

## Appendix A

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

Product Name: PORTABLE SOUND CHANGER KARAOKE PLAYER WITH BLUETOOTH

Trade Mark: singing machine

Test Model: SMK1010

#### Environmental Conditions

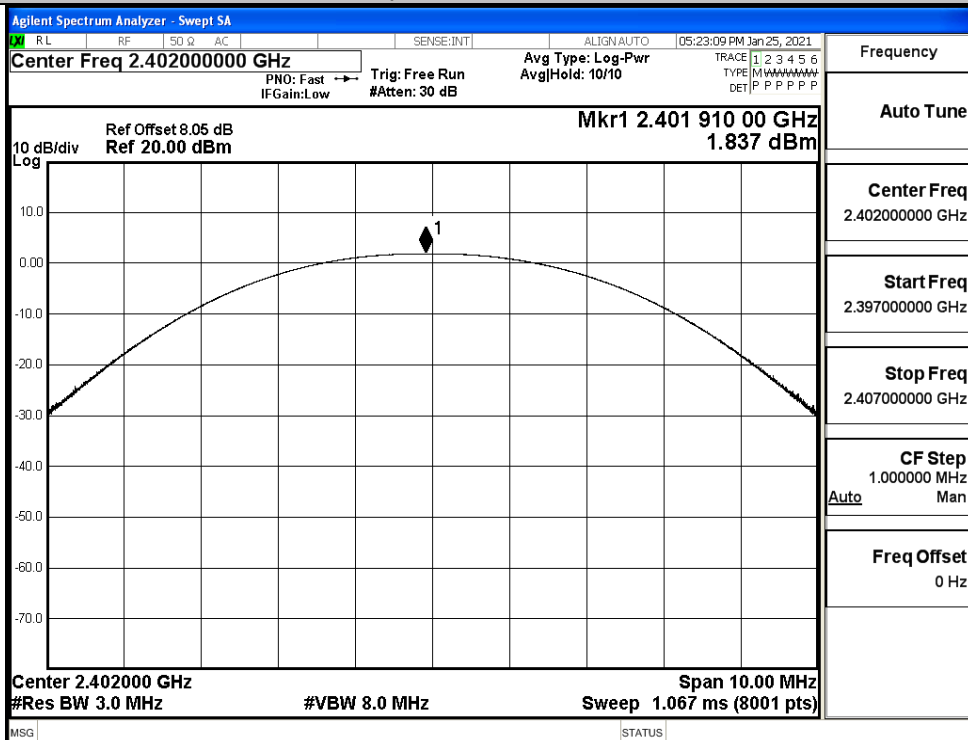
|                    |           |
|--------------------|-----------|
| Temperature:       | 22.0° C   |
| Relative Humidity: | 53.0%     |
| ATM Pressure:      | 100.0 kPa |
| Test Engineer:     | Kay Hu    |
| Supervised by:     | Li Huan   |

#### A.1 Maximum Conducted Peak Output Power

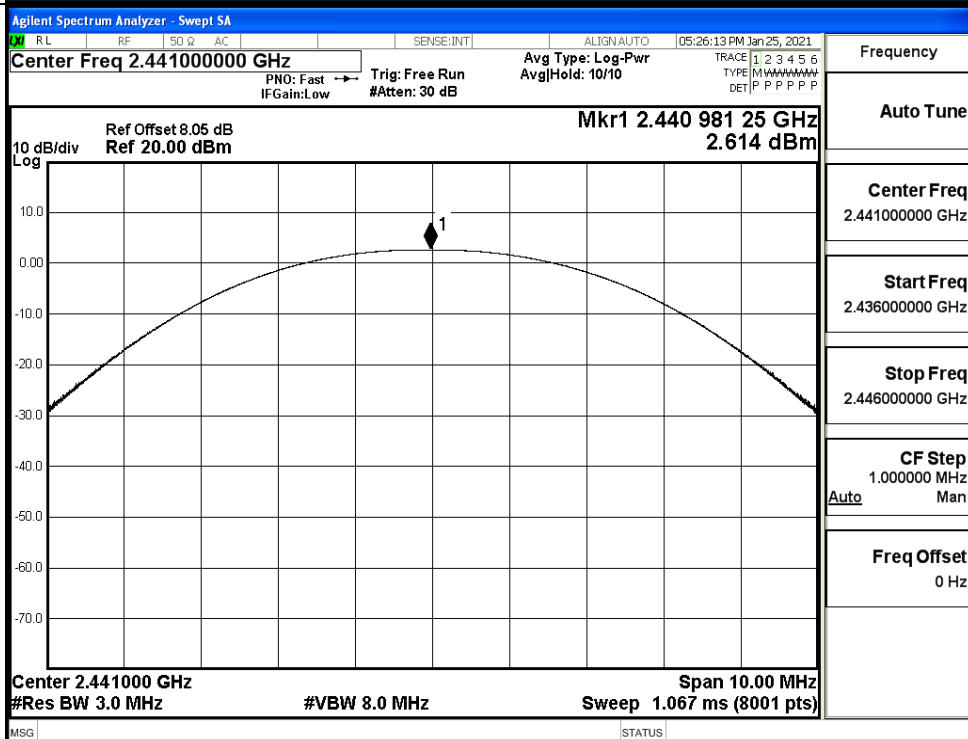
| Mode          | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK          | LCH      | 1.837                           | 21          | PASS    |
|               | MCH      | 2.614                           | 21          | PASS    |
|               | HCH      | 2.992                           | 21          | PASS    |
| $\pi/4$ DQPSK | LCH      | 2.578                           | 21          | PASS    |
|               | MCH      | 3.155                           | 21          | PASS    |
|               | HCH      | 3.049                           | 21          | PASS    |
| 8DPSK         | LCH      | 3.365                           | 21          | PASS    |
|               | MCH      | 4.023                           | 21          | PASS    |
|               | HCH      | 3.928                           | 21          | PASS    |

# Test Graphs

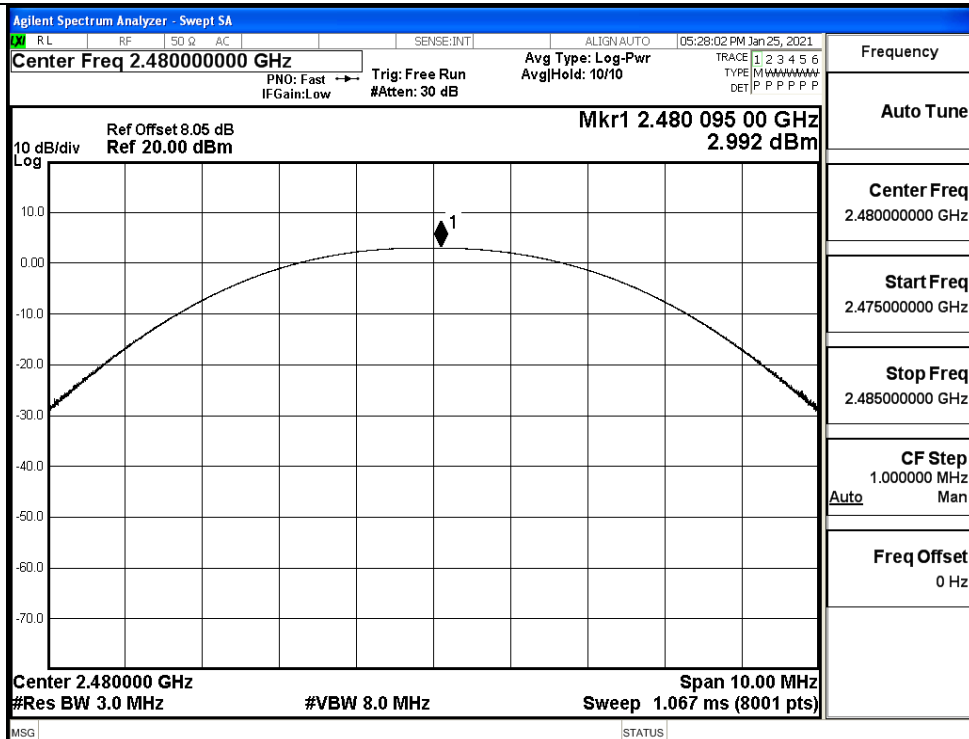
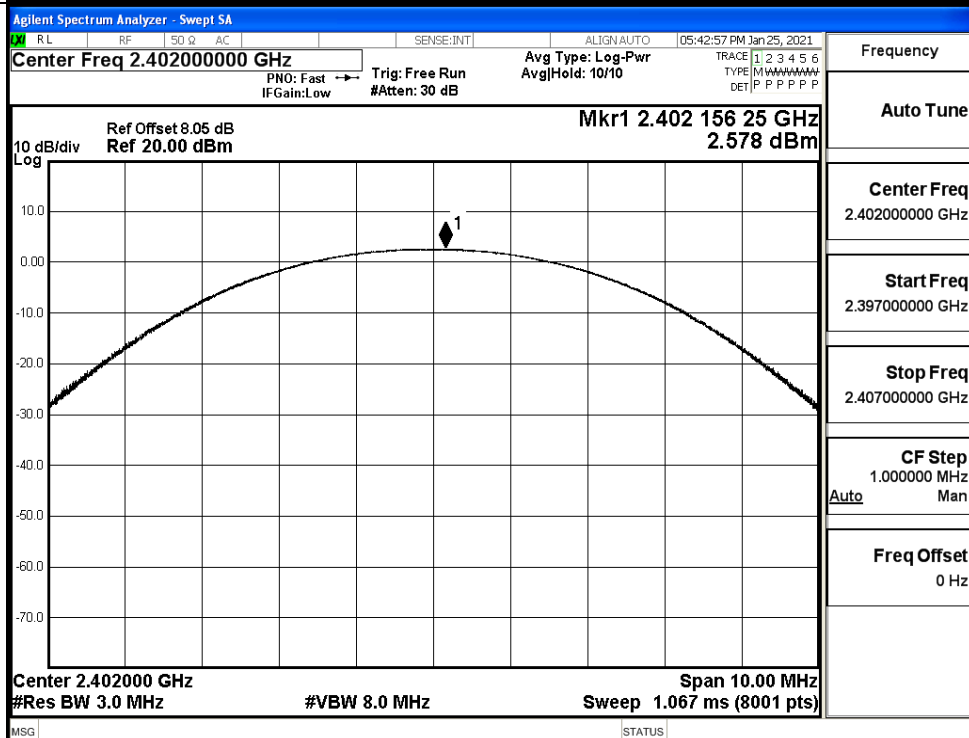
GFSK/LCH

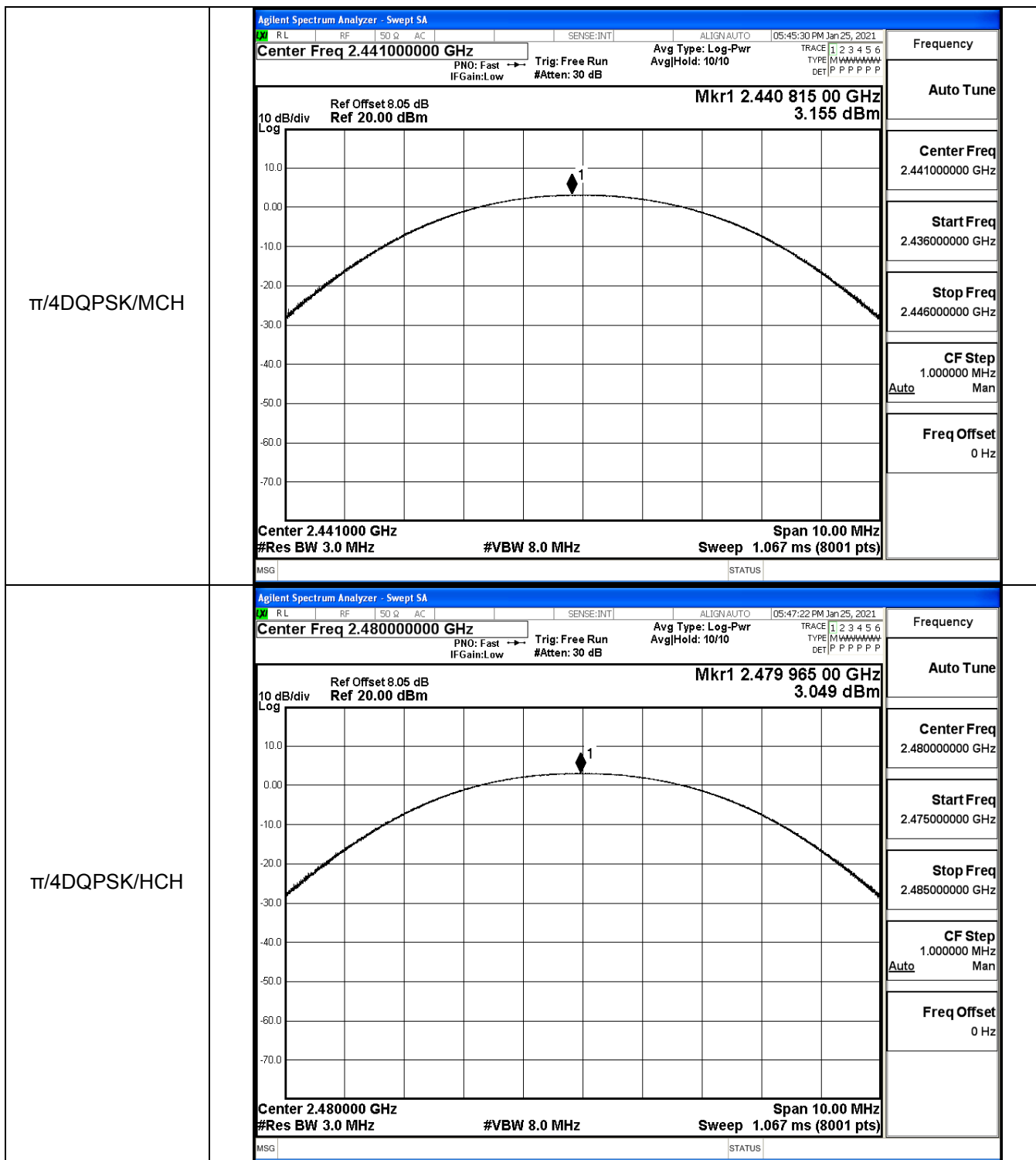


GFSK/MCH

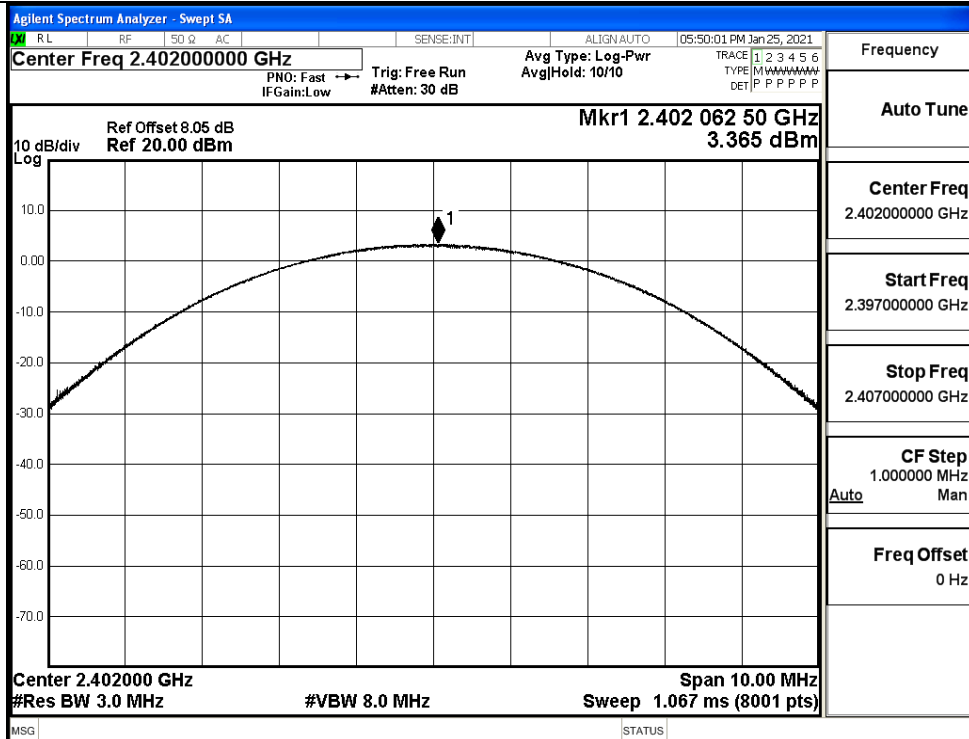


GFSK/HCH

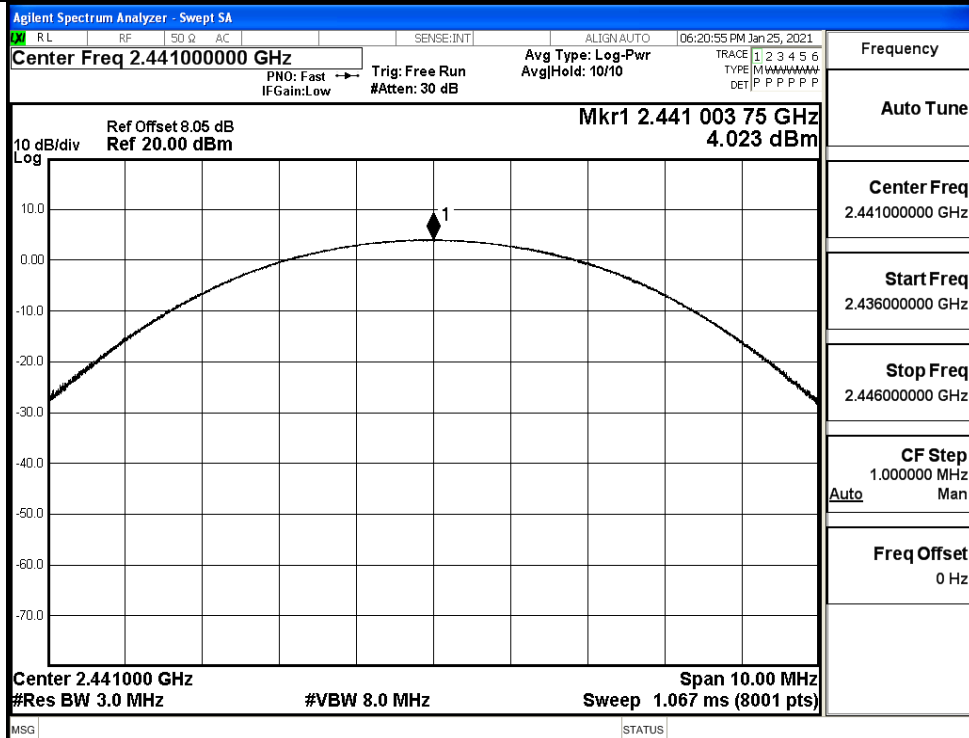
 $\pi$ /4DQPSK/LCH



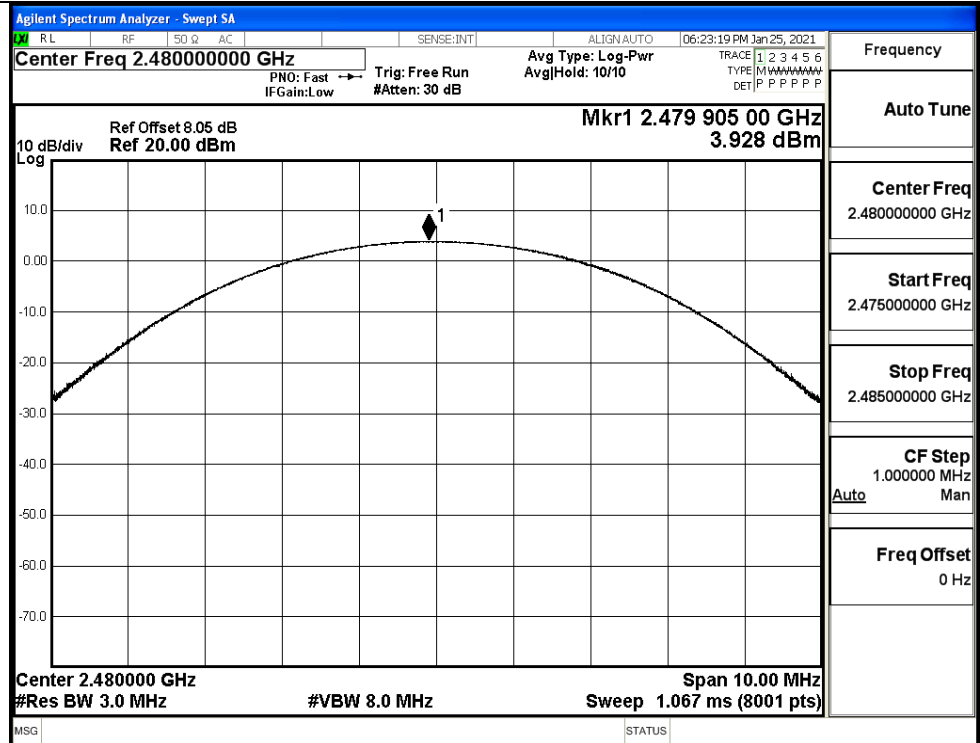
8DPSK/LCH



8DPSK/MCH



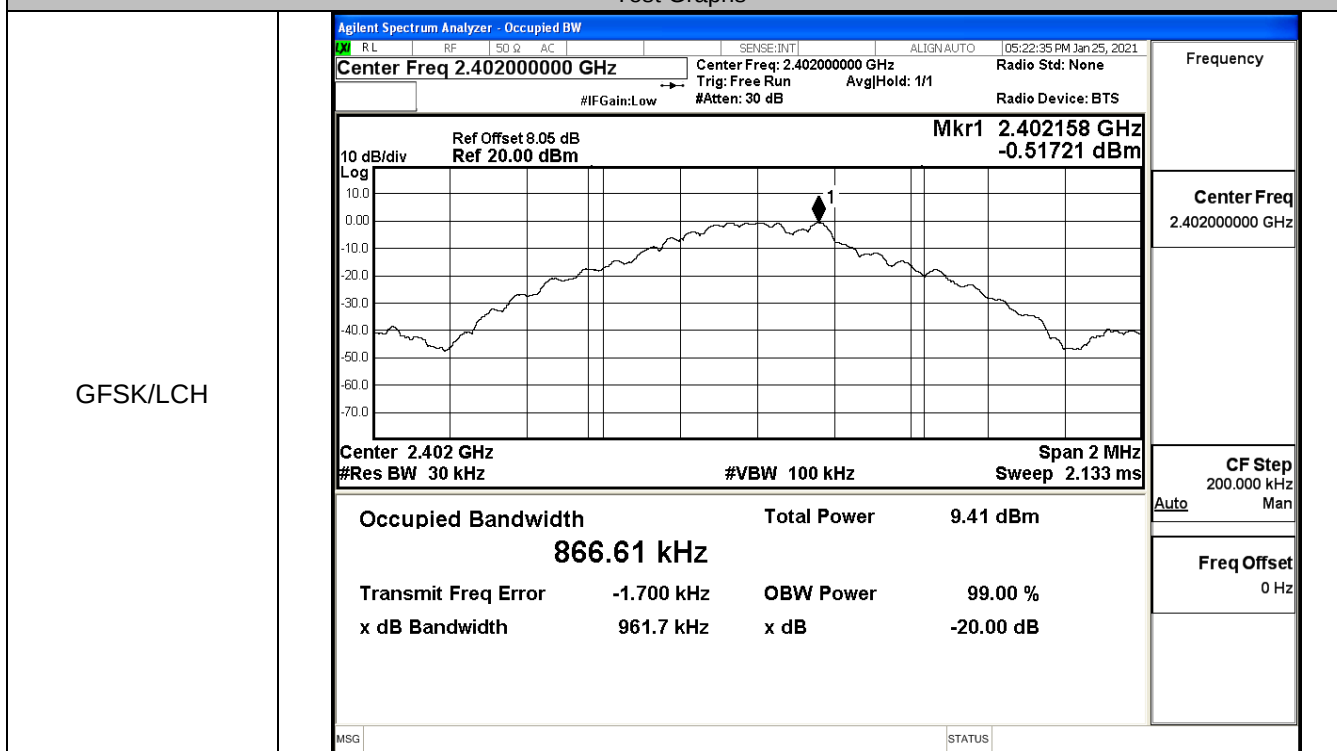
8DPSK/HCH



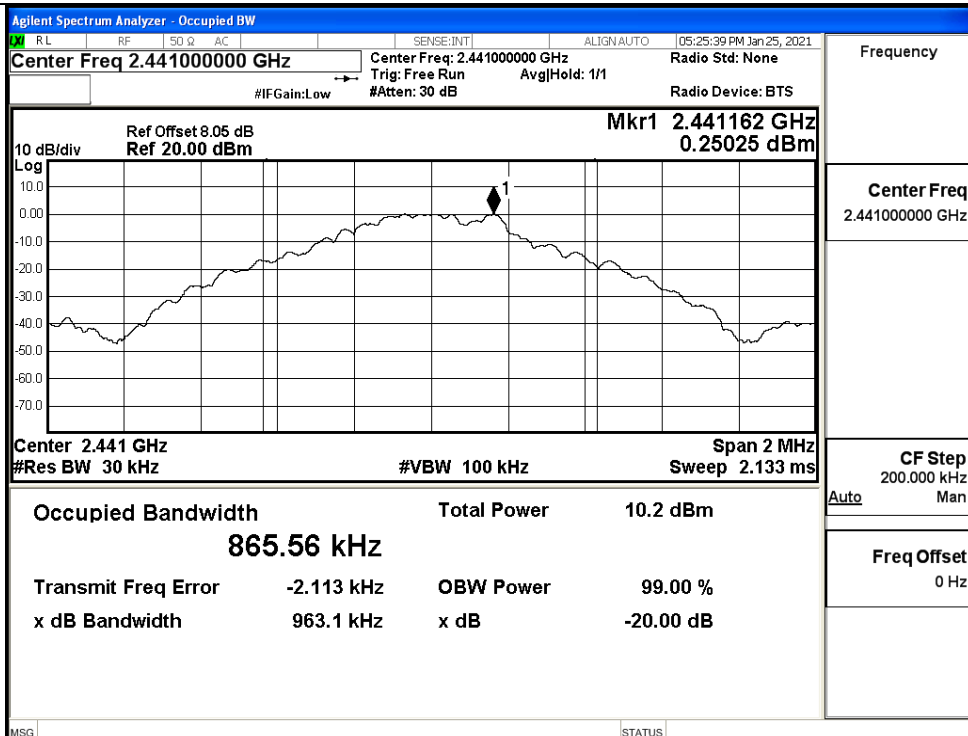
## A.2 20dB Bandwidth

| Mode          | Channel. | 20dB Bandwidth [MHz] | Limit [MHz]   | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK          | LCH      | 0.9617               | Not Specified | PASS    |
|               | MCH      | 0.9631               | Not Specified | PASS    |
|               | HCH      | 0.9609               | Not Specified | PASS    |
| $\pi/4$ DQPSK | LCH      | 1.335                | Not Specified | PASS    |
|               | MCH      | 1.335                | Not Specified | PASS    |
|               | HCH      | 1.338                | Not Specified | PASS    |
| 8DPSK         | LCH      | 1.310                | Not Specified | PASS    |
|               | MCH      | 1.311                | Not Specified | PASS    |
|               | HCH      | 1.311                | Not Specified | PASS    |

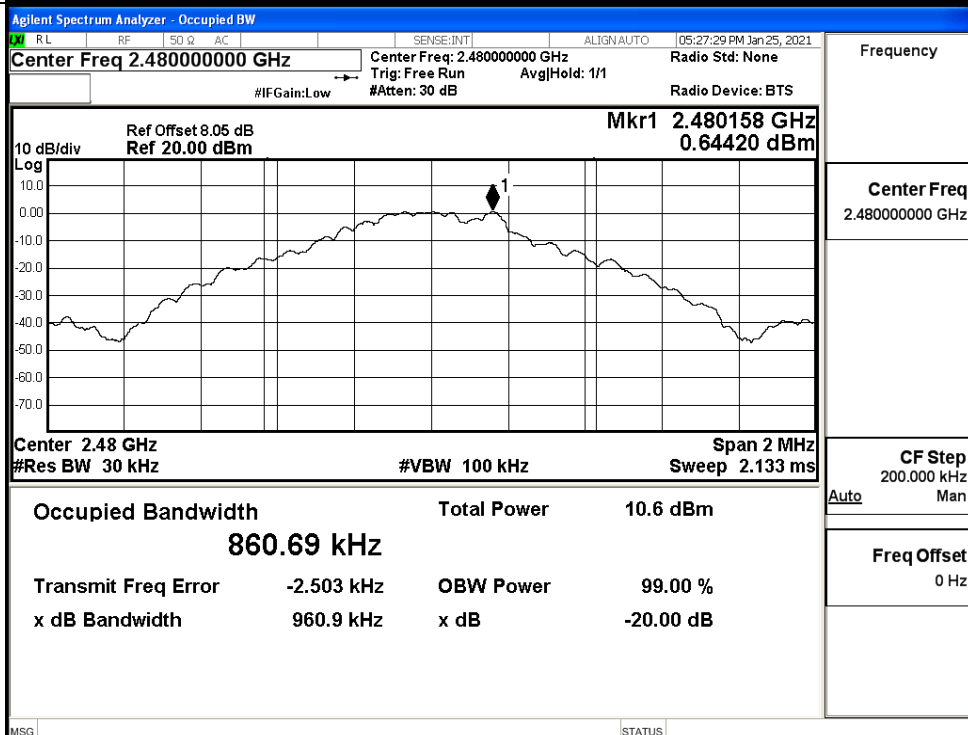
Test Graphs



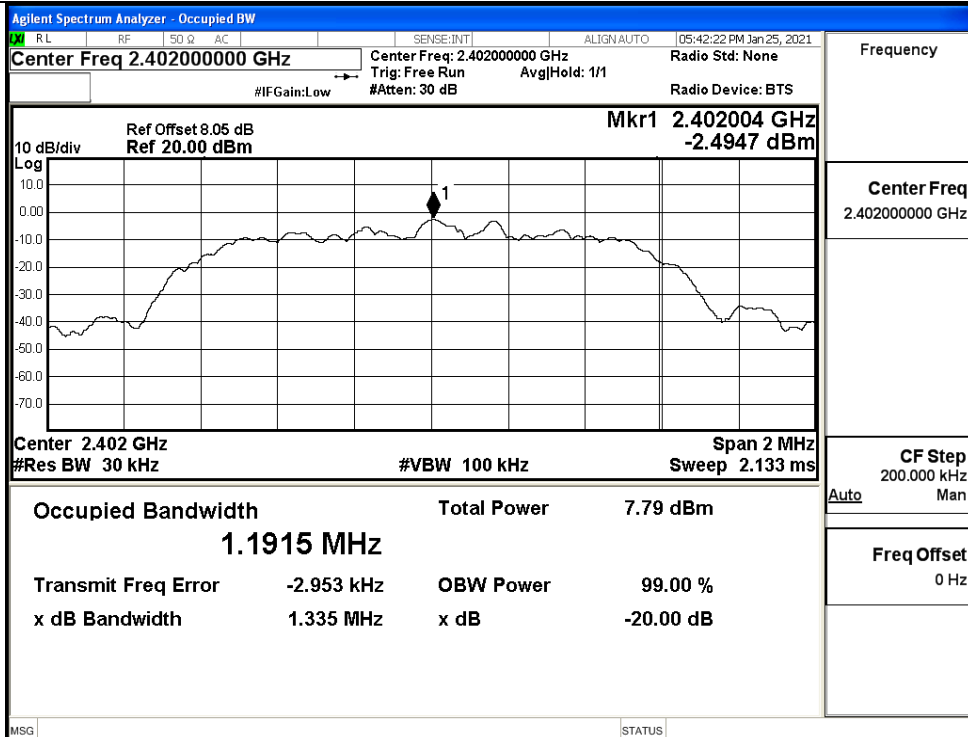
GFSK/MCH



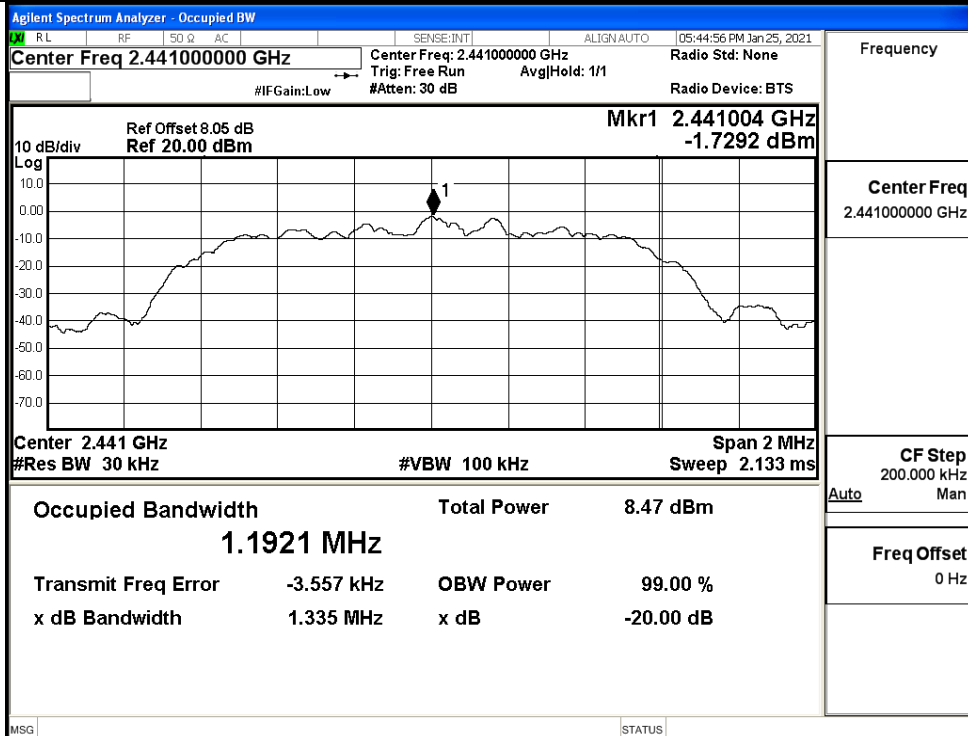
GFSK/HCH



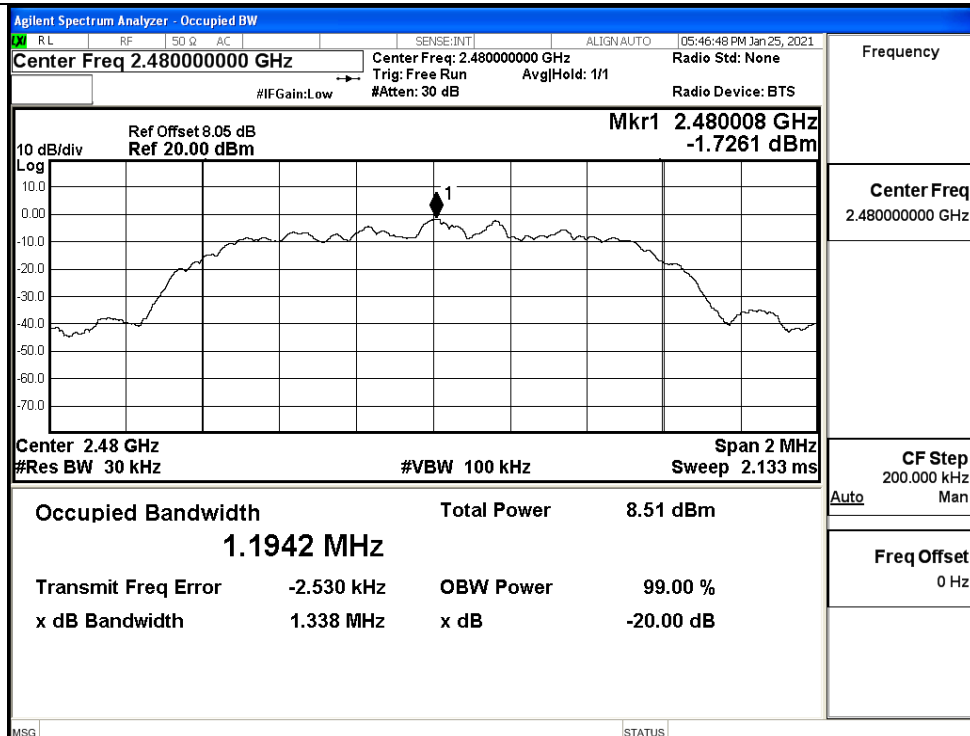
$\pi/4$ DQPSK/LCH



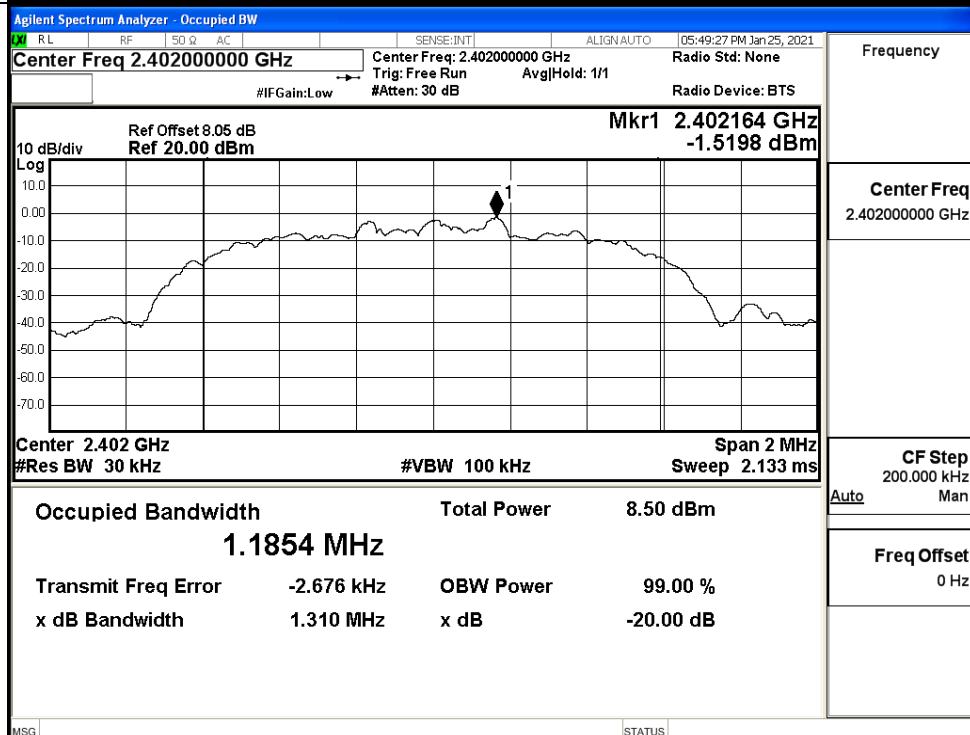
$\pi/4$ DQPSK/MCH



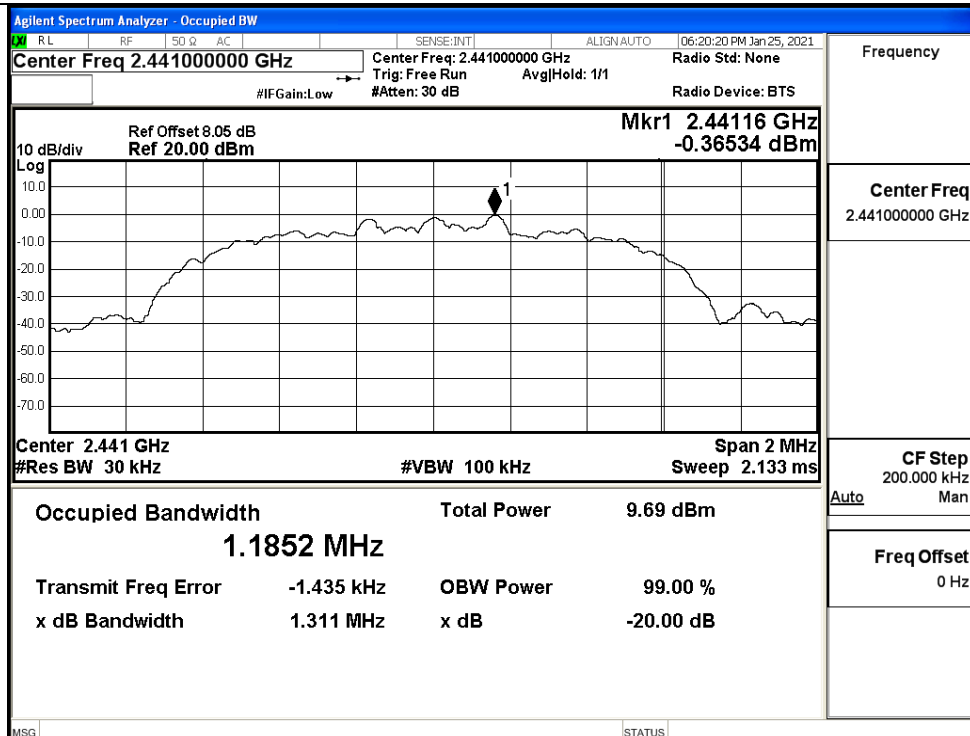
$\pi/4$ DQPSK/HCH



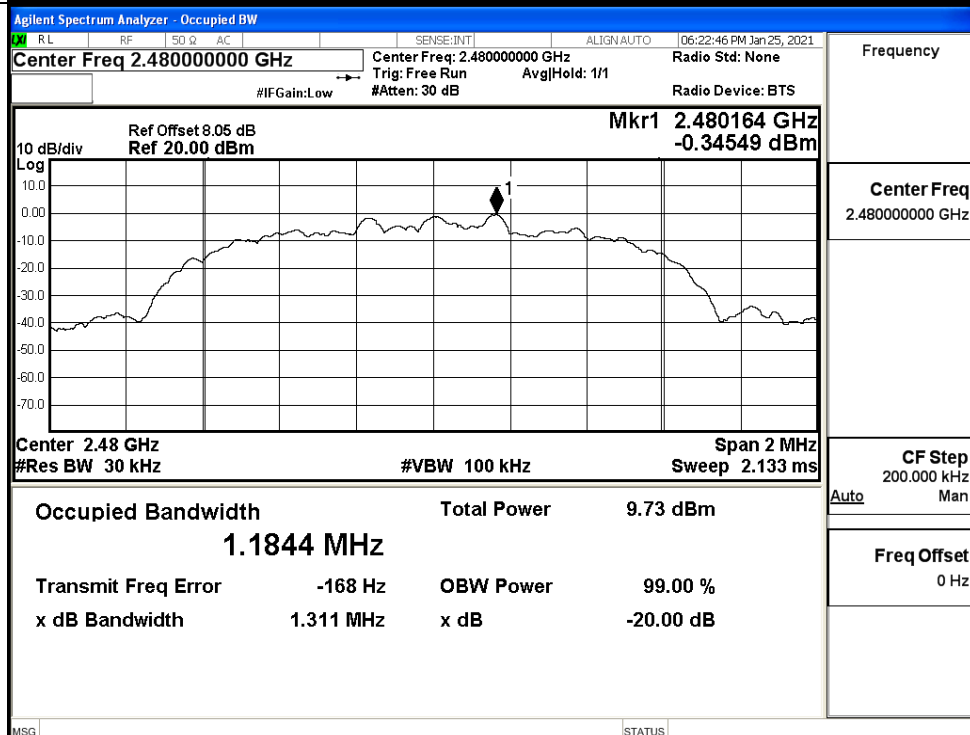
8DPSK/LCH



8DPSK/MCH



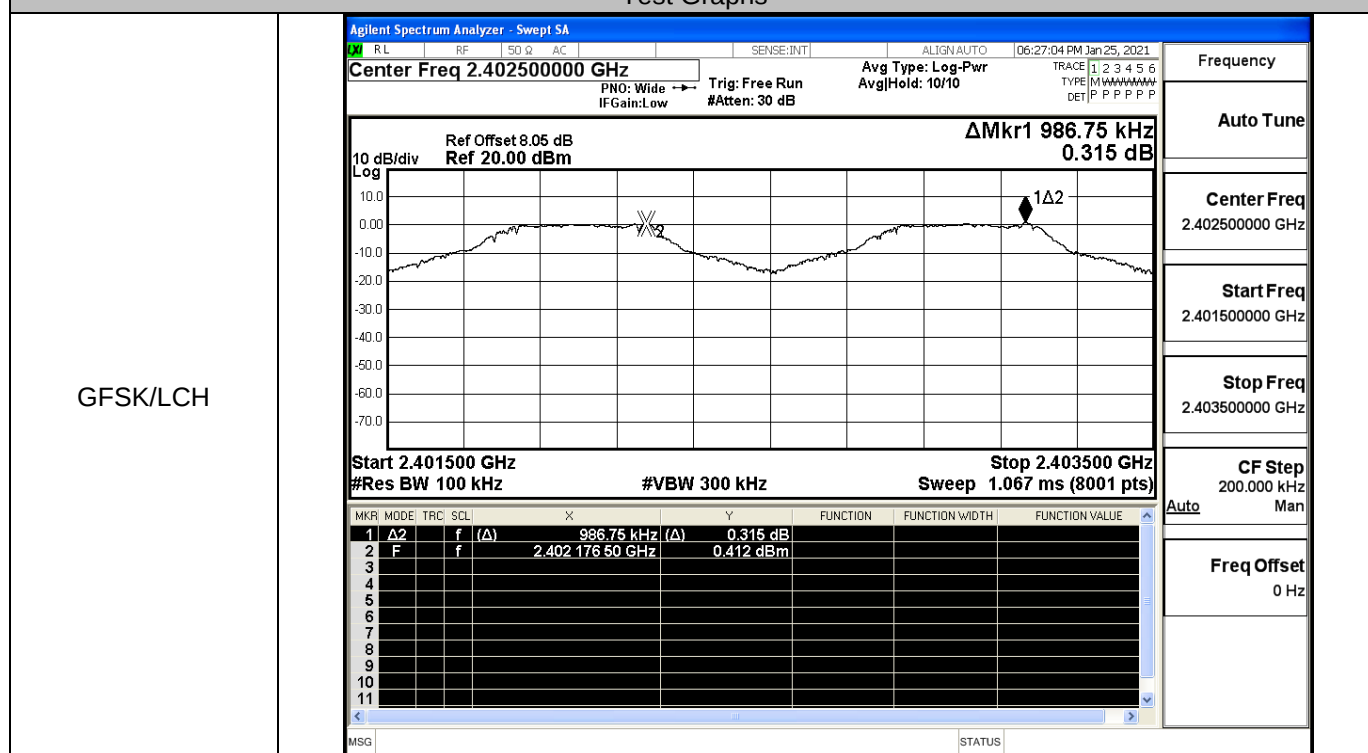
8DPSK/HCH



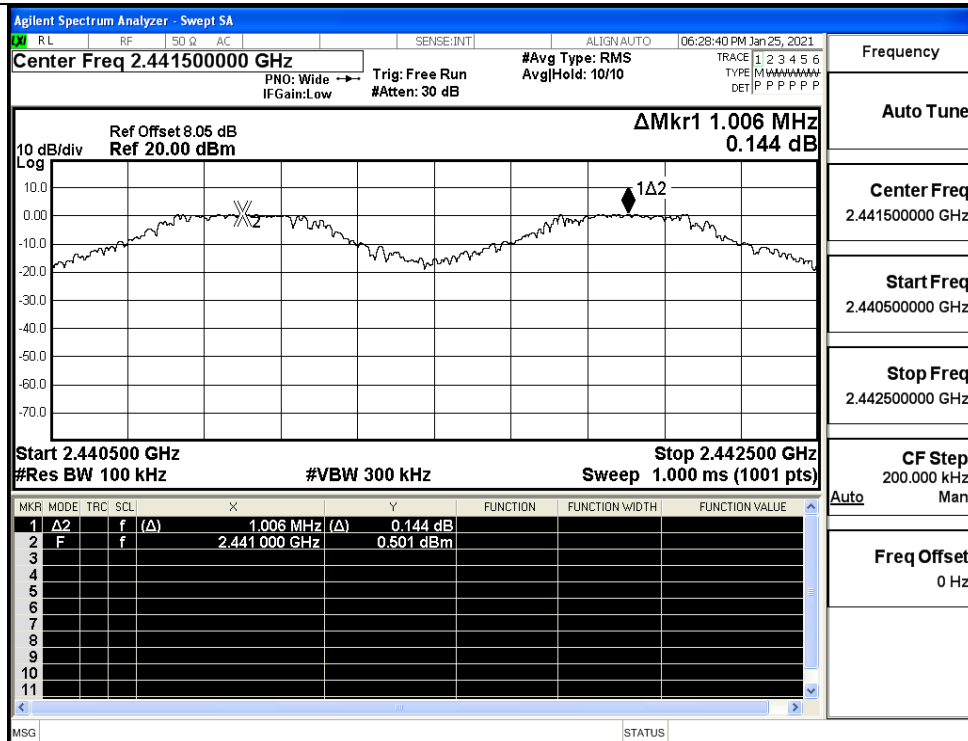
### A.3 Carrier Frequency Separation

| Mode          | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK          | LCH      | 0.987                              | 0.642       | PASS    |
|               | MCH      | 1.006                              | 0.642       | PASS    |
|               | HCH      | 1.206                              | 0.642       | PASS    |
| $\pi/4$ DQPSK | LCH      | 1.340                              | 0.892       | PASS    |
|               | MCH      | 1.132                              | 0.892       | PASS    |
|               | HCH      | 0.996                              | 0.892       | PASS    |
| 8DPSK         | LCH      | 0.998                              | 0.874       | PASS    |
|               | MCH      | 1.328                              | 0.874       | PASS    |
|               | HCH      | 1.324                              | 0.874       | PASS    |

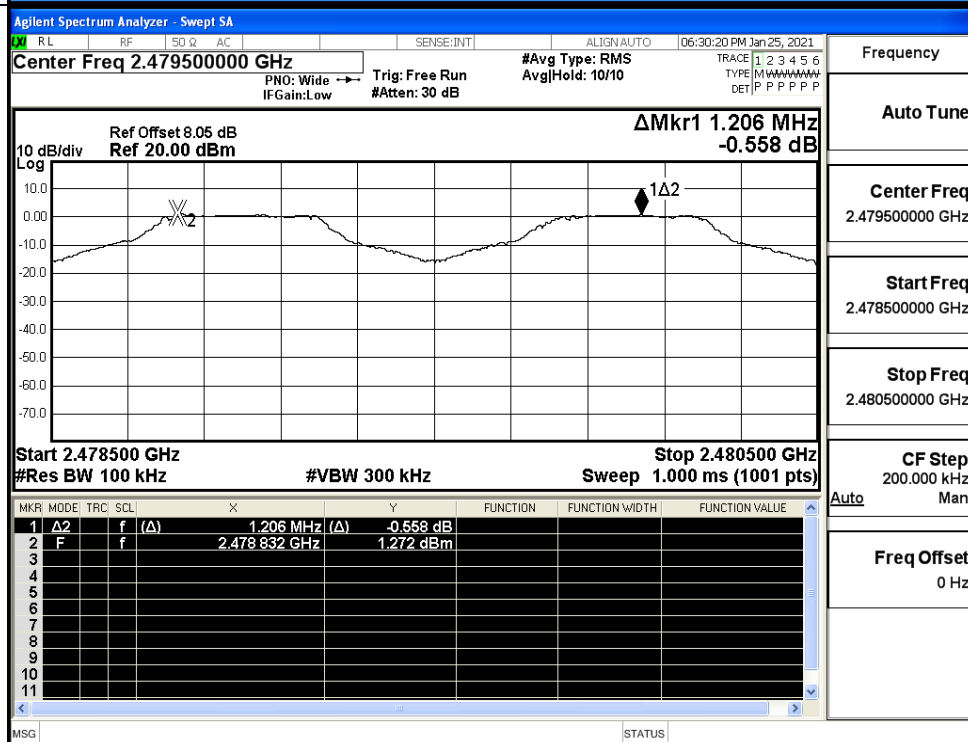
#### Test Graphs

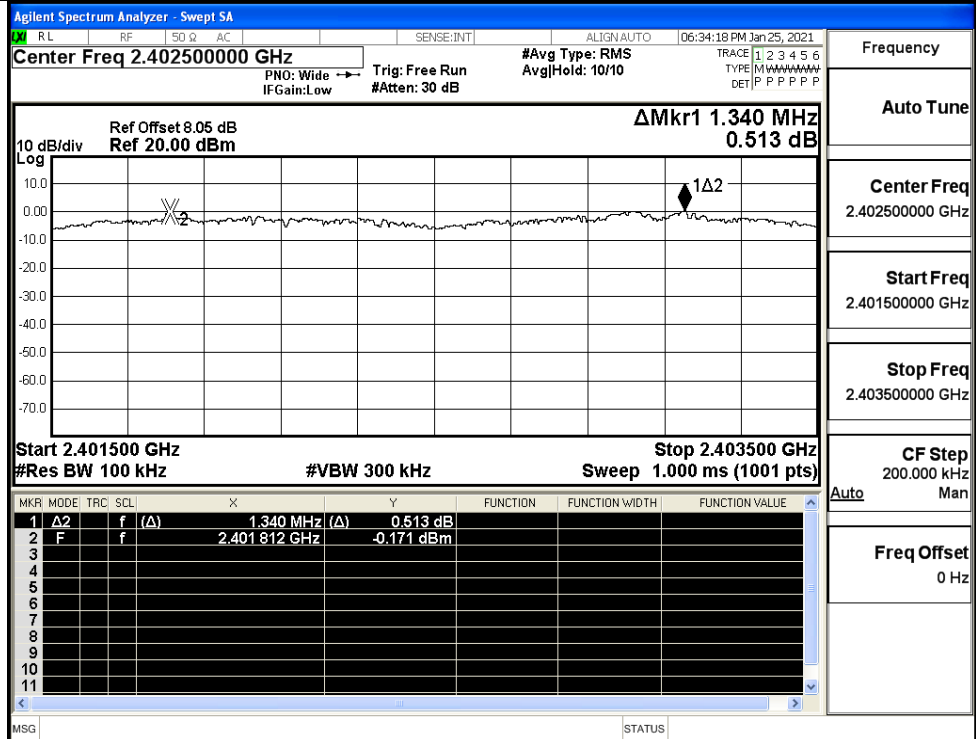
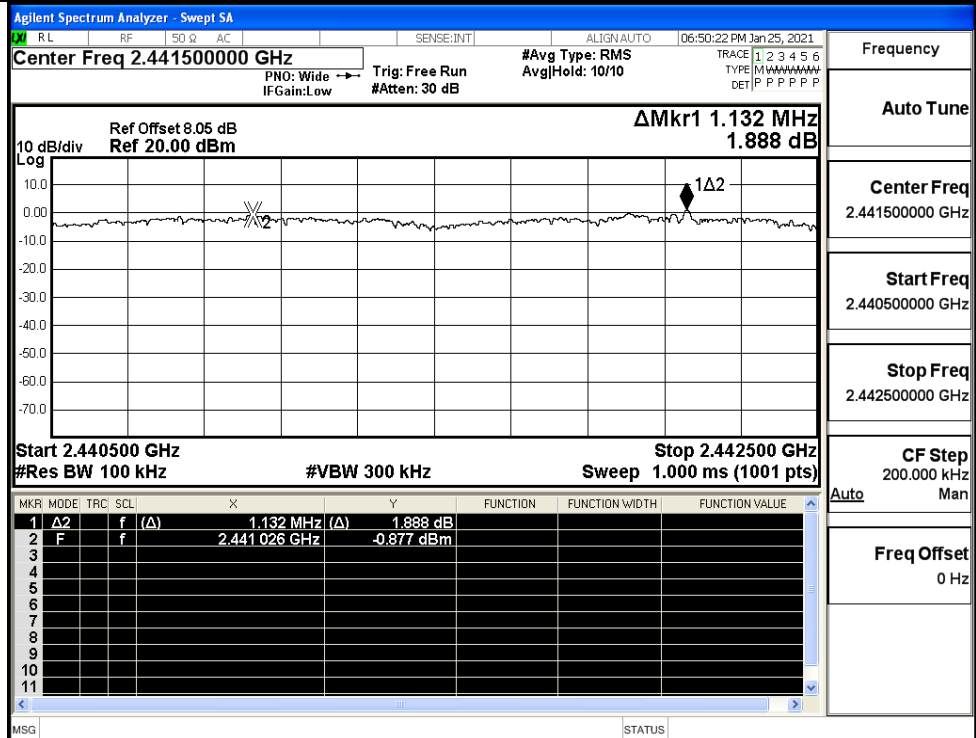


GFSK/MCH



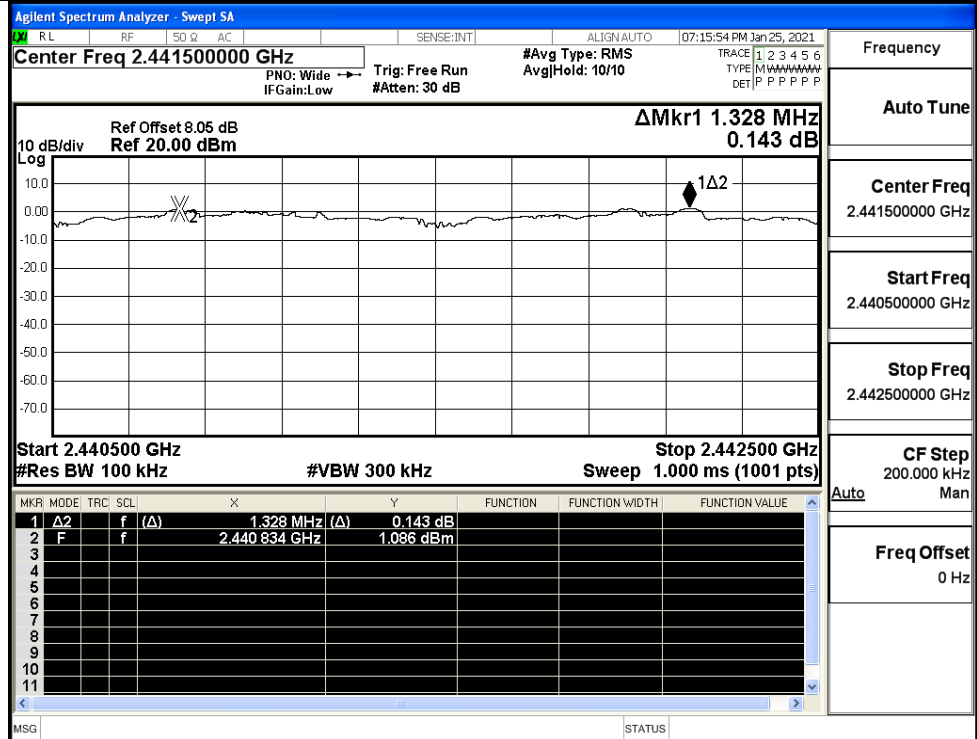
GFSK/HCH



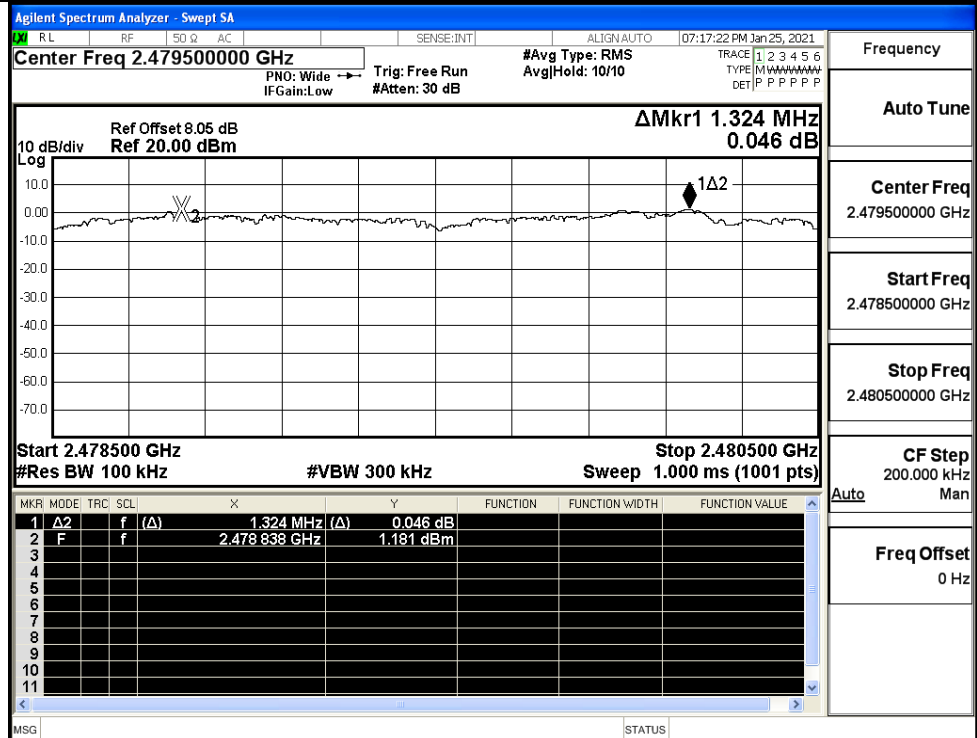
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>DQPSK/HCH</p> | <div> <div> Agilent Spectrum Analyzer - Swept SA<br/> RL RF 50 Q AC SENSE:INT ALIGN AUTO 06:51:21 PM Jan 25, 2021<br/> <b>Center Freq 2.479500000 GHz</b><br/> PNO: Wide IFGain:Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS AvgHold: 10/10<br/> TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P P P P P P P </div> <div> Ref Offset 8.05 dB<br/> Ref 20.00 dBm<br/> <b><math>\Delta</math>Mkr1 996 kHz -0.044 dB</b><br/> 10 dB/div Log<br/> Start 2.478500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.480500 GHz Sweep 1.000 ms (1001 pts)<br/> MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE<br/> 1 <math>\Delta</math>2 f (<math>\Delta</math>) 996 kHz (<math>\Delta</math>) -0.044 dB<br/> 2 F f 2.478 982 GHz 0.215 dBm<br/> 3<br/>4<br/>5<br/>6<br/>7<br/>8<br/>9<br/>10<br/>11 </div> <div> Frequency<br/> Auto Tune<br/> Center Freq 2.479500000 GHz<br/> Start Freq 2.478500000 GHz<br/> Stop Freq 2.480500000 GHz<br/> CF Step 200.000 kHz Man<br/> Freq Offset 0 Hz </div> </div> |
| <p>8DPSK/LCH</p>                   | <div> <div> Agilent Spectrum Analyzer - Swept SA<br/> RL RF 50 Q AC SENSE:INT ALIGN AUTO 07:06:48 PM Jan 25, 2021<br/> <b>Center Freq 2.402500000 GHz</b><br/> PNO: Wide IFGain:Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS AvgHold: 10/10<br/> TRACE 1 2 3 4 5 6 TYPE M W W W W W W W DET P P P P P P P </div> <div> Ref Offset 8.05 dB<br/> Ref 20.00 dBm<br/> <b><math>\Delta</math>Mkr1 998 kHz 0.070 dB</b><br/> 10 dB/div Log<br/> Start 2.401500 GHz #Res BW 100 kHz #VBW 300 kHz Stop 2.403500 GHz Sweep 1.000 ms (1001 pts)<br/> MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE<br/> 1 <math>\Delta</math>2 f (<math>\Delta</math>) 998 kHz (<math>\Delta</math>) 0.070 dB<br/> 2 F f 2.402 164 GHz 0.583 dBm<br/> 3<br/>4<br/>5<br/>6<br/>7<br/>8<br/>9<br/>10<br/>11 </div> <div> Frequency<br/> Auto Tune<br/> Center Freq 2.402500000 GHz<br/> Start Freq 2.401500000 GHz<br/> Stop Freq 2.403500000 GHz<br/> CF Step 200.000 kHz Man<br/> Freq Offset 0 Hz </div> </div>   |

8DPSK/MCH



8DPSK/HCH

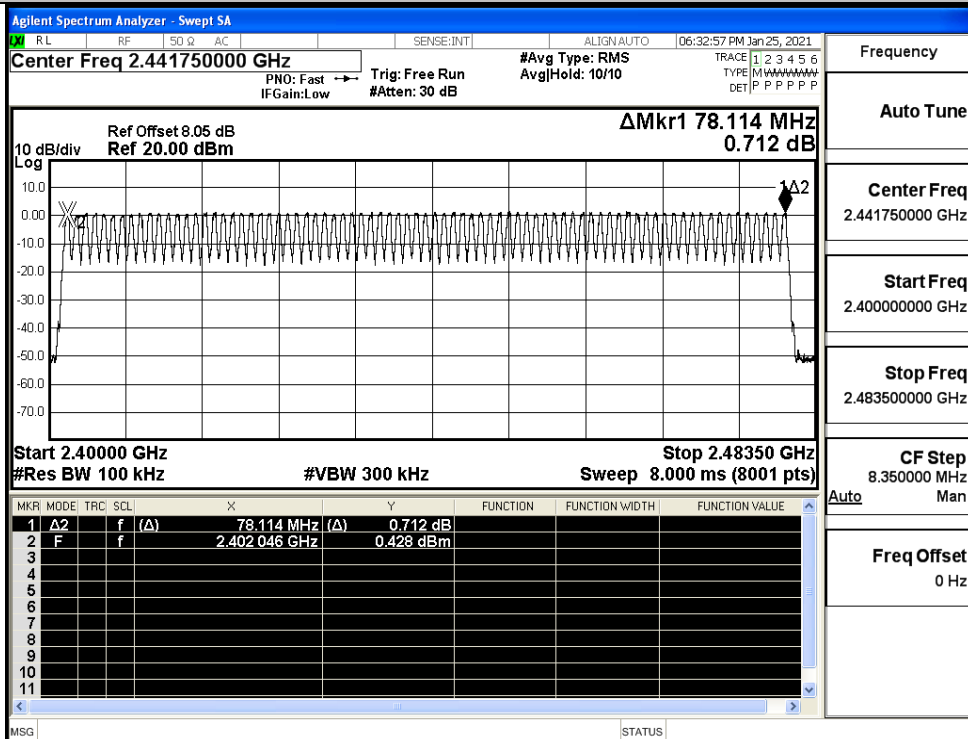
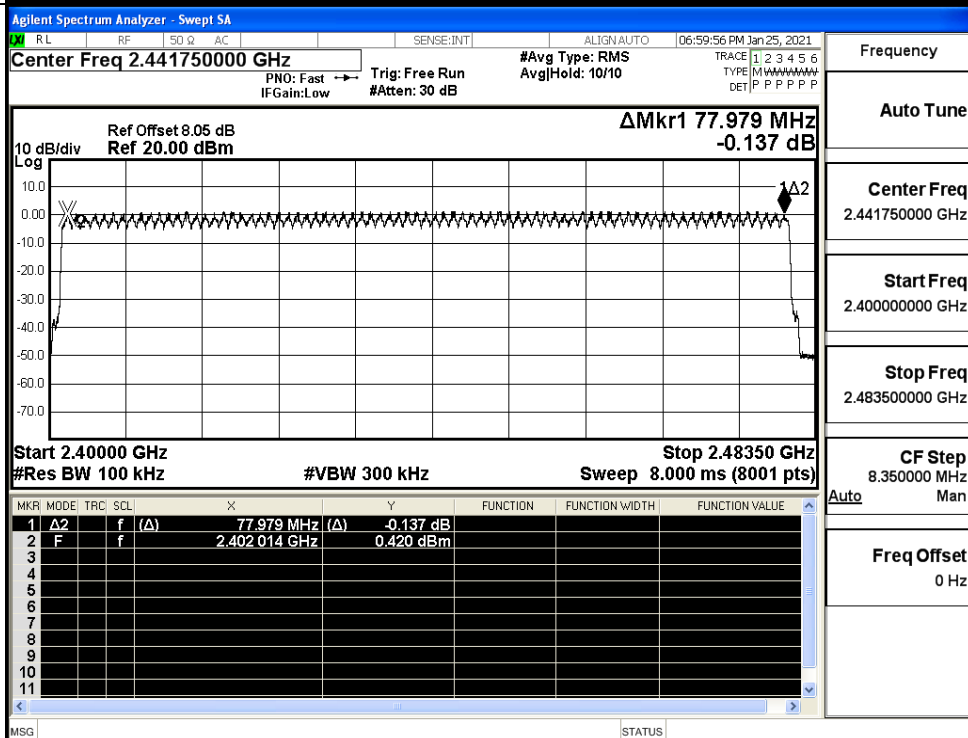


## A.4 Hopping Channel Number

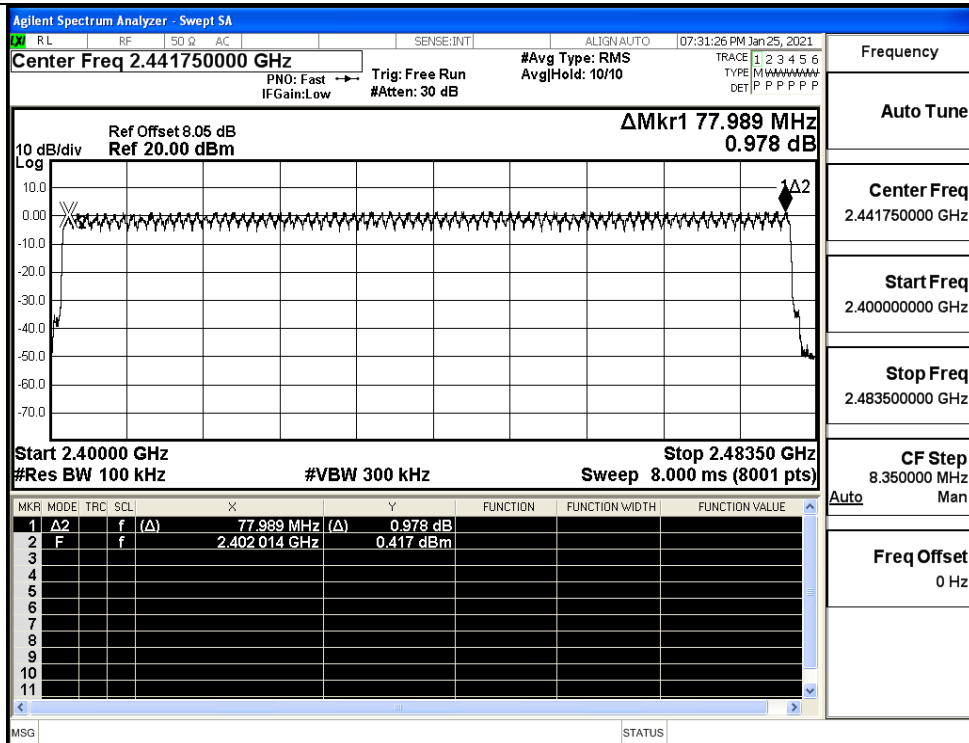
| Mode          | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---------------|----------|-------------------------------|-----------|---------|
| GFSK          | Hop      | 79                            | >=15      | PASS    |
| $\pi/4$ DQPSK | Hop      | 79                            | >=15      | PASS    |
| 8DPSK         | Hop      | 79                            | >=15      | PASS    |

## Test Graphs

GFSK/Hop

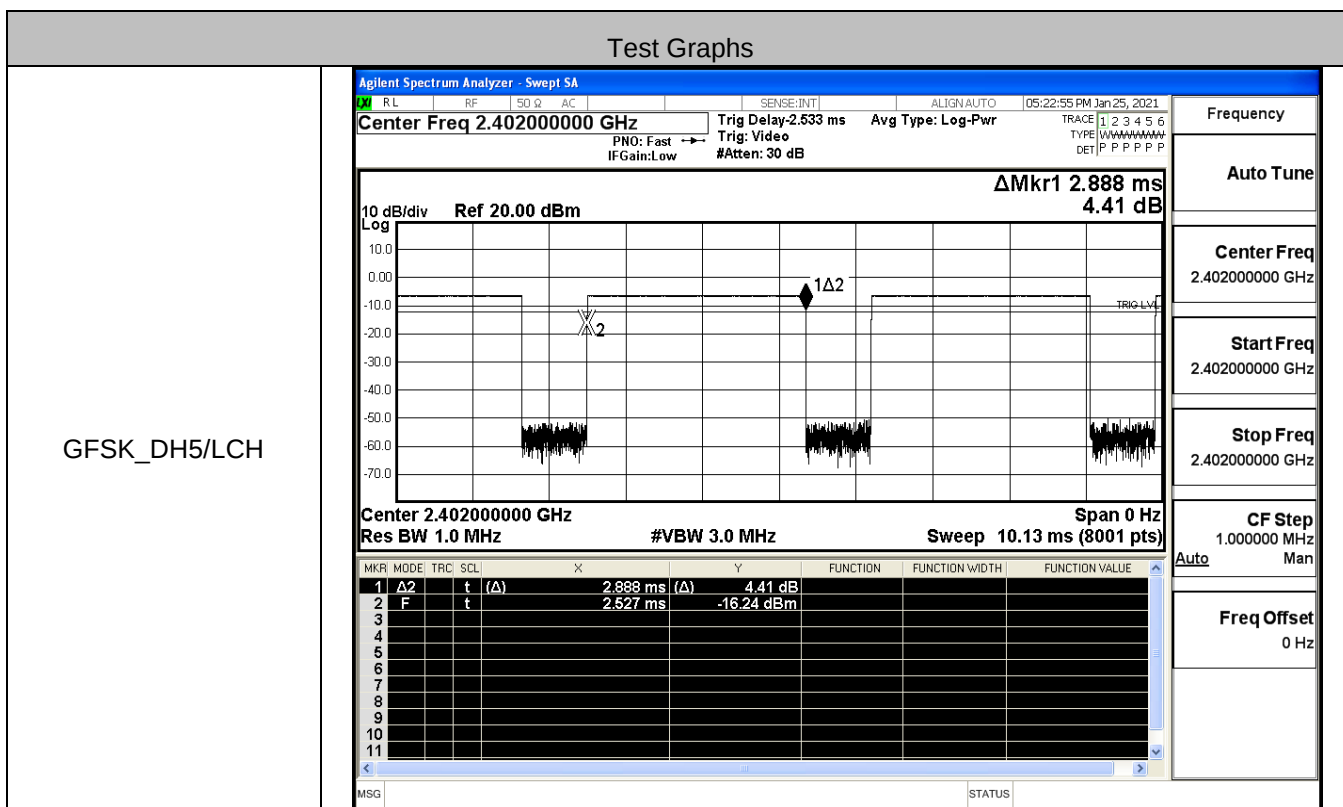
 $\pi/4$ DQPSK/Hop

8DPSK/Hop

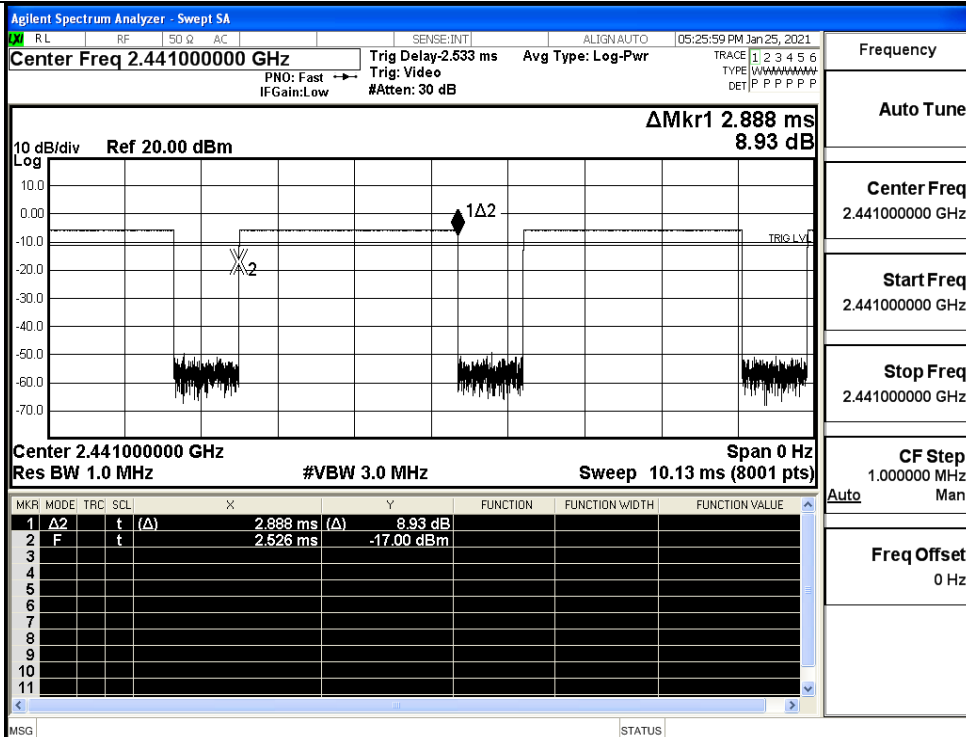


## A.5 Dwell Time

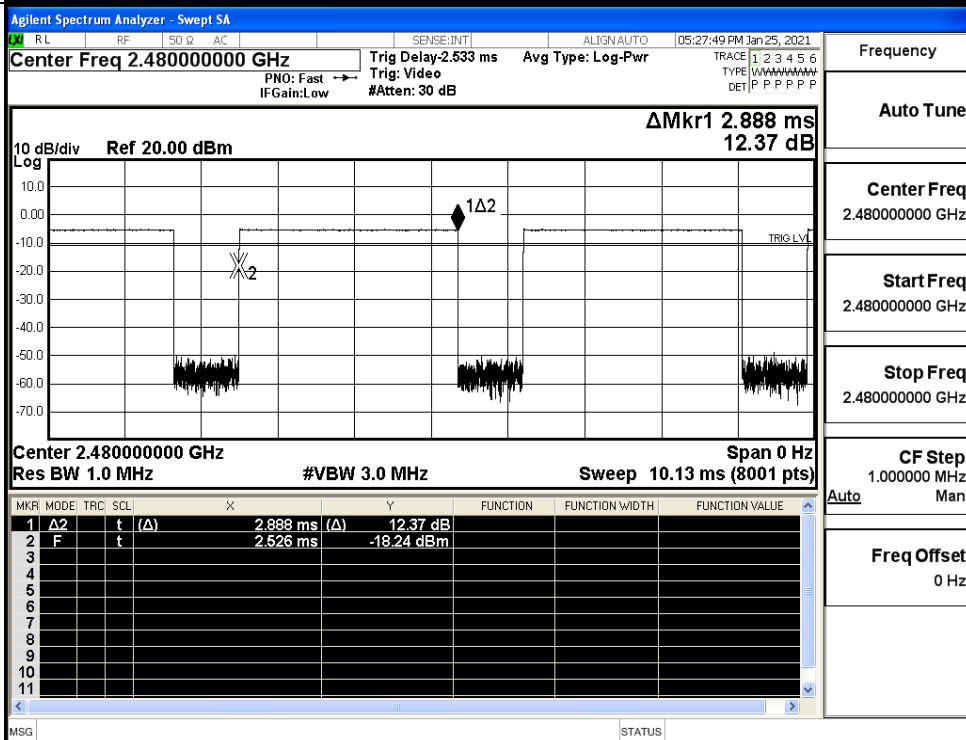
| Mode          | Packet | Channel | Burst Width<br>[ms/hop/ch] | Total<br>Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---------------|--------|---------|----------------------------|-----------------------|---------------|-----------|---------|
| GFSK          | DH5    | LCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
|               | DH5    | MCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
|               | DH5    | HCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
| $\pi/4$ DQPSK | 2DH5   | LCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
|               | 2DH5   | MCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
|               | 2DH5   | HCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
| 8DPSK         | 3DH5   | LCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |
|               | 3DH5   | MCH     | 2.89                       | 106.7                 | 0.309         | 0.4       | PASS    |
|               | 3DH5   | HCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |



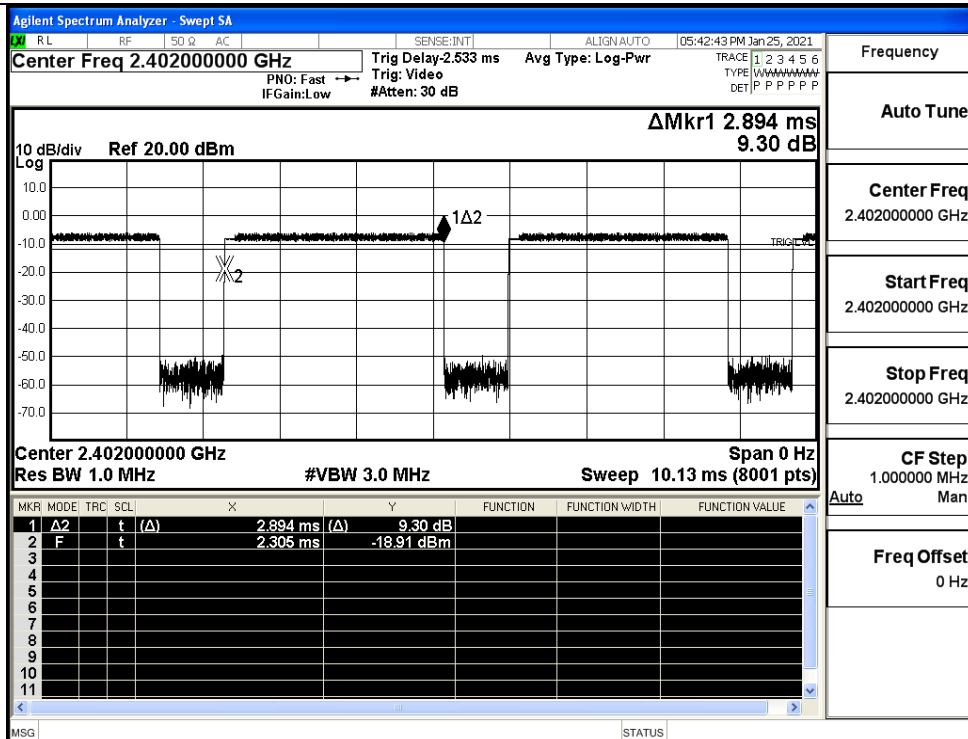
GFSK\_DH5/MCH



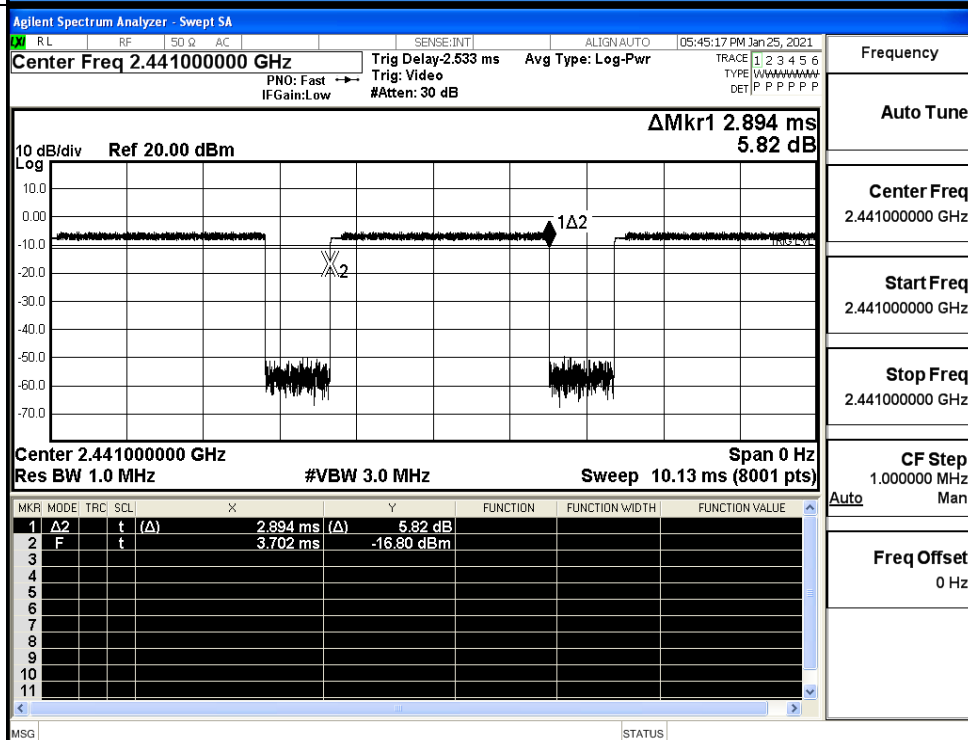
GFSK\_DH5/HCH



$\pi/4$ DQPSK  
\_2DH5/LCH



$\pi/4$ DQPSK  
\_2DH5/MCH



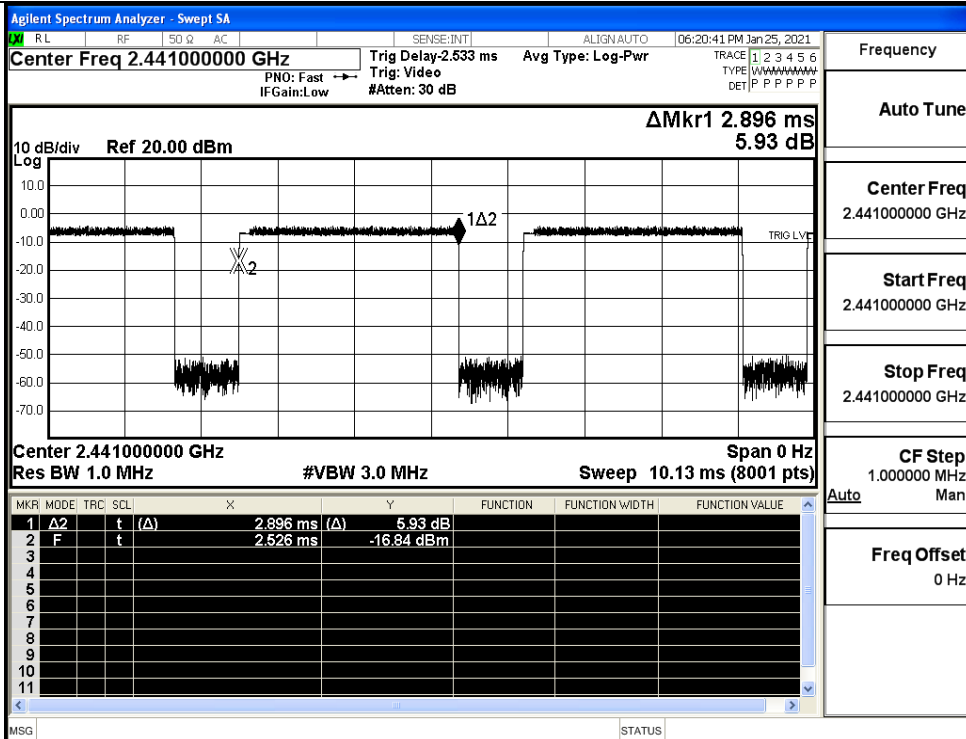
[illegible]

|             |                 |
|-------------|-----------------|
| Frequency   |                 |
| Auto Tune   |                 |
| Center Freq | 2.480000000 GHz |
| Start Freq  | 2.480000000 GHz |
| Stop Freq   | 2.480000000 GHz |
| CF Step     | 1.000000 MHz    |
| Auto        | Man             |
| Freq Offset | 0 Hz            |

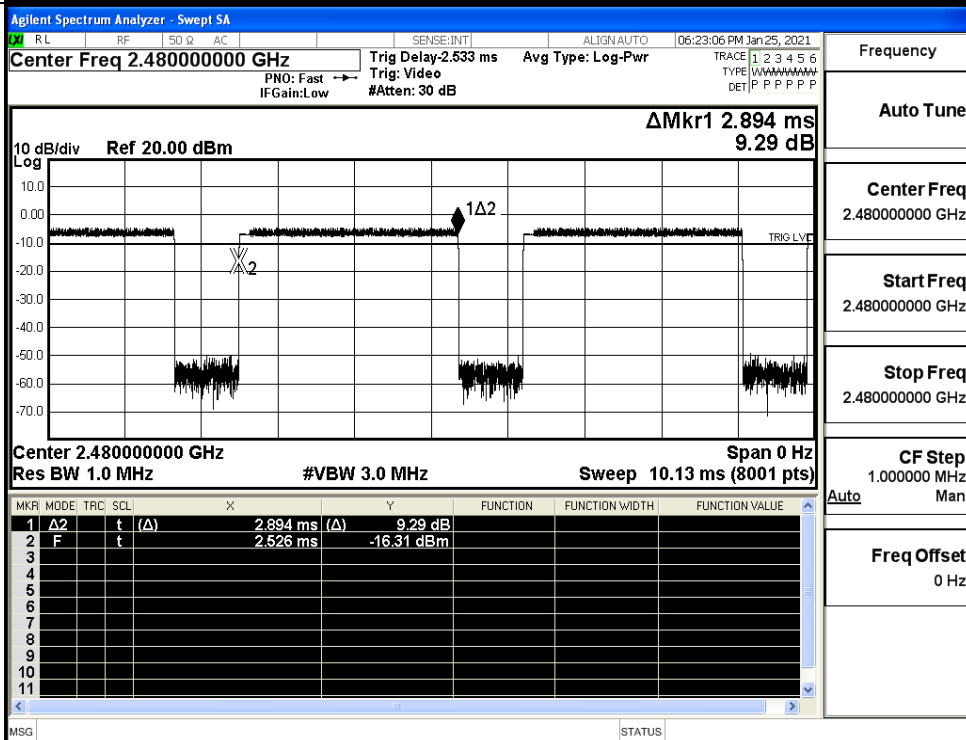
[illegible]

|             |                 |
|-------------|-----------------|
| Frequency   |                 |
| Auto Tune   |                 |
| Center Freq | 2.402000000 GHz |
| Start Freq  | 2.402000000 GHz |
| Stop Freq   | 2.402000000 GHz |
| CF Step     | 1.000000 MHz    |
| Auto        | Man             |
| Freq Offset | 0 Hz            |

8DPSK\_3DH5/MCH

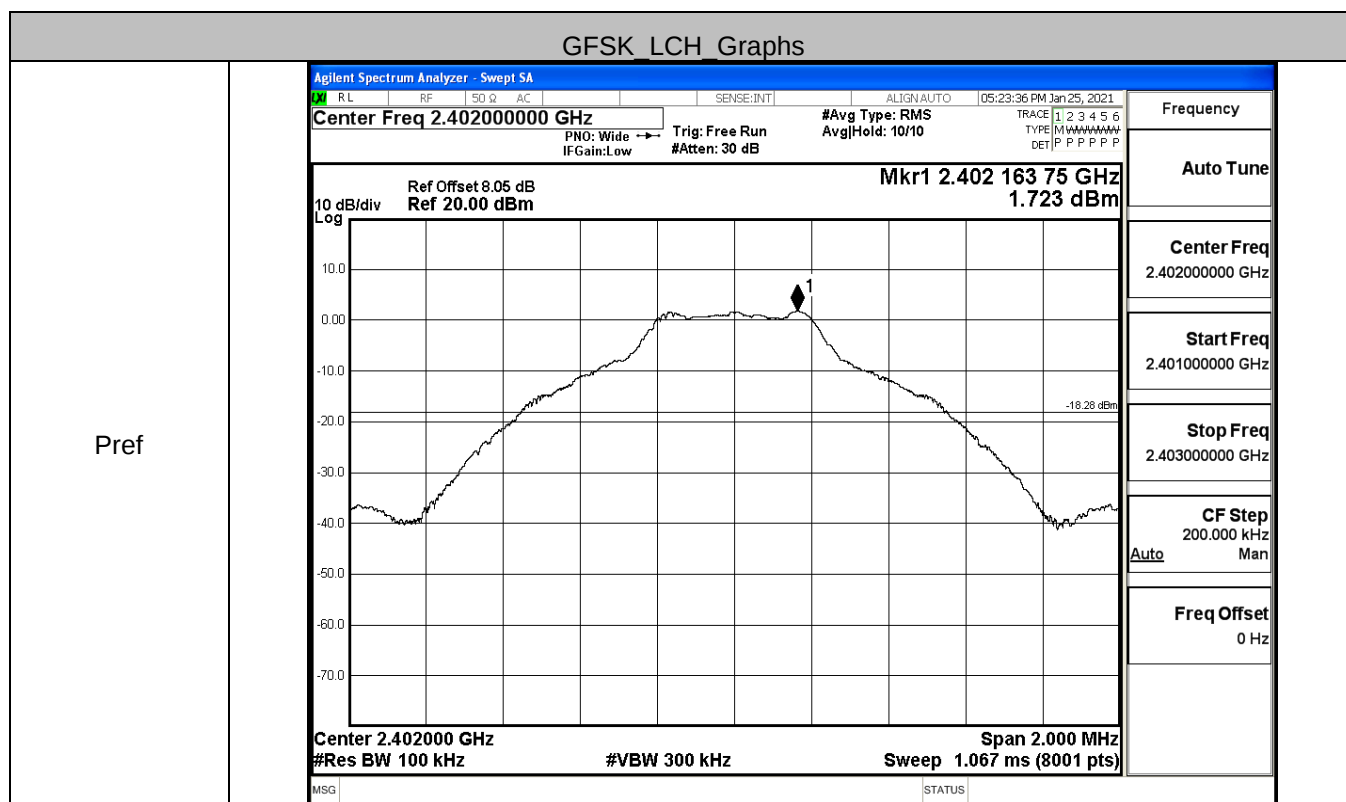


8DPSK\_3DH5/HCH

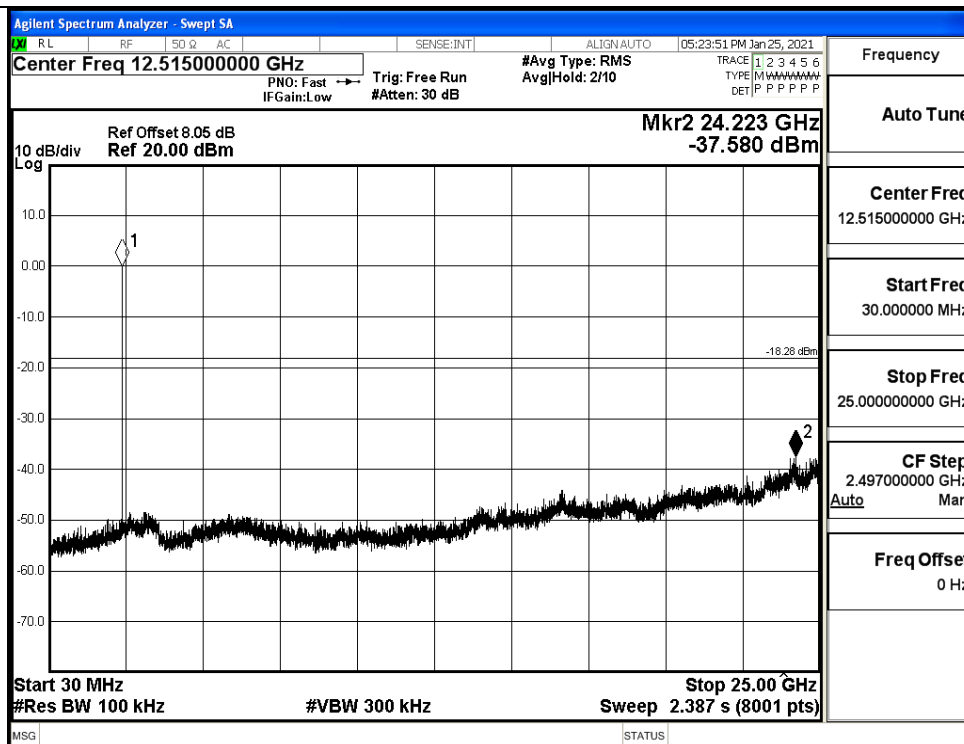


## A.6 RF Conducted Spurious Emissions

| Mode          | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|------------|------------------|-------------|---------|
| GFSK          | LCH     | 1.723      | -37.580          | -18.277     | PASS    |
|               | MCH     | 2.501      | -38.050          | -17.499     | PASS    |
|               | HCH     | 2.677      | -36.609          | -17.323     | PASS    |
| $\pi/4$ DQPSK | LCH     | -0.767     | -37.158          | -20.767     | PASS    |
|               | MCH     | 0.611      | -36.960          | -19.389     | PASS    |
|               | HCH     | -0.076     | -37.611          | -20.076     | PASS    |
| 8DPSK         | LCH     | 0.048      | -38.026          | -19.952     | PASS    |
|               | MCH     | 1.233      | -37.623          | -18.767     | PASS    |
|               | HCH     | 1.252      | -36.312          | -18.748     | PASS    |

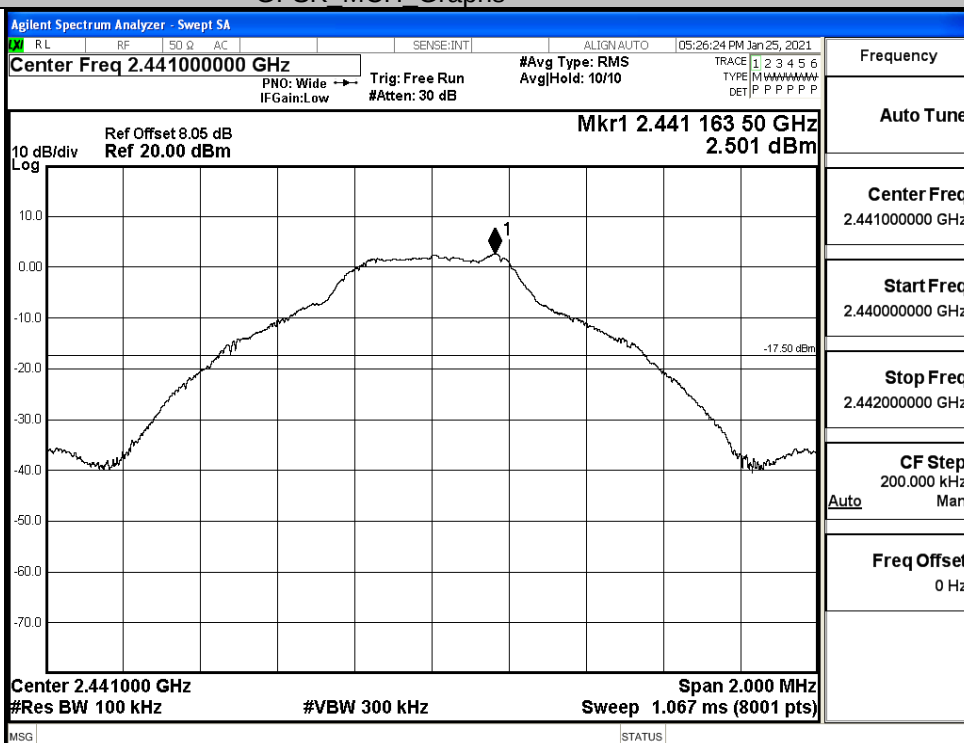


Puw

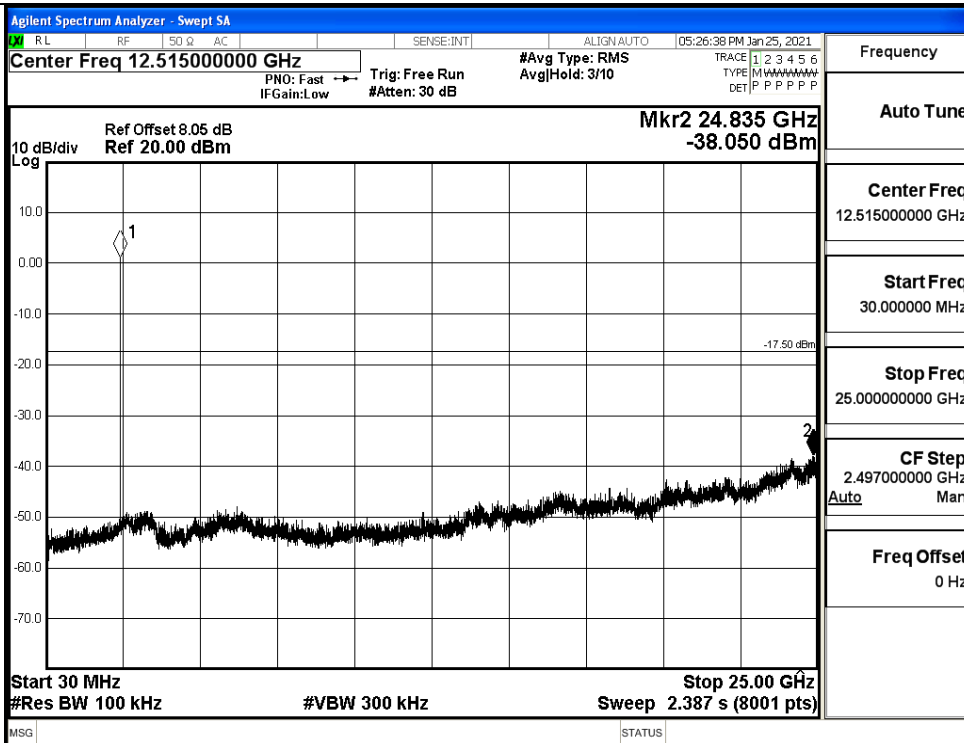


# GFSK MCH Graphs

Pref

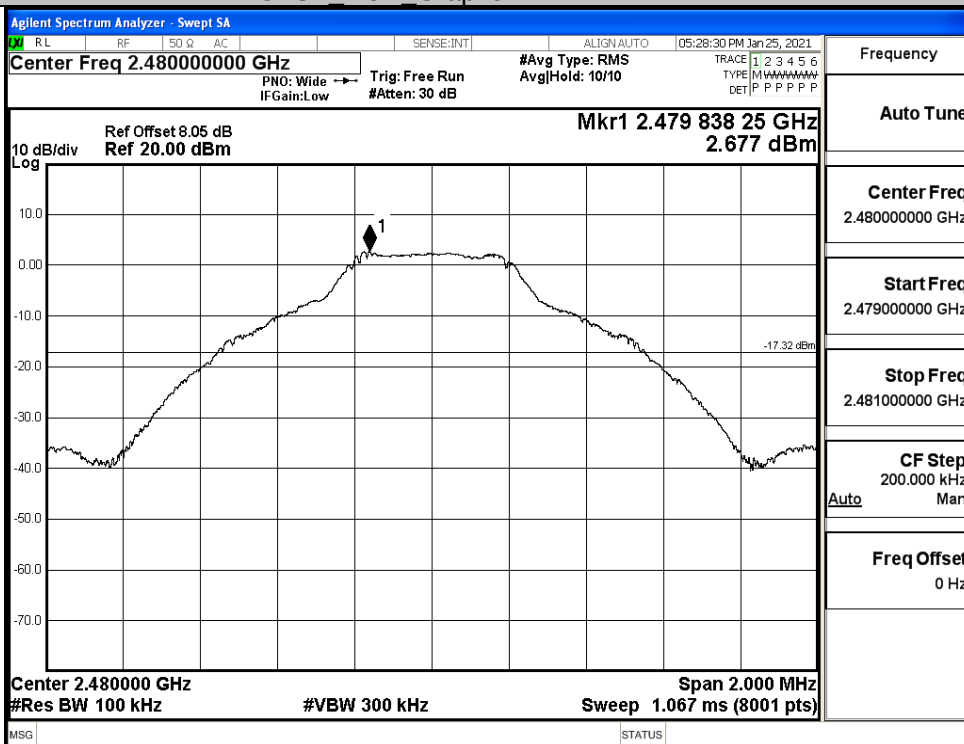


Puw

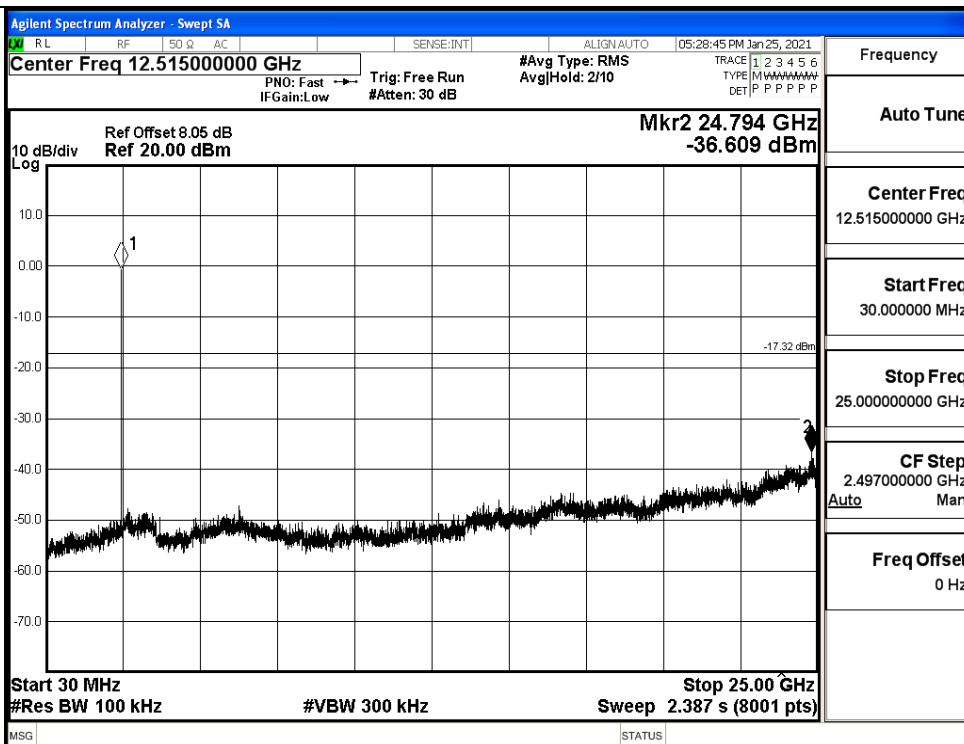


### GFSK HCH Graphs

Pref

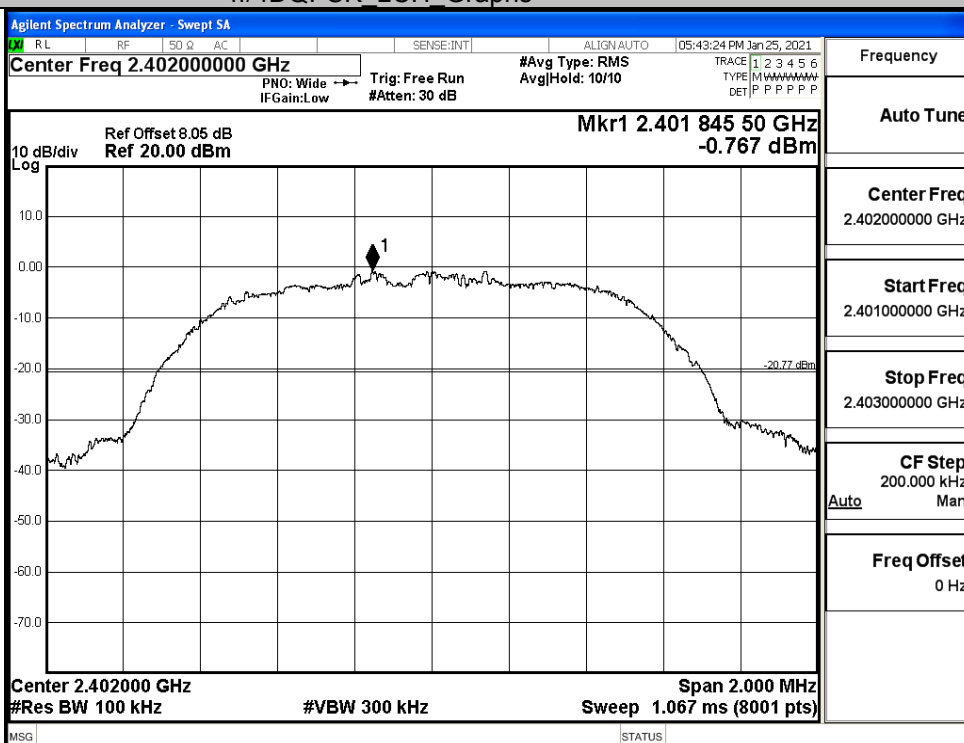


Puw

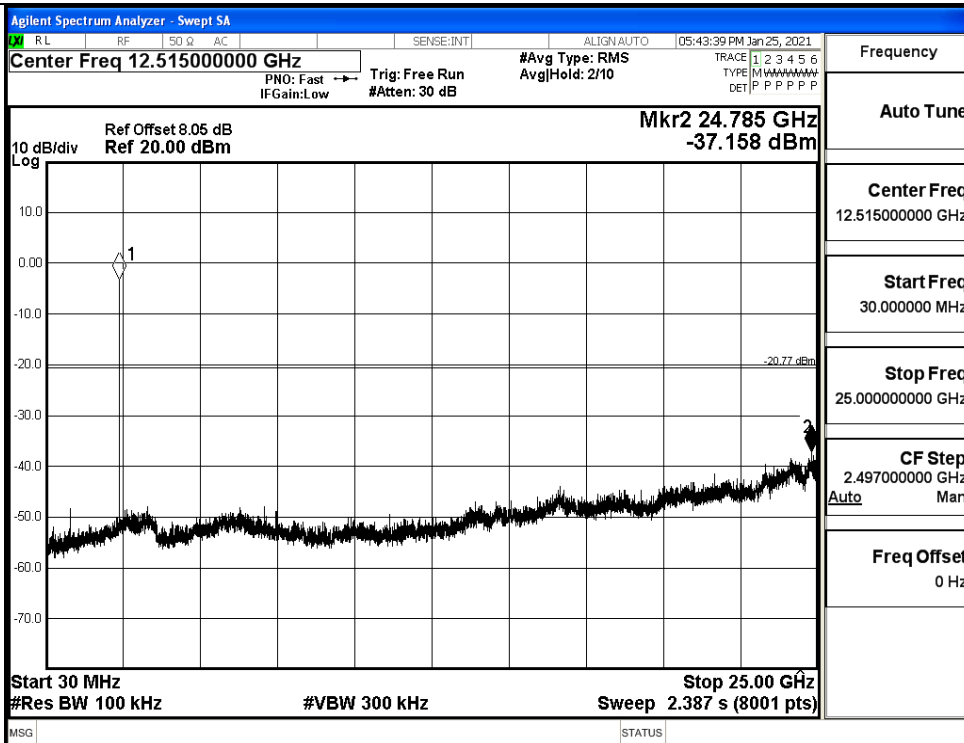


$\pi/4$ DQPSK LCH Graphs

Pref

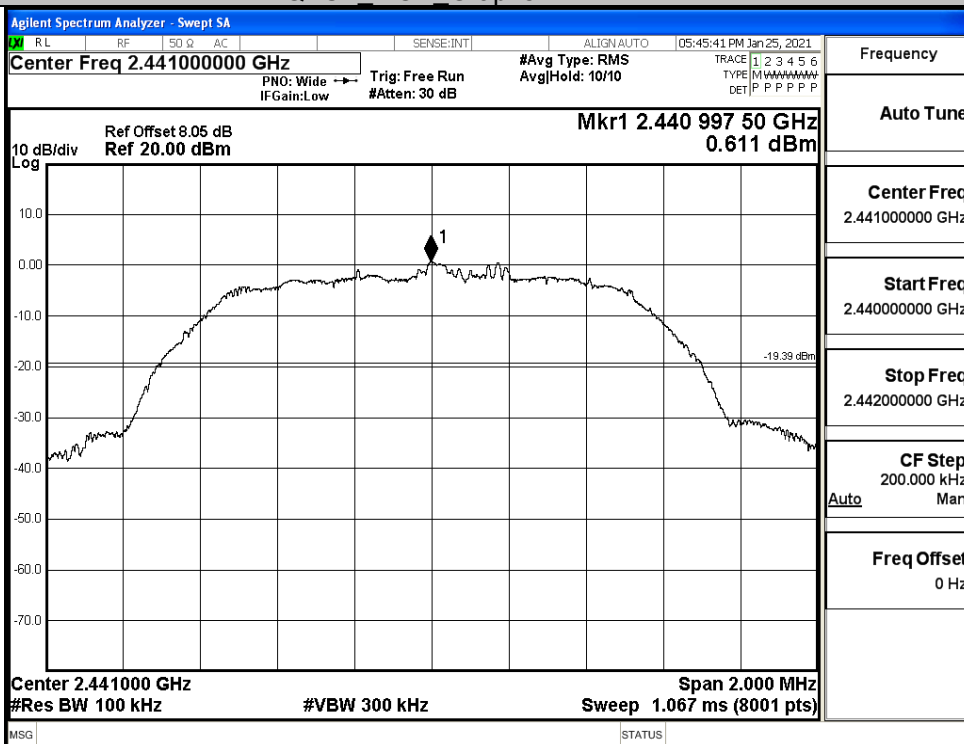


Puw

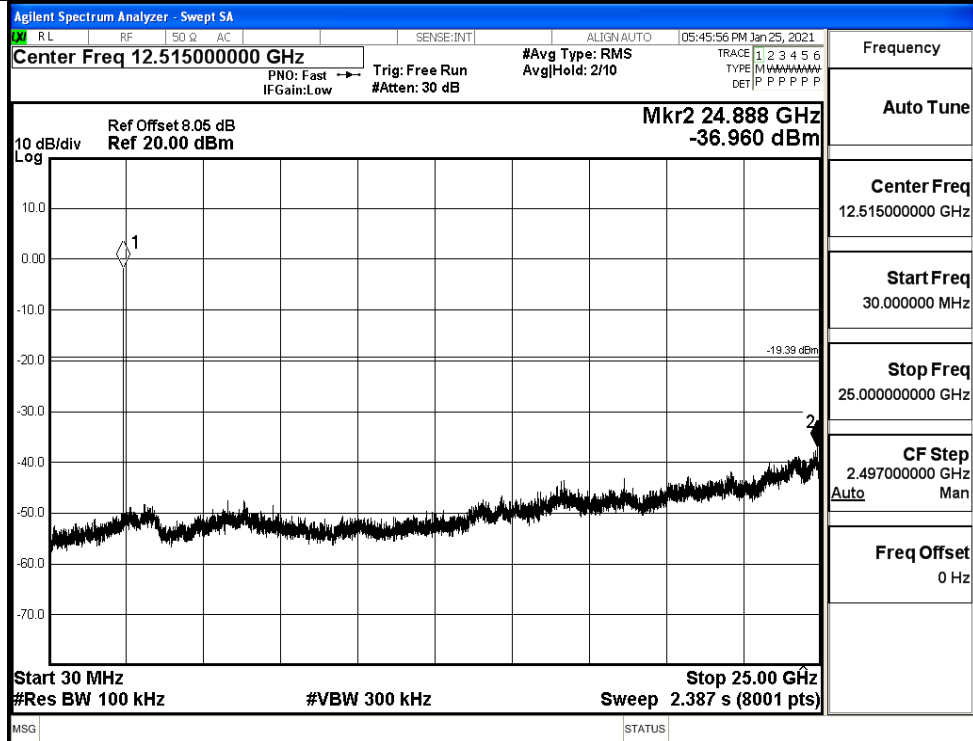


$\pi/4$ DQPSK MCH Graphs

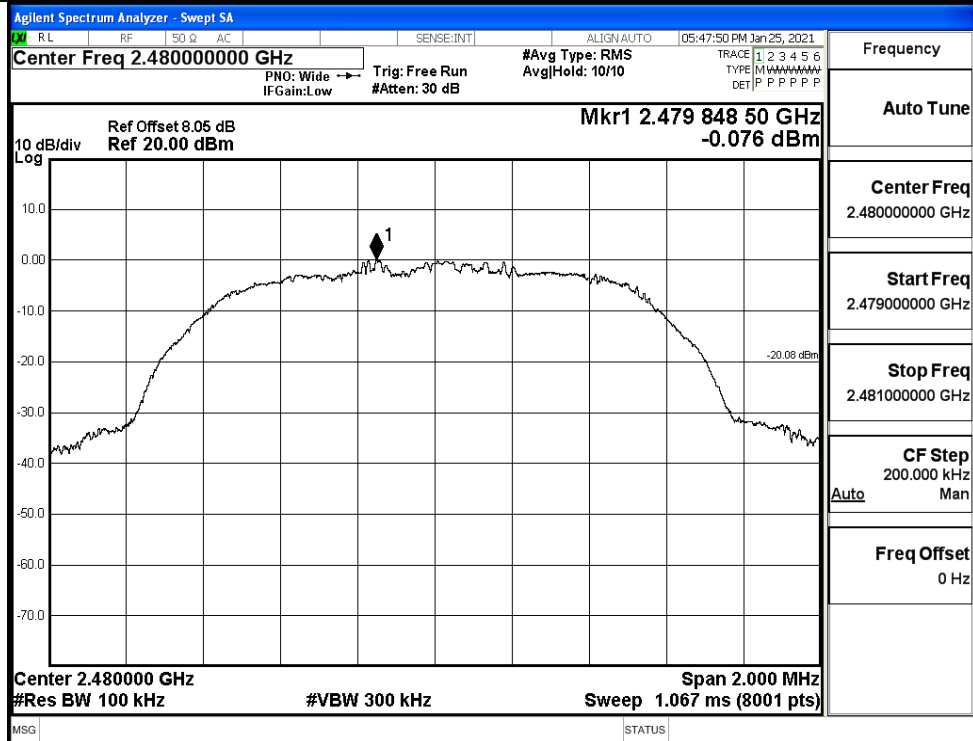
Pref



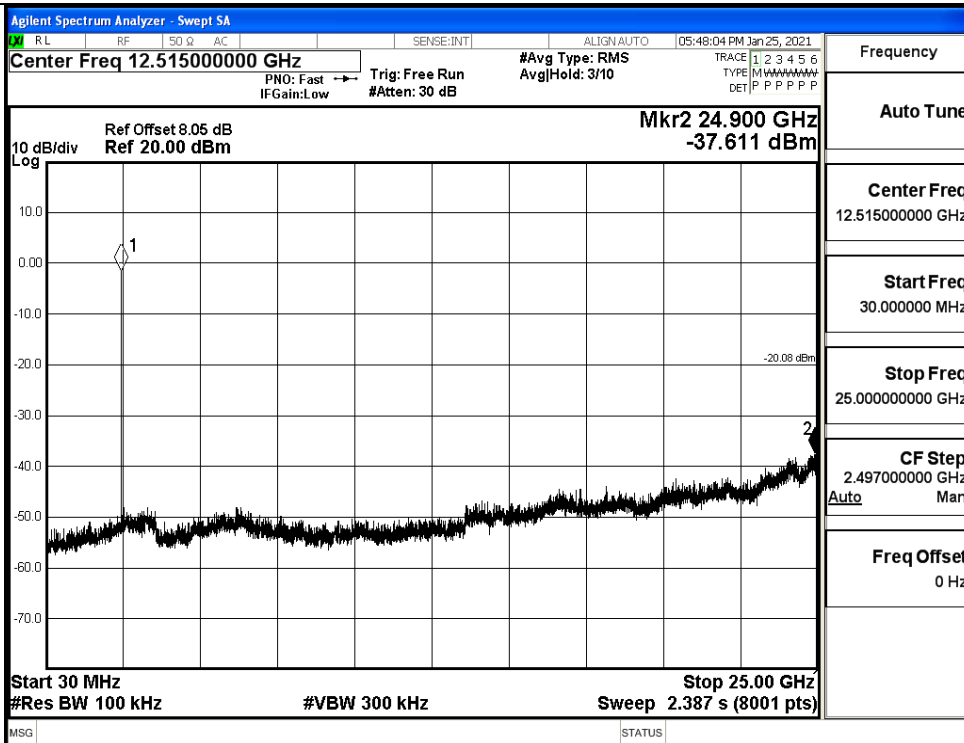
Puw

 $\pi/4$ DQPSK HCH Graphs

Pref

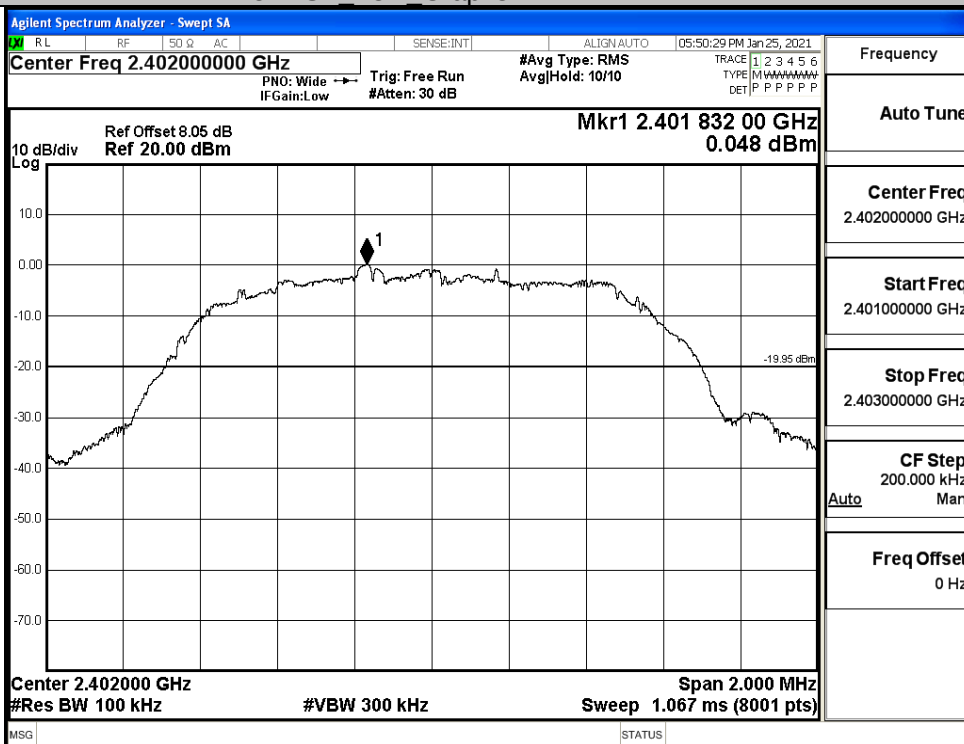


Puw

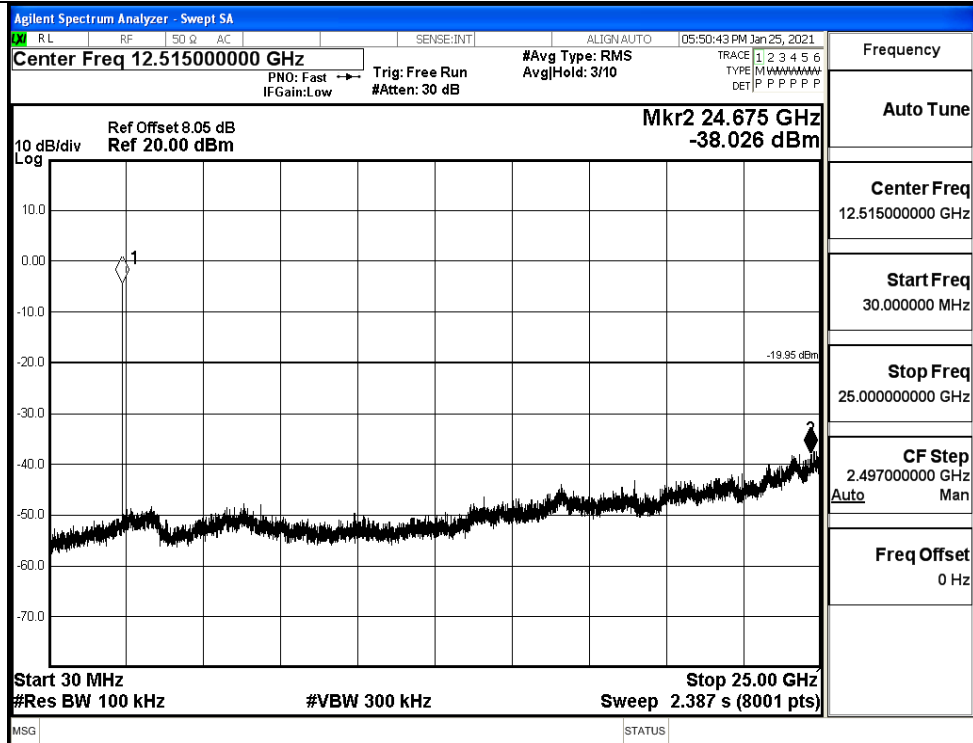


# 8DPSK LCH Graphs

Pref

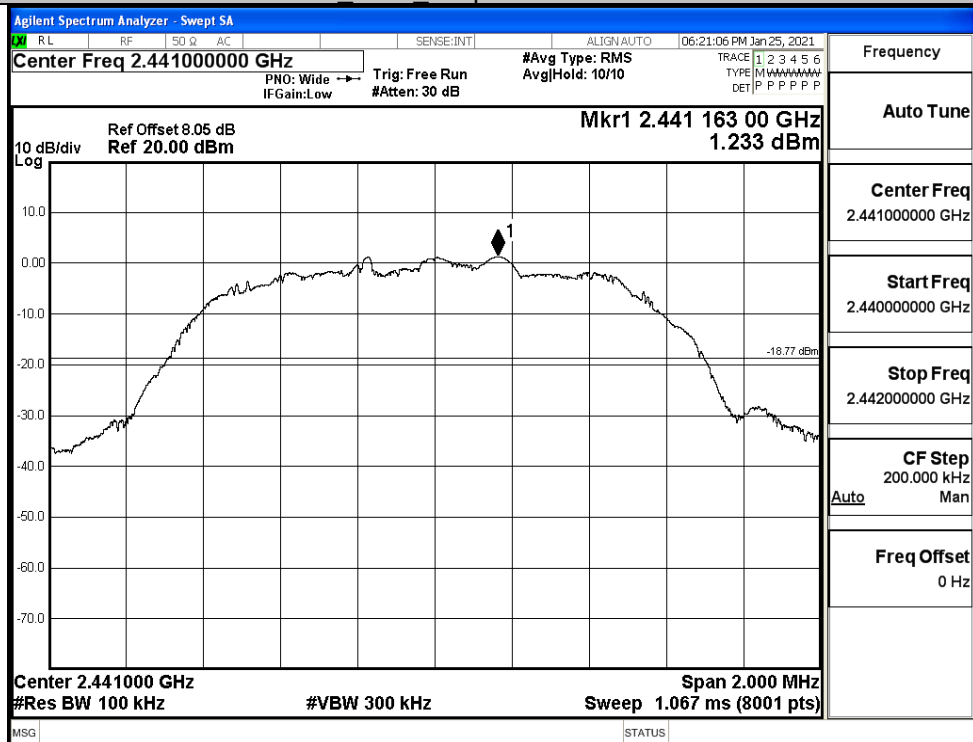


Puw

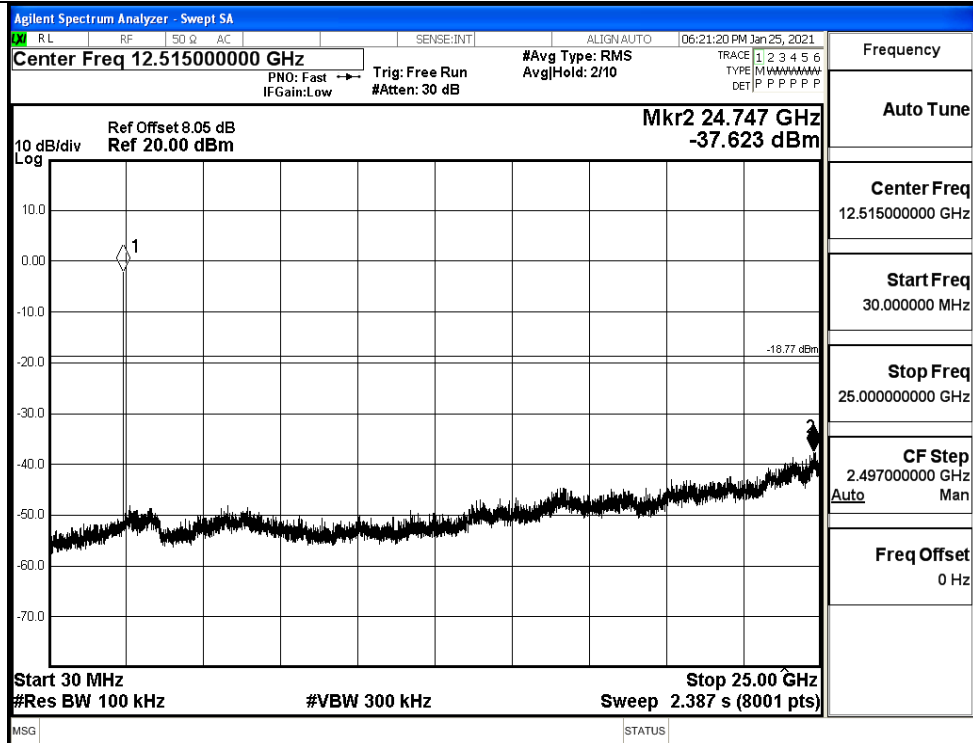


## 8DPSK MCH Graphs

Pref

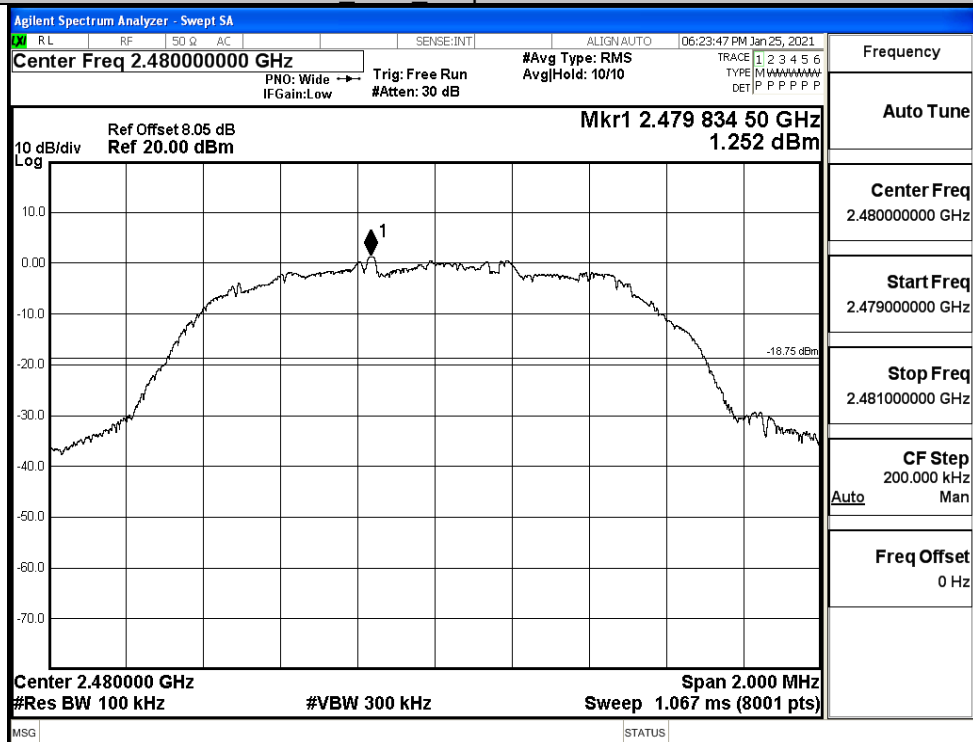


Puw

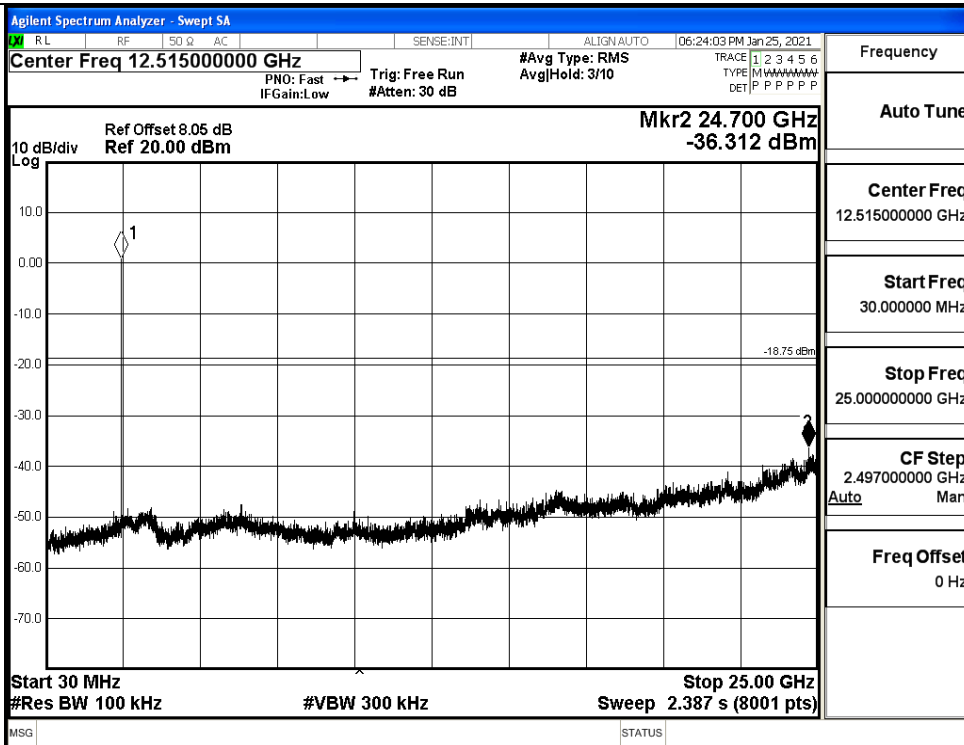


## 8DPSK HCH Graphs

Pref



Puw

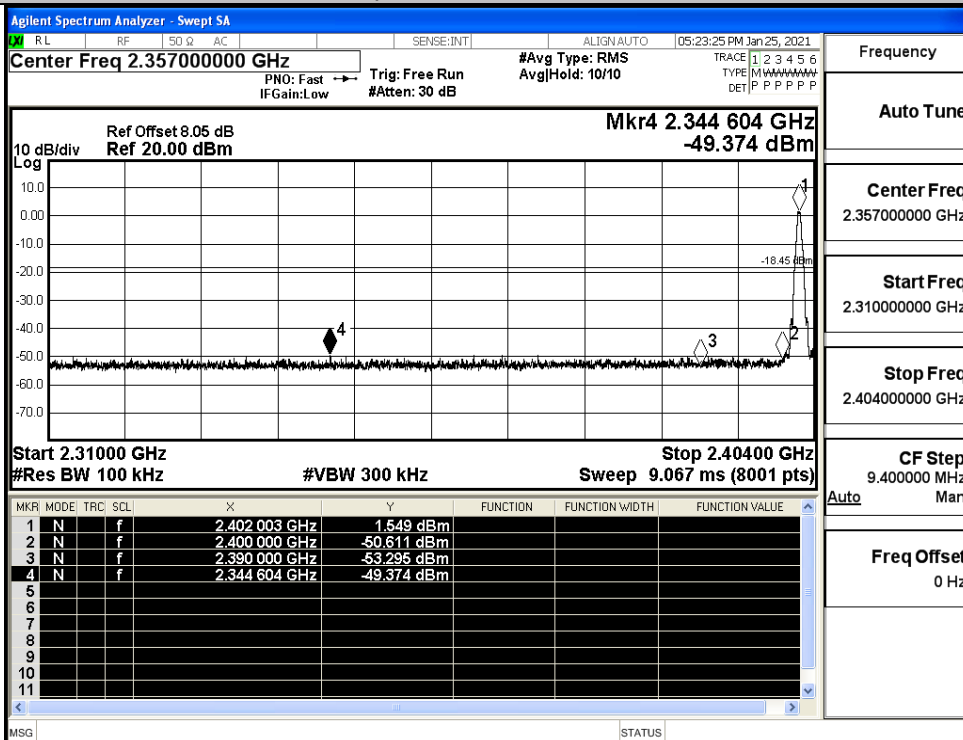


## A.7 Band-edge for RF Conducted Emissions

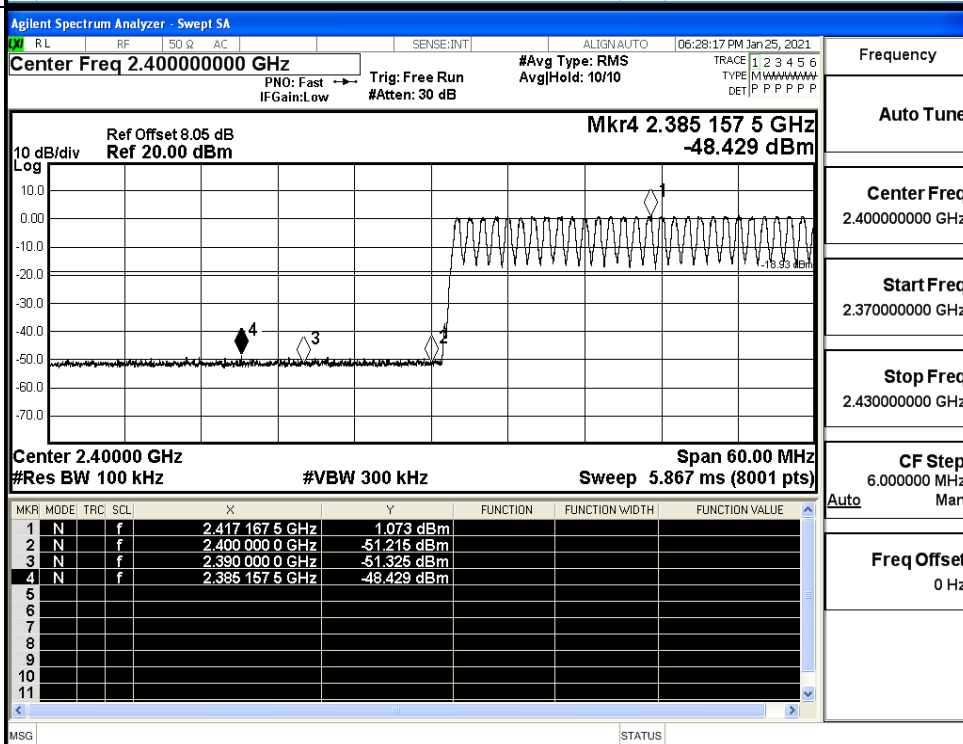
| Mode          | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|-------------------------|---------------------|-------------------|--------------------------|-------------|---------|
| GFSK          | LCH     | 2402                    | 1.549               | Off               | -49.374                  | -18.45      | PASS    |
|               |         |                         | 1.073               | On                | -48.429                  | -18.93      | PASS    |
|               | HCH     | 2480                    | 2.882               | Off               | -49.037                  | -17.12      | PASS    |
|               |         |                         | 1.372               | On                | -48.681                  | -18.63      | PASS    |
| $\pi/4$ DQPSK | LCH     | 2402                    | -0.276              | Off               | -49.048                  | -20.28      | PASS    |
|               |         |                         | 1.026               | On                | -49.133                  | -18.97      | PASS    |
|               | HCH     | 2480                    | 0.844               | Off               | -49.184                  | -19.16      | PASS    |
|               |         |                         | 1.326               | On                | -48.315                  | -18.67      | PASS    |
| 8DPSK         | LCH     | 2402                    | 0.120               | Off               | -49.578                  | -19.88      | PASS    |
|               |         |                         | 1.231               | On                | -48.594                  | -18.77      | PASS    |
|               | HCH     | 2480                    | 1.340               | Off               | -49.070                  | -18.66      | PASS    |
|               |         |                         | 1.368               | On                | -47.741                  | -18.63      | PASS    |

# Test Graphs

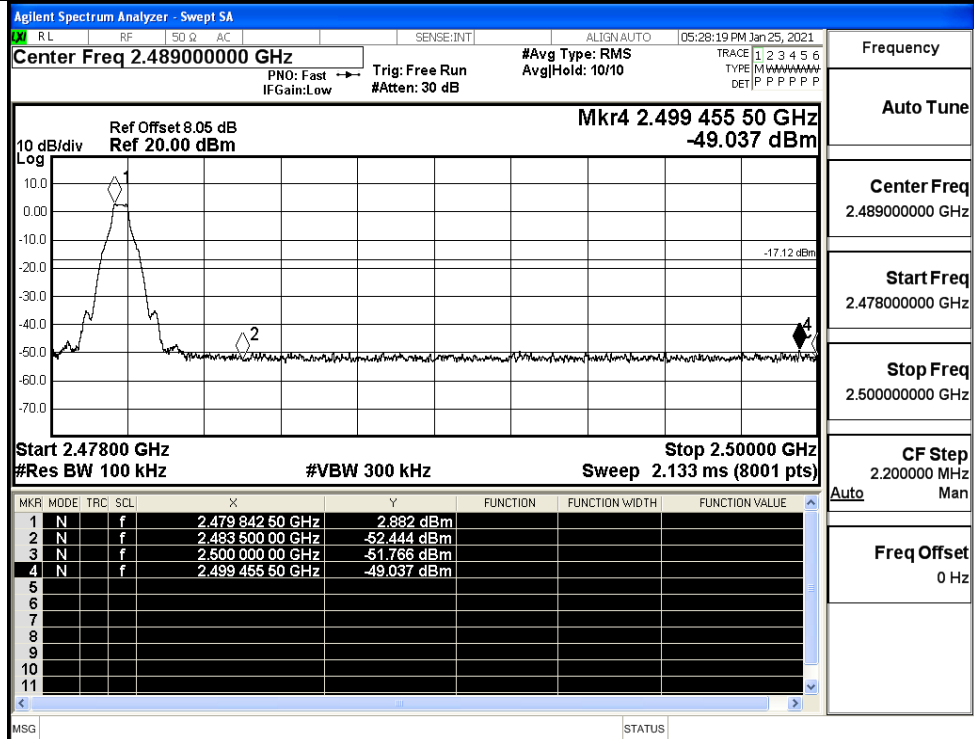
GFSK/LCH/No Hop



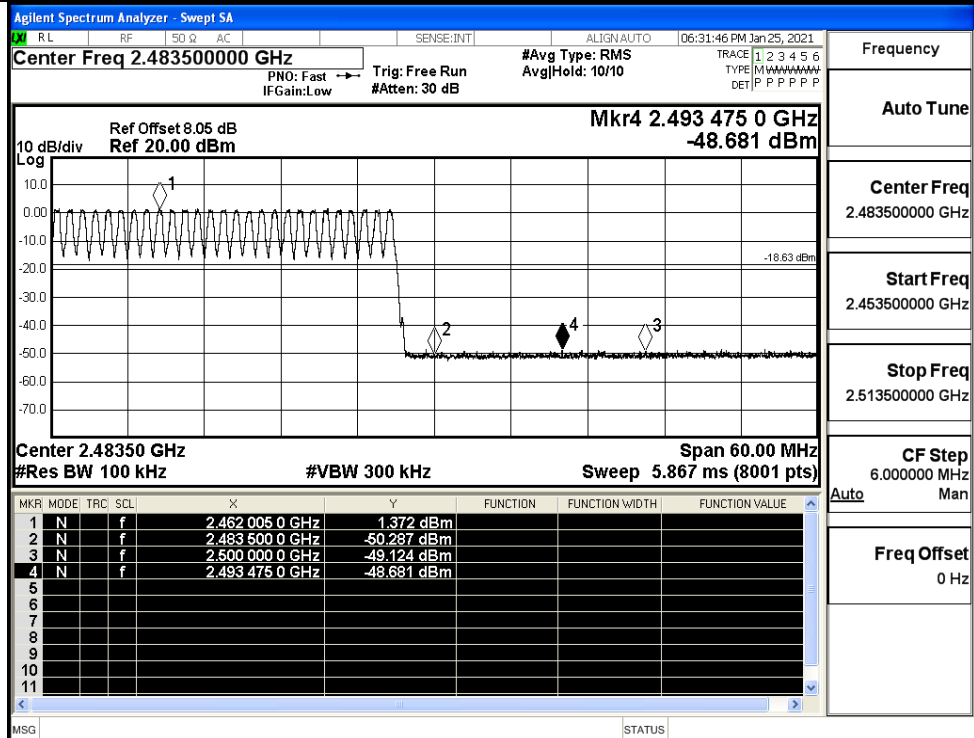
GFSK/LCH/Hop



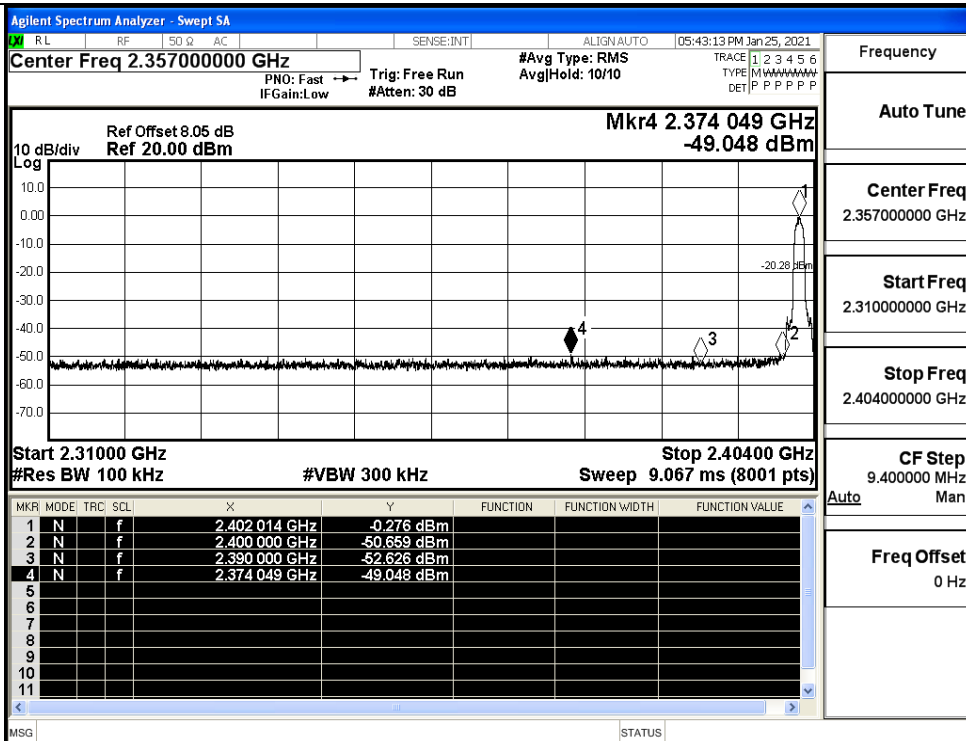
GFSK/HCH/No Hop



GFSK/HCH/Hop



$\pi/4$ DQPSK/LCH/No  
Hop



Frequency

Auto Tune

Center Freq  
2.357000000 GHz

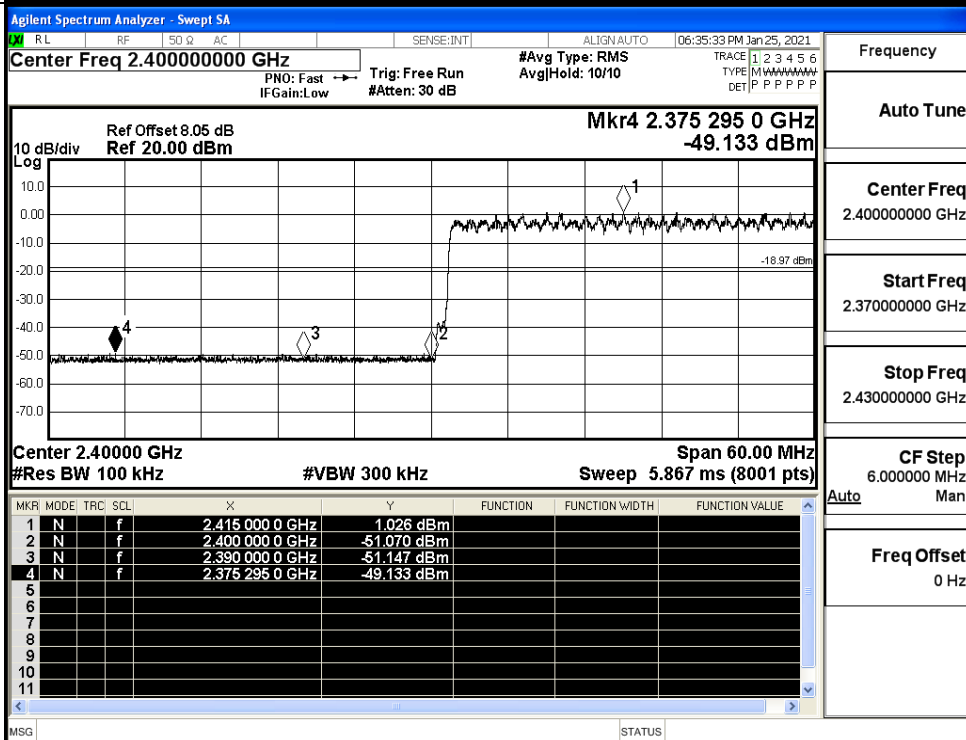
Start Freq  
2.310000000 GHz

Stop Freq  
2.404000000 GHz

CF Step  
9.400000 MHz

Freq Offset  
0 Hz

$\pi/4$ DQPSK/LCH/Hop



Frequency

Auto Tune

Center Freq  
2.400000000 GHz

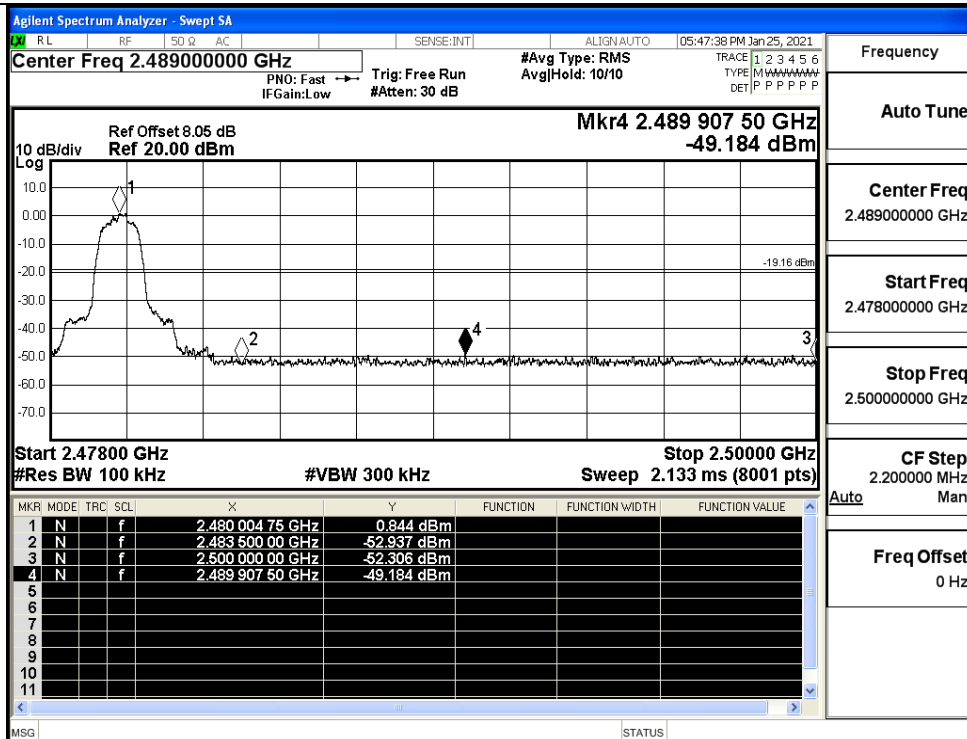
Start Freq  
2.370000000 GHz

Stop Freq  
2.430000000 GHz

CF Step  
6.000000 MHz

Freq Offset  
0 Hz

$\pi/4$ DQPSK/HCH/No  
Hop

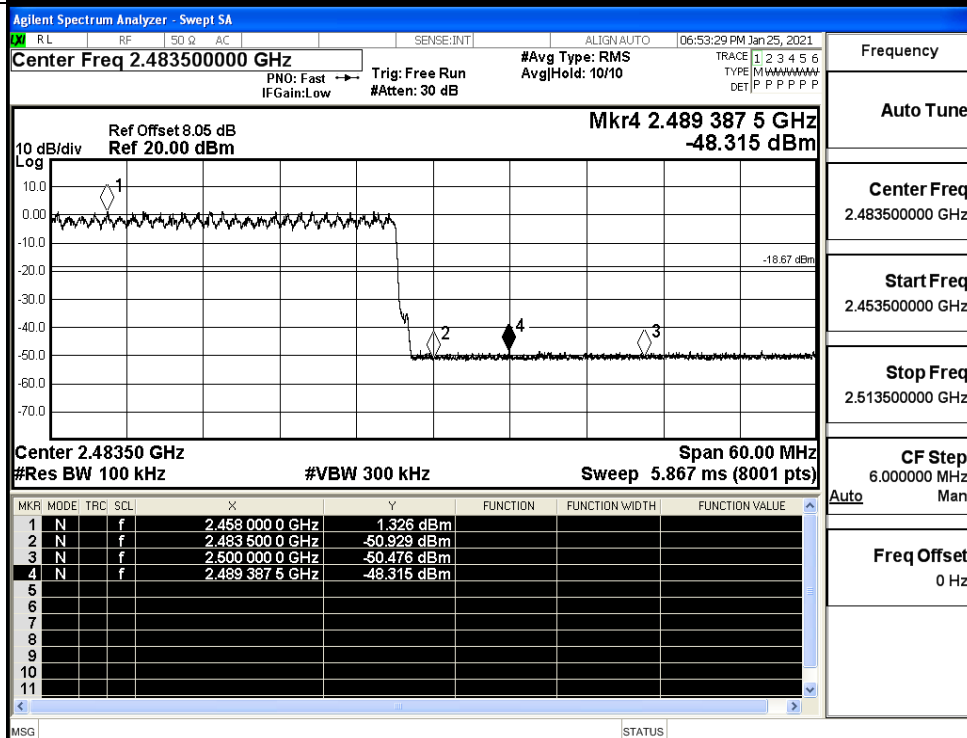


Frequency

Auto Tune

Center Freq  
2.489000000 GHzStart Freq  
2.478000000 GHzStop Freq  
2.500000000 GHzCF Step  
2.200000 MHz  
Auto ManFreq Offset  
0 Hz

$\pi/4$ DQPSK/HCH/Hop

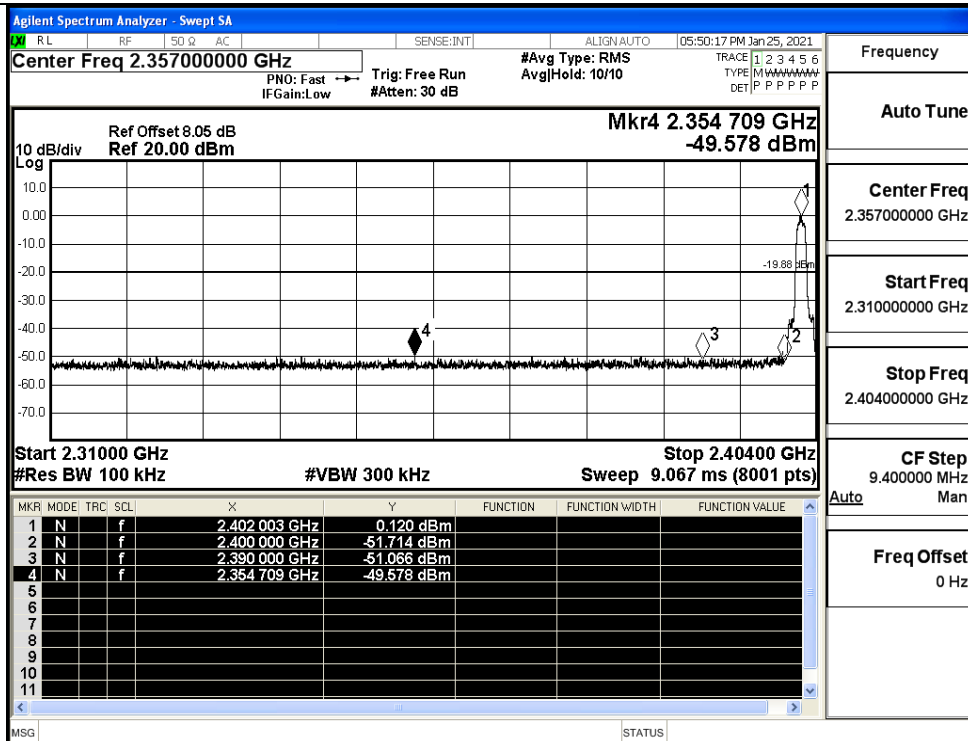


Frequency

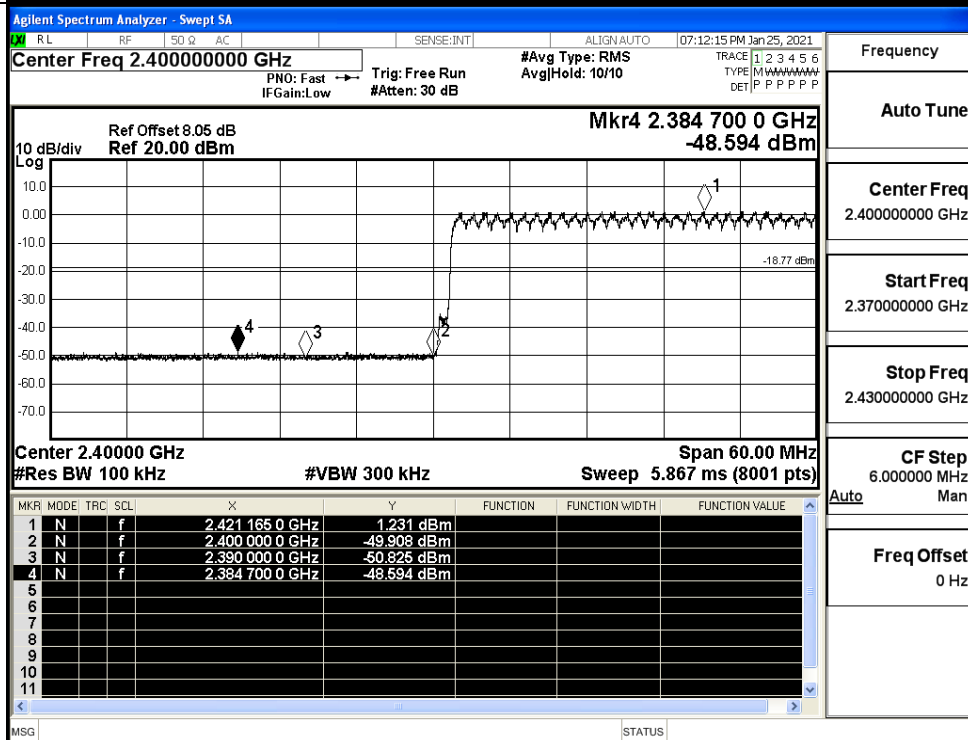
Auto Tune

Center Freq  
2.483500000 GHzStart Freq  
2.453500000 GHzStop Freq  
2.513500000 GHzCF Step  
6.000000 MHz  
Auto ManFreq Offset  
0 Hz

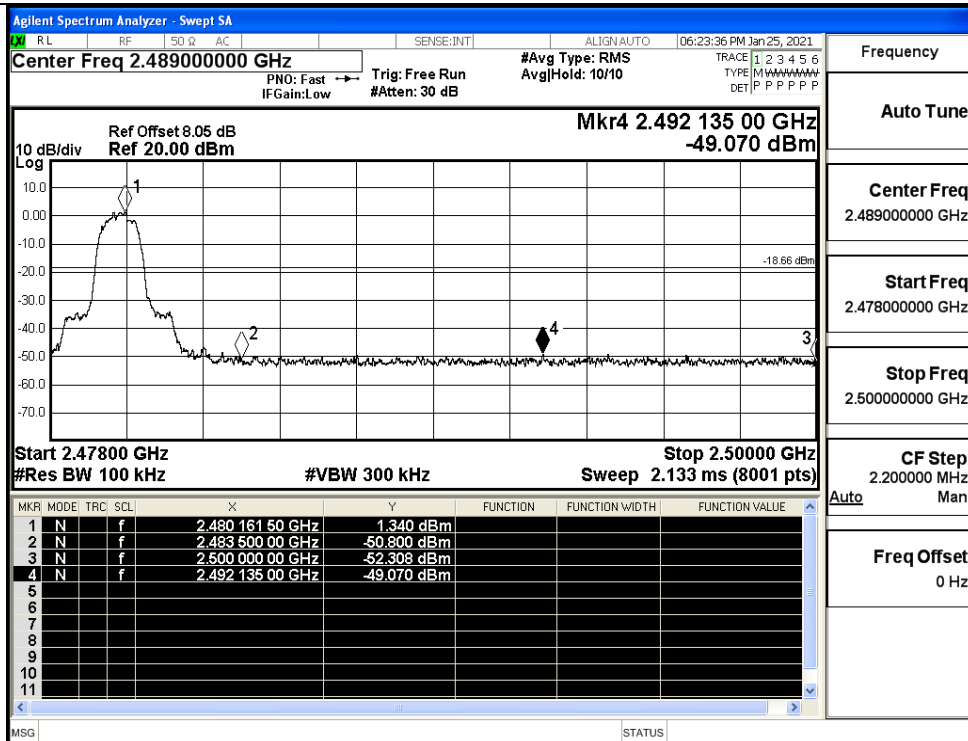
8DPSK/LCH/No Hop



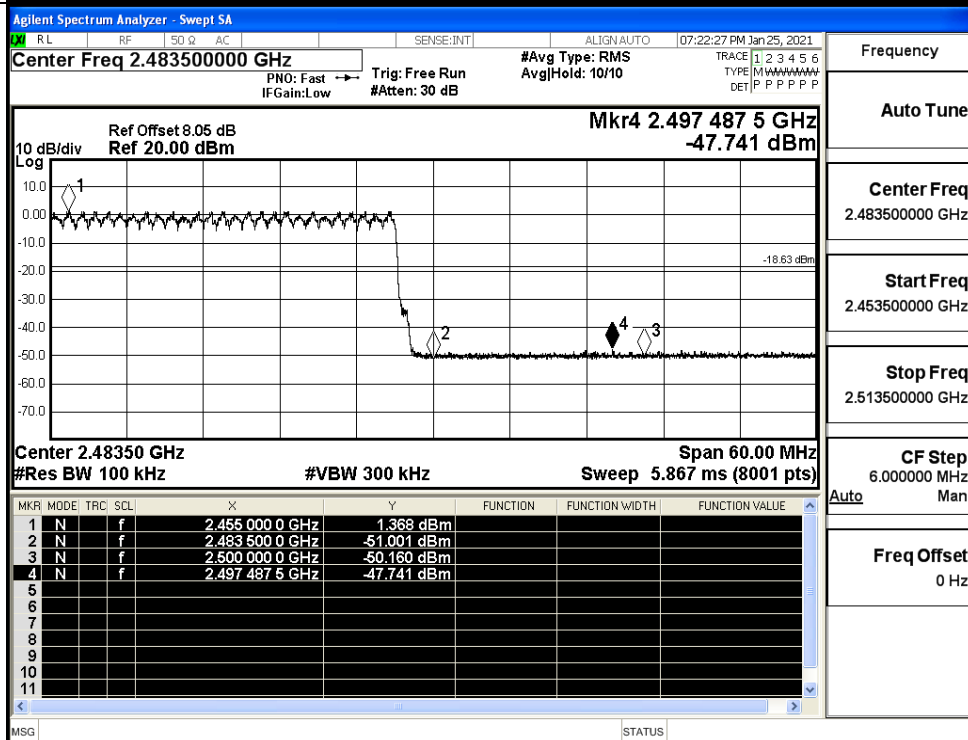
8DPSK/LCH/Hop



8DPSK/HCH/No Hop



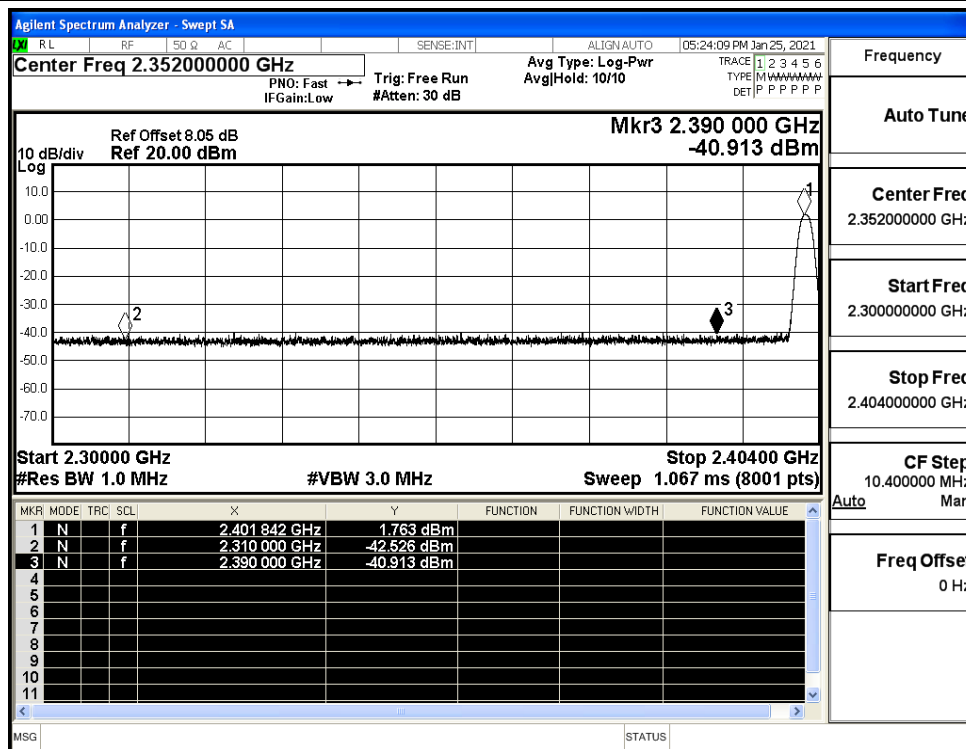
8DPSK/HCH/Hop



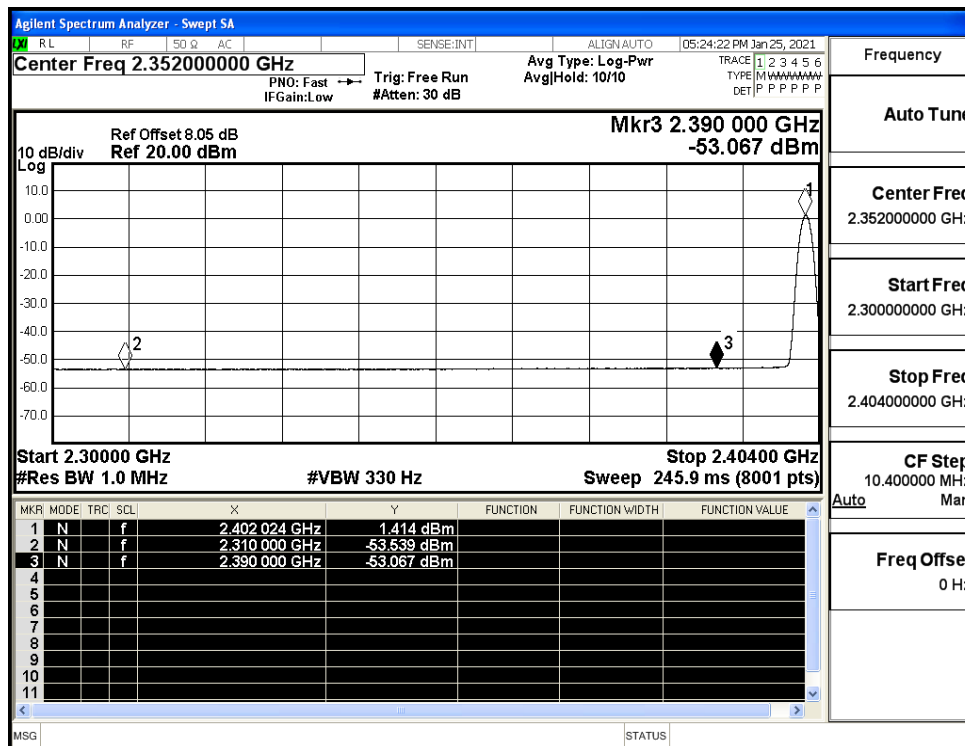
## A.8 Restrict-band band-edge measurements

| Test Mode     | Hopping | Freq.  | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---------------|---------|--------|-------------|------|---------------|------------|----------|----------------|---------|
| GFSK          | Off     | 2310.0 | -42.53      | 2.0  | 0             | 54.73      | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.54      | 2.0  | 0             | 43.72      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -40.91      | 2.0  | 0             | 56.35      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.07      | 2.0  | 0             | 44.19      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -41.40      | 2.0  | 0             | 55.86      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -52.38      | 2.0  | 0             | 44.88      | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -41.78      | 2.0  | 0             | 55.48      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -52.46      | 2.0  | 0             | 44.8       | AV       | 54             | PASS    |
| $\pi/4$ DQPSK | Off     | 2310.0 | -43.92      | 2.0  | 0             | 53.34      | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.48      | 2.0  | 0             | 43.78      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -43.47      | 2.0  | 0             | 53.79      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.01      | 2.0  | 0             | 44.25      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -41.47      | 2.0  | 0             | 55.79      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -52.18      | 2.0  | 0             | 45.08      | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -42.13      | 2.0  | 0             | 55.13      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -52.39      | 2.0  | 0             | 44.87      | AV       | 54             | PASS    |
| 8DPSK         | Off     | 2310.0 | -42.26      | 2.0  | 0             | 55         | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.45      | 2.0  | 0             | 43.81      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -42.68      | 2.0  | 0             | 54.58      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.04      | 2.0  | 0             | 44.22      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -40.18      | 2.0  | 0             | 57.08      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -51.86      | 2.0  | 0             | 45.4       | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -42.54      | 2.0  | 0             | 54.72      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -52.42      | 2.0  | 0             | 44.84      | AV       | 54             | PASS    |

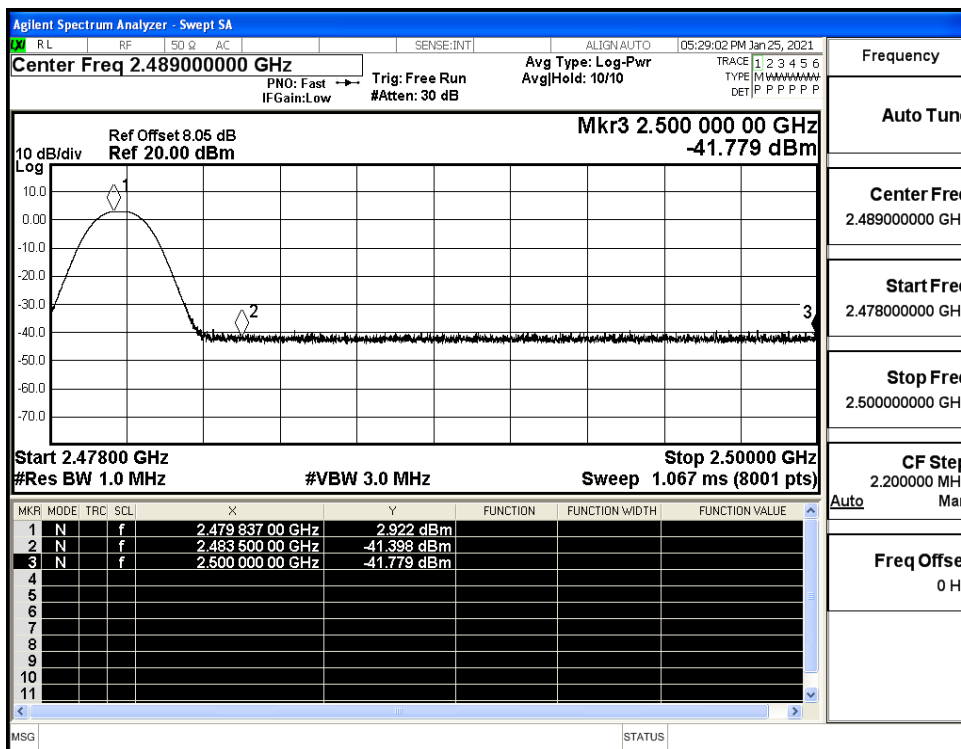
# Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



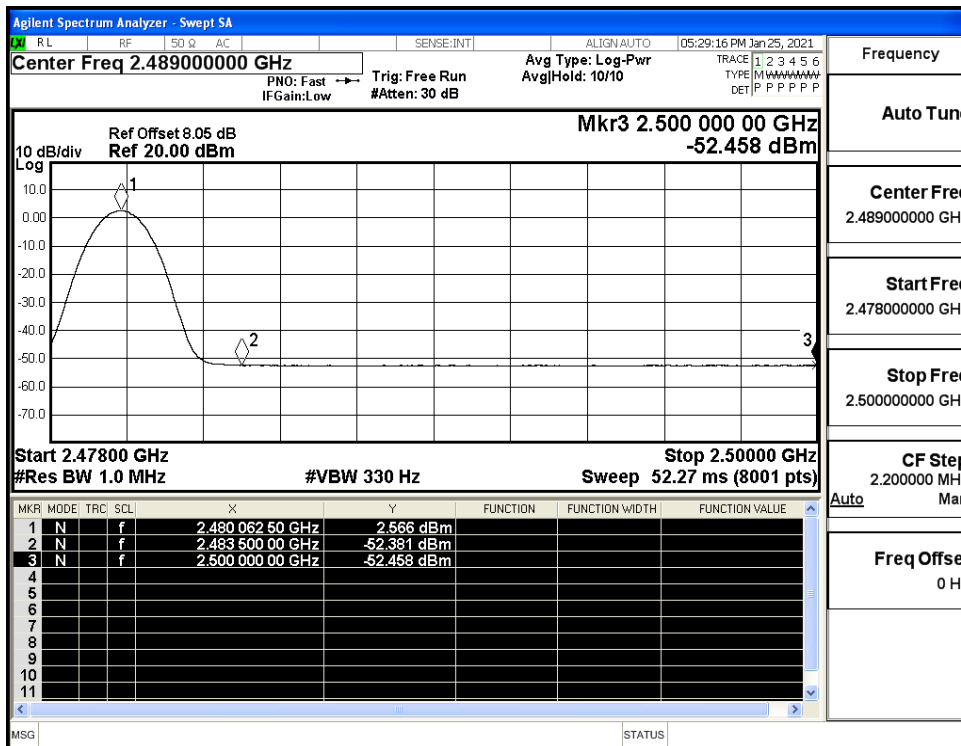
# Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)



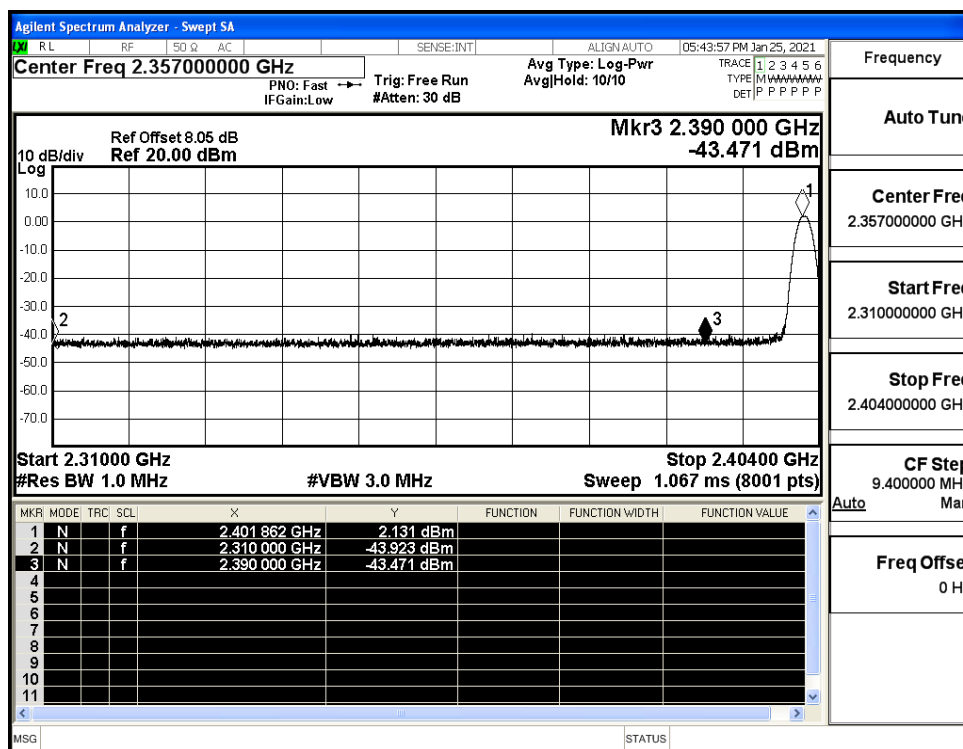
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)



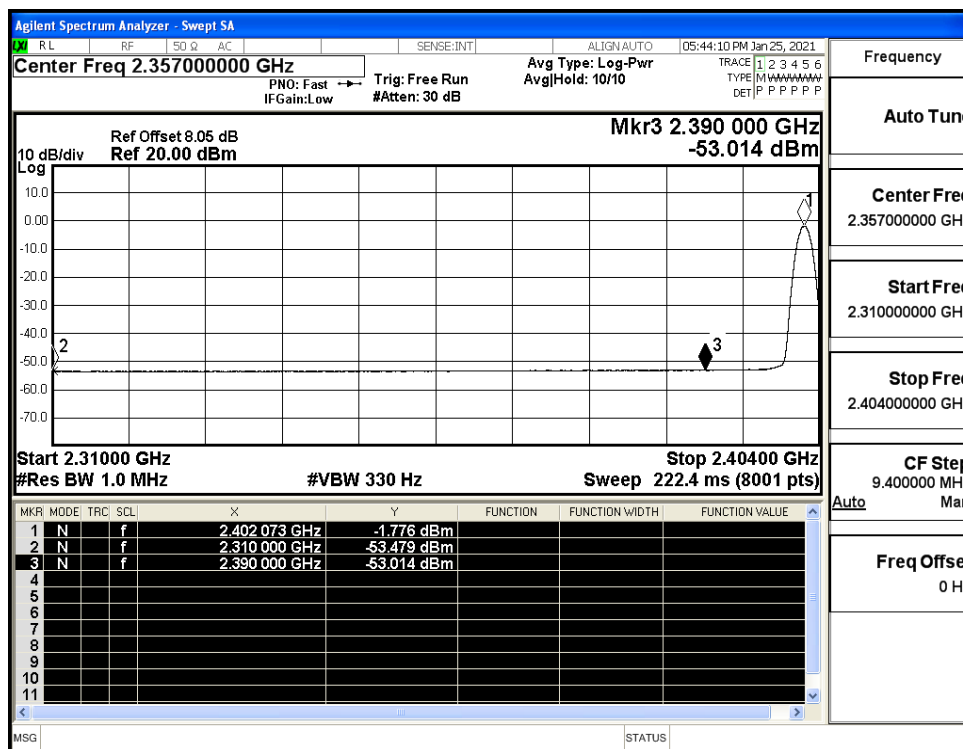
Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)



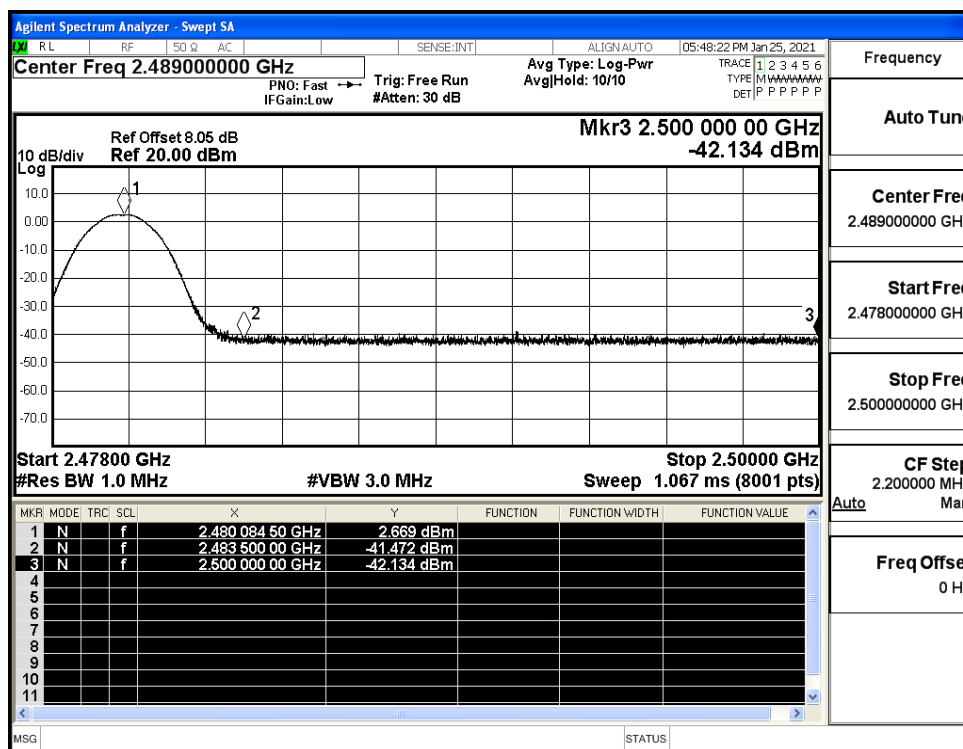
# Restrict-band band-edge measurements\_Hopping Off $\pi/4$ -DQPSK\_PEAK (Low Channel)



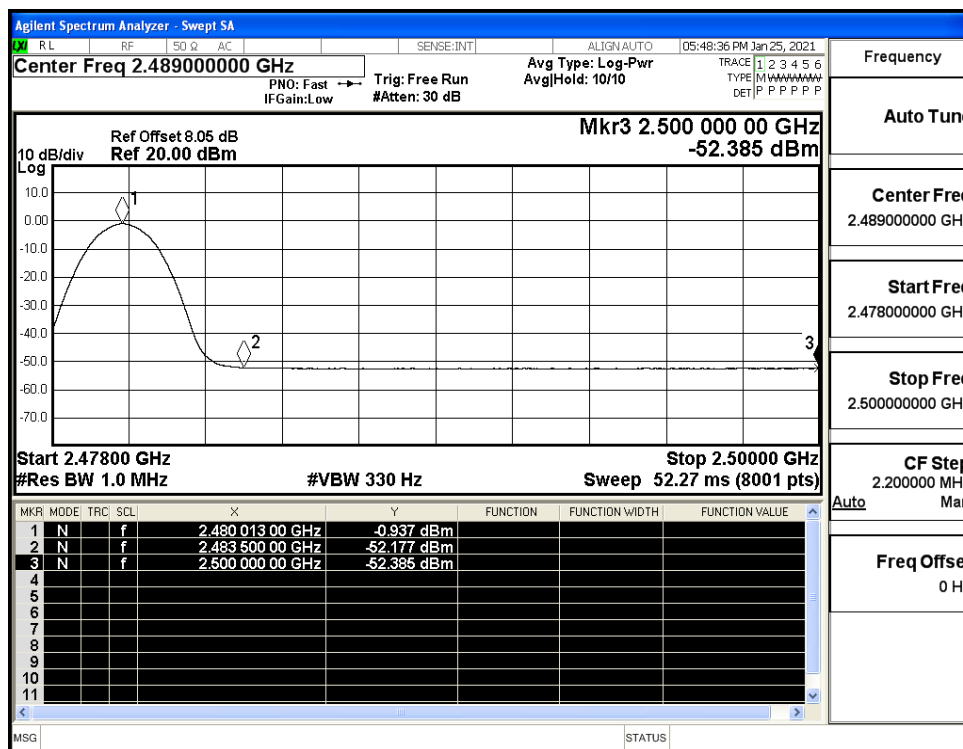
# Restrict-band band-edge measurements\_Hopping Off $\pi/4$ -DQPSK\_Average (Low Channel)



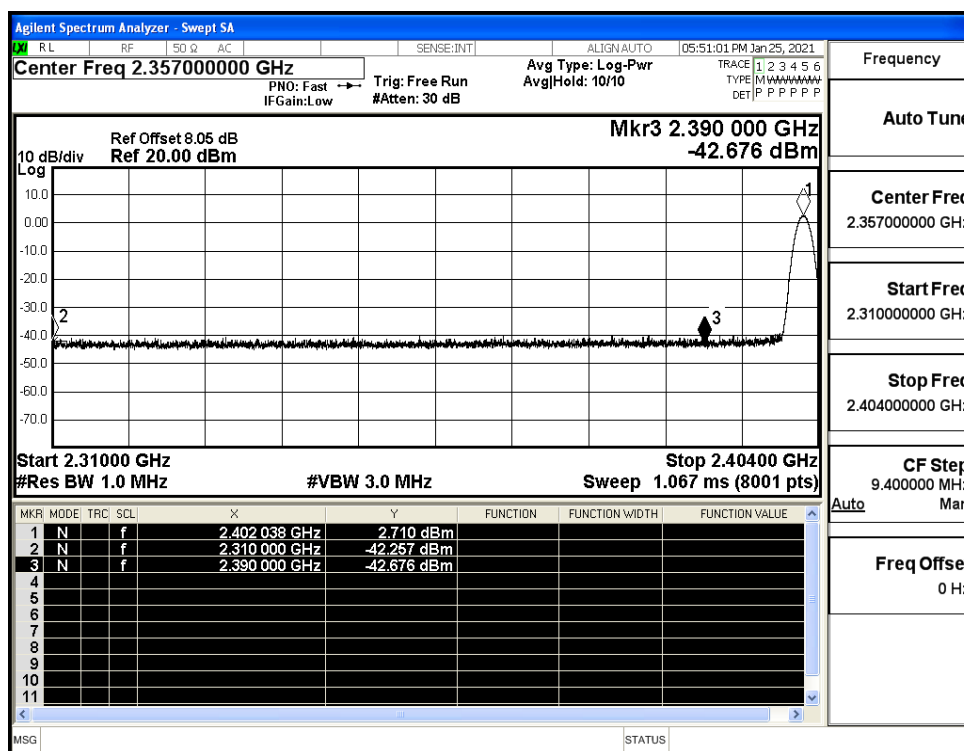
# Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (High Channel)



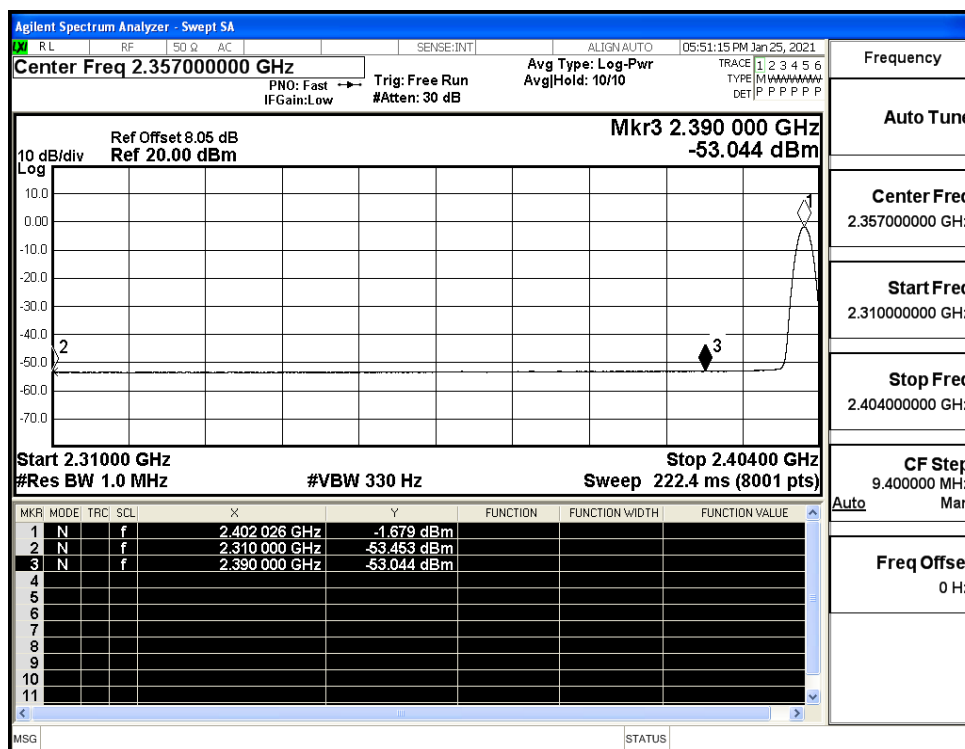
# Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (High Channel)



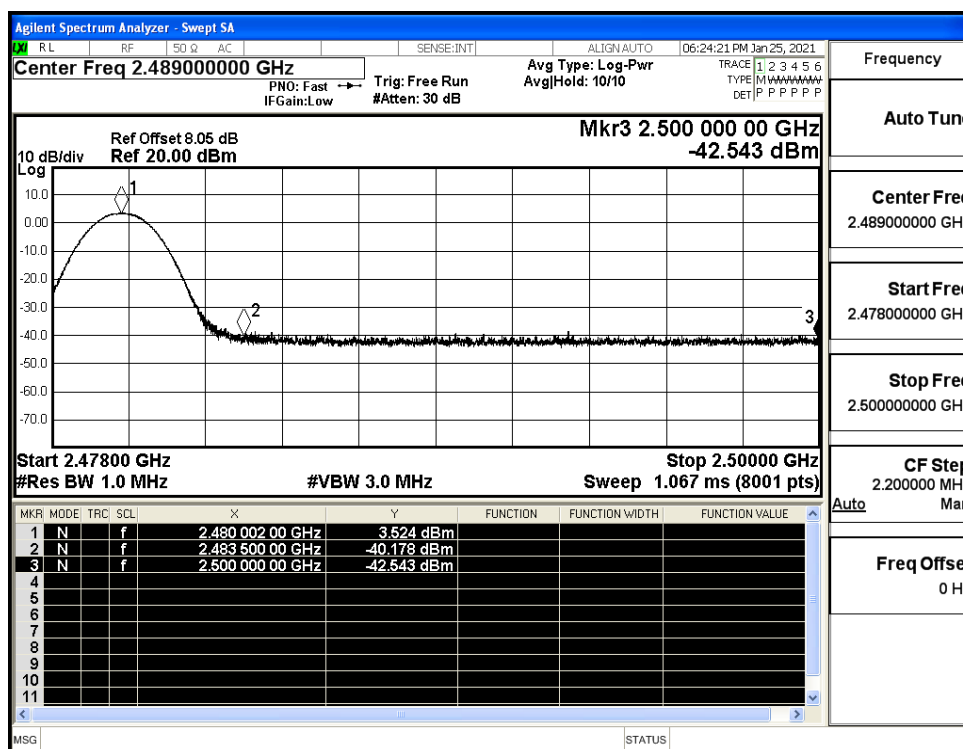
# Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



# 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)

