



Appendix A

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

Product Name: TURE Wireless earbuds

Trade Mark: Warbler

Test Model: LH-W1

Environmental Conditions

Temperature:	24.6° C
Relative Humidity:	54.1%
ATM Pressure:	100.0 kPa
Test Engineer:	Jay Li
Supervised by:	Li Huan

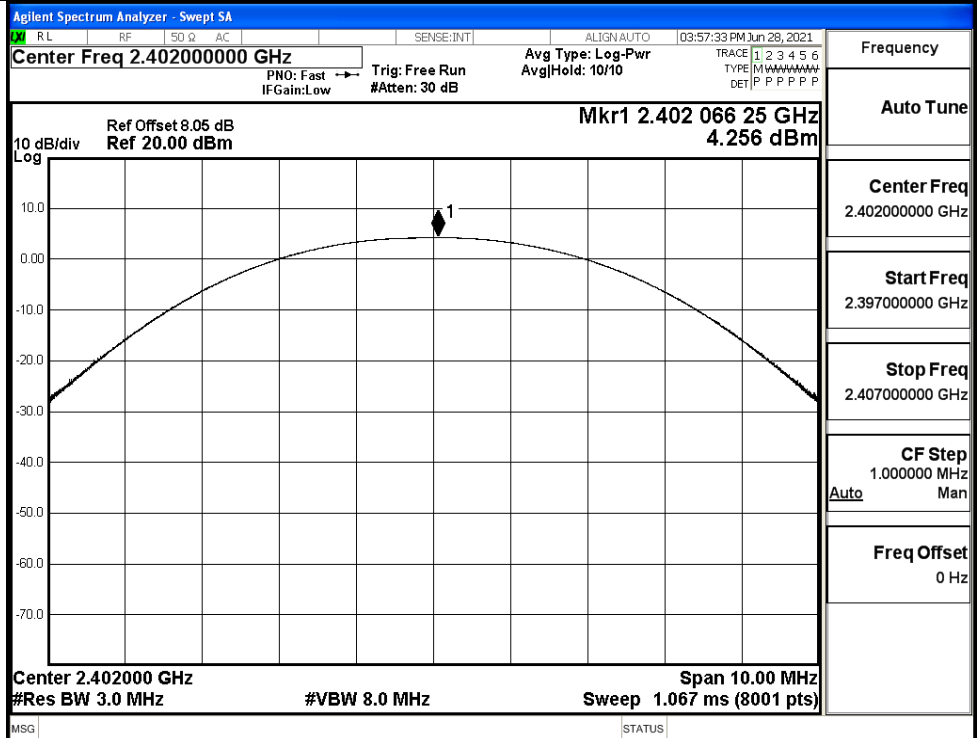
A.1 Maximum Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	4.256	30	PASS
	MCH	5.622	30	PASS
	HCH	4.039	30	PASS
$\pi/4$ DQPSK	LCH	3.474	21	PASS
	MCH	4.794	21	PASS
	HCH	3.312	21	PASS
8DPSK	LCH	3.537	21	PASS
	MCH	4.947	21	PASS
	HCH	3.450	21	PASS

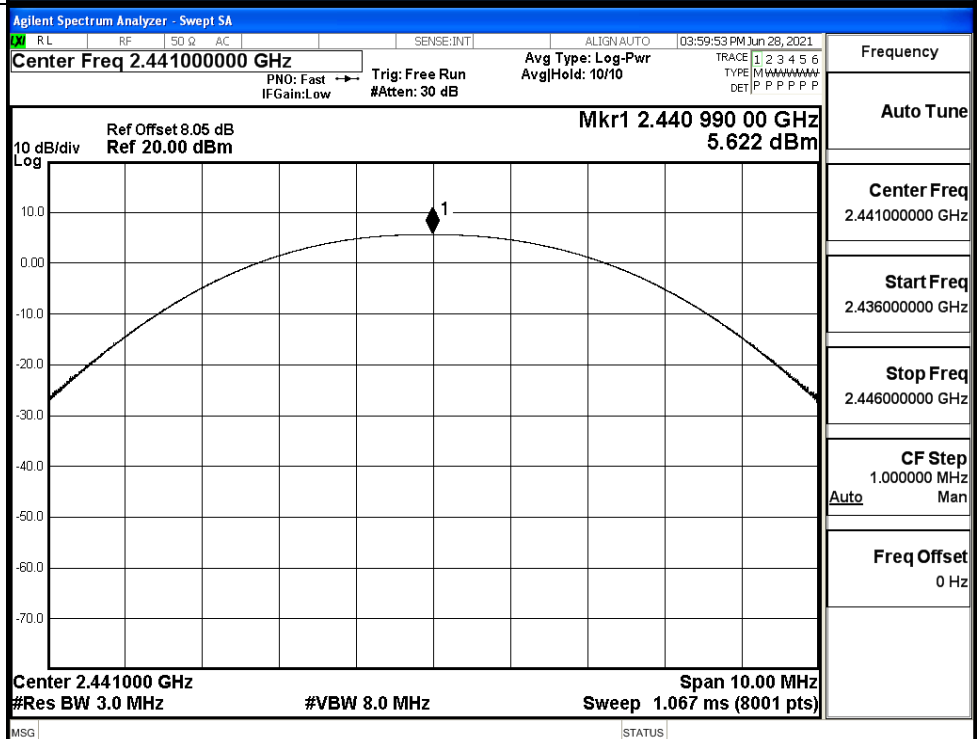


Test Graphs

GFSK/LCH

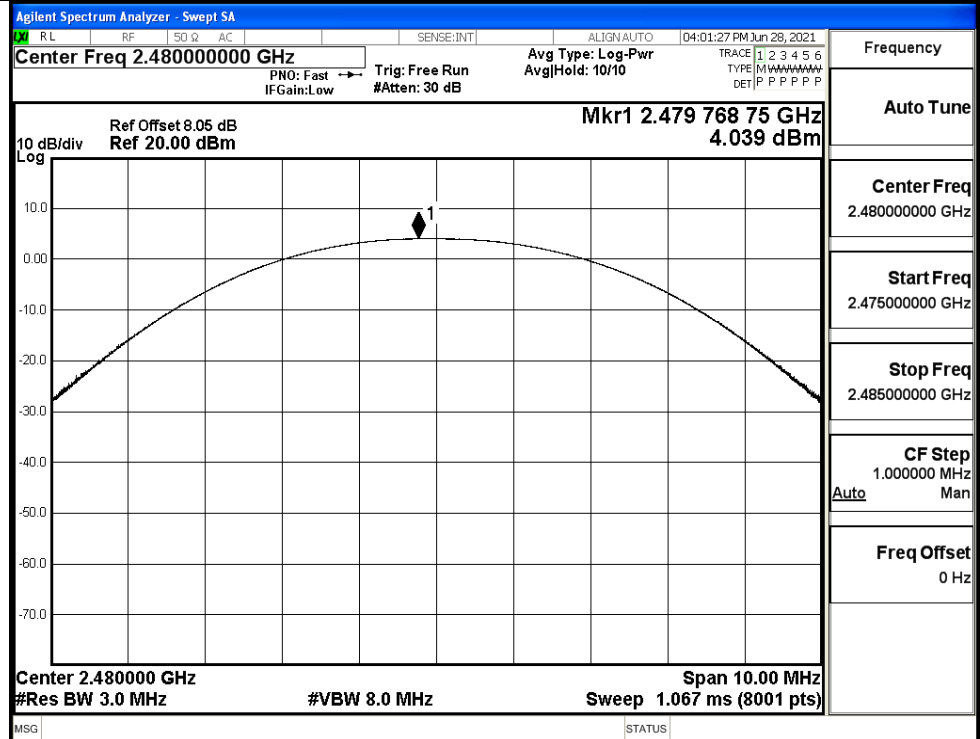
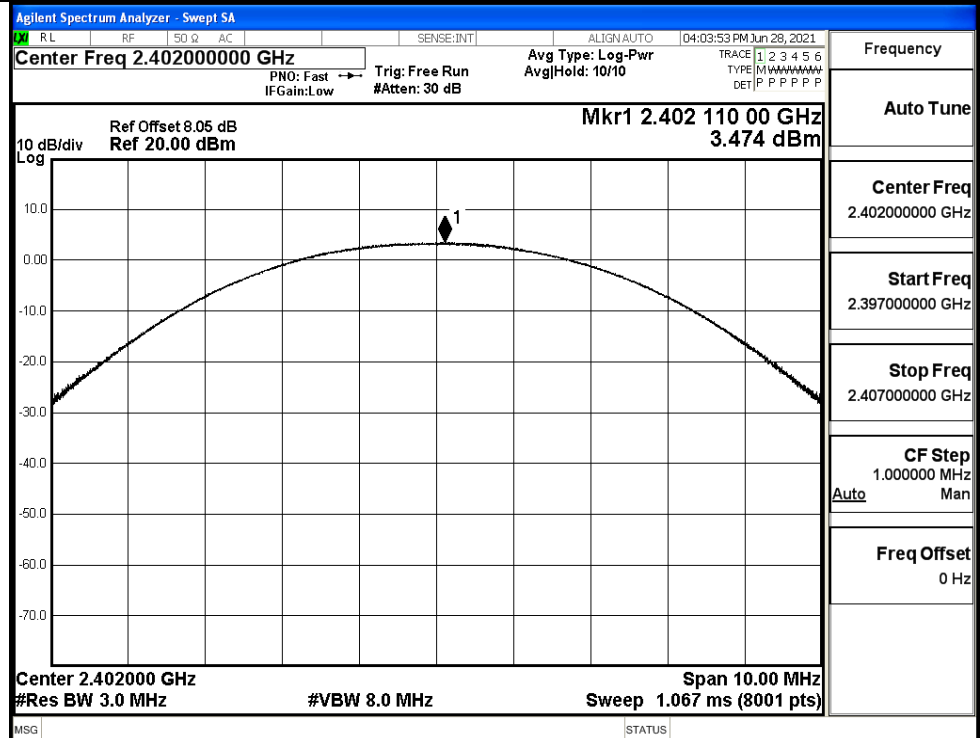


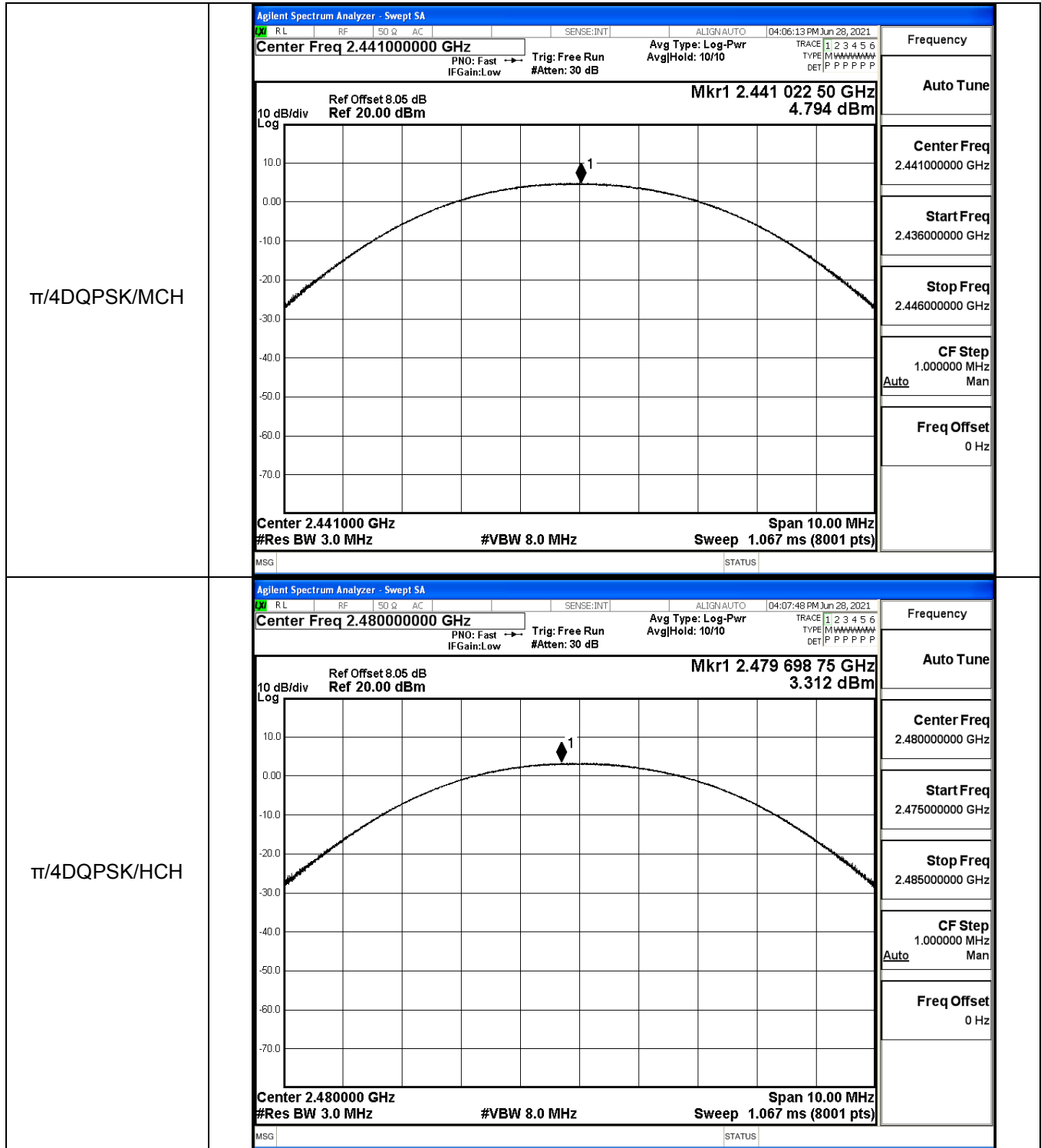
GFSK/MCH





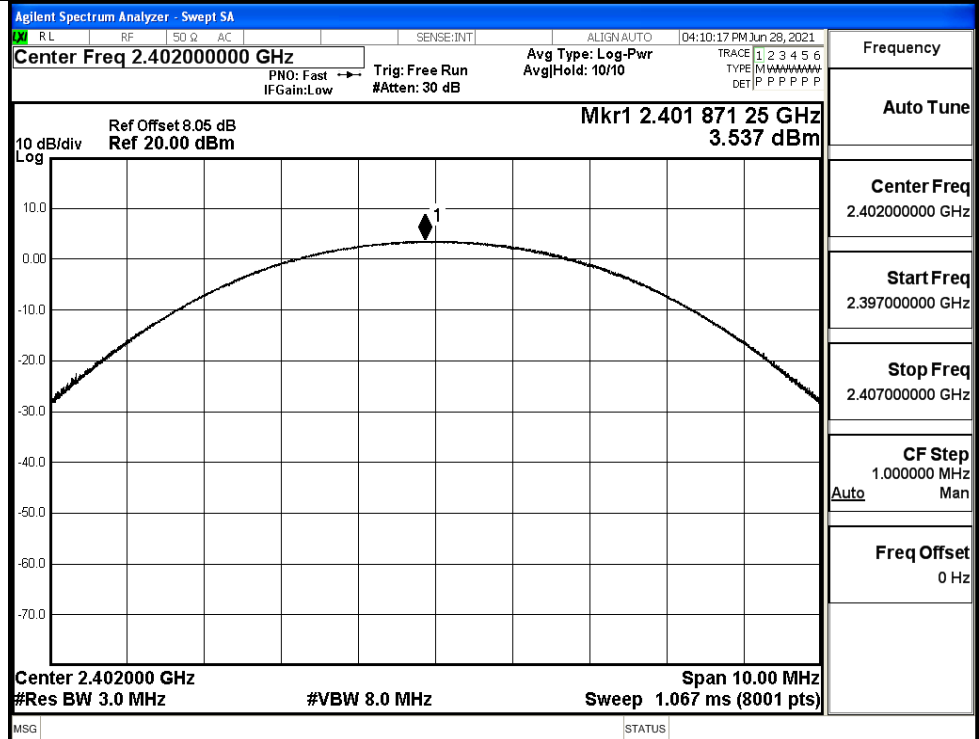
GFSK/HCH

 π /4DQPSK/LCH

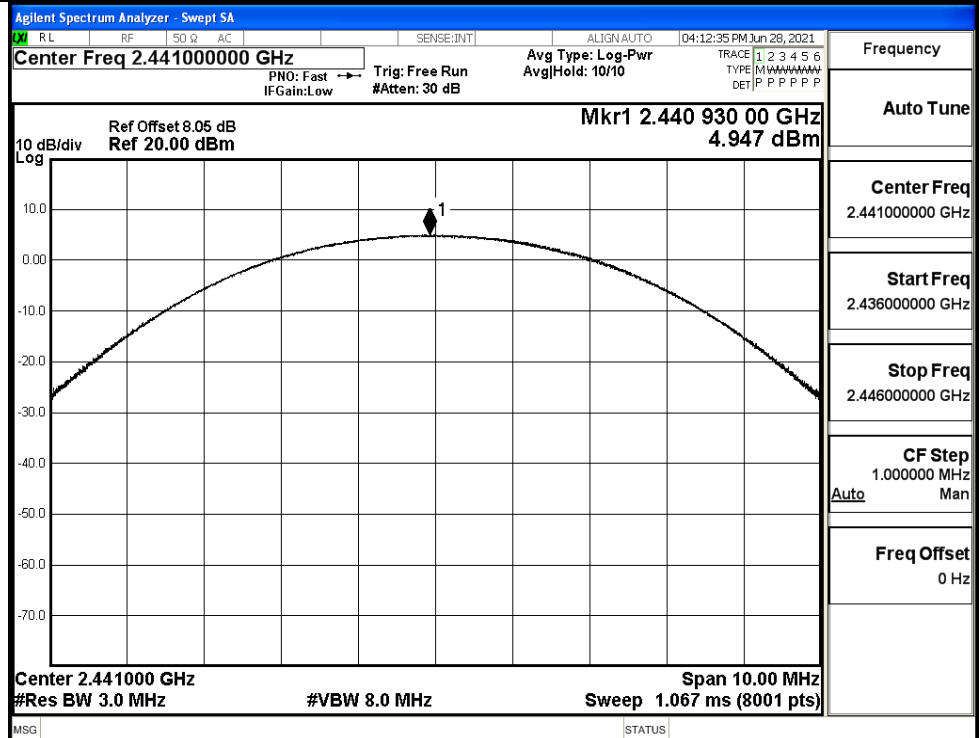




8DPSK/LCH

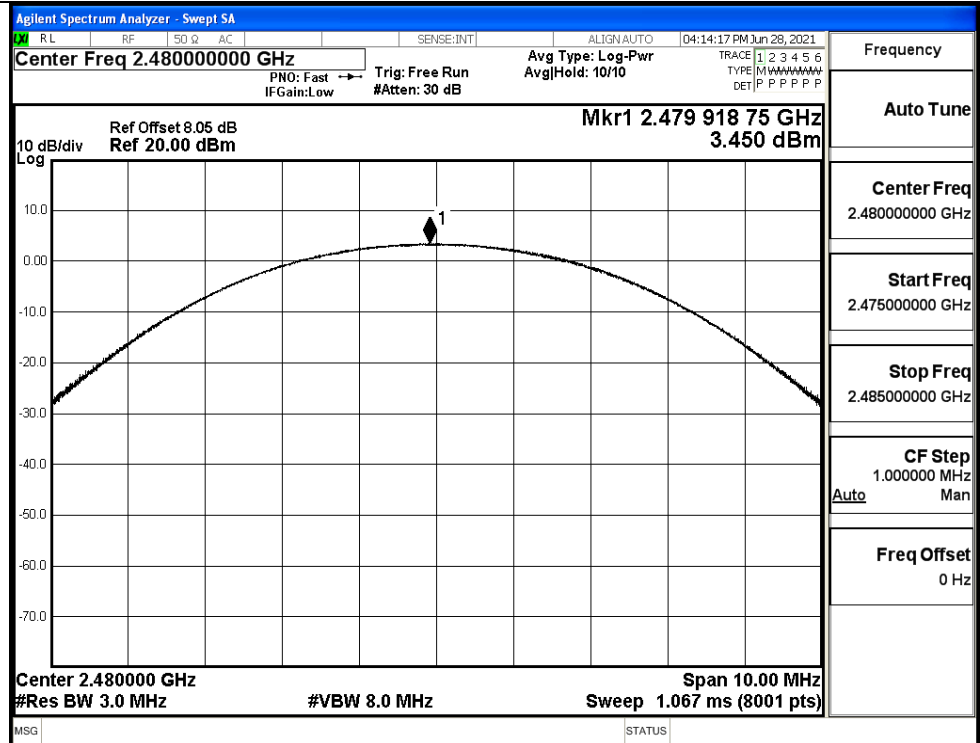


8DPSK/MCH





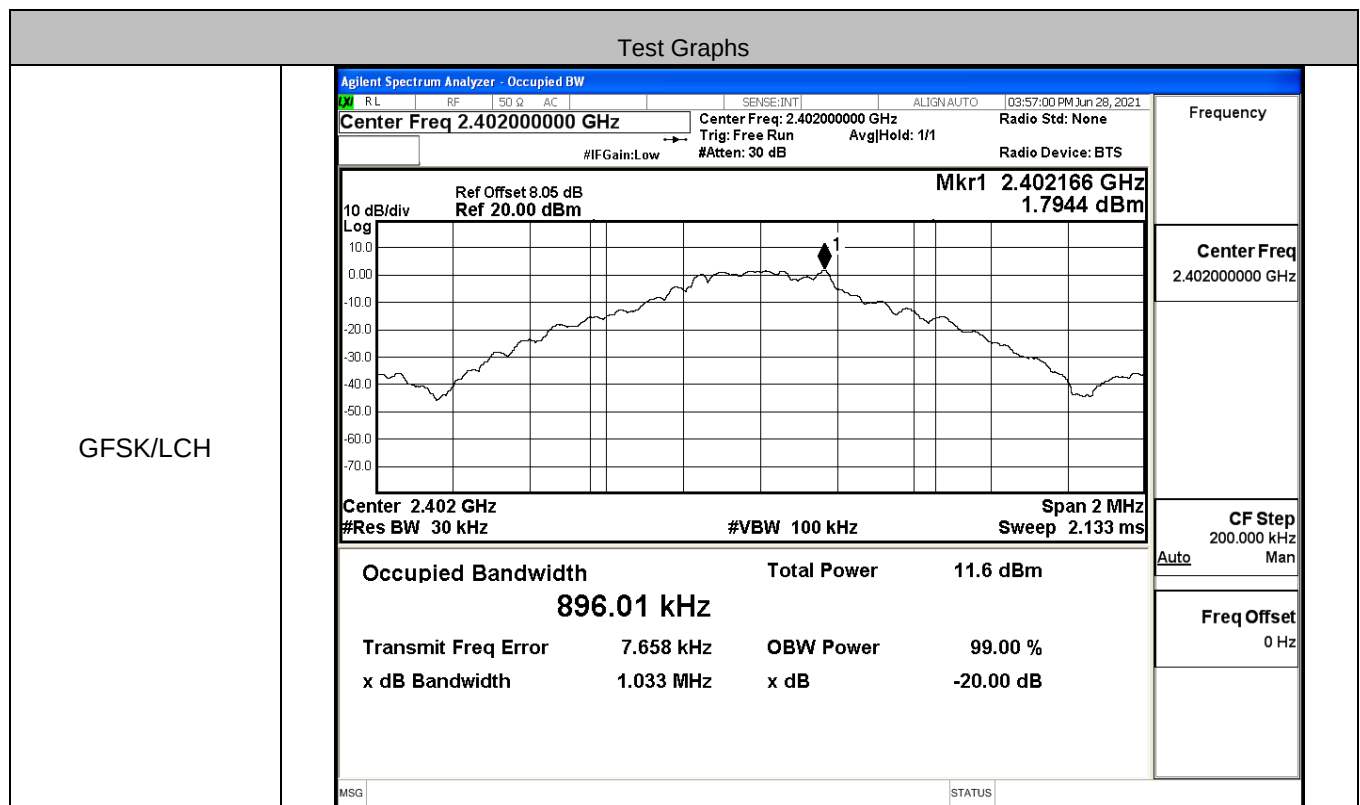
8DPSK/HCH





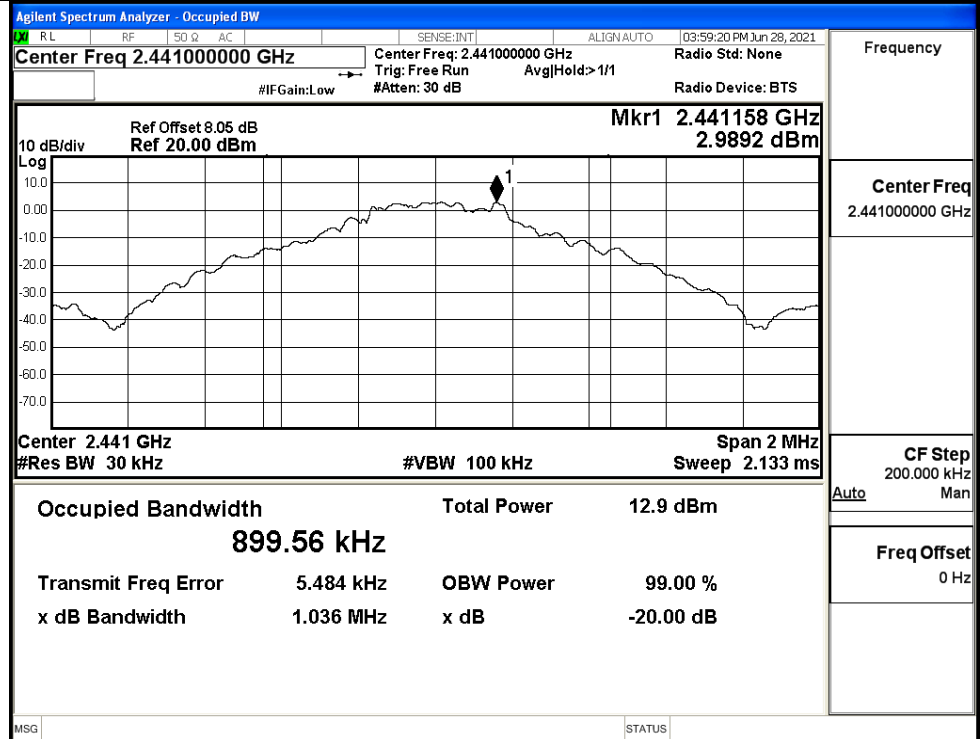
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.033	Not Specified	PASS
	MCH	1.036	Not Specified	PASS
	HCH	1.037	Not Specified	PASS
$\pi/4$ DQPSK	LCH	1.292	Not Specified	PASS
	MCH	1.287	Not Specified	PASS
	HCH	1.289	Not Specified	PASS
8DPSK	LCH	1.291	Not Specified	PASS
	MCH	1.293	Not Specified	PASS
	HCH	1.293	Not Specified	PASS

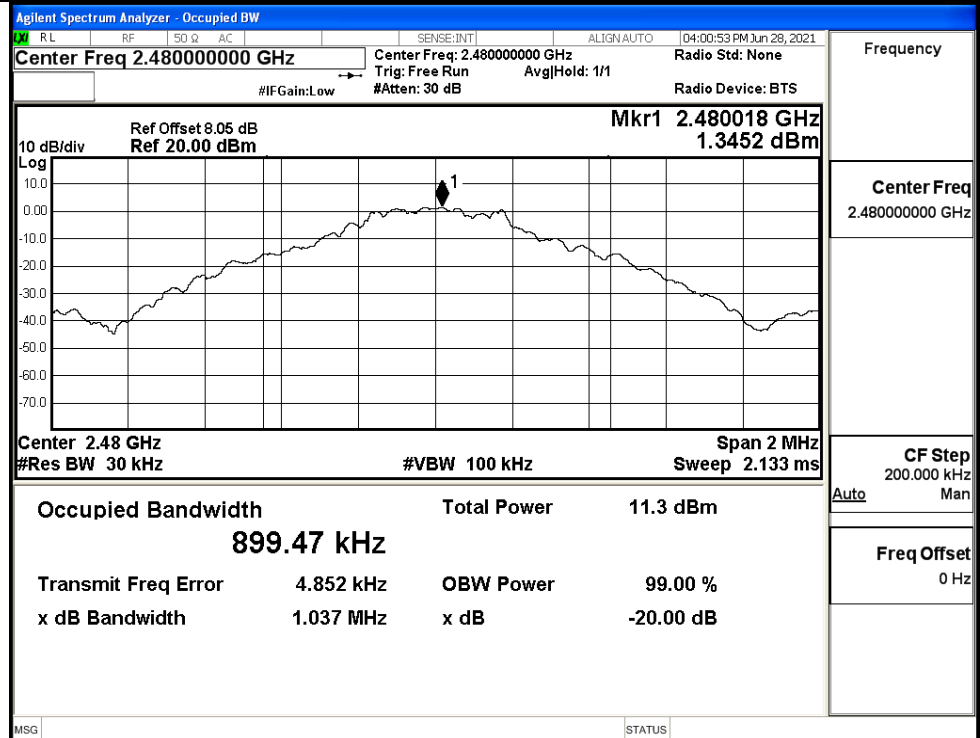


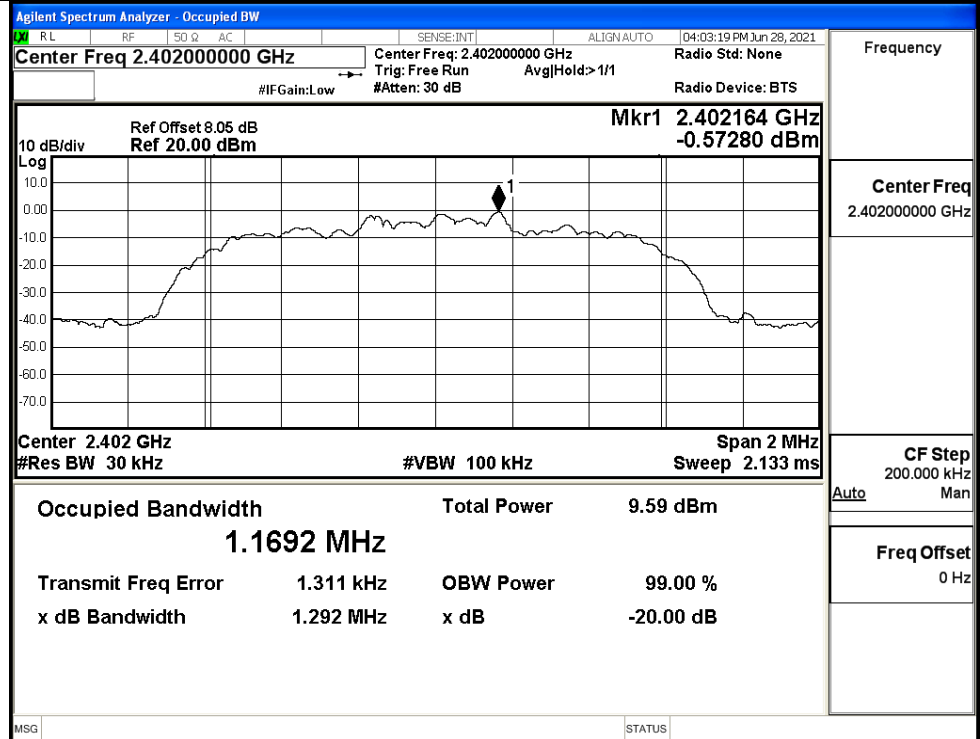
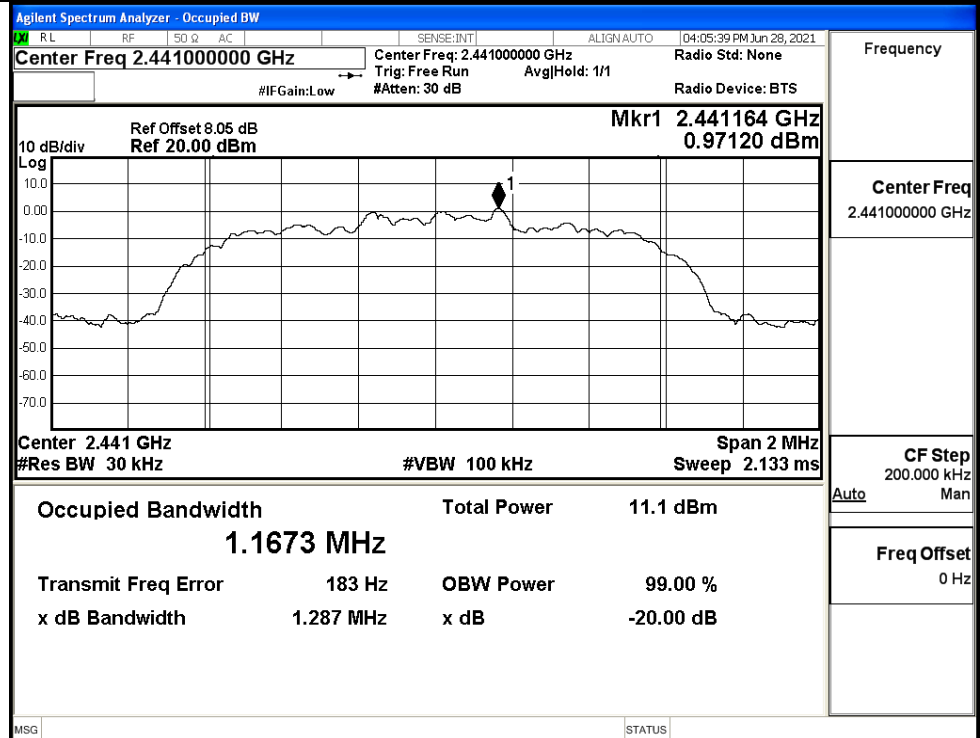


GFSK/MCH

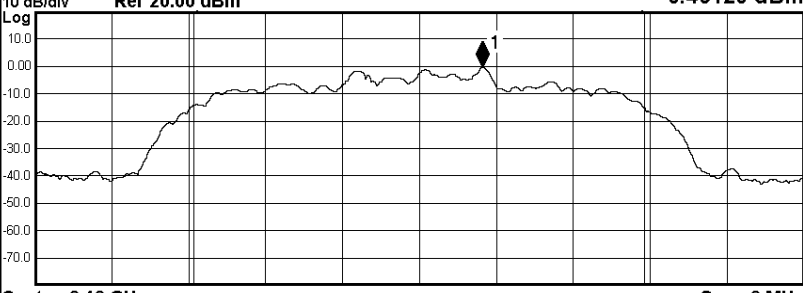
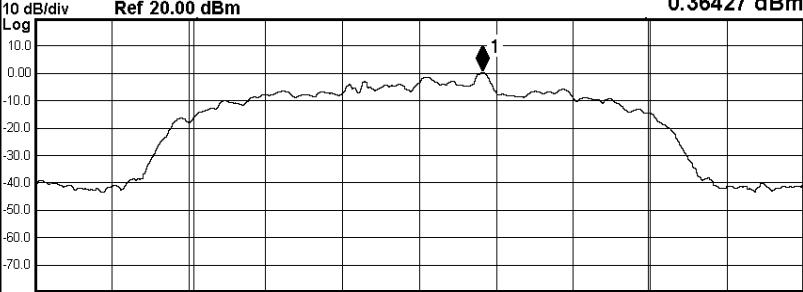


GFSK/HCH



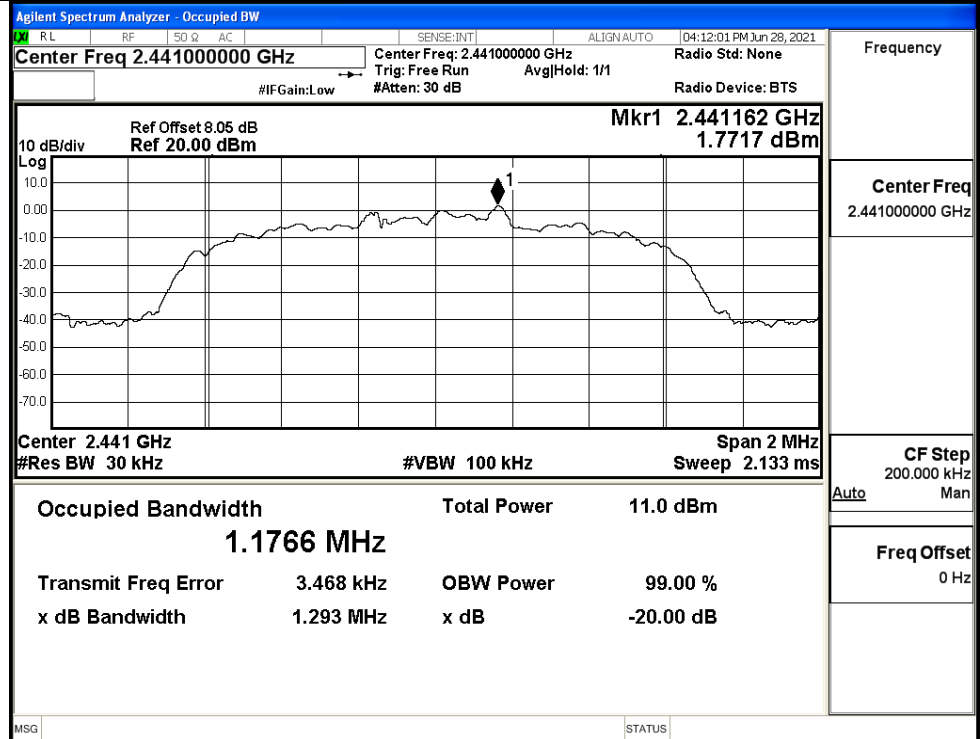
 $\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH



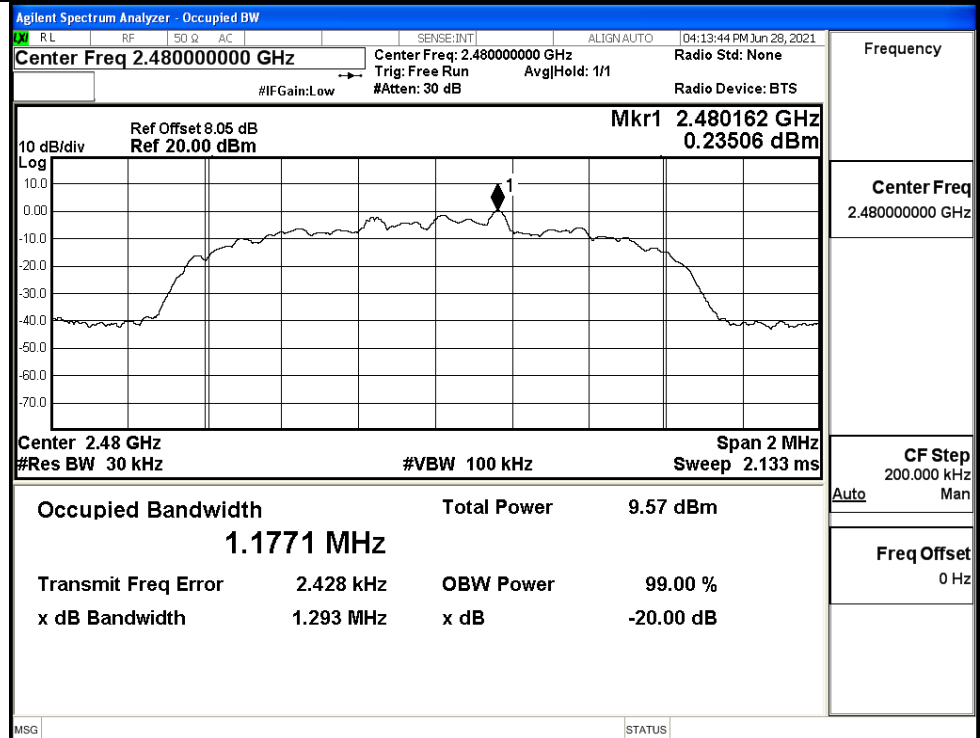
$\pi/4$ DQPSK/HCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.48000000 GHz Center Freq: 2.48000000 GHz Trig: Free Run #IFGain: Low #Atten: 30 dB ALIGN AUTO Radio Std: None Radio Device: BTS 04:07:14 PM Jun 28, 2021 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.480164 GHz -0.46120 dBm  Center 2.48 GHz #Res BW 30 kHz Span 2 MHz Sweep 2.133 ms #VBW 100 kHz Occupied Bandwidth 1.1690 MHz Total Power 9.59 dBm Transmit Freq Error -616 Hz OBW Power 99.00 % x dB Bandwidth 1.289 MHz x dB -20.00 dB MSG STATUS Frequency Center Freq 2.48000000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz
8DPSK/LCH	Agilent Spectrum Analyzer - Occupied BW Center Freq 2.40200000 GHz Center Freq: 2.40200000 GHz Trig: Free Run #IFGain: Low #Atten: 30 dB ALIGN AUTO Radio Std: None Radio Device: BTS 04:09:44 PM Jun 28, 2021 10 dB/div Ref Offset 8.05 dB Ref 20.00 dBm Mkr1 2.402164 GHz 0.36427 dBm  Center 2.402 GHz #Res BW 30 kHz Span 2 MHz Sweep 2.133 ms #VBW 100 kHz Occupied Bandwidth 1.1782 MHz Total Power 9.46 dBm Transmit Freq Error 4.822 kHz OBW Power 99.00 % x dB Bandwidth 1.291 MHz x dB -20.00 dB MSG STATUS Frequency Center Freq 2.40200000 GHz CF Step 200.000 kHz Auto Man Freq Offset 0 Hz



8DPSK/MCH



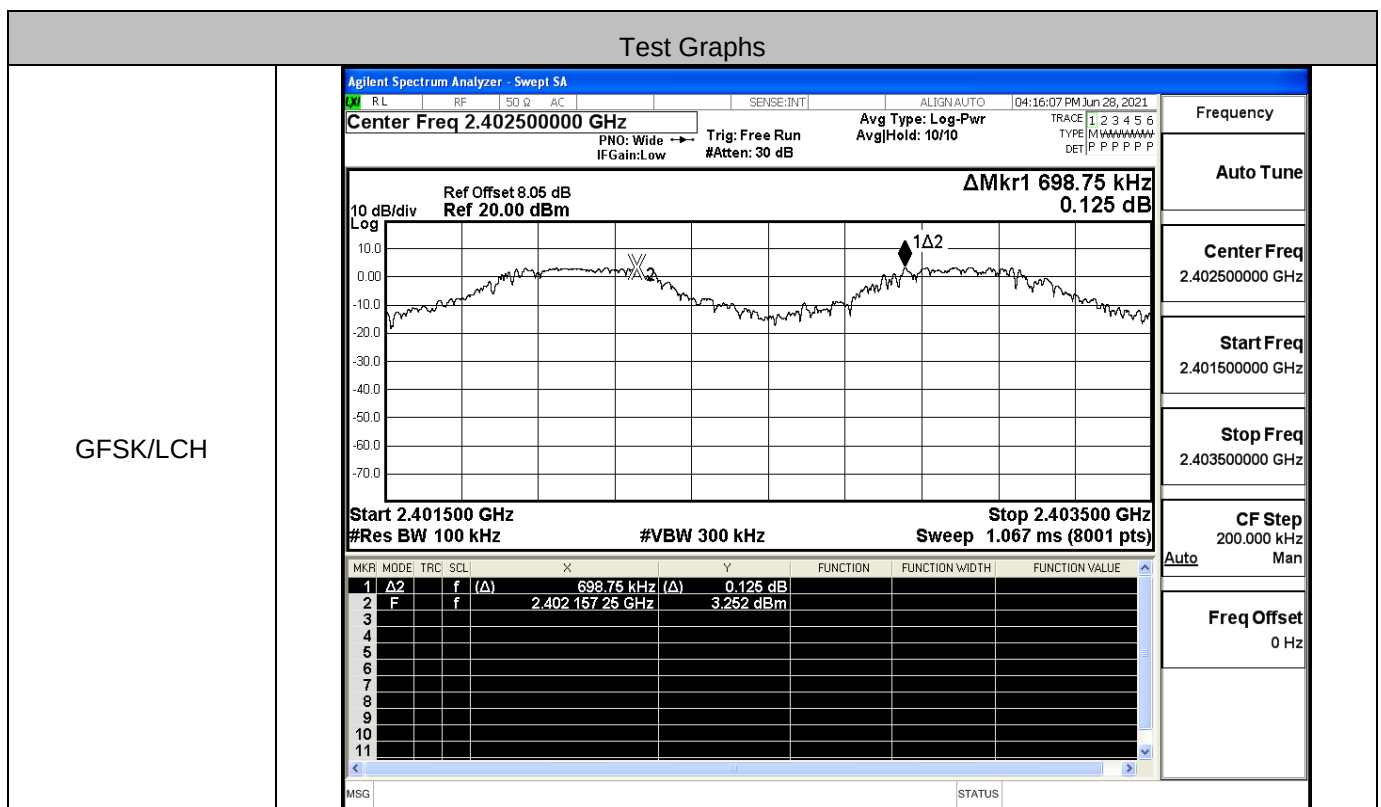
8DPSK/HCH





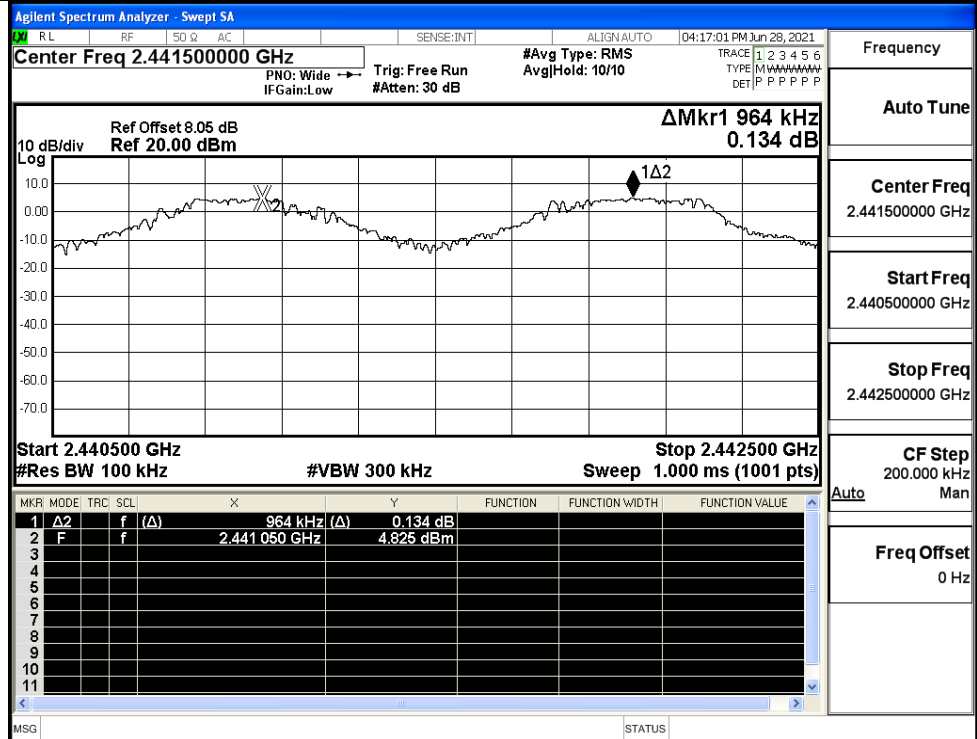
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.699	0.691	PASS
	MCH	0.964	0.691	PASS
	HCH	1.148	0.691	PASS
$\pi/4$ DQPSK	LCH	1.186	0.861	PASS
	MCH	0.862	0.861	PASS
	HCH	1.154	0.861	PASS
8DPSK	LCH	1.168	0.862	PASS
	MCH	1.056	0.862	PASS
	HCH	0.918	0.862	PASS

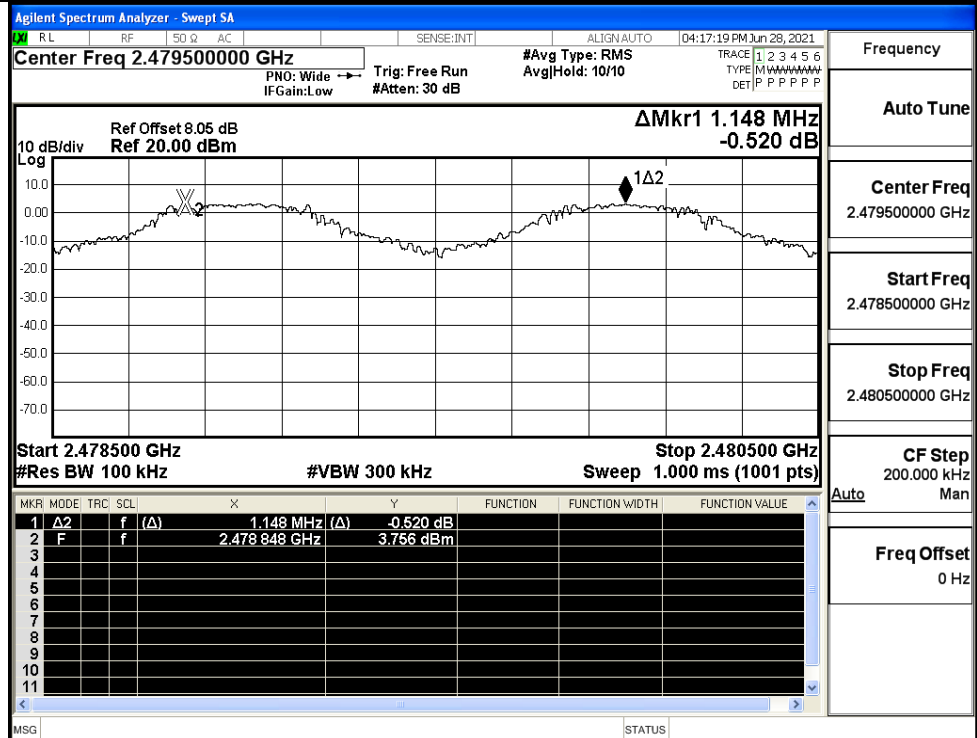


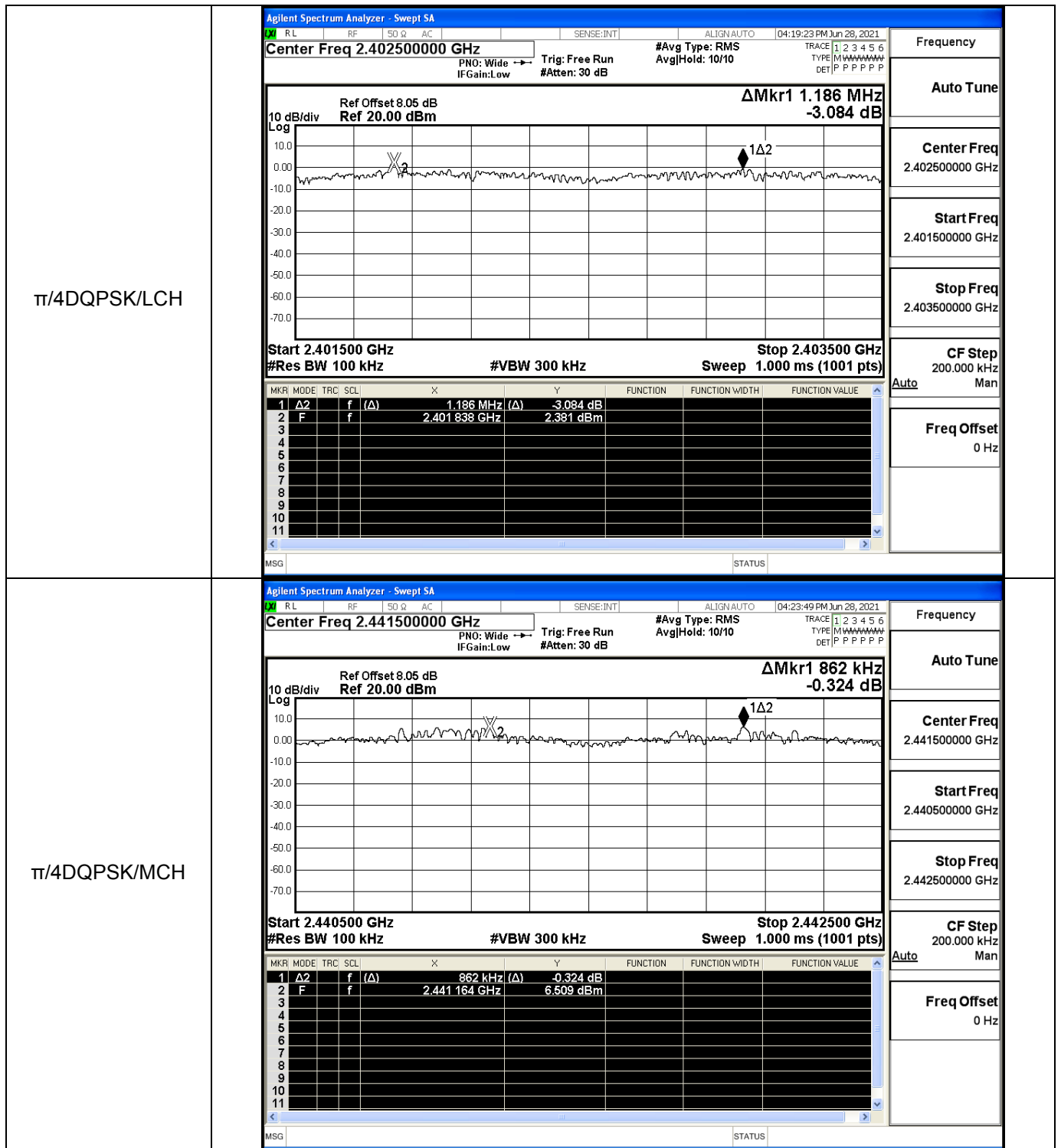


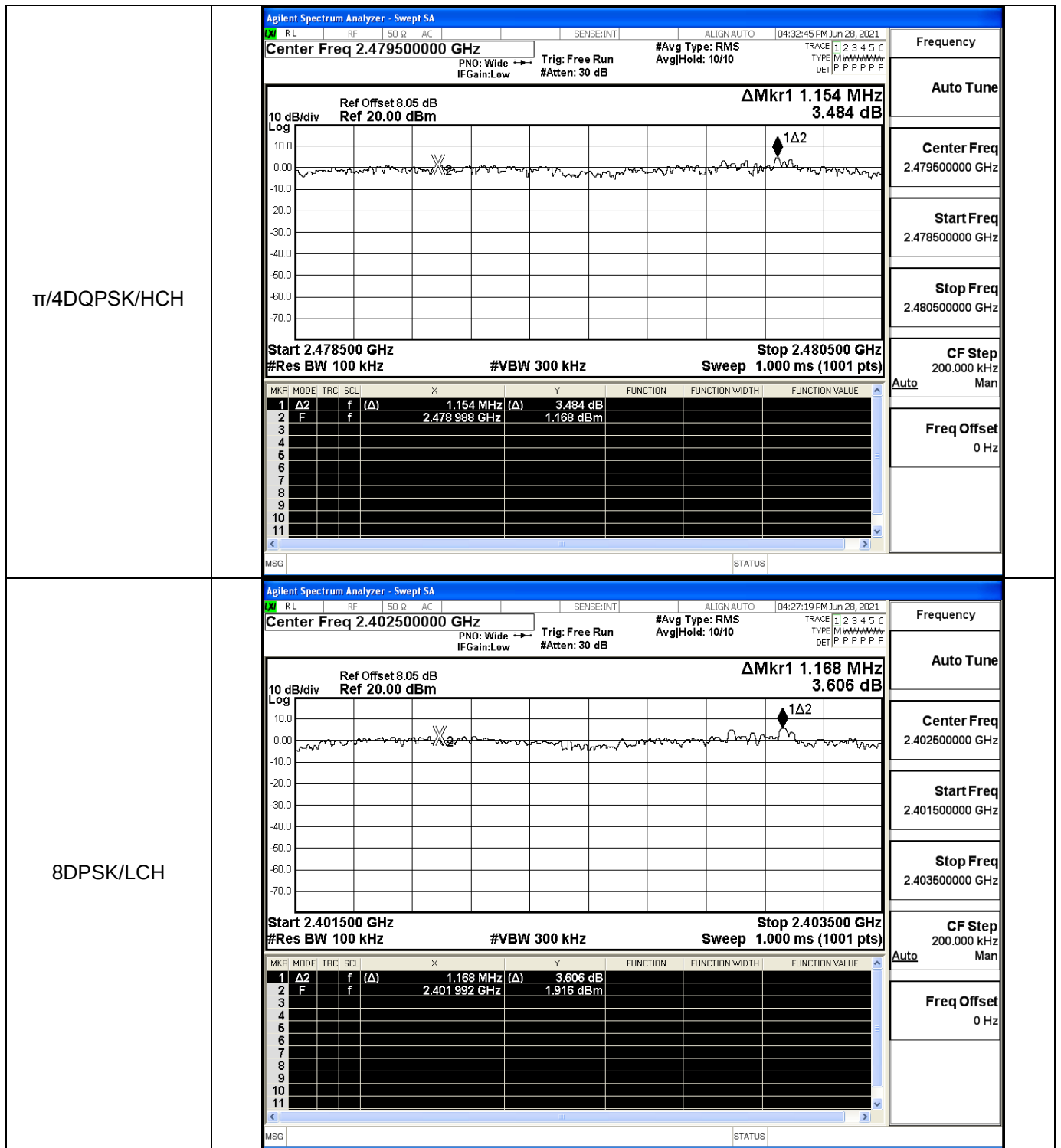
GFSK/MCH

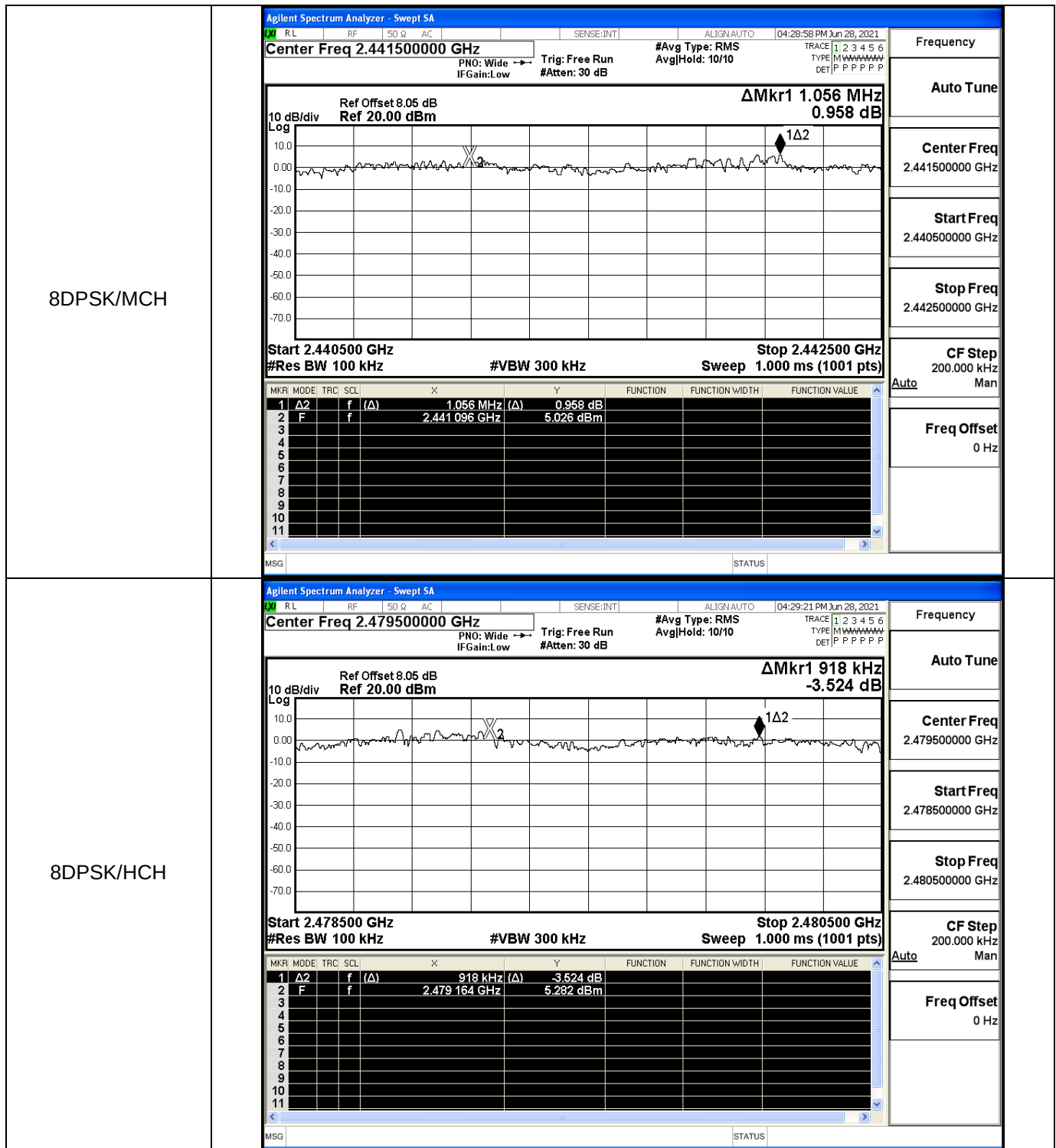


GFSK/HCH





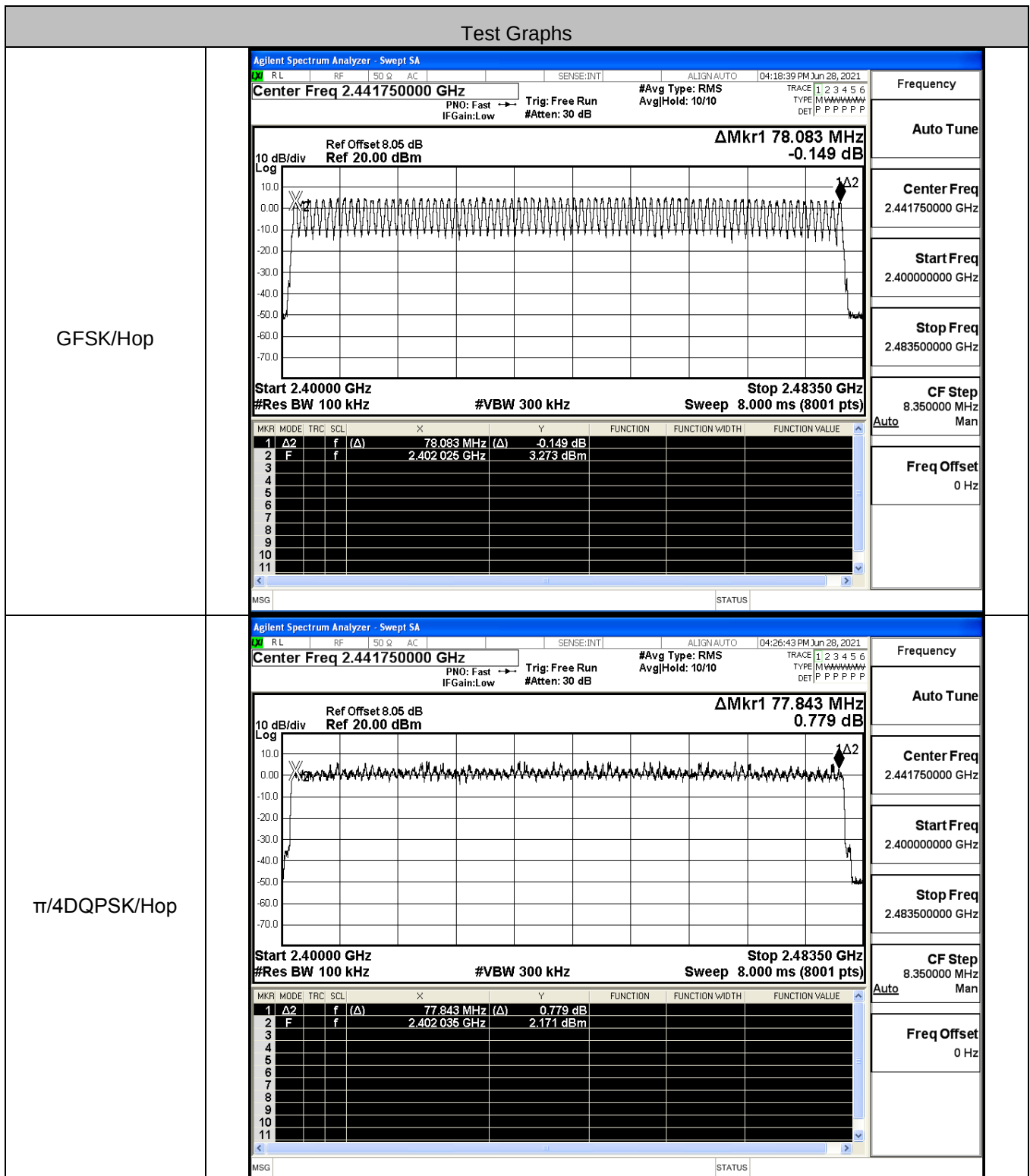






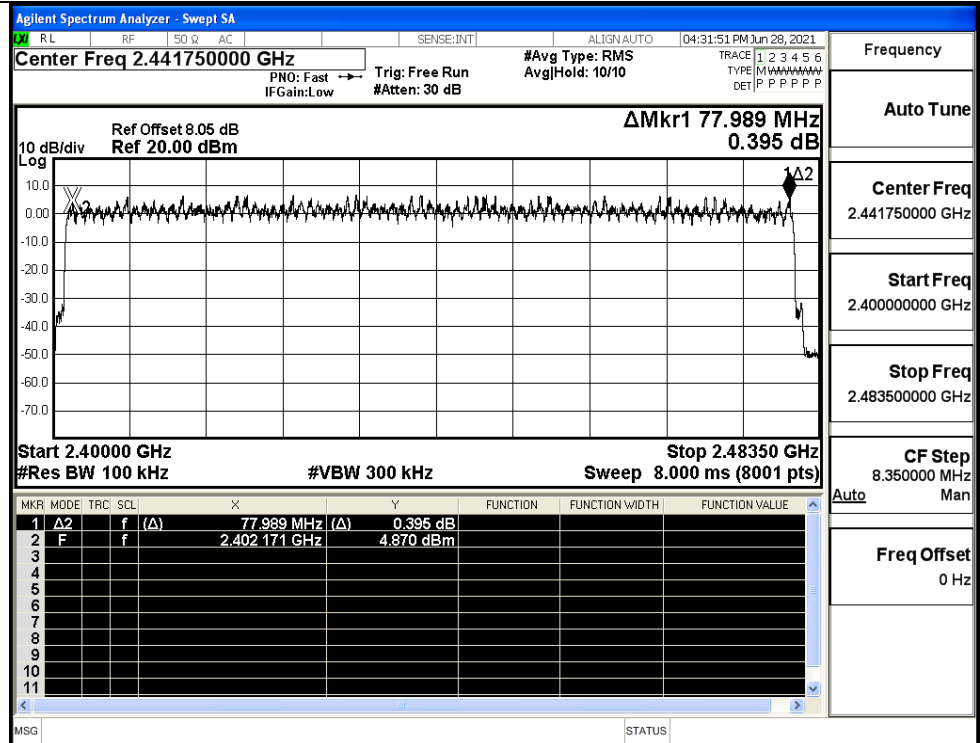
A.4 Hopping Channel Number

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





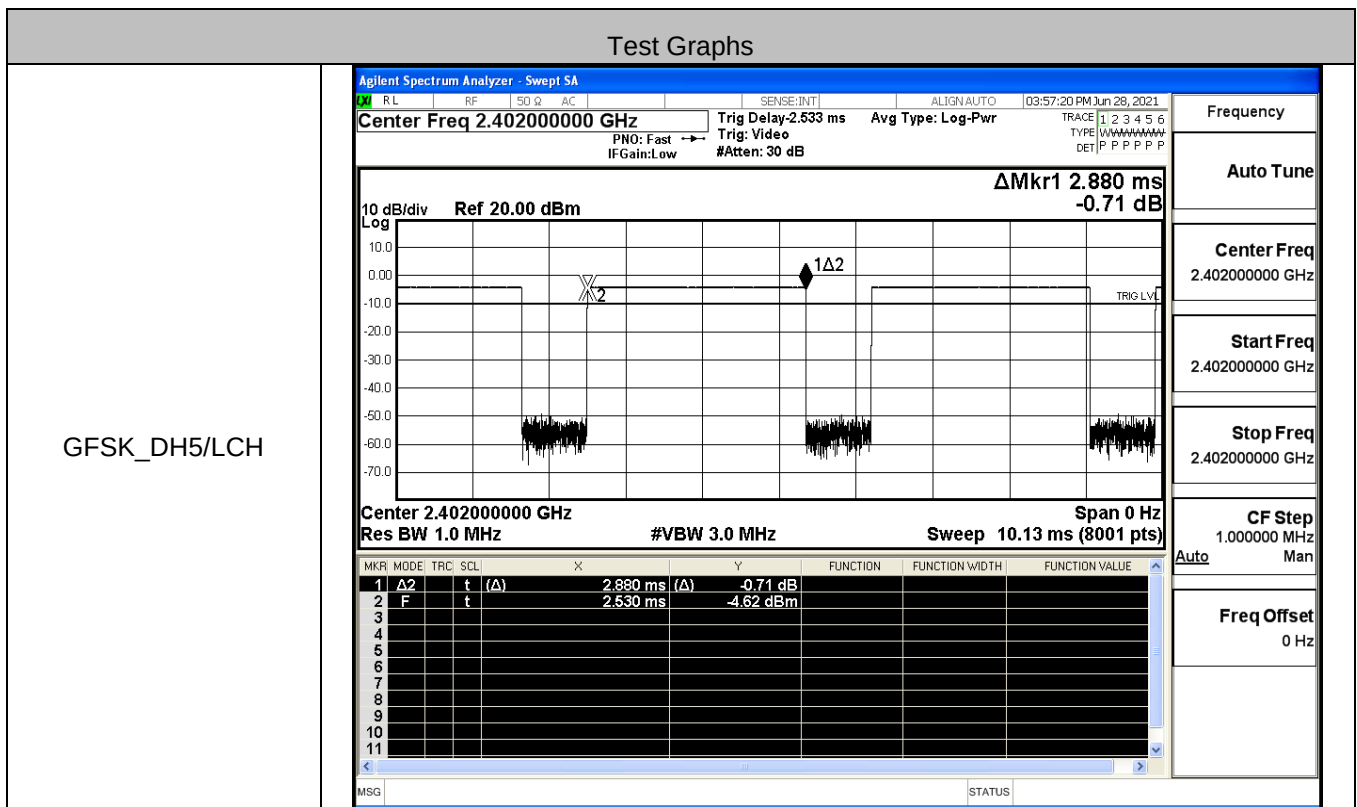
8DPSK/Hop





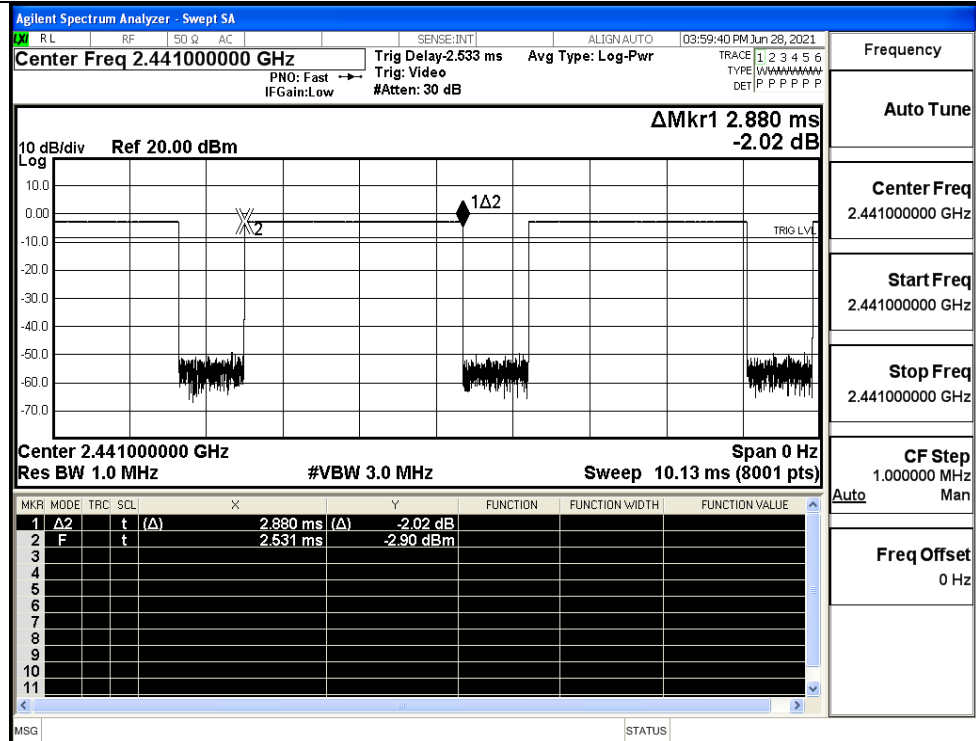
A.5 Dwell Time

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

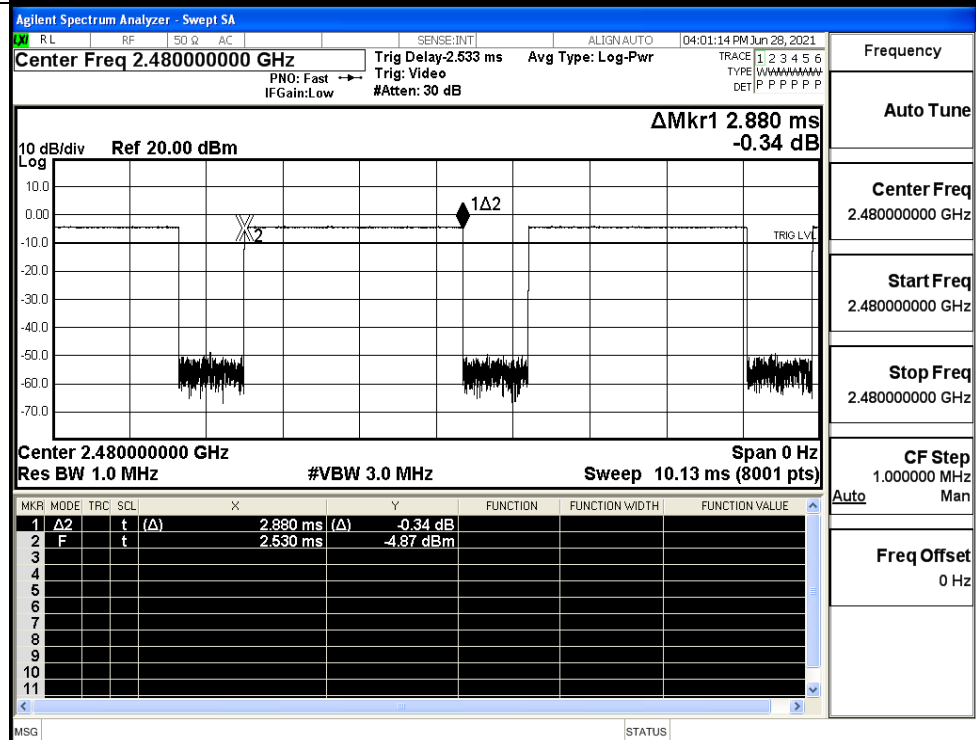




GFSK_DH5/MCH

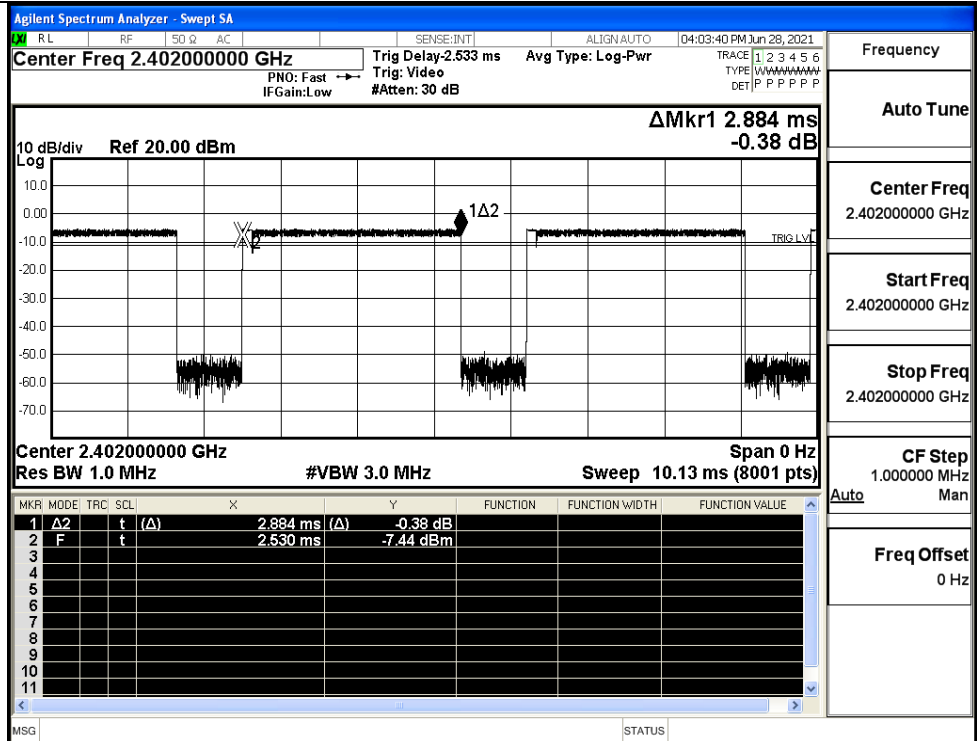


GFSK_DH5/HCH

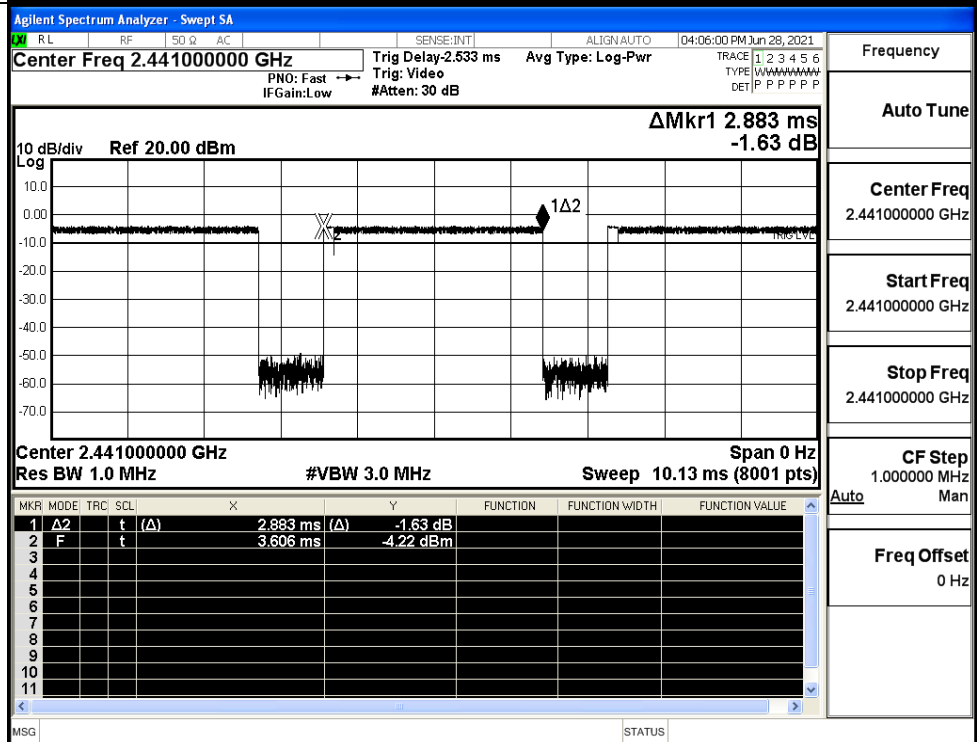




$\pi/4$ DQPSK
_2DH5/LCH

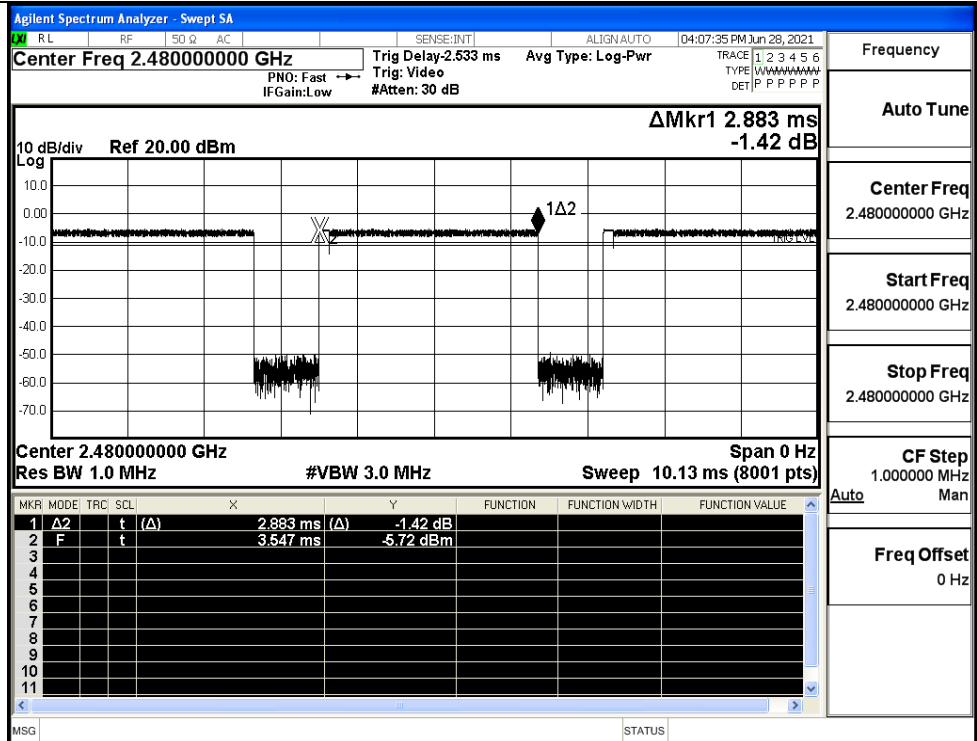


$\pi/4$ DQPSK
_2DH5/MCH

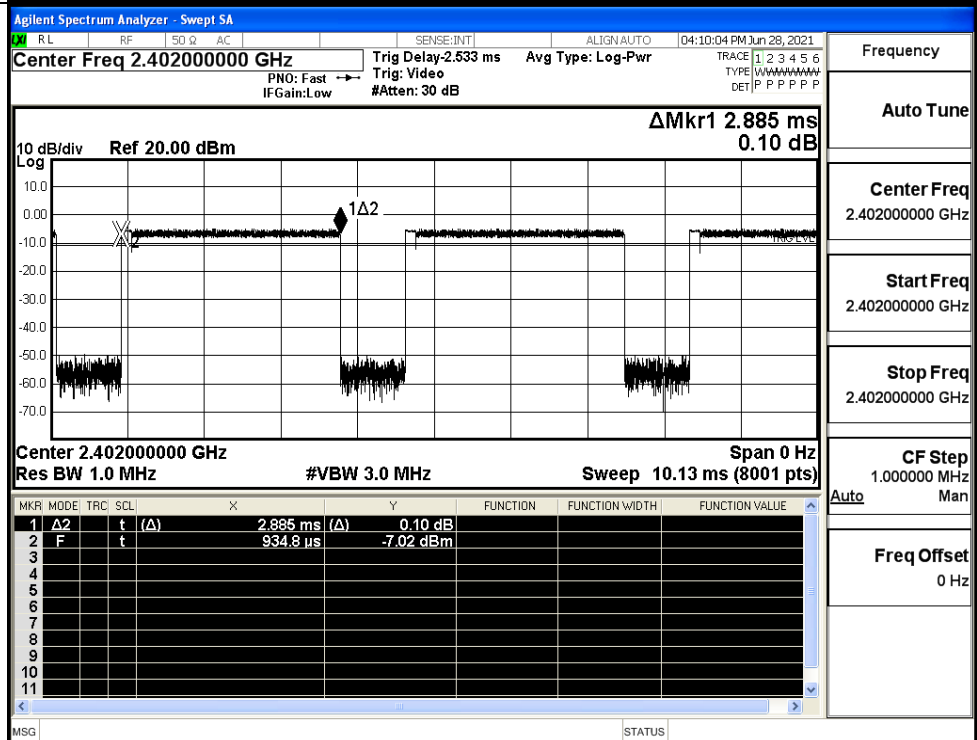




$\pi/4$ DQPSK
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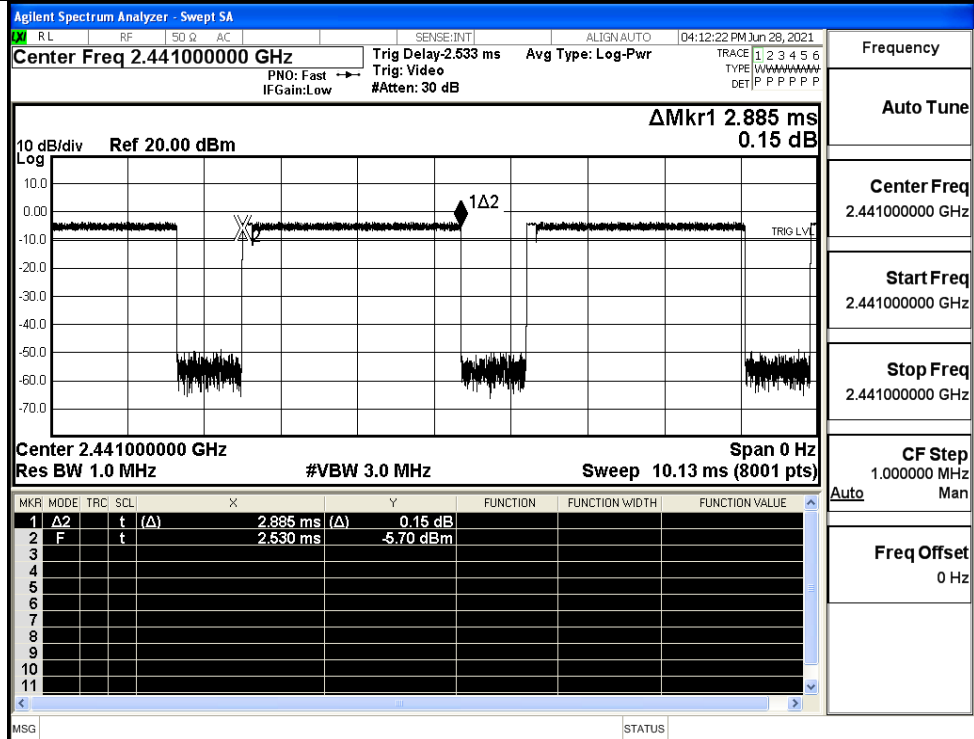


8DPSK _3DH5/LCH

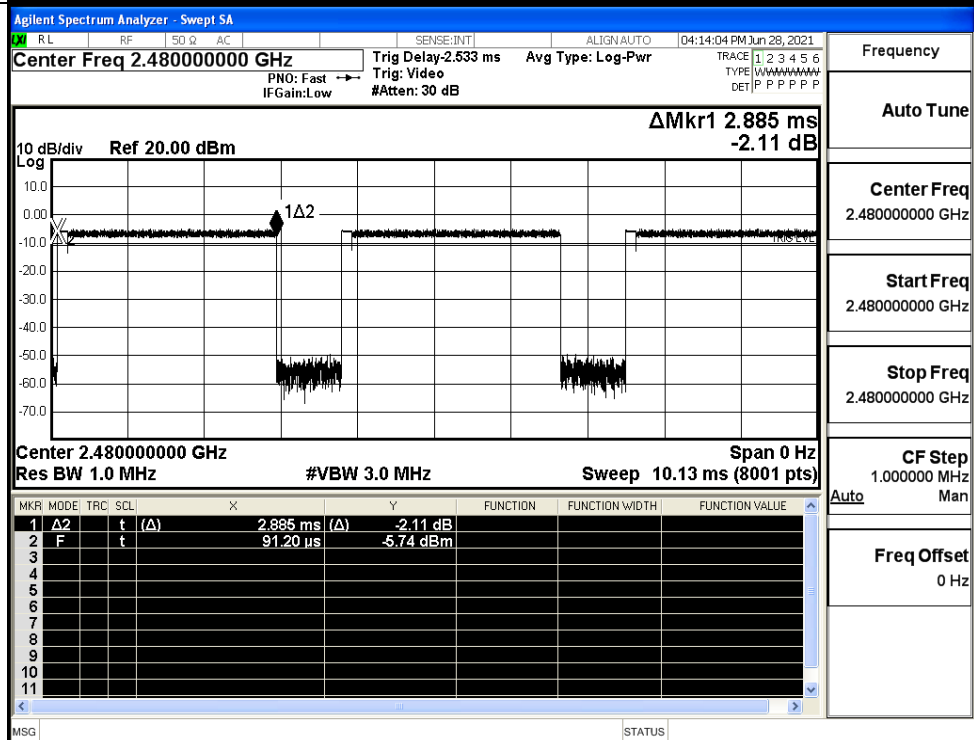




8DPSK_3DH5/MCH



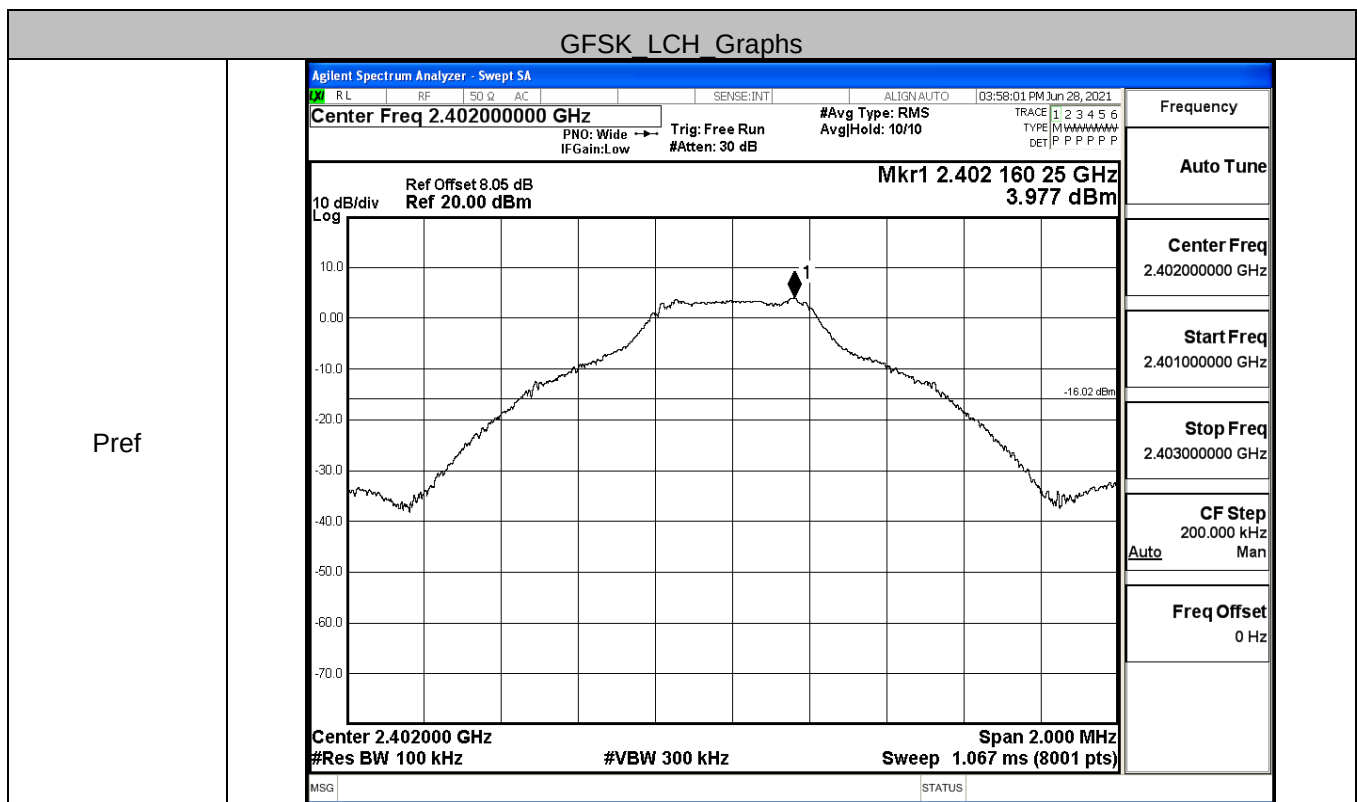
8DPSK_3DH5/HCH





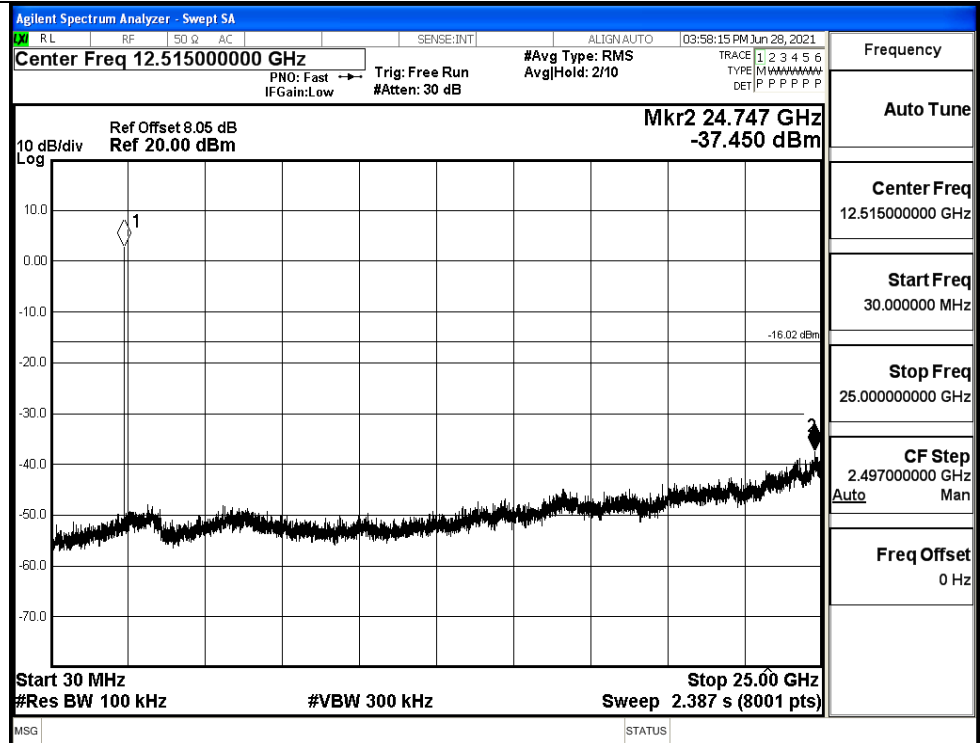
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.977	-37.450	-16.023	PASS
	MCH	5.339	-37.330	-14.661	PASS
	HCH	3.721	-37.829	-16.279	PASS
$\pi/4$ DQPSK	LCH	2.27	-37.792	-17.730	PASS
	MCH	3.83	-37.818	-16.170	PASS
	HCH	2.39	-38.268	-17.610	PASS
8DPSK	LCH	2.273	-38.123	-17.727	PASS
	MCH	3.676	-36.567	-16.324	PASS
	HCH	2.116	-38.002	-17.884	PASS





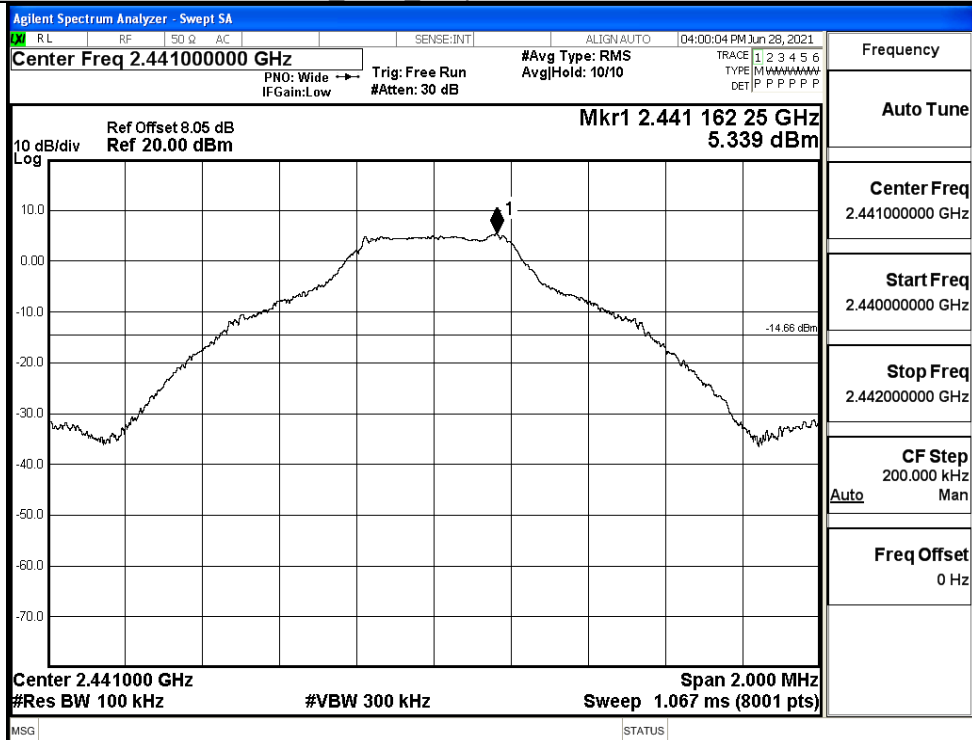
Puw



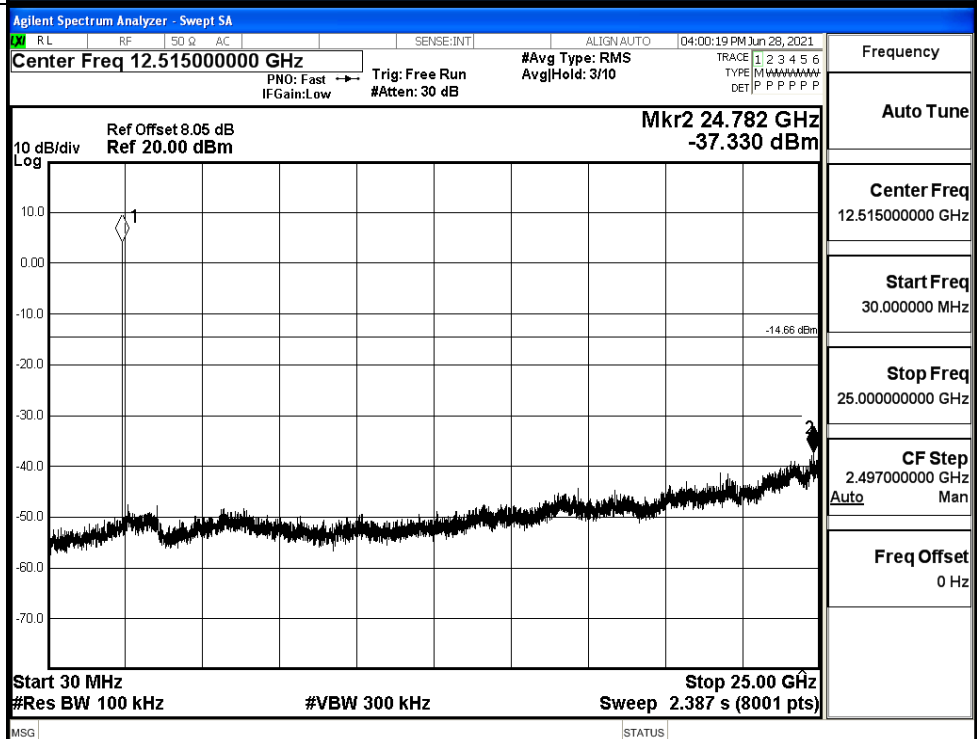


GFSK_MCH_Graphs

Pref



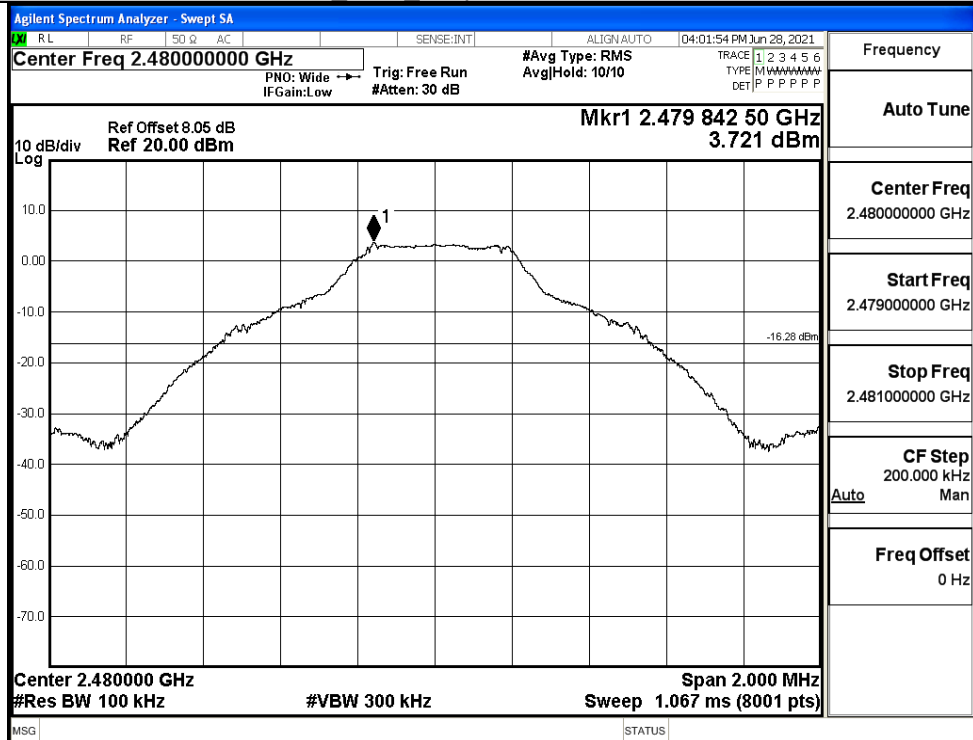
Puw



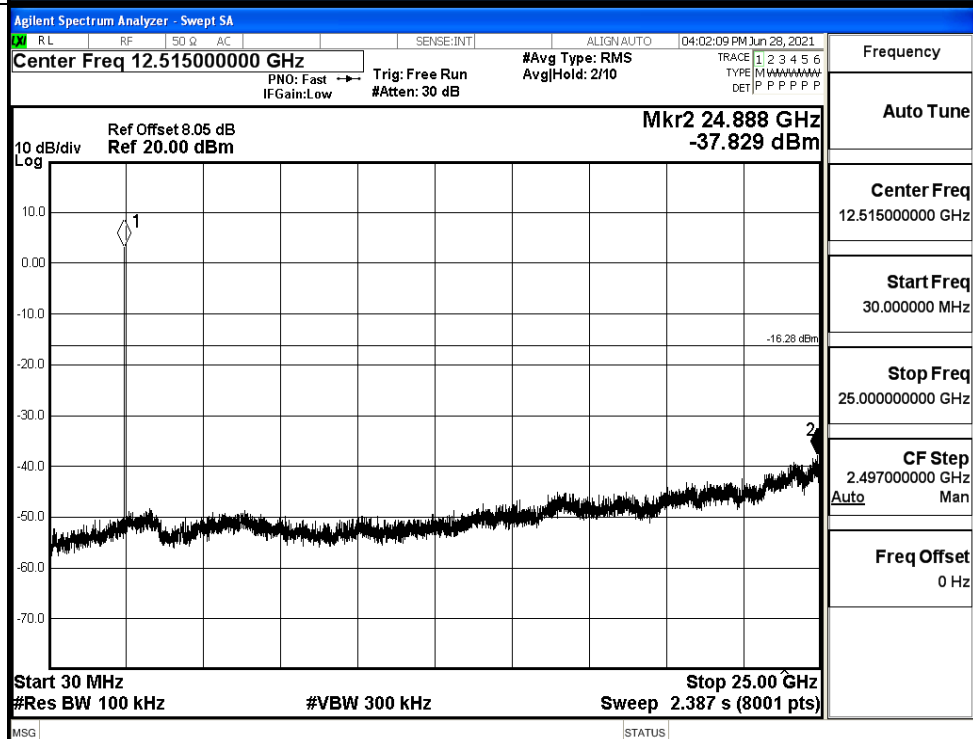


GFSK HCH Graphs

Pref

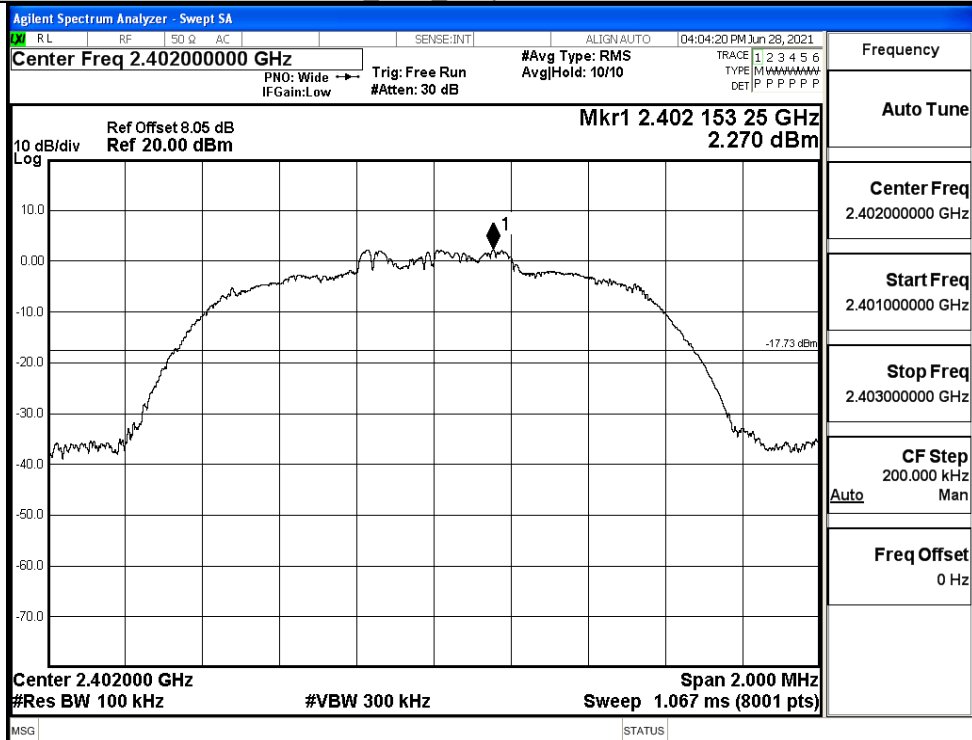


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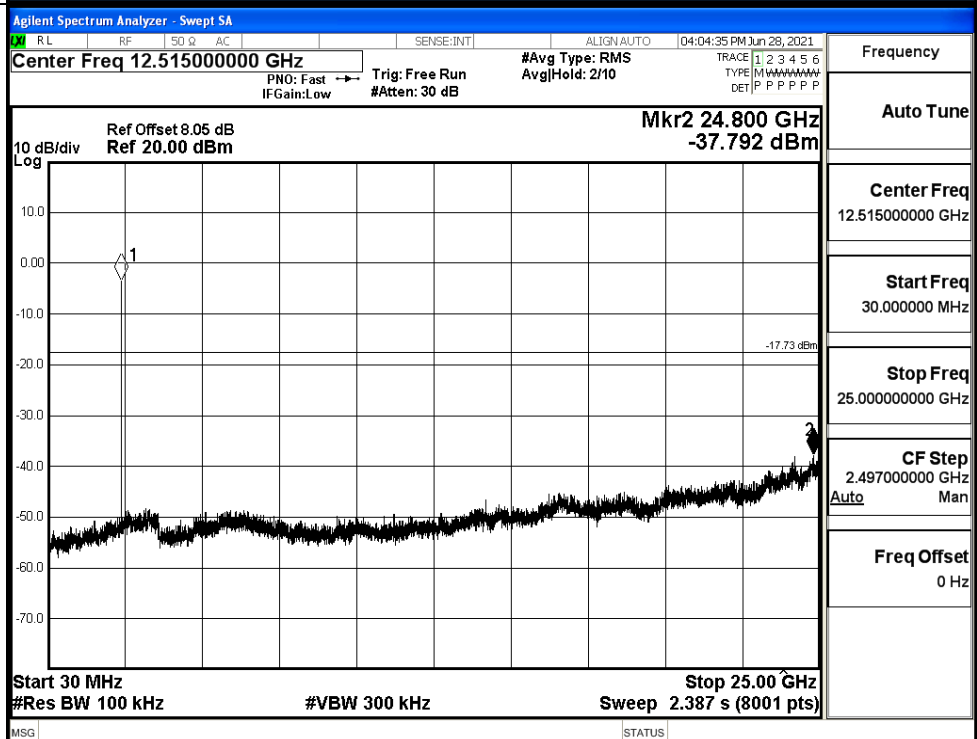


 π /4DQPSK_LCH_Graphs

Pref

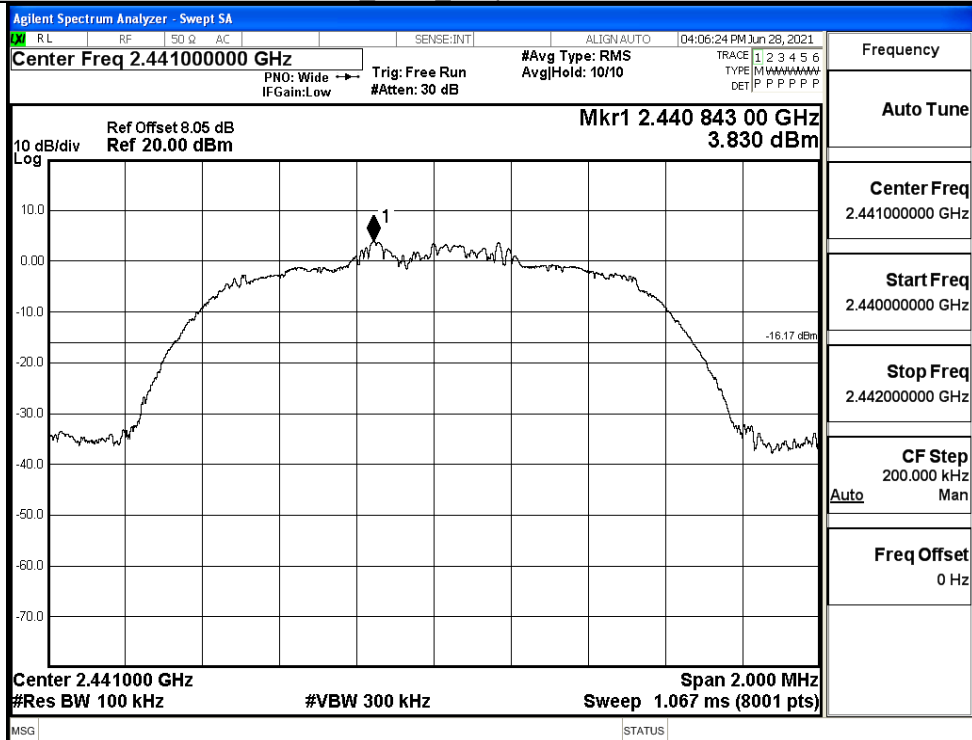


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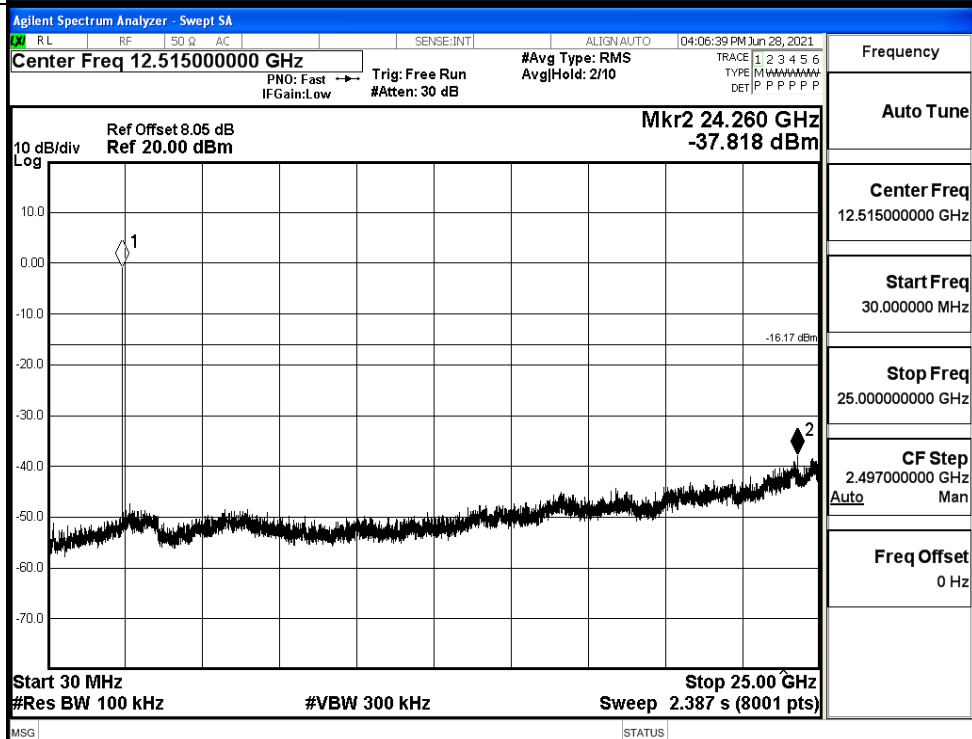


 π /4DQPSK_MCH_Graphs

Pref

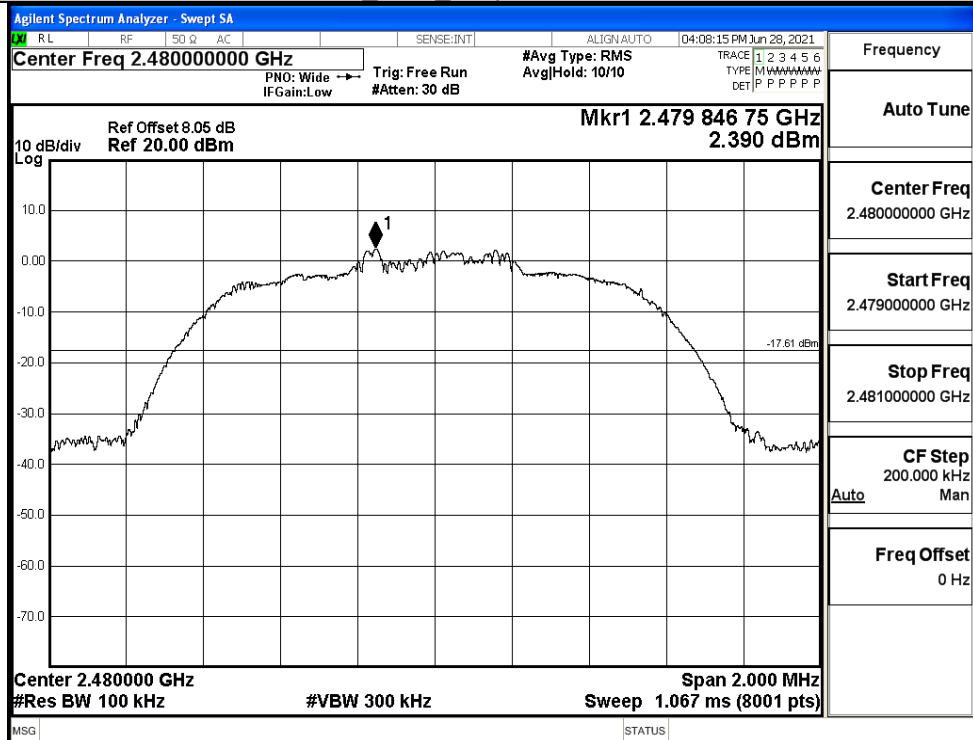


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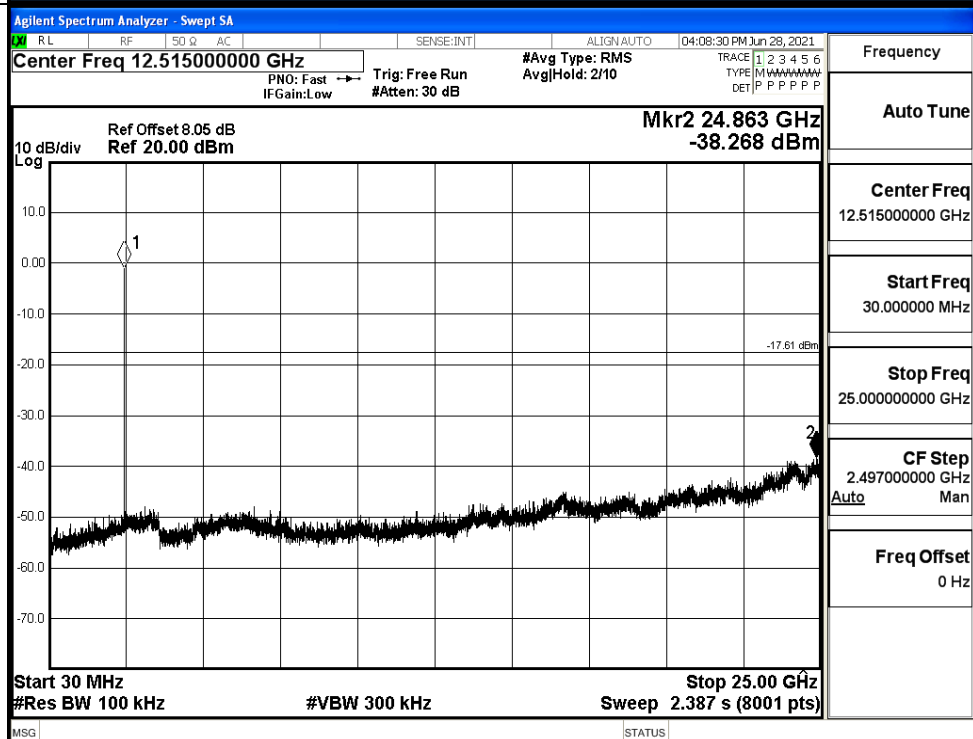


 π /4DQPSK_HCH_Graphs

Pref



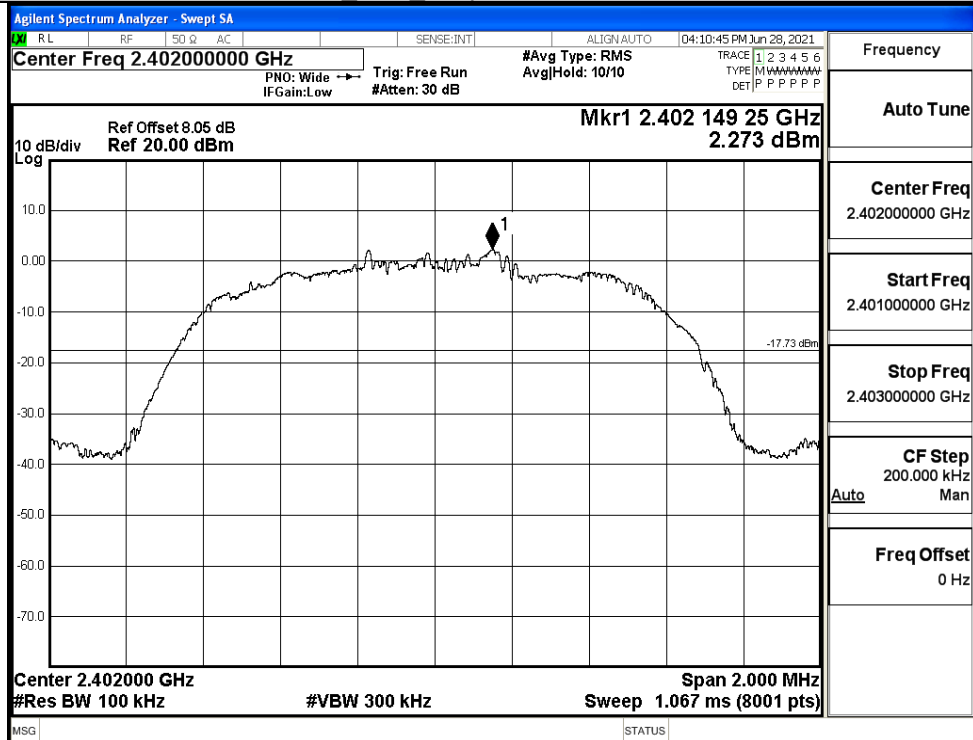
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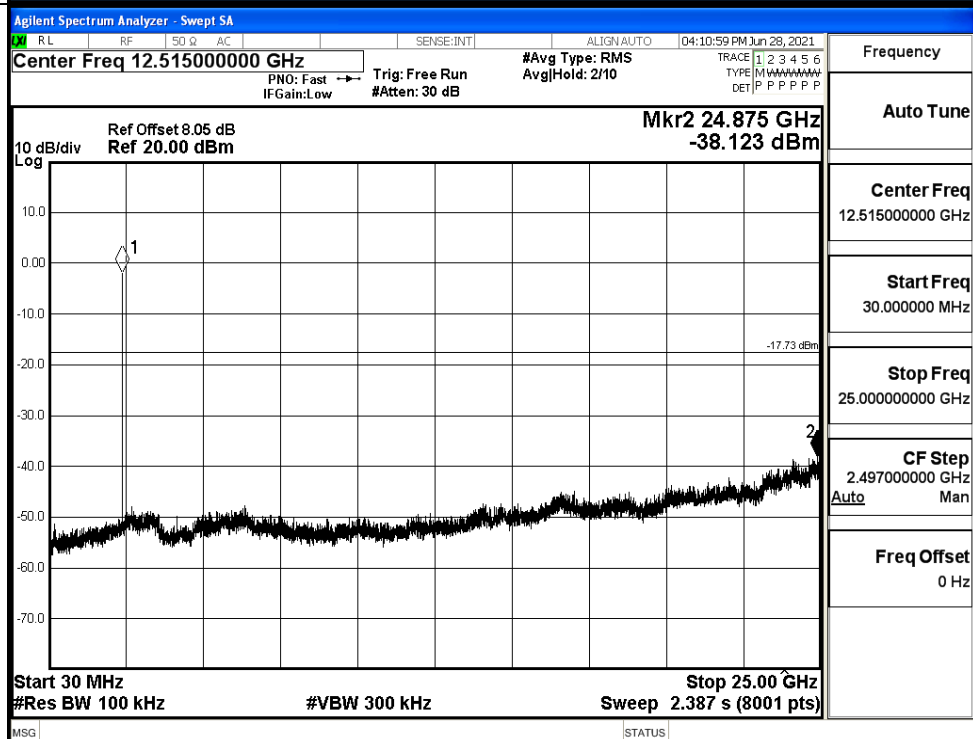


8DPSK_LCH_Graphs

Pref



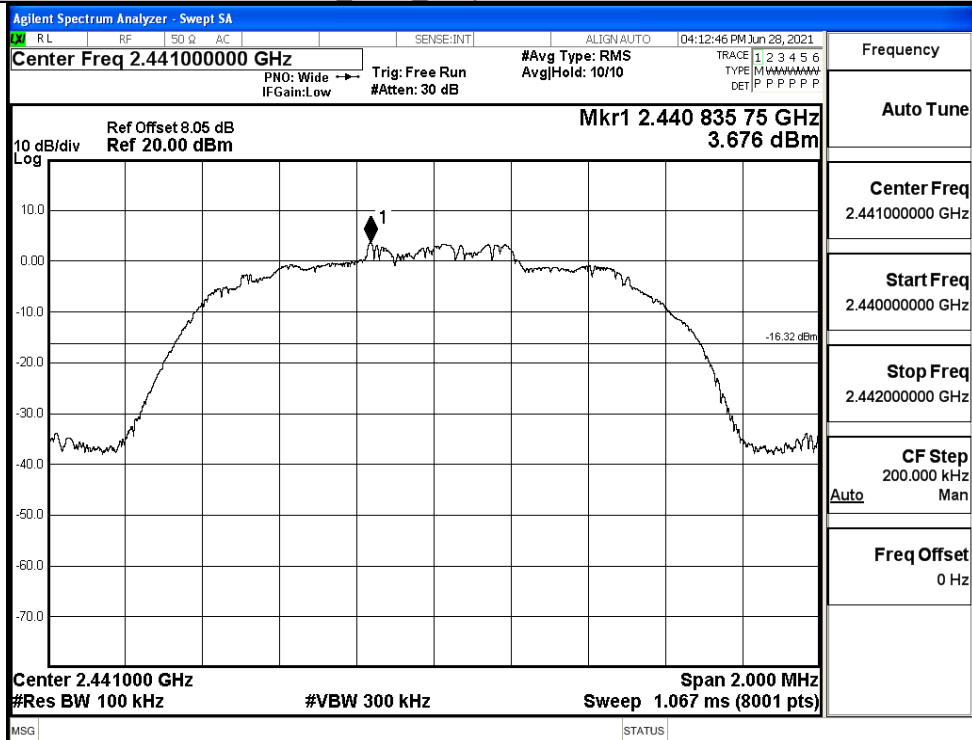
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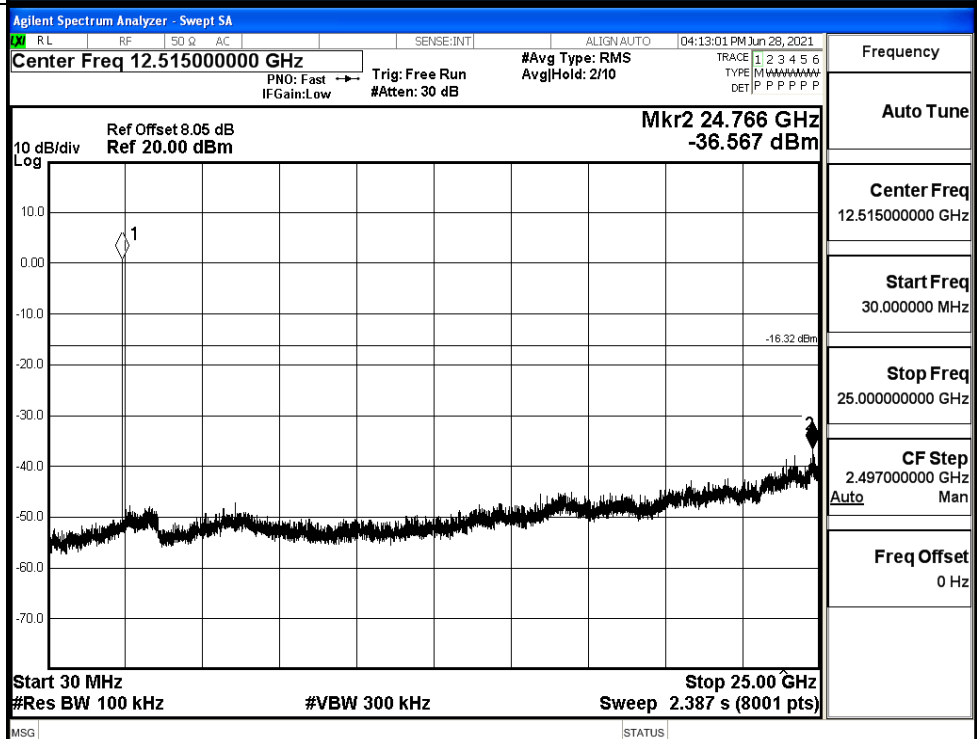


8DPSK_MCH_Graphs

Pref



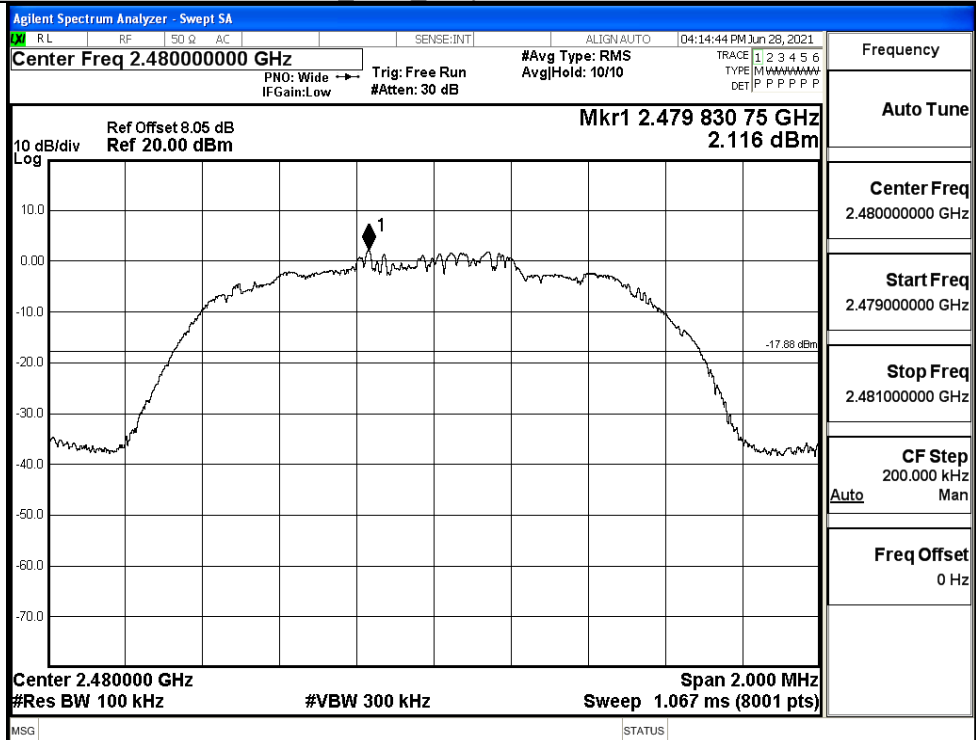
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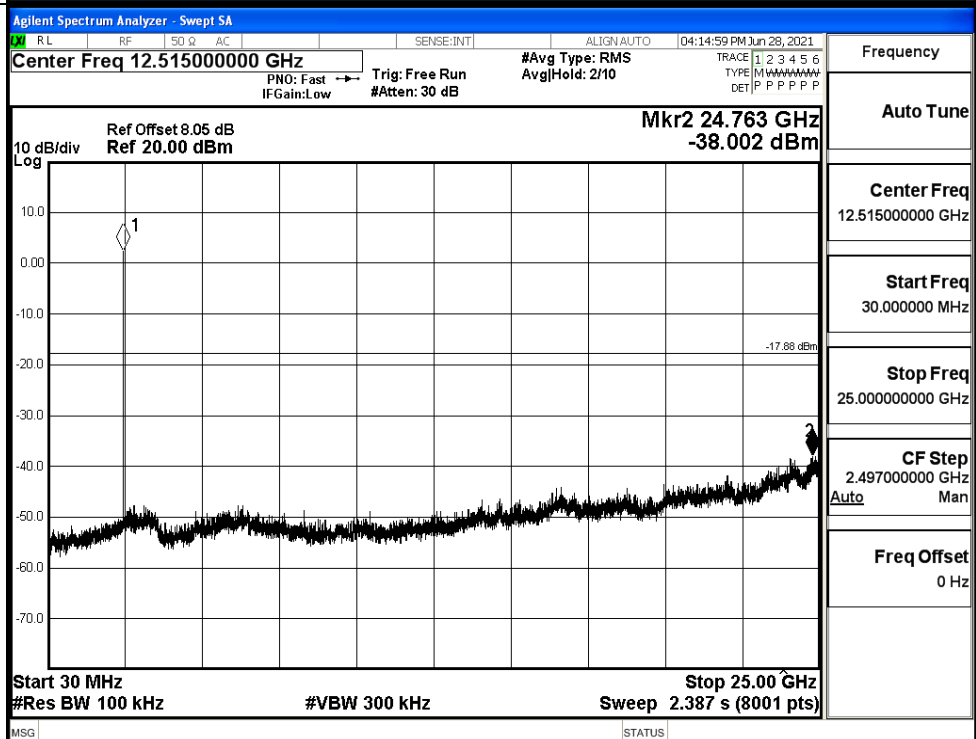


8DPSK_HCH_Graphs

Pref



Puw



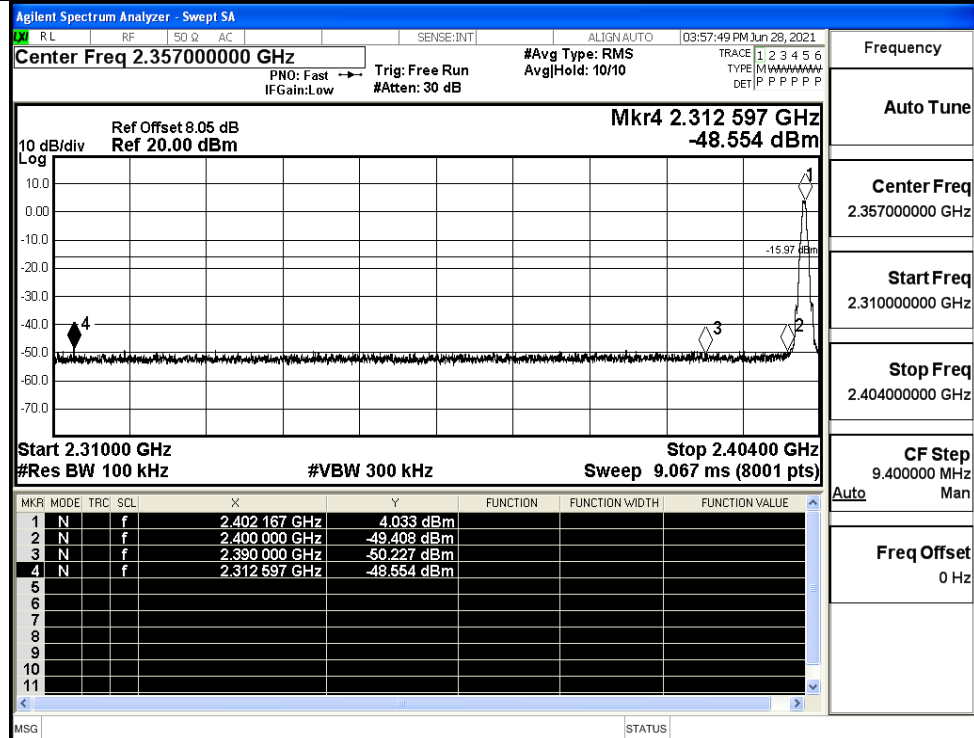
**A.7 Band-edge for RF Conducted Emissions**

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	4.033	Off	-48.554	-15.97	PASS
			4.945	On	-48.297	-15.06	PASS
	HCH	2480	3.616	Off	-48.507	-16.38	PASS
			4.844	On	-48.338	-15.16	PASS
$\pi/4$ DQPSK	LCH	2402	2.438	Off	-48.877	-17.56	PASS
			3.496	On	-48.811	-16.5	PASS
	HCH	2480	2.275	Off	-48.442	-17.73	PASS
			6.497	On	-47.528	-13.5	PASS
8DPSK	LCH	2402	2.569	Off	-49.487	-17.43	PASS
			6.333	On	-48.574	-13.67	PASS
	HCH	2480	2.082	Off	-48.414	-17.92	PASS
			6.366	On	-47.509	-13.63	PASS

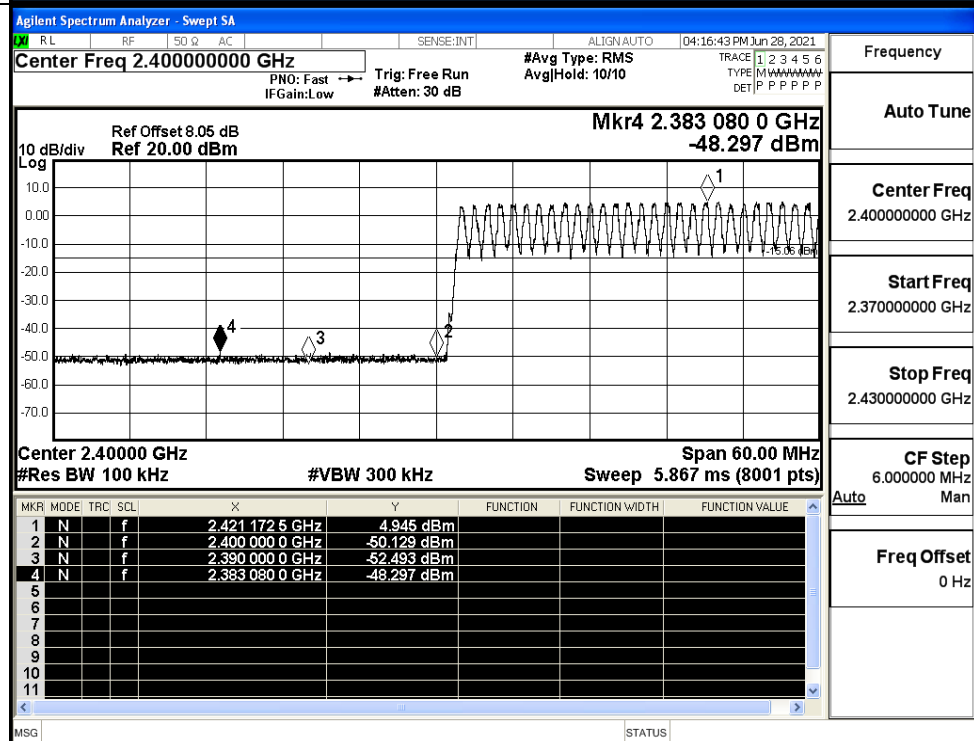


Test Graphs

GFSK/LCH/No Hop

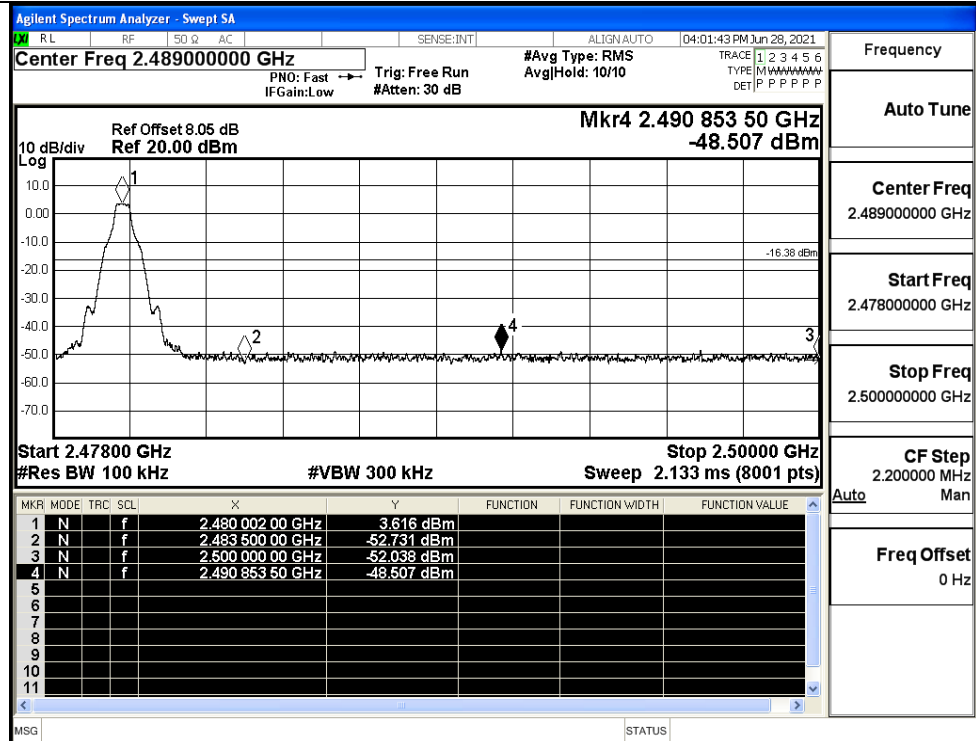


GFSK/LCH/Hop

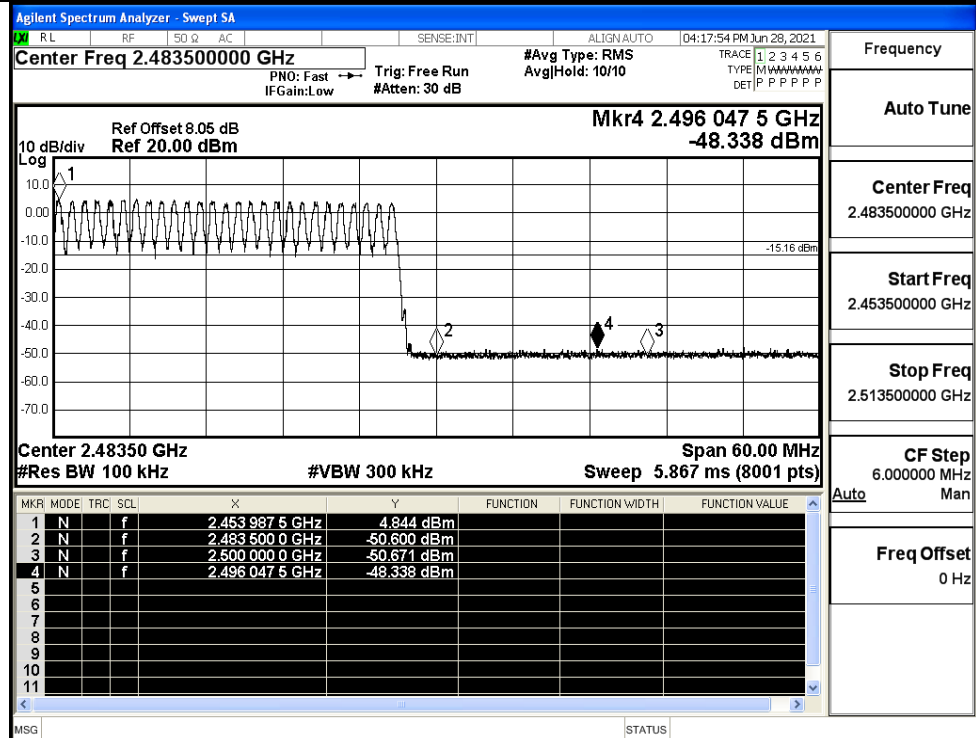




GFSK/HCH/No Hop

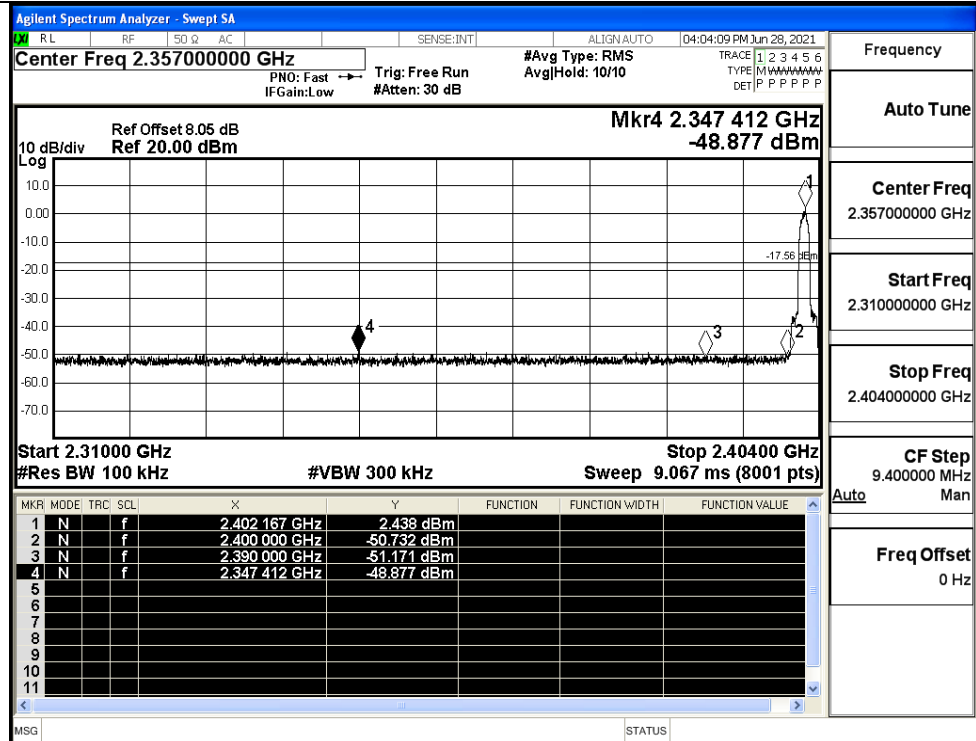


GFSK/HCH/Hop





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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

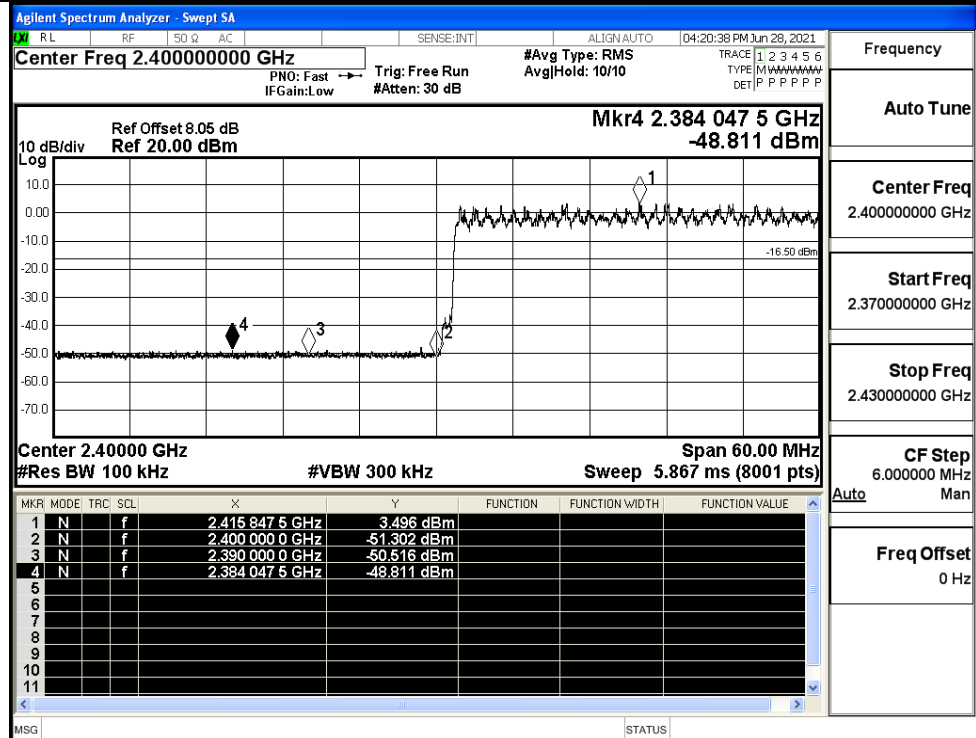
Start Freq
2.310000000 GHz

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

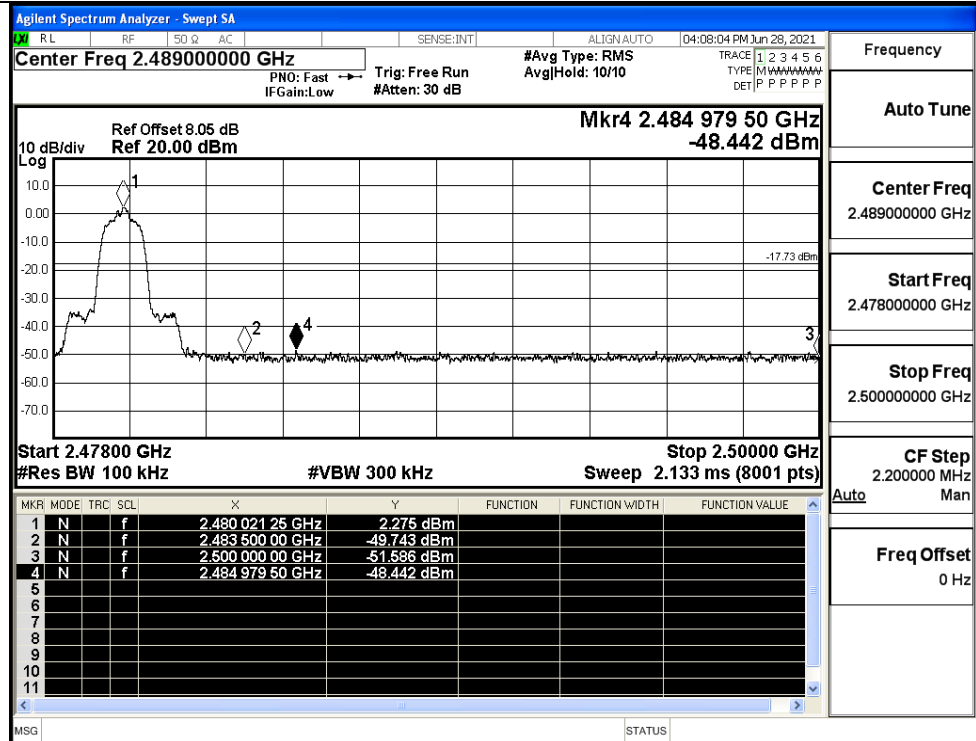
Stop Freq
2.430000000 GHz

CF Step
6.000000 MHz
Auto Man

Freq Offset
0 Hz



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



Frequency

Auto Tune

Center Freq
2.489000000 GHz

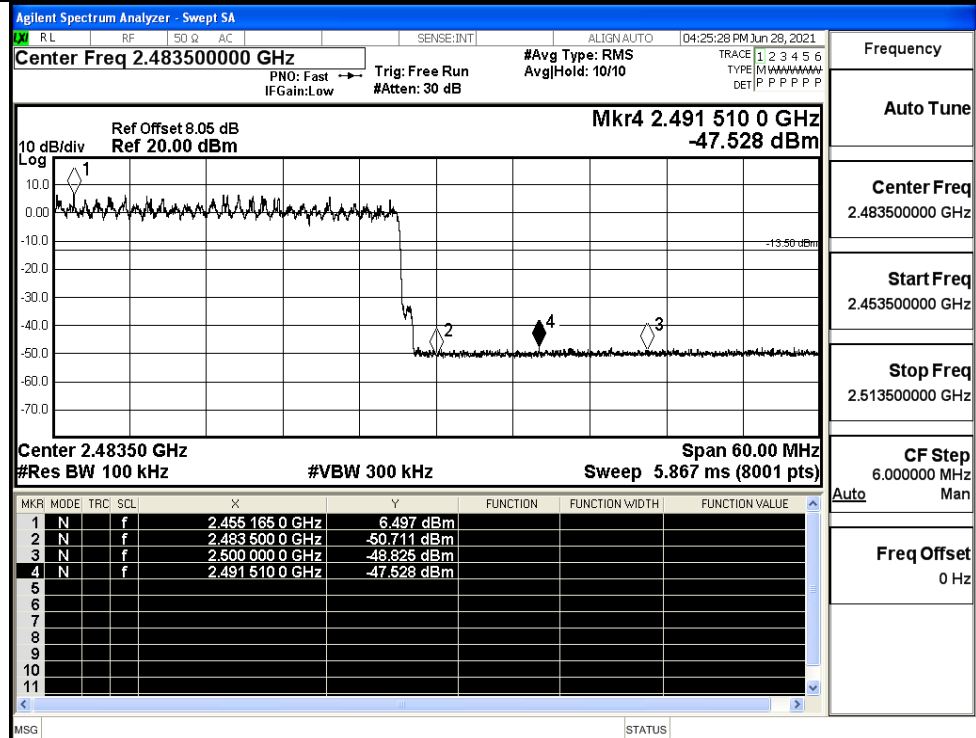
Start Freq
2.478000000 GHz

Stop Freq
2.500000000 GHz

CF Step
2.200000 MHz

Freq Offset
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

Auto Tune

Center Freq
2.483500000 GHz

Start Freq
2.453500000 GHz

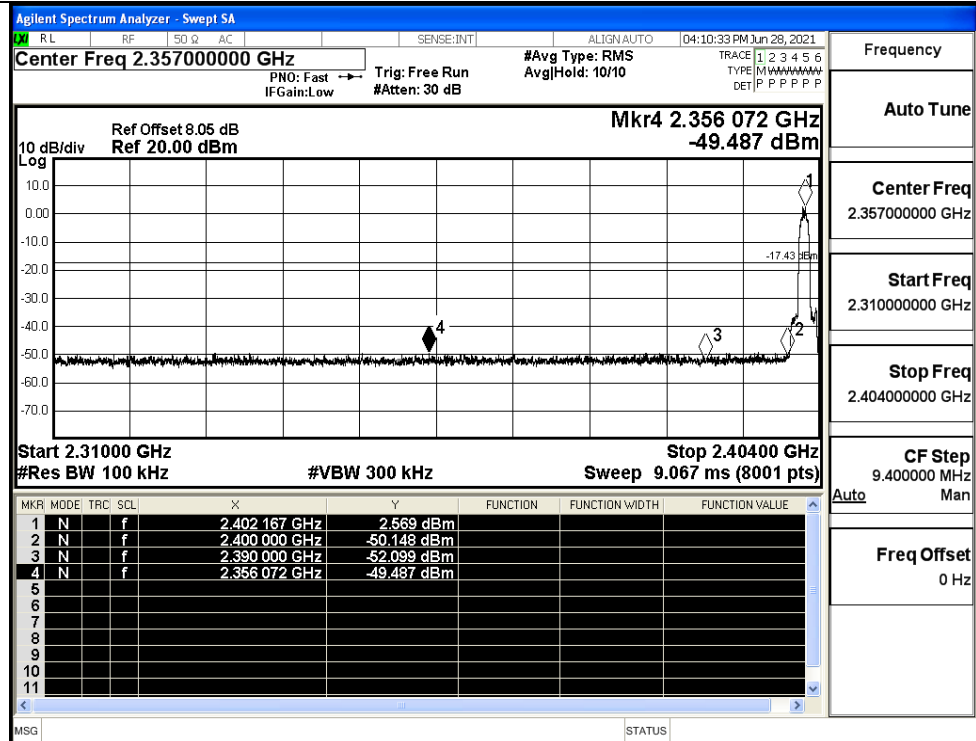
Stop Freq
2.513500000 GHz

CF Step
6.000000 MHz

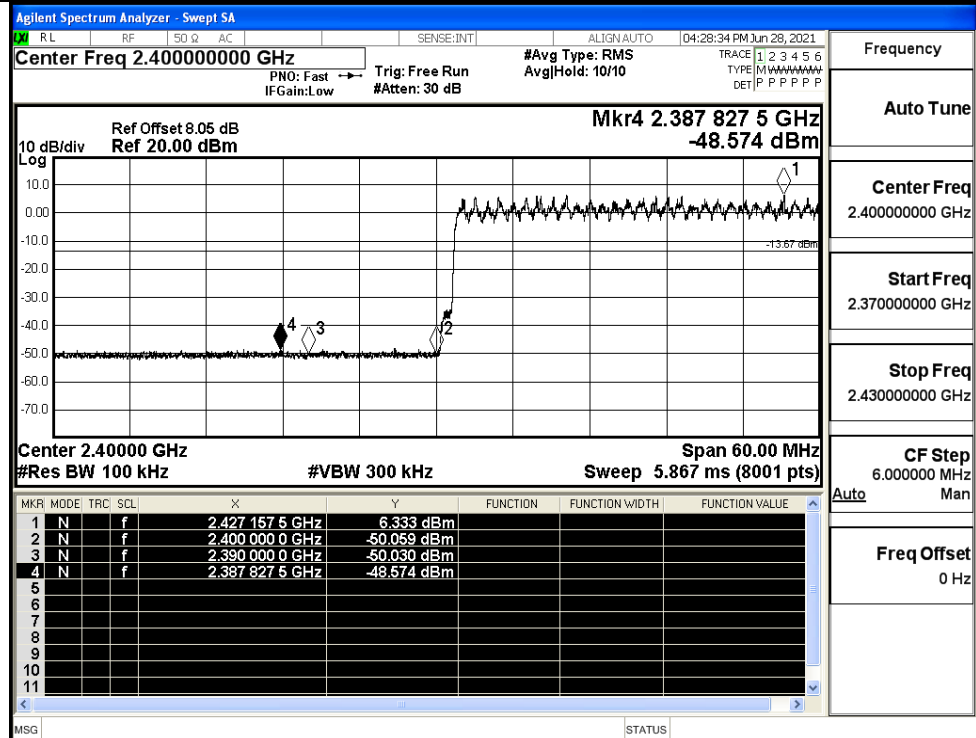
Freq Offset
0 Hz



8DPSK/LCH/No Hop

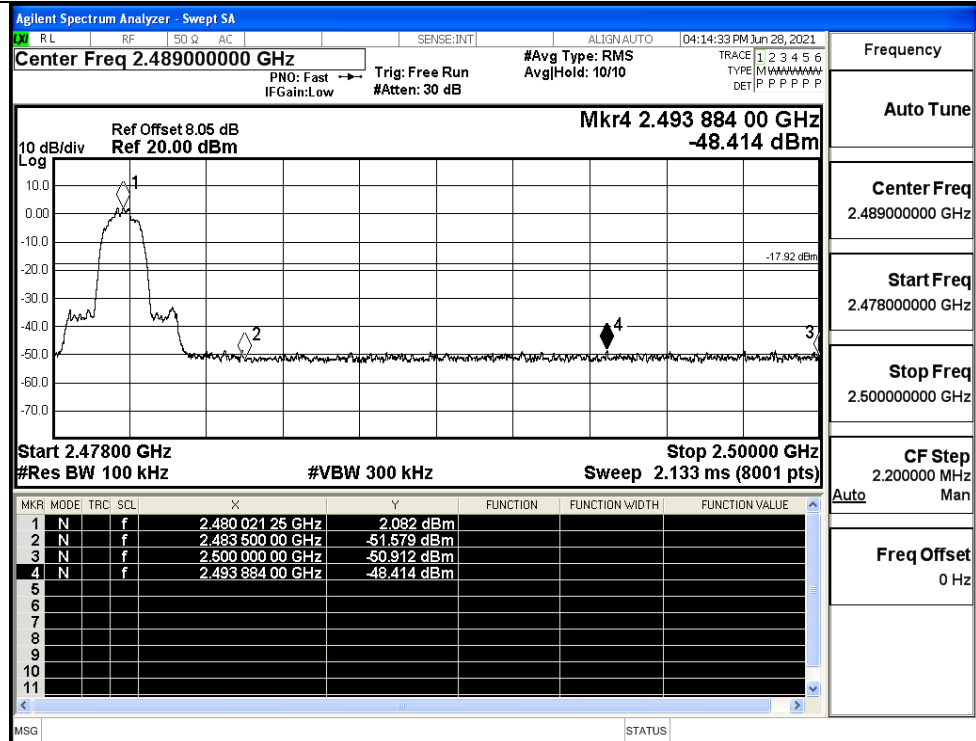


8DPSK/LCH/Hop

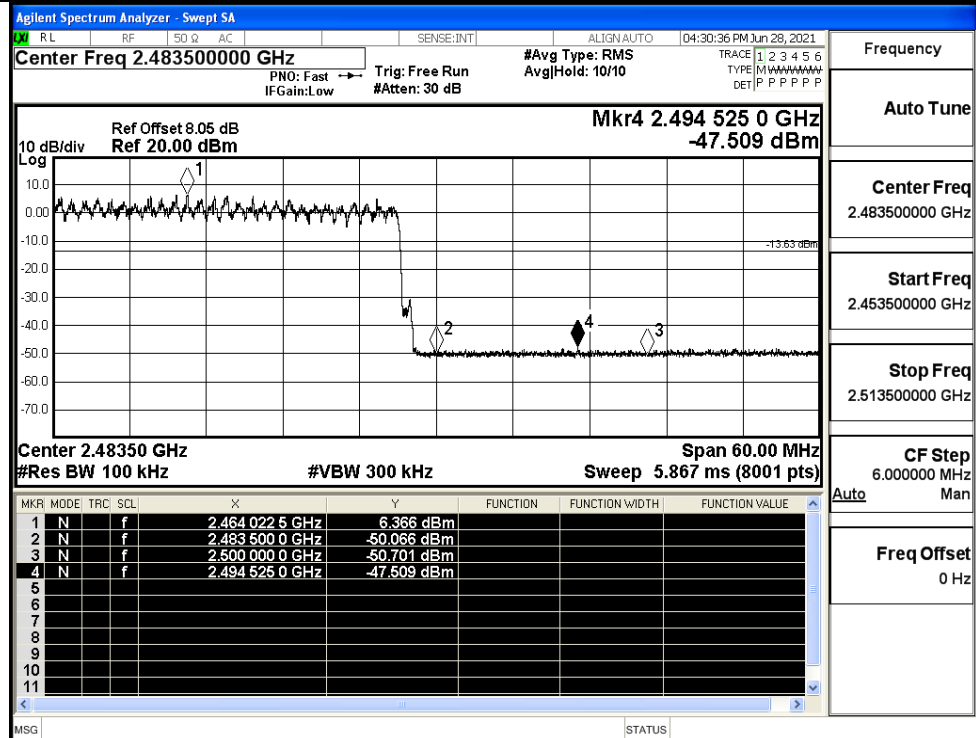




8DPSK/HCH/No Hop



8DPSK/HCH/Hop

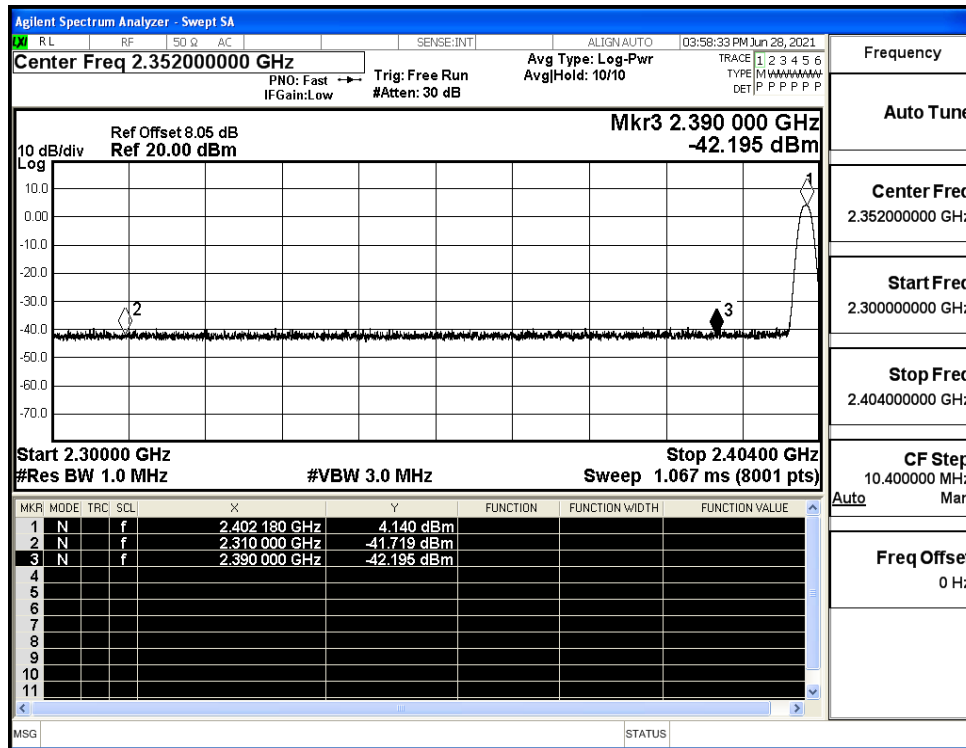


**A.8 Restrict-band band-edge measurements**

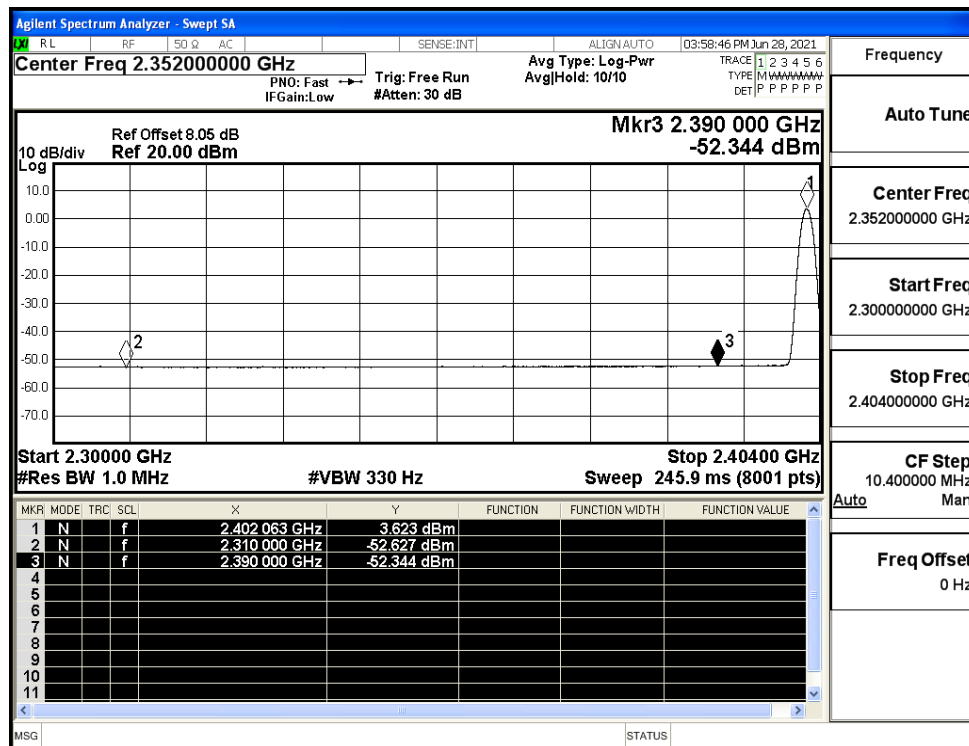
Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-41.72	2.0	0	55.54	PEAK	74	PASS
	Off	2310.0	-52.63	2.0	0	44.63	AV	54	PASS
	Off	2390.0	-42.20	2.0	0	55.06	PEAK	74	PASS
	Off	2390.0	-52.34	2.0	0	44.92	AV	54	PASS
	Off	2483.5	-40.94	2.0	0	56.32	PEAK	74	PASS
	Off	2483.5	-51.78	2.0	0	45.48	AV	54	PASS
	Off	2500.0	-41.54	2.0	0	55.72	PEAK	74	PASS
	Off	2500.0	-51.69	2.0	0	45.57	AV	54	PASS
$\pi/4$ DQPSK	Off	2310.0	-42.00	2.0	0	55.26	PEAK	74	PASS
	Off	2310.0	-52.70	2.0	0	44.56	AV	54	PASS
	Off	2390.0	-40.45	2.0	0	56.81	PEAK	74	PASS
	Off	2390.0	-52.27	2.0	0	44.99	AV	54	PASS
	Off	2483.5	-41.64	2.0	0	55.62	PEAK	74	PASS
	Off	2483.5	-51.67	2.0	0	45.59	AV	54	PASS
	Off	2500.0	-40.75	2.0	0	56.51	PEAK	74	PASS
	Off	2500.0	-51.67	2.0	0	45.59	AV	54	PASS
8DPSK	Off	2310.0	-41.81	2.0	0	55.45	PEAK	74	PASS
	Off	2310.0	-52.70	2.0	0	44.56	AV	54	PASS
	Off	2390.0	-43.37	2.0	0	53.89	PEAK	74	PASS
	Off	2390.0	-52.31	2.0	0	44.95	AV	54	PASS
	Off	2483.5	-41.82	2.0	0	55.44	PEAK	74	PASS
	Off	2483.5	-51.70	2.0	0	45.56	AV	54	PASS
	Off	2500.0	-42.27	2.0	0	54.99	PEAK	74	PASS
	Off	2500.0	-51.64	2.0	0	45.62	AV	54	PASS



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

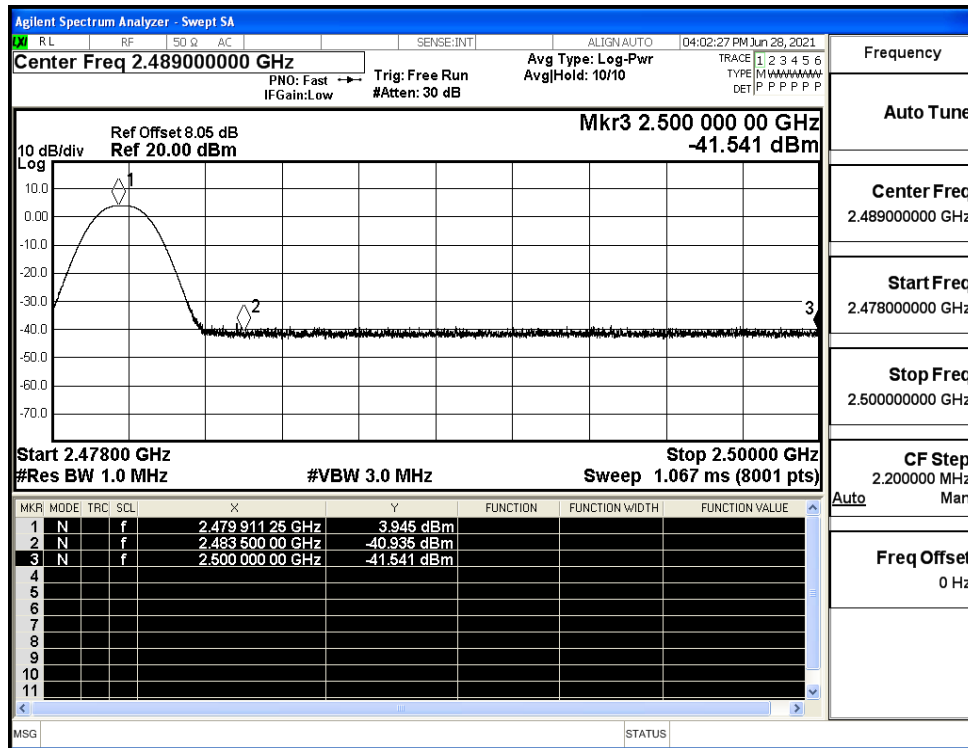


Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

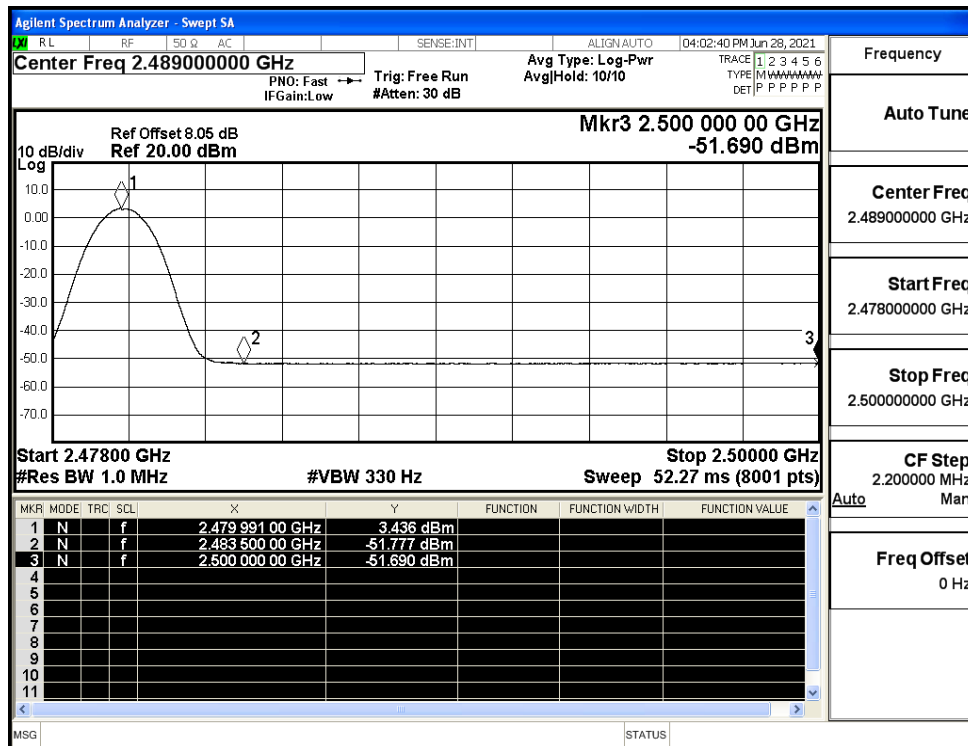


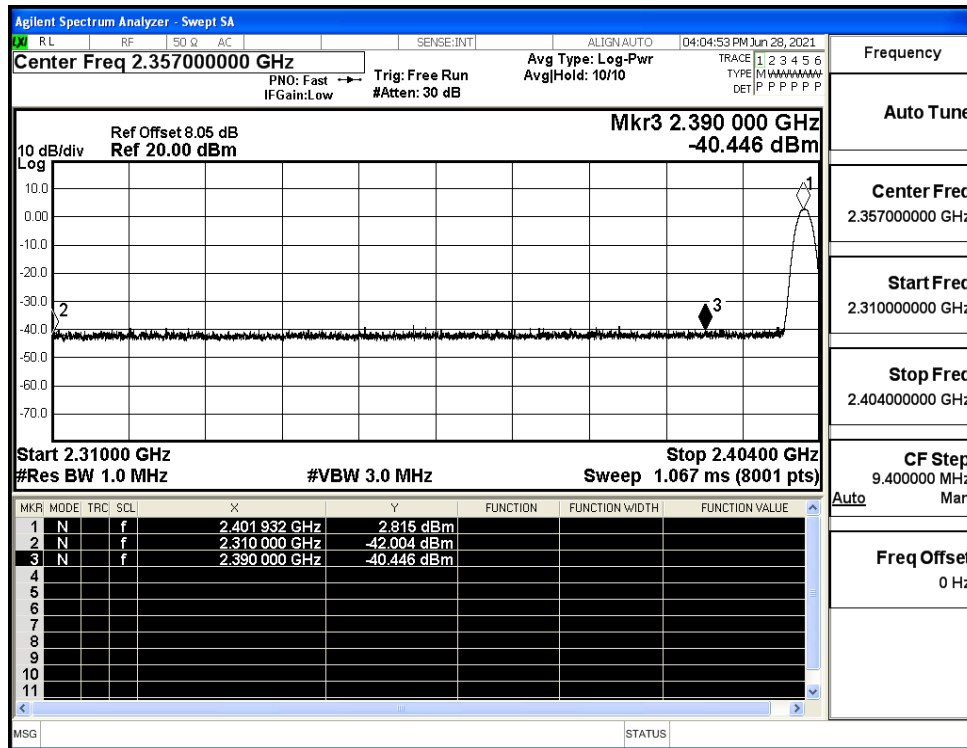
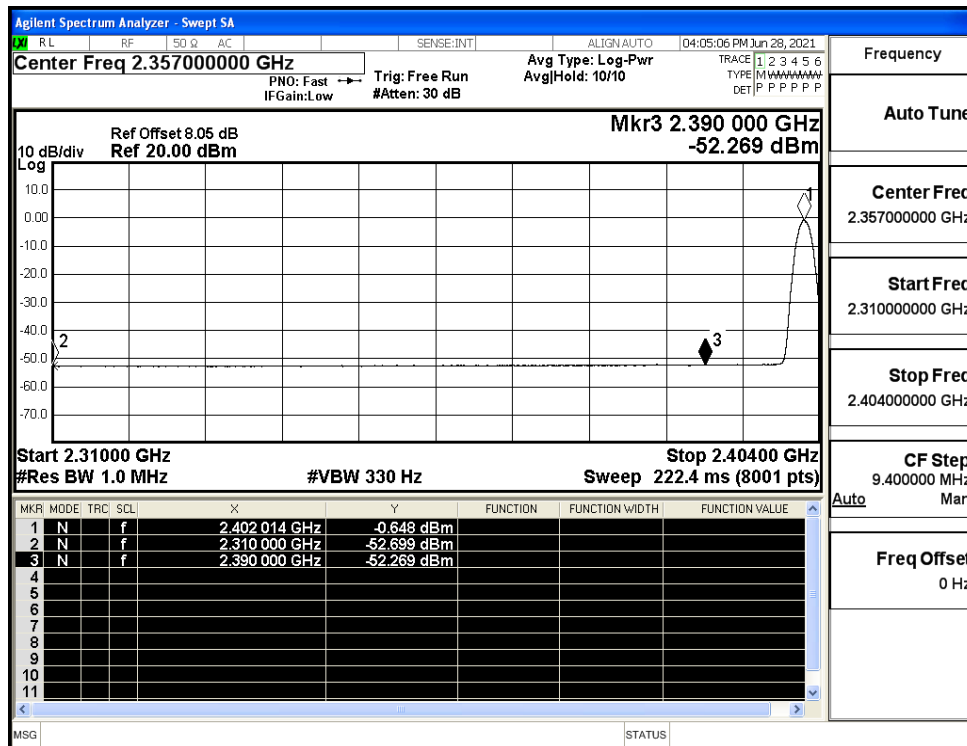


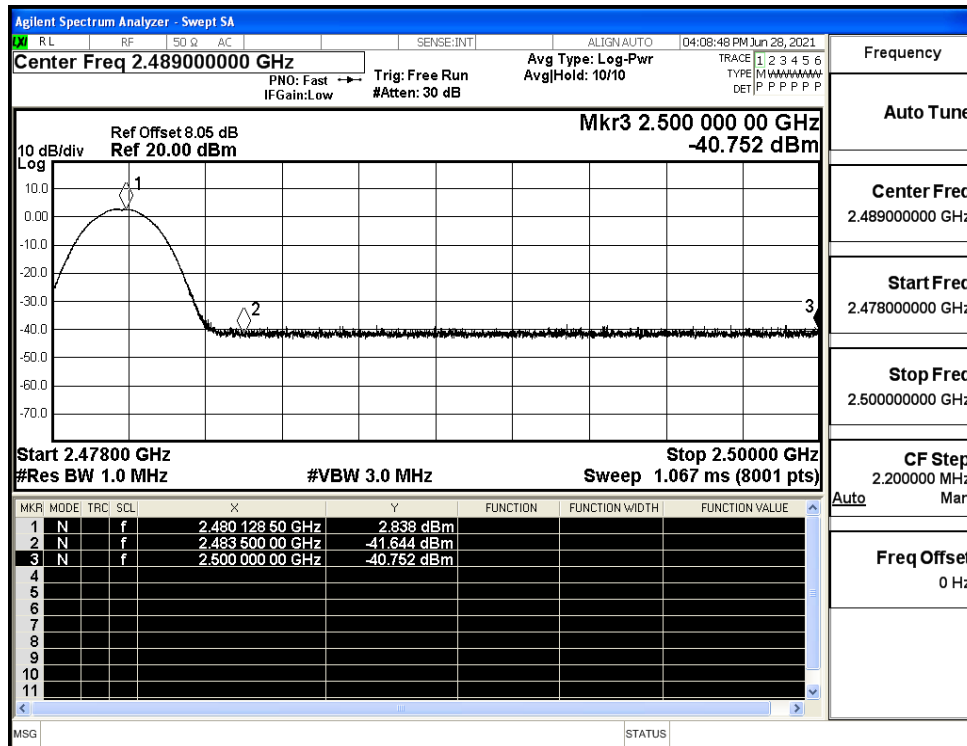
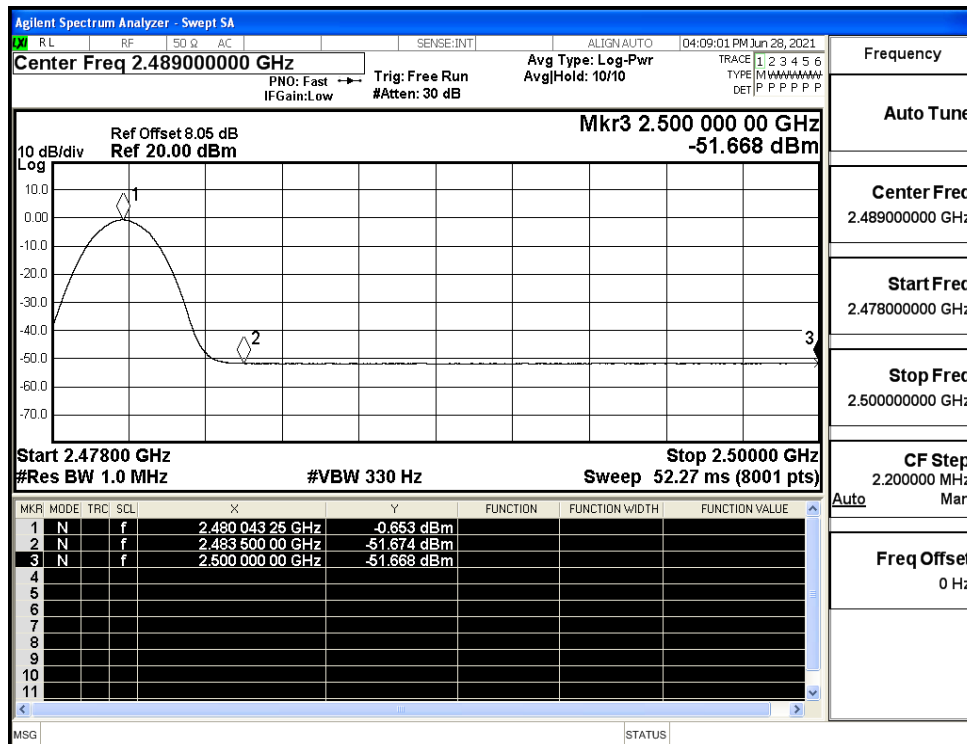
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



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

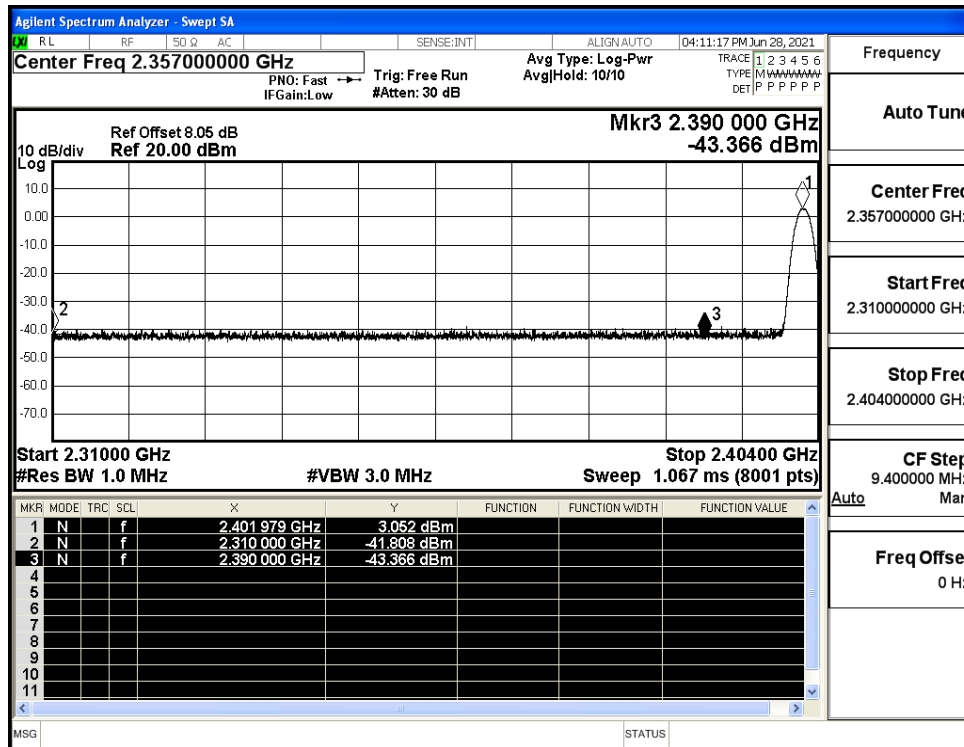


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

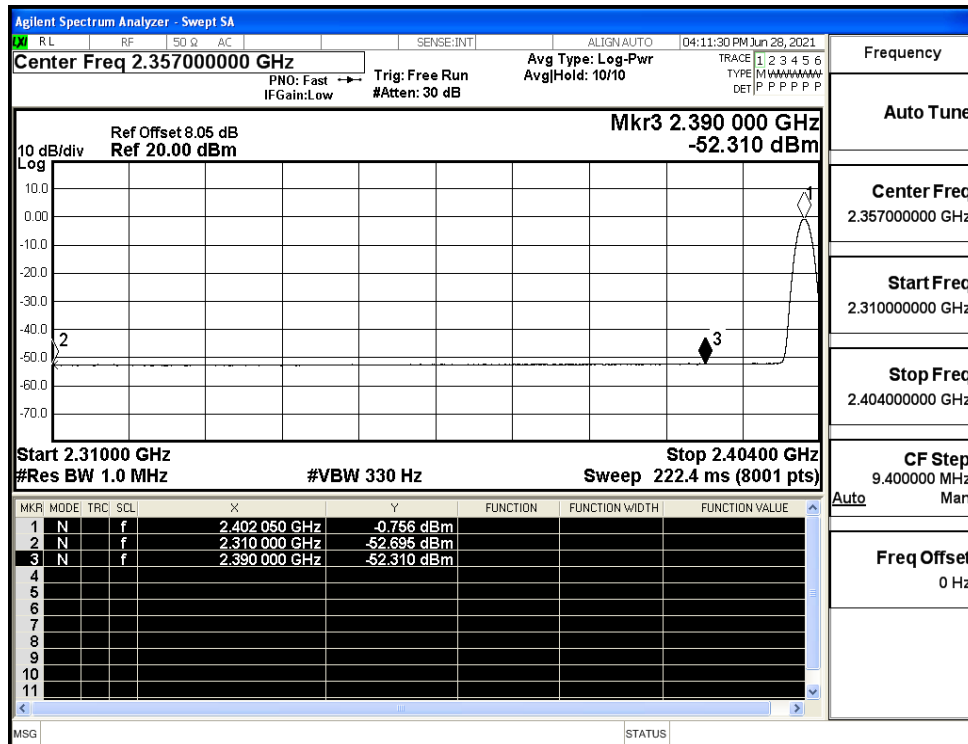
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (High Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (High Channel)



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

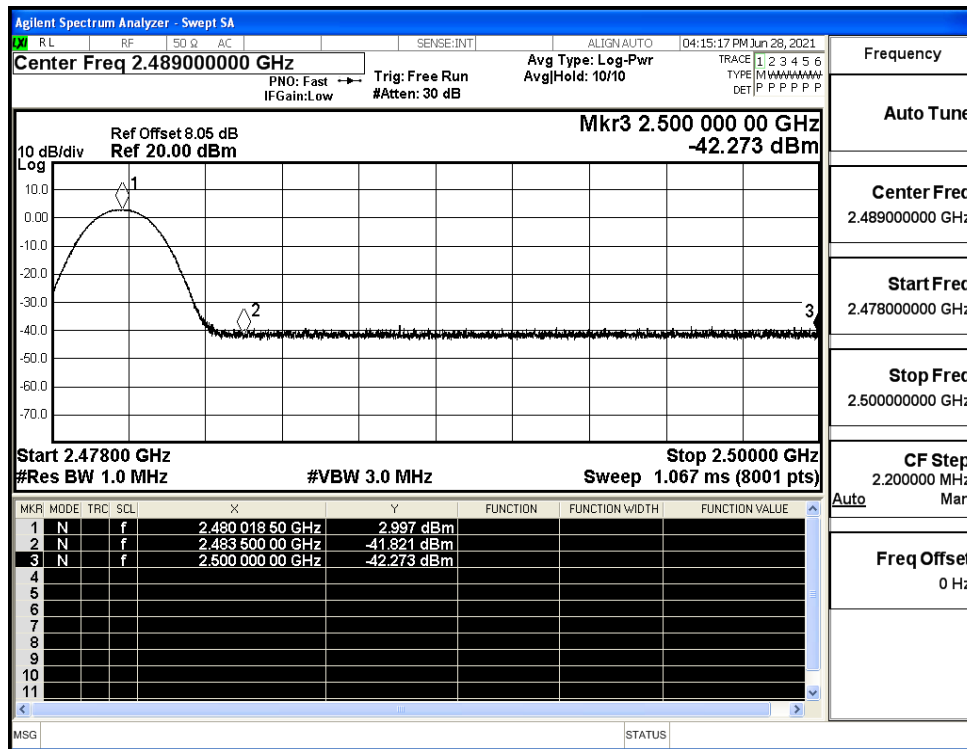


Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)





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



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)

