Appendix A

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

Product Name: Smart shopping cart

Trade Mark: Caper

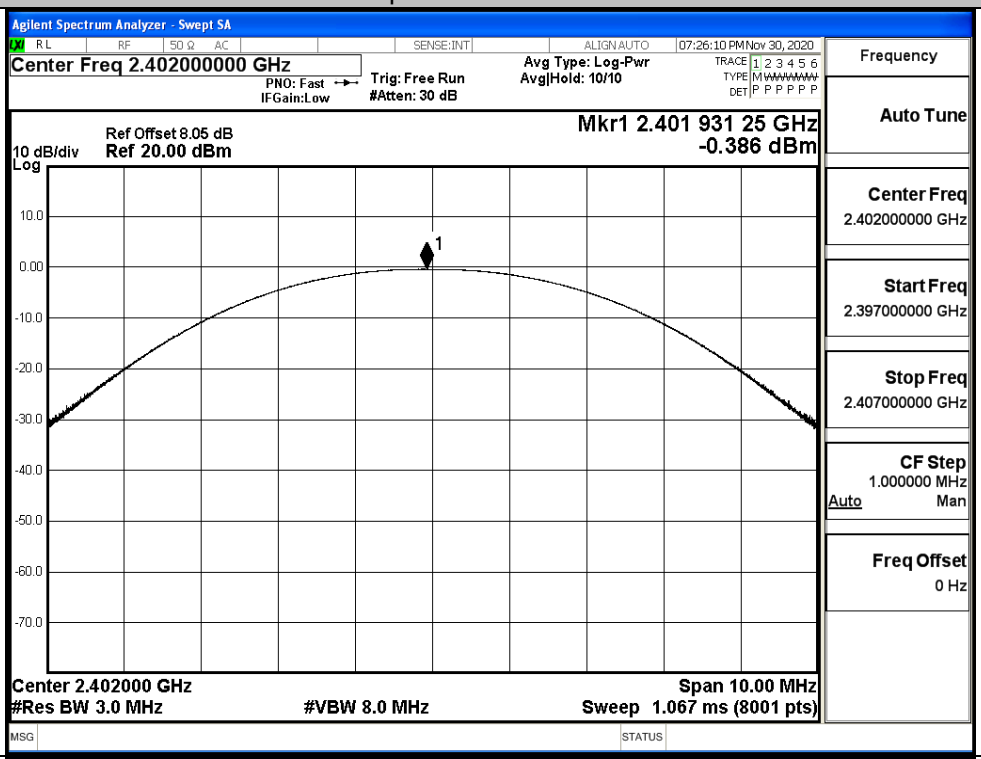
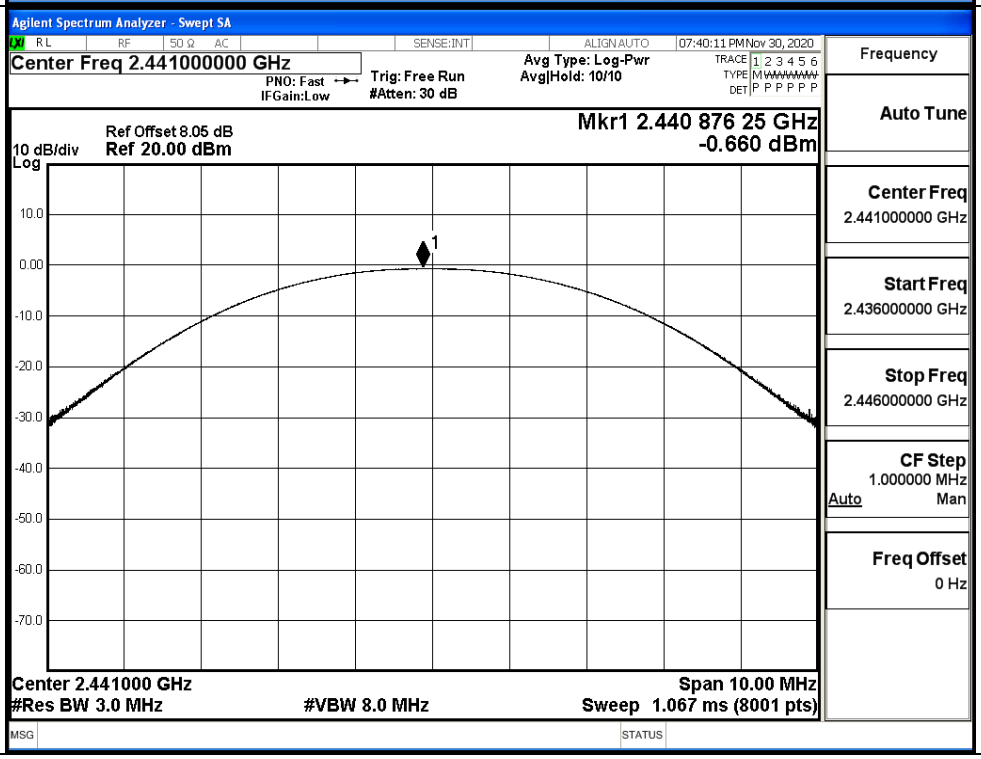
Test Model: Caper-V010.1

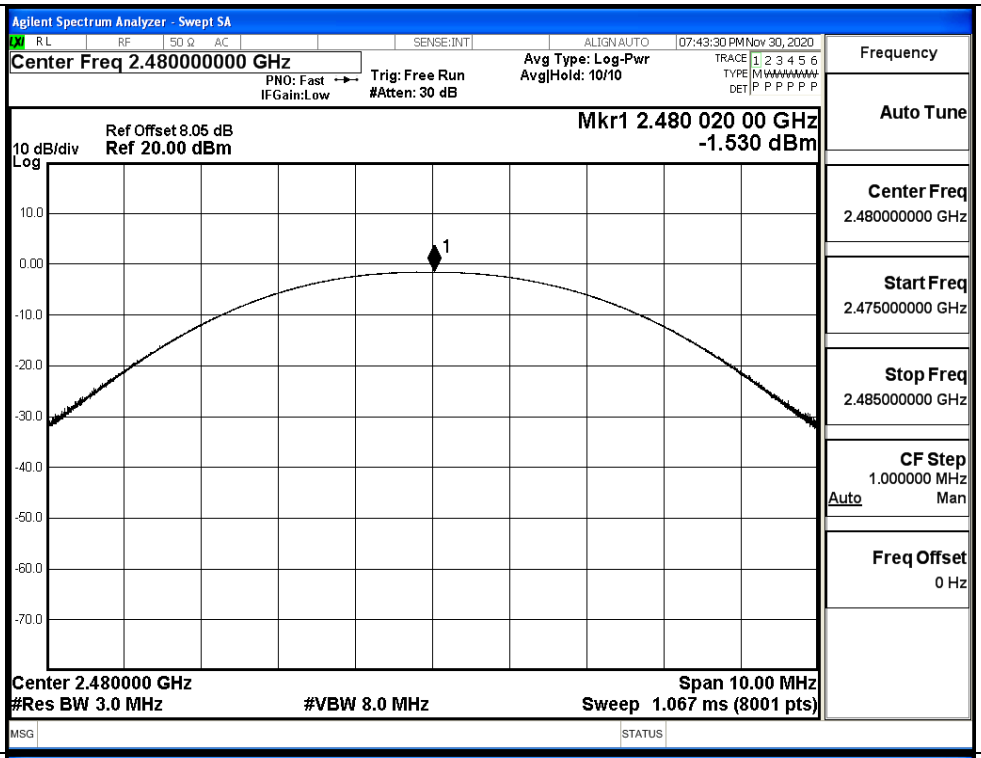
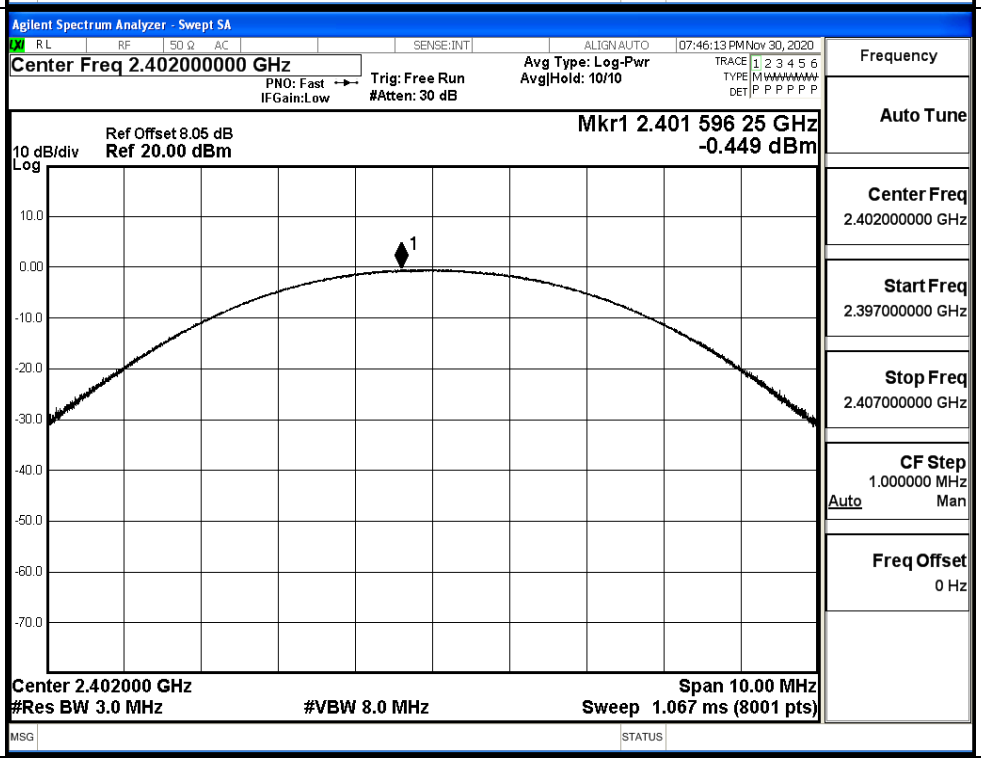
Environmental Conditions

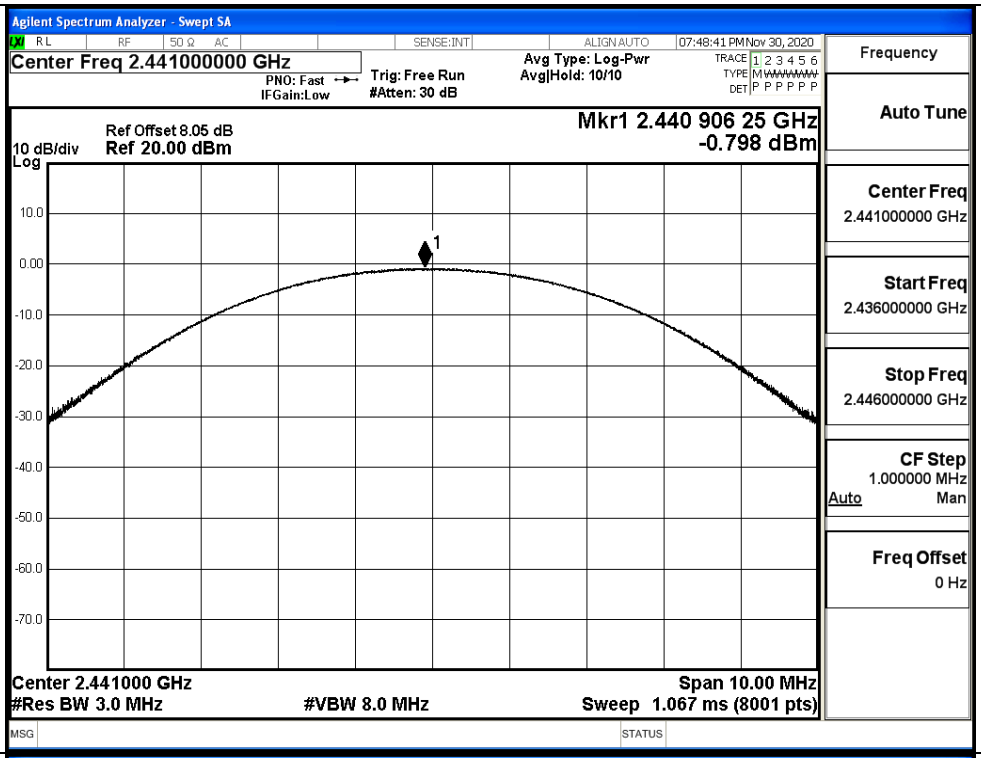
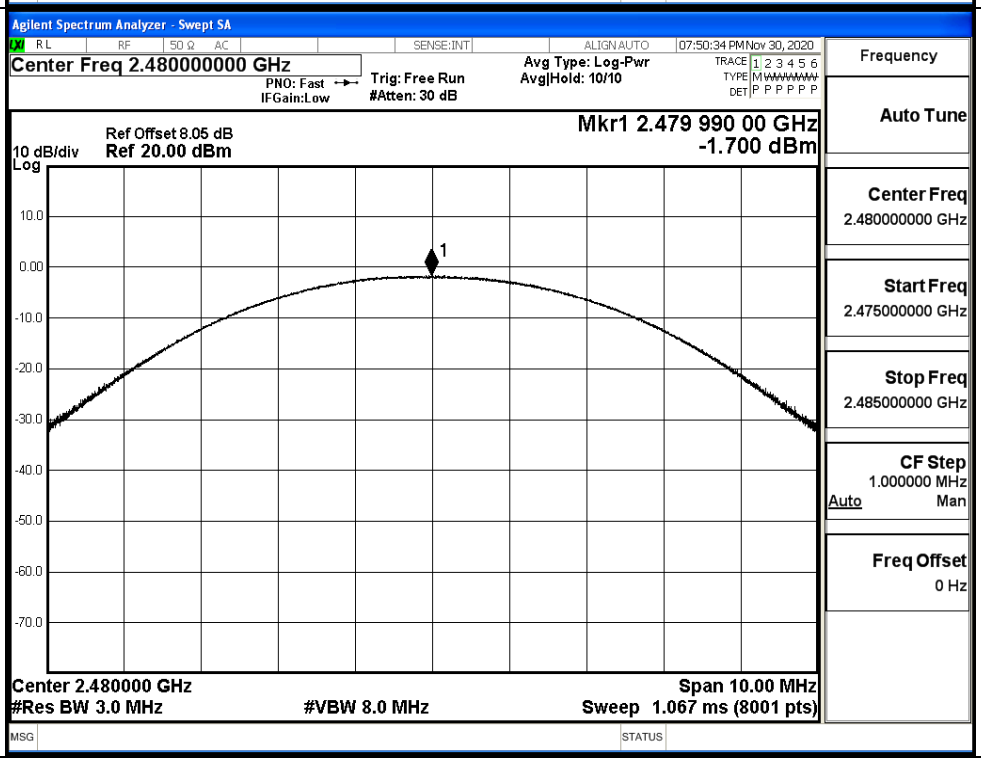
Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	CRAL FU
Supervised by:	Li Huan

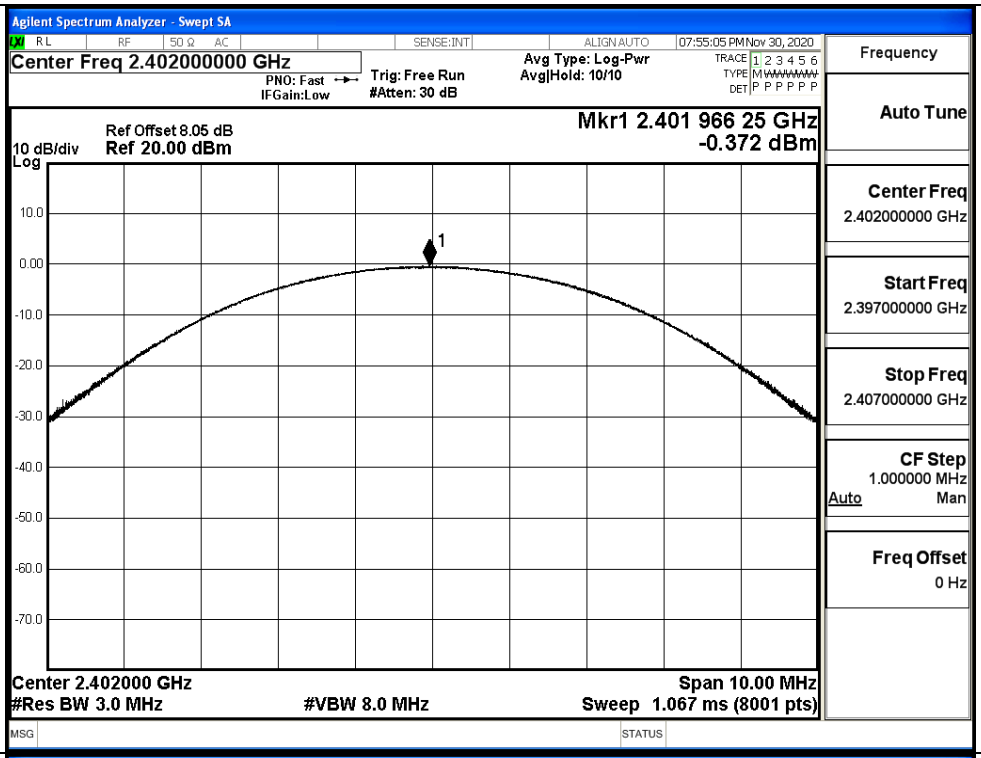
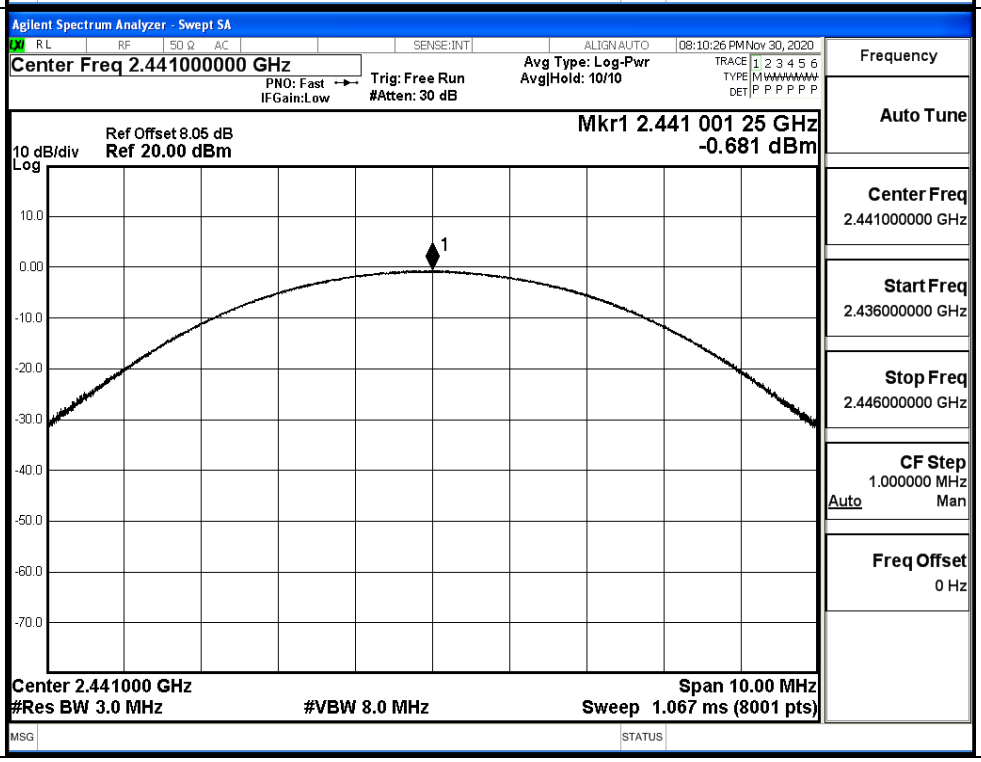
A.1 Maxmum Conducted Peak Output Power

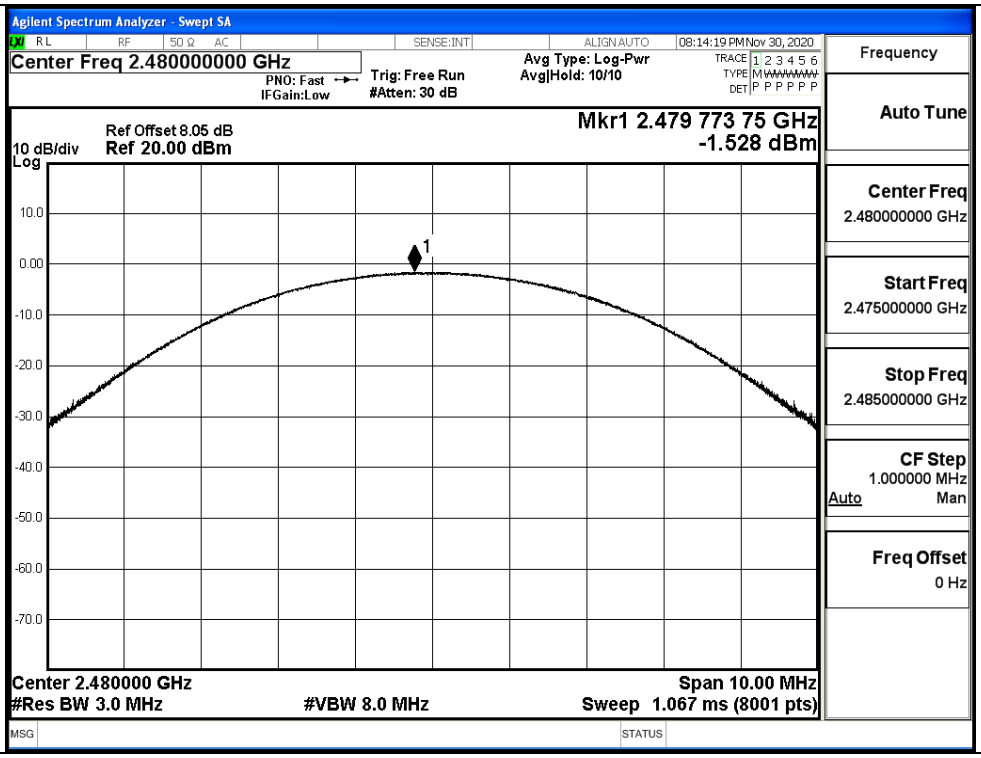
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.386	21	PASS
	MCH	-0.660	21	PASS
	HCH	-1.530	21	PASS
π/4DQPSK	LCH	-0.449	21	PASS
	MCH	-0.798	21	PASS
	HCH	-1.700	21	PASS
8DPSK	LCH	-0.372	21	PASS
	MCH	-0.681	21	PASS
	HCH	-1.528	21	PASS

Test Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH		
π/4DQPSK/HCH		

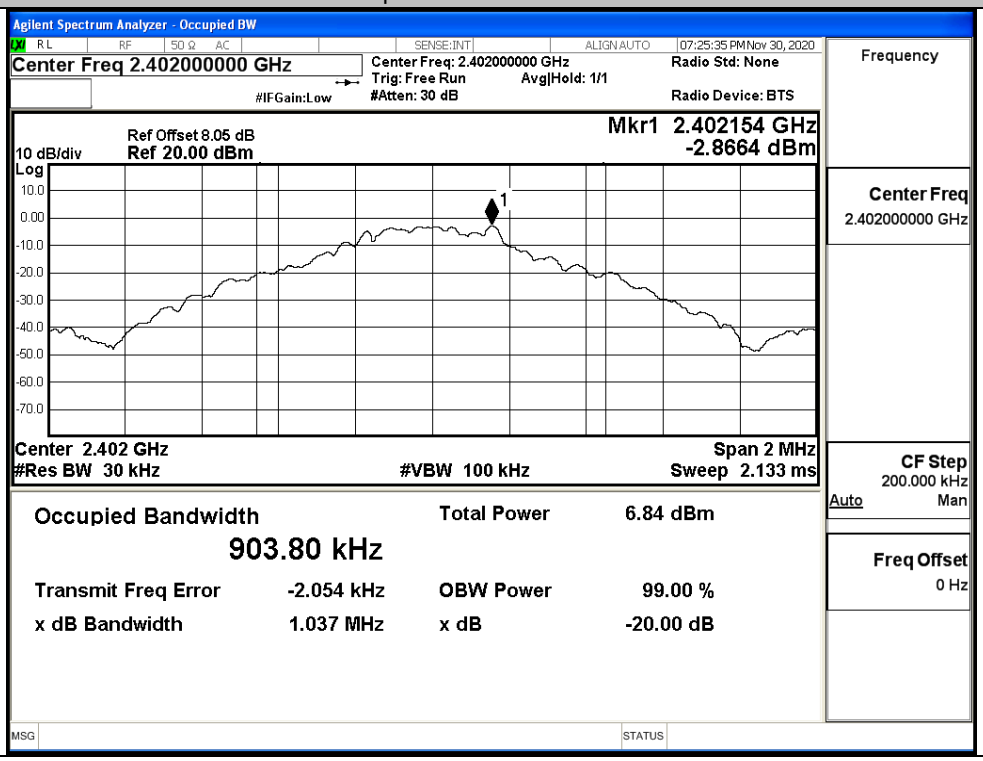
8DPSK/LCH	
8DPSK/MCH	

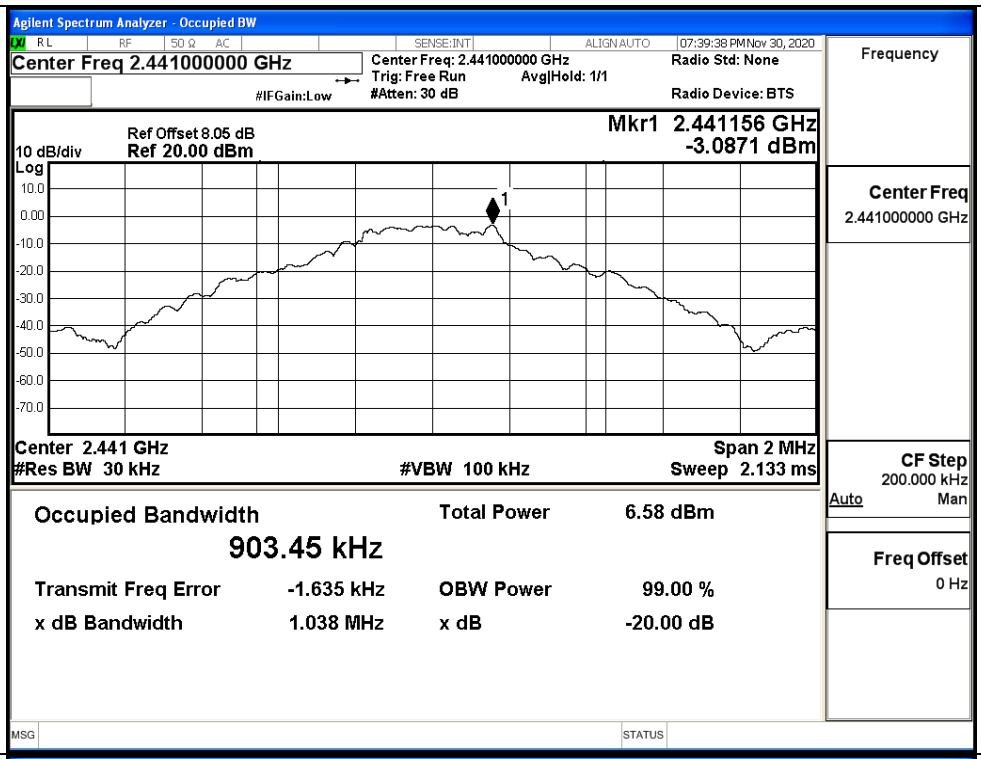
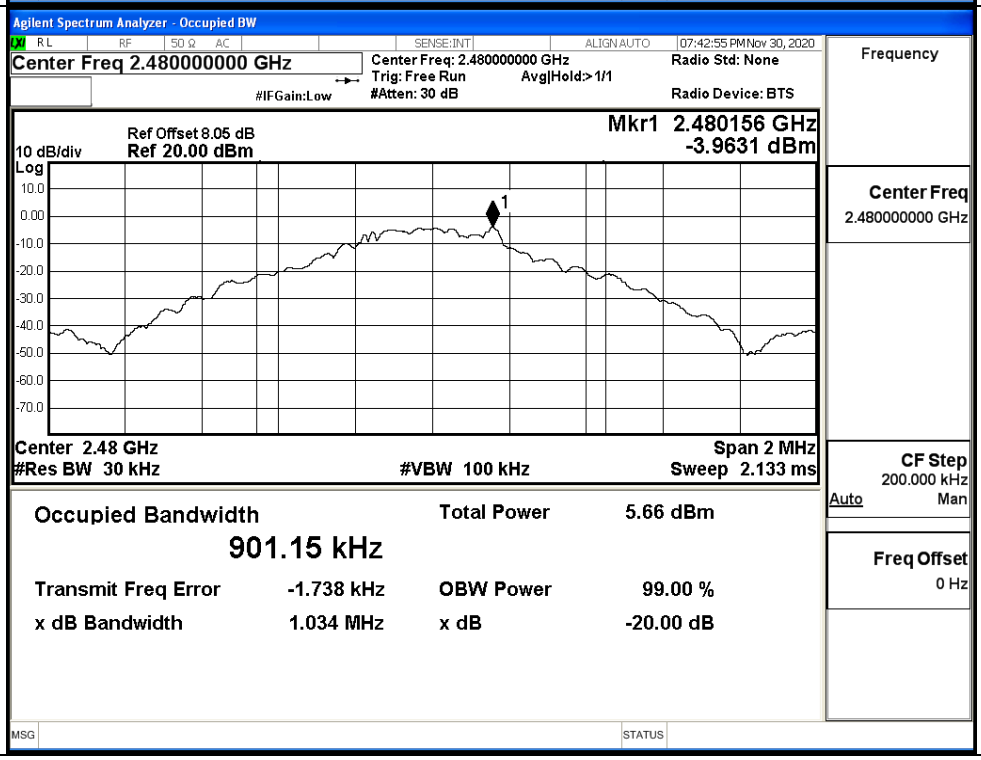
8DPSK/HCH		

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
08:14:19 PM Nov 30, 2020
Ref Offset 8.05 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 773 75 GHz
-1.528 dBm
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 10.00 MHz
Sweep 1.067 ms (8001 pts)
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.475000000 GHz
Stop Freq
2.485000000 GHz
CF Step
1.000000 MHz
Auto
Man
Freq Offset
0 Hz

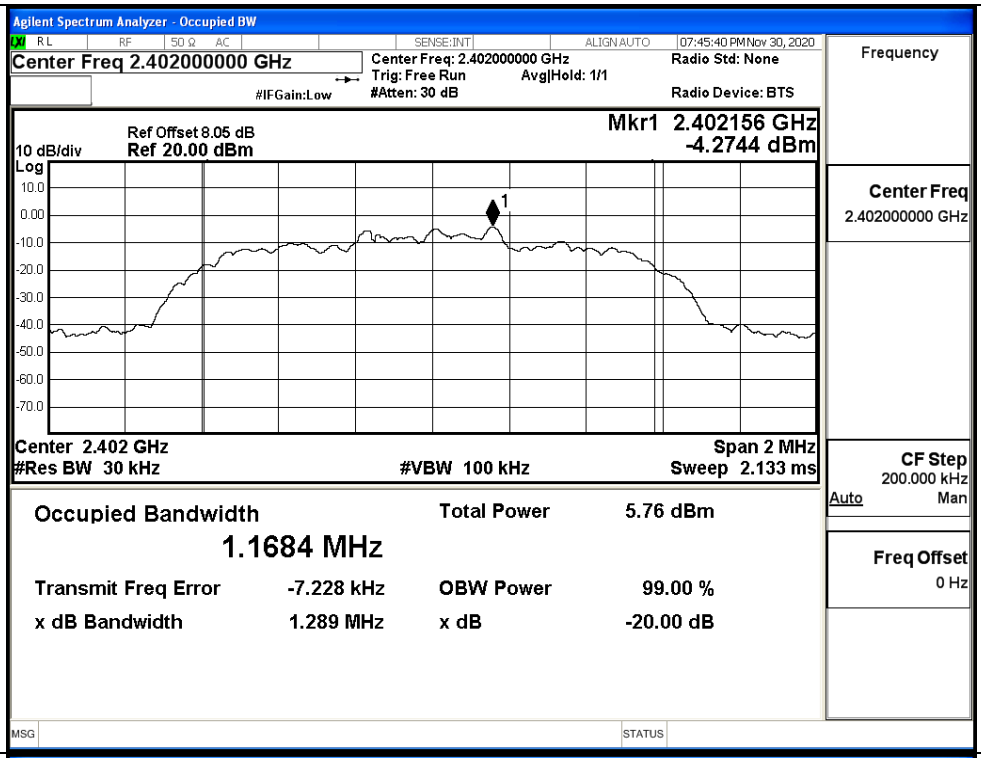
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.037	Not Specified	PASS
	MCH	1.038	Not Specified	PASS
	HCH	1.034	Not Specified	PASS
π/4DQPSK	LCH	1.289	Not Specified	PASS
	MCH	1.290	Not Specified	PASS
	HCH	1.288	Not Specified	PASS
8DPSK	LCH	1.289	Not Specified	PASS
	MCH	1.288	Not Specified	PASS
	HCH	1.287	Not Specified	PASS

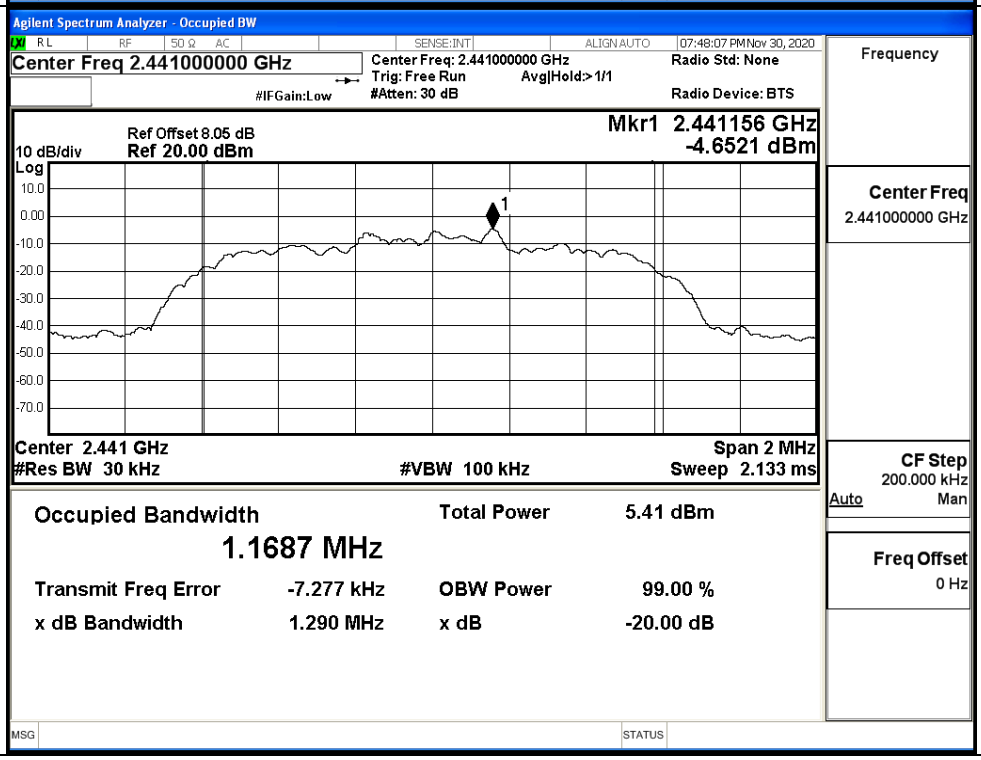
Test Graphs		
GFSK/LCH		

GFSK/MCH	
GFSK/HCH	

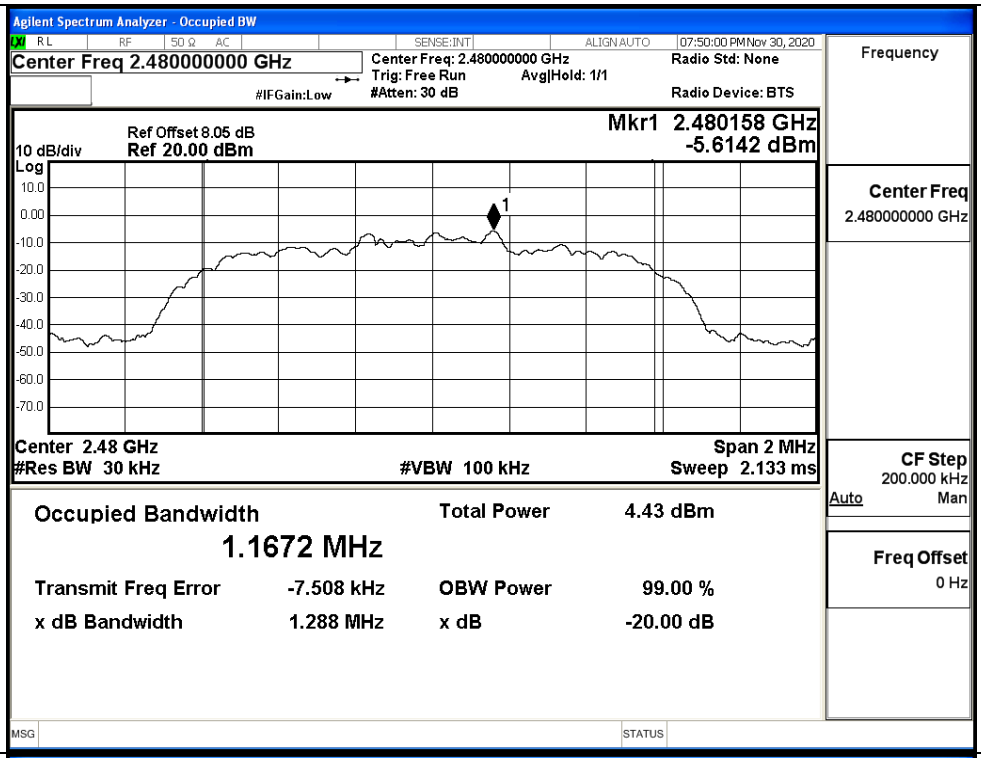
π/4DQPSK/LCH



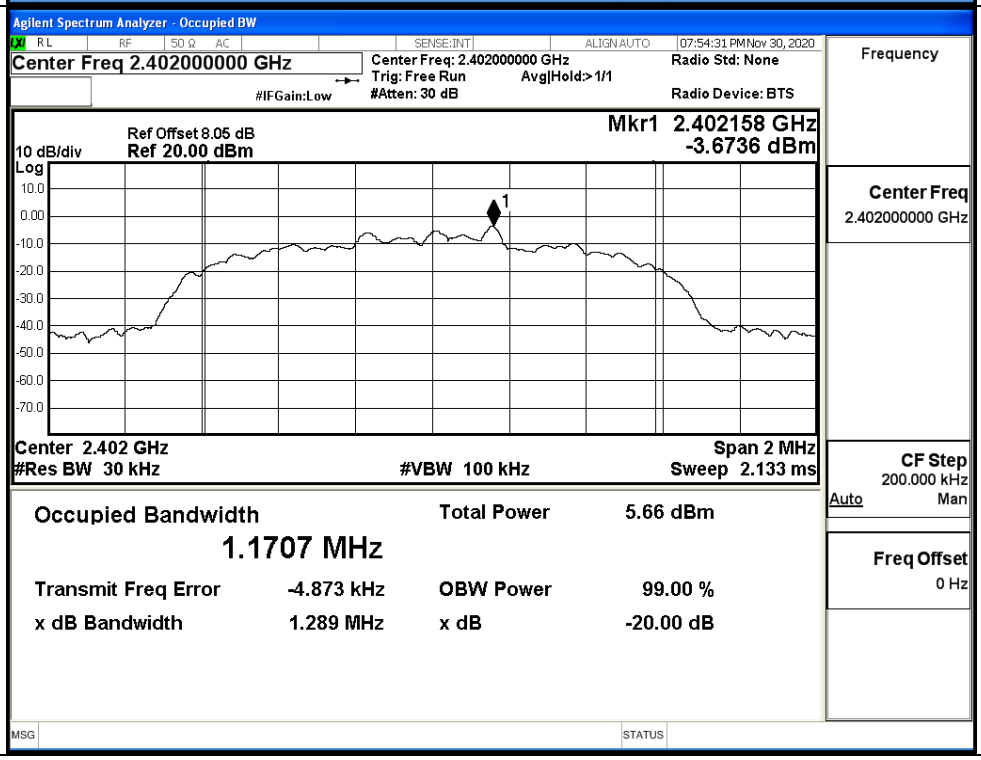
π/4DQPSK/MCH



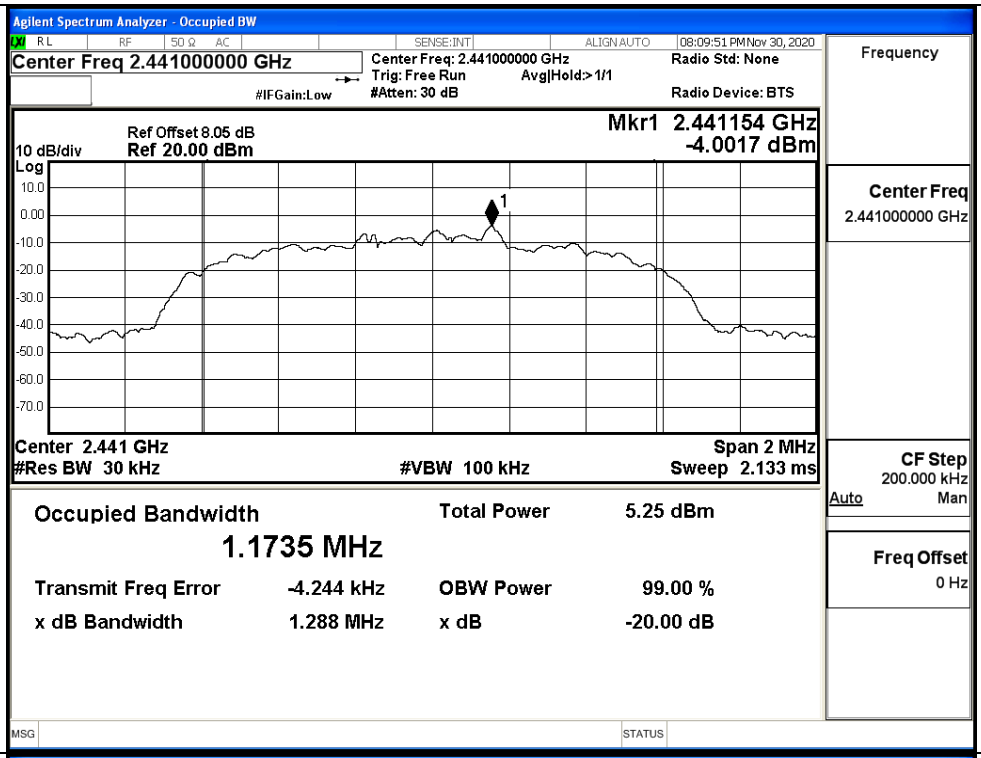
π/4DQPSK/HCH



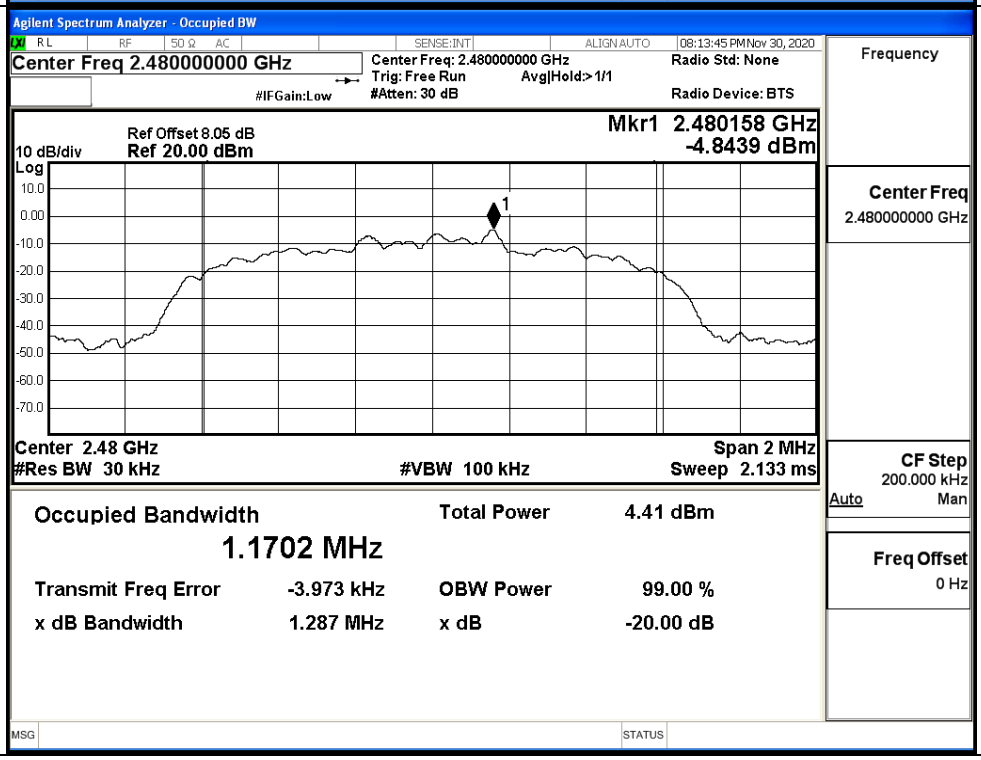
8DPSK/LCH



8DPSK/MCH

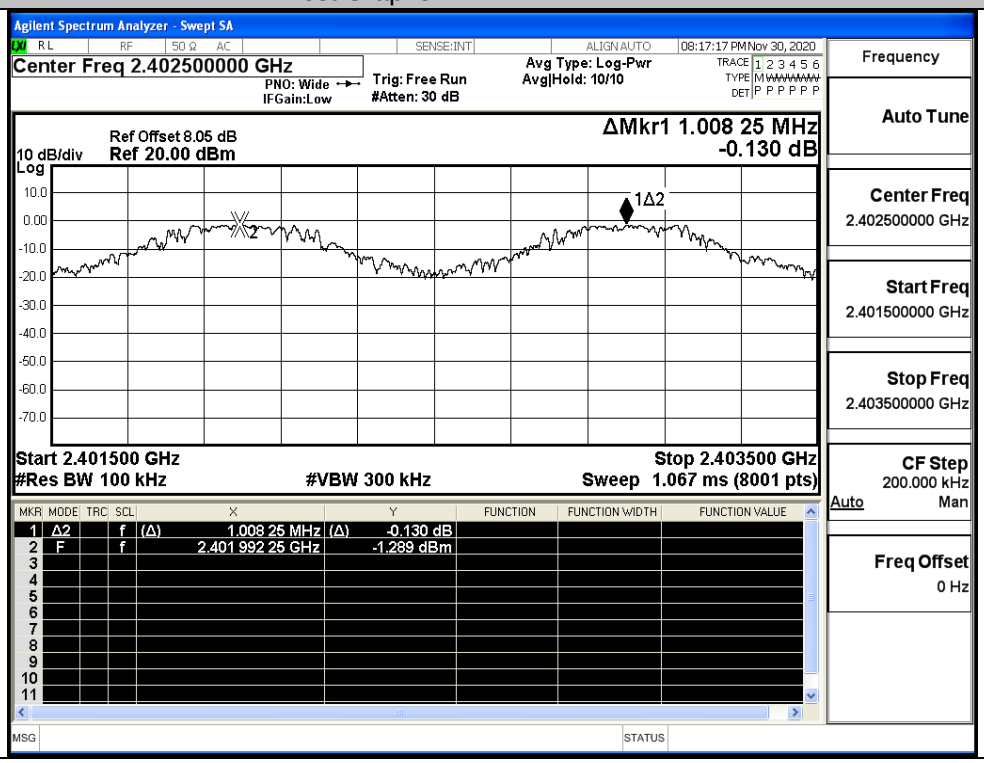


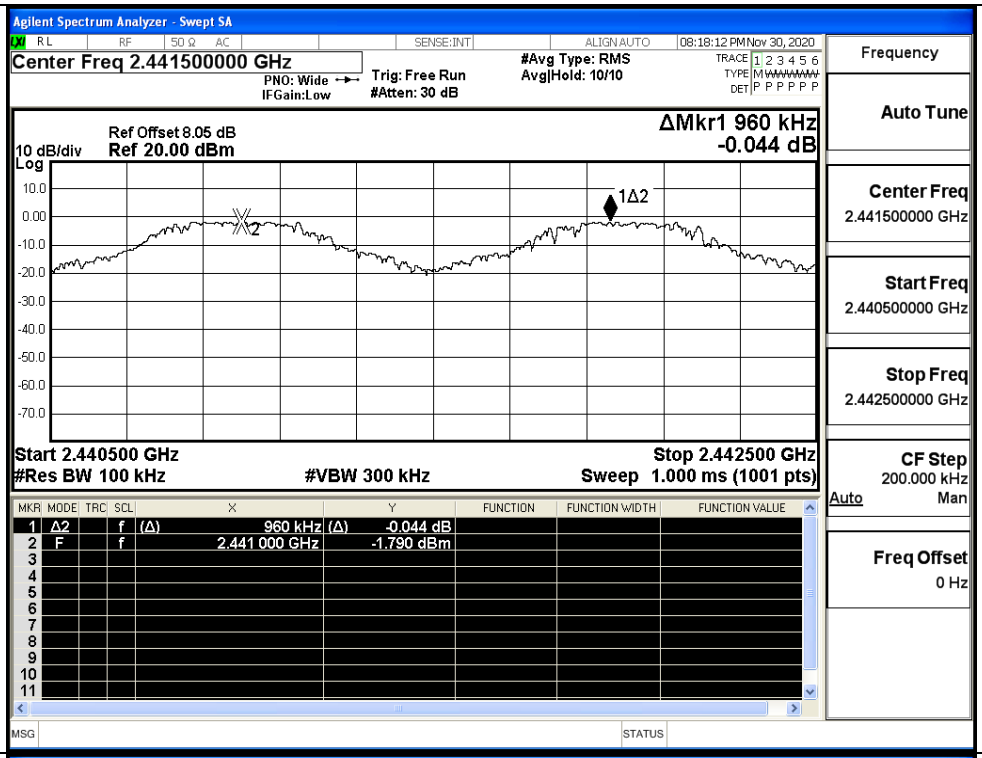
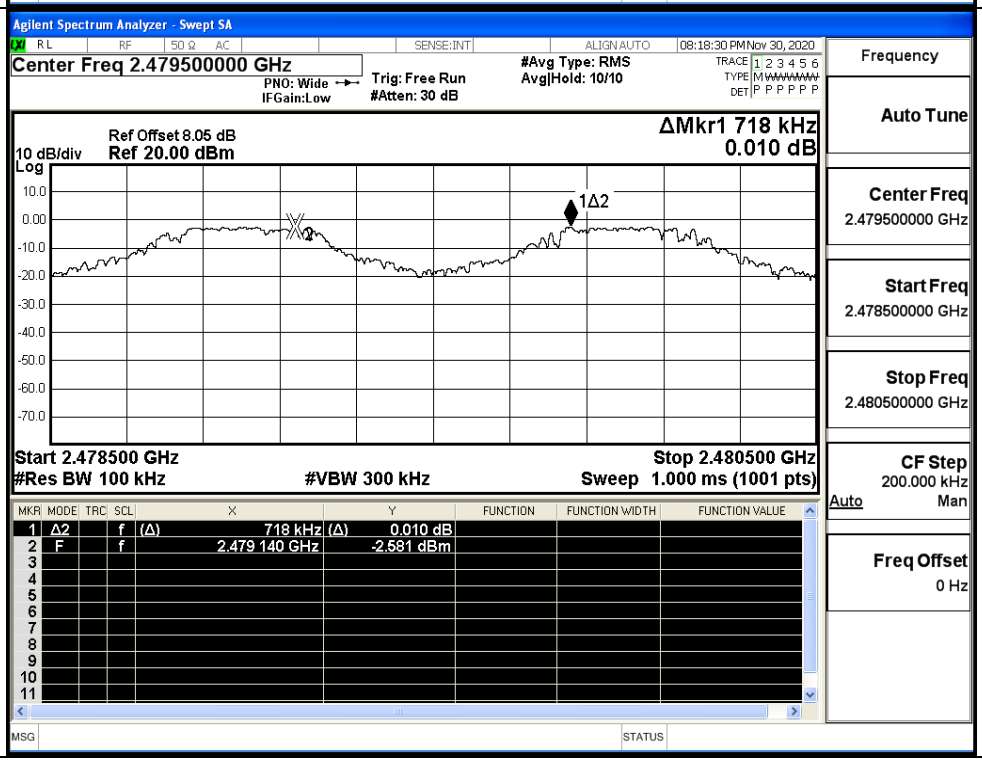
8DPSK/HCH



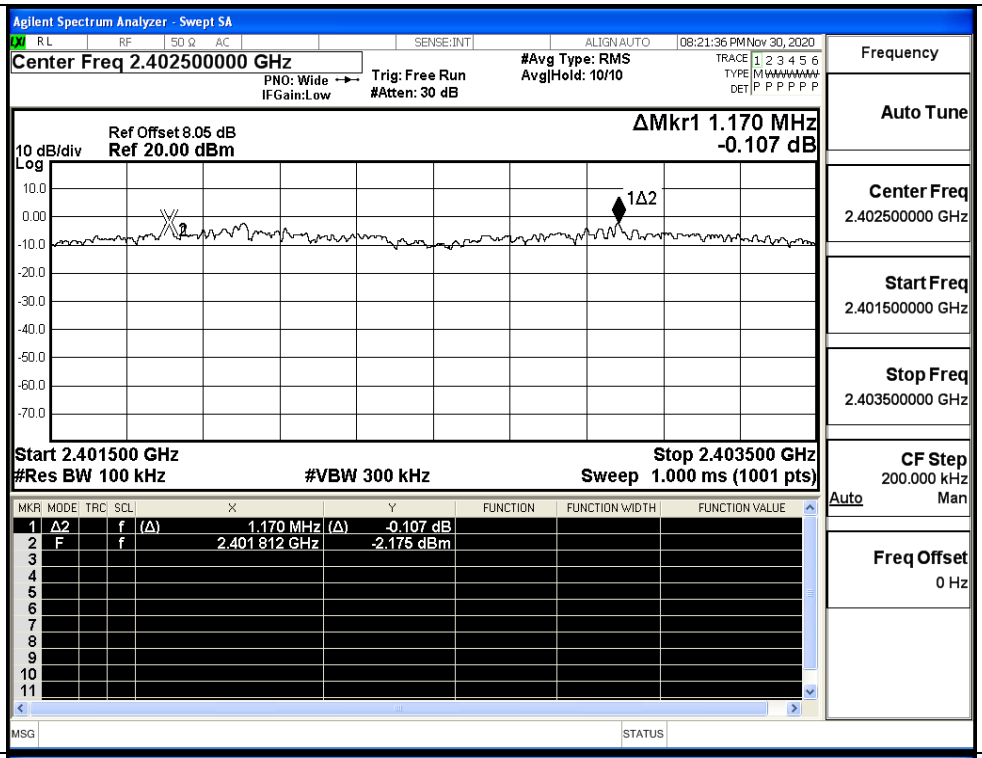
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.008	0.692	PASS
	MCH	0.960	0.692	PASS
	HCH	0.718	0.692	PASS
π/4DQPSK	LCH	1.170	0.860	PASS
	MCH	1.168	0.860	PASS
	HCH	1.004	0.860	PASS
8DPSK	LCH	0.984	0.859	PASS
	MCH	1.110	0.859	PASS
	HCH	1.116	0.859	PASS

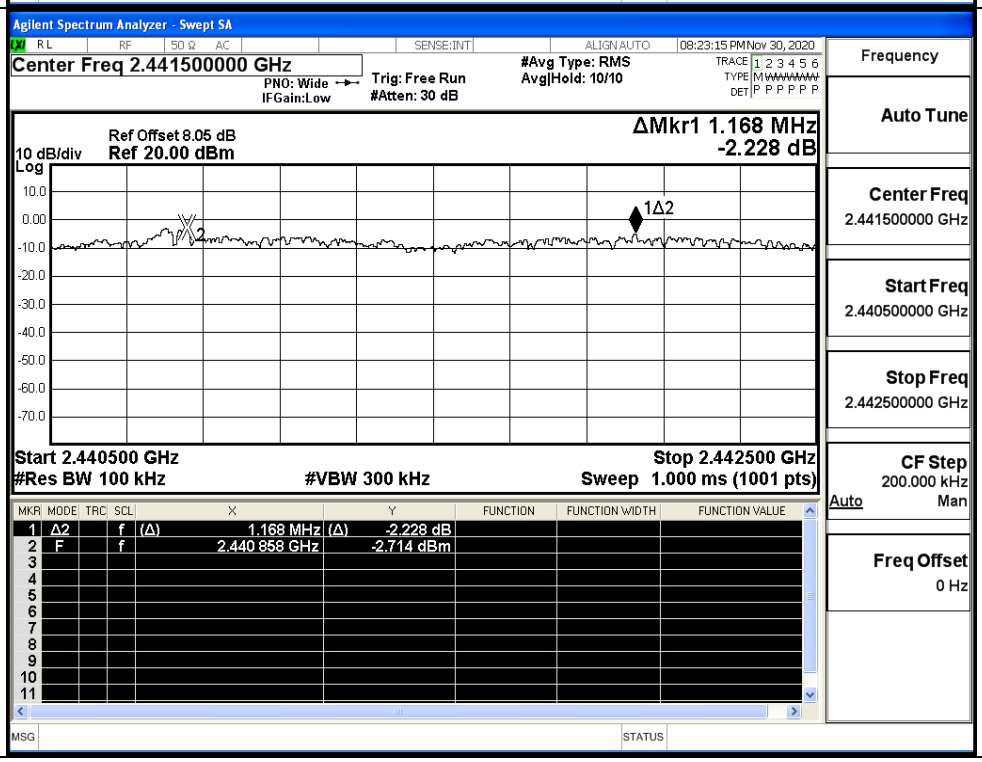
Test Graphs	
GFSK/LCH	

GFSK/MCH		
GFSK/HCH		

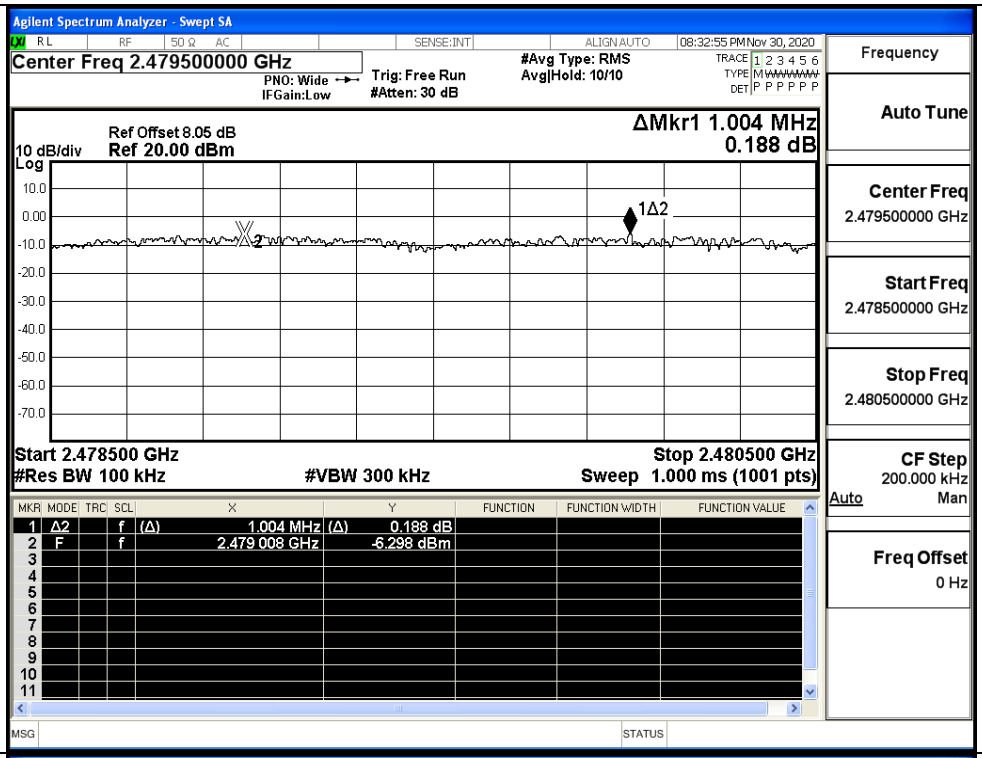
π/4DQPSK/LCH



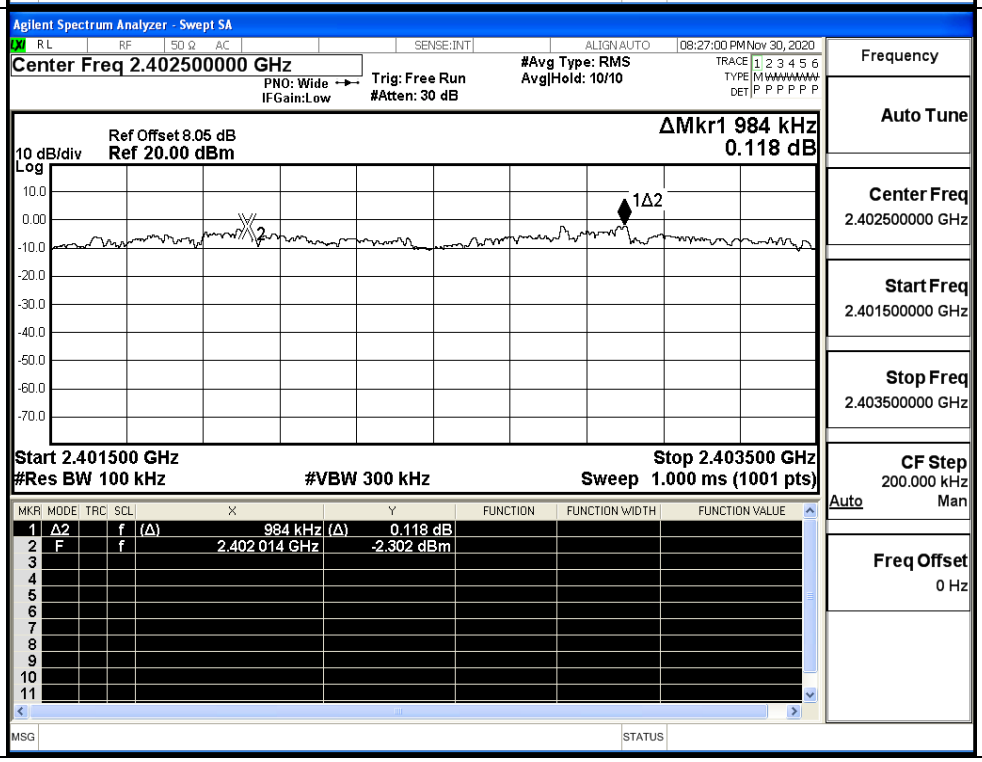
π/4DQPSK/MCH



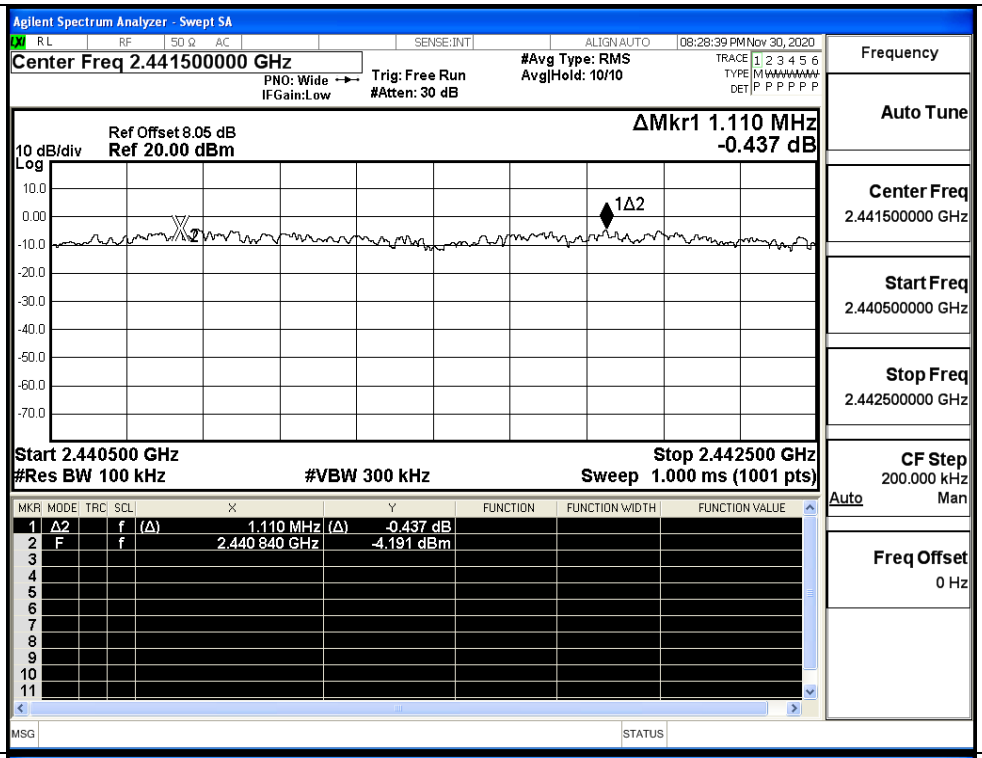
π/4DQPSK/HCH



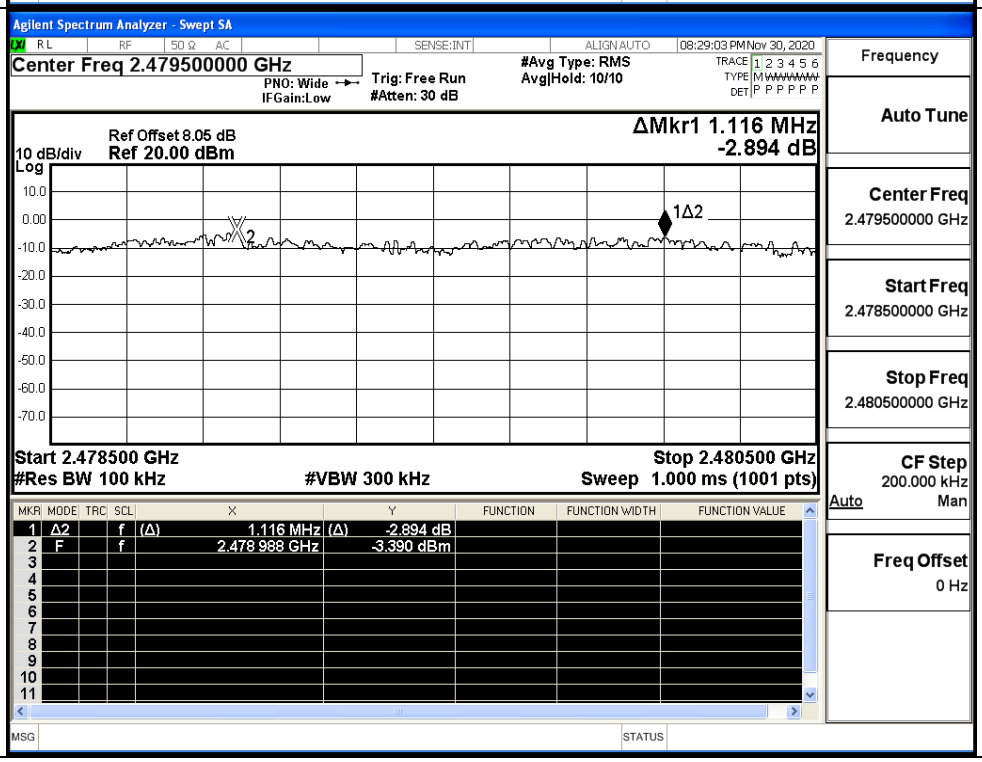
8DPSK/LCH



8DPSK/MCH

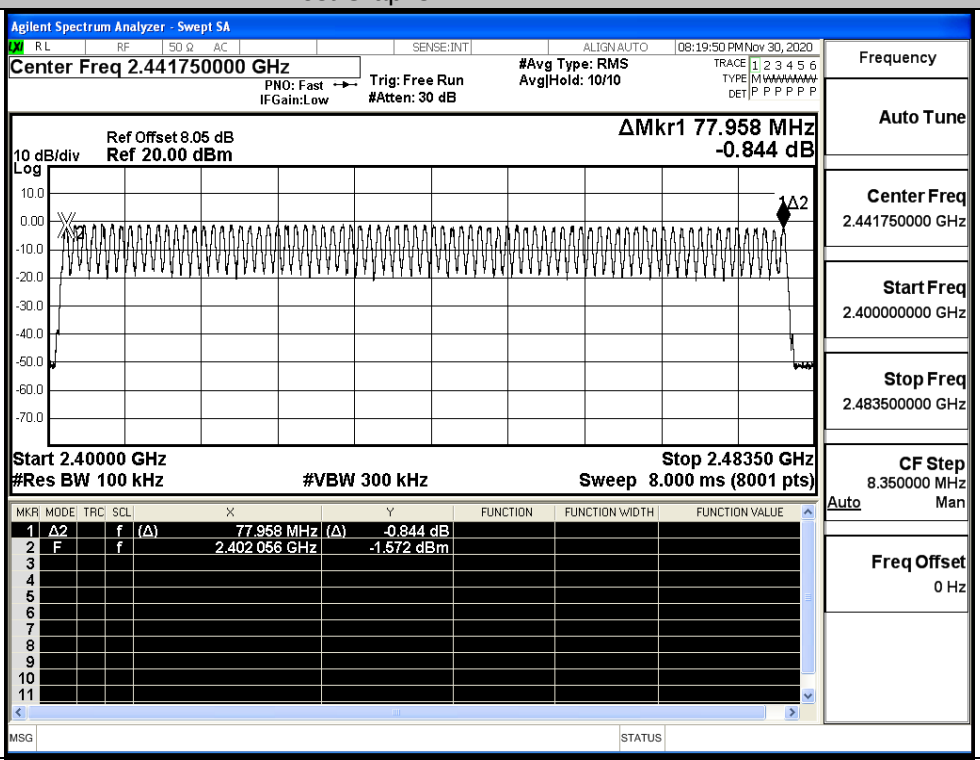
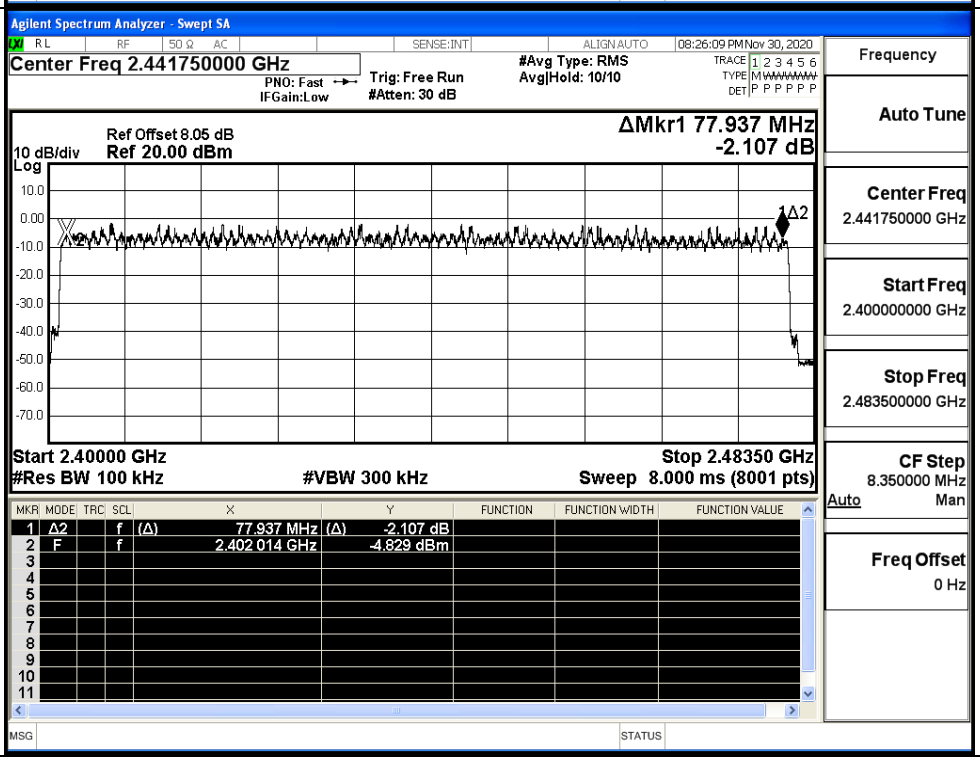


8DPSK/HCH

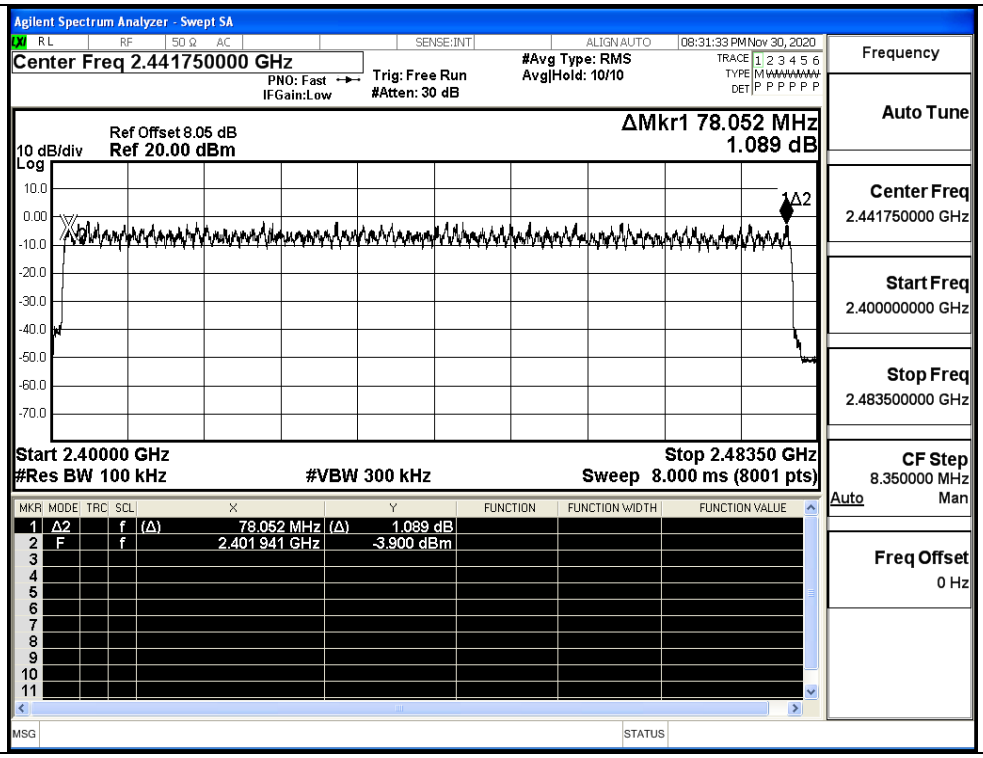


A.4 Hopping Channel Number

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

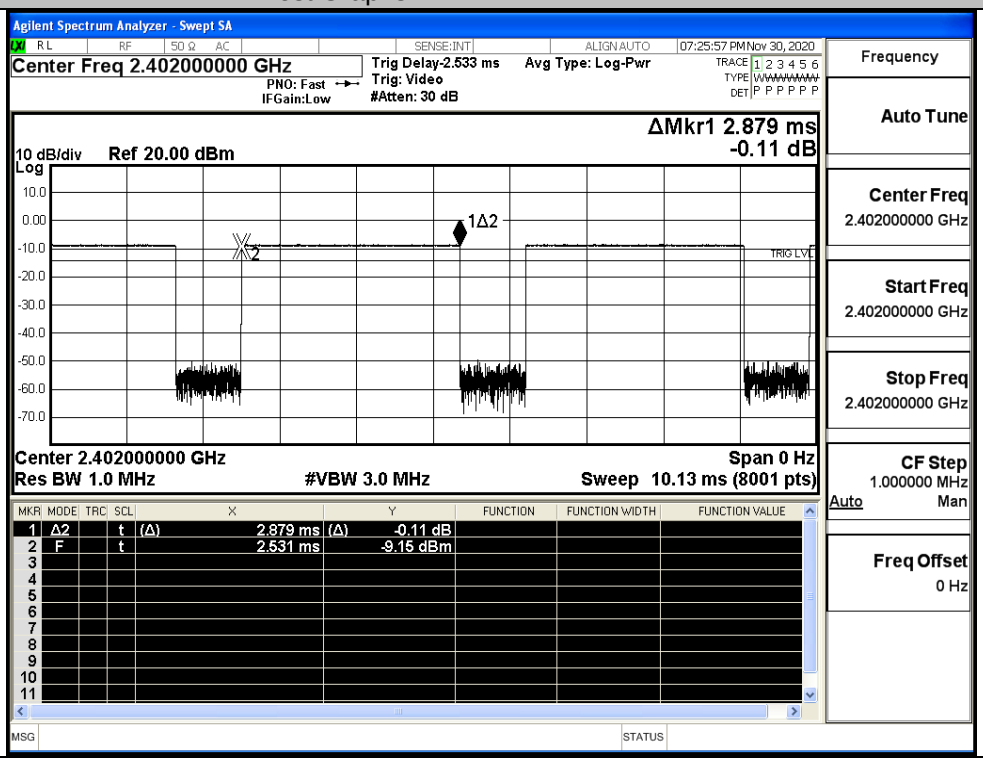
Test Graphs		
GFSK/Hop		
π/4DQPSK/Hop		

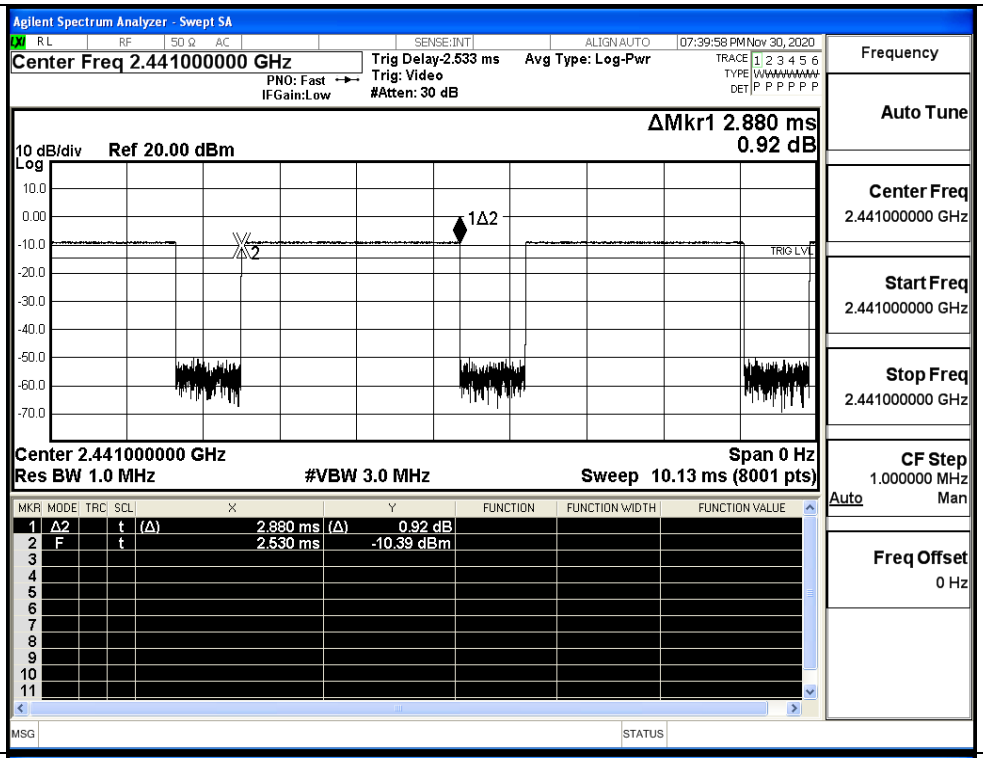
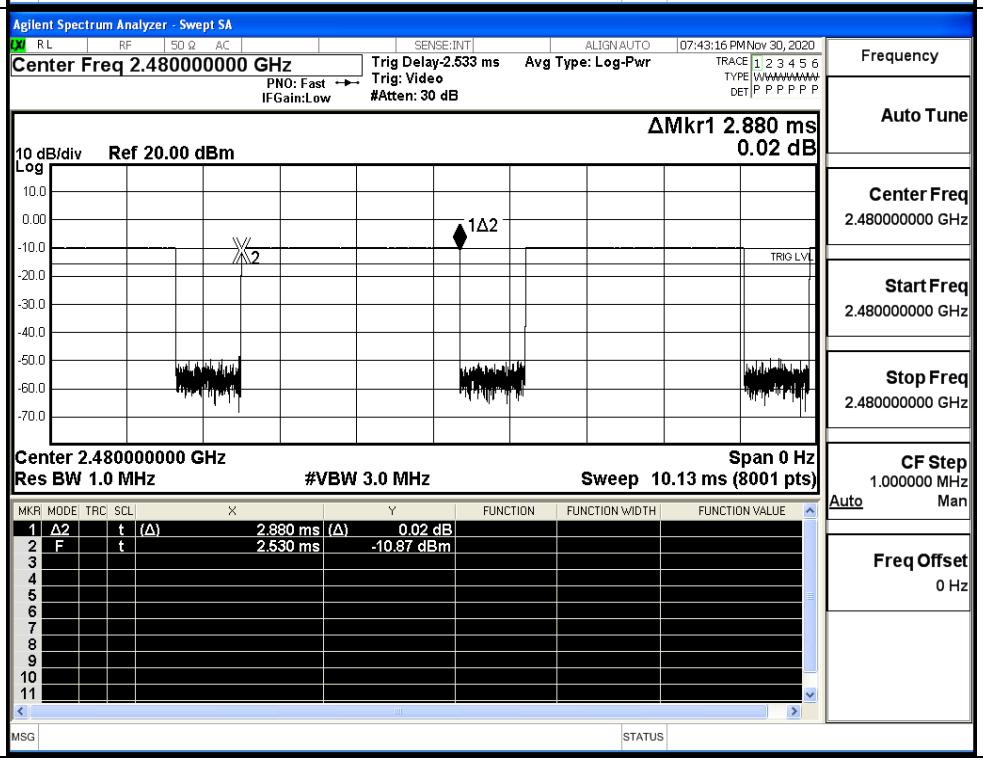
8DPSK/Hop


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
08:31:33 PM Nov 30, 2020
Ref Offset 8.05 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 78.052 MHz
1.089 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 78.052 MHz (Δ) 1.089 dB
2 F f 2.401 941 GHz -3.900 dBm
Frequency
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

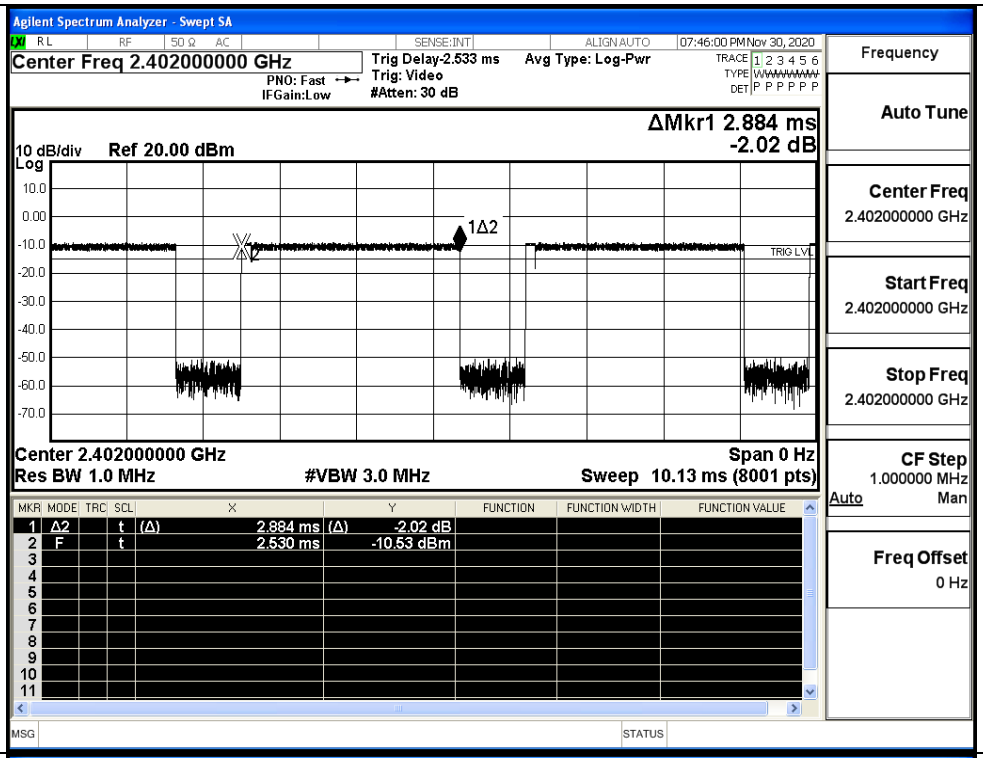
A.5 Dwell Time

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
π/4DQPSK	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

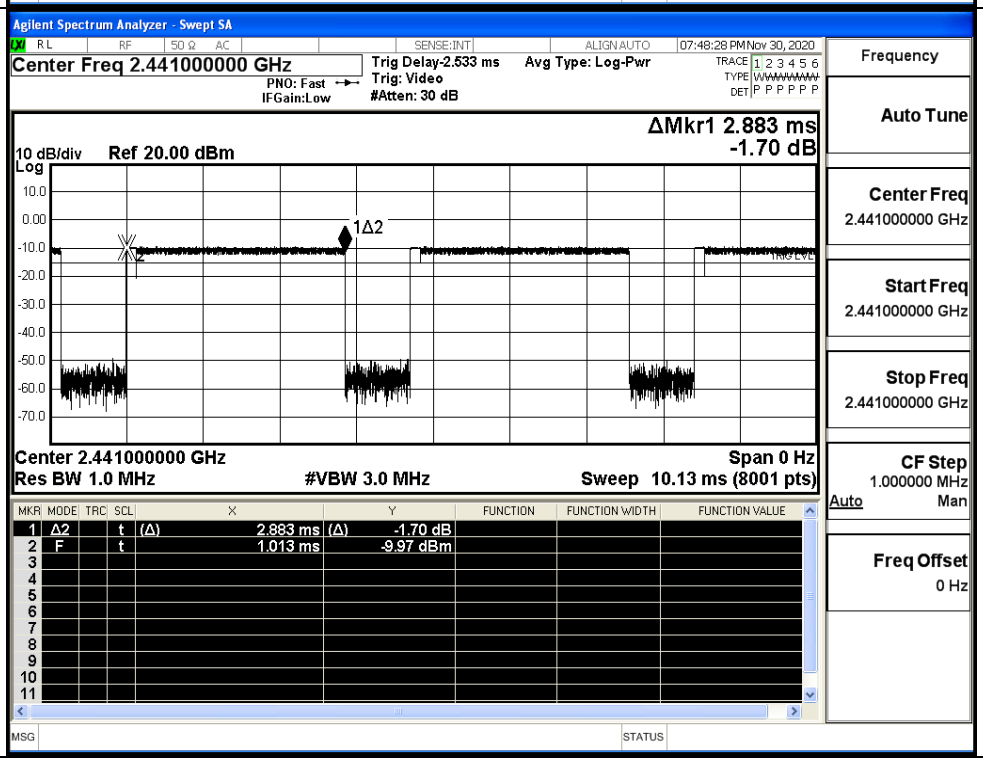
Test Graphs	
GFSK_DH5/LCH	

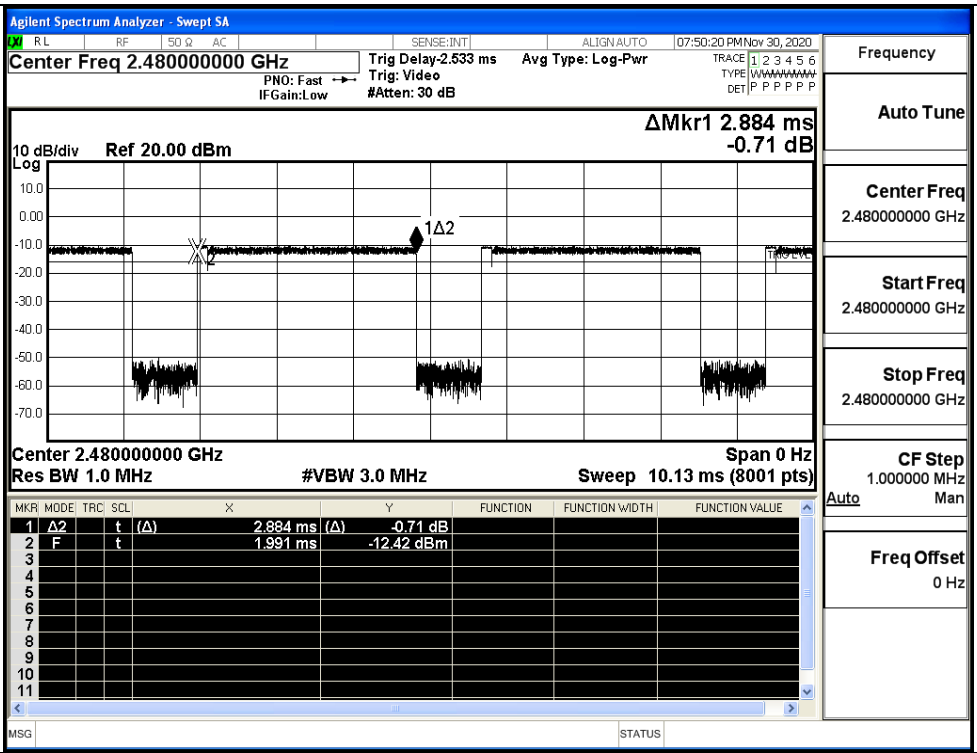
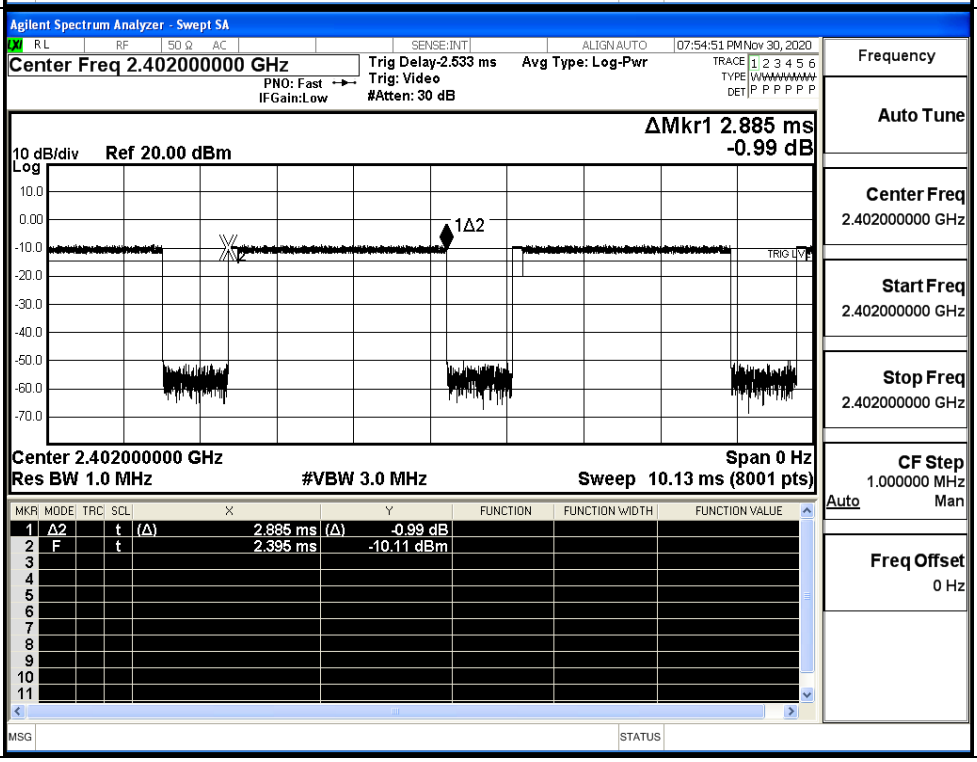
GFSK_DH5/MCH	
GFSK_DH5/HCH	

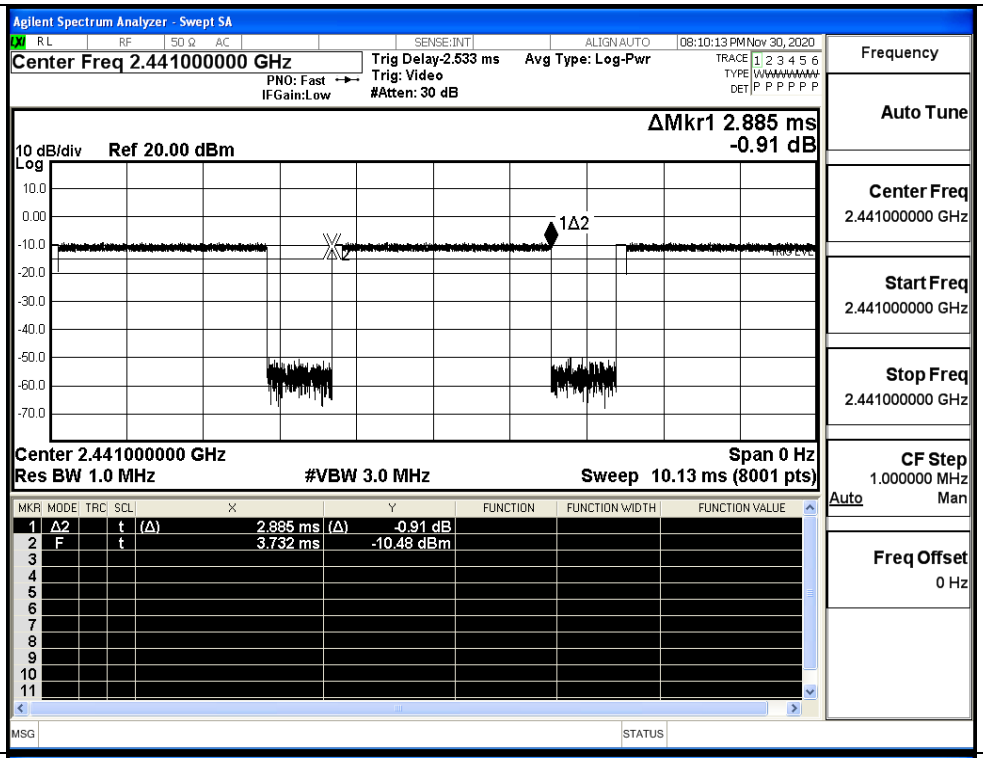
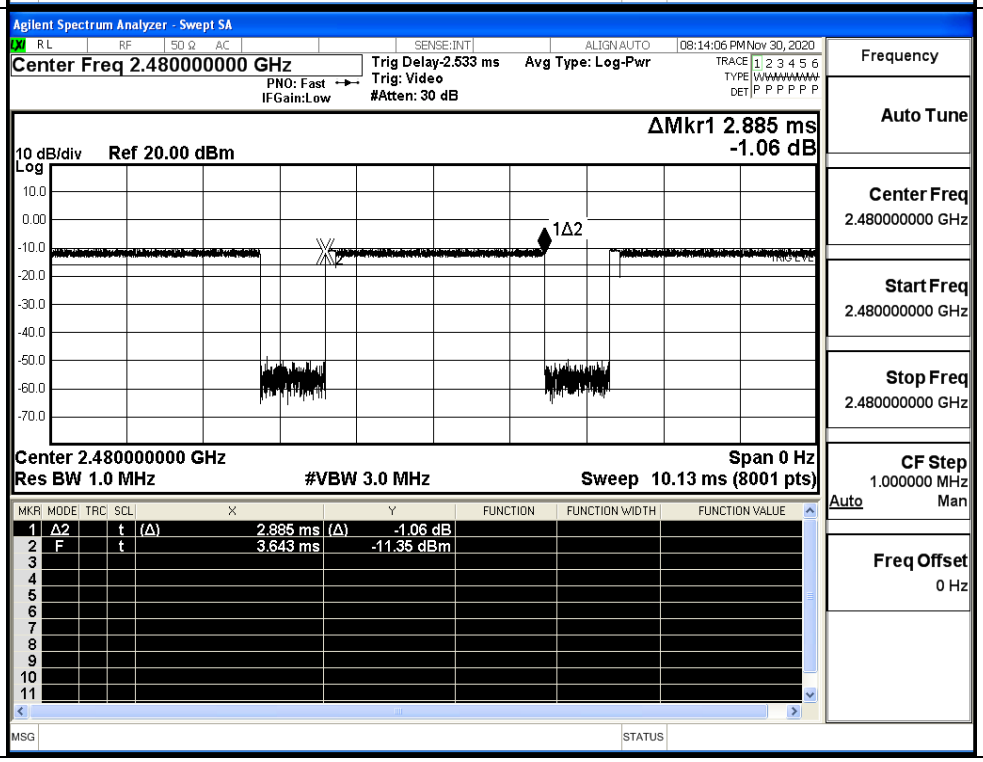
π/4DQPSK
_2DH5/LCH



π/4DQPSK
_2DH5/MCH

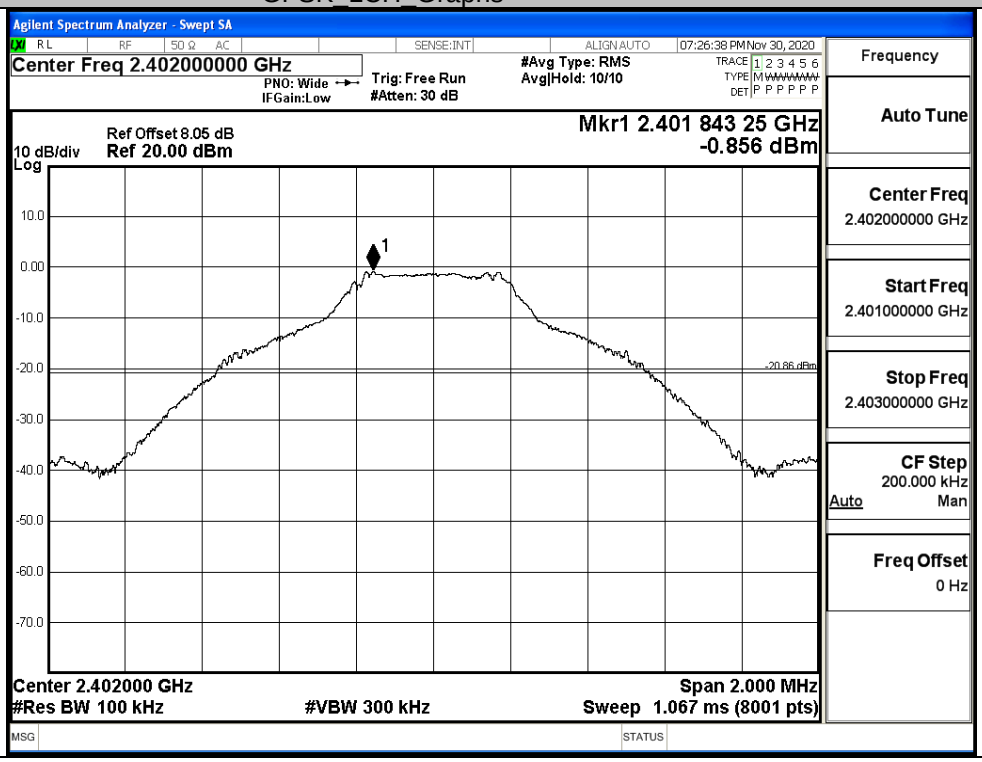


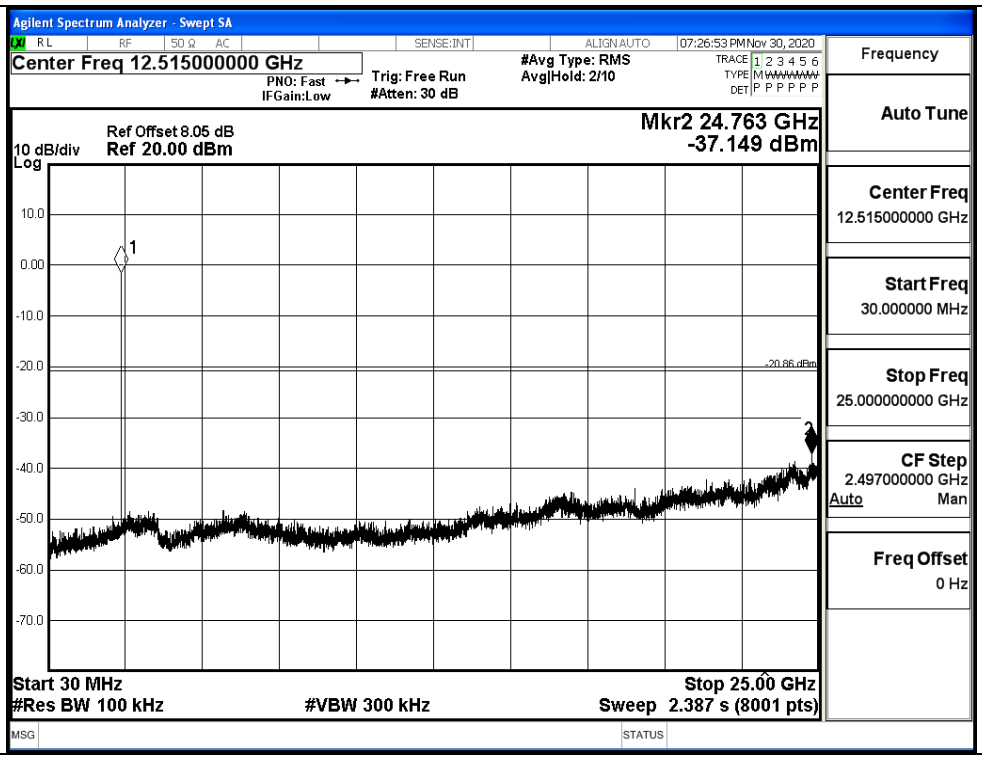
π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

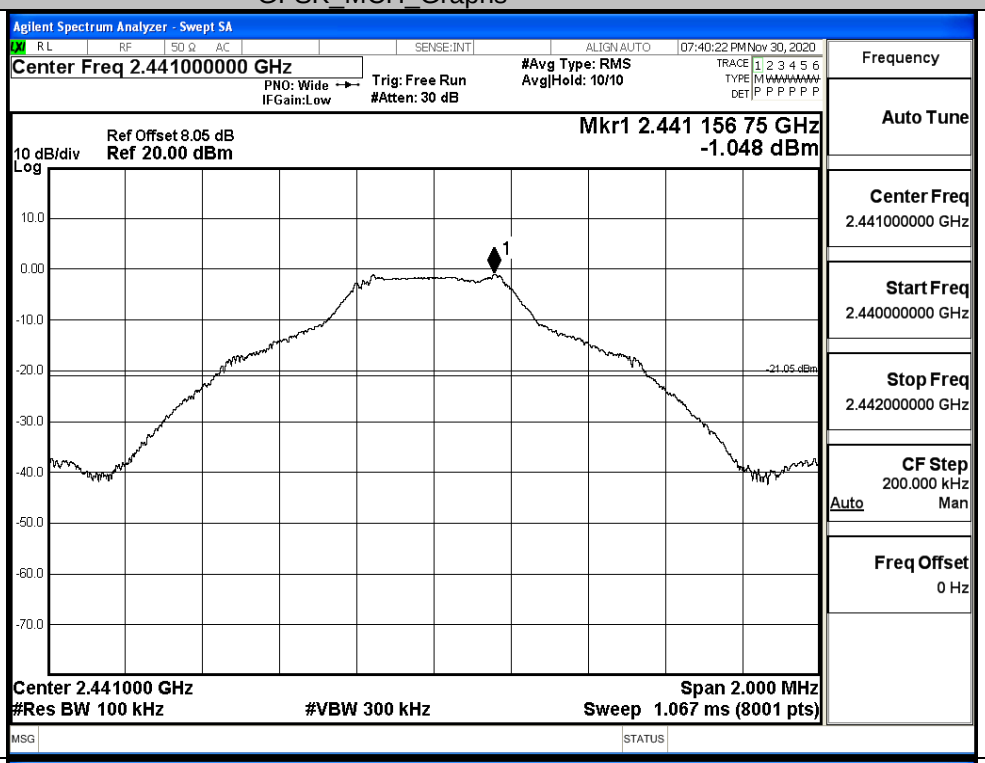
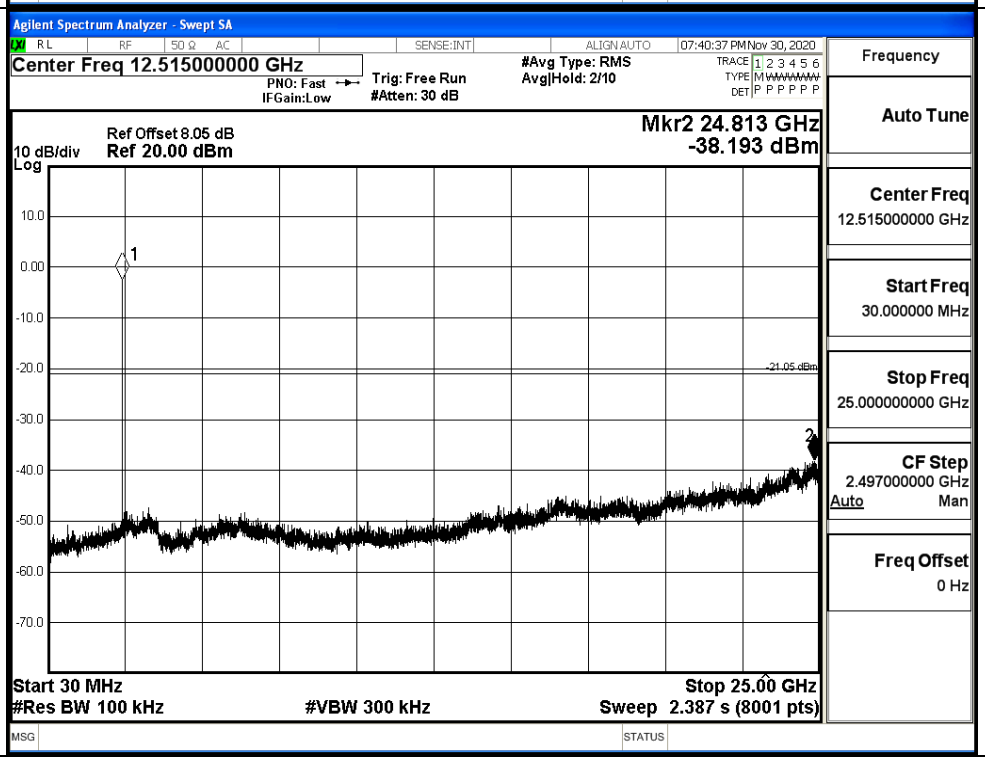
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.856	-37.149	-20.856	PASS
	MCH	-1.048	-38.193	-21.048	PASS
	HCH	-1.942	-36.827	-21.942	PASS
π/4DQPSK	LCH	-1.694	-37.329	-21.694	PASS
	MCH	-1.919	-38.137	-21.919	PASS
	HCH	-3.05	-37.862	-23.050	PASS
8DPSK	LCH	-1.703	-37.926	-21.703	PASS
	MCH	-1.839	-37.476	-21.839	PASS
	HCH	-2.771	-37.546	-22.771	PASS

GFSK_LCH_Graphs		
Pref		

Puw		

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
07:26:53 PM Nov 30, 2020
Ref Offset 8.05 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 24.763 GHz
-37.149 dBm
-20.86 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (8001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

GFSK_MCH_Graphs		
Pref		
Puw		

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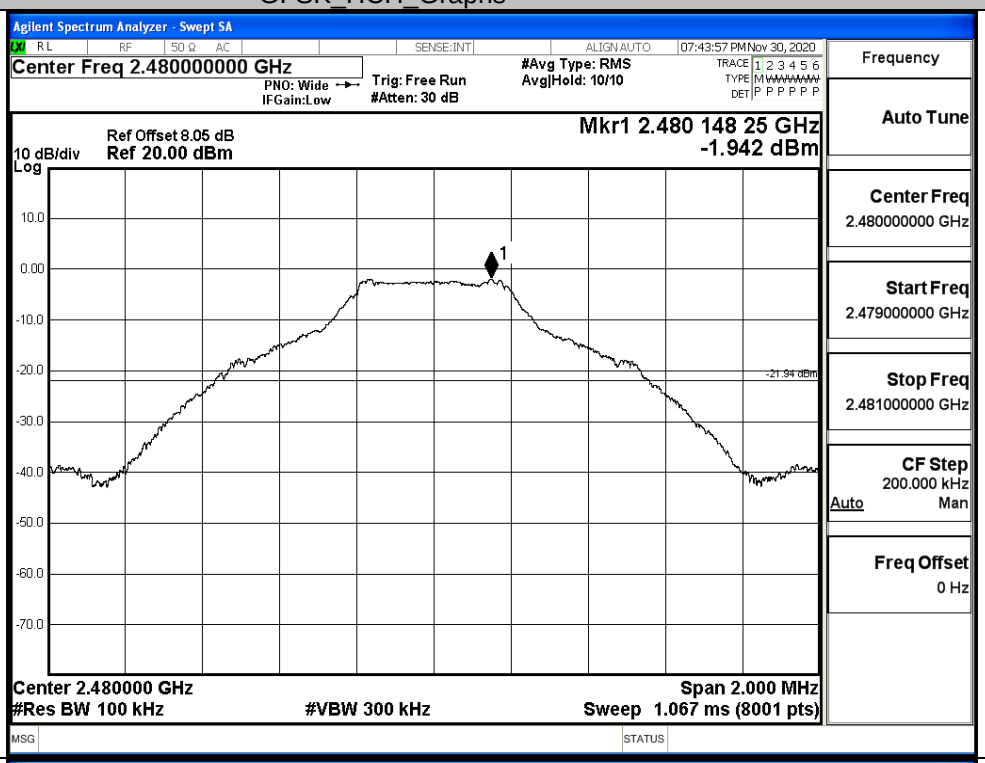
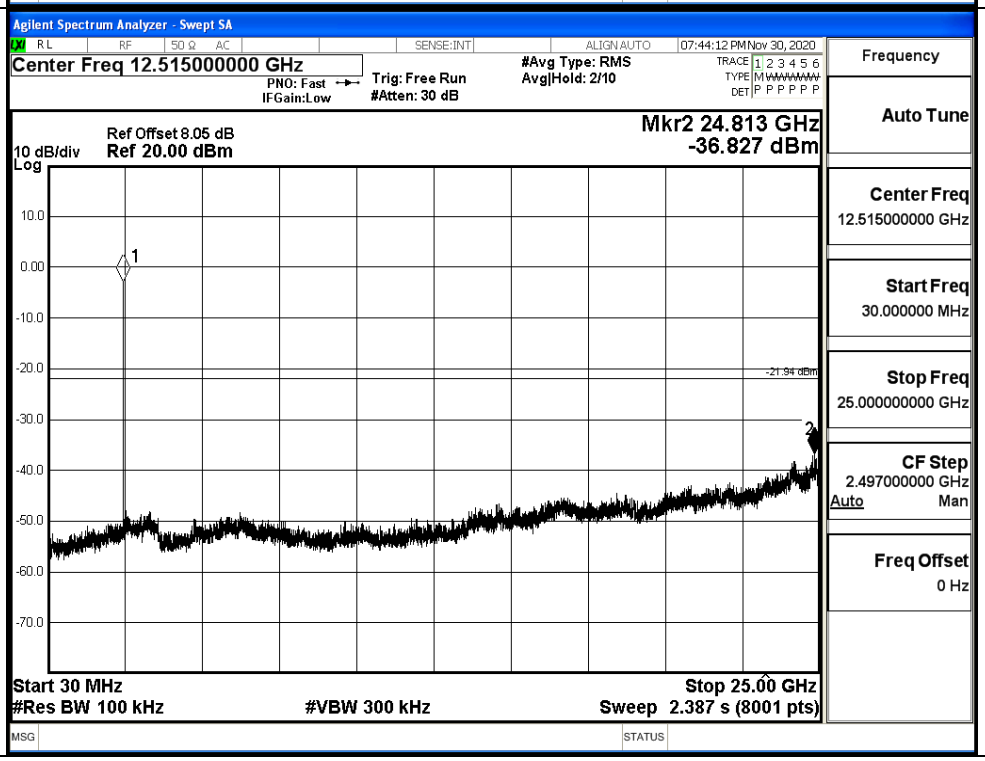
Pref		
Puw		

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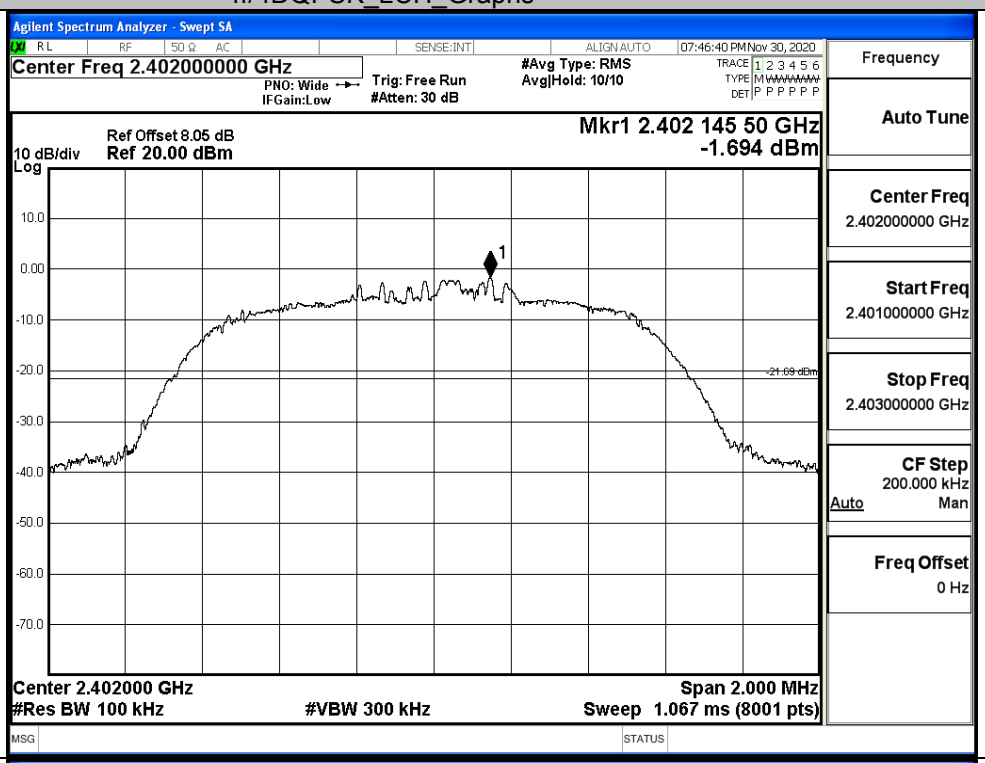
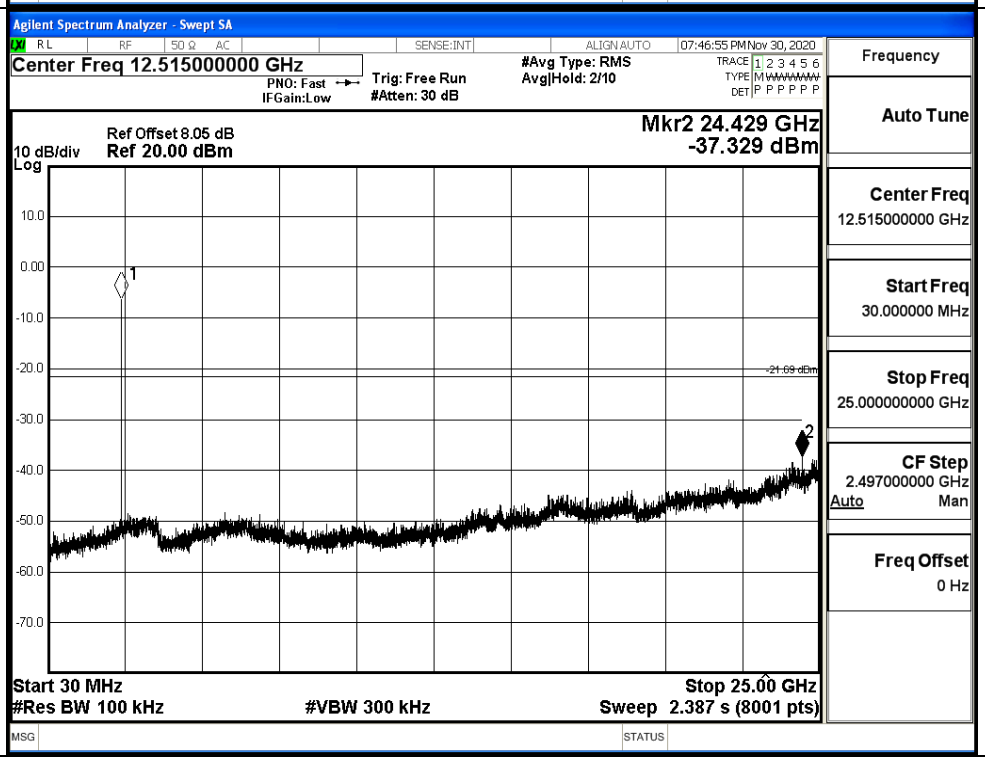
Pref		
Puw		

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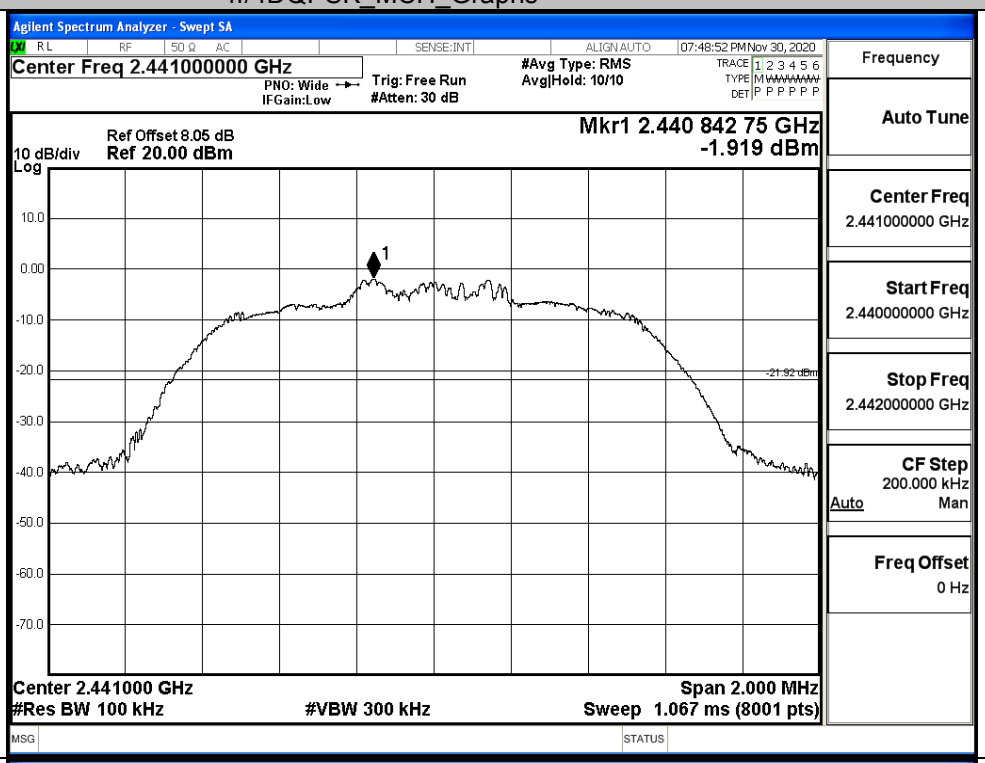
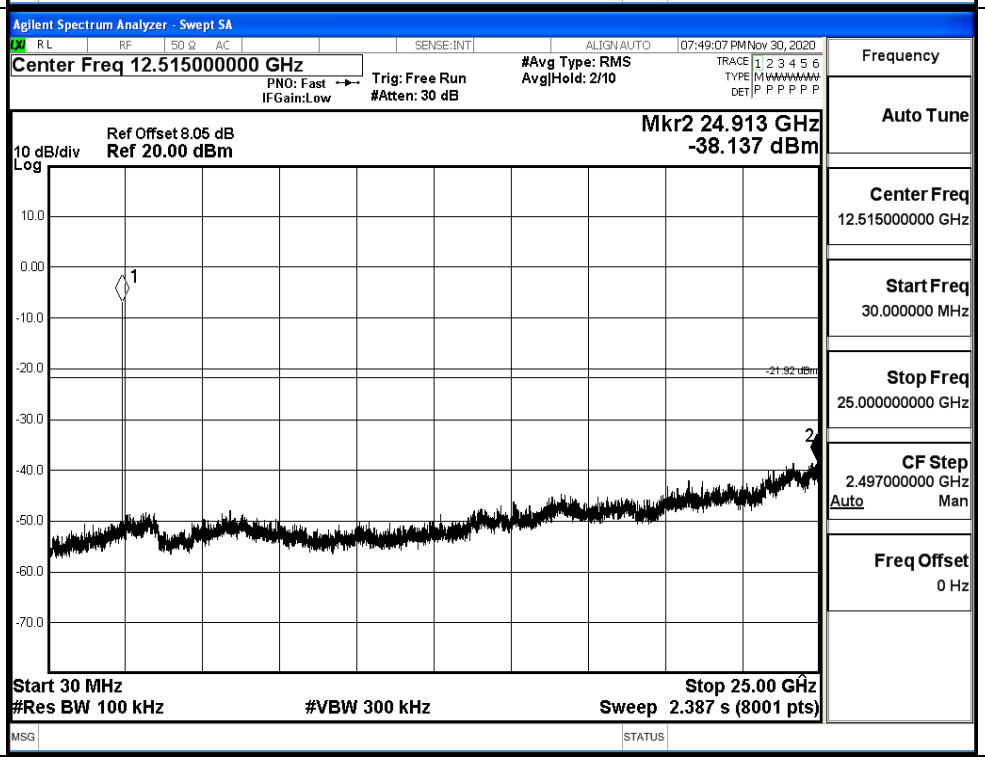
Pref		
Puw		

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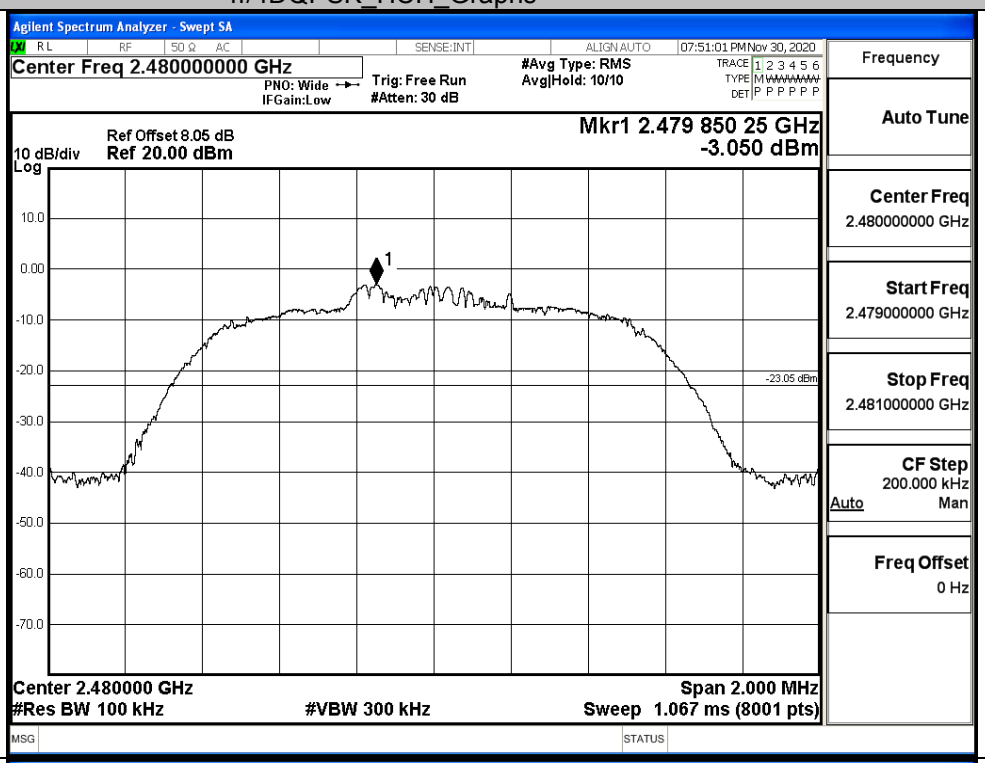
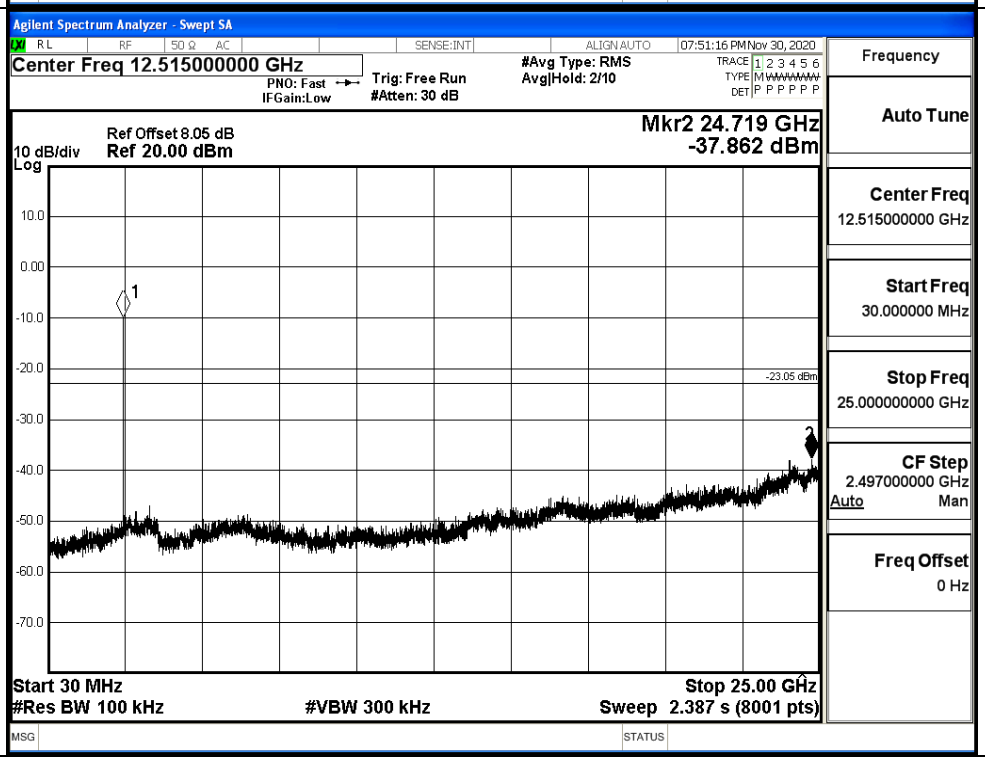
Pref		
Puw		

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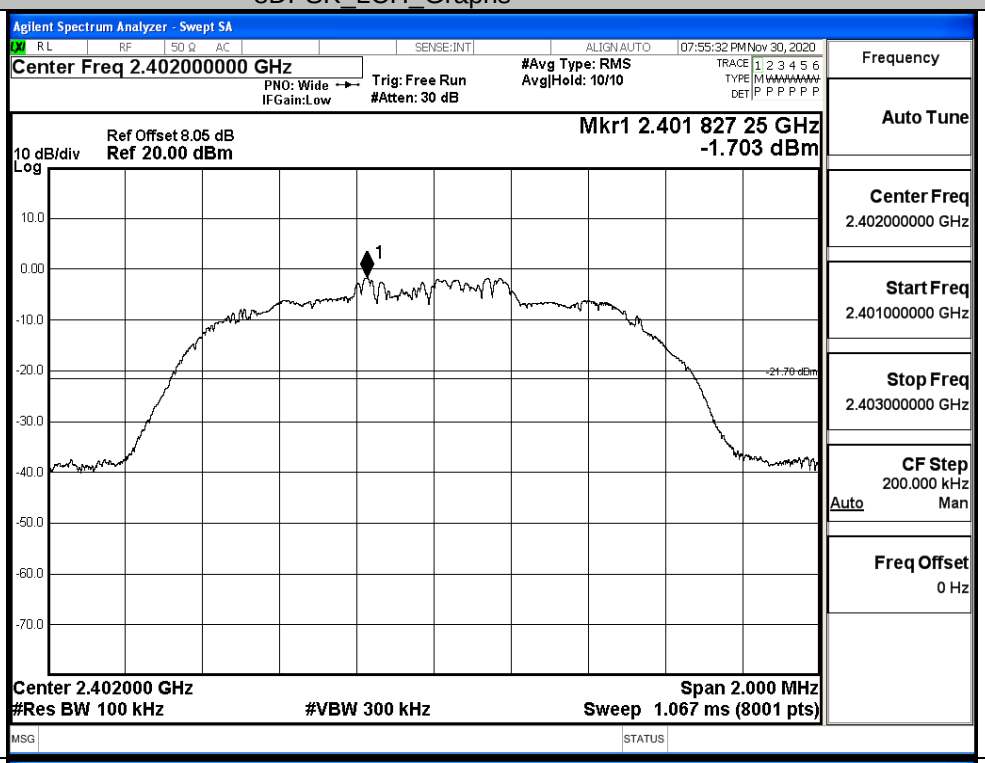
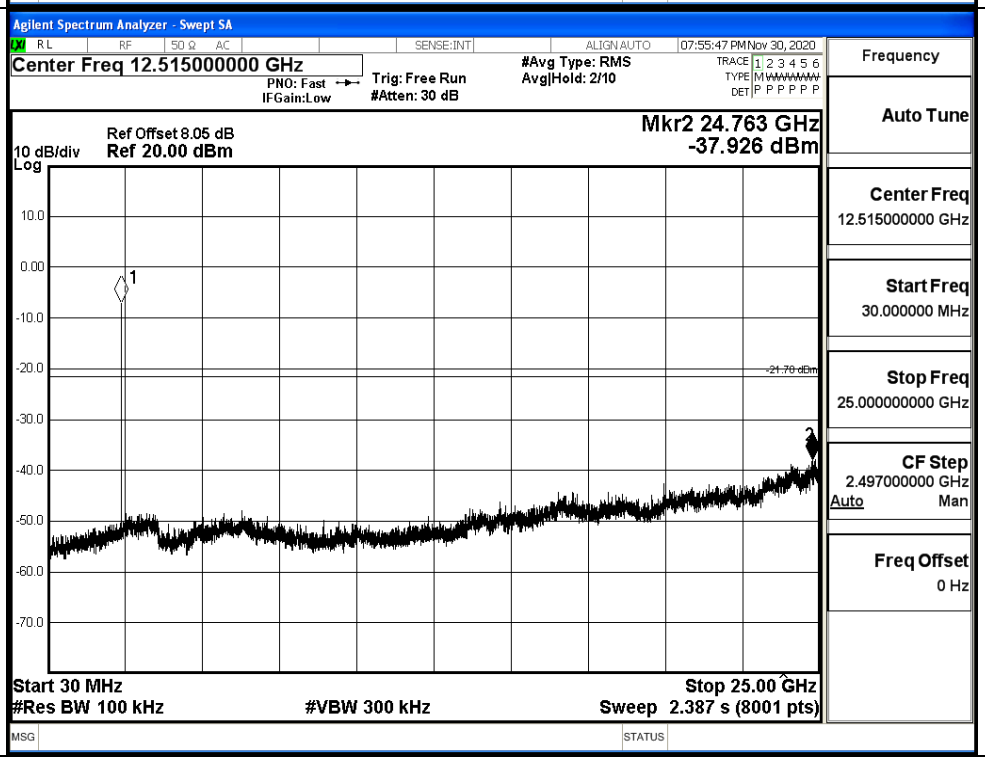
Pref		
Puw		

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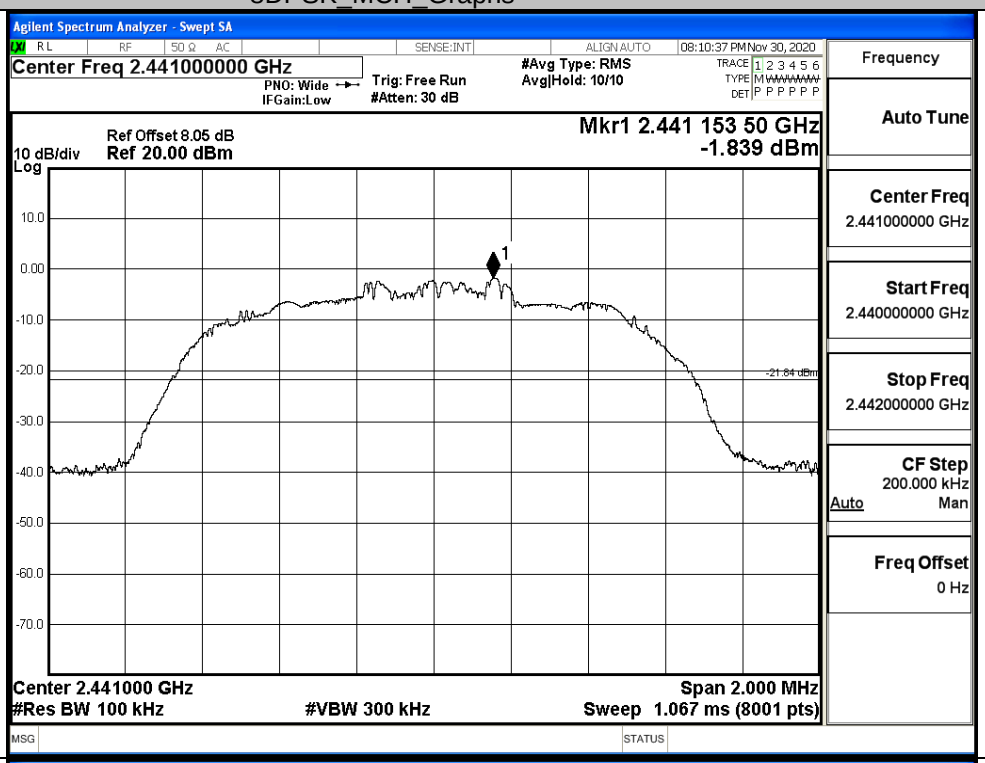
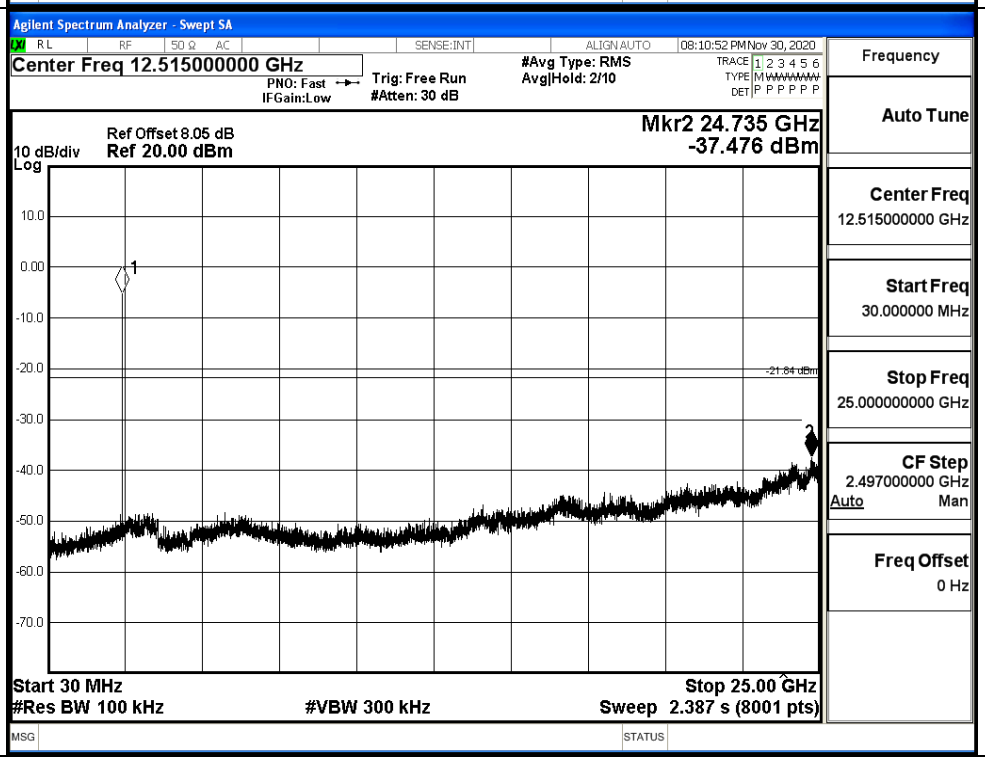
Pref		
Puw		

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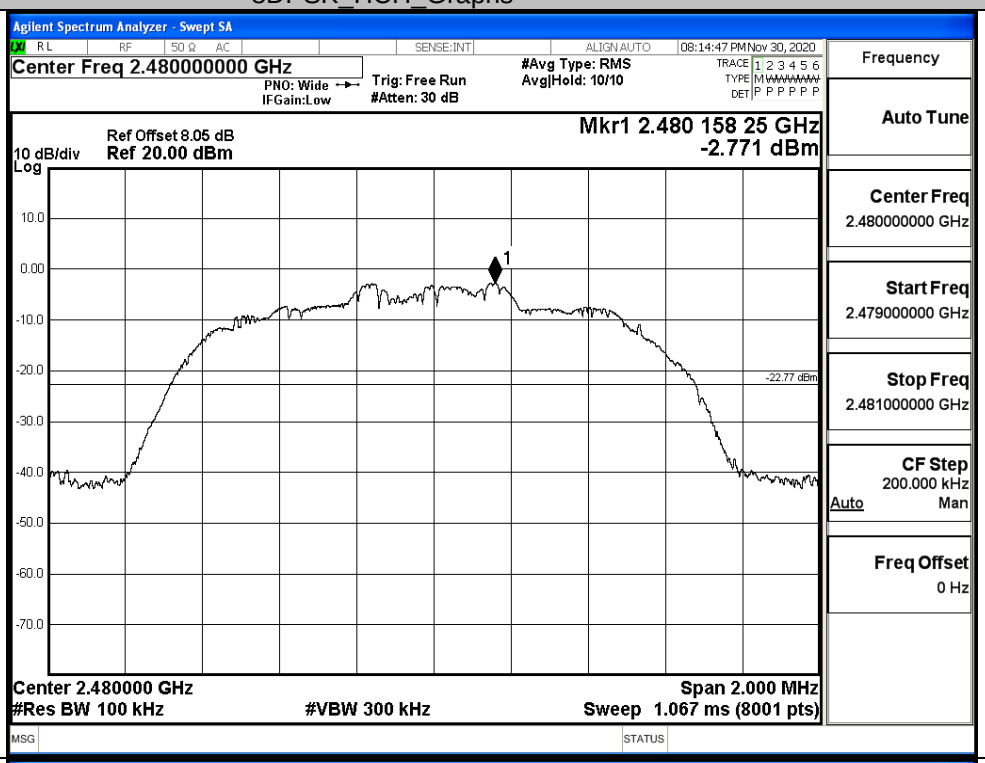
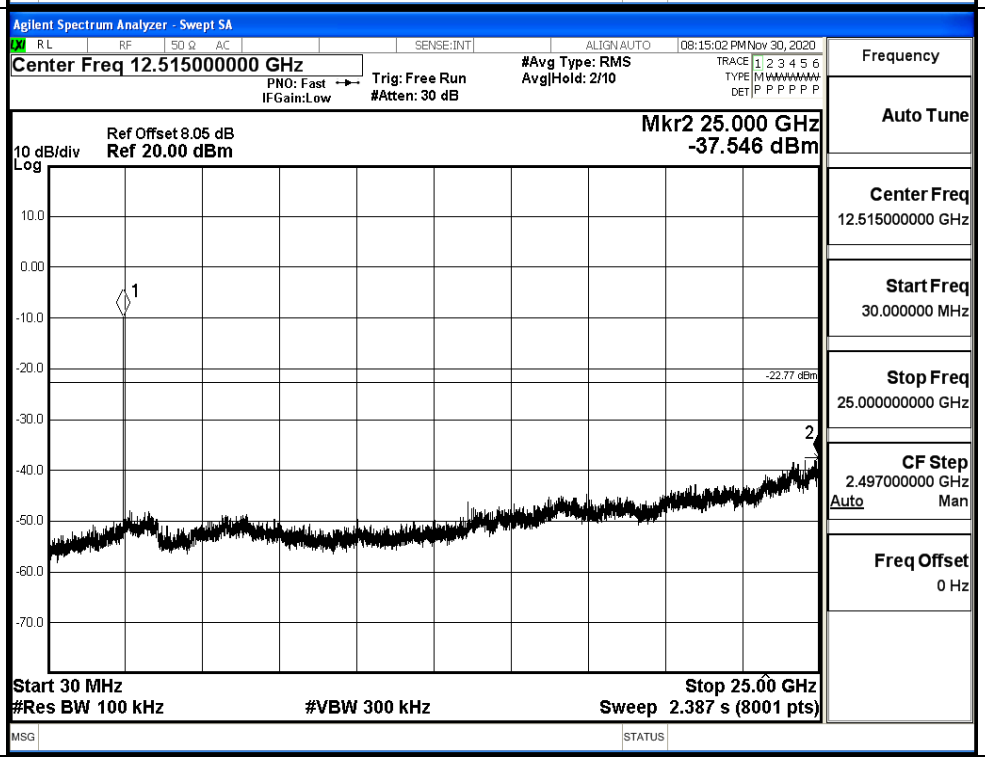
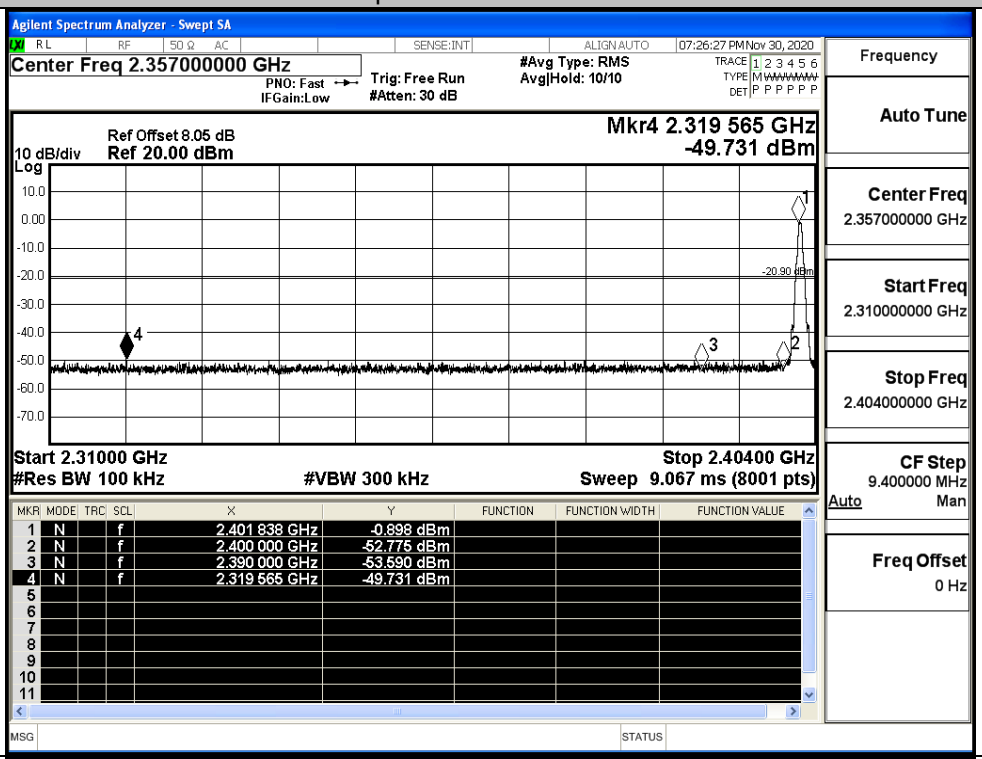
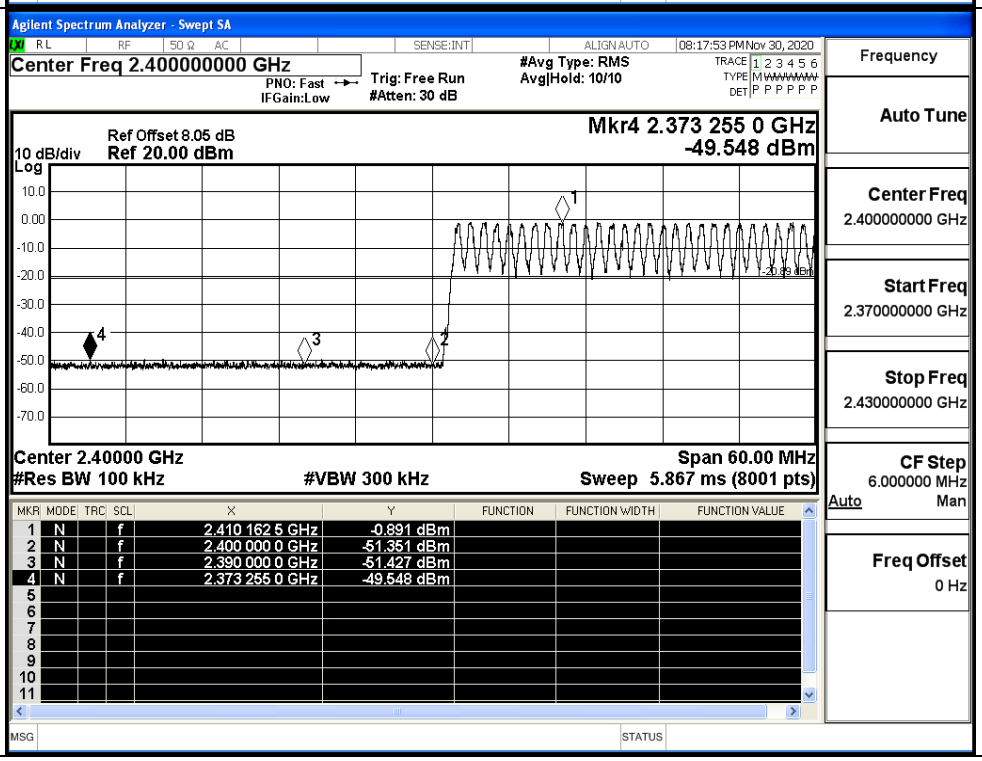
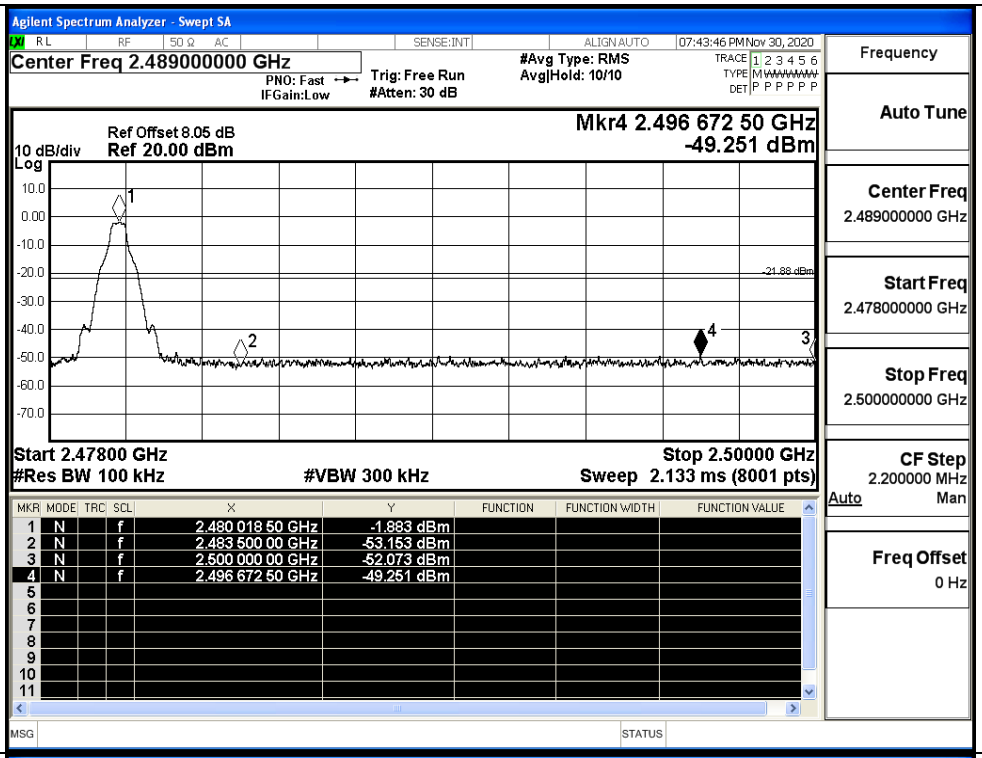
Pref		
Puw		

A.7 Band-edge for RF Conducted Emissions

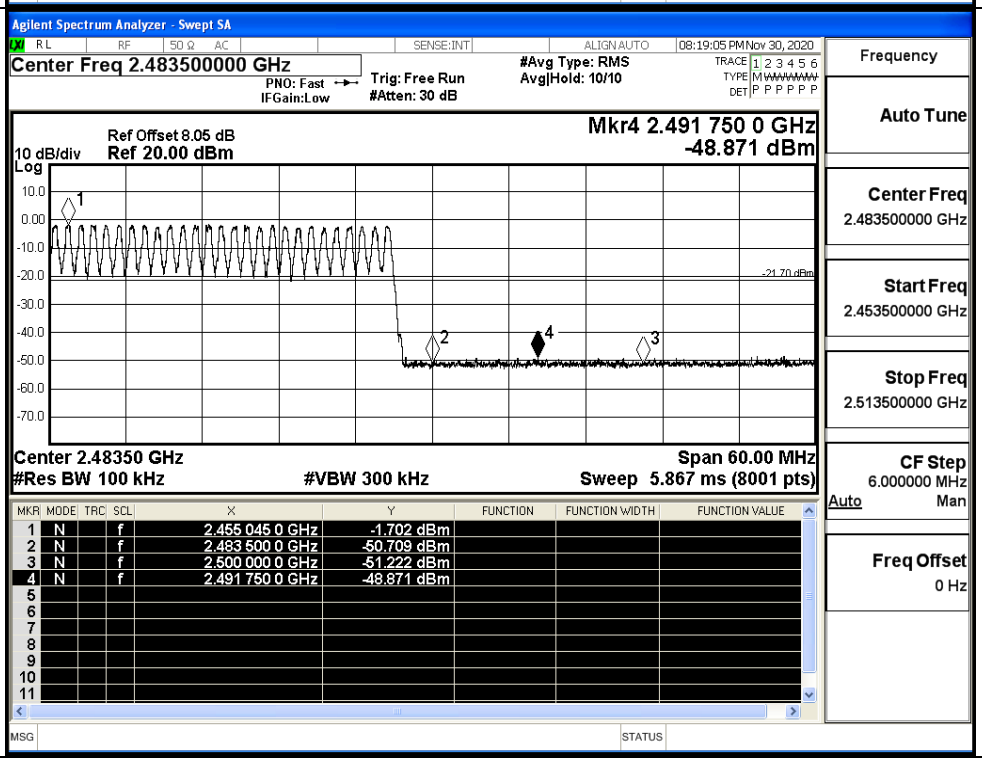
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-0.898	Off	-49.731	-20.9	PASS
			-0.891	On	-49.548	-20.89	PASS
	HCH	2480	-1.883	Off	-49.251	-21.88	PASS
			-1.702	On	-48.871	-21.7	PASS
π/4DQPSK	LCH	2402	-1.426	Off	-49.245	-21.43	PASS
			-1.483	On	-49.081	-21.48	PASS
	HCH	2480	-2.836	Off	-49.000	-22.84	PASS
			-2.362	On	-48.545	-22.36	PASS
8DPSK	LCH	2402	-3.684	Off	-49.530	-23.68	PASS
			-1.576	On	-49.262	-21.58	PASS
	HCH	2480	-2.693	Off	-48.892	-22.69	PASS
			-2.261	On	-48.582	-22.26	PASS

Test Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

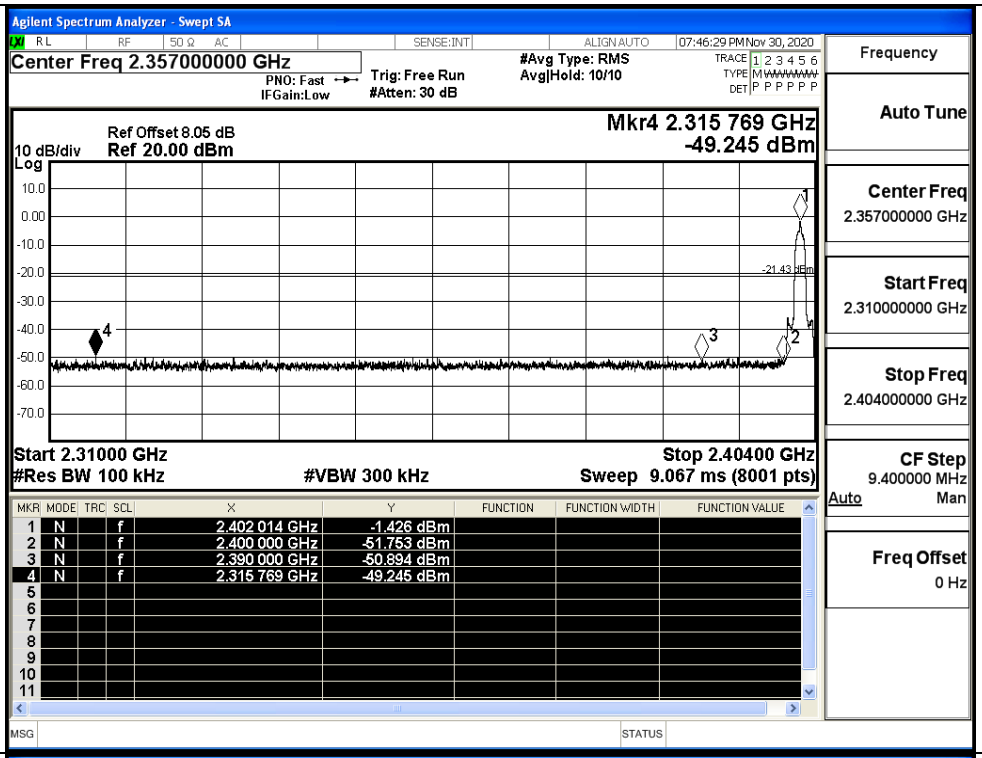
GFSK/HCH/No Hop



GFSK/HCH/Hop



π/4DQPSK/LCH/No Hop



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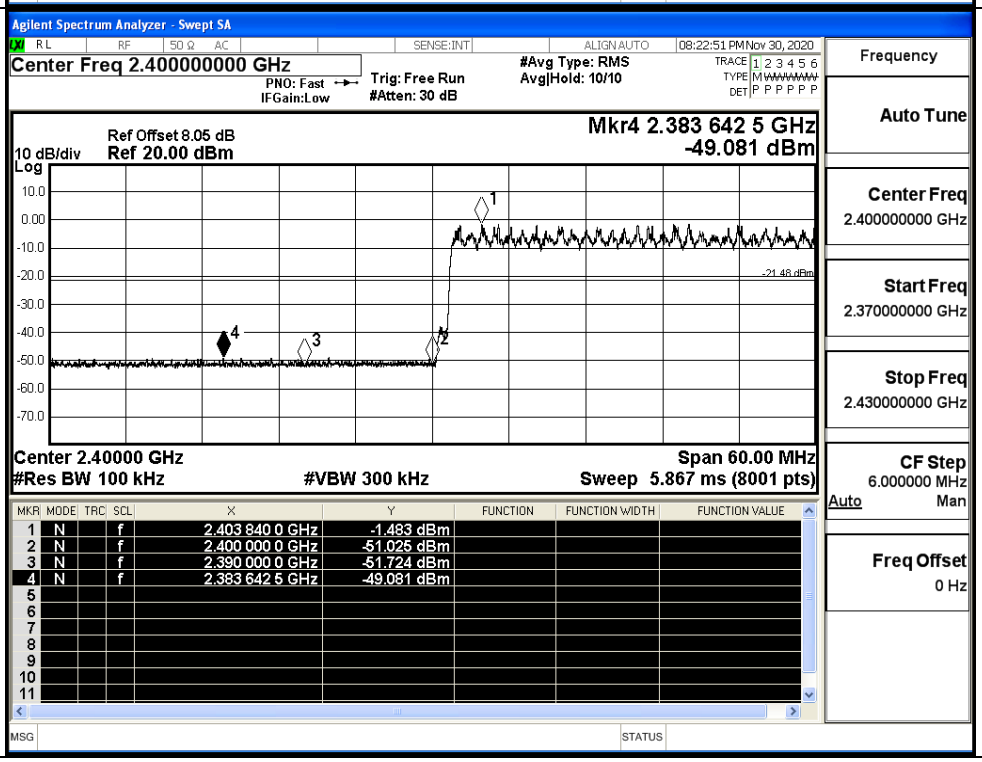

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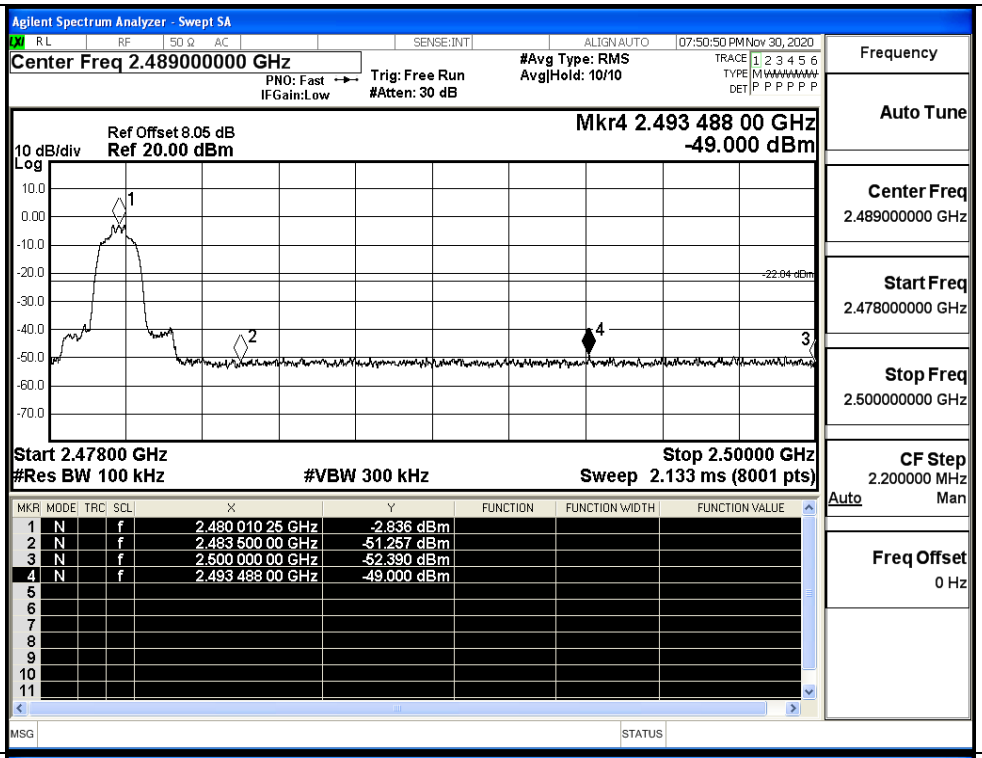

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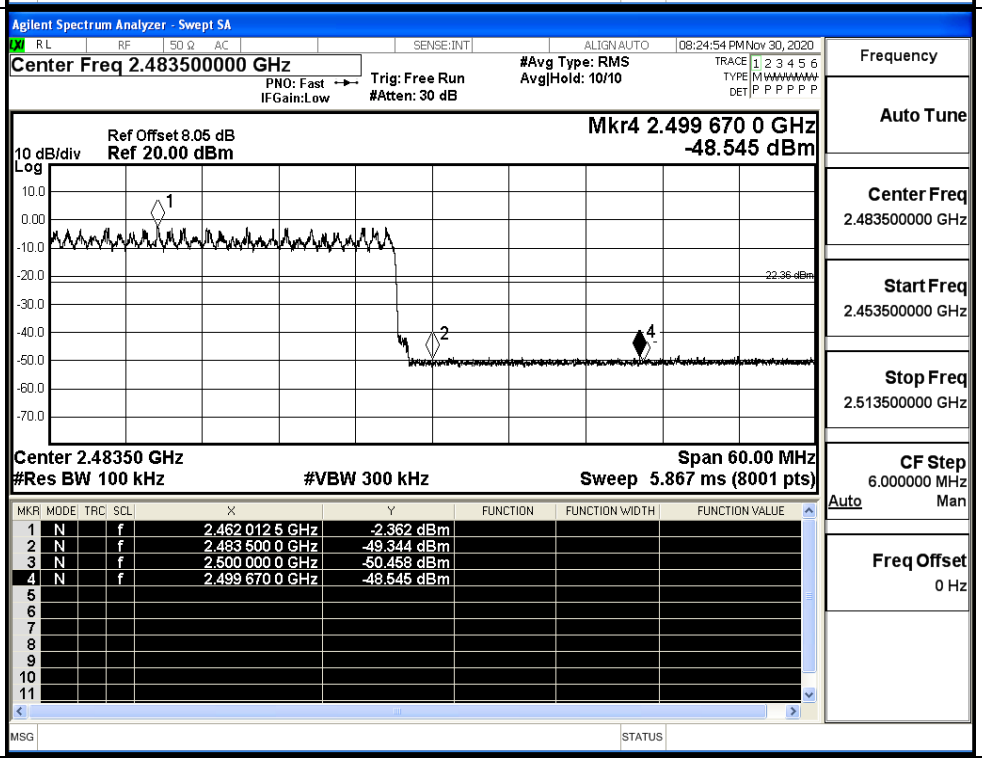
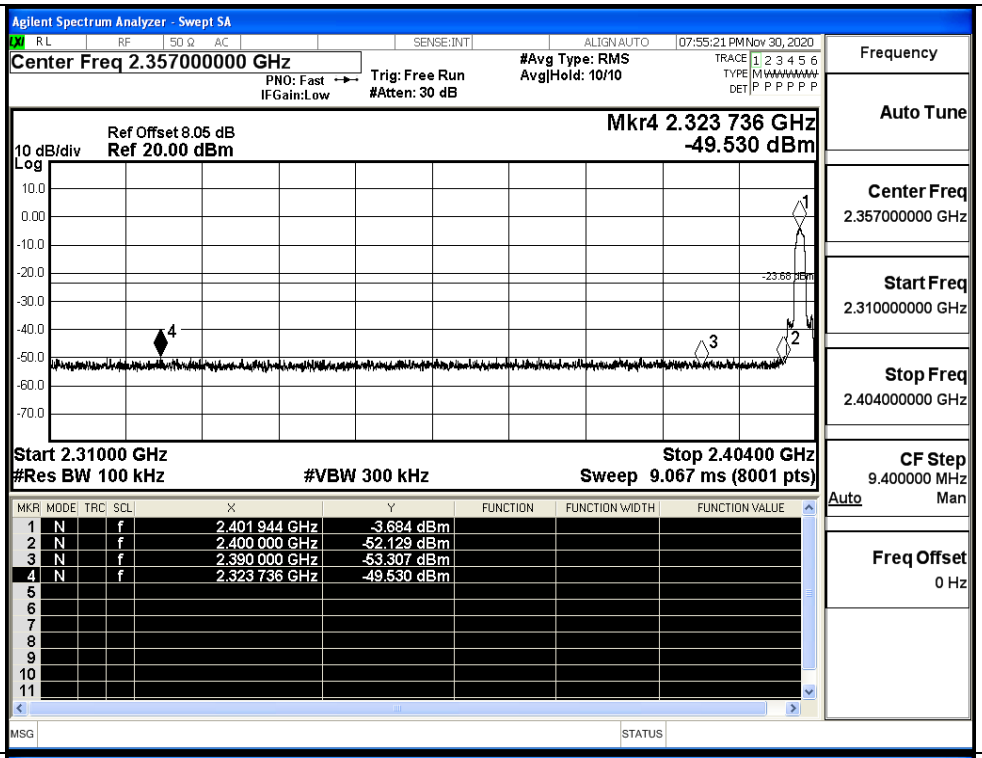
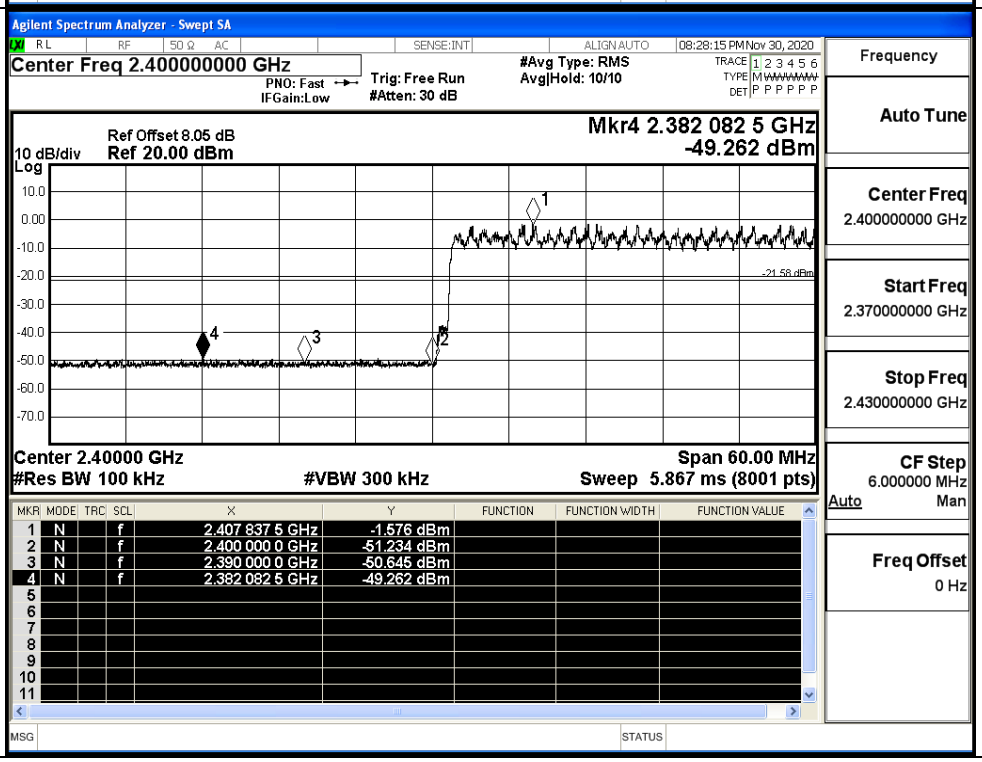
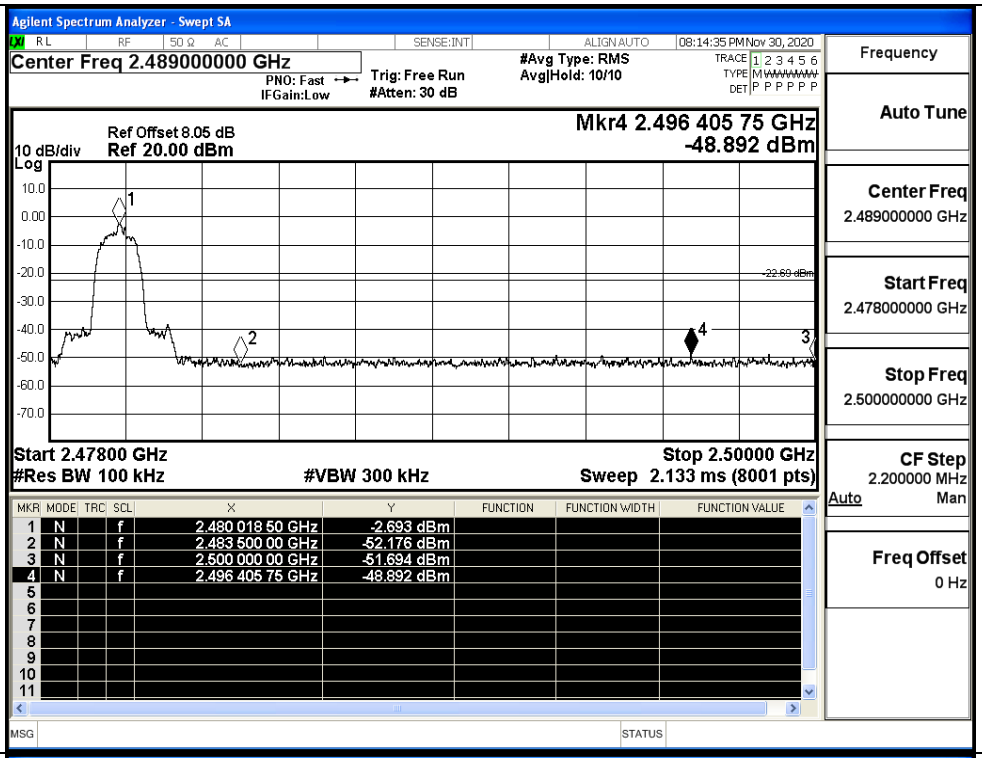
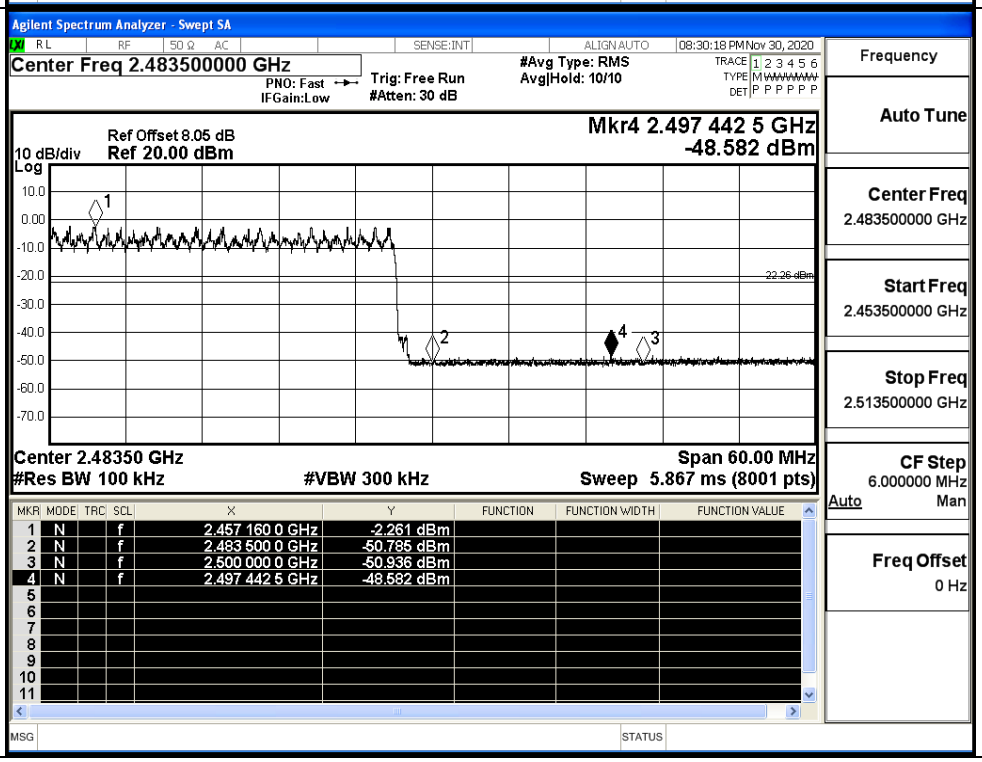


8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

8DPSK/HCH/No Hop



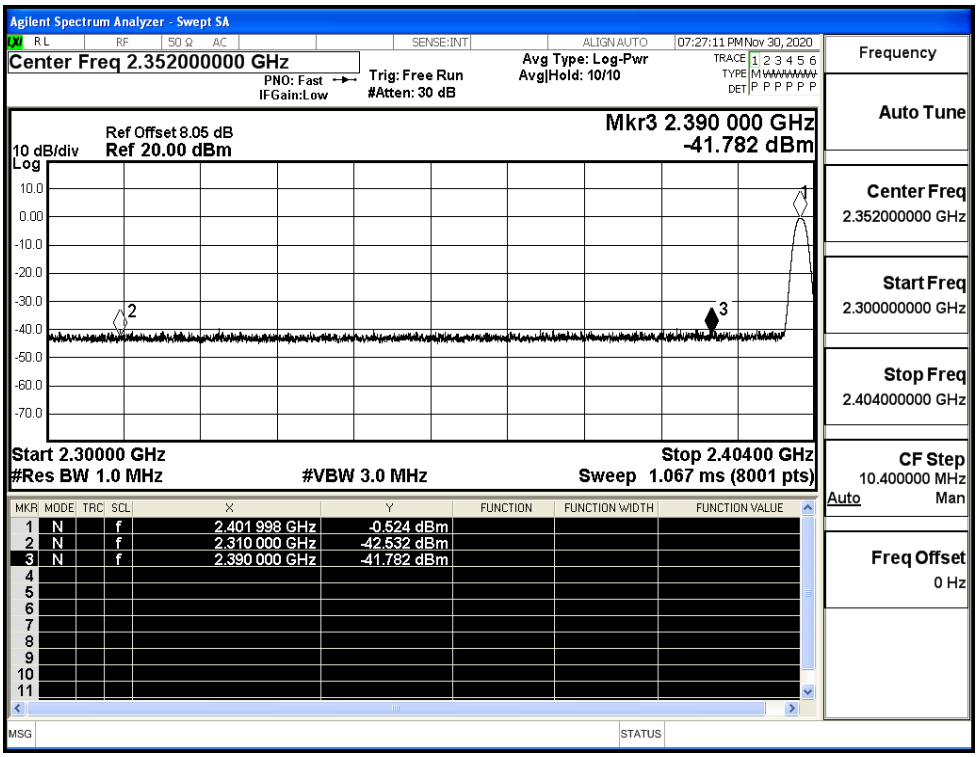
8DPSK/HCH/Hop



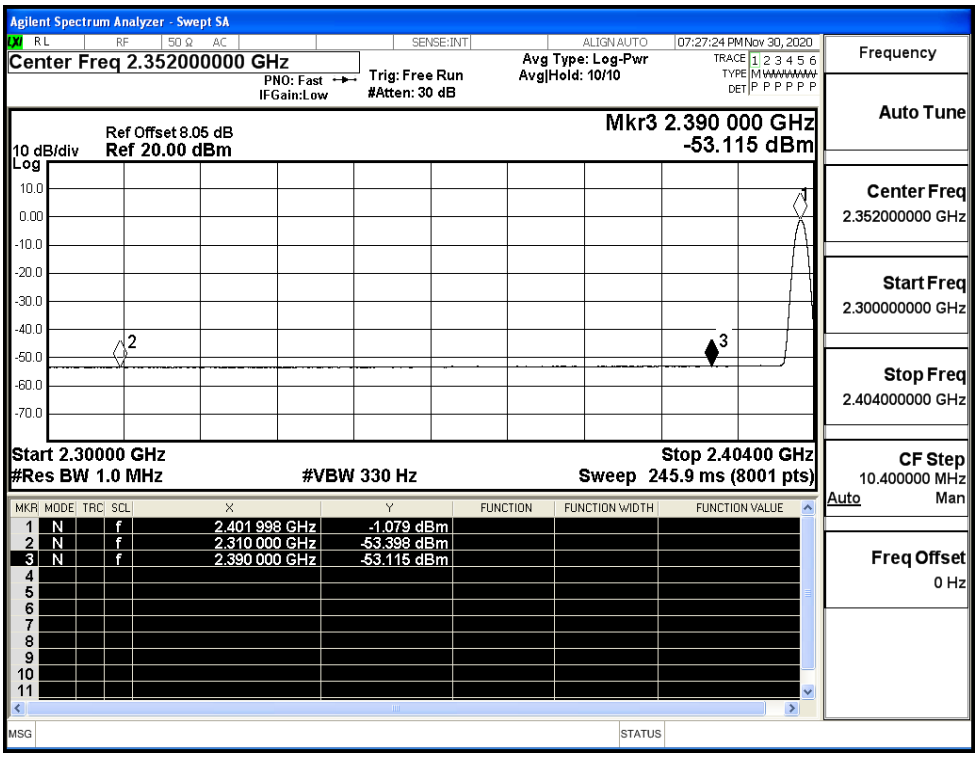
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-42.53	2.0	0	52.73	PEAK	74	PASS
	Off	2310.0	-53.40	2.0	0	41.86	AV	54	PASS
	Off	2390.0	-41.78	2.0	0	53.48	PEAK	74	PASS
	Off	2390.0	-53.12	2.0	0	42.14	AV	54	PASS
	Off	2483.5	-43.27	2.0	0	51.98	PEAK	74	PASS
	Off	2483.5	-52.48	2.0	0	42.78	AV	54	PASS
	Off	2500.0	-42.49	2.0	0	52.77	PEAK	74	PASS
	Off	2500.0	-52.36	2.0	0	42.90	AV	54	PASS
π/4DQPSK	Off	2310.0	-43.15	2.0	0	52.10	PEAK	74	PASS
	Off	2310.0	-53.41	2.0	0	41.85	AV	54	PASS
	Off	2390.0	-41.70	2.0	0	53.56	PEAK	74	PASS
	Off	2390.0	-52.99	2.0	0	42.26	AV	54	PASS
	Off	2483.5	-42.94	2.0	0	52.31	PEAK	74	PASS
	Off	2483.5	-52.40	2.0	0	42.86	AV	54	PASS
	Off	2500.0	-41.50	2.0	0	53.76	PEAK	74	PASS
	Off	2500.0	-52.40	2.0	0	42.86	AV	54	PASS
8DPSK	Off	2310.0	-42.73	2.0	0	52.53	PEAK	74	PASS
	Off	2310.0	-53.29	2.0	0	41.97	AV	54	PASS
	Off	2390.0	-43.01	2.0	0	52.25	PEAK	74	PASS
	Off	2390.0	-52.93	2.0	0	42.33	AV	54	PASS
	Off	2483.5	-41.79	2.0	0	53.47	PEAK	74	PASS
	Off	2483.5	-52.43	2.0	0	42.82	AV	54	PASS
	Off	2500.0	-41.24	2.0	0	54.02	PEAK	74	PASS
	Off	2500.0	-52.28	2.0	0	42.98	AV	54	PASS

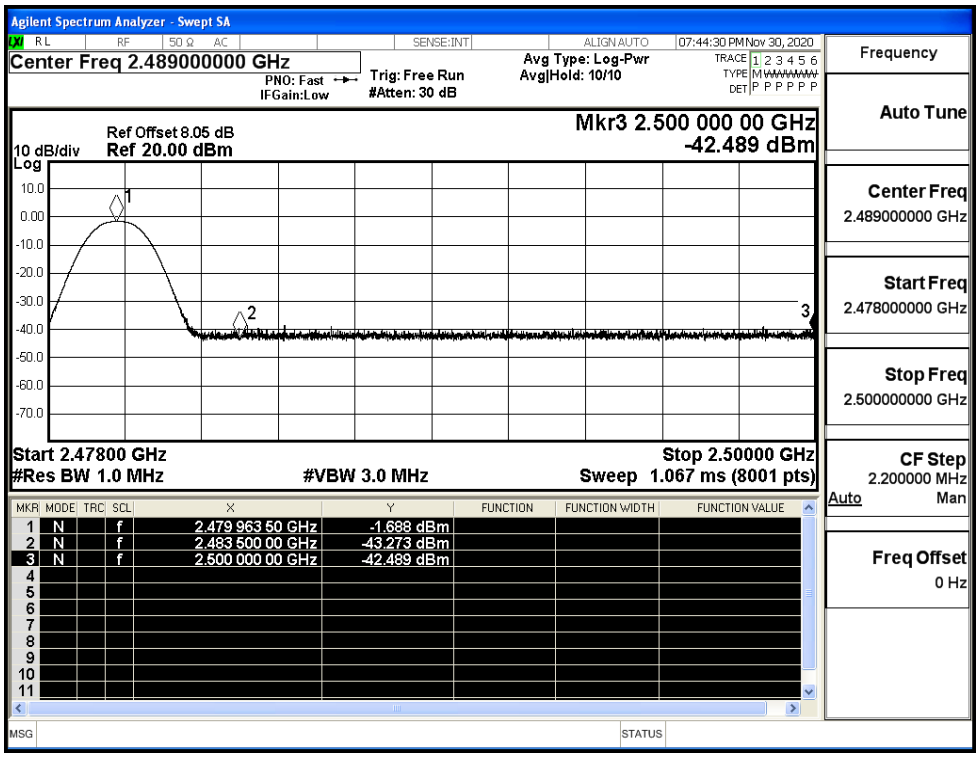
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



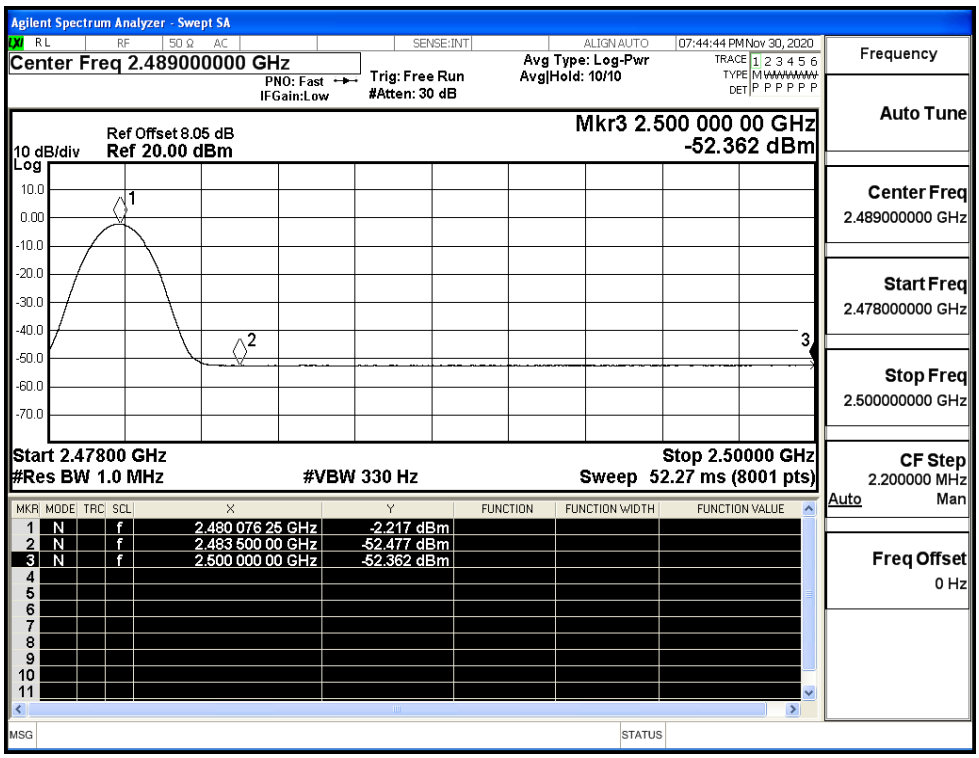
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



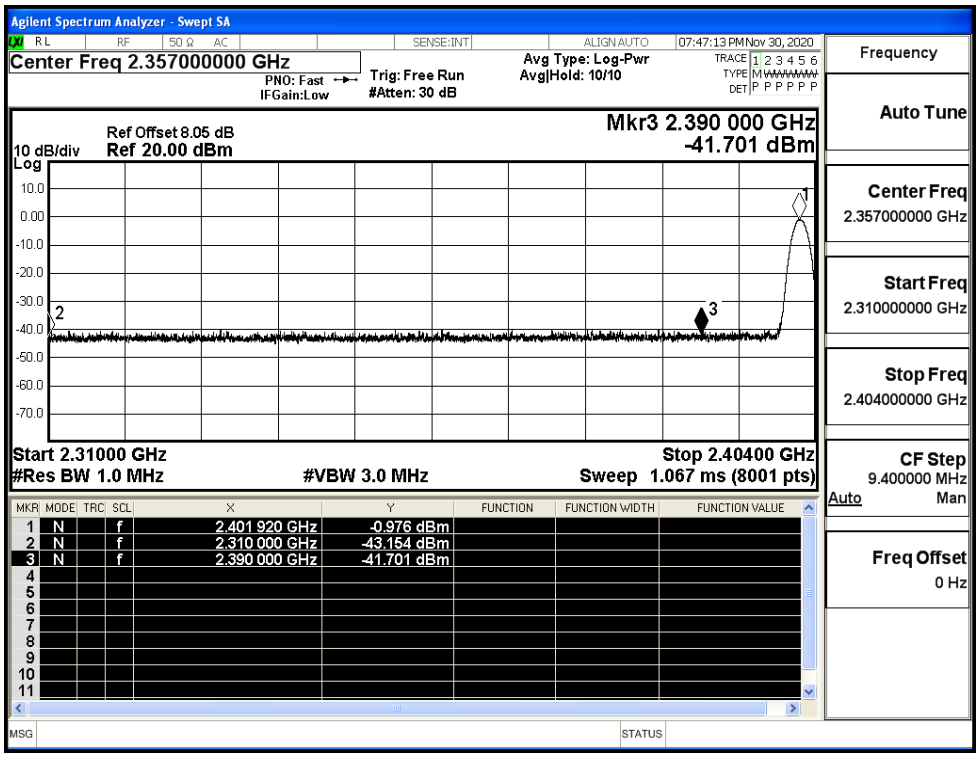
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



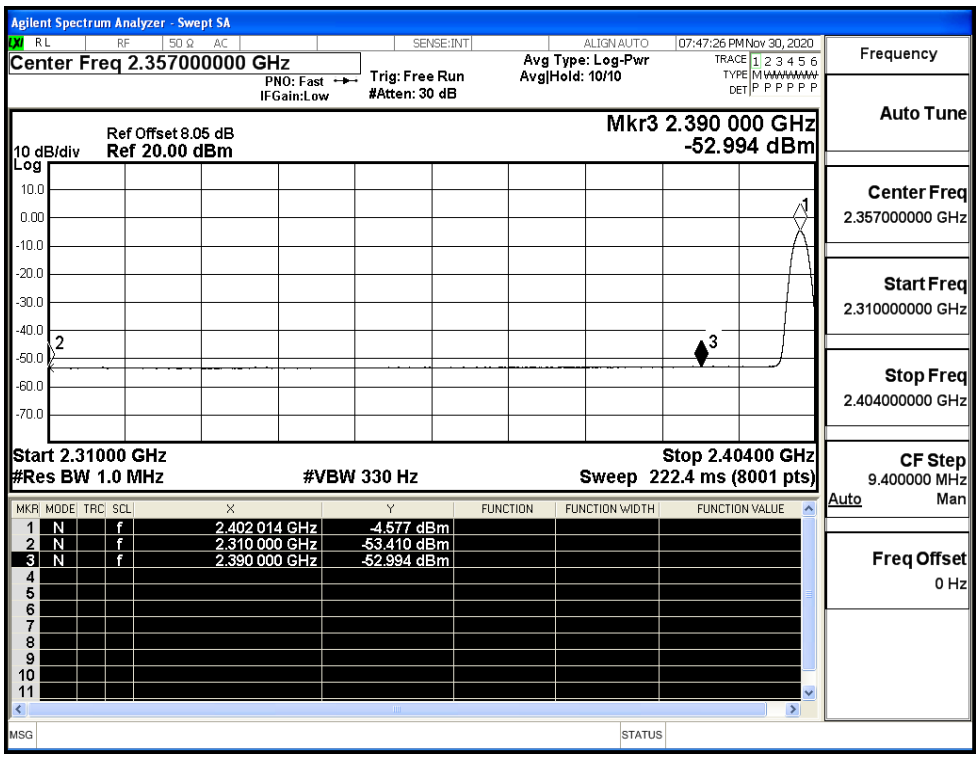
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



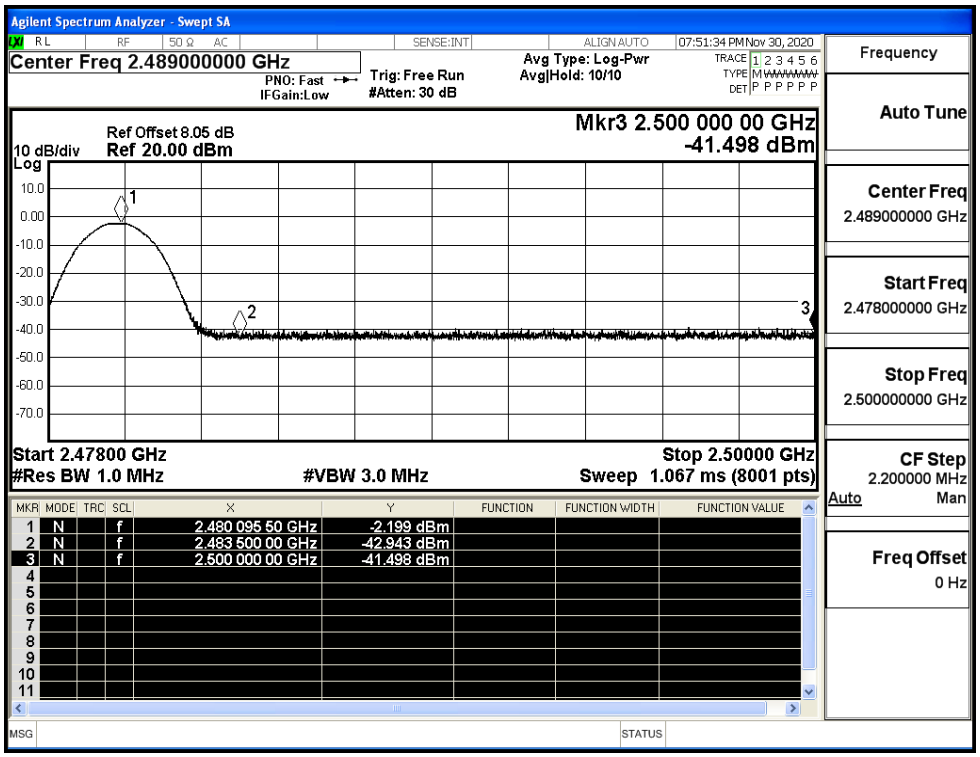
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



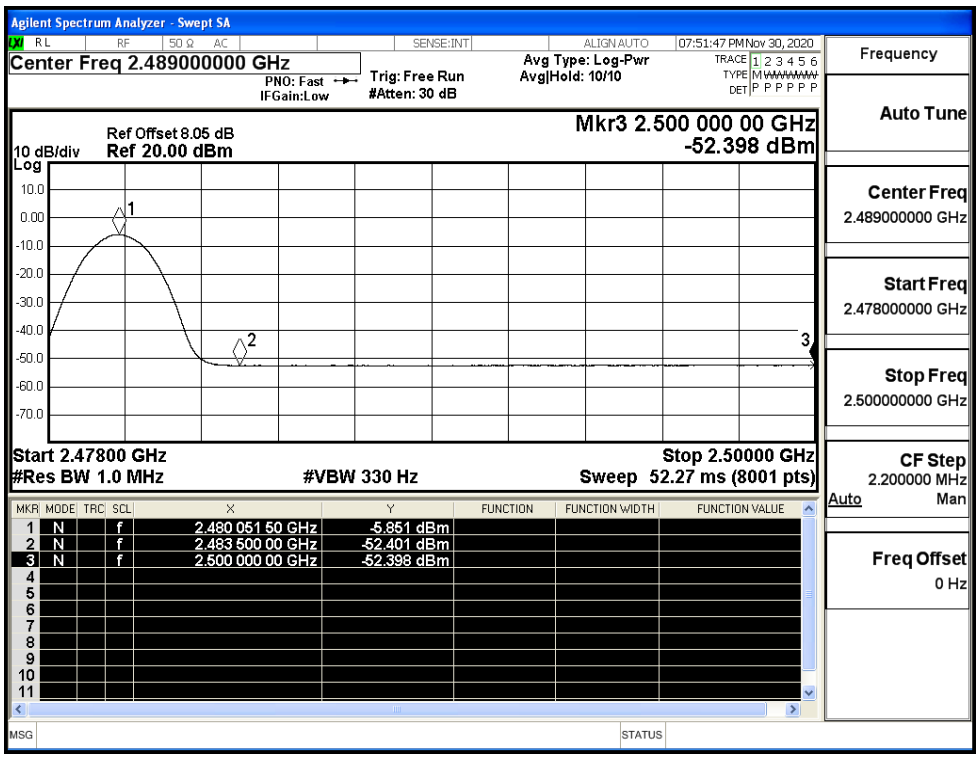
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



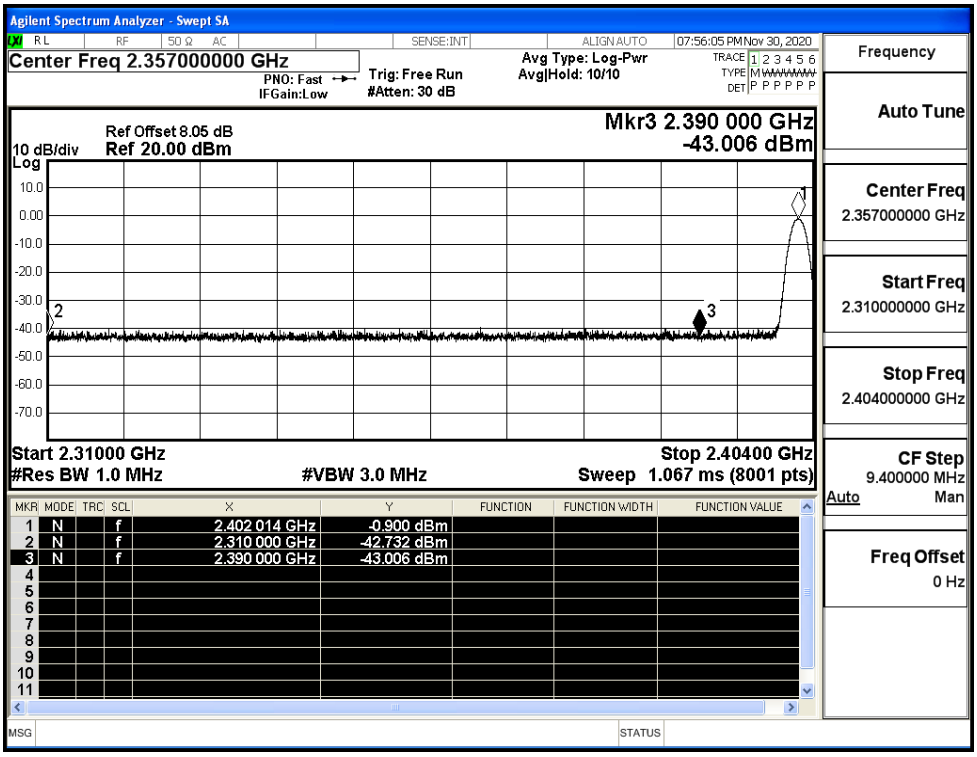
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



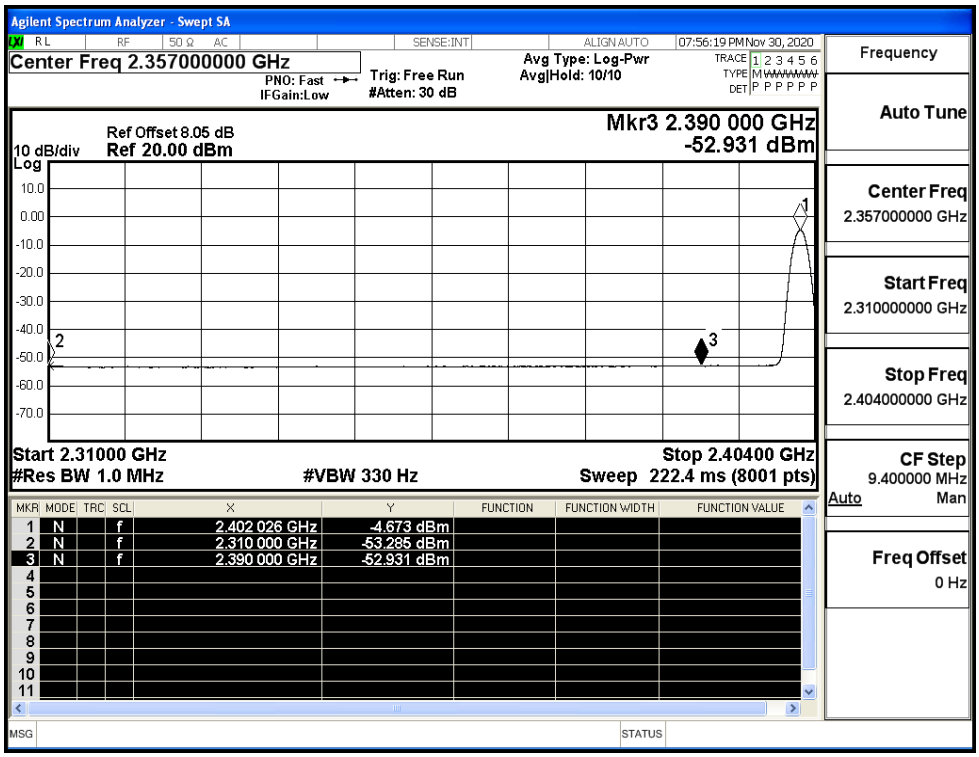
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



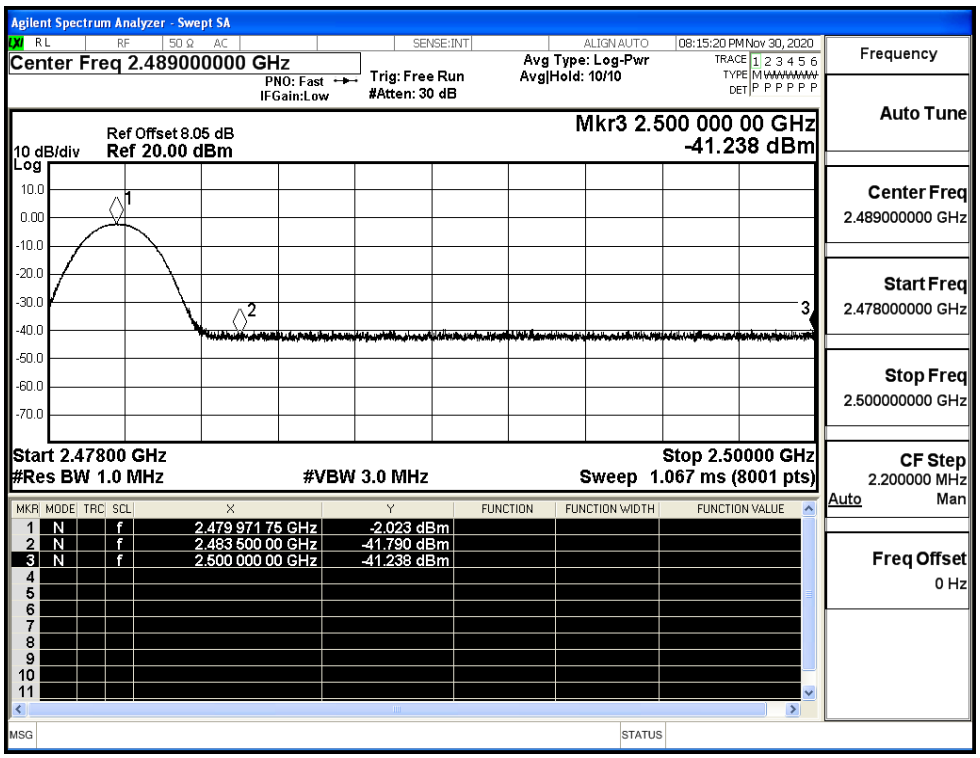
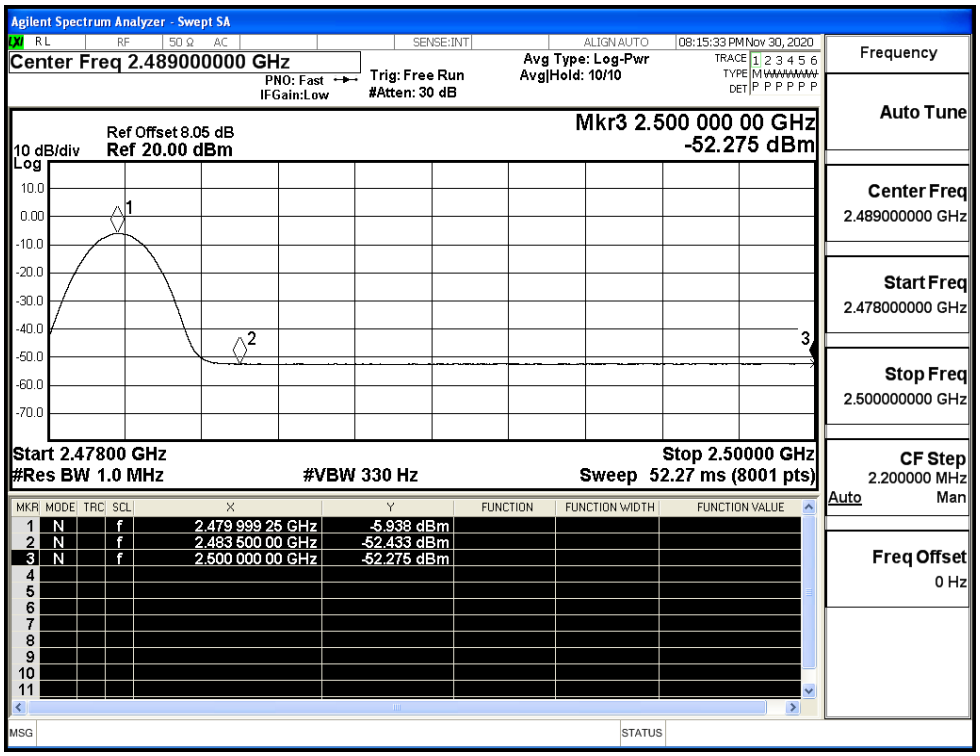
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)