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

Product Name: X-brain Smart gateway
Trade Mark: Xunison

Test Model: XUS100

FCC ID: 2AP2F-XUS100

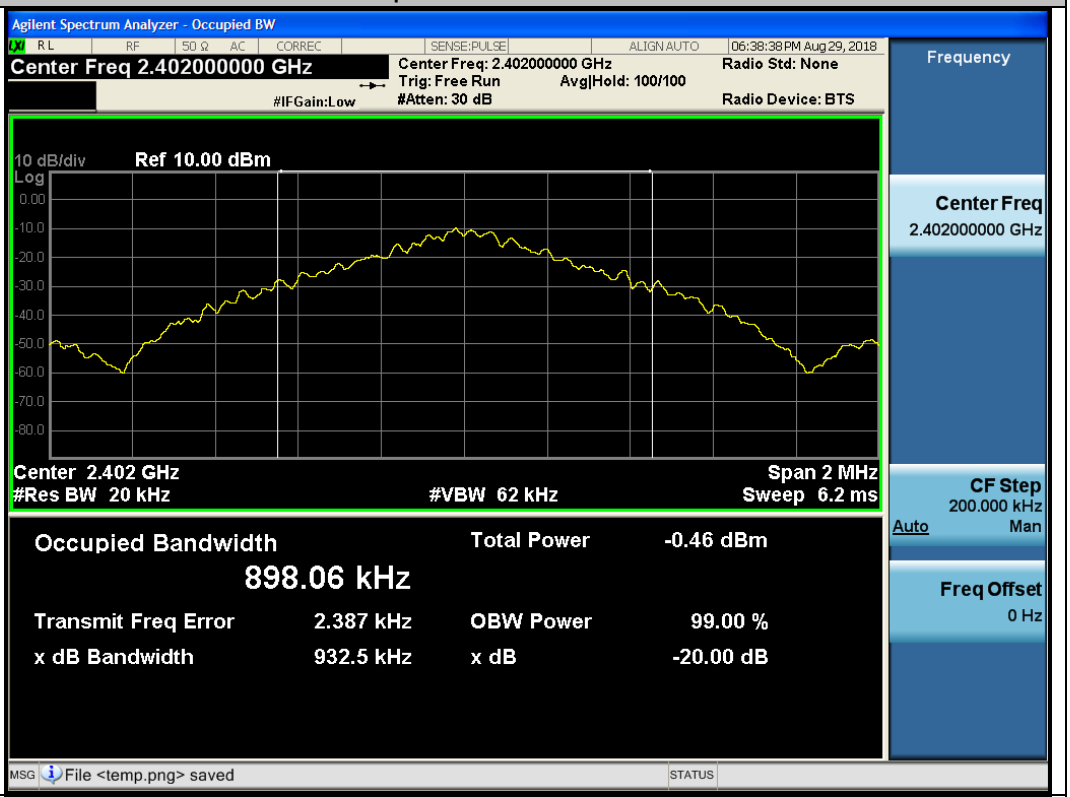
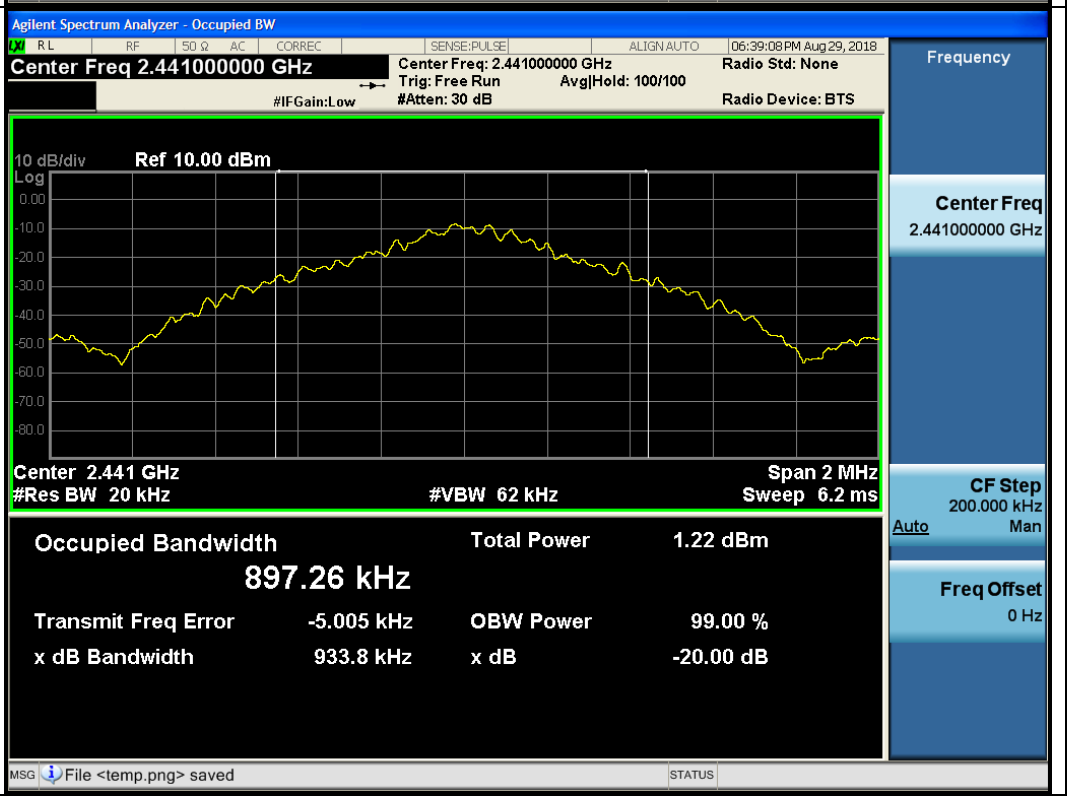
Environmental Conditions

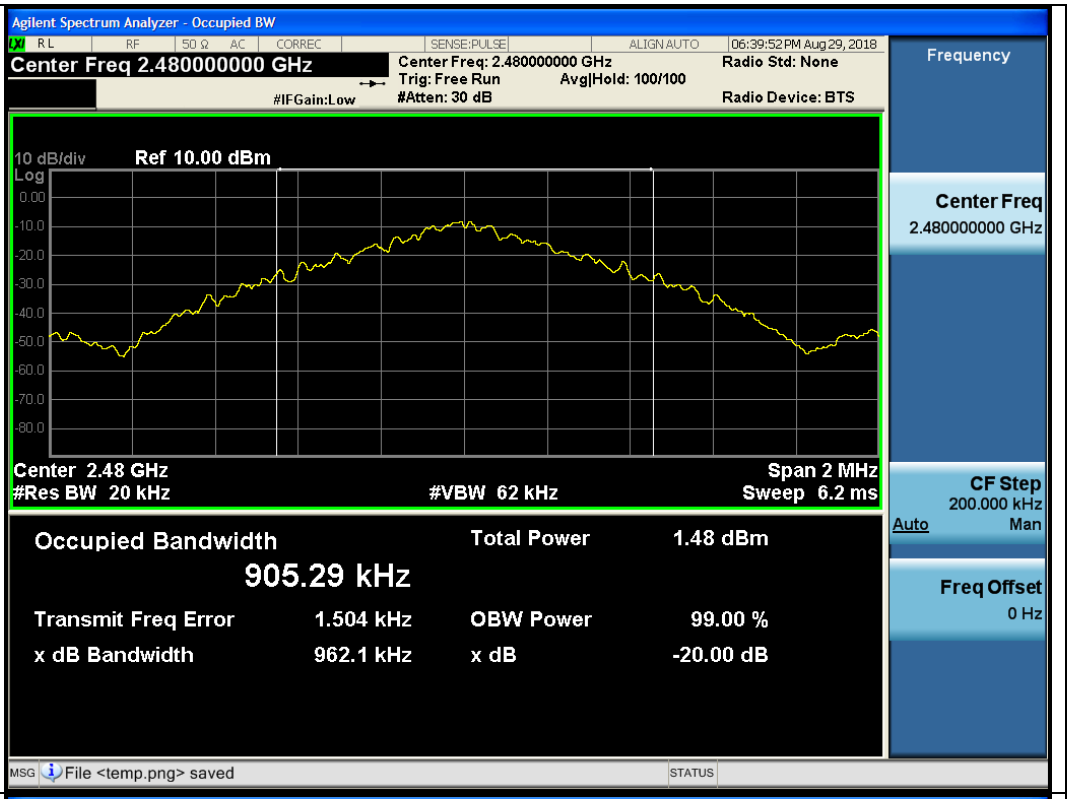
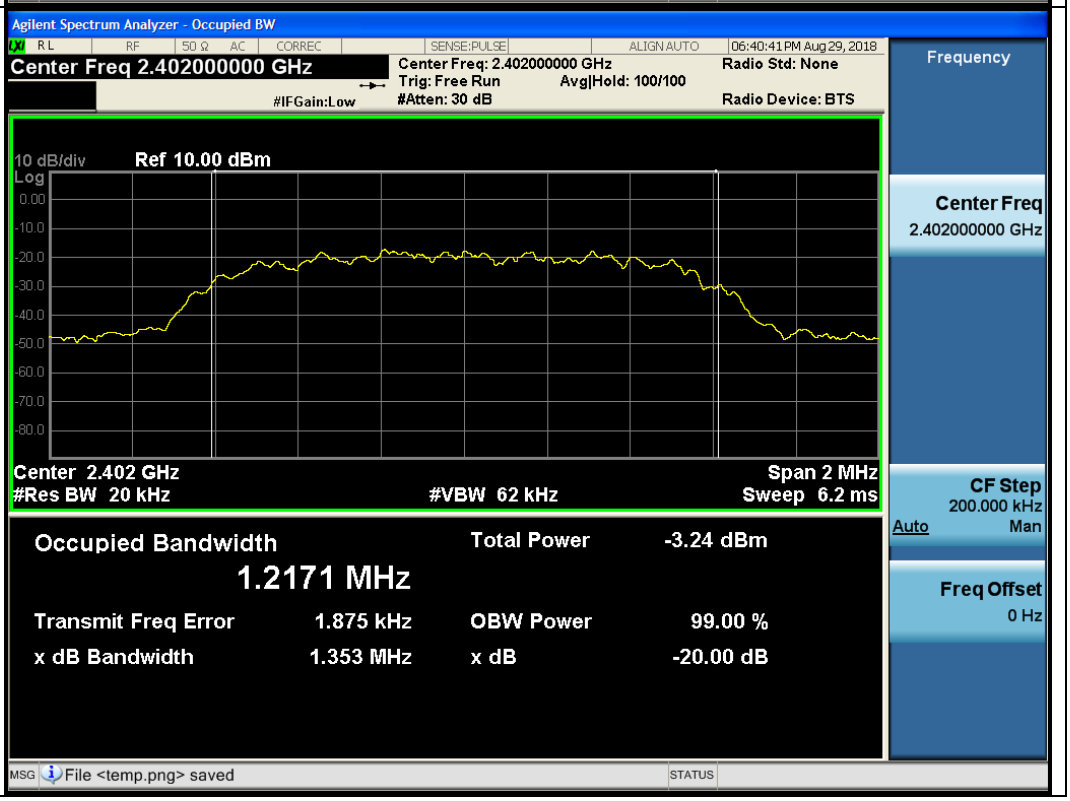
Temperature:	22.9 ° C
Relative Humidity:	52.3%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

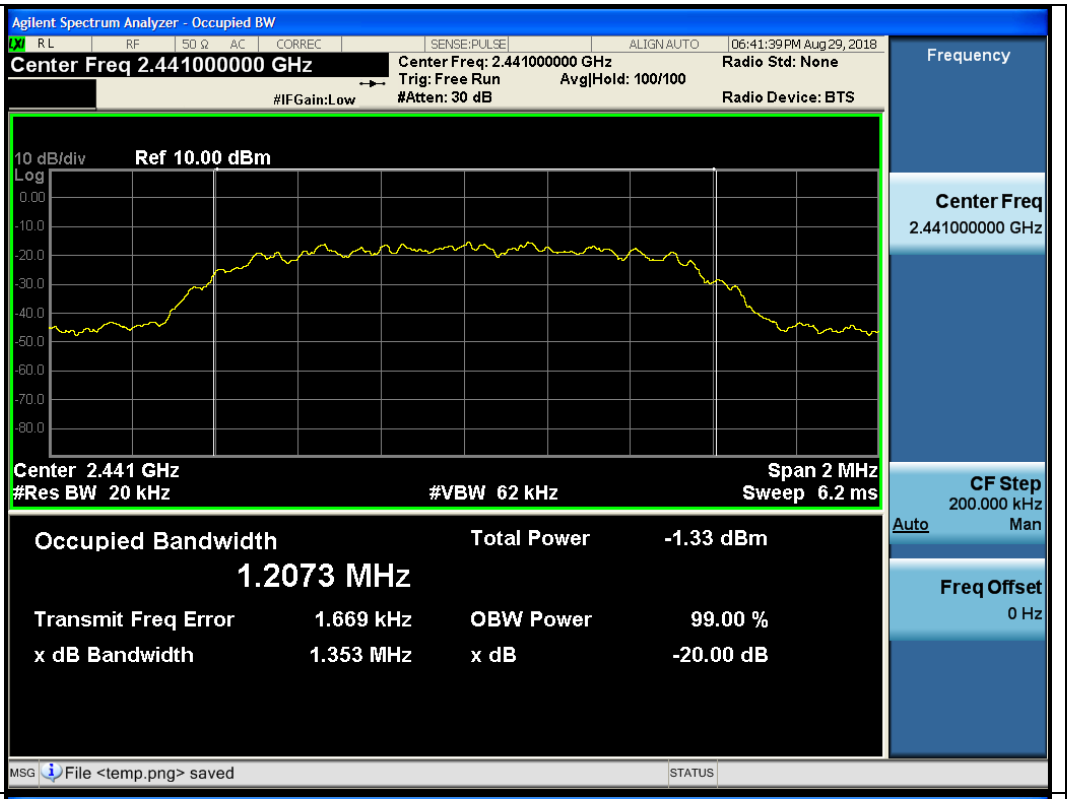
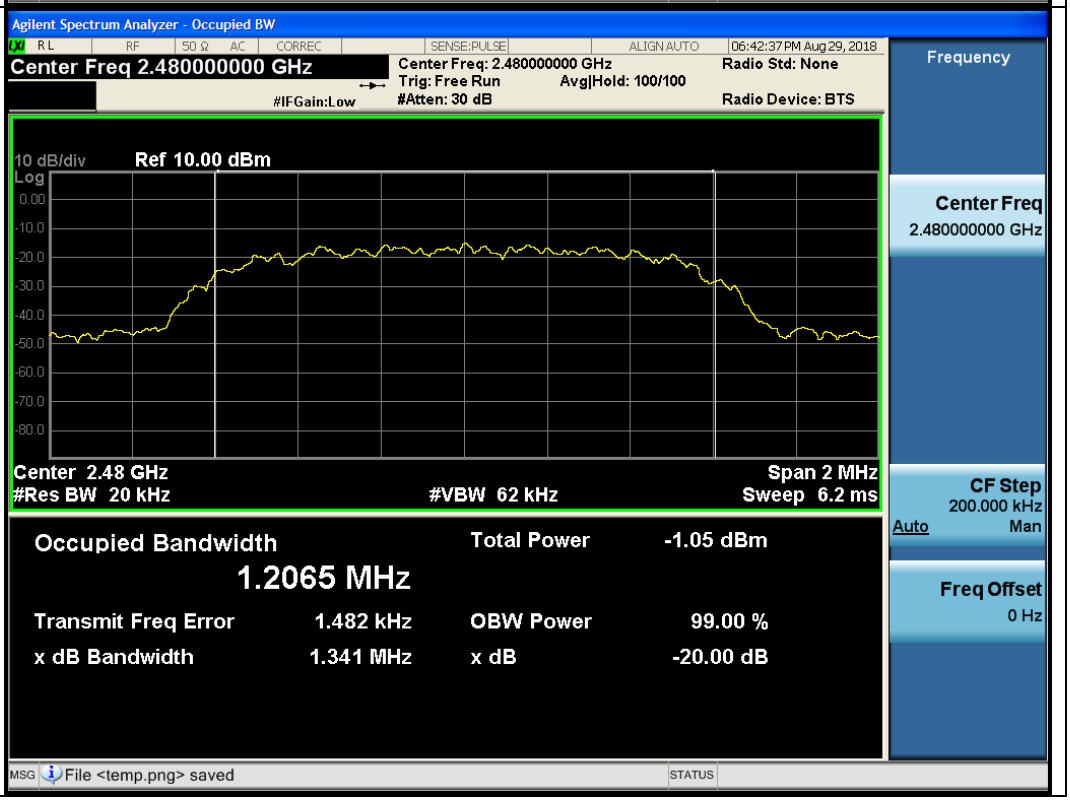
A.1 20 dB Bandwidth

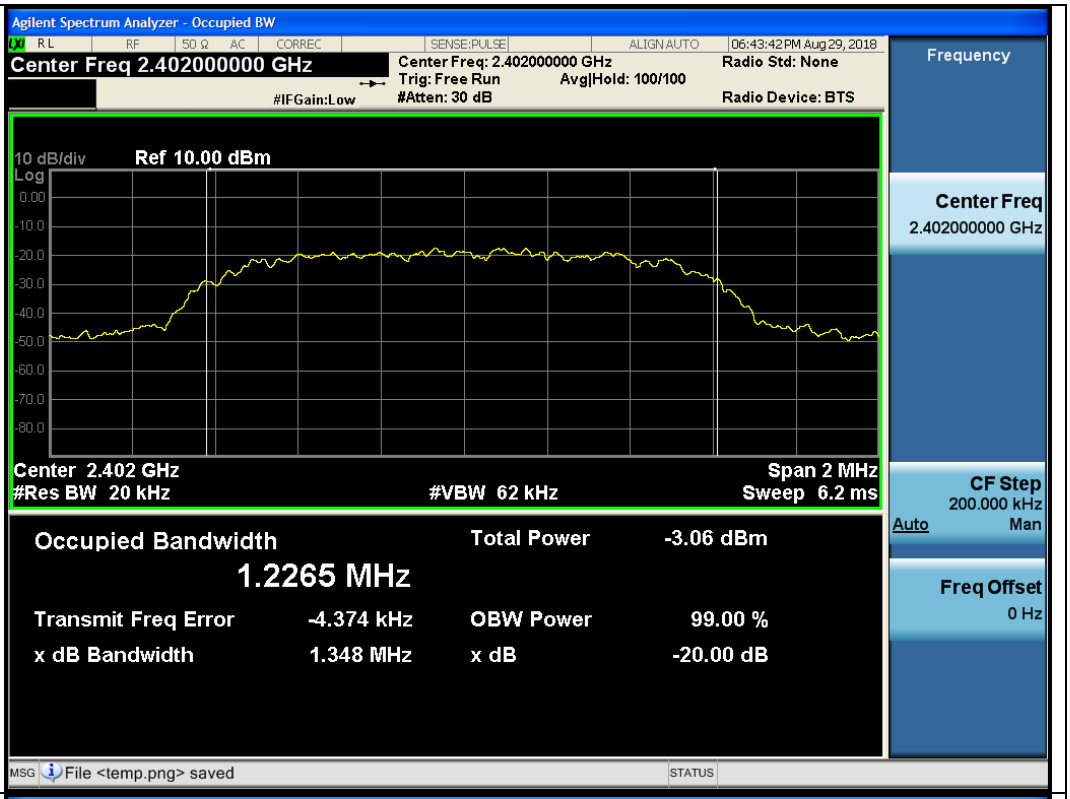
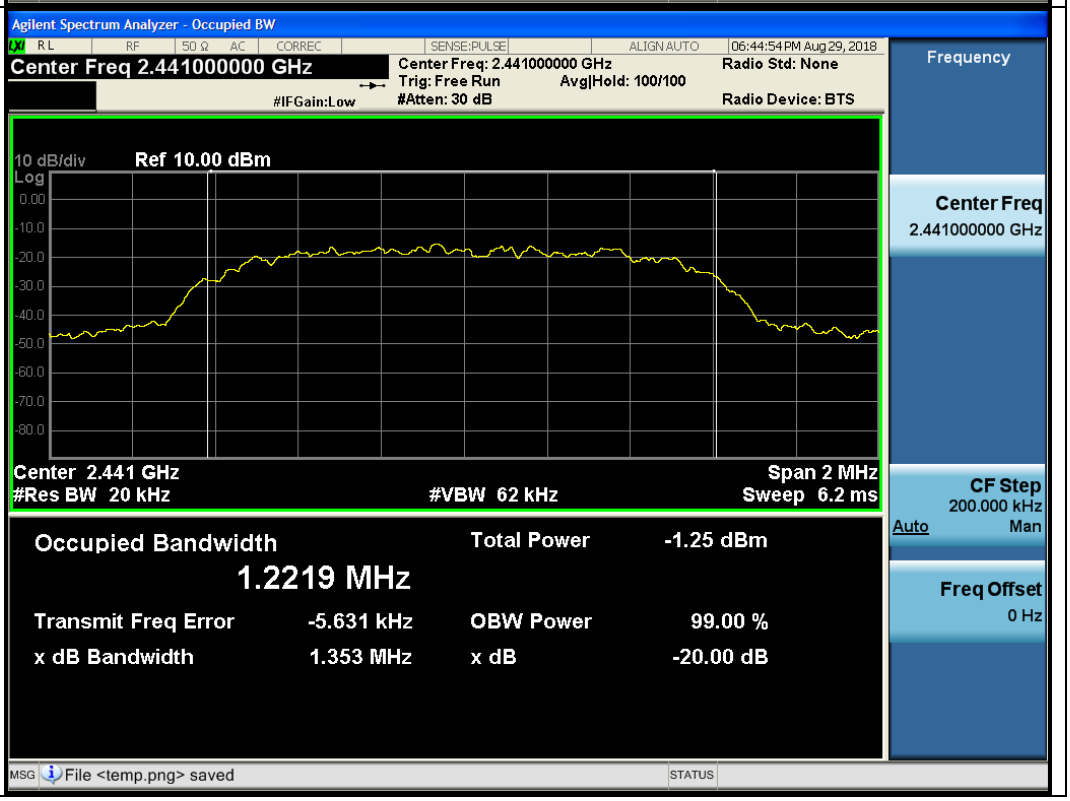
Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.933	Not Specified	PASS
GFSK	MCH	0.934	Not Specified	PASS
GFSK	HCH	0.962	Not Specified	PASS
π/4DQPSK	LCH	1.353	Not Specified	PASS
π/4DQPSK	MCH	1.353	Not Specified	PASS
π/4DQPSK	HCH	1.341	Not Specified	PASS
8DPSK	LCH	1.348	Not Specified	PASS
8DPSK	MCH	1.353	Not Specified	PASS
8DPSK	HCH	1.345	Not Specified	PASS

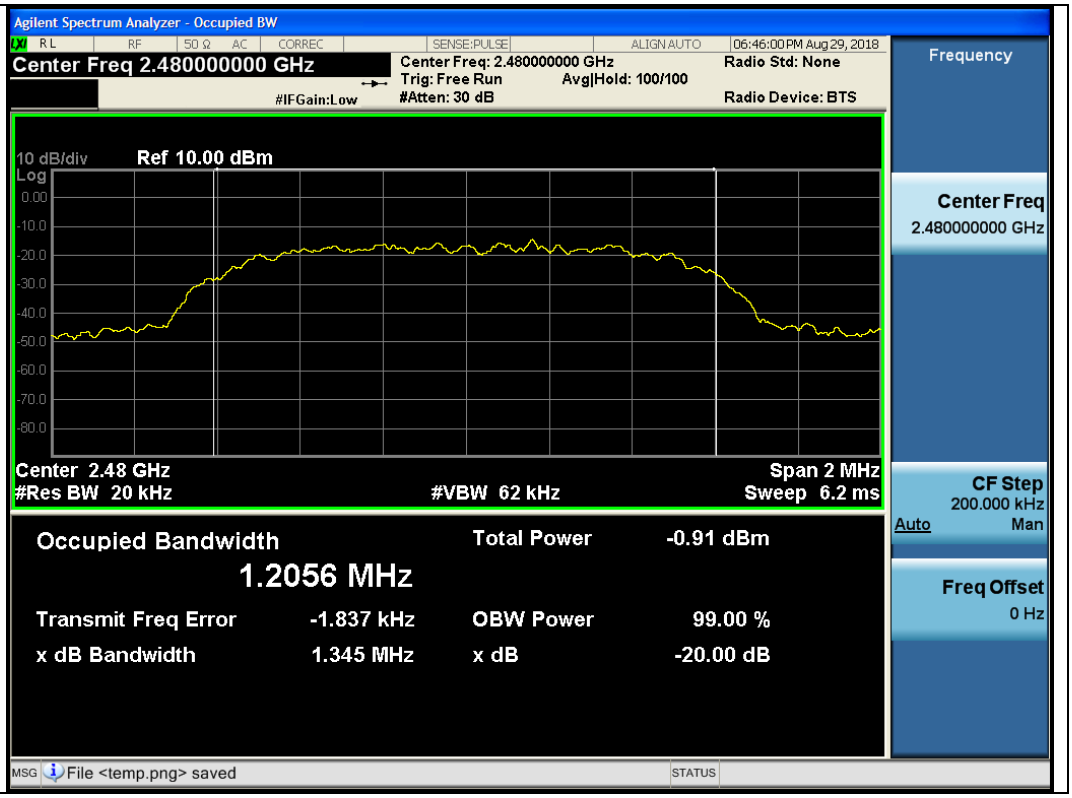
Test Graph

	Graphs
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

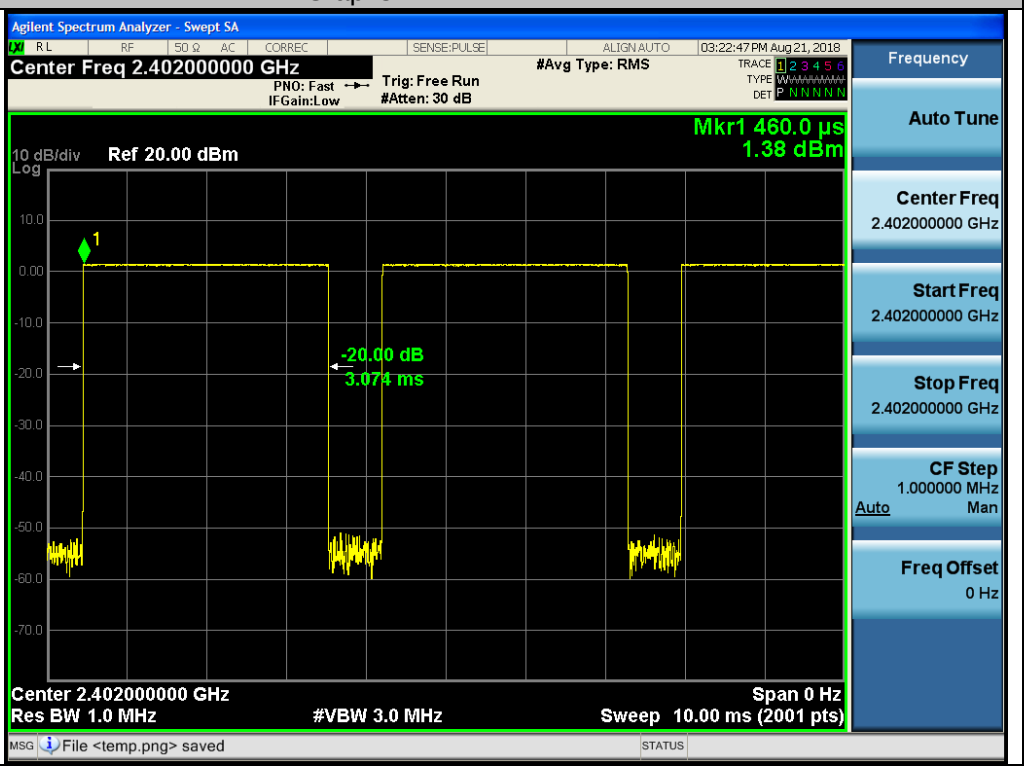
8DPSK/HCH	

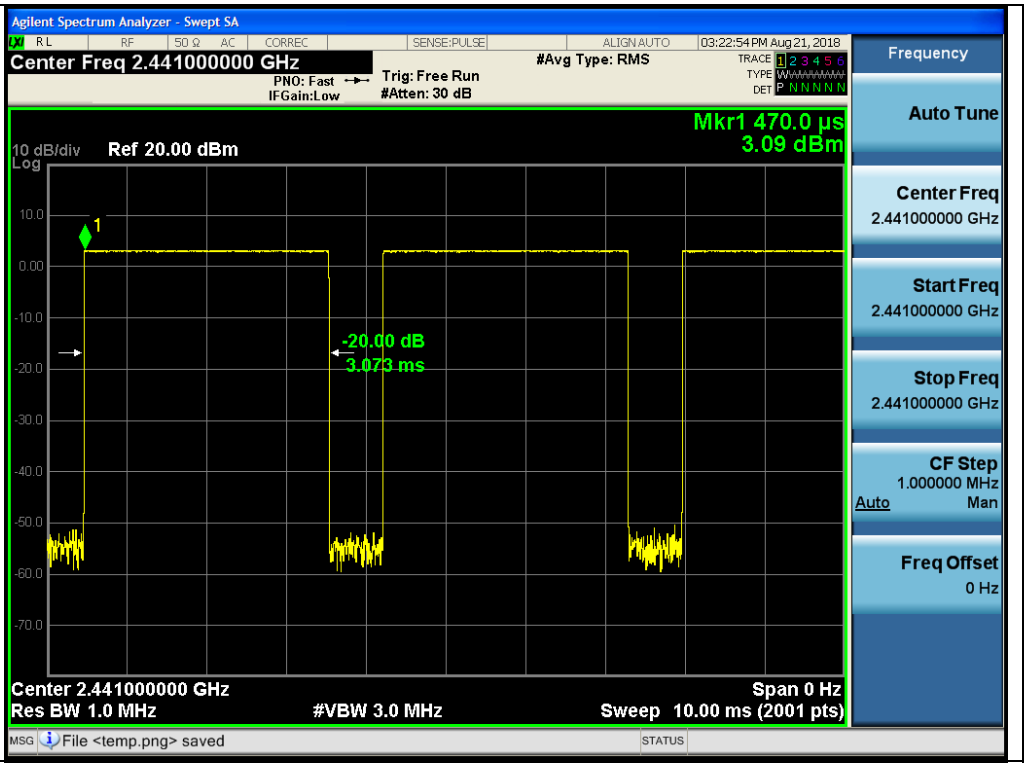
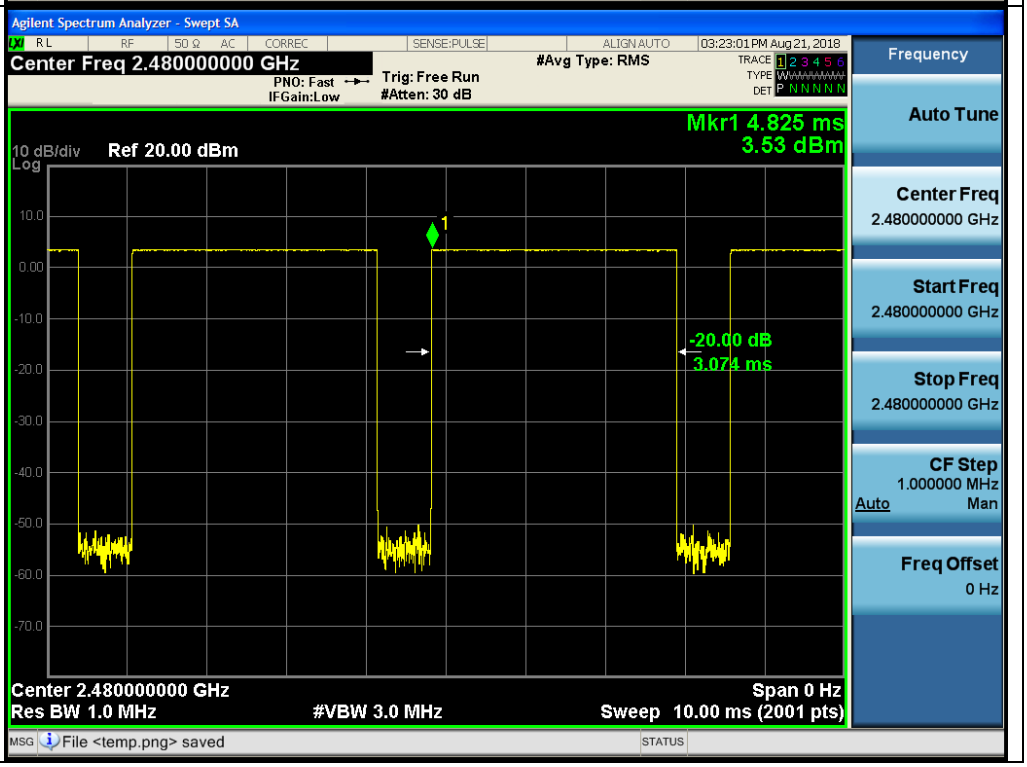
Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
CORREC
SENSE:PULSE
ALIGN AUTO
06:46:00 PM Aug 29, 2018
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Ref 10.00 dBm
Log
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 20 kHz
#VBW 62 kHz
Span 2 MHz
Sweep 6.2 ms
CF Step
200.000 kHz
Auto
Man
Occupied Bandwidth
1.2056 MHz
Total Power -0.91 dBm
Transmit Freq Error -1.837 kHz
OBW Power 99.00 %
x dB Bandwidth 1.345 MHz
x dB -20.00 dB
Freq Offset
0 Hz
MSG
File <temp.png> saved
STATUS

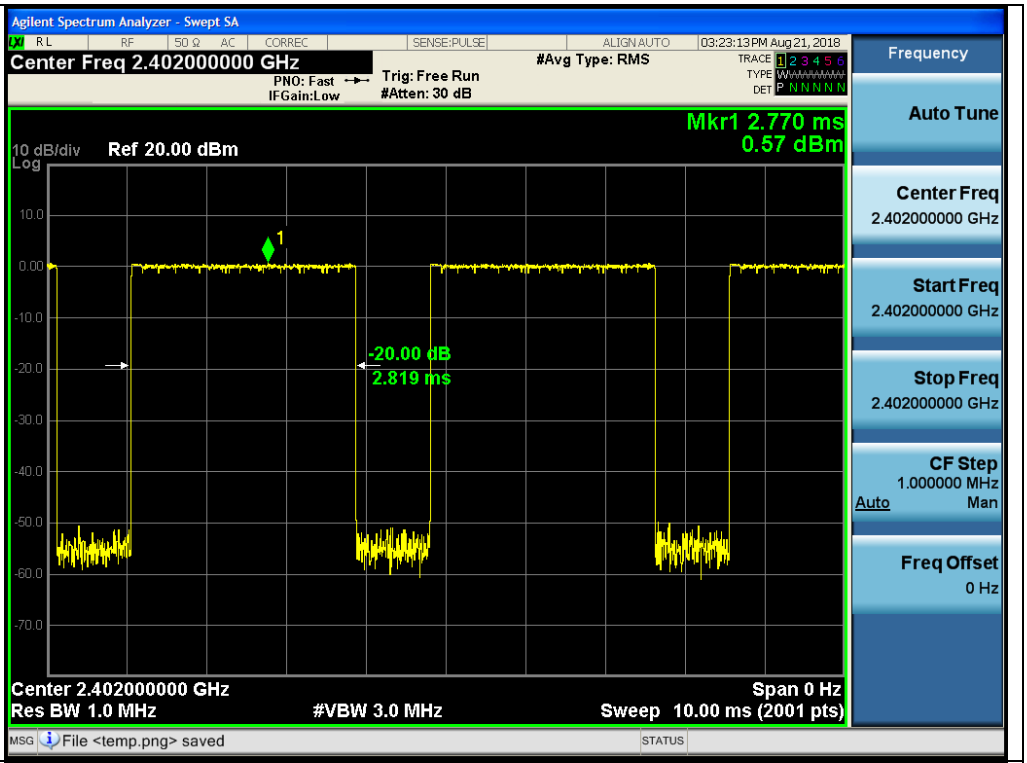
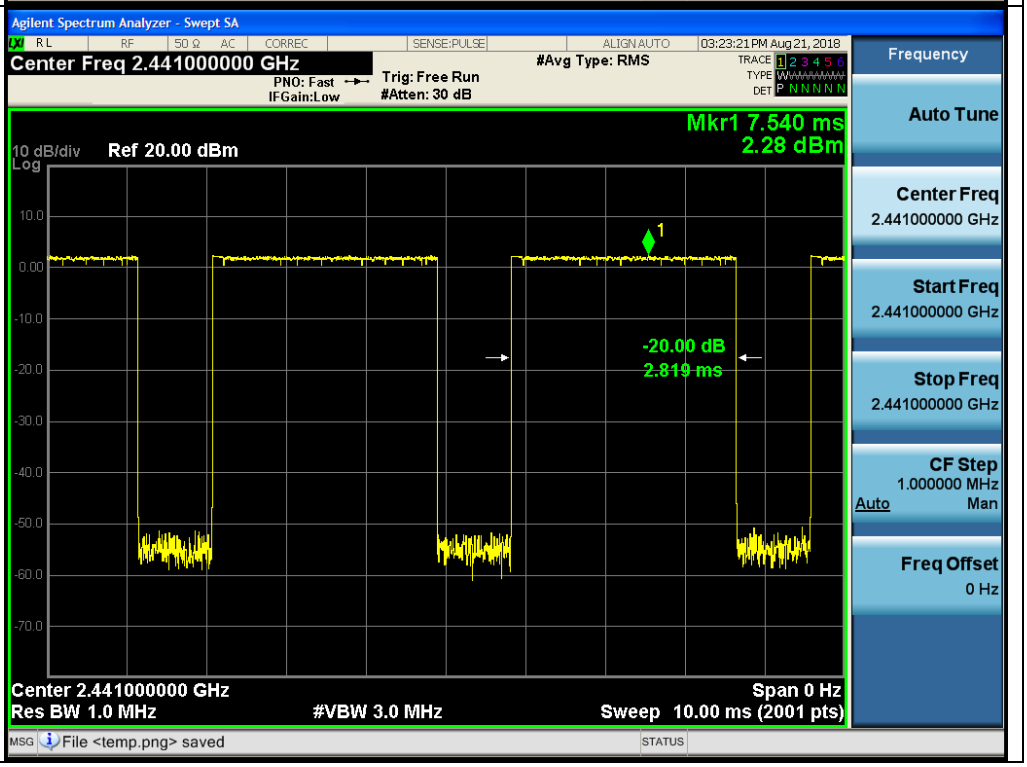
A.2 Dwell Time

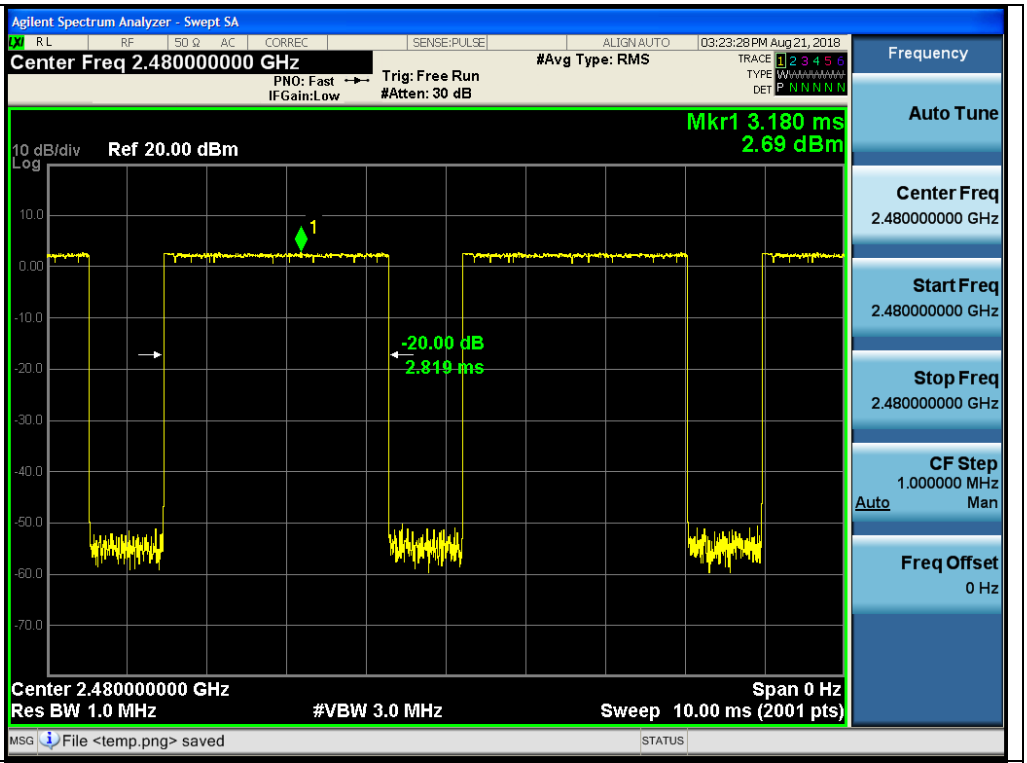
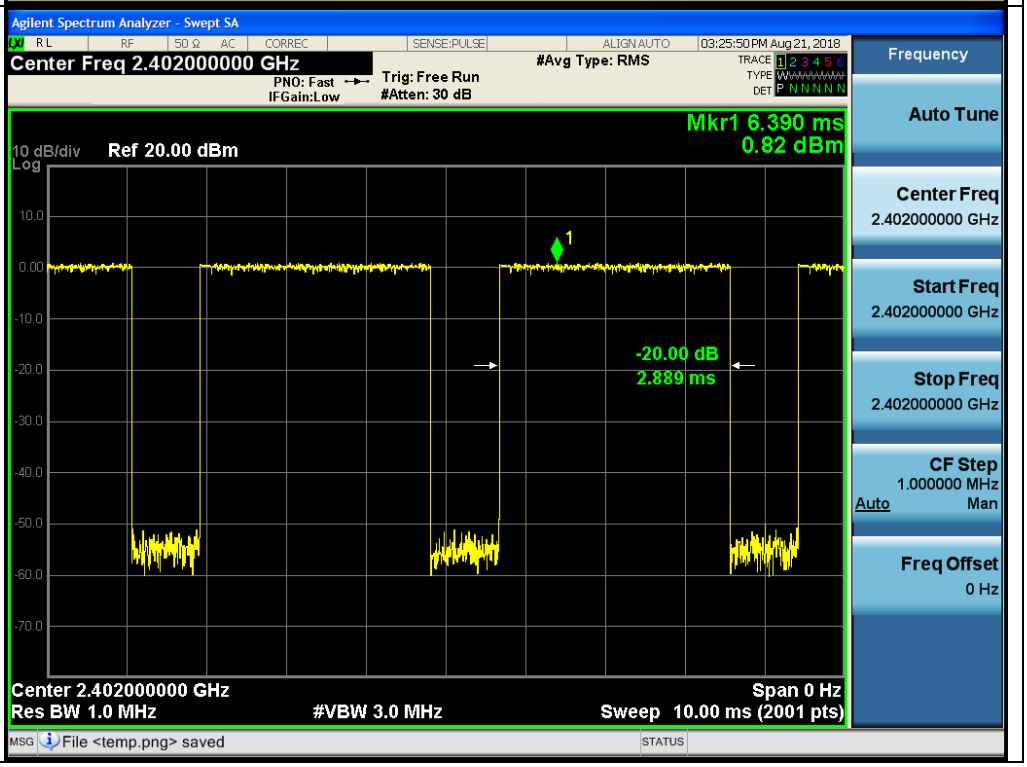
Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.003074	106.7	0.327983	0.4	PASS
GFSK	DH5	MCH	0.003073	106.7	0.327941	0.4	PASS
GFSK	DH5	HCH	0.003074	106.7	0.327953	0.4	PASS
π/4DQPSK	2DH5	LCH	0.002819	106.7	0.300768	0.4	PASS
π/4DQPSK	2DH5	MCH	0.002819	106.7	0.300795	0.4	PASS
π/4DQPSK	2DH5	HCH	0.002819	106.7	0.300758	0.4	PASS
8DPSK	3DH5	LCH	0.002889	106.7	0.308246	0.4	PASS
8DPSK	3DH5	MCH	0.002891	106.7	0.30851	0.4	PASS
8DPSK	3DH5	HCH	0.002889	106.7	0.308248	0.4	PASS

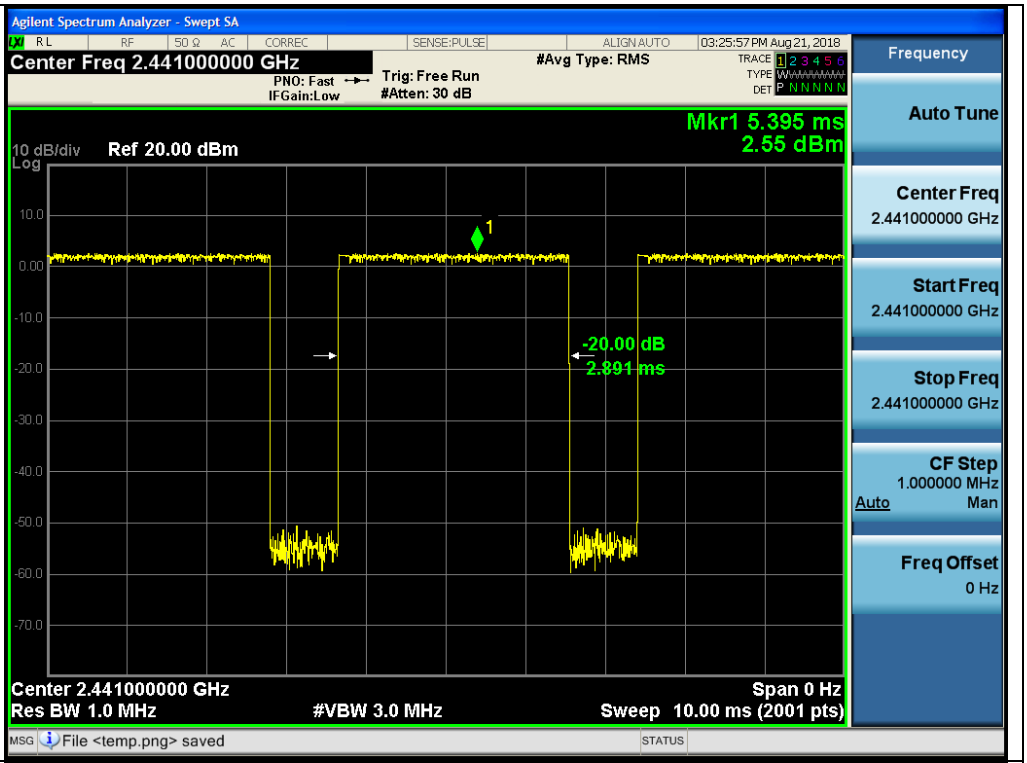
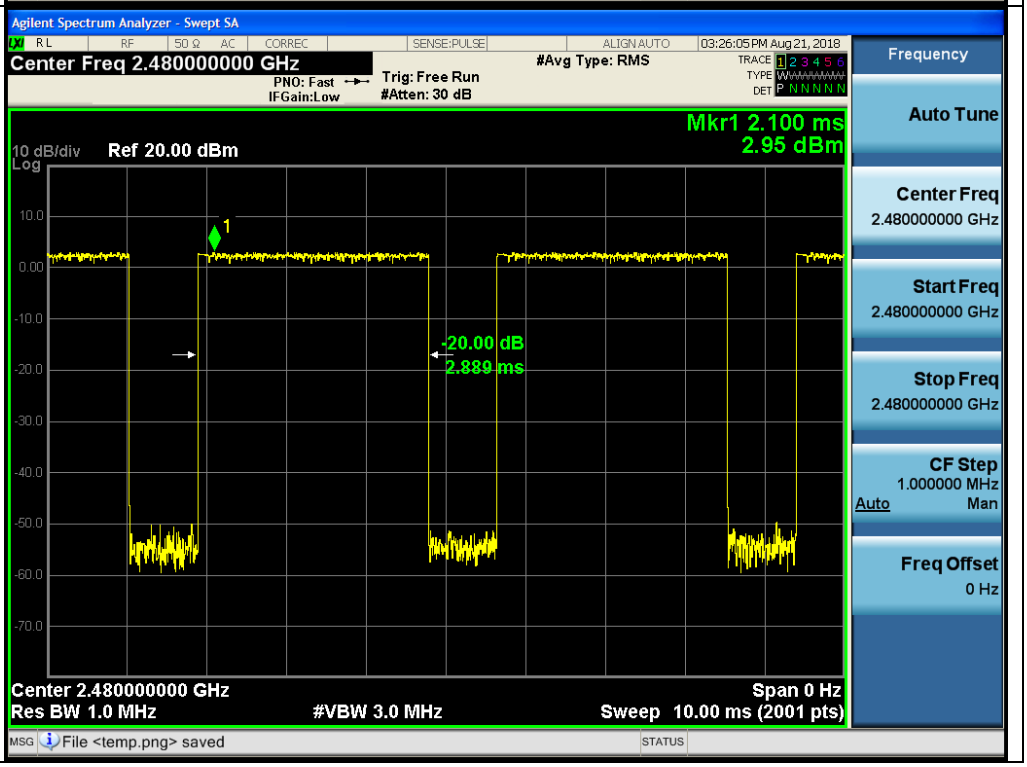
Test Graph

Graphs	
GFSK_DH5/LCH	

GFSK_DH5/MCH	
GFSK_DH5/HCH	

π/4DQPSK _2DH5/LCH	
π/4DQPSK _2DH5/MCH	

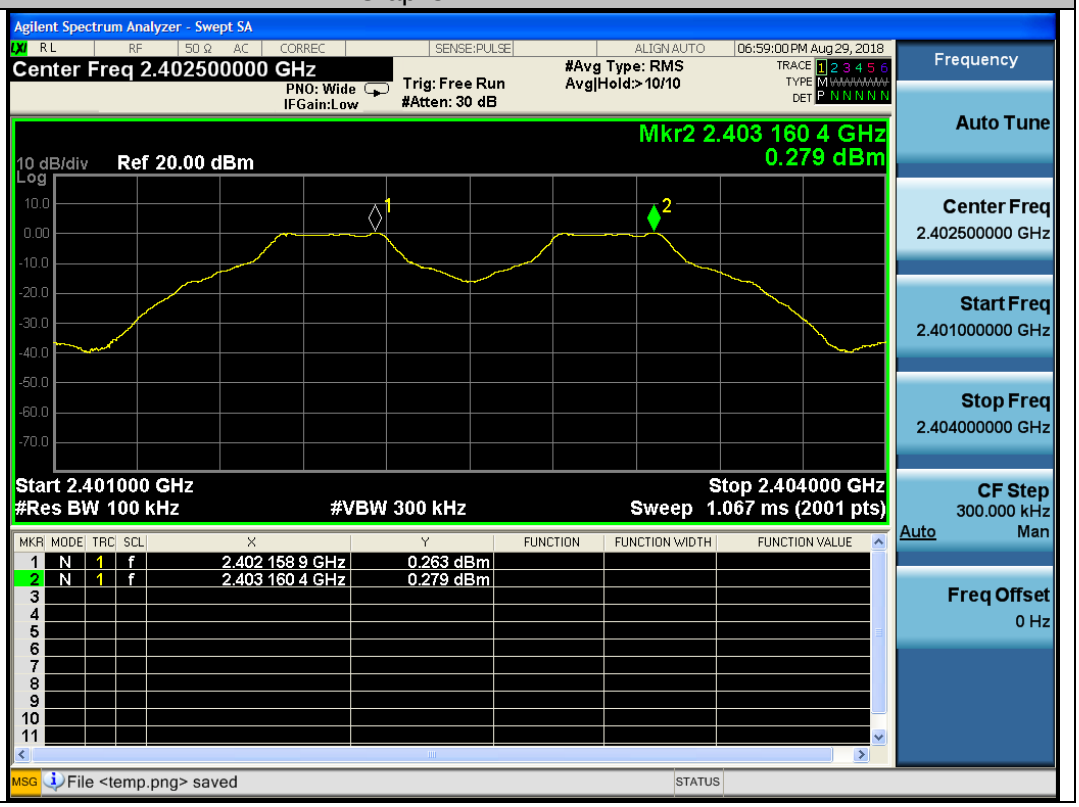
π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

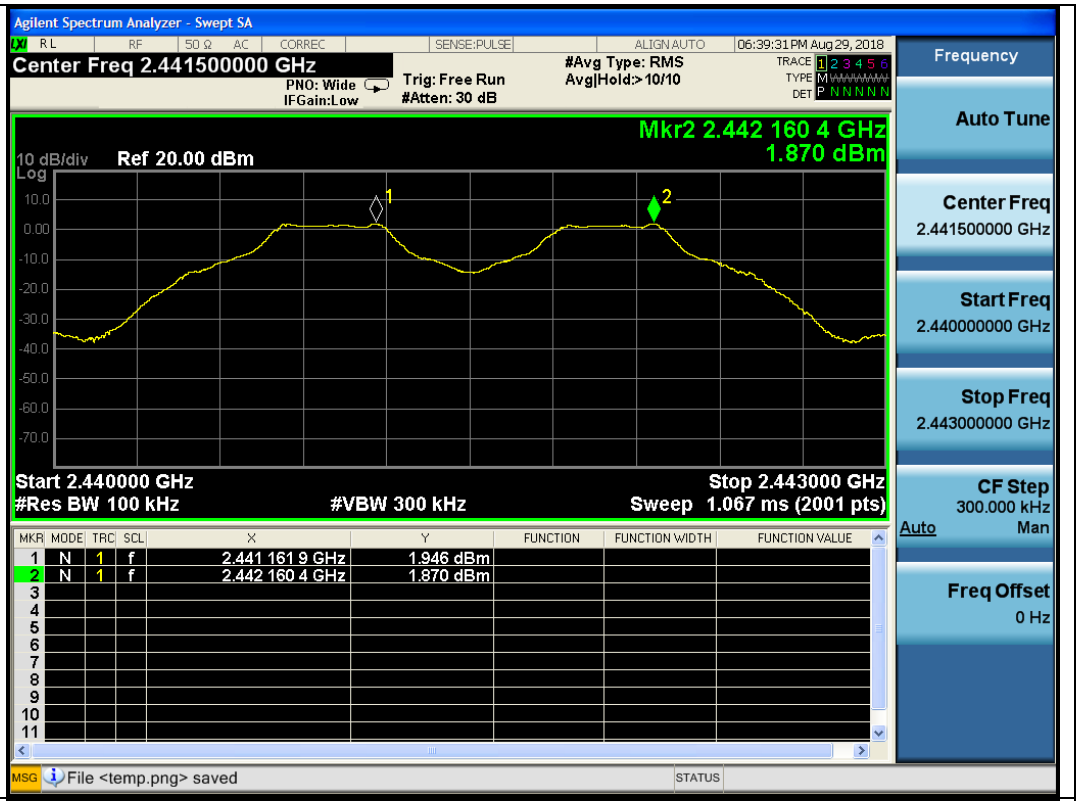
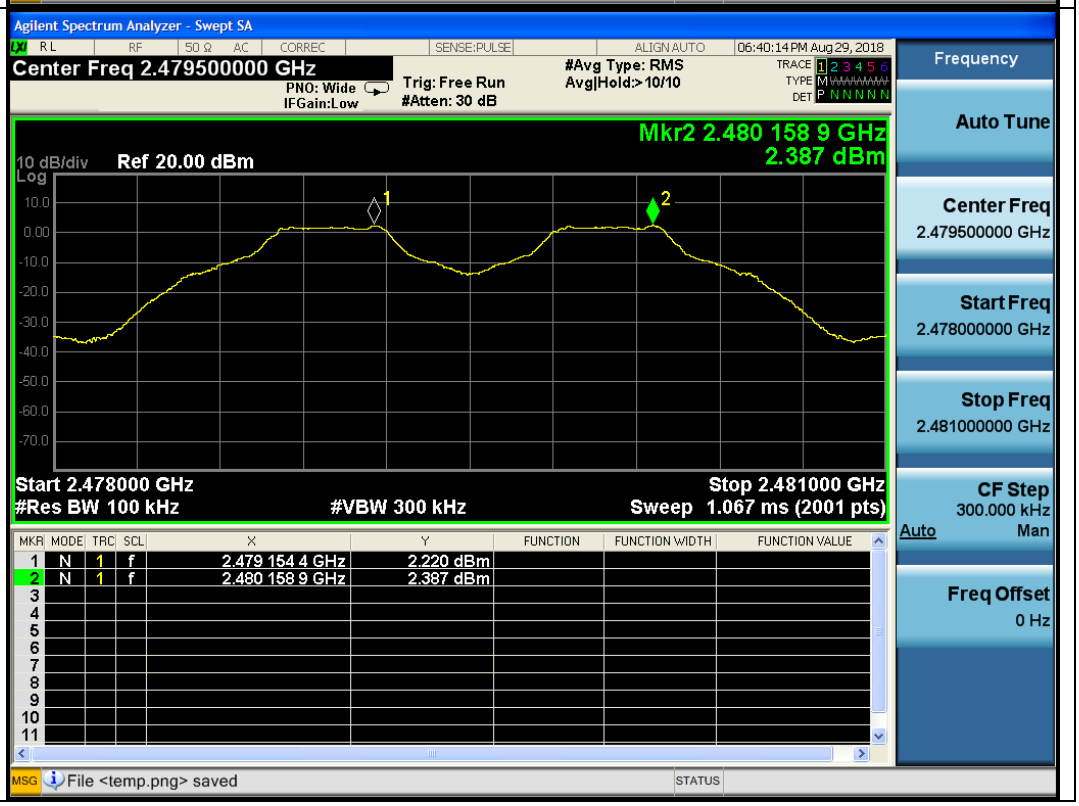
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

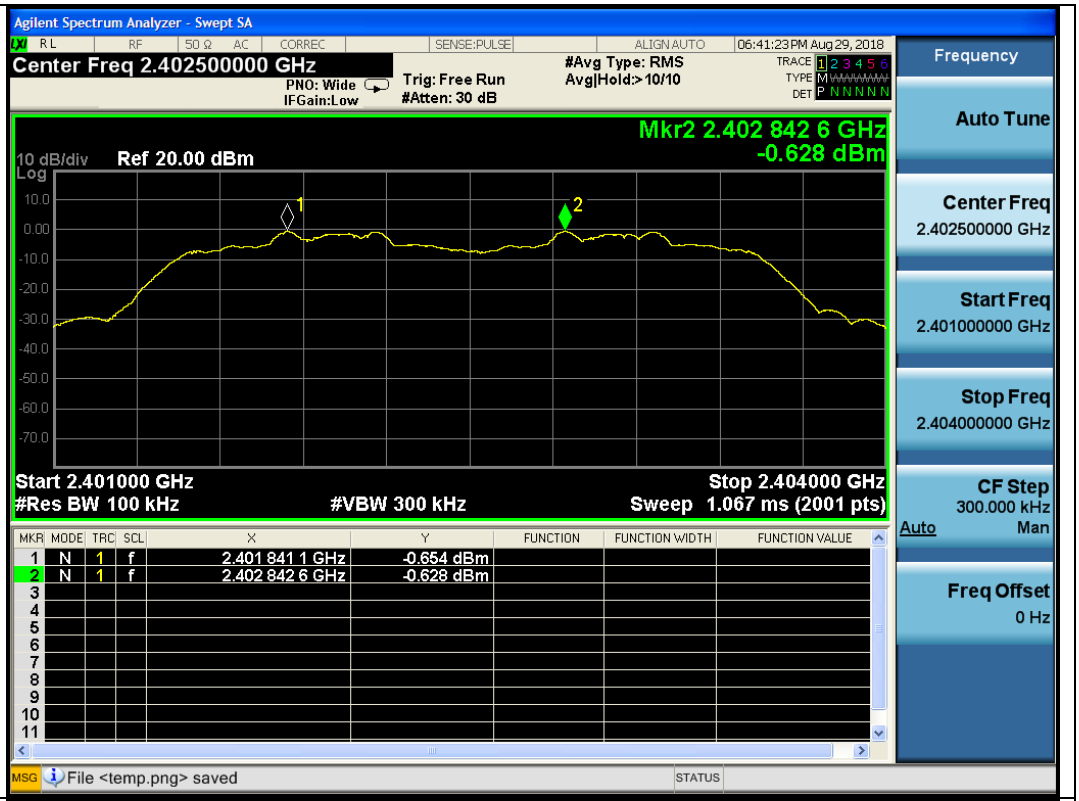
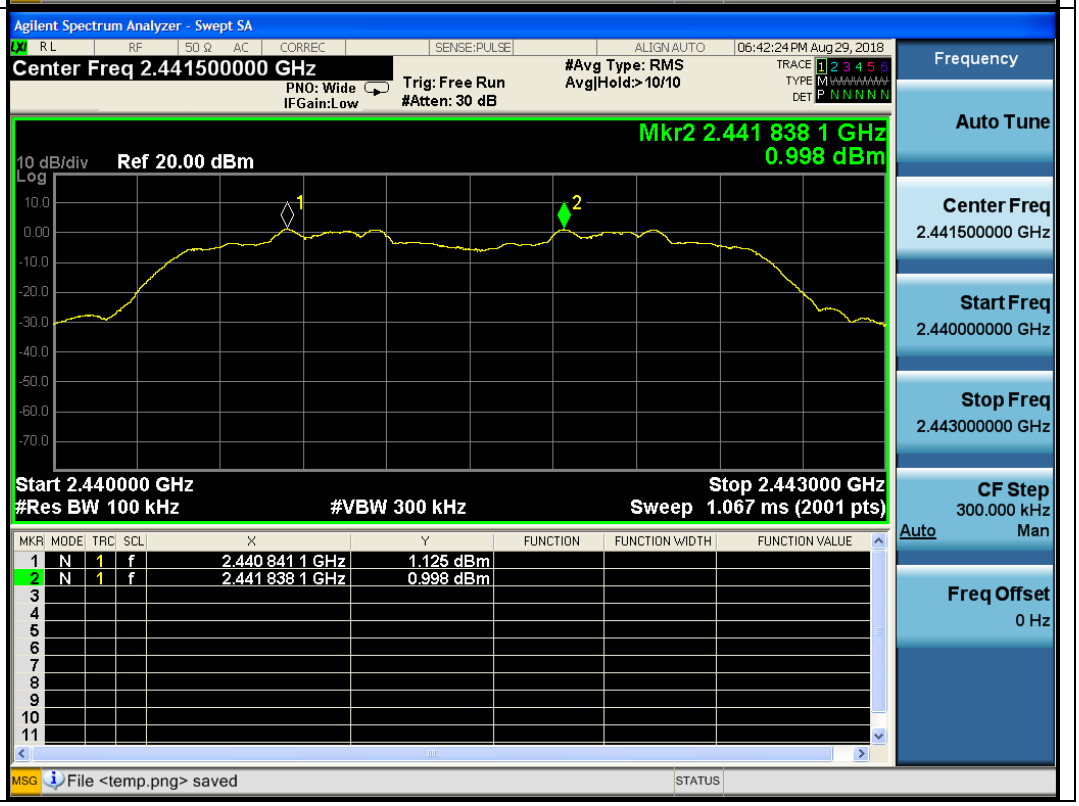
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.010	0.622	PASS
GFSK	MCH	0.999	0.623	PASS
GFSK	HCH	1.004	0.641	PASS
π/4DQPSK	LCH	1.001	0.902	PASS
π/4DQPSK	MCH	0.997	0.902	PASS
π/4DQPSK	HCH	0.993	0.894	PASS
8DPSK	LCH	1.004	0.899	PASS
8DPSK	MCH	0.999	0.902	PASS
8DPSK	HCH	1.000	0.897	PASS

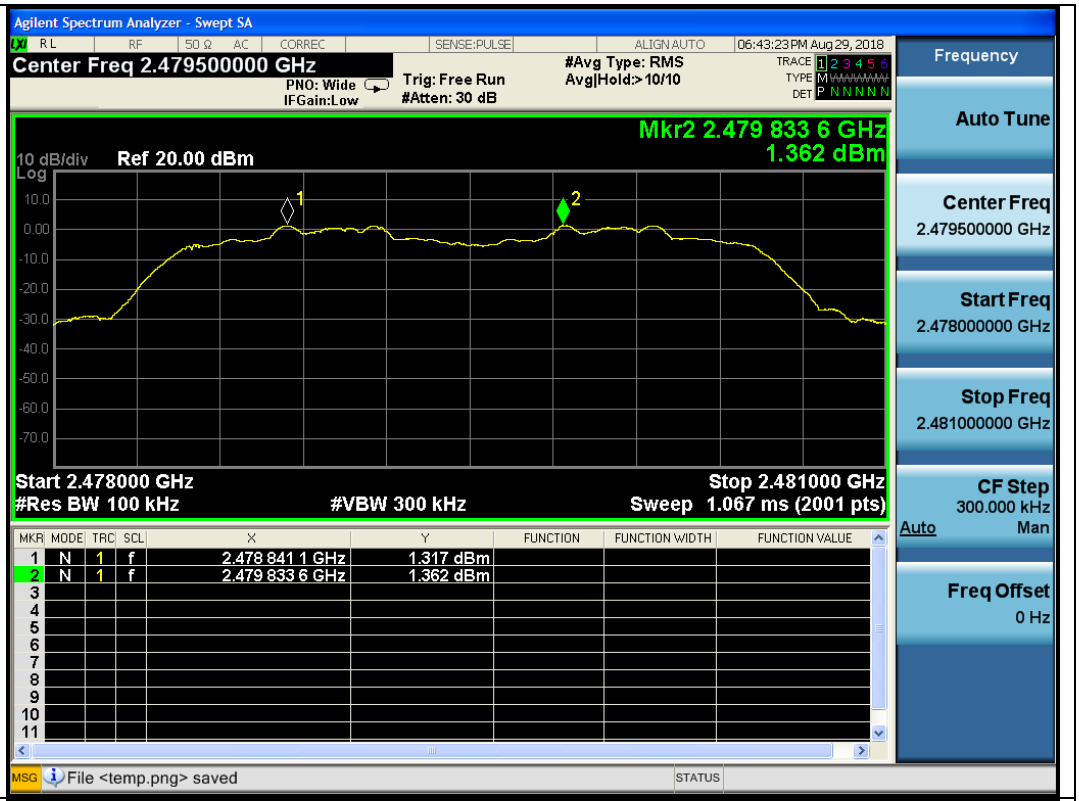
Test Graph

Graphs	
GFSK/LCH	

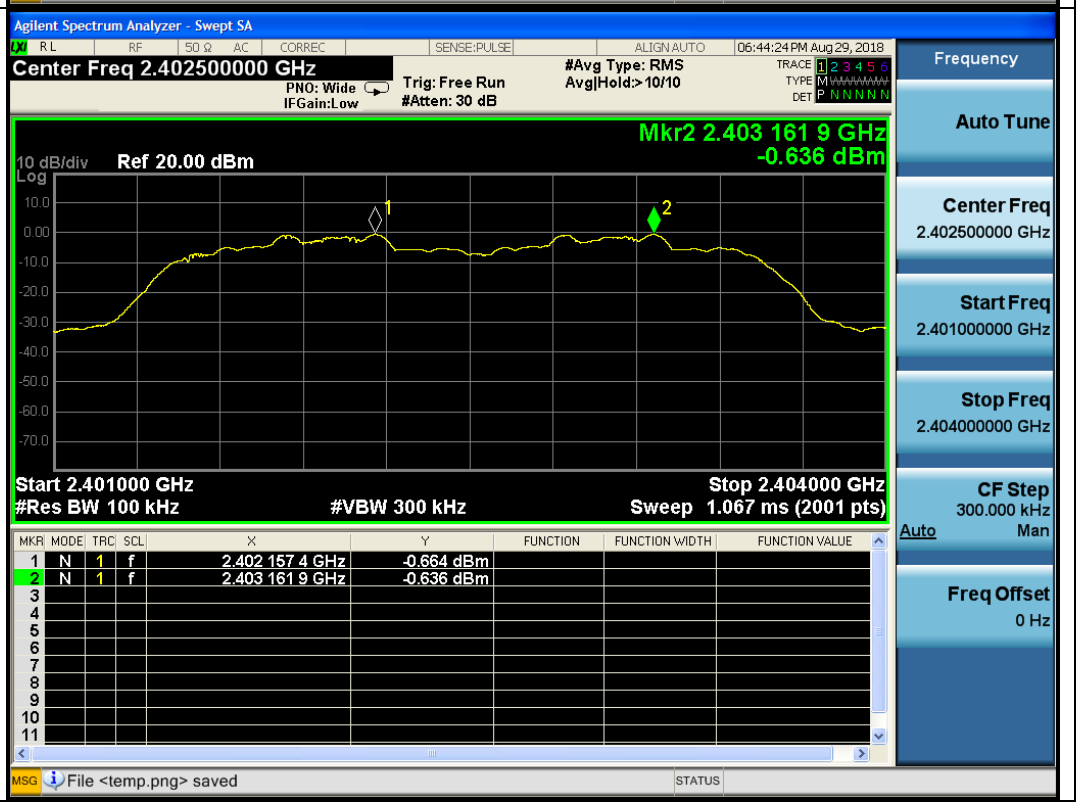
GFSK/MCH	
GFSK/HCH	

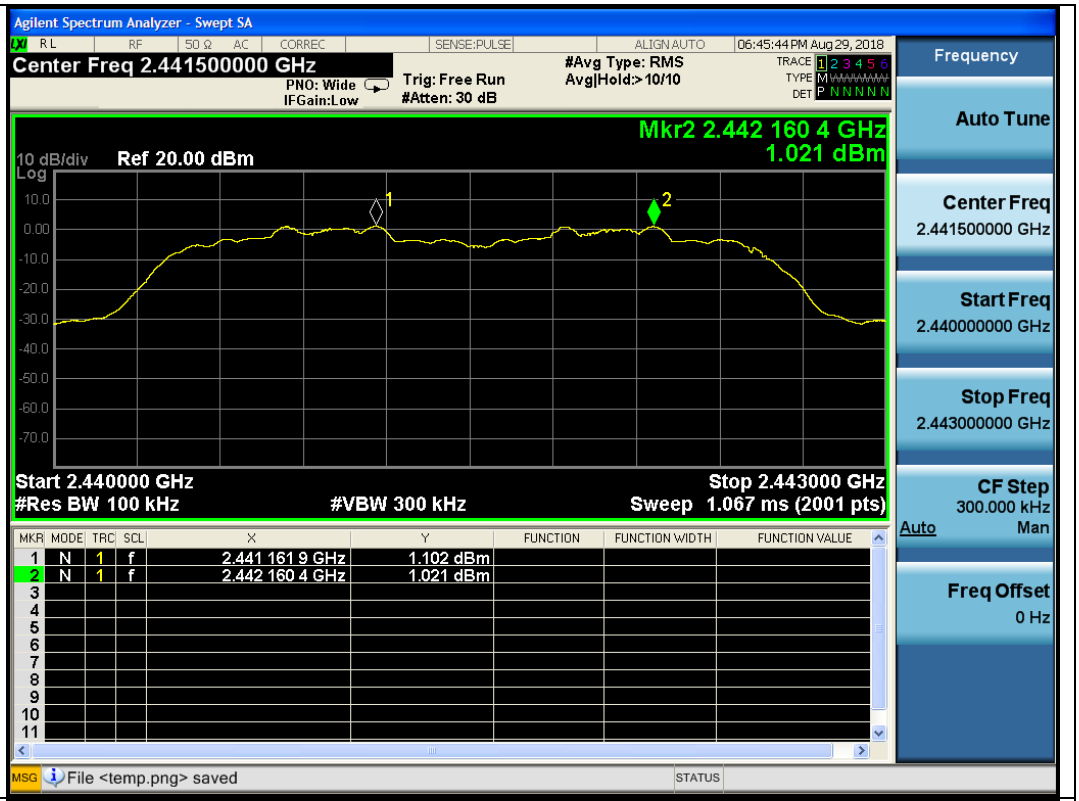
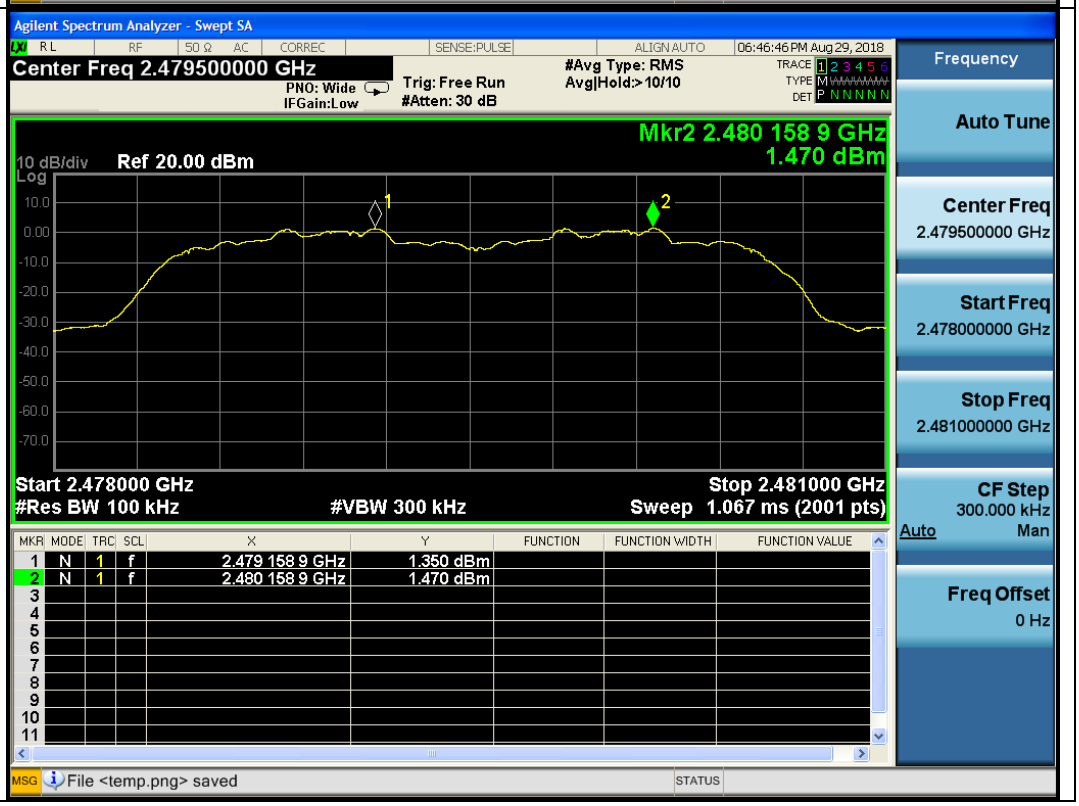
π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH



8DPSK/LCH

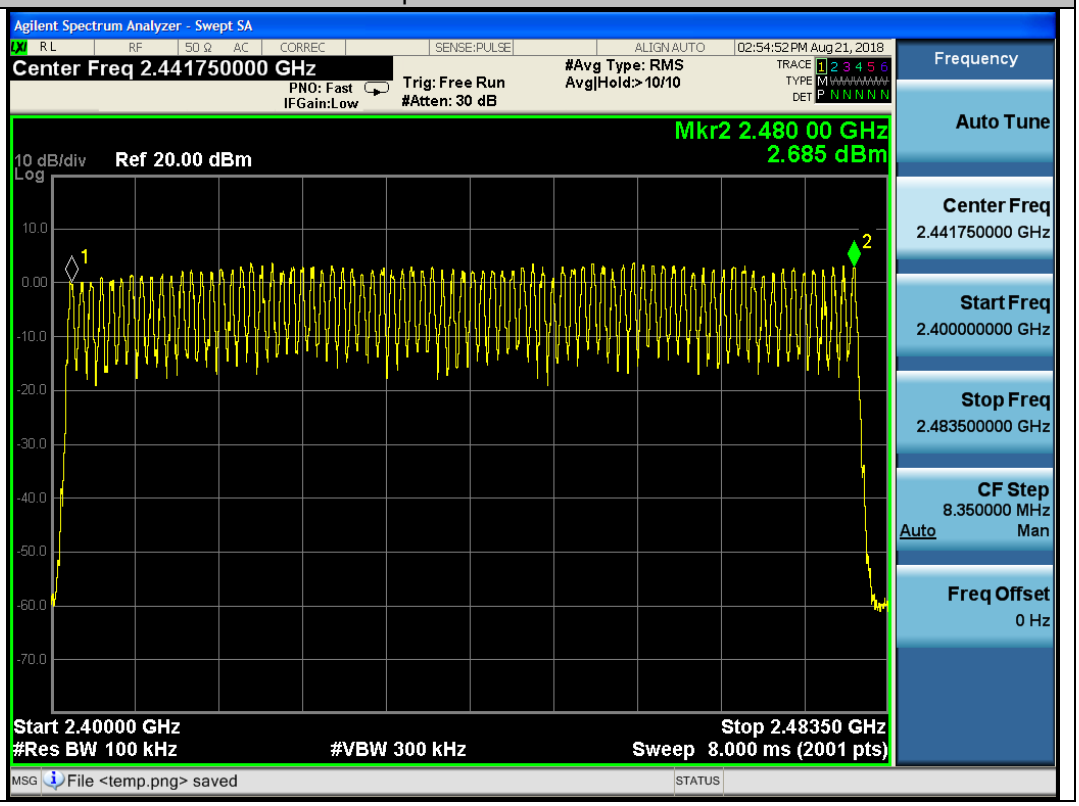


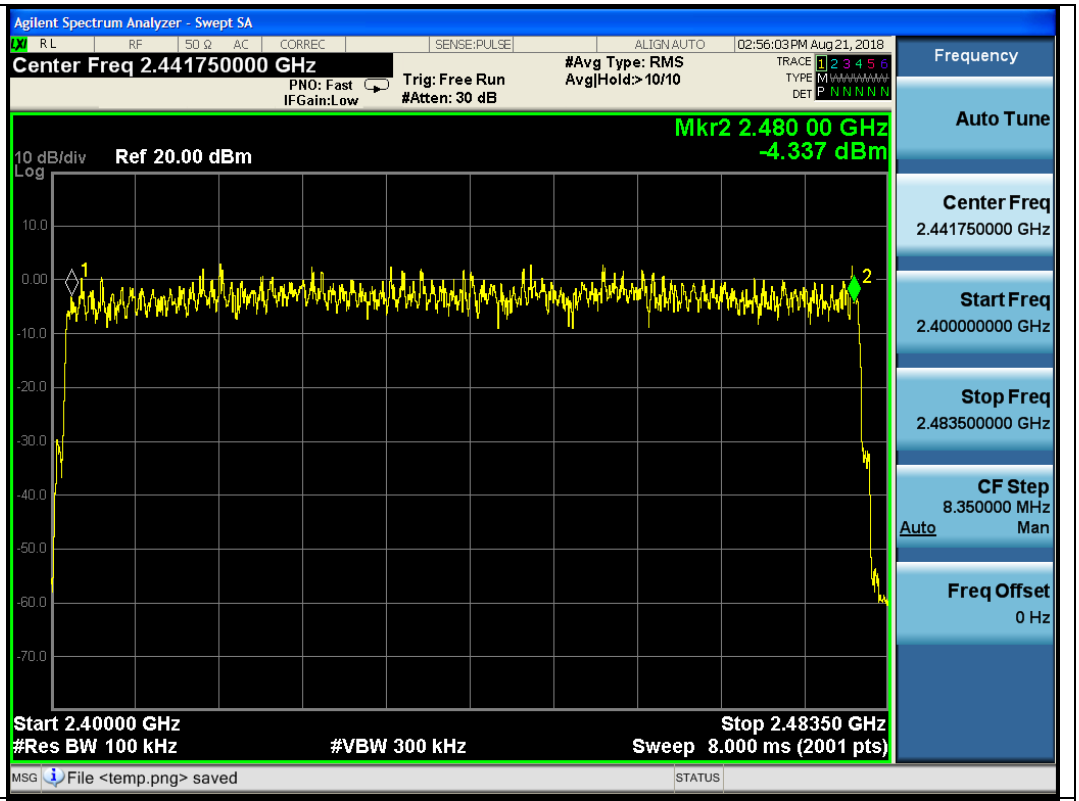
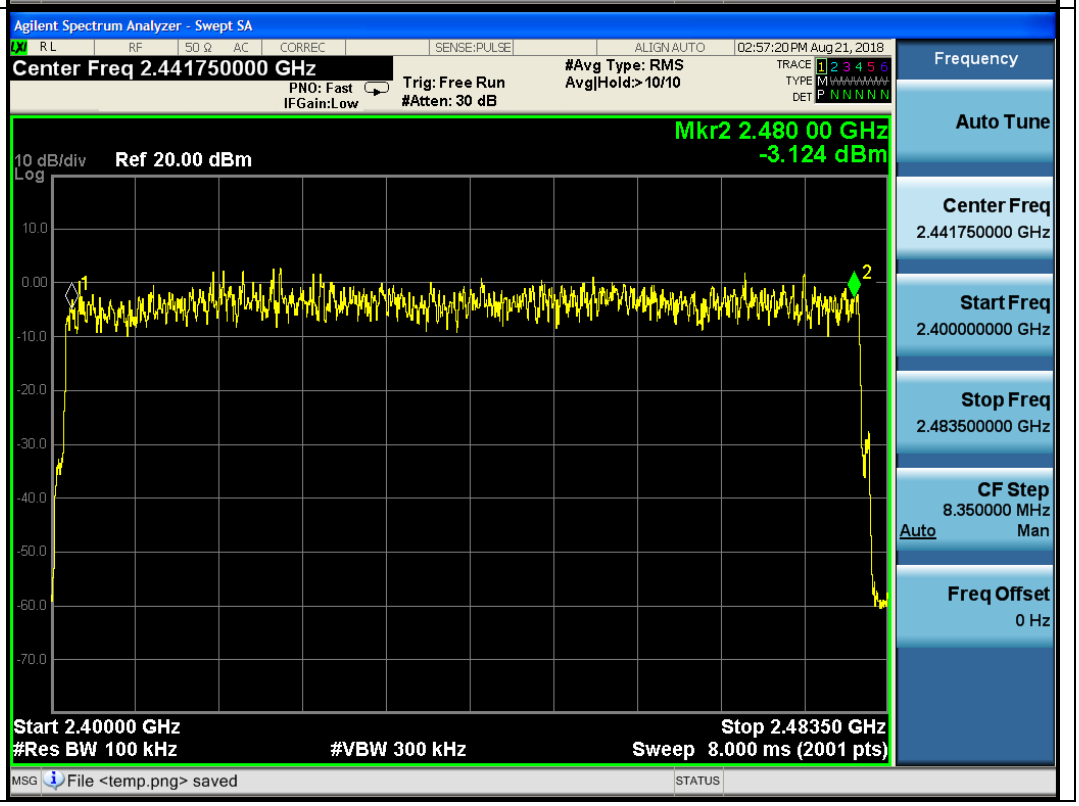
8DPSK/MCH	
8DPSK/HCH	

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 Graph

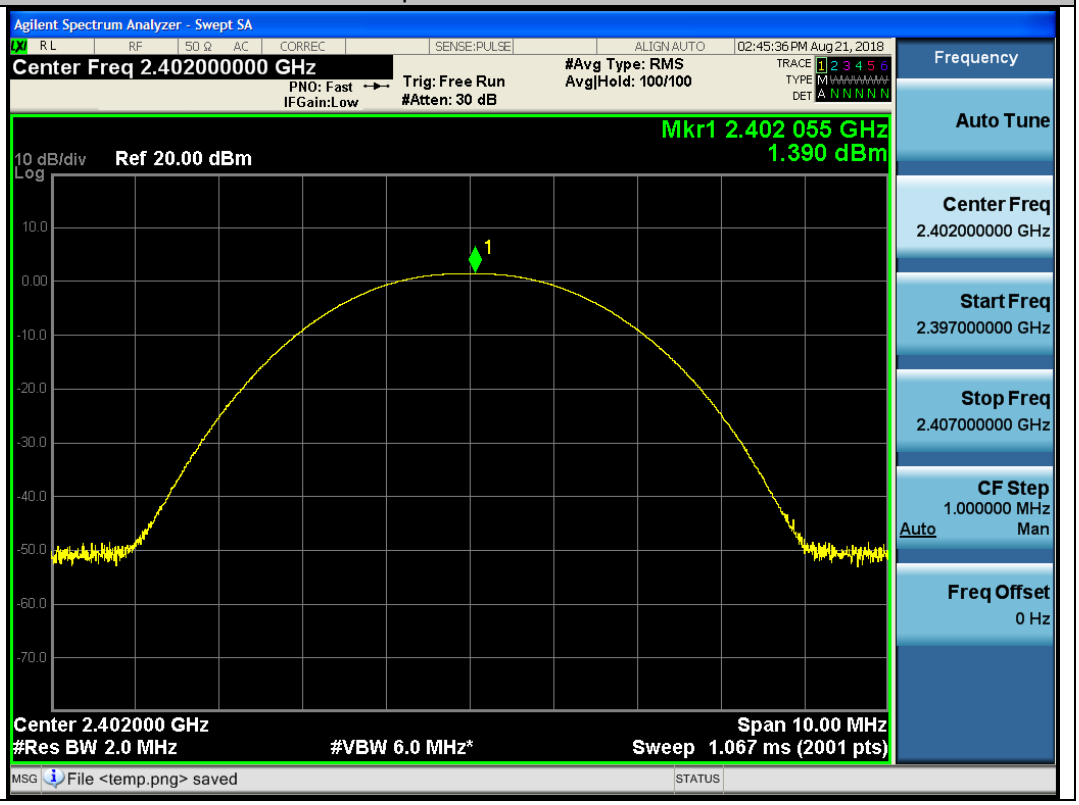
Graphs	
GFSK/Hop	

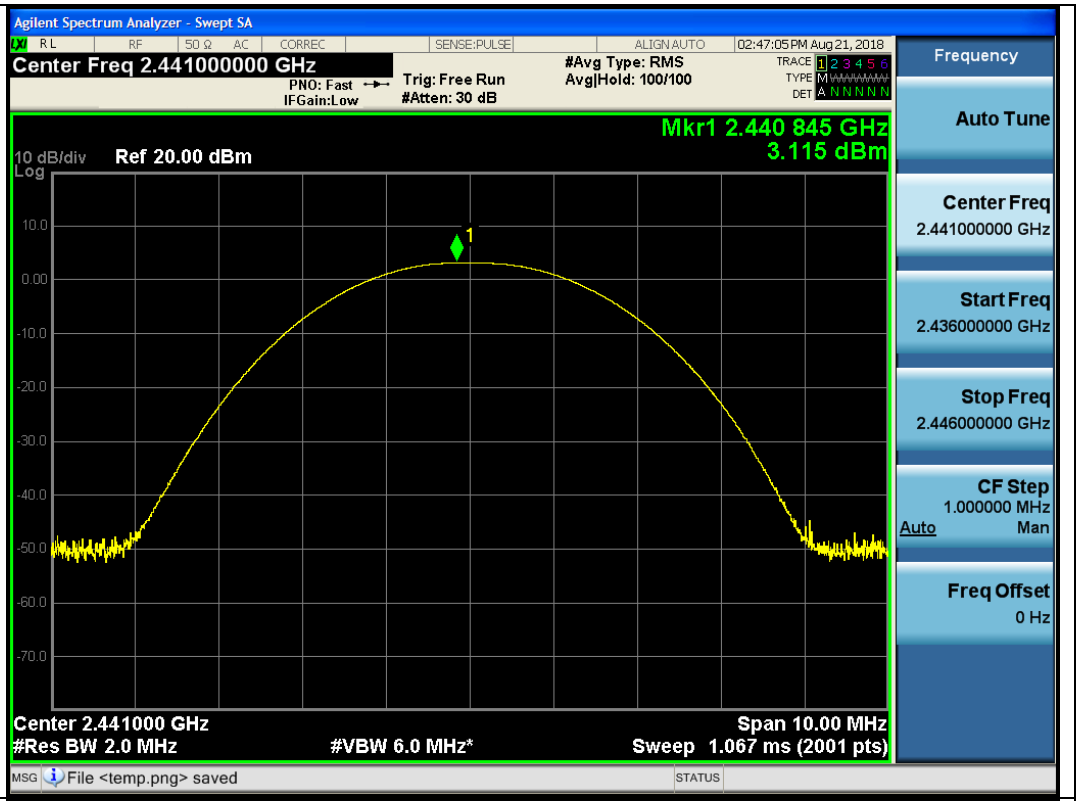
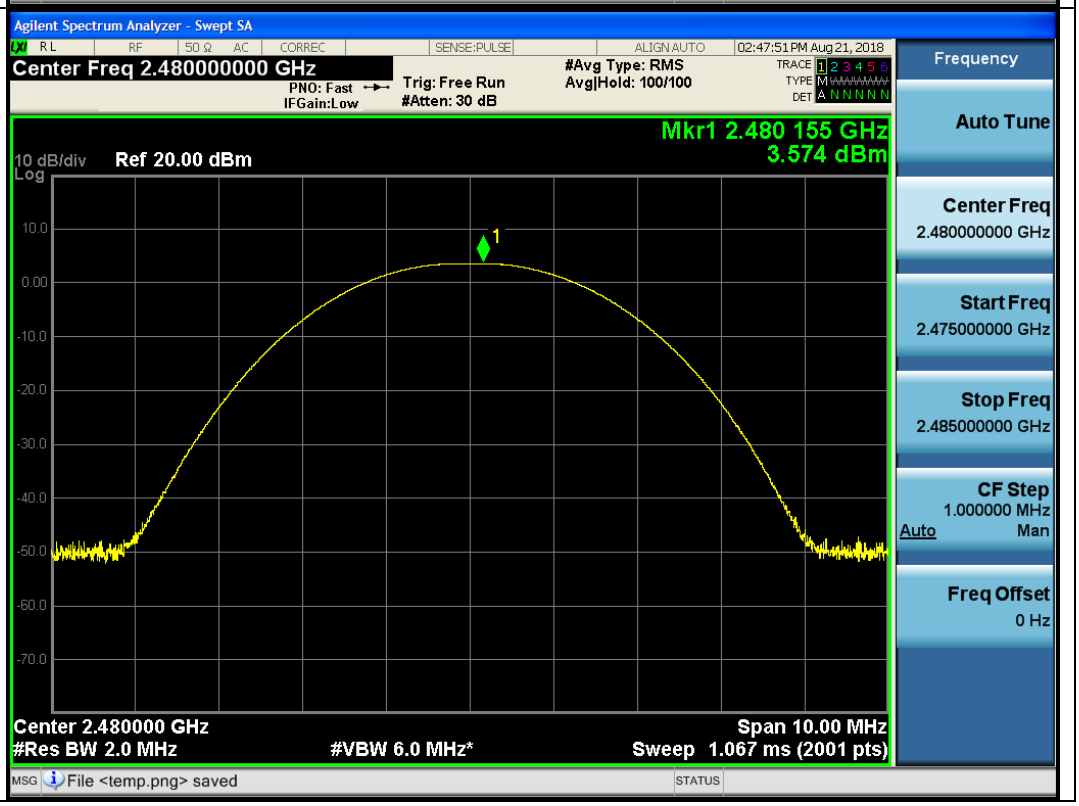
π/4DQPSK/Hop	
8DPSK/Hop	

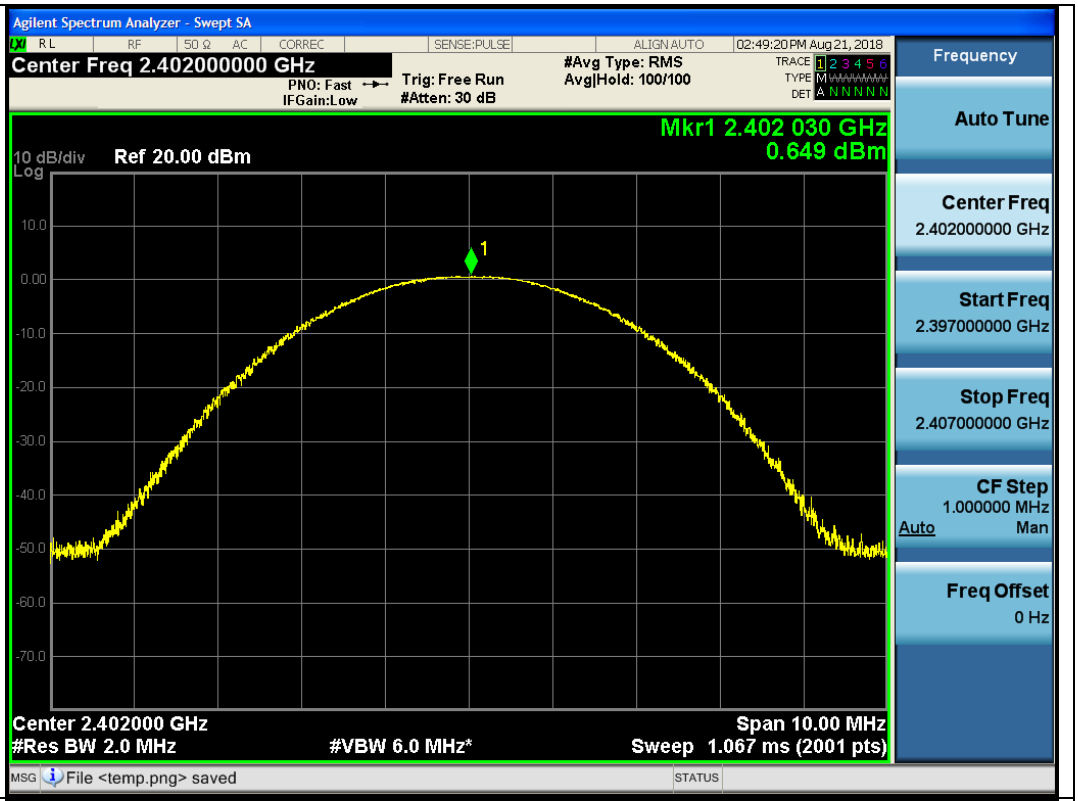
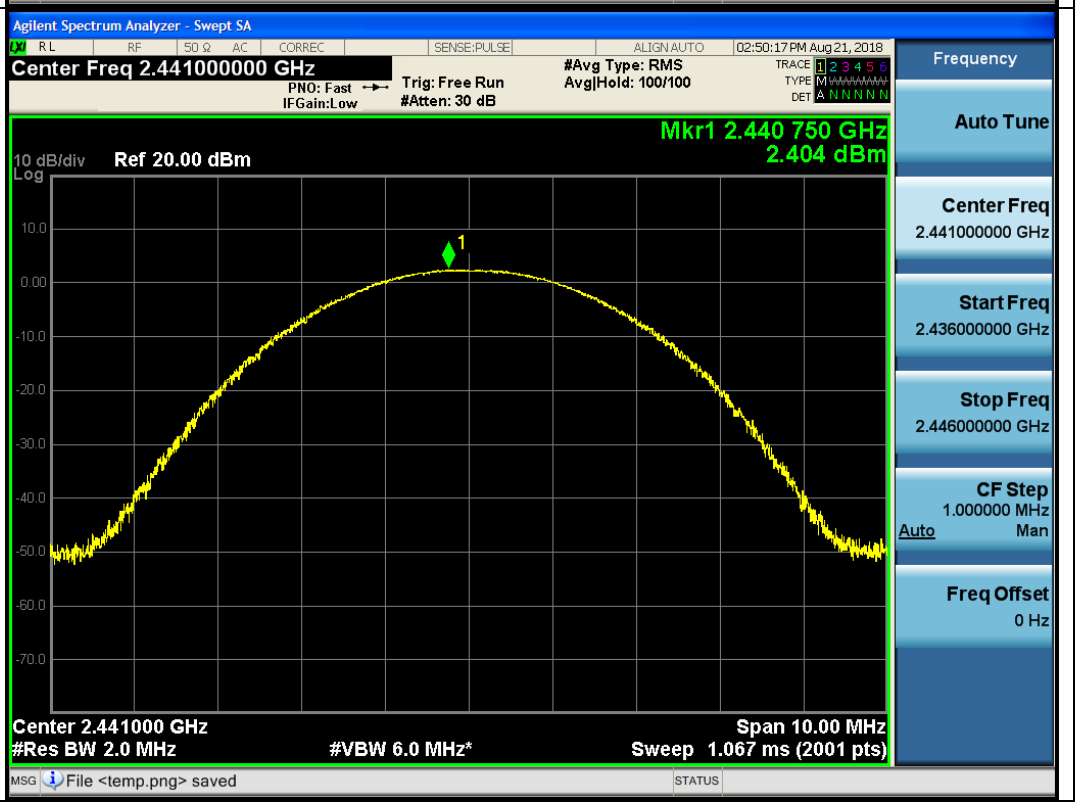
A.5 Conducted Peak Output Power

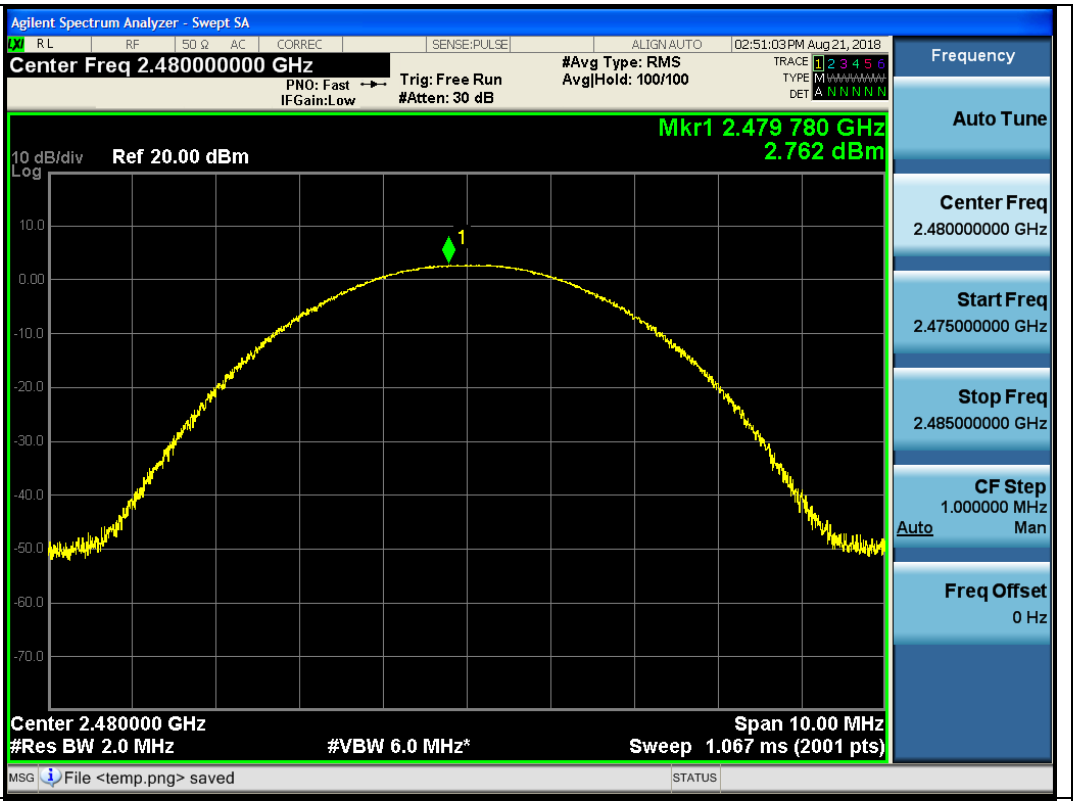
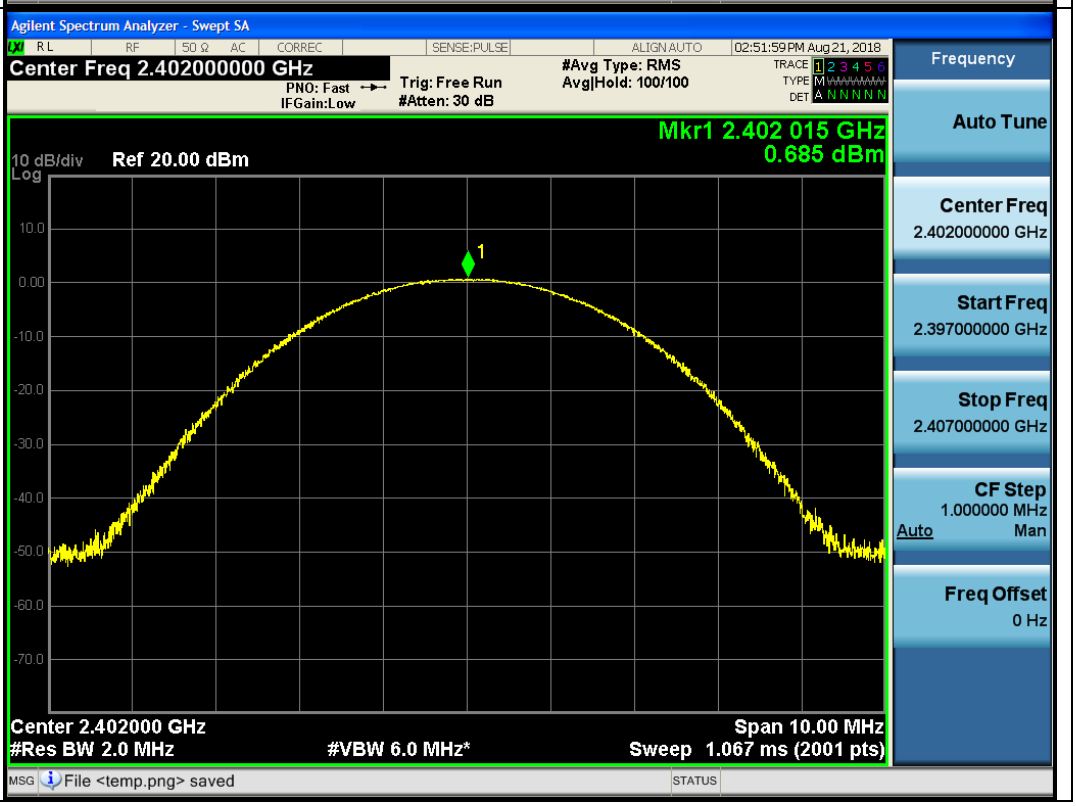
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.39	21	PASS
GFSK	MCH	3.12	21	PASS
GFSK	HCH	3.57	21	PASS
π/4DQPSK	LCH	0.65	21	PASS
π/4DQPSK	MCH	2.40	21	PASS
π/4DQPSK	HCH	2.76	21	PASS
8DPSK	LCH	0.69	21	PASS
8DPSK	MCH	2.46	21	PASS
8DPSK	HCH	2.79	21	PASS

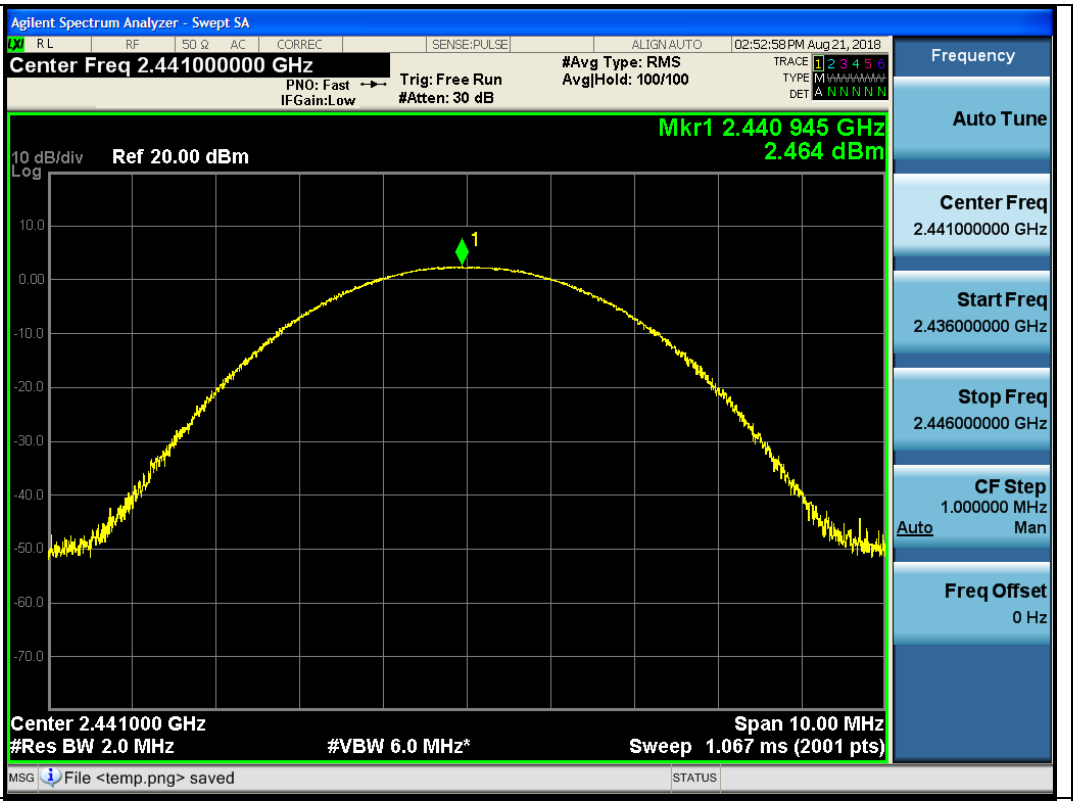
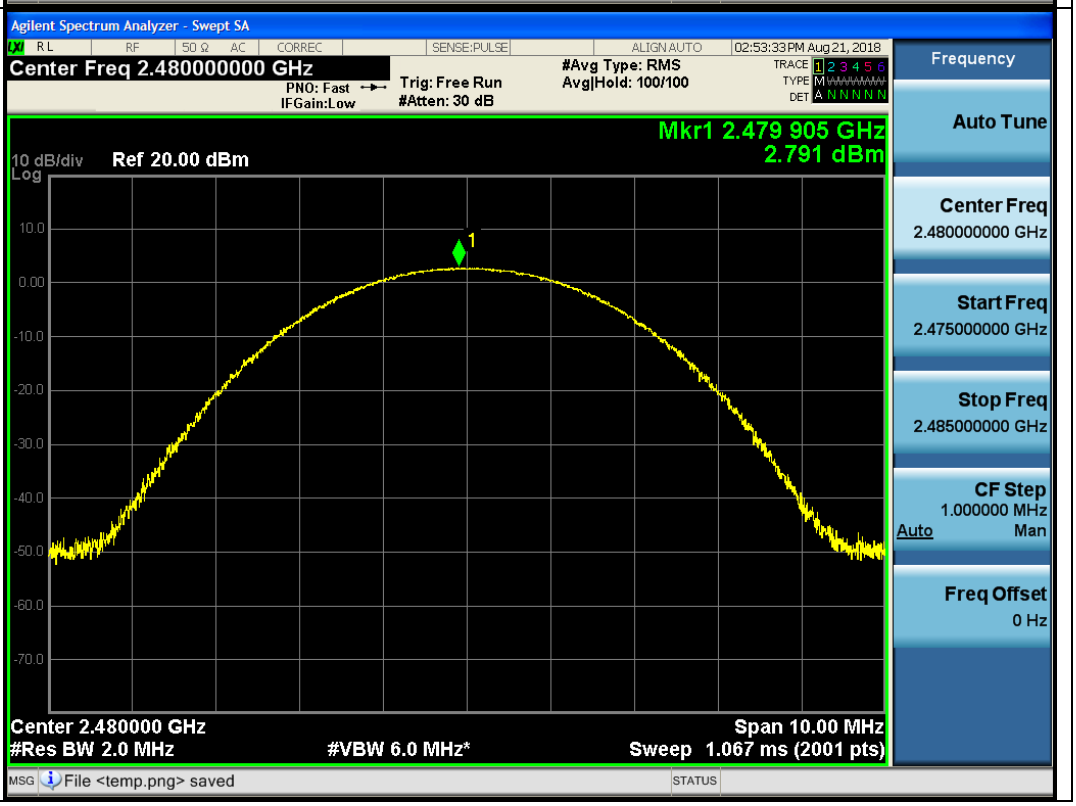
Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

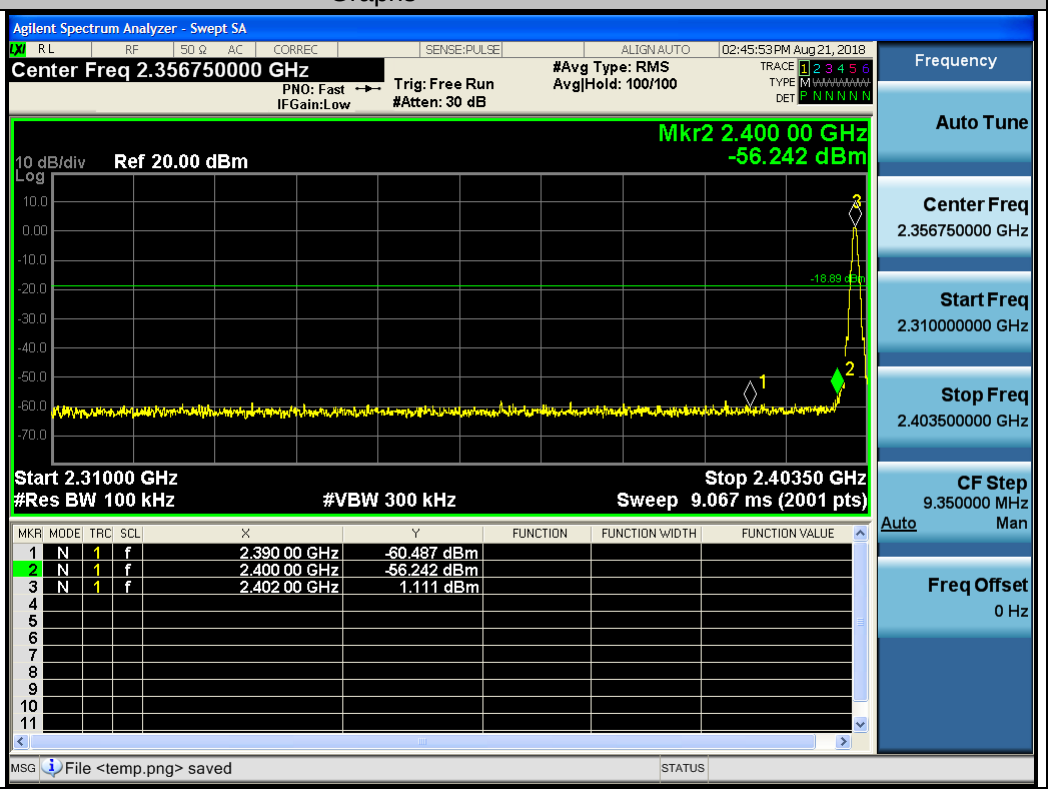
π/4DQPSK/HCH	
8DPSK/LCH	

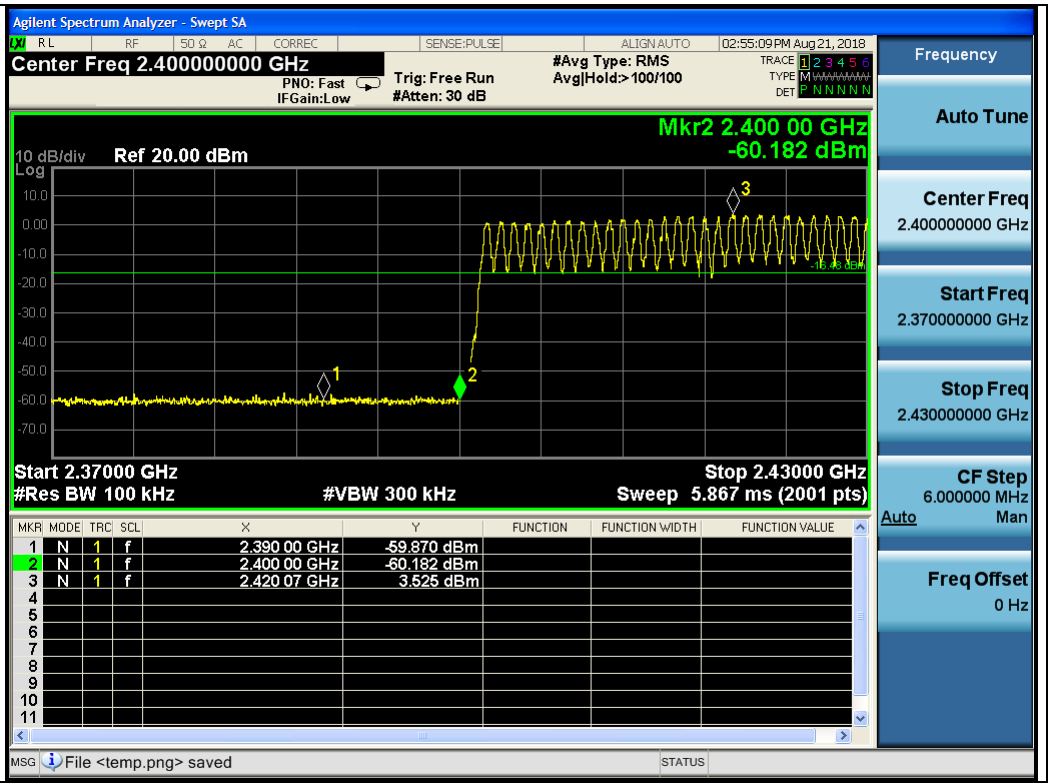
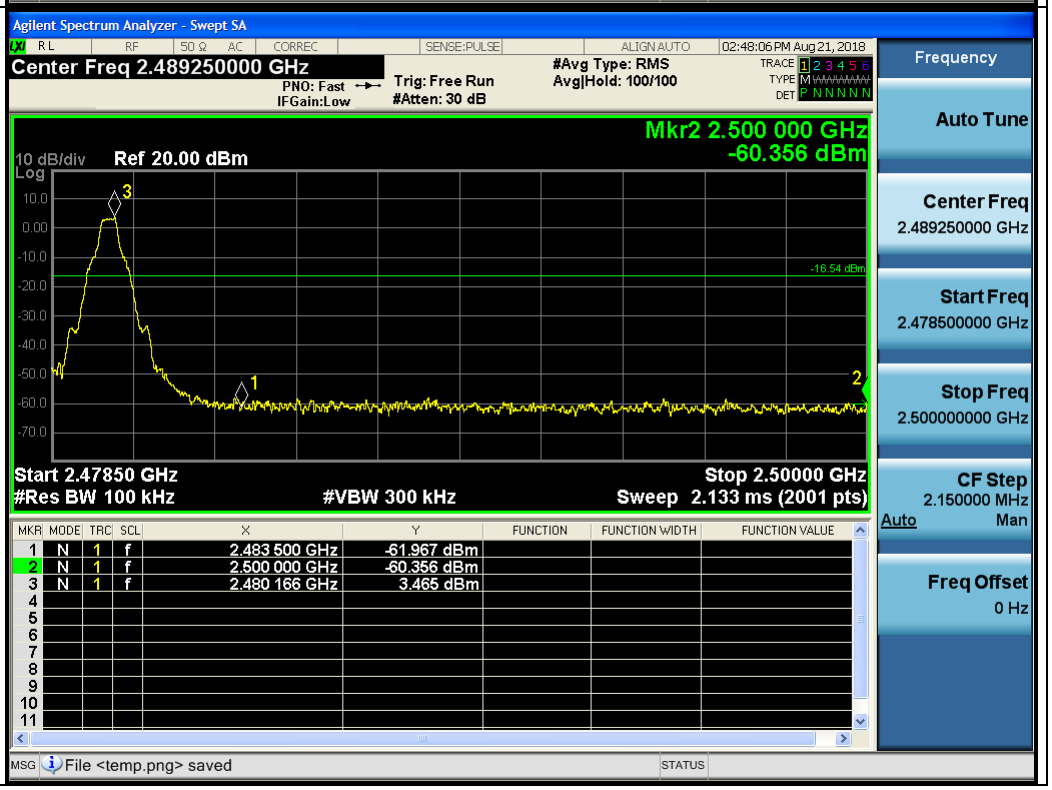
8DPSK/MCH	
8DPSK/HCH	

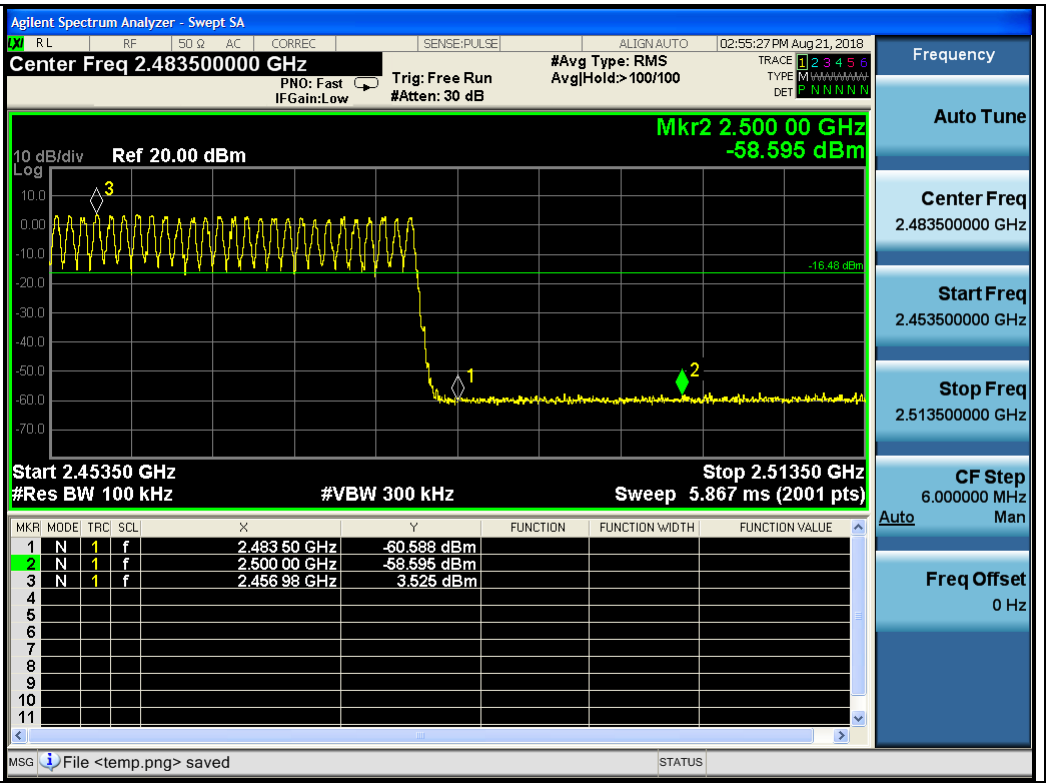
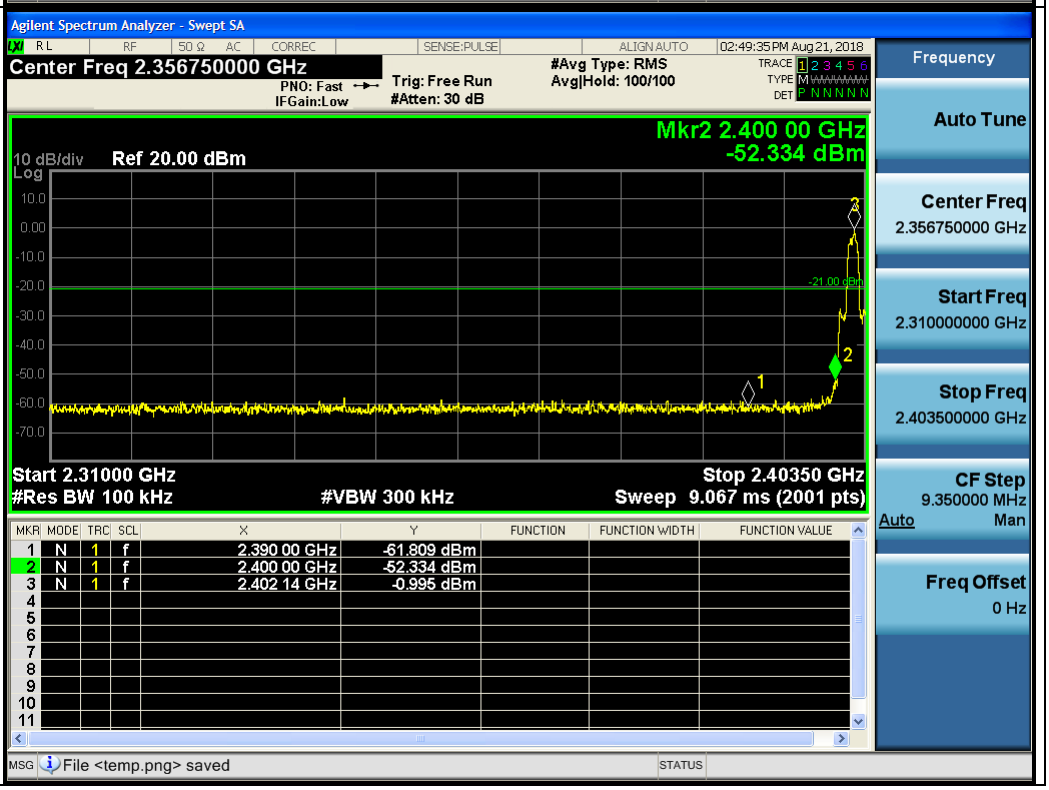
A.6 Band-edge for RF Conducted Emissions

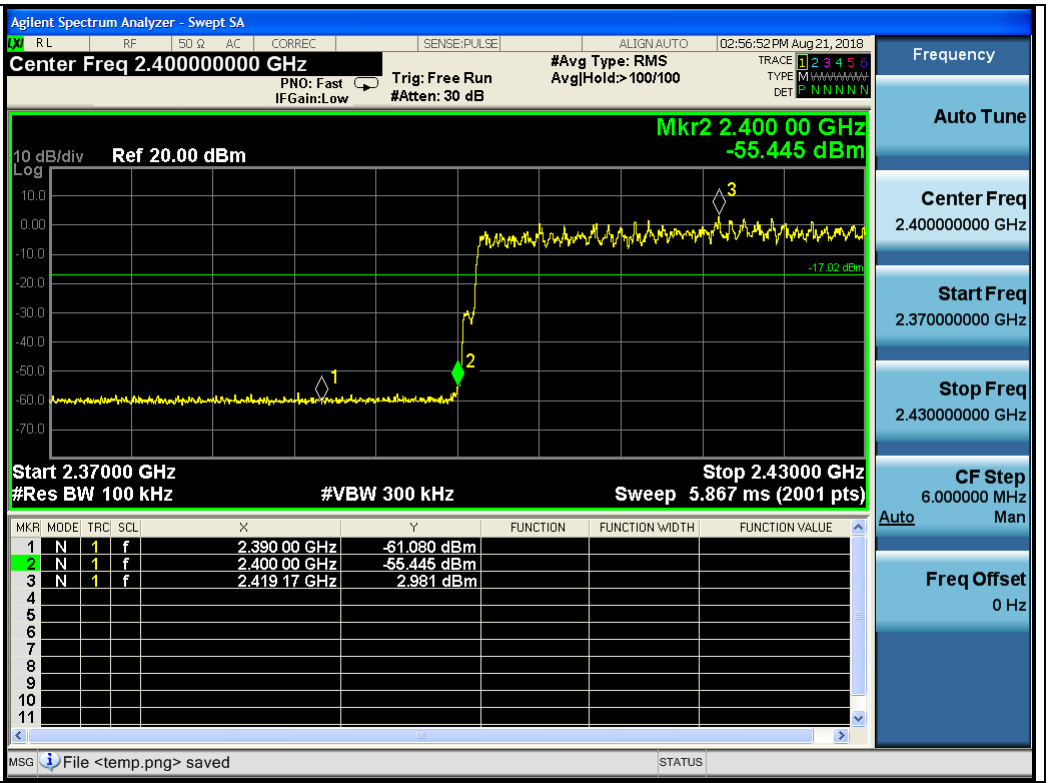
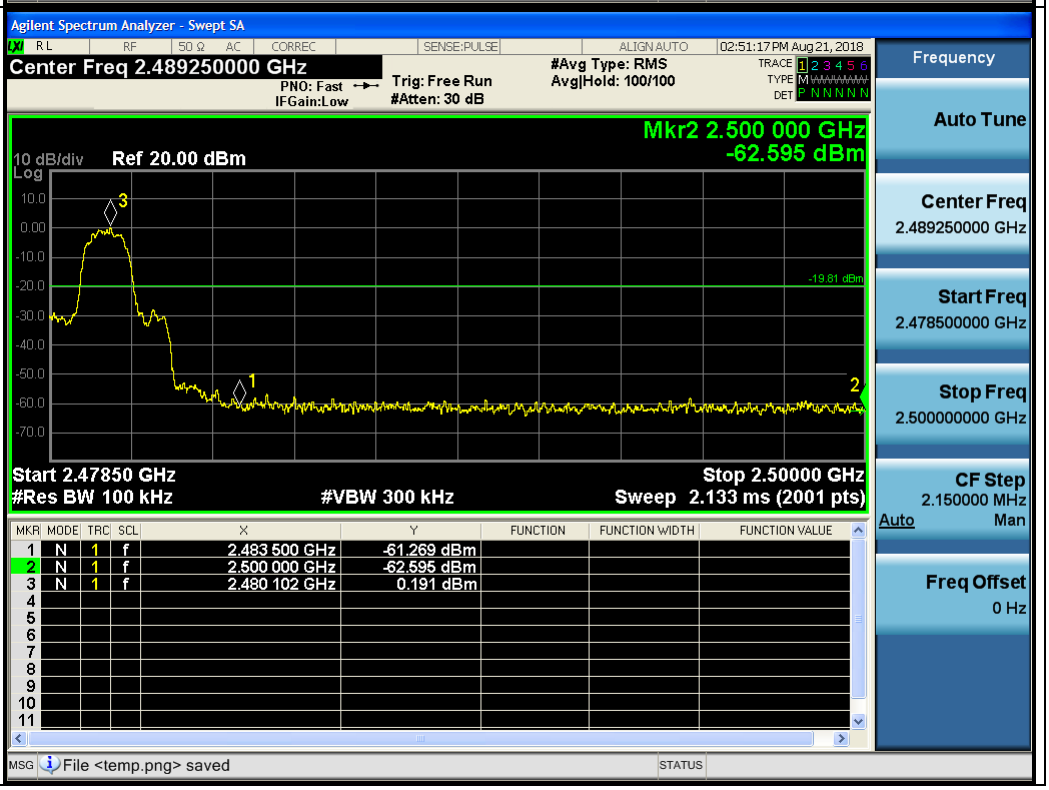
Mode	Channel	Carrier Frequency [MHz]	Frequency Hopping	Carrier Frequency Power [dBm]	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	Off	1.11	-56.24	-18.89	PASS
			On	3.52	-59.87	-16.48	PASS
GFSK	HCH	2480	Off	3.46	-60.36	-16.54	PASS
			On	3.52	-58.60	-16.48	PASS
π/4DQPSK	LCH	2402	Off	-1.00	-52.33	-21.00	PASS
			On	2.98	-55.44	-17.02	PASS
π/4DQPSK	HCH	2480	Off	2.27	-53.47	-17.73	PASS
			On	0.19	-61.27	-19.81	PASS
8DPSK	LCH	2402	Off	3.06	-59.10	-16.94	PASS
			On	2.55	-53.95	-17.45	PASS
8DPSK	HCH	2480	Off	0.94	-59.24	-19.06	PASS
			On	2.01	-59.21	-17.99	PASS

Test Graph

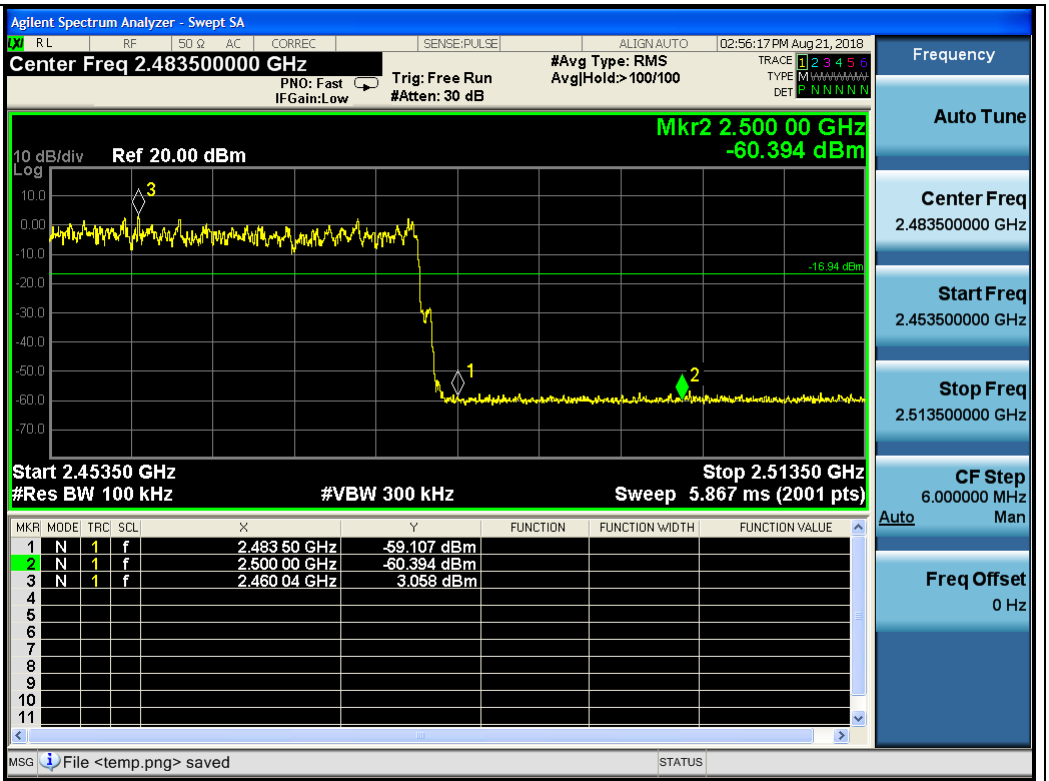
Graphs	
GFSK/LCH/No Hop	

GFSK/LCH/Hop	
GFSK/HCH/No Hop	

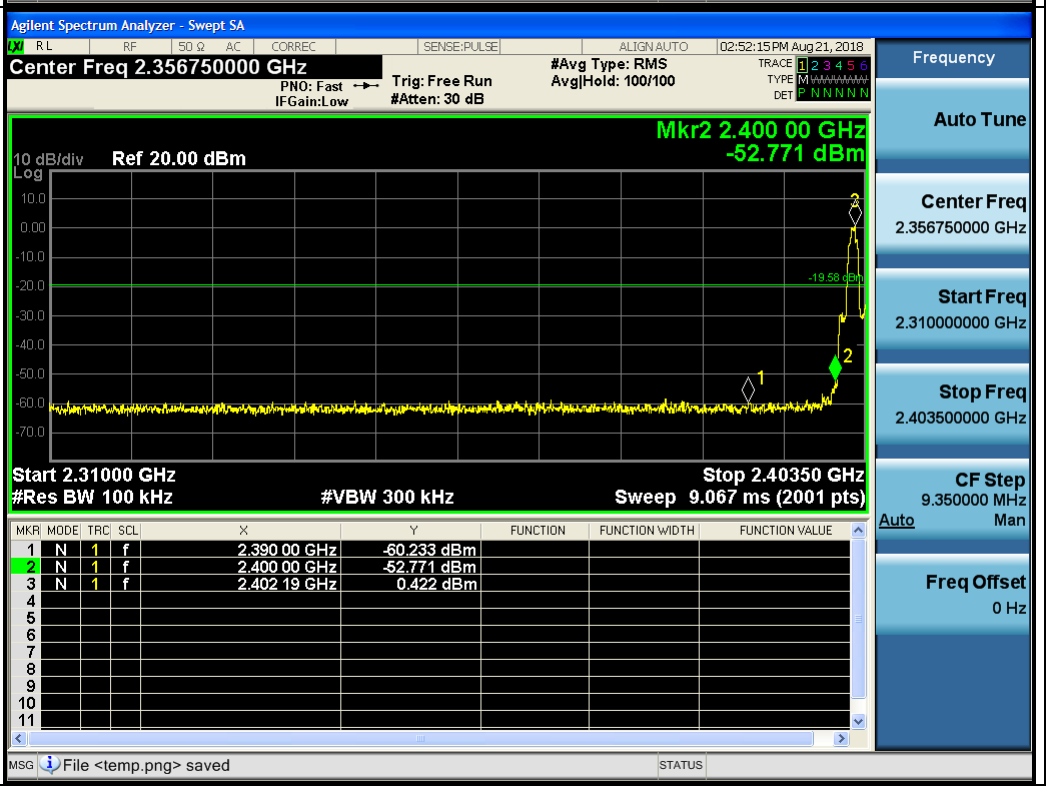
GFSK/HCH/Hop	
π/4DQPSK/LCH/No Hop	

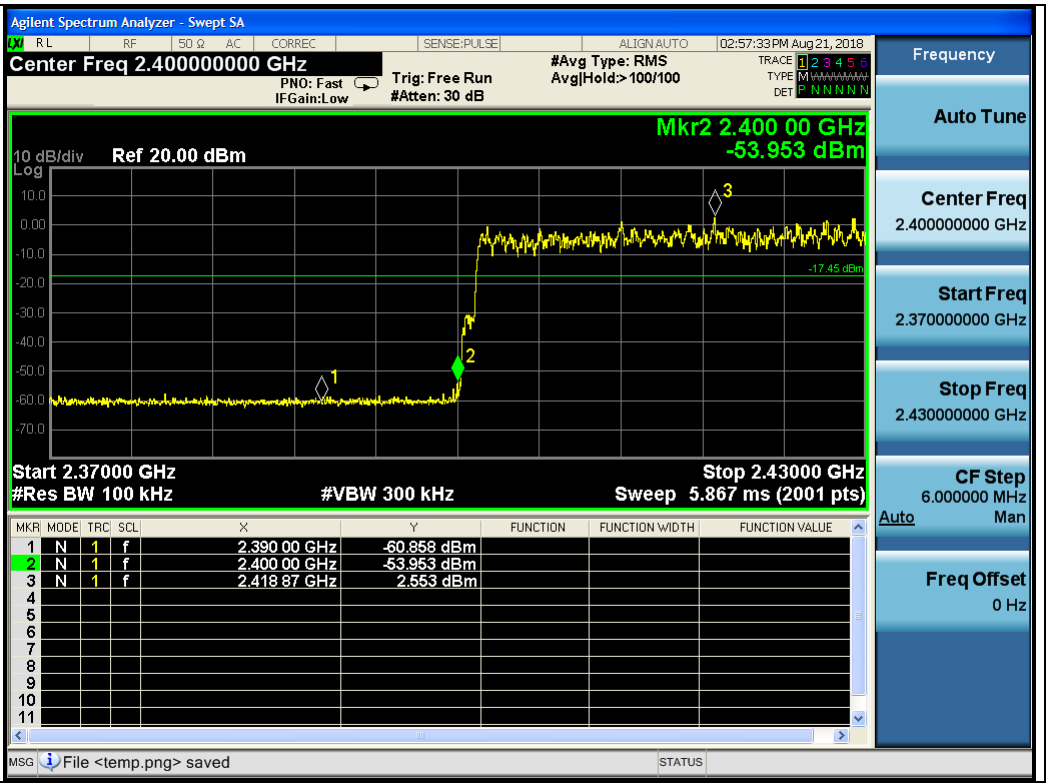
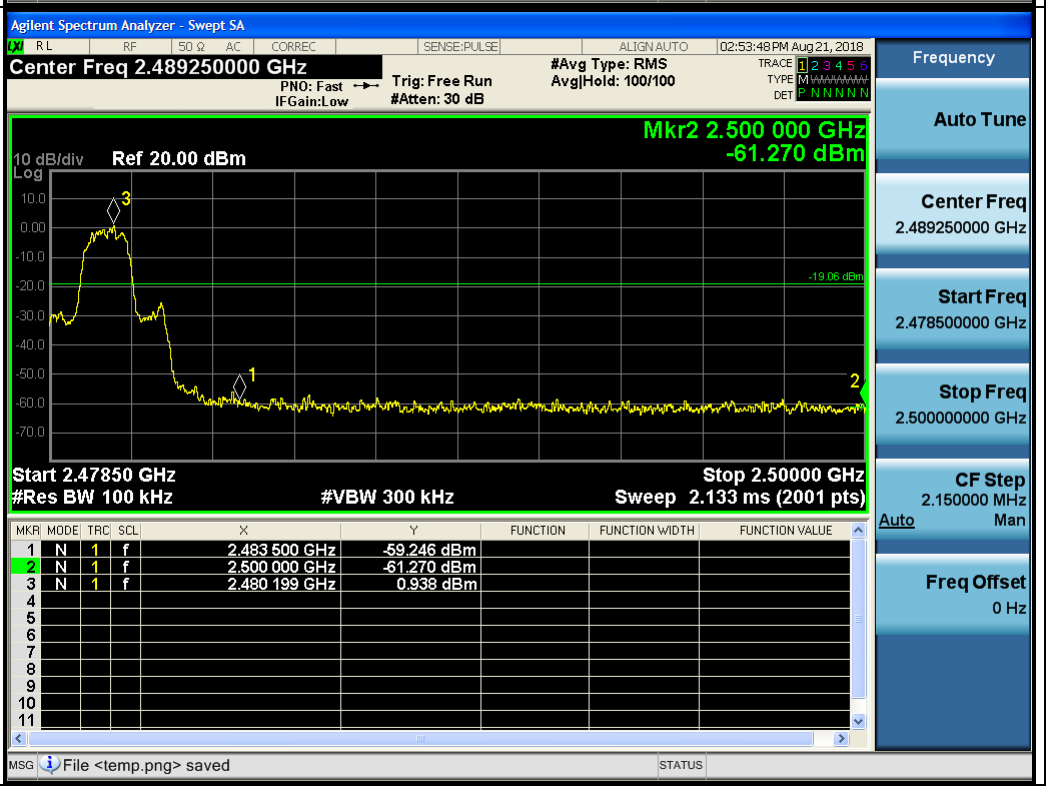
π/4DQPSK/LCH/Hop	
π/4DQPSK/HCH/No Hop	

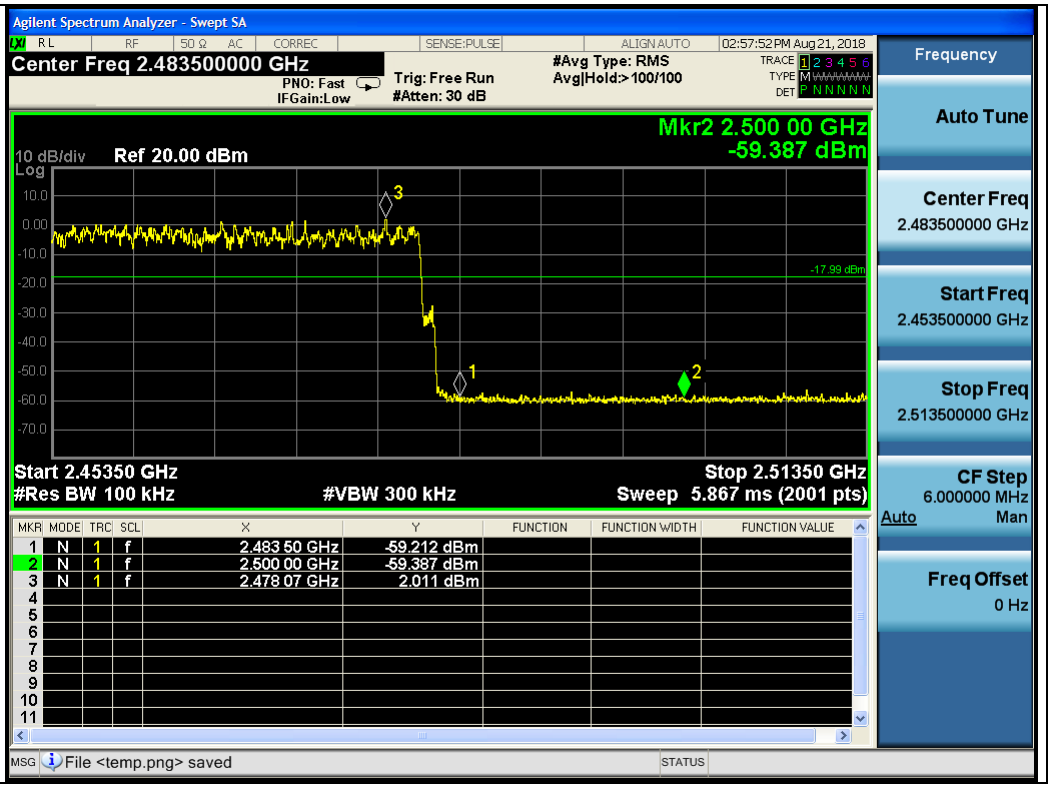
π/4DQPSK/HCH/Hop



8DPSK/LCH/No Hop

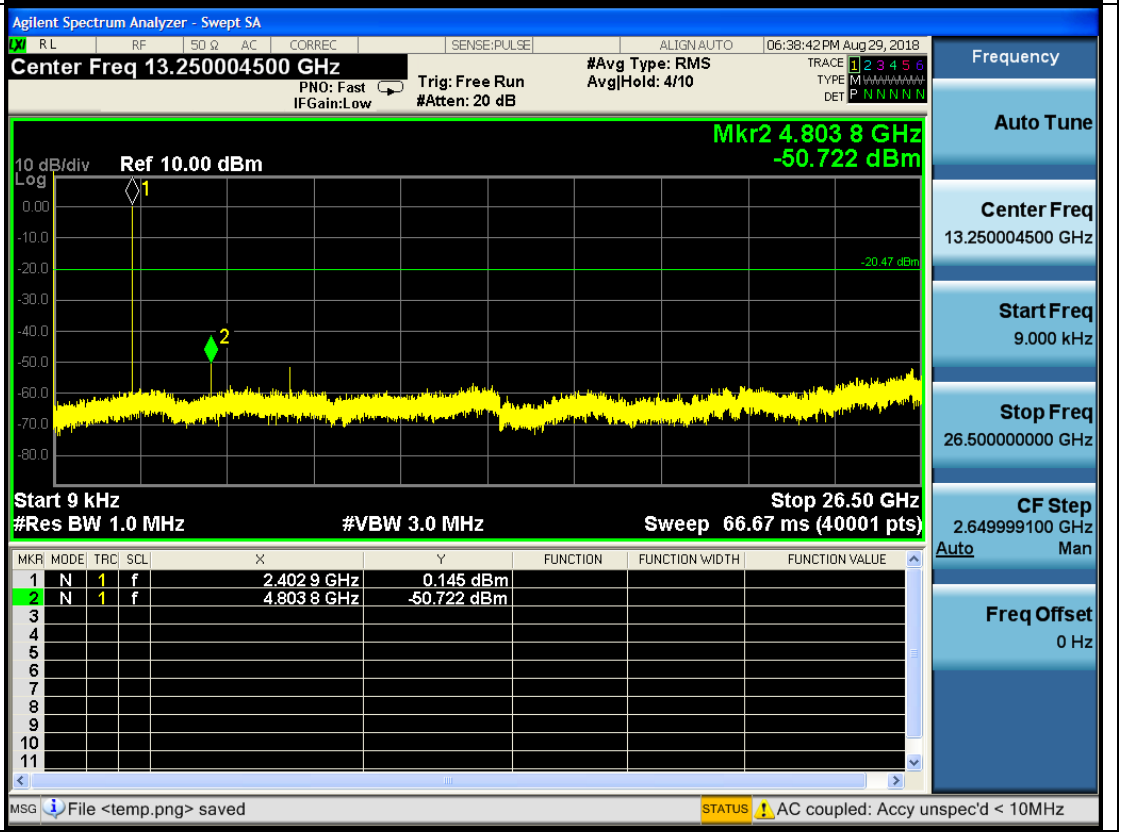


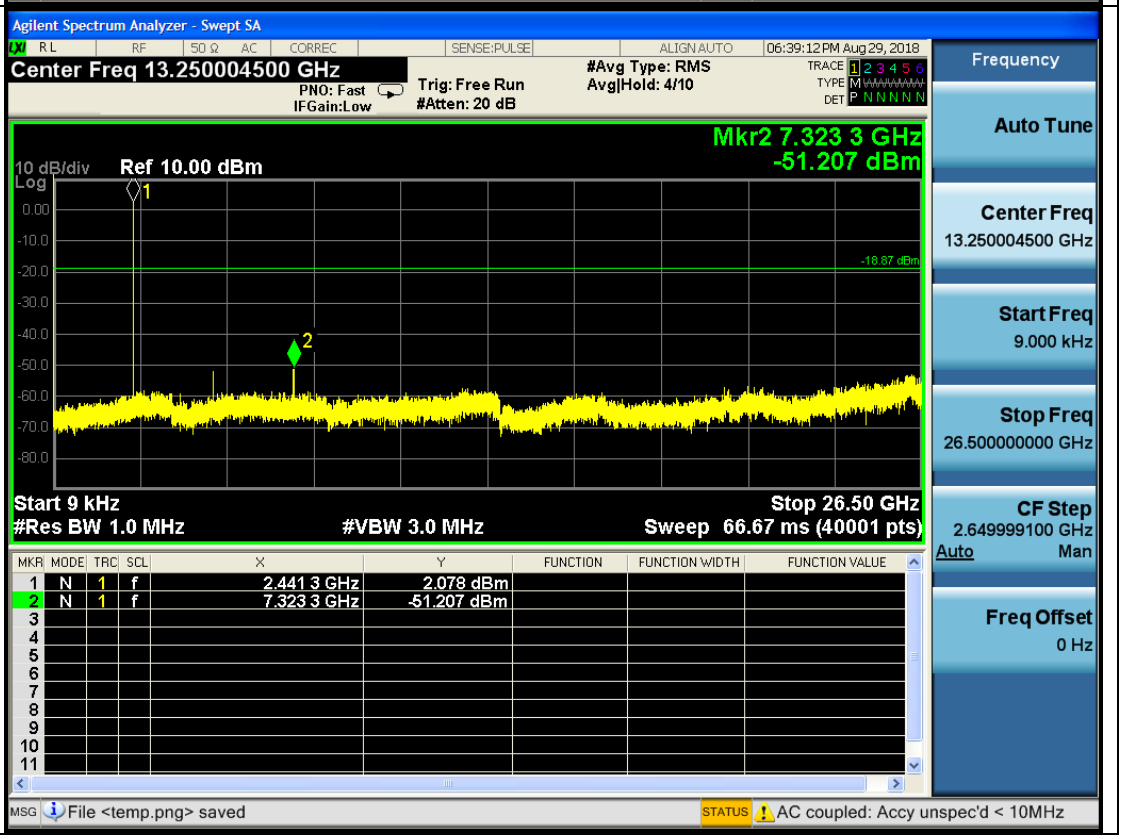
8DPSK/LCH/Hop	
8DPSK/HCH/No Hop	

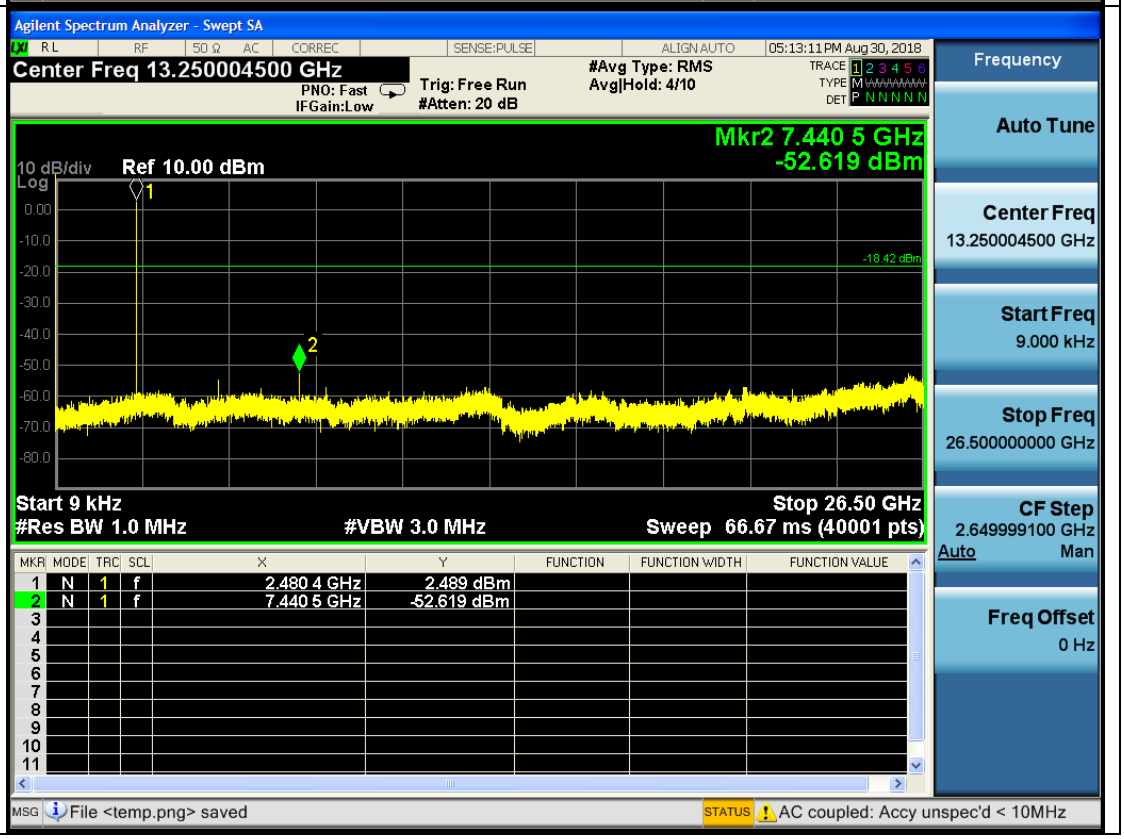
8DPSK/HCH/Hop	

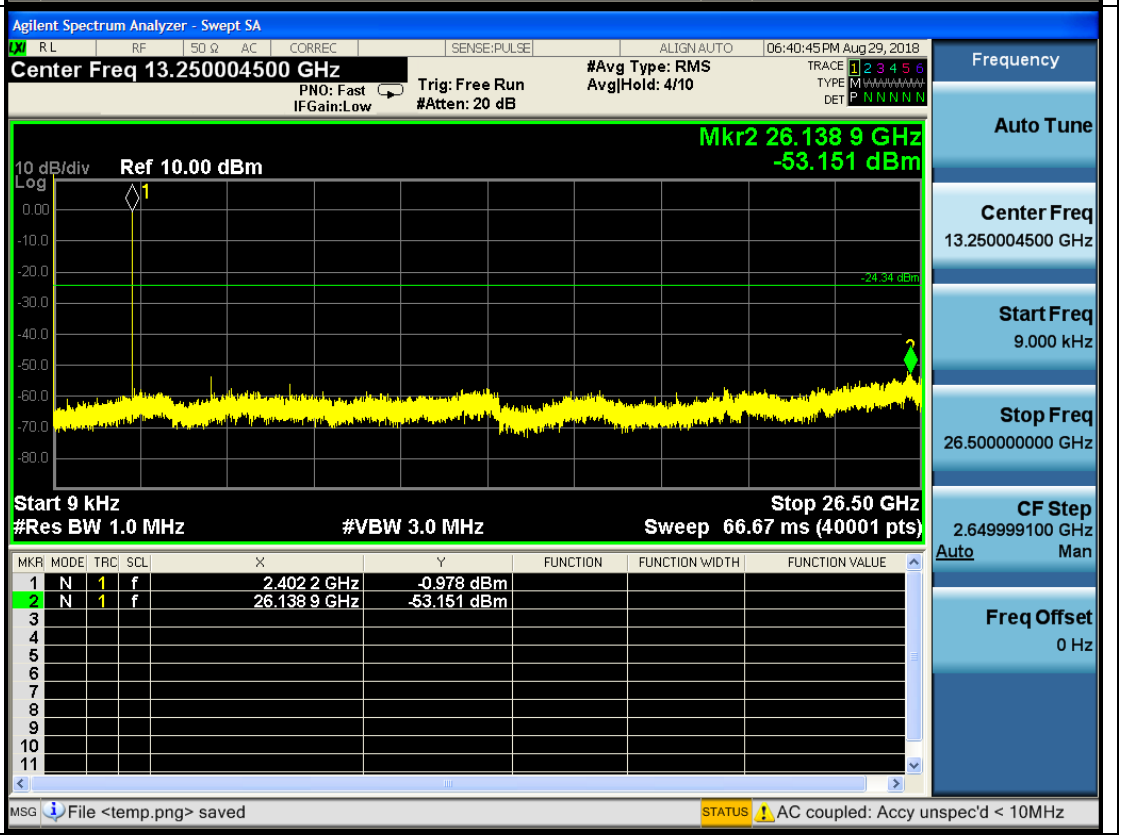
A.7 RF Conducted Spurious Emissions

Test Graph

GFSK_LCH_Graphs	
Pref	
Puw	

GFSK_MCH_Graphs	
Pref	
Puw	

GFSK_HCH_Graphs	
Pref	
Puw	

π/4DQPSK_LCH_Graphs	
Pref	
Puw	

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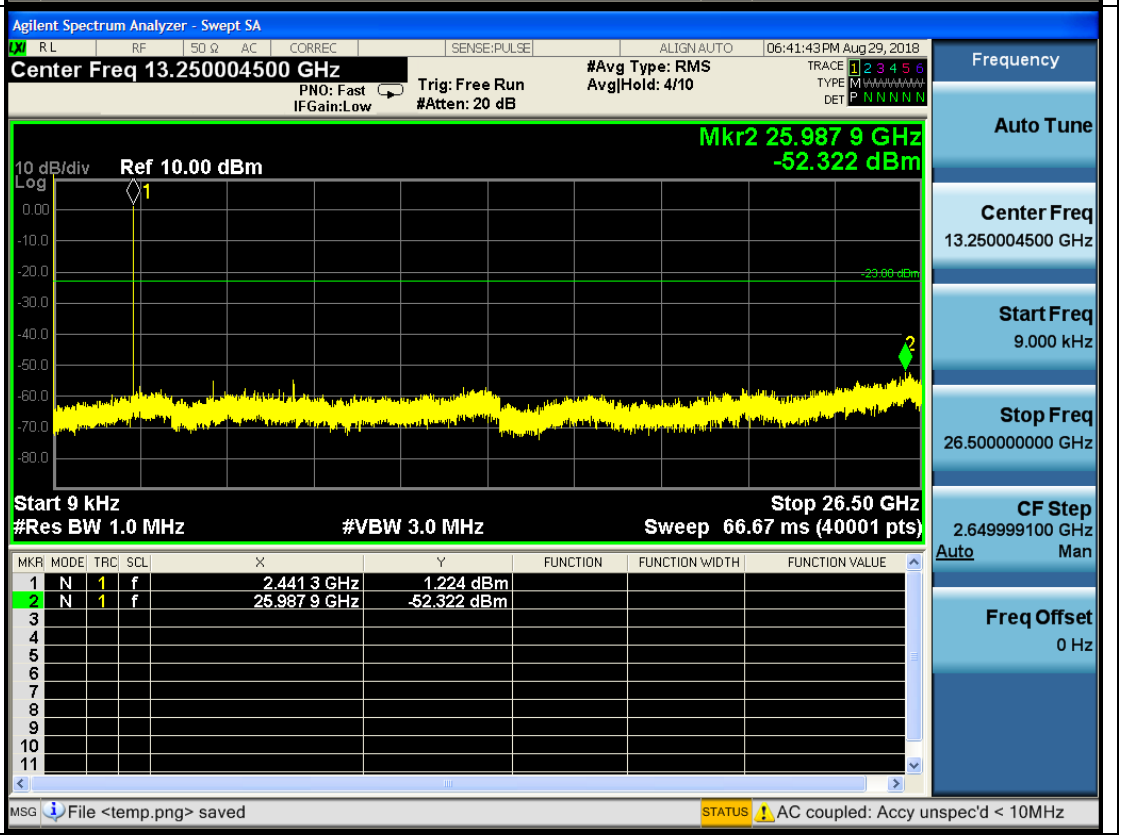
Puw	

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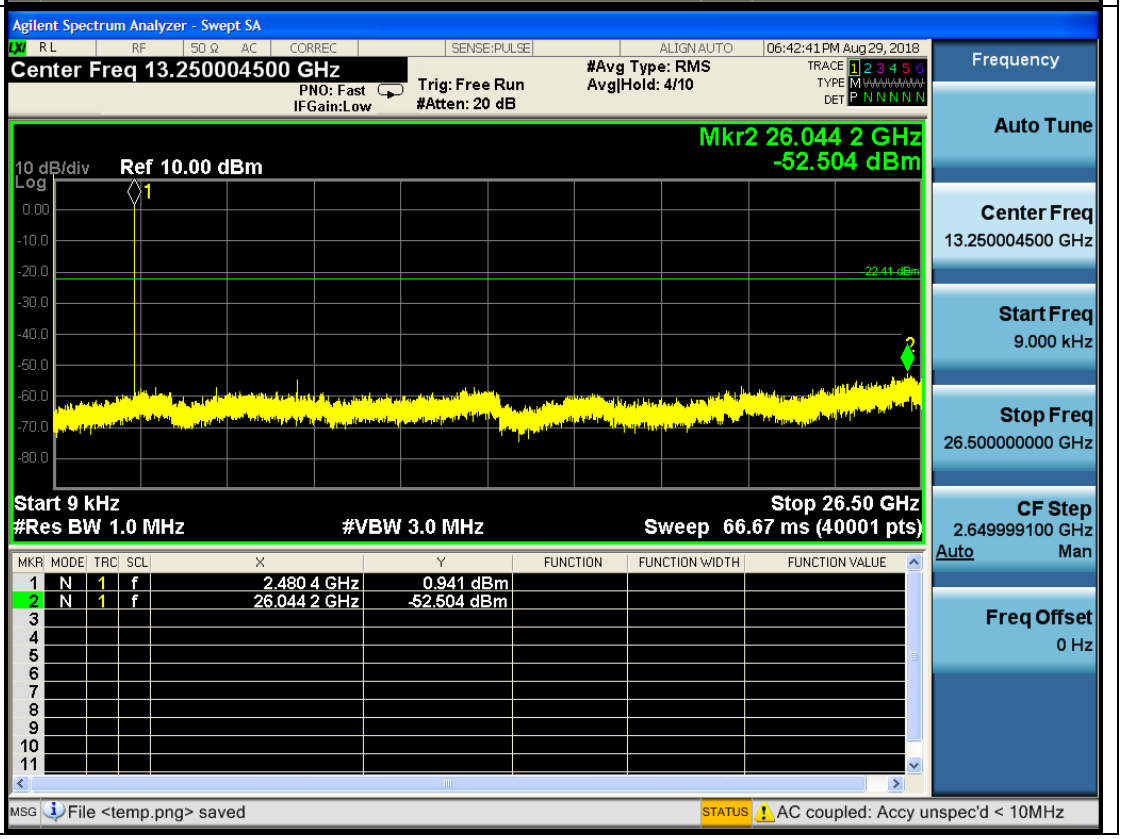
Puw	

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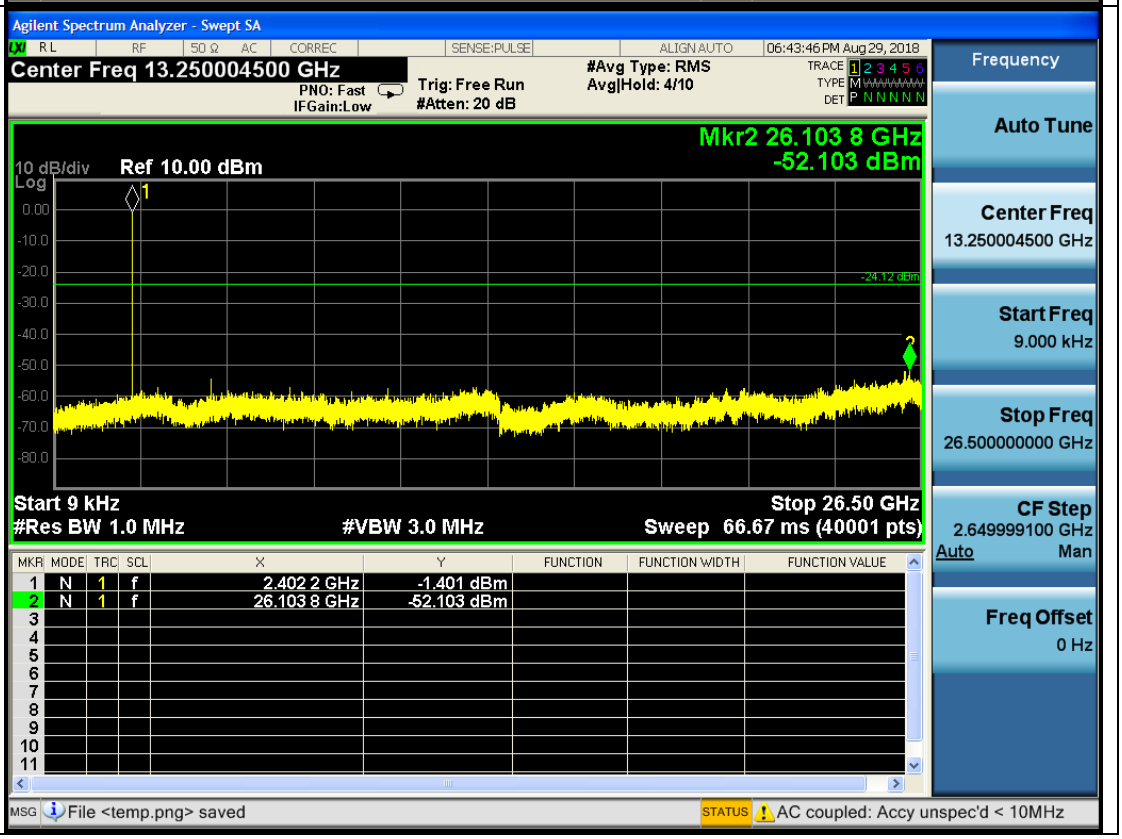
Puw	

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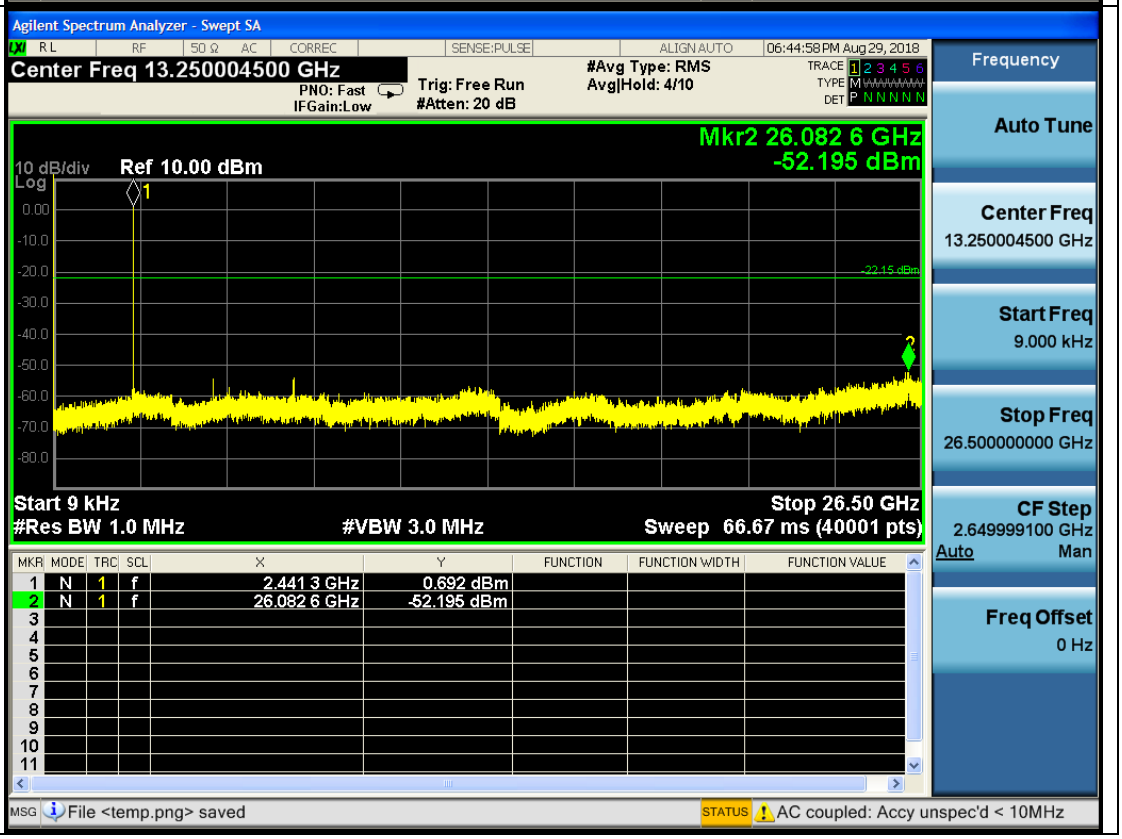
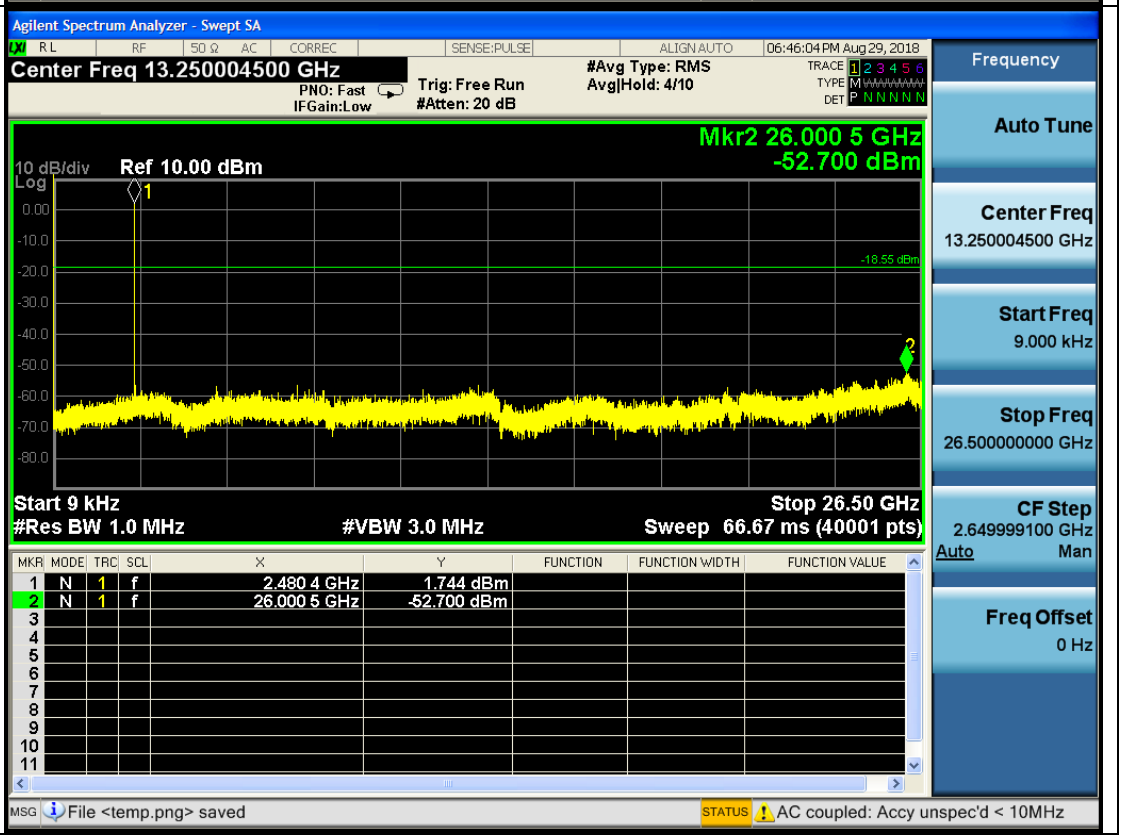
Puw	

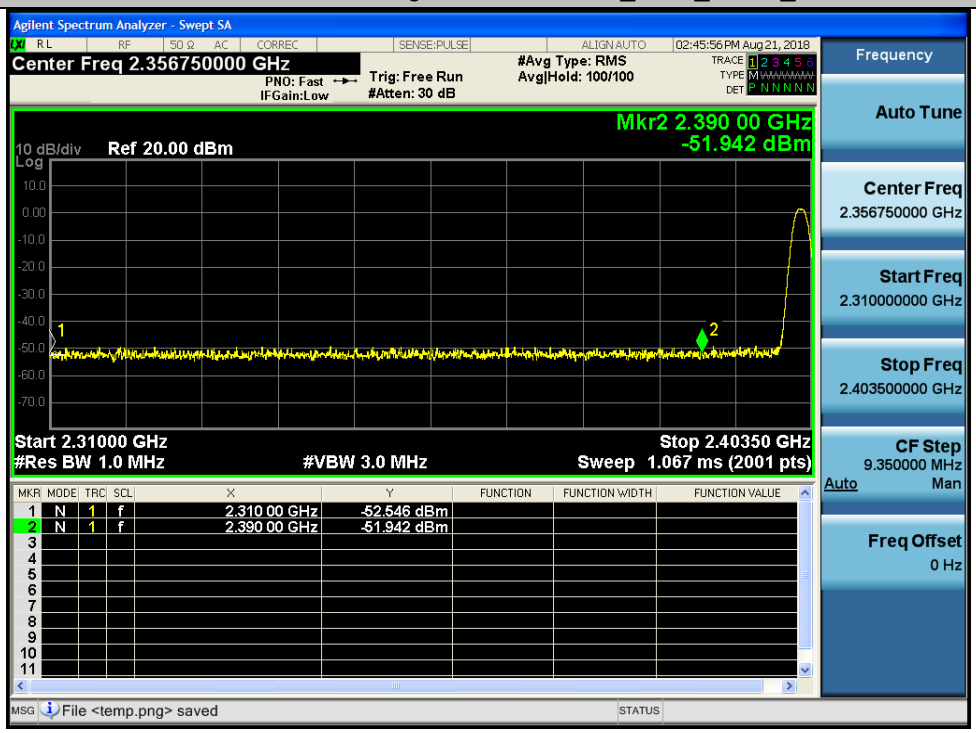
8DPSK_HCH_Graphs	
Pref	
Puw	

A.8 Restrict-band band-edge measurements

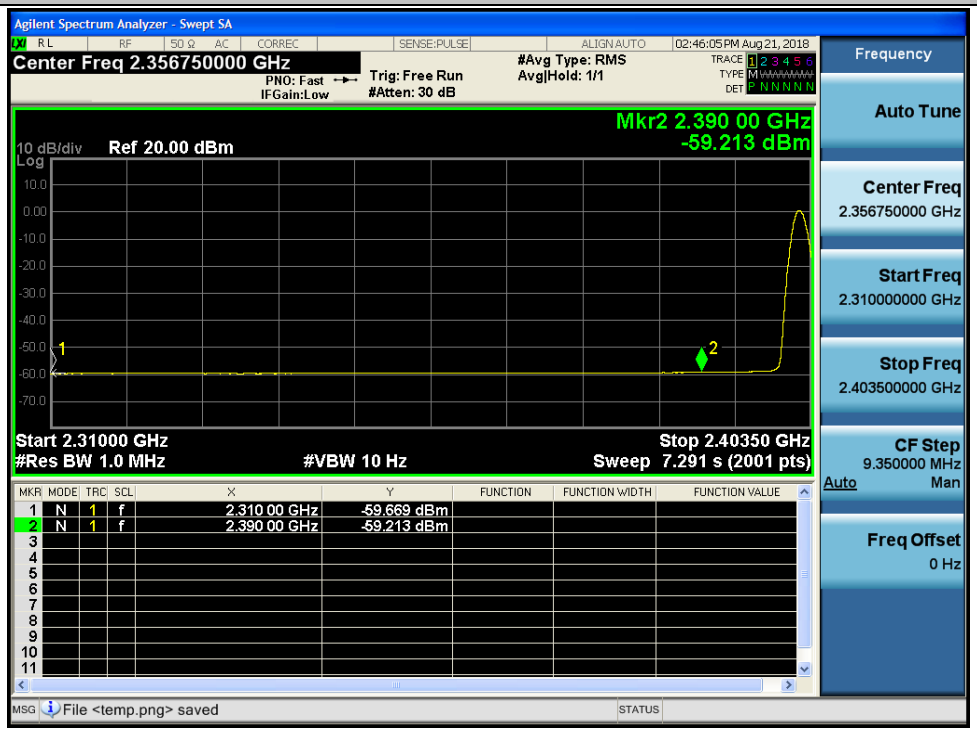
Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdi
GFSK	Off	2310.0-2390.0	-51.94	2.00	0	45.26	PEAK	74	PASS
	Off	2310.0-2390.0	-59.21	2.00	0	37.99	AV	54	PASS
	Off	2483.5-2500.0	-51.76	2.00	0	45.44	PEAK	74	PASS
	Off	2483.5-2500.0	-55.34	2.00	0	41.86	AV	54	PASS
π/4DQPSK	Off	2310.0-2390.0	-51.22	2.00	0	45.98	PEAK	74	PASS
	Off	2310.0-2390.0	-59.16	2.00	0	38.04	AV	54	PASS
	Off	2483.5-2500.0	-49.18	2.00	0	48.02	PEAK	74	PASS
	Off	2483.5-2500.0	-54.4	2.00	0	42.80	AV	54	PASS
8DPSK	Off	2310.0-2390.0	-51.38	2.00	0	45.82	PEAK	74	PASS
	Off	2310.0-2390.0	-59.19	2.00	0	38.01	AV	54	PASS
	Off	2483.5-2500.0	-49.71	2.00	0	47.49	PEAK	74	PASS
	Off	2483.5-2500.0	-54.25	2.00	0	42.95	AV	54	PASS

Test Graph

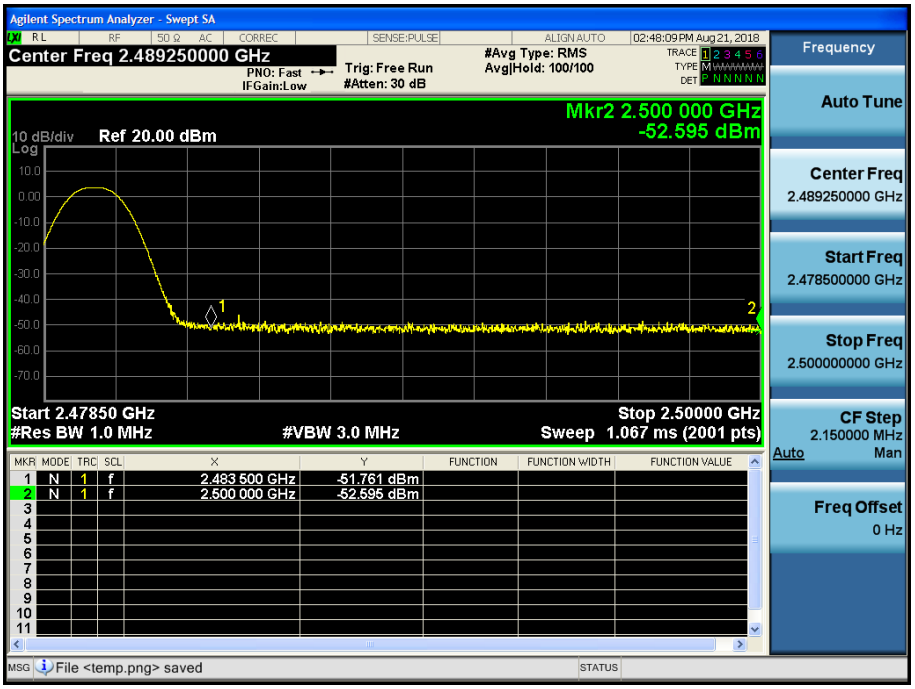
Restrict-band band-edge measurements_2402_PEAK_DH5



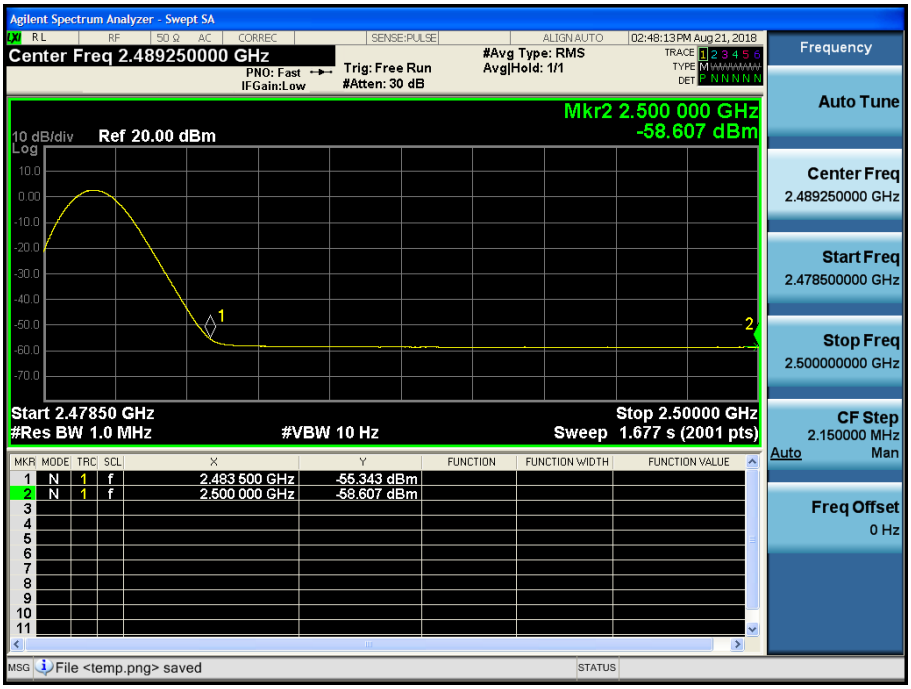
Restrict-band band-edge measurements_2402_AV_DH5



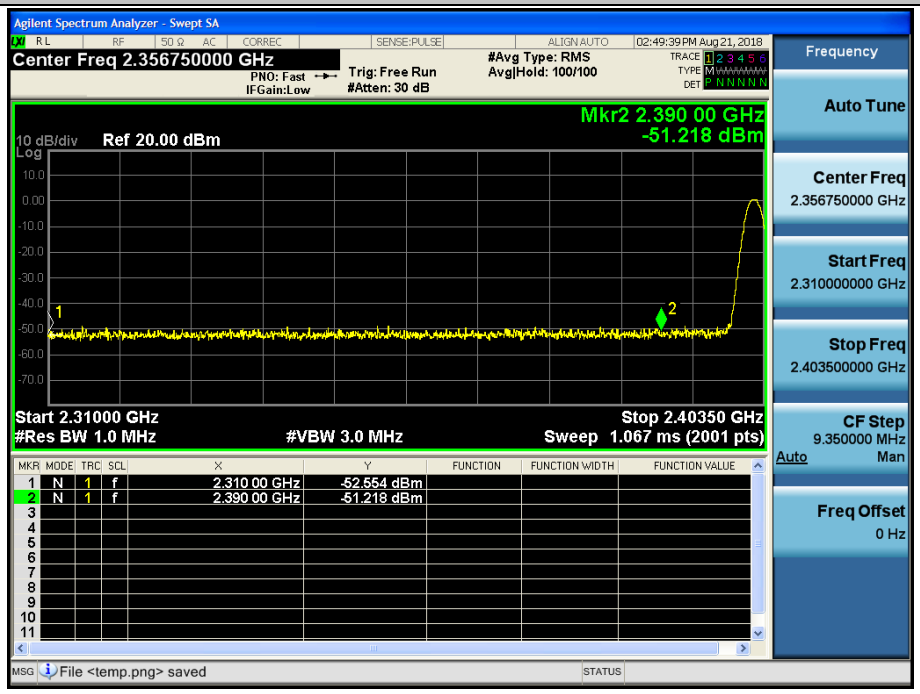
Restrict-band band-edge measurements_2480_PEAK_DH5



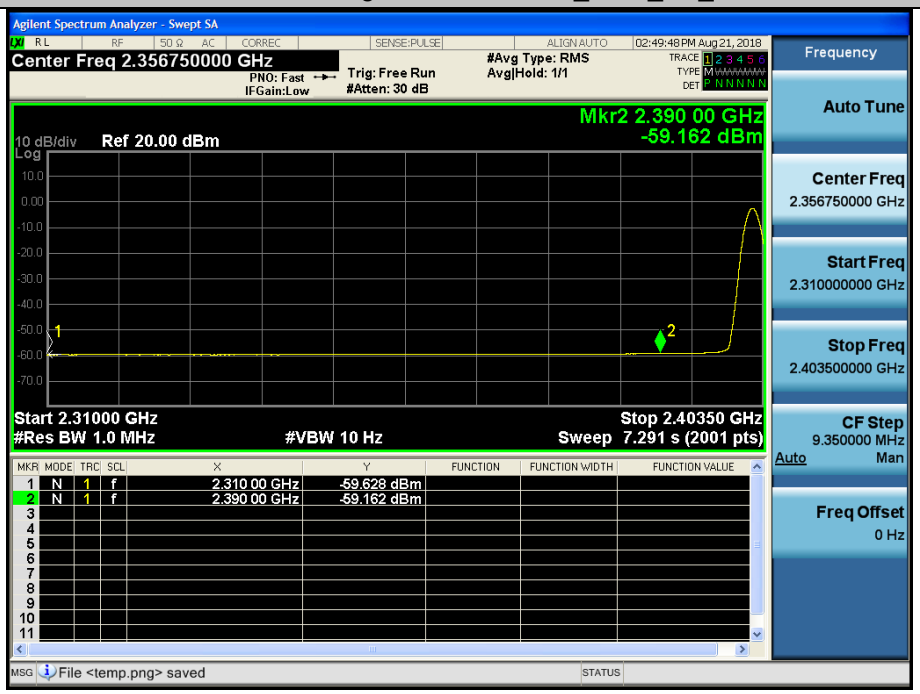
Restrict-band band-edge measurements_2480_AV_DH5



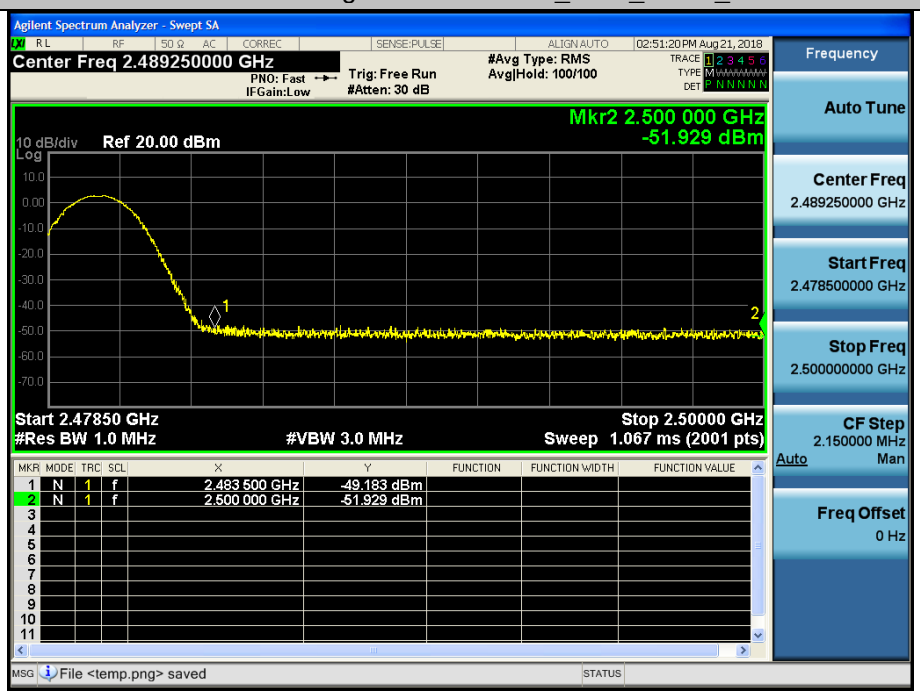
Restrict-band band-edge measurements_2402_PEAK_2DH5



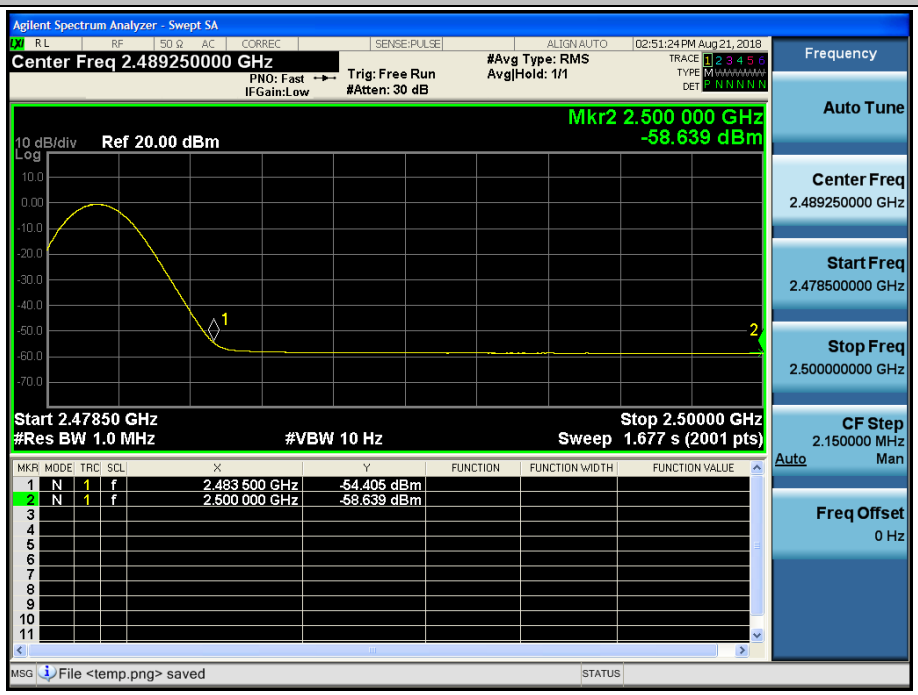
Restrict-band band-edge measurements_2402_AV_2DH5



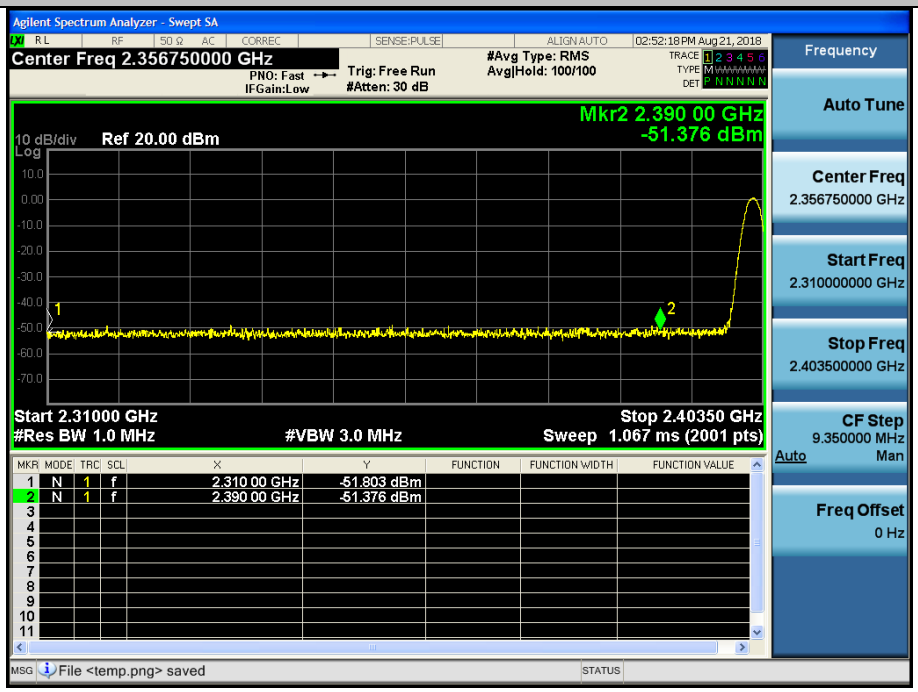
Restrict-band band-edge measurements_2480_PEAK_2DH5



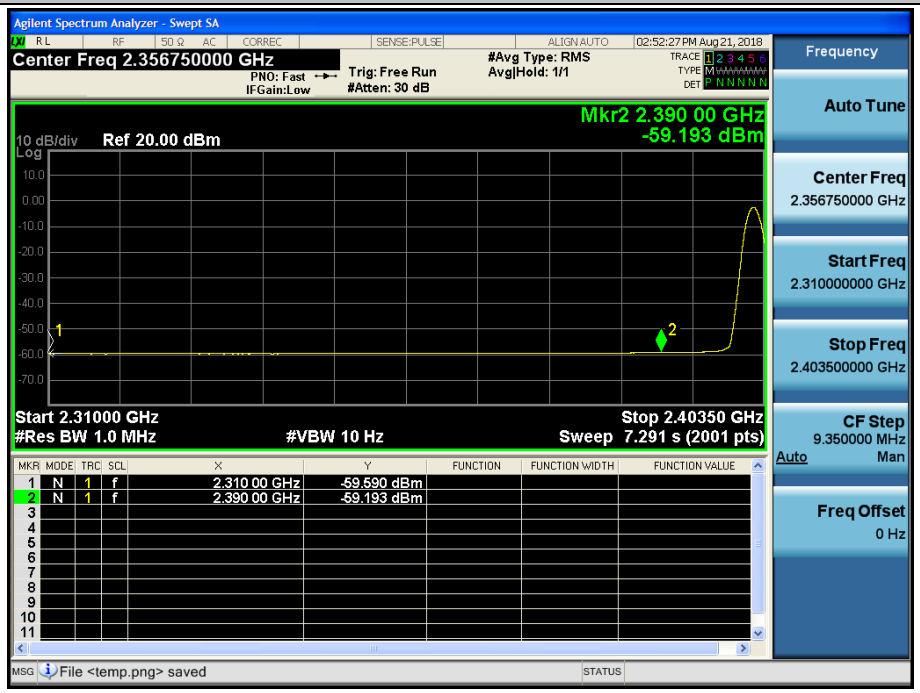
Restrict-band band-edge measurements_2480_AV_2DH5



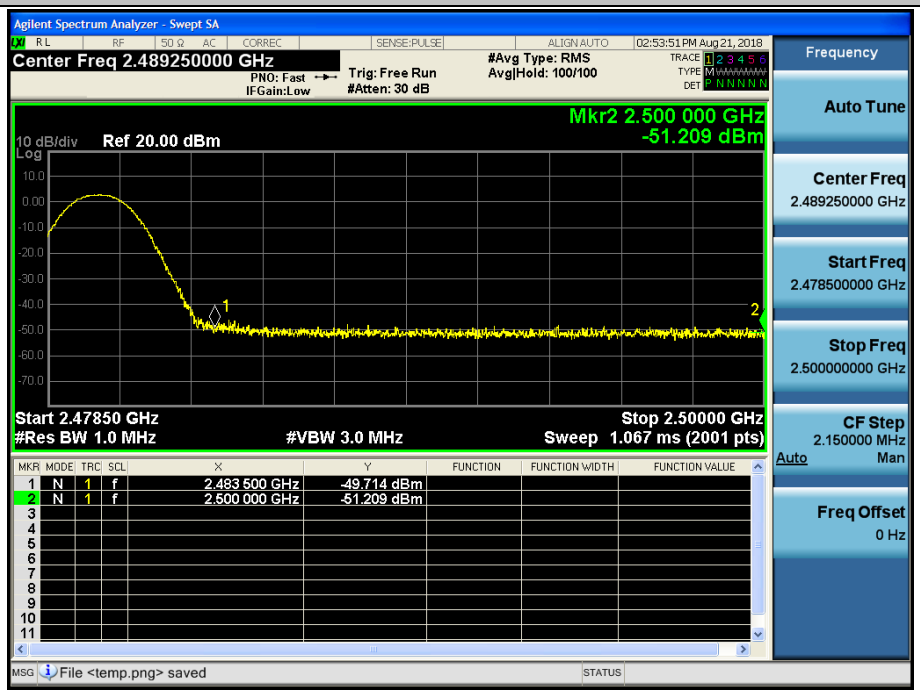
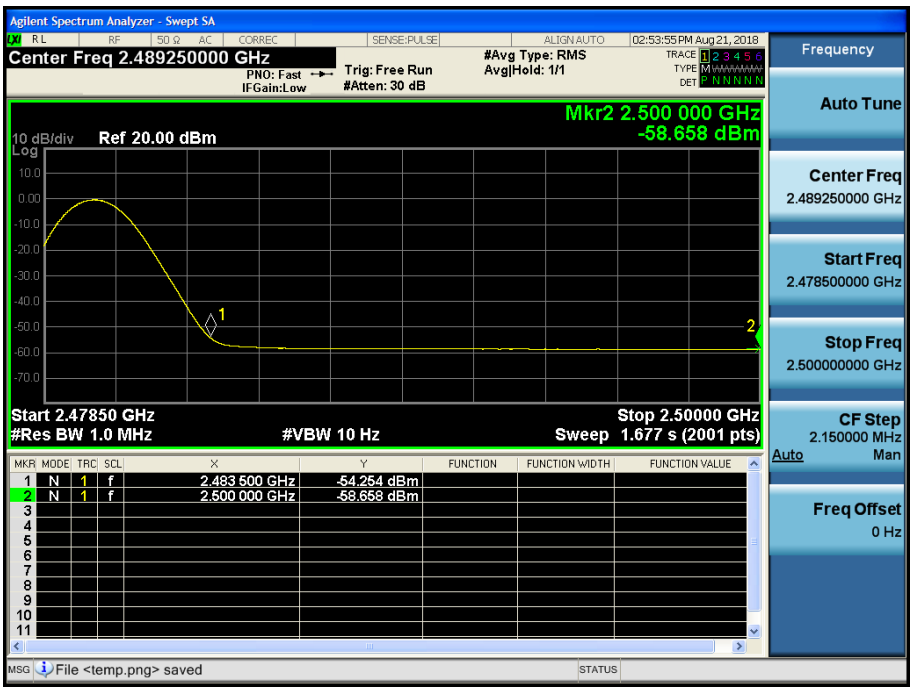
Restrict-band band-edge measurements_2402_PEAK_3DH5



Restrict-band band-edge measurements_2402_AV_3DH5



Restrict-band band-edge measurements_2480_PEAK_3DH5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