

Appendix A

RF Test Data for BT 4.2(BDR/EDR) (Conducted Measurement)

Product Name: HEADSET

Trade Mark: microlab

Test Model: Necklace 200

Environmental Conditions

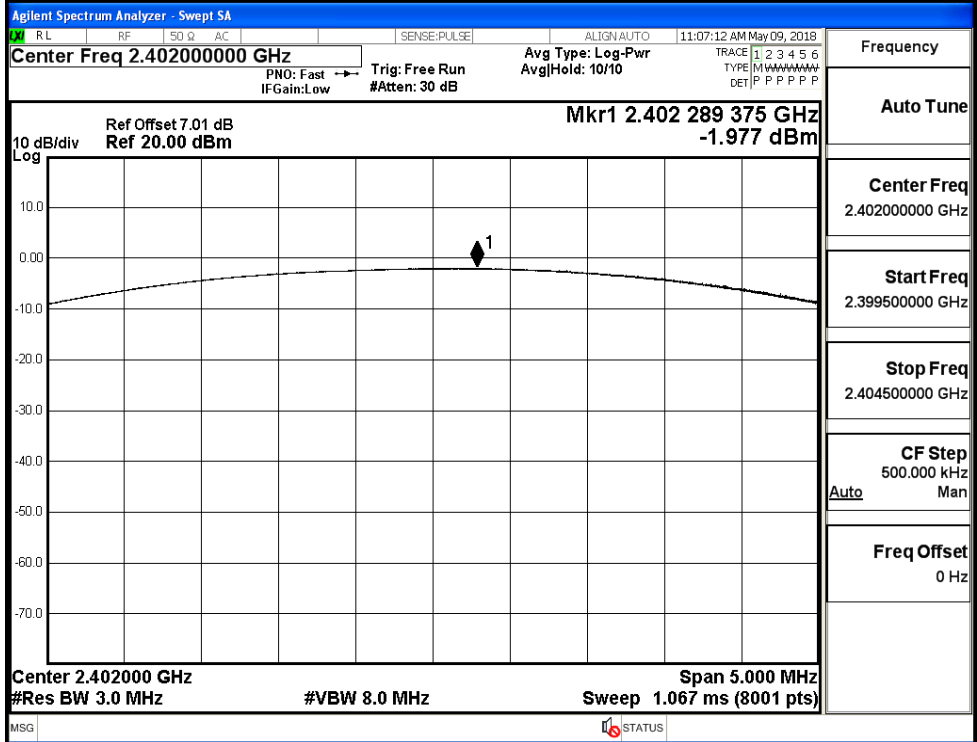
Temperature:	21.6 ° C
Relative Humidity:	52.6%
ATM Pressure:	100.0 kPa
Test Engineer:	Mina.xu
Supervised by:	Jayden.Zhuo

A.1 Maxmum Conducted Peak Output Power

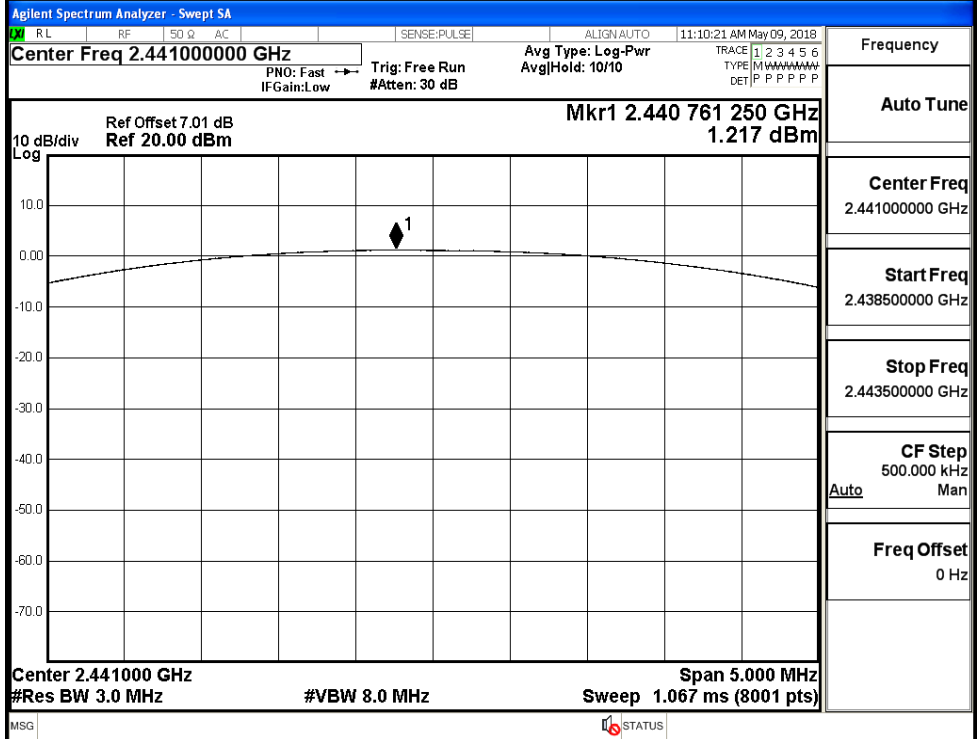
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.977	30	PASS
	MCH	1.217	30	PASS
	HCH	2.638	30	PASS
$\pi/4$ DQPSK	LCH	-1.029	21	PASS
	MCH	-0.212	21	PASS
	HCH	1.500	21	PASS
8DPSK	LCH	-0.913	21	PASS
	MCH	0.085	21	PASS
	HCH	1.743	21	PASS

Test Graphs

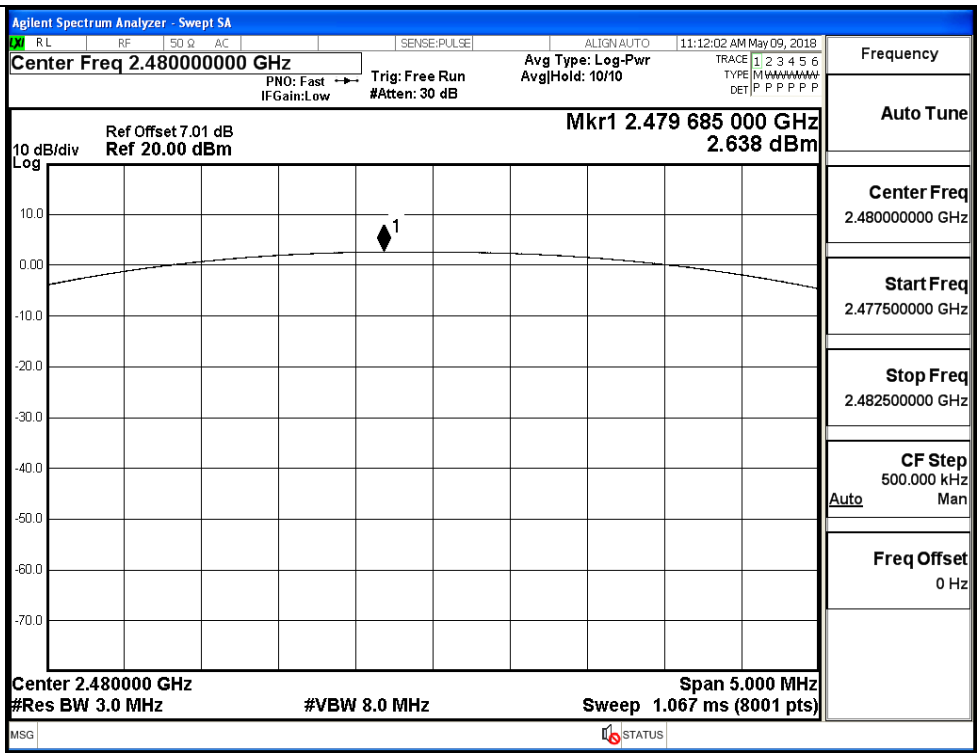
GFSK/LCH



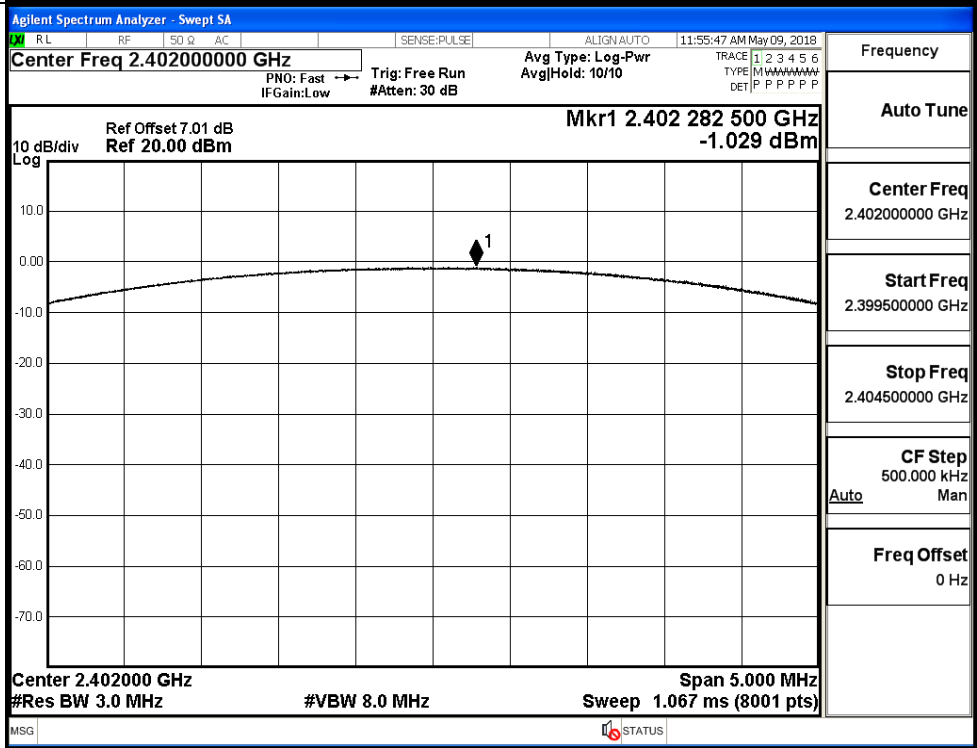
GFSK/MCH



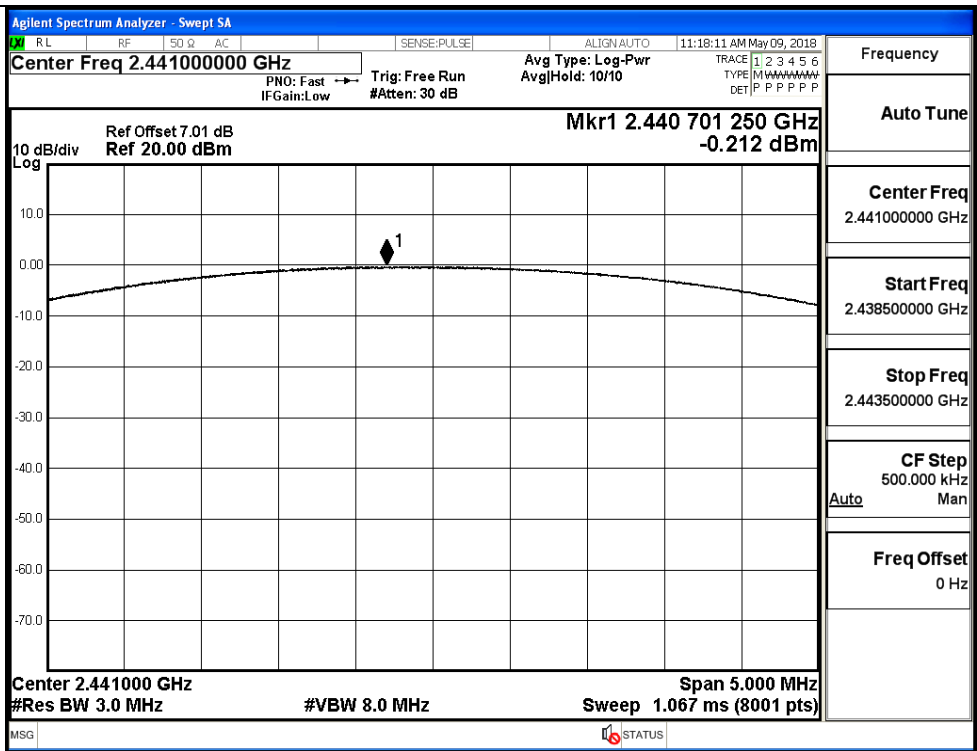
GFSK/HCH



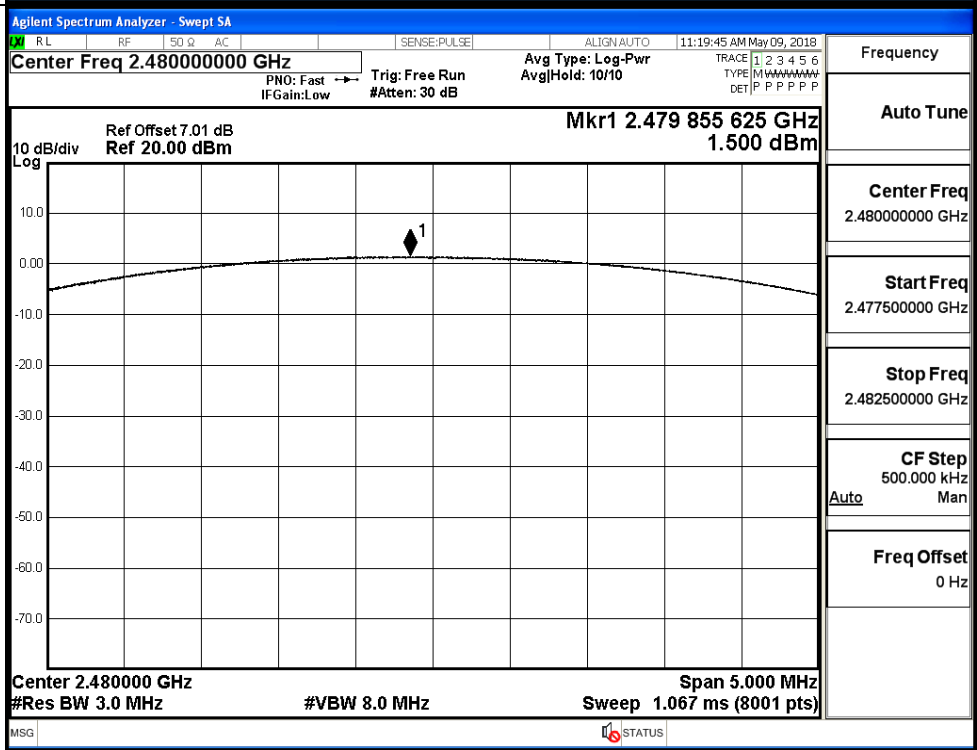
π /4DQPSK/LCH



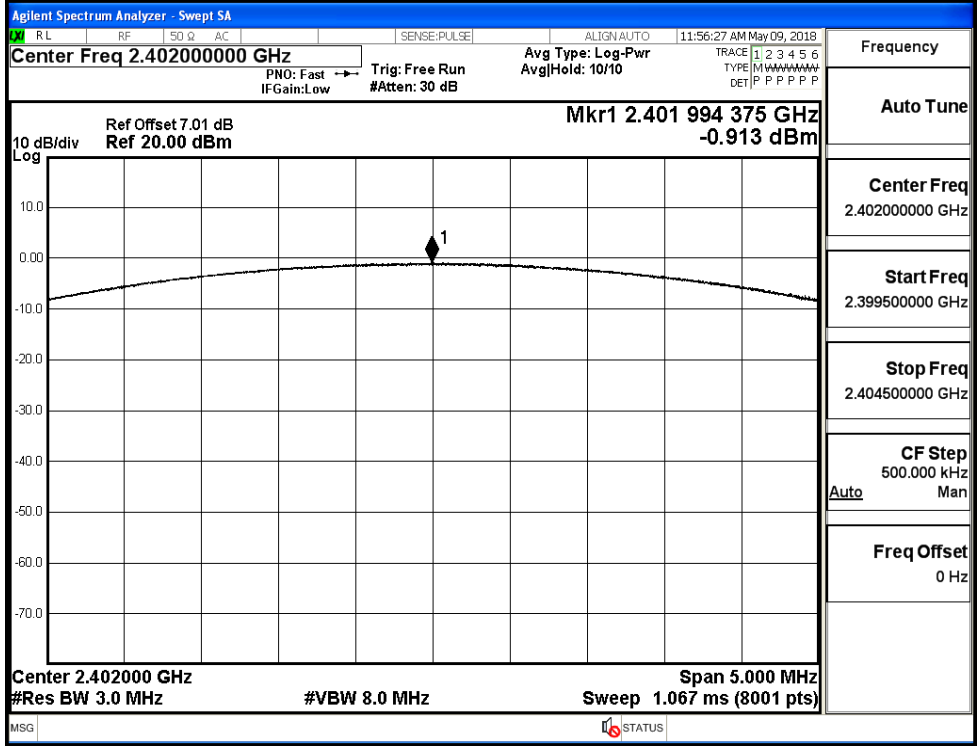
π /4DQPSK/MCH



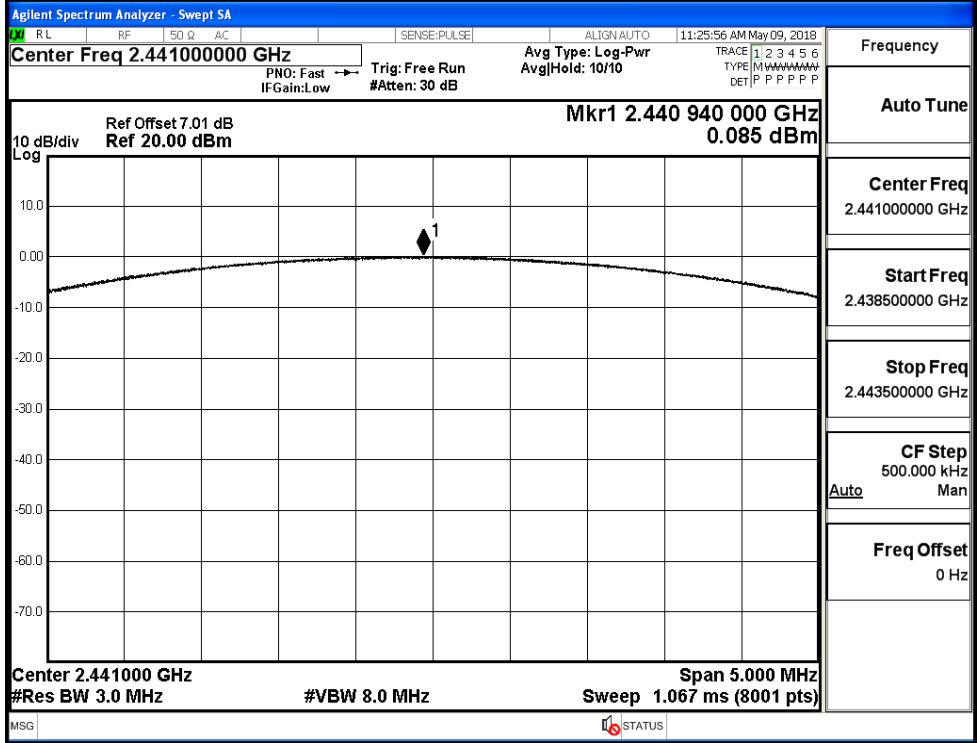
π /4DQPSK/HCH



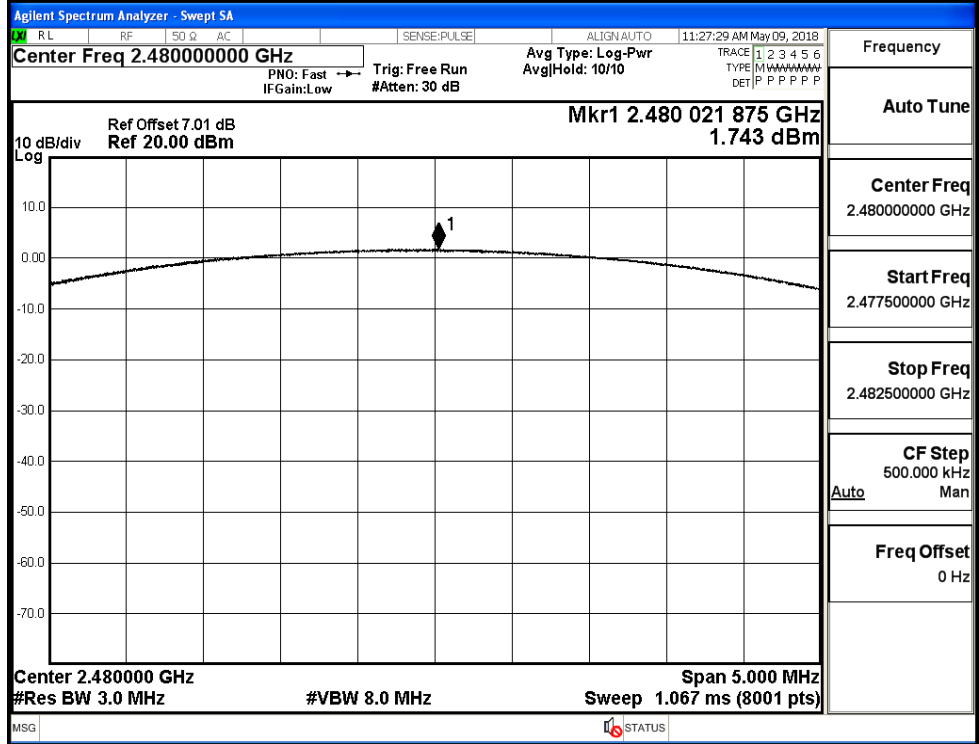
8DPSK/LCH



8DPSK/MCH

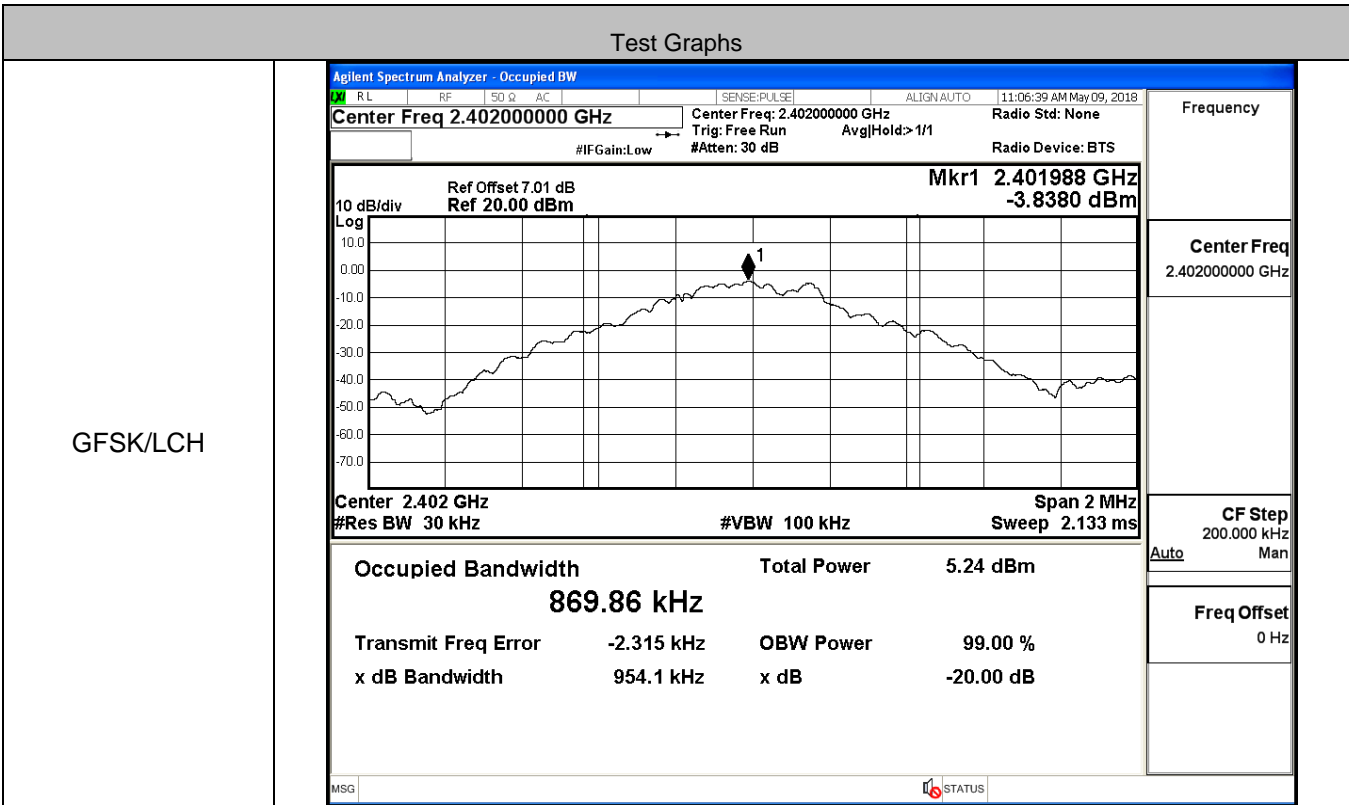


8DPSK/HCH

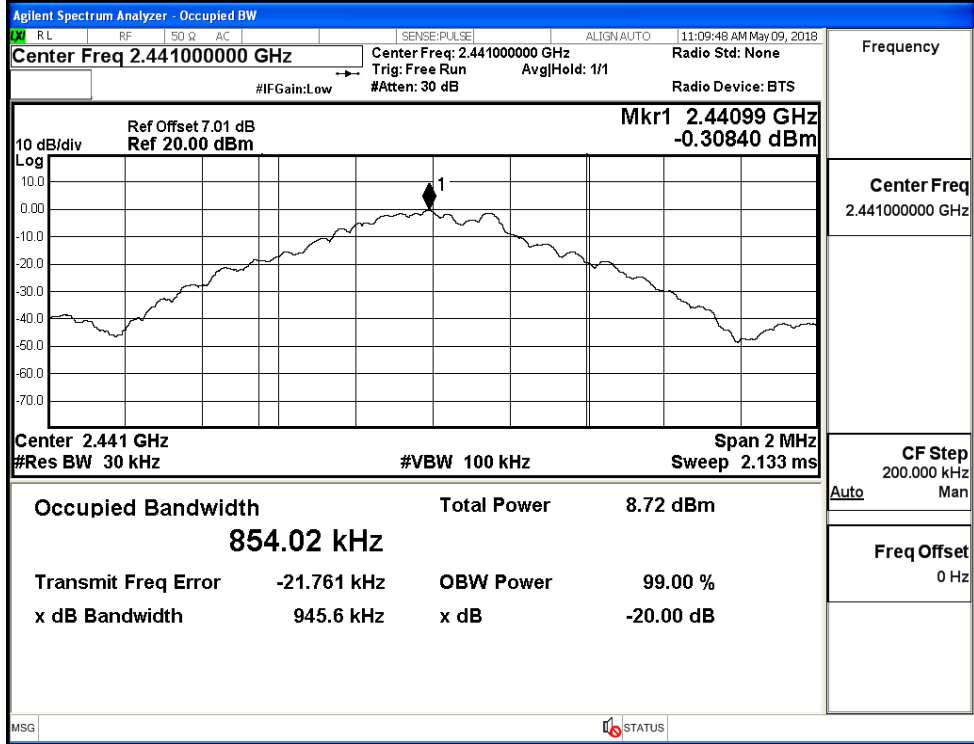


A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9541	Not Specified	PASS
	MCH	0.9456	Not Specified	PASS
	HCH	0.9446	Not Specified	PASS
π/4DQPSK	LCH	1.265	Not Specified	PASS
	MCH	1.231	Not Specified	PASS
	HCH	1.232	Not Specified	PASS
8DPSK	LCH	1.282	Not Specified	PASS
	MCH	1.267	Not Specified	PASS
	HCH	1.261	Not Specified	PASS

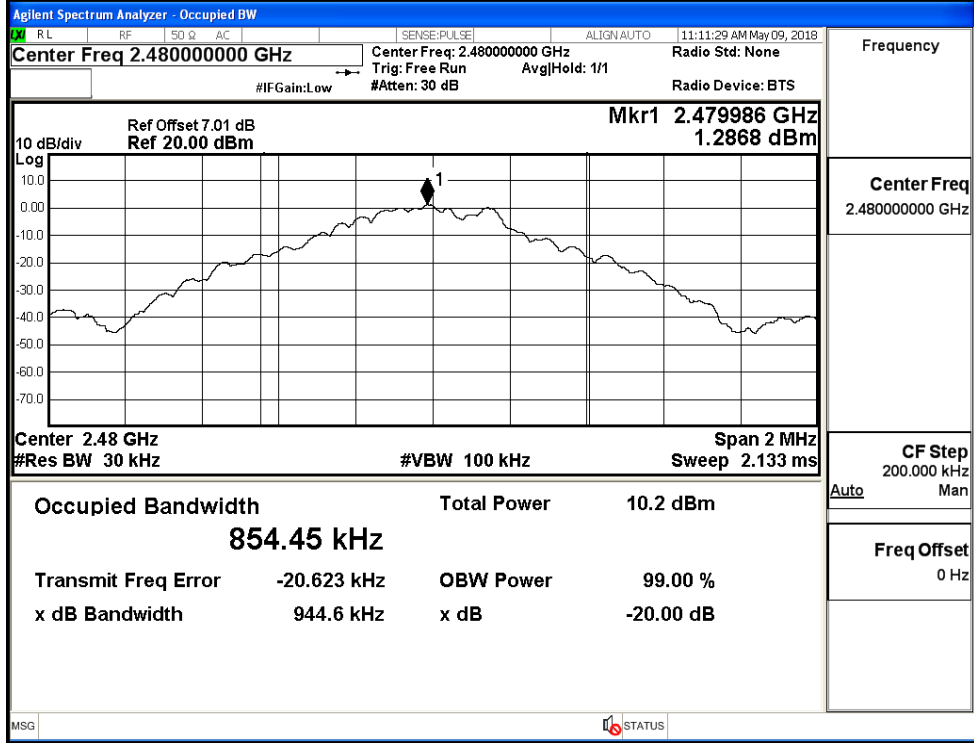


GFSK/MCH



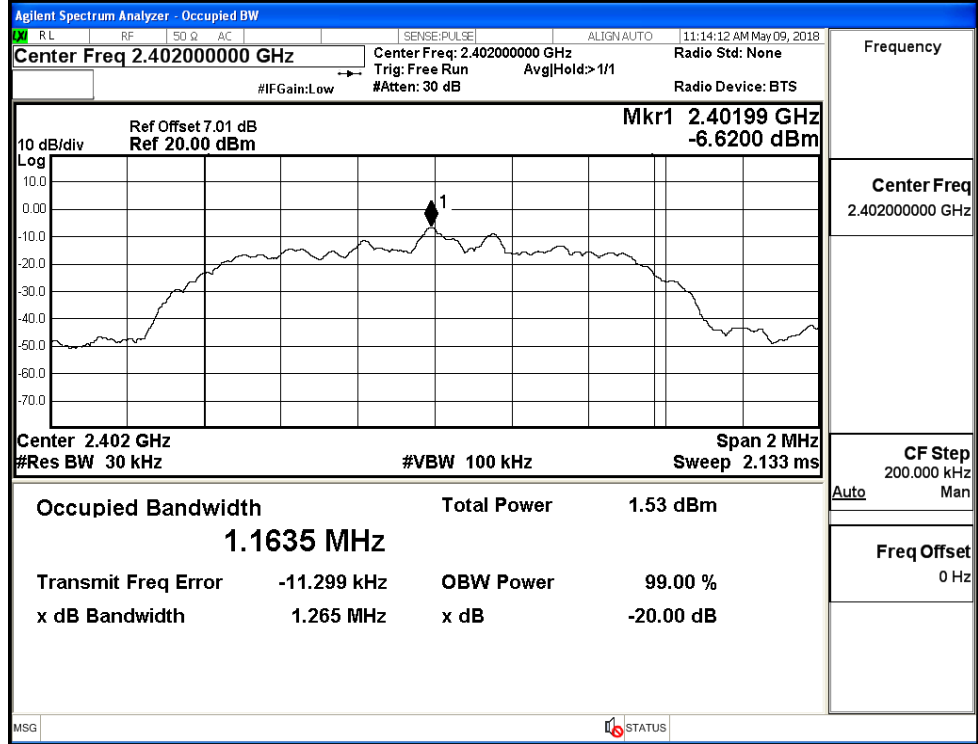
Frequency	2.441000000 GHz
Center Freq	2.441000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

GFSK/HCH



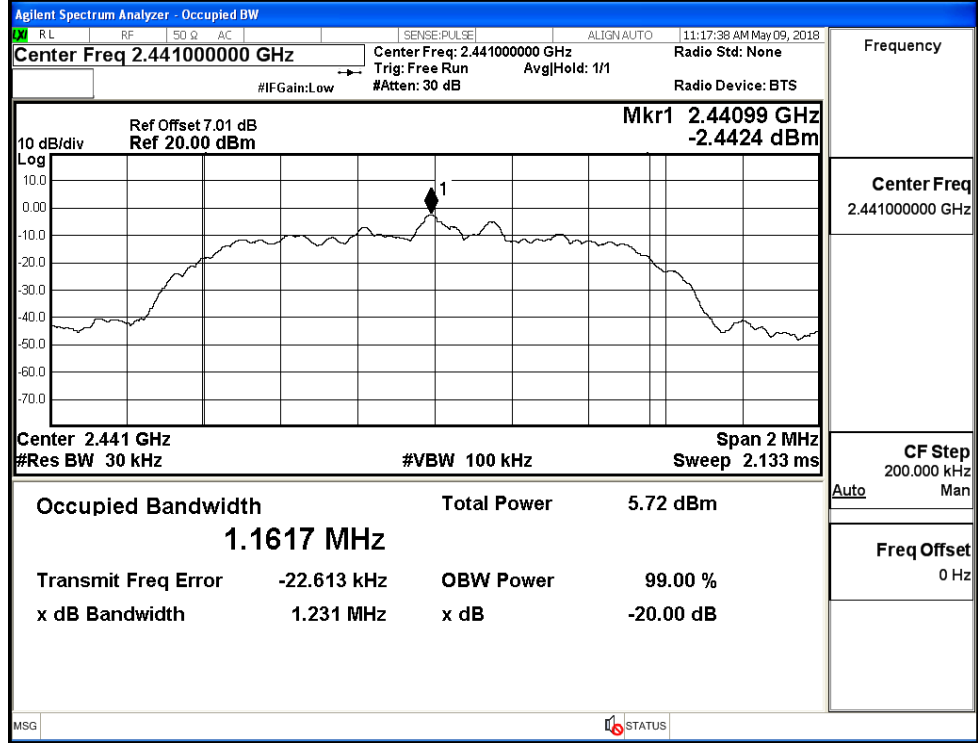
Frequency	2.480000000 GHz
Center Freq	2.480000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/LCH



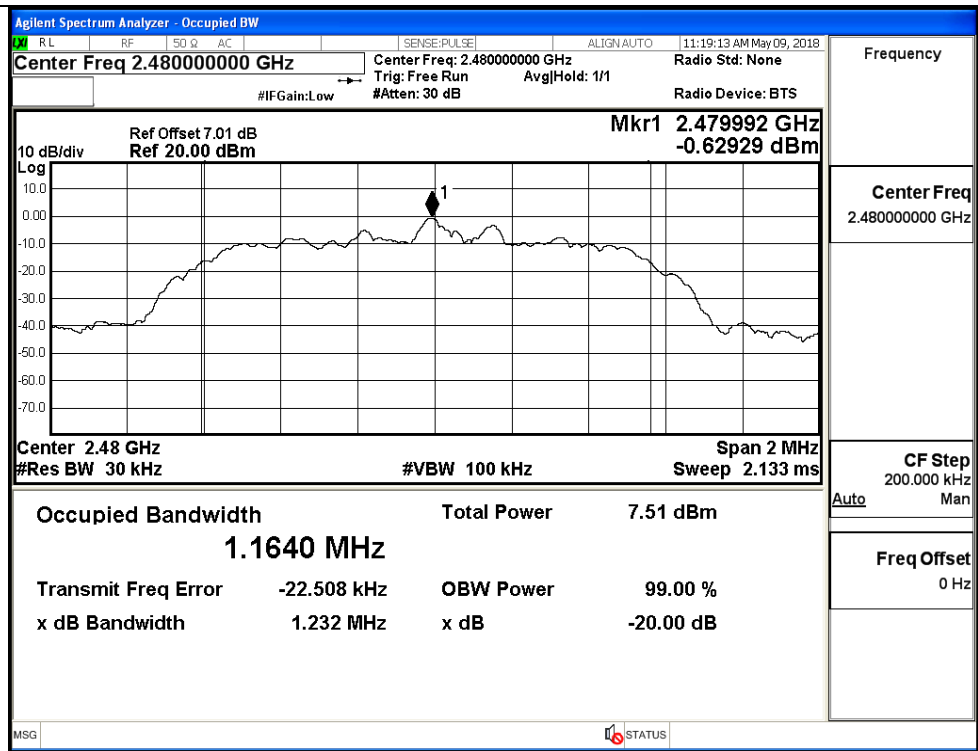
Frequency	2.40200000 GHz
Center Freq	2.40200000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/MCH



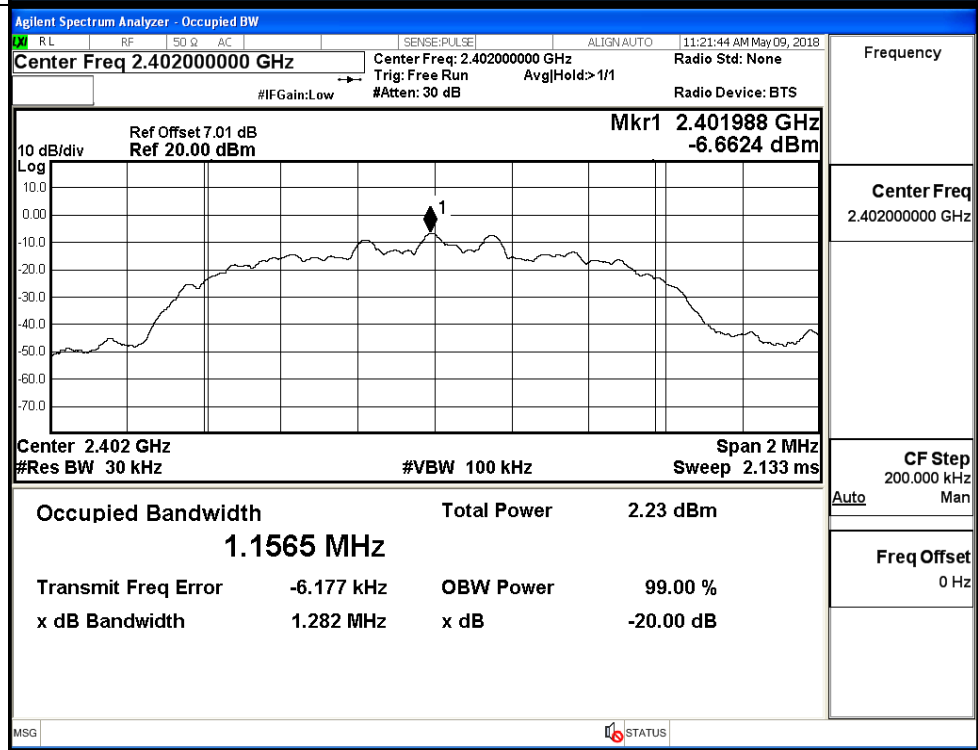
Frequency	2.44100000 GHz
Center Freq	2.44100000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/HCH



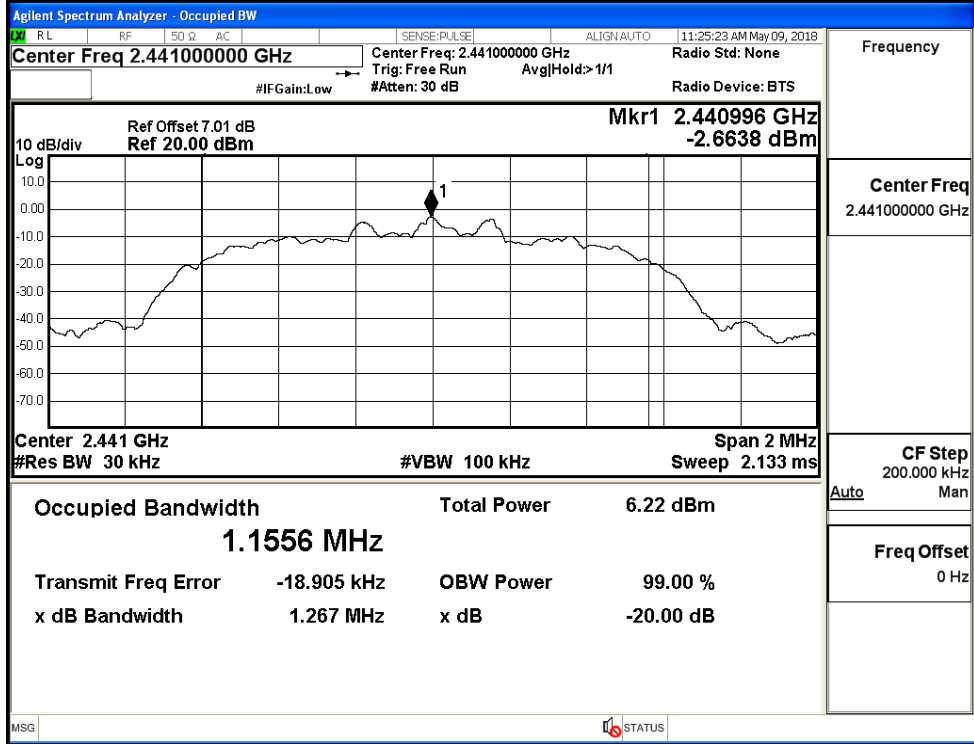
Frequency	2.48000000 GHz
Center Freq	2.48000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

8DPSK/LCH



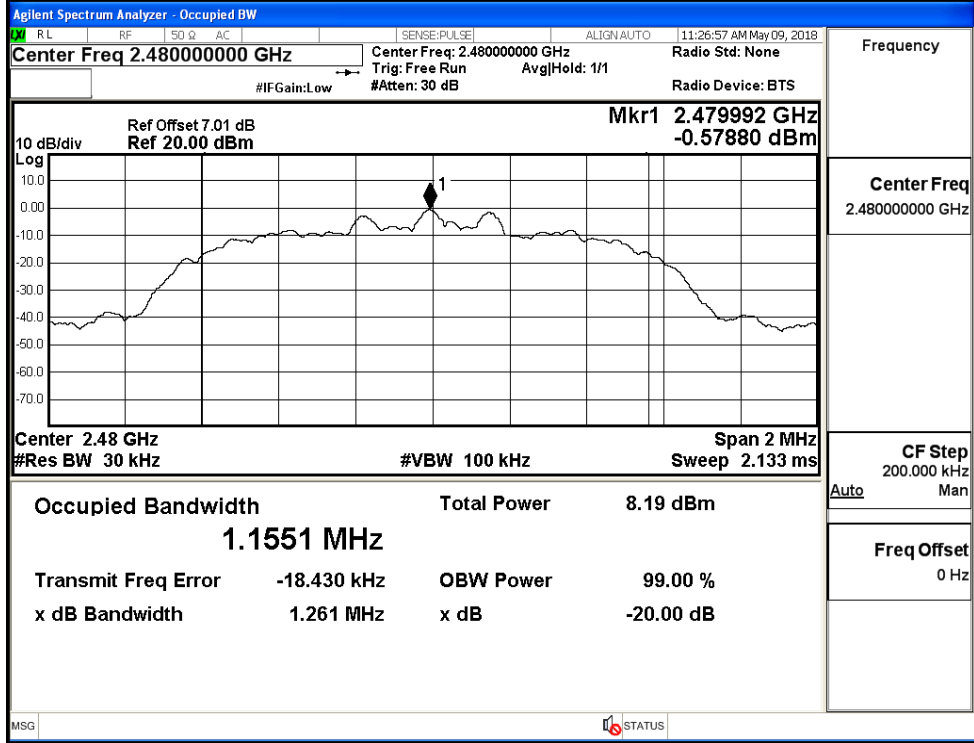
Frequency	2.40200000 GHz
Center Freq	2.40200000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

8DPSK/MCH



Frequency	2.441000000 GHz
Center Freq	2.441000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

8DPSK/HCH

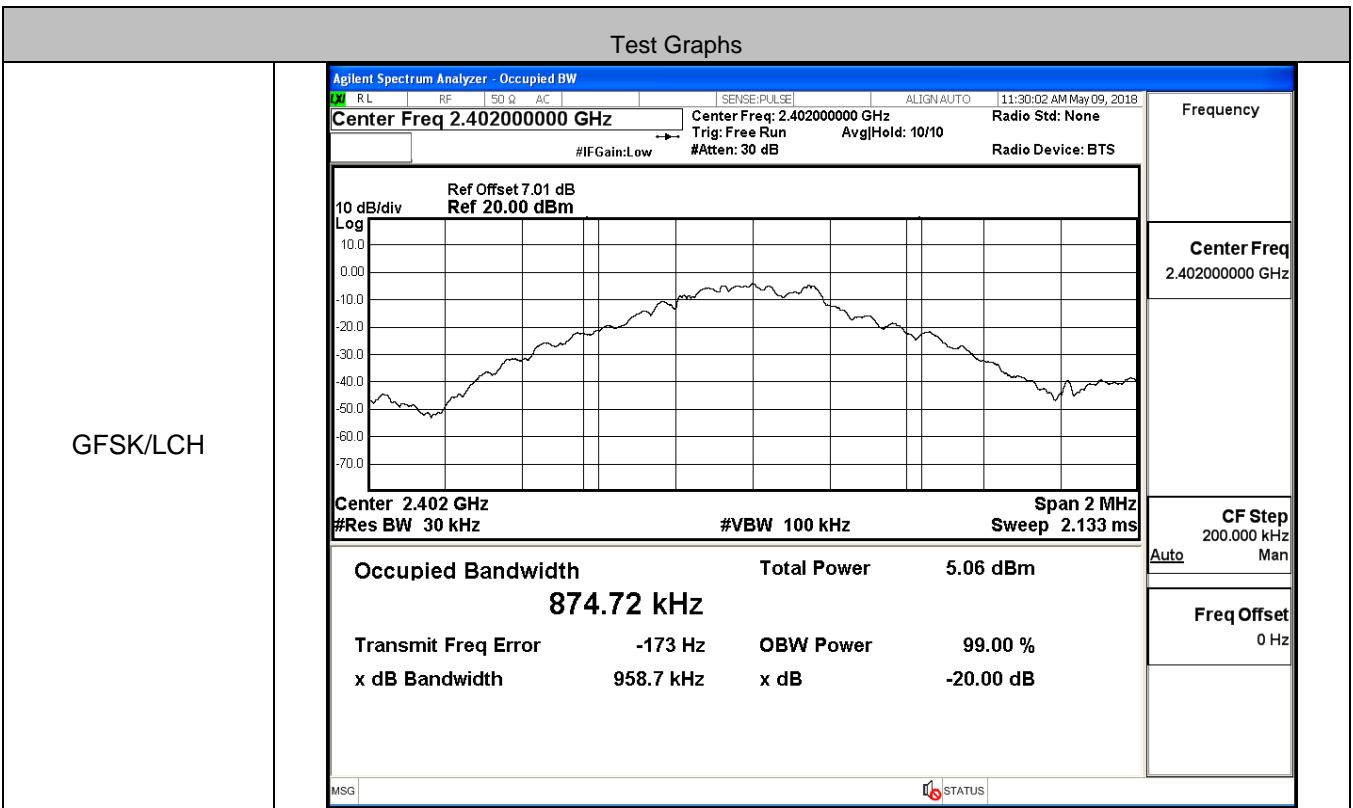


Frequency	2.480000000 GHz
Center Freq	2.480000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

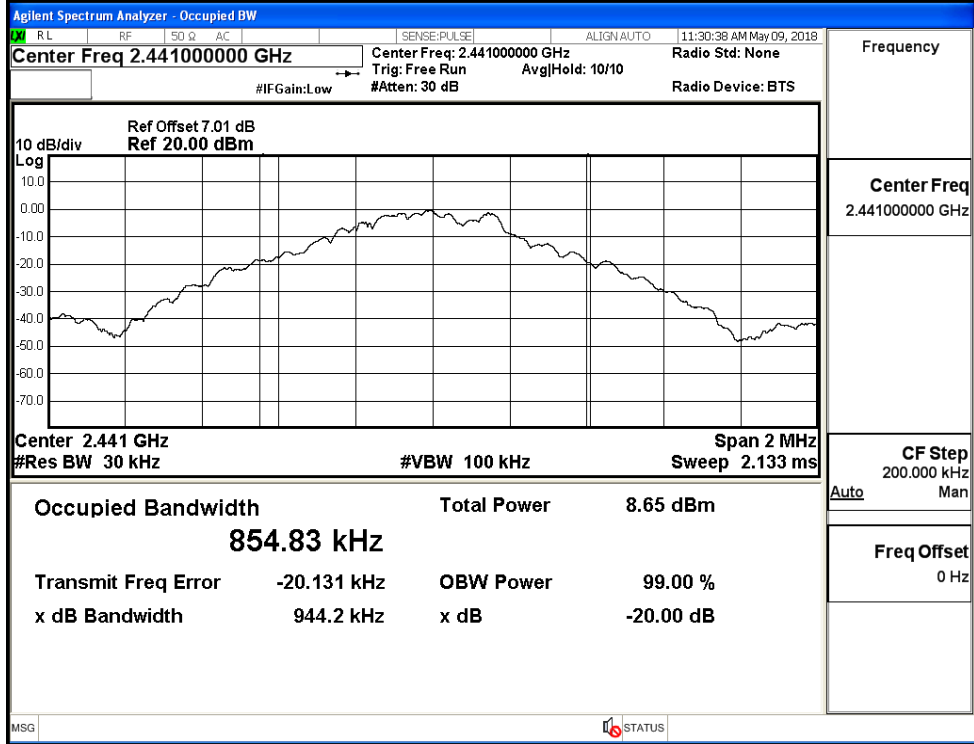
A.3 Occupied Bandwidth

Mode	Channel.	Occupied Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.87472	Not Specified	PASS
	MCH	0.85483	Not Specified	PASS
	HCH	0.85411	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.1666	Not Specified	PASS
	MCH	1.1620	Not Specified	PASS
	HCH	1.1628	Not Specified	PASS
8DPSK	LCH	1.1574	Not Specified	PASS
	MCH	1.1558	Not Specified	PASS
	HCH	1.1572	Not Specified	PASS

Test Graphs

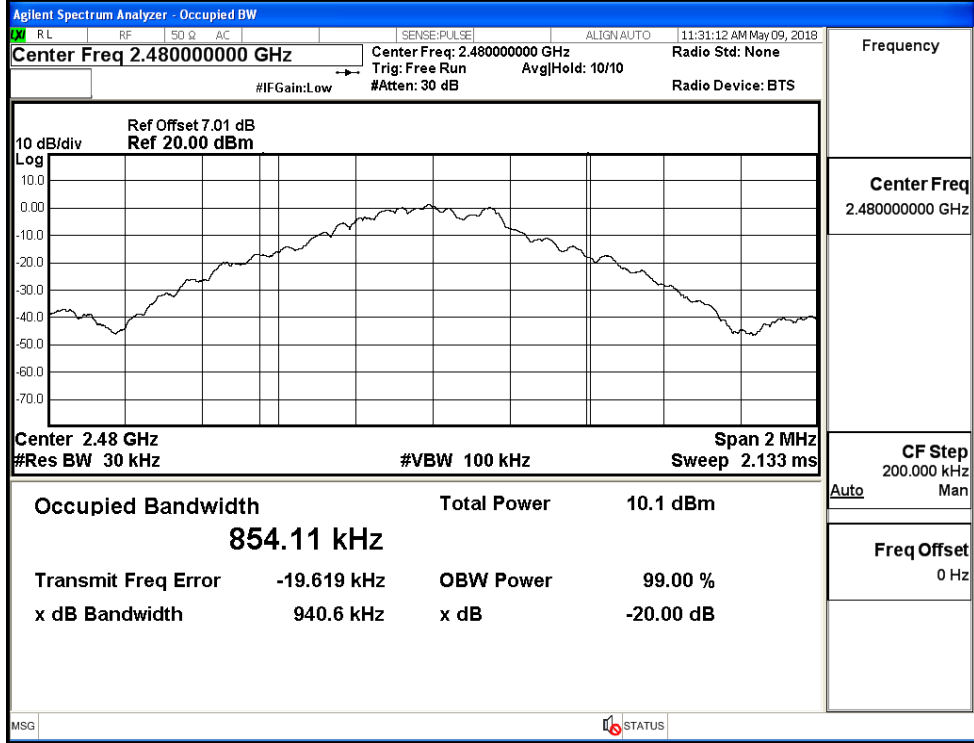


GFSK/MCH



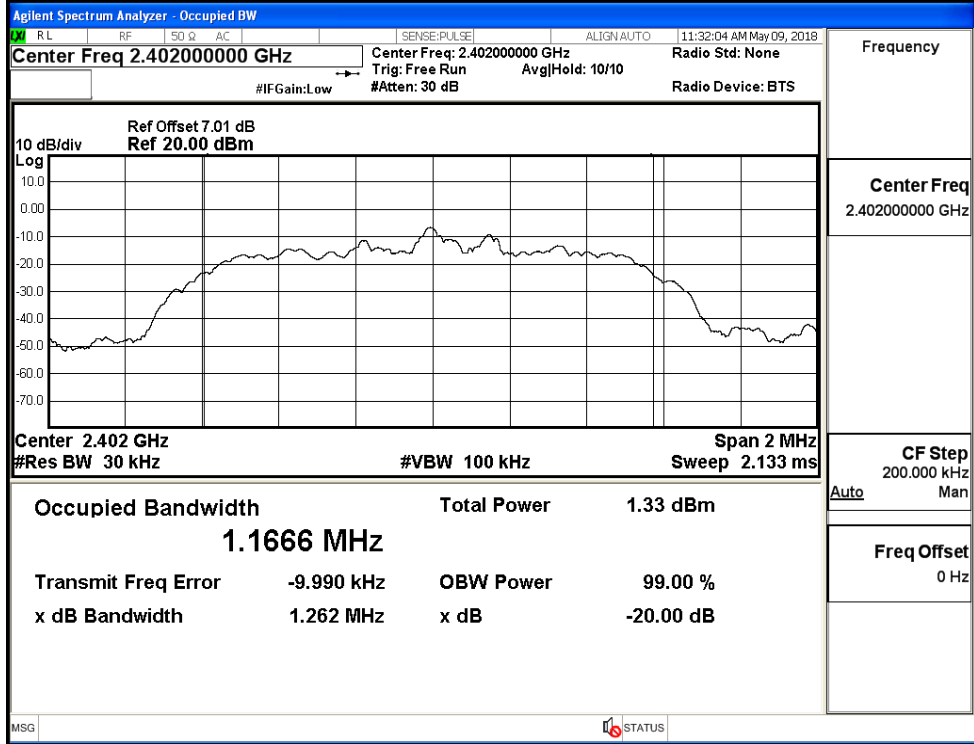
Frequency
Center Freq 2.441000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

GFSK/HCH



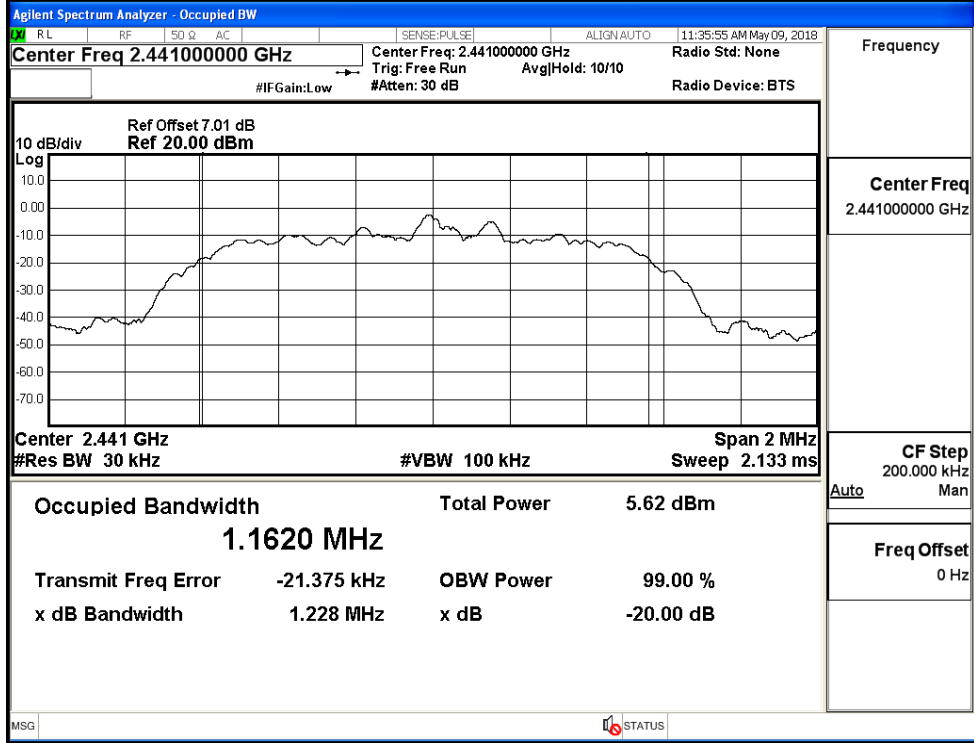
Frequency
Center Freq 2.480000000 GHz
CF Step 200.000 kHz Auto Man
Freq Offset 0 Hz

π /4DQPSK/LCH



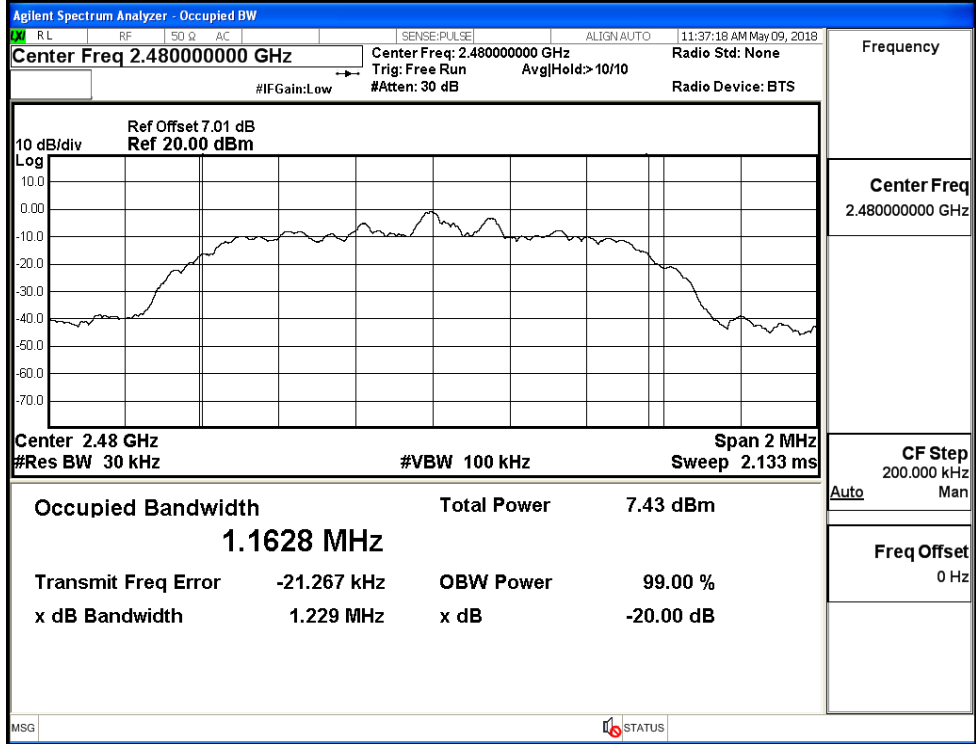
Frequency	2.40200000 GHz
Center Freq	2.40200000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/MCH



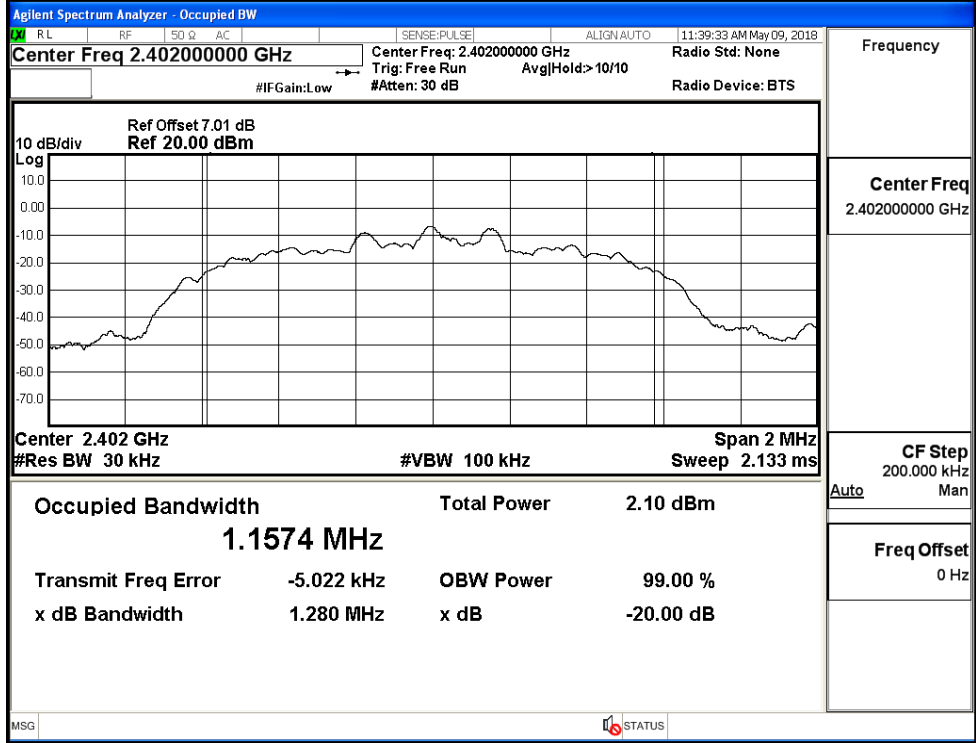
Frequency	2.44100000 GHz
Center Freq	2.44100000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

π/4DQPSK/HCH

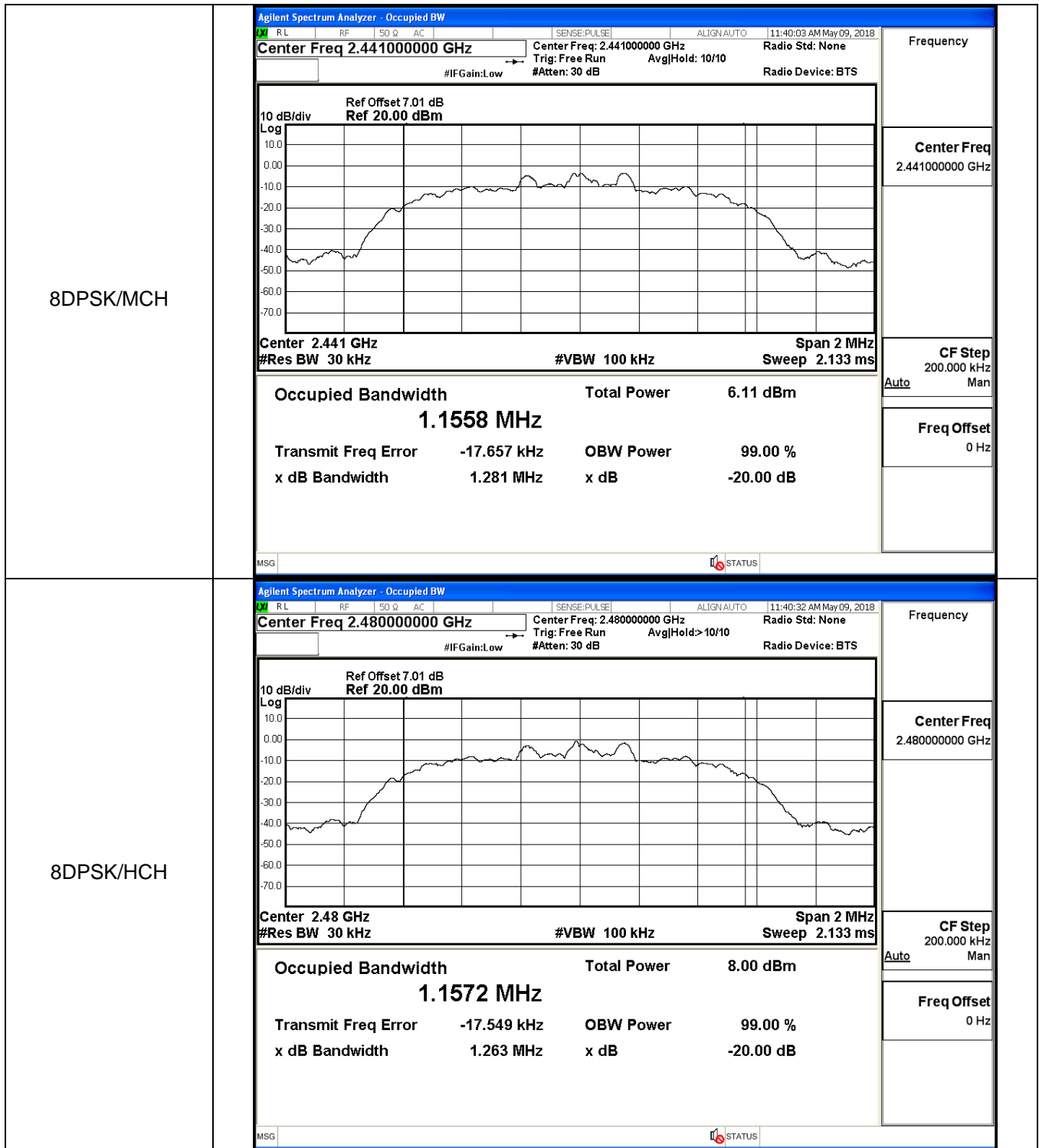


Frequency	2.48000000 GHz
Center Freq	2.48000000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz

8DPSK/LCH



Frequency	2.40200000 GHz
Center Freq	2.40200000 GHz
CF Step	200.000 kHz
Auto	Man
Freq Offset	0 Hz



A.4 Carrier Frequency Separation

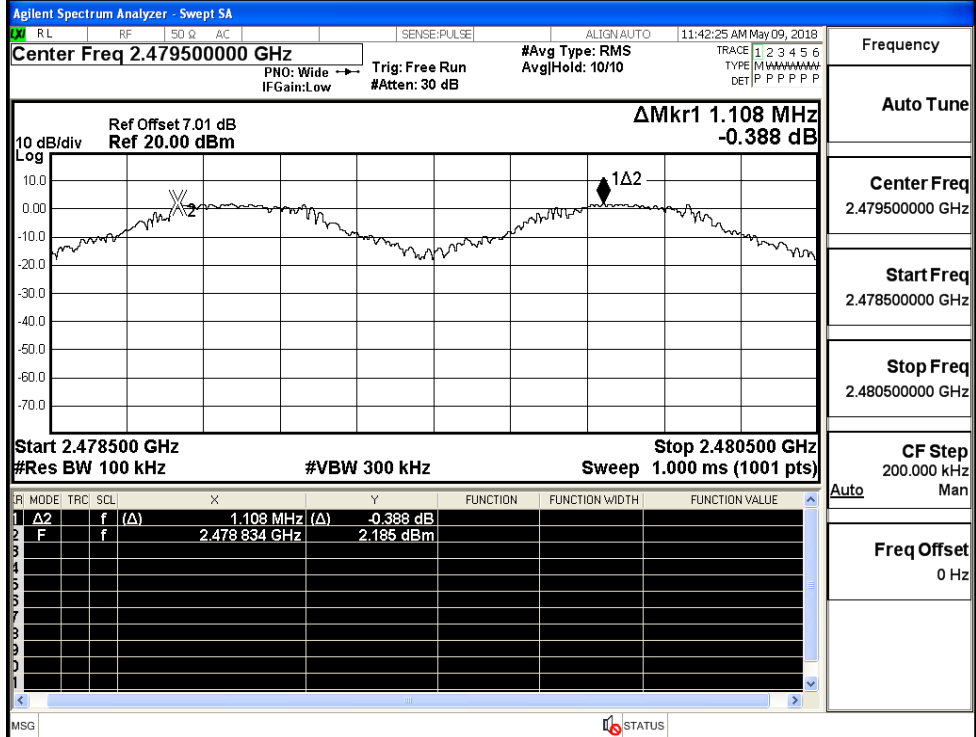
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.857	0.636	PASS
	MCH	1.216	0.636	PASS
	HCH	1.108	0.636	PASS
$\pi/4$ DQPSK	LCH	1.172	0.843	PASS

	MCH	1.004	0.843	PASS
	HCH	0.904	0.843	PASS
8DPSK	LCH	1.168	0.855	PASS
	MCH	1.012	0.855	PASS
	HCH	1.132	0.855	PASS

Test Graphs

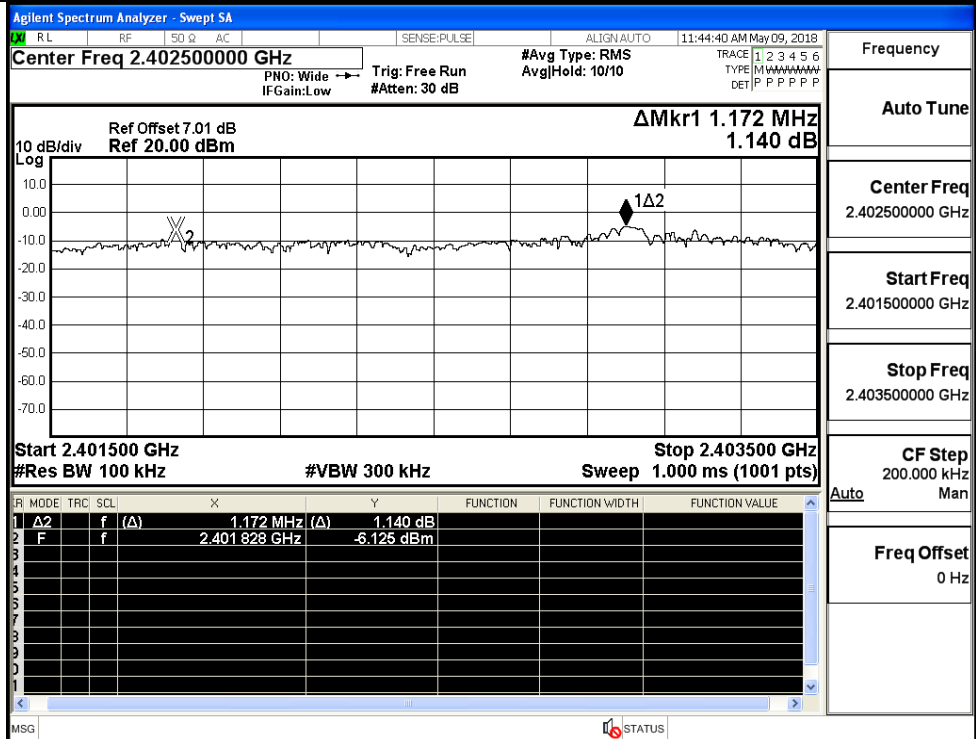
GFSK/LCH		<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.40250000 GHz</p> <p>Start Freq 2.40150000 GHz</p> <p>Stop Freq 2.40350000 GHz</p> <p>CF Step 200.000 kHz</p> <p>Freq Offset 0 Hz</p>
		<p>Frequency</p> <p>Auto Tune</p> <p>Center Freq 2.44150000 GHz</p> <p>Start Freq 2.44050000 GHz</p> <p>Stop Freq 2.44250000 GHz</p> <p>CF Step 200.000 kHz</p> <p>Freq Offset 0 Hz</p>

GFSK/HCH



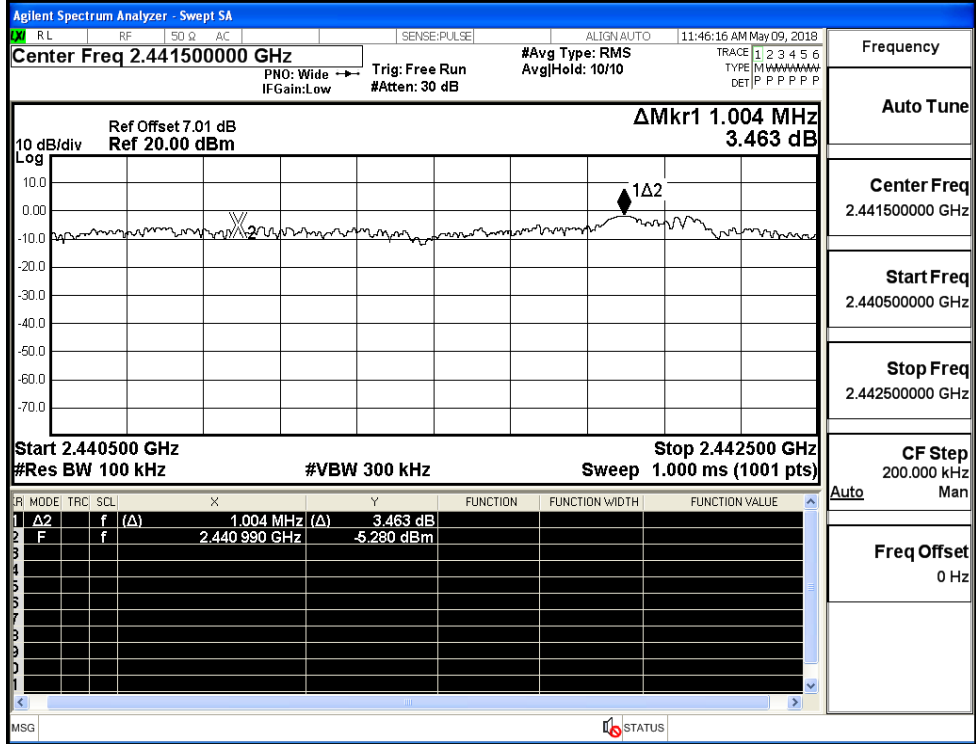
Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

π/4DQPSK/LCH



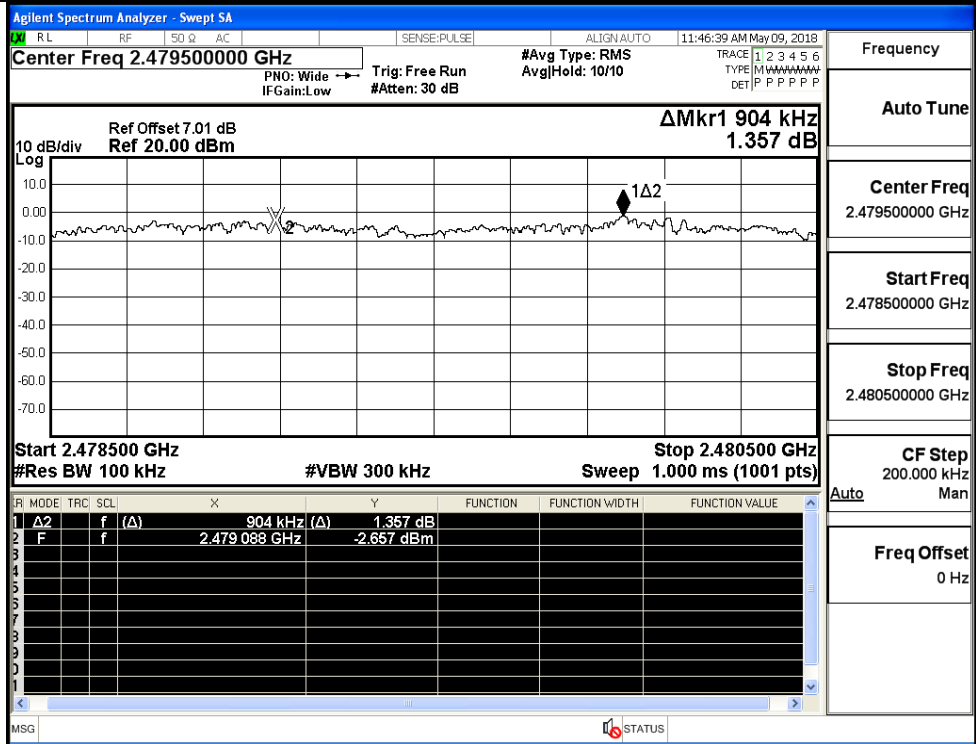
Frequency
Auto Tune
Center Freq
2.402500000 GHz
Start Freq
2.401500000 GHz
Stop Freq
2.403500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

π /4DQPSK/MCH



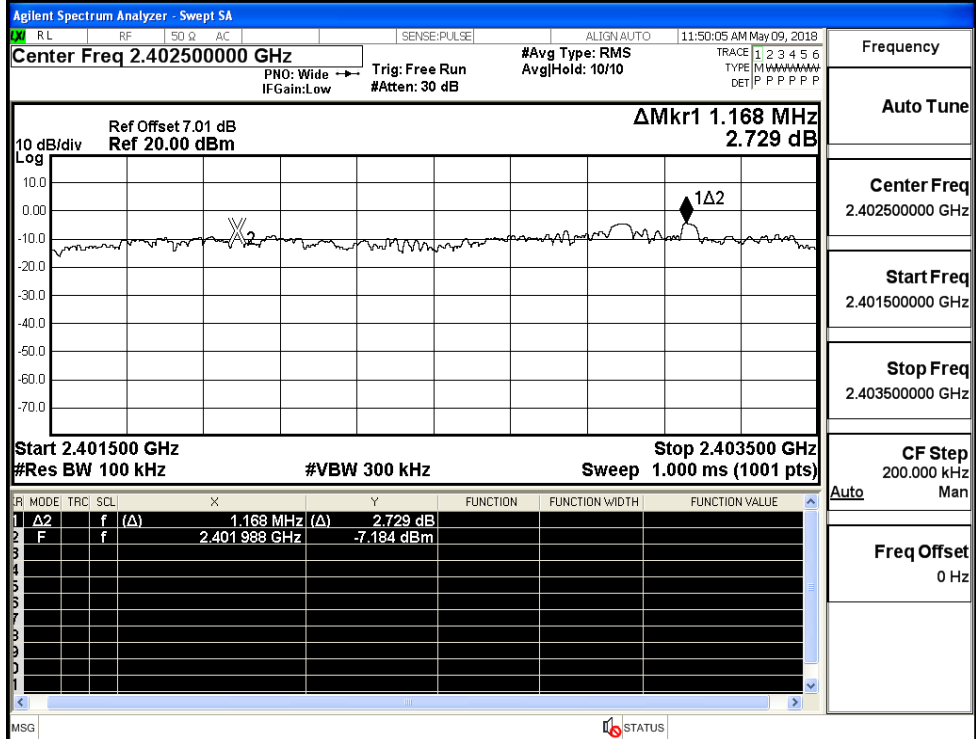
Frequency
Auto Tune
Center Freq 2.441500000 GHz
Start Freq 2.440500000 GHz
Stop Freq 2.442500000 GHz
CF Step 200.000 kHz
Auto
Freq Offset 0 Hz

π /4DQPSK/HCH



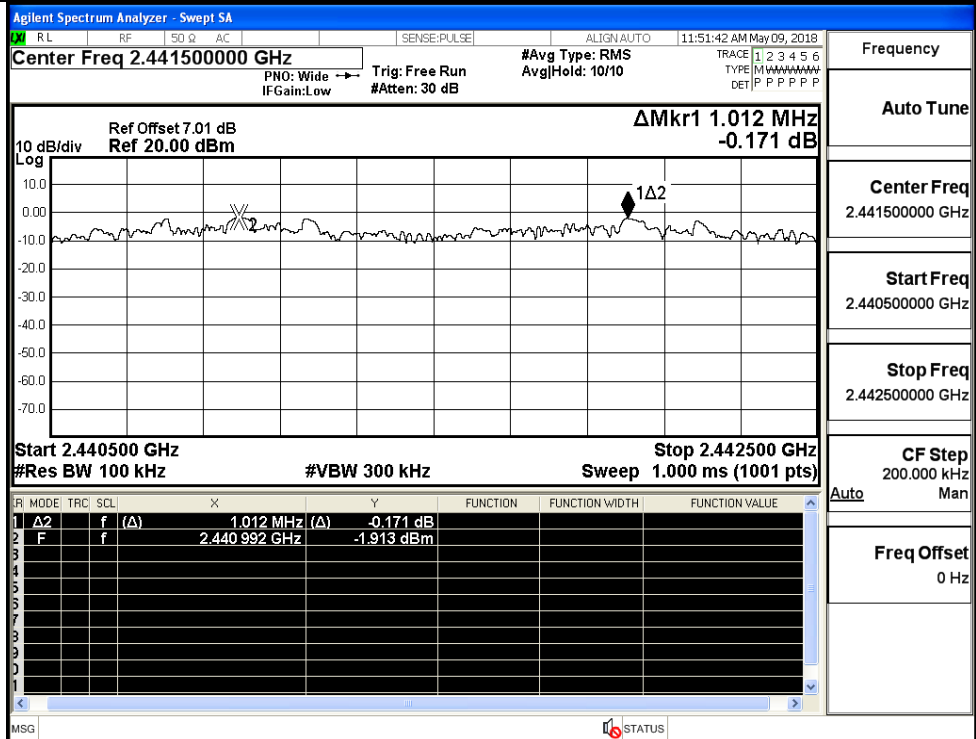
Frequency
Auto Tune
Center Freq 2.479500000 GHz
Start Freq 2.478500000 GHz
Stop Freq 2.480500000 GHz
CF Step 200.000 kHz
Auto
Freq Offset 0 Hz

8DPSK/LCH

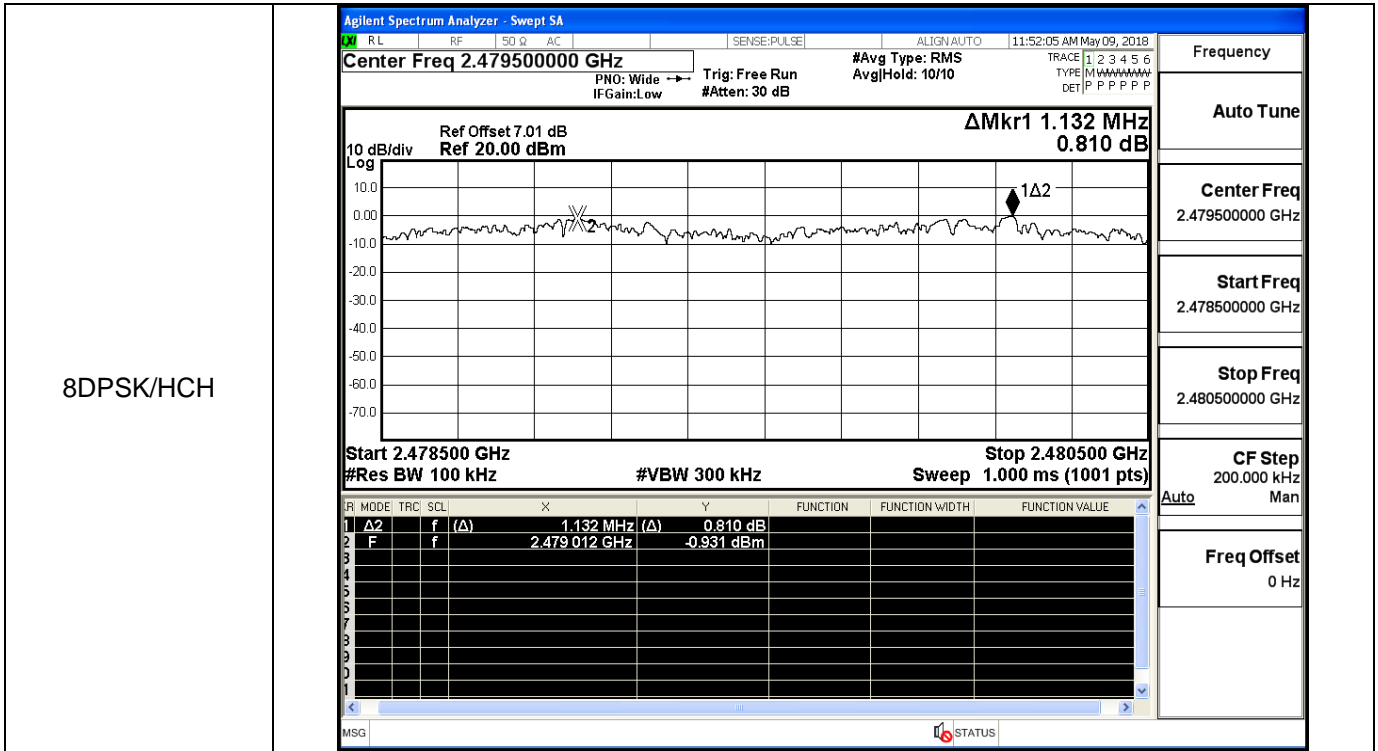


Frequency
Auto Tune
Center Freq
2.402500000 GHz
Start Freq
2.401500000 GHz
Stop Freq
2.403500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

8DPSK/MCH



Frequency
Auto Tune
Center Freq
2.441500000 GHz
Start Freq
2.440500000 GHz
Stop Freq
2.442500000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz

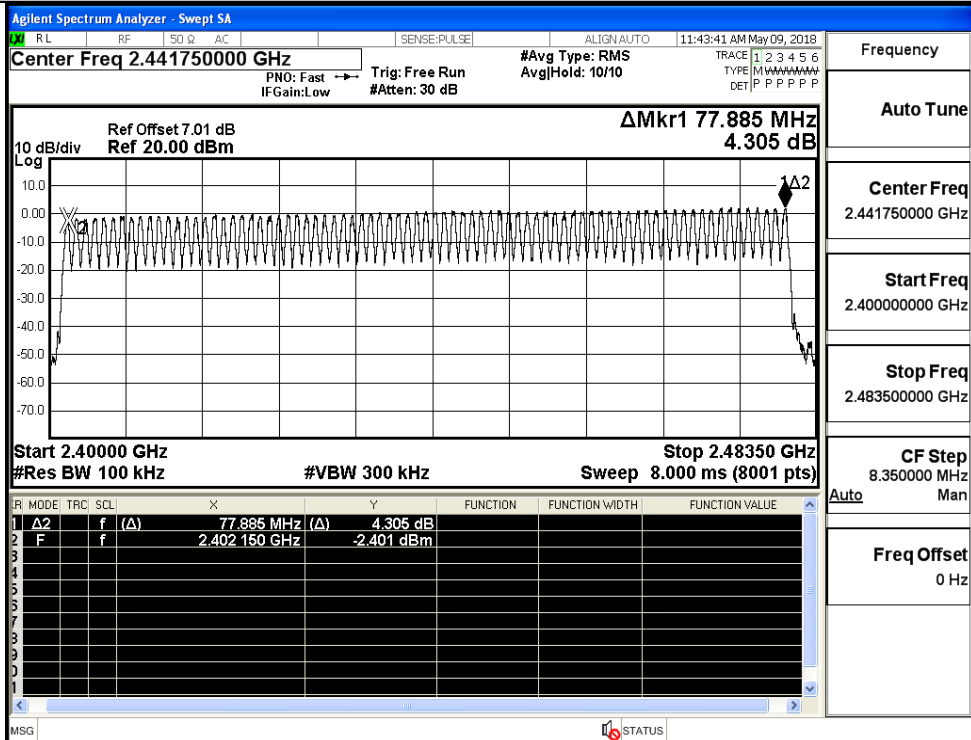


A.5 Hopping Channel Number

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

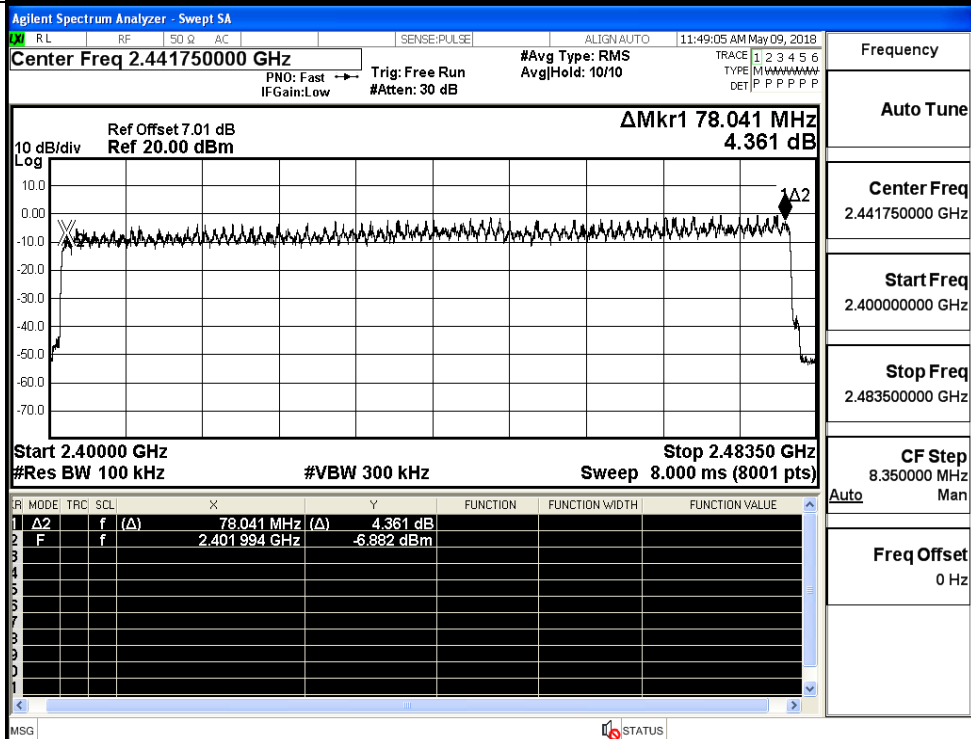
Test Graphs

GFSK/Hop



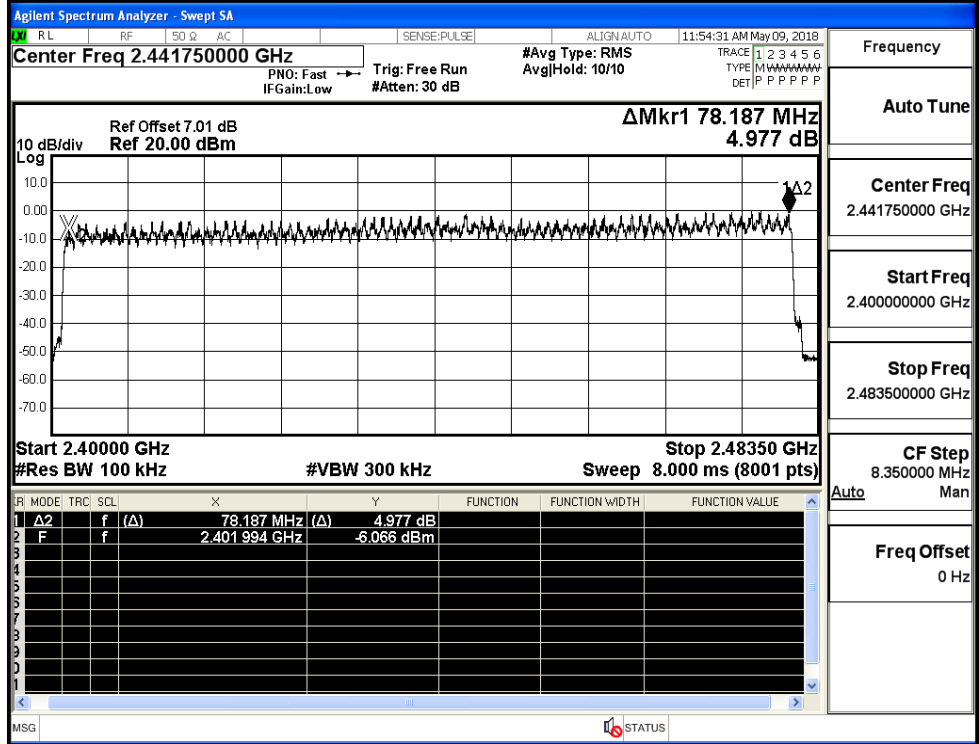
Frequency	2.441750000 GHz
Auto Tune	
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Auto	Man
Freq Offset	0 Hz

π /4DQPSK/Hop



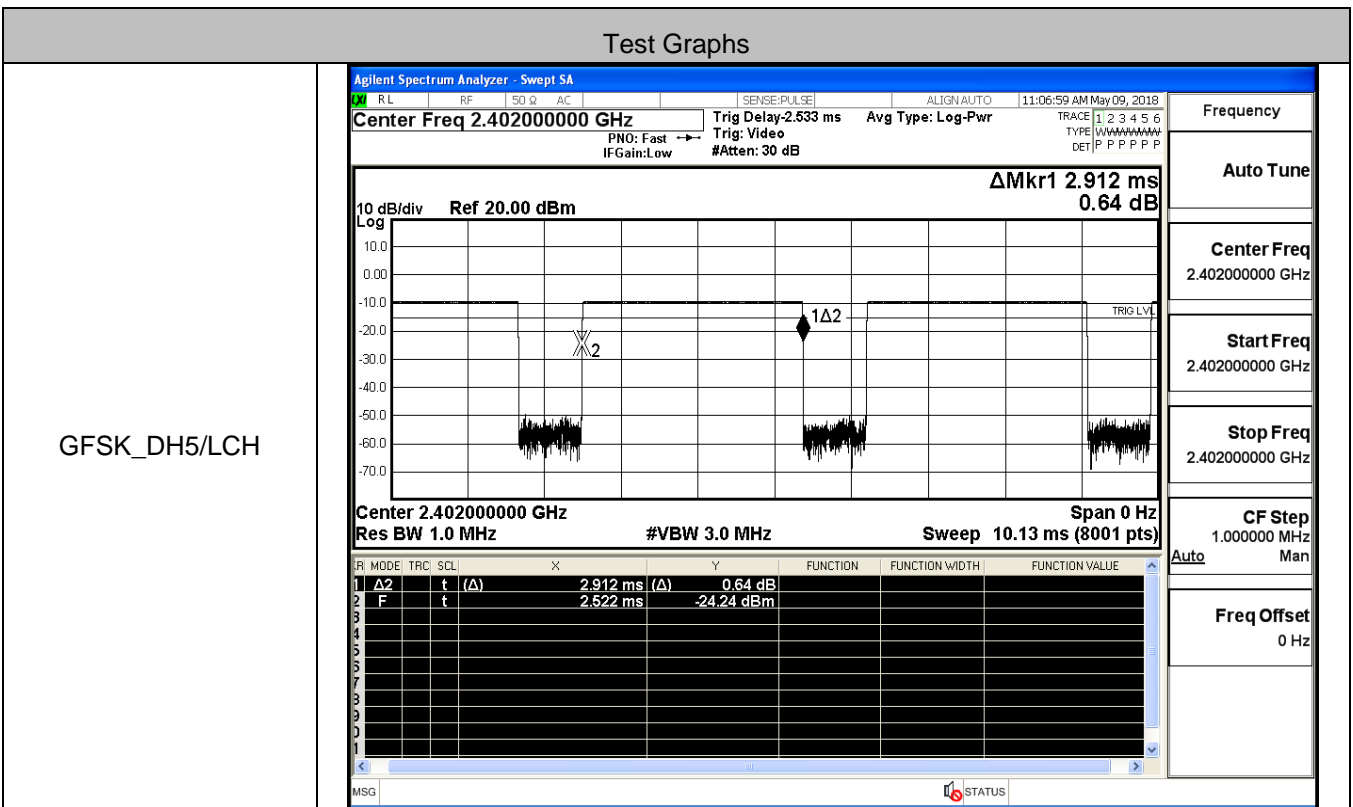
Frequency	2.441750000 GHz
Auto Tune	
Center Freq	2.441750000 GHz
Start Freq	2.400000000 GHz
Stop Freq	2.483500000 GHz
CF Step	8.350000 MHz
Auto	Man
Freq Offset	0 Hz

8DPSK/Hop

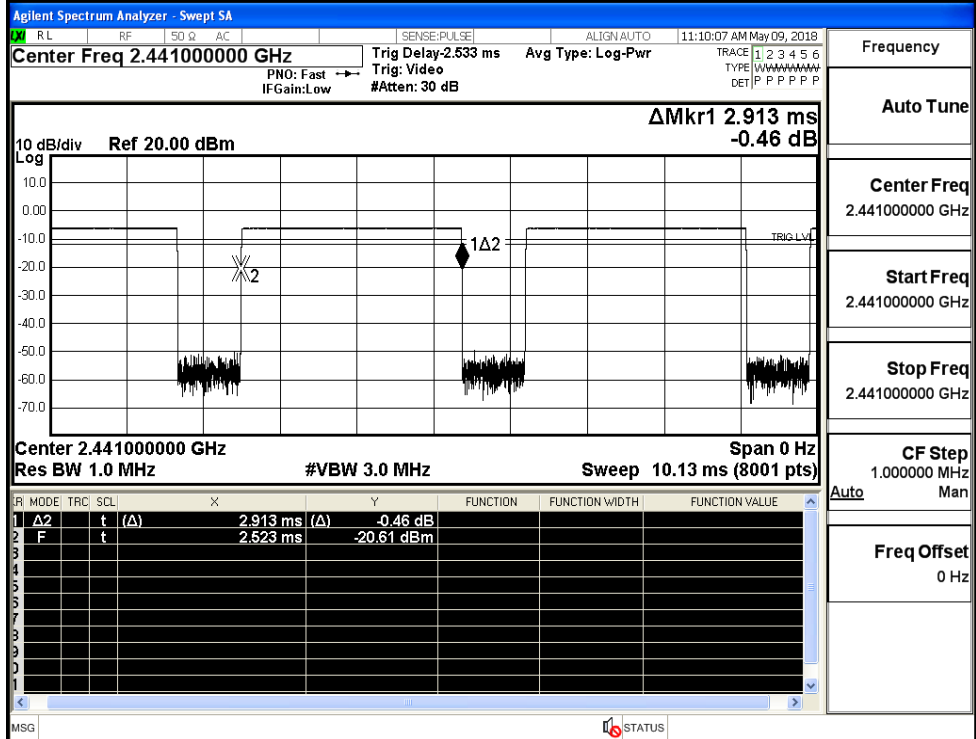


A.6 Dwell Time

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	0.31	0.4	PASS
	DH5	MCH	2.91	106.7	0.31	0.4	PASS
	DH5	HCH	2.91	106.7	0.31	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

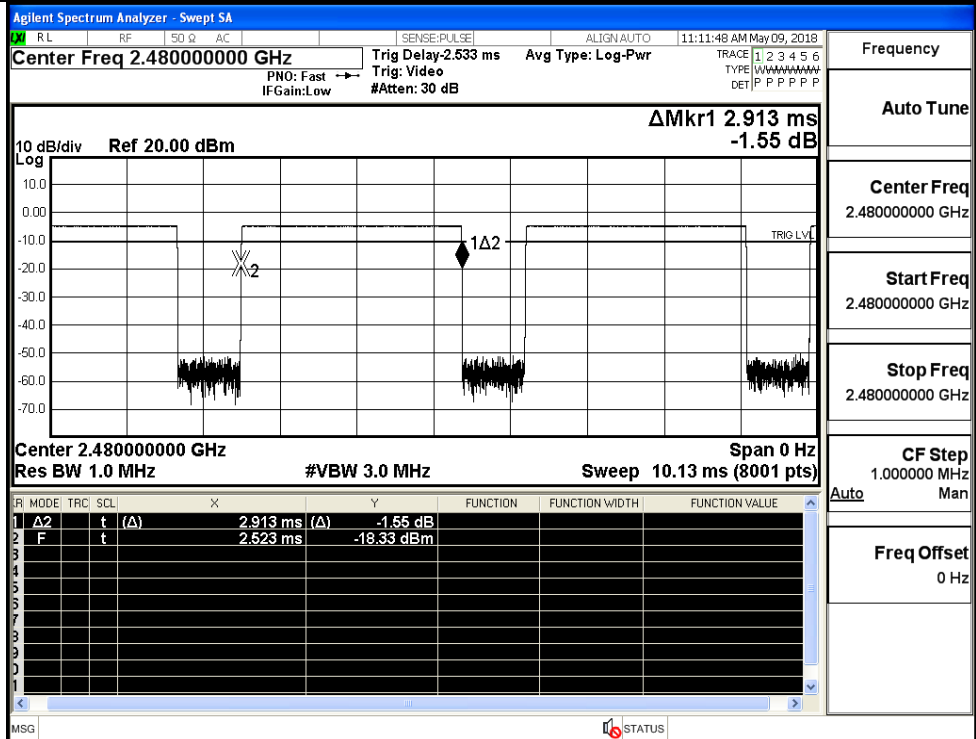


GFSK_DH5/MCH



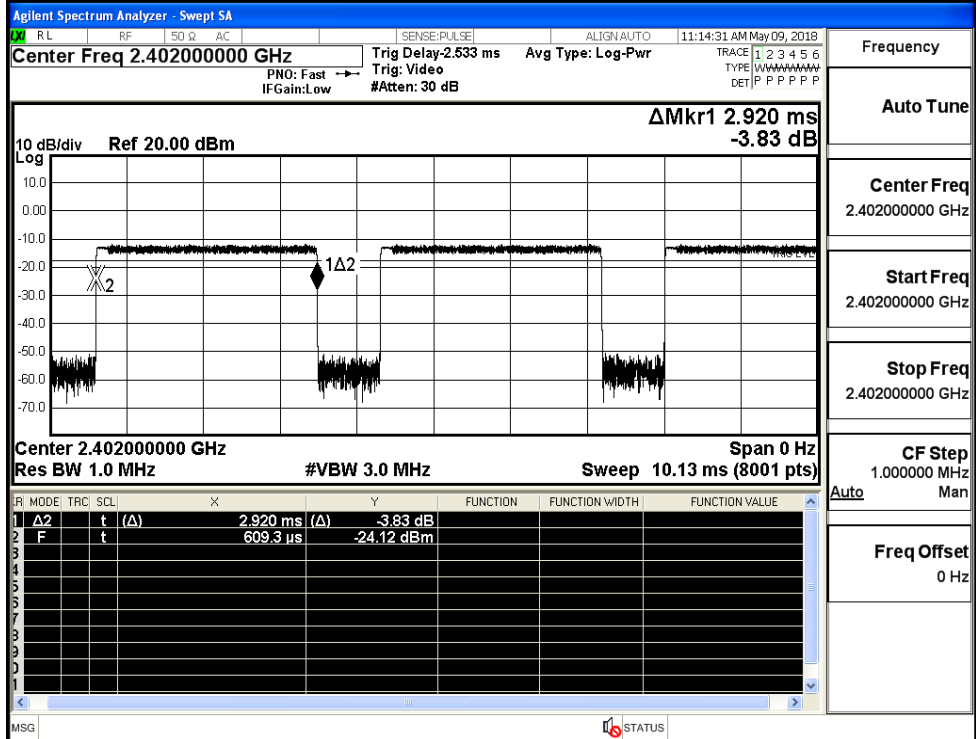
Frequency	
Auto Tune	
Center Freq	2.441000000 GHz
Start Freq	2.441000000 GHz
Stop Freq	2.441000000 GHz
CF Step	1.000000 MHz
Freq Offset	0 Hz

GFSK_DH5/HCH

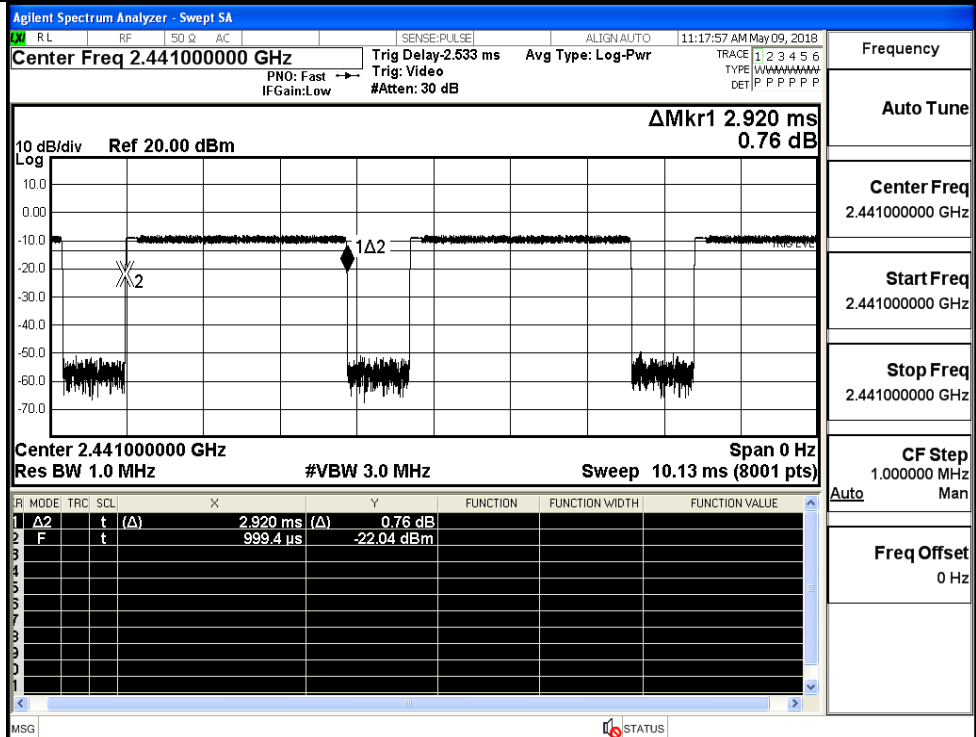


Frequency	
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Freq Offset	0 Hz

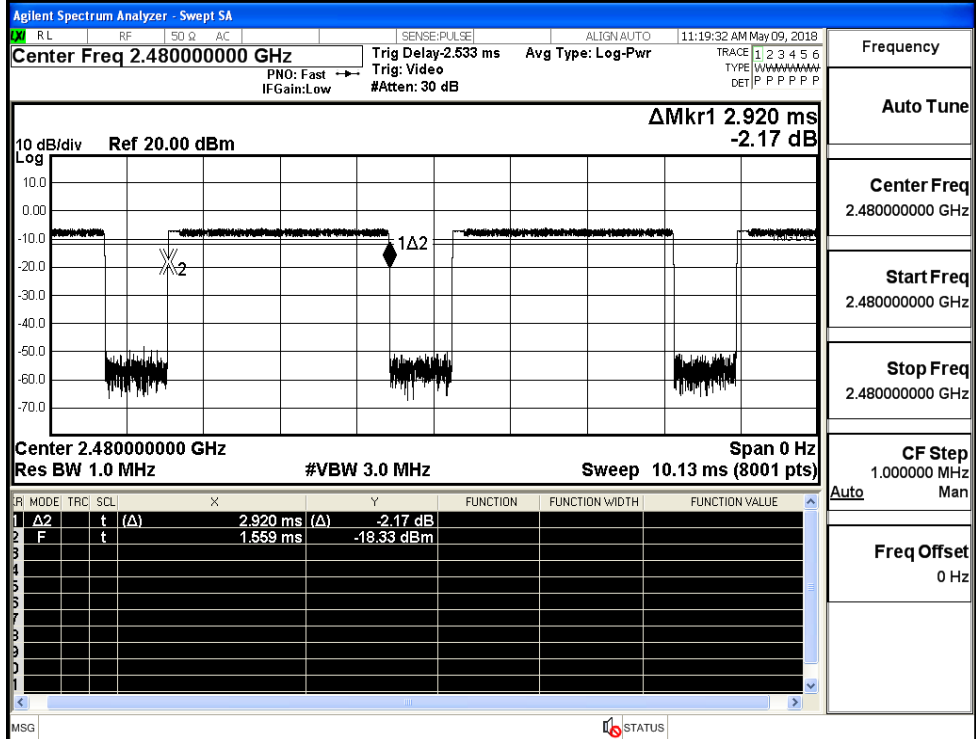
$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH

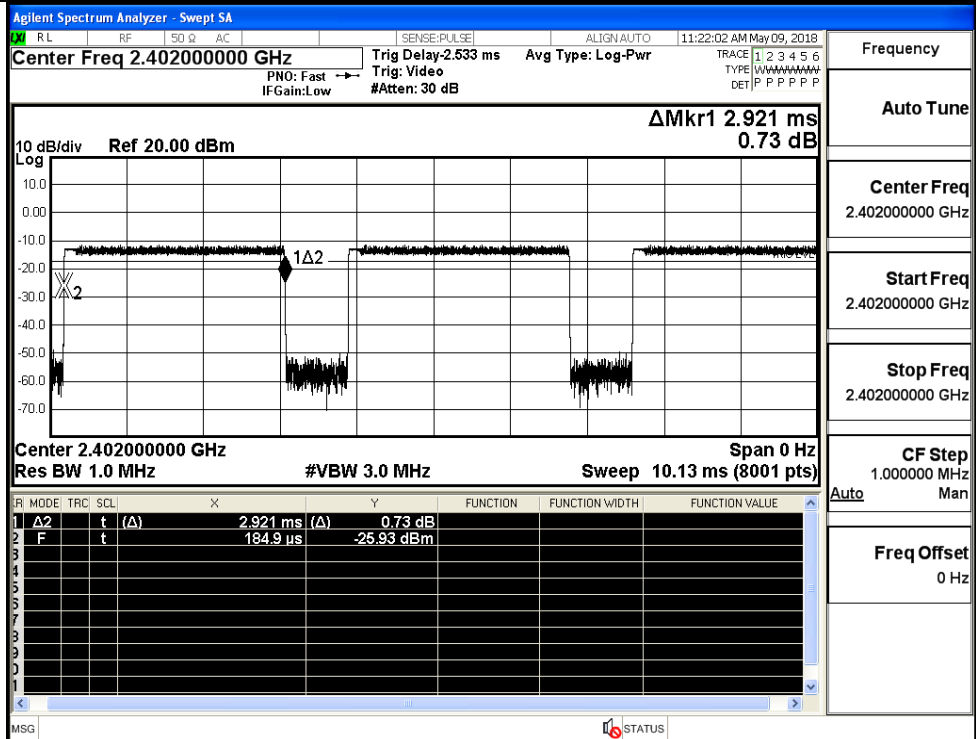


$\pi/4$ DQPSK
_2DH5/HCH



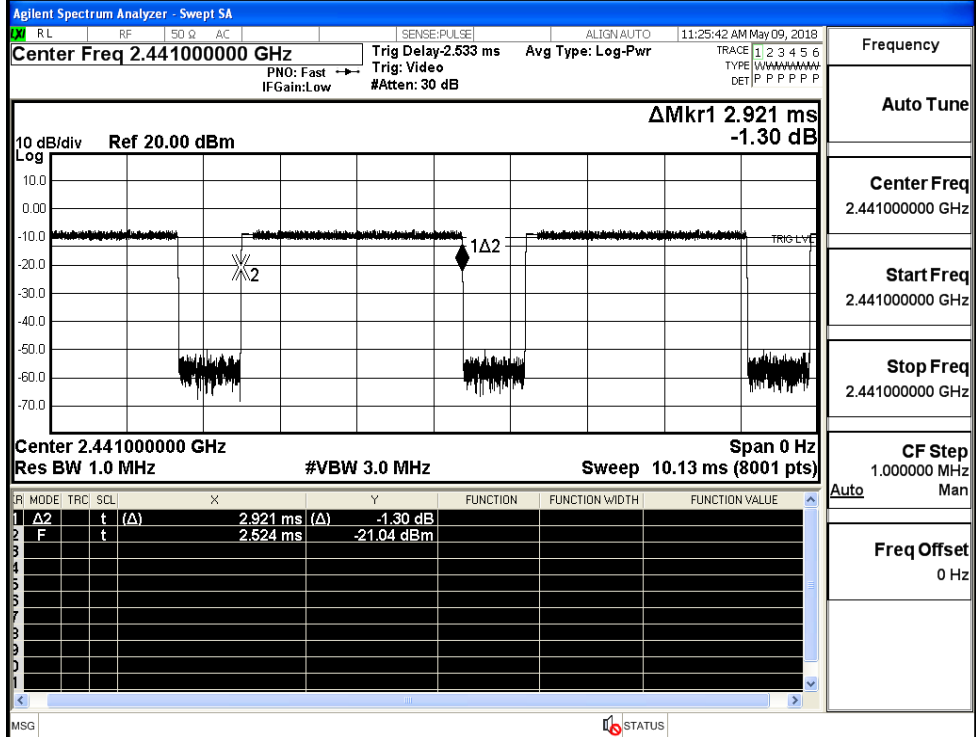
Frequency	2.480000000 GHz
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

8DPSK_3DH5/LCH



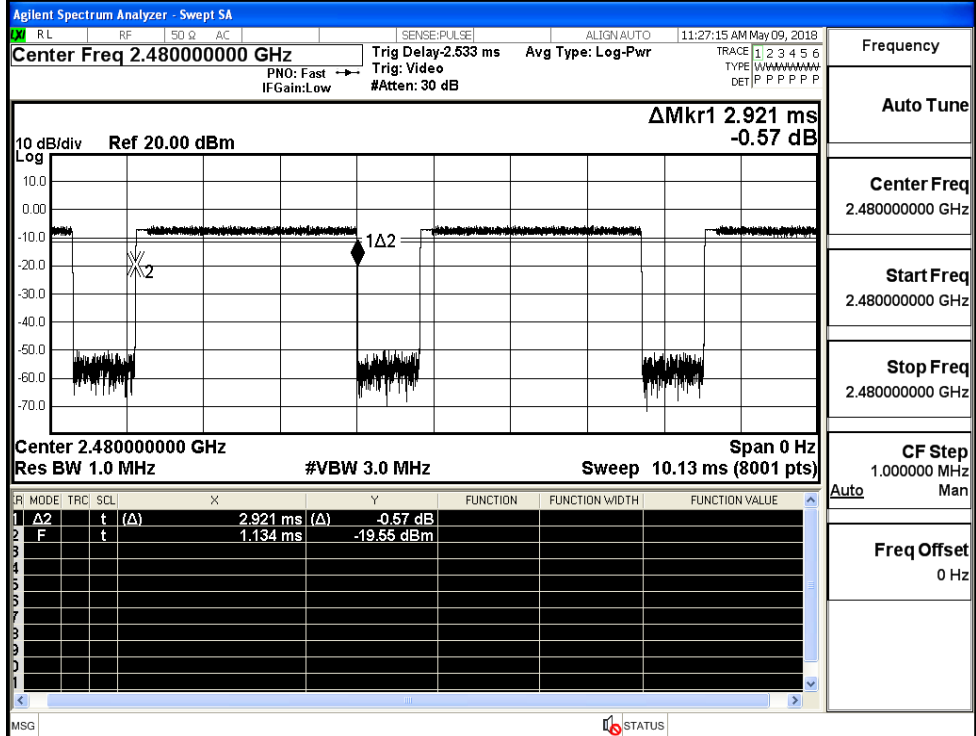
Frequency	2.402000000 GHz
Auto Tune	
Center Freq	2.402000000 GHz
Start Freq	2.402000000 GHz
Stop Freq	2.402000000 GHz
CF Step	1.000000 MHz
Auto	Man
Freq Offset	0 Hz

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

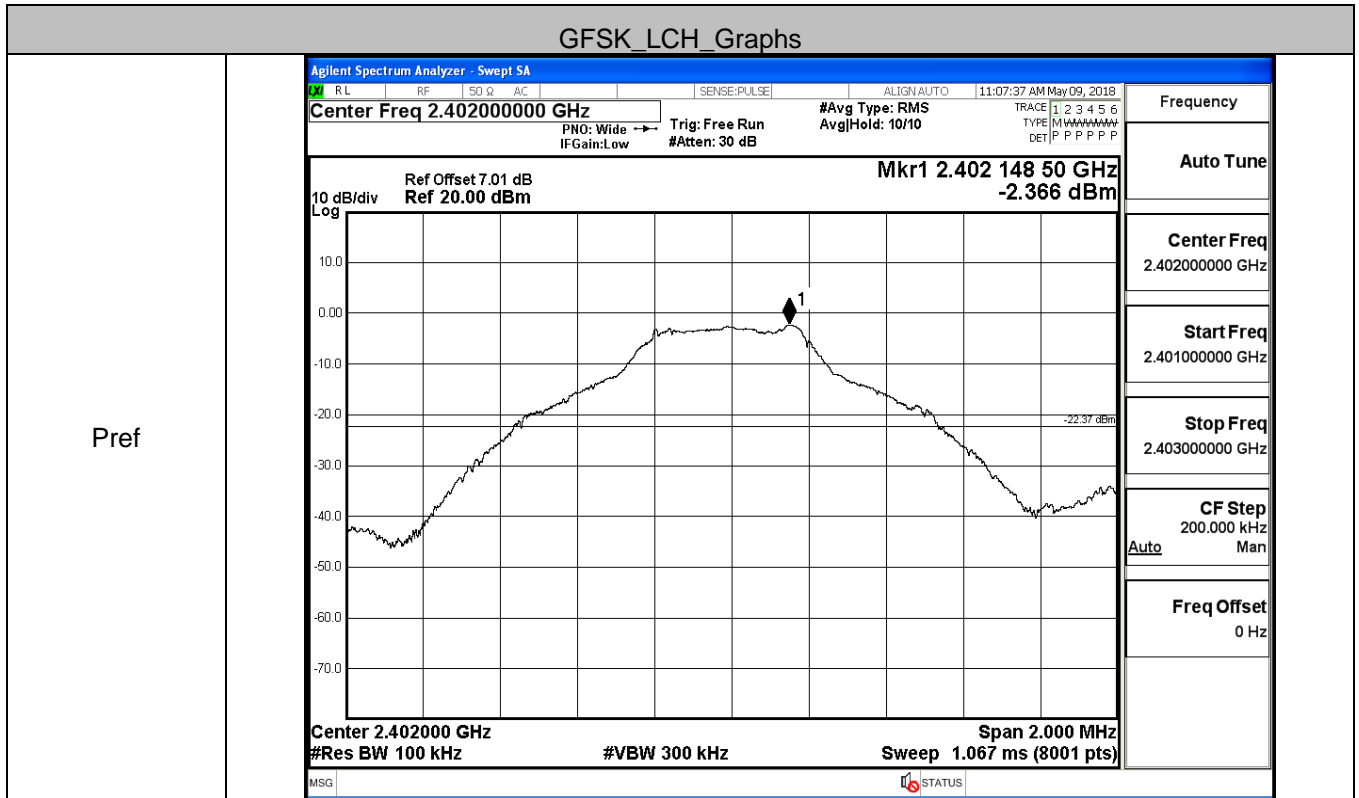


Frequency	2.480000000 GHz
Auto Tune	
Center Freq	2.480000000 GHz
Start Freq	2.480000000 GHz
Stop Freq	2.480000000 GHz
CF Step	1.000000 MHz
Freq Offset	0 Hz

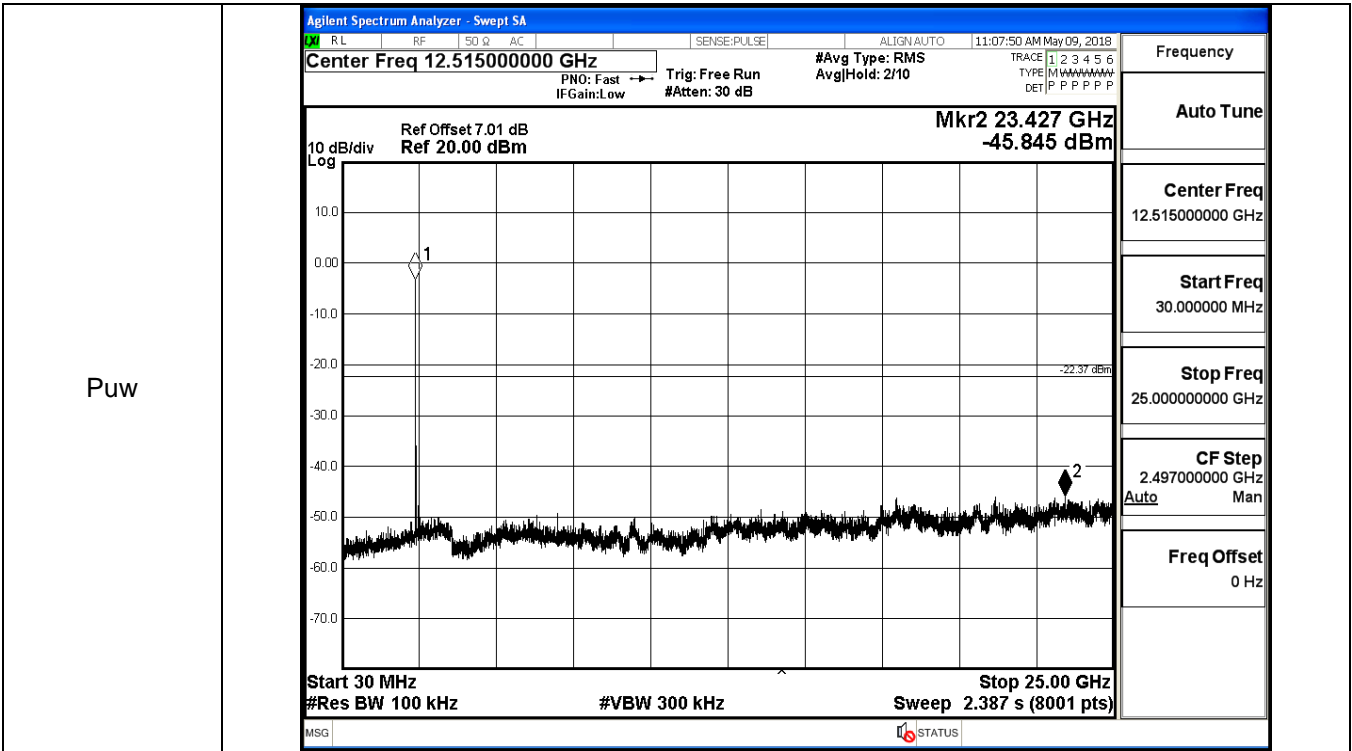
A.7 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-2.366	-45.845	-22.366	PASS
	MCH	0.759	-45.808	-19.241	PASS
	HCH	2.296	-44.686	-17.704	PASS
π/4DQPSK	LCH	-6.213	-45.223	-26.213	PASS
	MCH	-2.096	-46.208	-22.096	PASS
	HCH	-0.158	-45.806	-20.158	PASS
8DPSK	LCH	-5.882	-45.534	-25.882	PASS
	MCH	-1.791	-45.311	-21.791	PASS
	HCH	-0.055	-45.867	-20.055	PASS

GFSK_LCH_Graphs

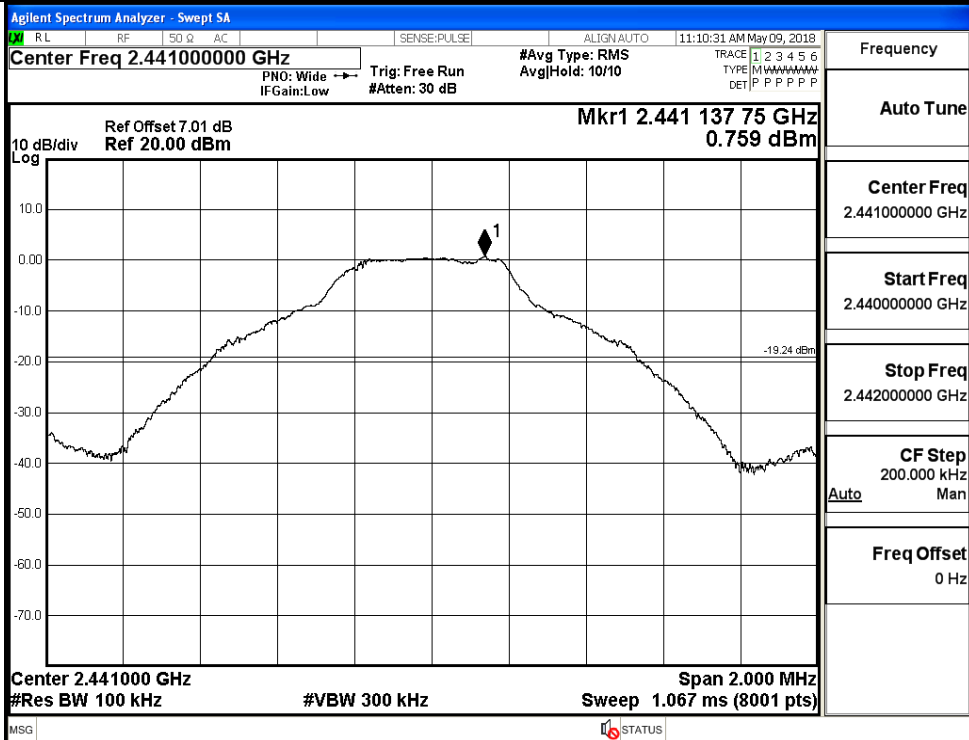


Pref

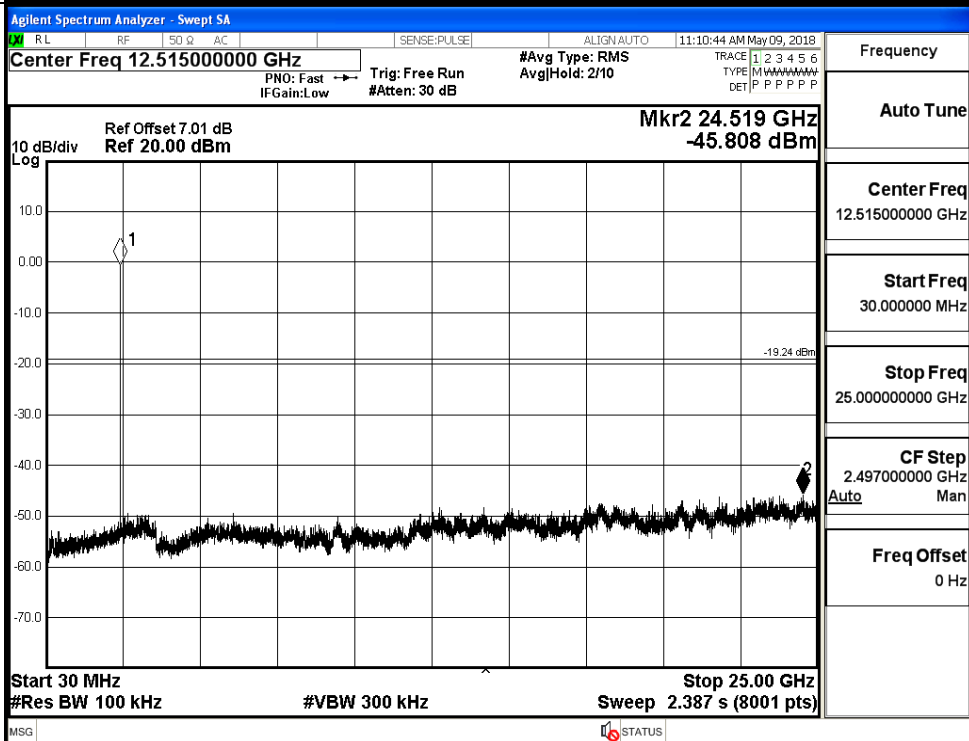


GFSK_MCH_Graphs

Pref

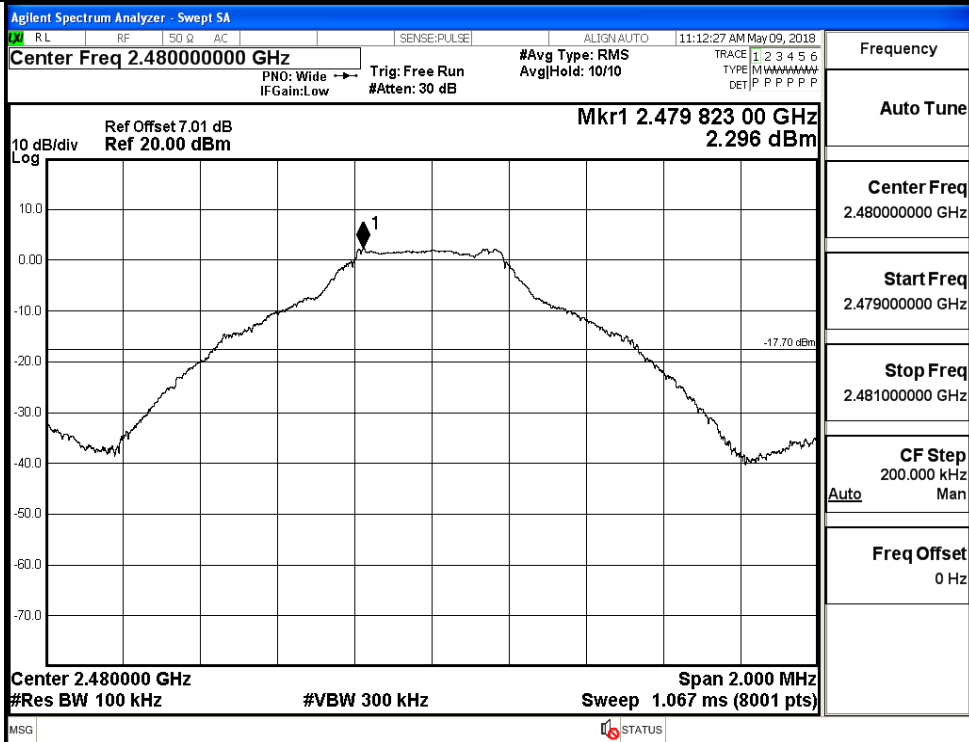


Puw

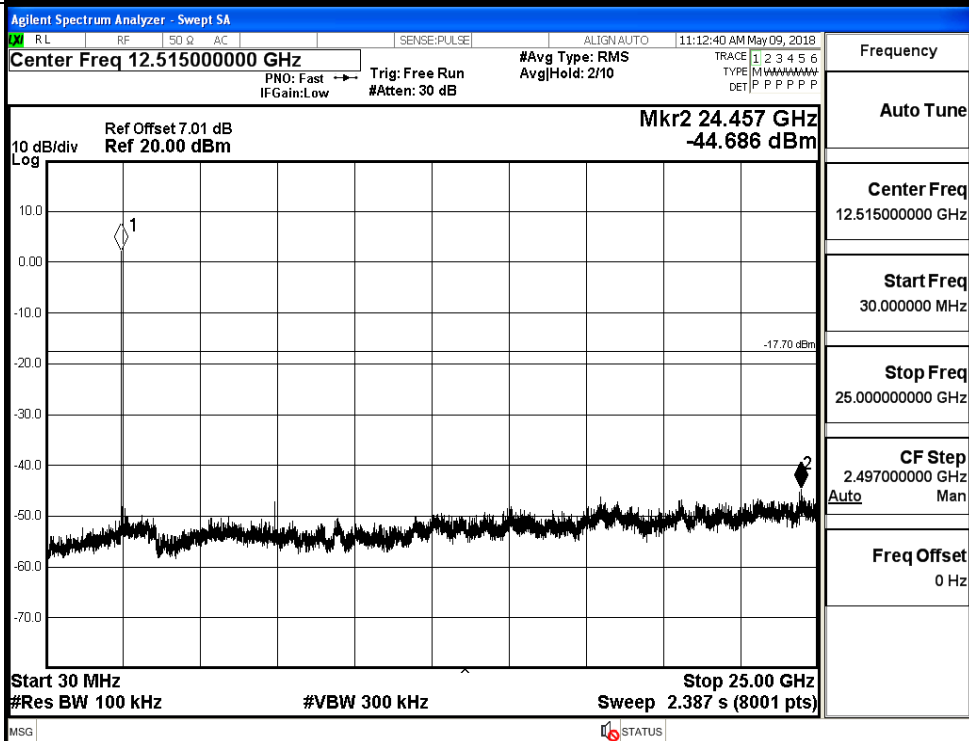


GFSK_HCH_Graphs

Pref

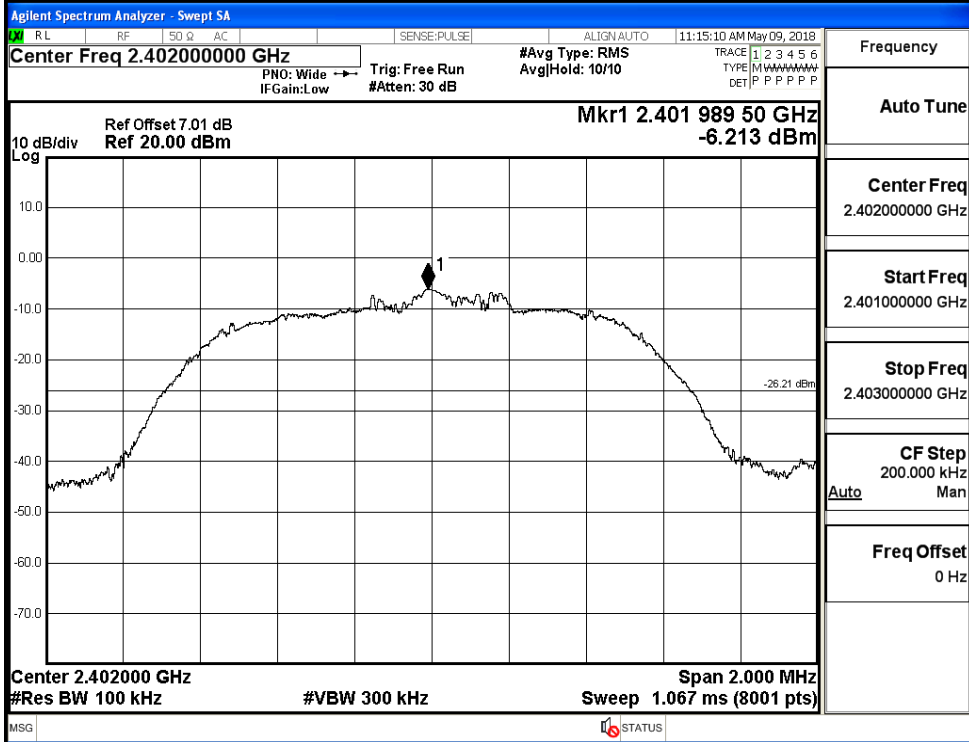


Puw

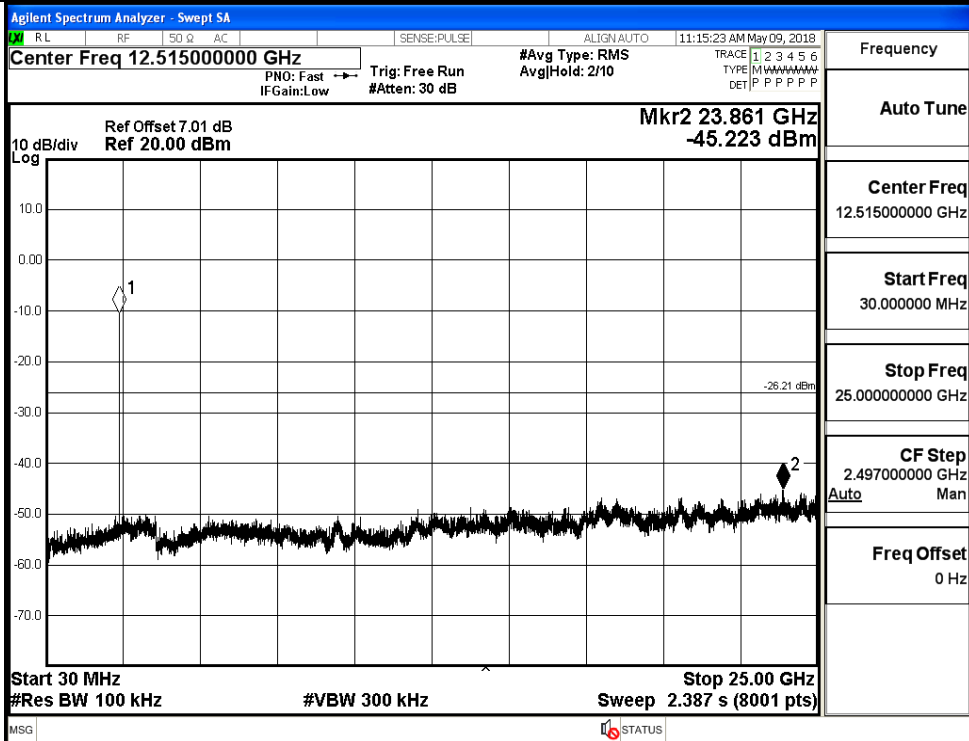


$\pi/4$ DQPSK LCH Graphs

Pref

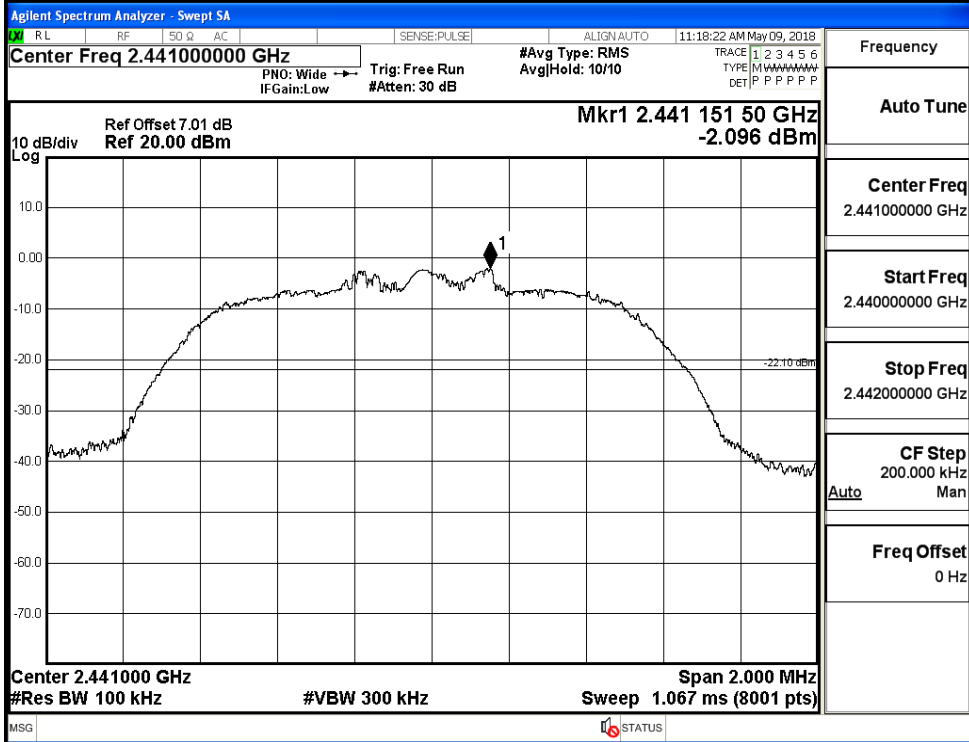


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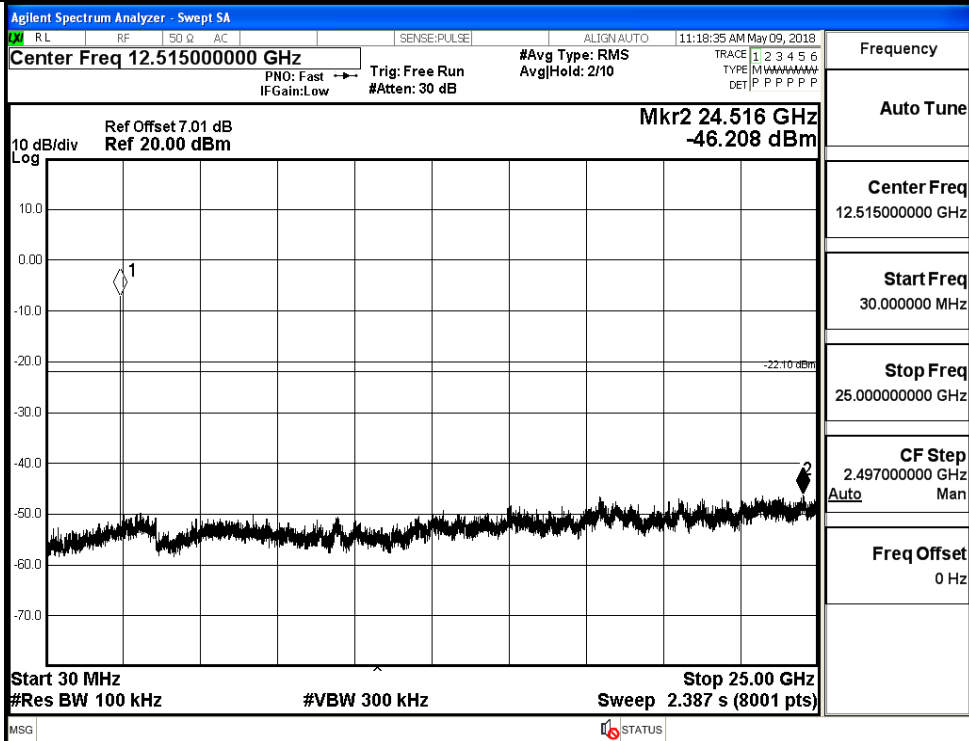


$\pi/4$ DQPSK MCH Graphs

Pref

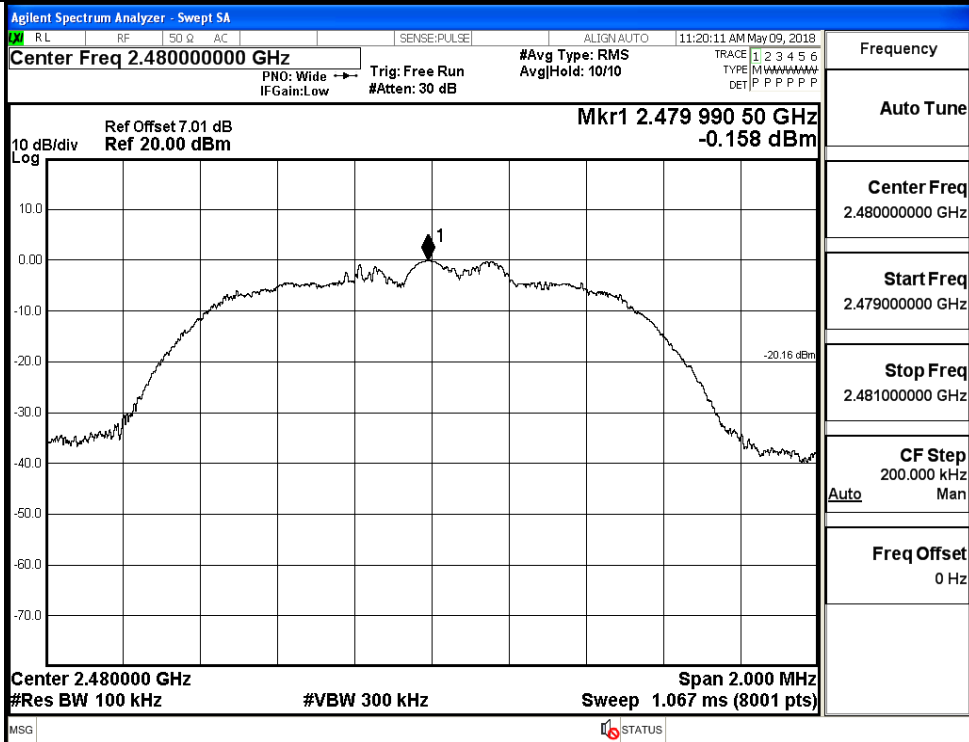


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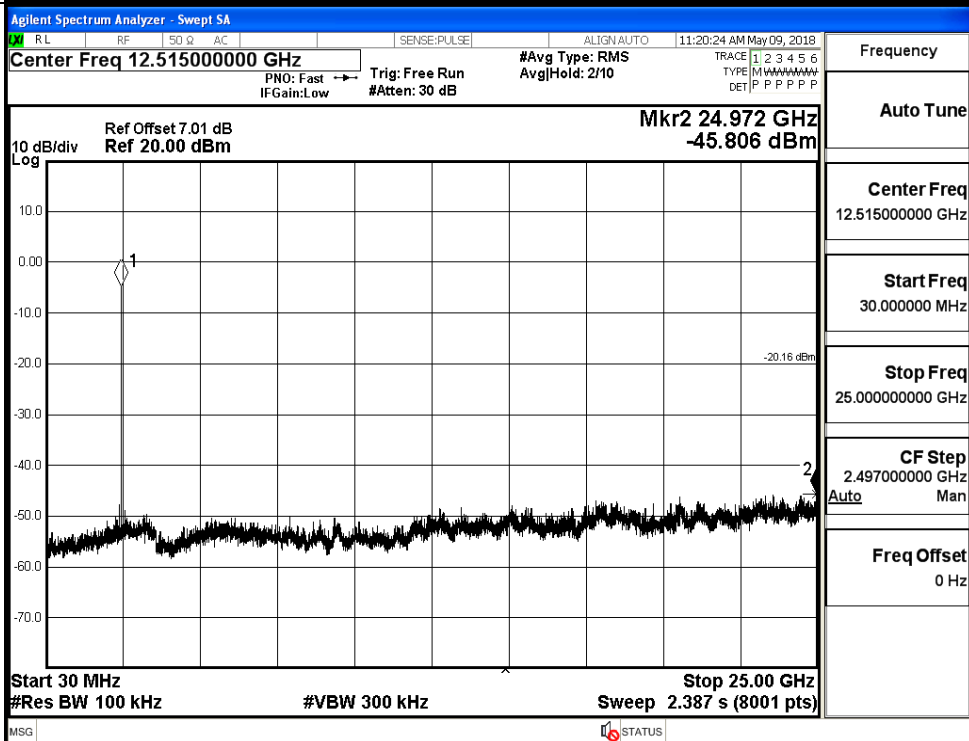


$\pi/4$ DQPSK HCH Graphs

Pref

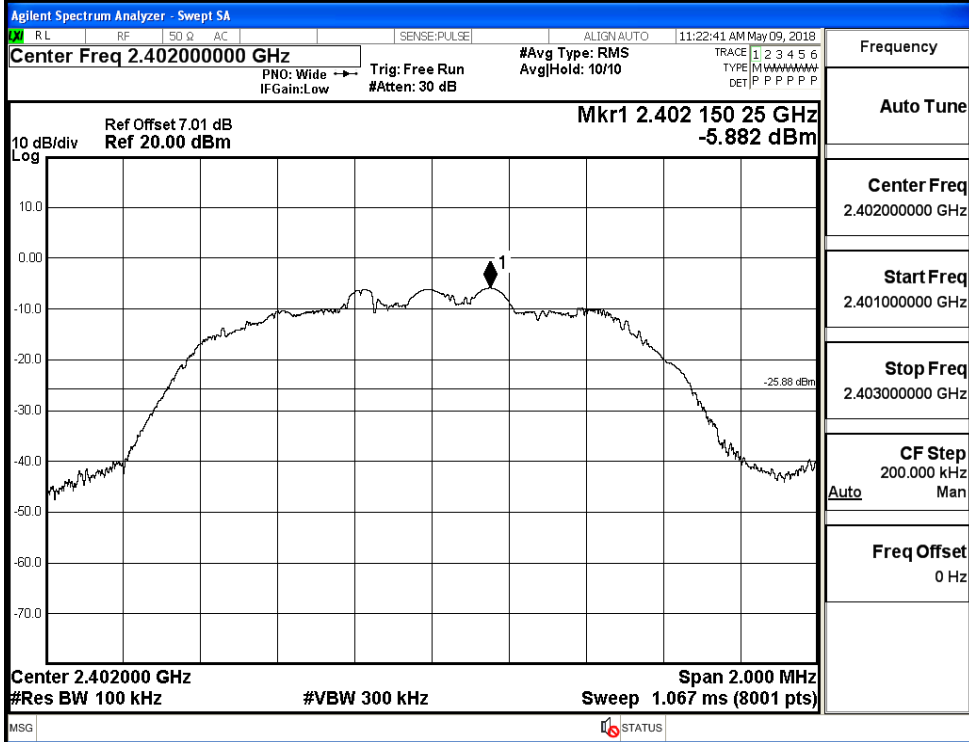


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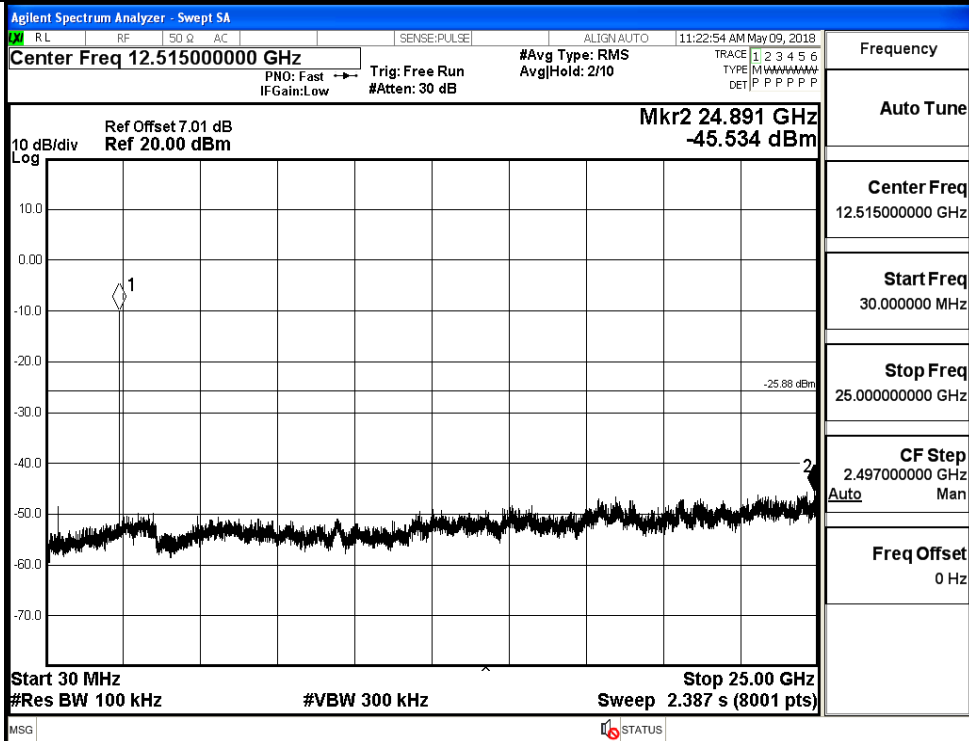


8DPSK_LCH_Graphs

Pref

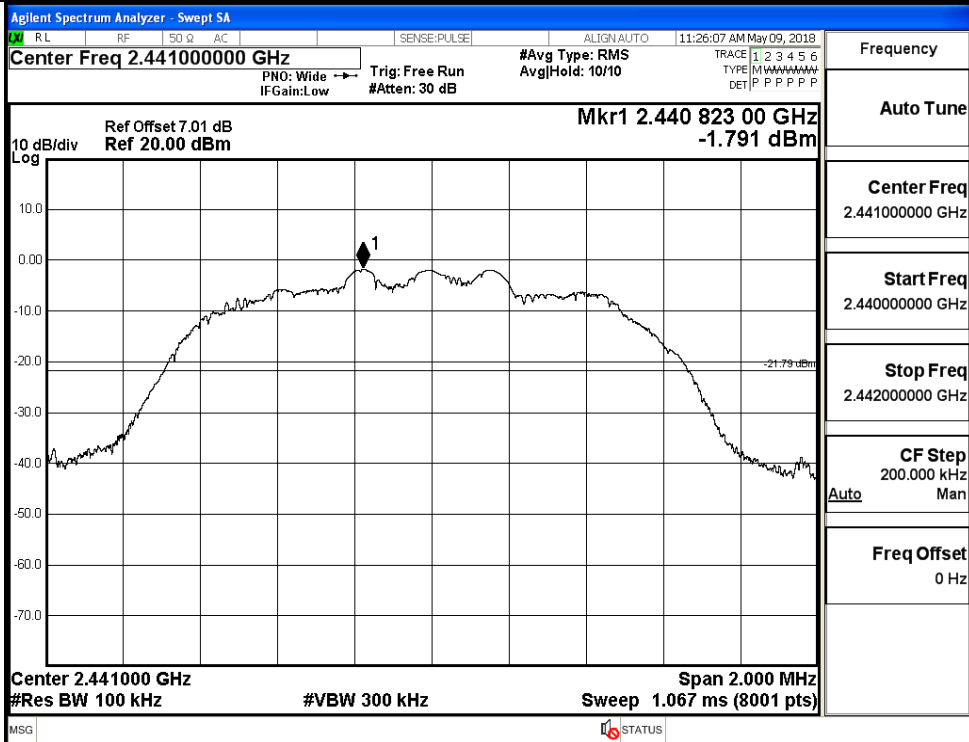


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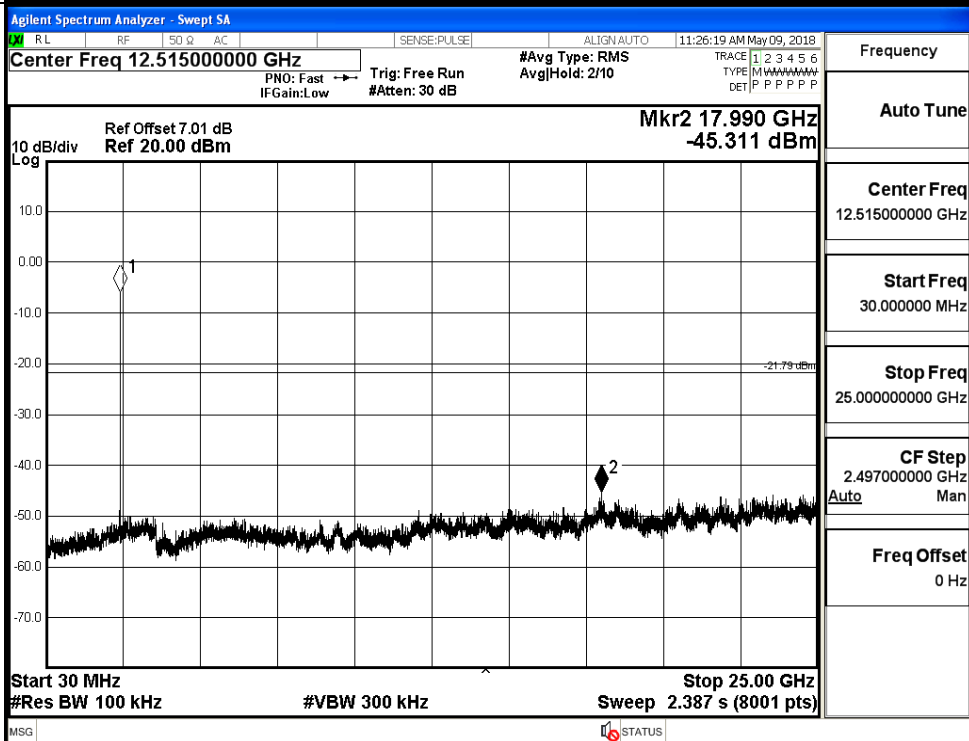


8DPSK_MCH_Graphs

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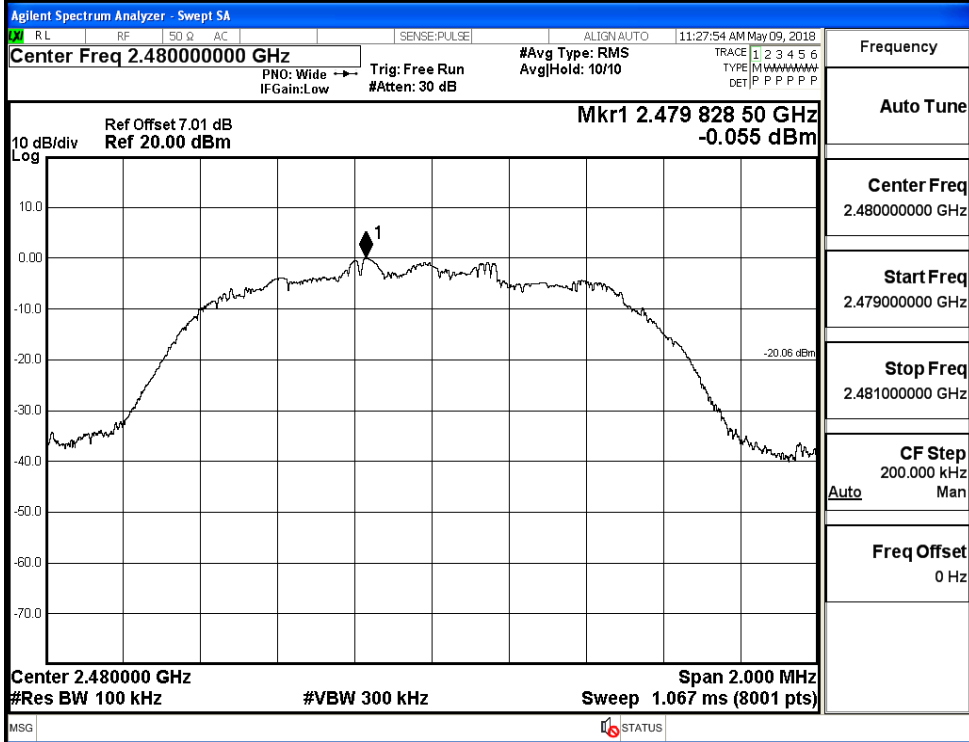


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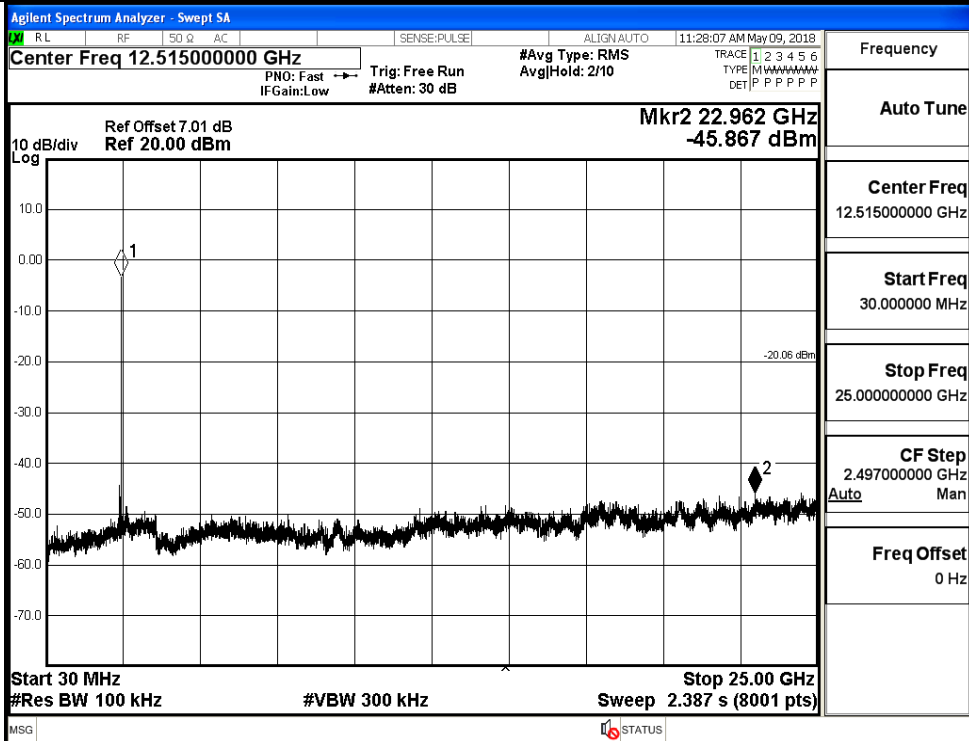


8DPSK_HCH_Graphs

Pref



Puw

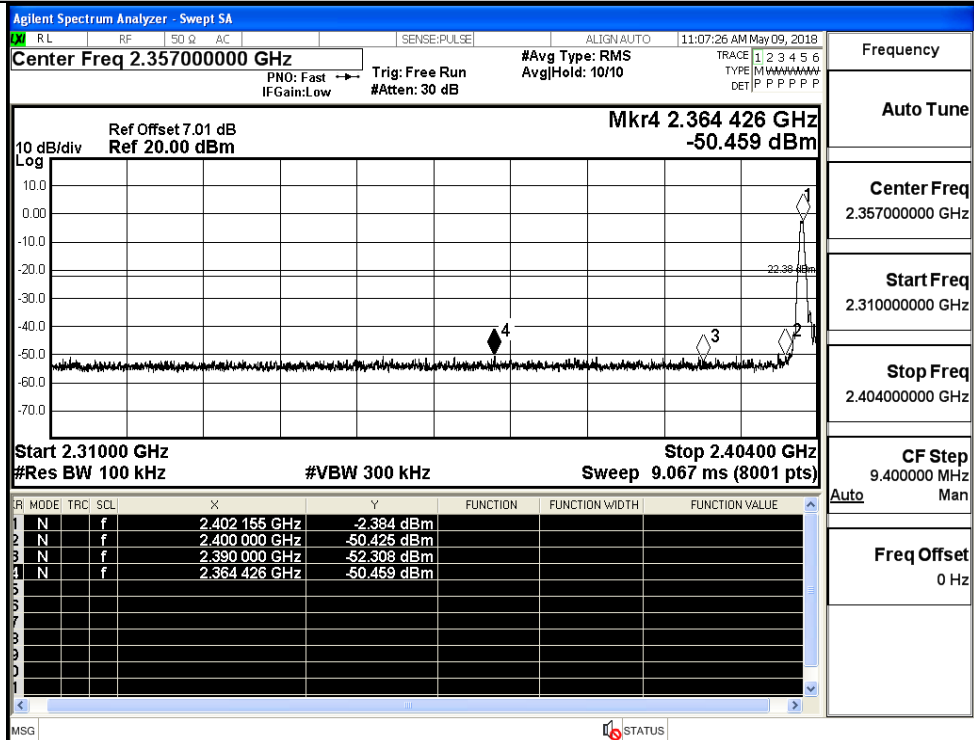


A.8 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-2.384	Off	-50.459	-22.38	PASS
			-0.342	On	-50.852	-20.34	PASS
	HCH	2480	2.473	Off	-50.237	-17.53	PASS
			2.316	On	-49.746	-17.68	PASS
π /4DQPSK	LCH	2402	-6.184	Off	-51.057	-26.18	PASS
			-3.301	On	-50.676	-23.3	PASS
	HCH	2480	-0.113	Off	-50.126	-20.11	PASS
			-0.077	On	-49.407	-20.08	PASS
8DPSK	LCH	2402	-5.760	Off	-50.609	-25.76	PASS
			-2.807	On	-50.380	-22.81	PASS
	HCH	2480	0.145	Off	-50.218	-19.86	PASS
			0.059	On	-49.580	-19.94	PASS

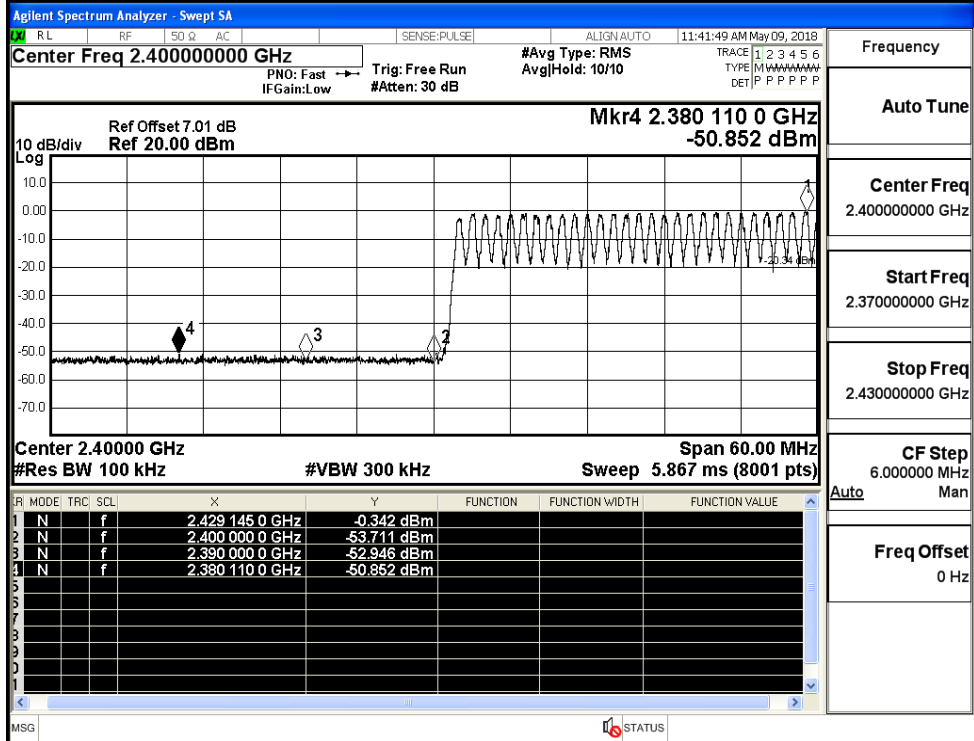
Test Graphs

GFSK/LCH/No Hop



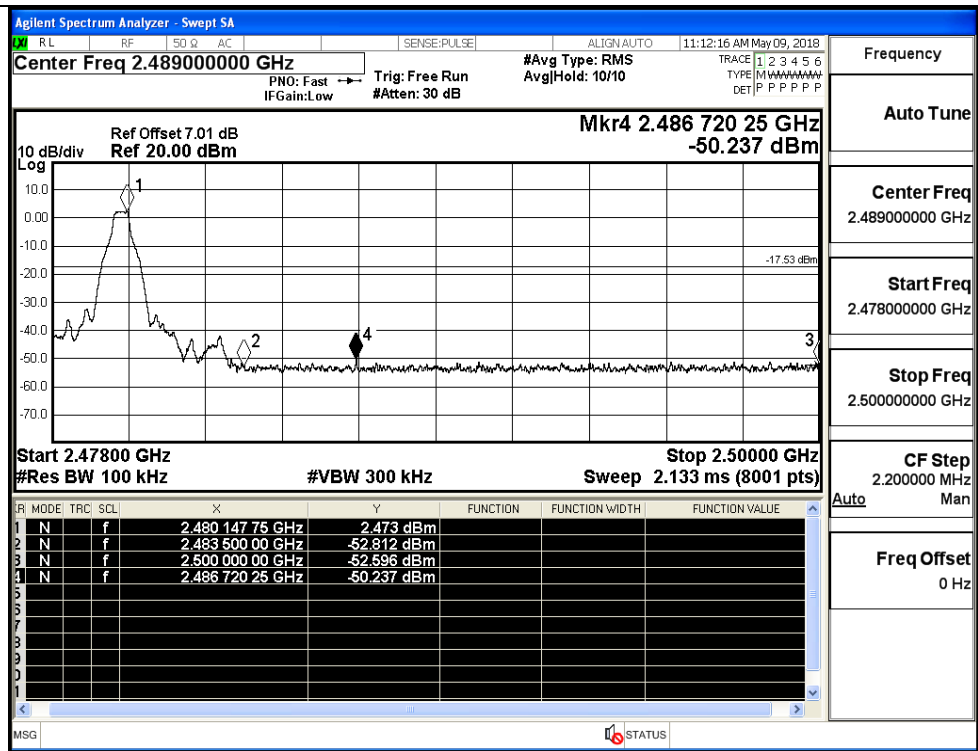
Frequency	Auto Tune
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz Man
Freq Offset	0 Hz

GFSK/LCH/Hop

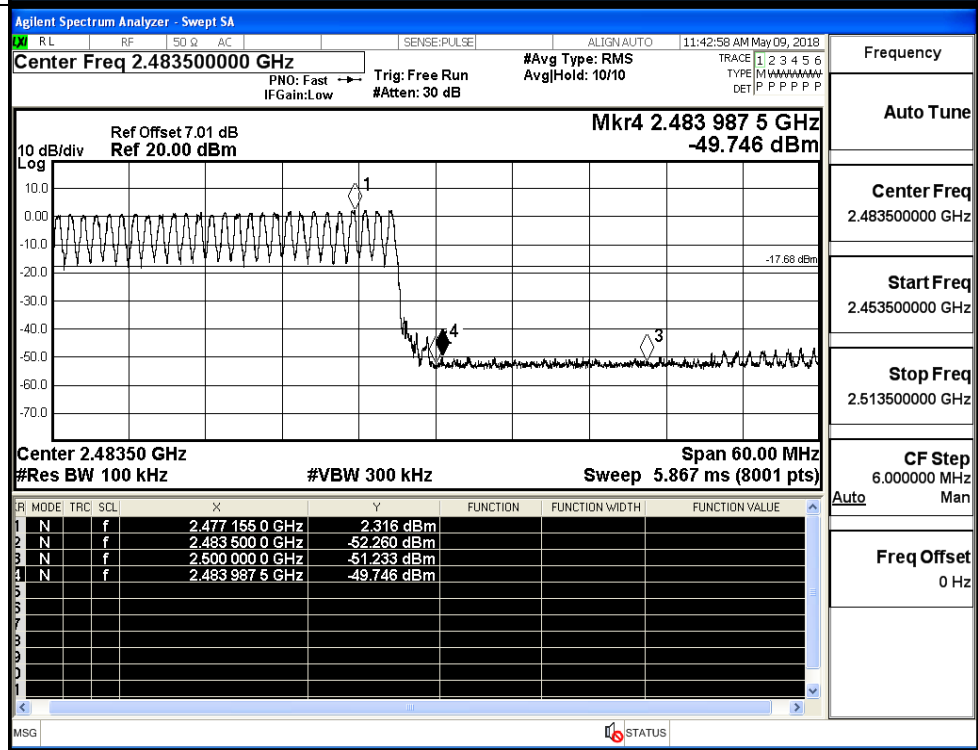


Frequency	Auto Tune
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz Man
Freq Offset	0 Hz

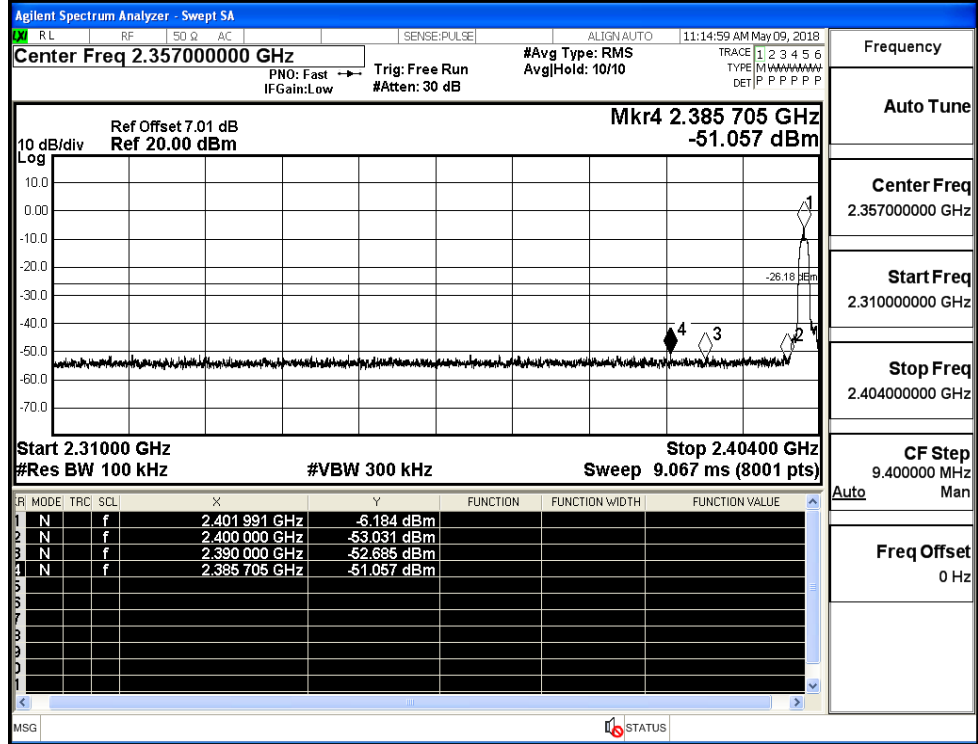
GFSK/HCH/No Hop



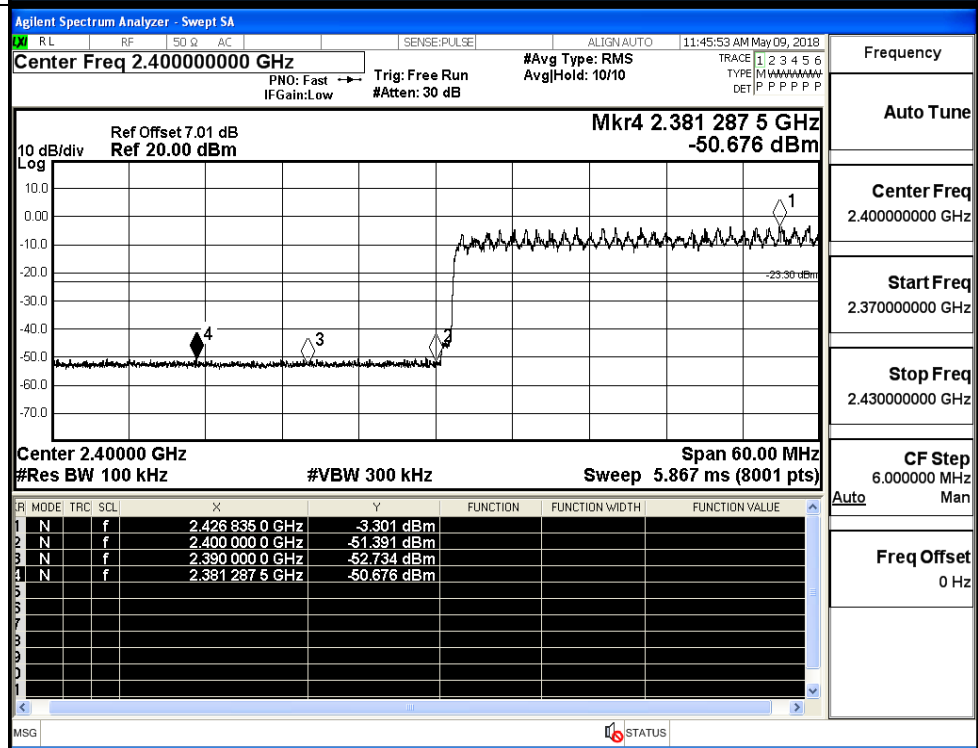
GFSK/HCH/Hop



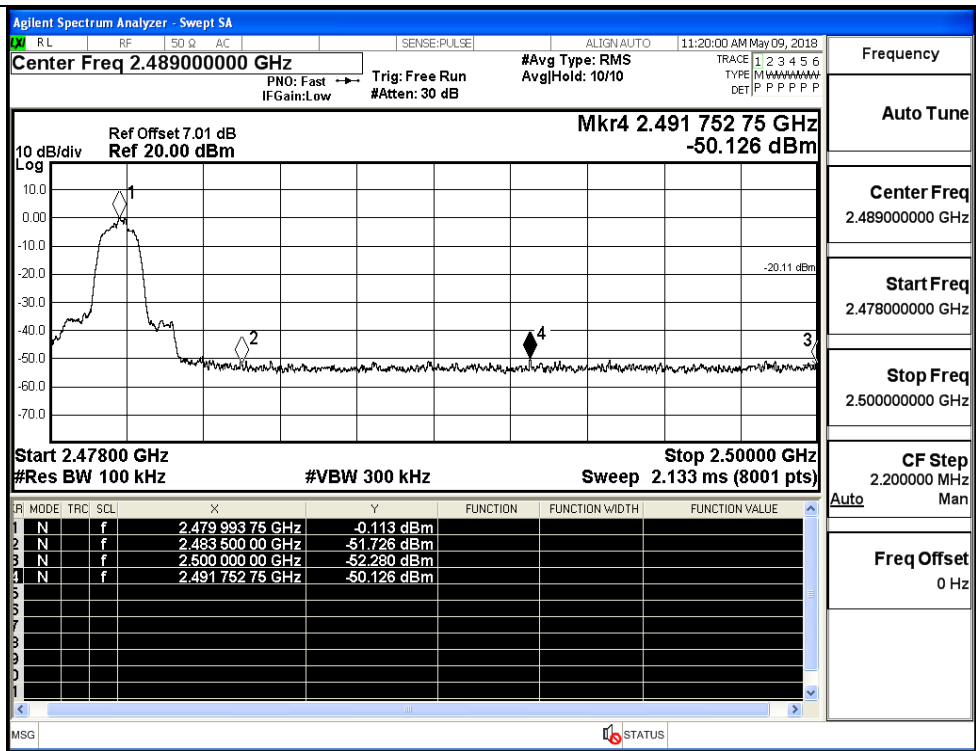
$\pi/4$ DQPSK/LCH/No
Hop



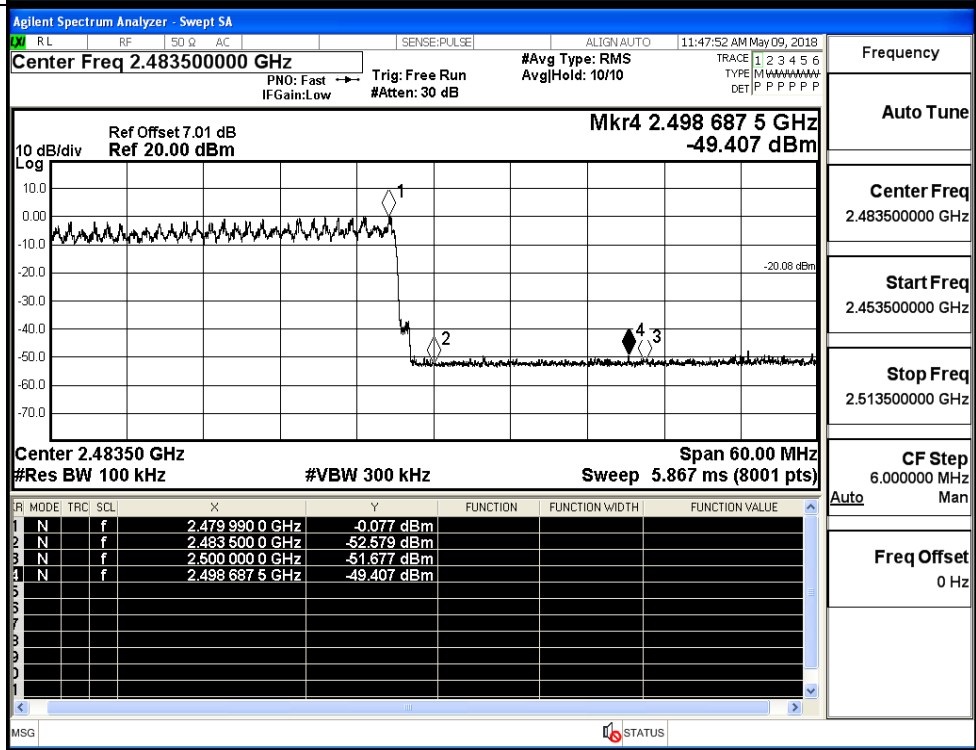
$\pi/4$ DQPSK/LCH/Hop



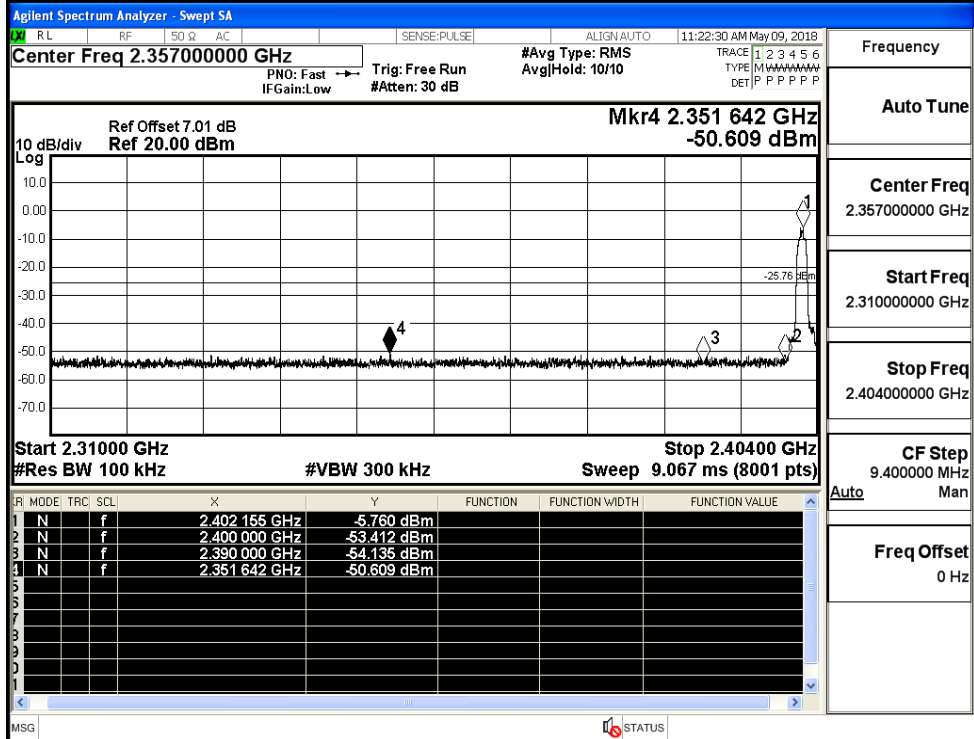
π /4DQPSK/HCH/No
Hop



π /4DQPSK/HCH/Hop

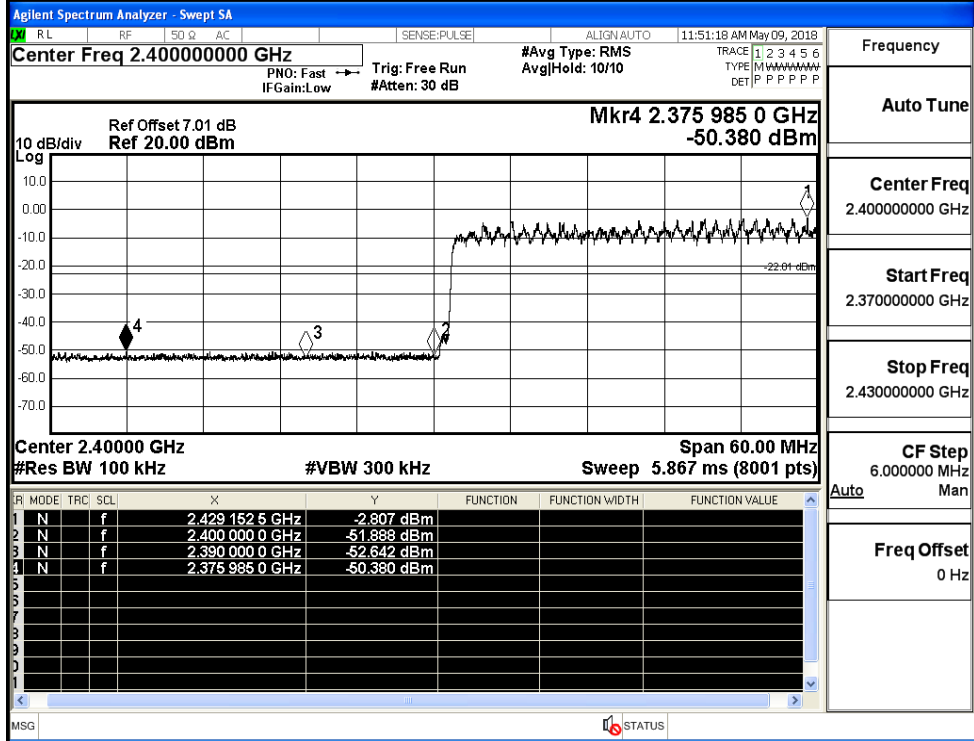


8DPSK/LCH/No Hop



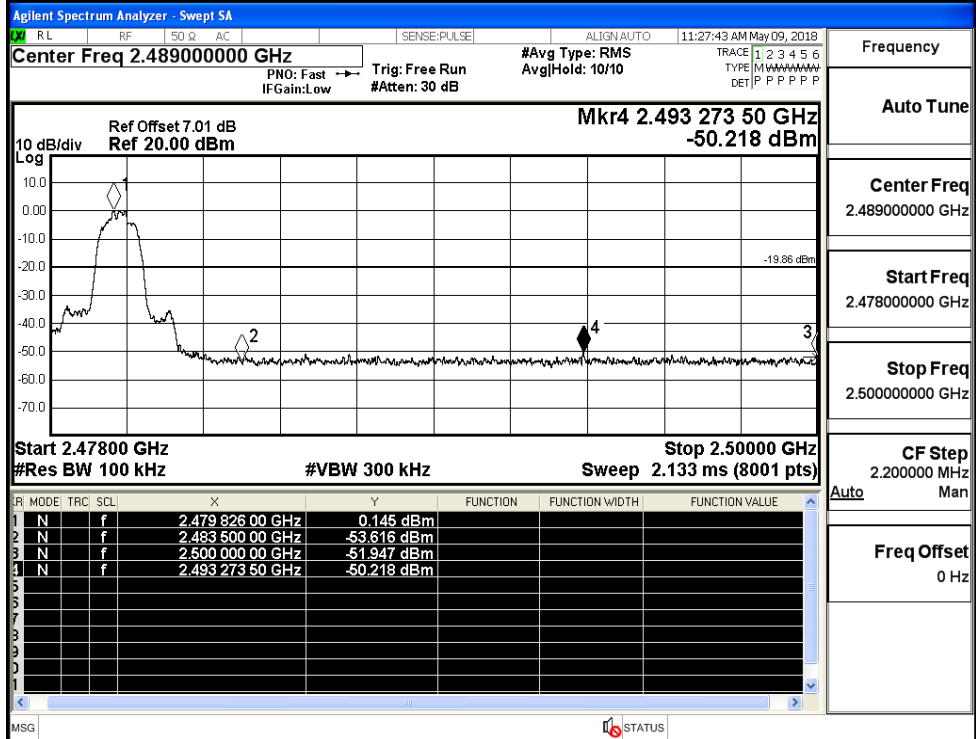
Frequency	
Auto Tune	
Center Freq	2.357000000 GHz
Start Freq	2.310000000 GHz
Stop Freq	2.404000000 GHz
CF Step	9.400000 MHz
Auto	Man
Freq Offset	0 Hz

8DPSK/LCH/Hop



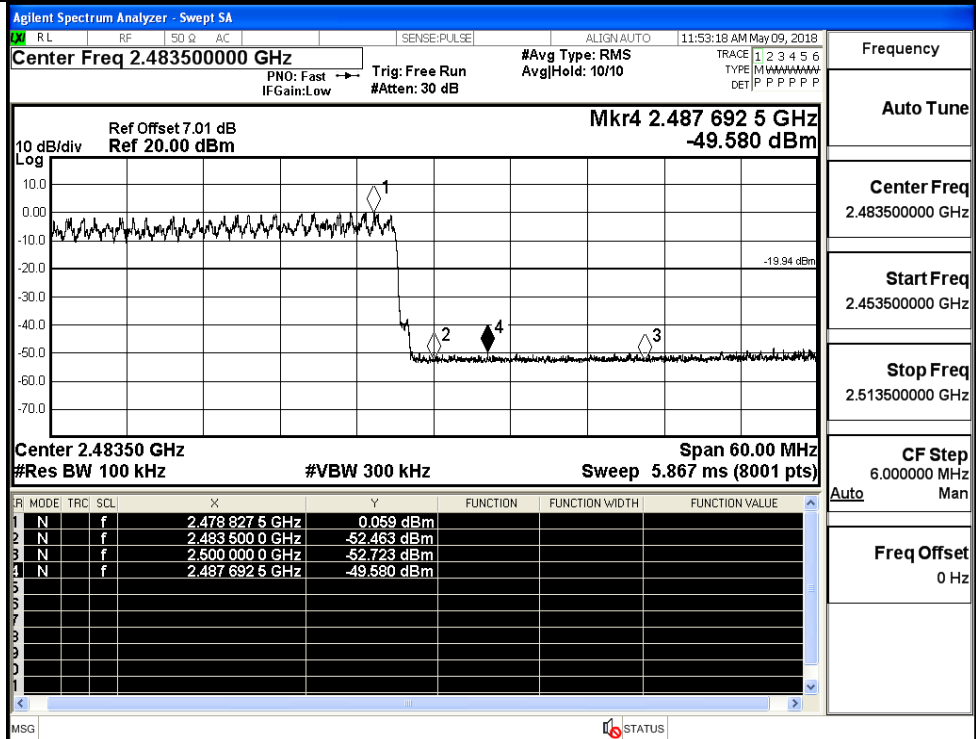
Frequency	
Auto Tune	
Center Freq	2.400000000 GHz
Start Freq	2.370000000 GHz
Stop Freq	2.430000000 GHz
CF Step	6.000000 MHz
Auto	Man
Freq Offset	0 Hz

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
Auto	Man
Freq Offset	0 Hz

8DPSK/HCH/Hop

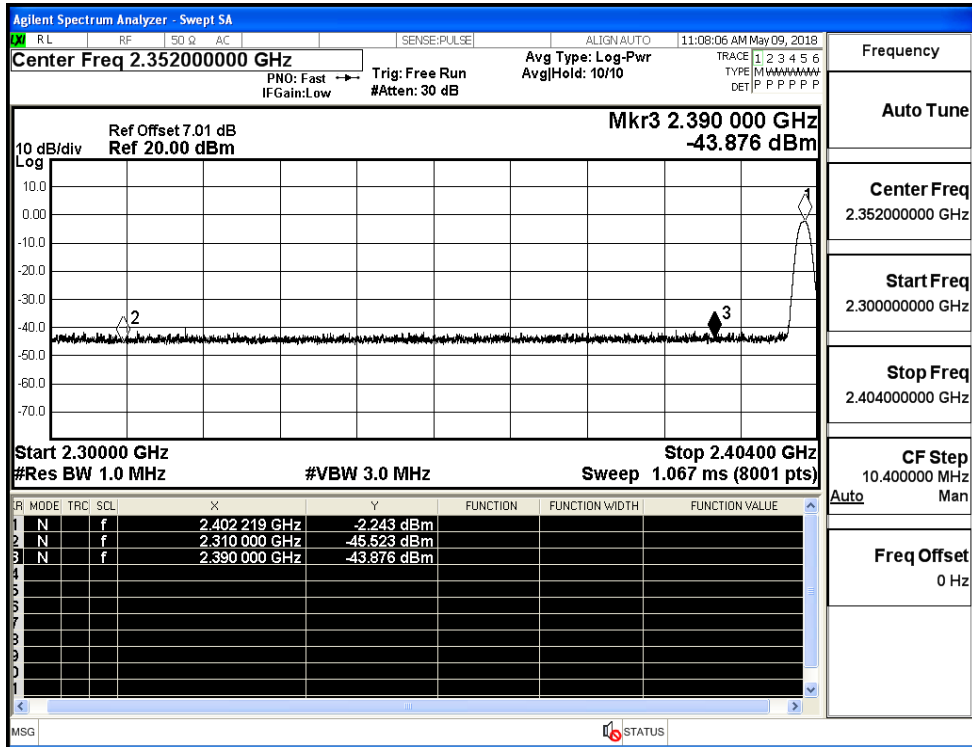


Frequency	
Auto Tune	
Center Freq	2.483500000 GHz
Start Freq	2.453500000 GHz
Stop Freq	2.513500000 GHz
CF Step	6.000000 MHz
Auto	Man
Freq Offset	0 Hz

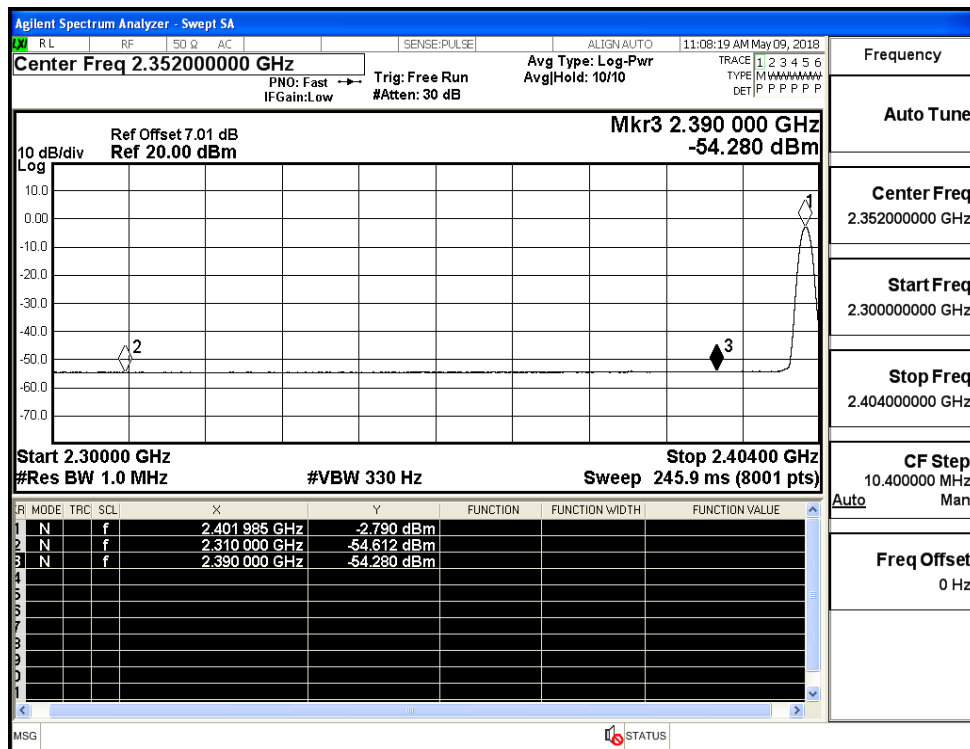
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-45.52	2.5	0	52.23	PEAK	74	PASS
	Off	2310.0	-54.61	2.5	0	43.15	AV	54	PASS
	Off	2390.0	-43.88	2.5	0	53.88	PEAK	74	PASS
	Off	2390.0	-54.28	2.5	0	43.48	AV	54	PASS
	Off	2483.5	-41.54	2.5	0	56.21	PEAK	74	PASS
	Off	2483.5	-51.36	2.5	0	46.40	AV	54	PASS
	Off	2500.0	-42.51	2.5	0	55.25	PEAK	74	PASS
	Off	2500.0	-53.81	2.5	0	43.95	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-44.17	2.5	0	53.59	PEAK	74	PASS
	Off	2310.0	-54.56	2.5	0	43.19	AV	54	PASS
	Off	2390.0	-43.92	2.5	0	53.83	PEAK	74	PASS
	Off	2390.0	-54.37	2.5	0	43.38	AV	54	PASS
	Off	2483.5	-44.08	2.5	0	53.68	PEAK	74	PASS
	Off	2483.5	-53.62	2.5	0	44.14	AV	54	PASS
	Off	2500.0	-42.63	2.5	0	55.12	PEAK	74	PASS
	Off	2500.0	-53.90	2.5	0	43.86	AV	54	PASS
8DPSK	Off	2310.0	-43.90	2.5	0	53.86	PEAK	74	PASS
	Off	2310.0	-54.56	2.5	0	43.20	AV	54	PASS
	Off	2390.0	-44.01	2.5	0	53.75	PEAK	74	PASS
	Off	2390.0	-54.33	2.5	0	43.43	AV	54	PASS
	Off	2483.5	-42.17	2.5	0	55.59	PEAK	74	PASS
	Off	2483.5	-53.65	2.5	0	44.11	AV	54	PASS
	Off	2500.0	-44.44	2.5	0	53.32	PEAK	74	PASS
	Off	2500.0	-53.93	2.5	0	43.83	AV	54	PASS

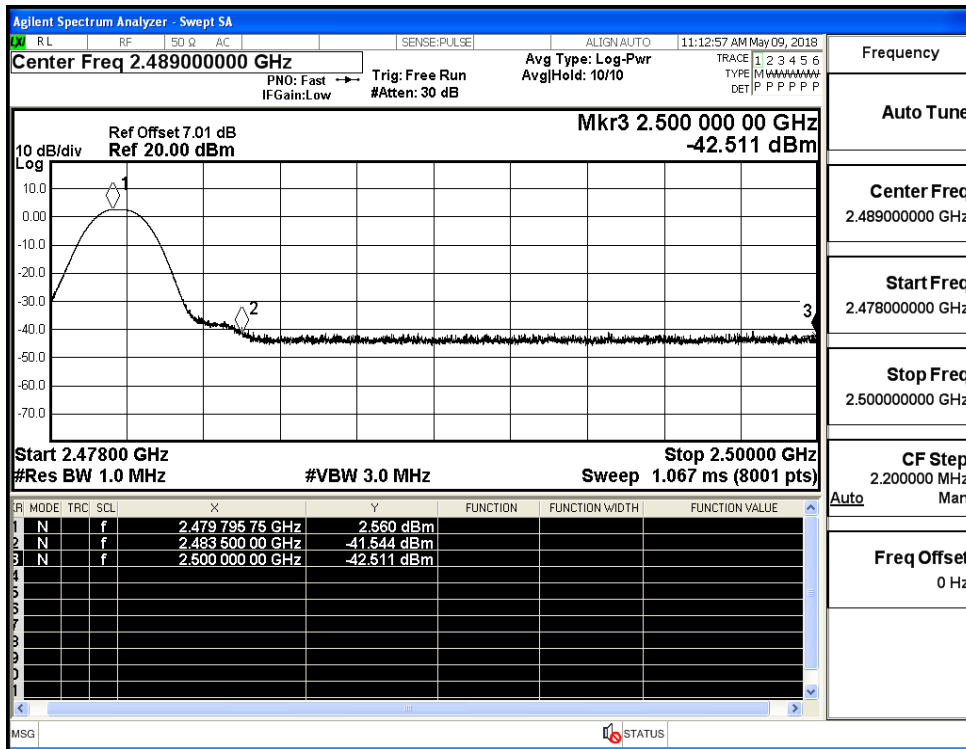
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



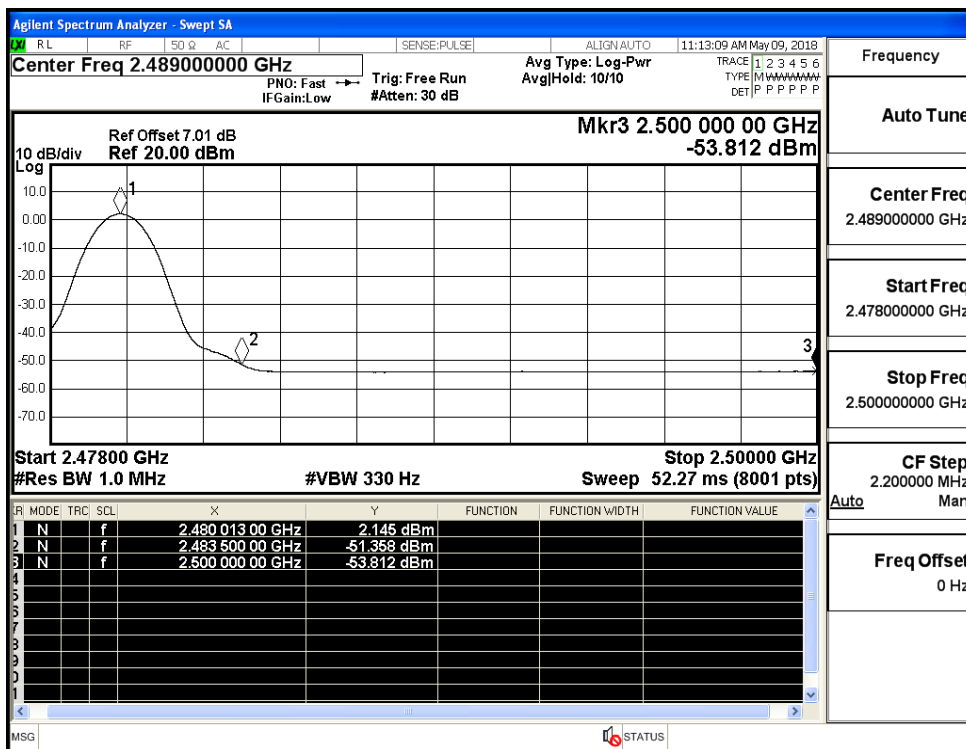
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



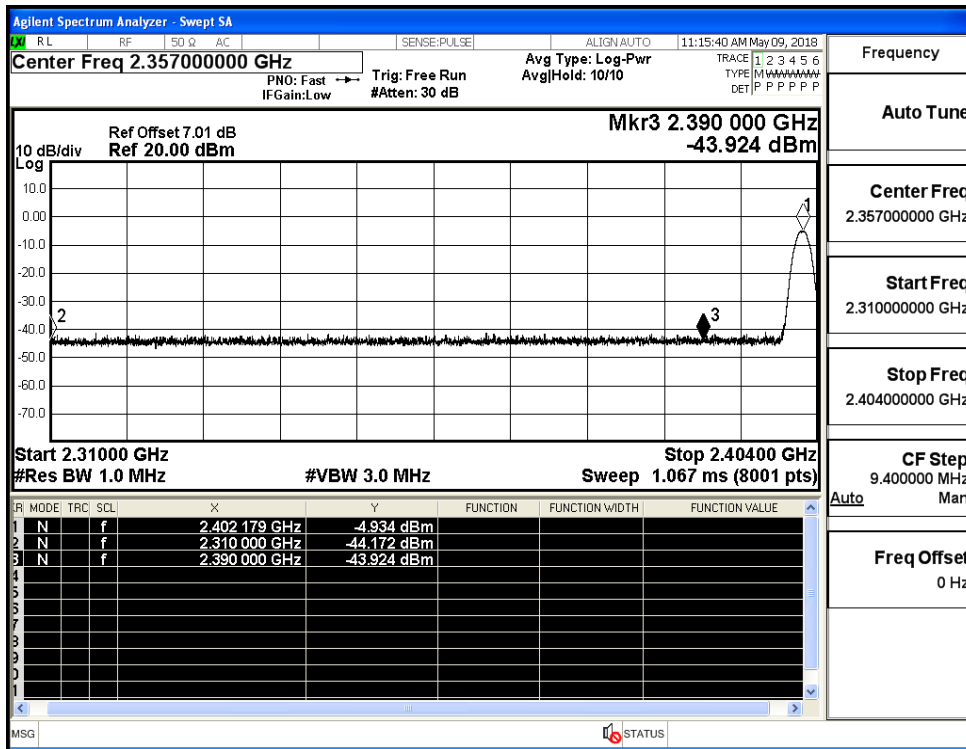
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



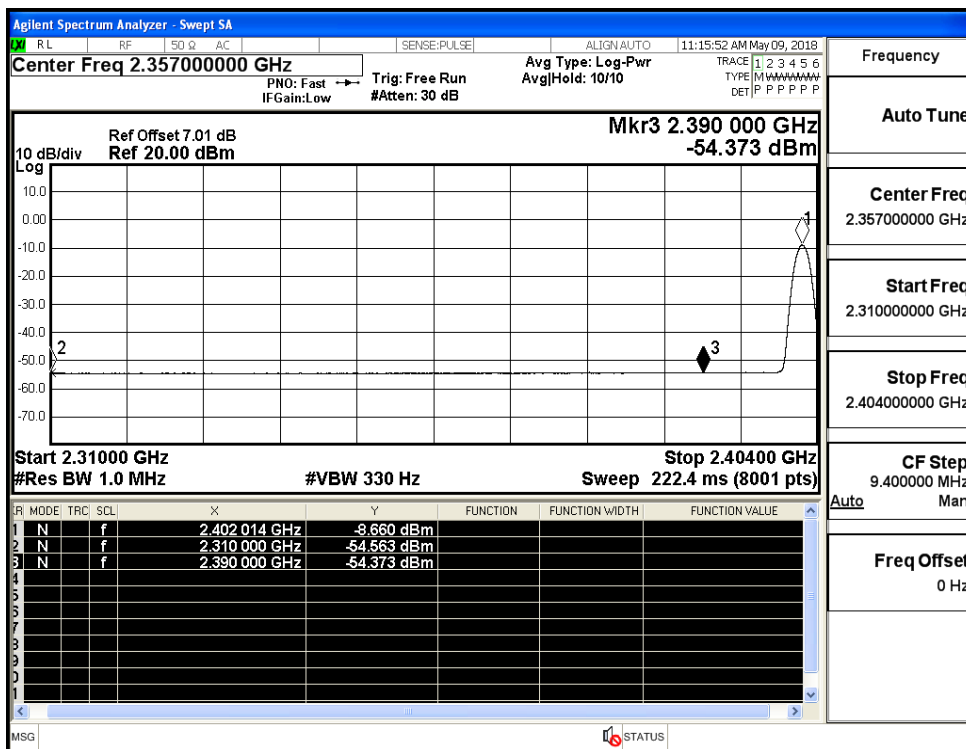
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



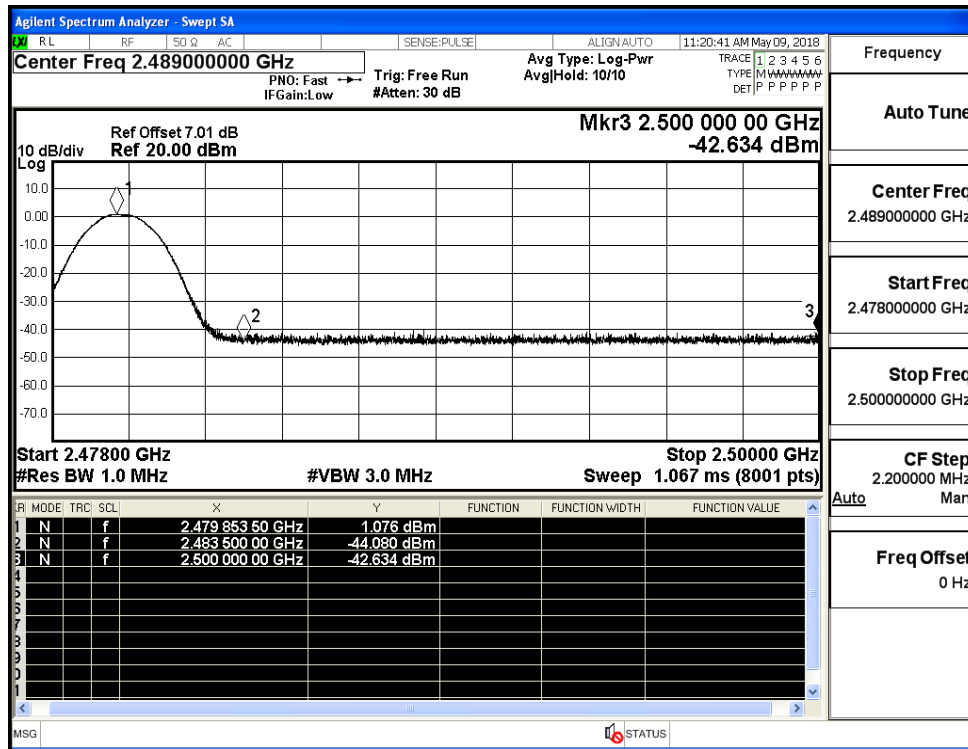
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



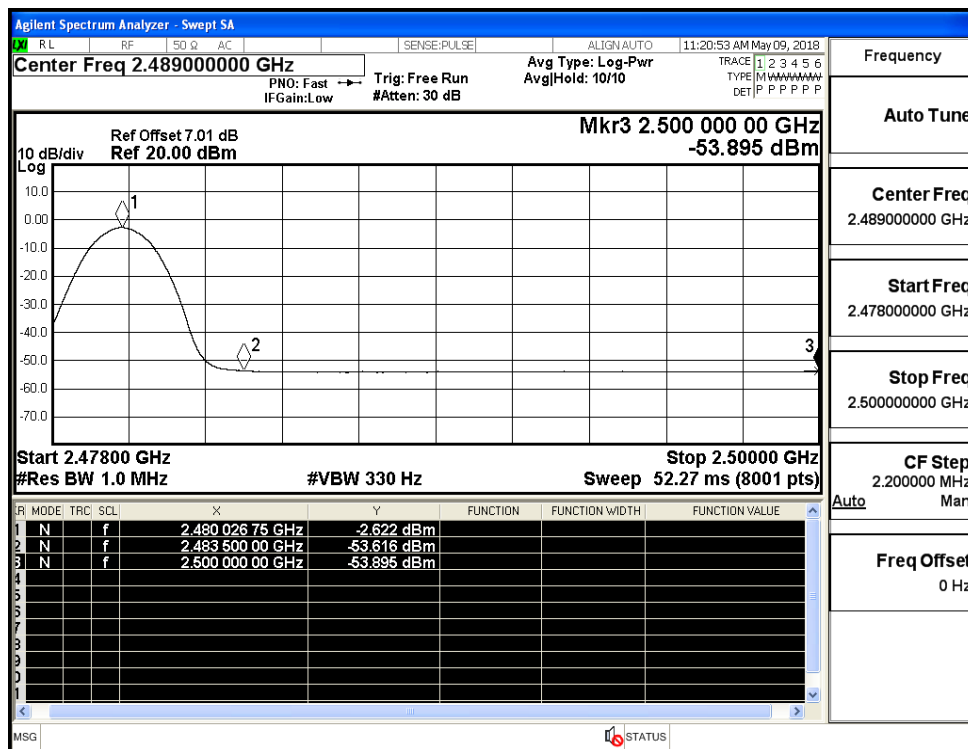
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



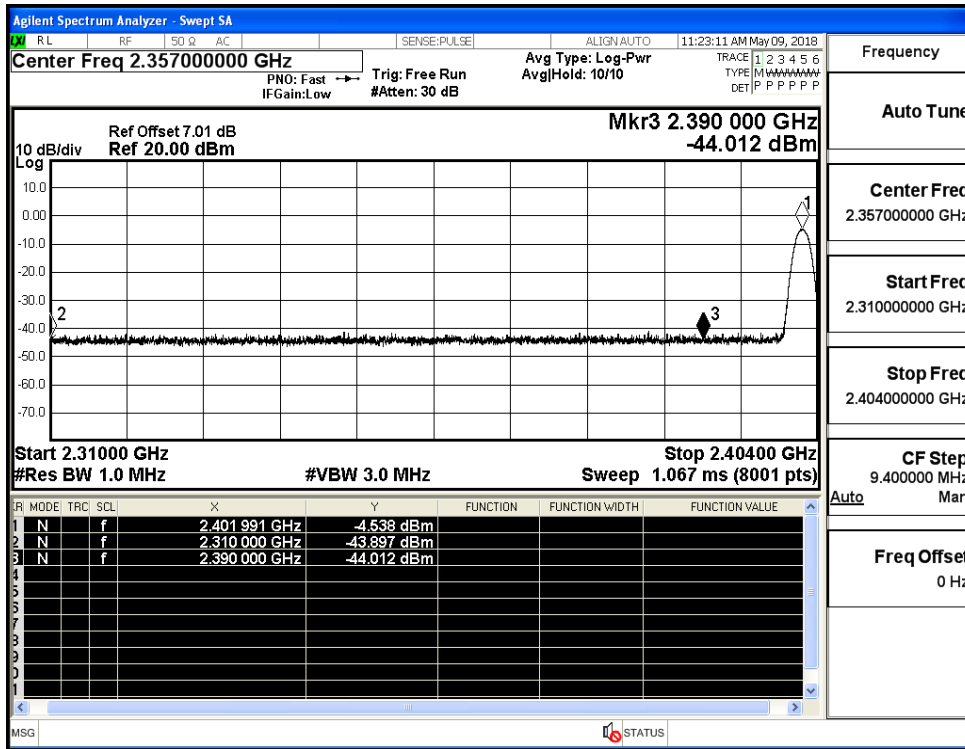
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



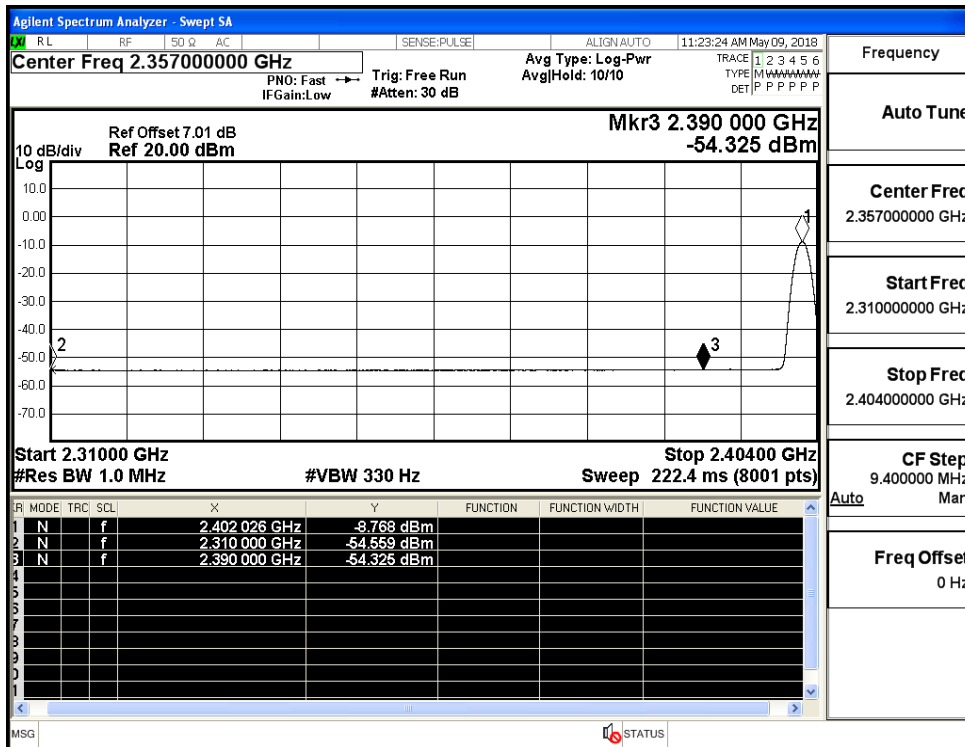
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



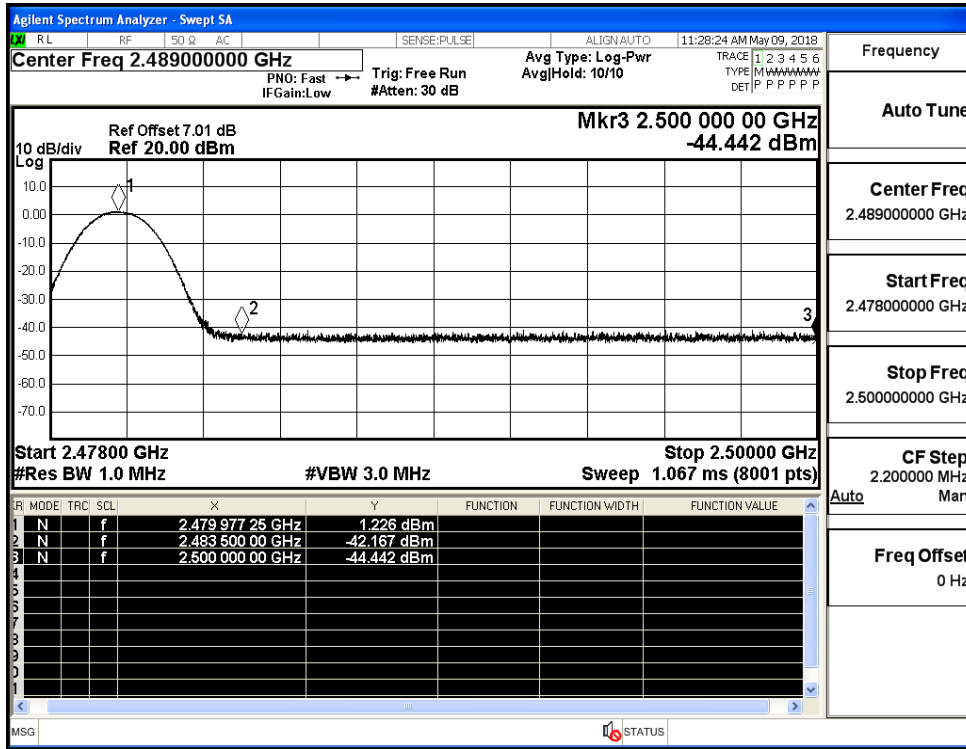
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

