Appendix A

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

Product Name: Bluetooth Alarm Clock Speaker with Wireless charger and FM Radio

Trade Mark: iLuv

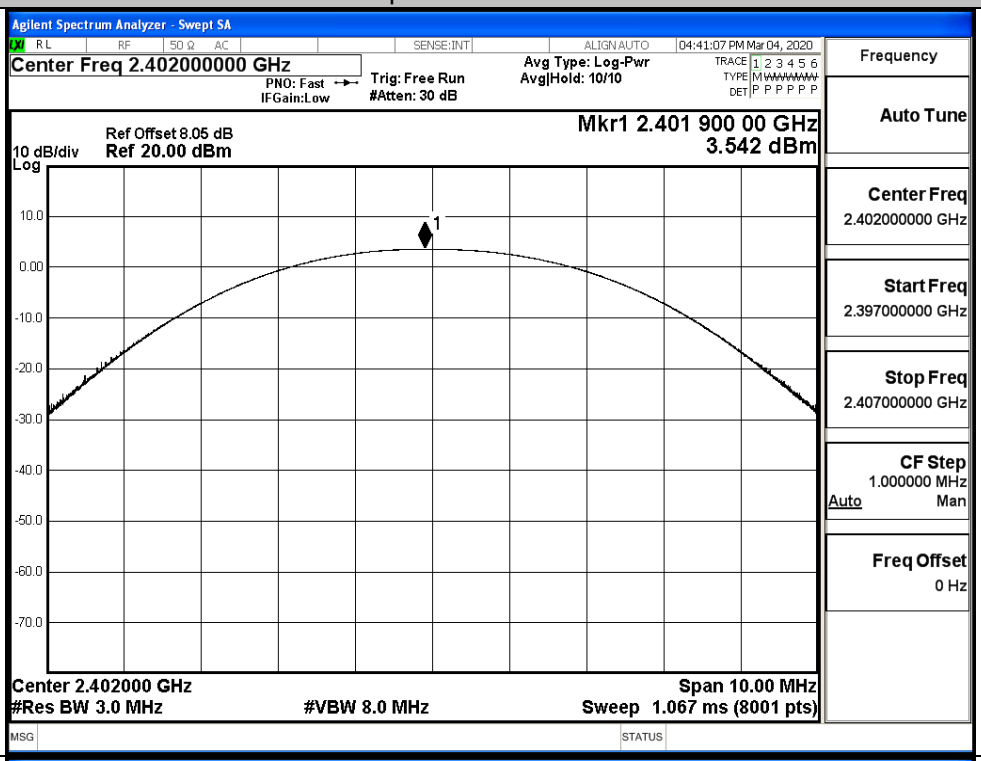
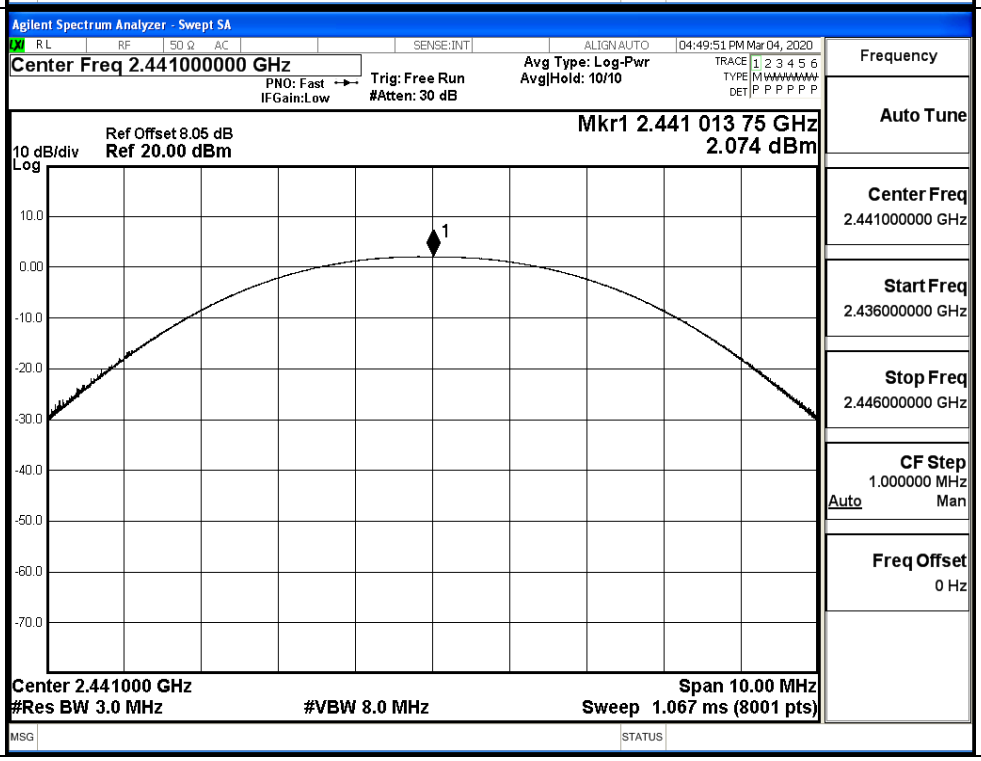
Test Model: MORCAL6Q

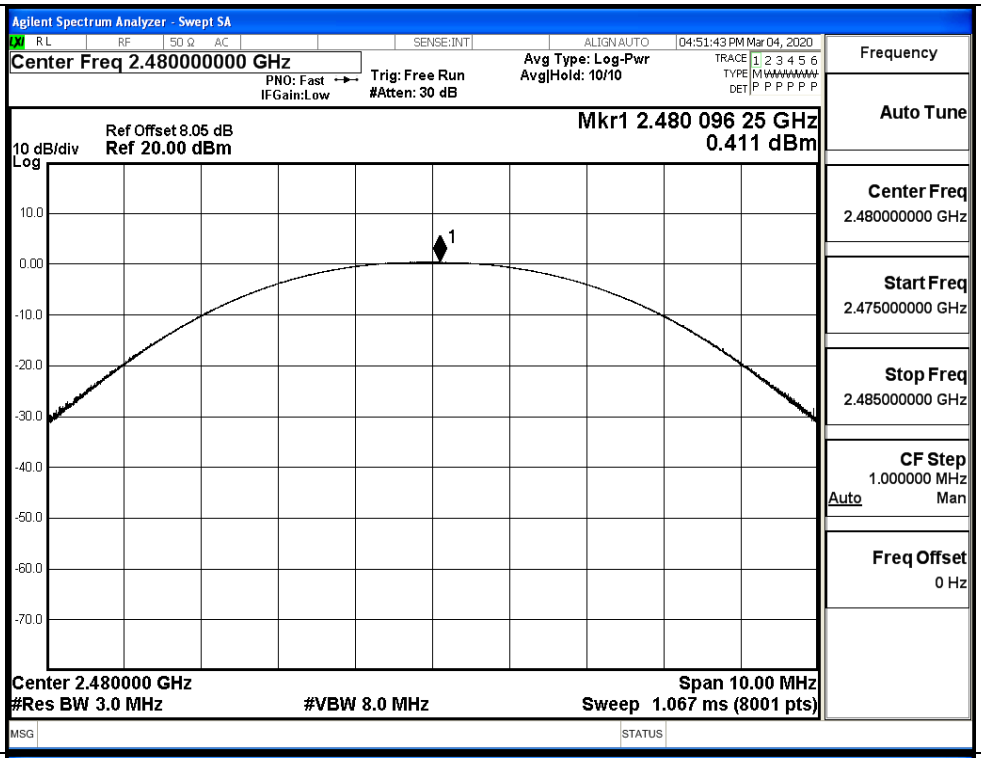
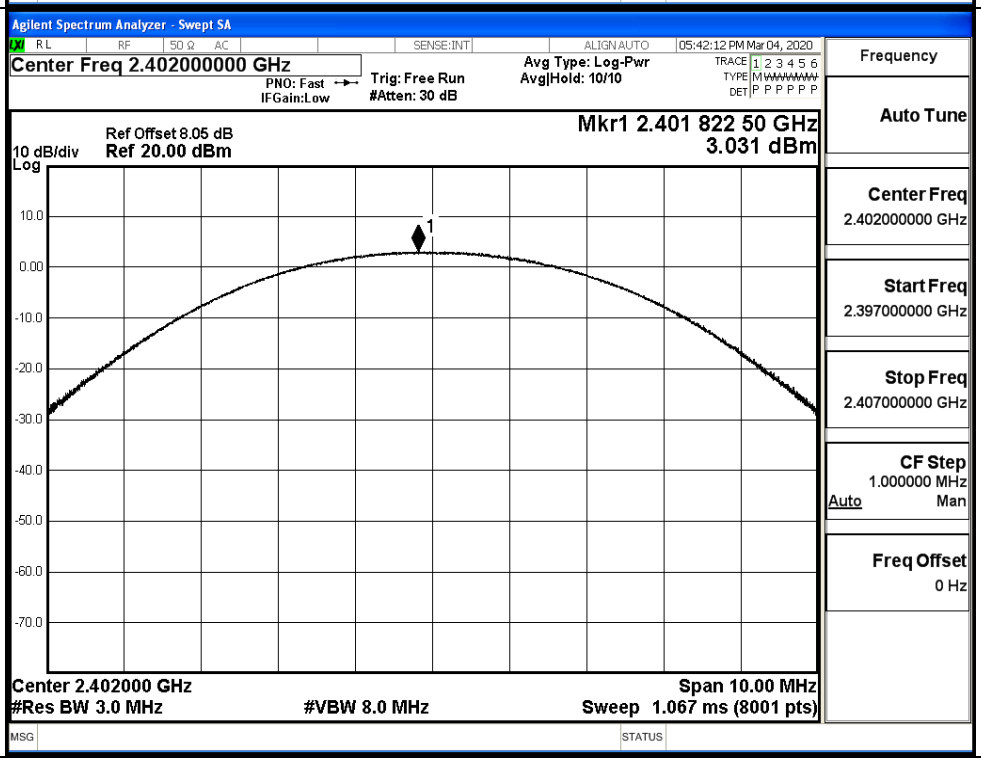
Environmental Conditions

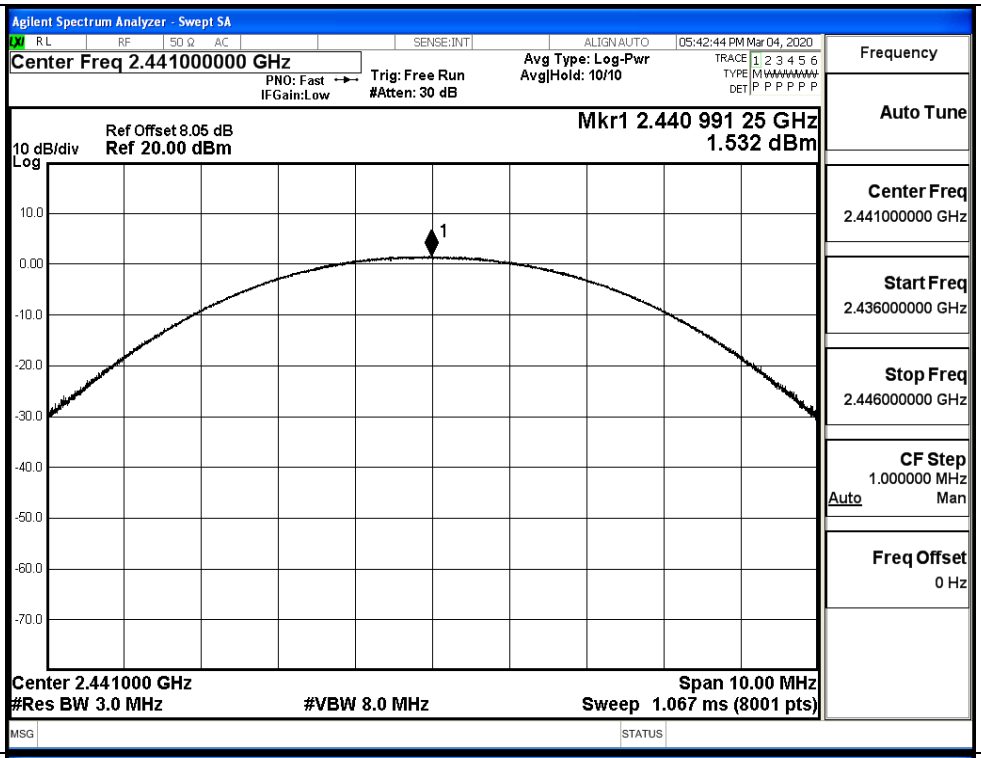
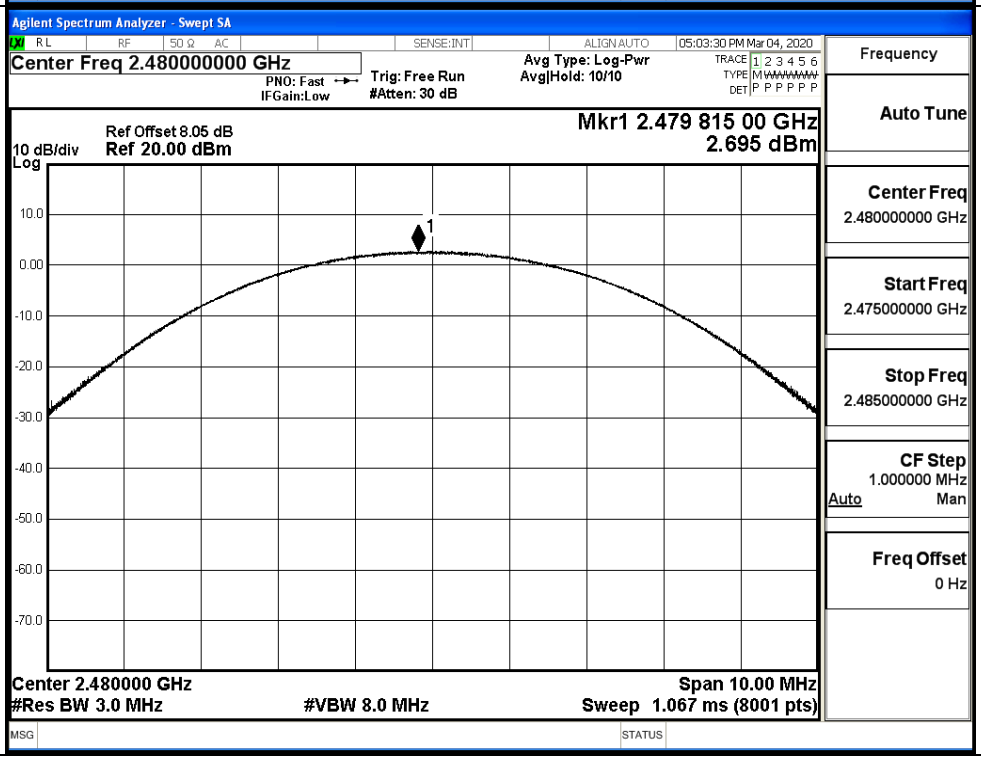
Temperature:	23.4 ° C
Relative Humidity:	54.7%
ATM Pressure:	100.0 kPa
Test Engineer:	Li Huan
Supervised by:	Tom.Liu

A.1 Maxmum Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	3.542	21	PASS
	MCH	2.074	21	PASS
	HCH	0.411	21	PASS
π/4DQPSK	LCH	3.031	21	PASS
	MCH	1.532	21	PASS
	HCH	2.695	21	PASS

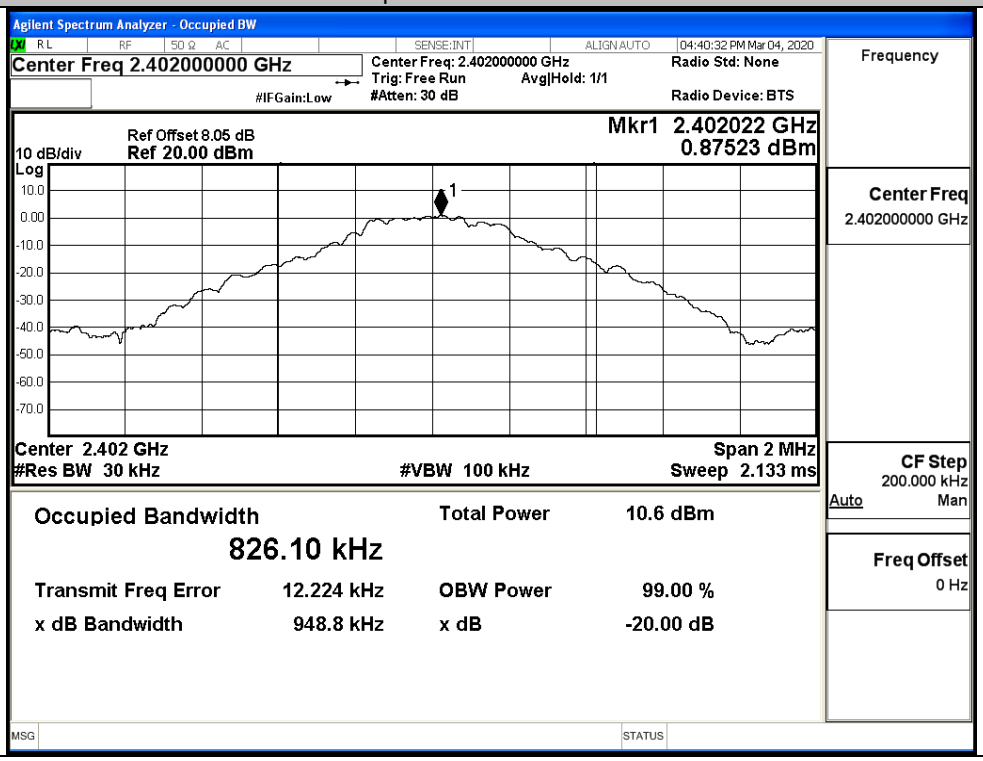
Test Graphs		
GFSK/LCH		
GFSK/MCH		

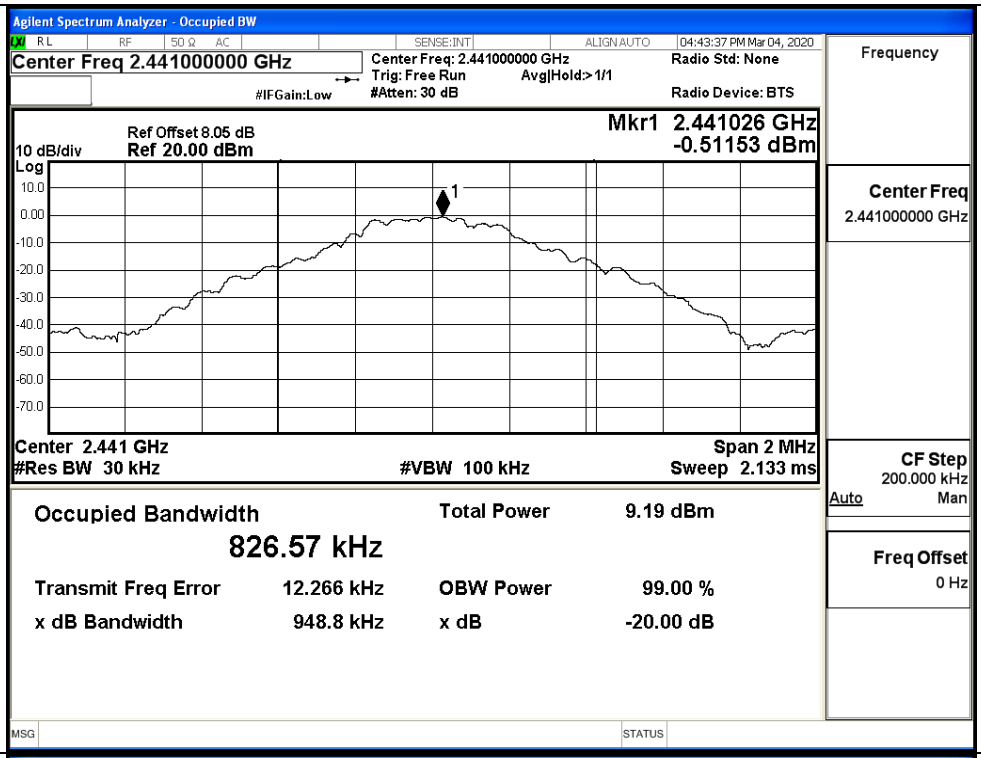
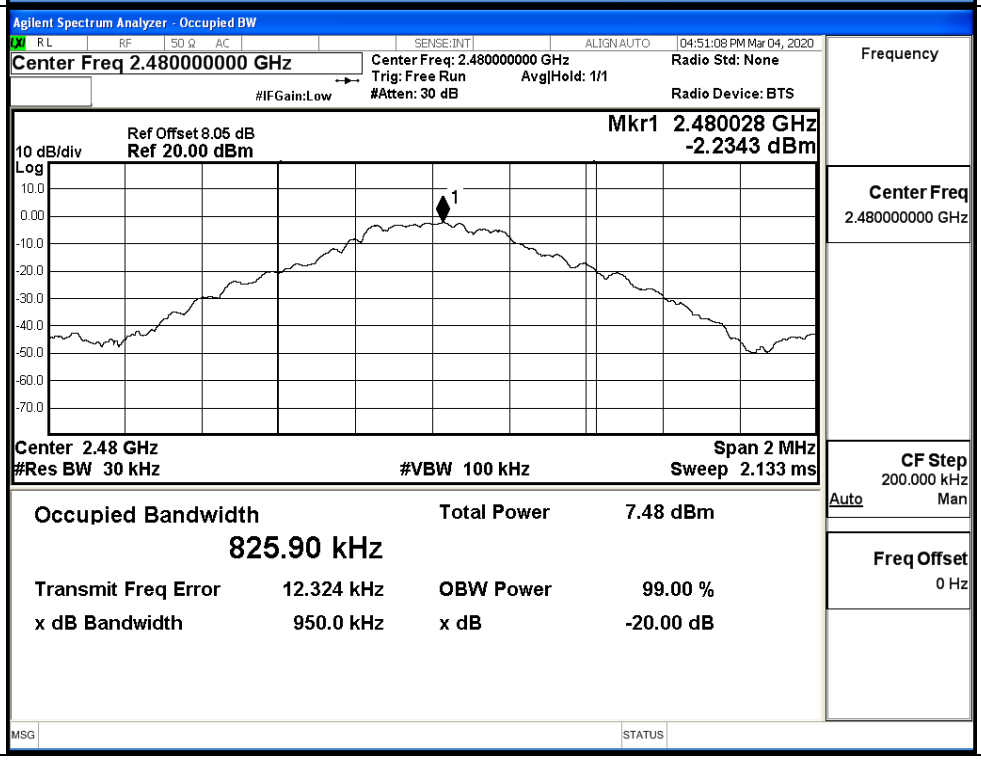
GFSK/HCH	
π/4DQPSK/LCH	

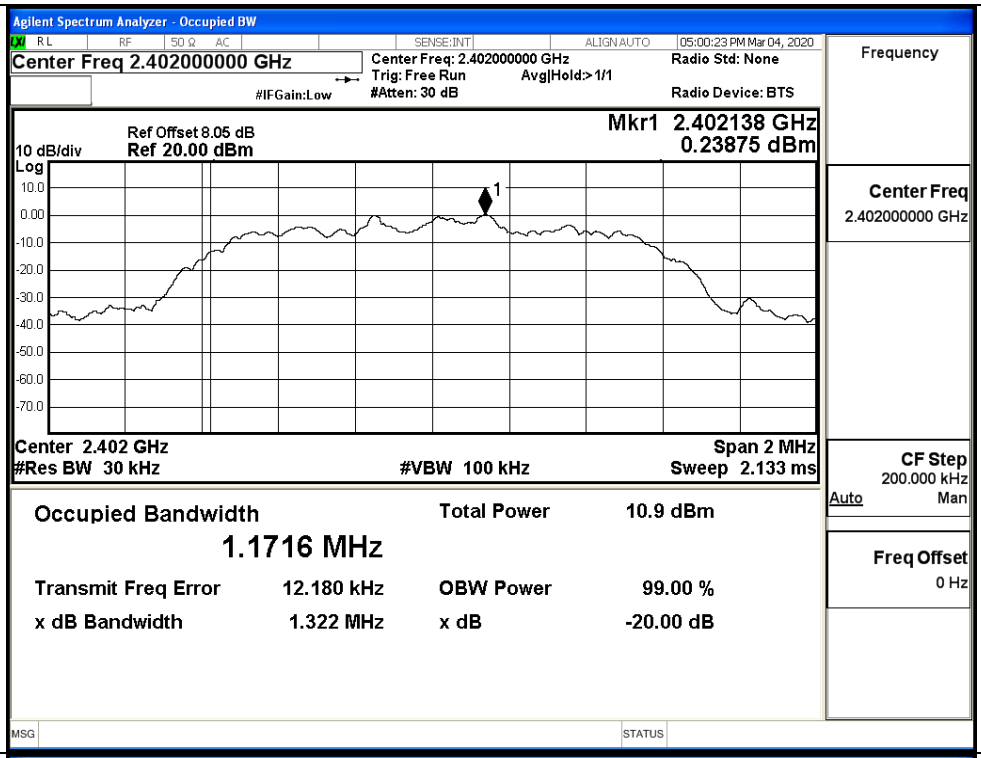
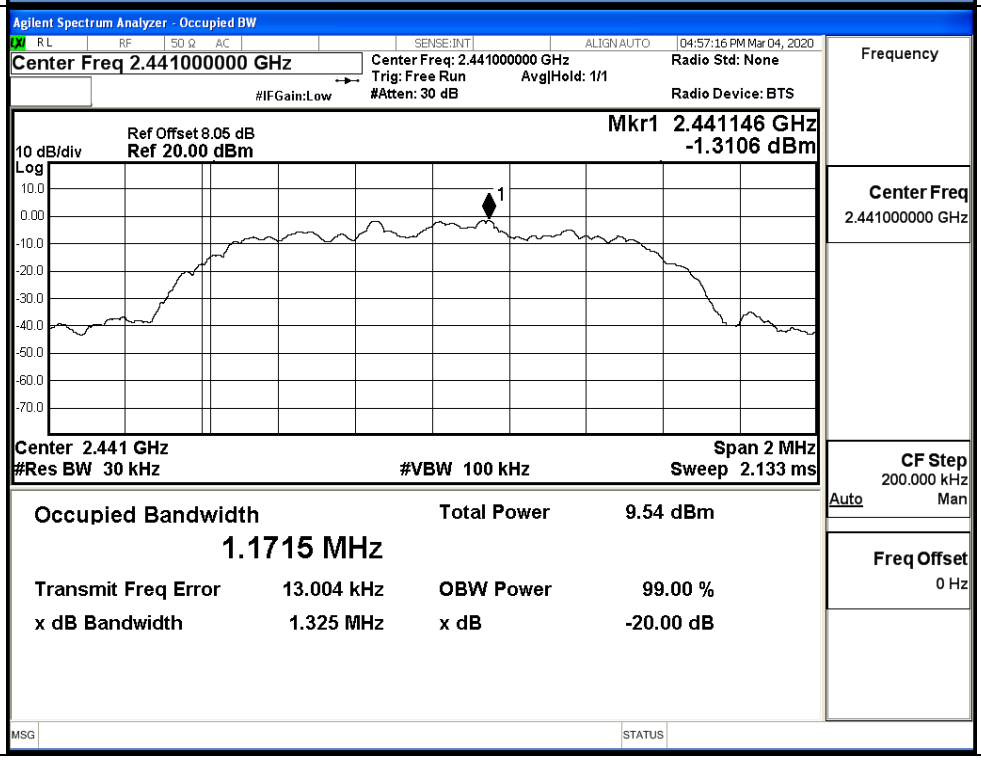
π/4DQPSK/MCH	
π/4DQPSK/HCH	

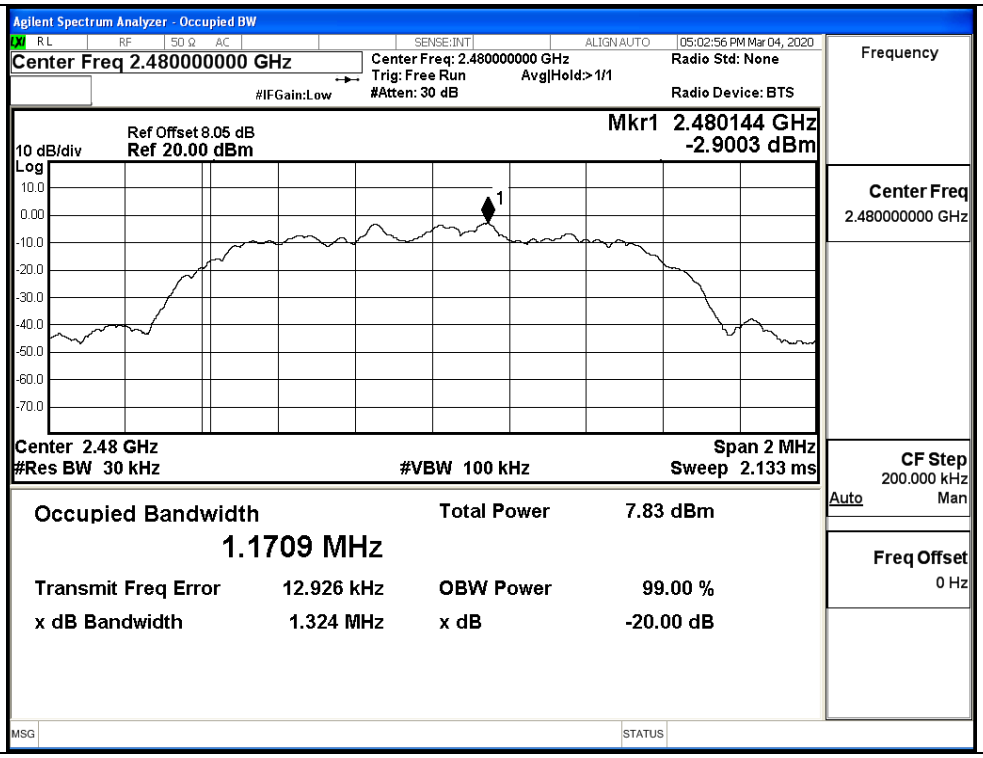
A.2 20dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.9488	Not Specified	PASS
	MCH	0.9488	Not Specified	PASS
	HCH	0.9500	Not Specified	PASS
π/4DQPSK	LCH	1.322	Not Specified	PASS
	MCH	1.325	Not Specified	PASS
	HCH	1.324	Not Specified	PASS

Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

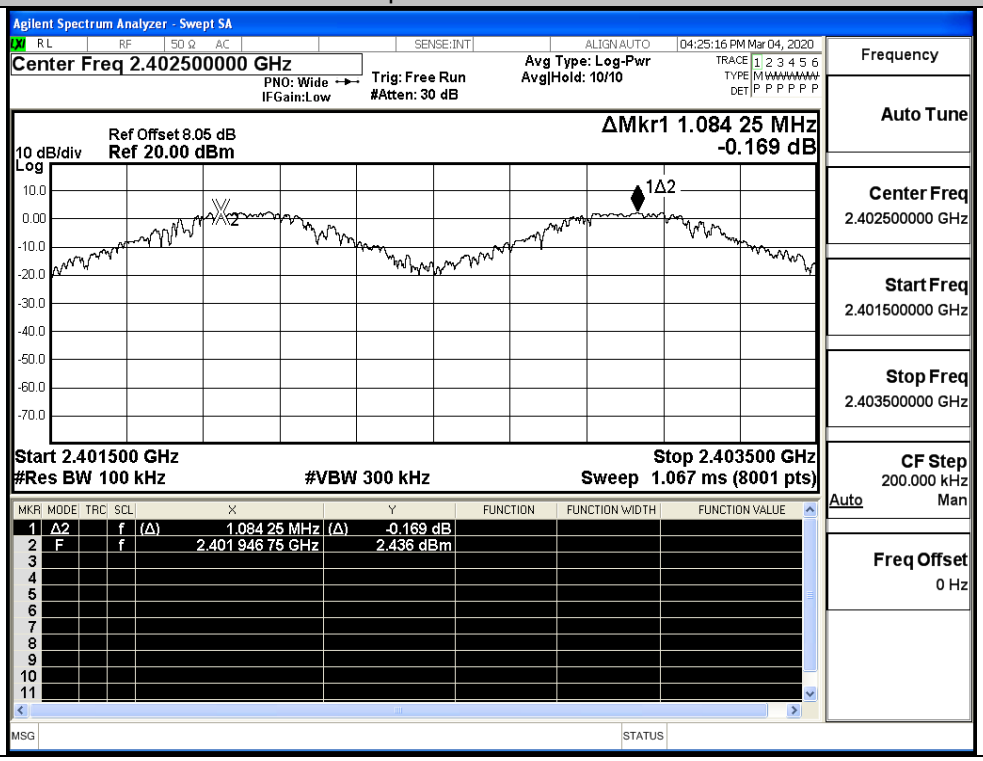
π/4DQPSK/LCH	
π/4DQPSK/MCH	

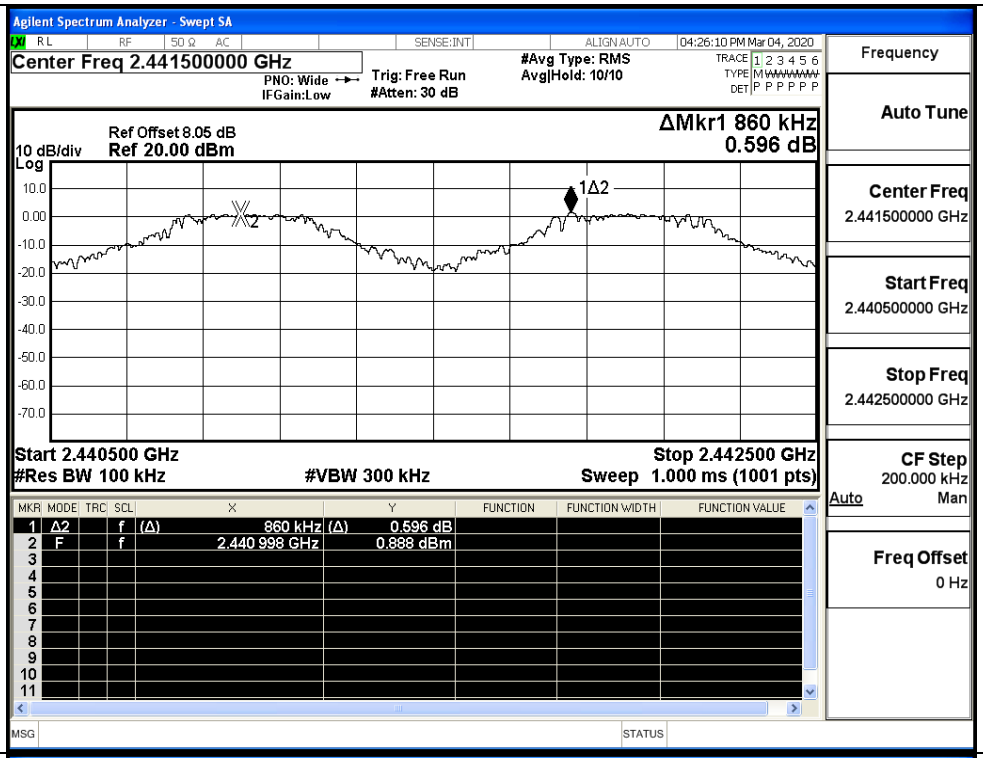
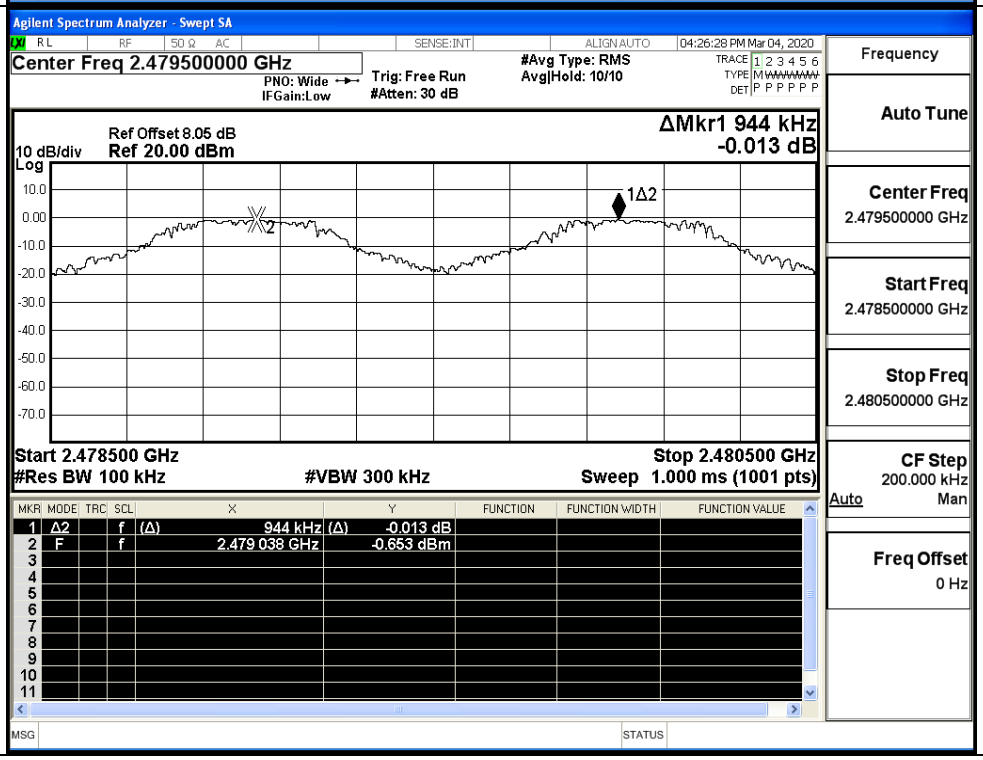
π/4DQPSK/HCH	

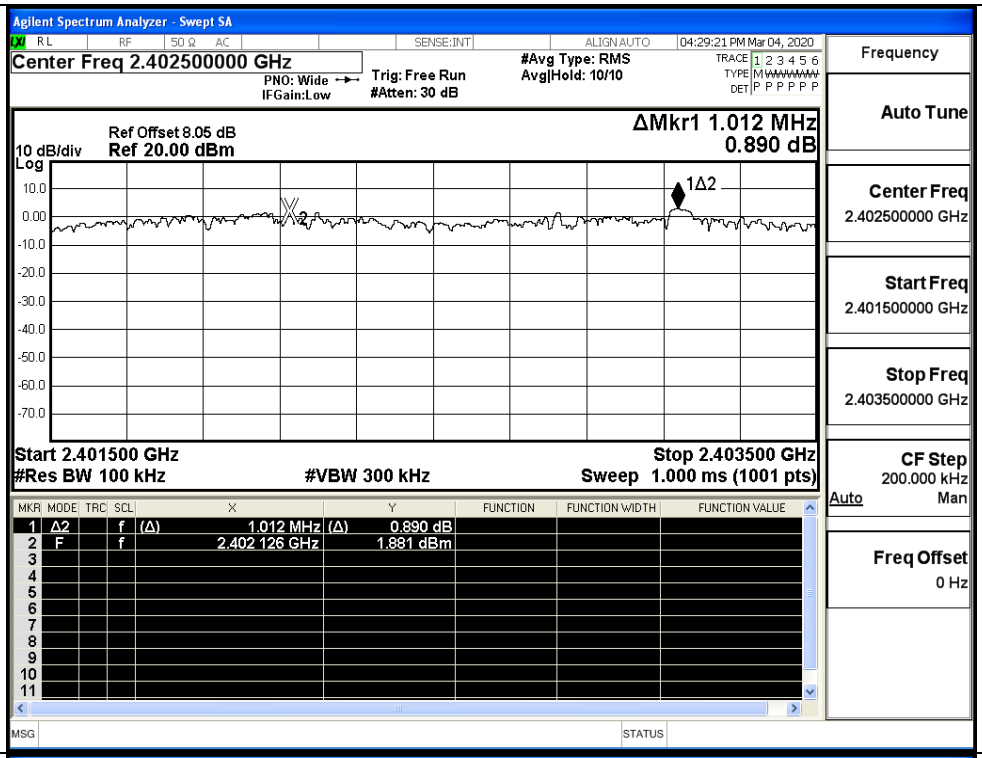
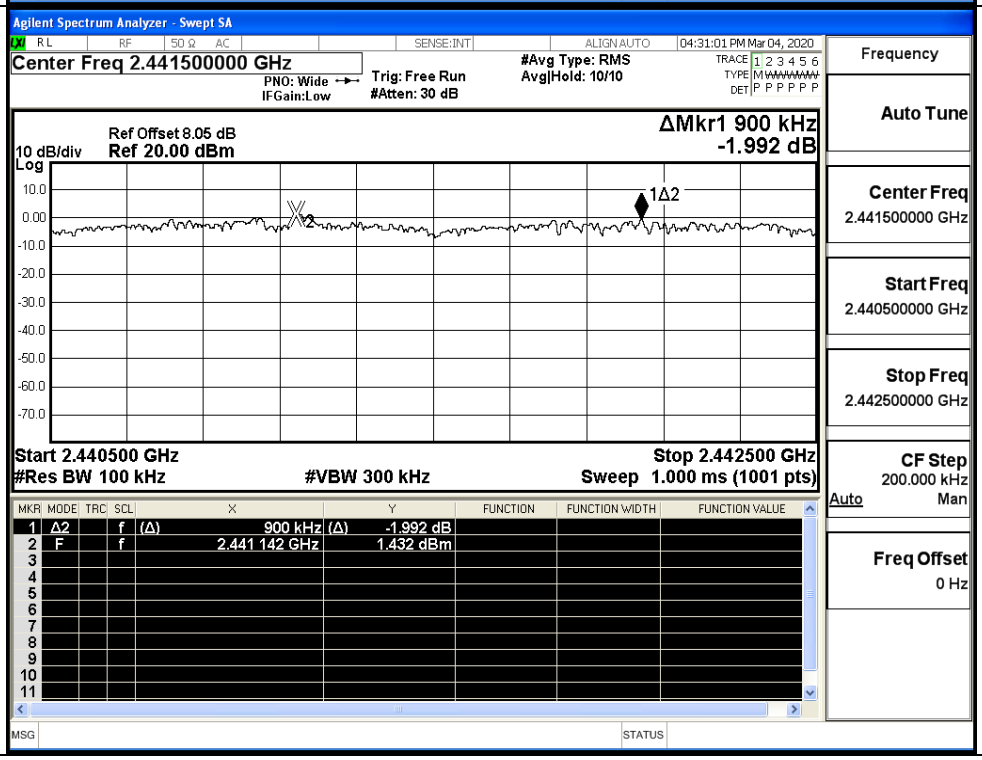
Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
05:02:56 PM Mar 04, 2020
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold:>1/1
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 8.05 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.480144 GHz
-2.9003 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.133 ms
CF Step
200.000 kHz
Auto
Man
Occupied Bandwidth
1.1709 MHz
Total Power
7.83 dBm
Freq Offset
0 Hz
Transmit Freq Error
12.926 kHz
OBW Power
99.00 %
x dB Bandwidth
1.324 MHz
x dB
-20.00 dB
MSG
STATUS

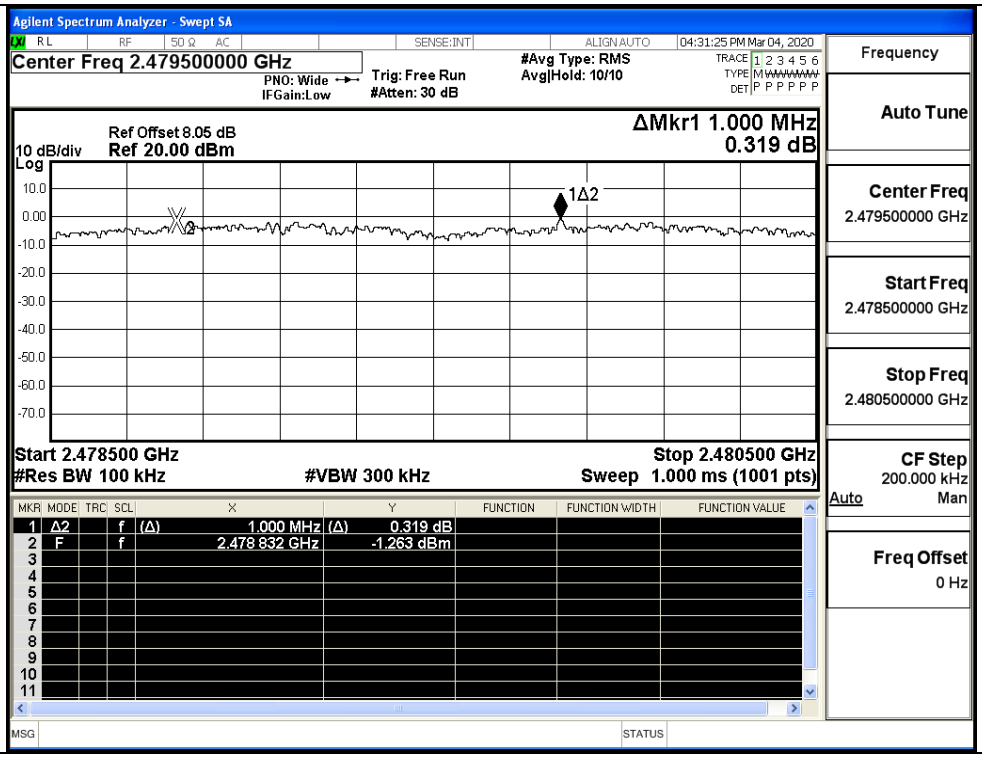
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.084	0.632	PASS
	MCH	0.860	0.632	PASS
	HCH	0.944	0.632	PASS
π/4DQPSK	LCH	1.012	0.883	PASS
	MCH	0.900	0.883	PASS
	HCH	1.000	0.883	PASS

Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

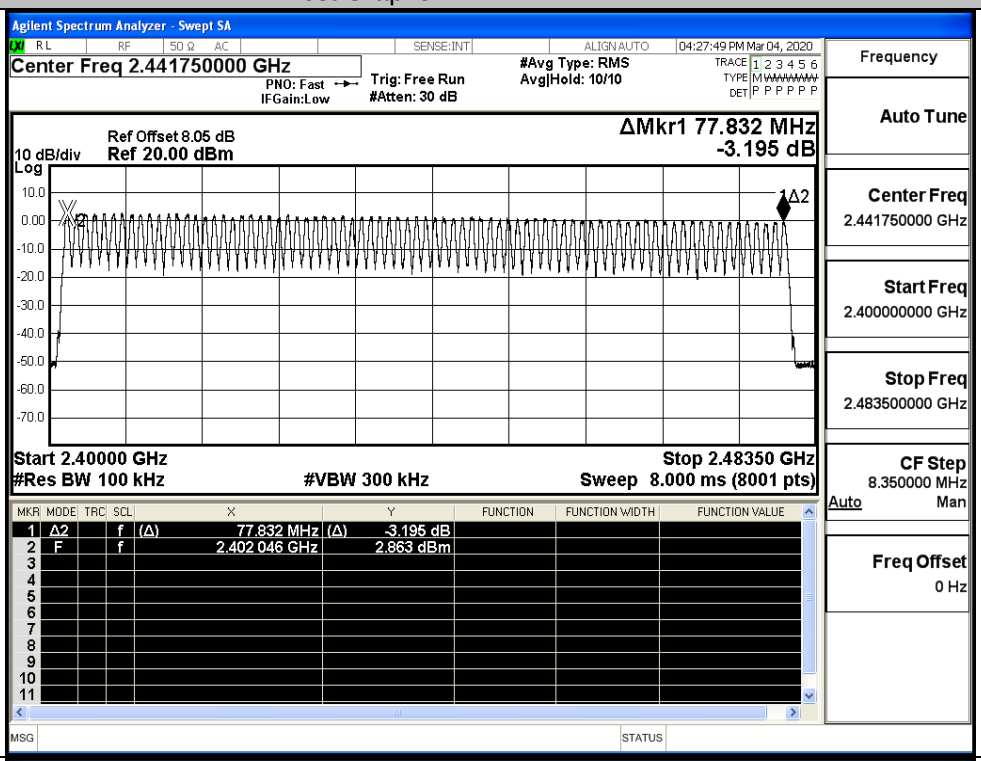
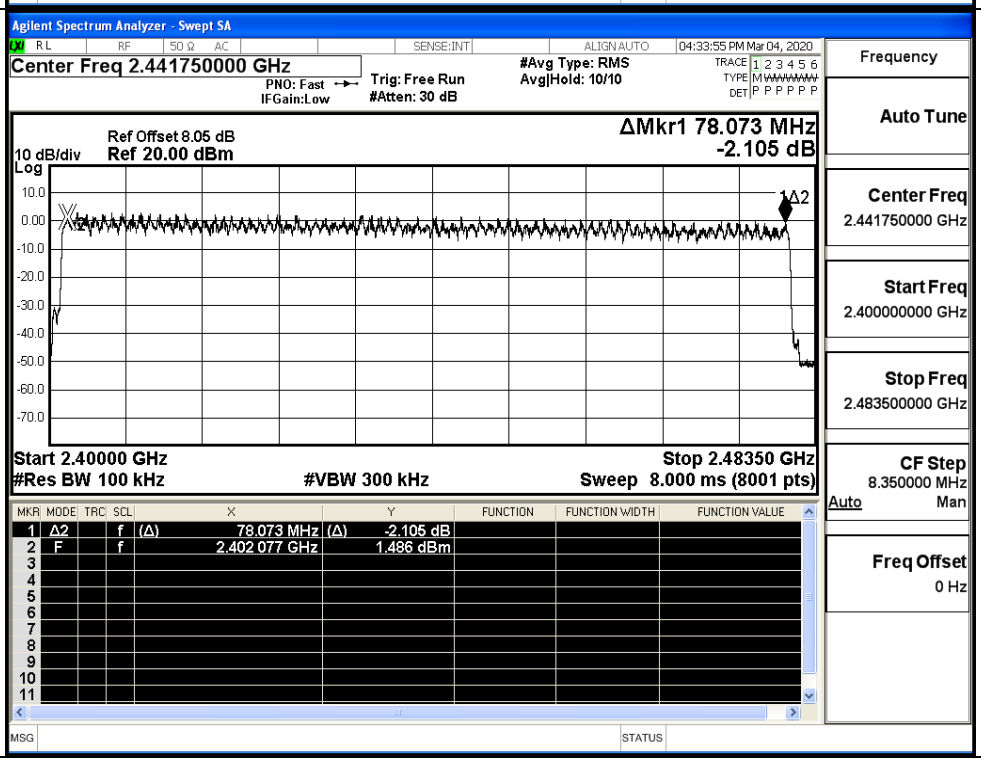
π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	

Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
04:31:25 PM Mar 04, 2020
Center Freq 2.479500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P P P P P
Ref Offset 8.05 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 1.000 MHz
0.319 dB
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
Start 2.478500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.480500 GHz
Sweep 1.000 ms (1001 pts)
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE
1 Δ2 f (Δ) 1.000 MHz (Δ) 0.319 dB
2 F f 2.478 832 GHz -1.263 dBm
3
4
5
6
7
8
9
10
11
MSG
STATUS
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

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

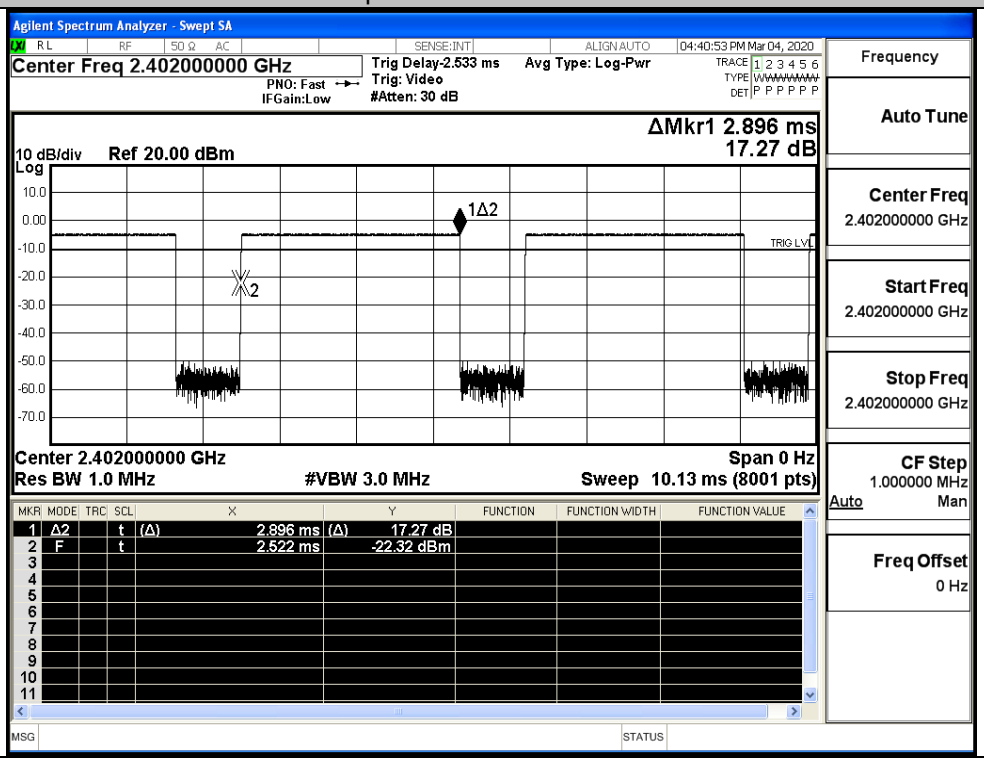
Test Graphs	
GFSK/Hop	
π/4DQPSK/Hop	

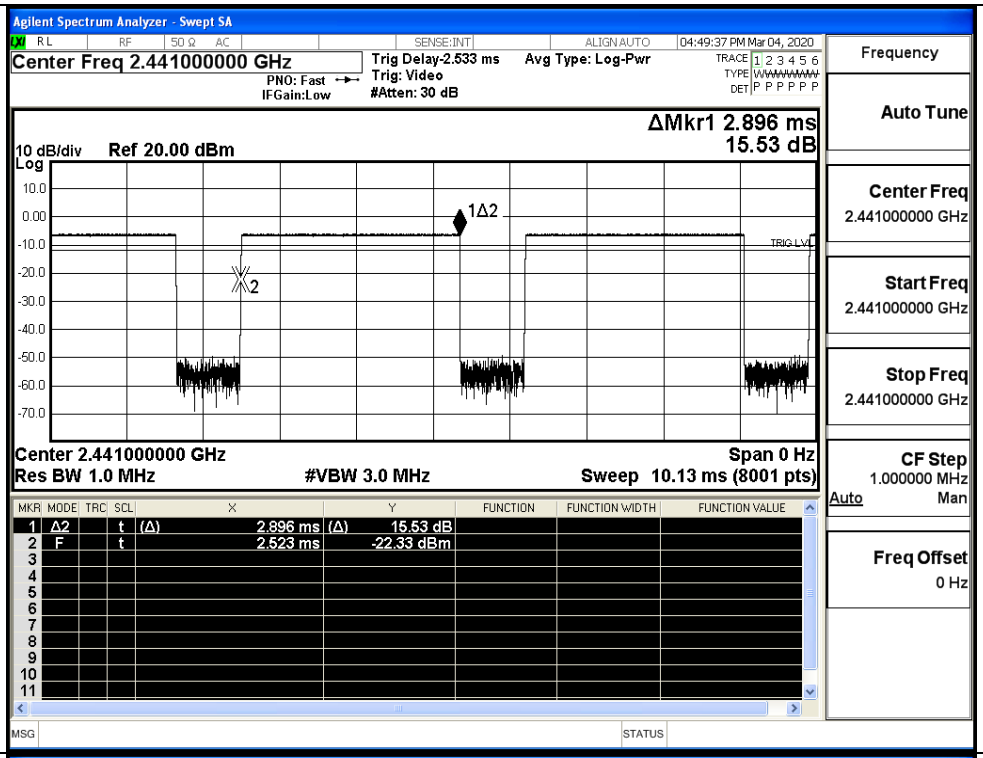
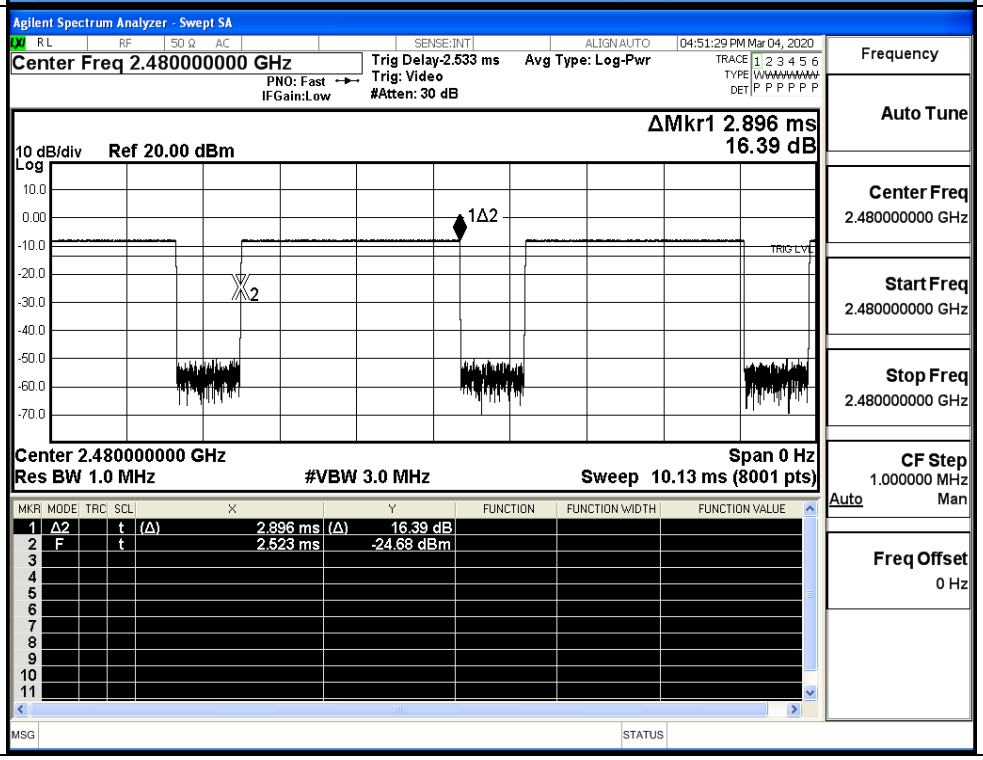
A.5 Dwell Time

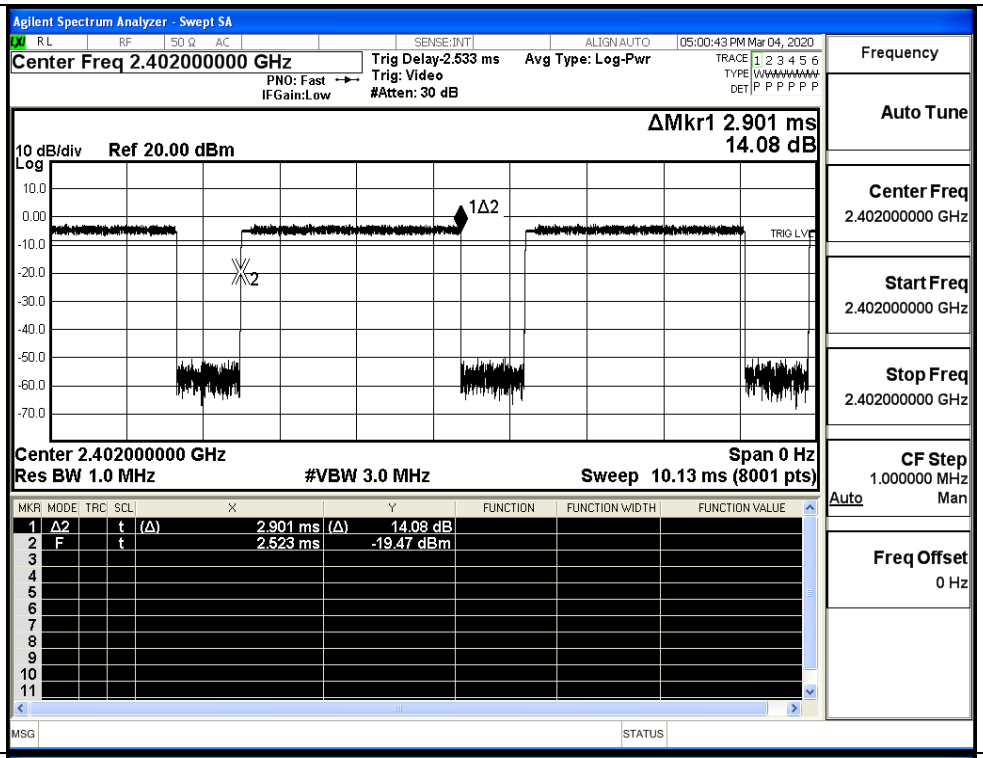
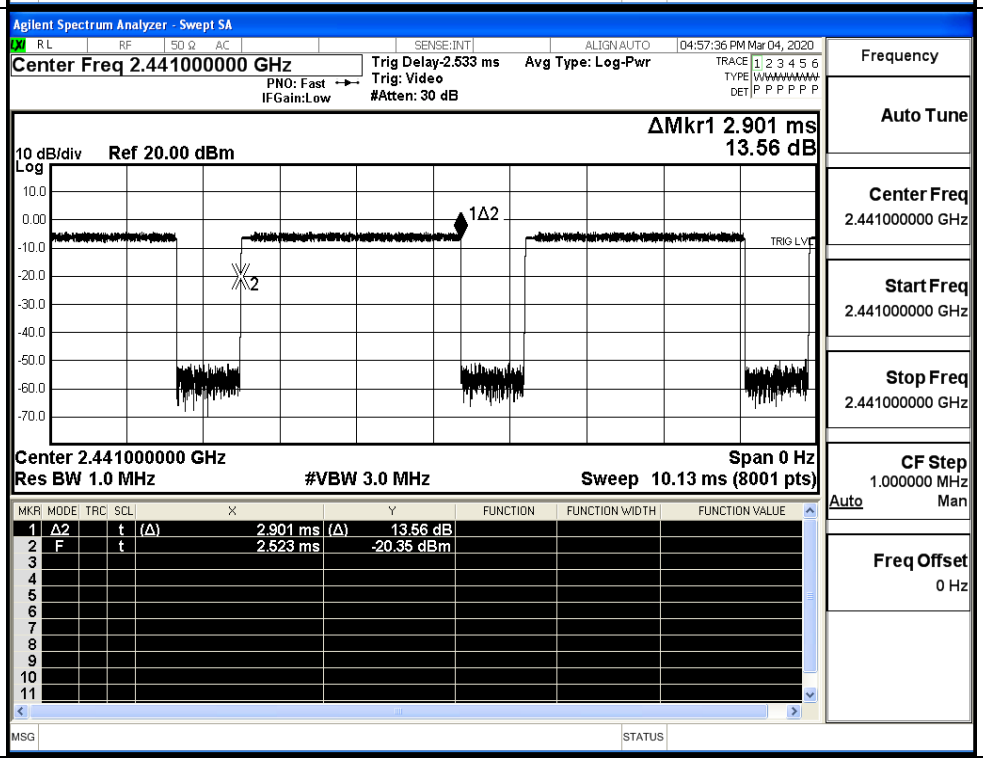
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.9	106.7	0.309	0.4	PASS
	DH5	MCH	2.9	106.7	0.309	0.4	PASS
	DH5	HCH	2.9	106.7	0.309	0.4	PASS
π/4DQPSK	2DH5	LCH	2.9	106.7	0.309	0.4	PASS
	2DH5	MCH	2.9	106.7	0.309	0.4	PASS
	2DH5	HCH	2.9	106.7	0.309	0.4	PASS

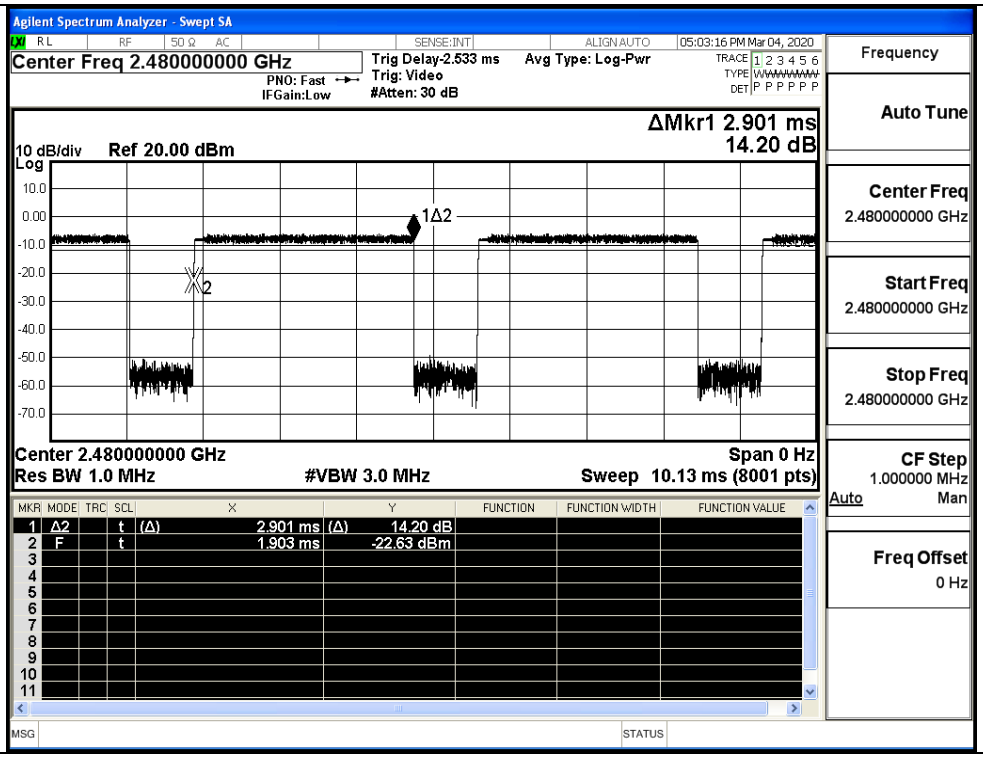
Test Graphs

GFSK_DH5/LCH



GFSK_DH5/MCH	
GFSK_DH5/HCH	

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

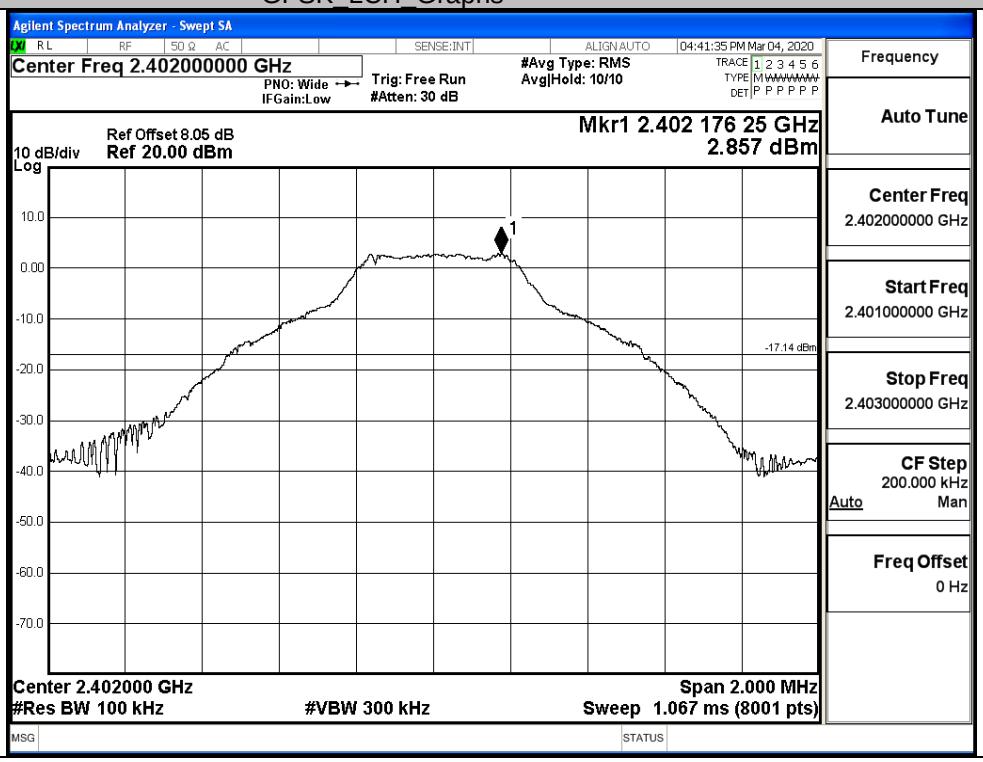
π/4DQPSK _2DH5/HCH	

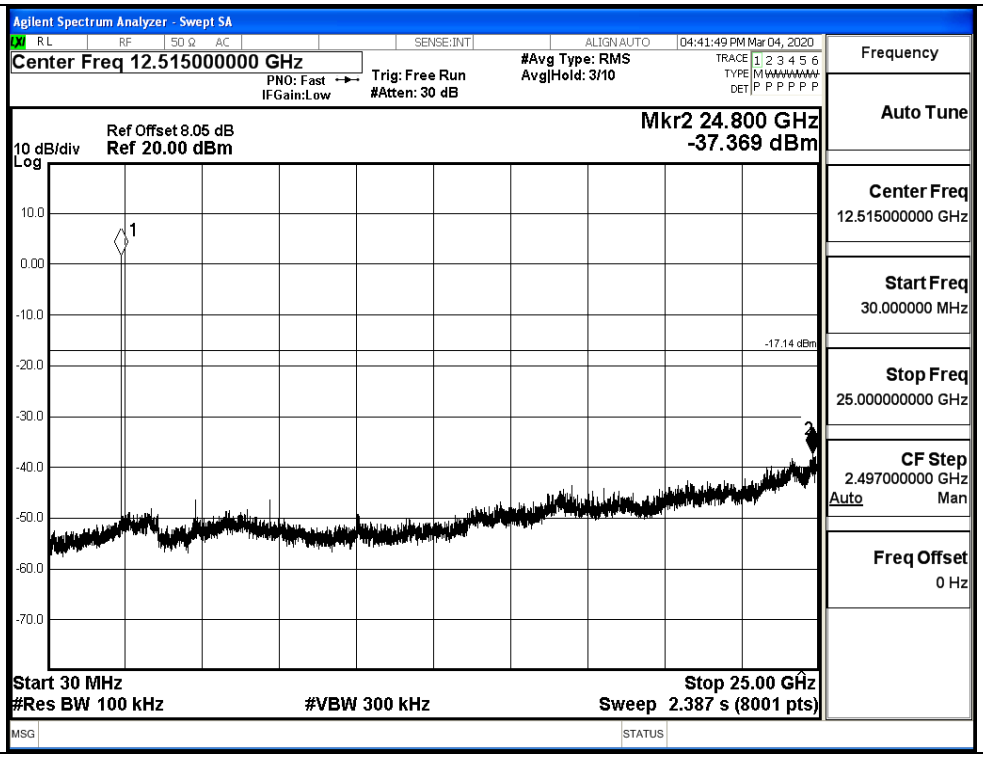
A.6 RF Conducted Spurious Emissions

Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2.857	-37.369	-17.143	PASS
	MCH	1.601	-37.724	-18.399	PASS
	HCH	-0.21	-38.263	-20.210	PASS
π/4DQPSK	LCH	2.867	-37.703	-17.133	PASS
	MCH	1.415	-38.400	-18.585	PASS
	HCH	-0.21	-38.457	-20.210	PASS

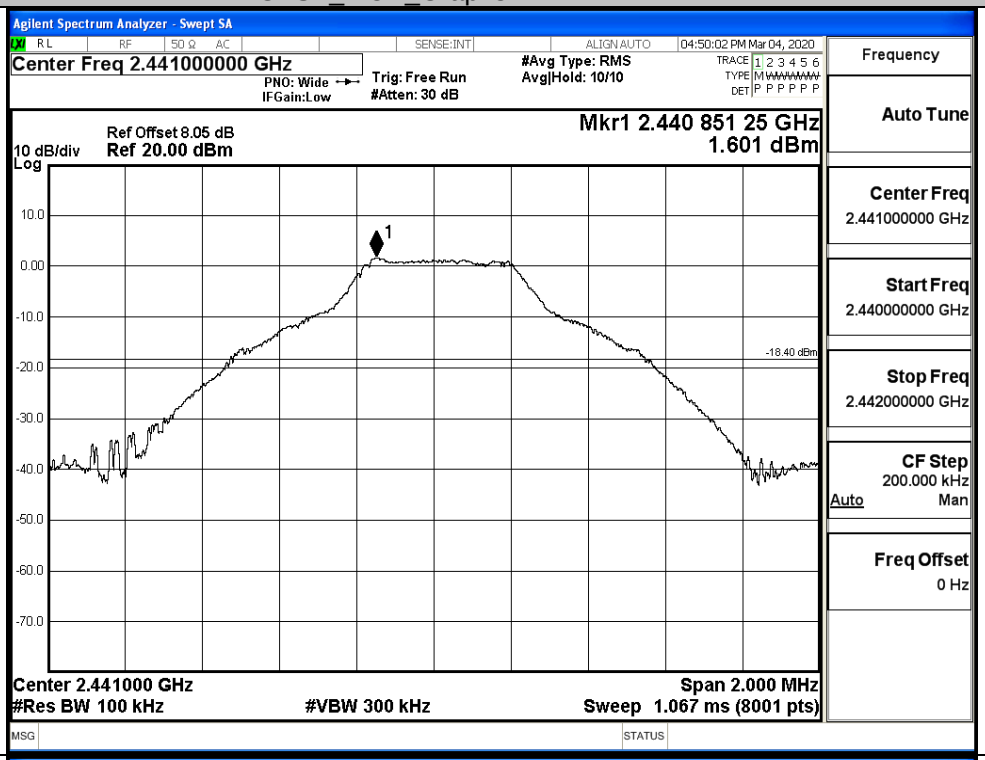
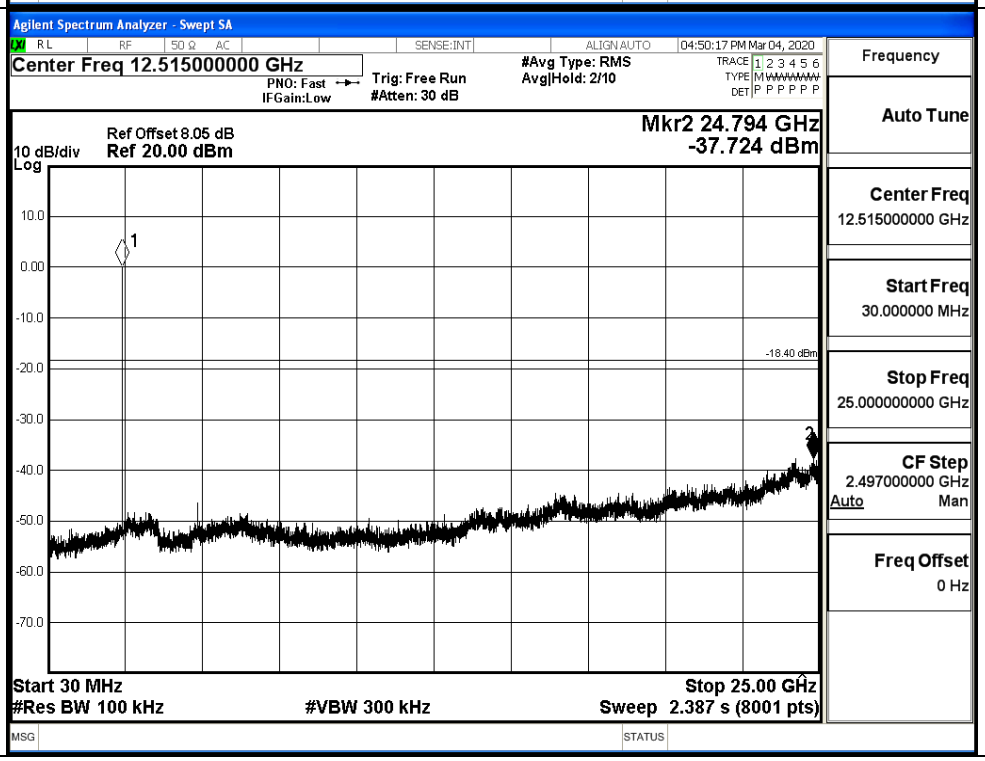
GFSK_LCH_Graphs

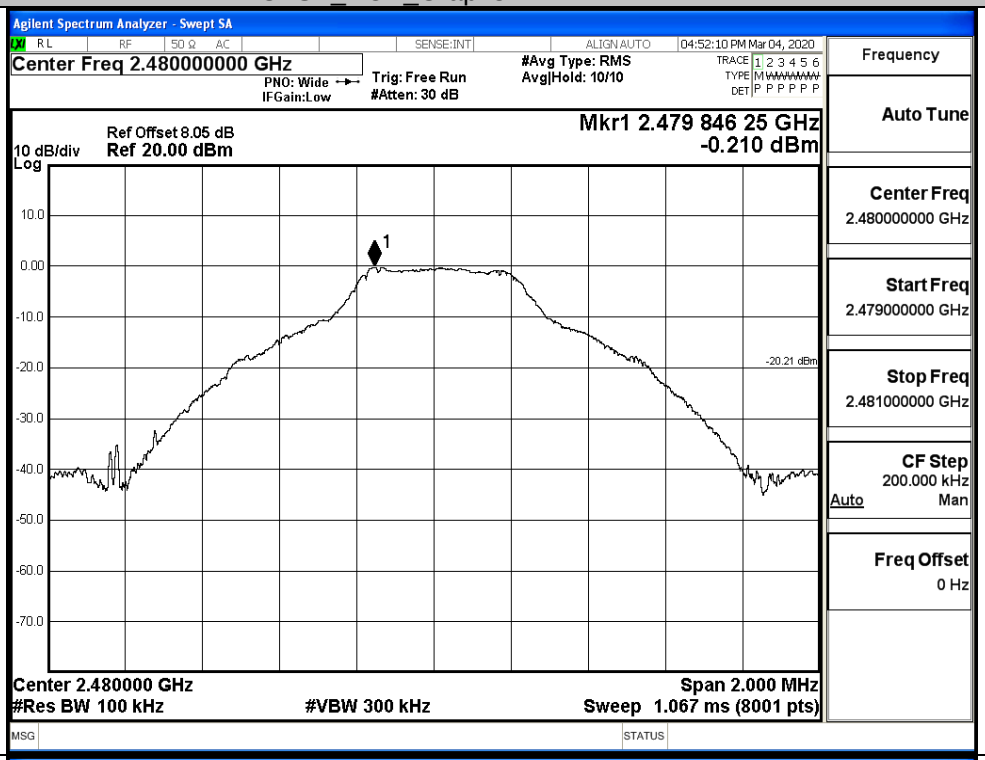
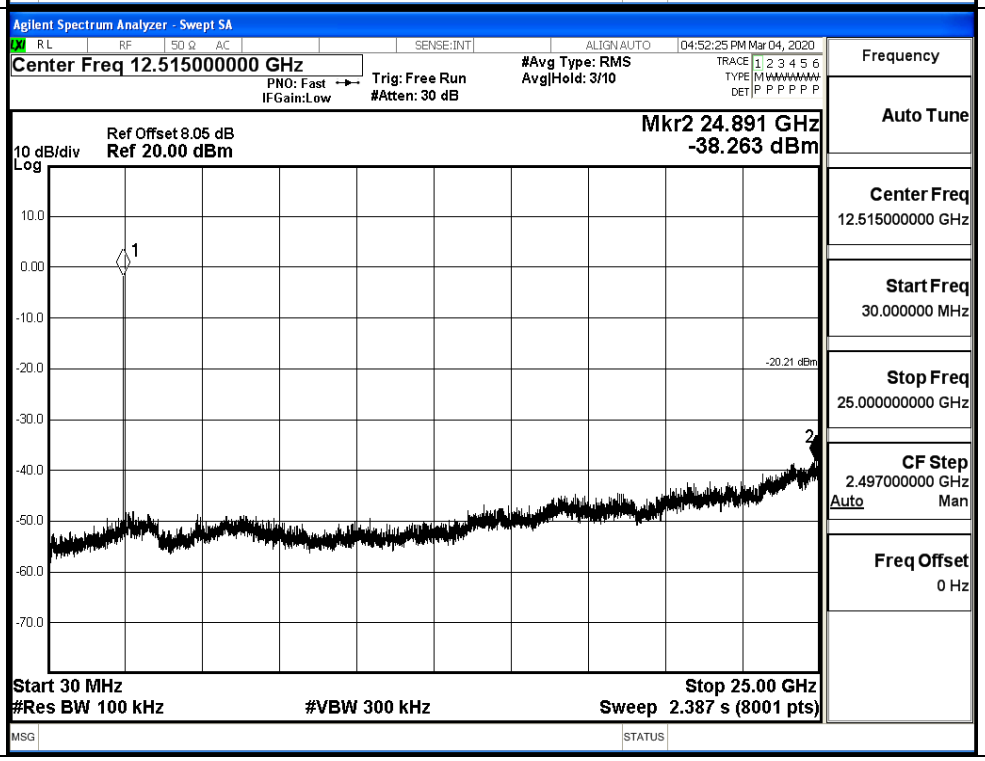
Pref

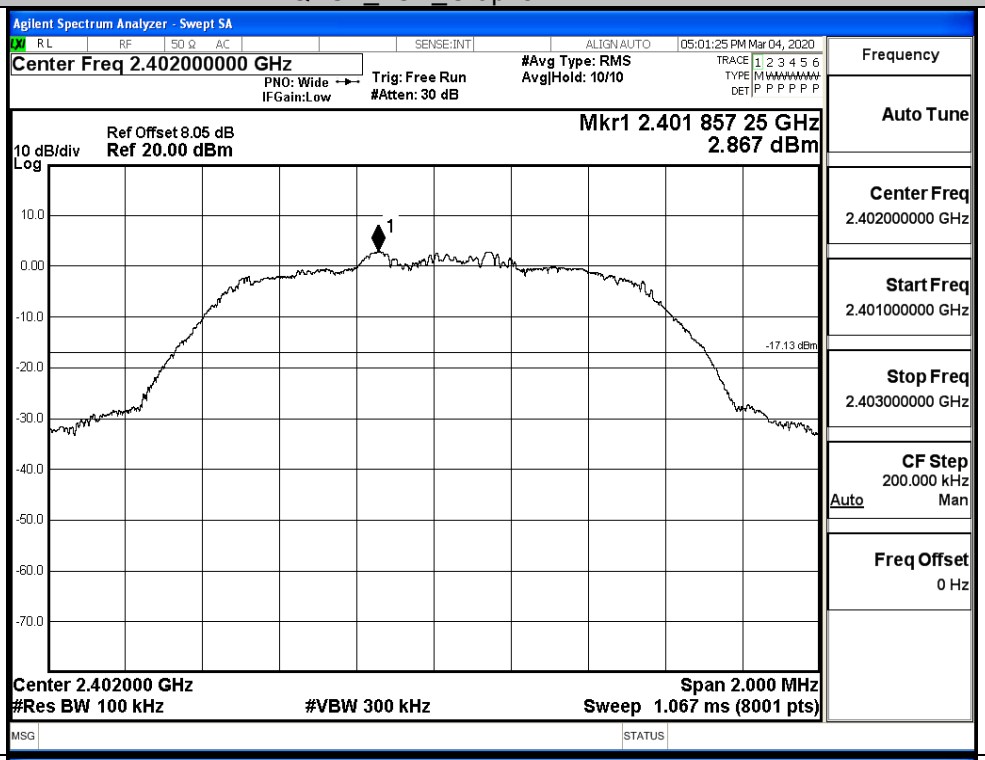
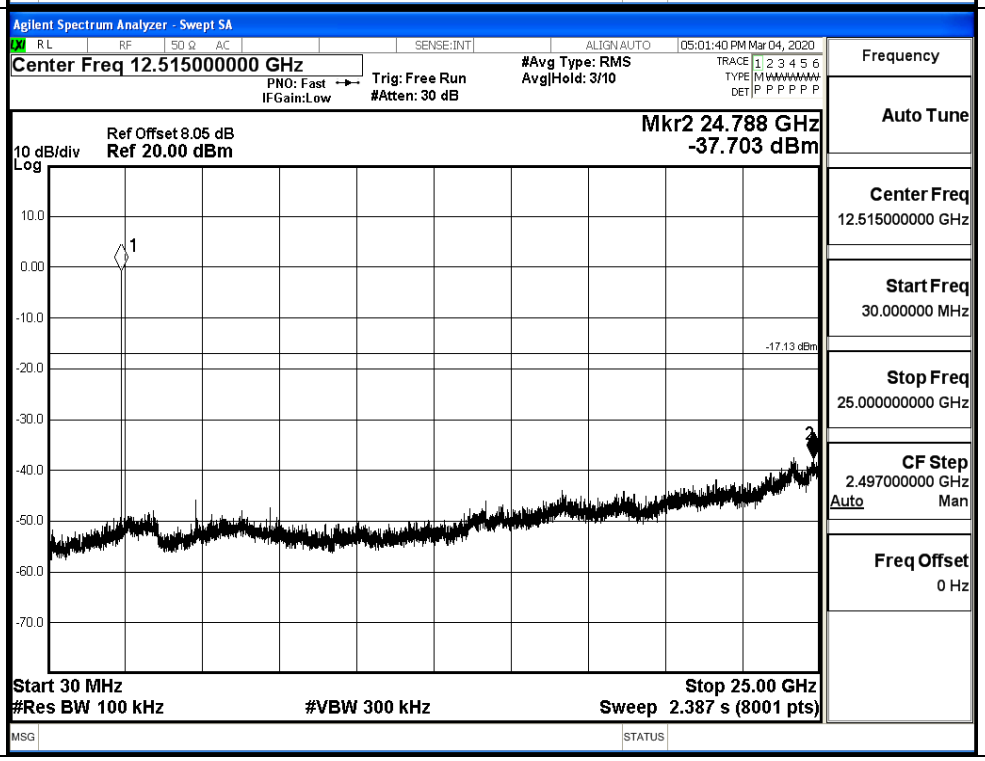


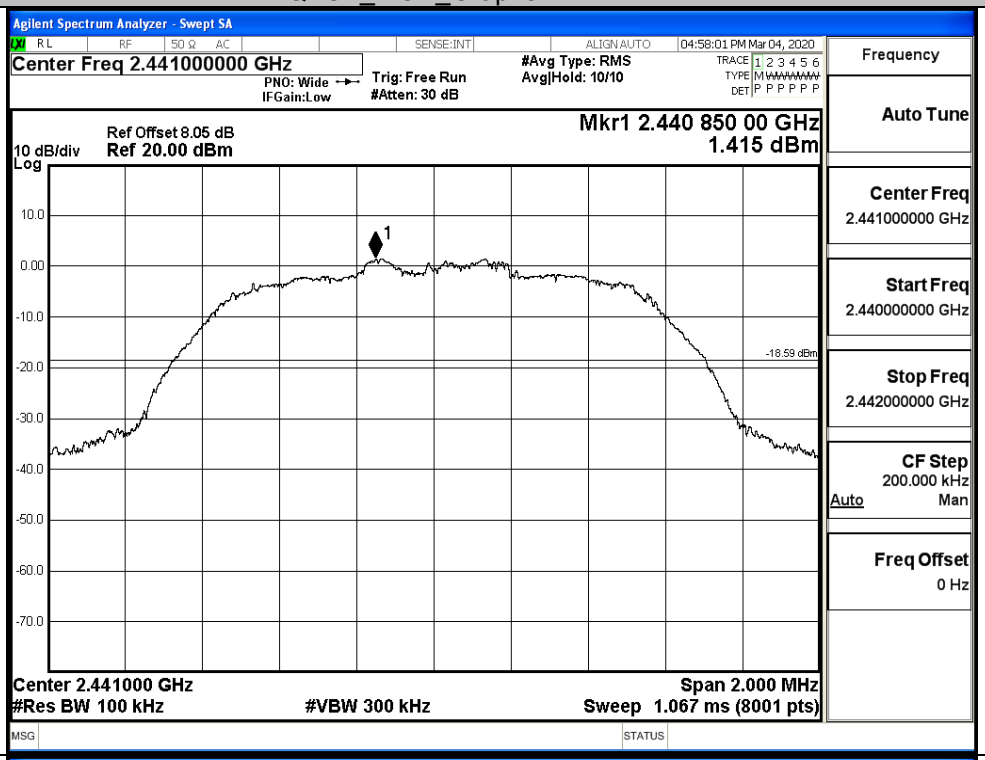
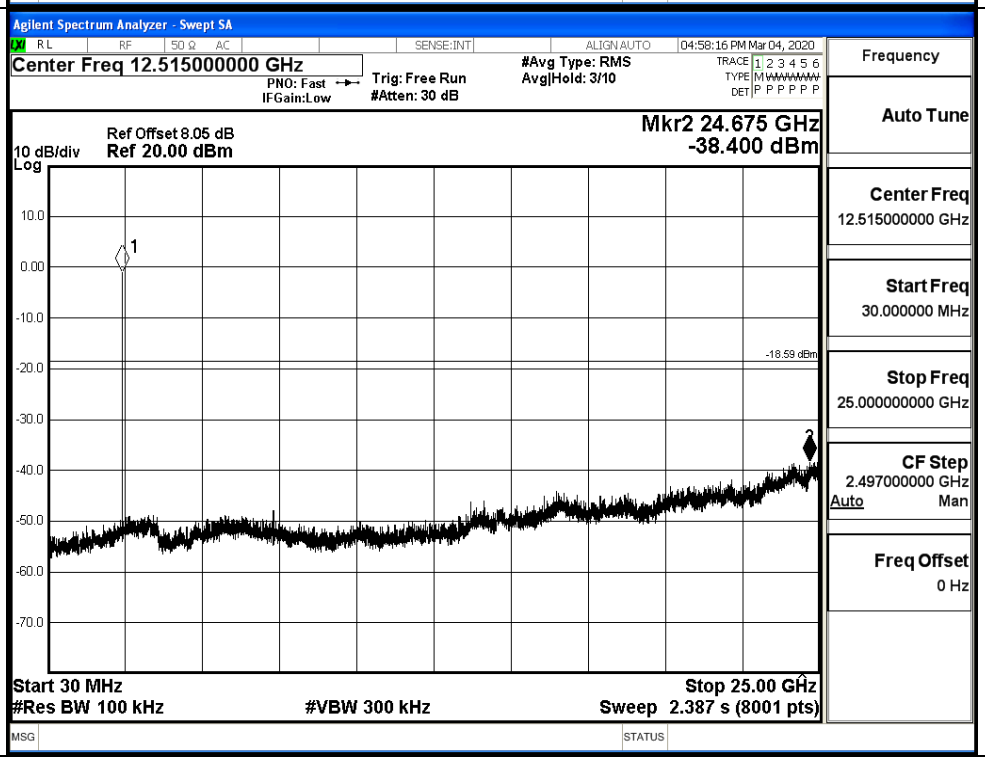
Puw		

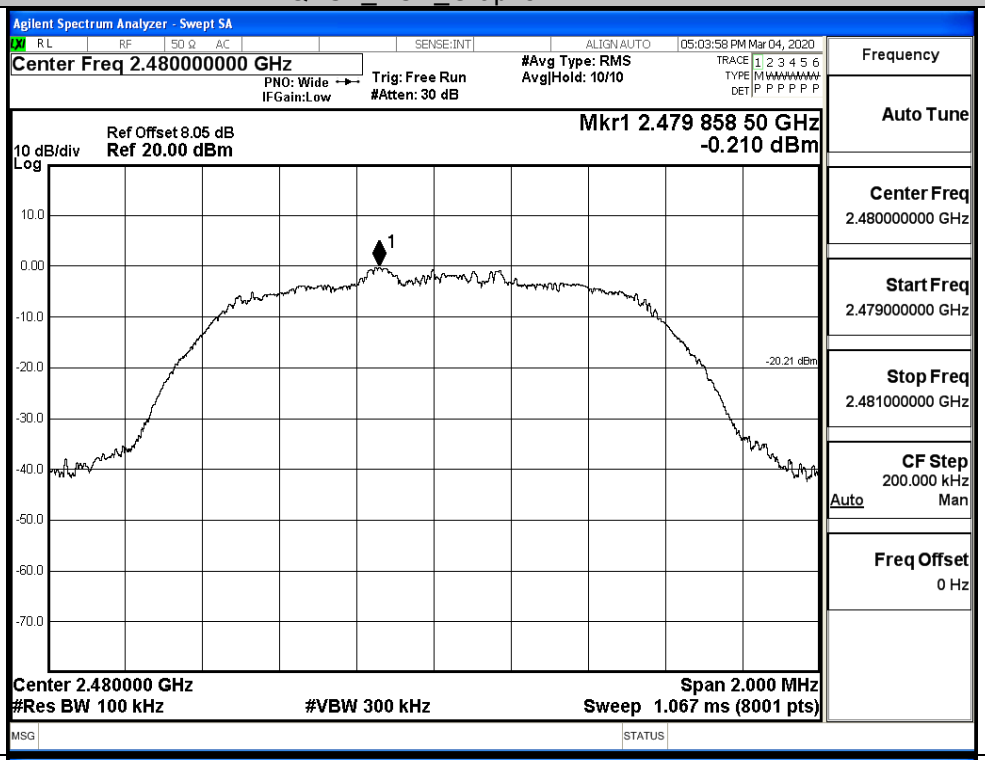
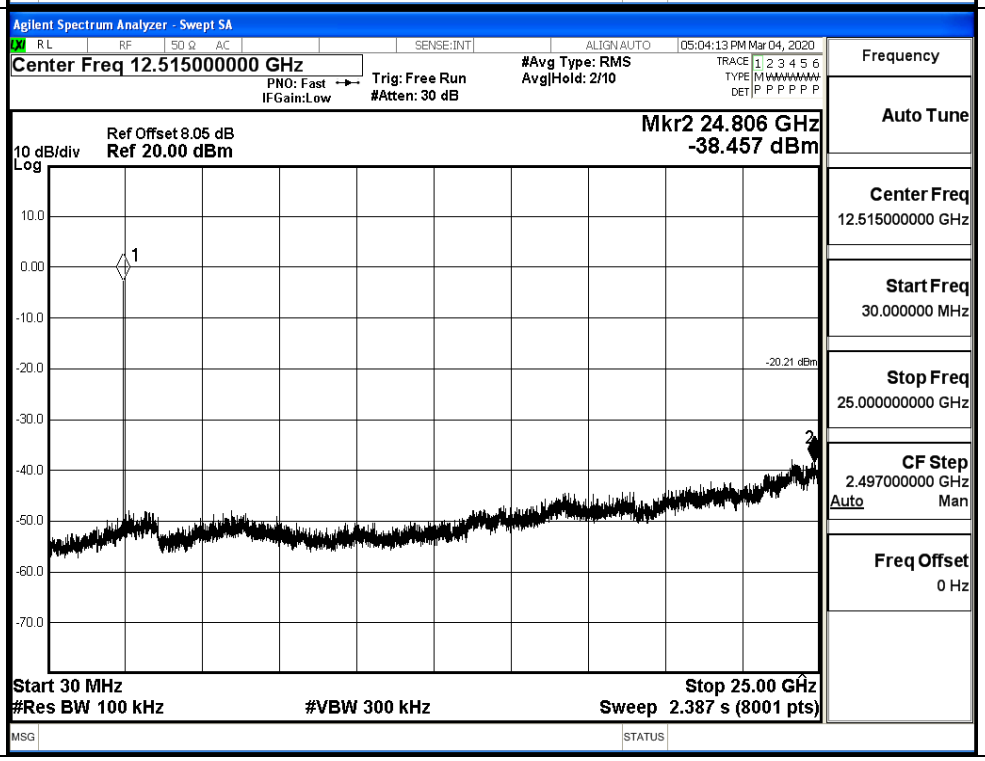
Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
04:41:49 PM Mar 04, 2020
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 3/10
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 8.05 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr2 24.800 GHz
-37.369 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-17.14 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
MSG
STATUS

GFSK_MCH_Graphs		
Pref		
Puw		

GFSK_HCH_Graphs		
Pref		
Puw		

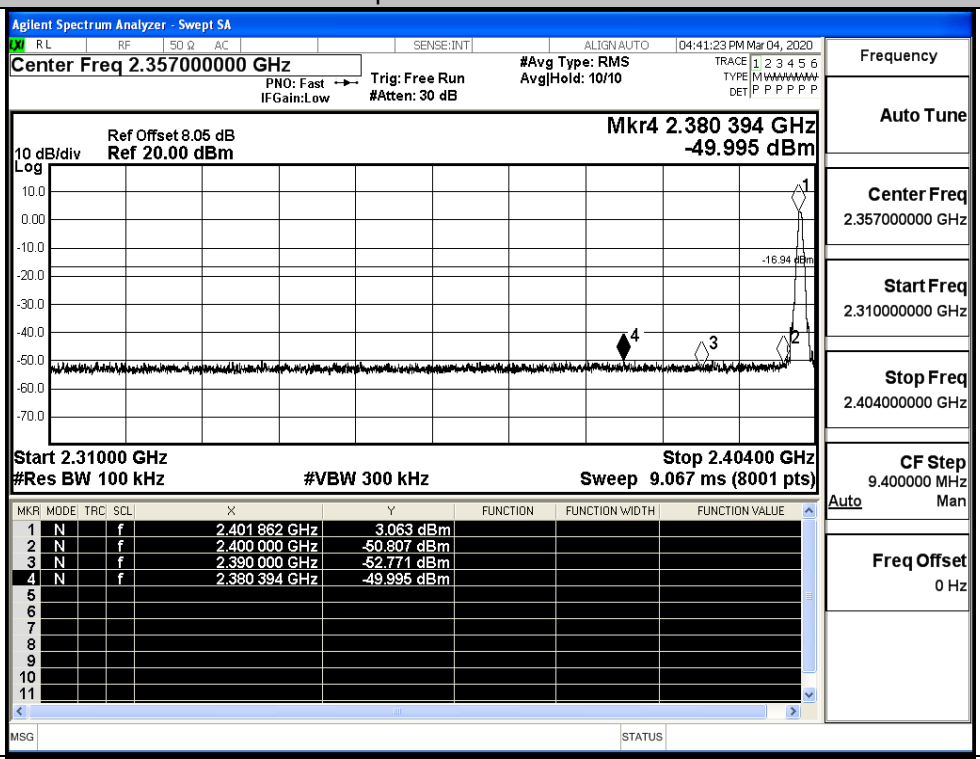
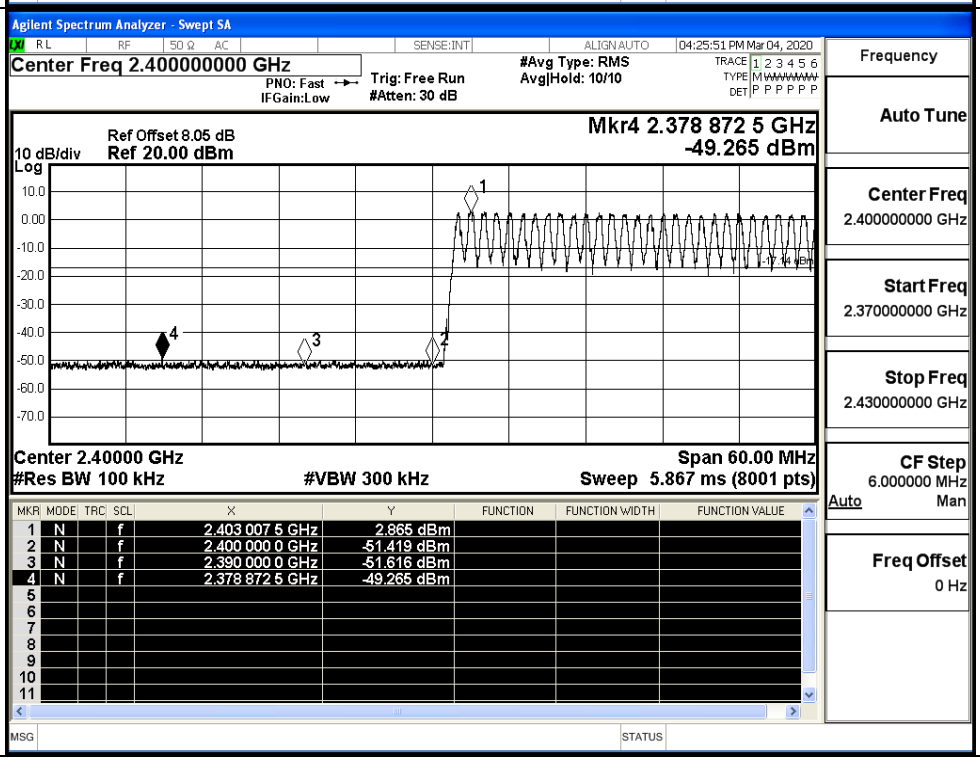
π/4DQPSK_LCH_Graphs			
Pref			
Puw			

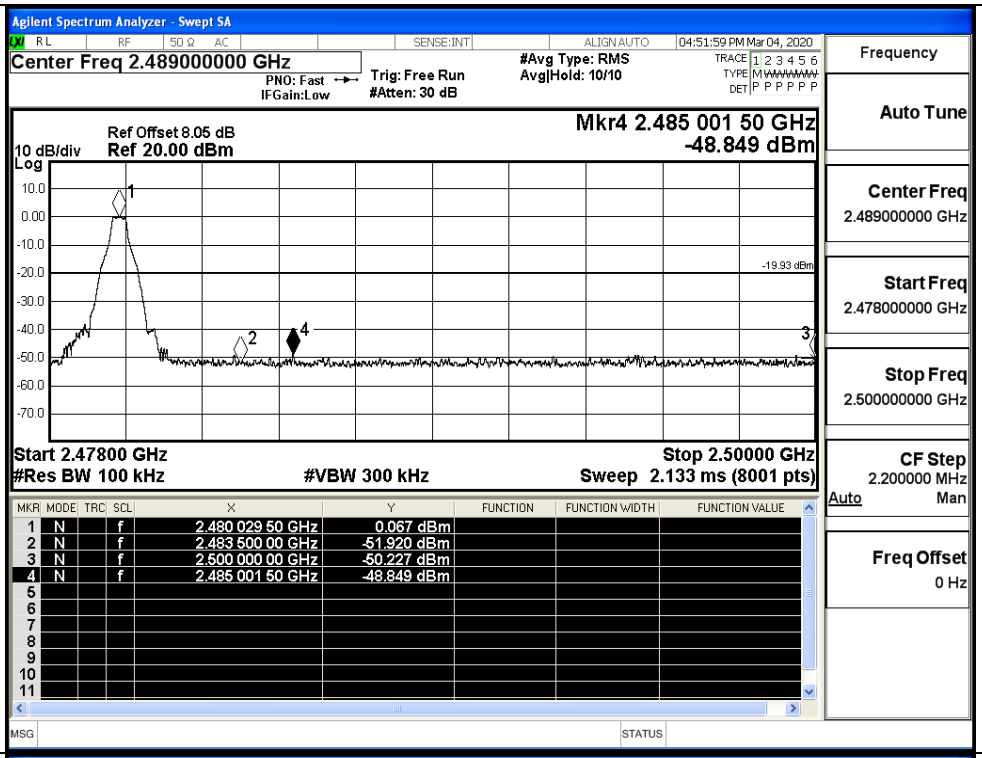
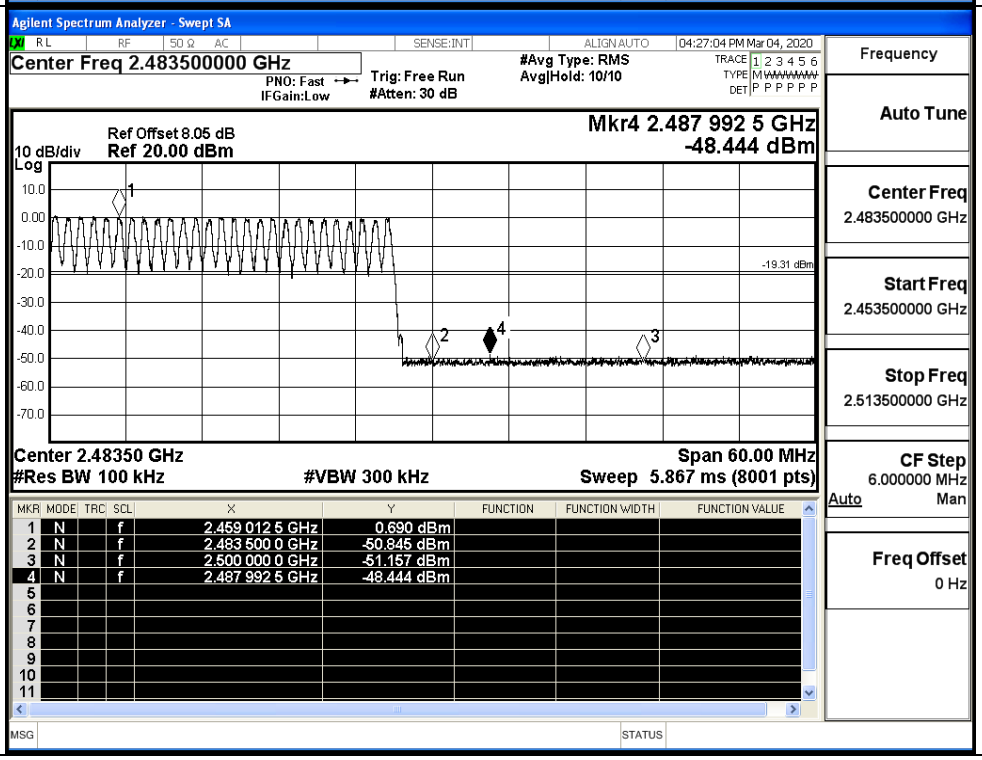
π/4DQPSK_MCH_Graphs		
Pref		
Puw		

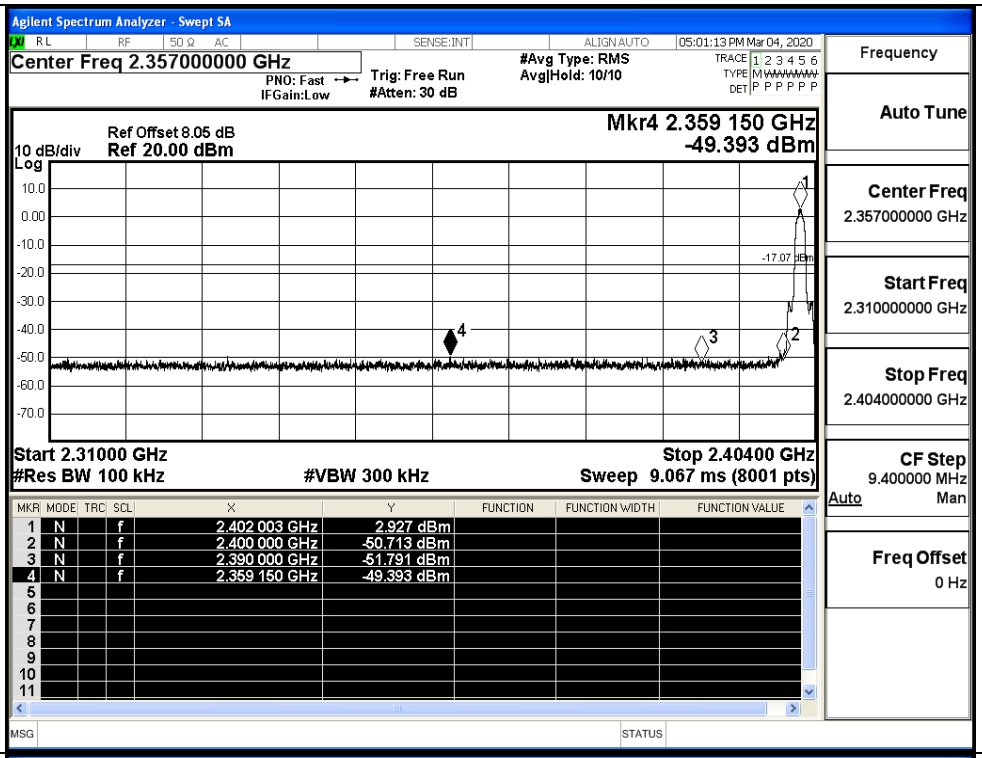
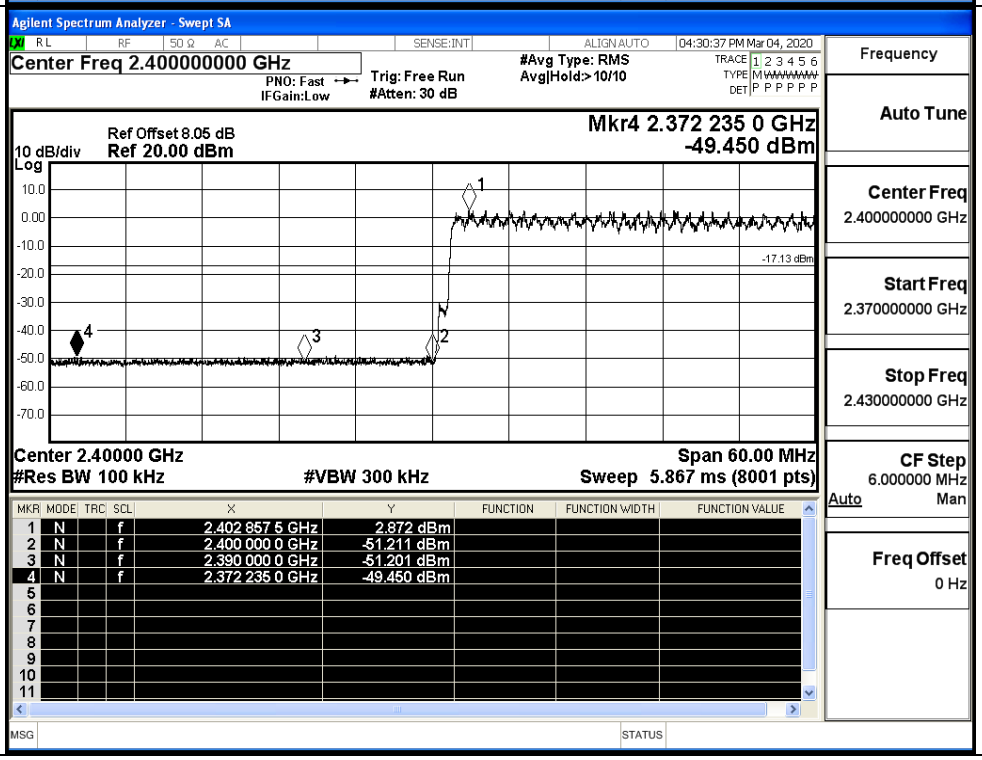
π/4DQPSK_HCH_Graphs		
Pref		
Puw		

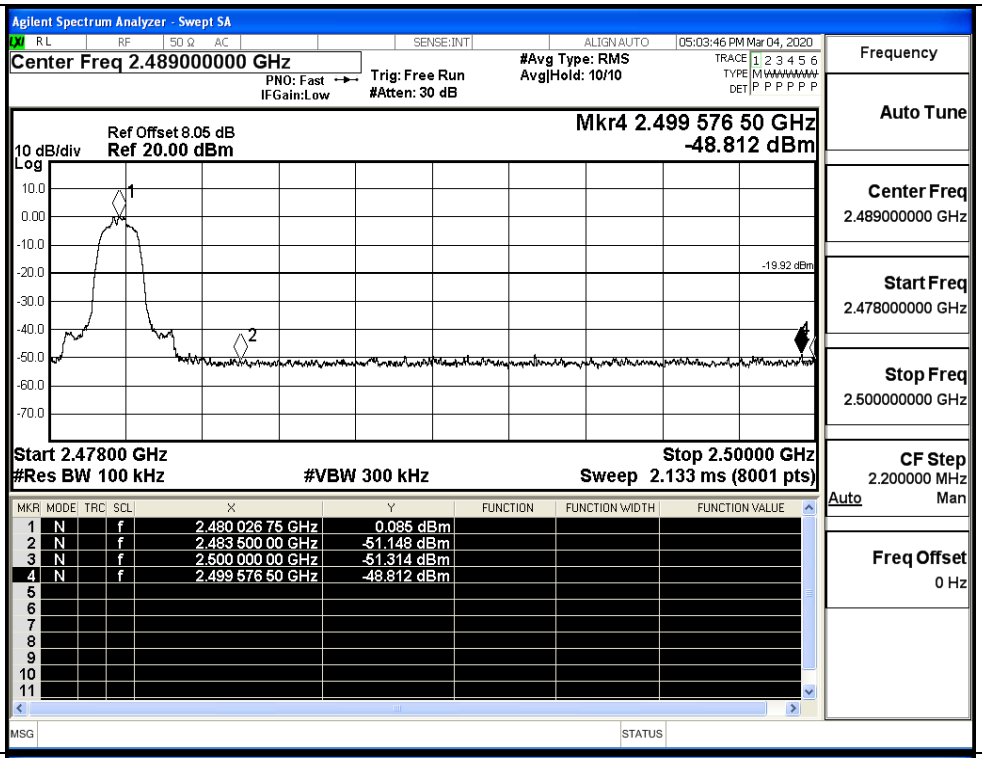
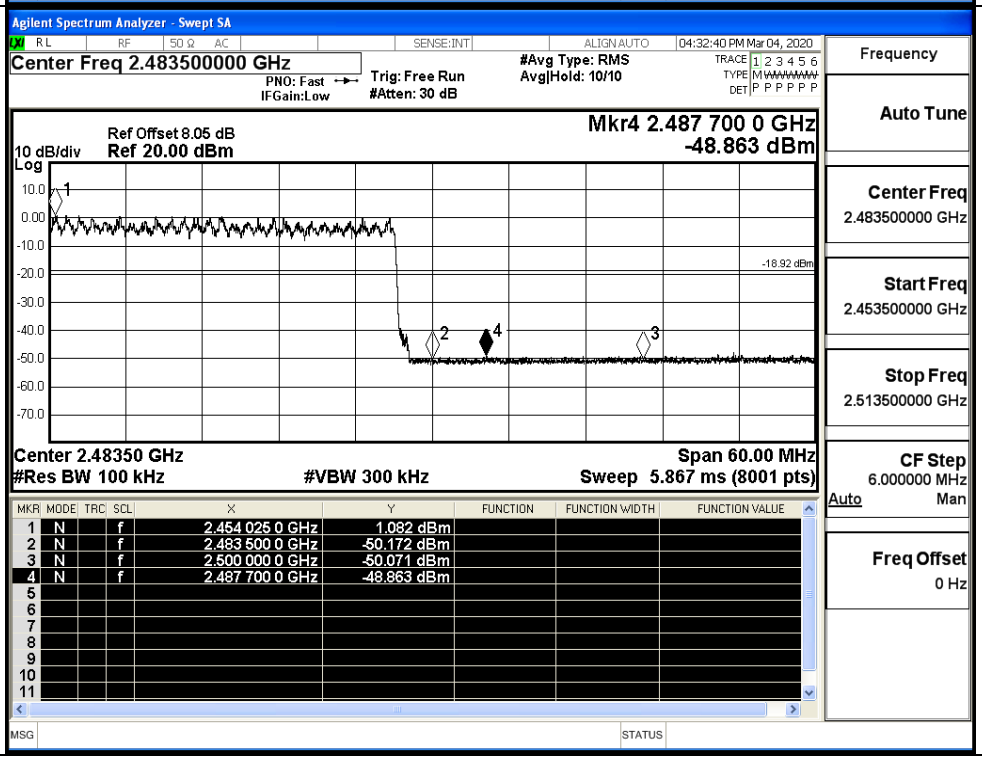
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	3.063	Off	-49.995	-16.94	PASS
			2.865	On	-49.265	-17.14	PASS
	HCH	2480	0.067	Off	-48.849	-19.93	PASS
			0.690	On	-48.444	-19.31	PASS
π/4DQPSK	LCH	2402	2.927	Off	-49.393	-17.07	PASS
			2.872	On	-49.450	-17.13	PASS
	HCH	2480	0.085	Off	-48.812	-19.92	PASS
			1.082	On	-48.863	-18.92	PASS

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

GFSK/HCH/No Hop	
GFSK/HCH/Hop	

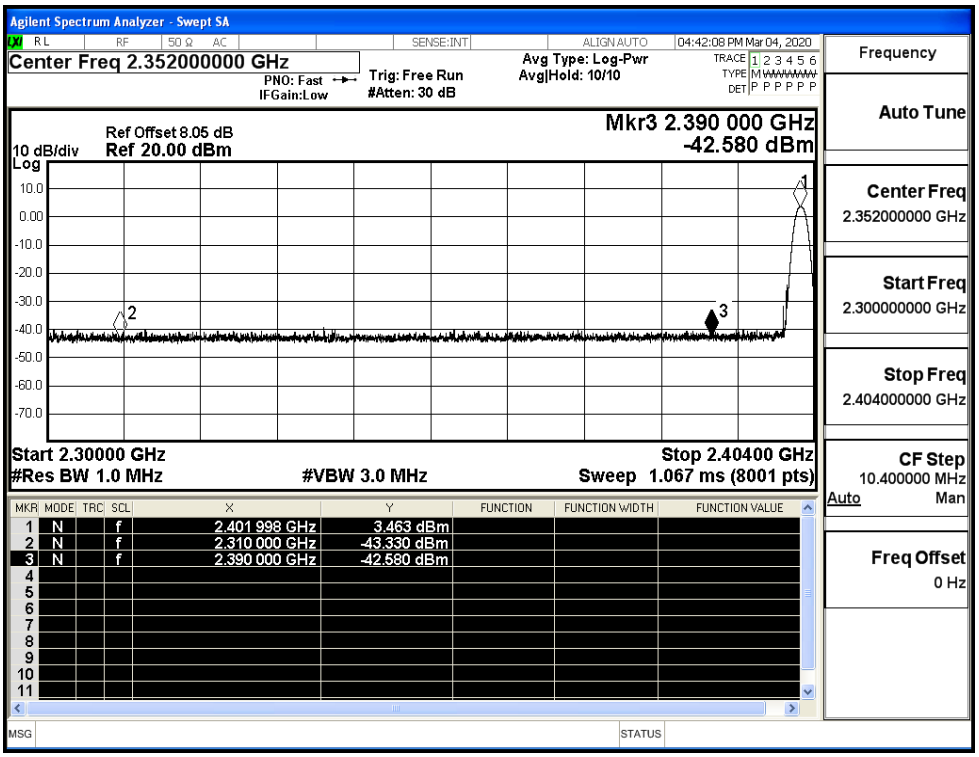
π/4DQPSK/LCH/No Hop	
π/4DQPSK/LCH/Hop	

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

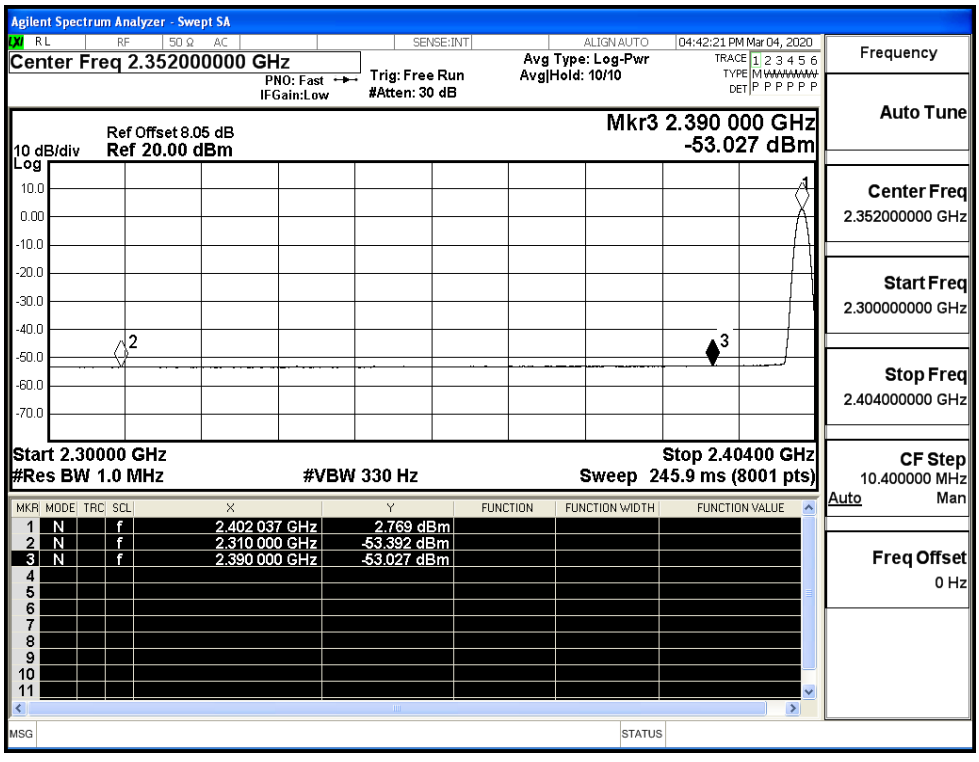
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.33	2.0	0	53.93	PEAK	74	PASS
	Off	2310.0	-53.39	2.0	0	43.87	AV	54	PASS
	Off	2390.0	-42.58	2.0	0	54.68	PEAK	74	PASS
	Off	2390.0	-53.03	2.0	0	44.23	AV	54	PASS
	Off	2483.5	-42.43	2.0	0	54.83	PEAK	74	PASS
	Off	2483.5	-52.40	2.0	0	44.86	AV	54	PASS
	Off	2500.0	-42.28	2.0	0	54.98	PEAK	74	PASS
	Off	2500.0	-52.39	2.0	0	44.87	AV	54	PASS
π/4DQPSK	Off	2310.0	-43.59	2.0	0	53.67	PEAK	74	PASS
	Off	2310.0	-53.36	2.0	0	43.9	AV	54	PASS
	Off	2390.0	-43.41	2.0	0	53.85	PEAK	74	PASS
	Off	2390.0	-52.98	2.0	0	44.28	AV	54	PASS
	Off	2483.5	-41.81	2.0	0	55.45	PEAK	74	PASS
	Off	2483.5	-52.41	2.0	0	44.85	AV	54	PASS
	Off	2500.0	-41.13	2.0	0	56.13	PEAK	74	PASS
	Off	2500.0	-52.35	2.0	0	44.91	AV	54	PASS

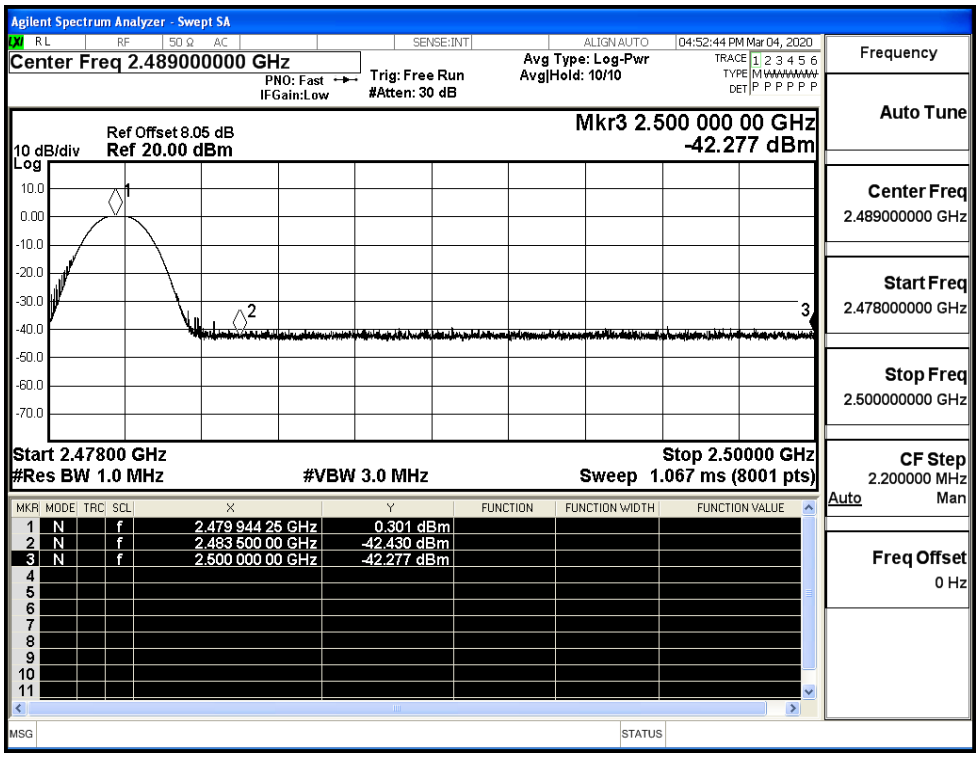
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



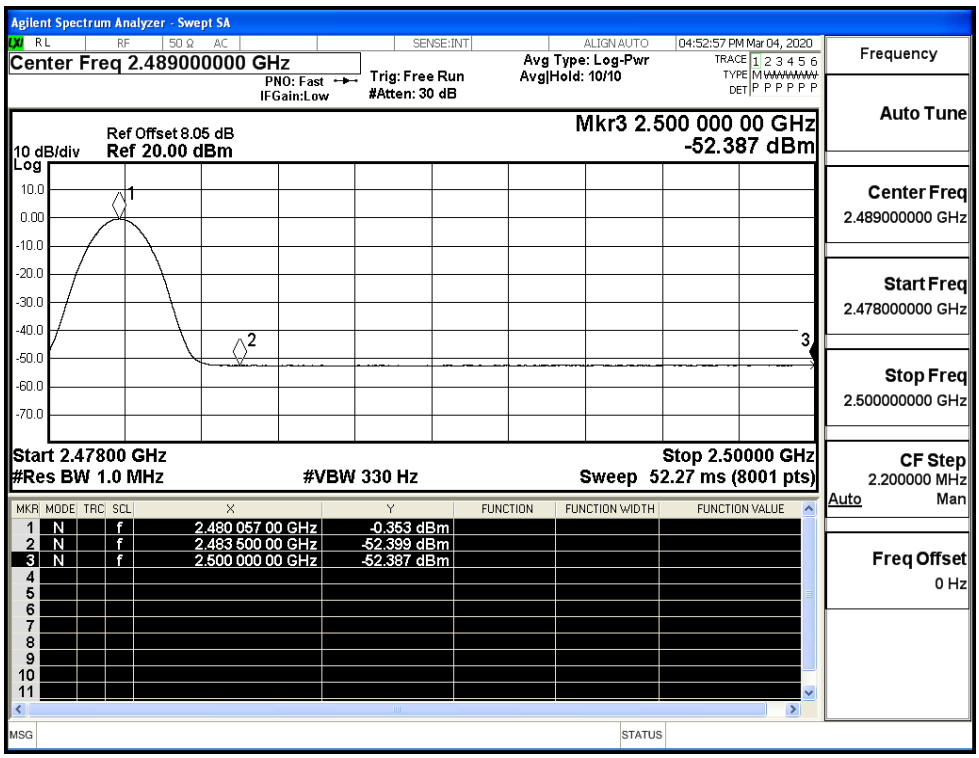
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



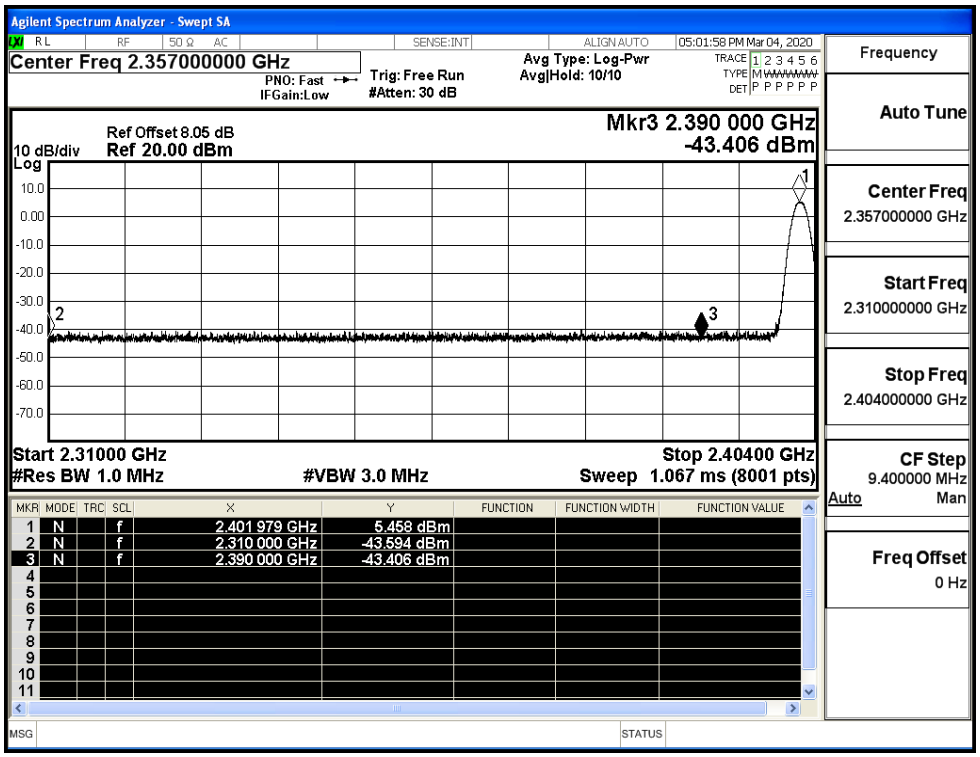
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



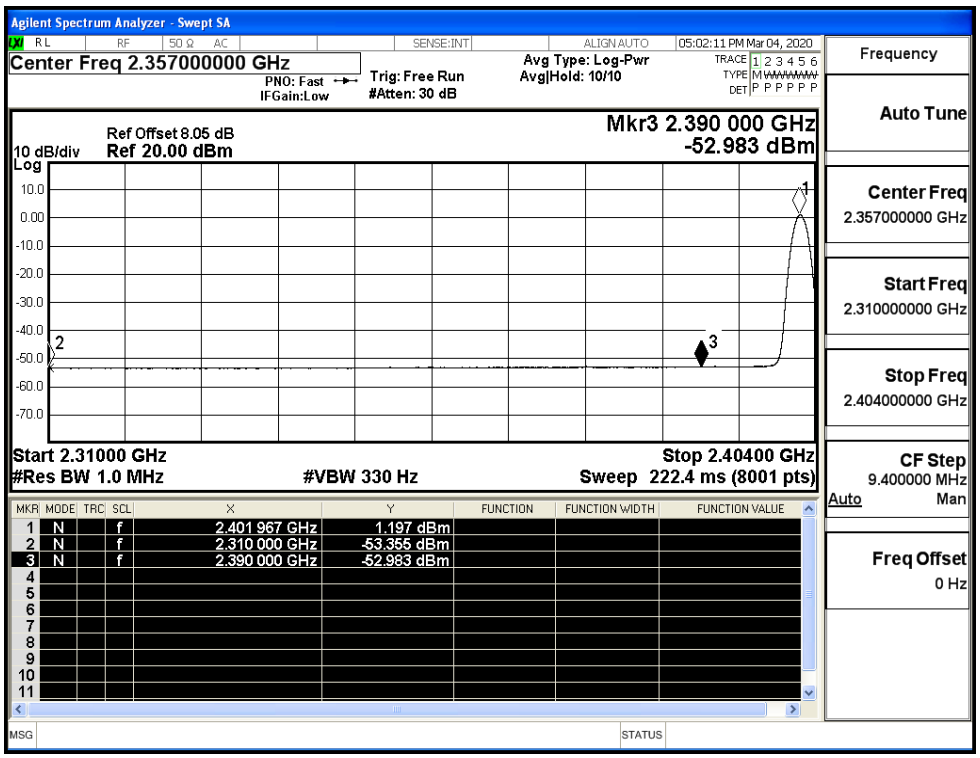
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



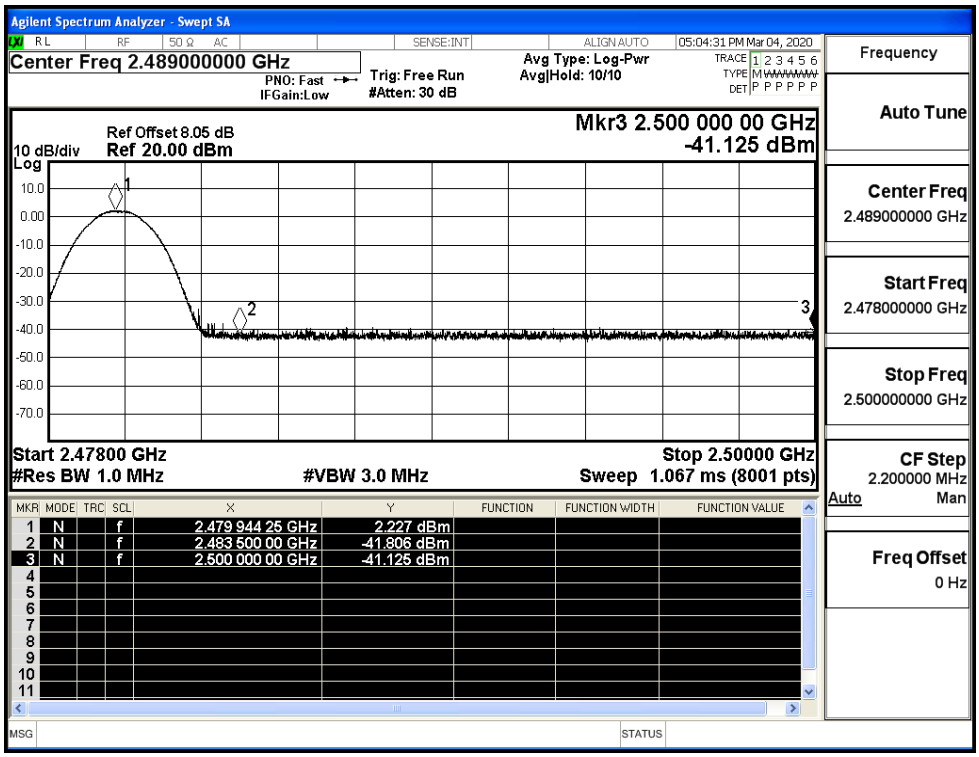
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



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)