

Appendix A

RF Test Data for BT V5.1(BDR/EDR) (Conducted Measurement)

Product Name: Wireless earbuds

Trade Mark: N/A

Test Model: XY-EB006

Environmental Conditions

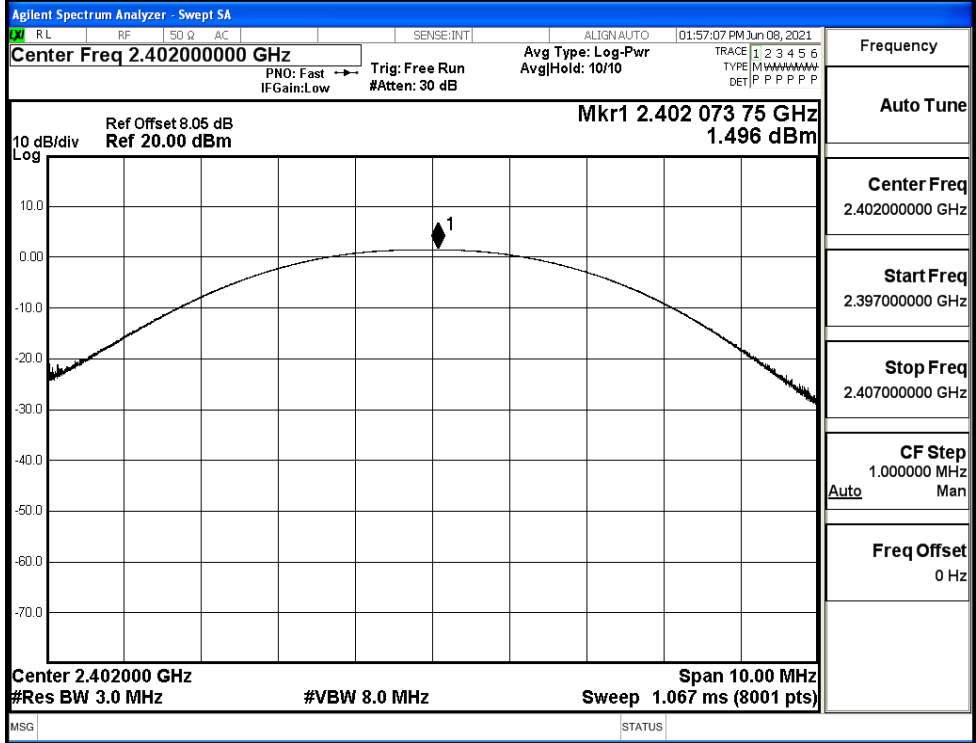
| | |
|--------------------|-----------|
| Temperature: | 24.6 ° C |
| Relative Humidity: | 54.1% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Kay Hu |
| Supervised by: | Li Huan |

A.1 Maximum Conducted Peak Output Power

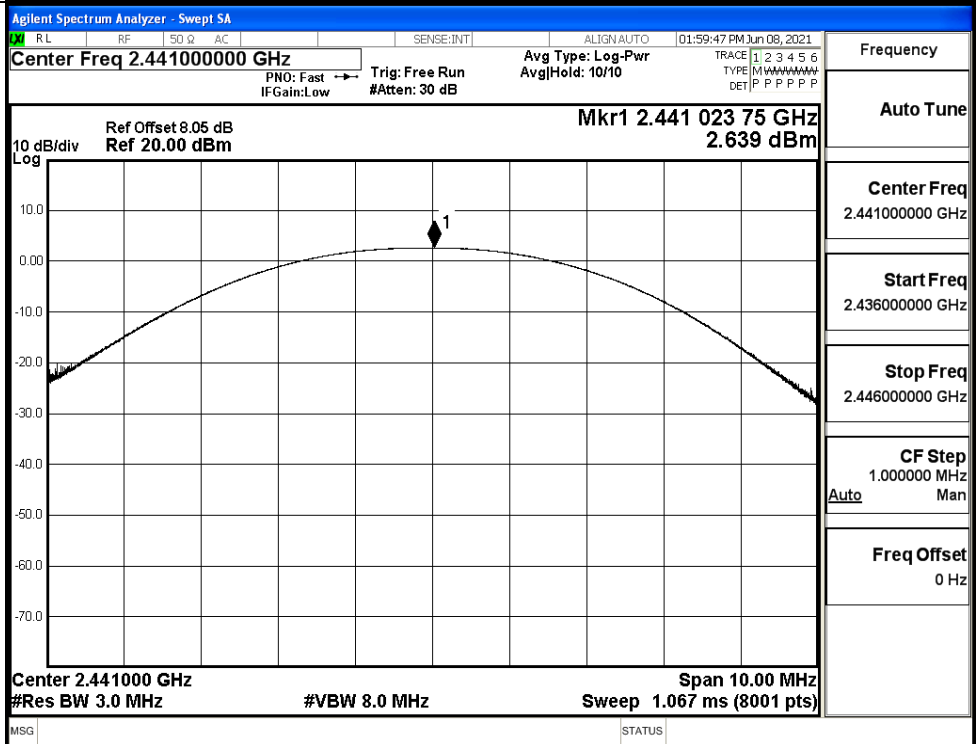
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK | LCH | 1.496 | 30 | PASS |
| | MCH | 2.639 | 30 | PASS |
| | HCH | 2.863 | 30 | PASS |
| $\pi/4$ DQPSK | LCH | 2.641 | 21 | PASS |
| | MCH | 3.763 | 21 | PASS |
| | HCH | 4.001 | 21 | PASS |

Test Graphs

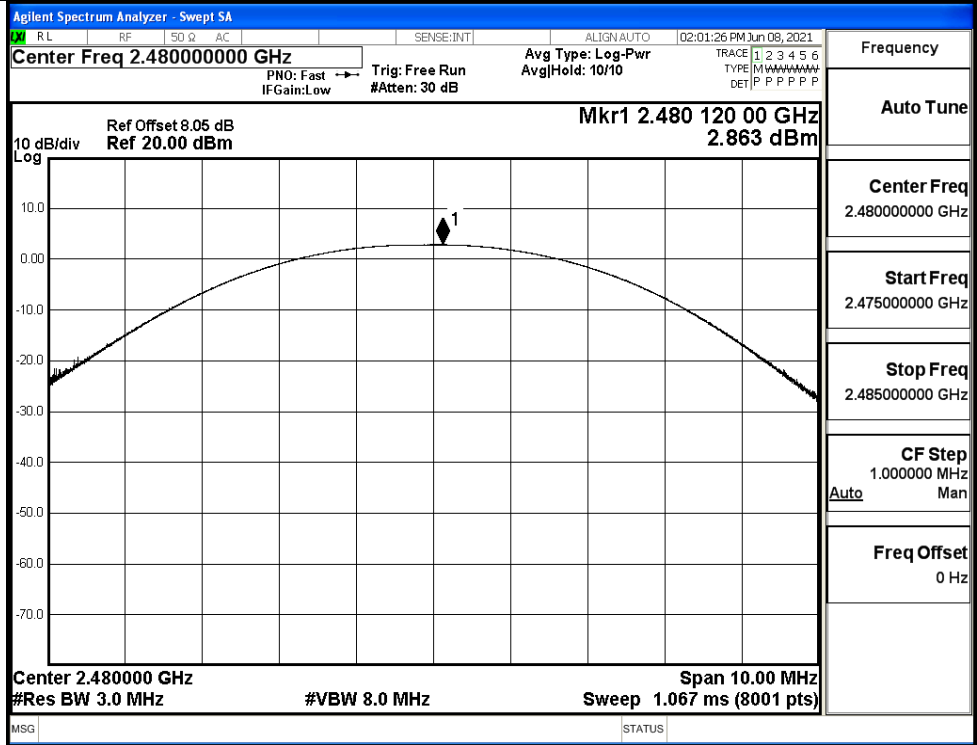
GFSK/LCH



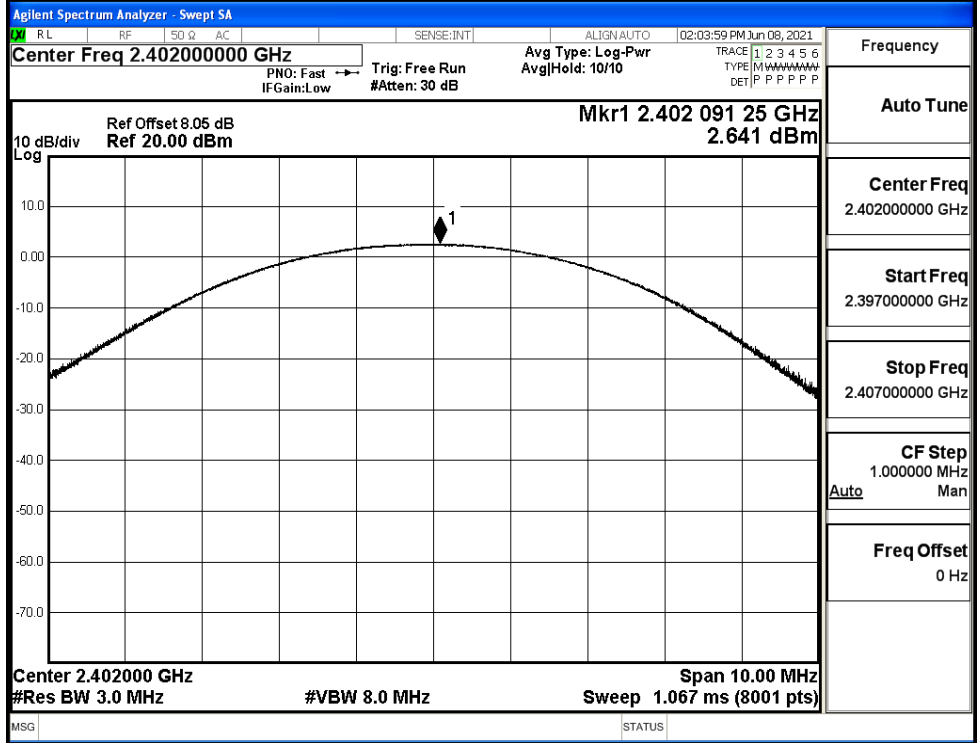
GFSK/MCH



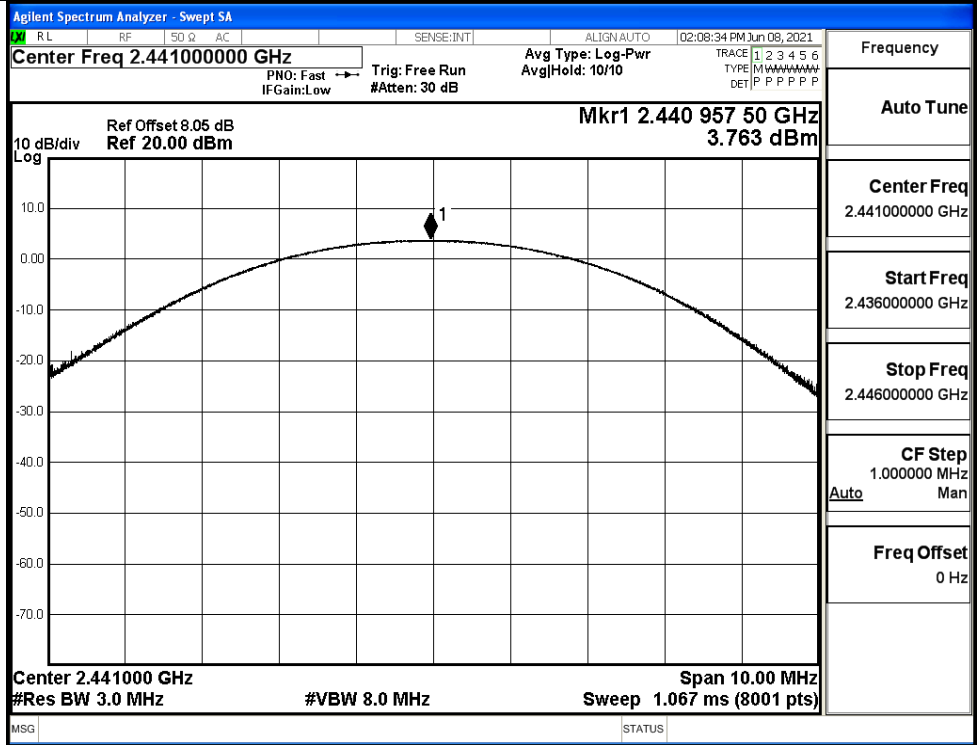
GFSK/HCH



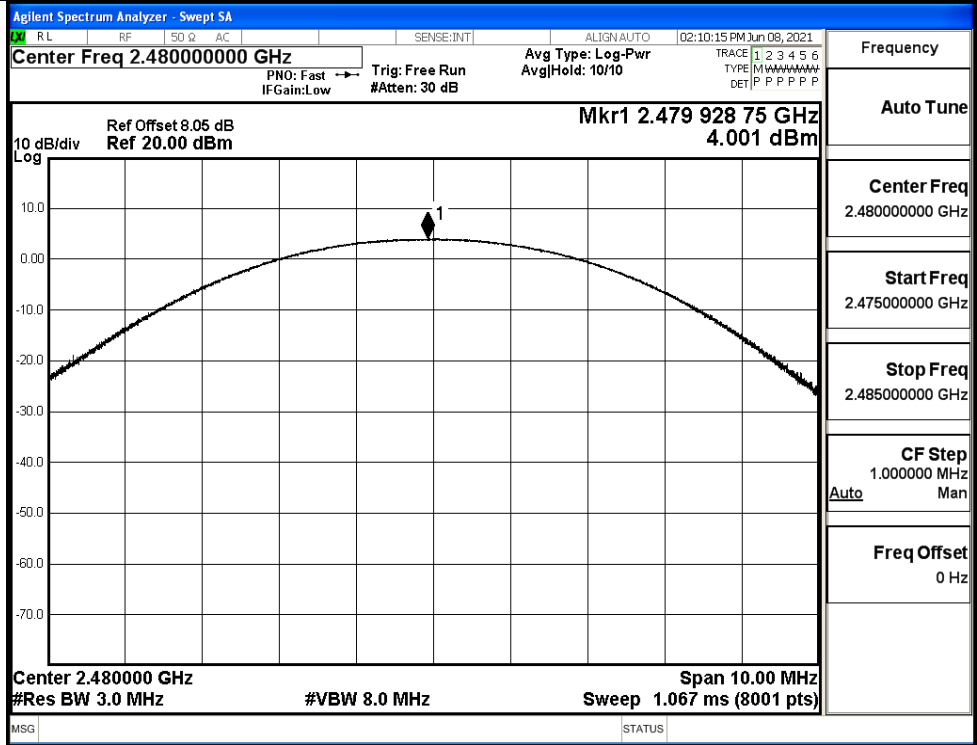
π /4DQPSK/LCH



π /4DQPSK/MCH

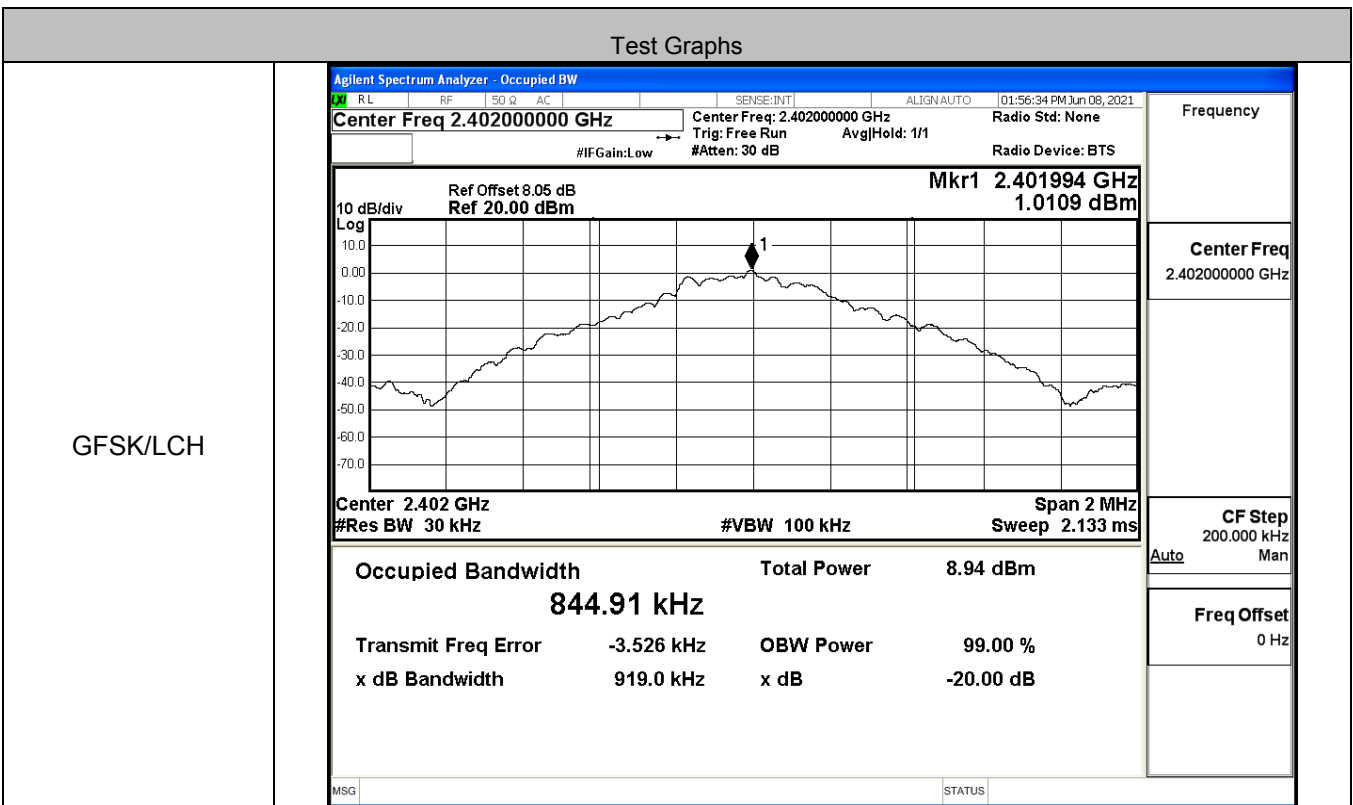


π /4DQPSK/HCH

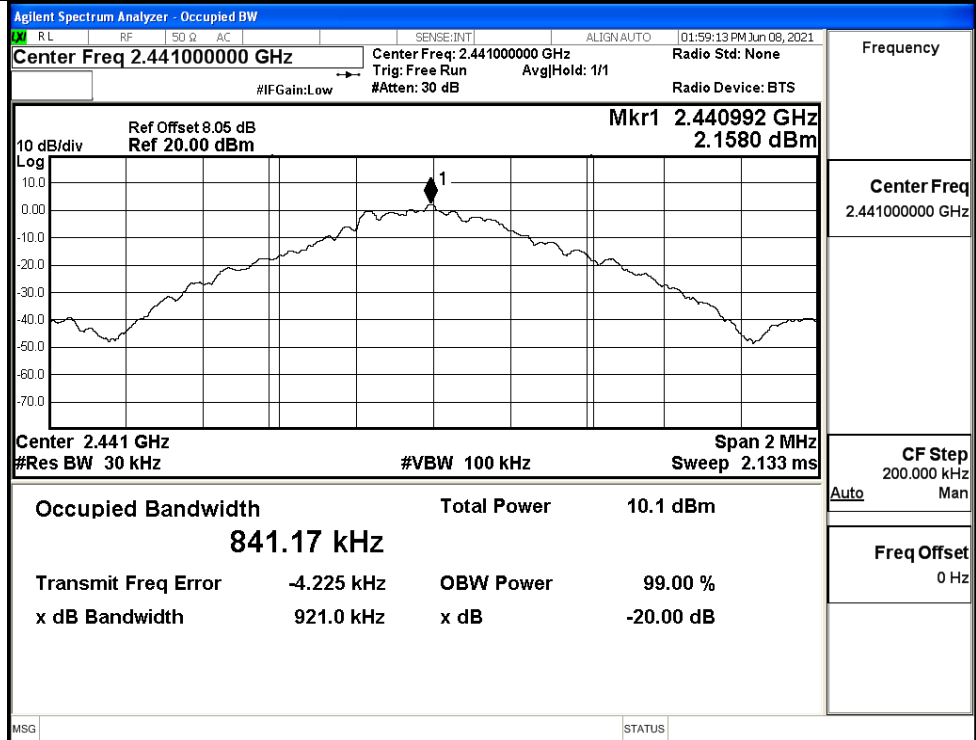


A.2 20dB Bandwidth

| Mode | Channel. | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|----------|----------|----------------------|---------------|---------|
| GFSK | LCH | 0.9190 | Not Specified | PASS |
| | MCH | 0.9210 | Not Specified | PASS |
| | HCH | 0.9071 | Not Specified | PASS |
| π/4DQPSK | LCH | 1.224 | Not Specified | PASS |
| | MCH | 1.253 | Not Specified | PASS |
| | HCH | 1.253 | Not Specified | PASS |



GFSK/MCH



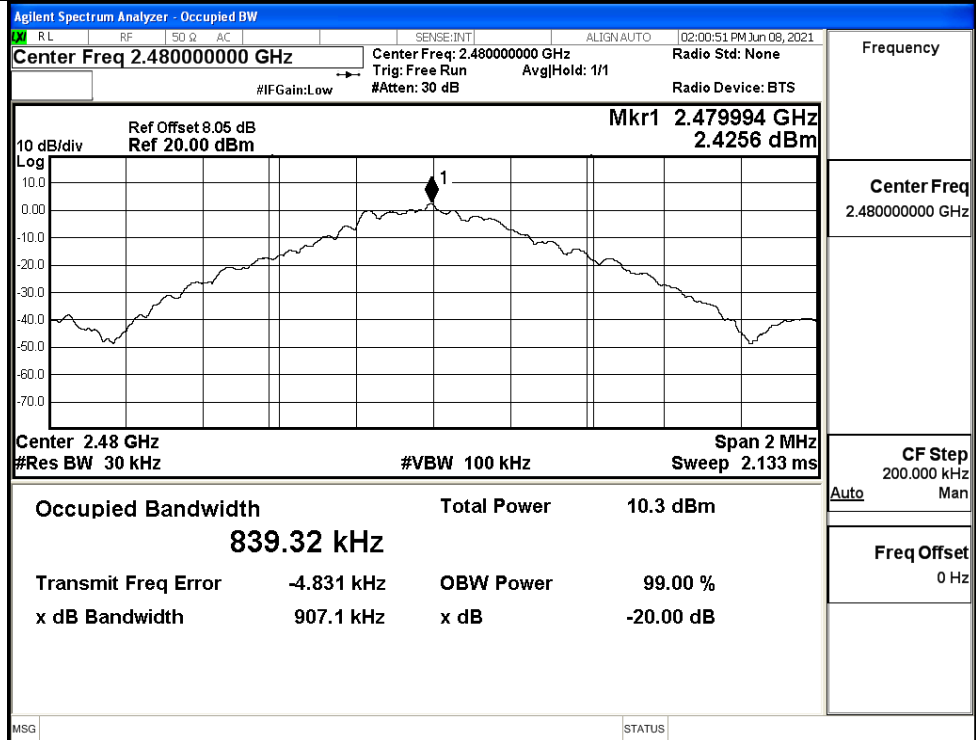
Frequency
2.44100000 GHz

Center Freq
2.44100000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

GFSK/HCH



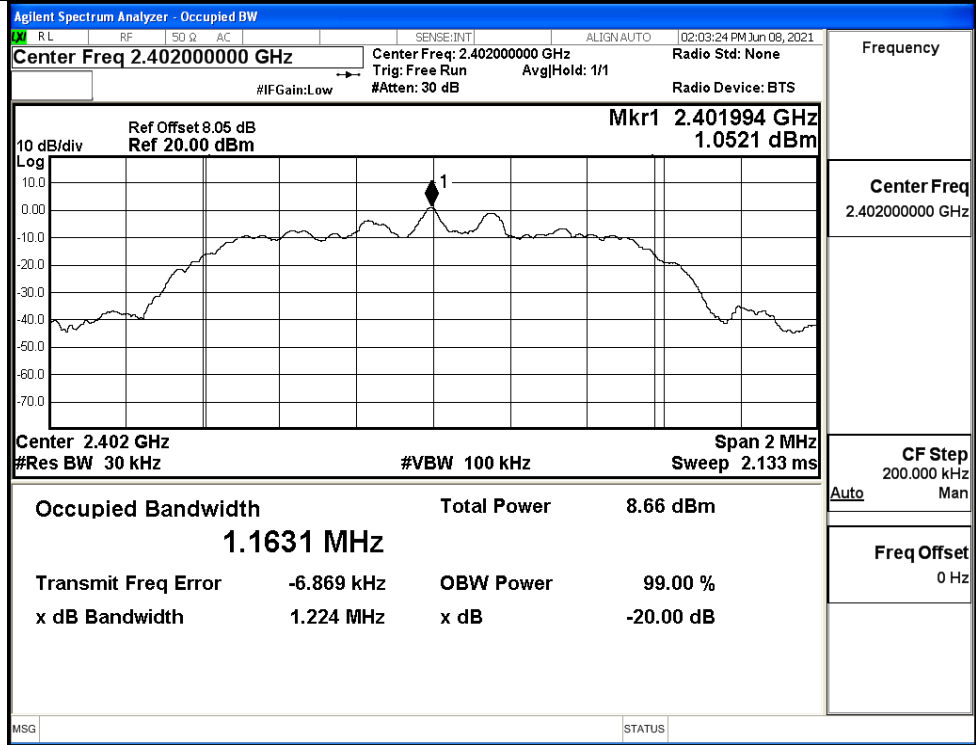
Frequency
2.48000000 GHz

Center Freq
2.48000000 GHz

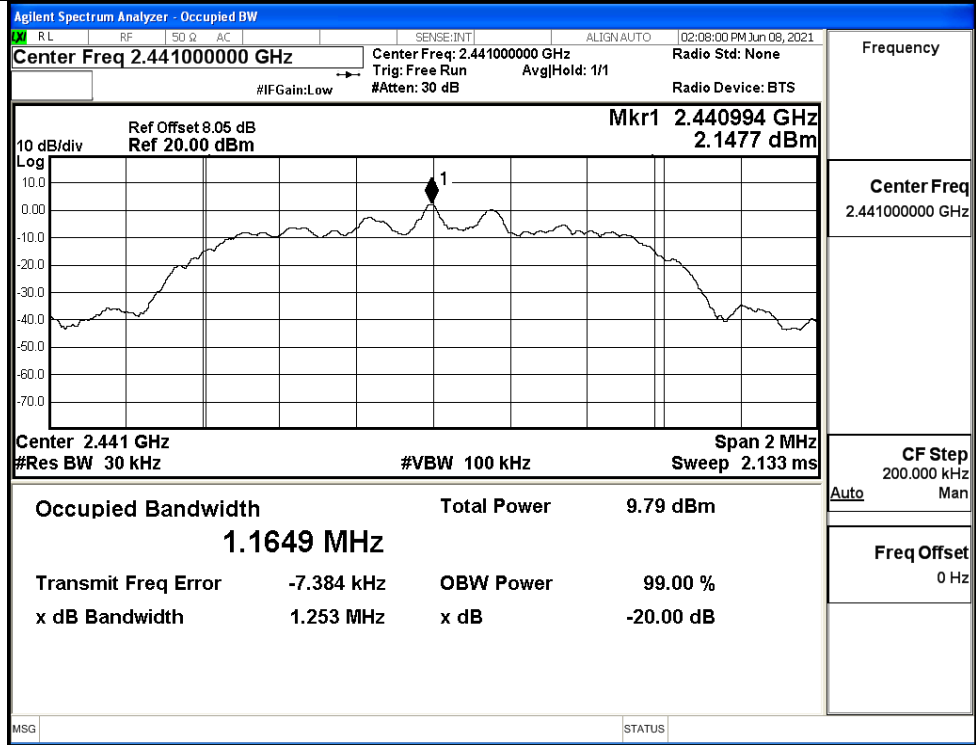
CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

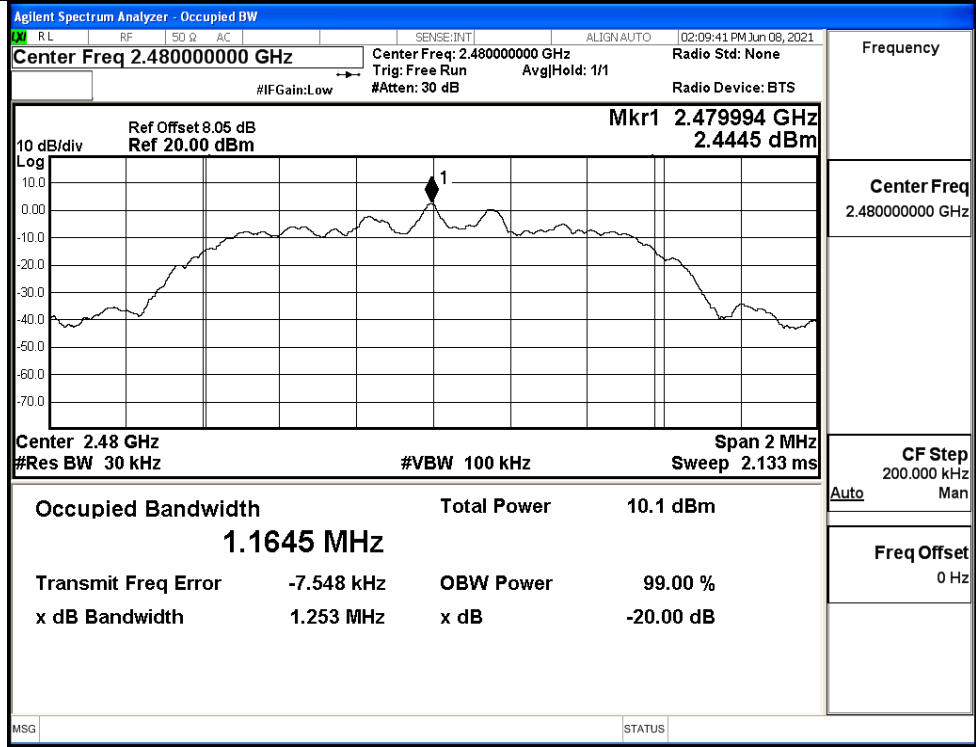
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH

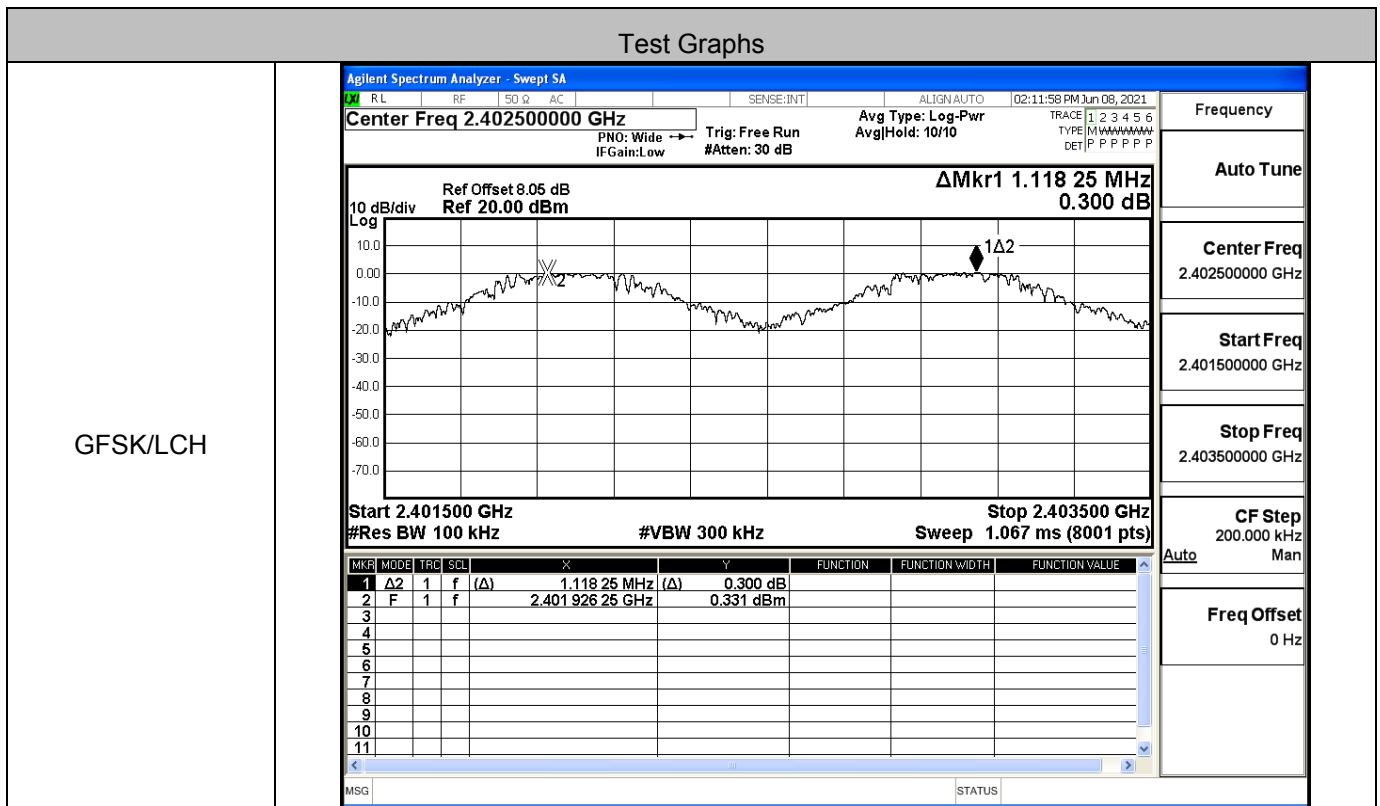


$\pi/4$ DQPSK/HCH

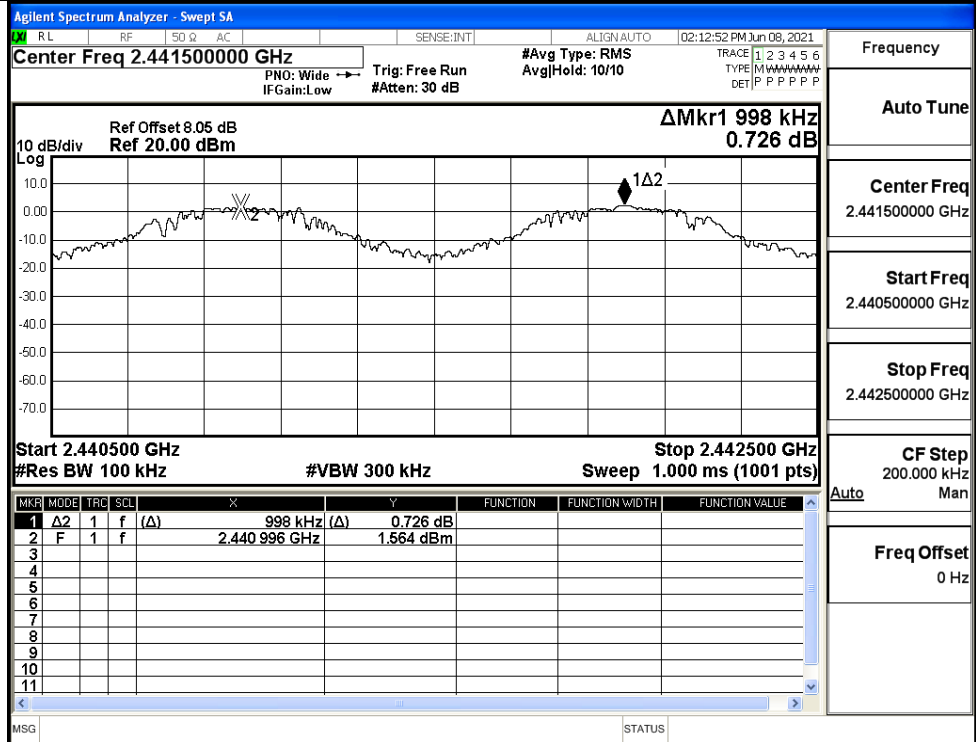


A.3 Carrier Frequency Separation

| Mode | Channel | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|----------|---------|------------------------------------|-------------|---------|
| GFSK | LCH | 1.118 | 0.614 | PASS |
| | MCH | 0.998 | 0.614 | PASS |
| | HCH | 0.980 | 0.614 | PASS |
| π/4DQPSK | LCH | 0.870 | 0.835 | PASS |
| | MCH | 0.972 | 0.835 | PASS |
| | HCH | 0.846 | 0.835 | PASS |



GFSK/MCH



Frequency

Auto Tune

Center Freq
2.441500000 GHz

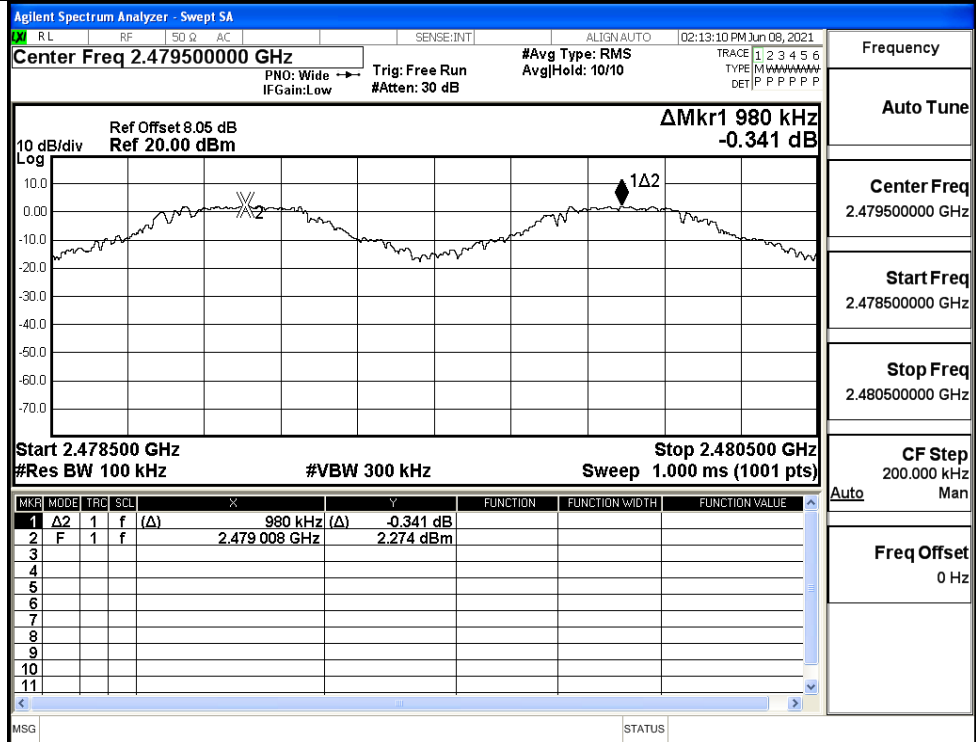
Start Freq
2.440500000 GHz

Stop Freq
2.442500000 GHz

CF Step
200.000 kHz
Man

Freq Offset
0 Hz

GFSK/HCH



Frequency

Auto Tune

Center Freq
2.479500000 GHz

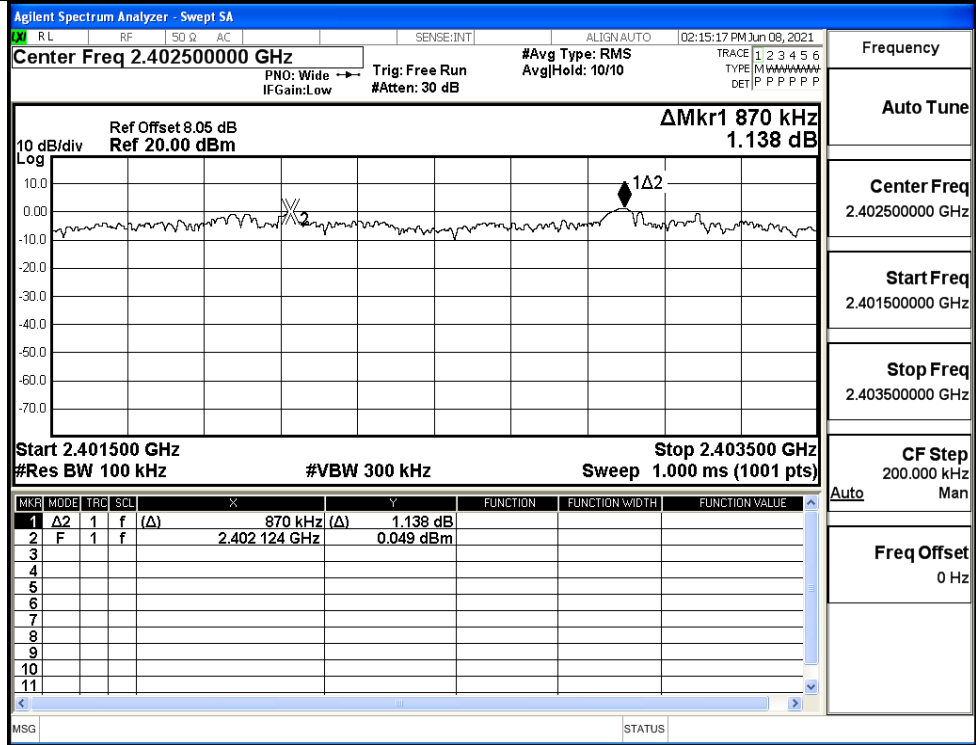
Start Freq
2.478500000 GHz

Stop Freq
2.480500000 GHz

CF Step
200.000 kHz
Man

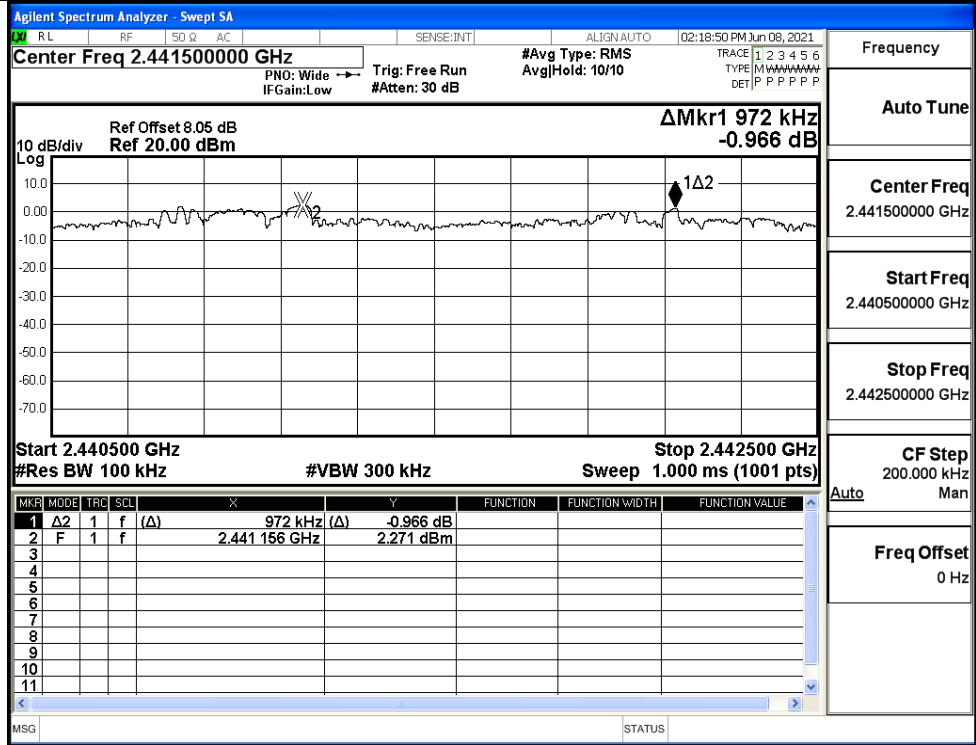
Freq Offset
0 Hz

π/4DQPSK/LCH



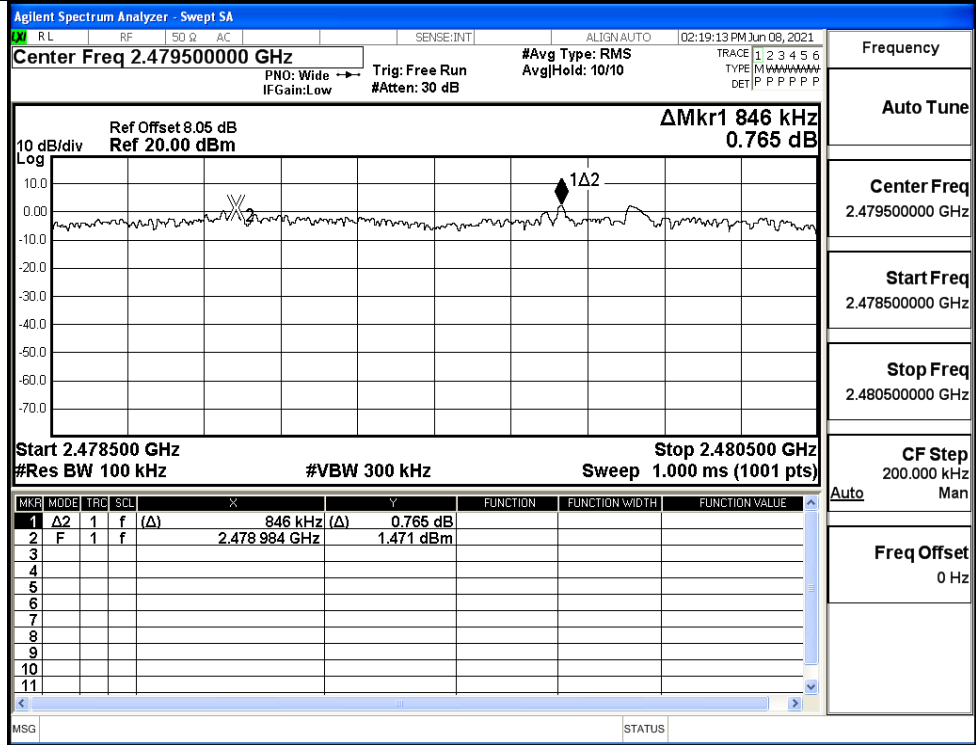
| | |
|-------------|-----------------|
| Frequency | 2.402500000 GHz |
| Auto Tune | |
| Center Freq | 2.402500000 GHz |
| Start Freq | 2.401500000 GHz |
| Stop Freq | 2.403500000 GHz |
| CF Step | 200.000 kHz |
| Auto | Man |
| Freq Offset | 0 Hz |

π/4DQPSK/MCH



| | |
|-------------|-----------------|
| Frequency | 2.441500000 GHz |
| Auto Tune | |
| Center Freq | 2.441500000 GHz |
| Start Freq | 2.440500000 GHz |
| Stop Freq | 2.442500000 GHz |
| CF Step | 200.000 kHz |
| Auto | Man |
| Freq Offset | 0 Hz |

$\pi/4$ DQPSK/HCH



A.4 Hopping Channel Number

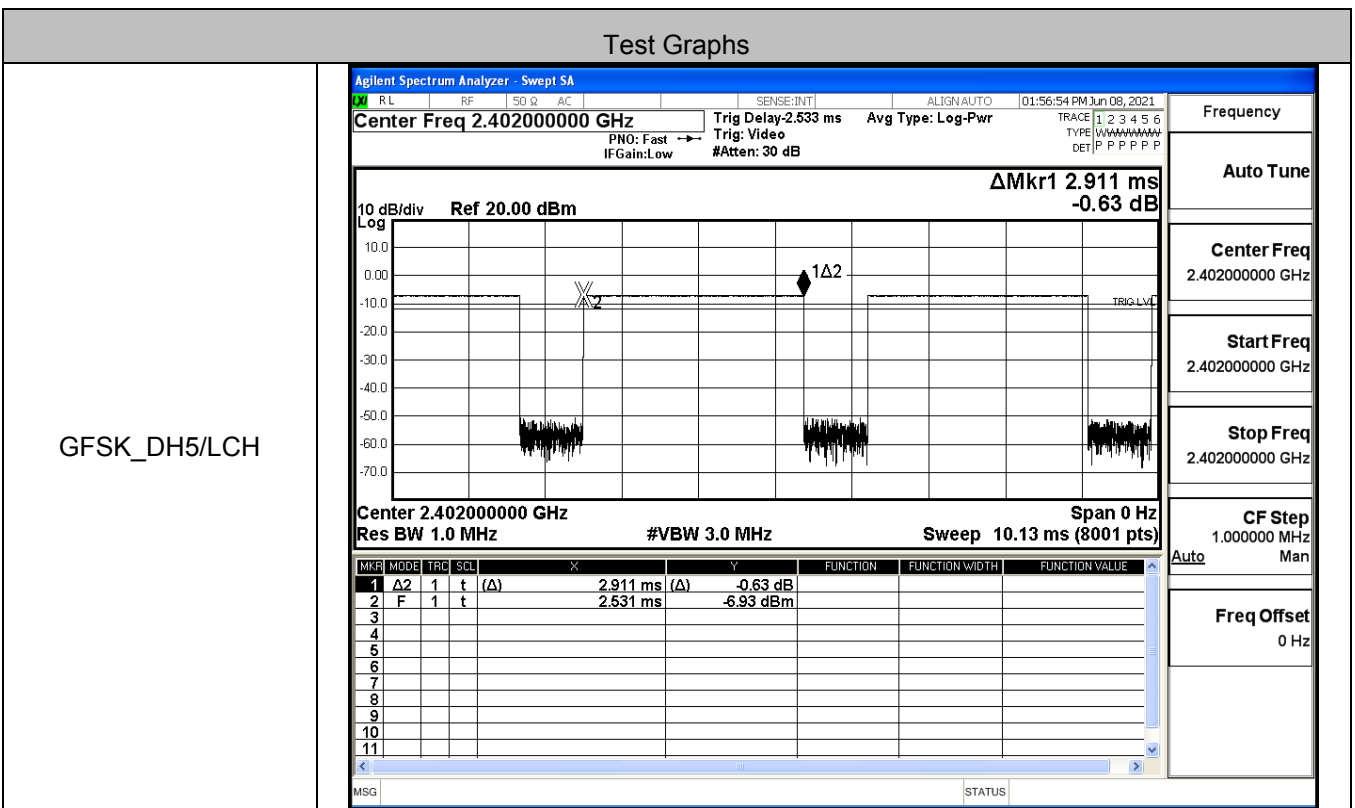
| Mode | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---------------|----------|-------------------------------|-----------|---------|
| GFSK | Hop | 79 | >=15 | PASS |
| $\pi/4$ DQPSK | Hop | 79 | >=15 | PASS |

Test Graphs

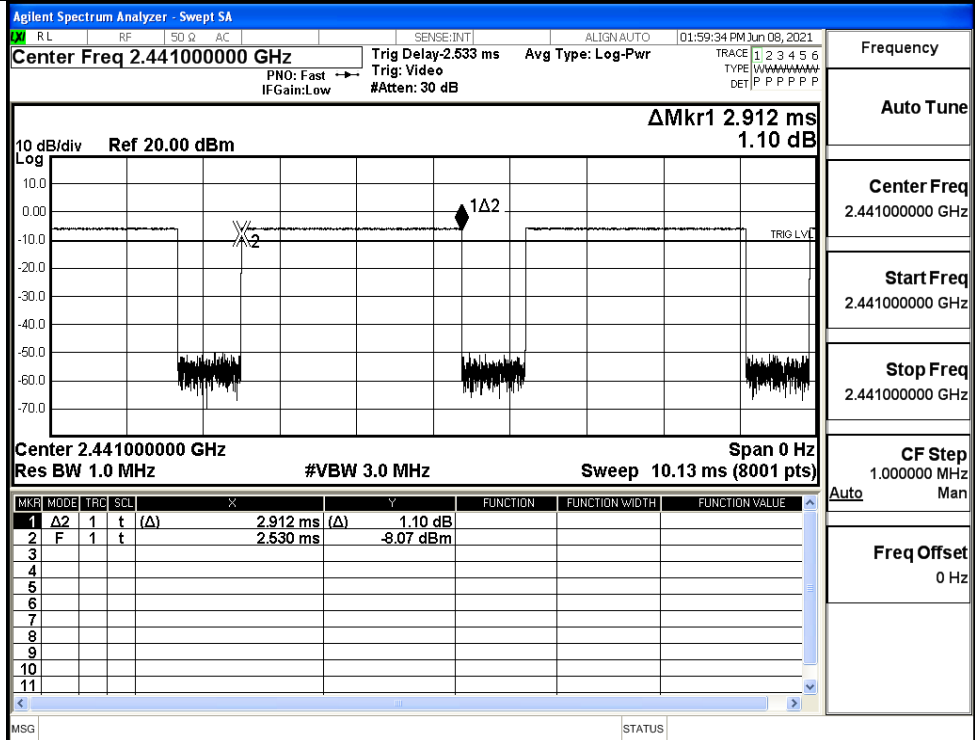
| <p>GFSK/Hop</p> | <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.441750000 GHz</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>ΔMkr1 78.041 MHz 0.874 dB</p> <p>Start 2.40000 GHz Stop 2.48350 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>1</td> <td>f</td> <td>(Δ)</td> <td>78.041 MHz (Δ)</td> <td>0.874 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td></td> <td>2.402004 GHz</td> <td>1.130 dBm</td> <td></td> <td></td> </tr> </tbody> </table> | MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | 1 | Δ2 | 1 | f | (Δ) | 78.041 MHz (Δ) | 0.874 dB | | | 2 | F | 1 | f | | 2.402004 GHz | 1.130 dBm | | |
|------------------------------------|--|-----|------|-----|----------------|-----------|----------------|----------------|----------------|----------------|---|----|---|---|-----|----------------|----------|--|--|---|---|---|---|--|--------------|-----------|--|--|
| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | | | | | | | | | | | | | | | | | | | | |
| 1 | Δ2 | 1 | f | (Δ) | 78.041 MHz (Δ) | 0.874 dB | | | | | | | | | | | | | | | | | | | | | | |
| 2 | F | 1 | f | | 2.402004 GHz | 1.130 dBm | | | | | | | | | | | | | | | | | | | | | | |
| <p>$\pi/4$DQPSK/Hop</p> | <p>Agilent Spectrum Analyzer - Swept SA</p> <p>Center Freq 2.441750000 GHz</p> <p>Ref Offset 8.05 dB Ref 20.00 dBm</p> <p>ΔMkr1 77.665 MHz 0.924 dB</p> <p>Start 2.40000 GHz Stop 2.48350 GHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 8.000 ms (8001 pts)</p> <table border="1"> <thead> <tr> <th>MKR</th> <th>MODE</th> <th>TRC</th> <th>SCL</th> <th>X</th> <th>Y</th> <th>FUNCTION</th> <th>FUNCTION WIDTH</th> <th>FUNCTION VALUE</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Δ2</td> <td>1</td> <td>f</td> <td>(Δ)</td> <td>77.665 MHz (Δ)</td> <td>0.924 dB</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>F</td> <td>1</td> <td>f</td> <td></td> <td>2.402161 GHz</td> <td>1.193 dBm</td> <td></td> <td></td> </tr> </tbody> </table> | MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | 1 | Δ2 | 1 | f | (Δ) | 77.665 MHz (Δ) | 0.924 dB | | | 2 | F | 1 | f | | 2.402161 GHz | 1.193 dBm | | |
| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE | | | | | | | | | | | | | | | | | | | | |
| 1 | Δ2 | 1 | f | (Δ) | 77.665 MHz (Δ) | 0.924 dB | | | | | | | | | | | | | | | | | | | | | | |
| 2 | F | 1 | f | | 2.402161 GHz | 1.193 dBm | | | | | | | | | | | | | | | | | | | | | | |

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 | 2.91 | 106.7 | 0.31 | 0.4 | PASS |
| | DH5 | MCH | 2.91 | 106.7 | 0.31 | 0.4 | PASS |
| | DH5 | HCH | 2.91 | 106.7 | 0.31 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | LCH | 2.91 | 106.7 | 0.312 | 0.4 | PASS |
| | 2DH5 | MCH | 2.91 | 106.7 | 0.312 | 0.4 | PASS |
| | 2DH5 | HCH | 2.91 | 106.7 | 0.312 | 0.4 | PASS |



GFSK_DH5/MCH



Frequency

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

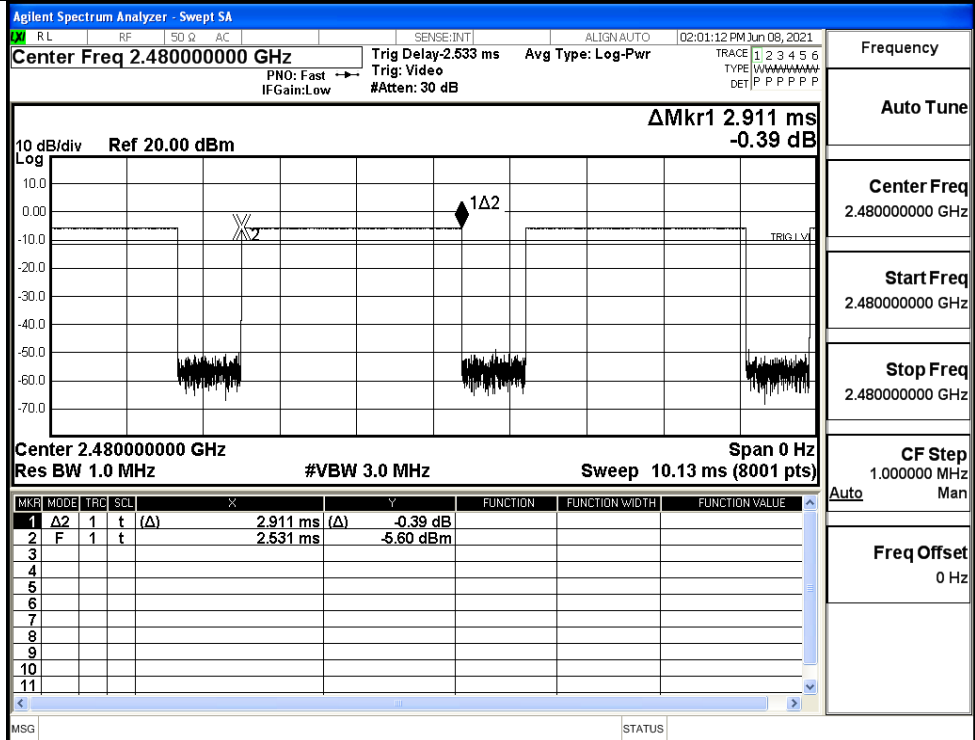
Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz

Auto Man

Freq Offset
0 Hz

GFSK_DH5/HCH



Frequency

Auto Tune

Center Freq
2.480000000 GHz

Start Freq
2.480000000 GHz

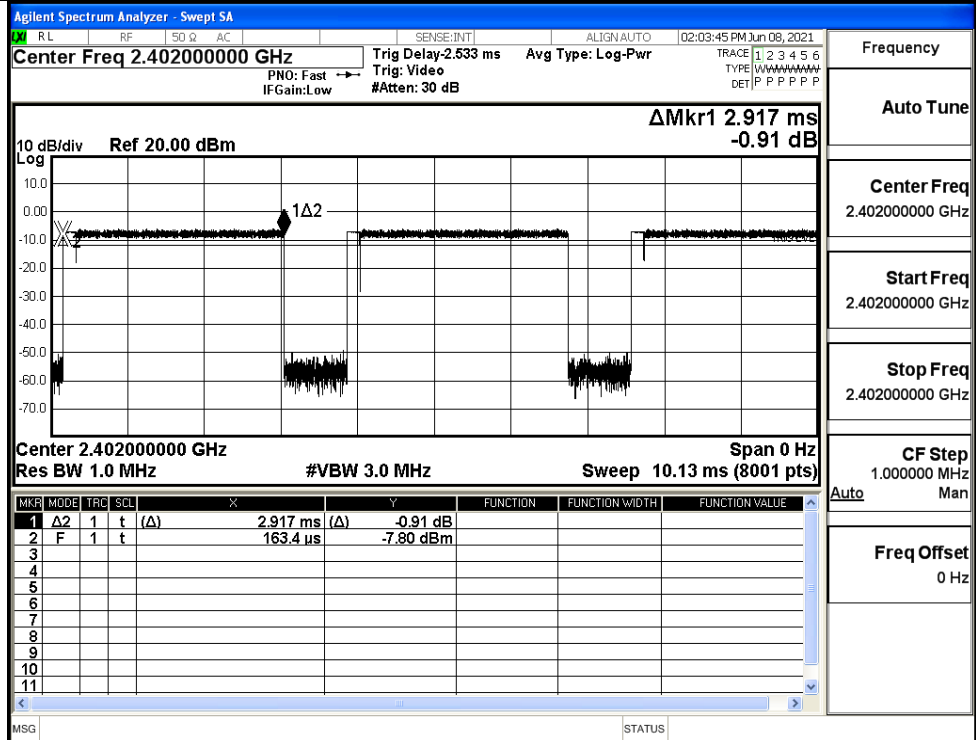
Stop Freq
2.480000000 GHz

CF Step
1.000000 MHz

Auto Man

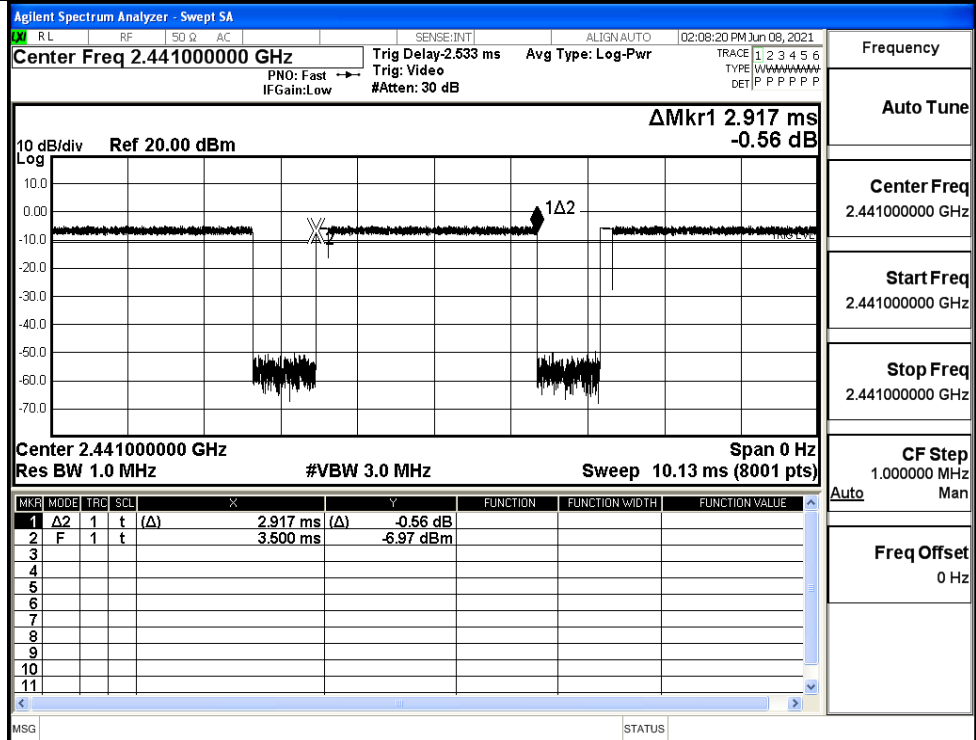
Freq Offset
0 Hz

$\pi/4$ DQPSK
_2DH5/LCH



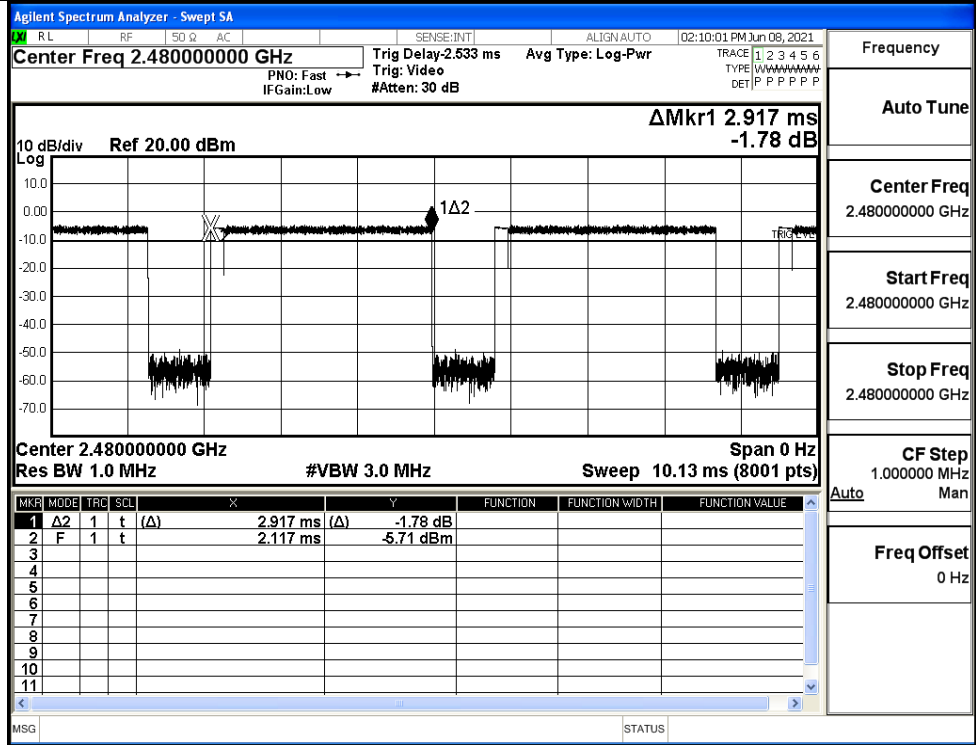
| | |
|-------------|----------------|
| Frequency | 2.40200000 GHz |
| Auto Tune | |
| Center Freq | 2.40200000 GHz |
| Start Freq | 2.40200000 GHz |
| Stop Freq | 2.40200000 GHz |
| CF Step | 1.000000 MHz |
| Freq Offset | 0 Hz |

$\pi/4$ DQPSK
_2DH5/MCH



| | |
|-------------|----------------|
| Frequency | 2.44100000 GHz |
| Auto Tune | |
| Center Freq | 2.44100000 GHz |
| Start Freq | 2.44100000 GHz |
| Stop Freq | 2.44100000 GHz |
| CF Step | 1.000000 MHz |
| Freq Offset | 0 Hz |

$\pi/4$ DQPSK
_2DH5/HCH

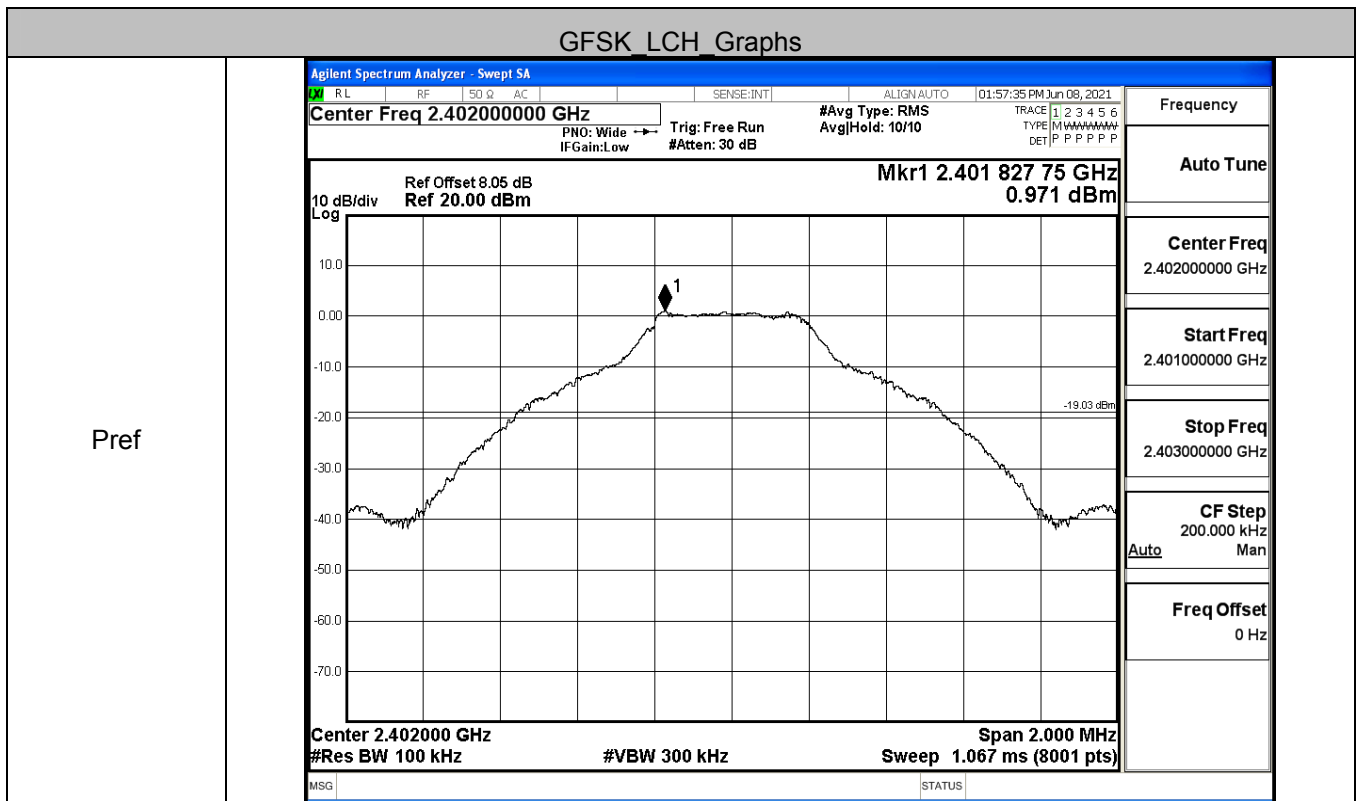


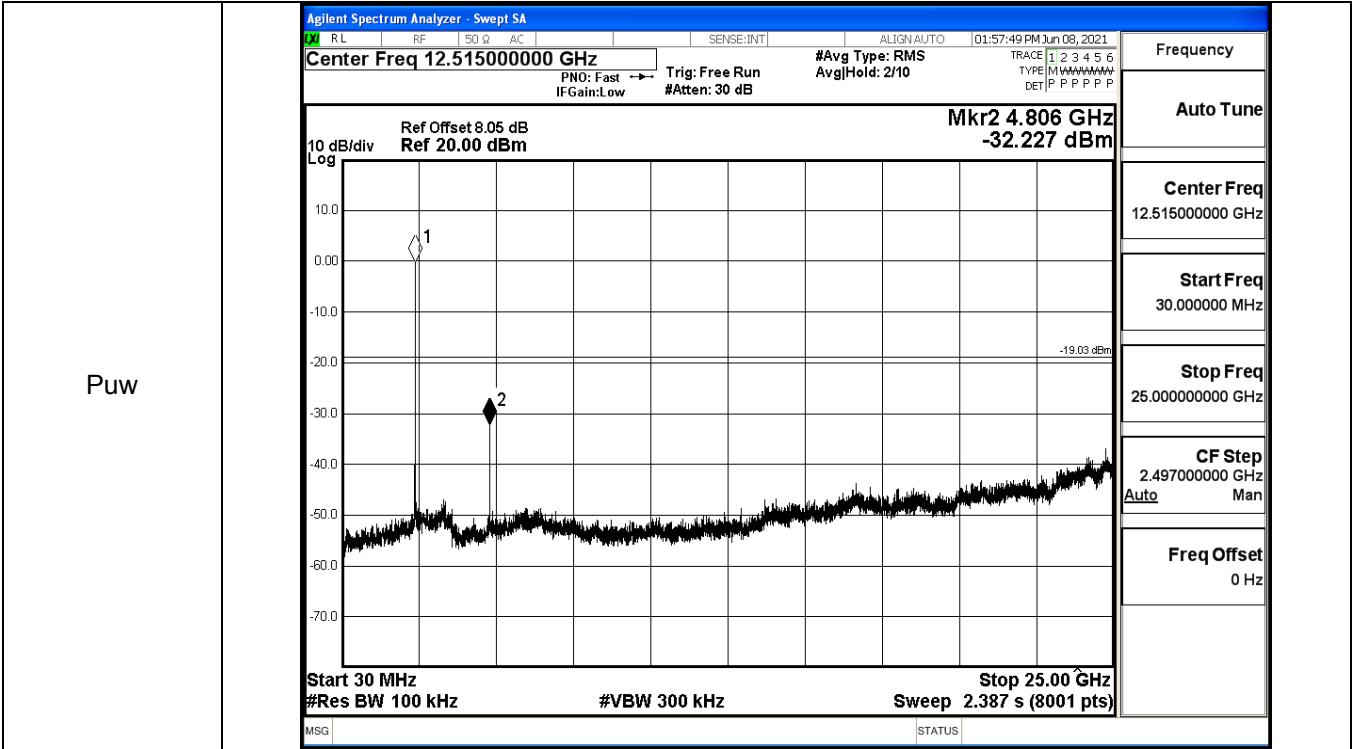
| | |
|-------------|-----------------|
| Frequency | |
| Auto Tune | |
| Center Freq | 2.480000000 GHz |
| Start Freq | 2.480000000 GHz |
| Stop Freq | 2.480000000 GHz |
| CF Step | 1.000000 MHz |
| Auto | Man |
| Freq Offset | 0 Hz |

A.6 RF Conducted Spurious Emissions

| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|----------|---------|------------|------------------|-------------|---------|
| GFSK | LCH | 0.971 | -32.227 | -19.029 | PASS |
| | MCH | 2.258 | -32.206 | -17.742 | PASS |
| | HCH | 2.46 | -28.218 | -17.540 | PASS |
| π/4DQPSK | LCH | 1.195 | -35.946 | -18.805 | PASS |
| | MCH | 2.318 | -34.830 | -17.682 | PASS |
| | HCH | 2.577 | -34.649 | -17.423 | PASS |

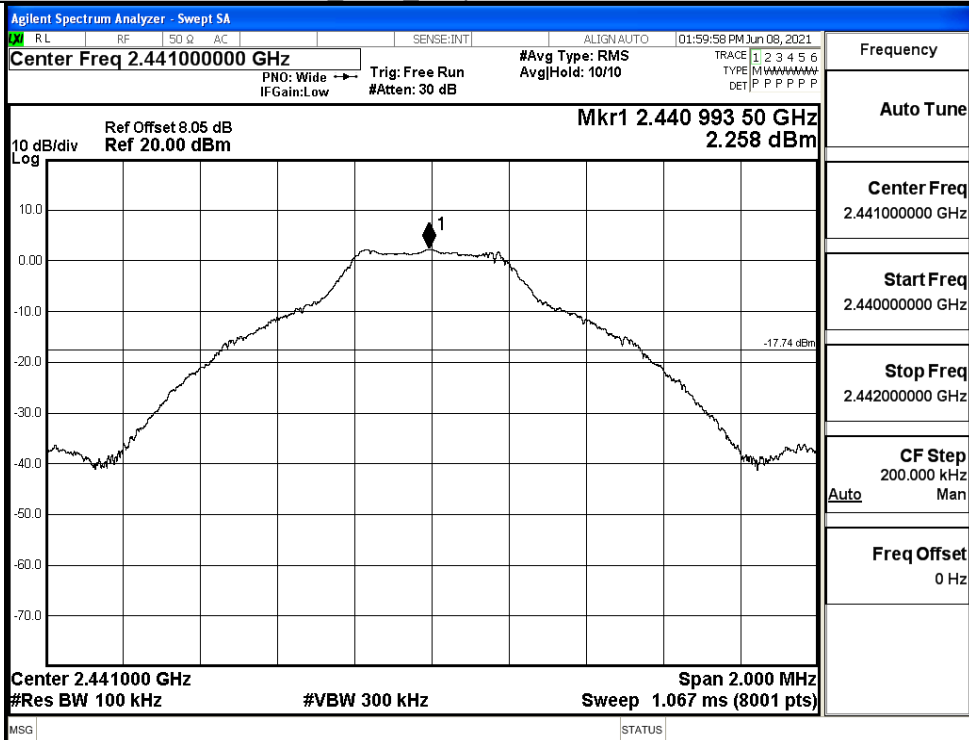
GFSK LCH Graphs



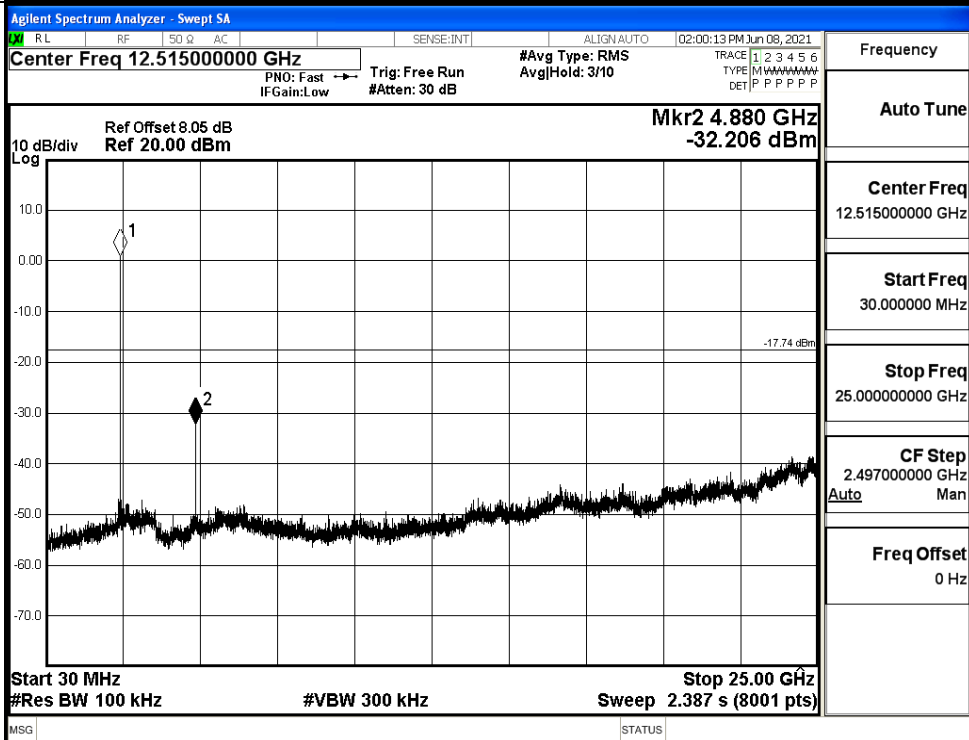


GFSK_MCH_Graphs

Pref

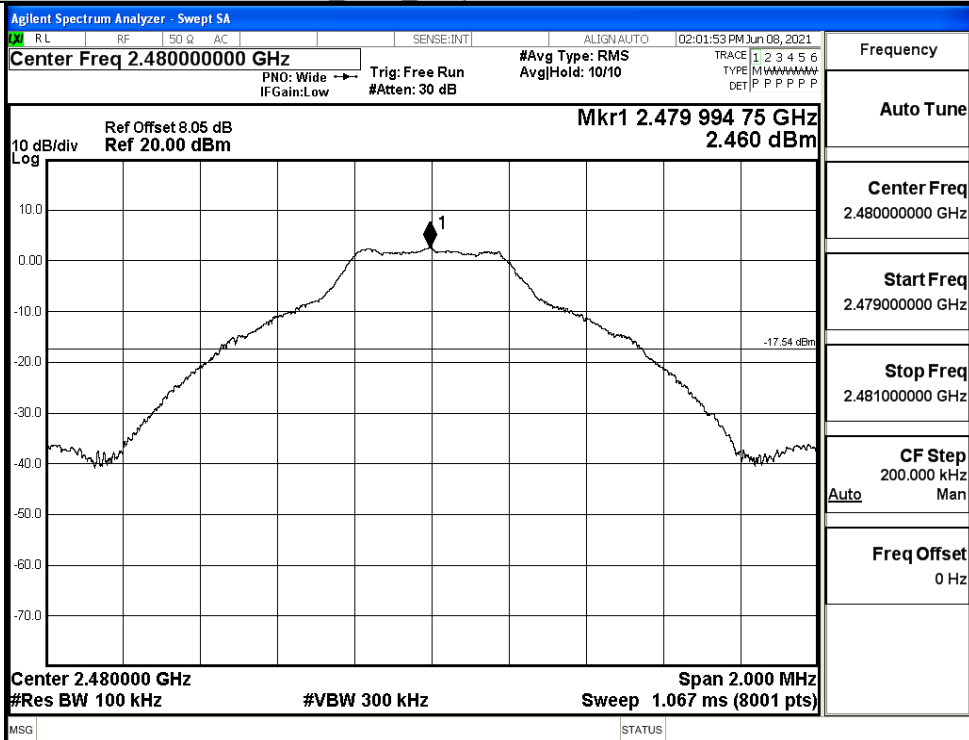


Puw

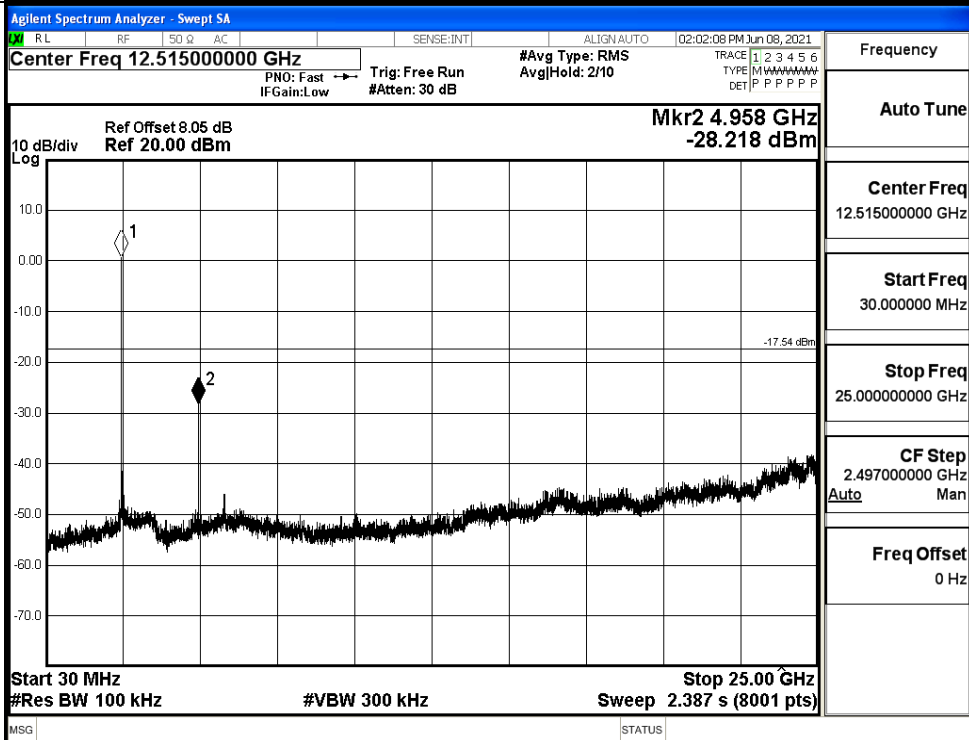


GFSK_HCH_Graphs

Pref

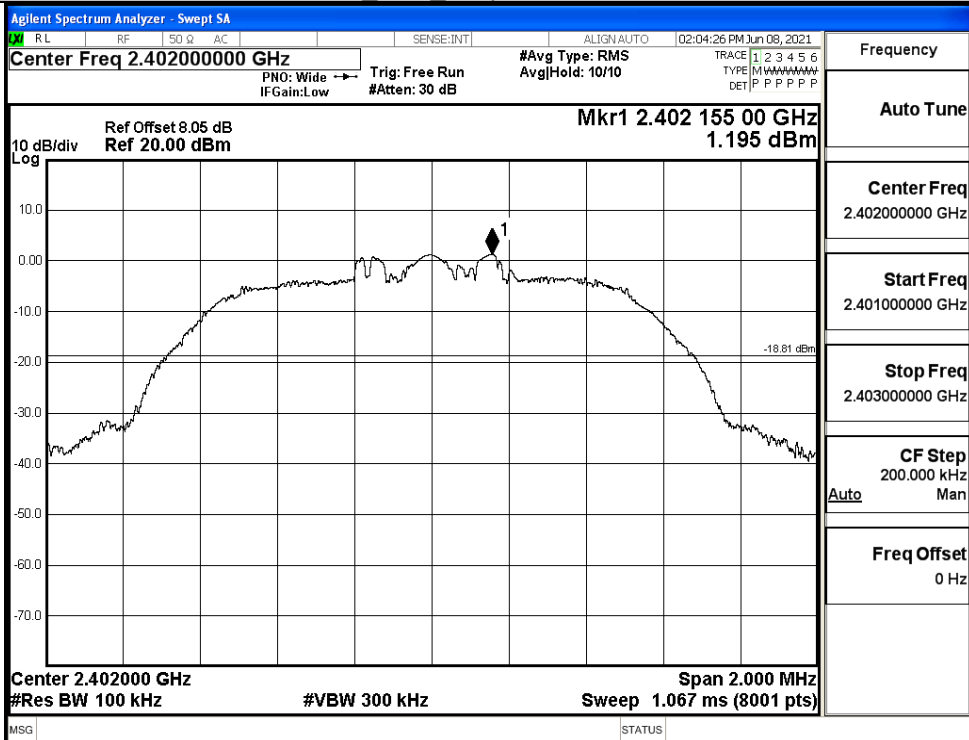


Puw

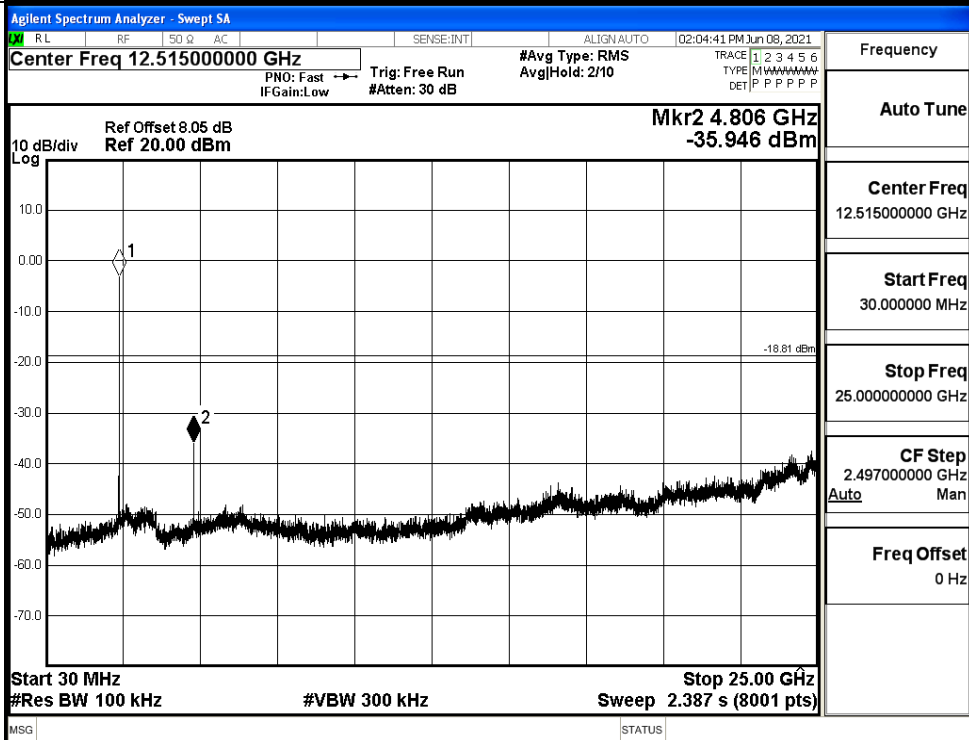


$\pi/4$ DQPSK_LCH_Graphs

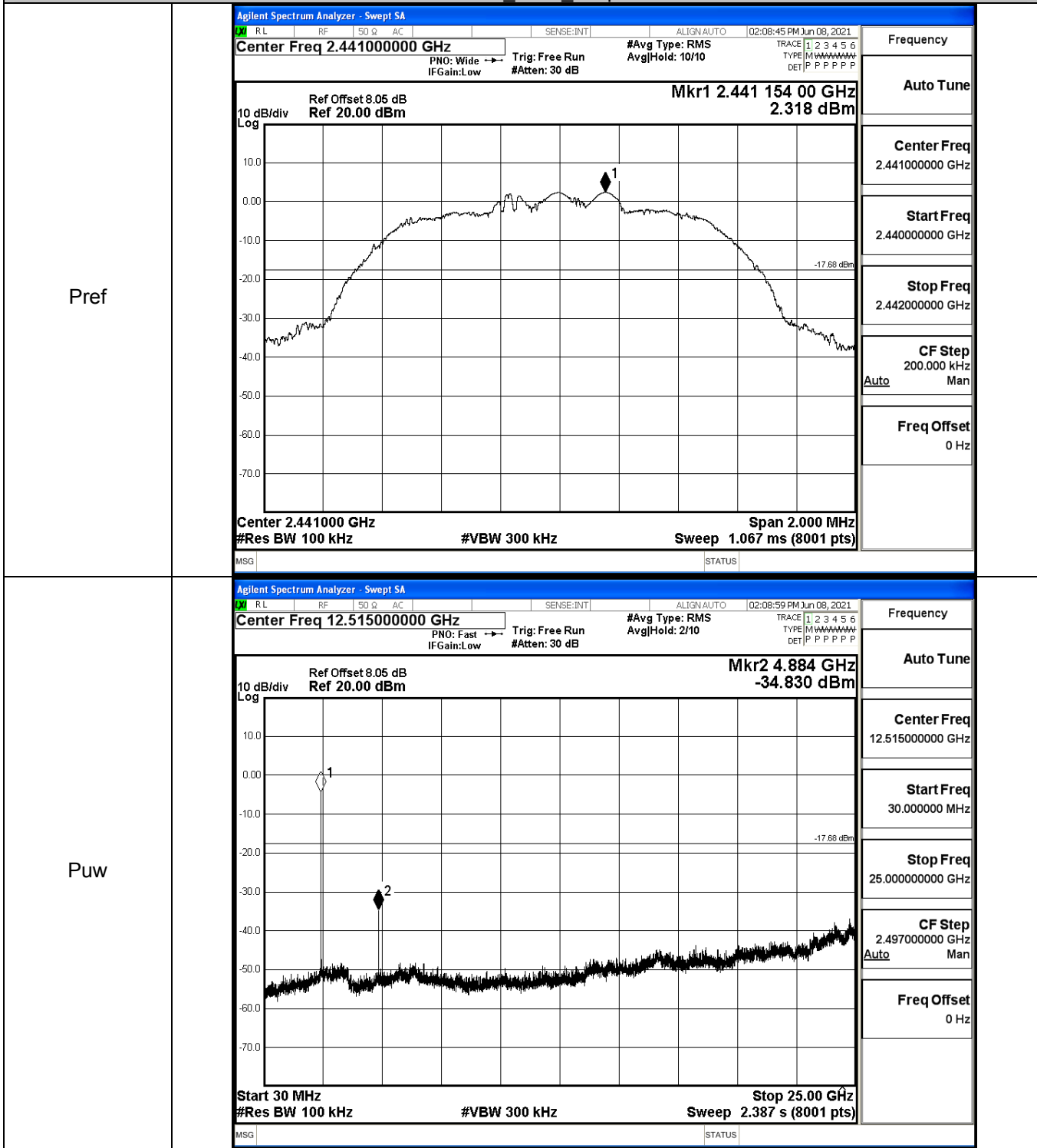
Pref



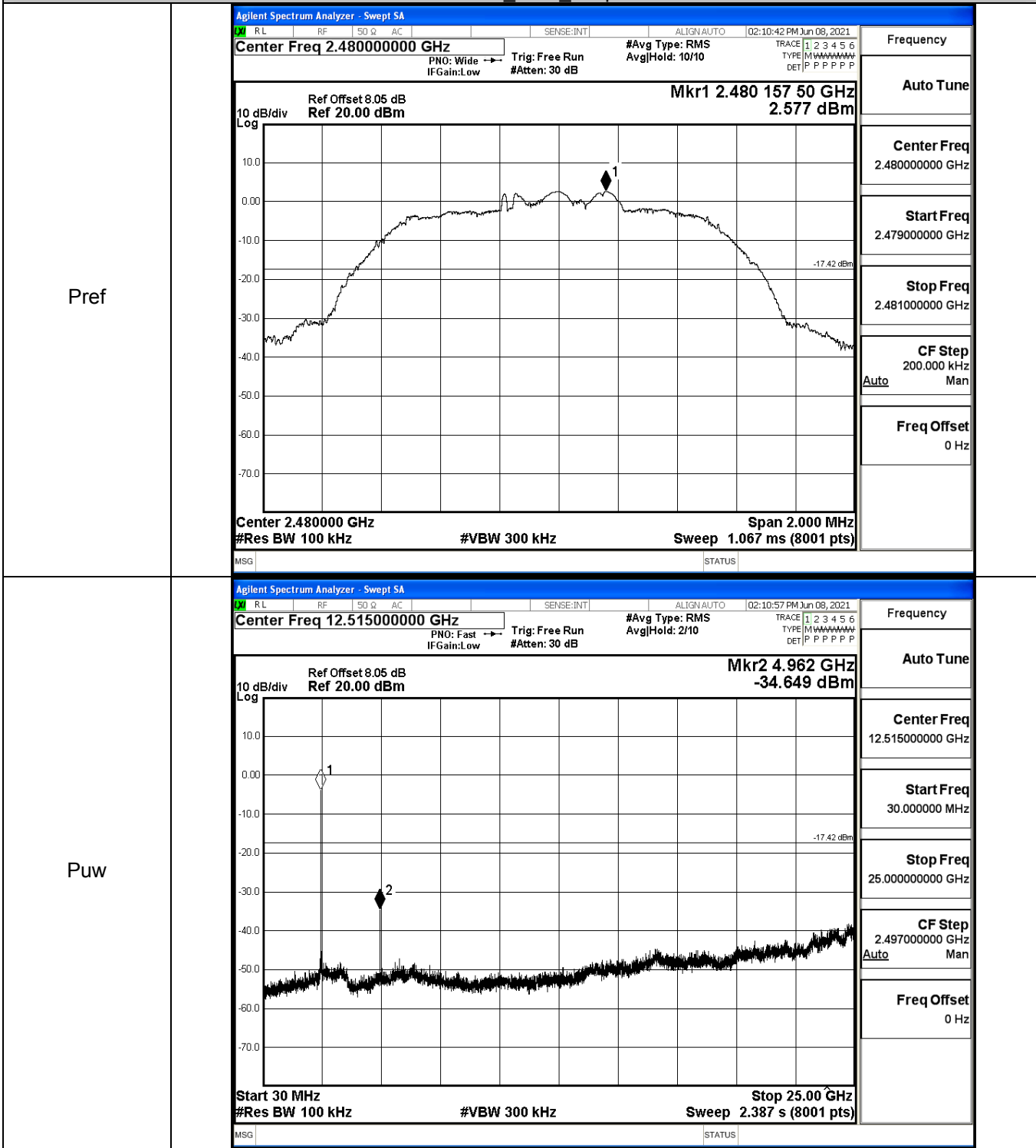
Puw



$\pi/4$ DQPSK_MCH_Graphs



$\pi/4$ DQPSK_HCH_Graphs

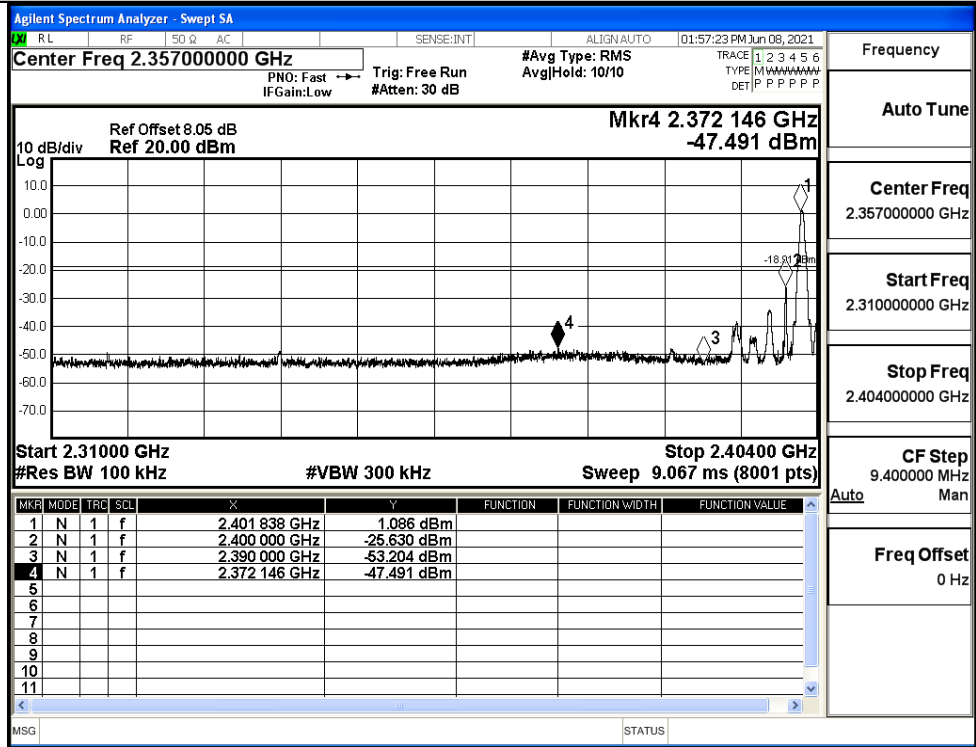


A.7 Band-edge for RF Conducted Emissions

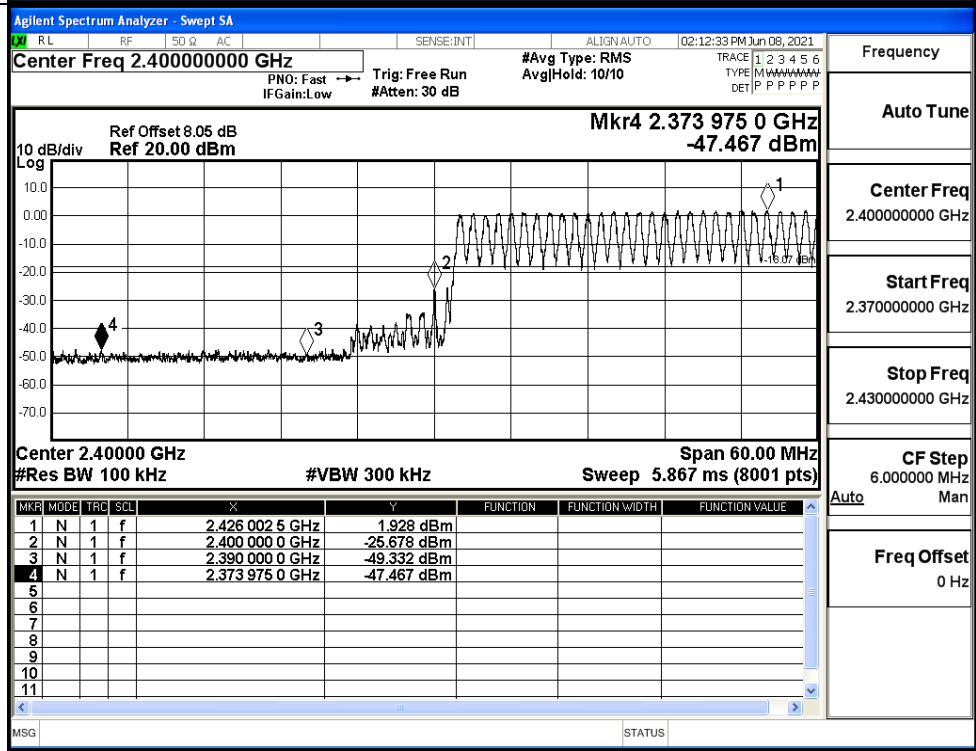
| Mode | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|-------------------------|---------------------|-------------------|--------------------------|-------------|---------|
| GFSK | LCH | 2402 | 1.086 | Off | -47.491 | -18.91 | PASS |
| | | | 1.928 | On | -47.467 | -18.07 | PASS |
| | HCH | 2480 | 2.528 | Off | -42.485 | -17.47 | PASS |
| | | | 2.690 | On | -44.035 | -17.31 | PASS |
| $\pi/4$ DQPSK | LCH | 2402 | 1.259 | Off | -48.335 | -18.74 | PASS |
| | | | 2.169 | On | -46.886 | -17.83 | PASS |
| | HCH | 2480 | 2.597 | Off | -42.560 | -17.4 | PASS |
| | | | 2.641 | On | -44.161 | -17.36 | PASS |

Test Graphs

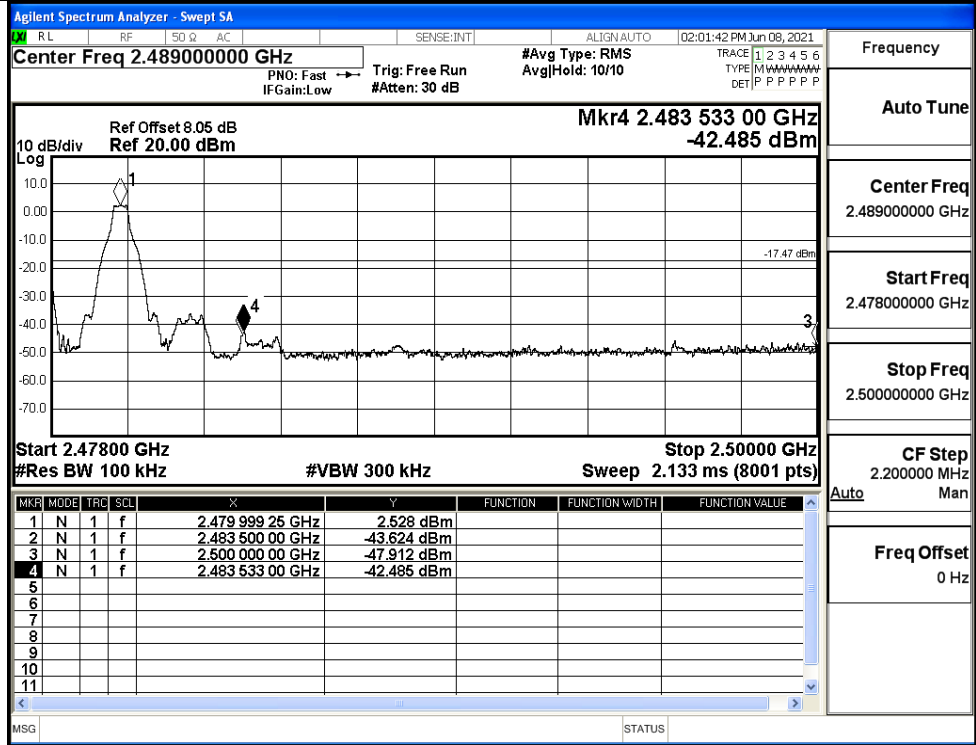
GFSK/LCH/No Hop



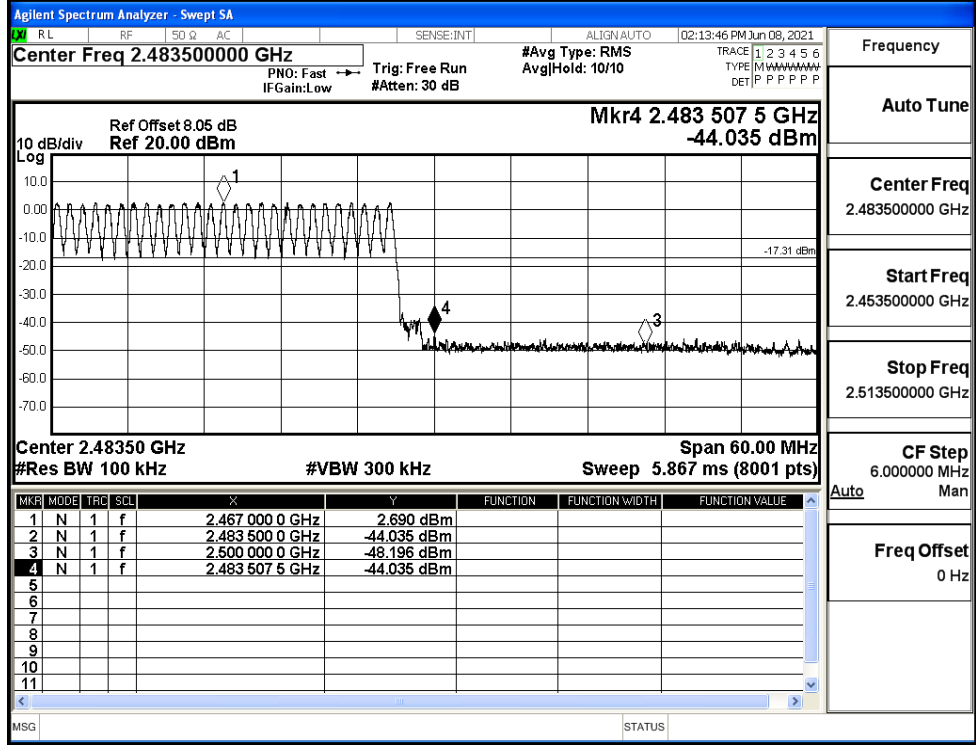
GFSK/LCH/Hop



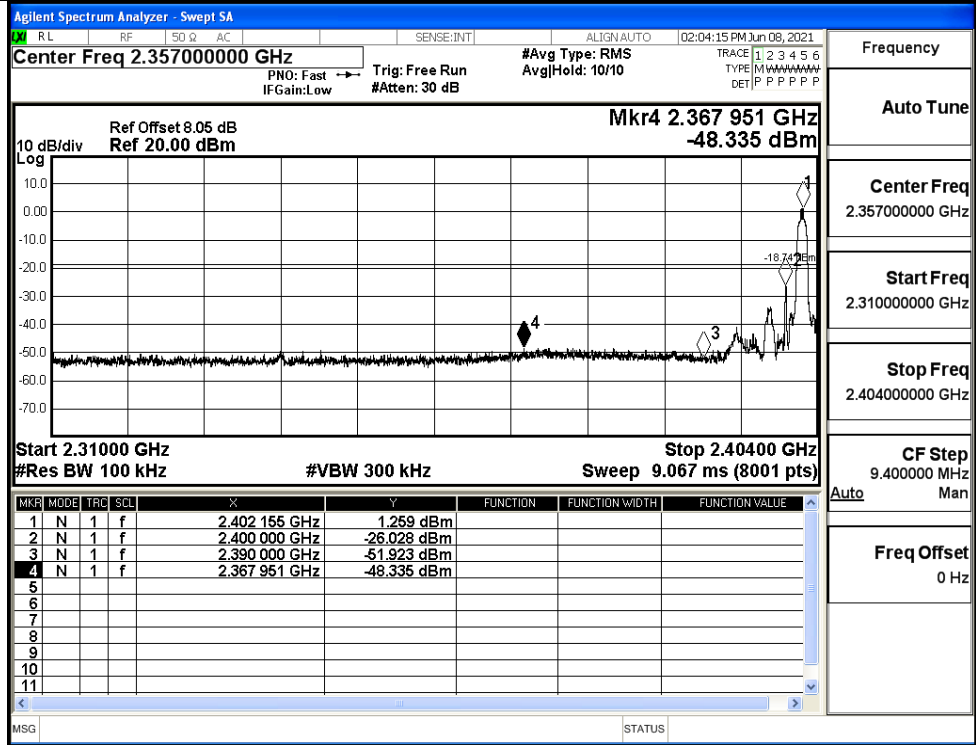
GFSK/HCH/No Hop



GFSK/HCH/Hop

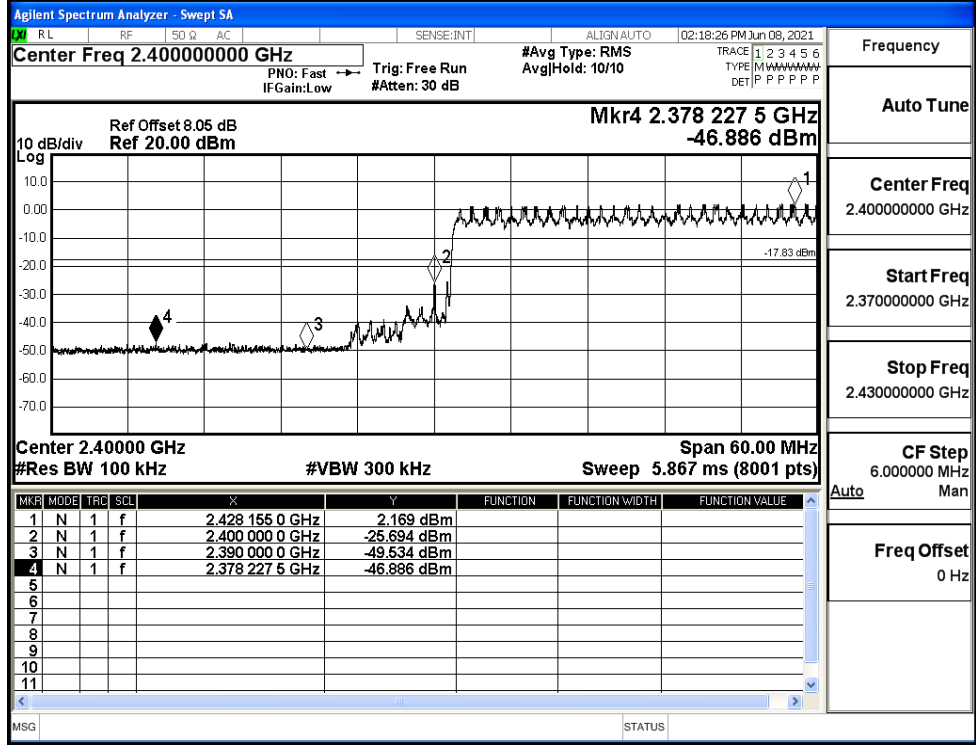


$\pi/4$ DQPSK/LCH/No Hop



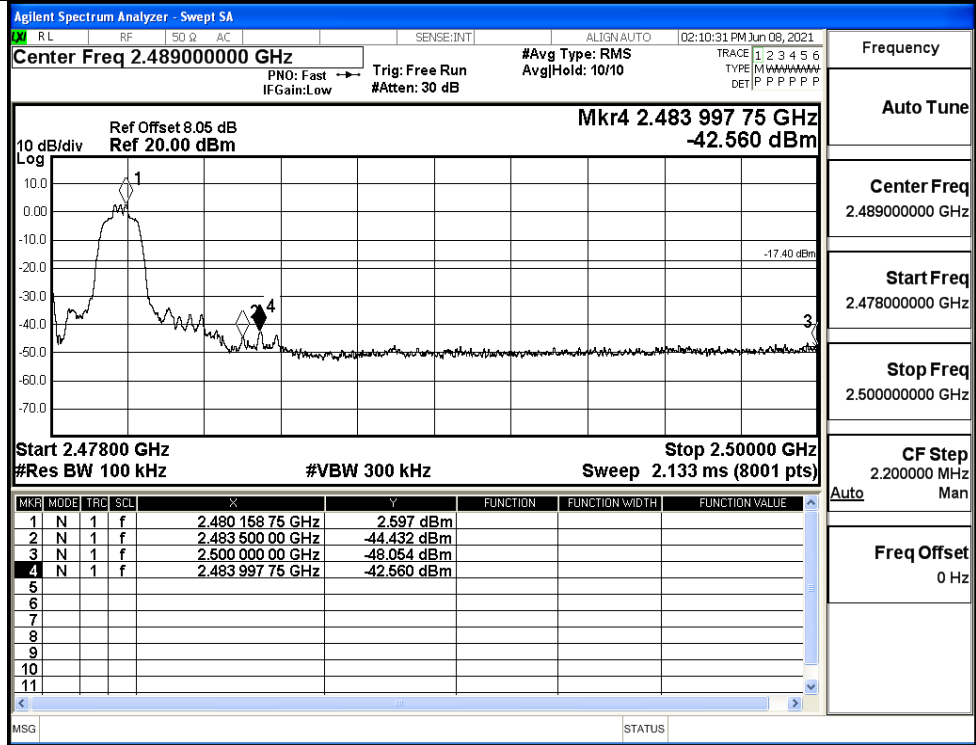
| | |
|-------------|-----------------|
| Frequency | 2.357000000 GHz |
| Auto Tune | |
| Center Freq | 2.357000000 GHz |
| Start Freq | 2.310000000 GHz |
| Stop Freq | 2.404000000 GHz |
| CF Step | 9.400000 MHz |
| Auto | Man |
| Freq Offset | 0 Hz |

$\pi/4$ DQPSK/LCH/Hop

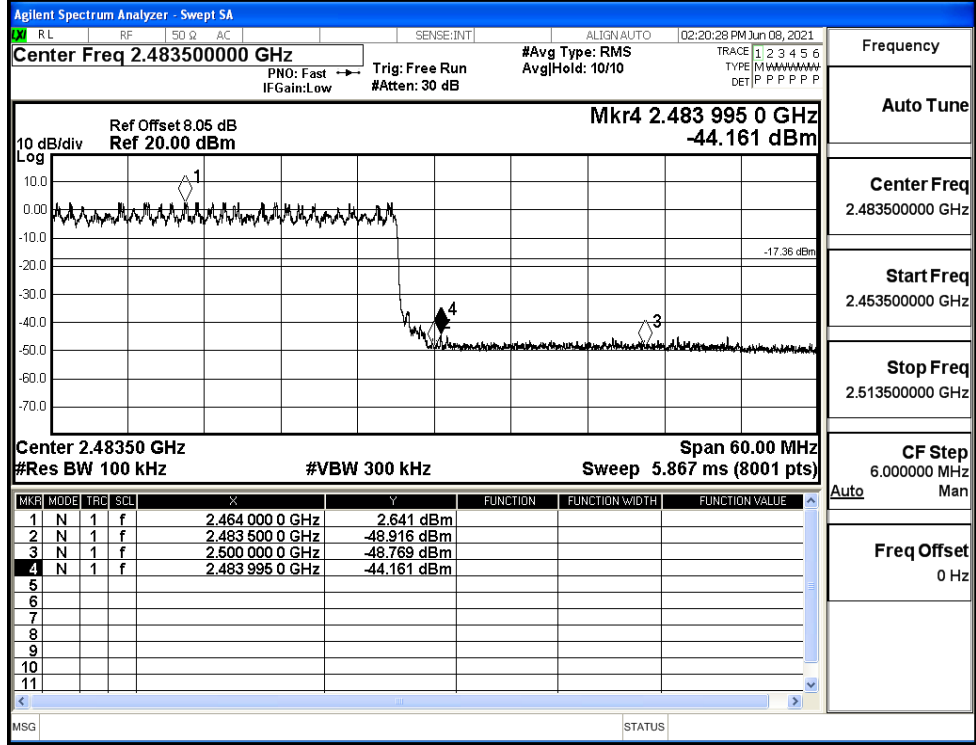


| | |
|-------------|-----------------|
| Frequency | 2.400000000 GHz |
| Auto Tune | |
| Center Freq | 2.400000000 GHz |
| Start Freq | 2.370000000 GHz |
| Stop Freq | 2.430000000 GHz |
| CF Step | 6.000000 MHz |
| Auto | Man |
| Freq Offset | 0 Hz |

π /4DQPSK/HCH/No Hop



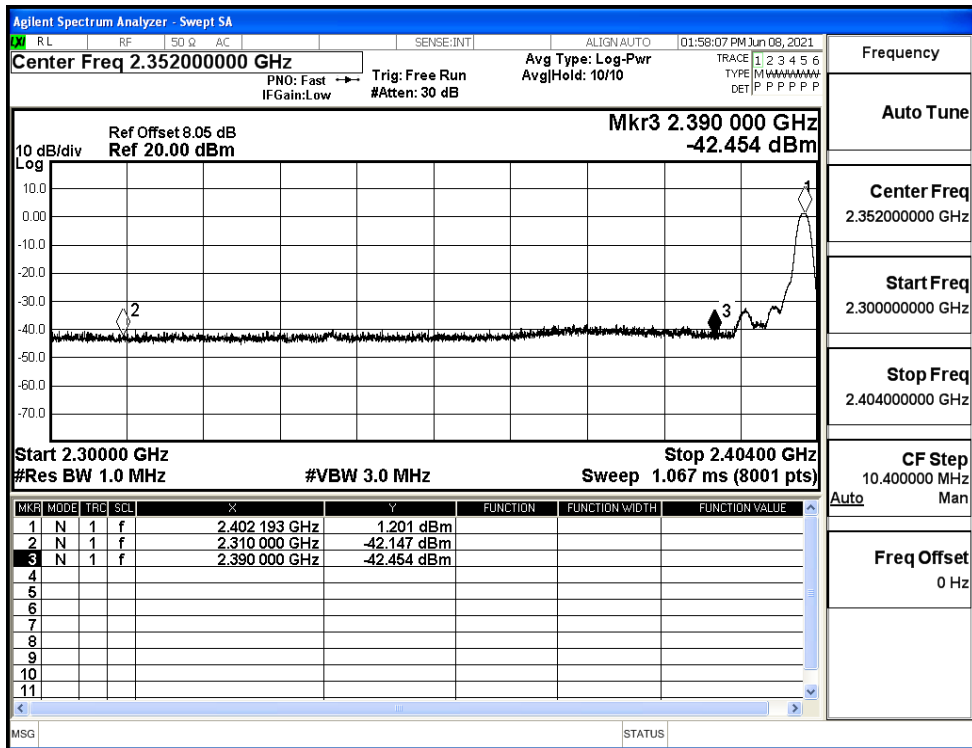
π /4DQPSK/HCH/Hop



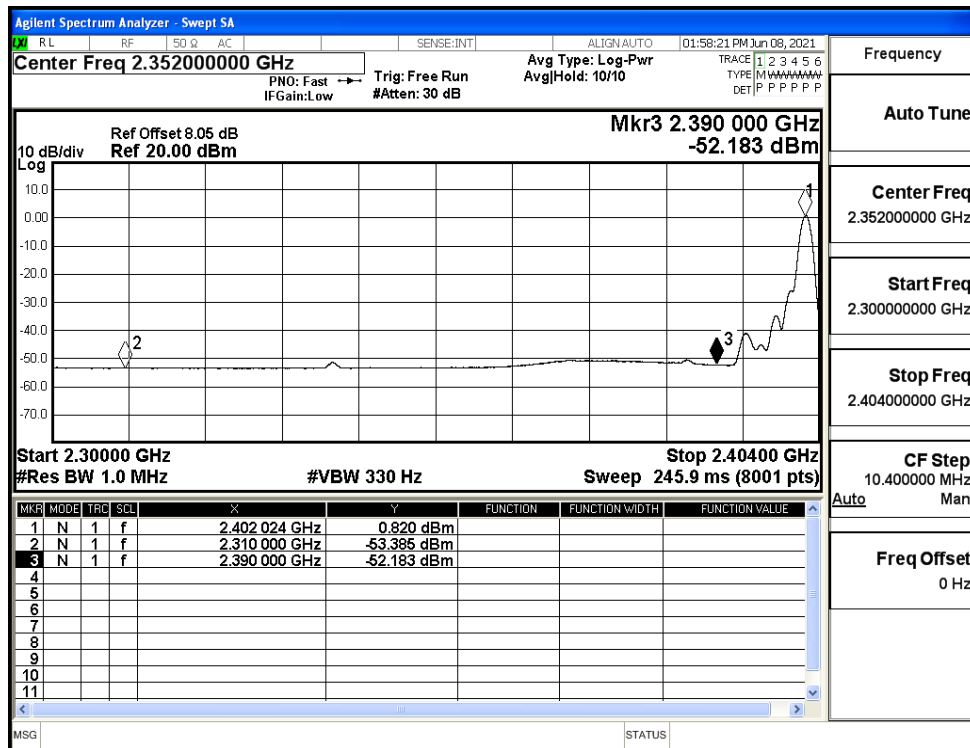
A.8 Restrict-band band-edge measurements

| Test Mode | Hopping | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---------------|---------|--------|-------------|------|---------------|------------|----------|----------------|---------|
| GFSK | Off | 2310.0 | -42.15 | 2.0 | 0 | 53.11 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.39 | 2.0 | 0 | 41.87 | AV | 54 | PASS |
| | Off | 2390.0 | -42.45 | 2.0 | 0 | 52.80 | PEAK | 74 | PASS |
| | Off | 2390.0 | -52.18 | 2.0 | 0 | 43.07 | AV | 54 | PASS |
| | Off | 2483.5 | -37.59 | 2.0 | 0 | 57.67 | PEAK | 74 | PASS |
| | Off | 2483.5 | -46.32 | 2.0 | 0 | 48.94 | AV | 54 | PASS |
| | Off | 2500.0 | -39.79 | 2.0 | 0 | 55.47 | PEAK | 74 | PASS |
| | Off | 2500.0 | -49.25 | 2.0 | 0 | 46.00 | AV | 54 | PASS |
| $\pi/4$ DQPSK | Off | 2310.0 | -43.17 | 2.0 | 0 | 52.09 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.37 | 2.0 | 0 | 41.89 | AV | 54 | PASS |
| | Off | 2390.0 | -41.24 | 2.0 | 0 | 54.02 | PEAK | 74 | PASS |
| | Off | 2390.0 | -52.19 | 2.0 | 0 | 43.07 | AV | 54 | PASS |
| | Off | 2483.5 | -39.00 | 2.0 | 0 | 56.26 | PEAK | 74 | PASS |
| | Off | 2483.5 | -47.43 | 2.0 | 0 | 47.83 | AV | 54 | PASS |
| | Off | 2500.0 | -39.13 | 2.0 | 0 | 56.13 | PEAK | 74 | PASS |
| | Off | 2500.0 | -49.62 | 2.0 | 0 | 45.63 | AV | 54 | PASS |

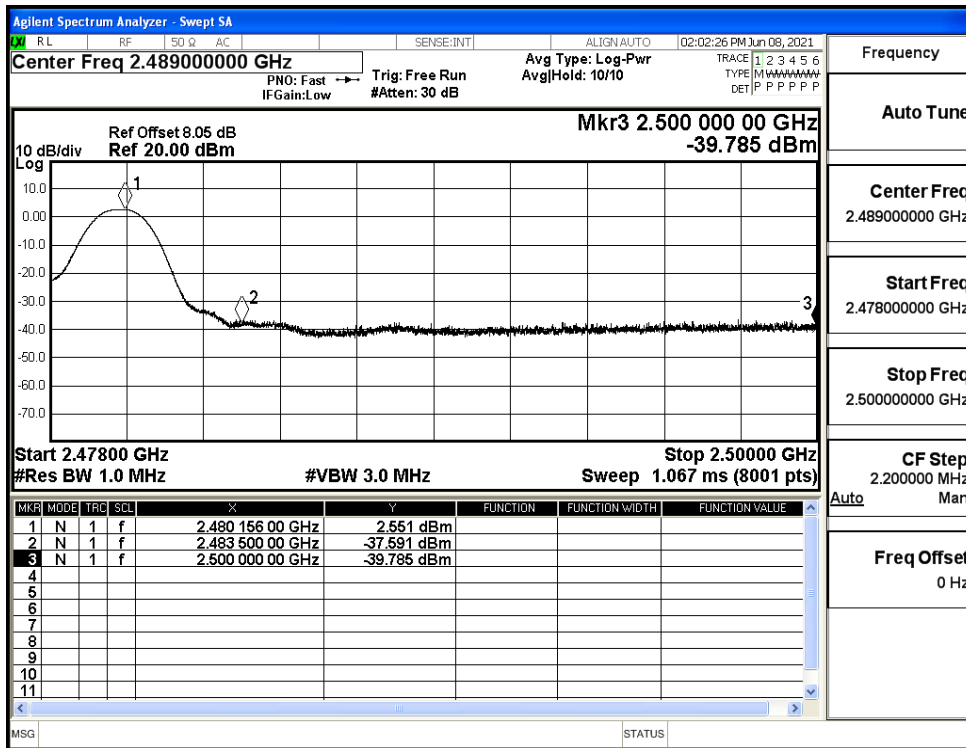
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



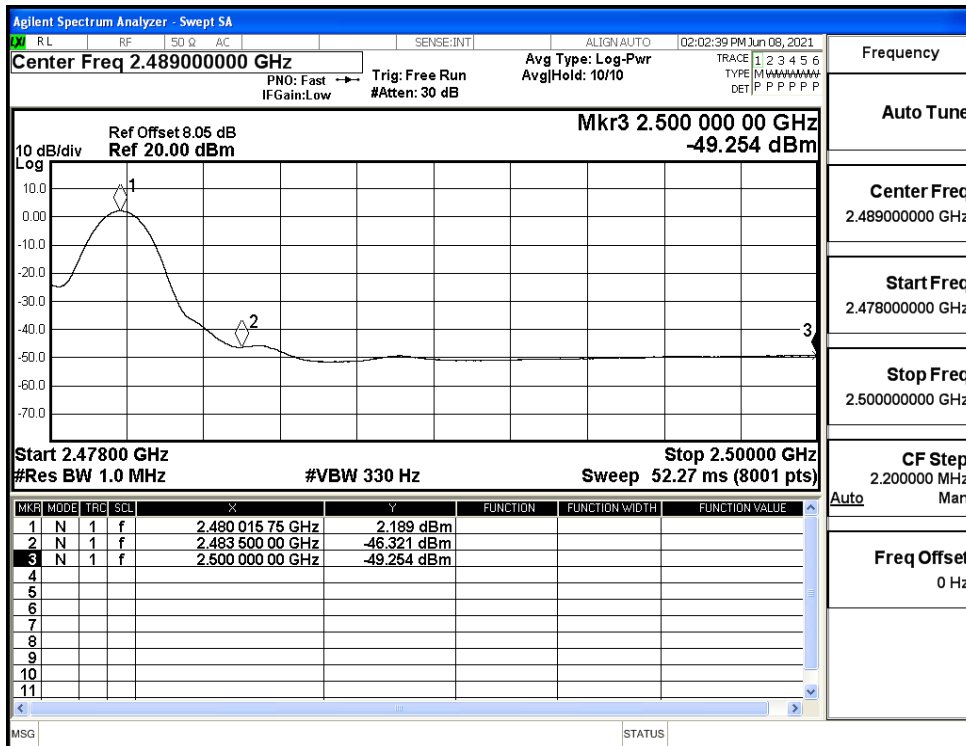
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)



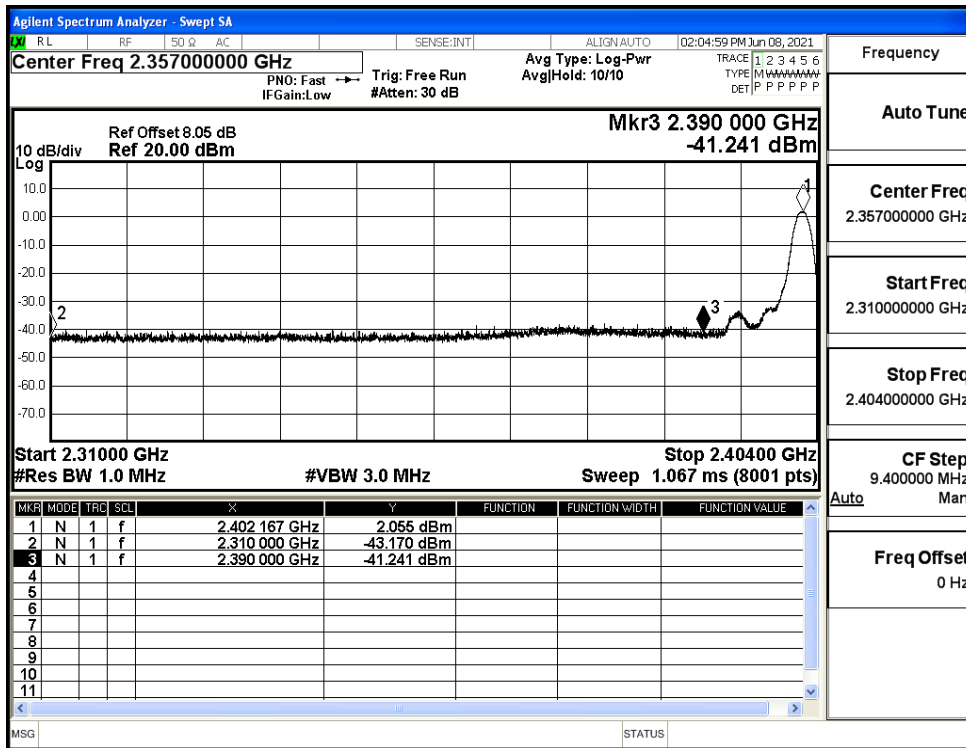
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (High Channel)



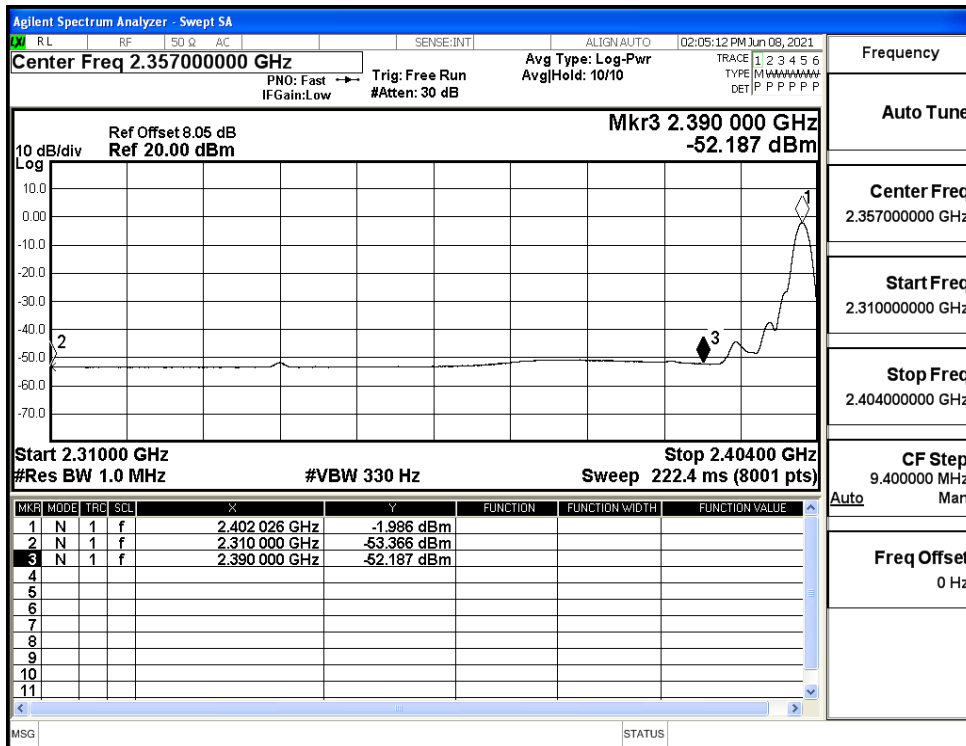
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (High Channel)



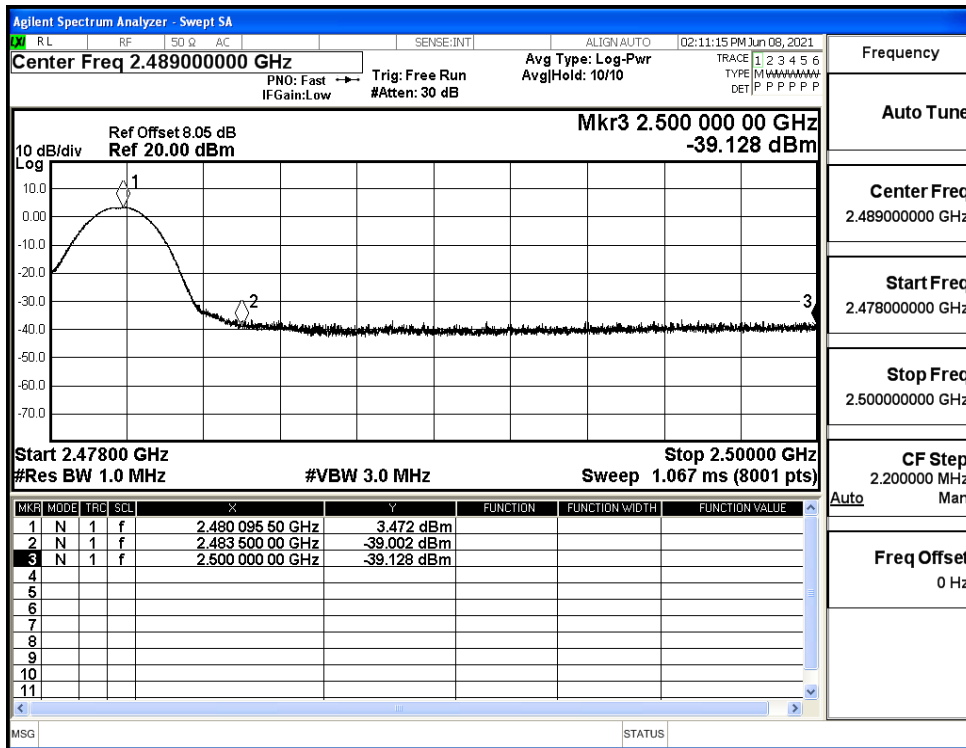
Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)



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)

