# Appendix A

# RF Test Data for BT V5.0 (BDR/EDR) (Conducted Measurement)

**Product Name: BLUETOOTH SPEAKER**

**Trade Mark: N/A**

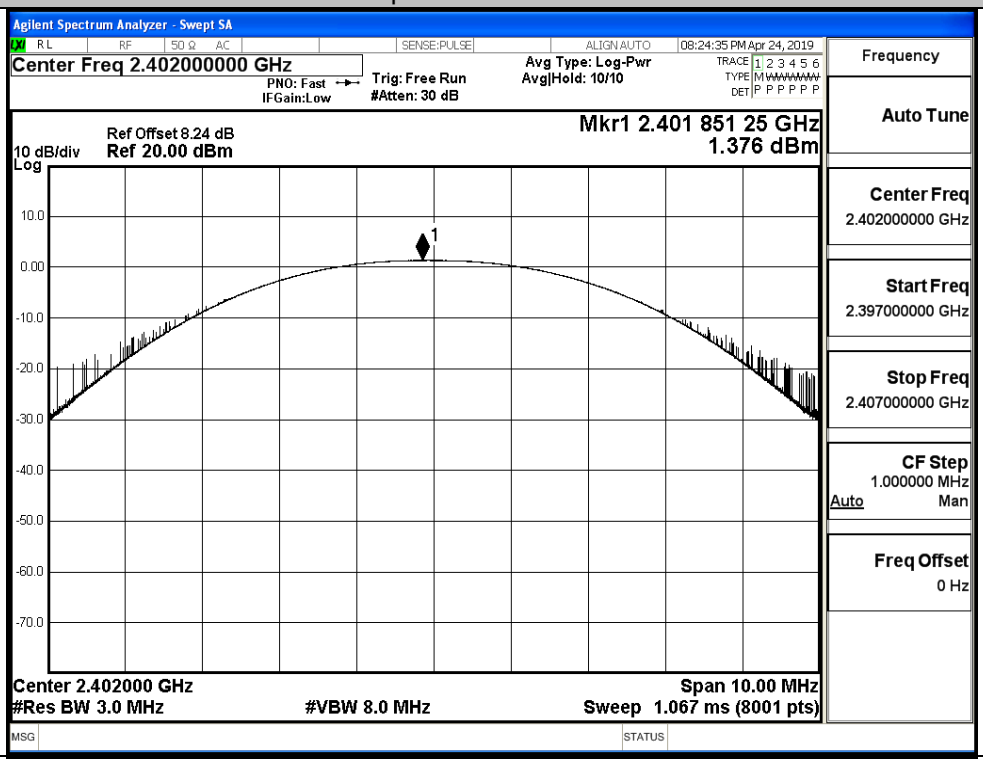
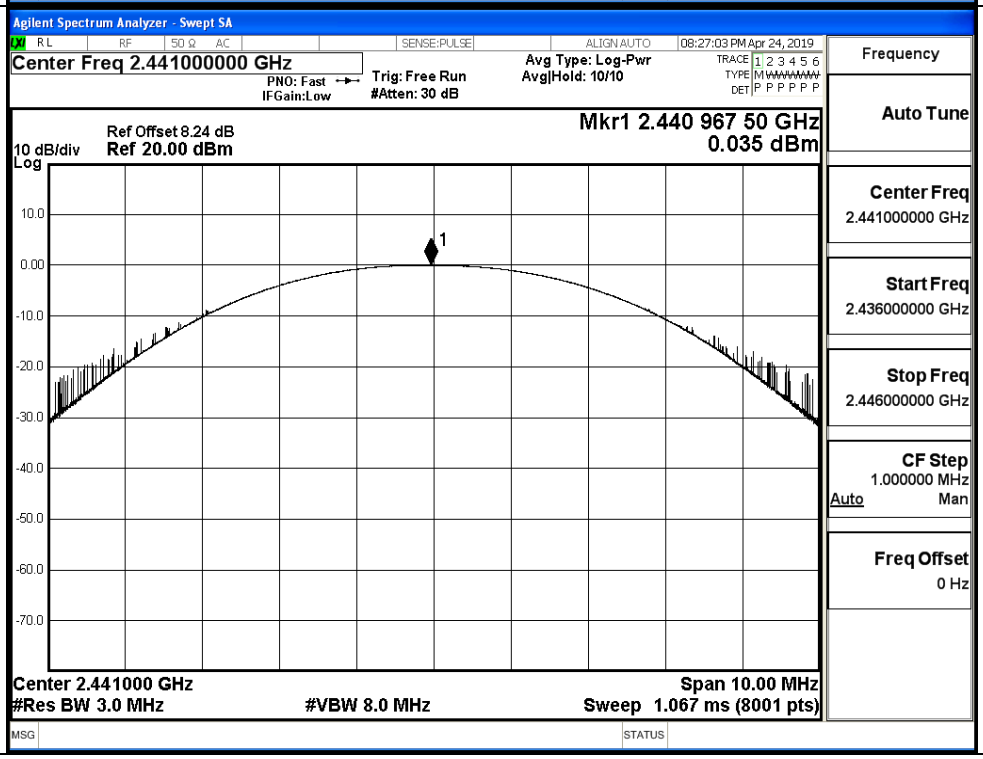
**Test Model: Q10**

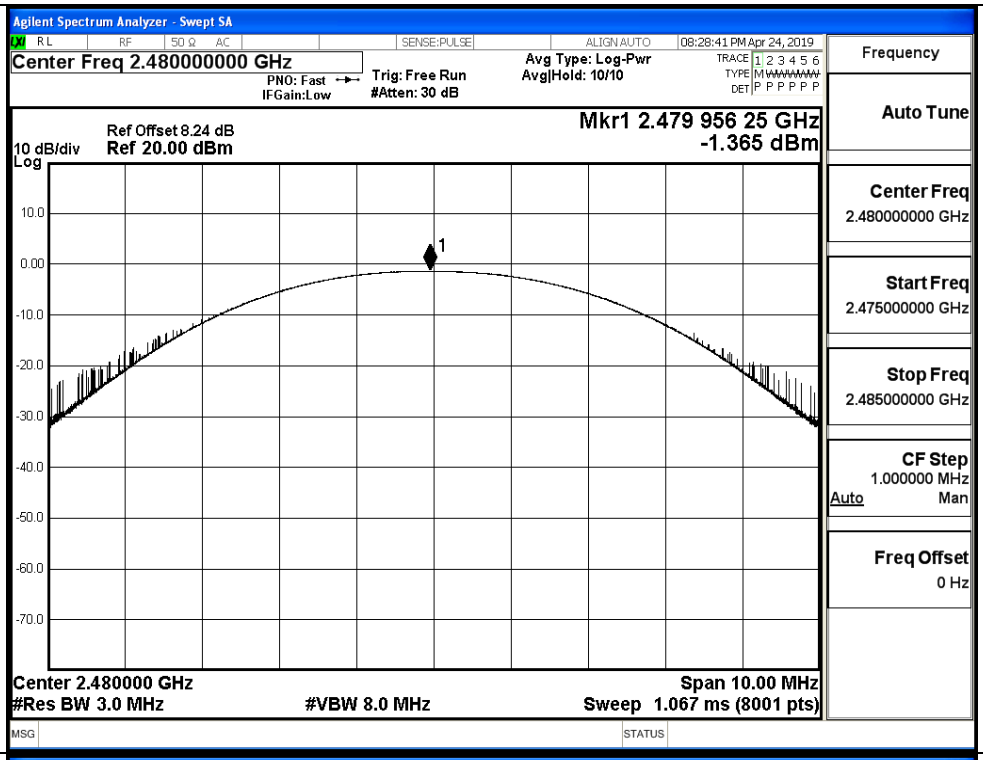
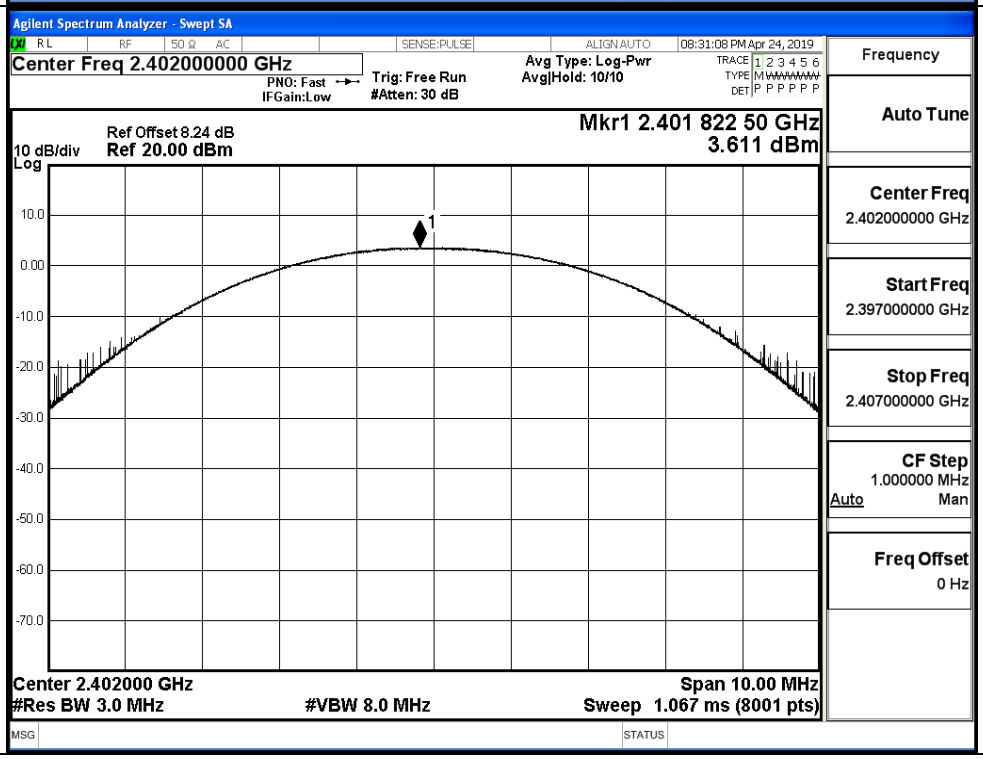
**Environmental Conditions**

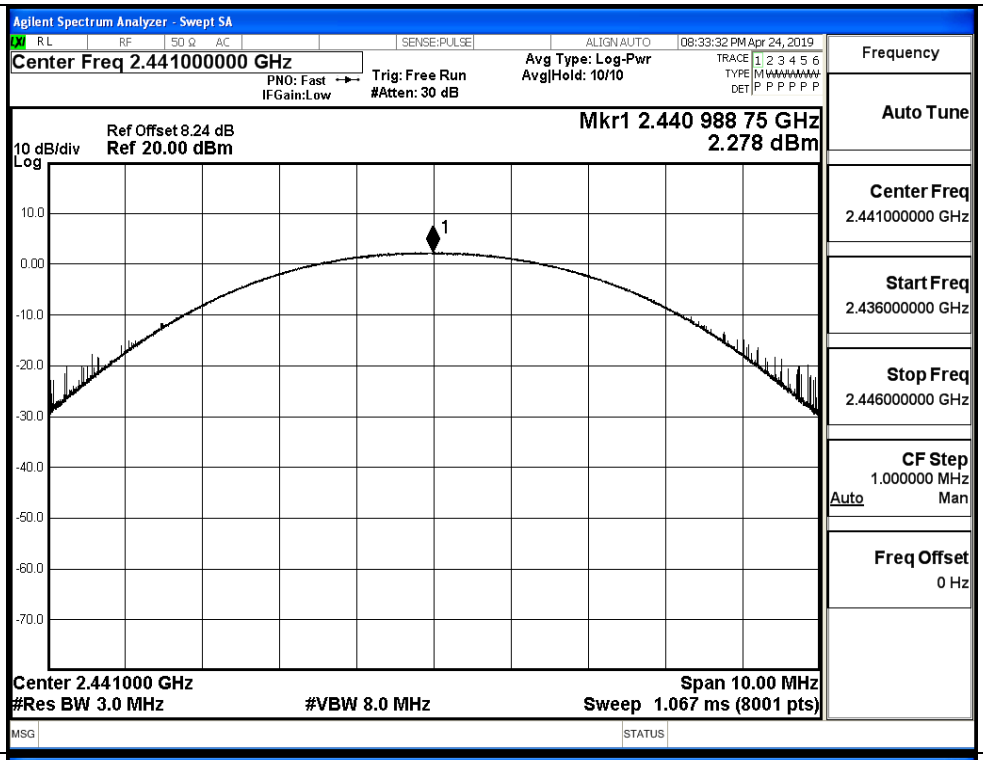
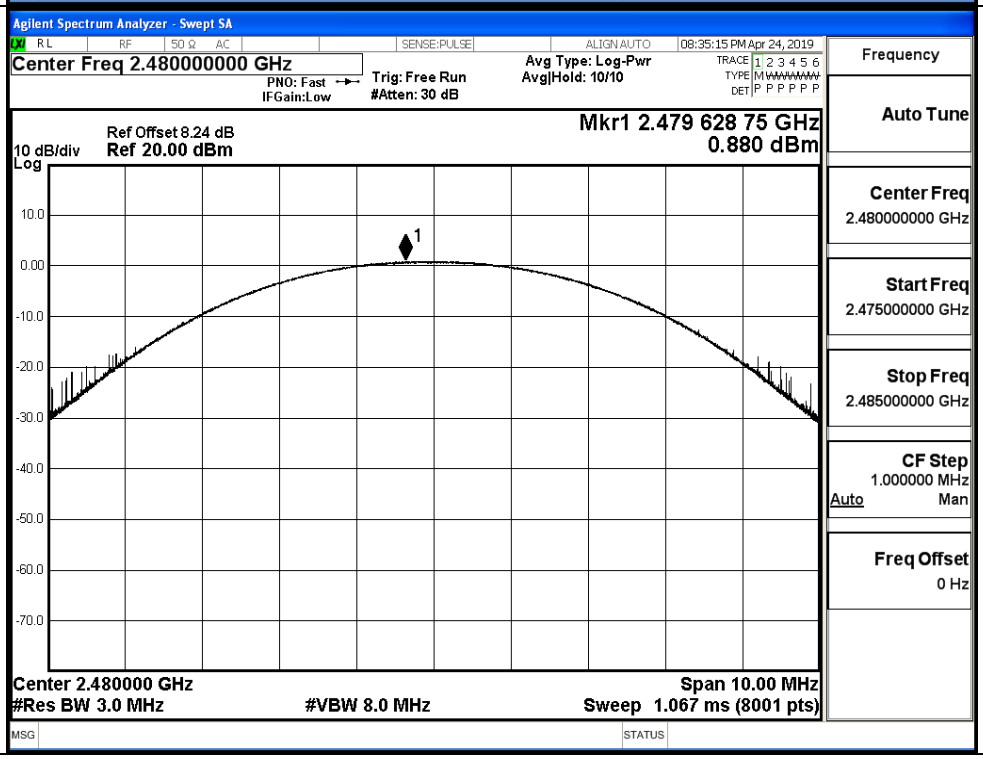
| | |
|---|---|
| Temperature: | 24.1 ° C |
| Relative Humidity: | 53.7% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | David.Luo |
| Supervised by: | Tom.Liu |

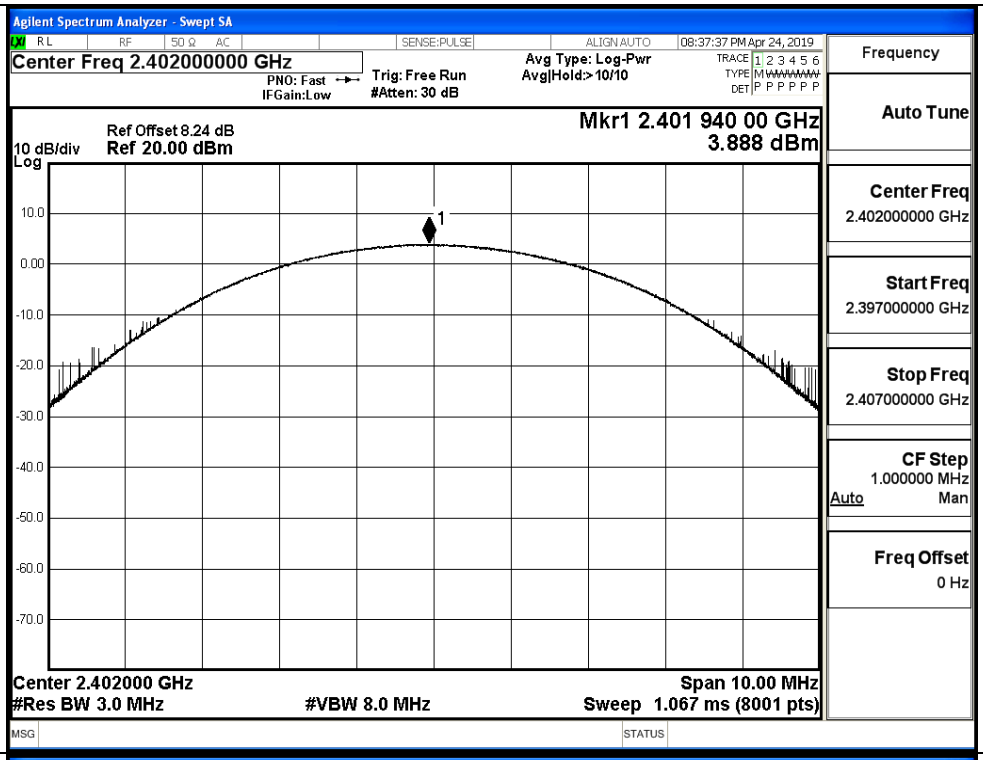
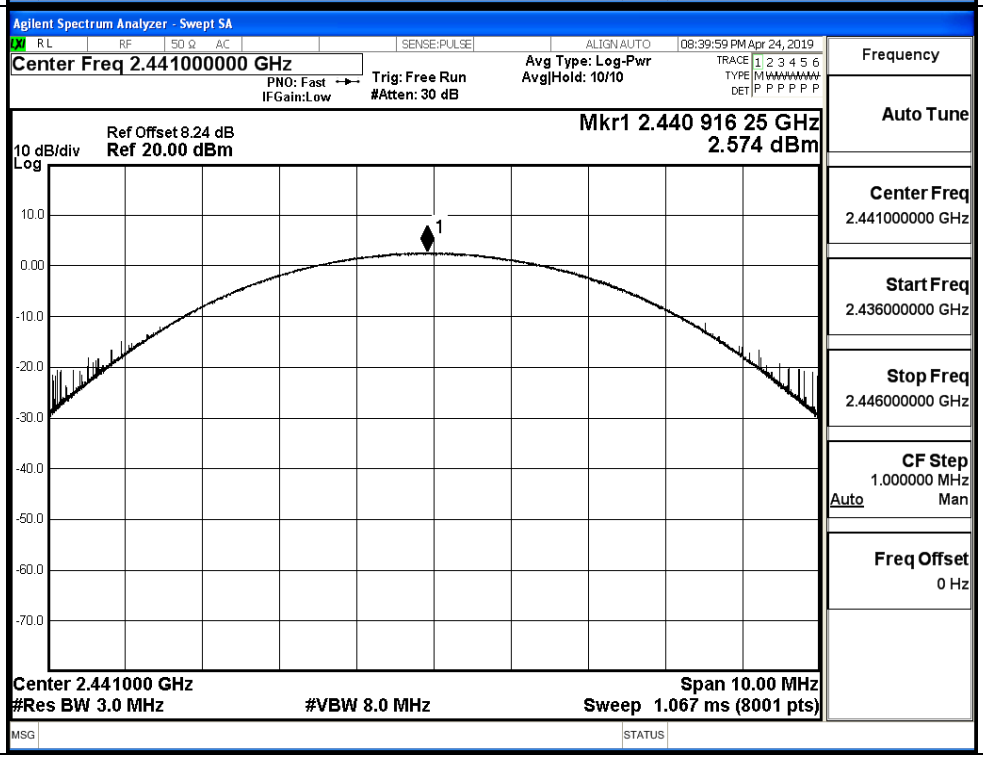
## A.1 Maximum Conducted Peak Output Power

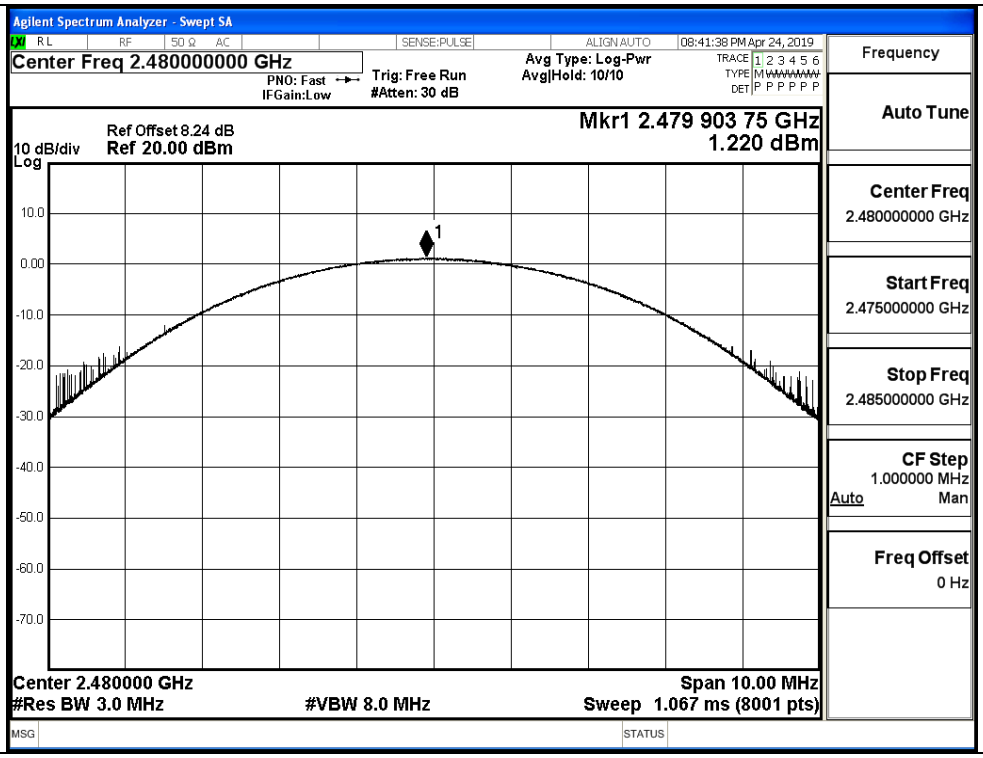
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 1.376 | 21 | PASS |
| | MCH | 0.035 | 21 | PASS |
| | HCH | -1.365 | 21 | PASS |
| π/4DQPSK | LCH | 3.611 | 21 | PASS |
| | MCH | 2.278 | 21 | PASS |
| | HCH | 0.880 | 21 | PASS |
| 8DPSK | LCH | 3.888 | 21 | PASS |
| | MCH | 2.574 | 21 | PASS |
| | HCH | 1.220 | 21 | PASS |

| Test Graphs | | |
|---|---|---|
| GFSK/LCH | |  |
| GFSK/MCH | |  |

| | |
|---|---|
| GFSK/HCH |  |
| π/4DQPSK/LCH |  |

| | | |
|---|---|---|
| π/4DQPSK/MCH | |  |
| π/4DQPSK/HCH | |  |

| | |
|---|---|
| 8DPSK/LCH |  |
| 8DPSK/MCH |  |

| | | |
|---|---|---|
| 8DPSK/HCH | |  |

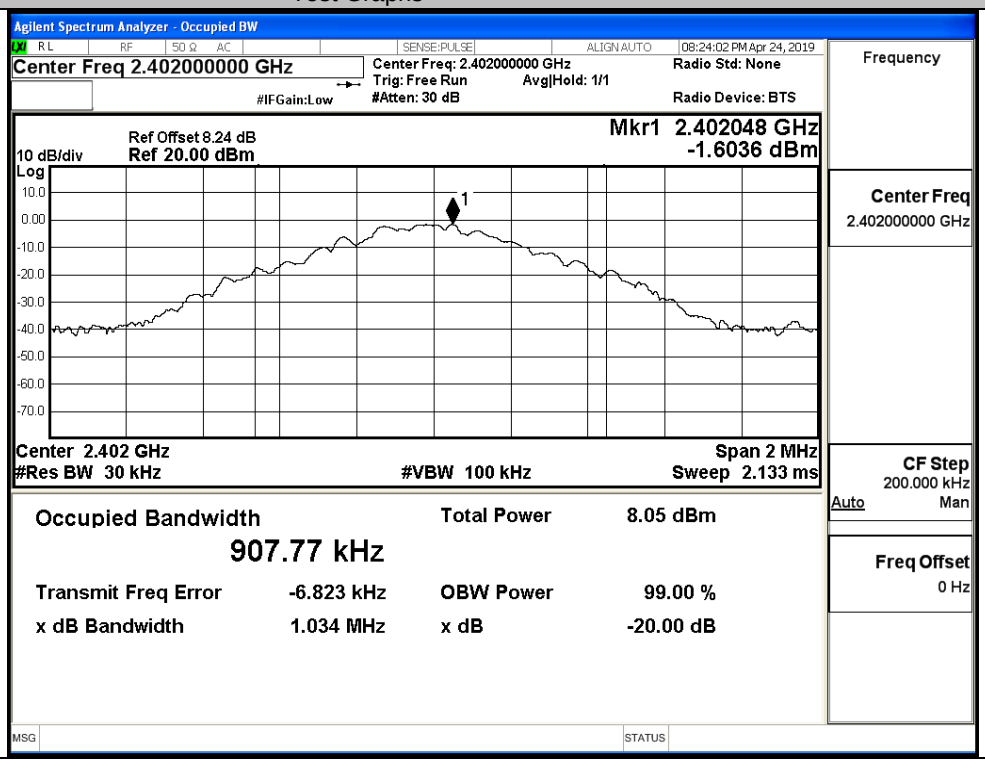
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 10/10
08:41:38 PM Apr 24, 2019
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.479 903 75 GHz
1.220 dBm
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 8.0 MHz
Span 10.00 MHz
Sweep 1.067 ms (8001 pts)
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

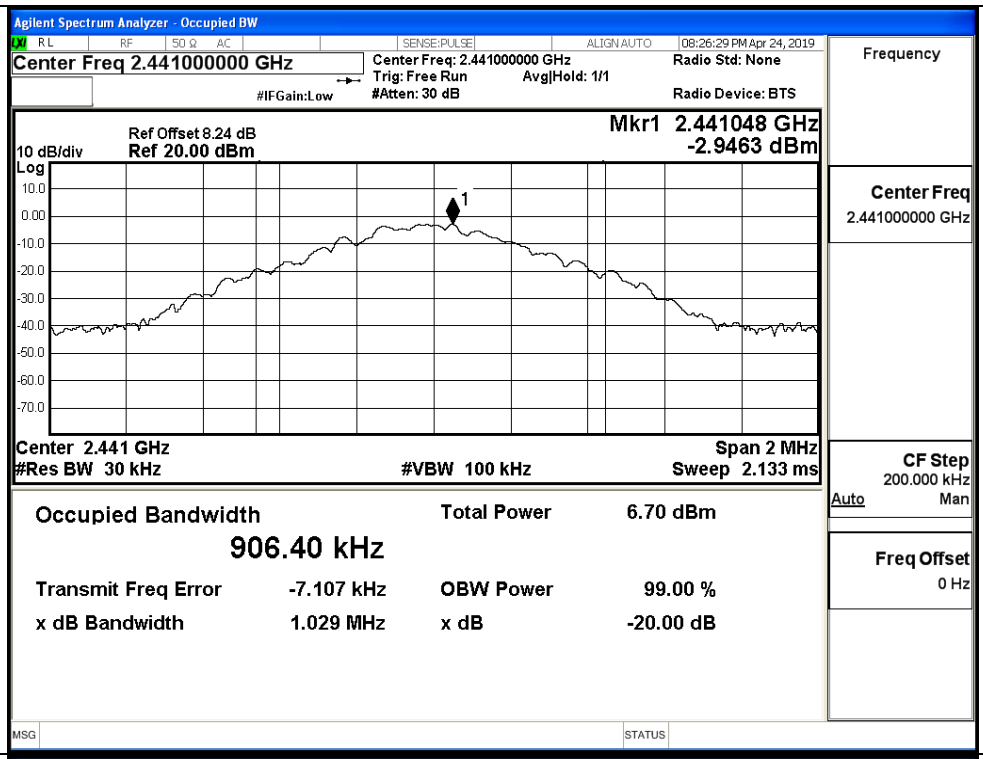
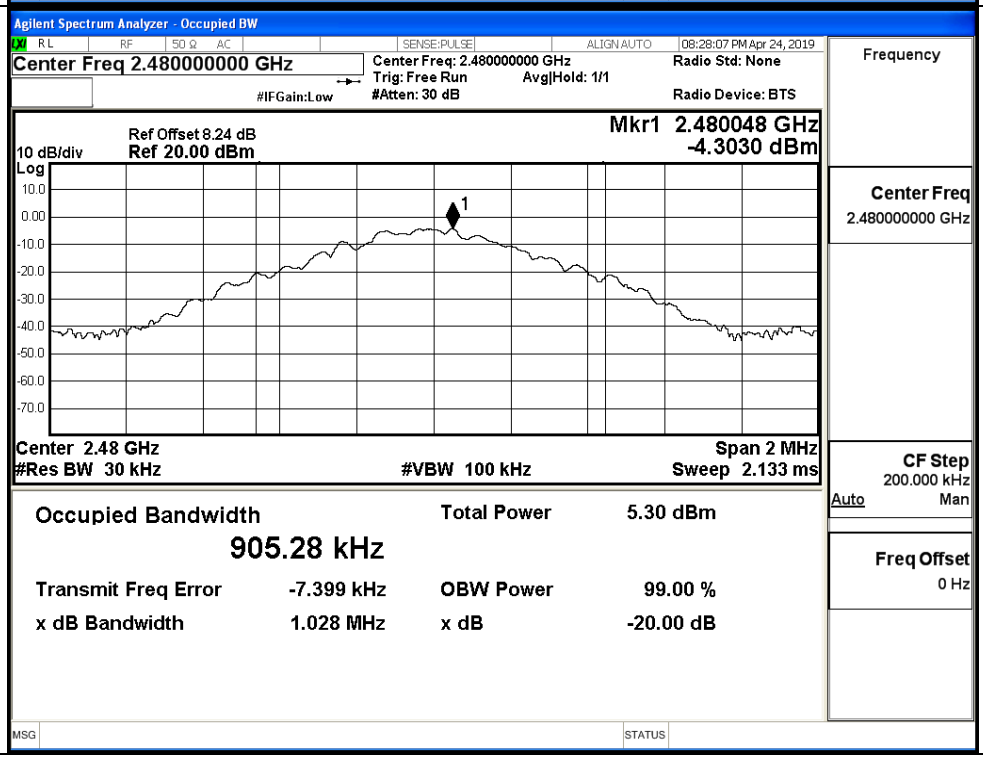
## A.2 99% and 20dB Bandwidth

| Mode | Channel. | 99% Bandwidth [MHz] | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|---|
| GFSK | LCH | 0.90777 | 1.034 | Not Specified | PASS |
| | MCH | 0.90640 | 1.029 | Not Specified | PASS |
| | HCH | 0.90528 | 1.028 | Not Specified | PASS |
| π/4DQPSK | LCH | 1.1949 | 1.364 | Not Specified | PASS |
| | MCH | 1.1947 | 1.363 | Not Specified | PASS |
| | HCH | 1.1931 | 1.360 | Not Specified | PASS |
| 8DPSK | LCH | 1.2049 | 1.346 | Not Specified | PASS |
| | MCH | 1.2044 | 1.345 | Not Specified | PASS |
| | HCH | 1.2030 | 1.344 | Not Specified | PASS |

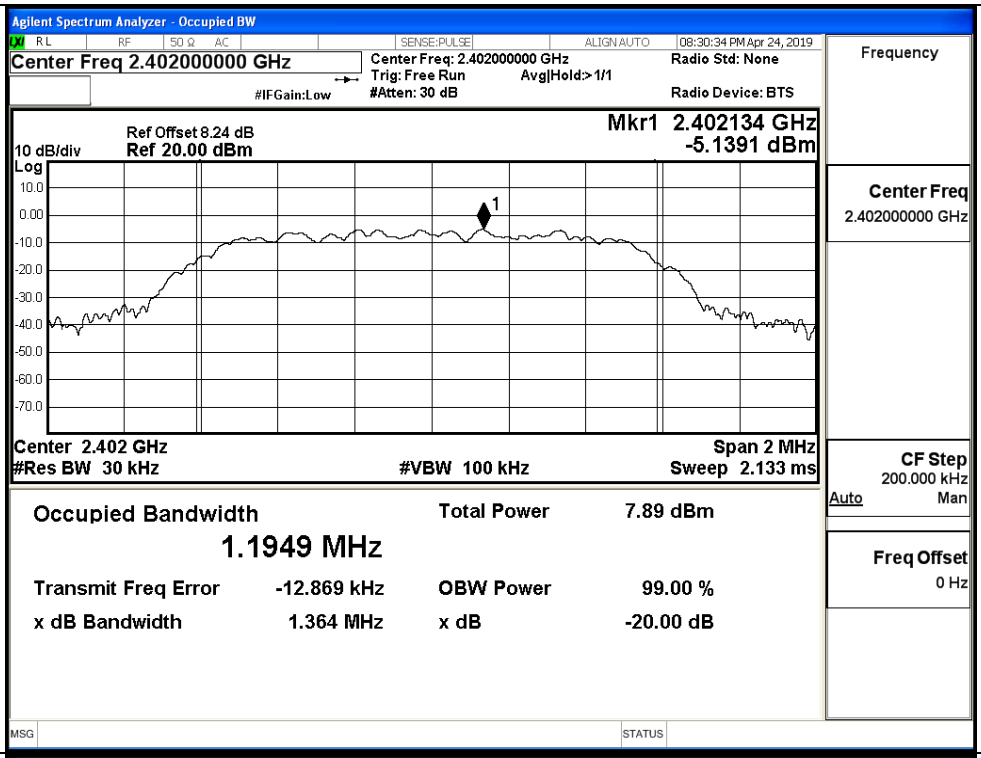
Test Graphs

GFSK/LCH

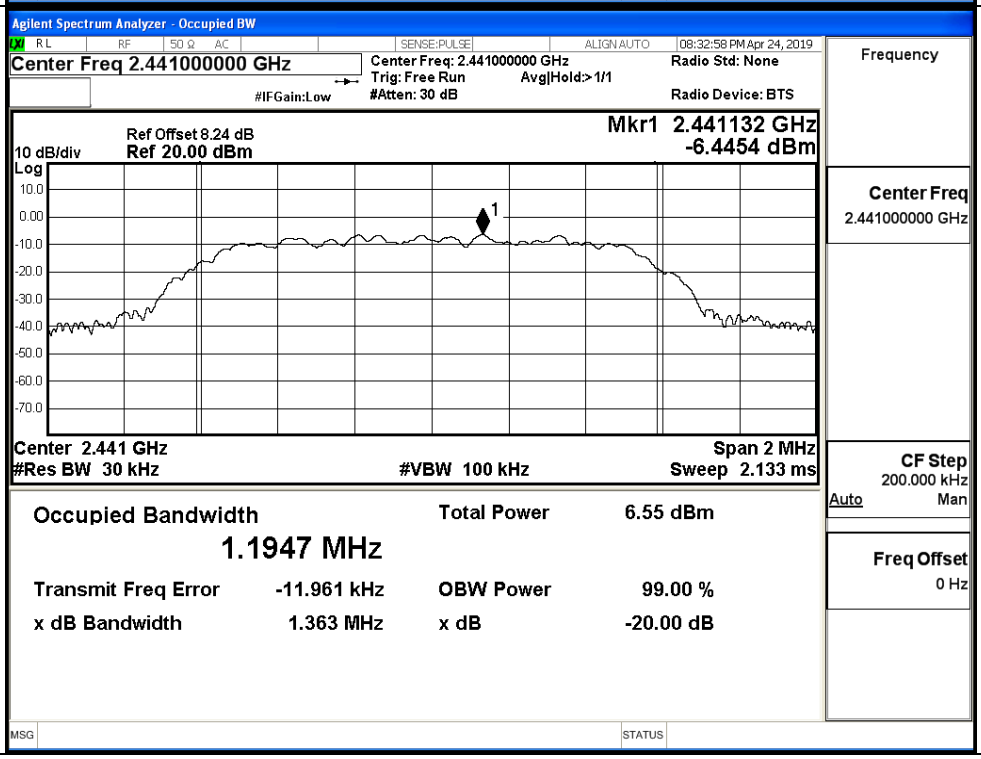


| | |
|---|---|
| GFSK/MCH |  |
| GFSK/HCH |  |

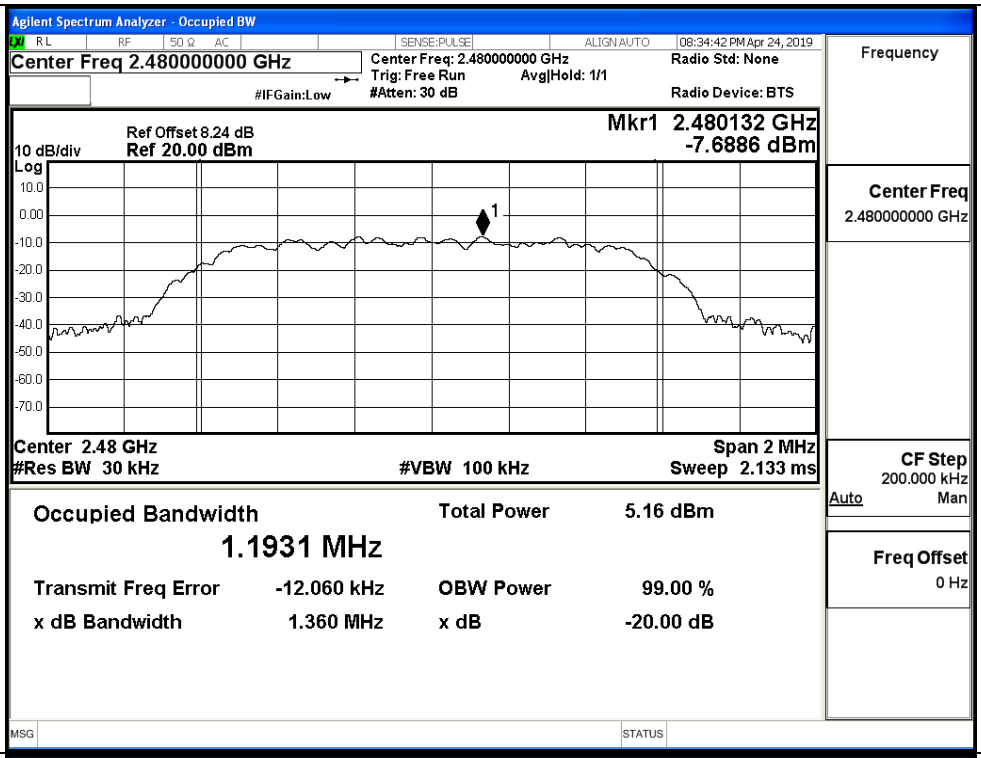
π/4DQPSK/LCH



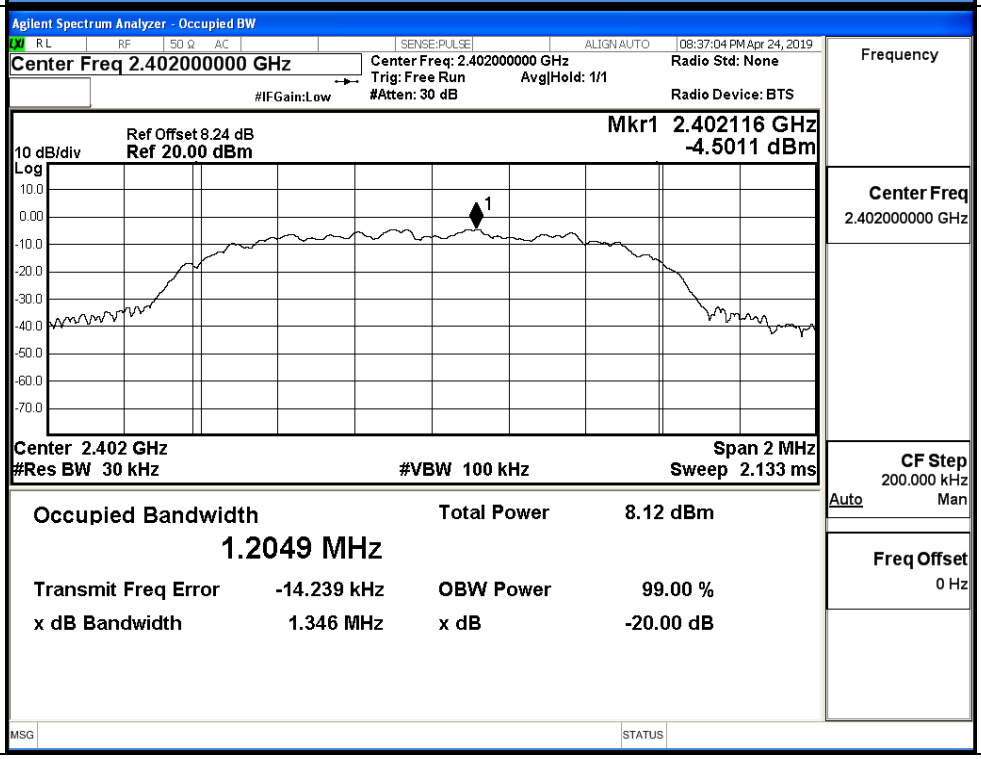

π/4DQPSK/MCH

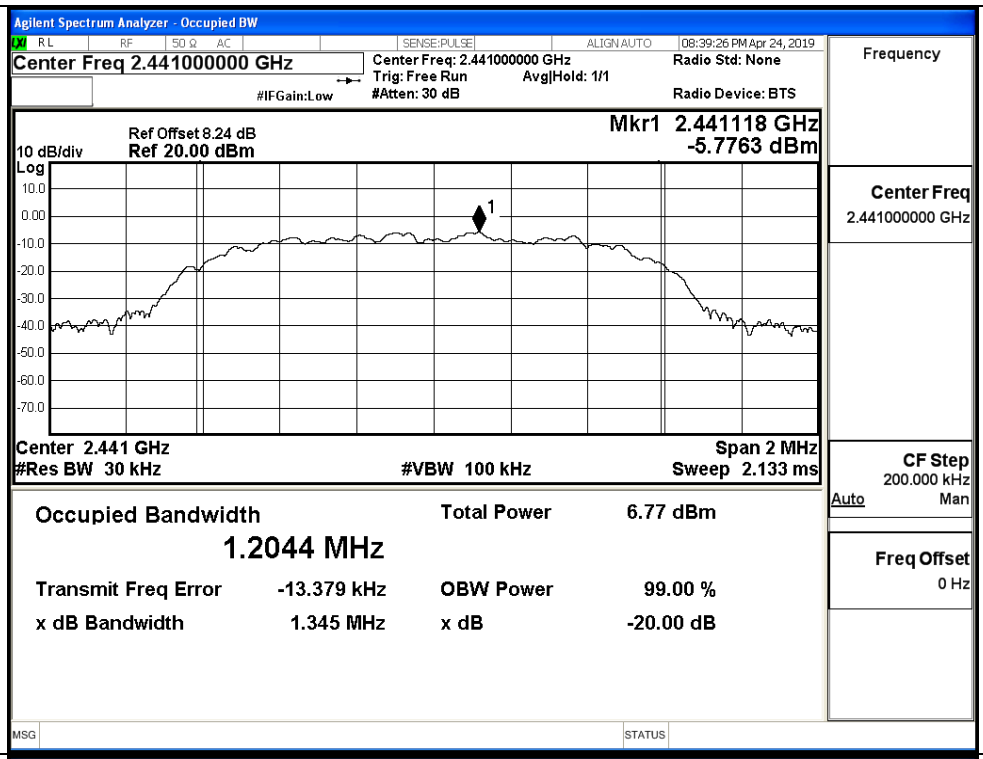
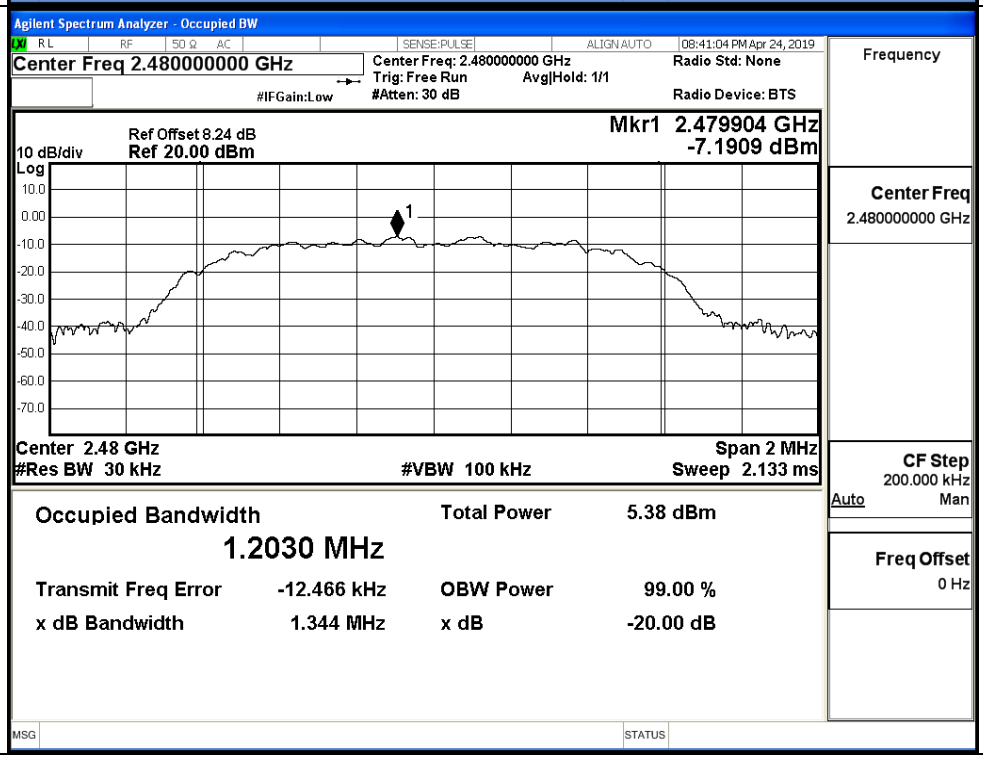


π/4DQPSK/HCH



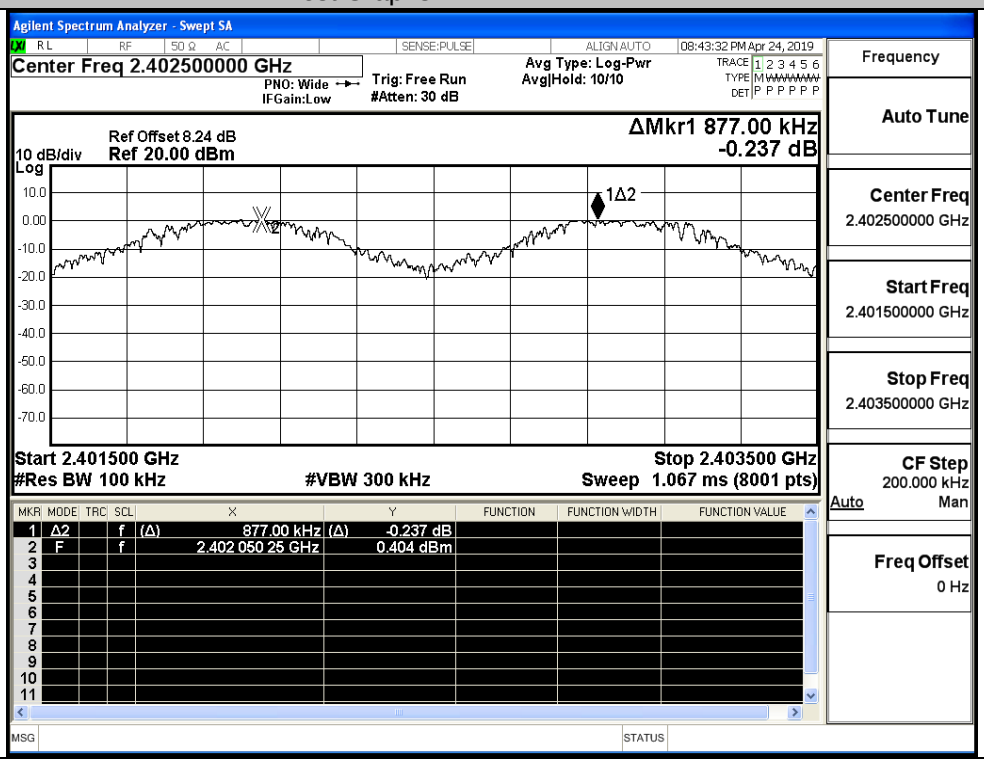

8DPSK/LCH

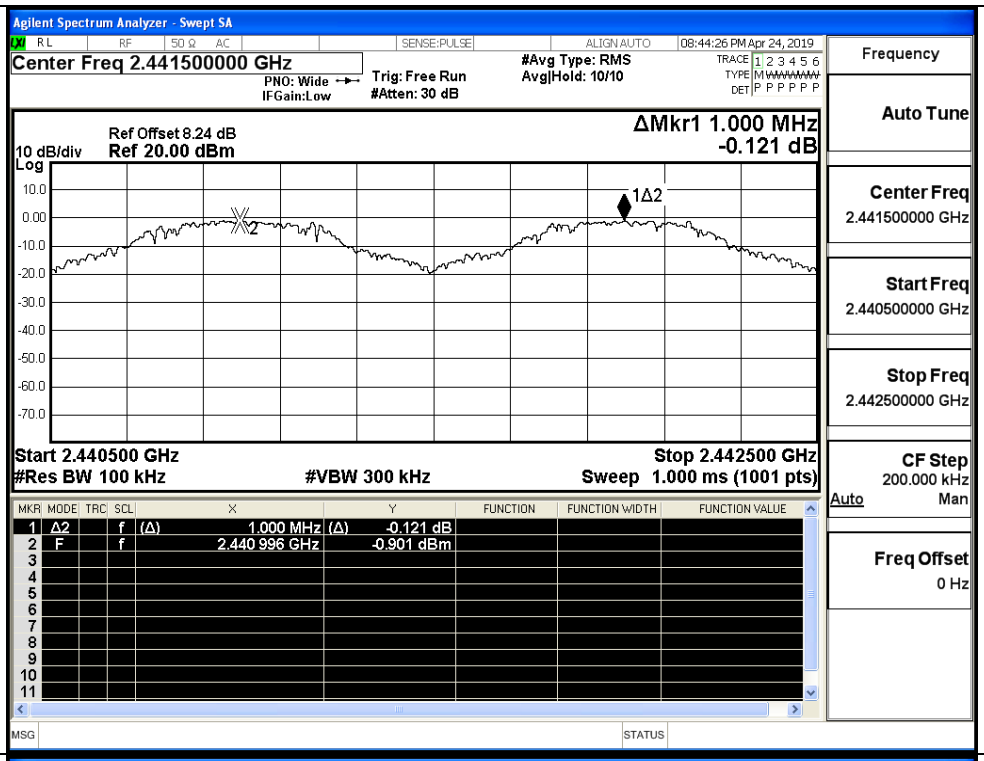
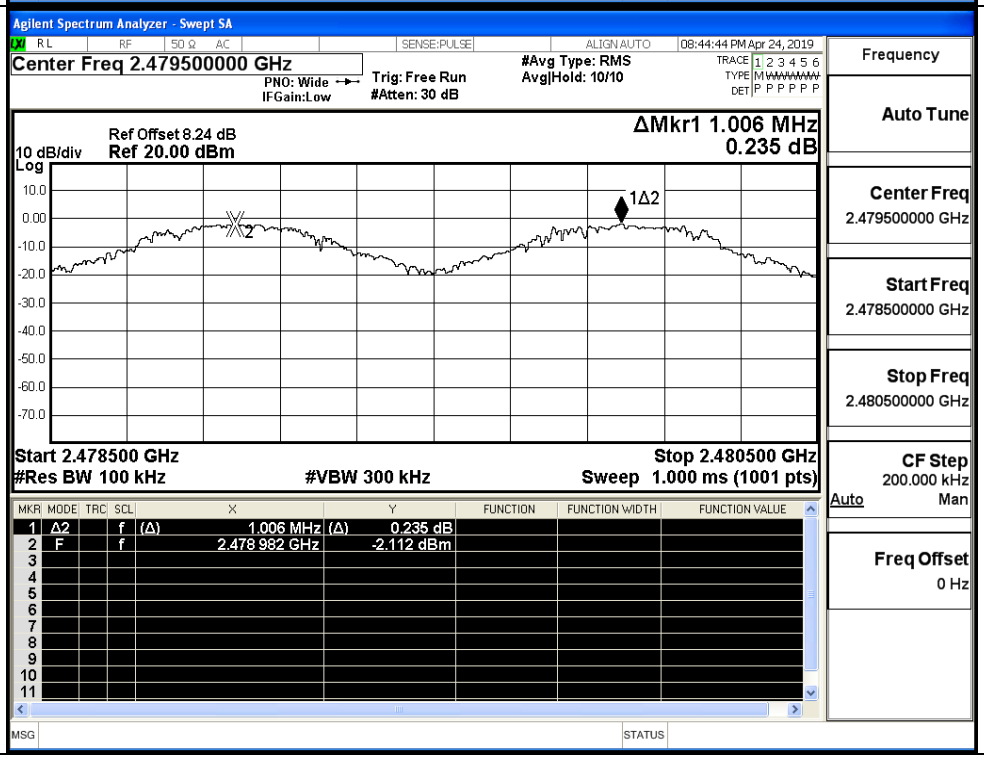


| | |
|---|---|
| 8DPSK/MCH |  |
| 8DPSK/HCH |  |

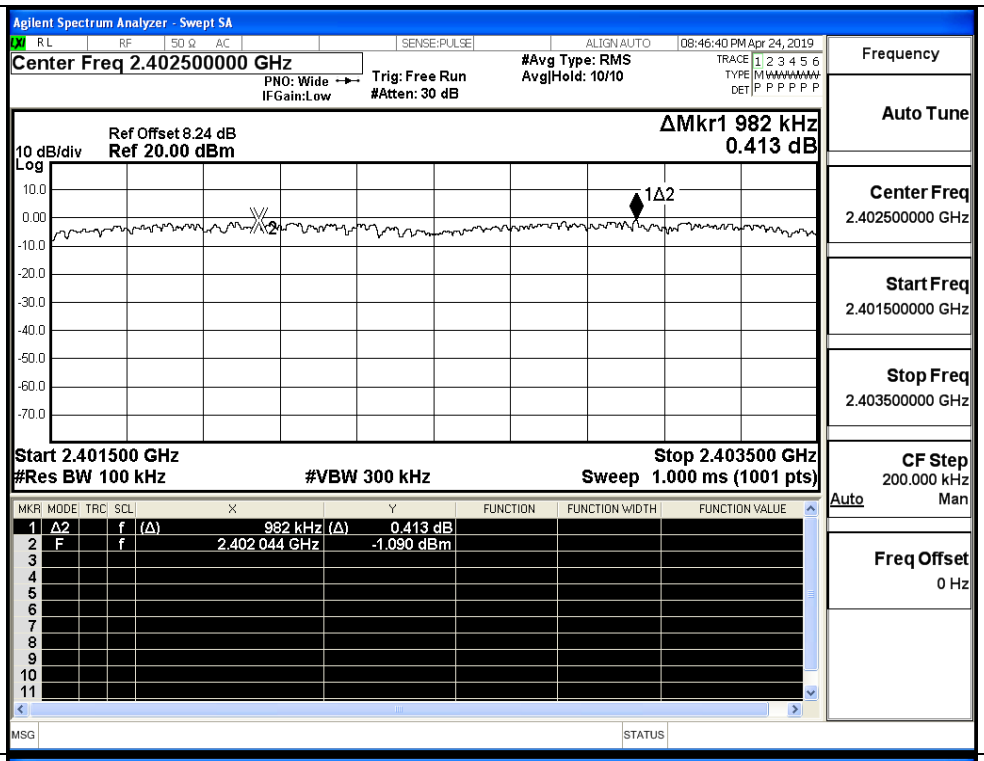
## A.3 Carrier Frequency Separation

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.877 | 0.689 | PASS |
| | MCH | 1.000 | 0.689 | PASS |
| | HCH | 1.006 | 0.689 | PASS |
| π/4DQPSK | LCH | 0.982 | 0.909 | PASS |
| | MCH | 0.996 | 0.909 | PASS |
| | HCH | 0.998 | 0.909 | PASS |
| 8DPSK | LCH | 0.994 | 0.897 | PASS |
| | MCH | 0.998 | 0.897 | PASS |
| | HCH | 1.156 | 0.897 | PASS |

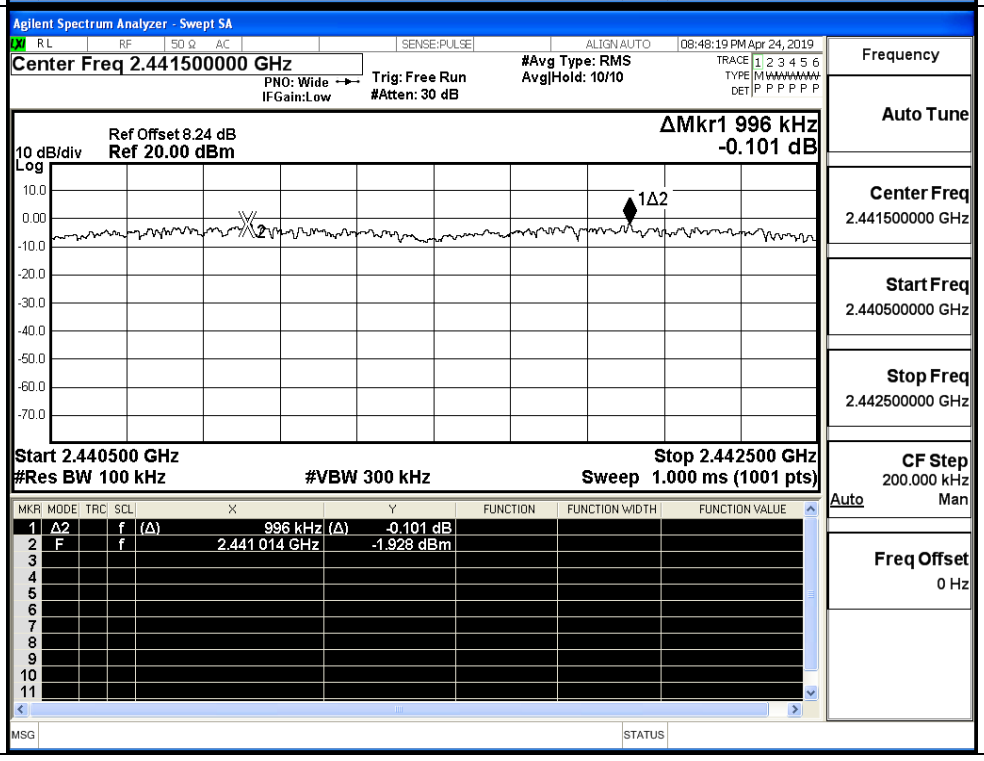
| Test Graphs | | |
|---|---|---|
| GFSK/LCH | |  |

| | | |
|---|---|---|
| GFSK/MCH | |  |
| GFSK/HCH | |  |

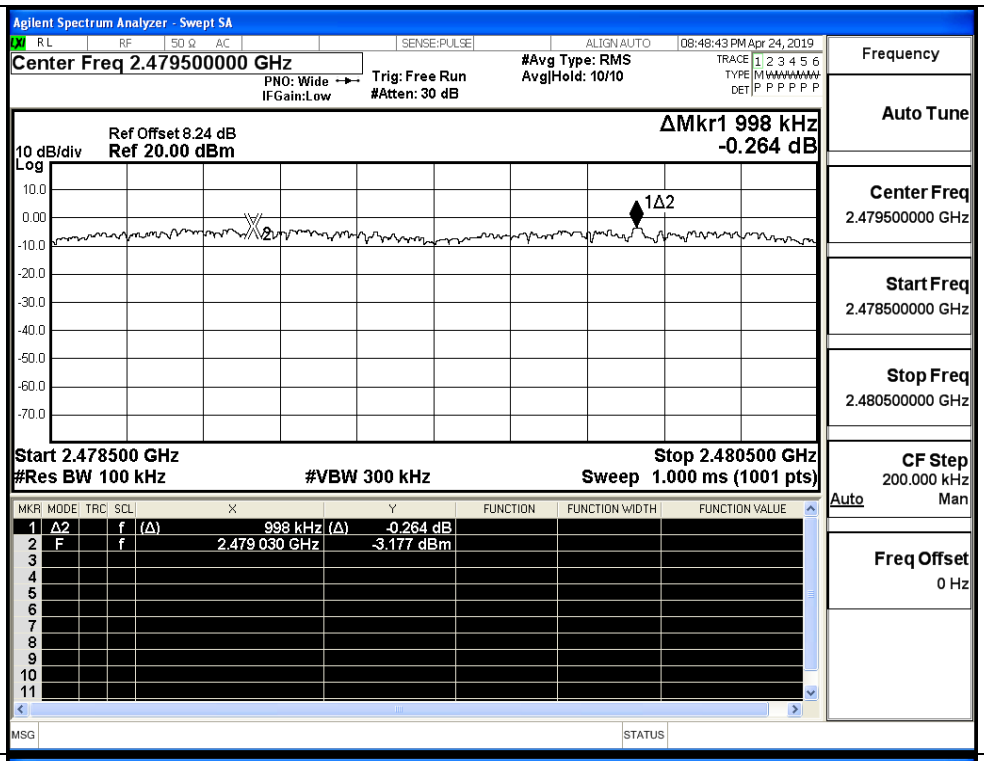
π/4DQPSK/LCH



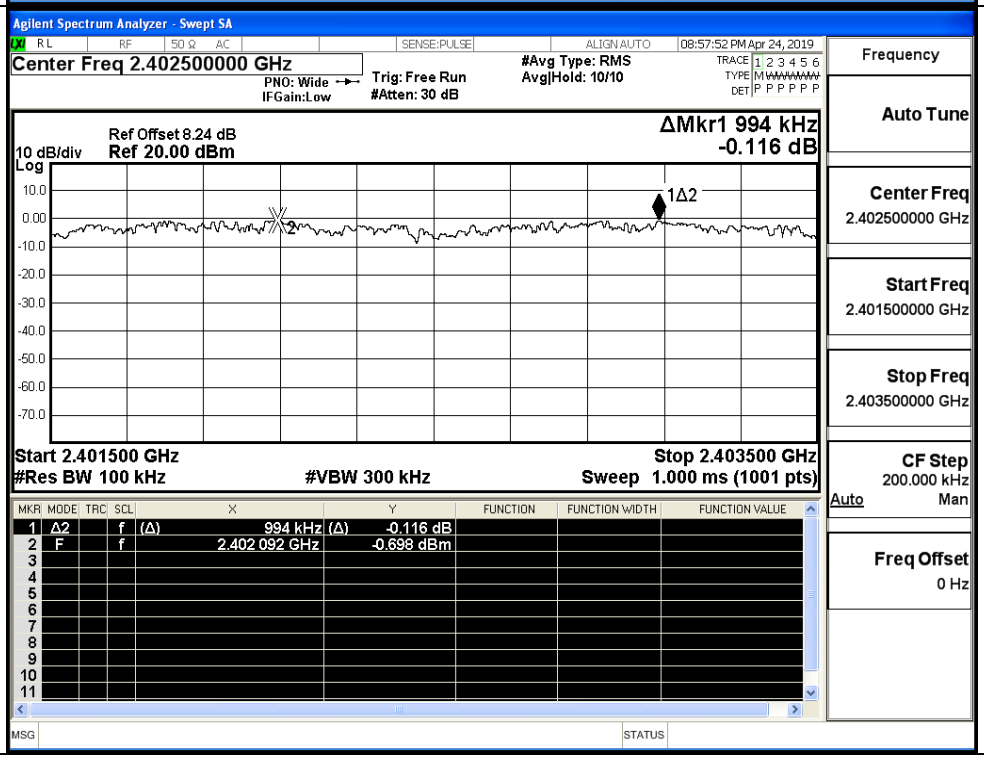

π/4DQPSK/MCH

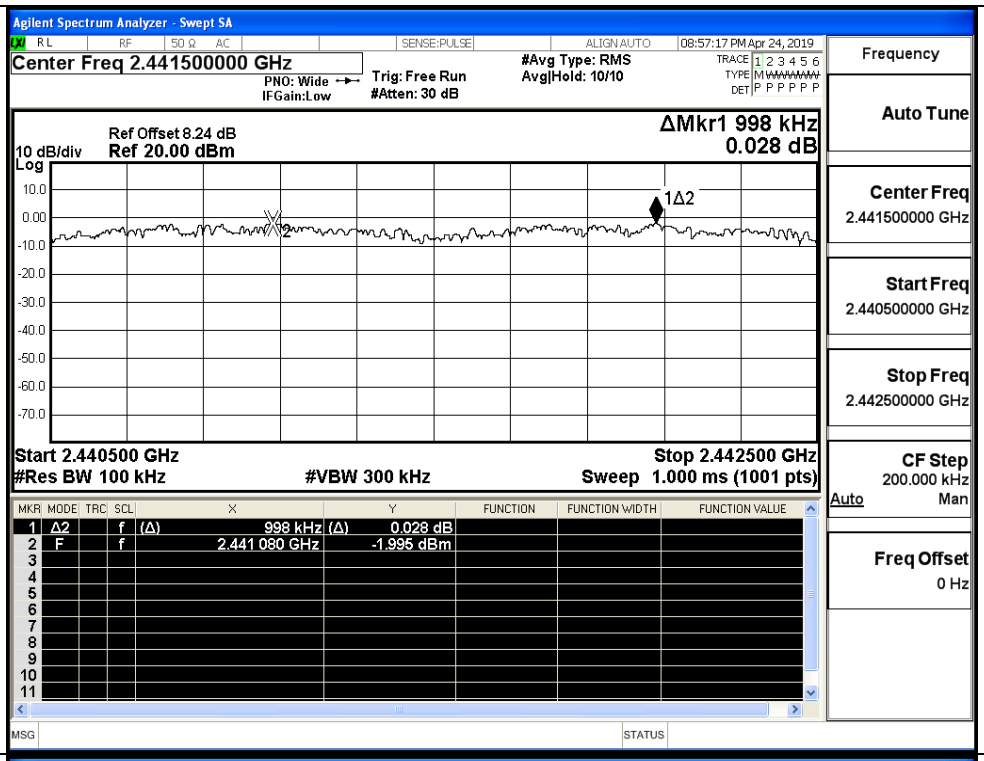
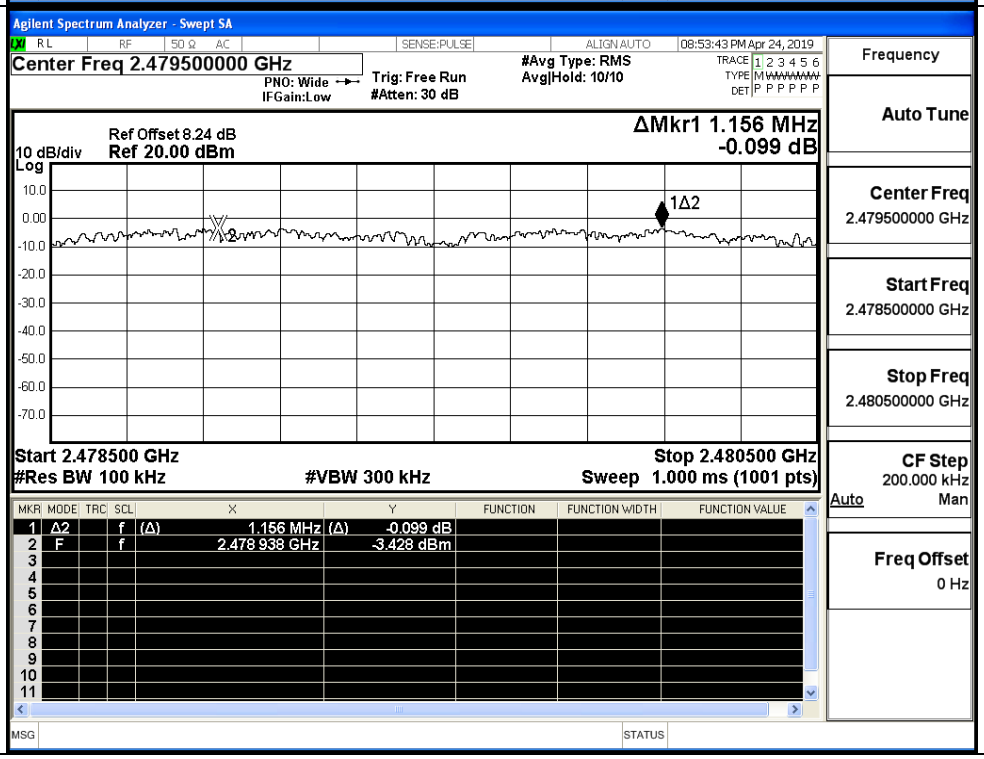


π/4DQPSK/HCH



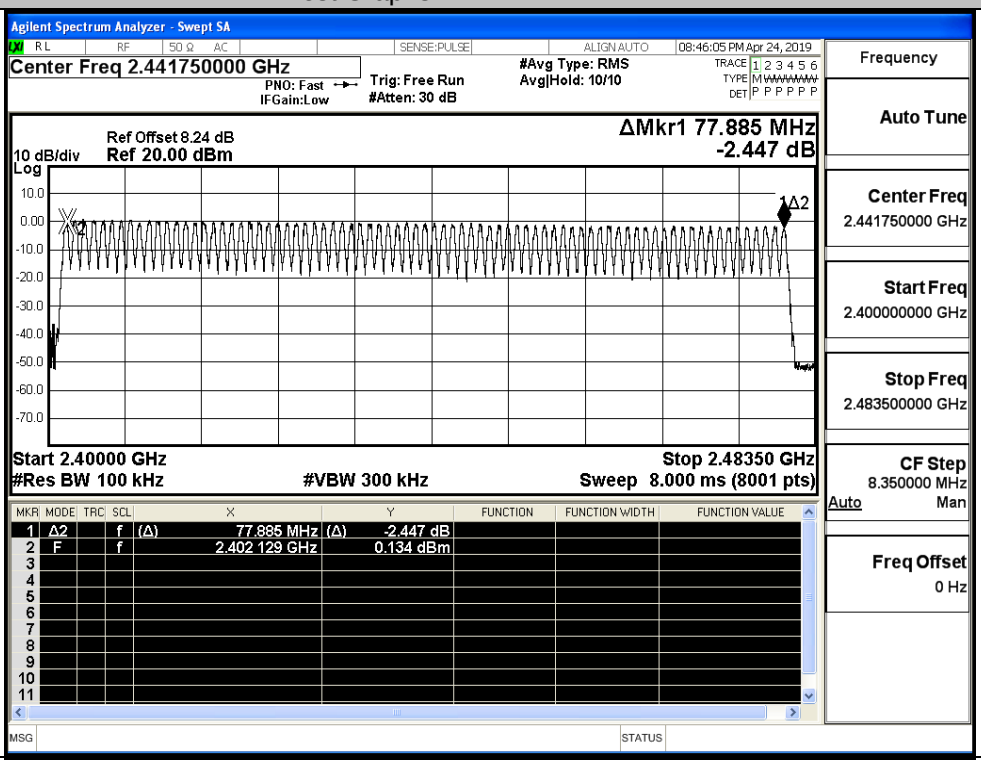
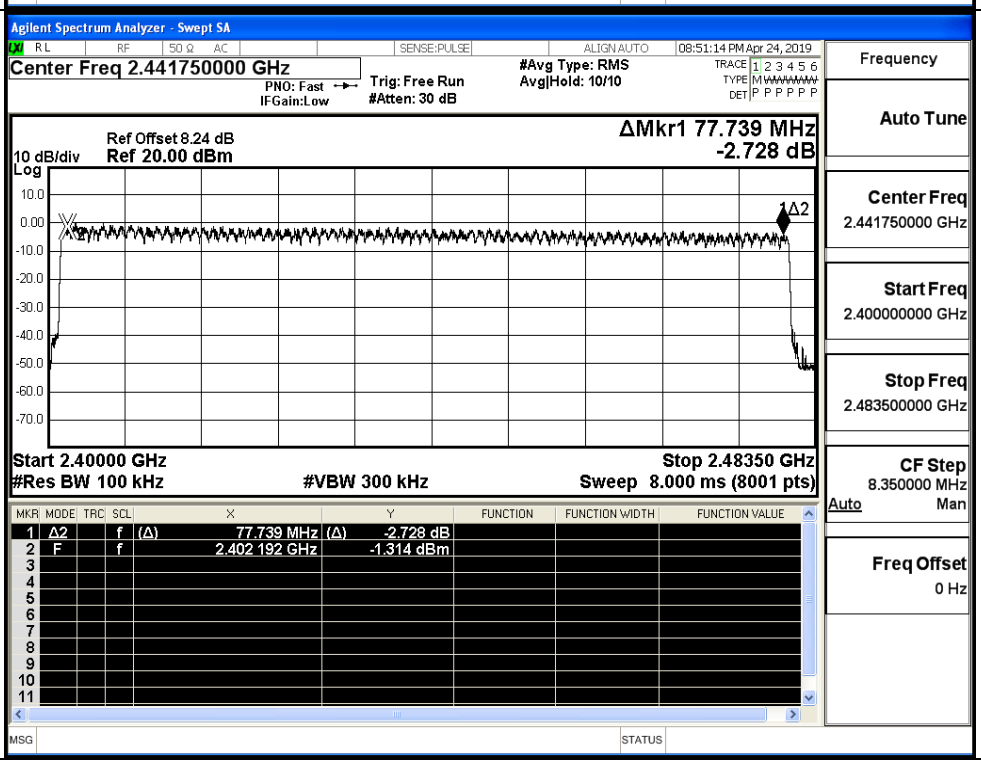

8DPSK/LCH

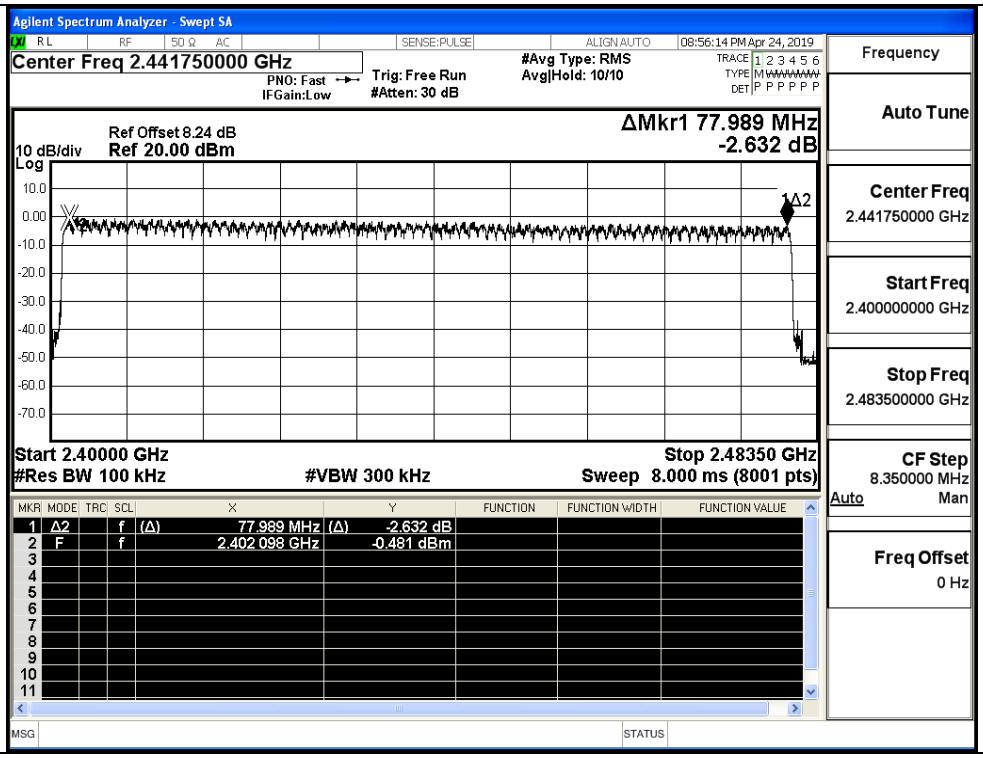


| | | |
|---|---|---|
| 8DPSK/MCH | |  |
| 8DPSK/HCH | |  |

## 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 |

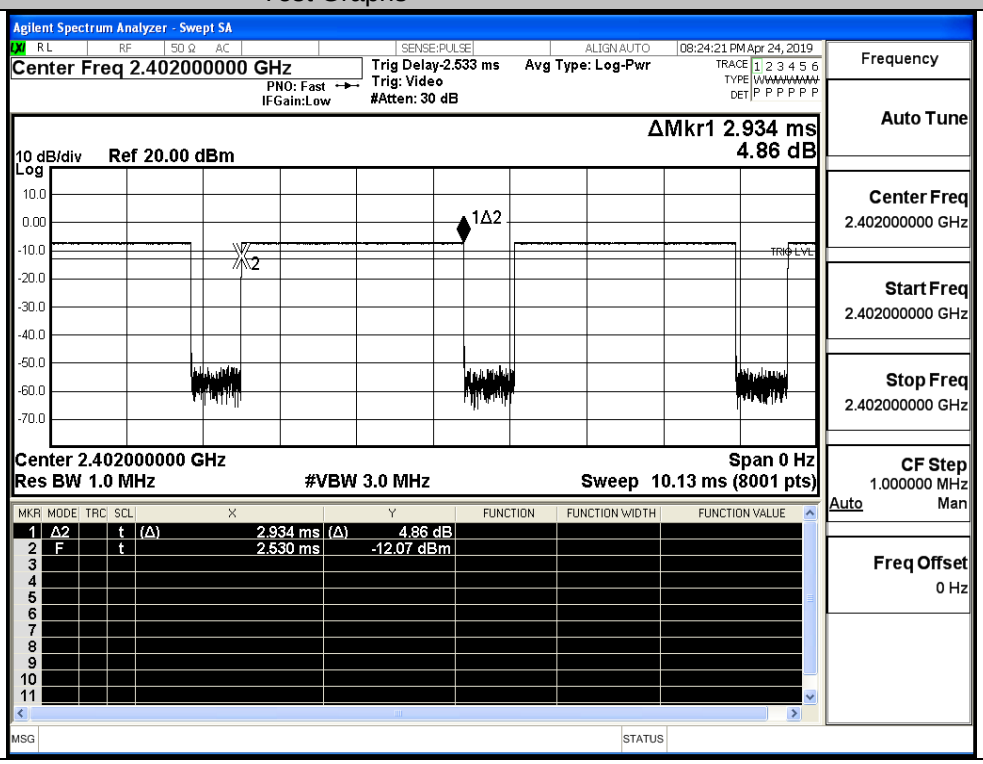
| Test Graphs | | |
|---|---|---|
| GFSK/Hop | |  |
| π/4DQPSK/Hop | |  |

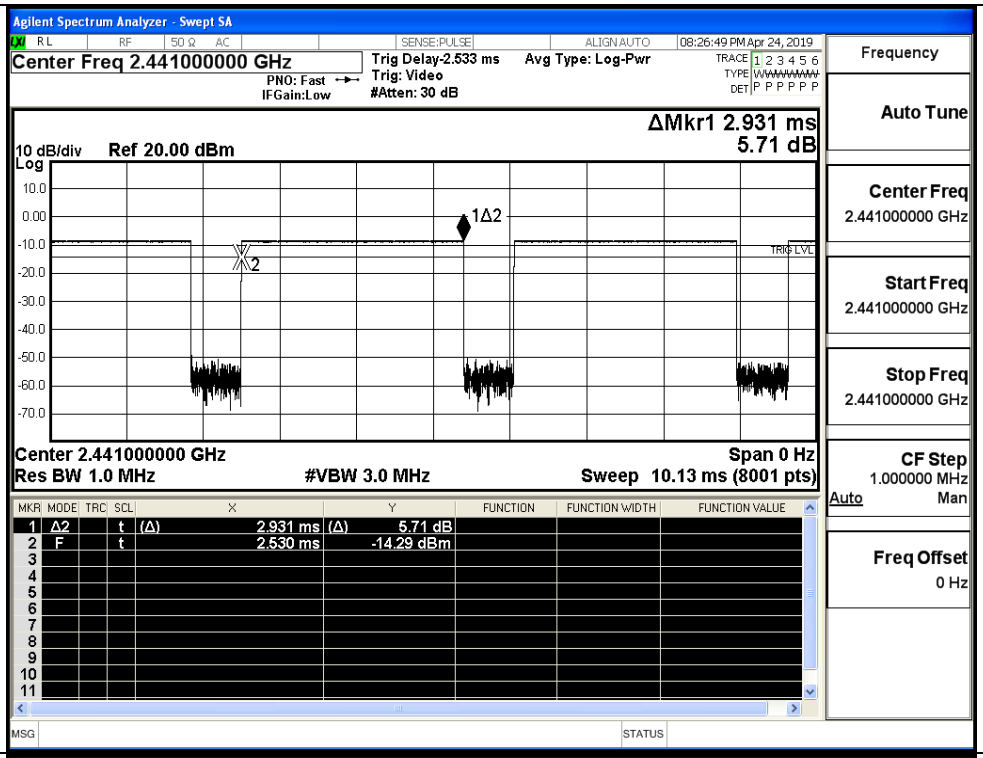
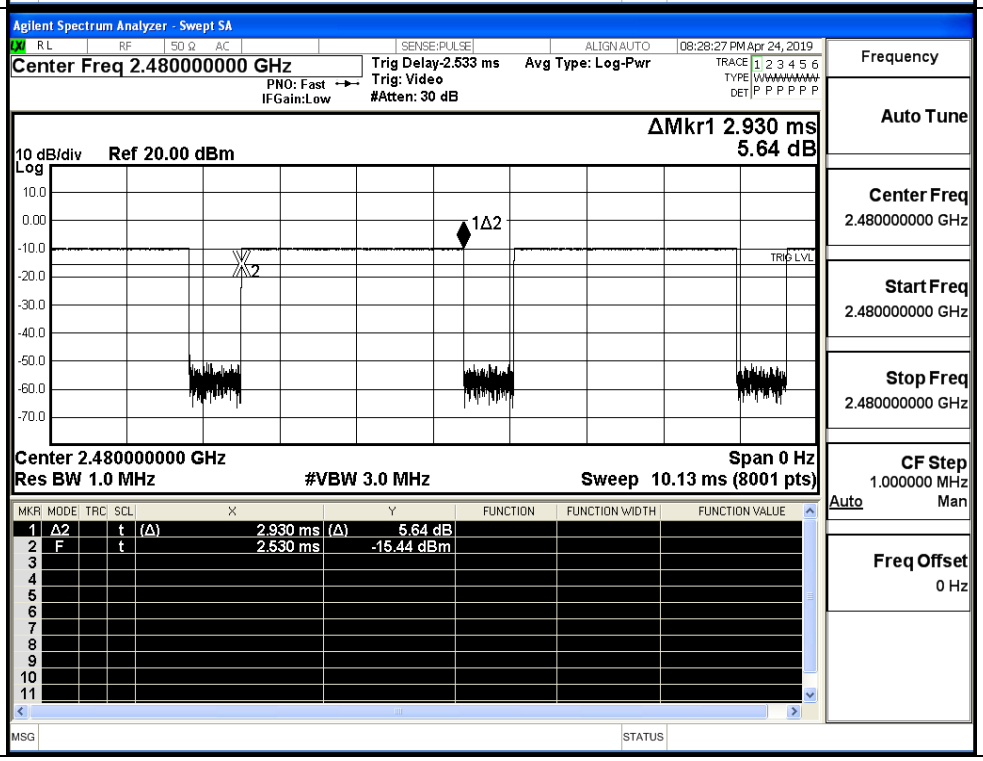
| | |
|---|---|
| 8DPSK/Hop |  |

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
08:56:14 PM Apr 24, 2019
Ref Offset 8.24 dB
10 dB/div
Ref 20.00 dBm
Log
ΔMkr1 77.989 MHz
-2.632 dB
Start 2.40000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.48350 GHz
Sweep 8.000 ms (8001 pts)
1 Δ2 f (Δ) 77.989 MHz (Δ) -2.632 dB
2 F f 2.402 098 GHz -0.481 dBm
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

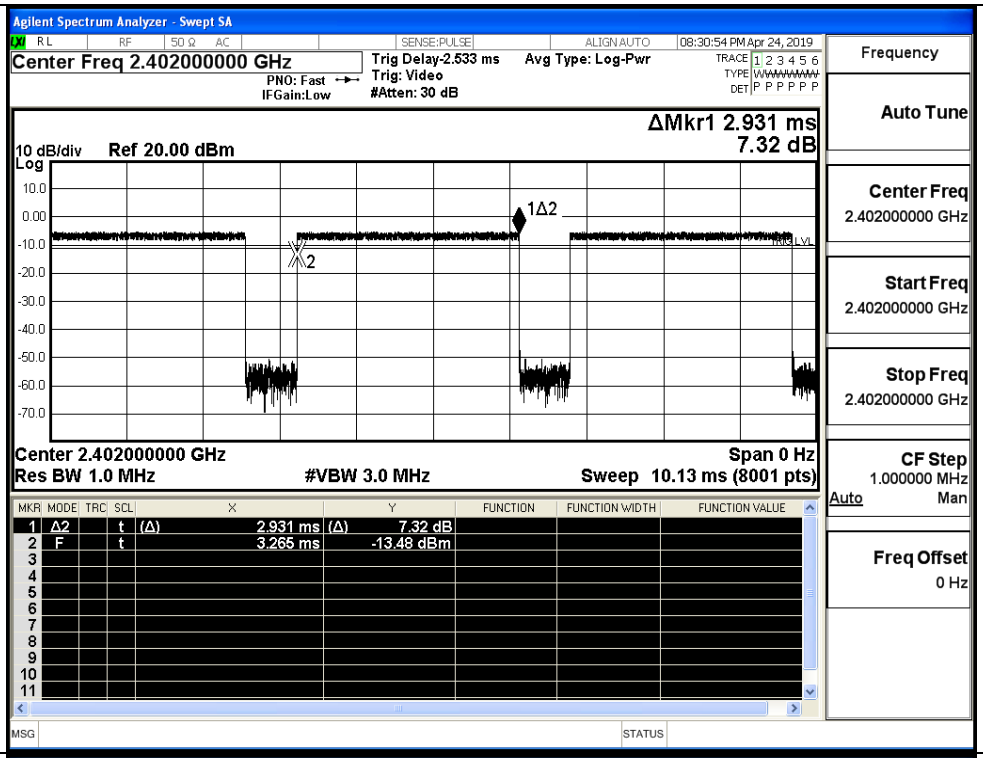
## A.5 Dwell Time

| Mode | Packet | Channel | Burst Width [ms/hop/ch] | Total Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | LCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| | DH5 | MCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| | DH5 | HCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| π/4DQPSK | 2DH5 | LCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| | 2DH5 | MCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| | 2DH5 | HCH | 2.94 | 106.7 | 0.314 | 0.4 | PASS |
| 8DPSK | 3DH5 | LCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |
| | 3DH5 | MCH | 2.92 | 106.7 | 0.312 | 0.4 | PASS |
| | 3DH5 | HCH | 2.93 | 106.7 | 0.313 | 0.4 | PASS |

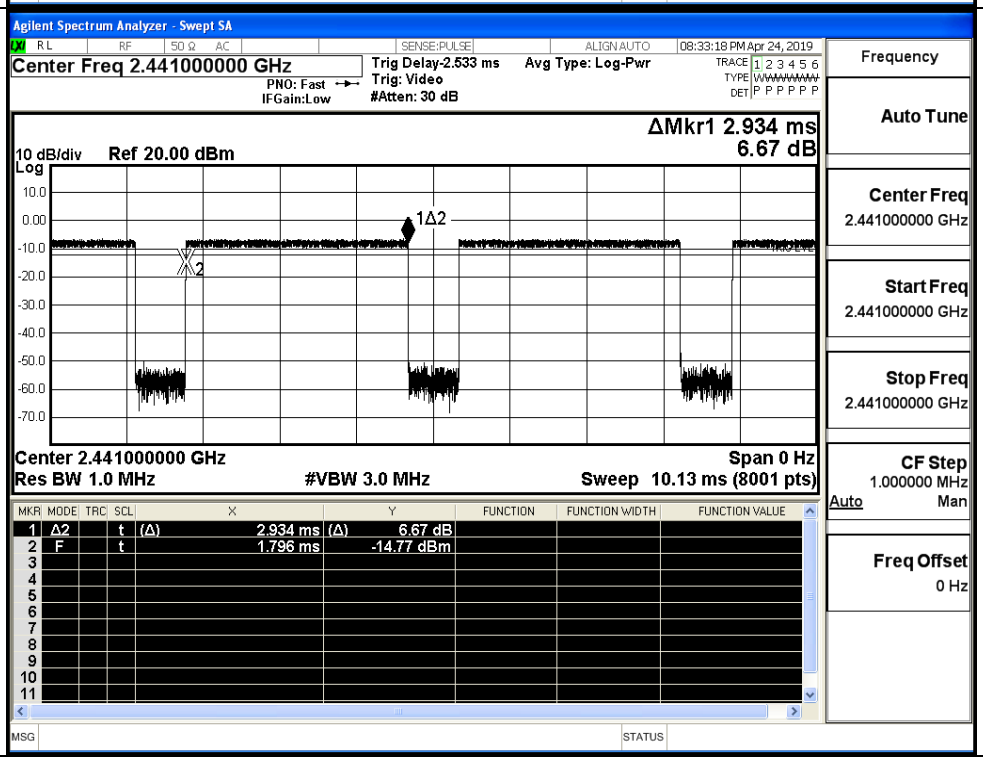
| Test Graphs | |
|---|---|
| GFSK_DH5/LCH |  |

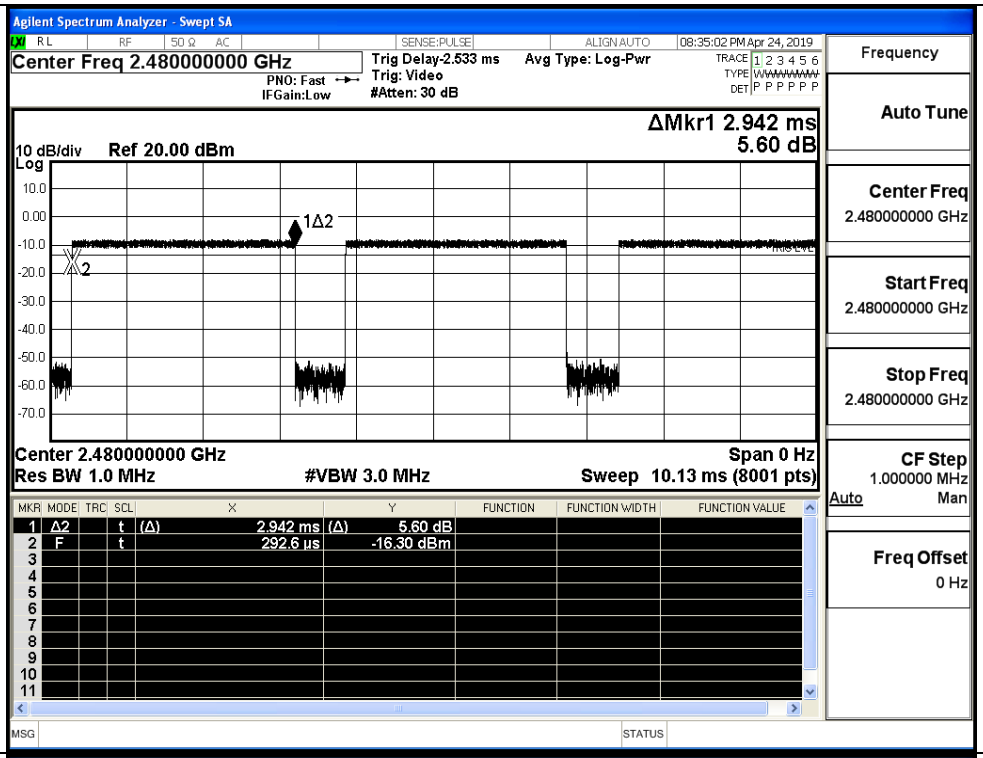
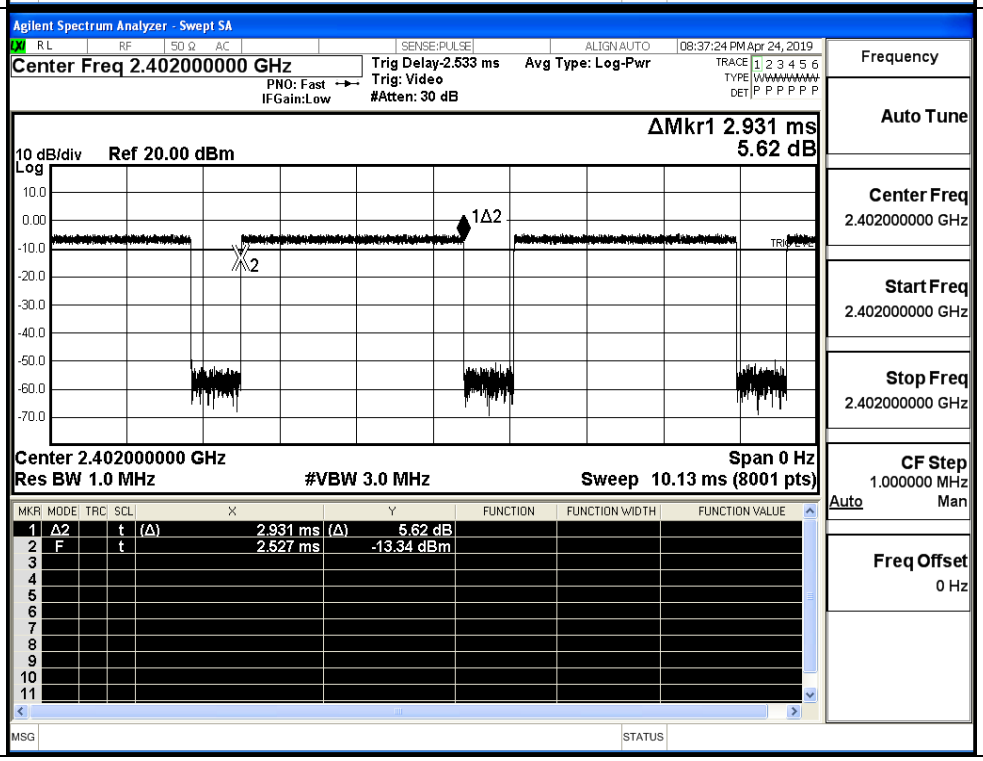
| | |
|---|---|
| GFSK_DH5/MCH |  |
| GFSK_DH5/HCH |  |

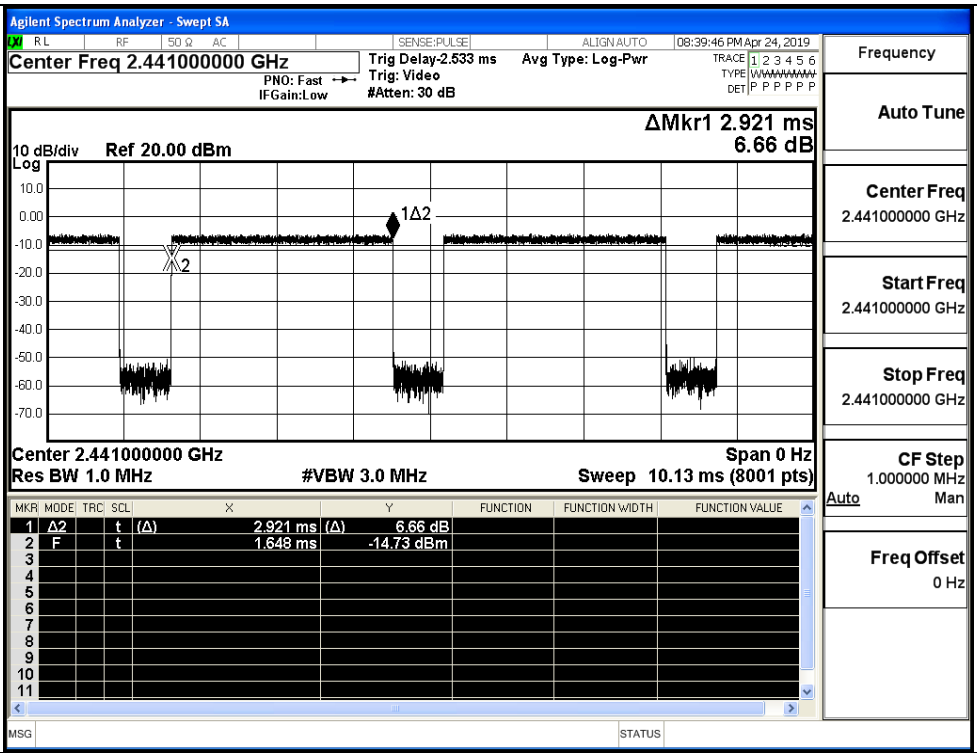
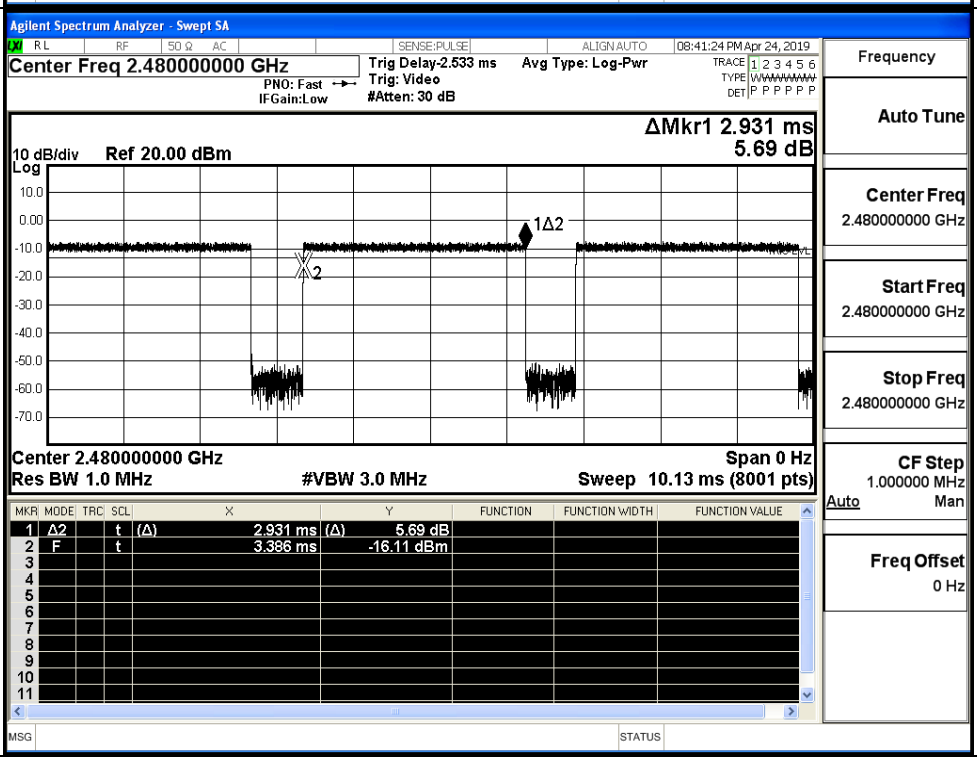
π/4DQPSK
_2DH5/LCH




π/4DQPSK
_2DH5/MCH

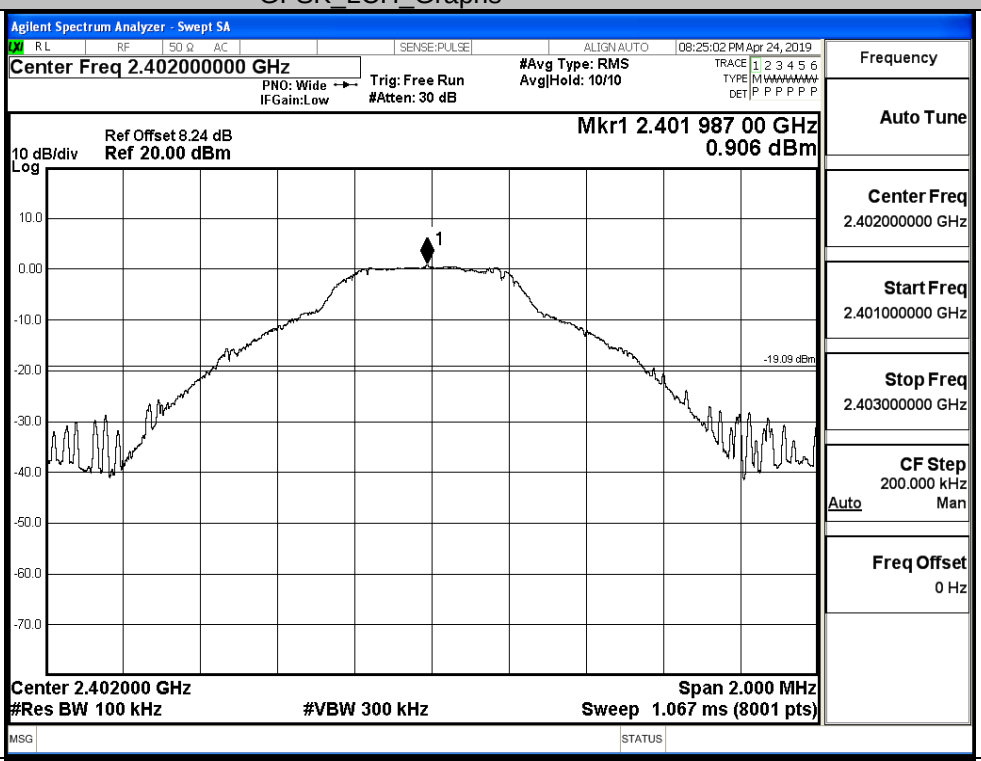
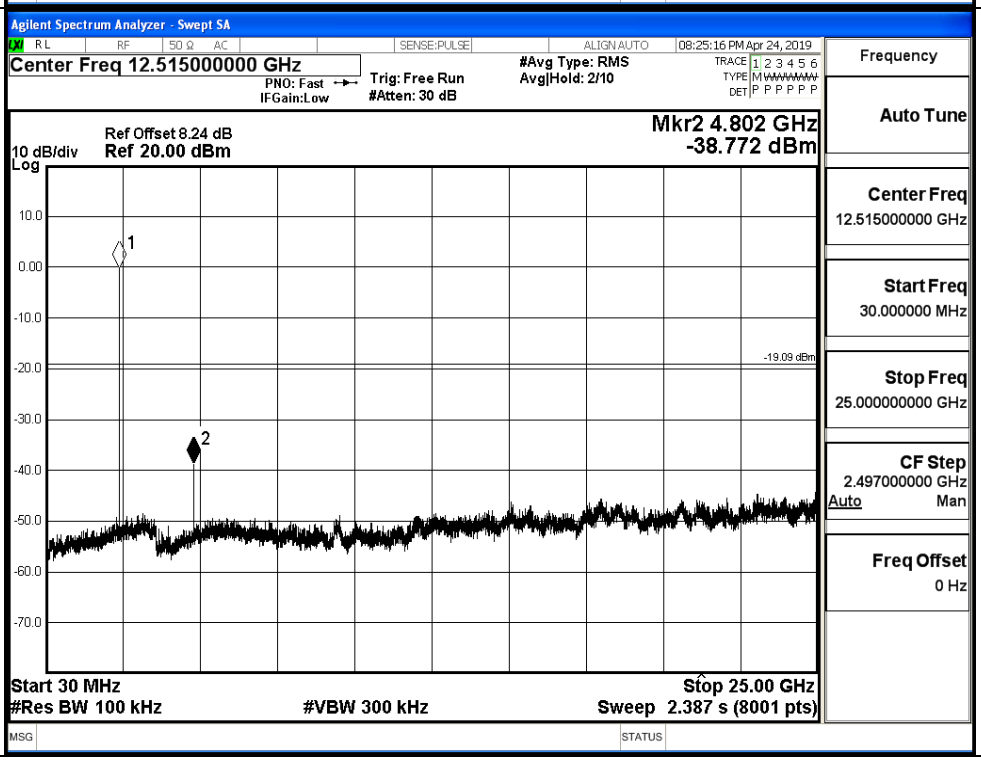


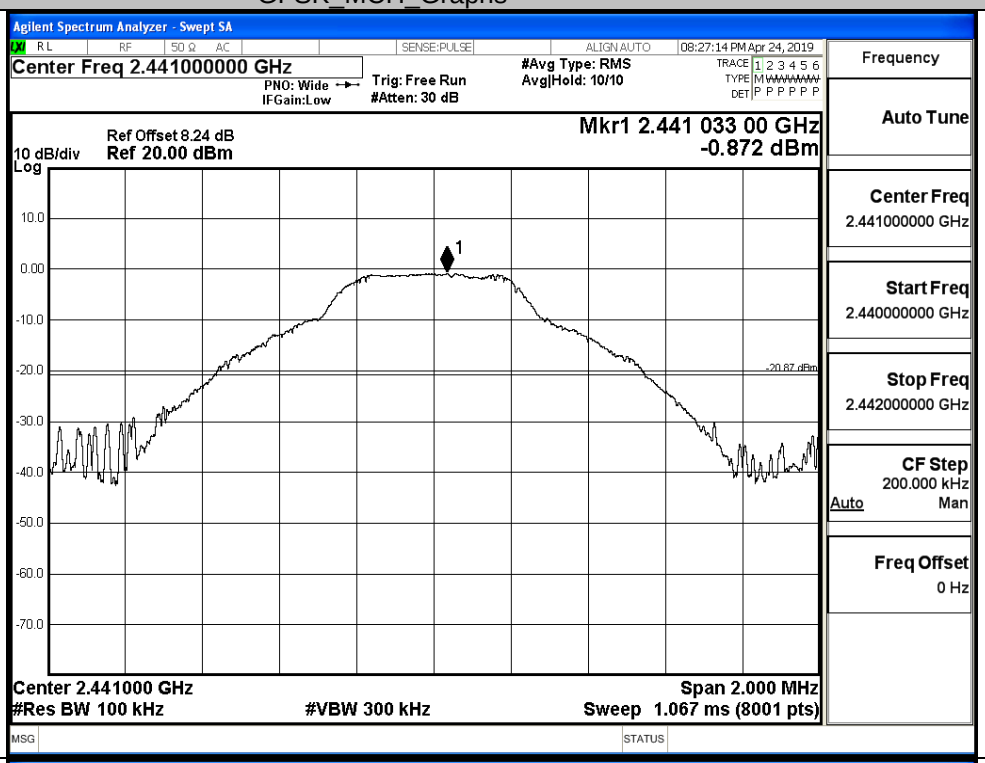
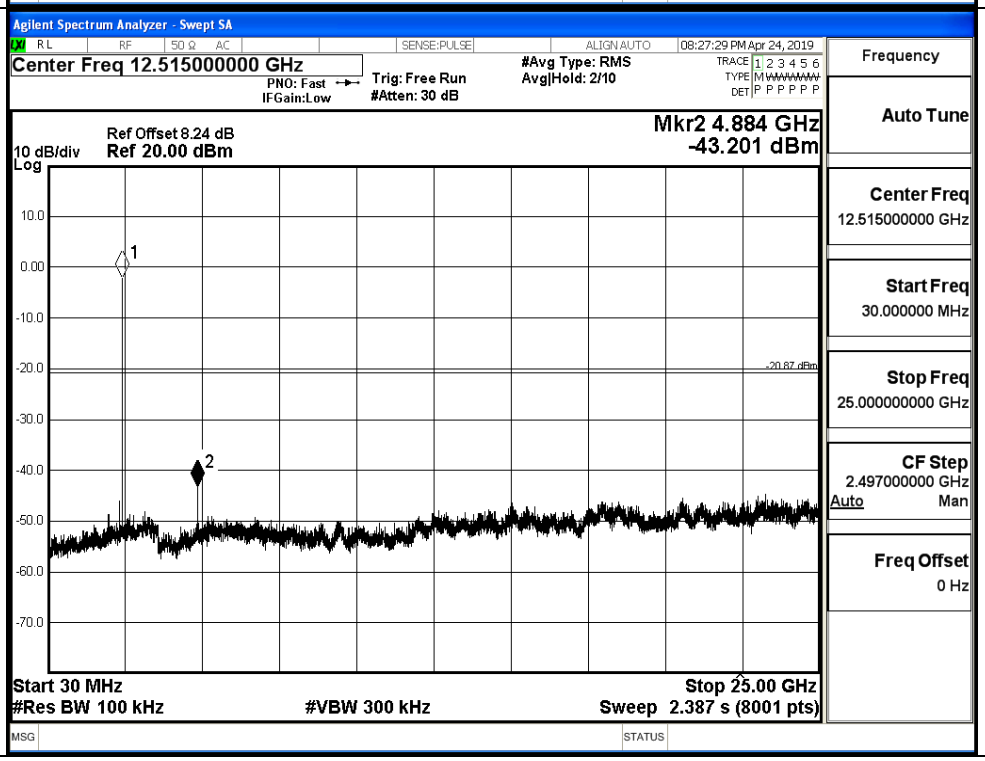
| | |
|---|---|
| π/4DQPSK _2DH5/HCH |  |
| 8DPSK _3DH5/LCH |  |

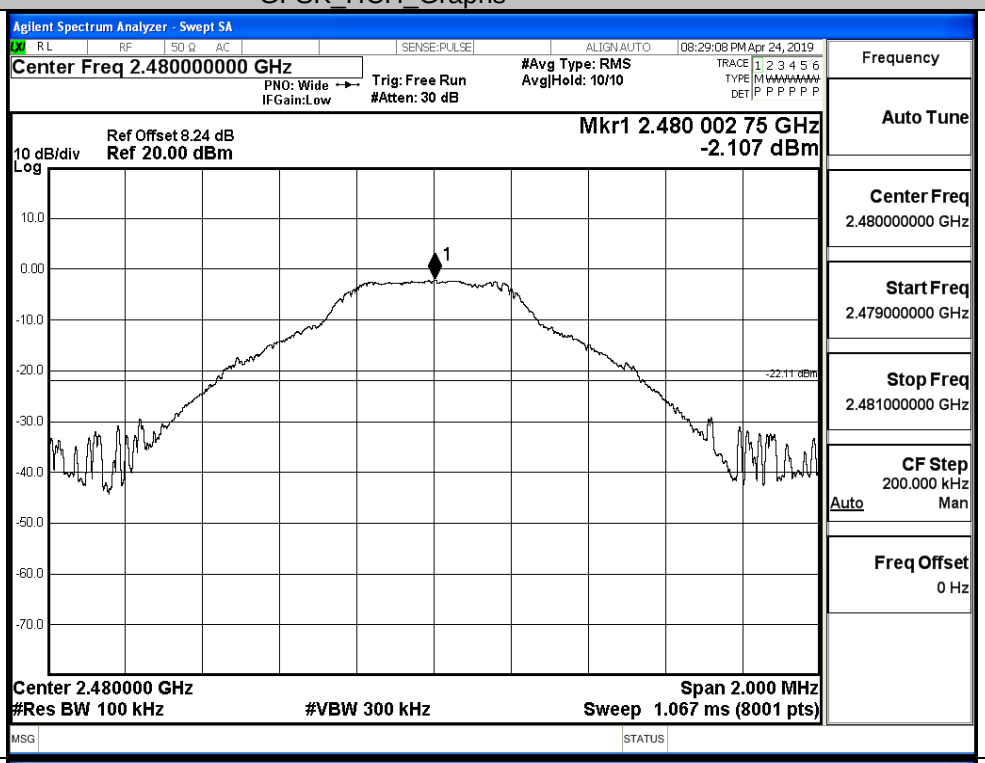
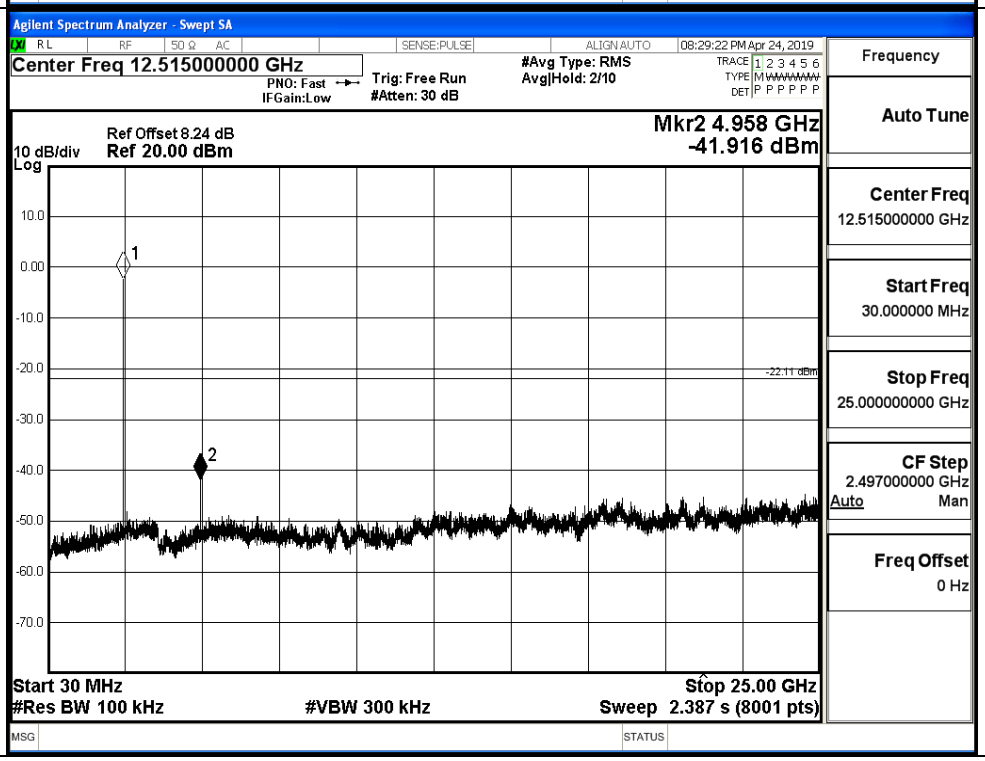
| | |
|---|---|
| 8DPSK _3DH5/MCH |  |
| 8DPSK _3DH5/HCH |  |

## A.6 RF Conducted Spurious Emissions

| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| GFSK | LCH | 0.906 | -38.772 | -19.094 | PASS |
| | MCH | -0.872 | -43.201 | -20.872 | PASS |
| | HCH | -2.107 | -41.916 | -22.107 | PASS |
| π/4DQPSK | LCH | -0.61 | -39.732 | -20.610 | PASS |
| | MCH | -2.01 | -43.244 | -22.010 | PASS |
| | HCH | -3.374 | -44.486 | -23.374 | PASS |
| 8DPSK | LCH | -0.608 | -39.923 | -20.608 | PASS |
| | MCH | -1.921 | -43.119 | -21.921 | PASS |
| | HCH | -3.477 | -43.908 | -23.477 | PASS |

| GFSK_LCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

| GFSK_MCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

| GFSK_HCH_Graphs | | | |
|---|---|---|---|
| Pref | |  | |
| Puw | |  | |

| π/4DQPSK_LCH_Graphs | | |
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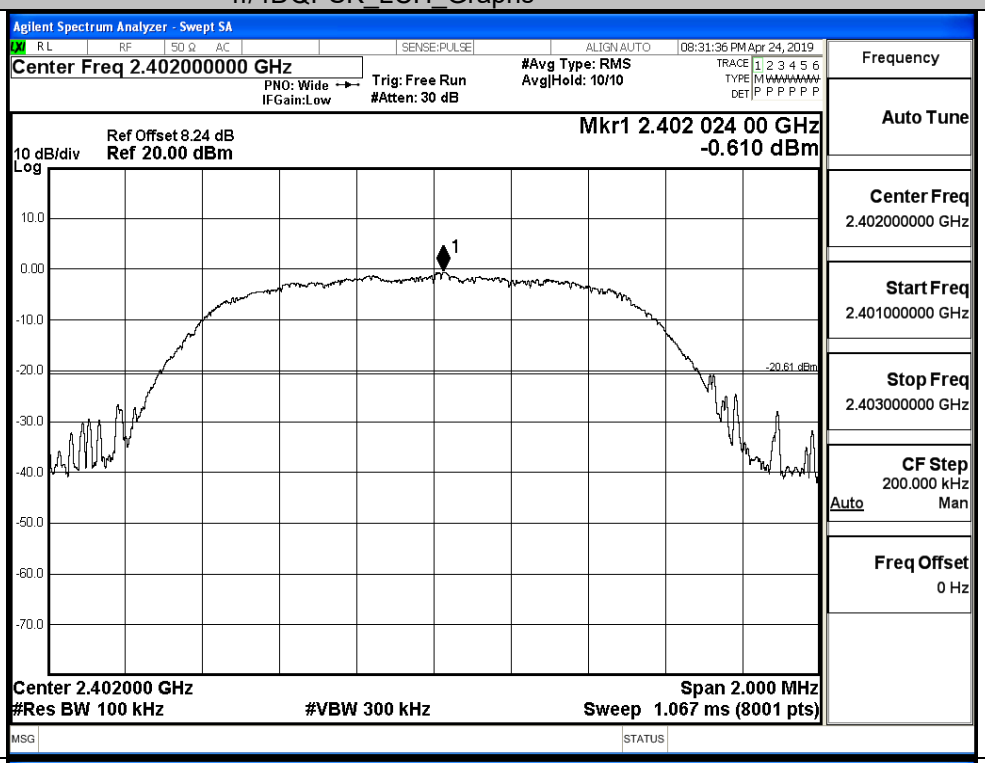
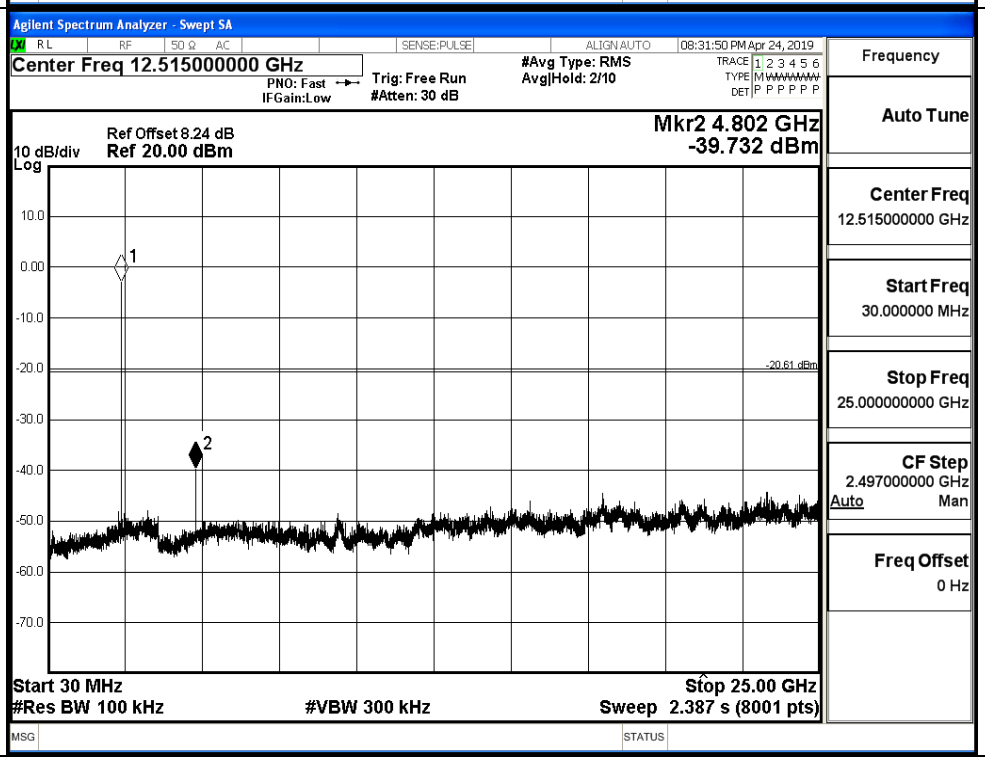
| Pref | |  |
| Puw | |  |

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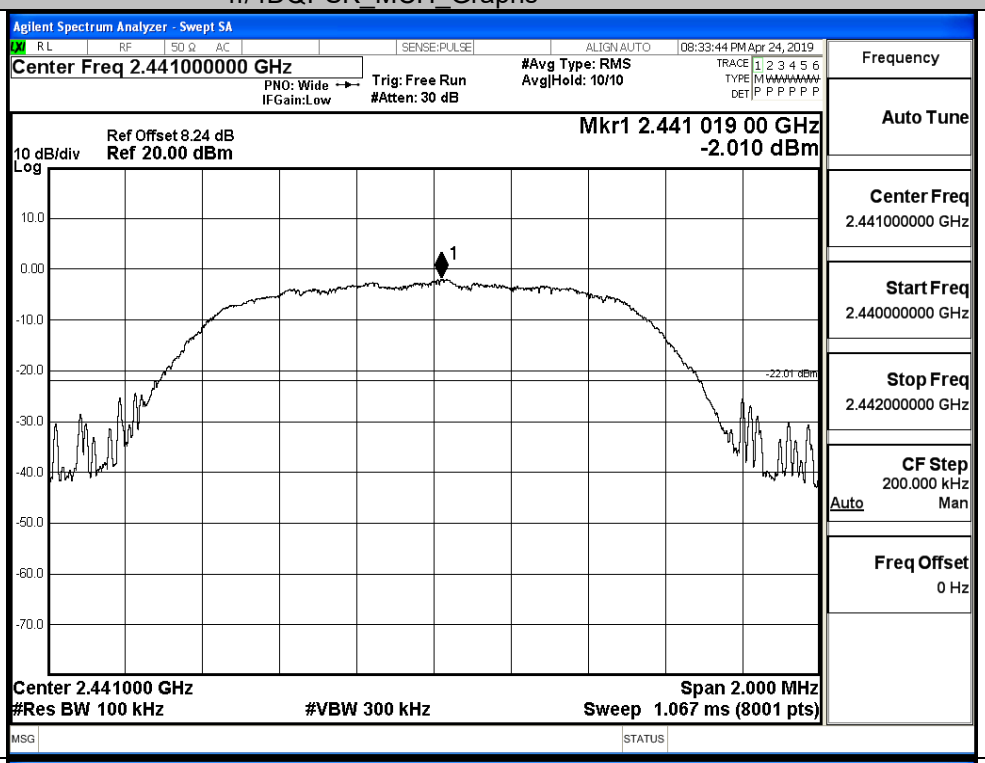
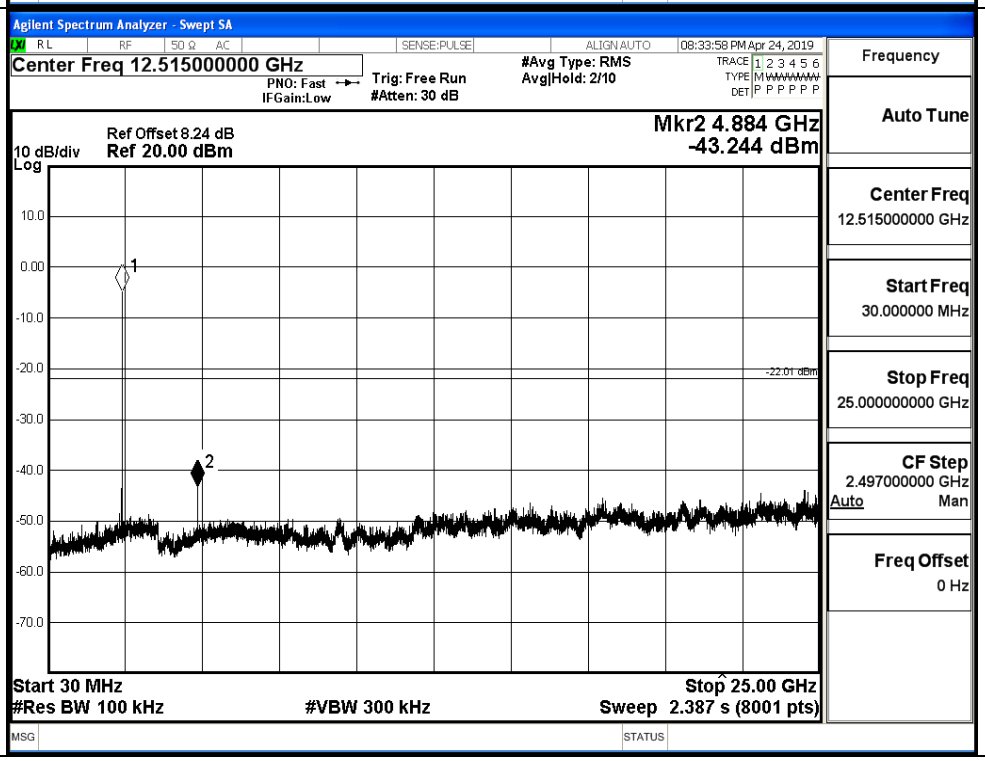
| Pref | |  | |
| Puw | |  | |

| π/4DQPSK_HCH_Graphs | | | |
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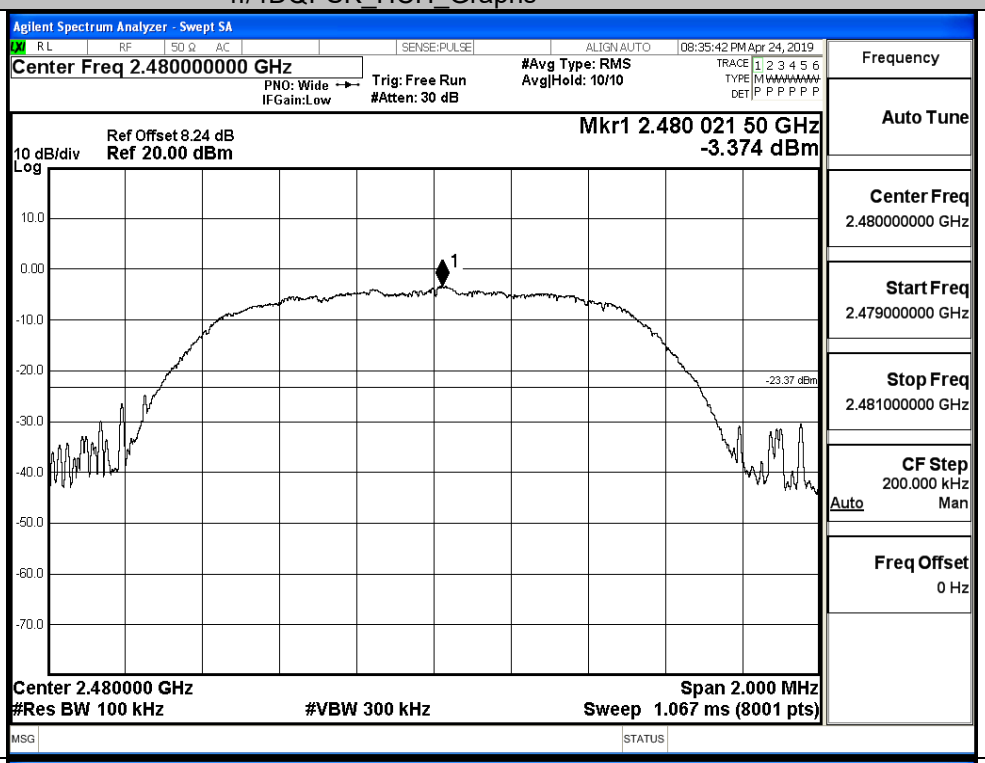
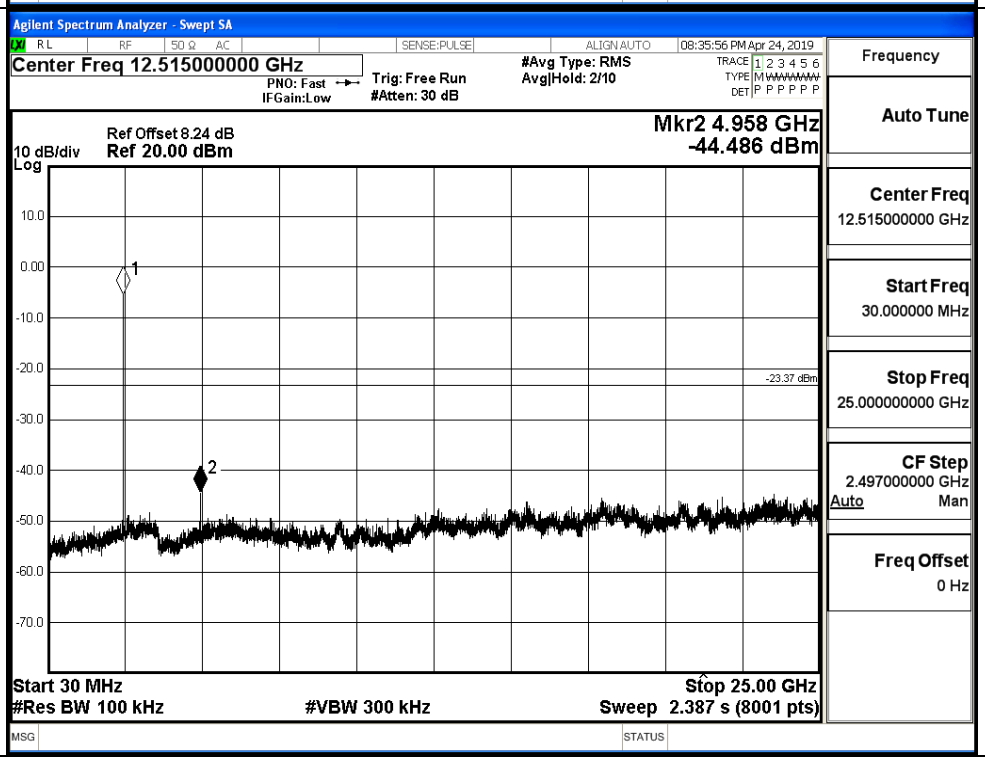
| Pref | |  | |
| Puw | |  | |

| 8DPSK_LCH_Graphs | | |
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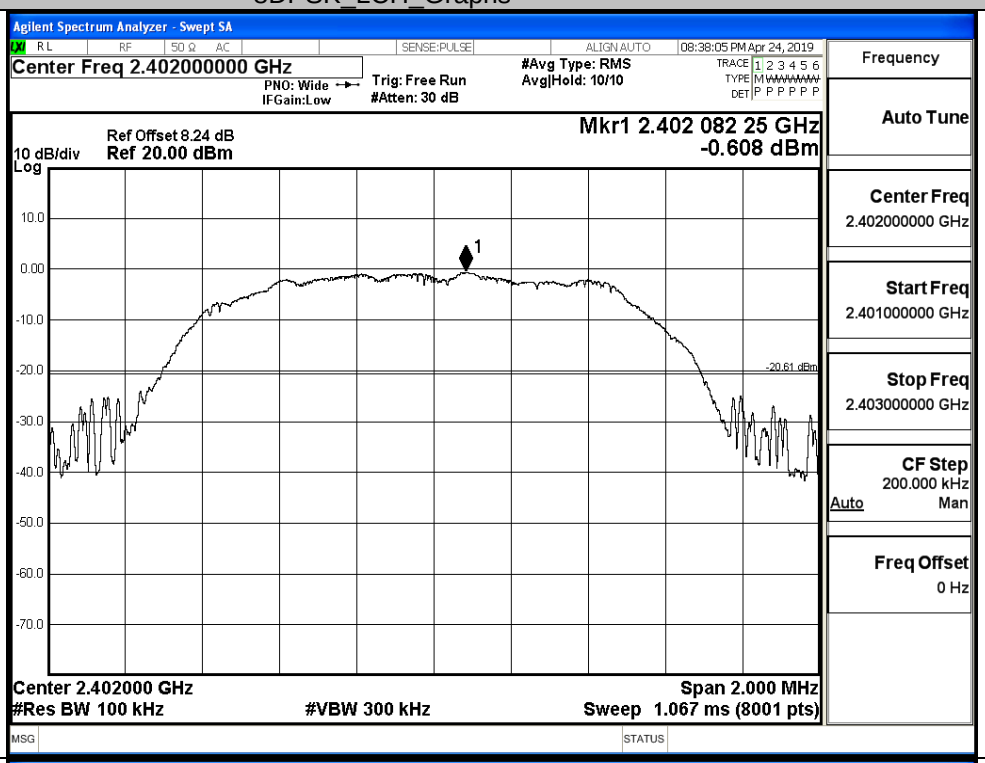
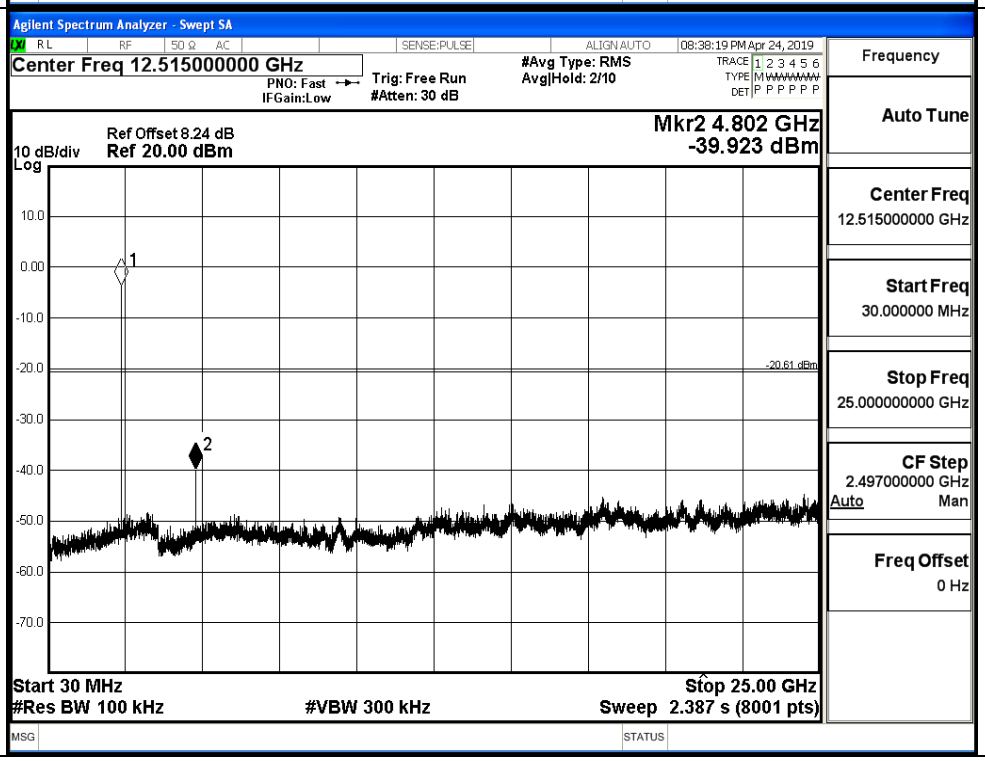
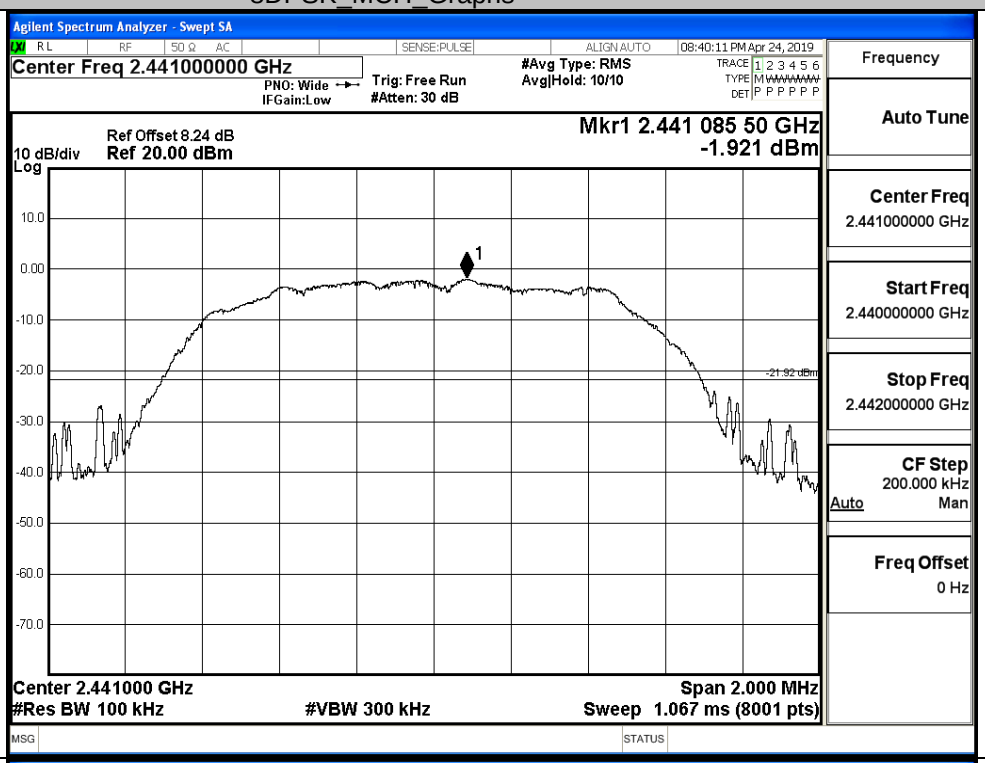
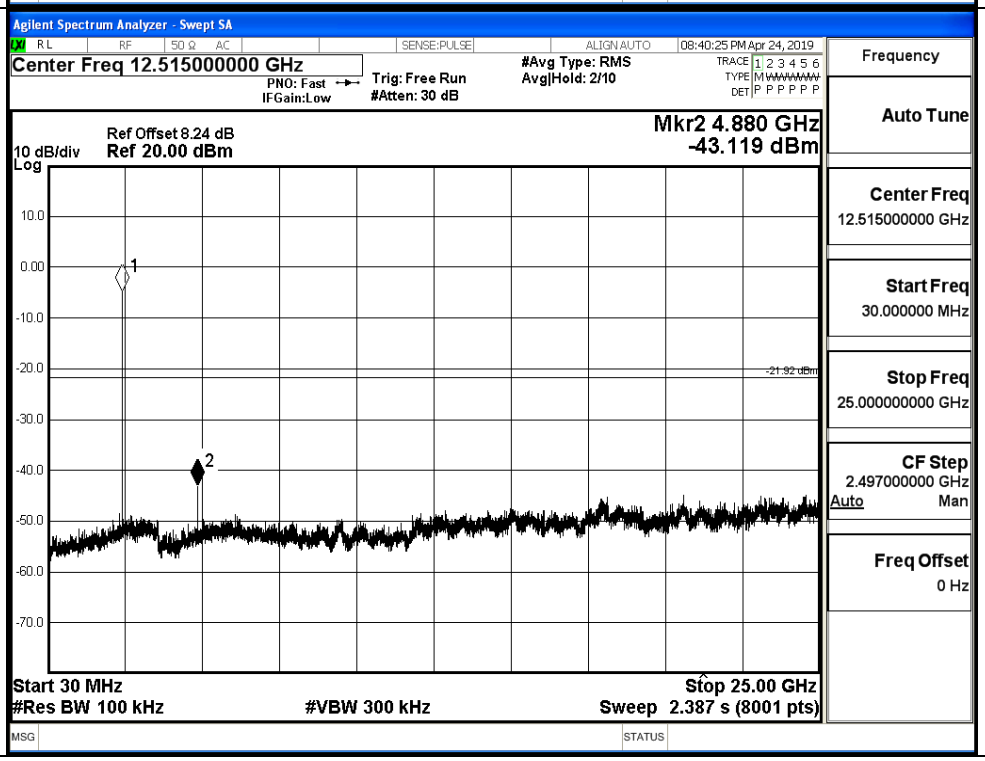
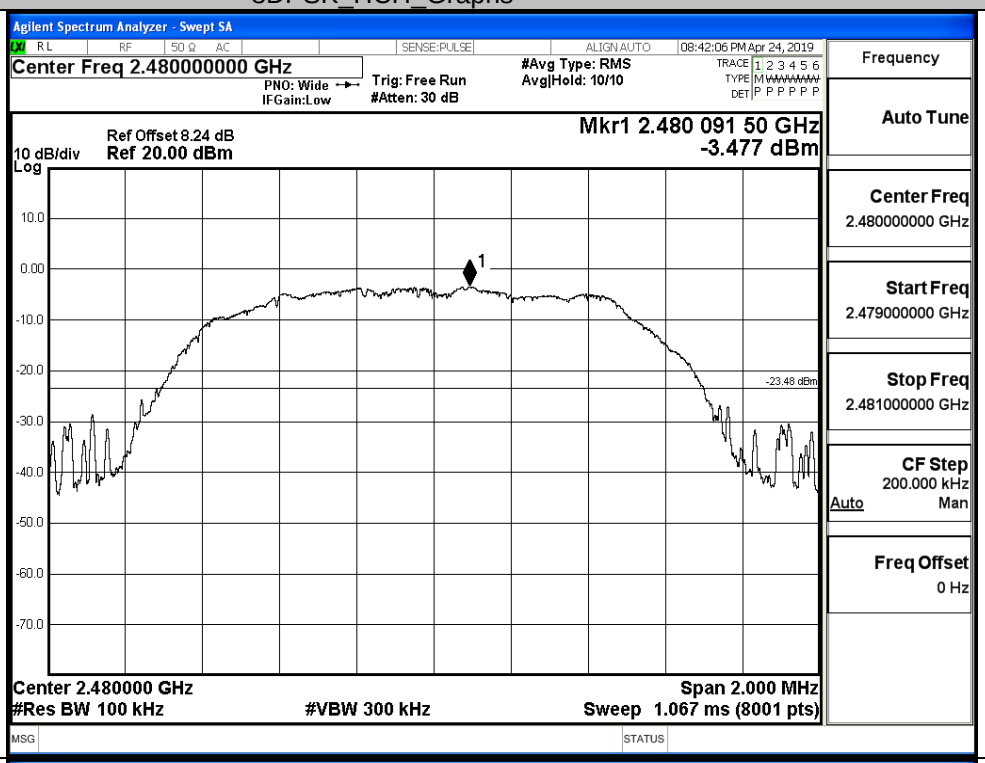
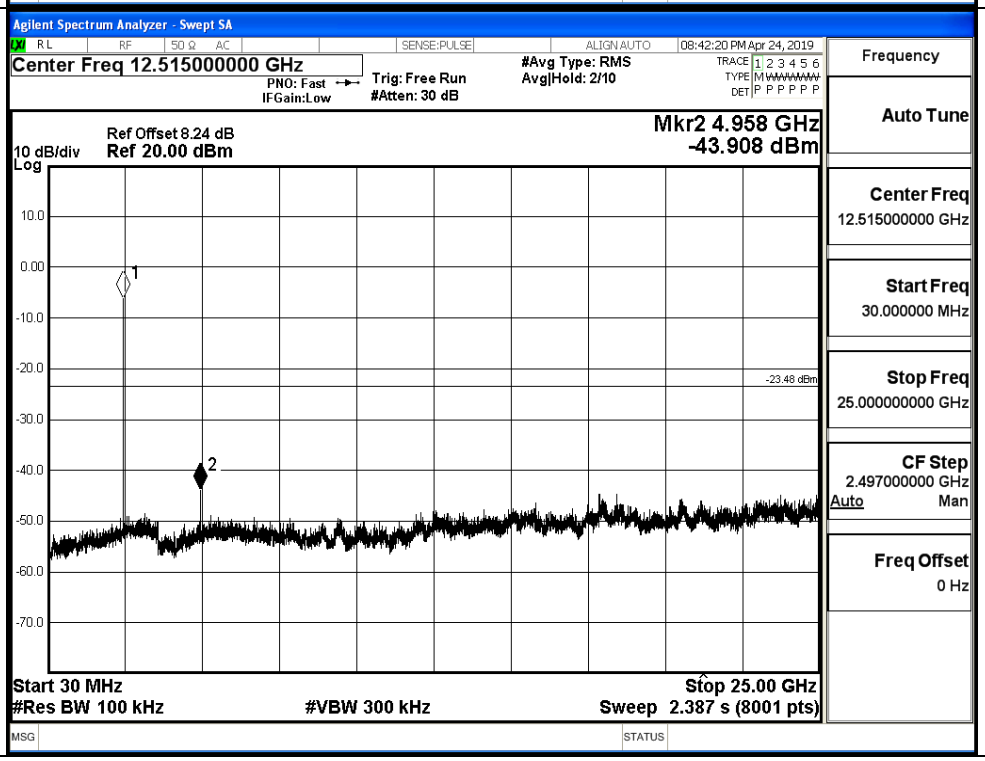
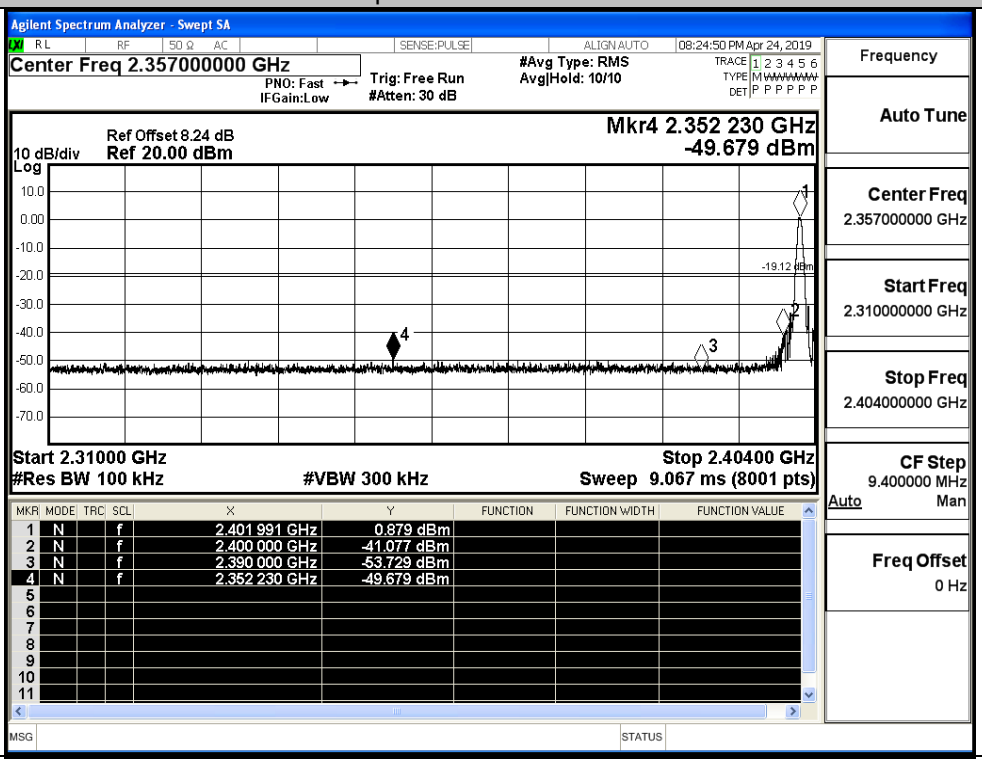
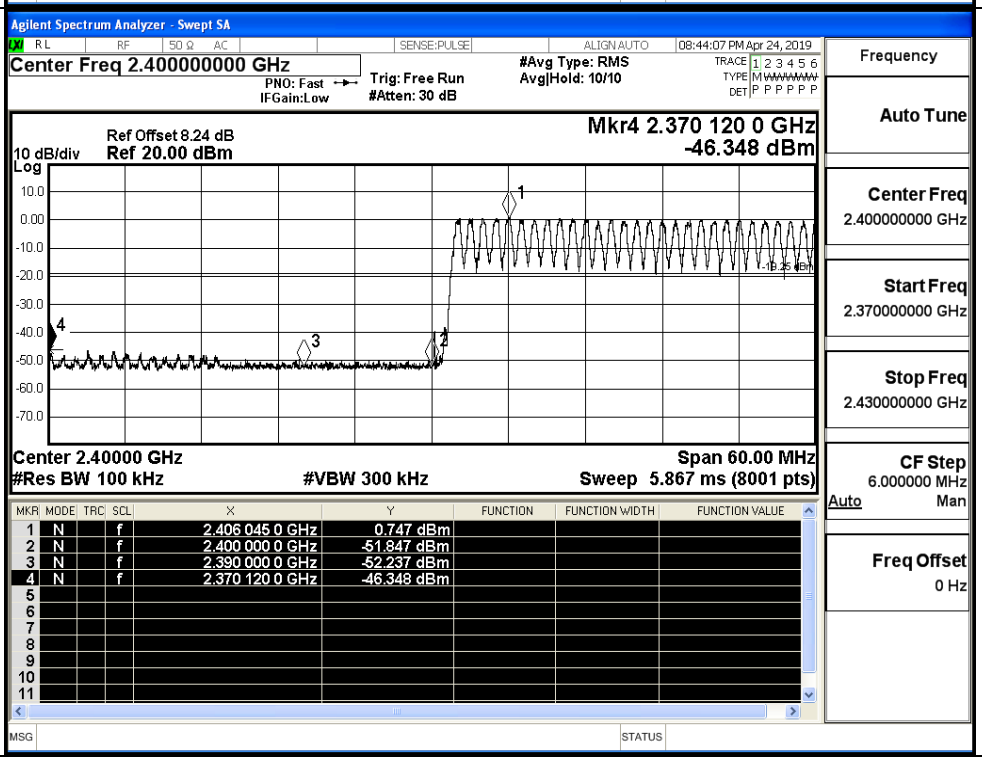
| Pref | |  |
| Puw | |  |

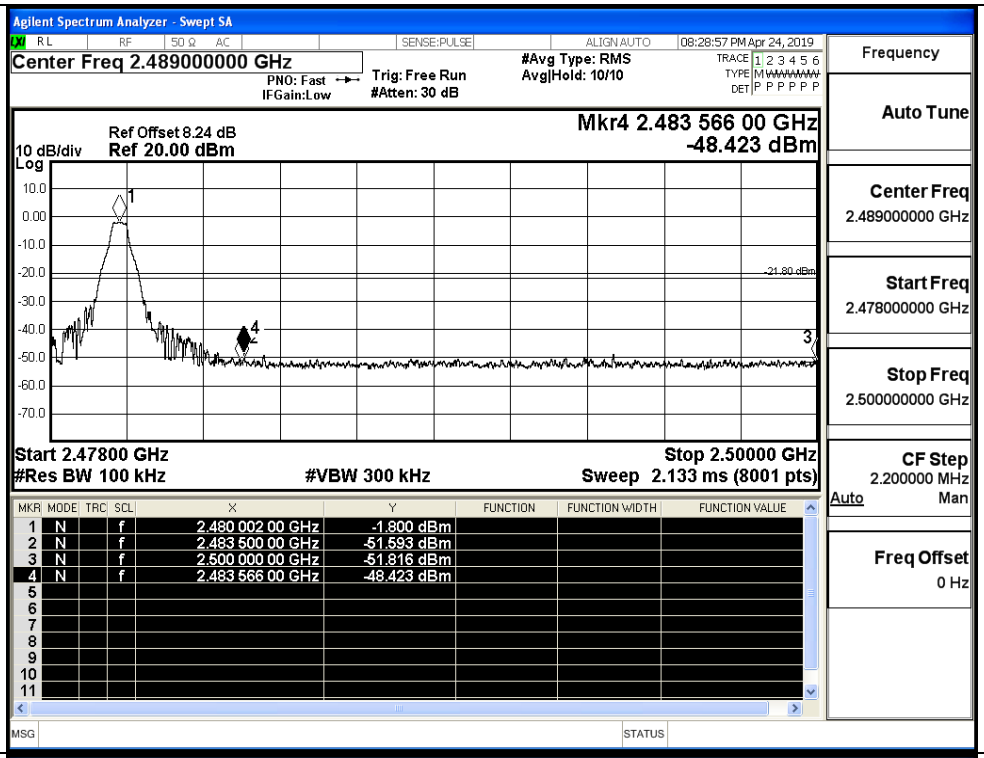
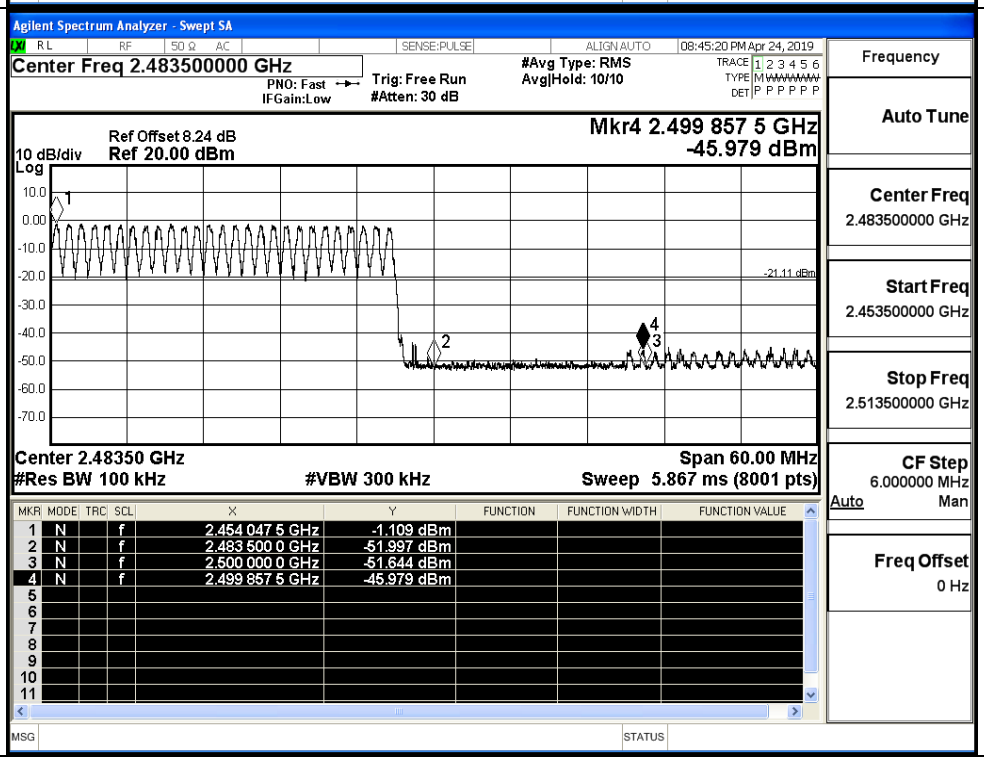
| 8DPSK_MCH_Graphs | | | |
|---|---|---|---|
| Pref | |   | |
| Puw | |   | |

| 8DPSK_HCH_Graphs | | | |
|---|---|---|---|
| Pref | |  | |
| Puw | |  | |

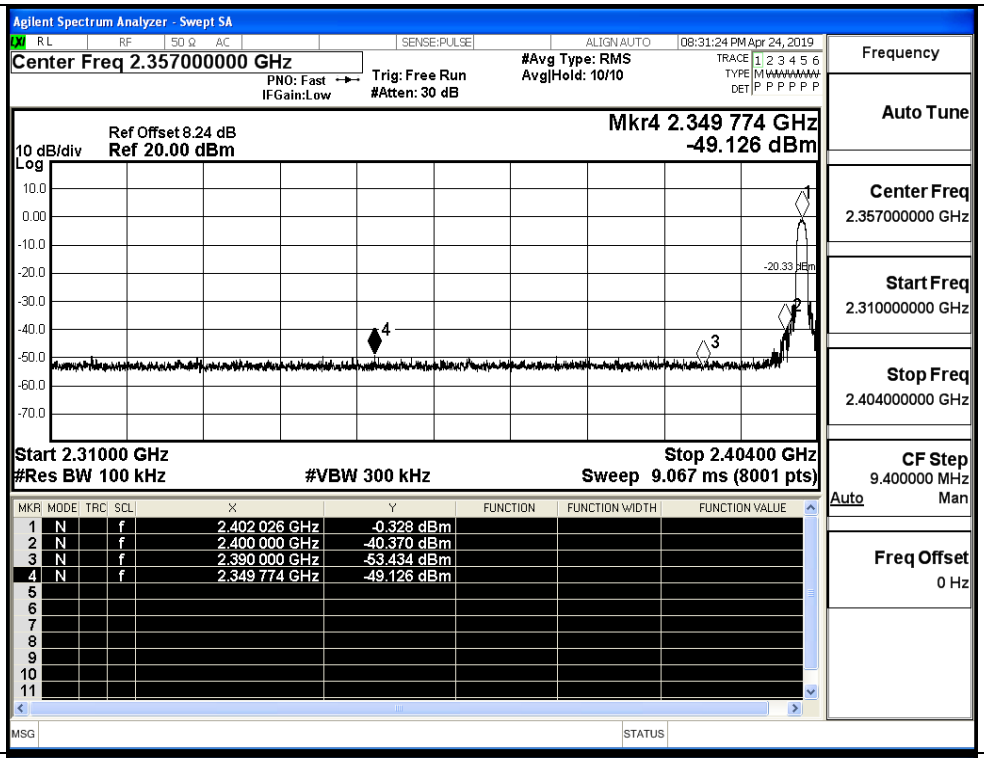
## A.7 Band-edge for RF Conducted Emissions

| Mode | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | LCH | 2402 | 0.879 | Off | -49.679 | -19.12 | PASS |
| | | | 0.747 | On | -46.348 | -19.25 | PASS |
| | HCH | 2480 | -1.800 | Off | -48.423 | -21.8 | PASS |
| | | | -1.109 | On | -45.979 | -21.11 | PASS |
| π/4DQPSK | LCH | 2402 | -0.328 | Off | -49.126 | -20.33 | PASS |
| | | | -0.373 | On | -46.695 | -20.37 | PASS |
| | HCH | 2480 | -3.130 | Off | -48.362 | -23.13 | PASS |
| | | | -2.484 | On | -46.015 | -22.48 | PASS |
| 8DPSK | LCH | 2402 | -0.233 | Off | -50.158 | -20.23 | PASS |
| | | | -0.356 | On | -46.631 | -20.36 | PASS |
| | HCH | 2480 | -3.051 | Off | -49.158 | -23.05 | PASS |
| | | | -2.266 | On | -45.374 | -22.27 | PASS |

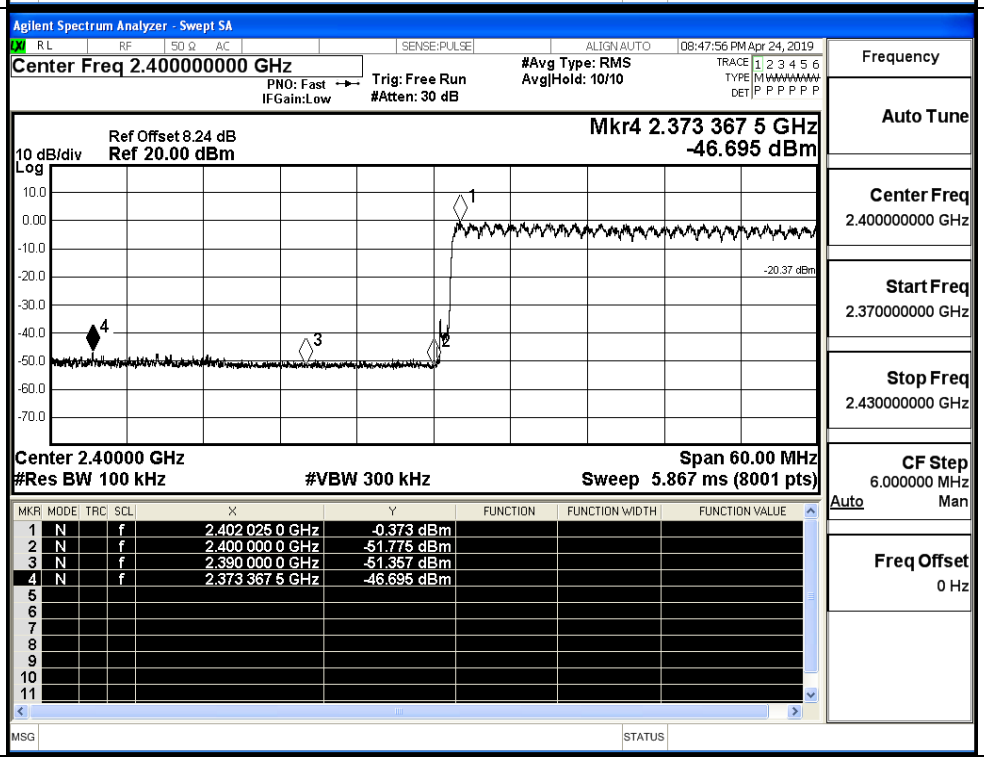
| Test Graphs | |
|---|---|
| GFSK/LCH/No Hop |  |
| GFSK/LCH/Hop |  |

| | |
|---|---|
| GFSK/HCH/No Hop |  |
| GFSK/HCH/Hop |  |

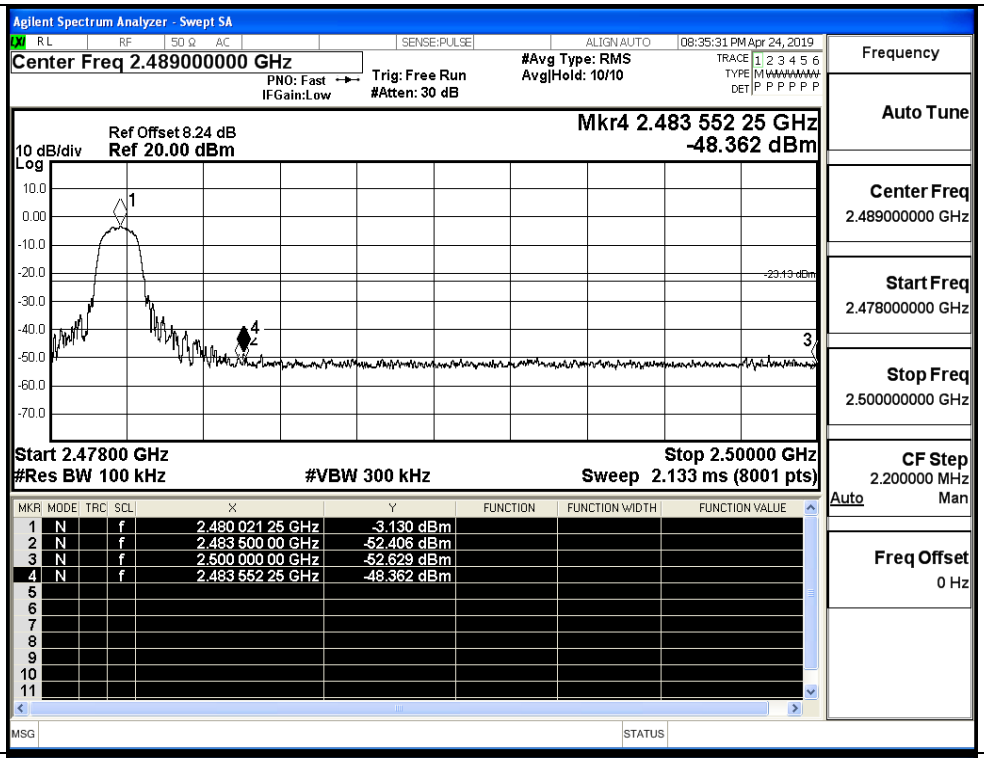
π/4DQPSK/LCH/No Hop



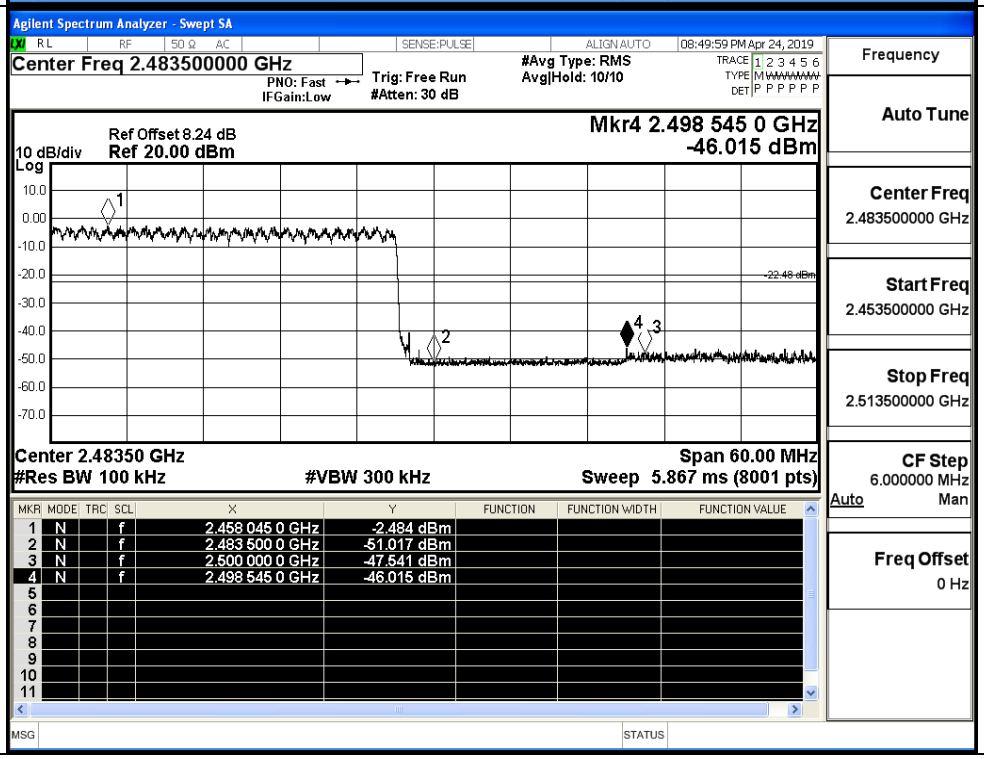

π/4DQPSK/LCH/Hop



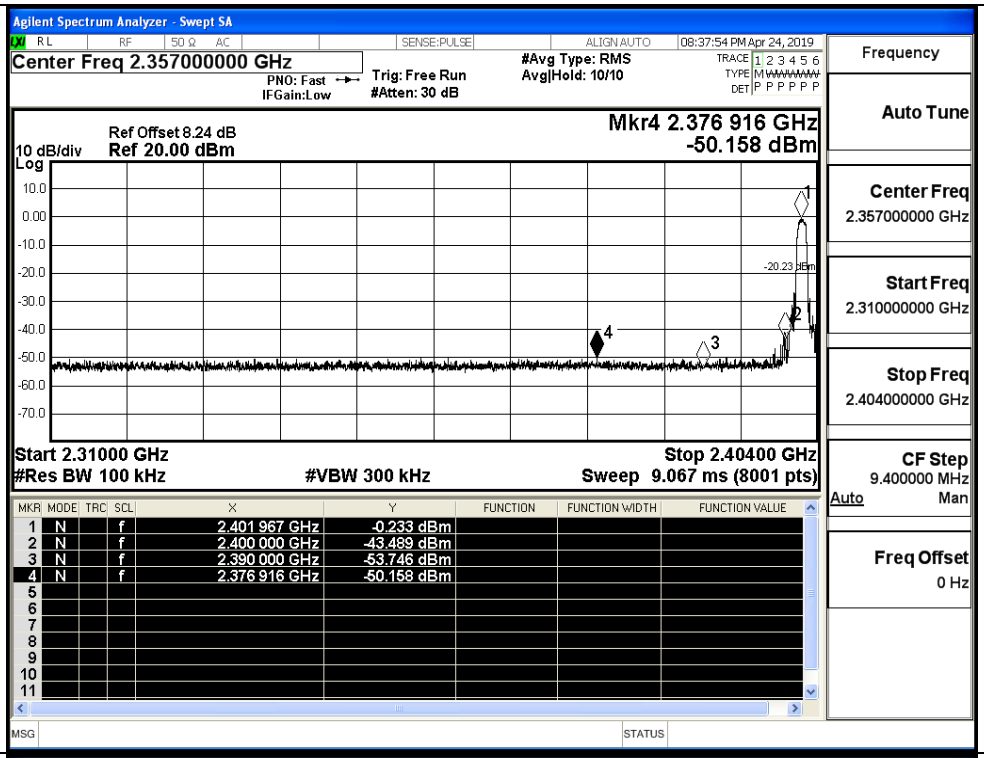
π/4DQPSK/HCH/No Hop



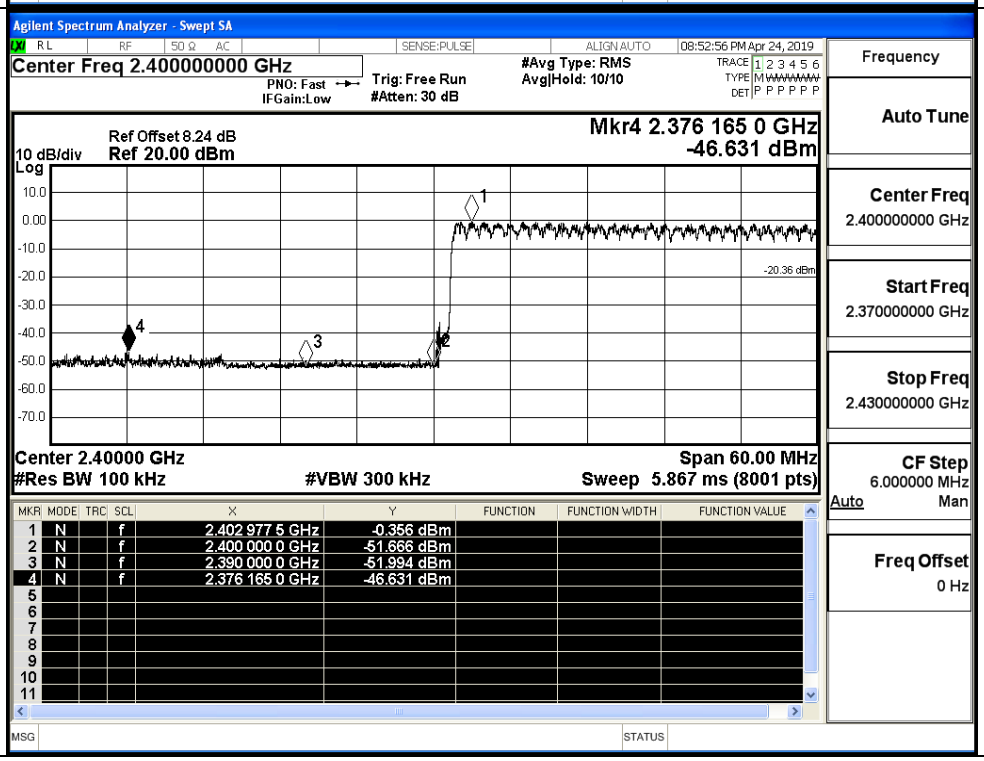

π/4DQPSK/HCH/Hop

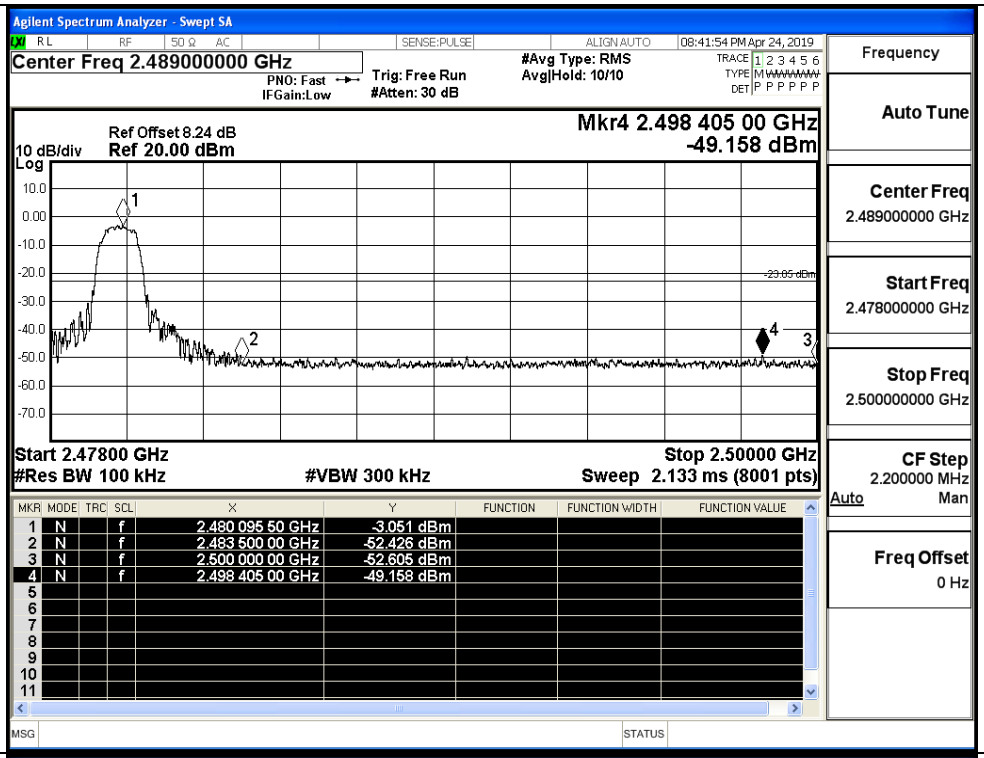
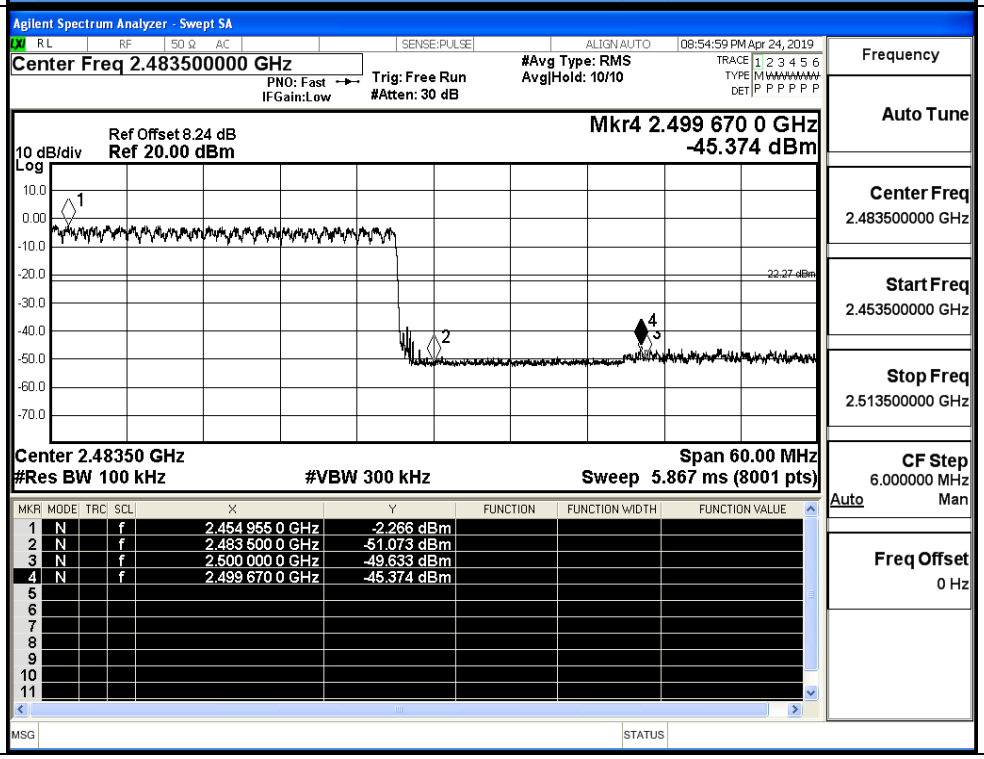


8DPSK/LCH/No Hop




8DPSK/LCH/Hop

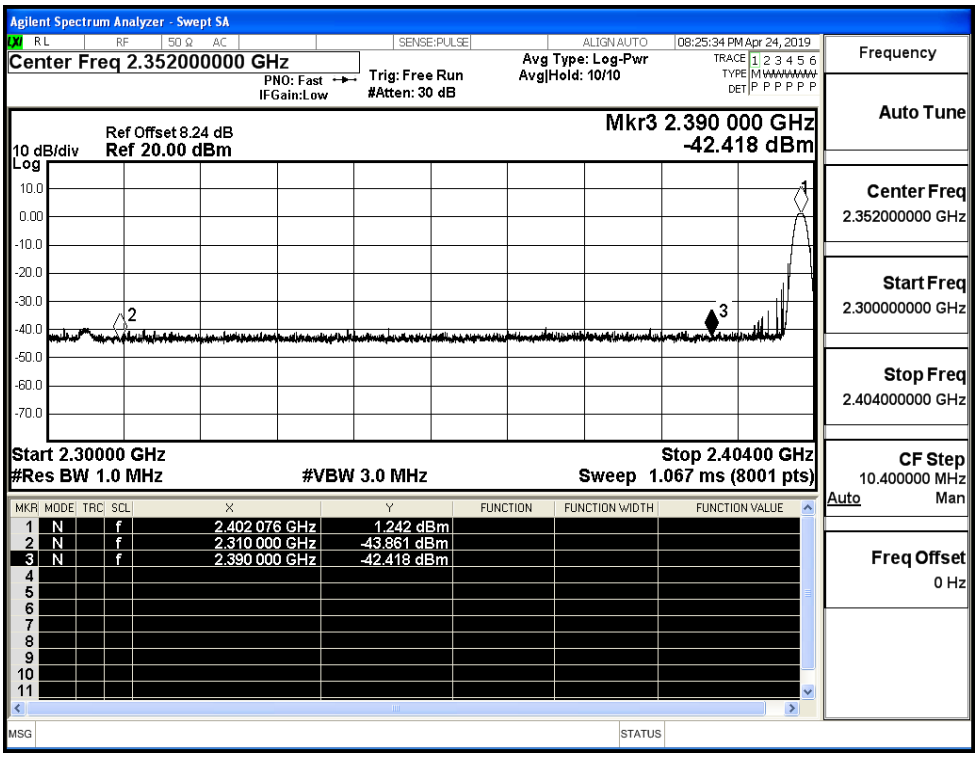


| | |
|---|---|
| 8DPSK/HCH/No Hop |  |
| 8DPSK/HCH/Hop |  |

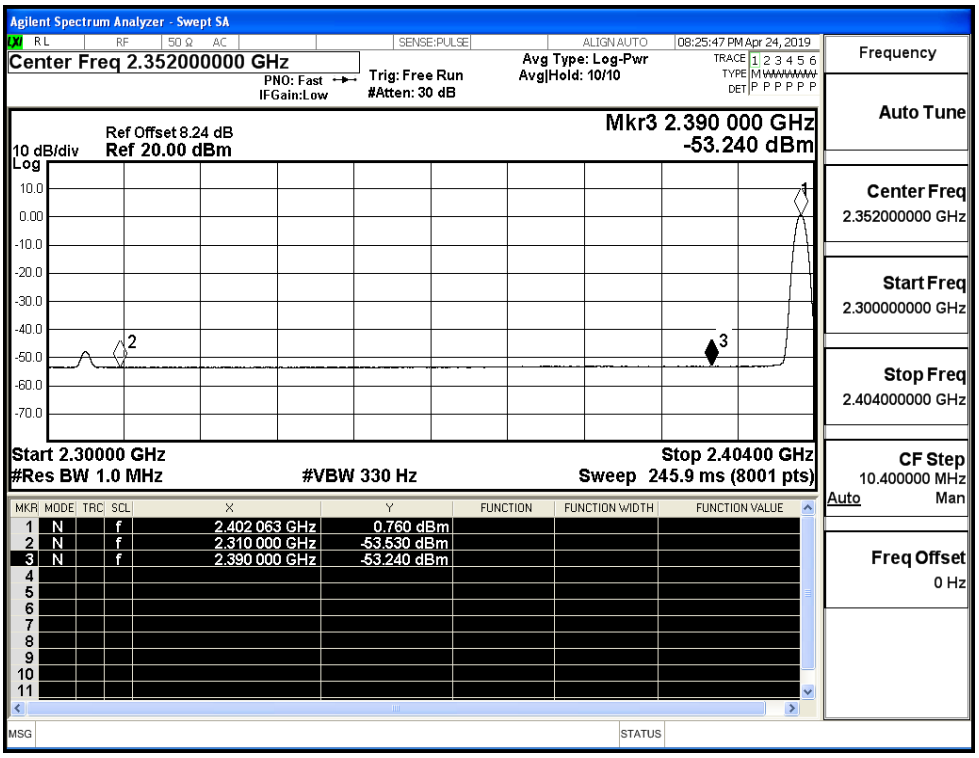
## A.8 Restrict-band band-edge measurements

| Test Mode | Hopping | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| GFSK | Off | 2310.0 | -43.86 | 2.0 | 0 | 53.40 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.53 | 2.0 | 0 | 43.73 | AV | 54 | PASS |
| | Off | 2390.0 | -42.42 | 2.0 | 0 | 54.84 | PEAK | 74 | PASS |
| | Off | 2390.0 | -53.24 | 2.0 | 0 | 44.02 | AV | 54 | PASS |
| | Off | 2483.5 | -43.07 | 2.0 | 0 | 54.19 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.65 | 2.0 | 0 | 44.61 | AV | 54 | PASS |
| | Off | 2500.0 | -42.08 | 2.0 | 0 | 55.17 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.79 | 2.0 | 0 | 44.47 | AV | 54 | PASS |
| π/4DQPSK | Off | 2310.0 | -42.77 | 2.0 | 0 | 54.49 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.40 | 2.0 | 0 | 43.85 | AV | 54 | PASS |
| | Off | 2390.0 | -42.64 | 2.0 | 0 | 54.62 | PEAK | 74 | PASS |
| | Off | 2390.0 | -53.20 | 2.0 | 0 | 44.06 | AV | 54 | PASS |
| | Off | 2483.5 | -43.68 | 2.0 | 0 | 53.58 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.71 | 2.0 | 0 | 44.55 | AV | 54 | PASS |
| | Off | 2500.0 | -42.14 | 2.0 | 0 | 55.12 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.94 | 2.0 | 0 | 44.32 | AV | 54 | PASS |
| 8DPSK | Off | 2310.0 | -41.43 | 2.0 | 0 | 55.82 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.35 | 2.0 | 0 | 43.90 | AV | 54 | PASS |
| | Off | 2390.0 | -42.90 | 2.0 | 0 | 54.36 | PEAK | 74 | PASS |
| | Off | 2390.0 | -53.17 | 2.0 | 0 | 44.09 | AV | 54 | PASS |
| | Off | 2483.5 | -42.96 | 2.0 | 0 | 54.30 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.64 | 2.0 | 0 | 44.62 | AV | 54 | PASS |
| | Off | 2500.0 | -43.07 | 2.0 | 0 | 54.18 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.89 | 2.0 | 0 | 44.37 | AV | 54 | PASS |

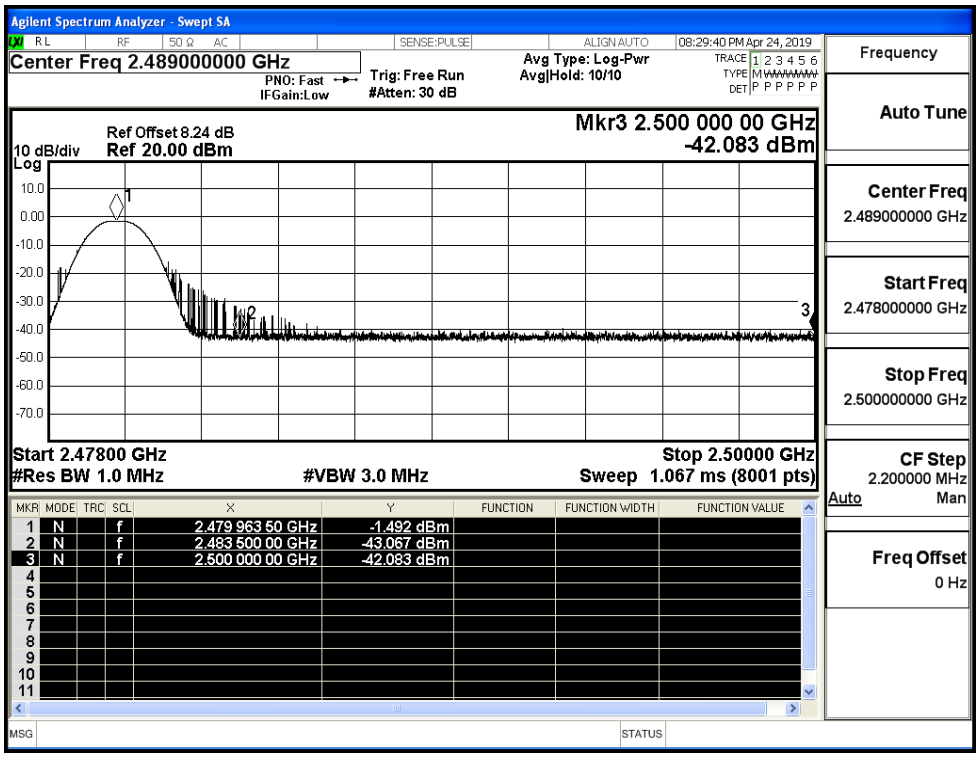
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



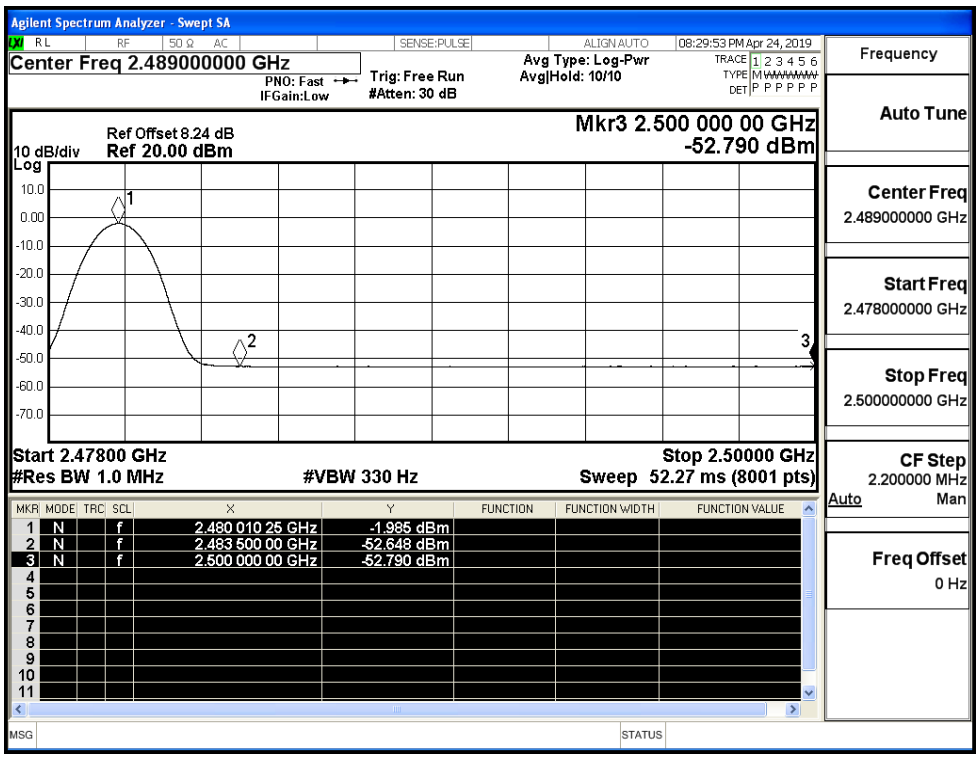

Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



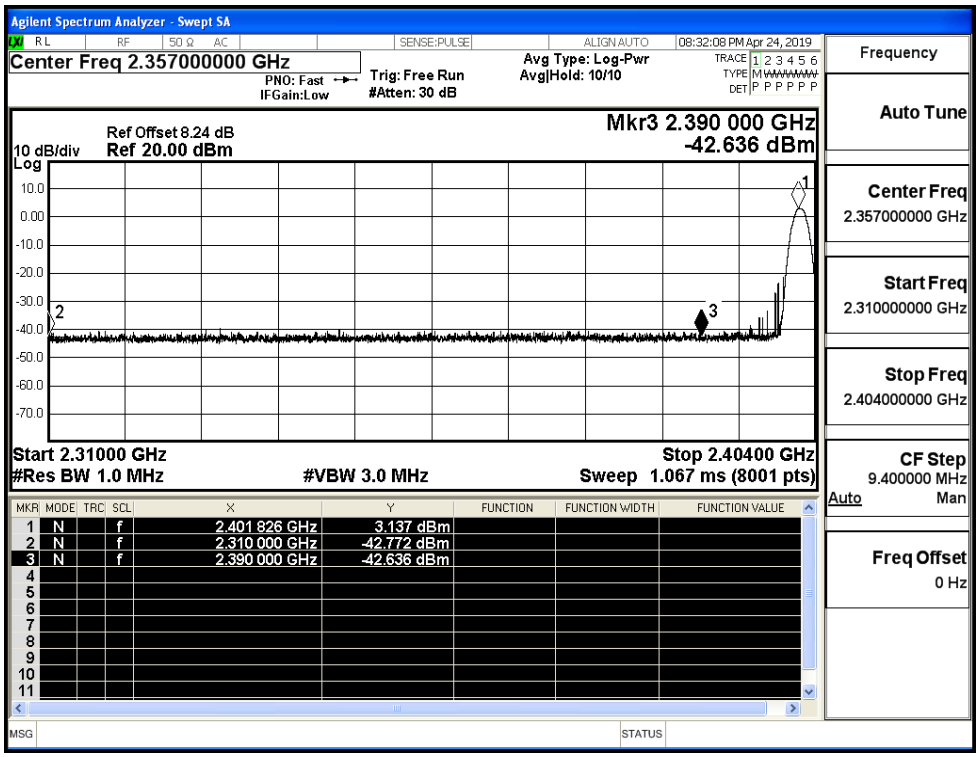
## Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



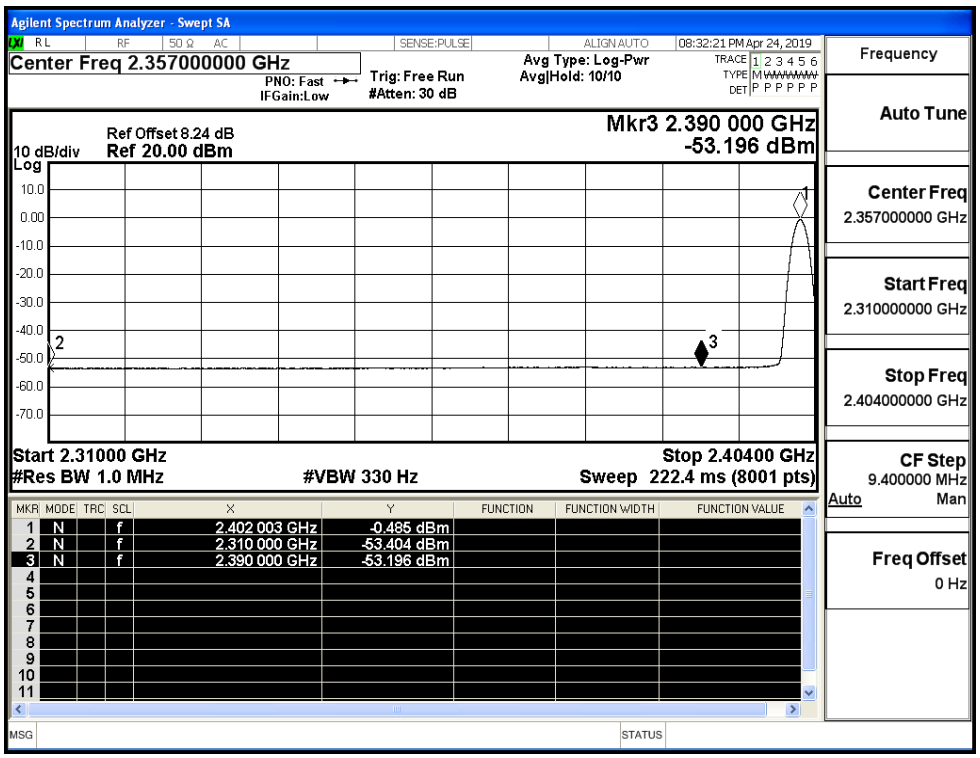

## Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



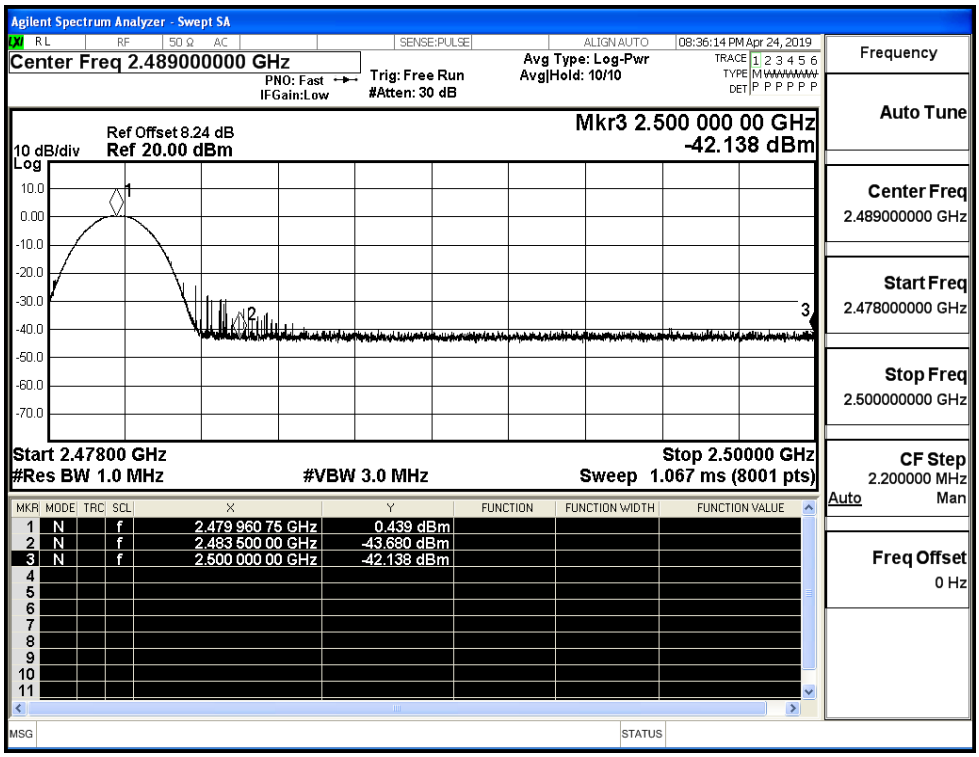
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)



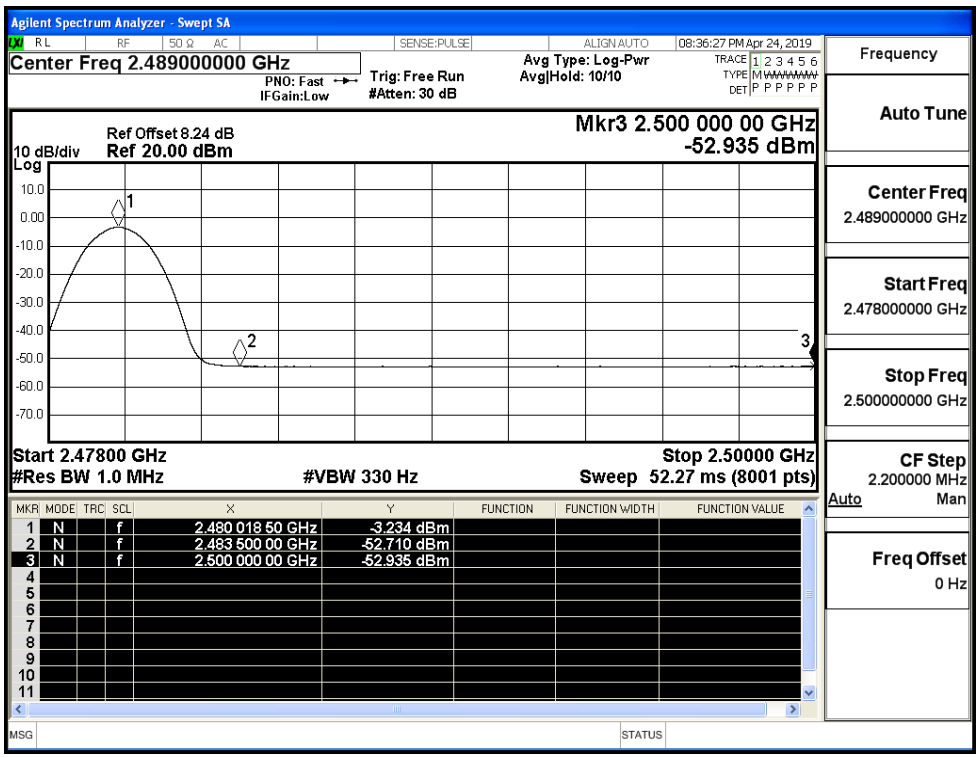

Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



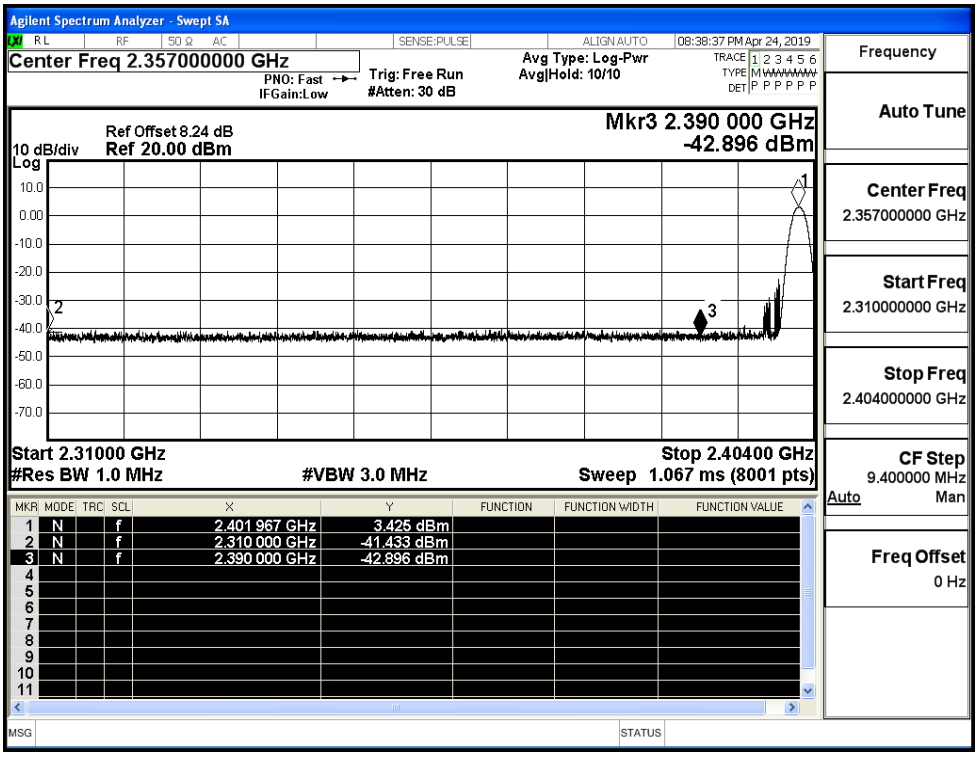
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



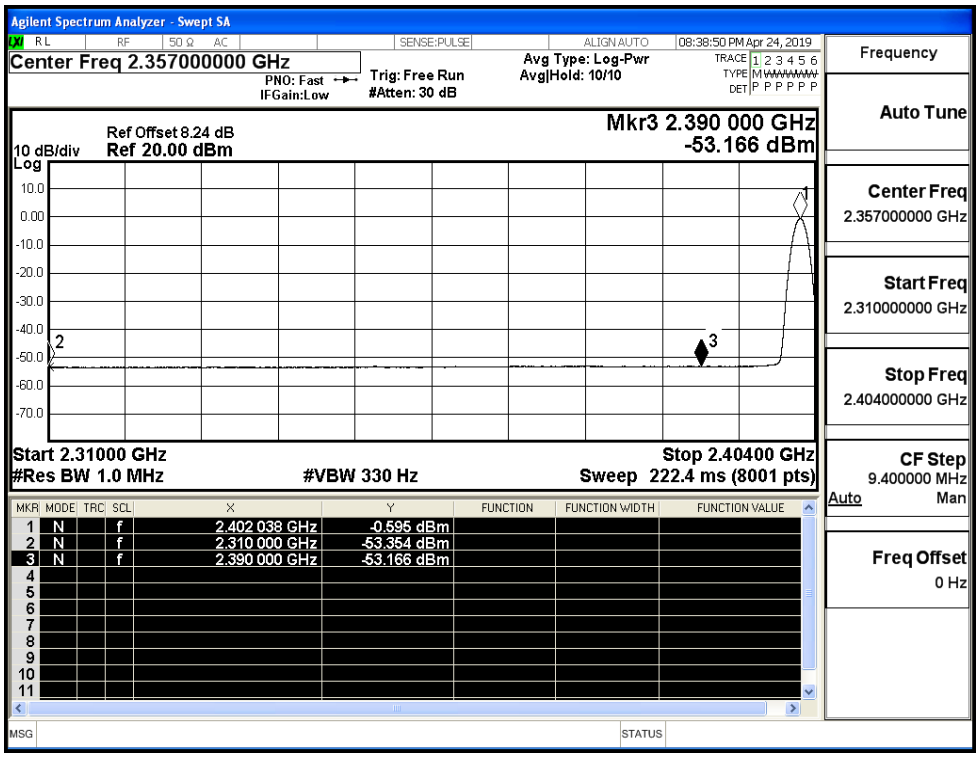

Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



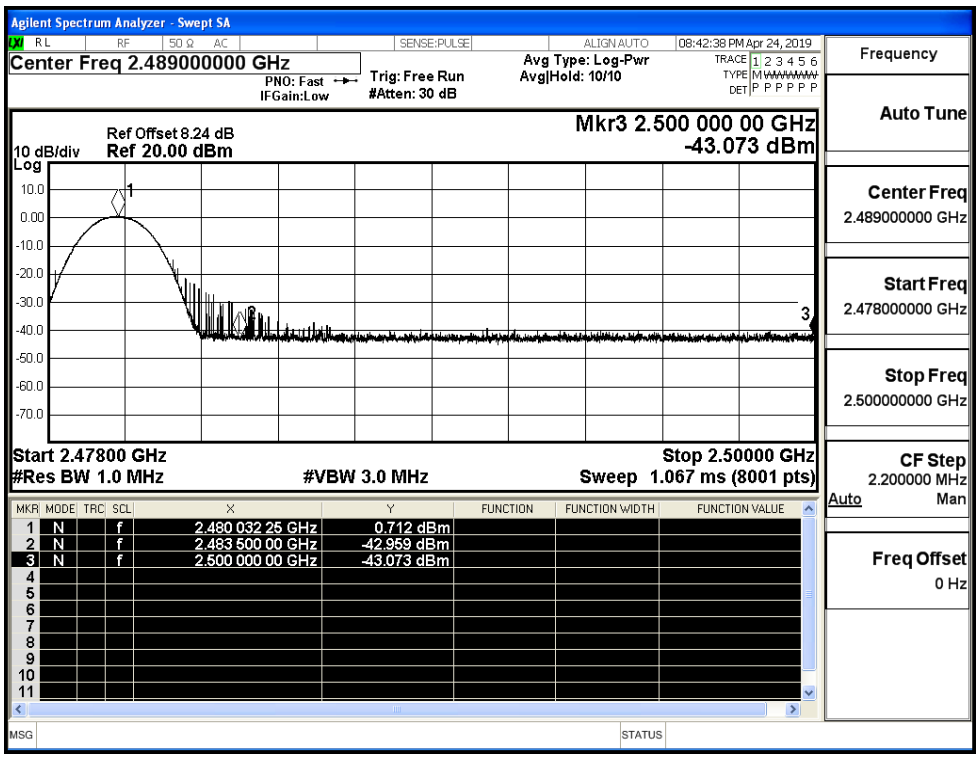
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)

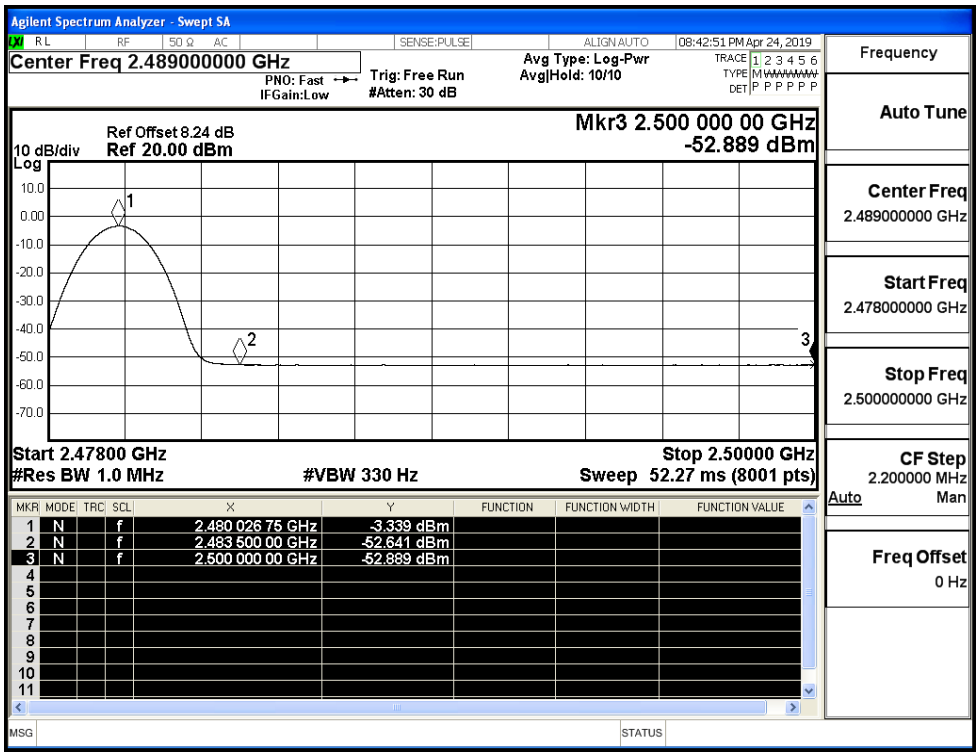



Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (Low Channel)



Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (High Channel)




Restrict-band band-edge measurements_Hopping Off_8DPSK_Average (High Channel)