

Appendix A

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

Product Name: Adak BT Speaker IX7

Trade Mark: Gemline

Test Model: 100500-001B

Environmental Conditions

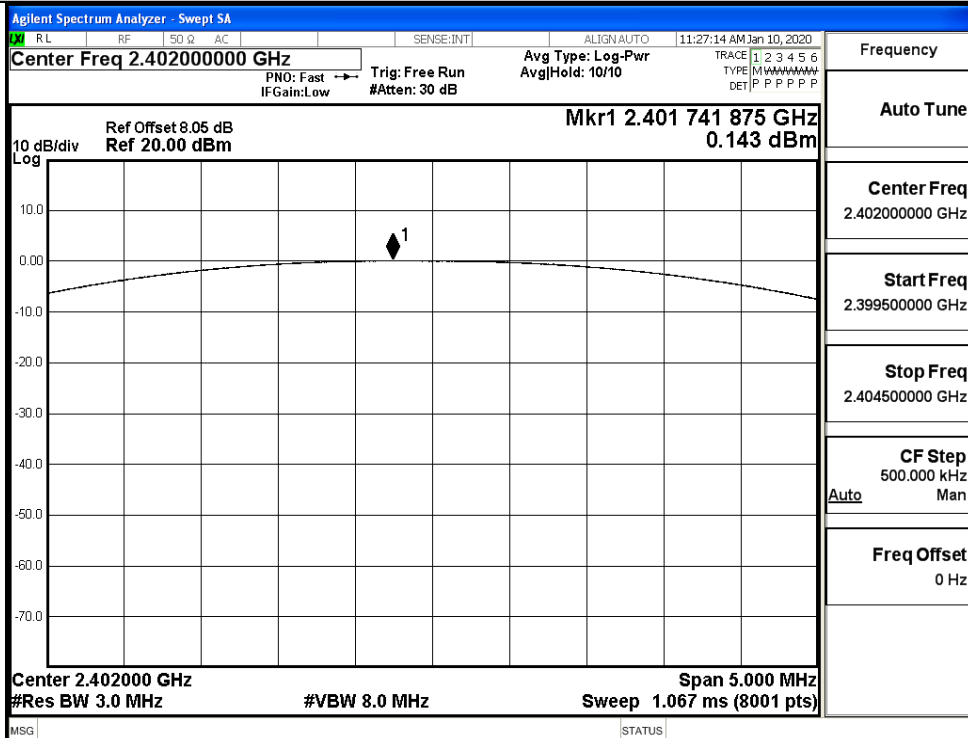
| | |
|--------------------|-----------|
| Temperature: | 25 ° C |
| Relative Humidity: | 50% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Qu Xin |
| Supervised by: | Tom.Liu |

A.1 Maximum Conducted Peak Output Power

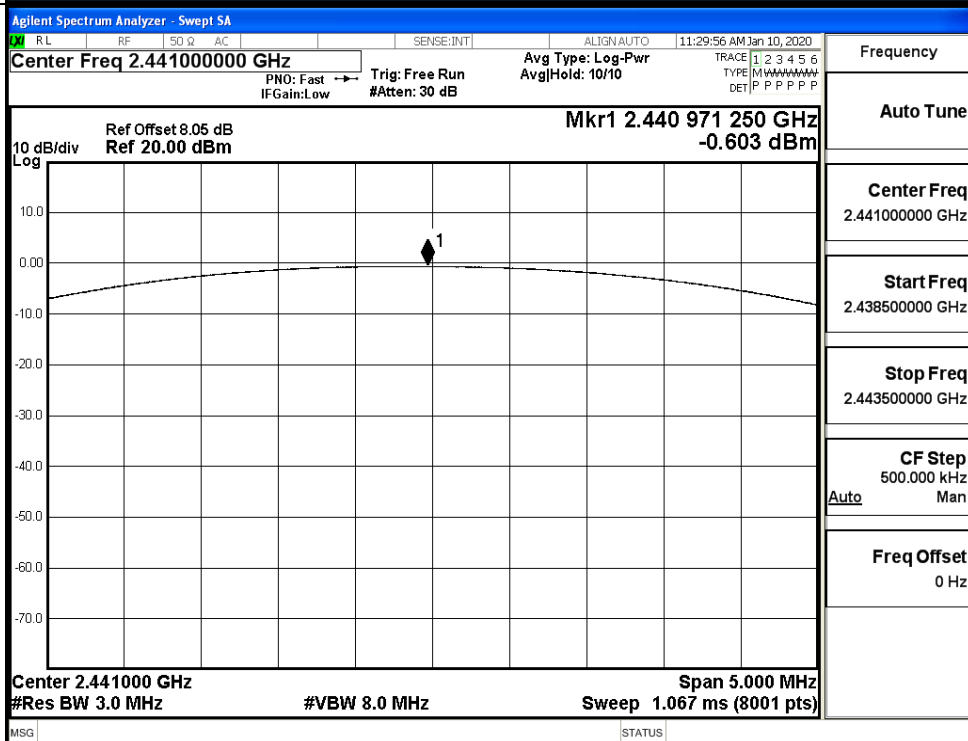
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK | LCH | 0.143 | 30 | PASS |
| | MCH | -0.603 | 30 | PASS |
| | HCH | -0.589 | 30 | PASS |
| $\pi/4$ DQPSK | LCH | 3.124 | 21 | PASS |
| | MCH | 2.585 | 21 | PASS |
| | HCH | 2.715 | 21 | PASS |
| 8DPSK | LCH | -0.594 | 21 | PASS |
| | MCH | -1.266 | 21 | PASS |
| | HCH | -1.635 | 21 | PASS |

Test Graphs

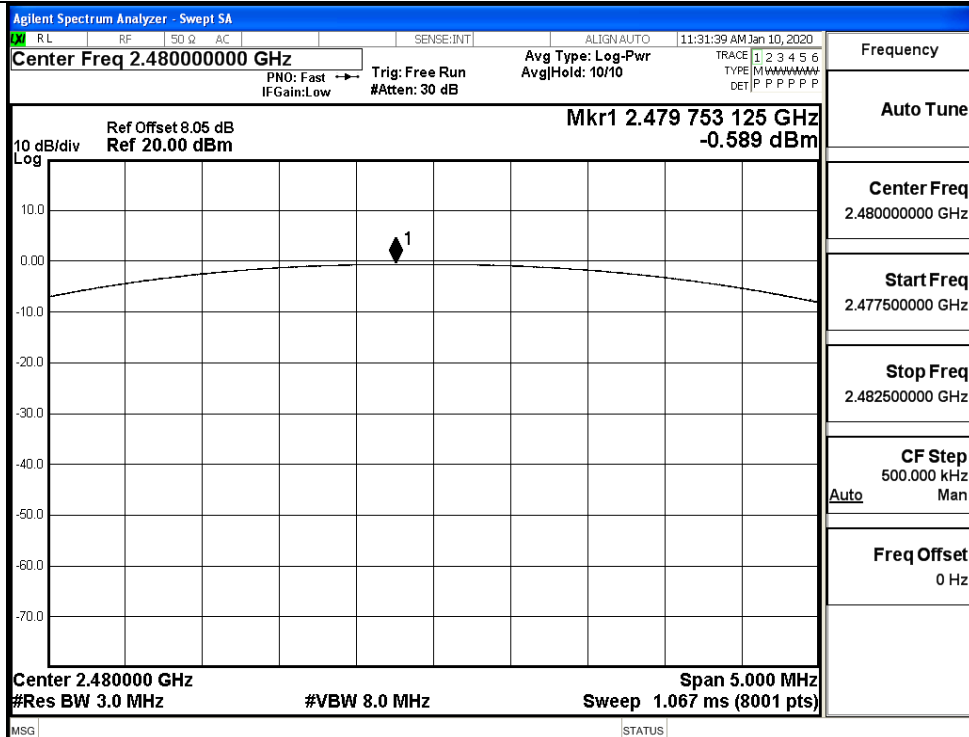
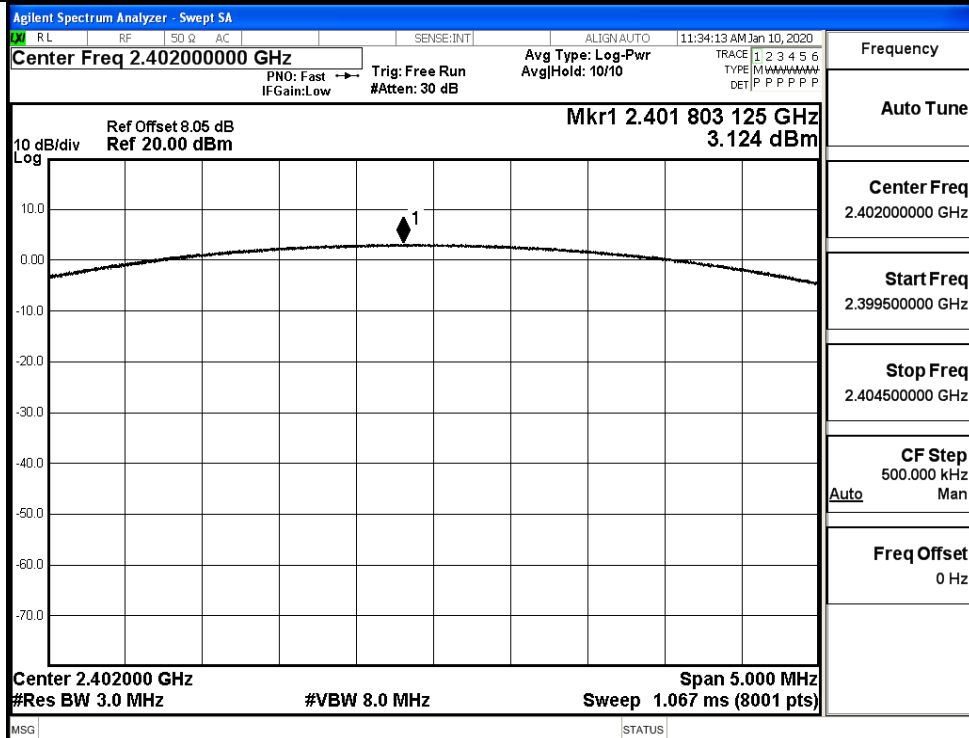
GFSK/LCH

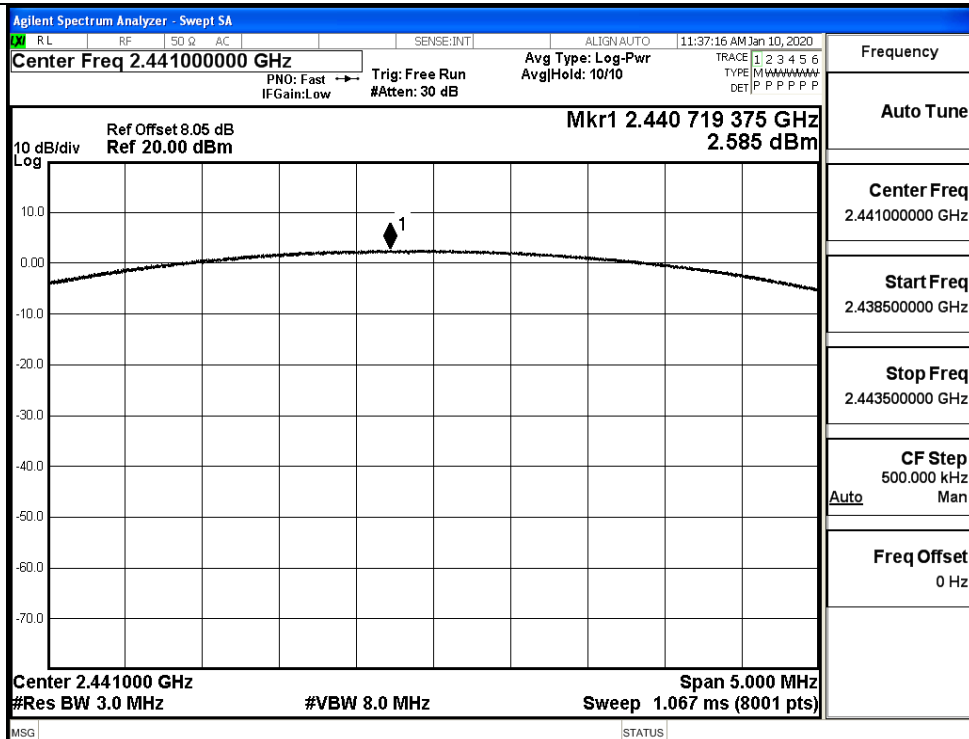
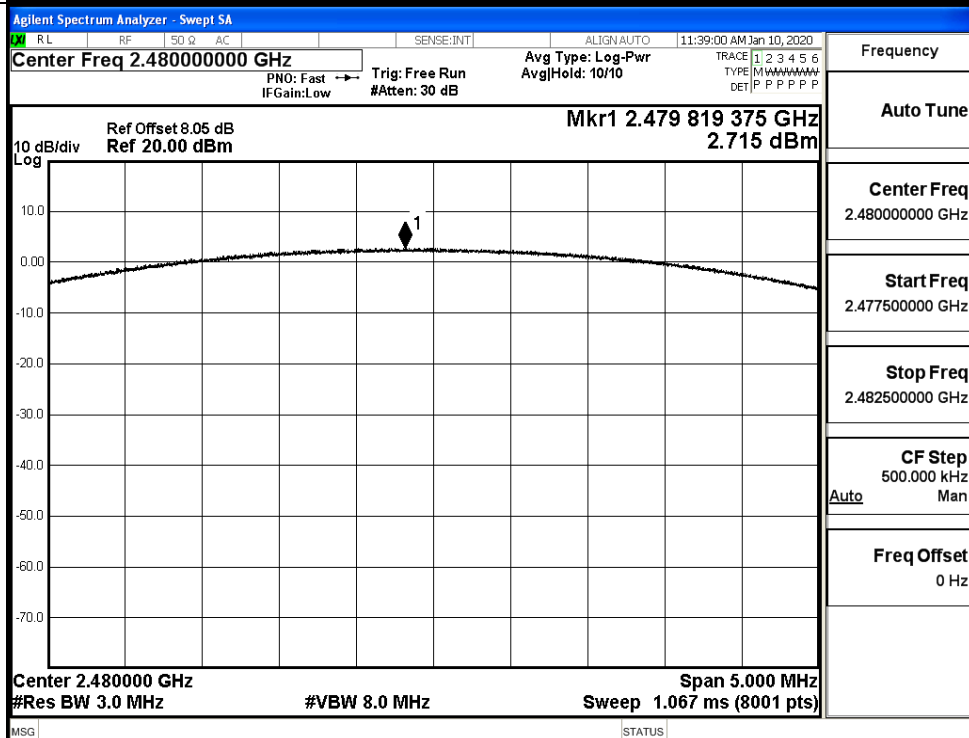


GFSK/MCH

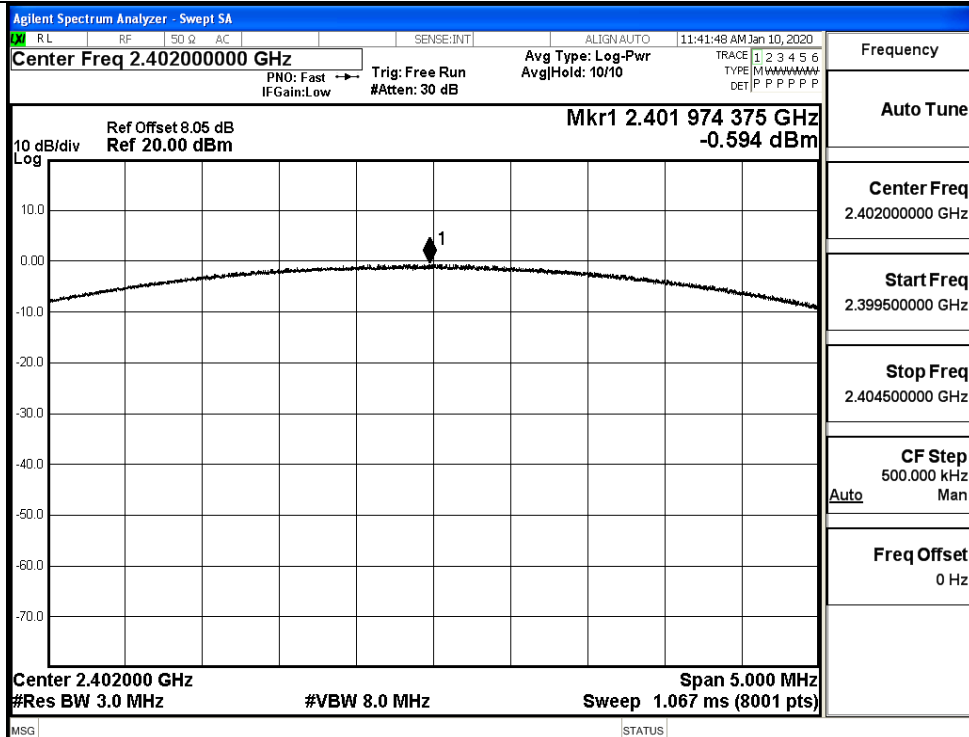


GFSK/HCH

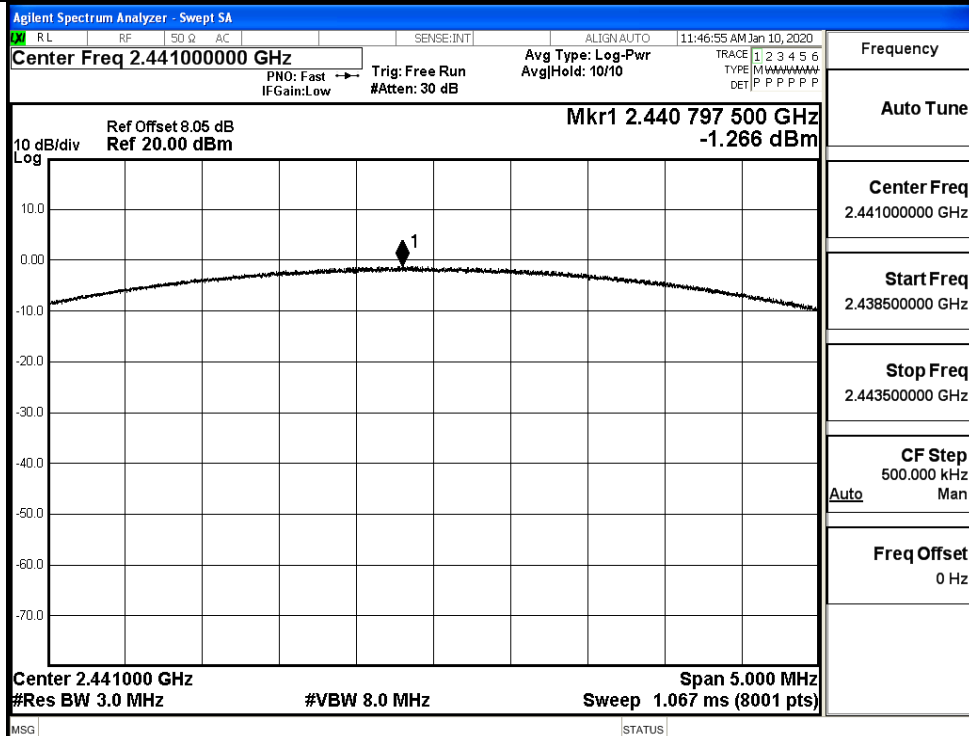
 $\pi/4$ DQPSK/LCH

$\pi/4$ DQPSK/MCH $\pi/4$ DQPSK/HCH

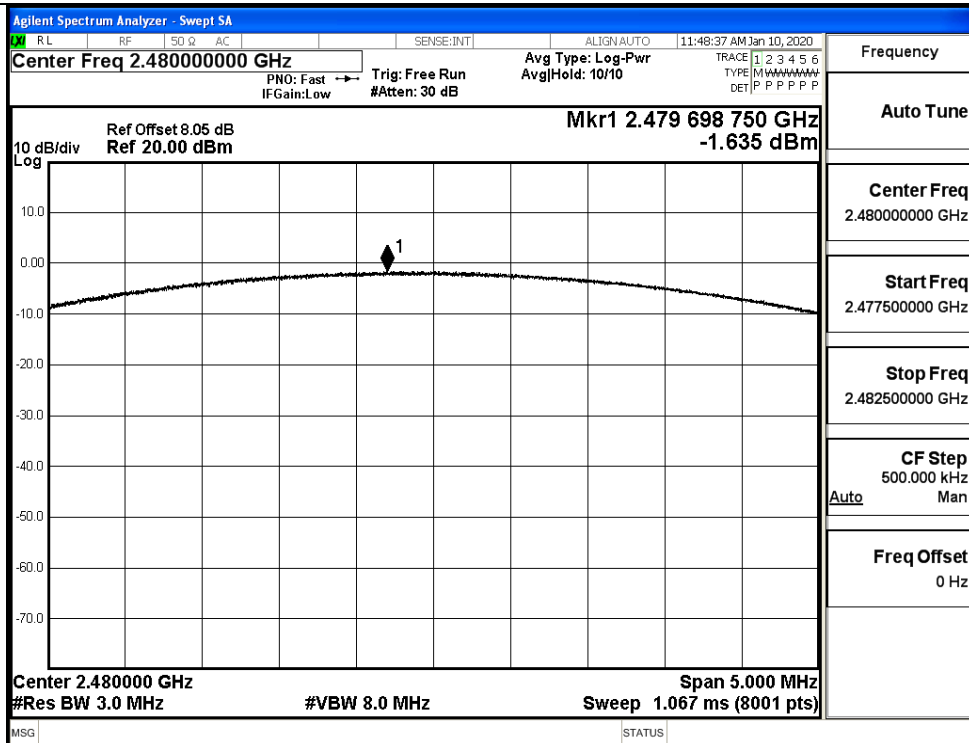
8DPSK/LCH



8DPSK/MCH



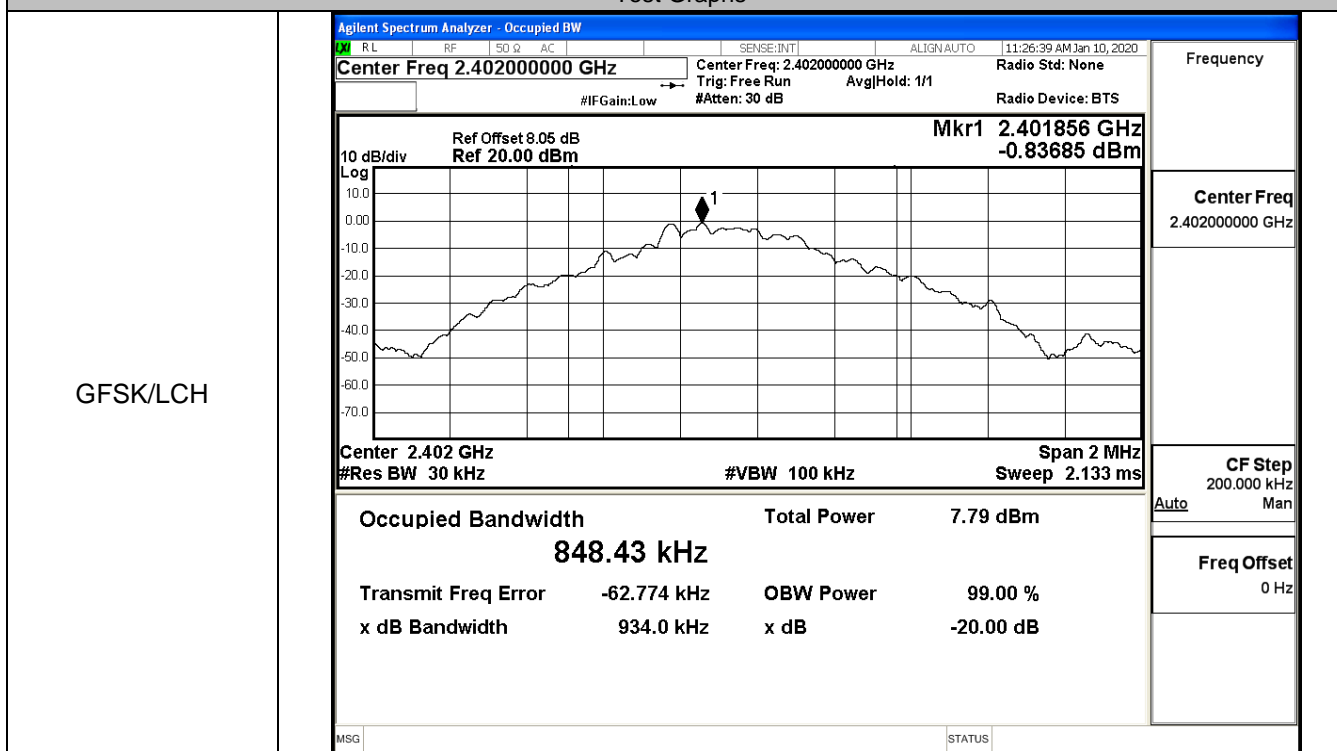
8DPSK/HCH



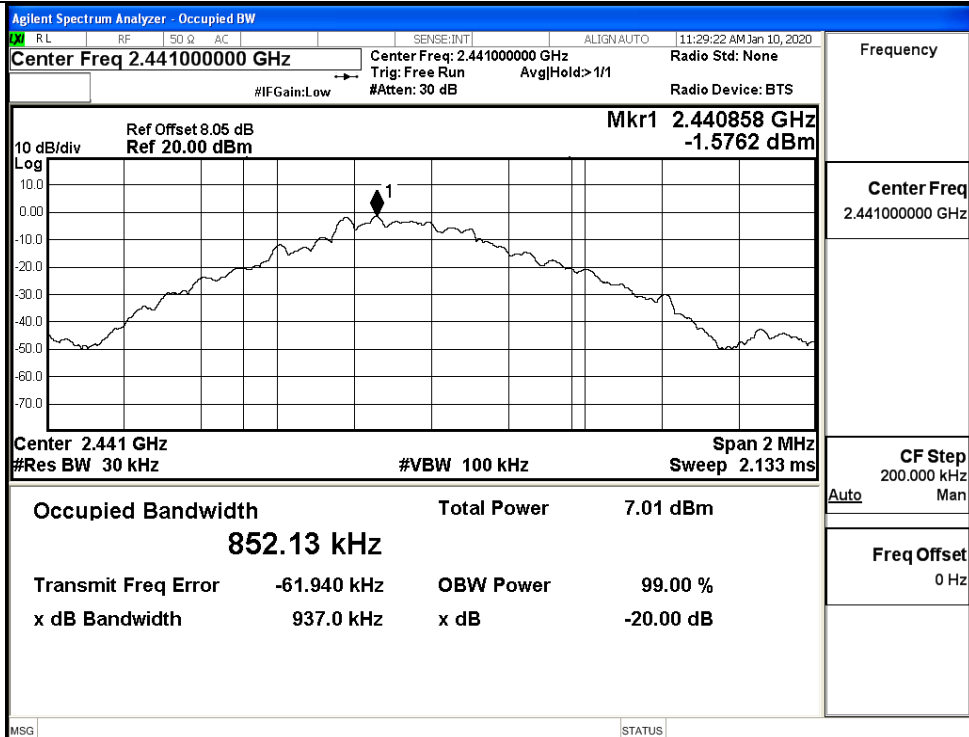
A.2 20dB Bandwidth

| Mode | Channel. | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK | LCH | 0.9340 | Not Specified | PASS |
| | MCH | 0.9370 | Not Specified | PASS |
| | HCH | 0.9352 | Not Specified | PASS |
| $\pi/4$ DQPSK | LCH | 1.282 | Not Specified | PASS |
| | MCH | 1.282 | Not Specified | PASS |
| | HCH | 1.285 | Not Specified | PASS |
| 8DPSK | LCH | 1.291 | Not Specified | PASS |
| | MCH | 1.294 | Not Specified | PASS |
| | HCH | 1.294 | Not Specified | PASS |

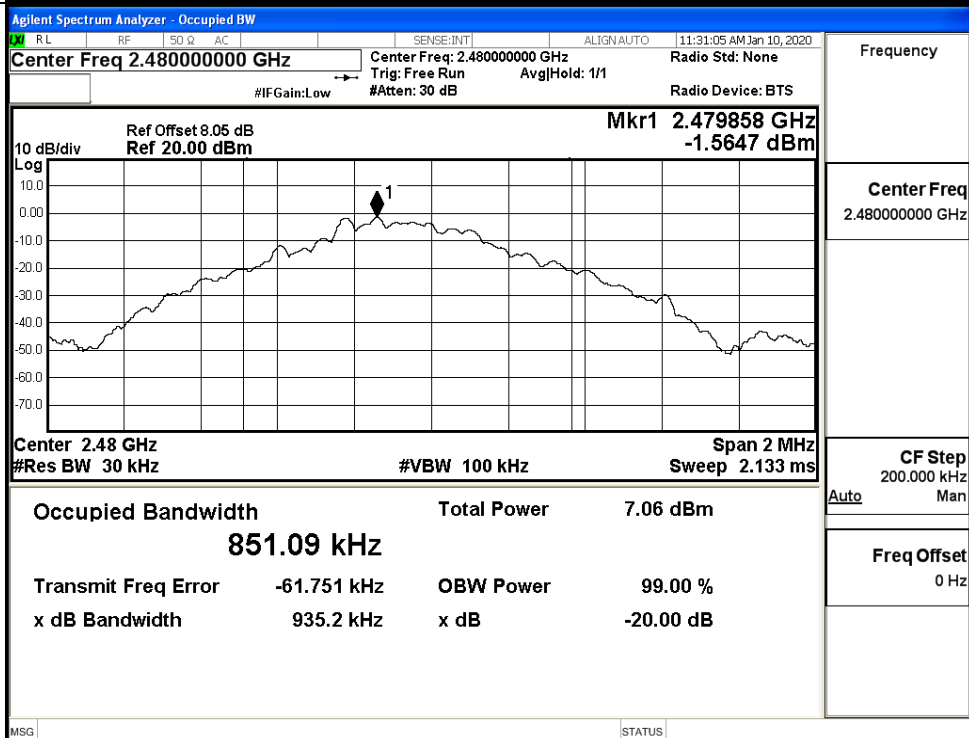
Test Graphs

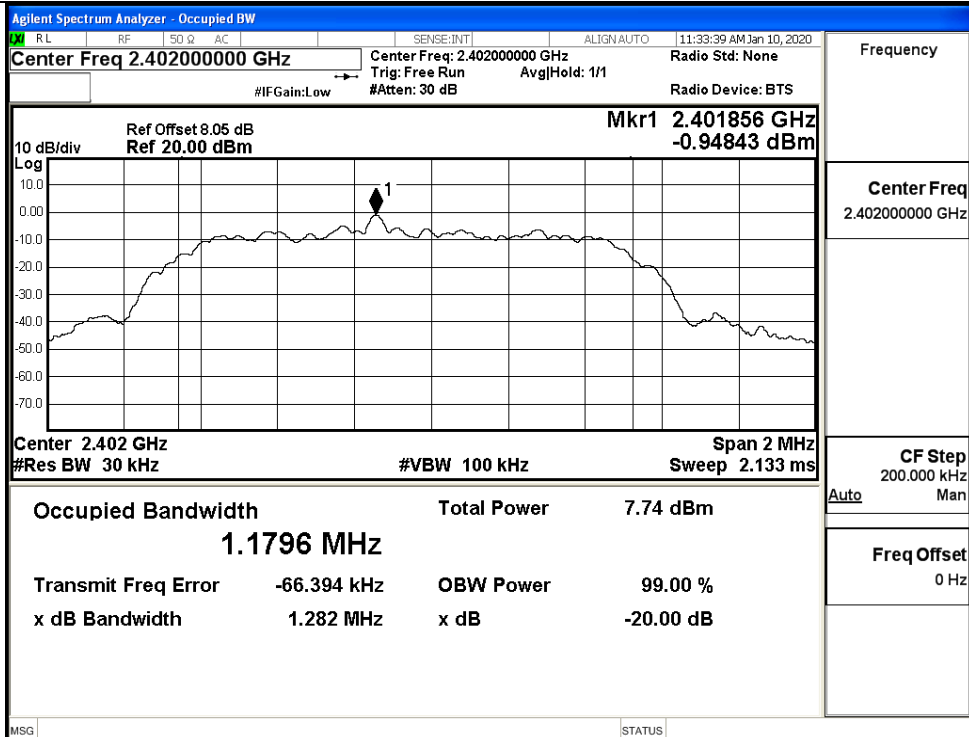
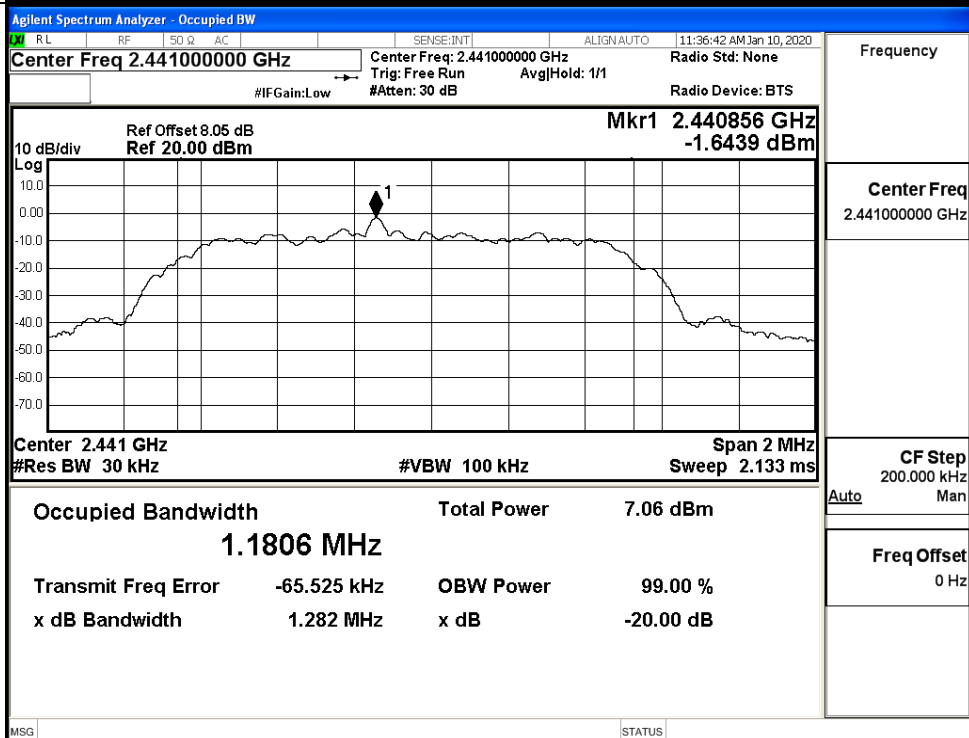


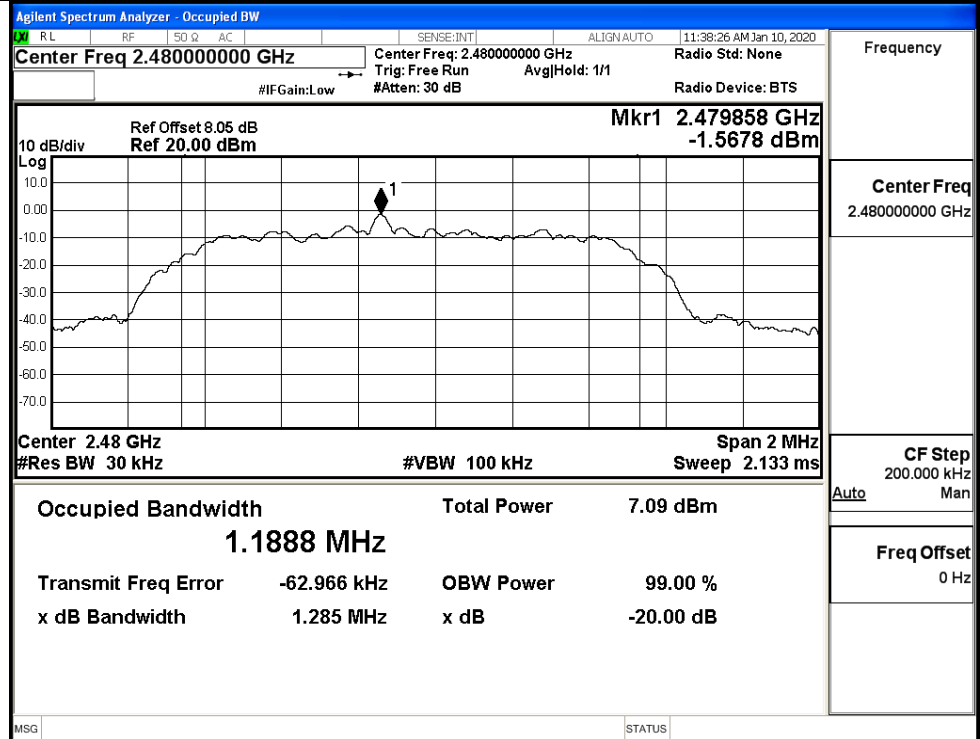
GFSK/MCH



GFSK/HCH



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

$\pi/4$ DQPSK/HCH

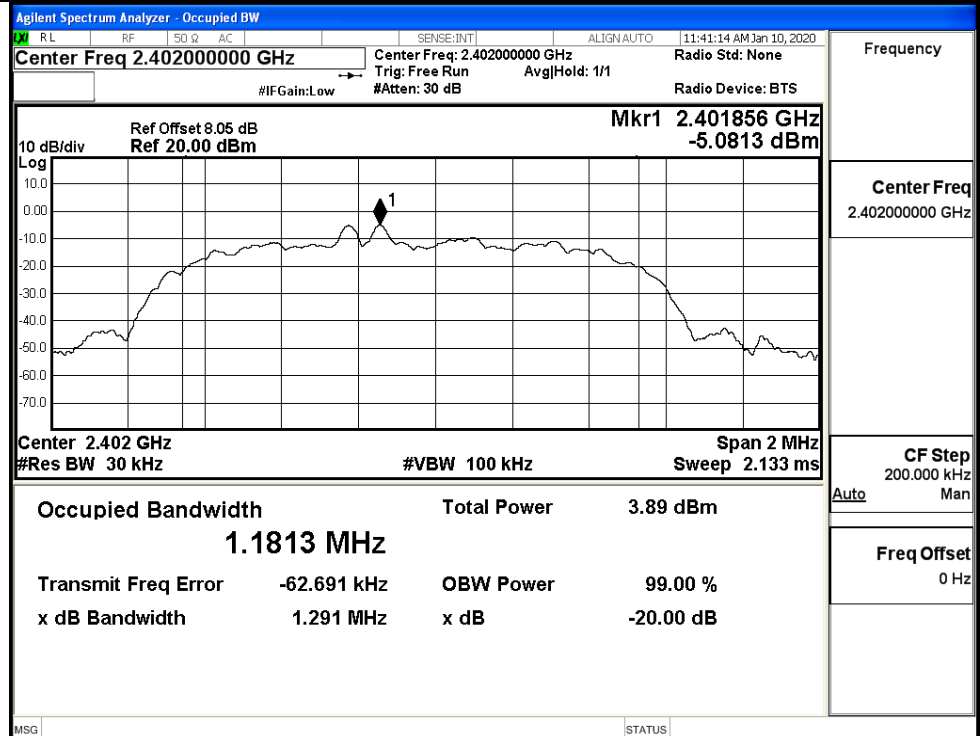
Frequency

Center Freq
2.48000000 GHzCF Step
200.000 kHz
Man

Auto

Freq Offset
0 Hz

8DPSK/LCH



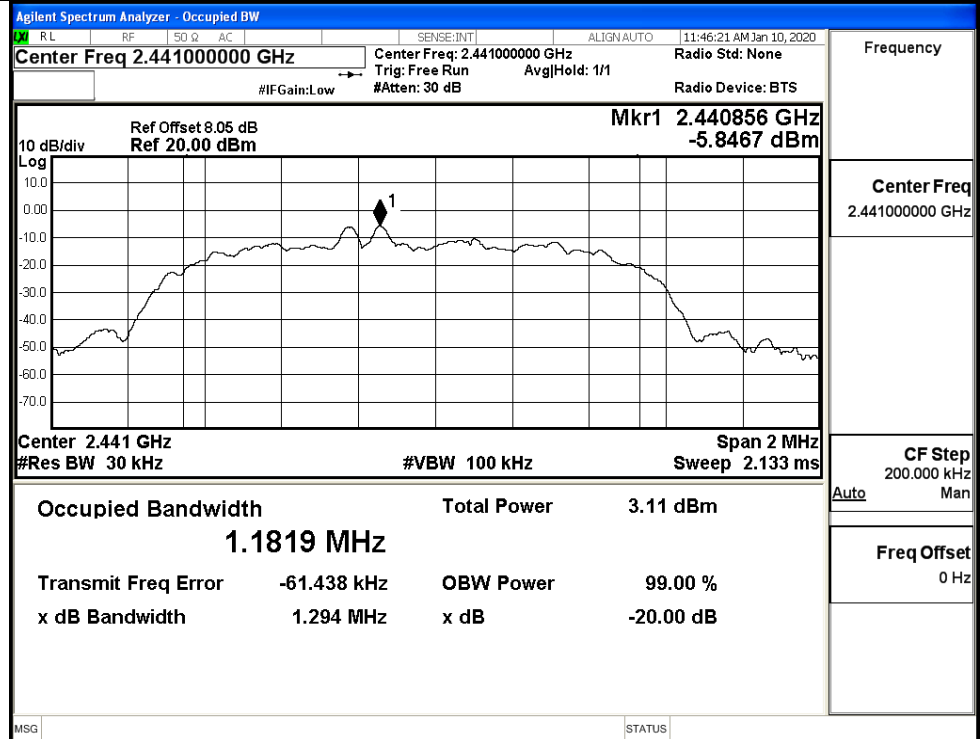
Frequency

Center Freq
2.40200000 GHz

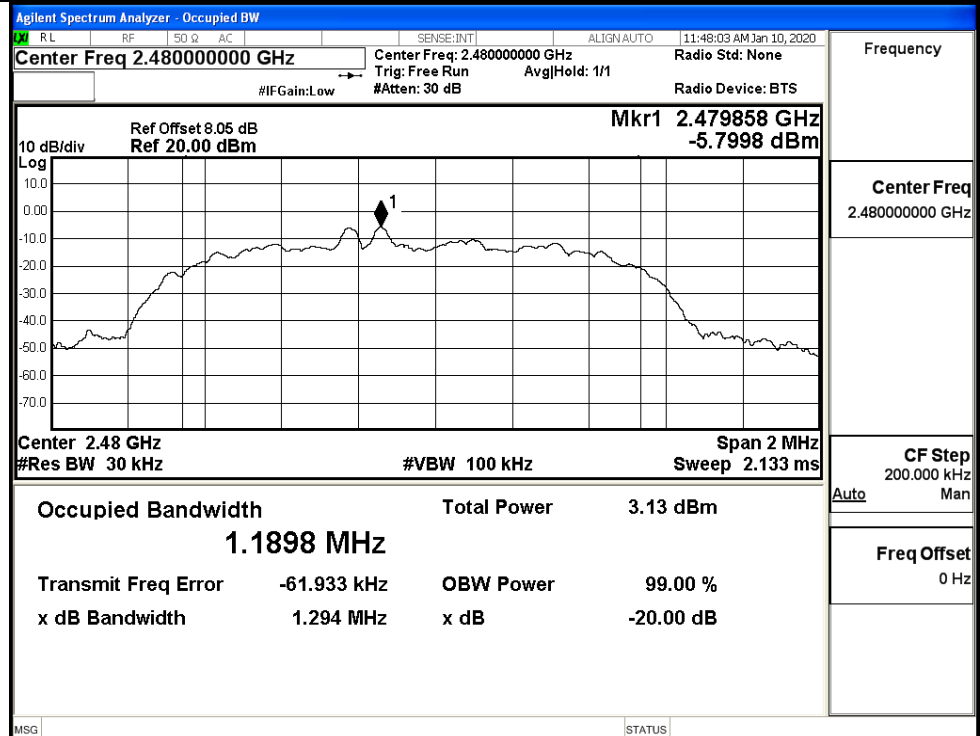
Auto

CF Step
200.000 kHz
ManFreq Offset
0 Hz

8DPSK/MCH



8DPSK/HCH

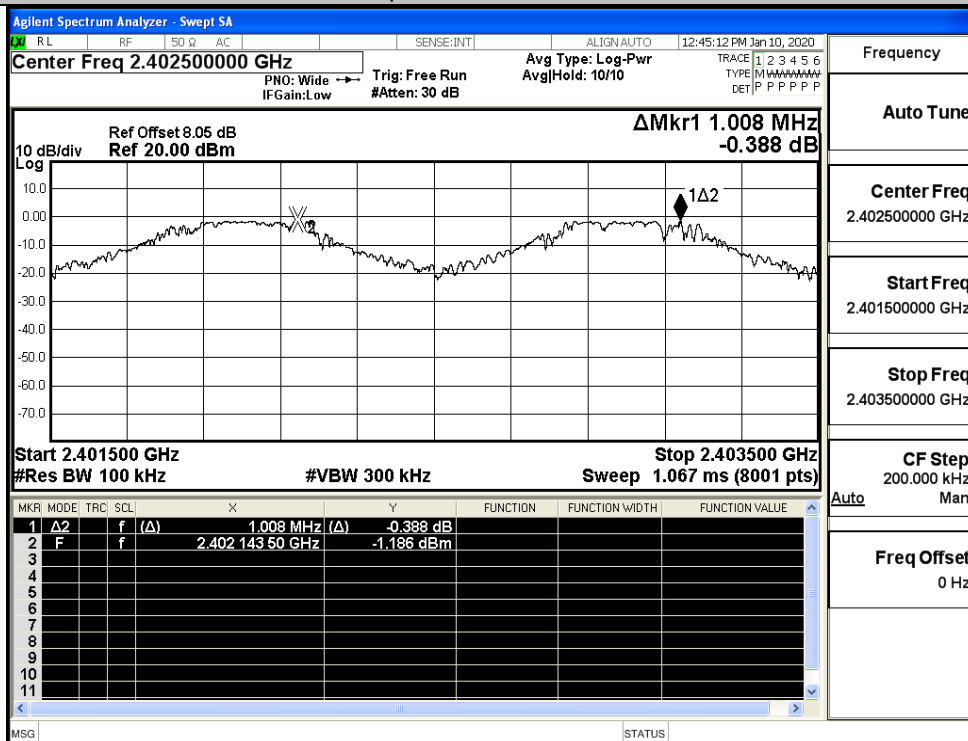


A.3 Carrier Frequency Separation

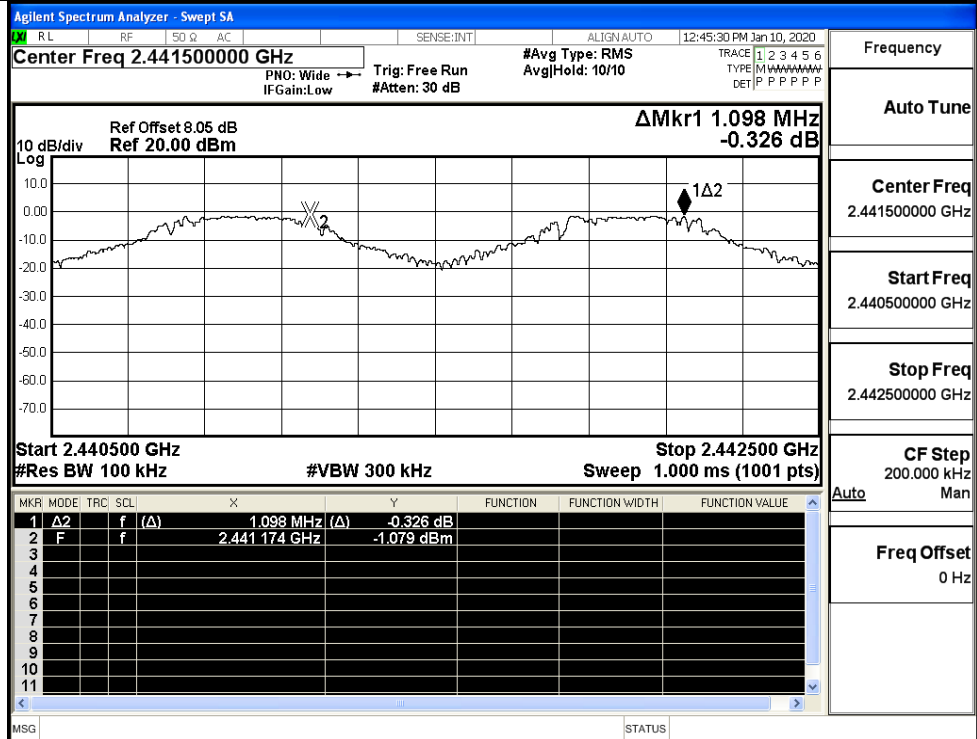
| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK | LCH | 1.008 | 0.934 | PASS |
| | MCH | 1.098 | 0.937 | PASS |
| | HCH | 1.198 | 0.935 | PASS |
| $\pi/4$ DQPSK | LCH | 1.140 | 0.857 | PASS |
| | MCH | 1.320 | 0.857 | PASS |
| | HCH | 1.014 | 0.857 | PASS |
| 8DPSK | LCH | 0.996 | 0.863 | PASS |
| | MCH | 1.008 | 0.863 | PASS |
| | HCH | 1.140 | 0.863 | PASS |

Test Graphs

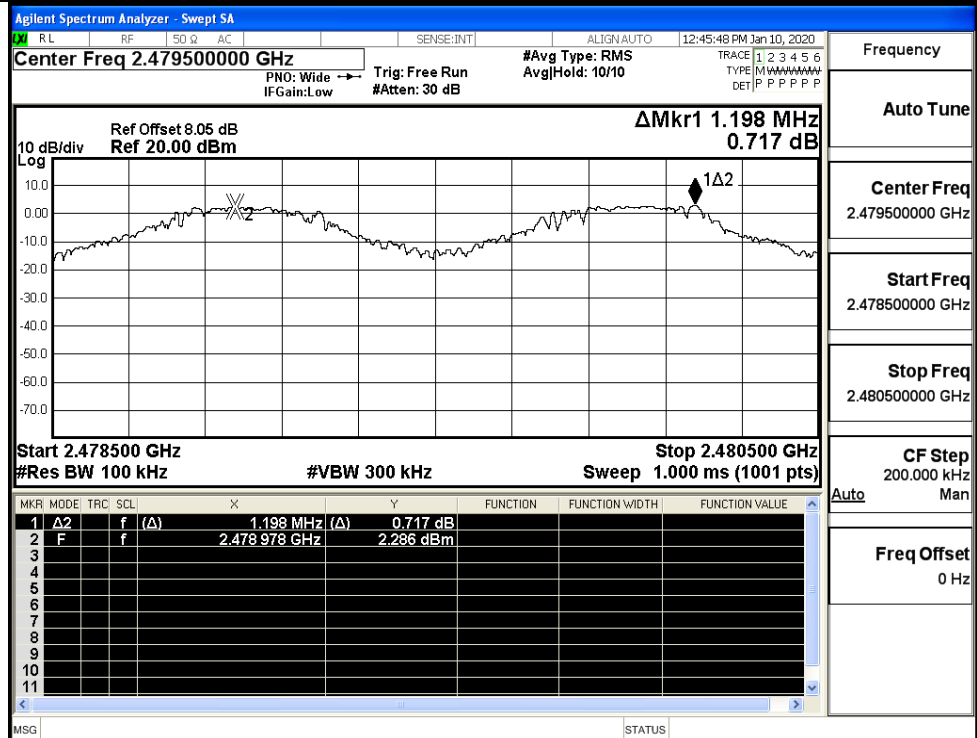
GFSK/LCH

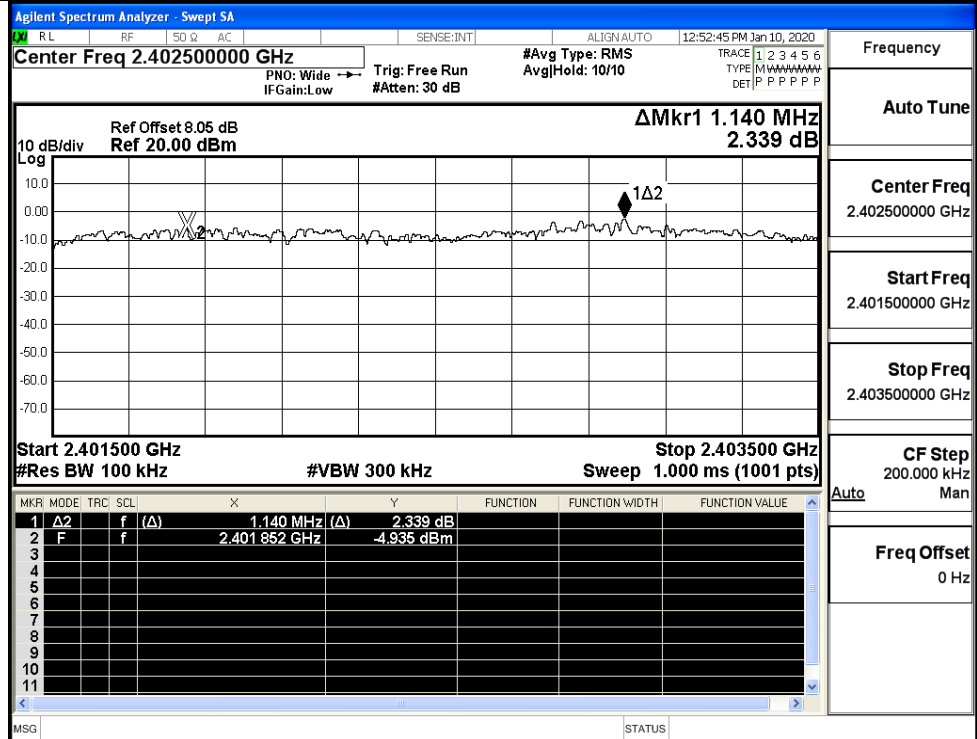
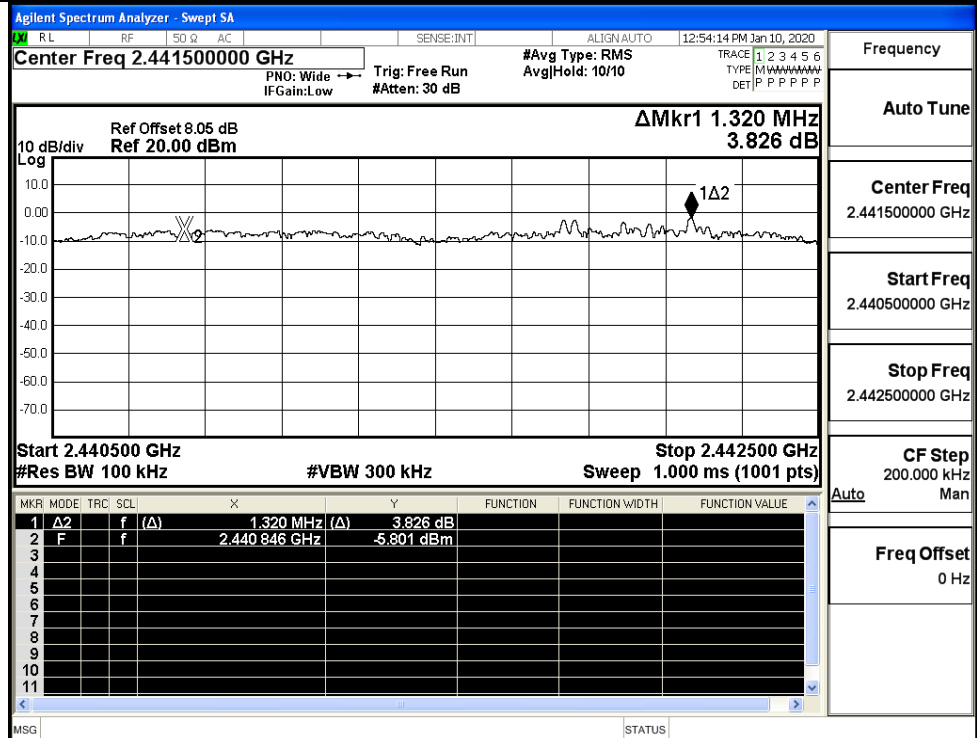


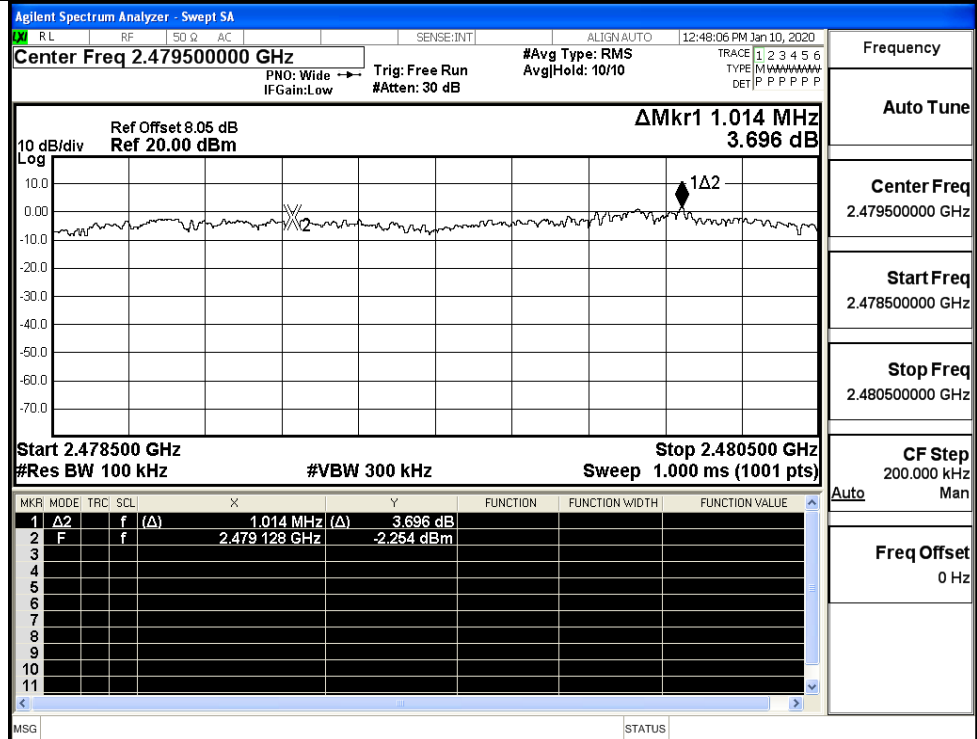
GFSK/MCH



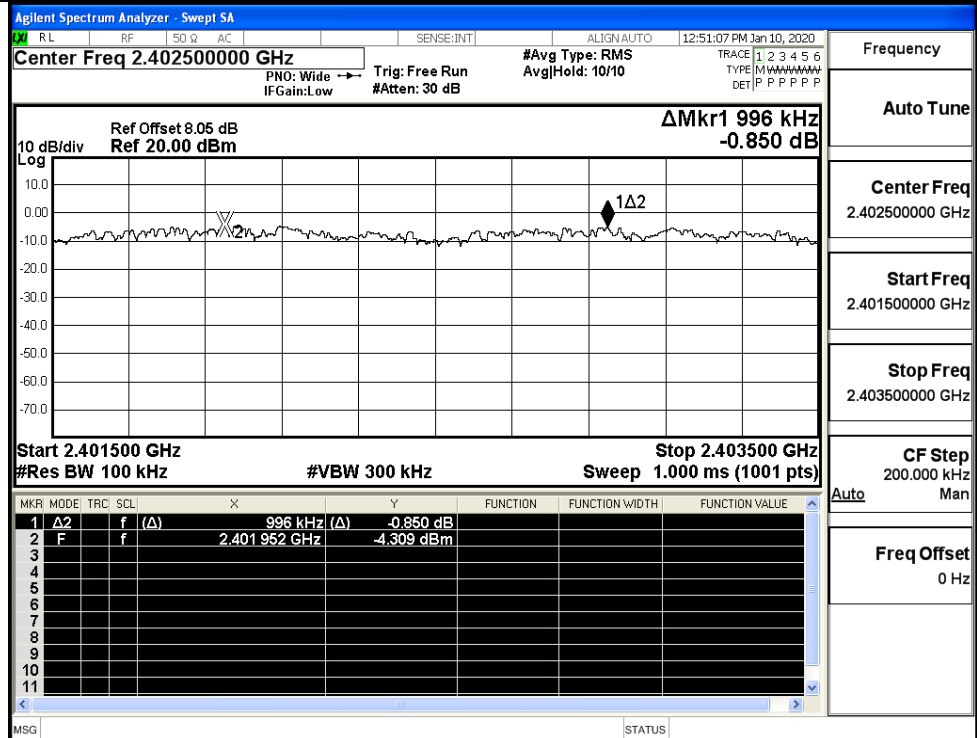
GFSK/HCH



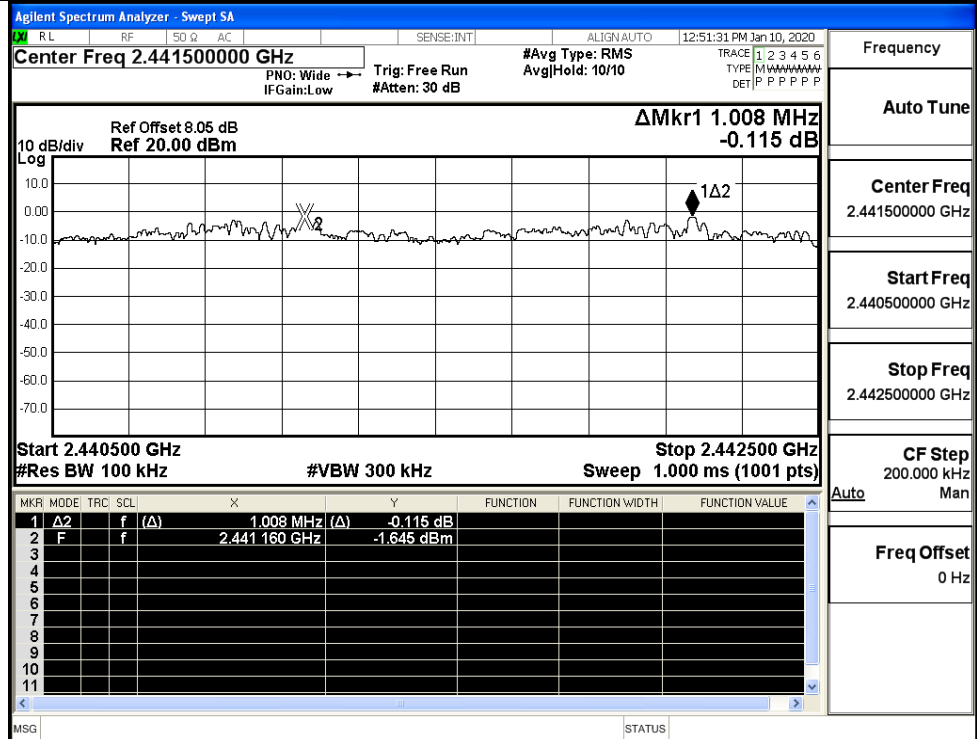
$\pi/4$ DQPSK/LCH $\pi/4$ DQPSK/MCH

$\pi/4$ DQPSK/HCH

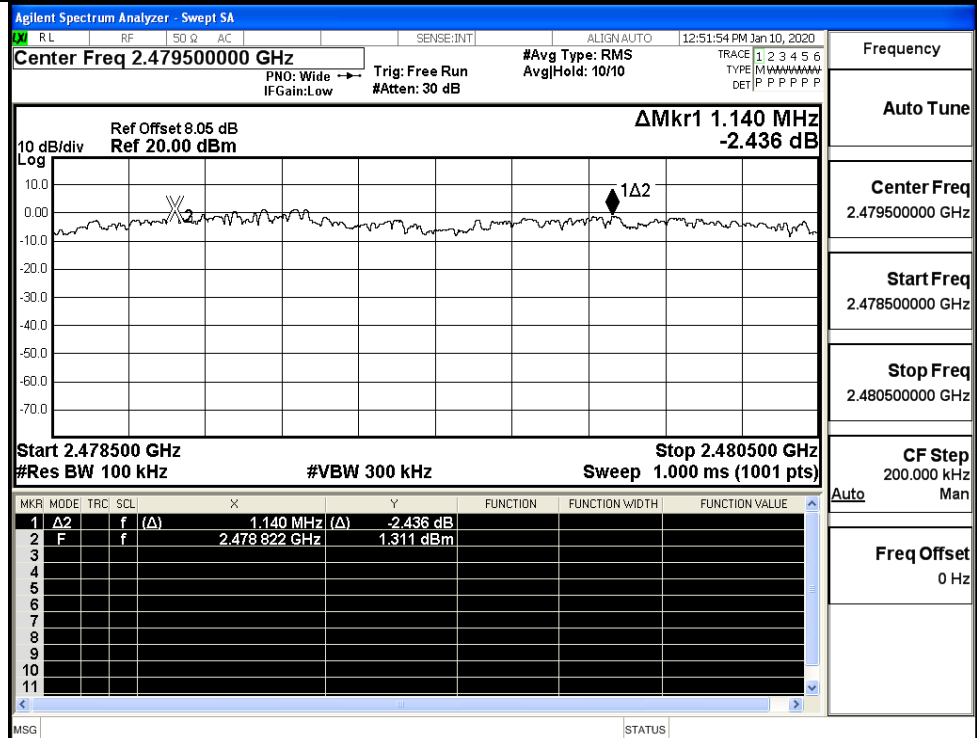
8DPSK/LCH



8DPSK/MCH



8DPSK/HCH

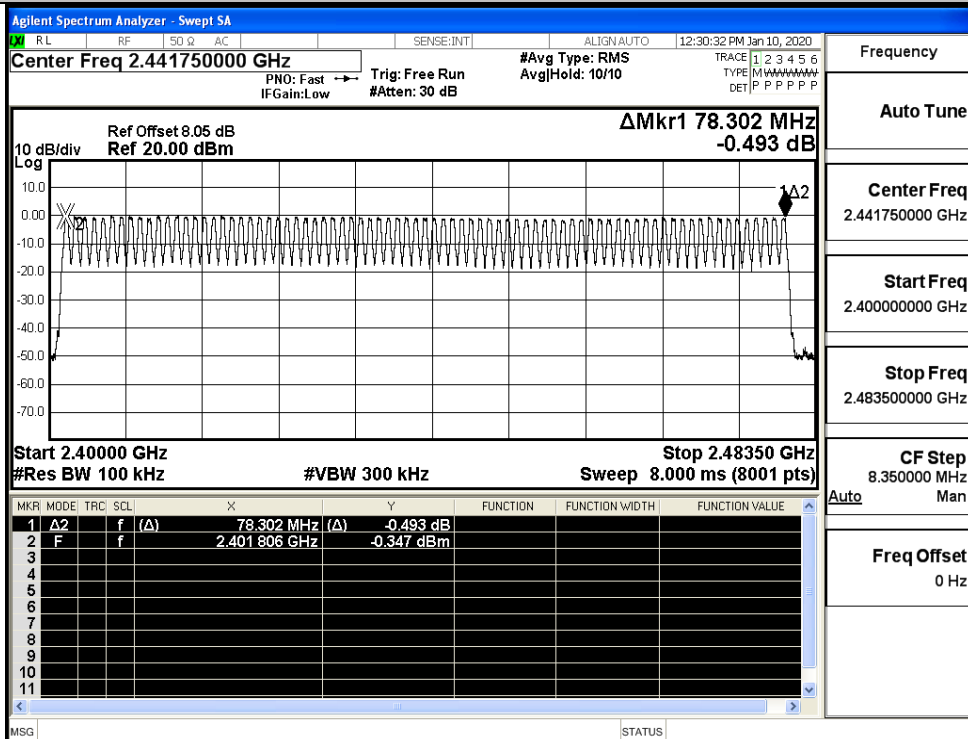
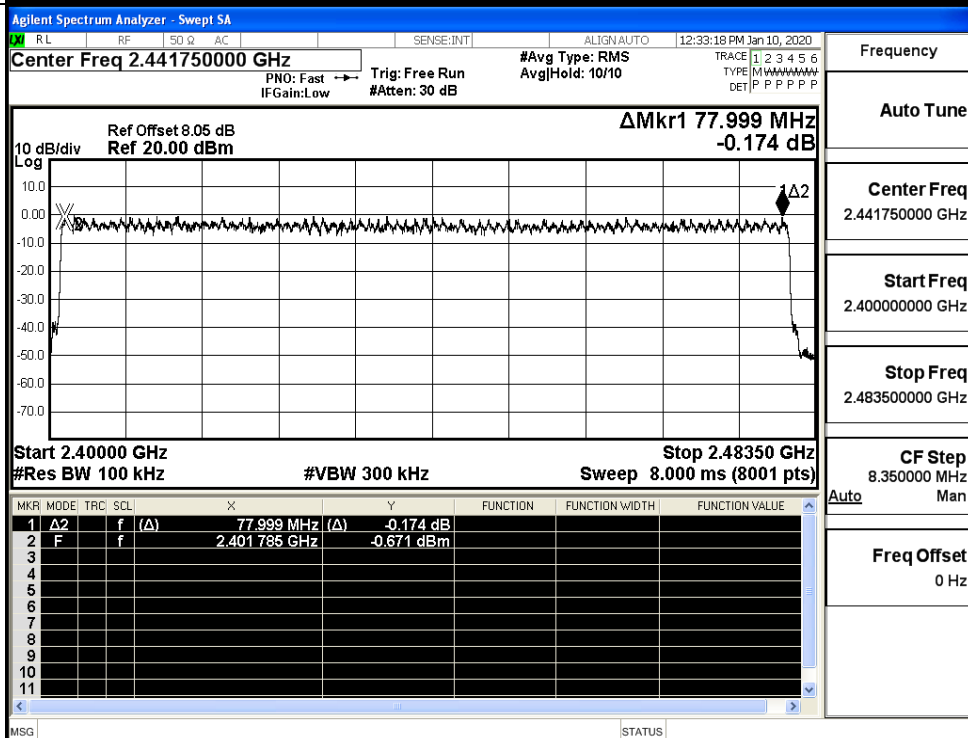


A.4 Hopping Channel Number

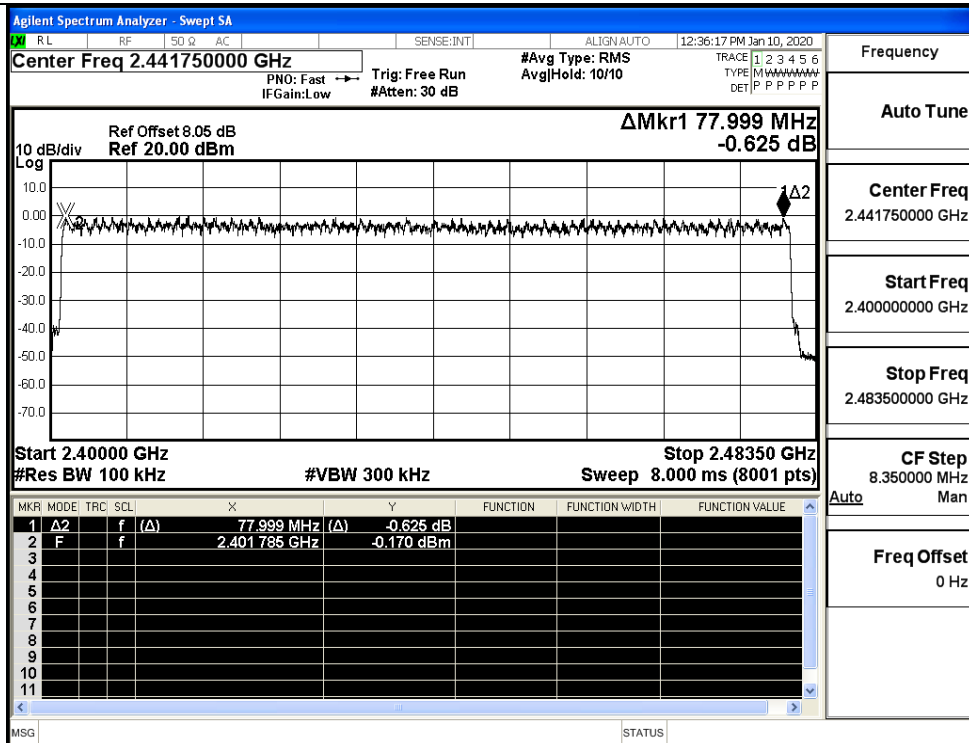
| Mode | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---------------|----------|-------------------------------|-----------|---------|
| GFSK | Hop | 79 | ≥ 15 | PASS |
| $\pi/4$ DQPSK | Hop | 79 | ≥ 15 | PASS |
| 8DPSK | Hop | 79 | ≥ 15 | PASS |

Test Graphs

GFSK/Hop

 $\pi/4$ DQPSK/Hop

8DPSK/Hop

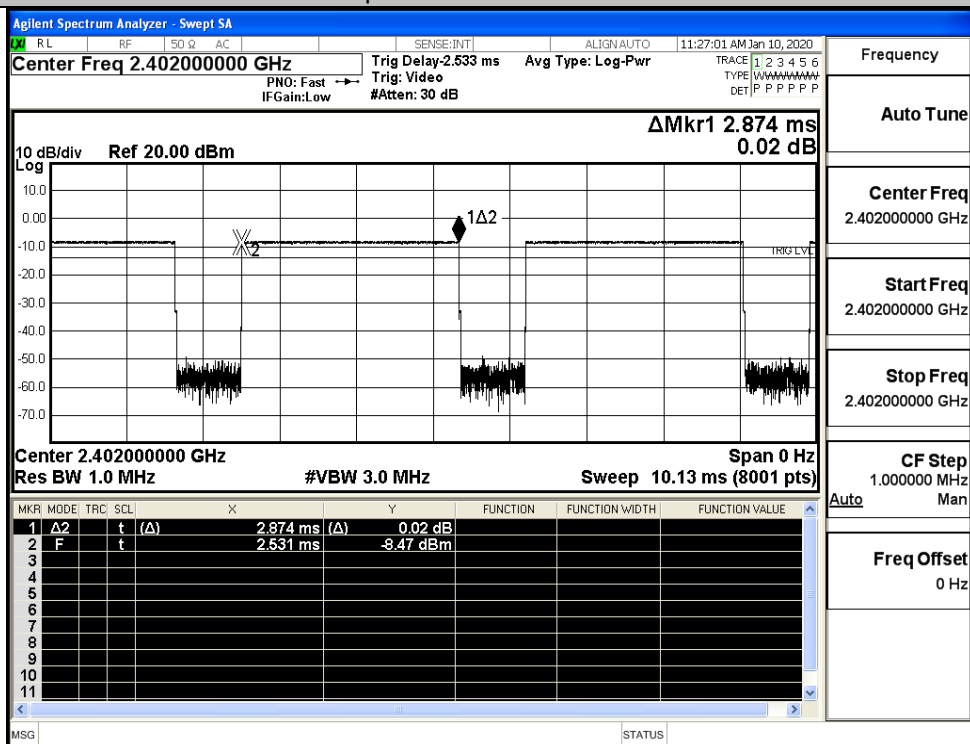


A.5 Dwell Time

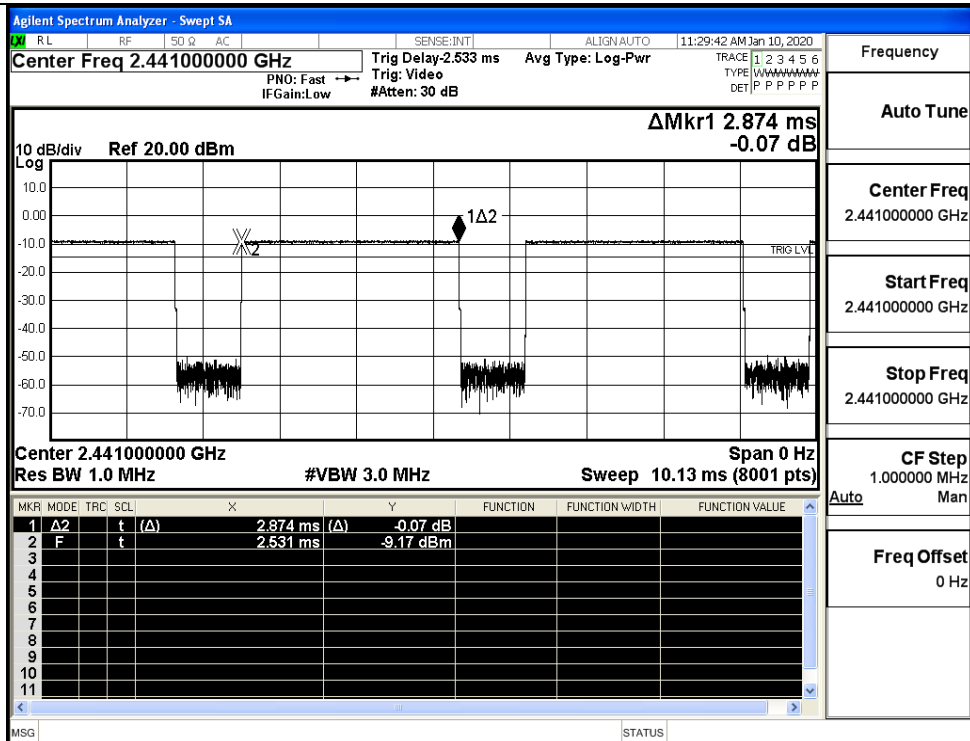
| Mode | Packet | Channel | Burst Width [ms/hop/ch] | Total Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---------------|--------|---------|----------------------------|-----------------------|---------------|-----------|---------|
| GFSK | DH5 | LCH | 2.87 | 106.7 | 0.306 | 0.4 | PASS |
| | DH5 | MCH | 2.87 | 106.7 | 0.306 | 0.4 | PASS |
| | DH5 | HCH | 2.87 | 106.7 | 0.306 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | LCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |
| | 2DH5 | MCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |
| | 2DH5 | HCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |
| 8DPSK | 3DH5 | LCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |
| | 3DH5 | MCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |
| | 3DH5 | HCH | 2.87 | 106.7 | 0.307 | 0.4 | PASS |

Test Graphs

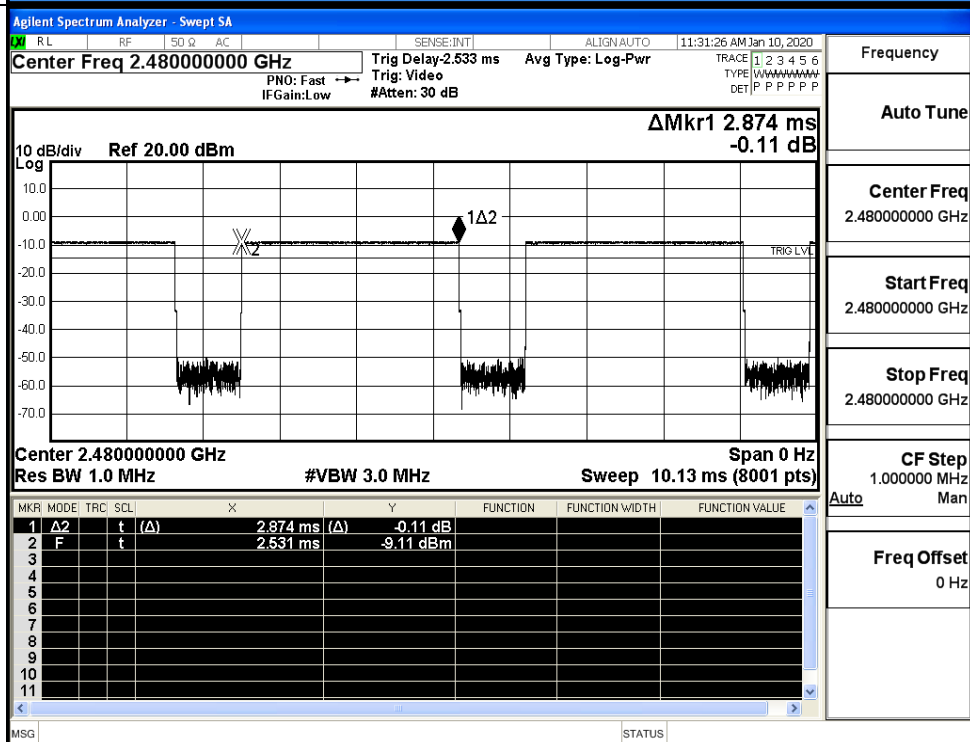
GFSK_DH5/LCH



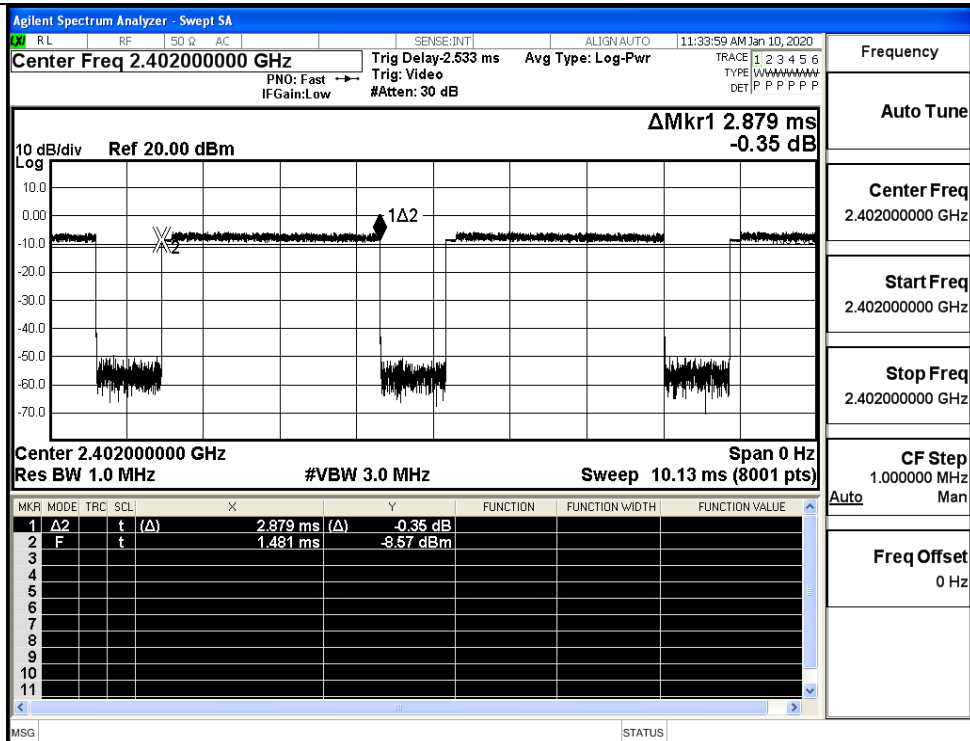
GFSK_DH5/MCH



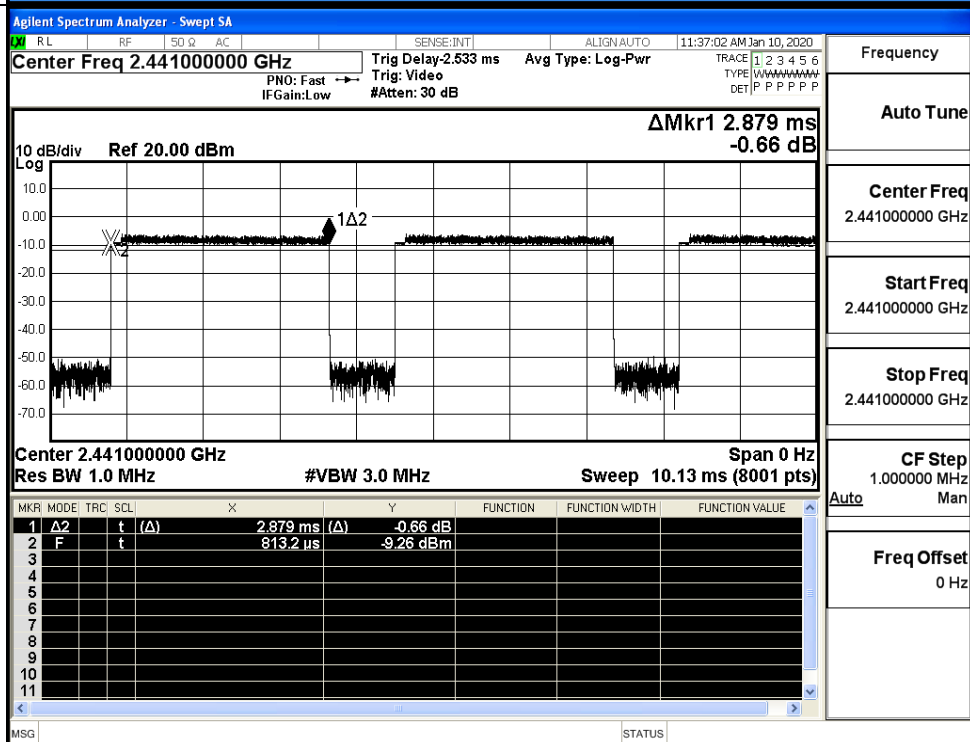
GFSK_DH5/HCH



$\pi/4$ DQPSK
_2DH5/LCH



$\pi/4$ DQPSK
_2DH5/MCH



Agilent Spectrum Analyzer - Swept SA

RL RF 50 Ω AC SENSE:INT ALIGN:AUTO 11:38:46 AM Jan 10, 2020

Center Freq 2.48000000 GHz Trig Delay: 2.533 ms Avg Type: Log-Pwr
PNO: Fast IF Gain: Low Trig: Video #Atten: 30 dB TRACE 1 2 3 4 5 6 TYPE P P P P P P DET P P P P P P

ΔMkr1 2.879 ms -0.35 dB

10 dB/div Ref 20.00 dBm

| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|-----|------|-----|-----|----------|-----------|----------|----------------|----------------|
| 1 | Δ2 | t | (Δ) | 2.879 ms | -0.35 dB | | | |
| 2 | F | t | | 2.530 ms | -9.11 dBm | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |

Center 2.48000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 3.0 MHz Sweep 10.13 ms (8001 pts)

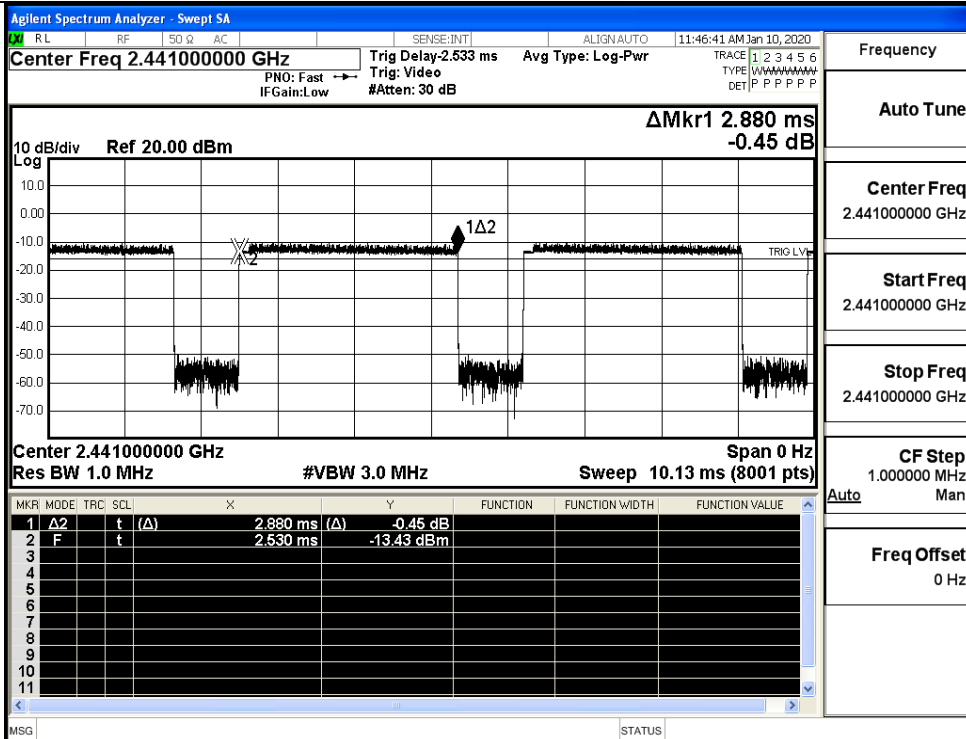
MSG STATUS

| |
|--------------------------------|
| 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 |
| |

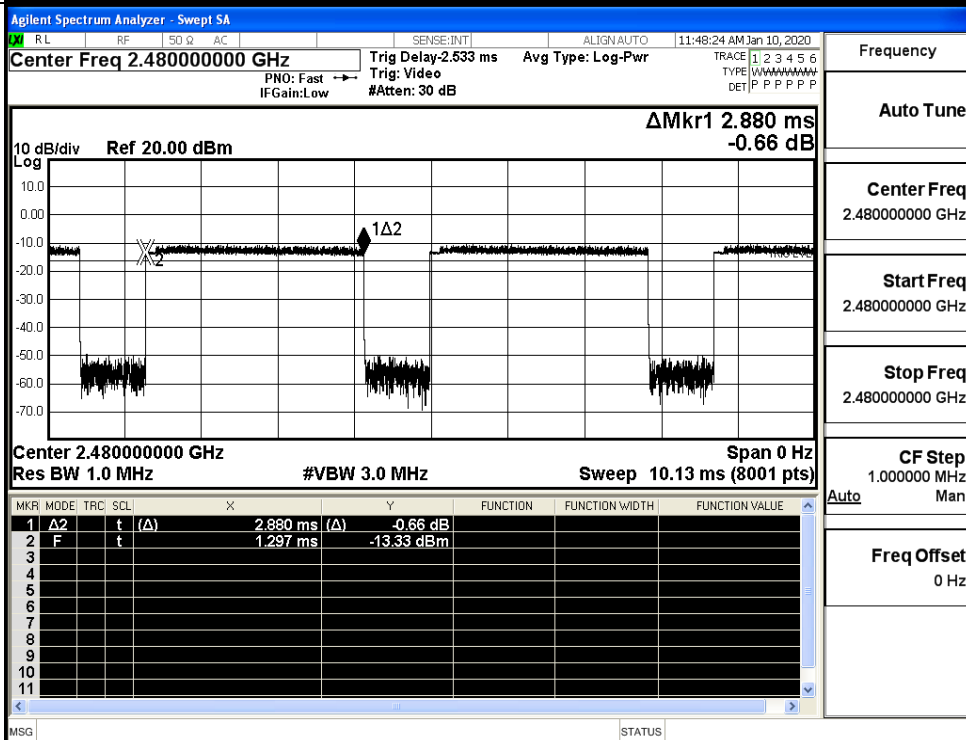
[illegible]

| |
|--------------------------------|
| 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

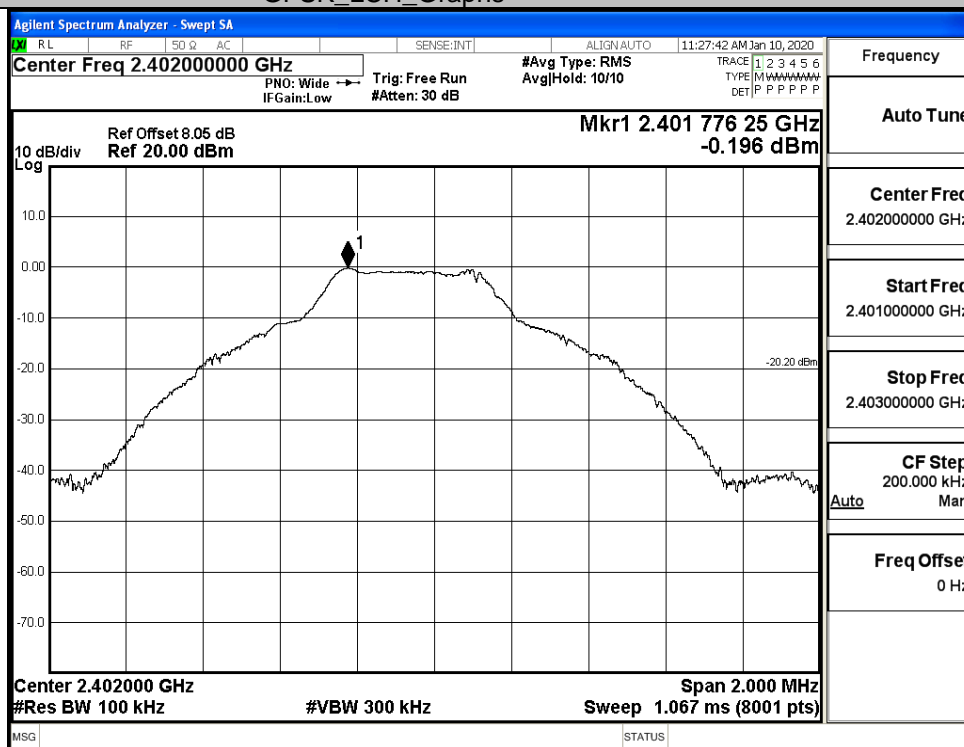


A.6 RF Conducted Spurious Emissions

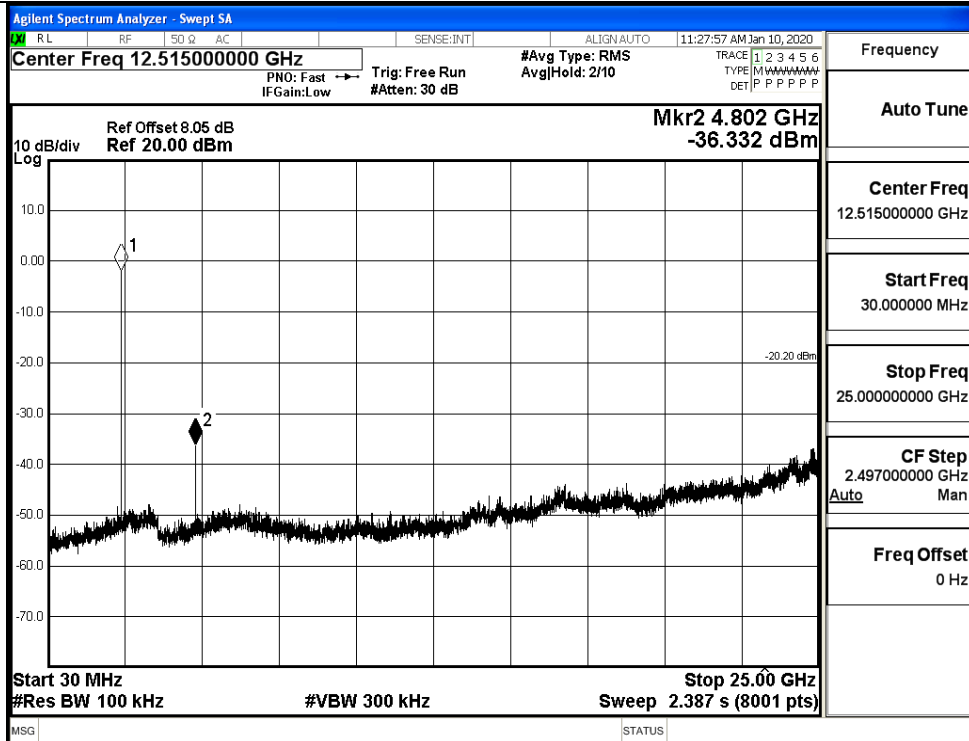
| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|------------|------------------|-------------|---------|
| GFSK | LCH | -0.196 | -36.332 | -20.196 | PASS |
| | MCH | -1.218 | -37.980 | -21.218 | PASS |
| | HCH | -0.946 | -36.986 | -20.946 | PASS |
| $\pi/4$ DQPSK | LCH | -0.427 | -37.636 | -20.427 | PASS |
| | MCH | -1.643 | -36.735 | -21.643 | PASS |
| | HCH | -1.067 | -37.101 | -21.067 | PASS |
| 8DPSK | LCH | -4.417 | -37.640 | -24.417 | PASS |
| | MCH | -5.142 | -38.144 | -25.142 | PASS |
| | HCH | -5.282 | -38.049 | -25.282 | PASS |

GFSK_LCH_Graphs

Pref

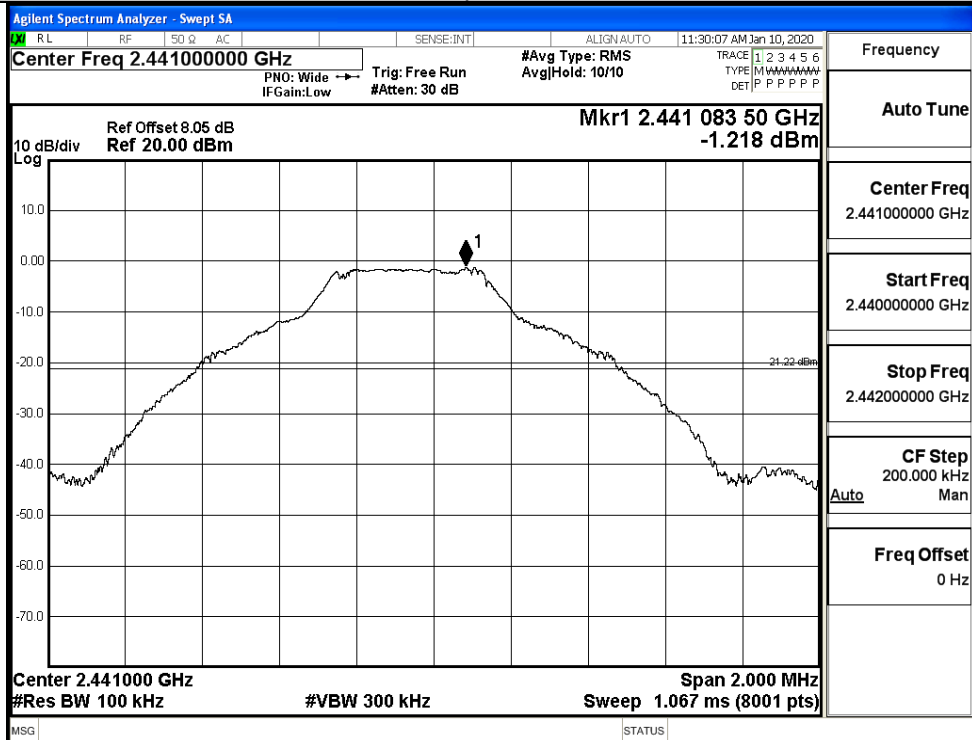


Puw

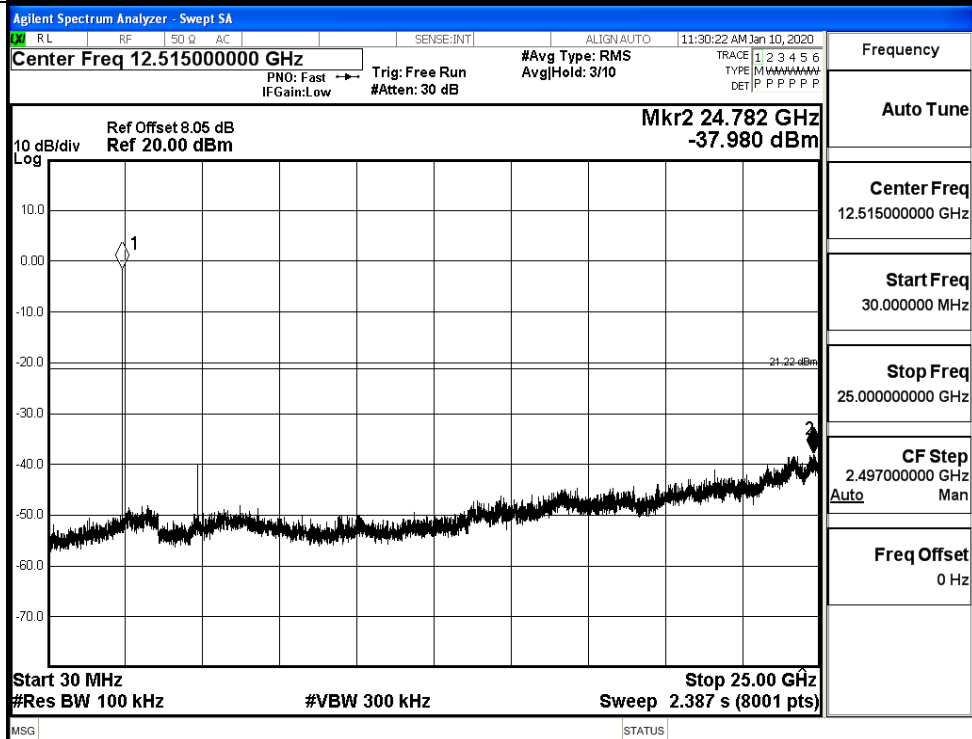


GFSK_MCH_Graphs

Pref

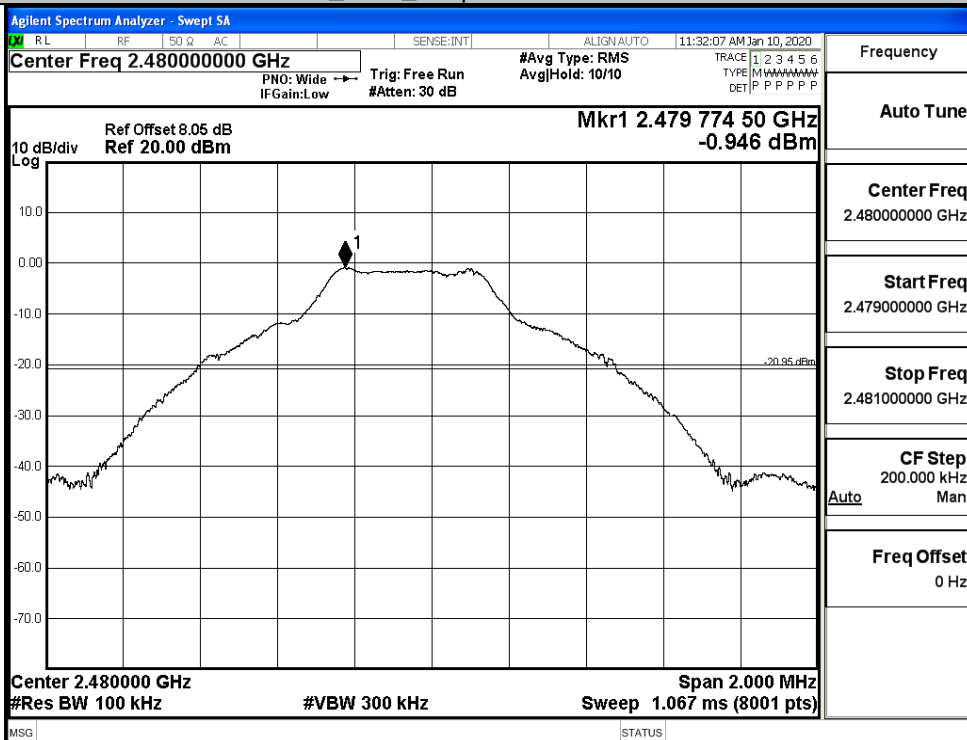


Puw

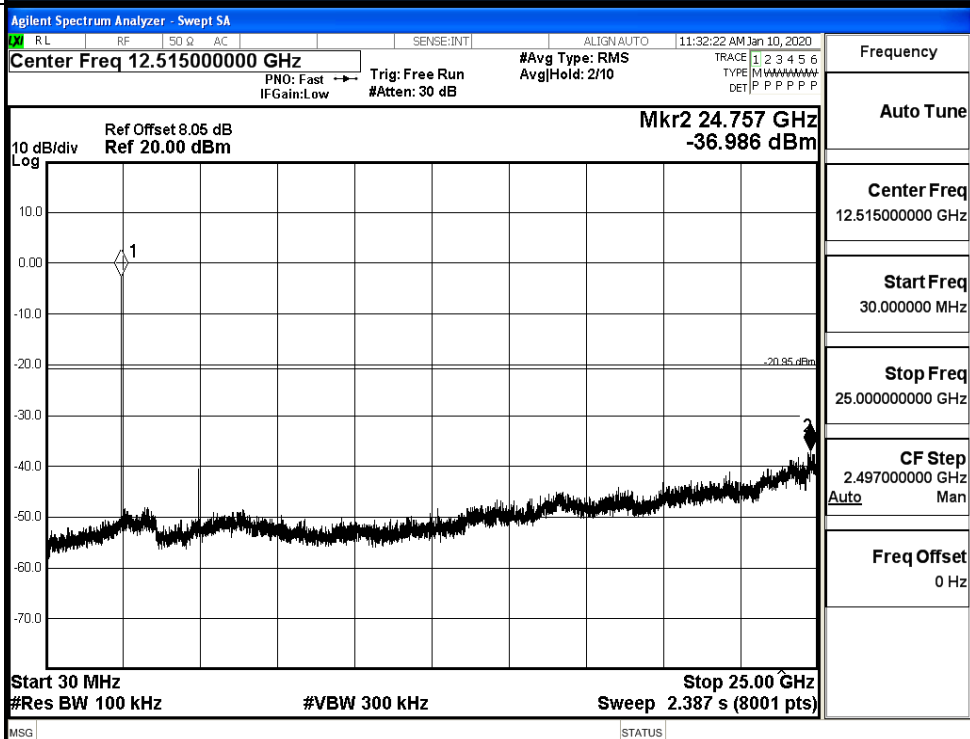


GFSK_HCH_Graphs

Pref

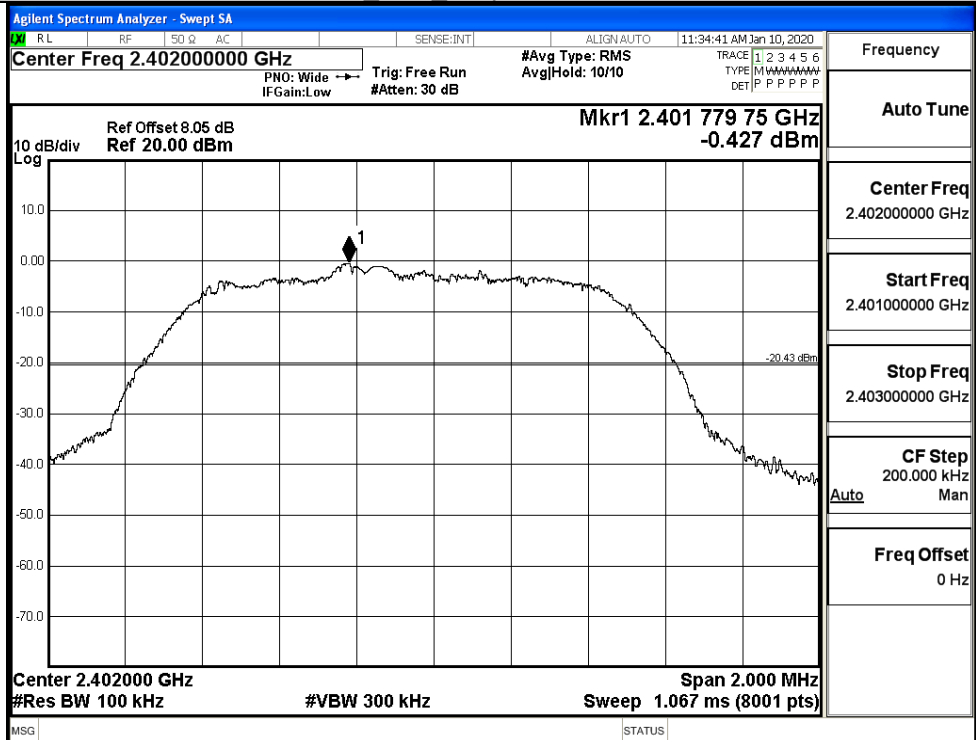


Puw

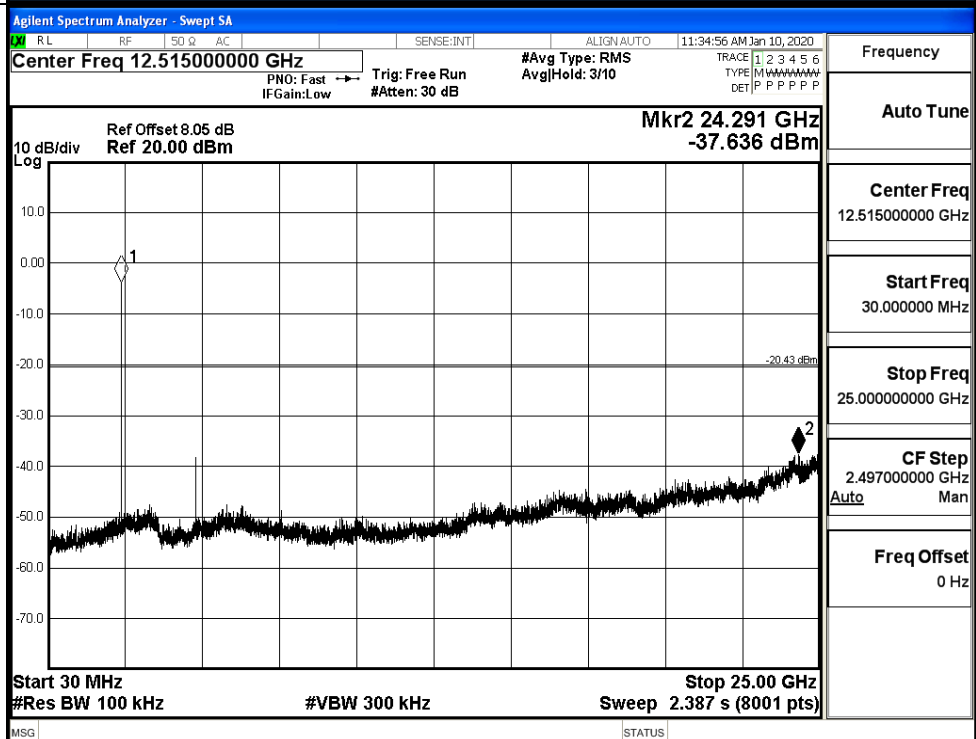


$\pi/4$ DQPSK_LCH_Graphs

Pref

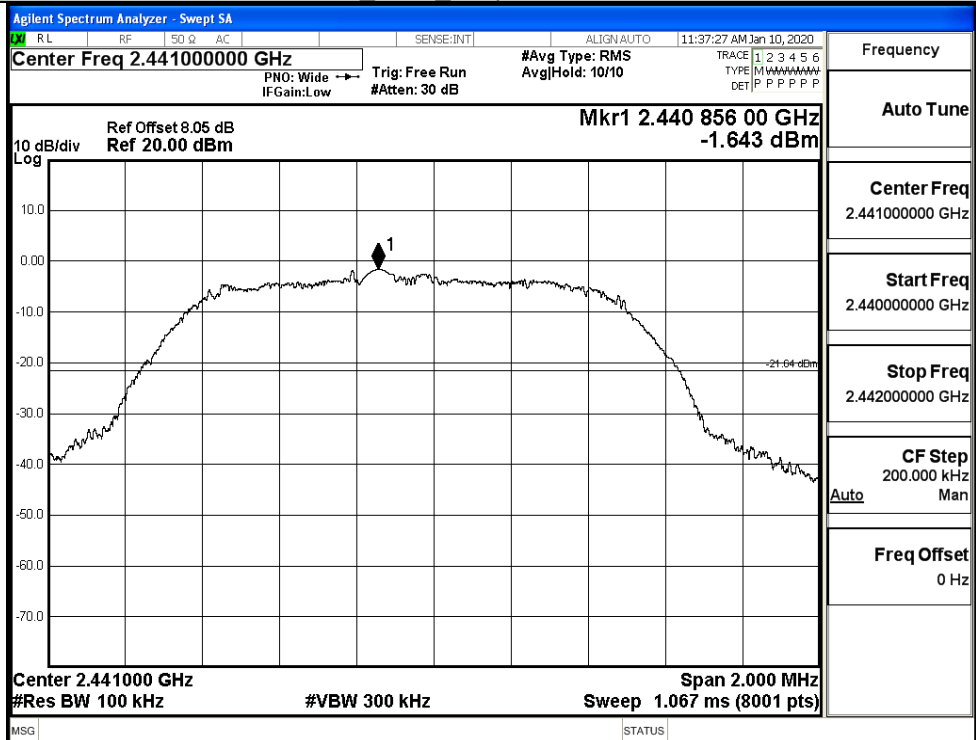


Puw

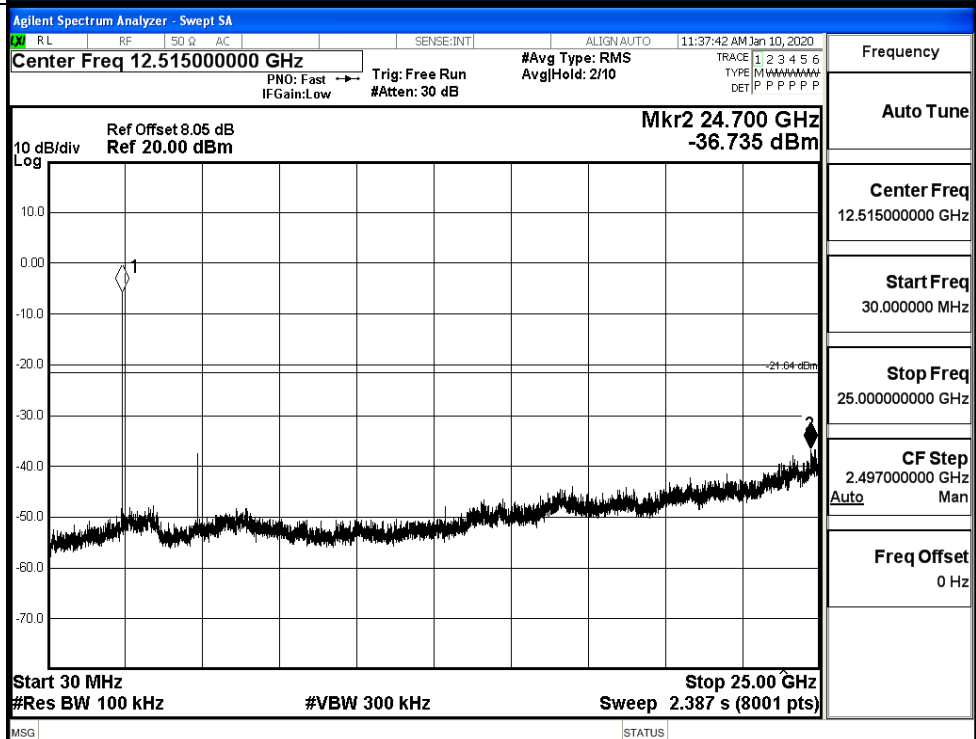


π /4DQPSK_MCH_Graphs

Pref

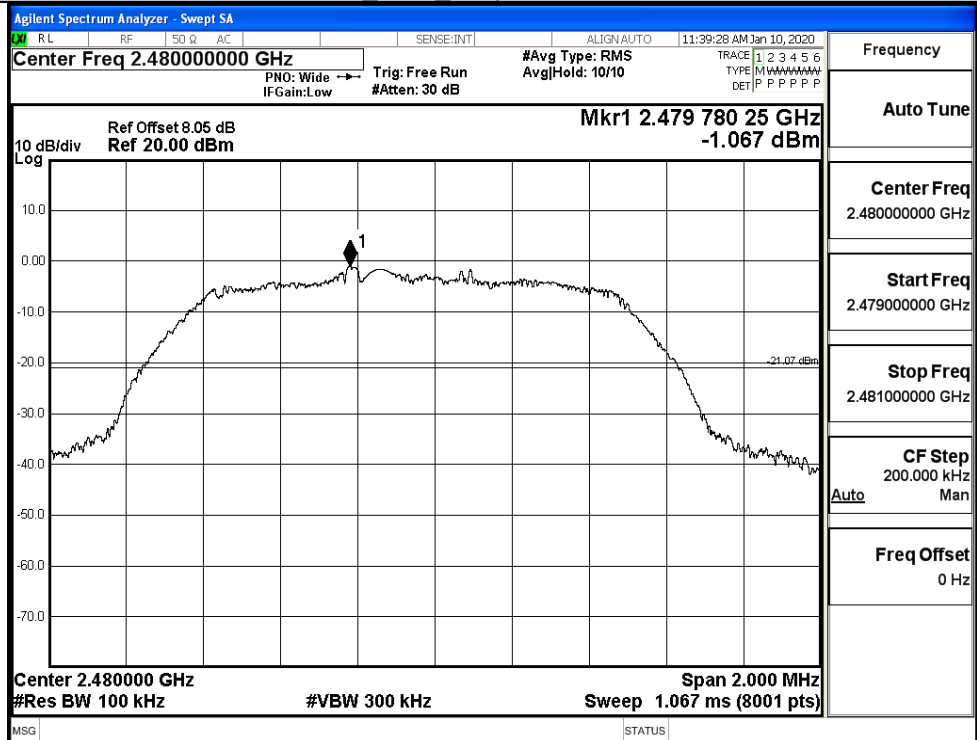


Puw

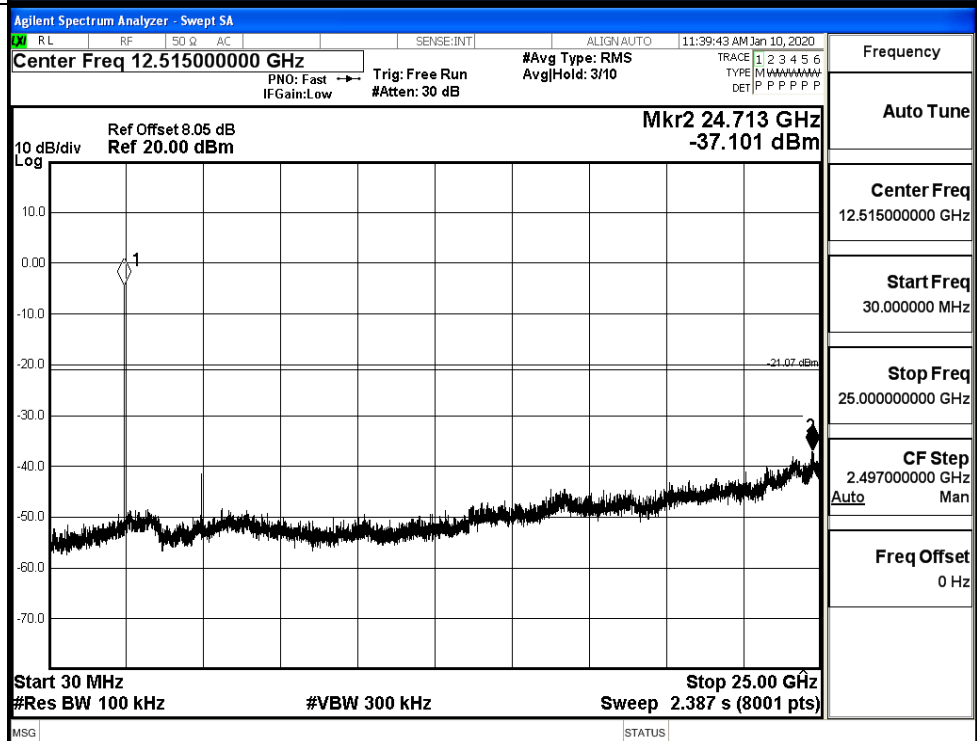


$\pi/4$ DQPSK_HCH_Graphs

Pref

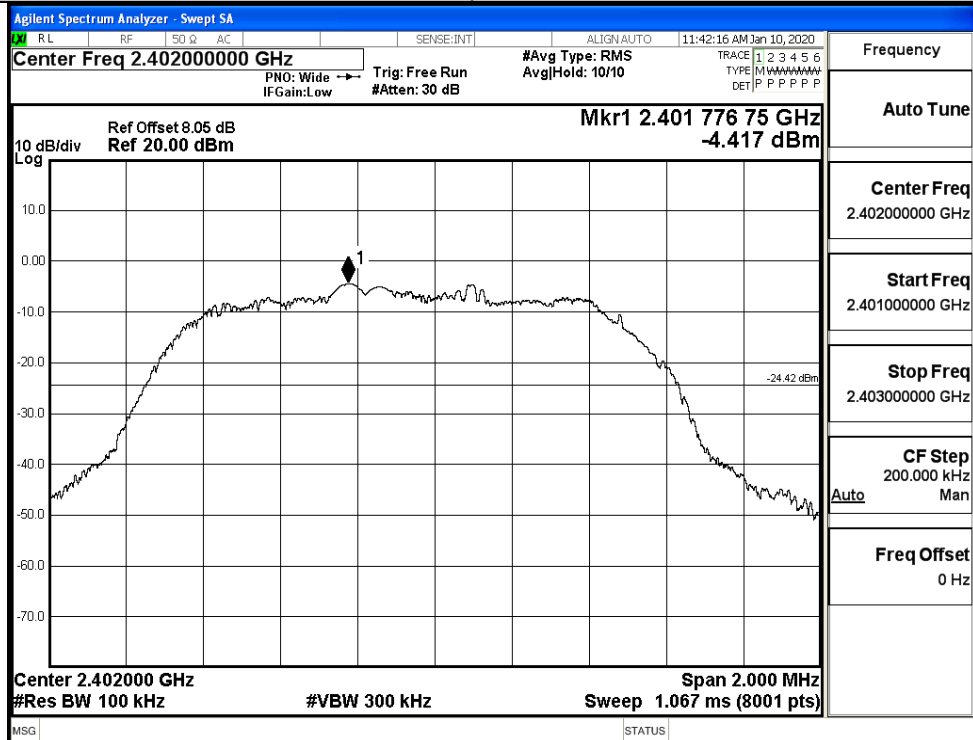


Puw

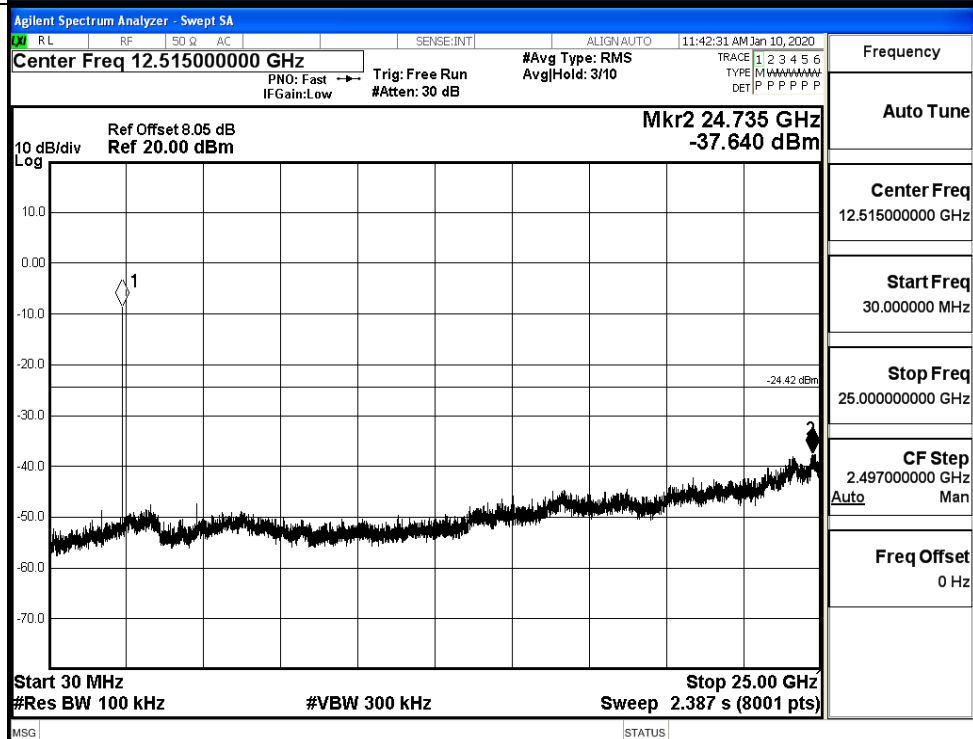


8DPSK_LCH_Graphs

Pref

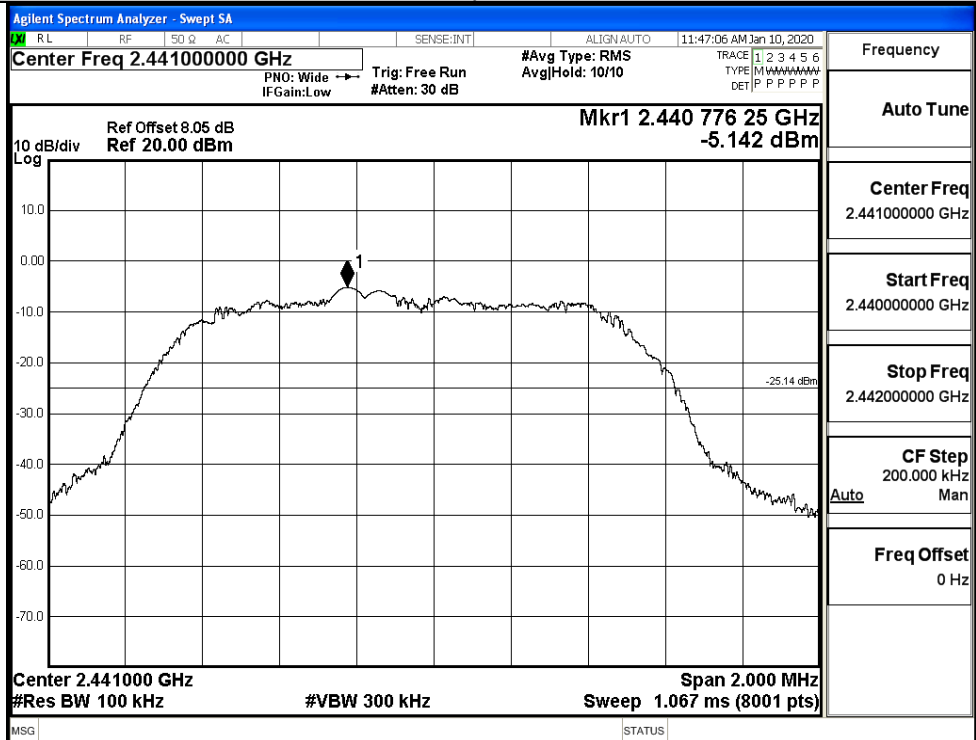


Puw

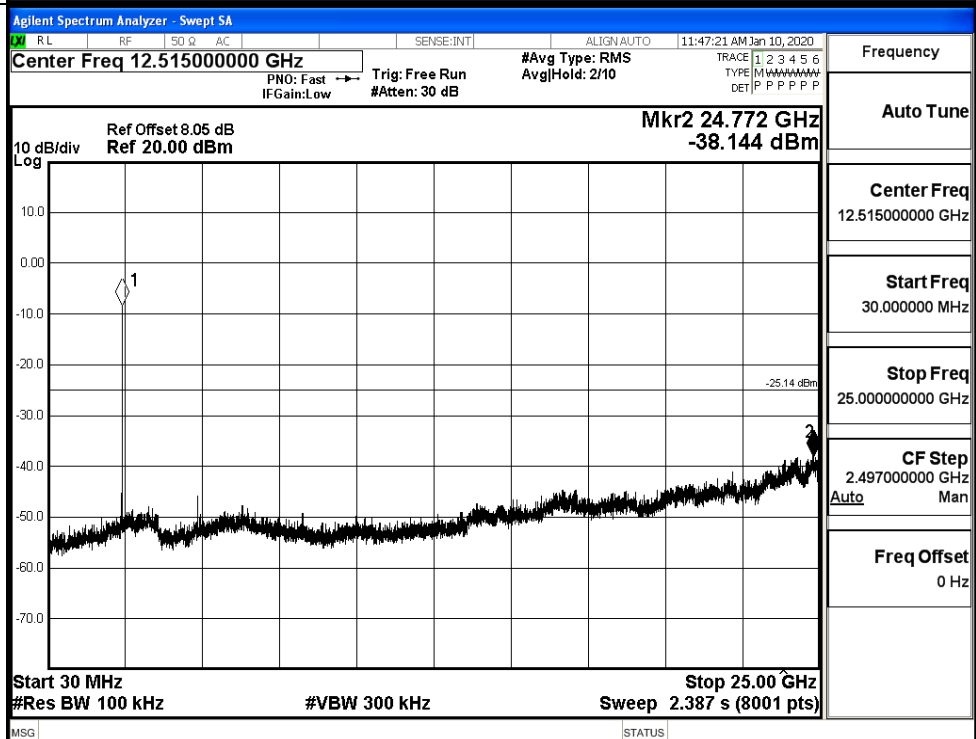


8DPSK_MCH_Graphs

Pref

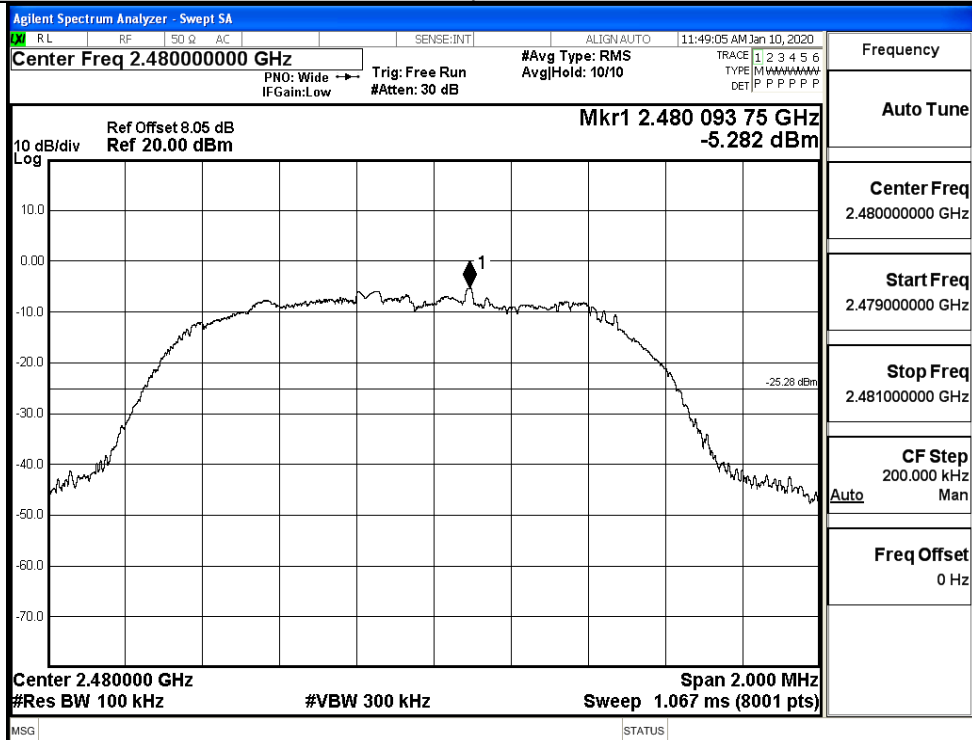


Puw

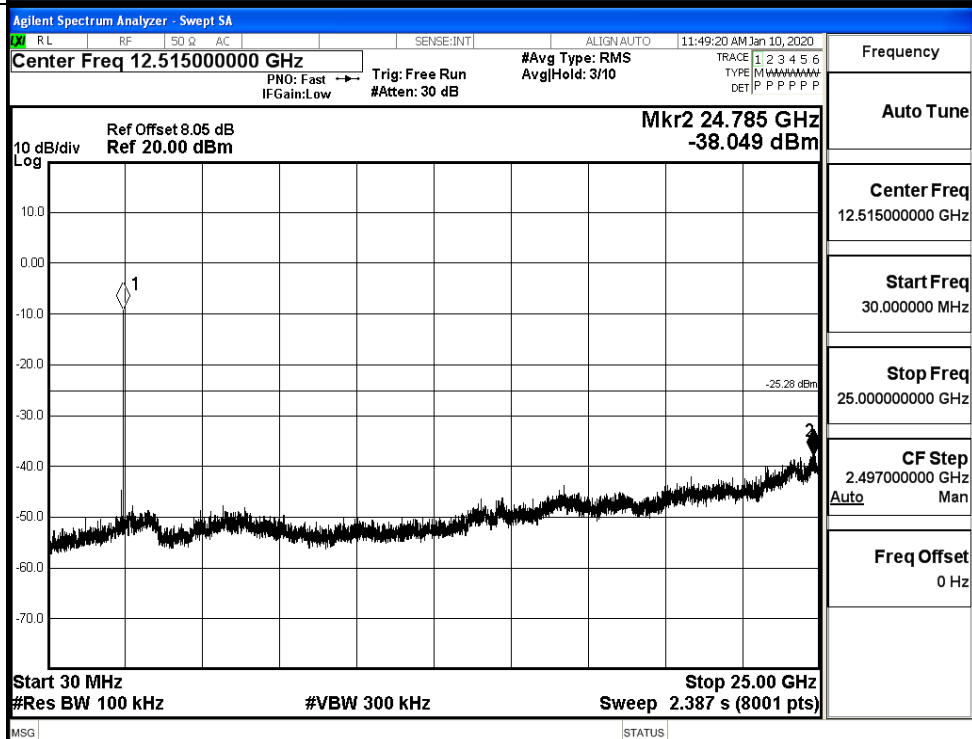


8DPSK_HCH_Graphs

Pref



Puw

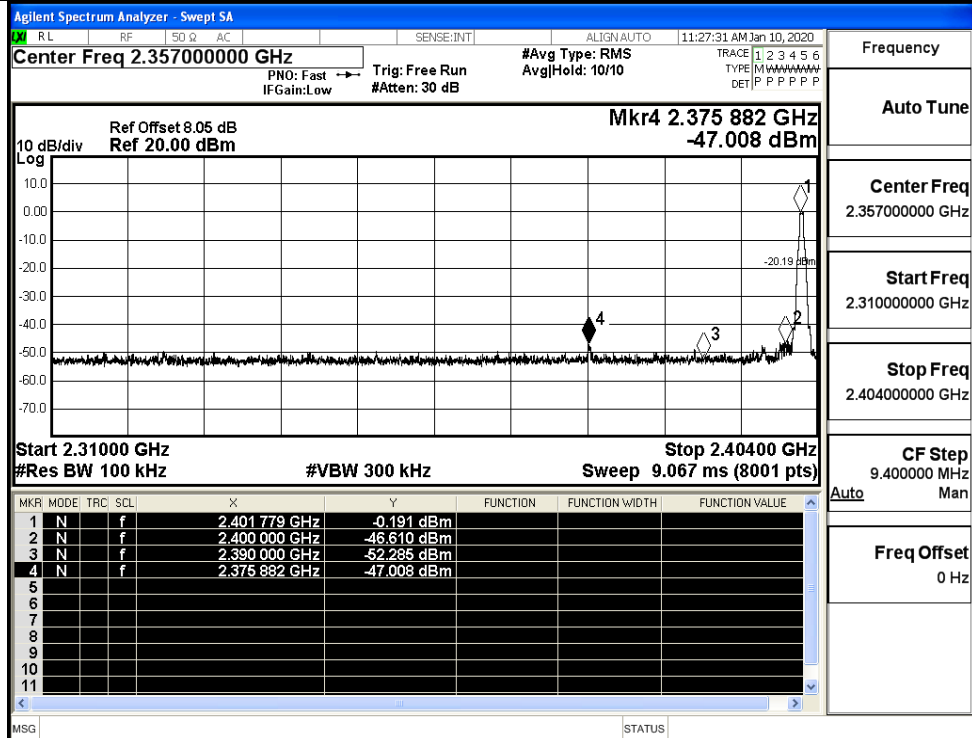


A.7 Band-edge for RF Conducted Emissions

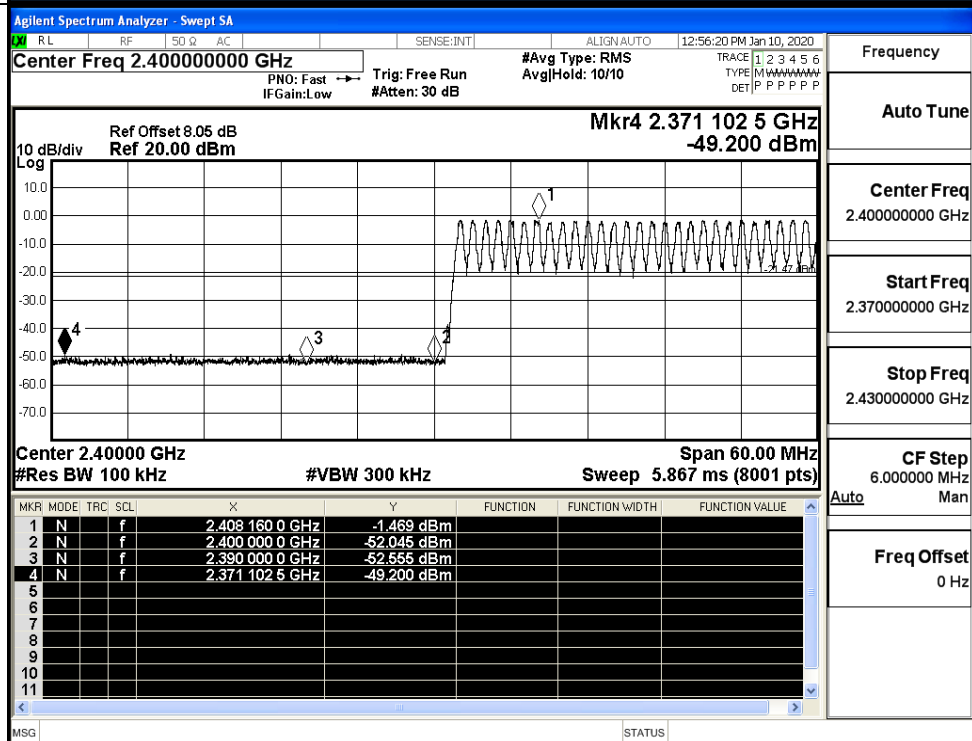
| Mode | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---------------|---------|-------------------------|---------------------|-------------------|--------------------------|-------------|---------|
| GFSK | LCH | 2402 | -0.191 | Off | -47.008 | -20.19 | PASS |
| | | | -1.469 | On | -49.200 | -21.47 | PASS |
| | HCH | 2480 | -1.112 | Off | -48.128 | -21.11 | PASS |
| | | | 2.376 | On | -48.377 | -17.62 | PASS |
| $\pi/4$ DQPSK | LCH | 2402 | -0.349 | Off | -48.569 | -20.35 | PASS |
| | | | -2.113 | On | -48.569 | -22.11 | PASS |
| | HCH | 2480 | -1.515 | Off | -48.345 | -21.52 | PASS |
| | | | 1.383 | On | -48.624 | -18.62 | PASS |
| 8DPSK | LCH | 2402 | -5.611 | Off | -49.186 | -25.61 | PASS |
| | | | -2.080 | On | -49.207 | -22.08 | PASS |
| | HCH | 2480 | -5.090 | Off | -48.932 | -25.09 | PASS |
| | | | 1.694 | On | -47.951 | -18.31 | PASS |

Test Graphs

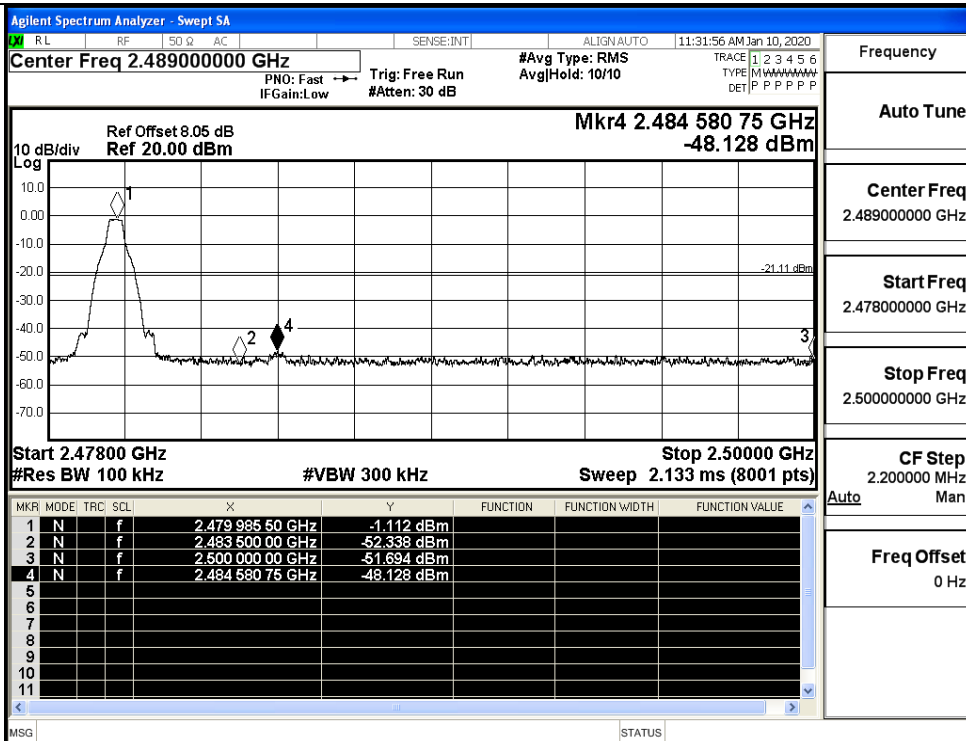
GFSK/LCH/No Hop



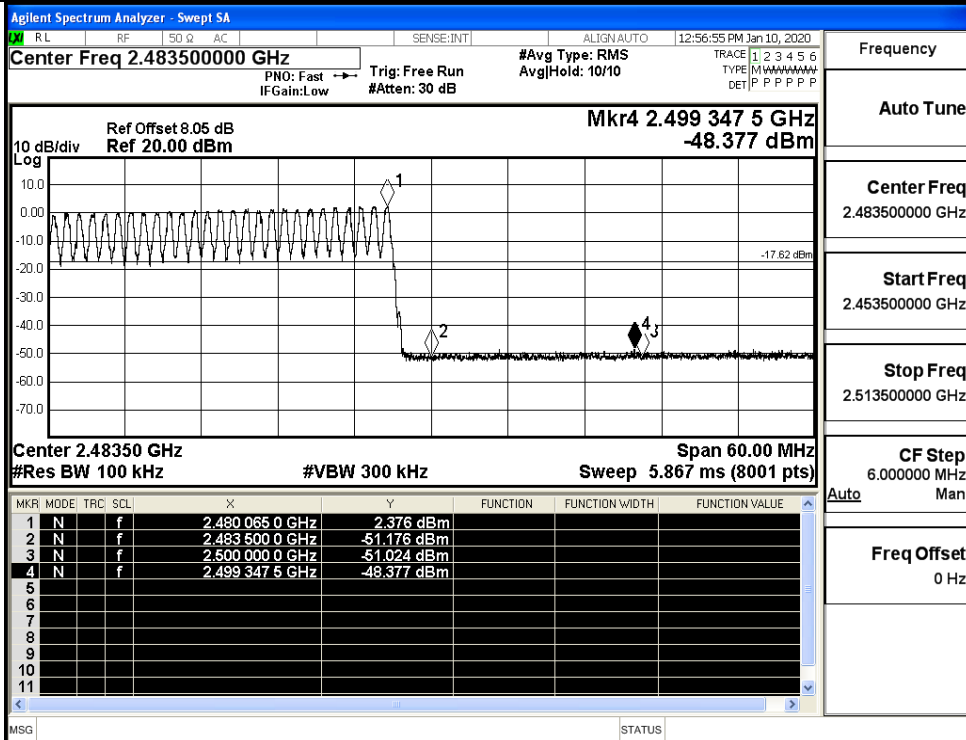
GFSK/LCH/Hop



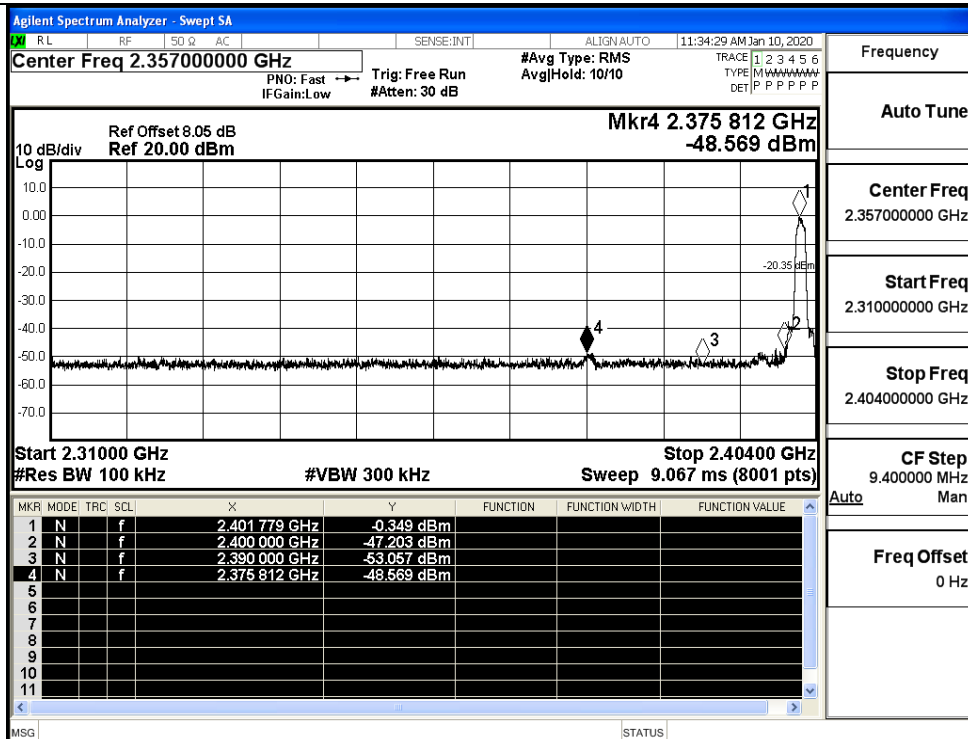
GFSK/HCH/No Hop



GFSK/HCH/Hop



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



Frequency

Auto Tune

Center Freq
2.357000000 GHz

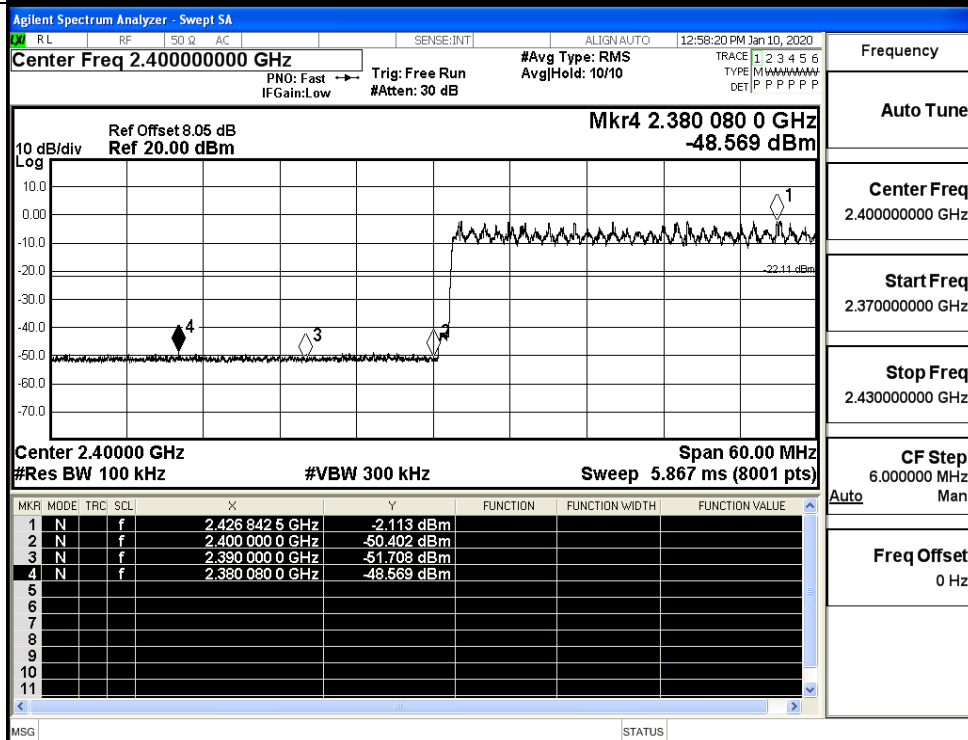
Start Freq
2.310000000 GHz

Stop Freq
2.404000000 GHz

CF Step
9.400000 MHz
Auto Man

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
Auto Man

Freq Offset
0 Hz

Agilent Spectrum Analyzer - Swept SA

RL RF 50 Q AC SENSE:INT 11:39:16 AM Jan 10, 2020

Center Freq 2.489000000 GHz PNO: Fast → Trg: Free Run Avg Type: RMS #Avg Hold: 10/10

Ref Offset 8.05 dB Ref 20.00 dBm Mkr4 2.484 836 50 GHz -48.345 dBm

10 dB/div Log

Start 2.47800 GHz #Res BW 100 kHz #VBW 300 kHz Sweep 2.133 ms (8001 pts)

| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|-----|------|-----|-----|------------------|-------------|----------|----------------|----------------|
| 1 | N | | f | 2.479 798 50 GHz | -1.515 dBm | | | |
| 2 | N | | f | 2.483 500 00 GHz | -51.625 dBm | | | |
| 3 | N | | f | 2.500 000 00 GHz | -52.125 dBm | | | |
| 4 | N | | f | 2.484 836 50 GHz | -48.345 dBm | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |

MSG STATUS

Frequency Auto Tune Center Freq 2.489000000 GHz Start Freq 2.478000000 GHz Stop Freq 2.500000000 GHz CF Step 2.200000 MHz Freq Offset 0 Hz

Agilent Spectrum Analyzer - Swept SA

| | | | | | | | |
|----|-----|----|------|----|-----------|------------|--------------------------|
| MW | R/L | RF | 50 Ω | AC | SENSE:INT | ALIGN:AUTO | 12:59:36 PM Jan 10, 2020 |
|----|-----|----|------|----|-----------|------------|--------------------------|

Center Freq 2.48350000 GHz

 PNO: Fast → Trig: Free Run
 IF Gain: Low #Atten: 30 dB

#Avg Type: RMS
Avg/Hold: 10/10

TRACE 1 2 3 4 5 6
TYPE M W A V I N G
DET P P P P P P

Mkr4 2.487 302 5 GHz
-48.624 dBm

Ref Offset 8.05 dB
Ref 20.00 dBm

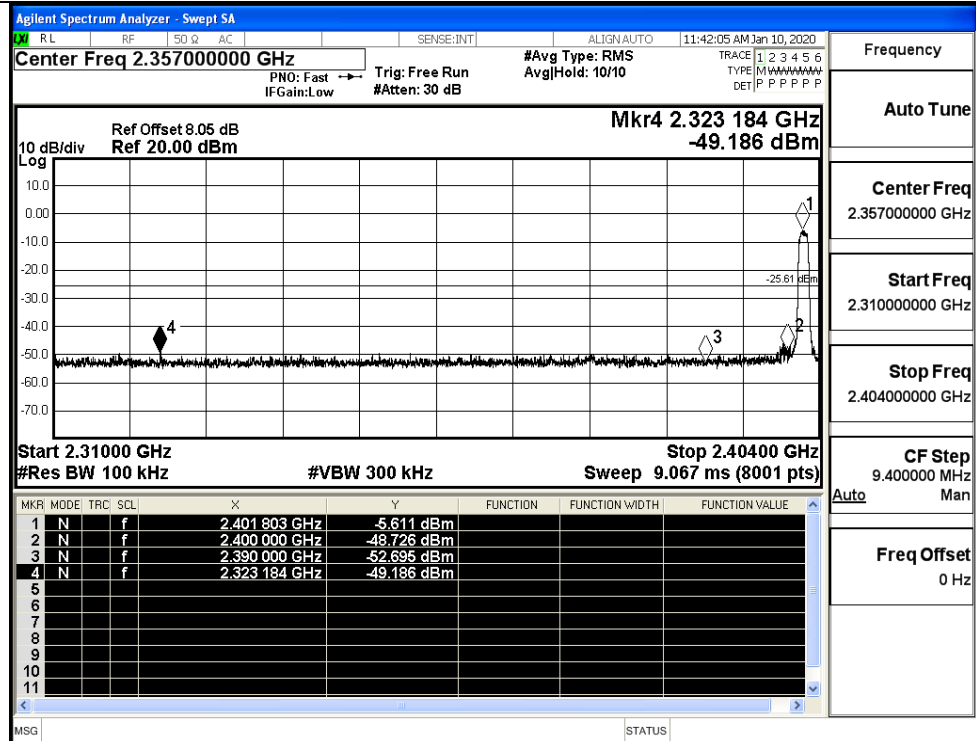
Log Scale: -70.0 to 10.0 dB/div

Peak Labels:
1: Main peak at ~-10 dBm
2: Marker at ~-48.6 dBm
3: Noise floor marker at ~-50 dBm
4: Another noise floor marker at ~-48.6 dBm

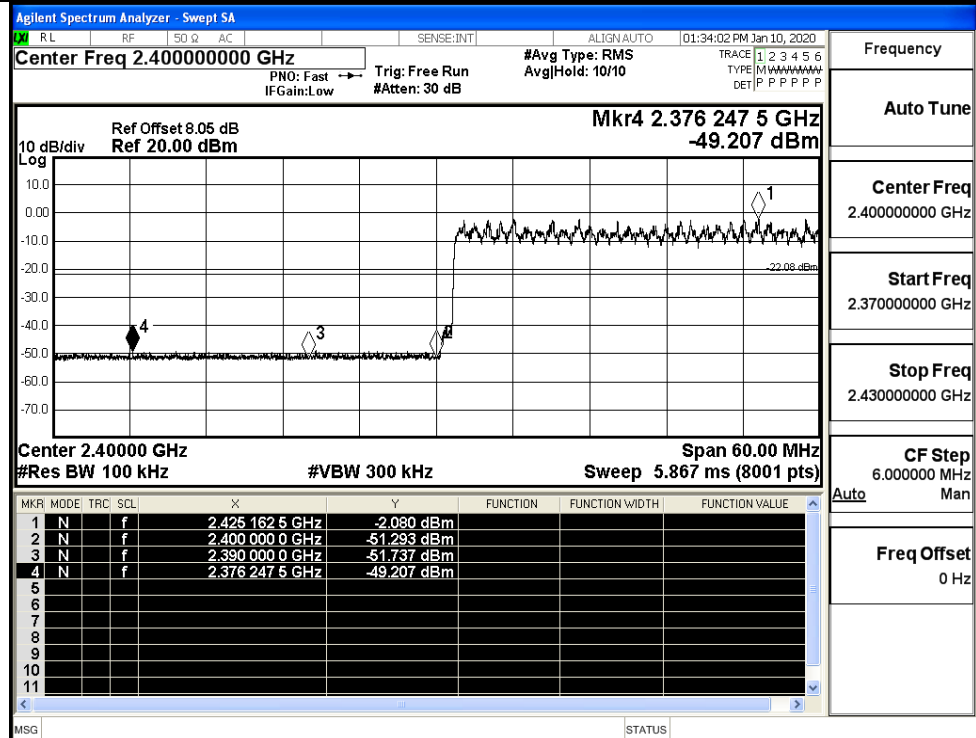
| | |
|---------------------------|----------------------------------|
| Center 2.48350 GHz | Span 60.00 MHz |
| #Res BW 100 kHz | #VBW 300 kHz |
| | Sweep 5.867 ms (8001 pts) |

| NR | MODE | FREQ | PWR | FUNCTION | WIDTH | VALUE |
|----|------|------|-----------------|----------|-------|-------------|
| 1 | N | f | 2.476 157 5 GHz | | | 1.383 dBm |
| 2 | N | f | 2.483 500 0 GHz | | | -50.806 dBm |
| 3 | N | f | 2.500 000 0 GHz | | | -51.156 dBm |
| 4 | N | f | 2.487 302 5 GHz | | | -48.624 dBm |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| 10 | | | | | | |
| 11 | | | | | | |

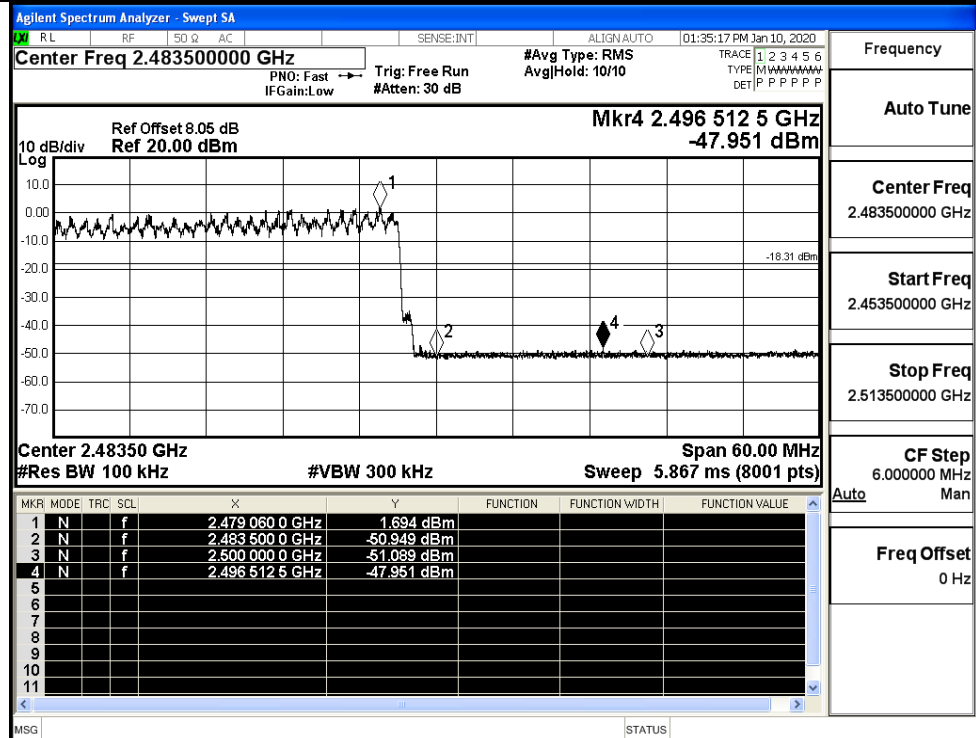
8DPSK/LCH/No Hop



8DPSK/LCH/Hop



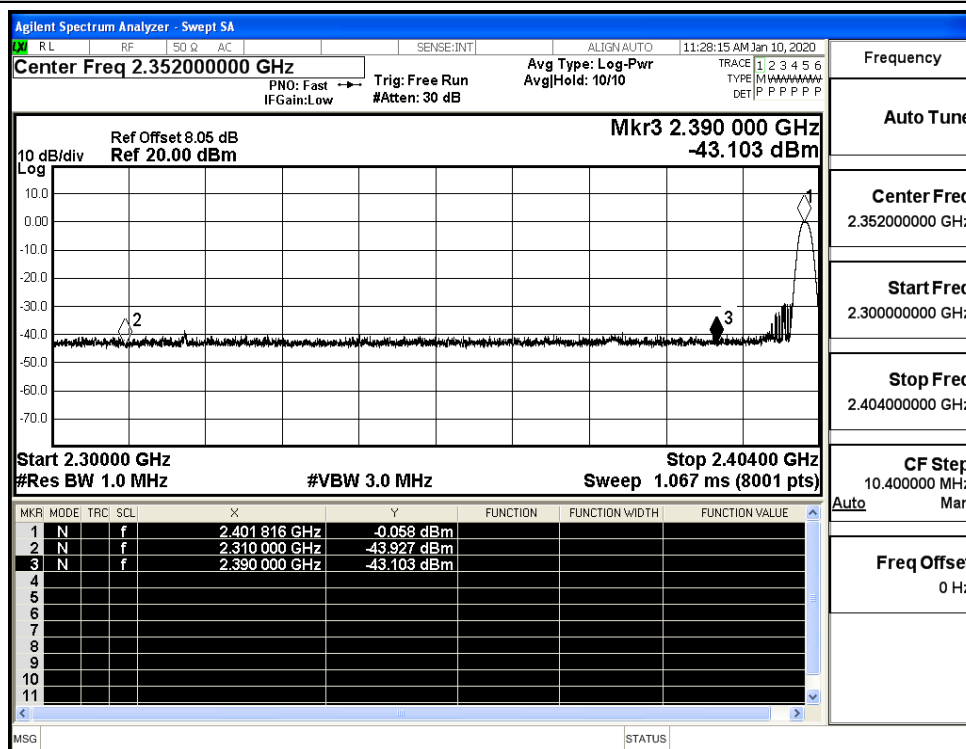
8DPSK/HCH/Hop



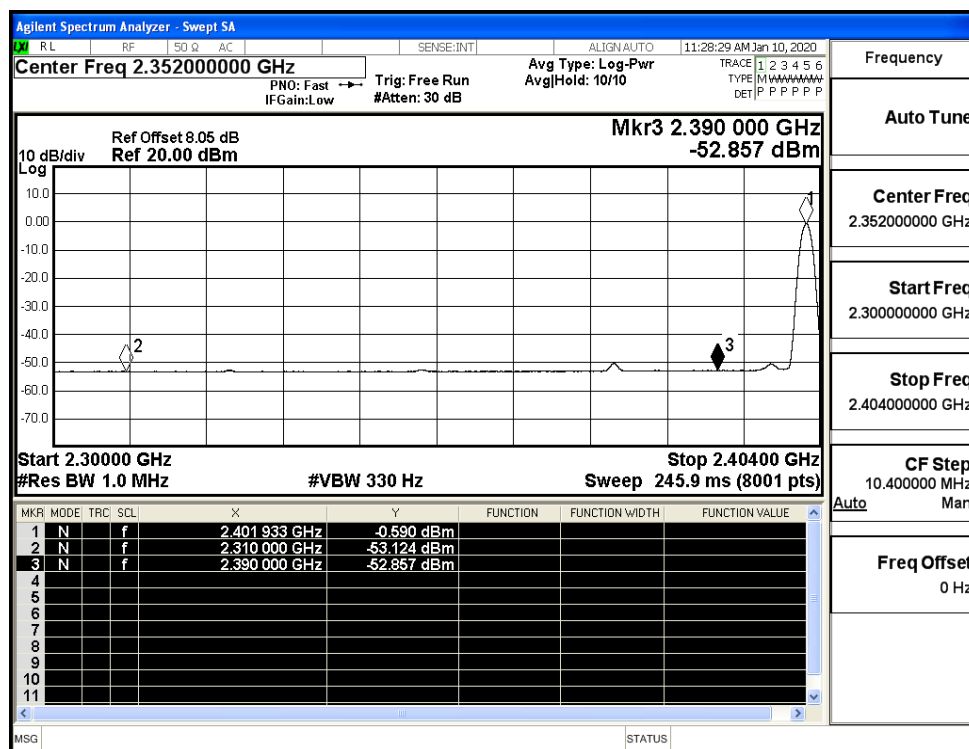
A.8 Restrict-band band-edge measurements

| Test Mode | Hopping | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---------------|---------|--------|-------------|------|---------------|------------|----------|----------------|---------|
| GFSK | Off | 2310.0 | -43.93 | 0.5 | 0 | 51.33 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.12 | 0.5 | 0 | 42.13 | AV | 54 | PASS |
| | Off | 2390.0 | -43.10 | 0.5 | 0 | 52.15 | PEAK | 74 | PASS |
| | Off | 2390.0 | -52.86 | 0.5 | 0 | 42.40 | AV | 54 | PASS |
| | Off | 2483.5 | -41.61 | 0.5 | 0 | 53.64 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.15 | 0.5 | 0 | 43.11 | AV | 54 | PASS |
| | Off | 2500.0 | -41.31 | 0.5 | 0 | 53.95 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.30 | 0.5 | 0 | 42.96 | AV | 54 | PASS |
| $\pi/4$ DQPSK | Off | 2310.0 | -44.01 | 0.5 | 0 | 51.25 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.33 | 0.5 | 0 | 41.93 | AV | 54 | PASS |
| | Off | 2390.0 | -43.19 | 0.5 | 0 | 52.07 | PEAK | 74 | PASS |
| | Off | 2390.0 | -52.90 | 0.5 | 0 | 42.36 | AV | 54 | PASS |
| | Off | 2483.5 | -41.81 | 0.5 | 0 | 53.45 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.05 | 0.5 | 0 | 43.21 | AV | 54 | PASS |
| | Off | 2500.0 | -41.30 | 0.5 | 0 | 53.96 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.27 | 0.5 | 0 | 42.98 | AV | 54 | PASS |
| 8DPSK | Off | 2310.0 | -43.13 | 0.5 | 0 | 52.13 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.26 | 0.5 | 0 | 42.00 | AV | 54 | PASS |
| | Off | 2390.0 | -42.82 | 0.5 | 0 | 52.44 | PEAK | 74 | PASS |
| | Off | 2390.0 | -52.87 | 0.5 | 0 | 42.38 | AV | 54 | PASS |
| | Off | 2483.5 | -42.58 | 0.5 | 0 | 52.68 | PEAK | 74 | PASS |
| | Off | 2483.5 | -52.30 | 0.5 | 0 | 42.96 | AV | 54 | PASS |
| | Off | 2500.0 | -42.37 | 0.5 | 0 | 52.88 | PEAK | 74 | PASS |
| | Off | 2500.0 | -52.18 | 0.5 | 0 | 43.07 | AV | 54 | PASS |

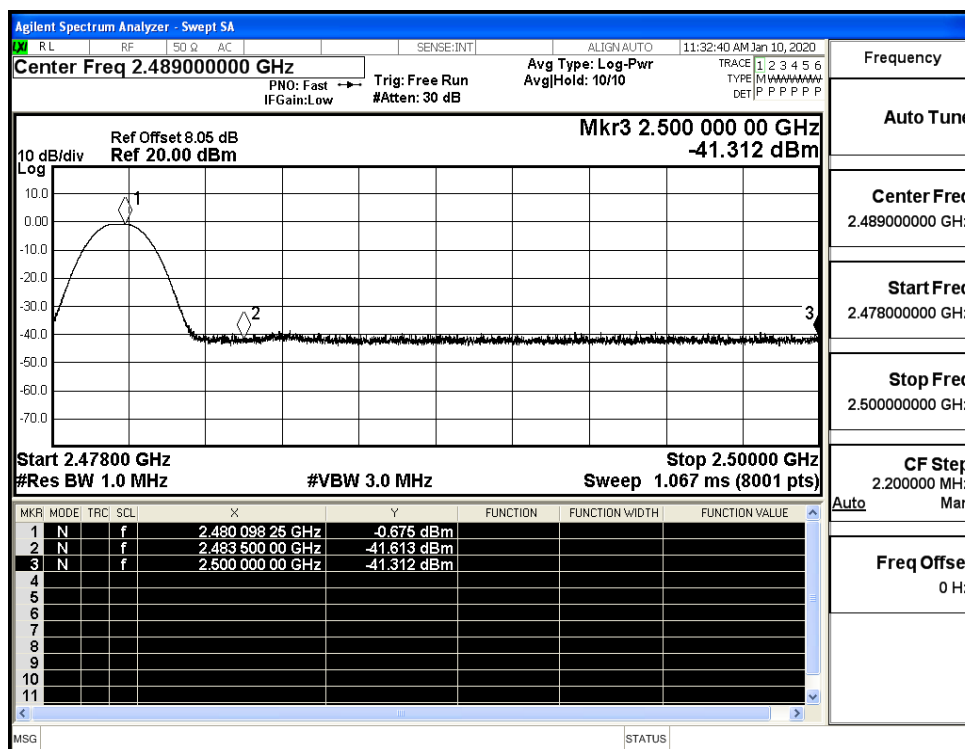
Restrict-band band-edge measurements_Hopping Off_GFSK_PEAK (Low Channel)



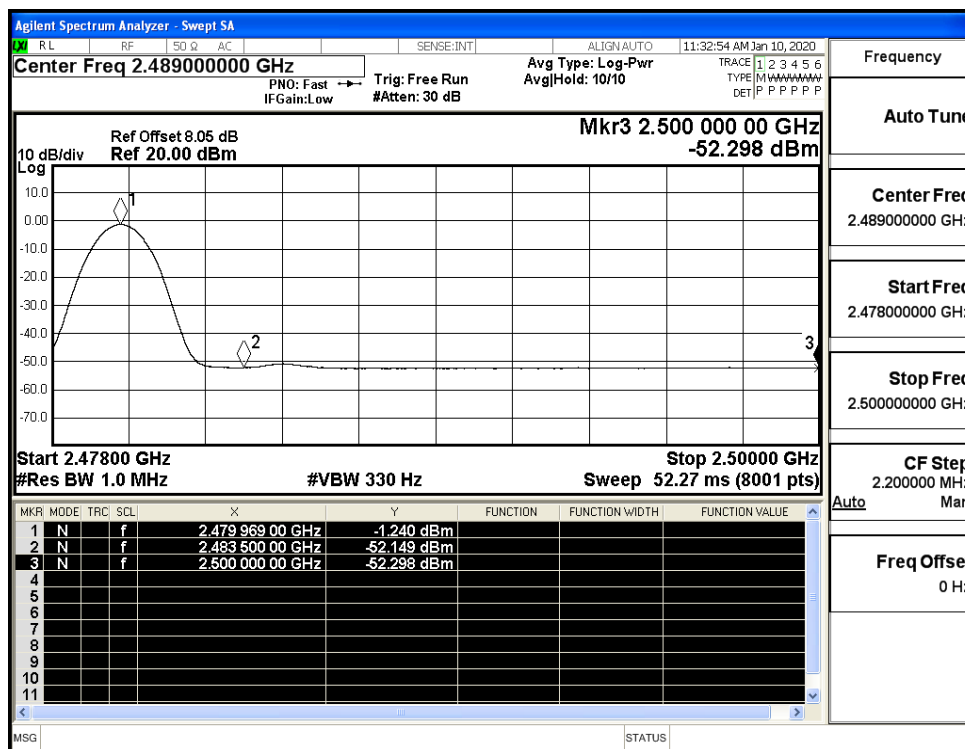
Restrict-band band-edge measurements_Hopping Off_GFSK_Average (Low Channel)

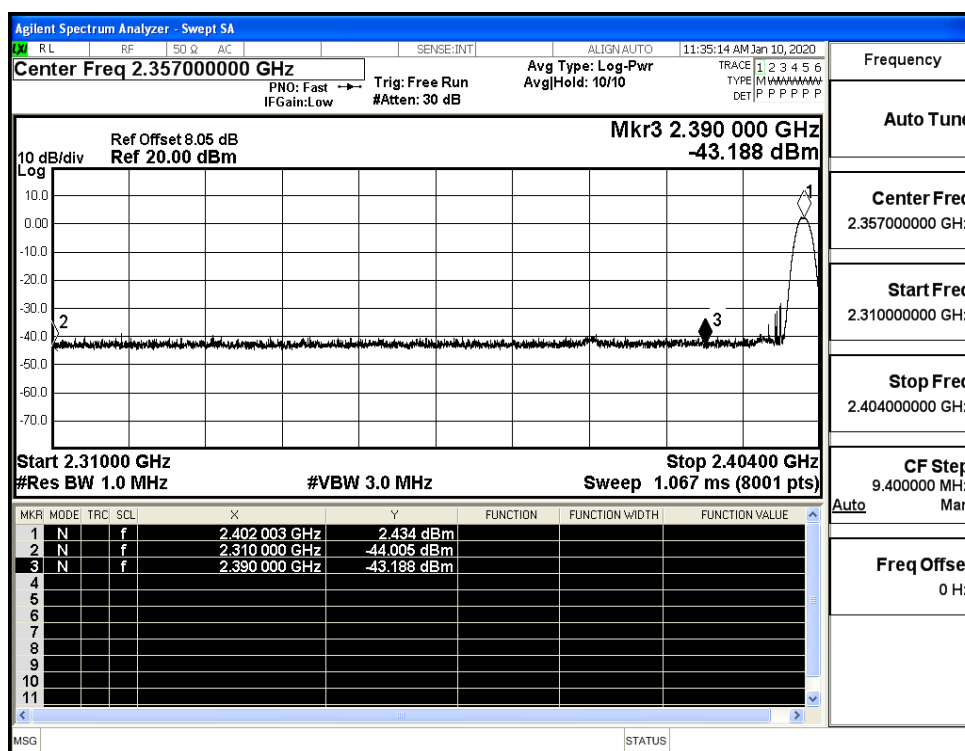
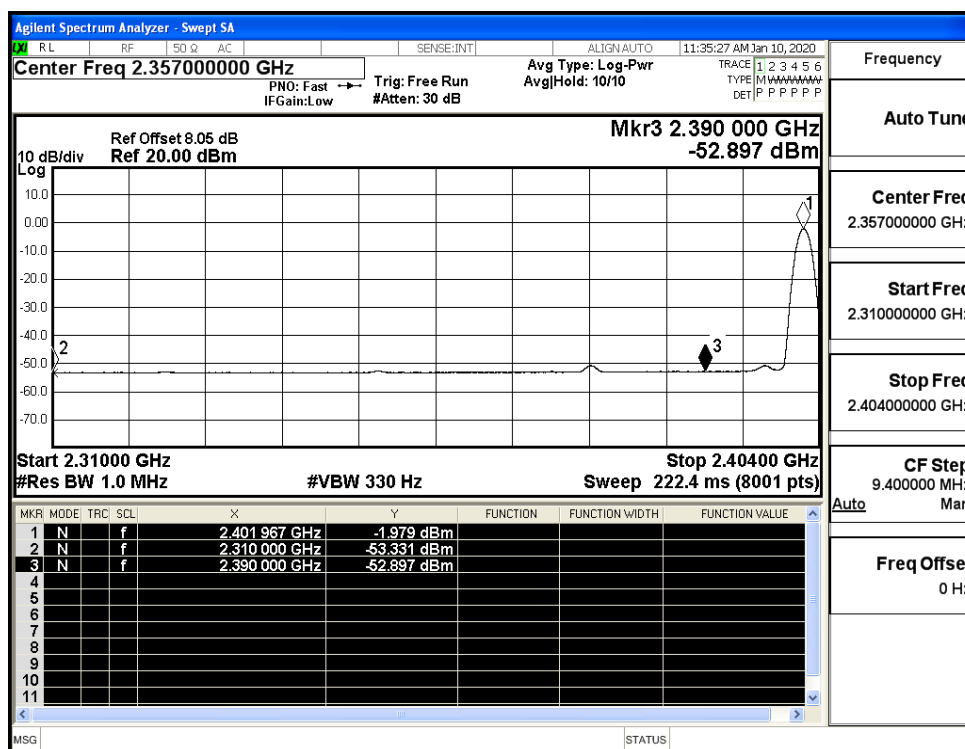


Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)

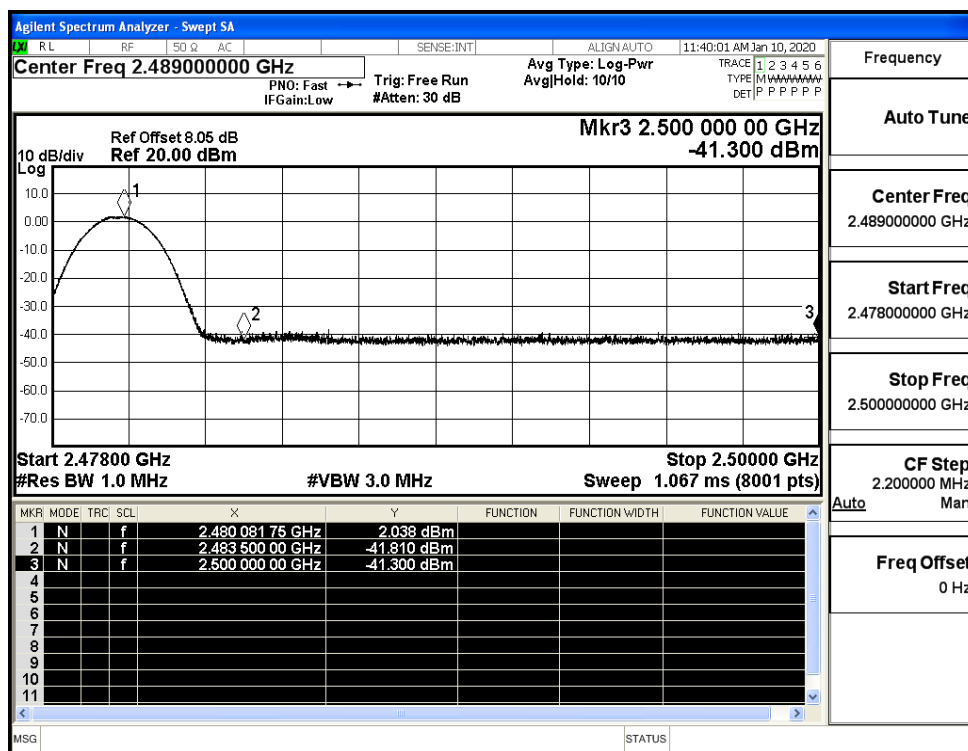


Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)

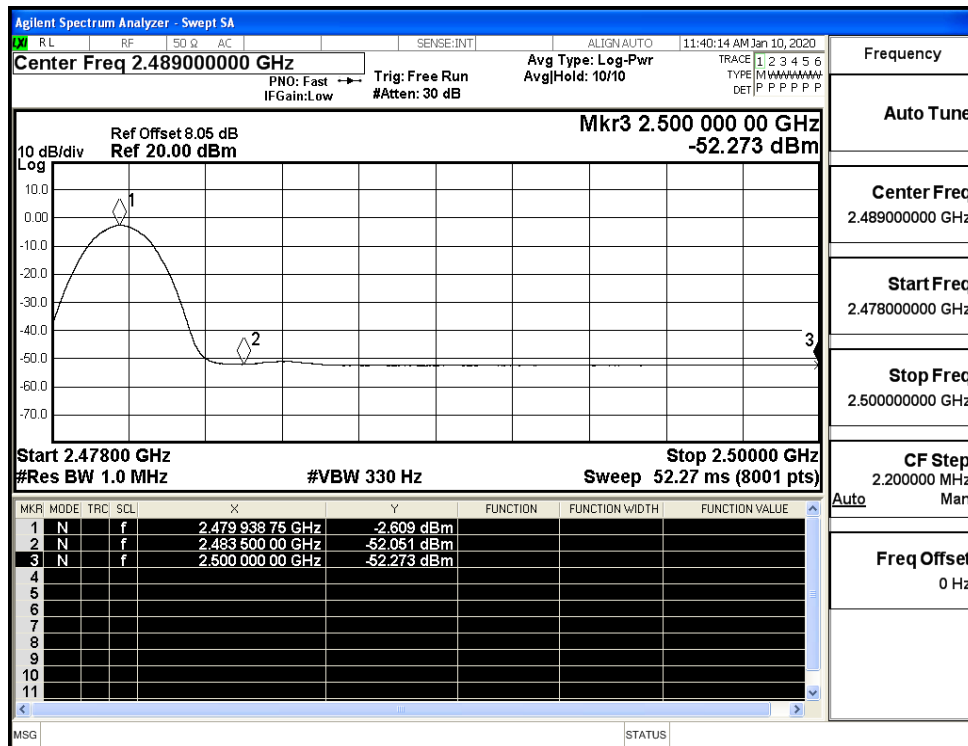


Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_PEAK (Low Channel)Restrict-band band-edge measurements_Hopping Off $\pi/4$ -DQPSK_Average (Low Channel)

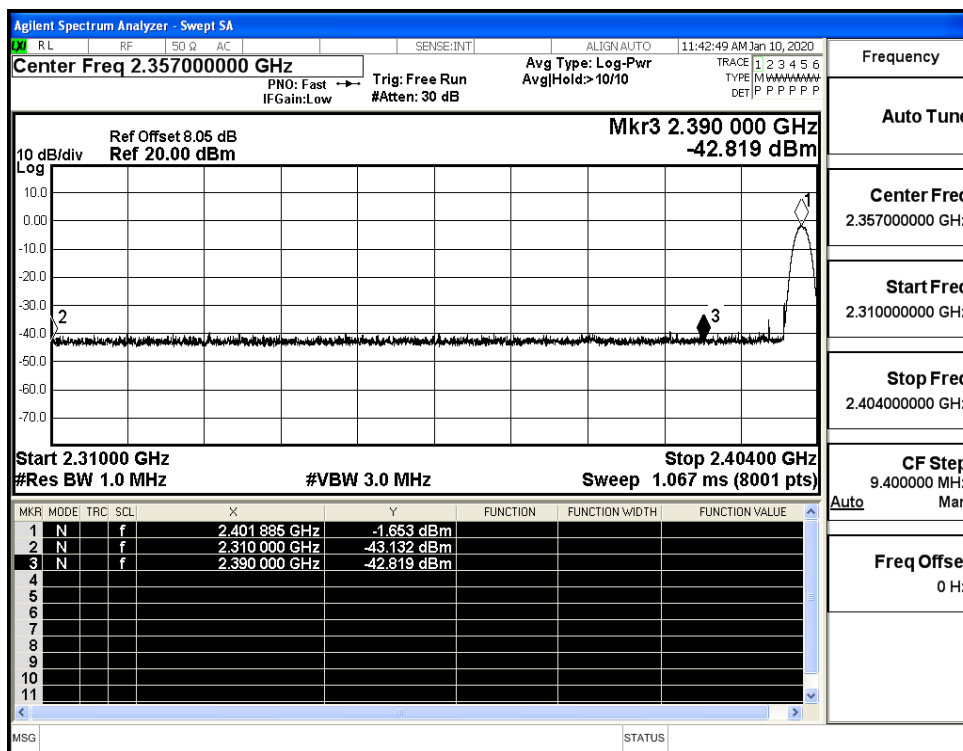
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (High Channel)



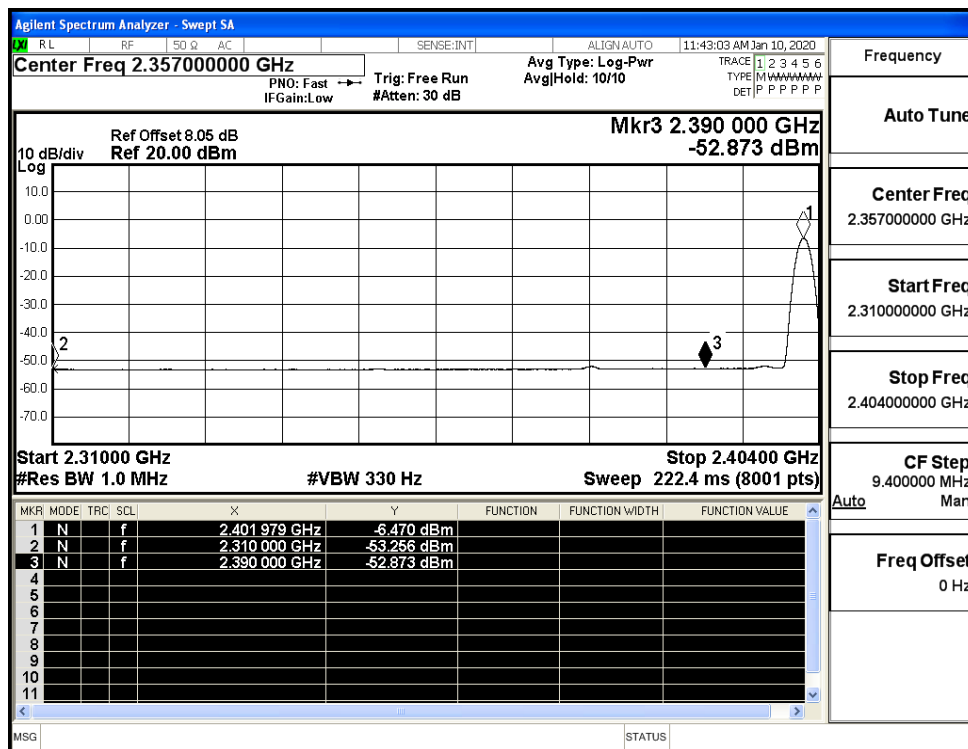
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (High Channel)



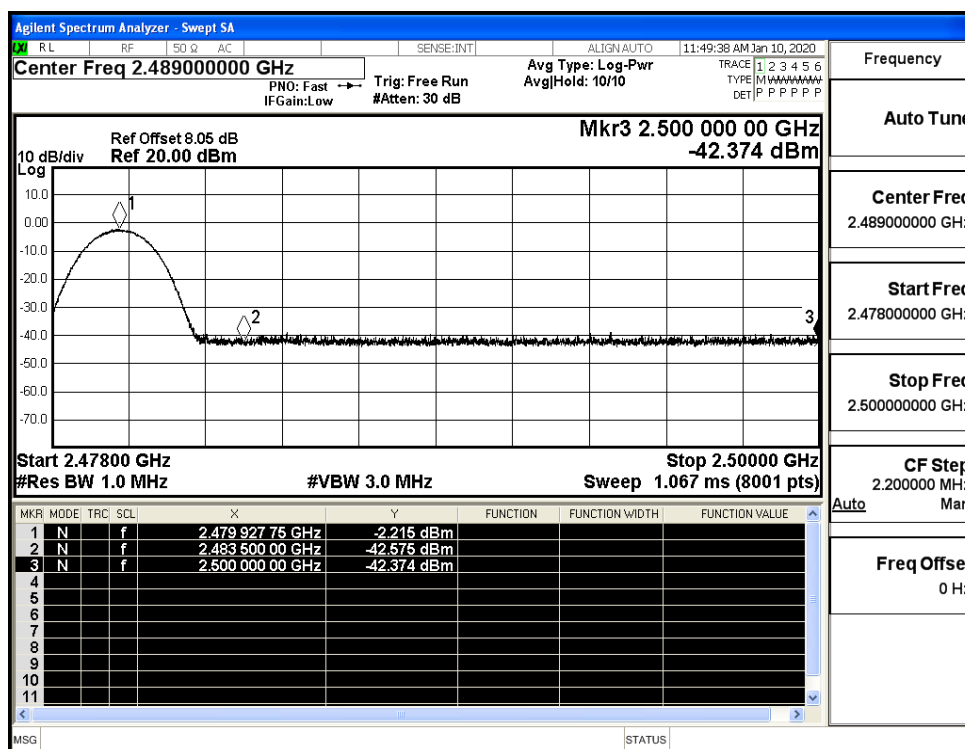
Restrict-band band-edge measurements_Hopping Off_8DPSK_PEAK (Low Channel)



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)

