# Appendix A

# RF Test Data for BT V4.2 (Conducted Measurement)

**Product Name: Lantern Speaker**

**Trade Mark: N/A**

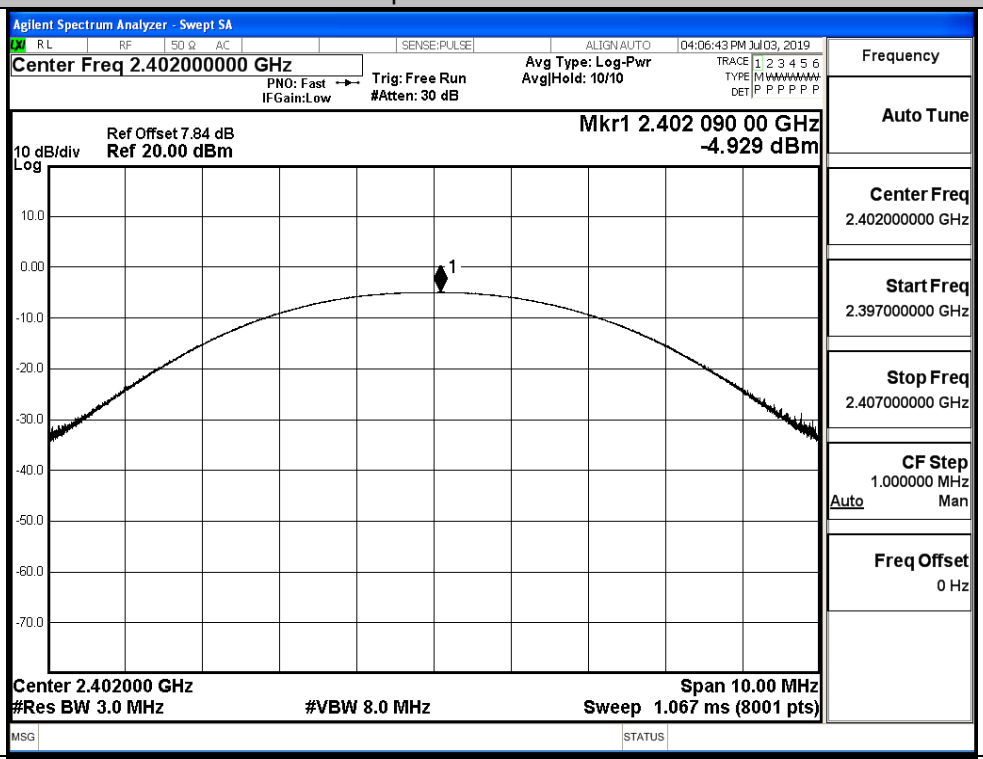
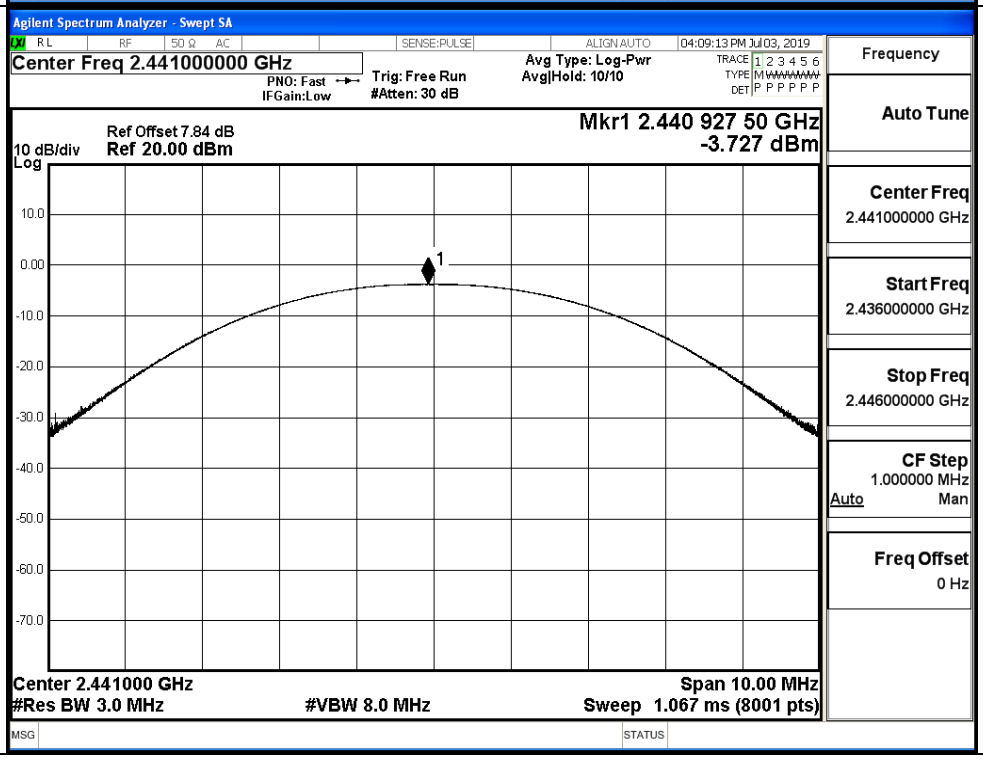
**Test Model: JWT2811L-2**

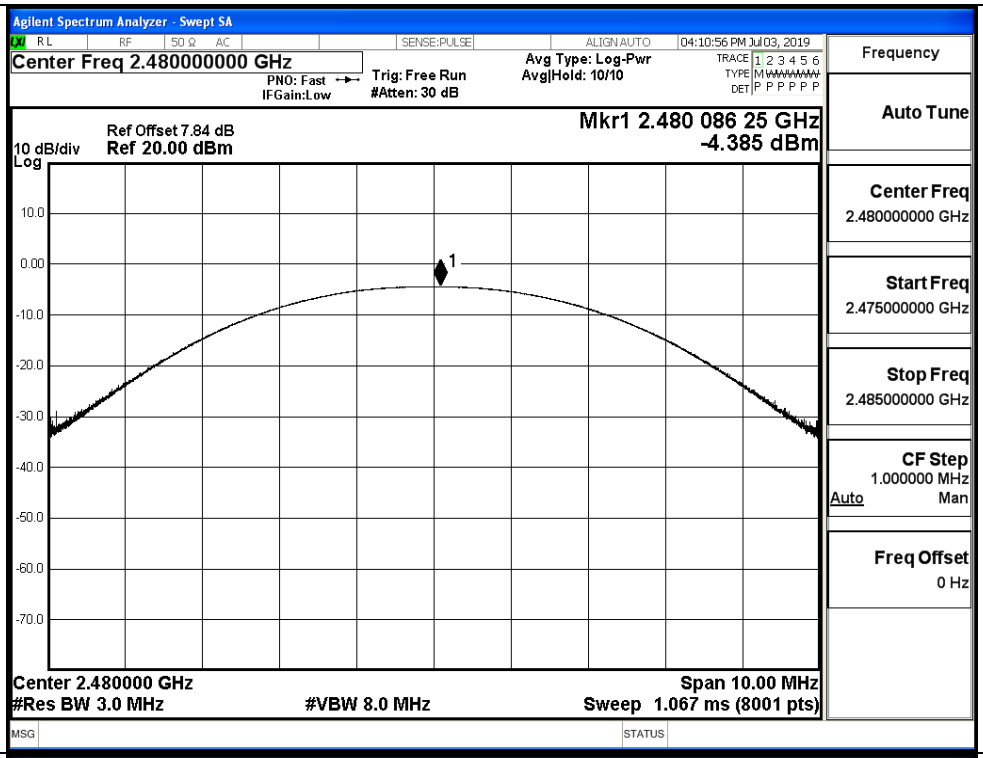
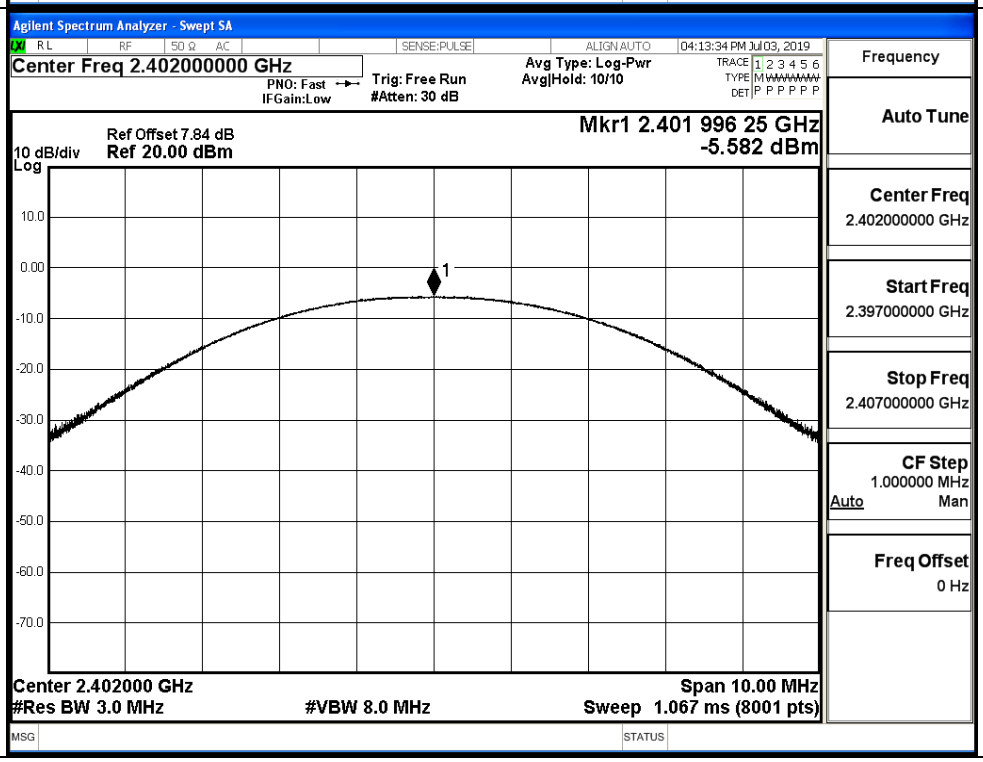
## Environmental Conditions

| | |
|---|---|
| Temperature: | 24.1°C |
| Relative Humidity: | 53.8% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | WANGCHUANG |
| Supervised by: | TOM.LIU |

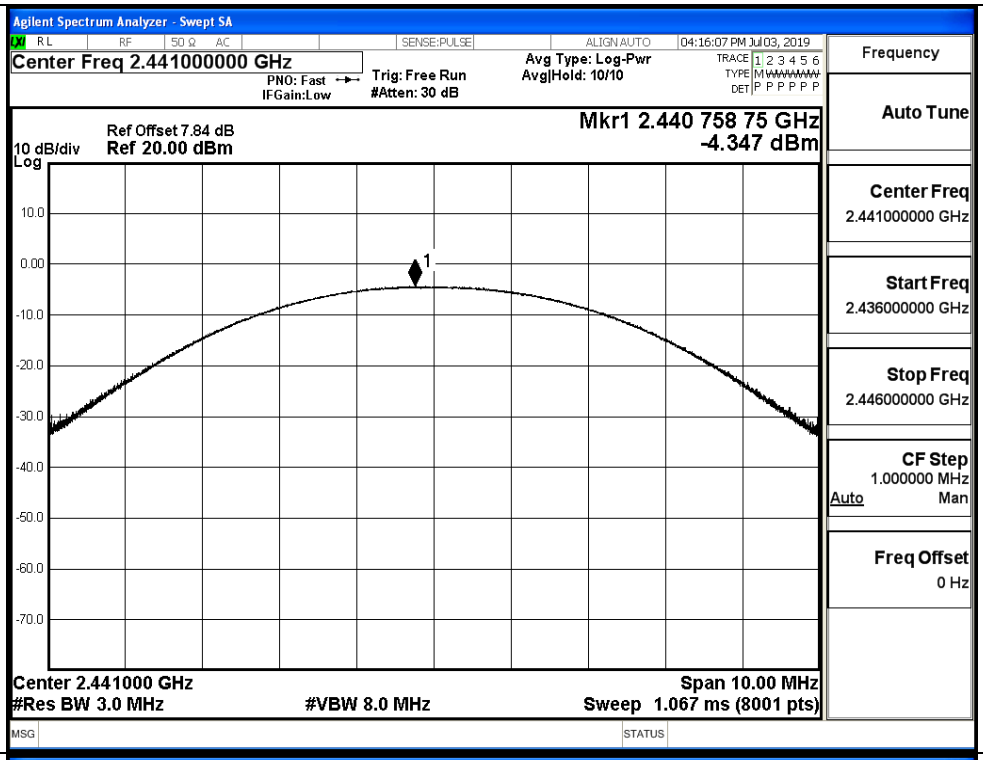
## A.1 Maxmum Conducted Peak Output Power

| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | -4.929 | 21 | PASS |
| | MCH | -3.727 | 21 | PASS |
| | HCH | -4.385 | 21 | PASS |
| π/4DQPSK | LCH | -5.582 | 21 | PASS |
| | MCH | -4.347 | 21 | PASS |
| | HCH | -4.981 | 21 | PASS |

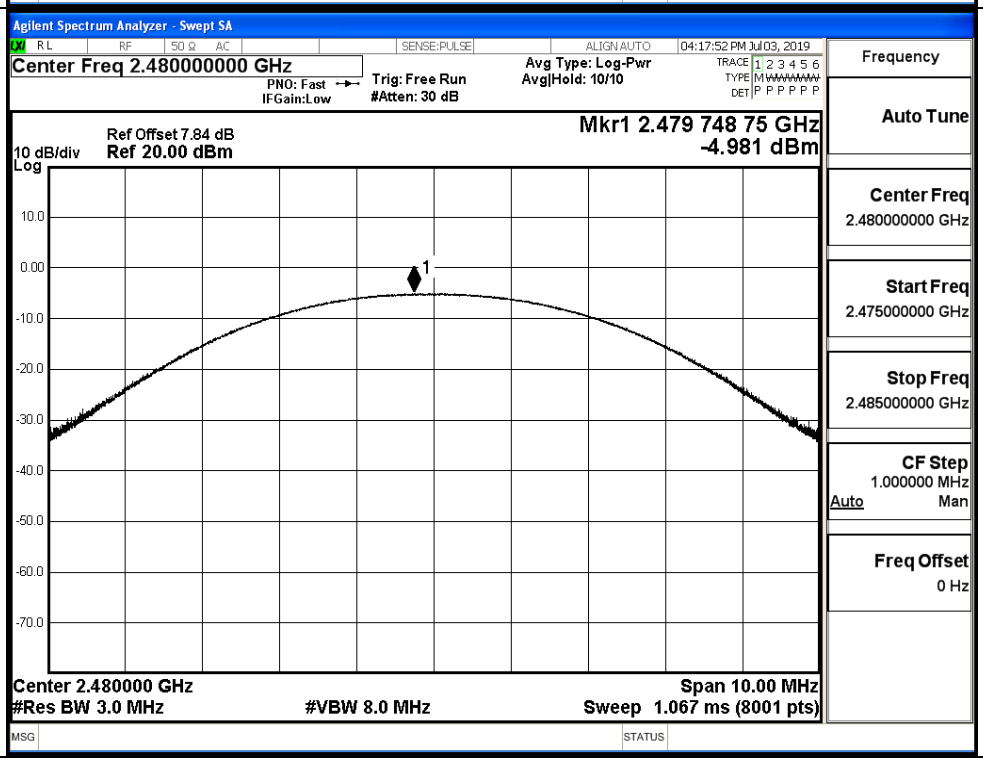
| Test Graphs | | |
|---|---|---|
| GFSK/LCH | |  |
| GFSK/MCH | |  |

| | |
|---|---|
| GFSK/HCH |  |
| π/4DQPSK/LCH |  |

π/4DQPSK/MCH

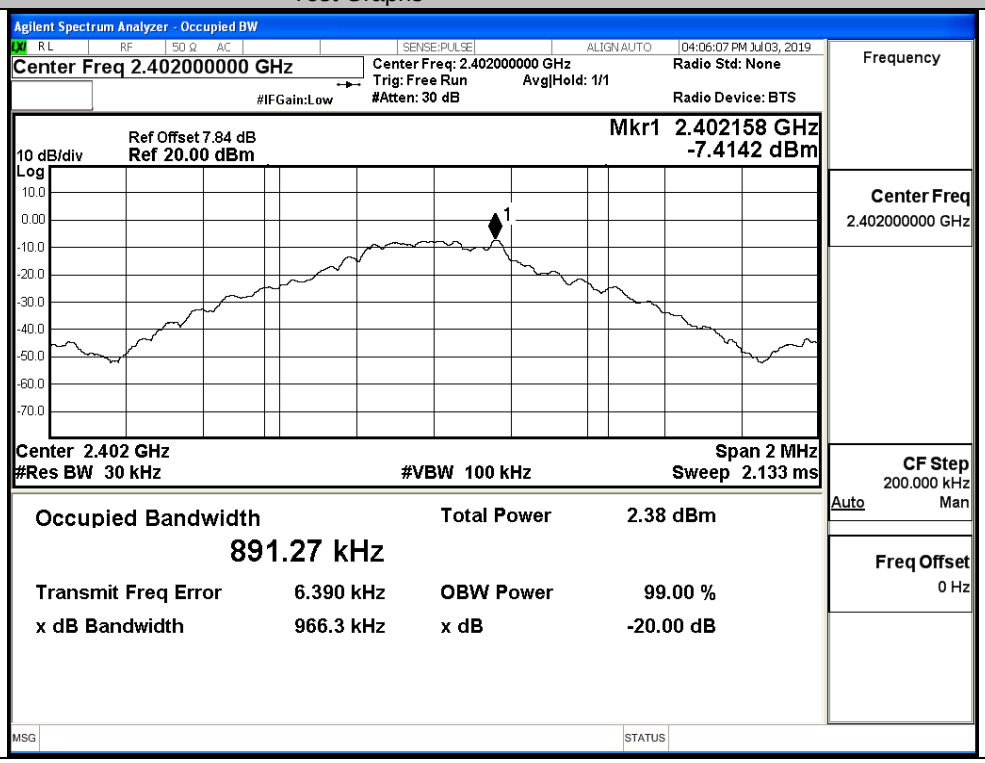


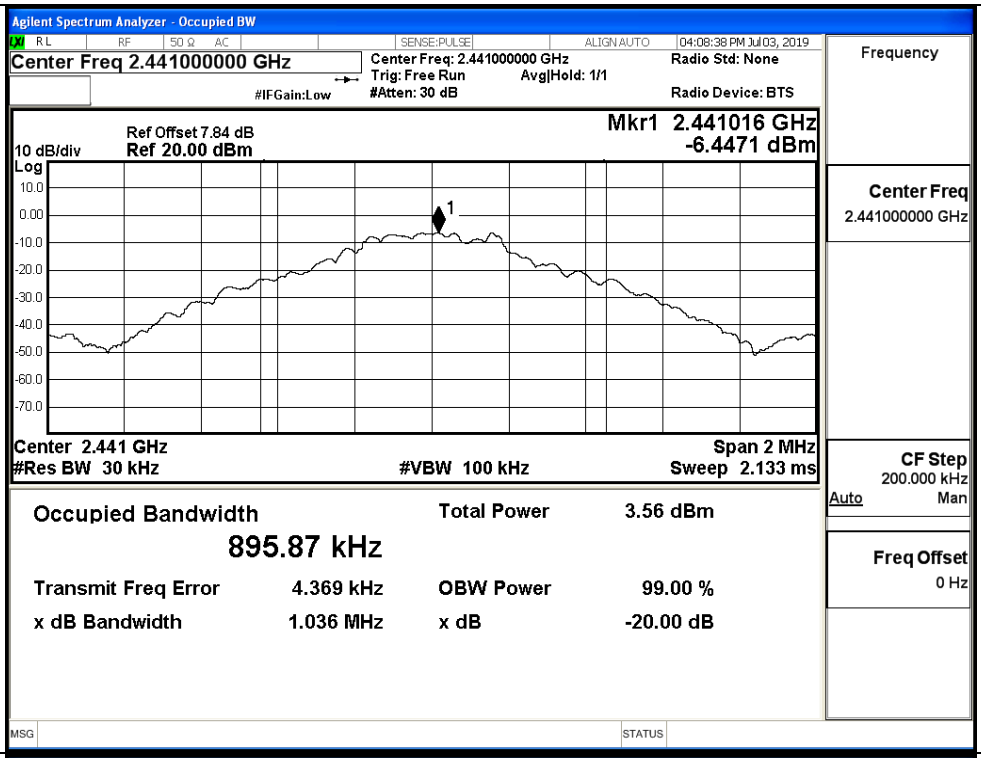
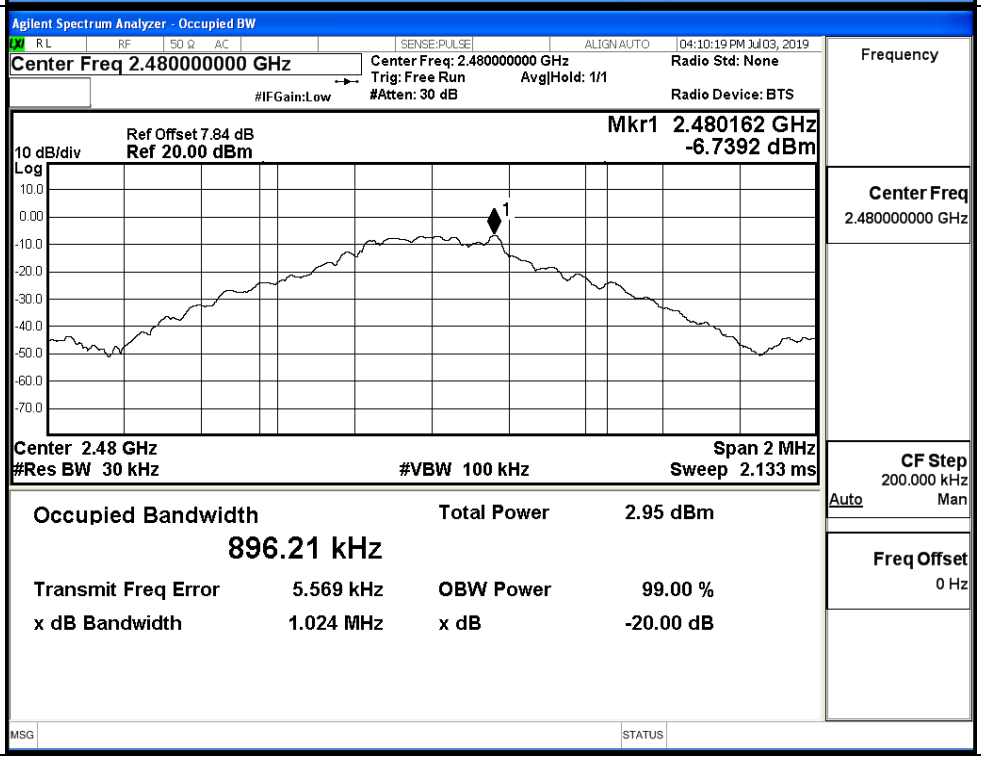

π/4DQPSK/HCH



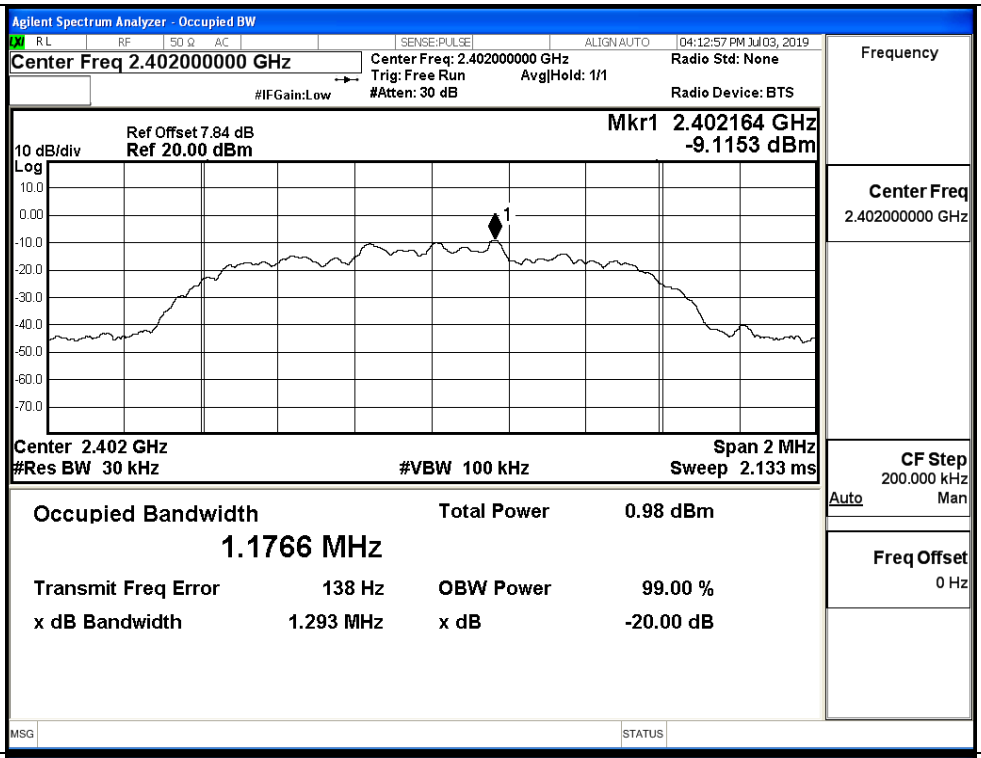
## A.2 20dB Bandwidth

| Mode | Channel. | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.9663 | Not Specified | PASS |
| | MCH | 1.036 | Not Specified | PASS |
| | HCH | 1.024 | Not Specified | PASS |
| π/4DQPSK | LCH | 1.293 | Not Specified | PASS |
| | MCH | 1.291 | Not Specified | PASS |
| | HCH | 1.292 | Not Specified | PASS |

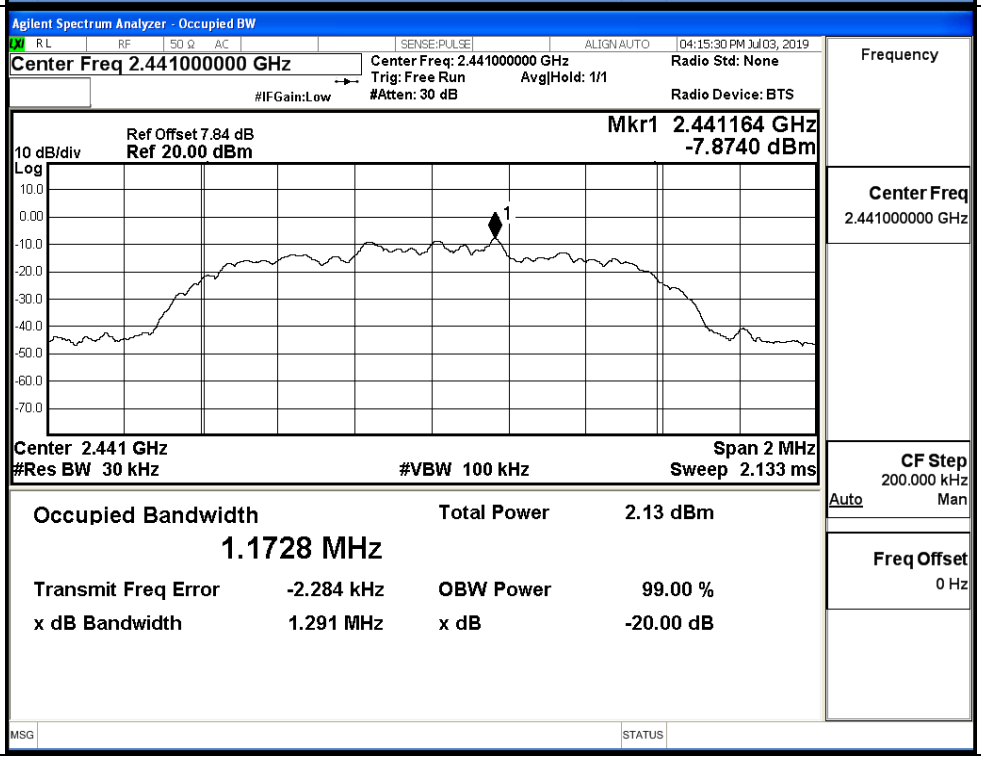
| Test Graphs | |
|---|---|
| GFSK/LCH |  |

| | |
|---|---|
| GFSK/MCH |  |
| GFSK/HCH |  |

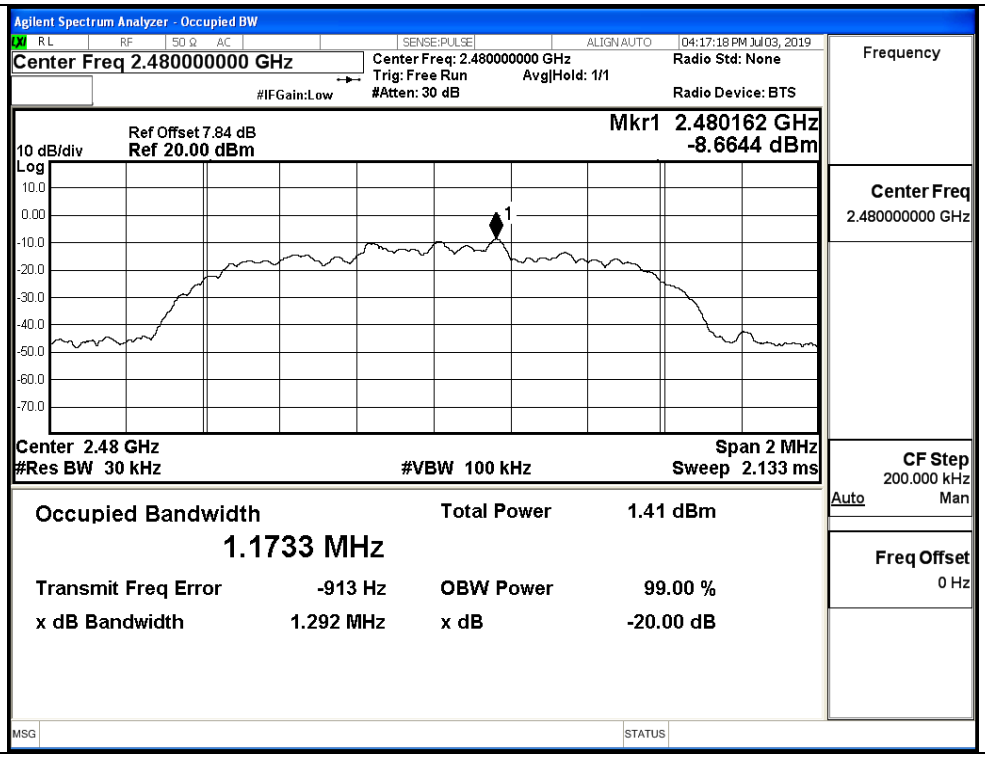
π/4DQPSK/LCH




π/4DQPSK/MCH

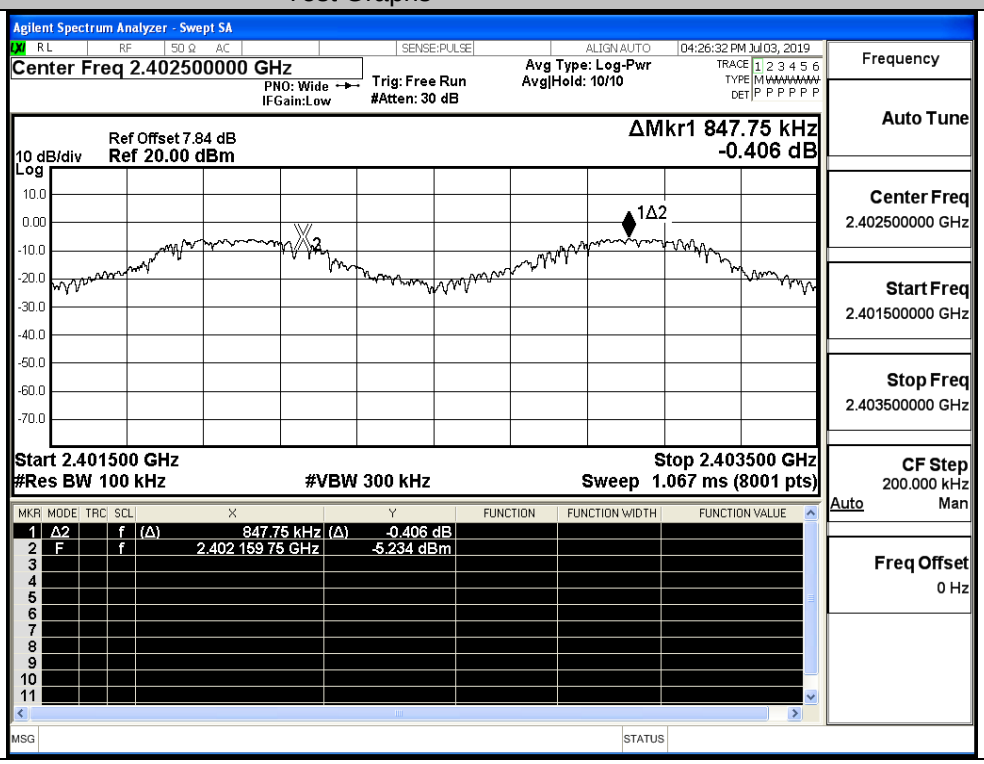


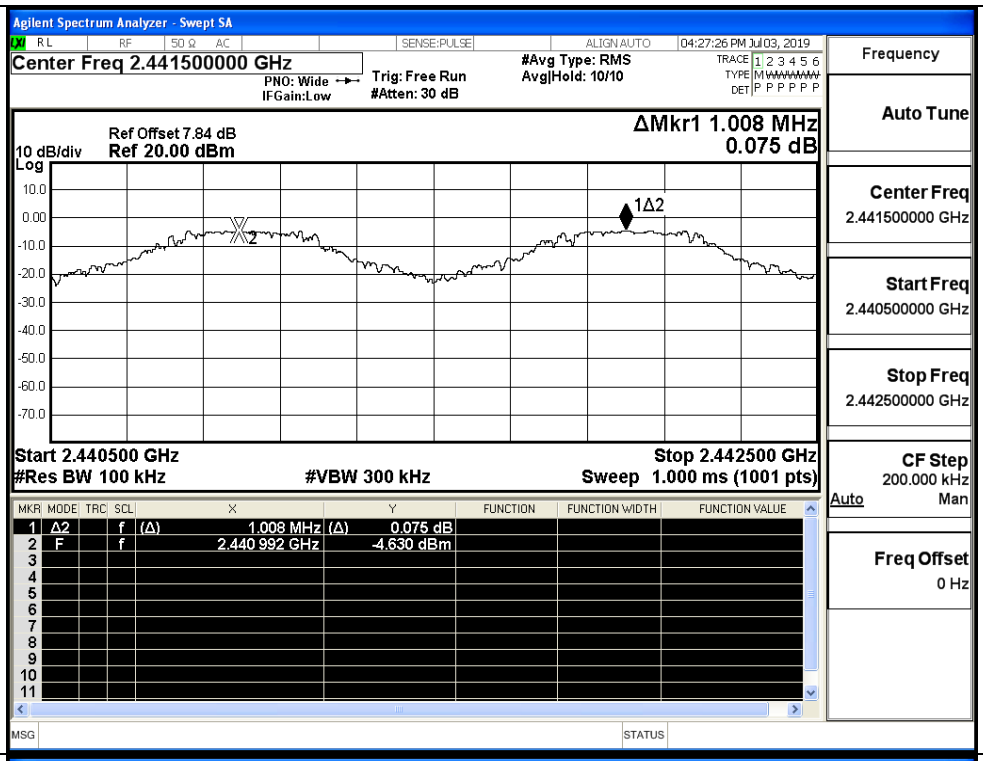
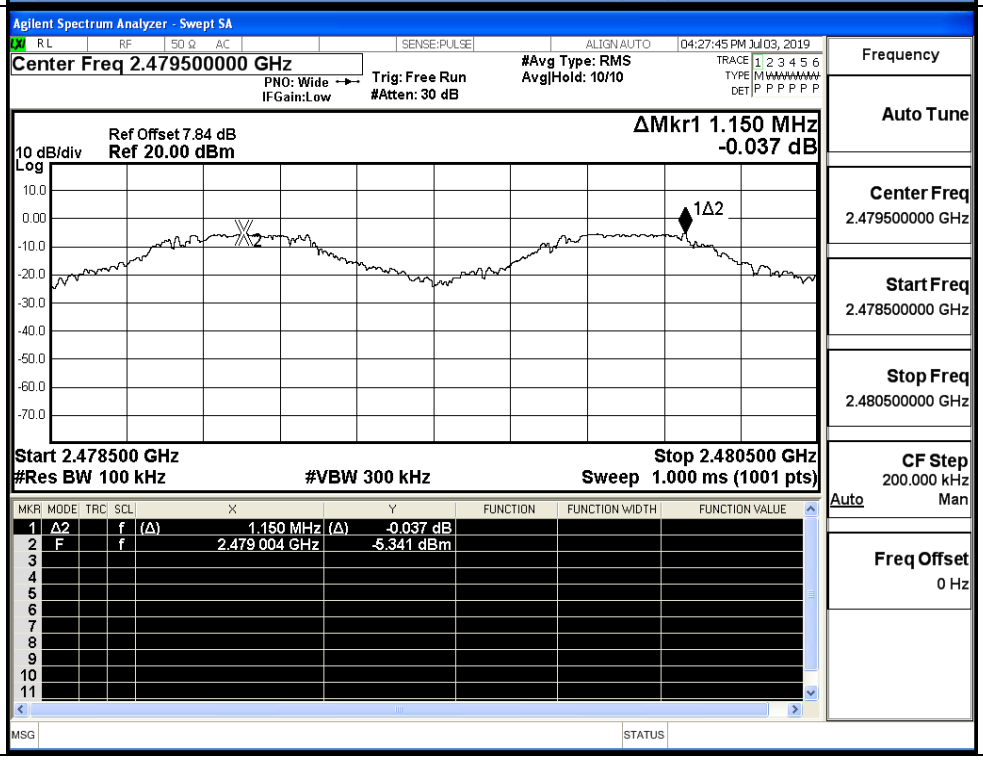
π/4DQPSK/HCH


Agilent Spectrum Analyzer - Occupied BW
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 1/1
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
04:17:18 PM Jul 03, 2019
Frequency
Ref Offset 7.84 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.480162 GHz
-8.6644 dBm
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.133 ms
CF Step
200.000 kHz
Auto
Man
Occupied Bandwidth
1.1733 MHz
Total Power 1.41 dBm
Transmit Freq Error -913 Hz
OBW Power 99.00 %
x dB Bandwidth 1.292 MHz
x dB -20.00 dB
Freq Offset
0 Hz
MSG
STATUS

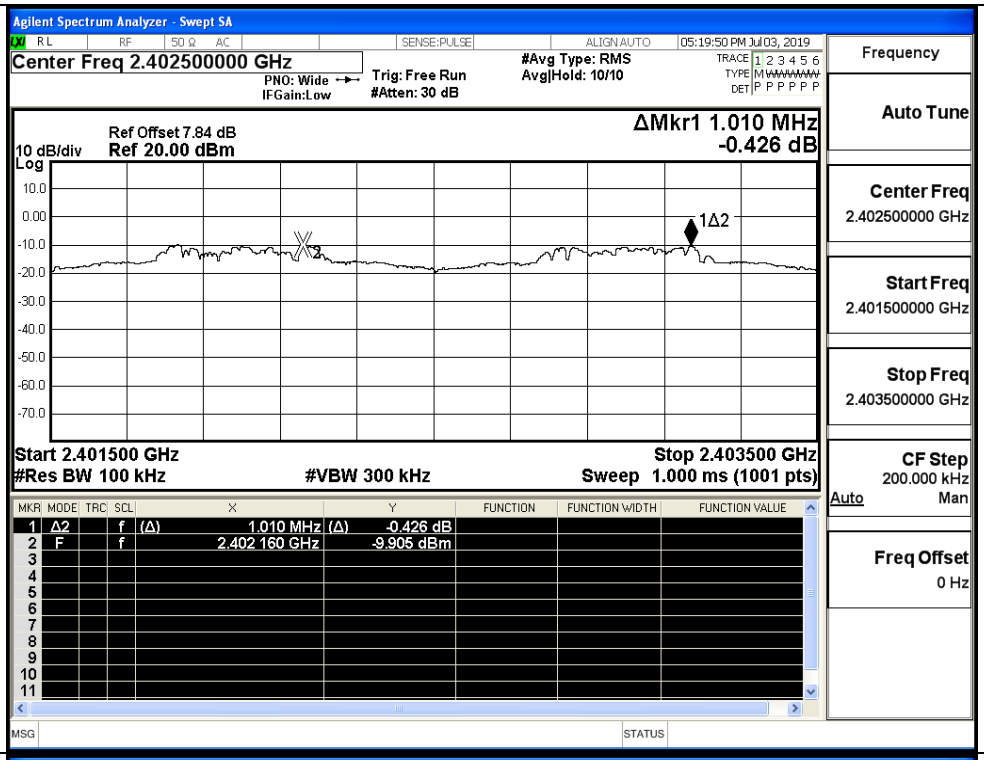
## A.3 Carrier Frequency Separation

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.848 | 0.691 | PASS |
| | MCH | 1.008 | 0.691 | PASS |
| | HCH | 1.150 | 0.691 | PASS |
| π/4DQPSK | LCH | 1.010 | 0.862 | PASS |
| | MCH | 1.112 | 0.862 | PASS |
| | HCH | 1.126 | 0.862 | PASS |

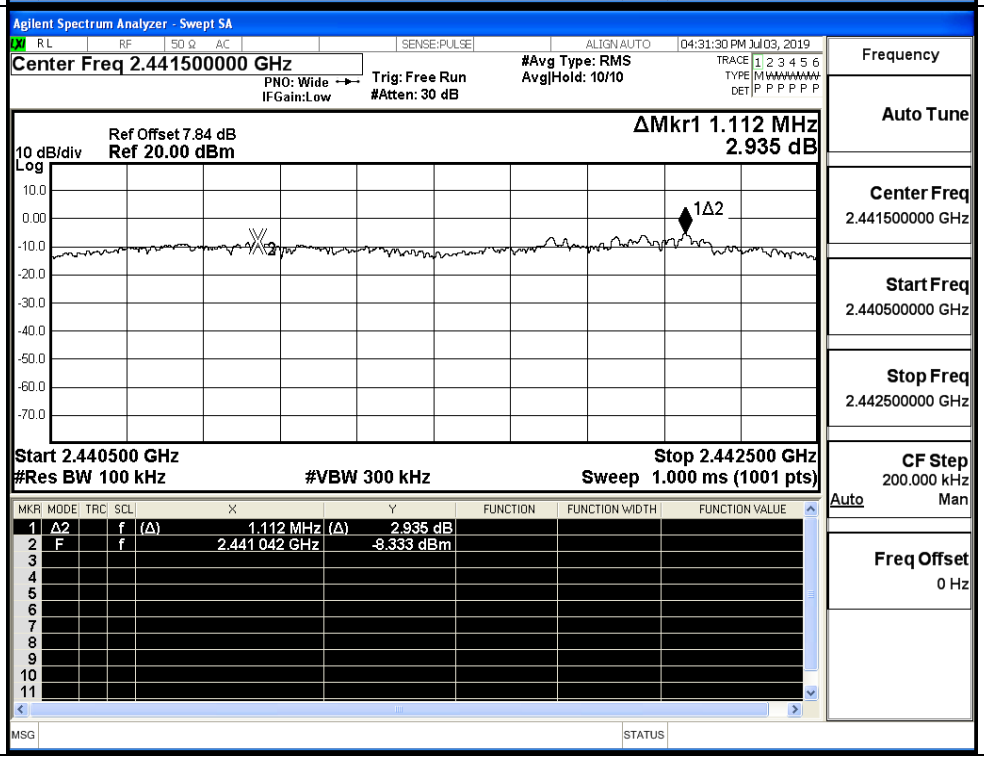
| Test Graphs | | |
|---|---|---|
| GFSK/LCH | |  |

| | | |
|---|---|---|
| GFSK/MCH | |  |
| GFSK/HCH | |  |

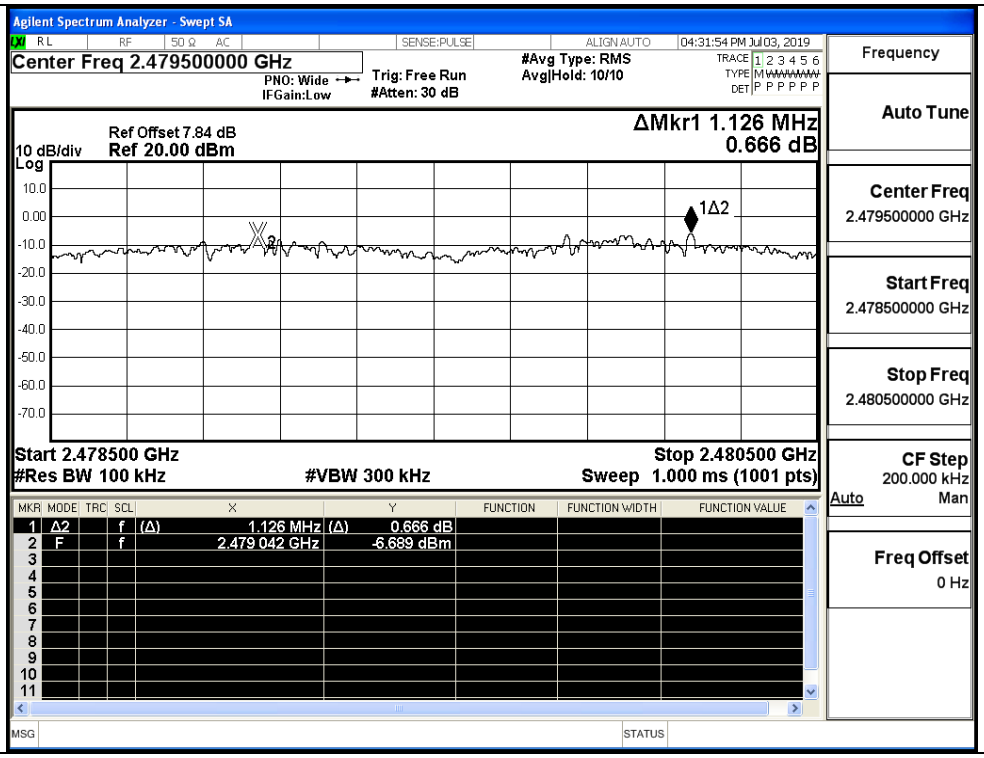
π/4DQPSK/LCH




π/4DQPSK/MCH

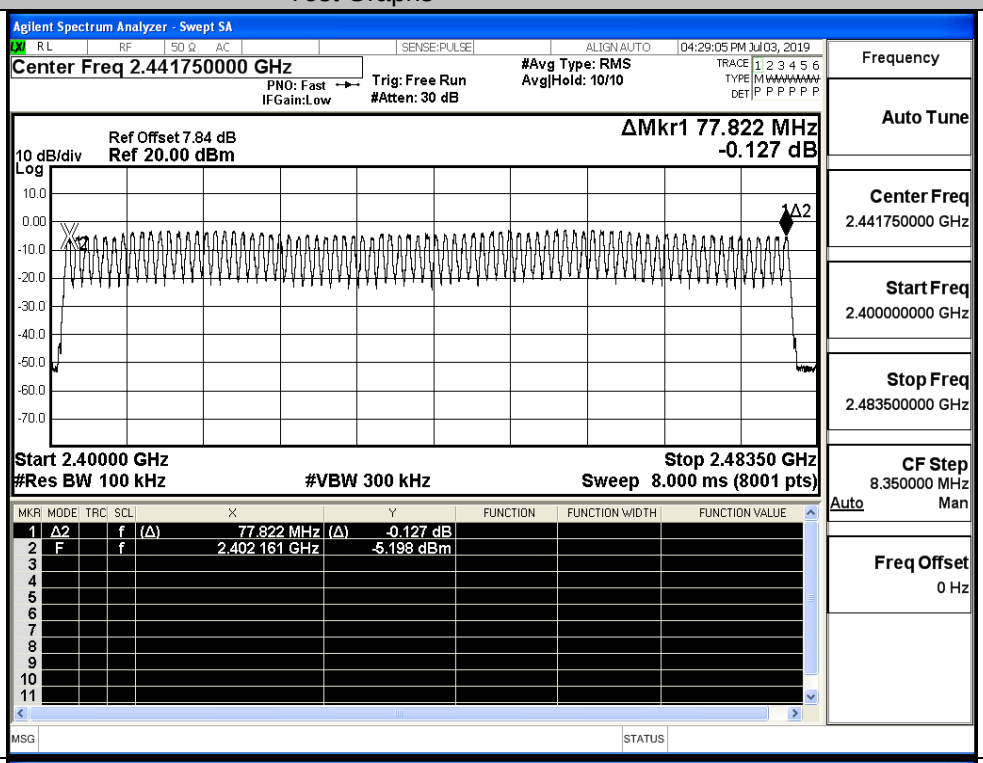
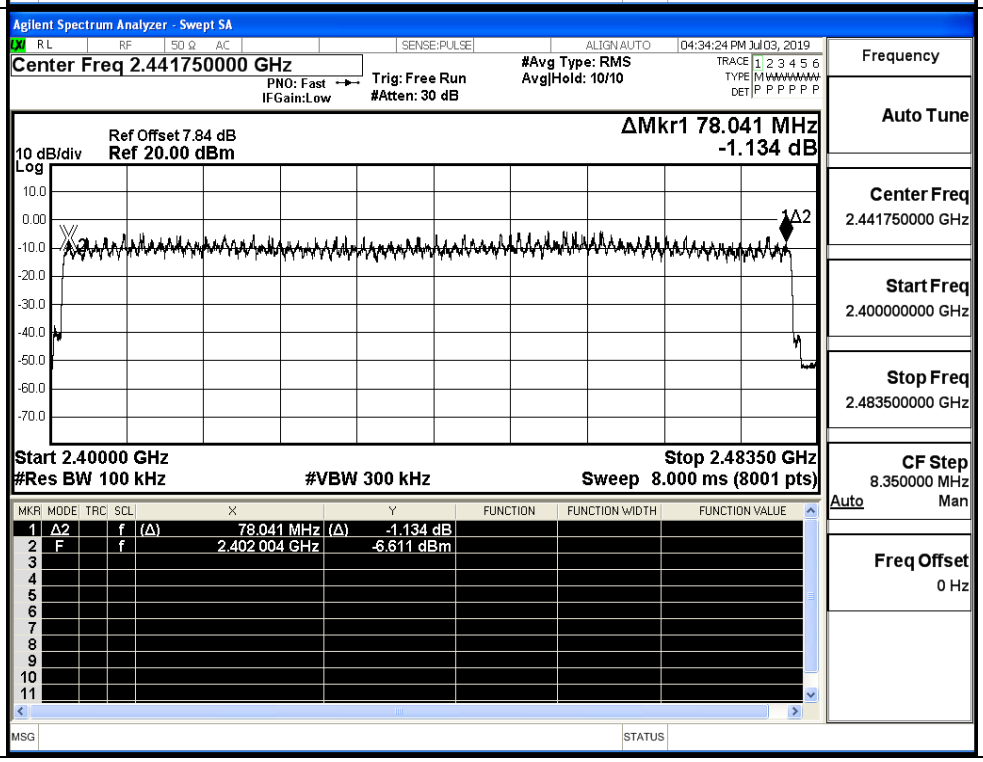


π/4DQPSK/HCH


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.479500000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 10/10
04:31:54 PM Jul 03, 2019
Ref Offset 7.84 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 1.126 MHz
0.666 dB
1Δ2
Start 2.478500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.480500 GHz
Sweep 1.000 ms (1001 pts)
1 Δ2 f (Δ) 1.126 MHz (Δ) 0.666 dB
2 F f 2.479 042 GHz -6.689 dBm
Frequency
Auto Tune
Center Freq
2.479500000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.480500000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz

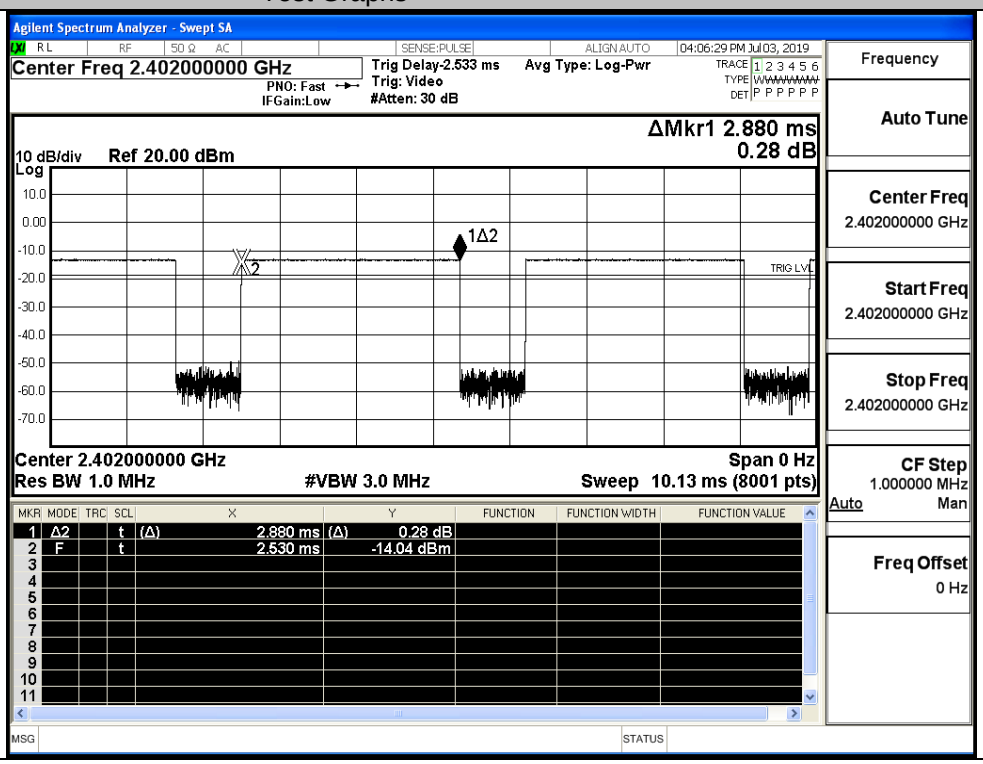
## A.4 Hopping Channel Number

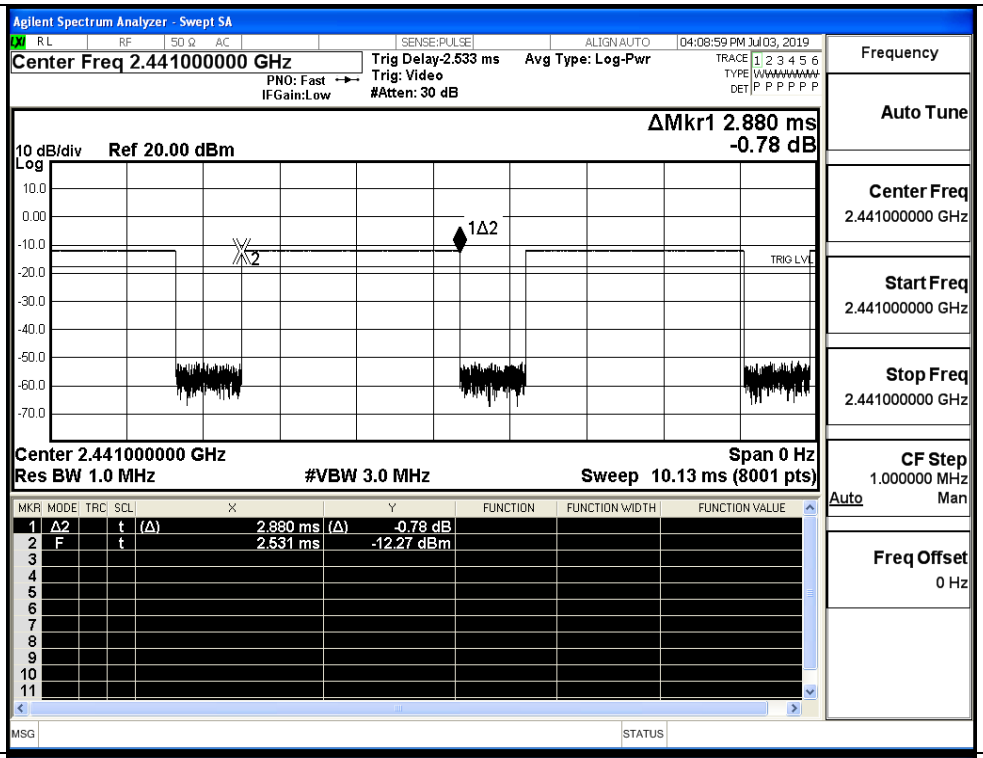
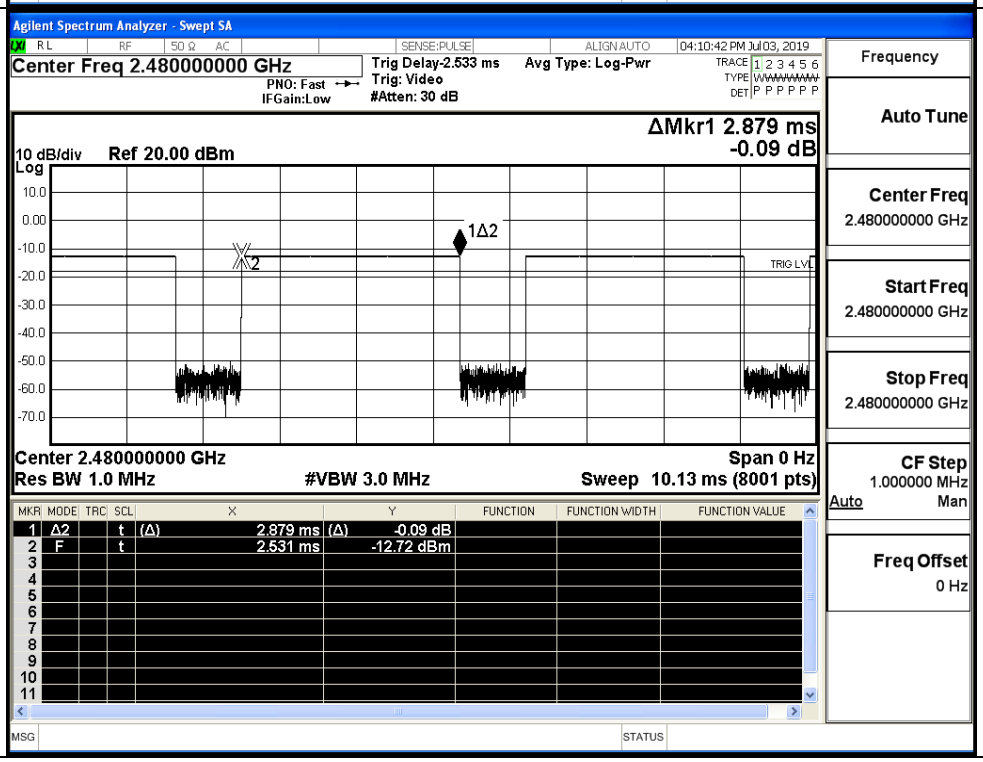
| Mode | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---|---|---|---|---|
| GFSK | Hop | 79 | >=15 | PASS |
| π/4DQPSK | Hop | 79 | >=15 | PASS |

| Test Graphs | |
|---|---|
| GFSK/Hop |  |
| π/4DQPSK/Hop |  |

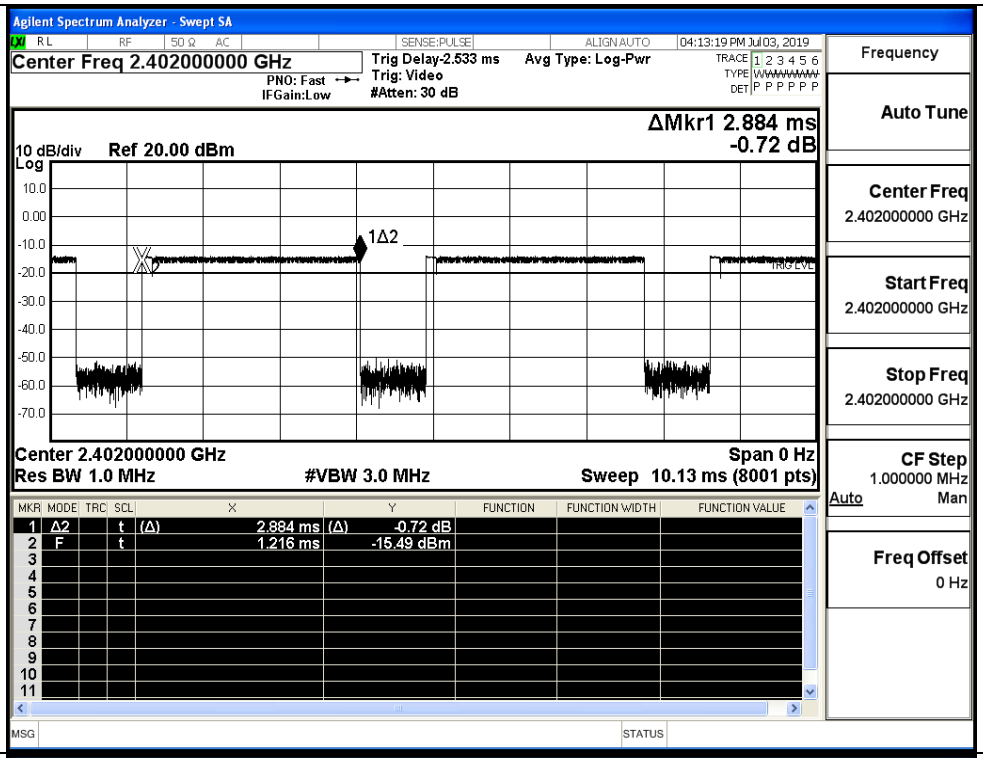
## A.5 Dwell Time

| Mode | Packet | Channel | Burst Width [ms/hop/ch] | Total Hops[hop*ch] | Dwell Time[s] | Limit [s] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | DH5 | LCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |
| | DH5 | MCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |
| | DH5 | HCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |
| π/4DQPSK | 2DH5 | LCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |
| | 2DH5 | MCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |
| | 2DH5 | HCH | 2.88 | 106.7 | 0.307 | 0.4 | PASS |

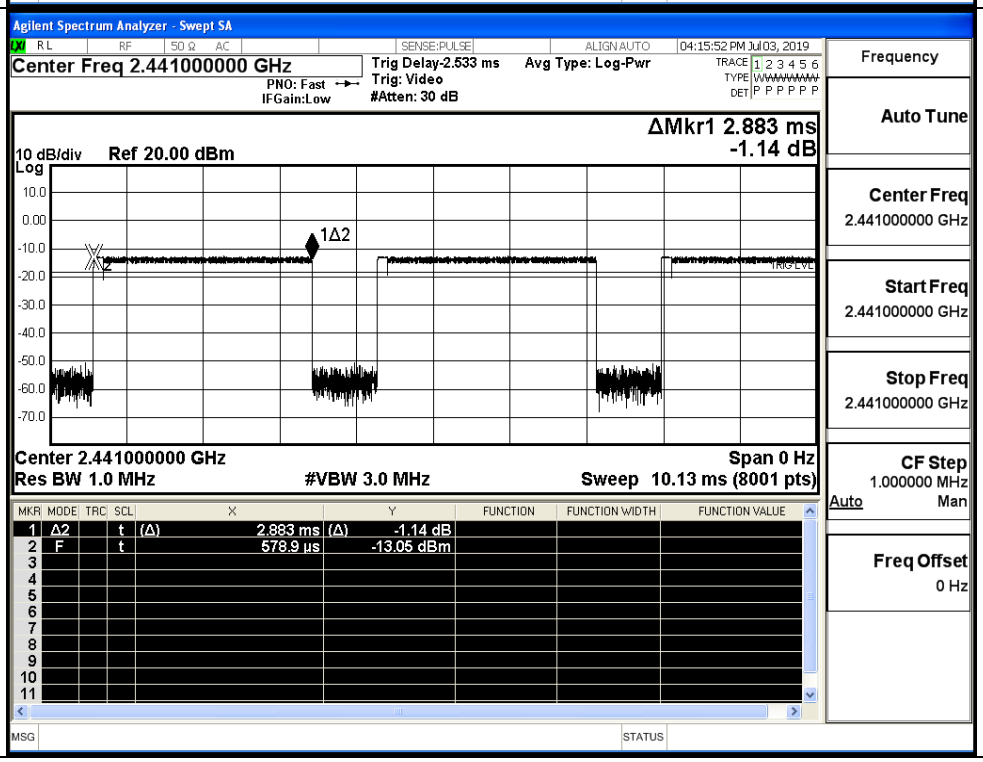
| Test Graphs | |
|---|---|
| GFSK_DH5/LCH |  |

| | |
|---|---|
| GFSK_DH5/MCH |  |
| GFSK_DH5/HCH |  |

π/4DQPSK
_2DH5/LCH

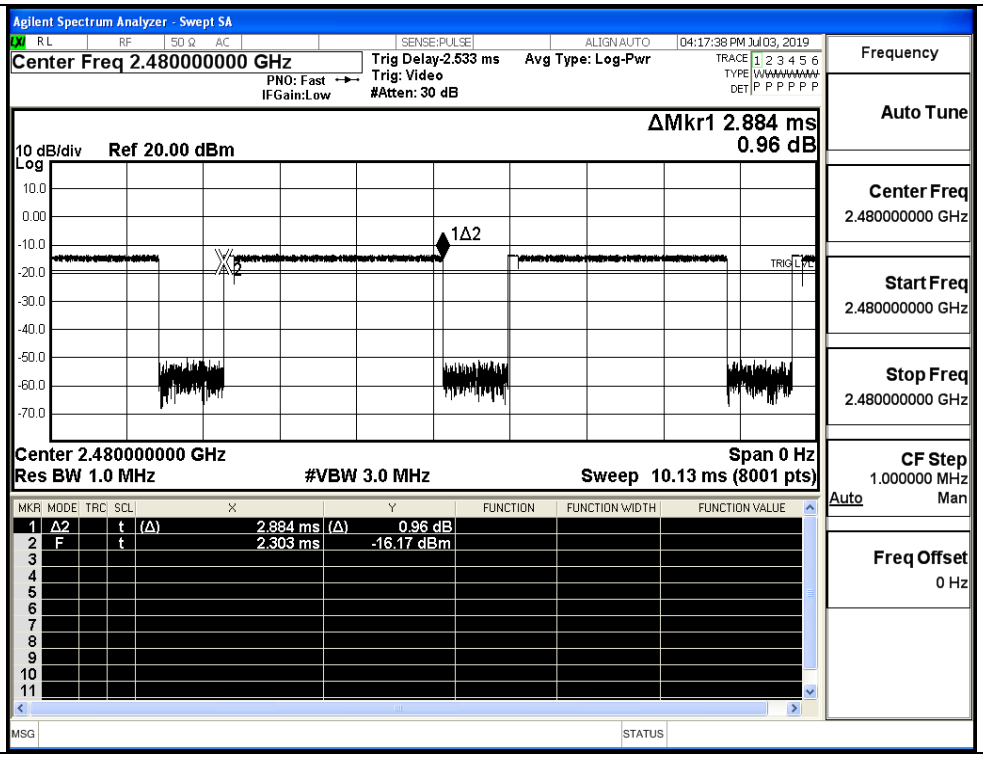



π/4DQPSK
_2DH5/MCH



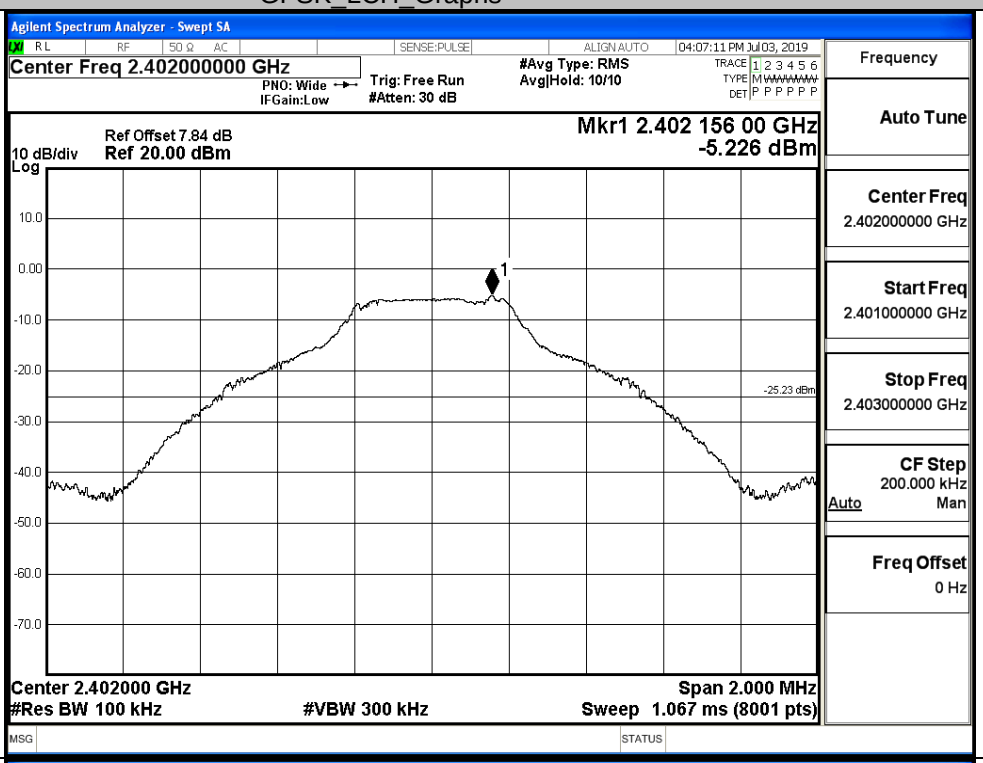
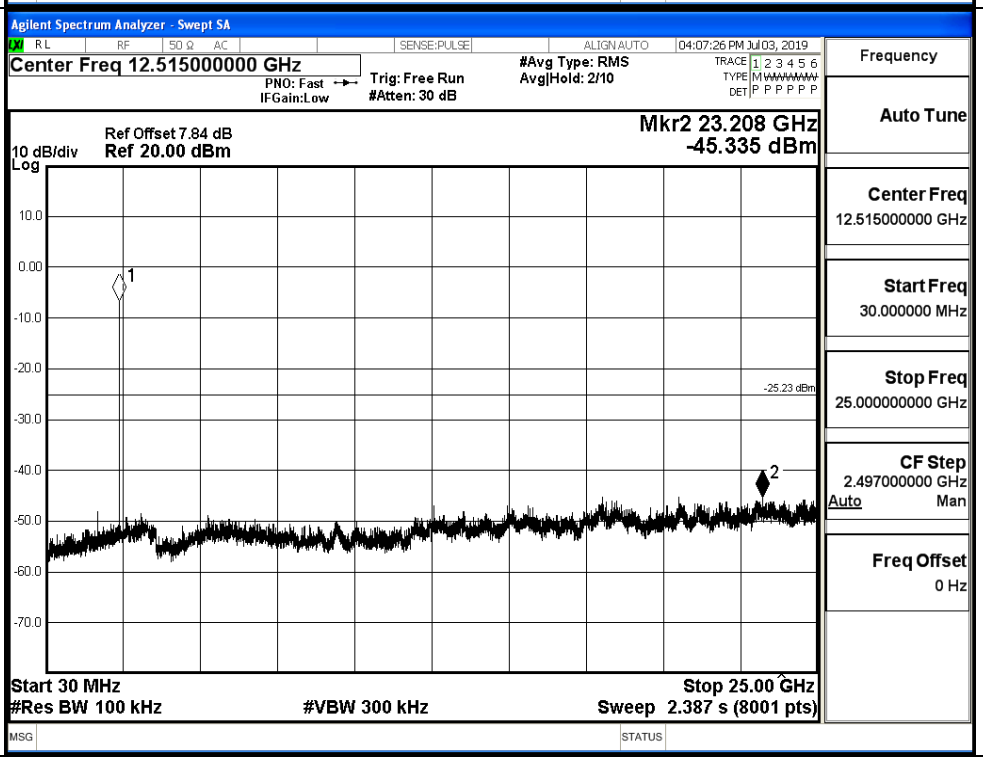
π/4DQPSK

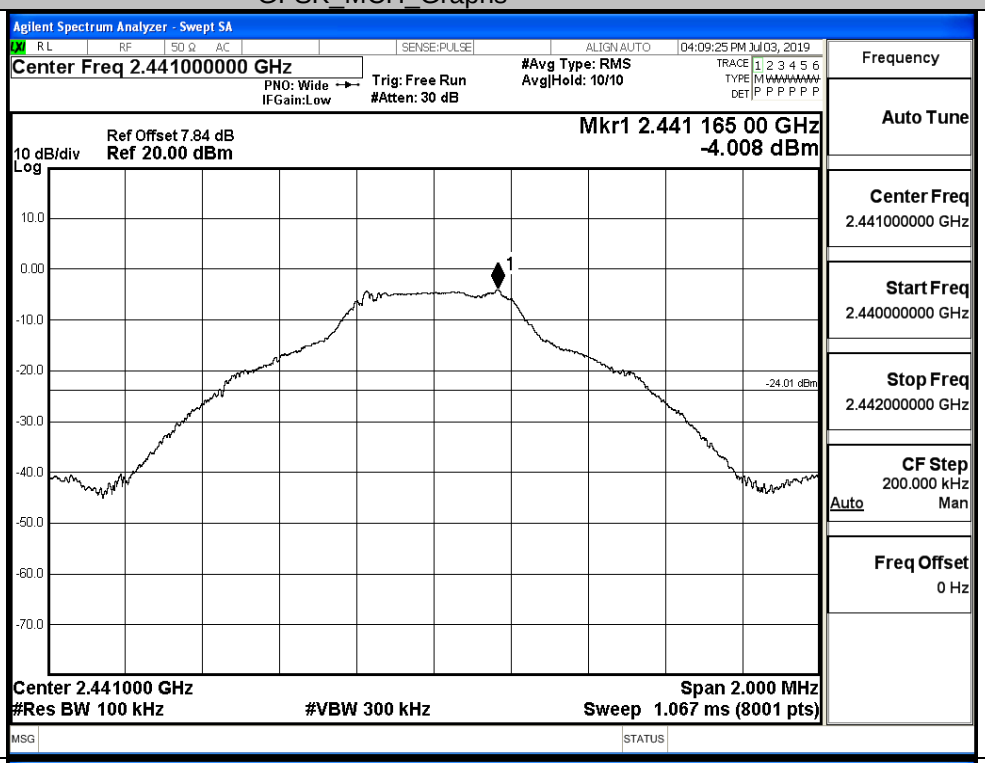
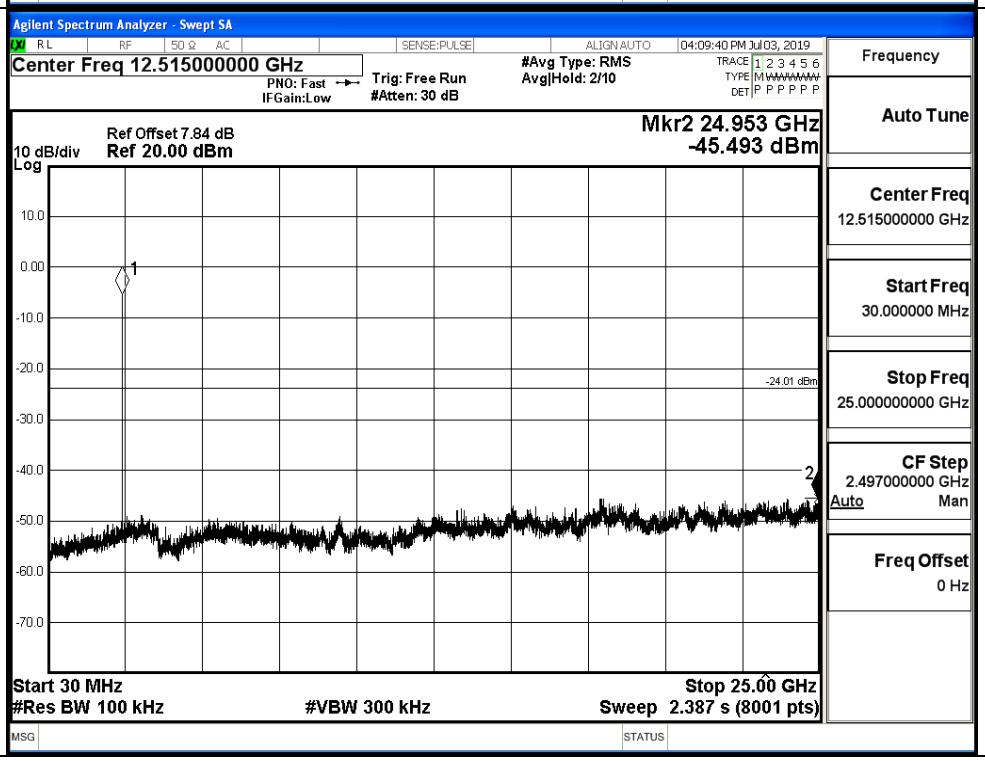
_2DH5/HCH

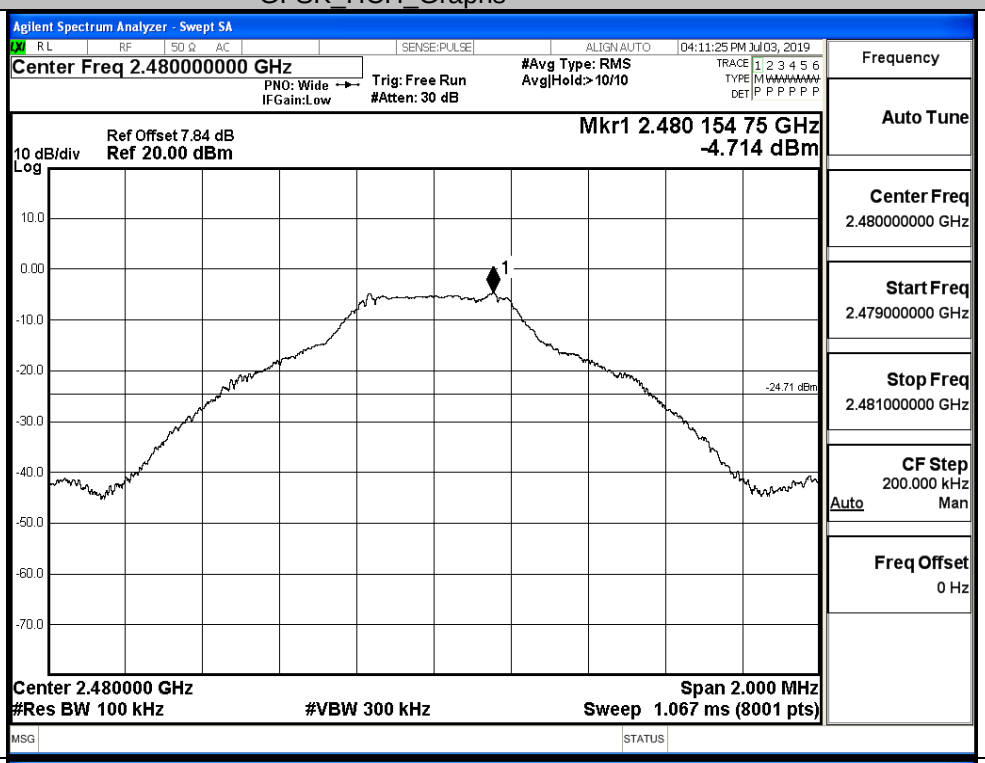
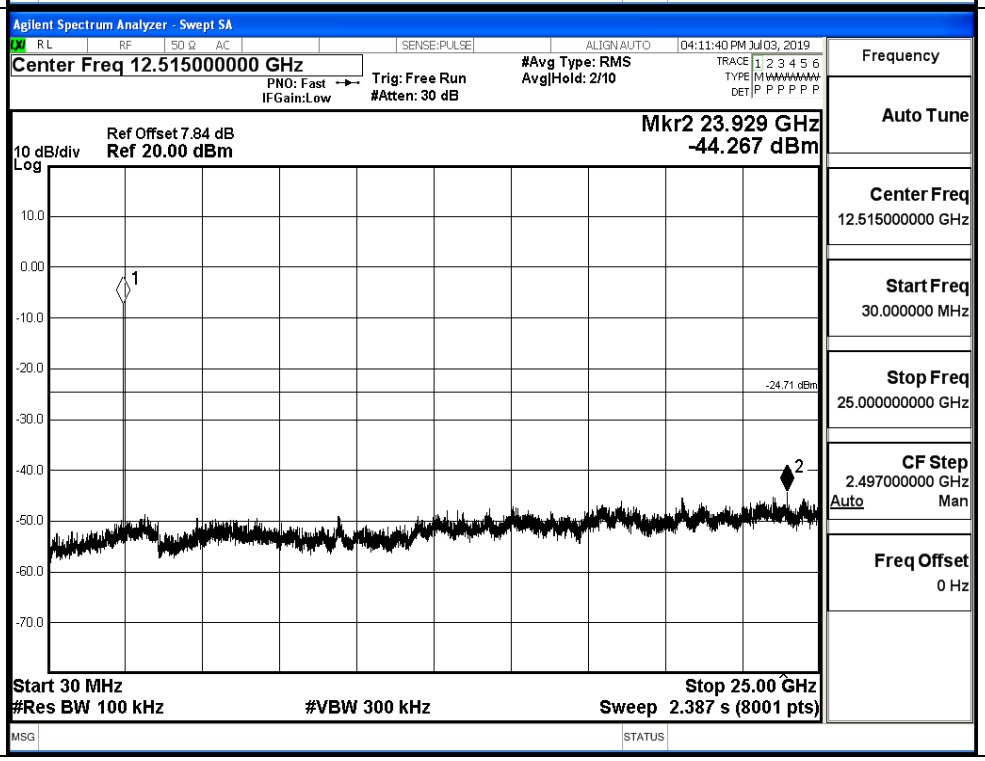


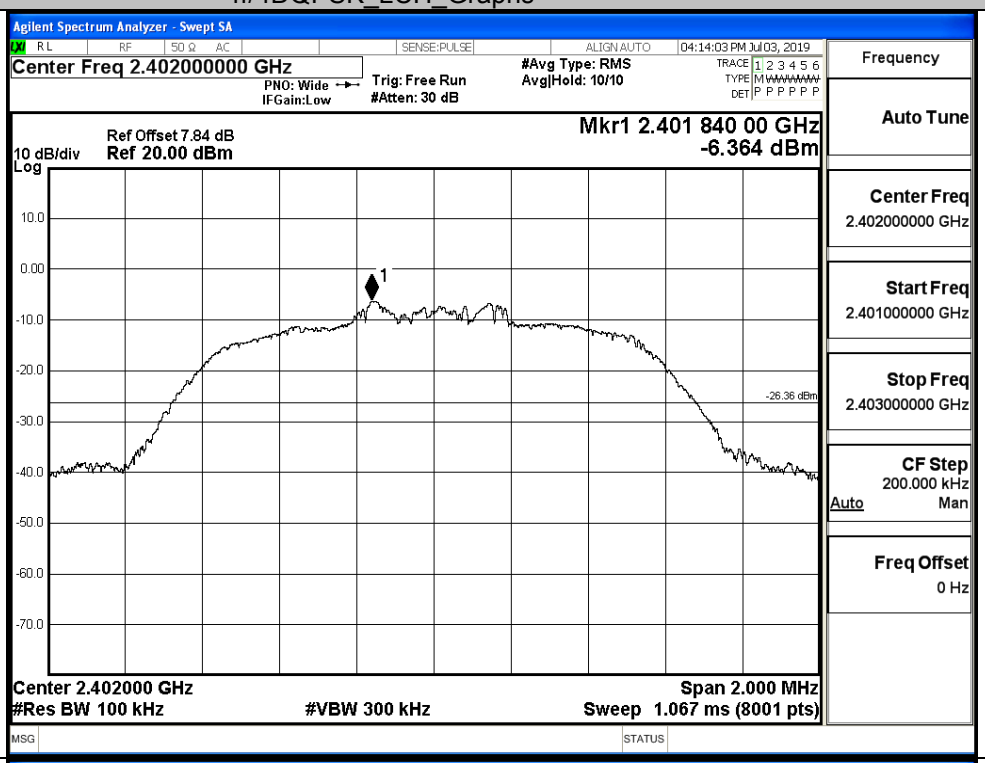
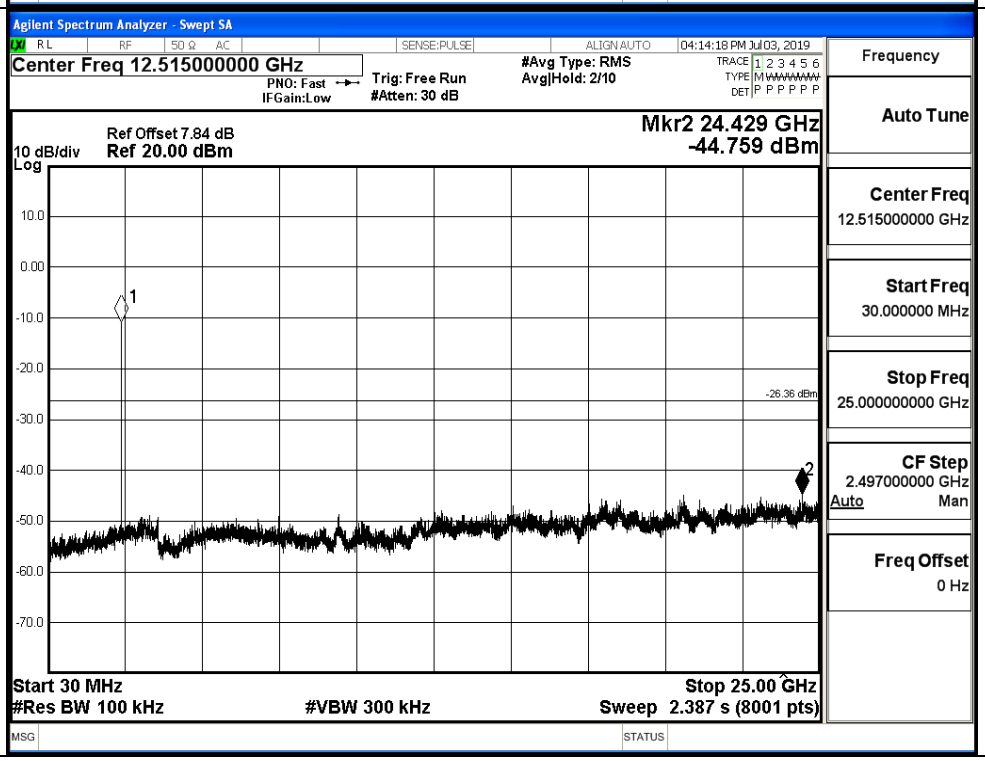
## A.6 RF Conducted Spurious Emissions

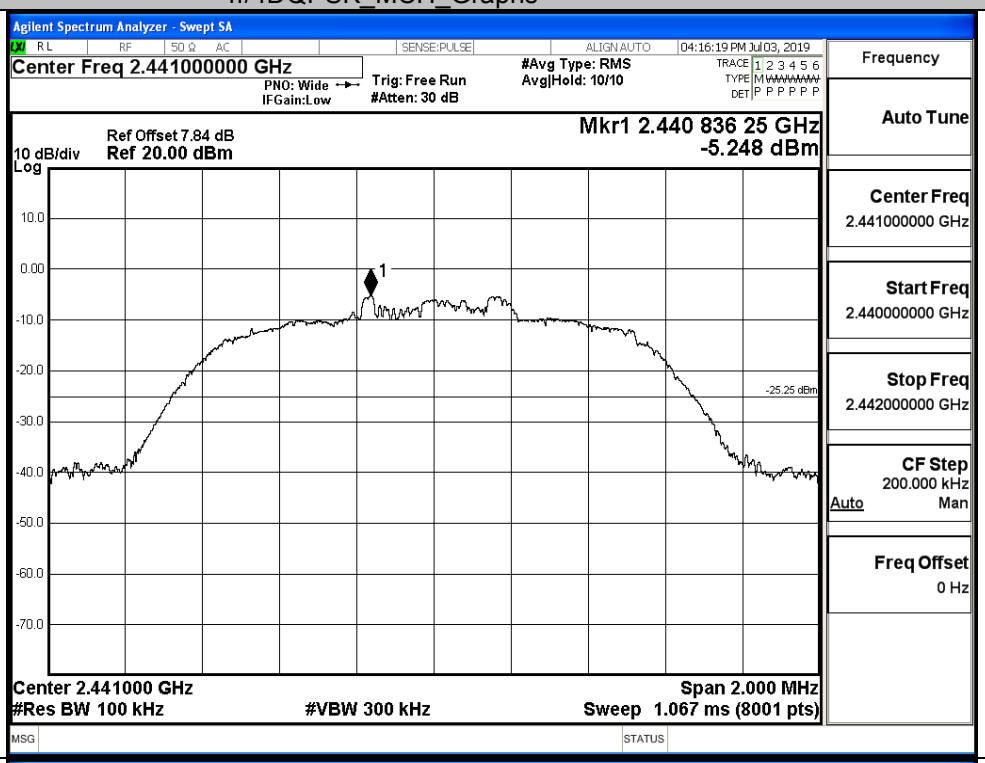
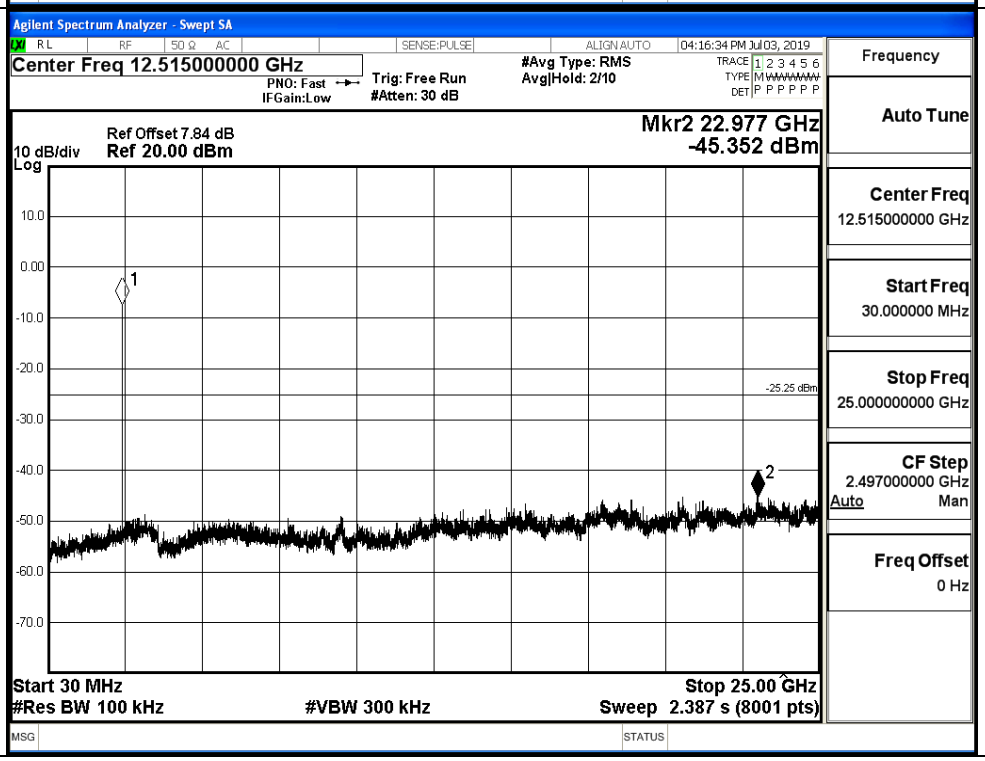
| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| GFSK | LCH | -5.226 | -45.335 | -25.226 | PASS |
| | MCH | -4.008 | -45.493 | -24.008 | PASS |
| | HCH | -4.714 | -44.267 | -24.714 | PASS |
| π/4DQPSK | LCH | -6.364 | -44.759 | -26.364 | PASS |
| | MCH | -5.248 | -45.352 | -25.248 | PASS |
| | HCH | -6.008 | -44.753 | -26.008 | PASS |

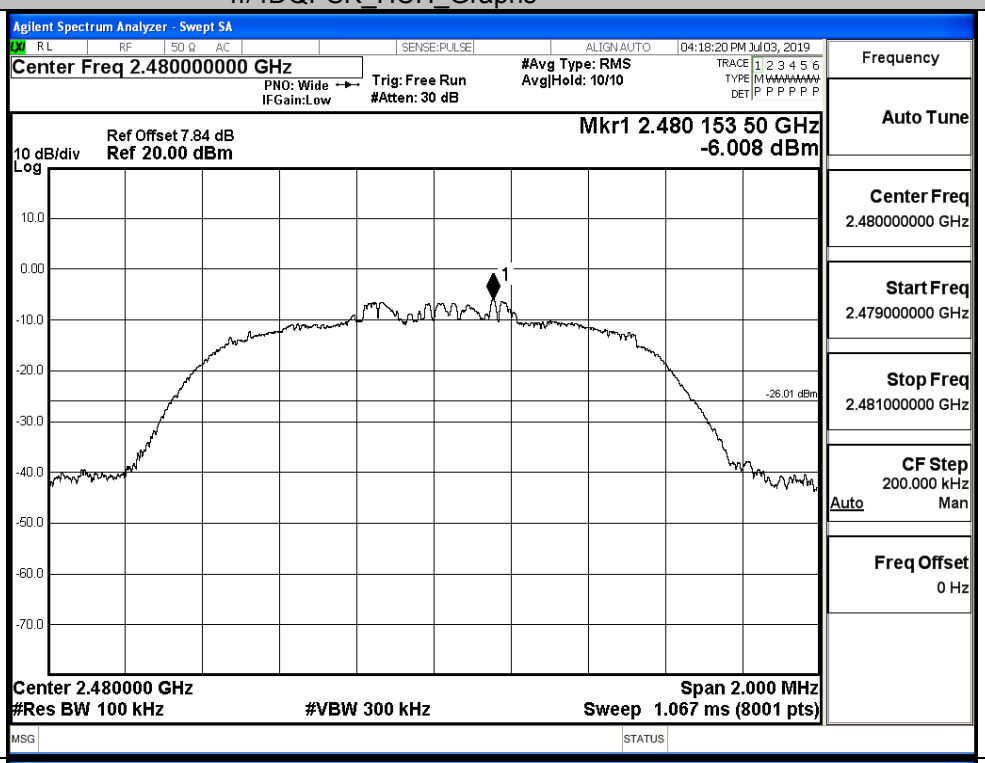
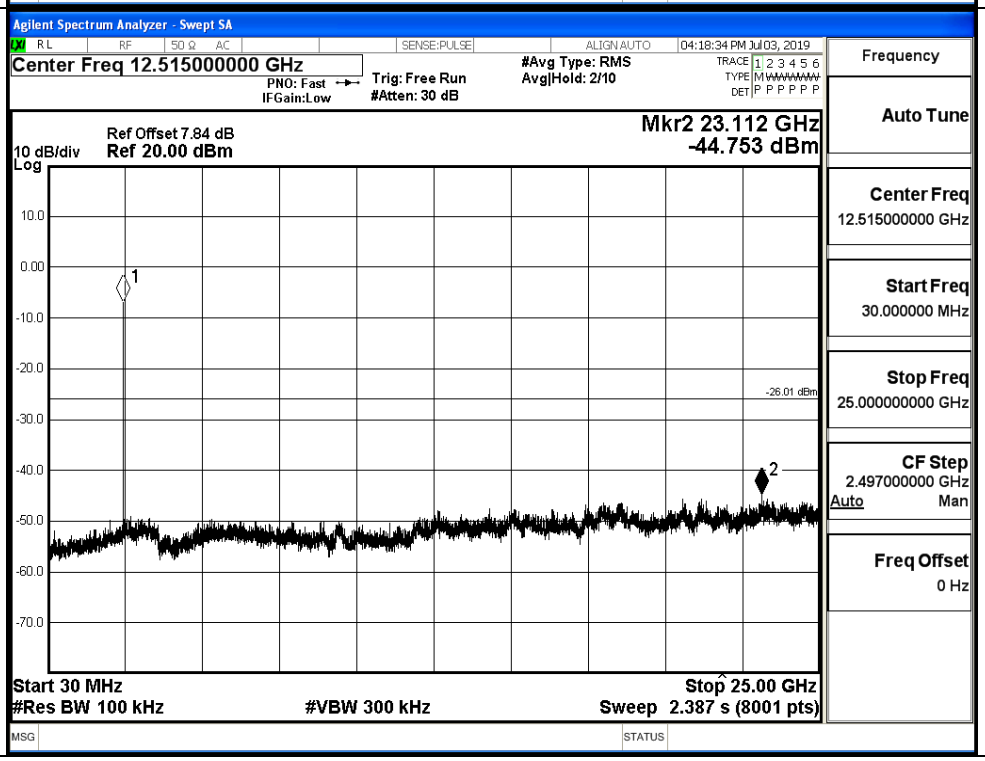
| GFSK_LCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

| GFSK_MCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

| GFSK_HCH_Graphs | | | |
|---|---|---|---|
| Pref | |  | |
| Puw | |  | |

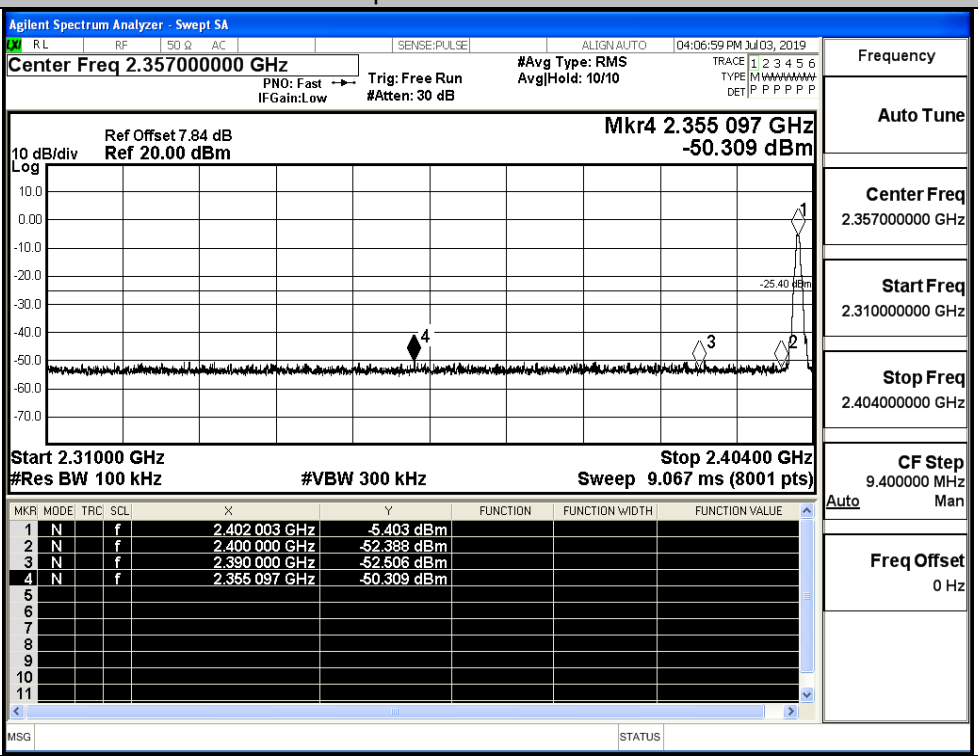
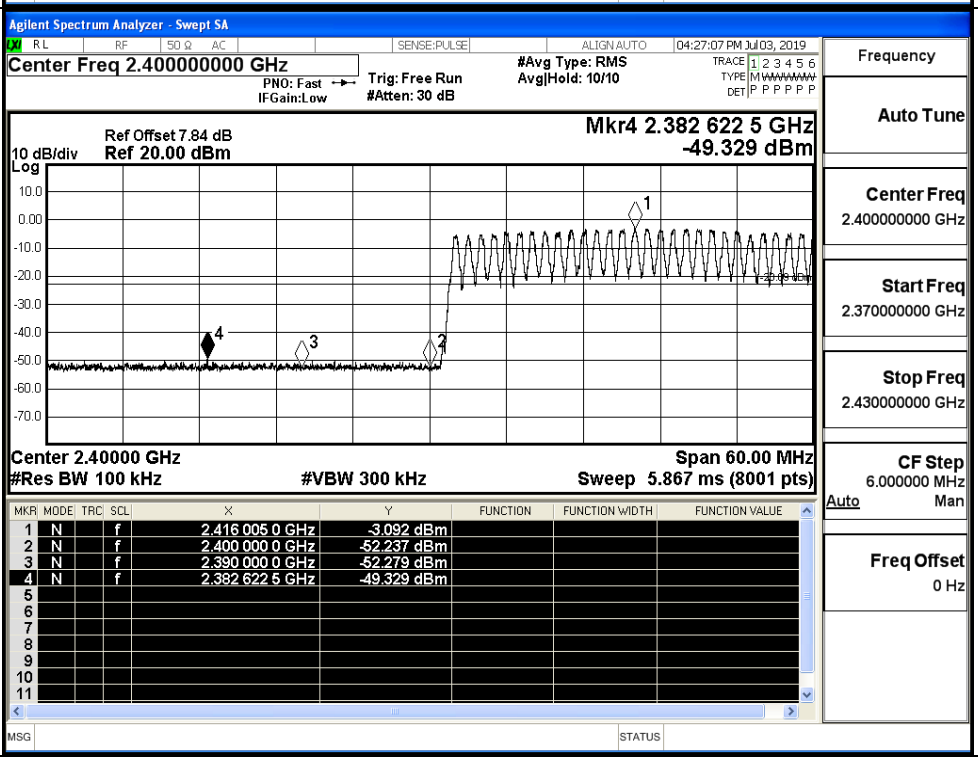
| π/4DQPSK_LCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

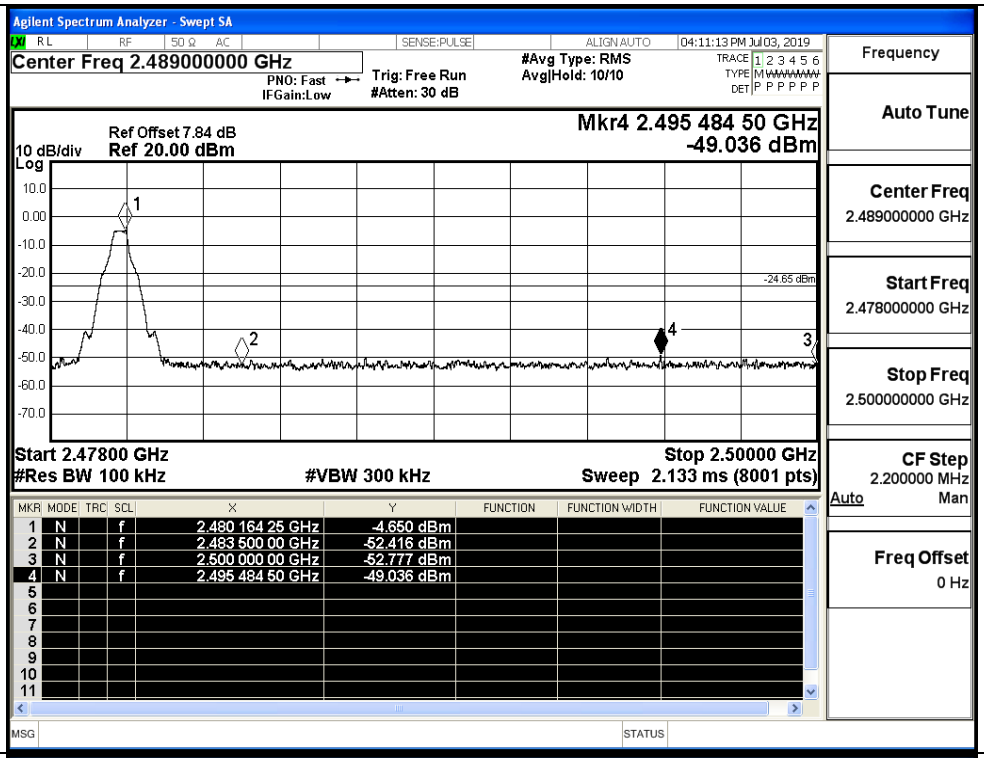
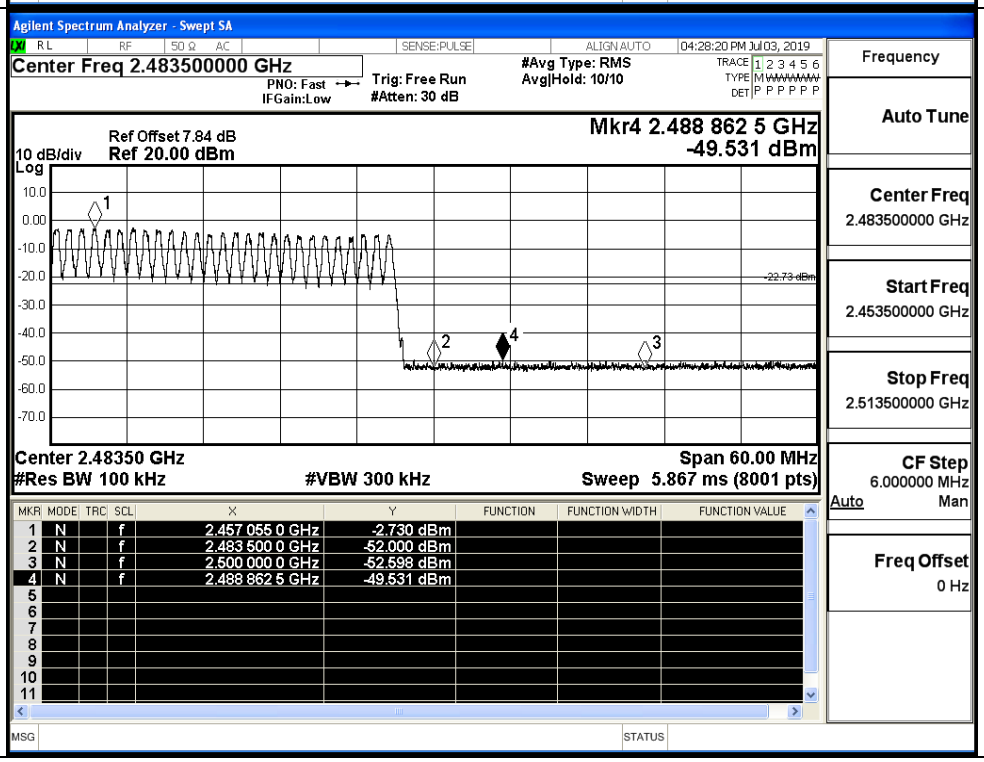
| π/4DQPSK_MCH_Graphs | | | |
|---|---|---|---|
| Pref | |  | |
| Puw | |  | |

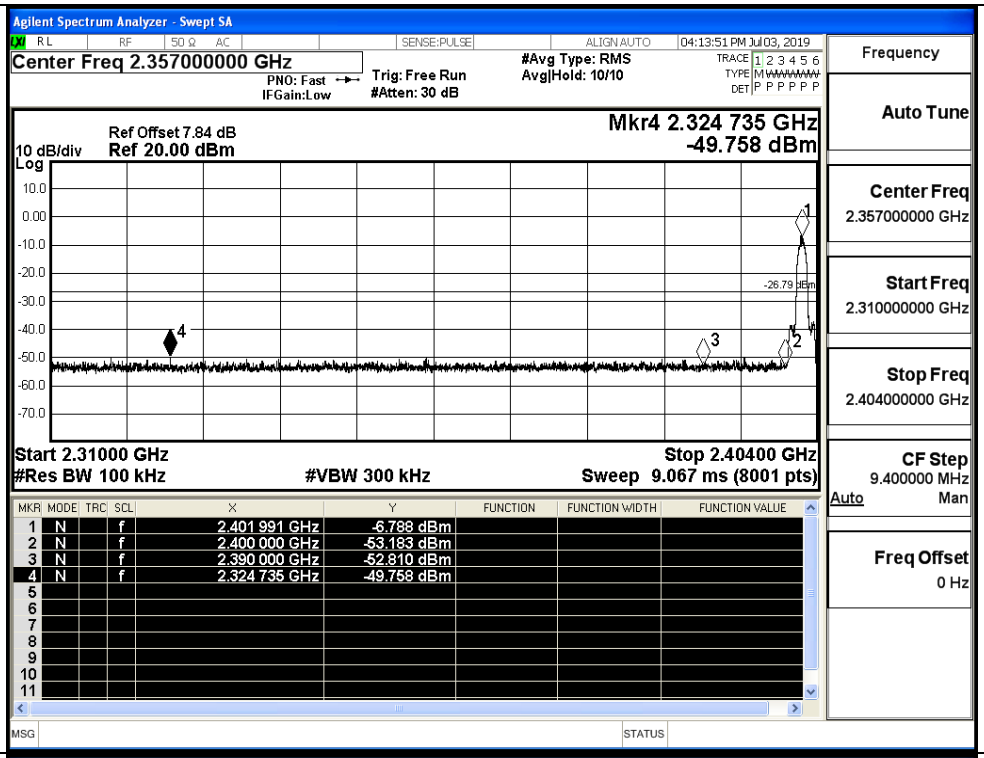
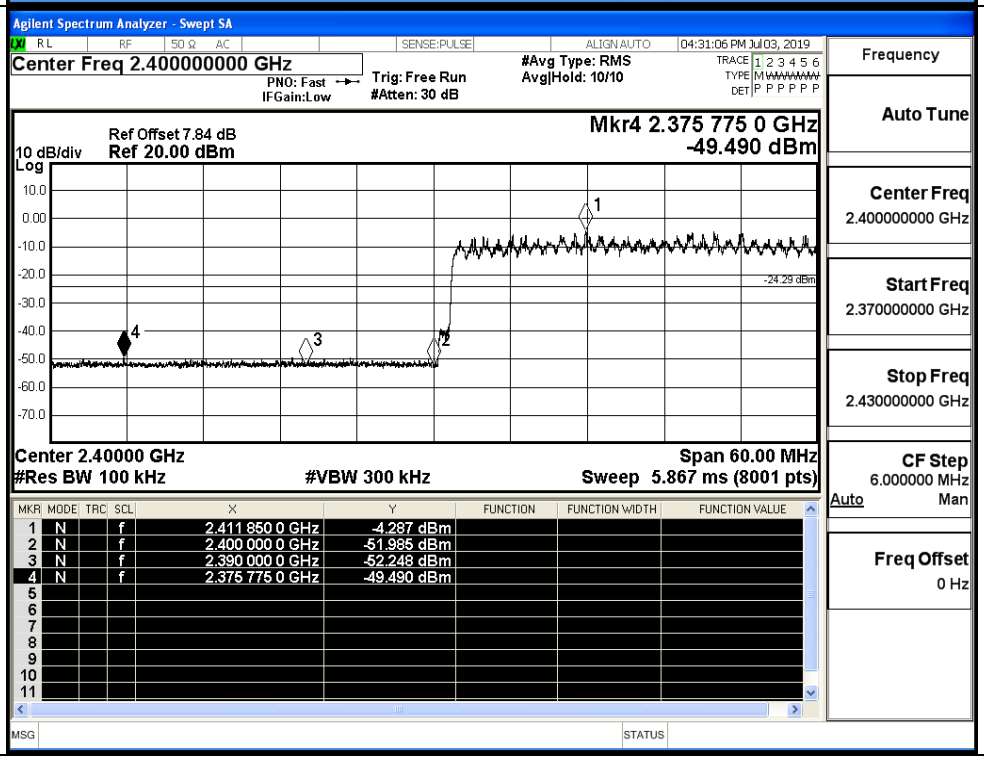
| π/4DQPSK_HCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

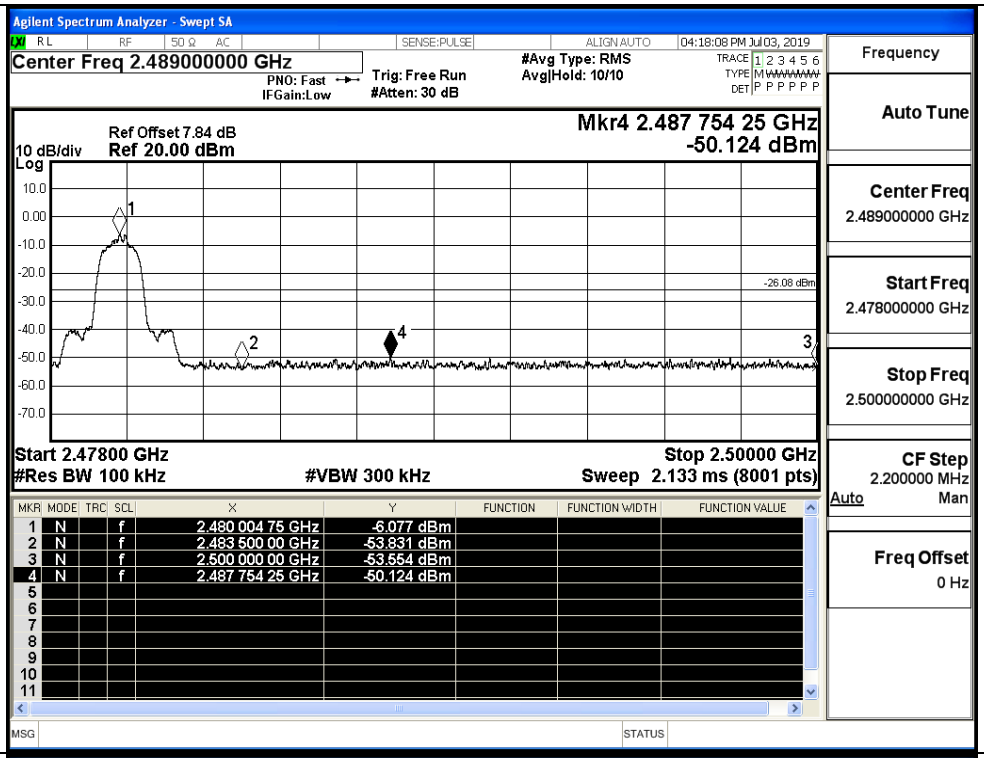
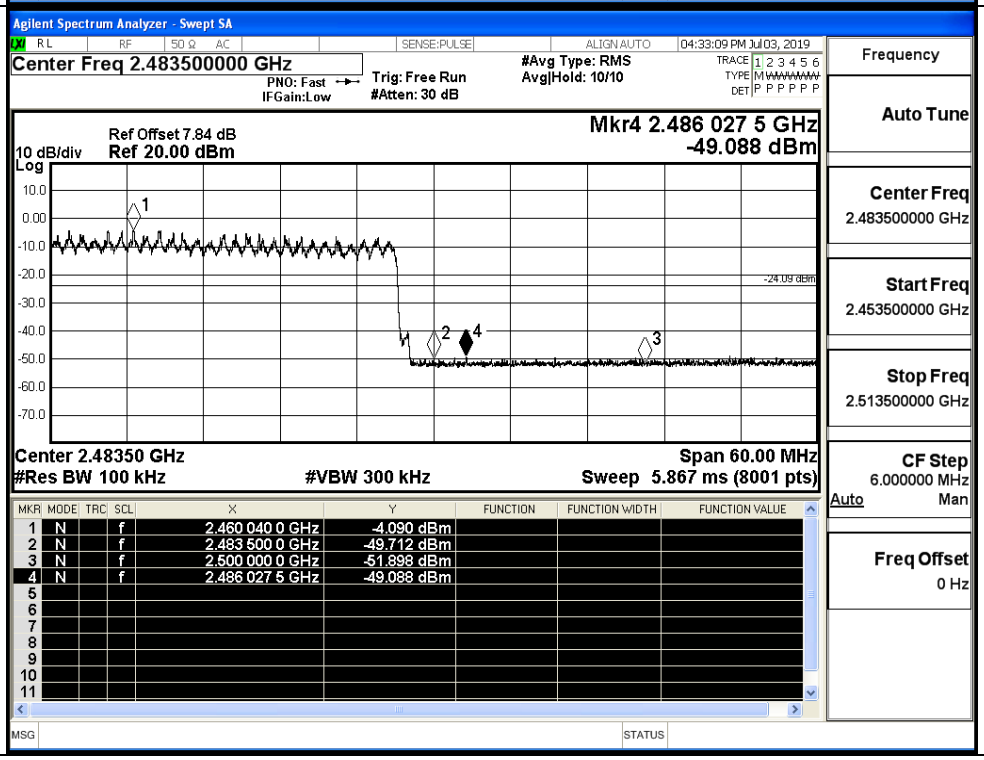
## A.7 Band-edge for RF Conducted Emissions

| Mode | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | LCH | 2402 | -5.403 | Off | -50.309 | -25.4 | PASS |
| | | | -3.092 | On | -49.329 | -23.09 | PASS |
| | HCH | 2480 | -4.650 | Off | -49.036 | -24.65 | PASS |
| | | | -2.730 | On | -49.531 | -22.73 | PASS |
| π/4DQPSK | LCH | 2402 | -6.788 | Off | -49.758 | -26.79 | PASS |
| | | | -4.287 | On | -49.490 | -24.29 | PASS |
| | HCH | 2480 | -6.077 | Off | -50.124 | -26.08 | PASS |
| | | | -4.090 | On | -49.088 | -24.09 | PASS |

| Test Graphs | |
|---|---|
| GFSK/LCH/No Hop |  |
| GFSK/LCH/Hop |  |

| | |
|---|---|
| GFSK/HCH/No Hop |  |
| GFSK/HCH/Hop |  |

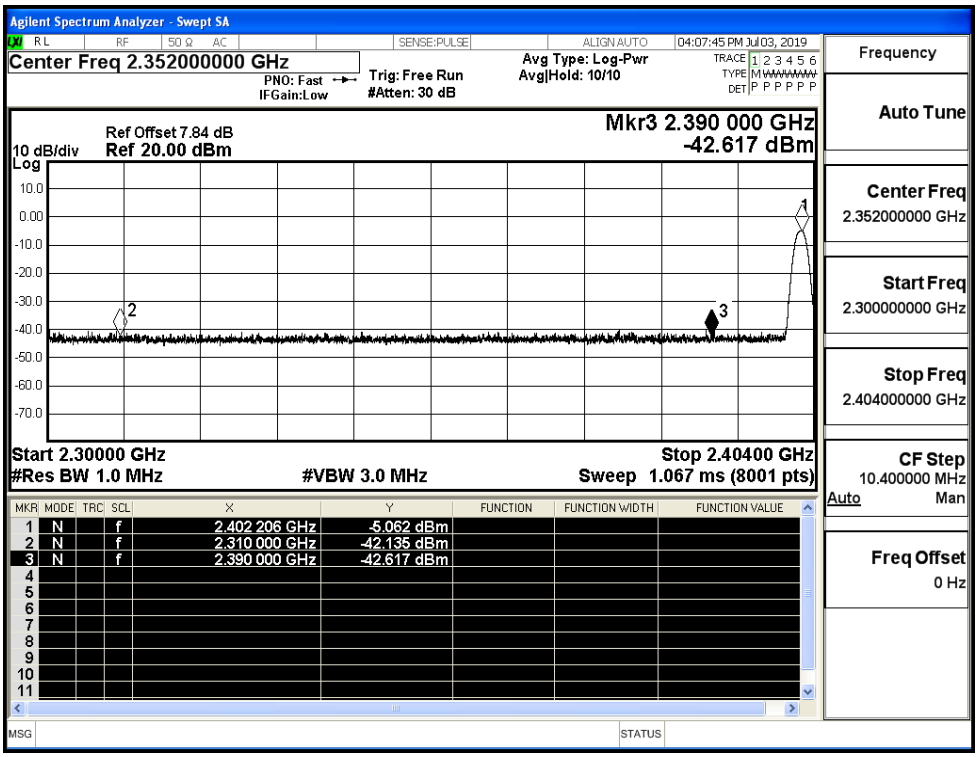
| | |
|---|---|
| π/4DQPSK/LCH/No Hop |  |
| π/4DQPSK/LCH/Hop |  |

| | |
|---|---|
| π/4DQPSK/HCH/No Hop |  |
| π/4DQPSK/HCH/Hop |  |

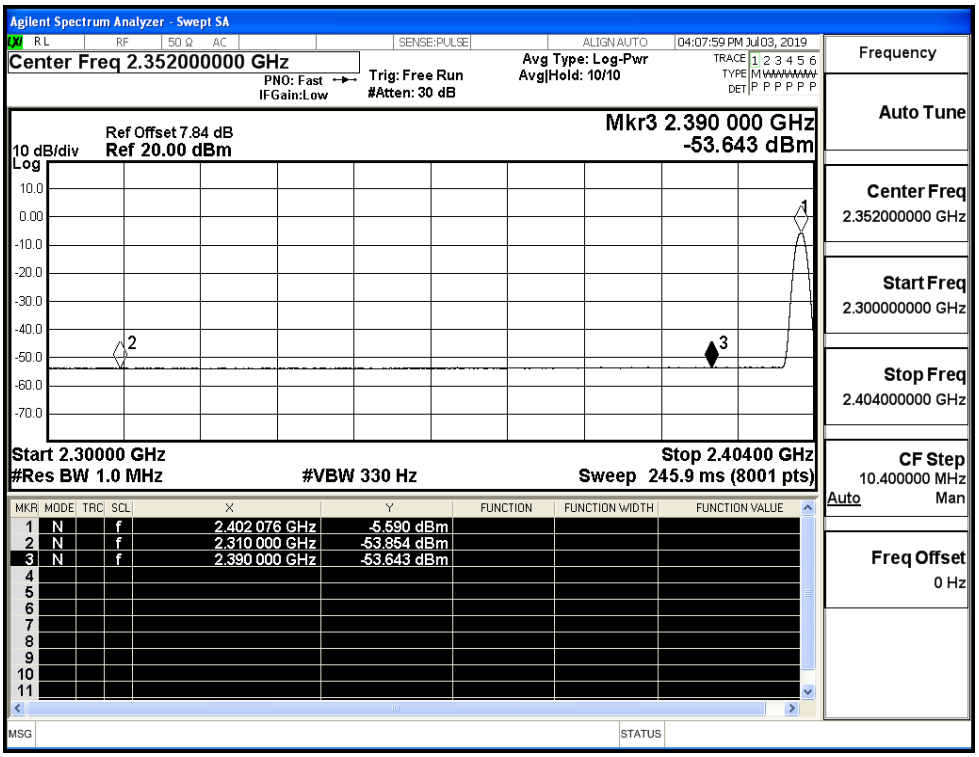
## A.8 Restrict-band band-edge measurements

| Test Mode | Hopping | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| GFSK | Off | 2310.0 | -42.14 | 2.0 | 0 | 53.12 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.85 | 2.0 | 0 | 41.40 | AV | 54 | PASS |
| | Off | 2390.0 | -42.62 | 2.0 | 0 | 52.64 | PEAK | 74 | PASS |
| | Off | 2390.0 | -53.64 | 2.0 | 0 | 41.61 | AV | 54 | PASS |
| | Off | 2483.5 | -44.55 | 2.0 | 0 | 50.71 | PEAK | 74 | PASS |
| | Off | 2483.5 | -53.28 | 2.0 | 0 | 41.98 | AV | 54 | PASS |
| | Off | 2500.0 | -44.16 | 2.0 | 0 | 51.10 | PEAK | 74 | PASS |
| | Off | 2500.0 | -53.19 | 2.0 | 0 | 42.07 | AV | 54 | PASS |
| π/4DQPSK | Off | 2310.0 | -43.74 | 2.0 | 0 | 51.52 | PEAK | 74 | PASS |
| | Off | 2310.0 | -53.90 | 2.0 | 0 | 41.36 | AV | 54 | PASS |
| | Off | 2390.0 | -42.07 | 2.0 | 0 | 53.18 | PEAK | 74 | PASS |
| | Off | 2390.0 | -53.60 | 2.0 | 0 | 41.66 | AV | 54 | PASS |
| | Off | 2483.5 | -44.00 | 2.0 | 0 | 51.26 | PEAK | 74 | PASS |
| | Off | 2483.5 | -53.31 | 2.0 | 0 | 41.94 | AV | 54 | PASS |
| | Off | 2500.0 | -43.16 | 2.0 | 0 | 52.10 | PEAK | 74 | PASS |
| | Off | 2500.0 | -53.19 | 2.0 | 0 | 42.07 | AV | 54 | PASS |

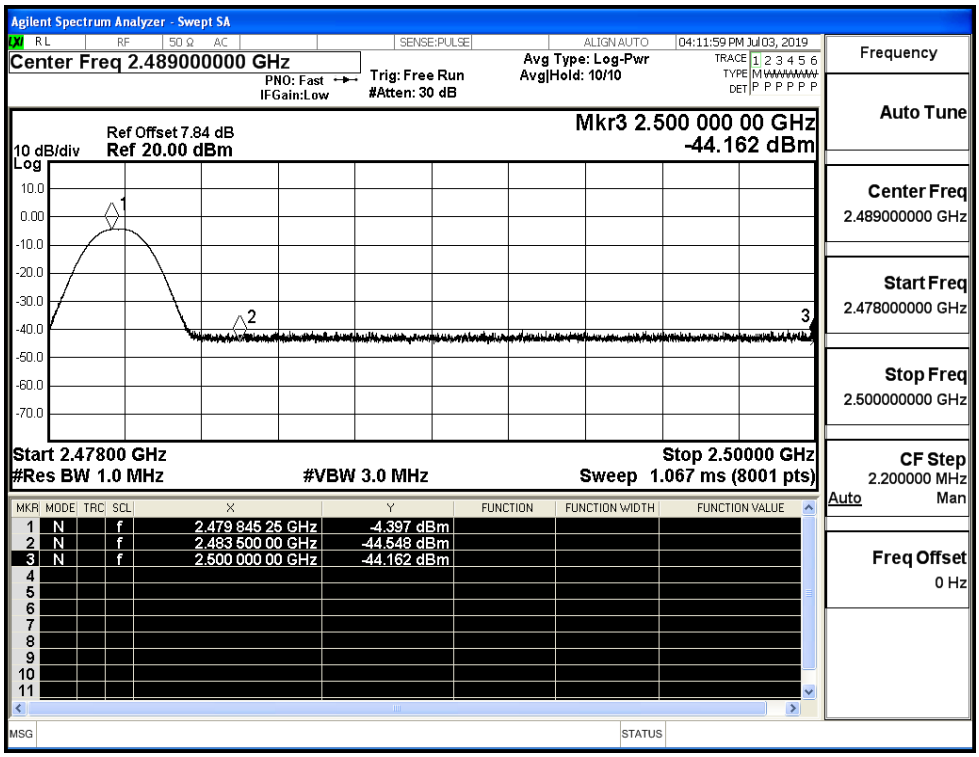
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



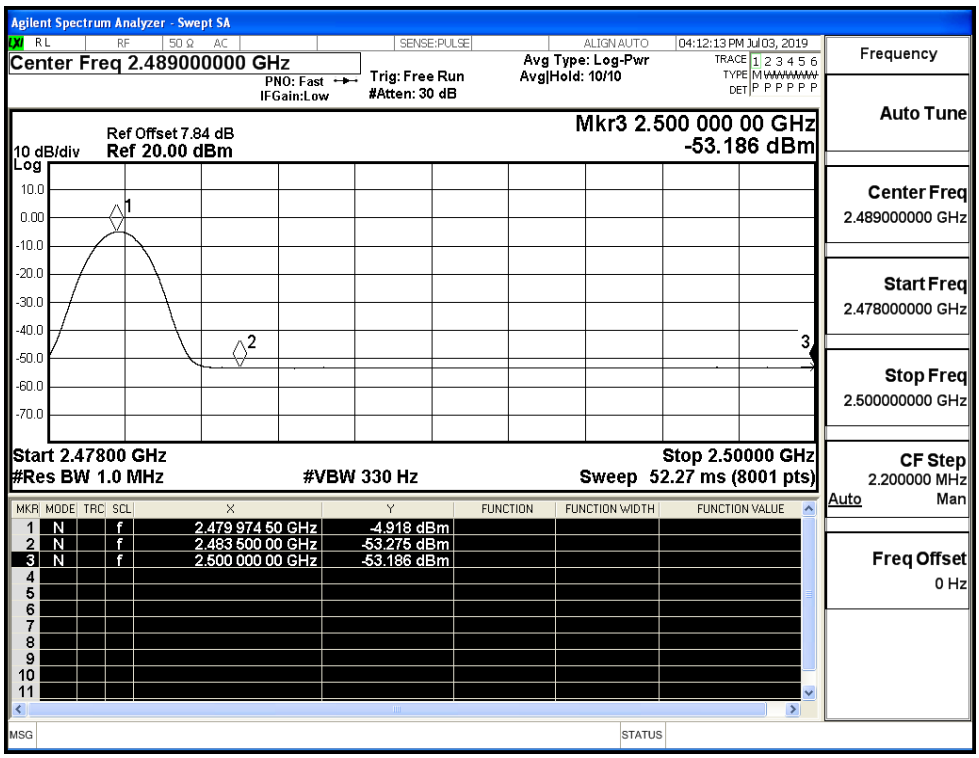

Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



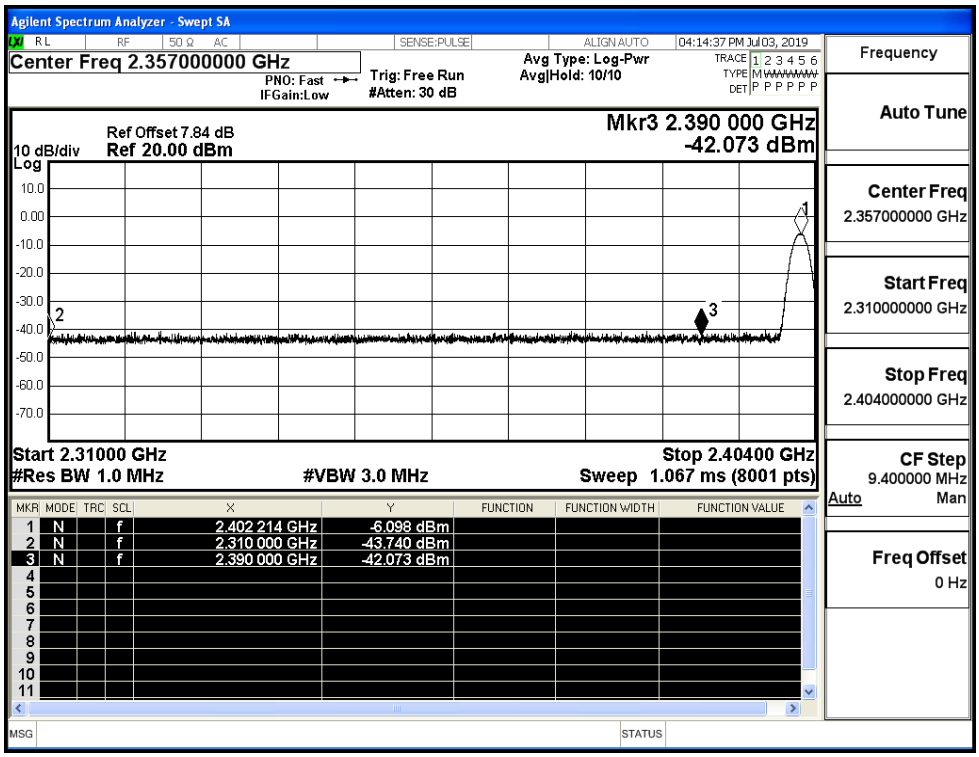
## Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



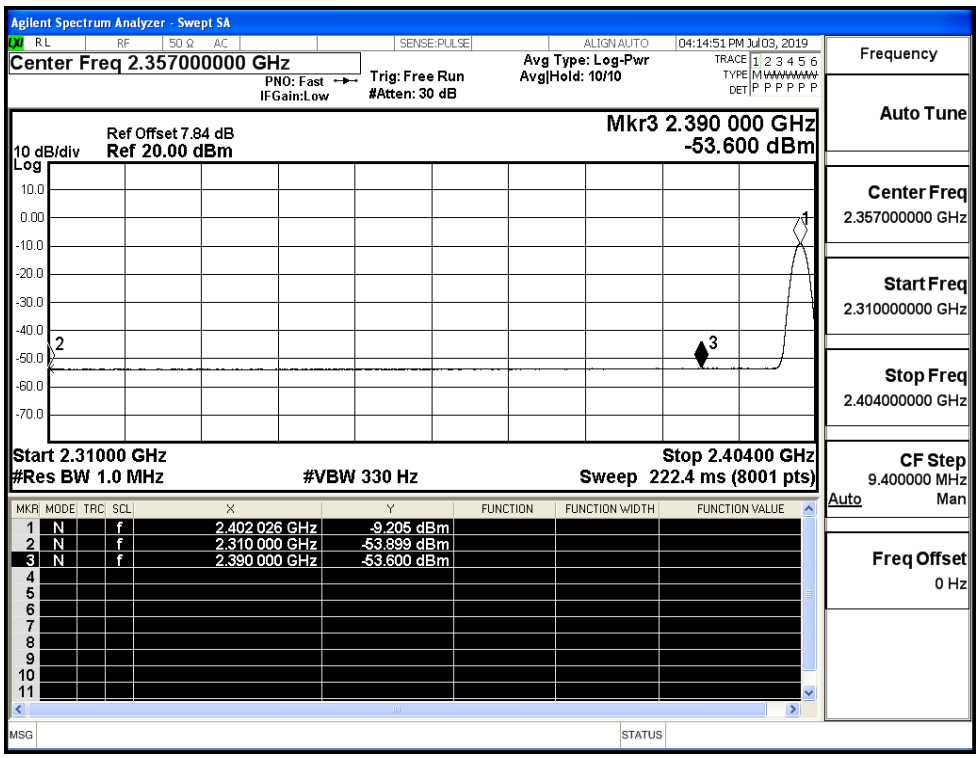

## Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



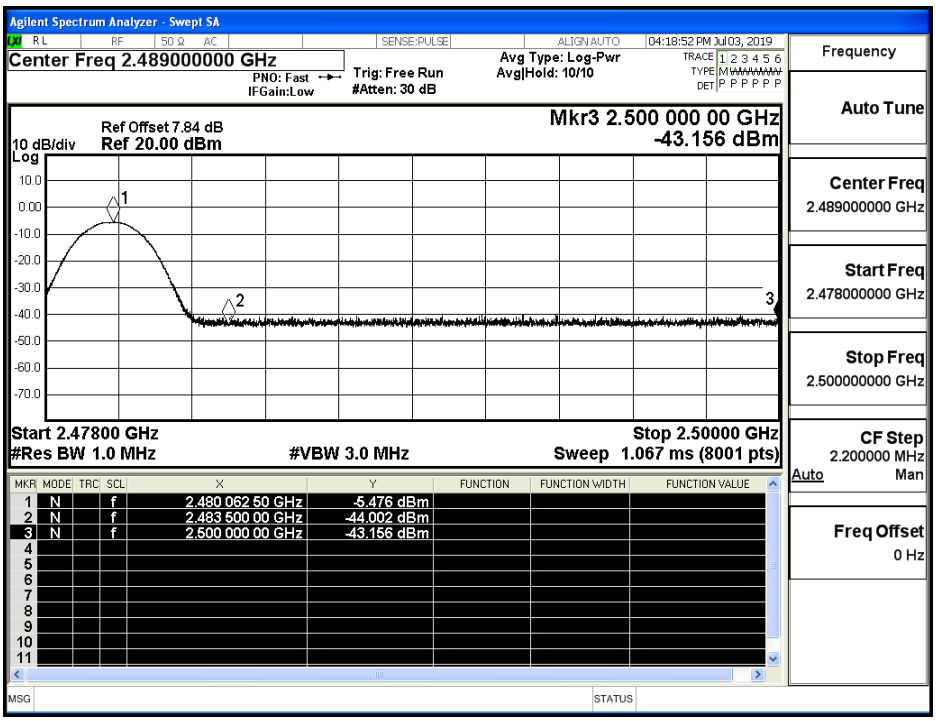
Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)

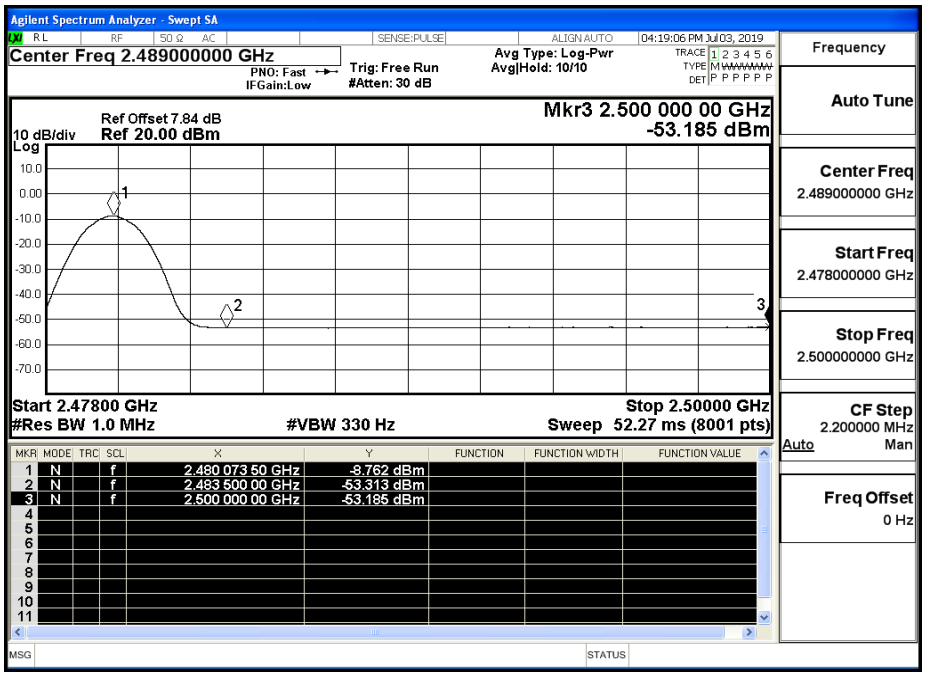



Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



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)