

## Appendix A

### RF Test Data for BT V4.0 (BDR/EDR) (Conducted Measurement)

Product Name: Bluetooth Speaker

Trade Mark: BC-AU-BS-174-BK

Test Model: BICONIC

#### Environmental Conditions

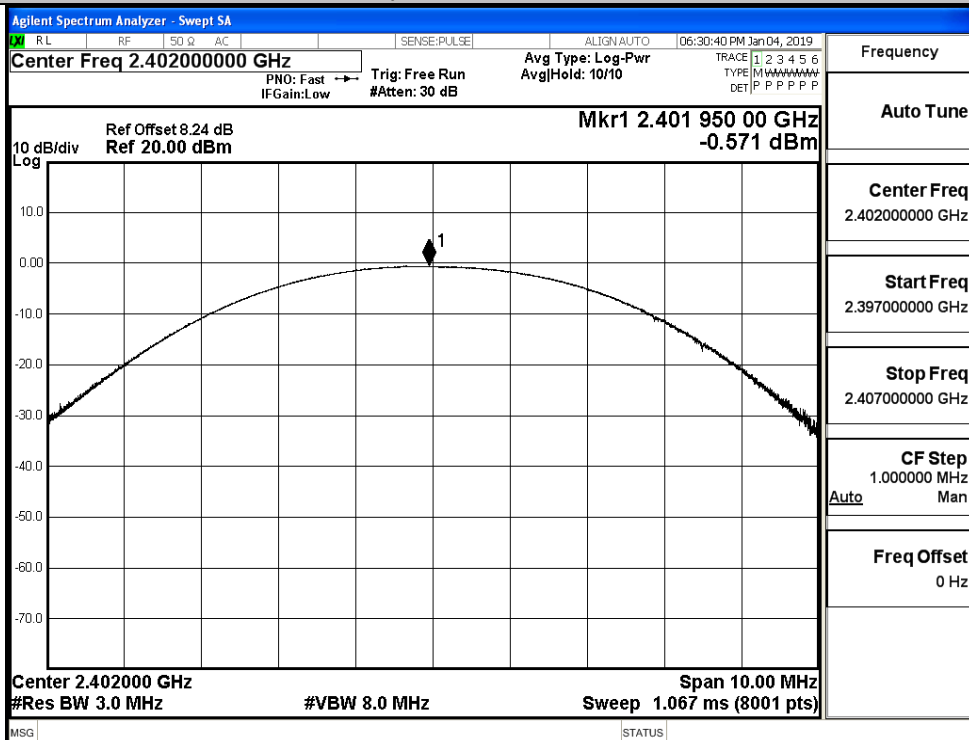
|                    |             |
|--------------------|-------------|
| Temperature:       | 24.6 ° C    |
| Relative Humidity: | 51.3%       |
| ATM Pressure:      | 100.0 kPa   |
| Test Engineer:     | David Luo   |
| Supervised by:     | Jayden.Zhuo |

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

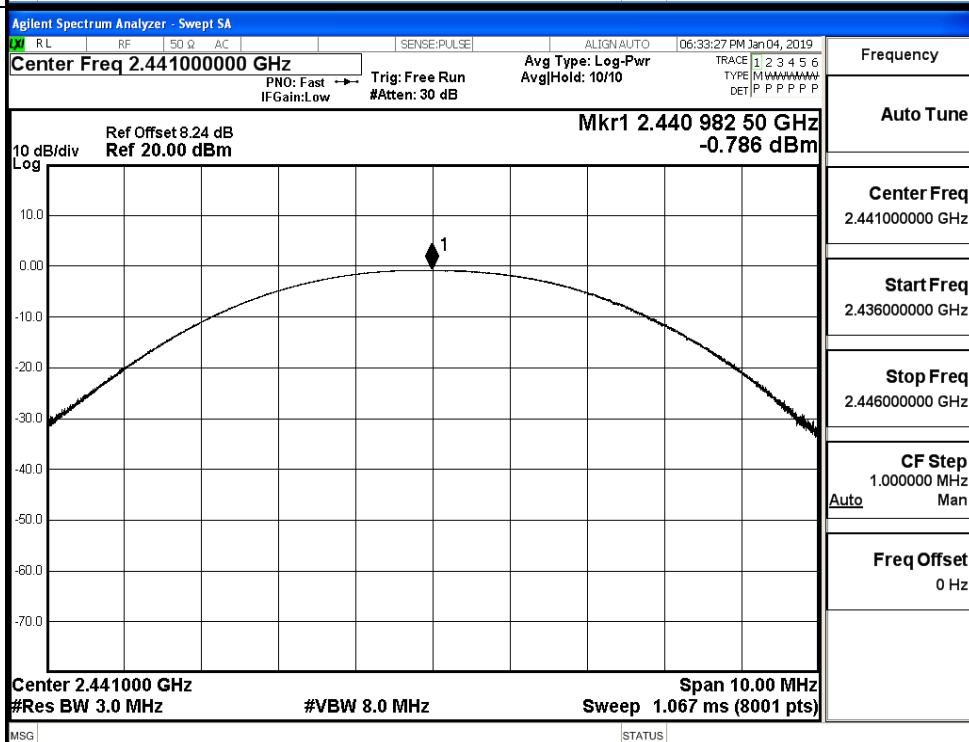
| Mode          | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK          | LCH      | -0.571                          | 21          | PASS    |
|               | MCH      | -0.786                          | 21          | PASS    |
|               | HCH      | -0.492                          | 21          | PASS    |
| $\pi/4$ DQPSK | LCH      | 0.605                           | 21          | PASS    |
|               | MCH      | 0.369                           | 21          | PASS    |
|               | HCH      | 0.954                           | 21          | PASS    |
| 8DPSK         | LCH      | 0.846                           | 21          | PASS    |
|               | MCH      | 0.538                           | 21          | PASS    |
|               | HCH      | 1.034                           | 21          | PASS    |

# Test Graphs

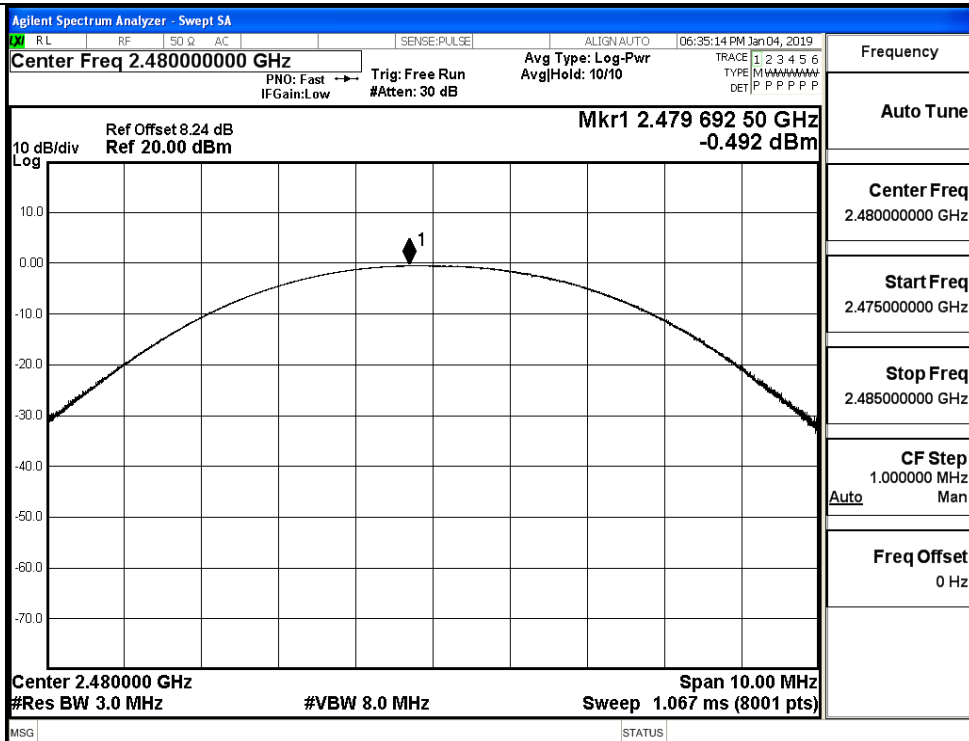
GFSK/LCH



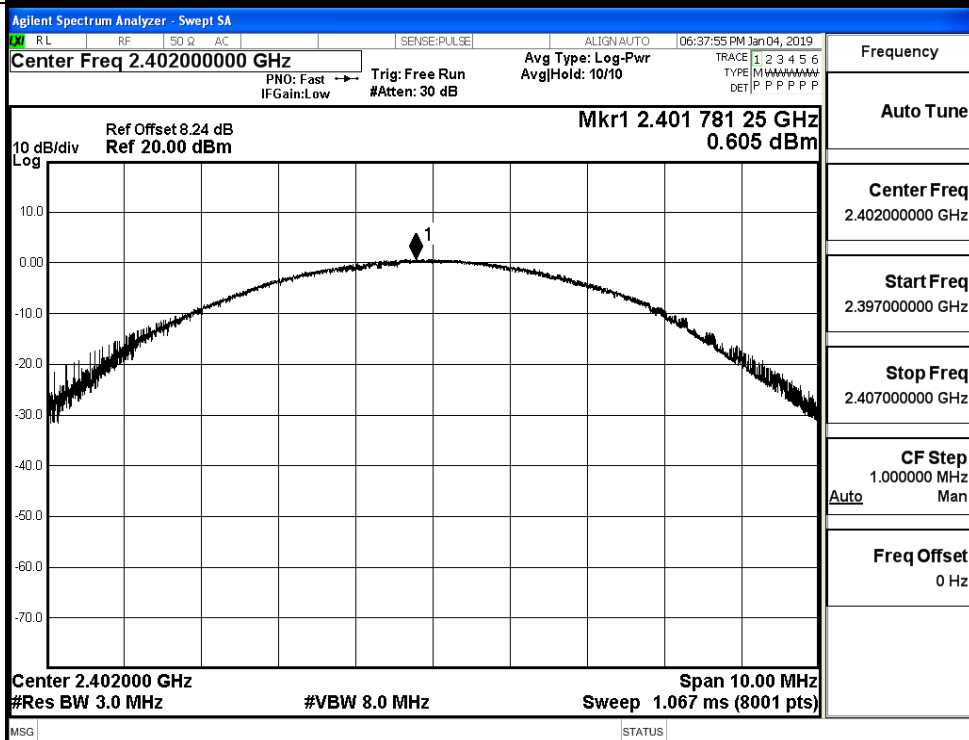
GFSK/MCH



GFSK/HCH

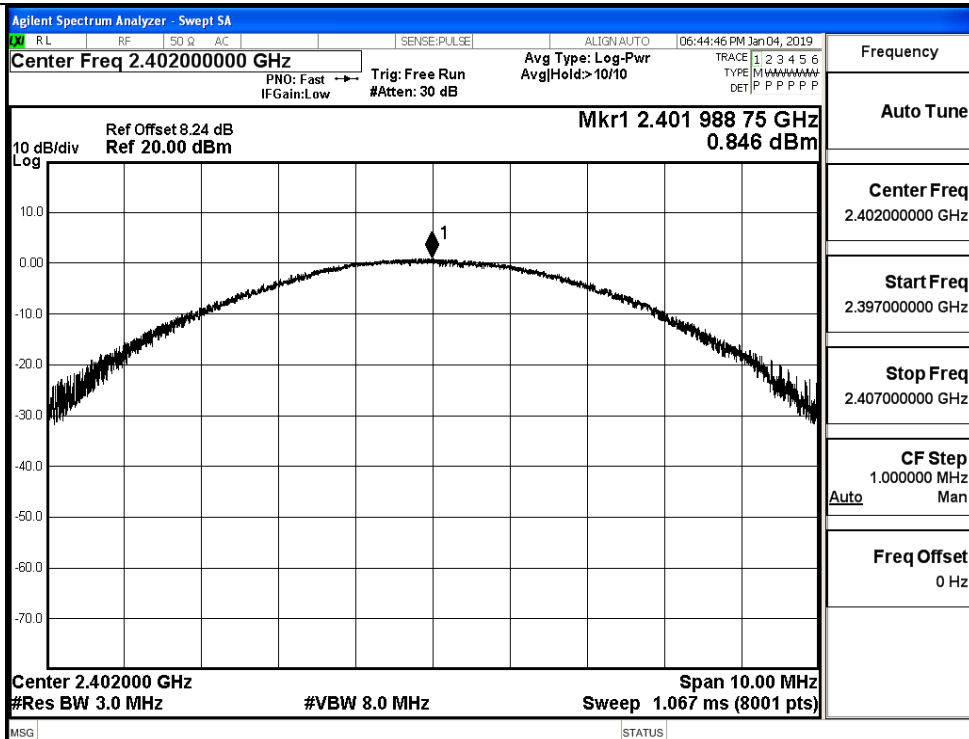


$\pi$ /4DQPSK/LCH

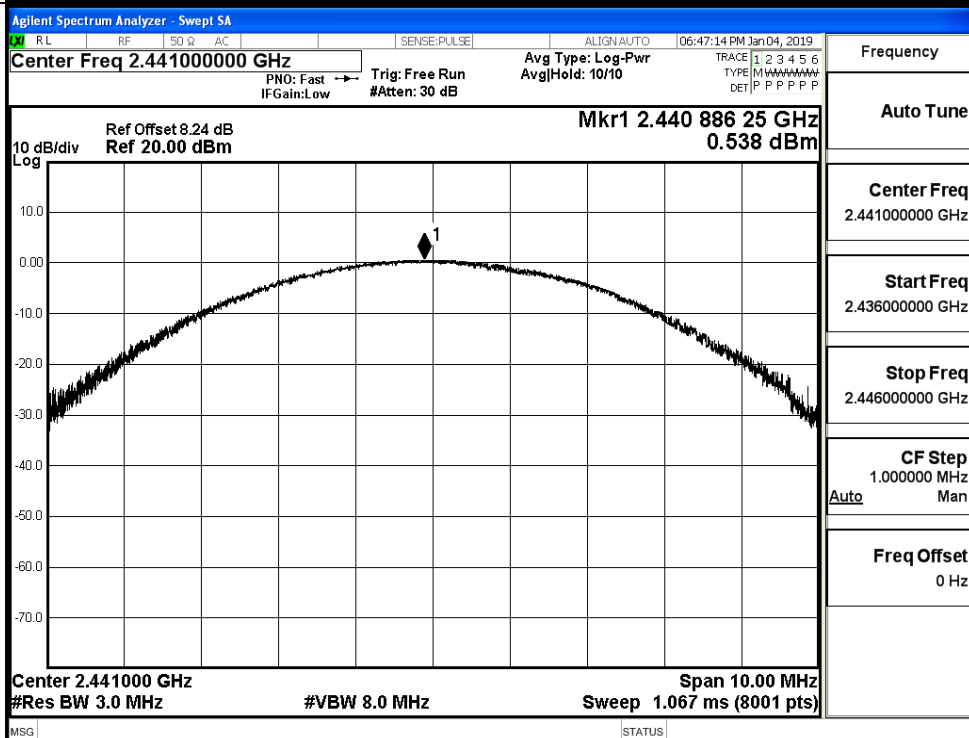


|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><math>\pi/4</math>DQPSK/MCH</p> | <div> <div> Agilent Spectrum Analyzer - Swept SA<br/> <input checked="" type="checkbox"/> R L <input type="checkbox"/> RF <input type="checkbox"/> 50 <math>\Omega</math> <input type="checkbox"/> AC <input type="checkbox"/> SENSE:PULSE <input type="checkbox"/> ALIGN:AUTO 06:40:25 PM Jan 04, 2019<br/> <b>Center Freq 2.441000000 GHz</b><br/>           PNO: Fast <input type="checkbox"/> Trg: Free Run Avg Type: Log-Pwr<br/>           IF Gain: Low #Atten: 30 dB AvgHld: 10/10<br/>           TRACE 1 2 3 4 5 6<br/>           TYPE M W W W W W W W<br/>           DET P P P P P P P </div> <div> 10 dB/div<br/>           Log<br/>           Ref Offset 8.24 dB<br/>           Ref 20.00 dBm<br/> <b>Mkr1 2.440 838 75 GHz</b><br/> <b>0.369 dBm</b> </div> <div> </div> <div> <b>Center 2.441000 GHz</b><br/> <b>#Res BW 3.0 MHz</b> <b>#VBW 8.0 MHz</b> <b>Span 10.00 MHz</b><br/> <b>Sweep 1.067 ms (8001 pts)</b> </div> <div> MSG STATUS </div> </div> <div> Frequency<br/> Auto Tune<br/> Center Freq<br/>2.441000000 GHz<br/> Start Freq<br/>2.436000000 GHz<br/> Stop Freq<br/>2.446000000 GHz<br/> CF Step<br/>1.000000 MHz<br/>Auto Man<br/> Freq Offset<br/>0 Hz </div> |
| <p><math>\pi/4</math>DQPSK/HCH</p> | <div> <div> Agilent Spectrum Analyzer - Swept SA<br/> <input checked="" type="checkbox"/> R L <input type="checkbox"/> RF <input type="checkbox"/> 50 <math>\Omega</math> <input type="checkbox"/> AC <input type="checkbox"/> SENSE:PULSE <input type="checkbox"/> ALIGN:AUTO 06:42:08 PM Jan 04, 2019<br/> <b>Center Freq 2.480000000 GHz</b><br/>           PNO: Fast <input type="checkbox"/> Trg: Free Run Avg Type: Log-Pwr<br/>           IF Gain: Low #Atten: 30 dB AvgHld: 10/10<br/>           TRACE 1 2 3 4 5 6<br/>           TYPE M W W W W W W W<br/>           DET P P P P P P P </div> <div> 10 dB/div<br/>           Log<br/>           Ref Offset 8.24 dB<br/>           Ref 20.00 dBm<br/> <b>Mkr1 2.480 093 75 GHz</b><br/> <b>0.954 dBm</b> </div> <div> </div> <div> <b>Center 2.480000 GHz</b><br/> <b>#Res BW 3.0 MHz</b> <b>#VBW 8.0 MHz</b> <b>Span 10.00 MHz</b><br/> <b>Sweep 1.067 ms (8001 pts)</b> </div> <div> MSG STATUS </div> </div> <div> Frequency<br/> Auto Tune<br/> Center Freq<br/>2.480000000 GHz<br/> Start Freq<br/>2.475000000 GHz<br/> Stop Freq<br/>2.485000000 GHz<br/> CF Step<br/>1.000000 MHz<br/>Auto Man<br/> Freq Offset<br/>0 Hz </div> |

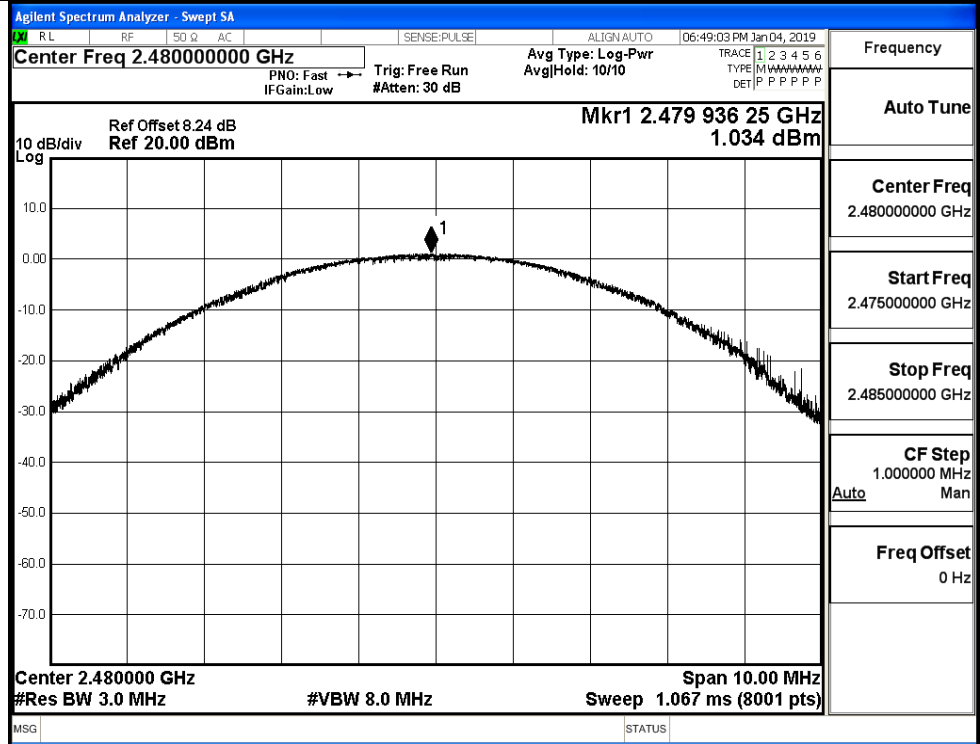
8DPSK/LCH



8DPSK/MCH



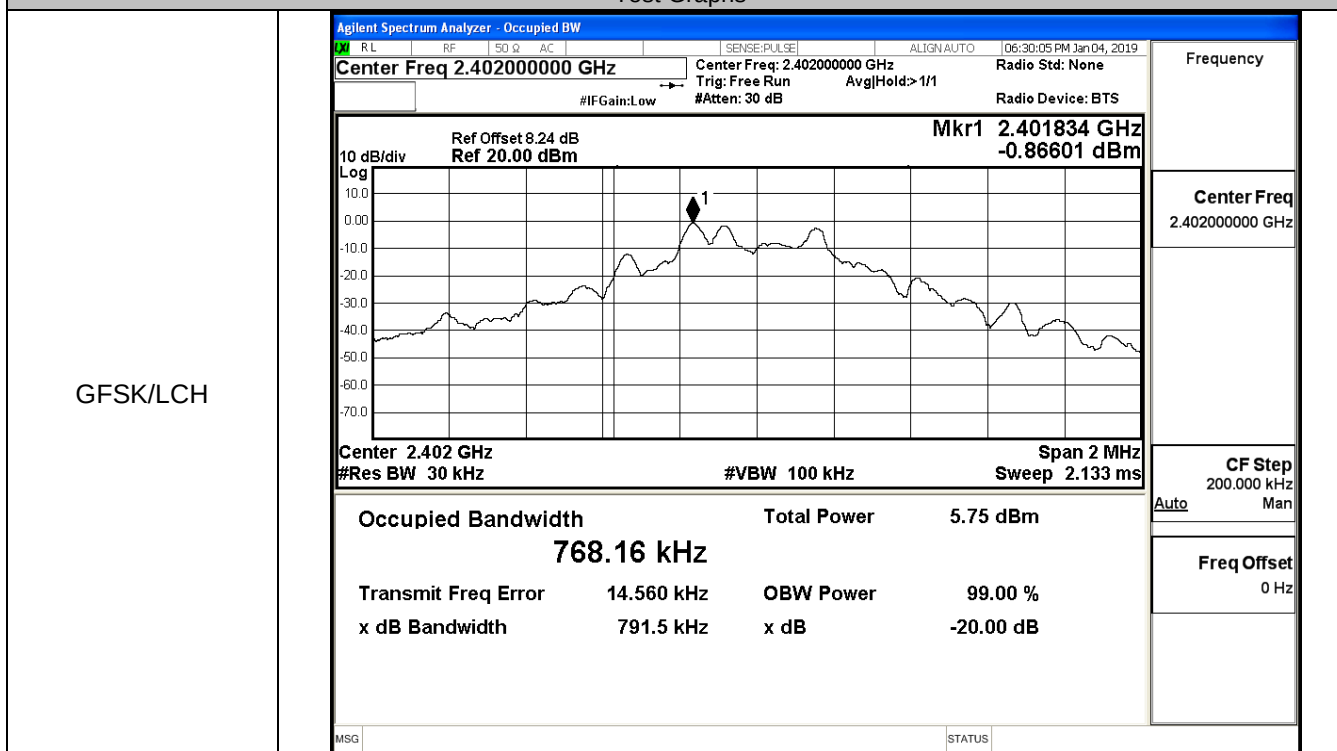
8DPSK/HCH



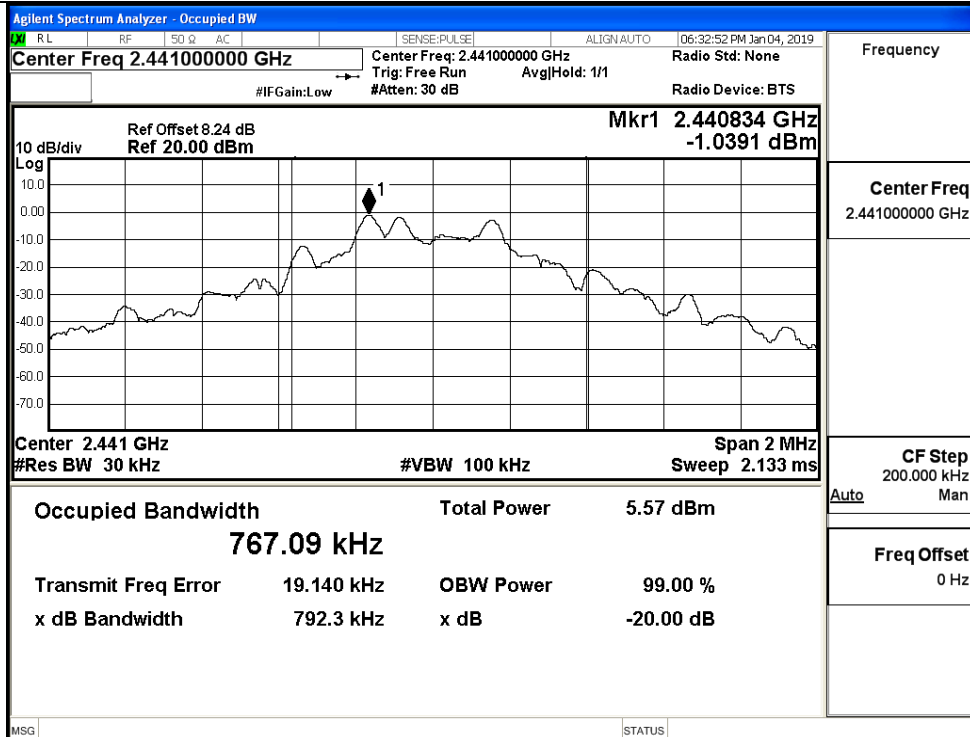
## A.2 99% and 20dB Bandwidth

| Mode          | Channel. | 99% Bandwidth [MHz] | 20dB Bandwidth [MHz] | Limit [MHz]   | Verdict |
|---------------|----------|---------------------|----------------------|---------------|---------|
| GFSK          | LCH      | 0.76816             | 0.7915               | Not Specified | PASS    |
|               | MCH      | 0.76709             | 0.7923               | Not Specified | PASS    |
|               | HCH      | 0.76301             | 0.7967               | Not Specified | PASS    |
| $\pi$ /4DQPSK | LCH      | 1.1110              | 1.148                | Not Specified | PASS    |
|               | MCH      | 1.1122              | 1.147                | Not Specified | PASS    |
|               | HCH      | 1.1159              | 1.146                | Not Specified | PASS    |
| 8DPSK         | LCH      | 1.1063              | 1.140                | Not Specified | PASS    |
|               | MCH      | 1.0951              | 1.128                | Not Specified | PASS    |
|               | HCH      | 1.1106              | 1.176                | Not Specified | PASS    |

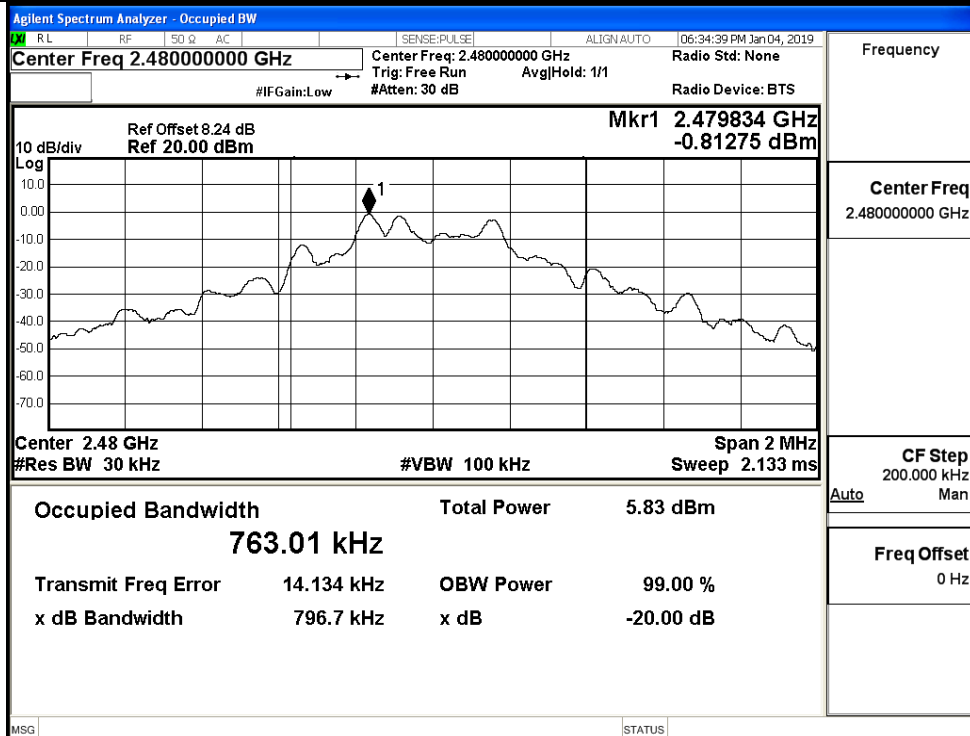
Test Graphs



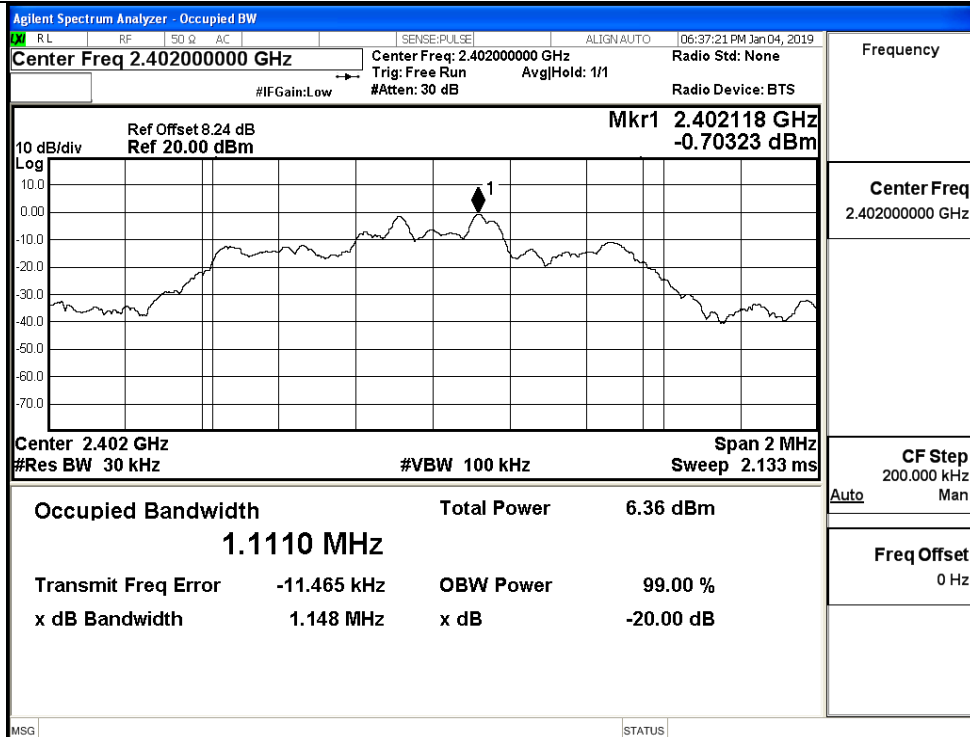
GFSK/MCH



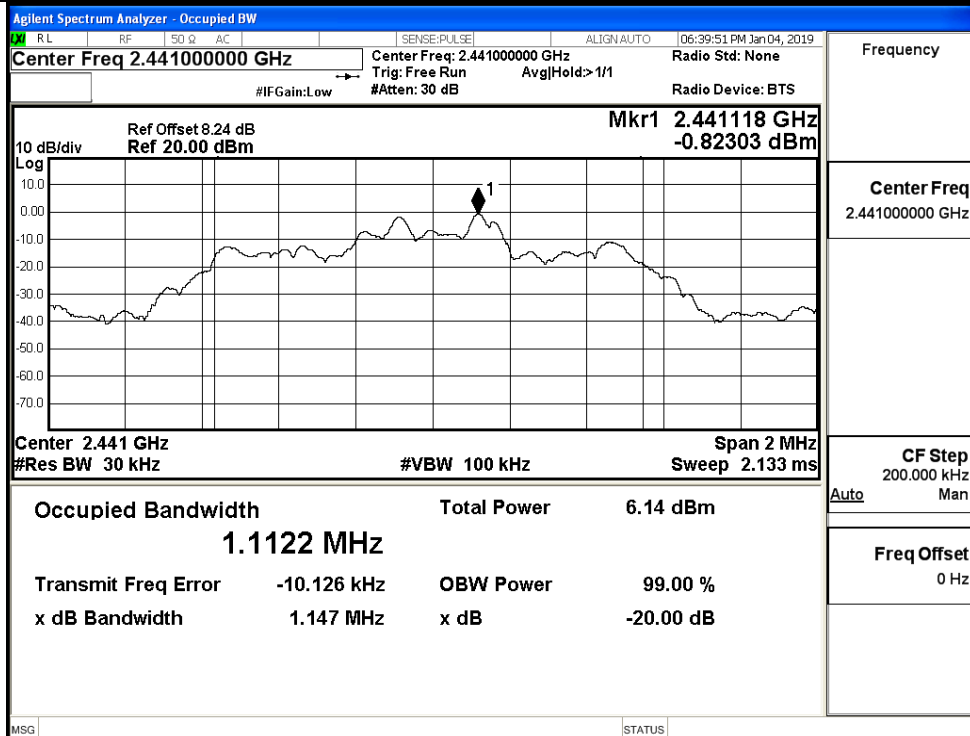
GFSK/HCH



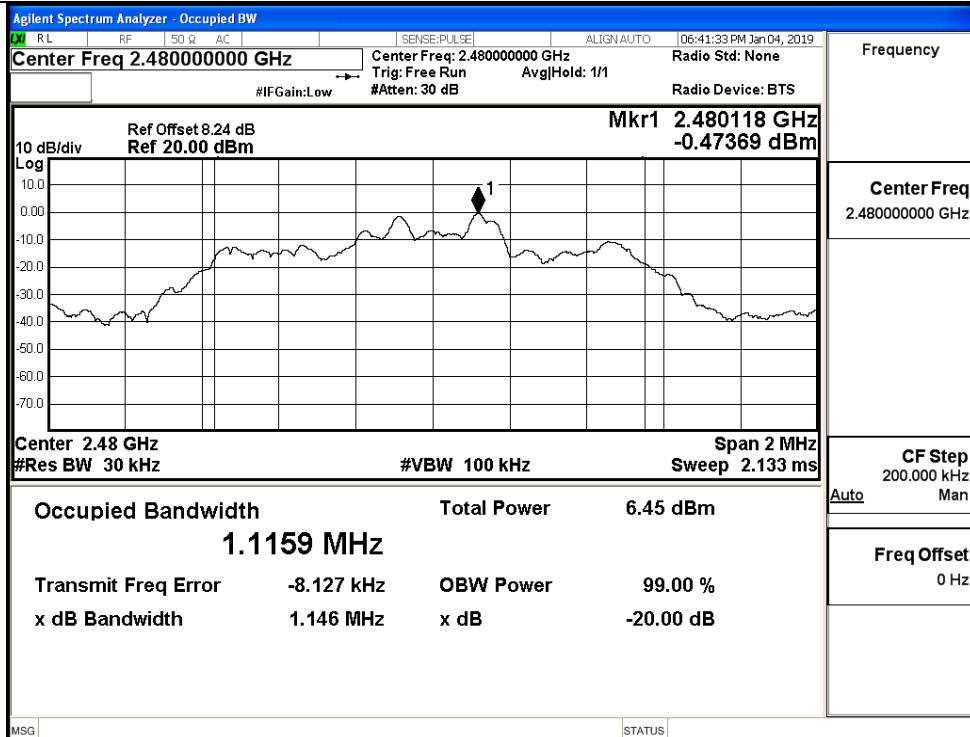
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH



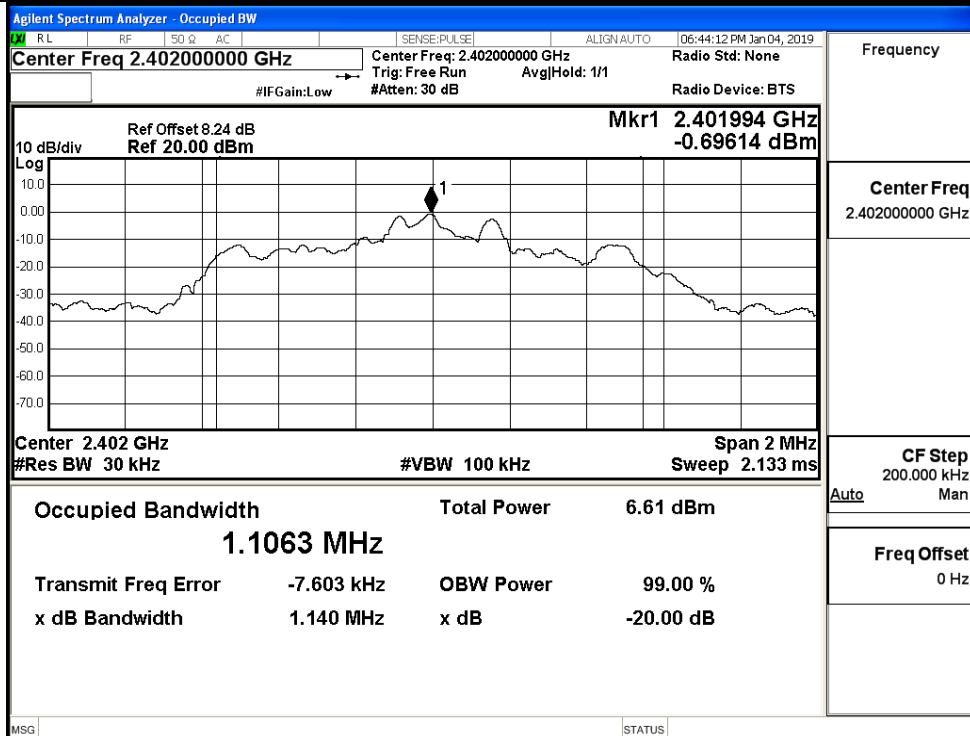
Frequency

Center Freq  
2.480000000 GHz

CF Step  
200.000 kHz

Freq Offset  
0 Hz

8DPSK/LCH



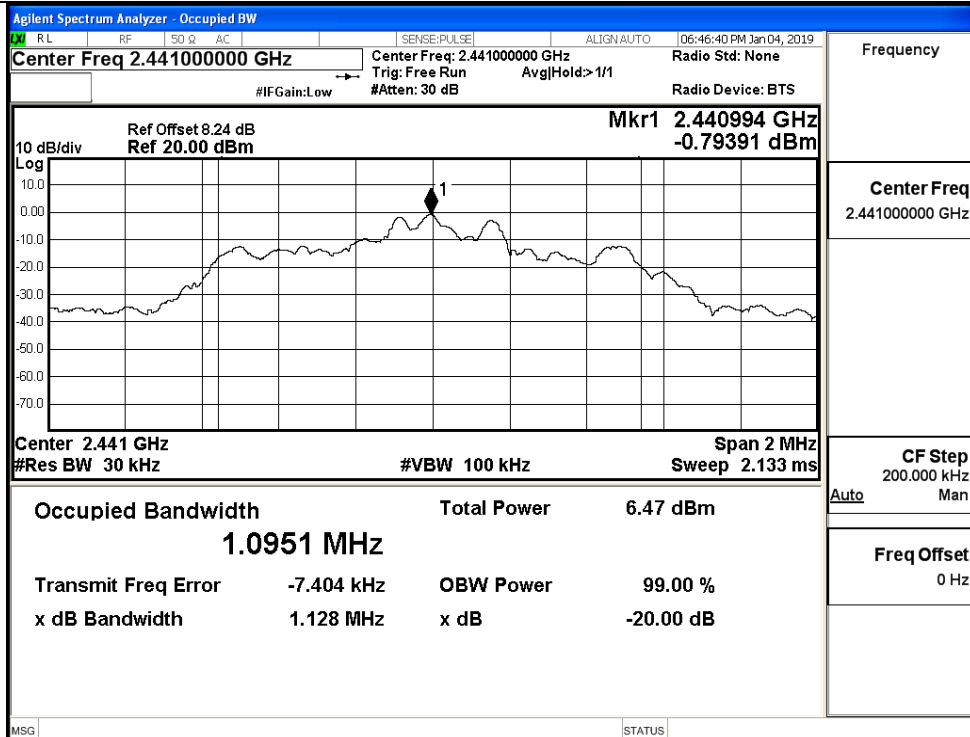
Frequency

Center Freq  
2.402000000 GHz

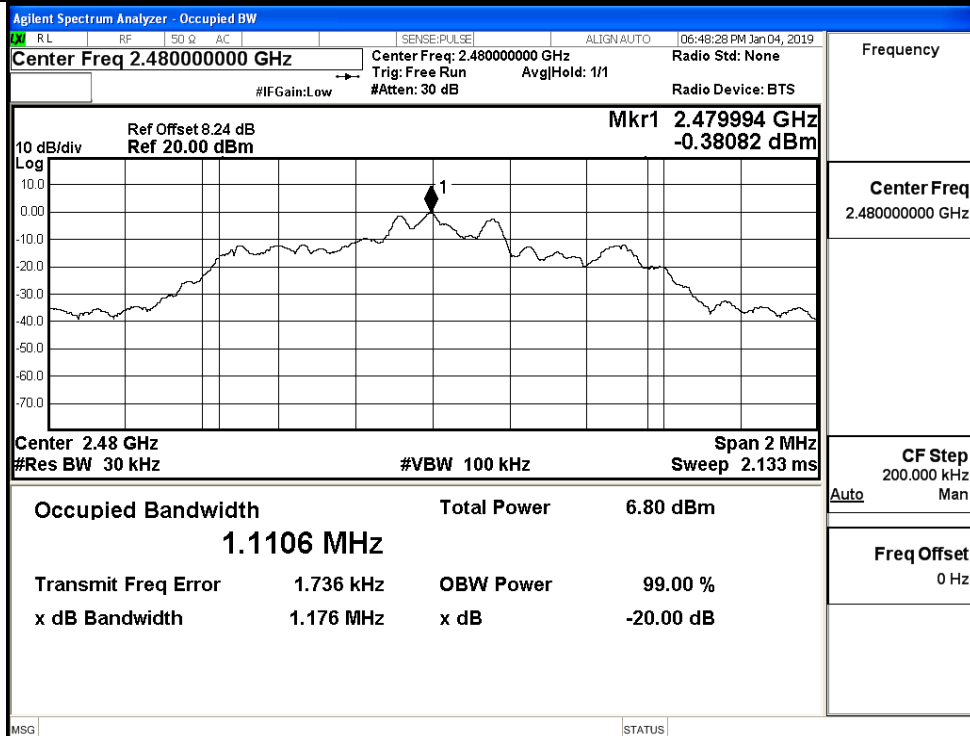
CF Step  
200.000 kHz

Freq Offset  
0 Hz

8DPSK/MCH



8DPSK/HCH

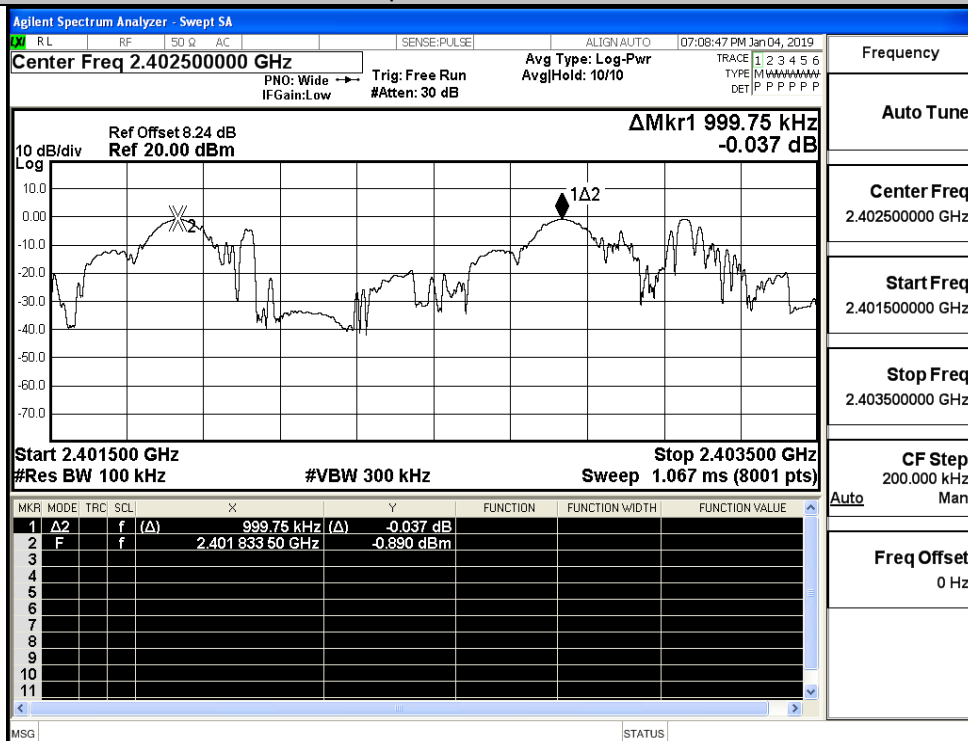


### A.3 Carrier Frequency Separation

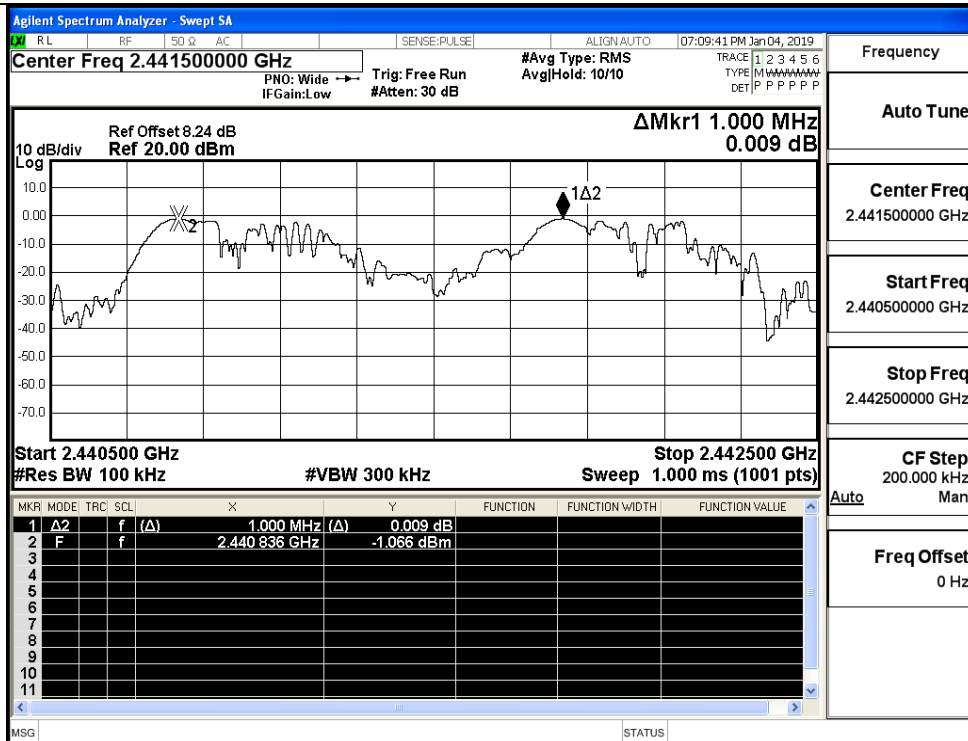
| Mode          | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK          | LCH      | 1.000                              | 0.531       | PASS    |
|               | MCH      | 1.000                              | 0.531       | PASS    |
|               | HCH      | 1.000                              | 0.531       | PASS    |
| $\pi$ /4DQPSK | LCH      | 0.998                              | 0.765       | PASS    |
|               | MCH      | 1.000                              | 0.765       | PASS    |
|               | HCH      | 1.000                              | 0.765       | PASS    |
| 8DPSK         | LCH      | 1.000                              | 0.784       | PASS    |
|               | MCH      | 1.000                              | 0.784       | PASS    |
|               | HCH      | 1.000                              | 0.784       | PASS    |

#### Test Graphs

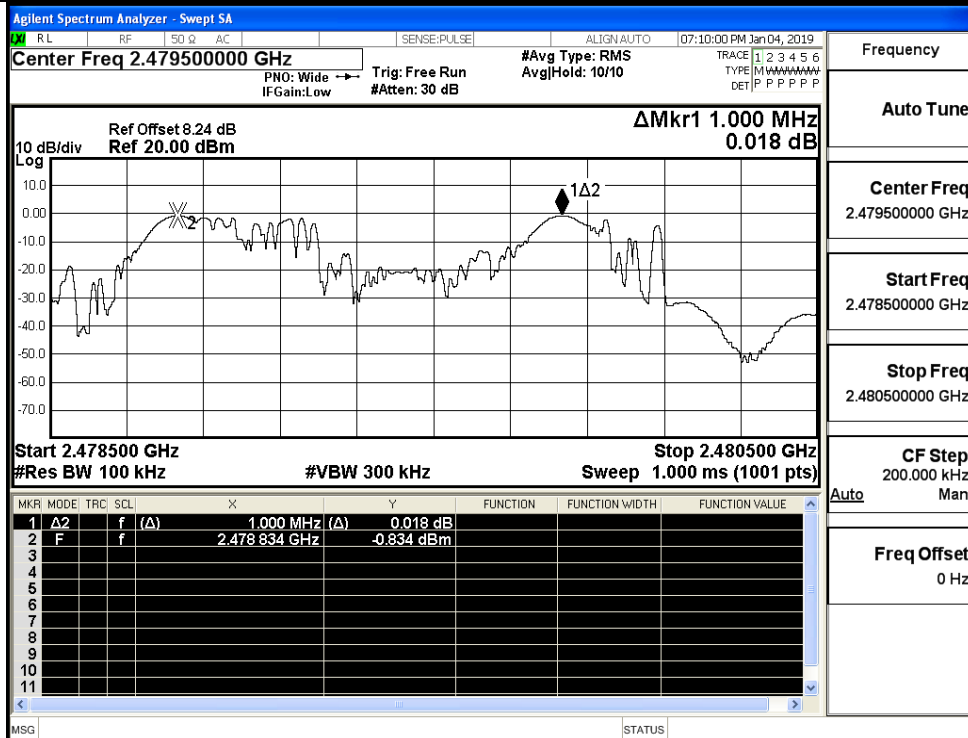
GFSK/LCH



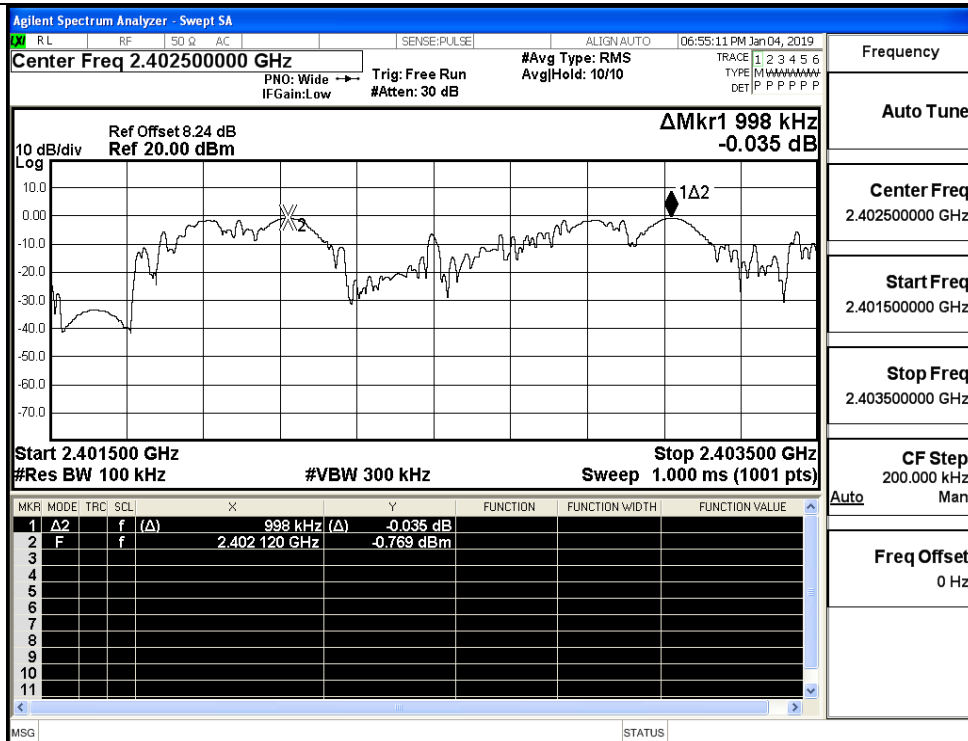
GFSK/MCH



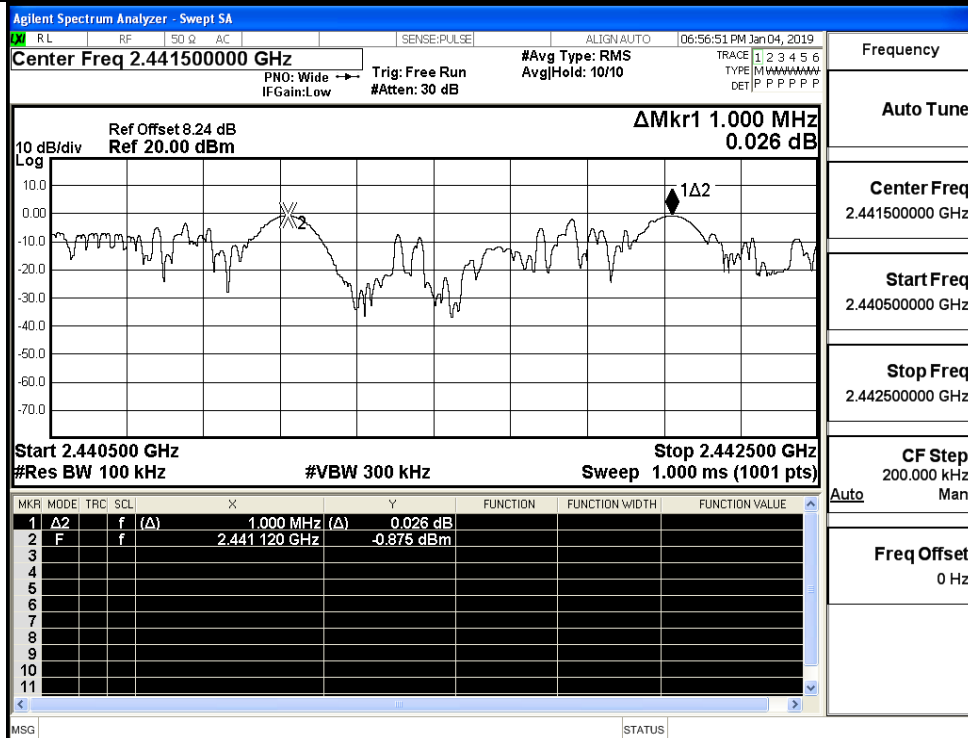
GFSK/HCH



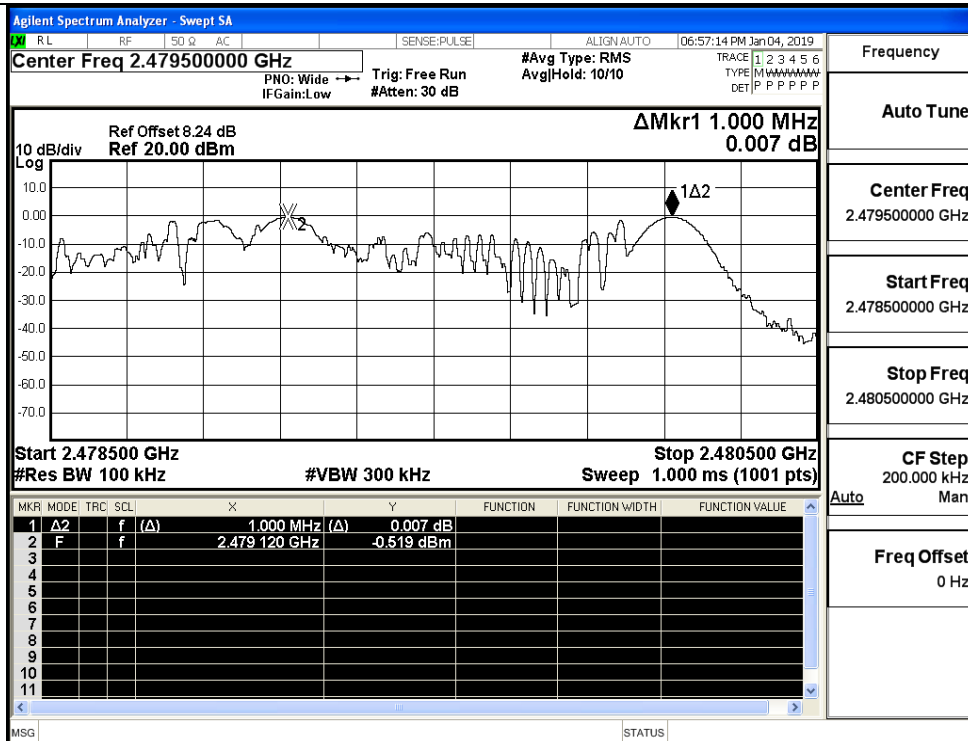
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH



Frequency

Auto Tune

Center Freq  
2.479500000 GHz

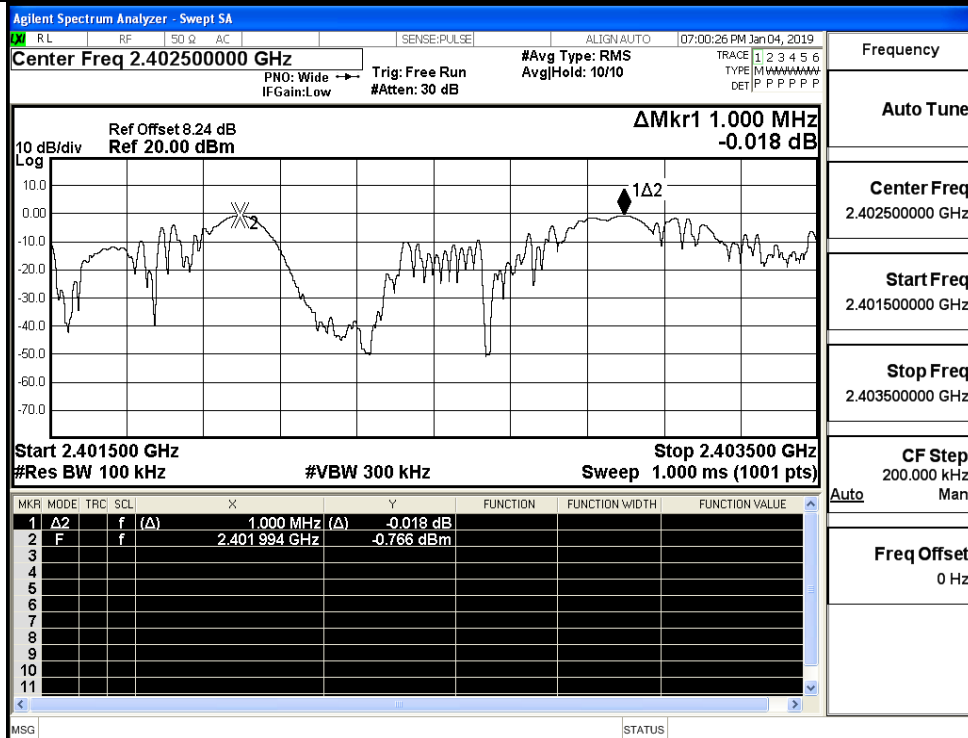
Start Freq  
2.478500000 GHz

Stop Freq  
2.480500000 GHz

CF Step  
200.000 kHz  
Man

Freq Offset  
0 Hz

8DPSK/LCH



Frequency

Auto Tune

Center Freq  
2.402500000 GHz

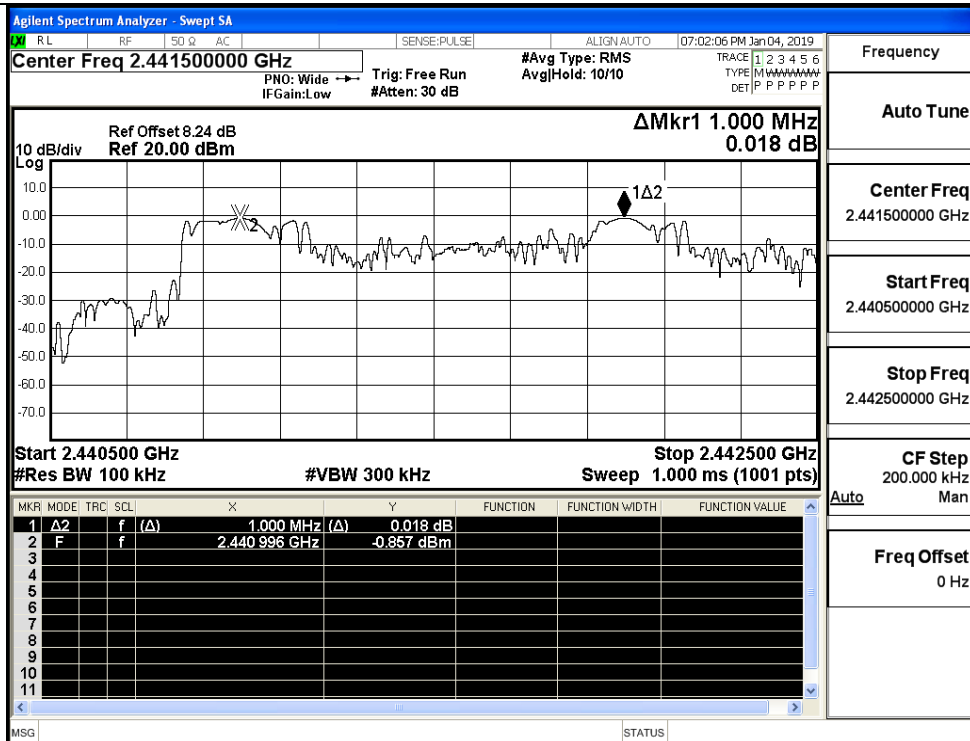
Start Freq  
2.401500000 GHz

Stop Freq  
2.403500000 GHz

CF Step  
200.000 kHz  
Man

Freq Offset  
0 Hz

8DPSK/MCH



Frequency

Auto Tune

Center Freq  
2.441500000 GHz

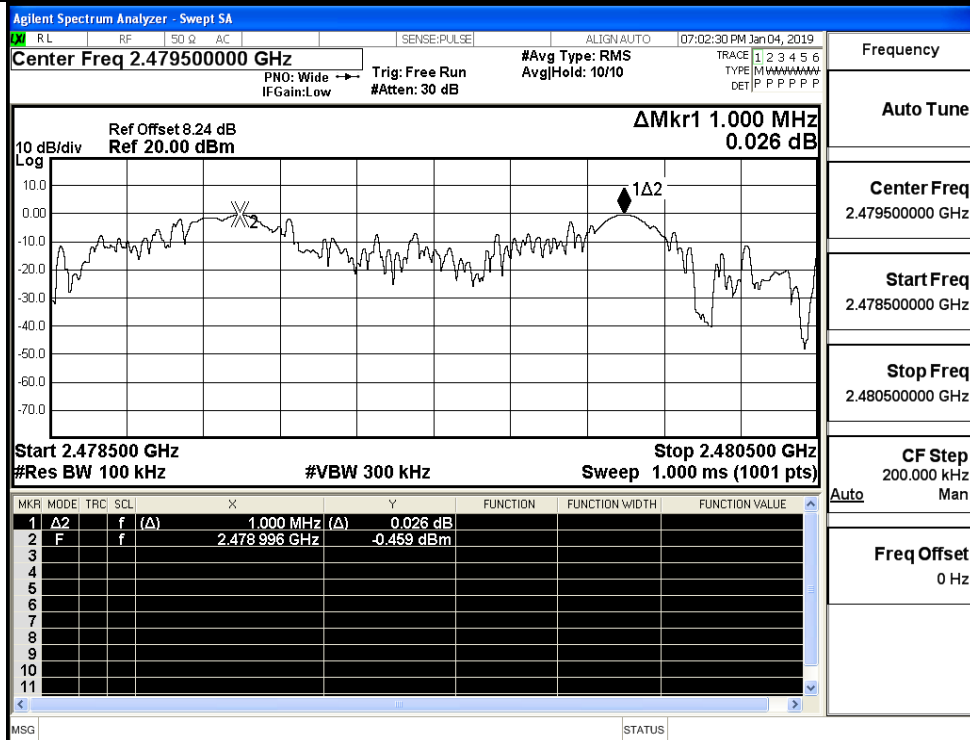
Start Freq  
2.440500000 GHz

Stop Freq  
2.442500000 GHz

CF Step  
200.000 kHz  
Man

Freq Offset  
0 Hz

8DPSK/HCH



Frequency

Auto Tune

Center Freq  
2.479500000 GHz

Start Freq  
2.478500000 GHz

Stop Freq  
2.480500000 GHz

CF Step  
200.000 kHz  
Man

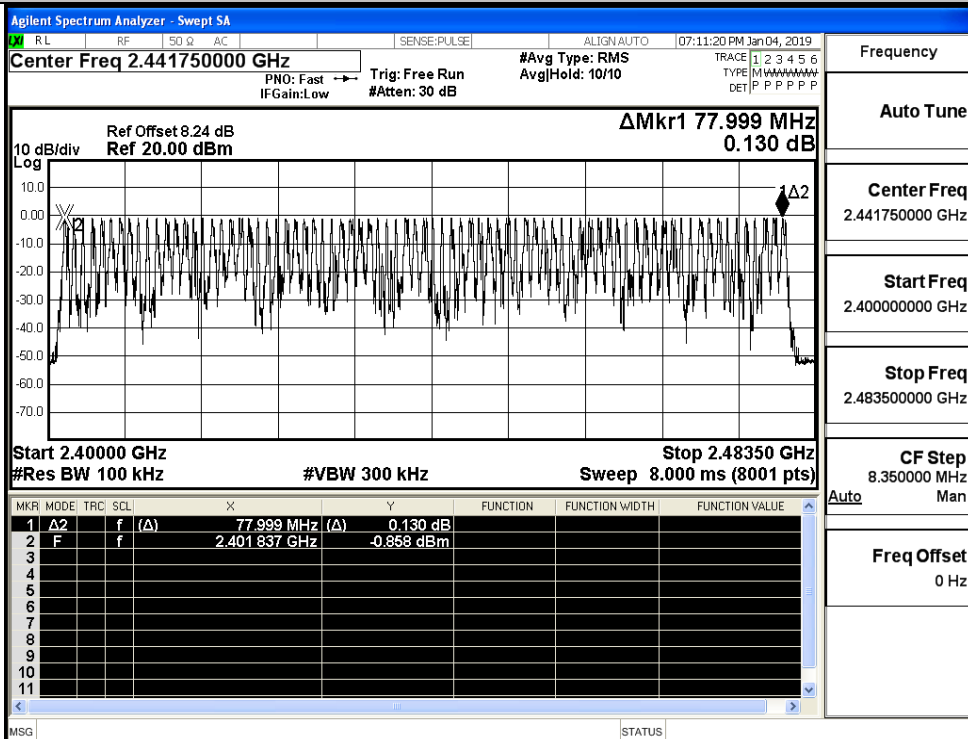
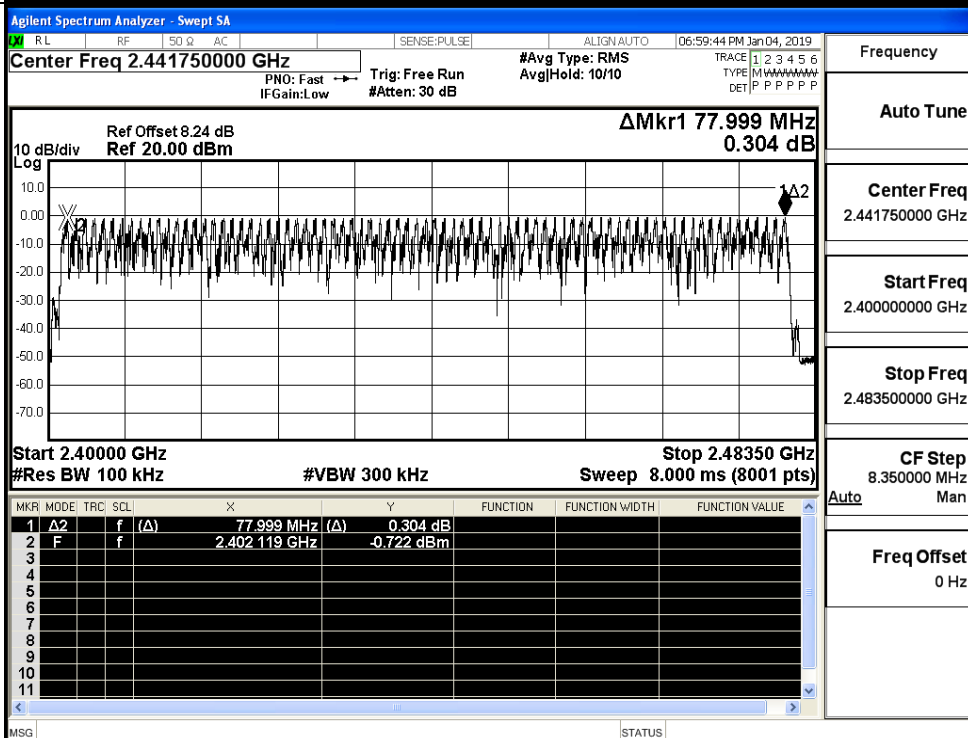
Freq Offset  
0 Hz

## A.4 Hopping Channel Number

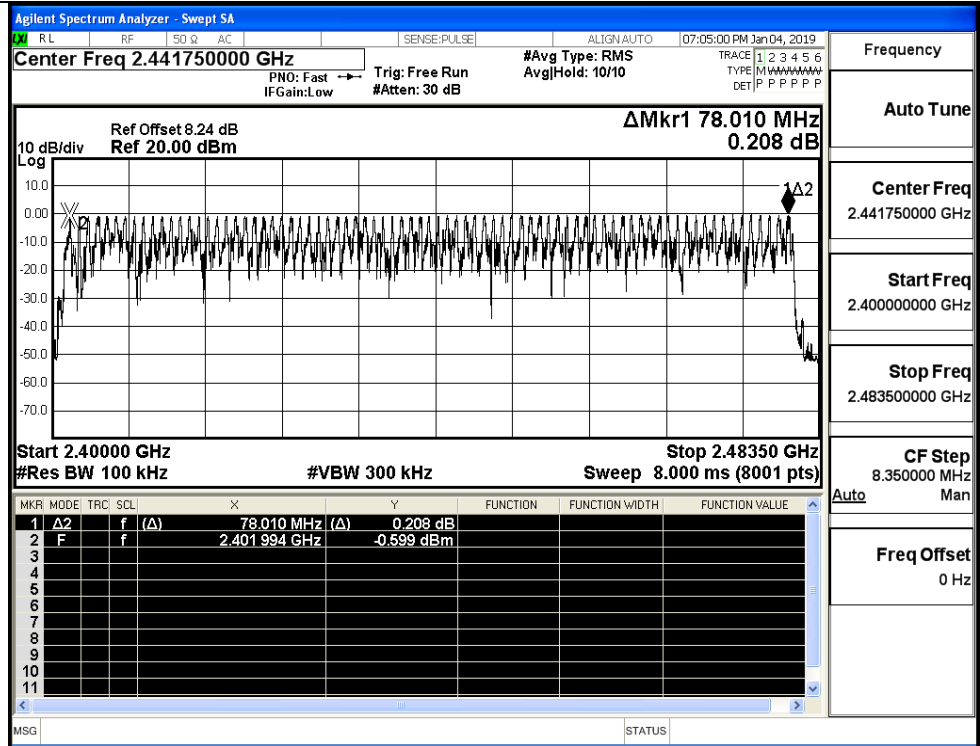
| Mode          | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---------------|----------|-------------------------------|-----------|---------|
| GFSK          | Hop      | 79                            | $\geq 15$ | PASS    |
| $\pi/4$ DQPSK | Hop      | 79                    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

## Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

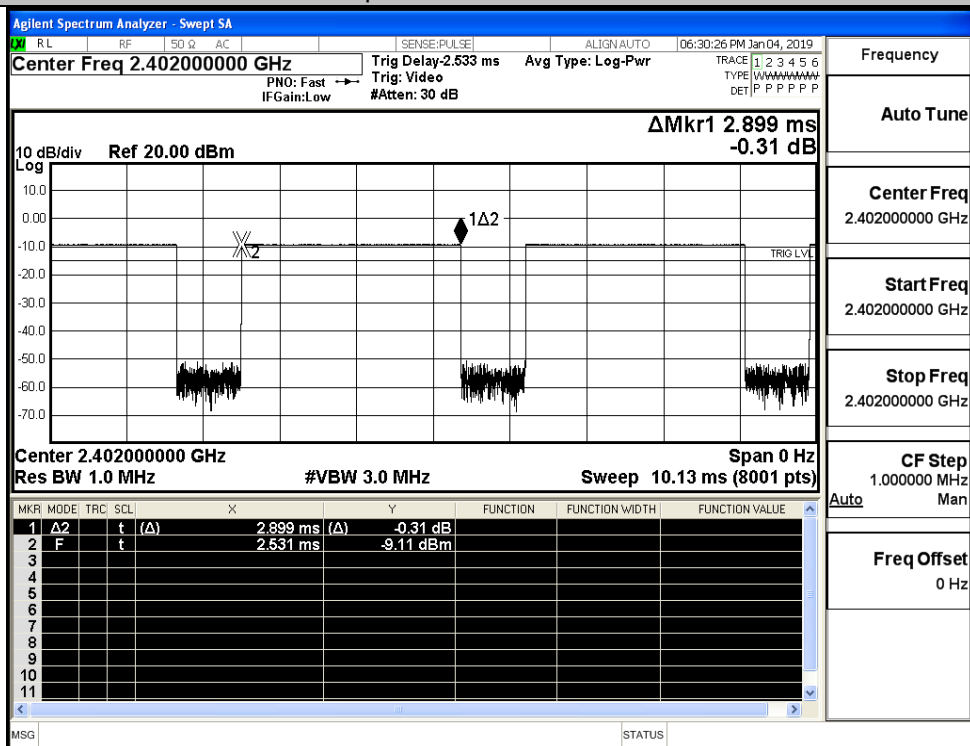


## A.5 Dwell Time

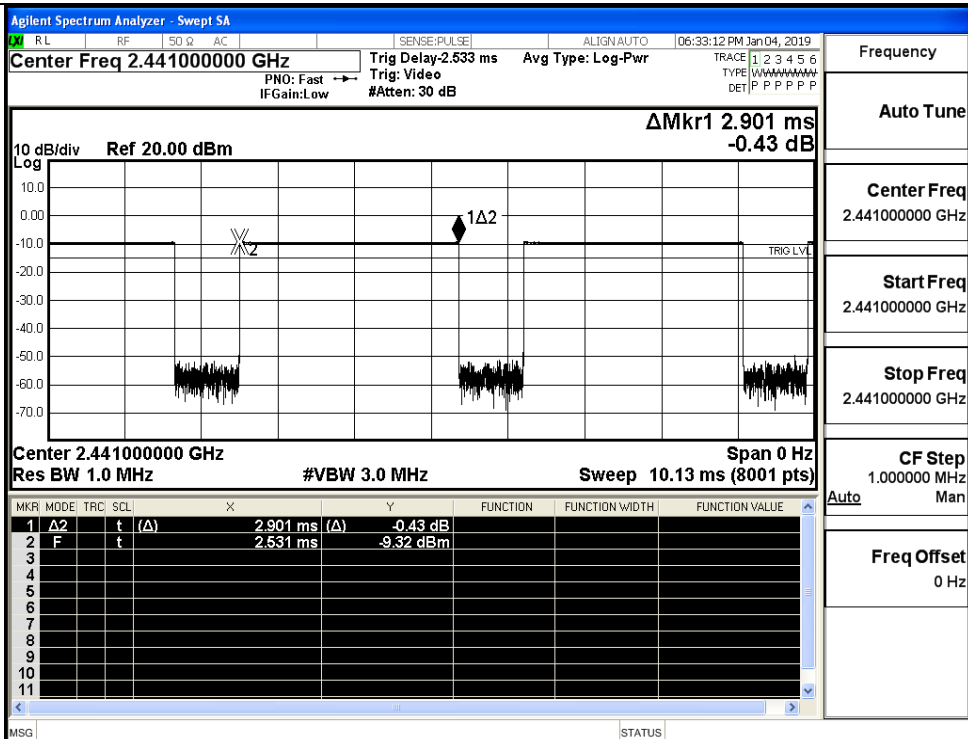
| Mode          | Packet | Channel | Burst Width<br>[ms/hop/ch] | Total<br>Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---------------|--------|---------|----------------------------|-----------------------|---------------|-----------|---------|
| GFSK          | DH5    | LCH     | 2.90                       | 106.7                 | 0.309         | 0.4       | PASS    |
|               | DH5    | MCH     | 2.90                       | 106.7                 | 0.309         | 0.4       | PASS    |
|               | DH5    | HCH     | 2.90                       | 106.7                 | 0.309         | 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                 | 0.308         | 0.4       | PASS    |
|               | 3DH5   | HCH     | 2.89                       | 106.7                 | 0.308         | 0.4       | PASS    |

Test Graphs

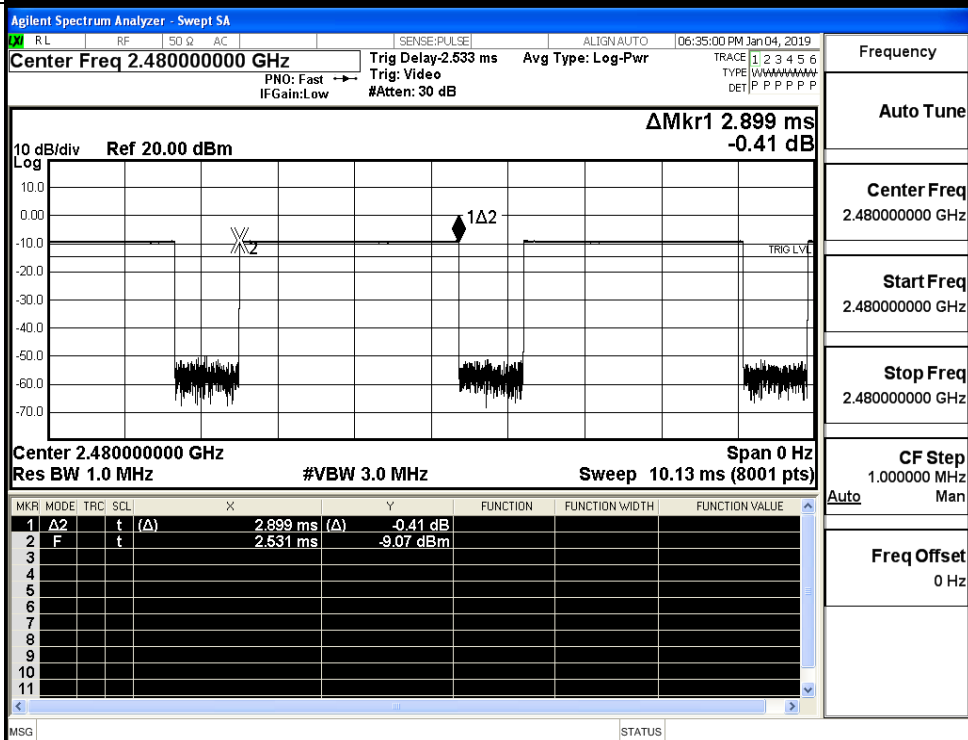
GFSK\_DH5/LCH



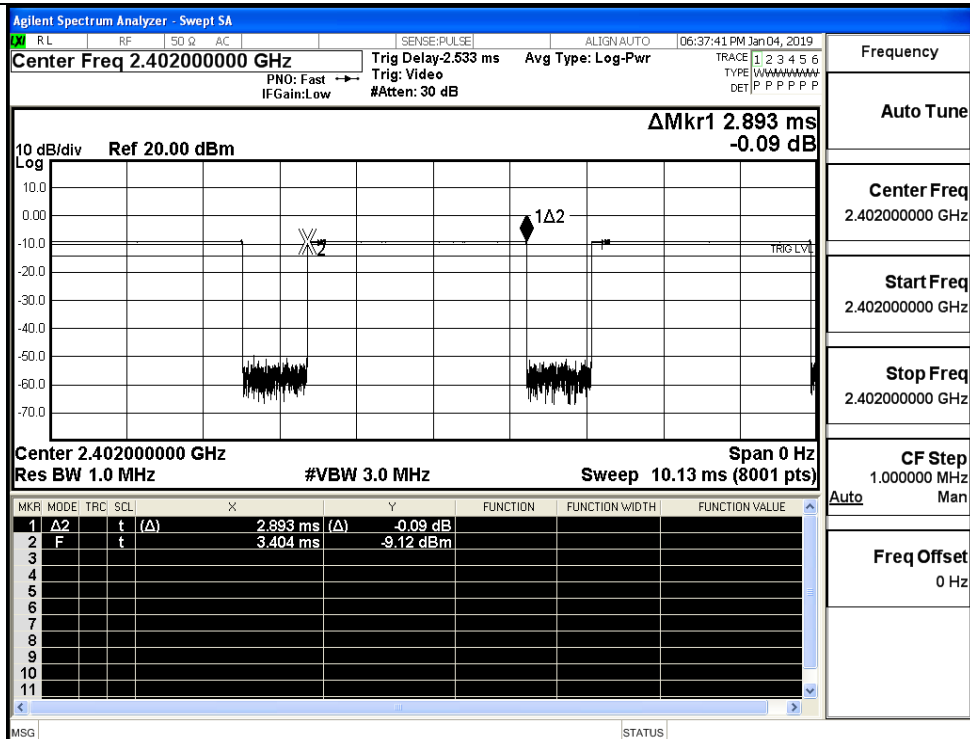
GFSK\_DH5/MCH



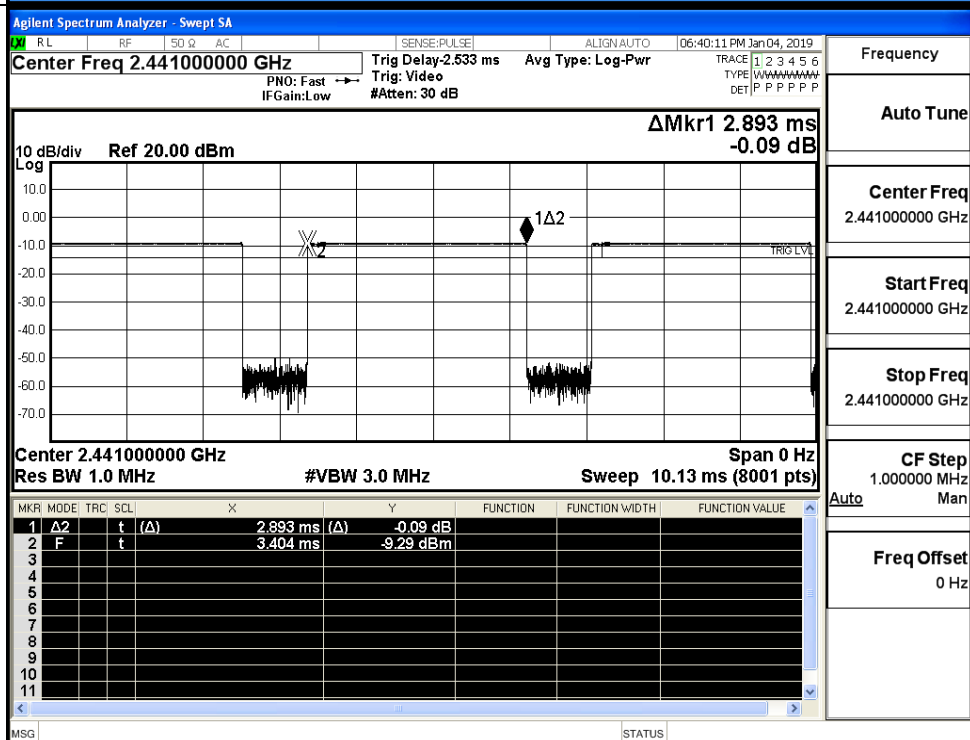
GFSK\_DH5/HCH



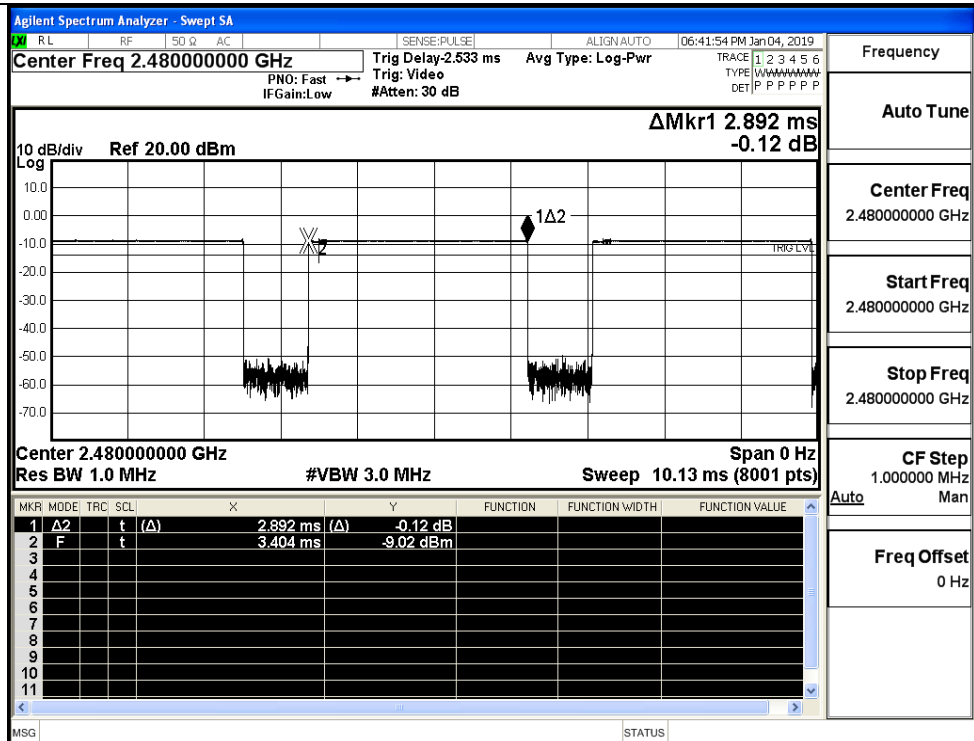
$\pi/4$ DQPSK  
\_2DH5/LCH



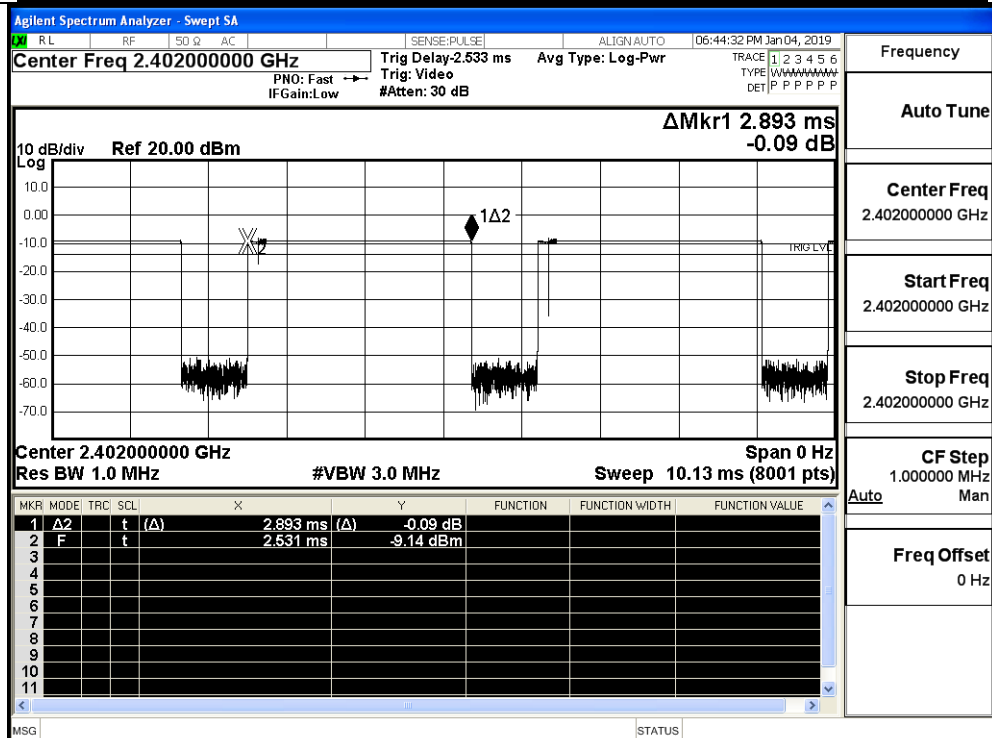
$\pi/4$ DQPSK  
\_2DH5/MCH



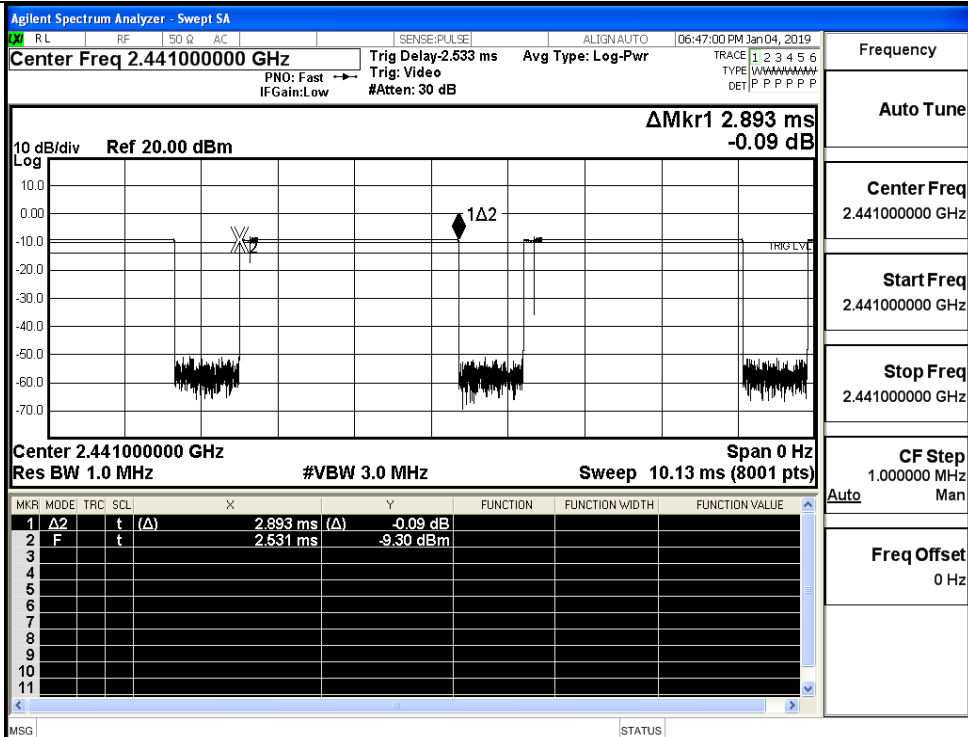
$\pi/4$ DQPSK  
\_2DH5/HCH



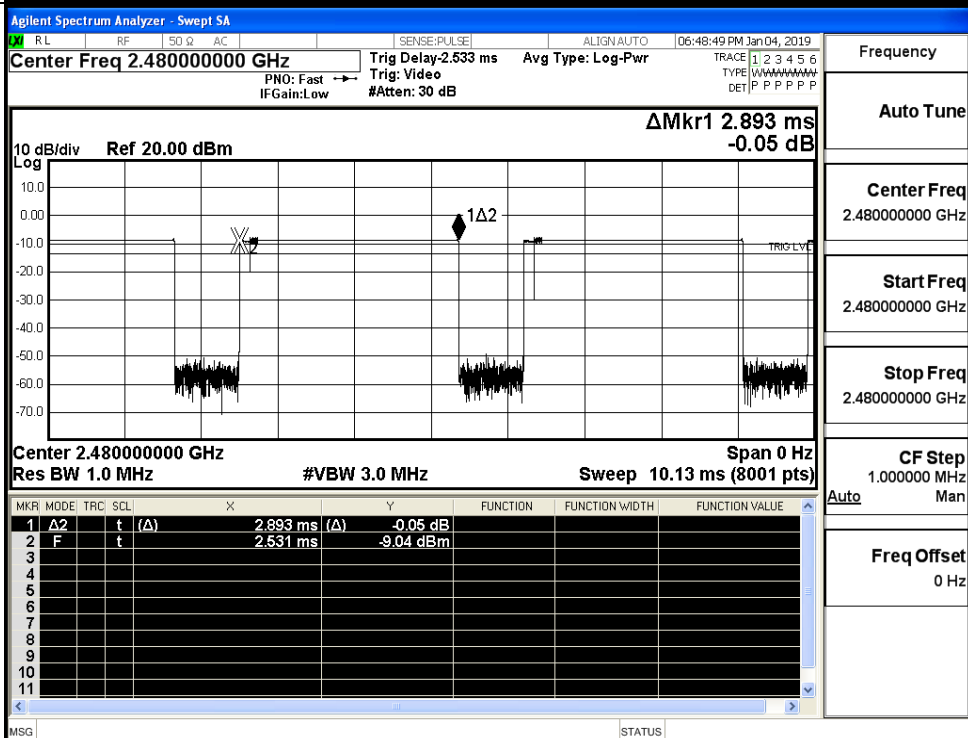
8DPSK \_3DH5/LCH



8DPSK\_3DH5/MCH



8DPSK\_3DH5/HCH

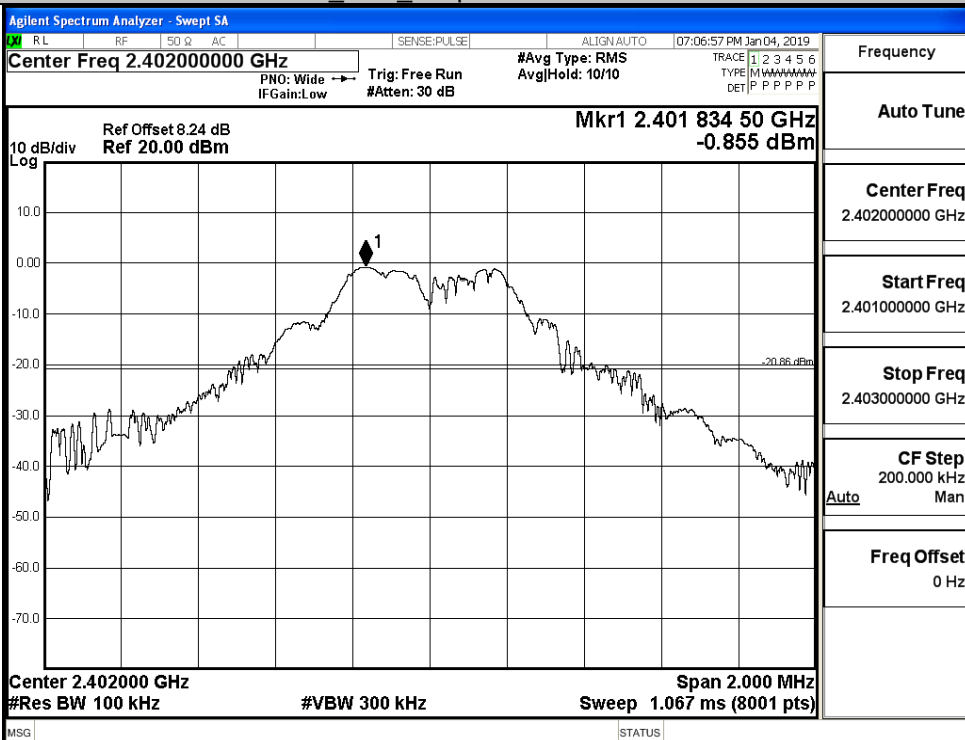


## A.6 RF Conducted Spurious Emissions

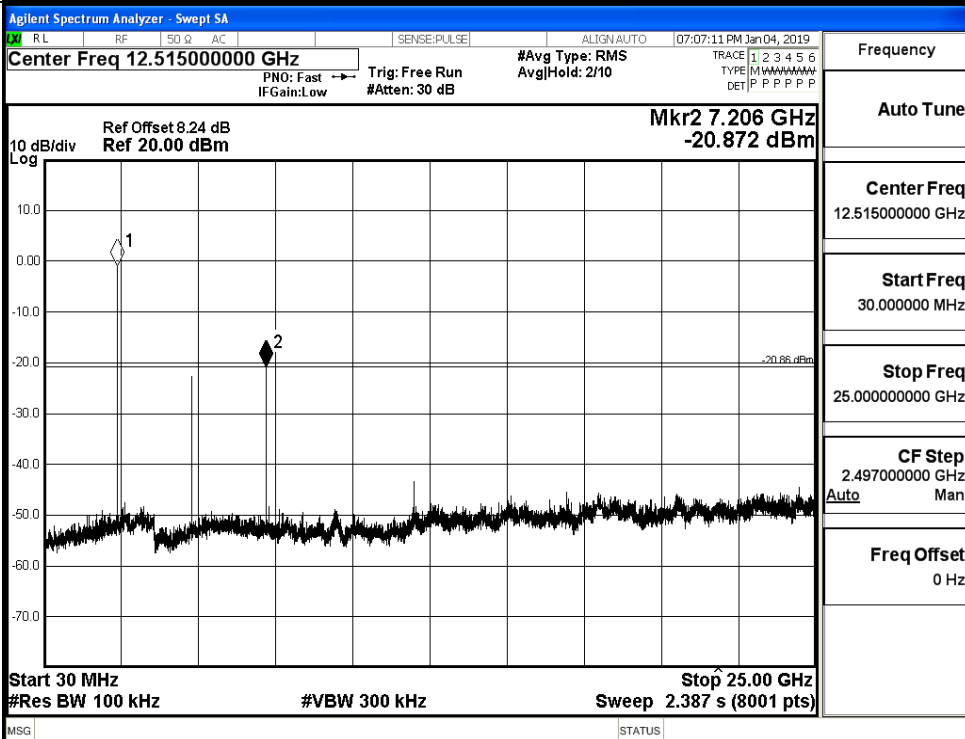
| Mode          | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|------------|------------------|-------------|---------|
| GFSK          | LCH     | -0.855     | -20.872          | -20.855     | PASS    |
|               | MCH     | -1.092     | -22.273          | -21.092     | PASS    |
|               | HCH     | -0.837     | -22.078          | -20.837     | PASS    |
| $\pi/4$ DQPSK | LCH     | 0.666      | -20.025          | -19.334     | PASS    |
|               | MCH     | -0.857     | -21.816          | -20.857     | PASS    |
|               | HCH     | -0.513     | -21.827          | -20.513     | PASS    |
| 8DPSK         | LCH     | -0.747     | -21.830          | -20.747     | PASS    |
|               | MCH     | -0.834     | -21.174          | -20.834     | PASS    |
|               | HCH     | -0.434     | -21.167          | -20.434     | PASS    |

# GFSK LCH Graphs

Pref

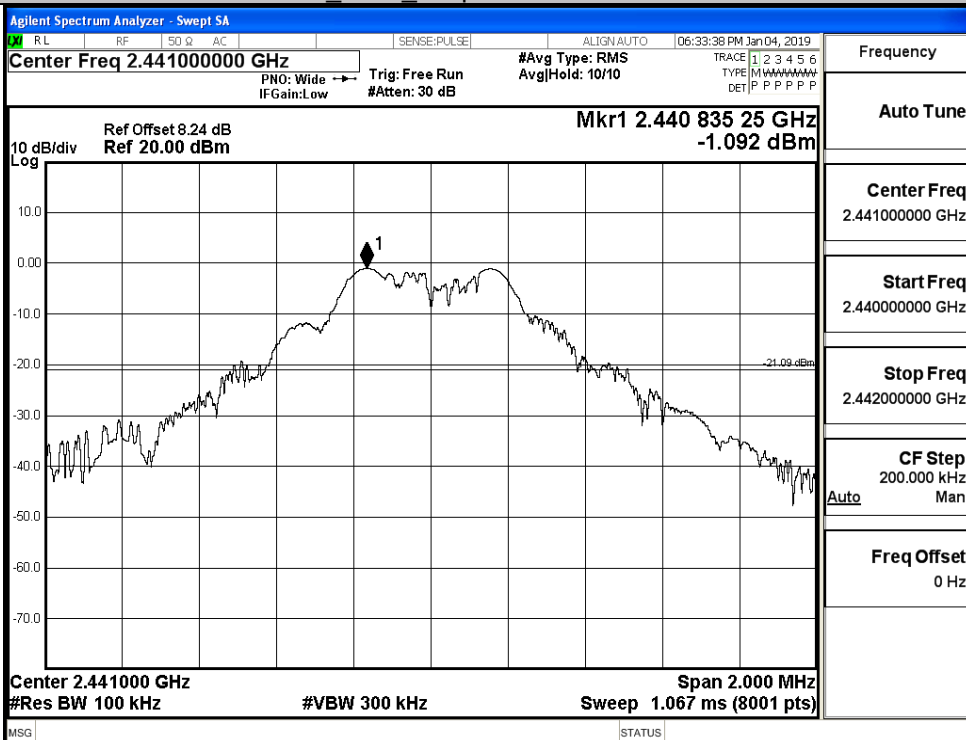


Puw

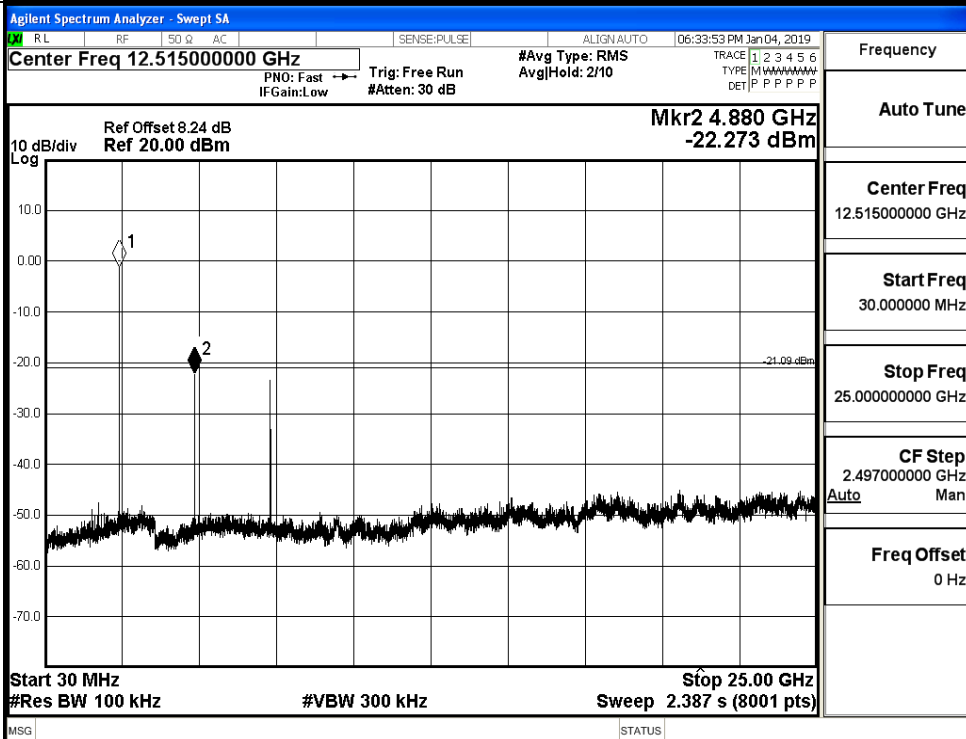


# GFSK\_MCH\_Graphs

Pref

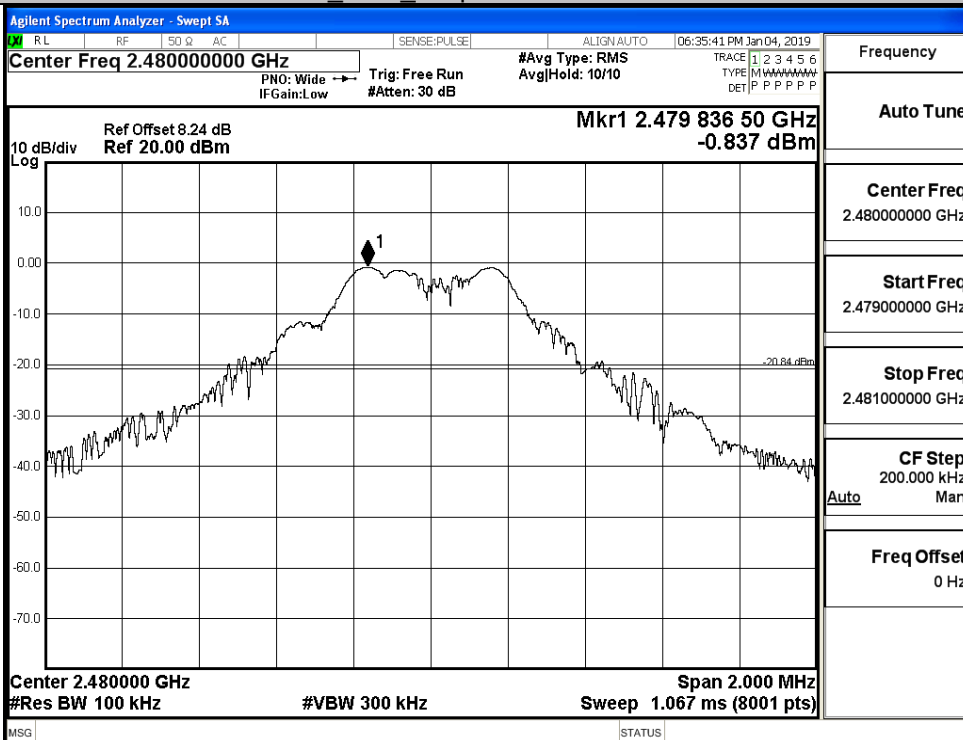


Puw

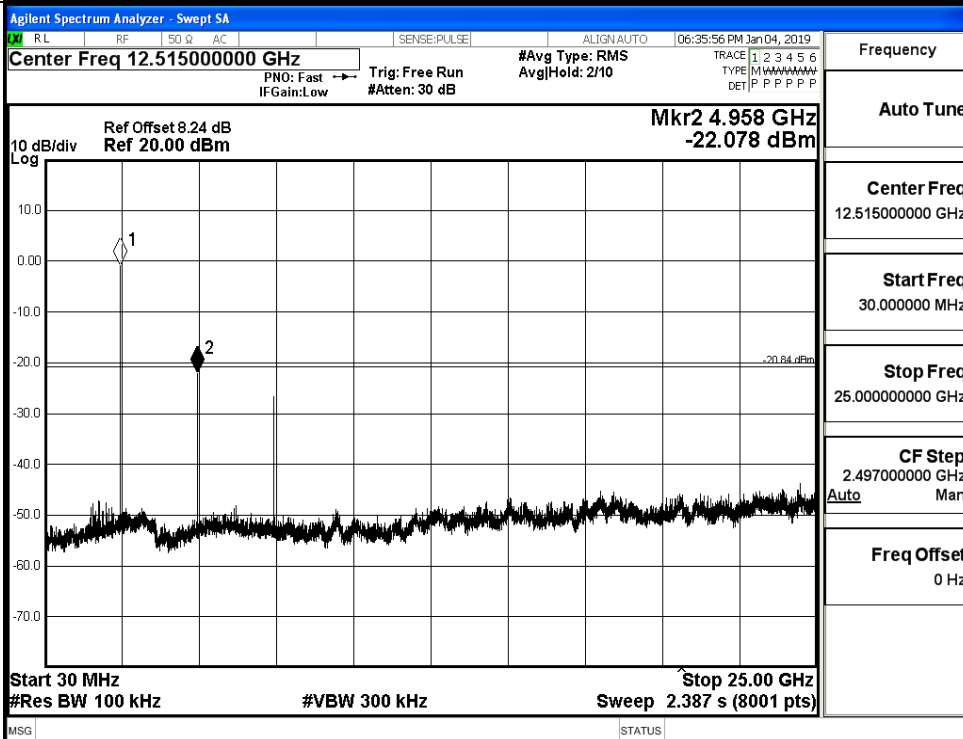


# GFSK HCH\_Graphs

Pref

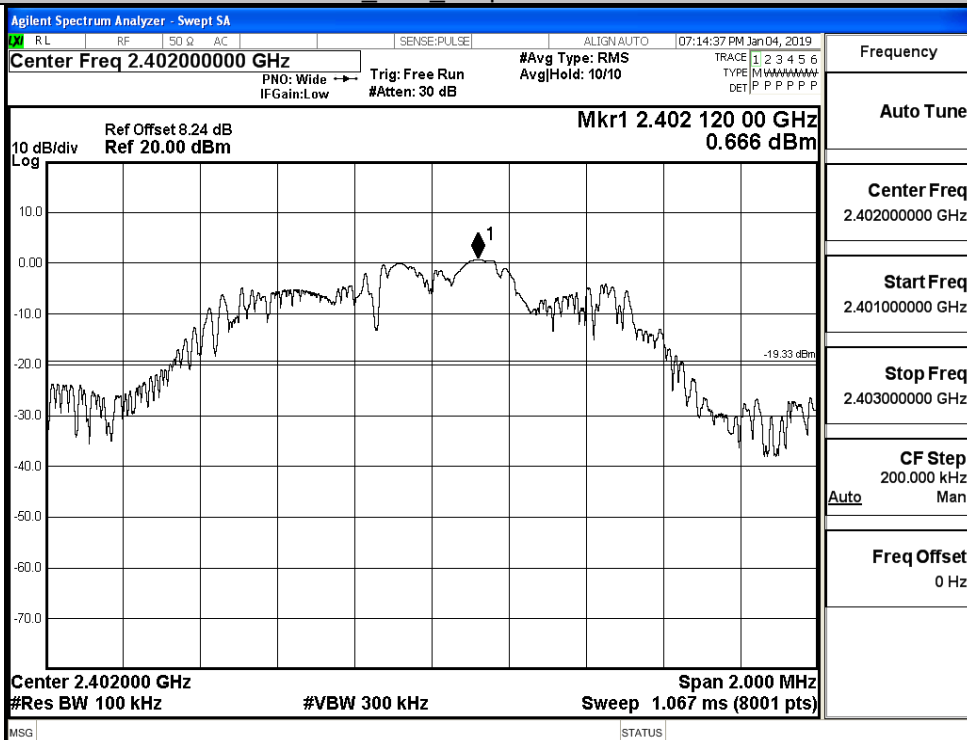


Puw

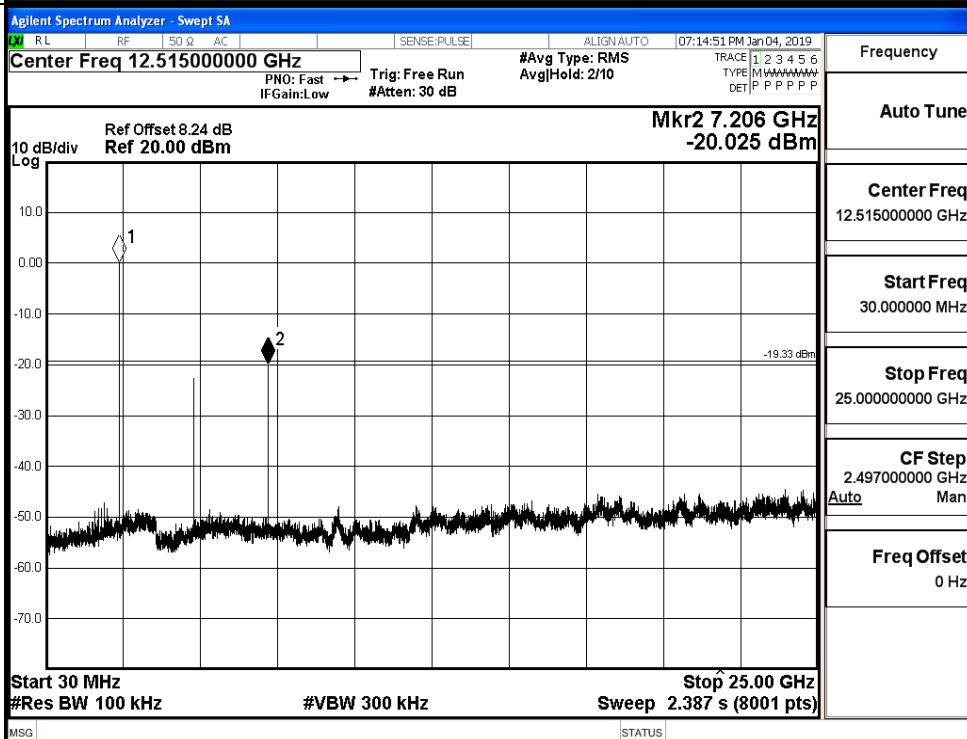


$\pi/4$ DQPSK LCH\_Graphs

Pref

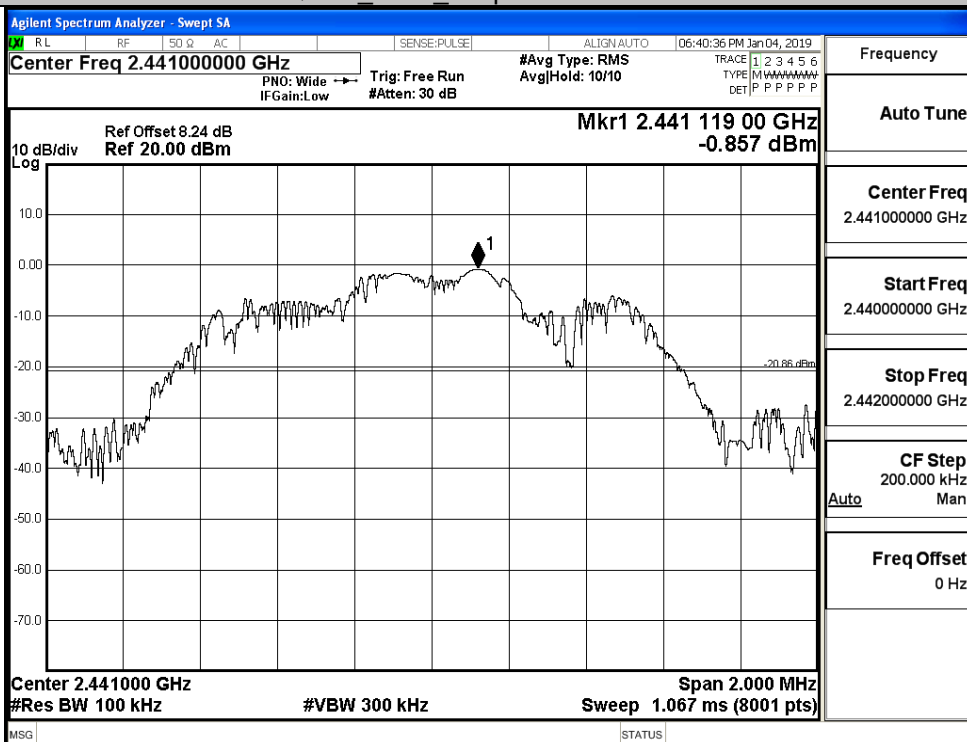


Puw

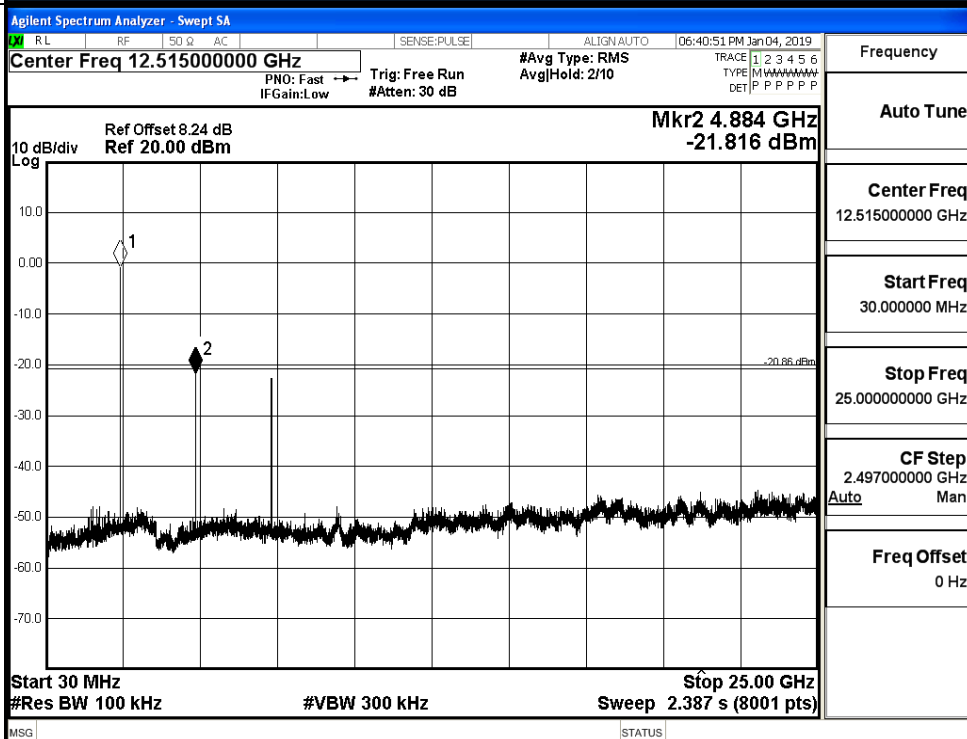


$\pi$ /4DQPSK\_MCH\_Graphs

Pref

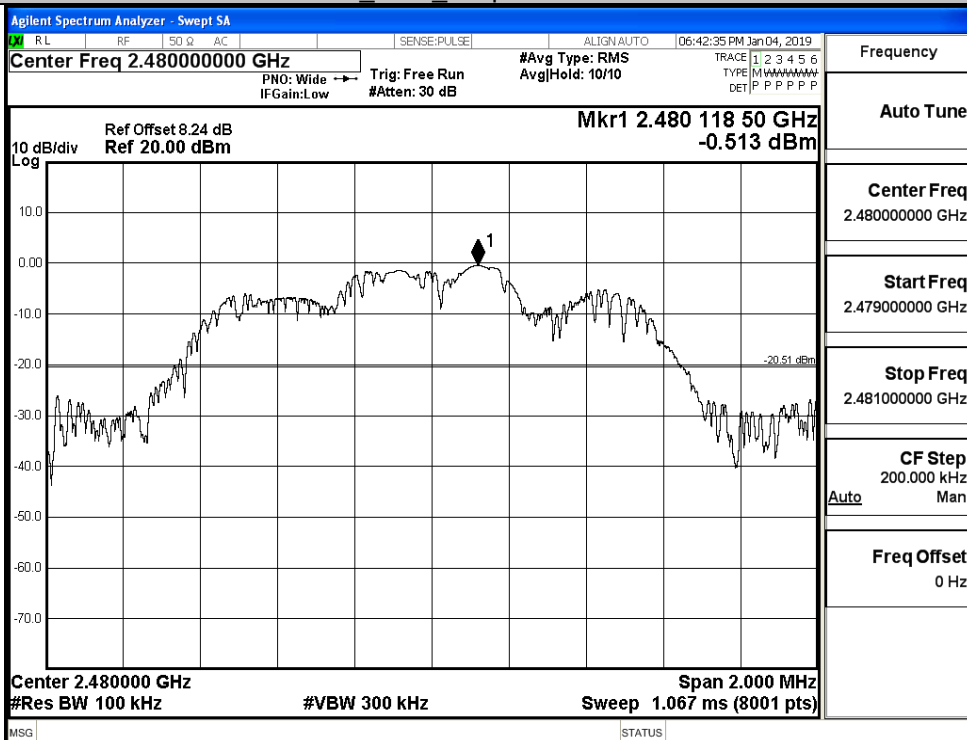


Puw

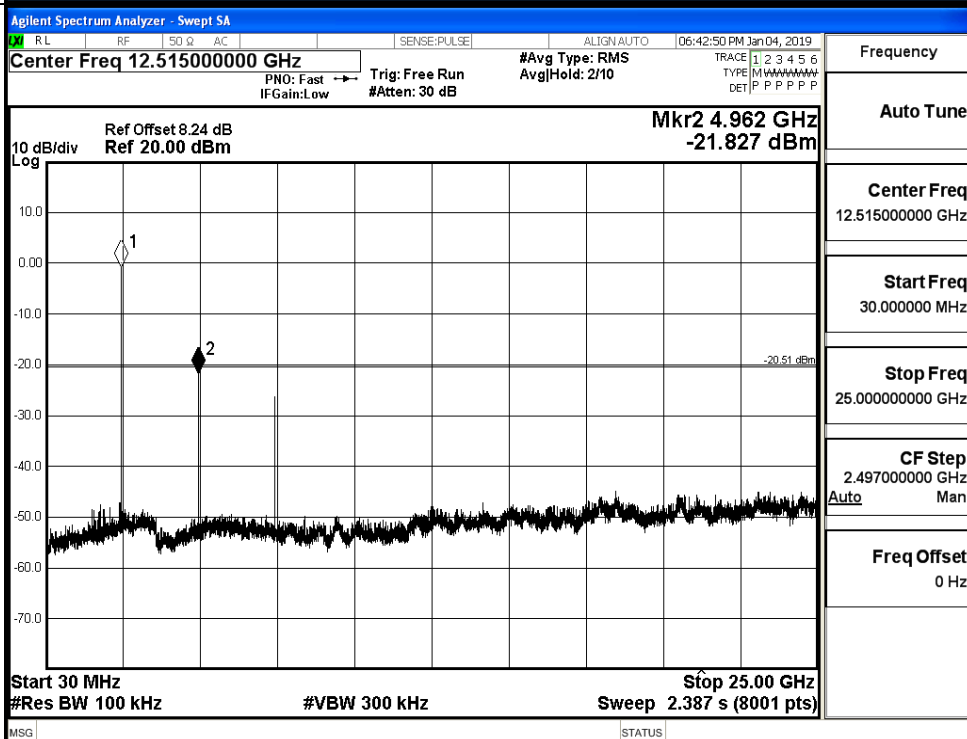


$\pi/4$ DQPSK\_HCH\_Graphs

Pref

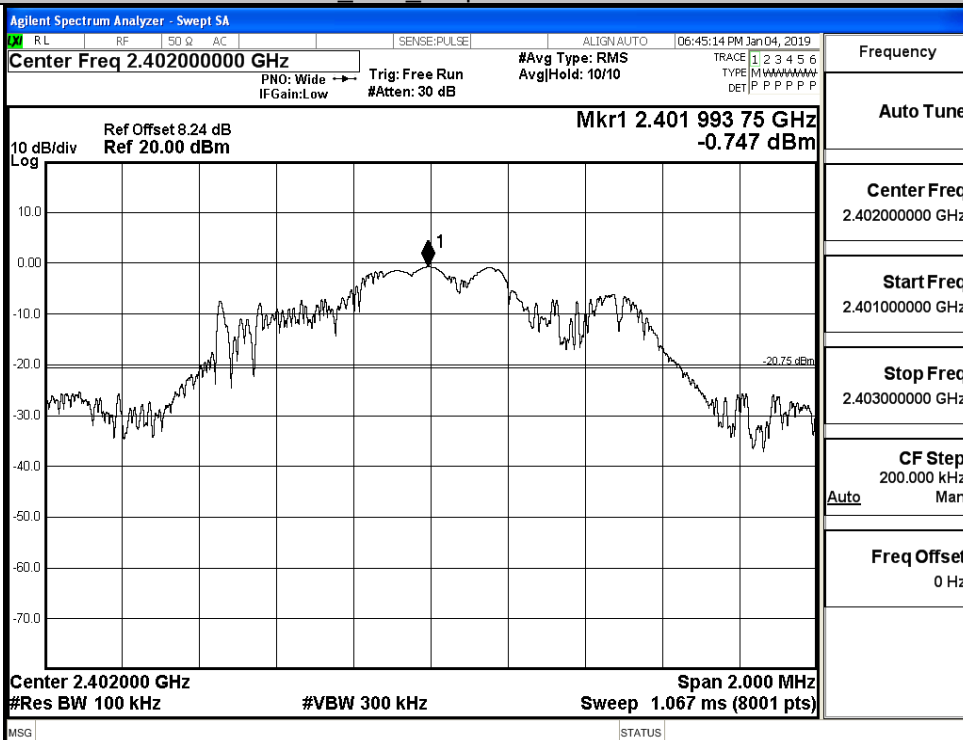


Puw

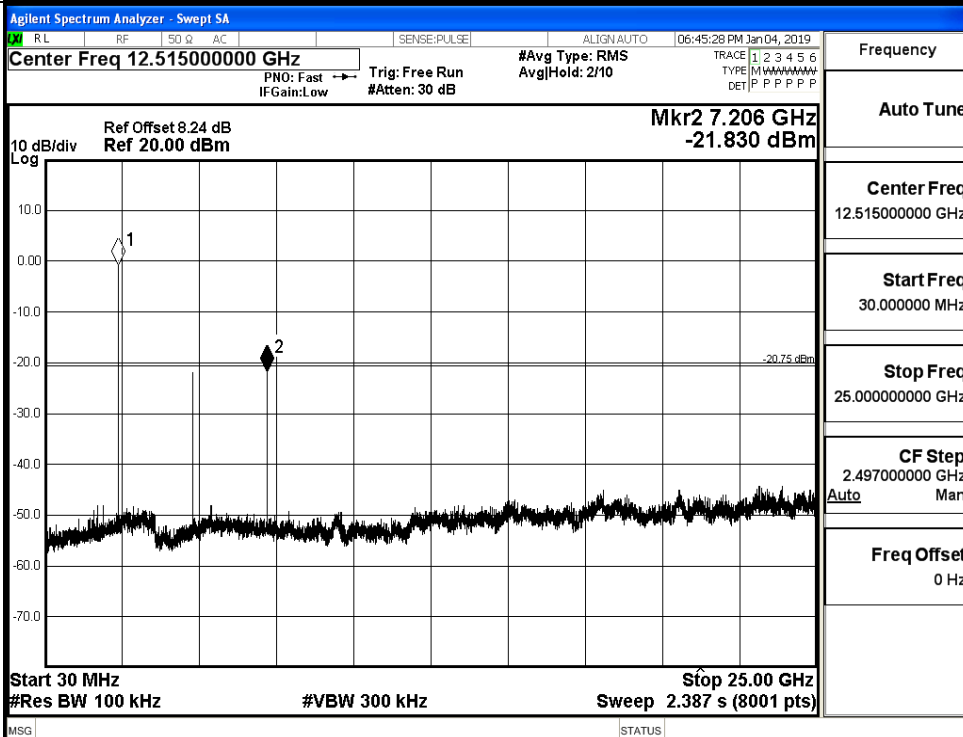


# 8DPSK\_LCH\_Graphs

Pref

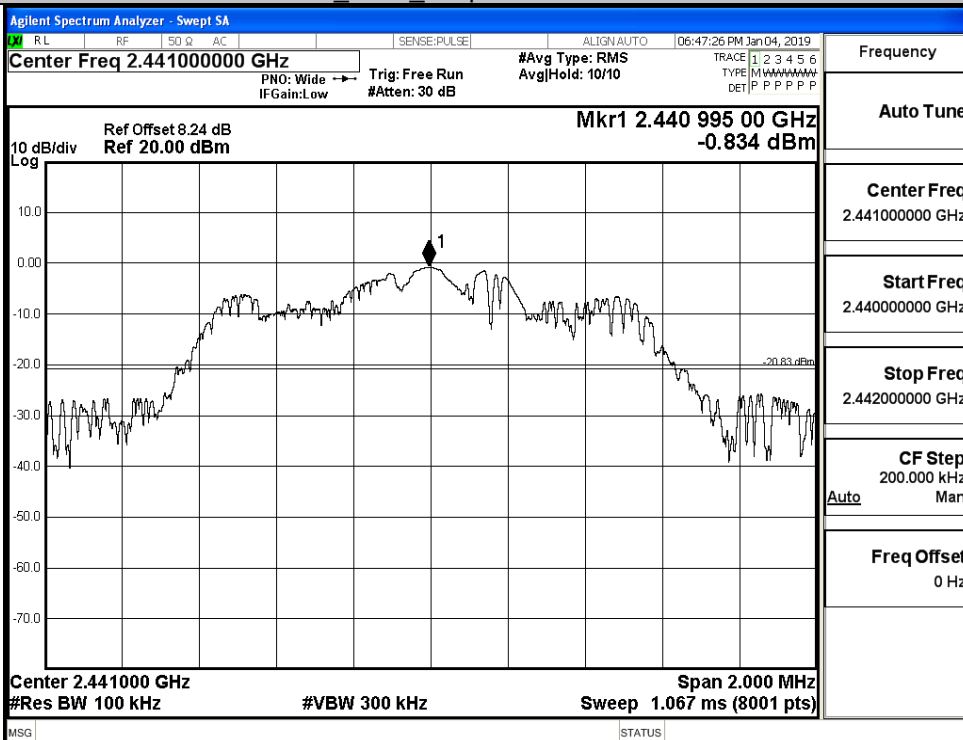


Puw

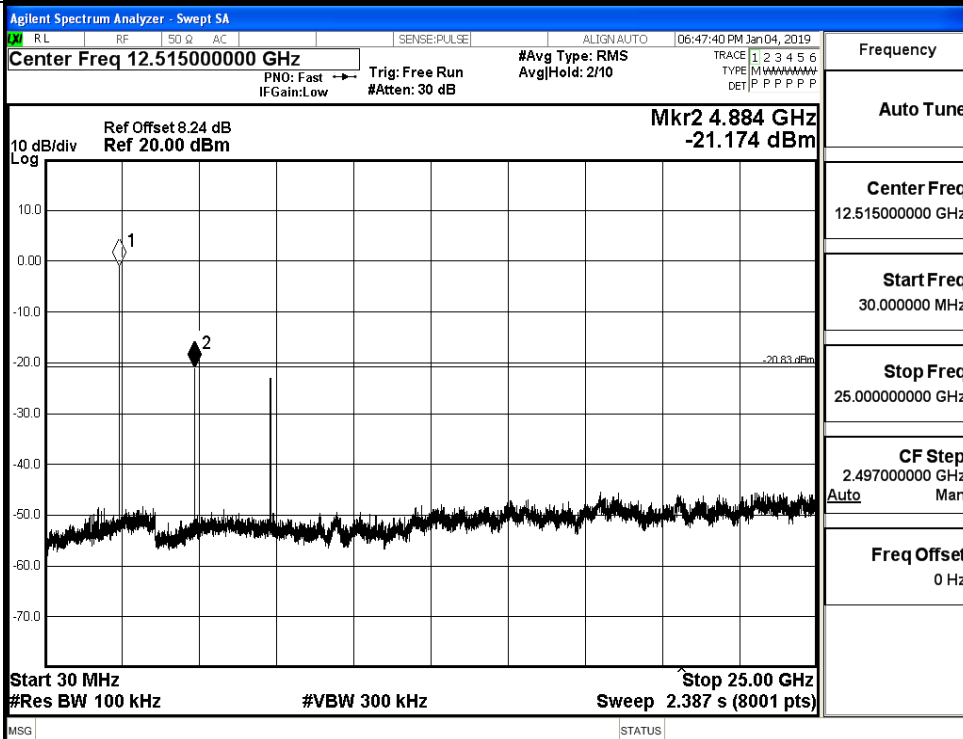


# 8DPSK\_MCH\_Graphs

Pref

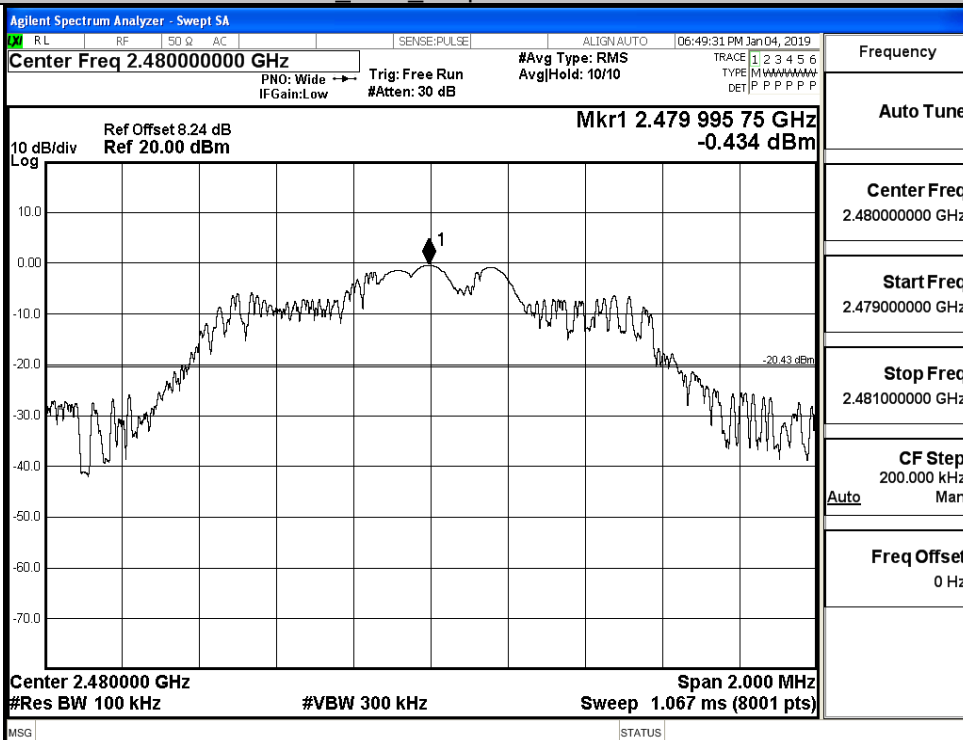


Puw

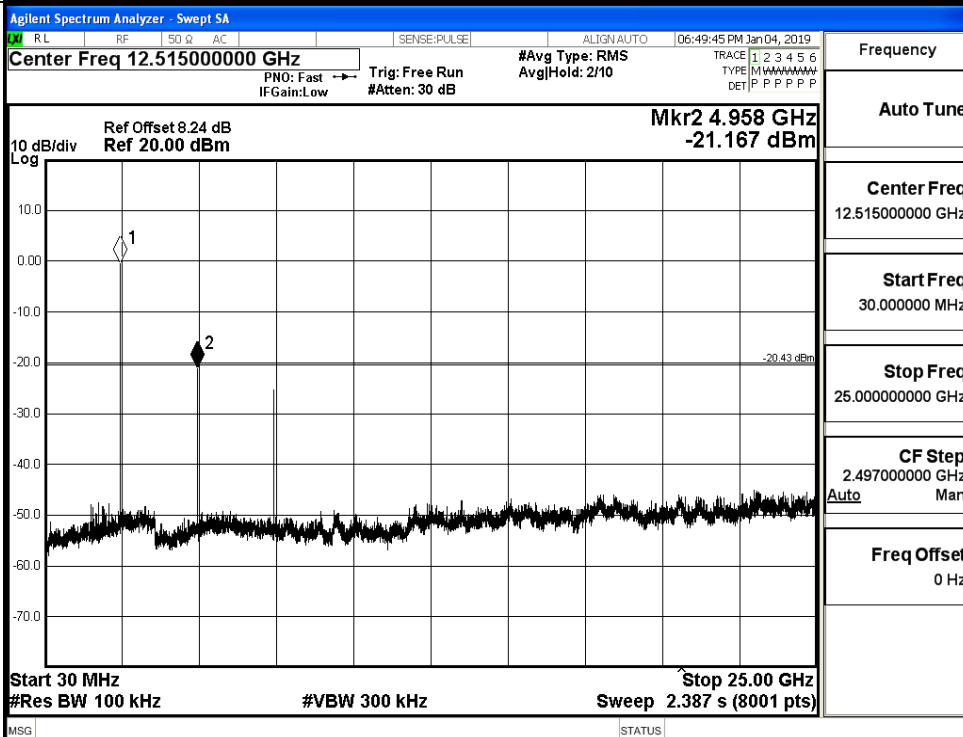


# 8DPSK\_HCH\_Graphs

Pref



Puw

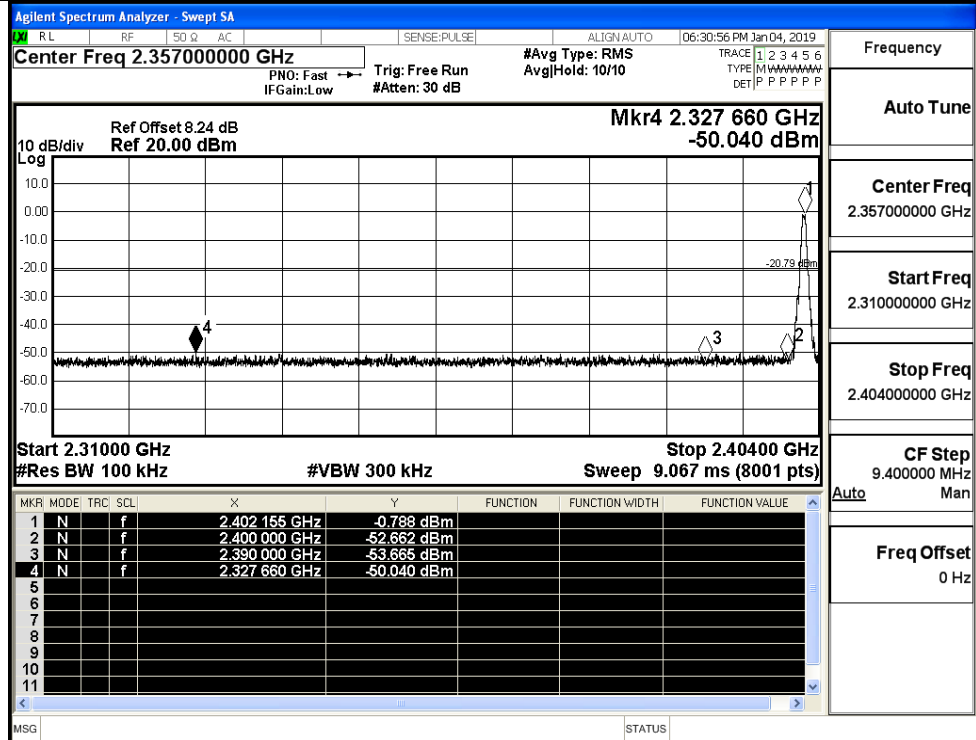


**A.7 Band-edge for RF Conducted Emissions**

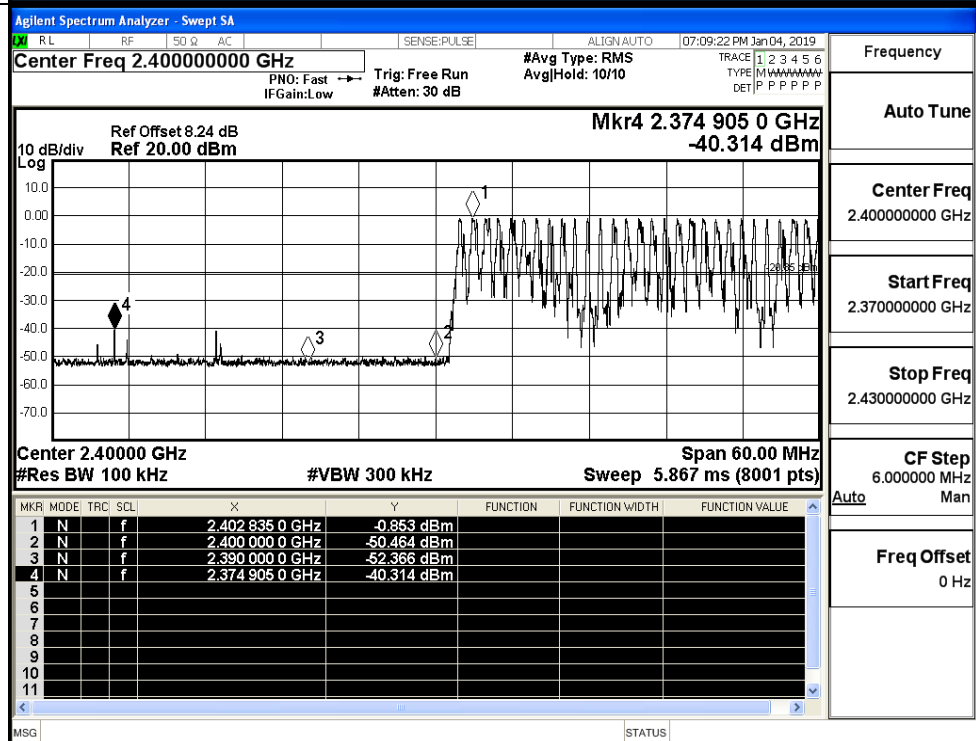
| Mode          | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|-------------------------|---------------------|-------------------|--------------------------|-------------|---------|
| GFSK          | LCH     | 2402                    | -0.788              | Off               | -50.040                  | -20.79      | PASS    |
|               |         |                         | -0.853              | On                | -40.314                  | -20.85      | PASS    |
|               | HCH     | 2480                    | -0.708              | Off               | -49.412                  | -20.71      | PASS    |
|               |         |                         | -0.725              | On                | -48.855                  | -20.73      | PASS    |
| $\pi/4$ DQPSK | LCH     | 2402                    | -0.674              | Off               | -49.530                  | -20.67      | PASS    |
|               |         |                         | -0.712              | On                | -40.614                  | -20.71      | PASS    |
|               | HCH     | 2480                    | -0.371              | Off               | -49.400                  | -20.37      | PASS    |
|               |         |                         | -0.387              | On                | -46.631                  | -20.39      | PASS    |
| 8DPSK         | LCH     | 2402                    | -0.618              | Off               | -48.449                  | -20.62      | PASS    |
|               |         |                         | -0.672              | On                | -37.087                  | -20.67      | PASS    |
|               | HCH     | 2480                    | -0.309              | Off               | -48.525                  | -20.31      | PASS    |
|               |         |                         | -0.354              | On                | -49.411                  | -20.35      | PASS    |

# Test Graphs

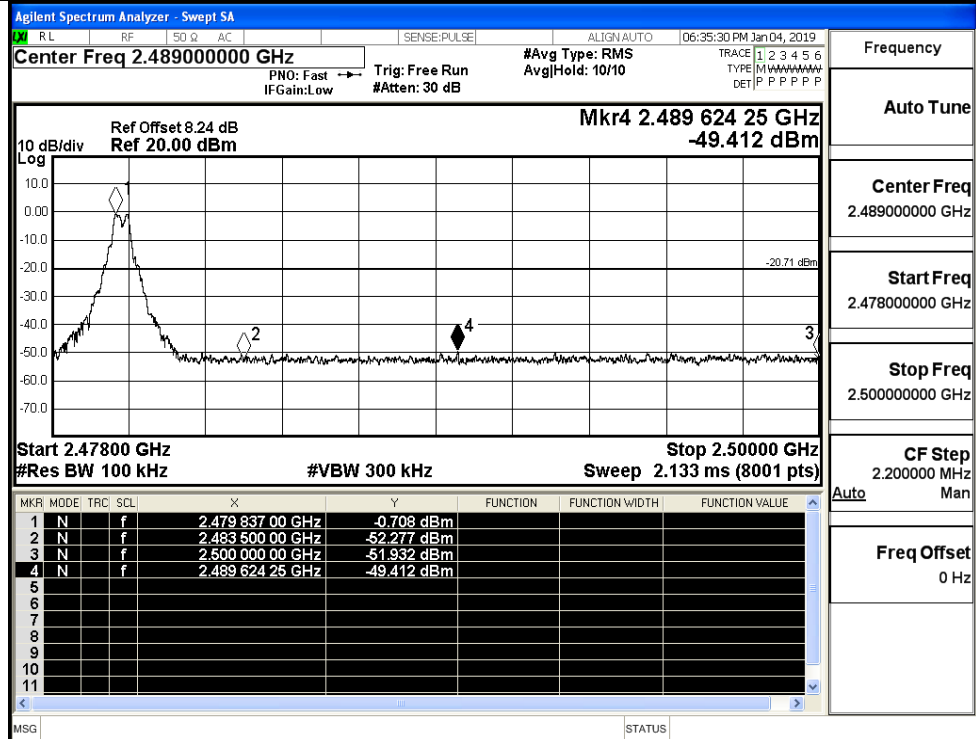
GFSK/LCH/No Hop



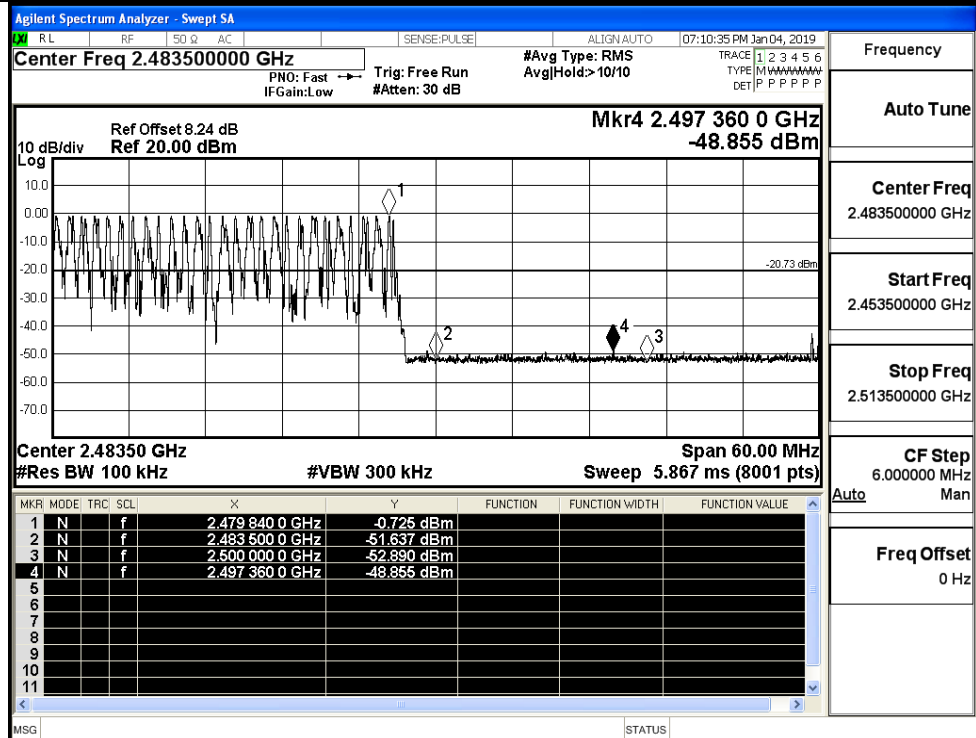
GFSK/LCH/Hop



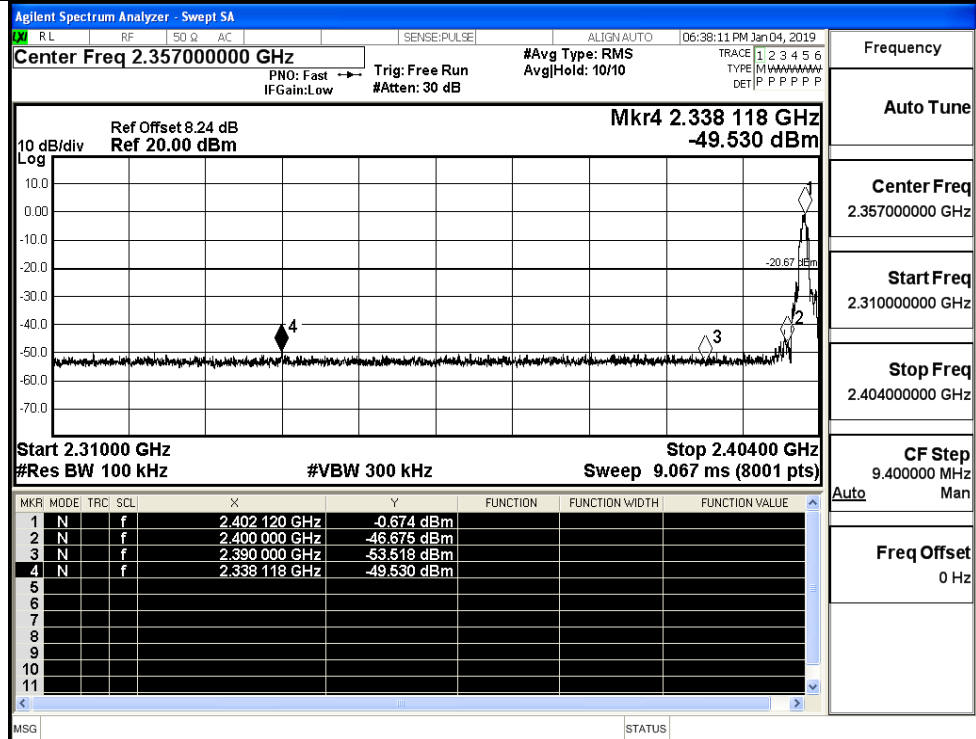
GFSK/HCH/No Hop



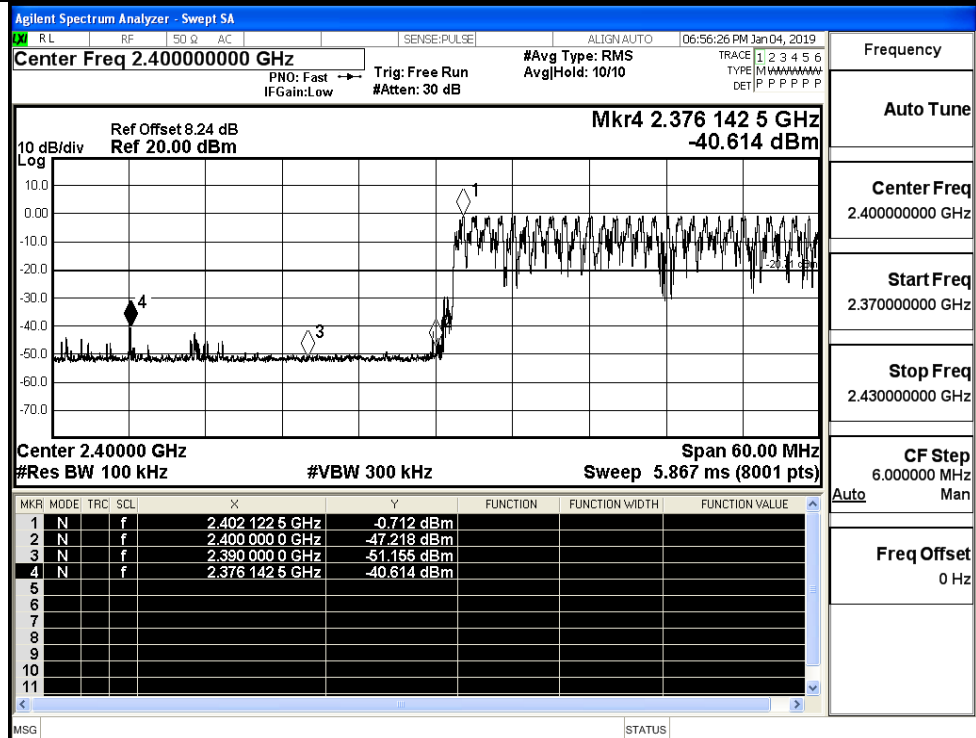
GFSK/HCH/Hop



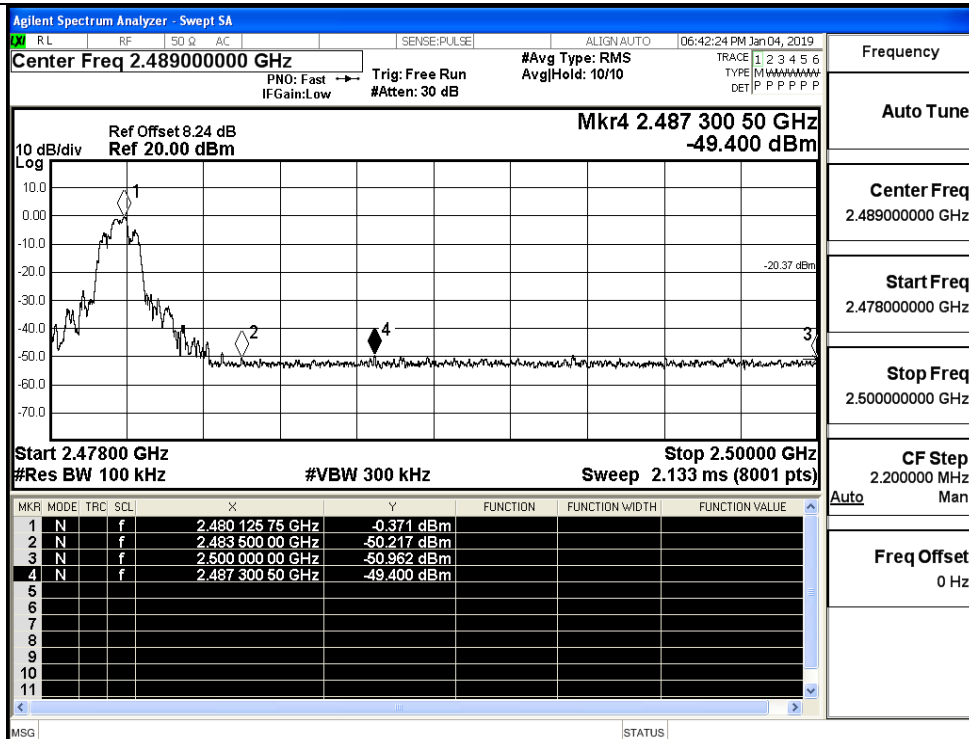
$\pi/4$ DQPSK/LCH/No  
Hop



$\pi/4$ DQPSK/LCH/Hop



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



Frequency

Auto Tune

Center Freq  
2.489000000 GHz

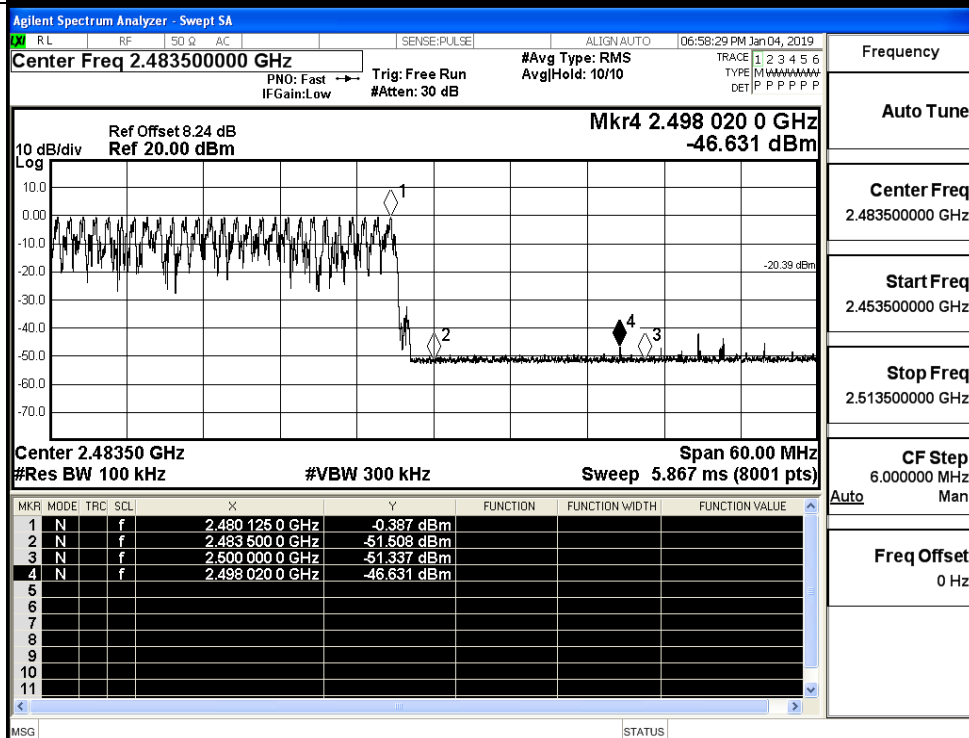
Start Freq  
2.478000000 GHz

Stop Freq  
2.500000000 GHz

CF Step  
2.200000 MHz  
Auto Man

Freq Offset  
0 Hz

$\pi/4$ DQPSK/HCH/Hop



Frequency

Auto Tune

Center Freq  
2.483500000 GHz

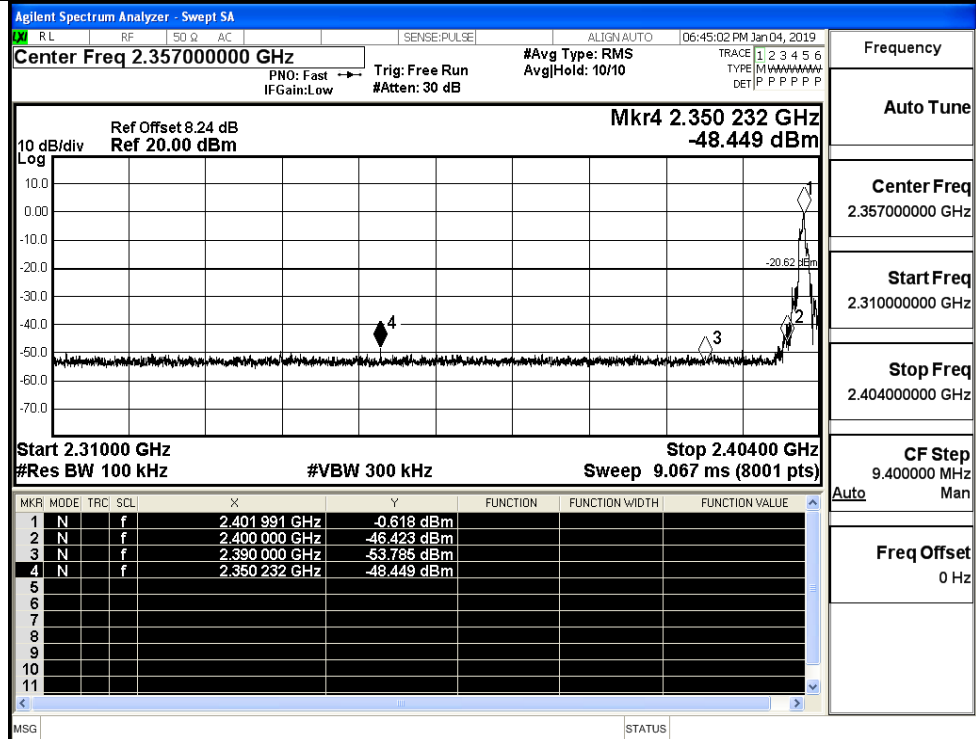
Start Freq  
2.453500000 GHz

Stop Freq  
2.513500000 GHz

CF Step  
6.000000 MHz  
Auto Man

Freq Offset  
0 Hz

8DPSK/LCH/No Hop



Frequency

Auto Tune

Center Freq  
2.357000000 GHz

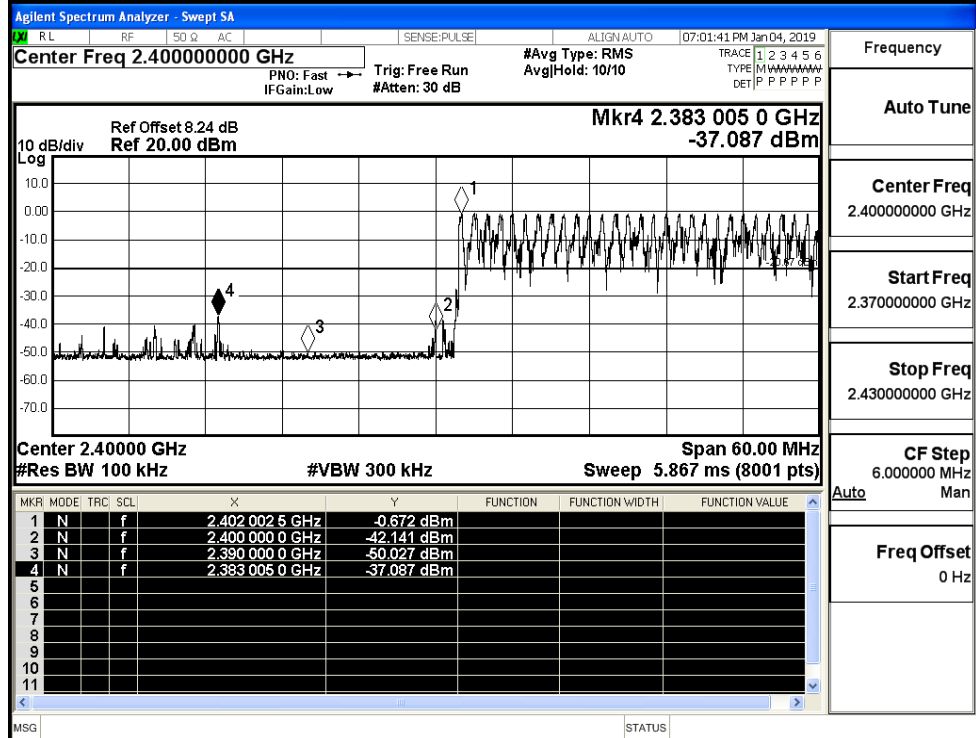
Start Freq  
2.310000000 GHz

Stop Freq  
2.404000000 GHz

CF Step  
9.400000 MHz  
Auto Man

Freq Offset  
0 Hz

8DPSK/LCH/Hop



Frequency

Auto Tune

Center Freq  
2.400000000 GHz

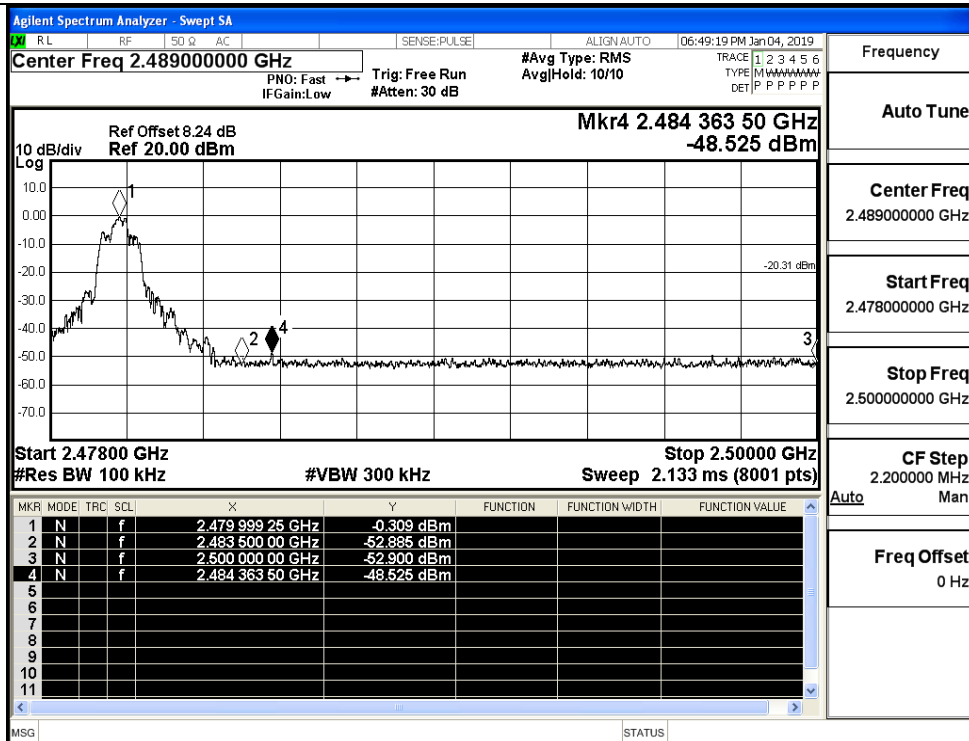
Start Freq  
2.370000000 GHz

Stop Freq  
2.430000000 GHz

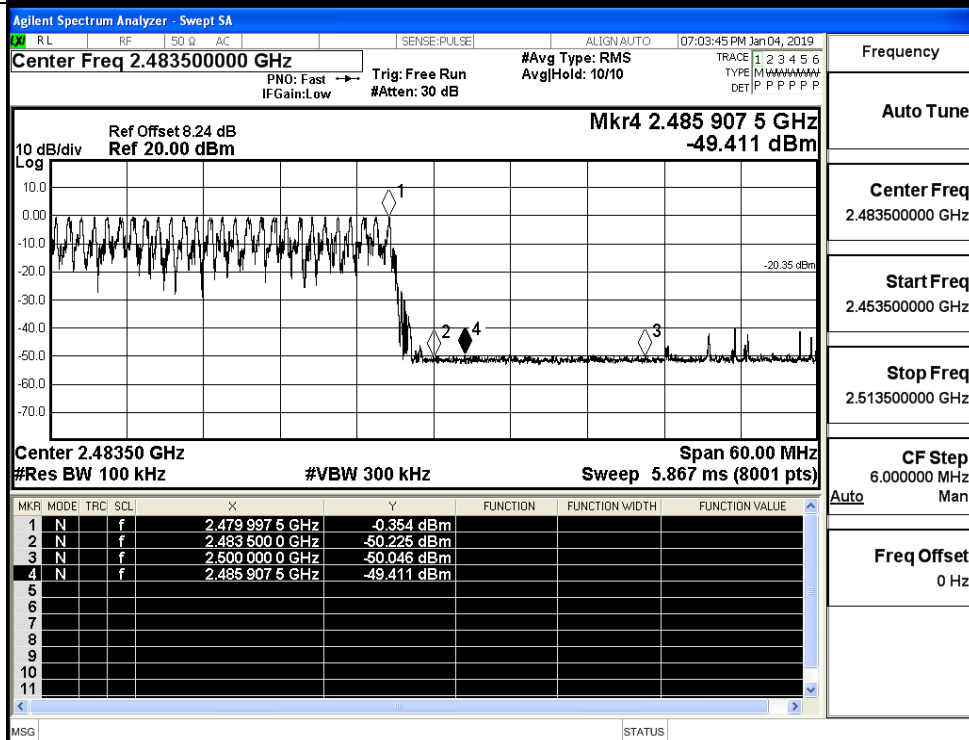
CF Step  
6.000000 MHz  
Auto Man

Freq Offset  
0 Hz

8DPSK/HCH/No Hop



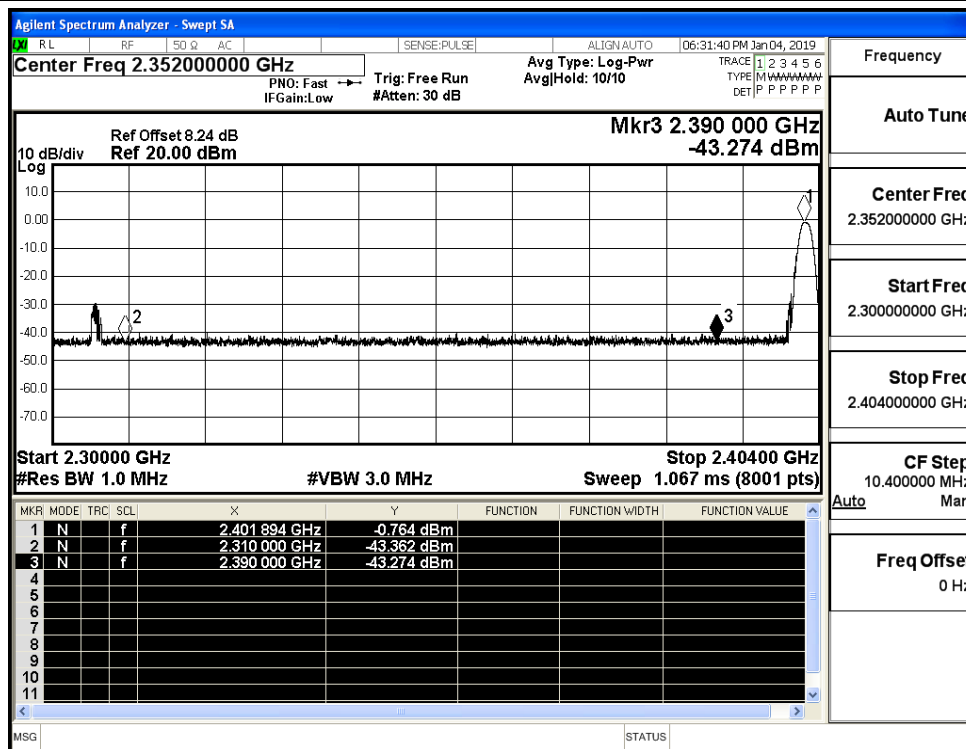
8DPSK/HCH/Hop



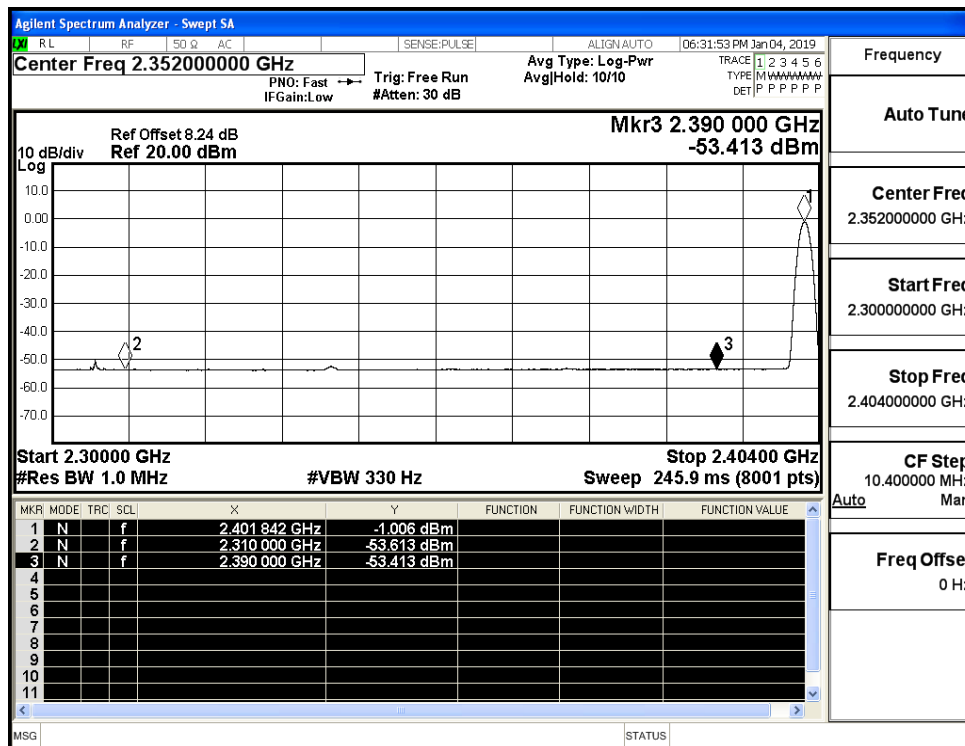
**A.8 Restrict-band band-edge measurements**

| Test Mode     | Hopping | Freq.  | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---------------|---------|--------|-------------|------|---------------|------------|----------|----------------|---------|
| GFSK          | Off     | 2310.0 | -43.36      | 2.0  | 0             | 51.90      | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.61      | 2.0  | 0             | 41.64      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -43.27      | 2.0  | 0             | 51.98      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.41      | 2.0  | 0             | 41.84      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -42.85      | 2.0  | 0             | 52.41      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -53.13      | 2.0  | 0             | 42.13      | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -43.36      | 2.0  | 0             | 51.90      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -53.04      | 2.0  | 0             | 42.22      | AV       | 54             | PASS    |
| $\pi/4$ DQPSK | Off     | 2310.0 | -43.65      | 2.0  | 0             | 51.60      | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.59      | 2.0  | 0             | 41.67      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -42.71      | 2.0  | 0             | 52.55      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.19      | 2.0  | 0             | 42.06      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -43.39      | 2.0  | 0             | 51.87      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -53.01      | 2.0  | 0             | 42.25      | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -42.81      | 2.0  | 0             | 52.45      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -52.96      | 2.0  | 0             | 42.30      | AV       | 54             | PASS    |
| 8DPSK         | Off     | 2310.0 | -44.06      | 2.0  | 0             | 51.20      | PEAK     | 74             | PASS    |
|               | Off     | 2310.0 | -53.43      | 2.0  | 0             | 41.83      | AV       | 54             | PASS    |
|               | Off     | 2390.0 | -42.47      | 2.0  | 0             | 52.79      | PEAK     | 74             | PASS    |
|               | Off     | 2390.0 | -53.39      | 2.0  | 0             | 41.87      | AV       | 54             | PASS    |
|               | Off     | 2483.5 | -42.49      | 2.0  | 0             | 52.77      | PEAK     | 74             | PASS    |
|               | Off     | 2483.5 | -52.94      | 2.0  | 0             | 42.32      | AV       | 54             | PASS    |
|               | Off     | 2500.0 | -42.95      | 2.0  | 0             | 52.31      | PEAK     | 74             | PASS    |
|               | Off     | 2500.0 | -52.93      | 2.0  | 0             | 42.33      | AV       | 54             | PASS    |

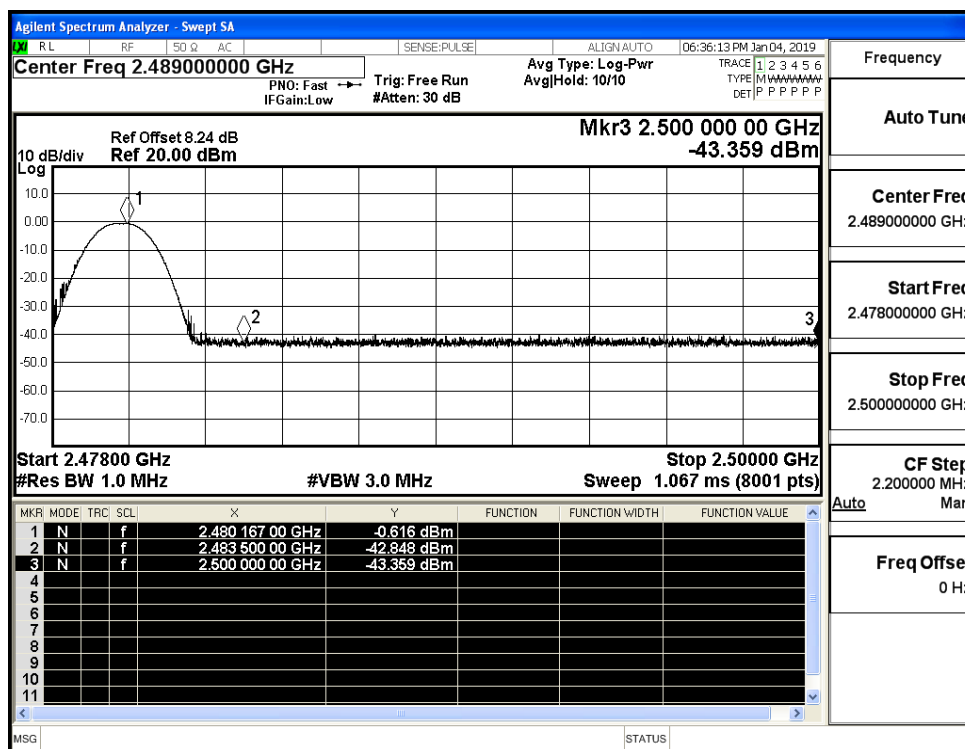
# Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (Low Channel)



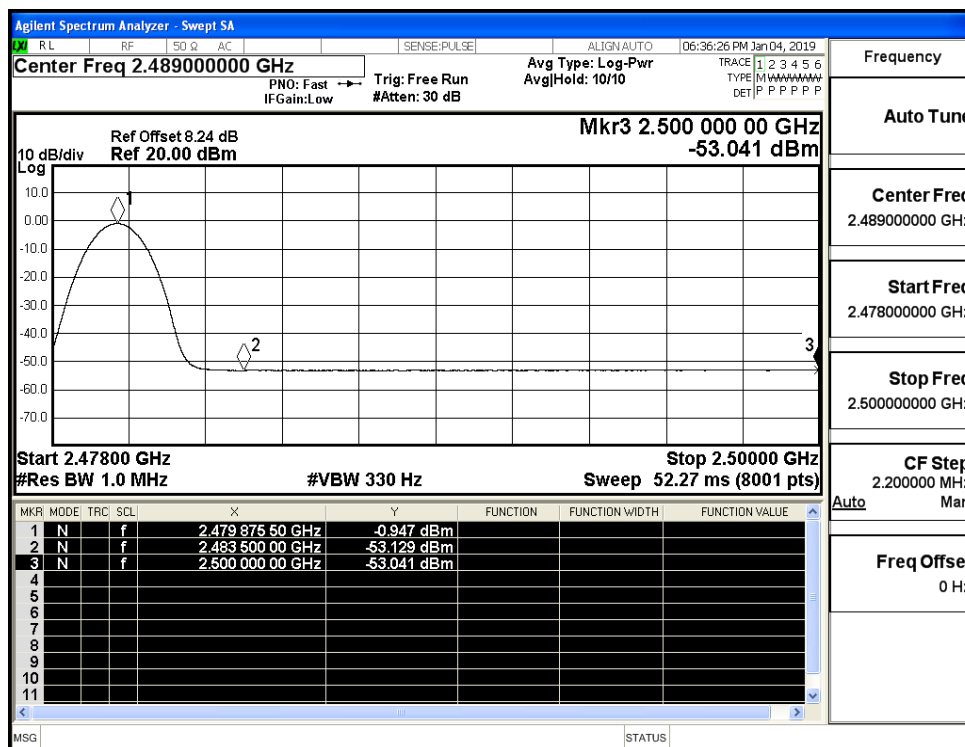
# Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (Low Channel)

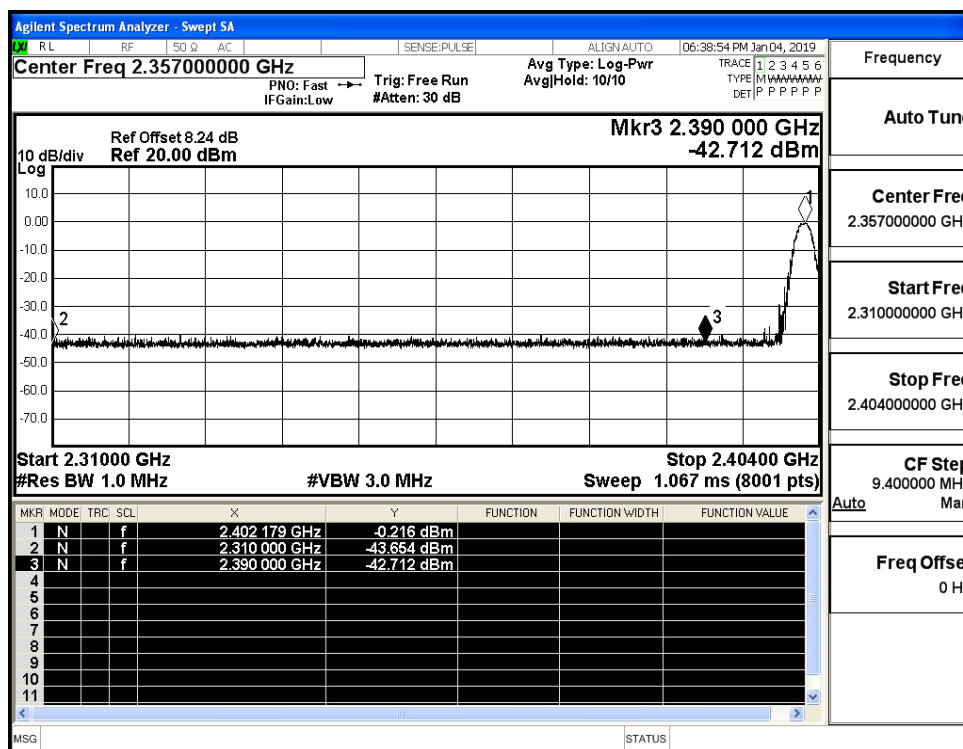
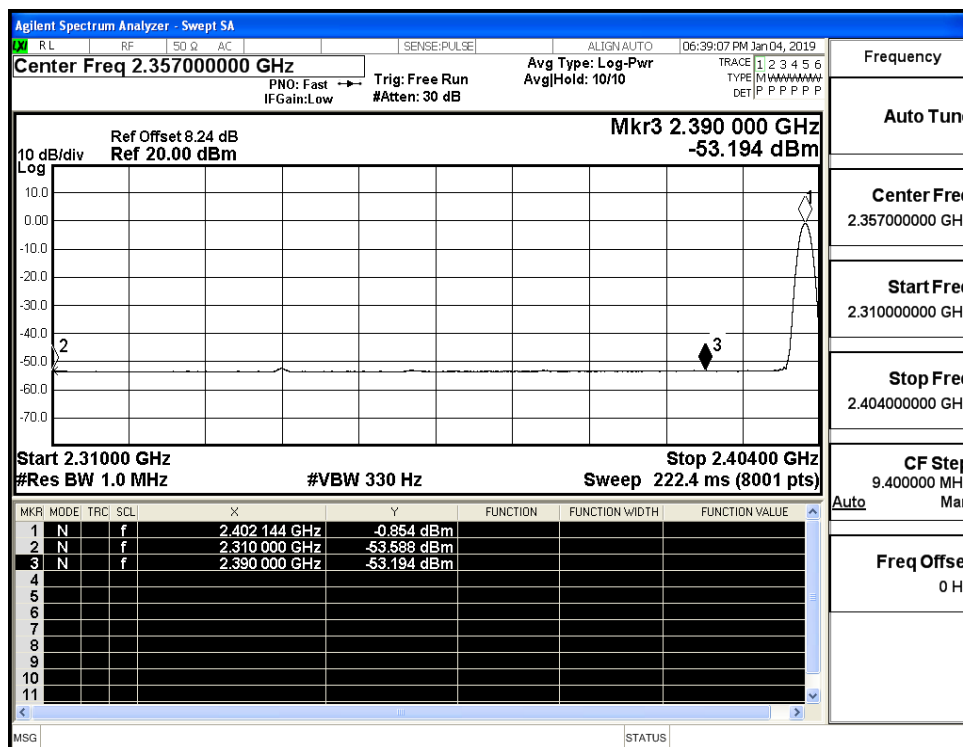


## Restrict-band band-edge measurements\_Hopping Off\_GFSK\_PEAK (High Channel)

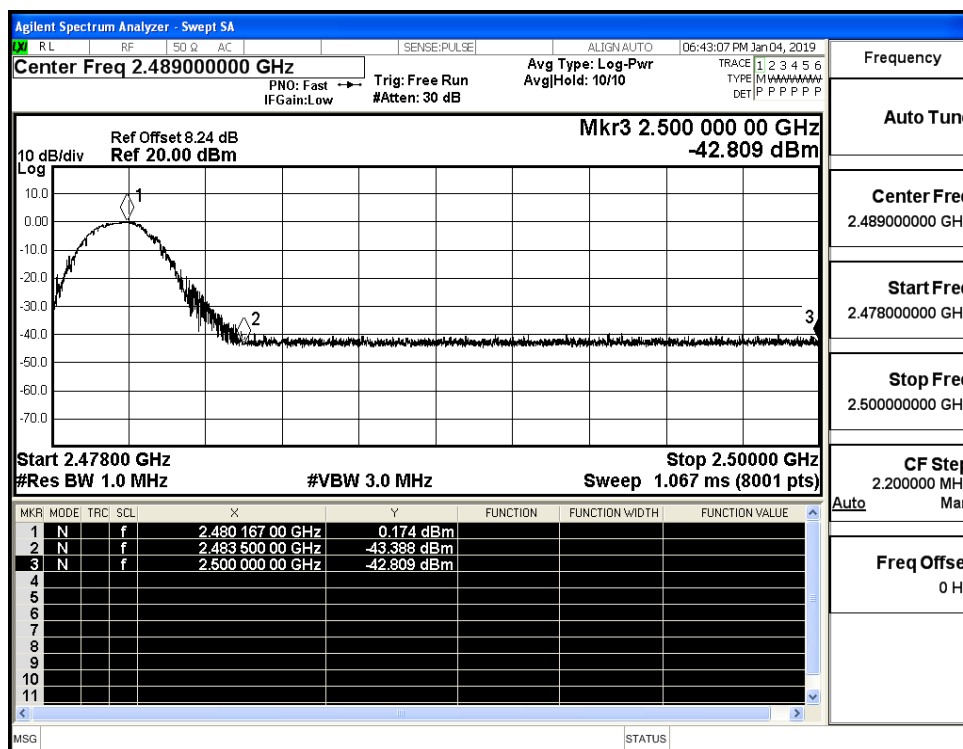


## Restrict-band band-edge measurements\_Hopping Off\_GFSK\_Average (High Channel)

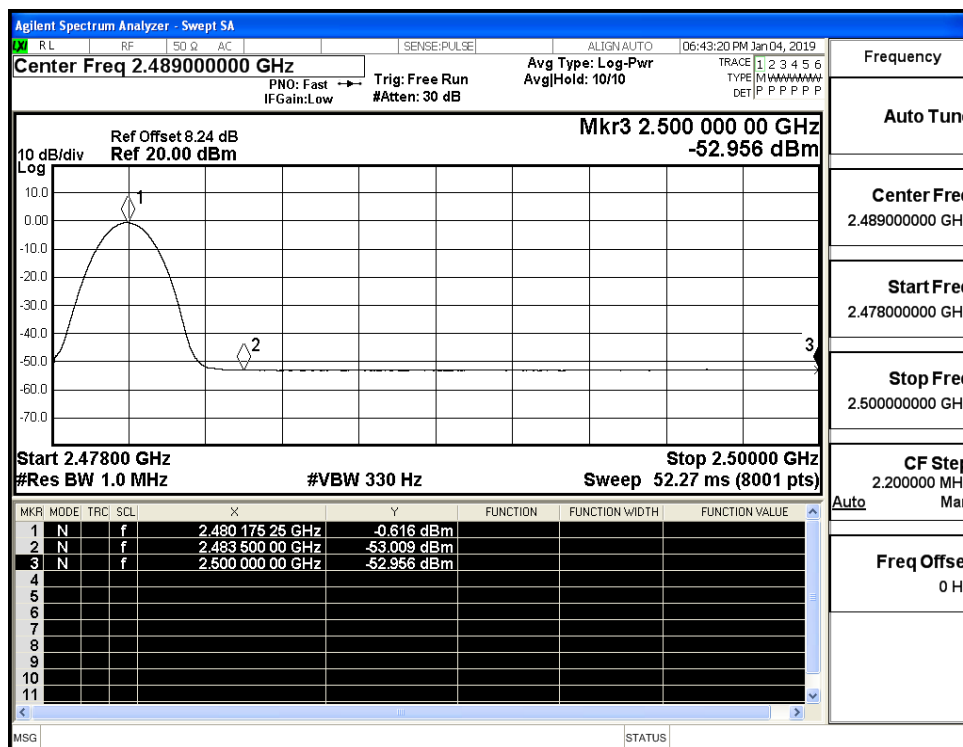


Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_PEAK (Low Channel)Restrict-band band-edge measurements\_Hopping Off  $\pi/4$ -DQPSK\_Average (Low Channel)

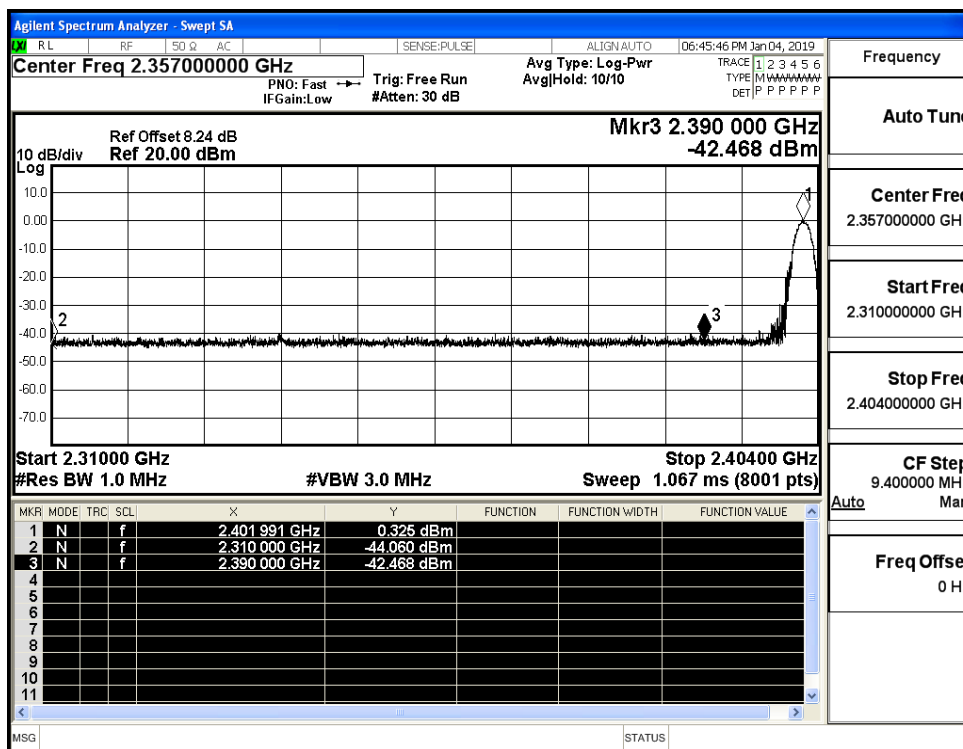
# Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (High Channel)



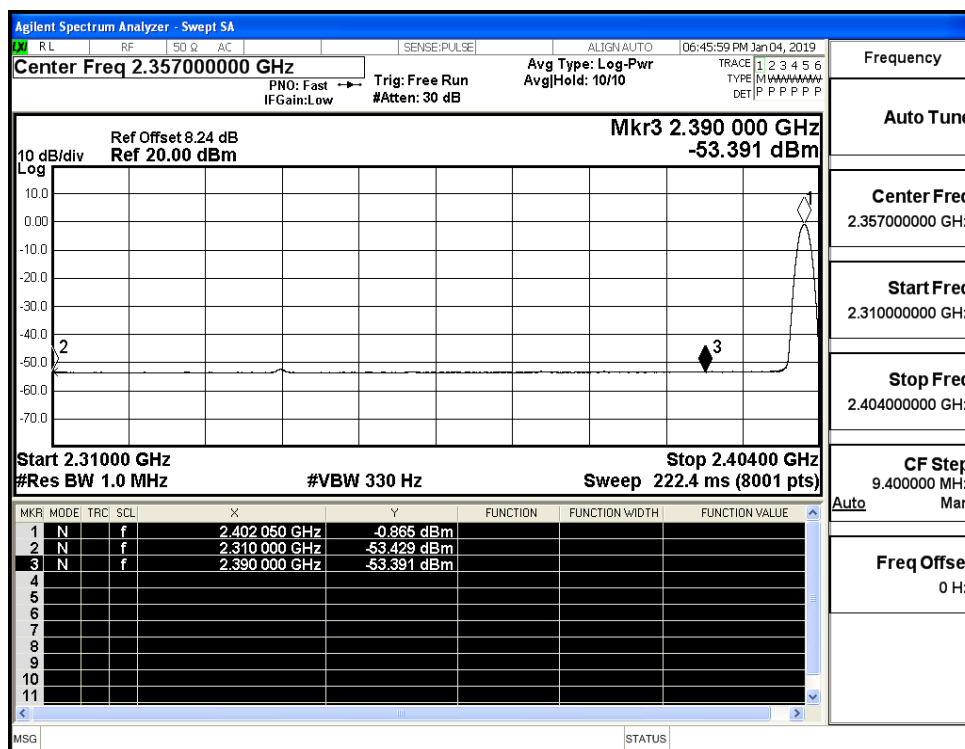
# Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (High Channel)



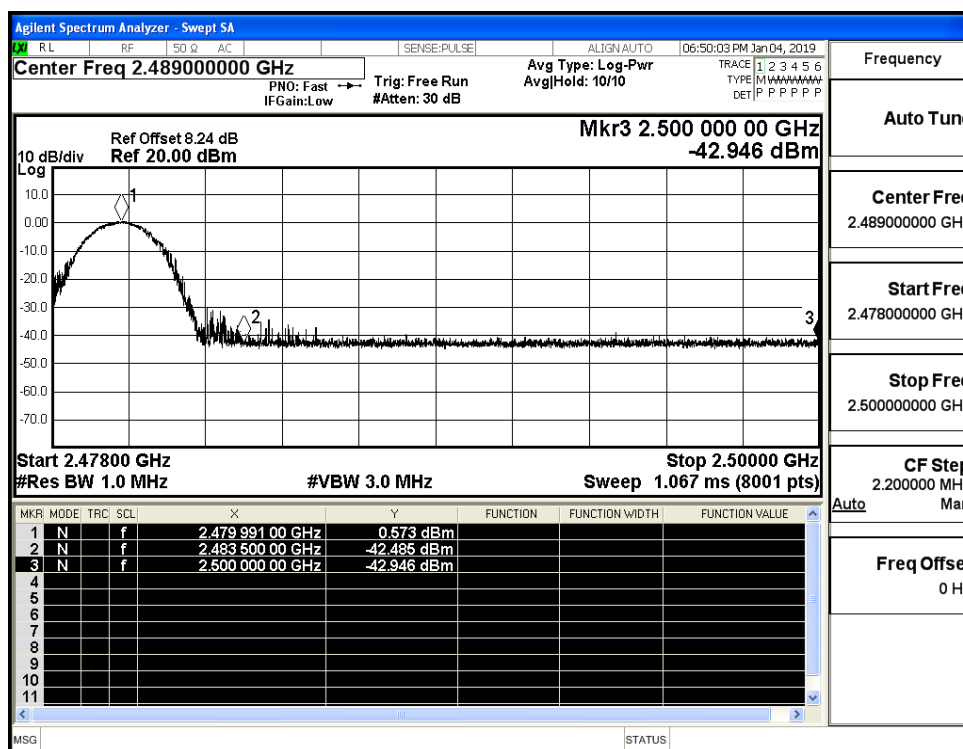
## Restrict-band band-edge measurements\_Hopping Off\_8DPSK\_PEAK (Low Channel)



## 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)

