Appendix A

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

Product Name: BLUETOOTH SPEAKER

Trade Mark: N/A

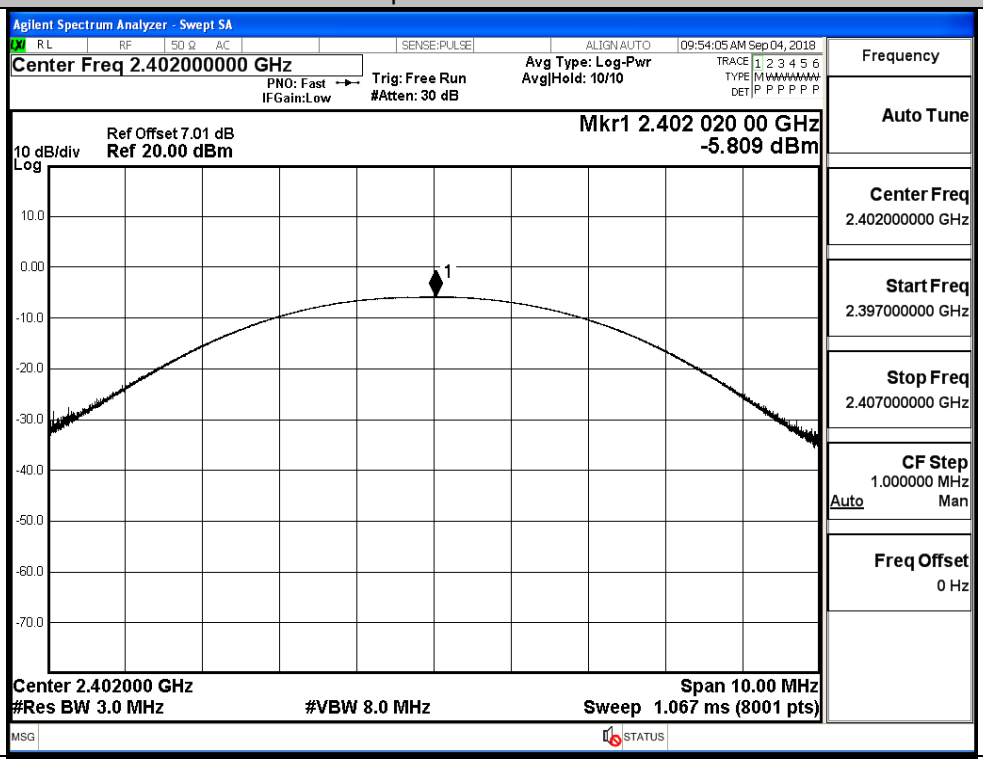
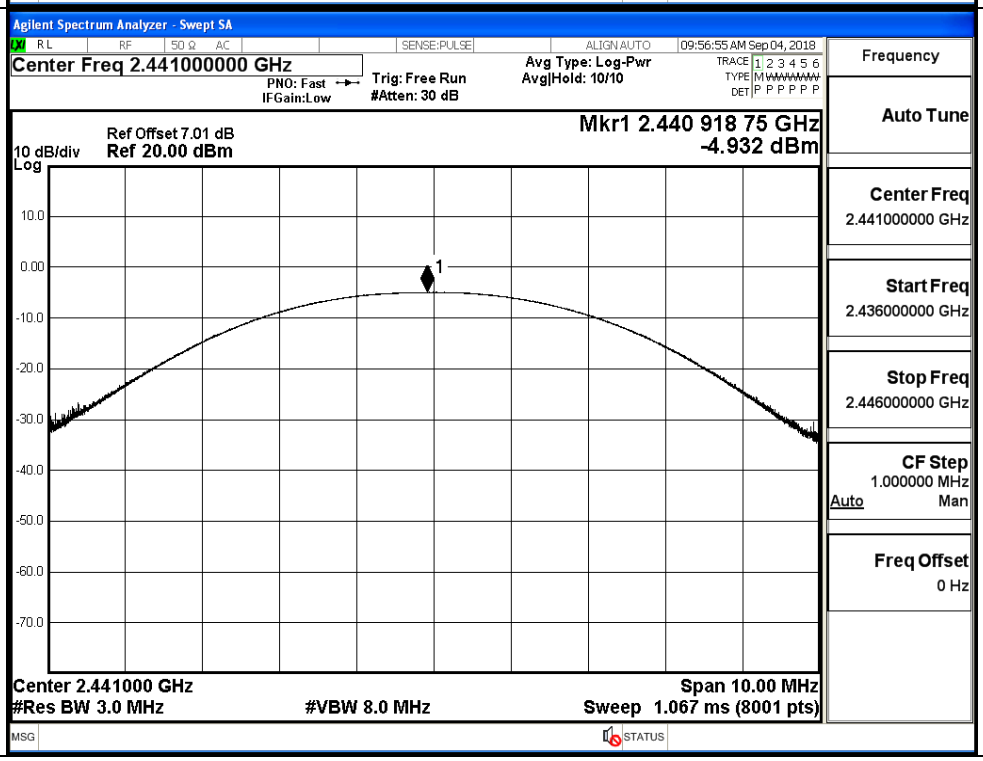
Test Model: BS504

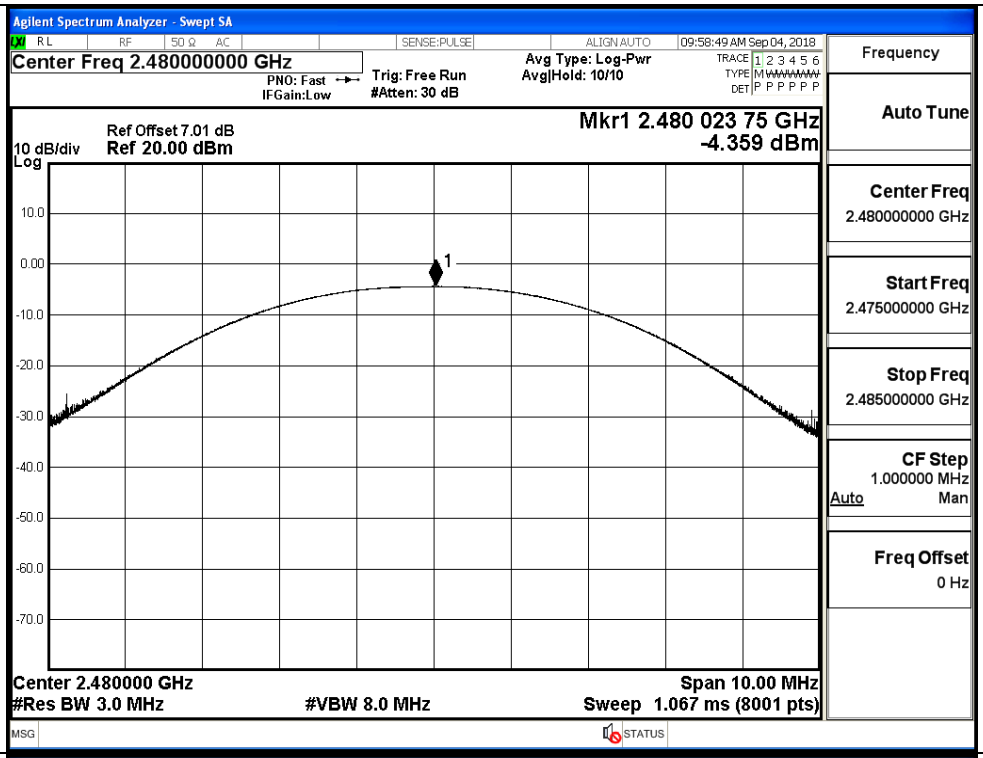
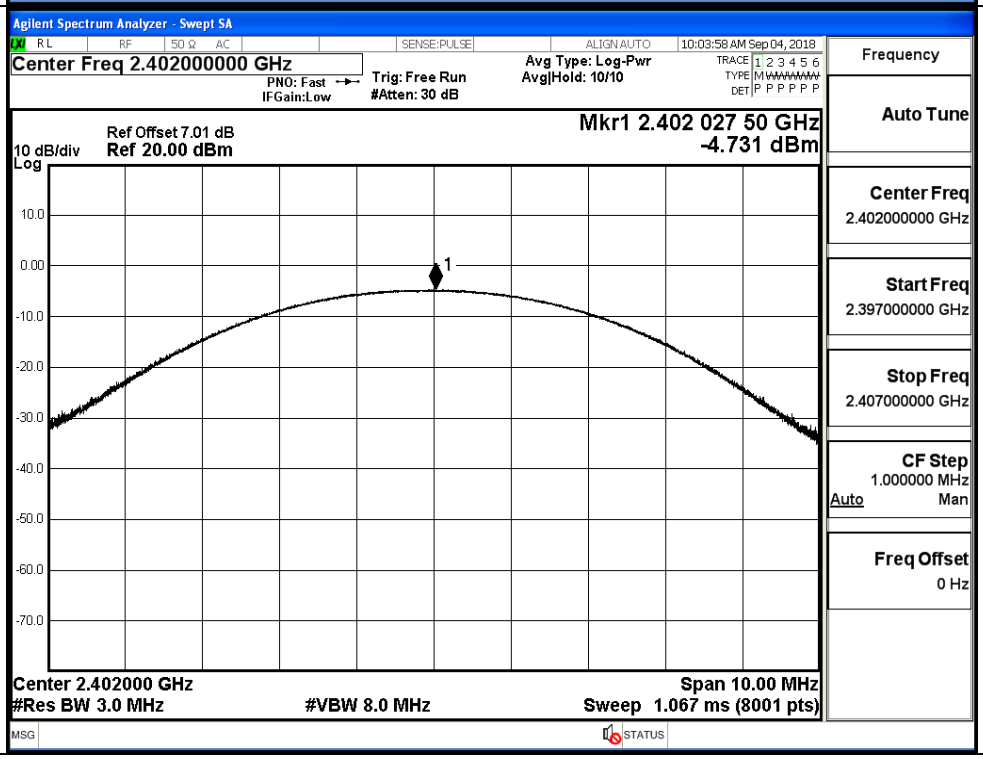
Environmental Conditions

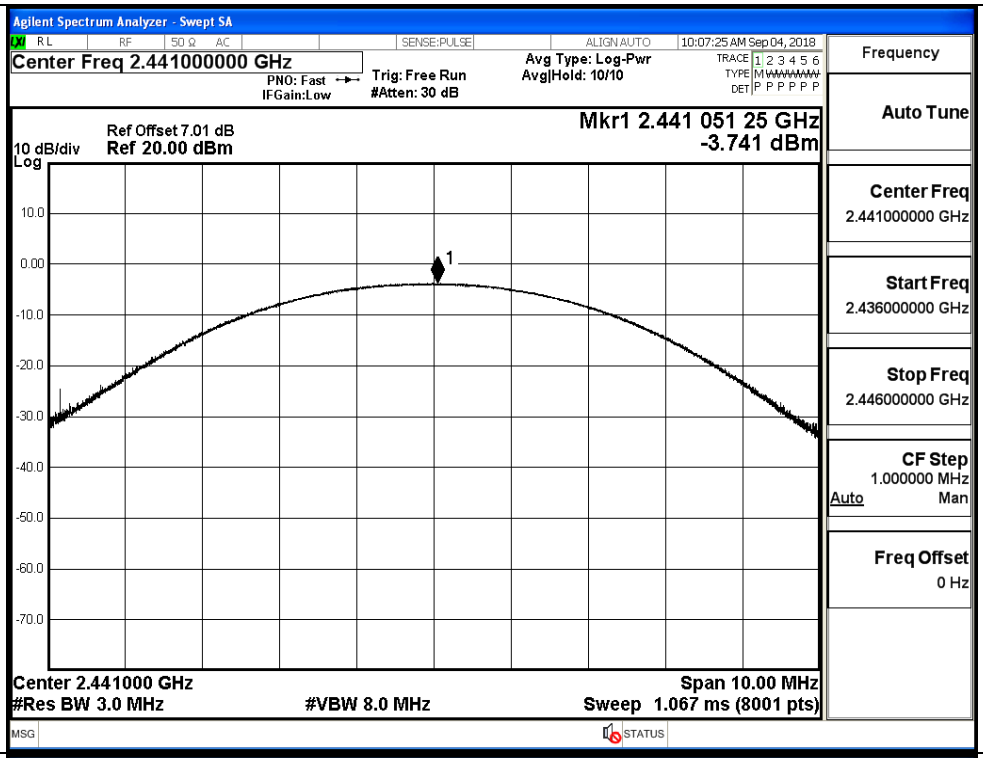
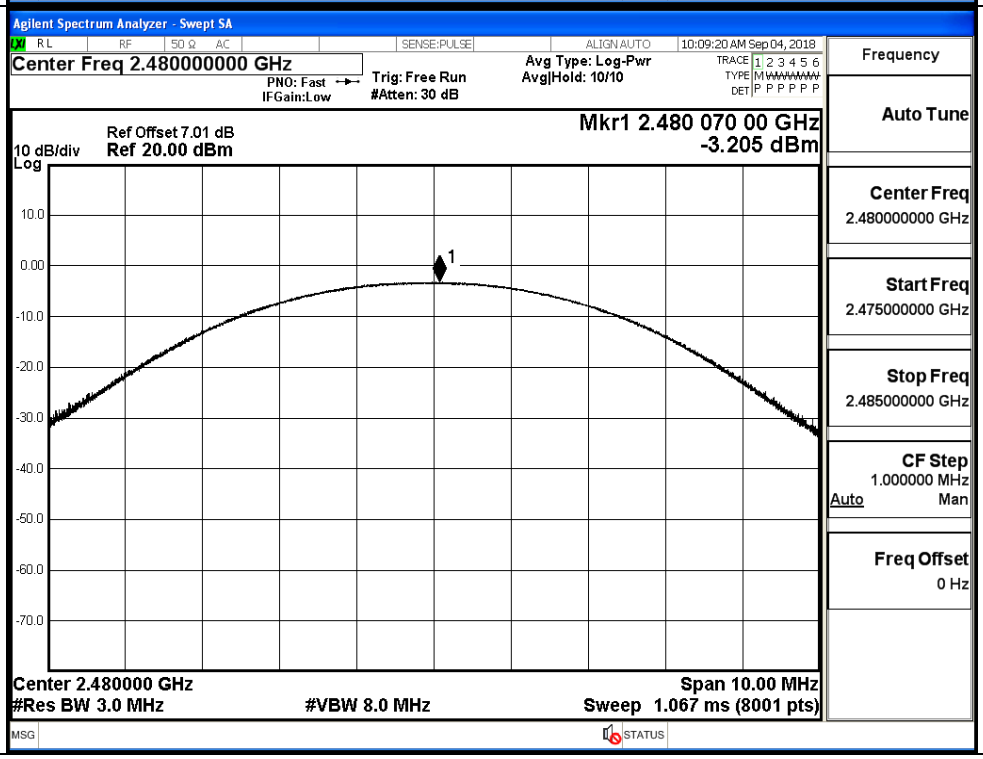
Temperature:	24.5 ° C
Relative Humidity:	54.2%
ATM Pressure:	100.0 kPa
Test Engineer:	Mina.Xu
Supervised by:	Jayden.Zhuo

A.1 Maximum Conducted Peak Output Power

Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-5.809	21	PASS
	MCH	-4.932	21	PASS
	HCH	-4.359	21	PASS
π/4DQPSK	LCH	-4.731	21	PASS
	MCH	-3.741	21	PASS
	HCH	-3.205	21	PASS

Test Graphs		
GFSK/LCH		
GFSK/MCH		

GFSK/HCH	
π/4DQPSK/LCH	

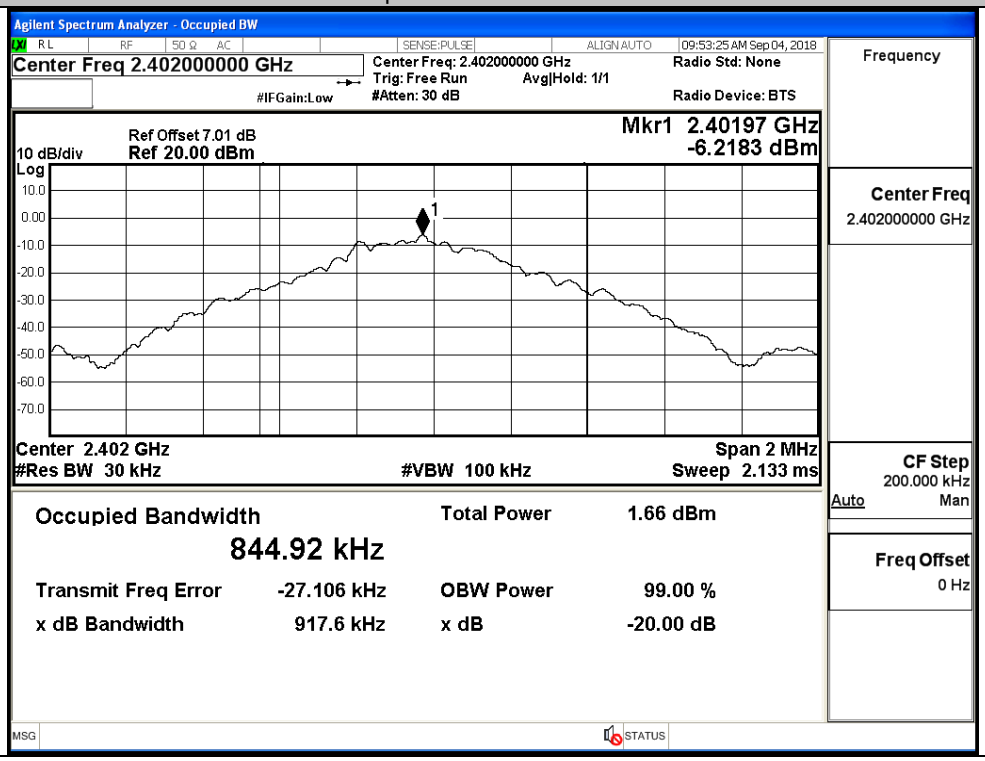
π/4DQPSK/MCH		
π/4DQPSK/HCH		

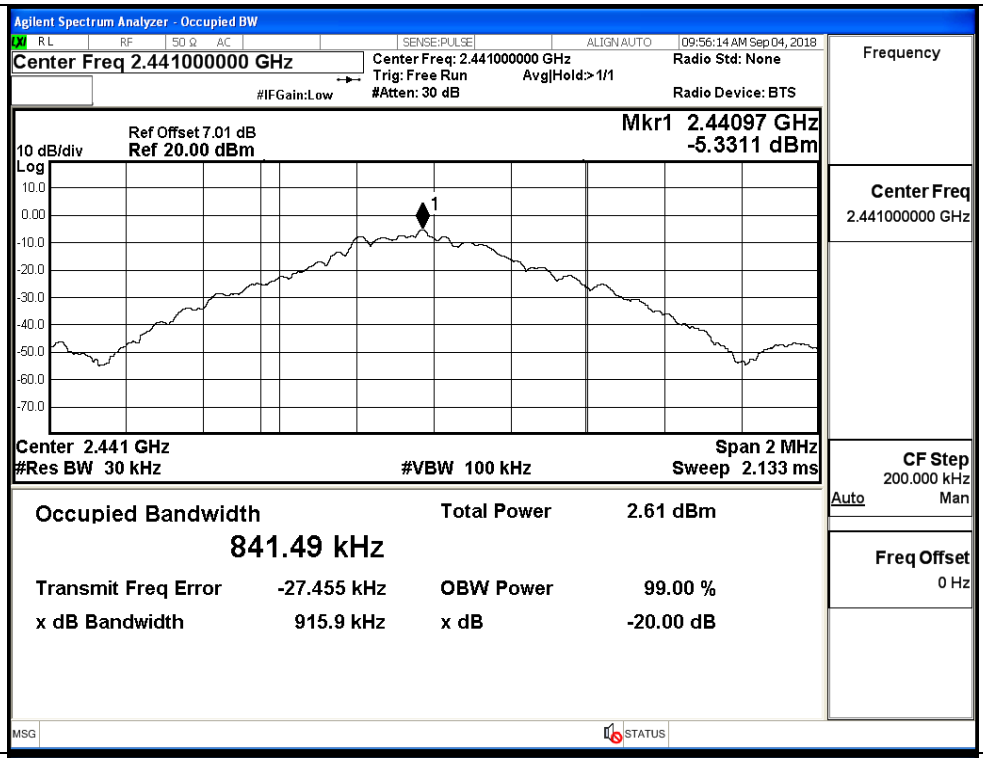
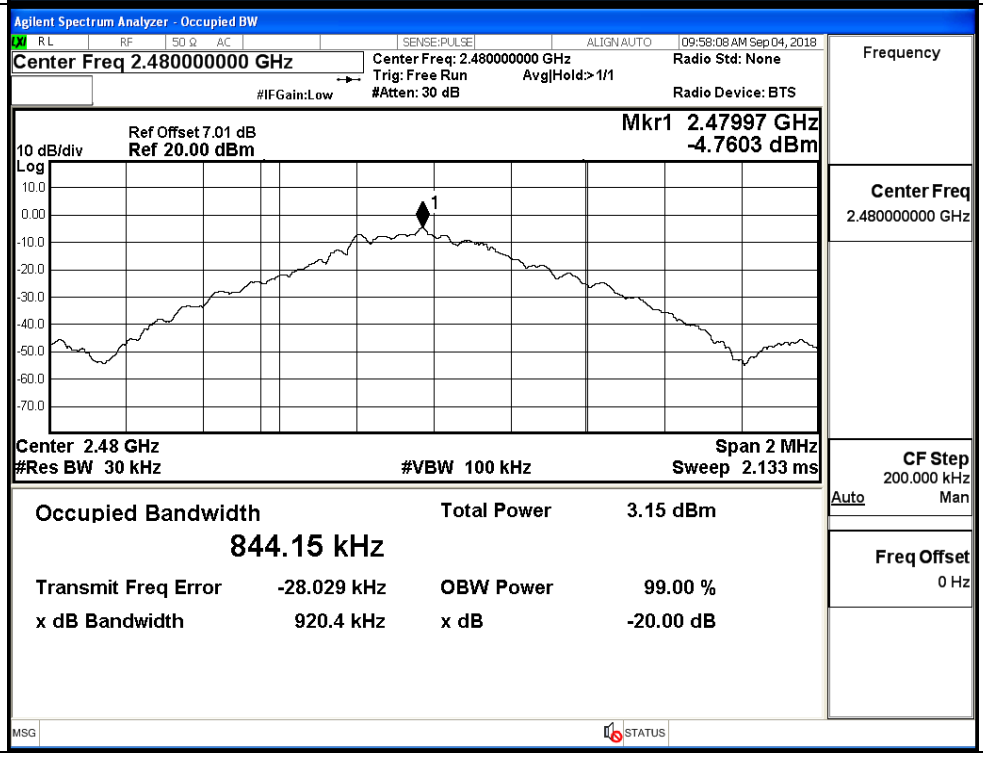
A.2 99% and 20dB Bandwidth

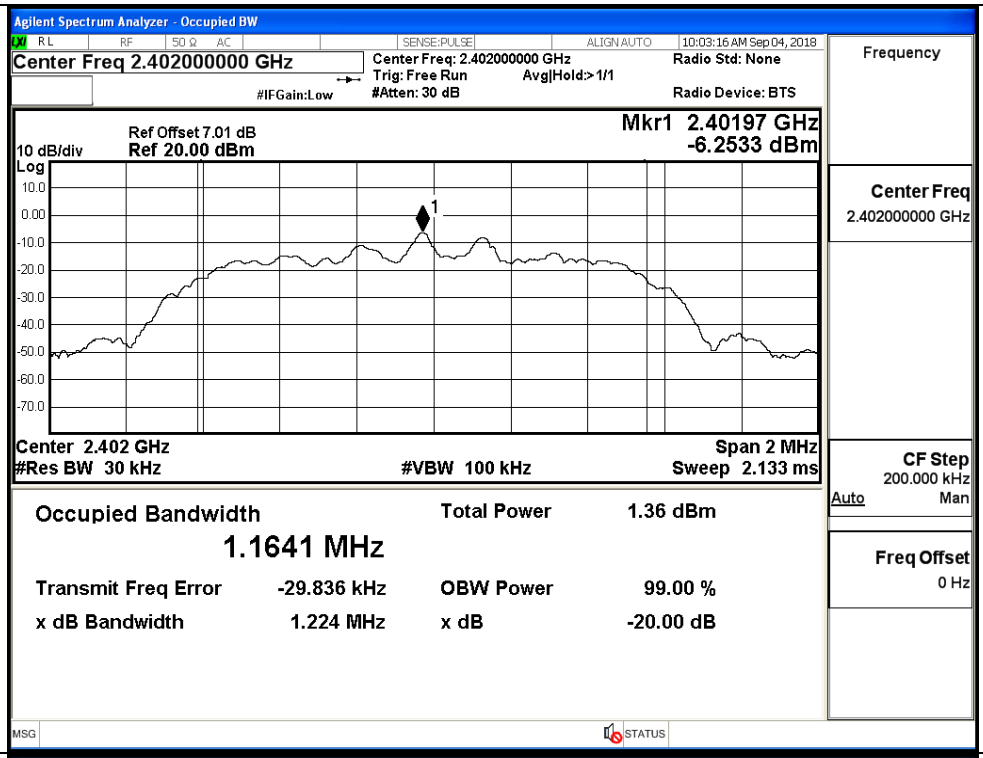
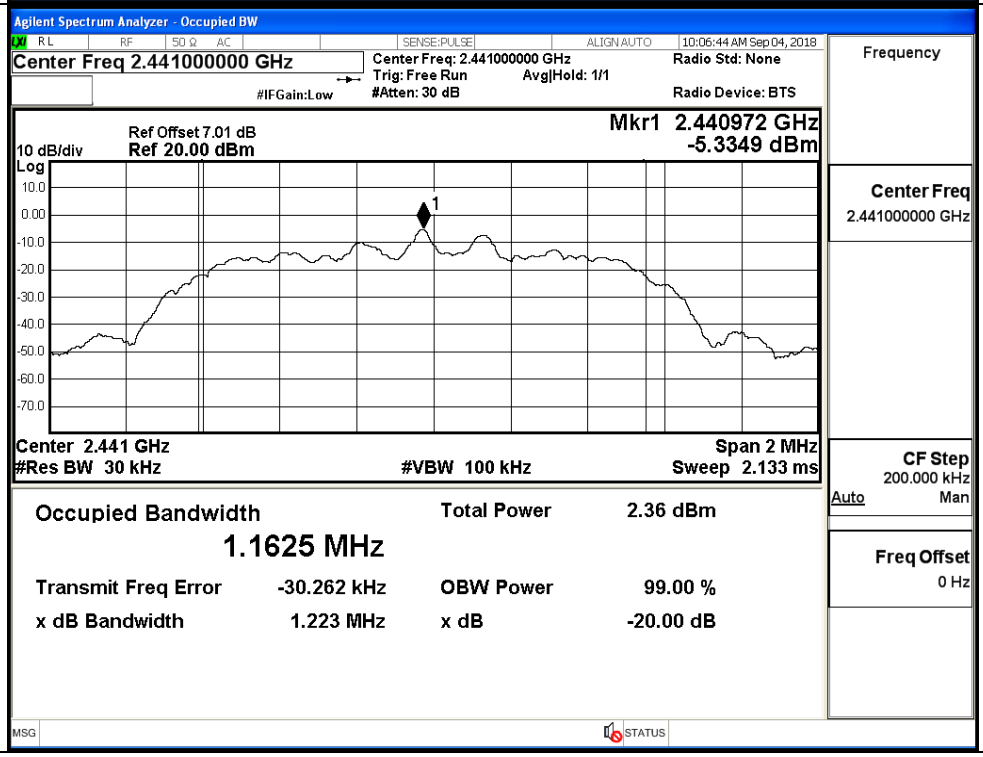
Mode	Channel.	99% Bandwidth [MHz]	20dB Bandwidth [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.84492	0.9176	Not Specified	PASS
	MCH	0.84149	0.9159	Not Specified	PASS
	HCH	0.84415	0.9204	Not Specified	PASS
π/4DQPSK	LCH	1.1641	1.224	Not Specified	PASS
	MCH	1.1625	1.223	Not Specified	PASS
	HCH	1.1653	1.231	Not Specified	PASS

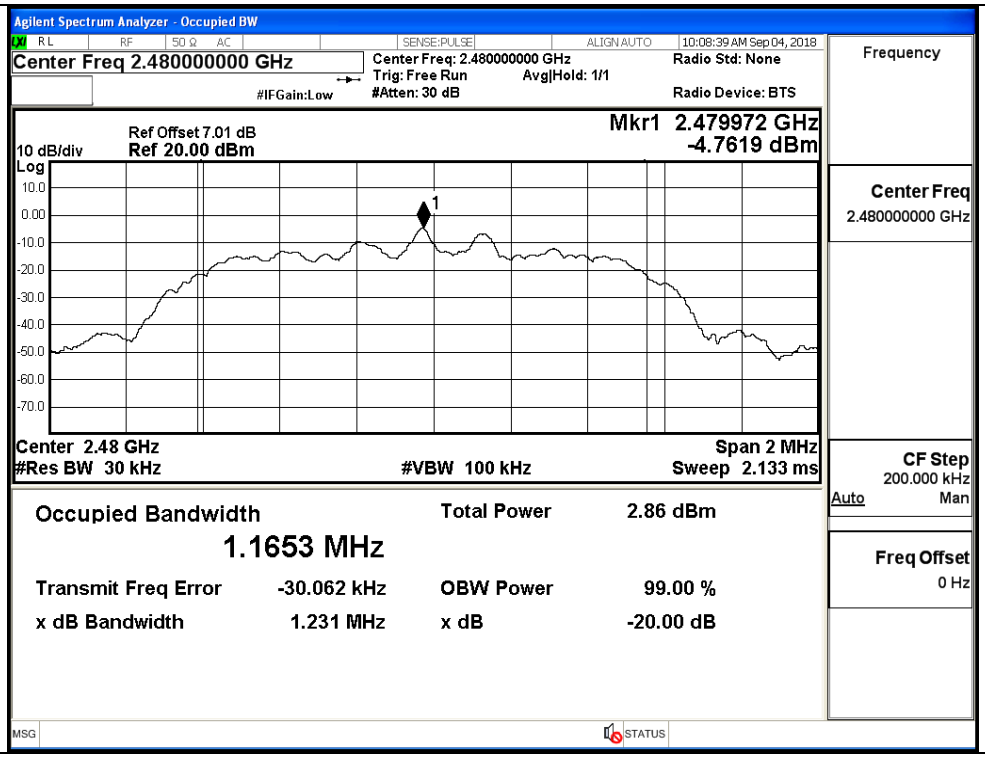
Test Graphs

GFSK/LCH



GFSK/MCH	
GFSK/HCH	

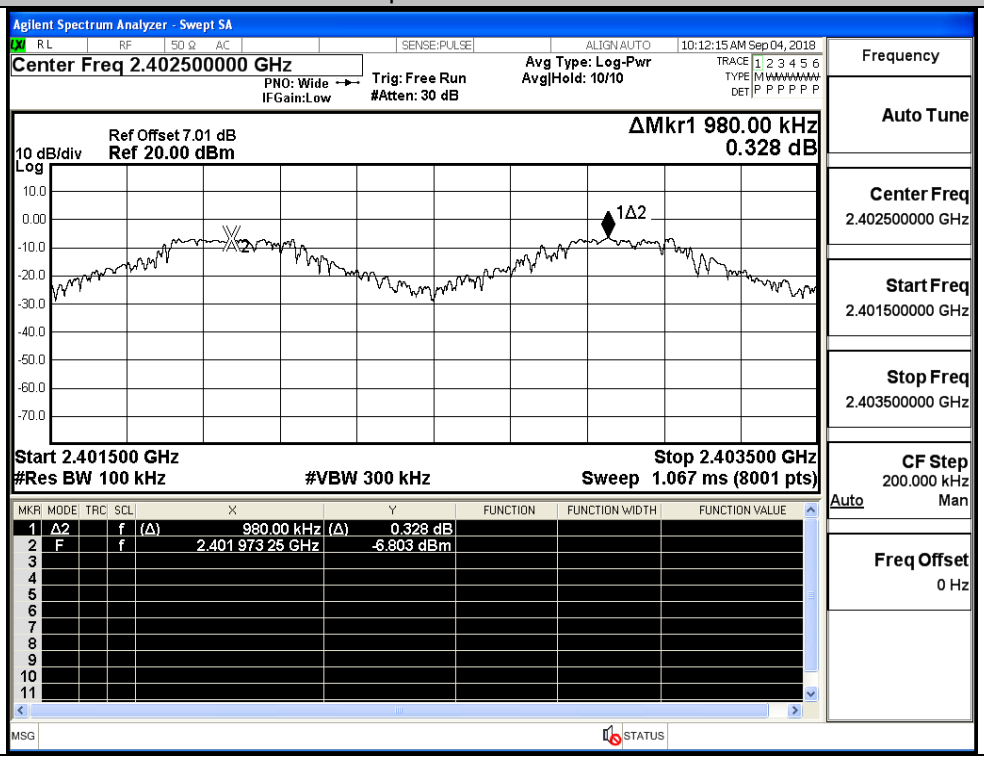
π/4DQPSK/LCH	
π/4DQPSK/MCH	

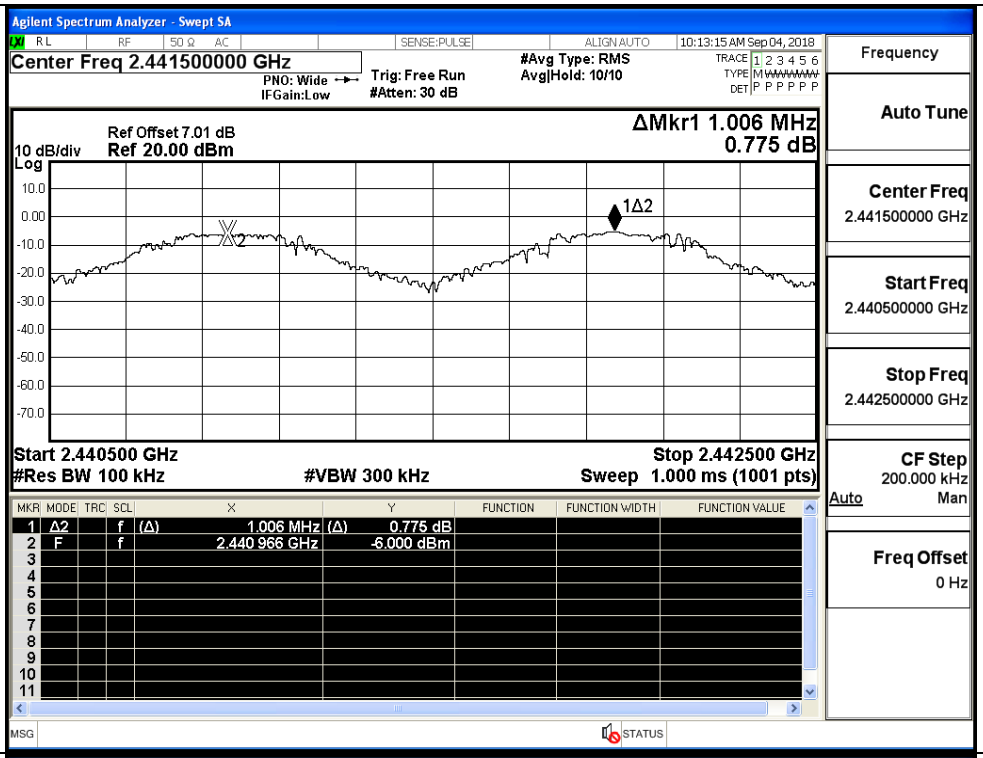
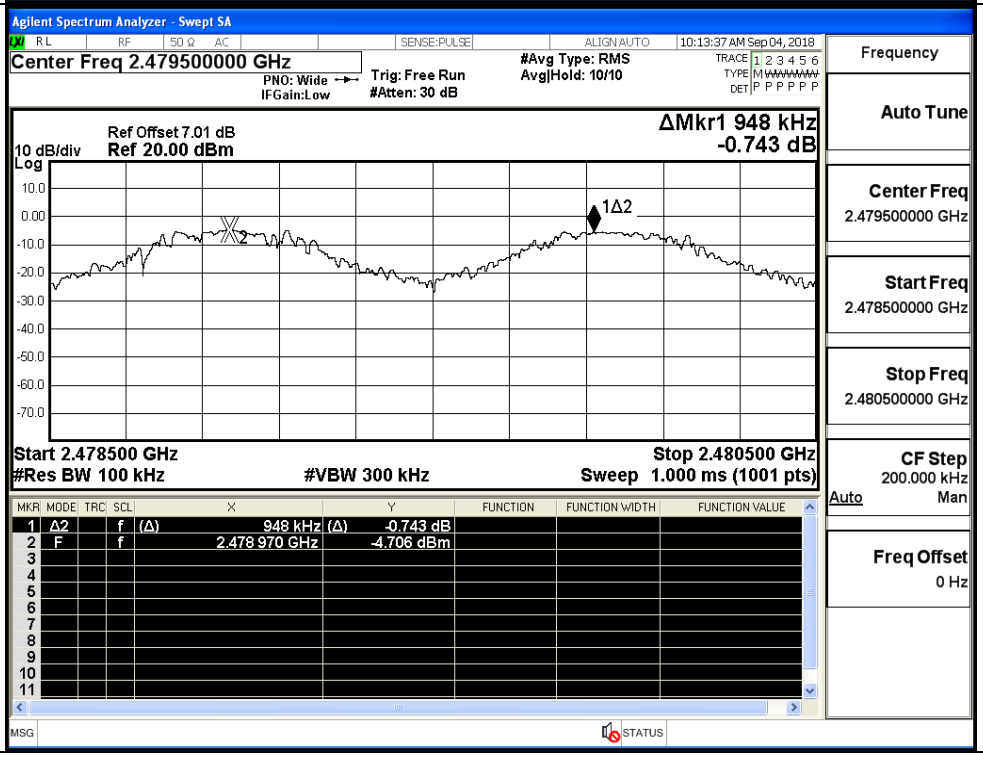
π/4DQPSK/HCH	

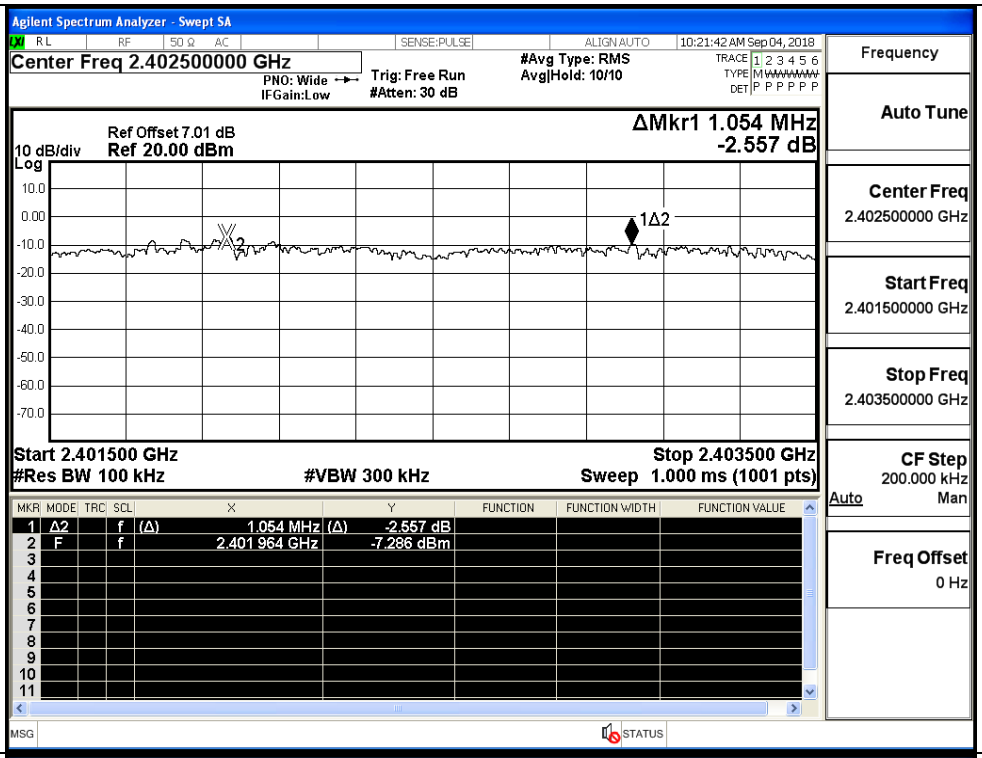
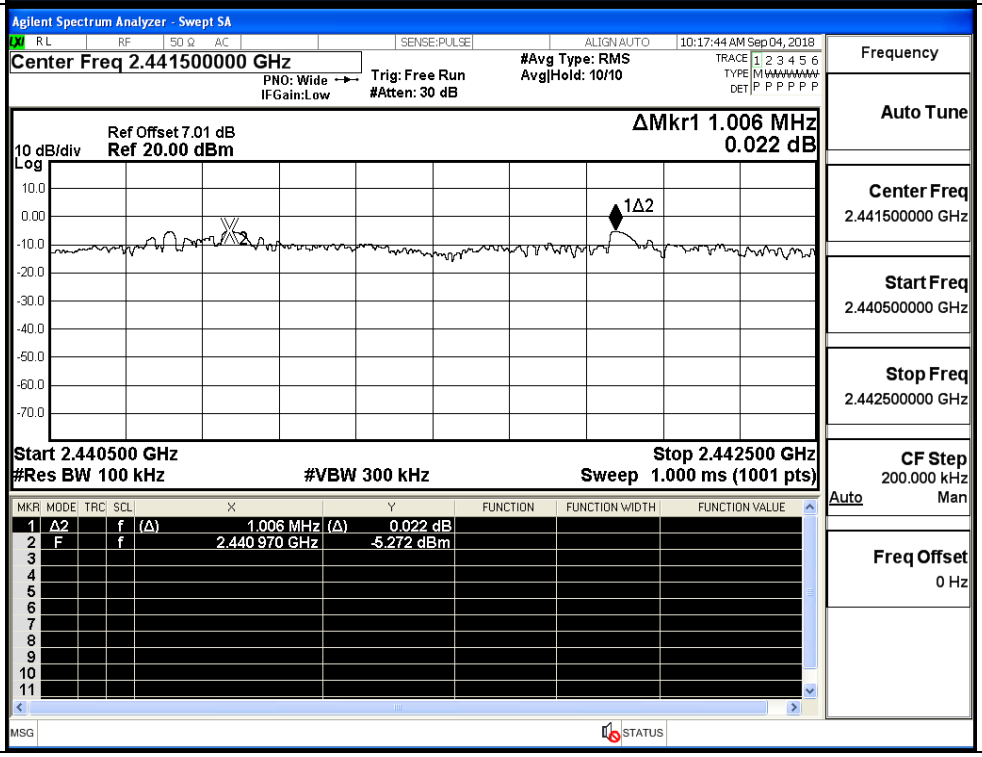
Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
10:08:39 AM Sep 04, 2018
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 1/1
#Atten: 30 dB
#IFGain:Low
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479972 GHz
-4.7619 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.133 ms
Occupied Bandwidth
1.1653 MHz
Total Power 2.86 dBm
Transmit Freq Error -30.062 kHz
OBW Power 99.00 %
x dB Bandwidth 1.231 MHz
x dB -20.00 dB
Center Freq
2.480000000 GHz
CF Step
200.000 kHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS

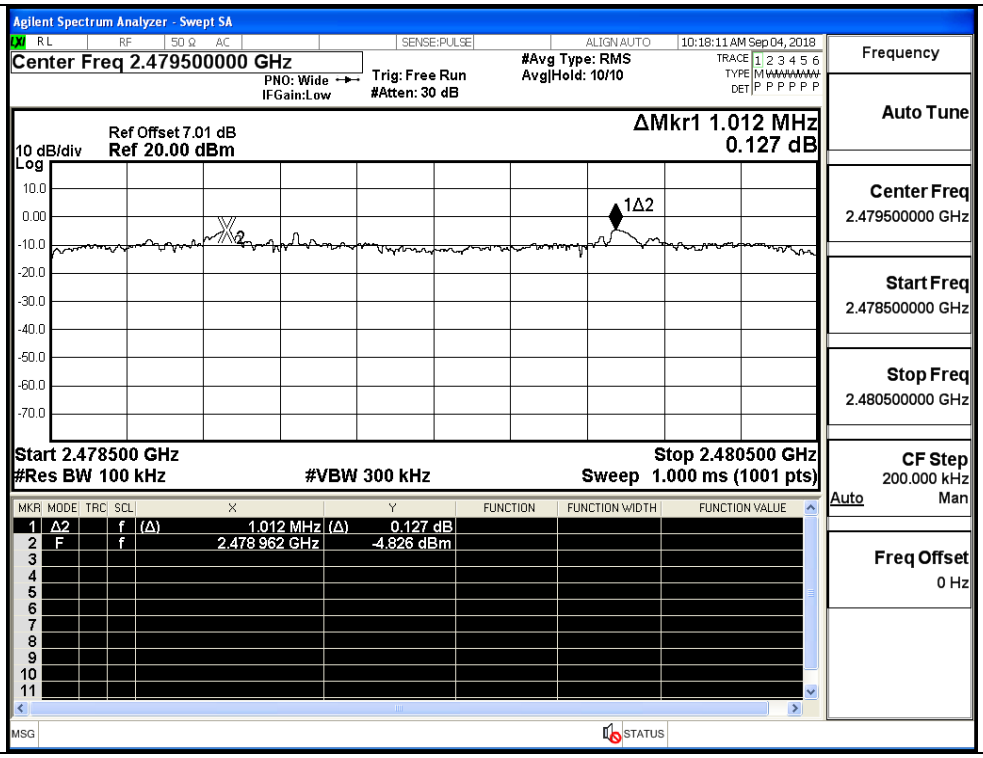
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	0.980	0.614	PASS
	MCH	1.006	0.614	PASS
	HCH	0.948	0.614	PASS
π/4DQPSK	LCH	1.054	0.821	PASS
	MCH	1.006	0.821	PASS
	HCH	1.012	0.821	PASS

Test Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

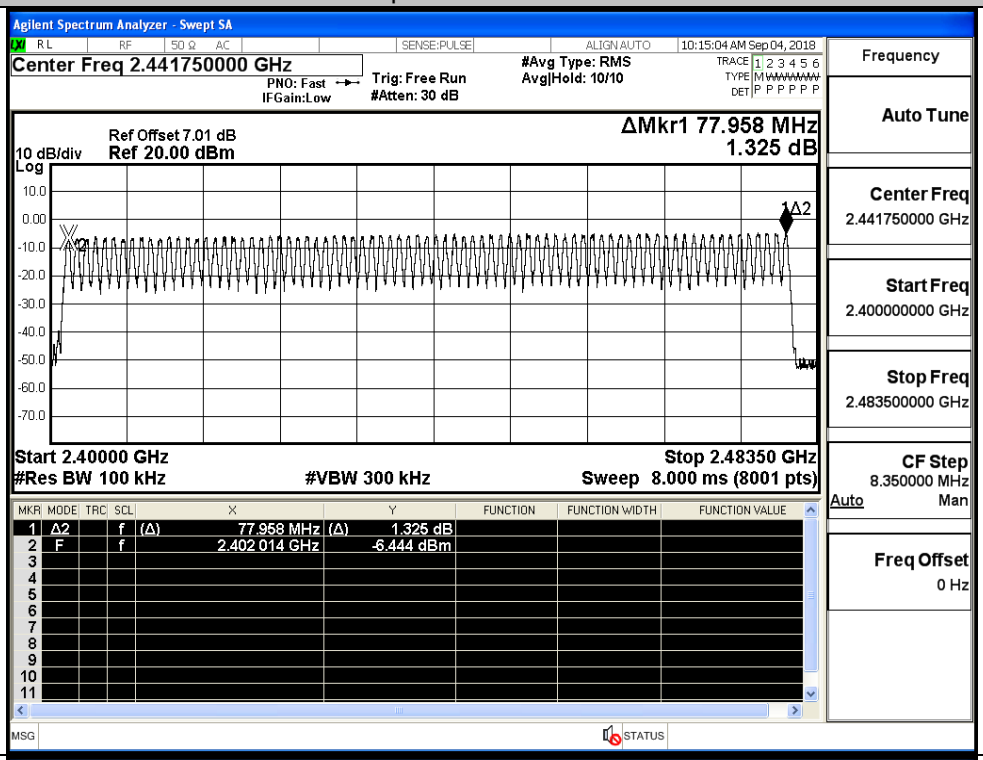
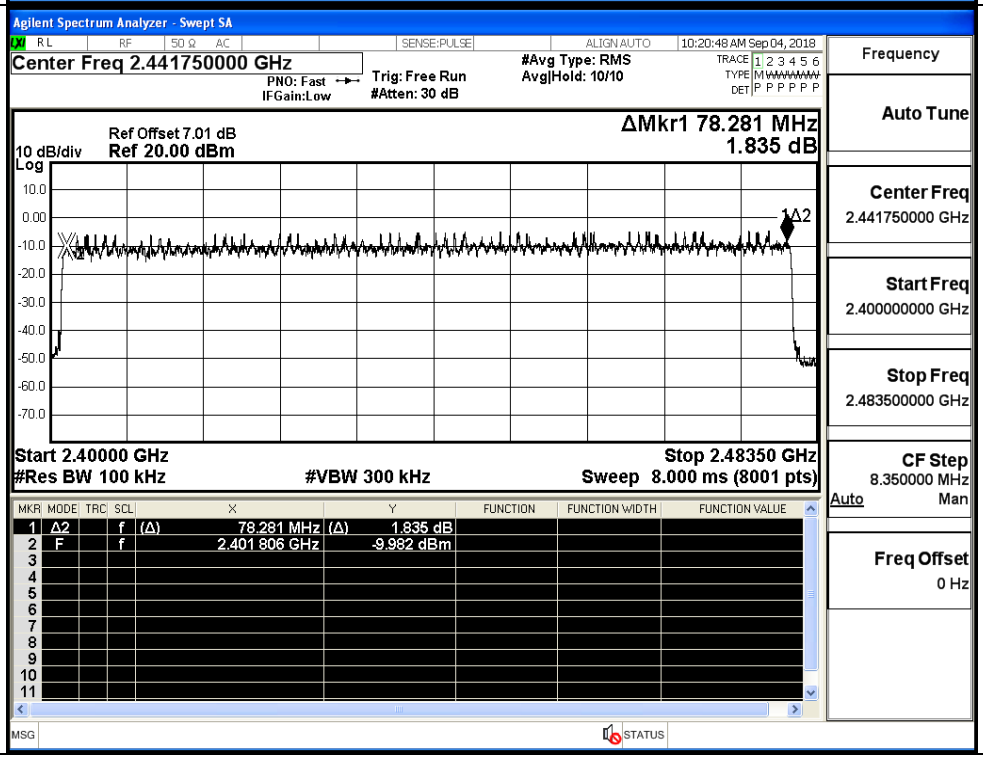
π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.479500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
10:18:11 AM Sep 04, 2018
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 1.012 MHz
0.127 dB
Start 2.478500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.480500 GHz
Sweep 1.000 ms (1001 pts)
1 Δ2 f (Δ) 1.012 MHz (Δ) 0.127 dB
2 F f 2.478 962 GHz -4.826 dBm
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
8DPSK	Hop	79	>=15	PASS

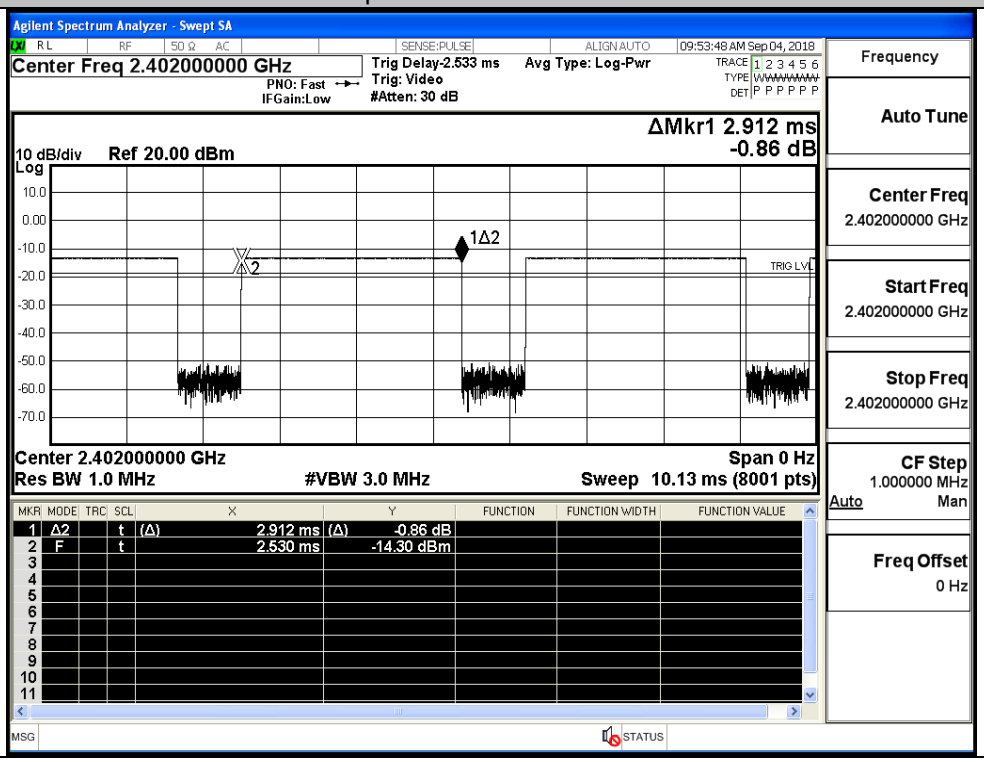
Test Graphs		
GFSK/Hop		
π/4DQPSK/Hop		

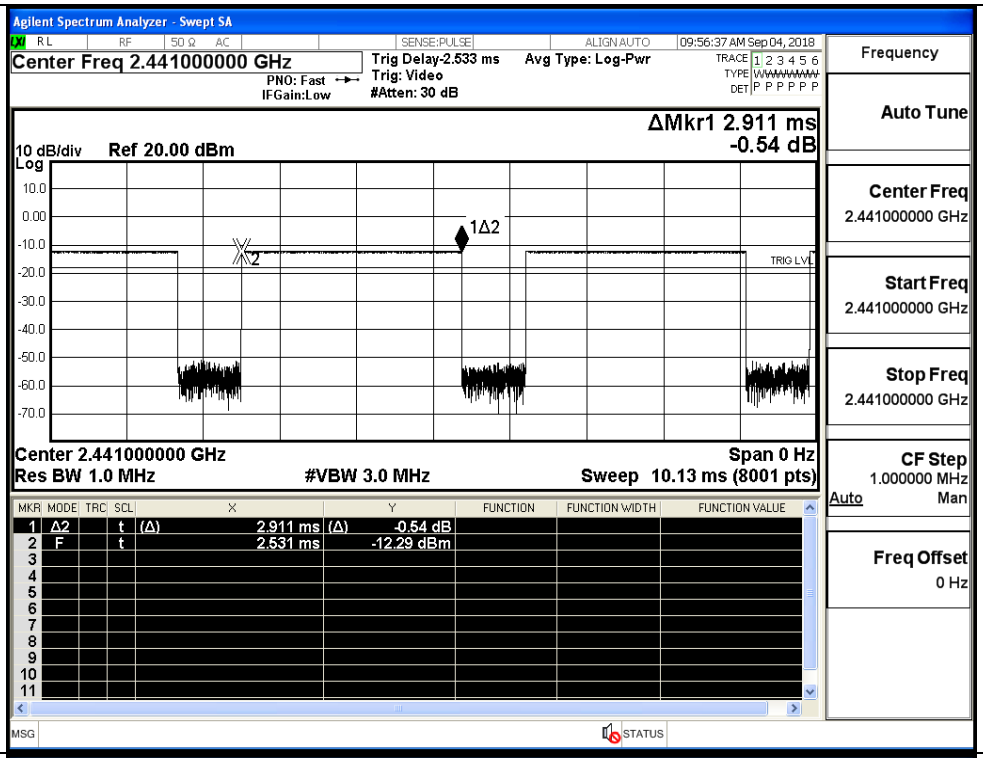
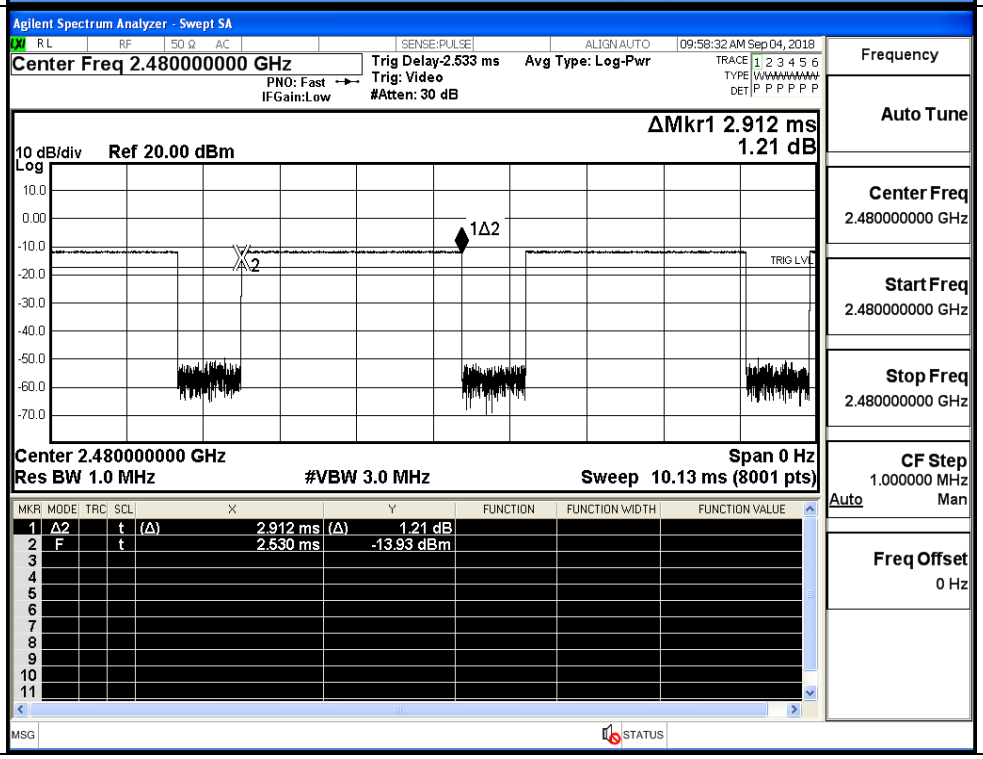
A.5 Dwell Time

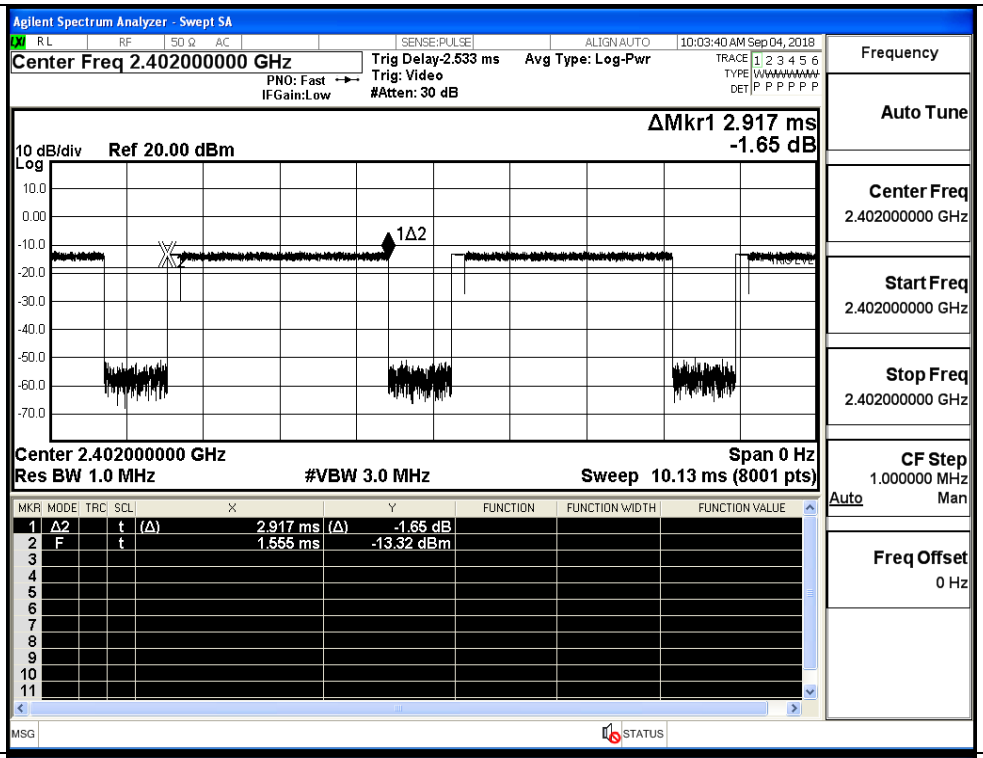
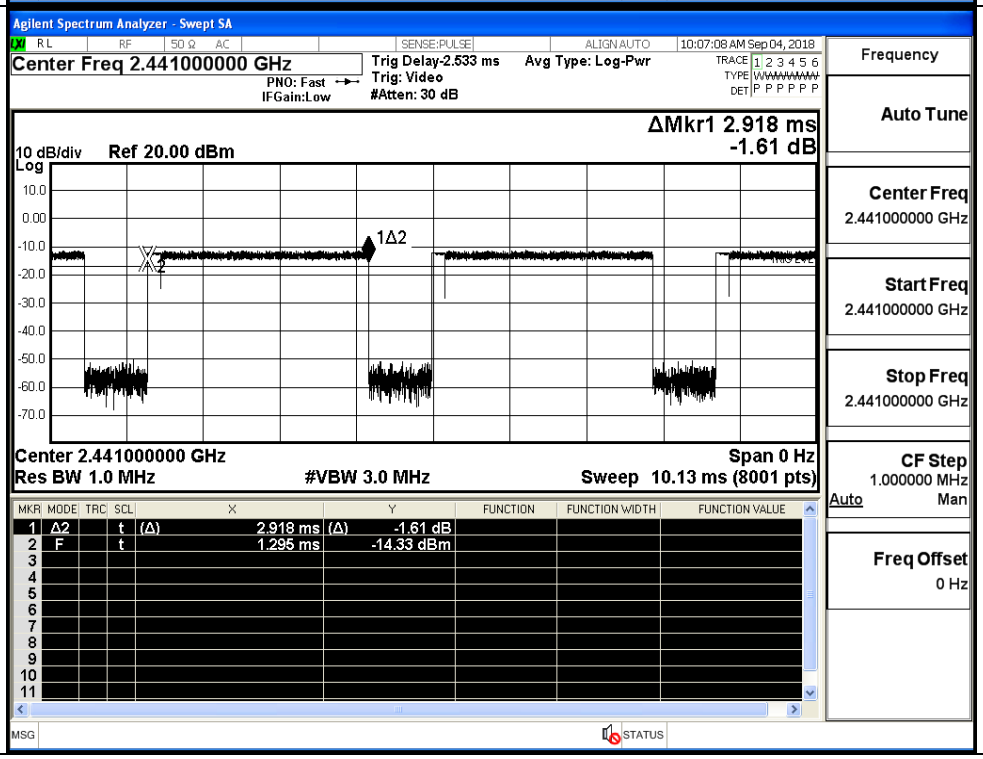
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.91	106.7	0.31	0.4	PASS
	DH5	MCH	2.91	106.7	0.31	0.4	PASS
	DH5	HCH	2.91	106.7	0.31	0.4	PASS
π/4DQPSK	2DH5	LCH	2.92	106.7	0.312	0.4	PASS
	2DH5	MCH	2.92	106.7	0.312	0.4	PASS
	2DH5	HCH	2.92	106.7	0.312	0.4	PASS

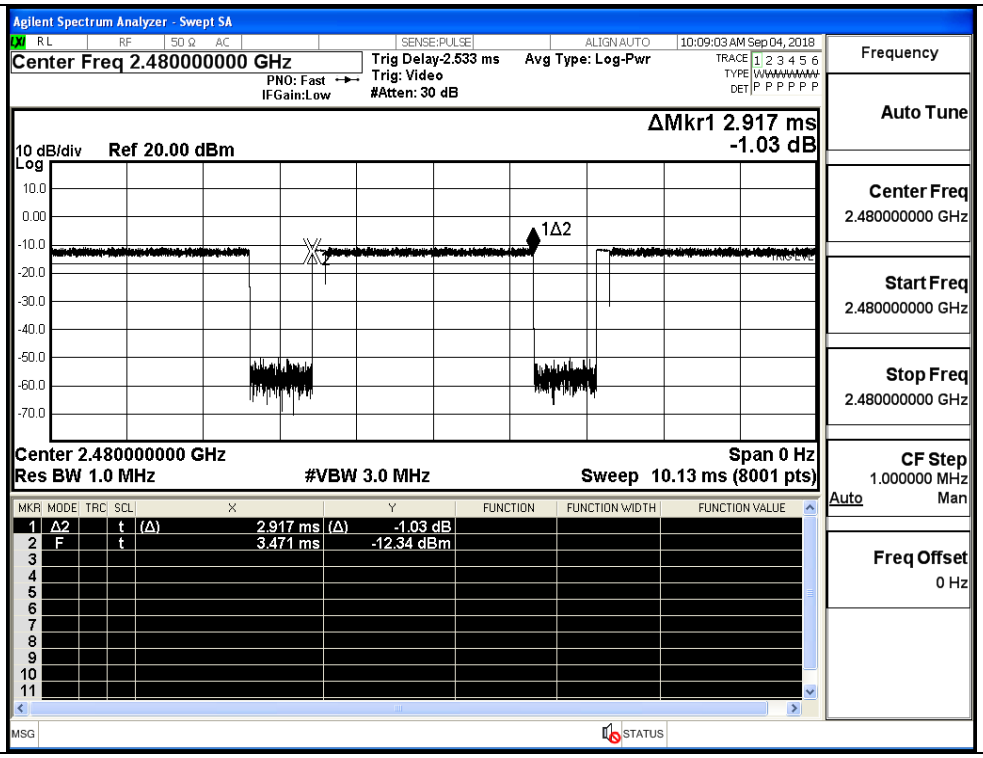
Test Graphs

GFSK_DH5/LCH



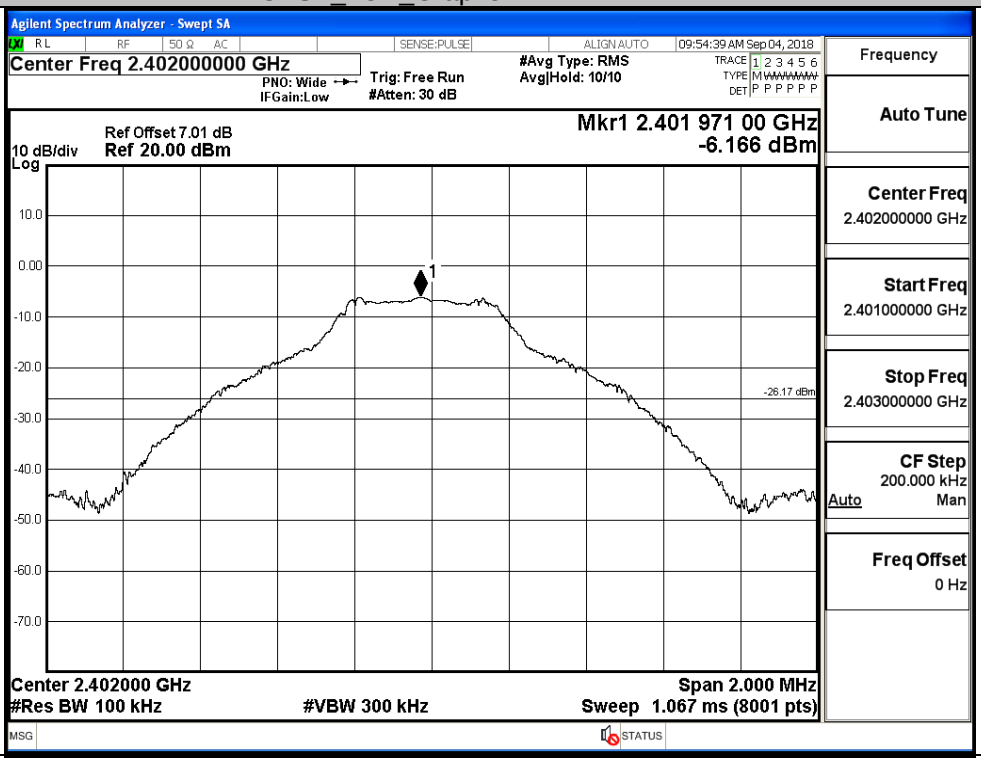
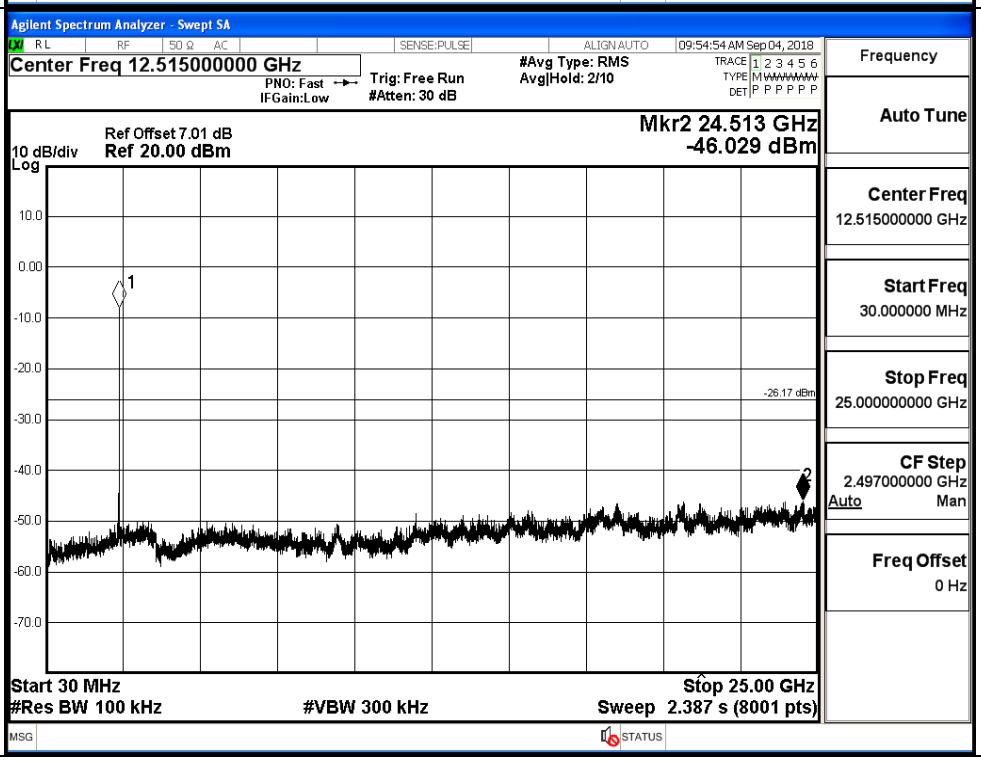
GFSK_DH5/MCH	
GFSK_DH5/HCH	

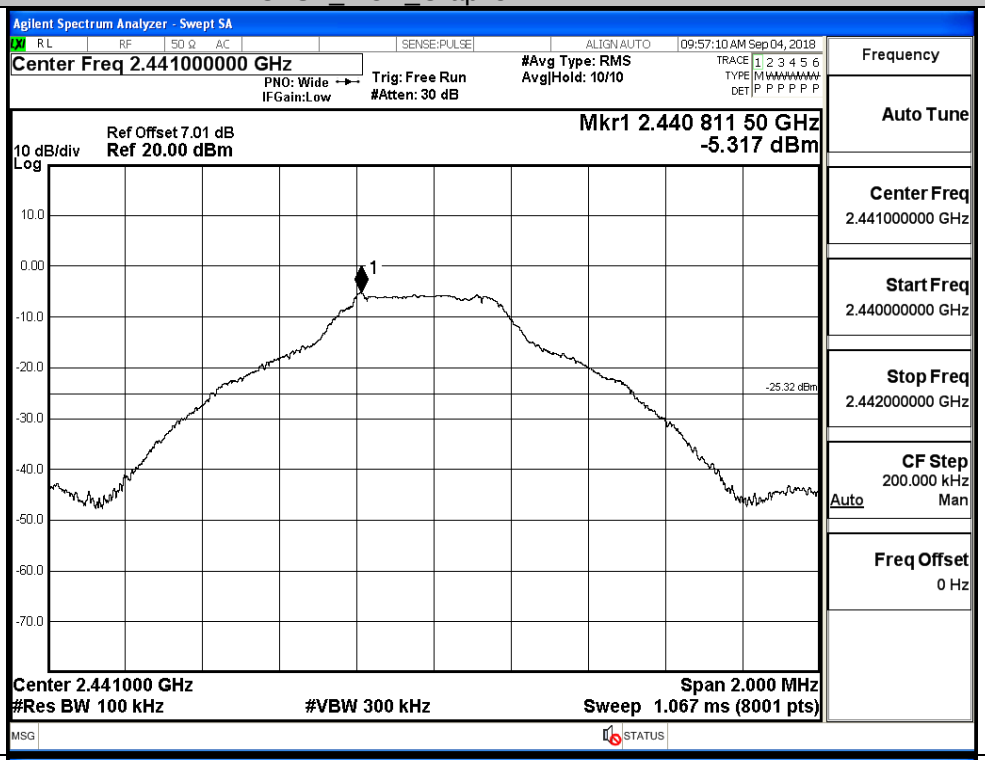
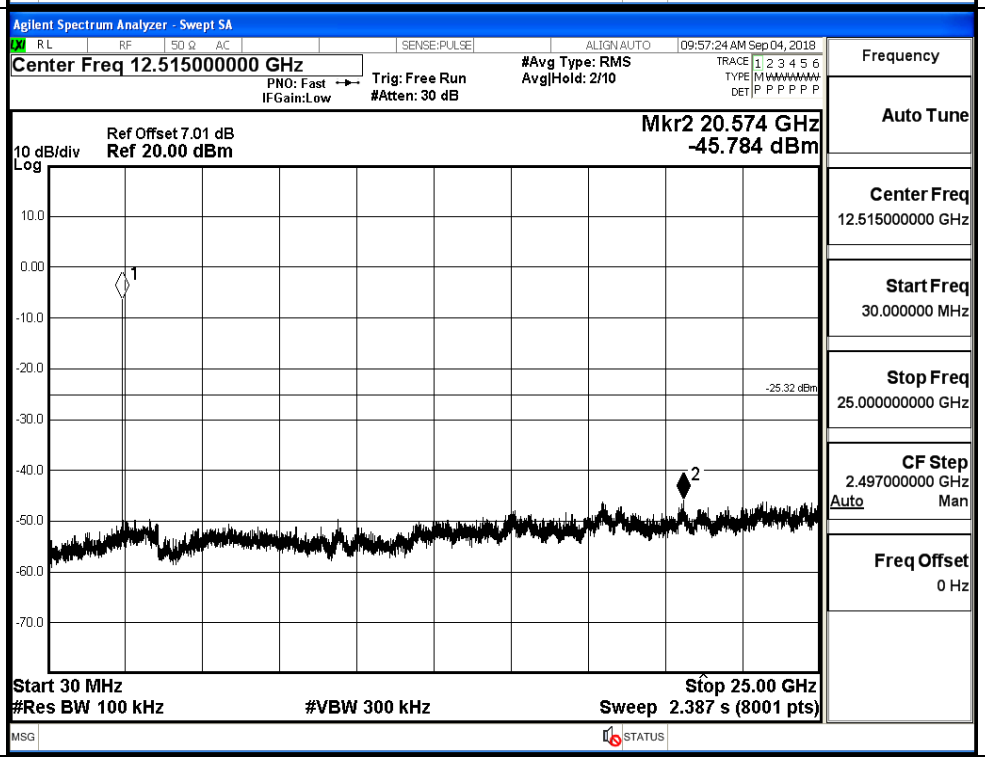
π/4DQPSK _2DH5/LCH	
π/4DQPSK _2DH5/MCH	

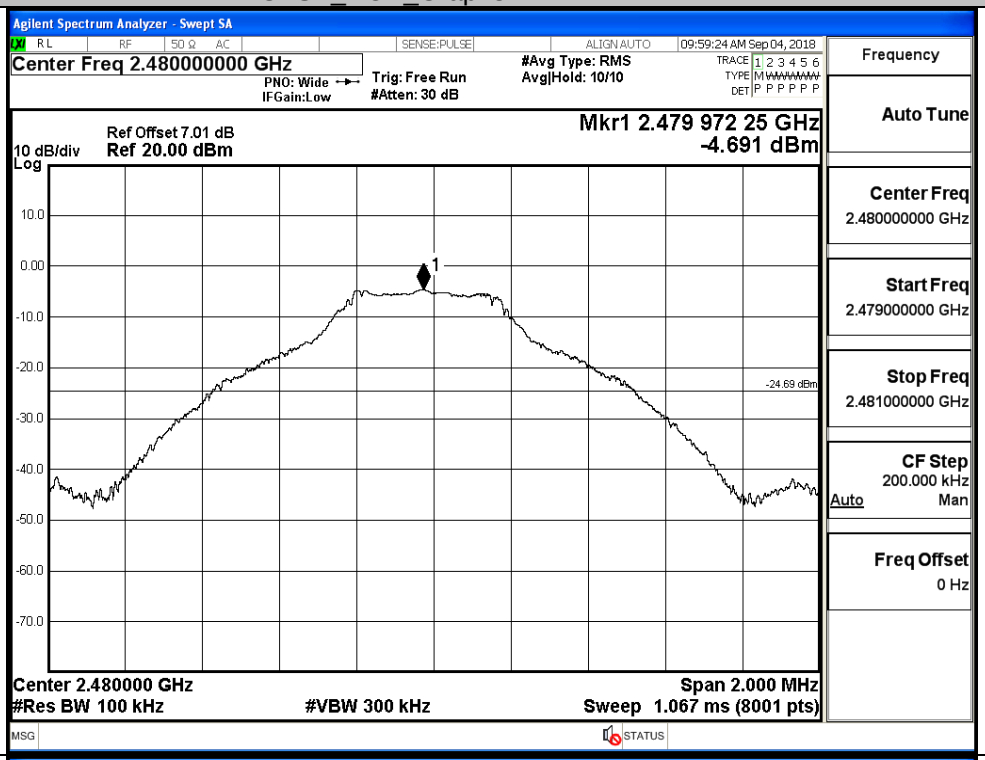
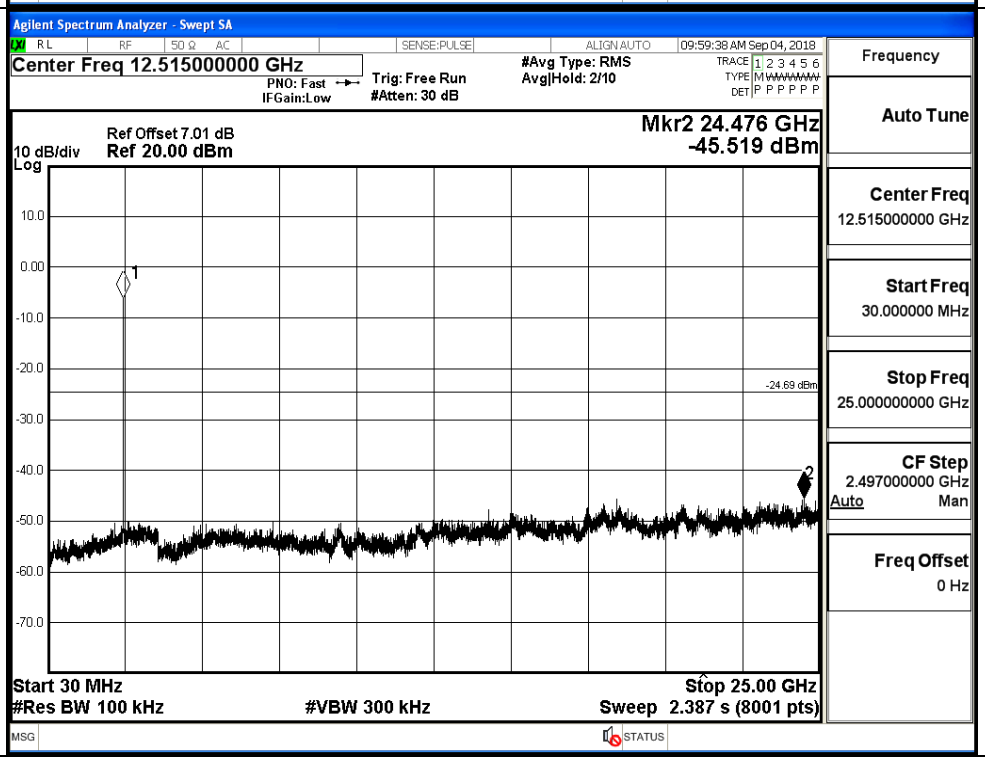
π/4DQPSK _2DH5/HCH	

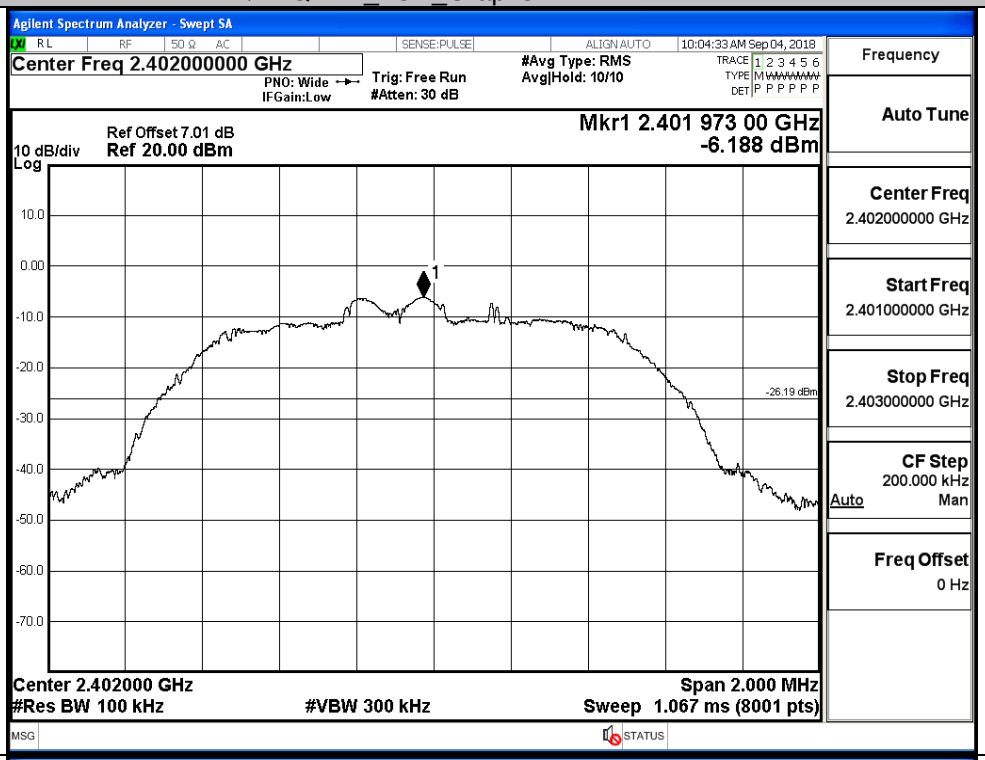
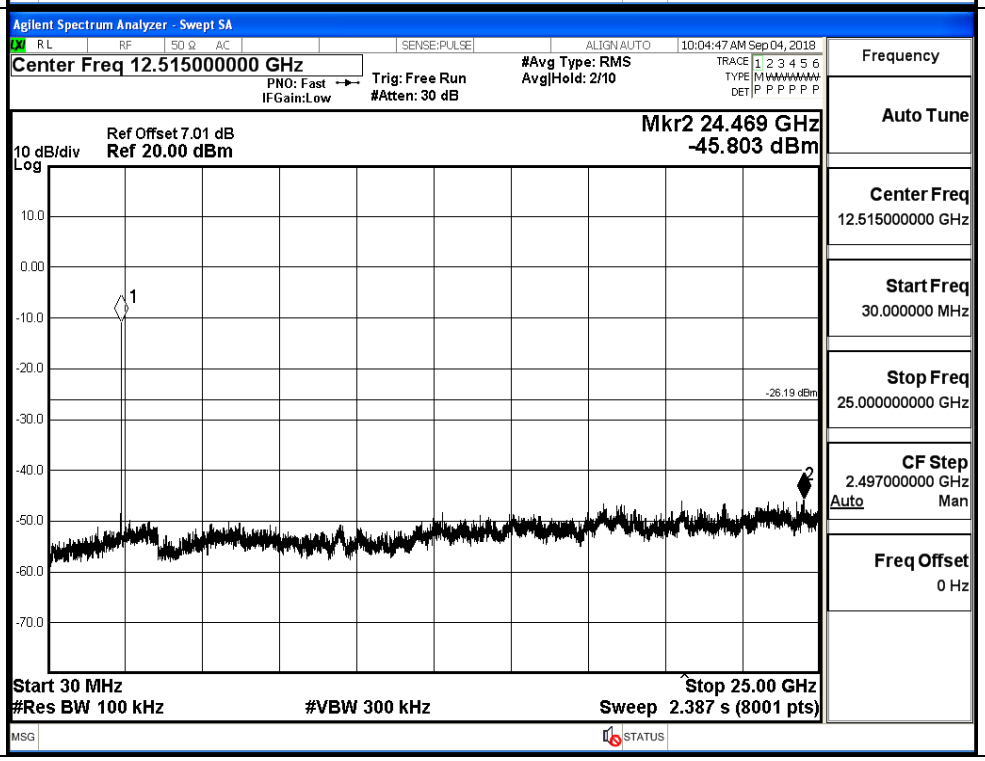
A.6 RF Conducted Spurious Emissions

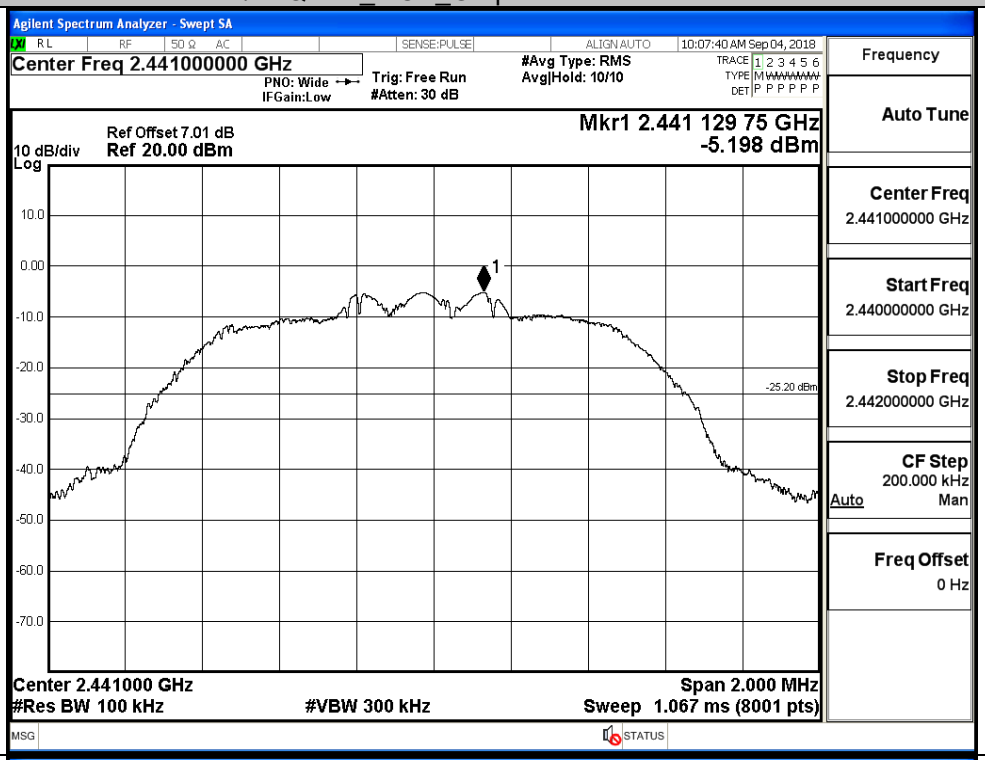
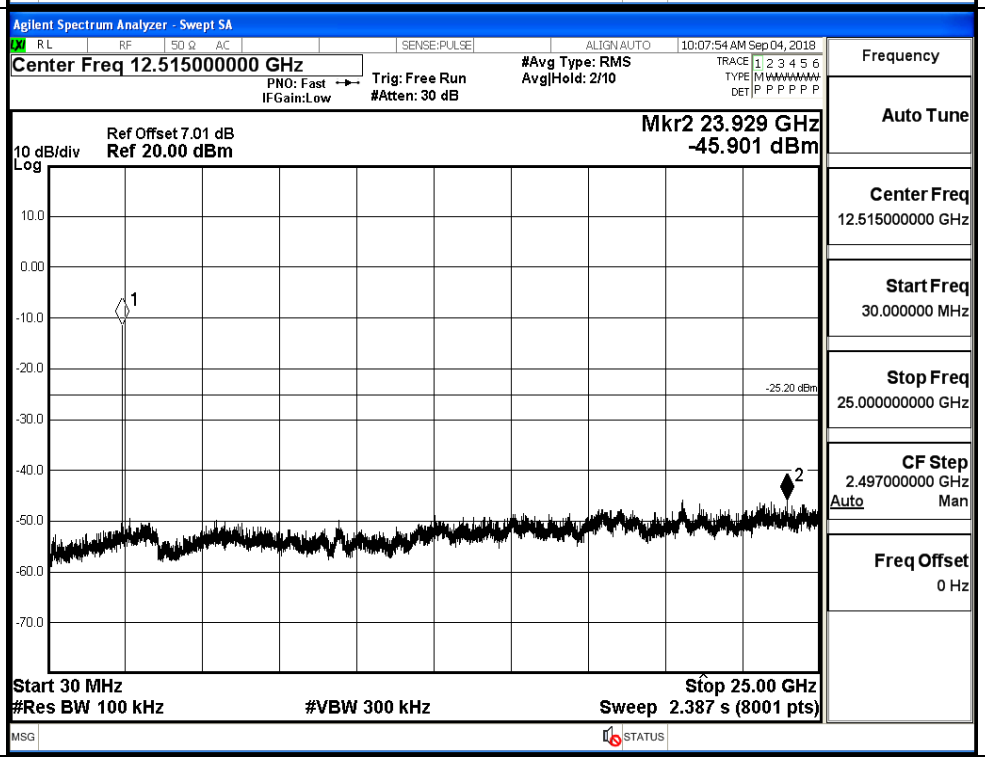
Mode	Channel	Pref [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-6.166	-46.029	-26.166	PASS
	MCH	-5.317	-45.784	-25.317	PASS
	HCH	-4.691	-45.519	-24.691	PASS
π/4DQPSK	LCH	-6.188	-45.803	-26.188	PASS
	MCH	-5.198	-45.901	-25.198	PASS
	HCH	-4.689	-46.034	-24.689	PASS

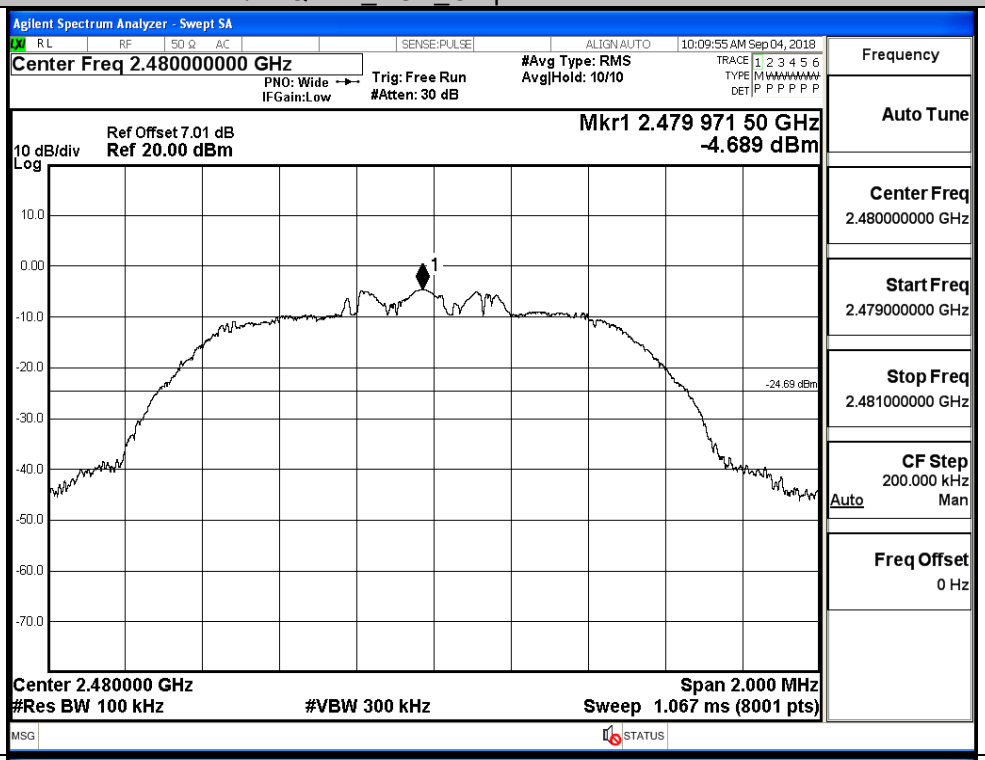
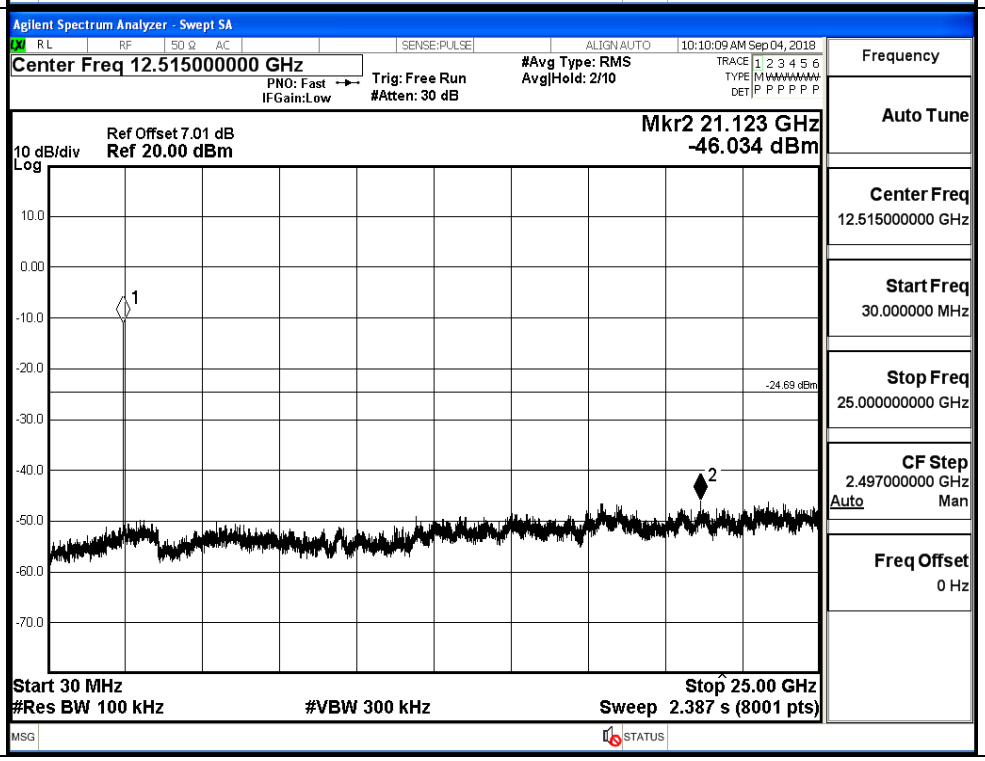
GFSK_LCH_Graphs			
Pref			
Puw			

GFSK_MCH_Graphs		
Pref		
Puw		

GFSK_HCH_Graphs		
Pref		
Puw		

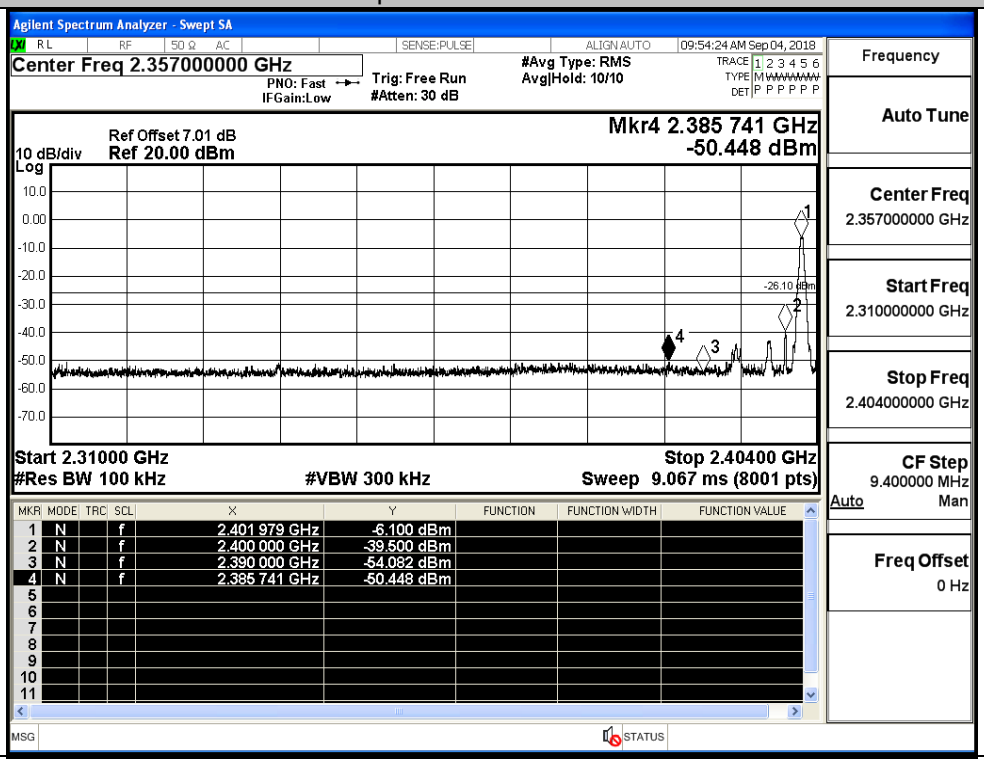
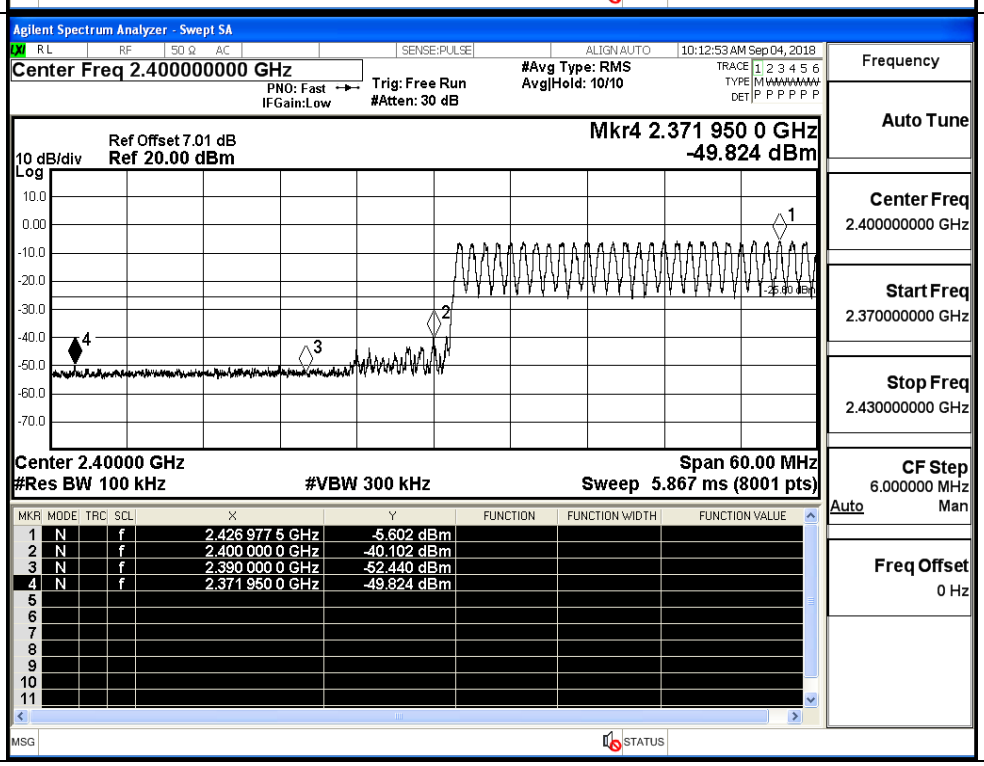
π/4DQPSK_LCH_Graphs		
Pref		
Puw		

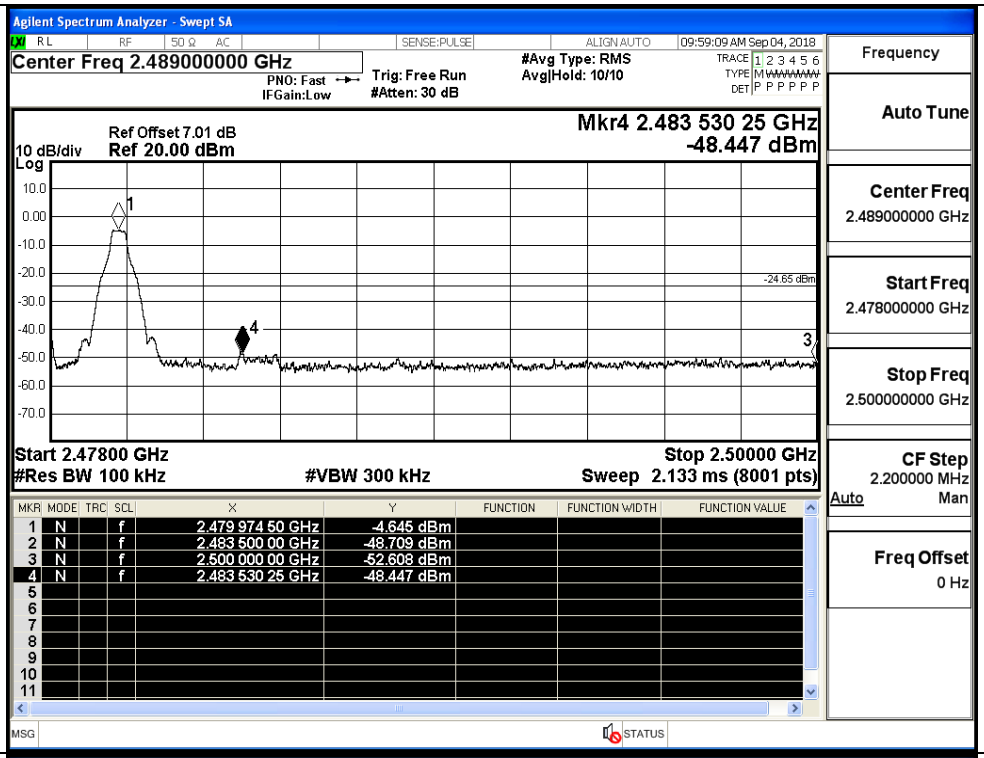
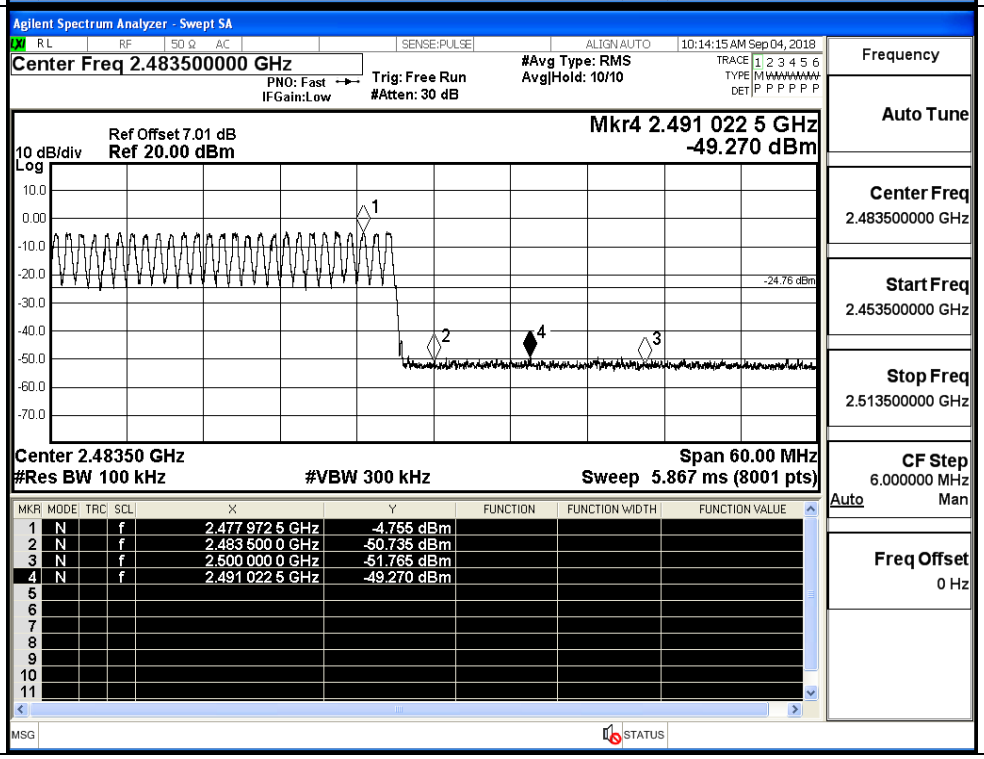
π/4DQPSK_MCH_Graphs		
Pref		
Puw		

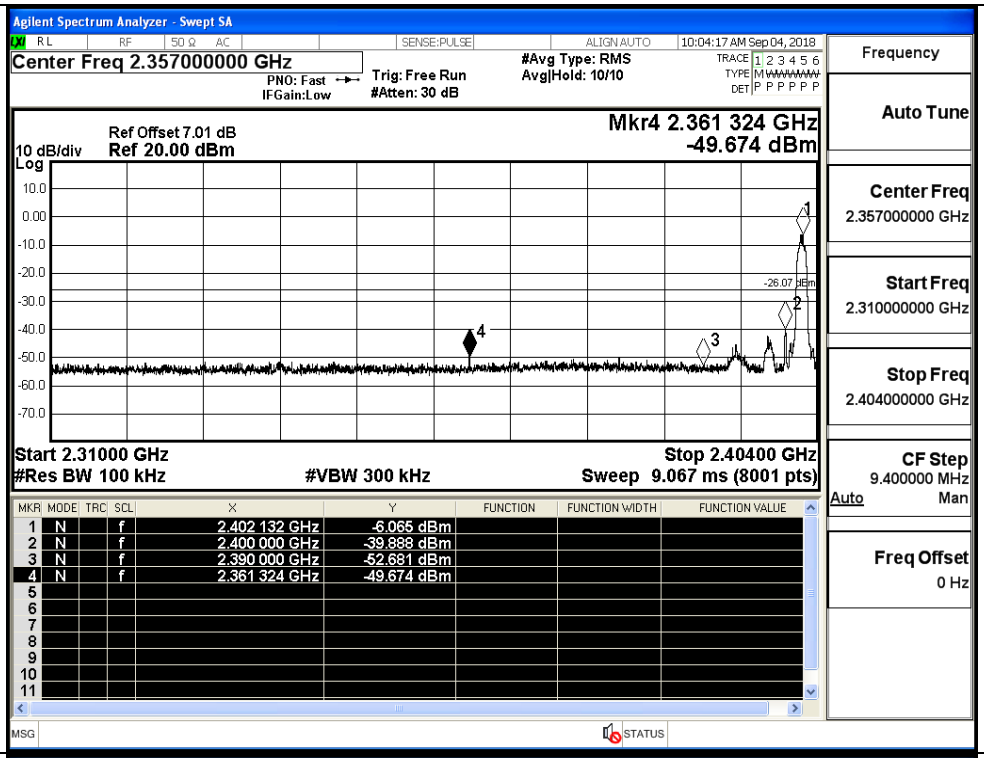
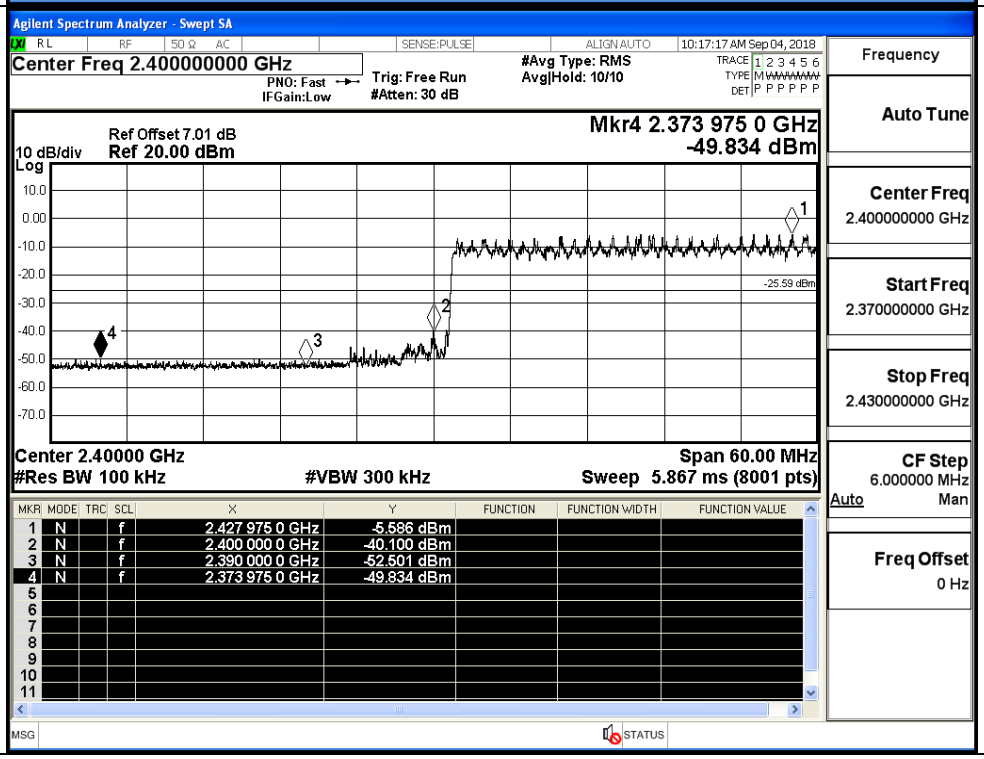
π/4DQPSK_HCH_Graphs		
Pref		
Puw		

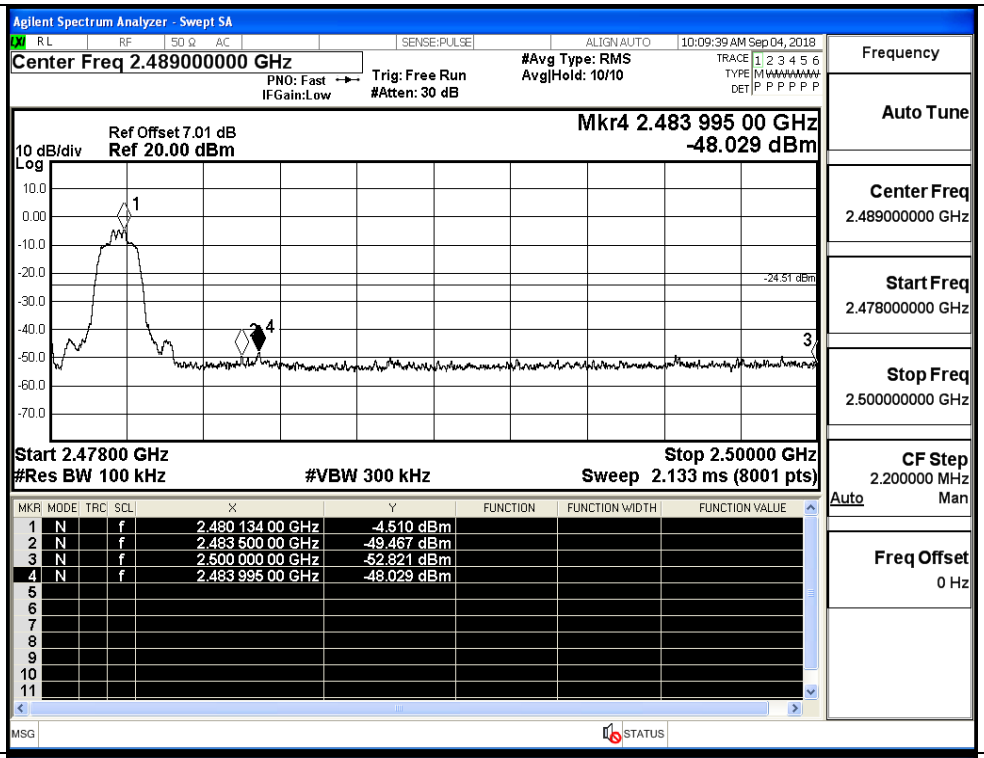
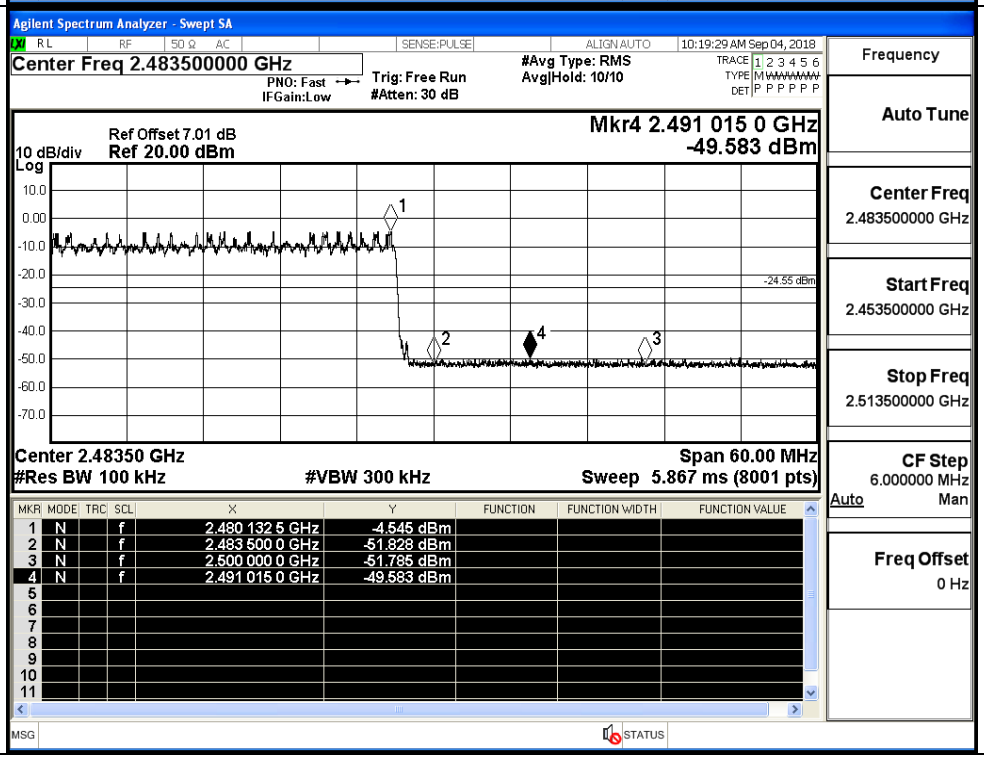
A.7 Band-edge for RF Conducted Emissions

Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	-6.100	Off	-50.448	-26.1	PASS
			-5.602	On	-49.824	-25.6	PASS
	HCH	2480	-4.645	Off	-48.447	-24.65	PASS
			-4.755	On	-49.270	-24.76	PASS
π/4DQPSK	LCH	2402	-6.065	Off	-49.674	-26.07	PASS
			-5.586	On	-49.834	-25.59	PASS
	HCH	2480	-4.510	Off	-48.029	-24.51	PASS
			-4.545	On	-49.583	-24.55	PASS

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

GFSK/HCH/No Hop	
GFSK/HCH/Hop	

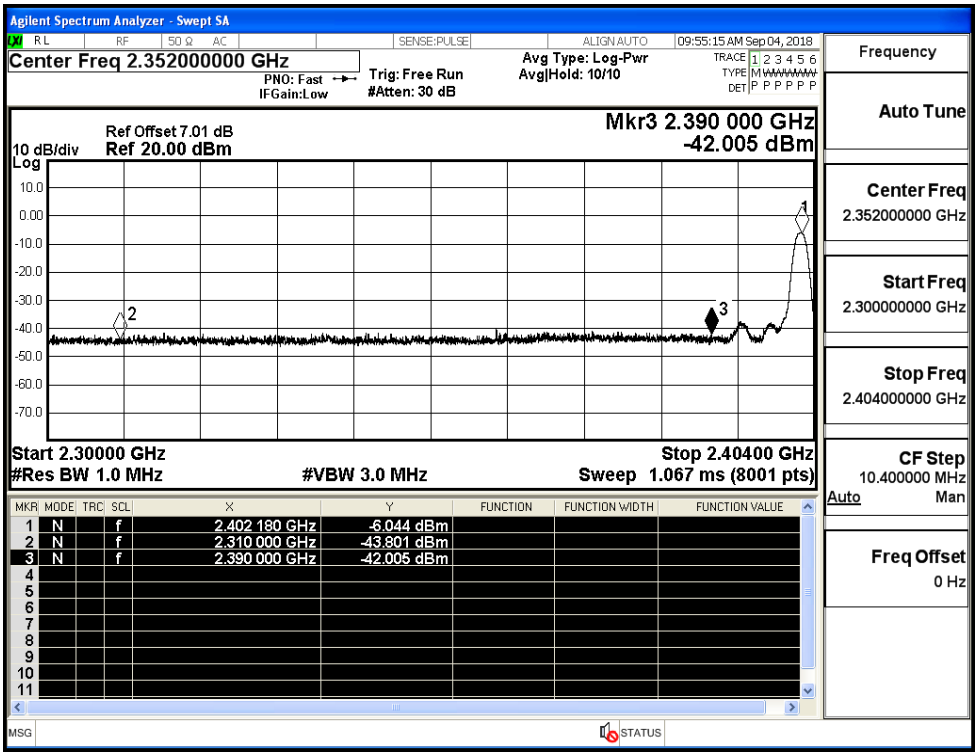
π/4DQPSK/LCH/No Hop	
π/4DQPSK/LCH/Hop	

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

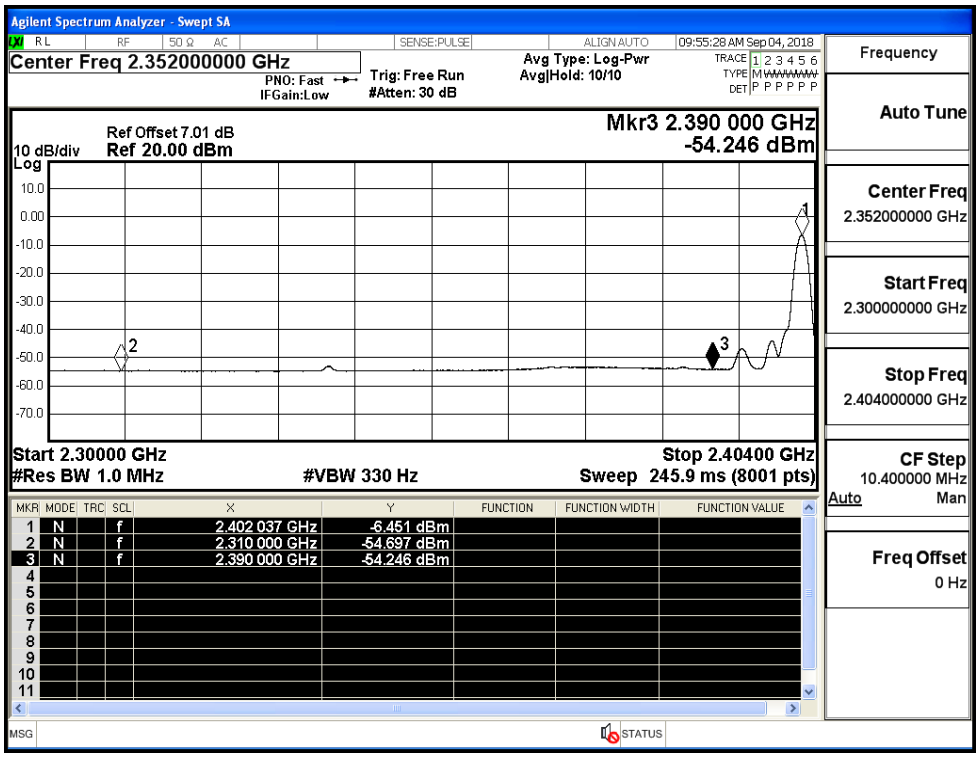
A.8 Restrict-band band-edge measurements

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdict
GFSK	Off	2310.0	-43.80	2.0	0	53.46	PEAK	74	PASS
	Off	2310.0	-54.70	2.0	0	42.56	AV	54	PASS
	Off	2390.0	-42.01	2.0	0	55.25	PEAK	74	PASS
	Off	2390.0	-54.25	2.0	0	43.01	AV	54	PASS
	Off	2483.5	-42.47	2.0	0	54.79	PEAK	74	PASS
	Off	2483.5	-51.67	2.0	0	45.59	AV	54	PASS
	Off	2500.0	-42.74	2.0	0	54.52	PEAK	74	PASS
	Off	2500.0	-52.54	2.0	0	44.72	AV	54	PASS
π/4DQPSK	Off	2310.0	-45.22	2.0	0	52.04	PEAK	74	PASS
	Off	2310.0	-54.69	2.0	0	42.57	AV	54	PASS
	Off	2390.0	-43.65	2.0	0	53.60	PEAK	74	PASS
	Off	2390.0	-54.11	2.0	0	43.15	AV	54	PASS
	Off	2483.5	-42.37	2.0	0	54.89	PEAK	74	PASS
	Off	2483.5	-52.71	2.0	0	44.55	AV	54	PASS
	Off	2500.0	-42.32	2.0	0	54.93	PEAK	74	PASS
	Off	2500.0	-52.69	2.0	0	44.56	AV	54	PASS

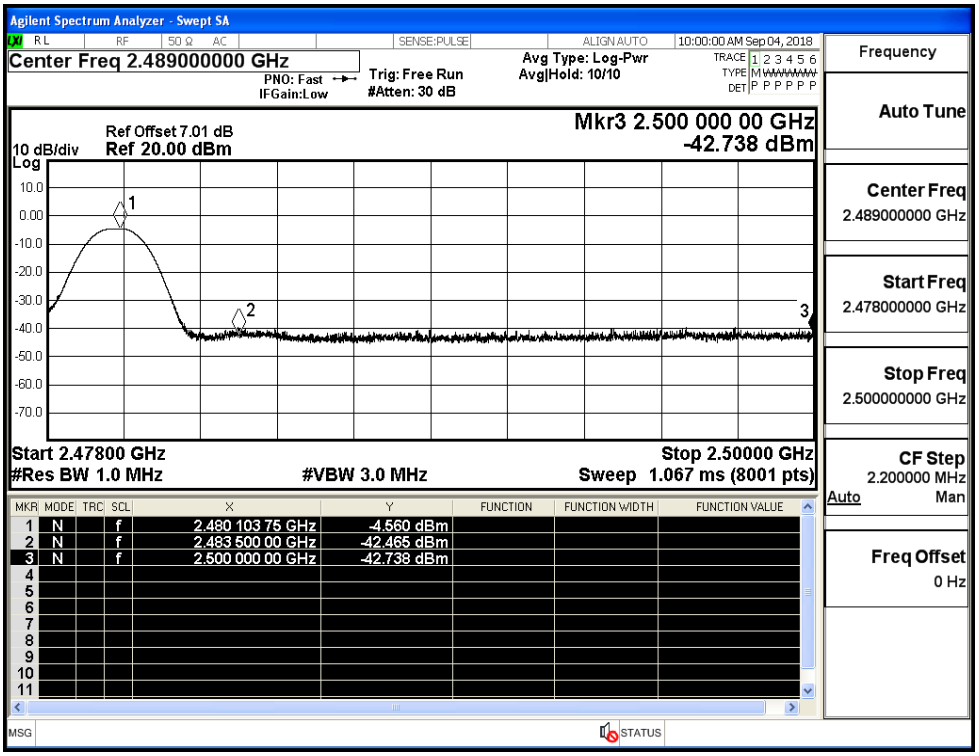
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



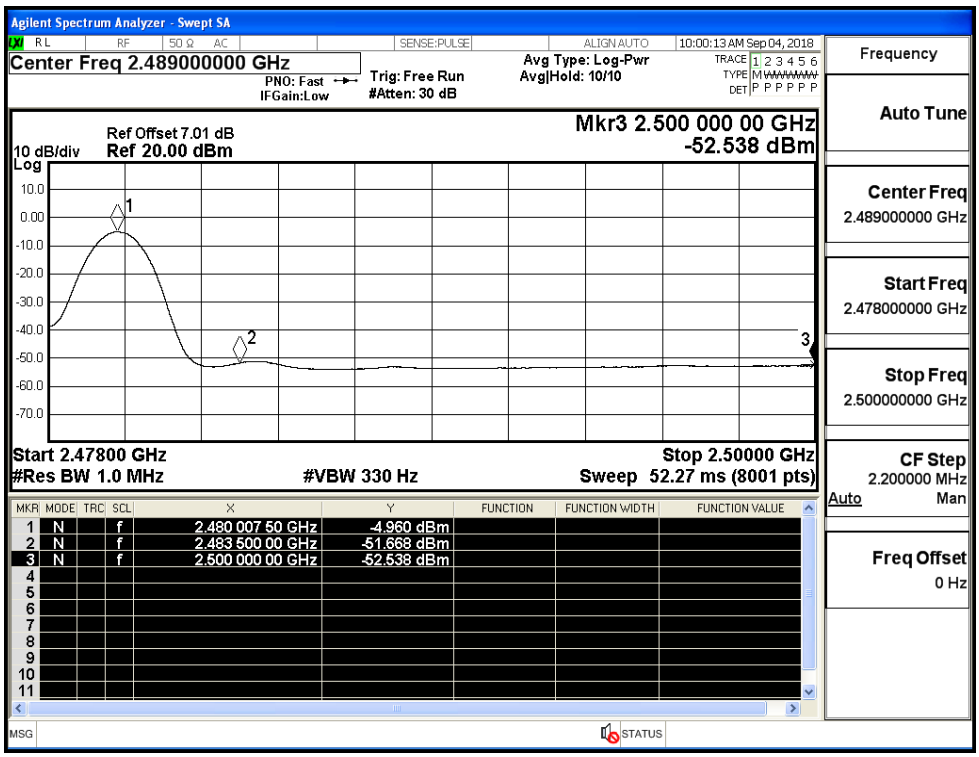
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



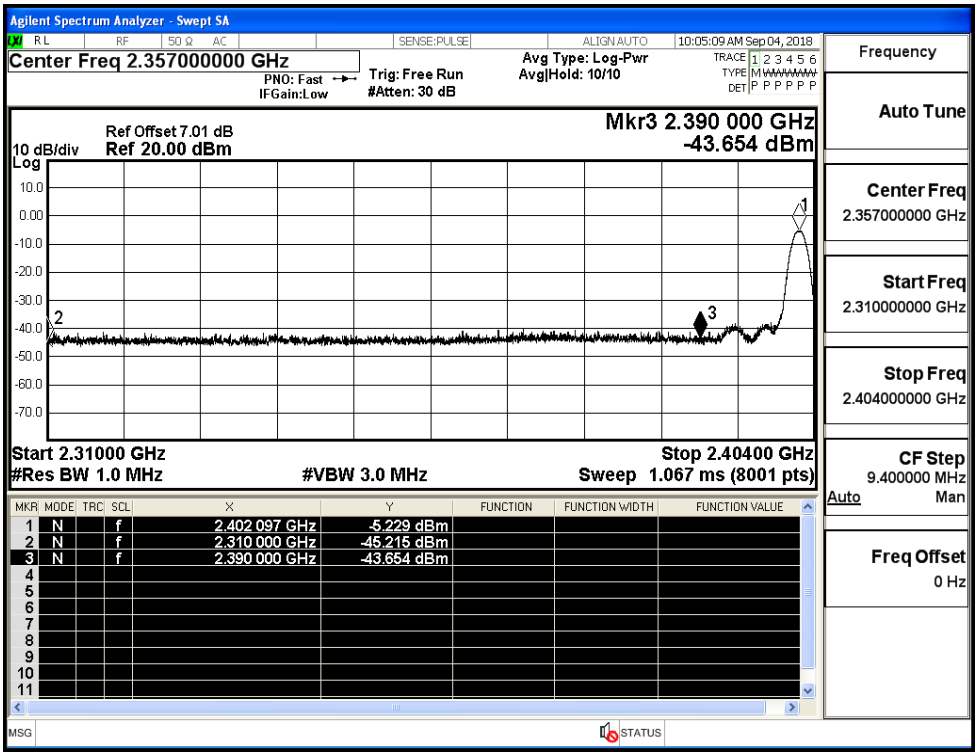
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



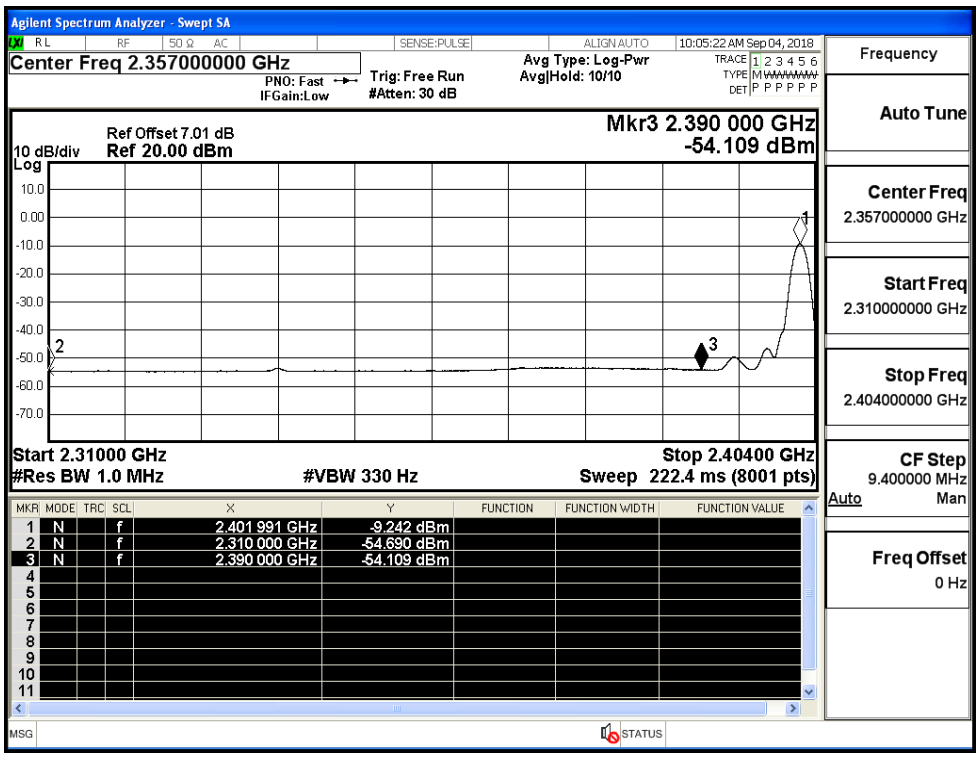
Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



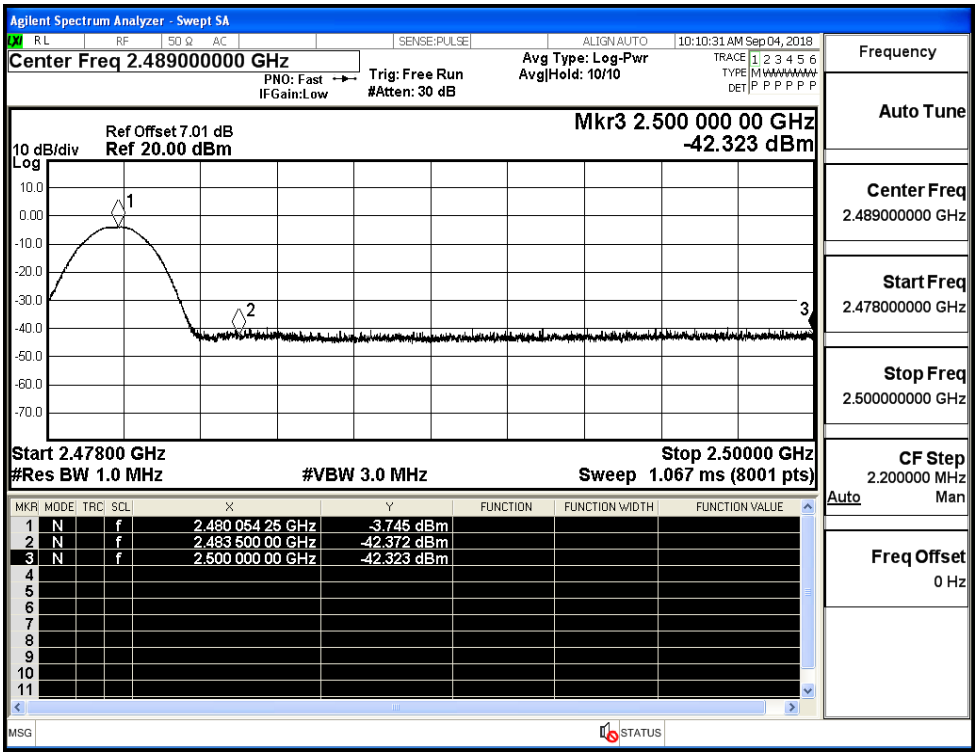
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



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)