Environmental Conditions

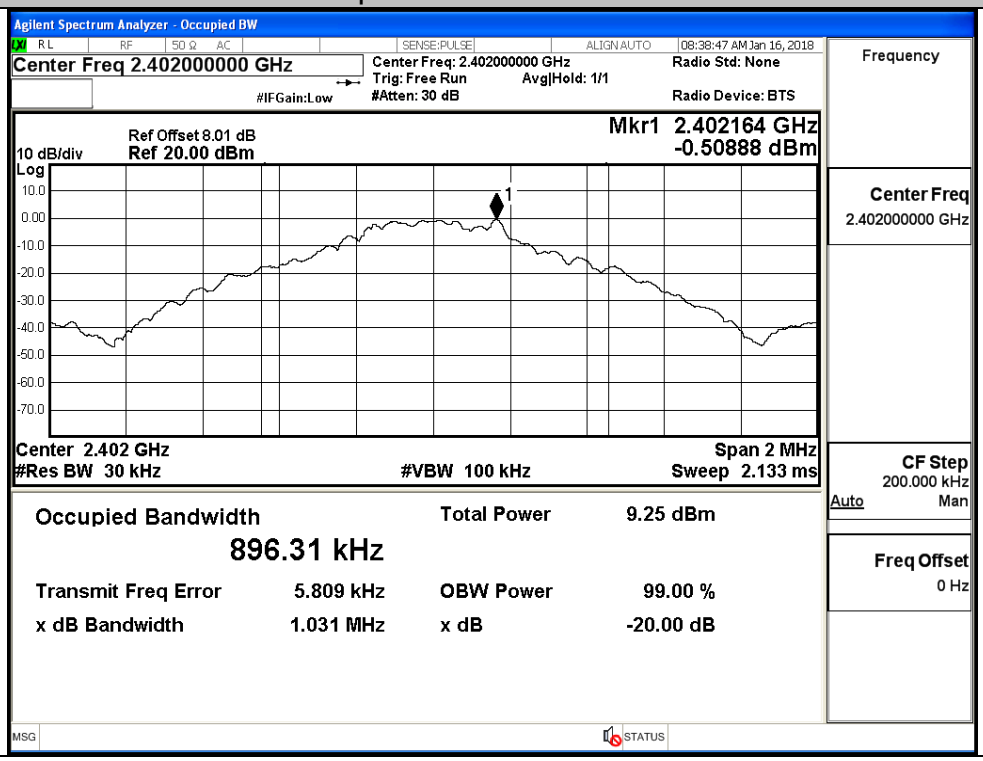
Temperature:	24.6 ° C
Relative Humidity:	48%
ATM Pressure:	100.0 kPa
Test Engineer:	Mina.xu
Supervised by:	Tom.Liu

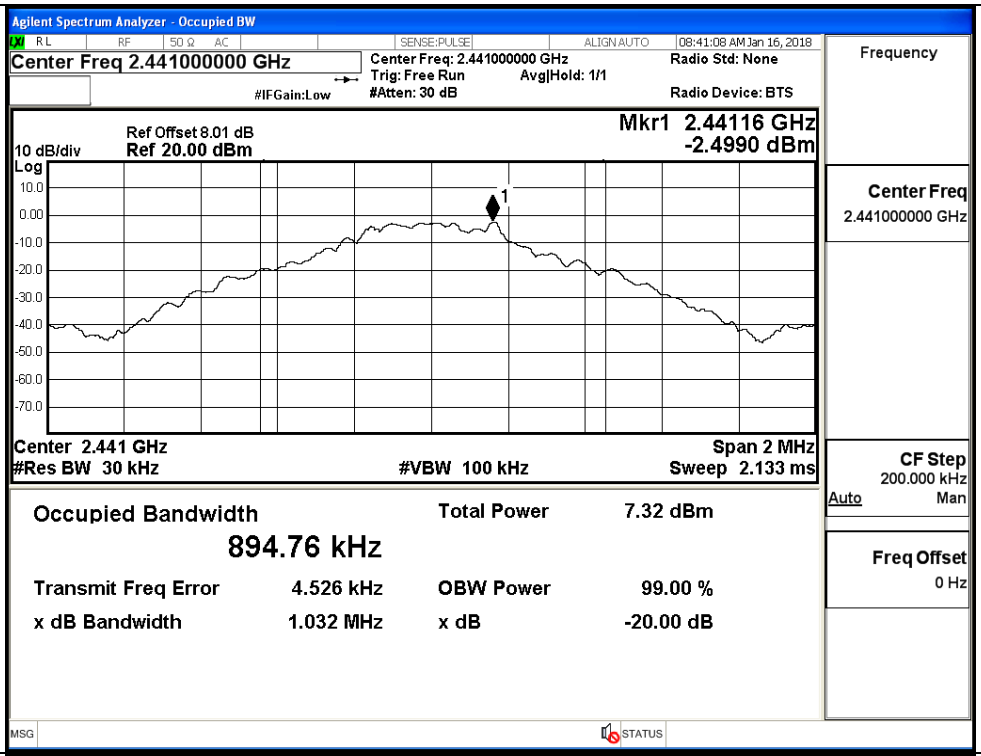
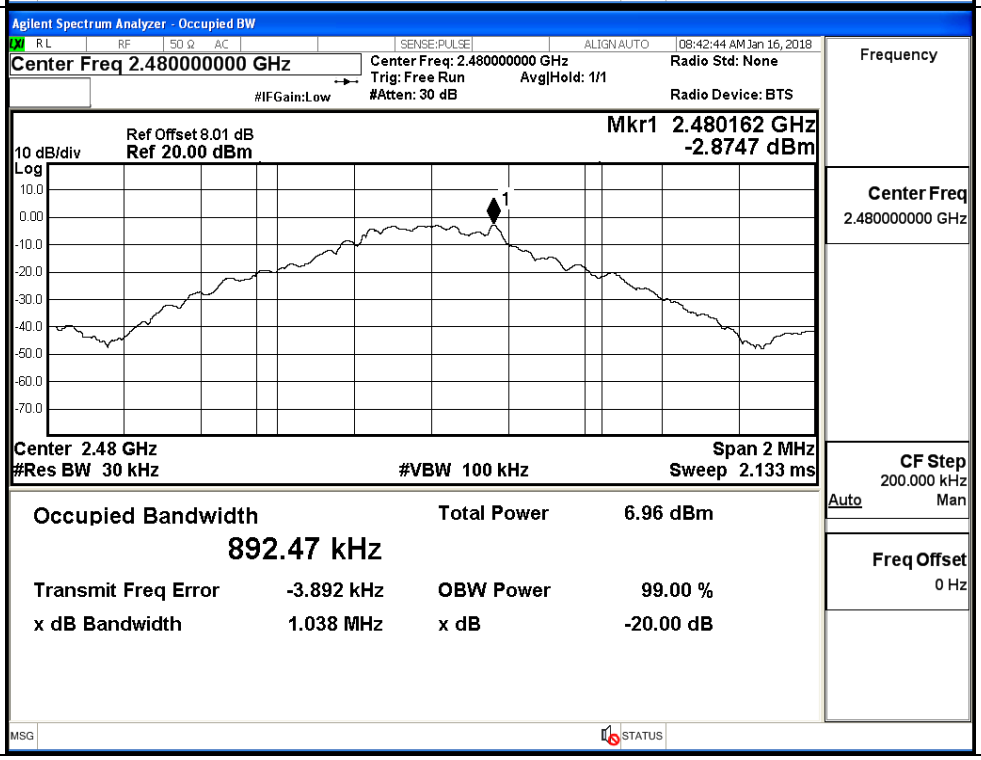
Appendix A): 20dB Bandwidth

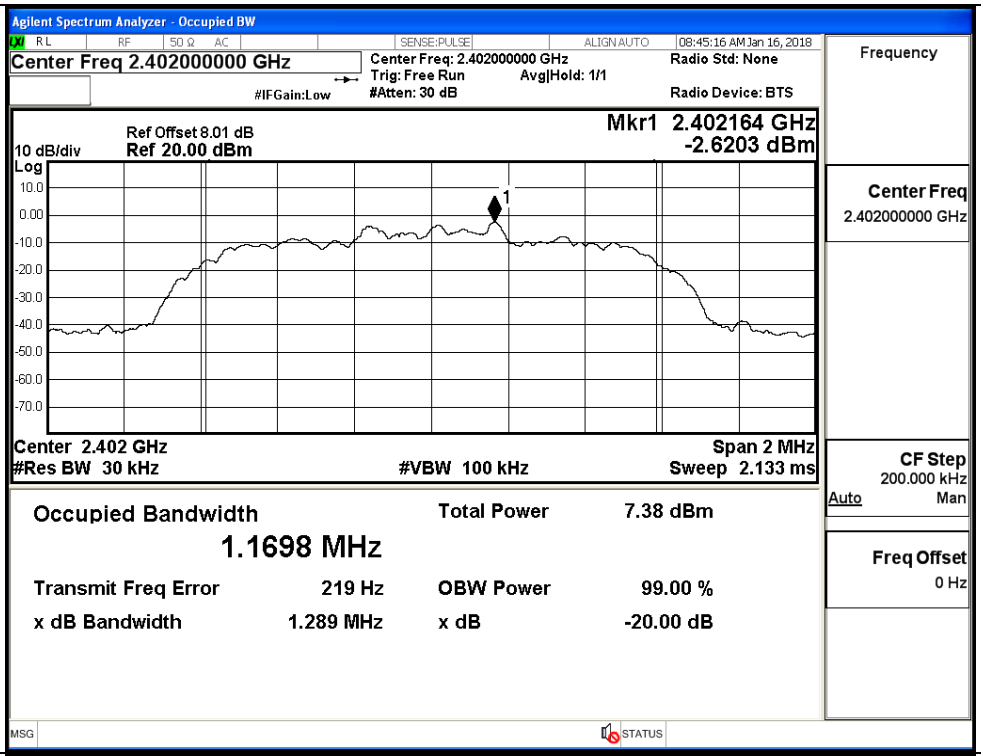
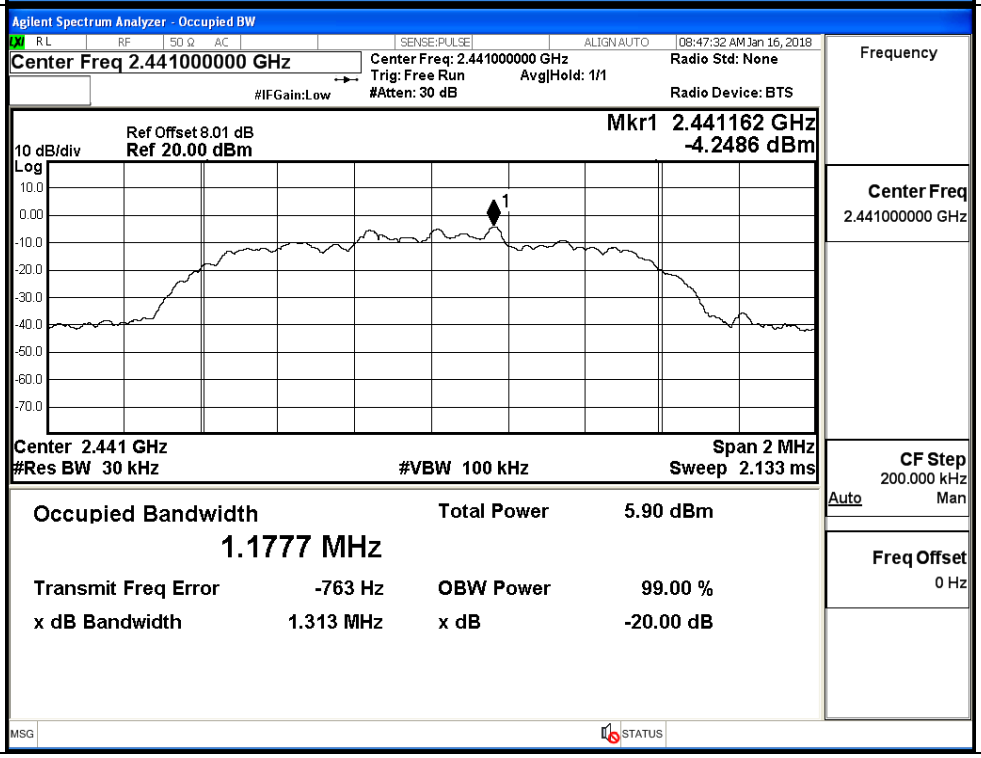
Test Result

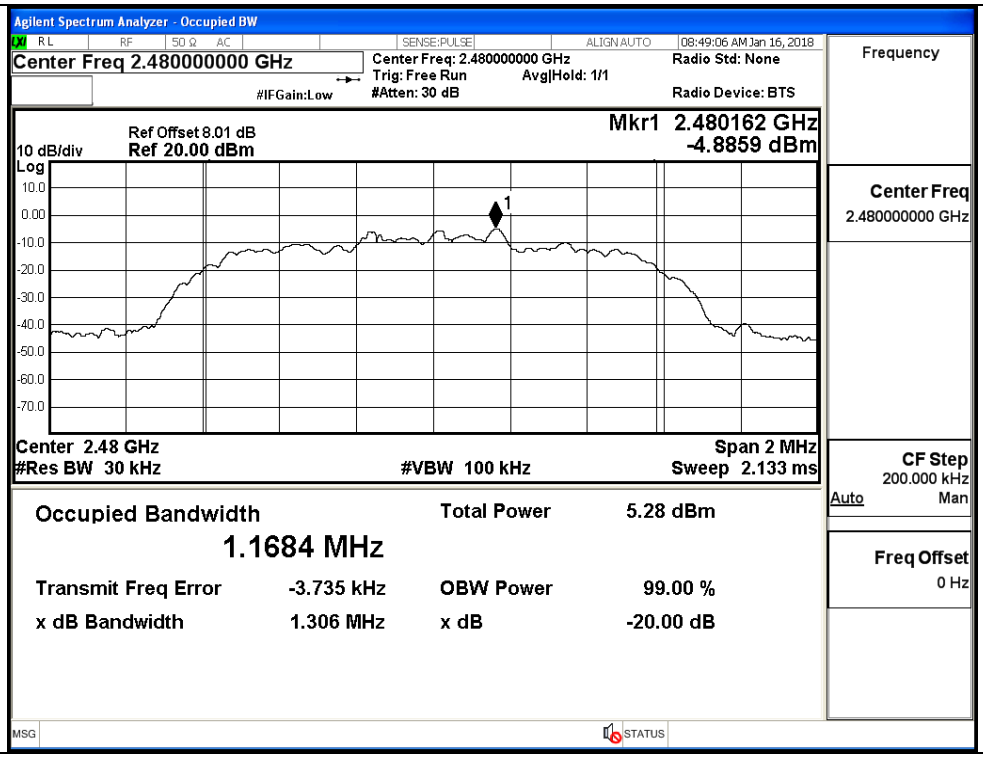
Mode	Channel.	20dB Bandwidth [MHz]	Verdict
GFSK	LCH	1.031	PASS
GFSK	MCH	1.032	PASS
GFSK	HCH	1.038	PASS
π/4DQPSK	LCH	1.289	PASS
π/4DQPSK	MCH	1.313	PASS
π/4DQPSK	HCH	1.306	PASS

Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH	
GFSK/HCH	

π/4DQPSK/LCH	
π/4DQPSK/MCH	

π/4DQPSK/HCH	

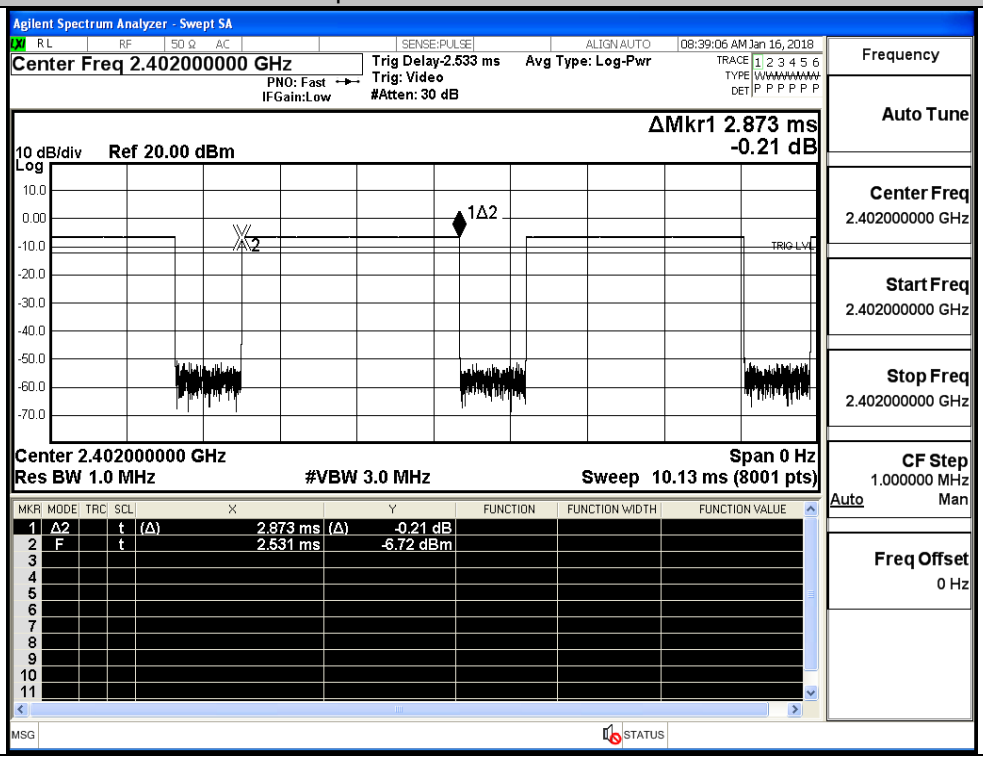
Agilent Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
08:49:06 AM Jan 16, 2018
Center Freq 2.480000000 GHz
#IFGain:Low
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 1/1
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 8.01 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.480162 GHz
-4.8859 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
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
1.1684 MHz
Total Power 5.28 dBm
Transmit Freq Error -3.735 kHz
OBW Power 99.00 %
x dB Bandwidth 1.306 MHz
x dB -20.00 dB
Freq Offset
0 Hz
MSG
STATUS

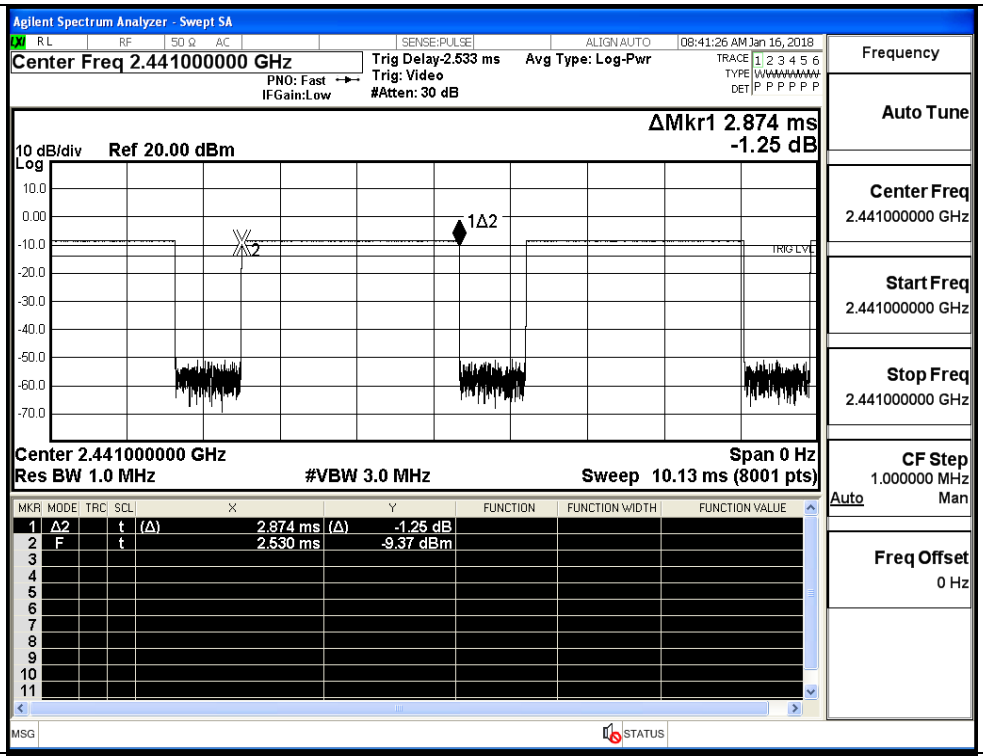
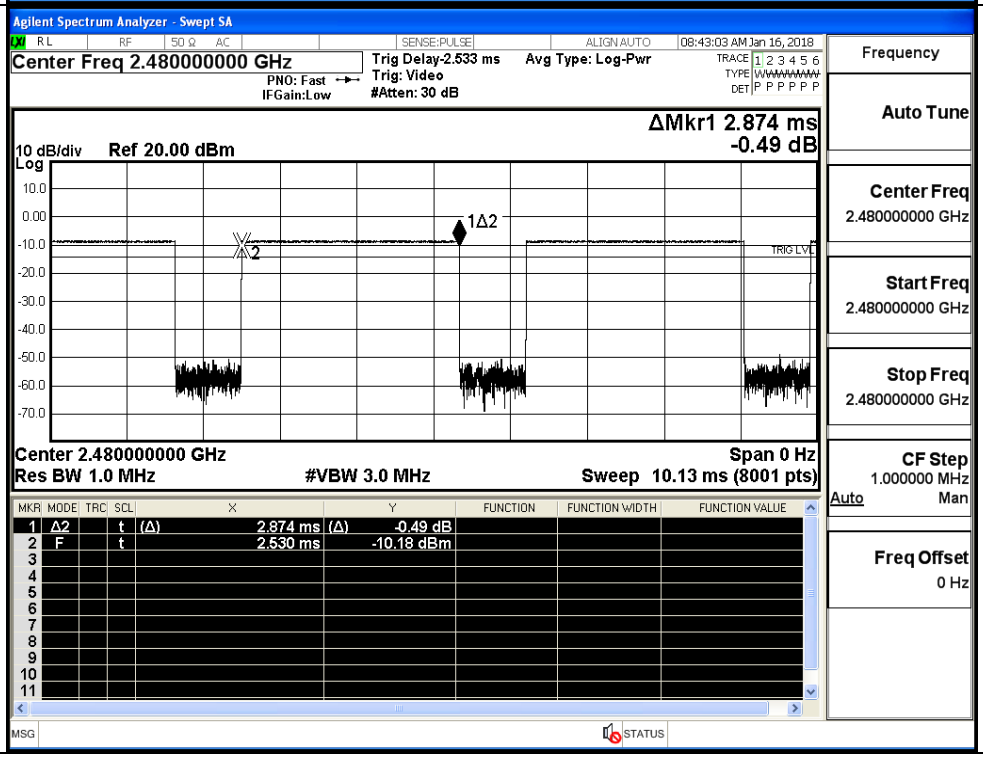
Appendix B): Dwell Time

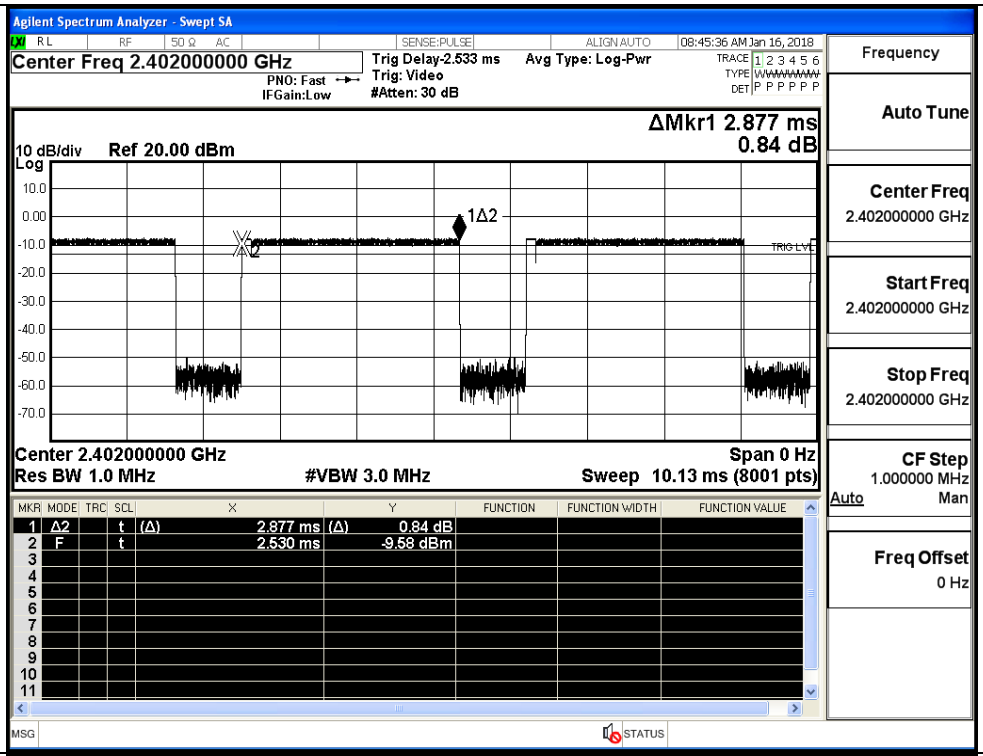
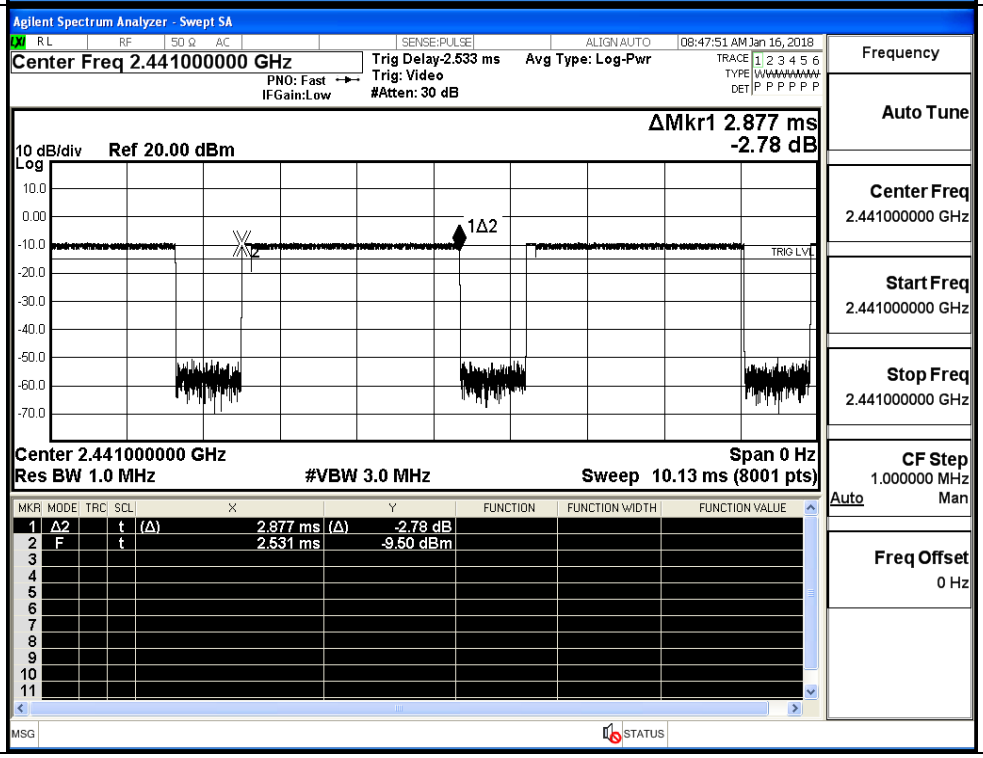
Result Table

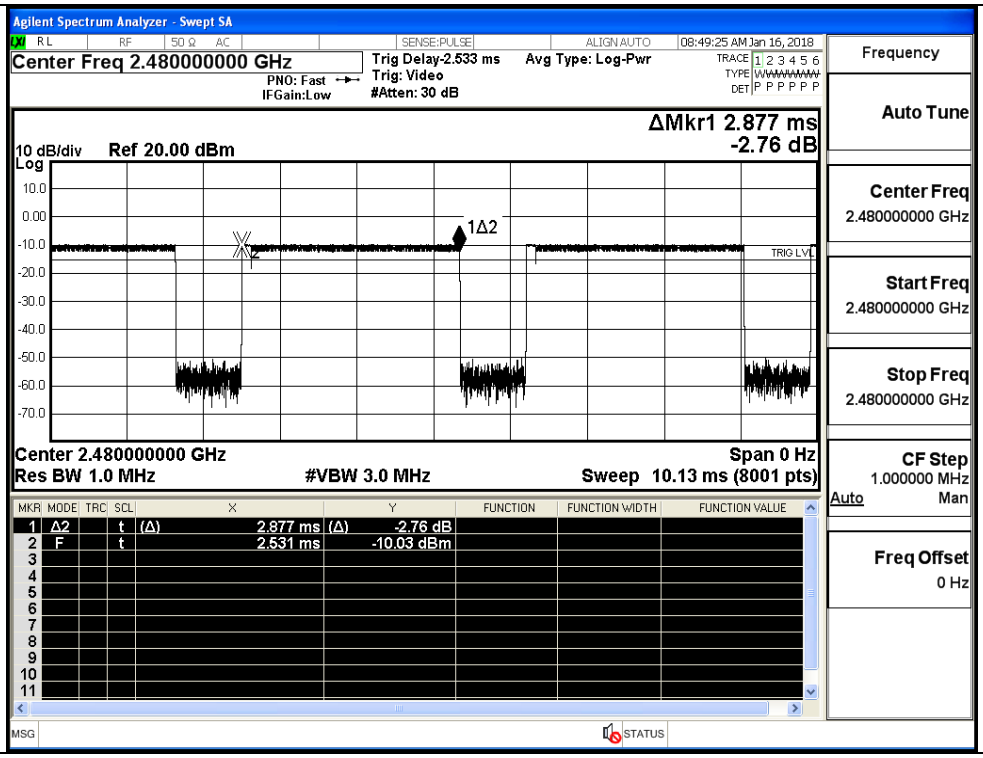
Mode	Packet	Channel	Burst Width [ms/hop/ch]	Total Hops[hop*ch]	Dwell Time[s]	Limit [s]	Verdict
GFSK	DH5	LCH	2.87	106.7	0.306	0.4	PASS
GFSK	DH5	MCH	2.87	106.7	0.306	0.4	PASS
GFSK	DH5	HCH	2.87	106.7	0.306	0.4	PASS
π/4DQPSK	2DH5	LCH	2.87	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	MCH	2.87	106.7	0.307	0.4	PASS
π/4DQPSK	2DH5	HCH	2.87	106.7	0.307	0.4	PASS

Test Graph

Graphs	
GFSK_DH5/LCH	

GFSK_DH5/MCH	
GFSK_DH5/HCH	

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

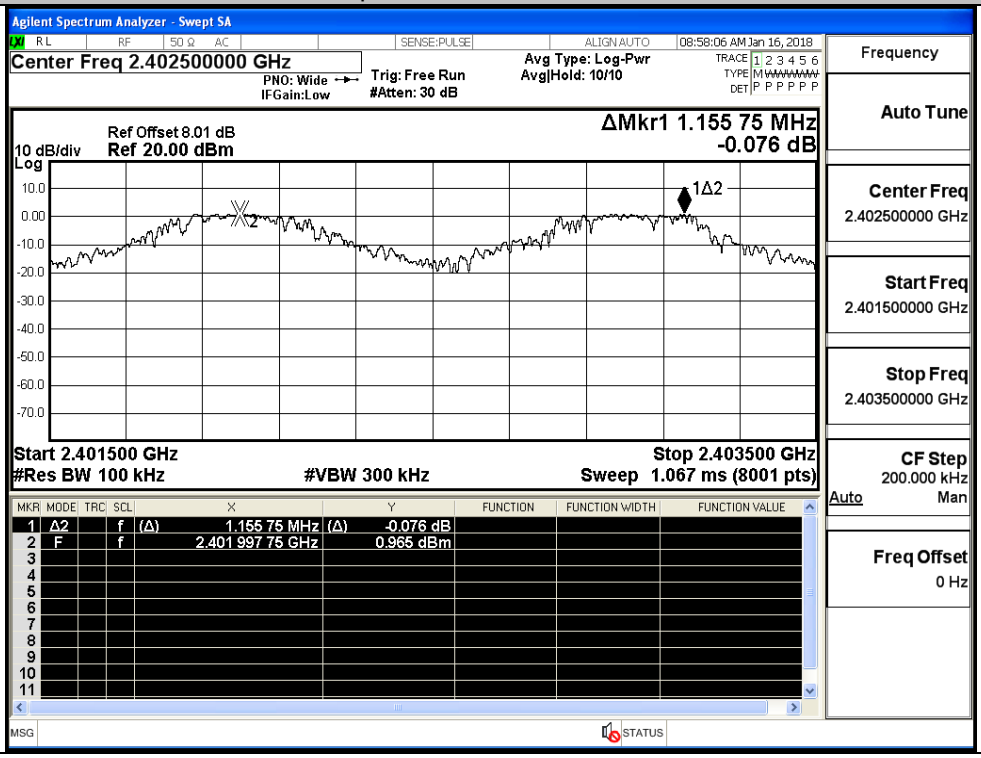
π/4DQPSK _2DH5/HCH	

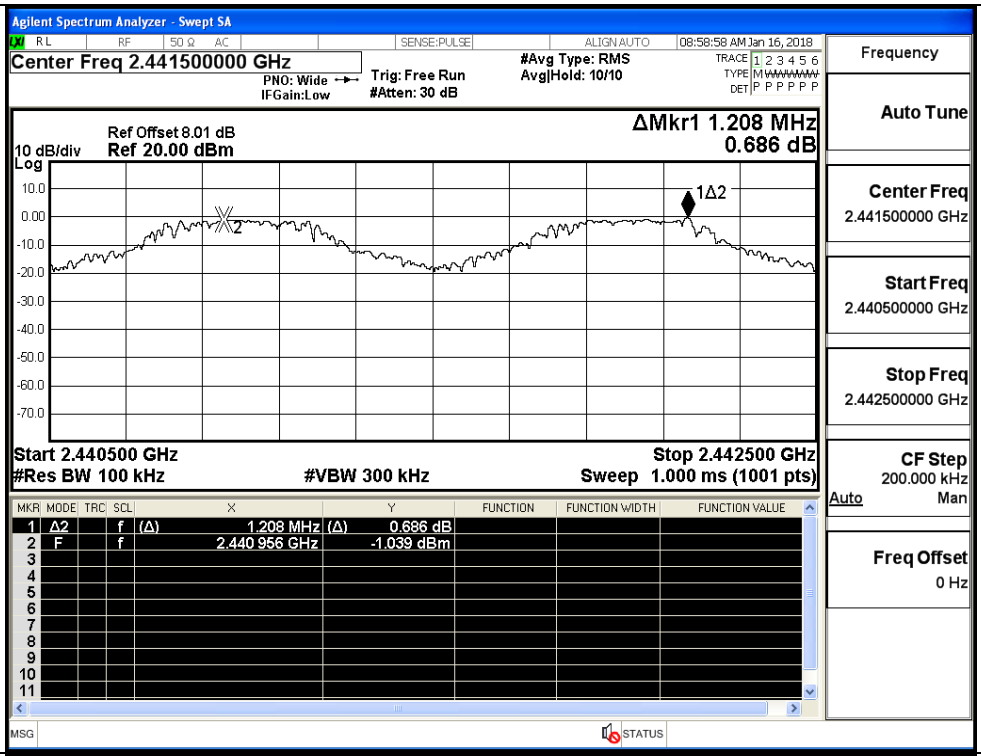
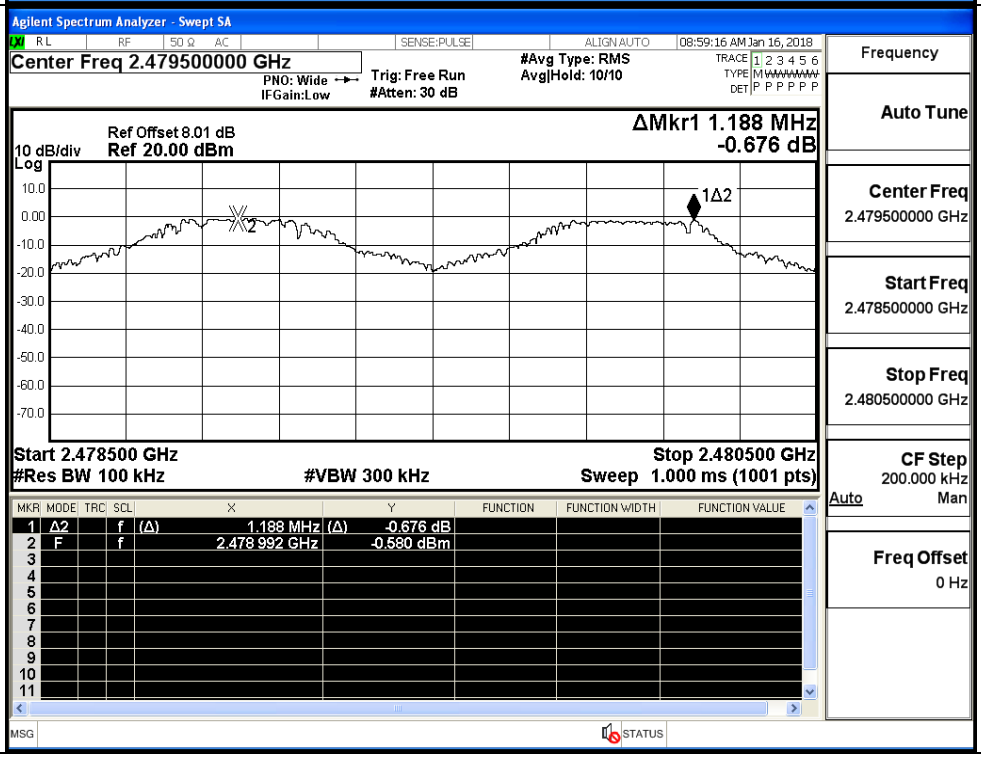
Appendix C): Carrier Frequency Separation

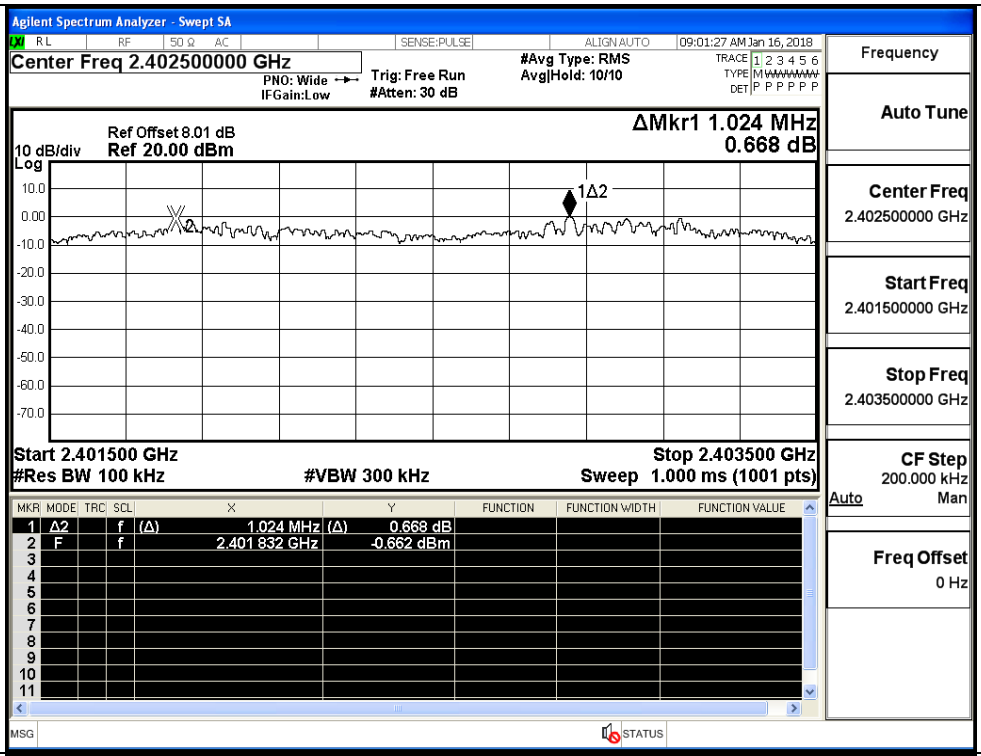
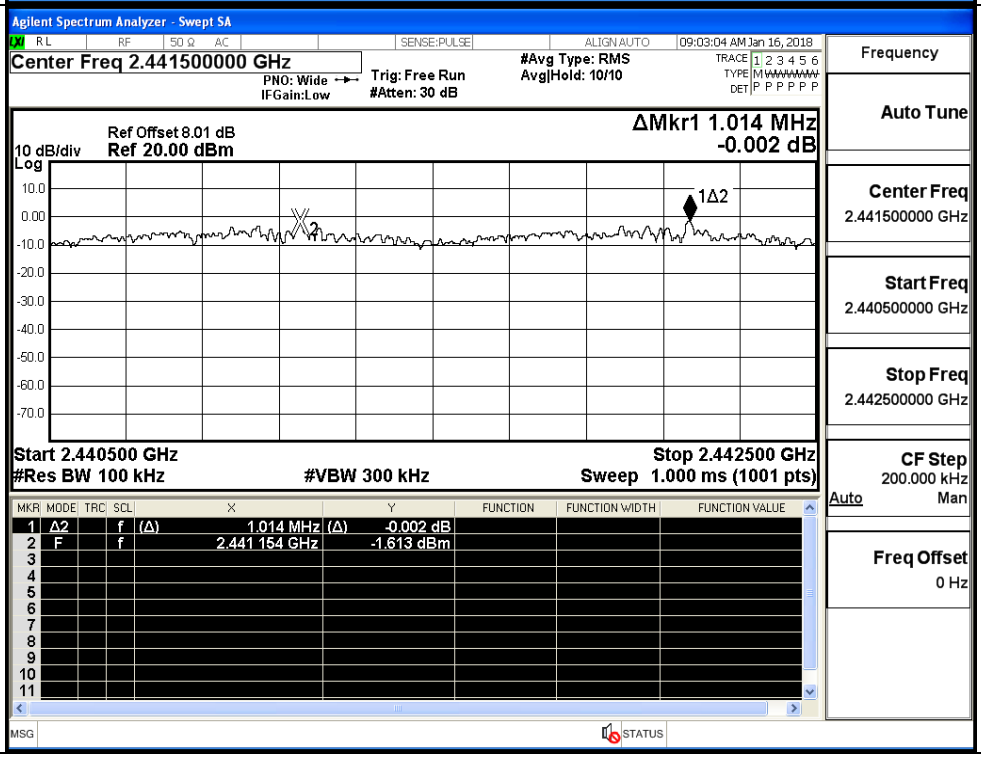
Result Table

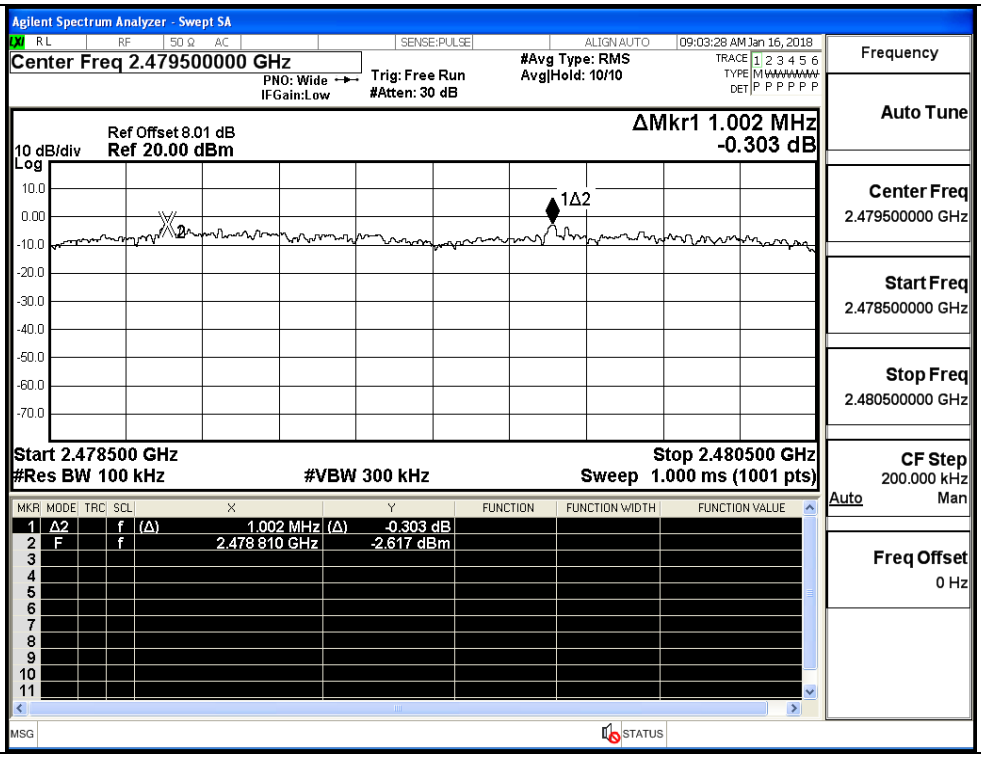
Mode	Channel.	Carrier Frequency Separation [MHz]	Limit[MHz]	Verdict
GFSK	LCH	1.156	1.031	PASS
GFSK	MCH	1.208	1.032	PASS
GFSK	HCH	1.188	1.038	PASS
π/4DQPSK	LCH	1.024	0.86	PASS
π/4DQPSK	MCH	1.014	0.88	PASS
π/4DQPSK	HCH	1.002	0.87	PASS

Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH		
GFSK/HCH		

π/4DQPSK/LCH		
π/4DQPSK/MCH		

π/4DQPSK/HCH		

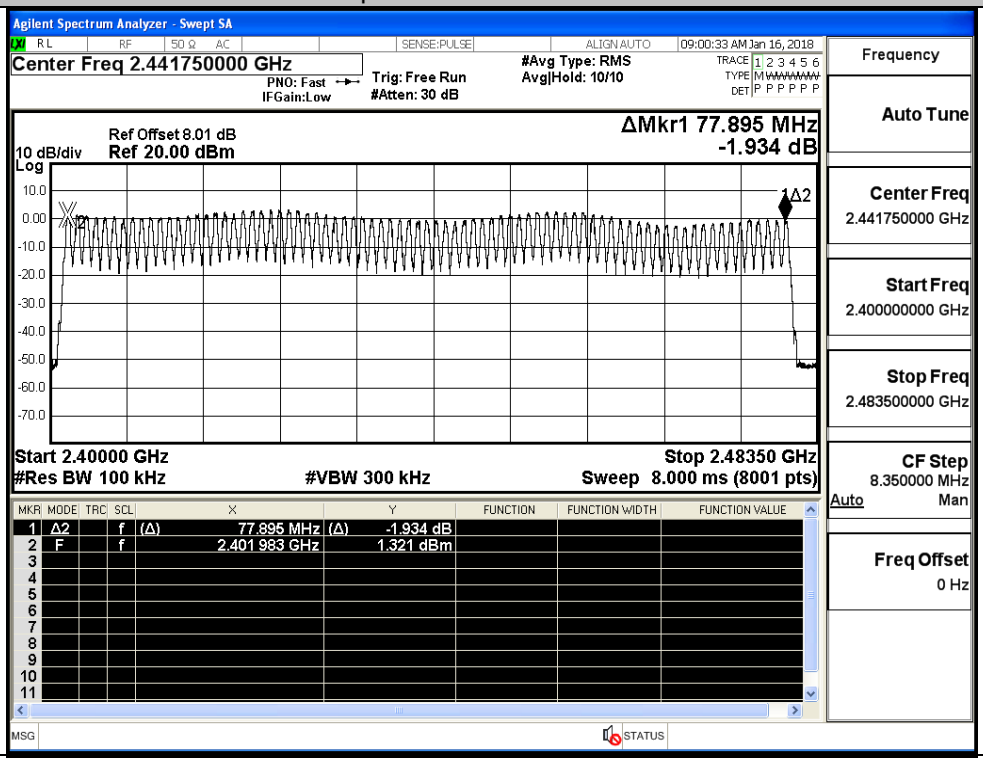
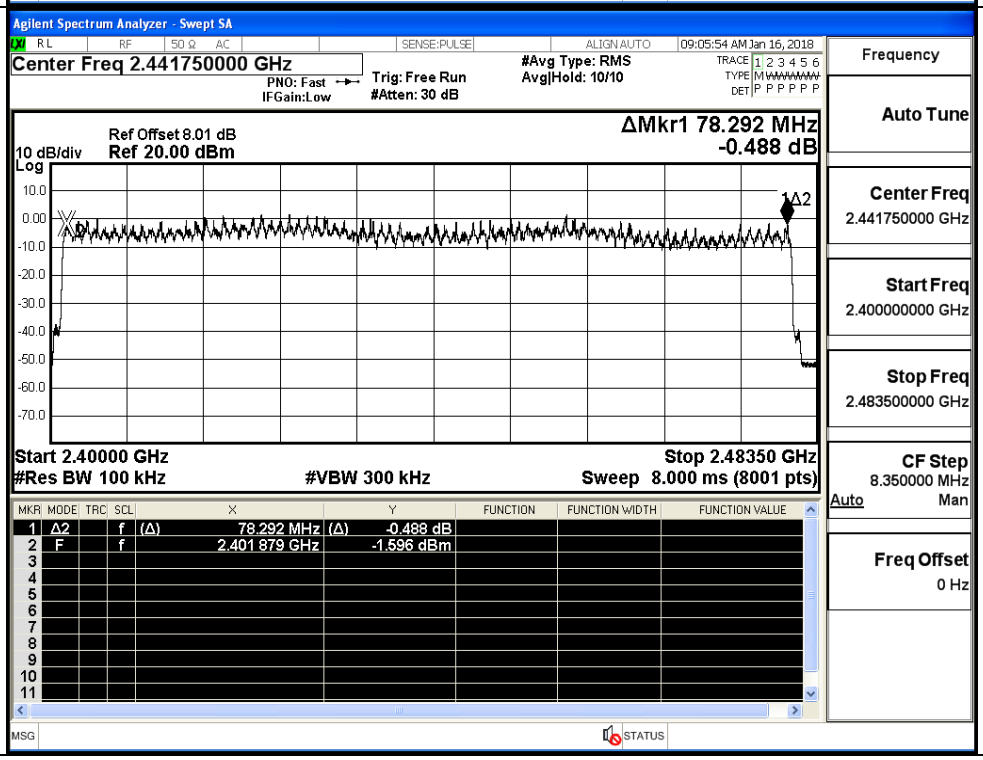
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.479500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
09:03:28 AM Jan 16, 2018
Ref Offset 8.01 dB
10 dB/div
Log
Ref 20.00 dBm
ΔMkr1 1.002 MHz
-0.303 dB
Start 2.478500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.480500 GHz
Sweep 1.000 ms (1001 pts)
1 Δ2 f (Δ) 1.002 MHz (Δ) -0.303 dB
2 F f 2.478 810 GHz -2.617 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
MSG
STATUS

Appendix D): Hopping Channel Number

Result Table

Mode	Channel.	Number of Hopping Channel	Verdict
GFSK	Hop	79	PASS
π/4DQPSK	Hop	79	PASS

Test Graph

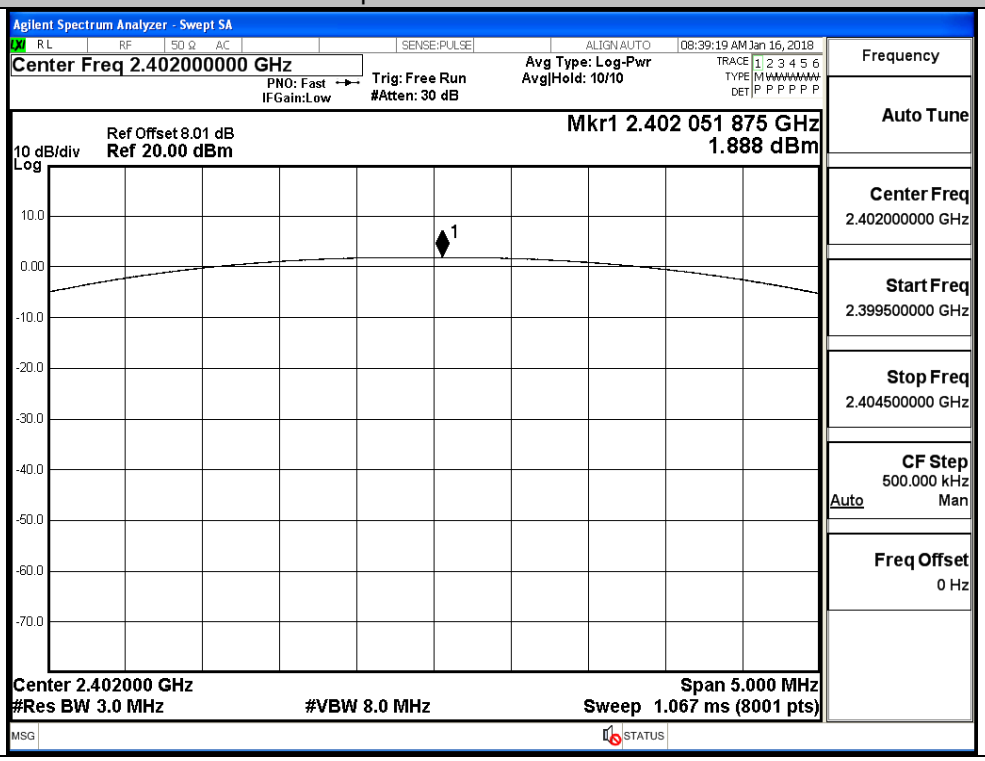
Graphs		
GFSK/Hop		
π/4DQPSK/Hop		

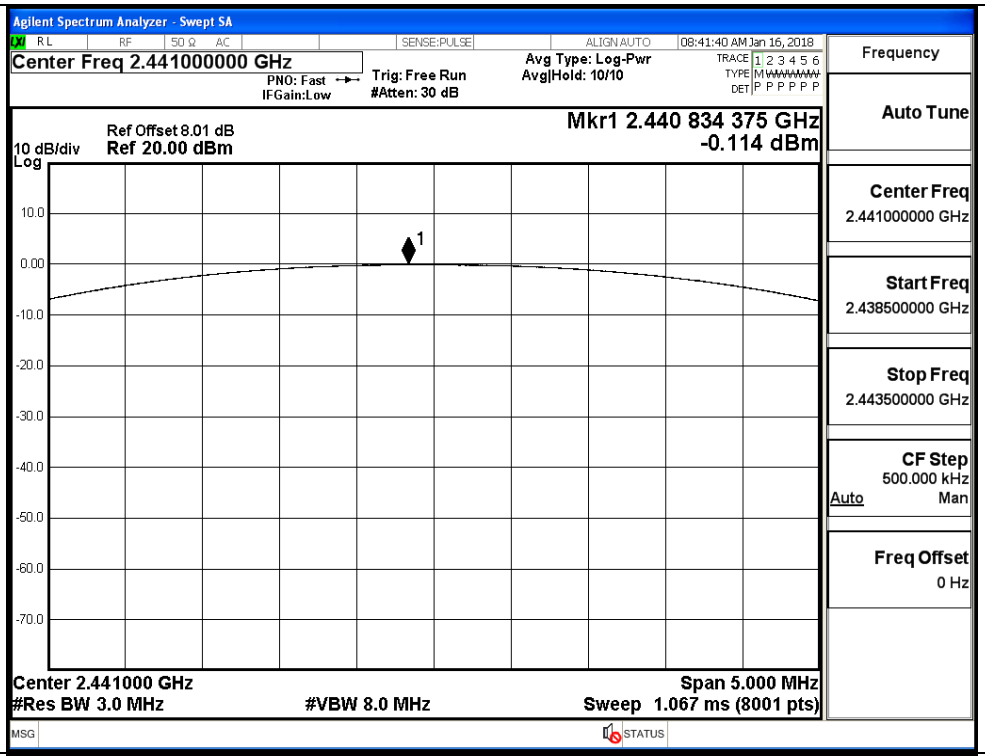
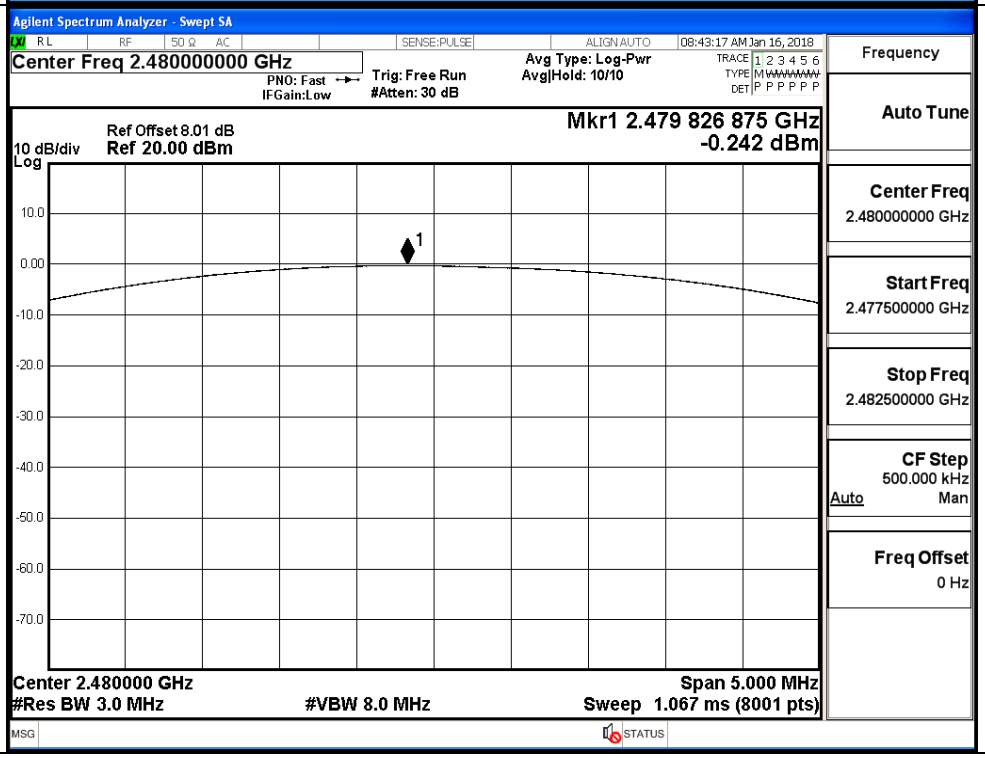
Appendix E): Conducted Peak Output Power

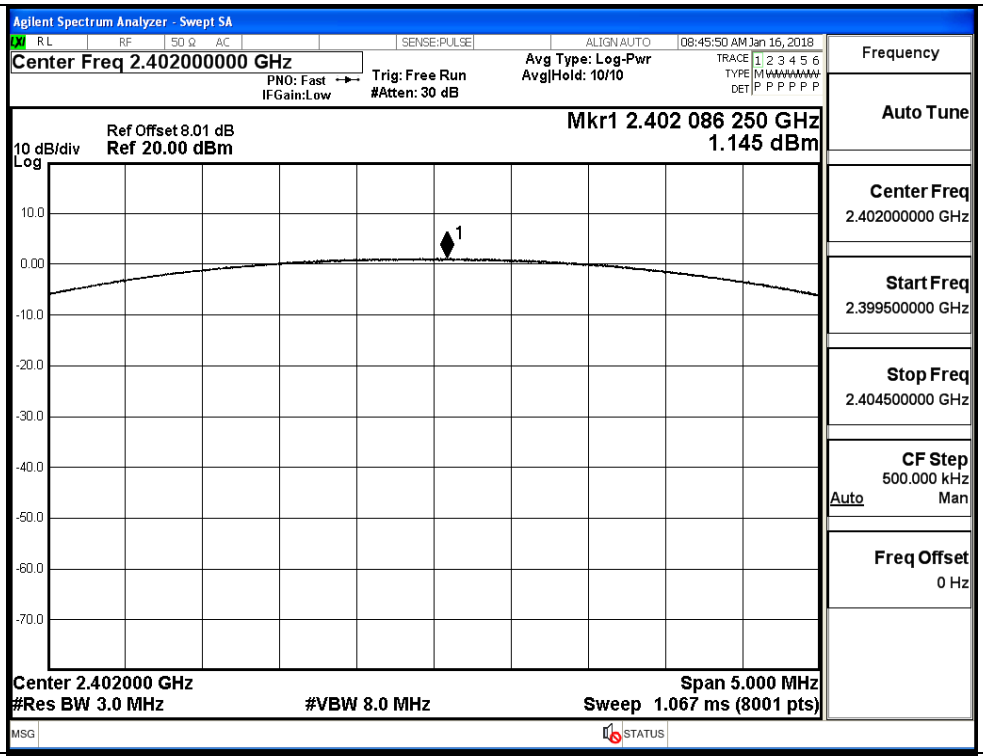
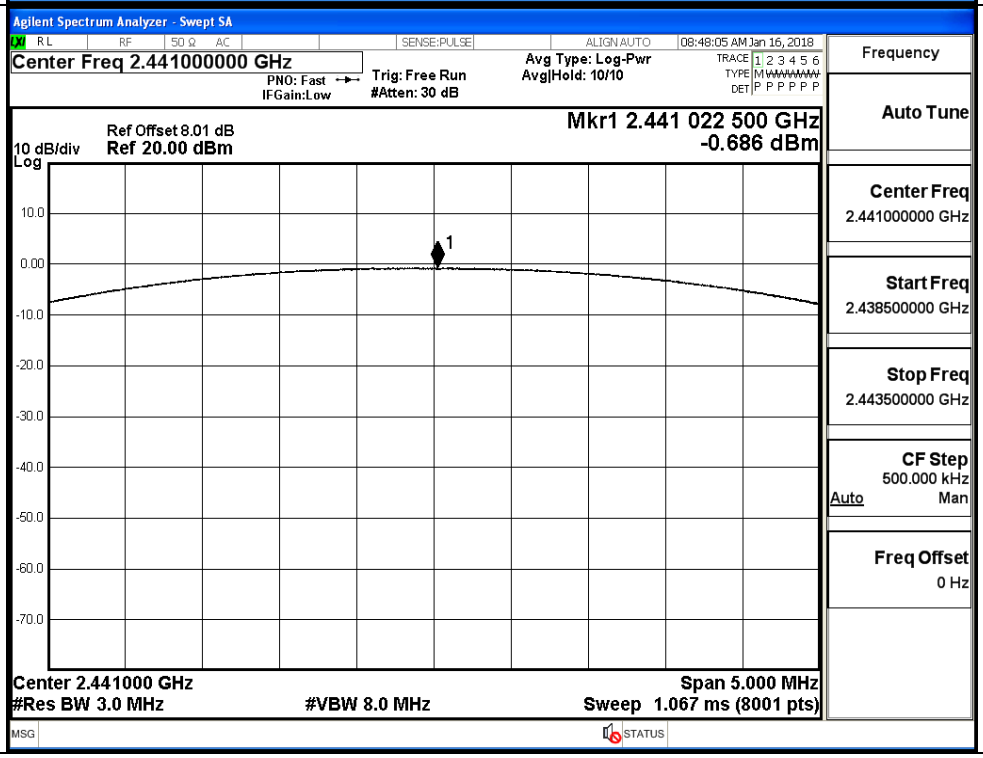
Result Table

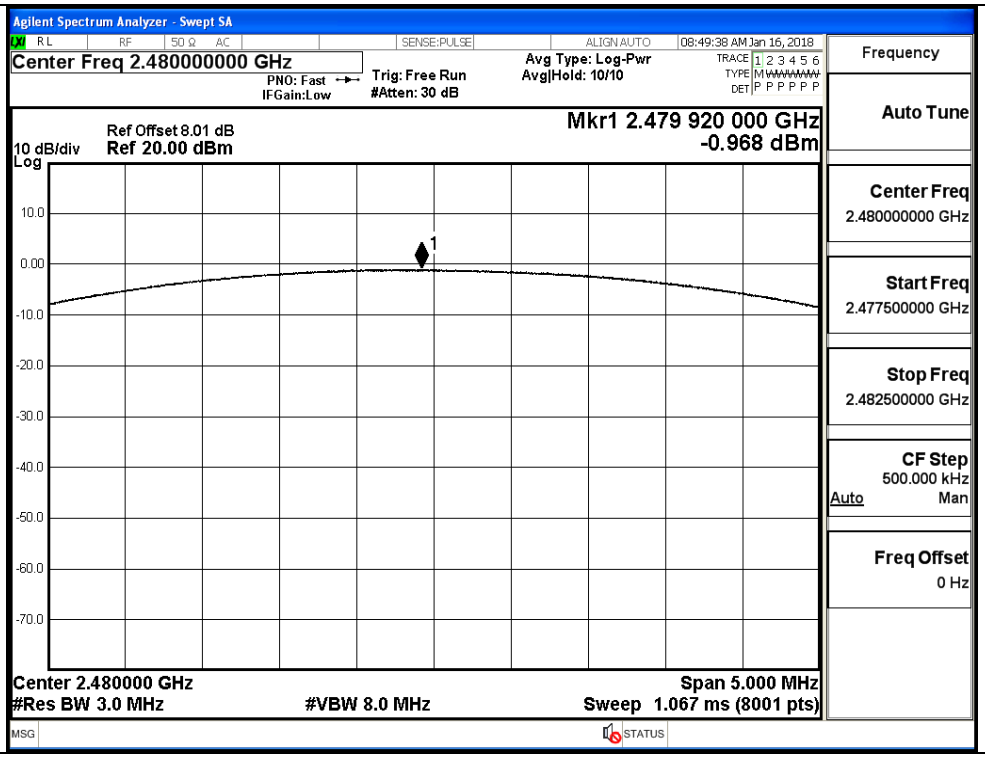
Mode	Channel.	Maximum Peak Output Power [dBm]	Limit[dBm]	Verdict
GFSK	LCH	1.888	30	PASS
GFSK	MCH	-0.114	30	PASS
GFSK	HCH	-0.242	30	PASS
π/4DQPSK	LCH	1.145	21	PASS
π/4DQPSK	MCH	-0.686	21	PASS
π/4DQPSK	HCH	-0.968	21	PASS

Test Graph

Graphs	
GFSK/LCH	

GFSK/MCH		
GFSK/HCH		

π/4DQPSK/LCH		
π/4DQPSK/MCH		

π/4DQPSK/HCH		

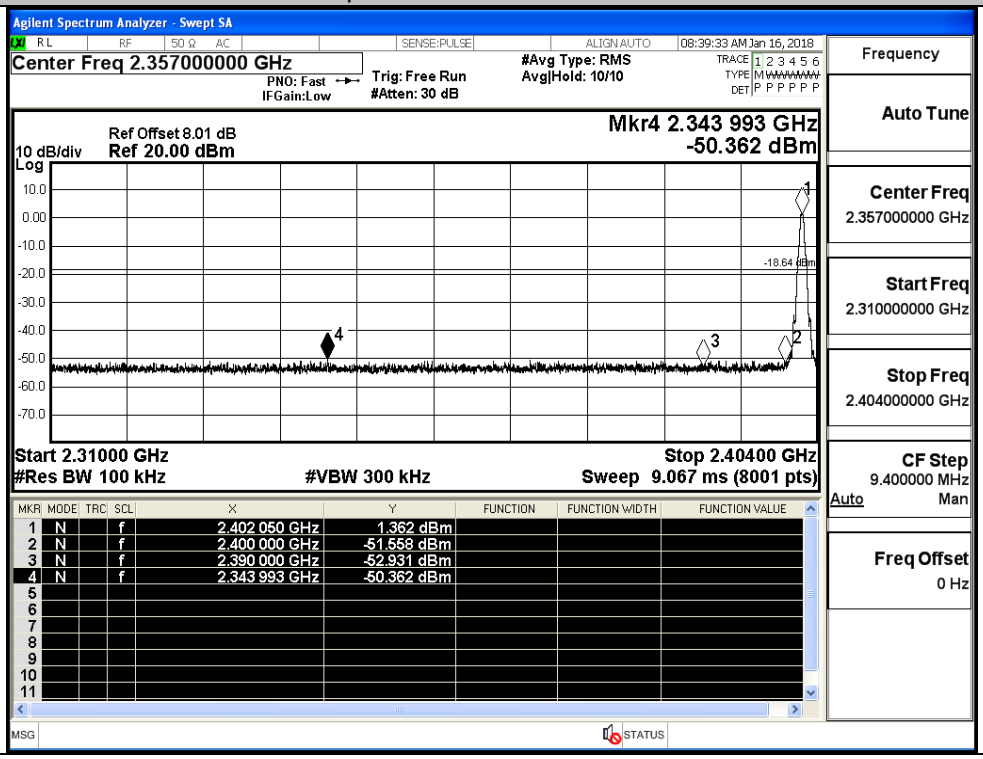
Agilent Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
08:49:38 AM Jan 16, 2018
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
TRACE 1 2 3 4 5 6
TYPE M
DET P P P P P
Ref Offset 8.01 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.479 920 000 GHz
-0.968 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 3.0 MHz
#VBW 8.0 MHz
Span 5.000 MHz
Sweep 1.067 ms (8001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.477500000 GHz
Stop Freq
2.482500000 GHz
CF Step
500.000 kHz
Auto
Man
Freq Offset
0 Hz

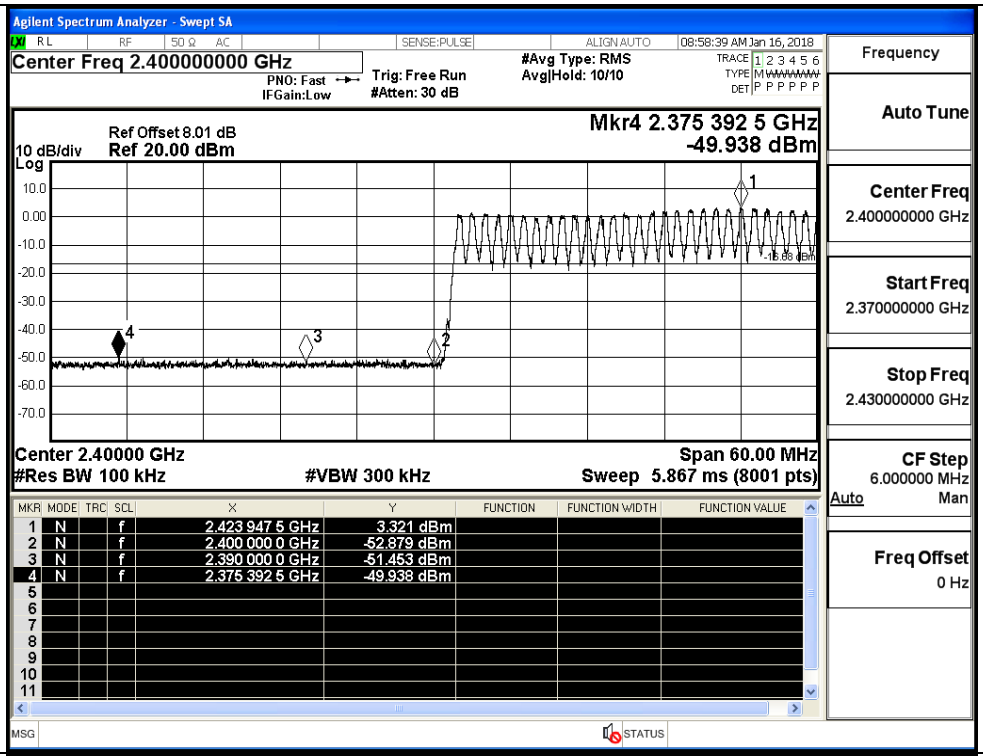
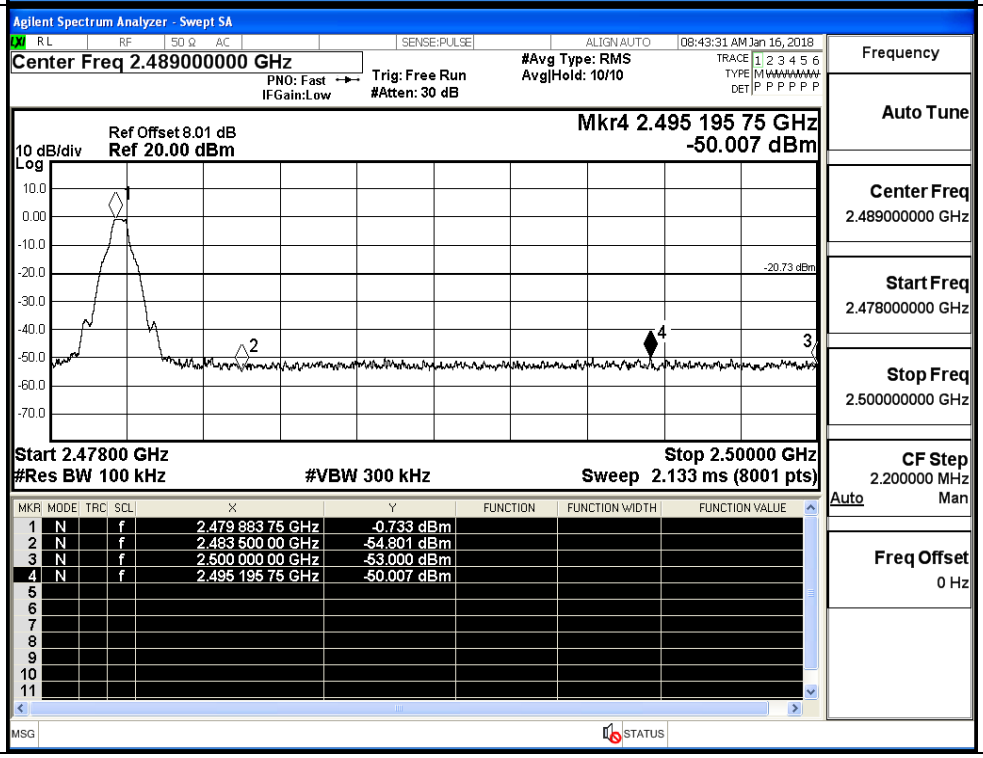
Appendix F): Band-edge for RF Conducted Emissions

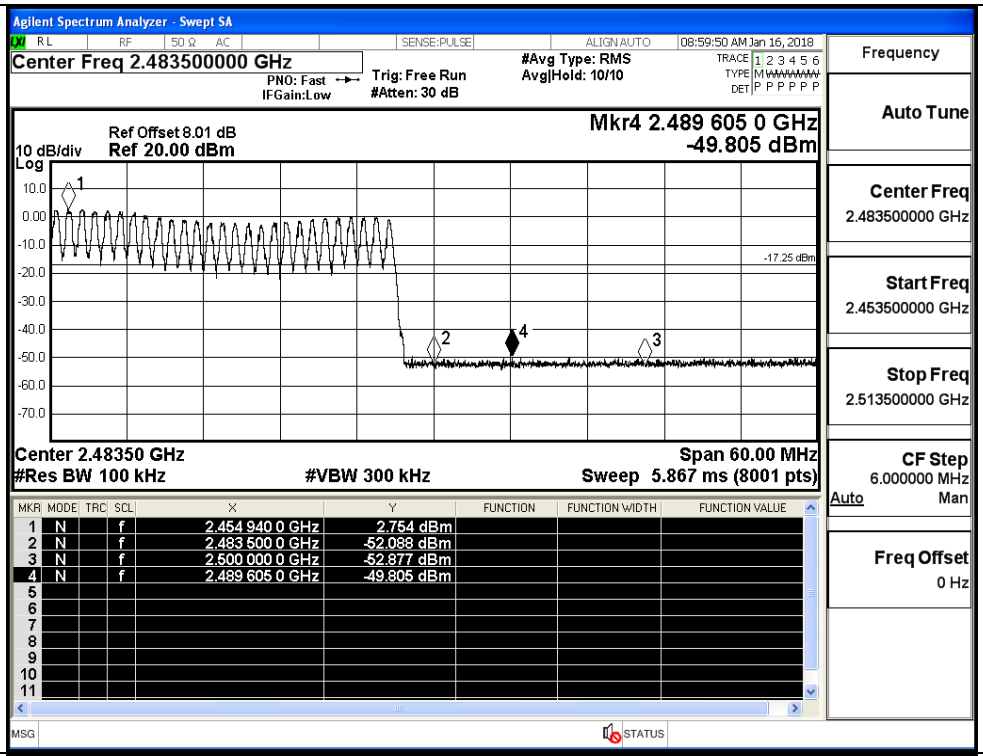
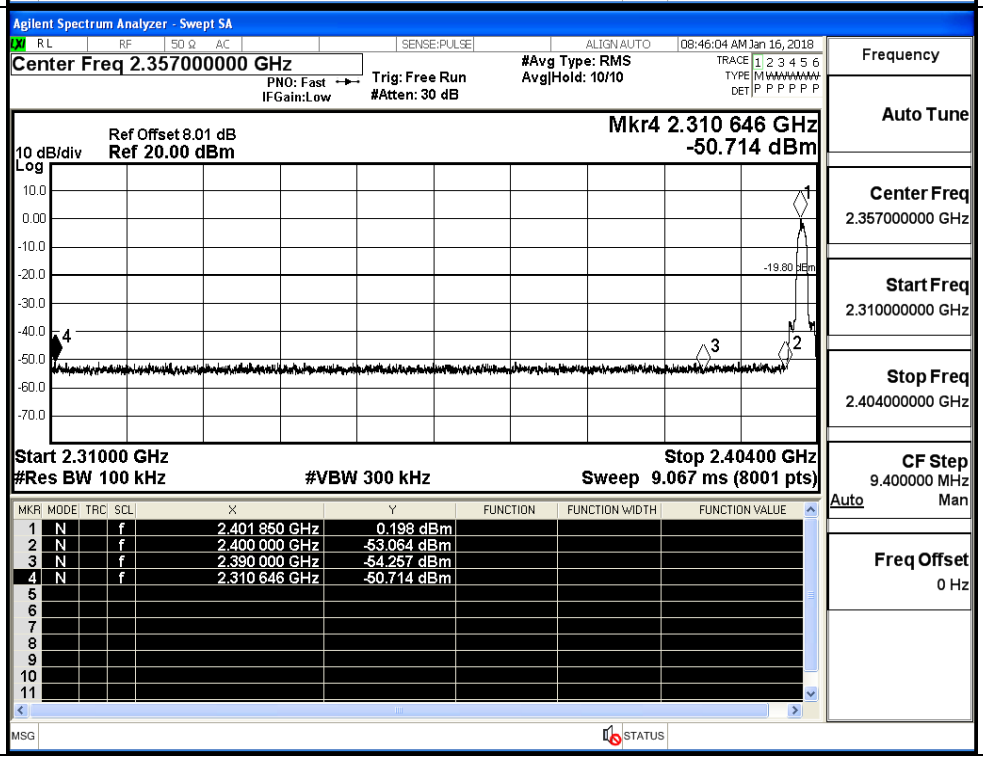
Result Table

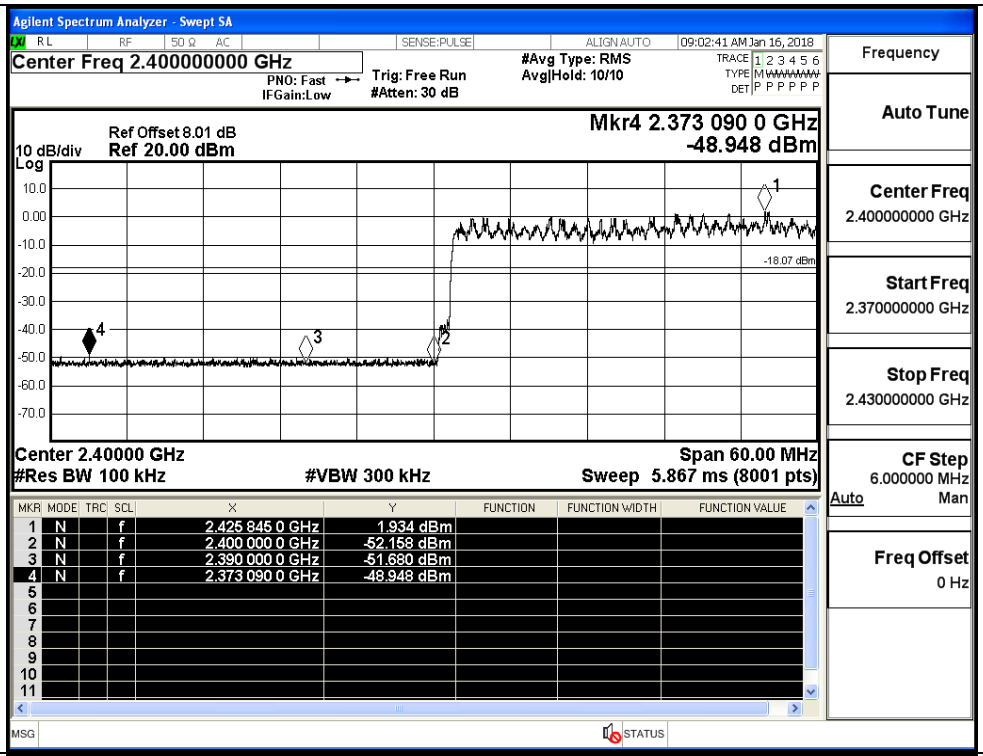
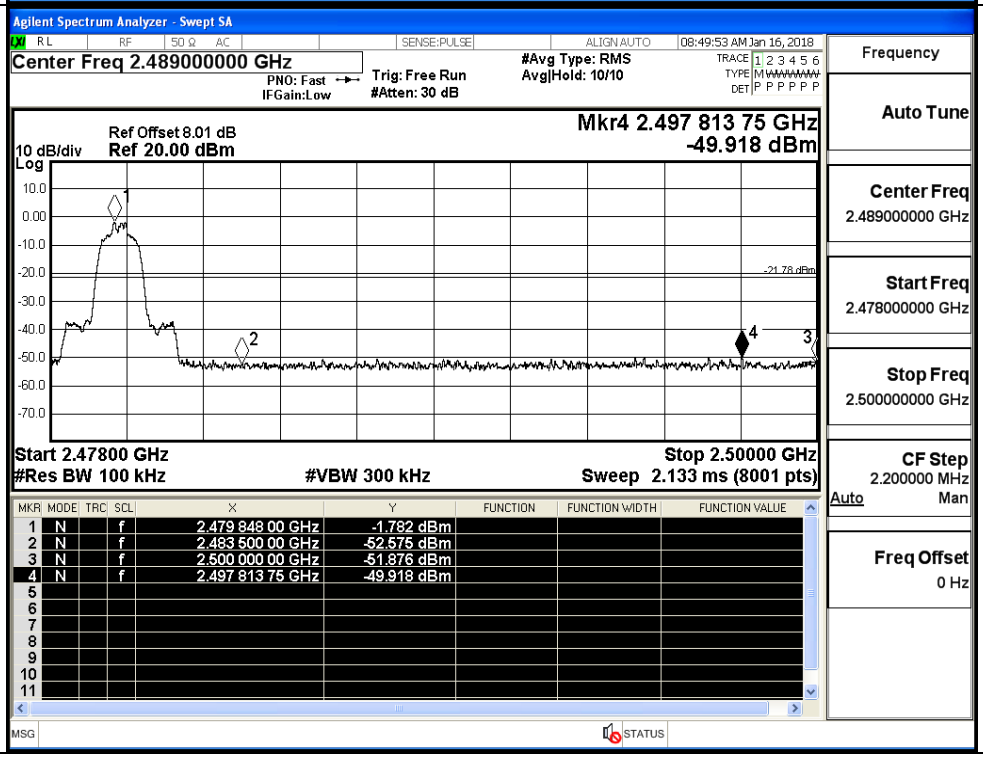
Mode	Channel	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max Spurious Level [dBm]	Limit [dBm]	Verdict
GFSK	LCH	2402	1.362	Off	-50.362	-18.64	PASS
			3.321	On	-49.938	-16.68	PASS
GFSK	HCH	2480	-0.733	Off	-50.007	-20.73	PASS
			2.754	On	-49.805	-17.25	PASS
π/4DQPSK	LCH	2402	0.198	Off	-50.714	-19.8	PASS
			1.934	On	-48.948	-18.07	PASS
π/4DQPSK	HCH	2480	-1.782	Off	-49.918	-21.78	PASS
			0.910	On	-49.481	-19.09	PASS

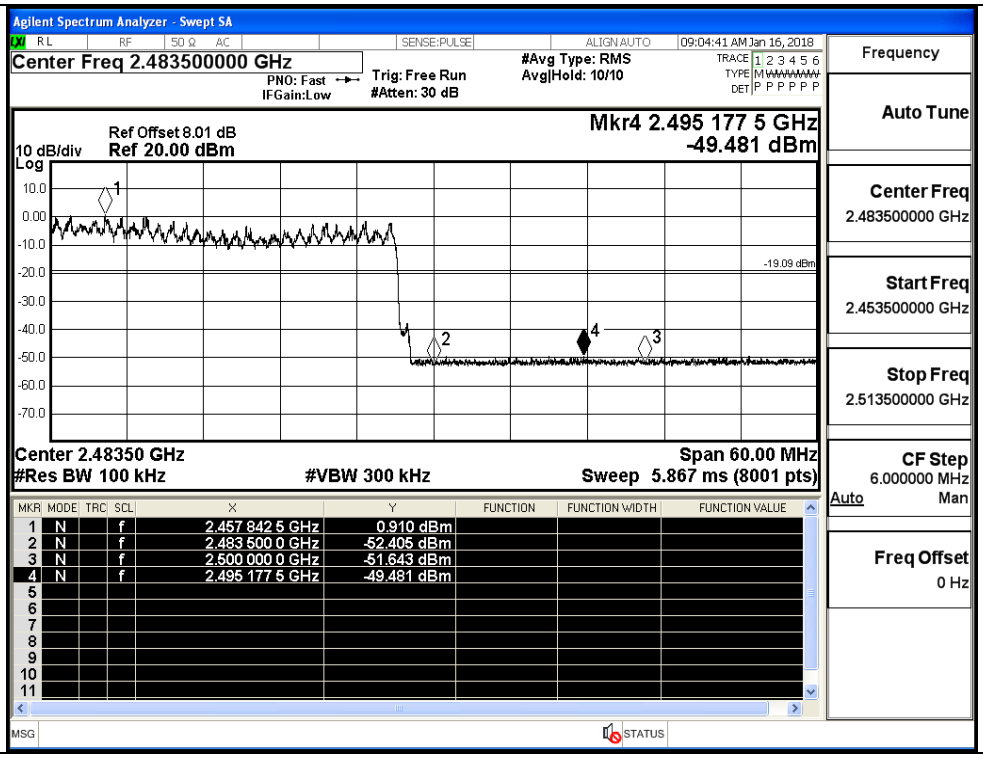
Test Graph

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	

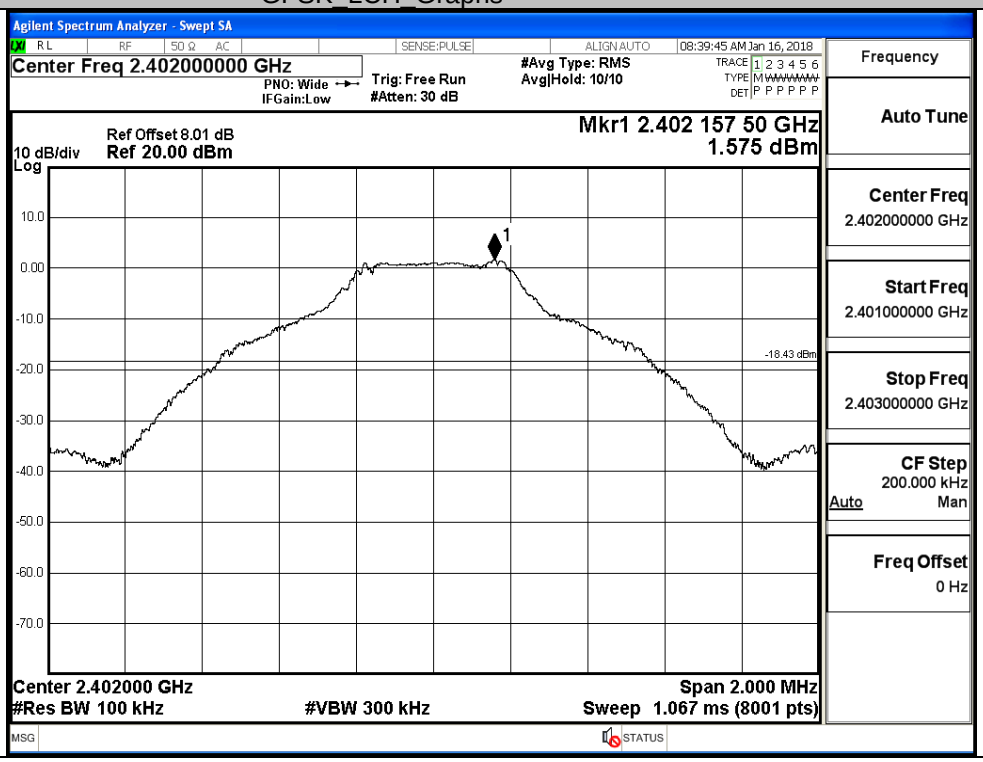
π/4DQPSK/HCH/Hop		

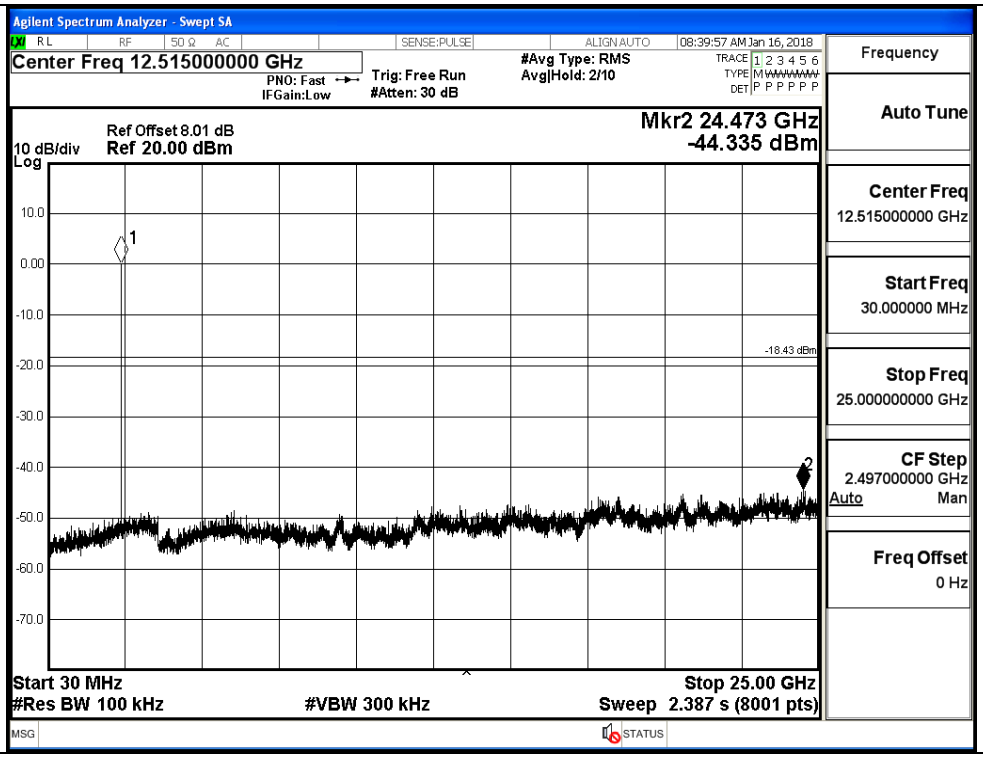
Appendix G): RF Conducted Spurious Emissions

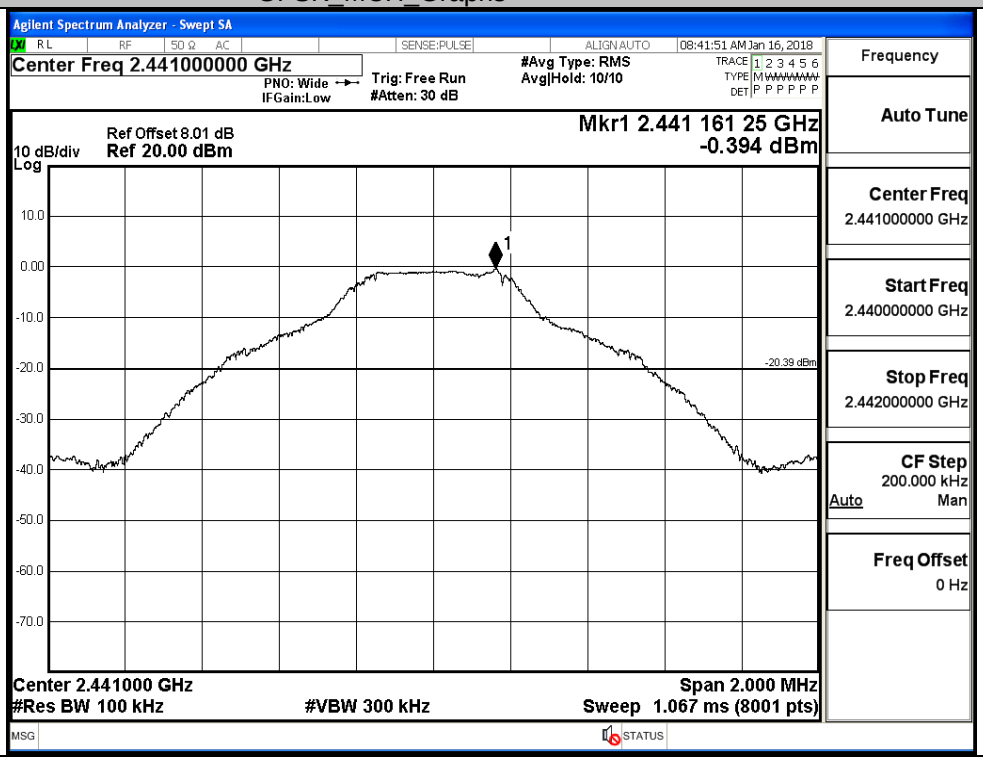
Result Table

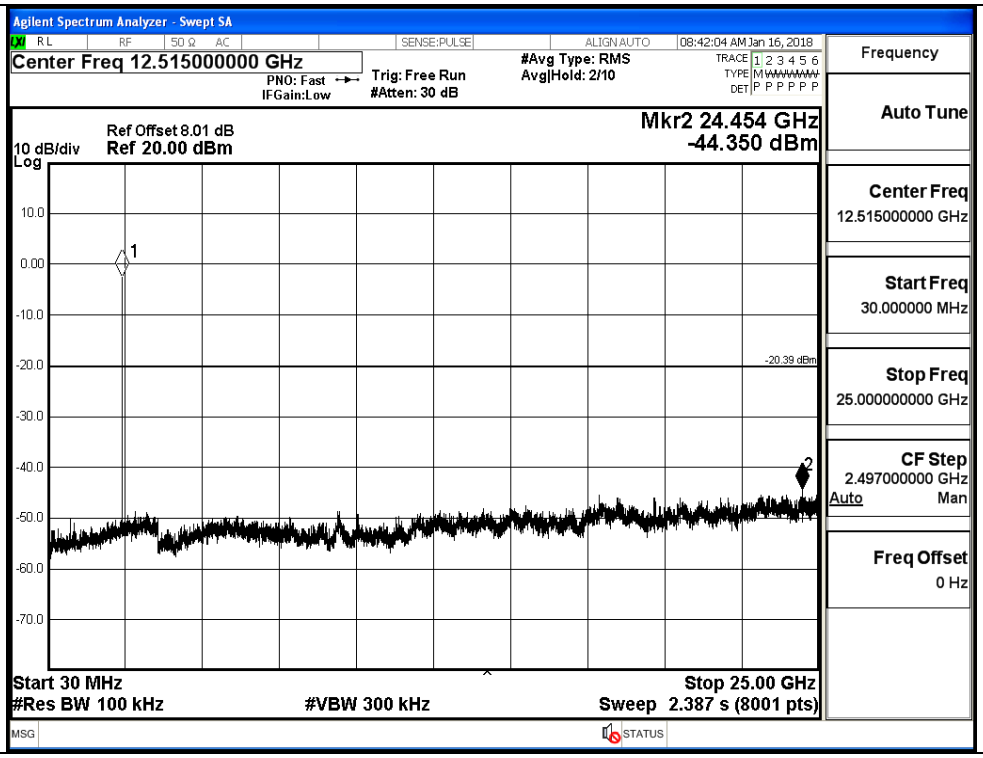
Mode	Channel	Pref [dBm]	Limit [dBm]	Verdict
GFSK	LCH	1.575	<-18.43	PASS
GFSK	MCH	-0.394	<-20.39	PASS
GFSK	HCH	-0.963	<-20.96	PASS
π/4DQPSK	LCH	0.124	<-19.88	PASS
π/4DQPSK	MCH	-1.723	<-21.72	PASS
π/4DQPSK	HCH	-1.862	<-21.88	PASS

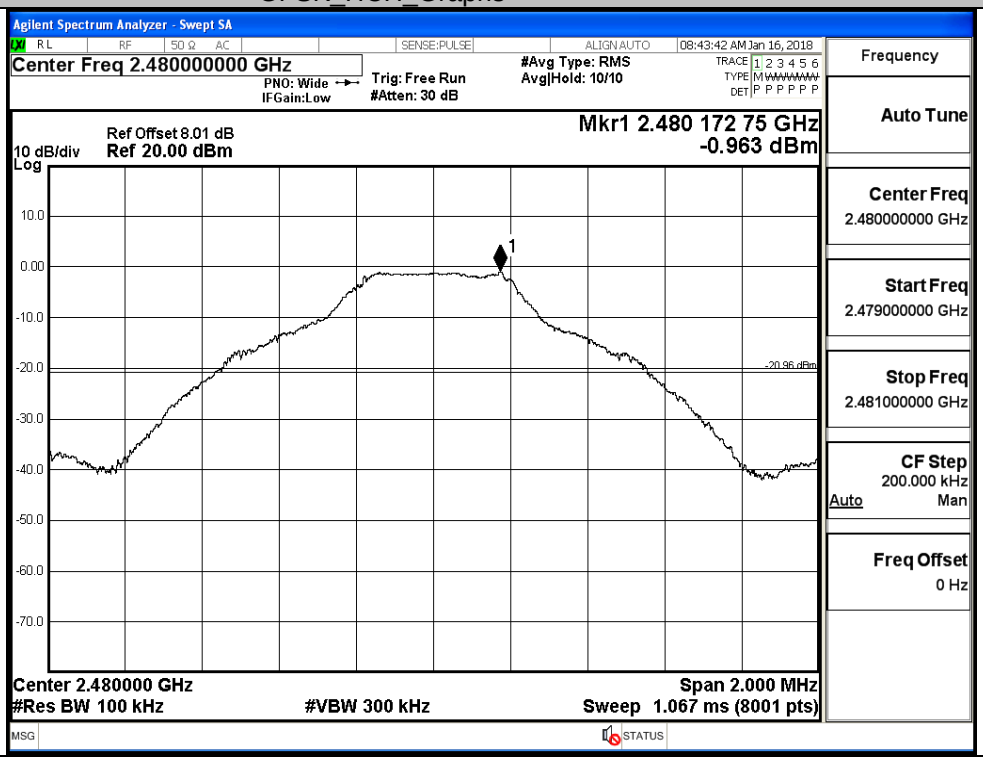
Test Graph

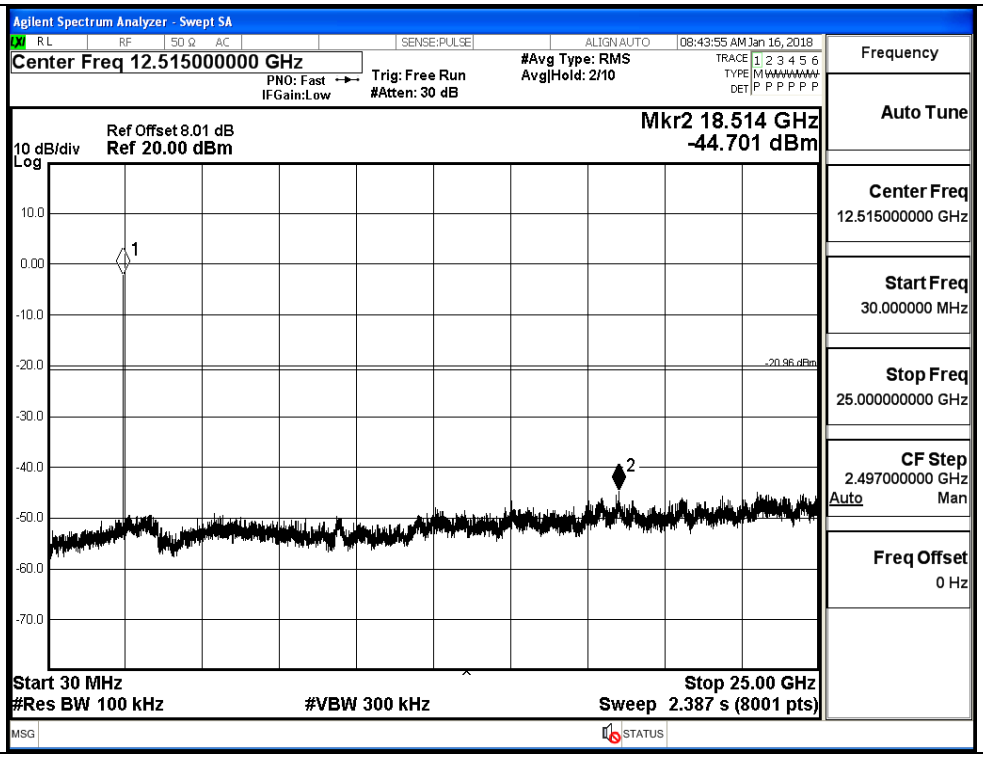
GFSK_LCH_Graphs	
Pref	

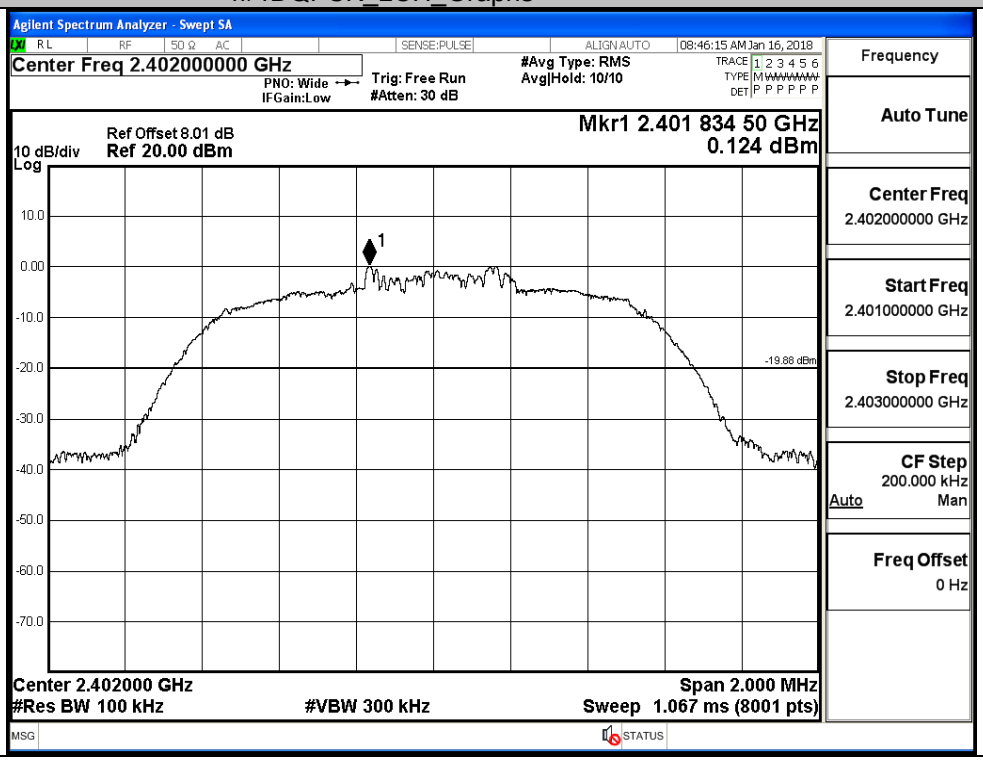
Puw		

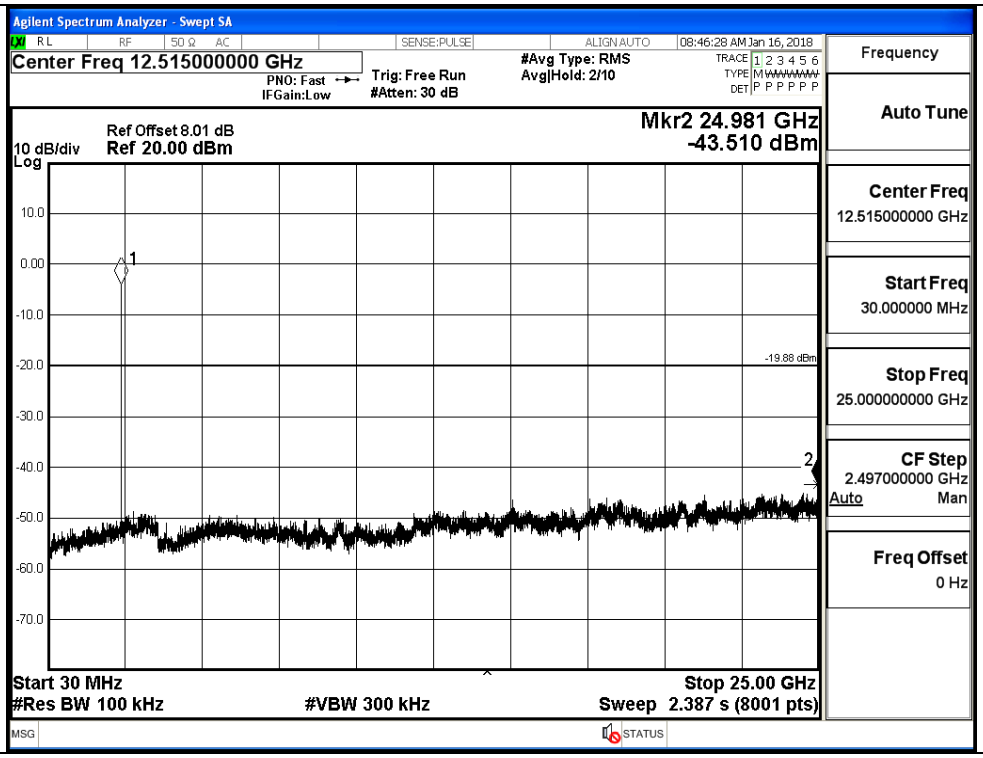
GFSK_MCH_Graphs		
Pref		

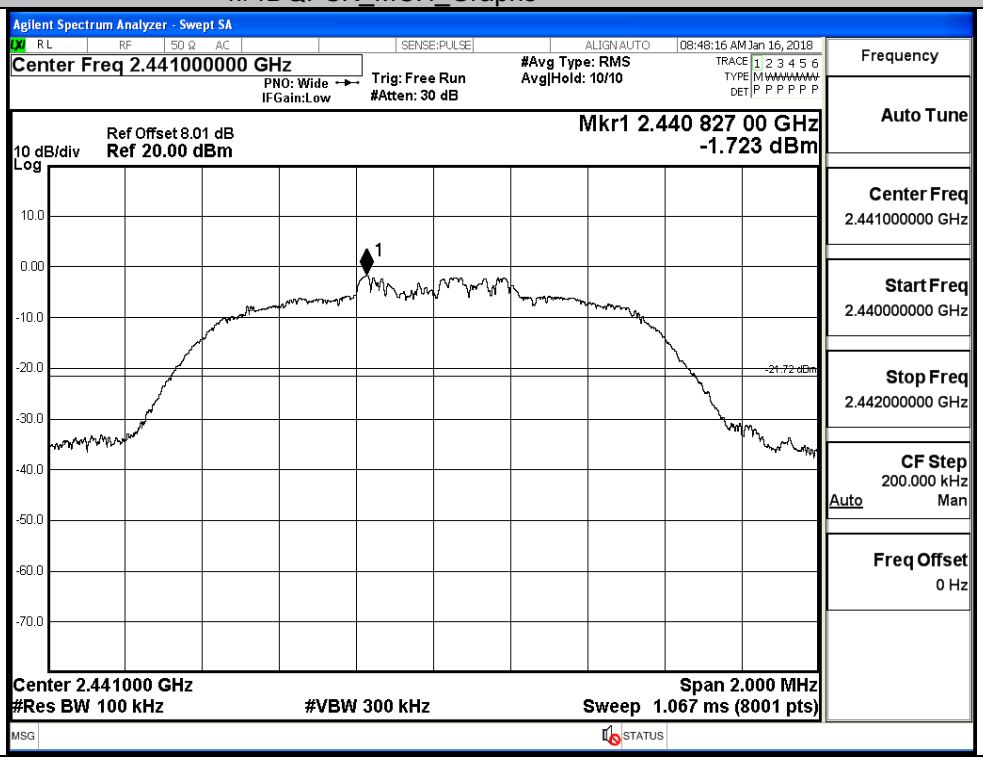
Puw		

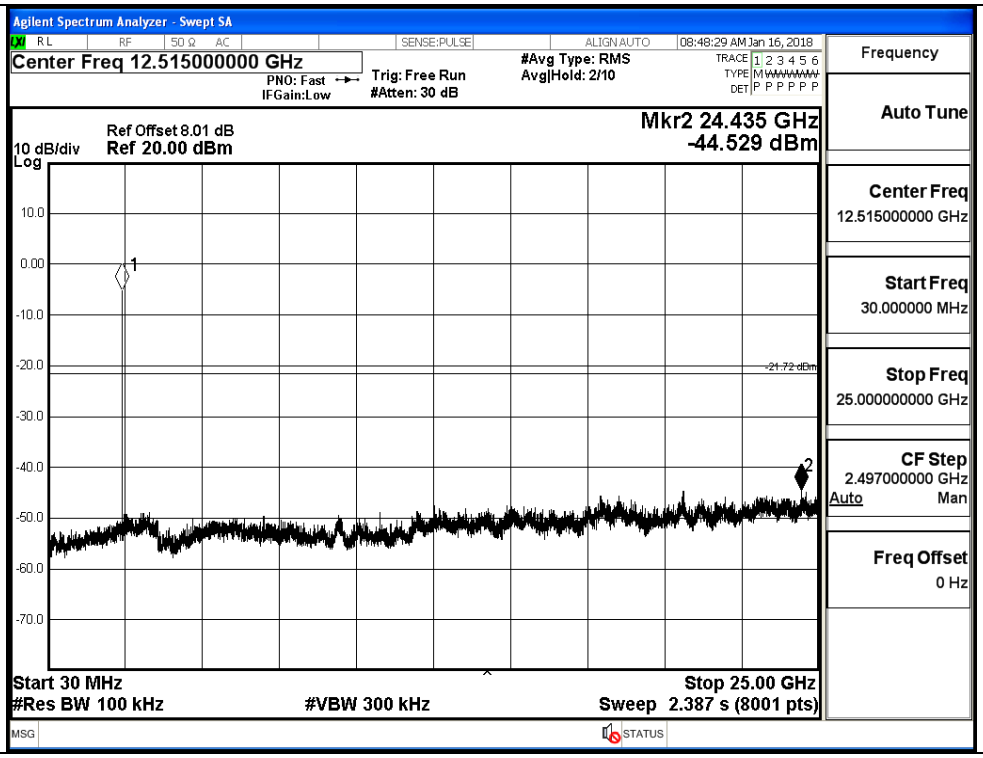
GFSK_HCH_Graphs		
Pref		

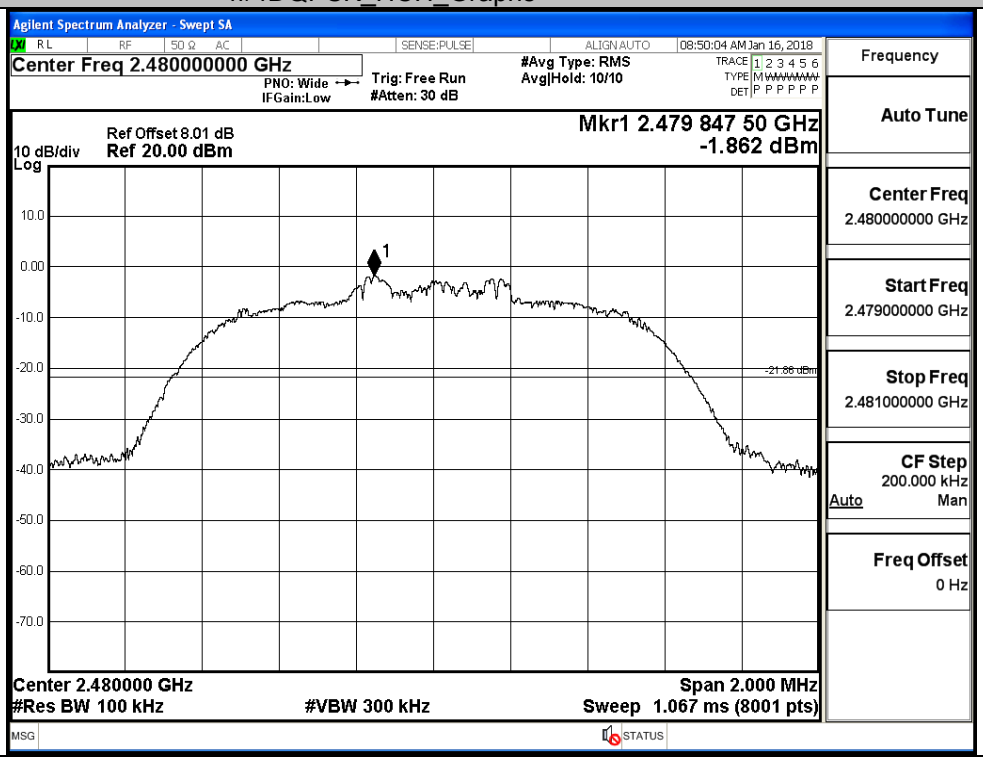
Puw	

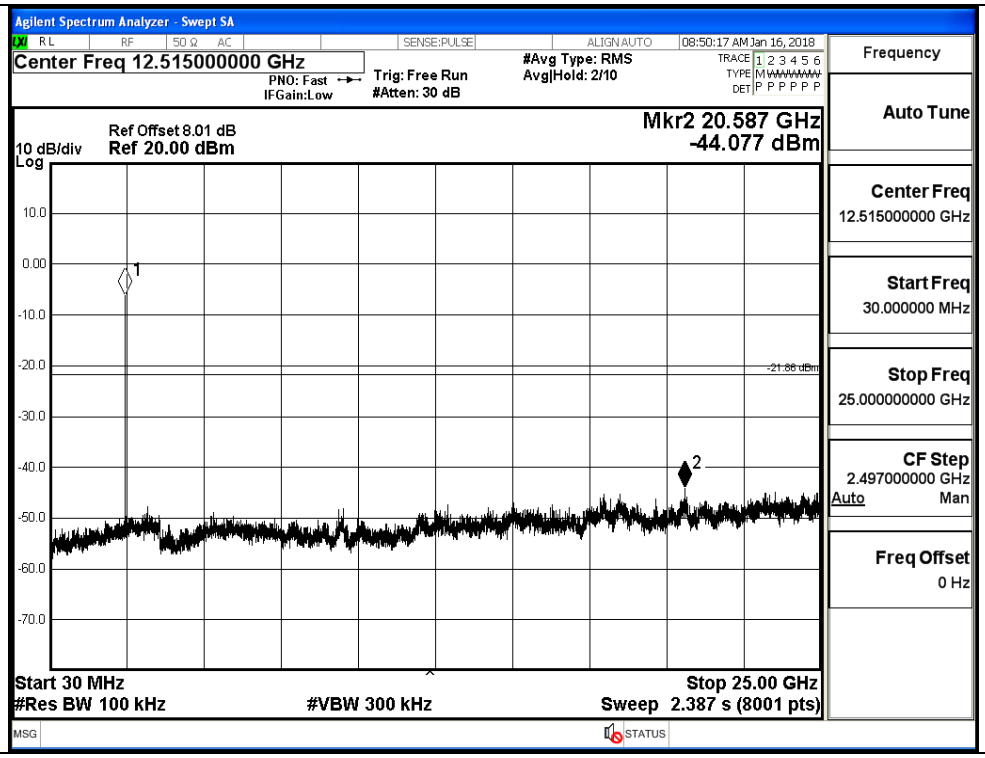
π/4DQPSK_LCH_Graphs	
Pref	

Puw	

π/4DQPSK_MCH_Graphs	
Pref	

Puw	

π/4DQPSK_HCH_Graphs	
Pref	

Puw		

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
08:50:17 AM Jan 16, 2018
Ref Offset 8.01 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr2 20.587 GHz
-44.077 dBm
-21.86 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

. Appendix H):Restrict-band band-edge measurements

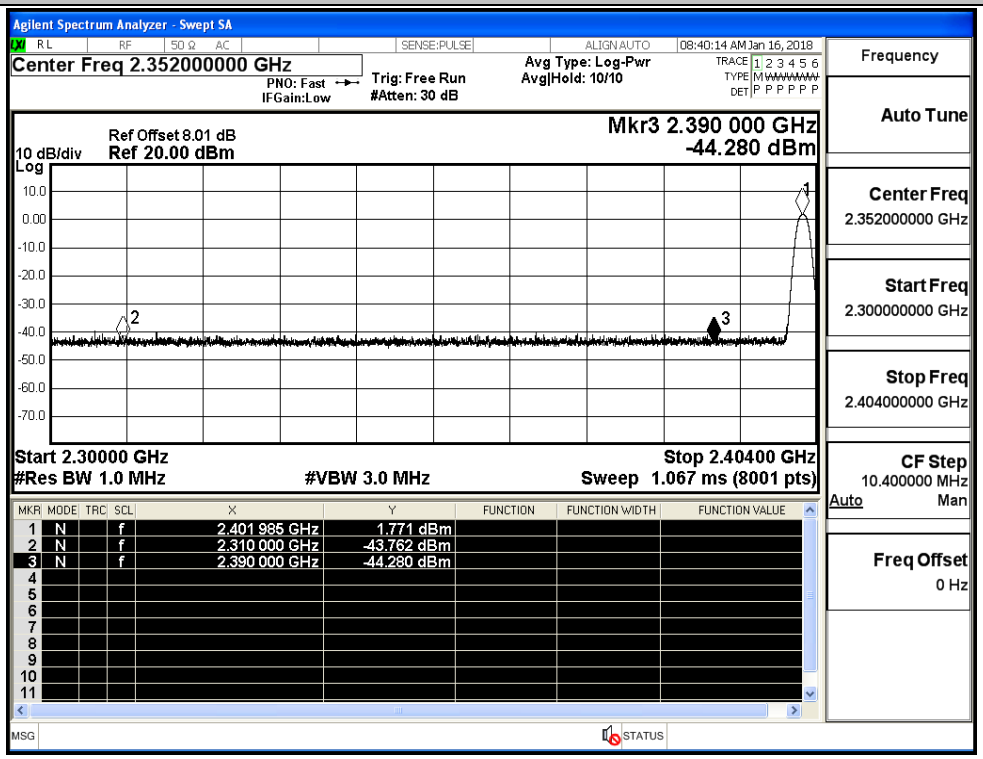
Result Table

Test Mode	Hopping	Freq.	Power [dBm]	Gain	Ground Factor	E [dBuV/m]	Detector	Limit [dBuV/m]	Verdi
GFSK_DH5	On	2310.0	-43.76	2	0	51.50	PEAK	74	PASS
GFSK_DH5	On	2310.0	-54.01	2	0	41.25	AV	54	PASS
GFSK_DH5	On	2390.0	-44.28	2	0	50.98	PEAK	74	PASS
GFSK_DH5	On	2390.0	-53.56	2	0	41.70	AV	54	PASS
GFSK_DH5	On	2483.5	-43.69	2	0	51.57	PEAK	74	PASS
GFSK_DH5	On	2483.5	-53.34	2	0	41.92	AV	54	PASS
GFSK_DH5	On	2500.0	-43.52	2	0	51.74	PEAK	74	PASS
GFSK_DH5	On	2500.0	-53.32	2	0	41.94	AV	54	PASS
π/4DQPSK _2DH5	On	2310.0	-43.79	2	0	51.47	PEAK	74	PASS
π/4DQPSK_ 2DH5	On	2310.0	-53.96	2	0	41.30	AV	54	PASS
π/4DQPSK_ 2DH5	On	2390.0	-43.21	2	0	52.05	PEAK	74	PASS
π/4DQPSK _2DH5	On	2390.0	-53.60	2	0	41.65	AV	54	PASS
π/4DQPSK _2DH5	On	2483.5	-43.63	2	0	51.62	PEAK	74	PASS
π/4DQPSK _2DH5	On	2483.5	-53.34	2	0	41.92	AV	54	PASS

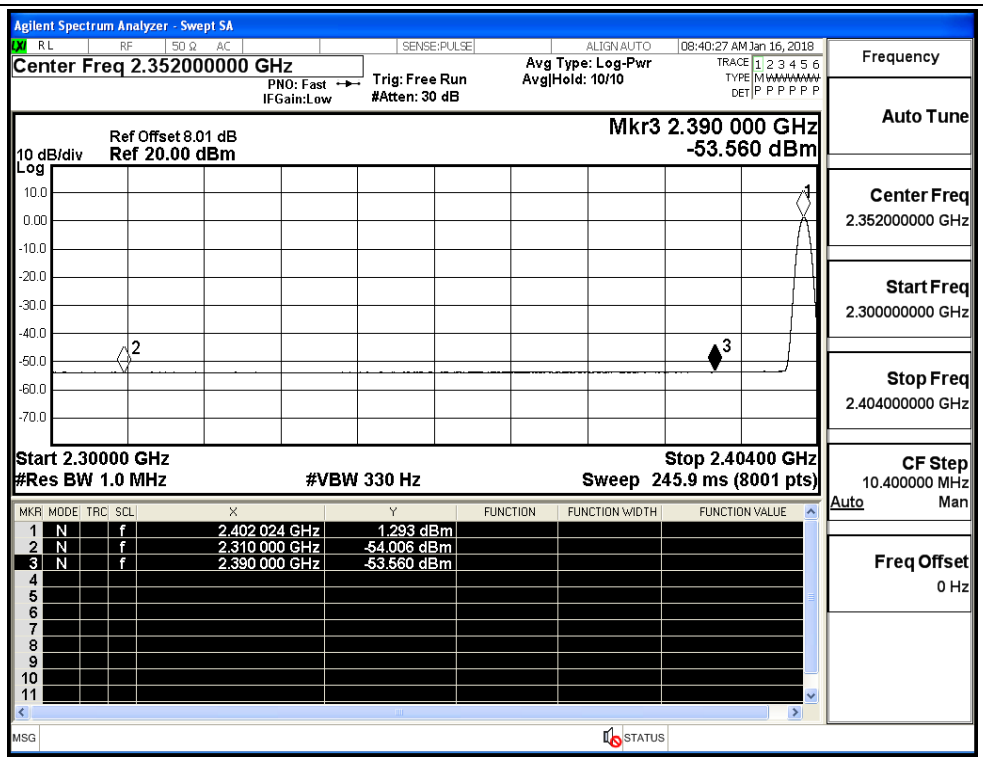
π/4DQPSK _2DH5	On	2500.0	-42.69	2	0	52.57	PEAK	74	PASS
π/4DQPSK_ 2DH5	On	2500.0	-53.23	2	0	42.03	AV	54	PASS

Test Graph

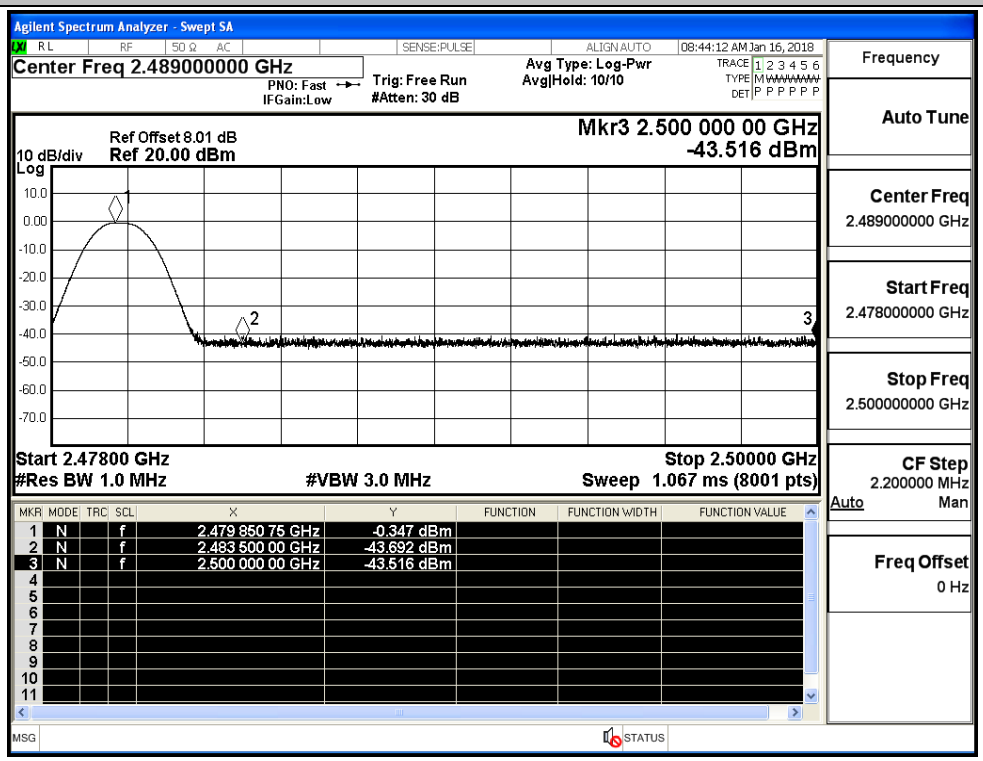
Restrict-band band-edge measurements_2402_PEAK_DH5



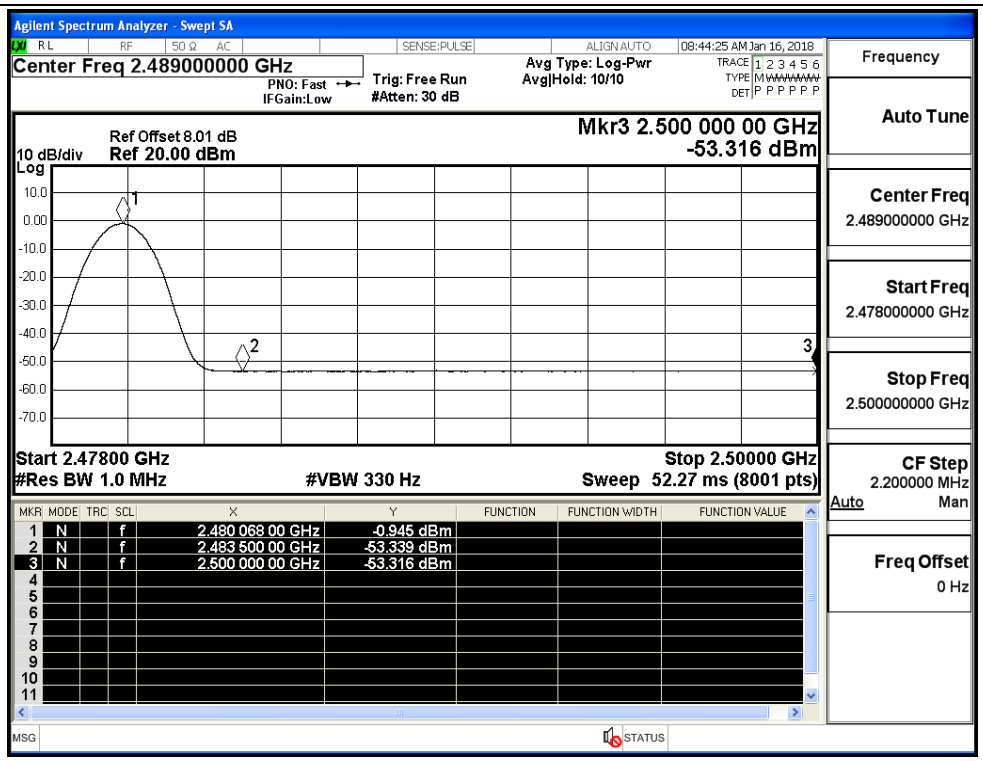
Restrict-band band-edge measurements_2402_AV_DH5



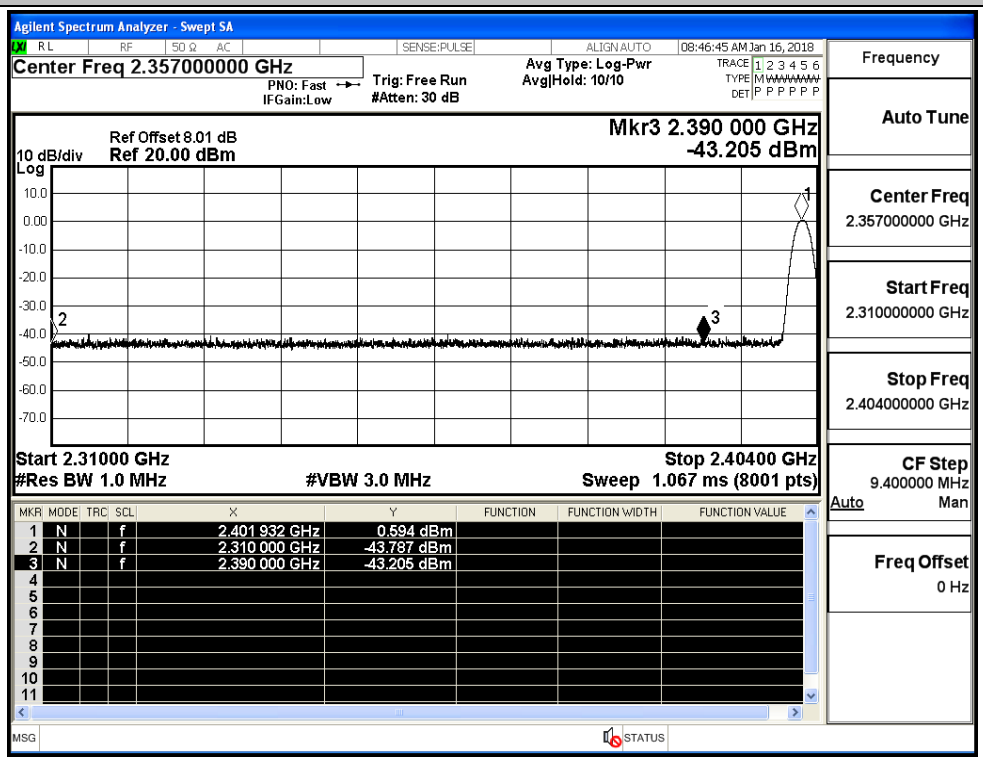
Restrict-band band-edge measurements_2480_PEAK_DH5



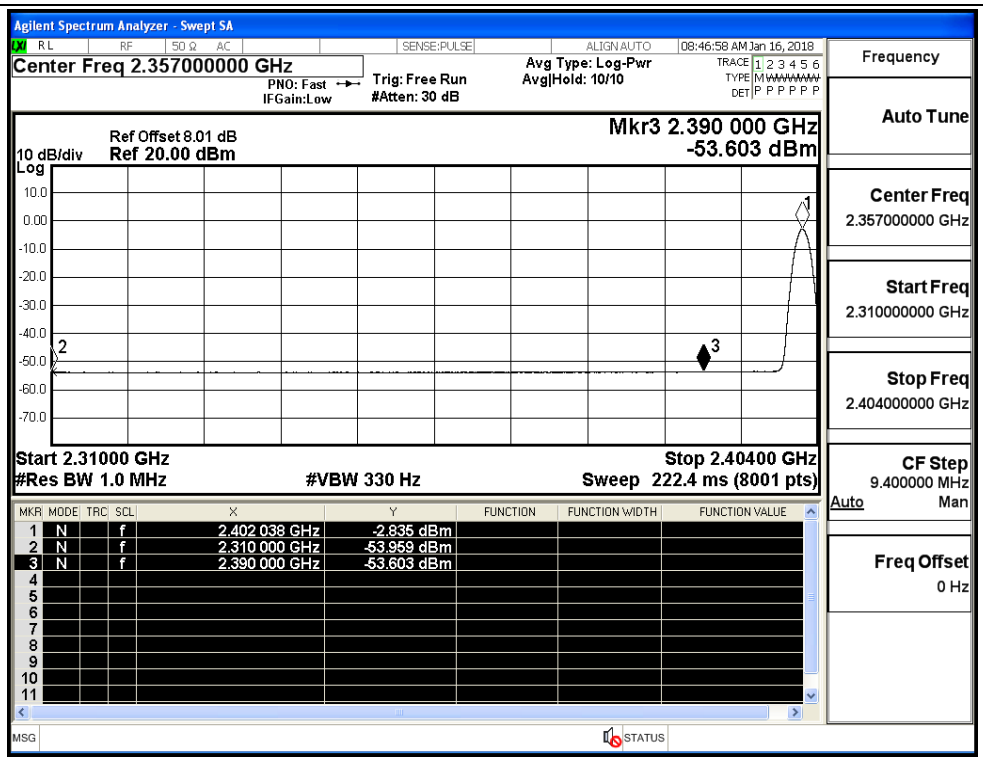
Restrict-band band-edge measurements_2480_AV_DH5



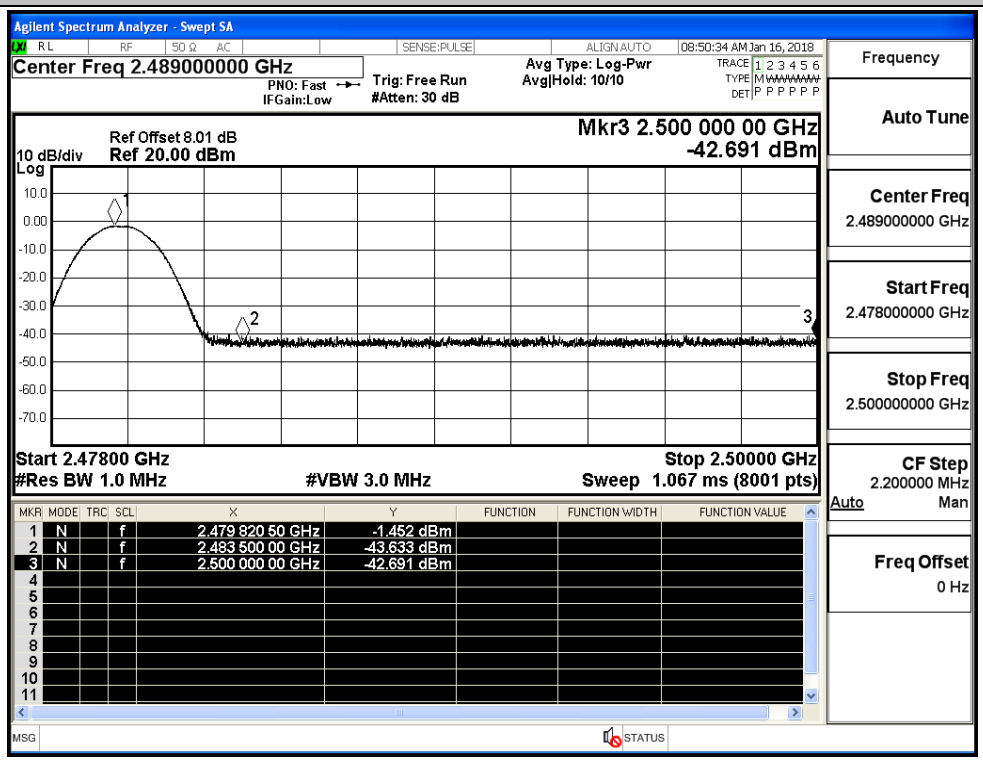
Restrict-band band-edge measurements_2402_PEAK_2DH5



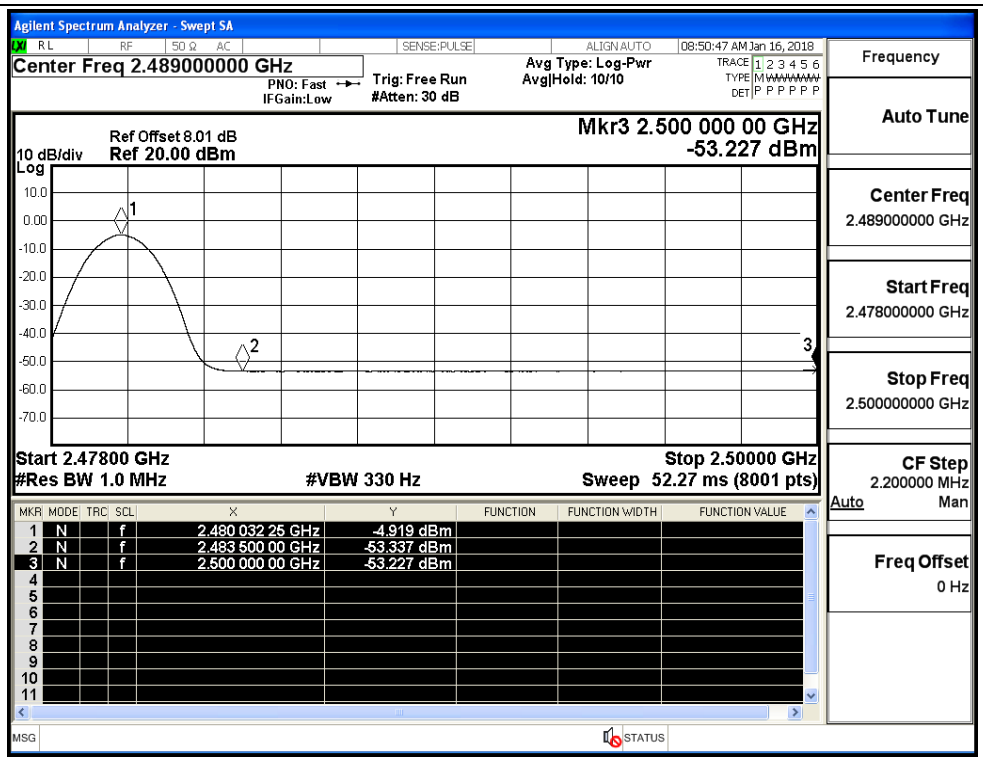
Restrict-band band-edge measurements_2402_AV_2DH5



Restrict-band band-edge measurements_2480_PEAK_2DH5



Restrict-band band-edge measurements_2480_AV_2DH5


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.489000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
08:50:47 AM Jan 16, 2018
Ref Offset 8.01 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr3 2.500 000 00 GHz
-53.227 dBm
Start 2.47800 GHz
#Res BW 1.0 MHz
#VBW 330 Hz
Stop 2.50000 GHz
Sweep 52.27 ms (8001 pts)
1 N 1 f 2.480 032 25 GHz -4.919 dBm
2 N 1 f 2.483 500 00 GHz -53.337 dBm
3 N 1 f 2.500 000 00 GHz -53.227 dBm
Frequency
Auto Tune
Center Freq
2.489000000 GHz
Start Freq
2.478000000 GHz
Stop Freq
2.500000000 GHz
CF Step
2.200000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS