

## Appendix A

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

Product Name: Bluetooth Speaker

Trade Mark:



Test Model: LBW290

#### Environmental Conditions

|                    |             |
|--------------------|-------------|
| Temperature:       | 23.9℃       |
| Relative Humidity: | 51%         |
| ATM Pressure:      | 101Kpa      |
| Test Engineer:     | Simba Huang |
| Supervised by:     | Seal Chen   |

# Contents

Page

**COVER PAGE**

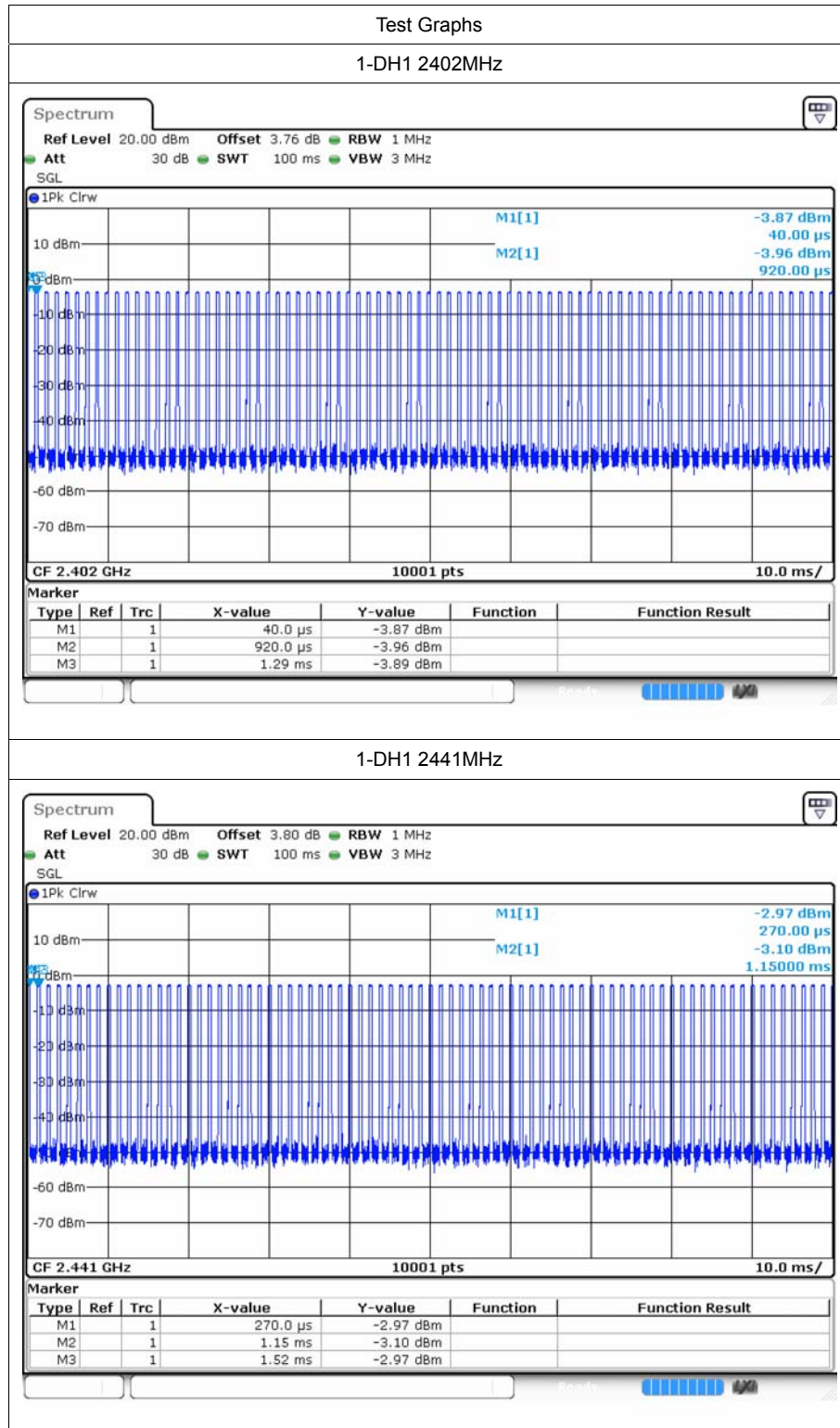
|     |                                            |    |
|-----|--------------------------------------------|----|
| 1   | Duty Cycle .....                           | 3  |
| 1.1 | Test Result.....                           | 3  |
| 1.2 | Test Graphs .....                          | 4  |
| 2   | Maximum Conducted Peak Output Power .....  | 7  |
| 2.1 | Test Result.....                           | 7  |
| 2.2 | Test Graphs .....                          | 8  |
| 3   | 20dB Bandwidth .....                       | 11 |
| 3.1 | Test Result.....                           | 11 |
| 3.2 | Test Graphs .....                          | 12 |
| 4   | Carrier Frequency Separation .....         | 15 |
| 4.1 | Test Result.....                           | 15 |
| 4.2 | Test Graphs .....                          | 16 |
| 5   | Hopping Channel Number.....                | 17 |
| 5.1 | Test Result.....                           | 17 |
| 5.2 | Test Graphs .....                          | 18 |
| 6   | Dwell Time .....                           | 19 |
| 6.1 | Test Result.....                           | 19 |
| 6.2 | Test Graphs .....                          | 20 |
| 7   | RF Conducted Spurious Emissions.....       | 22 |
| 7.1 | Test Result.....                           | 22 |
| 7.2 | Test Graphs .....                          | 23 |
| 8   | Band-edge for RF Conducted Emissions ..... | 29 |
| 8.1 | Test Result.....                           | 29 |
| 8.2 | Test Graphs .....                          | 30 |
| 9   | Restrict-band band-edge measurements ..... | 38 |
| 9.1 | Test Result.....                           | 38 |
| 9.2 | Test Graphs .....                          | 39 |

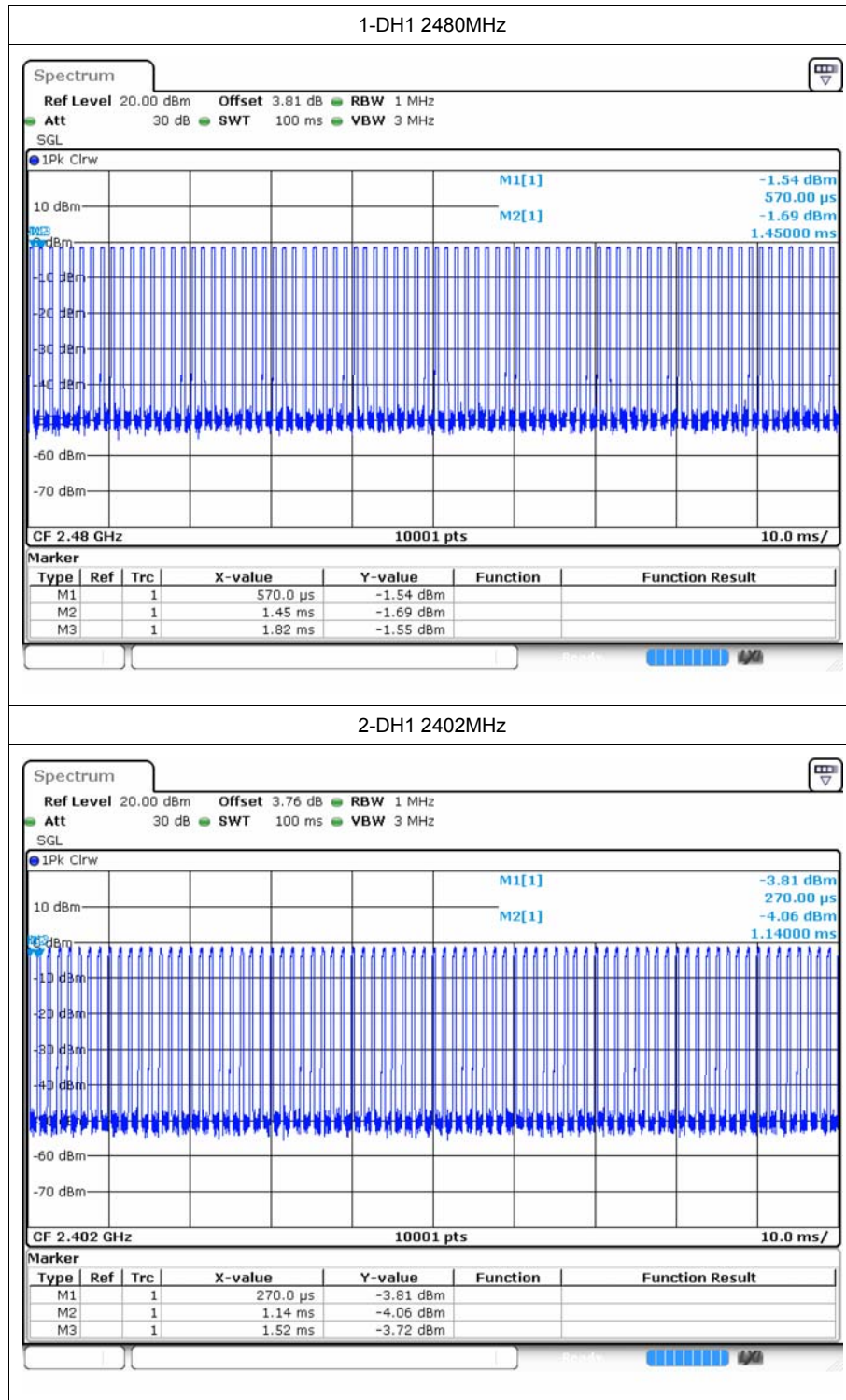
# 1 Duty Cycle

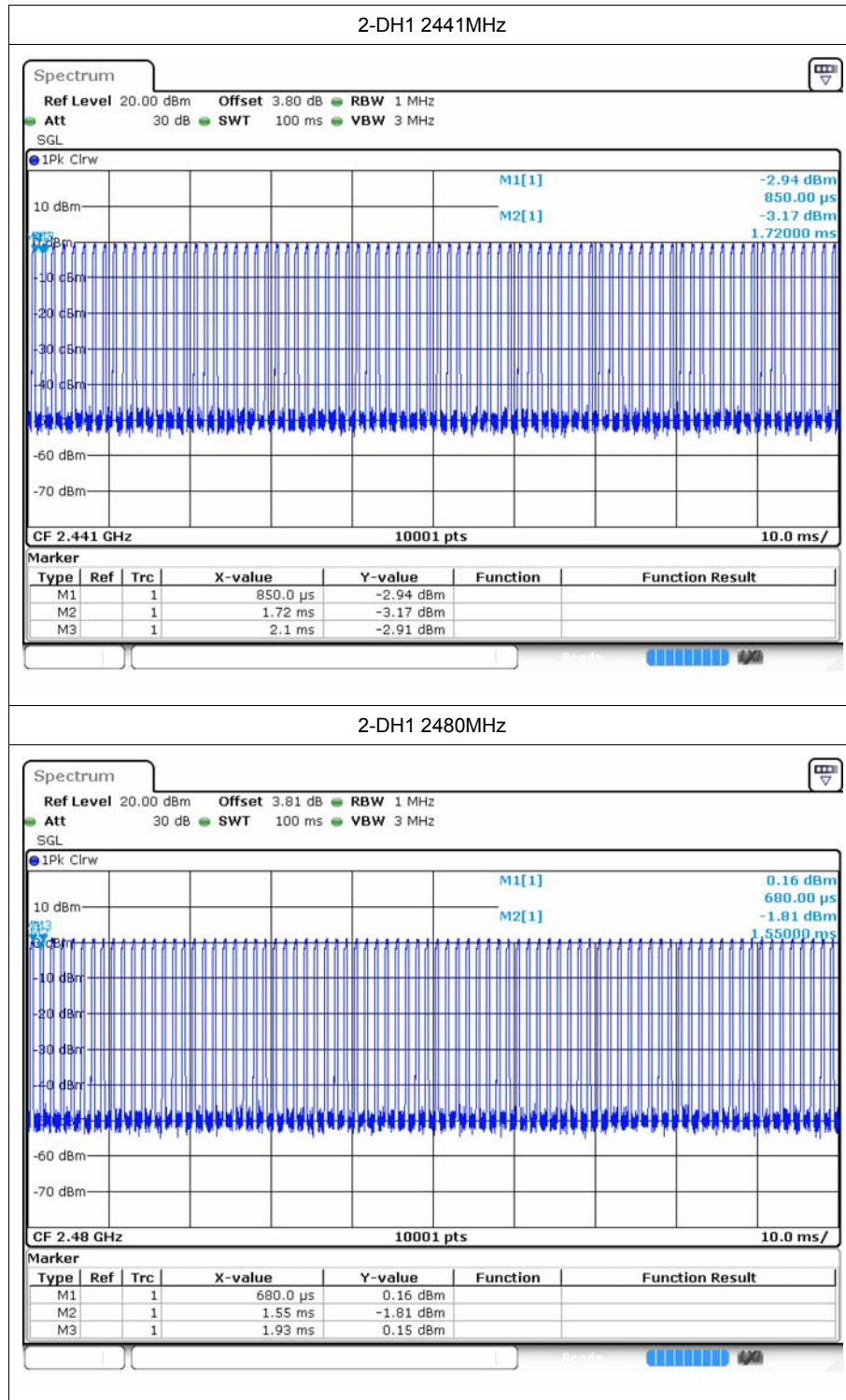
## 1.1 Test Result

| Mode  | Frequency (MHz) | Duty Cycle (%) | 1/T (kHz) |
|-------|-----------------|----------------|-----------|
| 1-DH1 | 2402            | 30.41          | 2.7       |
| 1-DH1 | 2441            | 30.41          | 2.7       |
| 1-DH1 | 2480            | 30.4           | 2.7       |
| 2-DH1 | 2402            | 31.21          | 2.63      |
| 2-DH1 | 2441            | 31.2           | 2.63      |
| 2-DH1 | 2480            | 31.2           | 2.63      |

## 1.2 Test Graphs





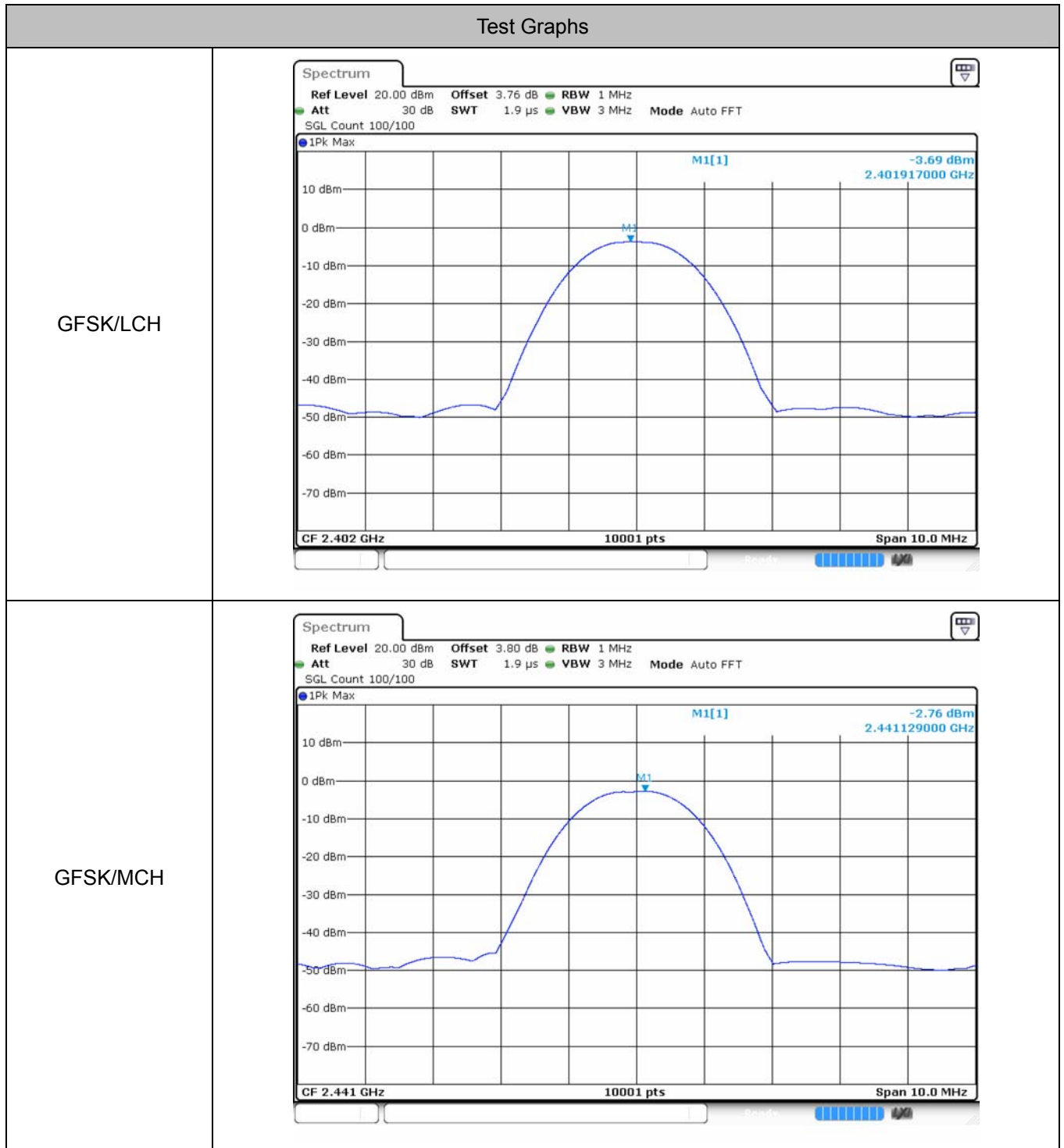


## 2 Maximum Conducted Peak Output Power

### 2.1 Test Result

| Mode          | Channel. | Maximum Peak Output Power<br>[dBm] | Limit<br>[dBm] | Verdict |
|---------------|----------|------------------------------------|----------------|---------|
| GFSK          | LCH      | -3.69                              | 21             | Pass    |
|               | MCH      | -2.76                              | 21             | Pass    |
|               | HCH      | -1.46                              | 21             | Pass    |
| $\pi/4$ DQPSK | LCH      | -1.28                              | 21             | Pass    |
|               | MCH      | -0.53                              | 21             | Pass    |
|               | HCH      | 1.12                               | 21             | Pass    |

## 2.2 Test Graphs

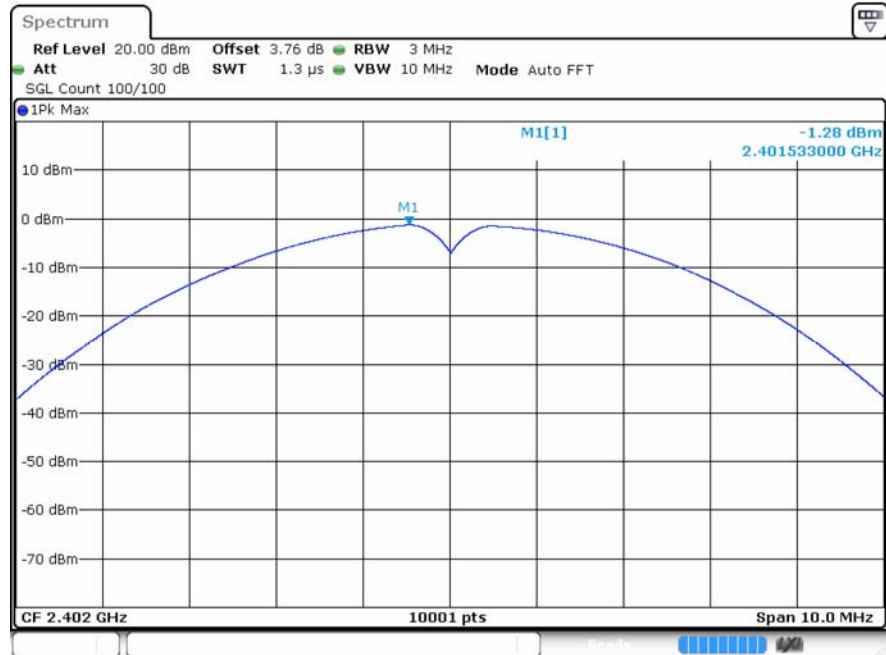




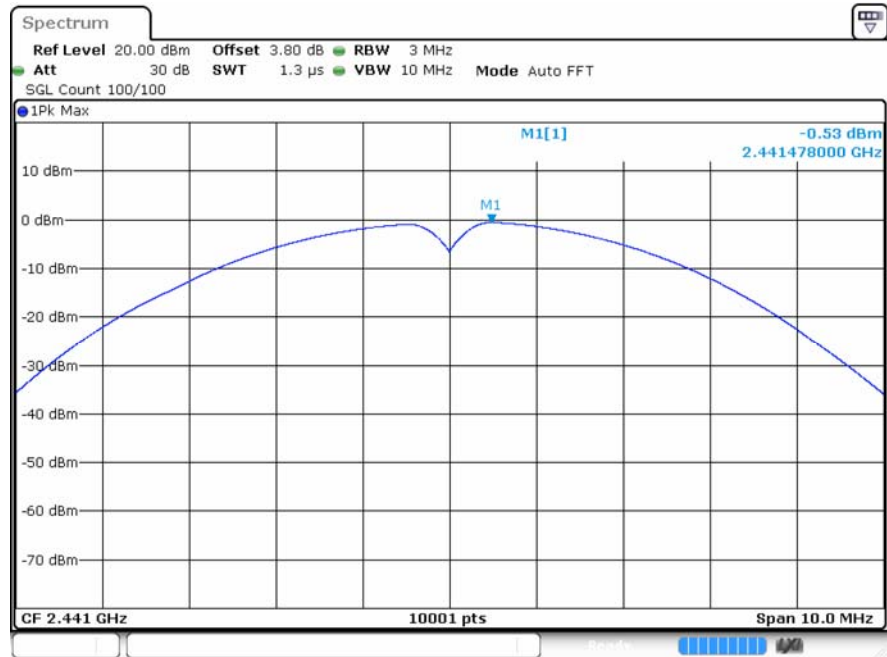
GFSK/HCH



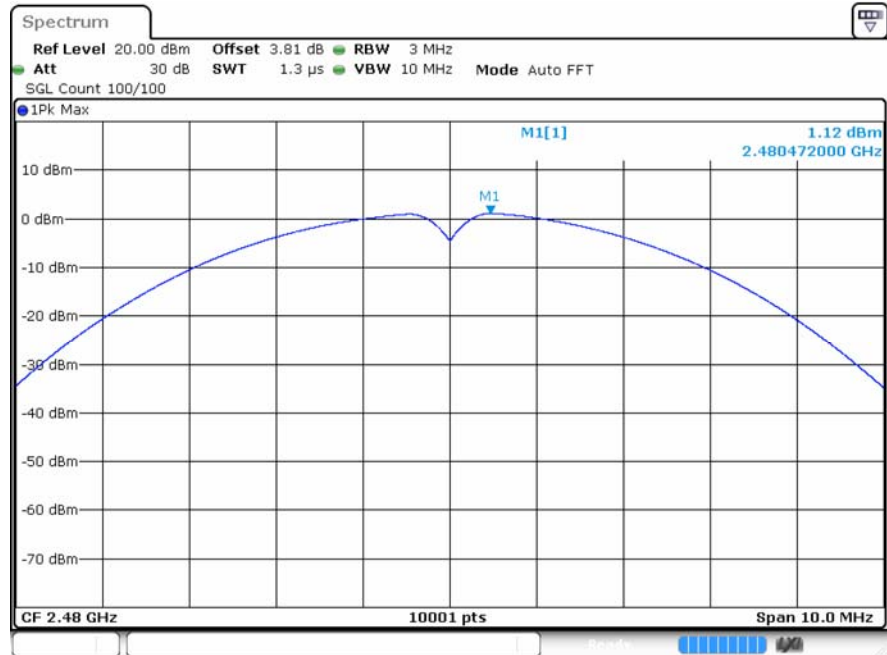
$\pi/4$ DQPSK/LCH



$\pi/4$ DQPSK/MCH



$\pi/4$ DQPSK/HCH

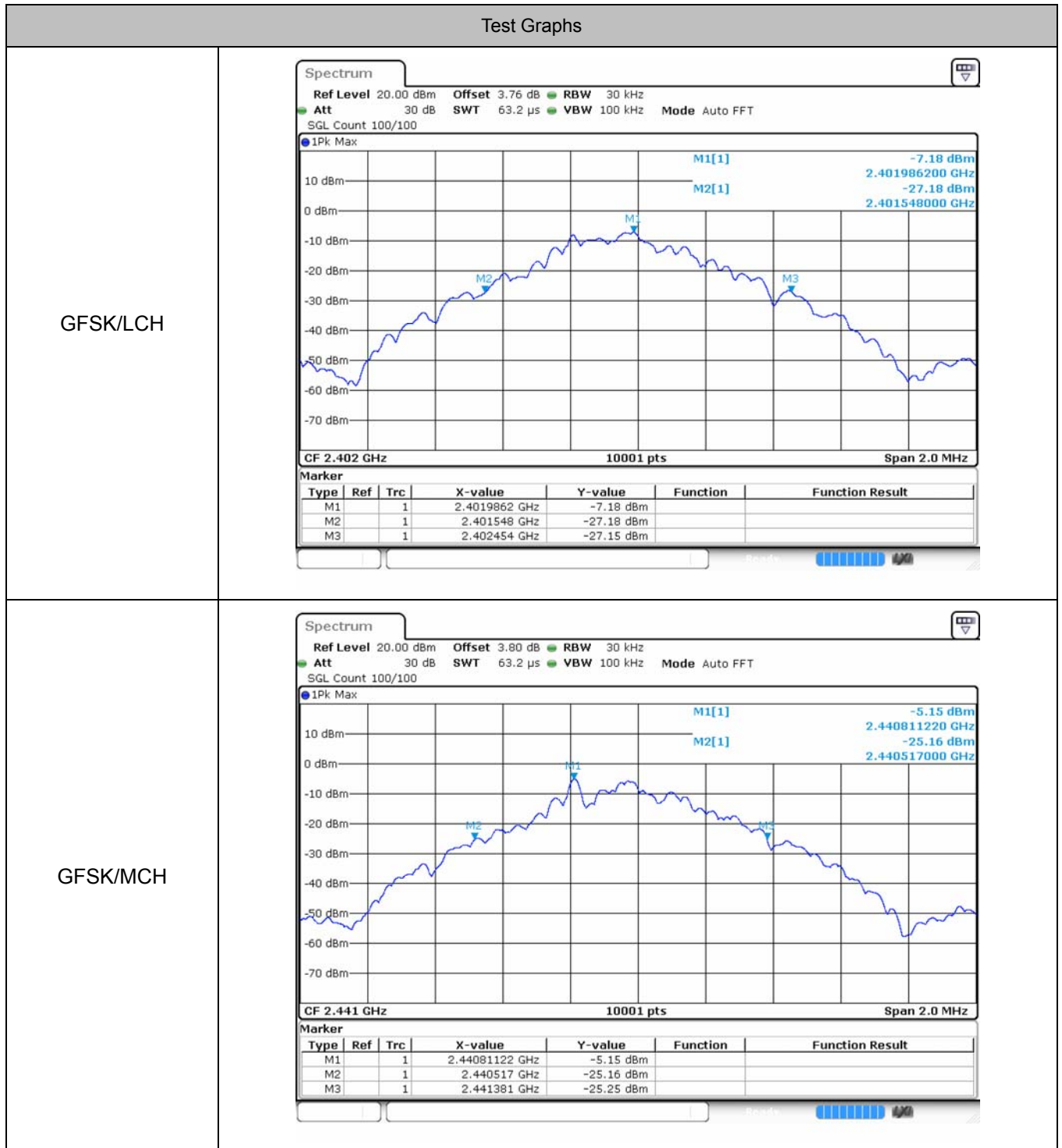


### 3 20dB Bandwidth

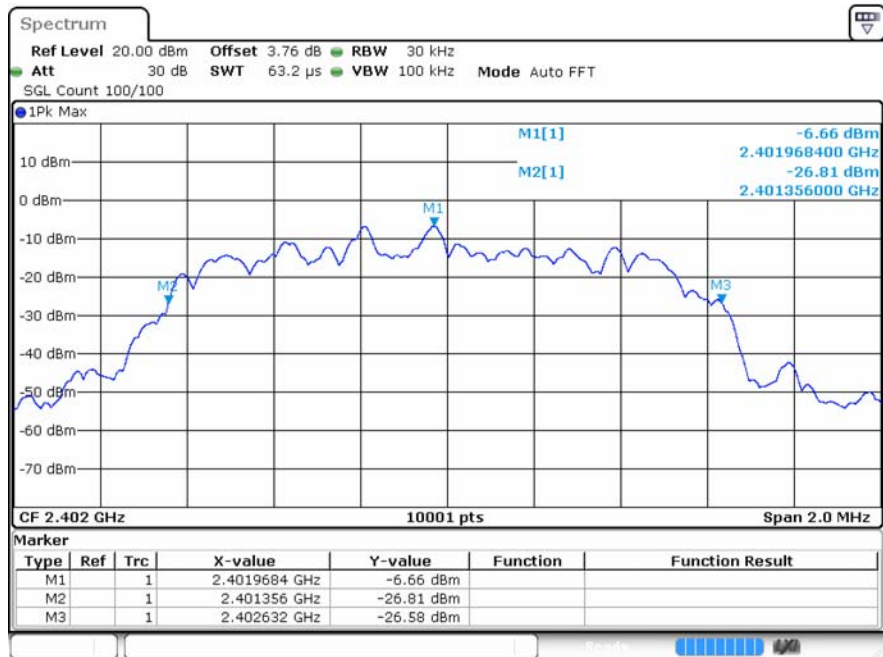
#### 3.1 Test Result

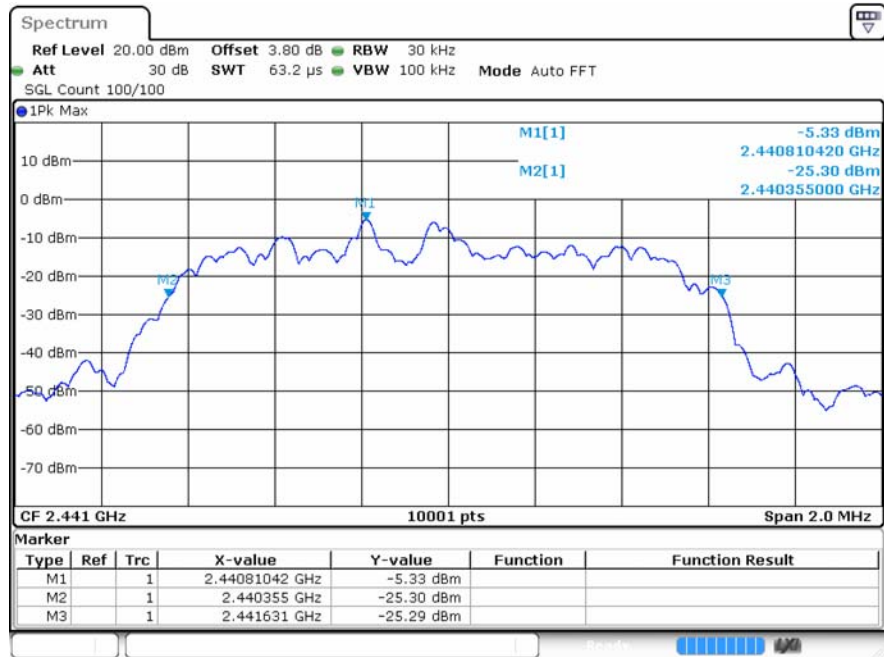
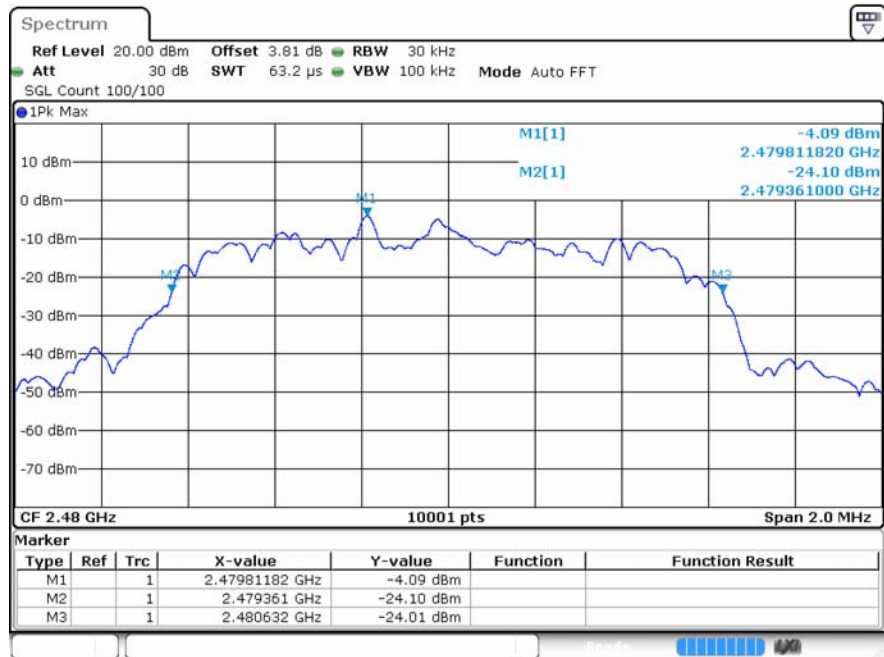
| Mode          | Channel. | 20dB Bandwidth [MHz] | Limit [MHz]   | Verdict |
|---------------|----------|----------------------|---------------|---------|
| GFSK          | LCH      | 0.906                | Not Specified | Pass    |
|               | MCH      | 0.863                | Not Specified | Pass    |
|               | HCH      | 0.859                | Not Specified | Pass    |
| $\pi/4$ DQPSK | LCH      | 1.276                | Not Specified | Pass    |
|               | MCH      | 1.276                | Not Specified | Pass    |
|               | HCH      | 1.271                | Not Specified | Pass    |

## 3.2 Test Graphs



GFSK/HCH


 $\pi/4$ DQPSK/LCH


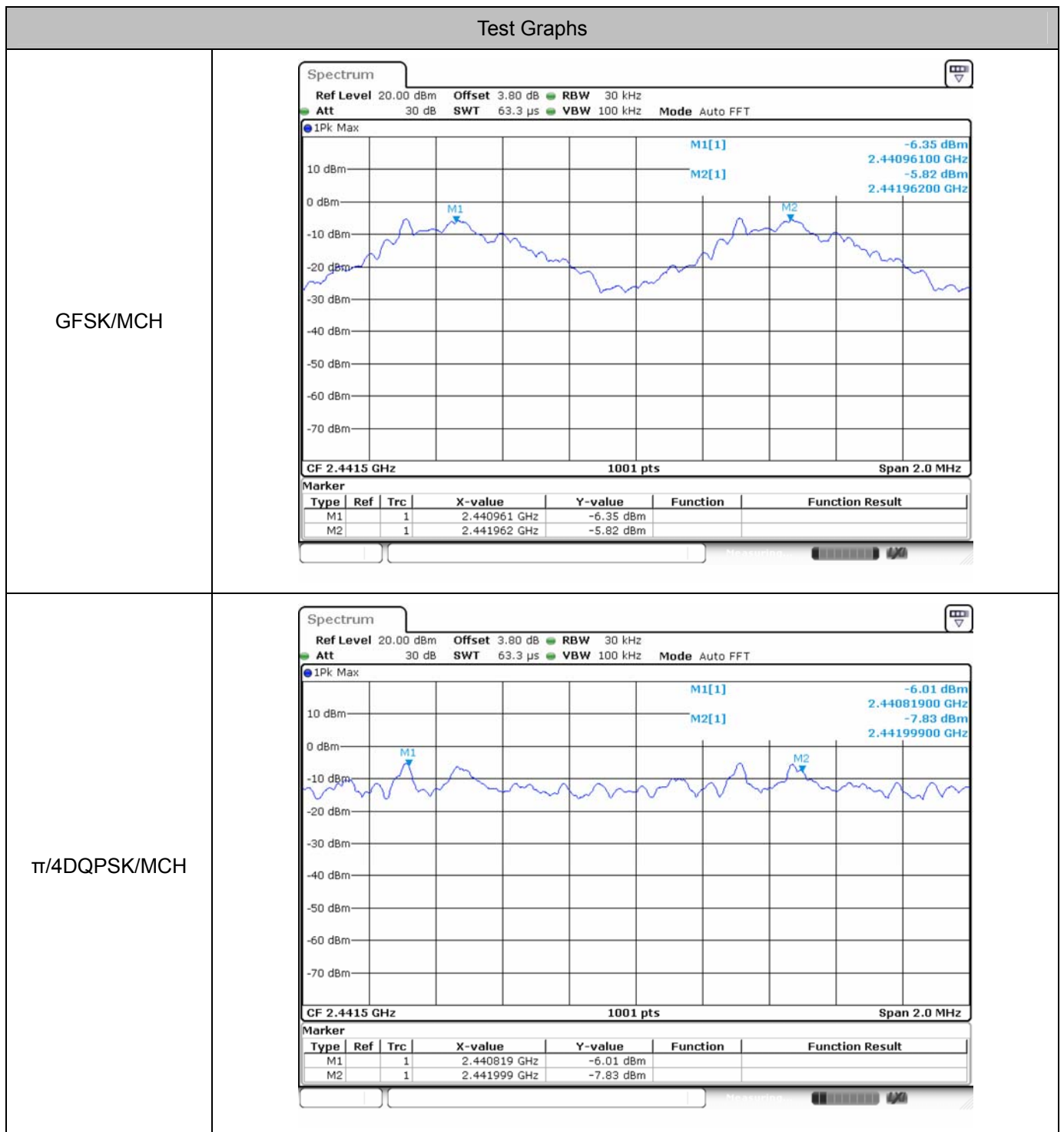
$\pi/4$ DQPSK/MCH

 $\pi/4$ DQPSK/HCH


## 4 Carrier Frequency Separation

### 4.1 Test Result

| Mode          | Channel. | Carrier Frequency Separation [MHz] | Limit [MHz] | Verdict |
|---------------|----------|------------------------------------|-------------|---------|
| GFSK          | MCH      | 1.001                              | 0.575       | Pass    |
| $\pi/4$ DQPSK | MCH      | 1.18                               | 0.851       | Pass    |

## 4.2 Test Graphs



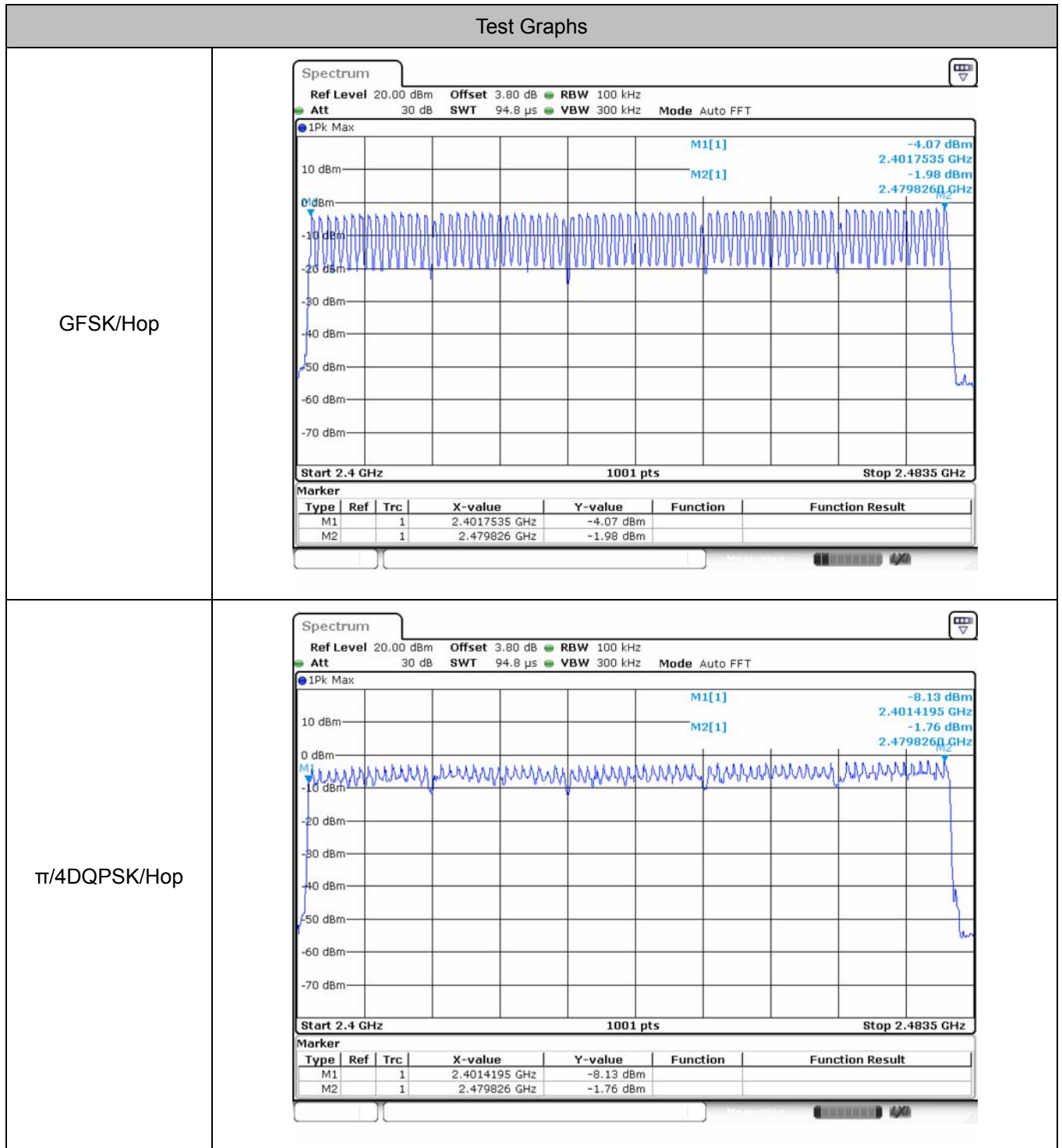


## 5 Hopping Channel Number

### 5.1 Test Result

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

## 5.2 Test Graphs

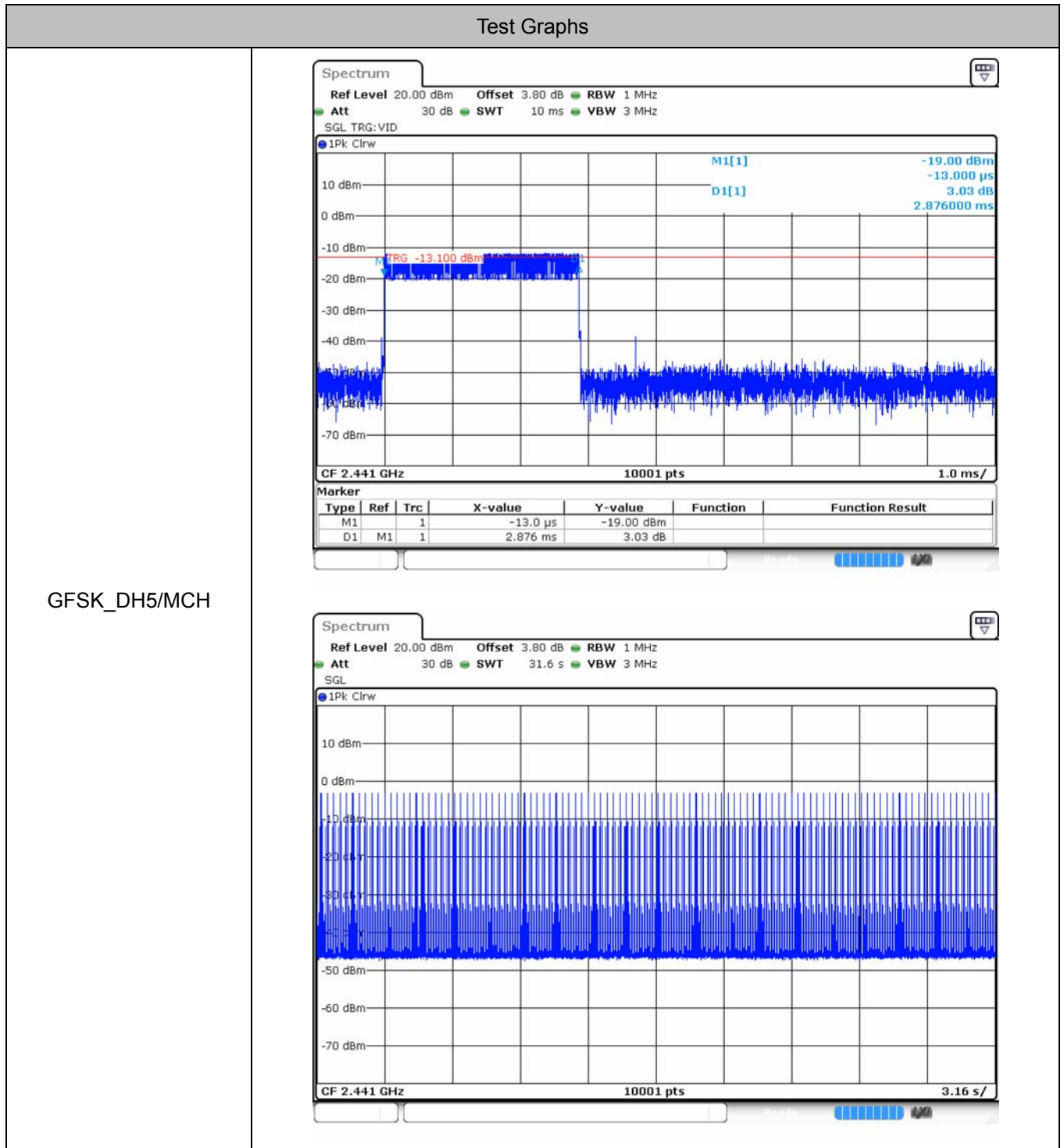


## 6 Dwell Time

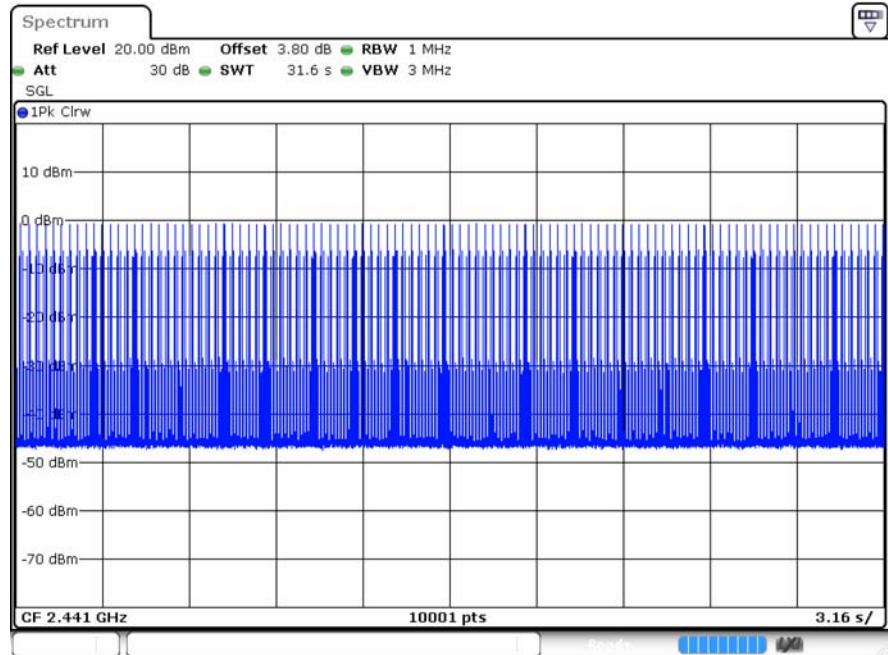
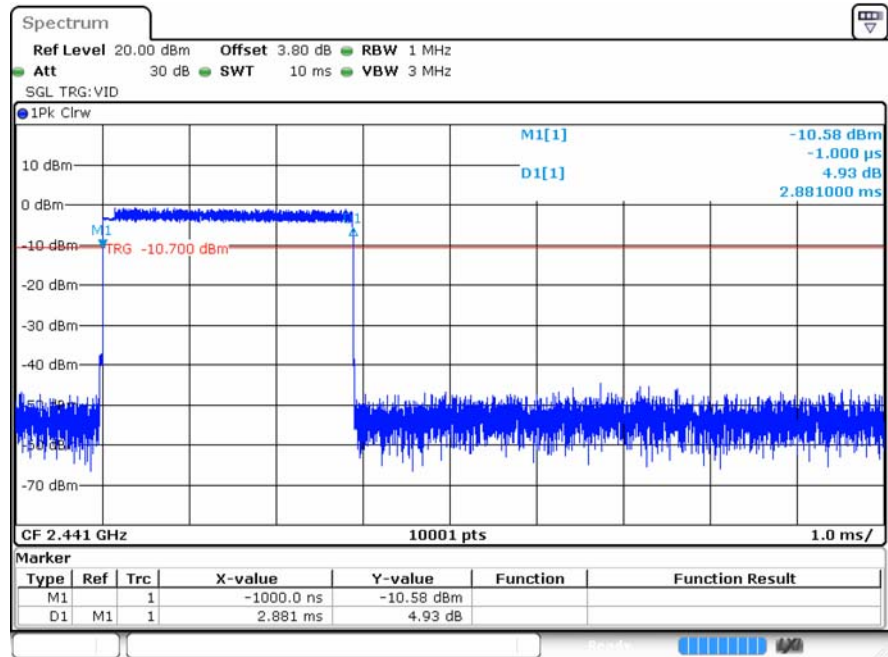
### 6.1 Test Result

| Mode          | Packet | Channel | Burst Width<br>[ms/hop/ch] | Total<br>Hops[hop*ch] | Dwell Time[ms] | Limit [s] | Verdict |
|---------------|--------|---------|----------------------------|-----------------------|----------------|-----------|---------|
| GFSK          | DH5    | MCH     | 2.876                      | 106                   | 304.856        | 0.4       | Pass    |
| $\pi/4$ DQPSK | 2DH5   | MCH     | 2.881                      | 107                   | 308.267        | 0.4       | Pass    |

## 6.2 Test Graphs



$\pi/4$ DQPSK  
\_2DH5/MCH

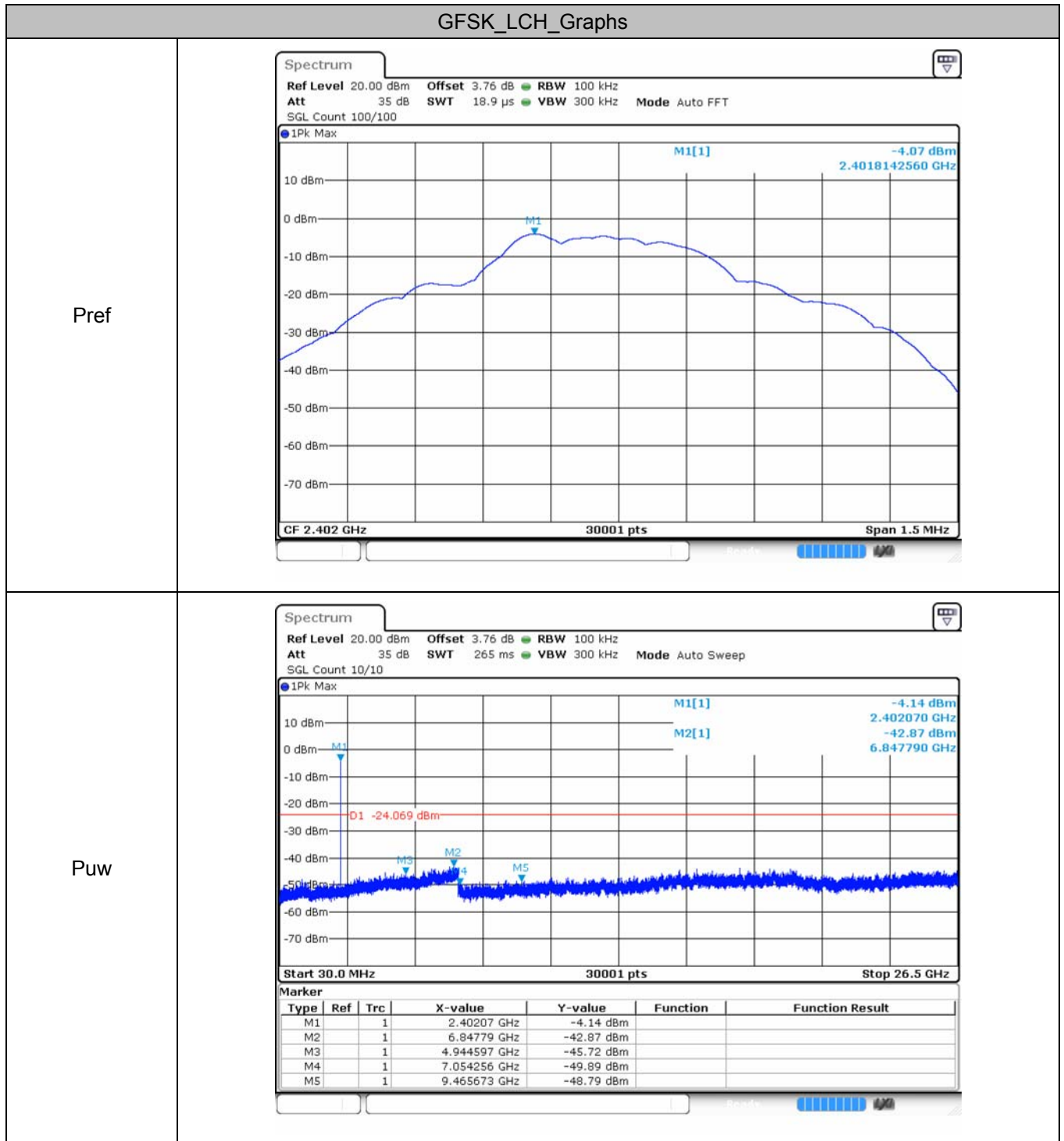


## 7 RF Conducted Spurious Emissions

### 7.1 Test Result

| Mode          | Channel | Max. Level [dBc] | Limit [dBc] | Verdict |
|---------------|---------|------------------|-------------|---------|
| GFSK          | LCH     | -38.8            | -20         | Pass    |
|               | MCH     | -40.27           | -20         | Pass    |
|               | HCH     | -41.23           | -20         | Pass    |
| $\pi/4$ DQPSK | LCH     | -38.66           | -20         | Pass    |
|               | MCH     | -39.56           | -20         | Pass    |
|               | HCH     | -40.57           | -20         | Pass    |

## 7.2 Test Graphs

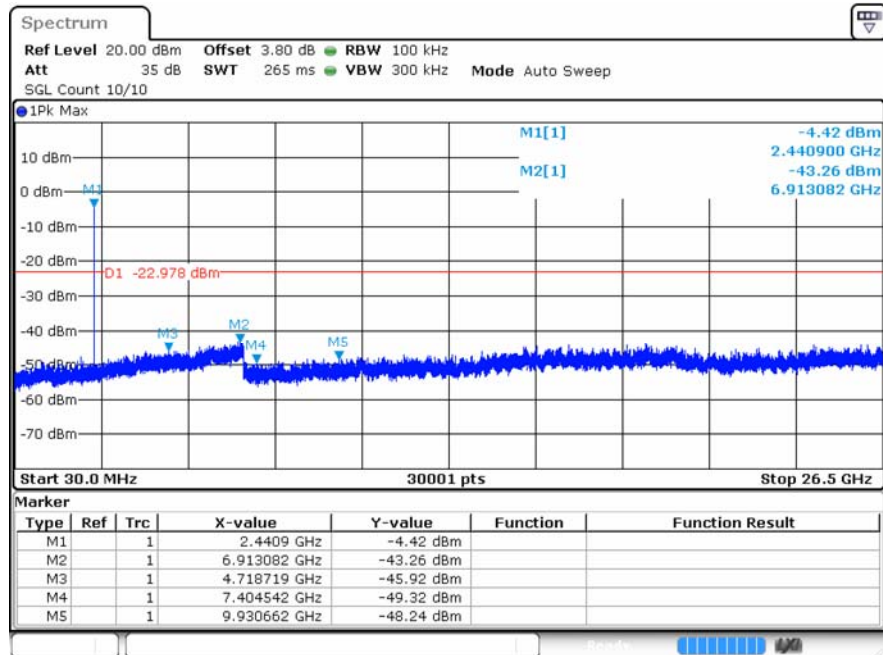


## GFSK\_MCH\_Graphs

Pref



Puw



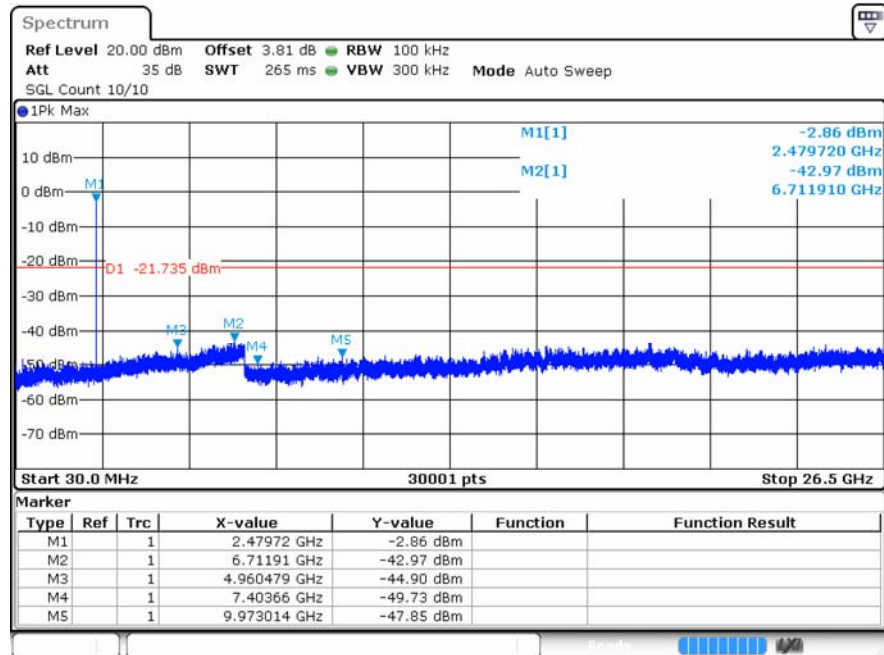


## GFSK\_HCH\_Graphs

Pref

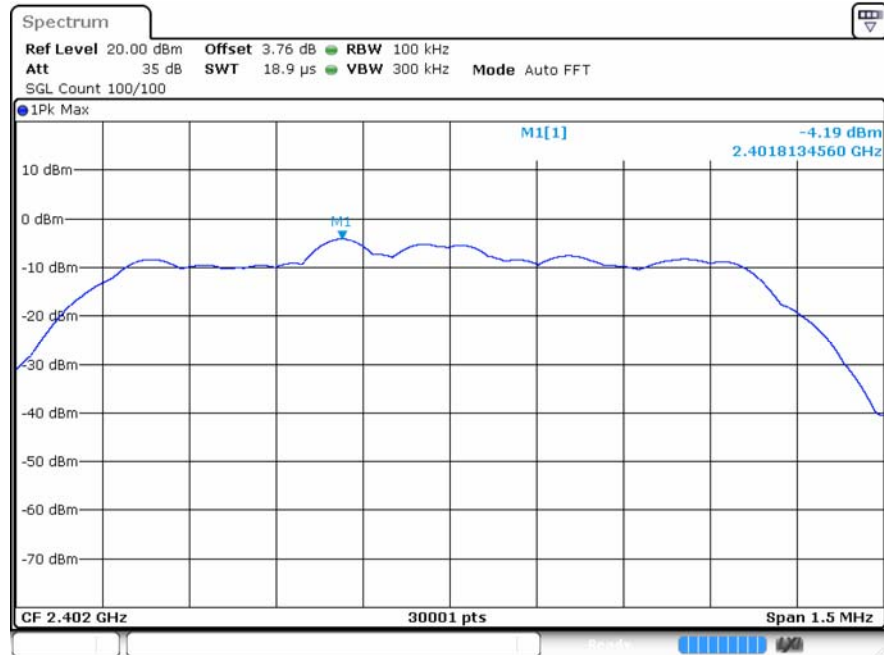


Puw

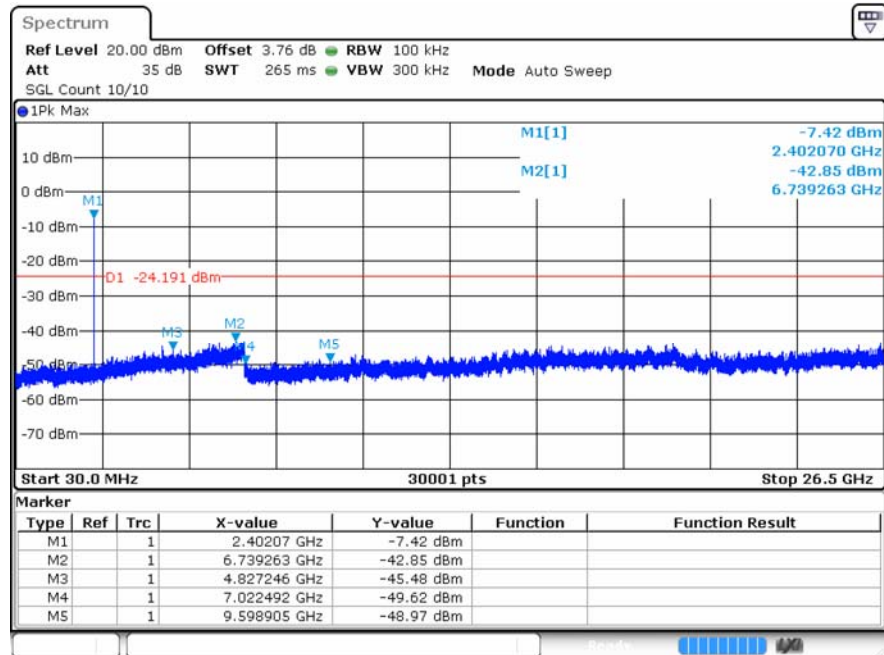


$\pi/4$ DQPSK\_LCH\_Graphs

Pref

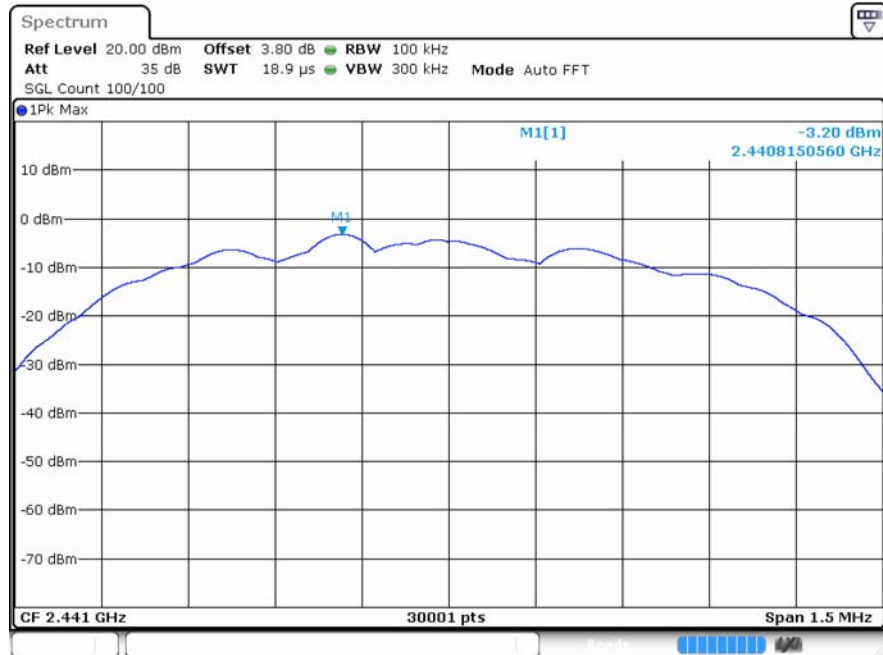


Puw

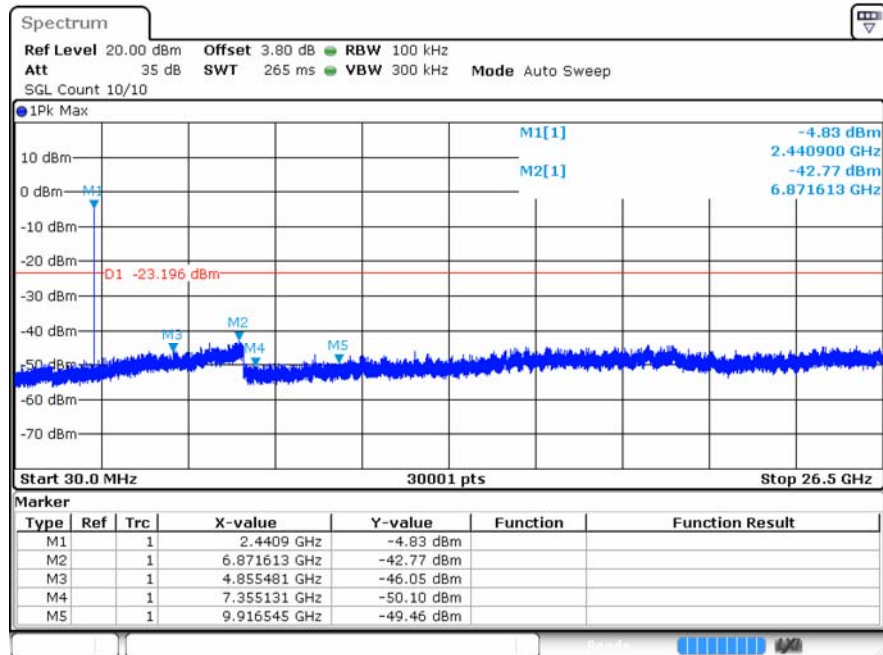


# $\pi/4$ DQPSK\_MCH\_Graphs

Pref

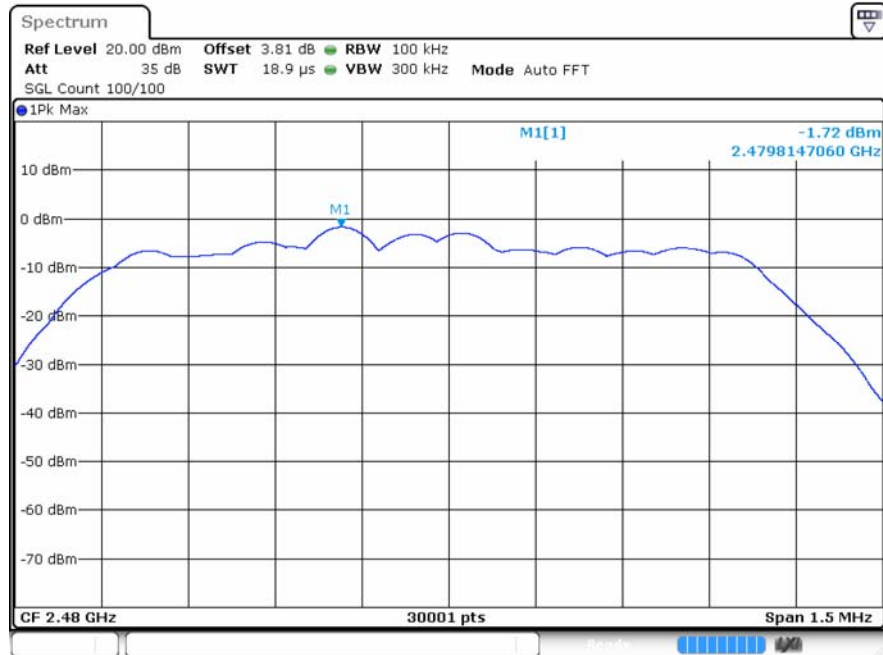


Puw

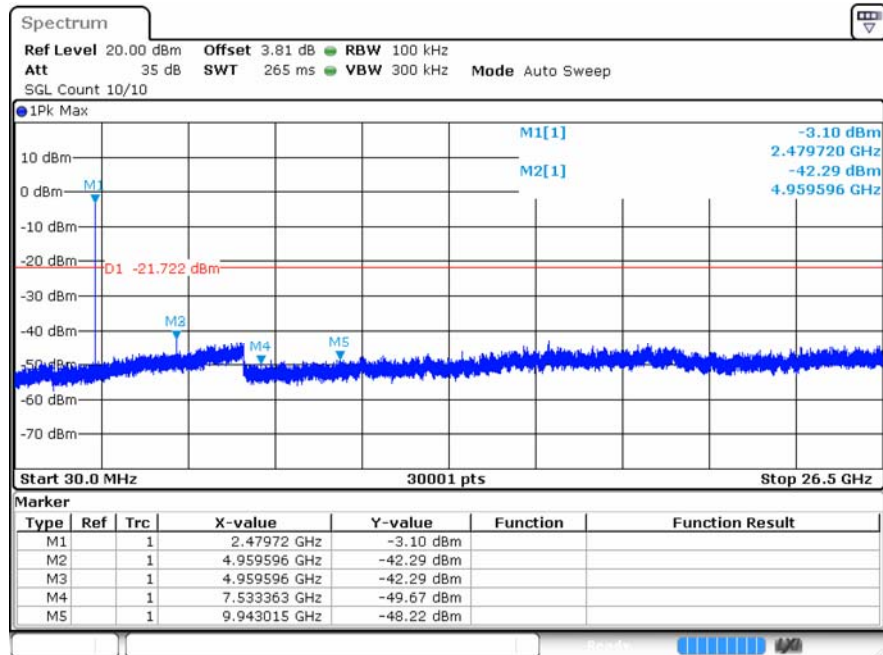


### $\pi/4$ DQPSK\_HCH\_Graphs

Pref



Puw

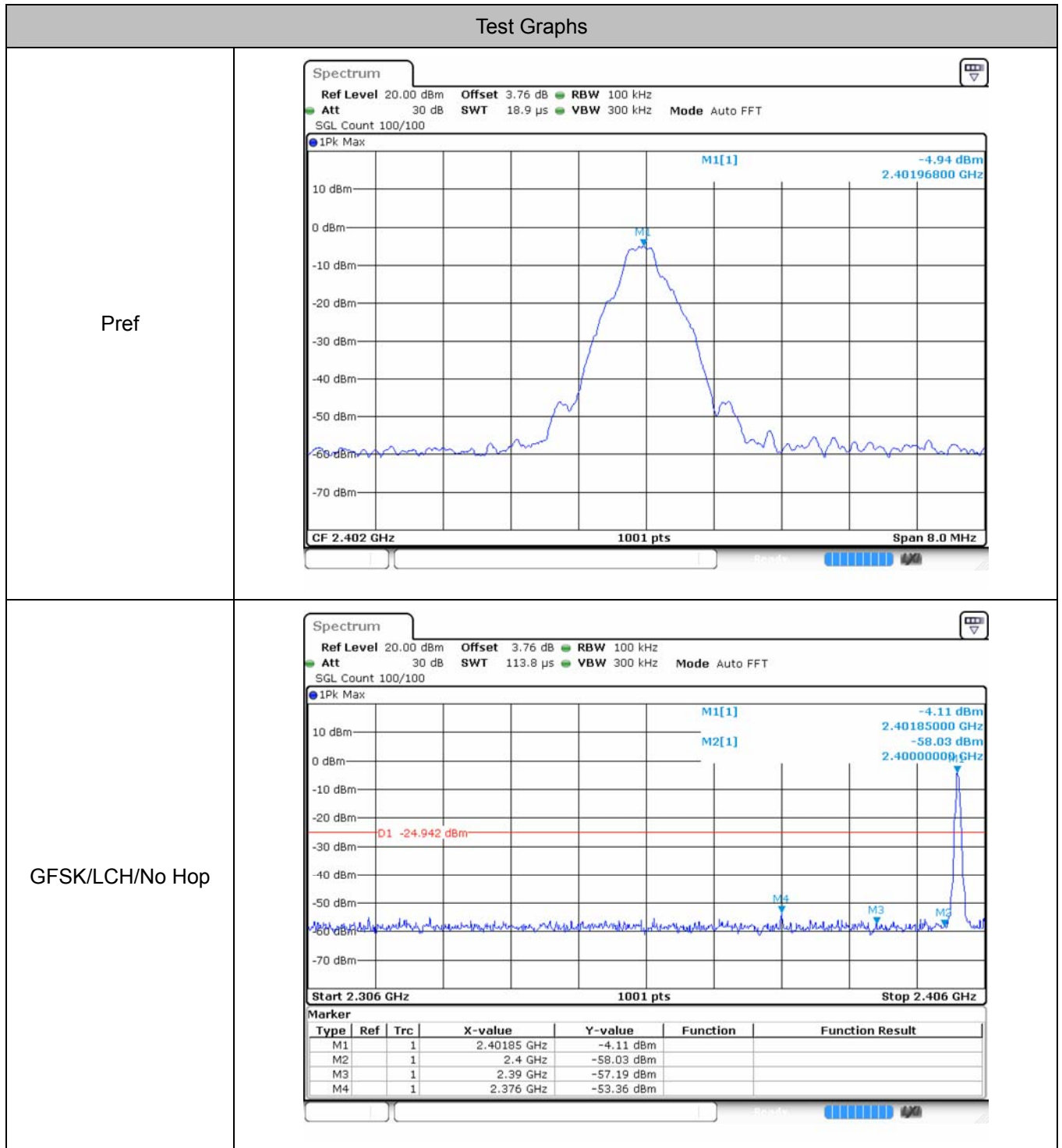


## 8 Band-edge for RF Conducted Emissions

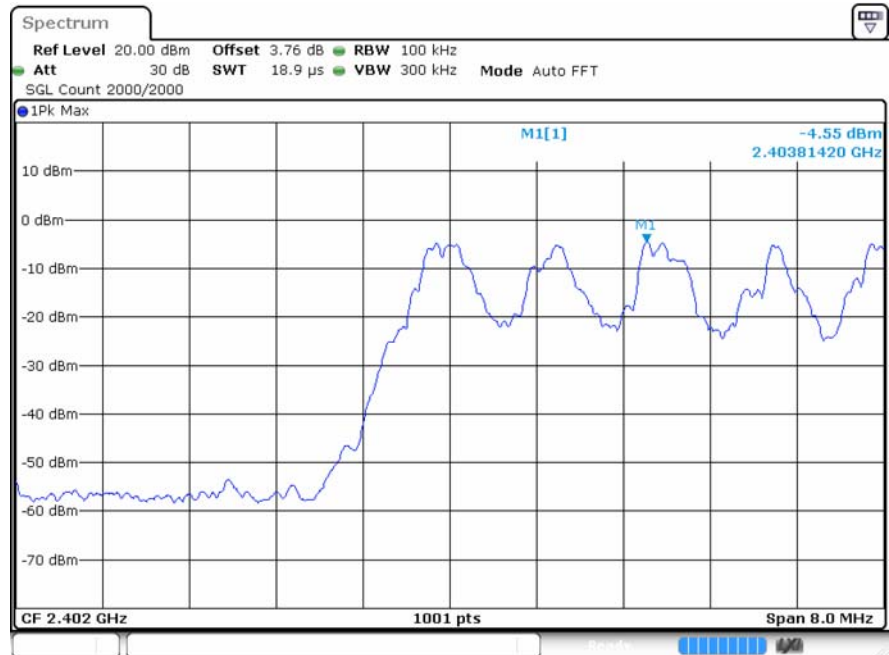
### 8.1 Test Result

| Mode          | Channel | Carrier Frequency [MHz] | Frequency Hopping | Max Spurious Level [dBc] | Limit [dBc] | Verdict |
|---------------|---------|-------------------------|-------------------|--------------------------|-------------|---------|
| GFSK          | LCH     | 2402                    | Off               | -48.42                   | -20         | Pass    |
|               |         |                         | On                | -46.96                   | -20         | Pass    |
|               | HCH     | 2480                    | Off               | -53.83                   | -20         | Pass    |
|               |         |                         | On                | -52.16                   | -20         | Pass    |
| $\pi/4$ DQPSK | LCH     | 2402                    | Off               | -47.17                   | -20         | Pass    |
|               |         |                         | On                | -47.1                    | -20         | Pass    |
|               | HCH     | 2480                    | Off               | -53.82                   | -20         | Pass    |
|               |         |                         | On                | -52.68                   | -20         | Pass    |

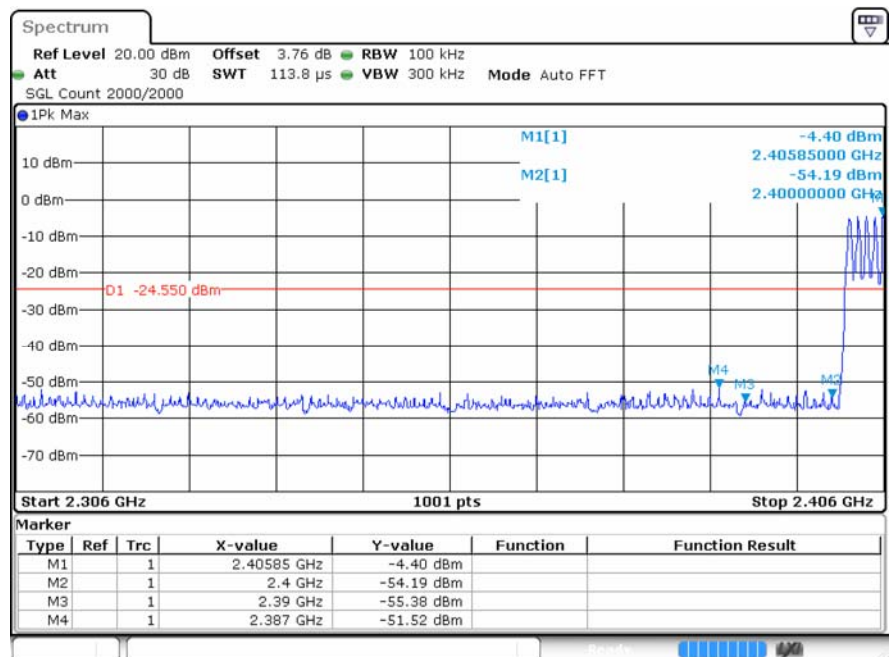
## 8.2 Test Graphs



Ref



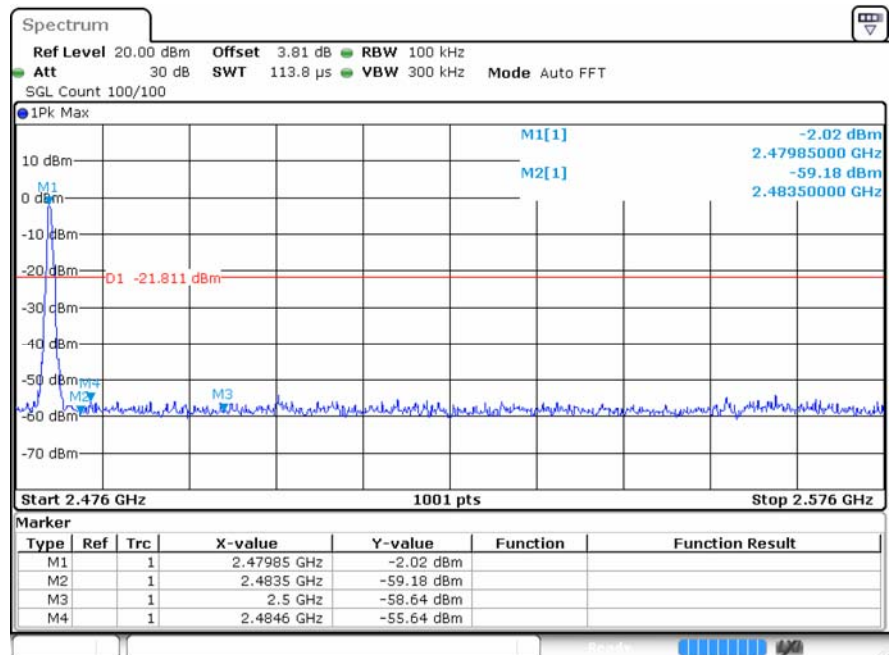
GFSK/LCH/Hop



Ref

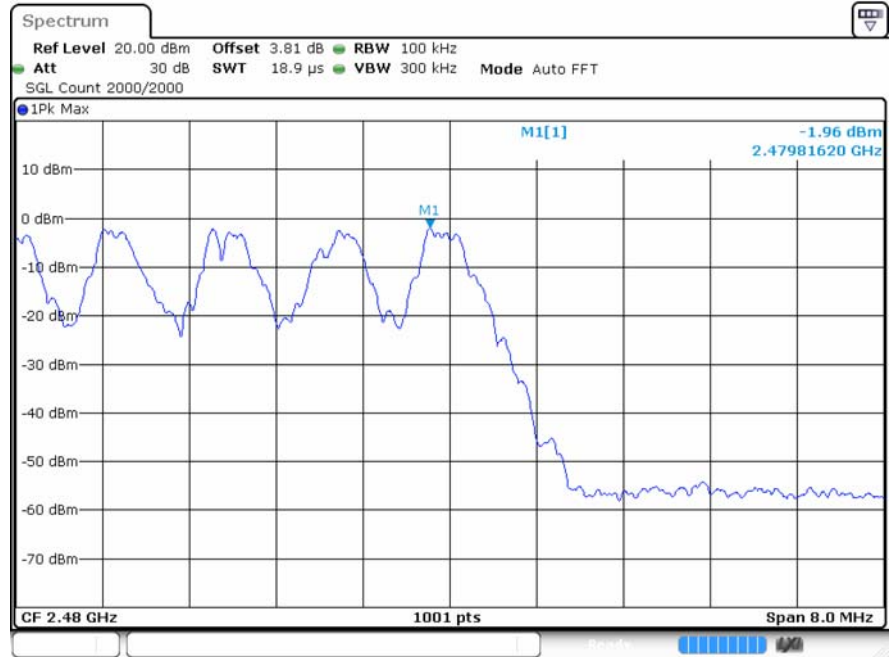


GFSK/HCH/No Hop

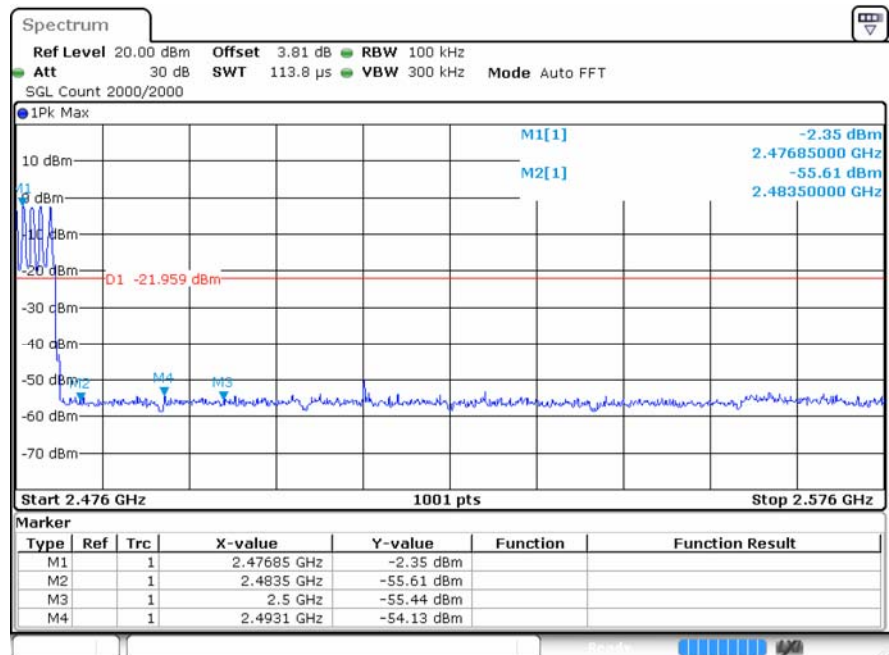




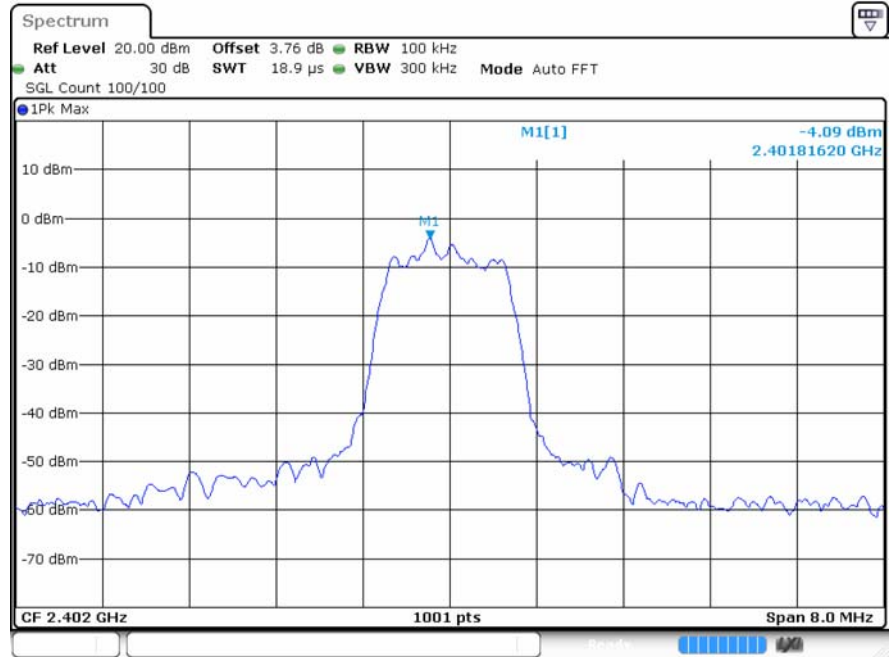
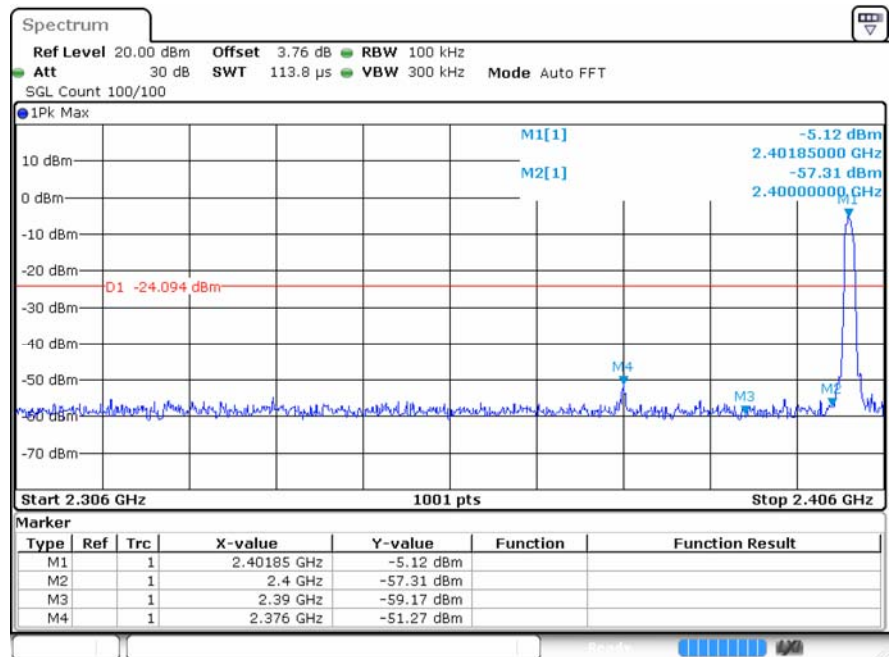
Ref.



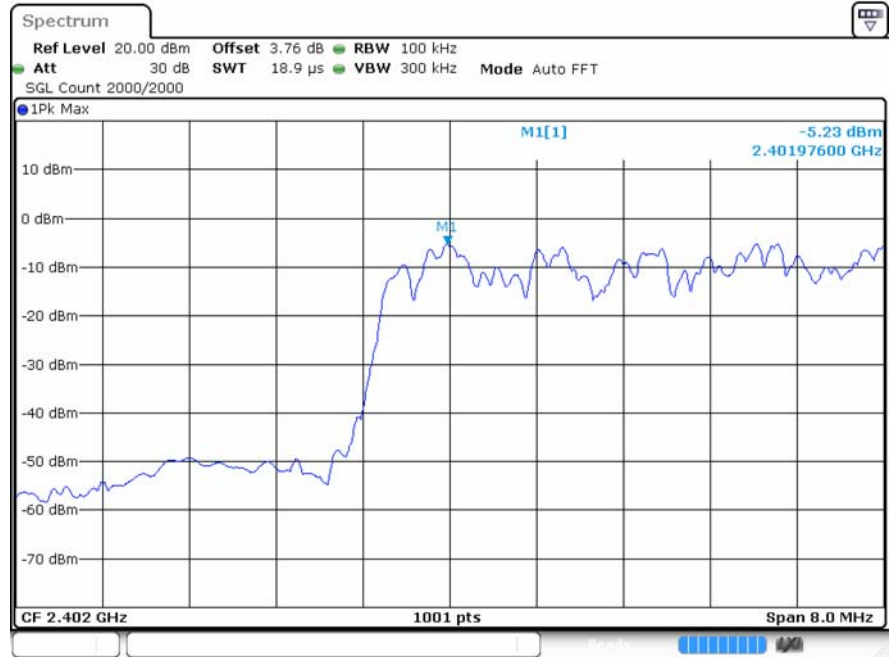
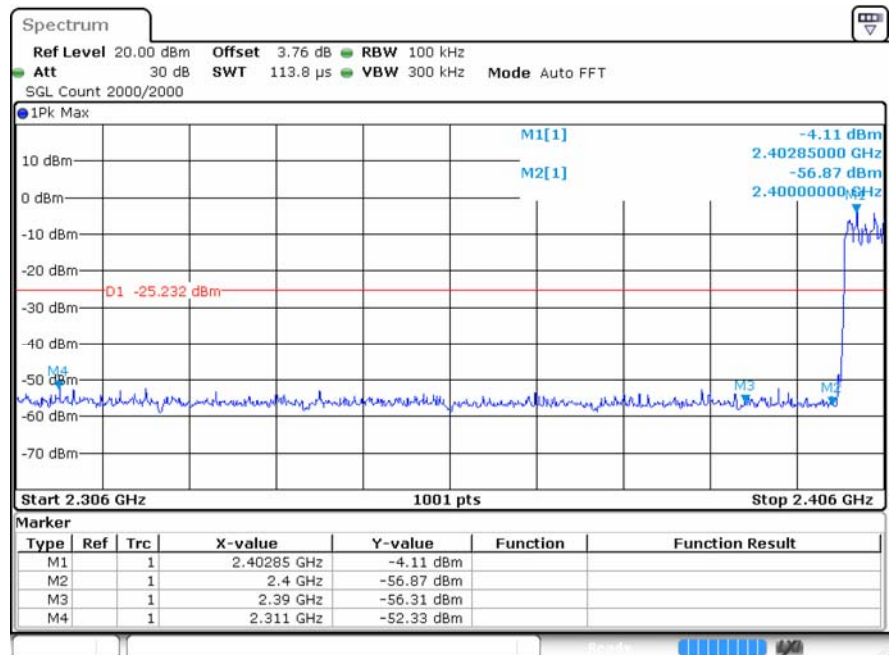
GFSK/HCH/Hop



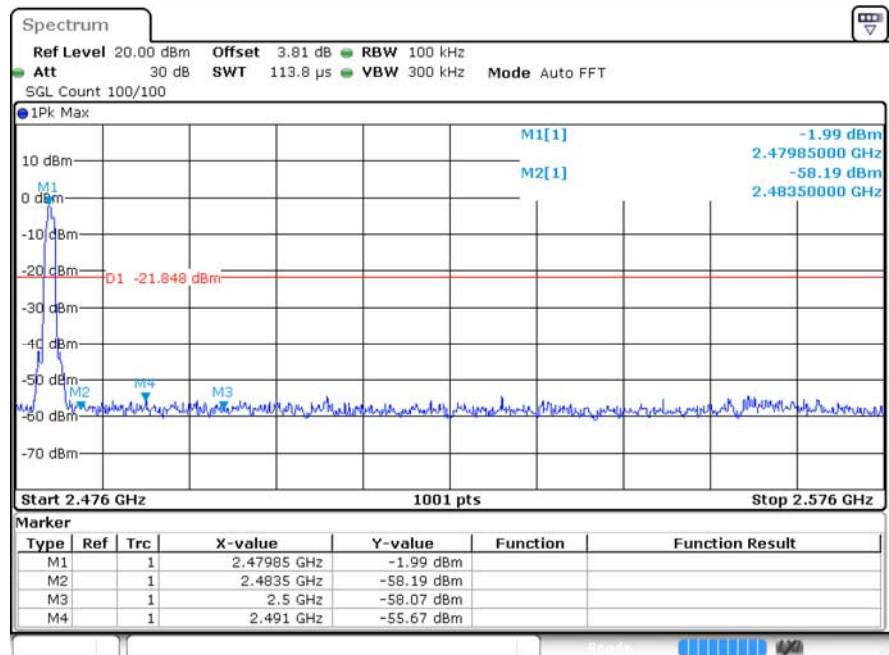
Ref


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


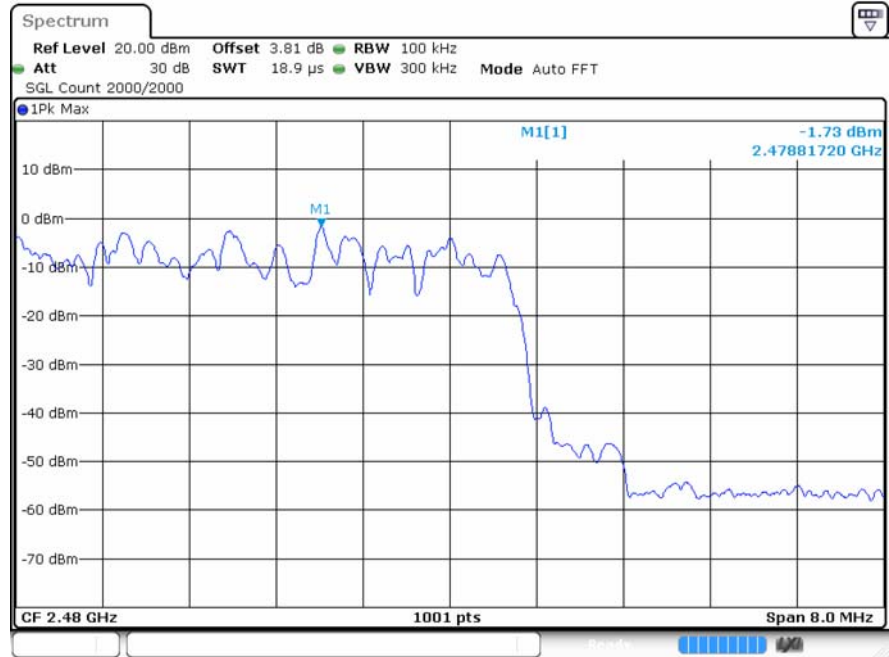
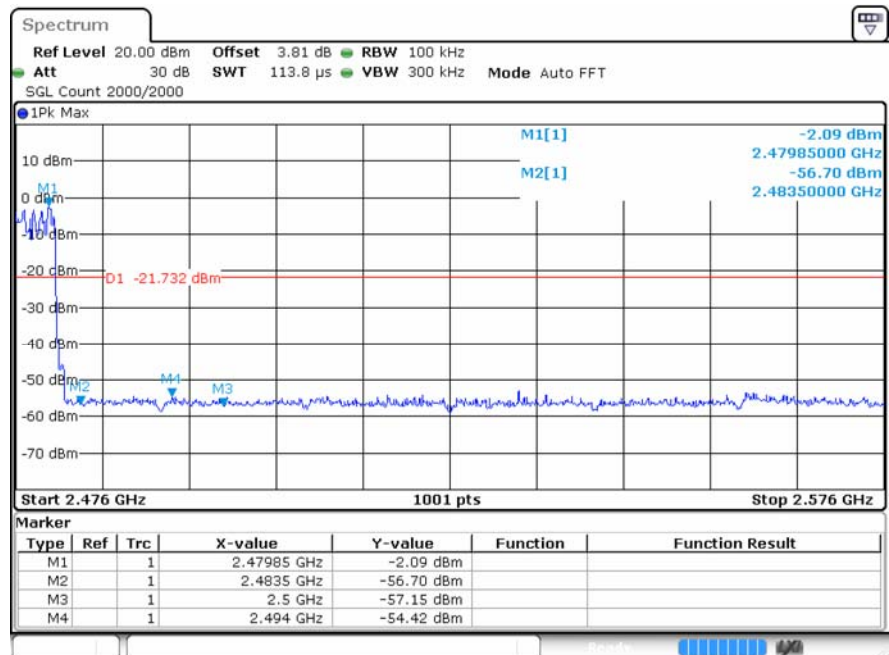
Ref


 $\pi/4$ DQPSK/LCH/Hop


Ref


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


Ref


 $\pi/4$ DQPSK/HCH/Hop


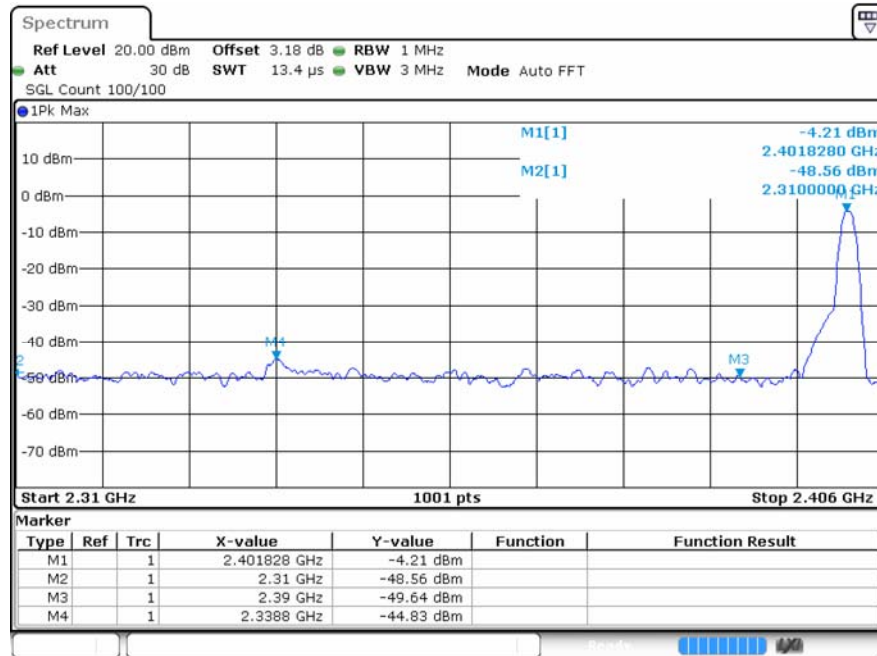
## 9 Restrict-band band-edge measurements

### 9.1 Test Result

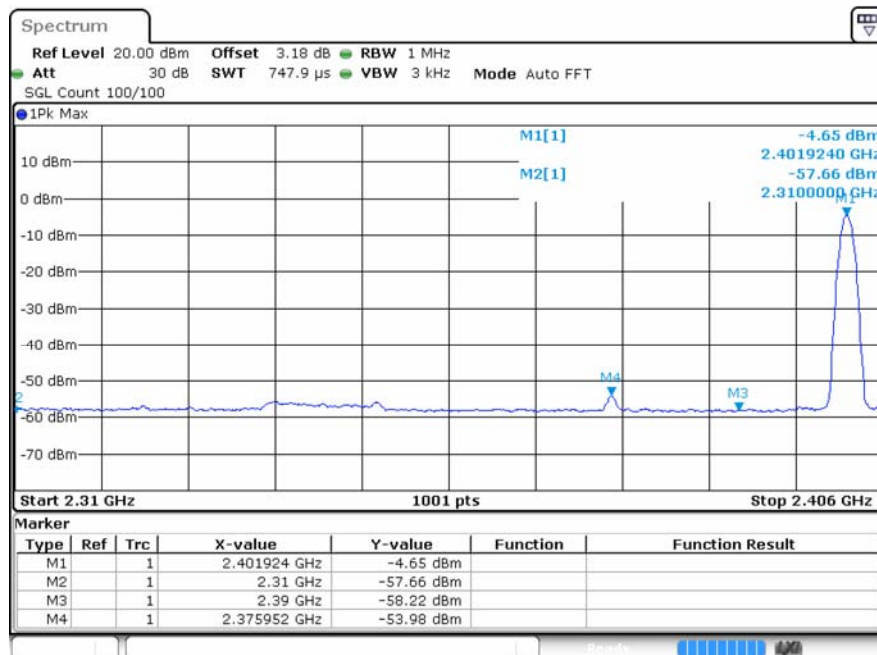
| Test Mode     | Hopping | Freq.    | Power [dBm] | Gain | E [dBuV/m] | Detector | Limit [dBuV/m] | Verdict |
|---------------|---------|----------|-------------|------|------------|----------|----------------|---------|
| GFSK          | Off     | 2310.0   | -48.55      | 2    | 48.71      | PEAK     | 74             | Pass    |
|               | Off     | 2310.0   | -57.66      | 2    | 39.6       | AV       | 54             | Pass    |
|               | Off     | 2338.8   | -44.82      | 2    | 52.44      | PEAK     | 74             | Pass    |
|               | Off     | 2375.952 | -53.98      | 2    | 43.28      | AV       | 54             | Pass    |
|               | Off     | 2390.0   | -49.64      | 2    | 47.62      | PEAK     | 74             | Pass    |
|               | Off     | 2390.0   | -58.21      | 2    | 39.05      | AV       | 54             | Pass    |
|               | Off     | 2483.5   | -48.76      | 2    | 48.5       | PEAK     | 74             | Pass    |
|               | Off     | 2483.5   | -57.49      | 2    | 39.77      | AV       | 54             | Pass    |
|               | Off     | 2493.328 | -46.71      | 2    | 50.55      | PEAK     | 74             | Pass    |
|               | Off     | 2484.688 | -55.88      | 2    | 41.38      | AV       | 54             | Pass    |
|               | Off     | 2500.0   | -49.68      | 2    | 47.58      | PEAK     | 74             | Pass    |
|               | Off     | 2500.0   | -57.59      | 2    | 39.67      | AV       | 54             | Pass    |
| $\pi/4$ DQPSK | Off     | 2310.0   | -49.17      | 2    | 48.09      | PEAK     | 74             | Pass    |
|               | Off     | 2310.0   | -58.09      | 2    | 39.17      | AV       | 54             | Pass    |
|               | Off     | 2338.896 | -46.2       | 2    | 51.06      | PEAK     | 74             | Pass    |
|               | Off     | 2376.048 | -54.52      | 2    | 42.74      | AV       | 54             | Pass    |
|               | Off     | 2390.0   | -49.15      | 2    | 48.11      | PEAK     | 74             | Pass    |
|               | Off     | 2390.0   | -57.96      | 2    | 39.3       | AV       | 54             | Pass    |
|               | Off     | 2483.5   | -48.96      | 2    | 48.3       | PEAK     | 74             | Pass    |
|               | Off     | 2483.5   | -56.87      | 2    | 40.39      | AV       | 54             | Pass    |
|               | Off     | 2485.6   | -45.57      | 2    | 51.69      | PEAK     | 74             | Pass    |
|               | Off     | 2484.376 | -55.83      | 2    | 41.43      | AV       | 54             | Pass    |
|               | Off     | 2500.0   | -48.94      | 2    | 48.32      | PEAK     | 74             | Pass    |
|               | Off     | 2500.0   | -57.49      | 2    | 39.77      | AV       | 54             | Pass    |

## 9.2 Test Graphs

Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (Low Channel)

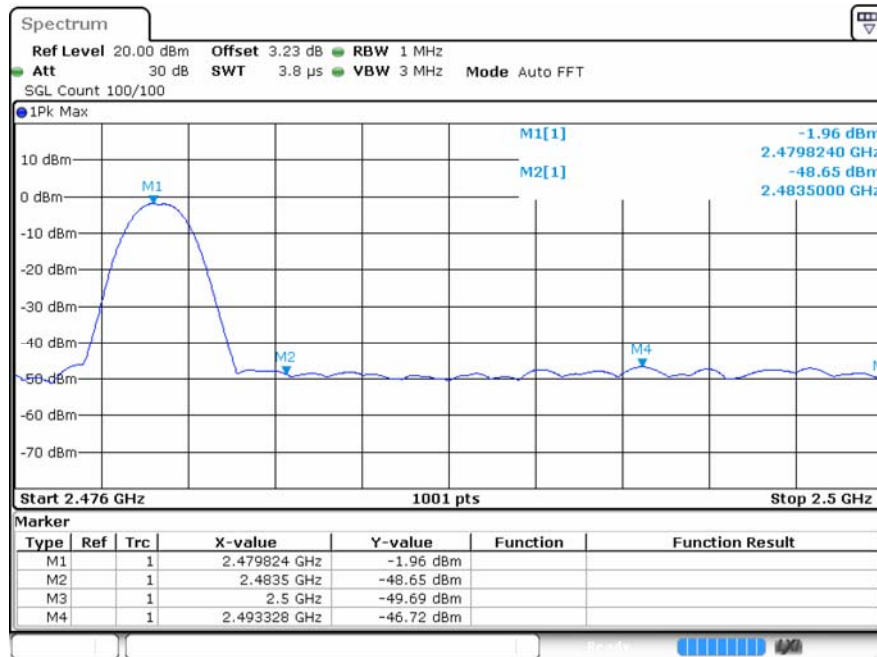


Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (Low Channel)

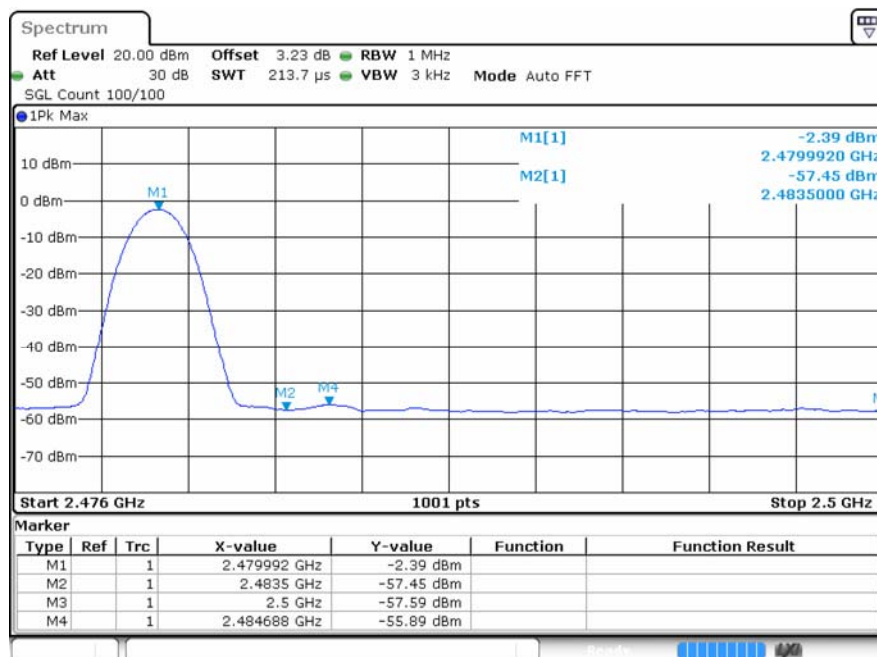




## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_PEAK (High Channel)

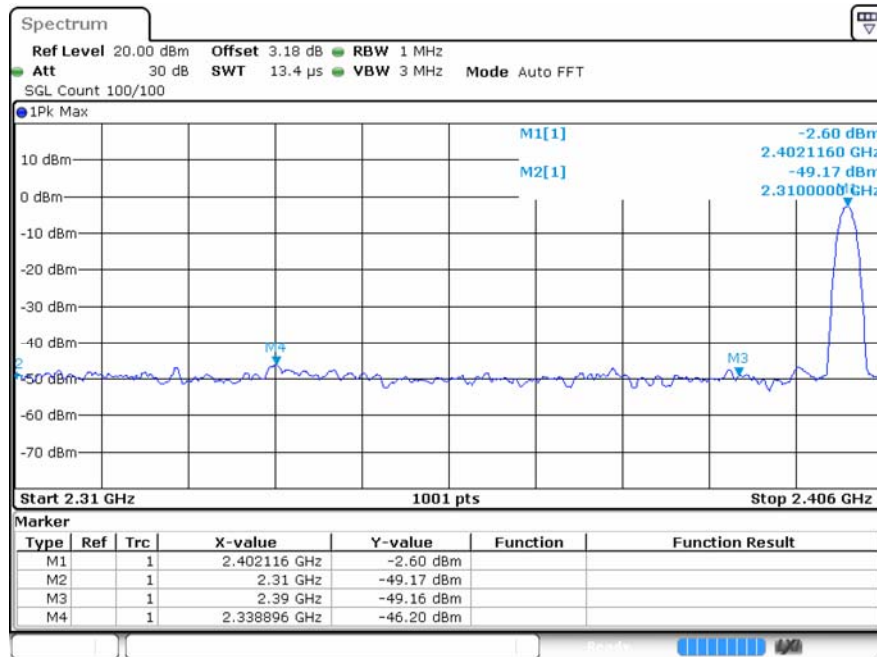


## Restrict-band band-edge measurements\_Hopping Off\_ GFSK\_Average (High Channel)

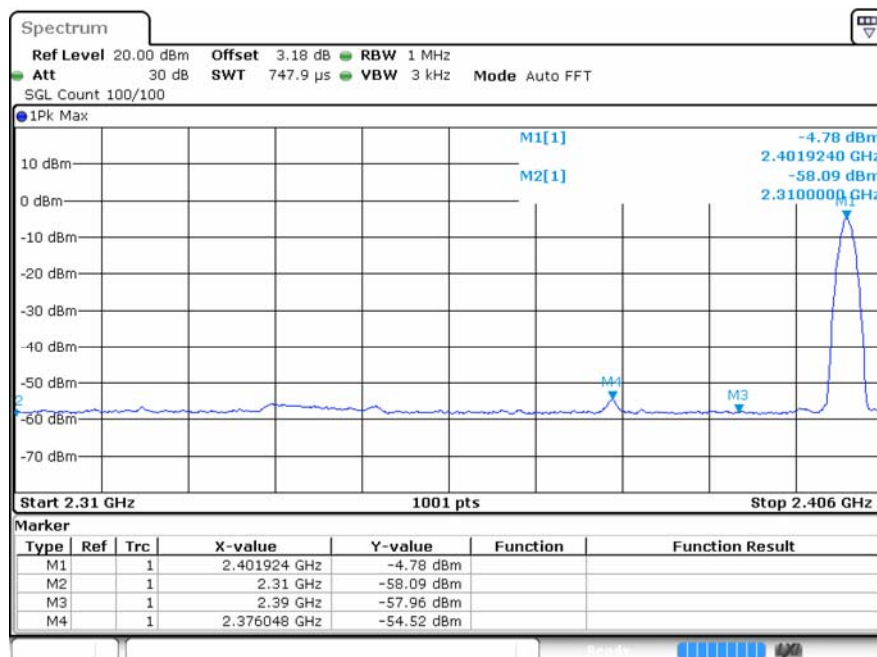




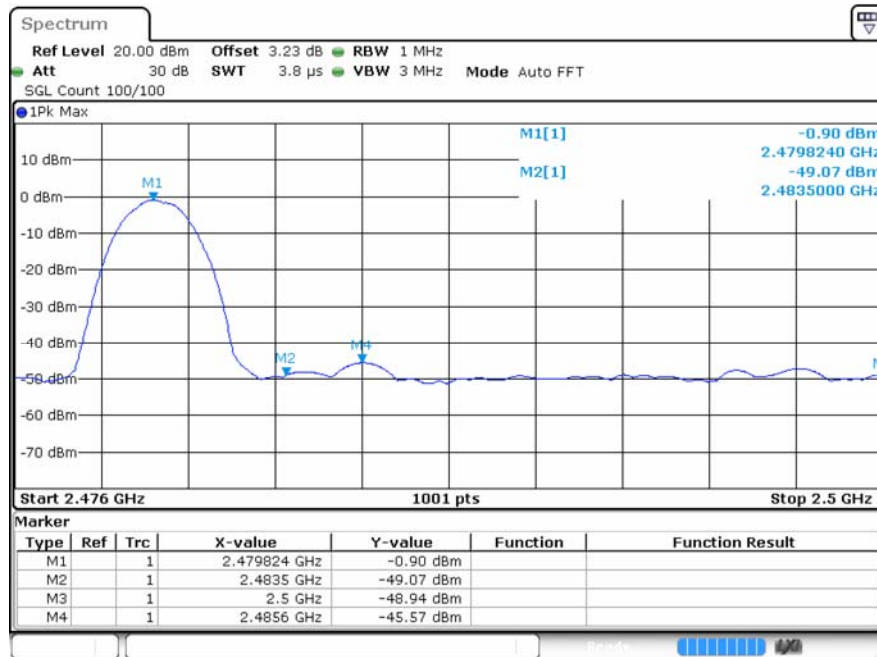
## Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_PEAK (Low Channel)



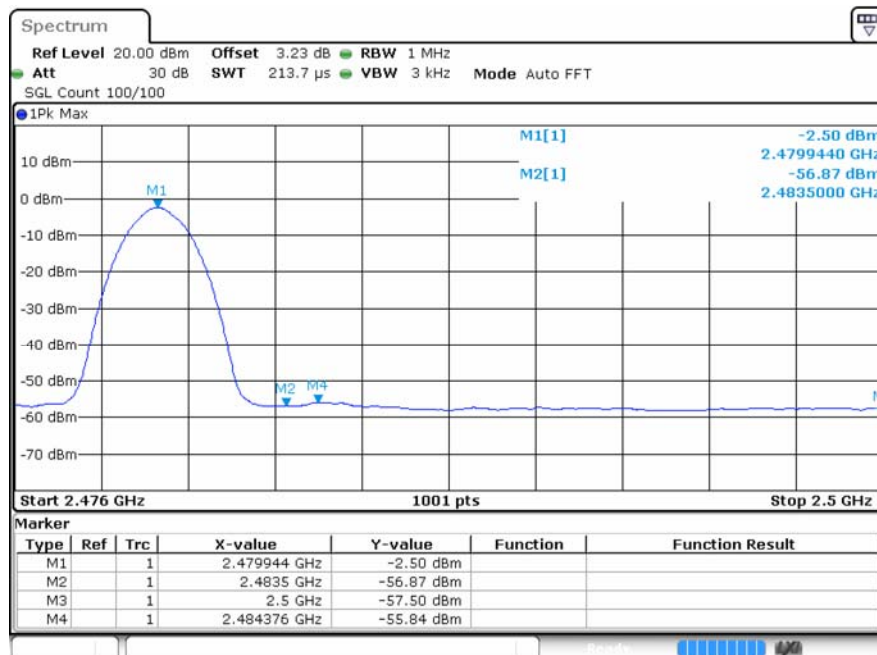
## Restrict-band band-edge measurements\_Hopping Off\_π/4-DQPSK\_Average (Low Channel)



## 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)



---The End---