

Appendix A

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

Product Name: Bluetooth Speaker with Wireless Charger

Trade Mark: /

Test Model: B90

FCC ID: QIF-LC-D990

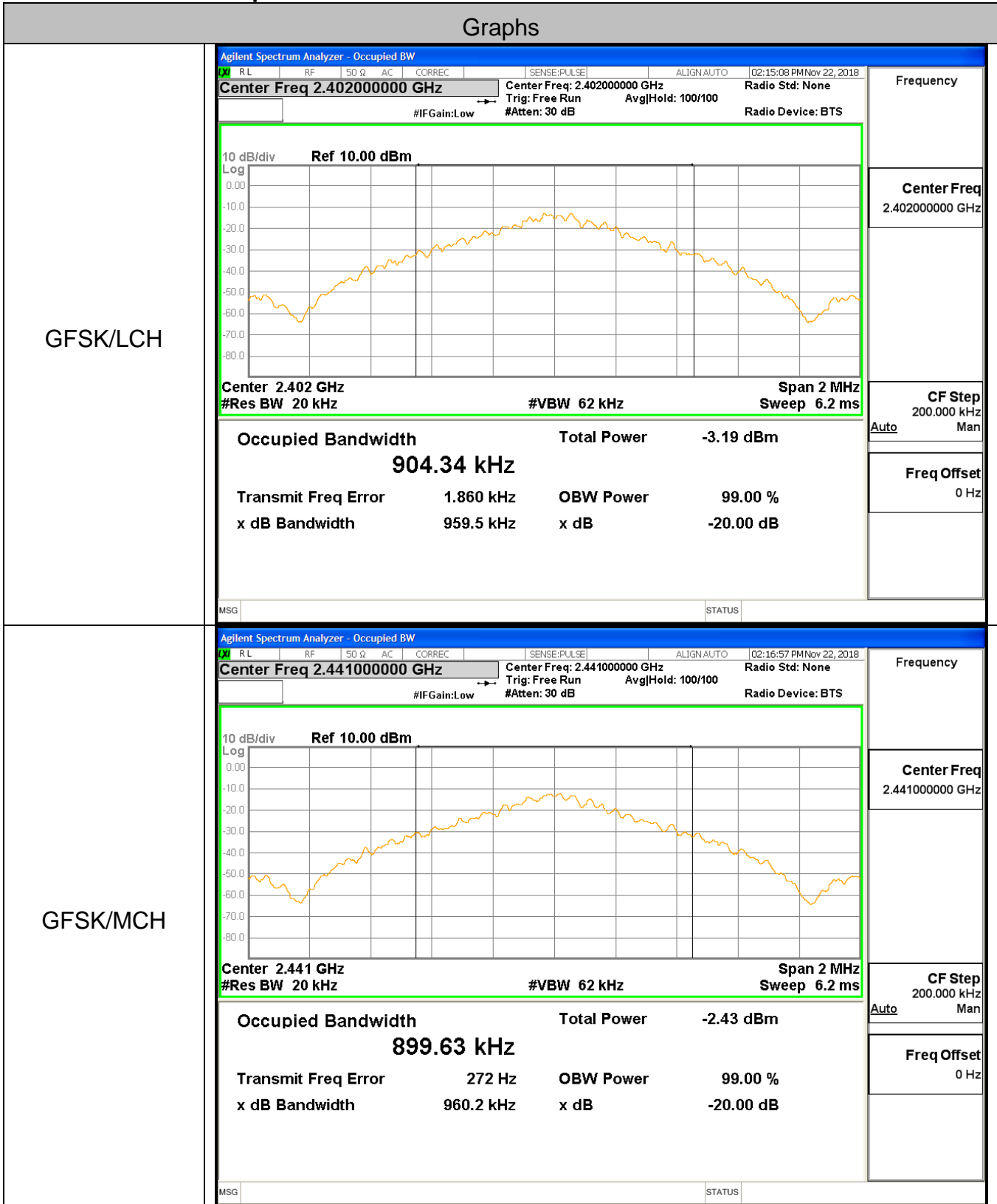
Environmental Conditions

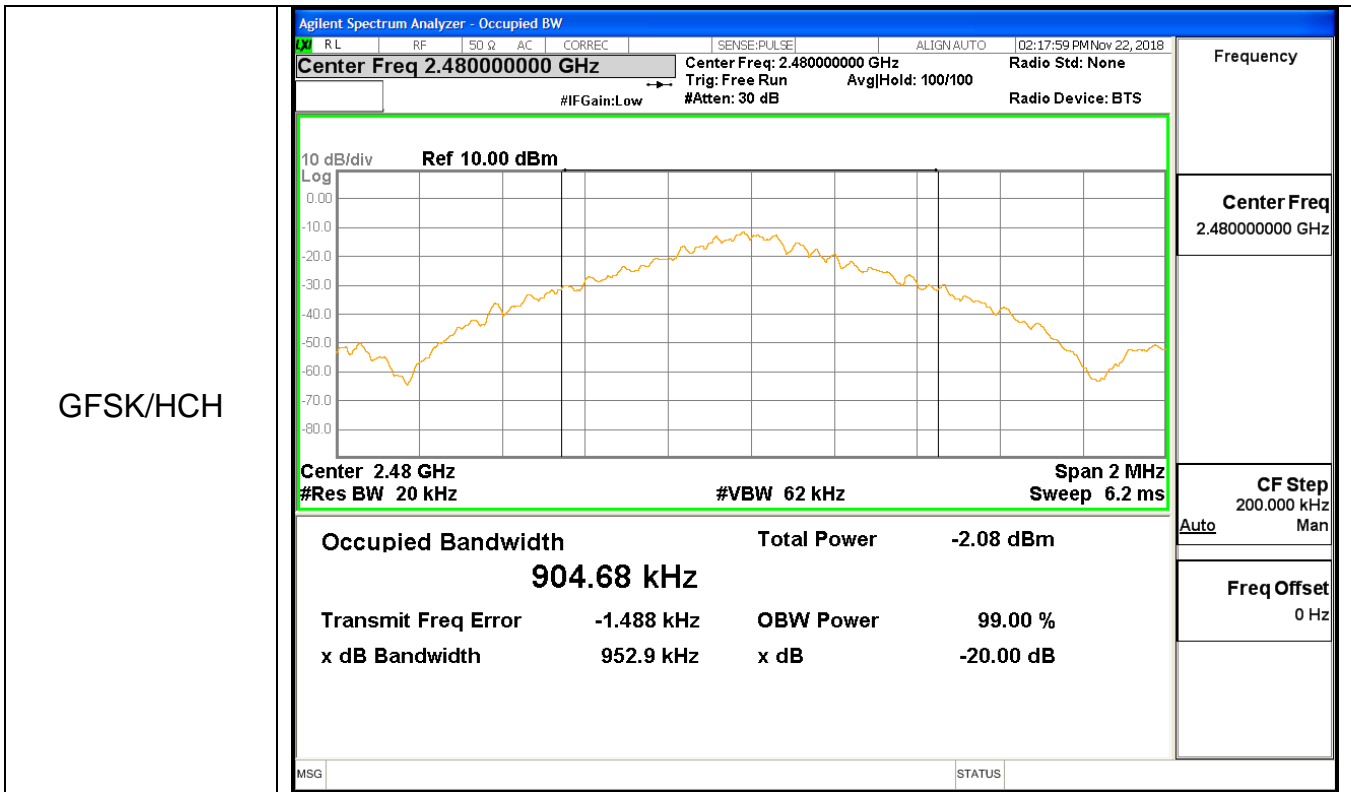
| | |
|--------------------|-----------|
| Temperature: | 22.9 ° C |
| Relative Humidity: | 52.3% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Gary Qian |
| Supervised by: | Eden Hu |

A.1 20 dB Bandwidth

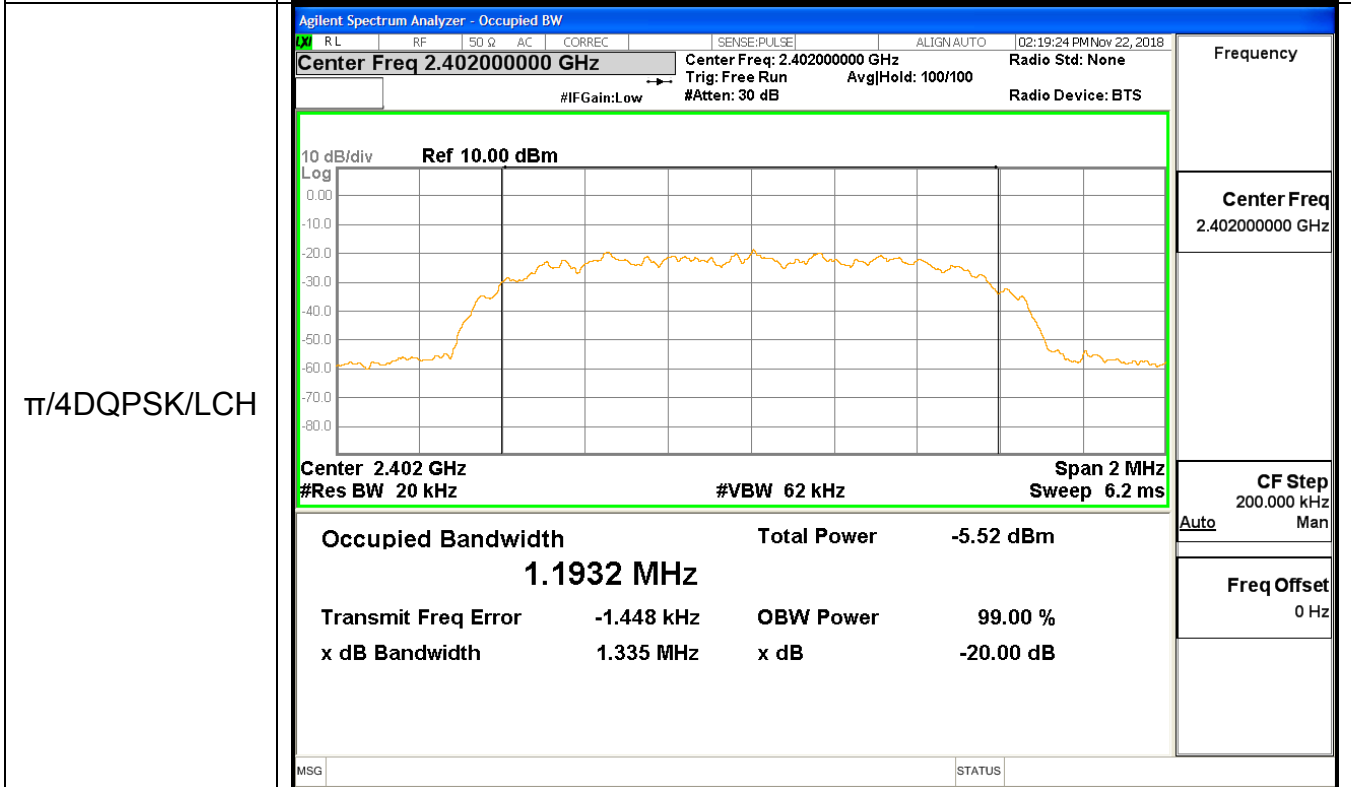
| Mode | Channel. | 20dB Bandwidth [MHz] | Limit(MHz) | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK | LCH | 0.960 | Not Specified | PASS |
| GFSK | MCH | 0.960 | Not Specified | PASS |
| GFSK | HCH | 0.953 | Not Specified | PASS |
| $\pi/4$ DQPSK | LCH | 1.335 | Not Specified | PASS |
| $\pi/4$ DQPSK | MCH | 1.337 | Not Specified | PASS |
| $\pi/4$ DQPSK | HCH | 1.337 | Not Specified | PASS |
| 8DPSK | LCH | 1.336 | Not Specified | PASS |
| 8DPSK | MCH | 1.335 | Not Specified | PASS |
| 8DPSK | HCH | 1.324 | Not Specified | PASS |

1.1.1.1.1 Test Graph

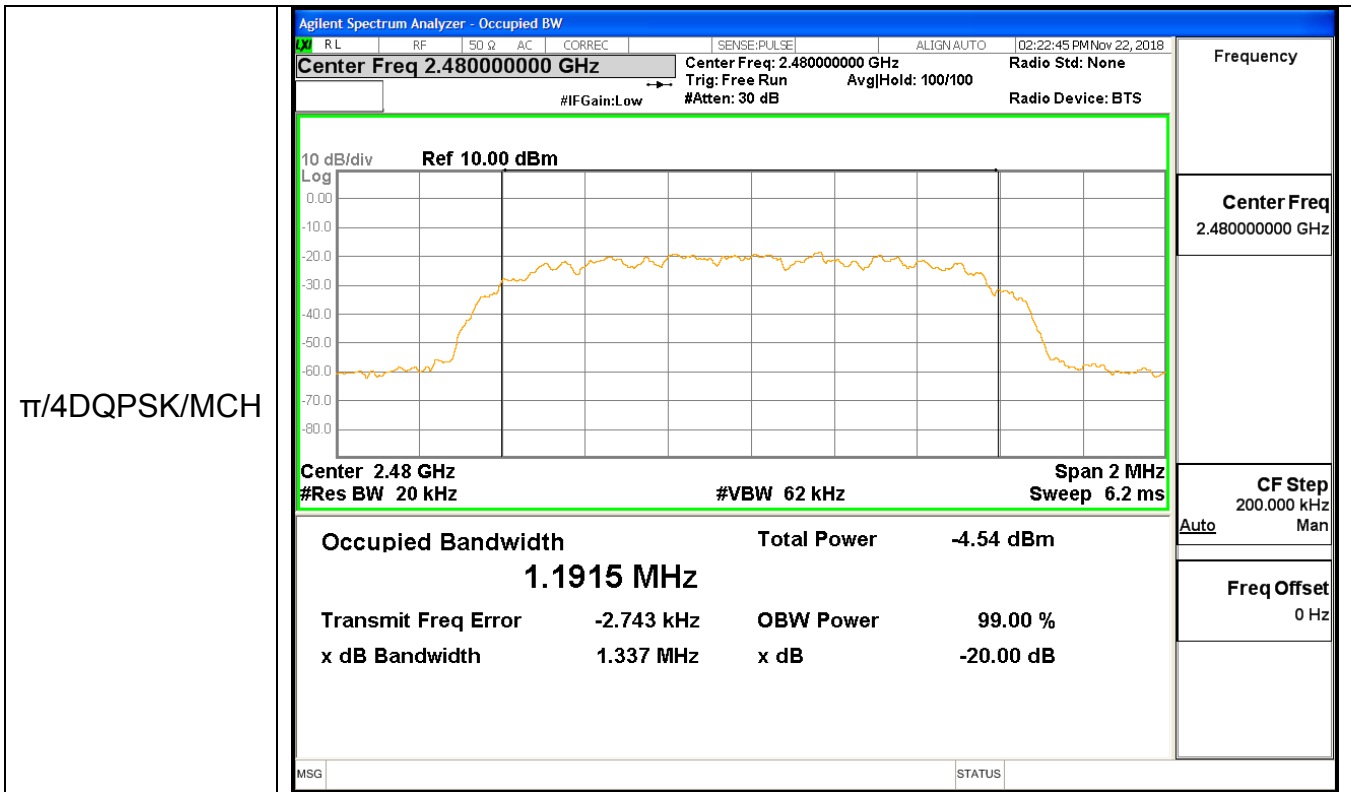




GFSK/HCH



π/4DQPSK/LCH



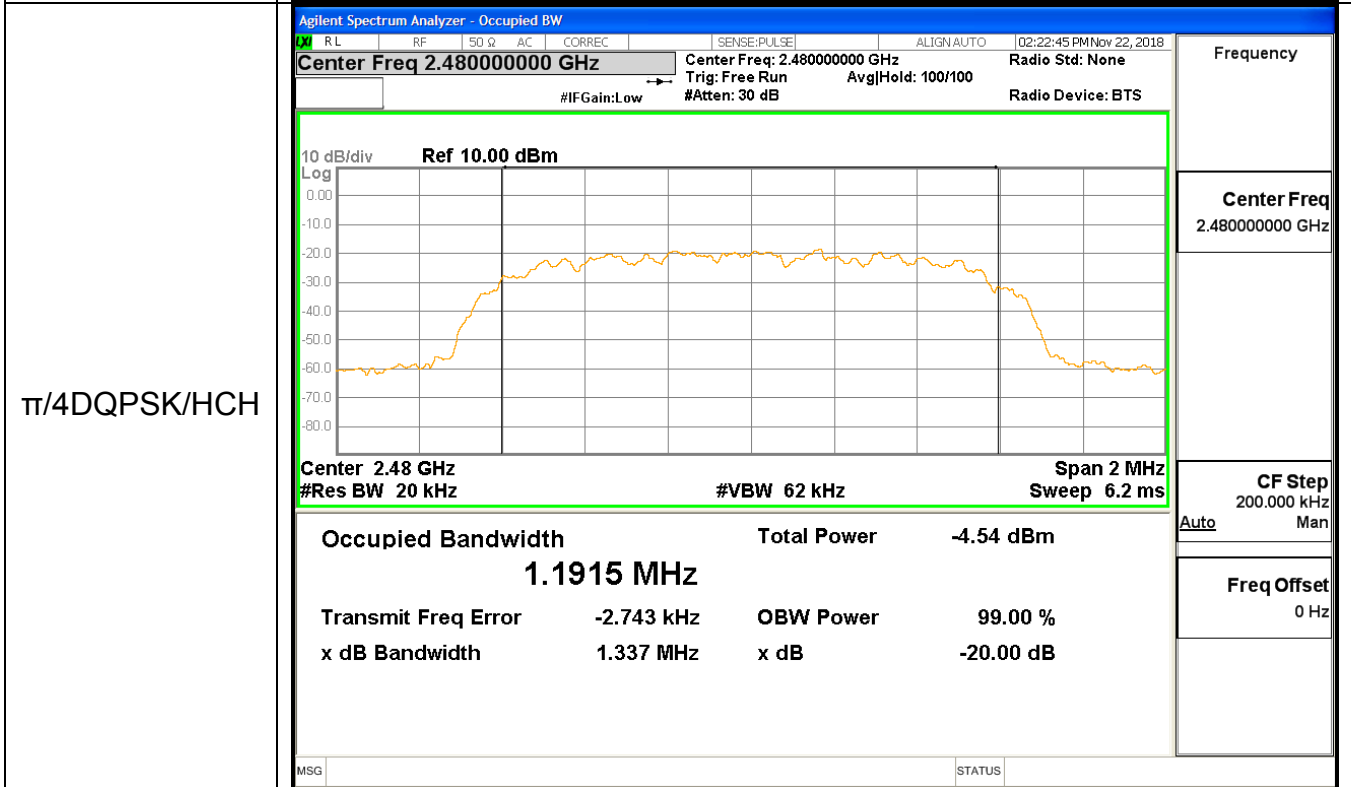
π/4DQPSK/MCH

Frequency

Center Freq
2.48000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz



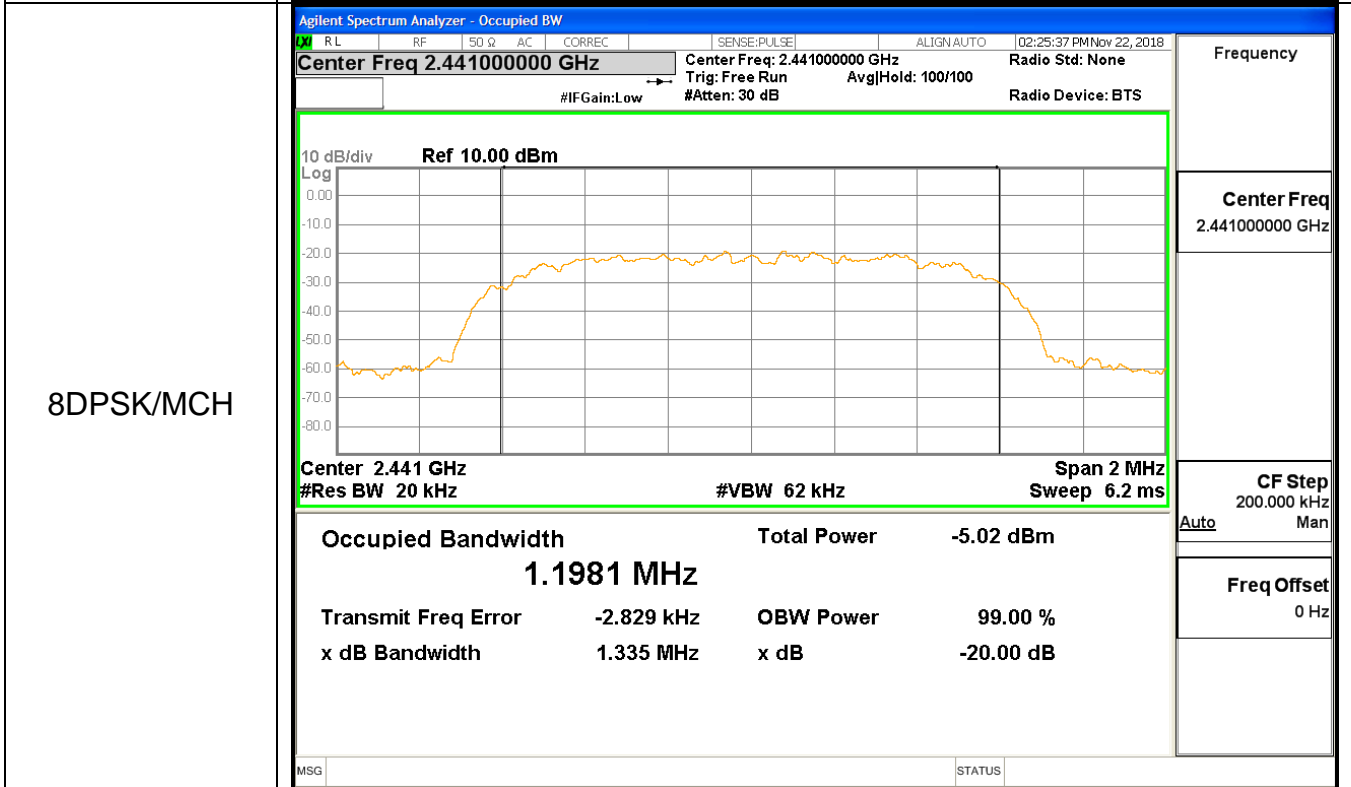
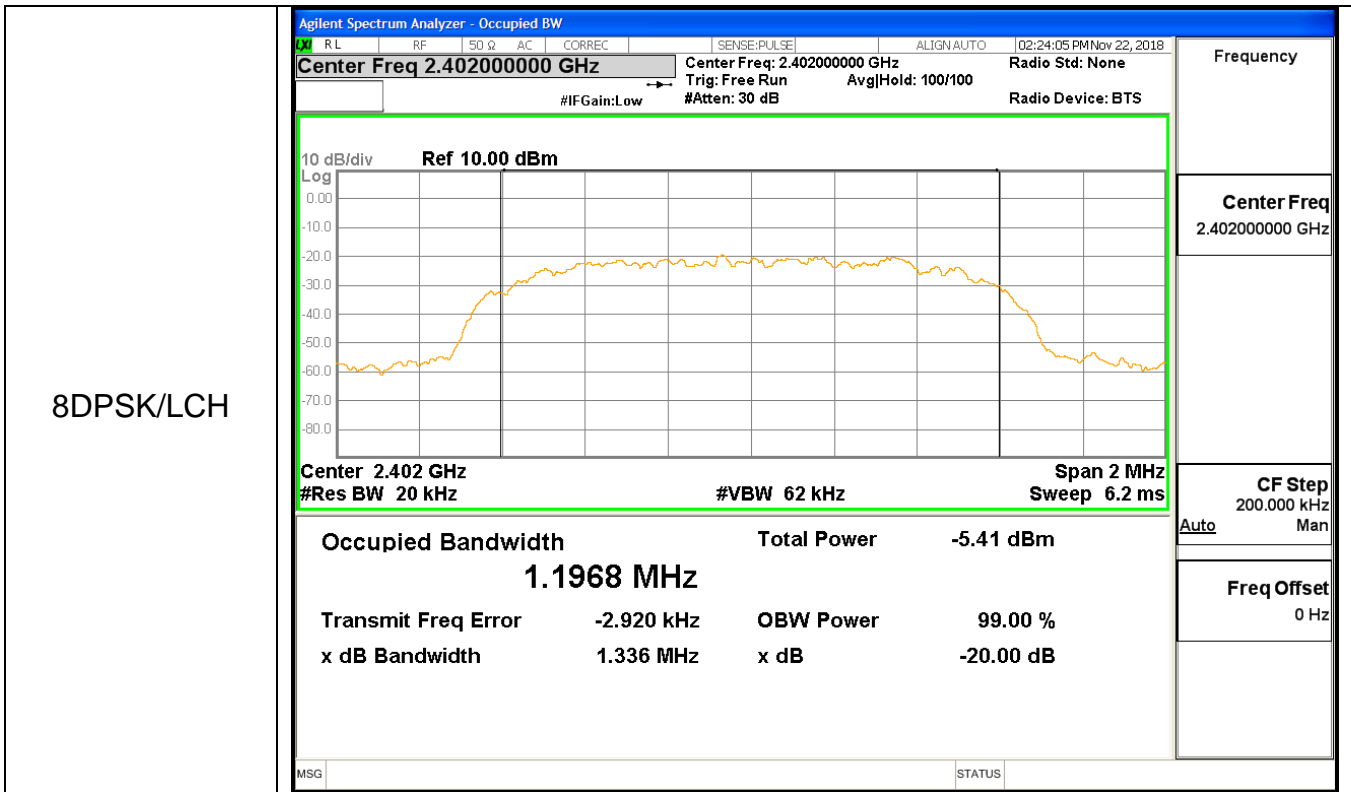
π/4DQPSK/HCH

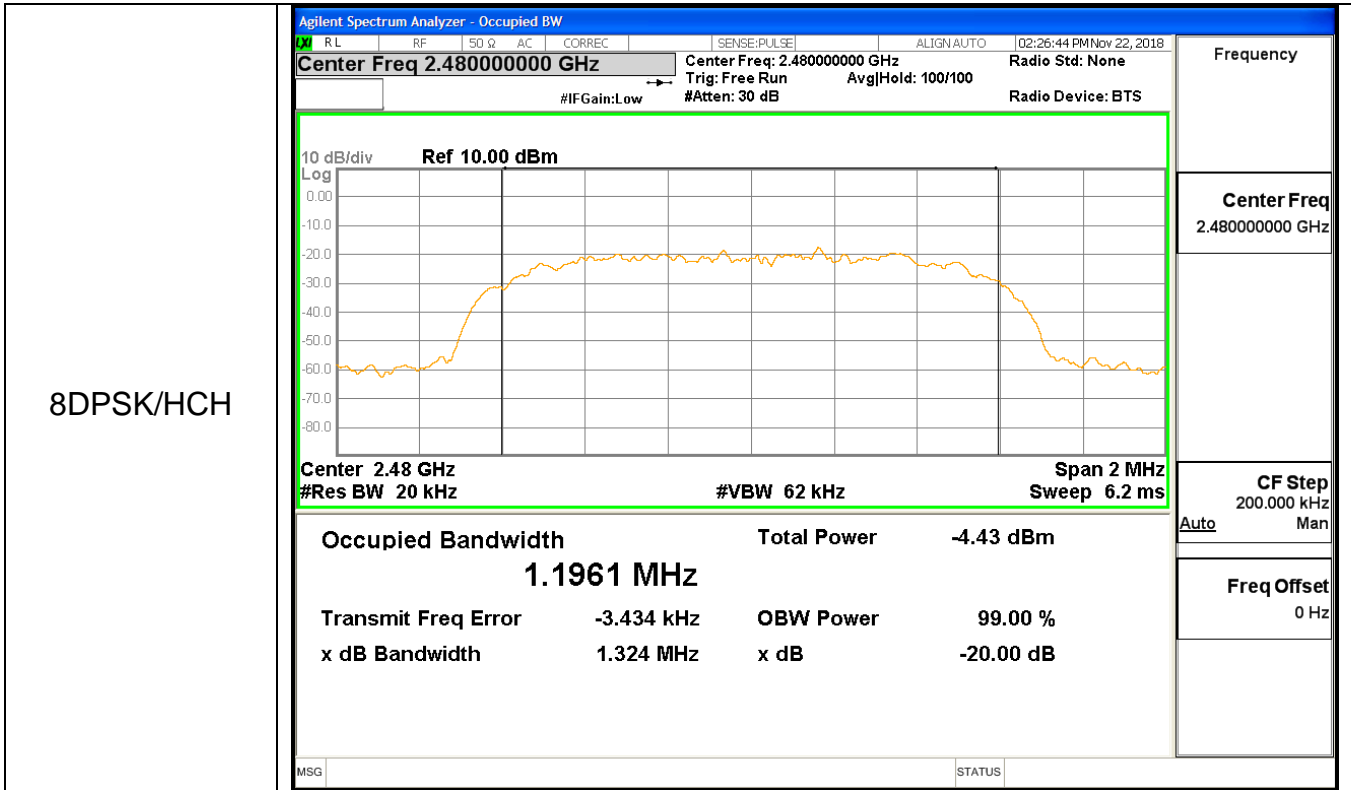
Frequency

Center Freq
2.48000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

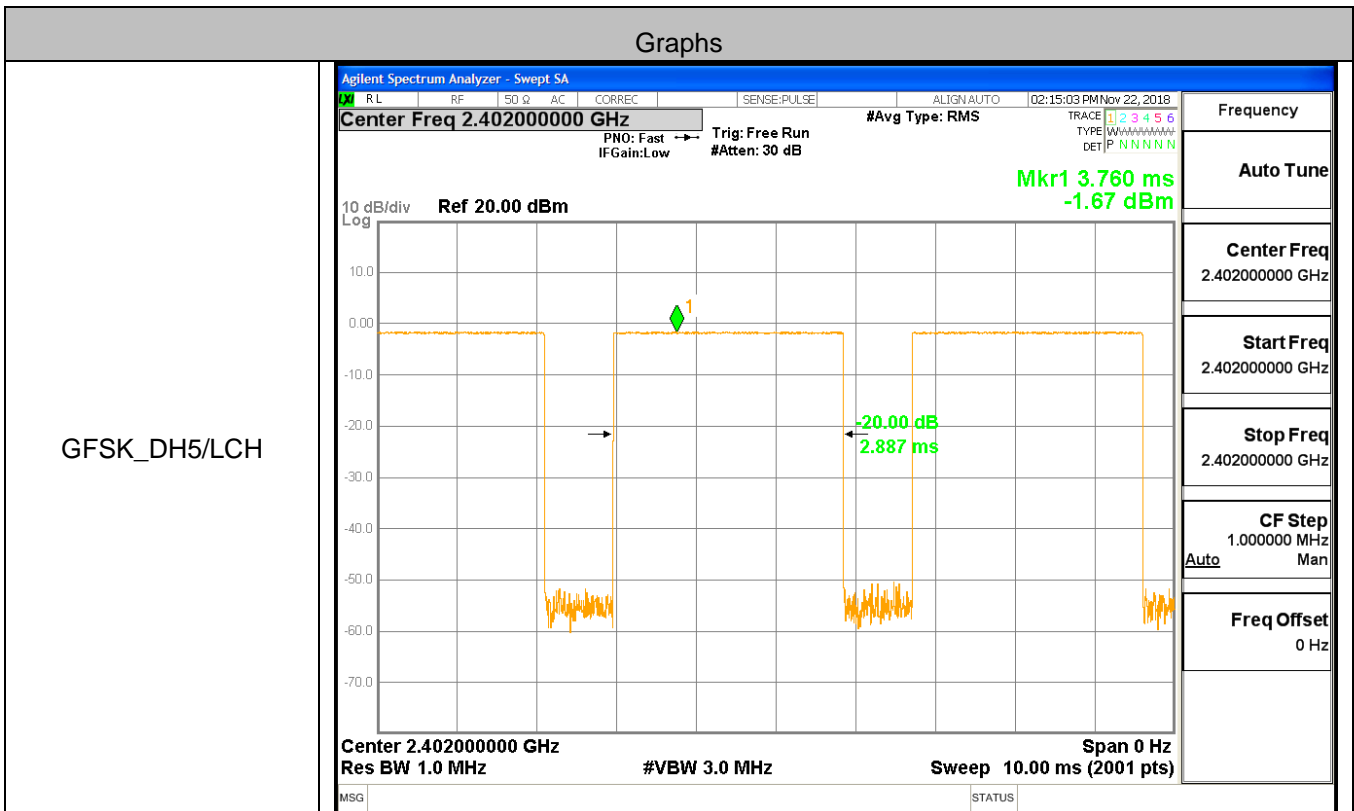


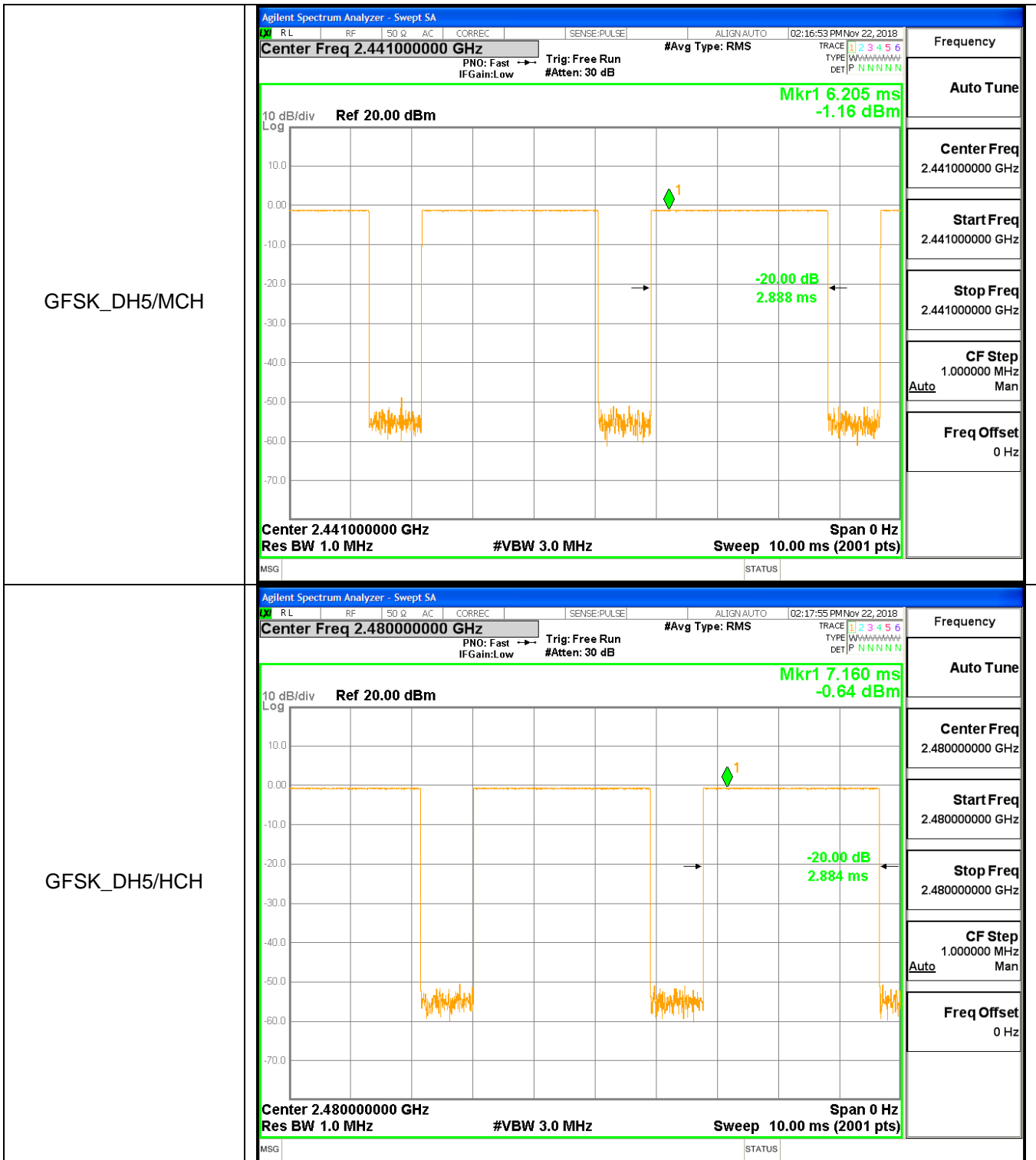


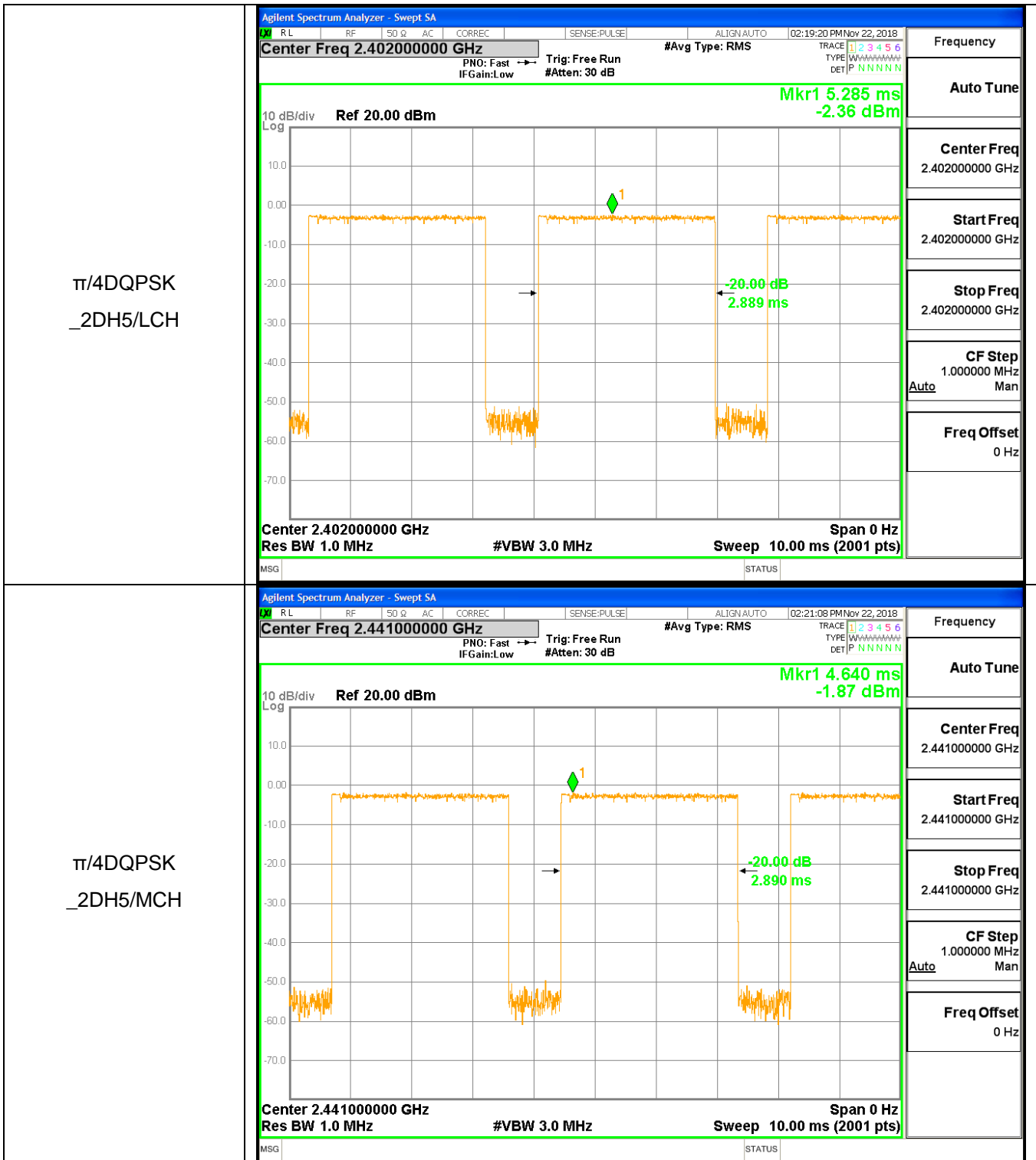
A.2 Dwell Time

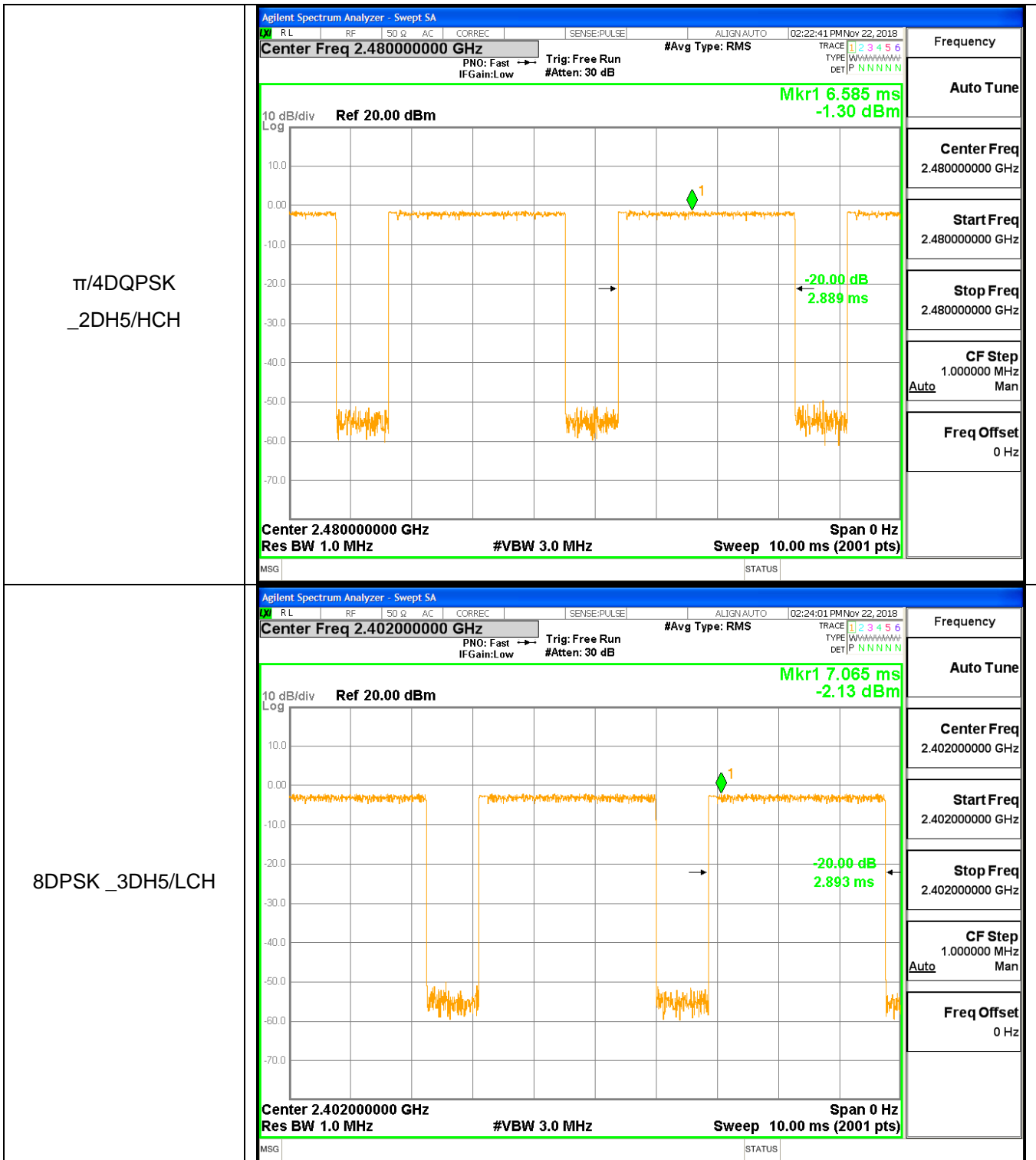
| Mode | Packet | Channel | Burst Width [s/hop/ch] | Total Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---------------|--------|---------|------------------------|--------------------|---------------|-----------|---------|
| GFSK | DH5 | LCH | 0.002887 | 106.7 | 0.308009 | 0.4 | PASS |
| GFSK | DH5 | MCH | 0.002888 | 106.7 | 0.308165 | 0.4 | PASS |
| GFSK | DH5 | HCH | 0.002884 | 106.7 | 0.307692 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | LCH | 0.002889 | 106.7 | 0.308221 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | MCH | 0.00289 | 106.7 | 0.308329 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | HCH | 0.002889 | 106.7 | 0.308224 | 0.4 | PASS |
| 8DPSK | 3DH5 | LCH | 0.002893 | 106.7 | 0.308722 | 0.4 | PASS |
| 8DPSK | 3DH5 | MCH | 0.002889 | 106.7 | 0.308228 | 0.4 | PASS |
| 8DPSK | 3DH5 | HCH | 0.002893 | 106.7 | 0.30873 | 0.4 | PASS |

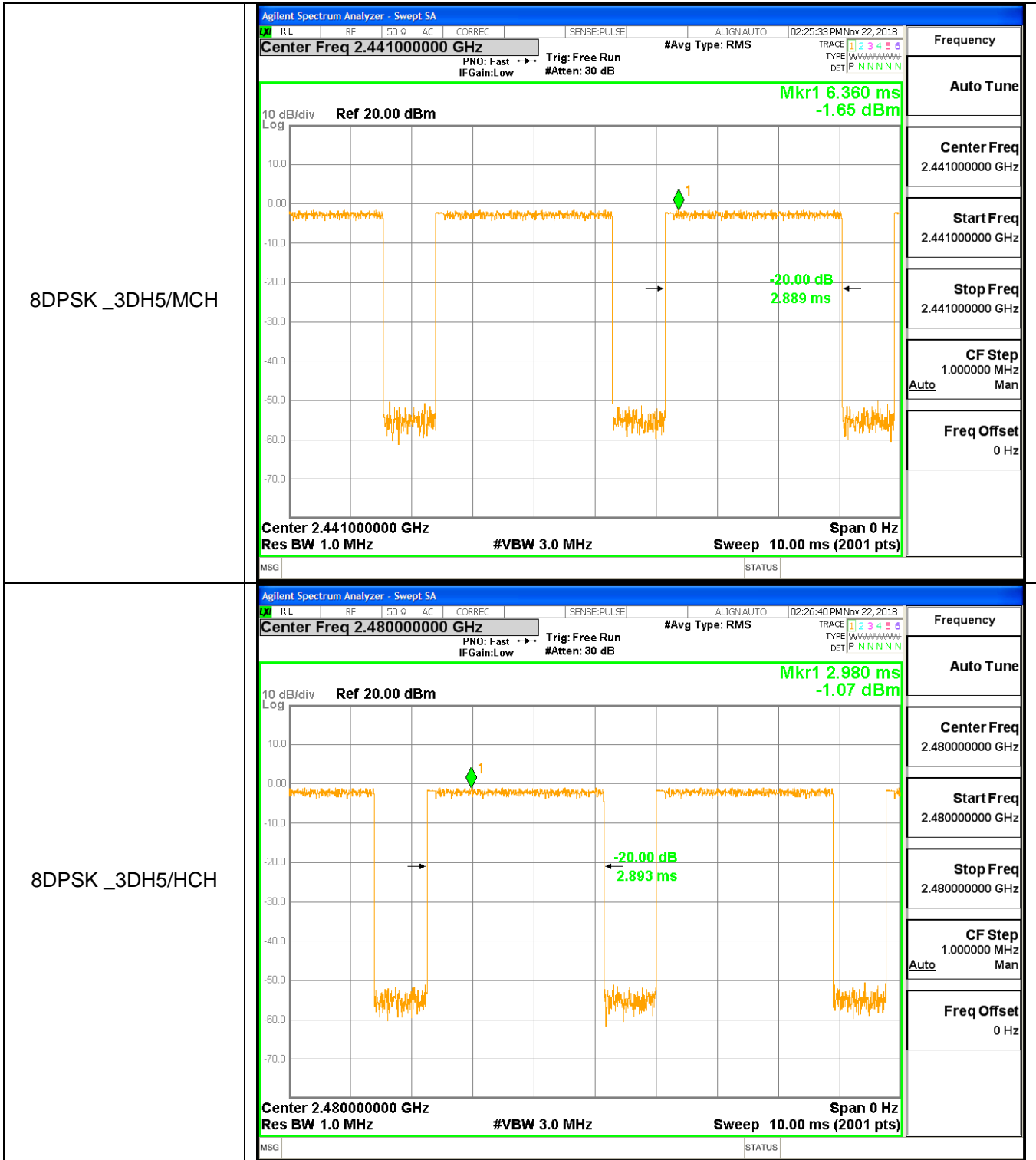
Test Graph







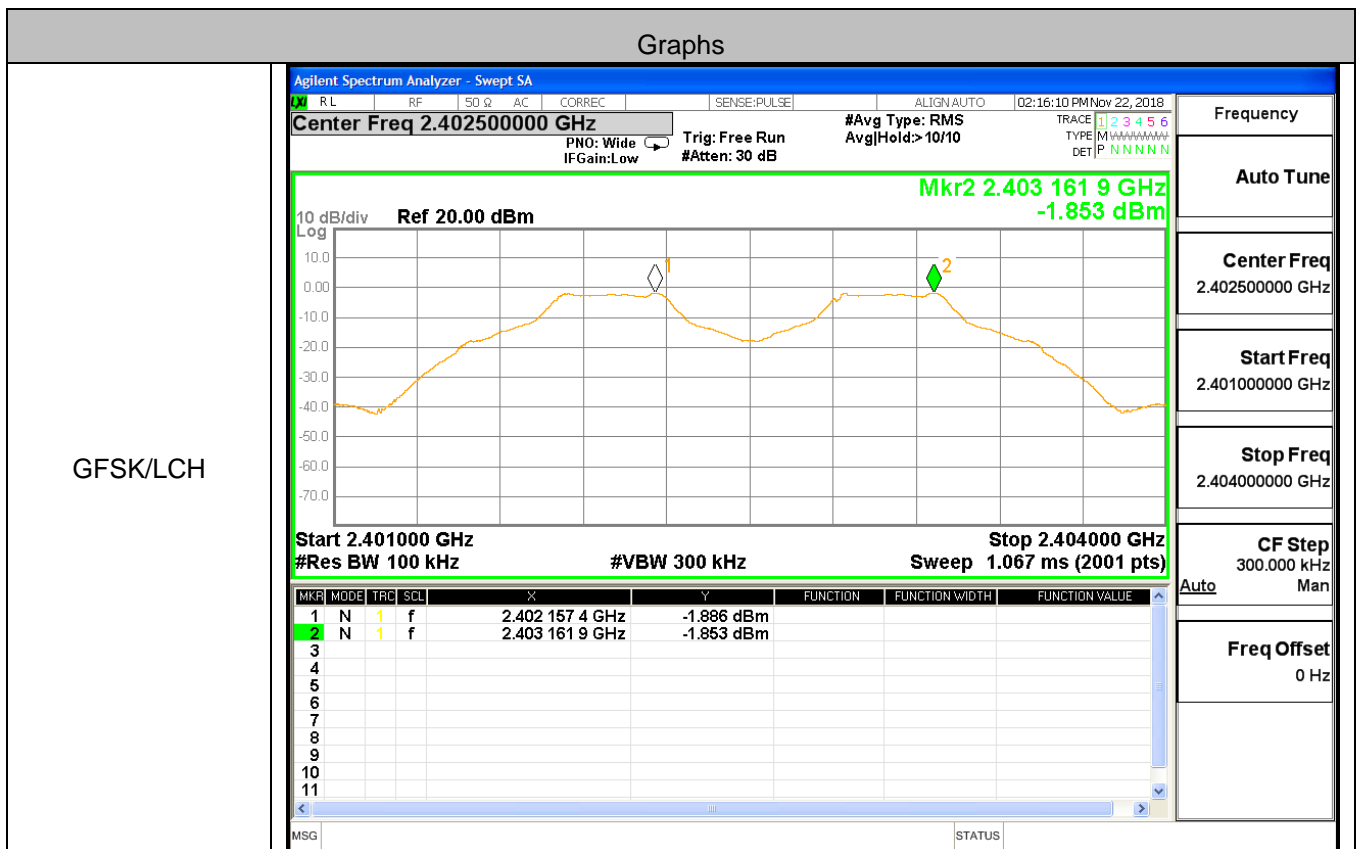




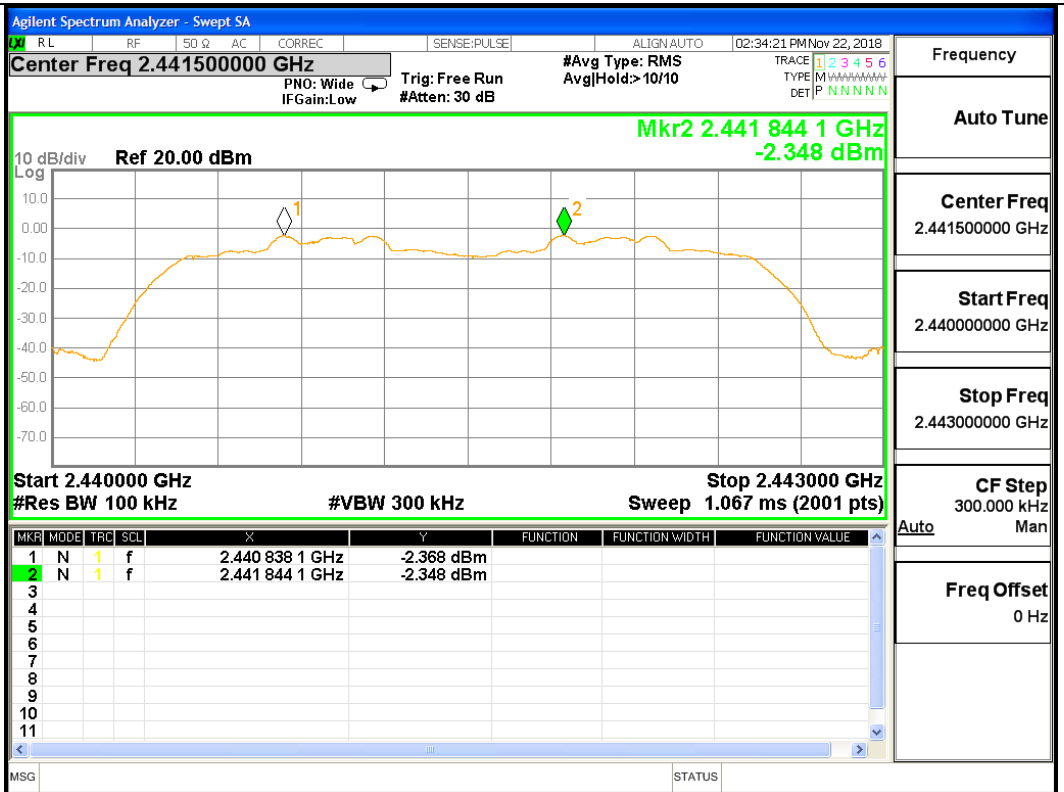
A.3 Carrier Frequency Separation

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK | LCH | 1.004 | 0.640 | PASS |
| GFSK | MCH | 1.004 | 0.641 | PASS |
| GFSK | HCH | 0.996 | 0.636 | PASS |
| $\pi/4$ DQPSK | LCH | 1.001 | 0.891 | PASS |
| $\pi/4$ DQPSK | MCH | 0.996 | 0.887 | PASS |
| $\pi/4$ DQPSK | HCH | 0.999 | 0.891 | PASS |
| 8DPSK | LCH | 0.997 | 0.891 | PASS |
| 8DPSK | MCH | 1.004 | 0.892 | PASS |
| 8DPSK | HCH | 1.004 | 0.883 | PASS |

Test Graph

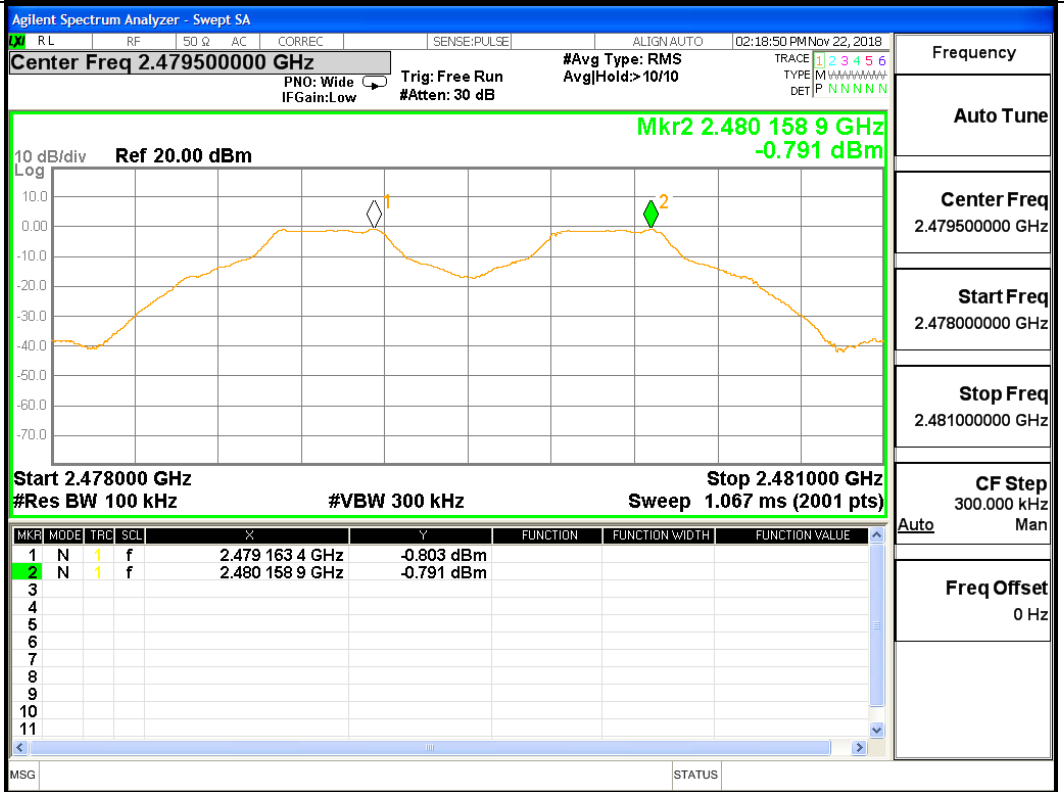


GFSK/MCH

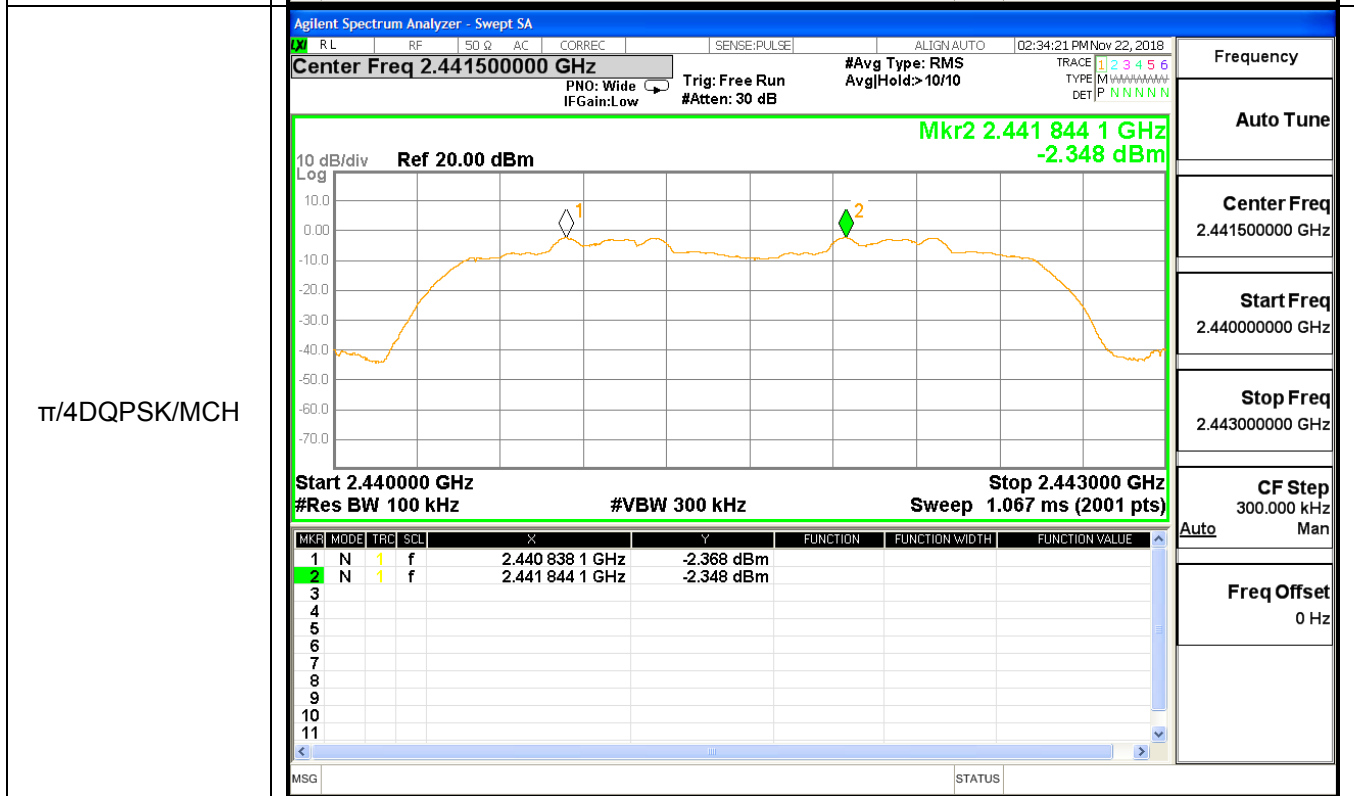
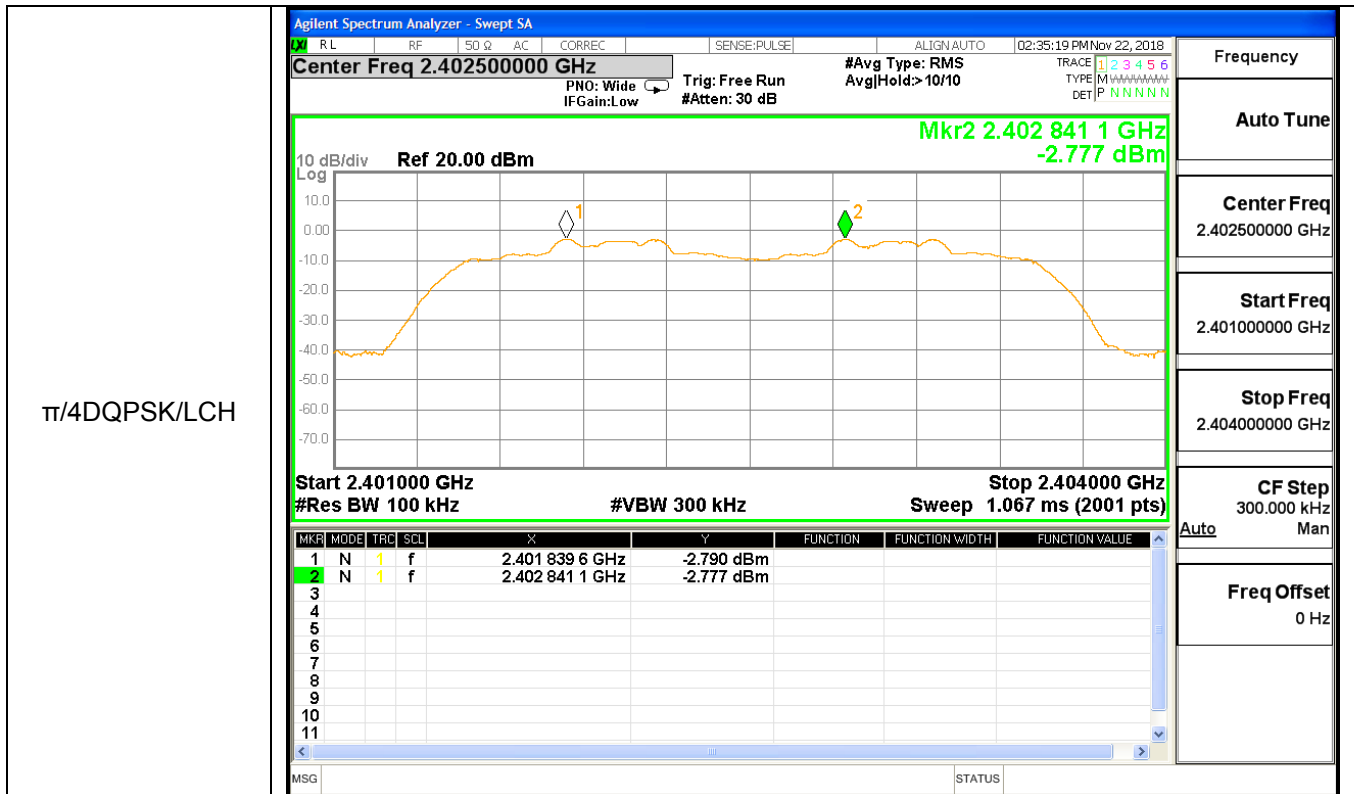


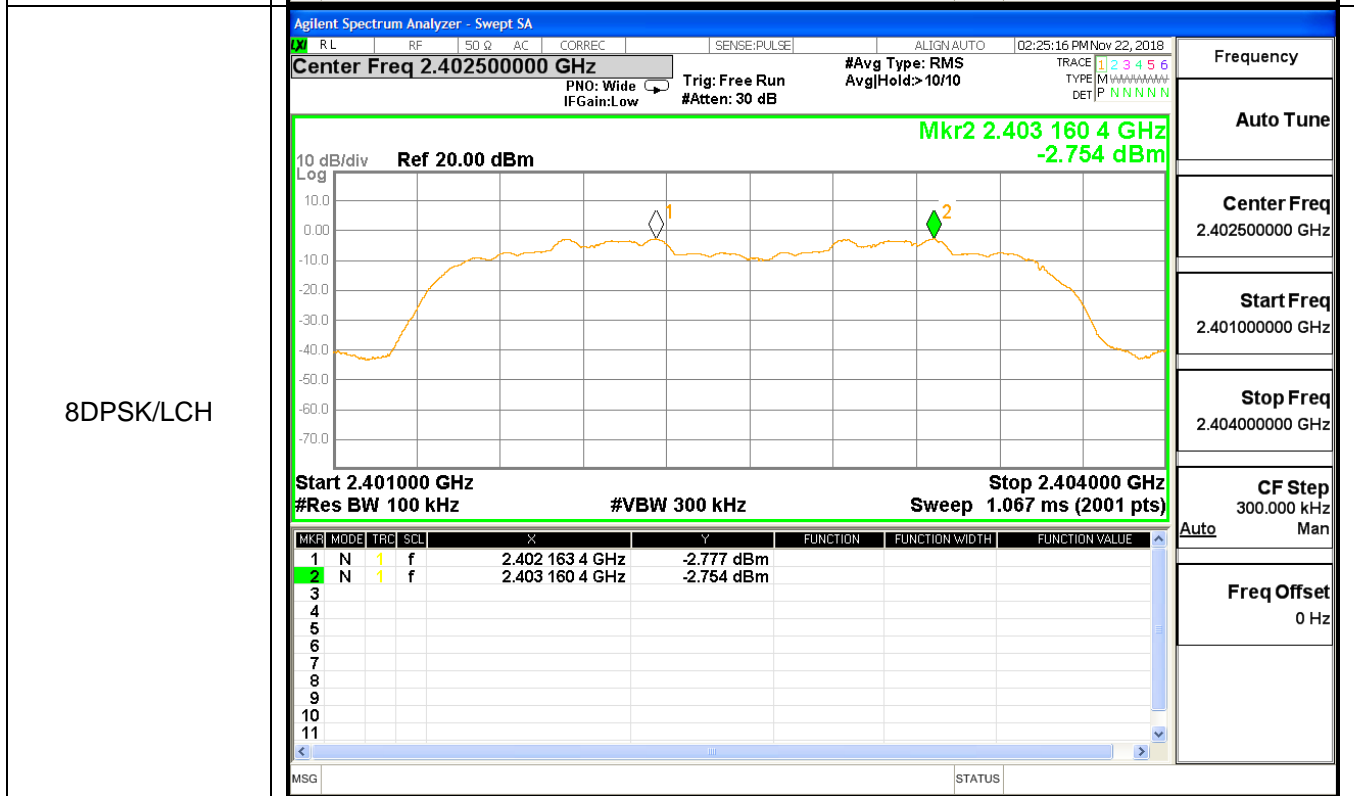
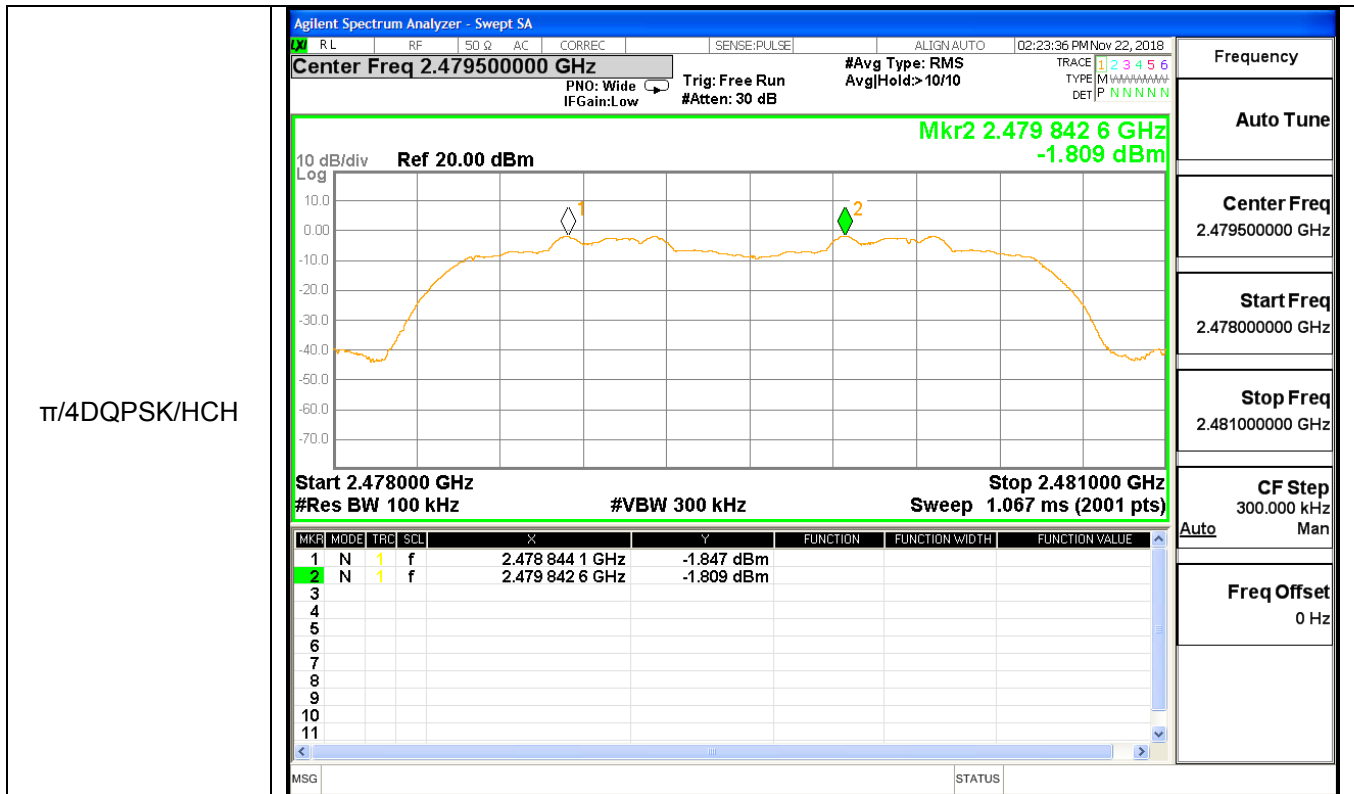
| |
|------------------------------------|
| Frequency |
| Auto Tune |
| Center Freq 2.441500000 GHz |
| Start Freq 2.440000000 GHz |
| Stop Freq 2.443000000 GHz |
| CF Step 300.000 kHz Auto Man |
| Freq Offset 0 Hz |

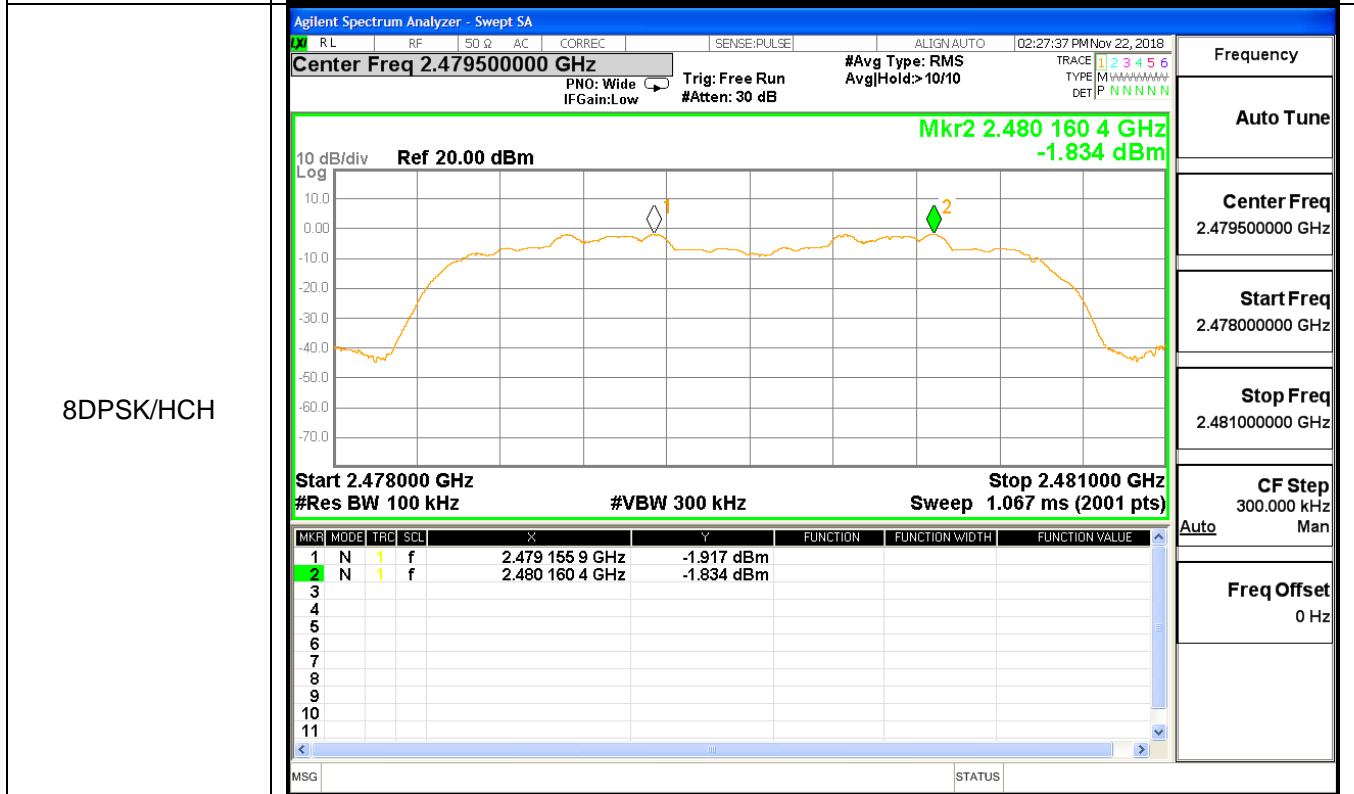
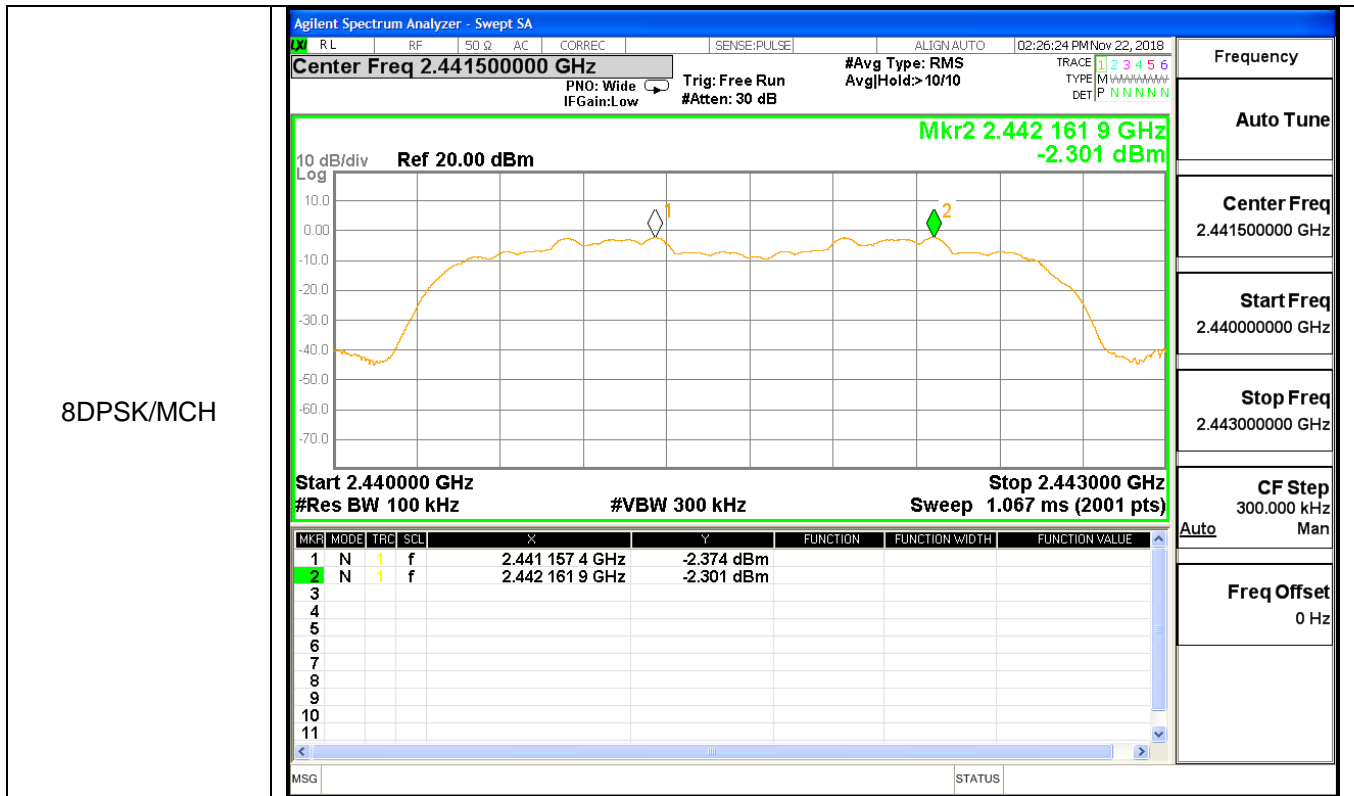
GFSK/HCH



| |
|------------------------------------|
| Frequency |
| Auto Tune |
| Center Freq 2.479500000 GHz |
| Start Freq 2.478000000 GHz |
| Stop Freq 2.481000000 GHz |
| CF Step 300.000 kHz Auto Man |
| Freq Offset 0 Hz |



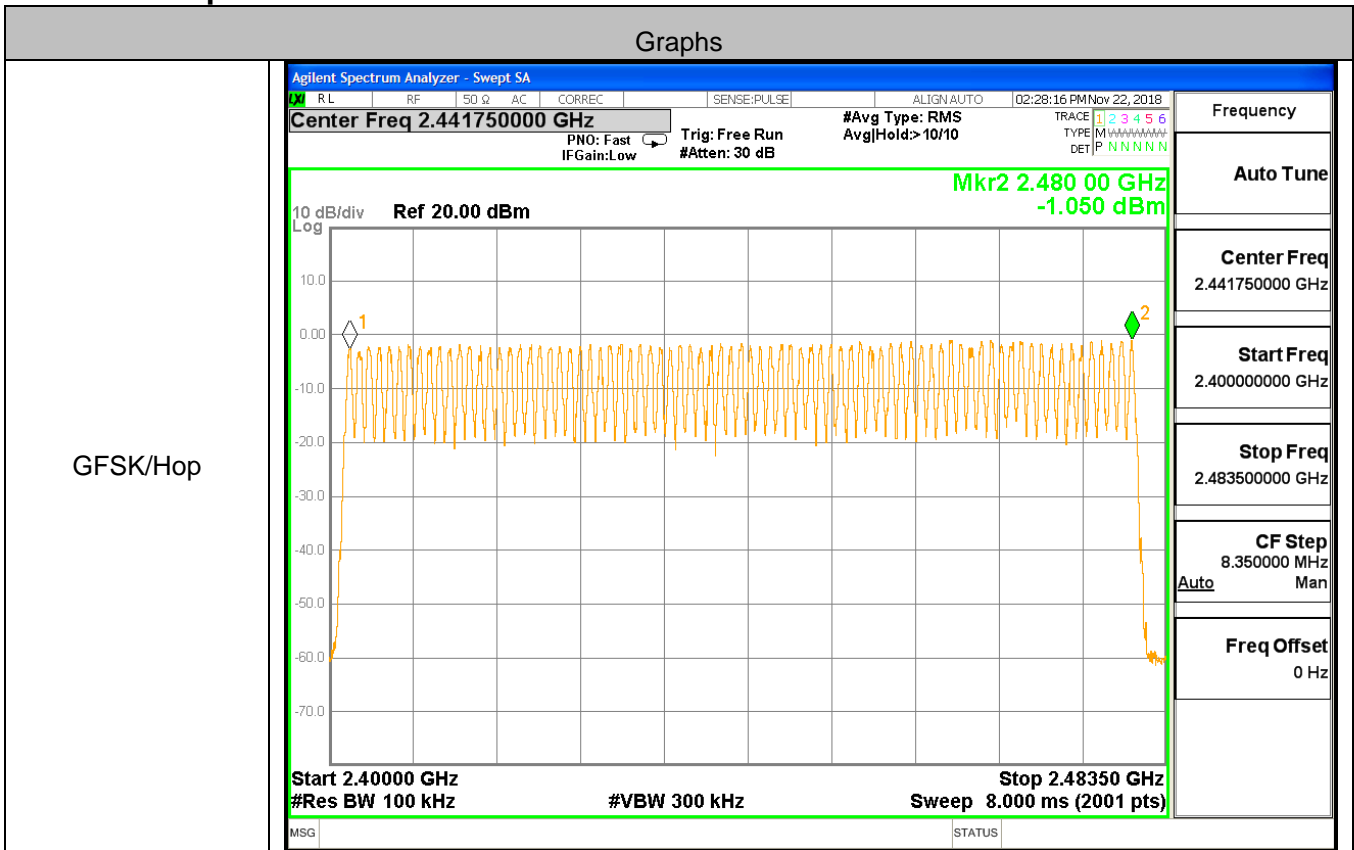


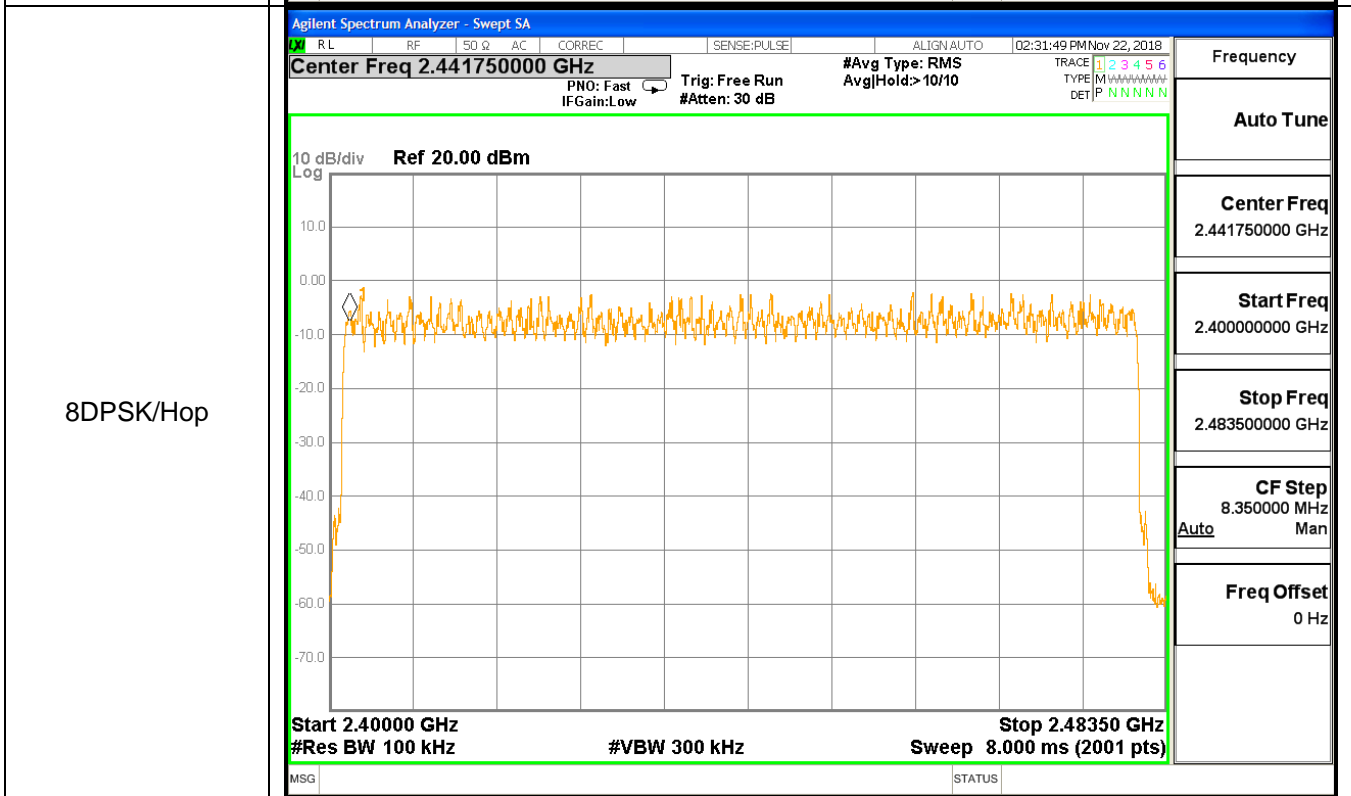
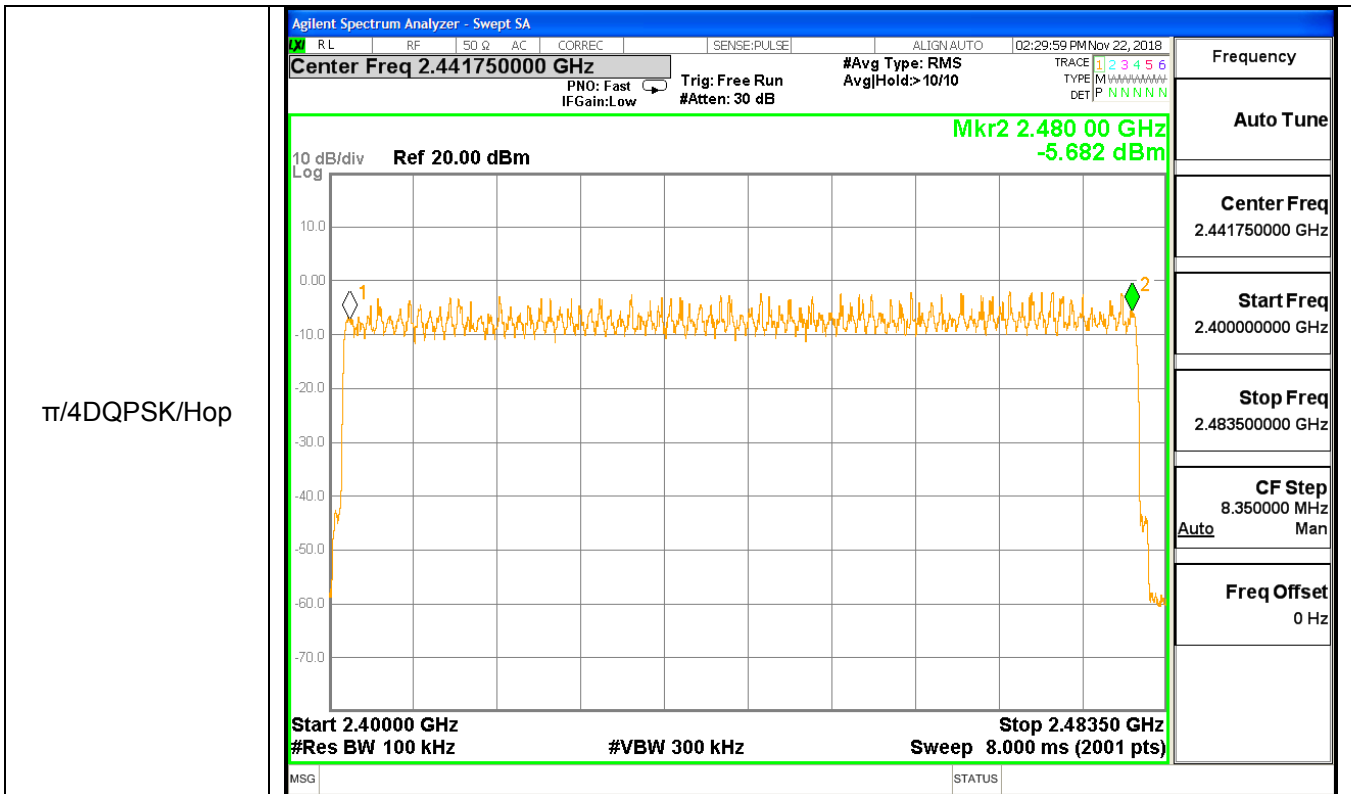


A.4 Hopping Channel Number

| 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 Graph





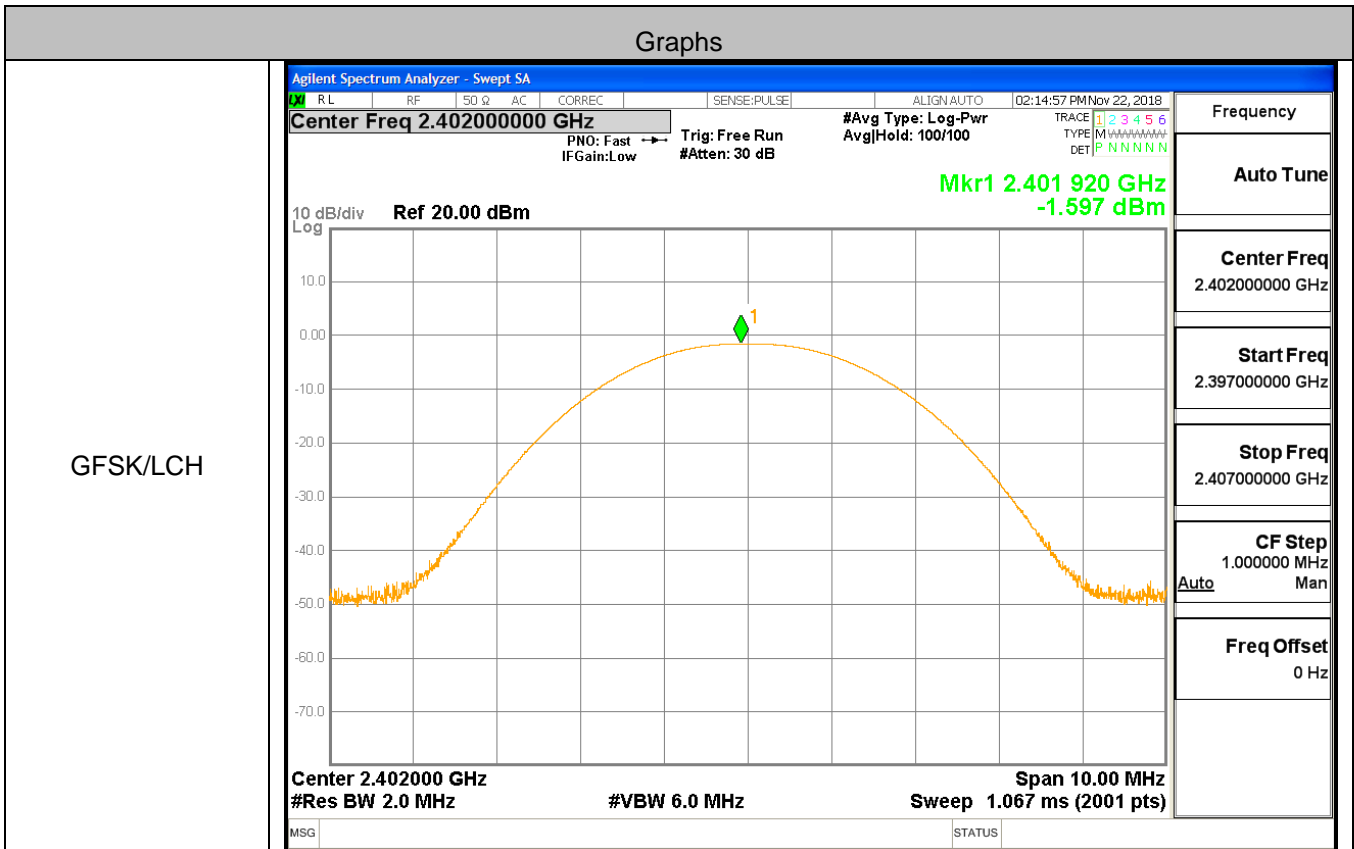
$\pi/4$ DQPSK/Hop

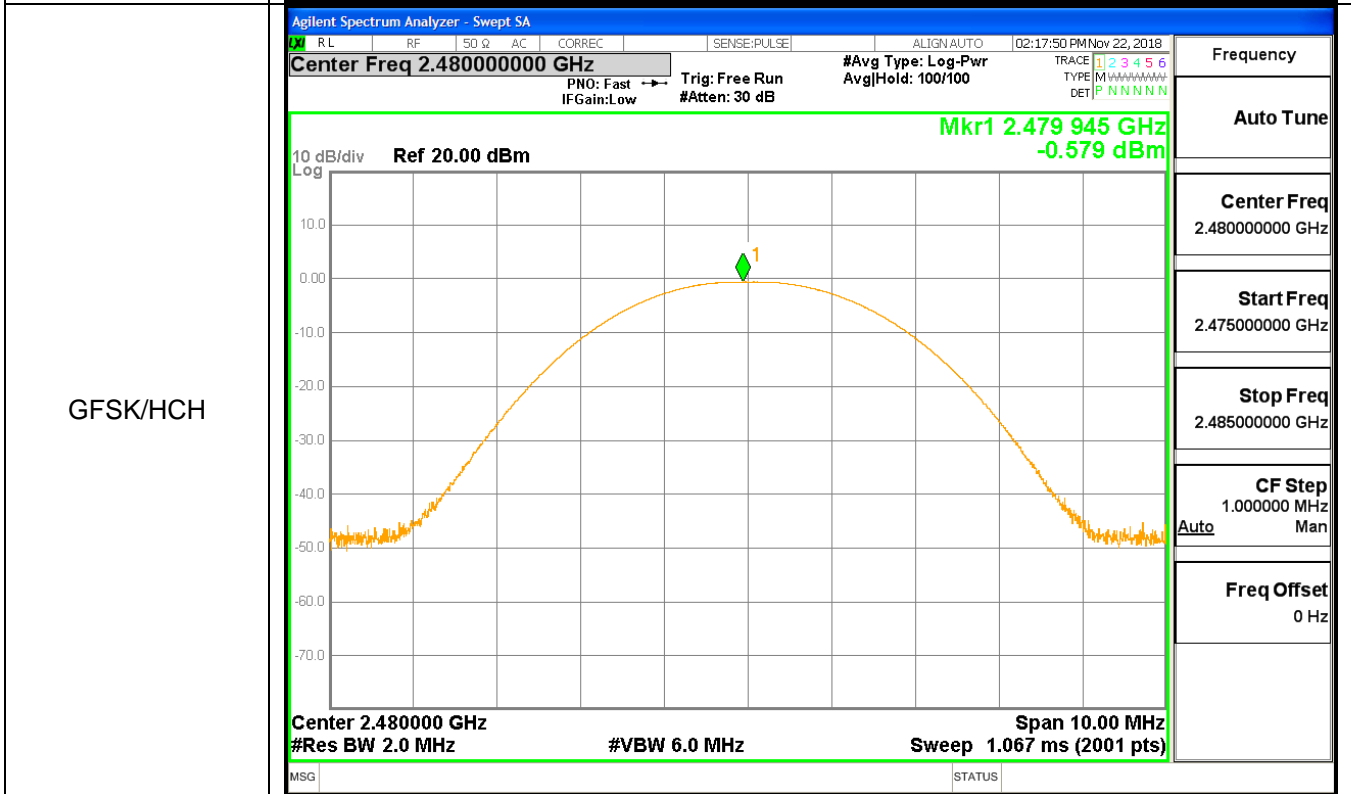
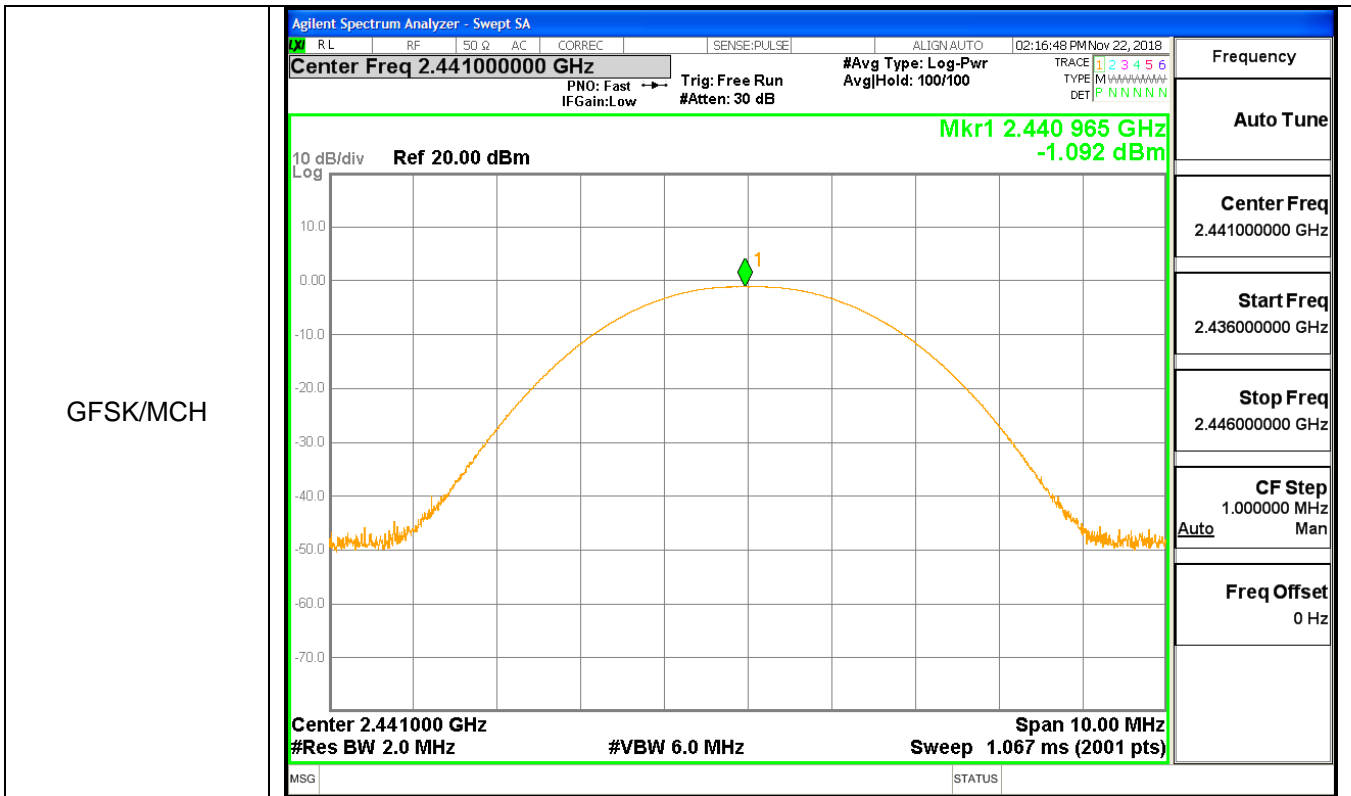
8DPSK/Hop

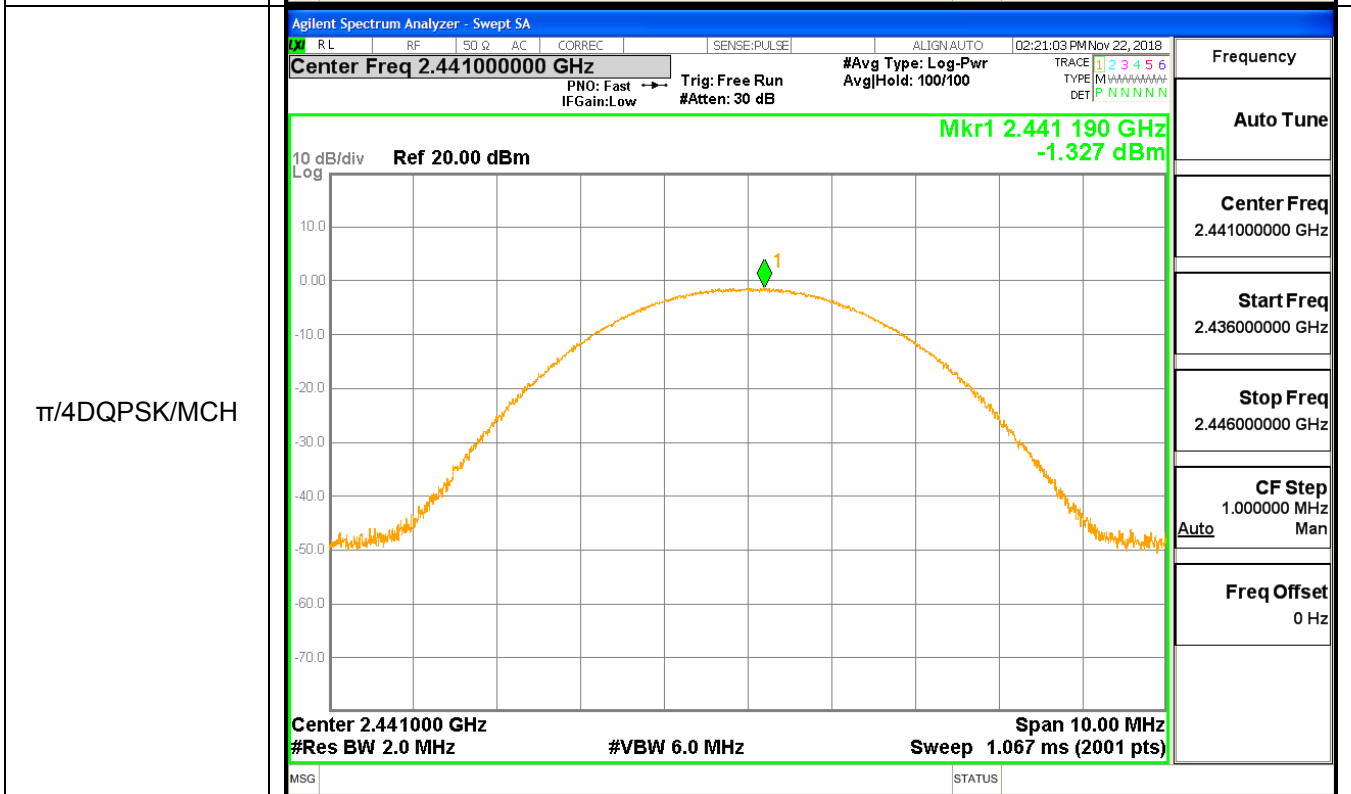
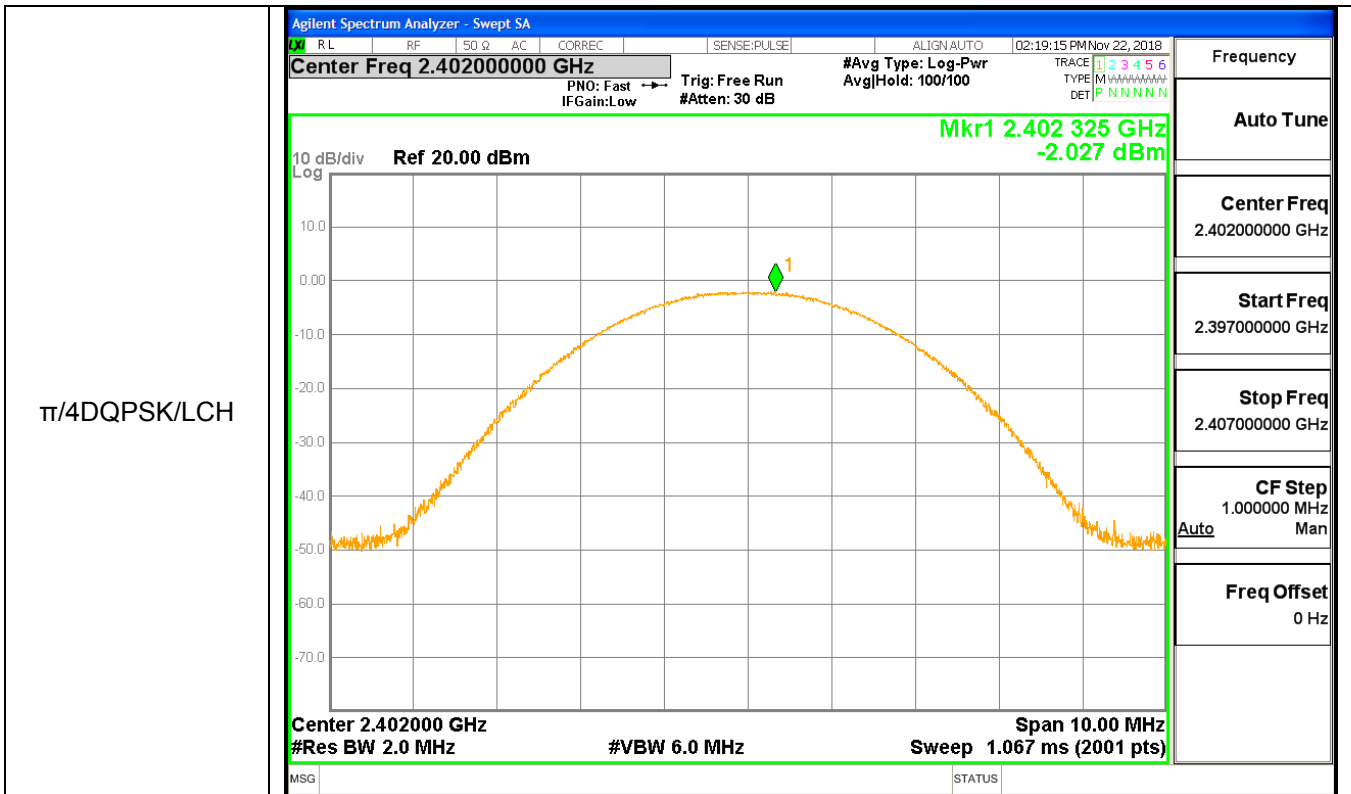
A.5 Conducted Peak Output Power

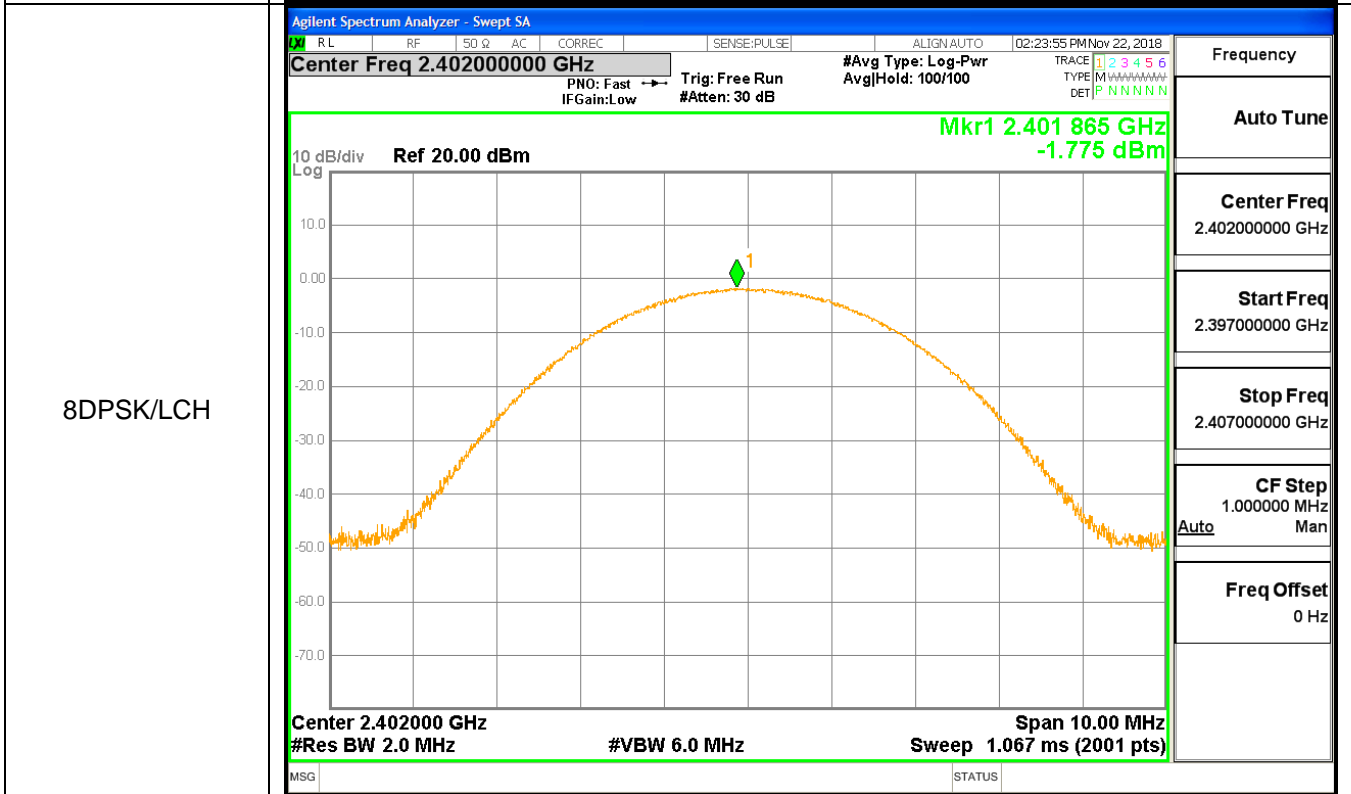
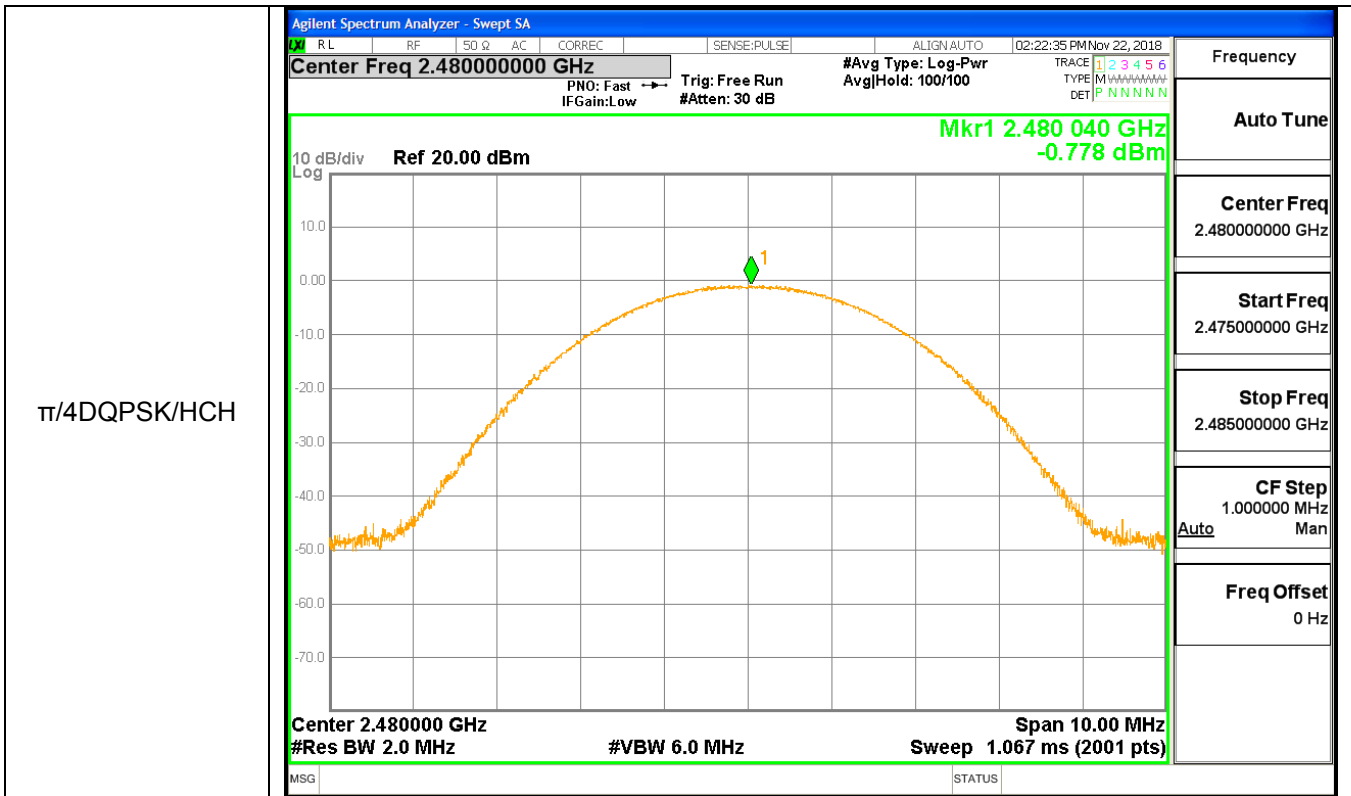
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK | LCH | -1.597 | 21 | PASS |
| GFSK | MCH | -1.092 | 21 | PASS |
| GFSK | HCH | -0.579 | 21 | PASS |
| $\pi/4$ DQPSK | LCH | -2.027 | 21 | PASS |
| $\pi/4$ DQPSK | MCH | -1.327 | 21 | PASS |
| $\pi/4$ DQPSK | HCH | -0.778 | 21 | PASS |
| 8DPSK | LCH | -1.775 | 21 | PASS |
| 8DPSK | MCH | -1.200 | 21 | PASS |
| 8DPSK | HCH | -0.623 | 21 | PASS |

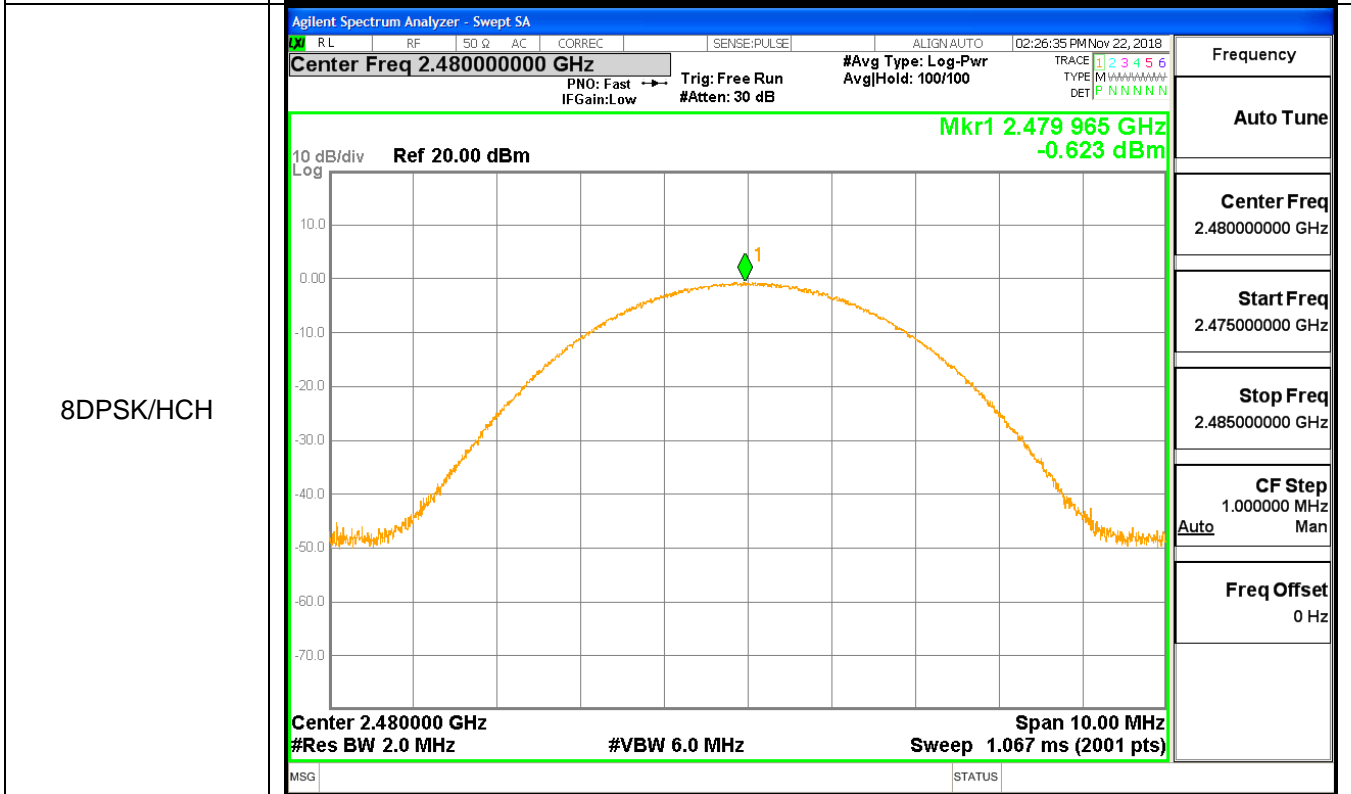
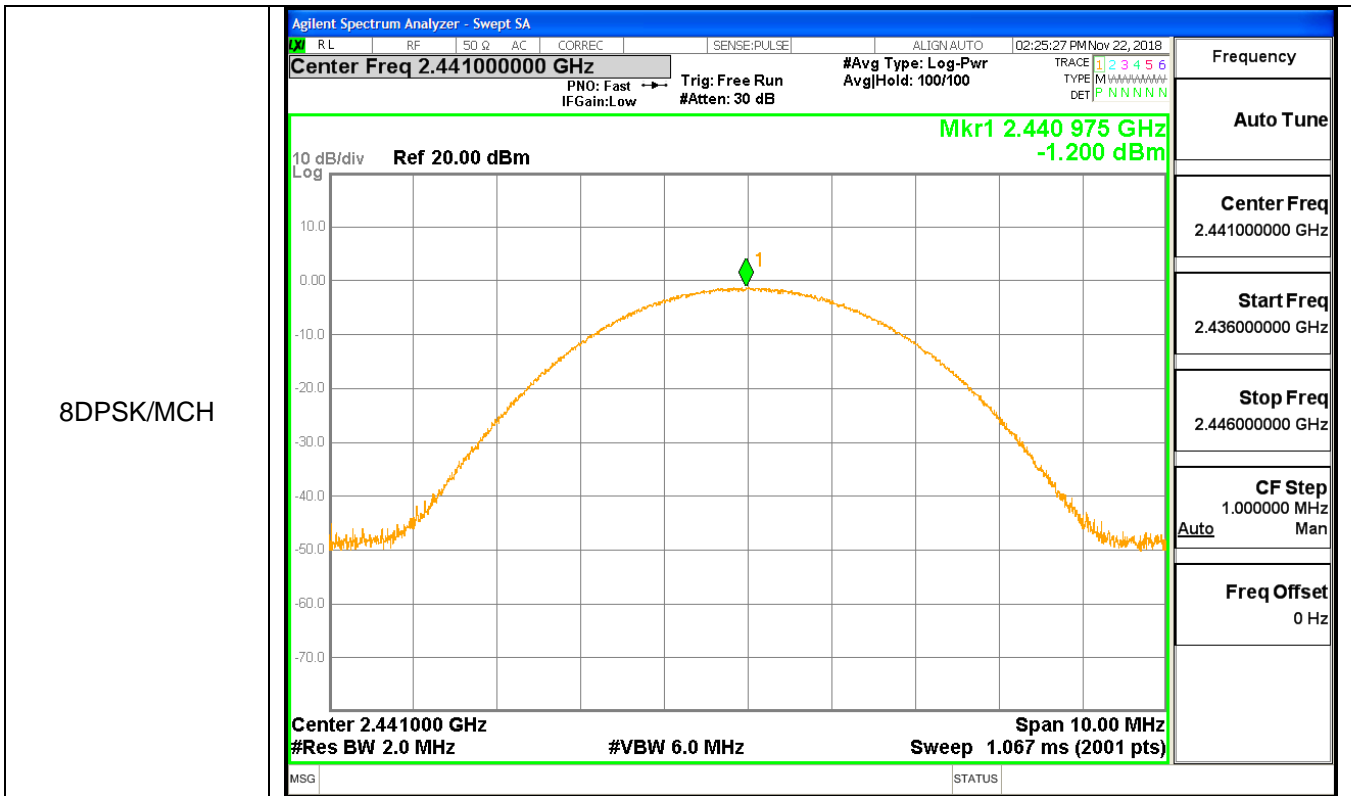
Test Graph











A.6 Band-edge for RF Conducted Emissions

| Type | Carrier Frequency(MHz) | Frequency(MHz) | Carrier Frequency Power [dBm] | Bandedge Peak(dBm) | Upper limit(dBm) | Conclusion |
|--------------|------------------------|----------------|-------------------------------|--------------------|------------------|------------|
| 1DH5 | 2402 | 2390 | -2.074 | -59.9 | -22.074 | Pass |
| 1DH5 | 2402 | 2400 | -2.074 | -59.43 | -22.074 | Pass |
| 1DH5-Hopping | 2402 | 2390 | -1.824 | -61.01 | -21.824 | Pass |
| 1DH5-Hopping | 2402 | 2400 | -1.824 | -60.45 | -21.824 | Pass |
| 1DH5 | 2480 | 2483.5 | -0.971 | -62.57 | -20.971 | Pass |
| 1DH5 | 2480 | 2500 | -0.971 | -61.54 | -20.971 | Pass |
| 1DH5-Hopping | 2480 | 2483.5 | -1.212 | -60.04 | -21.212 | Pass |
| 1DH5-Hopping | 2480 | 2500 | -1.212 | -60.11 | -21.212 | Pass |
| 2DH5 | 2402 | 2390 | -4.977 | -61.7 | -24.977 | Pass |
| 2DH5 | 2402 | 2400 | -4.977 | -57.4 | -24.977 | Pass |
| 2DH5-Hopping | 2480 | 2483.5 | -2.507 | -60.86 | -22.507 | Pass |
| 2DH5-Hopping | 2480 | 2500 | -2.507 | -60.45 | -22.507 | Pass |
| 2DH5 | 2480 | 2483.5 | -2.344 | -62.74 | -22.344 | Pass |
| 2DH5 | 2480 | 2500 | -2.344 | -62.91 | -22.344 | Pass |
| 2DH5-Hopping | 2402 | 2390 | -2.746 | -61.1 | -22.746 | Pass |
| 2DH5-Hopping | 2402 | 2400 | -2.746 | -59.85 | -22.746 | Pass |
| 3DH5 | 2402 | 2390 | -2.873 | -61.94 | -22.873 | Pass |
| 3DH5 | 2402 | 2400 | -2.928 | -60.86 | -22.928 | Pass |
| 3DH5-Hopping | 2402 | 2390 | -2.928 | -59.01 | -22.928 | Pass |
| 3DH5-Hopping | 2402 | 2400 | -2.873 | -58.16 | -22.873 | Pass |
| 3DH5 | 2480 | 2483.5 | -1.808 | -61.29 | -21.808 | Pass |
| 3DH5 | 2480 | 2500 | -1.808 | -61.72 | -21.808 | Pass |
| 3DH5-Hopping | 2480 | 2483.5 | -2.07 | -60.32 | -22.07 | Pass |
| 3DH5-Hopping | 2480 | 2500 | -2.07 | -58.39 | -22.07 | Pass |

Test Graph

Graphs

GFSK/LCH/No Hop

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.356750000 GHz

Ref 20.00 dBm

Mkr2 2.400 00 GHz -59.430 dBm

Start 2.31000 GHz Stop 2.40350 GHz

#Res BW 100 kHz #VBW 300 kHz Sweep 9.067 ms (2001 pts)

| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|-----|------|-----|-----|--------------|-------------|----------|----------------|----------------|
| 1 | N | 1 | f | 2.390 00 GHz | -59.896 dBm | | | |
| 2 | N | 1 | f | 2.400 00 GHz | -59.430 dBm | | | |
| 3 | N | 1 | f | 2.402 05 GHz | -2.074 dBm | | | |

Frequency

Auto Tune

Center Freq
2.356750000 GHz

Start Freq
2.310000000 GHz

Stop Freq
2.403500000 GHz

CF Step
9.350000 MHz

Freq Offset
0 Hz

GFSK/LCH/Hop

Agilent Spectrum Analyzer - Swept SA

Center Freq 2.400000000 GHz

Ref 20.00 dBm

Mkr2 2.400 00 GHz -60.448 dBm

Start 2.37000 GHz Stop 2.43000 GHz

#Res BW 100 kHz #VBW 300 kHz Sweep 5.867 ms (2001 pts)

| MKR | MODE | TRC | SCL | X | Y | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|-----|------|-----|-----|--------------|-------------|----------|----------------|----------------|
| 1 | N | 1 | f | 2.390 00 GHz | -61.014 dBm | | | |
| 2 | N | 1 | f | 2.400 00 GHz | -60.448 dBm | | | |
| 3 | N | 1 | f | 2.419 17 GHz | -1.824 dBm | | | |

Frequency

Auto Tune

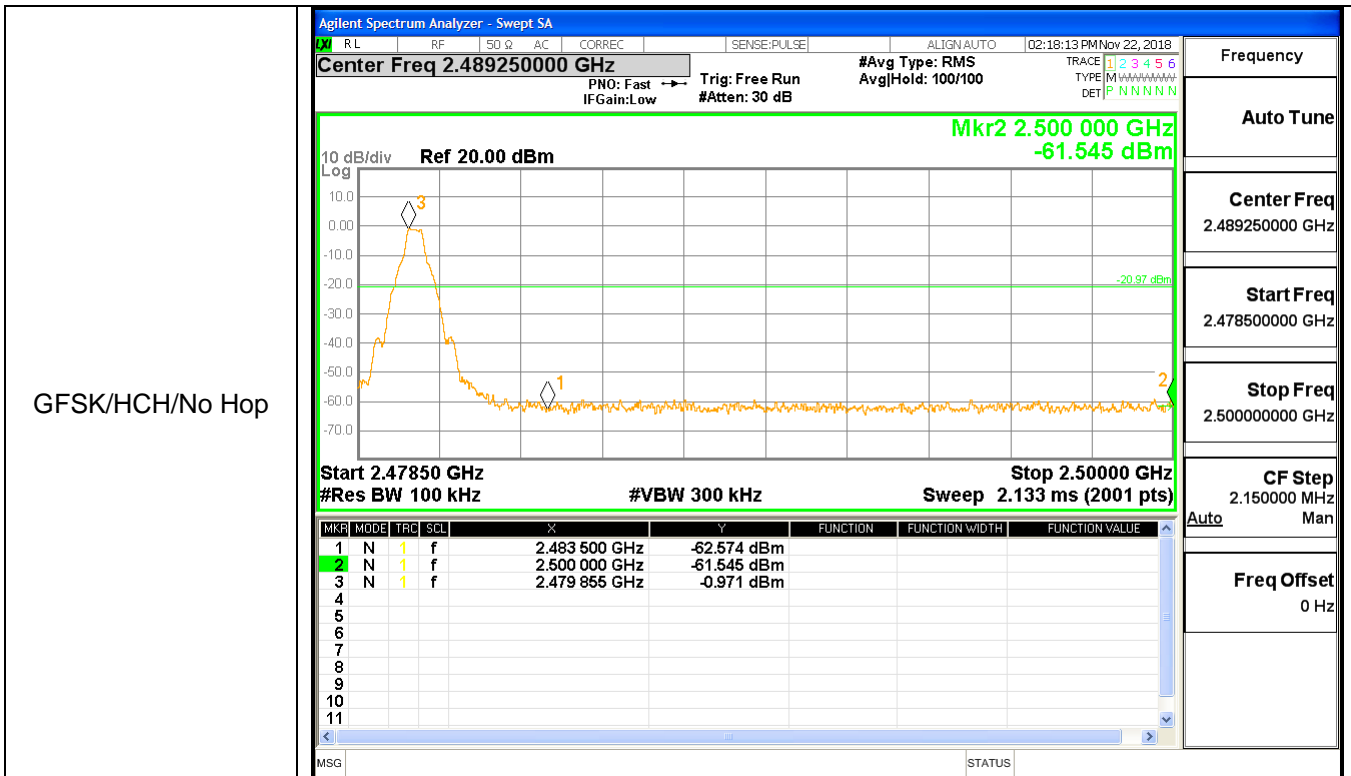
Center Freq
2.400000000 GHz

Start Freq
2.370000000 GHz

Stop Freq
2.430000000 GHz

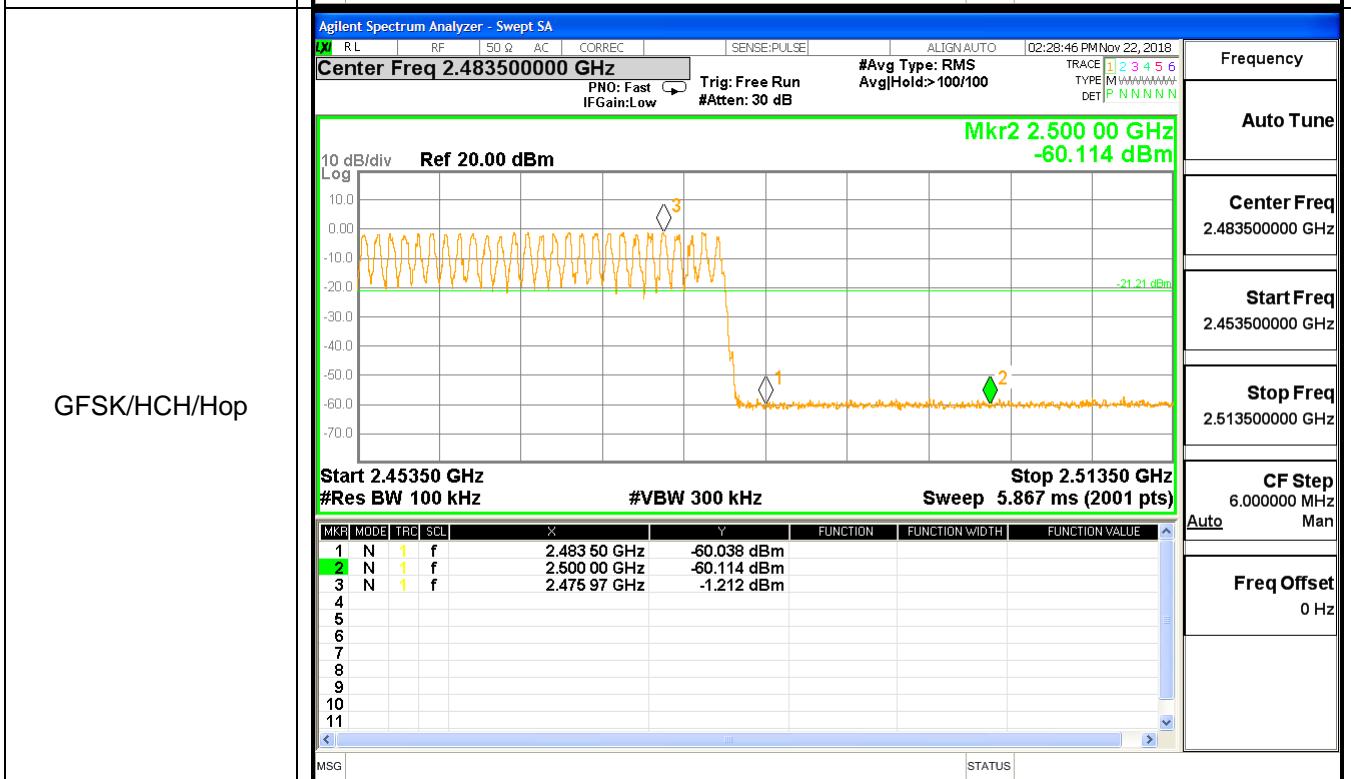
CF Step
6.000000 MHz

Freq Offset
0 Hz



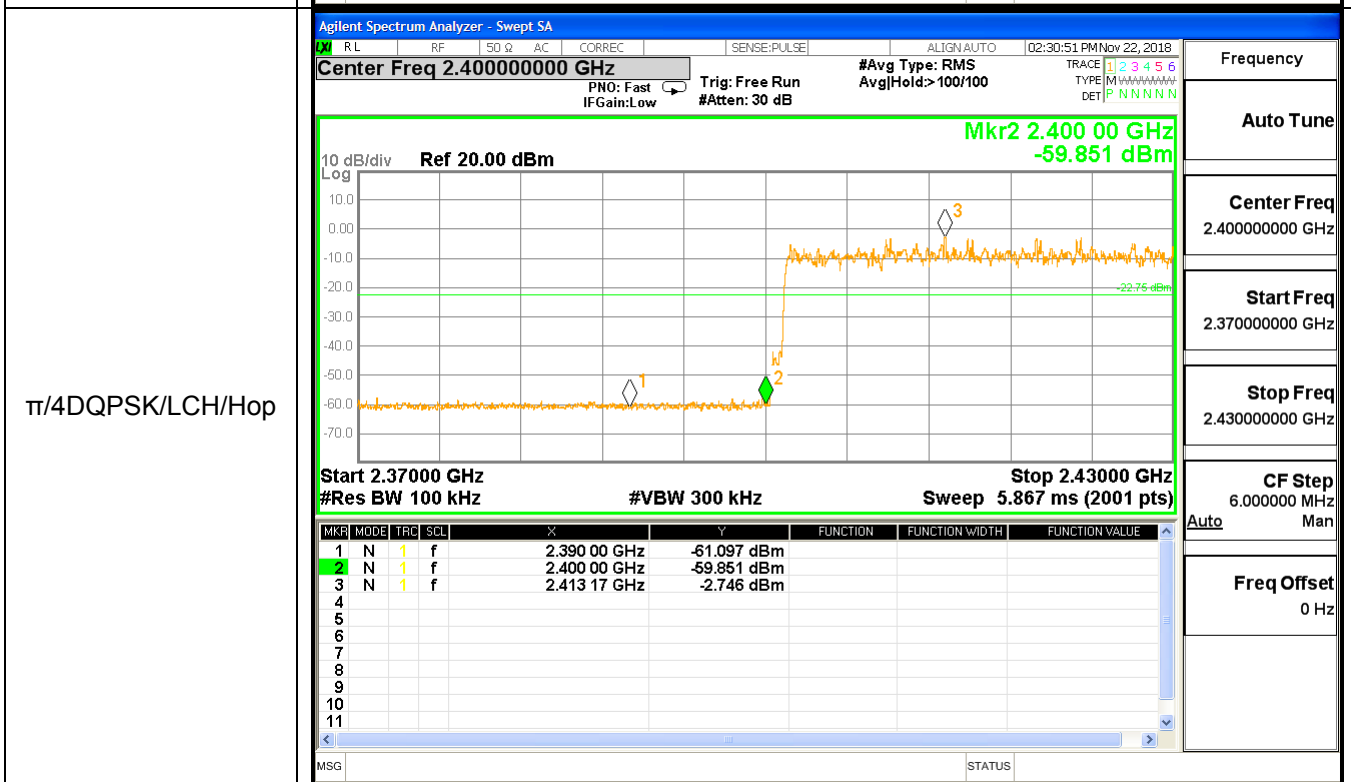
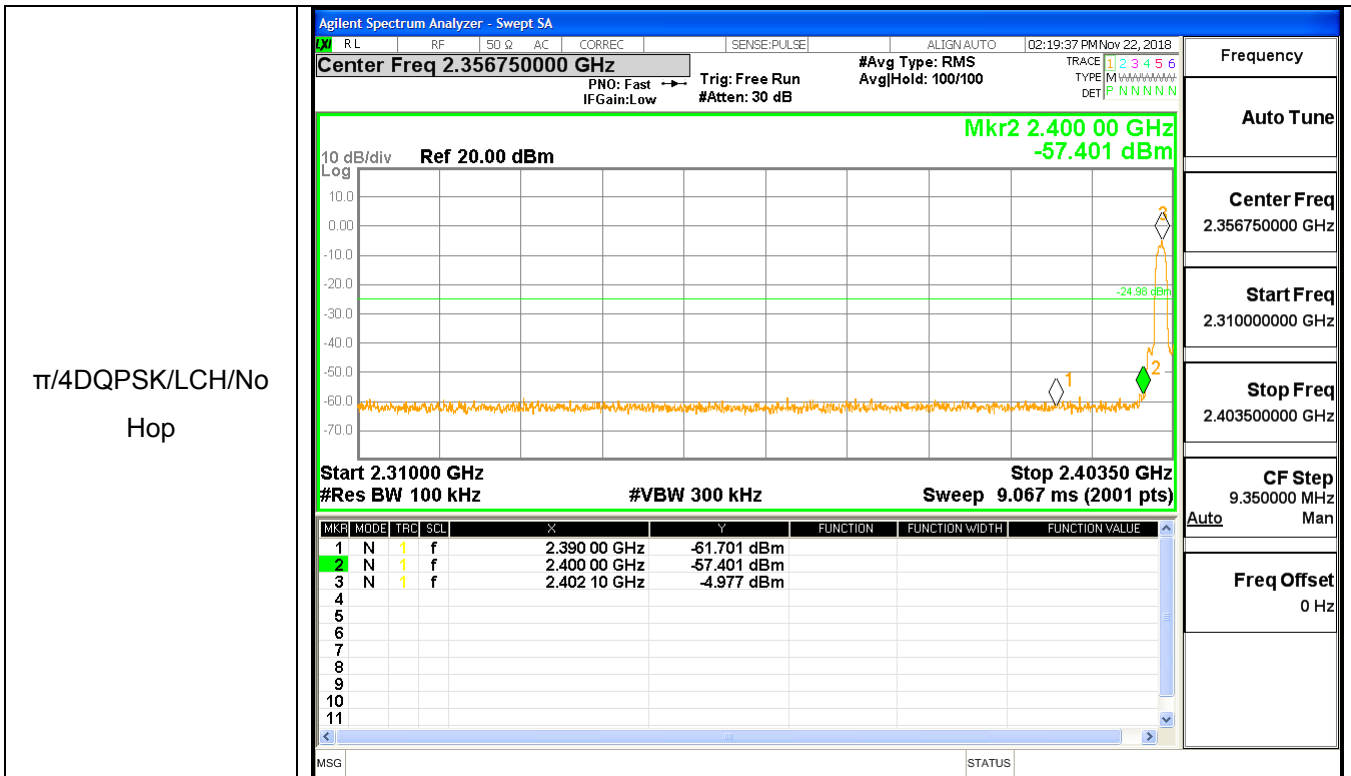
GFSK/HCH/No Hop

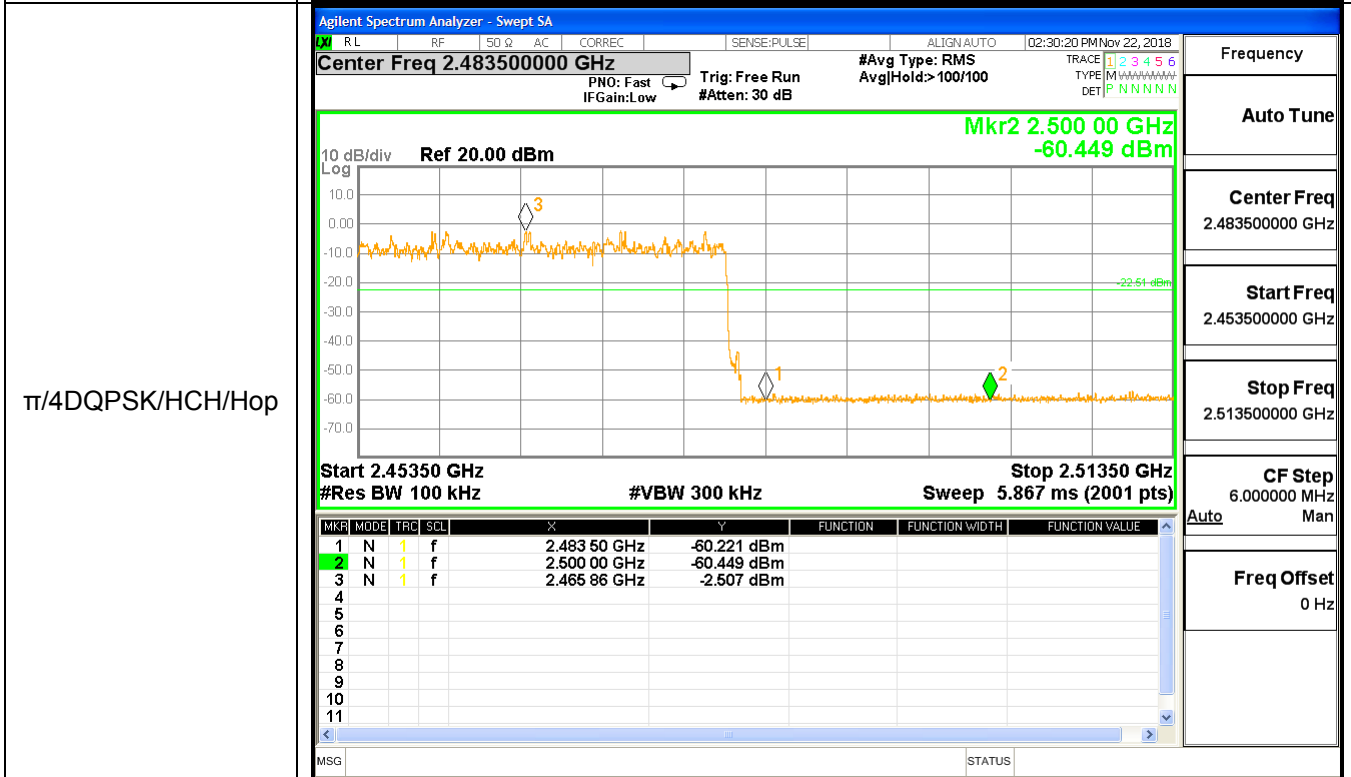
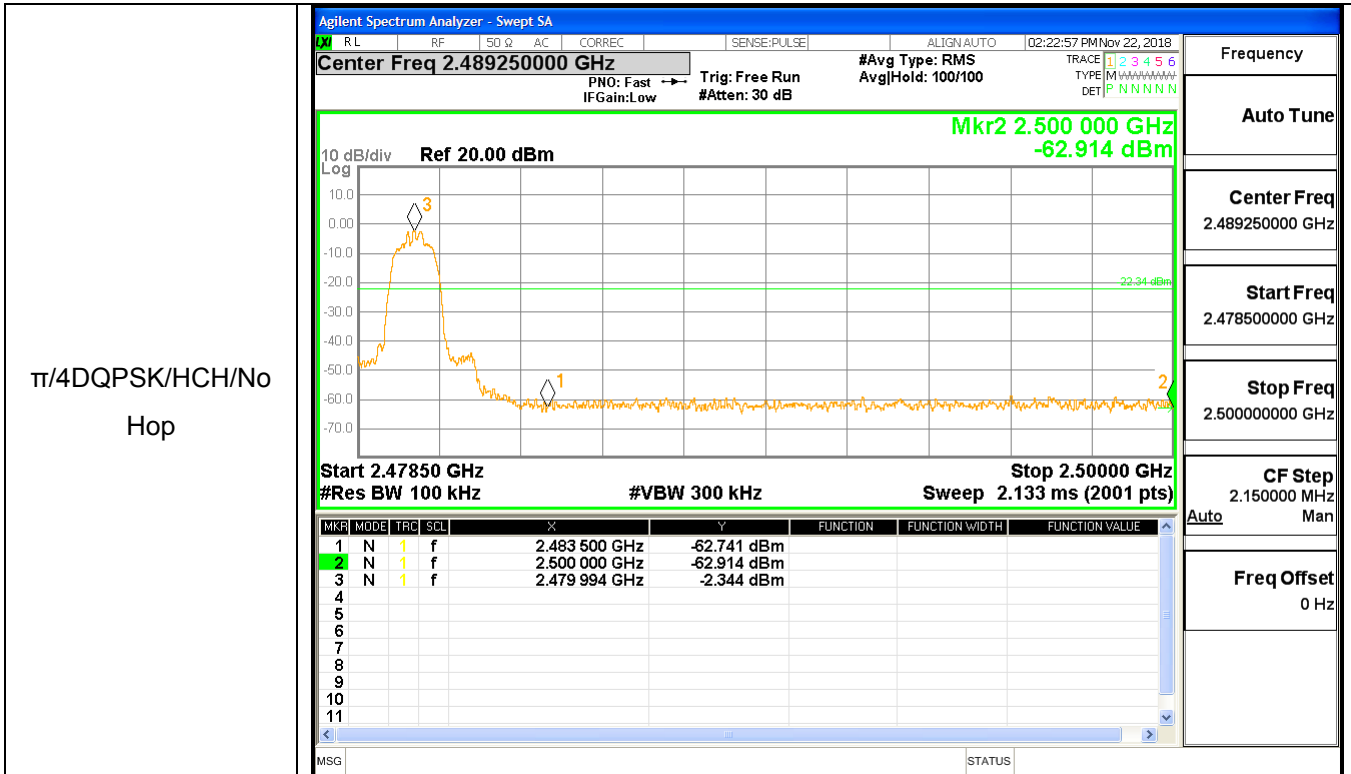
| |
|--------------------------------|
| Frequency |
| Auto Tune |
| Center Freq 2.489250000 GHz |
| Start Freq 2.478500000 GHz |
| Stop Freq 2.500000000 GHz |
| CF Step 2.150000 MHz |
| Auto Man |
| Freq Offset 0 Hz |

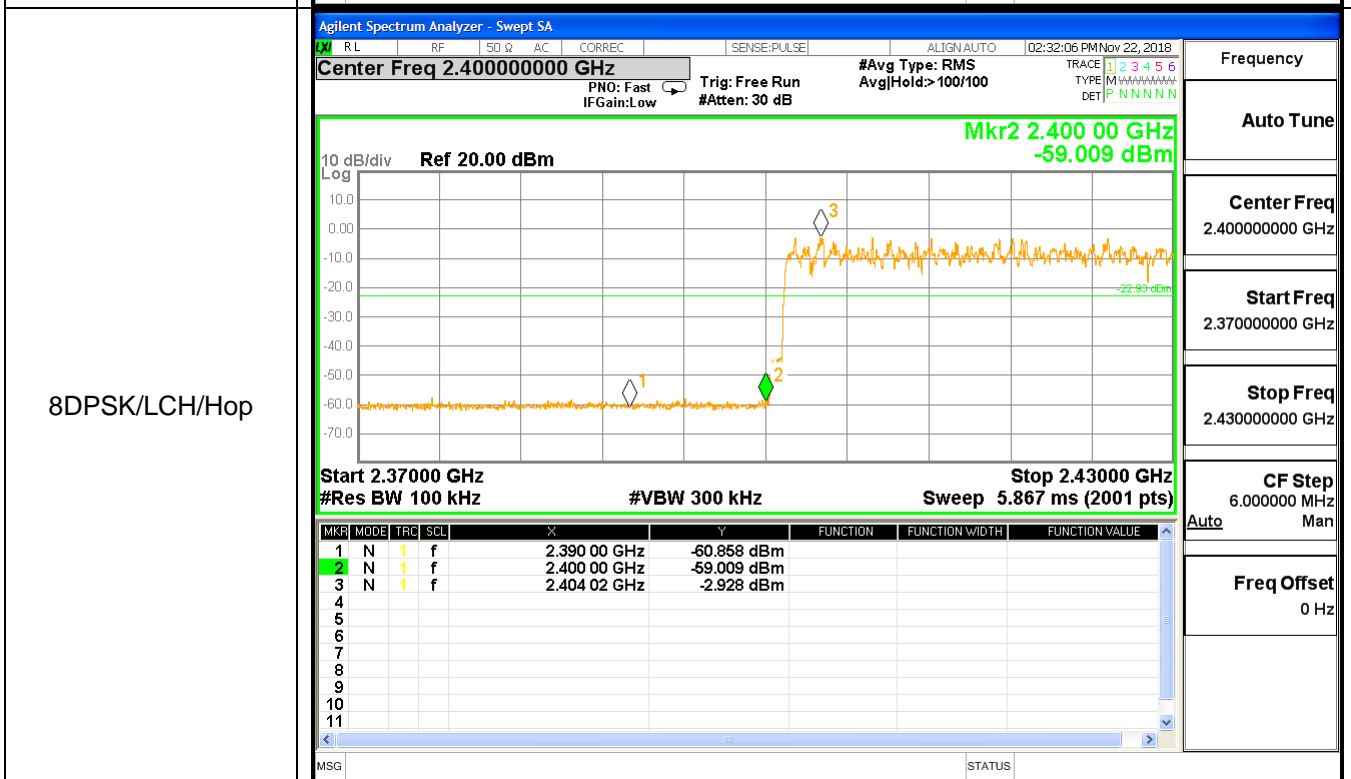
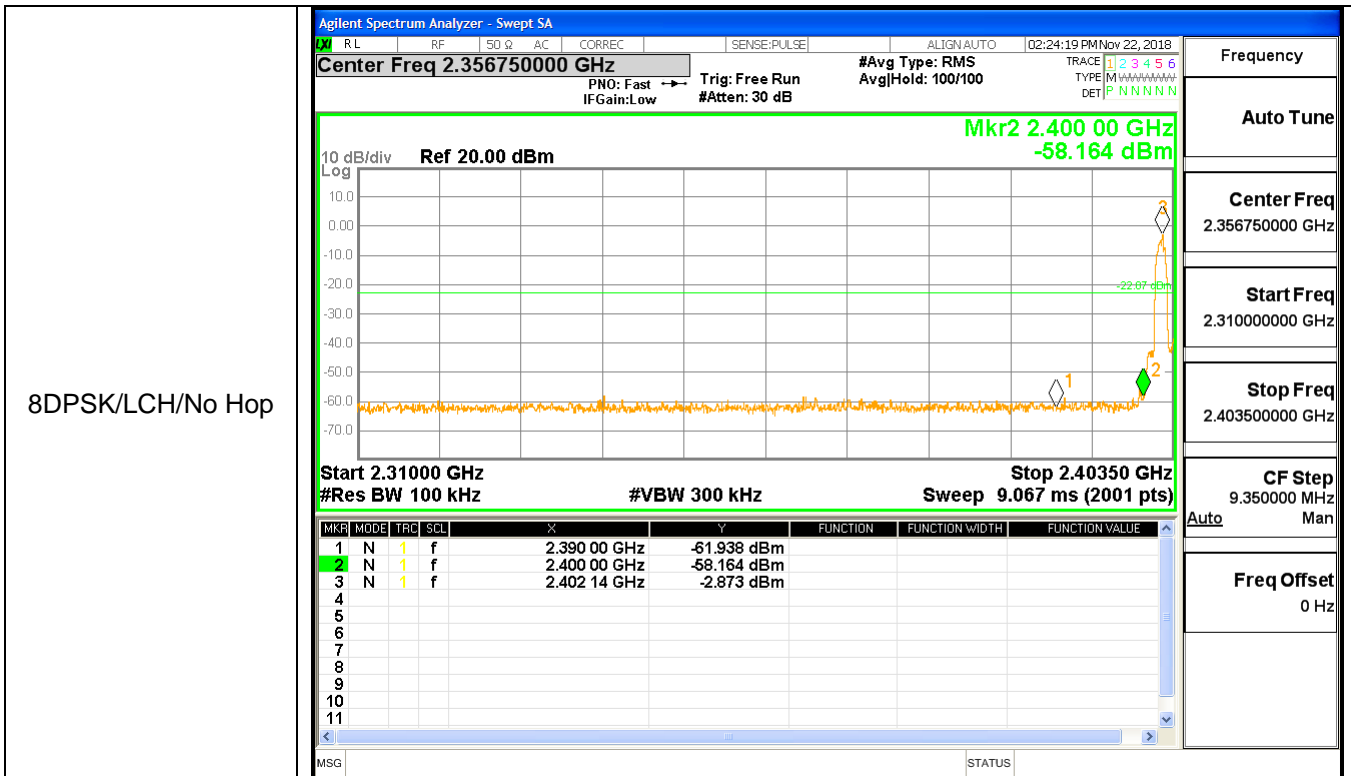


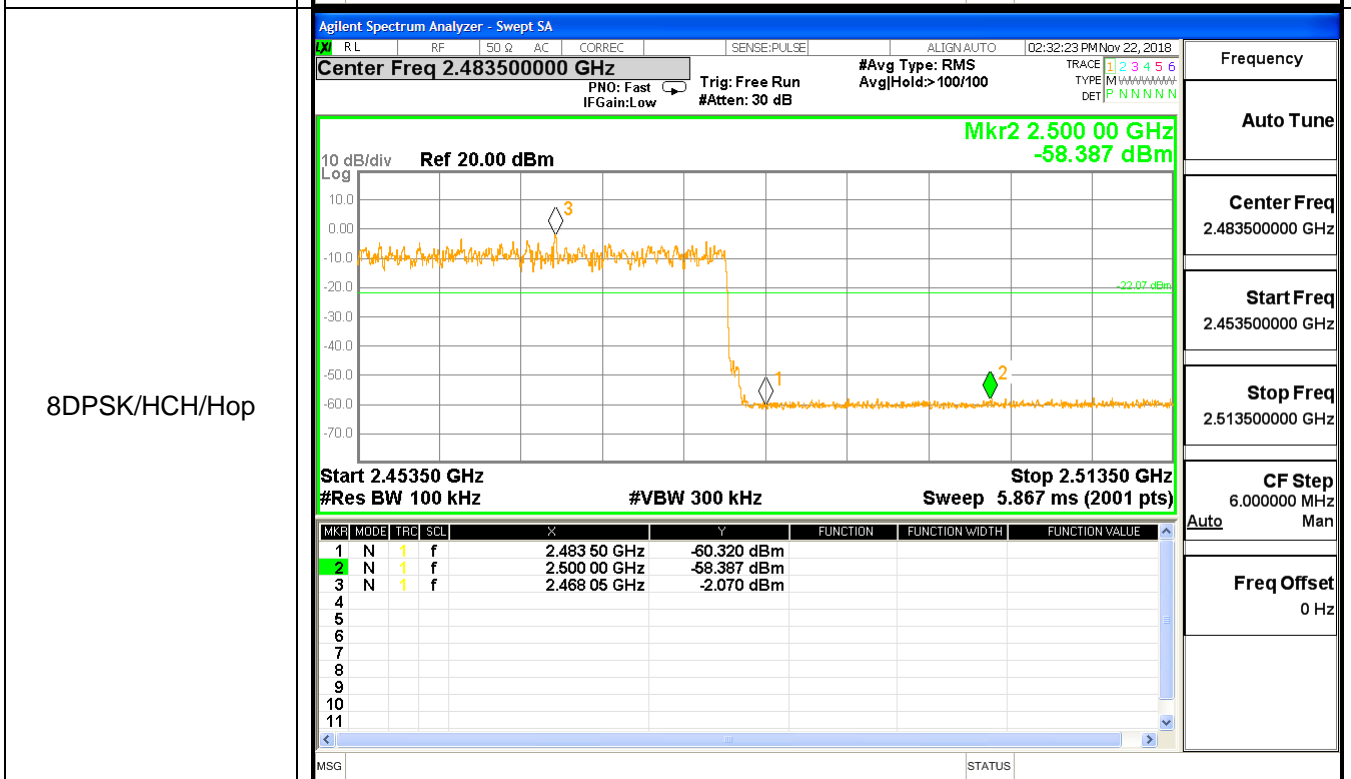
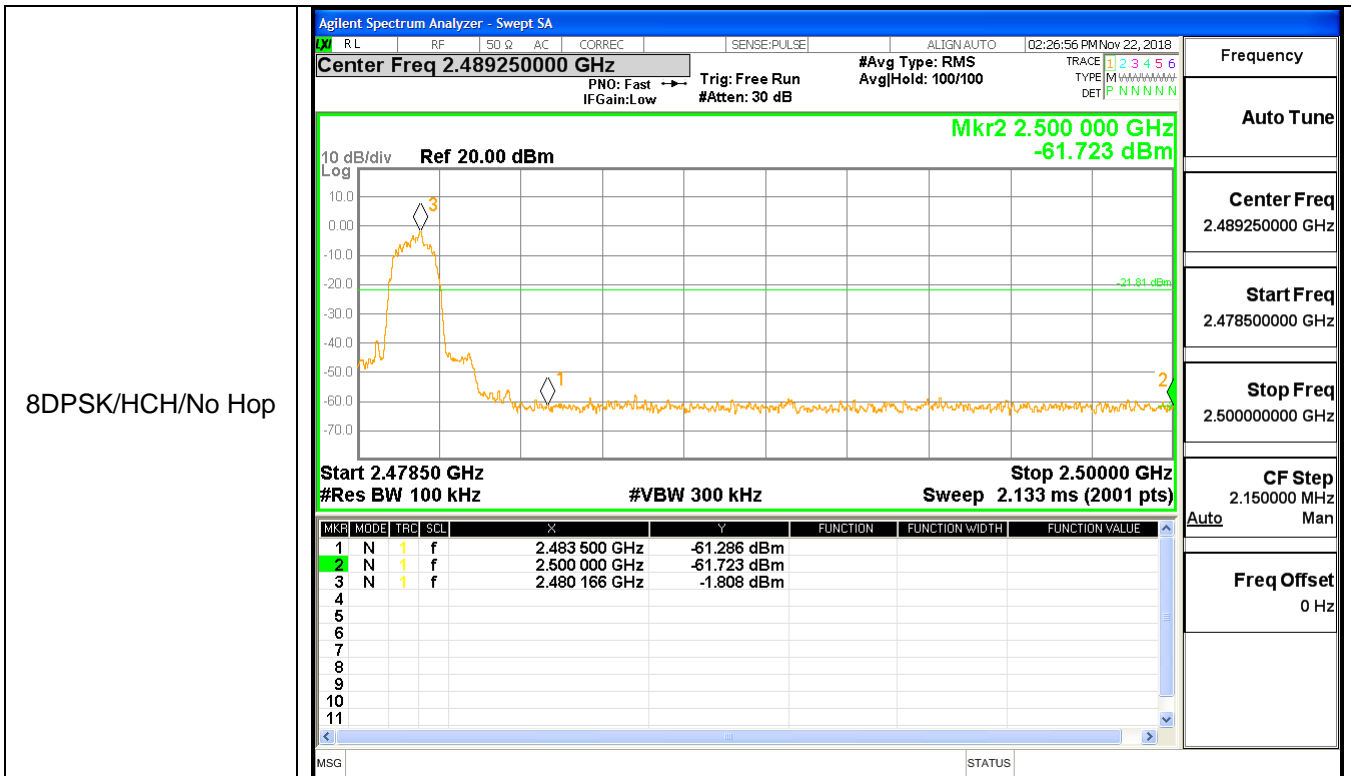
GFSK/HCH/Hop

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

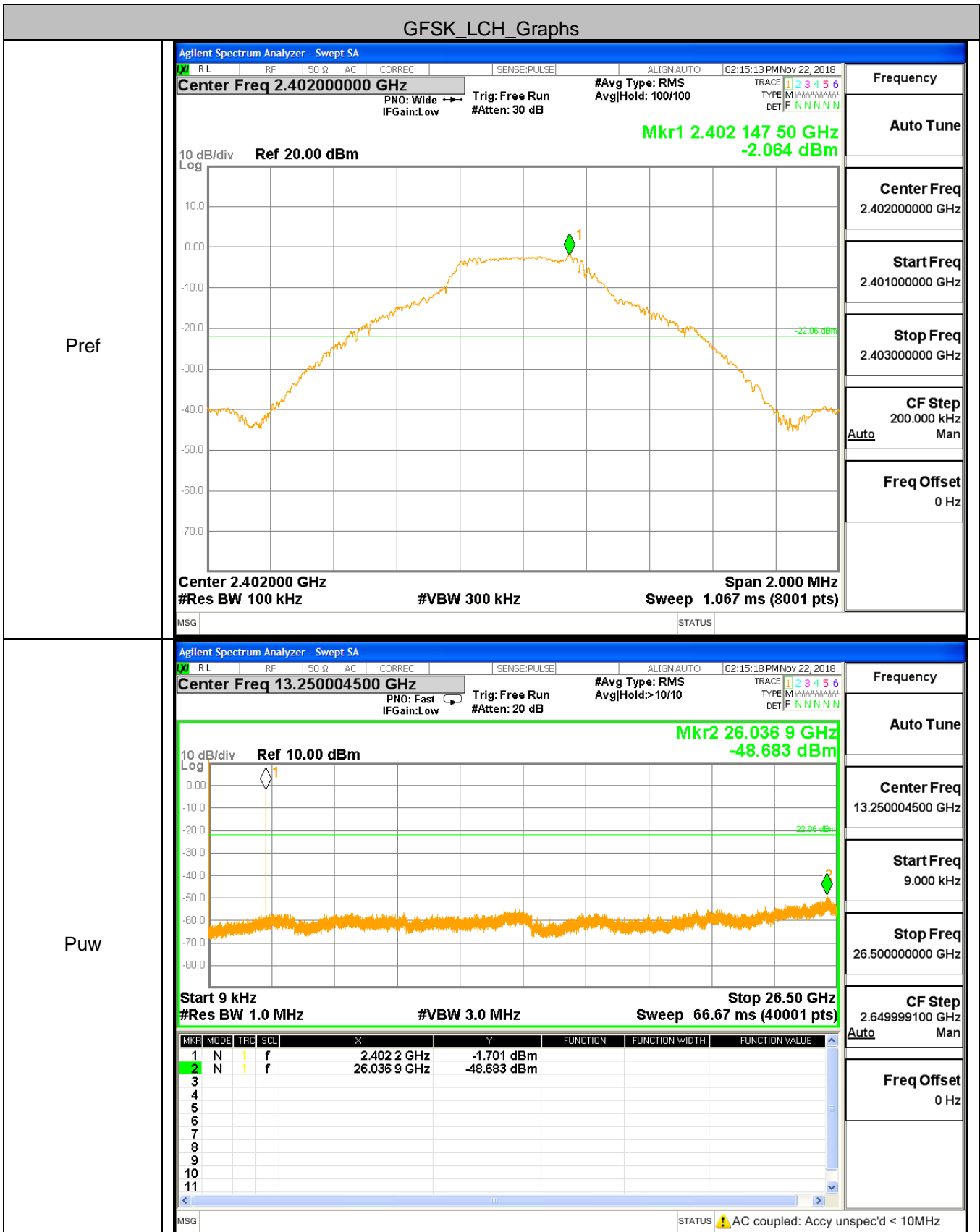


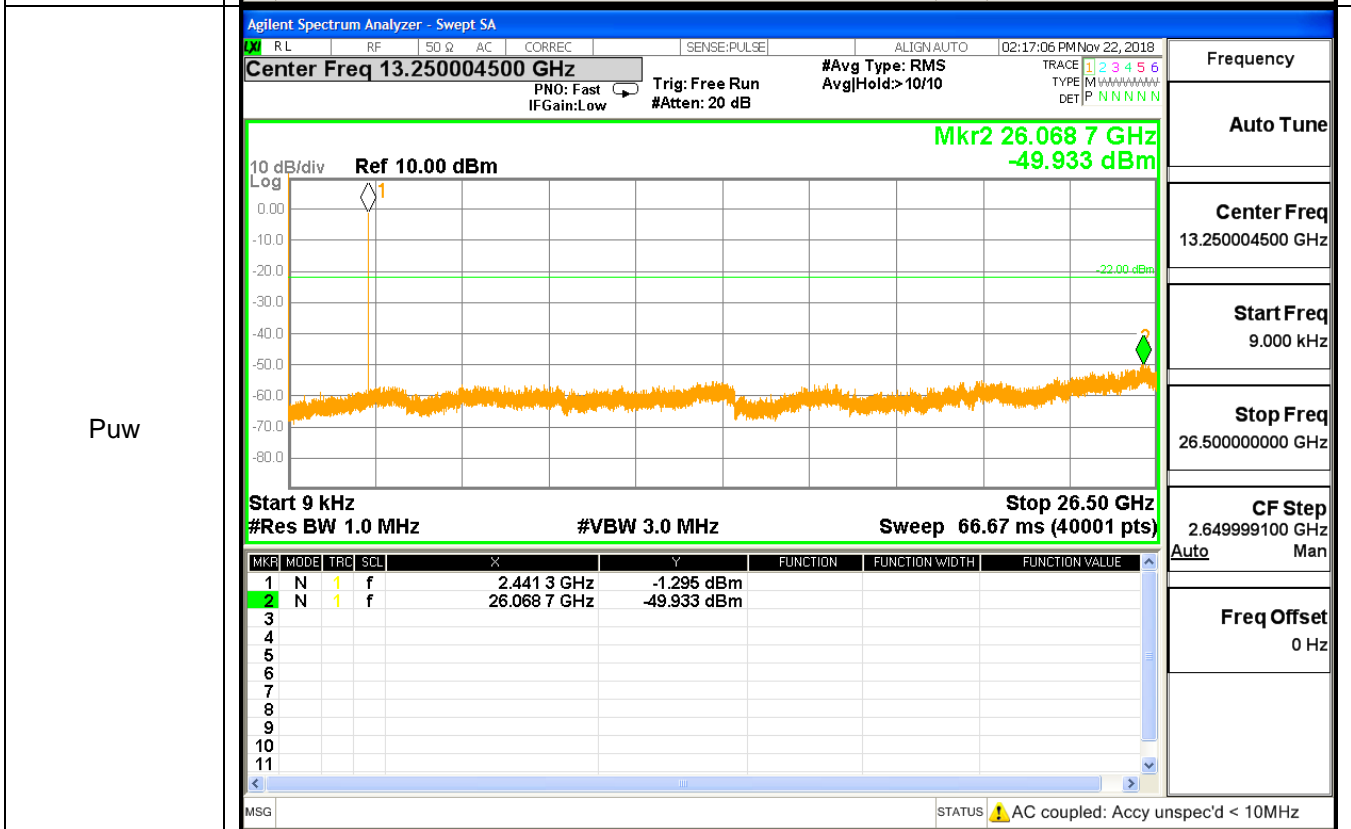
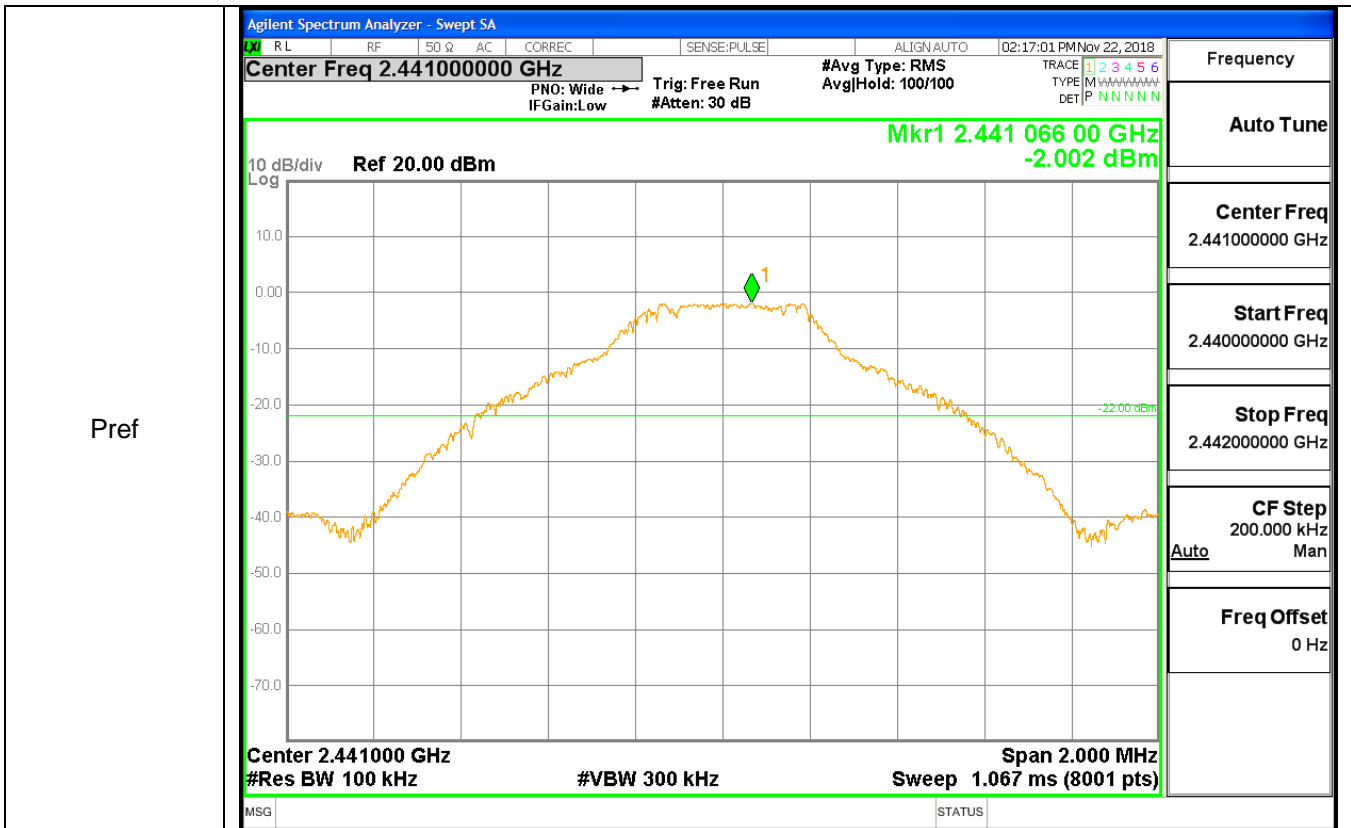




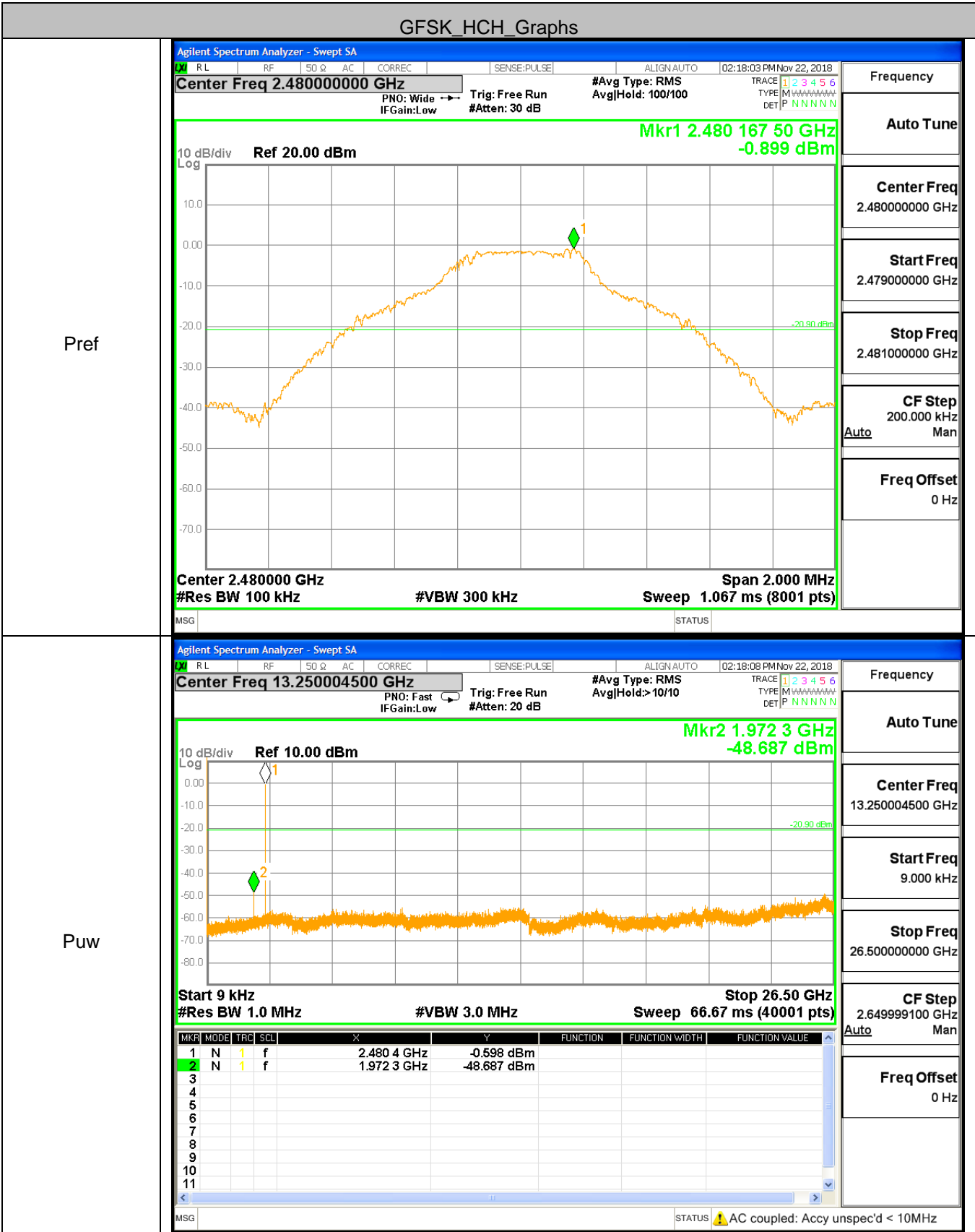


A.7 RF Conducted Spurious Emissions Test Graph





GFSK_HCH_Graphs



Pref

Puw

Frequency

Auto Tune

Center Freq
2.48000000 GHz

Start Freq
2.479000000 GHz

Stop Freq
2.481000000 GHz

CF Step
200.000 kHz
Auto Man

Freq Offset
0 Hz

Frequency

Auto Tune

Center Freq
13.250004500 GHz

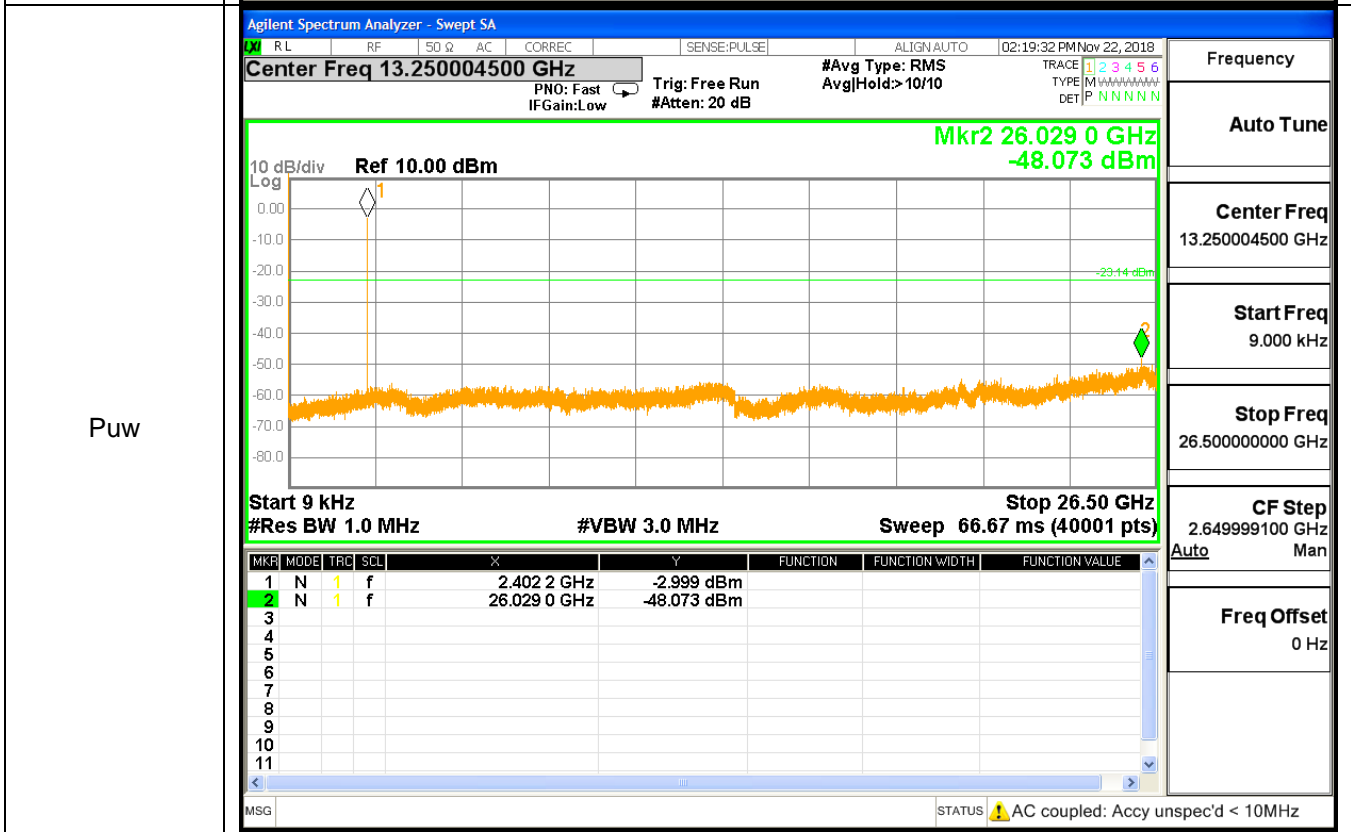
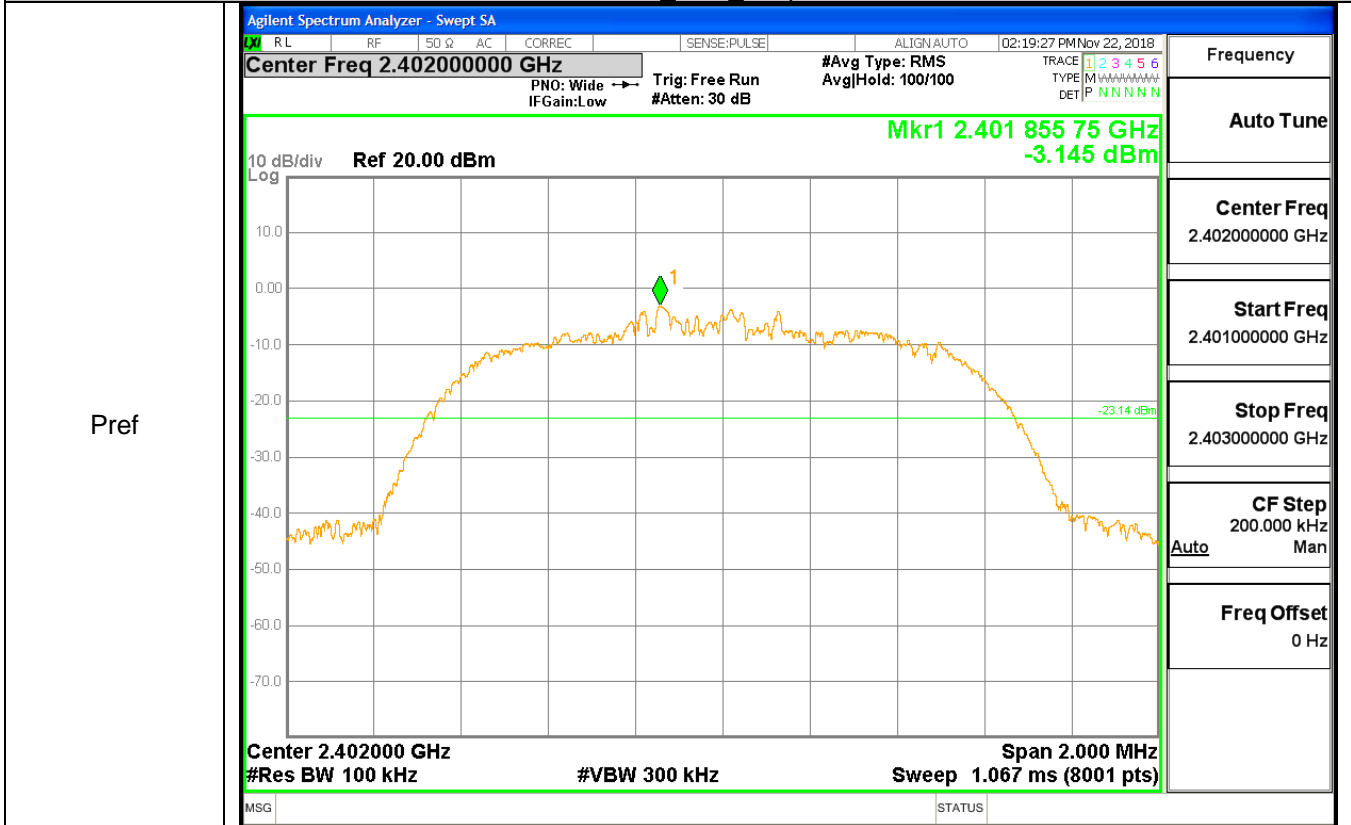
Start Freq
9.000 kHz

Stop Freq
26.500000000 GHz

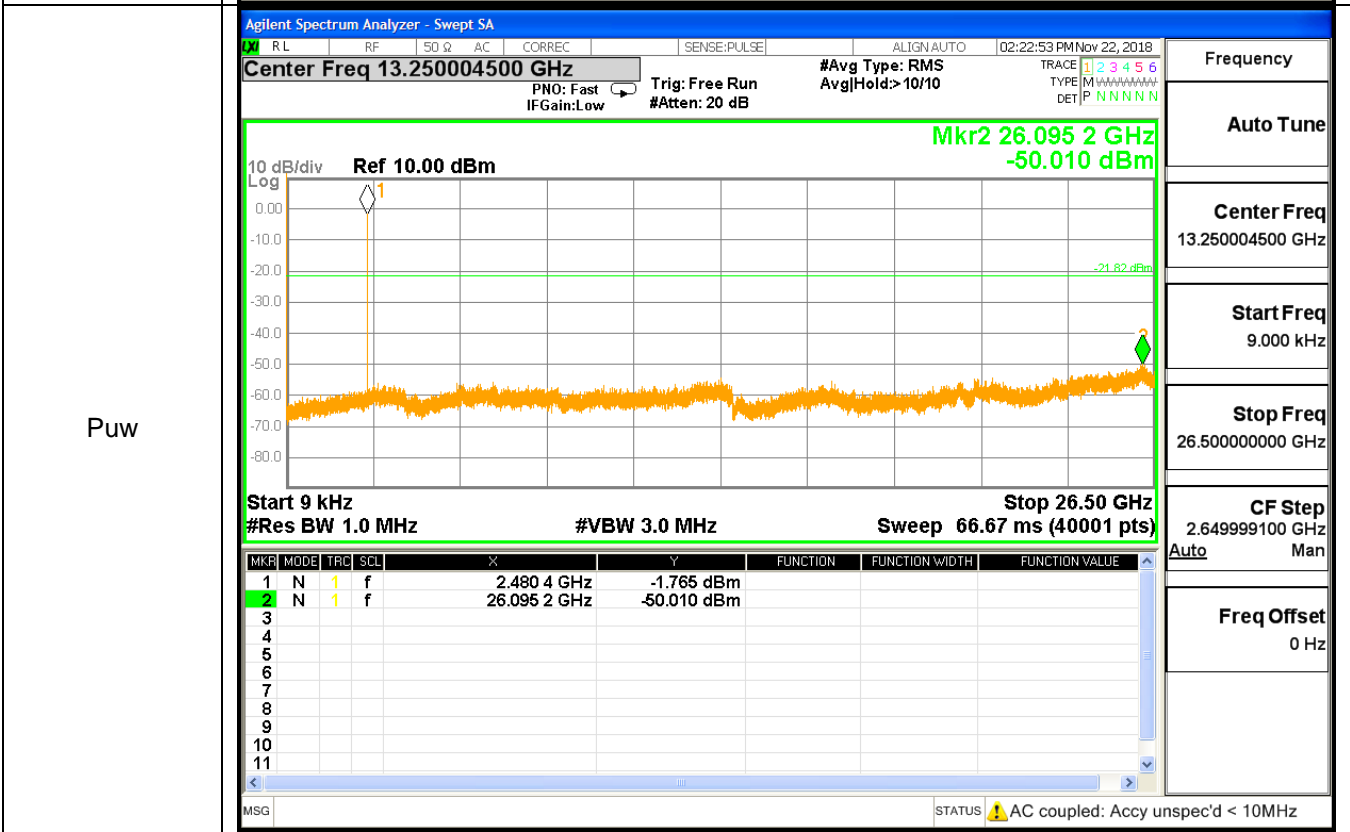
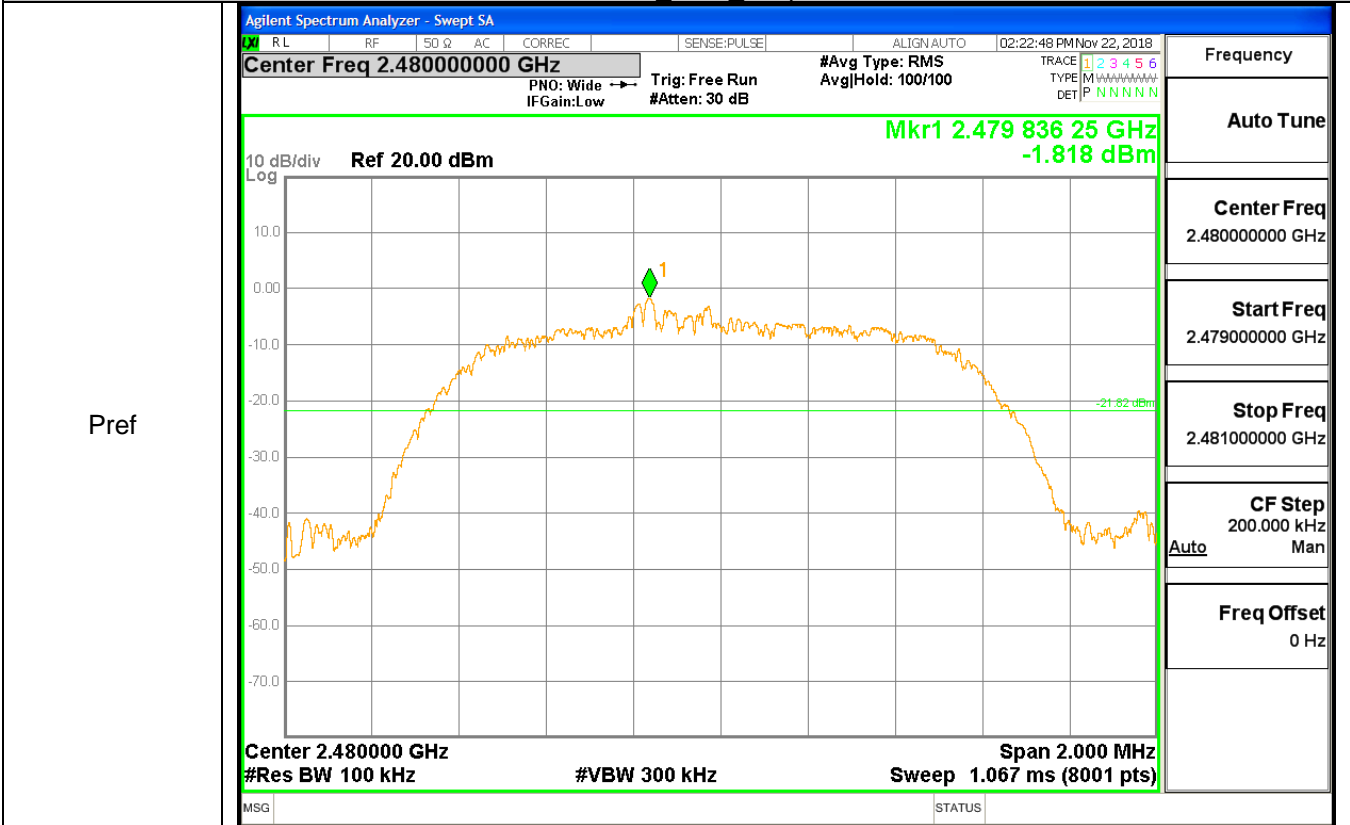
CF Step
2.649999100 GHz
Auto Man

Freq Offset
0 Hz

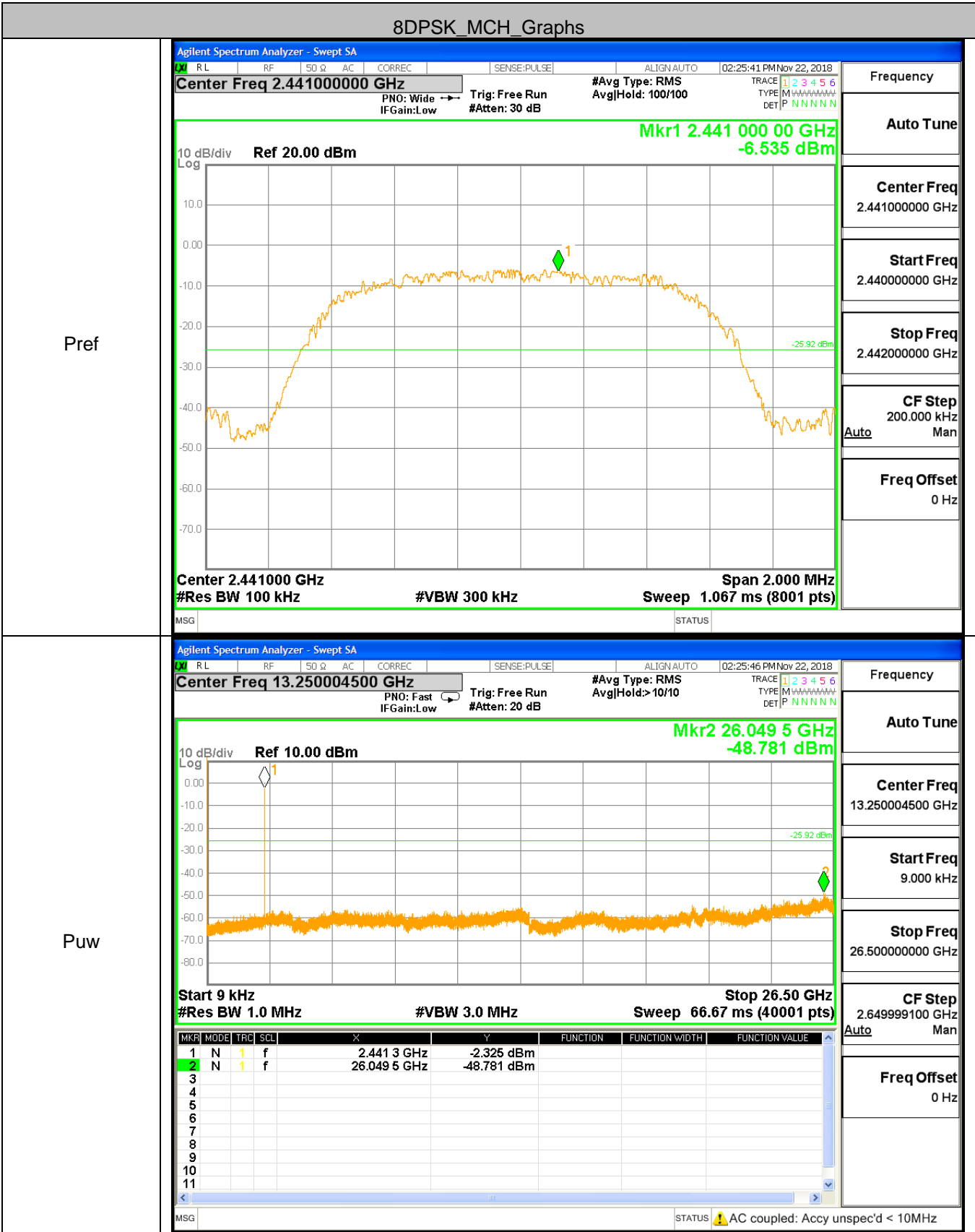
$\pi/4$ DQPSK LCH Graphs



$\pi/4$ DQPSK HCH Graphs



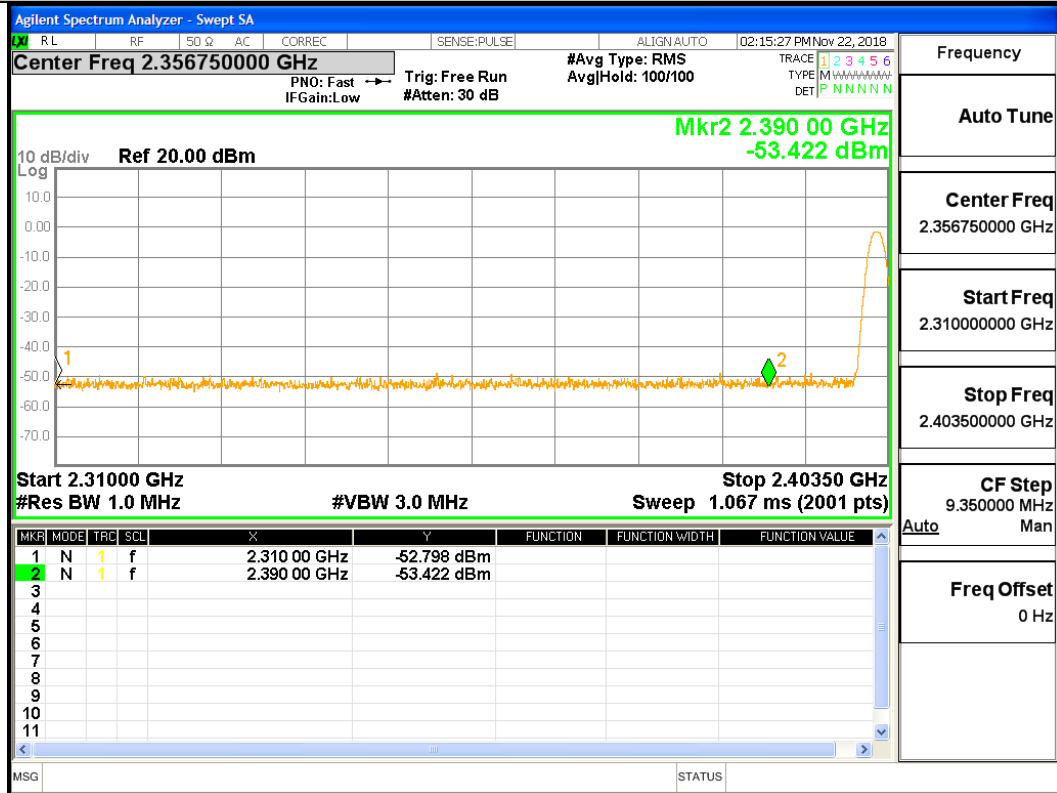
8DPSK_MCH_Graphs



A.8 Restrict-band band-edge measurements

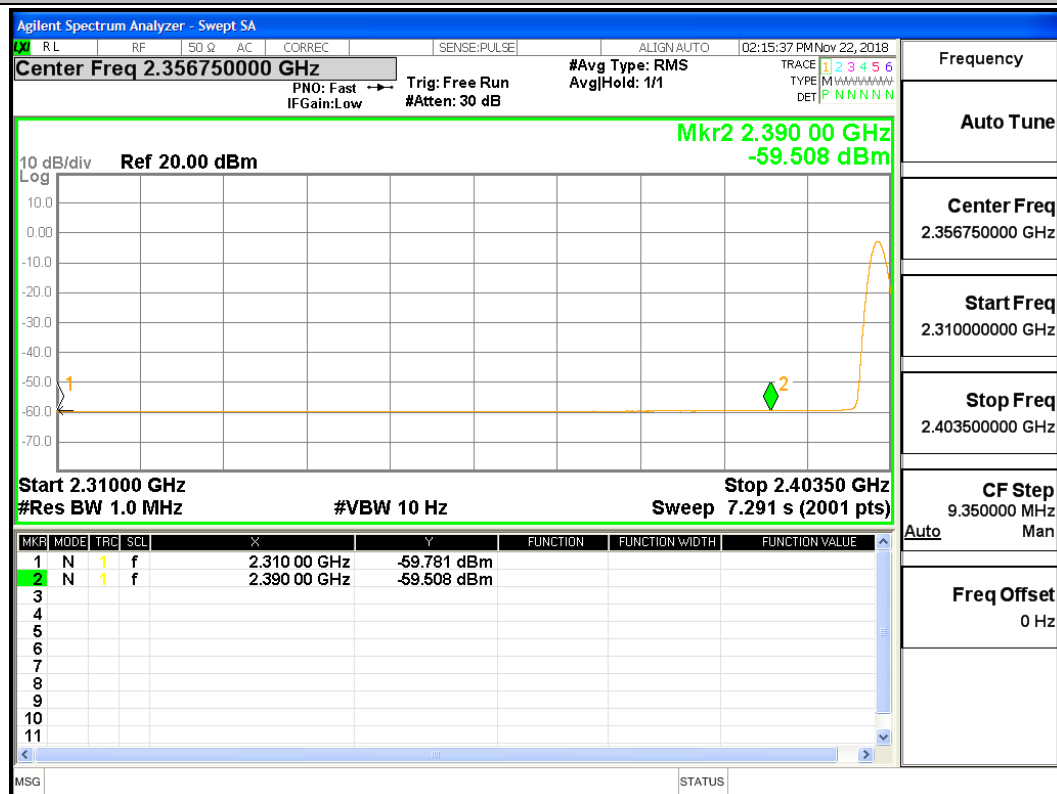
| Type | Carrier Frequency (MHz) | Frequency(MHz) | Gain | Ground Factor | Peak Value(dBm) | E [dBuV/m] | Limit [dBuV/m] | Average Value(dBm) | E [dBuV/m] | Limit [dBuV/m] | Conclusion |
|------|-------------------------|----------------|------|---------------|-----------------|------------|----------------|--------------------|------------|----------------|------------|
| 1DH5 | 2402 | 2310 | 0.00 | 0.00 | -52.8 | 42.4 | 74 | -59.78 | 35.42 | 54 | Pass |
| 1DH5 | 2402 | 2390 | 0.00 | 0.00 | -53.42 | 41.78 | 74 | -59.51 | 35.69 | 54 | Pass |
| 1DH5 | 2480 | 2483.5 | 0.00 | 0.00 | -52.4 | 42.8 | 74 | -57.57 | 37.63 | 54 | Pass |
| 1DH5 | 2480 | 2500 | 0.00 | 0.00 | -51.04 | 44.16 | 74 | -58.96 | 36.24 | 54 | Pass |
| 2DH5 | 2402 | 2310 | 0.00 | 0.00 | -50.35 | 44.85 | 74 | -59.79 | 35.41 | 54 | Pass |
| 2DH5 | 2402 | 2390 | 0.00 | 0.00 | -52.8 | 42.4 | 74 | -59.49 | 35.71 | 54 | Pass |
| 2DH5 | 2480 | 2483.5 | 0.00 | 0.00 | -51.96 | 43.24 | 74 | -57.45 | 37.75 | 54 | Pass |
| 2DH5 | 2480 | 2500 | 0.00 | 0.00 | -52.79 | 42.41 | 74 | -58.97 | 36.23 | 54 | Pass |
| 3DH5 | 2402 | 2310 | 0.00 | 0.00 | -52.38 | 42.82 | 74 | -59.83 | 35.37 | 54 | Pass |
| 3DH5 | 2402 | 2390 | 0.00 | 0.00 | -51.89 | 43.31 | 74 | -59.48 | 35.72 | 54 | Pass |
| 3DH5 | 2480 | 2483.5 | 0.00 | 0.00 | -50.64 | 44.56 | 74 | -57.42 | 37.78 | 54 | Pass |
| 3DH5 | 2480 | 2500 | 0.00 | 0.00 | -51.61 | 43.59 | 74 | -58.97 | 36.23 | 54 | Pass |

Restrict-band band-edge measurements_2402_PEAK_DH5



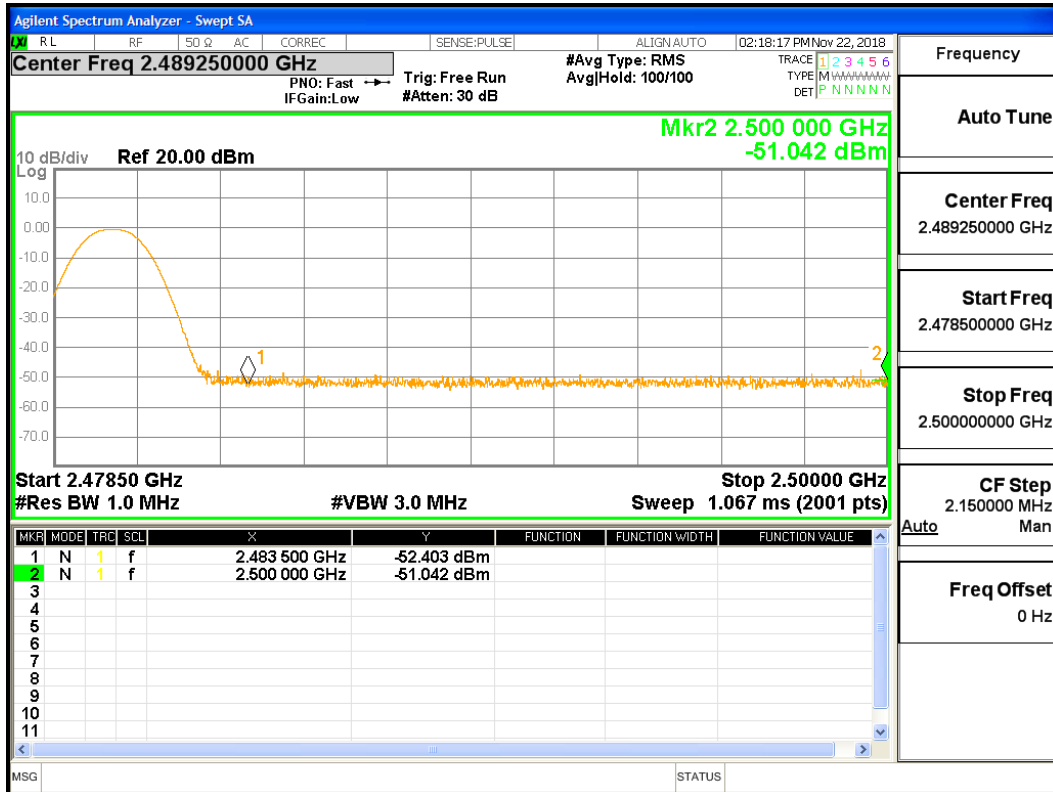
| |
|--------------------------------|
| Frequency |
| Auto Tune |
| Center Freq 2.356750000 GHz |
| Start Freq 2.310000000 GHz |
| Stop Freq 2.403500000 GHz |
| CF Step 9.350000 MHz |
| Auto Man |
| Freq Offset 0 Hz |

Restrict-band band-edge measurements_2402_AV_DH5

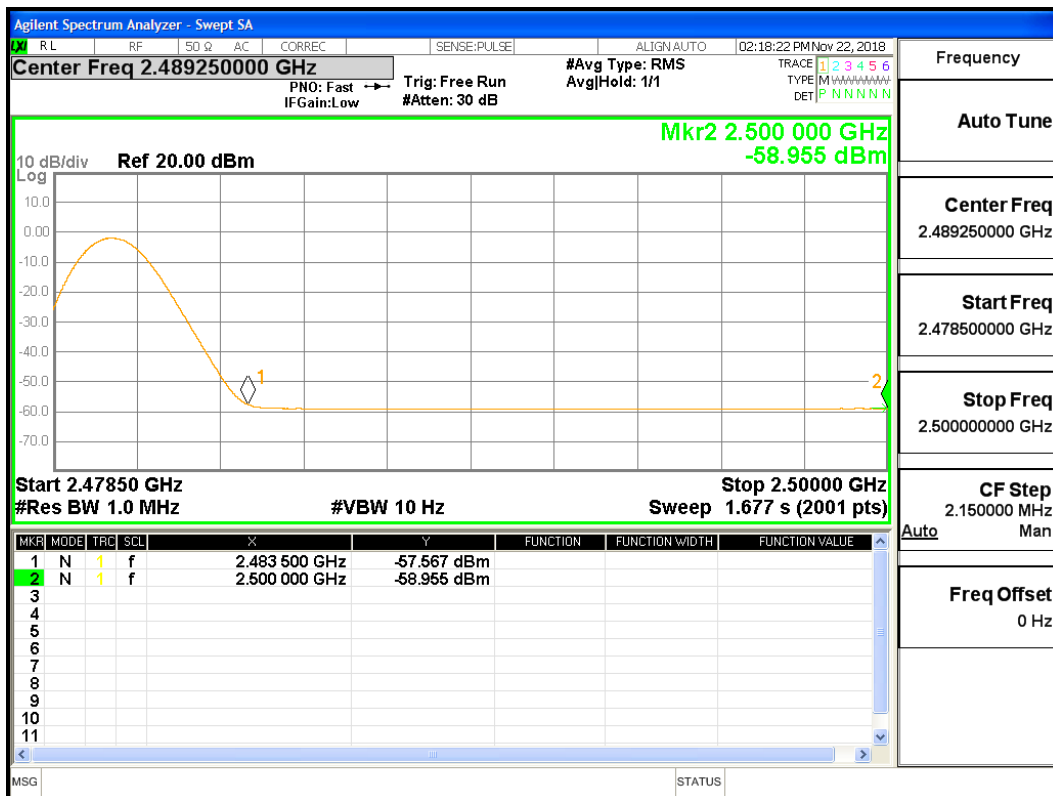


| |
|--------------------------------|
| Frequency |
| Auto Tune |
| Center Freq 2.356750000 GHz |
| Start Freq 2.310000000 GHz |
| Stop Freq 2.403500000 GHz |
| CF Step 9.350000 MHz |
| Auto Man |
| Freq Offset 0 Hz |

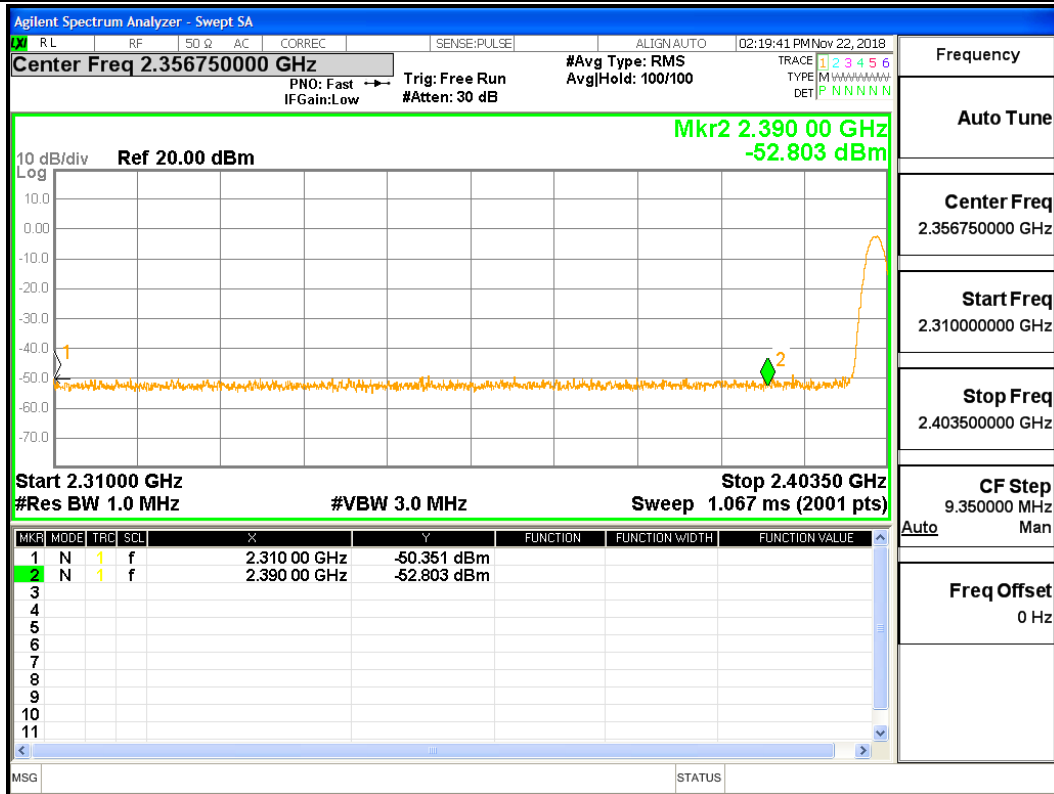
Restrict-band band-edge measurements_2480_PEAK_DH5



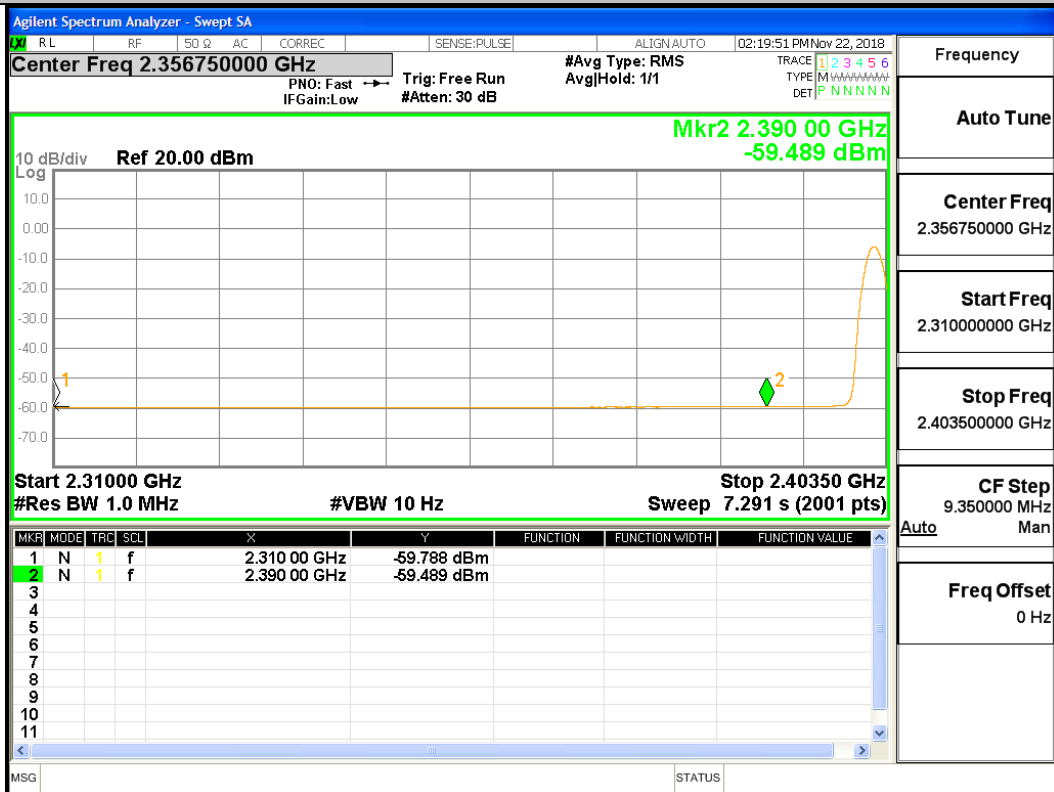
Restrict-band band-edge measurements_2480_AV_DH5



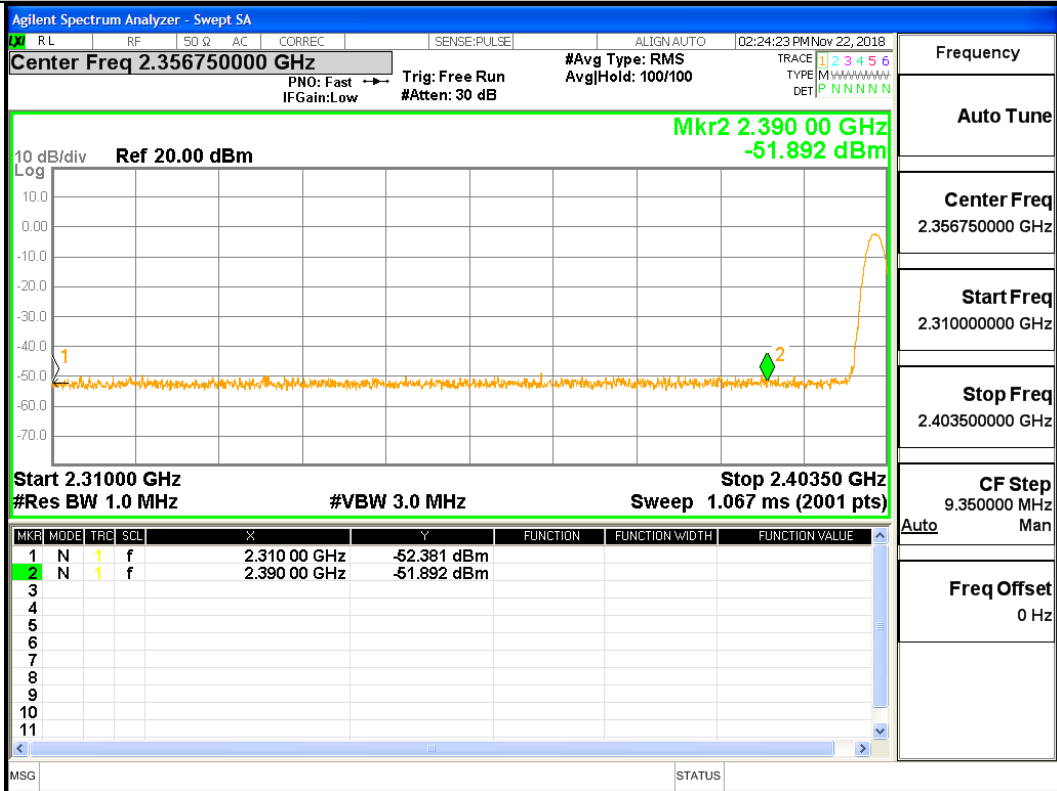
Restrict-band band-edge measurements_2402_PEAK_2DH5



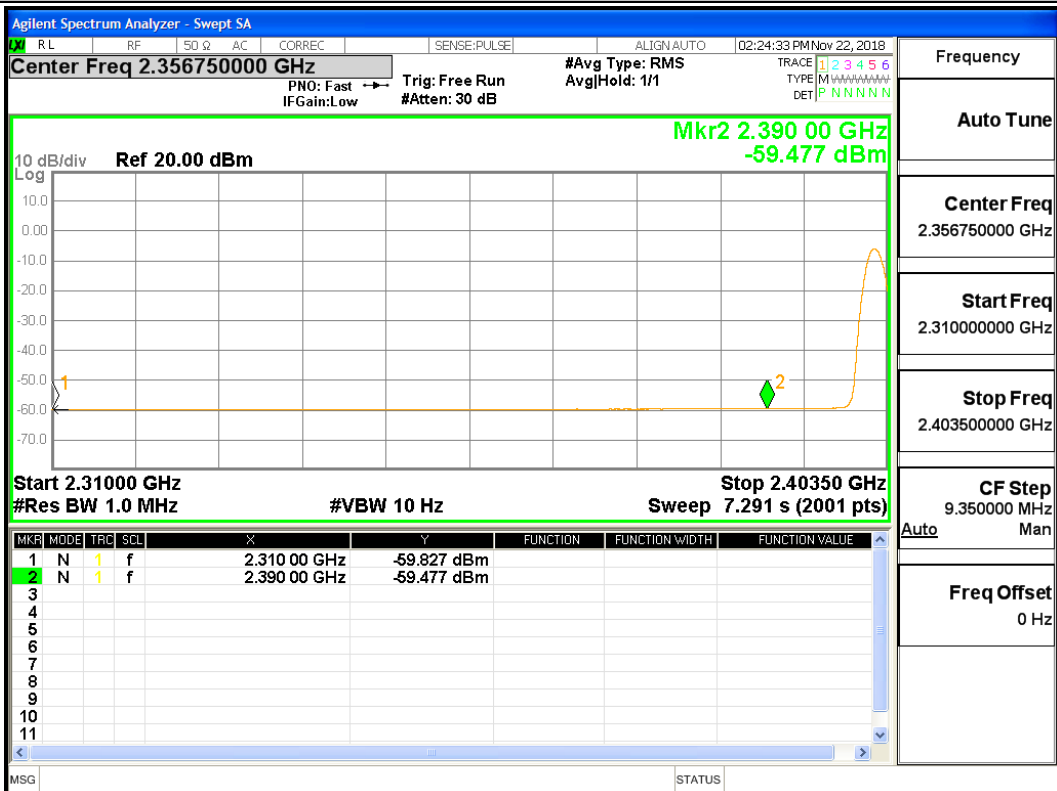
Restrict-band band-edge measurements_2402_AV_2DH5



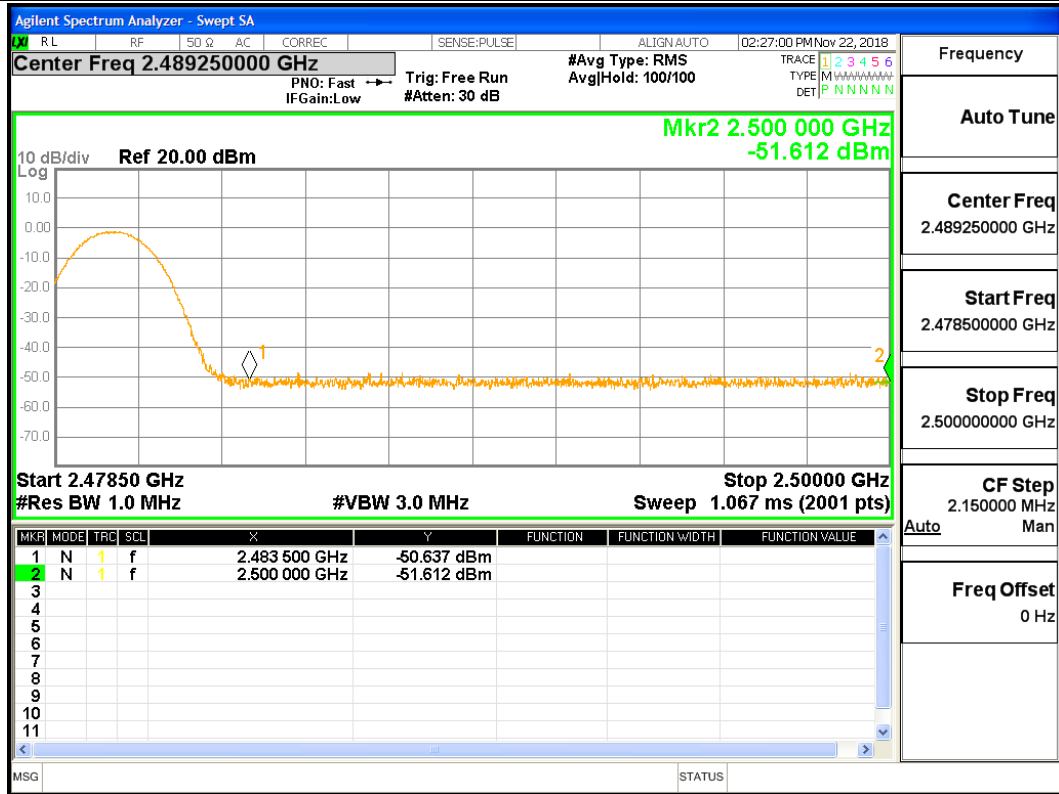
Restrict-band band-edge measurements_2402_PEAK_3DH5



Restrict-band band-edge measurements_2402_AV_3DH5



Restrict-band band-edge measurements_2480_PEAK_3DH5



Restrict-band band-edge measurements_2480_AV_3DH5

