

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

Product Name: Bluetooth Headphones

Trade Mark: Altec Lansing

Test Model: MZX250

FCC ID: 2AL9B-MZX250

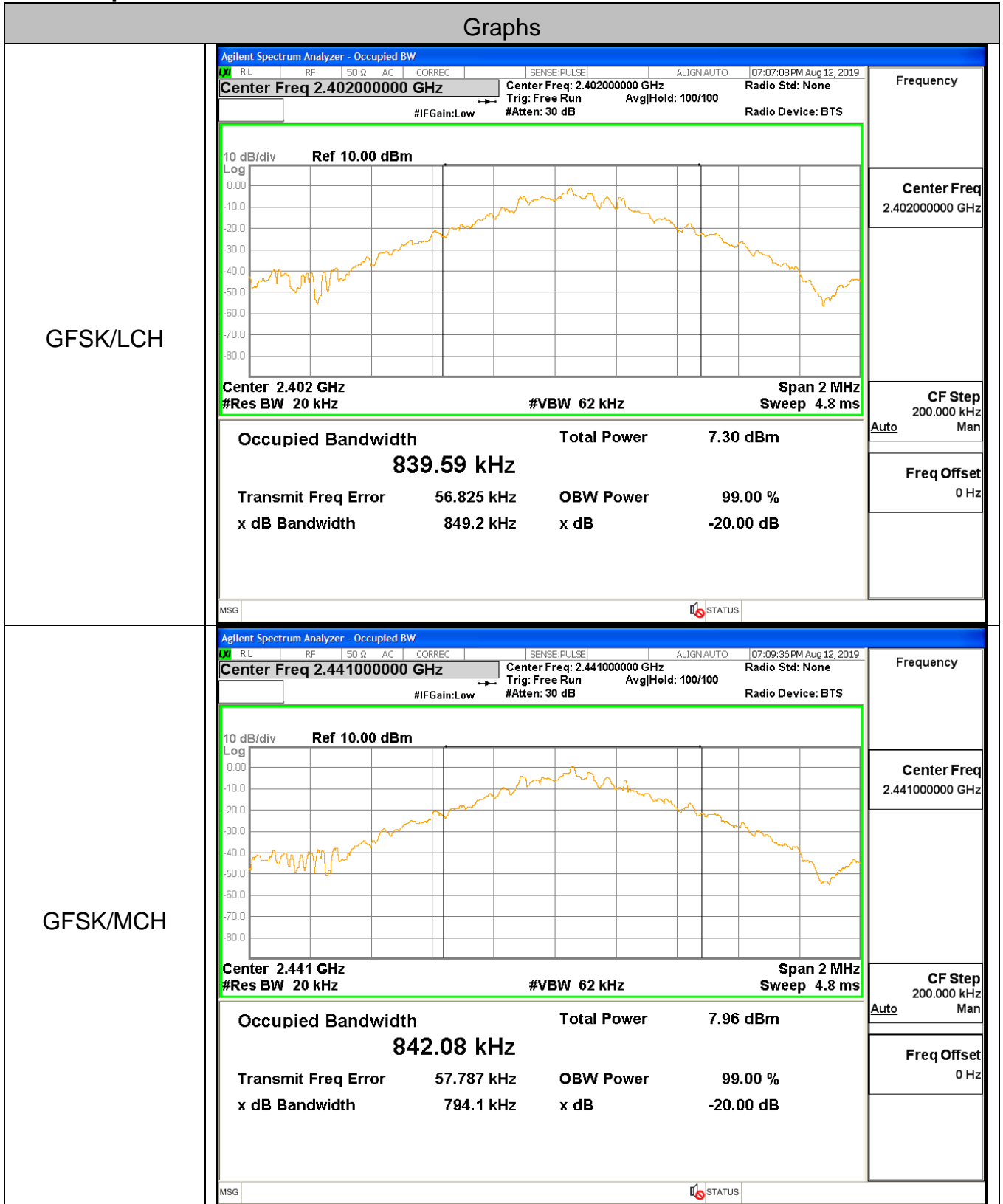
Environmental Conditions

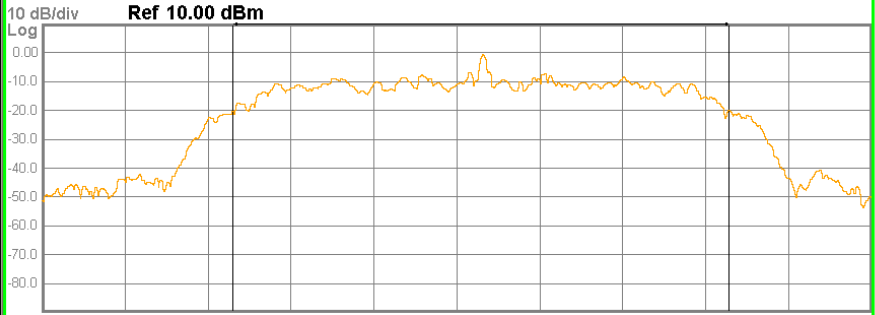
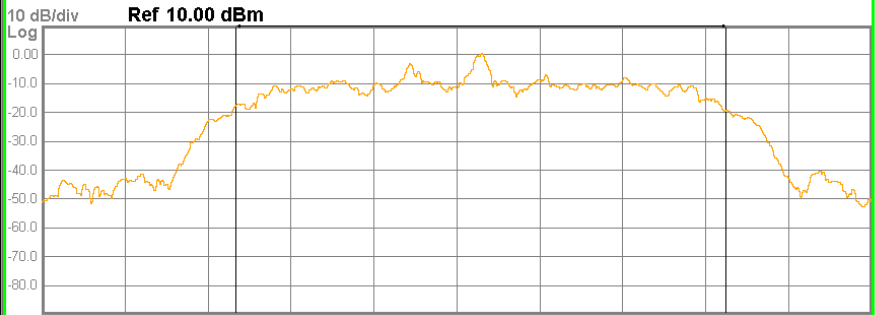
| | |
|--------------------|-----------|
| Temperature: | 24.1℃ |
| Relative Humidity: | 55% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | Gary Qian |
| Supervised by: | Eden Hu |

A.1 20 dB Bandwidth

| Mode | Channel. | 20dB Bandwidth [MHz] | Limit(MHz) | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK | LCH | 0.849 | Not Specified | PASS |
| GFSK | MCH | 0.794 | Not Specified | PASS |
| GFSK | HCH | 0.796 | Not Specified | PASS |
| $\pi/4$ DQPSK | LCH | 1.194 | Not Specified | PASS |
| $\pi/4$ DQPSK | MCH | 1.205 | Not Specified | PASS |
| $\pi/4$ DQPSK | HCH | 1.196 | Not Specified | PASS |

Test Graph

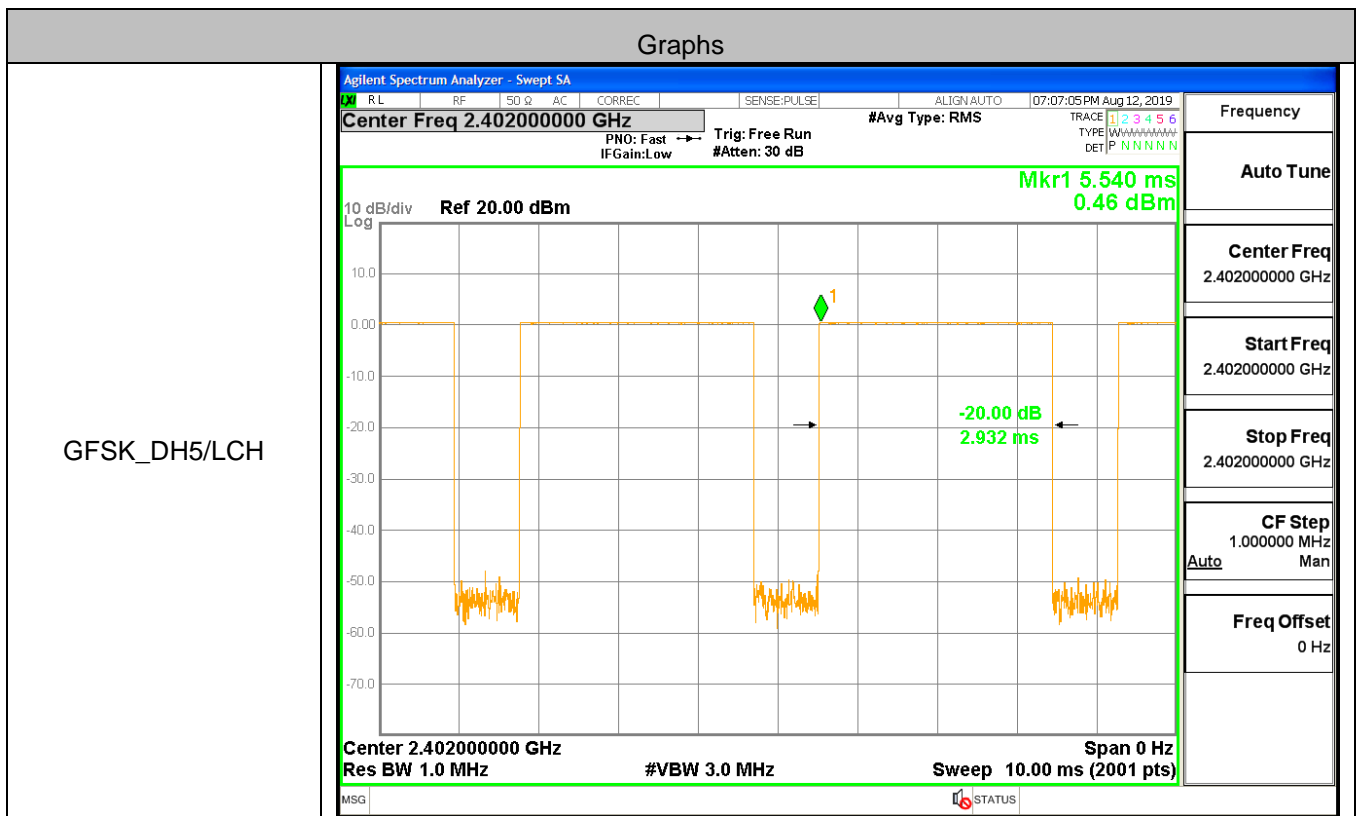


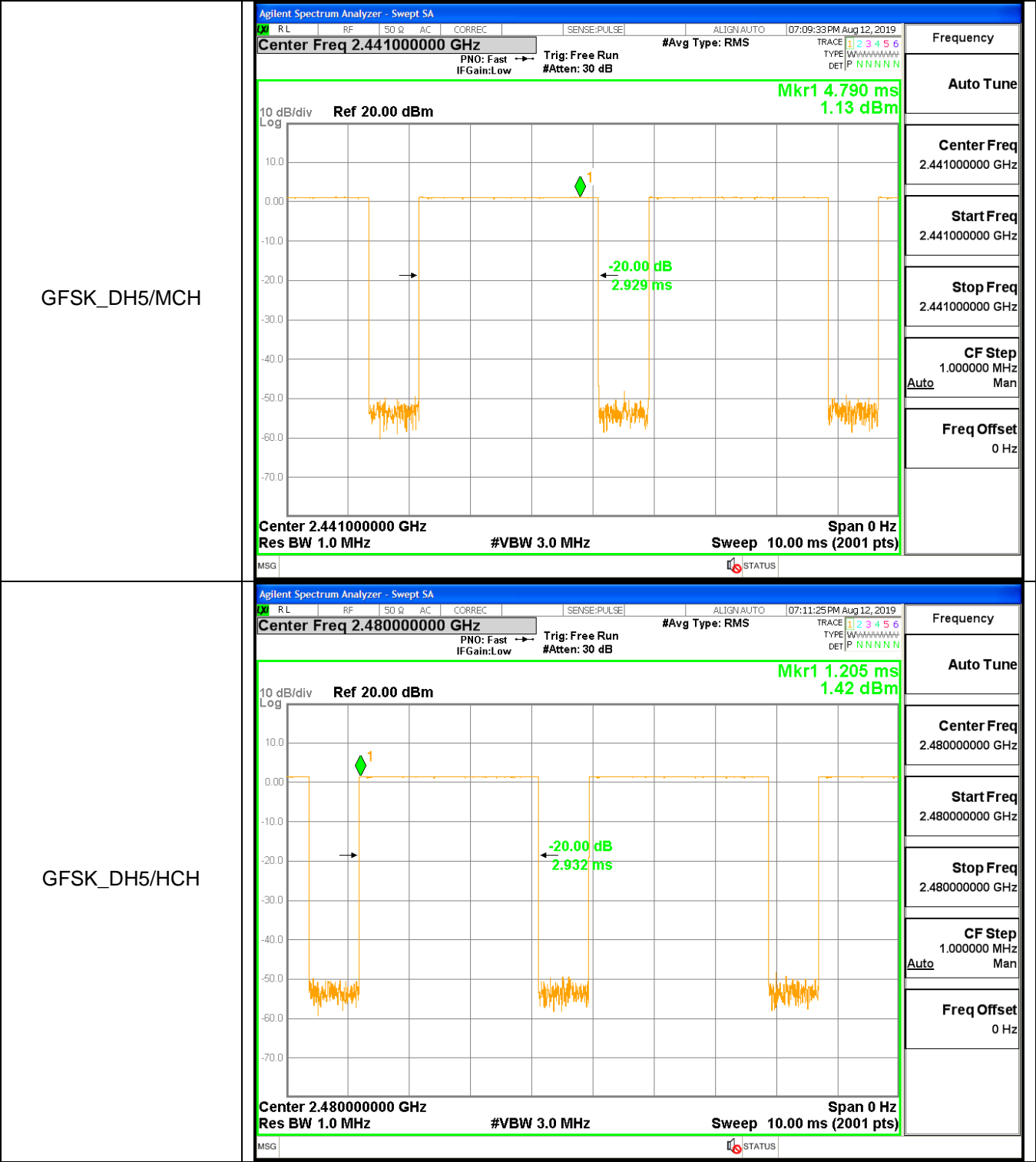
| | |
|-------------------------|---|
| <div>π/4DQPSK/MCH</div> | <div><div>Agilent Spectrum Analyzer - Occupied BW</div><div><div><div>Center Freq 2.441000000 GHz</div><div>Center Freq: 2.441000000 GHz</div><div>Trig: Free Run</div><div>#IFGain: Low</div><div>#Atten: 30 dB</div></div><div><div>ALIGN AUTO</div><div>07:16:35 PM Aug 12, 2019</div><div>Radio Std: None</div><div>Radio Device: BTS</div></div></div><div><div>10 dB/div</div><div>Ref 10.00 dBm</div><div></div><div><div>Center 2.441 GHz</div><div>#Res BW 20 kHz</div><div>#VBW 62 kHz</div><div>Span 2 MHz</div><div>Sweep 4.8 ms</div></div><div><div>Occupied Bandwidth</div><div>1.1897 MHz</div><div>Total Power</div><div>6.78 dBm</div><div>Transmit Freq Error</div><div>59.622 kHz</div><div>OBW Power</div><div>99.00 %</div><div>x dB Bandwidth</div><div>1.205 MHz</div><div>x dB</div><div>-20.00 dB</div></div><div><div>MSG</div><div>STATUS</div></div></div><div><div>Frequency</div><div>Center Freq</div><div>2.441000000 GHz</div><div>CF Step</div><div>200.000 kHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div></div> |
| <div>π/4DQPSK/HCH</div> | <div><div>Agilent Spectrum Analyzer - Occupied BW</div><div><div><div>Center Freq 2.480000000 GHz</div><div>Center Freq: 2.480000000 GHz</div><div>Trig: Free Run</div><div>#IFGain: Low</div><div>#Atten: 30 dB</div></div><div><div>ALIGN AUTO</div><div>07:19:57 PM Aug 12, 2019</div><div>Radio Std: None</div><div>Radio Device: BTS</div></div></div><div><div>10 dB/div</div><div>Ref 10.00 dBm</div><div></div><div><div>Center 2.48 GHz</div><div>#Res BW 20 kHz</div><div>#VBW 62 kHz</div><div>Span 2 MHz</div><div>Sweep 4.8 ms</div></div><div><div>Occupied Bandwidth</div><div>1.1776 MHz</div><div>Total Power</div><div>7.85 dBm</div><div>Transmit Freq Error</div><div>58.942 kHz</div><div>OBW Power</div><div>99.00 %</div><div>x dB Bandwidth</div><div>1.196 MHz</div><div>x dB</div><div>-20.00 dB</div></div><div><div>MSG</div><div>STATUS</div></div></div><div><div>Frequency</div><div>Center Freq</div><div>2.480000000 GHz</div><div>CF Step</div><div>200.000 kHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0 Hz</div></div></div> |

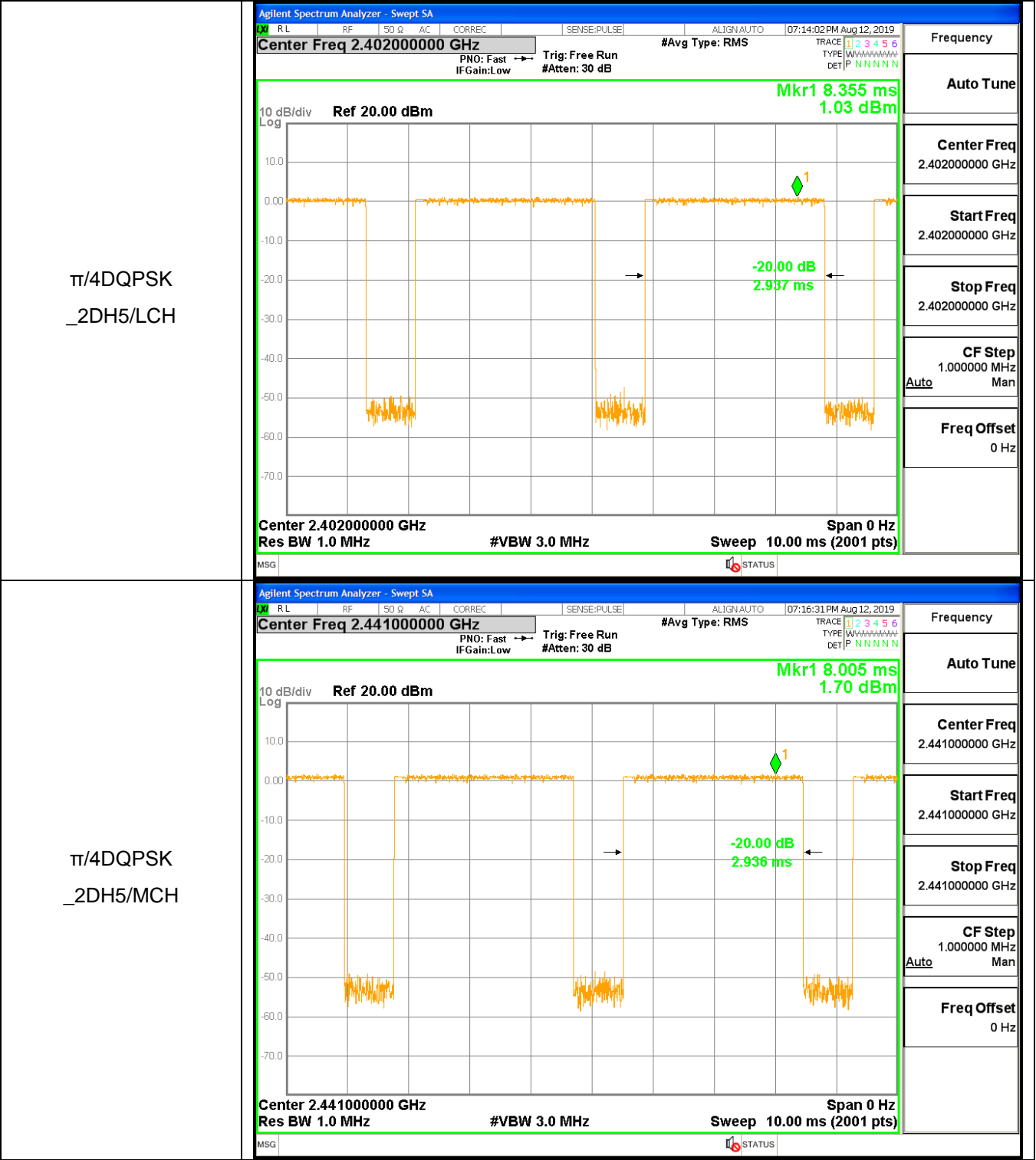
A.2 Dwell Time

| Mode | Packet | Channel | Burst Width [s/hop/ch] | Total Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---------------|--------|---------|------------------------|--------------------|---------------|-----------|---------|
| GFSK | DH5 | LCH | 0.002932 | 106.7 | 0.312811 | 0.4 | PASS |
| GFSK | DH5 | MCH | 0.002929 | 106.7 | 0.312506 | 0.4 | PASS |
| GFSK | DH5 | HCH | 0.002932 | 106.7 | 0.312809 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | LCH | 0.002937 | 106.7 | 0.313343 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | MCH | 0.002936 | 106.7 | 0.313312 | 0.4 | PASS |
| $\pi/4$ DQPSK | 2DH5 | HCH | 0.002938 | 106.7 | 0.313536 | 0.4 | PASS |

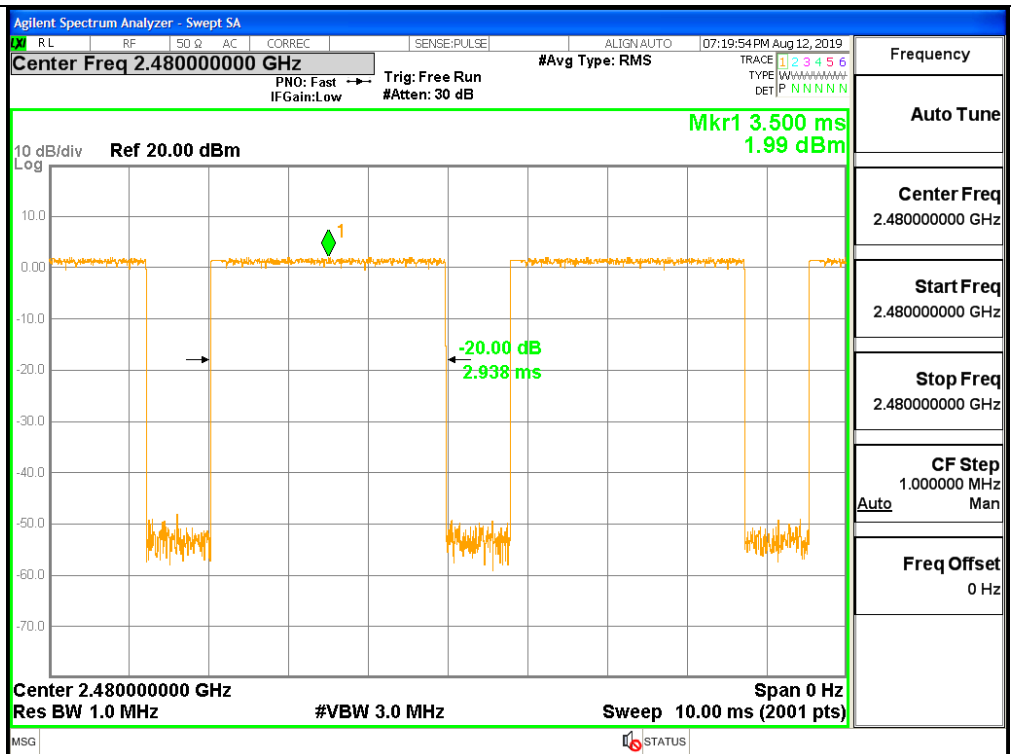
Test Graph







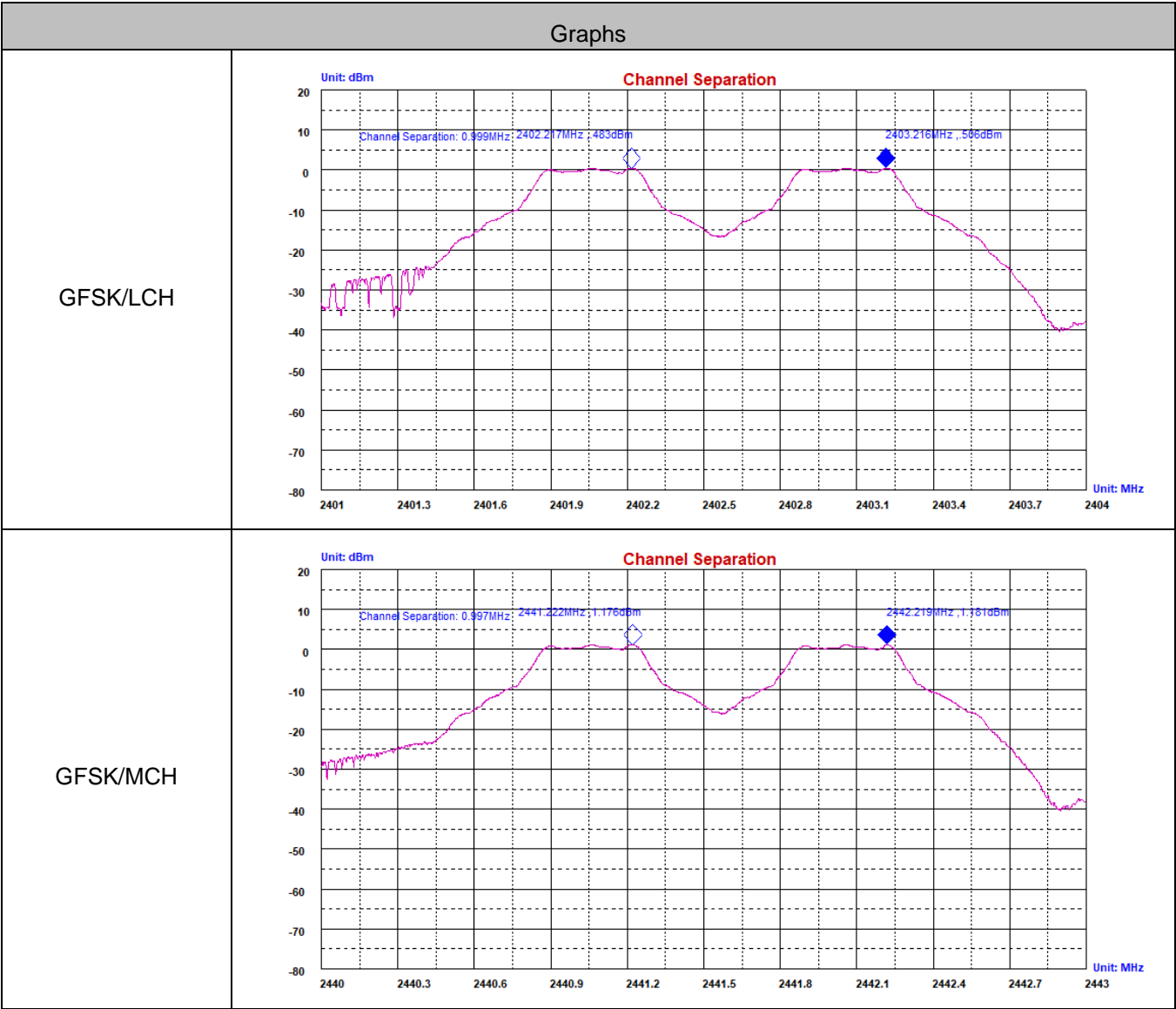
π/4DQPSK
_2DH5/HCH

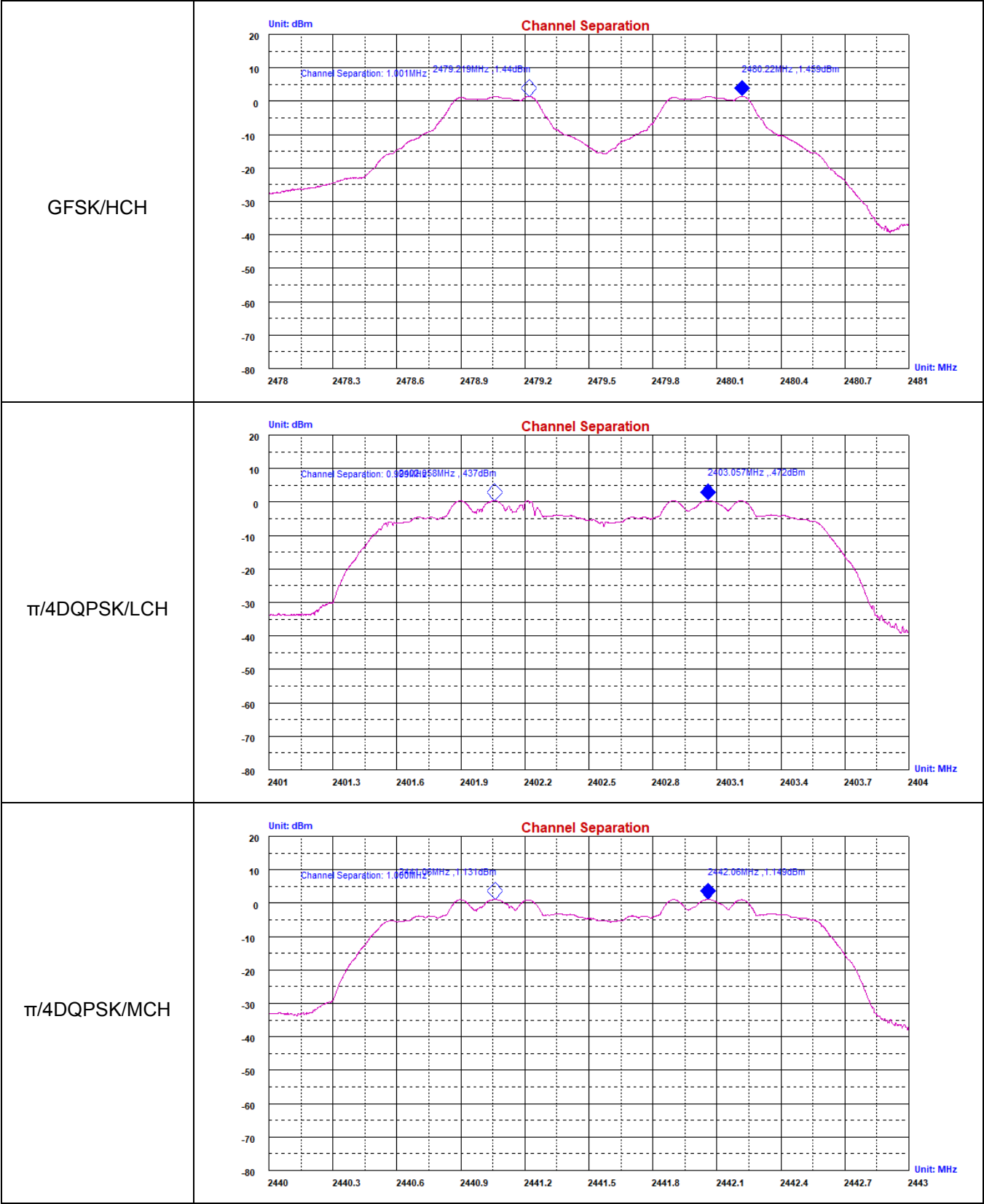


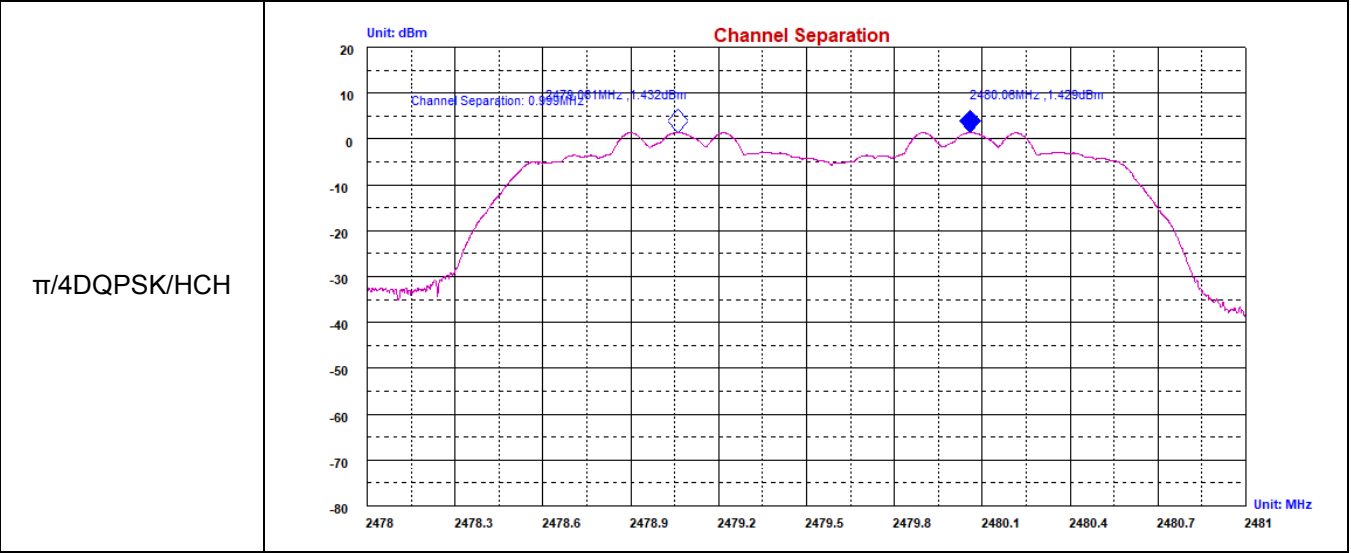
A.3 Carrier Frequency Separation

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK | LCH | 0.999 | 0.566 | PASS |
| GFSK | MCH | 0.997 | 0.529 | PASS |
| GFSK | HCH | 1.001 | 0.797 | PASS |
| π /4DQPSK | LCH | 0.999 | 0.796 | PASS |
| π /4DQPSK | MCH | 1.000 | 0.803 | PASS |
| π /4DQPSK | HCH | 0.999 | 0.797 | PASS |

Test Graph



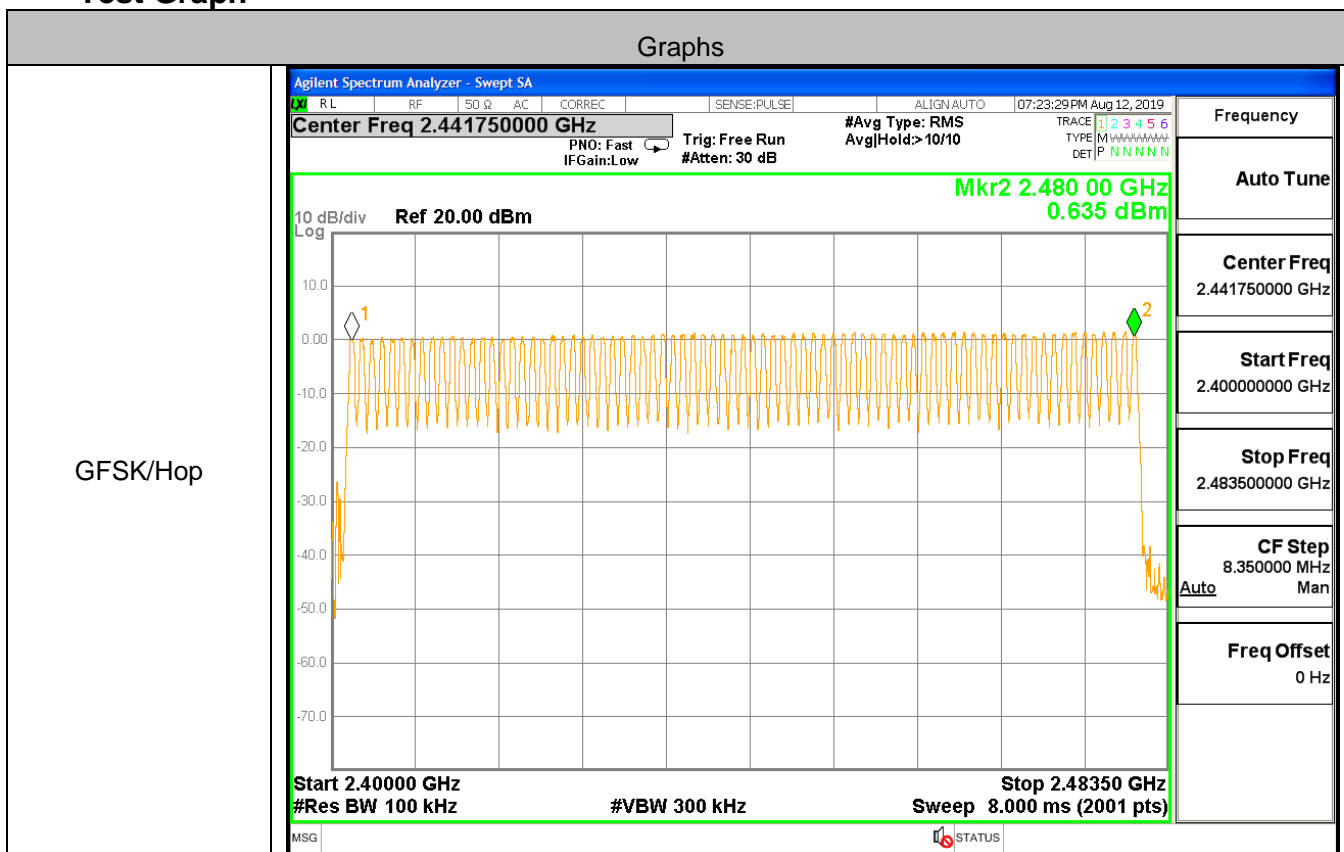




A.4 Hopping Channel Number

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

Test Graph

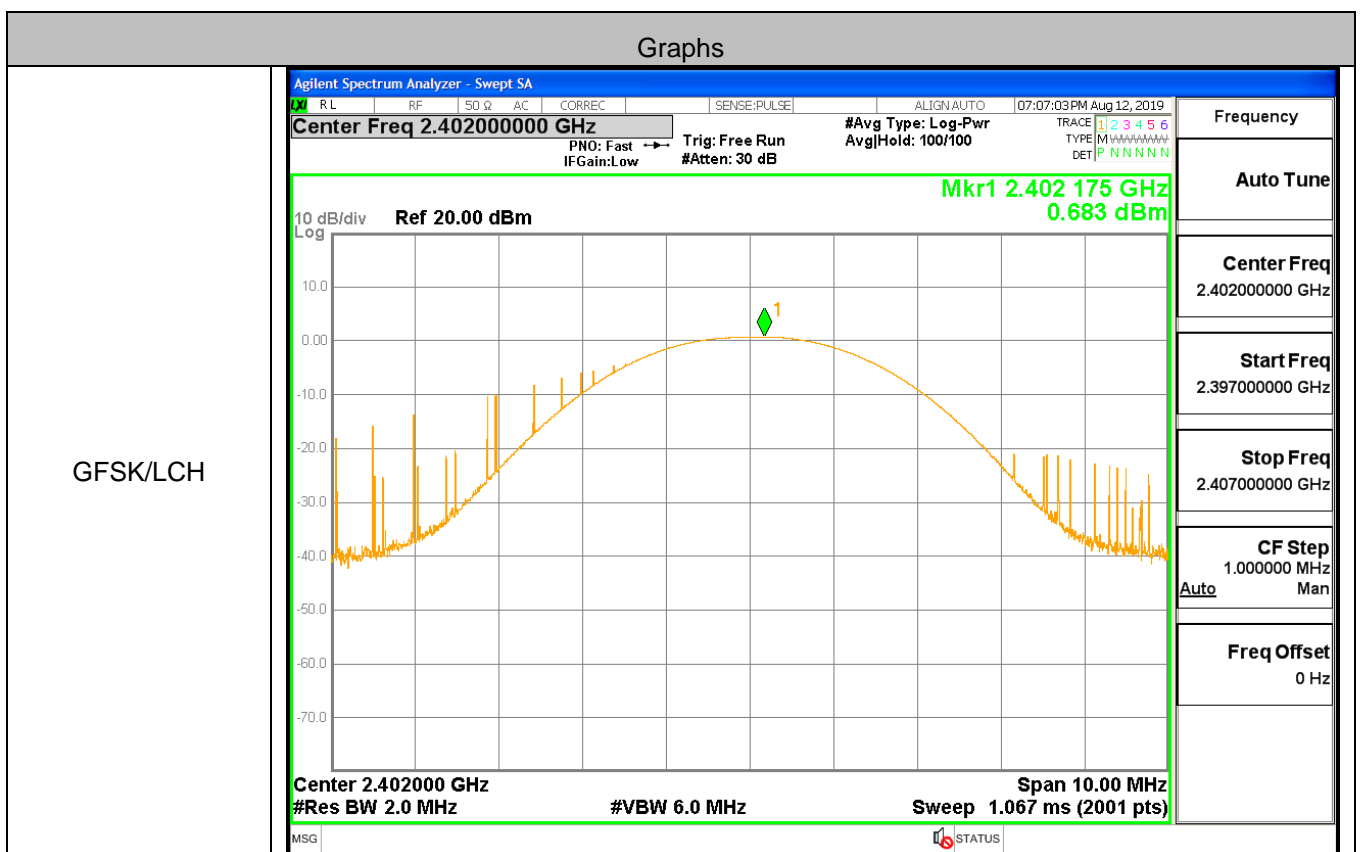


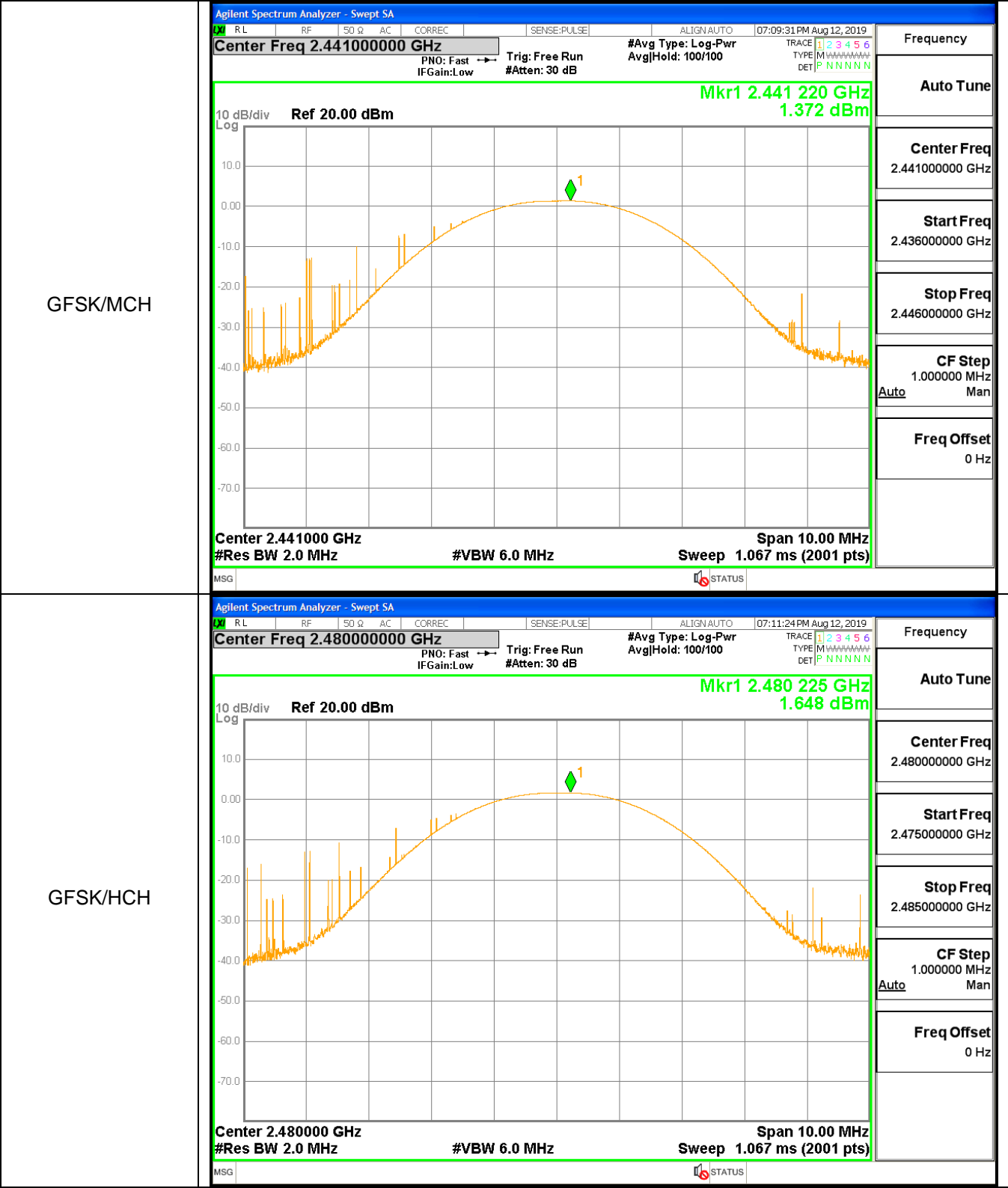


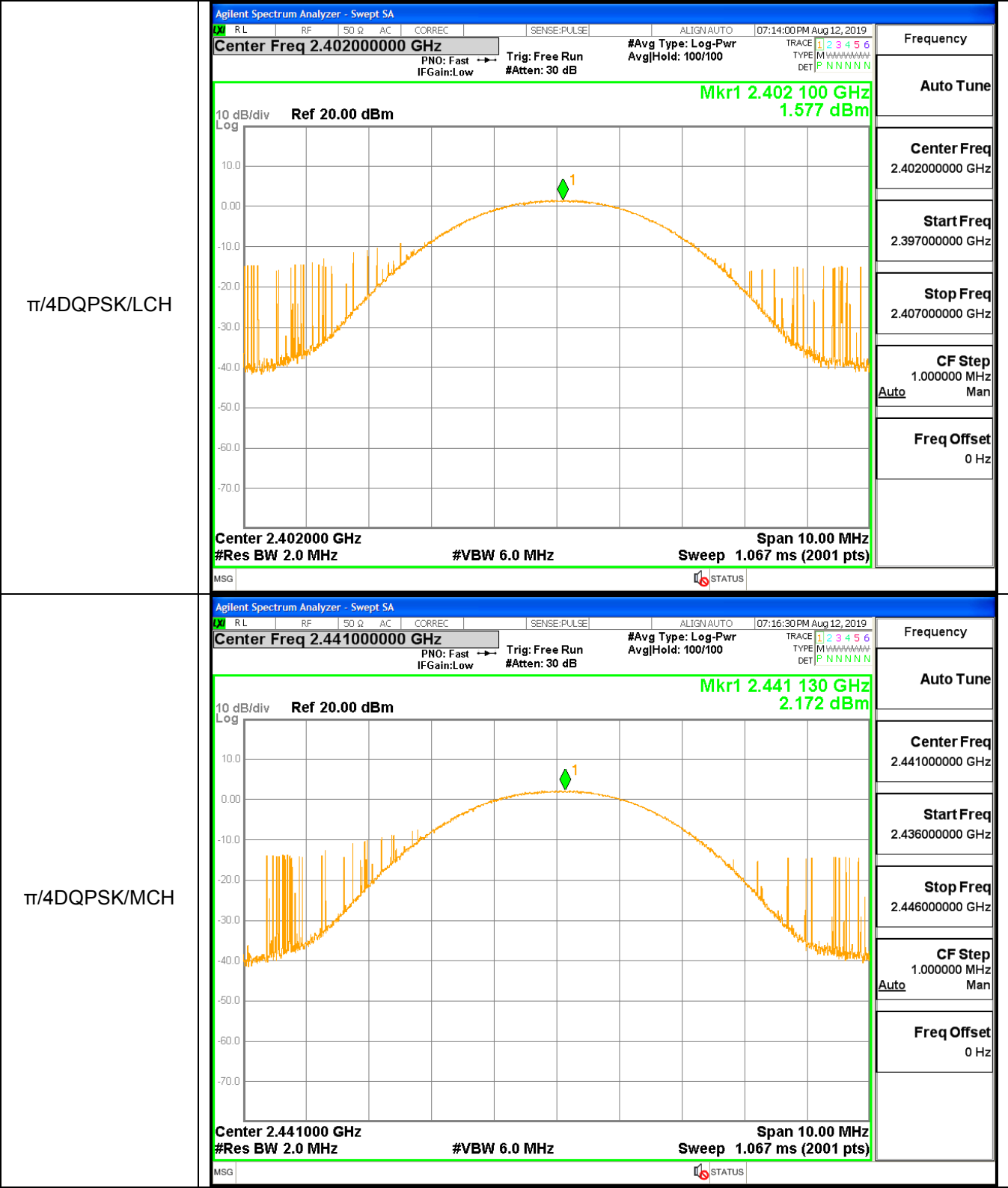
A.5 Conducted Peak Output Power

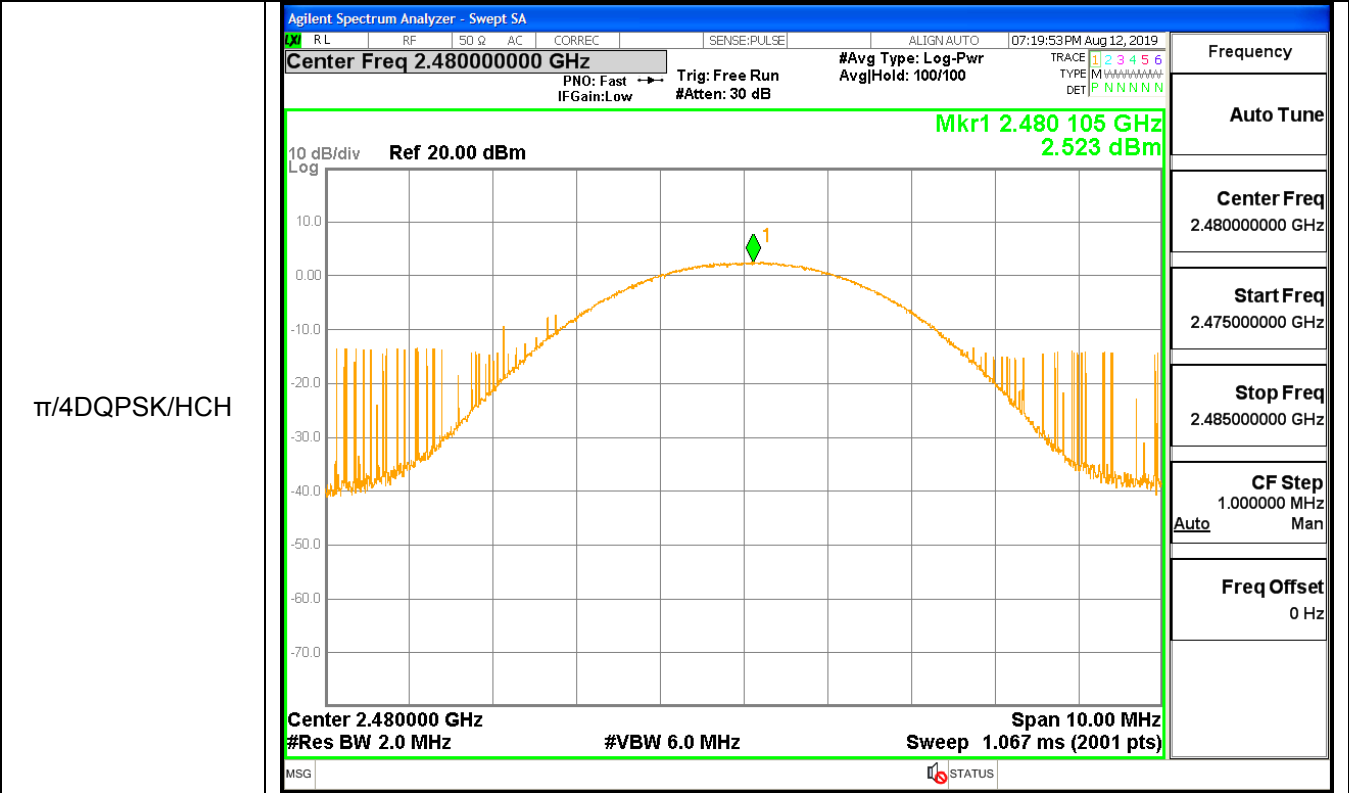
| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---------------|----------|---------------------------------|-------------|---------|
| GFSK | LCH | 0.683 | 21 | PASS |
| GFSK | MCH | 1.372 | 21 | PASS |
| GFSK | HCH | 1.648 | 21 | PASS |
| $\pi/4$ DQPSK | LCH | 1.577 | 21 | PASS |
| $\pi/4$ DQPSK | MCH | 2.172 | 21 | PASS |
| $\pi/4$ DQPSK | HCH | 2.523 | 21 | PASS |

Test Graph







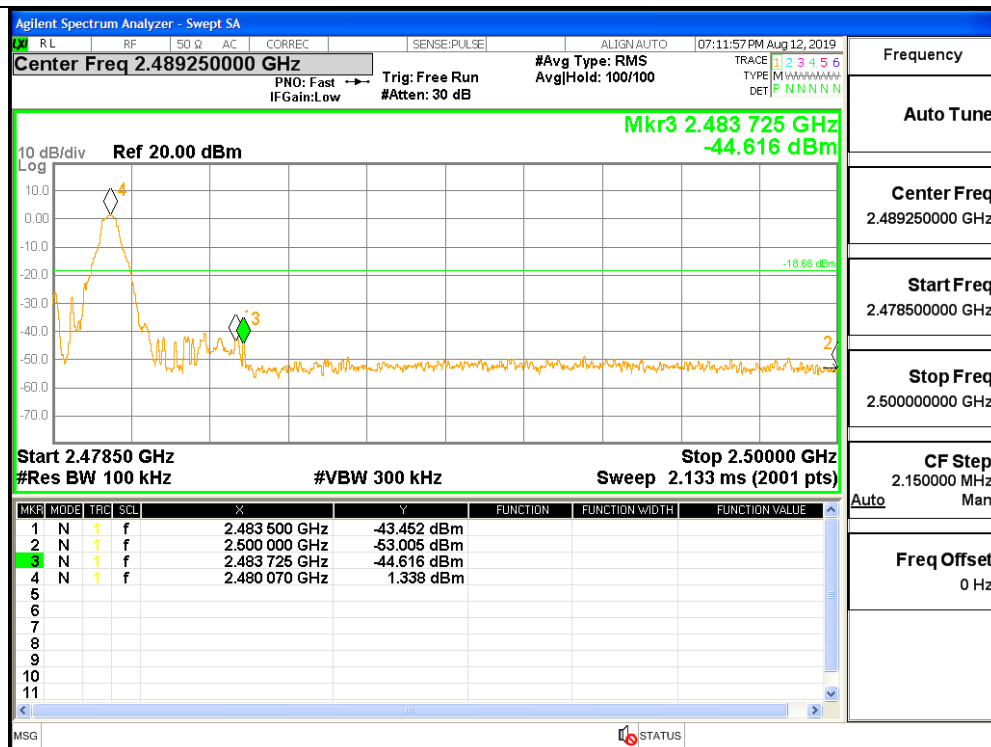


A.6 Band-edge for RF Conducted Emissions

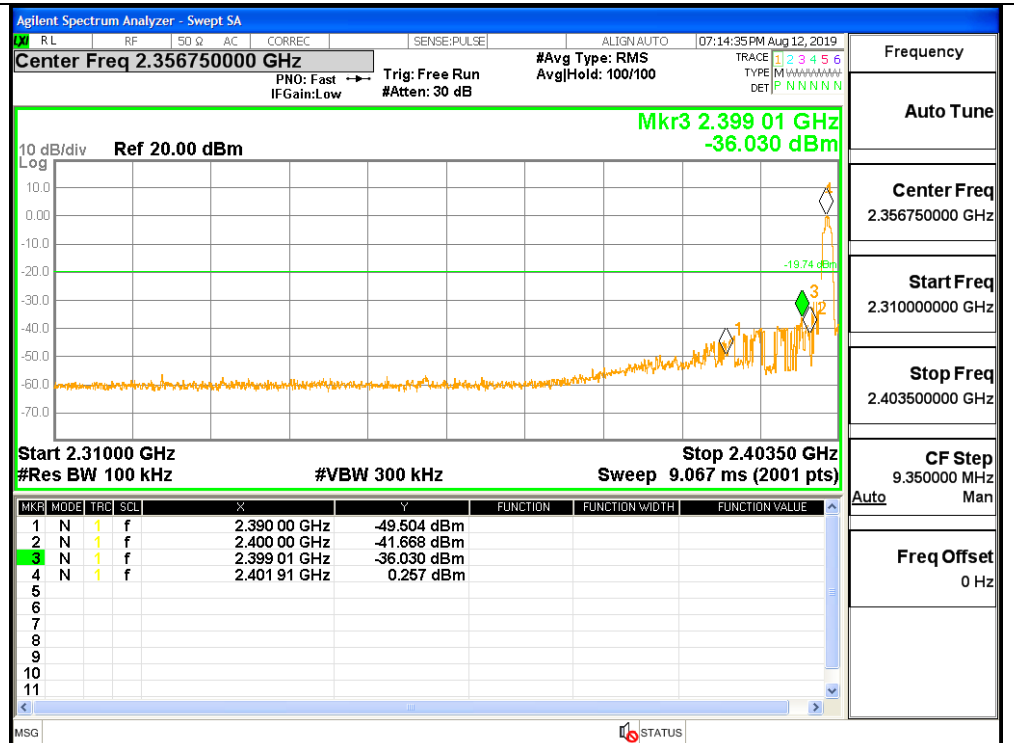
| Type | Carrier Frequency(MHz) | Frequency(MHz) | Carrier Frequency Power [dBm] | Bandedge Peak(dBm) | Upper limit(dBm) | Conclusion |
|--------------|------------------------|----------------|-------------------------------|--------------------|------------------|------------|
| 1DH5 | 2402 | 2399.433 | 0.447 | -35.525 | -19.553 | Pass |
| 1DH5 | 2480 | 2483.5 | 1.338 | -43.45 | -18.662 | Pass |
| 2DH5 | 2402 | 2399.012 | 0.257 | -36.03 | -19.743 | Pass |
| 2DH5 | 2480 | 2484.23 | 1.416 | -38.321 | -18.584 | Pass |
| 1DH5-Hopping | 2402 | 2398.47 | 0.76 | -39.015 | -19.24 | Pass |
| 1DH5-Hopping | 2480 | 2483.5 | 1.476 | -43.97 | -18.524 | Pass |
| 2DH5-Hopping | 2402 | 2400 | 0.671 | -34.19 | -19.329 | Pass |
| 2DH5-Hopping | 2480 | 2484.1 | 1.458 | -39.418 | -18.542 | Pass |

Graphs

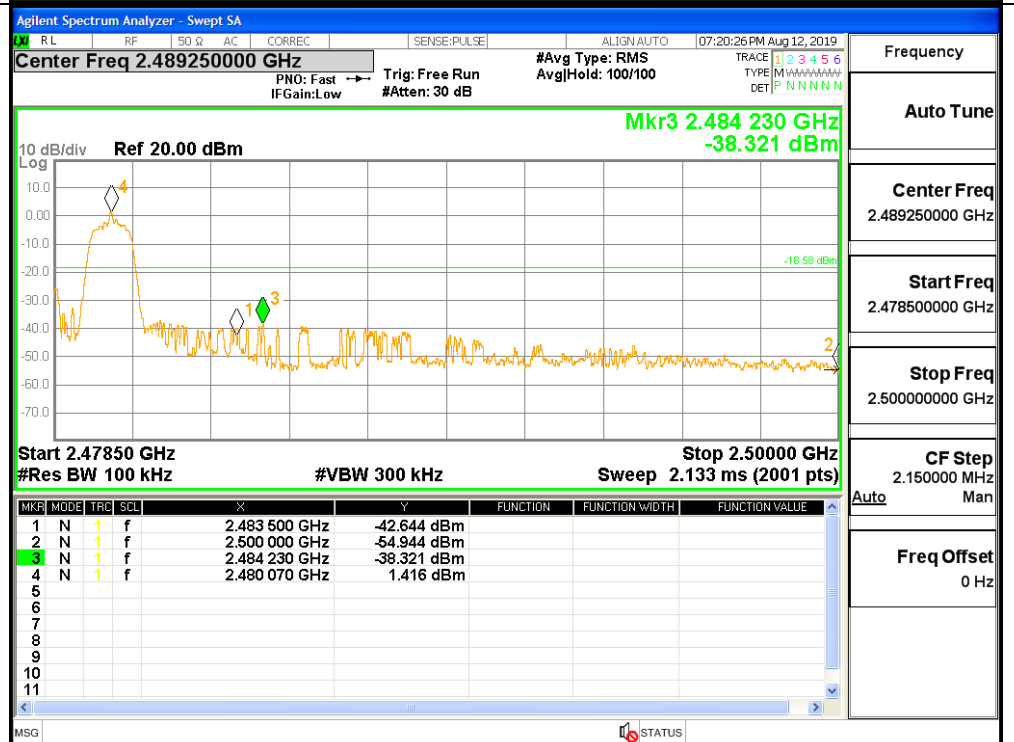
GFSK/HCH/No Hop



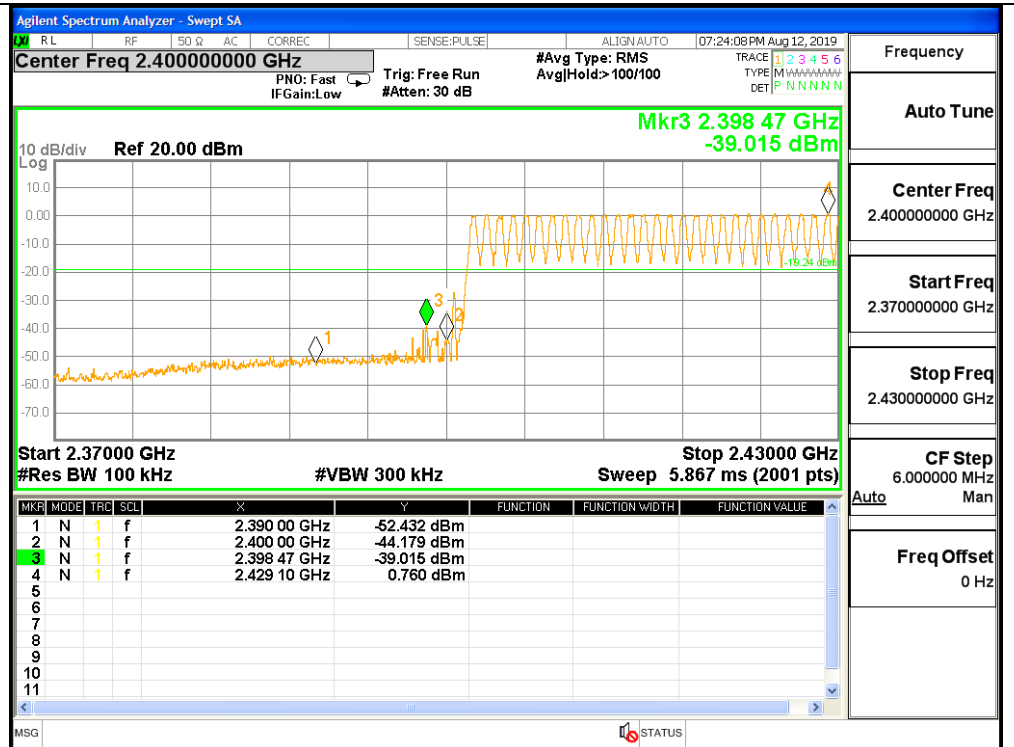
π /4DQPSK/LCH/No
Hop



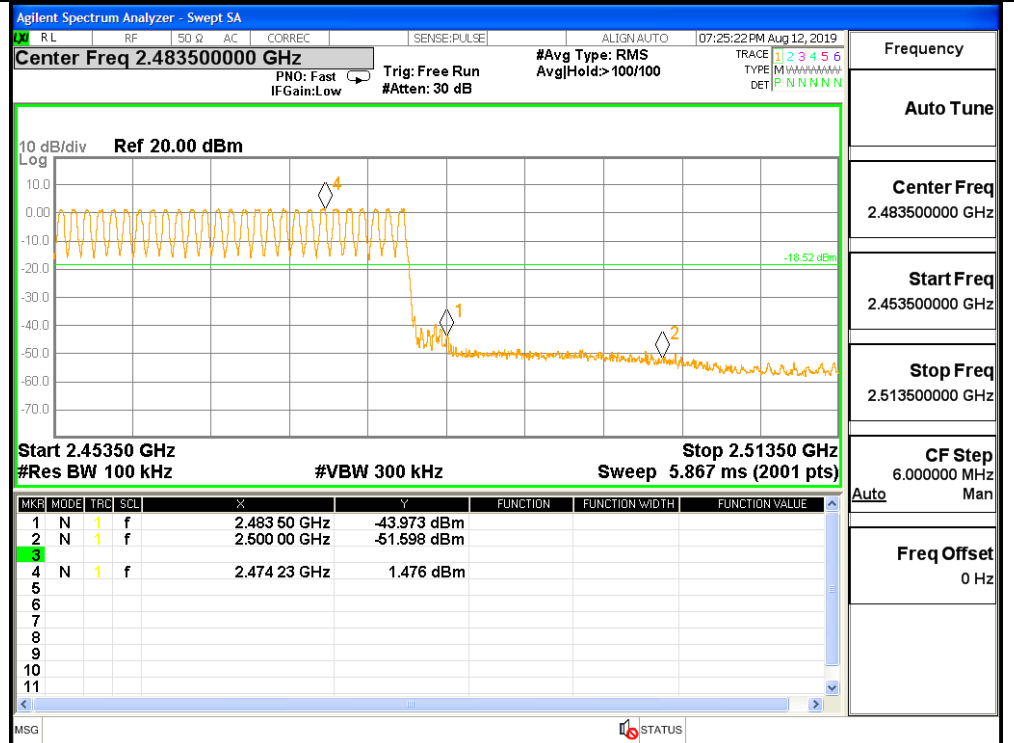
π /4DQPSK/HCH/No
Hop



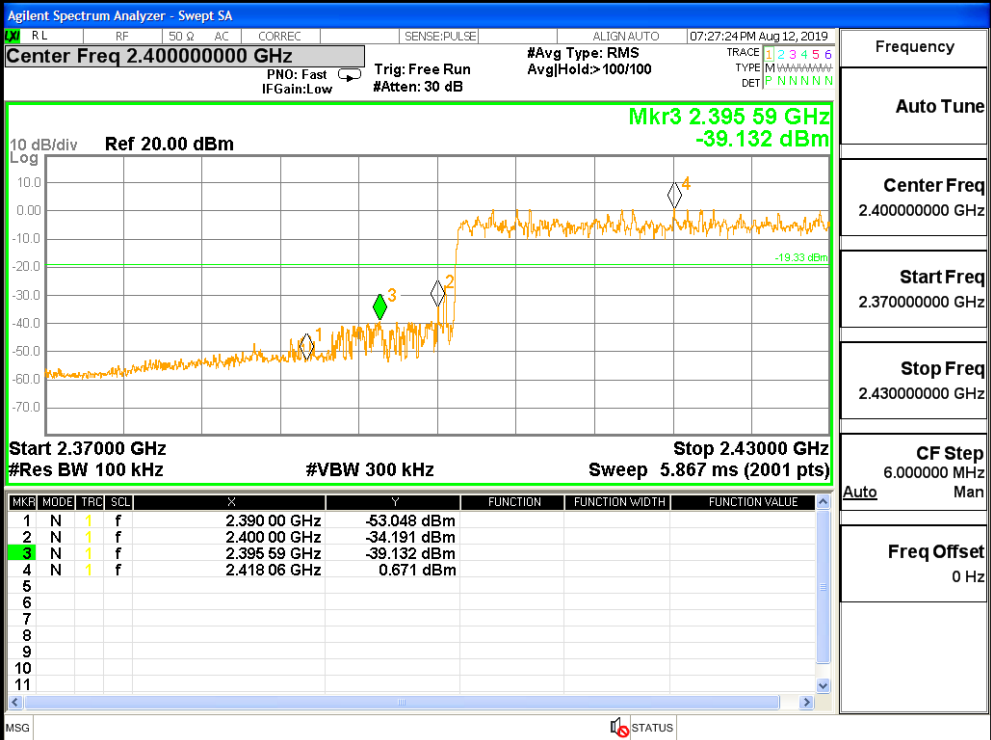
GFSK/LCH/Hop



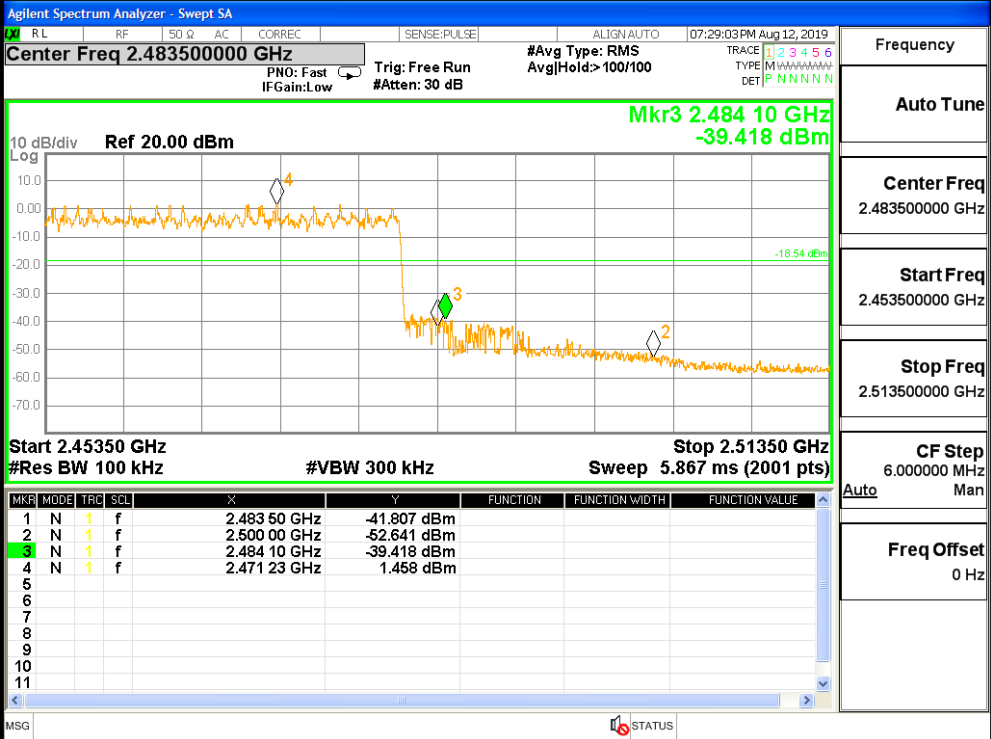
GFSK/HCH/Hop



π /4DQPSK/LCH/Hop

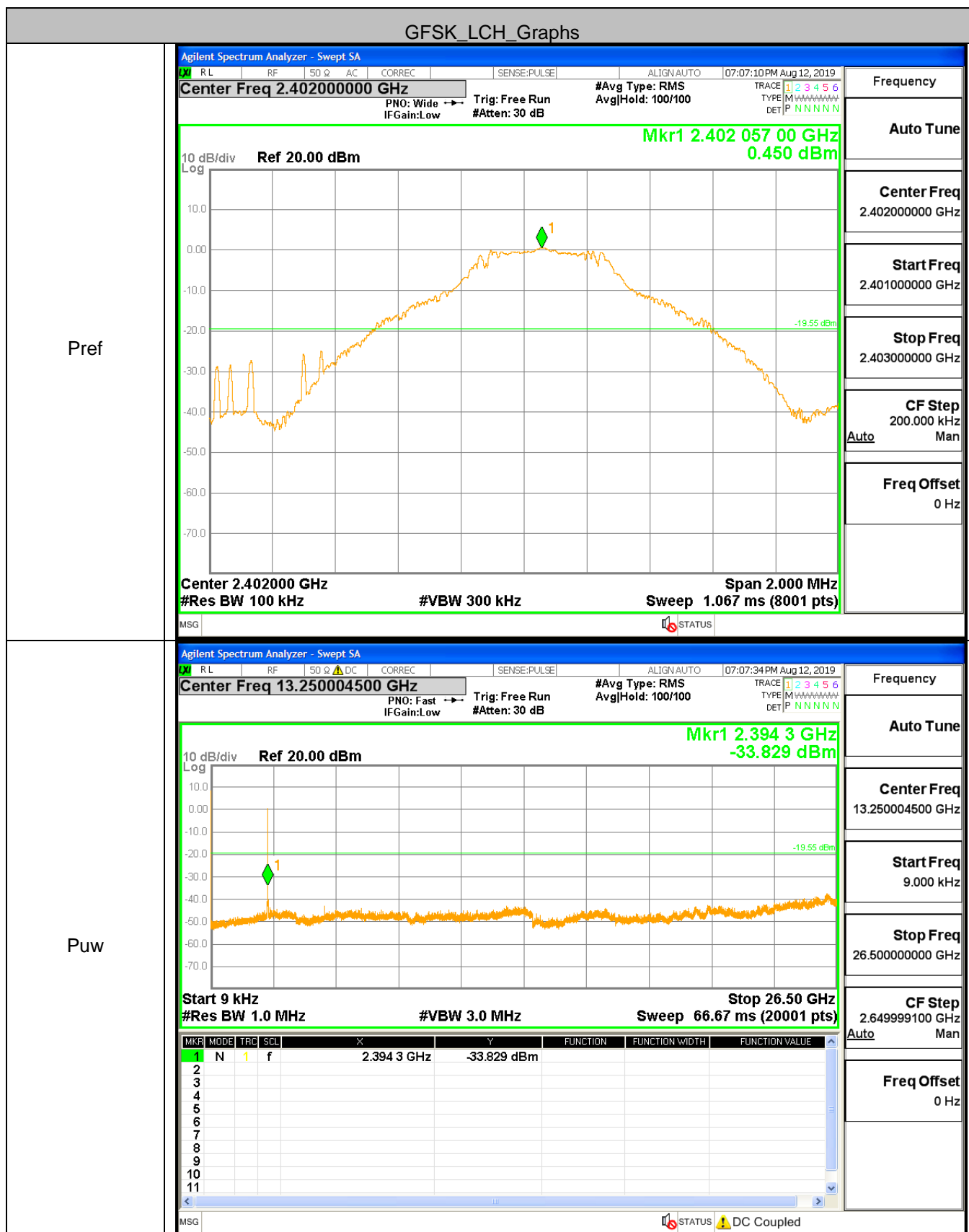


π /4DQPSK/HCH/Hop

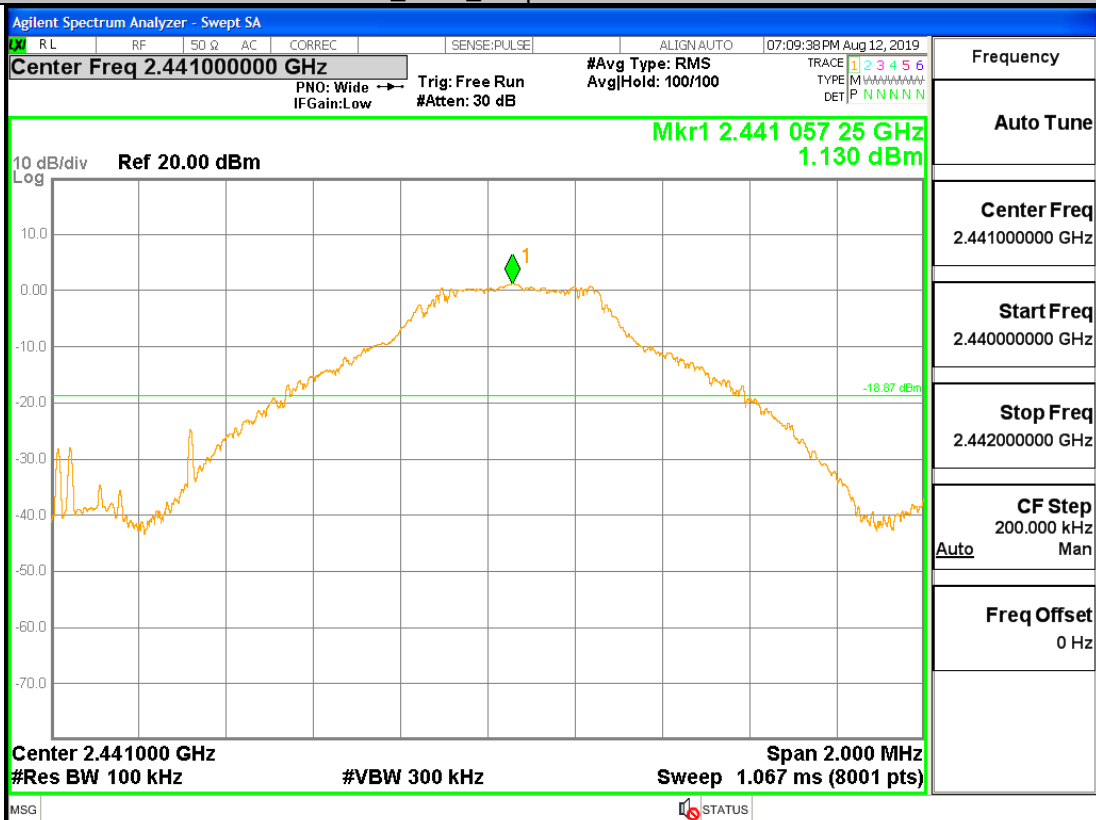


A.7 RF Conducted Spurious Emissions

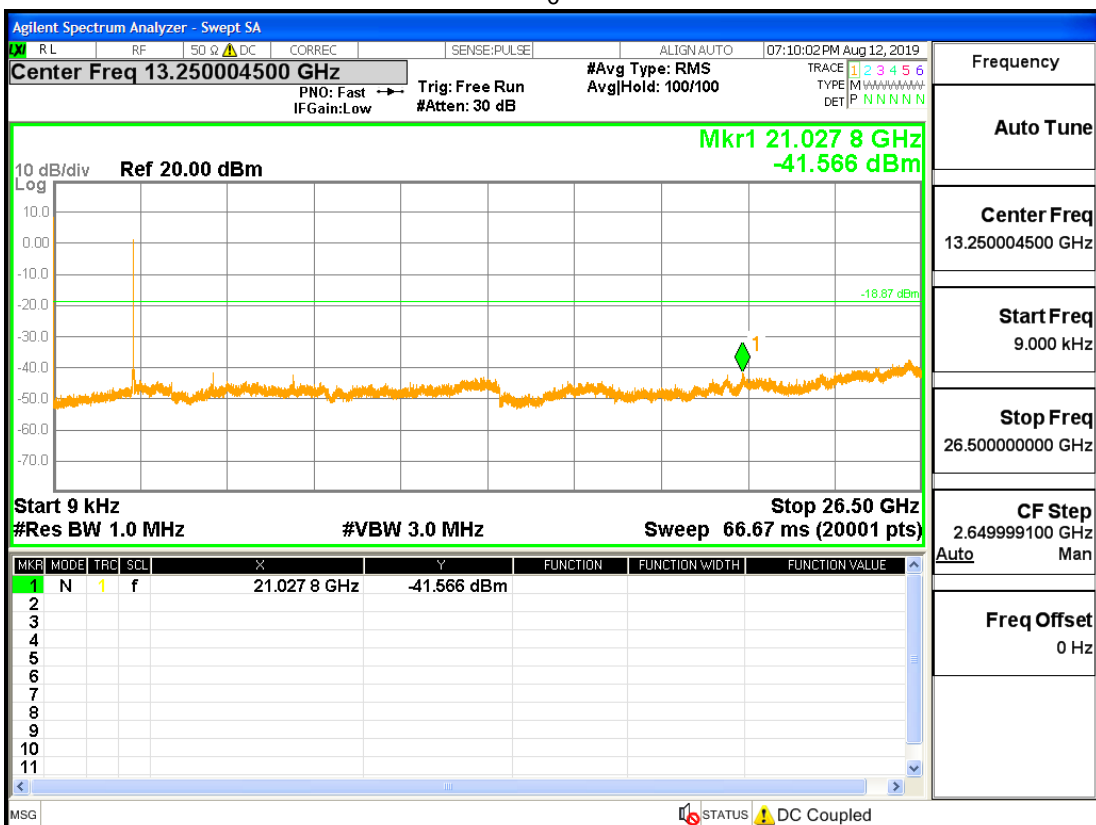
Test Graph



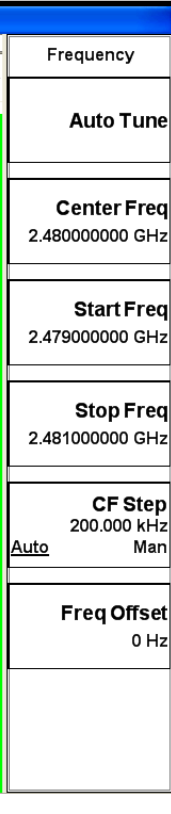
GFSK_MCH_Graphs



0

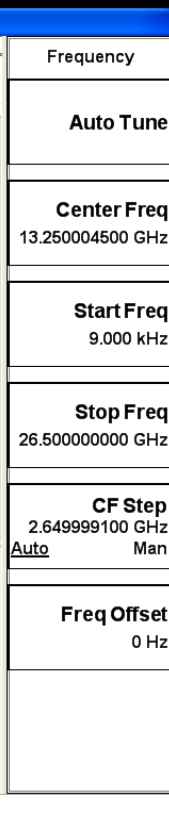
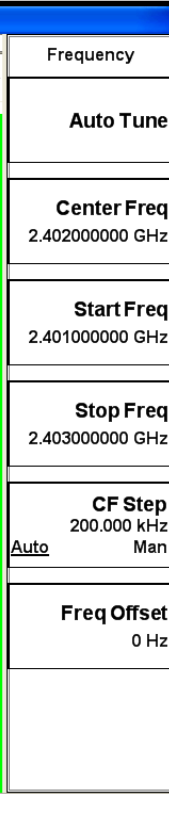


GFSK_HCH_Graphs

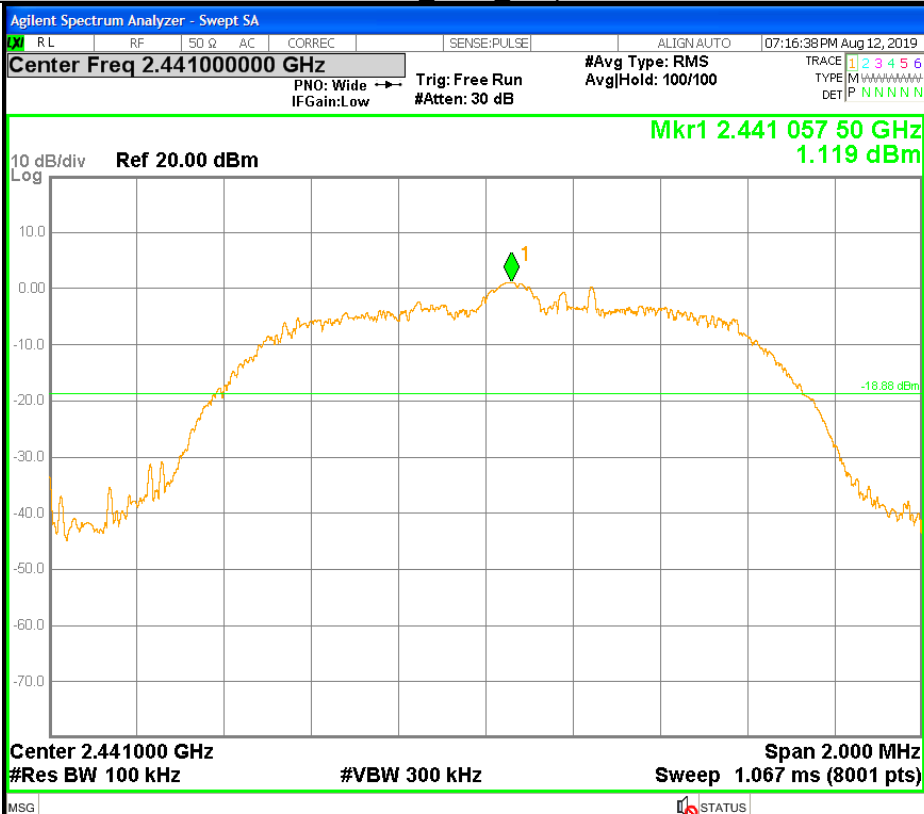


| | |
|---------------------------------|------|
| Frequency | |
| Auto Tune | |
| Center Freq 13.250004500 GHz | |
| Start Freq 9.000 kHz | |
| Stop Freq 26.500000000 GHz | |
| CF Step 2.649999100 GHz | Auto |
| Freq Offset 0 Hz | |

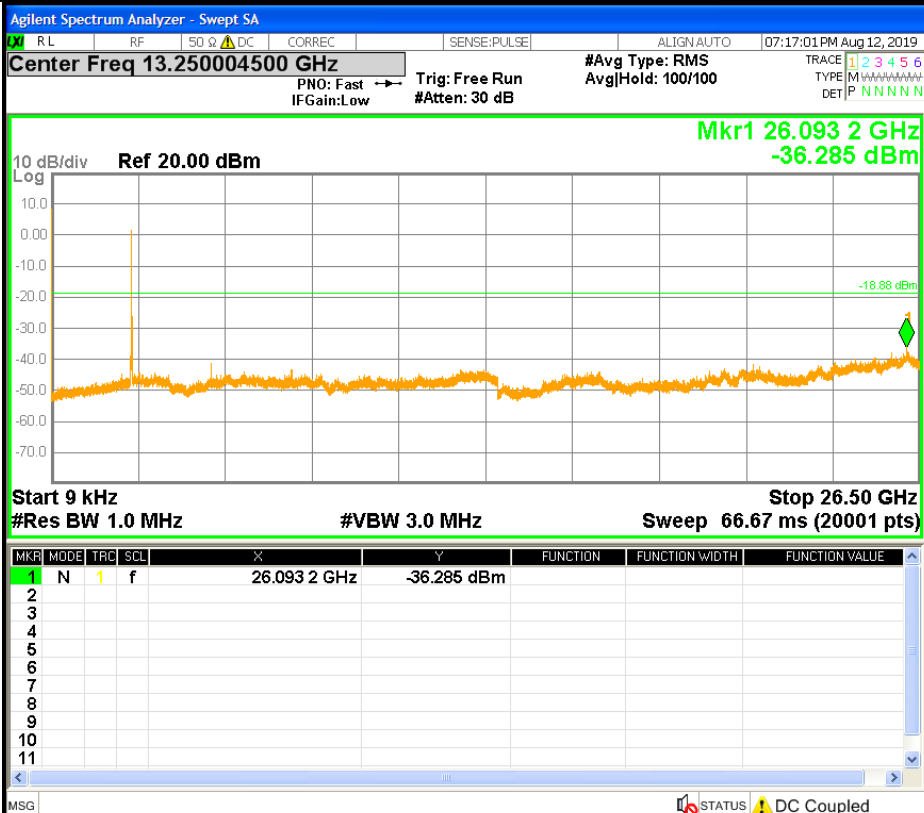
$\pi/4$ DQPSK LCH Graphs



$\pi/4$ DQPSK MCH Graphs

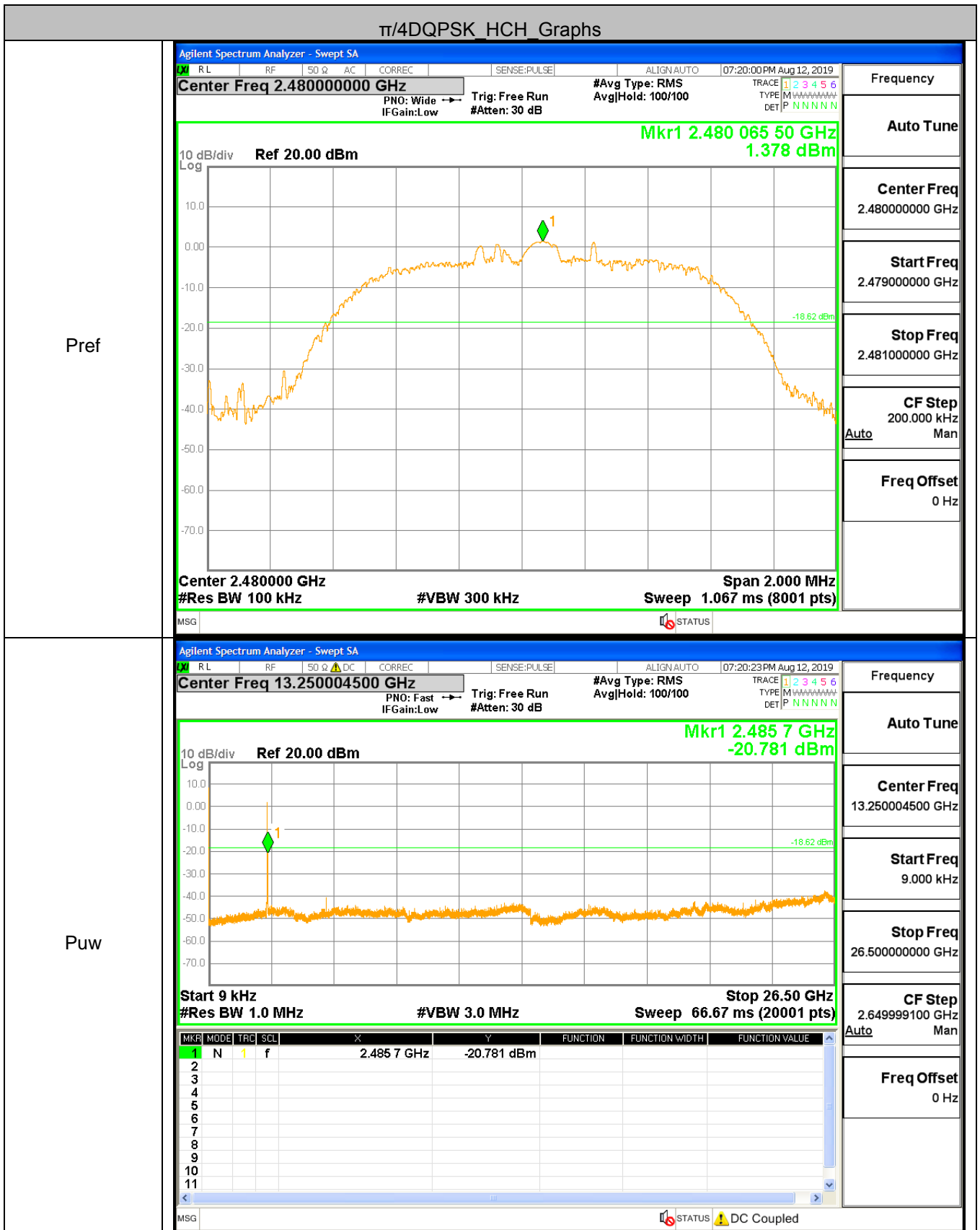


| |
|---|
| Frequency |
| Auto Tune |
| Center Freq 2.441000000 GHz |
| Start Freq 2.440000000 GHz |
| Stop Freq 2.442000000 GHz |
| CF Step 200.000 kHz <u>Auto</u> Man |
| Freq Offset 0 Hz |



| |
|--|
| 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 HCH Graphs

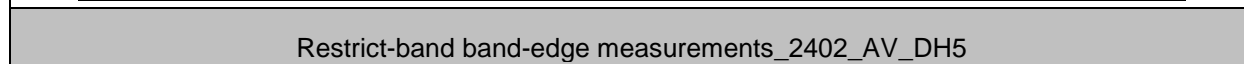


A.8 Restrict-band measurements

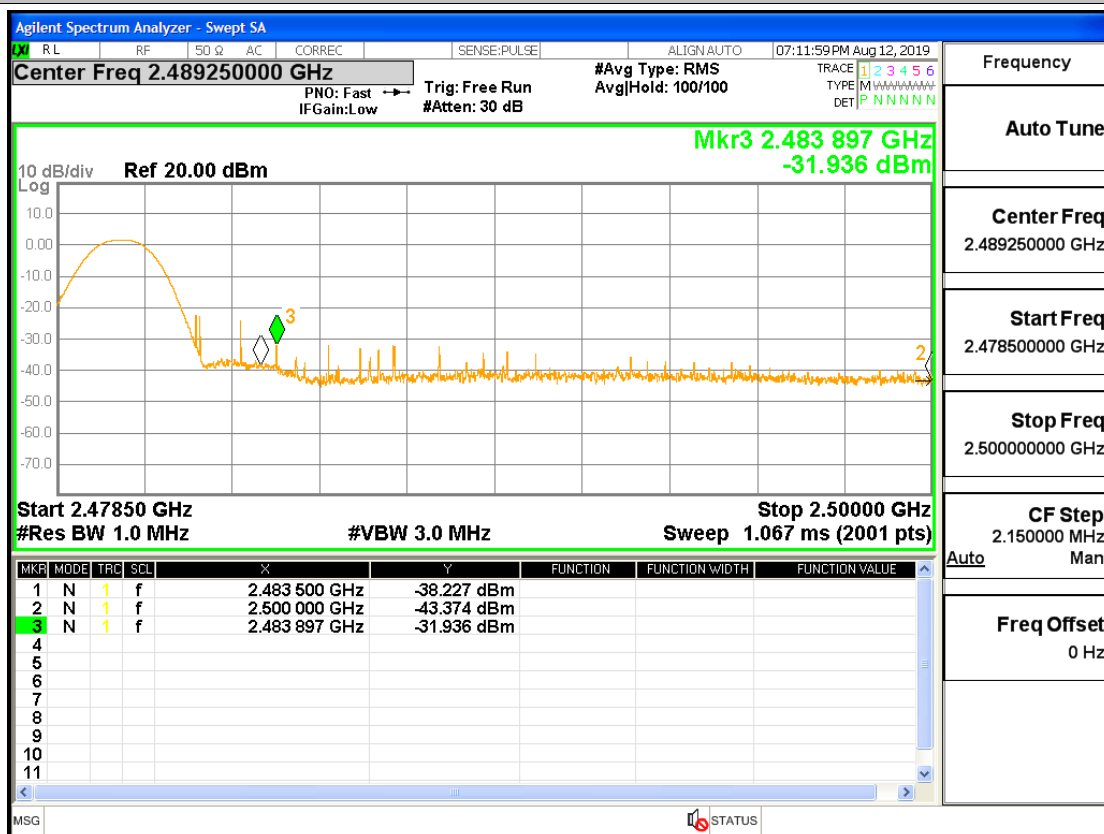
| Type | Carrier Frequency (MHz) | Frequency(M Hz) | Gain | Ground Factor | Peak Value(dBm) | E [dBuV/m] | Limit [dBuV/m] | Conclusion |
|------|-------------------------------|--------------------|------|------------------|--------------------|---------------|-------------------|------------|
| 1DH5 | 2402 | 2388.77 | 2.00 | 0.00 | -37.15 | 60.05 | 74 | Pass |
| 1DH5 | 2480 | 2483.90 | 2.00 | 0.00 | -31.94 | 65.26 | 74 | Pass |
| 2DH5 | 2402 | 2387.89 | 2.00 | 0.00 | -28.09 | 69.11 | 74 | Pass |
| 2DH5 | 2480 | 2483.50 | 2.00 | 0.00 | -35.97 | 61.23 | 74 | Pass |

| Type | Carrier Frequency (MHz) | Frequency(M Hz) | Gain | Ground Factor | Average Value(dBm) | E [dBuV/m] | Limit [dBuV/m] | Conclusion |
|------|-------------------------------|--------------------|------|------------------|-----------------------|---------------|-------------------|------------|
| 1DH5 | 2402 | 2388.77 | 2.00 | 0.00 | -50.37 | 46.83 | 54 | Pass |
| 1DH5 | 2480 | 2483.90 | 2.00 | 0.00 | -44.32 | 52.88 | 54 | Pass |
| 2DH5 | 2402 | 2387.89 | 2.00 | 0.00 | -49.70 | 47.50 | 54 | Pass |
| 2DH5 | 2480 | 2484.38 | 2.00 | 0.00 | -45.39 | 51.81 | 54 | Pass |

Restrict-band band-edge measurements_2402_PEAK_DH5



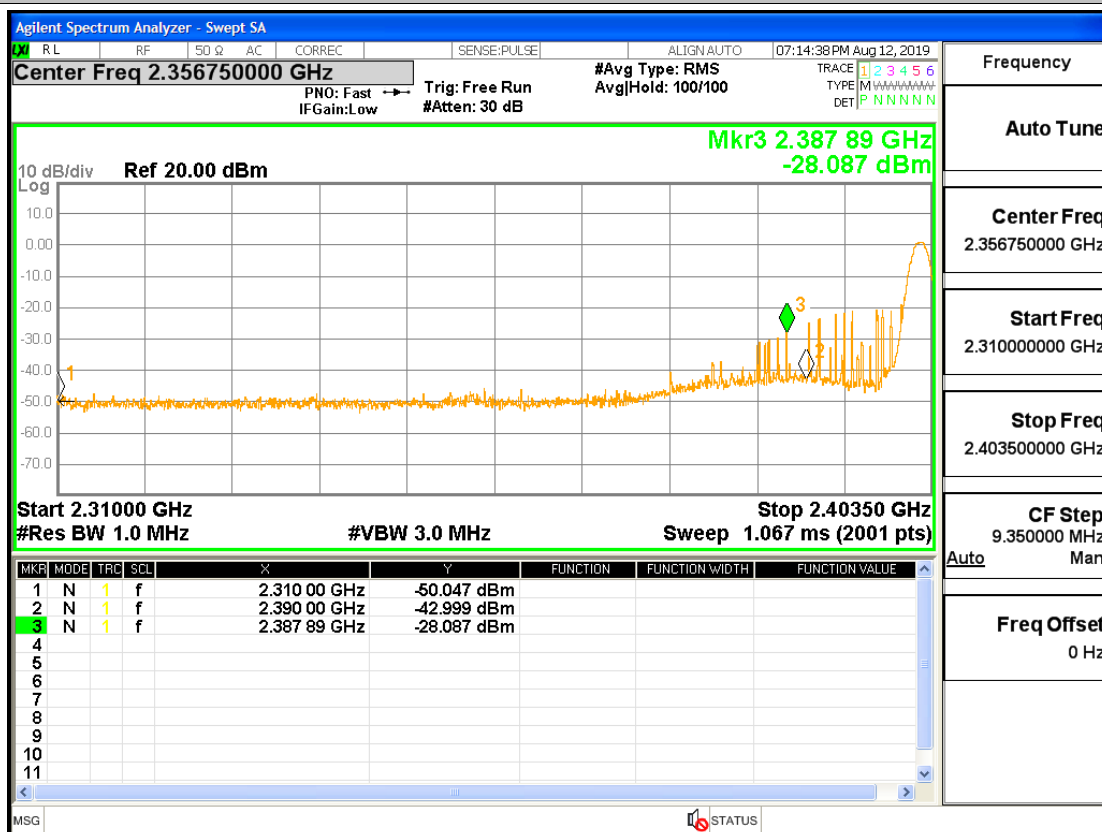
Restrict-band band-edge measurements 2480 PEAK DH5



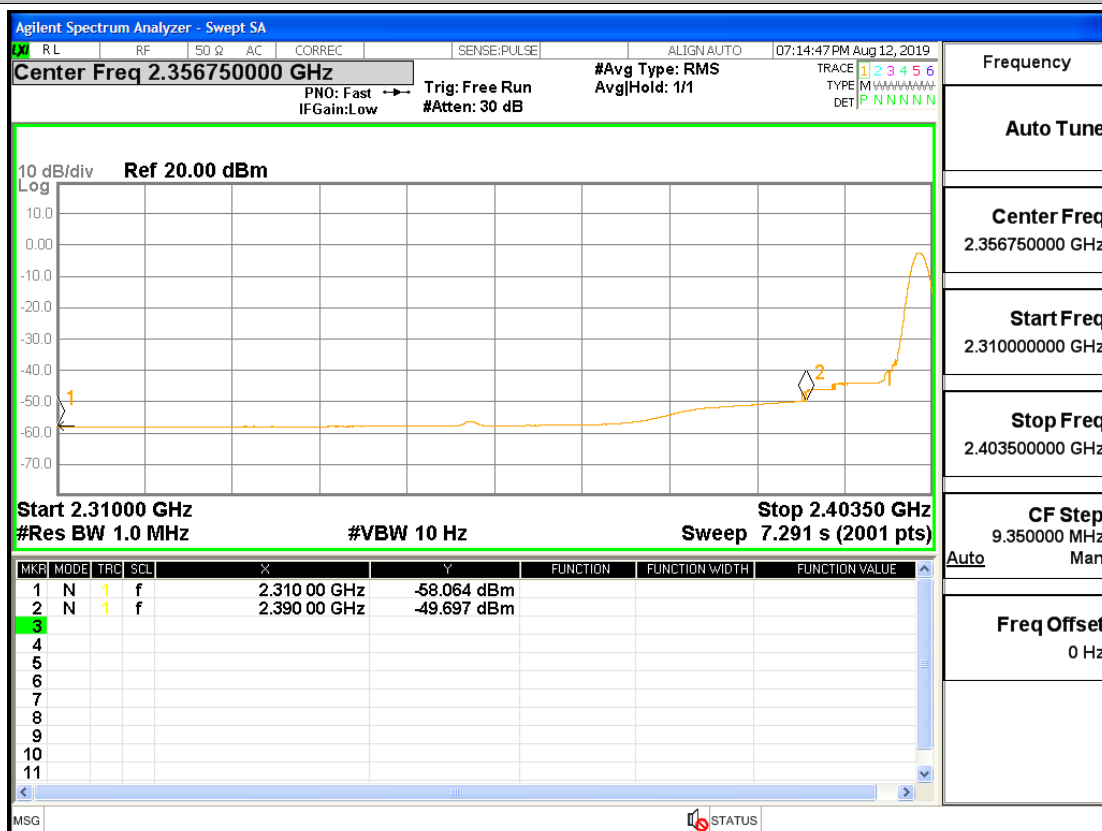
Restrict-band band-edge measurements_2480_AV_DH5



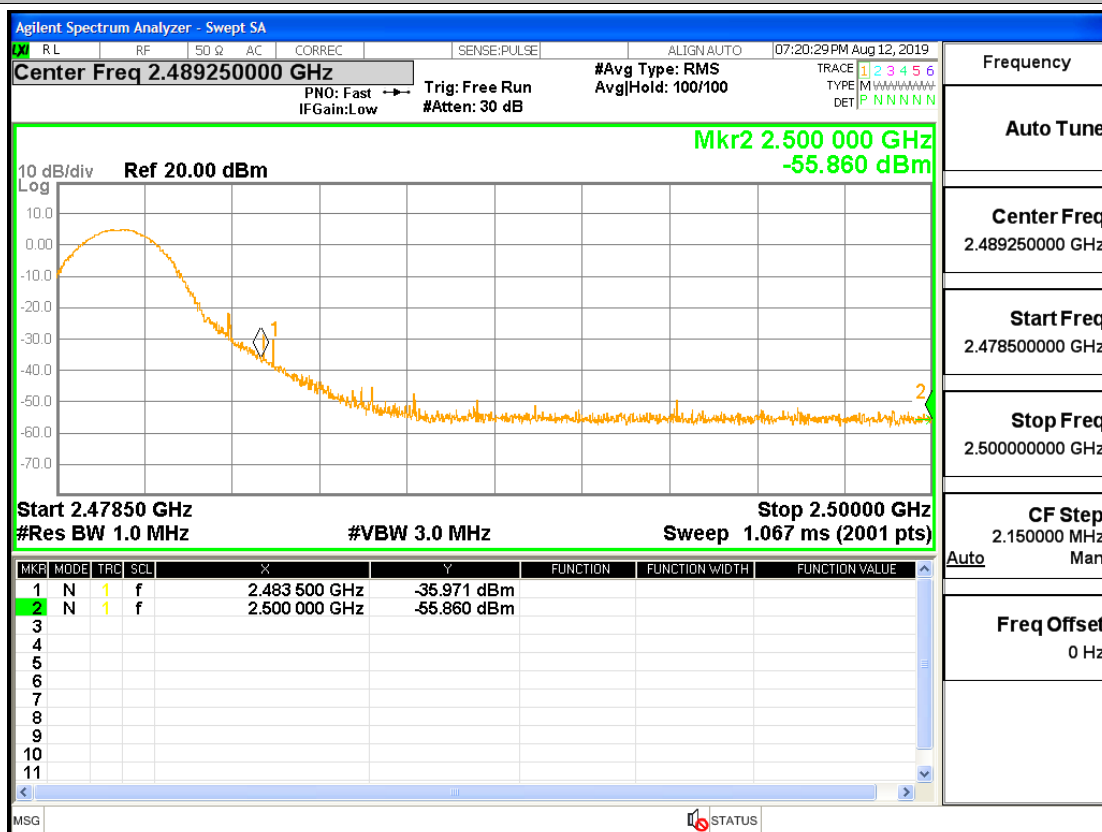
Restrict-band band-edge measurements 2402 PEAK 2DH5



Restrict-band band-edge measurements 2402 AV 2DH5



Restrict-band band-edge measurements 2480 PEAK 2DH5



Restrict-band band-edge measurements 2480 AV 2DH5

