# Appendix A

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

**Product Name: LED Lighting Speaker**

**Trade Mark: N/A**

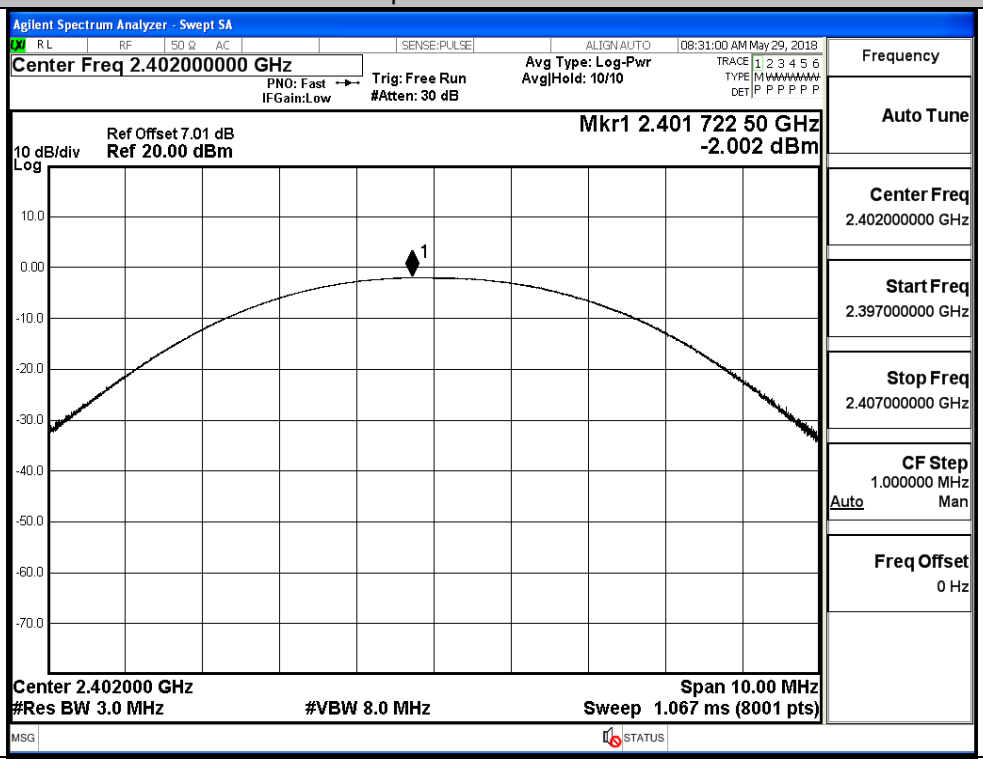
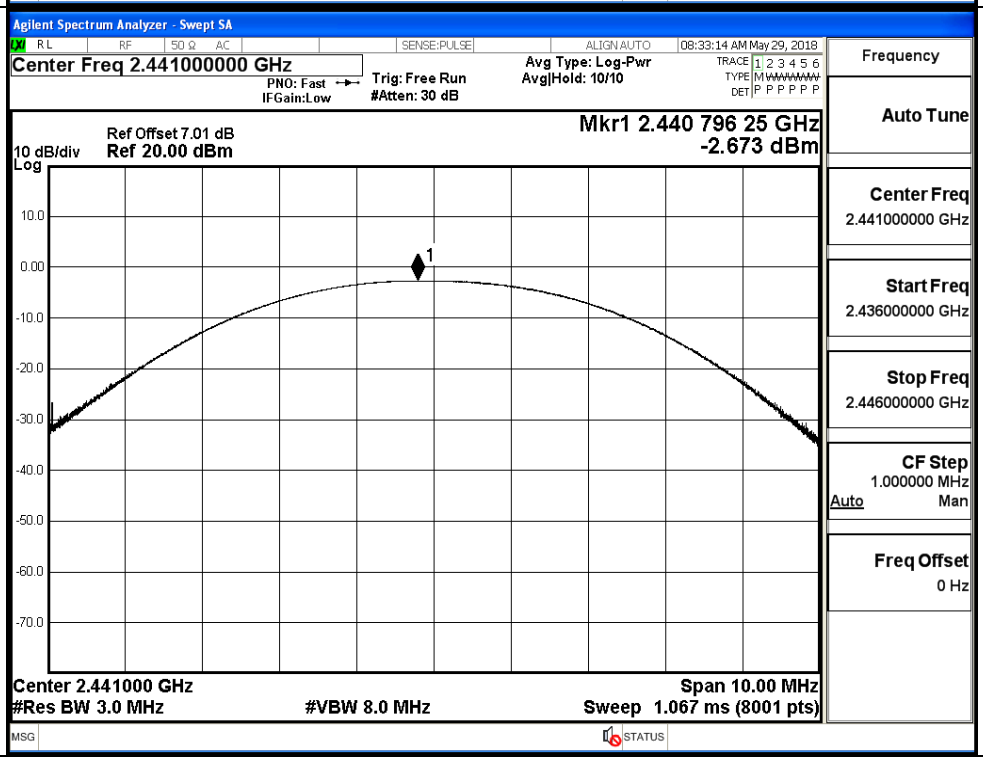
**Test Model: SP0011/ORB**

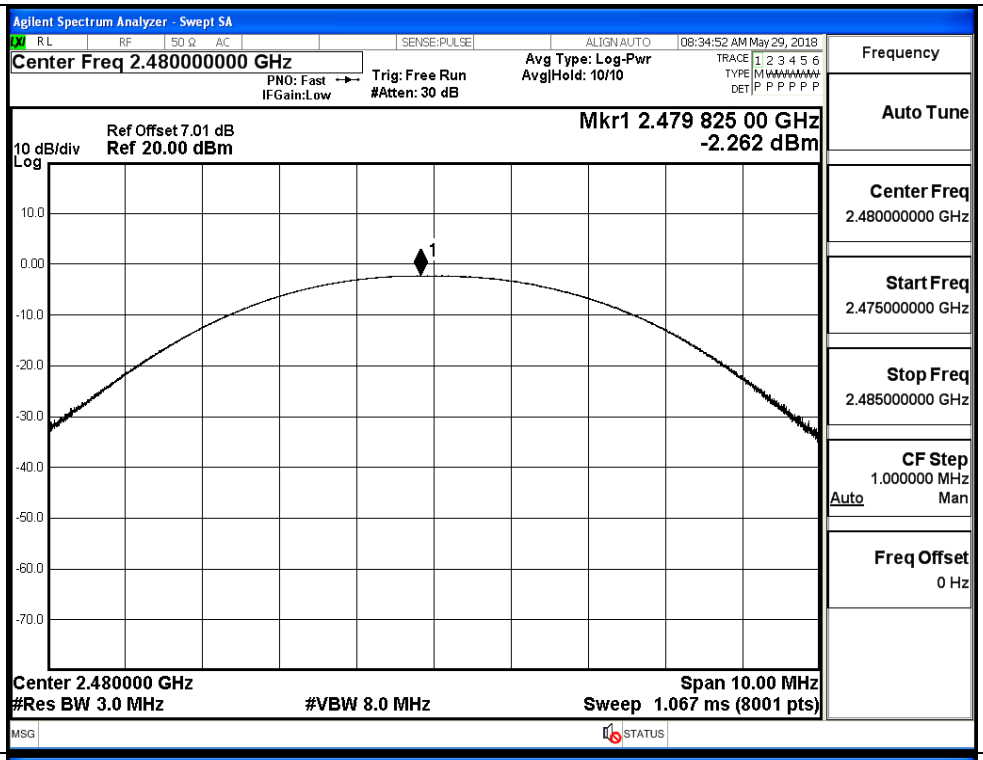
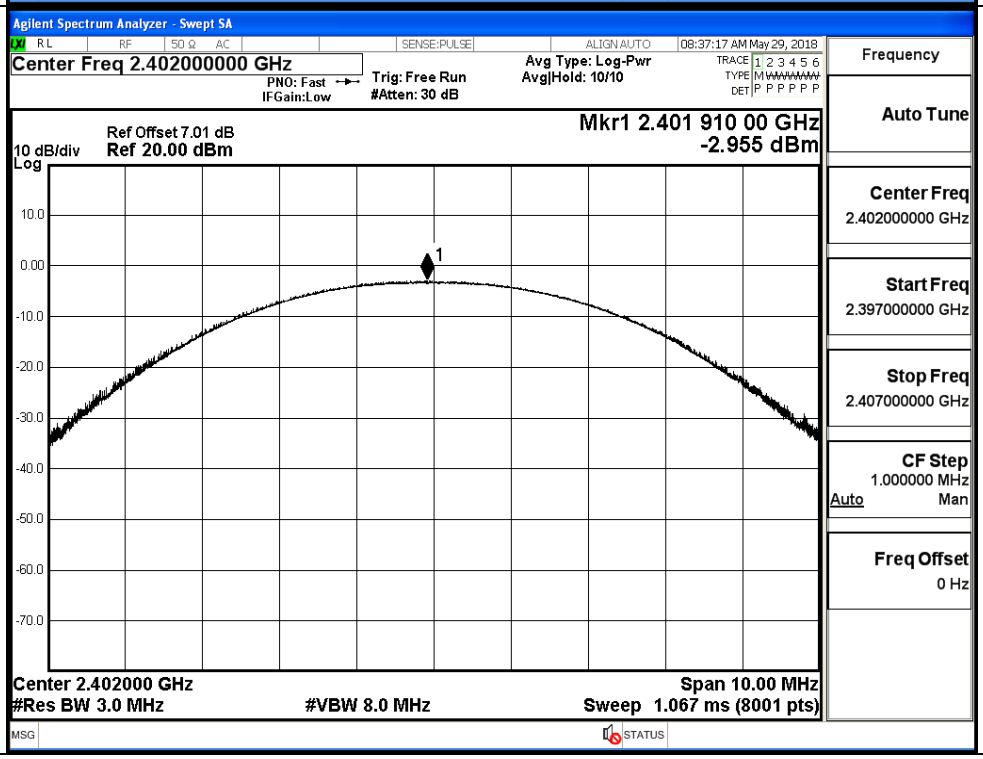
**Environmental Conditions**

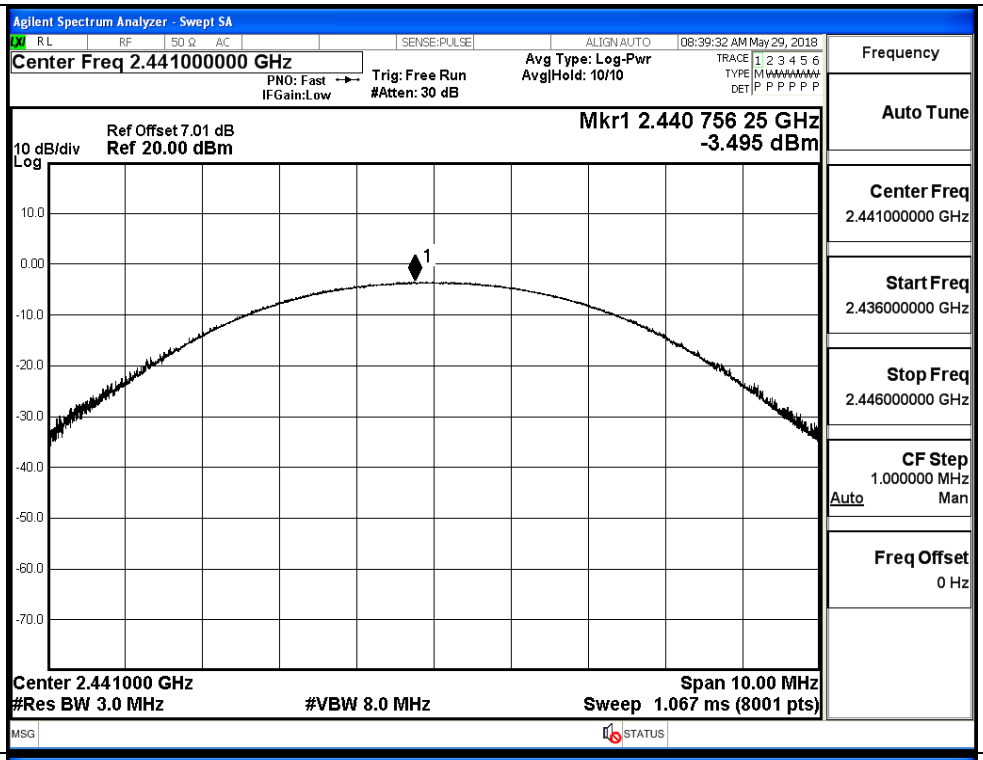
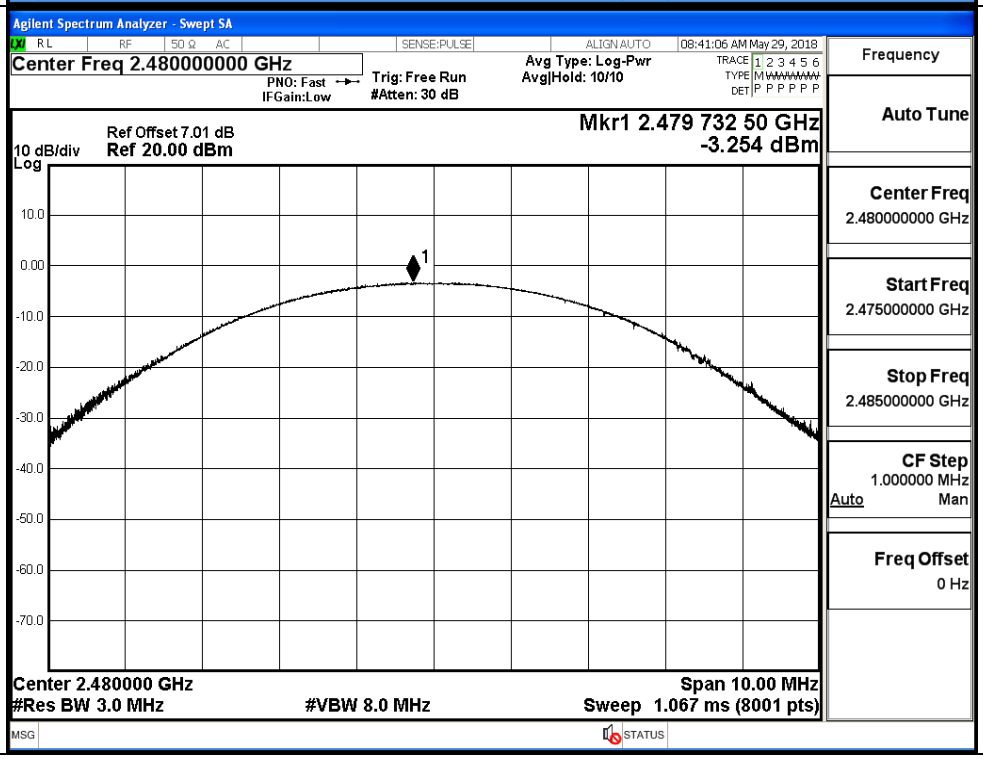
| | |
|---|---|
| Temperature: | 24.5 ° C |
| Relative Humidity: | 52.4% |
| ATM Pressure: | 100.0 kPa |
| Test Engineer: | WANGCHUANG |
| Supervised by: | Jayden.Zhuo |

## A.1 Maximum Conducted Peak Output Power

| Mode | Channel. | Maximum Peak Output Power [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | -2.002 | 30 | PASS |
| | MCH | -2.673 | 30 | PASS |
| | HCH | -2.262 | 30 | PASS |
| π/4DQPSK | LCH | -2.955 | 21 | PASS |
| | MCH | -3.495 | 21 | PASS |
| | HCH | -3.254 | 21 | PASS |

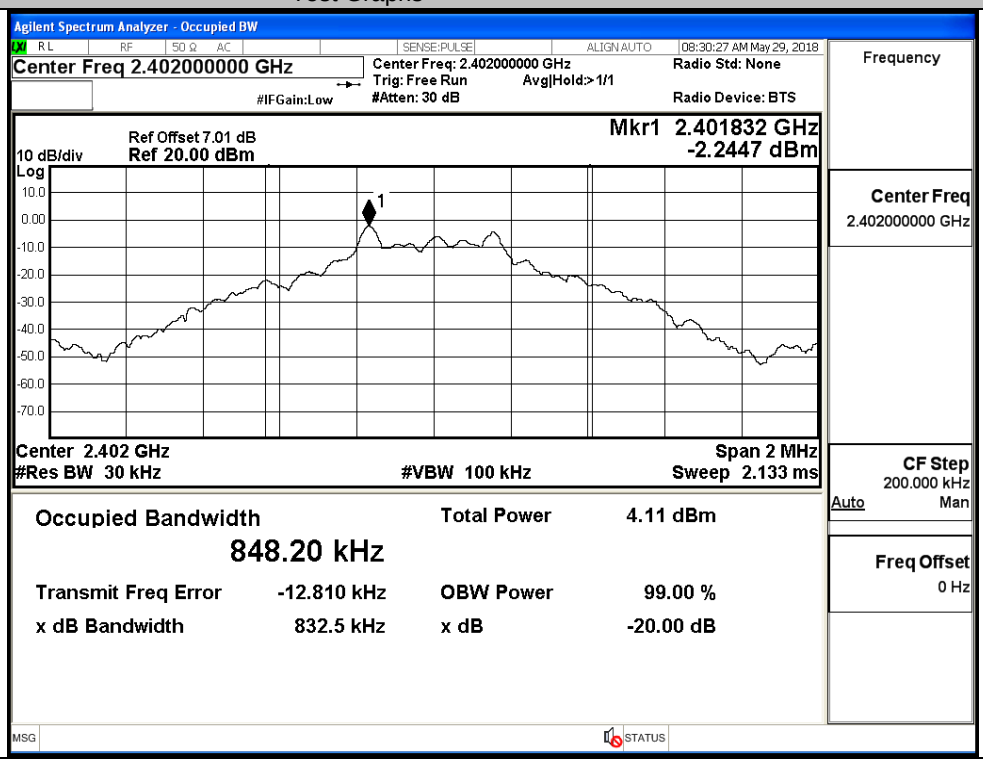
| Test Graphs | |
|---|---|
| GFSK/LCH |  |
| GFSK/MCH |  |

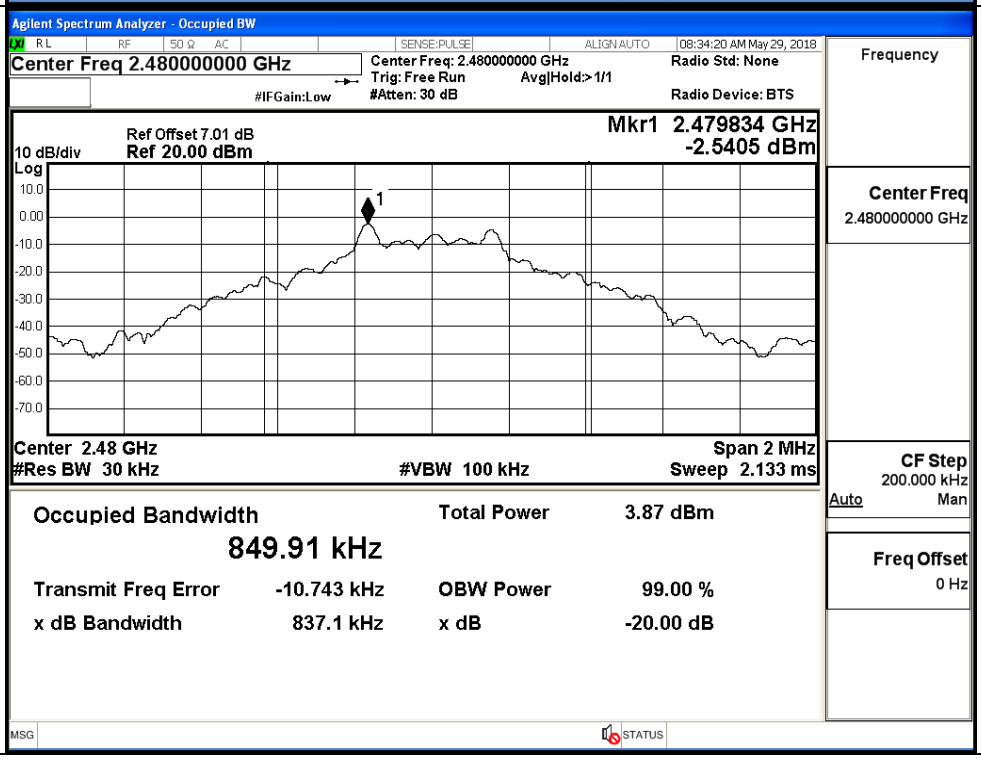
| | |
|---|---|
| GFSK/HCH |  |
| π/4DQPSK/LCH |  |

| | | |
|---|---|---|
| π/4DQPSK/MCH | |  |
| π/4DQPSK/HCH | |  |

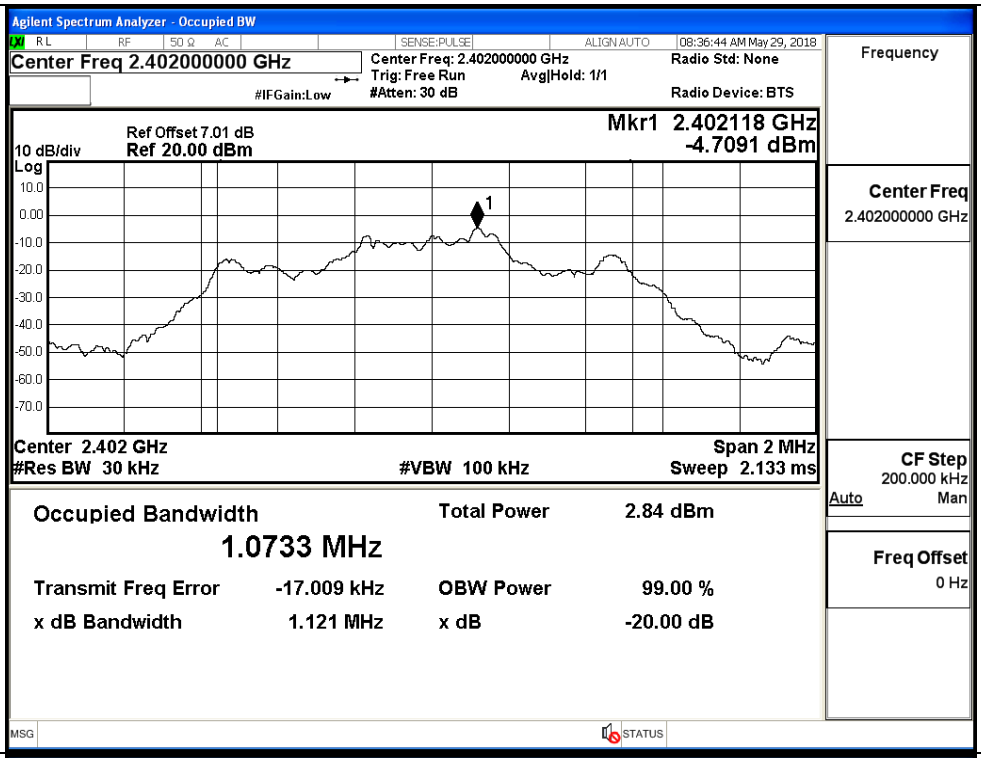
## A.2 20dB Bandwidth

| Mode | Channel. | 20dB Bandwidth [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.8325 | Not Specified | PASS |
| | MCH | 0.8329 | Not Specified | PASS |
| | HCH | 0.8371 | Not Specified | PASS |
| π/4DQPSK | LCH | 1.121 | Not Specified | PASS |
| | MCH | 1.116 | Not Specified | PASS |
| | HCH | 1.120 | Not Specified | PASS |

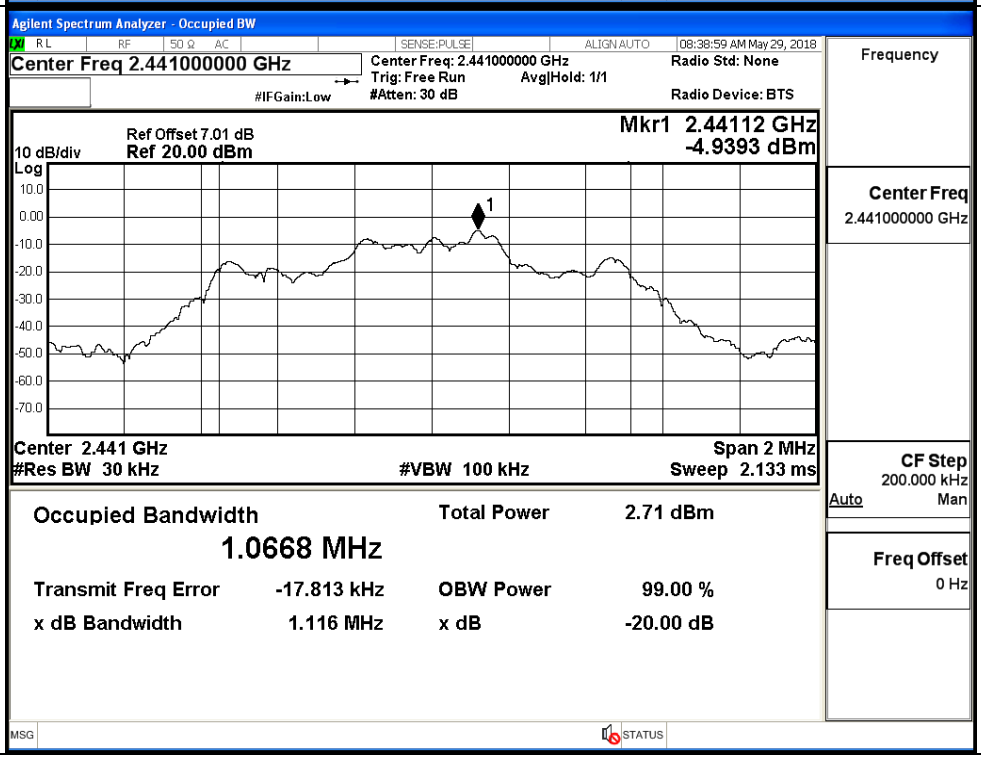
| Test Graphs | |
|---|---|
| GFSK/LCH |  |

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

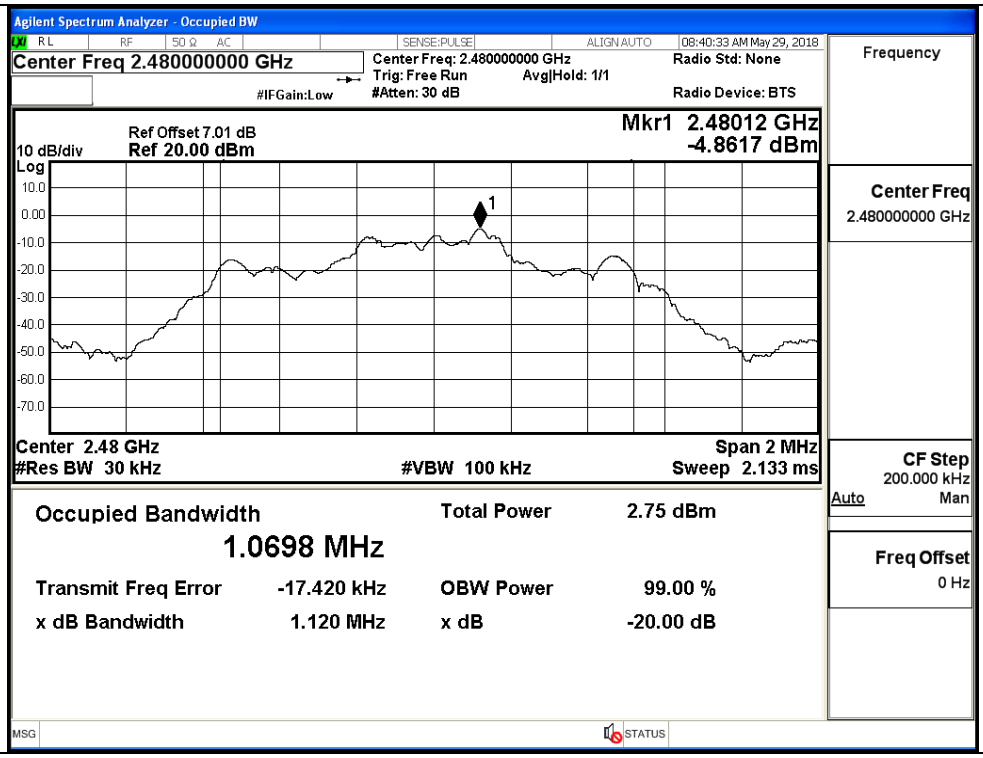
π/4DQPSK/LCH




π/4DQPSK/MCH

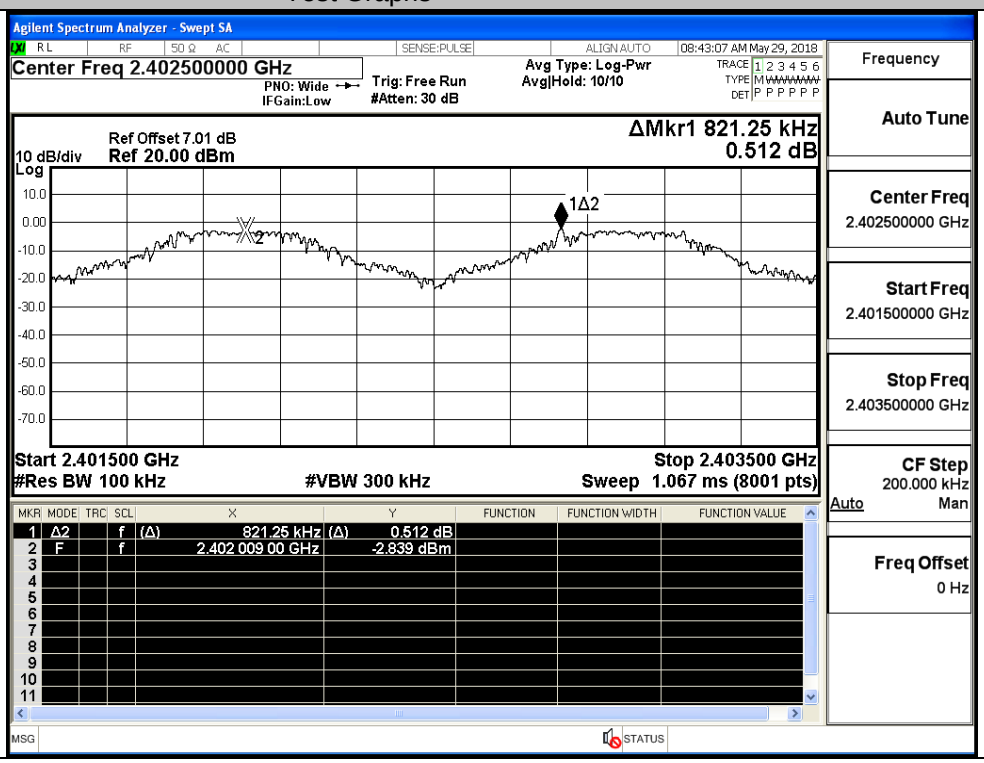


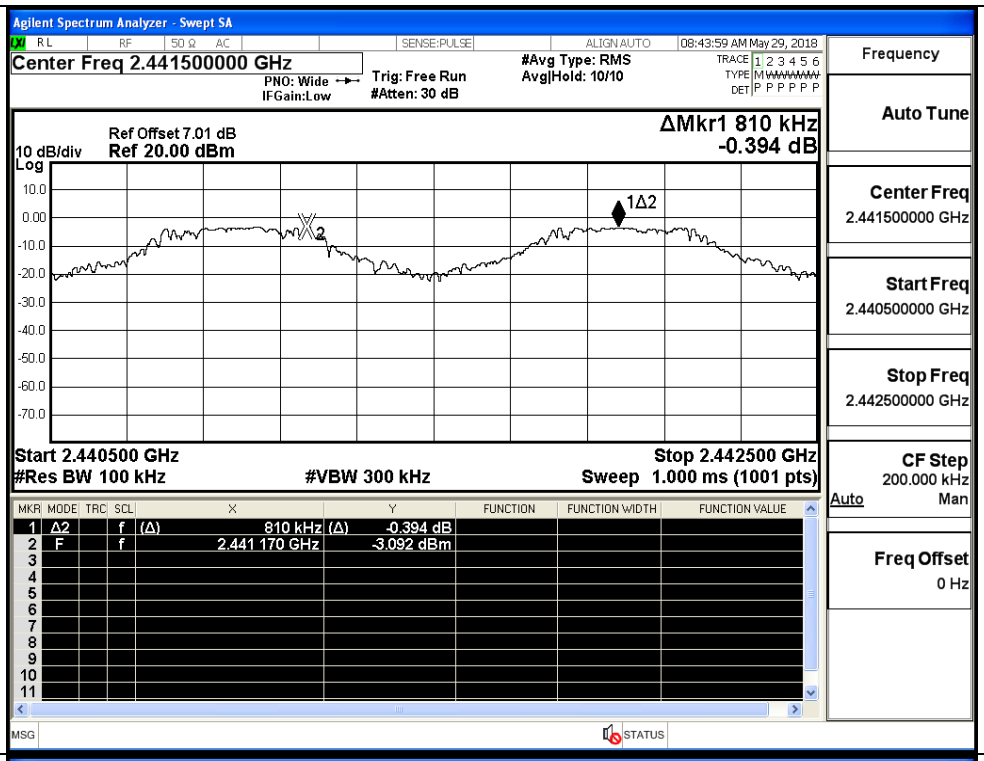
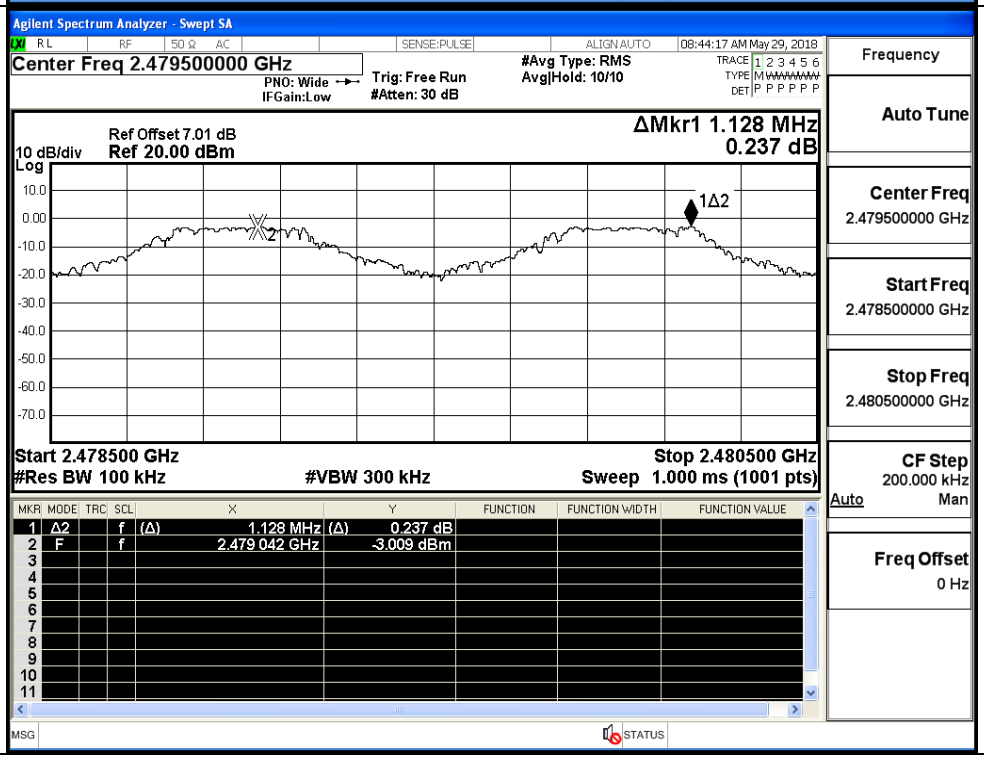
π/4DQPSK/HCH


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
08:40:33 AM May 29, 2018
#IFGain:Low
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.48012 GHz
-4.8617 dBm
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 2 MHz
Sweep 2.133 ms
Occupied Bandwidth
1.0698 MHz
Total Power 2.75 dBm
Transmit Freq Error -17.420 kHz
OBW Power 99.00 %
x dB Bandwidth 1.120 MHz
x dB -20.00 dB
Frequency
Center Freq
2.480000000 GHz
CF Step
200.000 kHz
Auto Man
Freq Offset
0 Hz
MSG
STATUS

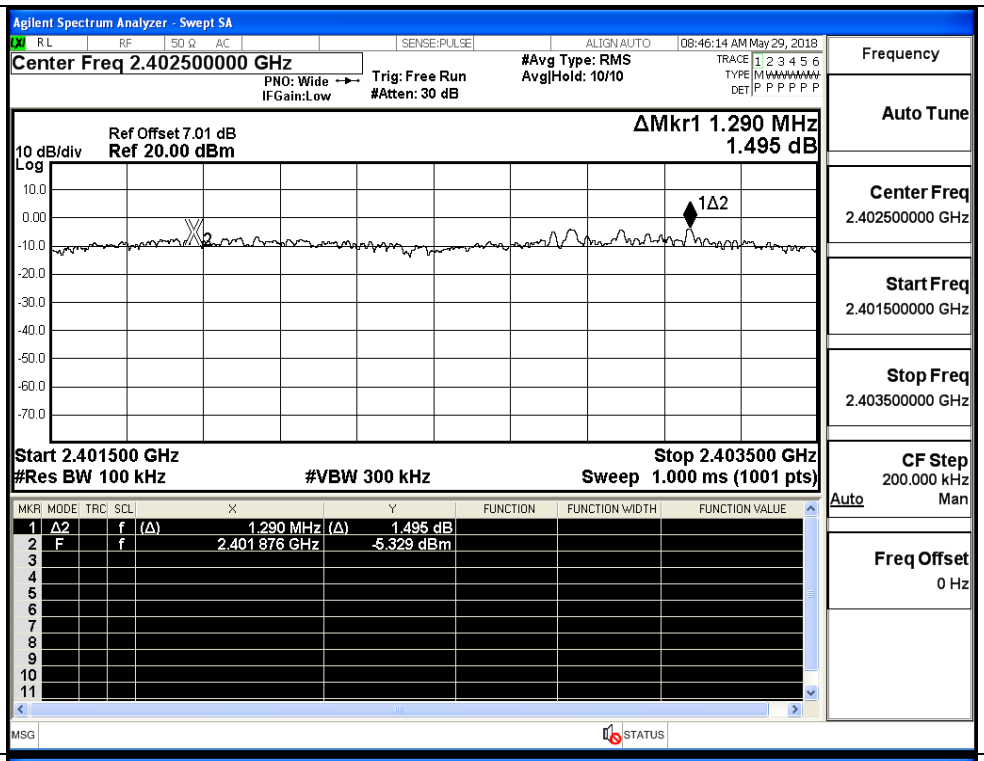
## A.3 Carrier Frequency Separation

| Mode | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---|---|---|---|---|
| GFSK | LCH | 0.821 | 0.558 | PASS |
| | MCH | 0.810 | 0.558 | PASS |
| | HCH | 1.128 | 0.558 | PASS |
| π/4DQPSK | LCH | 1.290 | 0.747 | PASS |
| | MCH | 1.216 | 0.747 | PASS |
| | HCH | 0.992 | 0.747 | PASS |

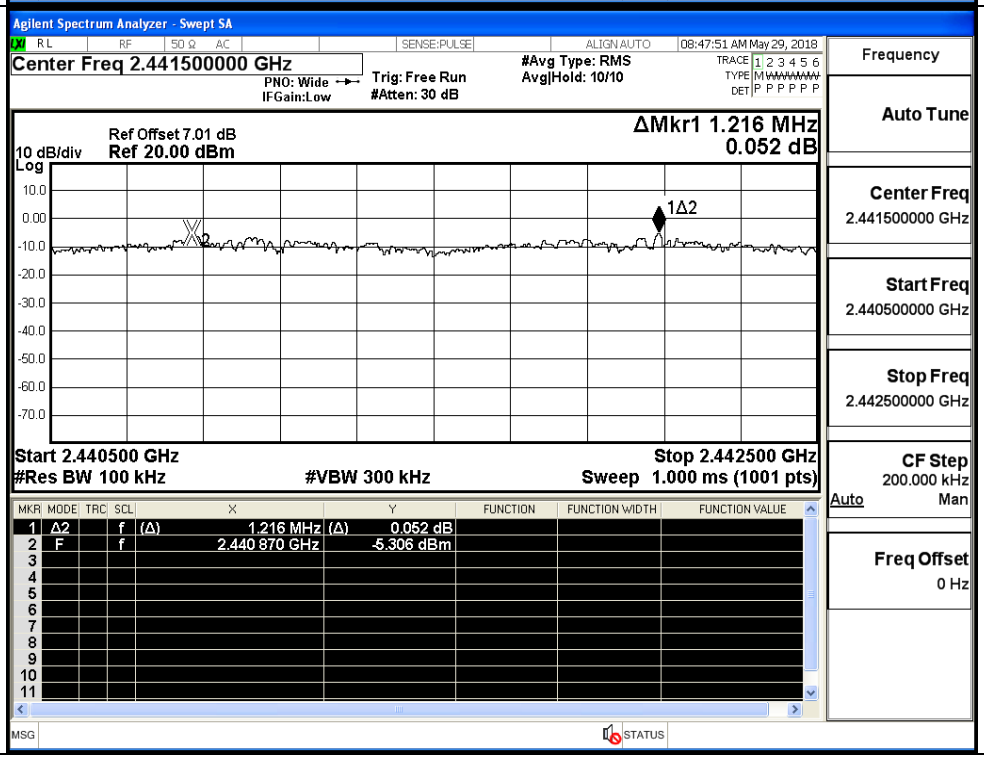
| Test Graphs | | |
|---|---|---|
| GFSK/LCH | |  |

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

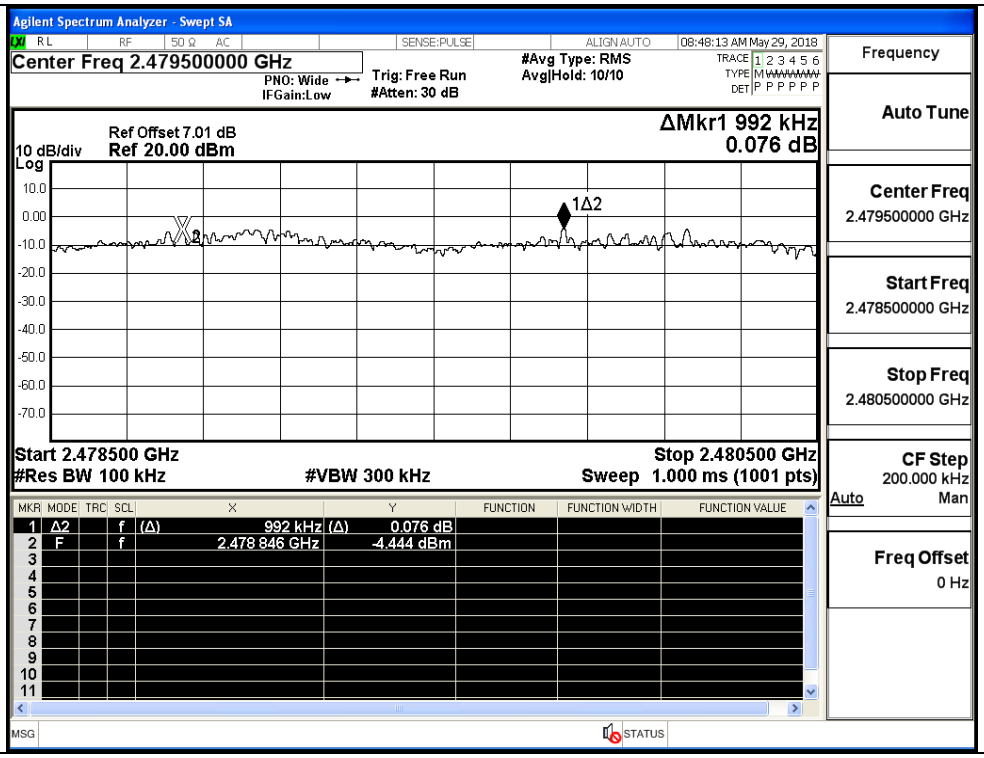
π/4DQPSK/LCH




π/4DQPSK/MCH

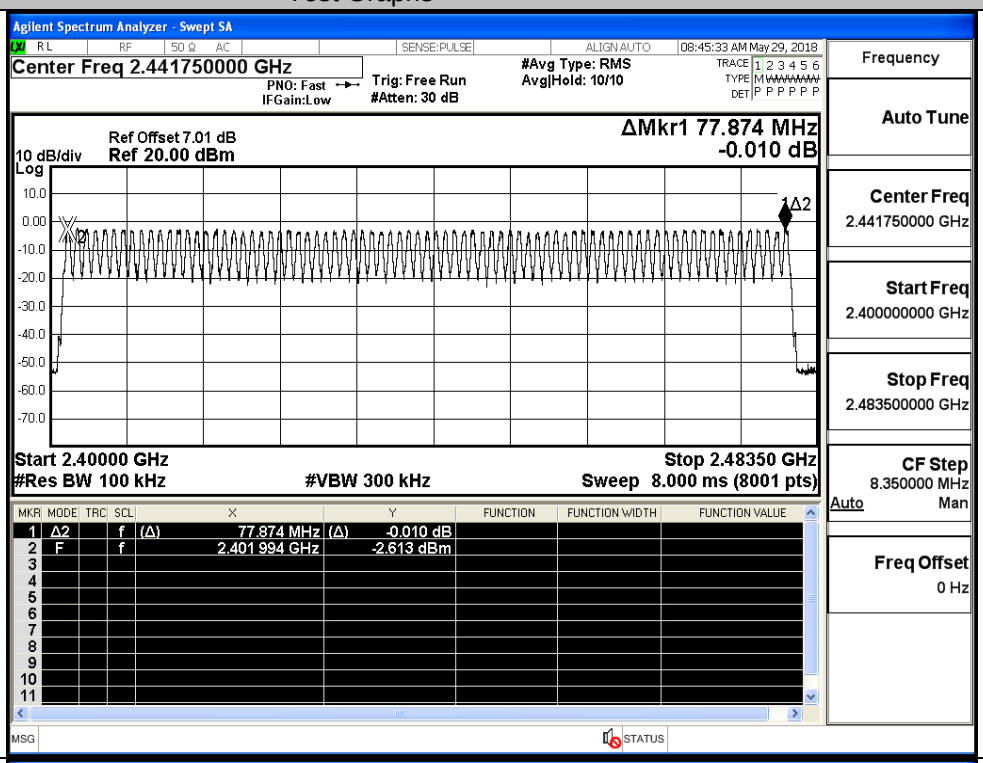
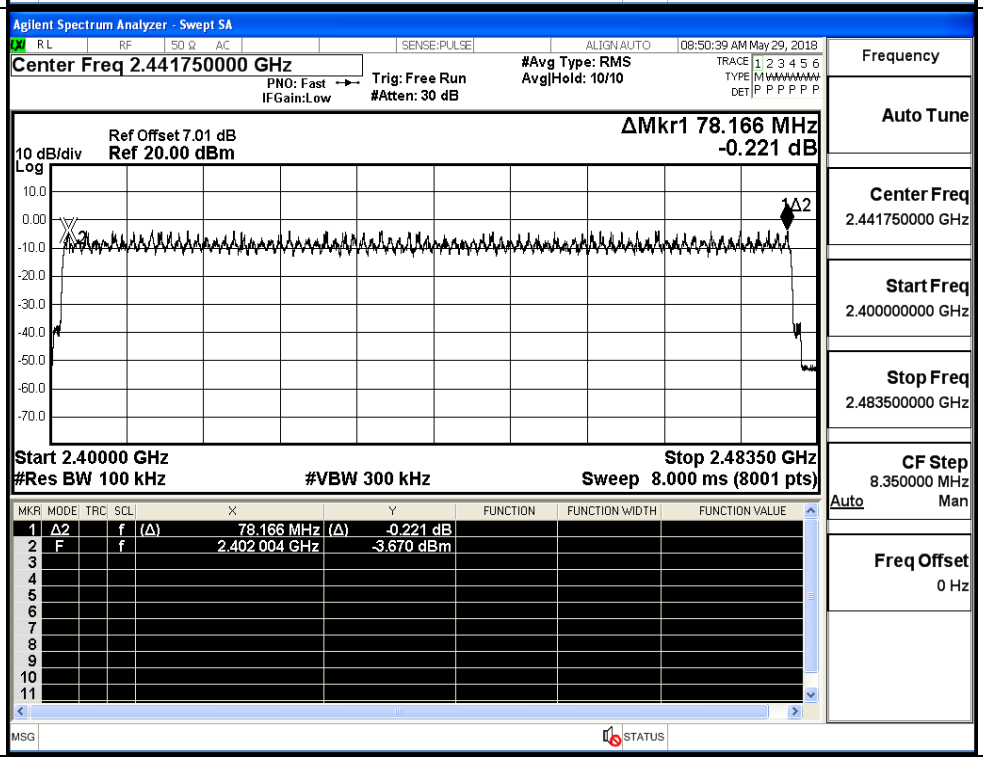


π/4DQPSK/HCH


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
08:48:13 AM May 29, 2018
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
ΔMkr1 992 kHz
0.076 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) 992 kHz (Δ) 0.076 dB
2 F f 2.478 846 GHz -4.444 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

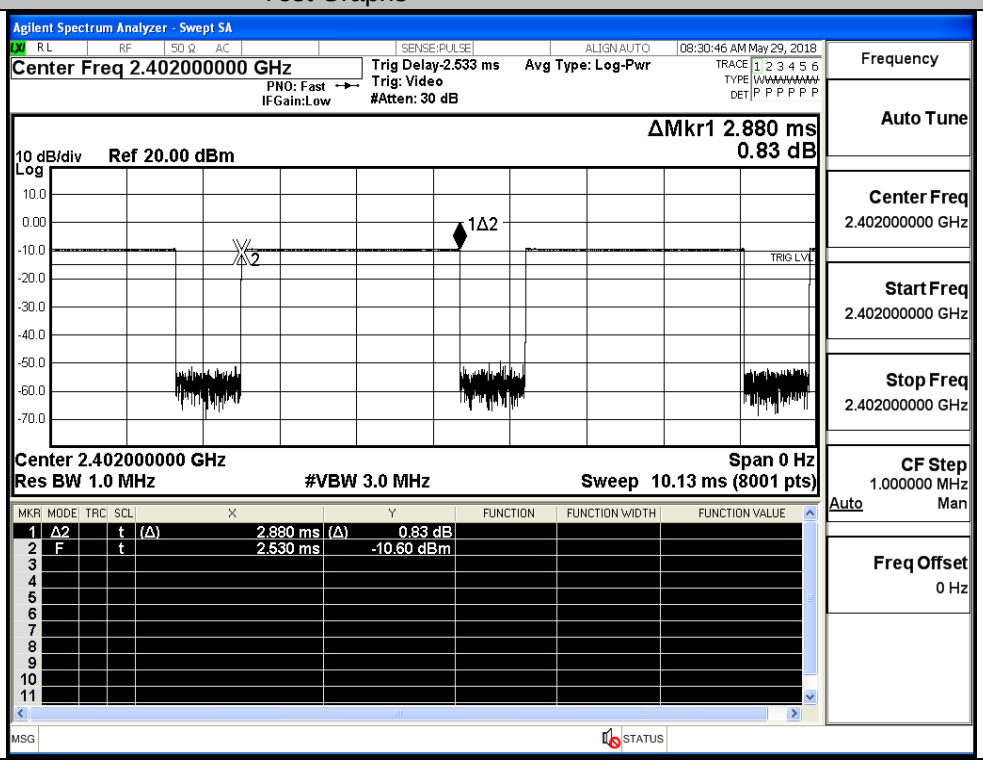
## A.4 Hopping Channel Number

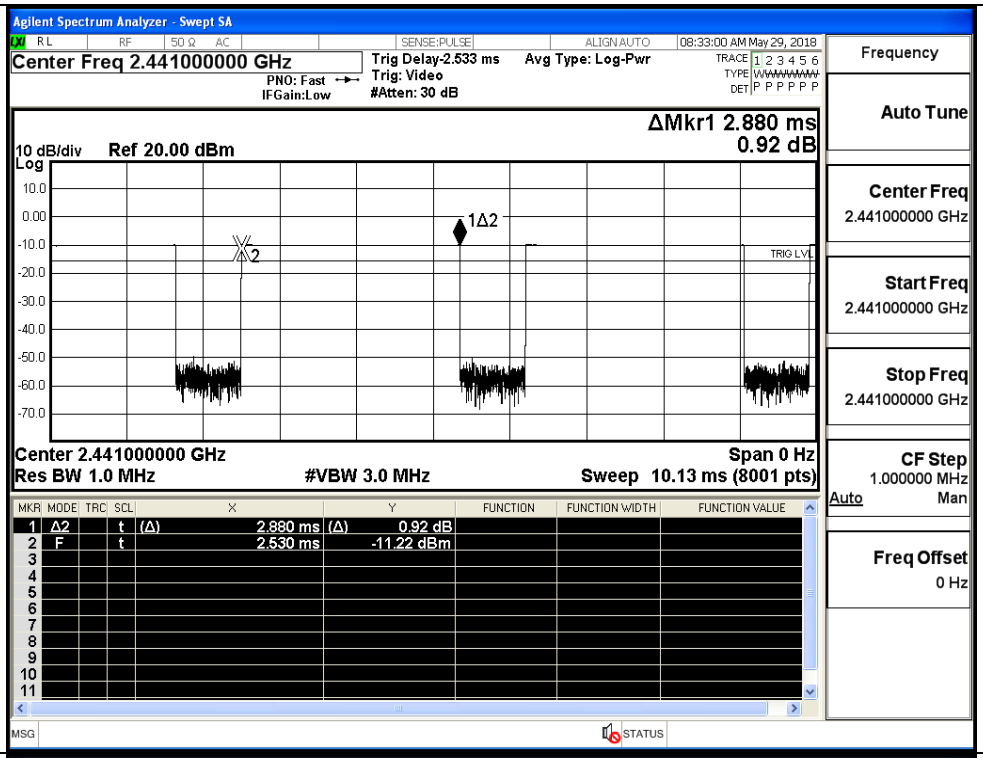
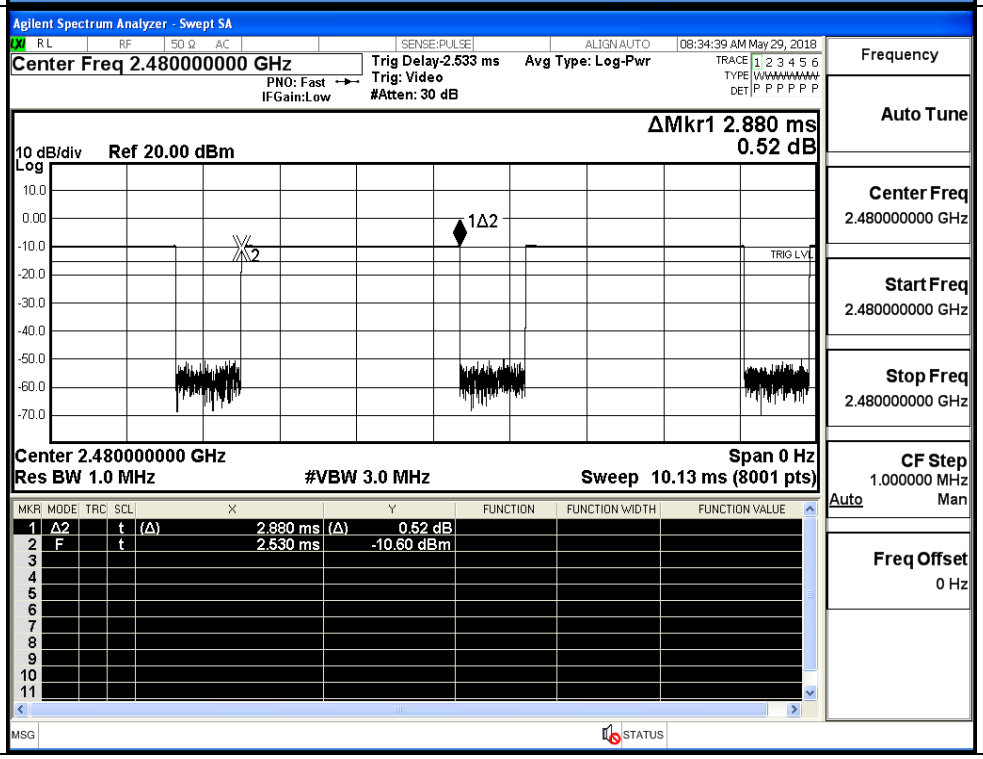
| Mode | Channel. | Number of Hopping Channel [N] | Limit [N] | Verdict |
|---|---|---|---|---|
| GFSK | Hop | 79 | >=15 | PASS |
| π/4DQPSK | Hop | 79 | >=15 | PASS |

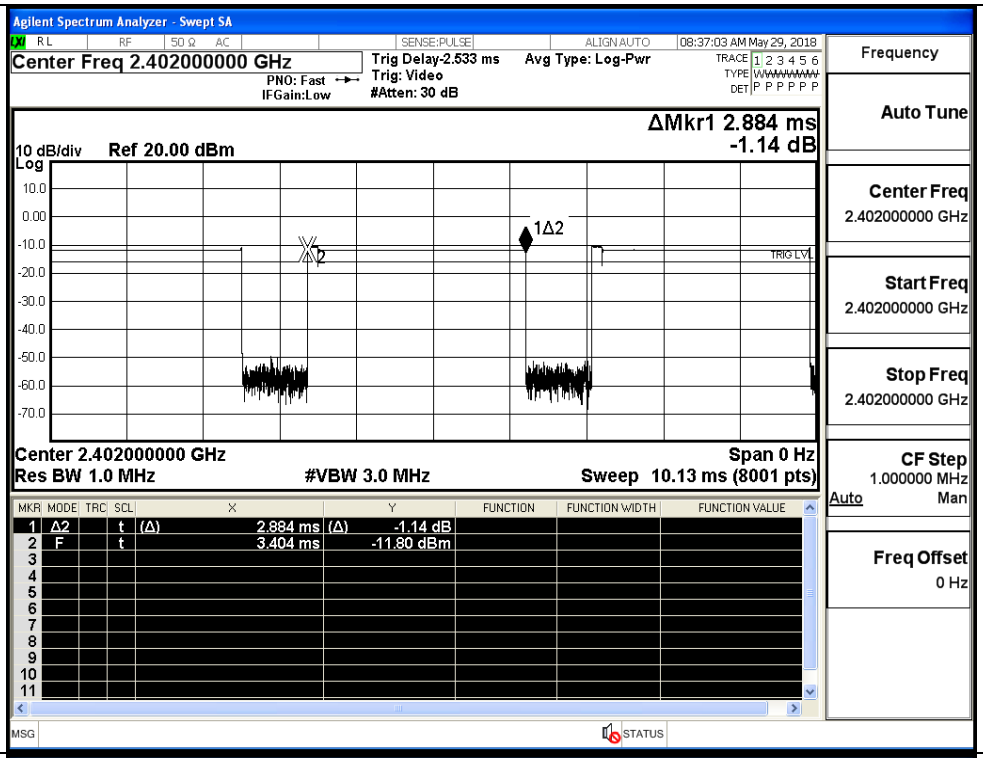
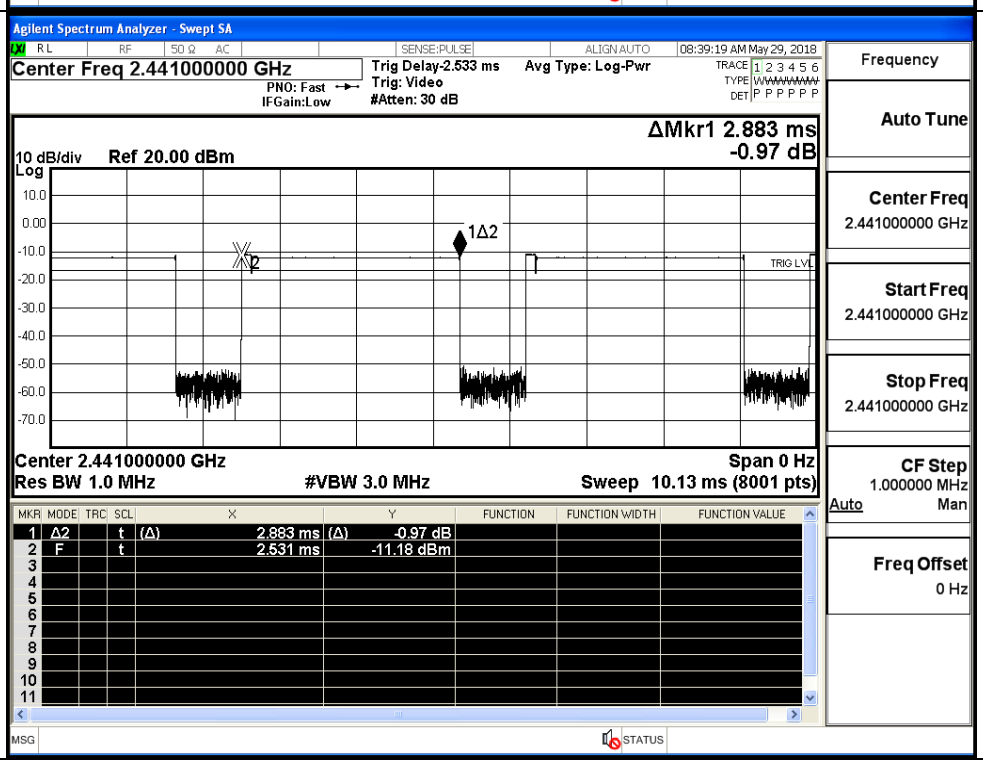
| Test Graphs | | |
|---|---|---|
| GFSK/Hop | |  |
| π/4DQPSK/Hop | |  |

## 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 |

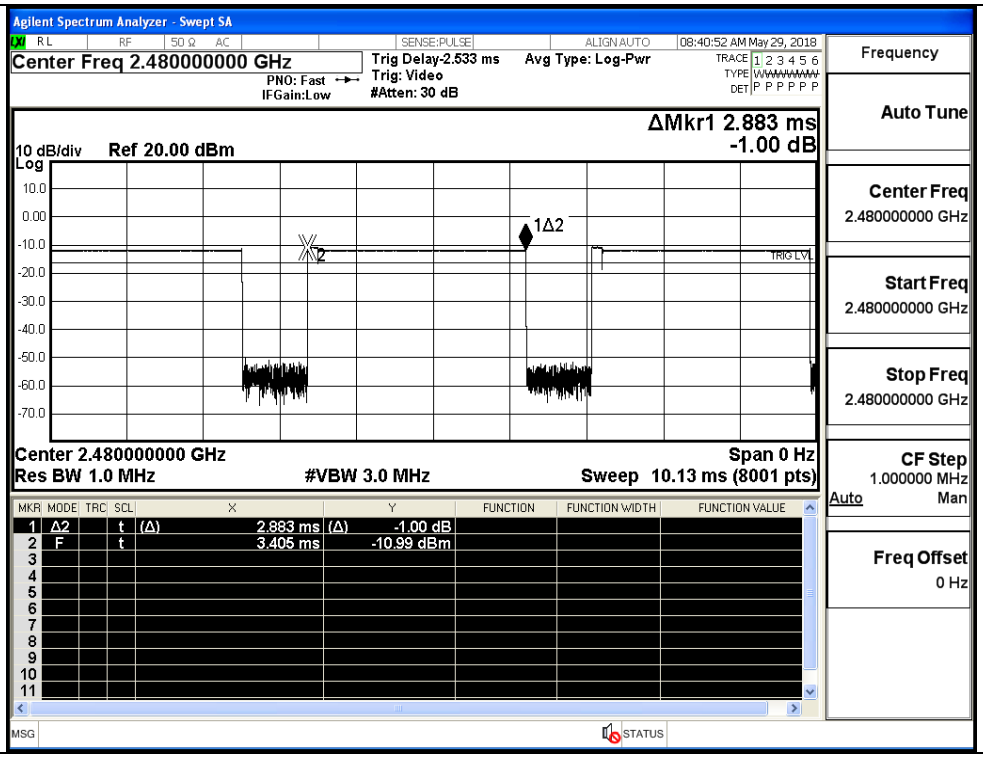
| Test Graphs | |
|---|---|
| GFSK_DH5/LCH |  |

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

| | |
|---|---|
| π/4DQPSK<br>_2DH5/LCH |  |
| π/4DQPSK<br>_2DH5/MCH |  |

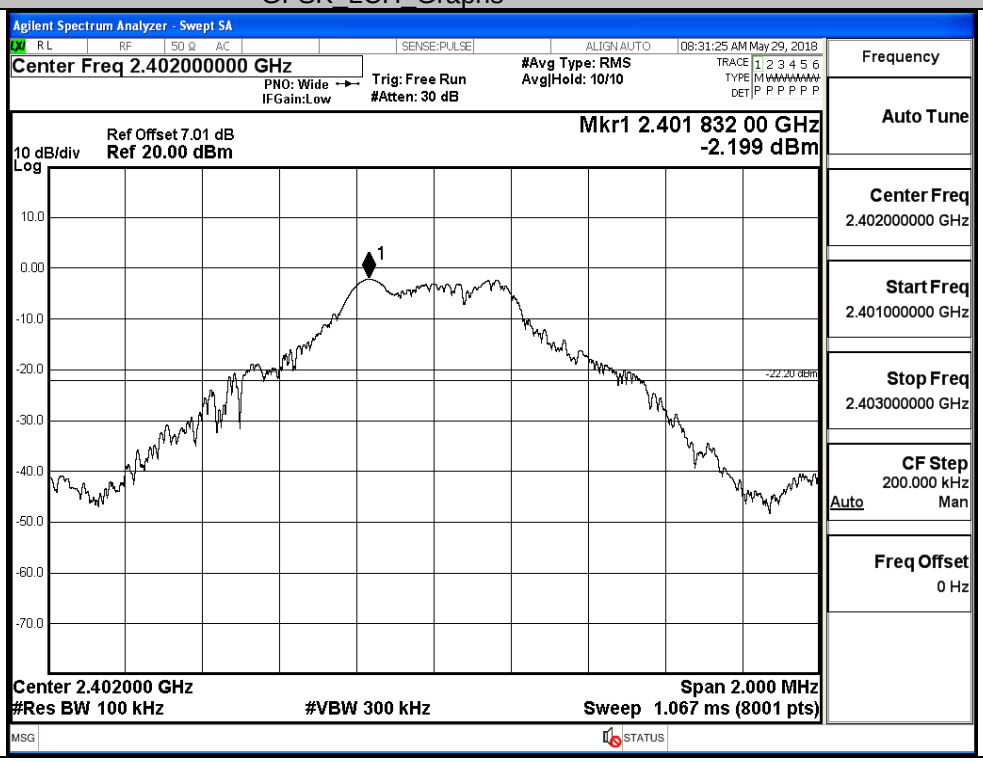
π/4DQPSK

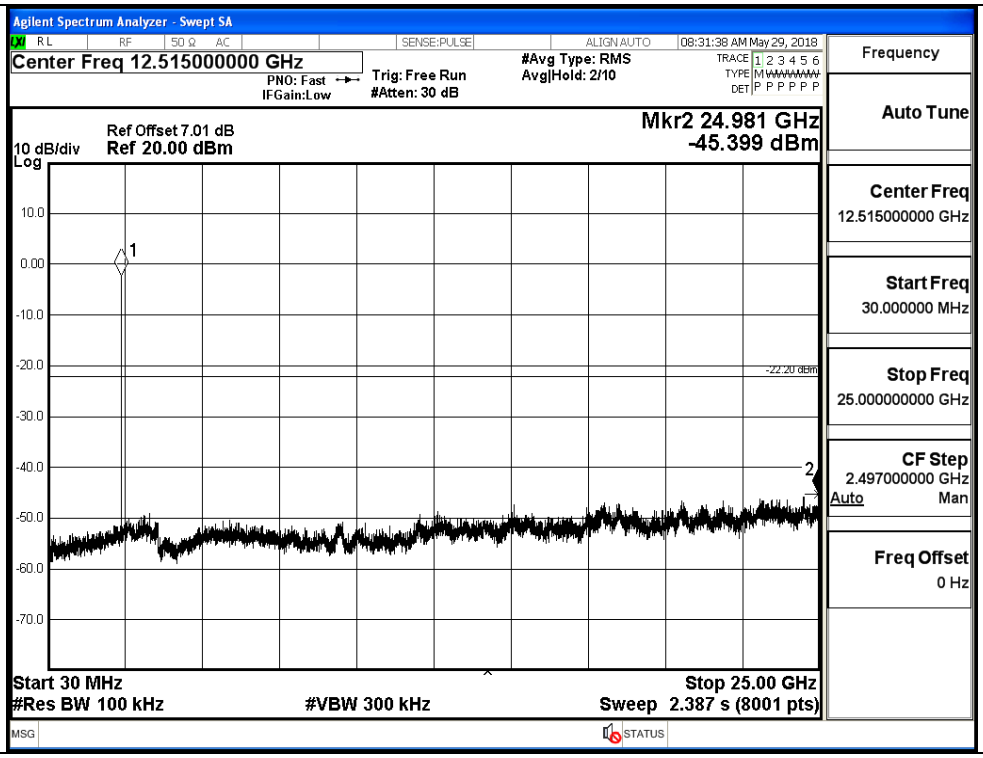
_2DH5/HCH



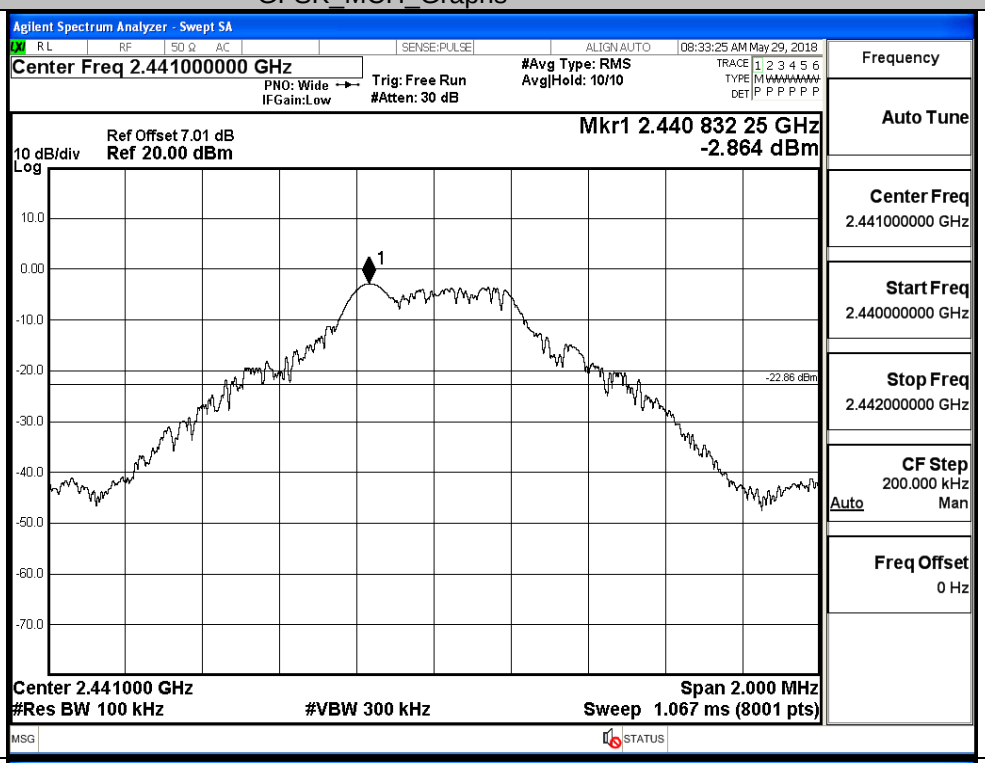
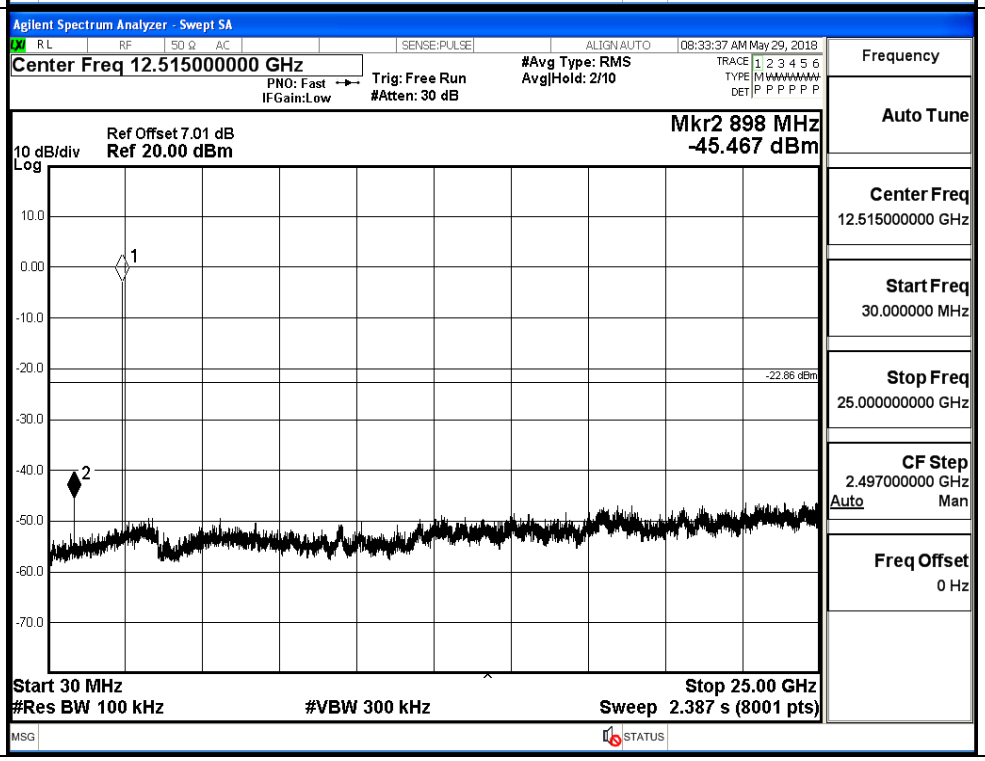
## A.6 RF Conducted Spurious Emissions

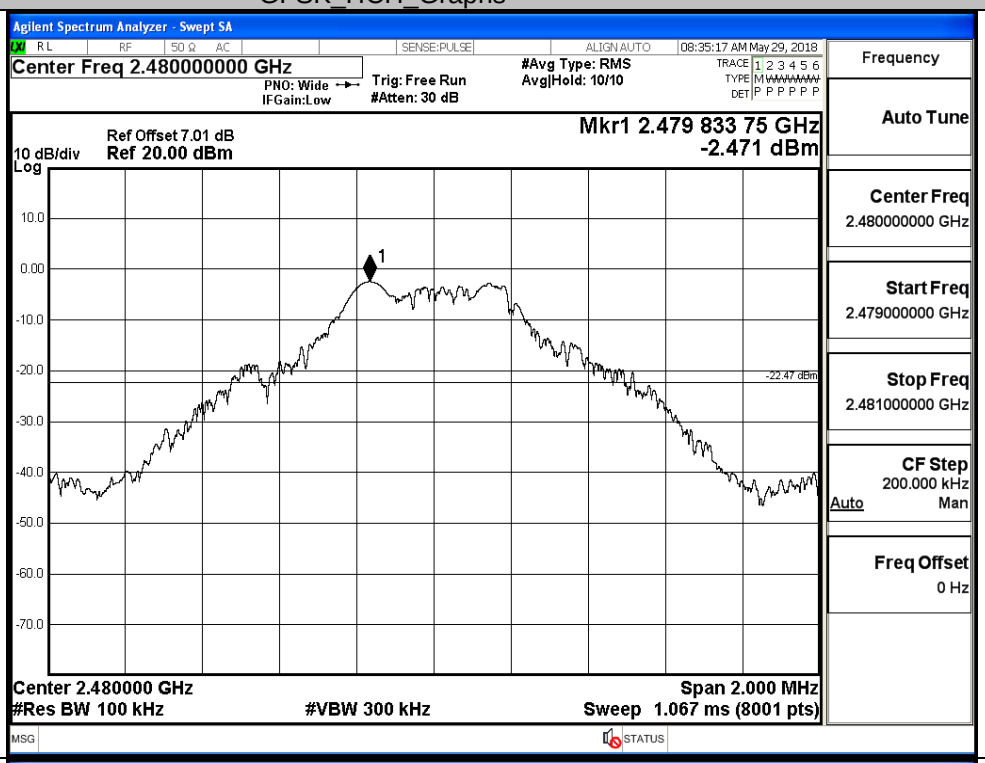
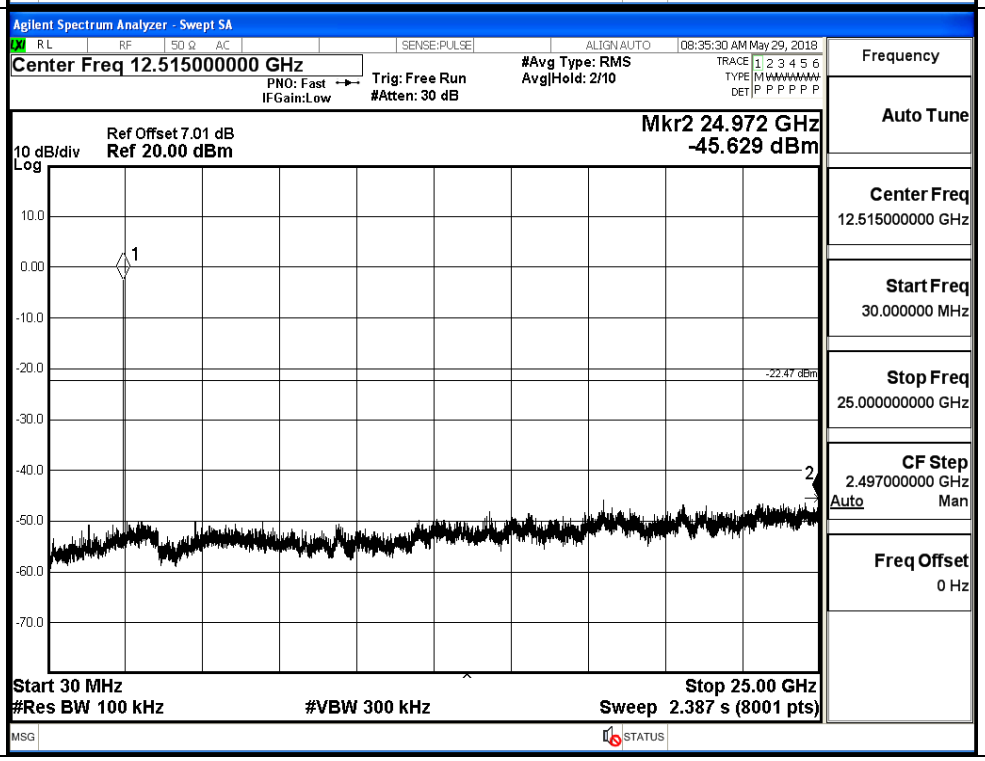
| Mode | Channel | Pref [dBm] | Max. Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|
| GFSK | LCH | -2.199 | -45.399 | -22.199 | PASS |
| | MCH | -2.864 | -45.467 | -22.864 | PASS |
| | HCH | -2.471 | -45.629 | -22.471 | PASS |
| π/4DQPSK | LCH | -3.631 | -45.951 | -23.631 | PASS |
| | MCH | -4.097 | -45.834 | -24.097 | PASS |
| | HCH | -3.712 | -44.576 | -23.712 | PASS |

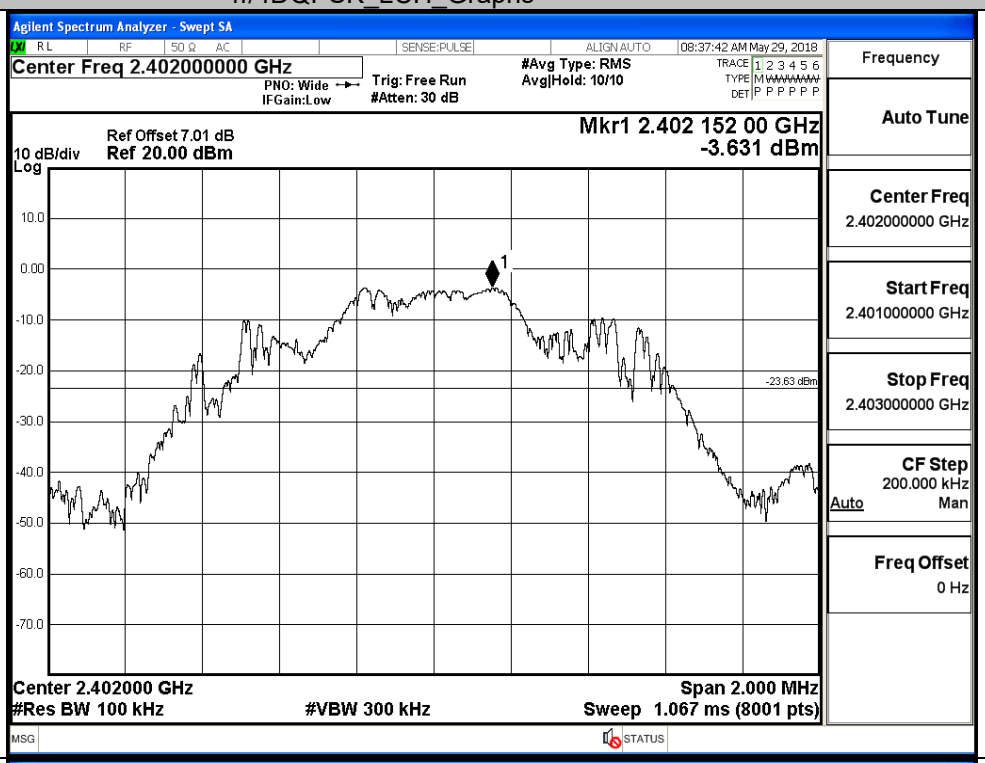
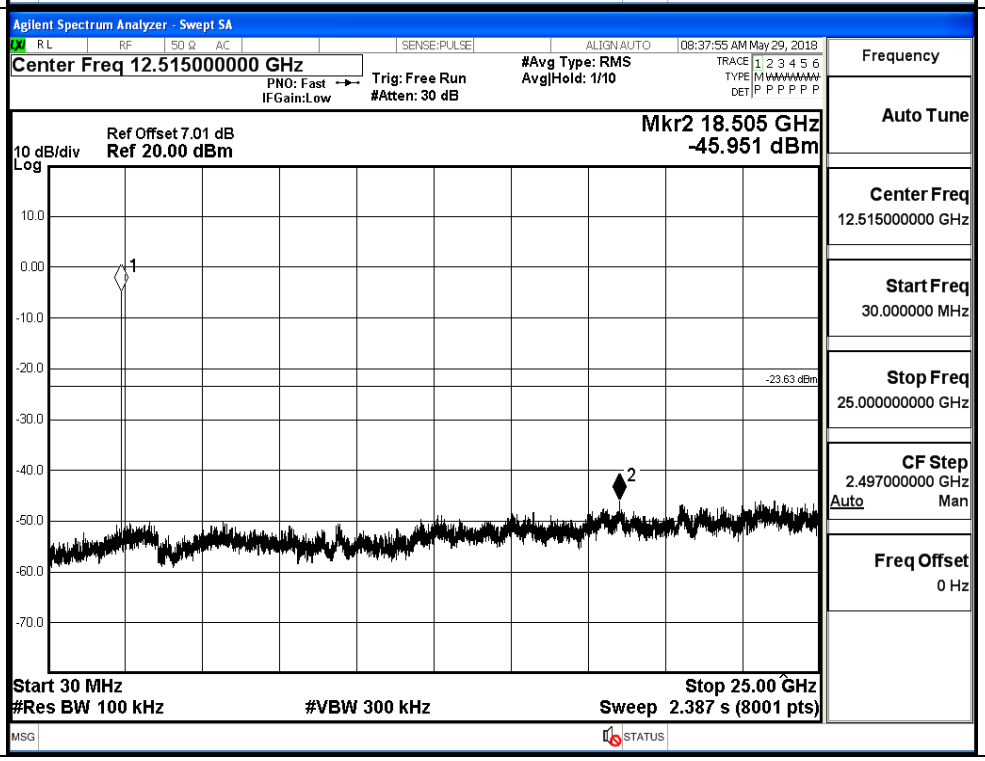
| GFSK_LCH_Graphs | | |
|---|---|---|
| Pref | |  |

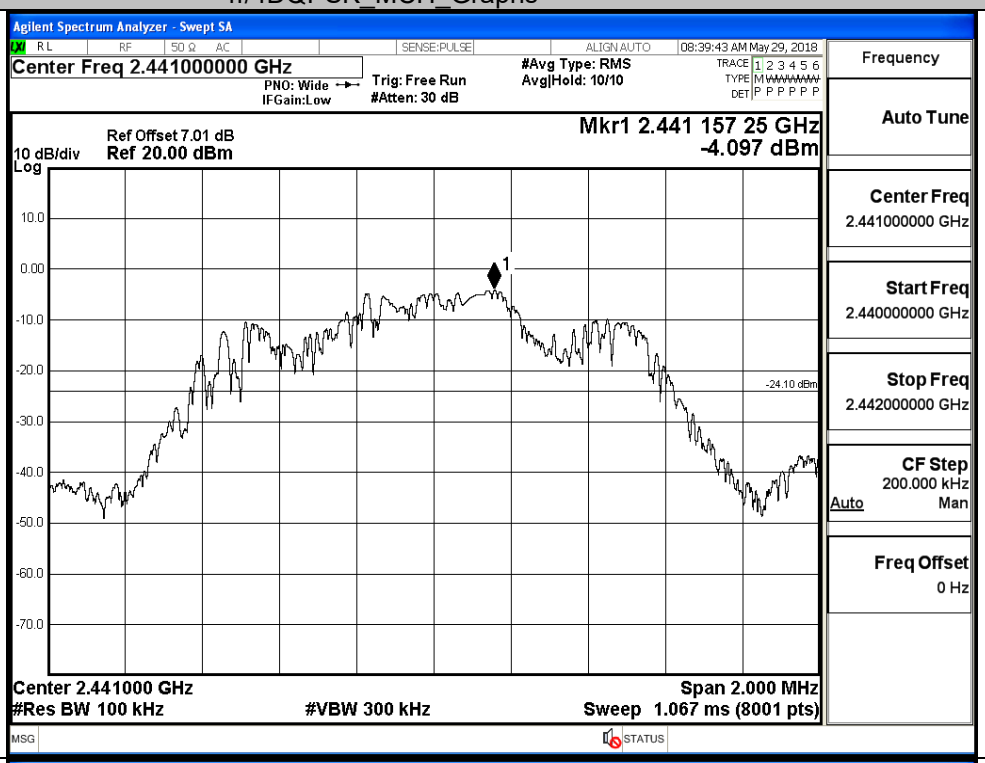
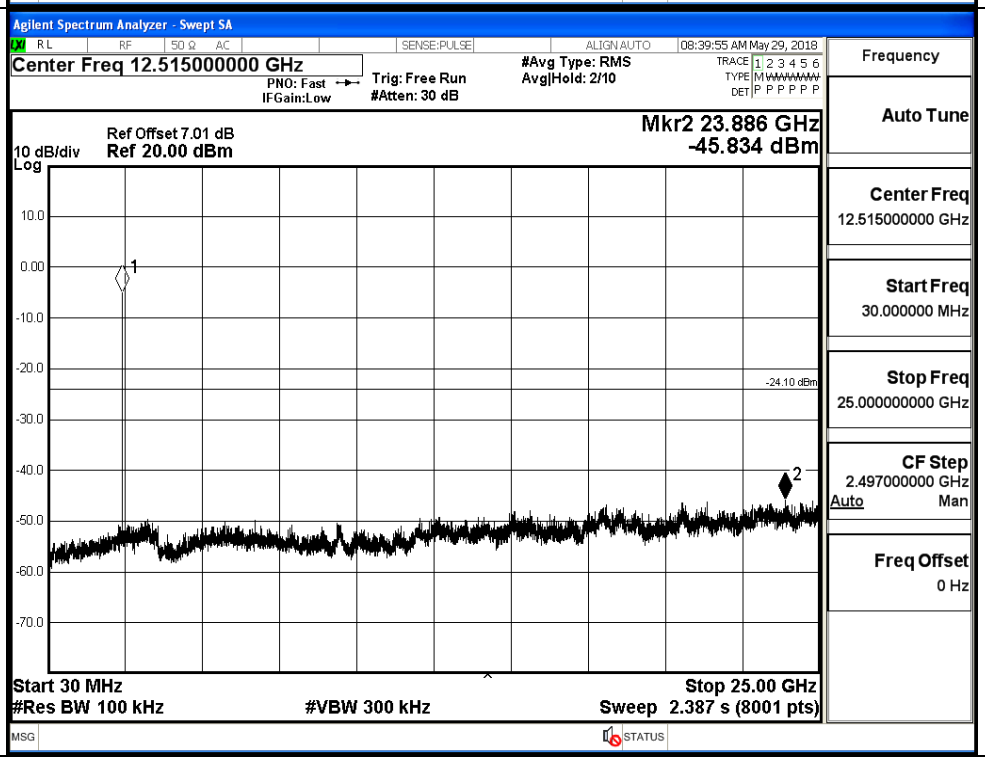
| | | |
|---|---|---|
| Puw | |  |

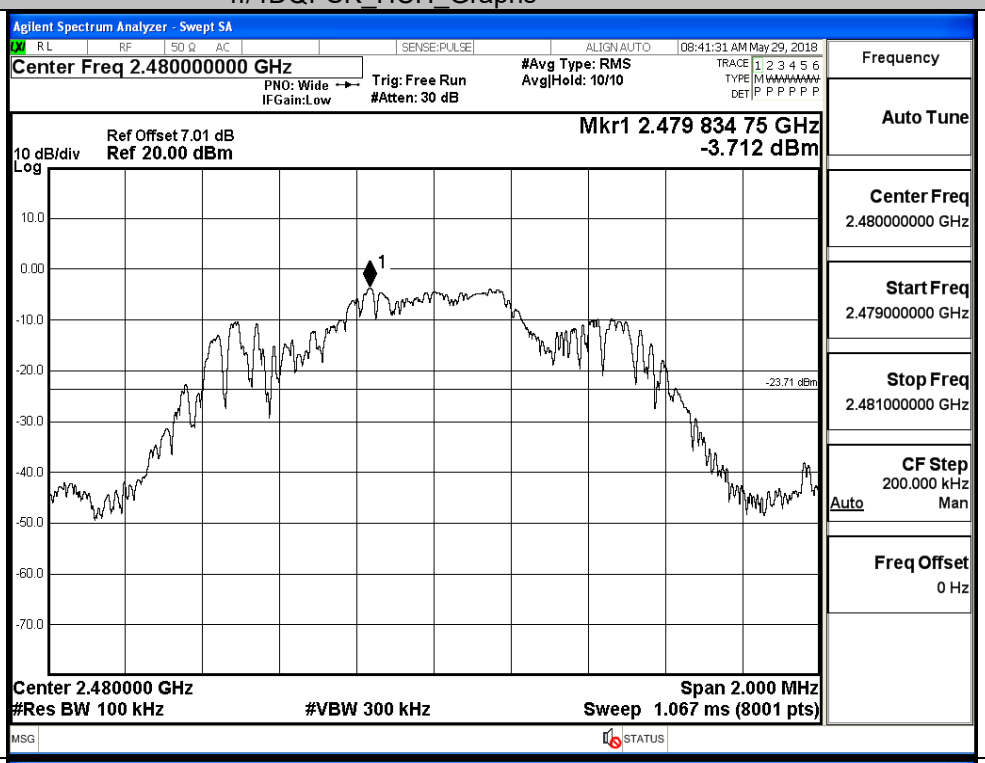
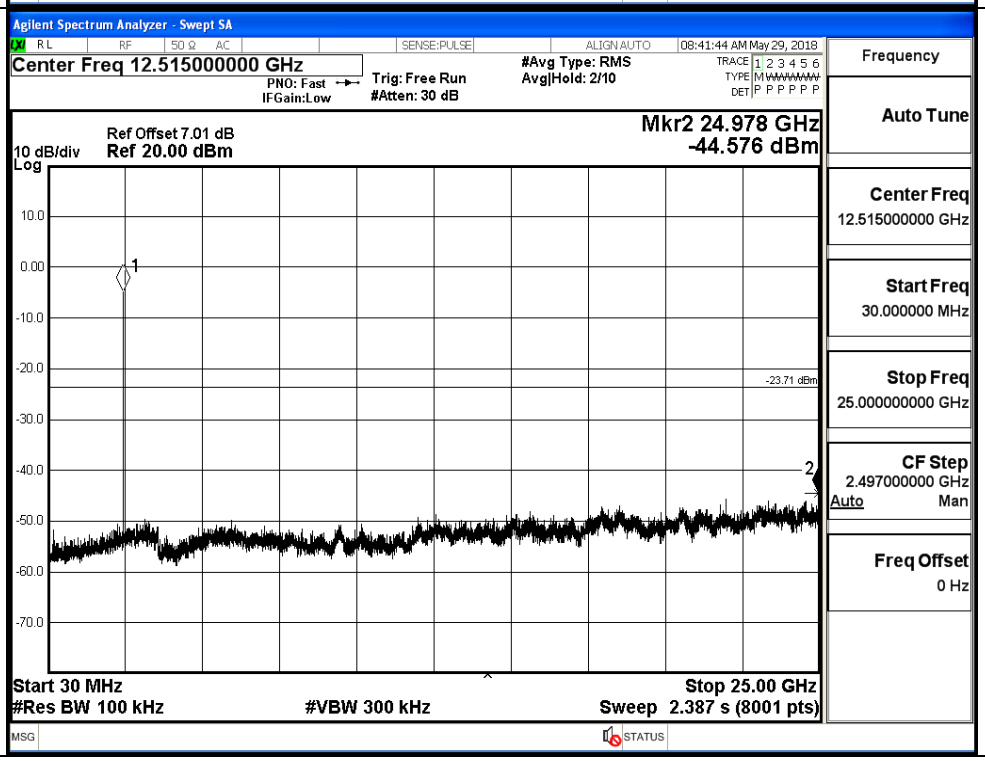
Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 2/10
08:31:38 AM May 29, 2018
Ref Offset 7.01 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr2 24.981 GHz
-45.399 dBm
-22.20 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (8001 pts)
Frequency
Auto Tune
Center Freq
12.515000000 GHz
Start Freq
30.000000 MHz
Stop Freq
25.000000000 GHz
CF Step
2.497000000 GHz
Auto
Man
Freq Offset
0 Hz

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

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

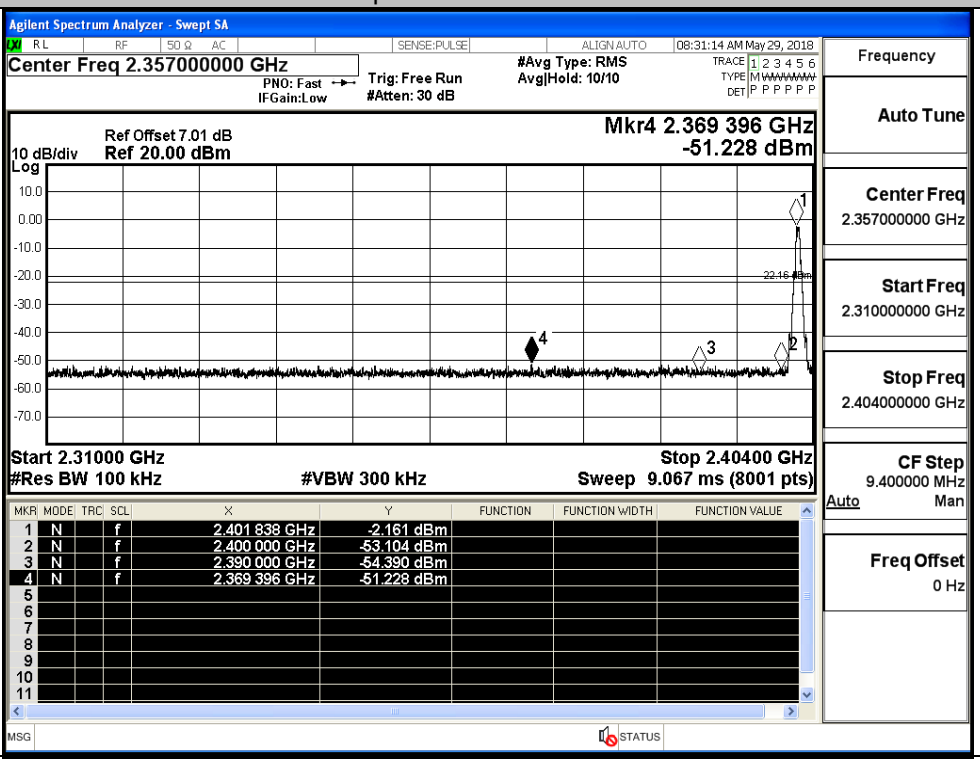
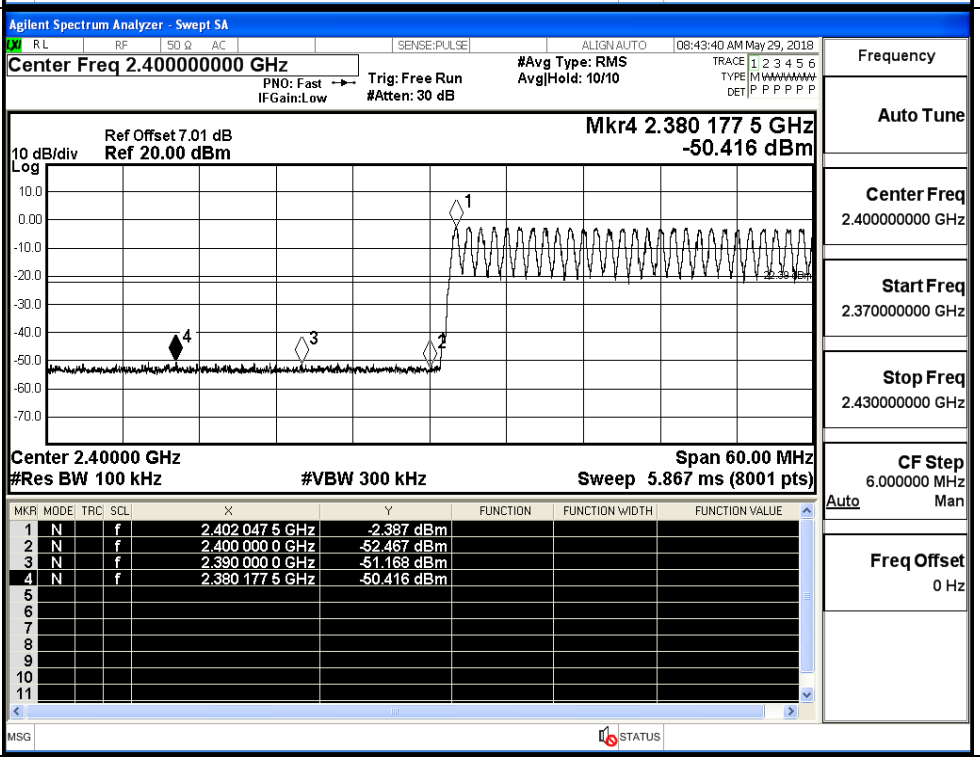
| π/4DQPSK_LCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

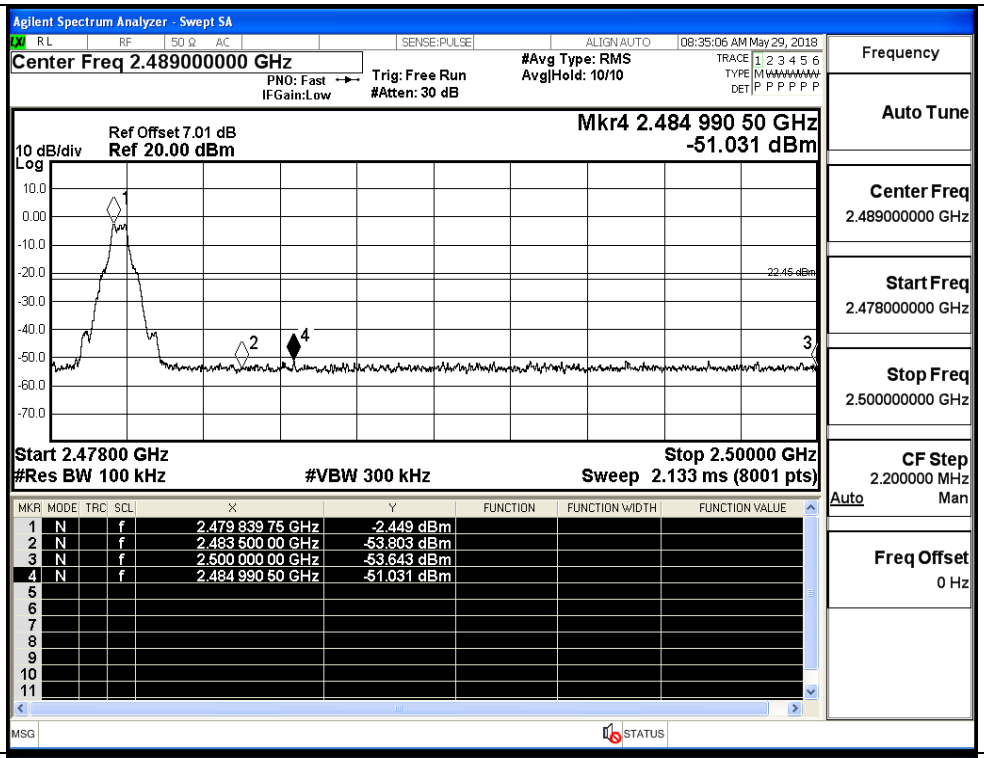
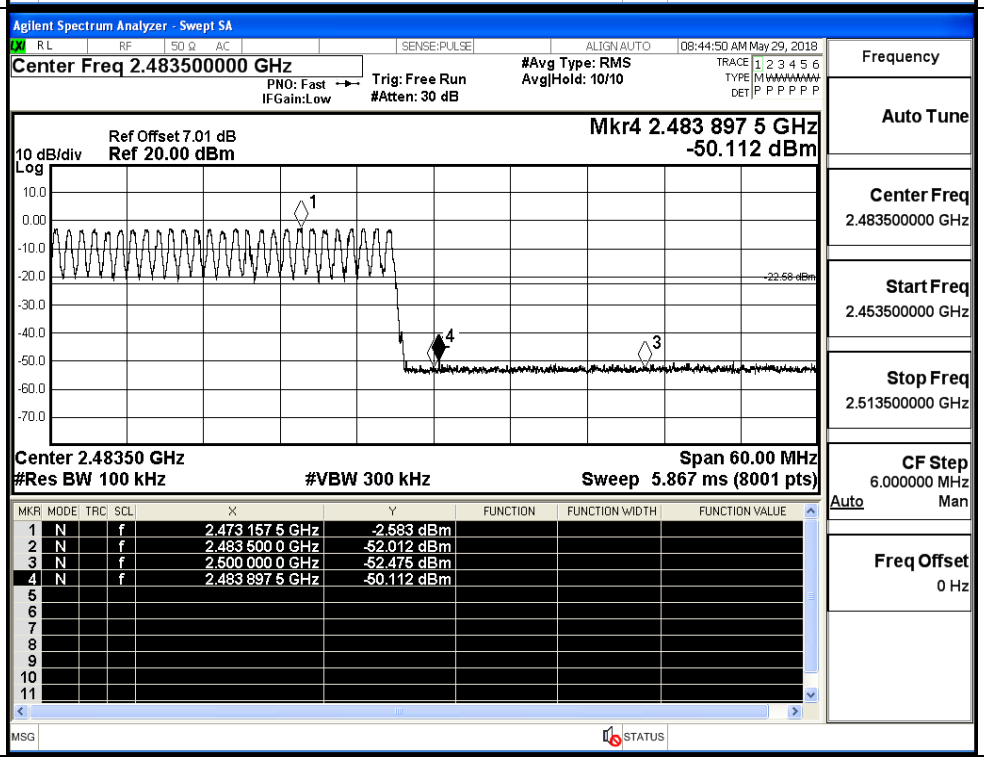
| π/4DQPSK_MCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

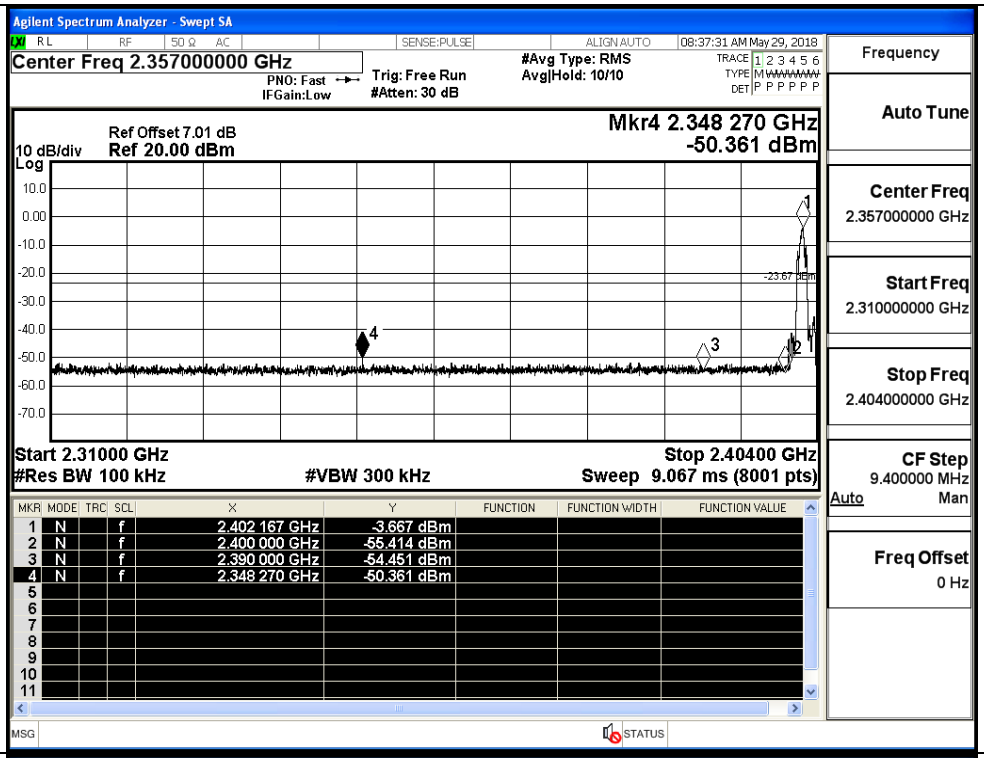
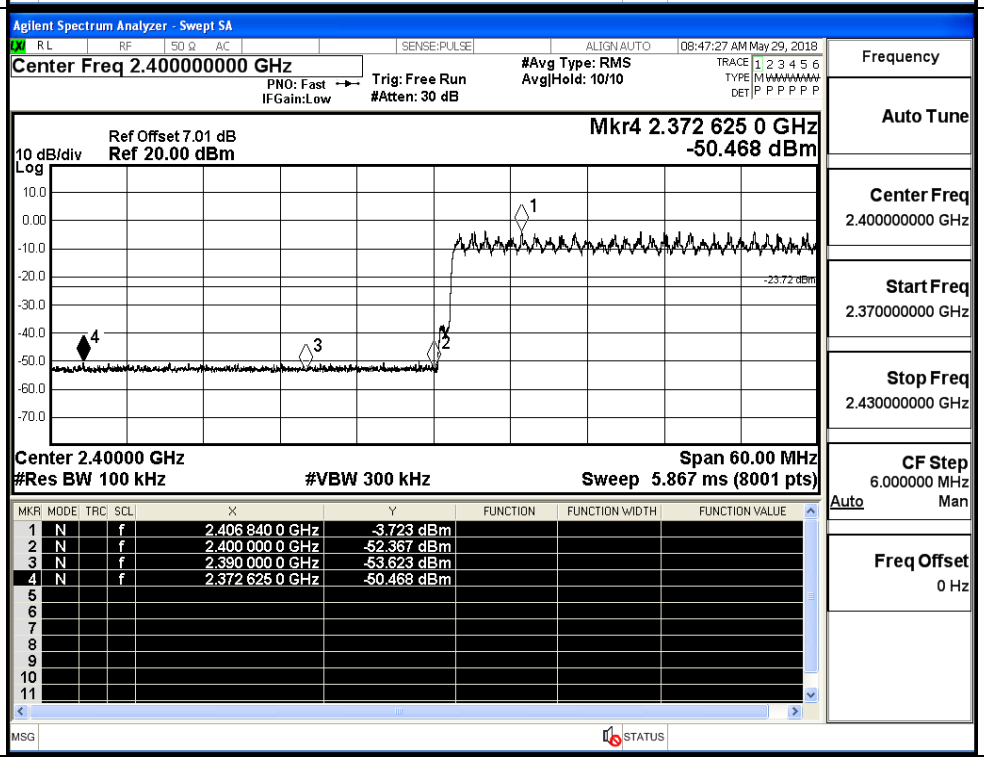
| π/4DQPSK_HCH_Graphs | | |
|---|---|---|
| Pref | |  |
| Puw | |  |

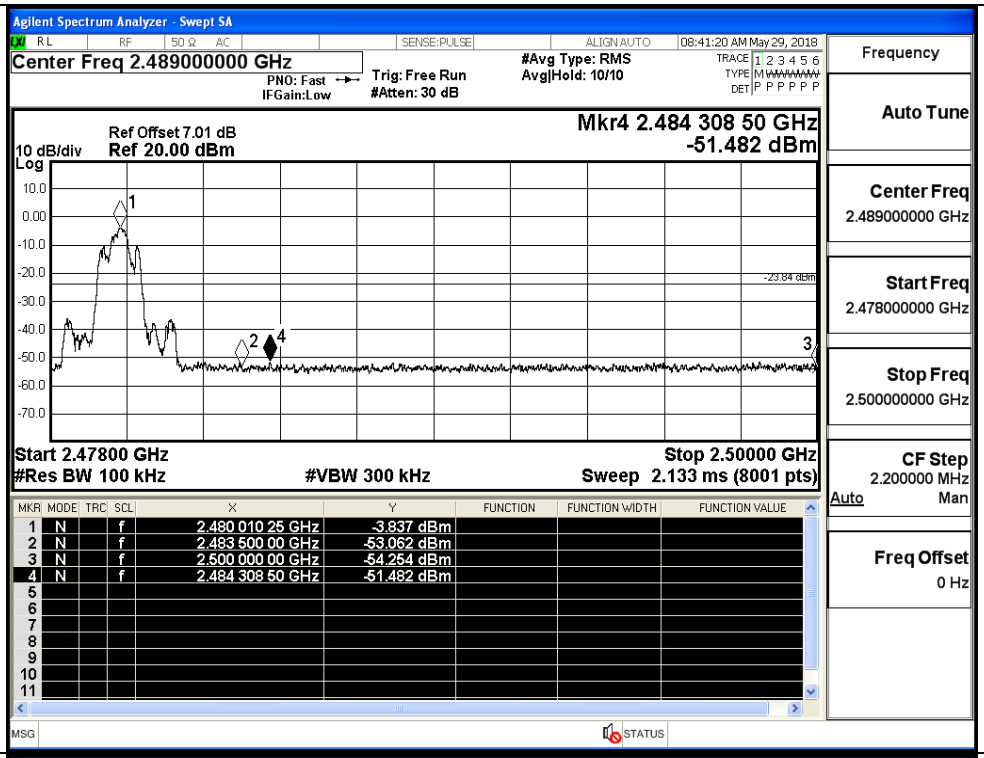
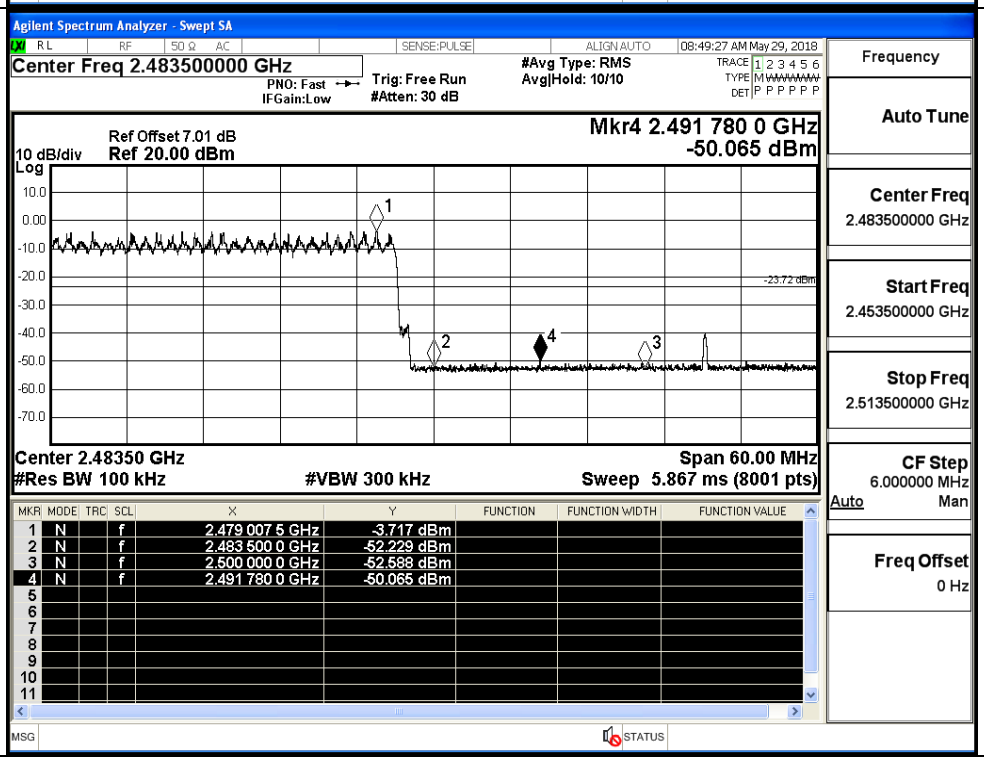
## A.7 Band-edge for RF Conducted Emissions

| Mode | Channel | Carrier Frequency [MHz] | Carrier Power [dBm] | Frequency Hopping | Max Spurious Level [dBm] | Limit [dBm] | Verdict |
|---|---|---|---|---|---|---|---|
| GFSK | LCH | 2402 | -2.161 | Off | -51.228 | -22.16 | PASS |
| | | | -2.387 | On | -50.416 | -22.39 | PASS |
| | HCH | 2480 | -2.449 | Off | -51.031 | -22.45 | PASS |
| | | | -2.583 | On | -50.112 | -22.58 | PASS |
| π/4DQPSK | LCH | 2402 | -3.667 | Off | -50.361 | -23.67 | PASS |
| | | | -3.723 | On | -50.468 | -23.72 | PASS |
| | HCH | 2480 | -3.837 | Off | -51.482 | -23.84 | PASS |
| | | | -3.717 | On | -50.065 | -23.72 | PASS |

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

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

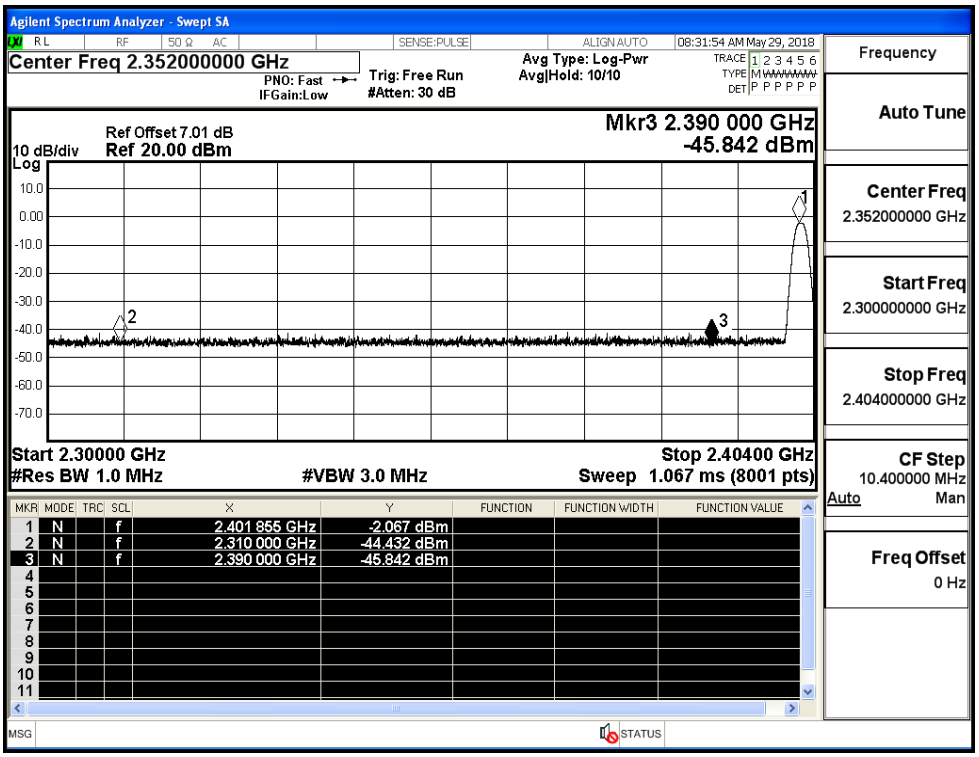
| | |
|---|---|
| π/4DQPSK/LCH/No Hop |  |
| π/4DQPSK/LCH/Hop |  |

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

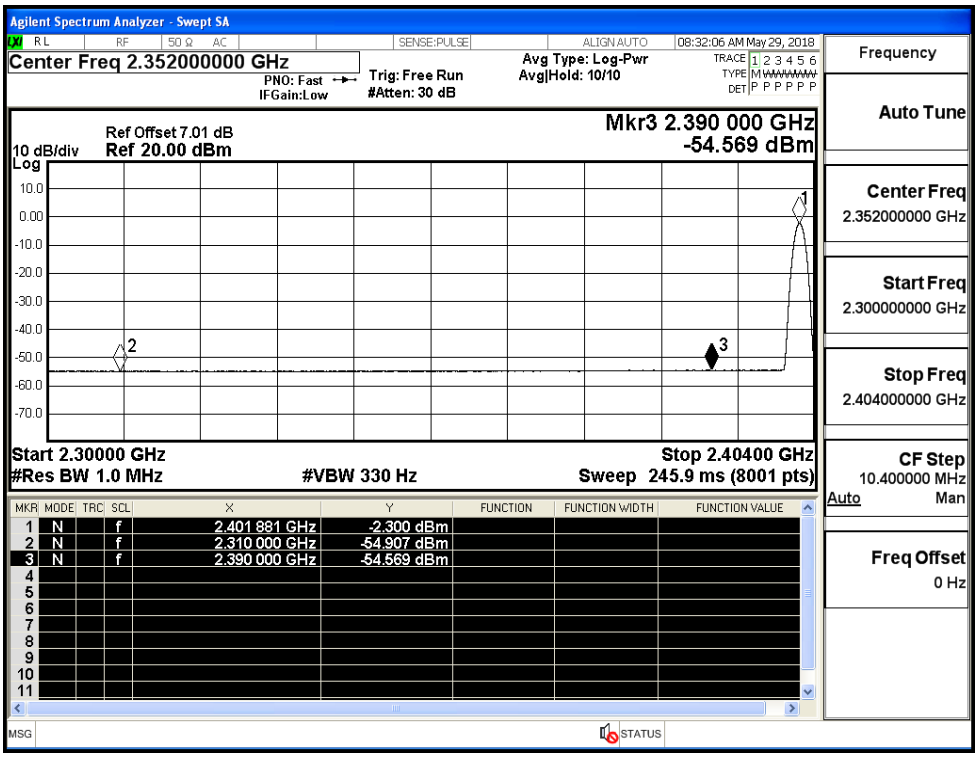
## A.8 Restrict-band band-edge measurements

| Test Mode | Hopping | Freq. | Power [dBm] | Gain | Ground Factor | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---|---|---|---|---|---|---|---|---|---|
| GFSK | Off | 2310.0 | -44.43 | 2.0 | 0 | 52.83 | PEAK | 74 | PASS |
| | Off | 2310.0 | -54.91 | 2.0 | 0 | 42.35 | AV | 54 | PASS |
| | Off | 2390.0 | -45.84 | 2.0 | 0 | 51.42 | PEAK | 74 | PASS |
| | Off | 2390.0 | -54.57 | 2.0 | 0 | 42.69 | AV | 54 | PASS |
| | Off | 2483.5 | -43.22 | 2.0 | 0 | 54.03 | PEAK | 74 | PASS |
| | Off | 2483.5 | -54.32 | 2.0 | 0 | 42.93 | AV | 54 | PASS |
| | Off | 2500.0 | -44.80 | 2.0 | 0 | 52.46 | PEAK | 74 | PASS |
| | Off | 2500.0 | -54.23 | 2.0 | 0 | 43.03 | AV | 54 | PASS |
| π/4DQPSK | Off | 2310.0 | -44.52 | 2.0 | 0 | 52.74 | PEAK | 74 | PASS |
| | Off | 2310.0 | -54.80 | 2.0 | 0 | 42.46 | AV | 54 | PASS |
| | Off | 2390.0 | -43.82 | 2.0 | 0 | 53.44 | PEAK | 74 | PASS |
| | Off | 2390.0 | -54.58 | 2.0 | 0 | 42.68 | AV | 54 | PASS |
| | Off | 2483.5 | -43.41 | 2.0 | 0 | 53.85 | PEAK | 74 | PASS |
| | Off | 2483.5 | -54.31 | 2.0 | 0 | 42.95 | AV | 54 | PASS |
| | Off | 2500.0 | -44.40 | 2.0 | 0 | 52.86 | PEAK | 74 | PASS |
| | Off | 2500.0 | -54.22 | 2.0 | 0 | 43.04 | AV | 54 | PASS |

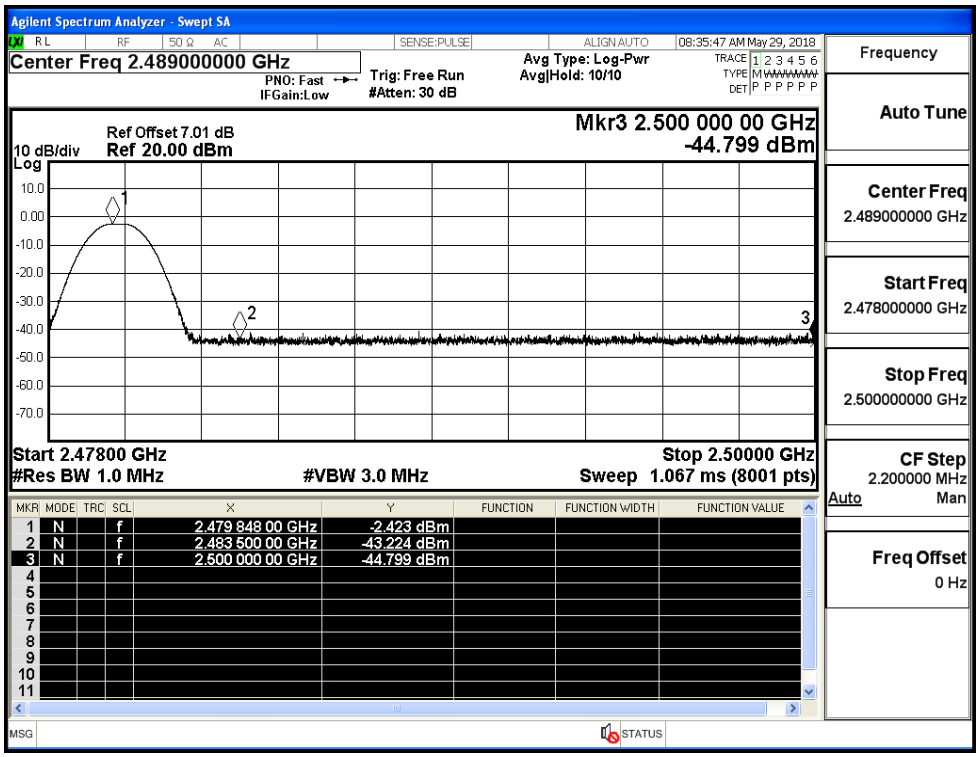
Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (Low Channel)



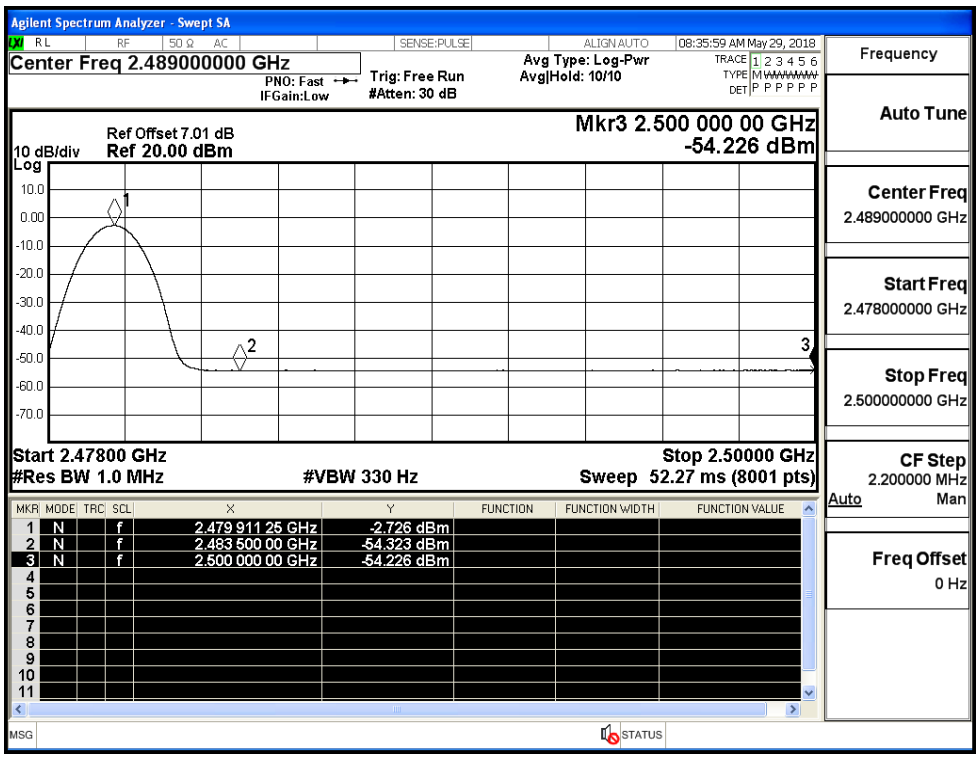

Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (Low Channel)



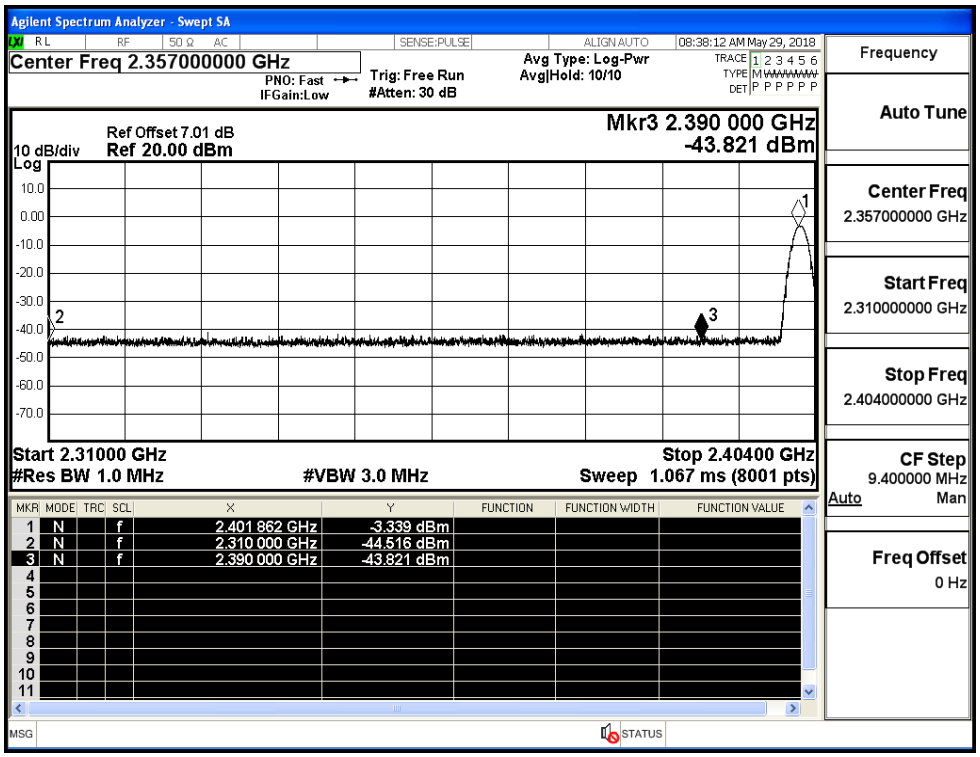
## Restrict-band band-edge measurements_Hopping Off_ GFSK_PEAK (High Channel)



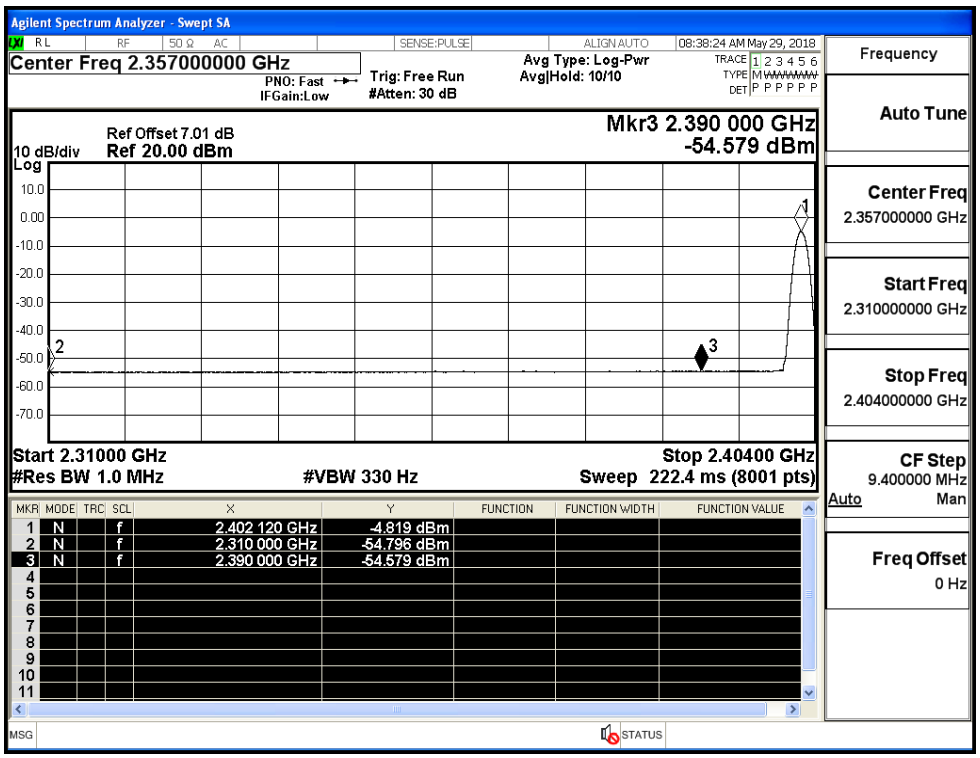

## Restrict-band band-edge measurements_Hopping Off_ GFSK_Average (High Channel)



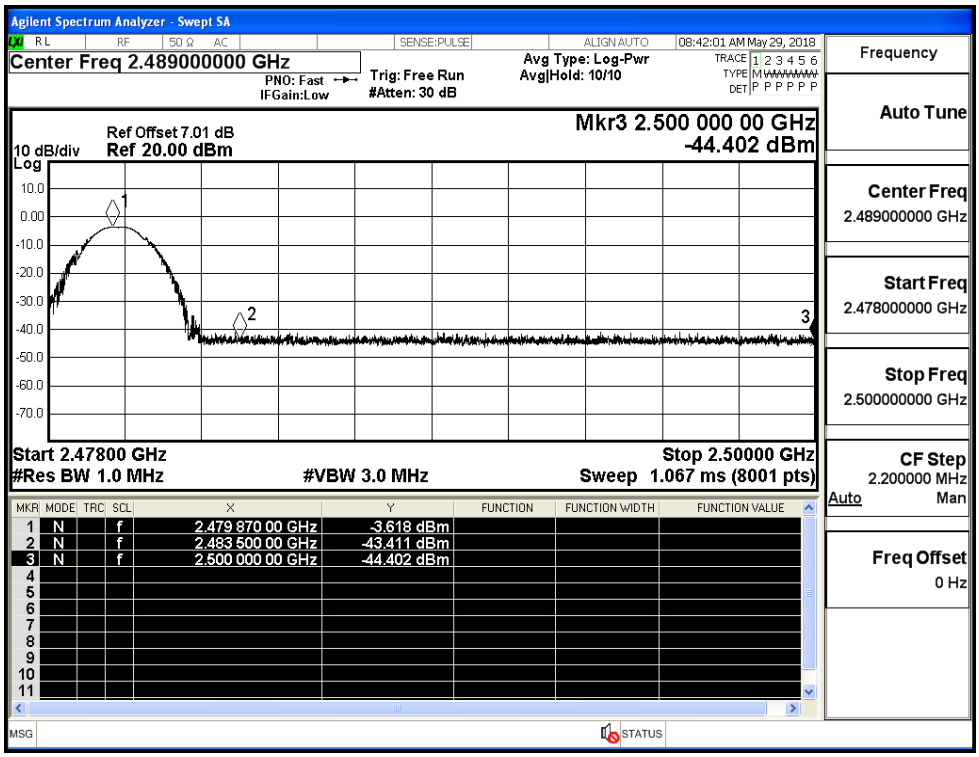
## Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_PEAK (Low Channel)

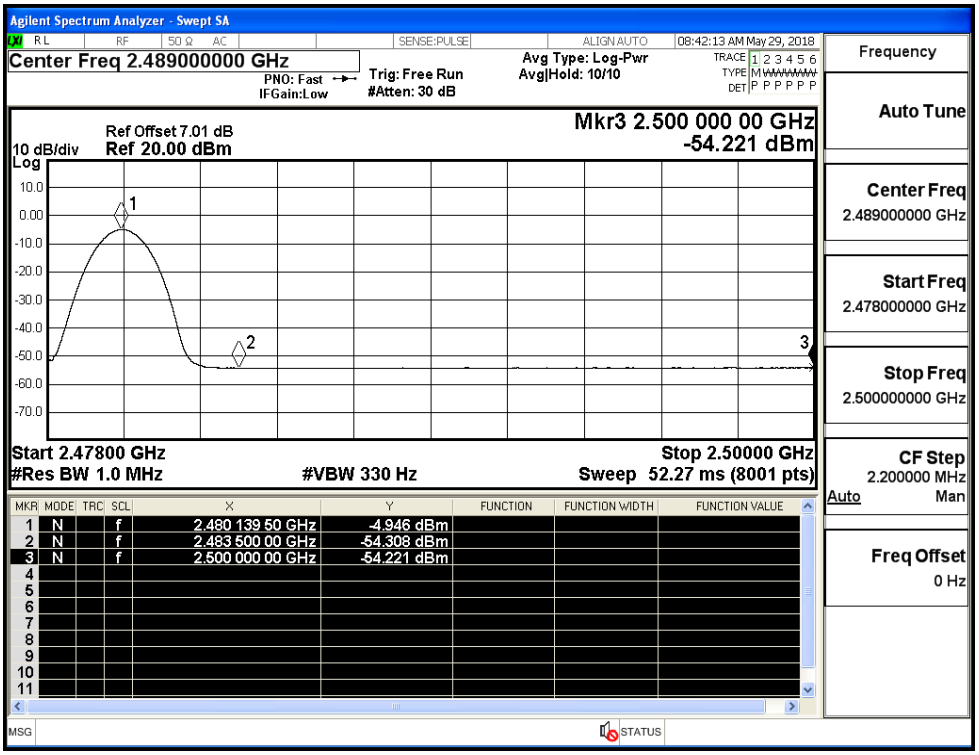



## Restrict-band band-edge measurements_Hopping Off_π/4-DQPSK_Average (Low Channel)



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)