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

Product Name: Bluetooth Earphones
Trade Mark: Altec Lansing

Test Model: MZX148

FCC ID: 2AL9B-MZX148

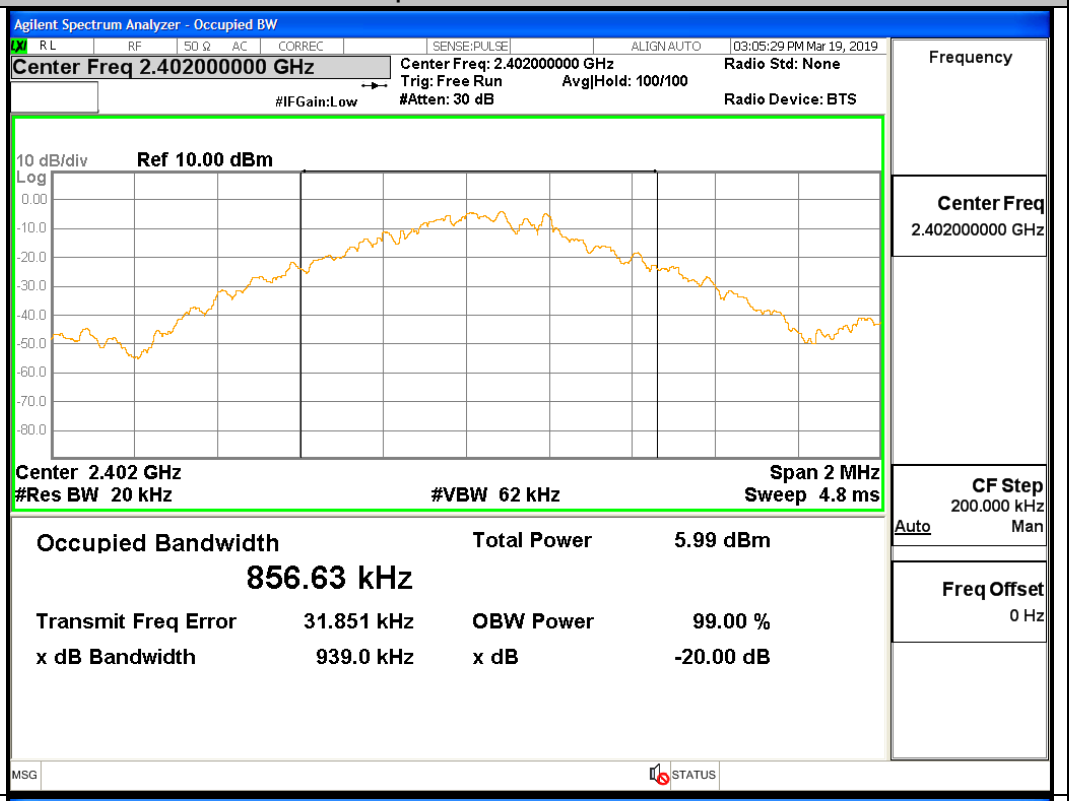
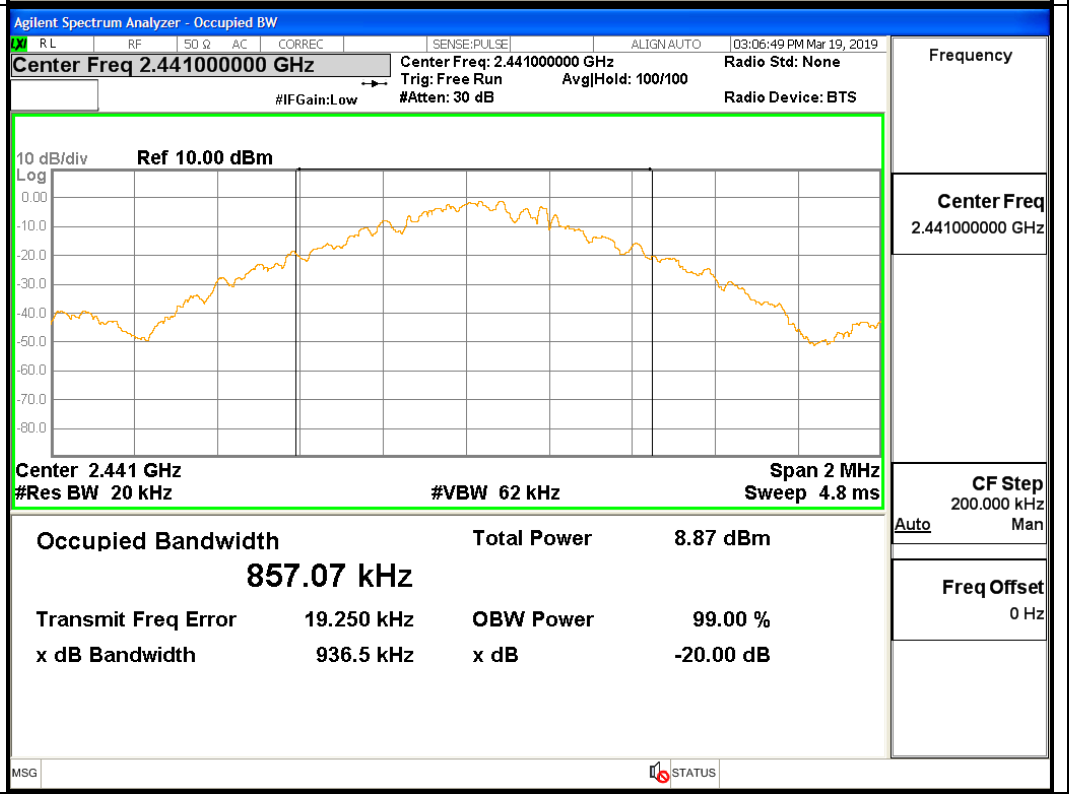
Environmental Conditions

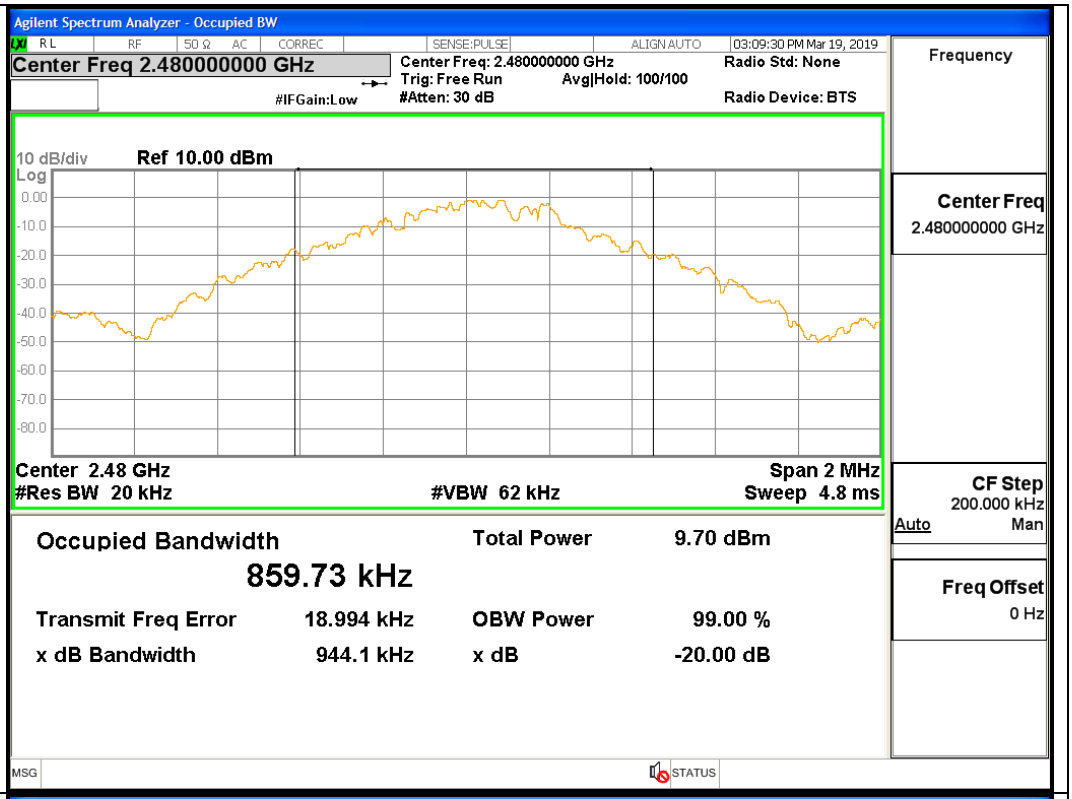
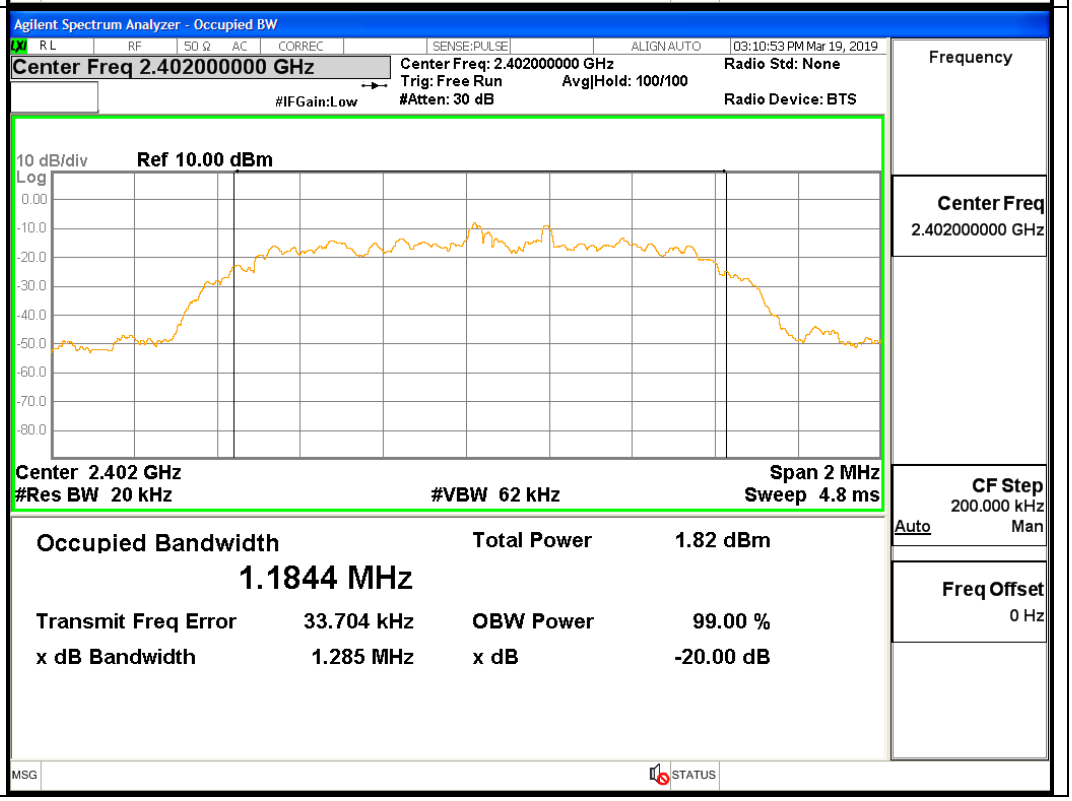
Temperature:	22.3 ° C
Relative Humidity:	50%
ATM Pressure:	100.0 kPa
Test Engineer:	Gary Qian
Supervised by:	Eden Hu

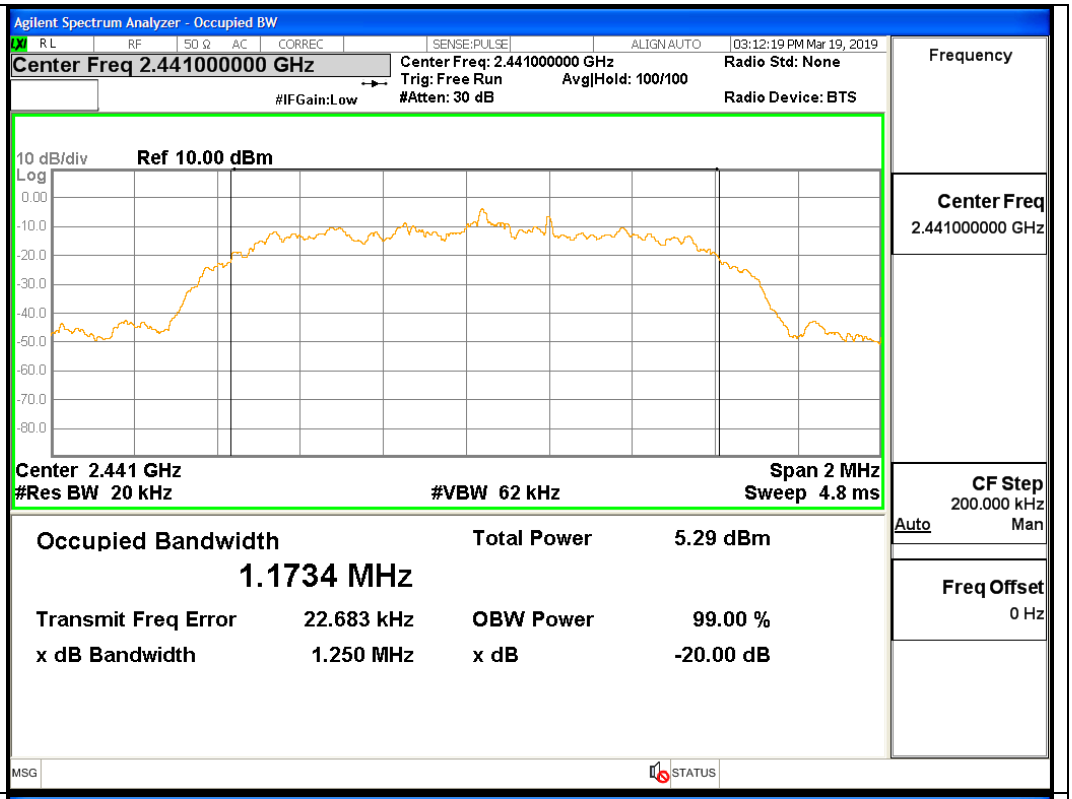
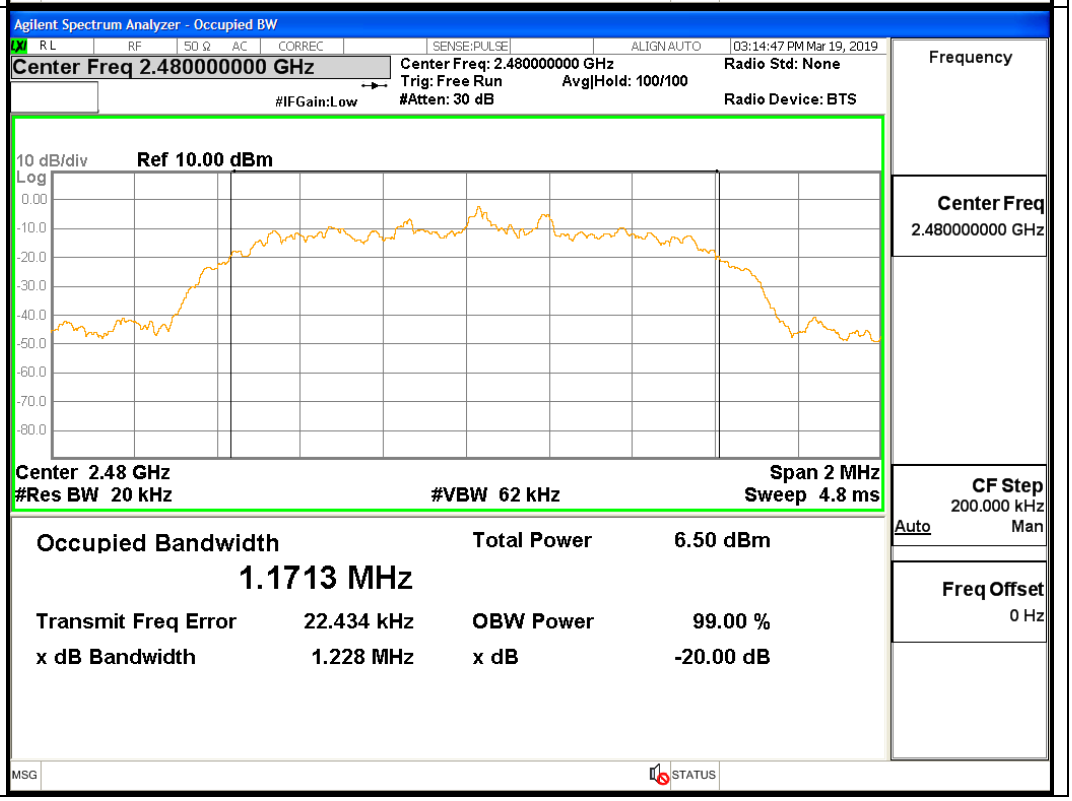
A.1 20 dB Bandwidth

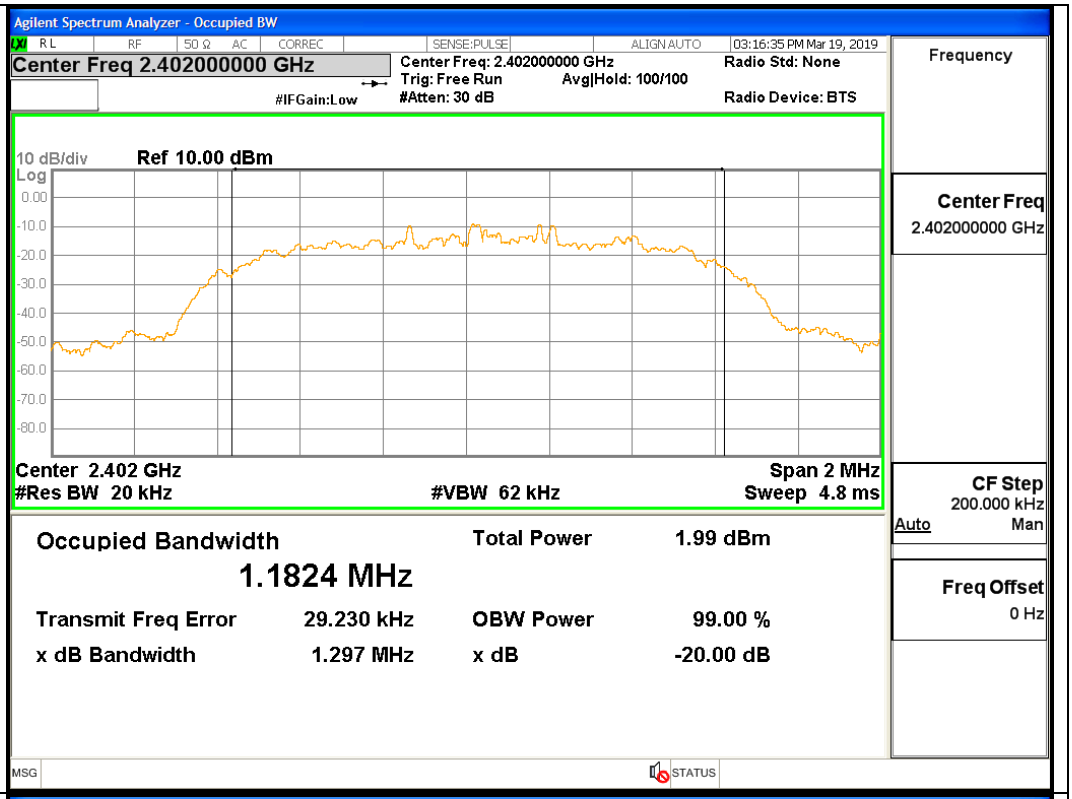
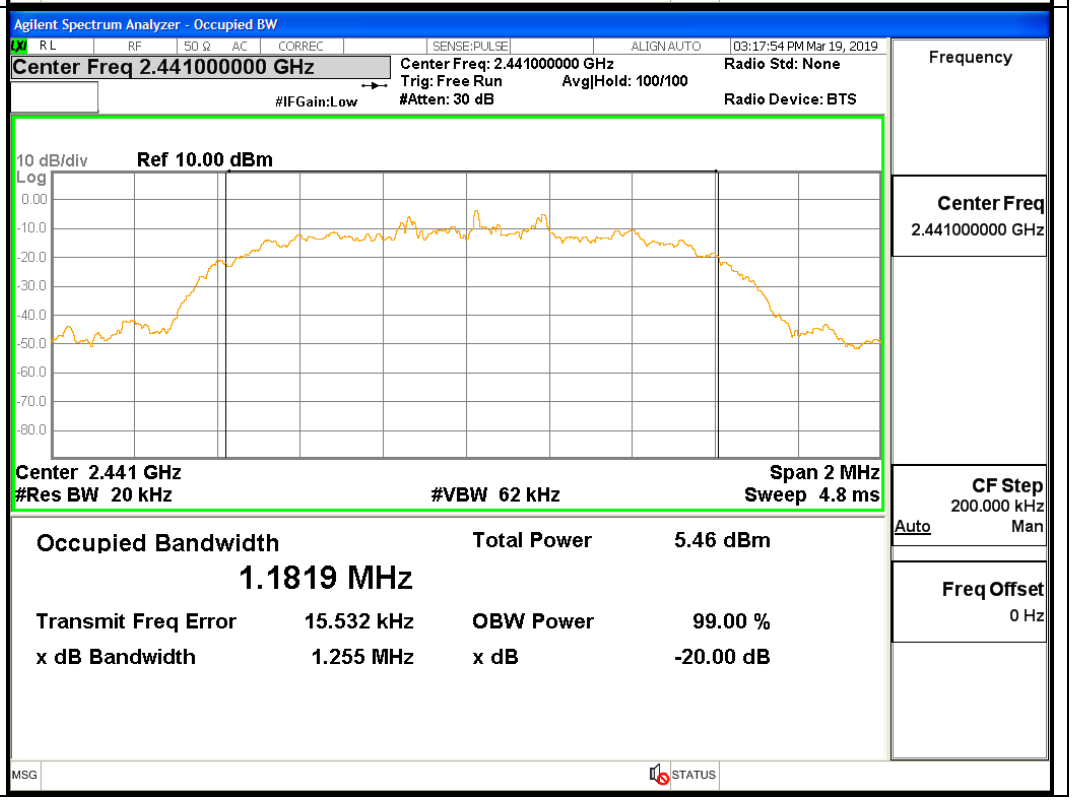
Mode	Channel.	20dB Bandwidth [MHz]	Limit(MHz)	Verdict
GFSK	LCH	0.939	Not Specified	PASS
GFSK	MCH	0.936	Not Specified	PASS
GFSK	HCH	0.944	Not Specified	PASS
π/4DQPSK	LCH	1.285	Not Specified	PASS
π/4DQPSK	MCH	1.250	Not Specified	PASS
π/4DQPSK	HCH	1.228	Not Specified	PASS
8DPSK	LCH	1.297	Not Specified	PASS
8DPSK	MCH	1.255	Not Specified	PASS
8DPSK	HCH	1.253	Not Specified	PASS

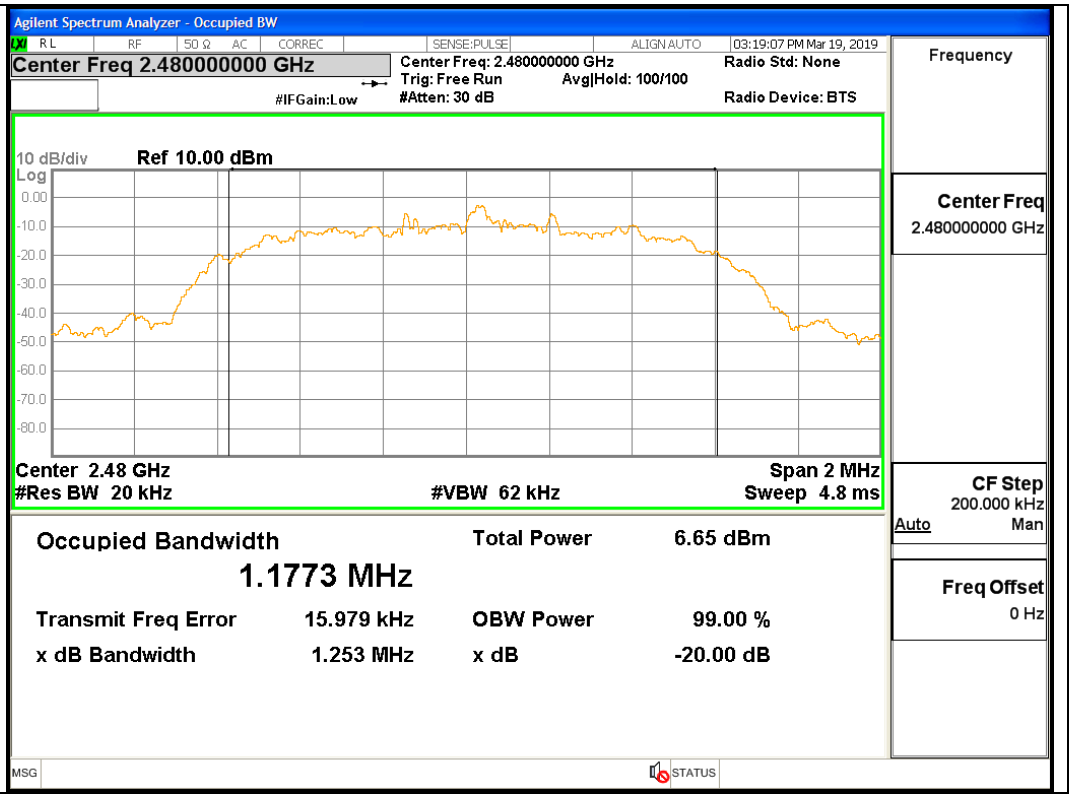
Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	

π/4DQPSK/MCH	
π/4DQPSK/HCH	

8DPSK/LCH	
8DPSK/MCH	

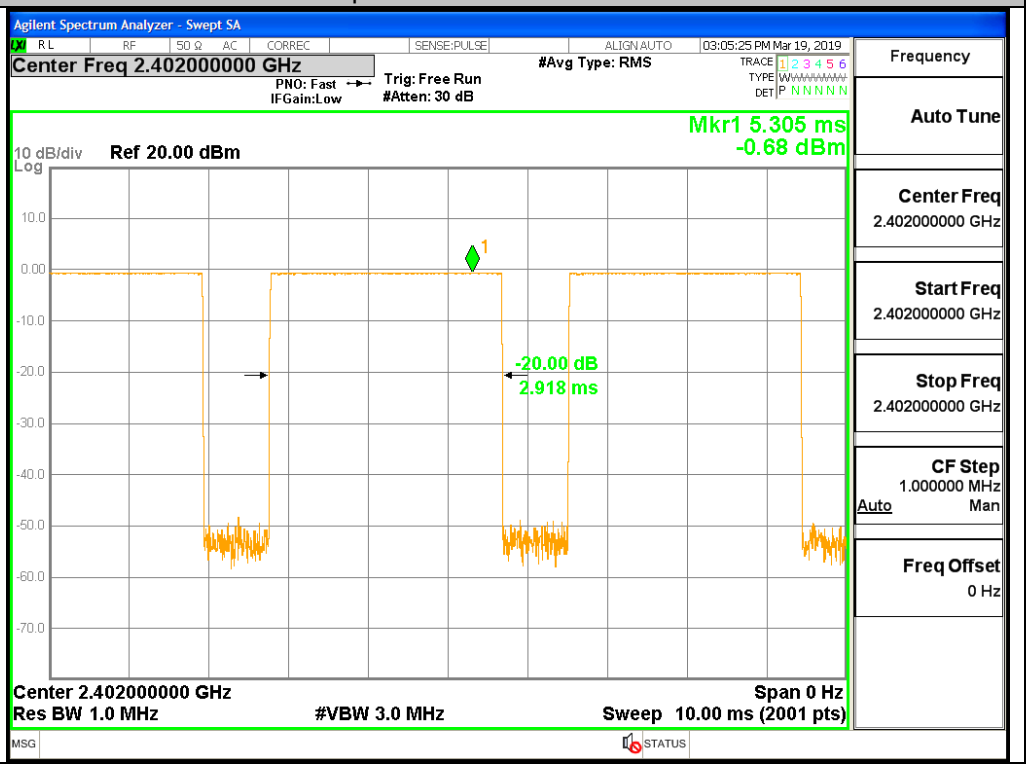
8DPSK/HCH	

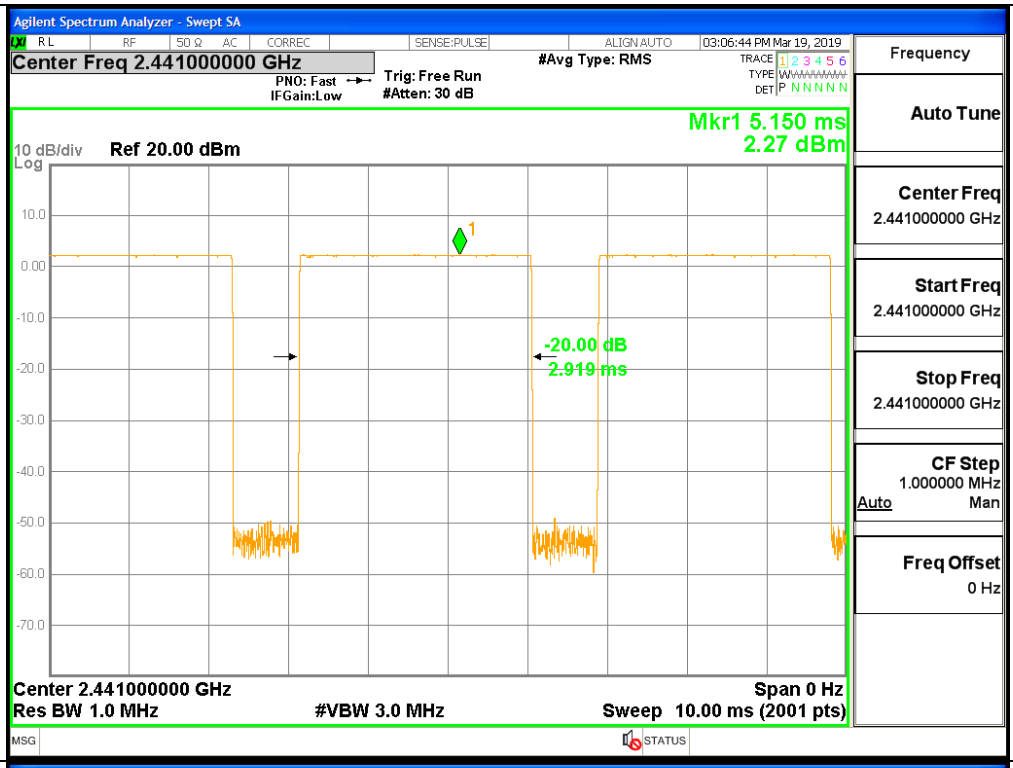
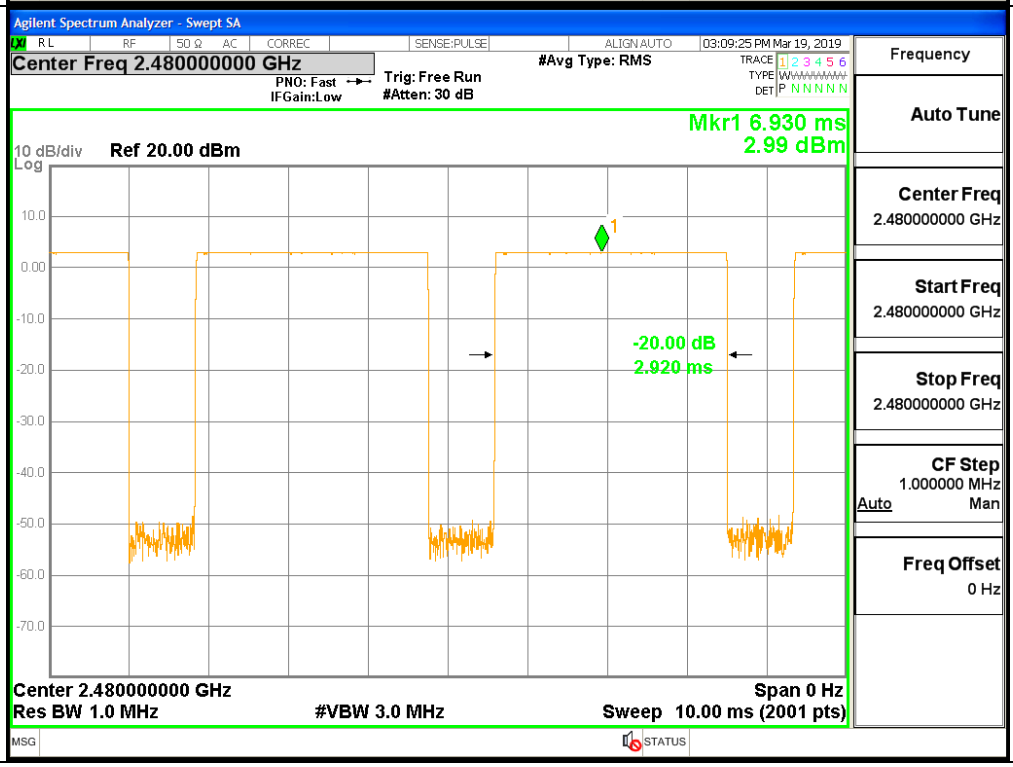
Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
CORREC
SENSE:PULSE
ALIGN AUTO
03:19:07 PM Mar 19, 2019
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 100/100
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
10 dB/div
Log
Ref 10.00 dBm
0.00
-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 4.8 ms
CF Step
200.000 kHz
Auto
Man
Occupied Bandwidth
1.1773 MHz
Total Power
6.65 dBm
Transmit Freq Error
15.979 kHz
OBW Power
99.00 %
x dB Bandwidth
1.253 MHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS

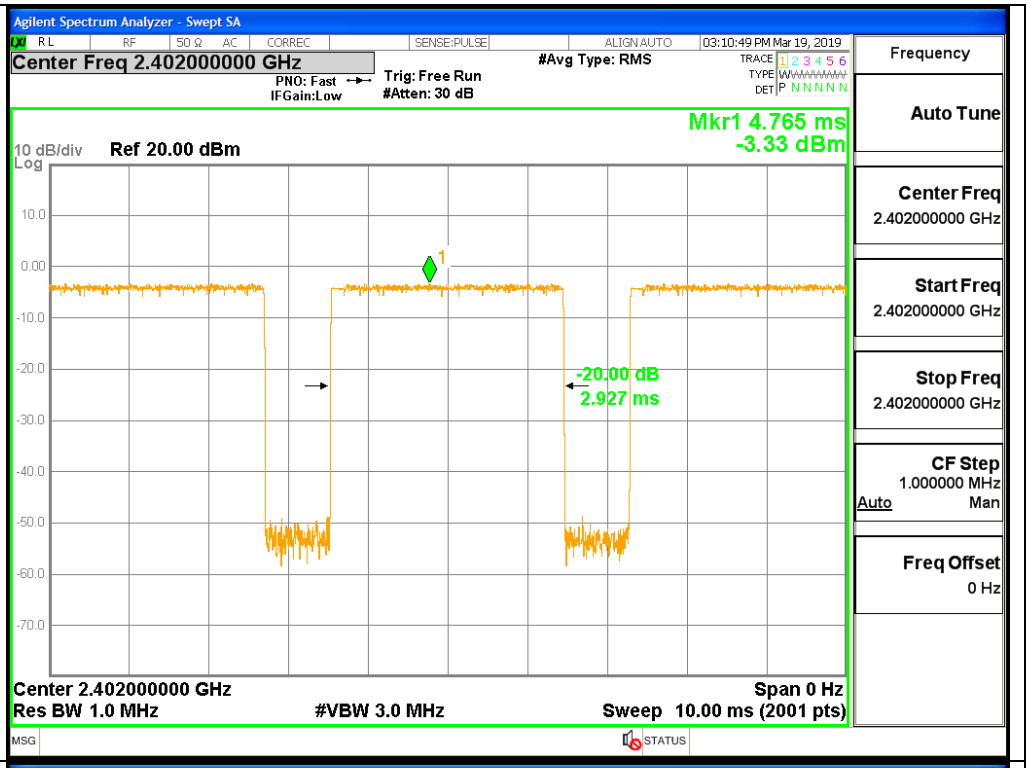
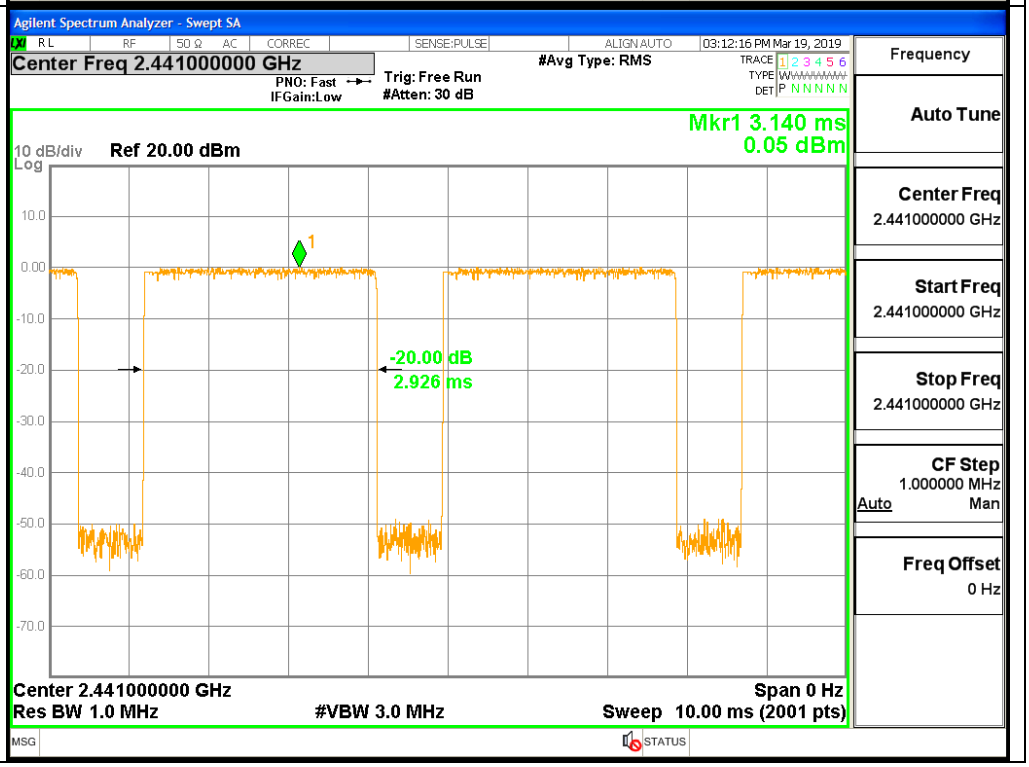
A.2 Dwell Time

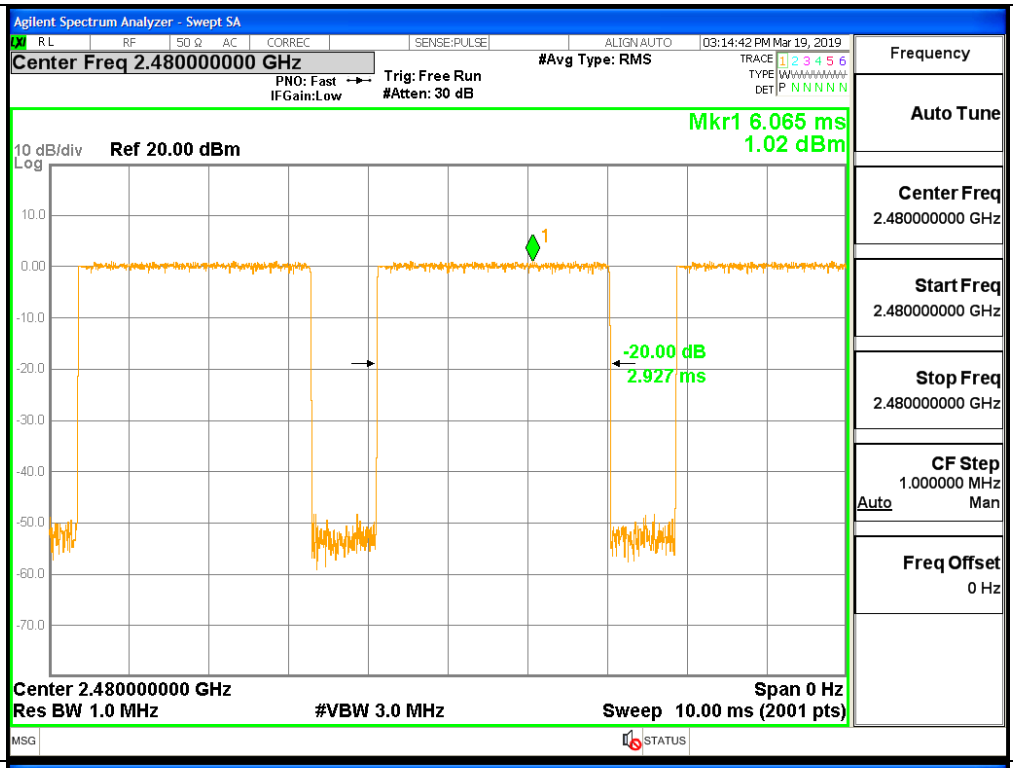
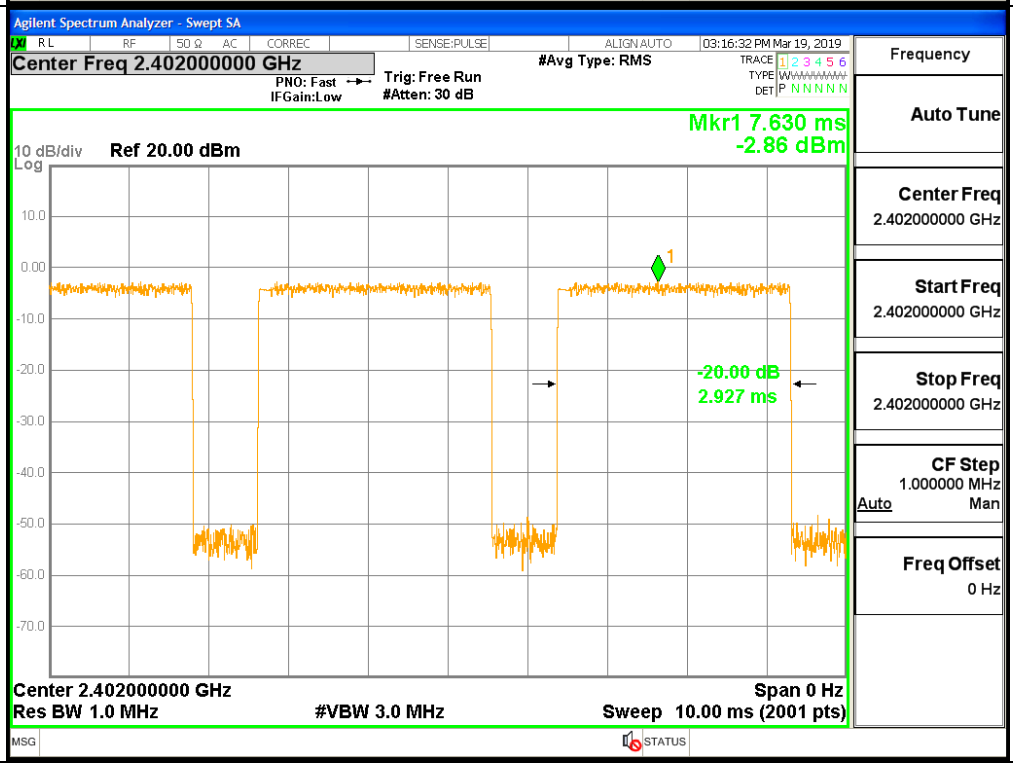
Mode	Packet	Channel	Burst Width [s/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	0.002918	106.7	0.311373	0.4	PASS
GFSK	DH5	MCH	0.002919	106.7	0.311479	0.4	PASS
GFSK	DH5	HCH	0.00292	106.7	0.311604	0.4	PASS
π/4DQPSK	2DH5	LCH	0.002927	106.7	0.312334	0.4	PASS
π/4DQPSK	2DH5	MCH	0.002926	106.7	0.312196	0.4	PASS
π/4DQPSK	2DH5	HCH	0.002927	106.7	0.312289	0.4	PASS
8DPSK	3DH5	LCH	0.002927	106.7	0.312297	0.4	PASS
8DPSK	3DH5	MCH	0.002927	106.7	0.312305	0.4	PASS
8DPSK	3DH5	HCH	0.002928	106.7	0.312443	0.4	PASS

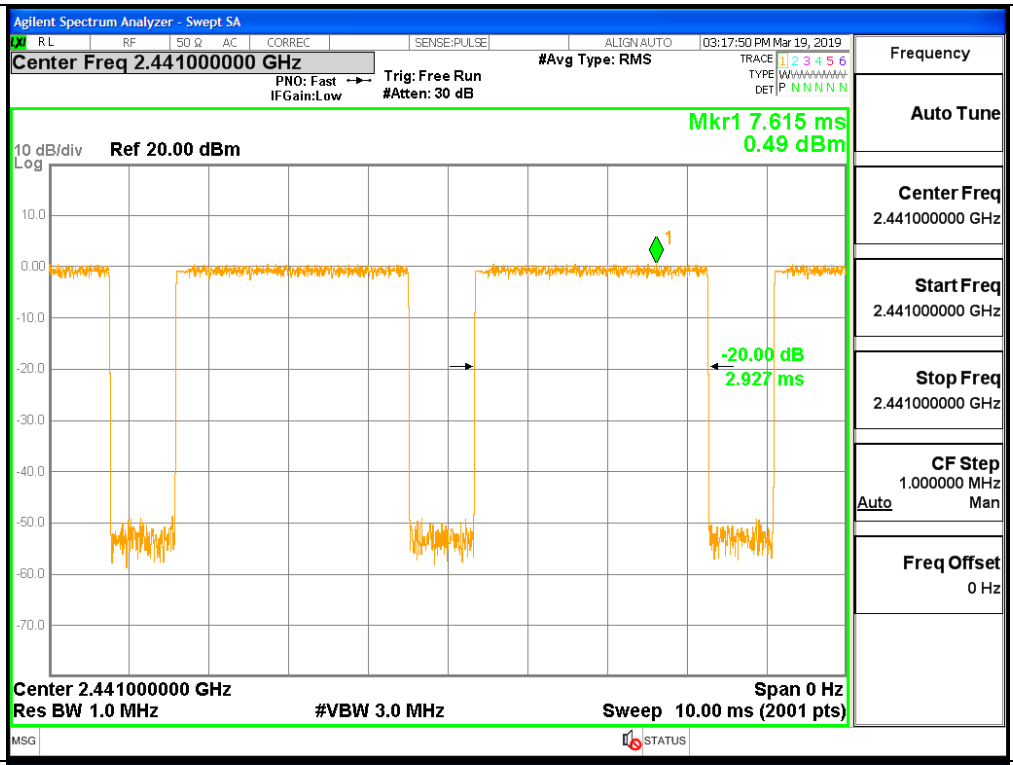
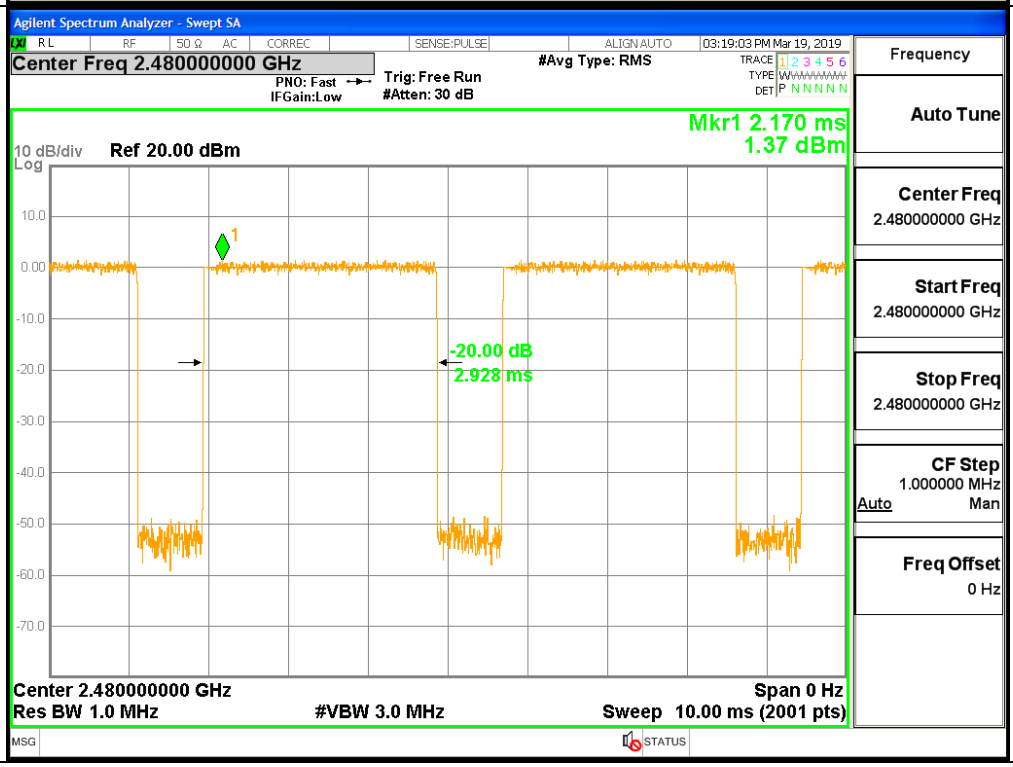
Test Graph

Graphs	
GFSK_DH5/LCH	

GFSK_DH5/MCH	
GFSK_DH5/HCH	

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

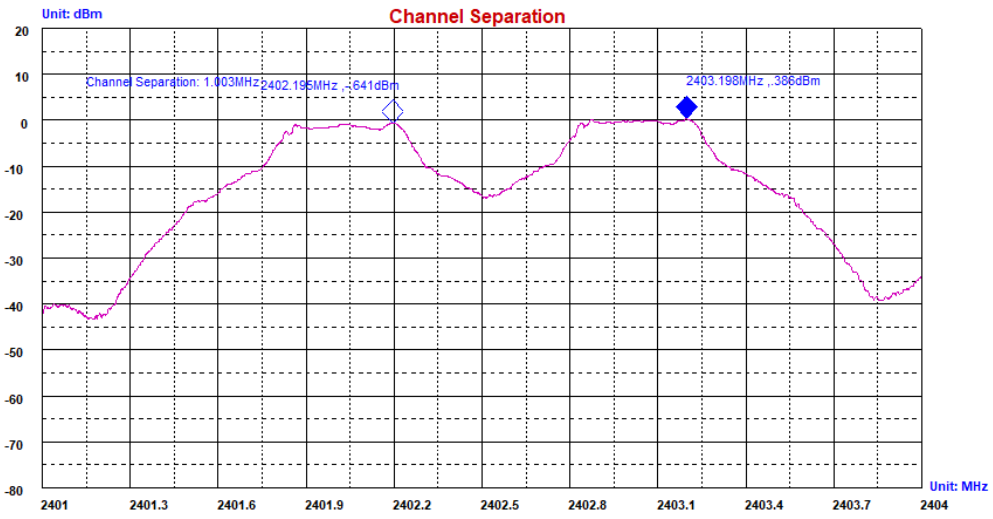
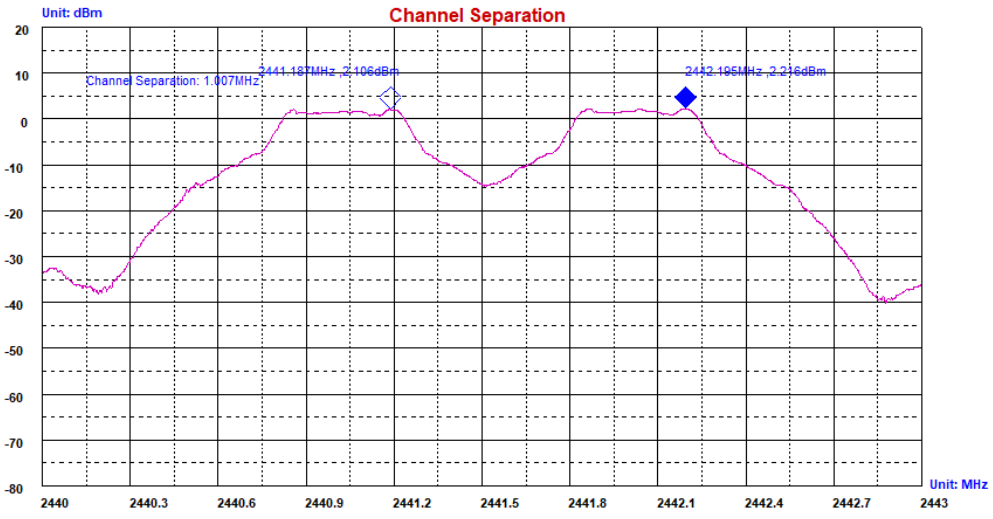
π/4DQPSK _2DH5/HCH	
8DPSK _3DH5/LCH	

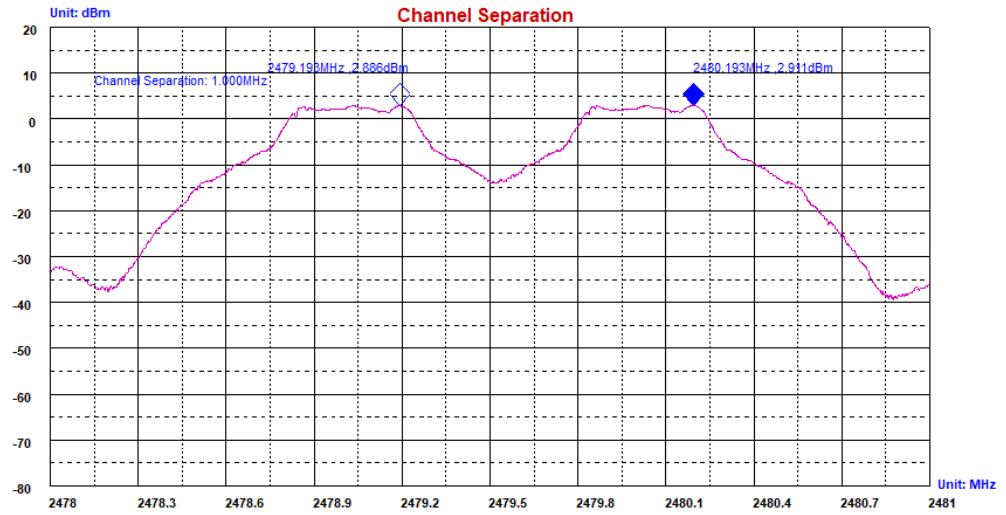
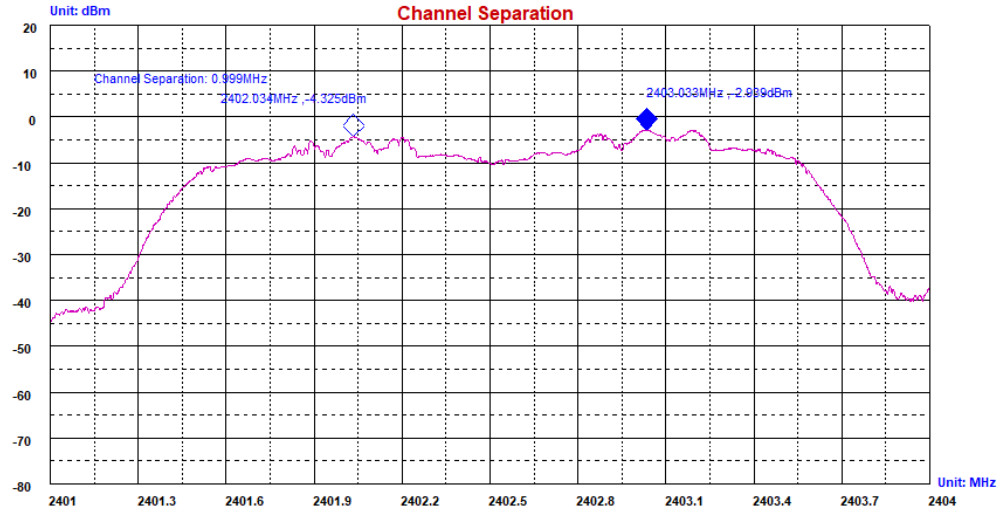
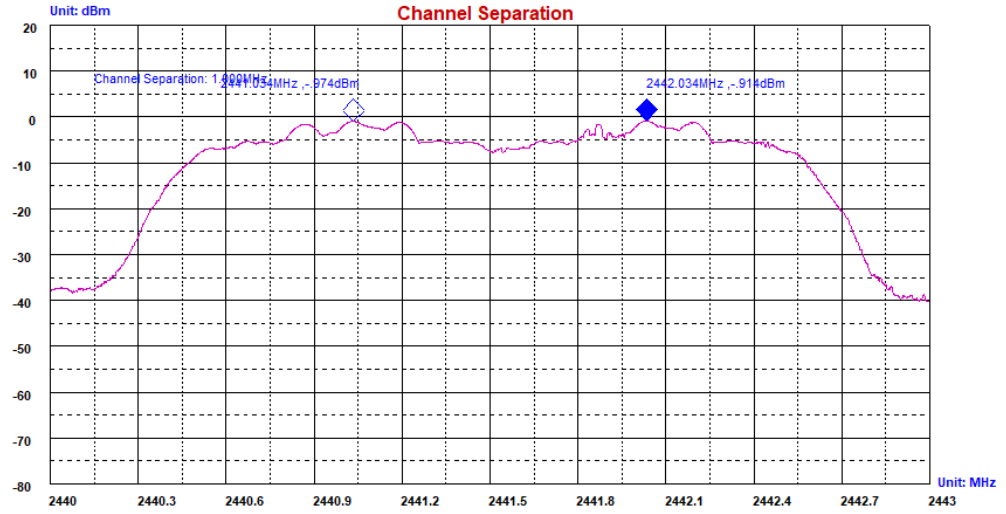
8DPSK _3DH5/MCH	
8DPSK _3DH5/HCH	

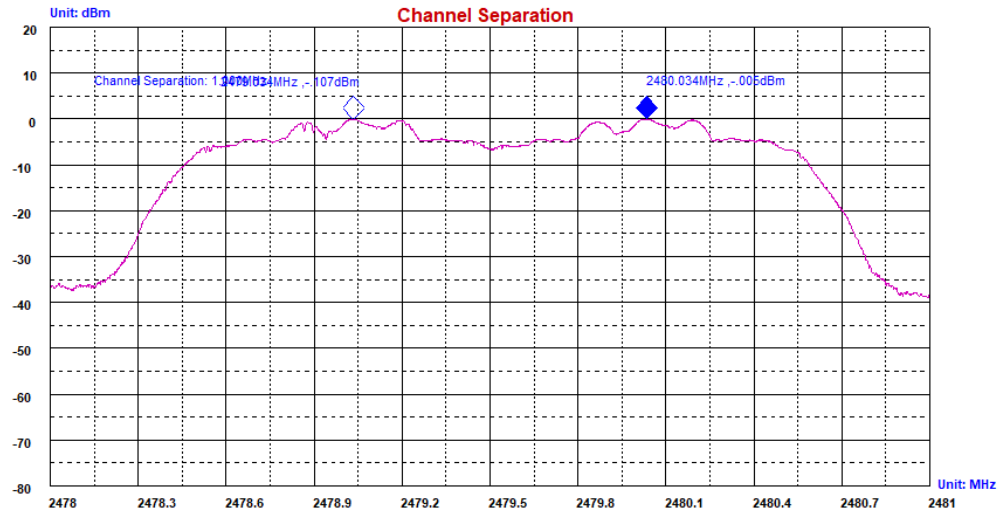
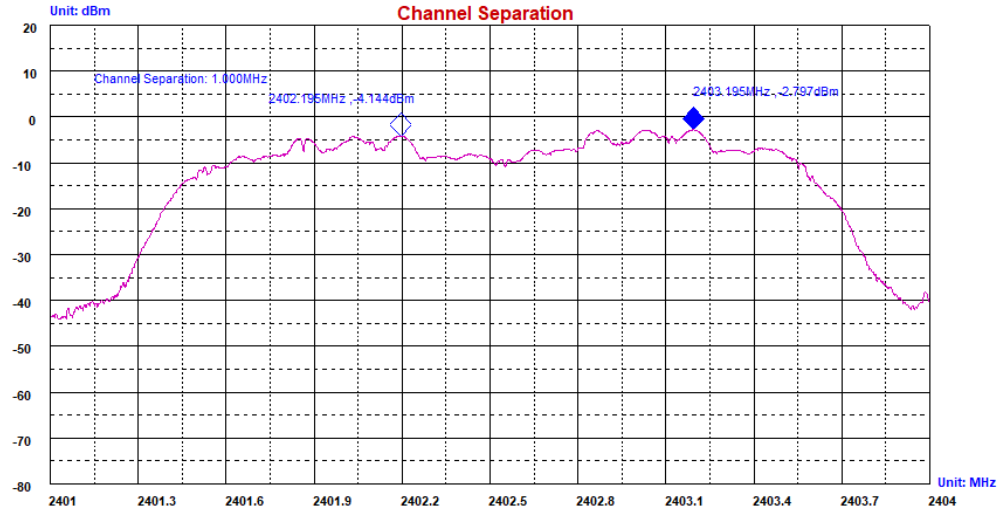
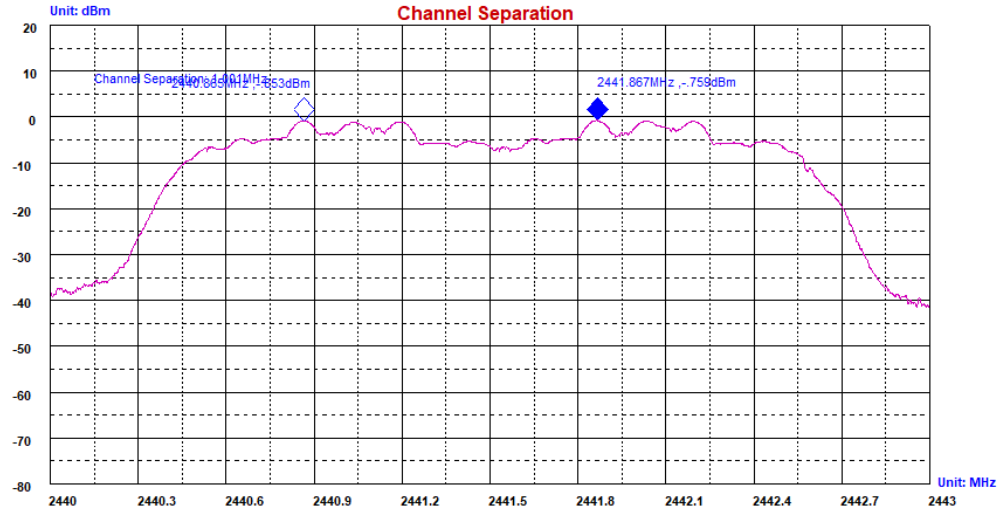
A.3 Carrier Frequency Separation

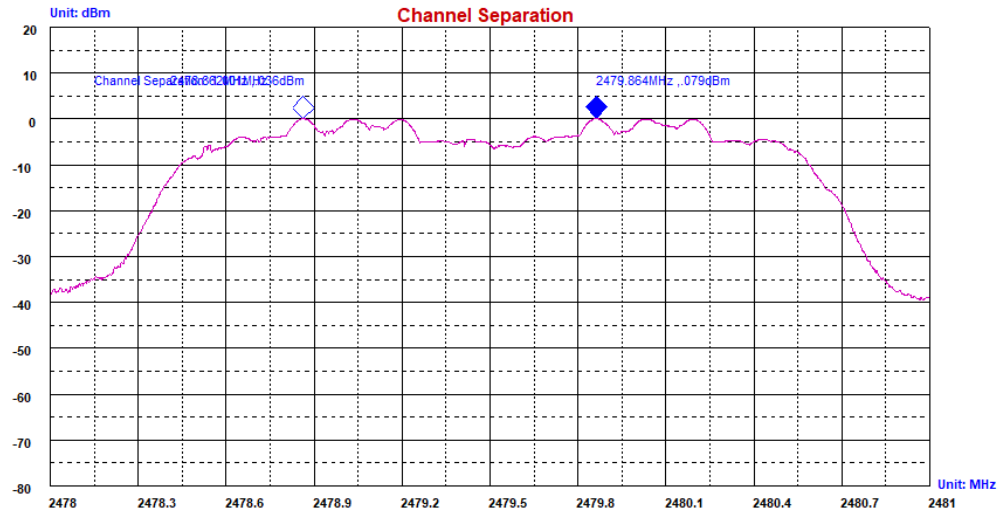
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit [MHz]	Verdict
GFSK	LCH	1.003	0.626	PASS
GFSK	MCH	1.007	0.624	PASS
GFSK	HCH	1.000	0.629	PASS
π/4DQPSK	LCH	0.999	0.857	PASS
π/4DQPSK	MCH	1.000	0.833	PASS
π/4DQPSK	HCH	1.000	0.819	PASS
8DPSK	LCH	1.000	0.865	PASS
8DPSK	MCH	1.001	0.837	PASS
8DPSK	HCH	1.001	0.835	PASS

Test Graph

Graphs	
GFSK/LCH	
GFSK/MCH	

GFSK/HCH	
π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	
8DPSK/LCH	
8DPSK/MCH	

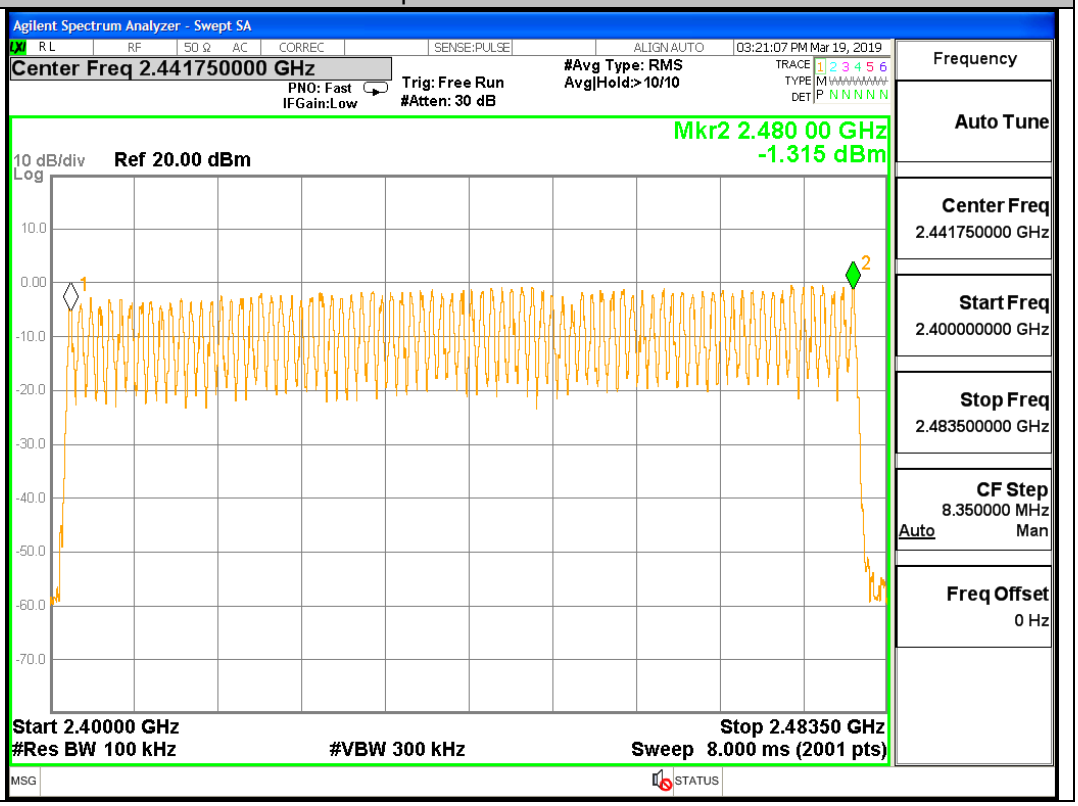
8DPSK/HCH	

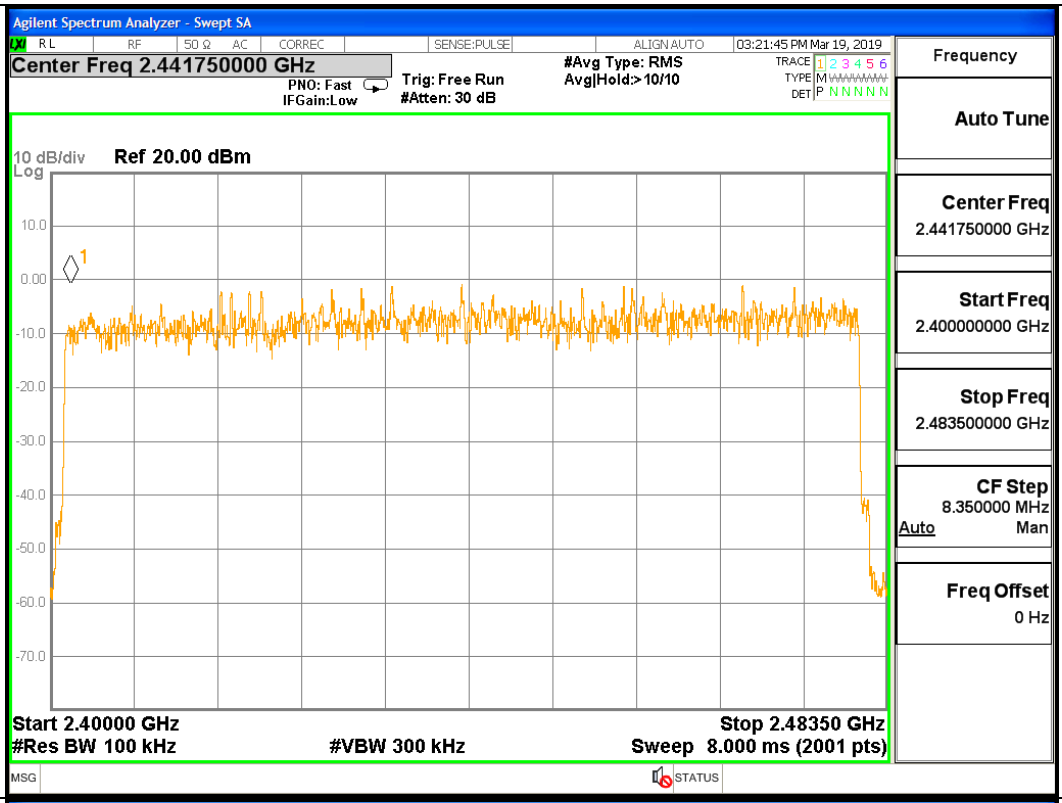
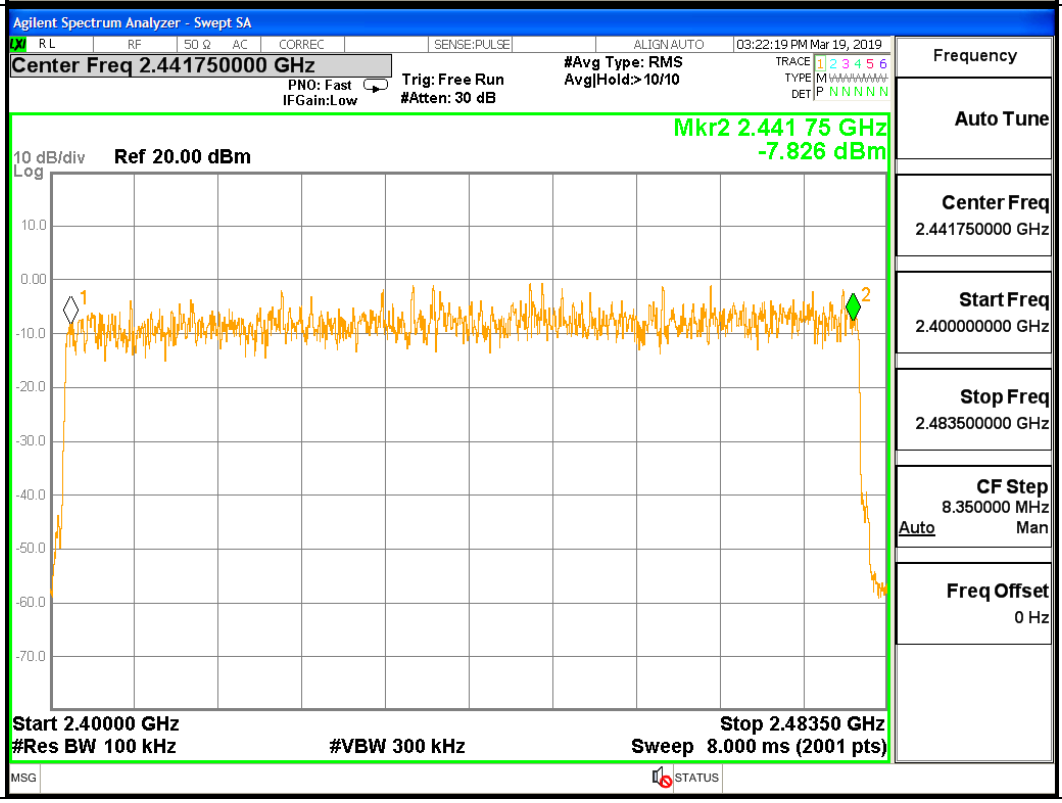
Unit: dBm
Channel Separation
20
10
0
-10
-20
-30
-40
-50
-60
-70
-80
2479.864MHz ,.079dBm
Unit: MHz
2478
2478.3
2478.6
2478.9
2479.2
2479.5
2479.8
2480.1
2480.4
2480.7
2481

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

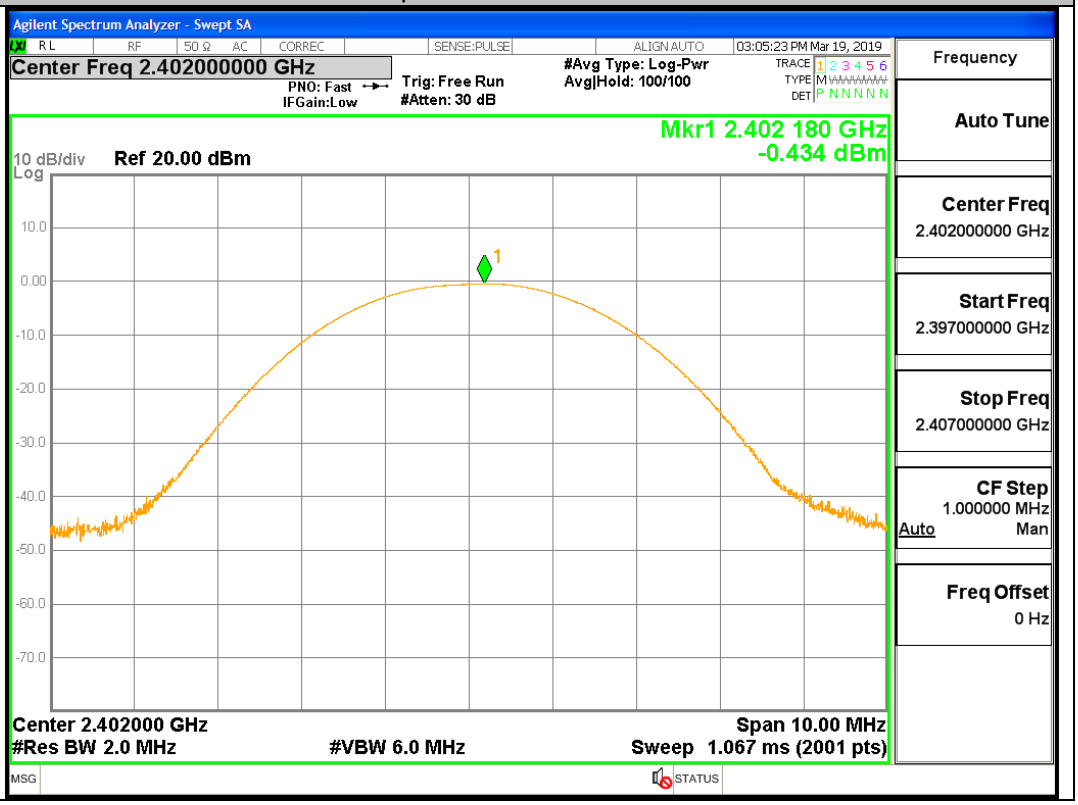
Graphs	
GFSK/Hop	

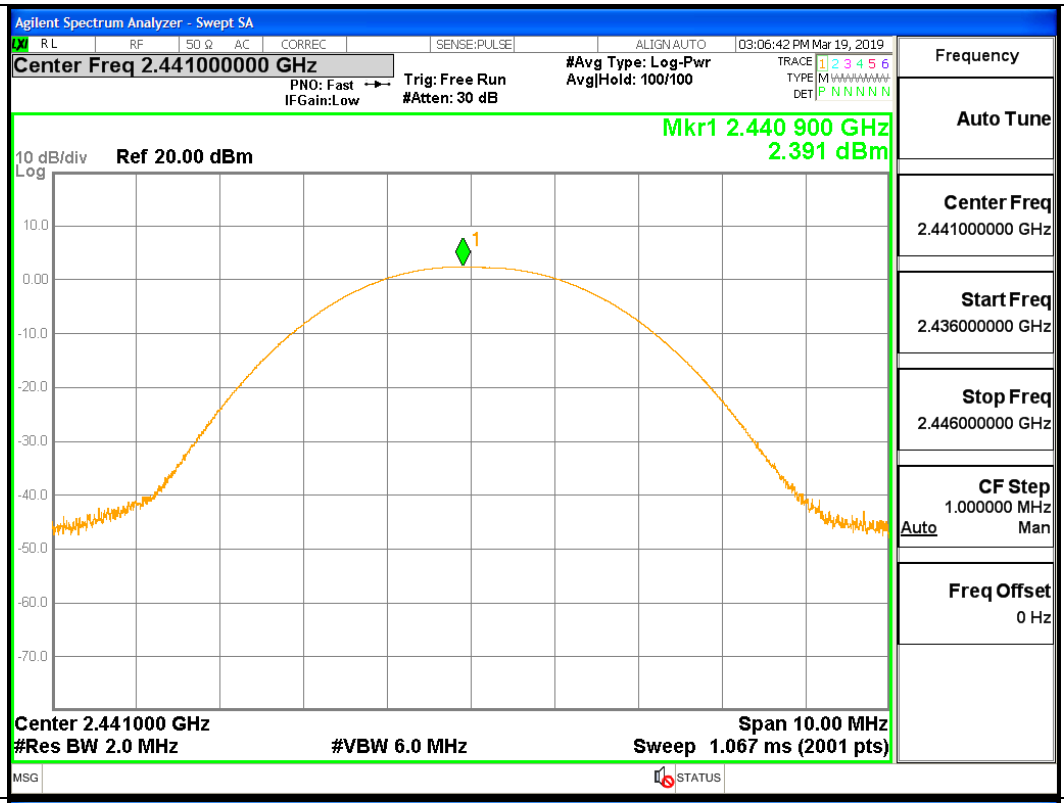
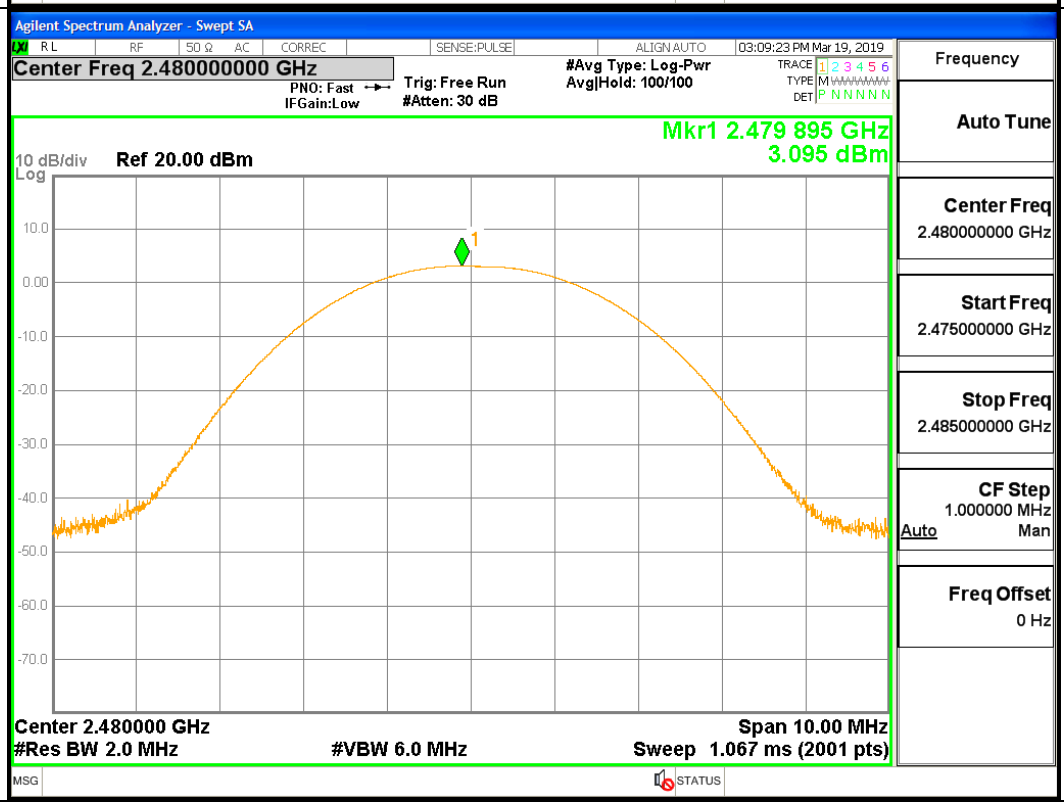
π/4DQPSK/Hop	
8DPSK/Hop	

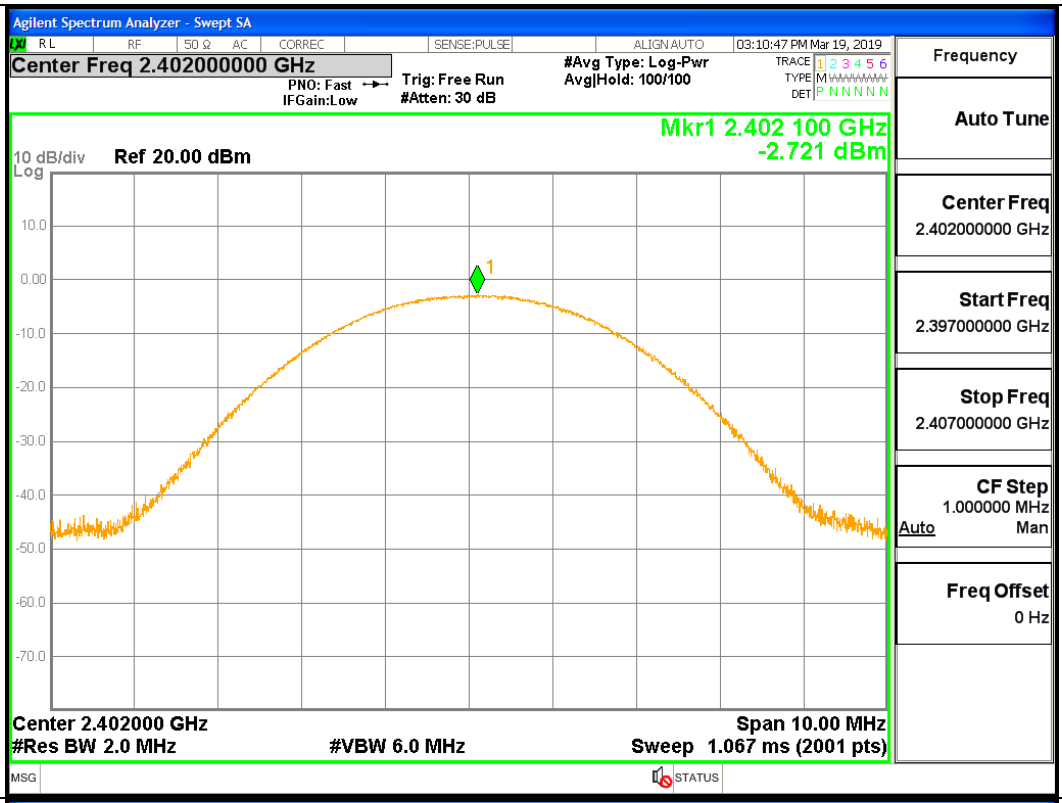
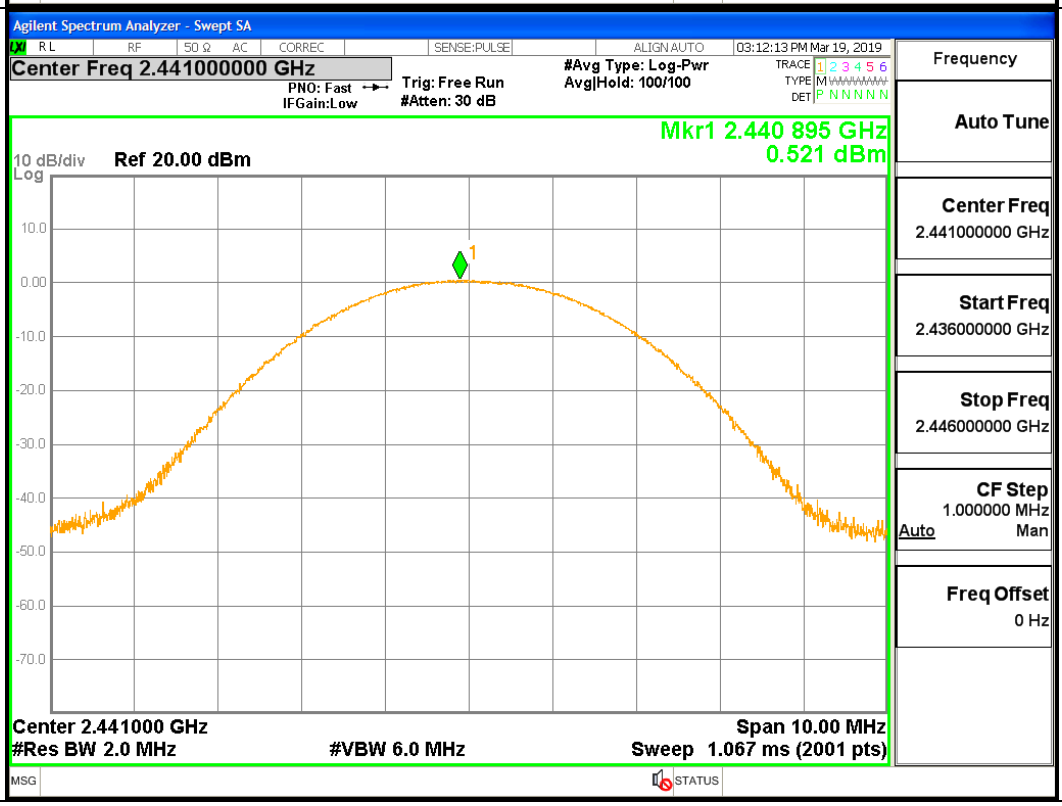
A.5 Conducted Peak Output Power

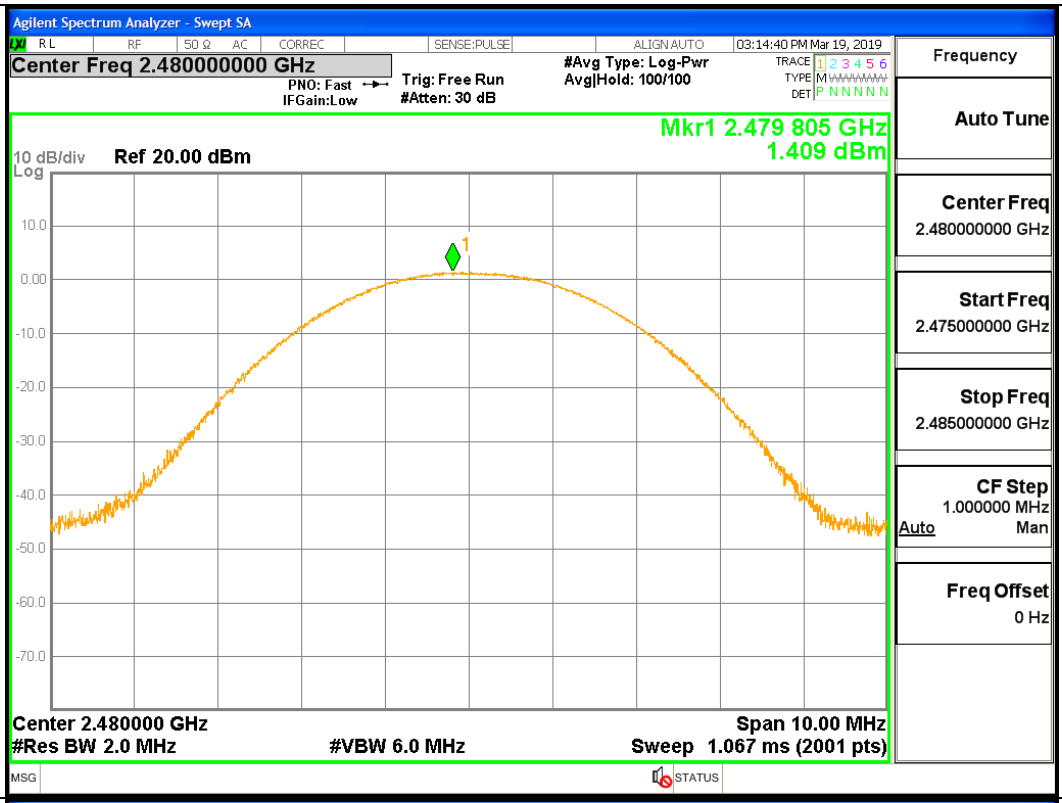
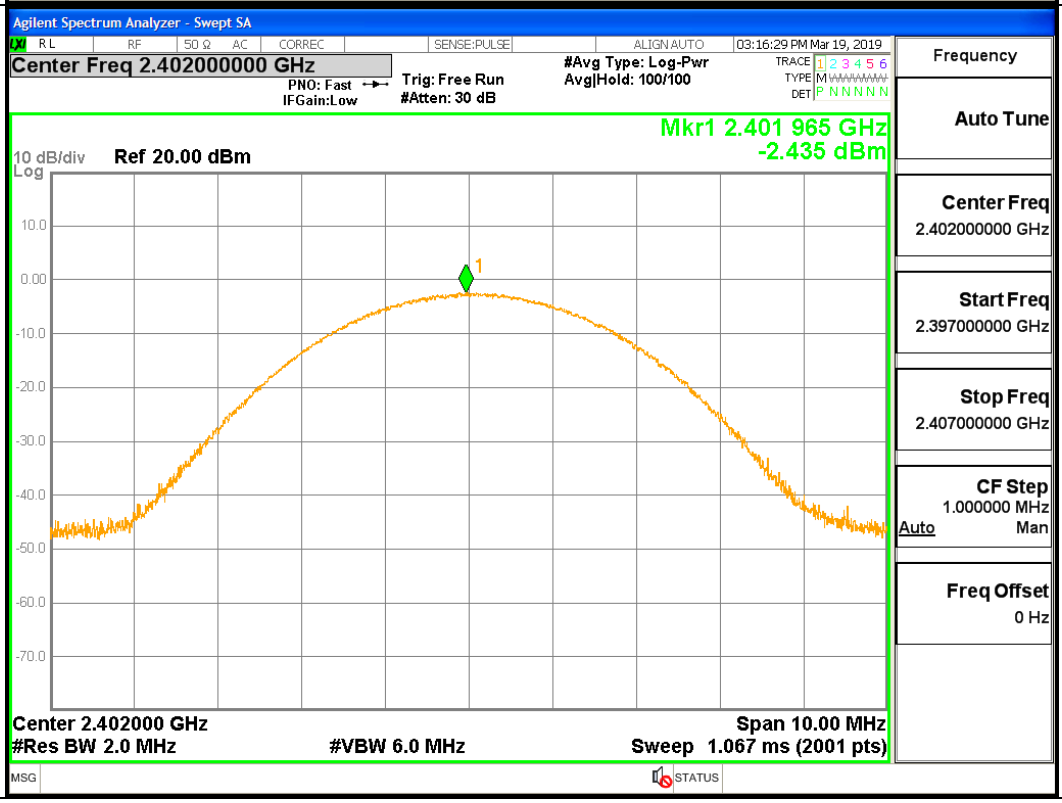
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit [dBm]	Verdict
GFSK	LCH	-0.434	21	PASS
GFSK	MCH	2.391	21	PASS
GFSK	HCH	3.095	21	PASS
π/4DQPSK	LCH	-2.721	21	PASS
π/4DQPSK	MCH	0.521	21	PASS
π/4DQPSK	HCH	1.409	21	PASS
8DPSK	LCH	-2.435	21	PASS
8DPSK	MCH	0.939	21	PASS
8DPSK	HCH	1.832	21	PASS

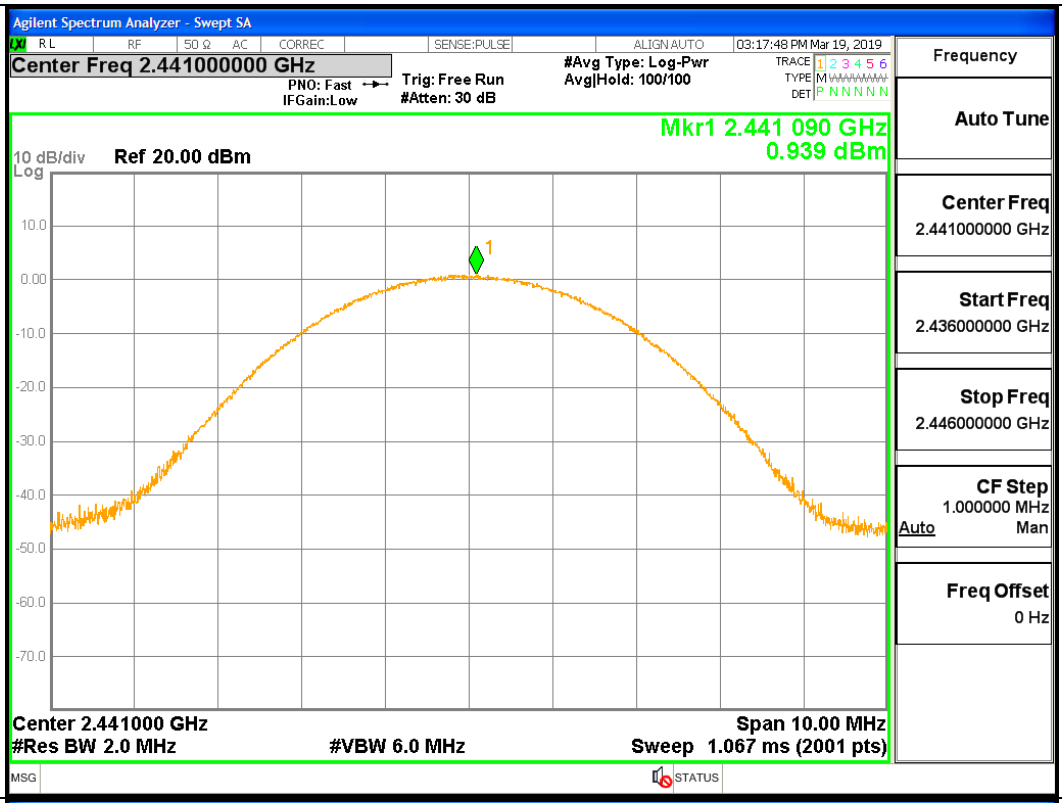
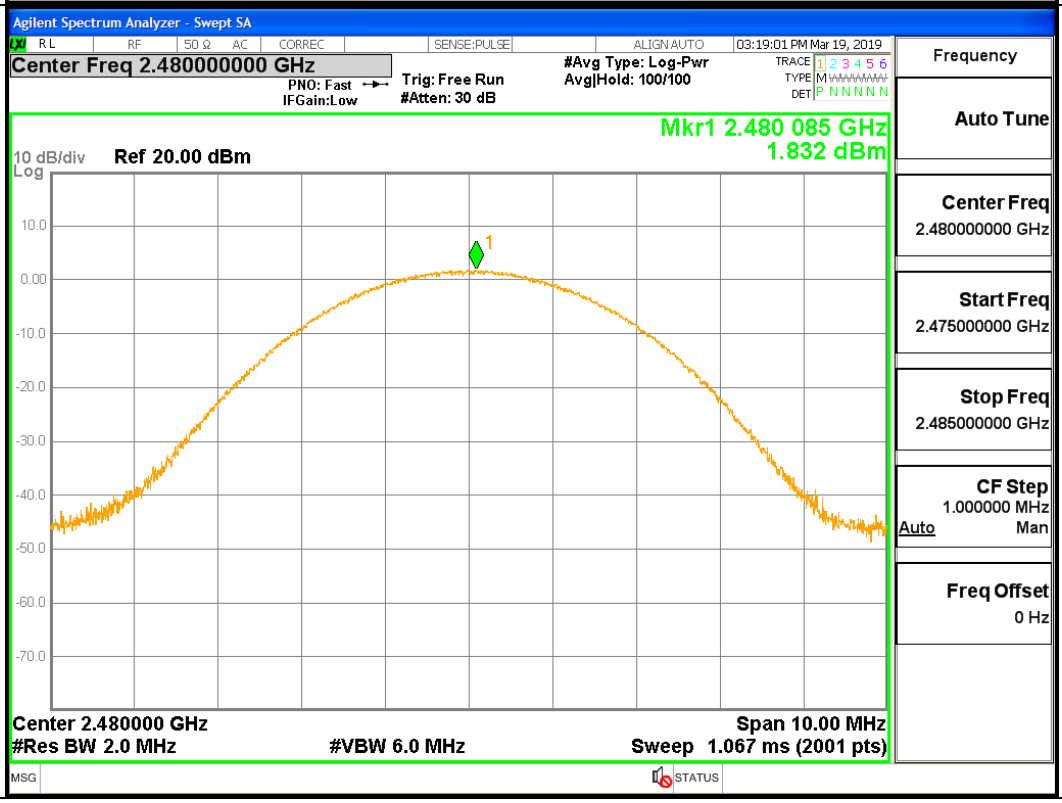
Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

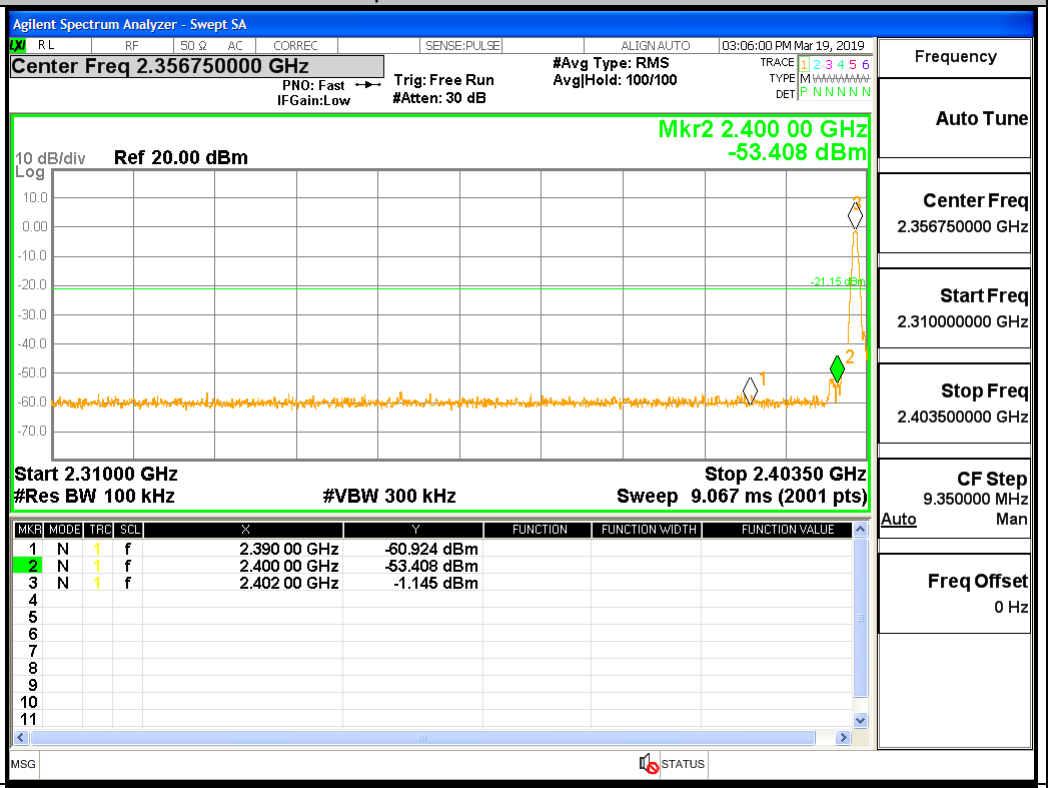
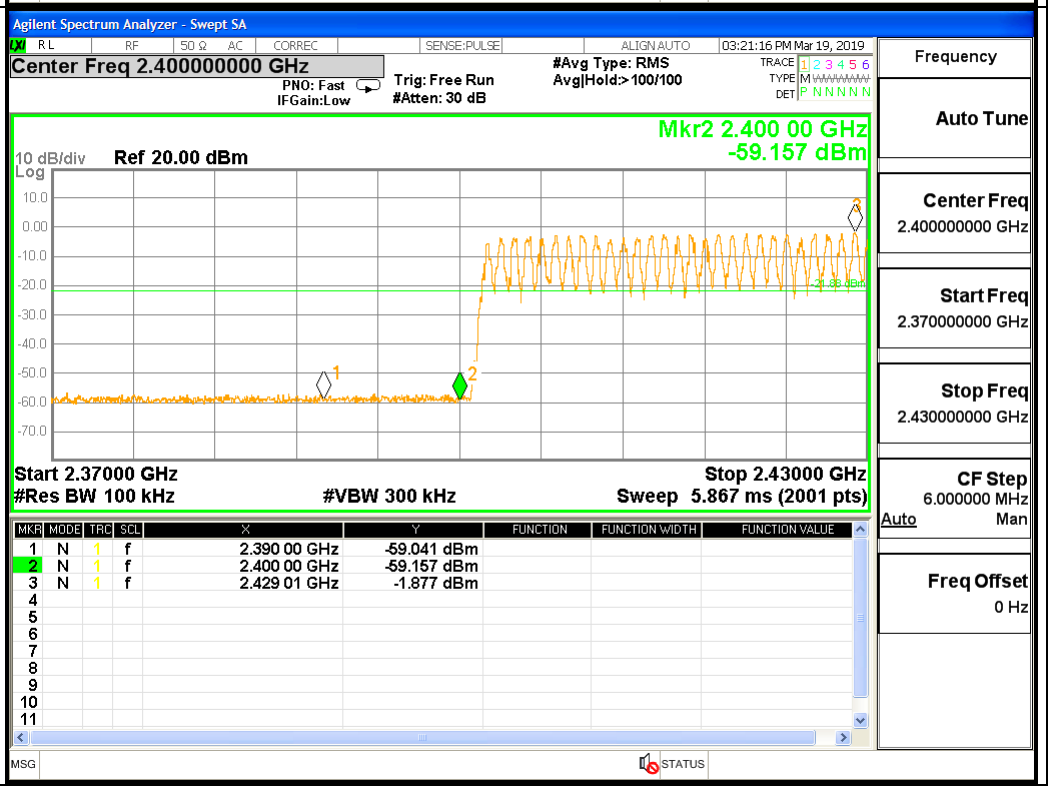
π/4DQPSK/HCH	
8DPSK/LCH	

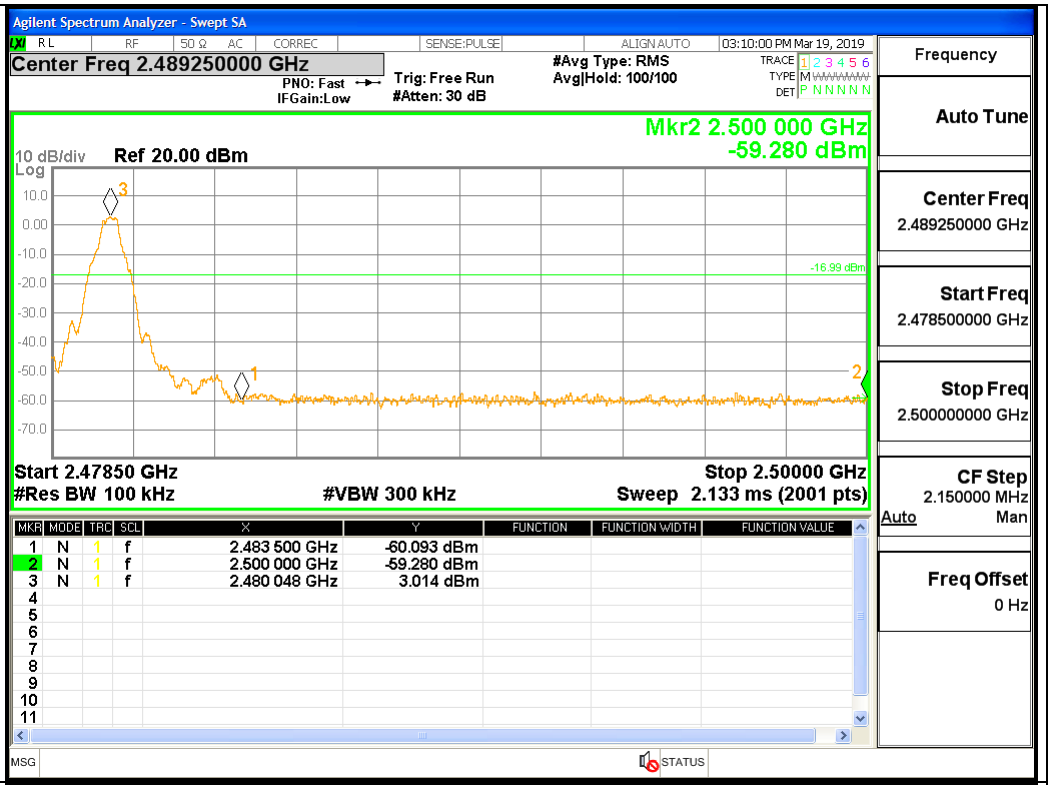
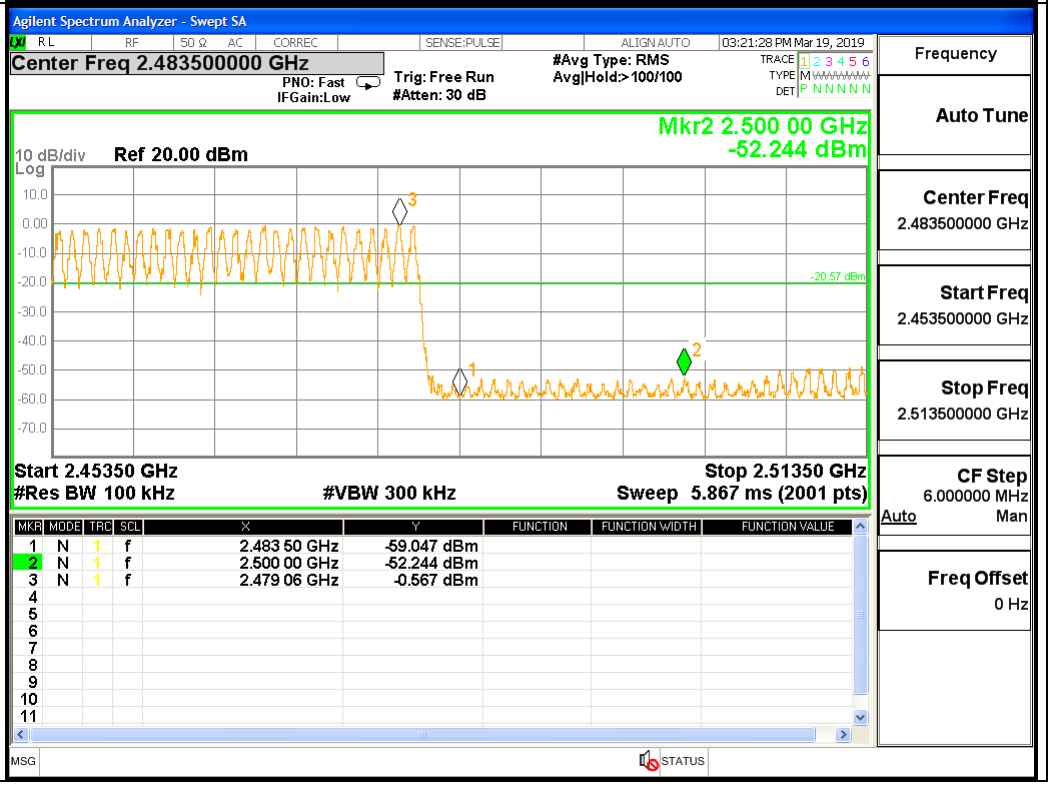
8DPSK/MCH	
8DPSK/HCH	

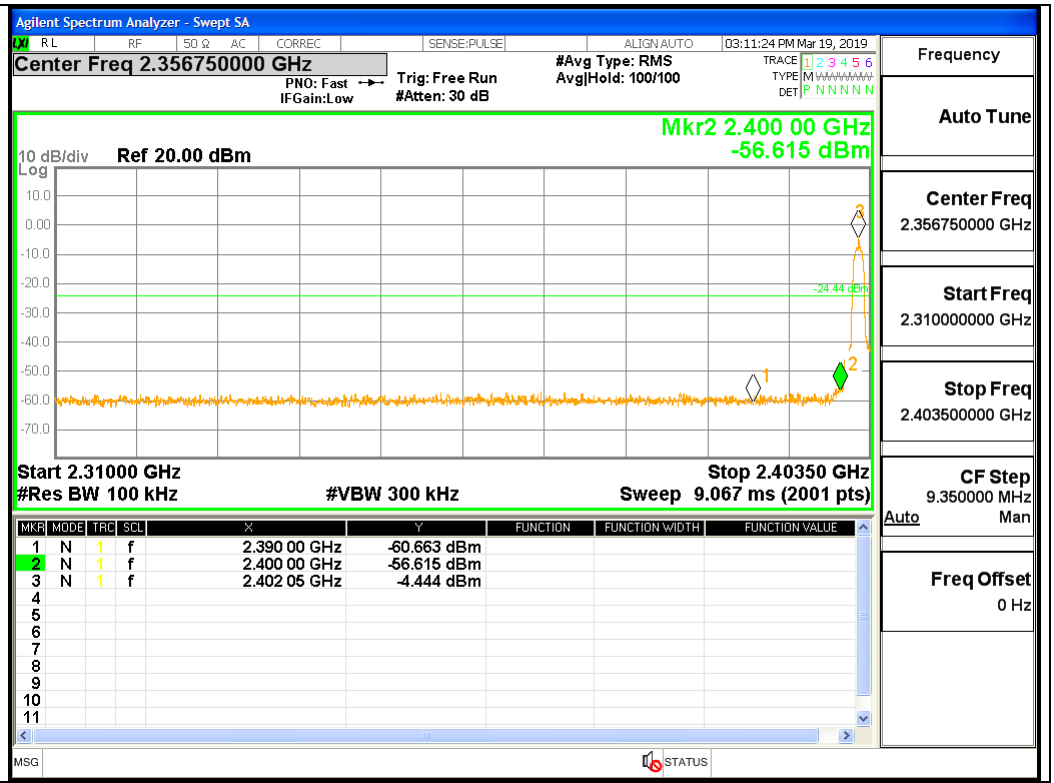
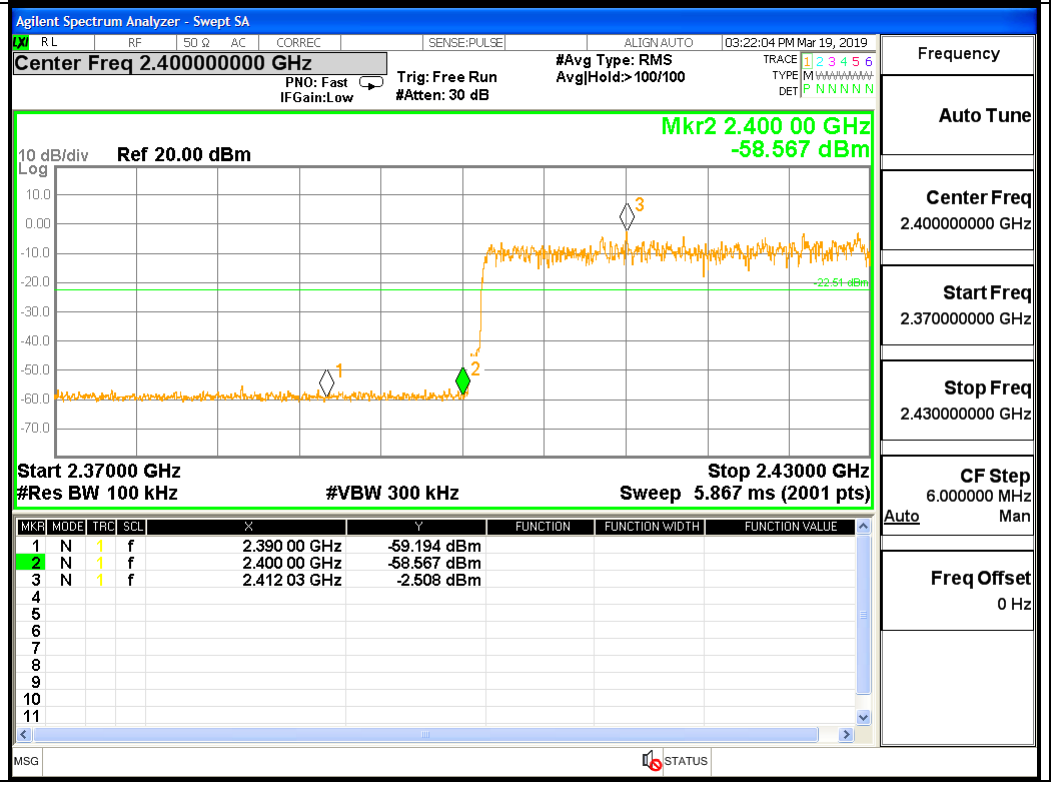
A.6 Band-edge for RF Conducted Emissions

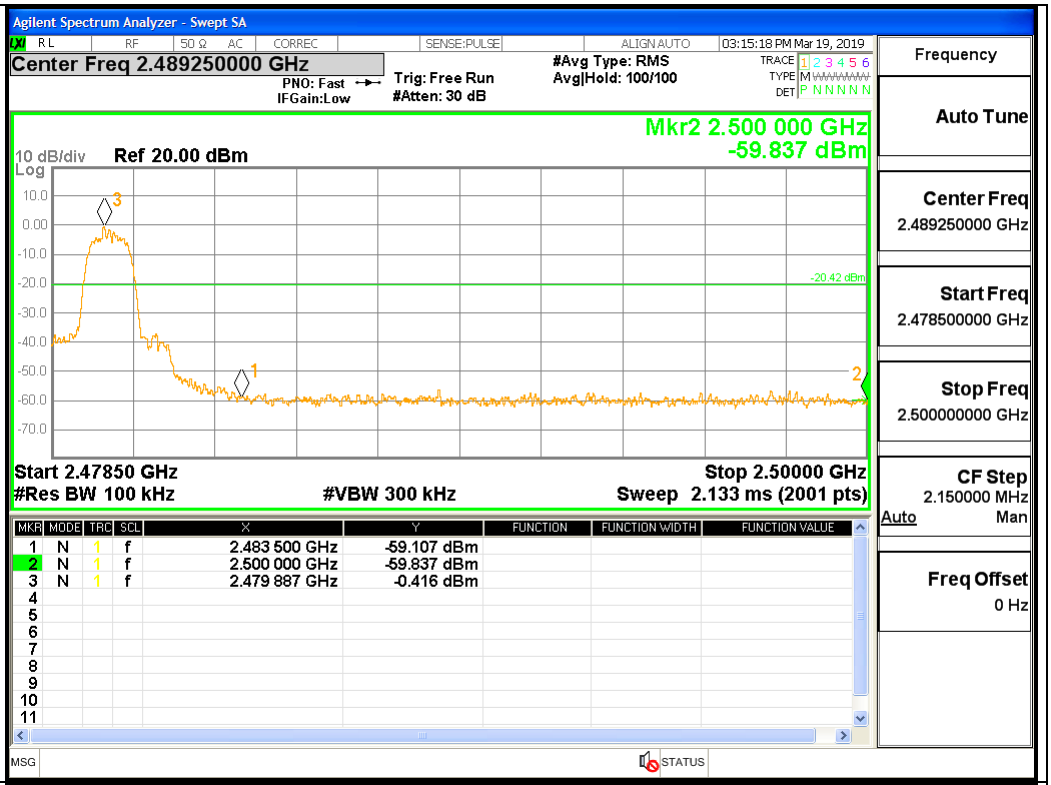
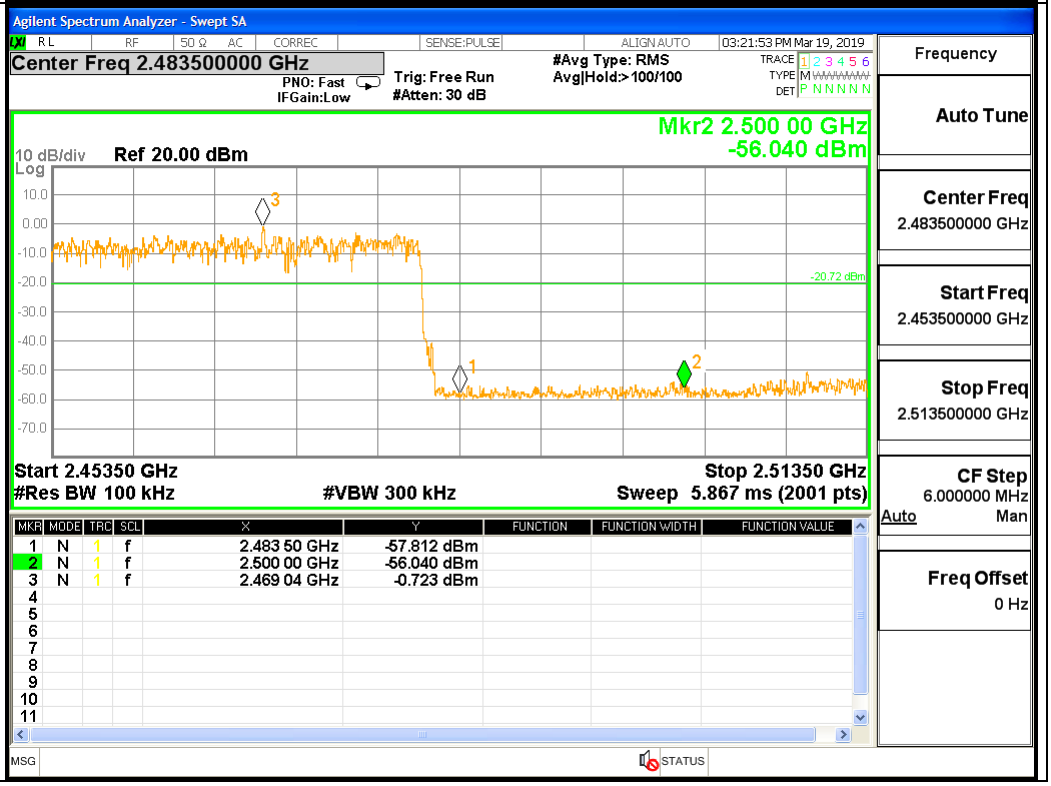
Type	Carrier Frequency(MHz)	Frequency(MHz)	Carrier Frequency Power [dBm]	Bandedge Peak(dBm)	Upper limit(dBm)	Conclusion
1DH5	2402	2390	-1.145	-60.92	-21.145	Pass
1DH5	2402	2400	-1.145	-53.41	-21.145	Pass
1DH5-Hopping	2402	2390	-1.877	-59.04	-21.877	Pass
1DH5-Hopping	2402	2400	-1.877	-59.16	-21.877	Pass
1DH5	2480	2483.5	3.014	-60.09	-16.986	Pass
1DH5	2480	2500	3.014	-59.28	-16.986	Pass
1DH5-Hopping	2480	2483.5	-0.567	-59.05	-20.567	Pass
1DH5-Hopping	2480	2500	-0.567	-55.36	-20.567	Pass
2DH5	2402	2390	-4.444	-60.66	-24.444	Pass
2DH5	2402	2400	-4.444	-56.62	-24.444	Pass
2DH5-Hopping	2480	2483.5	-0.723	-57.81	-20.723	Pass
2DH5-Hopping	2480	2500	-0.723	-56.04	-20.723	Pass
2DH5	2480	2483.5	-0.416	-59.11	-20.416	Pass
2DH5	2480	2500	-0.416	-59.84	-20.416	Pass
2DH5-Hopping	2402	2390	-2.508	-59.19	-22.508	Pass
2DH5-Hopping	2402	2400	-2.508	-58.57	-22.508	Pass
3DH5	2402	2390	-4.153	-59.04	-24.153	Pass
3DH5	2402	2400	-4.153	-55.90	-24.153	Pass
3DH5-Hopping	2402	2390	-3.283	-60.19	-23.283	Pass
3DH5-Hopping	2402	2400	-3.283	-59.64	-23.283	Pass
3DH5	2480	2483.5	-0.073	-55.58	-20.073	Pass
3DH5	2480	2500	-0.073	-58.79	-20.073	Pass
3DH5-Hopping	2480	2483.5	-1.644	-56.88	-21.644	Pass
3DH5-Hopping	2480	2500	-1.644	-55.15	-21.644	Pass

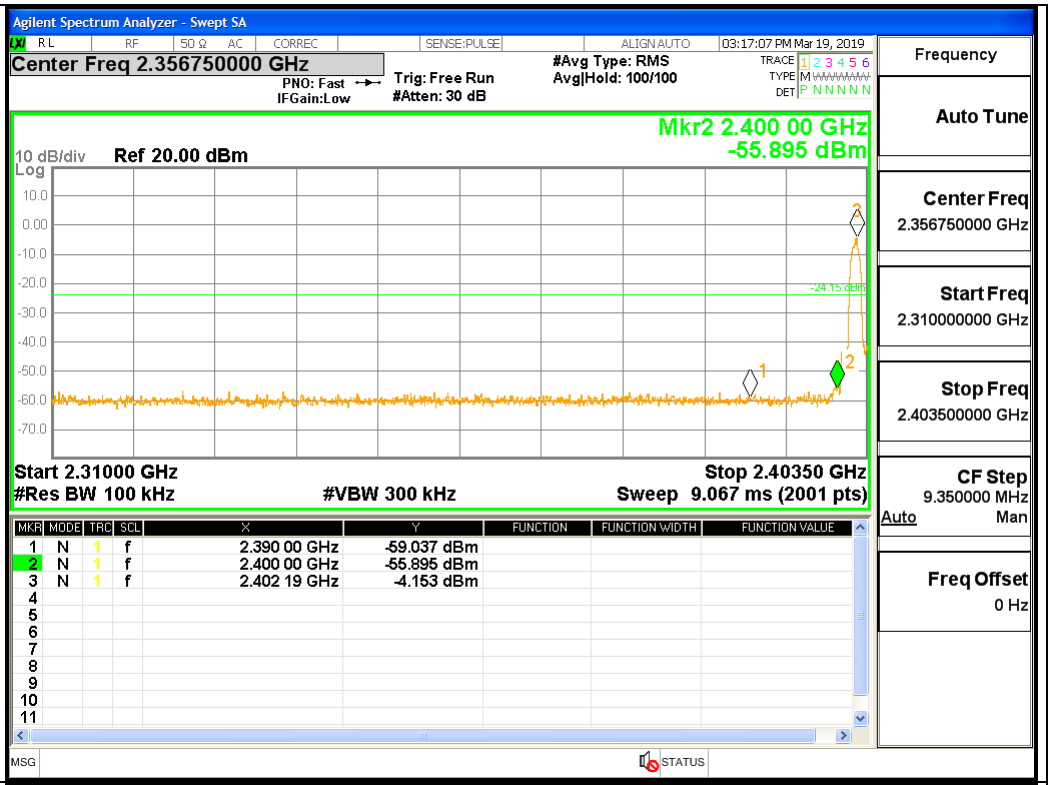
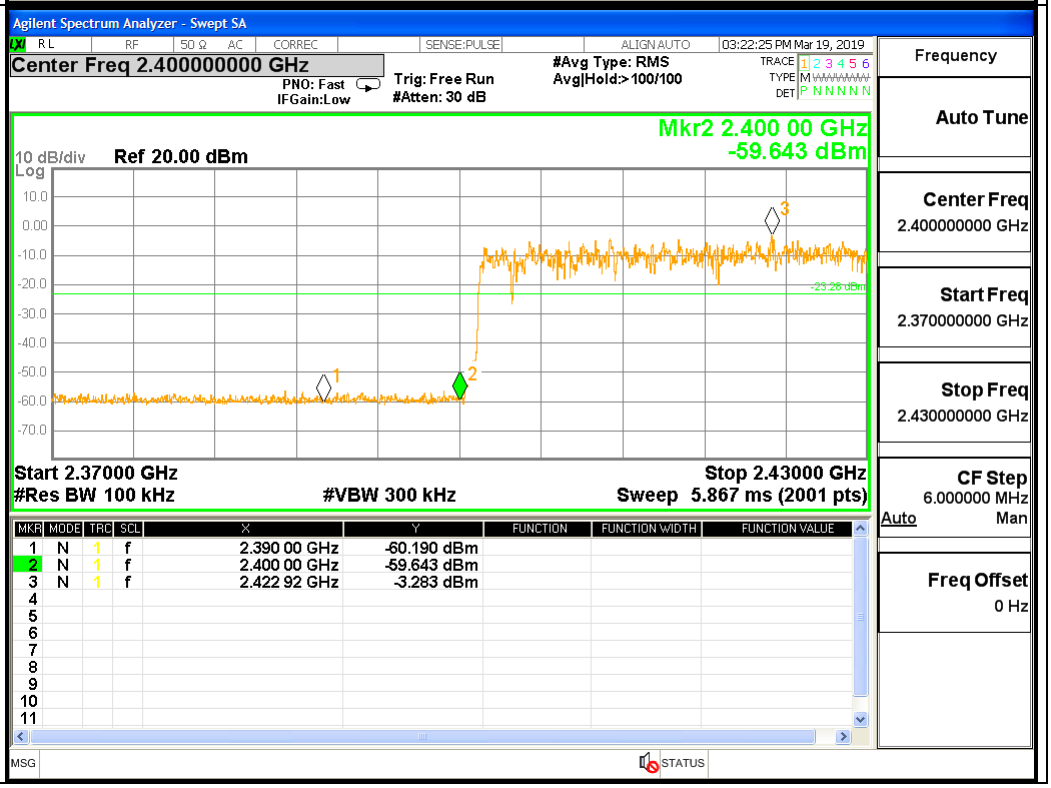
Test Graph

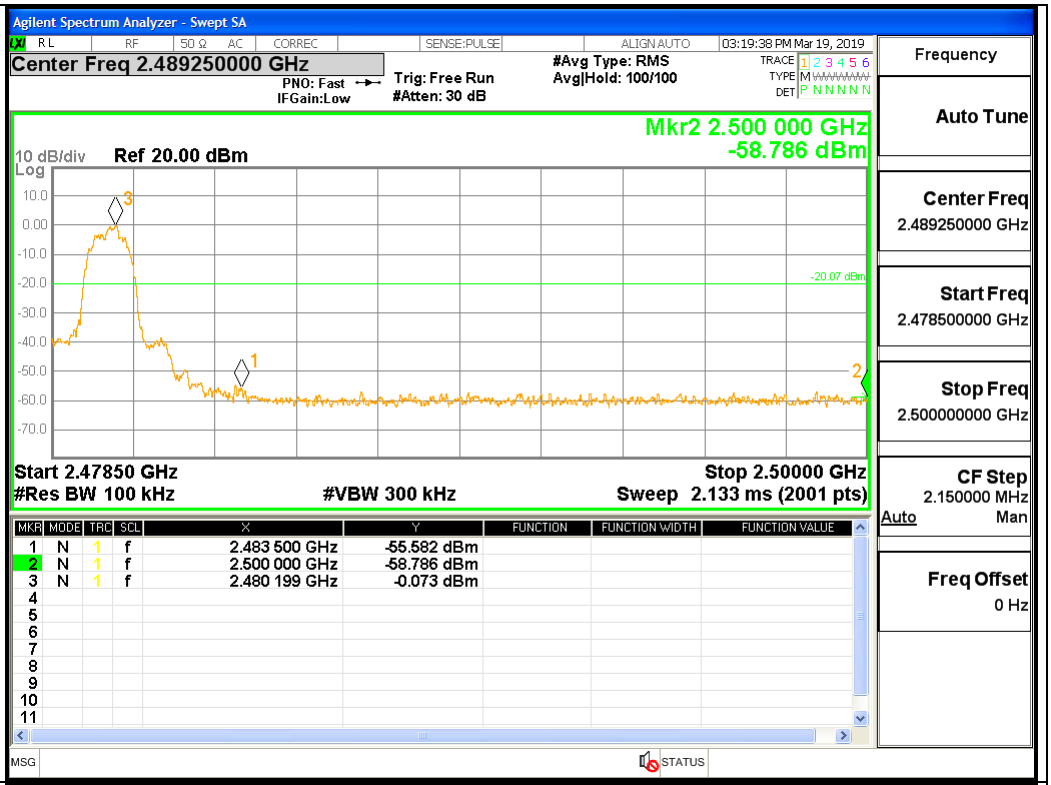
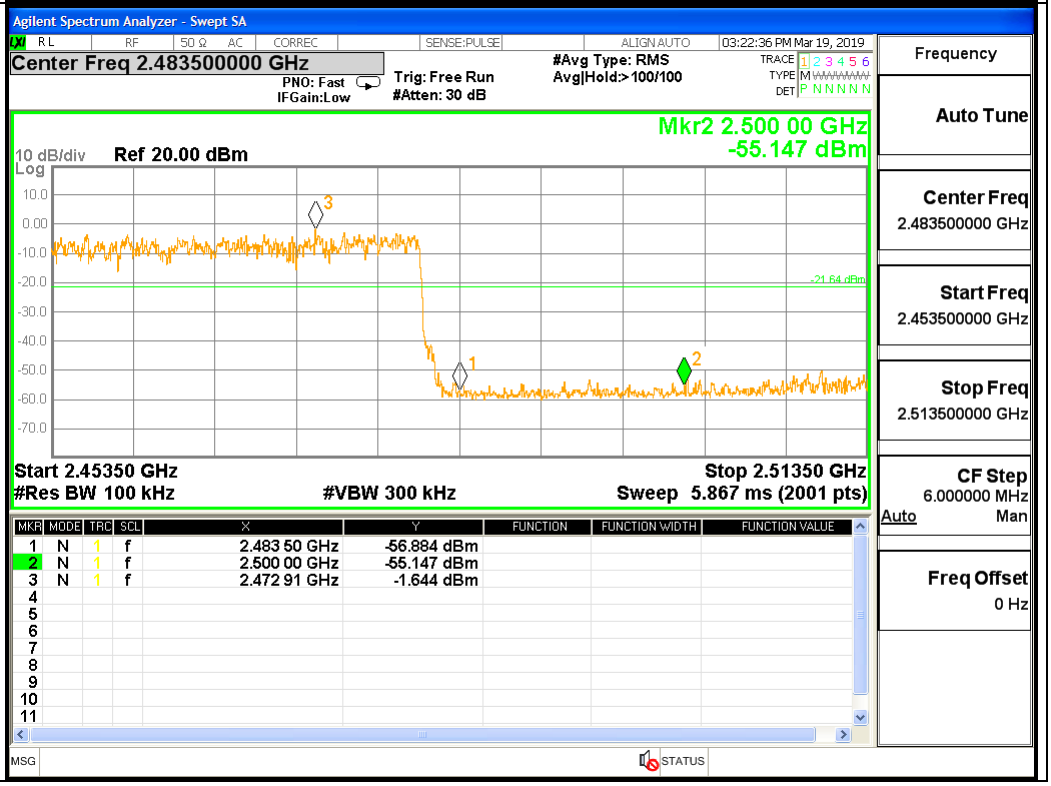
Graphs	
GFSK/LCH/No Hop	
GFSK/LCH/Hop	

GFSK/HCH/No Hop	
GFSK/HCH/Hop	

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

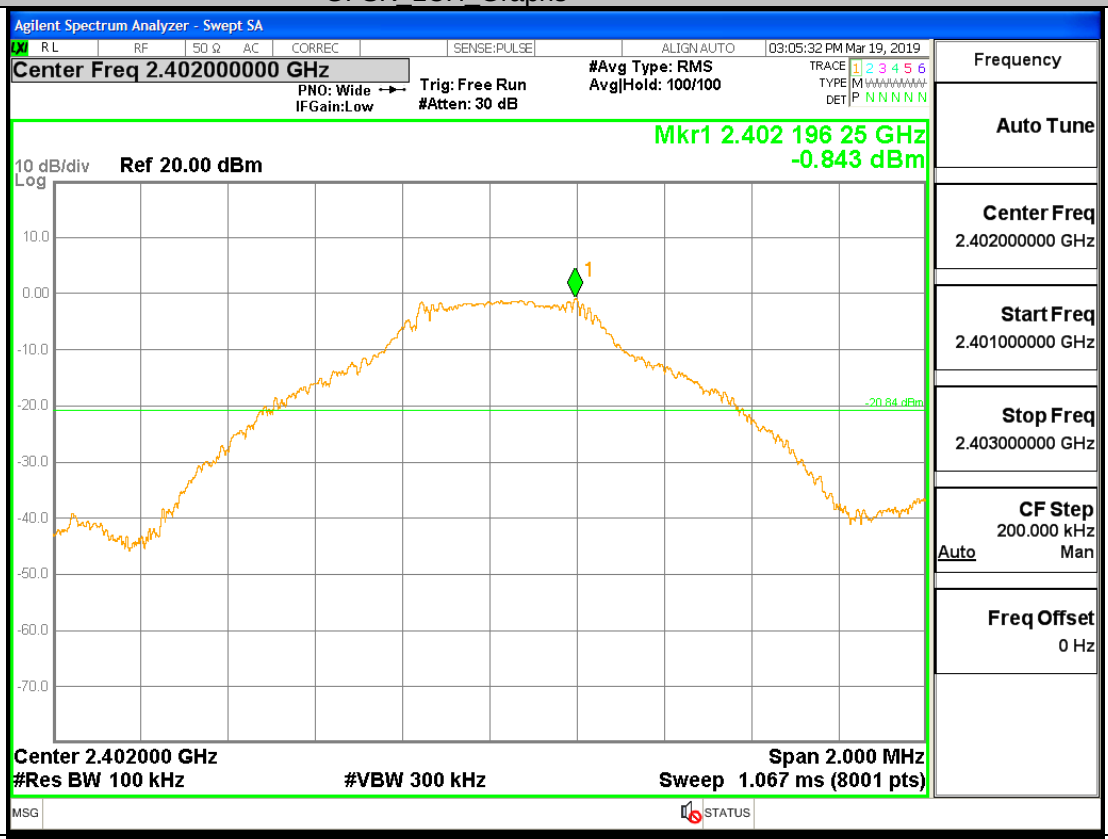
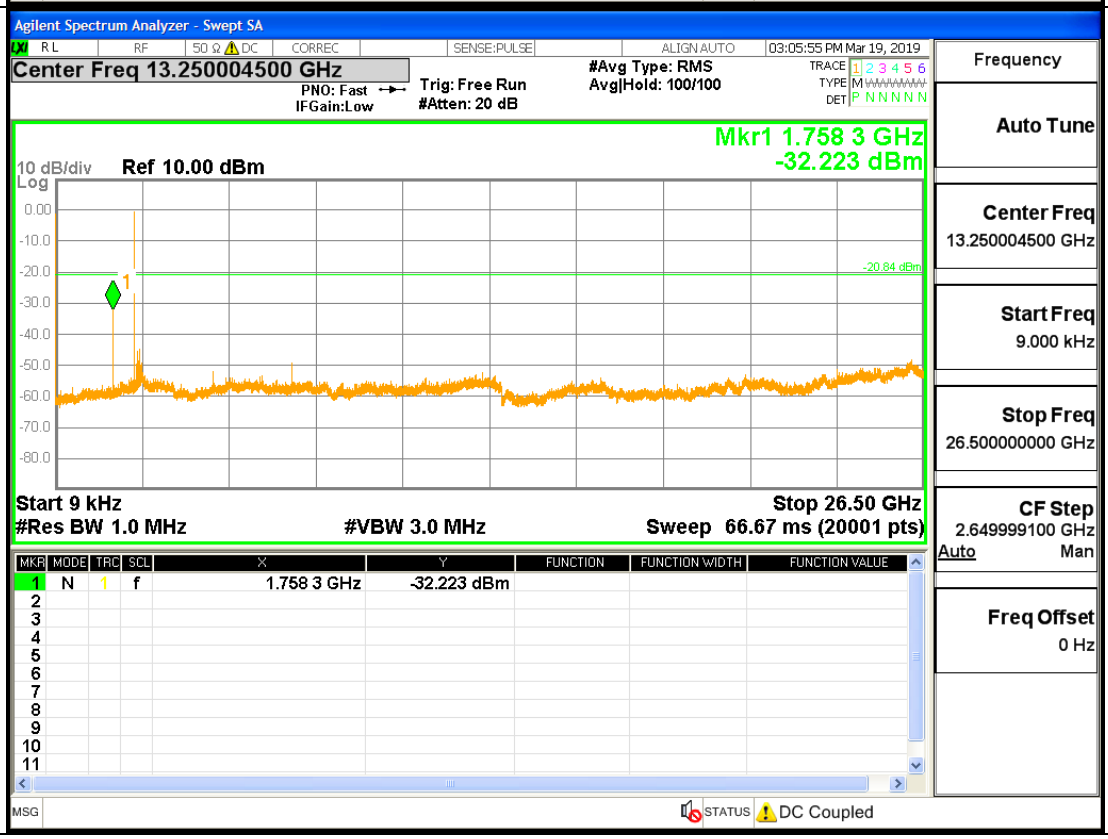
π/4DQPSK/HCH/No Hop	
π/4DQPSK/HCH/Hop	

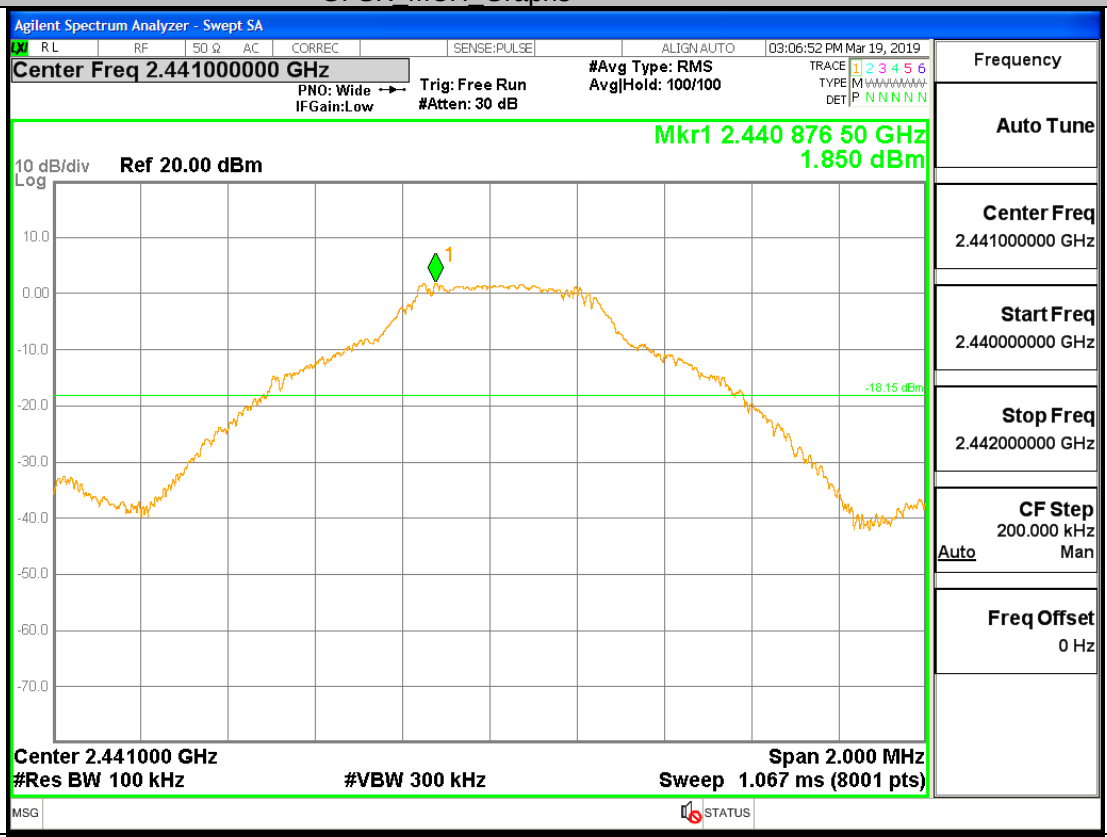
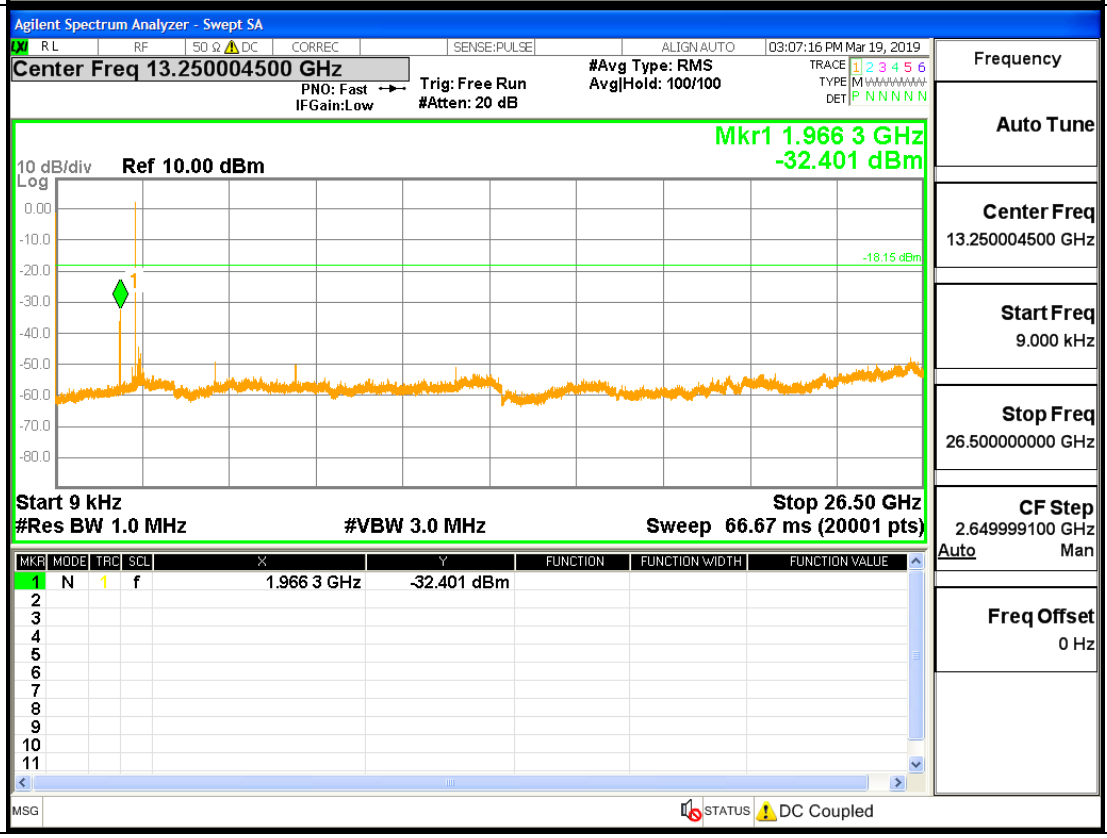
8DPSK/LCH/No Hop	
8DPSK/LCH/Hop	

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	

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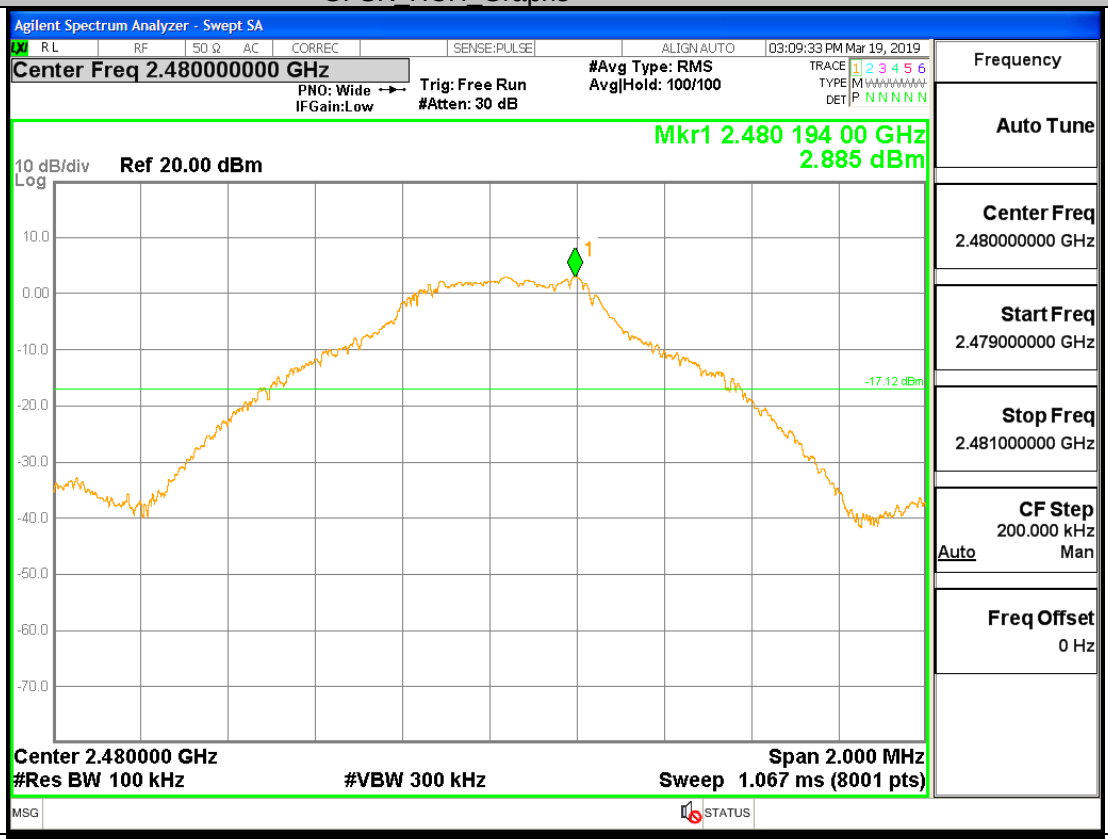
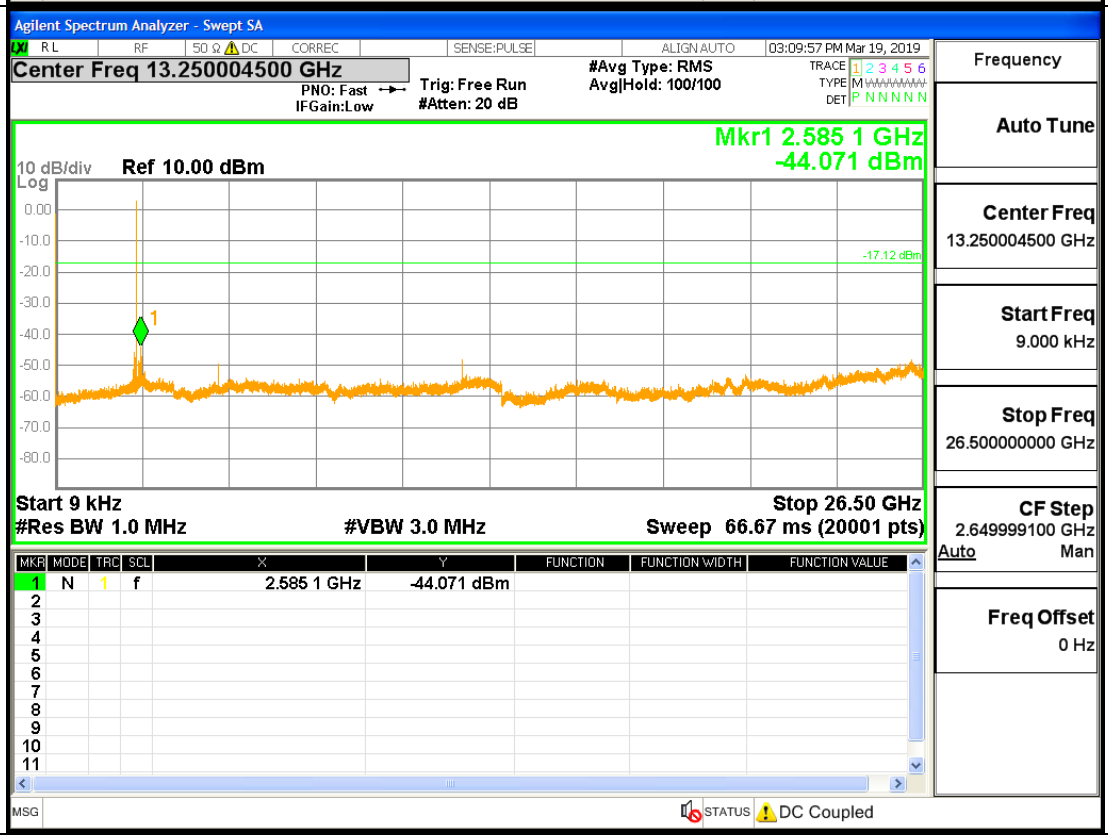
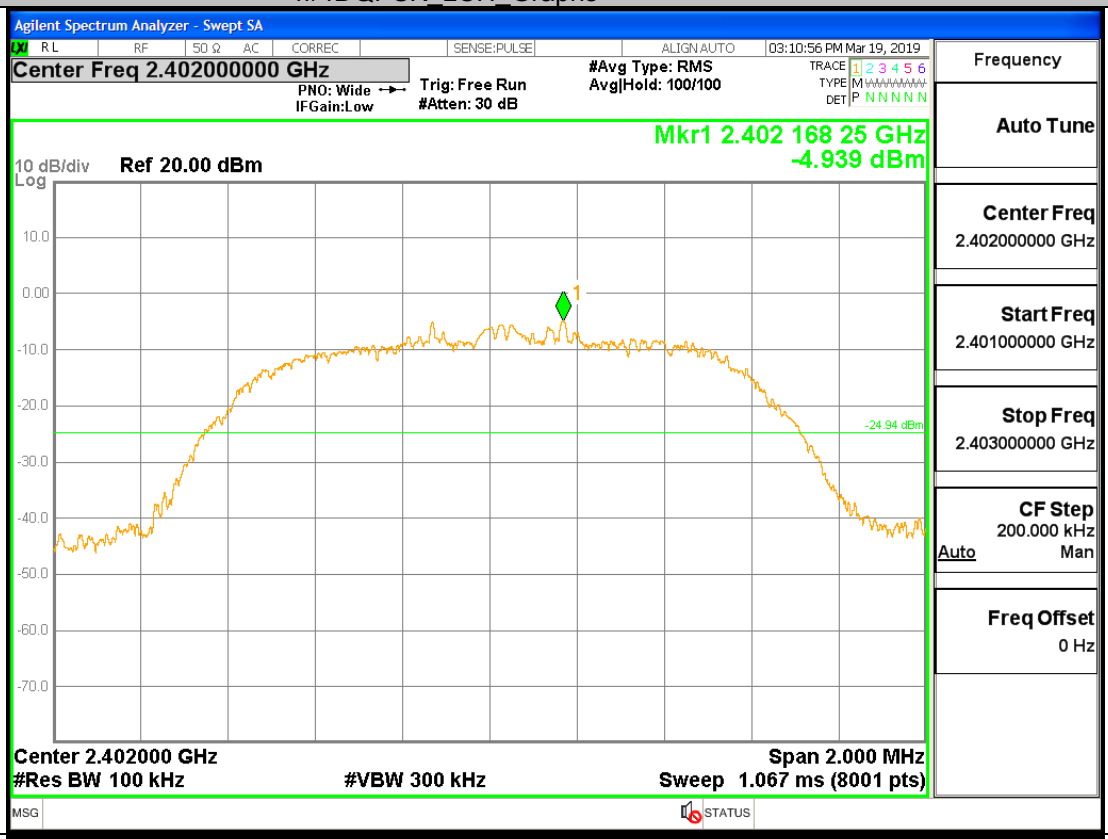
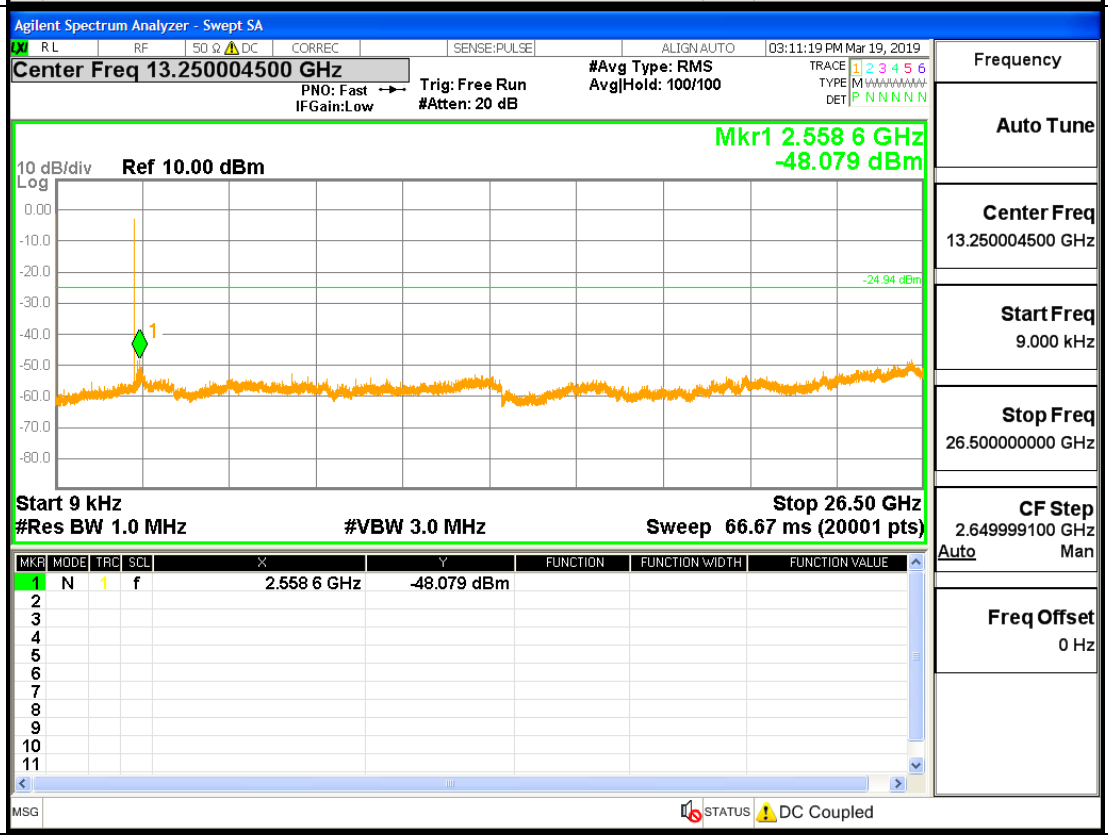
Pref	
Puw	

π/4DQPSK_LCH_Graphs	
Pref	
Puw	

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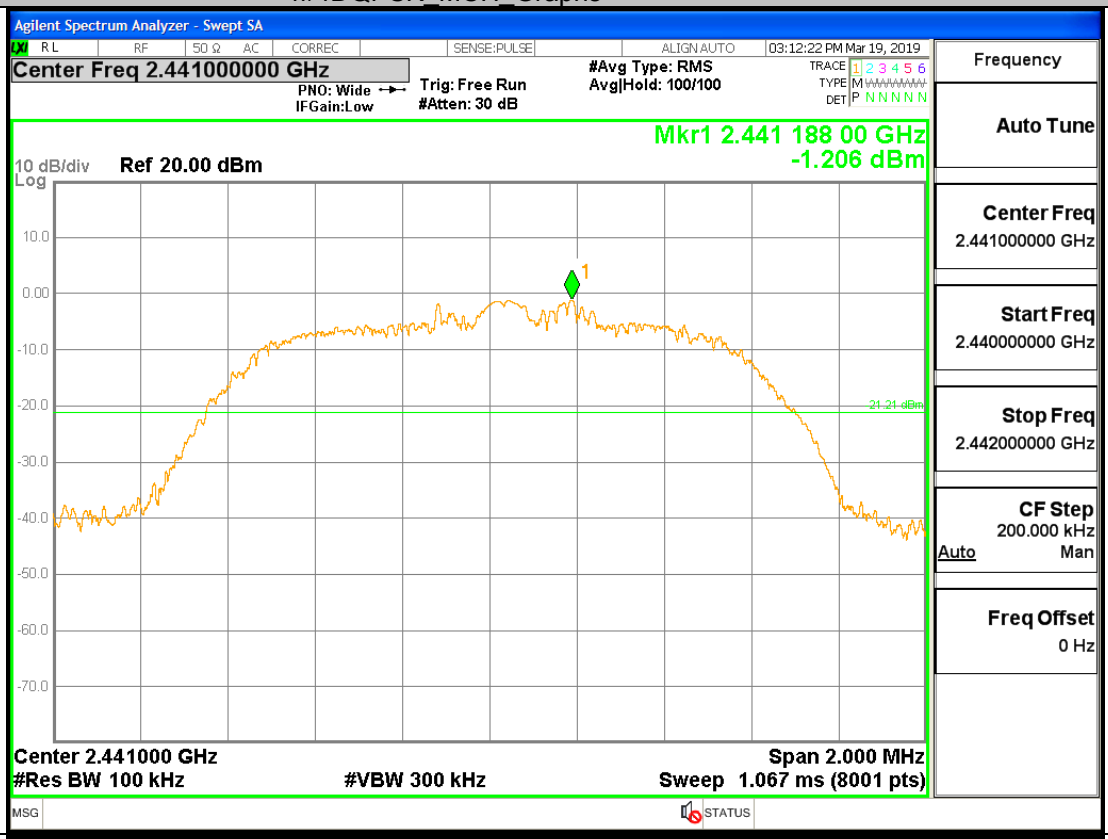
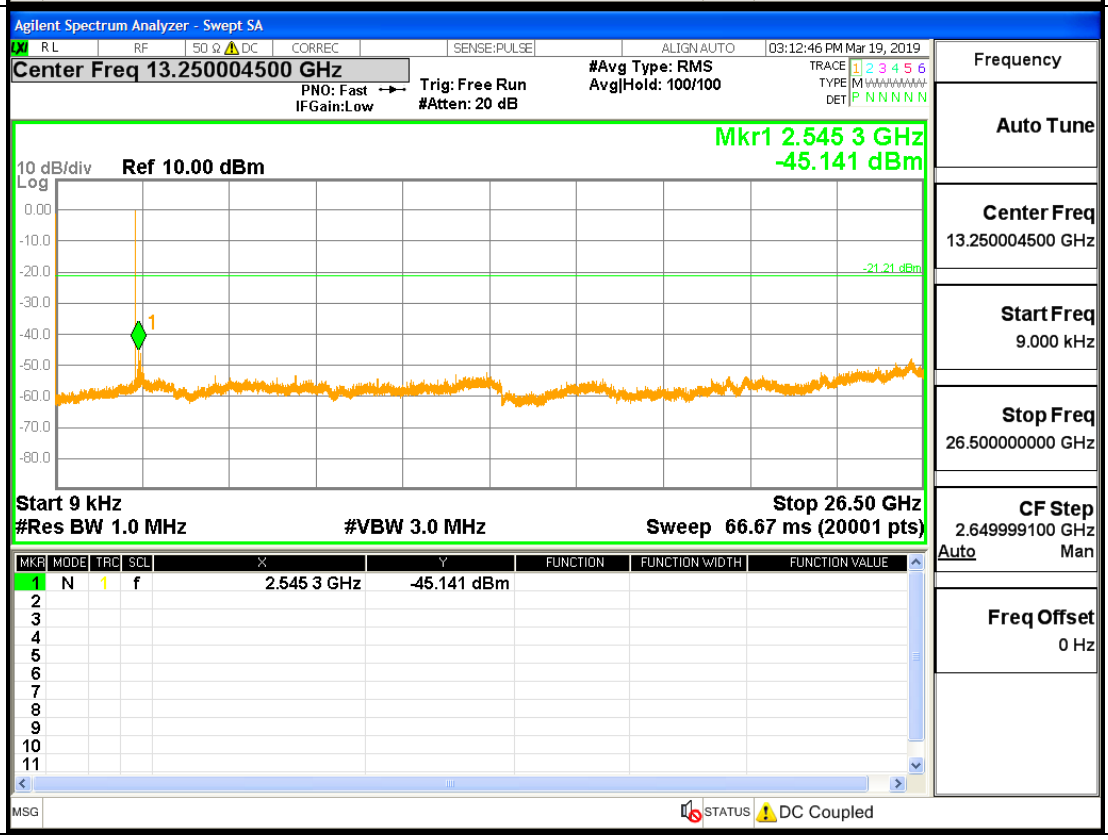
Pref	
Puw	

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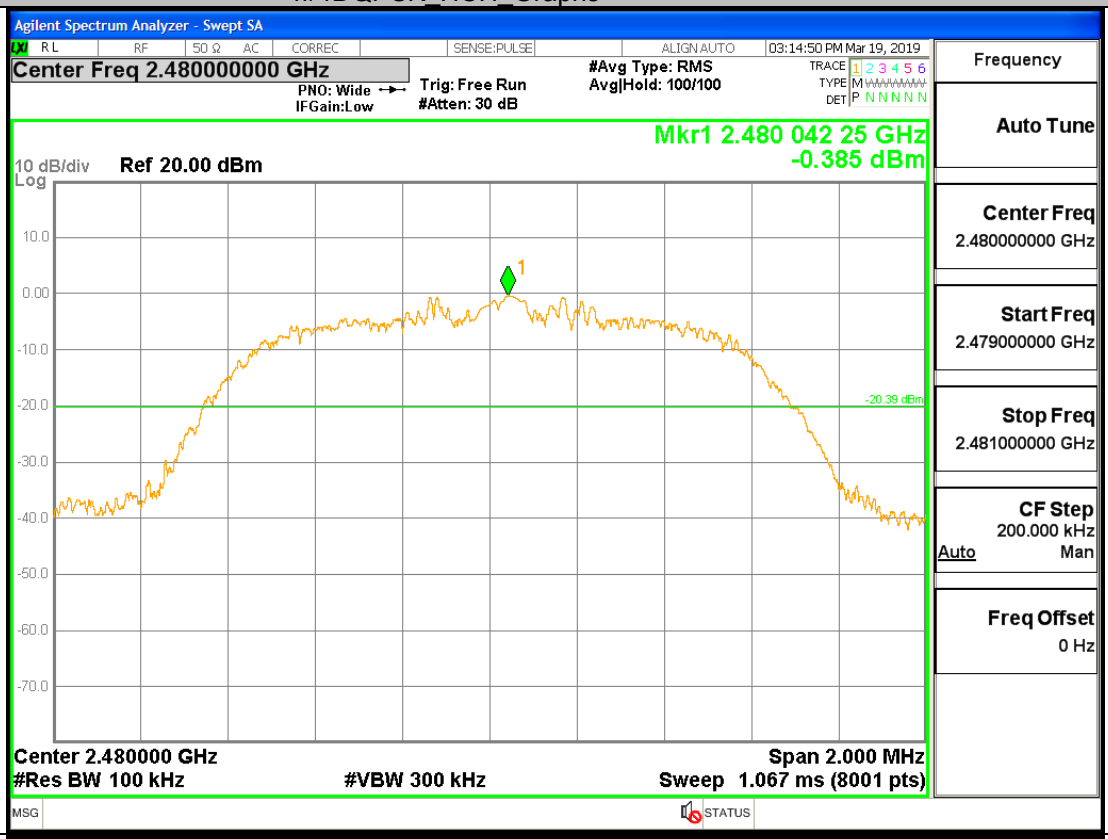
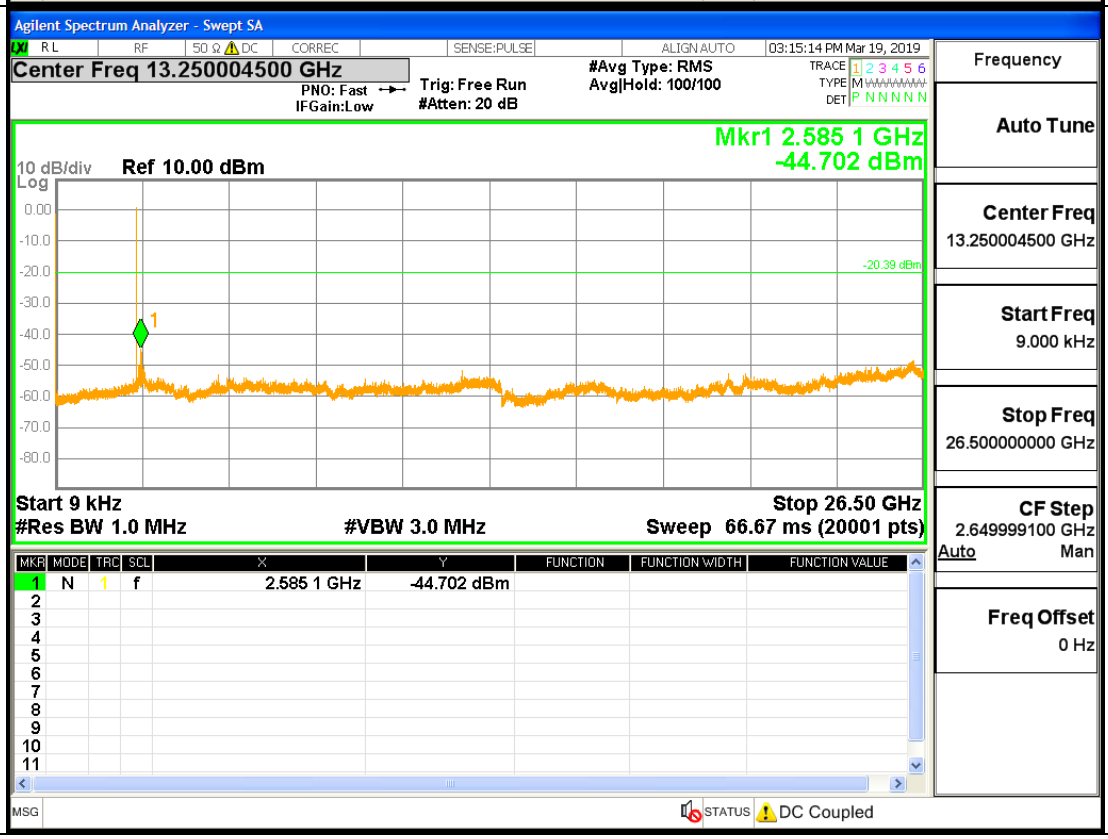
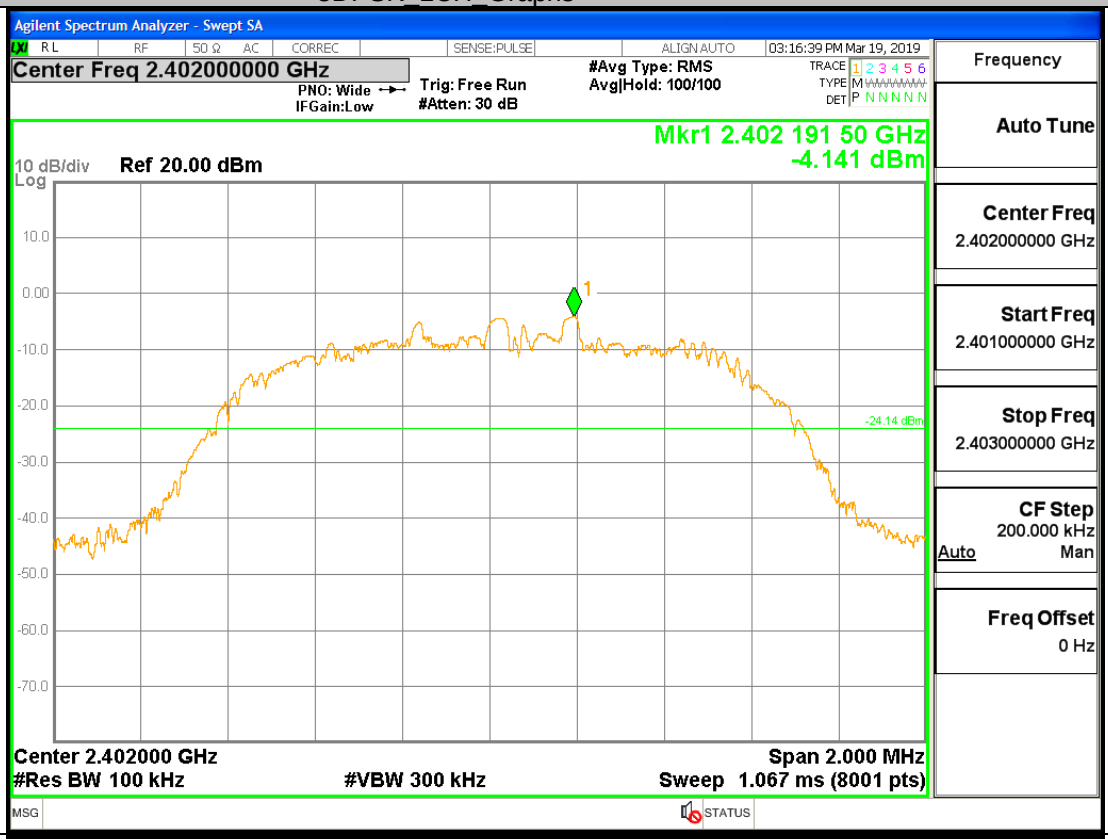
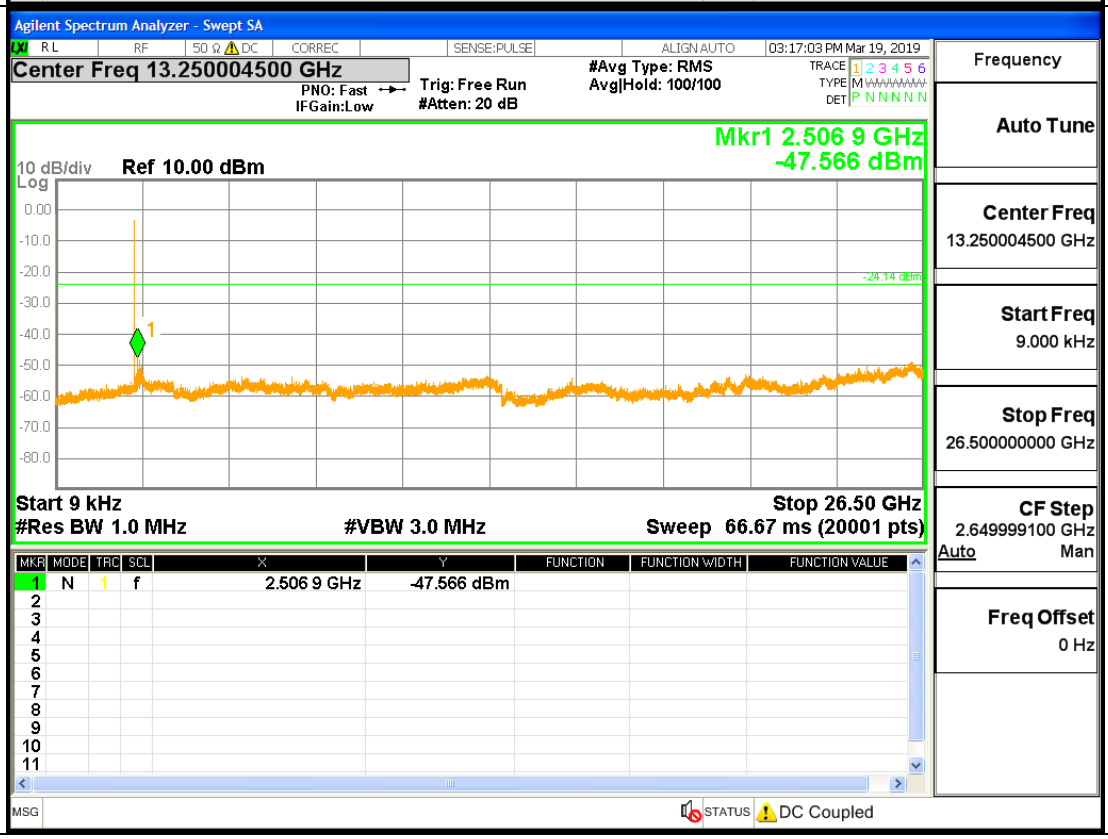
Pref	
Puw	

8DPSK_LCH_Graphs	
Pref	
Puw	

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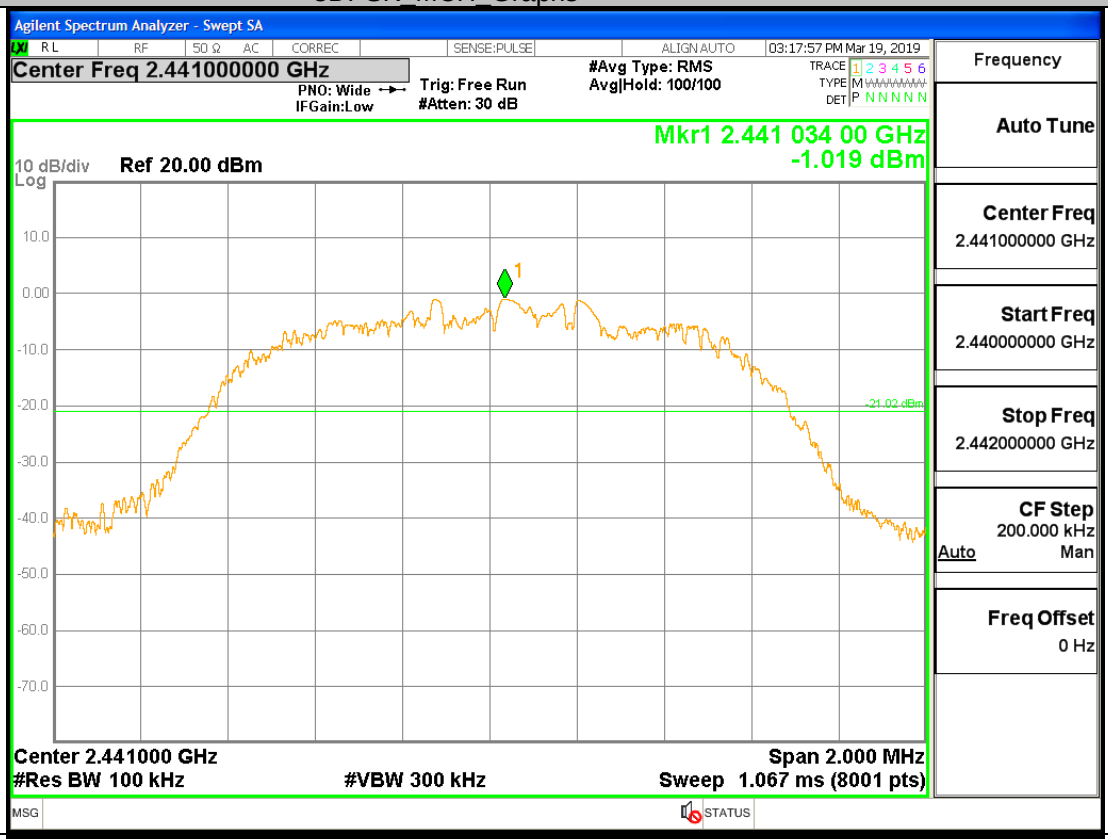
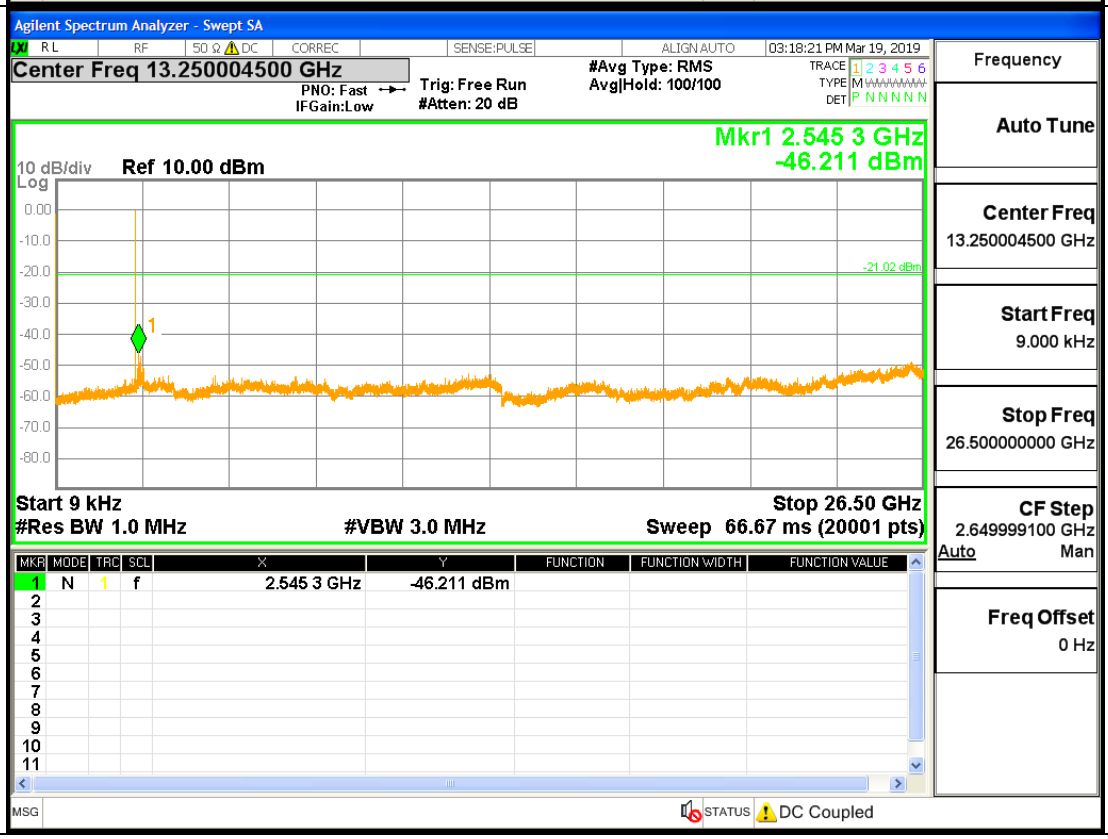
Pref	
Puw	

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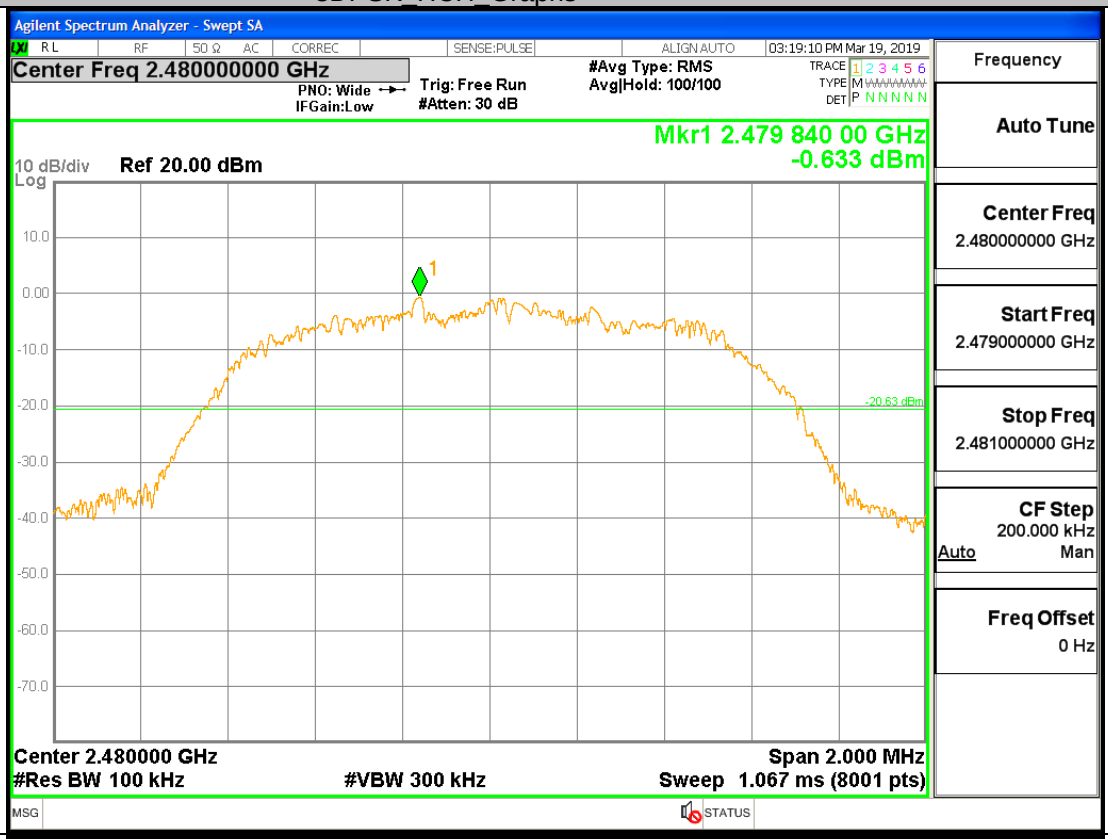
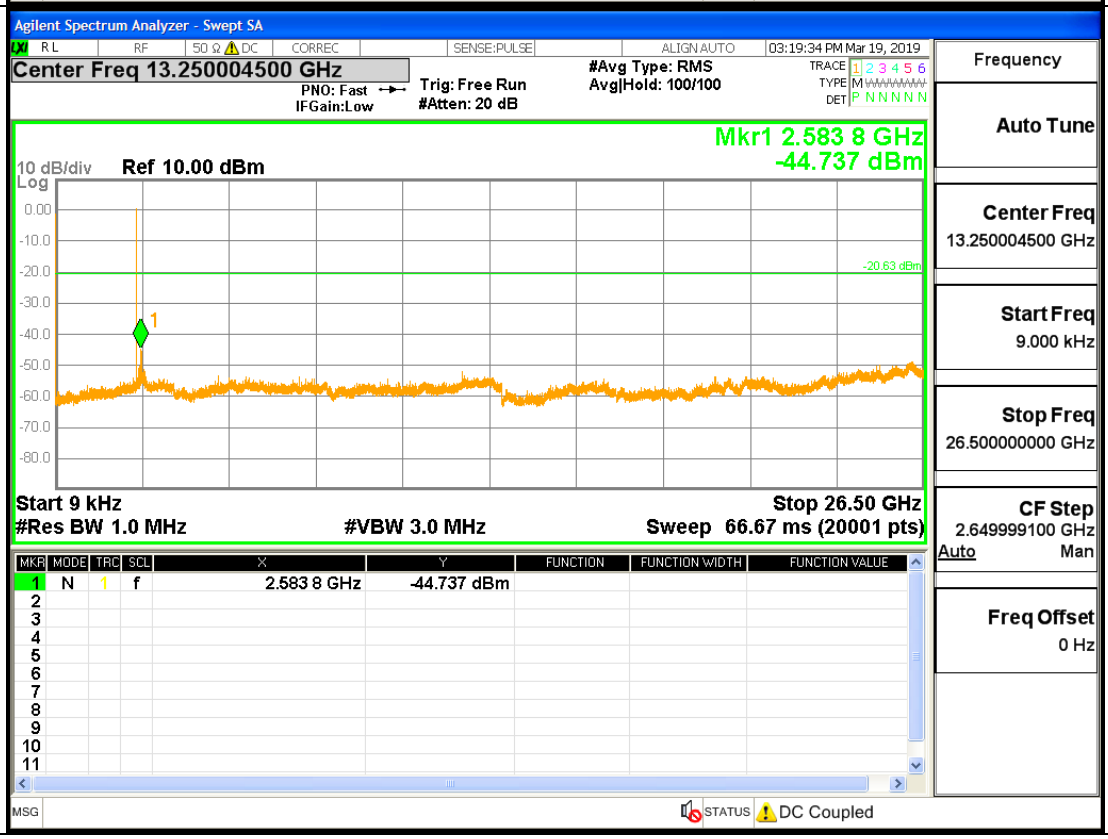
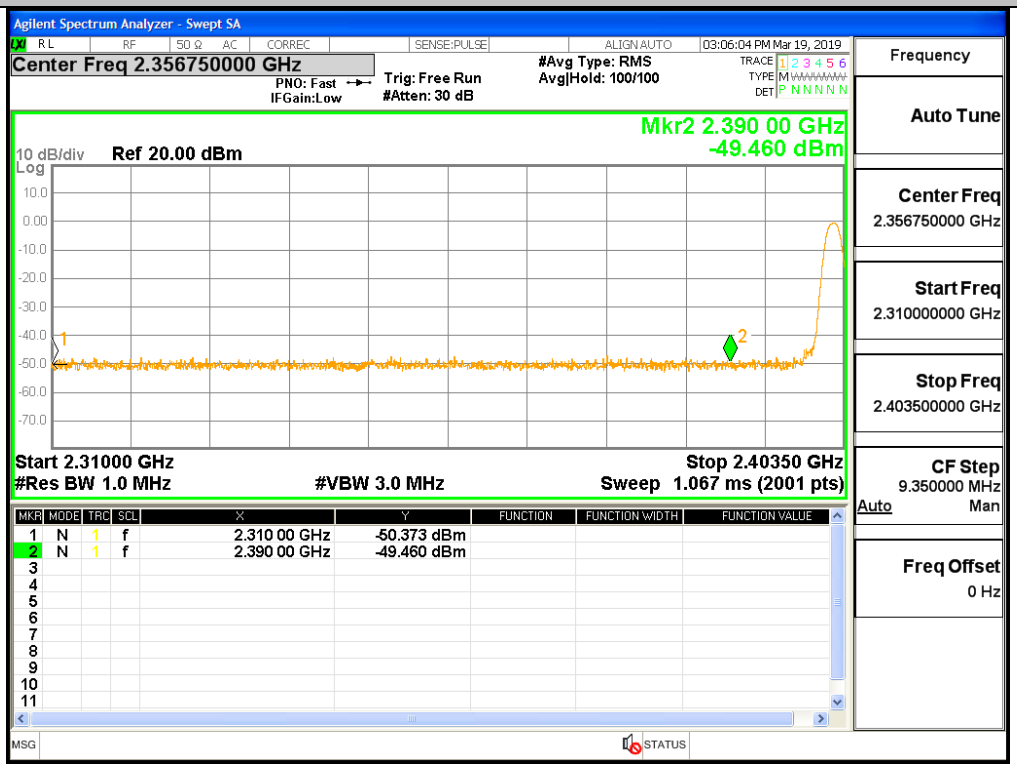
Pref	
Puw	

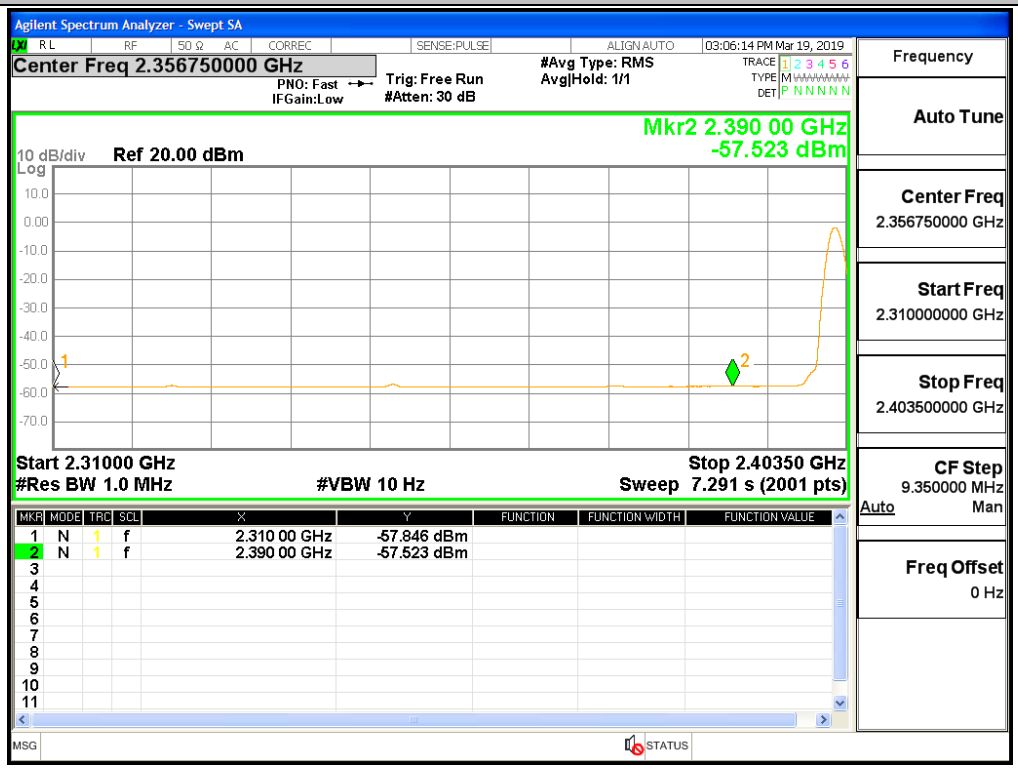
A.8 Restrict-band band-edge measurements

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	-50.37	46.83	74	-57.85	39.35	54	Pass
1DH5	2402	2390	2.00	0.00	-49.46	47.74	74	-57.52	39.68	54	Pass
1DH5	2480	2483.5	2.00	0.00	-47.58	49.62	74	-53.35	43.85	54	Pass
1DH5	2480	2500	2.00	0.00	-50.65	46.55	74	-56.96	40.24	54	Pass
2DH5	2402	2310	2.00	0.00	-51.77	45.43	74	-57.79	39.41	54	Pass
2DH5	2402	2390	2.00	0.00	-51.40	45.80	74	-57.57	39.63	54	Pass
2DH5	2480	2483.5	2.00	0.00	-46.95	50.25	74	-54.34	42.86	54	Pass
2DH5	2480	2500	2.00	0.00	-49.66	47.54	74	-56.99	40.21	54	Pass
3DH5	2402	2310	2.00	0.00	-50.43	46.77	74	-57.89	39.31	54	Pass
3DH5	2402	2390	2.00	0.00	-50.34	46.86	74	-57.57	39.63	54	Pass
3DH5	2480	2483.5	2.00	0.00	-47.80	49.40	74	-54.29	42.91	54	Pass
3DH5	2480	2500	2.00	0.00	-50.33	46.87	74	-56.96	40.24	54	Pass

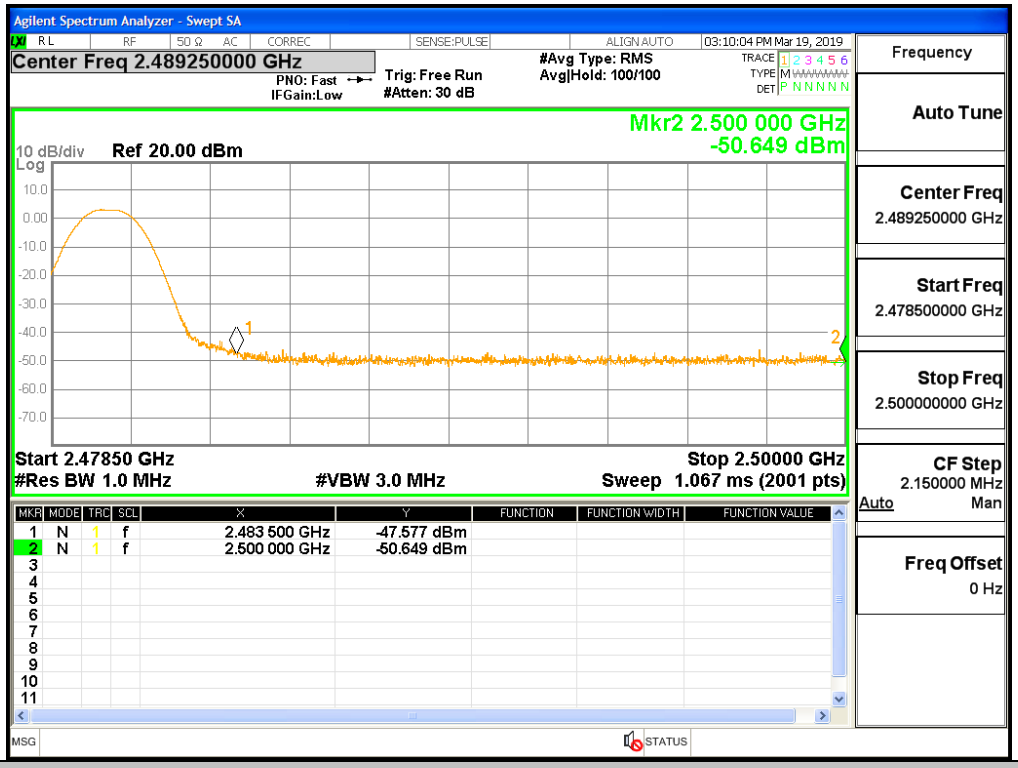
Restrict-band band-edge measurements_2402_PEAK_DH5



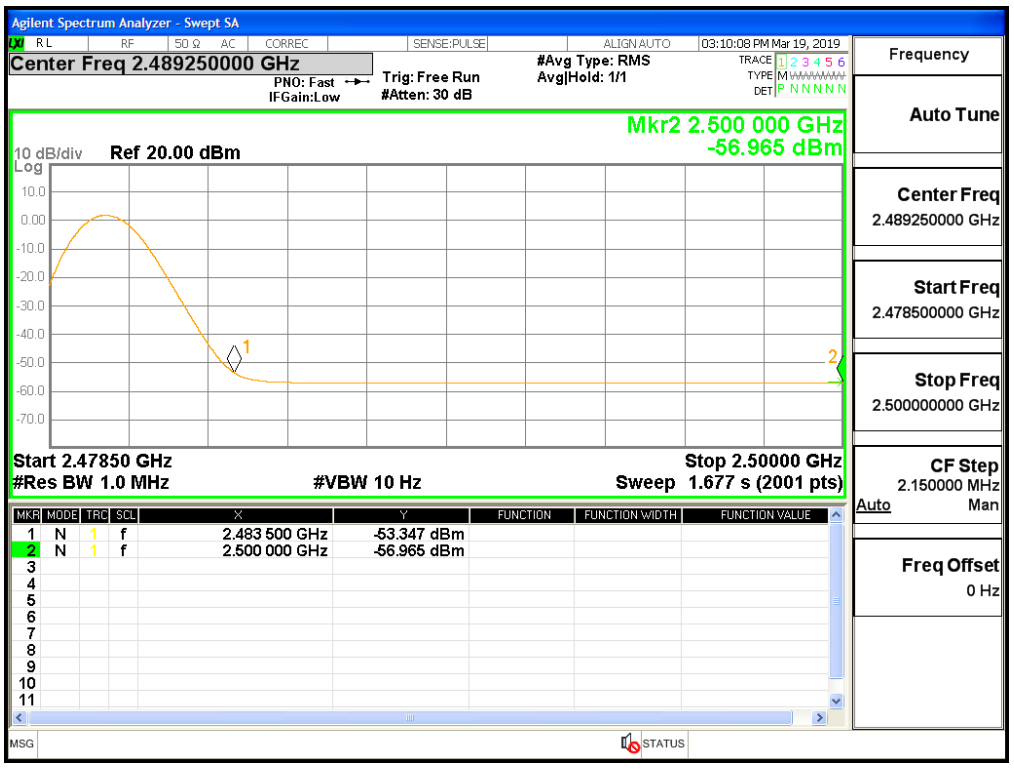
Restrict-band band-edge measurements_2402_AV_DH5



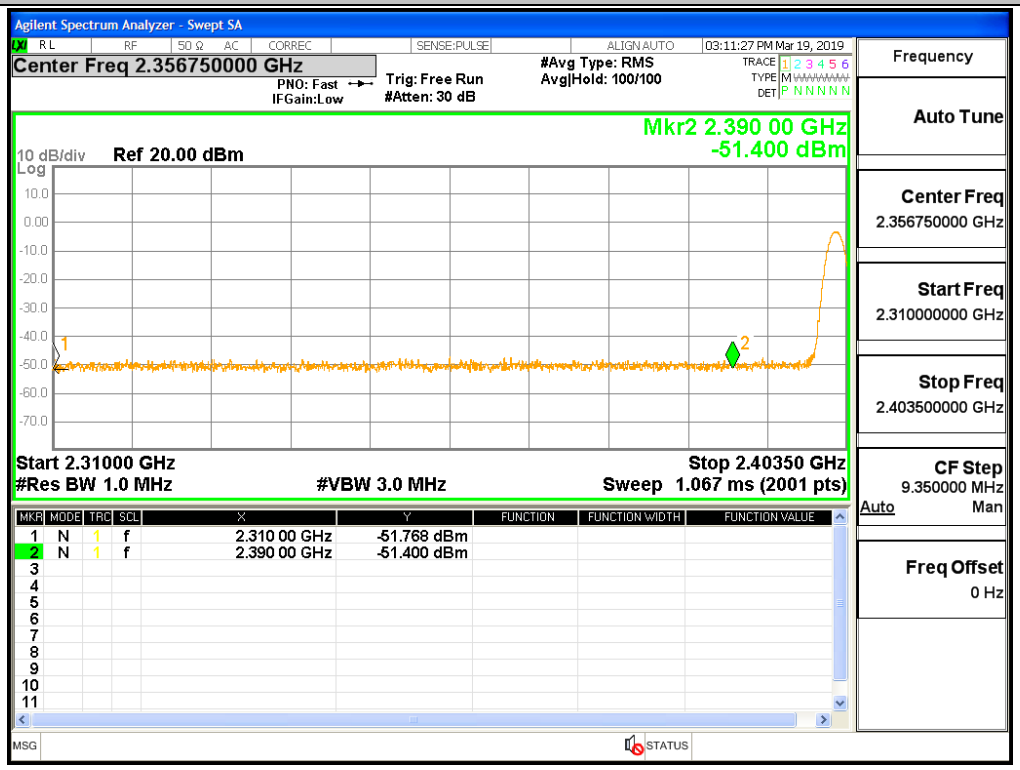
Restrict-band band-edge measurements_2480_PEAK_DH5



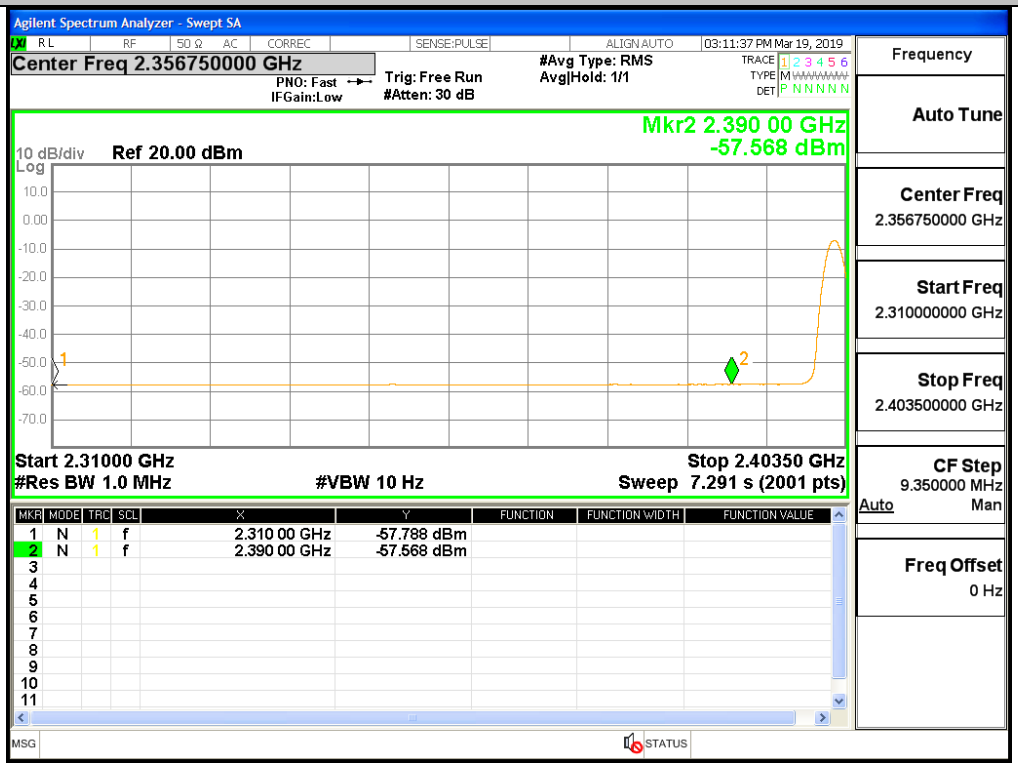
Restrict-band band-edge measurements_2480_AV_DH5



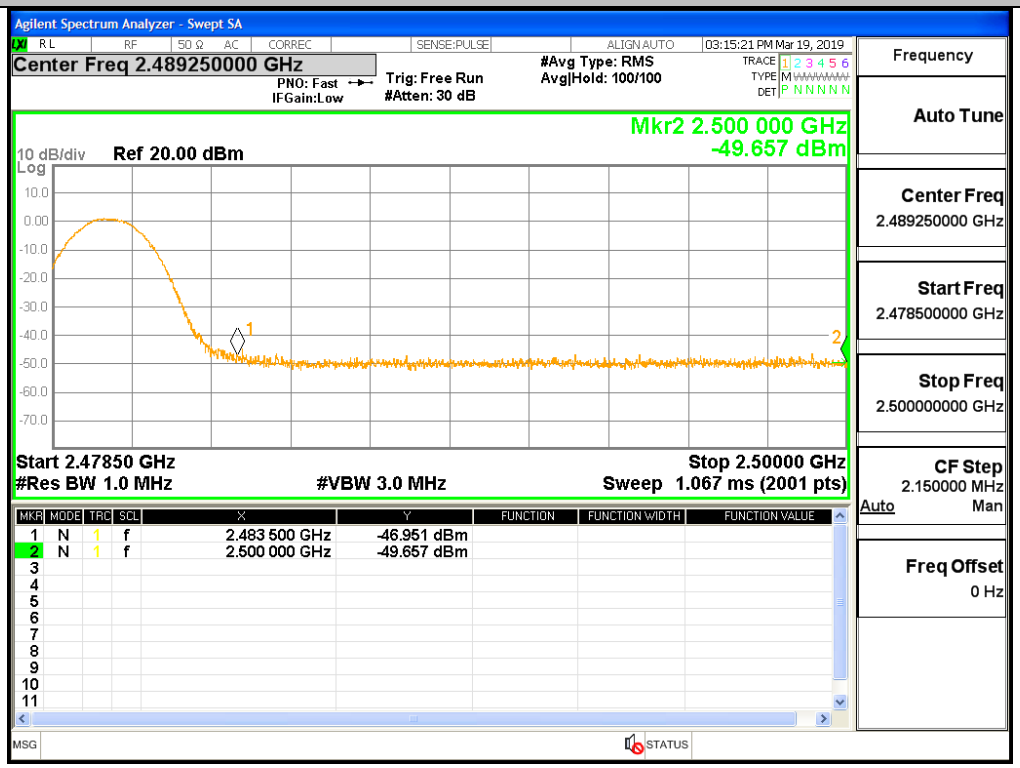
Restrict-band band-edge measurements_2402_PEAK_2DH5



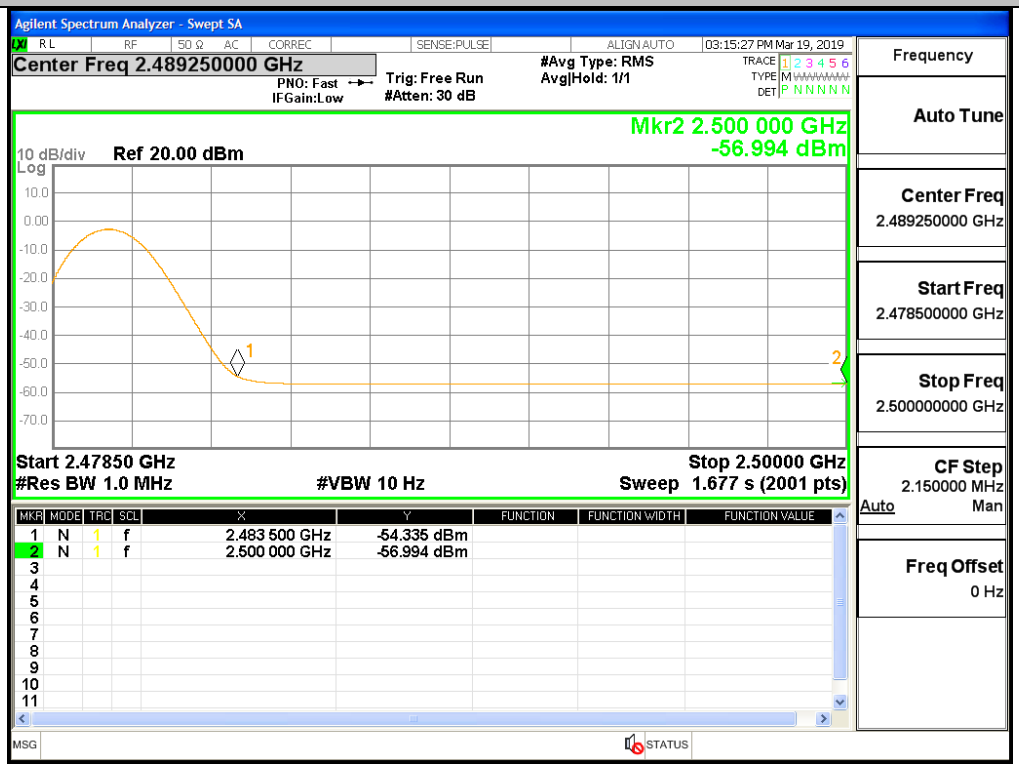
Restrict-band band-edge measurements_2402_AV_2DH5



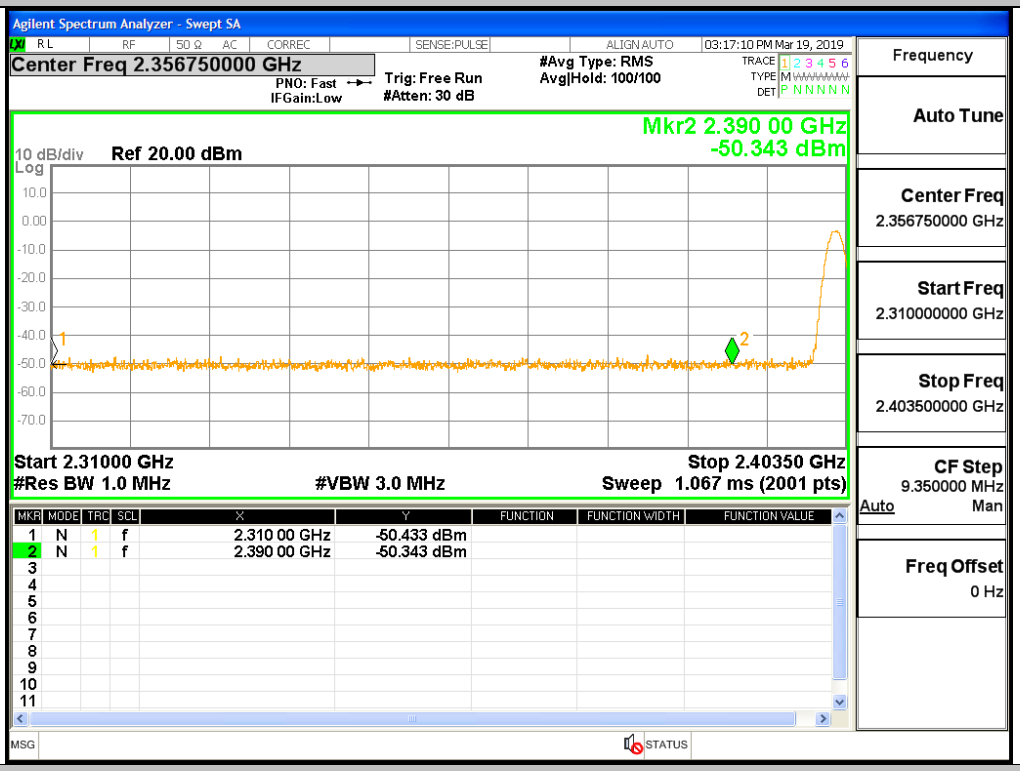
Restrict-band band-edge measurements_2480_PEAK_2DH5



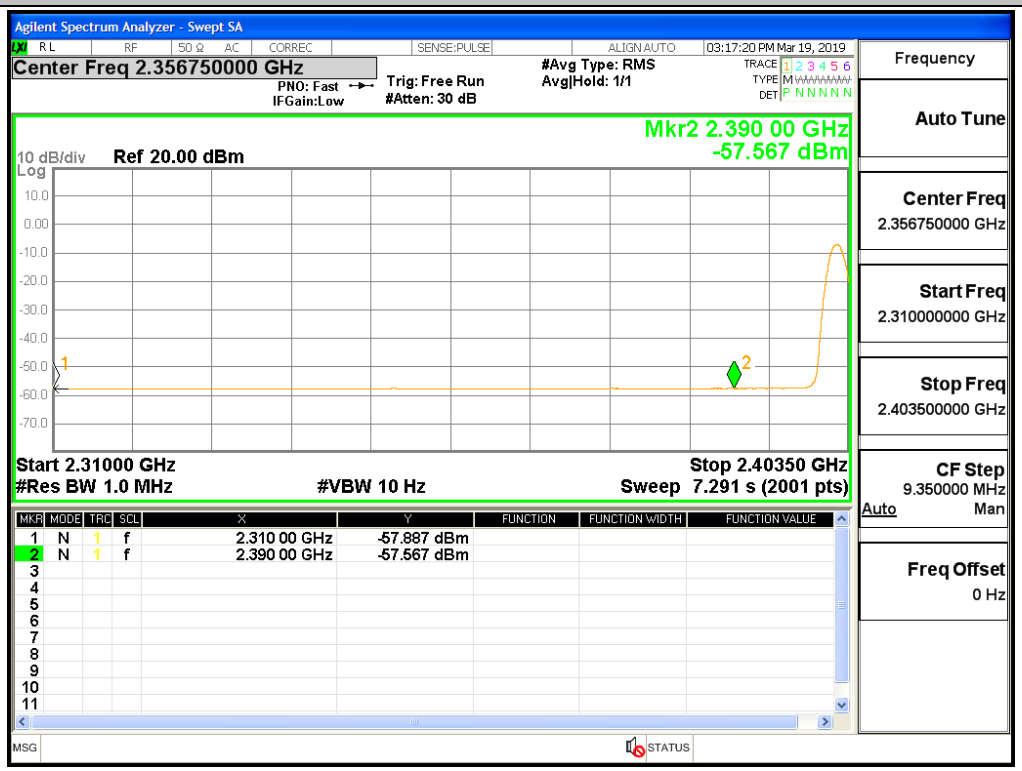
Restrict-band band-edge measurements_2480_AV_2DH5



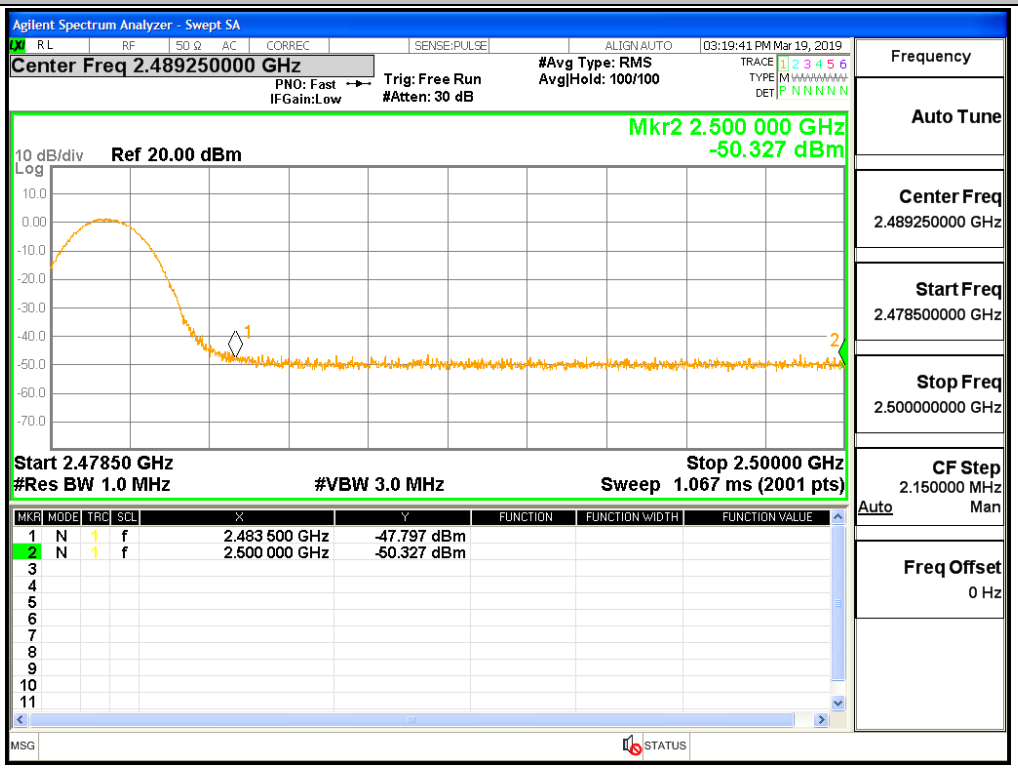
Restrict-band band-edge measurements_2402_PEAK_3DH5



Restrict-band band-edge measurements_2402_AV_3DH5



Restrict-band band-edge measurements_2480_PEAK_3DH5



Restrict-band band-edge measurements_2480_AV_3DH5