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

Product Name: Bluetooth Earphones
Trade Mark: Altec Lansing

Test Model: MZX890L

FCC ID: 2AL9B-MZX890L

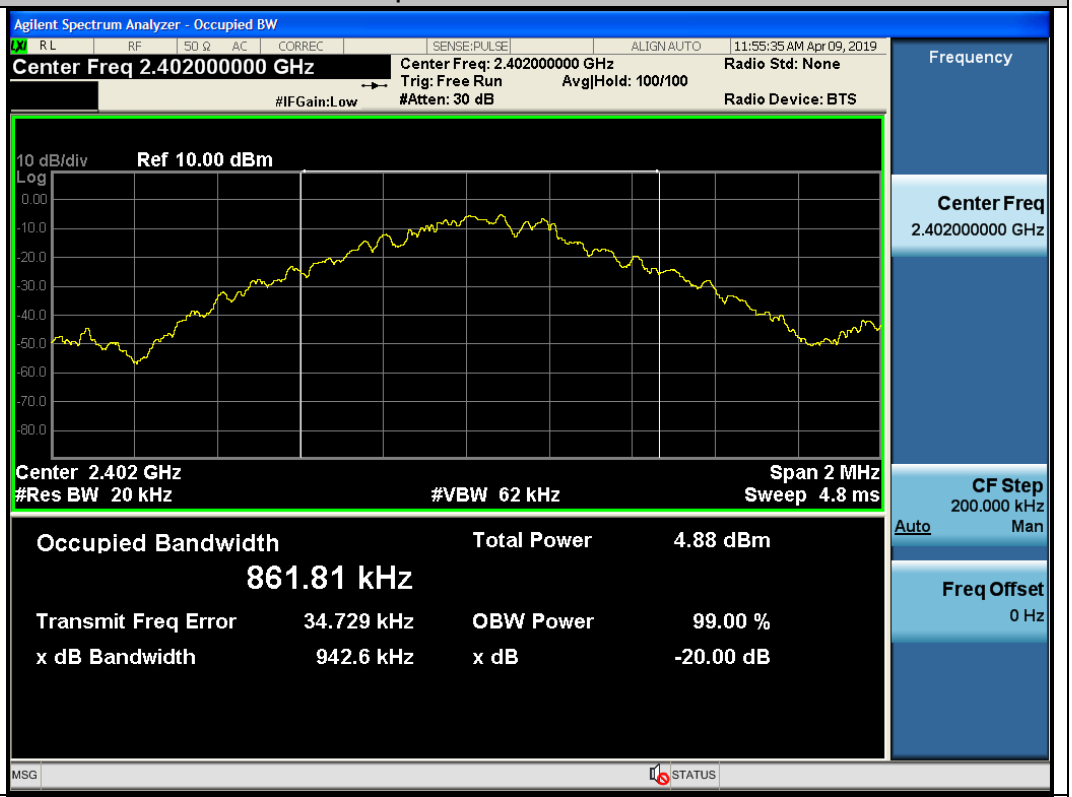
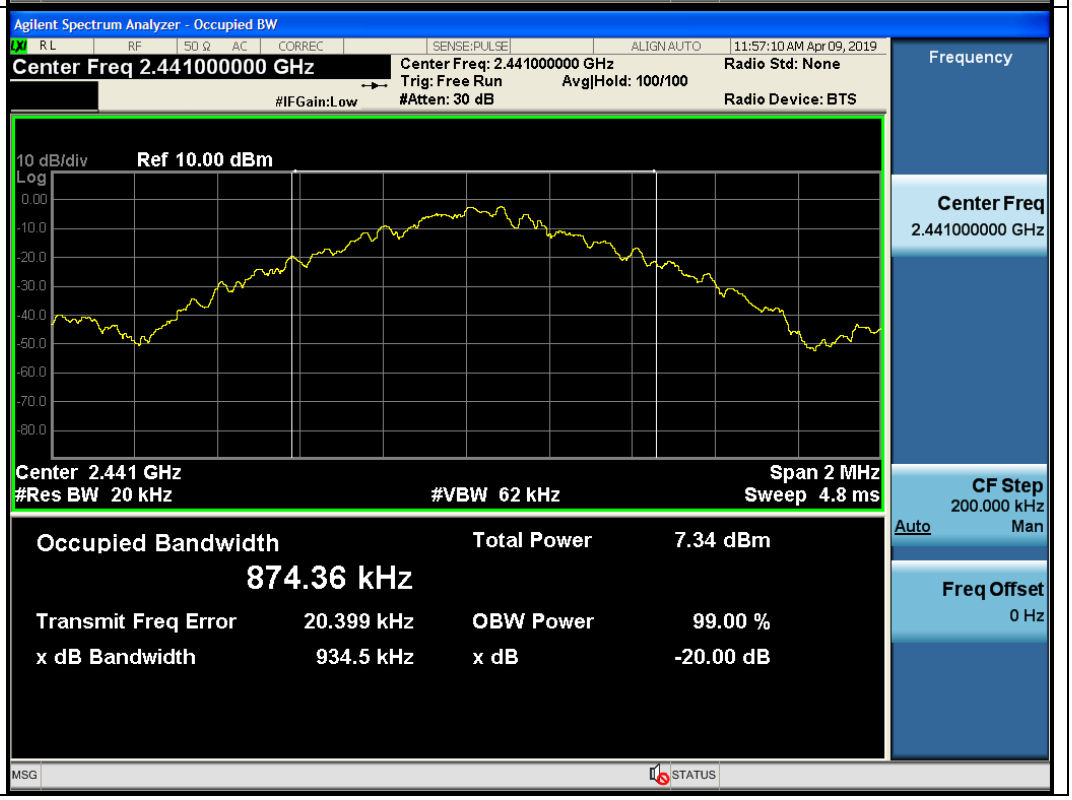
Environmental Conditions

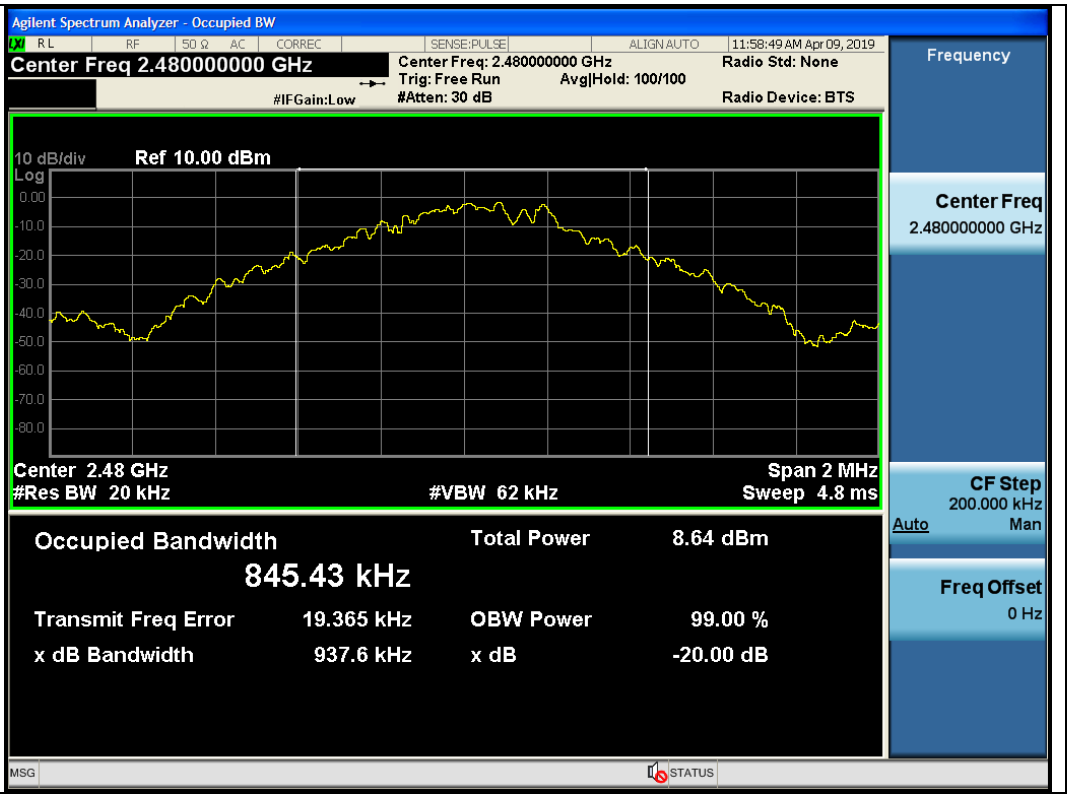
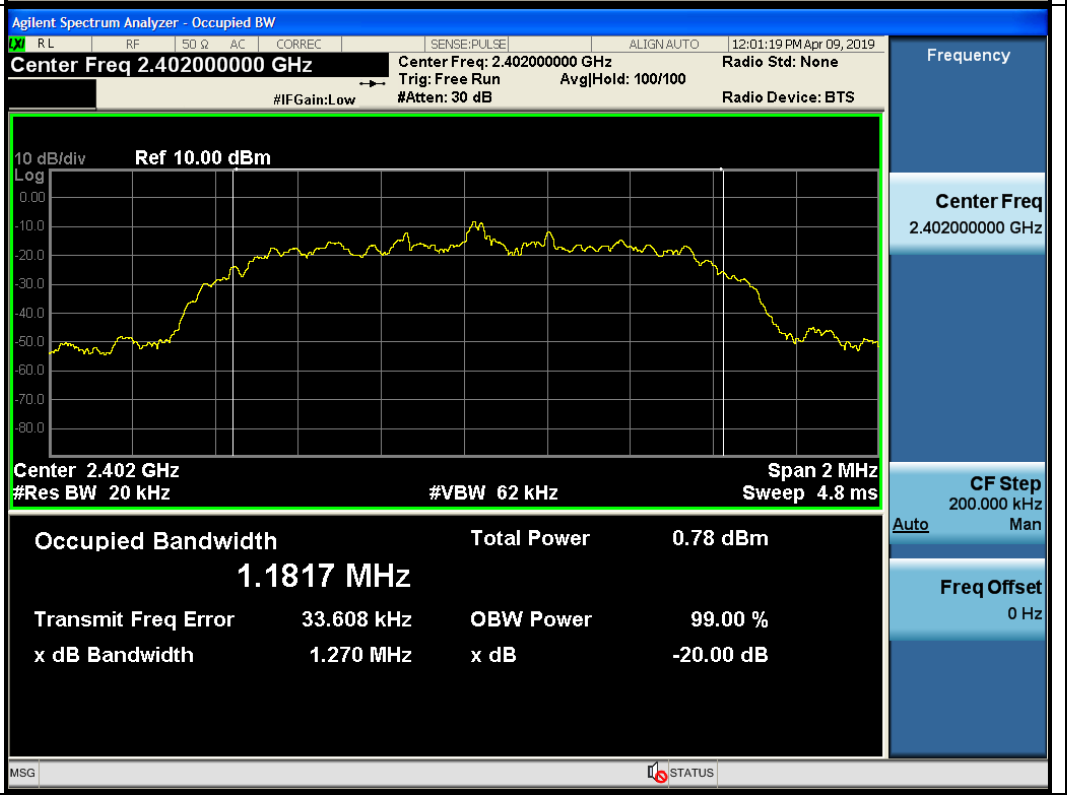
Temperature:	25.5℃
Relative Humidity:	55%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

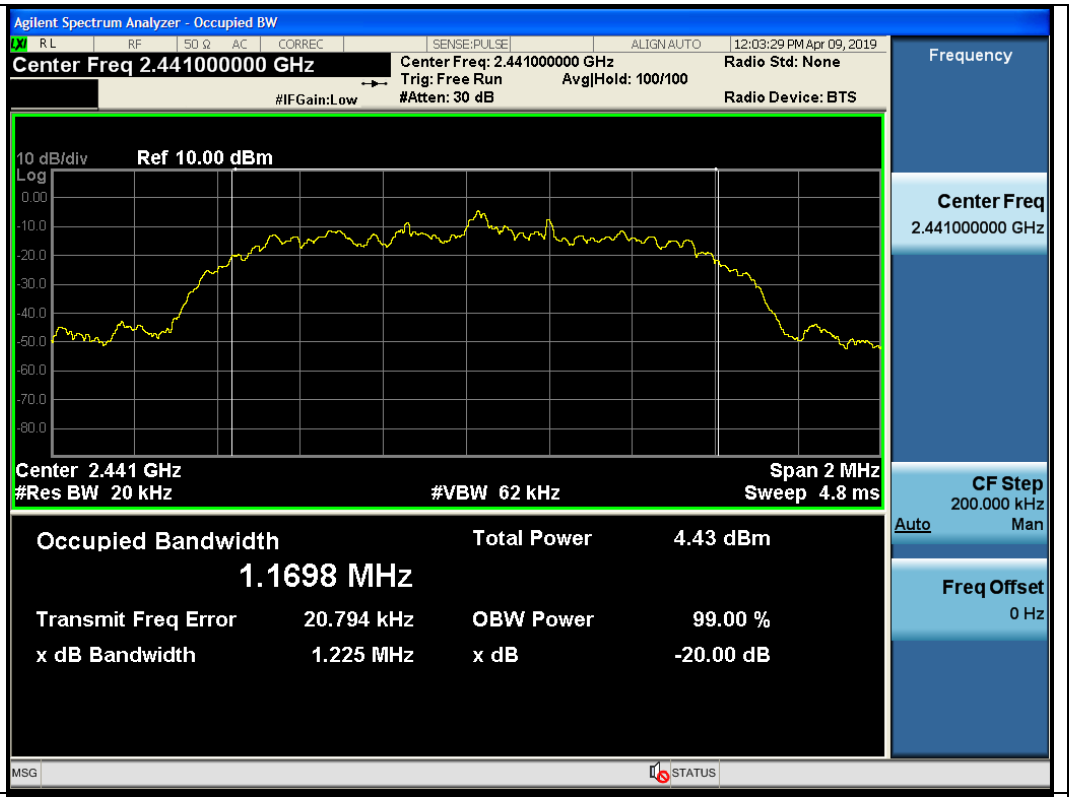
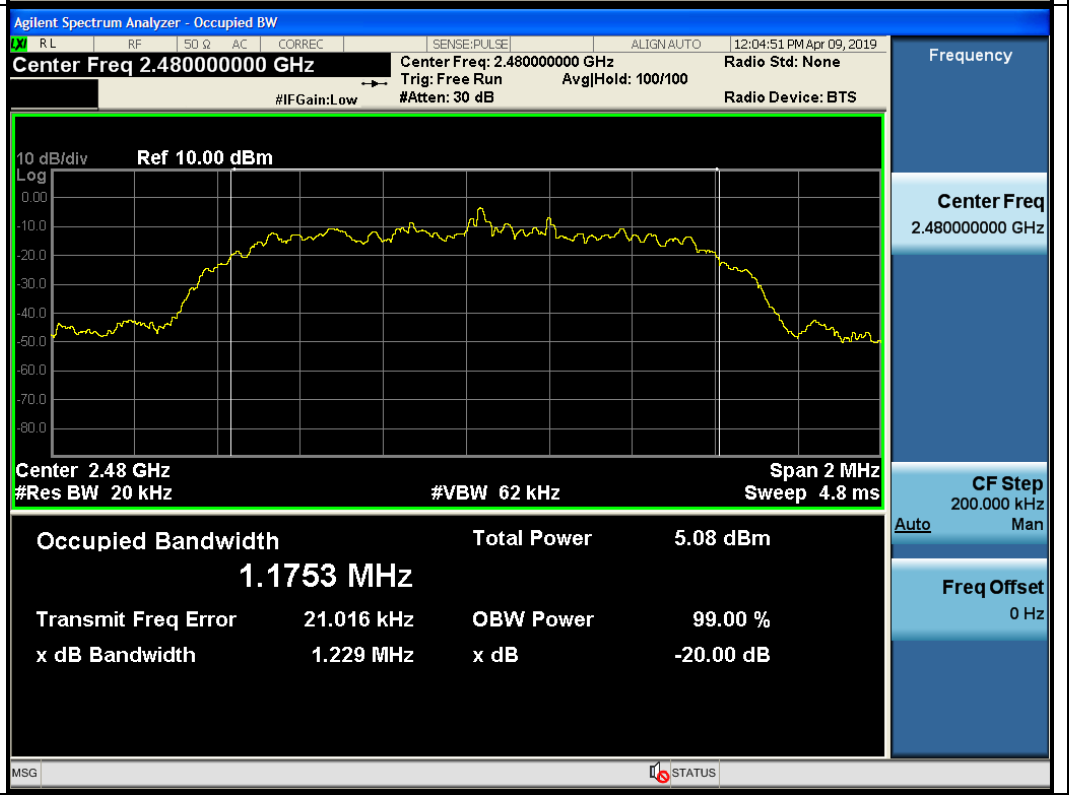
A.1 20 dB Bandwidth

Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.943	Not Specified	PASS
GFSK	MCH	0.934	Not Specified	PASS
GFSK	HCH	0.938	Not Specified	PASS
π/4DQPSK	LCH	1.270	Not Specified	PASS
π/4DQPSK	MCH	1.225	Not Specified	PASS
π/4DQPSK	HCH	1.229	Not Specified	PASS

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

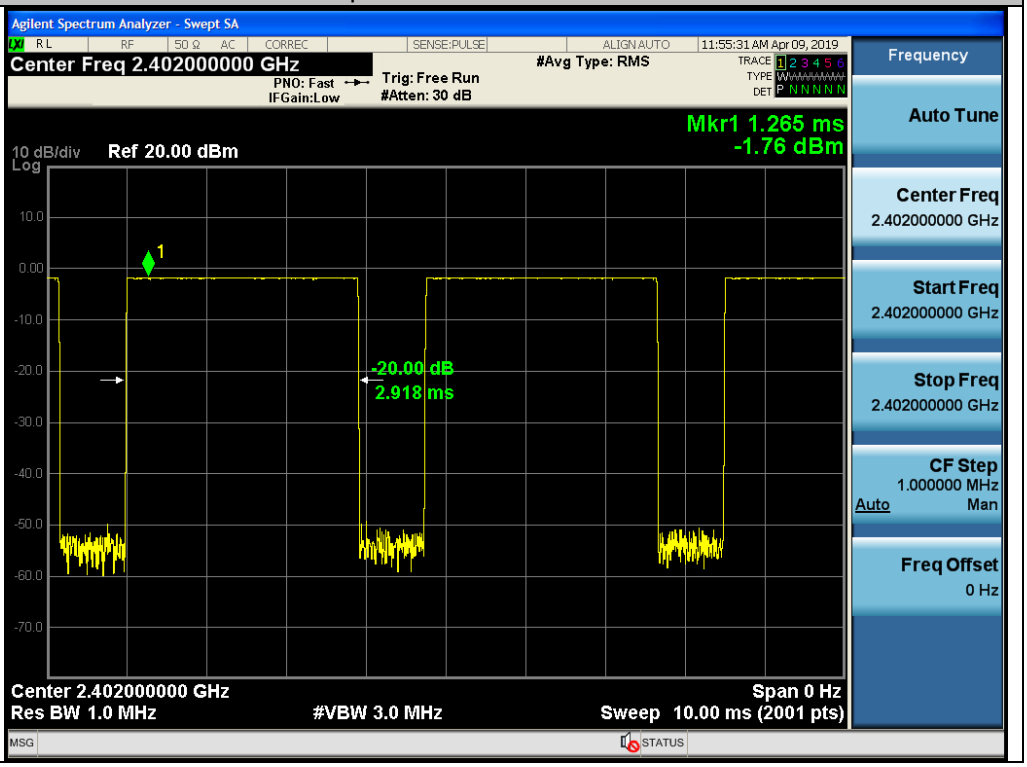
GFSK/HCH	
π/4DQPSK/LCH	

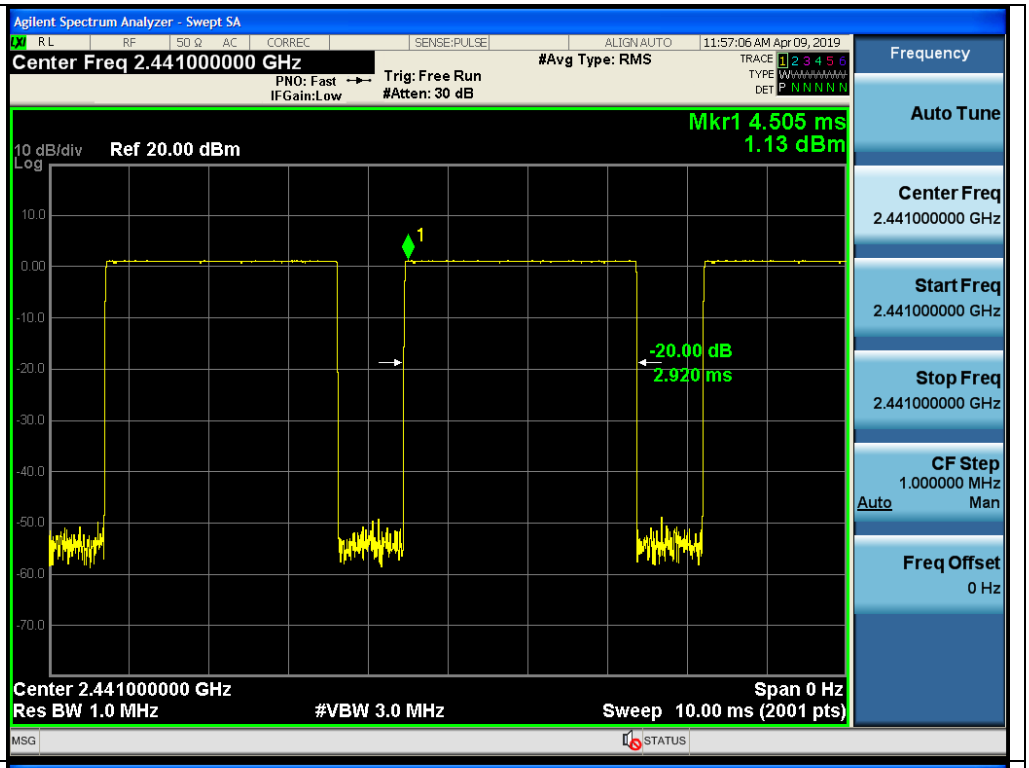
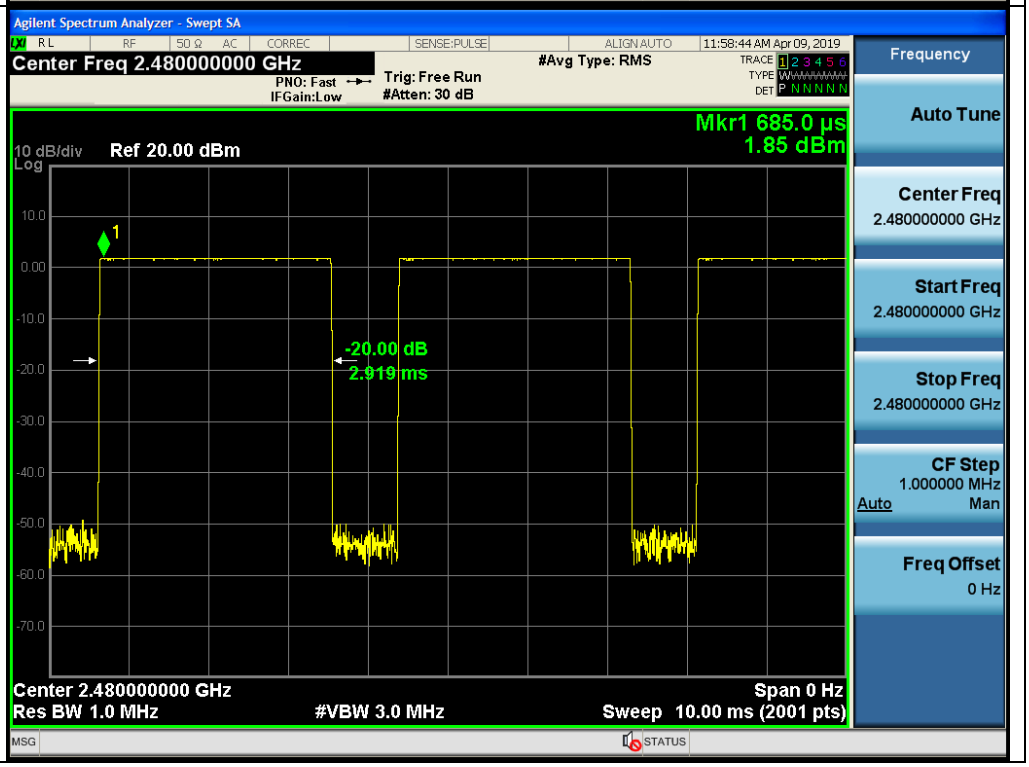
π/4DQPSK/MCH	
π/4DQPSK/HCH	

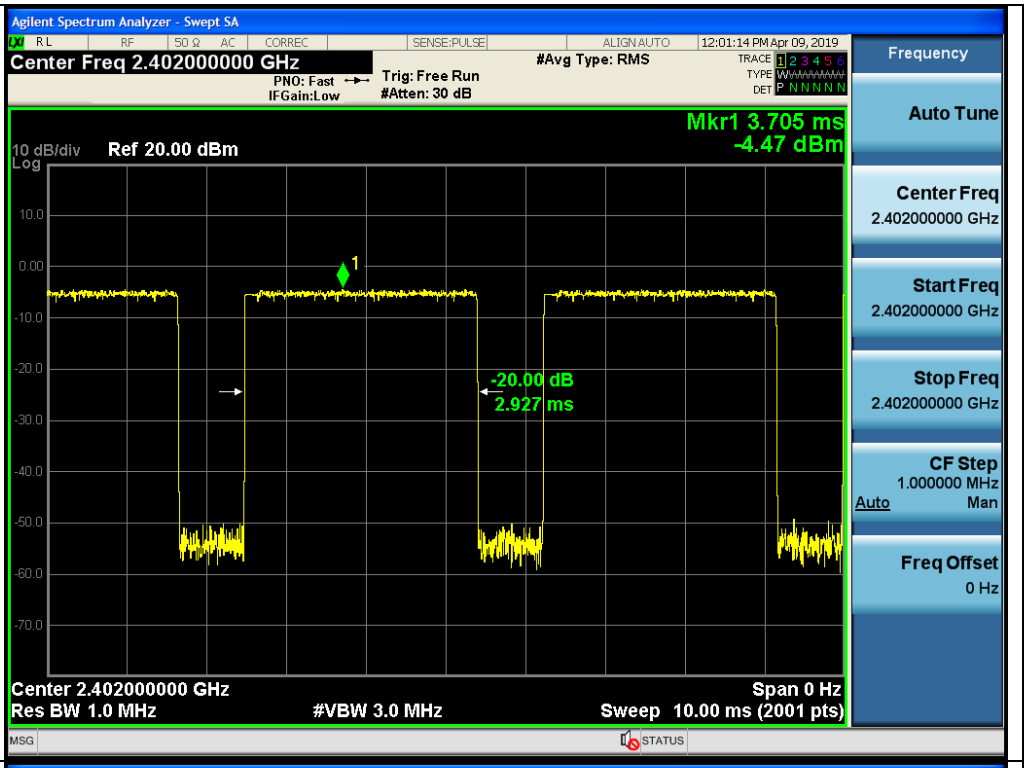
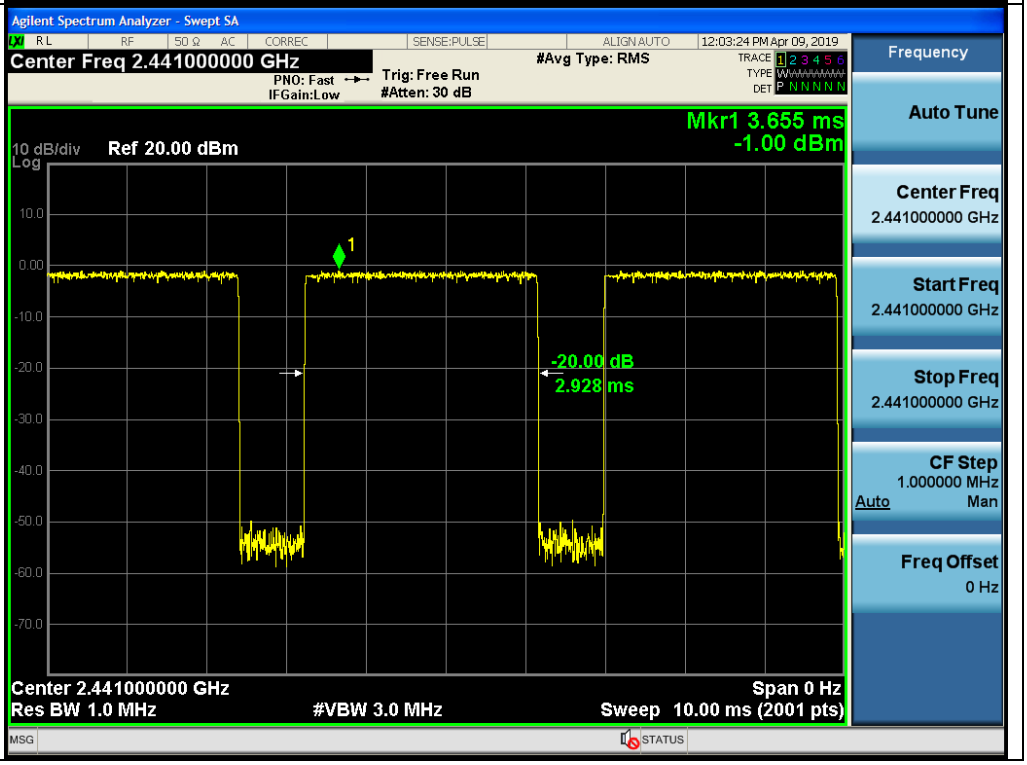
A.2 Dwell Time

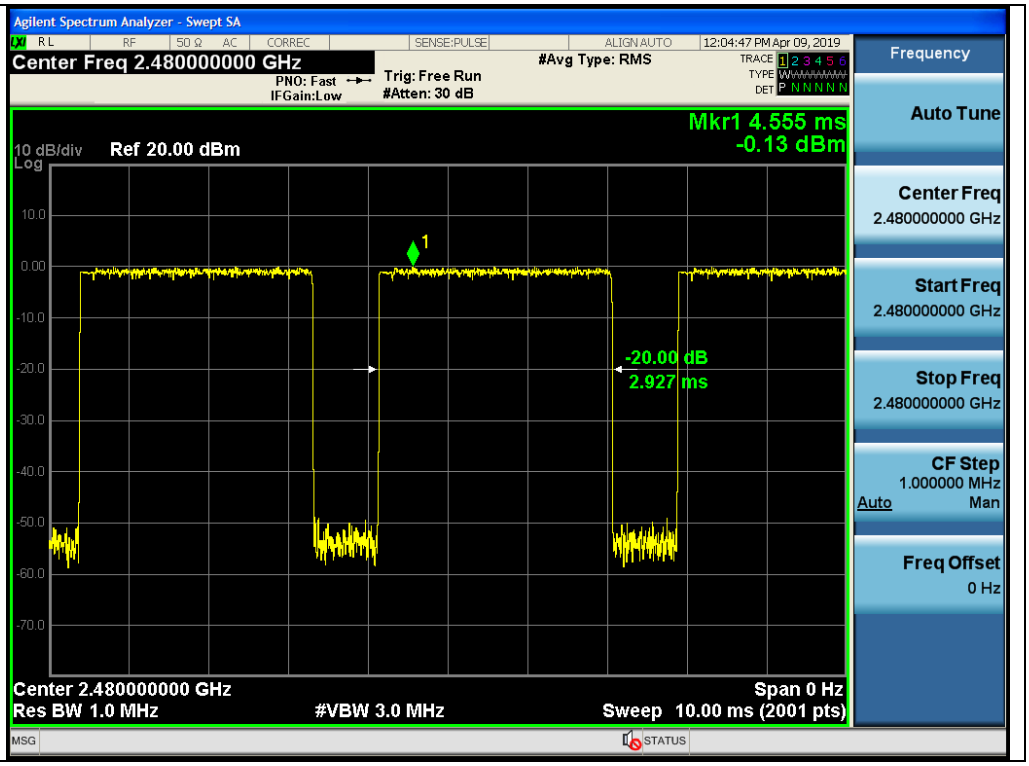
Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002918	106.7	0.311401	0.4	PASS
GFSK	DH5	MCH	0.002920	106.7	0.311563	0.4	PASS
GFSK	DH5	HCH	0.002919	106.7	0.311430	0.4	PASS
π/4DQPSK	2DH5	LCH	0.002927	106.7	0.312309	0.4	PASS
π/4DQPSK	2DH5	MCH	0.002928	106.7	0.312368	0.4	PASS
π/4DQPSK	2DH5	HCH	0.002927	106.7	0.312320	0.4	PASS

Test Graph

Graphs	
GFSK_DH5/LCH	

GFSK_DH5/MCH	
GFSK_DH5/HCH	

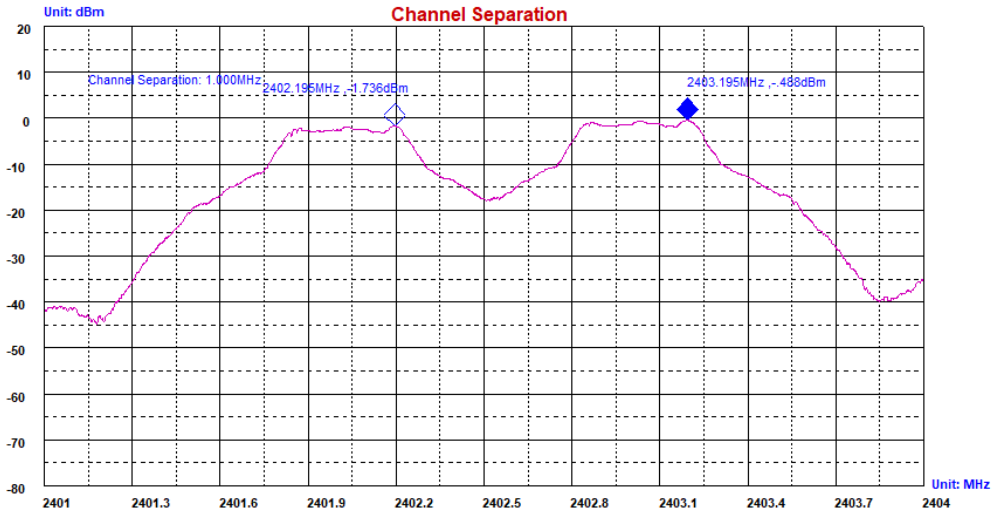
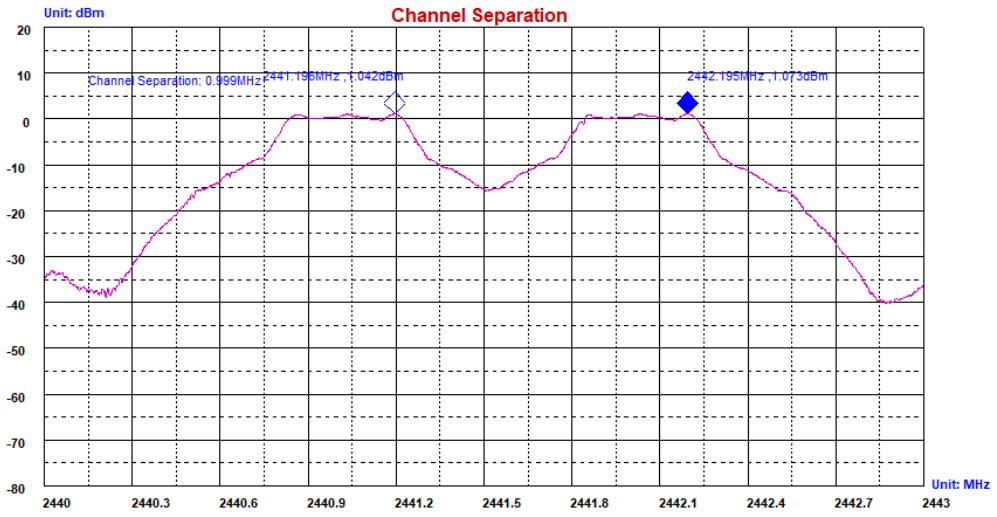
π/4DQPSK _2DH5/LCH	
π/4DQPSK _2DH5/MCH	

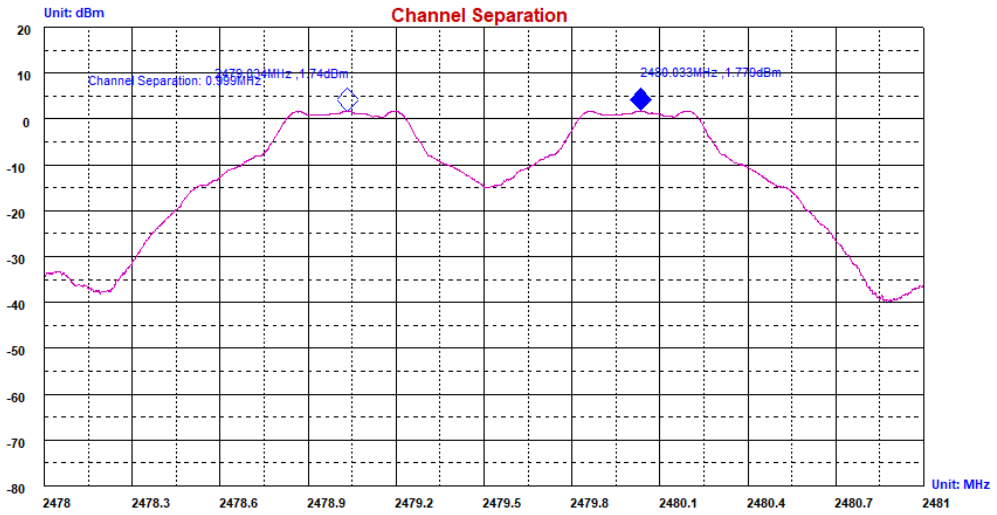
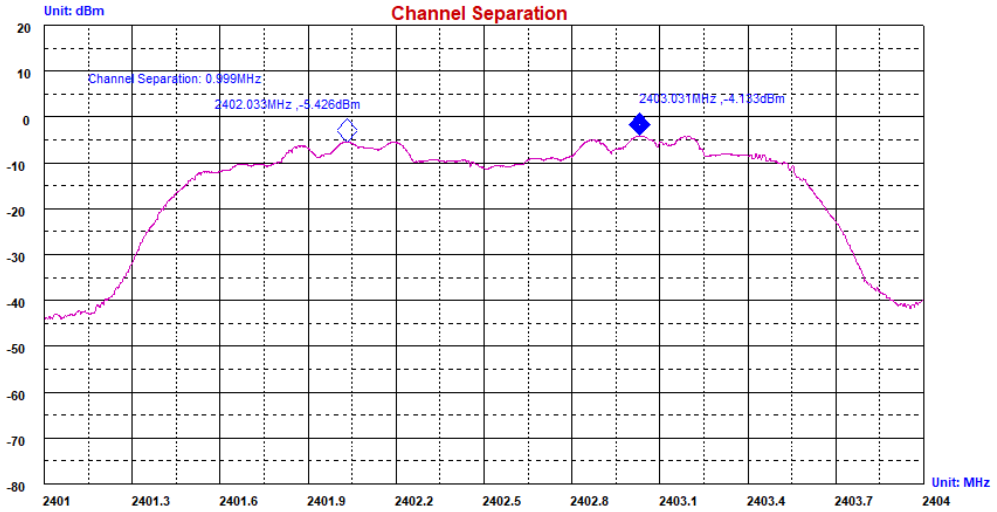
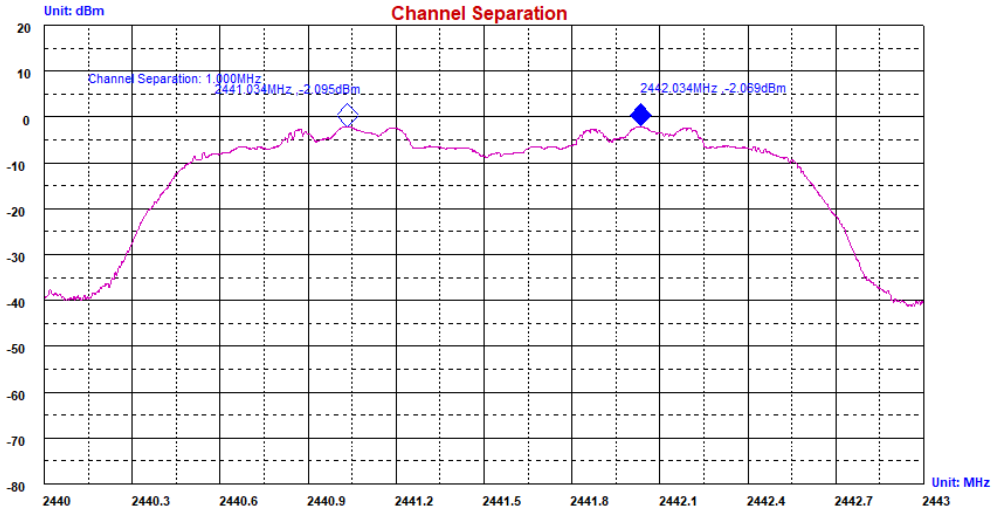
π/4DQPSK _2DH5/HCH	

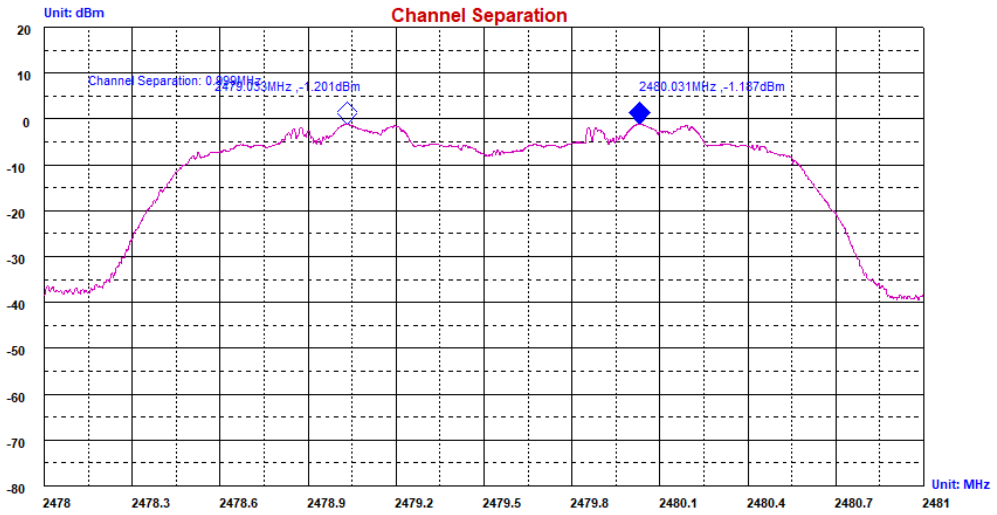
A.3 Carrier Frequency Separation

Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.000	0.629	PASS
GFSK	MCH	0.999	0.623	PASS
GFSK	HCH	0.999	0.625	PASS
π/4DQPSK	LCH	0.999	0.847	PASS
π/4DQPSK	MCH	1.000	0.817	PASS
π/4DQPSK	HCH	0.999	0.819	PASS

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	
π/4DQPSK/MCH	

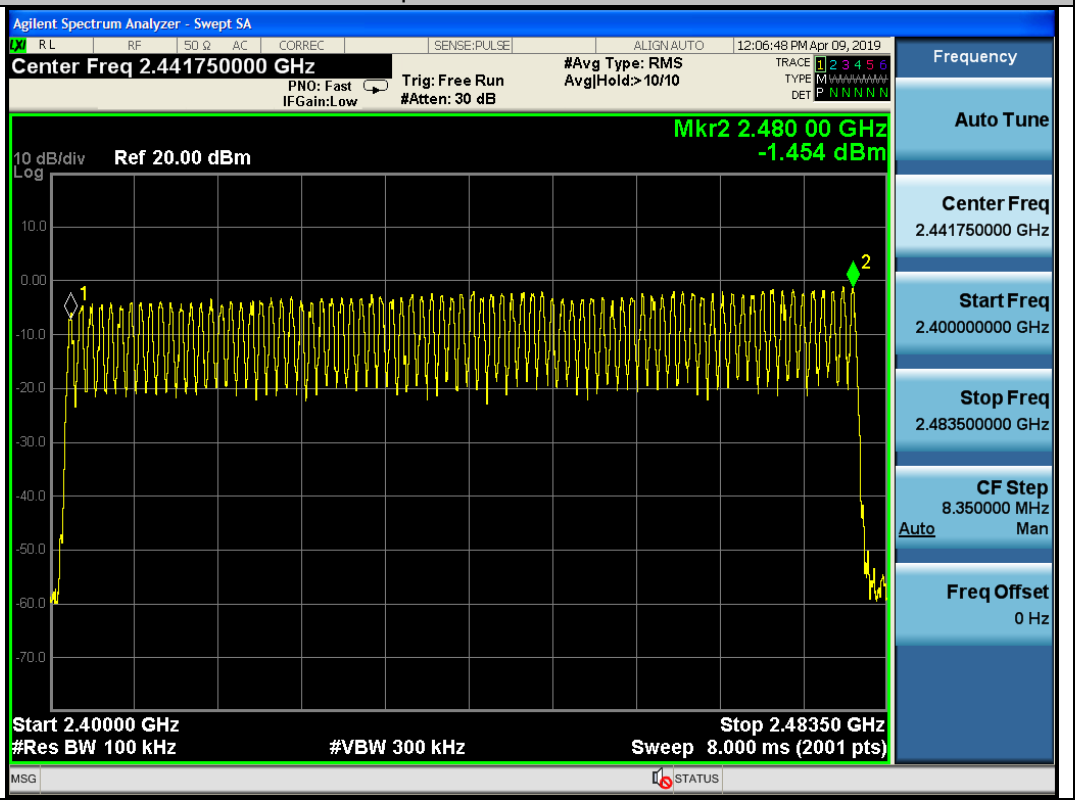
π/4DQPSK/HCH	

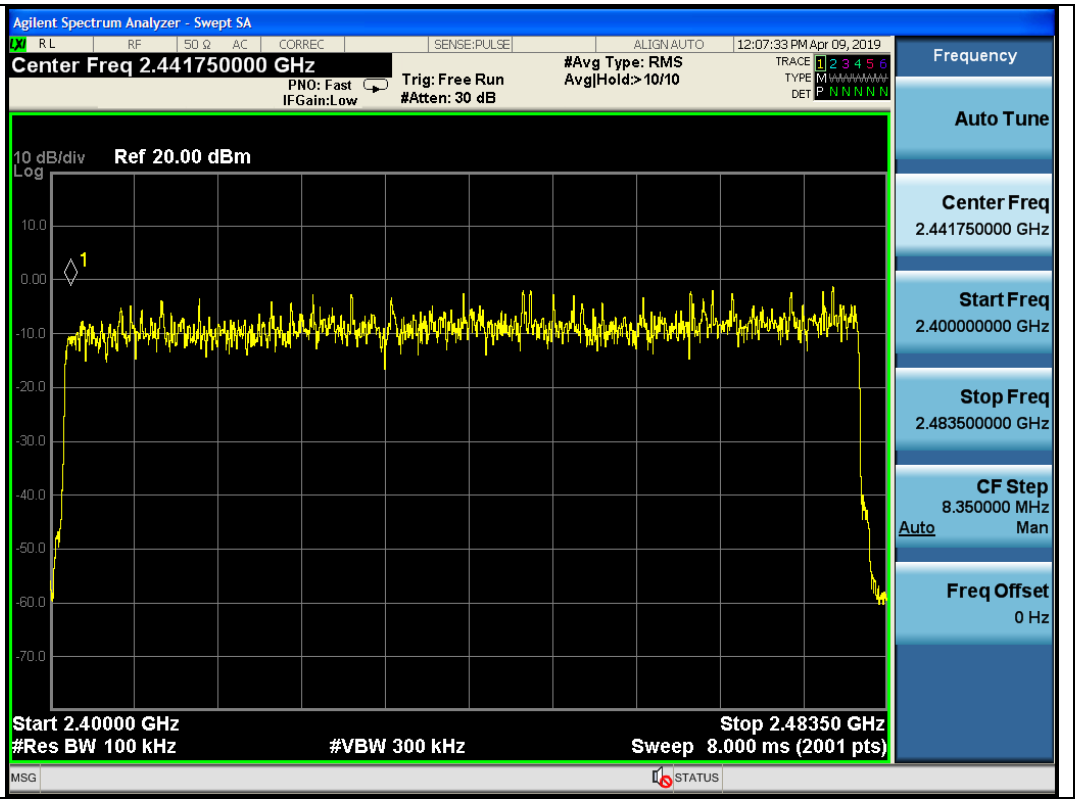
Unit: dBm
Channel Separation
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
Channel Separation: 0.999MHz
2479.033MHz ,-1.201dBm
2480.031MHz ,-1.187dBm
2478
2478.3
2478.6
2478.9
2479.2
2479.5
2479.8
2480.1
2480.4
2480.7
2481
Unit: MHz

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 Graph

Graphs	
GFSK/Hop	

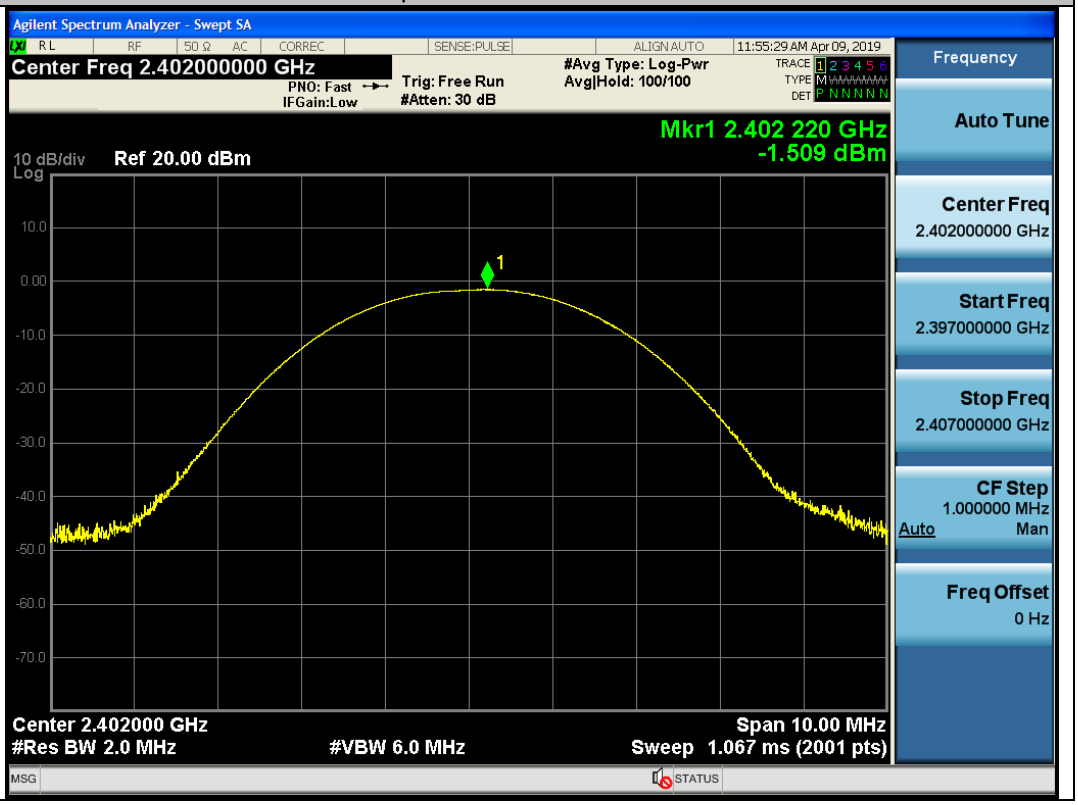
π/4DQPSK/Hop	

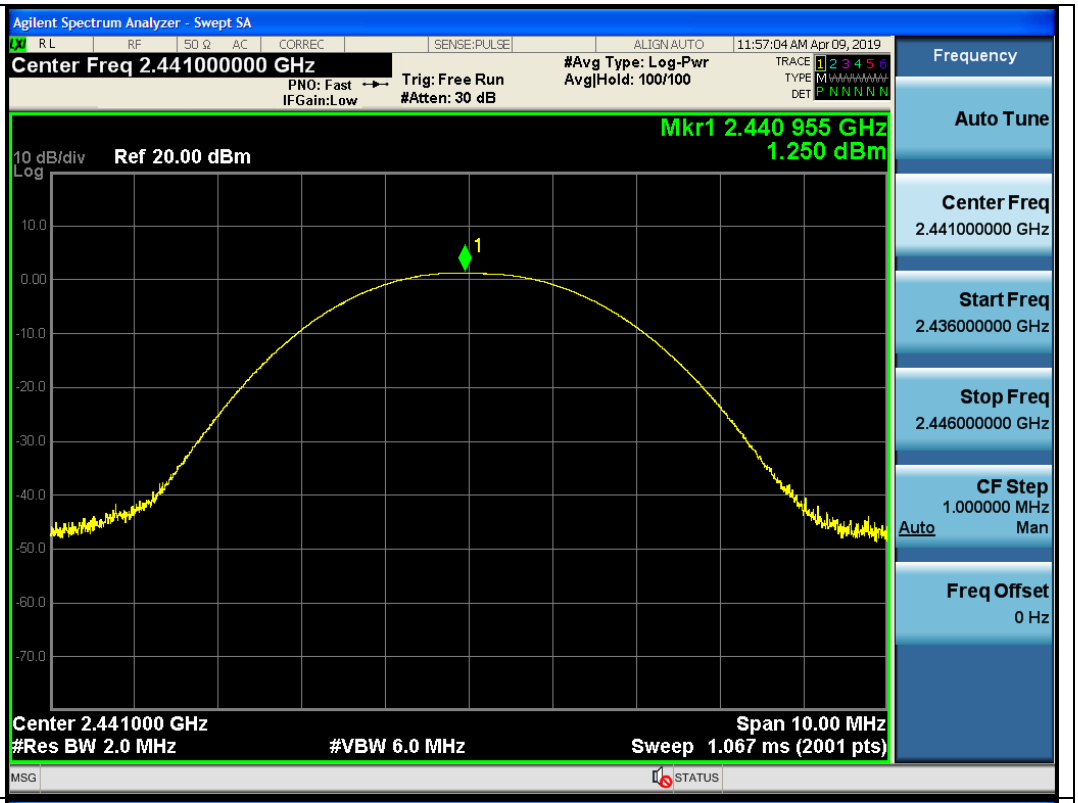
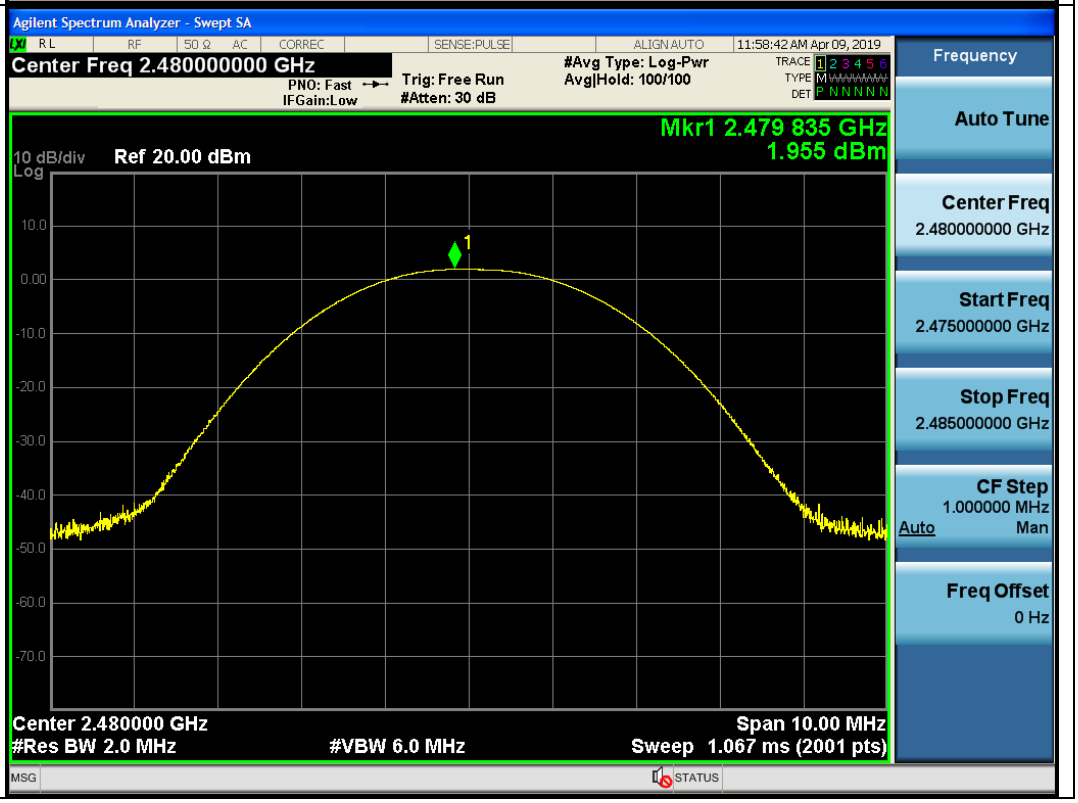
Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
SENSE:PULSE
ALIGN AUTO
12:07:33 PM Apr 09, 2019
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>10/10
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (2001 pts)
MSG
STATUS
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

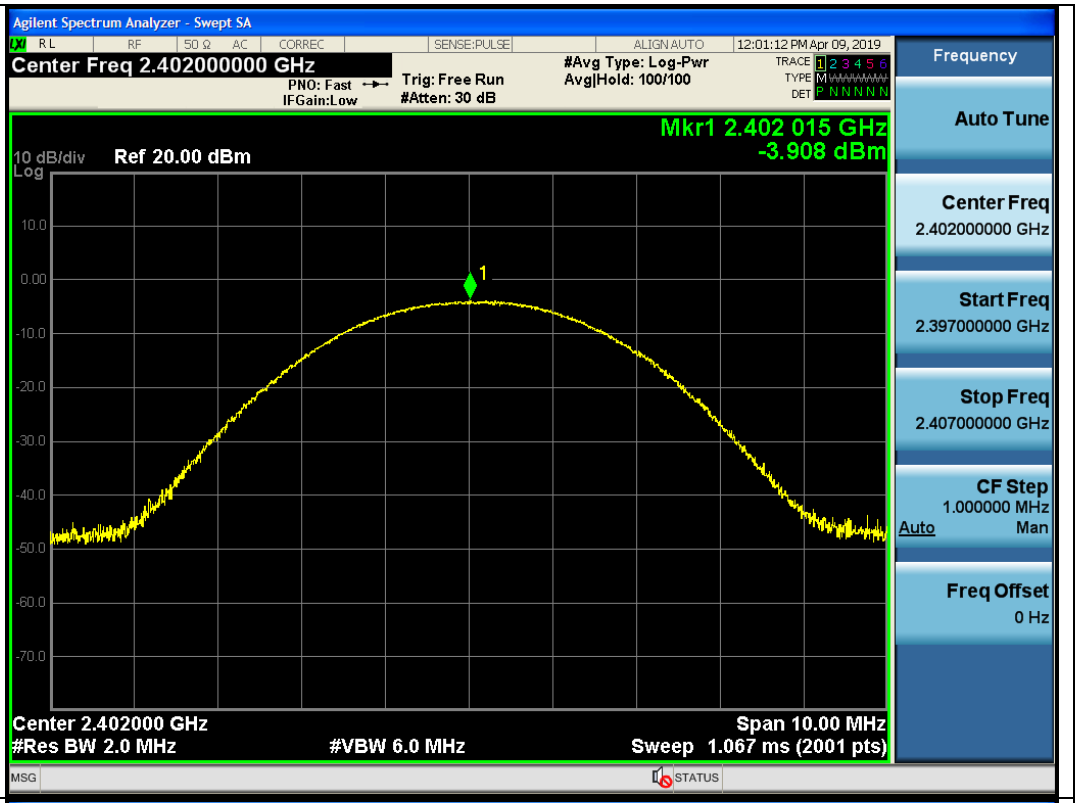
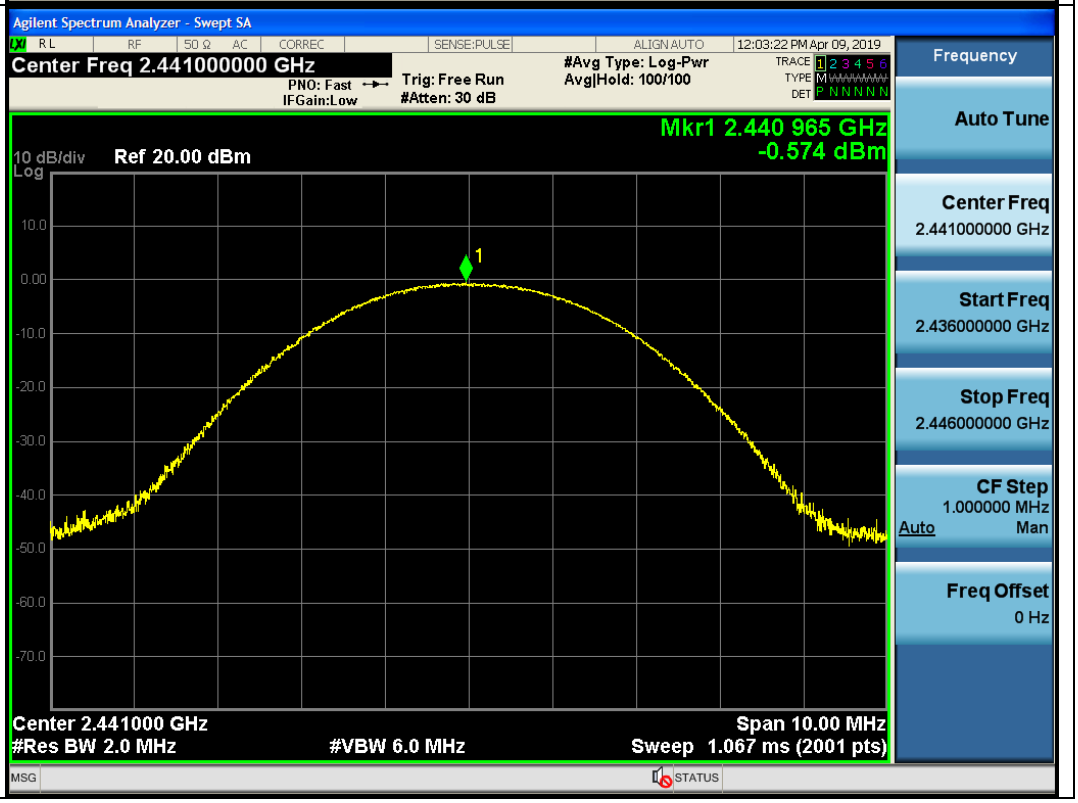
A.5 Conducted Peak Output Power

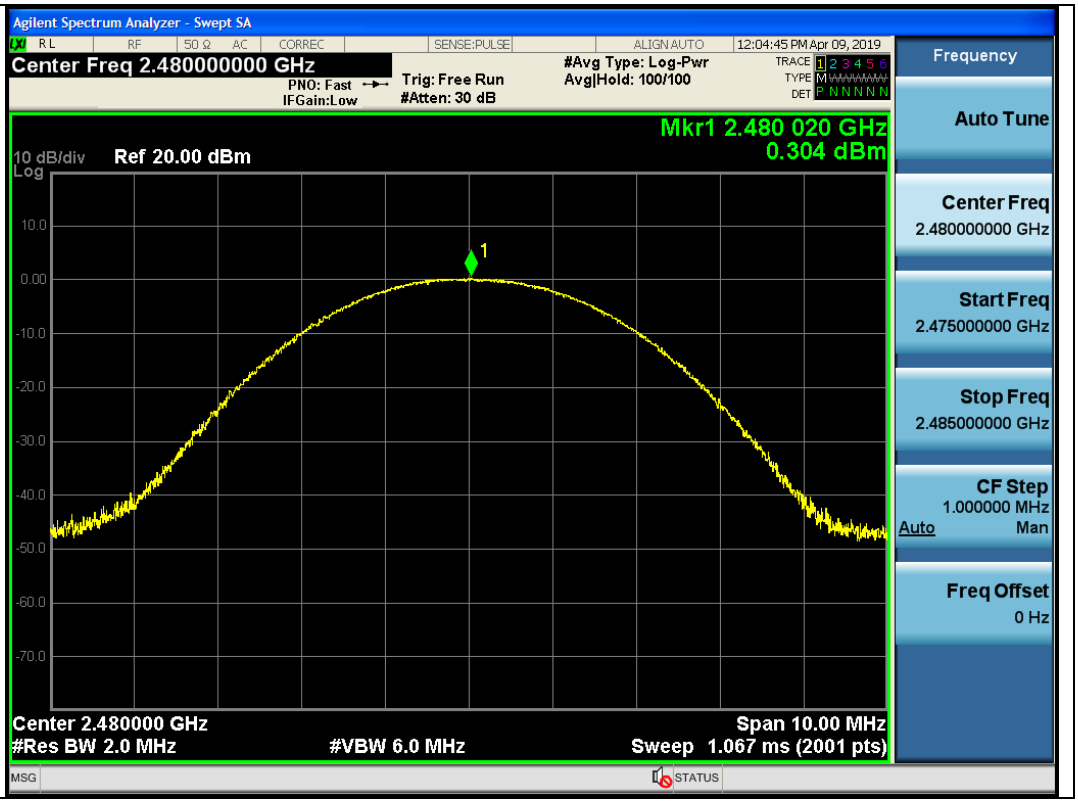
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-1.509	21	PASS
GFSK	MCH	1.250	21	PASS
GFSK	HCH	1.955	21	PASS
π/4DQPSK	LCH	-3.908	21	PASS
π/4DQPSK	MCH	-0.574	21	PASS
π/4DQPSK	HCH	0.304	21	PASS

Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

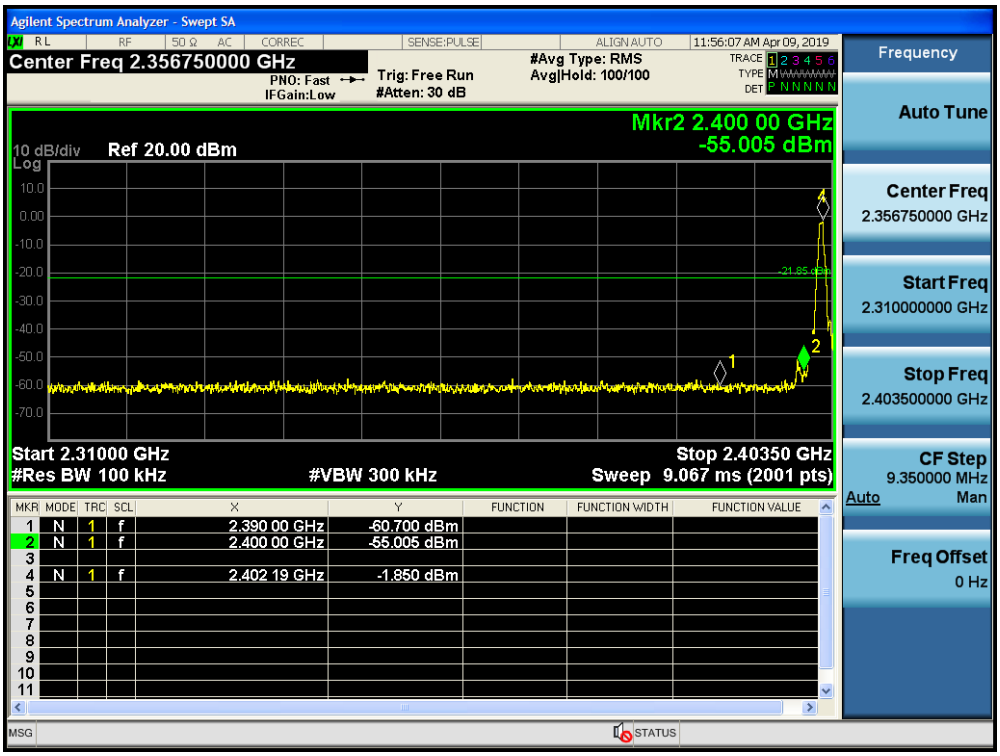
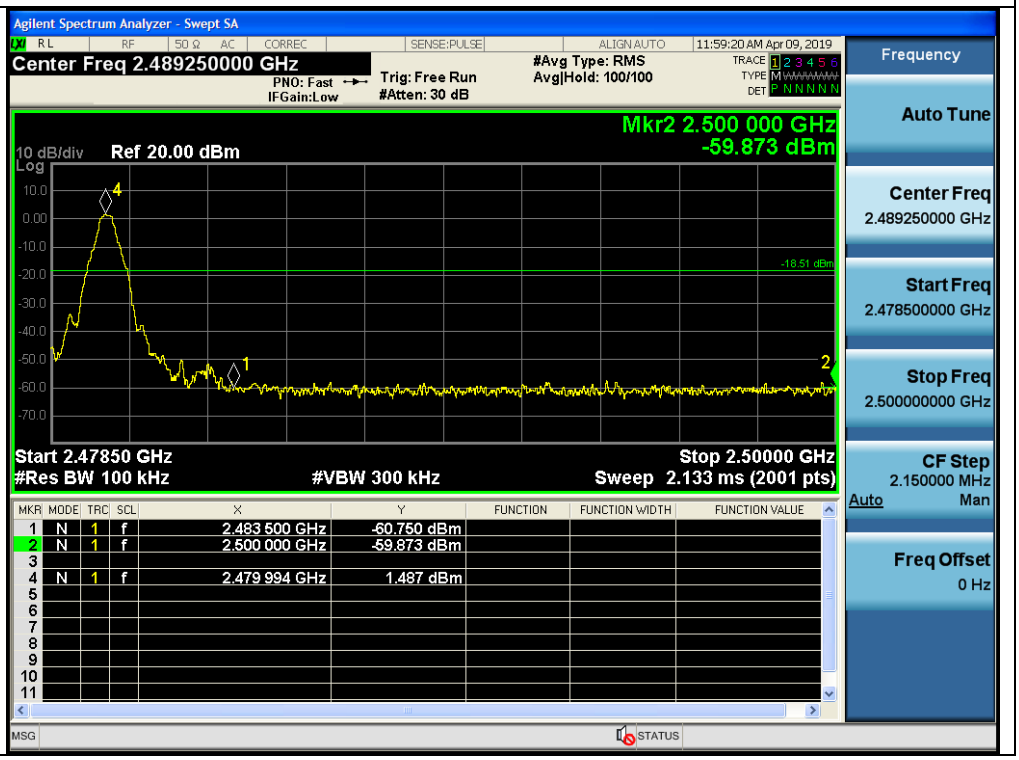
π/4DQPSK/HCH	

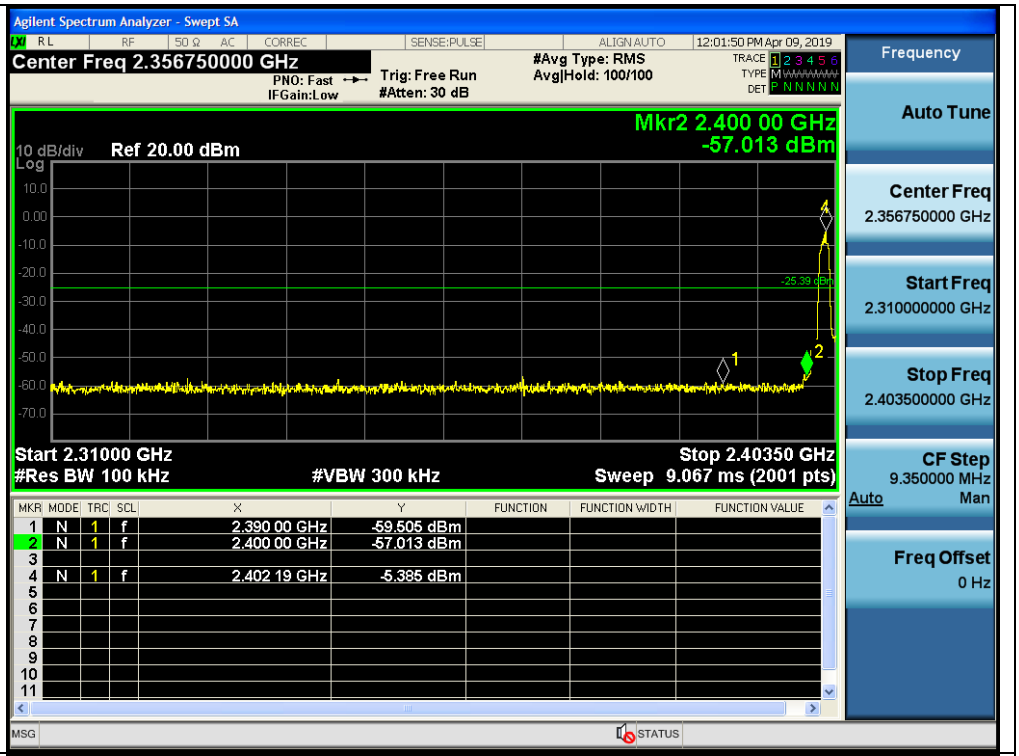
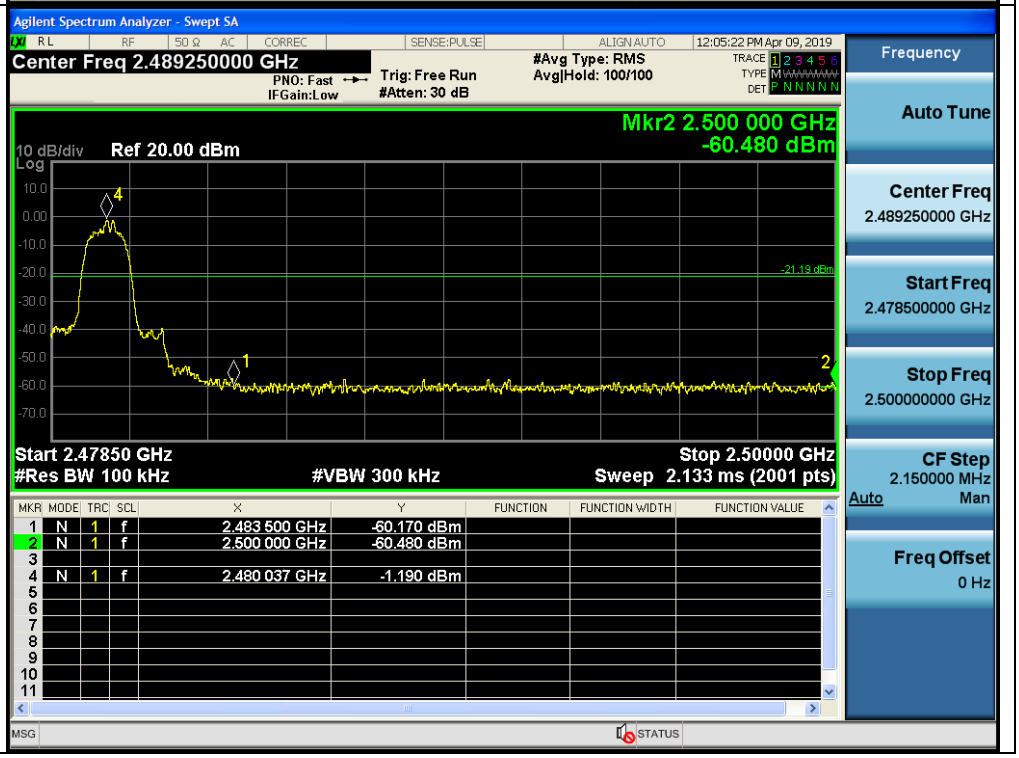
Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
CORREC
SENSE:PULSE
ALIGN AUTO
12:04:45 PM Apr 09, 2019
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: Log-Pwr
Avg|Hold: 100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 2.480 020 GHz
0.304 dBm
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
Center 2.480000 GHz
#Res BW 2.0 MHz
#VBW 6.0 MHz
Span 10.00 MHz
Sweep 1.067 ms (2001 pts)
MSG
STATUS
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

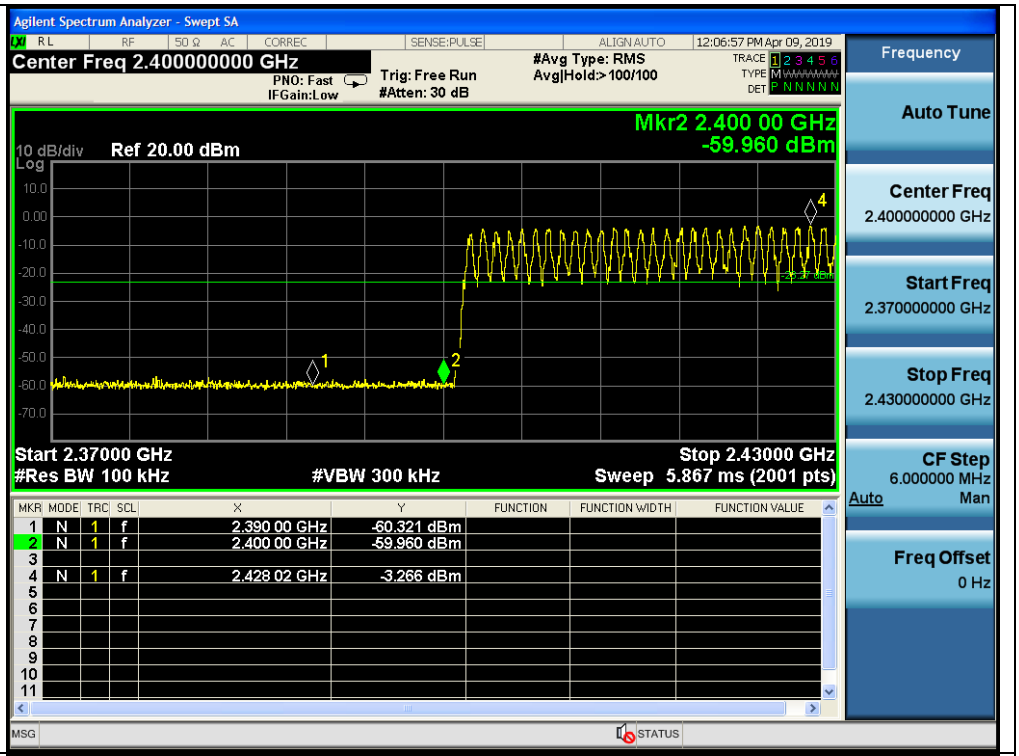
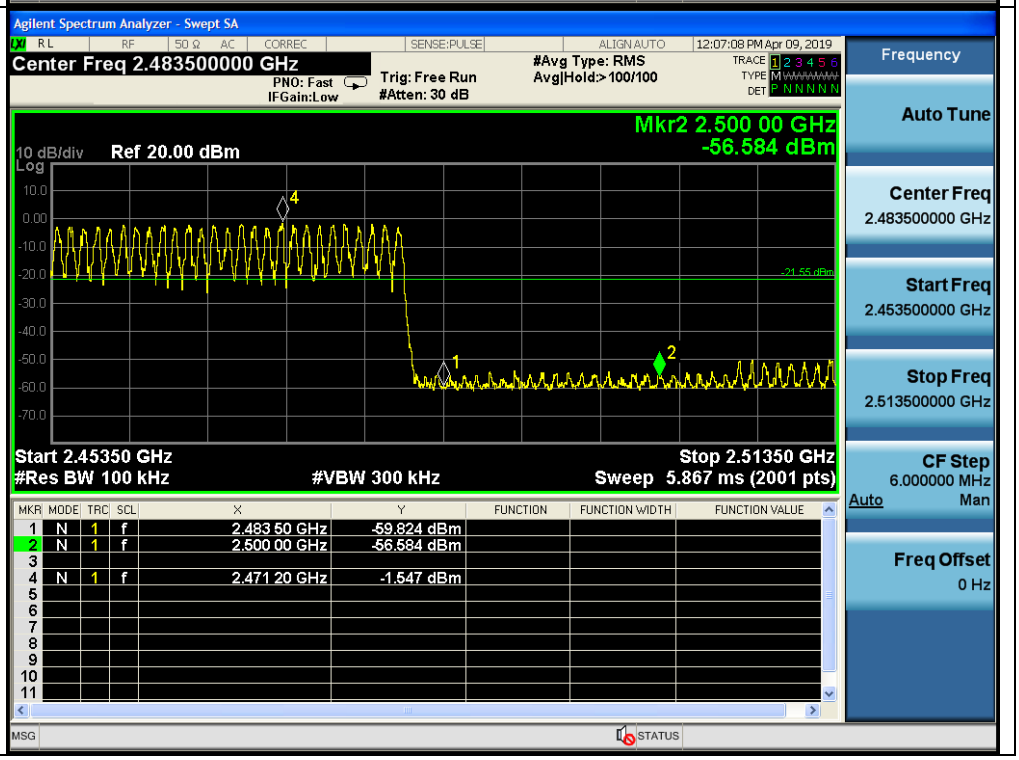
A.6 Band-edge for RF Conducted Emissions

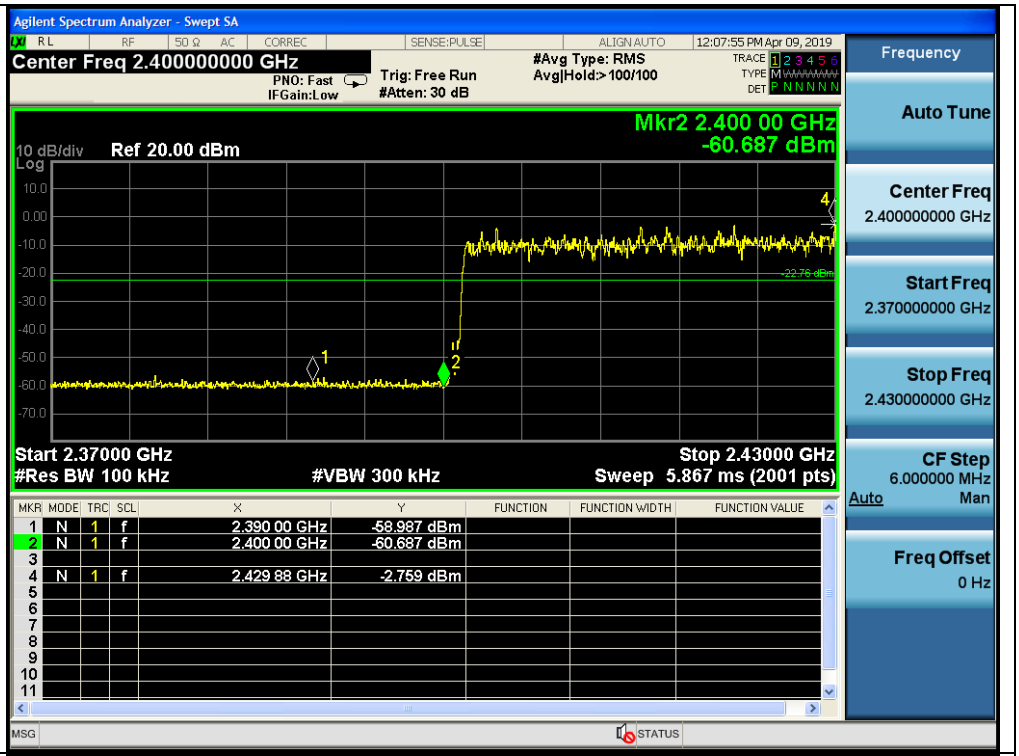
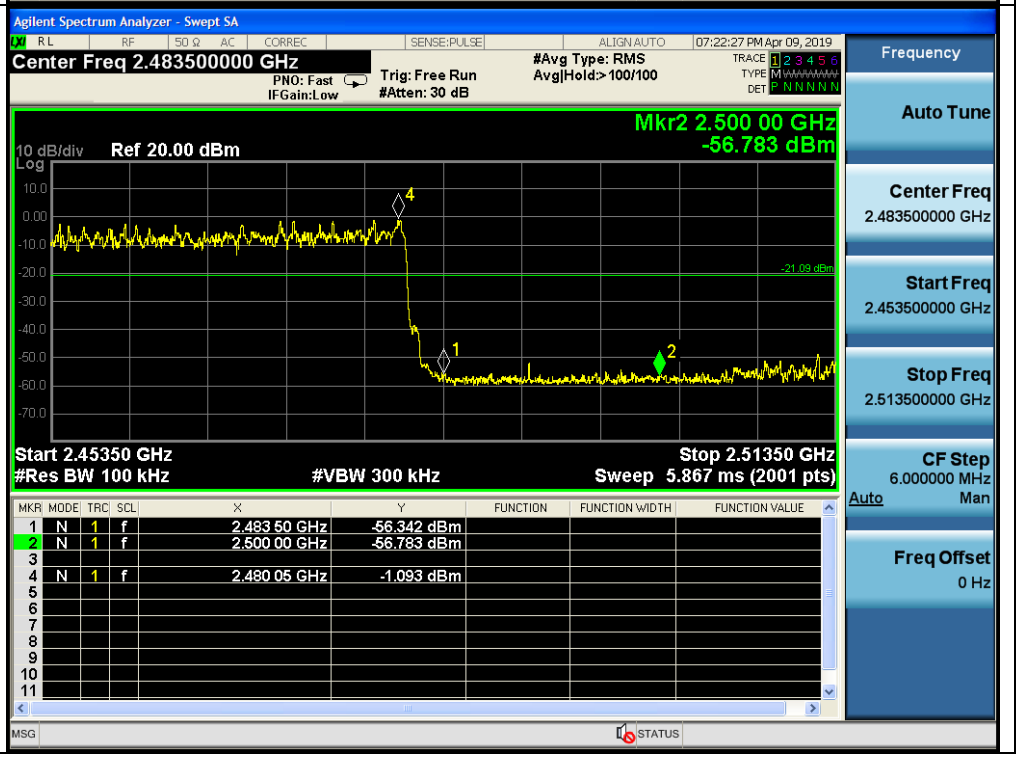
Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2390	-1.850	-60.70	-21.850	Pass
1DH5	2402	2400	-1.850	-55.00	-21.850	Pass
1DH5	2480	2483.5	1.487	-60.75	-18.513	Pass
1DH5	2480	2500	1.487	-59.87	-18.513	Pass
2DH5	2402	2390	-5.385	-59.50	-25.385	Pass
2DH5	2402	2400	-5.385	-57.01	-25.385	Pass
2DH5	2480	2483.5	-1.190	-60.17	-21.190	Pass
2DH5	2480	2500	-1.190	-60.48	-21.190	Pass
1DH5-Hopping	2402	2390	-3.266	-60.32	-23.266	Pass
1DH5-Hopping	2402	2400	-3.266	-59.96	-23.266	Pass
1DH5-Hopping	2480	2483.5	-1.547	-59.82	-21.547	Pass
1DH5-Hopping	2480	2500	-1.547	-56.58	-21.547	Pass
2DH5-Hopping	2402	2390	-4.459	-58.49	-24.459	Pass
2DH5-Hopping	2402	2400	-4.459	-55.81	-24.459	Pass
2DH5-Hopping	2480	2483.5	-1.093	-56.34	-21.093	Pass
2DH5-Hopping	2480	2500	-1.093	-56.78	-21.093	Pass

Test Graph

Graphs	
GFSK/LCH/No Hop	
GFSK/HCH/No Hop	

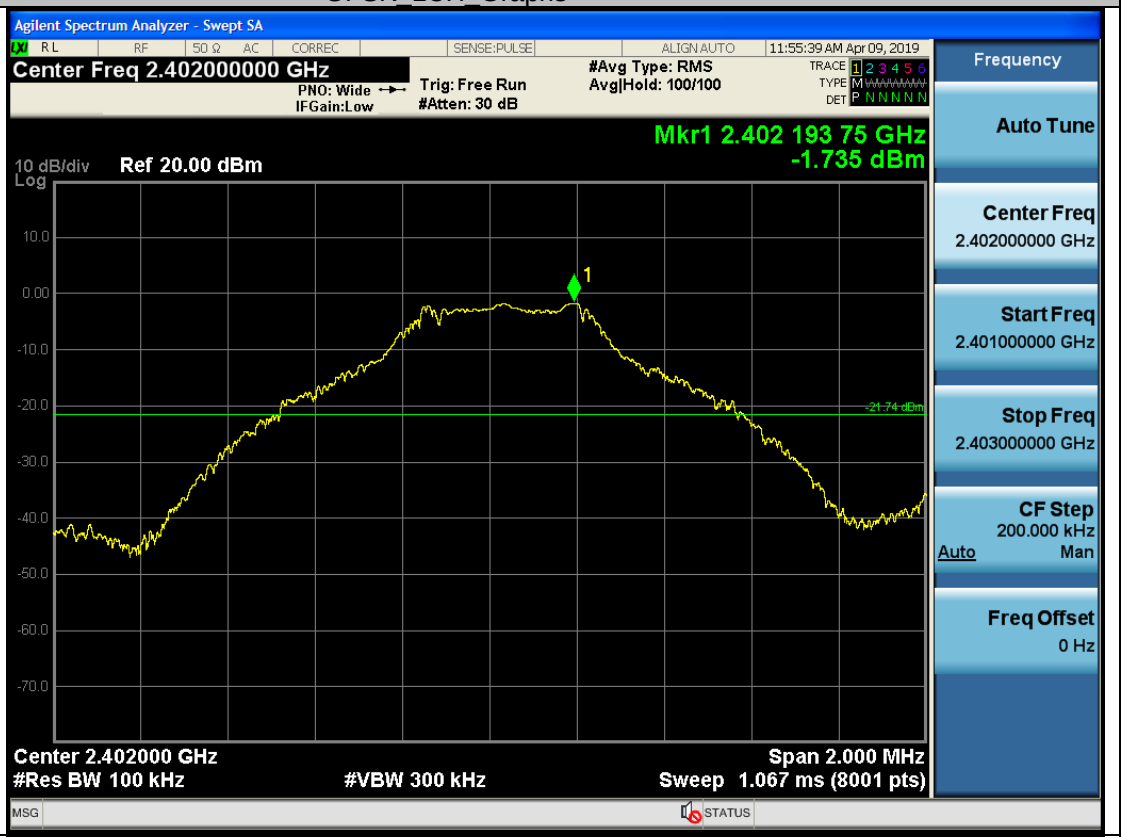
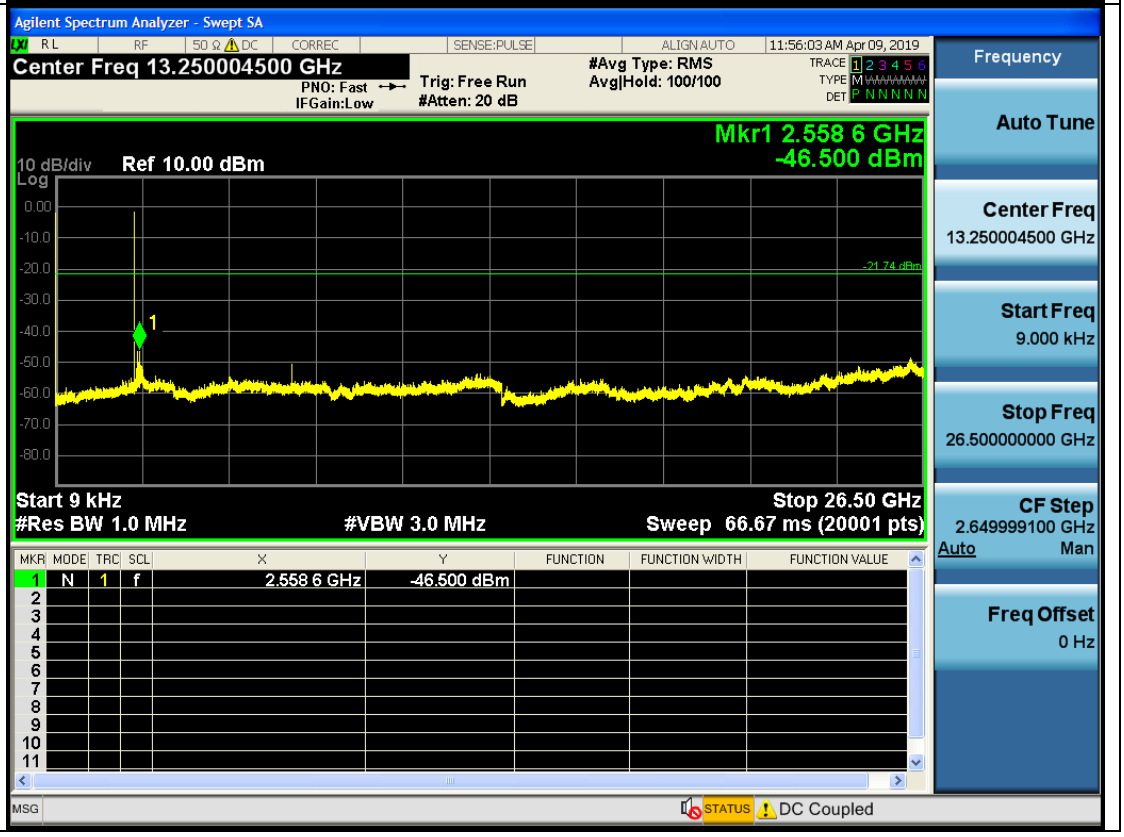
π/4DQPSK/LCH/No Hop	
π/4DQPSK/HCH/No Hop	

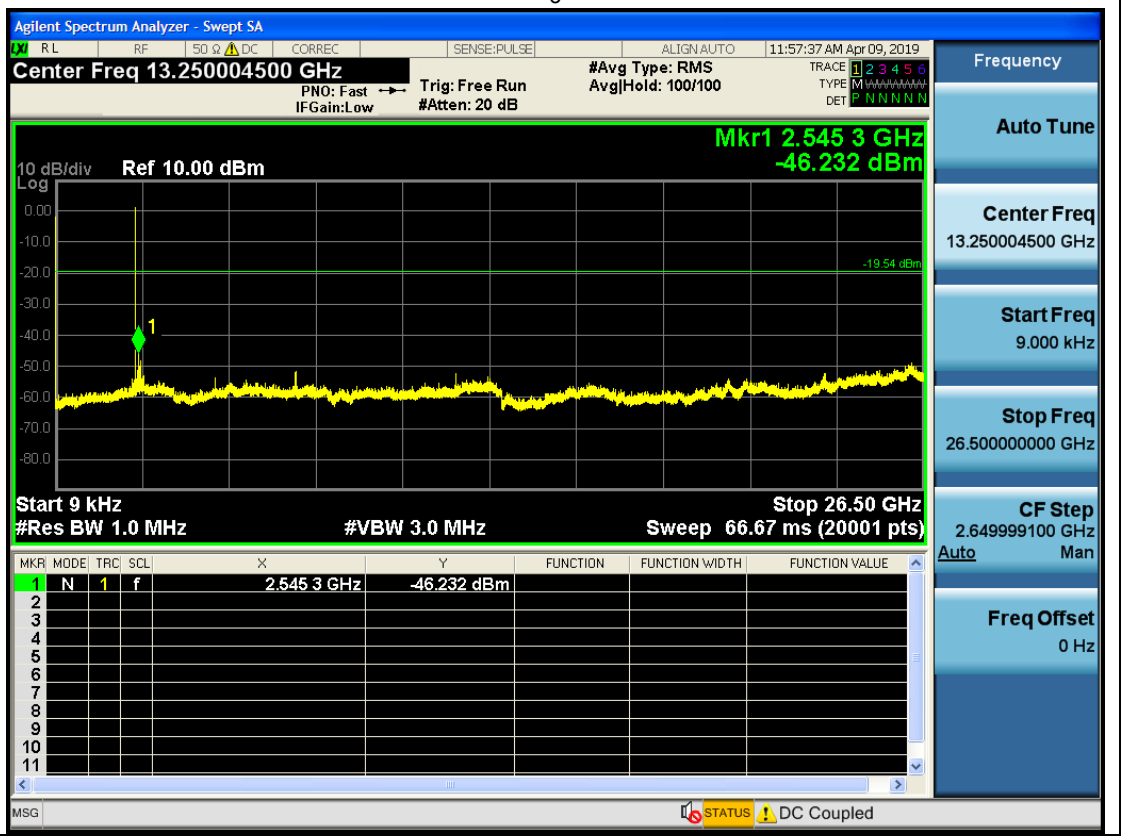
GFSK/LCH/Hop	
GFSK/HCH/Hop	

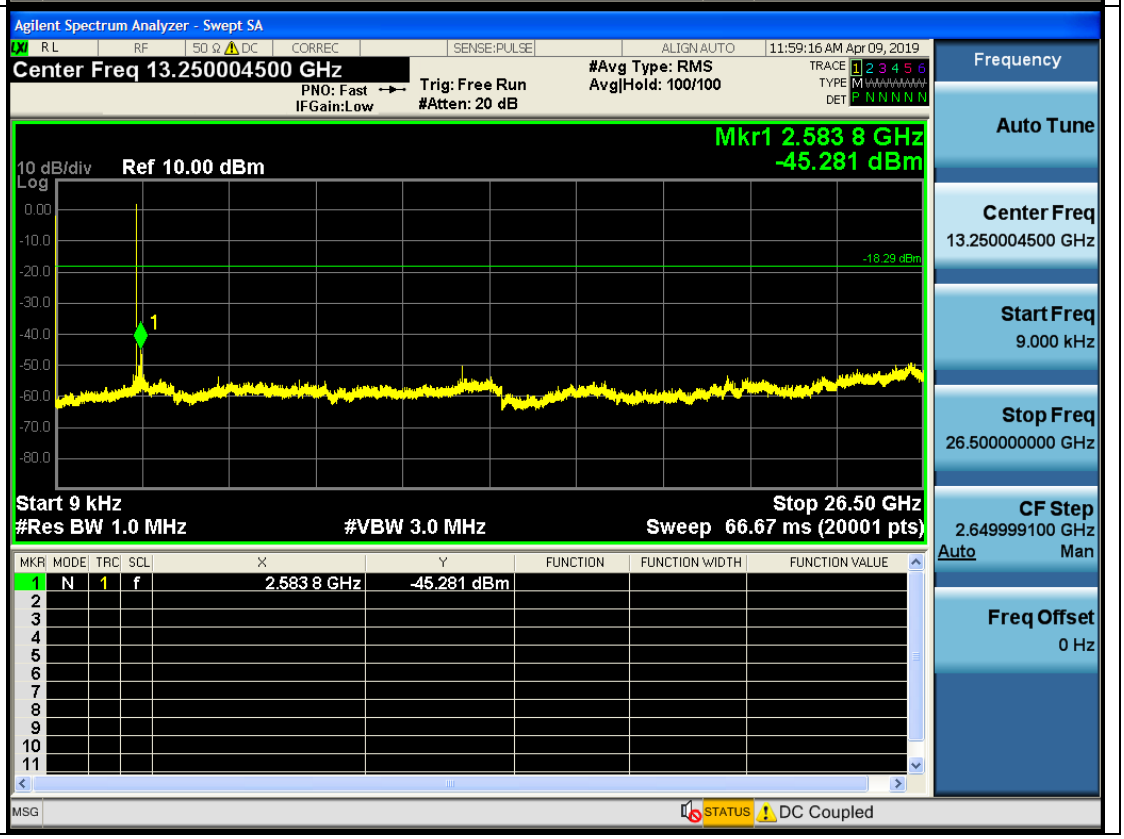
π /4DQPSK/LCH/Hop	
π /4DQPSK/HCH/Hop	

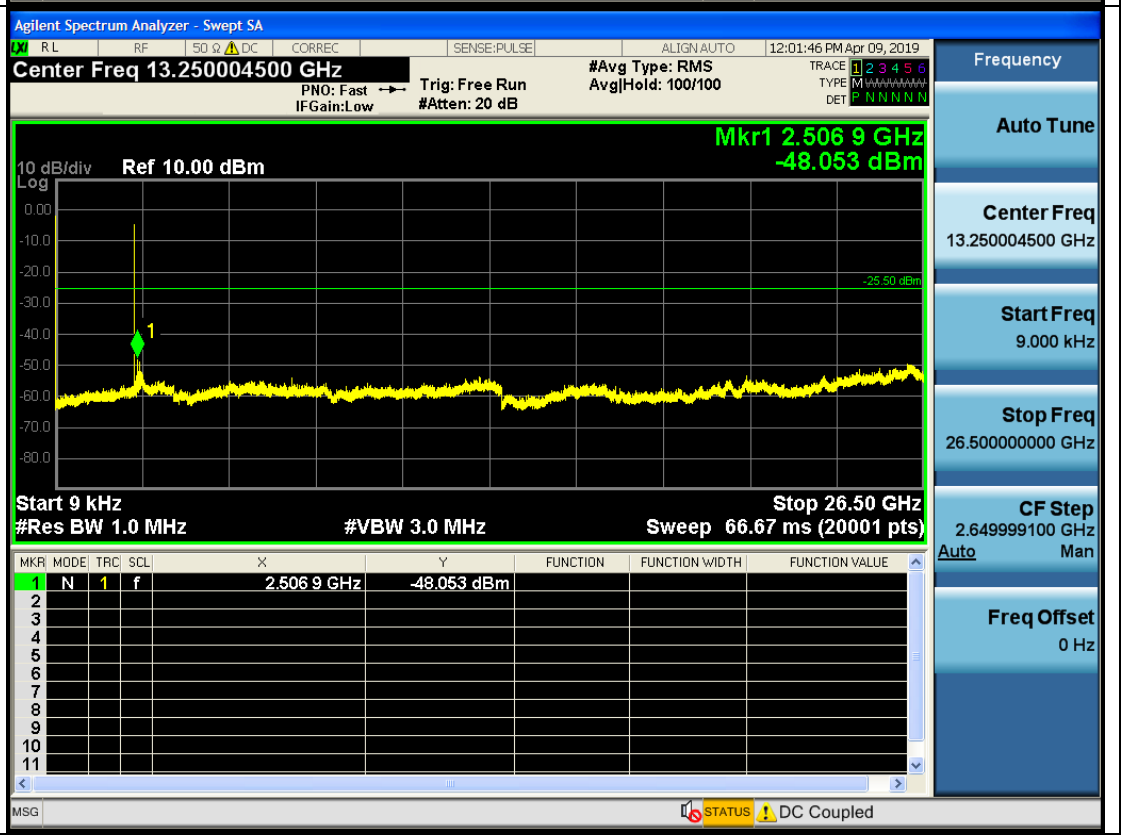
A.7 RF Conducted Spurious Emissions

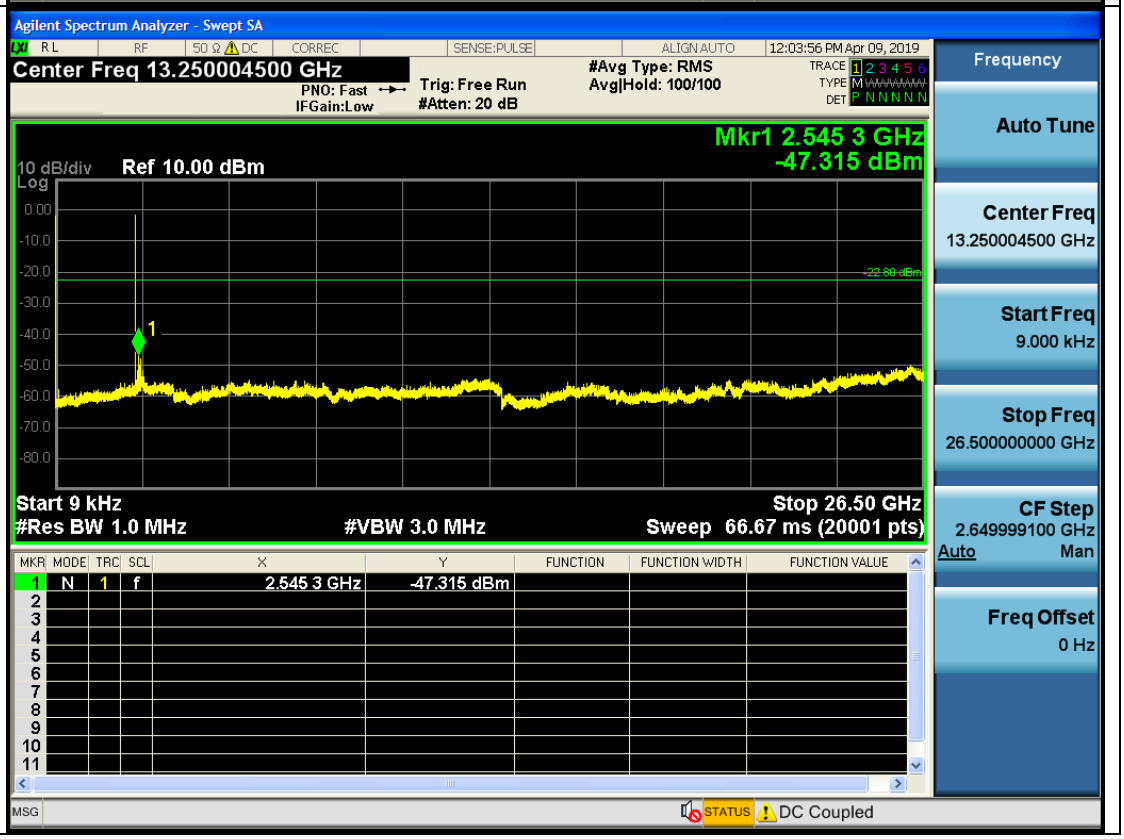
Test Graph

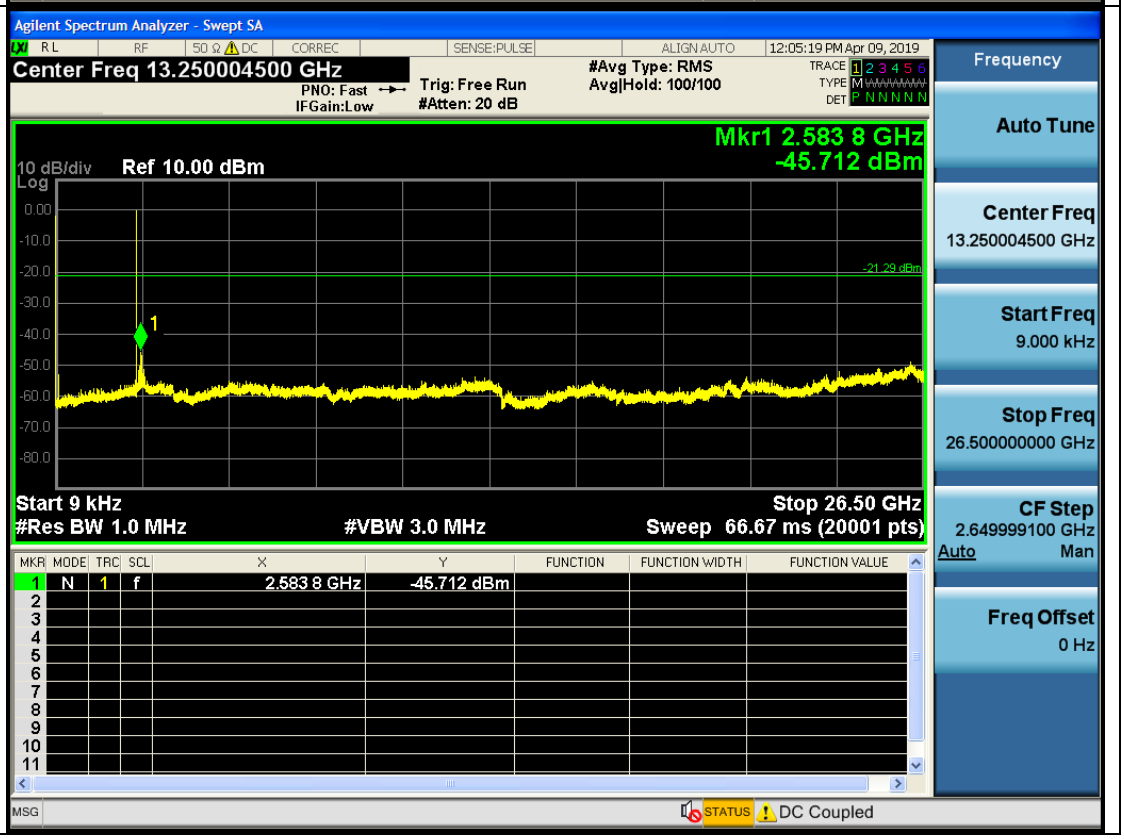
GFSK_LCH_Graphs	
Pref	
Puw	

GFSK_MCH_Graphs	
Pref	
Puw	0 

GFSK_HCH_Graphs	
Pref	
Puw	

π/4DQPSK_LCH_Graphs	
Pref	
Puw	

π/4DQPSK_MCH_Graphs	
Pref	
Puw	

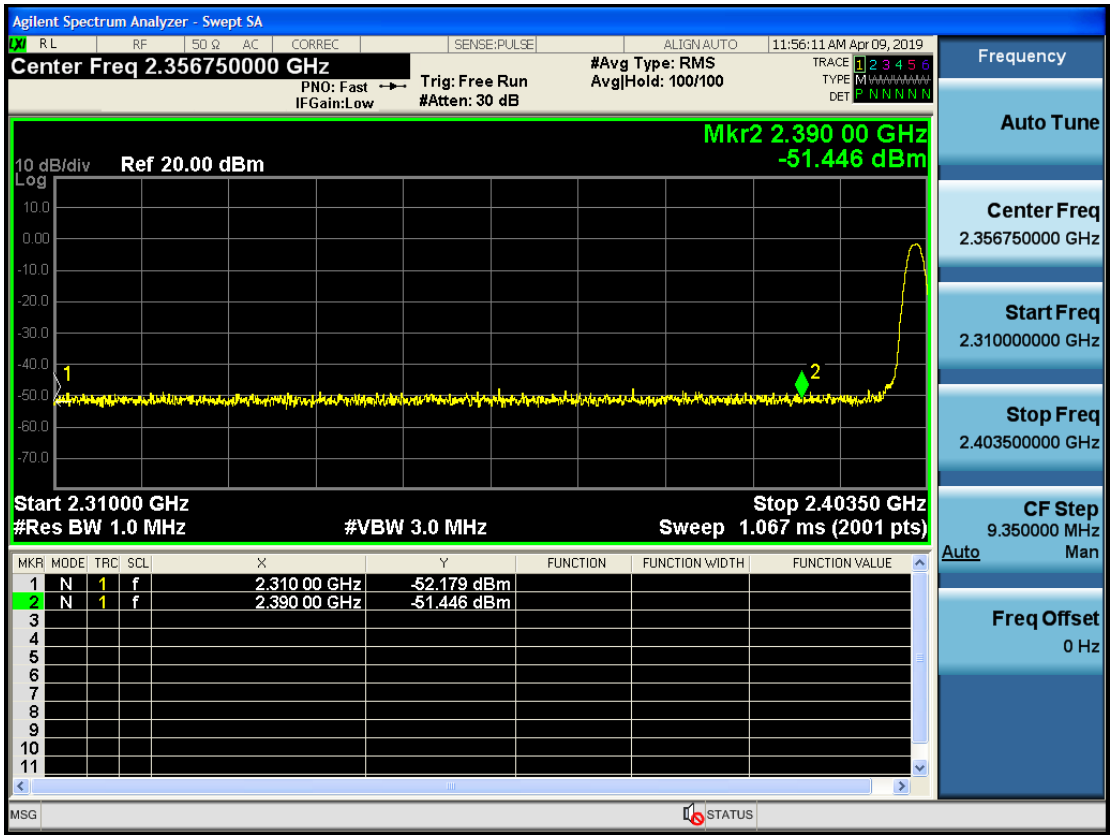
π/4DQPSK_HCH_Graphs	
Pref	
Puw	

A.8 Restrict-band measurements

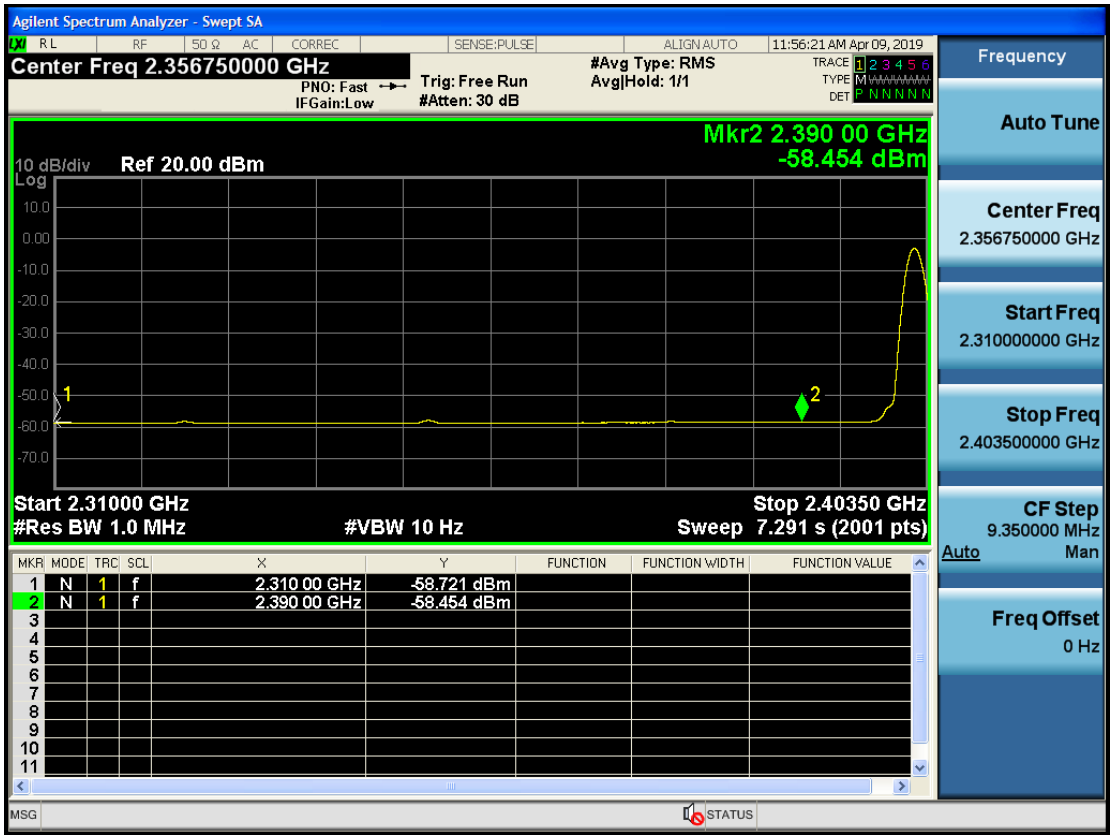
Type	Carrier Frequency (MHz)	Frequency(MHz)	Gain	Ground Factor	Peak Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Average Value(dBm)	E [dBuV/m]	Limit [dBuV/m]	Conclusion
1DH5	2402	2310	2.00	0.00	-52.18	45.02	74	-58.72	38.48	38.42	Pass
1DH5	2402	2390	2.00	0.00	-51.45	45.75	74	-58.45	38.75	38.85	Pass
1DH5	2480	2483.5	2.00	0.00	-48.71	48.49	74	-54.48	42.72	45.33	Pass
1DH5	2480	2500	2.00	0.00	-49.80	47.40	74	-57.92	39.28	39.58	Pass
2DH5	2402	2310	2.00	0.00	-49.94	47.26	74	-58.72	38.48	38.45	Pass
2DH5	2402	2390	2.00	0.00	-50.24	46.96	74	-58.49	38.71	38.79	Pass
2DH5	2480	2483.5	2.00	0.00	-49.57	47.63	74	-55.54	41.66	43.37	Pass
2DH5	2480	2500	2.00	0.00	-52.29	44.91	74	-57.90	39.30	39.36	Pass

Test Graph

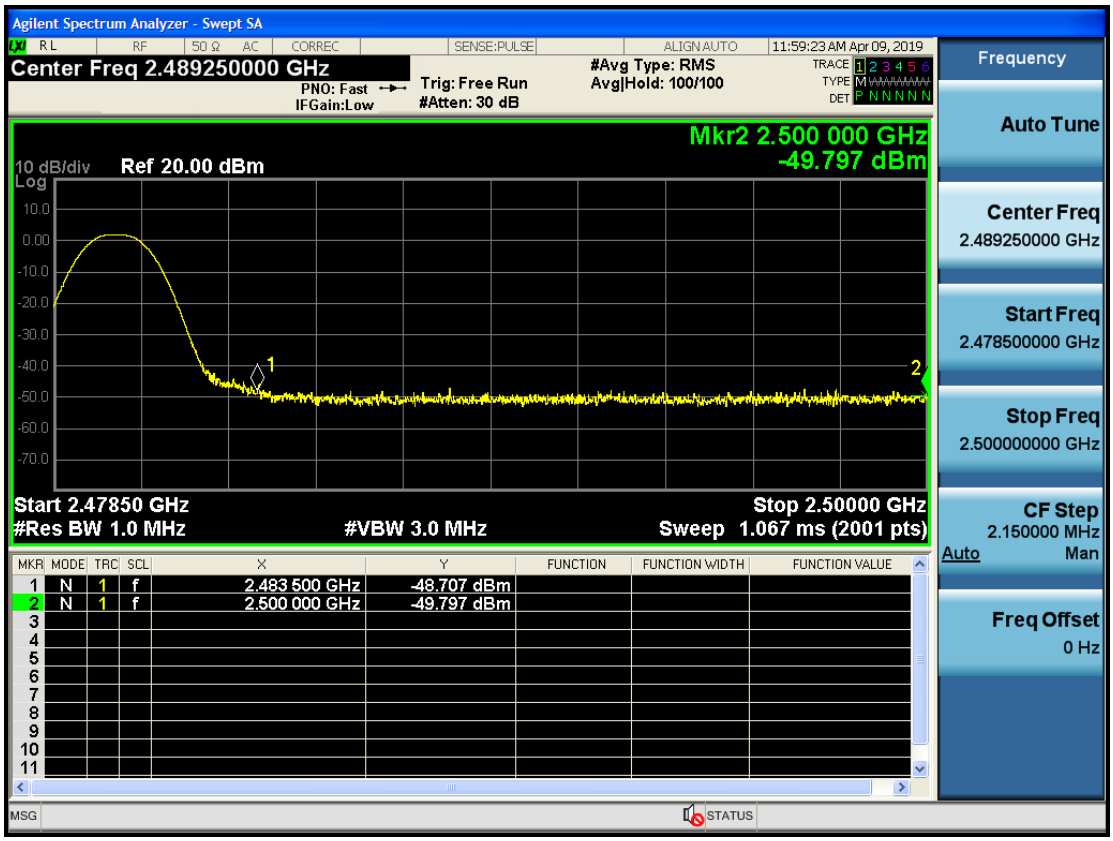
Restrict-band band-edge measurements_2402_PEAK_DH5



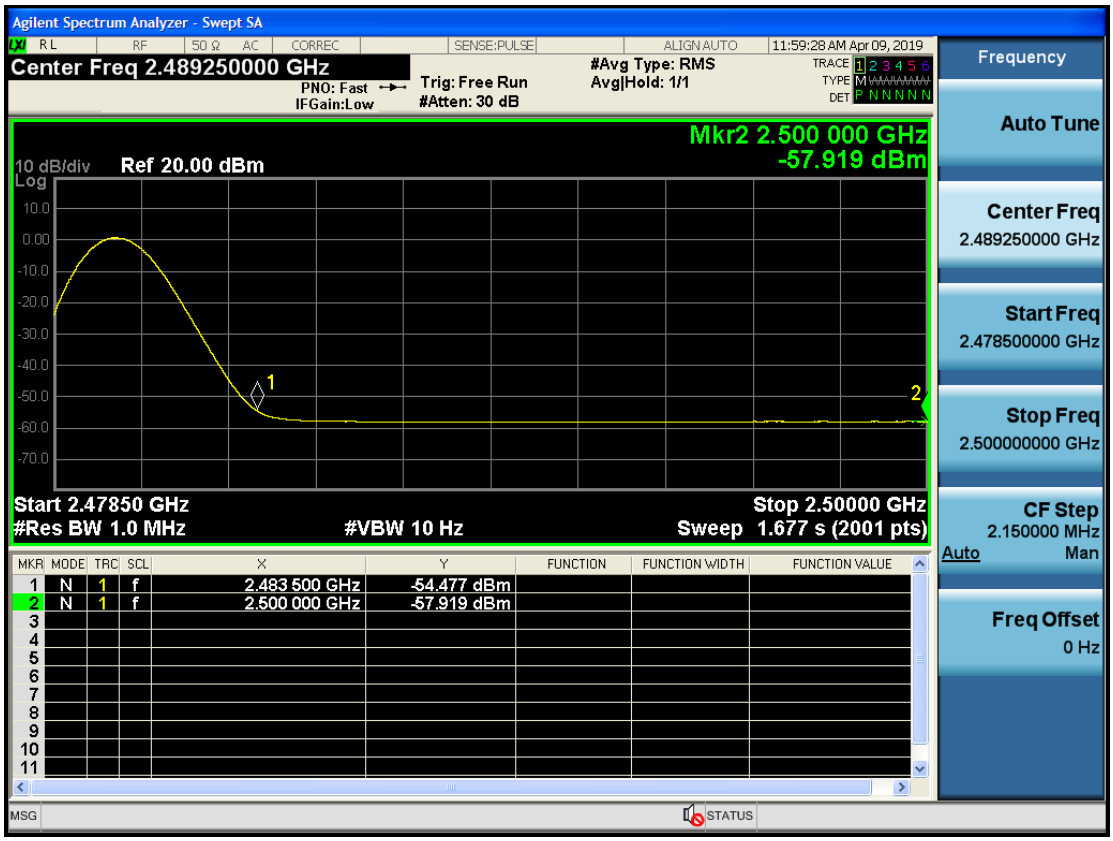
Restrict-band band-edge measurements_2402_AV_DH5



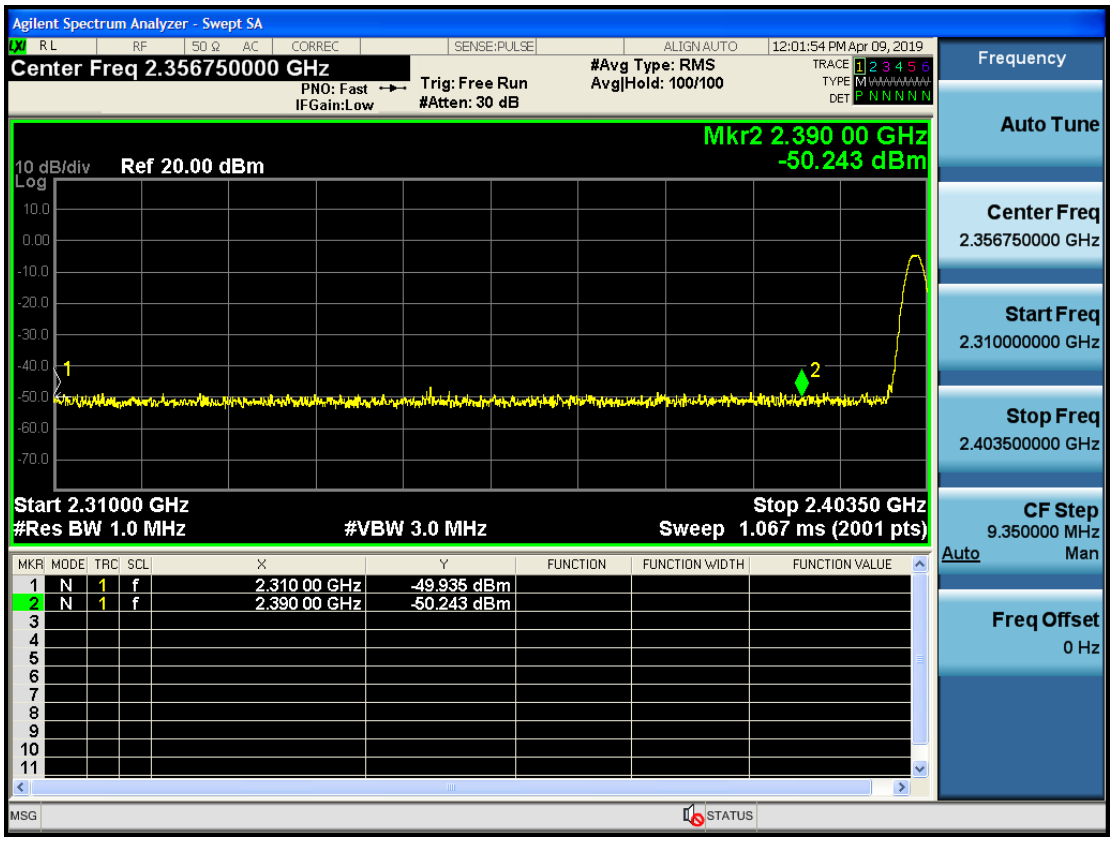
Restrict-band band-edge measurements_2480_PEAK_DH5



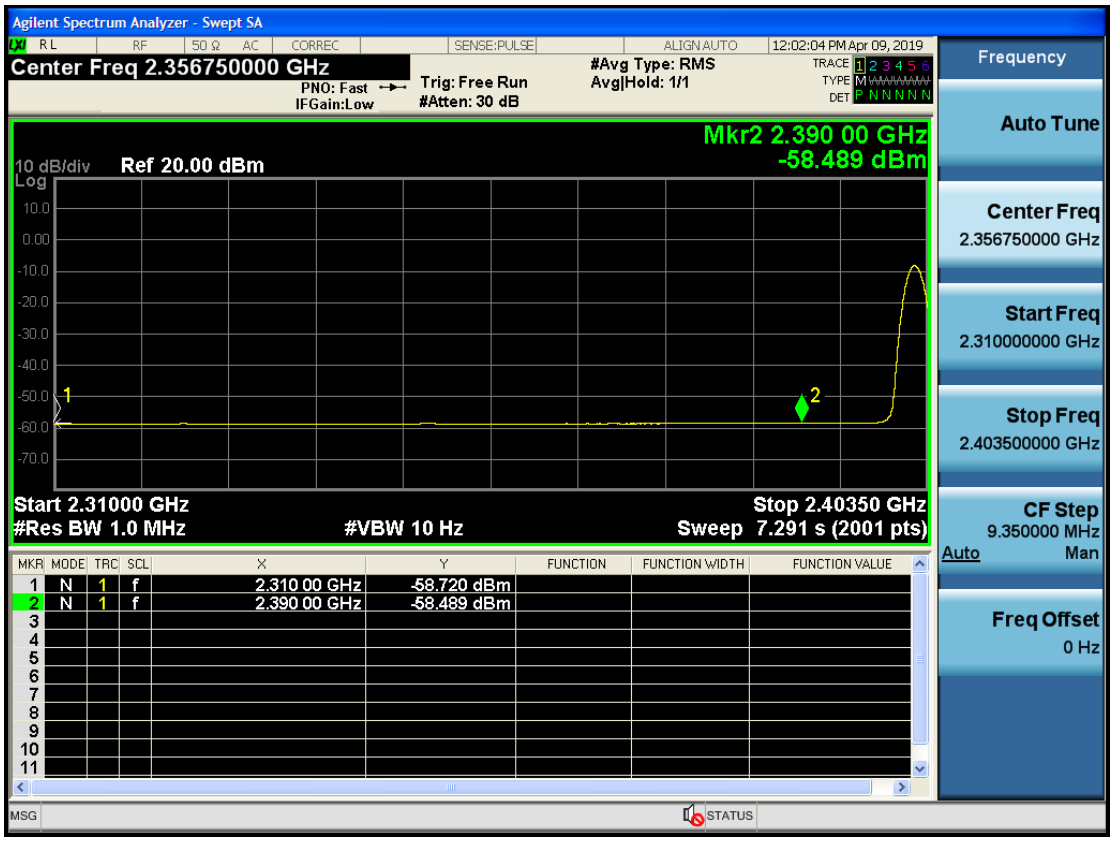
Restrict-band band-edge measurements_2480_AV_DH5



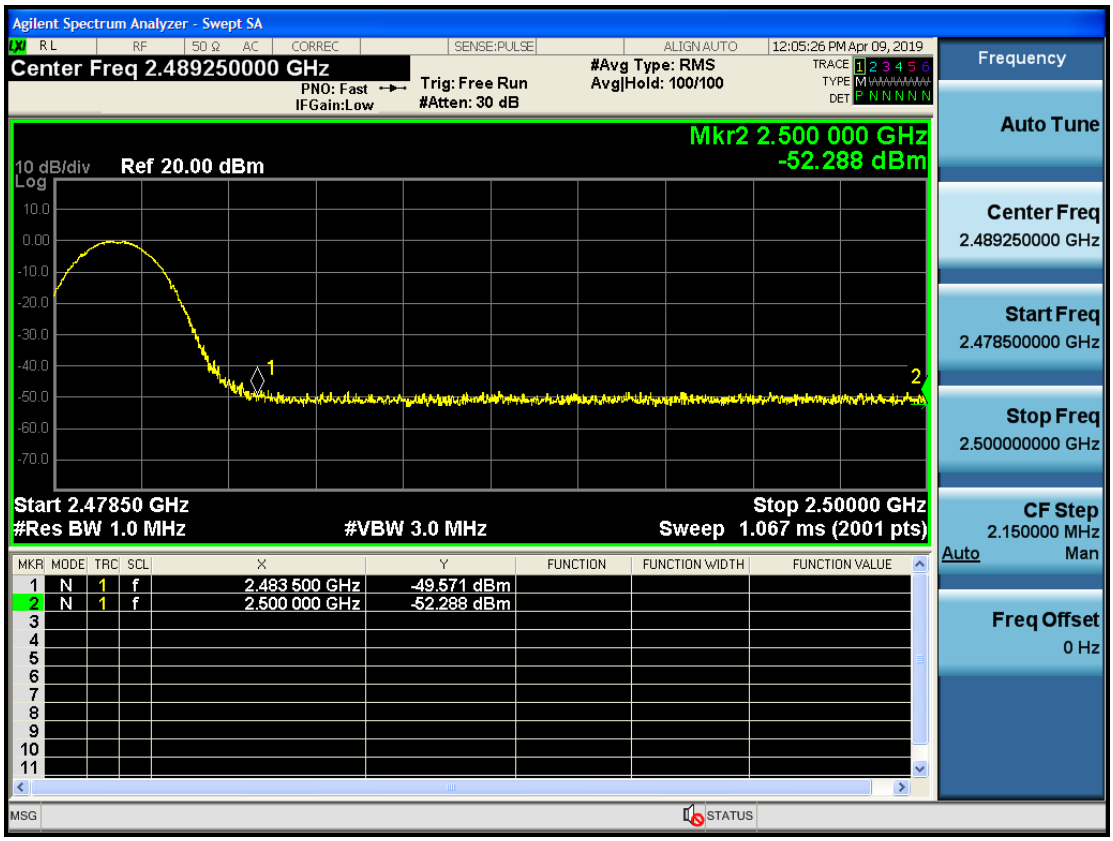
Restrict-band band-edge measurements_2402_PEAK_2DH5



Restrict-band band-edge measurements_2402_AV_2DH5



Restrict-band band-edge measurements_2480_PEAK_2DH5



Restrict-band band-edge measurements_2480_AV_2DH5