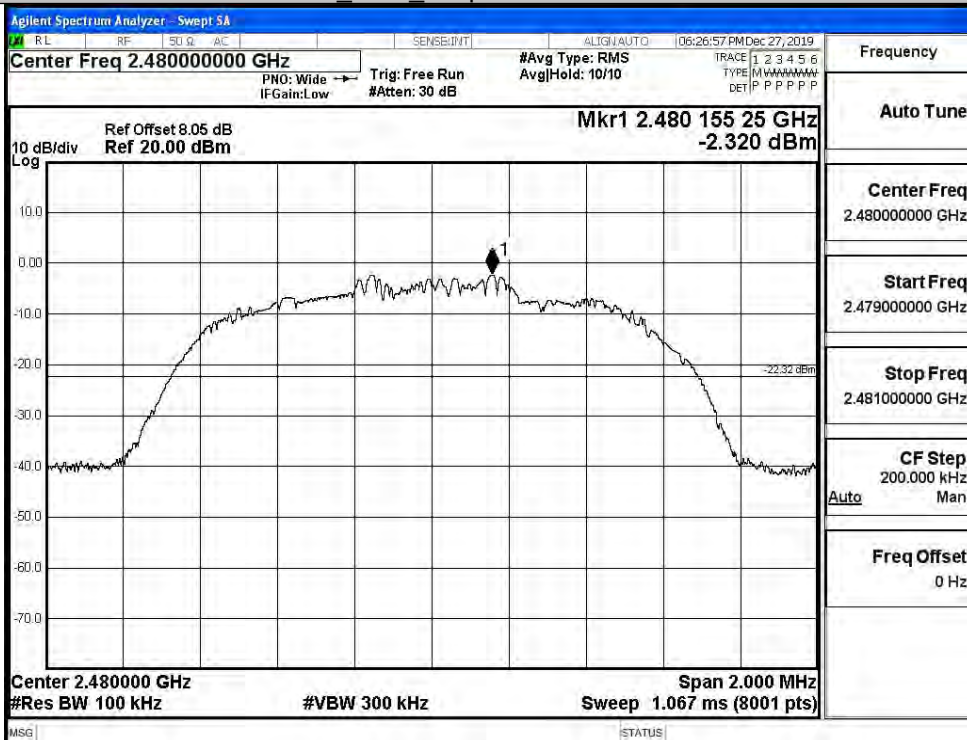


Puw

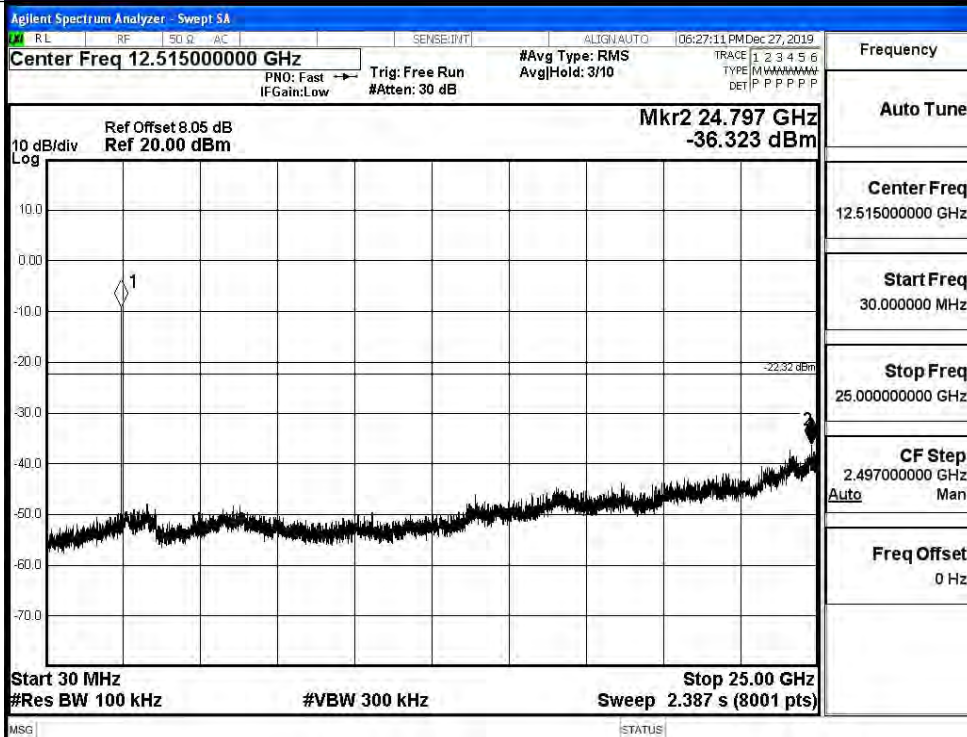


8DPSK_HCH_Graphs

Pref



Puw

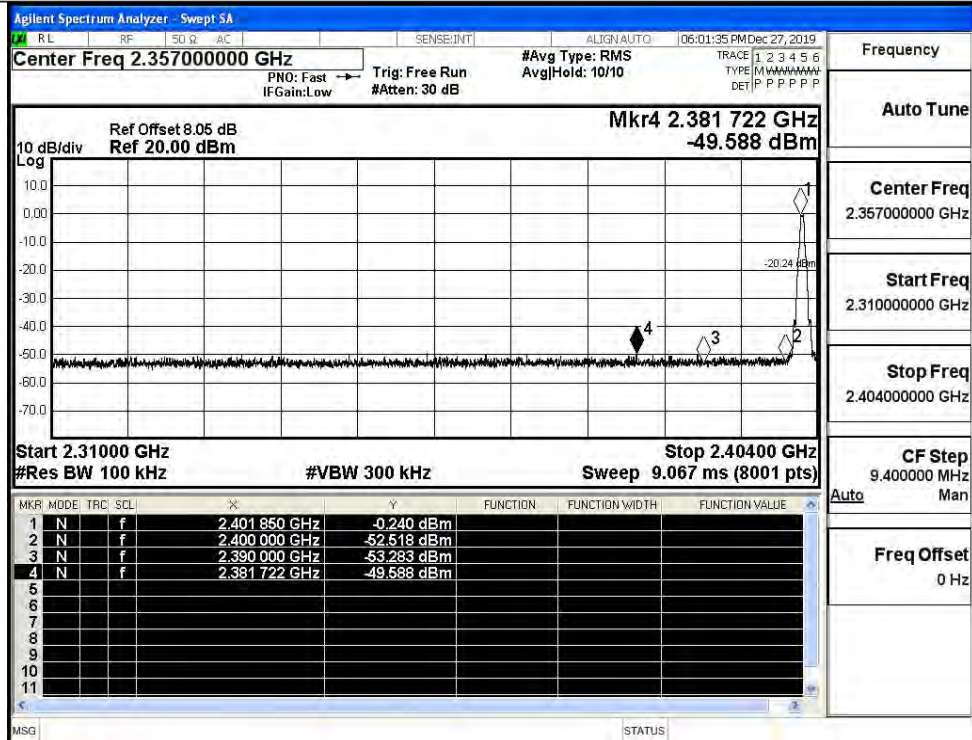


A.7 Band-edge for RF Conducted Emissions

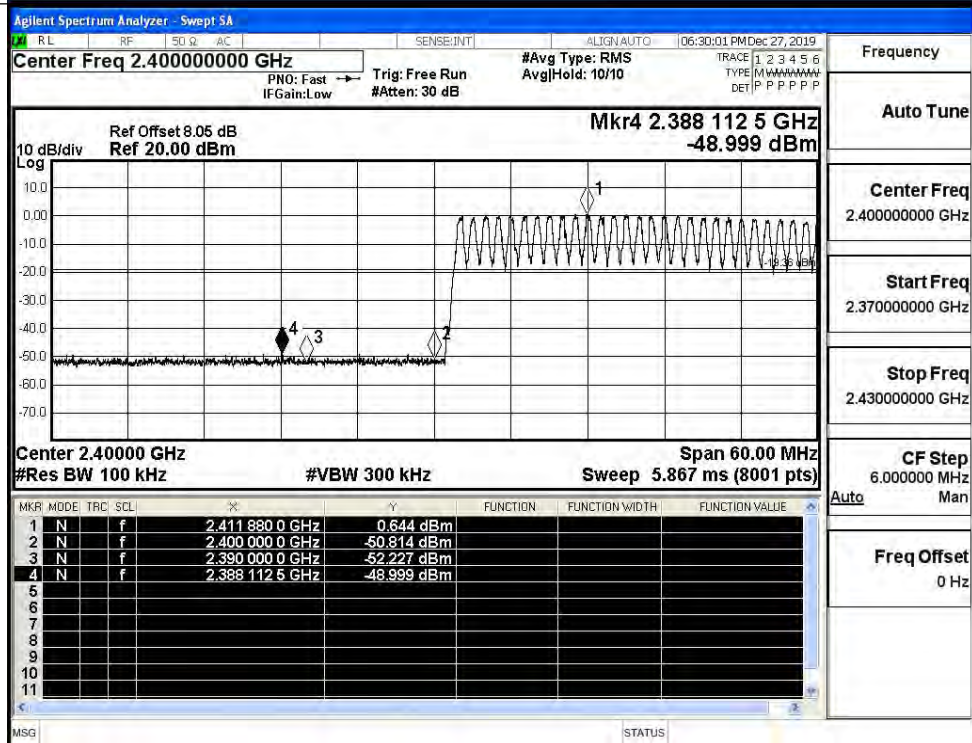
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.240	Off	-49.588	-20.24	PASS
			0.644	On	-48.999	-19.36	PASS
	HCH	2480	-0.951	Off	-49.105	-20.95	PASS
			0.276	On	-48.465	-19.72	PASS
$\pi/4$ DQPSK	LCH	2402	-1.896	Off	-48.911	-21.9	PASS
			-0.808	On	-49.020	-20.81	PASS
	HCH	2480	-2.331	Off	-49.444	-22.33	PASS
			-1.175	On	-48.277	-21.18	PASS
8DPSK	LCH	2402	-2.940	Off	-49.760	-22.94	PASS
			-0.866	On	-48.287	-20.87	PASS
	HCH	2480	-2.331	Off	-49.000	-22.33	PASS
			-1.290	On	-48.716	-21.29	PASS

Test Graphs

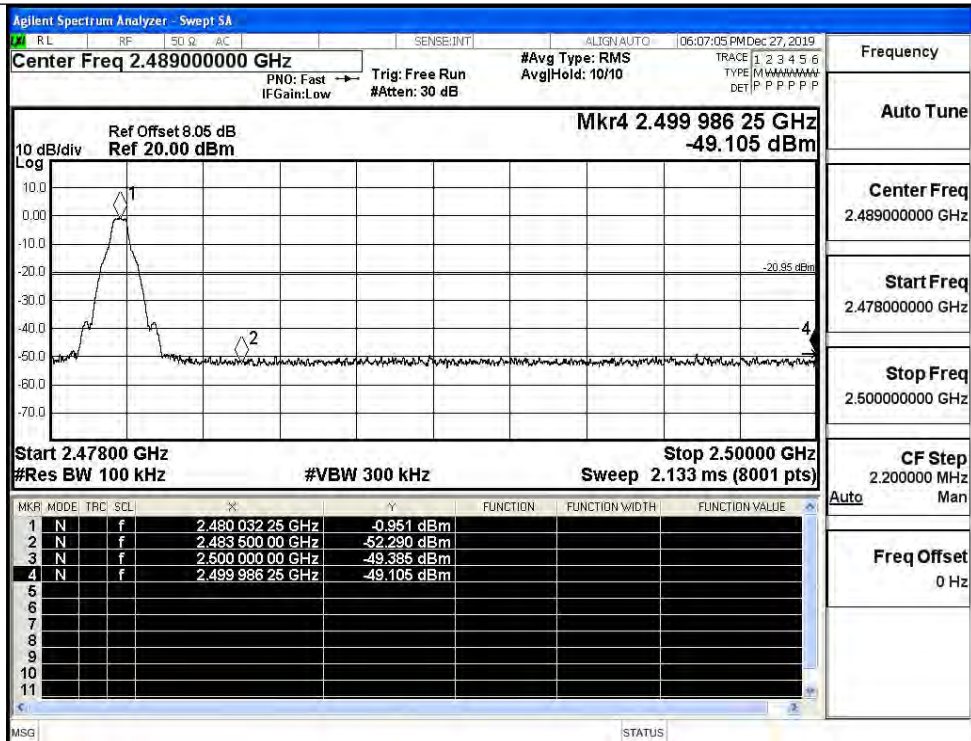
GFSK/LCH/No Hop



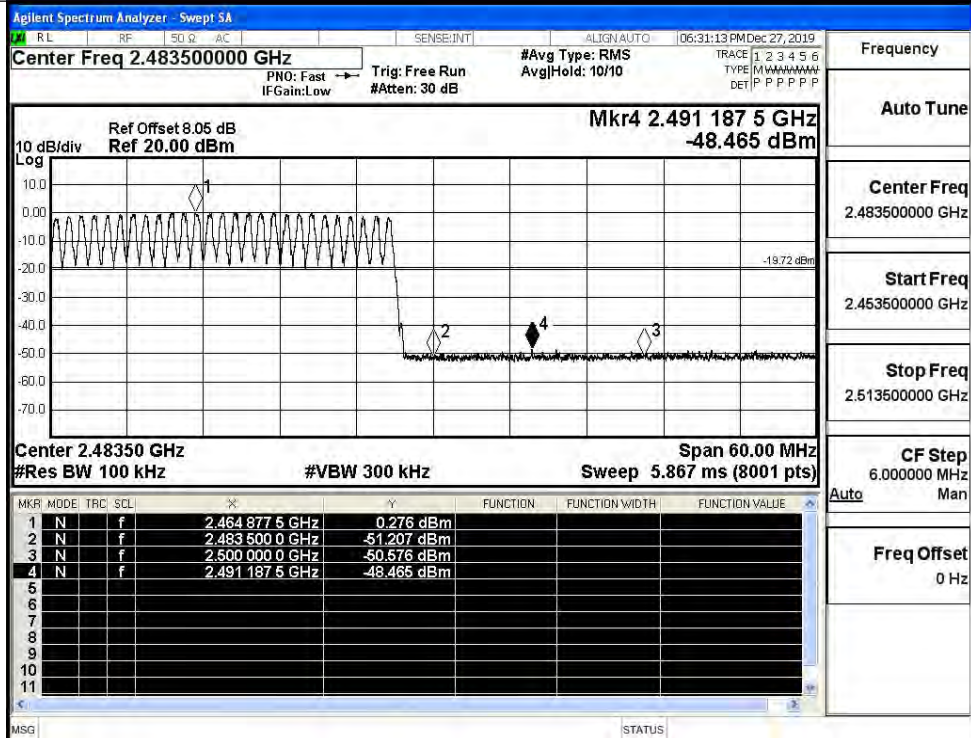
GFSK/LCH/Hop



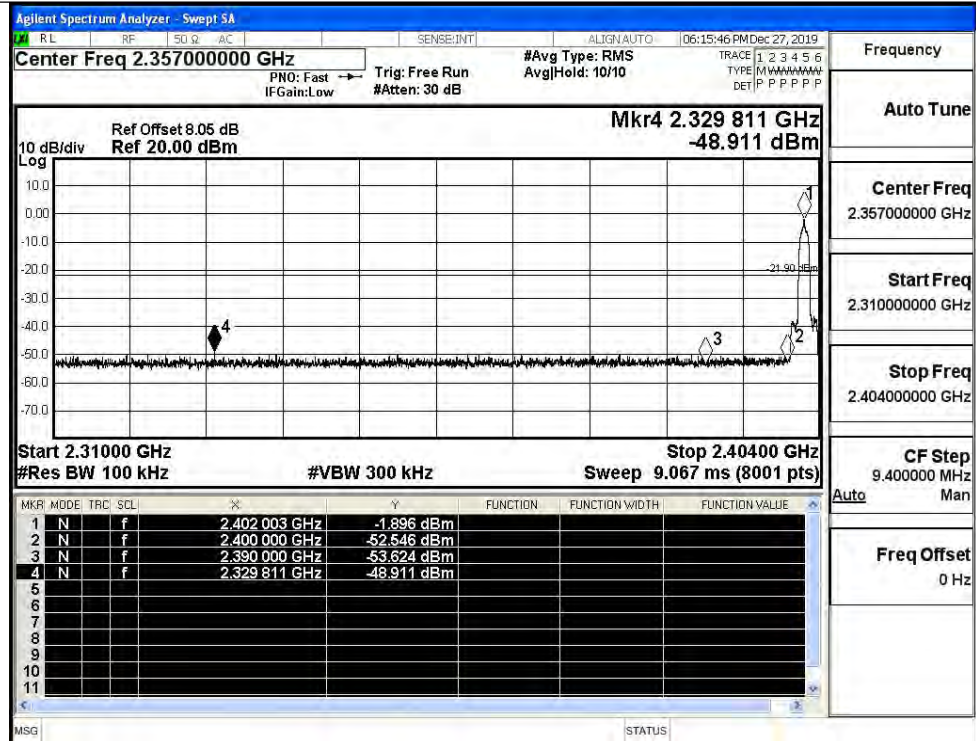
GFSK/HCH/No Hop



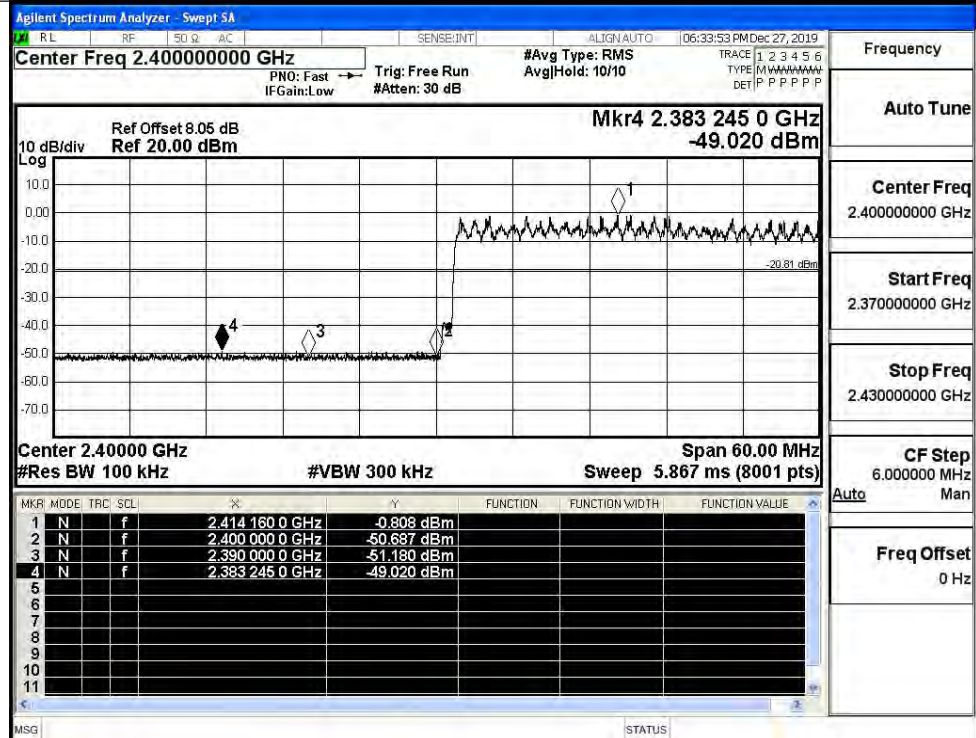
GFSK/HCH/Hop



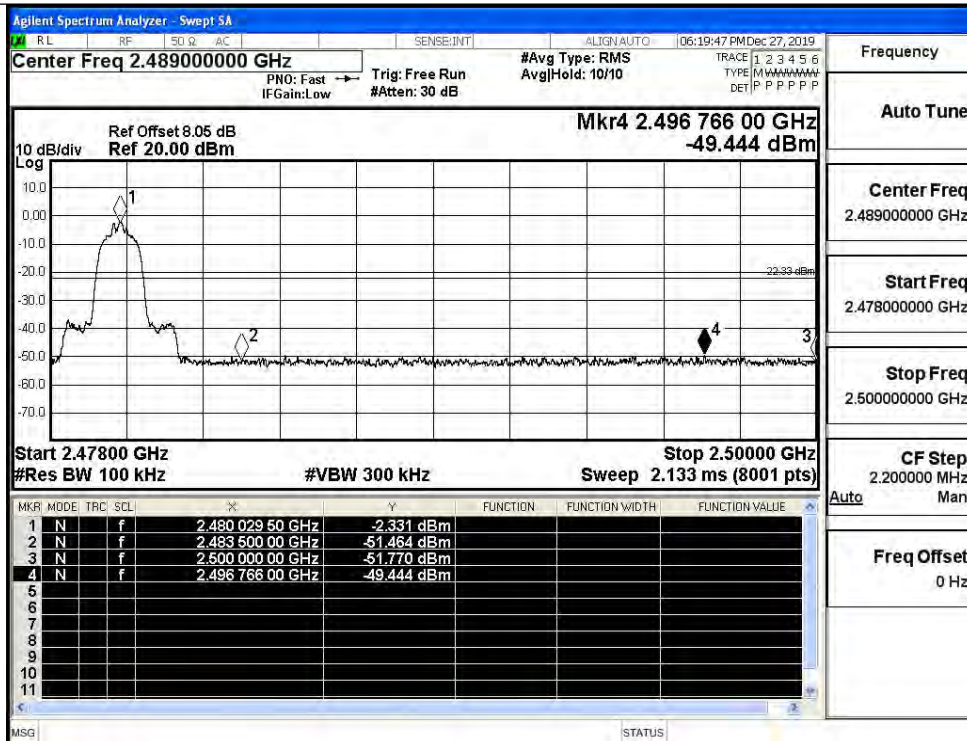
$\pi/4$ DQPSK/LCH/No
Hop



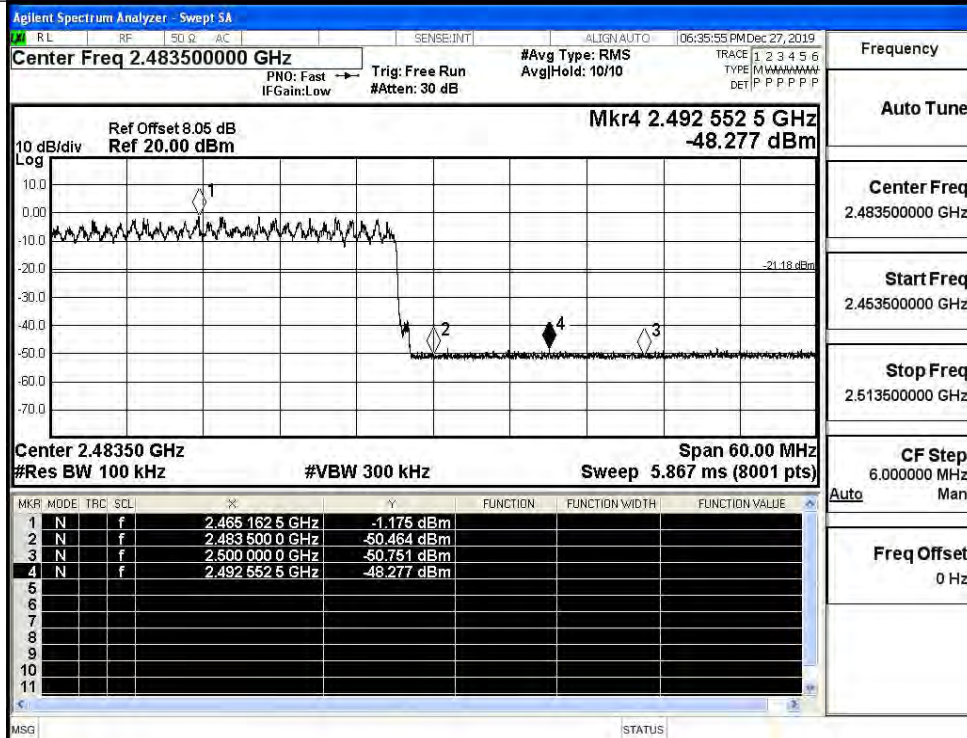
$\pi/4$ DQPSK/LCH/Hop



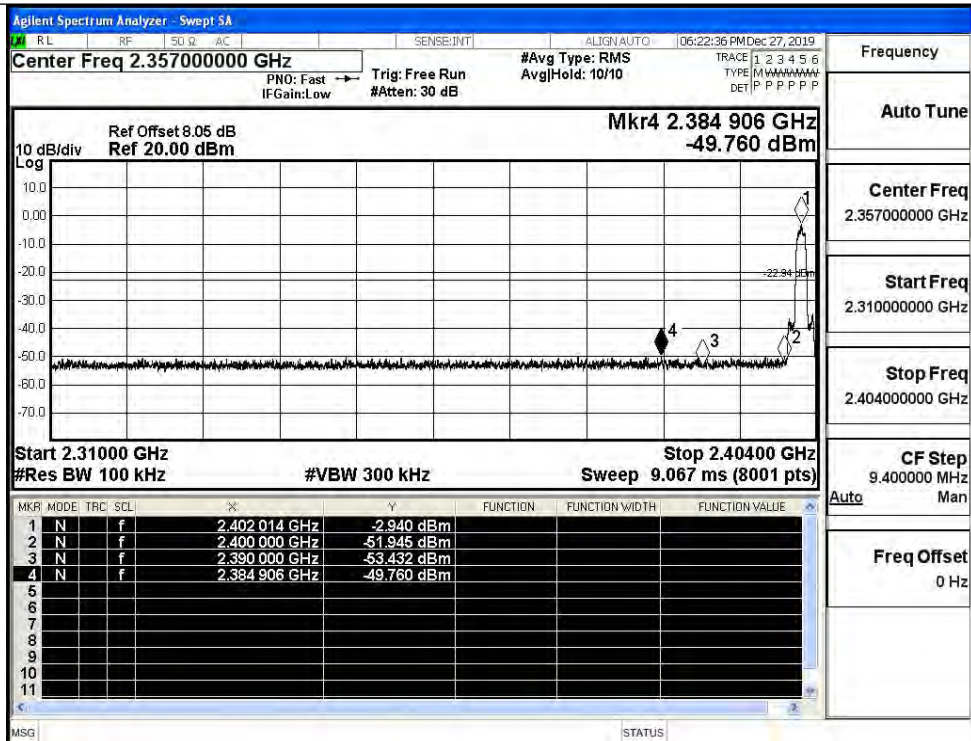
$\pi/4$ DQPSK/HCH/No
Hop



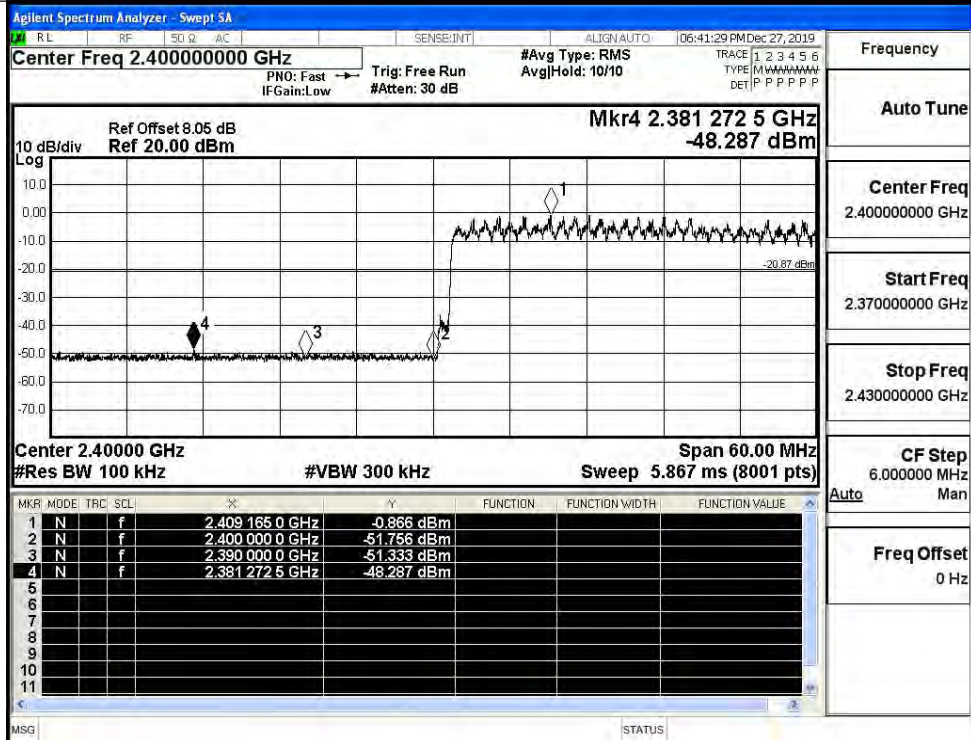
$\pi/4$ DQPSK/HCH/Hop



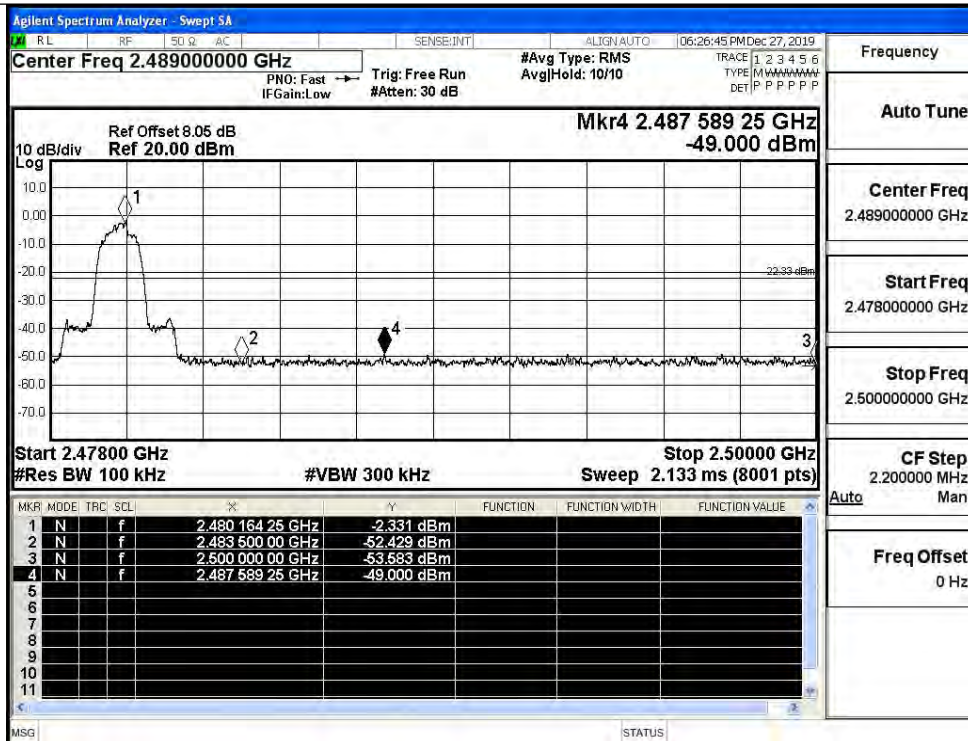
8DPSK/LCH/No Hop



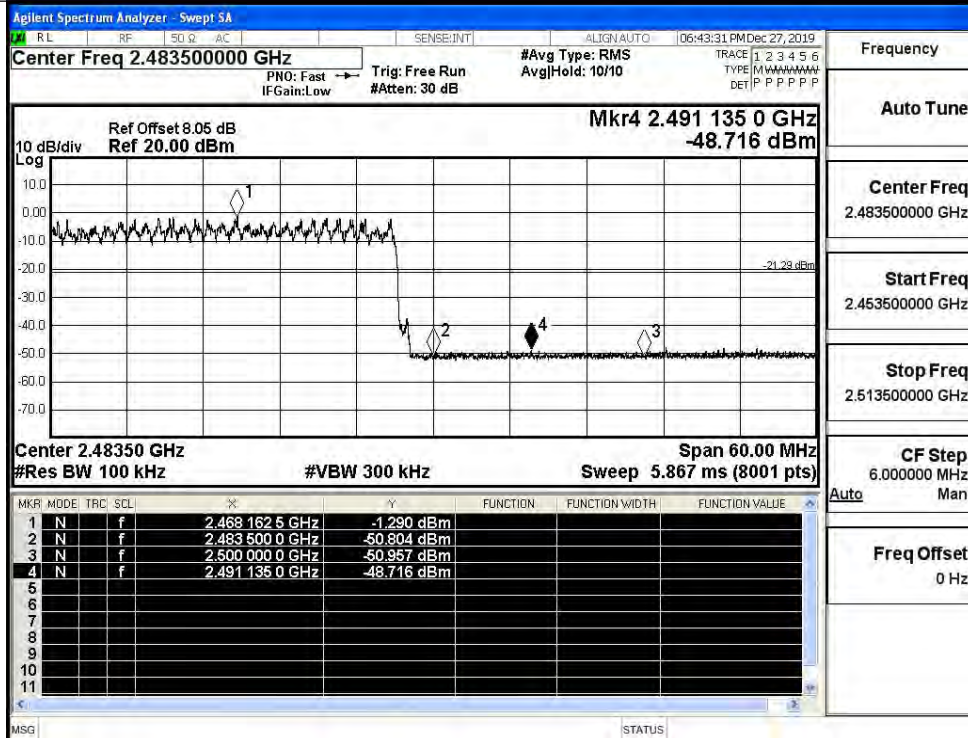
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



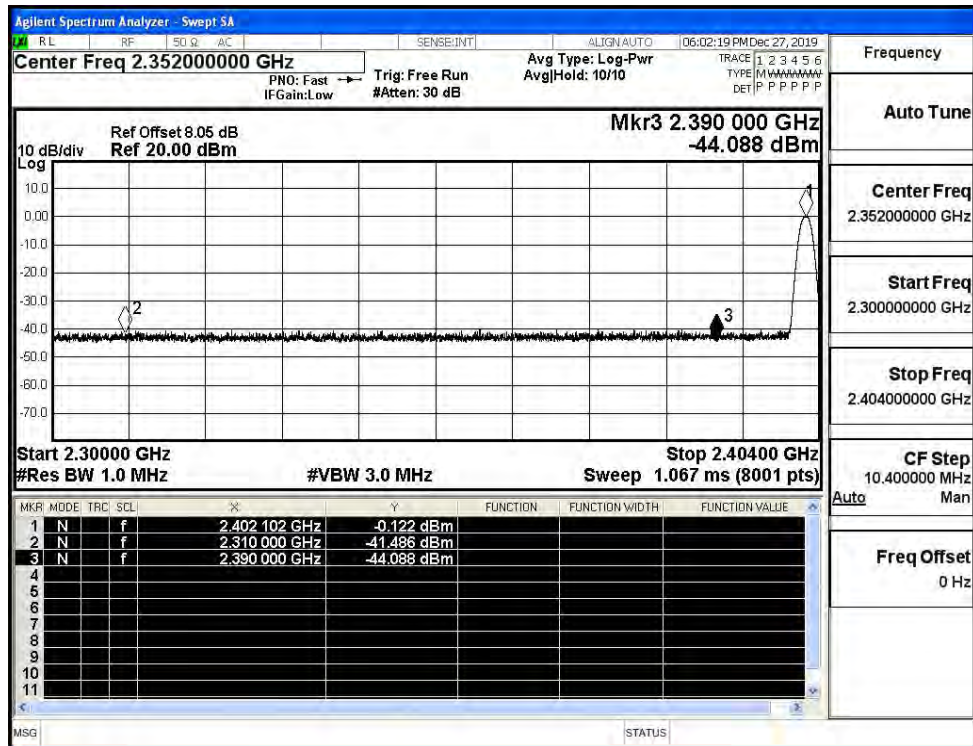
8DPSK/HCH/Hop



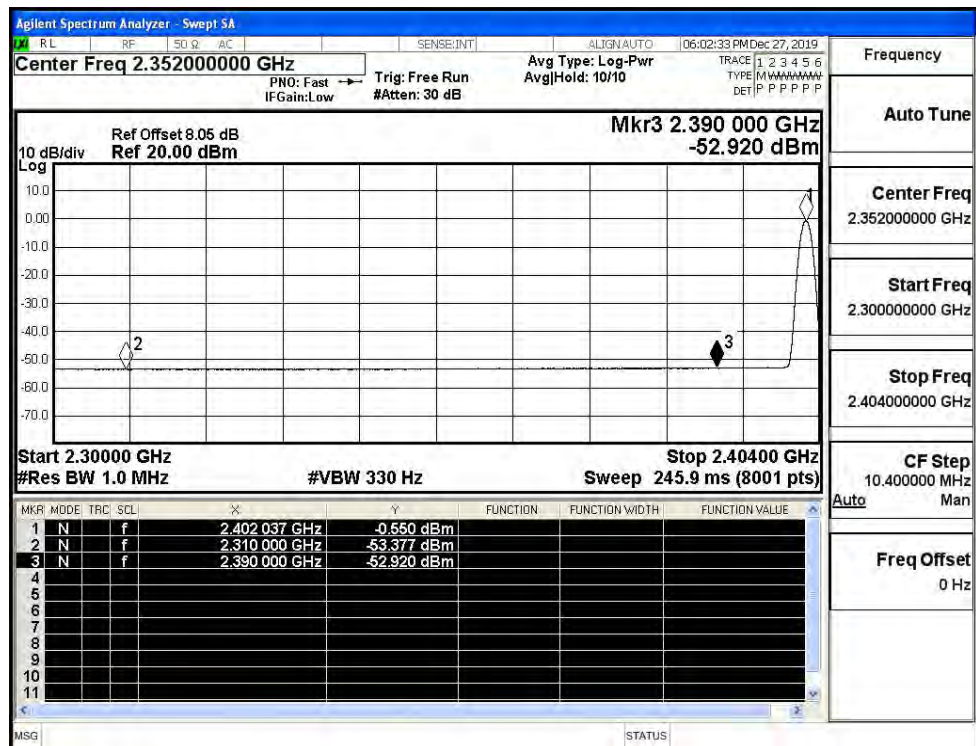
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-41.49	2.0	0	55.77	PEAK	74	PASS
	Off	2310.0	-53.38	2.0	0	43.88	AV	54	PASS
	Off	2390.0	-44.09	2.0	0	53.17	PEAK	74	PASS
	Off	2390.0	-52.92	2.0	0	44.34	AV	54	PASS
	Off	2483.5	-41.53	2.0	0	55.73	PEAK	74	PASS
	Off	2483.5	-52.70	2.0	0	44.56	AV	54	PASS
	Off	2500.0	-41.78	2.0	0	55.48	PEAK	74	PASS
	Off	2500.0	-52.55	2.0	0	44.71	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-43.61	2.0	0	53.65	PEAK	74	PASS
	Off	2310.0	-53.47	2.0	0	43.79	AV	54	PASS
	Off	2390.0	-41.75	2.0	0	55.51	PEAK	74	PASS
	Off	2390.0	-53.13	2.0	0	44.13	AV	54	PASS
	Off	2483.5	-41.90	2.0	0	55.36	PEAK	74	PASS
	Off	2483.5	-52.54	2.0	0	44.71	AV	54	PASS
	Off	2500.0	-41.46	2.0	0	55.80	PEAK	74	PASS
	Off	2500.0	-52.46	2.0	0	44.80	AV	54	PASS
8DPSK	Off	2310.0	-43.44	2.0	0	53.82	PEAK	74	PASS
	Off	2310.0	-53.38	2.0	0	43.88	AV	54	PASS
	Off	2390.0	-43.62	2.0	0	53.64	PEAK	74	PASS
	Off	2390.0	-52.98	2.0	0	44.27	AV	54	PASS
	Off	2483.5	-42.90	2.0	0	54.36	PEAK	74	PASS
	Off	2483.5	-52.61	2.0	0	44.65	AV	54	PASS
	Off	2500.0	-41.24	2.0	0	56.02	PEAK	74	PASS
	Off	2500.0	-52.38	2.0	0	44.87	AV	54	PASS

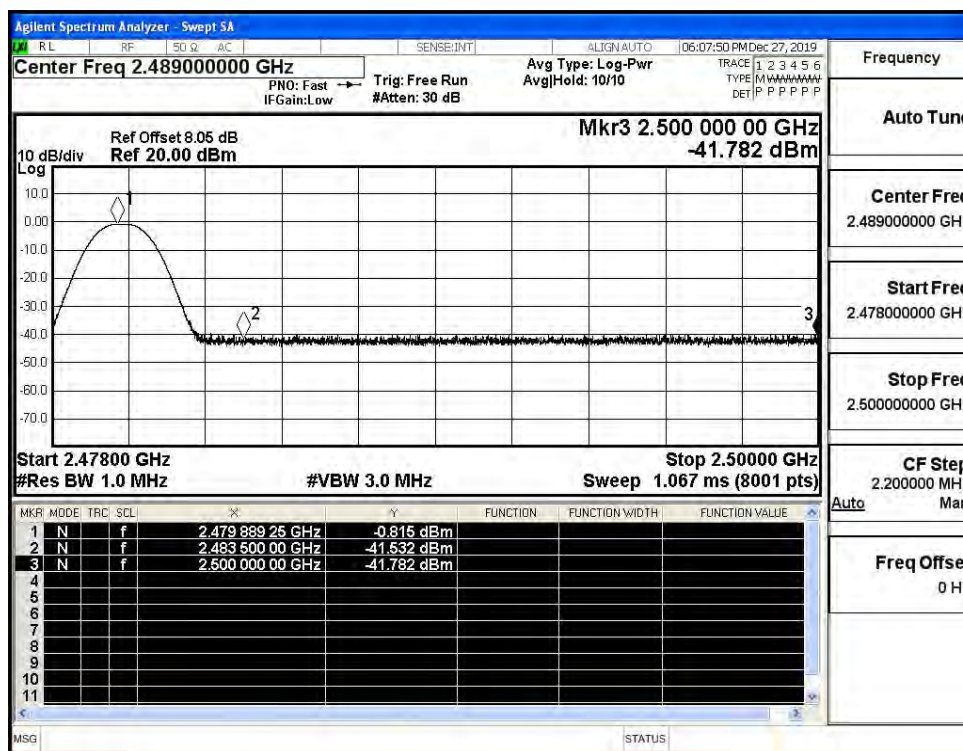
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



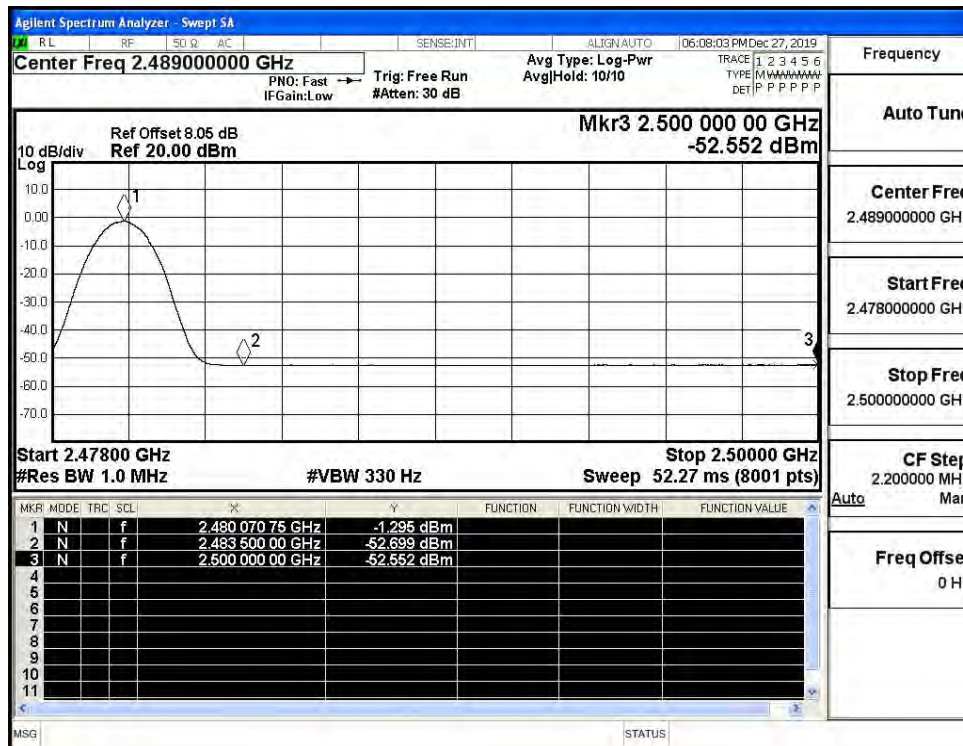
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

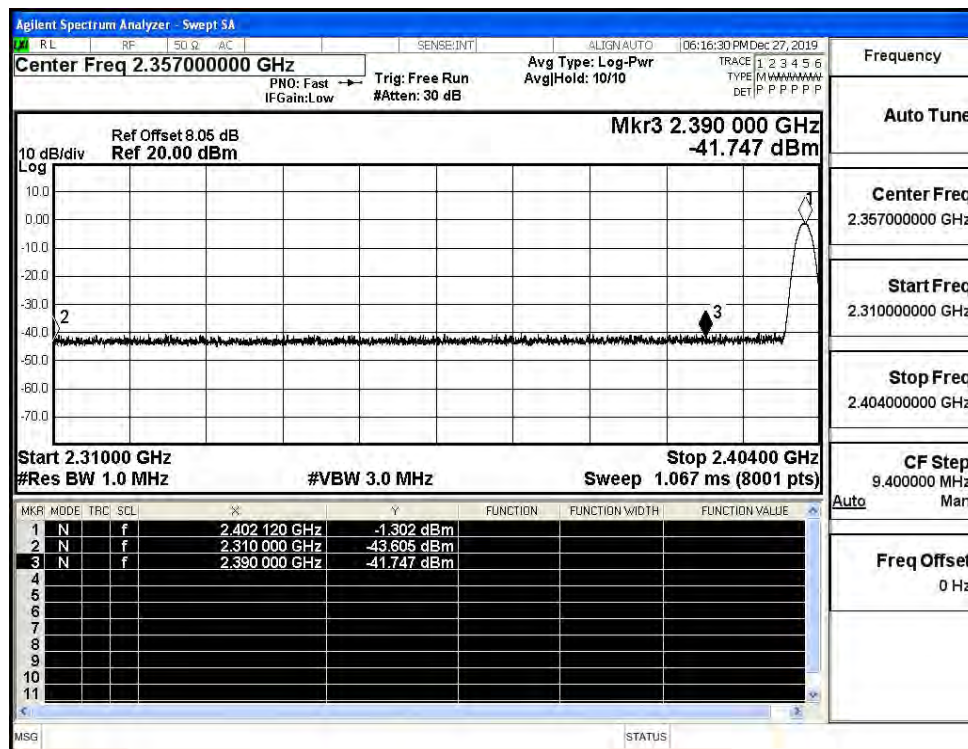
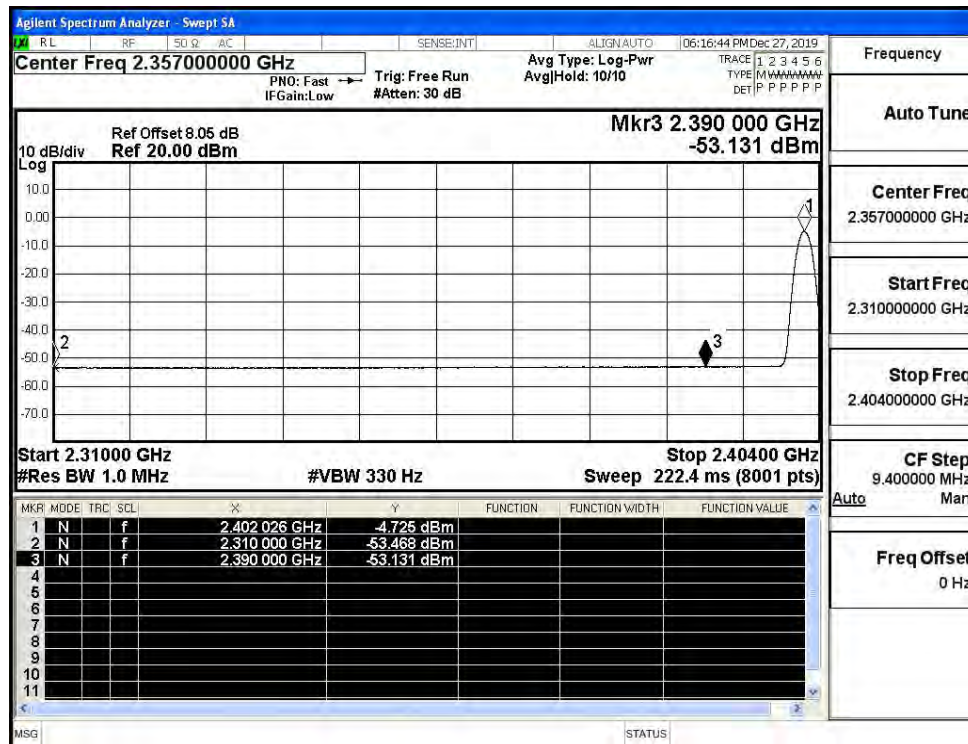


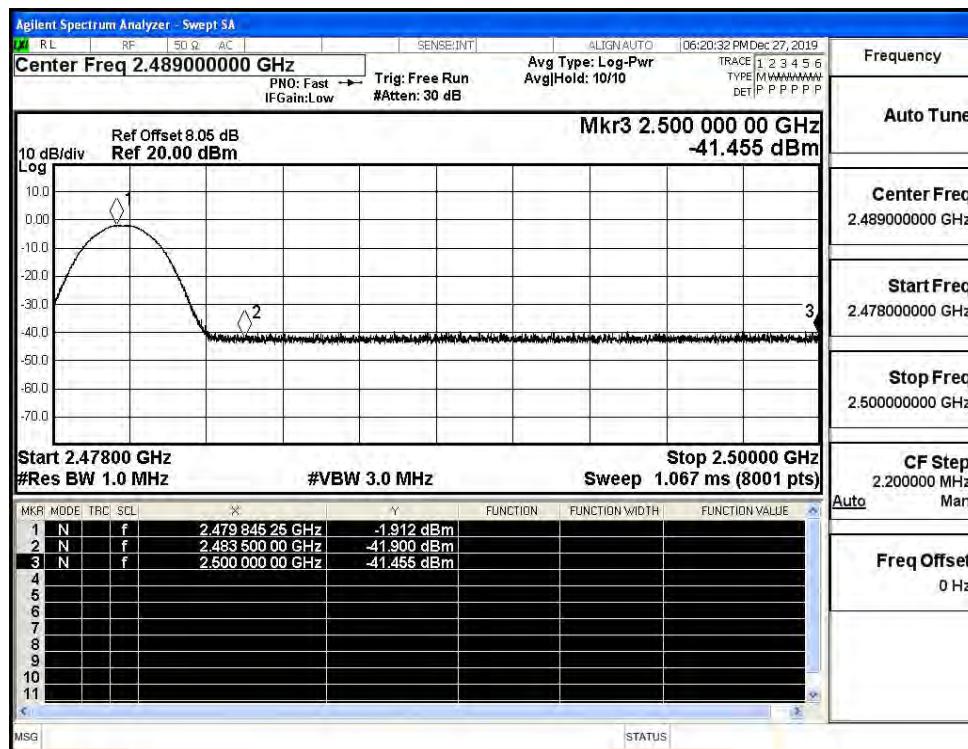
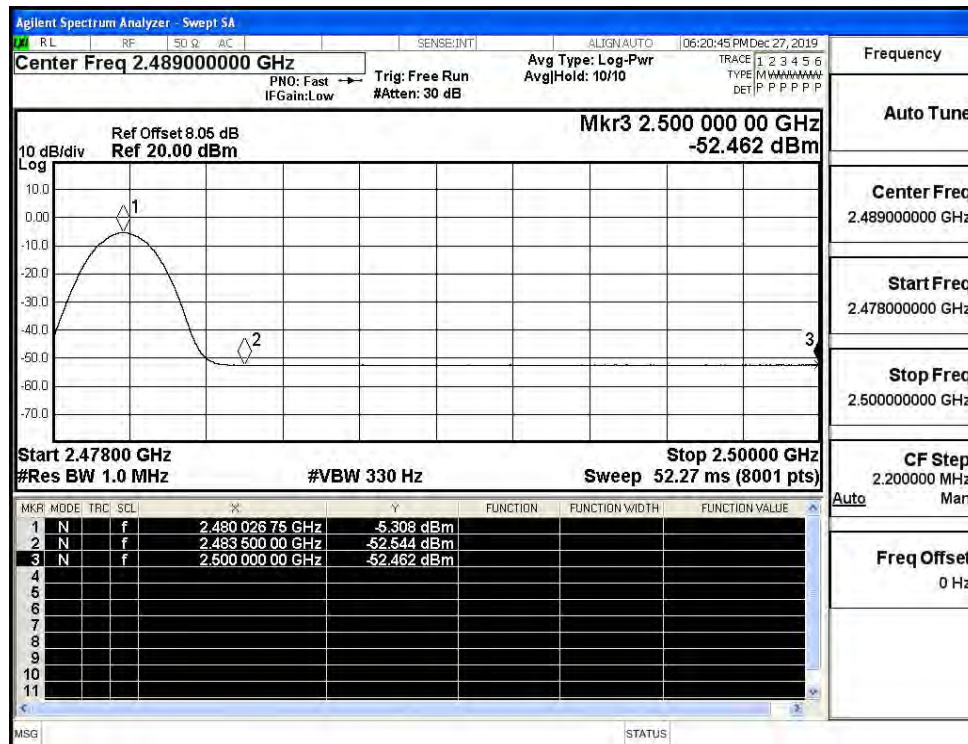
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



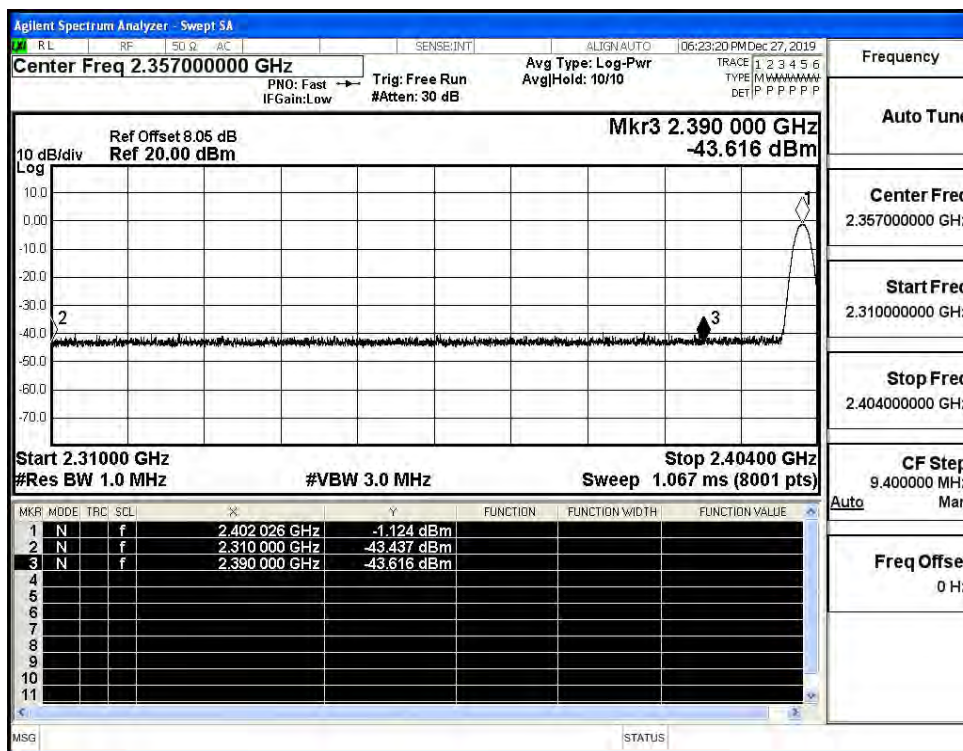
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



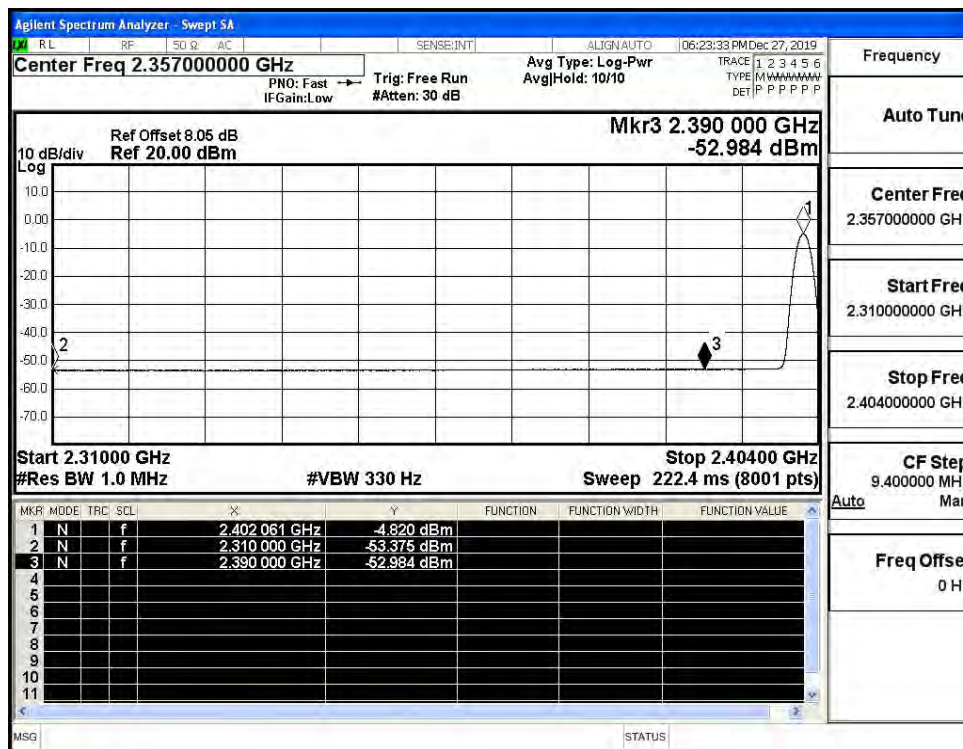
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

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)

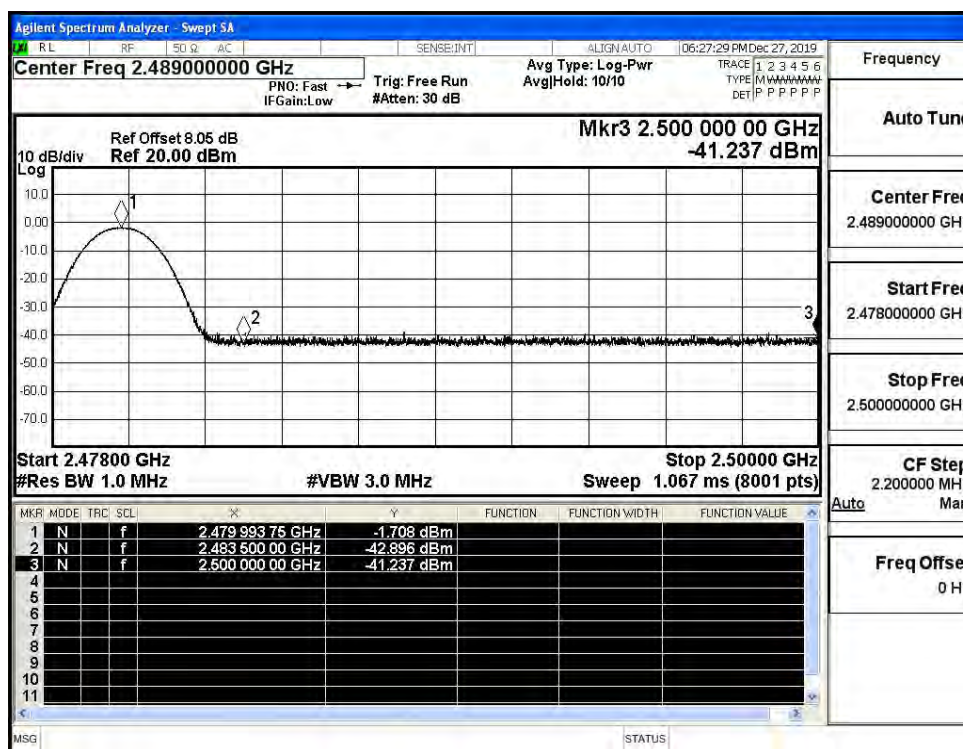
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

